

**INTERNATIONAL CIVIL AVIATION ORGANIZATION
ASIA AND PACIFIC OFFICE**



REPORT

**TWENTY-FOURTH MEETING OF THE ASIA/PACIFIC METEOROLOGY SUB-GROUP
(MET SG/24)**

Web-conference, 16 – 20 November 2020

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of ICAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The views expressed in this Report should be taken as those of the Meeting and not the Organization.

Approved by the Meeting
Published by the ICAO Asia and Pacific Office, Bangkok

HISTORY OF THE MEETING

Page

1. Introduction.....	ii
2. Attendance	ii
3. Chair and Secretariat.....	ii
4. Organization and language of the meeting	ii
5. Draft Conclusions, Draft Decisions, Conclusions and Decisions	iii
6. Task List	iii

REPORT ON AGENDA ITEMS

1. Organizational matters	1
2. Review outcomes from previous meetings	1
3. Planning and monitoring.....	5
4. Air navigation deficiencies	8
5. Research, development and other initiatives.....	10
6. Regional guidance material.....	19
7. Future work programme of the Meteorology Sub-group.....	21
8. Any other business.....	22

APPENDICES

1. MET SG Terms of Reference and Work Plan	1-4
2. MET SG Task Lis	1-3
3. MET/R WG Terms of Reference and Work Plan	1-9
4. MET/IE WG Terms of Reference and Work Plan.....	1-9
5. MET/S WG Terms of Reference and Work Plan	1-6
6. Survey questionnaire on MET to support ATM and ATFM	1-8
7. Reporting form on AN-deficiencies in the MET field.....	1-8
8. APAC user requirements for SWIM-based MET supporting ATFM.....	1
9. APAC Regional SIGMET Guide.....	1-122
10. ROBEX handbook	1-83
11. APAC Regional guidance for tailored MET to support ATM.....	1-35
12. List of papers and presentation	1-4
13. List of participants	1-16

HISTORY OF THE MEETING

1. Introduction

1.1. The ICAO Asia and Pacific Office (APAC) hosted the Twenty-Fourth Meeting of the Meteorology Sub-group (MET SG/24), of the APAC Air Navigation Planning and Implementation Regional Group (APANPIRG), via web-conference, from 16 to 20 November 2020.

2. Attendance

2.1. One-hundred and thirty-eight (138) participants from thirty-one (31) States and Special Administrative Regions (listed below¹) and the ICAO registered to participate in the meeting. The list of participants is provided at **Appendix 13** to this Report.

3. Chair and Secretariat

3.1. Mr. Jun Ryuzaki presided over the meeting, in the role of Chairperson; assisted by Ms. Sharon Lau, in the role of Vice-Chairperson. Mr. Peter Dunda, ICAO Regional Officer, Aeronautical Meteorology, acted as Secretary of the meeting.

4. Organization and language of the meeting

4.1. The meeting convened as a single body for discussion on the agenda items. The working language was English, including all documentation. The meeting considered twenty-five (25) working papers (WPs), twenty-nine (29) information papers (IPs) and one slide presentation (SP). The list of papers and presentation is at the **Appendix 12** to this Report.

5. Draft Conclusions, Draft Decisions, Conclusions and Decisions

5.1. The meeting recorded its outcomes in the form of Draft Conclusions, Draft Decisions, Conclusions and Decisions within the following definitions:

- a) **Draft Conclusions** (formulated by the Sub-group for further consideration by APANPIRG) deal with matters involving economic, environmental or political aspects, or global implications, that, according to the APANPIRG terms of reference, will not be dealt with by the Sub-group but require the attention of States, or action by the ICAO, in accordance with established APANPIRG procedures;
- b) **Draft Decisions** (formulated by the Sub-group for further consideration by APANPIRG) deal with matters of concern only to the APANPIRG and its contributory bodies;
- c) **Conclusions** (adopted by the Sub-group) deal with matters of a technical nature and of regional applicability that, according to the Sub-group's terms of reference, require the attention of States, or action by the ICAO, in accordance with established APANPIRG procedures; and
- d) **Decisions** (adopted by the Sub-group) relate solely to matters dealing with the internal working arrangements of the Sub-group.

¹ Afghanistan, Australia, Bangladesh, Bhutan, Cambodia, China, Hong Kong China, Macao China, Fiji, India, Indonesia, Japan, Kiribati, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Papua New Guinea, Philippines, Republic of Korea, Singapore, Solomon Islands, Timor-Leste, Thailand, Tonga, United States, Vanuatu and Viet Nam

5.2. The meeting formulated the following four (4) Draft Conclusions and one (1) Draft Decision, and adopted the following six (6) Conclusions and eight (8) Decisions:

a) Draft Conclusions

Draft Conclusion MET SG/24-02: *APAC Regional Air Navigation Plan (ANP), Volume III*
Draft Conclusion MET SG/24-04: *Resolution of Air Navigation Deficiency AP-MET-01*
Draft Conclusion MET SG/24-06: *0.25 degree WAFS hazard data*
Draft Conclusion MET SG/24-10: *Implementation of IWXXM*

b) Draft Decisions

Draft Decision MET SG/24-17: *Updates to terms of reference and work plan of MET SG*

c) Conclusions

Conclusion MET SG/24-03: *Survey of State Meteorological Information Supporting Air Traffic Management*
Conclusion MET SG/24-08: *Volcanic Ash Information Conflict Reduction*
Conclusion MET SG/24-09: *IWXXM Survey and Online Workshop*
Conclusion MET SG/24-11: *IWXXM Exchange Approach*
Conclusion MET SG/24-12: *Development of Online Register of the status of IWXXM Exchange*
Conclusion MET SG/24-19: *Amendments to Regional Guidance to reflect changes to location indicators for Hanoi FIR and Ho Chi Minh FIR*

d) Decisions

Decision MET SG/24-01: *Updates to legacy FASID Table information*
Decision MET SG/24-05: *MET Deficiencies*
Decision MET SG/24-07: *November 2023 WAFS and SADIS Upgrades*
Decision MET SG/24-13: *Development of APAC User Requirements for SWIM-based MET Information Services Supporting ATFM*
Decision MET SG/24-14: *Updates to Regional SIGMET Guide*
Decision MET SG/24-15: *Updates to ROBEX Handbook*
Decision MET SG/24-16: *Updates to Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*
Decision MET SG/24-18: *Updates to terms of reference and work plan of and MET/R WG, MET/IE WG and MET/S WG*

6. Task List

6.1. In addition to the above outcomes, the meeting agreed to a number of actions/tasks arising from the discussions. The meeting recorded these in the body of this Report as follows: [ACTION/TASK: 24/xx], and in the consolidated MET SG Task List at the **Appendix 2** to this Report.

REPORT ON AGENDA ITEMS

1. ORGANIZATIONAL MATTERS

Opening of the meeting

1.1. On behalf of the ICAO Regional Director, Mr. Arun Mishra, the Secretary, Mr. Peter Dunda, welcomed all participants. The Chairperson, Mr. Jun Ryuzaki, officially opened the meeting and provided the opening remarks.

Adoption of the agenda (WP/01)

1.2. The meeting adopted the agenda, as circulated with the meeting invitation, as follows:

- Agenda Item 1: Organizational matters
- Agenda Item 2: Review outcomes from previous meetings
- Agenda Item 3: Planning and monitoring
- Agenda Item 4: Air navigation deficiencies
- Agenda Item 5: Research, development and other initiatives
- Agenda Item 6: Regional guidance material
- Agenda Item 7: Future work programme of the Meteorology Sub-group
- Agenda Item 8: Any other business

Review the Terms of Reference (WP/02)

1.3. The meeting reviewed and adopted the terms of reference (of the MET SG), as approved by APANPIRG/30 (November 2019). Noting the importance for timely availability of the meeting papers for thorough review by participants before the meeting, the meeting agreed to make slight changes to the wording of the terms of reference of the MET SG.

1.4. The meeting noted that, in the terms of reference and work plan document, references to the “APAC Seamless ATM Plan” should be adjusted to reflect the re-named APAC Seamless “ANS Plan”. The meeting also recommended adding a column in the work plan table to enable the Sub-group to record the work plan deliverables’ current status of progress.

1.5. As discussed above concerning the agreed changes to the terms of reference, the meeting recommended that the invitation to the MET SG meeting (i.e., the State letter) should be sent no less than 3-months before the meeting. In addition, reminders for submission of papers should be sent approx. 6-weeks and 1-week before the due date for submission of papers, noting that meeting papers are due 4-weeks before the start of the meeting [*ACTION/TASK: 24/01*].

1.6. A copy of the terms of reference and work plan of the MET SG is at the **Appendix 1** to this Report.

2. REVIEW OUTCOMES FROM PREVIOUS MEETINGS

Review outcomes from MET SG/23 (WP/03)

2.1 The meeting reviewed the main outcomes from the Twenty-Third Meeting of the

Meteorology Sub-group (MET SG/23), which included two (2) Draft Conclusions and one (1) Draft Decision for further consideration by APANPIRG/30, three (3) Conclusions for the attention of States or action by the ICAO, and two (2) Decisions related to the internal working arrangements of the MET SG, as follows:

- **Draft Conclusion** MET SG/23-1: *Implementation of IWXXM*
- **Draft Conclusion** MET SG/23-2: *Discontinuation of meteorological information in TAC form*
- **Draft Decision** MET SG/23-8: *Updated terms of reference and work plan of MET SG*
- **Conclusion** MET SG/23-4: *Endorsement of APAC Regional SIGMET Guide updates for Amendment 78 to Annex 3 (20th Edition)*
- **Conclusion** MET SG/23-5: *Endorsement of APAC Regional guidance for the alignment of cross-FIR-boundary SIGMET information*
- **Conclusion** MET SG/23-6: *Endorsement of updates to Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*
- **Decision** MET SG/23-3: *Improved Regional guidance for SIGMET for volcanic ash forecast to cross FIR boundaries*
- **Decision** MET SG/23-7: *Development of APAC User Requirements for SWIM-based MET Information Services Supporting ATFM.*

2.2 The meeting noted that APANPIRG/30 (November 2019) had adopted the above MET SG/23 Draft Conclusions and Draft Decision.

2.3 The meeting noted that, as follow-up to the above MET SG/23 Conclusions, ICAO had published the relevant, updated regional guidance materials at the ICAO APAC Office website (www.icao.int/apac > APAC eDocuments > MET).

2.4 With respect to the above Decision MET SG/23-3, the meeting noted that the Meteorological Services Working Group (MET/S WG) had not yet reported any significant progress on this task.

2.5 In order to further assist the MET/S WG with the above, the meeting suggested that, as a start, the MET/S WG should examine the report of the volcanic ash exercise which prompted the Decision (i.e., APAC VOLCEX 18/02). Then, based on the challenges encountered/reported by the participants of the exercise, MET/S WG should consider developing examples of how to coordinate the issuance of SIGMET information for volcanic ash which is forecast in adjacent flight information regions (FIRs) [ACTION/TASK: 24/02].

2.6 With respect to the above Decision MET SG/23-7, the meeting noted that the Meteorological Requirements Working Group (MET/R WG), at its ninth meeting (May 2020), had commenced the development of the *APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM*. The meeting discussed this matter further under Agenda Item 5 (WP/24).

2.7 The meeting also reviewed, and provided further updates on, the status of progress on the list of fourteen (14) actions/tasks agreed by MET SG/23. The meeting agreed that the status of progress on the MET SG/23 actions/tasks was either still “in progress” or already “completed”, as recorded in the consolidated MET SG Task List at the **Appendix 2** to this Report.

2.8 With respect to the MET SG/23 Action: 23/08, on assistance to Solomon Islands to prepare the full report on the resolution of air navigation deficiencies, the meeting noted that the absence of an established format or template for such a report presented a difficulty to States in the process of removal of a deficiency from the APANPIRG list.

2.9 On the other hand, the meeting acknowledged that the Solomon Islands' efforts so far, as well as those of other States, and the recent work done by the Pacific Islands Aviation Weather Services (PIAWS) Panel, Task Team (TT), on the resolution of air navigation deficiencies and reporting of the progress made, should provide the basis for a suitable template for use by States.

2.10 In view of the above, the meeting recommended the development of a suitable template to assist the States concerned with reporting on the resolution of air navigation deficiencies. The meeting discussed this matter further under Agenda Item 4, in the discussion on air navigation deficiencies (WP/13), and adopted Decision MET SG/24-05: *MET Deficiencies*.

Review outcomes from APANPIRG/30 (WP/04)

2.11 The meeting reviewed outcomes from the Thirtieth Meeting of the APAC Air Navigation Planning and Implementation Regional Group (APANPIRG/30) and considered further actions to complete the follow-up work from APANPIRG/30.

2.12 With respect to Conclusion APANPIRG/30/17 and Conclusion APANPIRG/30/18, the meeting noted that ICAO had disseminated to States, by State letter, a reminder of the need for urgent action to ensure compliance with existing Standards and Recommended Practices (SARPs) and the need to prepare for further, expected air navigation developments related to the ICAO Meteorological Information Exchange Model (IWXXM).

2.13 Based on the outcomes from subsequent ICAO events, including the Eighteenth Meeting of the Meteorological Information Exchange Working Group (MET/IE WG/18) (July 2020) and the Regional Survey and Regional Webinar on the implementation of IWXXM (July/August 2020 and October 2020, respectively), the meeting considered the need to develop further follow-up actions to facilitate States with their response to the above APANPIRG Conclusions, i.e., States' planning and implementation of the Annex 3 SARPs for dissemination of meteorological information in IWXXM GML form.

2.14 The meeting deferred further discussion on this matter to the scheduled discussion under Agenda Item 5 and the meeting papers (WP/08 and WP/25) related to IWXXM.

Review outcomes from MET/R WG/9 (WP/05)

2.15 The meeting reviewed outcomes from the Ninth Meeting of the Meteorological Requirements Working Group (MET/R WG/9), held via web-conference 7 May and 11 – 14 May 2020, including the agreed actions and work plan of MET/R WG.

2.16 MET/R WG/9 proposed updates to its terms of reference to ensure the working group remains aligned with the broader objectives of the MET SG and APANPIRG.

2.17 In accordance with outcomes from MET SG/23, and further coordination between the MET SG and working groups' Chairs, the MET/R WG agreed to transfer the lead on the work to support the integration and expansion of SIGMET coordination activities among States/Administrations to the Meteorological Services Working Group (MET/S WG).

2.18 Notwithstanding the above, MET/R WG would continue to coordinate with and assist MET/S WG, especially with respect to the user requirements, as reflected in the updated MET/R WG work plan.

2.19 The meeting deferred discussion on the other major outcomes from MET/R WG/9 to the discussion under Agenda Item 3, on WP/11 – *Survey of State Meteorological Information*

Supporting Air Traffic Management, Agenda Item 5, on WP/24 – APAC User Requirements for SWIM-based MET Information Services Supporting ATFM, and Agenda Item 6, on WP/17 – Updates of Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations.

2.20 The updated terms of reference and work plan of the MET/R WG is at the **Appendix 3** to this Report. The meeting approved the updates to the terms of reference and work plan of the MET/R WG in the discussion under Agenda Item 7, with the adoption of Decision MET SG/24-18: *Updates to terms of reference and work plan of and MET/R WG, MET/IE WG and MET/S WG.*

REVIEW OUTCOMES FROM MET/IE WG/18 (WP/06)

2.21 The meeting reviewed a summary of the 18th meeting of the Meteorological Information Exchange Working Group (MET/IE WG) of the APANPIRG MET SG, held 27 - 29 July 2020, including the revised terms of reference and work plan of the working group.

2.22 MET/IE WG formulated a proposal that would provide States with access to up to date information on the OPMET required in SADIS and WIFS and service provision responsibilities of the TCACs and VAACs, which is no longer provided by the ANP, but was formerly available to States in the legacy, ANP FASID Tables and Charts.

2.23 The meeting supported the above proposal and adopted the following Decision:

Decision MET SG/24-01: Updates to legacy FASID Table information	
What: <i>That, ICAO and States update and incorporate the required information from the legacy Facilities and Service Implementation Document (FASID) Tables relating to meteorology, into existing ICAO APAC regional guidance documentation as follows:</i>	
FROM: Legacy FASID Table	TO: Existing APAC regional guidance
Table MET 2A - OPMET Information (METAR, SPECI and TAF) Required in SADIS and WIFS	APAC ROBEX Handbook
Table MET 3A - Tropical cyclone advisory centres	APAC Regional SIGMET Guide
Table MET 3B - Volcanic ash advisory centres	APAC Regional SIGMET Guide
Chart MET 1 - Areas of Responsibility of the TCACs	APAC Regional SIGMET Guide
Chart MET 2 - Map of Areas of Responsibility of VAAC and Corresponding FIR	APAC Regional SIGMET Guide
Why: To provide States with access to required up to date information, previously contained in the legacy ANP, FASID Tables, and not replicated in the current APAC ANP, based on June 2014, ICAO Council approved common template to be used for Regional ANPs.	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: As soon as practicable	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

2.24 The updated terms of reference and work plan of the MET/IE WG is at the **Appendix 4** to this Report. The meeting approved the updates in the discussion under Agenda Item 7, with the adoption of Decision MET SG/24-18: *Updates to terms of reference and work plan of and MET/R WG,*

MET/IE WG and MET/S WG.

Review outcomes from MET/S WG/10 (WP/07)

2.25 The meeting reviewed outcomes of the MET/S WG/10 meeting, including developments in SIGMET co-ordination among the States in the region, SIGMET deficiencies, capacity building, and update of the SIGMET Guide.

2.26 The updated terms of reference and work plan of the MET/S WG is at the **Appendix 5** to this Report. The meeting approved the updates in the discussion under Agenda Item 7, with the adoption of Decision MET SG/24-18: *Updates to terms of reference and work plan of and MET/R WG, MET/IE WG and MET/S WG.*

3. PLANNING AND MONITORING

Review of the APAC ANP (WP/09)

3.1 The meeting reviewed the APAC Air Navigation Plan (ANP) and noted that the Secretariat was coordinating input from the MET/S WG and States for the development of a draft proposal for amendment of the ANP, Volume II, Part V – MET, Table MET II-2, to fill the data gaps in the requirements for meteorological information at aerodromes.

3.2 The meeting also noted the work underway by the MET/S WG (as reported at MET/S WG/10), on the development of a proposal for amendment of the ANP, Volume I, Part V – MET, Table MET I-1, to reflect the current requirements for State volcano observatories, and Volume II, Part V – MET, Table MET II-2, to reflect recent changes made by States to the requirements for meteorological service at aerodromes.

3.3 With respect to the work on the proposal for amendment of the APAC ANP, Volume III, the meeting noted that the continued lack of reported progress was due to the work being put on hold pending further development on the ICAO electronic ANP (eANP) project. However, the Secretary also noted there was no firm timeframe for the eANP Project deliverables and it was apparent that any near-term development on the eANP, Volume III, would be unlikely.

3.4 The Secretary also reminded the meeting of inconsistencies in the APAC ANP between Volume III and Volume I, in which Volume I stipulates that the status of implementation of SADIS and WIFS, volcanic ash advisory information, Volcano Observatory Notice for Aviation (VONA) and tropical cyclone advisory information are detailed in Volume III.

3.5 In addition, the meeting noted that much of the information currently in the APAC ANP, Volume III, which pertains more generally to APAC air navigation priorities and objectives and ASBU¹ modules, had already passed the end of its validity period in 2019.

3.6 Taking into account that the requirement for updates or improvements to the APAC ANP, Volume III is not necessarily limited to the MET-specific information only, the meeting considered proposing a cross-cutting effort, rather than assigning the work to a particular MET group, involving input from each of the ANP fields, as a more effective approach.

3.7 In view of the above, the meeting formulated the following Draft Conclusion:

¹ Aviation System Block Upgrades

Draft Conclusion MET SG/24-02: APAC Regional Air Navigation Plan (ANP), Volume III	
What: That, APANPIRG establish a cross-cutting, ANP Volume III Task Force, with representation from each APANPIRG SG, to develop a proposal for amendment to the APAC ANP, Volume III, to realign Volume III with Volume I (and II) and the requirements of States.	
Why: The APAC ANP, Volume III, does not detail the status of implementation of SADIS and WIFS, volcanic ash advisory information, Volcano Observatory Notice for Aviation (VONA) and tropical cyclone advisory information – as specifically required by the text of the ANP, Volume I, Part V – MET, General Regional Requirements. In addition, much of the information in Volume III, which pertains to APAC air navigation priorities and objectives and ASBU modules, has already passed the end of its validity period in 2019.	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: As soon as practicable	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

Amendment 79 to Annex 3 (WP/10)

3.8 The meeting reviewed the Amendment 79 to ICAO Annex 3, which became applicable on 5 November 2020, and noted the changes concerning SIGMET information on the release of radioactive material in the atmosphere, improved harmonization of SIGMET information, space weather advisory information, routine observations at aerodromes (METAR) information, tropical cyclone advisory and related SIGMET information, the ICAO Meteorological Information Exchange Model (IWXXM), the international airways volcano watch (IAVW), the world area forecast system (WAFS), special air-reports on turbulence, quality management system, dissemination of AIRMET and GAMET and the inclusion of heavy dust storms (HVY DS) in special air-reports.

3.9 Some members of the meeting noted that ICAO had made available to States, via the Secure (website) Portal, the full edition of Amendment 79 to Annex 3 only just before the applicability date (5 November 2020). This resulted in insufficient time being provided to those States to process the new information and implement the necessary changes.

3.10 Given that ICAO had indicated it would forward to States a new edition of Annex 3 incorporating Amendment 79 as soon as practicable after the amendment becomes effective on 20 July 2020 (State letter Ref: AN 10/1.1-20/16, dated 2 April 2020, refers), the meeting requested the Secretary to investigate the late availability of the Annex 3 amendment 79 to States, which led to States having inadequate time to implement necessary changes [ACTION/TASK: 24/03].

Survey of state MET information supporting ATM (WP/11)

3.11 The meeting noted that MET/R WG/9 had reviewed the revised version of the draft survey on the provision of current and future meteorological (MET) information services by States to support Air Traffic Management (ATM), in particular Air Traffic Flow Management (ATFM), and would support its circulation to States.

3.12 Furthermore, the ad-hoc group had made final adjustments to the survey questionnaire based on feedback from a preliminary trial-run of the survey on a limited selection of MET and ATM experts and Airspace Users.

3.13 A copy of the revised draft survey questionnaire is provided at the **Appendix 6** to this Report.

3.14 In view of the discussion above, the meeting adopted the following Conclusion:

Conclusion MET SG/24-03: <i>Survey of State Meteorological Information Supporting Air Traffic Management</i>	
What: That, the MET SG approve the proposed terms of reference and the survey questionnaire at the Appendix 6 to the MET SG/24 Report and inform ATM SG/8 in November 2020 and then circulate the survey questionnaire for States to respond in early 2021.	
Why: To inform ICAO (and States) of the provision of current and future meteorological (MET) information services by States specifically to support Air Traffic Management (ATM), in particular Air Traffic Flow Management (ATFM).	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☒ Required from States	
When: Early 2021	Status: Adopted by Subgroup
Who: ☒ Sub groups ☒ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other: MET/R WG	

Hand-over SIGMET issuance from Southwest ATMB of CAAC to State Secretariat of Civil Aviation, Cambodia (WP/21)

3.15 The meeting noted the hand-over of responsibility for SIGMET issuance for Phnom Penh FIR from Southwest Air Traffic Management Bureau (ATMB) of Civil Aviation Authority of China (CAAC) to State Secretariat of Civil Aviation, Cambodia, on 15 October 2020 following more than 10-years of bilateral agreement for SIGMET service provision by China on behalf of Cambodia.

3.16 The meeting noted the need for consequential updates to the Regional guidance material, e.g., to delete the notes indicating the arrangement for issuance of SIGMET on behalf of Meteorological Watch Office (MWO) Phnom Penh by MWO Chengdu from the legacy APAC FASID, Table MET 3A – *Tropical cyclone advisory centres*, Table MET 3B – *Volcanic ash advisory centres*, and SIGMET Guide [ACTION/TASK: 24/04].

Space weather updates (IP/04)

3.17 The meeting noted updates provided in ICAO State Letter Ref.: AN 10/1 –20/115, dated 29 October 2020, on the provision of space weather information.

Update on the global space weather advisory service (IP/18)

3.18 The meeting noted updates on the first year of operation of the space weather advisory service, focusing on the Australian Bureau of Meteorology's operations contributing to the delivery of this new service to aviation.

3.19 The meeting also noted that the Australian Bureau of Meteorology, a member of the Australia, Canada, France and Japan (ACFJ) consortium, issued the first, real space weather advisory with an impact on high frequency radio communications (HF COM).

The introduction of the progress of CRC (IP/05)

3.20 The meeting noted updates on the progress of the China-Russian Federation consortium

(CRC), which is the fourth, designated global space weather information service provider, the related work China had done for the construction of CRC and the current work that China is progressing on the CRC.

Further discussion related to space weather centres and advisory information

3.21 With respect to the information available to States, the meeting noted that, in addition to the Annex 3 provisions for space weather advisory information, the ICAO *Manual on Space Weather Information in Support of International Air Navigation* (Doc 10100) provides States with guidance for aeronautical meteorologists, particularly those at the operational level, as well as for operators, flight crew members, air traffic services units, search and rescue services units, airport management and others concerned with the conduct or development of international air navigation.

3.22 Noting the importance of the exchange by States of space weather advisory information, internationally and nationally, and States' responsibility to ensure the availability of the information to users, the meeting considered what actions the Sub-group should take to further facilitate States' implementation of the exchange of space weather advisory information.

Activities of the ICAO METP WG-MOG IAVW and WG-MISD VASD (IP/06)

3.23 The meeting noted the activities of the ICAO Meteorology Panel (METP) Working Group on Meteorological Operations Group (WG-MOG) International Airways Volcano Watch (IAVW) Work Stream, and a brief summary of the activities of the METP Working Group on Meteorological Information and Service Development (WG-MISD) Volcanic Ash and Sulphur Dioxide (VASD) Work Stream.

4. AIR NAVIGATION DEFICIENCIES

Review APANPIRG air navigation deficiencies (WP/12)

4.1 The meeting reviewed the (open) list of APANPIRG air navigation deficiencies, in the field of meteorology (MET), including the associated corrective action plans (CAPs) for the resolution of deficiencies.

4.2 The list of air navigation deficiencies, last reviewed by APANPIRG/30 (November 2019), currently contains fourteen (14) open deficiencies in the MET field related to facilities and services in nine (9) APAC States. A detailed copy of the APANPIRG reporting form on air navigation deficiencies in the MET field is at the **Appendix 7** to this Report.

4.3 The meeting recalled that APANPIRG/30 had endorsed the removal of the deficiency Ref: AP-MET-07, concerning provision of SIGMET for volcanic ash in Philippines, from the open list (Conclusion APANPIRG/30/19 – *Update of information in APANPIRG Air Navigation Deficiencies Reporting Form*, refers).

4.4 The meeting also noted that the APANPIRG Deficiencies Database, accessible on the ICAO Secure (website) Portal, currently lists all recorded deficiencies in the MET field, including deficiencies that have already been removed from the open list, i.e., all MET deficiencies with "DEF Status" indicated as either "open" and "closed".

Implementation of the corrective action to close the Solomon Islands deficiency AP-MET-01 and AP-MET-20 (WP/22)

4.5 The meeting reviewed the corrective actions taken by Solomon Islands, supported by

other States and with the concurrence of Solomon Airlines, to rectify the APANPIRG air navigation deficiency (AP-MET-01) concerning aerodrome meteorological observations or reports.

4.6 Solomon Islands provided the meeting with a report indicating completion of corrective action to ensure provision of aerodrome meteorological observations or reports is in compliance with ICAO SARPs and that users and OPMET monitoring results had validated the resolution of the deficiency. Corrective action for the removal of AP-MET-20 is still ongoing.

4.7 In view of the above, the meeting formulated the following Draft Conclusion:

Draft Conclusion MET SG/24-04: Resolution of Air Navigation Deficiency AP-MET-01	
What: That APANPIRG removes the Air Navigation Deficiency AP-MET-01, concerning aerodrome meteorological observations or reports at Honiara (AGGH), Solomon Islands, from the open list.	
Why: Solomon Islands completed corrective action to ensure provision of aerodrome meteorological observations or reports is in compliance with ICAO SARPs. Resolution of the deficiency is validated by users and OPMET monitoring results.	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: As soon as practicable	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

Implementation of the corrective action to close the Solomon Islands deficiency AP-MET-23 (WP/23)

4.8 The meeting reviewed a summary of corrective actions taken so far by Solomon Islands, with support from New Zealand and Australia, and the concurrence of the user on the implementation of the procedure to rectify the APANPIRG air navigation deficiency (AP-MET-23) concerning SIGMET issuance. Corrective action for the removal of AP-MET-23 is still ongoing.

Updates to the APANPIRG reporting form on air navigation deficiencies

4.9 Based on the discussions above, consequential updates to the APANPIRG reporting form on air navigation deficiencies in the MET field are highlighted at the **Appendix 7** to this Report.

Air navigation deficiencies – Meteorology (WP/13)

4.10 The meeting recalled that MET SG, and its contributory bodies, conducts testing of operational meteorological information as part of its work plan. The outcomes of these tests are reported to MET SG on an annual basis and may be used as evidence to remove APANPIRG deficiencies in the field of meteorology.

4.11 The meeting also noted the possibility of using OPMET test reports to identify deficiencies related to any long-standing issues that may have a negative impact on the safety, regularity and/or efficiency of air navigation.

4.12 Australia proposed guidance that could be used for identifying, and subsequently registering, a MET deficiency, based on OPMET monitoring and SIGMET testing, and proposed the establishment of an ad hoc group to assist States with corrective action plans, testing and reporting.

4.13 In view of the above, the meeting adopted the following Decision:

Decision MET SG/24-05: MET Deficiencies	
What: That a MET/S WG ad hoc group be formed* to work with relevant members of the MET/IE WG and, utilizing the guidance in the APANPIRG Procedural Handbook, Part V: <i>Uniform methodology for the identification, assessment and reporting of air navigation shortcomings and deficiencies</i> and other relevant ICAO documentation, assist the ICAO Secretariat with the following: a) Define a process, based on the APANPIRG Procedural Handbook, for identifying, analysing, removing and proposing MET Deficiencies; b) Develop templates to be used for Deficiency Corrective Action Plans (CAP), Progress Reports and Final Reports; c) Develop thresholds for Deficiencies based on OPMET Monitoring performance indicators and SIGMET testing; d) Review the analysis of the annual, and any ad hoc, OPMET Monitoring, and SIGMET Tests against agreed thresholds; e) Identify deficiencies from the OPMET Monitoring and SIGMET Test analysis, along with other tests and exercises, mission reports, analysis of differences against ICAO provisions, aircraft accident and incident reports and reports provided by users of air navigation services; f) Work with States concerned to develop a CAP, arrange for testing and monitoring and assist with the reporting to ICAO on the resolution of air navigation deficiencies; and g) Report recommended updates to MET Deficiencies, through MET/S WG, to MET SG.	
Why: To optimize the MET SG assistance to APANPIRG towards the identification and resolution of specific air navigation deficiencies in the field of aeronautical meteorological (MET) services.	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: November 2020	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☒ Other: MET/S WG	

*Ad hoc group Members (alphabetical order, surname):

- Paula ACETHORP, *Rapporteur* (New Zealand)
- CHEONG Wee Kiong (Singapore, RODB Singapore)
- Jarrad DENMAN (Australia, VAAC Darwin)
- Mike GRAF (United States)
- Keiko ITO (Japan)
- Christy Y.Y. LEUNG (Hong Kong, China)
- Sujin PROMDUANG (Thailand, ROC Bangkok)
- THAM Yap Fung (Singapore, RODB Singapore)
- Kentaro TSUBOI (Japan, RODB Tokyo)

5. RESEARCH, DEVELOPMENT AND OTHER INITIATIVES

SADIS and WAFS update (WP/20)

5.1 The meeting reviewed an update on changes to the World Area Forecast System (WAFS) and changes in the operation of the World Area Forecast Centre (WAFS) London operated Secure Aviation Data Information System (SADIS), including the recent introduction (5 November 2020) of improved, 0.25 degree WAFS hazard data and the future introduction (November 2023) of significant WAFS and SADIS upgrades, which will have a huge impact on the volume of data available, and therefore will require an upgraded delivery mechanism (note: system to be determined).

5.2 In view of the above the meeting formulated the following Draft Conclusion and adopted the following Decision:

Draft Conclusion MET SG/24-06: 0.25 degree WAFS hazard data	
What: That SADIS user States urgently make the necessary systems changes to integrate the new 0.25 degree WAFS hazard data into their SADIS user systems and software	
Why: To benefit from the new 0.25 degree WAFS data and prepare for the retirement of the existing Turbulence Potential, Icing Potential and 1.25 degree cumulonimbus fields (not before November 2022) and the in-cloud turbulence field	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: As soon as practicable	Status: Adopted by Subgroup
Who: ☒ Sub groups ☒ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

Decision MET SG/24-07: November 2023 WAFS and SADIS Upgrades	
What: That MET/S WG develops appropriate actions to facilitate WAFS and SADIS user States' preparations for the proposed WAFS and SADIS changes planned for November 2023.	
Why: Significant changes to the data provided on SADIS are coming in November 2023	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☒ Required from States	
When: November 2020	Status: Adopted by Subgroup
Who: ☒ Sub groups ☒ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

Presentation – Improvements to the WAFS (SP/01)

5.3 The SADIS and WAFS manager, United Kingdom Met Office, presented training material on the improvements to the World Area Forecast System (WAFS).

Development of meteorological products for new ATC operation in the Tokyo approach control area (IP/09)

5.4 The meeting noted new ATM-tailored MET products launched by the Tokyo Metropolitan Area Team (TMAT) of the Japan Meteorological Agency (JMA) to support ATM operation by the Traffic Management Units (TMUs).

5.5 Route-based and impact-based weather information is required and provided in the Estimated convective CLOUD impact on AIR-routes (ECLAIR) product, which is a numerical weather prediction (NWP)-based, automated product, adjusted by other manually processed products, that compensates for weaknesses in NWP forecasting. In addition, information on weather phenomena that could not be presented in deterministic forecasting, but may greatly impact air traffic is provided based on the requirements from TMUs.

5.6 The meeting also noted that it is important for MET officers to identify requirements of ATM officers and strive to improve MET service methods and information to support ATM operation.

The progress of coordination between MET and ATM (IP/19)

5.7 The meeting noted the improvement of meteorological services for collaborative decision making (CDM) system and Massive Delay Response System (MDRS) in China. In order to minimize air traffic capacity loss caused by adverse weather, MET and ATM experts make or update ATM decision together through face-to-face consultation. Besides, case study and quick reviews can improve MET and ATM skills, conjoint reviews can promote MET-ATM coordination and optimize CDM.

Tailored weather service focused on air traffic flow management (IP/27)

5.8 The meeting noted tailored weather service focused on air traffic flow management provided by Aviation Meteorological Office of the Republic of Korea.

Updates to tailored MET information supporting ATM (IP/10)

5.9 The meeting noted the on-going collaborative study between Meteorological Service Singapore and Civil Aviation Authority of Singapore on the Meteorology – Air Traffic Management (MET-ATM) impact translation as part of the future plan to enhance the existing tailored meteorological information services to support ATM decision making and planning.

Update of the SIGMET coordination efforts by the Hong Kong Observatory for the compliance of Amendment 79 to Annex 3 (IP/07)

5.10 The meeting noted updates on the efforts, outcomes, experiences in promoting SIGMET coordination by the Hong Kong Observatory (HKO). This includes the support of various SIGMET coordination projects which include the Operational SIGMET Coordination (OSC), GHSV SIGMET Coordination project, conducted by a number of MWOs in the north and north-western part of the South China Sea, and South and South-eastern Asia (SSEA) SIGMET Coordination project, conducted by Indonesia and Sri Lanka.

5.11 In support of regional SIGMET coordination activities over the APAC region under Amendment 79 to Annex 3, the meeting noted the development of a full-suite, HKO SIGMET Coordination platform, which covers various hazardous weather (including significant convection, turbulence, icing and volcanic ash) with the provision of TAC- and IWXXM-formatted SIGMET messages.

Recent progress of CSI (IP/08)

5.12 The meeting noted the ongoing scheme, known as Collaborative SIGMET Issuance (CSI), conducted by Japan, Lao PDR, Myanmar, Philippines, Thailand and Vietnam, reported recent activities; especially the result of the CSI Workshop held in December 2019.

5.13 The CSI member States agreed to continue to consider the definition of (SIGMET) “consensus”, their challenges about issuance of SIGMET for tropical cyclone and other matters. Moreover, the CSI member States welcomed Malaysia’s interest in participating in CSI.

5.14 The CSI participants identified the need by MWOs of special air-reports as an important source of information to support the issuance of SIGMET information concerning turbulence and icing and proposed to discuss plausible ways to encourage airlines and air traffic services (ATS) units to share more special air-reports to the associated MWOs.

5.15 MET/R WG/9 agreed to publicize by way of ICAO State letter the importance of exchanging special air-reports between airlines, ATS units and MWOs (and aerodrome meteorological offices). MET/S WG/10 also supported the MET/R WG/9 action and formulated the Decision.

5.16 Furthermore, the CSI member States had a joint session with Operational SIGMET coordination project members and other relevant members and agreed to conduct the three, one-to-one coordination trials using the Japan Meteorological Agency (JMA) web tool.

Indonesian SIGMET coordination progress with neighbouring FIRs (IP/26)

5.17 The meeting noted the progress for the development of SIGMET coordination activities between Indonesia and its neighbouring FIRs.

Detection and now-casting of thunderstorms with meteorological satellite data for en-route aeronautical operations (IP/11)

5.18 The meeting noted the ongoing initiatives undertaken at the Meteorological Service Singapore (MSS) in developing an automatic detection and now-casting system for thunderstorms affecting en-route aeronautical operations using high-resolution meteorological satellite data.

Development of ETE for provision of high resolution turbulence forecast (IP/12)

5.19 The meeting noted the positive verification results of en-route turbulence in eddy-dissipation rate (ETE), an hourly turbulence guidance product in eddy-dissipation rate (EDR) based on numerical weather prediction (NWP) forecasts for Electronic Flight Bag meteorological application for enhanced turbulence mitigation in flight.

Improvements in MDRS meteorological information (IP/20)

5.20 The meeting noted the development of the Massive Delay Response System (MDRS) application and MET-ATM cooperation during strategic decision making and tactical operational period. MET forecasters endeavour to provide tailored information to support ATM operation. MET and ATM departments collaborate closely to reach consensus about the operational situation. Developments in MDRS application include providing information of convective area coverage ratio and increasing the forecast lead time in aerodrome warnings.

VOLCEX 20/02 exercise outcomes (WP/14)

5.21 The meeting reviewed a summary of the ICAO volcanic ash exercise, VOLCEX 20/02, conducted in the South Pacific on 17 July 2020.

5.22 The meeting noted that the exercise demonstrated how different sources can provide conflicting information on volcanic ash. To resolve this situation in the South Pacific, the Informal South Pacific ATS Coordination Group (ISPACG) proposed to arrange a dedicated workshop in coordination with MET/S WG.

5.23 In view of the above, the meeting supported the proposed workshop and suggested to open the proposed workshop for other interested participants and adopted the following Conclusion:

Conclusion MET SG/24-08: Volcanic Ash Information Conflict Reduction
What: That the ICAO APAC Volcanic Ash Exercises Steering Group (VOLCEX/SG) supports the Informal South Pacific ATS Coordination Group in conducting a workshop to discuss proactive measures which could be used to minimise the likelihood of conflicting volcanic ash information.

MET SG/24
Report on Agenda Items

Why: To support aviation safety during volcanic eruptions, by reducing the likelihood of conflicting volcanic ash information being supplied to aviation.	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: On request from ISPACG (likely 2021)	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

VAAC Wellington management report (IP/13)

5.24 The meeting noted the VAAC Wellington activities for the period 1 June 2019 to 30 September 2020.

VAAC Darwin management report (IP/14)

5.25 The meeting noted the IAVW Management Report for the VAAC Darwin area of responsibility covering the period 1 July 2019 to 30 September 2020. It provides an update on current VAAC Darwin activities, significant operational changes, training and development, collaboration and stakeholder engagement.

VAAC Tokyo management report (IP/22)

5.26 The meeting noted the VAAC Tokyo IAVW Management Report for the period from 1 May 2019 through 30 September 2020.

Review outcomes from the 2020 ICAO APAC IWXXM Webinar (WP/08)

5.27 The meeting reviewed outcomes from the ICAO APAC 2020 Webinar on the Implementation of the ICAO Meteorological Information Exchange Model (IWXXM) and considered the development of further actions to support the planning and implementation, by APAC States, of dissemination of meteorological information in IWXXM GML form.

5.28 The Webinar reviewed results from the July/August 2020 survey (Ref: State Letter Ref: T 4/3.2.5- AP155/20 (MET)), which indicated that only half (or less) of APAC States had implemented, or had plans to implement the ICAO SARPs for IWXXM by 5 November 2020.

5.29 In addition, Australia noted that recent OPMET monitoring conducted by RODB Brisbane indicated that only four States (in APAC) are currently operationally exchanging IWXXM formatted data.

5.30 Considering the apparent lack of progress in the Region, the meeting agreed that MET SG should develop further actions to both monitor the status of States' progress, and further support States on, the required planning and implementation activities.

5.31 To further assist States, the meeting considered the need to organize and conduct another regional survey to determine the status of States' progress on the planning and implementation of dissemination of meteorological information in IWXXM GML form. Such a survey could also help the MET SG to identify States' needs for additional technical assistance, including another Regional IWXXM-specific seminar or workshop during 2021.

5.32 In view of the above, the meeting adopted the following Conclusion:

Conclusion MET SG/24-09: IWXXM Survey and Online Workshop	
What: That MET/IE, organize and conduct another regional survey on the following: a) Status of States' progress on the planning and implementation of the following: i. dissemination of meteorological information in IWXXM GML form; and ii. AFS connections supporting AMHS with FTBP and IHE; and b) States' requirements for another Regional IWXXM-specific seminar or workshop during 2021.	
Why: Amendment 79 to Annex 3 specifies that, applicable from 5 November 2020, States shall disseminate specific meteorological information (i.e., METAR/SPECI, TAF, SIGMET, AIRMET and volcanic ash, tropical cyclone and space weather advisory information) in IWXXM GML form. To date, it is apparent that few States (in APAC) are currently operationally exchanging IWXXM formatted data.	
Expected impact: ☐ Political / Global ☒ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☒ Required from States	
When: Now	Status: Draft to be adopted by PIRG
Who: ☐ Sub groups ☒ APAC States ☐ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

5.33 The meeting also recalled that APANPIRG had previously adopted Conclusions (30/17 and 30/18), initiated by MET SG, to facilitate the planning and implementation, by APAC States, of dissemination of meteorological information in IWXXM GML form.

5.34 Taking into account the apparent, ongoing need for urgent progress by States on the Regional implementation of the SARPs concerning IWXXM, the meeting adopted the following Draft Conclusion:

Draft Conclusion MET SG/24-10: Implementation of IWXXM
What: That, to support the dissemination by States of the required meteorological information in IWXXM GML form, in accordance with Amendment 79 to Annex 3, Member States/Special Administrative Regions, in particular those which host the designated APAC Regional OPMET Centres (ROCs) and Regional OPMET Databanks (RODBs), that have not already done so, urgently complete the necessary steps including the following: a) For the generation and dissemination of required meteorological information in IWXXM GML form to the local ROC to manage the onward dissemination within the Region, use only IWXXM Version 3 (or a later version); b) To support the exchange of IWXXM formatted data, implement the Air Traffic Services Message Handling System (AMHS) with File Transfer Body Part (FTBP) and the Interpersonal Message Heading Extension (IHE) and include support for AMHS message exchange of a maximum size of 4-MB for IWXXM formatted messages with maximum size of 2-MB for FTBP; c) To support the exchange of the required meteorological information in both IWXXM GML form and traditional alphanumeric code (TAC) form, ensure there is adequate capacity in the operational Aeronautical Fixed Service (AFS) links; d) When ingesting FTBP messages, as a minimum, utilize appropriate malware and anti-virus precautions; and e) For any requirements States have for further technical assistance to achieve compliance with the Annex 3 requirements for disseminating meteorological information in IWXXM GML form and/or differences that exist between the national regulations or practices and the above Annex 3 provisions, inform ICAO via the appropriate channels.
Why:

a) Amendment 79 to Annex 3 specifies that, applicable 5 November 2020, States shall disseminate specific meteorological information (i.e., METAR/SPECI, TAF, SIGMET, AIRMET and volcanic ash, tropical cyclone and space weather advisory information) in IWXXM GML form; b) ICAO Doc 10003 – <i>Manual on the Digital Exchange of Aeronautical Meteorological Information</i>, stipulates that, to meet the requirements of Amendment 79 to Annex 3, only Version 3 of IWXXM formatted data, or later, shall be exchanged on operational networks from 5 November 2020; c) IWXXM GML form is far more verbose than the existing TAC format and, as a result, compression is required. However, to support the exchange of compressed IWXXM files, AMHS links with FTBP and IHE are required; d) In accordance with Annex 3, States shall disseminate both IWXXM and TAC data over the AFS in parallel and, given the significant increase in data volumes, operational links will, therefore, require adequate capacity to support both data sets; and e) The regional and global exchange of the required meteorological information in IWXXM GML form depends on the ROCs and RODBs being capable of exchanging IWXXM formatted messages.	
Expected impact: ☐ Political / Global ☒ Inter-regional ☒ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☒ Required from States	
When: Now	Status: Draft to be adopted by PIRG
Who: ☐ Sub groups ☒ APAC States ☐ ICAO APAC RO ☐ ICAO HQ ☐ Other:	

Changes to OPMET exchange and IWXXM exchange register (WP/25)

5.35 The meeting reviewed a proposal for a new OPMET exchange scheme for IWXXM formatted data and the development of an online register of the status of IWXXM exchange at ROCs to facilitate the implementation of IWXXM exchange in the APAC Region during the implementation of Region-wide IWXXM exchange.

5.36 The meeting noted that, due to technical differences between the old and new formats, OPMET information in IWXXM GML form cannot be transmitted in the same way as it is in Traditional Alphanumeric Code (TAC) form via the Aeronautical Fixed Telecommunication Network (AFTN). The transmission of IWXXM messages requires States to implement AMHS (with FTBP) and the management of IWXXM exchange requires States to use unique addresses.

5.37 These complexities make it difficult to implement IWXXM message dissemination by following the existing dissemination schemes in the APAC Region. Consolidating the IWXXM exchange, through ROCs, will greatly simplify the gradual implementation of Region-wide IWXXM exchange and will increase the reliability of IWXXM exchange throughout the Region.

5.38 The meeting agreed that the *Guidelines for the Implementation of OPMET Data Exchange using IWXXM* provided an appropriate solution for IWXXM exchange in the APAC Region.

5.39 In view of the above, the meeting adopted the following Conclusion:

Conclusion MET SG/24-11: IWXXM Exchange Approach
What: That, IWXXM exchange in APAC Region shall be aligned with <i>Guidelines for the Implementation of OPMET Data Exchange using IWXXM</i> (fourth edition, November 2020) and, specifically, that Regional OPMET Centres (ROCs) are responsible for the distribution of all types of IWXXM formatted OPMET data to States within the Asia Pacific Region.
Why: While the ICAO provisions for the dissemination of meteorological information in both TAC

and IWXXM form coexist, due to technical differences between the old and new formats, the Regional OPMET exchange scheme for IWXXM formatted data shall necessarily differ from the traditional OPMET exchange scheme for TAC messages.

Expected impact:

☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical

Follow-up: ☒ Required from States

When: As soon as practicable

Status: Adopted by Subgroup

Who: ☒ Sub groups ☒ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other: MET/IE WG

5.40 Furthermore, the meeting noted that, to facilitate the Regional exchange of OPMET in IWXXM form, MET/IE WG/18 identified the need to provide States with IWXXM-related information in the ROBEX Handbook. In particular, States need to share their unique address for receiving IWXXM messages and information on the capabilities of the ROBEX scheme for transmitting IWXXM messages.

5.41 Recognizing that, at a Regional level, such information would need relatively frequent updates, to reflect the evolving requirements of States, especially during the transition period to Region-wide implementation of IWXXM exchange, the meeting considered that the current process for updates to the ROBEX Handbook (i.e., on an annual basis) would not be sufficient.

5.42 The meeting noted that the proposal presented by Australia and Hong Kong, China, on the development of an online register of the status of IWXXM exchange in the APAC Region, would provide a suitable, alternative solution to the current format of the ROBEX Handbook during the transition to IWXXM exchange.

5.43 In view of the above, the meeting adopted the following Conclusion:

Conclusion MET SG/24-12: *Development of Online Register of the status of IWXXM Exchange*

What: That, the MET SG supports the development of an online register of the status of IWXXM exchange in the APAC Region to collate and maintain reliable information about implementation status of AMHS and FTBP between the annual ROBEX Handbook update, and to facilitate the States to identify the possible alternate dissemination paths for IWXXM exchange so that ROCs could distribute the IWXXM to other capable ROCs in the APAC region as far as possible.

Why: ROCs need a channel to share timely updates of their status of implementation of IWXXM exchange, including their IWXXM-capable AMHS addresses and readiness to receive IWXXM, supported file size, AMHS status and the status in transmitting NOC's IWXXM report.

Expected impact:

☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical

Follow-up: ☒ Required from States

When: As soon as practicable

Status: Adopted by Subgroup

Who: ☒ Sub groups ☒ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other: MET/IE WG

Status of IWXXM implementation in Australia (IP/15)

5.44 The meeting noted a brief update on the status, and plans for the support, of ICAO Meteorological Information Exchange Model (IWXXM) format in Australia.

Status of IWXXM implementation in Hong Kong, China (IP/23)

5.45 The meeting noted the latest status of implementation of OPMET exchange in ICAO Meteorological Information Exchange Model (IWXXM) in Hong Kong, China.

Current status and plan of IWXXM implementation in INDONESIA (IP/25)

5.46 The meeting noted the progress and plan for the implementation of the ICAO Meteorological Information Model (IWXXM) in Indonesia.

Implementation of IWXXM and translation service of the Republic of Korea (IP/28)

5.47 The meeting noted the current status of implementation of ICAO IWXXM 3.0 and IWXXM translation service through the website.

Review outcomes from SWIM TF (IP/03)

5.48 The meeting noted some relevant outcomes from the Fourth Meeting of the APAC SWIM Task Force (SWIM TF/4).

APAC user requirements for SWIM-based MET information services supporting ATFM (WP/24)

5.49 The meeting reviewed a revised proposal on the development of APAC use cases and user requirements for System-Wide Information Management (SWIM)-based MET information services supporting Air Traffic Flow Management (ATFM), including the terms of reference regarding the scope and objectives of the work to be conducted by the ad-hoc group comprising MET and ATFM subject matter experts.

5.50 The meeting supported the proposal with some minor adjustments to the terms of reference, as indicated at the **Appendix 8** to this Report, and, therefore, adopted the following Decision:

Decision MET SG/24-13: <i>Development of APAC User Requirements for SWIM-based MET Information Services Supporting ATFM</i>	
What: That, the MET SG approves the terms of reference at the Appendix 8 to the MET SG/24 Report regarding the scope and objectives of the MET/R ad hoc group to develop SWIM-based MET information services specifically addressing the needs of ATFM in the APAC Region.	
Why: To support efforts for effective MET/ATM integration, provide the baseline for further development of the regional SWIM data catalogue and service catalogue and support the development of future MET Information Exchange Services in the Region	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: As soon as practicable	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☒ Other: MET/R WG	

Operational SMS in New Zealand (IP/16)

5.51 The meeting noted an update on the Safety Management System implemented by the Meteorological Service of New Zealand (MetService).

WMO activities of relevance to ICAO including the response to the coronavirus (COVID-19) pandemic (IP/17)

5.52 The meeting noted an overview of some of the recent activities of the World Meteorological Organization (WMO) of relevance to ICAO, particularly in the context of WMO Governance Reform and WMO's contribution to global and regional aeronautical meteorology initiatives as well as WMO's response to the coronavirus (COVID-19) pandemic. In addition, this paper provides information on upcoming WMO meetings/events of relevance to ICAO as well as links to available WMO resources and further information.

Review of ICAO ACCRPG (IP/02)

5.53 The meeting noted an overview of the ICAO APAC COVID-19 Contingency and Recovery Planning Group (ACCRPG), which assists the DGCAs in coordinating their approach to the management of civil aviation through, and out of, the current extraordinary circumstances resulting from the COVID-19 pandemic.

COVID-19 impact on Philippines' meteorological service

5.54 The meeting noted that, due to the impact of COVID-19 on the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), PAGASA and JMA made an agreement temporally and JMA transmitted SIGMET messages for Manila FIR to AFTN/AMHS on behalf of PAGASA from 28 July to 6 September (0000Z to 0800Z), based on the request from PAGASA.

5.55 In addition, HKO commenced the international dissemination support for PAGASA's SIGMETs (0801Z to 2359Z) on same dates. HKO also supported the dissemination of METAR, SPECI and TAF from 16 July to 6 September 2020.

Payment deferral of aeronautical meteorological service charges as a measure to help aviation industry overcome COVID-19 recession (IP/29)

5.56 The meeting noted the Aviation Meteorological Office (AMO) of the Republic of Korea has granted the payment deferral of aeronautical meteorological service charges to airlines faced with economic difficulties amid COVID-19. Any airplanes landing at Korean airports from March to November are allowed to defer the payment for 3 months. From March to September, 2020, 63 airlines around the world filed deferral requests.

6. REGIONAL GUIDANCE MATERIAL

Update to Regional SIGMET Guide (WP/15)

6.1 The meeting reviewed a proposal for updates of the APAC Regional SIGMET Guide to align the guide throughout with Amendment 79 to Annex 3, replace the SIGMET test procedure, update the references Australian MWOs and apply some minor corrections.

6.2 The meeting supported the proposal, along with the incorporation of the legacy ANP FASID Table (and Chart) information into the SIGMET Guide as agreed by the meeting in Decision MET SG/24-1: *Updates to legacy FASID Table information*. The aforementioned, consolidated proposed updates to the SIGMET Guide are provided at the **Appendix 9** to this report.

6.3 In view of the above, the meeting adopted the following Decision:

Decision MET SG/24-14: Updates to Regional SIGMET Guide	
What: That, the MET SG approves the updates to the SIGMET Guide presented in Appendix 9 to the MET SG/24 Report for use by States and publishing on the ICAO APAC Office website.	
Why: To realign the SIGMET Guide with the Amendment 79 to Annex 3, update the SIGMET test procedure, reflect changes to MWOs designated by Australia, apply minor corrections and include the legacy ANP FASID Table information (ref: Decision MET SG/24-1).	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: November 2020	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☐ Other: MET/S WG	

6.4 The meeting also recalled the MET SG discussion on the need to ensure harmonization among the ICAO Regional SIGMET Guides and the need to include guidance relevant to SIGMET information in IWXXM GML form [ACTION/TASK: 24/05].

ROBEX Handbook updates (WP/16)

6.5 The meeting reviewed a proposal to update the Appendices to the Regional OPMET Bulletin Exchange (ROBEX) Handbook. The proposal, based on outcomes from the conjoint MET/IE WG/18 and MET/S WG/10 (July 2020), and supplementary information from Australia, included amendments to ROBEX Handbook Appendix A and Appendix B (METAR and TAF bulletins), Appendix E (procedure and format for notification of changes to OPMET Bulletins (METNO)) and Appendix I (ROBEX focal points' contact information).

6.6 The meeting supported the proposal and requested the Secretary to include additional updates to the Appendices based on information provided to the Secretary by States, including Republic of Korea and Singapore, incorporate the legacy ANP FASID Table MET 2-A information into the ROBEX Handbook as agreed in Decision MET SG/24-1: *Updates to legacy FASID Table information*, and include a link to the online register as agreed in Conclusion MET SG/24-12: *Development of Online Register of the status of IWXXM Exchange*. The aforementioned, consolidated proposed updates to the ROBEX Handbook are provided at the **Appendix 10** to this report.

6.7 In view of the above, the meeting adopted the following Decision:

Decision MET SG/24-15: Updates to ROBEX Handbook	
What: That, the MET SG approves the updates to the ROBEX Handbook at the Appendix 10 to the MET SG/24 report for use by States and publishing on the ICAO APAC Office website.	
Why: To (a) reflect changes made by Australia, Republic of Korea and Thailand to ROBEX Bulletins compiled by Regional OPMET Centres (ROCs) Brisbane (YBBN) (effective on 5 November 2020), Incheon (RKSI) and Bangkok (VTBB) (effective on 14 May 2020); (b) align the "Changes to OPMET Bulletin Procedures" (METNO procedures) with the equivalent procedures in the ICAO EUR Region; and update the States' ROBEX Focal Point information; (c) include the information from the legacy ANP FASID Tables (ref: Decision MET SG/24-1); and include a link to the online register provided by the APAC ROCs for IWXXM-exchange-capability (ref: Conclusion MET SG/24-12)	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: November 2020	Status: Adopted by Subgroup

Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☒ Other: MET/IE WG

Updates of APAC Regional guidance for tailored MET to support ATM operations (WP/17)

6.8 The meeting reviewed proposed updates on the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management (ATM) Operations* as provided at the **Appendix 11** to this Report.

6.9 The proposed updates, developed by the MET/R WG ad-hoc group, comprising members from Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and the International Air Transport Association (IATA), included updated examples from Hong Kong, China, Republic of Korea and Singapore and a few improvements to the main part of document.

6.10 The meeting approved the proposed updates to the guidance and adopted the following Decision:

Decision MET SG/24-16: <i>Updates to Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations</i>	
What: That, the MET SG approve the proposed updates to the <i>APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations</i> at the Appendix 11 to the MET SG/24 report for use by States and publishing on the ICAO APAC Office website.	
Why: To provide States with updated examples from Hong Kong, China, Republic of Korea and Singapore and make a few improvements to the main part of document published for use by States the ICAO APAC eDocuments website (https://www.icao.int/APAC/Pages/eDocs.aspx).	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: November 2020	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☒ Other: MET/R WG	

7. FUTURE WORK PROGRAMME OF THE METEOROLOGY SUB-GROUP

Review plan of work (WP/18)

13.1 The meeting reviewed the work plan of the MET SG and formulated updates based on the discussions of the meeting. The meeting also noted that, while the MET SG and Working Group Chairs had commenced on a collective realignment of the work, the realignment of the respective work plans was still progressing.

13.2 In view of the above, the meeting formulated the following Draft Decision and adopted the following Decision:

Draft Decision MET SG/24-17: <i>Updates to terms of reference and work plan of MET SG</i>	
What: That, APANPIRG approve the updated terms of reference and work plan document for MET SG at the Appendix 1 to the Report of MET SG/24.	
Why: To ensure alignment of the work of the MET SG and its contributory bodies.	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	

Follow-up: ☐ Required from States	
When: November 2020	Status: Adopted by Subgroup
Who: ☐ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☒ Other: MET WGs	

Decision MET SG/24-18: <i>Updates to terms of reference and work plan of MET/R WG, MET/IE WG and MET/S WG</i>	
What: That, the MET SG approve the updated terms of reference and work plan documents for MET/R WG, MET/IE WG and MET/S WG at the Appendix 3, Appendix 4 and Appendix 5 to the Report of MET SG/24.	
Why: To ensure alignment of the work of the MET SG and it's contributory bodies.	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: November 2020	Status: Adopted by Subgroup
Who: ☐ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☒ Other: MET WGs	

8. ANY OTHER BUSINESS

Change of Hanoi and Ho Chi Minh FIR location indicator (IP/21)

8.1 The meeting noted that since 2019 Vietnam has begun the procedure for changing location indicators of its two FIR (Hanoi FIR and Ho Chi Minh FIR). The change became operational by 00:00UTC 08th October 2020 and makes effect of changing some key words in first lines of SIGMET for Hanoi FIR and Ho Chi Minh FIR.

8.2 In view of the above, the meeting noted the need for the consequential amendments required to the regional guidance material and the APAC ANP, and adopted the following Conclusion:

Conclusion MET SG/24-19: <i>Amendments to Regional Guidance to reflect changes to location indicators for Hanoi FIR and Ho Chi Minh FIR</i>	
What: That, Vietnam in coordination with the Secretariat, initiate appropriate proposals for amendment of Regional Guidance Material and the APAC ANP to reflect the current requirements in Vietnam concerning the location indicators for Hanoi FIR and Ho Chi Minh FIR.	
Why: To ensure alignment of the Regional Guidance material with the current requirements in Vietnam	
Expected impact: ☐ Political / Global ☐ Inter-regional ☐ Economic ☐ Environmental ☒ Ops/Technical	
Follow-up: ☐ Required from States	
When: November 2020	Status: Adopted by Subgroup
Who: ☒ Sub groups ☐ APAC States ☒ ICAO APAC RO ☐ ICAO HQ ☒ Other: MET WGs	

Amendments of tropical cyclone advisory – TCAC Tokyo (IP/24)

8.3 The meeting noted that TCAC Tokyo is now providing tropical cyclone advisory (TCA) messages that fully comply with the ICAO SARPs including Annex 3 Amendments 78 and 79. TCA messages in IWXXM format are now available on the TCAC Tokyo webpage, and planned to be disseminated via AMHS from around April, 2021.

Election of Chairperson for MET SG (WP/19)

8.4 The meeting recalled that the maximum period of four years for the term of the Chairperson and Vice Chairperson of MET SG will occur in 2021 and, therefore, agreed to include in the agenda for the next meeting the election of Chairperson and Vice-Chairperson.

8.5 The meeting requested the Chair and Secretary to include in the agenda for the next meeting the election of Chairperson and Vice-Chairperson and the members to submit nominations of suitable candidates no less than 2-months prior to the next meeting [*ACTION/TASK: 24/06*].

Next meeting

8.6 The meeting agreed to the tentative schedule for the next meetings of the MET SG and its contributory Working Groups as follows:

- MET/IE WG/19: 22-24 March 2021
- MET/S WG/11: 24-26 March 2021
- MET/R WG/10: May 2021 (tbc)
- MET SG/25: July 2021 (tbc)

8.7 The Meeting noted that the Secretariat would make arrangements for a virtual meeting of the seventh ICAO APAC Volcanic Ash Exercises Steering Group (VOLCEX/SG/7) in the first quarter of 2021.

—END—

**METEOROLOGY SUB-GROUP (MET SG)
TERMS OF REFERENCE AND PLAN OF WORK**

Editorial Note: Proposed updates endorsed by MET SG/24 shows deleted text using strikethrough (~~text to be deleted~~), and added text with grey shading (text to be inserted).

1. Objectives of the MET SG

- a) Ensure the continuous and coherent development of the MET parts of the Asia/Pacific Regional Air Navigation Plan (APAC ANP) and other relevant regional documentation in a manner that is harmonized with adjacent regions, consistent with ICAO standards and recommended practices (SARPs), the Global Air Navigation Plan and the Global Aviation Safety Plan and reflects global requirements;
- b) Facilitate the implementation of aeronautical meteorological systems and services, as identified in the APAC ANP, Aviation System Block Upgrade (ASBU) priority modules and Asia/Pacific Seamless **ATMANS** Plan elements, with due observance to the primacy of air safety, regularity and efficiency; and
- c) Identify and address specific air navigation deficiencies in the field of aeronautical meteorological (MET) services.

2. Functions of the MET SG:

- a) Review MET parts of the APAC ANP, prepare amendment proposals as necessary to reflect updates and changes in the operational and global requirements;
- b) Monitor the level of and, as necessary, facilitate the implementation of aeronautical meteorological services to support the effective implementation of ASBU priority modules and the Asia/Pacific Seamless **ATMANS** Plan elements;
- c) Identify air navigation deficiencies in the field of aeronautical meteorology, e.g., through systems performance monitoring) and, where necessary, propose appropriate corrective action and facilitate the development and implementation of action plans by States to resolve identified deficiencies;
- d) Review and update the APANPIRG list of air navigation deficiencies in the field of aeronautical meteorology, as necessary, to reflect the current situation;
- e) Monitor research and development and trials and demonstrations in the field of aeronautical meteorology and other relevant areas and facilitate the transfer of this information and expertise, as necessary, between States;
- f) Make specific recommendations and develop guidance materials aimed at improving aeronautical meteorological services through the use of existing and/or new procedures, facilities and technologies;
- g) Review and identify inter-regional and intra-regional co-ordination issues in the field of aeronautical meteorology and, as necessary, recommend actions to address those issues; and
- h) Identify and progress environmental initiatives related to aeronautical meteorology.

3. Establishment of the MET SG

3.1. The Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) established the MET SG to assist in its planning and implementation work, charging MET SG with preparatory work on specifically defined problems in the field of aeronautical meteorology requiring expert advice for their resolution. APANPIRG also appointed MET SG as the 'parent' group for other contributory bodies working in the field of aeronautical meteorology for APANPIRG.

4. Membership of the MET SG

4.1. Membership of the MET SG comprises experts provided by States, whether Members or not of the APANPIRG, International Organizations and bodies having experience in the provision of aeronautical meteorological information and services.

5. Chairing and Secretary of the MET SG

5.1. The MET SG shall elect a Chairperson, and Vice-Chairperson if needed, from the experts provided by States. The maximum term of the Chairperson and Vice Chairperson is four years. The Secretary of APANPIRG will appoint the Secretary of the MET SG.

6. Meetings of the MET SG

6.1. The Chairperson of the MET SG, in consultation with Members and the Secretary, shall decide the date and duration of Meetings. As a rule, the MET SG should agree, at each Meeting, on the date and duration of the next Meeting and on a tentative schedule of future Meetings.

7. Documentation and Record of Meetings of the MET SG

7.1. The MET SG shall record the proceedings of its Meetings in the form of a Report or a Summary and submit the Report or Summary for review and consideration by APANPIRG. A Meeting Report should cover completed action on any part of the MET SG work plan and outline the needs of MET SG for further directives or guidance from the APANPIRG to proceed in its work. Reports on Meetings shall be of a simple layout and as concise as practicable and should normally cover:

- a) Short introduction;
- b) Summary of findings (presented in the order of discussion of the agenda items, including any proposals for action); and
- c) Work plan and schedule for future Meetings.

7.2. The Secretary should publish the Report as early as practicable (21-days) after the Meeting.

7.3. The Secretary should disseminate the meeting invitation as early as practicable, i.e., not less than 3-months before the Meeting, and reminders for submission of papers approx. 6-weeks and 1-week before the due date for submission of papers.

7.4. Contributors should submit papers to the ICAO Secretariat as early as practicable, i.e., 28-days before the Meeting at which they are intended to be considered. The Secretary should publish

MET SG/24
Appendix 1 to the Report

papers, and send a notification of their availability, as early as practicable, i.e., 14-days before the Meeting at which they are intended to be considered.

7.5. The Secretary, in consultation with the Chairperson, may decide to accept papers submitted less than 28-days before the Meeting at which they are intended to be considered when there is a clear benefit to the Meeting in doing so.

8. Delegated authority of the MET SG

8.1. The MET SG may propose actions for further consideration by APANPIRG and record these in the MET SG Report as either draft Conclusions or draft Decisions of APANPIRG.

8.2. Additionally, APANPIRG has empowered MET SG to adopt proposals for action on technical matters (especially those concerning guidance to States in the implementation of ICAO SARPs and global and regional plans) that do not have additional economic, environmental, inter-regional or political effects, which should be considered by APANPIRG. The MET SG shall record these in its Meeting Report as Conclusions or Decisions of MET SG.

9. Work Plan of the MET SG

	Detailed description of deliverable	Responsibility	Target date	Status of progress
a) to h)	Coordination meeting for the Chairs of MET SG, MET/R WG, MET/IE WG, MET/S WG, VOLCEX/SG	Chair MET SG and Secretary	Dec 2020 Mar 2021 Jun 2021 Sep 2021	In progress
a)	Draft amendment proposal for APAC ANP to fulfil missing data in Tables MET	MET/S WG	Mar 2020	In progress
a)	Draft amendment proposal for APAC ANP to clarify the MET-related implementation planning guidance in the ANRF and other parts of Volume III	MET/IE WG MET/S WG MET/R WG	Mar 2020	In progress
b) c)	Analysis of APAC Regional SIGMET test	MET/S WG (Task 1 and 3) MET/IE WG (Task 3)	Mar 2020	Completed
b) c)	Analysis of APAC Regional OPMET-availability monitoring exercise	MET/IE WG (Task 1)	Mar 2020	Completed
b) c)	Analysis of APAC Regional OPMET-timeliness, -compliance and -regularity monitoring exercises	MET/IE WG (Task 2)	Mar 2020	Completed
b) g)	Analysis of APAC Regional VAAC backup tests	MET/IE WG (Task 4)	Mar 2020	Completed
b) g)	Analysis of APAC Regional IROG backup tests	MET/IE WG (Task 5)	Mar 2020	Completed
b)	Revised draft regional guidance material on MET information needed to support the elements of the APAC Seamless ATMANS Plan	MET/R WG (Task 3)	Mar 2020	In progress
c)	Analysis of APAC Regional SIGMET monitoring exercises	MET/S WG (Task 1)	Mar 2020	Completed
b) c) g)	Final report on ICAO volcanic ash exercise APAC VOLCEX 18/01 (Papua New Guinea)	APAC VOLCEX/SG (Task 5)	TBD	Not started
b) c) g)	Final report on ICAO volcanic ash exercise APAC VOLCEX 18/02 (Indonesia/Sumatra)	APAC VOLCEX/SG (Task 6)	Completed	Completed
b) c) g)	Final report on ICAO volcanic ash exercise APAC VOLCEX 19/01 (Raoul Island, affecting Fiji's area of responsibility)	APAC VOLCEX/SG (Task 7)	Completed	Completed

MET SG/24
Appendix 1 to the Report

	Detailed description of deliverable	Responsibility	Target date	Status of progress
b) c) g)	Final report on ICAO volcanic ash exercise APAC VOLCEX 20/01 (North-east Asia)	APAC VOLCEX/SG (Task 8)	Jun 2020	Not started
b) c) g)	Final report on ICAO volcanic ash exercise APAC VOLCEX 19/02 (Philippines)	APAC VOLCEX/SG (Task 9)	Jun 2020	Not Started
c) d)	Proposal to update the APANPIRG AN deficiencies database to add/remove deficiencies in the MET field	MET SG Chair, Secretariat	Aug 2019	Completed
c) d)	Reporting form updates showing the status of implementation of corrective action for the resolution of AN Deficiencies in the MET field	MET/S WG (Task 2 and 6)	Mar 2020	In progress
e) f) g)	First draft of input to the Regional SIGMET Guide to assist States in aligning cross-FIR-boundary SIGMET information	MET/R WG (Task 1) MET/S WG (Task 4)	Completed	Completed
f)	First draft of input to the Regional SIGMET Guide on the use of objective criteria supporting the issuance of SIGMET information for thunderstorm	MET/S WG (Task 4)	Completed	Completed
f)	Progress report on implementation and testing of IWXXM exchange	MET/IE WG (Task 5)	Jun 2020	Completed
f) g)	ROBEX Handbook updates to support improved efficiency and effectiveness of the ROBEX scheme; develop new table indicating COMM links and status	MET/IE WG (Task 6)	Mar 2020	Completed
g)	Information on ICAO provisions related to meteorological authority and quality assurance, cost recovery, competency, training and qualifications for meteorological service provision shared with States	MET SG Chair, Secretariat	Jun 2020	In progress
g)	Analysis of MET information used in the Region specifically to support ATM operations	MET/R WG (Task 2)	Jun 2020	In progress
g)	Plan for seminar on regional implementation of MET information to support ATM operations	MET/R WG (Task 5)	Jun 2020	In progress
h)	Environmental Issues Identify issues in the field of aeronautical meteorology related to environmental issues	MET SG Chair, Secretariat	Jun 2020	In progress
b) e) g)	IWXXM workshop Plan and conduct the IWWXM workshop	Secretariat, MET/IE Chair, MET SG Chair, Hong Kong China, Singapore	April/May 2020	Completed
f) g)	SIGMET Guide update Update the Regional SIGMET Guide to align with Annex 3, Amendment 79	MET/S WG (ad-hoc group)	Jun 2020	Completed
e) f) g)	SIGMET coordination activities in APAC Region Coordinate on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.	MET/S WG (MET/R WG)	Jun 2020	In progress

MET SG/24
Appendix 2 to the Report

MET SG TASK LIST

Action/Task agreed at MET SG/24

Action No.	Detailed description of actions	Responsibility	Target date	Status
24/01	<u>Terms of Reference and Work Plan</u> a) Adjust the references to “APAC Seamless ATM Plan” to reflect the re-named APAC Seamless “ANS Plan”. b) Add a column in the work plan table to enable the Sub-group to record the current status of progress on the work plan deliverables. c) Add timing of invitation (State Letter) and reminders for paper submissions [Ref: MET SG/24 Report, para. 1.5]	Secretary	Nov 2020	In progress
24/02	<u>Follow-up on Decision MET SG/23-3: Improved Regional guidance for SIGMET for volcanic ash forecast to cross FIR boundaries</u> Examine the report of the volcanic ash exercise APAC VOLCEX 18/02 and, based on the challenges encountered / reported by the participants of the exercise, consider developing examples of how to coordinate the issuance of SIGMET information for volcanic ash which is forecast in adjacent FIRs. [Ref: MET SG/24 Report, para. 2.5]	MET/S WG	MET/S WG/11 (Mar 2021)	In progress
24/03	<u>Availability of Annex 3</u> Investigate the late the late availability of the Annex 3 amendment 79, which led to States having inadequate time to implement necessary changes. [Ref: MET SG/24 Report, para. 3.10]	Secretary	APANPIRG/31 (Dec 2020)	In progress
24/04	<u>Operational MWO Phnom Penh – Consequential updates to the Regional guidance material</u> Delete the notes indicating the arrangement for issuance of SIGMET on behalf of MWO Phnom Penh by MWO Chengdu from the legacy APAC FASID, Table MET 3A – Tropical cyclone advisory centres, and Table MET 3B – Volcanic ash advisory centres and SIGMET Guide. [Ref: MET SG/24 Report, para. 3.16]	Secretariat	Nov 2020	In progress
24/05	<u>SIGMET Guide updates</u> Coordinate future proposals to update the SIGMET Guide with the other ICAO Regions and include guidance relevant to SIGMET information in IWXXM GML form. [Ref: MET SG/24 Report, para. 6.4]	MET/S WG	MET/S WG/11 (Mar 2021)	To begin
24/06	<u>Election of Chairperson</u> Include in the agenda for the next meeting the election of Chairperson and Vice-Chairperson. Members to submit nominations of suitable candidates no later than 2-months prior to the next meeting. [Ref: MET SG/24 Report, para. 8.5]	Chair and Secretary	2-months before MET SG/25	To begin

MET SG/24
Appendix 2 to the Report

Action/Task agreed at MET SG/23

Editorial Note: Proposed updates endorsed by MET SG/24 shows deleted text using strikethrough (~~text to be deleted~~), and added text with grey shading (**text to be inserted**).

Action No.	Detailed description of actions	Responsibility	Target date	Status
23/01	Coordinate the necessary Draft proposals for amendment of the ANP Volume I and Volume II, in coordination with States concerned (Ref. Work plan of MET SG: <i>Draft amendment proposal for APAC ANP to fulfil missing data in Tables MET</i>) [Report, para. 2.8]	Secretariat	As soon as practicable	In progress
23/02	~~Update the work plan of MET/S WG to coordinate with MET/R WG on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations (Ref: Conclusion MET/SG/22/03) [Report, para. 2.9]~~	Chairs MET/S WG and MET/R WG, in conjunction with Chair MET SG and Secretariat	Before APANPIRG/30	Completed
23/03	Conduct a coordinated review and update of the terms of reference and work plans to realign the working groups with the work plan of the MET SG [Report, para. 2.10]	Chairs MET/IE WG, MET/S WG, MET/R WG and MET SG, in conjunction with Secretariat	Before APANPIRG/30	In progress
23/04	Distribute the following documents, as endorsed by the ICAO METP/4, by State letter in order to publicize the content and purpose of each document and to invite feedback from relevant stakeholders: a) <i>MET-SWIM Plan</i> ; b) <i>Guidelines for the Implementation of OPMET Data Exchange Using IWXXM</i> ; c) <i>Roadmap for International Airways Volcano Watch (IAVW) in Support of International Air Navigation</i> ; and d) <i>“White Paper” on Future Aeronautical Meteorology Information Service Delivery</i> [Report, para. 2.20]	Secretariat	As soon as practicable	In progress
23/05	~~Upload the MET SWIM Plan to the ICAO APAC Office “eDocuments” website. [Report, para. 2.21]~~	Secretariat	As soon as practicable	Completed
23/06	~~Include the review of lessons learnt from real volcanic ash events in the Region in the terms of reference and work plan of the VOLCEX/SG. [Report, para. 2.42]~~	Chair VOLCEX/SG in conjunction with Secretariat	As soon as practicable	Completed
23/07	~~Remind States of the invitation to provide feedback on the draft Asia/Pacific Seamless ATM Plan before 15 July 2019 [Report, para. 3.21]~~	Secretariat	As soon as practicable, before 15 July	Completed

MET SG/24
Appendix 2 to the Report

Action No.	Detailed description of actions	Responsibility	Target date	Status
23/08	Assist Solomon Islands to perform OPMET monitoring to support the validation of the corrective action to resolve the APANPIRG air navigation deficiencies and to prepare the full report to enable APANPIRG to remove the deficiencies. [Report, para. 4.7.]	Secretariat, in conjunction with Solomon Islands and States (including Australia)	As soon as practicable	In progress
23/09	Issue a State Letter reminding all States in the APAC Region that the TEST or EXER indicator in the Annex 3 templates for SIGMET, VAA, TCA and SWXA becomes applicable on 7 November 2019 [Report, para. 5.15.]	Secretariat	As soon as practicable	Completed
23/10	Change the SIGMET Guide updates, concerning the format for SIGMET with multiple TC centres or CB areas related to one TC, to reflect only the valid provisions in Amendment 78 to Annex 3 (i.e., Repetition of elements in Table A6-1A "Template for SIGMET and AIRMET messages", including footnote 28. [Report, para. 6.1.-6.3.]	MET/S WG ad-hoc group (rapporteur Australia)	As soon as practicable	Completed
23/11	Coordinate the realignment of the SIGMET pamphlets (located on the ICAO APAC Office website) with Amendment 78 to Annex 3. [Report, para. 6.1.-6.3.]	MET/S WG ad-hoc group (rapporteur Australia)	As soon as practicable	Completed
23/12	Incorporate the <i>Guidelines for Operational SIGMET Coordination</i> into the SIGMET Guide and to keep it under review and propose updates as necessary [Report, para. 6.9.]	MET/S WG (SIGMET Guide) ad-hoc group	As soon as practicable	In progress
23/13	Continue to develop the draft survey questionnaire (on the provision of current and future MET information and services by States specifically to support ATM and, in particular, ATFM operations) based on feedback from MET SG/23, including developing more clear terms of reference and ensuring alignment with the scope of work of the MET/R WG [Report, para. 6.11.-6.13.]	MET/R WG ad-hoc group (rapporteur Australia)	Next MET/R WG meeting	In progress
23/14	Conduct an ATM-focussed review on the <i>Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management (ATM) Operations</i> [Report, para. 6.14.]	Secretariat	Before ATM/SG/7	In progress

**ICAO ASIA AND PACIFIC METEOROLOGICAL REQUIREMENTS WORKING GROUP
(MET/R WG)**

TERMS OF REFERENCE AND WORK PLAN

Editorial note: Updates show deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

TERMS OF REFERENCE

DESCRIPTION	
Name and establishment of group	The Meteorological Requirements Working Group (MET/R WG) was established by the Meteorology Sub-group (MET SG) of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) [MET SG/19, Decision 19/2 refers].
Administrative arrangements	The membership and appointment of members, chairing, frequency of meetings and quorum, and recording of meetings shall be determined and conducted in accordance with the working arrangements and instructions provided in the APANPIRG Procedural Handbook.
Reporting mechanism	The MET/R WG shall report its work progress and co-ordination requirements to the MET SG, normally in the form of a report to the MET SG meeting presented by the chairperson of the MET/R WG. The MET/R WG may also provide reports to other relevant bodies as necessary (e.g., contributory bodies of APANPIRG) with assistance from the ICAO Secretariat.
Objective	Improve safety, efficiency and sustainability of air traffic management (ATM ¹) operations by providing meteorological (MET) information needed to meet current and future requirements of the ATM system.
Benefits	Increase safety – optimize safety risk management Increase efficiency – save time and fuel Increase sustainability – reduce carbon emissions
Functions and delegated authority	Under guidance from the ICAO Secretariat, support the MET SG to assist APANPIRG in its planning and implementation work by carrying out designated tasks on specifically defined problems including: a) Coordinate with other relevant contributory bodies of APANPIRG such as ATM/SG and ATFM/SG; b) Recommend updates to the Asia/Pacific Regional Air Navigation Plan and other regional guidance material as necessary, based on analysis and evaluation of the current and future requirements for MET information in support of ATM, as well as ATM information required to support the provision of MET services; c) Facilitate the exchange of expertise in the Asia/Pacific Region on the integration of MET information into ATM systems to support collaborative decision making (CDM) and the migration of MET information into the SWIM environment; d) Facilitate the monitoring and implementation of sub-regional exchange of MET information (including in digital format) and associated inter-agency agreements that support the integration of MET information in ATM operations in line with the priorities defined in the ASIA/PAC Seamless ATM Plan; e) Promote coordination between the MET and ATM communities in the

¹ ATM: the dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management — safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions [ICAO Doc 4444, PANS ATM]

MET SG/24
Appendix 3 to the Report

DESCRIPTION	
	Asia/Pacific Region to enhance the level of understanding of MET requirements and capabilities in support of ATM; and f) Report to the MET SG for further co-ordination through the ICAO Secretariat with APANPIRG and other relevant bodies.

MEMBERSHIP		
State/Organization/ Name	Position/organization/ (field of expertise)	Contact
AUSTRALIA Mr. Ashwin NAIDU (Chair)	Manager ~~Regional Aviation Meteorological Services~~ Senior Aviation Customer Lead Australian Bureau of Meteorology (MET)	Tel: +61 2 9296 1503 E-mail: ashwin.naidu@bom.gov.au
CHINA Mr. Hanqingyuan	Deputy Director, Met Division of ATMB, CAAC (MET)	Tel: +86(10)87786529 E-mail: hanqingyuan@atmb.net.cn
CHINA Ms. Huomiao	Engineer MET Center of North China, Air Traffic Management Bureau. CAAC (MET)	E-mail: huomiao0826@163.com
HONG KONG, CHINA Mr. Marco Mang- hin KOK	Scientific Officer Hong Kong Observatory (MET)	Tel: +852 2926 8702 Mobile: +852 6226 7907 Fax: +852 2375 2645 E-mail: mhhkok@hko.gov.hk
JAPAN Ms. KOMATSU Naoko (Vice-Chair)	Senior Scientific Officer Office of International Affairs Planning Division Japan Meteorological Agency (MET)	Tel: +81 (3) 3212 8341 x3524 Fax: +81 (3) 3212 8377 E-mail: n-komatsu@met.kishou.go.jp
JAPAN Mr. YASUI Kazuki	Scientific Officer Office of Aviation Weather Forecasting Forecast Division Japan Meteorological Agency (MET)	E-mail: k_yasui@met.kishou.go.jp
JAPAN Mr. SHIGENOBU Toshiya	Special assistant to the Director Japan Civil Aviation Bureau (ATM)	tel: +81-3-5253-8749 fax: +81-3-5253-1664 E-mail: shigenobu-t07sa@mlit.go.jp
NEW ZEALAND Mr. Keith MACKERSY	Senior Meteorological Specialist Civil Aviation Authority of New Zealand (CAANZ) (MET)	Tel: +64 (4) 560 9400 Fax: +64 (4) 569 2024 keith.mackersy@caa.govt.nz
PAKISTAN Mr. Fazal Ur Rehman	Sr. Joint Director (ATM / ANS Inspector)	Tel: +92-21-99072756 Mobile: +92-306-2266788 Fax: +92-21-99242676 E-mail: fazal_ur_rehman@caapakistan.com.pk

MET SG/24
Appendix 3 to the Report

MEMBERSHIP		
State/Organization/ Name	Position/organization/ (field of expertise)	Contact
PAKISTAN Mr. Jan Muhammad	Deputy Director (MET / Meteorological Inspector)	Tel: +92-21-99072758 Mobile: +92-336-3564464 Fax No: +92-21-99242676 E-mail: jan.muhammad@caapakistan.com.pk; jansolangi.met2009@gmail.com
PIAWS Panel Mr. Ofa Faanunu	Director of Meteorology Tonga Meteorological Services (MET)	Tel: +676 35355 Fax: +676 35123 E-mail: ofaf@met.gov.to
REPUBLIC OF KOREA Mr. Yeonghun Kim	Assistant Director Aviation Meteorological Office (AMO) of Korea Meteorological Administration (KMA) (MET)	Tel : +82 (32) 222 3008 Fax : +82 (32) 740 2807 E-mail: av_pod@korea.kr
RUSSIAN FEDERATION TBC	TBC	TBC
SINGAPORE Ms. YAP Chui Wah Mr. Yeo Cheng Xun	Executive Meteorologist Meteorological Services Singapore Singapore Changi Airport P.O. Box 8, Singapore 918141 (MET)	Tel: +65 6546 2934 Fax: +65 6542 5026 E-mail: YAP_Chui_Wah@nea.gov.sg YEO_Cheng_Xun@nea.gov.sg
THAILAND Ms. Kornrawee Sithichivapak Mr. Nuttawut Dandee	Director of Aeronautical Meteorology Division Aeronautical Meteorology Division Thailand Meteorological Department (MET)	Tel: +66 (2) 134 0011 Ext. 216 Fax: +66 (2) 213 4009 -10 E-mail: phuwienji@yahoo.com wut.tmd@gmail.com
THAILAND Mr. Somchai Yimsricharoenkit	Chief of Aeronautical Meteorology Division The Civil Aviation Authority of Thailand (MET/regulator)	Tel: +66 (0) 2568 8825 Fax: +66 (0) 25688847 E-mail: somchai.y@caat.or.th
THAILAND Ms. Sujin Promduang	Director of Aeronautical Information and Flight Data Management Center Aeronautical Radio of Thailand Ltd. (AIS)	Tel: +66 (2) 2859083 Fax: +66 (2) 287 8538 E-mail: sujin.pr@aerorhai.co.th
UNITED STATES Mr. Michael WATKINS	FAA Senior Asia/Pacific Air Traffic Representative Singapore (MET/ATM)	Tel: +65 6476 9462 E-mail: michael.w.watkins@faa.gov
VIET NAM Ms. Lan Oanh Nguyen (Lana)	Deputy Director, Air Navigation Department Civil Aviation Authority of Vietnam (MET)	Tel: +84 (24) 3872 3600 E-mail: lanoanh@caa.gov.vn
VIET NAM Mr. Do Tien Duc	Meteorological Official Department of Air Traffic Services Viet Nam Air Traffic Management Corporation (MET)	Tel: +84 (24) 3873 0320 E-mail: dotienduc@vatm.vn
IATA Mr. John MOORE	Assistant Director (Infrastructure) Safety and Flight Operations Asia-Pacific (Airline operators)	Tel: +65 6499 2529 E-mail: moorej@iata.org

MET SG/24
Appendix 3 to the Report

MEMBERSHIP		
State/Organization/ Name	Position/organization/ (field of expertise)	Contact
ICAO Mr. Shane SUMNER (Secretariat)	Regional Officer ATM International Civil Aviation Organization (ICAO) Asia and Pacific Office (ATM)	Tel: +66 (2) 537 8189 x159 Fax: +66 (2) 537 8199 E-mail: ssumner@icao.int
ICAO Mr. Peter DUNDA (Secretariat)	Regional Officer MET International Civil Aviation Organization (ICAO) Asia and Pacific Office (MET)	Tel: +66 (2) 537 8189 x153 Fax: +66 (2) 537 8199 E-mail: pdunda@icao.int

COMMUNICATION STRATEGIES				
Description	Target Audience	Delivery Method	Frequency / Date	Responsibility
Work Plan	MET/R WG, MET SG	Document via e-mail and MET/R WG meeting	As required, but reviewed at MET/R WG and MET SG meetings	Chair and Secretariat
General correspondence	MET/R WG Members	E-mail	As required	MET/R WG Members
MET/R WG Meeting	MET/R WG Members	Meeting (face-to-face or tele- /web-conference)	As required; ~~may be supplemented by tele- web-conference~~	Chair and Secretariat
Status and Milestone Reports	MET/R WG Members	E-mail and working paper at MET/R WG meeting	At least annually	Chair and Secretariat
MET/R WG Report	MET SG (and ATM/SG, through MET SG) and all APAC States	ICAO website and working paper at MET SG meeting	Following each MET/R WG meeting	Chair and Secretariat

MET SG/24
Appendix 3 to the Report

PLAN OF WORK

DELIVERABLES
1. Input to the draft update to the Regional SIGMET Guide to assist States in aligning cross-FIR-boundary SIGMET information in coordination with MET/S WG
2. Documented analysis of MET information used in the Region specifically to support ATM operations
3. Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ATM Plan
4. Draft regional guidance material for tailored MET information supporting ATM operations
5. Seminar on regional implementation of MET information to support ATM operations
6. Coordinated review of the APAC ANP Volume III, including proposals for improvements to the ANRF and other parts of Volume III, to clarify the MET-related implementation planning guidance
7. SIGMET coordination activities in APAC Region; Coordinate on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.
8. * Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM

* Proposed updates arising from discussion on WP/03 – Review Outcomes from MET/R WG/8 and MET SG/23

MILESTONES	By date	Responsibility	Status
Deliverable 1: Input to the draft update to the Regional SIGMET Guide to assist States in aligning cross-FIR-boundary SIGMET information in coordination with MET/S WG			
1.1 Input to First draft of guidance for inclusion in Regional SIGMET Guide for review by MET/R WG members (taking into consideration lessons learnt from the SIGMET coordination projects occurring in the Region)	next meeting of MET/R WG	Ad hoc group 1: Japan, Singapore and Secretariat in coordination with MET/S WG	Completed
1.2 First draft of guidance for inclusion in Regional SIGMET Guide for review by MET SG	MET SG/22	Secretariat in coordination with MET/S WG, MET SG	Completed
1.3 Submit the latest version of the guidance for possible approval by MET SG	MET SG/23	Ad hoc group 1: Japan, Singapore and Secretariat in coordination with MET/S WG	*In progress Closed-Completed
*1.4 Review the guidance and propose updates as necessary for possible approval by MET SG [MET SG/23 task: 23/12, tasked the MET/S WG (rather than the MET/R WG) to keep the guidance under review and propose updates as necessary]	*meeting of MET/R WG	*Ad hoc group 1: Japan, Singapore and Secretariat in coordination with MET/S WG	*To begin Closed-Redundant

* Proposed updates arising from discussion on WP/03 – Review Outcomes from MET/R WG/8 and MET SG/23

MILESTONES	By date	Responsibility	Status
Deliverable 2: Analysis of MET information used in the Region specifically to support ATM operations			
2.1 Survey on regional requirements for MET information to support ATM operations	Oct/Nov 2015	Secretariat	Completed
2.2 Preliminary draft documented analysis of MET information used in the Region specifically to support ATM operations	Jun 2016	Secretariat and Chair	Completed
2.3 Final draft documented analysis of MET information used in the Region specifically to support ATM operations	Next meeting	Ad hoc group 2: Australia (Rapporteur), Singapore, New Zealand, China,	Completed

MET SG/24
Appendix 3 to the Report

		Japan, Thailand, Hong Kong China, Viet Nam	
2.4 Develop a revised questionnaire and conduct a survey, taking into account outcomes from the review of the survey results by the MET SG and ATM/SG and how this can support the next MET/ATM seminar	By 10 June 2019	Ad hoc group 2	*In progress Closed-Completed
2.5 Submit draft survey questionnaire to MET SG/23 for approval	By 10 June 2019 for MET SG/23 on 17 June	As above	*In progress Closed-Completed
* [Revise the follow-up action on Decision MET/R WG/8/4 – Survey of State Meteorological Information Supporting Air Traffic Management, taking into account additional proposals to be presented in MET/R WG/9: WP/05 – Survey of State Meteorological Information Supporting Air Traffic Management] Note: this row will be removed after agreement by the meeting on the points below		*As above	*In progress
# 2.6 Revise questionnaire taking into account outcomes from MET/R WG/9 and further feedback and comments from the WG members	#29 May 2020	#As above	#To begin
#2.7 Conduct a small trial-run of the survey questionnaire	#29 Jun 2020	#As above	#To begin
#2.8 Submit final draft survey questionnaire to MET SG/24 for approval	#29 Jun 2020	#As above	#To begin
#2.9 Conduct the Regional survey	#Q3-4 2020 or as decided by MET SG	#As above	#To begin

* Proposed updates arising from discussion on WP/03 – Review Outcomes from MET/R WG/8 and MET SG/23
Proposed updates arising from discussion on WP/05 – Survey of State Meteorological Information Supporting Air Traffic Management

MILESTONES	By date	Responsibility	Status
Deliverable 3: Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ATM Plan			
3.1 First draft of a list on the MET information or services necessary to support implementation of each element of the Asia/Pacific Seamless ATM Plan	Jul 2016 ATM/SG	Ad hoc group 3: Australia, China, Hong Kong, China, and Japan, Thailand, Singapore (Rapporteur)	Completed
3.2 Revise the draft list and present to ATM/SG/5	17 July 2017	Ad hoc group 3	Completed
3.3 Further development pending outcomes of ICAO A40 review of GANP 2019	TBD	TBD	On hold

MET SG/24
Appendix 3 to the Report

MILESTONES	By date	Responsibility	Status
Deliverable 4: Draft regional guidance material for tailored MET information supporting ATM operations			
4.1 List of tailored MET information or services used in the region to support ATM operations	Jun 2016	Ad hoc group 4: Australia, China, Hong Kong, China, IATA, Japan (Rapporteur), Republic of Korea, Singapore, Thailand and Viet Nam	Completed
4.2 List of sub-regional exchange of MET information and associated agreements that facilitate ATM operations, particularly where major traffic flows affect multiple FIRs	Jun 2016	As above	Completed
4.3 First draft of regional guidance material for tailored MET information supporting ATM operations	Aug 2016	As above	Completed
4.4 Draft of version 2 produced, based on survey results and outcomes/recommendations provided by MET SG and/or ATM/SG	Jun 2018	As above	~~*In progress~~ Completed
4.5 Submit the regional guidance material for tailored MET information supporting ATM operations for possible approval by MET SG and inform the ATM/SG	By 10 June 2019 for MET SG/23 on 17 June	As above	~~*To begin~~ Closed-Completed
4.6 Review the regional guidance material for tailored MET information supporting ATM operations and propose updates as necessary for possible approval by MET SG	Next meeting of MET/R WG	As above	~~†To begin~~ Closed-Completed
~~†4.7 Review the working draft guidance and provide comment to the ICAO RO MET~~	~~†12 June 2020~~	~~†MET/R WG~~	~~†To begin~~
~~†4.8 Finalize the updated guidance for approval at the MET SG in July 2020~~	~~†29 June 2020~~	~~†Ad-hoc group, consisting of Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and IATA~~	~~†To begin~~

* Proposed updates arising from discussion on WP/03 – Review Outcomes from MET/R WG/8 and MET SG/23
† Proposed updates arising from discussion on WP/06 – Updates of Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations

MILESTONES	By date	Responsibility	Status
Deliverable 5: Seminar on regional implementation of MET information to support ATM operations			
5.1 Plan for future seminar on regional implementation of MET information to support ATM operations (May 2020) – initial proposal for MET SG/23 to consider	By 10 June 2019 for MET SG/23 on 17 June	Chair and Secretariat (organizing committee)	~~To begin~~ On hold pending further advice from MET SG

MILESTONES	By date	Responsibility	Status
Deliverable 6: Coordinated review of the APAC ANP Volume III, including proposals for improvements to the ANRF and other parts of Volume III, to clarify the MET-related implementation planning guidance			

MET SG/24
Appendix 3 to the Report

6.1 First draft of proposed APAC ANP Volume III improvements (pending outcomes from the ICAO eANP WG development on ANP Vol III common template)	TBD	TBD	On hold

MILESTONES	By date	Responsibility	Status
Deliverable 7: SIGMET coordination activities in APAC Region; Coordinate on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.			
*7.1 Consolidated progress report on SIGMET coordination activities in the APAC Region and recommendations based on lessons learnt: —new and existing SIGMET coordination activities —WP (MET/R WG) and SP (MET/ATM Seminar) —key lessons learnt/recommendations for regional guidance on SIGMET coordination —identify opportunities for integration and expansion of SIGMET coordination activities [Revise the deliverable to focus on determining the end-users' requirements; and taking into account the additional proposals to be presented in MET/R WG/9: WP/09 – Review and update of the Work Programme]	*Next meeting of MET/R WG and MET/ATM Seminar	*Ad hoc group (Japan and Singapore, Hong Kong China, Malaysia, India, Viet Nam, Thailand, Fiji, IFALPA...) coordinated by the Chairperson and Secretary MET-group Chairs considered this task is more appropriate to be included under the work plan of MET/S WG	*To begin

* Proposed updates arising from discussion on WP/03 – Review Outcomes from MET/R WG/8 and MET SG/23

MILESTONES	By date	Responsibility	Status
*Deliverable 8: Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM			
*[Establish a new deliverable taking into account the proposals to be presented in MET/R WG/9: WP/04 – APAC User Requirements for SWIM-based MET Information Services Supporting ATFM] Note: this row will be removed after agreement by the meeting on the points below		*An ad-hoc group comprising SMEs from both MET/R WG and ATFM/SG	*To begin
**8.1 In coordination with SWIM TF, identify and develop the specifications of future SWIM-based MET information services required to support ATFM operations		**Ad-hoc group 8 (see below)	**To begin
**8.2 Identify MET and ATFM data to be exchanged using SWIM-based Information Exchange Service		**Ad-hoc group 8 (see below)	**To begin
**8.3 Based on the findings (above), develop APAC use cases and user requirements document for future SWIM-based MET information services supporting ATFM		**Ad-hoc group 8 (see below)	**To begin

* Proposed updates arising from discussion on WP/03 – Review Outcomes from MET/R WG/8 and MET SG/23

** Proposed updates arising from discussion on WP/04 – APAC User Requirements for SWIM-based MET Information Services Supporting ATFM

Ad-hoc group 8

State / Administration / IO	NamePosition	Position and/or Organisation	Expertise

MET SG/24
Appendix 3 to the Report

Australia	Jesper Bronsvort	Airservices Australia	ATFM
Australia	Ashwin Naidu	BOM	MET
CANSO	Stuart Ratcliffe	CANSO	ATFM
Hong Kong China	Marco Kok	HKO	MET/SWIM
	(Rapporteur)		
Hong Kong China	Peter Chadwick	Senior Air Traffic Control Specialist (Strategic Planning) / HKCAD	ATFM
		Project Officer / HKCAD	
Hong Kong China	(Mr) Anfernee Poon	IATA	ATFM
IATA	John Moore	JCAB	ATFM/MET
Japan	SHIGENOBU Toshiya	JMA	ATFM
Japan	YASUI Kazuki	PCAA	MET
Pakistan	Fazal Ur Rehman	PCAA	ATFM
Pakistan	Jan Muhammad	Assistant of Director / KMA	MET
Republic of Korea	Dong-won, LEE	Assistant of Director / KMA	MET
Republic of Korea	Jiwon, LEE	Head, ATM development/CAAS	ATFM
Singapore	Clarence Foo	Head, ATC Specialist/CAAS	ATFM
Singapore	Zhang HuanBin	Senior Engineer, ATM Systems /CAAS	ATFM
Singapore	Aw Ying Kit	MSS	MET
Singapore	Yeo Cheng Xun	Strategic Planning Manager	ATFM/SWIM
Thailand	Amornrat Jirattigalachote	/AEROTHAI	
	(Amo)	Strategic ATFM Team/AEROTHAI	ATFM
Thailand	Dudsadee Sungthong	VATM	MET/ATFM
Vietnam	Mr. Nguyen Van Dung		

ICAO ASIA AND PACIFIC METEOROLOGICAL INFORMATION EXCHANGE WORKING GROUP (MET/IE WG)

TERMS OF REFERENCE AND WORK PLAN

Editorial note: Updates show deleted text using strikethrough (~~text to be deleted~~), and added text with grey shading (**text to be inserted**).

TERMS OF REFERENCE

1. COMPOSITION MEMBERSHIP

The MET/IE WG is made up of experts from the following bodies:

- APAC Regional OPMET Data Banks (RODBs): Brisbane, Nadi, Tokyo, Singapore and Bangkok;
- **APAC Regional OPMET Centres (ROCs);**
- World Area Forecast Centres (WAFCs), London and Washington;
- Secure Aviation Data Information Service (SADIS) and WAFS Internet File System (WIFS) Provider States, United Kingdom and United States;
- APAC Volcanic Ash Advisory Centres (VAACs): Darwin, Tokyo and Wellington;
- Designated focal points for SIGMET tests and regional OPMET bulletin exchange (ROBEX);
- Pacific Islands Aviation Weather Services (PIAWS) Panel; and
- International Air Transport Association (IATA).

State or Org./Name	Title/Organization	Contact information
AUSTRALIA (Chair) Mr. Tim HAILES (VAAC, ROBEX)	~~National Manager Aviation Service Development Systems & Technology Lead,~~ Australian Bureau of Meteorology, GPO 1289, Melbourne VIC 3001 AUSTRALIA	Tel: +61 3 9669 4273 Mob: +61 4 2784 0175 Email: tim.hailes@bom.gov.au
AUSTRALIA Mr. Pierre KEMMERS (RODB, ROBEX)	~~Network Operations Line~~ AIS Business Manager Airservices Australia GPO Box 367 Canberra ACT 2601	Tel: ~~02 6268 5662~~ +61 2 6268 4426 Mob: +61 416 509078 E: pierre.kemmers@airservicesaustralia.com (primary) / YBBBYPYX@airservicesaustralia.com (secondary)
AUSTRALIA Mr. Tristan King (VAAC, ROBEX)	Innovation Lead Australian Bureau of Meteorology, GPO 1289, Melbourne VIC 3001 AUSTRALIA	Tel: +61 3 9669 4146 E: tristan.king@bom.gov.au
AUSTRALIA Mr. David House (ROBEX)	Operational Systems Specialist Australian Bureau of Meteorology, GPO Box 727, Hobart TAS 7001 AUSTRALIA	Tel: +61 3 6221 2058 E: david.house@bom.gov.au
CHINA Ms. ZOU Juan (ROBEX)	Meteorologist, Meteorology Division, Air Traffic Management Bureau, Civil Aviation Administration of China, No. 12, East Sanhuan Road Middle, Chaoyang District, Beijing 100022 CHINA	Tel: 86-10-87786826 Fax: 86-18-87786820 Email: zoujuan@atmb.net.cn
FIJI Mr. William REECE (RODB, ROBEX)	Head of Support & Maintenance, Airports Fiji Limited, Private Mail Bag, Nadi Airport FIJI Islands	Tel: +679 673 1198 Mob: +679 990 6105 Email: williamr@fijiairports.com.fj
HONG KONG, CHINA ~~Ms. NG Wa-mui, Miranda~~ Mr. Patrick LAM (ROBEX)	Senior Aeronautical Communications, Supervisor, Civil Aviation Department, Air Traffic Management Division, Telecommunications Unit, 3/F, 1 Tung Fai Road, Lantau, HONG KONG, CHINA	Tel: +852 2910 6211 Fax: +852 2910 1160 Email: wmng@cad.gov.hk hhlam@cad.gov.hk
HONG KONG, CHINA Mr. KOK Mang-hin, Marco (ROBEX)	Scientific Officer, Hong Kong Observatory 134A Nathan Road, Kowloon, HONG KONG, CHINA	Tel: +852 2926 8702 Fax: +852 2375 2645 Email: mhkok@hko.gov.hk

MET SG/24
Appendix 4 to the Report

State or Org./Name	Title/Organization	Contact information
JAPAN Mr. Kentaro TSUBOI (RODB, SIGMET test)	Scientific Officer, Information and Communications Technology Division, Forecast Department, Japan Meteorological Agency (JMA), 1-3-4 Otemachi, Chiyoda-ku, Tokyo 100-8122, JAPAN	Tel: +81 3 3212 8341 (ext. 3283) Fax: +81 3 3211 8404 Email: k-tsuboi@met.kishou.go.jp
JAPAN Mr. ~~Kazuki ITO~~ Kazuya Kawaguchi (VAAC)	Senior Scientific Officer, Volcanology Division, Seismology and Volcanology Department, Japan Meteorological Agency (JMA), 1-3-4 Otemachi, Chiyoda-ku Tokyo 1008122, JAPAN	Tel: +81 3 3284 1749 Fax: +81 3 3212 3648 Email: kazuki.ito@met.kishou.go.jp kazuya_kawaguchi@met.kishou.go.jp
MALAYSIA Mr. Jailan bin Simon (ROBEX)	Senior Director, National Aviation Meteorological Centre, Kuala Lumpur International Airport, 1st Floor, Airport Management Centre, 64000 Sepang, Selangor Darul Ehsan, MALAYSIA	Tel. : +603-8787 2360 Fax : +603-87871019 Email : jailan@met.gov.my
NEW ZEALAND Ms Paula ACETHORP Mr. Keith MACKERSY (VAAC, ROBEX)	Chief Meteorological Officer, Senior Meteorological Specialist, Civil Aviation Authority of New Zealand, PO Box 3555, Wellington NEW ZEALAND	Tel: +64 4 830 2611 +64 4 9040543 Fax: +64 4 9041543 Email: paula.acethorp@caa.govt.nz
REPUBLIC OF KOREA Ms. Insul SONG (ROBEX)	Assistant Director, Aviation Meteorological Office (AMO) of Korea Meteorological Administration (KMA), PO box 43, 272 Gonghang-ro, Jung-gu, Incheon, 22382 REPUBLIC OF KOREA	Tel: +82 (32) 740 2840 Fax: +82 (32) 740 2487 E-mail: songis2015@korea.kr
REPUBLIC OF KOREA Mr. Young-Lock KIM (ROBEX)	Assistant Director, Aviation Meteorological Office (AMO) of Korea Meteorological Administration (KMA) PO box 43, 272 Gonghang-ro, Jung-gu, Incheon, 22382 REPUBLIC OF KOREA	Tel: +82 (32) 740 2840 Fax: +82 (32) 740 2487 E-mail: kyl99@korea.kr
SINGAPORE Mr. Chow Kwok Wah (RODB, SIGMET test, ROBEX)	Principal Meteorologist, Meteorological Services Singapore, P.O. Box 8, Singapore Changi Airport Post Office, 918141 SINGAPORE	Tel: +65 6542 4715 Fax: +65 6545 7192 Email: chow_kwok_wah@nea.gov.sg
THAILAND Ms. Sujin PROMDUANG (RODB, ROBEX)	Director, Aeronautical Information & Flight Data Management Centre, Aeronautical Radio of Thailand Ltd., 102 Ngamduplee, Sathorn, Bangkok 10120, THAILAND	Tel: +66 (2) 285 9083 Fax: +66 (2) 287 3131 Email: sujin.pr@aerothai.co.th
TONGA Mr. 'Ofa F' ANUNU (PIAWS Panel)	Director of Meteorology, Tonga Meteorological Service, Fuaamotu Airport TONGA	Tel: +676 877 7750 Fax: +676 35123 E-mail: ofaf@met.gov.to
UNITED KINGDOM Ms. Karen Shorey (WAFIC, SADIS)	International Aviation and SADIS Manager Met Office, FitzRoy Road, Exeter, EX1 3PB UNITED KINGDOM	Tel: Fax: Email: karen.shorey@metoffice.gov.uk
UNITED STATES Mr. Pat MURPHY (WAFIC, WIFS)	Federal Aviation Administration, Senior Meteorologist, Programme Lead International, FAA Headquarters, 800 Independence Ave, S.W., Washington, D.C. 20591 UNITED STATES	Tel: +1 (202) 267 2788 Email: michael.murphy@faa.gov
IATA (TBC)	(TBC)	Tel: Fax: Email:
ICAO (Secretariat) Mr. Peter DUNDA	Regional Officer Aeronautical Meteorology/Environment International Civil Aviation Organization 252/1, Vibhavadi Rangsit Road, Ladyao, Chatuchak, Bangkok 10900 THAILAND	Tel: +66 (2) 537-8189 Ext. 153 Fax: +66 (2) 537-8199 Email: PDunda@icao.int

2. DESCRIPTION	
Objective	Increase OPMET availability and reliability needed for flight planning (efficiency) and in-flight re-planning (safety) in support of the Global Air Navigation Plan (GANP) framework and the Aviation System Block Upgrade (ASBUs) methodology.

MET SG/24
Appendix 4 to the Report

Benefits	Increase in safety and efficiency (time and fuel savings).
Terms of Reference Functions of the group	Under guidance from the ICAO APAC Secretariat: - Review the OPMET exchange schemes in the APAC and other regions and develop proposals for their optimization, taking into account the requirements by the aviation users and global OPMET exchange; - Review and update of the procedures for inter-regional OPMET exchange and ensure the availability of the required APAC OPMET data for SADIS and WIFS; - Report on deficiencies in the format and dissemination of OPMET messages; - Monitor and participate in inter- and intra-regional trials of digital aeronautical meteorological information exchange in support of the implementation of IWXXM and SWIM-inter and intra-regionally; - Conduct trials and develop standardized quality control, monitoring and management procedures related to exchange of IWXXM and TAC OPMET information; - Participate in the implementation and promote awareness of the transition to digital exchange of OPMET (IWXXM) and System Wide Information Management (SWIM); - Conduct regular regional VAAC back-up and SIGMET tests; - Provide support for the APAC Volcanic Ash Exercises; - Review and update the regional guidance material related to OPMET exchange, including relevant material on IWXXM, AMHS and SWIM; - Liaise and consult with other appropriate bodies within ICAO and WMO dealing with communication and/or management aspects of the OPMET exchange; and - Provide advice and report to the MET Sub-group on the above issues for further co-ordination through the ICAO Secretariat with other appropriate bodies.
Work Program	The work to be addressed by the MET/IE WG includes: — Examine new and existing requirements for OPMET exchange in APAC and other neighbouring regions along with the WAFS Provider States and assess the feasibility of satisfying these requirements, taking into account the availability of the data; — Keep the ROBEX scheme and other OPMET exchange schemes under review and prepare proposals for updating and optimizing the schemes; — Review and update of the procedures for inter-regional OPMET exchange and ensure the availability of the required APAC OPMET data for SADIS and WIFS; — Review the regional guidance material on OPMET exchange to ensure procedures are provided for the exchange of all required OPMET data; — Conduct trials and develop procedures for quality control, monitoring and management of the OPMET exchange to foster implementation of quality management of OPMET data by the ROCs and the RODBs/TROCs; — Develop quality control guidance material and promote implementation of quality control for OPMET management; — Report on deficiencies in the format and dissemination of OPMET messages; — Participate in the implementation and promote awareness of the transition to digital exchange of OPMET (IWXXM) and System Wide Information Management (SWIM); — Engage with, and participate in the activities of, the SWIM Task Force; — Conduct regular regional VAAC back-up and SIGMET tests; and — Provide support for the APAC Volcanic Ash Exercises.

3. COMMUNICATION STRATEGIES				
Description	Target Audience	Delivery Method	Frequency / Date	Responsibility
Interim Work Plan Program Progress Report	MET/IE WG Members	Web-conference E-mail MET/IE WG (also reviewed by MET SG)	Quarterly/as determined by Chair As required Annually	Chair and Secretariat
Major Work Program Progress Report	MET/IE WG Members	Working Paper (MET/IE WG meeting)	Annually/published 14-days or more before the meeting	Chair and Secretariat
General correspondence	MET/IE WG Members	E-mail	As required	MET/IE WG Members
New, specific proposal for action (WP)	MET/IE WG Meeting Members	Working Paper (MET/IE WG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	MET/IE WG Members or States
New, specific information (IP)	MET/IE WG Meeting Members	Information Paper (MET/IE WG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	MET/IE WG Members or States

MET SG/24
Appendix 4 to the Report

Working Group Meeting Report	MET/IE WG Members and all APAC States	MET/IE WG Meeting Report	Annually/published 21-days or less after the meeting	Chair and Secretariat
Status & Milestone	ICAO Secretariat and MET/IE WG Members	E-mail WP at MET/IE WG	Annually	Chair
Working Group Progress Report	MET SG Meeting All APAC States	Working Paper (MET SG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	Chair and Secretariat

WORK PROGRAM

4. PERFORMANCE FRAMEWORK FORM (PFF)				
Activity/Tasks	Time Frame	Responsibility	Status	Milestone
Task Activity 1: Improve the Availability of OPMET information data	Ongoing	MET/IE WG		1
Task Activity 2: Improve Timeliness, compliance and regularity of OPMET exchange	Ongoing	MET/IE WG		2
Task Activity 3: Identify gaps and errors in processes, procedures and OPMET exchange SIGMET and Advisory Tests	Ongoing	MET/IE WG		3, 4, 5
Activity 4: VAAC Backup Tests	Ongoing	MET/IE WG		
Activity 5: IROG Backup Tests	Ongoing			
Task Activity 6: Review Regional guidance material related to OPMET data exchange	Ongoing	MET/IE WG		3, 4, 5, 6
Task Activity 7: Facilitate and monitor the migration to IWXXM in support of SWIM implementation	2020-2017-20210	MET/IE WG		7
Task Activity 8: Review the OPMET information exchange structure scheme	2020-20192026	MET/IE WG		8
Activity 9: MET information in SWIM	2020-2026			

5. MILESTONES			
Milestone	Accountability	Dates	Status
Milestone 1: Achieve 95% (90%) or greater OPMET availability for AOP (non AOP) aerodromes where OPMET information is required at RODBs, SADIS and WIFS (i.e., aerodromes listed in former FASID Table MET 2A).	MET/IE WG	Annually Jun	
Milestone 2: Achieve OPMET timeliness, compliance and regularity index of 0.95 (0.90) for AOP (non AOP) aerodromes where OPMET information is required at RODBs, SADIS and WIFS (i.e., aerodromes listed in former FASID Table MET 2A).	MET/IE WG	Annually Jun	
Milestone 3: SIGMET tests conducted, analysed and report complete.	MET/IE WG	Annually Jun	
Milestone 4: VAAC Back up tests conducted, analysed and report complete.	VAAC Back up Focal Points	Annually Jun	
Milestone 5: IROG Back up tests conducted, analysed and report complete.	IROG Bangkok & Singapore	Annually Mar	
Milestone 6: RODB Monitoring procedures updated in ROBEX Handbook.	Secretariat	Annually Sep	
Milestone 7: Report to MET/IE WG & MET SG on IWXXM exchange & testing.	Secretariat & Chair	Annually Mar & May	
Milestone 8: OPMET Exchange structure review complete.	MET/IE WG	2019	

MET SG/24
Appendix 4 to the Report

Milestone 9: Improved efficiency and effectiveness of ROBEX scheme.	RODBs	Annually Jun	
Milestone 10: Participated in the development of SWIM Meteorological services for APAC.	MET/IE WG	2023	

56. WORK PLAN				
Activity / Milestone	Accountability	Predecessors	Date	Status
Activity 1: ~~Increasing OPMET Availability for aerodromes where~~ OPMET information is required at RODBs, SADIS and WIFS				
Activity 1.1: Perform real time monitoring if required	IATA	-	If required	
Activity 1.2: Monitor and score SADIS/WIFS OPMET reception.	IATA	-	Annually Jan	
Activity 1.3: ~~Capture~~ Assess OPMET monitoring results & identify corrective actions	~~IATA and~~ RODBs	1.2	Annually ~~Feb~~ Dec	
Activity 1.4: Assess OPMET monitoring results & share results with RODBs	RODB Bangkok	1.3	Annually Jan	
Activity 1.5: Prepare paper reporting results and deficiencies to MET/IE WG meeting.	IATA and RODB Bangkok	1.4	Annually ~~Mar~~ Feb	
Activity 1.6: Report summary of OPMET availability results to MET SG	Secretariat & Chair	1.5	Annually May	
Activity 1.7: Advise States of OPMET deficiencies and corrective actions.	Secretariat	1.6	Annually Jun	
Activity 1.8: ~~Provide~~ Actively engage support to States to rectify with corrective against deficiencies if requested.	RODBs ROCs	1.7	As required	
Milestone 1: Achieve 95% (90%) or greater OPMET availability for AOP (non-AOP) aerodromes at RODBs & WAFS.	MET/IE WG	1.8	Annually Jun	
Activity 2: ~~Improving OPMET Timeliness, compliance and regularity of~~ OPMET exchange at RODBs, SADIS and WIFS				
Activity 2.1: Monitor & collate OPMET data.	RODBs & IATA	-	Annually ~~Dec~~ Jan	
Activity 2.2: Score RODB OPMET reception against PI thresholds.	RODB Bangkok	-	Annually ~~Dec~~ Jan	
Activity 2.3: Analyse data and share results with RODBs	RODB Bangkok	2.2	Annually ~~Feb~~ Jan	
Activity 2.4: Prepare paper report results to MET/IE WG meeting & identify corrective actions	RODB Bangkok	2.3	Annually ~~Mar~~ Feb	
Activity 2.5: Report summary of OPMET timeliness, compliance and regularity results to METSG	Chair	2.4	Annually May	
Activity 2.6: Inform States of non-compliance and corrective actions	Secretariat	2.5	Annually Jun	
Activity 2.7: Provide support for States to rectify deficiencies if requested.	RODBs	2.6	As required	
Milestone 2: Achieve 95% (90%) or greater OPMET timeliness, compliance and regularity for AOP (non-AOP) aerodromes at RODBs, SADIS and WIFS.	MET/IE WG	2.7	Annually Jun	

MET SG/24
Appendix 4 to the Report

56. WORK PLAN				
Activity / Milestone	Accountability	Predecessors	Date	Status
Activity 3: SIGMET and Advisory Tests				
Activity 3.1: Review SIGMET Test procedures	MET/IE WG	-	Annually Aug	
Activity 3.2: State Letter regarding SIGMET Tests	Secretariat	3.1	Annually Sep	
Activity 3.3: Email States regarding SIGMET Tests	Secretariat	3.2	Annually	Last Wed in Oct
Activity 3.4: Conduct & collate data for WC SIGMET Tests	RODBs	3.2	Annually	2 nd Wed in Nov
Activity 3.5: Conduct & collate data for WV SIGMET Tests	RODBs	3.2	Annually	3 rd Wed in Nov
Activity 3.6: Conduct & collate data for WS SIGMET Tests	RODBs	3.2	Annually	4 th Wed in Nov
Activity 3.7: Analyse test data	RODB Singapore & Tokyo	3.4 - 3.6	Annually Jan	
Activity 3.8: Assess SIGMET test results to identify corrective actions from Nov tests	RODB Singapore & Tokyo	3.4 - 3.6	Annually Feb	
Activity 3.9: Report to MET/IE WG	RODB Singapore & Tokyo	3.8	Annually Mar	
Activity 3.10: Report on SIGMET Test Results to MET SG.	Chair	3.9	Annually May	
Activity 3.11: Advise States of SIGMET deficiencies	Secretariat	3.9	Annually Jun	
Milestone 3: Improved issuance and compliance of SIGMETs	MET/IE WG	3.11	Annually Jun	
Activity 4: VAAC Back-up Tests				
Activity 4.1: Review and Update VAAC Back-up Test procedures	MET/IE WG and VAACs		Annually Jan	2 months prior to test
Activity 4.2: Update VAAC Back-up Procedures	Secretariat	4.1	Annually May	
Activity 4.2: Issue Notice of VAAC Back-up Tests	Secretariat/VAACs	4.1	Annually Aug	
Activity 4.3: Conduct VAAC Back-up Test between Darwin and Tokyo	VAACs	4.2	Annually Oct – TBC	
Activity 4.4: Conduct VAAC Back-up Test between Darwin and Wellington	VAACs	4.2	Annually Oct – TBC	
Activity 4.5: Collect test results and send to VAAC Provider State members	RODBs	4.3	Annually Oct – TBC	
Activity 4.6: Analyse Test results	VAAC Back-up Focal Points Members	4.5	Annually Nov	
Activity 4.7: Report to MET/IE WG	VAAC Back-up Focal Points Members	4.6	Annually Feb	
Activity 4.8: Report to MET SG.	Chair	4.7	Annually May	

MET SG/24
Appendix 4 to the Report

56. WORK PLAN				
Activity / Milestone	Accountability	Predecessors	Date	Status
Activity 4.9: Advise relevant States, VAACs and RODBs of any deficiencies.	Secretariat	4.7	Annually Jun	
Milestone 4: VAAC Back-up Tests conducted, analysed and report complete.	VAAC Back-up Focal Points Members	4.8	Annually Jun	
Activity 5: IROG Back-up Tests				
Activity 5.1: Investigate the feasibility & benefits of back-up arrangements of IROG Tokyo, Nadi & Brisbane	IROG Nadi, Tokyo and Brisbane	-	Nov 2020 ~~19~~	
Activity 5.2: Review IROG Back-up Test procedures to include all IROG.	IROG Bangkok & Singapore	-	Apr 2019, Annually Feb	
Activity 5.3: Updated IROG Back-up Procedures in ROBEX Handbook.	Secretariat	5.2	Annually May	
Activity 5.4: Identify list of MET Bulletins to monitor.	IROG Bangkok & Singapore	-	Annually Jan/Feb	
Activity 5.5: Conduct IROG Back-up Test of Bangkok & analyse results	IROG Bangkok & Singapore	5.4	Annually Sept/Oct	
Activity 5.6: Conduct IROG Back-up Test of Singapore & analyse results	IROG Bangkok & Singapore	5.4	Annually Jan/Feb	
Activity 5.8: Report to MET/IE WG	IROG Bangkok & Singapore	5.7	Annually Mar	
Milestone 5: IROG Back-up Tests conducted, analysed and report complete.	IROG Bangkok & Singapore	5.7	Annually Mar	
Activity 6: ~~APAC RODB Monitoring procedures~~ Regional guidance material related to data exchange				
Activity 6.1: Review monitoring procedure in ROBEX Handbook and update as necessary.	All RODBs	-	Annually Apr	
Activity 6.2: Changes to RODB monitoring procedures and updates to Appendix A & B in ROBEX Handbook.	Secretariat	6.1	Annually May	
Activity 6.3: Advise Secretariat of changes to ROBEX Handbook.	All States	-	Annually Apr	
Activity 6.4: Incorporation of AMHS & Addressing in ROBEX Handbook.	Pierre & Marco		Sep 2020	
Activity 6.5: Complete update of ROBEX Handbook including Table MET 2A.	~~New Zealand &~~ Secretariat	-	Annually May	
Activity 6.6: Review ANP Tables (initially MET II-2) and ensure all necessary aerodromes are contained in OPMET bulletins	WG	-	May Annually	
Activity 6.7: Seek MET/SG endorsement of the updated ROBEX Handbook.	Secretariat	-	Annually Jun	
Milestone 6: RODB Monitoring procedures published in ROBEX Handbook	Secretariat	6.7	Annually Sep	
Activity 7: ~~New OPMET Exchange Formats~~ IWXXM Implementation				
Activity 7.1: Monitor migration to IWXXM.	WG	-	As required	
Activity 7.2: Conduct survey to determine status of IWXXM Implementation ~~Undertake IWXXM tests with other centres.~~	Secretariat ~~WG~~		~~As required~~ July 2020, May 2021	

MET SG/24
Appendix 4 to the Report

56. WORK PLAN				
Activity / Milestone	Accountability	Predecessors	Date	Status
Activity 7.3: Report to MET SG on APAC States' RODBs support IWXXM implementation status.	Secretariat		Next meeting MET SG	
Activity 7.4: Increase awareness of the requirement for States to exchange of OPMET data in IWXXM format and the impact of inability to do so.	WG		As required	
Activity 7.5: Conduct IWXXM tests and report to MET/IE WG & RODB Singapore on the status of the testing and implementation of digital OPMET exchange.	WG		Annually Mar	
Activity 7.6: Maintain a register of IWXXM tests conducted, detailing Met software, UAs and MTAs tested	RODB Singapore	7.5	As required	
Activity 7.7: Arrange provision for the next IWXXM Workshop in APAC	Secretariat/Chair, WG, RODB Bangkok	7.2	May Sep 202019	
Activity 7.8: Actively participate in the next APAC IWXXM Workshop	Secretariat/Chair, WG	7.7	June Oct 201920	
Activity 7.9: Prepare information (e.g. issues, CONOPS) for MET/P WG-MIE	WG		As required	
Activity 7.10: Development & Publishing AMHS/FTBP network map	Pierre, Secretariat		Monthly	
Activity 7.11: State IWXXM status register	Secretariat		Monthly	
Milestone 7: Report to MET/IE WG & MET SG on IWXXM exchange & testing.	Secretariat & Chair	7.5, 7.6 & 7.8	Annually May	
Activity 8: Review OPMET MET Information Exchange Structure				
Activity 8.1: Review ROBEX Scheme diagram.	All RODBs, Secretariat		May Annually	
Activity 8.2: Review the structure of the ROBEX exchange in light of the introduction of SWIM.	WG		Annually Feb	
Milestone 8: RODB structure review complete.	MET/IE WG	-	2020	
Activity 9: Improve Efficiency and effectiveness of ROBEX Scheme				
Activity 9.1: Align content of SA bulletins with FT bulletins, where appropriate	All RODBs	-	May 2019	
Activity 9.2: Adjust FT bulletin filing time, where appropriate	All RODBs	-	May 2019	
Activity 9.3: Review ANP Table MET II 2 and ensure all necessary aerodromes are contained in OPMET bulletins	WG	-	May Annually	
Activity 9.4: Review and update ROBEX HB and ICD, including aligning with OPMET bulletin contents and changes associated with IWXXM	WG	-	Feb Annually	
Activity 8.3: Review use of the Request/Reply service	RODBs	-	May 202119	
Activity 8.4: Improve the efficiency of Request/Reply service	RODBs	8.3	Sep 202119	

MET SG/24
Appendix 4 to the Report

56. WORK PLAN				
Activity / Milestone	Accountability	Predecessors	Date	Status
Milestone 8: Improved efficiency and effectiveness of ROBEX Scheme	MET/IE WG	-	2021-19	
Activity 9: ~~Participate in the development of meteorological elements of MET information in SWIM in APAC~~				
Activity 9.1: Assist in the definition of the APAC SWIM Met service catalogue	WG	-	May 2019 As required	
Activity 9.2: Assist in the definition of the APAC SWIM Met data catalogue	WG	-	May 2019 As required	
Milestone 9: Participated in the development of SWIM Meteorological services for APAC	MET/IE WG	-	2023	

MET SG/24
Appendix 5 to the Report

ICAO ASIA AND PACIFIC METEOROLOGICAL SERVICES WORKING GROUP (MET/S WG)

TERMS OF REFERENCE AND WORK PLAN

Editorial note: Updates show deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

TERMS OF REFERENCE

1. MEMBERSHIP		
The MET/S WG comprises experts provided by States, International Organizations and/or bodies and Organizations having experience in the provision of aeronautical meteorological services.		
State or Org./Name	Title/Organization	Contact information
AUSTRALIA Ms. Elizabeth HEBA	~~Manager, Regional Aviation Weather Services (WA and SA),~~ ~~Aviation Quality Assurance Lead~~ Australian Bureau of Meteorology, ~~P.O. Box 1370, West Perth,~~ ~~WA, 6005,~~ GPO Box 1289, Melbourne VIC 3001, AUSTRALIA	Tel: +61 (8) 9263 2266 +61 3 9669 4313 E-mail: ~~e.heba@bom.gov.au~~ elizabeth.heba@bom.gov.au
AUSTRALIA Mr. Domenic PANUCCIO	Senior Aviation Meteorologist Australian Bureau of Meteorology GPO Box 1289, Melbourne VIC 3001, AUSTRALIA	Tel: +61 3 9669 4379 E-mail: domenic.panuccio@bom.gov.au
CHINA Mr. WANG Fengyun	Engineer, MET Office, Air Traffic Management Bureau of East China Shanghai 200335, CHINA	Ph: +86 (21) 2232 7505 Fax: +86 (21) 6268 3667 Em: wangfy@atmb.cn
CHINA Mr. JI Pengfei	Meteorologist, Meteorology Division Air Traffic Management Bureau 12 East Sanhuan Road Middle Chaoyang District Beijing 100022 PEOPLE'S REPUBLIC OF CHINA	Tel: +86 (10) 8778 6033 Fax: +86 (10) 8778 6820 Email: jipengfei@atmb.net.cn
HONG KONG, CHINA (Chair) Mr. PAK-WAI Chan	Assistant Director, Hong Kong Observatory, 134A Nathan Road, Tsim Sha Tsui, HONG KONG CHINA	Ph: +852 2926 8435 Fax: +852 2375 2645 Em: pwchan@hko.gov.hk
HONG KONG, CHINA Dr. Chi-Wai Jeffrey LEE	Scientific Officer, Hong Kong Observatory, 134A Nathan Road, Tsim Sha Tsui, HONG KONG CHINA	Ph: +852 2926 8642 Fax: +852 2375 2645 Em: jeffreylee@hko.gov.hk
INDIA ~~Dr. R. SURESH~~ (TBC)	~~Scientist 'F' & Deputy Director General of Meteorology (Central Aviation Meteorological Division), India Meteorological Department, Mausam Bhawan, New Delhi 11003~~ INDIA	Ph: +91 (11) 2461 5371 +91 (11) 2462 6015 +91 986 823 8212 Fax: +91 (11) 2461 5371 Em: ~~suresh.ind@gmail.com~~ r58.suresh@imd.gov.in
INDONESIA Mr. Zulkarnain (TBC)	~~Head of Sub-division for Public Weather Services Management, Meteorological Climatological and Geophysical Agency (BMKG), Jalan Angkasa 1 No.2 Kemayoran, Jakarta, 10720,~~ INDONESIA	Tel: +62 (21) 65463118 Fax: +62 (21) 65463115 Email: ~~zulkarnain@bmkg.go.id;~~ zulkarnain.bmg@gmail.com
JAPAN ~~Ms. Naoko Komatsu~~ Mr. Kazuki Yasui	~~Senior Scientific Officer, Office of Aviation Weather Forecasting~~ Forecast Division, Forecast Department, Japan Meteorological Agency (JMA), 1-3-4 Otemachi, Chiyoda-ku, Tokyo 1008122	Tel: +81 3 3212 8341 (ex. 3524) Fax: +81 3 3212 8377 Email: k_yasui@met.kishou.go.jp
JAPAN ~~Ms. Keiko Ito~~ Mr. Tatsuya Yabe	Assistant Scientific Officer, Aeronautical Meteorology Division, Administration Department, Japan Meteorological Agency (JMA), 1-3-4 Otemachi, Chiyoda-ku Tokyo 1008122	Tel: +81 3 3212 8968 Fax: +81 3 3212 8968 Email: tatsuyabe@met.kishou.go.jp
MALAYSIA Mr. Mr. Muhammad Helmi bin Abdullah	Senior Director, National Meteorological Aviation Centre, Kuala Lumpur International Airport, 1 st Floor, Airport Management Centre, 64000 Sepang Selangor Darul Ehsan, MALAYSIA	Ph: +603 8787 2360 Fax: +603 8787 1019 Email: helmi@met.gov.my
MALDIVES Mr. Ali SHAREEF	Deputy Director General, Maldives Meteorological Service, Hulhule, 22000 MALDIVES	Ph: +960 332 6200 Fax: +960 334 1797, 332 0021 Em: ~~shareef@meteorology.gov.mv~~ ali.shareef@met.gov.mv

MET SG/24
Appendix 5 to the Report

State or Org./Name	Title/Organization	Contact information
NEW ZEALAND Ms Paula ACETHORP ~~Mr. Keith MACKERSY~~	Chief Meteorological Officer ~~Senior Meteorological Specialist~~ Civil Aviation Authority of New Zealand P.O. Box 3555, Wellington 6140 NEW ZEALAND	Ph: +64 4 830 2611 ~~+64 (4) 560 9400~~ ~~Fax: +64 (4) 569 2024~~ Em: paula.acethorp@caa.govt.nz
REPUBLIC OF KOREA Ms. Ka-Young Byen	Assistant Director, Aviation Meteorological Office (AMO) of Korea Meteorological Administration (KMA) 272 Gonghang-ro, Jung-gu, Incheon, REPUBLIC OF KOREA 22382	Tel: +82 (32) 740 2855 Fax: +82 (32) 740 2817 E-mail: bky2012@korea.kr
PHILIPPINES (TBC)	(TBC)	(TBC)
SINGAPORE Mr. Chow Kwok Wah	Principal Meteorologist, Meteorological Service of Singapore, National Environment Agency, P.O. Box 8, Singapore Changi Airport, Singapore 918141, SINGAPORE	Tel: +65 6542 4715 Fax: +65 6545 7192 Email: chow_kwok_wah@nea.gov.sg
THAILAND Ms Rassmee Damrongkietwattana	Director, Aeronautical Weather Monitoring Sub-Division, Aeronautical Meteorology Division, Thai Meteorological Department, 6 th Floor, ATC Complex Suvarnabhumi International Airport Bang Pli, Samut Prakarn, 10540 THAILAND	Ph: +66 (2) 1340011 Ext 213 Fax: +66 (2) 1340009 +66 (2) 1340010 Em: rassmee@hotmail.com
UNITED STATES Mr. Pat MURPHY	Federal Aviation Administration, Senior Meteorologist, Programme Lead International, FAA Headquarters, 800 Independence Ave, S.W., Washington, D.C. 20591 UNITED STATES	Tel: +1 (202) 267 2788 Email: michael.murphy@faa.gov
VIETNAM Ms. Lan Oanh Nguyen (Lana)	Deputy Director, Air Navigation Department, Civil Aviation Authority of Vietnam, 119 Nguyen Son street, Long Bien district, Hanoi, VIET NAM	Ph: Fax: Email: lanoanh@caa.gov.vn
ICAO (Secretariat) Mr. Peter DUNDA	Regional Officer Aeronautical Meteorology/Environment International Civil Aviation Organization 252/1 Vibhavadi Rangsit Road Chatuchak, THAILAND	Ph: +66 (2) 537-8189 Ext. 153 Fax: +66 (2) 537-8199 Email: pdunda@icao.int

2. DESCRIPTION	
Objective	Improve the quality of meteorological services, in particular, observations, forecasts, advisories and warnings – including facilitating implementation of the International Airways Volcano Watch (IAVW) and International Tropical Cyclone Watch (ITCW) – in support of the global air navigation plan framework and the aviation system block upgrade (ASBUs) methodology.
Benefits	Improve the safety and efficiency of flight and ground operations.
Terms of Reference Functions of the group	Under guidance from ICAO APAC MET Secretariat: ~~Identify and evaluate current and future requirements with respect to meteorological services, in particular, observations, forecasts, advisories and warnings, in support of the aviation system block upgrades (ASBUs);~~ a) Promote the implementation of meteorological services, in particular, observations, forecasts, advisories and warnings, in support of the aviation system block upgrades (ASBUs), System Wide Information Management (SWIM), MET support to Air Traffic Management, etc.; b) Promote the requirement for, and benefits of, QMS for MET services and competency of aeronautical meteorological personnel; c) Maintain awareness of, and identify new, meteorological deficiencies and formulate strategies to resolve these deficiencies; d) Continually seek ways to improve the quality, compliance against SARPs and operational effectiveness of the meteorological services; Monitor the implementation and use of products and services under the framework of the World Area Forecast System (WAFS), the International Airway Volcano Watch (IAVW) and the International Tropical Cyclone Watch (ITCW); e) Monitor the relevant activities of the MET Panel and appropriate bodies; f) ~~Monitor the relevant activities of VOLCEX/SG; and~~ g) Provide advice and report to the MET Sub-group on the above issues for further co-ordination through the ICAO Secretariat with other appropriate bodies.
Work Programme	The work to be addressed by the ASIA/PAC MET/S WG includes: - Review procedures for the issuance of meteorological observations, forecasts, advisories and warnings in the region and propose actions for their improvement to related performance objectives; - In conjunction with MET/IE WG, investigate the deficiencies in the format and dissemination of meteorological observations, forecasts, advisories and warnings and propose remediation plans; - Respond to the needs of the guidance and/or training related to the implementation of meteorological observations, forecasts, advisories and warnings and inform MET/IE WG of changes required to the SIGMET guide; - In conjunction with MET/R WG and in support of the ASBUs, provide meteorological input for operational planning for specific phenomenon including volcanic ash, radioactive cloud, tropical cyclone, tsunami and space weather; - Follow the developments in the States related to the improvement of meteorological observations, forecasts, advisories and warnings and provide regional input on these matters to relevant ICAO and WMO groups and to

MET SG/24
Appendix 5 to the Report

2. DESCRIPTION	
	gather user requirements from ANSPs, IATA, IFATCA and IFALPA; - Investigate options for rectification of air navigation deficiencies in the field of meteorological services in APAC States; - Provide support for the ICAO APAC volcanic ash exercises; - Report on its work to the MET Sub-group of APANPIRG; and - Maintain a link to the Regional ATM Contingency Plan through the ATM SG.

3. COMMUNICATION STRATEGIES				
Description	Target Audience	Delivery Method	Frequency/ Date	Responsibility
Interim Work Plan Programme Progress Report	MET/S WG Members	Email and web-conference ~~Document via email and posted on ICAO Bangkok website; Webex~~	Quarterly/as determined by Chair ~~As required but reviewed at least quarterly~~	Chair and Secretariat
Major Work Programme Progress Report	MET/S WG Members	Working Paper (MET/S WG meeting) ~~Document via email and posted on ICAO Bangkok website; Webex~~	Annually/published 14-days or more before the meeting ~~As required but reviewed at least quarterly~~	Chair and Secretariat
General correspondence	MET/S WG Members	Email	As required	MET/S WG Members
Working Group Meeting	MET/S WG Members	Meeting (in conjunction with MET/IE WG)	Yearly in March	Chair
Status & Milestone	ICAO Secretariat and MET/S WG Members	Email WP at MET/S WG	Quarterly	Chair
New, specific proposal for action (WP)	MET/S WG Meeting Members	Working Paper (MET/S WG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	MET/S WG Members or States
New, specific information (IP)	MET/S WG Meeting Members	Information Paper (MET/S WG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	MET/S WG Members or States
Working Group Meeting Report	MET/S WG Members and all APAC States MET/S WG and MET/IE WG	MET/S WG Meeting Report ~~Working Paper~~	Annually/published 21-days or less after the meeting	Chair and Secretariat
Working Group Progress Report	MET SG Meeting	Working Paper (MET SG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting) ~~Yearly~~	Chair and Secretariat

WORK PROGRAMME

4. TASKS ACTIVITIES				
Tasks Activity	Time Frame	Responsibility	Status	Milestone
~~Task Activity~~ 1: Monitor and provide assistance to the regional implementation of meteorological observations, forecasts, warnings and advisories	2020-2021	MET/S WG	In progress	1
~~Task Activity~~ 2: Track and investigate deficiencies in the format and dissemination of meteorological observations, forecasts, warnings and advisories and propose corrective action and provide information to ICAO and WMO groups for possible assistance	2020-2021	MET/S WG and MET/IE WG	In progress	1,2
~~Task Activity~~ 3: Review WC, WV & WS SIGMET test results and implement improvements.	2020-2021	MET/S WG	In progress	1
~~Task Activity~~ 4: Provide guidance and/or training related to the implementation of meteorological observations, forecasts, warnings and advisories, including input to the Regional SIGMET Guide as they relate to the Annex 3 amendment cycle and SIGMET tests.	2020-2021	R/O, MET/S WG and MET/IE WG	In progress	1,3
~~Task Activity~~ 5: Provide input into regional-operational	2020-2021	MET/S WG and	In progress	3

MET SG/24
Appendix 5 to the Report

4. TASKS ACTIVITIES				
Tasks Activity	Time Frame	Responsibility	Status	Milestone
plans as required for specific phenomenon, including VA, radioactive cloud, TC, Tsunami and Space Weather, with consideration to global ICAO groups and WMO developments.		MET/R WG		
~~Task Activity 6: Investigate, and implement as appropriate, options to assist States in resolving air navigation deficiencies in the field of meteorological service.~~	~~2020-2021~~	~~MET/S WG~~	~~In progress~~	~~4~~
~~Task 7: Initiate amendment proposal for ANP concerning regional requirements for 30-hour TAF based on information provided by IATA.~~	~~2018~~	~~Secretariat, IATA~~	~~ON HOLD~~	~~5~~
~~Task Activity 9 7: Cost recovery – assist the PMC with development of an effective cost recovery strategy for the Pacific SIDS.~~	~~2020-2021~~	~~MET/S WG~~	~~To commence~~	
Activity 8: SIGMET coordination	2020-2021	MET/S WG	In progress	

5. MILESTONES OF MET/S WG			
Milestone	Accountability	Dates	Status
~~Milestone 1: Report on SIGMET test results and regional performance to MET SG~~	~~Chair~~	~~Annually~~	~~On track~~
~~Milestone 2: Guidance and educational material available~~	~~Chair~~	~~TBD~~	
~~Milestone 3: MET input provided for ASIA/PAC Regional ATM Contingency Plans~~	~~ad-hoc group~~	~~Next meeting~~	~~Recommend that this be closed~~
~~Milestone 4: Reduction in air navigation deficiencies in the field of meteorological service.~~	~~States~~	~~TBD~~	
~~(Old) Milestone 5: Conduct survey on the implementation and utilization of WAES and training needs within the ASIA/PAC Region and report to MET SG~~	~~Chair~~	~~Every 2 years~~	~~Recommend that this be suspended~~
~~Milestone 5: Amendment to APAC ANP Vol II (Table MET II 2) to reflect current requirements for provision of 30-hour validity TAF.~~	~~States~~	~~2017~~	~~On hold~~

5 6. WORK PLAN				
Task Activity / Milestone	Accountability	Predecessors	Date	Status
Activity 3: Review SIGMET test results and implement improvements				
Task Activity 3.1: Review SIGMET tests (conjoint session with MET/IE WG)	Working Group MET/S WG	-	Annually Mar	
Task Activity 3.2: Develop action plan to fix identified deficiencies	Chair in conjunction with the Working Group MET/S WG	conjoint session with MET/IE WG 3.1	During meeting Annually Mar	
Task Activity 3.3: Report back to MET SG on regional performance and action plan	Chair	3.2	Annually May	
Activity 3.4: Advise States of SIGMET deficiencies	Secretariat	3.3	Annually Jun	
Milestone 3: Report on SIGMET test results and regional performance to MET SG Improved issuance and compliance of SIGMETs	Chair MET/S WG	3.4	Annually	
Activity 4: GUIDANCE AND EDUCATIONAL MATERIAL				
Task 2.1: e) Review SIGMET pamphlets with regard to Annex 3 Amendment 77	Australia, Hong Kong, China, Japan and New Zealand (Rapporteur) in	—		Done

MET SG/24
Appendix 5 to the Report

5 6. WORK PLAN				
Task Activity / Milestone	Accountability	Predecessors	Date	Status
	conjunction with ICAO HQ and WMO		August 2016	
Task 2.2: Monitor international development of radioactive cloud SIGMET	China (Rapporteur), Hong Kong China and Japan	—	TBD	Done
Task 2.3: Review the draft guidance of tsunami warning in line with Amendment 77 to Annex 3 and present the guidance to MET SG for endorsement	Australia, Japan (rapporteur) and Indonesia		June 2016	Done
Task 2.4: Review the regional SIGMET Guide to be in line with Amendment 77 to Annex 3 New (specific task): Prepare proposal to include guidance on developing and using objective criteria supporting thunderstorm SIGMET issuance in the SIGMET Guide	Australia (rapporteur), China, Hong Kong China, Japan and New Zealand, in conjunction with Secretariat		2018	Done
Task Activity 4.1: Review the regional SIGMET Guide to be in line with Amendment 78 79 to Annex 3	Australia (rapporteur), Hong Kong China, Japan, New Zealand and Singapore, in conjunction with Secretariat		2020	
Activity 4.2: Review the regional SIGMET Guide to be in line with Amendment 81 to Annex 3	MET/S WG		2023	
Activity 4.3: Develop and implement a plan to educate MET service providers and aviation users on the new ICAO SWX provisions – based on SWXC coordination group (METP)	Secretary		2021	
Activity 4.4: Develop proposal to amend the ROBEX Handbook to facilitate the exchange of routine TAF for locations where States issue routine TAF every three hours instead of the recommended practice of every six hours [Report of MET/S WG/8, paragraph 3.5 refers].	Chair, Secretariat and State/s concerned		As advised by State/s concerned	
Activity 4.5: Develop proposal to amend ANP Volume III to clarify MET-related implementation planning guidance.	Chair, Secretariat		2021	
Milestone 4: Guidance and educational material available	Chair MET/S WG		TBD	
Activity 3: REGIONAL CONTINGENCY PLANS				
Activity 6 – SIGMET Air Navigation Deficiencies				
Task 4.1: Review options to eliminate SIGMET deficiencies	ad hoc group #1: Australia, China, Hong Kong China, Japan, Indonesia, and New Zealand (rapporteur)		Sep 2016	Done
Task 4.2: Monitor the provision of SIGMET services from States with SIGMET deficiencies	ad hoc group #2: Australia, Japan (rapporteur), Singapore and Thailand, in conjunction with MET/S WG chair and Secretariat	4.1	May 2016 and 2017	Done (July 2016) 2017 (to be coordinated with RODBs)
Task Activity 6.1: Assist the ICAO Secretariat in the facilitation of discussion of viable options with relevant States.	Paula and Secretariat ad hoc group #1	4.1	Ongoing	
Task Activity 6.2: Monitor the implementation of the solution/s to remove deficiencies.	MET/S WG ad hoc group #1	4.2	Ongoing	

MET SG/24
Appendix 5 to the Report

5 6. WORK PLAN				
Task Activity / Milestone	Accountability	Predecessors	Date	Status
Task Activity 6.3: Monitor global development on the establishment of a regional advisory system for hazardous weather information system.	MET/S WG ad hoc group #1		Ongoing	
Task Activity 6.4: Report progress to MET SG	Secretariat Rapporteur of ad hoc group #1	4.3	Ongoing	
Task 4.7: New task: Investigate options and provide examples for monitoring SIGMET implementation utilizing SIGMET coordination platforms Investigate metrics for monitoring SIGMET implementation, in coordination with RODBs, referring to practices in SIGMET coordination activities	ad hoc group #1 Singapore		Ongoing	
Milestone 6: Reduction in SIGMET air navigation deficiencies.	MET/S WG States		2021	
Activity 5 – Proposal to amend APAC ANP Volume II, Table MET II-2				
Task 5.1: Provide a list of regional requirements for 30 hour TAF	IATA	MET/S WG/7	Apr 2017	Done
Task 5.2: Draft a proposal to amend the ANP concerning regional requirements for 30 hour TAF based on information provided by IATA	Secretariat, IATA	5.1	Apr 2017	Done
Task 5.3: Ascertain whether the proposal has adequate support from the State/s affected	Secretariat	5.2	Apr 2017	Done
Task 5.4: Present outcomes of 5.1 to 5.3 for review by MET SG/24	Secretariat, IATA	5.3	May 2017	Done
Task 5.5: If supported, circulate the proposal to amend the ANP concerning regional requirements for 30 hour TAF	Secretariat	5.4	After May 2017	Done
Task: Develop proposal to amend the ROBEX Handbook to facilitate the exchange of routine TAF for locations where States issue routine TAF every three hours instead of the recommended practice of every six hours [Report of MET/S WG/8, paragraph 3.5 refers].	Chair, Secretariat and State/s concerned		As advised by State/s concerned	
Task: Develop proposal to amend ANP Volume III to clarify MET related implementation planning guidance.	Chair, Secretariat		2021	
Activity 7 – Cost recovery strategy				
Task Activity 7: Cost recovery – assist the PMC with development of an effective cost recovery strategy for the Pacific SIDS.	Tonga, Secretariat		2021	
Deliverable Activity 8 – SIGMET coordination activities in APAC Region Coordinate on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.				
Activity 8.1 Consolidated progress report on SIGMET coordination activities in the APAC Region and recommendations based on lessons learnt: - new and existing SIGMET coordination activities - WP (MET/R WG) and SP (MET/ATM Seminar) MET/IE WG and MET/S WG - key lessons learnt/recommendations for regional guidance on SIGMET coordination - identify opportunities for integration and expansion of SIGMET coordination activities	Ad-hoc group: Japan, Singapore, Hong Kong China, (Joint Rapporteurs) China, Indonesia, Malaysia, India, Viet Nam, Thailand, Fiji and IFALPA, coordinated by the Chairperson and Secretary	Next meeting of MET/R WG and MET/ATM Seminar	MET/S WG	

QUESTIONNAIRE ON THE PROVISION OF MET INFORMATION SERVICES TO SUPPORT ATM AND ATFM

INTRODUCTION

Purpose: This survey is intended to inform ICAO (and States) of the provision of current and future meteorological (MET) information services by States specifically to support Air Traffic Management (ATM), in particular Air Traffic Flow Management (ATFM).

The survey solicits input from the MET and ATM communities and Airspace Users in the Asia/Pacific Region (APAC) Region with the following terms of reference regarding the initiative and objective of the survey.

- To identify current and future meteorological requirements, in terms of the provision of MET information and communication methods, to support ATM;
- To identify the types and importance of MET information for ATM;
- To identify the gaps between the existing MET information services and the requirements of ATM community and Airspace Users;
- To identify challenges faced by States/Administrations regarding the provision of MET information to support ATM, in particular ATFM;
- To identify other guidance and education material required to support States/Administrations in implementing MET information to support ATFM.
- To remind States/Administrations of the existence of Asia Pacific Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations document.

Benefits: The survey results will assist ICAO APAC Regional Office to:

- Understand States/Administration current status and requirements of MET information to support ATM, in particular ATFM;
- Explore opportunities and enhance MET-ATM integration in APAC States/Administrations;
- Facilitate a coordinated approach for further improvement of MET services in support of ATM, especially ATFM in the APAC Region.
- Seek further input from States/Administrations on other guidance or education material required to assist the implementation of MET information service to support ATFM.

To collect input from BOTH the MET and ATM communities in the APAC Region, each State/Administration would be requested to provide at least **2 separate survey returns**, one from each of the MET and ATM communities.

State/Administrations are also encouraged to invite additional survey returns from their State-based Airspace Users such as airlines, for some of the specific questions indicated in the Questionnaire.

Please select all relevant responses (there may be more than one per question)

PART A – GOVERNANCE AND LEGISLATION (Questions for MET and ATM)

- (1) Has your State/Administration enacted primary legislation and supporting regulations to ensure that the implementation of MET service is in accordance with ICAO Annex 3 - *Meteorological Service for International Air Navigation* and any applicable regional air navigation agreements?

a) No

b) Yes (please specify):

- (2) Does your State/Administration have a written agreement in place between the air traffic authority/service and the meteorological authority/service defining roles and responsibilities and the MET information to be provided in accordance with ICAO Annex 3 and ICAO Doc. 9377 – *Manual on Coordination between Air Traffic Services, Aeronautical information Services and Aeronautical Meteorological Services*?

- a) No
b) Yes (please specify):

**PART B – IMPLEMENTATION OF AIR TRAFFIC FLOW MANAGEMENT (ATFM) –
Questions for ATM only**

- (3) Has your State/Administration implemented ATFM?

- a) Yes
b) No

- (4) If Yes to Q3, please specify your State's level of implementation of ATFM and provide further details.

Note: Level of implementation defines the phase at which the States are in implementing their ATFM procedures and processes. For example, Level 1, 2 or 3 of Distributed Multi-Nodal ATFM Project or implementation phases of any other ATFM projects the States are involved in.

- (5) If No to Q3, is your State/Administrative intending to implement ATFM?

- a) Yes
b) No

If yes, please specify the expected timeline and provide further details:

PART C- PROVISION OF MET INFORMATION

PART C1 - CURRENT PROVISION OF METEOROLOGICAL INFORMATION (Questions for MET and ATM)

- (6) **For ATM and MET:** Indicate below the provision of specific MET information/services in your State/Administration to support ATFM (select more than one options as necessary):

- a) Local report, routine/special
b) Aerodrome meteorological report, routine/special (METAR/SPECI)
c) Volcanic activity report
d) Volcano Observatory Notice to Aviation (VONA)
e) Air-report, routine/special (ARP/ARS)
f) Aerodrome forecast (TAF)

- g) Trend forecast (TREND)
 - h) Area forecast for low-level flights (GAMET)
 - i) Significant weather (SIGWX) forecast; low-level (flight levels below 100)
 - j) Significant weather (SIGWX) forecast; medium-level (flight levels between 100 and 250)
 - k) Significant weather (SIGWX) forecast; high-level (flight levels between 250 and 630)
 - l) Upper-air wind and temperature grid point forecasts
 - m) Volcanic ash advisory information (VAA)
 - n) Volcanic ash advisory information in graphical format (VAG)
 - o) Tropical cyclone advisory information (TCA)
 - p) Tropical cyclone advisory information in graphical format (TCG)
 - q) SIGMET information
 - r) AIRMET information
 - s) Aerodrome warning (AD WRNG)
 - t) Wind shear Warning (WS WRNG)
 - u) Wind shear alert
 - v) Aeronautical climatological information
 - w) Other MET information, e.g., tailored service (please specify):
-
-

- (7) **For ATM only:** Does your State/Administration's ATM/ATFM system(s) utilize automated processing of gridded MET information (e.g. World Area Forecast System (WAFS) information) to support flight planning?

For MET only: What gridded MET information (e.g. World Area Forecast System (WAFS) information) is provided to your State's ATM to support flight planning.?

Parameter	WAFS as the information source (Yes / No)	Other sources (Yes / No) (If yes, please specify the source(s))
Wind		
Temperature		
Humidity		
Icing		
Turbulence		
Cumulonimbus cloud		
Other (please specify):		

PART C2 - FUTURE PROVISION OF METEOROLOGICAL INFORMATION (Questions for MET, ATM and Airspace Users)

- (8) **For ATM and Airspace Users:** Rate the types of aerodrome MET observation and forecast parameters considered useful to support ATM/ATFM operation and rate the impact of these parameters to ATM/ATFM operations. Please use the ratings as follows
- Ratings on usefulness: 5-Very useful / 4-Useful / 3-Less useful / 2-Not useful / 1-Not Applicable
 - Ratings on impact: 5-Very high impact / 4- Relatively high impact / 3 – Relatively low impact / 2 – Very low impact / 1-Not Applicable

Aerodrome MET information	Ratings on usefulness	Ratings on impact
Wind speed and direction		
Headwind and crosswind		
Wind Shear		
Visibility		
Runway Visual Range (RVR)		
Temperature		
QNH		
Low clouds		
Fog/Mist		
Haze		
Smoke		
Frost		
Snow (including snowstorm)		
Hail		
Thunderstorm		
Dust (including Duststorm)		
Sand (including Sandstorm)		
Light precipitation (e.g. drizzle, light rain)		
Heavy precipitation (e.g. Heavy showers, rain, snow, etc)		
Volcanic ash		
Flooding / storm surge		
Tropical Cyclone		
Other (please specify):		

- (9) **For ATM and Airspace User:** Rate the types of MET observation and forecast phenomena within your Flight Information Region (FIR) considered useful to support ATFM operation and rate the impact of these phenomena to ATM/ATFM operations.

Please use the ratings as follows

- Ratings on usefulness: 5-Very useful / 4-Useful / 3-Less useful / 2-Not useful / 1-Not Applicable
- Ratings on impact: 5-Very high impact / 4- Relatively high impact / 3 – Relatively low impact / 2 – Very low impact / 1-Not Applicable

Airspace (Enroute) MET information	Ratings on usefulness	Ratings on impact
Wind speed and direction		
Temperature		
Convective Cloud (such as Deep Convection or Towering Cumulus Cloud)		
Thunderstorms		
Duststorms		
Sandstorms		
Icing (moderate or severe)		
Turbulence (moderate or severe)		
Volcanic Ash		
Tropical Cyclone		

MET SG/24
Appendix 6 to the Report

Other (please specify):		

- (10) **For ATM and Airspace User:** Rate the importance of characteristic descriptions of MET phenomenon for an effective and efficient ATFM in your State/Administration. Please use the ratings as follows and specify the reasons.
(Ratings of importance: 5-Very important / 4-Important / 3-Less important / 2-Not important / 1-Not Applicable)

Characteristic descriptions of MET Information	Ratings of importance	Reason(s)
Time of issuance and validity		
Observed position, horizontal extent and vertical extent		
Forecast position, horizontal extent and vertical extent		
Observed movement / forecast movement		
Intensity (light, moderate and severe)		
Expected change in intensity (weakening, intensifying or no change)		
Frequency (isolated, scattered, occasional and frequent)		
Probability of occurrence		
Confidence/Uncertainty of forecast		
Other (Please specify):		

- (11) **For ATM and MET:** Are there any established objective rules for automatic quantitative translation from MET constraints to ATFM impact (e.g. change in Airport Arrival Rate, Airport Departure Rate, Miles-in-Tail (MIT)/Minutes-in-Tail (MINIT), other flow control measures) developed or planned to be developed in your State/Administration? If yes, please provide implementation details otherwise, please provide additional information on the State's plan.

- (12) **For ATM and Airspace Users:** In relation to MET information, rate the importance of the following components for an effective and efficient ATFM in your State/Administration. Please provide your expectations from MET service providers for each component. Please use the ratings as follows and provide further details.
(Ratings of importance: 5-Very important / 4-Important / 3-Less important / 2-Not important / 1-Not Applicable)

Needs of ATFM operation	Ratings of importance	Please provide further details
Timeliness, such as forecast lead time and update frequency		
Quality of forecast, such as accuracy and reliability		
Provision of MET information as an information service, such as through secured web services, in SWIM environment		

Note: SWIM information can be found at https://www.icao.int/APAC/Pages/swim.aspx		
Integration of MET information, provided through information service in SWIM, with other information domain, such aeronautical information and flight information to enable a data-centric operational environment.		
SWIM-compliant meteorological information to be more readily exchanged with the aircraft to improve operational awareness and decision-making using air/ground data connectivity and aircraft on-board systems.		
Capability to translate MET constraint into ATFM impact is required for decision support tool.		
Optimized flight trajectory planning		
Information on the state of the runway as provided by the appropriate airport authority, such as runway deposits, the extent of runway contamination, the depth of deposit and the estimated surface friction.		
Other (please specify):		

- (13) **For ATM and Airspace User:** Based on the response from Q8 to Q12, what the challenges that your organization may have encountered, if any, regarding the development, implementation and/or utilisation of enhanced MET services to better support ATFM operation?

- (14) **For MET only:** In reference to Q8 to Q12, what are the challenges your organization may have encountered (or may encounter), if any, regarding the development and implementation of enhanced MET services to better support ATFM operation?

- (15) **For ATM and MET:** What initiatives does your State/Administration currently undertake, or will undertake in future, to enhance MET service provision specifically in support of ATFM operations? Indicate the expected implementation timeline for these initiatives.

Future Initiatives	Expected Timeline (2020-2021) / (2022-2023) / (2024-2025)	Brief Description of the Initiative
Collaborative decision-making process, including MET		

MET SG/24
Appendix 6 to the Report

information to support of ATFM operations.		
MET-ATM integration (Integration of forecast data supporting ATM (ATFM and Air Traffic Services (ATS)).		
MET for FF-ICE (Flight and Flow Information for Collaborative Environment – Reference ICAO Doc 9965) (link the brochure)		
Other (Please Specify):		

PART D – COMMUNICATION METHODS (Questions for MET, ATM and Airspace Users)

- (16) **For ATM and MET:** By which mode does your State/Administration disseminate aeronautical MET information to ATS units, Airspace Users and other stakeholders (select more than one option as necessary)?

- a. Aeronautical Fixed Telecommunications Network (AFTN)
- b. ATS Message Handling System (AMHS)
- c. Telephone
- d. Facsimile
- e. Internet
- f. Web/video conferencing
- g. System to system Interface, e.g. web-based technology.
- h. Other (please specify):

- (17) **For ATM and MET:** What is the most effective means of representing MET information in support of AFTM in your State/Administration? Please use the ratings below for your preference.
(Preference: 5-Most preferred / 4-Preferred / 3-Less preferred / 2-least preferred / 1- Not Applicable)

Form of MET information presentation	Preference
Text	
Chart / Graphical	
Animation / Video	
Briefing	
Other (please specify):	

- (18) **For ATM, MET and Airspace Users:** What are the challenges that your State/Administration may have encountered, if any, for an effective collaboration and communication between ATM and MET while developing and implementing ATFM?

PART E – EDUCATION (Questions for MET, ATM and Airspace Users)

A document titled *Asia Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations* is now available on the ICAO APAC eDocuments web-page. <Put a link here once final version is made available>. The aim of the document is to foster States' implementation and enhancement of MET information and services for ATM within APAC region.

The guidance captures most of the necessary processes from preparatory to operational phases. A stepwise (process-wise) structure of the guidance is expected to allow each State to refer to chapters, sections or subsections useful for the commencement, implementation or improvement of its MET information and services to support effective ATM. This guidance is expected to support State implementation of the Regional Framework for Collaborative ATFM.

- (19) Was your State/Administration aware of this document?
- a) No
 - b) Yes

- (20) How do you think your State/Administration can benefit from the guidance in implementation or enhancement of MET information and services for ATM?

- (21) What other guidance or education material required to support State/Administration in implementing or improving provisions of MET information and services to support effective ATFM?

Thank you for your time to complete this survey

Respondent Information

State/Administration: _____
Organization: _____
Name: _____
Post title: _____
Email: _____
Work nature: (ATM operation / MET service / Airspace User)

MET SG/24
Appendix 7 to the Report

Reproduced from APANPIRG/30, Appendix D to the Report on Agenda Item 4

Editorial Note: Proposed updates endorsed by MET SG/24 shows deleted text using strikethrough (~~text to be deleted~~), and added text with grey shading (text to be inserted).

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		Deficiencies			Corrective action			
Requirements	States/ Facilities (Index No.)	Description	Date first reported	Remarks	Description	Executing body	Target date for completion	Priority for action *
MWO and SIGMET service (Annex 3: Chapter 3, 3.4 and Chapter 7)	Democratic Peoples' Republic of Korea (DPRK) (AP-MET-16)	Requirements for MWO and SIGMET service not established for Pyongyang FIR	2008	Reported by ICAO Regional Office mission	Establish MWO to provide required service, including SIGMET information for Phnom Penh FIR. See notes below for more information.	GACA, Democratic Peoples' Republic of Korea	TBC	A
Meteorological observations and reports. (Annex 3: Chapter 4)	Kiribati (AP-MET-02)	METAR from Kiribati not available on regular basis.	1998	Reported by airlines	Equipment to be installed and arrangements to be made for regular observations and reports, including: training of personnel; maintenance of equipment; calibration and verification of meteorological observations; and proper/secure transmission of data. See notes below for more information.	State designated MET authority	TBC	A
Meteorological information for operators and flight crew members, including forecasts provided by the WAFCs (Annex 3: Chapter 9)	Kiribati (AP-MET-18)	WAFC forecasts not available for inclusion in flight briefings and documentation	2008	Reported by TCB CAEMSA-SP Technical Expert	Implement procedures and systems for the required meteorological information to be supplied to operators and flight crew members, including forecasts generated from the digital forecasts provided by the WAFCs. See notes below for more information.	State designated MET authority	TBC	U
Meteorological information for operators and flight crew members, including forecasts provided by the WAFCs (Annex 3: Chapter 9)	Nauru (AP-MET-19)	WAFC forecasts not available for inclusion in flight briefings and documentation	2008	Reported by TCB CAEMSA-SP Technical Expert	Implement procedures and systems for the required meteorological information to be supplied to operators and flight crew members, including forecasts generated from the digital forecasts provided by the WAFCs. See notes below for more information.	State designated MET authority	TBC	U

MET SG/24
Appendix 7 to the Report

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		Deficiencies			Corrective action			
Requirements	States/ Facilities (Index No.)	Description	Date first reported	Remarks	Description	Executing body	Target date for completion	Priority for action *
Meteorological observations and reports. (Annex 3: Chapter 4)	Nauru (AP-MET-21)	METAR/SPECI service not provided	2008	Reported by TCB CAEMSA-SP Technical Expert	Equipment to be installed and arrangements to be made for regular observations and reports, including: training of personnel; maintenance of equipment; calibration and verification of meteorological observations; and proper/secure transmission of data. See notes below for more information.	State designated MET authority	TBC	U
Provision of SIGMET information (Annex 3, Chapter 7)	Nauru (AP-MET-24)	Lack of SIGMET issued for the Nauru FIR.	Sep 2011	IATA deemed this situation unsafe and unacceptable to airline operations.	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. See notes below for more information.	State designated MET authority	TBC	U
Provision of SIGMET information (Annex 3: Chapter 7)	Nepal (AP-MET-14)	Requirements for issuance and dissemination of SIGMET information for Kathmandu FIR have not been fully implemented	2000		Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. See notes below for more information.	State designated MET authority	TBC	A

MET SG/24
Appendix 7 to the Report

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		Deficiencies			Corrective action			
Requirements	States/ Facilities (Index No.)	Description	Date first reported	Remarks	Description	Executing body	Target date for completion	Priority for action *
Reporting of information on volcanic eruptions to civil aviation units. (Annex 3, 3.6, 4.8)	Papua New Guinea (AP-MET-04)	Information on volcanic activity not provided regularly to ATS units, MWOs and VAACs.	1995	Observed by States concerned. Reported at the WMO/ICAO Workshop on Volcanic Ash Hazards (Darwin, 1995)	Establish arrangements for State volcano observatories to send the required volcano observation information as quickly as practicable to the associated ACC/FIC, MWO and VAAC. See notes below for more information.	Rabaul Volcano Observatory, NWS and ASL of Papua New Guinea	TBC	A
Provision of SIGMET for volcanic ash (Annex 3: Chapter 7)	Papua New Guinea (AP-MET-08)	Requirements for issuance and proper dissemination of SIGMET for volcanic ash have not been fully implemented	Dec 2003	Reported by airlines, noted by Volcanic Ash Advisory Centres and confirmed by ICAO mission	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of volcanic ash. See notes below for more information.	NWS of Papua New Guinea	TBC	U
Provision of SIGMET information (Annex 3, Chapter 7)	Papua New Guinea (AP-MET-22)	Lack of SIGMET issued for the Port Moresby FIR.	Sep 2011	IATA deemed this situation unsafe and unacceptable to airline operations.	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. See notes below for more information.	State designated MET authority	TBC	U

MET SG/24
Appendix 7 to the Report

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		Deficiencies			Corrective action			
Requirements	States/ Facilities (Index No.)	Description	Date first reported	Remarks	Description	Executing body	Target date for completion	Priority for action *
Meteorological observations and reports. (Annex 3: Chapter 4)	Solomon Islands (AP-MET-01)	Weather information is inadequate and not provided on a regular basis	1996	Reported by airlines operating to Solomon Islands	Equipment to be upgraded and arrangements to be made for regular observations and reports, including: training of personnel; maintenance of equipment; calibration and verification of meteorological observations; and proper/secure transmission of data. MET SG/24 proposes that APANPIRG removes AP-MET-01 from the open list. See notes below for more information.	Solomon Is. MET Service	TBC	A
Meteorological information for operators and flight crew members, including forecasts provided by the WAFCs (Annex 3: Chapter 9)	Solomon Islands (AP-MET-20)	WAFC forecasts not available for inclusion in flight briefings and documentation	2008	Reported by TCB CAEMSA-SP Technical Expert	Implement procedures and systems for the required meteorological information to be supplied to operators and flight crew members, including forecasts generated from the digital forecasts provided by the WAFCs. See notes below for more information.	State designated MET authority	TBC	U
Provision of SIGMET information (Annex 3, Chapter 7)	Solomon Islands (AP-MET-23)	Lack of SIGMET issued for the Honiara FIRs.	Sep 2011	IATA deemed this situation unsafe and unacceptable to airline operations.	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. See notes below for more information.	State designated MET authority	TBC	U
Reporting of information on volcanic eruptions to civil aviation units. (Annex 3: 3.6, 4.8)	Tonga (AP-MET-17)	Information on volcanic activity not provided regularly to ATS units, MWOs and VAACs	2008	Reported by TCB CAEMSA-SP technical expert	Establish arrangements for State volcano observatories to send the required volcano observation information as quickly as practicable to the associated ACC/FIC, MWO and VAAC. See notes below for more information.	MOI and MEIDECC	TBC	U

MET SG/24
Appendix 7 to the Report

NOTES:

Index No.	State	Update Date	NOTES ON <u>OPEN</u> DEFICIENCIES
AP-MET-01	Solomon Islands	September 2017	APANPIRG/28 noted that Solomon Islands should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
		June 2019	MET SG/23 requested the Secretary in conjunction with support from other States to provide Solomon Islands with assistance in preparing the full report on rectification of the deficiency.
		November 2020	MET SG/24 concurred that Solomon Islands completed corrective action to ensure provision of aerodrome meteorological observations or reports is in compliance with ICAO SARPs. Resolution of the deficiency is validated by users and OPMET monitoring results. MET SG/24 proposes that APANPIRG removes AP-MET-01 from the open list. Draft Conclusion MET SG/24-04, refers.
AP-MET-02	Kiribati	September 2017	APANPIRG/28 noted that Kiribati should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-04	Papua New Guinea	September 2017	APANPIRG/28 noted that Papua New Guinea should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-08	Papua New Guinea	September 2017	APANPIRG/28 noted that Papua New Guinea should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-14	Nepal	September 2017	APANPIRG/28 noted that Nepal should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-16	Democratic People's Republic of Korea	September 2017	APANPIRG/28 noted that DPRK should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-17	Tonga	10 May 2013	Ministry of Infrastructure (MOI), Civil Aviation Division, advised that: • MOU established between the national authority providing volcano monitoring (Ministry of Lands, Environment, Climate Change and Natural Resources – MLECCNR) and the national authority providing meteorological service for international

MET SG/24
Appendix 7 to the Report

Index No.	State	Update Date	NOTES ON <u>OPEN</u> DEFICIENCIES
		29 May 2017	air navigation (MOI) for the reporting of volcanic activity to the associated ACCs, MWOs and VAACs in accordance with the relevant ICAO SARPs.
		September 2017	MOI, Civil Aviation Division, advised that: • Relevant operating procedures implemented in the units concerned and case studies of real volcanic events presented as evidence of the State volcano observatory's issuance of the required volcano observation information.
		June 2018	APANPIRG/28 noted that: • Removal of the deficiency from the open list is subject to the concurrence of the ATS units, MWOs and VAACs concerned that the deficiency is resolved.
			MET SG/22 noted that: • VAAC Wellington was coordinating with Tonga on the validation of corrective action taken to resolve the deficiency.
AP-MET-18	Kiribati	September 2017	APANPIRG/28 noted that Kiribati should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-19	Nauru	September 2017	APANPIRG/28 noted that Nauru should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-20	Solomon Islands	September 2017	APANPIRG/28 noted that Solomon Islands should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
		June 2019	MET SG/23 requested the Secretary in conjunction with support from other States to provide Solomon Islands with assistance in preparing the full report on rectification of the deficiency.
AP-MET-21	Nauru	September 2017	APANPIRG/28 noted that Nauru should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
AP-MET-22	Papua New Guinea	September 2017	APANPIRG/28 noted that Papua New Guinea should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.

MET SG/24
Appendix 7 to the Report

Index No.	State	Update Date	NOTES ON <u>OPEN</u> DEFICIENCIES
AP-MET-23	Solomon Islands	September 2017	APANPIRG/28 noted that Solomon Islands should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.
		June 2019	MET SG/23 requested the Secretary in conjunction with support from other States to provide Solomon Islands with assistance in preparing the full report on rectification of the deficiency.
AP-MET-24	Nauru	September 2017	APANPIRG/28 noted that Nauru should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the deficiency.

Index No.	State	Update Date	NOTES ON <u>CLOSED</u> DEFICIENCIES
AP-MET-03	Indonesia	September 2017	Removed from the open list, APANPIRG/28 Conclusion 28/29 refers.
AP-MET-05	–	–	This Index No. is not used.
AP-MET-06	Indonesia	September 2017	Removed from the open list, APANPIRG/28 Conclusion 28/29 refers.
AP-MET-07	Philippines	November 2019	Removed from the open list, Conclusion APANPIRG/30/19, refers.
AP-MET-09	Cambodia	September 2018	Removed from the open list, APANPIRG/29 Decision 29/23 refers
AP-MET-10	–	–	This Index No. is not used.
AP-MET-11	Cambodia	September 2018	Removed from the open list, APANPIRG/29 Decision 29/24 refers
AP-MET-12	Lao PDR	September 2018	Removed from the open list, APANPIRG/29 Decision 29/24 refers
AP-MET-13	–	–	This Index No. is not used.
AP-MET-15	–	–	This Index No. is not used.

Acronyms/Abbreviations/Definitions

ACC	— Area control centre
ASL	— Air Services Ltd.
ATS	— Air traffic services
CAEMSA-SP	— Cooperative Agreement for the Enhancement of Meteorological Services to Aviation - South Pacific
CAAP	— Civil Aviation Authority Philippines
CAP	— Corrective action plan
FIC	— Flight information centre
FIR	— Flight information region
GACA	— General Administration of Civil Aviation
IATA	— International Air Transport Association
MEIDECC	— Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication
MET	— Meteorological
METAR	— Aerodrome routine meteorological report (<i>in meteorological code</i>)
MWO	— Meteorological watch office
NWS	— National Weather Service
PAGASA	— Philippine Atmospheric, Geophysical and Astronomical Services Administration
PHIVOLCS	— Philippine Institute of Volcanology and Seismology
SIGMET	— Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations
SPECI	— Aerodrome special meteorological report (<i>in meteorological code</i>)
SSCA	— State Secretariat of Civil Aviation
TBC	— To be confirmed
TCB	— Technical Cooperation Bureau (of ICAO)
VAAC	— Volcanic ash advisory centre
WAFC	— World area forecast centre
WMO	— World Meteorological Organization

**APAC USER REQUIREMENTS FOR SWIM-BASED MET INFORMATION SERVICES
SUPPORTING ATFM**

Proposed terms of reference regarding the scope and objective of the work to be conducted by the ad-hoc group:

1. To focus on SWIM-based MET information services specifically addressing the needs of ATFM in the APAC Region;
2. To document user requirements and use cases from ATFM in the APAC Region to facilitate the development of future SWIM-based MET information services;
3. To supplement the global concept described in the MET-SWIM Plan, prepared by the METP WG-MIE, and the MET requirements being developed by the METP Working Group on Meteorological Requirements and Integration (WG-MRI) in a global sense and IWXXM development by METP WG-MIE for effective exchange of MET information supporting ATFM operation;
4. To assist SWIM TF in identifying and developing the specifications of information services required to support operations based on user needs;
5. To identify MET and ATFM data to be exchanged using SWIM-based Information Exchange Services in the Region (examples shown in Appendix B) to enable the effective MET/ATM integration and to provide the baseline for further development of the regional SWIM data catalogue and service catalogue; and
6. To identify other granular MET-related requirements from ATFM perspective such as update frequency and forecast lead time of MET information to better support the development of future MET Information Exchange Services in the Region.

INTERNATIONAL CIVIL AVIATION ORGANIZATION



ASIA/PACIFIC REGIONAL SIGMET GUIDE

EIGHTH EDITION — XXX 2020

Note: This edition includes changes agreed for Amendment 79 to Annex 3 (applicable Nov 2020)

RECORD OF AMENDMENTS AND CORRIGENDA

[illegible][illegible]

TABLE OF CONTENTS

	Page
Part 1: Introduction	
1.1 General.....	1-1
Part 2: Responsibilities and coordination	
2.1 General.....	2-1
2.2 Meteorological watch office (MWO) responsibilities	2-1
2.3 Air traffic services (ATS) unit responsibilities.....	2-3
2.4 Pilot responsibilities	2-3
2.5 Coordination between MWOs and ATS units	2-4
2.6 Coordination between MWOs, VAACs, TCACs and State volcano observatories.....	2-4
Part 3: Procedures for preparation of SIGMET information	
3.1 General.....	3-1
3.2 SIGMET phenomena.....	3-2
3.3 Allowable abbreviations	3-3
3.4 SIGMET structure	3-3
3.5 SIGMET format.....	3-4
3.5.1 WMO header	3-4
3.5.2 First line of SIGMET.....	3-5
3.5.3 Structure of the meteorological part of SIGMET	3-6
3.6 Cancellation of SIGMET.....	3-17
3.7 Amendment/correction of SIGMET	3-18
3.8 Dissemination of SIGMET	3-18
Appendices	
Appendix A — SIGMET guidance table: Simplified from Annex 3 Table A6-1	A-1
Appendix B — SIGMET examples.....	B-1
Appendix C — SIGMET test procedures	C-1
Appendix D — WMO headings (WMO AHL) for SIGMET bulletins	D-1
Appendix E — WMO headings for tropical cyclone and volcanic ash advisory bulletins (FK and FV).....	E-1
Appendix F — Asia/Pacific VAAC back-up procedures	F-1
Appendix G — Tokyo/Darwin VAAC back-up test procedures.....	G-1
Appendix H — Wellington/Darwin VAAC back-up test procedures	H-1
Appendix I — Additional Criteria for Issuance of SIGMET for thunderstorm	I -1
Appendix J — Space Weather Advisories	J -1
Appendix K — Guidelines for Operational SIGMET Coordination	K-1

1. INTRODUCTION

1.1. General

- 1.1.1. The main purpose of this regional SIGMET guide is to provide guidance for standardization and harmonization of the procedures and formats related to the preparation and issuance of aeronautical meteorological information pertaining to specified en-route hazardous weather, and other phenomena in the atmosphere, which may affect safety of aircraft operations, known as SIGMET. The guidance is complementary to Annex 3 to the Convention on International Civil Aviation – *Meteorological Services for International Air Navigation*, the Standards and Recommended Practices (SARPs) contained therein regarding SIGMET, and to the SIGMET-related provisions in ICAO Regional Air Navigation Plans (ANPs).
- 1.1.2. The guidance is specifically provided for the provision of SIGMET in traditional alphanumeric code (TAC) form. As the provision and use of SIGMET data in digital form (IWXXM XML/GML) is used increasingly across ICAO communications networks it is expected that the conventions of the digital form will result in more compliant and less ambiguous SIGMET messages. During the period of transition, where it is likely that originating MWOs will issue both TAC and digital forms of SIGMET and until TAC SIGMET is formally retired, it is considered necessary to make available a guidance document of this form.
- 1.1.3. ICAO provisions concerning the preparation and issuance of SIGMET information are primarily contained in:
- Annex 3 - *Meteorological Service for International Air Navigation*, Part I, Chapters 3 and 7 and Part II, Appendix 6;
 - Annex 11 - *Air Traffic Services*, Chapter 4, 4.2.1 and Chapter 7, 7.1;
 - Regional Air Navigation Plans, Basic ANP, Part VI - Meteorology (MET);
 - Regional Air Navigation Plans, Volume II, FASID, Part VI – Meteorology (MET) FASID, Tables MET 1B, MET 3A and MET 3B;
 - *Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM, Doc 4444)*, Chapter 9, 9.1.3.2;
 - Regional Supplementary Procedures (Doc 7030), Chapter 6, 6.13.2;
 - *ICAO Abbreviations and Codes* (Doc 8400);
 - *Handbook on the International Airways Volcano Watch (IAVW) – Operational Procedures and Contact List* (Doc 9766);
 - *Manual of Aeronautical Meteorological Practice* (Doc 8896), Chapters 1 and 4;
 - *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377).
- 1.1.4. This regional SIGMET guide is primarily intended to assist meteorological watch offices (MWOs) in preparing and disseminating SIGMET information in conformance with the format prescribed in Annex 3. The explanations of the format to be used are accompanied by examples. The regional SIGMET guide also provides information regarding the necessary coordination between the MWOs, air traffic services (ATS), volcanic ash advisory centres (VAACs), tropical cyclone advisory centres (TCACs) and pilots, and their respective responsibilities.
- 1.1.5. To support regional management of SIGMET issuance and dissemination, Appendix C of the regional SIGMET guide contains guidance on the purpose, scope and procedures for conducting regional SIGMET tests.

2. RESPONSIBILITIES AND COORDINATION

2.1. General

- 2.1.1. SIGMET messages provide information on hazardous meteorological and other phenomena which may affect safety of aircraft operations; hence they are considered a high priority among other types of meteorological information provided to the aviation users. The primary purpose of SIGMET is for in-flight service, which requires timely transmission of the SIGMET messages to pilots by the ATS units and/or through VOLMET and D-VOLMET. Further information on the responsibilities of each party involved in the SIGMET process can be found in the *Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services* (Doc 9377).
- 2.1.2. Airlines are the main users of the SIGMET information. They contribute to the effectiveness of the SIGMET service through issuance of special air-reports reported by pilots to the ATS units. Special air-reports are among the most valuable sources of information for the MWOs in the preparation of SIGMET. The ATS units receiving special air-reports should forward them to their associated MWOs without delay.
- 2.1.3. In view of the foregoing, it should be well understood that the effectiveness of the SIGMET service depends strongly on the level of collaboration between the MWOs, ATS units, pilots, TCACs, VAACs and State volcano observatories. That is why, close coordination between these parties, as well as mutual understanding of their needs and responsibilities are essential for the successful implementation of the SIGMET service.
- 2.1.4. For the special cases of SIGMET for volcanic ash and tropical cyclones, the MWOs are provided with advisories from VAACs and TCACs respectively, as designated in the regional ANPs.
- 2.1.5. SIGMET is also used for flight planning. This requires global dissemination of SIGMET through the regional OPMET data banks (RODBs), the Internet-based SADIS FTP service and the WAFS Internet File Service (WIFS). SIGMET should also be distributed to the World Area Forecast Centres (WAFCs) London and Washington for use in the preparation of the significant weather (SIGWX) forecasts.

2.2. Meteorological watch office (MWO) responsibilities

- 2.2.1. SIGMET is to be issued by the MWO in order to provide timely information on the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere affecting the safety of the flight operations in the MWO's area of responsibility. SIGMET provides information concerning the location, extent, intensity and expected evolution of the specified phenomena.
- 2.2.2. Information about the provision of the SIGMET service, including details on the designated MWO(s), is to be included in the State's Aeronautical Information Publication (AIP) as required by Annex 15 – *Aeronautical Information Service*, Appendix 1, GEN 3.5.8.
- 2.2.3. If a State is temporarily unable to meet its obligations for establishing MWO(s) and for provision of SIGMET, arrangements have to be made for another State to assume this responsibility. Such delegation of responsibilities is to be agreed by the meteorological authority of each State concerned and should be notified by a NOTAM, within the State's AIP and in a letter to the ICAO Regional Office concerned.

- 2.2.4. The meteorological authority concerned should ensure that the MWO obligations and responsibilities are clearly defined and assigned to the unit designated to serve the MWO. Corresponding operational procedures should be established and the meteorological staff should be trained accordingly.
- 2.2.5. In preparing SIGMET information MWOs should follow the format prescribed in Annex 3, Appendix 6, Table A6-1A. Whilst Table A6-1A is the authoritative source, Appendix A of this regional SIGMET guide, includes an enhanced SIGMET specific guidance based on Table A6-1A and provides more specific instructions on how SIGMET should be compiled. The aim is to ensure that SIGMET is produced reliably and consistently worldwide.
- 2.2.6. SIGMET must be issued only for those phenomena listed in Annex 3, Appendix 6, 1.1.4 and only when specified criteria for their intensity and spatial extent are met (section 3.2 below refers).
- 2.2.7. The MWOs should be adequately equipped in order to be able to identify, analyse and forecast those phenomena for which SIGMET is required. The MWO should make use of all available sources of information including:
- special air-reports passed to the MWO from ATS (voice communication);
 - special air-reports received from automated downlink;
 - Numerical Weather Prediction (NWP) data, especially high resolution models where available;
 - meteorological observations, including those from automatic weather stations and human observers;
 - upper wind information;
 - information from meteorological satellites;
 - weather radar (including Doppler radar);
 - State volcano observatories;
 - International Atomic Energy Agency (IAEA) through the relevant World Meteorological Organization (WMO) Regional Specialized Meteorological Centre (RSMC) for radioactive cloud;
 - local knowledge;
 - volcanic ash or tropical cyclone advisory messages.
- 2.2.8. On receipt of a special air-report from the associated ACC or FIC, the MWO shall:
- a) issue SIGMET information based on the special-air report; or
 - b) send the special air-report for onward transmission to MWOs, WAFCs and other meteorological offices in accordance with regional air navigation agreement in the case that the issuance of SIGMET information is not warranted (e.g., the phenomenon concerned is of transient nature).
- 2.2.9. Appropriate telecommunication means should be available at the MWO in order to ensure timely dissemination of SIGMET according to a dissemination scheme, which should include transmission to:
- local ATS users;
 - aerodrome MET offices within its area of responsibility, where SIGMET is required for briefing and/or flight documentation;
 - other MWOs in accordance with regional air navigation plans;
 - Centres designated for transmission of VOLMET or D-VOLMET where SIGMET is required for those transmissions;
 - responsible ROBEX centres and regional OPMET data bank (RODB). It should be arranged that, through the ROBEX scheme, SIGMETs are sent to the designated RODB in the other ICAO regions, to the WAFCs and to the SADIS and WIFS providers;

- 2.2.10. In issuing SIGMET for tropical cyclones or volcanic ash, the MWOs should include as appropriate the advisory information received from the responsible TCAC or VAAC. In addition to the information received from the TCAC and VAAC, the MWOs may use the available complementary information from other reliable sources.

2.3. Air traffic service (ATS) unit responsibilities

- 2.3.1. Close coordination should be established between the MWO and the corresponding ATS unit (ACC or FIC) and arrangements should be in place to ensure:
- receipt without delay and display at the relevant ATS units of SIGMET issued by the associated MWO;
 - receipt and display at the ATS unit of SIGMETs issued by MWOs responsible for the adjacent FIRs/ACCs if these SIGMETs are required according to 2.3.4 below; and
 - transmission without delay by the ATS unit of special air-reports received through voice communication to the associated MWO.
- 2.3.2. SIGMET information should be transmitted to aircraft with the least possible delay on the initiative of the responsible ATS unit, by the preferred method of direct transmission followed by acknowledgement or by a general call when the number of aircraft would render the preferred method impracticable.
- 2.3.3. SIGMET information transmitted to aircraft-in-flight should cover a portion of the route up to two hours flying time ahead of the aircraft. SIGMET should be transmitted only during the time corresponding to their period of validity.
- 2.3.4. Air traffic controllers should ascertain whether any of the currently valid SIGMETs may affect any of the aircraft they are controlling, either within or outside the FIR/CTA boundary, up to two hours flying time ahead of the current position of the aircraft. If this is the case, the controllers should at their own initiative transmit the SIGMET promptly to the aircraft-in-flight likely to be affected. If necessary, the controller should pass to the aircraft available SIGMETs issued for the adjacent FIR/CTA, which the aircraft will be entering, if relevant to the expected flight route.
- 2.3.5. The ATS units concerned should also transmit to aircraft-in-flight the special air-reports received, for which SIGMET has not been issued. Once a SIGMET for the weather phenomenon reported in the special air report is made available this obligation of the ATS unit expires.

2.4. Pilot responsibilities

- 2.4.1. Timely issuance of SIGMET information is largely dependent on the prompt receipt by MWOs of special air-reports. It is essential that pilots prepare and transmit such reports to the ATS units whenever any of the specified en-route hazardous conditions are encountered or observed.
- 2.4.2. It should be emphasized that, even when automatic dependent surveillance (ADS) is being used for routine air-reports, pilots should continue to make special air-reports.
- 2.4.3. Pilots should compile special air-reports and disseminate to ATS by air-ground data link as per Annex 3, Appendix 4, 1.2 and *Procedures for Air Navigation Services – Air Traffic Management* (PANS-ATM, Doc 4444), 4.12.3.2, or by voice communication as per Annex 3, Appendix 4, 1.3 and PANS-ATM (Doc 4444), 4.12.3.3.

Note. — The MWO will compile special air-reports for uplink as per Annex 3, Appendix 6, and as reported using the instructions given PANS-ATM, Appendix 1.

2.5. Coordination between MWOs and ATS units

- 2.5.1. To achieve the best service to aviation and as part of the collaborative decision-making process, close coordination between the MWO and the ATS units is required. This is of particular importance for the avoidance of hazardous weather.
- 2.5.2. A Letter of Agreement between the ATS authority and the meteorological authority is also recommended (as per Annex 3, 4.2) to outline the responsibilities and coordination processes between the MWOs and ATS units.

2.6. Coordination between MWOs, VAACs, TCACs and State volcano observatories

- 2.6.1. Amongst the phenomena for which SIGMET information is required, volcanic ash and tropical cyclones are of particular importance.
- 2.6.2. Since the identification, analysis and forecasting of volcanic ash and tropical cyclones requires considerable scientific and technical resources, normally not available at each MWO, VAACs and TCACs have been designated to provide volcanic ash advisories and tropical cyclone advisories respectively to the users and assist the MWOs in the preparation of SIGMETs for those phenomena. Close coordination should be established between the MWO and its responsible VAAC and/or TCAC.
- 2.6.3. Information regarding the VAACs and TCACs areas of responsibility and lists of MWOs and ACC/FICs to which advisories are to be sent is provided in the regional ANPs FASID Tables MET 3A and MET 3B. Volcanic ash advisories and tropical cyclone advisories are required for global exchange through SADIS and WIFS as they are used by the operators during the pre-flight planning. Nevertheless, it should be emphasized that SIGMET information is still required especially for in-flight re-planning. SIGMETs should be transmitted to aircraft-in-flight through voice communication, VOLMET or D-VOLMET, thus providing vital information for making in-flight decisions regarding large-scale route deviations due to volcanic ash clouds or tropical cyclones.
- 2.6.4. Information from State volcano observatories is an important part of the process for issuance of volcanic ash advisories and SIGMETs. Information from a State volcano observatory should be in the form of a Volcano Observatory Notification for Aviation (VONA) and include information on significant pre-eruption volcanic activity, volcanic eruptions or the presence of volcanic ash clouds. Guidance including responsibilities for the issuance of the VONA is given in the *Handbook on the International Airways Volcano Watch (IAVW) – Operational Procedures and Contact List* (Doc 9766); the format of the VONA is given in Appendix E of the Doc 9766.

2.7. SIGMET Coordination

- 2.7.1. To ensure harmonization of SIGMET messages on en-route hazardous weather affecting or expected to affect more than one FIR, neighbouring MWOs should coordinate in SIGMET provision in accordance with Recommendation 3.4.4 of Annex 3 *Meteorological Service for International Air Navigation* effective on 5 November 2020. Guidelines on SIGMET coordination including planning and operational implementation are provided in Appendix K *Guidelines on Operational SIGMET Coordination* of this Guide.

3. PROCEDURES FOR PREPARATION OF SIGMET INFORMATION

3.1. General

- 3.1.1. SIGMET is intended for transmission to aircraft in flight either by ATC or by VOLMET or D-VOLMET, and therefore, SIGMET messages should be kept concise. To this end, SIGMET information is prepared using approved ICAO abbreviations, a limited number of non-abbreviated words and, numerical values of a self-explanatory nature.
- 3.1.2. The increasing use of automated systems for handling the aeronautical meteorological information by the users makes it essential that all types of OPMET information, including SIGMET messages, are prepared and issued in the prescribed standardized format. Therefore, the format of the SIGMET message, as specified in Annex 3, Appendix 6, should be strictly followed by the MWOs.
- 3.1.3. The MWO should maintain watch over the evolution of the phenomenon for which a SIGMET has been issued. If the phenomenon persists or is expected to persist beyond the period of validity of the SIGMET, another SIGMET message for a further period of validity should be issued with updated information. SIGMETs for volcanic ash and tropical cyclone should be updated at least every 6 hours, while SIGMET for all other phenomena should be updated at least every 4 hours.
- 3.1.4. SIGMET should be promptly cancelled when the phenomenon is no longer occurring or no longer expected to occur in the MWO's area of responsibility.
- 3.1.5. Some SIGMET are generated using information from special air-reports (received by voice communications or data link (downlink)). The reporting of turbulence and icing used in special air-reports includes both moderate and severe categories (as per Doc 4444, Appendix 1).

Note. — Although the categories for the reporting, by pilots, of moderate and severe turbulence in special air-reports is provided in PANS-ATM (Doc 4444), some pilots report turbulence as “moderate to severe”. A MWO is then faced with determining which category to use in a special air-report (uplink) or in a SIGMET message for severe turbulence. Some States elect to treat such “moderate to severe” observations as ‘severe’ in the context of using the report to prompt the issuance of a special air-report (uplink) or a SIGMET message.

3.2. SIGMET phenomena

3.2.1. SIGMET shall only be issued for the phenomena listed in *Table 1* below and only using the abbreviations as indicated.

Phenomena Abbreviation	Description
OBSC TS	Thunderstorms that are obscured by haze or smoke or cannot be readily seen due to darkness.
EMBD TS	Thunderstorms that are embedded within cloud layers and cannot be readily recognized by the pilot in command
FRQ TS	Frequent thunderstorms where, within the area of thunderstorms, there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75%.
SQL TS	A squall line indicating that a line of thunderstorms with little or no space between individual cumulonimbus clouds (CB).
OBSC TSGR	Thunderstorms with hail that are obscured by haze or smoke or cannot be readily seen due to darkness.
EMBD TSGR	Thunderstorms with hail that are embedded within cloud layers and cannot be readily recognized.
FRQ TSGR	Frequent thunderstorms with hail, within the area of thunderstorms, there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75%.
SQL TSGR	A squall line indicating that a line of thunderstorms with hail with little or no space between cumulonimbus clouds (CB).
TC	A tropical cyclone with a 10 minute mean surface wind speed of 17m/s (34 kt) or more.
SEV TURB	Severe turbulence referring to: • low-level turbulence associated with strong surface winds; • rotor streaming; or • clear air turbulence, whether in cloud or not in cloud. <i>Note. — Turbulence should not be used in connection with convective clouds. Severe turbulence shall be considered whenever the peak value of EDR equals or exceeds 0.45.</i>
SEV ICE	Severe icing not associated with convective cloud.
SEV ICE (FZRA)	Severe icing caused by freezing rain and not associated with convective cloud.
SEV MTW	Severe mountain wave the accompanying downdraft is 3 m/s (600 ft/min) or more or when severe turbulence is observed or forecast.
HVY DS	Heavy duststorm where the visibility is below 200 m and the sky is obscured.
HVY SS	Heavy sandstorm where the visibility is below 200 m and the sky is obscured.
VA	Volcanic ash
RDOACT CLD	Radioactive cloud

Table 1: SIGMET phenomena abbreviations and descriptions

3.3. Allowable abbreviations

3.3.1. Abbreviations that can be used in the meteorological section of SIGMET are given in *Table 1* above and in *Table 2* below.

Abbreviation	Meaning	Abbreviation	Meaning
ABV	Above	NC	No change
APRX	Approximate or approximately	NE	North-east
AT	At (followed by time)	NNE	North-north-east
BLW	Below	NNW	North-north-west
BTN	Between	NM	Nautical miles
CB	Cumulonimbus cloud	NO	No
CLD	Cloud	NW	North-west
CNL	Cancel or cancelled	OBS	Observe or observed or observation
E	East or eastern longitude	PSN	Position
ENE	East-north-east	S	South or southern latitude
ESE	East-south-east	SE	South-east
EXER	Exercise	SFC	Surface
EXP	Expect or expected or expecting	SSE	South-south-east
FCST	Forecast	SSW	South-south-west
FIR	Flight information region	STNR	Stationary
FL	Flight level	SW	South-west
FT	Feet	TO	To
INTSF	Intensify or intensifying	TOP	Cumulonimbus cloud top (height)
KM	Kilometres	W	West or western longitude
KT	Knots	WID	Width or wide
M	Metres	WKN	Weaken or weakening
MOV	Move or moving or movement	WNW	West-north-west
MT	Mountain	WSW	West-south-west
N	North or northern latitude	Z	Coordinated Universal Time

Table 2: SIGMET phenomena abbreviations and descriptions.

3.4. SIGMET structure

3.4.1. A SIGMET message consists of:

- **WMO Abbreviated Heading Line (WMO AHL)** – all SIGMETs are preceded by an appropriate WMO AHL;
- **First line**, containing location indicators of the respective ATS unit and MWO, sequential number and period of validity;
- **SIGMET main body**, containing information concerning the observed or forecast phenomenon for which the SIGMET is issued together with its expected evolution within the period of validity, and a TEST or EXERCISE indicator when appropriate;

3.5. SIGMET format

Note. — In the following text, square brackets - [] - are used to indicate an optional or conditional element, and angled brackets - < > - for symbolic representation of a variable element, which in a real SIGMET accepts a discrete numerical value.

3.5.1. WMO header

T₁T₂A₁A₂ii CCCC YYGGgg [BBB]

3.5.1.1. The group **T₁T₂A₁A₂ii** is the bulletin identification (WMO AHL) for the SIGMET message. It is constructed in the following way:

T₁T₂	Data type designator	WS – for SIGMET for phenomena other than volcanic ash cloud or tropical cyclone WC – for SIGMET for tropical cyclone WV – for SIGMET for volcanic ash
A₁A₂	Country or territory designators	Assigned according to Table C1, Part II of <i>Manual on the Global Telecommunication System, Volume I – Global Aspects</i> (WMO Publication No. 386)
ii	Bulletin number	Assigned on national level according to p 2.3.2.2, Part II of <i>Manual on the Global Telecommunication System, Volume I – Global Aspects</i> (WMO Publication No. 386)

Table 3: Specification of the WMO Abbreviated Header Line for SIGMET

Note .1 — Tropical cyclone and volcanic ash cloud SIGMETs will be referred to hereafter as WC SIGMET (due to the T₁T₂ section of the WMO AHL being set to WC) and WV SIGMET (due to the T₁T₂ section of the WMO AHL being set to WV) respectively. All other SIGMET types will be referred to by WS (due to the T₁T₂ section of the WMO AHL being set to WS).

Note 2. — WMO AHLs for SIGMET bulletins used by [INSERT REGION NAME] MWOs are listed in Appendix D to this SIGMET Guide.

3.5.1.2. **CCCC** is the ICAO location indicator of the communication centre disseminating the message (this may be the same as the MWO location indicator).

3.5.1.3. **YYGGgg** is the date/time group; where **YY** is the day of the month and **GGgg** is the time of compilation of the SIGMET in hours and minutes UTC (normally this time is assigned by the disseminating (AFTN) centre, it may also be the time the forecast software compiles the SIGMET message).

Examples:

WSTH31 VTBS 121200

WVJP31 RJTD 010230

WCNG21 AYPY 100600

3.5.2. First line of SIGMET

CCCC SIGMET [n] [n]n VALID YYGGgg/YYGGgg CCCC-

3.5.2.1. The meaning of the groups in the first line of the SIGMET is as follows:

CCCC	ICAO location indicator of the ATS unit serving the FIR, UIR or CTA to which the SIGMET refers
SIGMET	Message identifier
[n] [n]n	Daily sequence number (see 3.5.2.2)
VALID	Period of validity indicator
YYGGgg/YYGGgg	Validity period of the SIGMET given by date/time group of the beginning and date/time group of the end of the period (see 3.5.2.3)
CCCC	ICAO location indicator of the issuing MWO
-	Mandatory hyphen to separate the preamble from the text

Table 4: Elements making up the first line of SIGMET

3.5.2.2. The numbering of SIGMETs starts every day at 0001 UTC. The sequence number should consist of up to three alphanumeric characters and may be a combination of letters and numbers, such as:

- **1, 2, ...**
- **01, 02, ...**
- **A01, A02, ...**

Examples:

RPM SIGMET 3 VALID 121100/121700 RPLL-
WSJC SIGMET A04 VALID 202230/210430 WSSS-

Note 1. — No other combinations should be used, like “CHARLIE 05” or “NR7”.

Note 2. — Correct numbering of SIGMET is very important since the number is used for reference in communication between ATC and pilots and in VOLMET and D-VOLMET.

Note 3. — In accordance with Annex 5 – Units of Measurement to be Used in Air and Ground Operations, when the validity period begins or ends at midnight, YY should be set for the following day and GGgg should be '0000'. i.e. SIGMET validity ending at midnight on the 23rd day of the month should be expressed as '240000'.

Note 4. - The sequence number is the sequence number for all SIGMET messages types (WS, WV and WC) for one flight information region

3.5.2.3. The following regulations apply when determining the validity period:

- The period of validity of a **WS** SIGMET should not be more than 4 hours;
- The period of validity of a **WC** or **WV** SIGMET should not be more than 6 hours;
- In case of a SIGMET for an observed phenomenon, the filing time (date/time group in the WMO header) should be the same or very close to the time in the date/time group indicating the start of the SIGMET validity period;

- When the SIGMET is issued for a forecast phenomenon:
 - o the beginning of validity period should be the time of the expected commencement (occurrence) of the phenomenon in the MWO area of responsibility;
 - o the time of issuance of a **WS** SIGMET should not be more than 4 hours before the start of validity period (i.e., expected time of occurrence of the phenomenon); and for **WC** (tropical cyclone) and **WV** (volcanic ash) SIGMET the lead time should not be more than 12 hours.

3.5.2.4. The period of validity is that period during which the SIGMET information is valid for transmission to aircraft in flight.

Examples:

- 1) First two lines of a SIGMET for an observed phenomenon:

WSTH31 VTBS 241120
VTBB SIGMET 3 VALID 241120/241500 VTBS-

- 2) First two lines of a SIGMET for a forecast phenomenon (expected time of occurrence 1530)

WSSR20 WSSS 311130
WSJC SIGMET 1 VALID 311530/311930 WSSS-

3.5.3. Structure of the meteorological part of SIGMET

3.5.3.1. The meteorological part of a SIGMET for the phenomena consists of elements as shown in the table below.

Start of the second line of the message

1	2	3	4	5	6
Name of the FIR/UIR or CTA (M)	Test or Exercise (C)	Phenomenon (M)	Observed or forecast phenomenon (M)	Location (C)	Level (C)
See 3.5.3.2	See 3.5.3.3	See 3.5.3.4	See 3.5.3.5	See 3.5.3.6	See 3.5.3.7

7	8	9	10	11	12
Movement or expected movement (C)	Changes in intensity (C)	Forecast time (C)	TC Forecast position (C)	Forecast position (C)	Repetition of elements (C)
See 3.5.3.8	See 3.5.3.9	See 3.5.3.10	See 3.5.3.11	See 3.5.3.12	See 3.5.3.13

Table 5: Elements making up the meteorological part of SIGMET.

Note 1) Item 2, 'Test or Exercise' element should only be used if the SIGMET message is for TEST or EXERCISE purposes – see section 3.5.3.3 below for more information.

Note 2) Item 7, 'Movement or expected movement' should not be used if the 'forecast time' and 'forecast position' elements are used.

Note 3) M = inclusion mandatory, part of every message. C = inclusion conditional, include whenever applicable.

3.5.3.2. Name of the FIR/UIR or CTA

CCCC <name> FIR[/UIR]
or
CCCC <name> CTA

The ICAO location indicator and the name of the FIR/CTA are given followed by the appropriate abbreviation: FIR, FIR/UIR or CTA. The name may consist of up to 10 characters.

Examples:

VTBB BANGKOK FIR

3.5.3.3. Test or Exercise

This field will only be used if the SIGMET message is intended to be used for Test or Exercise purposes. The omission of this field indicates that the SIGMET is intended for operational decision making.

When used, the SIGMET message may either end immediately after the word TEST or abbreviation EXER. Alternatively after the word TEST or abbreviation EXER, depending on the nature of the test and under most exercise circumstances the SIGMET message may contain realistic, although not necessarily valid content (the nature of tests and exercises may require historical data to be used).

3.5.3.4. Phenomenon

The phenomenon description consists of a qualifier and a phenomenon abbreviation. SIGMET should be issued only for the following phenomena observed and forecast to persist for more than a transitory period.:

- thunderstorms – if they are **OBSC**, **EMBD**, **FRQ** or **SQL** with or without hail (**GR**);
- turbulence – only **SEV**
- icing – only **SEV** with or without **FZRA**
- mountain waves – only **SEV**
- dust storm – only **HVY**
- sand storm – only **HVY**
- radioactive cloud – **RDOACT CLD**

For volcanic ash SIGMET (WV) only, the following conventions should be used

a) In the case when the eruption is from a previously unknown or un-named volcano.

VA ERUPTION PSN Nnn[nn] or Snn[nn] Ennn[nn] or Wnnn[nn] VA CLD

b) In the case when the eruption is from a known and named volcano. The name may be up to 10 alphanumeric characters.

VA ERUPTION MT nnnnnnnnnn PSN Nnn[nn] or Snn[nn] Ennn[nn] or Wnnn[nn] VA CLD

c) In the case when a region of volcanic ash cloud is known to exist, but the precise origin of its source is unknown (the ash cloud may be of large horizontal extent, and obscuring the precise vent from which it emanates, and is otherwise in an area sparse of observation to identify the source).

VA CLD

For tropical cyclone SIGMET (WC) only, the following conventions should be used

a) In the case when the tropical cyclone is known and named. The name may be up to 10 alphanumeric characters.

**TC nnnnnnnnnn PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]
CB**

b) In the case when the tropical cyclone is not yet named.

TC NN PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] CB

The appropriate abbreviations and combinations, and their meaning are given in *Table 1*.

3.5.3.5. Indication whether the phenomenon is observed or forecast

OBS
or
OBS AT GGggZ
or
FCST
or
FCST AT GGggZ

The indication whether the phenomenon is observed or forecast is given by using the abbreviations **OBS** or **FCST**. **OBS AT** and **FCST AT** may be used, in which case they are followed by a time group in the form **GGggZ**. If the phenomenon is observed, **GGggZ** is the time of the observation in hours and minutes UTC. If the exact time of the observation is not known the time is not included. When the phenomenon is based on a forecast without a reported observation, the time given for **GGggZ** represents the time of commencement of the validity period.

Examples:

OBS
OBS AT 0140Z
FCST
FCST AT 0200Z

Note. — In the case of volcanic ash cloud covering more than one area within the FIR or cumulonimbus clouds associated with a tropical cyclone covering more than one area within the FIR, when elements such as location and forecast position are repeated, each location and forecast position must be preceded by an observed or forecast time.

3.5.3.6. Location of the phenomenon

The location of the phenomenon is given with reference to geographical coordinates (latitude and longitude). Latitude and longitude may be reported in degrees, or in degrees and minutes. When reporting in degrees the format will be **Nnn** or **Snn** for latitude, and **Ennn** or **Wnnn** for longitude. When reporting in degrees and minutes the format will be **Nnnnn** or **Snnnn** for latitude, and **Ennnnn** or **Wnnnnn** for longitude. The MWOs should try to be as specific as possible in reporting the location of the phenomenon and, at the same time, to avoid overwhelming the SIGMET with too many coordinates, which may be difficult to process or follow when transmitted by voice radio.

The following are the possible ways to describe the location of the phenomenon:

- 1) An area of the FIR defined by a polygon. Minimum 4 coordinates¹, and not normally more than 7 coordinates. This is the format preferred operationally by users.

Symbolically, this is indicated as:

WI <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> -
 <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> -
 <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> -
 <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> -
 <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> -
 <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> -
 <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>

For example:

**WI N6030 E02550 - N6055 E02500 - N6050 E02630 -
 N6030 E02550**

WI N60 E025 - N62 E027 - N58 E030 - N59 E026 - N60 E025

Note 1. — The points of a polygon should be provided in a clockwise order, and the end point should be a repeat of the start point.

Note 2. - The location of phenomenon given at the beginning of the SIGMET is referring to the beginning of the validity period if the exact time group of Observed or Forecast phenomenon is not included.

Use of polygons with complex FIR boundaries.

*Annex 3 (19th Edition, July 2016 and 20th Edition, July 2018) specifies that the points of a polygon '... should be kept to a minimum and should not normally exceed seven'. However, some FIR boundaries are complex, and it would be unrealistic to expect that a polygon would be defined that followed such boundaries exactly. As such, some States have determined that the polygon points be chosen in relation to the complex boundary such that the FIR boundary approximates, but is wholly encompassed by, the polygon, and that any additional area beyond the FIR boundary be the minimum that can be reasonably and practically described. Caution should however be exercised in those instances where international aerodromes are located in close proximity to such a complex FIR boundary. **Appendix B** provides examples and advice with regard to describing such areas.*

- 2a) In a sector of the FIR defined relative to a specified line, or single series of up to three connected lines, with start and end points on the FIR boundary (or so close

¹ Including the last point as a repeat of the first point to explicitly close the polygon

to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at that point).

Symbolically this is indicated as:

<N OF> or <NE OF> or <E OF> or <SE OF> or <S OF> or
<SW OF> or <W OF> or <NW OF> LINE <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> - <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>

For example:

NE OF LINE N2500 W08700 - N2000 W08300

W OF LINE N20 E042 - N35 E045

- 2b) In a sector of the FIR defined as being between two lines of latitude, or between two lines of longitude.

Symbolically this is indicated as:

<N OF> or <S OF> <Nnn[nn]> or <Snn[nn]> AND <N OF> or
<S OF> <Nnn[nn]> or <Snn[nn]>

<W OF> or <E OF> <Wnnn[nn]> or <Ennn[nn]> AND <W OF>
or <E OF> <Wnnn[nn]> or <Ennn[nn]>

Chosen so that the affected area is BETWEEN lines of latitude or BETWEEN lines of Longitude

For example:

N OF N1200 AND S OF N2530

W OF W060 AND E OF W082

- 2c) In a sector of the FIR defined as being **between** two specified lines, or **between** two series of up to three connected lines, each with start and endpoints on the FIR boundary (or start and endpoints so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points).

<N OF> or <NE OF> or <E OF> or <SE OF> or <S OF> or
<SW OF> or <W OF> or <NW OF> LINE <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> - <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]> [- <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>] [- <Nnn[nn]> or
<Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>] AND <N OF> or <NE
OF> or <E OF> or <SE OF> or <S OF> or <SW OF> or <W
OF> or <NW OF> LINE <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]>
or <Ennn[nn]> - <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]> [- <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]>] [- <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]>]

For example:

**NE OF LINE N2500 W08700 - N2000 W08300 AND SW OF LINE
N2800 W08500 - N2200 W08200**

W OF LINE N20 E042 - N35 E045 AND E OF LINE N20 E039 - N35 E043

- 2d) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a quadrant);

Symbolically this is indicated as:

<N OF> or <S OF> <Nnn[nn]> or <Snn[nn]> AND
<E OF> or <W OF> <Wnnn[nn]> or <Ennn[nn]>

For example:

N OF N1200 AND E OF W02530

S OF N60 AND W OF E120

- 2e) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment), where a coordinate of latitude (or longitude) defines a line, and the preceding descriptor defines on which side of the line the phenomena is expected

Symbolically, this is indicated as:

<N OF> or <S OF> <Nnn[nn]> or <Snn[nn]> or
<E OF> or <W OF> <Wnnn[nn]> or <Ennn[nn]>

For example:

N OF S2230

W OF E080

- 3) Defined by a 'corridor' of specified width, centred upon a line, of up to three connected segments, described by;

APRX nnKM WID LINE BTN <Nnn[nn]> or <Snn[nn]>
<Wnnn[nn]> or <Ennn[nn]> - <Nnn[nn]> or <Snn[nn]>
<Wnnn[nn]> or <Ennn[nn]>[- <Nnn[nn]> or <Snn[nn]>
<Wnnn[nn]> or <Ennn[nn]>][- <Nnn[nn]> or <Snn[nn]>
<Wnnn[nn]> or <Ennn[nn]>]

or

APRX nnNM WID LINE BTN <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]>
or <Ennn[nn]> - <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]>[- <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]>][- <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]>]

For example:

APRX 50KM WID LINE BTN S1500 E07348 - S1530 E07642

- 4) At a specific point within the FIR, indicated by a single coordinate of latitude and longitude.

Symbolically, this is indicated as:

<Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or <Ennn[nn]>

For example:

N5530 W02230

S23 E107

- 5) Within a specified radius of the centre of a tropical cyclone.

Symbolically, this is indicated as:

WI nnnKM OF TC CENTRE

WI nnnNM OF TC CENTRE

- 6) Within a specified radius of the location of a radioactive release event.

Symbolically, this is indicated as:

WI nnKM OF <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]>

WI nnNM OF <Nnn[nn]> or <Snn[nn]> <Wnnn[nn]> or
<Ennn[nn]>

For example:

WI 30KM OF N5530 W02230

A radius of up to 30 kilometres (or 16 nautical miles) from the source and a vertical extent from surface (SFC) to the upper limit of the flight information region/upper flight information region (FIR/UIR) or control area (CTA) is to be applied.

Note. - For SIGMET messages for radioactive cloud, only within (WI) is to be used for the location of phenomenon and must describe a cylinder centred on the location of the radioactive release event.

- 7) A reference to the whole FIR, FIR/UIR, or CTA.

Symbolically, this is indicated as:

ENTIRE FIR

ENTIRE UIR

ENTIRE FIR/UIR

ENTIRE CTA

More detail on reporting the location of the phenomenon is given in the examples provided in **Appendix B** to this guide.

3.5.3.7. Flight level

Symbolically, the options permitted are:

FLnnn
or
nnnnM
or
[n]nnnnFT
or
SFC/FLnnn
or
SFC/nnnnM
or
SFC/[n]nnnnFT
or
FLnnn/nnn
or
TOP FLnnn
or
ABV FLnnn
or
TOP ABV FLnnn or TOP ABV [n]nnnnFT
or
TOP BLW FLnnn (only to be used for tropical cyclone)
or
nnnn/nnnnM
or
[n]nnnn/[n]nnnnFT
or
nnnnM/FLnnn
or
[n]nnnnFT/FLnnn

In more detail, the location or extent of the phenomenon in the vertical is given by one or more of the above methods, as follows:

- 1) reporting at a single flight level

For example: **FL320**

- 2) reporting at a single geometric level, in metres or feet

For example: **4500M or 8250FT or 12000FT**

- 3) reporting a layer extending from the surface to a given height in meters, feet or flight level

For example: **SFC/3000M or SFC/9900FT or SFC/11000FT or SFC/FL350**

4) reporting a layer extending from a given FL to a higher flight level

For example: **FL250/290**

5) reporting a layer where the base is unknown, but the top is given:

For example: **TOP FL350**

6) reporting phenomenon above a specified flight level, but where the upper limit is unknown:

For example: **ABV FL350**

7) reporting phenomenon that has an unknown lower limit, but has an upper limit that is known to extend above a known flight level:

For example: **TOP ABV FL350**

8) reporting phenomenon expected between a lower and upper geometric level expressed in metres or feet:

For example: **3500/9000M or 8000/12000FT or 11000/14000FT**

9) reporting phenomenon expected between a lower geometric level expressed in metres or feet and a higher flight level:

For example: **4000M/FL220 or 6000FT/FL140 or 11000FT/FL190**

10) reporting the CB upper limit for tropical cyclone SIGMET

For example: **TOP BLW FL450**

Additional examples:

EMBD TS ... TOP ABV FL340
SEV TURB ... FL180/210
SEV ICE ... SFC/FL150
SEV MTW ... FL090

3.5.3.8. Movement

Note. — Footnote 26 to Table A6-1A of ICAO Annex 3 states that “The elements ‘Forecast Time’ and ‘Forecast Position’ are not to be used in conjunction with the element ‘Movement or Expected Movement’”.

Rate of movement is indicated in the following way:

MOV <direction> <speed>KMH [KT]
or
STNR

Direction of movement is given with reference to one of the sixteen points of compass (**N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW**). Speed is given in **KMH** or **KT**. The abbreviation **STNR** is used if no significant movement is expected.

For example:

MOV NNW 30KMH

MOV E 25KT

STNR

Note 1. – Movement information should not be provided when a forecast position is explicitly given

Note 2. – For SIGMET messages for radioactive cloud, only stationary (STNR) is to be used for the element “Movement or Expected movement”.

Note 3. – For SIGMET messages for tropical cyclone, “Movement or Expected Movement” solely refers to the movement of the centre of a tropical cyclone and not the associated cumulonimbus clouds.

3.5.3.9. Expected changes in intensity

The expected evolution of the phenomenon’s intensity is indicated by one of the following abbreviations:

INTSF
or
WKN
or
NC

Note. – For SIGMET messages for tropical cyclone, this element indicates the change of the maximum surface winds around a tropical cyclone and not the intensity of the associated cumulonimbus clouds.

3.5.3.10. Forecast time

This section is used, with ‘Forecast position’ to explicitly provide a forecast of the position of the phenomena at the time specified. The format is fixed, and is of the form

FCST AT <GGgg>Z

For example

FCST AT 1600Z

Where the forecast time is the same as the SIGMET validity end time.

Note. — In accordance with Annex 5 – Units of Measurement to be Used in Air and Ground Operations, when the validity period ends at midnight, YY should be set for the following day and GGgg should be '0000'. i.e. SIGMET validity ending at midnight on the 23rd day of the month should be expressed as '240000'.

3.5.3.11. TC Forecast position

Only to be used for tropical cyclones, and used to indicate the location of the centre of the tropical cyclone.

The forecast centre position of a tropical cyclone is given by:

**TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or
Ennn[nn]**
or
**TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or
Ennn[nn] CB**

Note. — The term CB is to be used when the forecast position for the cumulonimbus cloud is included.

For example

TC CENTRE PSN N2740 W07345

TC CENTRE PSN S1015 E15030 CB

3.5.3.12. Forecast position of the hazardous phenomenon at the end of the validity period of the SIGMET message

The available methods of describing the forecast position of the phenomenon in the 'Forecast position' section is exactly as detailed in section 3.5.3.6 "Location of the phenomenon" with the addition of :

- a) For volcanic ash which is not expected to be present within the FIR at the end of the validity of the SIGMET, the following is permitted:

NO VA EXP

Note. — Currently, there is no provision for indicating changes to the levels affected by phenomena between the initial position and the forecast position. As such, and as per footnote 27 to Table A6-1A of Annex 3 (21st Edition, July 2020), it should be assumed that the levels affected remain the same for both initial and forecast positions. If levels differ significantly then separate SIGMET should be issued.

3.5.3.13. Repetition of elements (volcanic ash and tropical cyclone SIGMET only)

Elements can be repeated when there are instances of more than one volcanic ash cloud, or more than one area of cumulonimbus cloud associated with a tropical cyclone.

Note 1. — This must not be used for two separate tropical cyclones that are present in a FIR, or UIR.

Note 2. — For SIGMET messages for tropical cyclone, this should be used for areas of cumulonimbus clouds associated with a tropical cyclone, not all cumulonimbus clouds in a FIR.

With regard to the portrayal of complex volcanic ash events (which implies areas of volcanic ash at different levels) guidance in this regard is provided in Appendix B, example 8.

With regard to the portrayal of more than one area of cumulonimbus cloud associated with a tropical cyclone, guidance is provided in Appendix B, example 10.

3.5.4. Cancellation of SIGMET

3.5.4.1. Annex 3, 7.1.2 requires that "*SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area*".

3.5.4.2. As such, it is mandatory for an MWO to cancel any SIGMET that is currently valid but for which the specified phenomena no longer exists or is expected to exist.

3.5.4.3. The cancellation is done by issuing the same type of SIGMET (i.e. WS, WV or WC) with the following structure:

- WMO heading with the same data type designator;
- First line, including the next sequence number followed by a new validity period that represents the remaining time of the original period of validity, and
- Second line, which contains the name of the FIR or CTA, the combination CNL SIGMET, followed by the sequence number of the original SIGMET and its original validity period.

3.5.4.4. A cancellation SIGMET should have a unique sequence number, and should follow the format below.

As an example, an original SIGMET of:

```
YMMM SIGMET A01 VALID 260300/260700 YMMC-  
YMMM MELBOURNE FIR EMBD TS FCST WI S4000 E12000 - S3830 E12200 -  
S4200 E12100 - S4000 E12000 TOP FL450 MOV SW 05KT INTSF=
```

If it were to be cancelled early (i.e. prior to 0700 UTC), then the following would be appropriate:

```
YMMM SIGMET A02 VALID 260600/260700 YMMC-  
YMMM MELBOURNE FIR CNL SIGMET A01 260300/260700=
```

Where:

- the sequence number will be the next incrementing, unique sequence number.
- the validity time will be the time remaining between issuance and the end time of the original SIGMET.
- the sequence number of the original (and to be cancelled) SIGMET shall follow 'CNL SIGMET '.

- the original validity time of the original (and to be cancelled) SIGMET shall be included in the message after the reference to the original SIGMET's sequence number.

For SIGMET for volcanic ash only, the following is permitted:

```
WSAU21 ADRM 202155  
YBBB SIGMET E03 VALID 202155/210000 YMMC  
YBBB BRISBANE FIR CNL SIGMET E01 202000/210000 VA MOV TO WXYZ  
FIR=
```

- 3.5.4.5. Where the FIR (WXYZ in the example) into which the volcanic ash has moved is indicated.

3.5.5. Amendment/correction of SIGMET

3.5.5.1. If it is known that an existing SIGMET no longer accurately describes the existing or expected future evolution of the phenomena a new SIGMET, correctly describing the hazard should be issued, followed immediately by a cancellation of the original, erroneous SIGMET. The new SIGMET should be issued before the cancellation in order to ensure there is always a SIGMET in force and that the cancellation is not mistakenly understood to mean that the hazard has completely dissipated.

3.5.5.2. Originally issued SIGMET, later determined to no longer be accurate (bold text identifies points that will be changed):

```
WSZZ21 YUSO 201855  
YUDD SIGMET 1 VALID 202000/210000 YUSO-  
YUDD SHANLON FIR SEV TURB FCST WI S1530 E13700 - S1900 E13730  
S2000 E13130 - S1600 E13500 - S1530 E13700 SFC/FL120 MOV SE 12KT  
WKN=
```

3.5.5.3. Updated SIGMET (bold text identifies points that have been changed):

```
WSZZ21 YUSO 202155  
YUDD SIGMET 2 VALID 202155/210155 YUSO-  
YUDD SHANLON FIR SEV TURB FCST WI S1530 E13700 - S2000 E13750 -  
S2045 E13245 - S1600 E13500 - S1530 E13700 SFC/FL120 MOV SE 12KT  
WKN=
```

Note, the updated SIGMET can have not only validity of four hours (or six hours for a VA or TC SIGMET) but also a reduced validity period, either to retain the original end validity time of the SIGMET it replaced, or to reflect the expected duration of the phenomenon.

3.5.5.4. Cancellation SIGMET (this cancels the original SIGMET):

```
WSZZ21 YUSO 202156  
YUDD SIGMET 3 VALID 202155/210000 YUSO-  
YUDD SHANLON FIR CNL SIGMET 1 202000/210000=
```

Note, it is essential that the time of compilation of the updated (correct) SIGMET and of the cancellation are separated by at least one minute to prevent inadvertent suppression by message switches. However, it is also important that the minimum delay between issuance of the updated and the cancellation messages.

3.6. Dissemination of SIGMET

3.6.1. SIGMET is part of operational meteorological (OPMET) information. According to Annex 3, the telecommunication facilities used for the exchange of the operational meteorological information should be the aeronautical fixed service (AFS).

3.6.2. The AFS consists of a terrestrial segment, AFTN or ATN (AMHS), as well as the Internet-based SADIS FTP and WIFS services provided by WAFC London and WAFC Washington respectively. Note that SIGMET priority indicator is **FF** for flight safety messages (Annex 10, Volume II, 4.4.1.1.3 refers).

- 3.6.3. Currently, AFS should be used by the MWOs to send the SIGMET, as follows:
- to the adjacent MWOs and ACCs² using direct AFTN addressing;
 - when required for VOLMET or D-VOLMET, SIGMET should be sent to the relevant centre providing the VOLMET service;
 - SIGMET should be sent to all regional OPMET Data Banks (RODB);
 - it should be arranged that SIGMET is relayed to the SADIS and WIFS providers for satellite/public internet dissemination, as well as to the WAFCs London and Washington, either through the ROBEX scheme, or directly by the issuing MWO;
 - SIGMET for volcanic ash should be disseminated to the responsible VAAC.
- 3.6.4. Through SADIS and WIFS, SIGMET is disseminated to all authorised users. In this way, SIGMET is available on a global basis, meeting the aeronautical requirements.
- — — — —

² For this dissemination it is required that SIGMET is available at the ACCs for transmission to aircraft in flight for the route ahead up to a distance corresponding to two hours flying time.

APPENDIX A

ENHANCED SIGMET GUIDANCE TABLE DEVELOPED FROM ANNEX 3 TABLE A6-1A

Note. — The table below seeks to provide more detailed guidance than that given in Table A6-1A of Annex 3 (21st Edition, July 2020). It does this by removing all references to the AIRMET message. Table A6-1A. The table below simplifies the available options and provides more specific expansion of the symbolic structure of SIGMET messages, with guidance sub-titles where appropriate. It should be noted that Annex 3, Appendix 6, Table A6-1A remains the authoritative reference.

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
1.1	Location indicator of FIR/CTA (M) ¹	ICAO location indicator of the ATS unit serving the FIR or CTA to which the SIGMET refers	nnnn	YUCC ² YUDD ²
1.2	Identification (M)	Message identification and sequence number ³	SIGMET n SIGMET nn SIGMET nnn	SIGMET 1 SIGMET 01 SIGMET A01
1.3	Validity period (M)	Day-time groups indicating the period of validity in UTC	VALID nnnnnn/nnnnnn	VALID 010000/010400 VALID 221215/221600 VALID 101520/101800 VALID 251600/252200 VALID 152000/160000 VALID 192300/200300 VALID 122200/130400 (6 hour validity applicable to TC or VA only)
1.4	Location indicator of MWO (M)	Location indicator of MWO originating the message with a separating hyphen	nnnn-	YUDO- ² YUSO- ²
1.5	Name of the FIR/CTA (M)	Location indicator and name of the FIR/CTA ⁴ for which the SIGMET is issued	nnnn nnnnnnnnnn FIR nnnn nnnnnnnnnn UIR nnnn nnnnnnnnnn FIR/UIR nnnn nnnnnnnnnn CTA	YUCC AMSWELL FIR ² YUDD SHANLON FIR/UIR ² YUDD SHANLON FIR ² YUCC AMSWELL CTA ²
1.6	Status indicator (C) ⁵	Indicator of test or exercise	TEST or EXER	TEST EXER

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
2.1	Phenomenon (M) ⁶	Description of phenomenon causing the issuance of SIGMET	OBSC ⁷ TS OBSC ⁷ TSGR ⁸ EMBD ⁹ TS EMBD ⁹ TSGR ⁸ FRQ ¹⁰ TS FRQ ¹⁰ TSGR ⁸ SQL ¹¹ TS SQL ¹¹ TSGR ⁸ TC nnnnnnnnnn PSN Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] CB TC NN ¹² PSN Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] CB SEV TURB ¹³ SEV ICE ¹⁴ SEV ICE (FZRA) ¹⁴ SEV MTW ¹⁵ HVY DS HVY SS VA ERUPTION PSN Nnn[nn] <i>or</i> Snn[nn] Ennn[nn] <i>or</i> Wnnn[nn] VA CLD VA ERUPTION MT nnnnnnnnnn PSN Nnn[nn] <i>or</i> Snn[nn] Ennn[nn] <i>or</i> Wnnn[nn] VA CLD VA CLD RDOACT CLD	OBSC TS OBSC TSGR EMBD TS EMBD TSGR FRQ TS FRQ TSGR SQL TS SQL TSGR TC GLORIA PSN N2215 W07500 CB TC NN PSN S26 E150 CB SEV TURB SEV ICE SEV ICE (FZRA) SEV MTW HVY DS HVY SS VA ERUPTION PSN N27 W017 VA CLD VA ERUPTION PSN S1200 E01730 VA CLD VA ERUPTION MT ASHVAL ² PSN S15 E073 VA CLD VA ERUPTION MT VALASH ² PSN N2030 E02015 VA CLD VA CLD RDOACT CLD
2.2	Observed or forecast phenomenon (M) ^{20,21}	Indication whether the information is observed and expected to continue, <i>or</i> forecast	OBS OBS AT nnnnZ FCST FCST AT nnnnZ	OBS OBS AT 1210Z FCST FCST AT 1815Z
2.3	Location (C) ^{20,21,33}	Location (referring to latitude and longitude (in degrees and minutes))	1) An area of the FIR defined by a polygon. The end point shall be a repeat of the start point. Minimum 4 coordinates (including the last point as a repeat of the first), and not normally more than 7 coordinates. WI ^{22,23} Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn]	1) An area of the FIR defined by a polygon. The end point shall be a repeat of the start point. Minimum 4 coordinates (including the last point as a repeat of the first), and not normally more than 7 coordinates.

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> 2a) In a sector of the FIR defined relative to a specified line, or single series of up to three connected lines, with start and endpoints on the FIR boundary (or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points). [N][NE][E][SE][S][SW][W][NW] OF LINE²² Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> 2b) In a sector of the FIR defined as being between two lines of latitude, or between two lines of longitude. N OF Nnn[nn] <i>or</i> N OF Snn[nn] AND S OF Nnn[nn] <i>or</i> S OF Snn[nn] <i>or</i> W OF Wnnn[nn] <i>or</i> W OF Ennn[nn] AND E OF Wnnn[nn] <i>or</i> E OF Ennn[nn] <i>or</i> 2c) In a sector of the FIR defined as being between two specified lines, or between two series of up to three connected lines, each with start and endpoints on the FIR boundary (or start and endpoints so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points). [N][NE][E][SE][S][SW][W][NW] OF LINE²² Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [-	WI N6030 E02550 - N6055 E02500 - N6050 E02630 - N6030 E02550 WI N30 W067 - N32 W070 - N35 W068 - N30 W067 <i>or</i> 2a) In a sector of the FIR defined relative to a specified line, or single series of up to three connected lines, with start and endpoints on the FIR boundary (or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points). NE OF LINE N2515 W08700 - N2000 W08330 S OF LINE S14 E150 - S14 E155 <i>or</i> 2b) In a sector of the FIR defined as being between two lines of latitude, or between two lines of longitude. N OF N45 AND S OF N50 <i>or</i> W OF E04530 AND E OF E04000 <i>or</i> 2c) In a sector of the FIR defined as being between two specified lines, or between two series of up to three connected lines, each with start and endpoints on the FIR boundary (or start and endpoints so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points).

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] AND [N][NE][E][SE][S][SW][W][NW] OF LINE Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> 2d) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a quadrant); N OF Nnn[nn] AND W OF Wnnn[nn] <i>or</i> N OF Nnn[nn] AND E OF Wnnn[nn] <i>or</i> S OF Nnn[nn] AND W OF Wnnn[nn] <i>or</i> S OF Nnn[nn] AND E OF Wnnn[nn] <i>or</i> N OF Nnn[nn] AND W OF Ennn[nn] <i>or</i> N OF Nnn[nn] AND E OF Ennn[nn] <i>or</i> S OF Nnn[nn] AND W OF Ennn[nn] <i>or</i> S OF Nnn[nn] AND E OF Ennn[nn] <i>or</i> N OF Snn[nn] AND W OF Wnnn[nn] <i>or</i> N OF Snn[nn] AND E OF Wnnn[nn] <i>or</i> S OF Snn[nn] AND W OF Wnnn[nn] <i>or</i> S OF Snn[nn] AND E OF Wnnn[nn] <i>or</i> N OF Snn[nn] AND W OF Ennn[nn] <i>or</i> N OF Snn[nn] AND E OF Ennn[nn] <i>or</i> S OF Snn[nn] AND W OF Ennn[nn] <i>or</i> S OF Snn[nn] AND E OF Ennn[nn] <i>or</i> <i>or</i> 2e) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment); N OF Nnn[nn] <i>or</i> S OF Nnn[nn] <i>or</i> N OF Snn[nn] <i>or</i> S OF Snn[nn] <i>or</i> W OF Wnnn[nn] <i>or</i> E OF Wnnn[nn] <i>or</i> W OF Ennn[nn] <i>or</i> E OF Ennn[nn]	SW OF LINE N50 W020 - N45 E010 AND NE OF LINE N45 W020 - N40 E010 <i>or</i> 2d) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a quadrant); S OF N3200 AND E OF E02000 S OF S3215 AND W OF E10130 S OF N12 AND W OF E040 N OF N35 AND E OF E078 <i>or</i> 2e) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment); N OF S2230 S OF S43 E OF E01700 E OF W005

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			<i>or</i> 3) Defined by a 'corridor' of specified width, centred upon a line, of up to three connected segments, described by; APRX nnKM WID LINE²² BTN Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] APRX nnNM WID LINE²² BTN Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> 4) At a specific point within the FIR; Nnn[nn] Wnnn[nn] <i>or</i> Nnn[nn] Ennn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Snn[nn] Ennn[nn] <i>or</i> 5) tropical cyclone; WI nnnKM (or nnnNM) OF TC CENTRE²⁴ <i>or</i> 6) A cylinder of specified radius;²⁵ WI nnKM (<i>or</i> nnNM) OF Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]	<i>or</i> 3) Defined by a 'corridor' of specified width, centred upon a line, of up to three connected segments, described by; APRX 50KM WID LINE BTN N64 W017 - N60 W010 - N57 E010 - N60 E015 APRX 50NM WID LINE BTN S1530 W09500 - S1815 W10130 - S2000 W10300 <i>or</i> 4) At a specific point within the FIR; N5530 W02230 S12 E177 <i>or</i> 5) tropical cyclone; WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE <i>or</i> 6) A cylinder of specified radius;

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			<i>or</i> 7) A reference to the whole FIR, FIR/UIR, or CTA ENTIRE FIR ENTIRE FIR/UIR ENTIRE UIR ENTIRE CTA	WI 30 KM OF N6030 E02550 WI 50 NM OF S2000 E04000 <i>or</i> 7) A reference to the whole FIR, FIR/UIR, or CTA ENTIRE FIR ENTIRE FIR/UIR ENTIRE UIR ENTIRE CTA
2.4	Level (C) ^{20,21}	Flight level or altitude	1) Generic height/range descriptors to be used when 'Location' descriptors above are used. FLnnn [n]nnnnFT nnnnM SFC/FLnnn SFC/nnnnM SFC/nnnnFT SFC/nnnnnFT FLnnn/nnn TOP FLnnn ABV FLnnn TOP ABV FLnnn ABV [n]nnnnFT TOP ABV [n]nnnnFT nnnn/nnnnM [n]nnnn/[n]nnnnFT nnnnM/FLnnn [n]nnnnFT/FLnnn <i>or</i>²⁴ TOP FLnnn TOP BLW FLnnn TOP ABV FLnnn	1) Generic height/range descriptors to be used when 'Location' descriptors above are used. FL180 7000FT 10000FT 600M 1200M SFC/FL070 SFC/9000FT SFC/10000FT SFC/2500M FL050/080 FL310/450 TOP FL390 ABV FL280 ABV 7000FT TOP ABV FL100 TOP ABV 9000FT TOP ABV 10000FT 3000M 2000/3000M 8000FT 6000/12000FT 11000/14000FT 2000M/FL150 8000FT/FL190 10000FT/FL250 <i>or</i> TOP FL500

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
				TOP BLW FL450 TOP ABV FL360
2.5	Movement or expected movement (C) ^{20, 26, 34}	Movement or expected movement (direction and speed) with reference to one of the sixteen points of compass, or stationary	MOV N [nnKMH (or nnKT)] or MOV NNE [nnKMH (or nnKT)] or MOV NE [nnKMH (or nnKT)] or MOV ENE [nnKMH (or nnKT)] or MOV E [nnKMH (or nnKT)] or MOV ESE [nnKMH (or nnKT)] or MOV SE [nnKMH (or nnKT)] or MOV SSE [nnKMH (or nnKT)] or MOV S [nnKMH (or nnKT)] or MOV SSW [nnKMH (or nnKT)] or MOV SW [nnKMH (or nnKT)] or MOV WSW [nnKMH (or nnKT)] or MOV W [nnKMH (or nnKT)] or MOV WNW [nnKMH (or nnKT)] or MOV NW [nnKMH (or nnKT)] or MOV NNW [nnKMH (or nnKT)] or STNR	MOV E 40KMH MOV E 20KT MOV SE 20KT STNR
2.6	Changes in intensity (C) ²⁰	Expected changes in intensity	INTSF or WKN or NC	INTSF WKN NC
2.7	Forecast time (C) ^{20, 21, 26}	Indication of the forecast time of the phenomena	FCST AT nnnnZ	FCST AT 2200Z FCST AT 0000Z
2.8	TC forecast position (C) ²⁴	Forecast position of TC centre	TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] or ³¹ TC CENTRE PSN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] CB	TC CENTRE PSN N1030 E16015 TC CENTRE PSN N1015 E15030 CB
2.9	Forecast position (C) ^{20, 21, 26, 27, 33}	Forecast position of phenomenon at the end of the validity period of the SIGMET message ³²	1) An area of the FIR defined by a polygon. The end point shall be a repeat of the start point. Minimum 4 coordinates (including the last point as a repeat of the first), and not normally more than 7 coordinates. WI ^{22, 23} Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] - Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] - Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [- Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [- Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [- Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] or	1) An area of the FIR defined by a polygon. The end point shall be a repeat of the start point. Minimum 4 coordinates (including the last point as a repeat of the first), and not normally more than 7 coordinates. WI N6030 E02550 - N6055 E02500 - N6050 E02630 - N6030 E02550 WI N30 W067 - N32 W070 - N35 W068 - N30 W067 or

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			2a) In a sector of the FIR defined relative to a specified line, or single series of up to three connected lines, with start and endpoints on the FIR boundary (or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points). [N][NE][E][SE][S][SW][W][NW] OF LINE²² Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> 2b) In a sector of the FIR defined as being between two lines of latitude, or between two lines of longitude. N OF Nnn[nn] <i>or</i> N OF Snn[nn] AND S OF Nnn[nn] <i>or</i> S OF Snn[nn] <i>or</i> W OF Wnnn[nn] <i>or</i> W OF Ennn[nn] AND E OF Wnnn[nn] <i>or</i> E OF Ennn[nn] <i>or</i> 2c) In a sector of the FIR defined as being between two specified lines, or between two series of up to three connected lines, each with start and endpoints on the FIR boundary (or start and endpoints so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points). [N][NE][E][SE][S][SW][W][NW] OF LINE²² Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] AND [N][NE][E][SE][S][SW][W][NW] OF LINE Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] - Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [- Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i>	2a) In a sector of the FIR defined relative to a specified line, or single series of up to three connected lines, with start and endpoints on the FIR boundary (or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points). NE OF LINE N2515 W08700 - N2000 W08330 S OF LINE S14 E150 - S14 E155 <i>or</i> 2b) In a sector of the FIR defined as being between two lines of latitude, or between two lines of longitude. N OF N45 AND S OF N50 W OF E04530 AND E OF E04000 <i>or</i> 2c) In a sector of the FIR defined as being between two specified lines, or between two series of up to three connected lines, each with start and endpoints on the FIR boundary (or start and endpoints so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points). SW OF LINE N50 W020 - N45 E010 AND NE OF LINE N45 W020 - N40 E010 <i>or</i>

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			2d) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a quadrant); N OF Nnn[nn] AND W OF Wnnn[nn] <i>or</i> N OF Nnn[nn] AND E OF Wnnn[nn] <i>or</i> S OF Nnn[nn] AND W OF Wnnn[nn] <i>or</i> S OF Nnn[nn] AND E OF Wnnn[nn] <i>or</i> N OF Nnn[nn] AND W OF Ennn[nn] <i>or</i> N OF Nnn[nn] AND E OF Ennn[nn] <i>or</i> S OF Nnn[nn] AND W OF Ennn[nn] <i>or</i> S OF Nnn[nn] AND E OF Ennn[nn] <i>or</i> N OF Snn[nn] AND W OF Wnnn[nn] <i>or</i> N OF Snn[nn] AND E OF Wnnn[nn] <i>or</i> S OF Snn[nn] AND W OF Wnnn[nn] <i>or</i> S OF Snn[nn] AND E OF Wnnn[nn] <i>or</i> N OF Snn[nn] AND W OF Ennn[nn] <i>or</i> N OF Snn[nn] AND E OF Ennn[nn] <i>or</i> S OF Snn[nn] AND W OF Ennn[nn] <i>or</i> S OF Snn[nn] AND E OF Ennn[nn] <i>or</i> <i>or</i> 2e) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment); N OF Nnn[nn] <i>or</i> S OF Nnn[nn] <i>or</i> N OF Snn[nn] <i>or</i> S OF Snn[nn] <i>or</i> W OF Wnnn[nn] <i>or</i> E OF Wnnn[nn] <i>or</i> W OF Ennn[nn] <i>or</i> E OF Ennn[nn] <i>or</i> 3) Defined by a 'corridor' of specified width, centred upon a line, of up to three connected segments, described by;	2d) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a quadrant); S OF N3200 AND E OF E02000 S OF S3215 AND W OF E10130 S OF N12 AND W OF E040 N OF N35 AND E OF E078 <i>or</i> 2e) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment); N OF S2230 S OF S43 E OF E01700 E OF W005 <i>or</i> 3) Defined by a 'corridor' of specified width, centred upon the line described;

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			APRX nnKM WID LINE²² BTN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] - Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [- Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [- Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] APRX nnNM WID LINE²² BTN Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] - Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [- Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [- Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] <i>or</i> 4) At a specific point within the FIR; Nnn[nn] Wnnn[nn] <i>or</i> Nnn[nn] Ennn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Snn[nn] Ennn[nn] <i>or</i> 5) tropical cyclone; WI nnnKM (or nnnNM) OF TC CENTRE²⁴ <i>or</i> 6) A cylinder of specified radius;²⁵ WI nnKM OF Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] WI nnNM OF Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] <i>or</i> 7) A reference to the whole FIR, FIR/UIR, or CTA ENTIRE FIR ENTIRE FIR/UIR	APRX 50KM WID LINE BTN N64 W017 - N60 W010 - N57 E010 - N60 E015 APRX 50NM WID LINE BTN S1530 W09500 - S1815 W10130 - S2000 W10300 <i>or</i> 4) At a specific point within the FIR; N5530 W02230 S12 E177 <i>or</i> 5) tropical cyclone; WI 150NM OF TC CENTRE <i>or</i> 6) A cylinder of specified radius; WI 30 KM OF N6030 E02550 WI 16 NM OF S2000 E04000 <i>or</i> 7) A reference to the whole FIR, FIR/UIR, or CTA ENTIRE FIR ENTIRE FIR/UIR ENTIRE UIR

MET SG/24
Appendix 9 to the Report

Ref No.	Element as specified in Chapter 5 and Appendix 6	Detailed Content	Expanded symbolic - These 'expanded' symbolic representations of the various SIGMET code elements represent the interpretation of Table A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the guidelines below.	Examples. These examples of various SIGMET code elements represent the interpretation A6-1A of Annex 3. MWOs are encouraged to align their SIGMETs with the examples below.
			ENTIRE UIR ENTIRE CTA <i>or</i> 8) No volcanic ash expected ²⁸ NO VA EXP	ENTIRE CTA <i>or</i> 8) No volcanic ash expected NO VA EXP
3.0	Repetition elements (C) ²⁹ of	Repetition elements included in a SIGMET message for volcanic ash cloud or tropical cyclone	[AND] ²⁹	AND
4.0	Cancellation of SIGMET (C) ³⁰	Cancellation of SIGMET referring to its identification	CNL SIGMET n nnnnnn/nnnnnn CNL SIGMET nn nnnnnn/nnnnnn CNL SIGMET nnn nnnnnn/nnnnnn <i>or</i> CNL SIGMET n nnnnnn/nnnnnn VA MOV TO nnnn FIR ²⁸ CNL SIGMET nn nnnnnn/nnnnnn VA MOV TO nnnn FIR ²⁸ CNL SIGMET nnn nnnnnn/nnnnnn VA MOV TO nnnn FIR ²⁸	CNL SIGMET 2 102000/110000 CNL SIGMET 12 101200/101600 CNL SIGMET A12 031600/032000 <i>or</i> CNL SIGMET 3 251030/251630 VA MOV TO YUDO FIR CNL SIGMET 06 191200/191800 VA MOV TO YUDO FIR CNL SIGMET B10 030600/031200 VA MOV TO YUDO FIR

Table A-1: Expanded SIGMET template

Footnotes to table: (note, in order to ensure consistency between this document and ICAO Annex 3, Table 6-1A, any footnote in Table 6-1A that refers to AIRMET only is identified as such below.

1. See 4.1. “**Recommendation.**— *In cases where the airspace is divided into a flight information region (FIR) and an upper flight information region (UIR), the SIGMET should be identified by the location indicator of the air traffic services unit serving the FIR. Note.— The SIGMET message applies to the whole airspace within the lateral limits of the FIR, i.e. to the FIR and to the UIR. The particular areas and/or flight levels affected by the meteorological phenomena causing the issuance of the SIGMET are given in the text of the message.*”
2. Fictitious location.
3. In accordance with 1.1.3 “The sequence number referred to in the template in Table A6-1A shall correspond with the number of SIGMET messages issued for the flight information region since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or control area (CTA) shall issue separate SIGMET messages for each FIR and/or CTA within their area of responsibility.”
4. AIRMET only – not SIGMET
5. Only used when a message is issued to indicate that a test or exercise taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”.
6. As per 1.1.4 “In accordance with the template in Table A6-1A, only one of the following phenomena shall be included in a SIGMET message, using the abbreviations as indicated below [list of SIGMET phenomena follows in section 1.1.4 – see section]”
7. In accordance with 4.2.1 a) “*obscured (OBSC) if it is obscured by haze or smoke or cannot be readily seen due to darkness*”.
8. In accordance with 4.2.4 “*Hail (GR) should be used as a further description of the thunderstorm, as necessary*”
9. accordance with 4.2.1 b) “*embedded (EMBD) if it is embedded within cloud layers and cannot be readily recognized*”
10. In accordance with 4.2.2 “**Recommendation.**— An area of thunderstorms should be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity)”
11. In accordance with 4.2.3 “**Recommendation.**— Squall line (SQL) should indicate a thunderstorm along a line with little or no space between individual clouds.”
12. Used for unnamed tropical cyclones.
13. In accordance with 4.2.5 and 4.2.6 “**Recommendation.**— Severe turbulence (TURB) should refer only to: low-level turbulence associated with strong surface winds; rotor streaming; or turbulence whether in cloud or not in cloud (CAT). Turbulence should not be used in connection with convective clouds.” and “Turbulence shall be considered: a) severe whenever the peak value of the cube root of EDR exceeds 0.7”
14. In accordance with 4.2.7 “**Recommendation.**— Severe icing (ICE) should refer to icing in other than convective clouds. Freezing rain (FZRA) should refer to severe icing conditions caused by freezing rain”.

15. In accordance with 4.2.8 “**Recommendation.**— A mountain wave (MTW) should be considered: a) severe whenever an accompanying downdraft of 3.0 m/s (600 ft/min) or more and/or severe turbulence is observed or forecast; and b) *moderate whenever an accompanying downdraft of 1.75–3.0 m/s (350–600 ft/min) and/or moderate turbulence is observed or forecast.*”
16. AIRMET only – not SIGMET
17. AIRMET only – not SIGMET
18. AIRMET only – not SIGMET
19. AIRMET only – not SIGMET
20. In the case of volcanic ash cloud covering more than one area within the FIR, these elements can be repeated, as necessary. Each location and forecast position is to be preceded by an observed or forecast time.
21. In the case of cumulonimbus clouds associated with a tropical cyclone covering more than one area within the FIR, these elements can be repeated as necessary. Each location and forecast position must be preceded by an observed or forecast time.
22. A straight line is to be used between two points drawn on a map in the Mercator projection or between two points which crosses lines of longitude at a constant angle.
23. The number of coordinates are to be kept to a minimum and should not normally exceed seven.
24. Only for SIGMET messages for tropical cyclones.
25. Only for SIGMET messages for radioactive cloud. A radius of up to 30 kilometres (or 16 nautical miles) from the source and a vertical extent from surface (SFC) to the upper limit of the flight information region/upper flight information region (FIR/UIR) or control area (CTA) is to be applied.
26. The elements “forecast time” and “forecast position” are not to be used in conjunction with the element “movement or expected movement”.
27. The levels of the phenomena remain fixed throughout the forecast period.
28. Only for SIGMET messages for volcanic ash.
29. To be used for more than one volcanic ash clouds or cumulonimbus clouds associated with a tropical cyclone simultaneously affecting the FIR concerned.
30. End of the message (as the SIGMET message is being cancelled).
31. The term CB is to be used when the forecast position for the cumulonimbus cloud is included.
32. The forecast position for cumulonimbus (CB) cloud occurring in connection with tropical cyclones relate to the forecast time of the tropical cyclone centre position, not to the end of the validity period of the SIGMET message.
33. For SIGMET messages for radioactive cloud, only within (WI) is to be used for the elements “location” and “forecast position”.
34. For SIGMET messages for radioactive cloud, only stationary (STNR) is to be used for the element “movement or expected movement”.

Additional notes (not specifically identified in footnotes to Table A6-1A):

In accordance with 4.2.9 of Appendix 6 of Annex 3, “Sandstorm/duststorm should be considered: a) heavy whenever the visibility is below 200 m and the sky is obscured; and b) moderate whenever the visibility is: 1) below 200 m and the sky is not obscured; or 2) between 200 m and 600 m.” (no footnote in Annex 3, but this is applicable reference)

APPENDIX B

SIGMET EXAMPLES

*Note. — The figures used in this appendix are intended simply to clarify the intent of the SIGMET message in abbreviated plain language, and therefore how each SIGMET should be **constructed** by MWOs and also **interpreted** by users. The figures used are not intended to give guidance on how a SIGMET in graphical format should be produced.*

Examples of ‘**WS**’ SIGMET. See the sections for SIGMET for volcanic ash only (WV) and SIGMET for tropical cyclone only (WC) for examples specific to those phenomena.

Contents

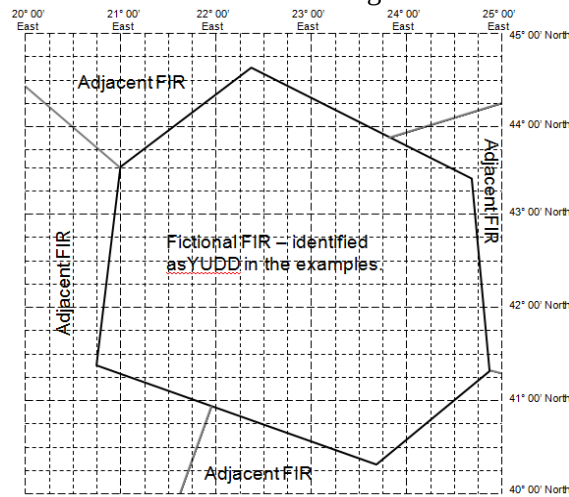
General

- 1) An area of the FIR defined by a polygon.
Use of polygons with complex FIR boundaries.
- 2a) In a sector of the FIR defined relative to a specified line, or single series of up to three connected lines, with start and end points on the FIR boundary
- 2b) In a sector of the FIR defined as being between two lines of latitude, or between two lines of longitude
- 2c) In a sector of the FIR defined as being *between* two specified lines, or *between* two series of up to three connected lines, each with start and endpoints on the FIR boundary
- 2d) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a segment)
- 2e) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment)
- 3) Defined by a ‘corridor’ of specified width, centred upon the line described;
- 4) At a specific point within the FIR
- 5) A vertical cylinder of specified radius
- 6) Covering entire FIR.
- 7) Additional examples using volcanic ash references applicable to volcanic ash SIGMET only
- 8) Additional examples using volcanic ash references applicable to multiple areas in SIGMET for volcanic ash.
- 9) Additional example illustrating use of "WI nnnKM (or nnnNM) OF TC CENTRE " in Tropical Cyclone SIGMET only.
- 10) Additional example with multiple CB areas in SIGMET for tropical cyclone
- 11) Additional examples of SIGMETs relating to ‘concave’ or ‘horseshoe’ shaped FIRs
- 12) Examples of Test and Exercise SIGMET indicators

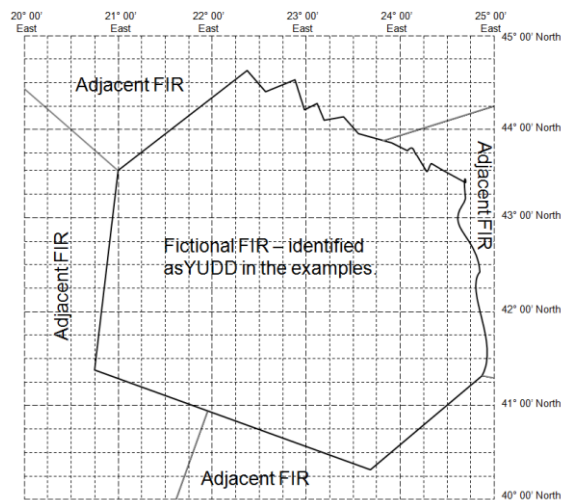
General

Explanation of “fictional FIR”.

In each of the examples below, a fictional FIR area is indicated, with portions of adjacent fictional FIRs also indicated. The FIR areas are overlaid on a coordinate grid, in order that the example plain language SIGMETs can be explicitly related to the intended meaning.



For some cases, examples are given where the FIR has boundaries that are complex (country borders for example, especially when defined by rivers)



Fictional FIR ‘Shanlon = YUDD’ is used for the examples.

Repetition of start point as last coordinate.

In accordance with practices and procedures laid down for other aeronautical bulletins (i.e. NOTAM), it is recommended that the last point of a polygon is a repeat of the first point of the polygon. This will ensure that the polygon has been closed, and that no points have been accidentally omitted.

'Direction' of encoding of the points of a polygon

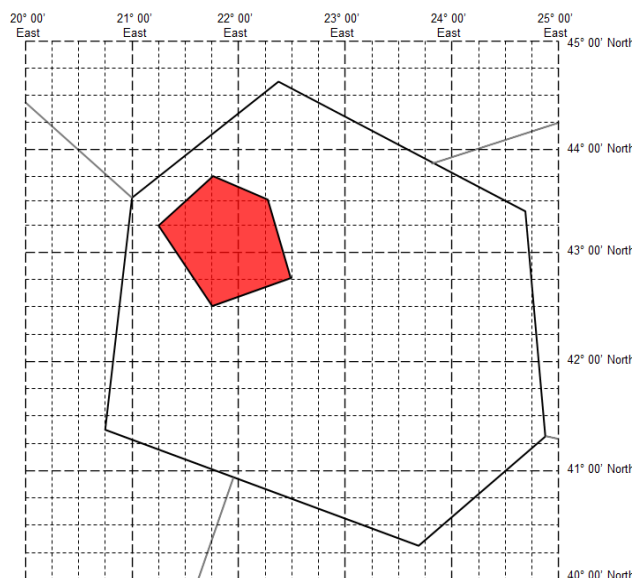
In accordance with practices and procedures laid down for other aeronautical bulletins and international practice (e.g. BUFR encoding of WAFS significant weather (SIGWX) forecasts), it is recommended that the points of a polygon are provided in a 'clockwise' sense. This assists automated systems in determining the 'inside' of polygons.

Use of 'Expected Movement' and 'Forecast Position'/'Forecast Time'.

With applicability of Amendment 77, the 'Expected Movement' element of SIGMET should not be used if the 'Forecast Position'/'Forecast Time' element is being used, and vice versa. This is to prevent duplication at best and inconsistencies at worst.

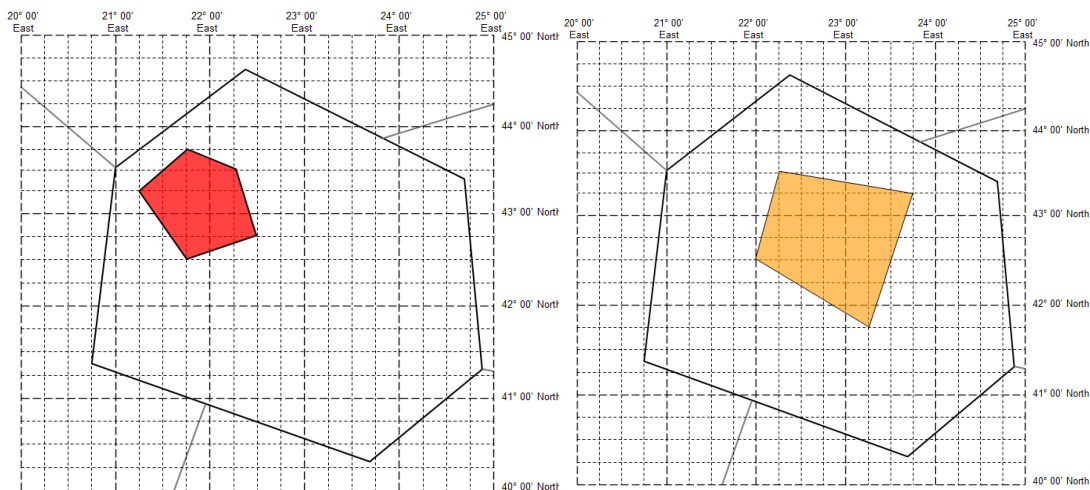
1) An area of the FIR defined by a polygon. The end point should be a repeat of the start point.

When the SIGMET does not include a 'forecast position' section.



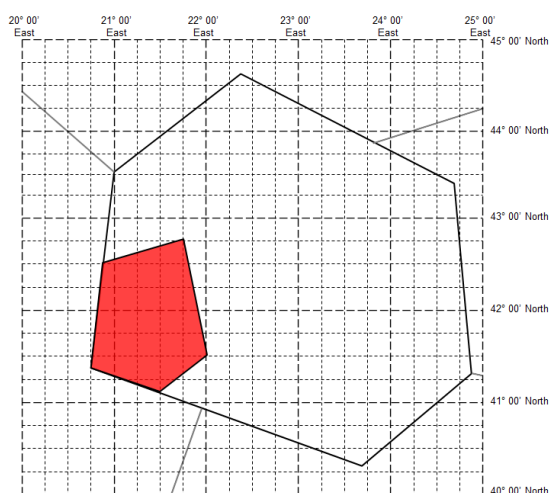
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST WI N4230 E02145 - N4315 E02115 -
N4345 E02145 - N4330 E02215 - N4245 E02230 - N4230 E02145 FL250/370
MOV ESE 20KT INTSF=

With an explicit forecast position:



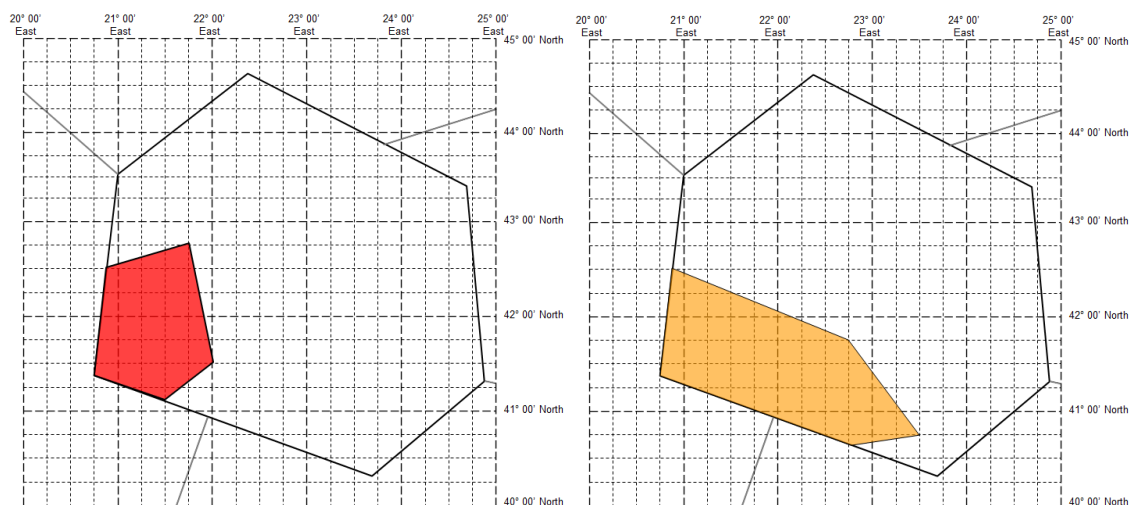
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST WI N4230 E02145 - N4315 E02115 -
N4345 E02145 - N4330 E02215 - N4245 E02230 - N4230 E02145 FL250/370
INTSF FCST AT 1600Z WI N4145 E02315 - N4230 E02200 - N4330 E02215 -
N4315 E02345 - N4145 E02315=

When the SIGMET does not include a 'forecast position' section.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST WI N4230 E02052 - N4245 E02145 -
N4130 E02200 - N4107 E02130 - N4123 E02045 - N4230 E02052 FL250/370
MOV SE 30KT WKN=

With an explicit forecast position:



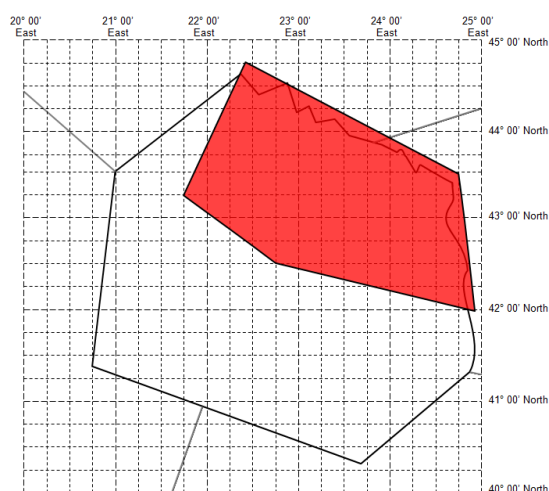
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST WI N4230 E02052 - N4245 E02145 -
N4130 E02200 - N4107 E02130 - N4123 E02045- N4230 E02052 FL250/370 WKN
FCST AT 1600Z WI N4230 E02052 - N4145 E02245 - N4045 E02330 - N4040
E02248 - N4123 E02045- N4230 E02052=

Use of polygons with complex FIR boundaries.

Annex 3 (21st Edition, July 2020) specifies that the points of a polygon '... are to be kept to a minimum and should not normally exceed seven'. However, some FIR boundaries are complex, and it would be unrealistic to expect that a polygon would be defined that followed such boundaries precisely. As such, some States have determined that the polygon points be chosen in relation to the complex boundary such that the FIR boundary approximates, but is wholly encompassed by, the polygon, and that any additional area beyond the FIR boundary be the minimum that can be reasonably and practically described. Caution should however be exercised in those instances where international aerodromes are located in close proximity to such a complex FIR boundary.

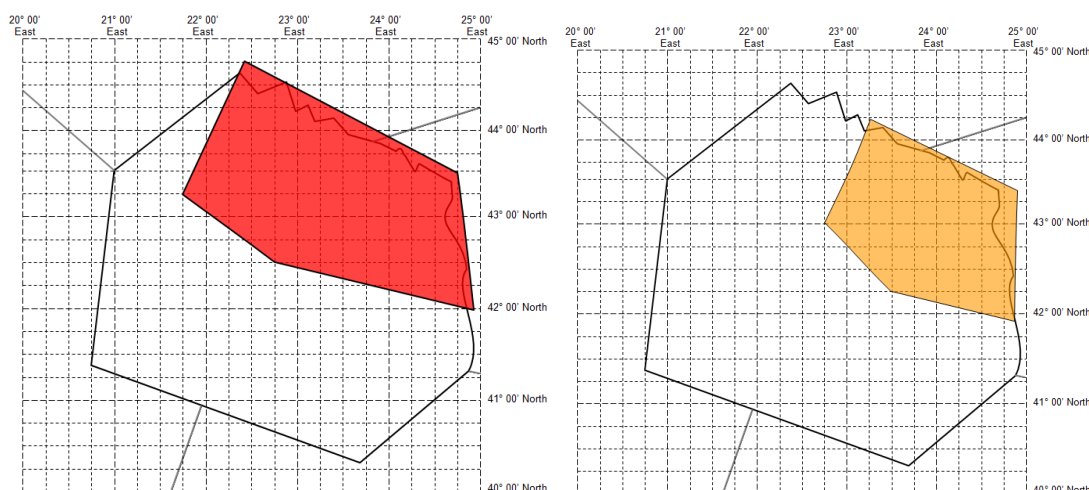
In the examples below, it would not be practical to follow the northeastern boundary of the FIR exactly. The point close to N4330 E02245 is obviously a 'major' turning point along the FIR boundary, but the other, numerous and complex turning points can only be approximated when constrained to seven points.

When the SIGMET does not include a 'forecast position' section.



```
YUDD SIGMET 2 VALID 101200/101600 YUSO-  
YUDD SHANLON FIR/UIR SEV TURB FCST WI N4315 E02145 - N4445 E02225 -  
N4330 E02445 - N4200 E02455 - N4230 E02245 - N4315 E02145 FL250/370  
MOV SE 20KT WKN=
```

With an explicit forecast position:

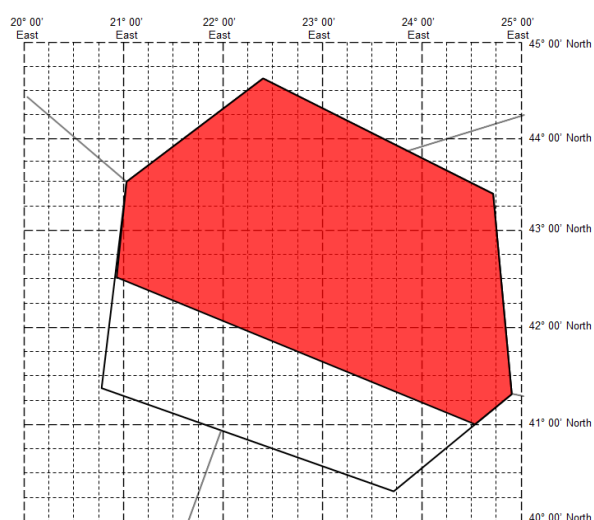


YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST WI N4315 E02145 - N4445 E02245 -
N4330 E02445 - N4200 E02455 - N4230 E02245- N4315 E02145 FL250/370 WKN
FCST AT 1600Z WI N4300 E02245 - N4415 E02315 - N4322 E02452 - N4155
E02445 - N4215 E02330- N4300 E02245=

2a) In a sector of the FIR defined relative to a specified line, or single series of up to three connected lines, with start and end points on the FIR boundary (or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at that point).

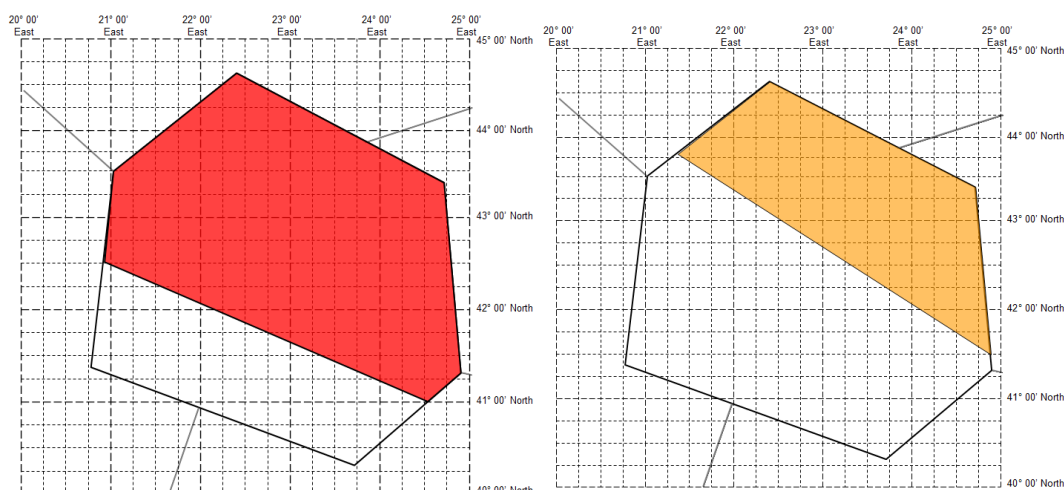
The specified points shall be on the FIR boundary (or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at that point)

When the SIGMET does not include a 'forecast position' section.



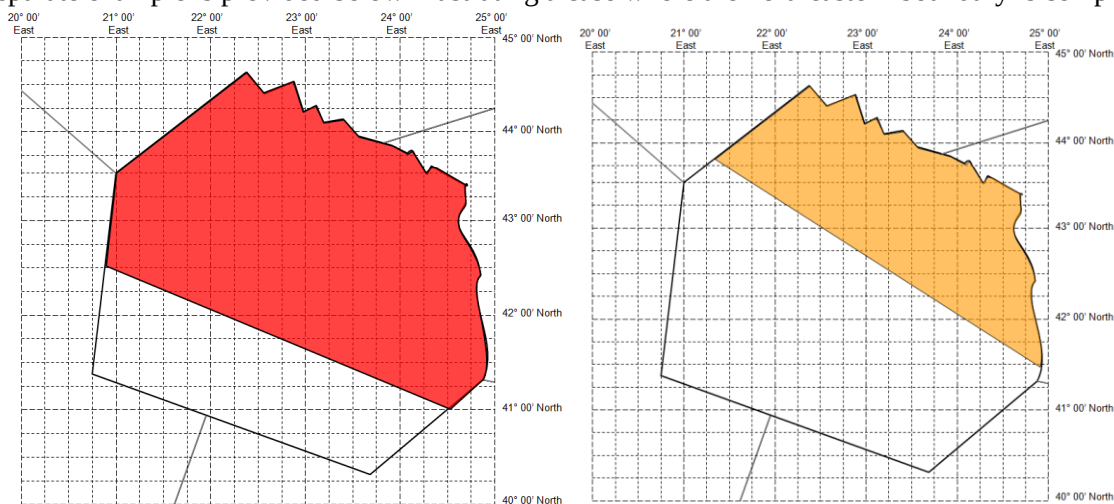
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4230 E02052 - N4100 E02430
FL250/370 MOV NE 15KT WKN=

With an explicit forecast position:



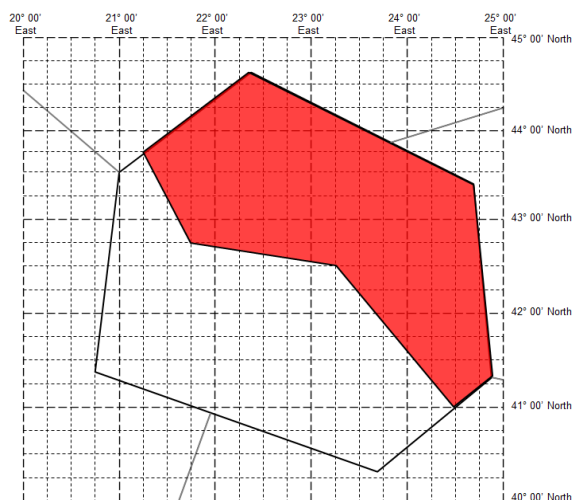
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4230 E02052 - N4100 E02430
FL250/370 WKN FCST AT 1600Z NE OF LINE N4346 E02122 - N4130 E02452=

A separate example is provided below illustrating a case where the northeastern boundary is complex.



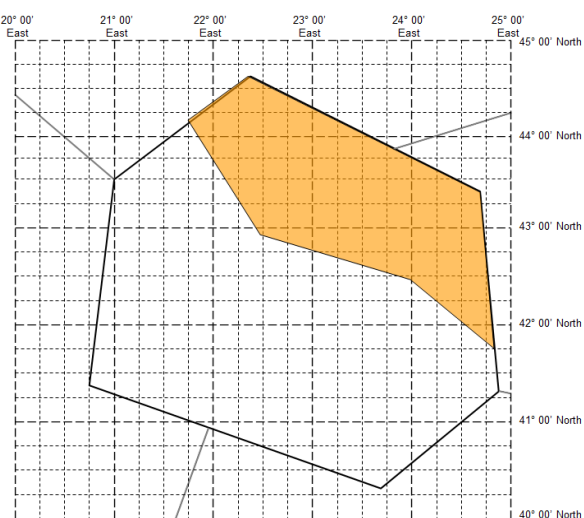
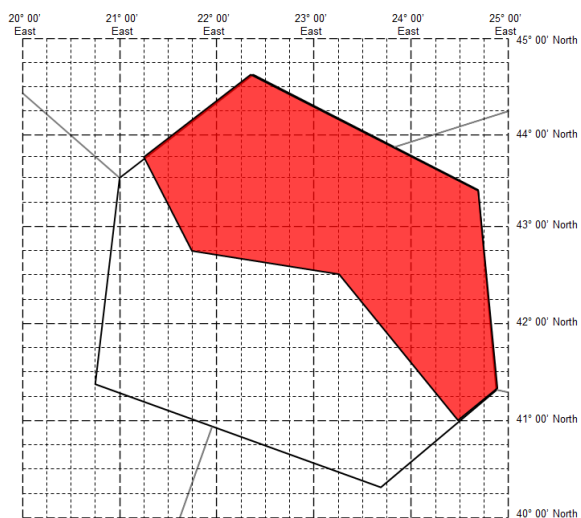
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4230 E02052 - N4100 E02430
FL250/370 WKN FCST AT 1600Z NE OF LINE N4346 E02122 - N4130 E02457=

For a series of connected lines when the SIGMET does not include a ‘forecast position’ section.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4345 E02115 - N4245 E02145
- N4230 E02315 - N4100 E02430 FL250/370 MOV NE 20KT WKN=

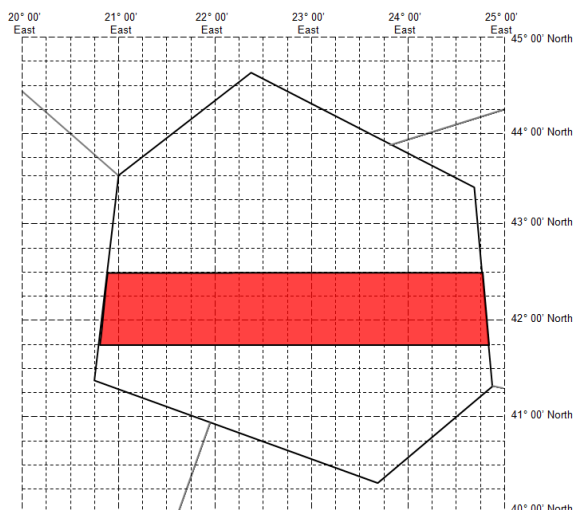
With an explicit forecast position:



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4345 E02115 - N4245 E02145
- N4230 E02315 - N4100 E02430 FL250/370 WKN FCST AT 1600Z NE OF LINE
N4411 E02145 - N4255 E02228 - N4228 E02400 - N4145 E02450=

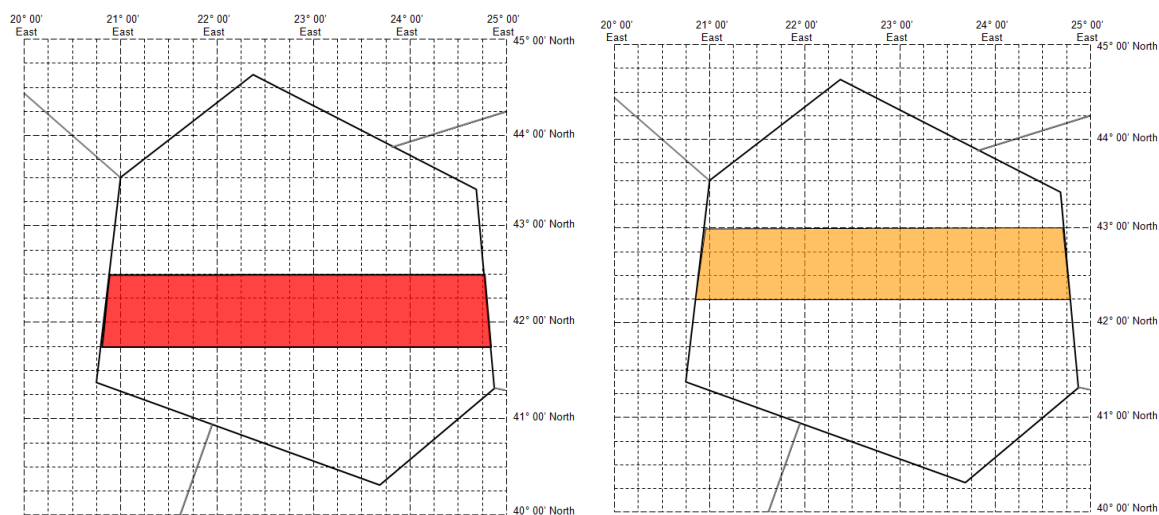
2b) In a sector of the FIR defined as being *between* two lines of latitude, or between two lines of longitude.

When the SIGMET does not include a ‘forecast position’ section.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST N OF N4145 AND S OF N4230 FL250/370 MOV
N 30KT WKN=

With an explicit forecast position:



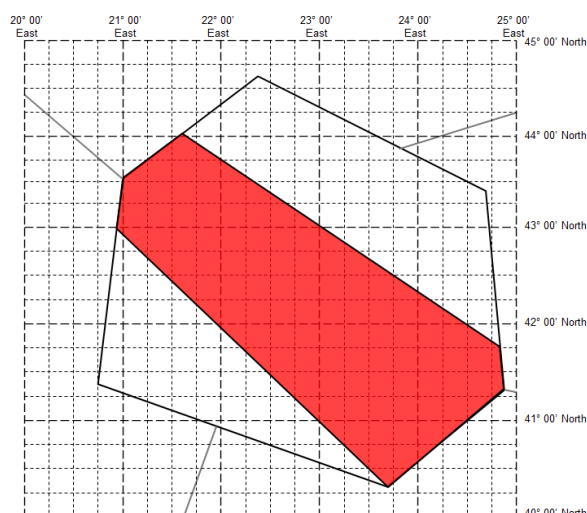
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST N OF N4145 AND S OF N4230 FL250/370 WKN
FCST AT 1600Z N OF N4215 AND S OF N4300=

(similar constructions can be used for specifying areas between lines of longitude)

2c) In a sector of the FIR defined as being *between* two specified lines, or *between* two series of up to three connected lines, each with start and endpoints on the FIR boundary (or start and endpoints so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at those points).

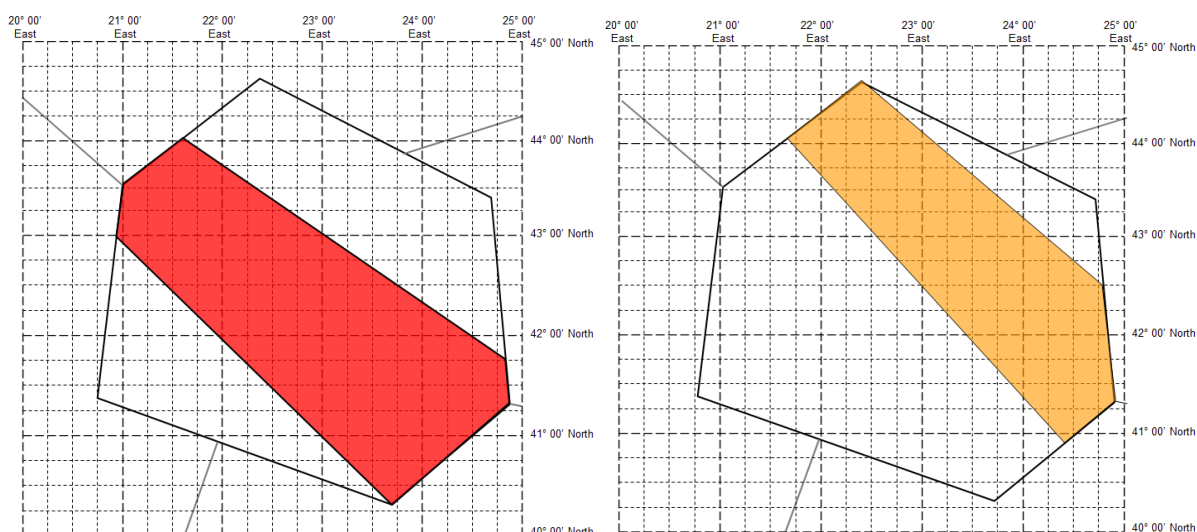
The specified points shall be on the FIR boundary (or so close to the FIR boundary so as to leave no doubt that the intent is for the line to connect to the FIR boundary at that point)

When the SIGMET does not include a ‘forecast position’ section.



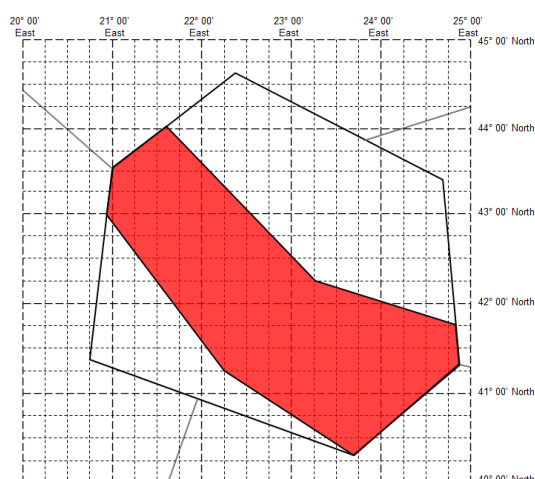
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4300 E02057 - N4020 E02340
AND SW OF LINE N4402 E02142 - N4145 E02450 FL250/370 MOV NE 20KT WKN=

With an explicit forecast position:



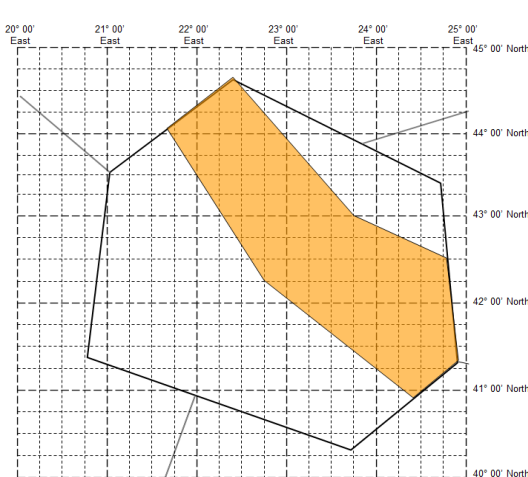
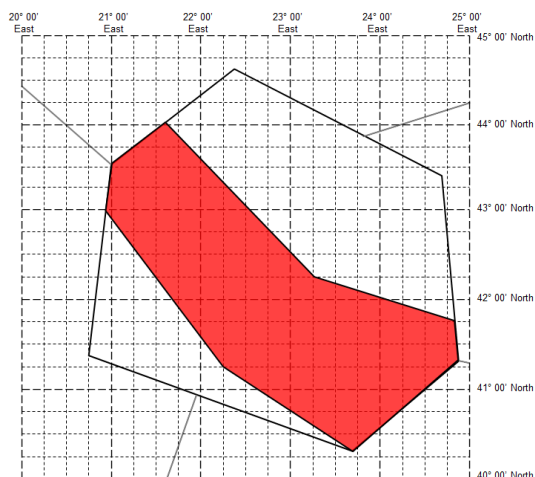
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4300 E02057 - N4020 E02340
AND SW OF LINE N4402 E02142 - N4145 E02450 FL250/370 WKN FCST AT 1600Z
NE OF LINE N4403 E02140 - N4055 E02422 AND SW OF LINE N4437 E02222 -
N4230 E02447=

For a series of connected lines when the SIGMET does not include a ‘forecast position’ section.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4300 E02057 - N4115 E02215
- N4020 E02340 AND SW OF LINE N4402 E02137 - N4215 E02315 - N4145
E02450 FL250/370 MOV NE 20KT WKN=

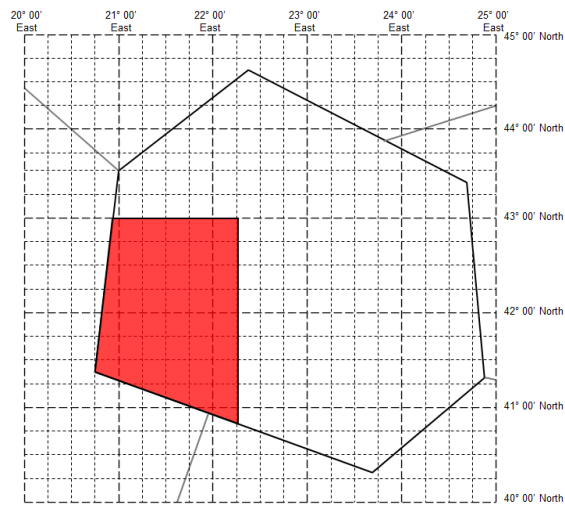
With an explicit forecast position:



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR SEV TURB FCST NE OF LINE N4300 E02057 - N4115 E02215
- N4020 E02340 AND SW OF LINE N4402 E02137 - N4215 E02315 - N4145
E02450 FL250/370 WKN FCST AT 1600Z NE OF LINE N4403 E02140 - N4215
E02245 - N4055 E02422 AND SW OF LINE N4437 E02222 - N4300 E02345 -
N4230 E02447=

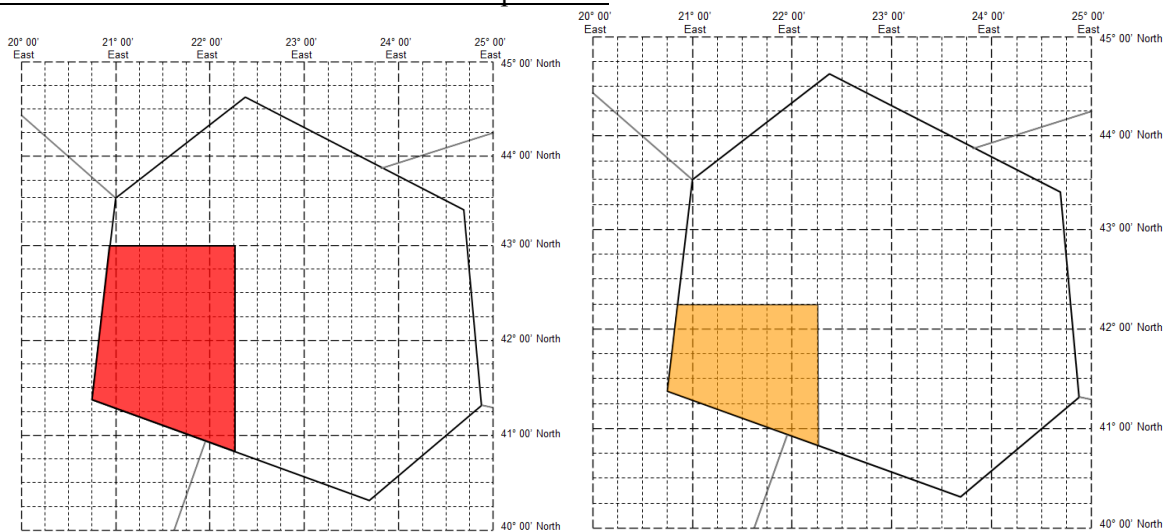
2d) In a sector of the FIR defined relative to a line of latitude and a line of longitude (effectively a quadrant)

When the SIGMET does not include a 'forecast position' section.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST S OF N4300 AND W OF E02215 FL250/370
MOV S 12KT WKN=

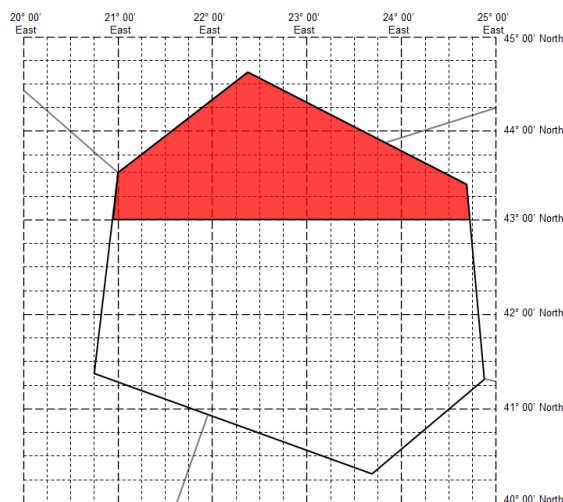
When the SIGMET does include a 'forecast position'.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST S OF N4300 AND W OF E02215 FL250/370
WKN FCST AT 1600Z S OF N4215 AND W OF E02215=

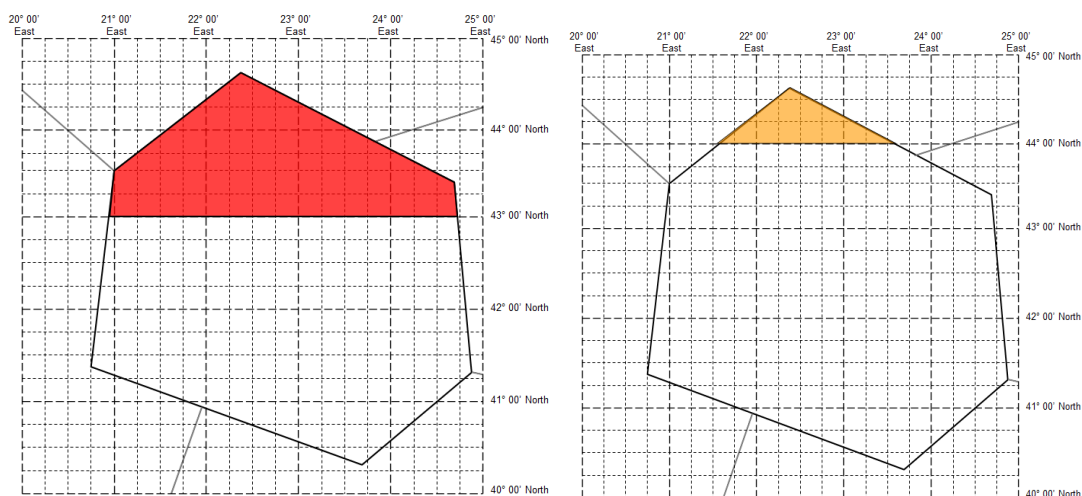
2e) In a sector of the FIR defined relative to a line of latitude or longitude (effectively a segment)

When the SIGMET does not include a 'forecast position' section.



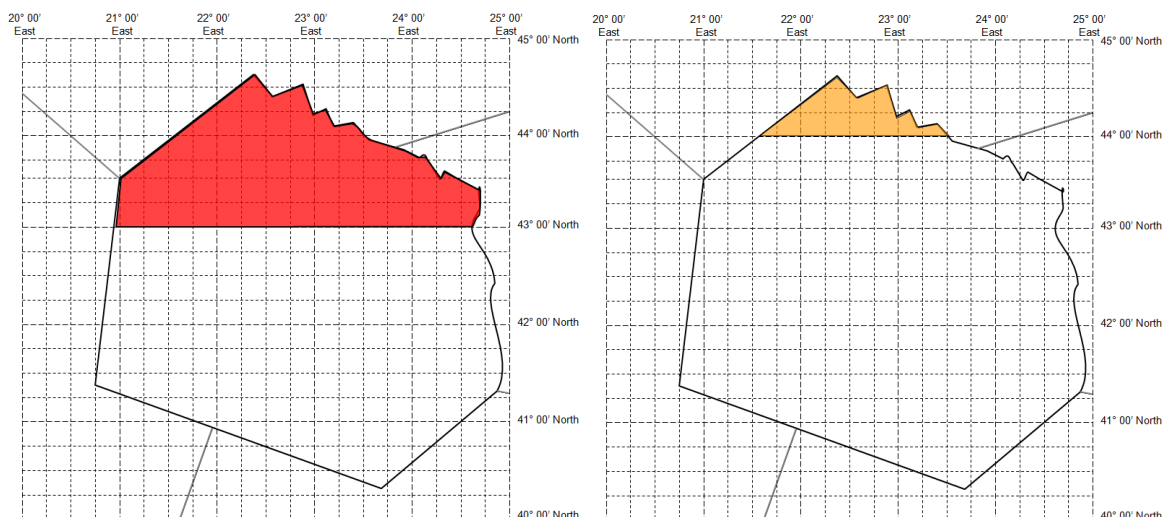
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST N OF N43 FL250/370 MOV N 15KT WKN=

When the SIGMET does include a 'forecast position' section.



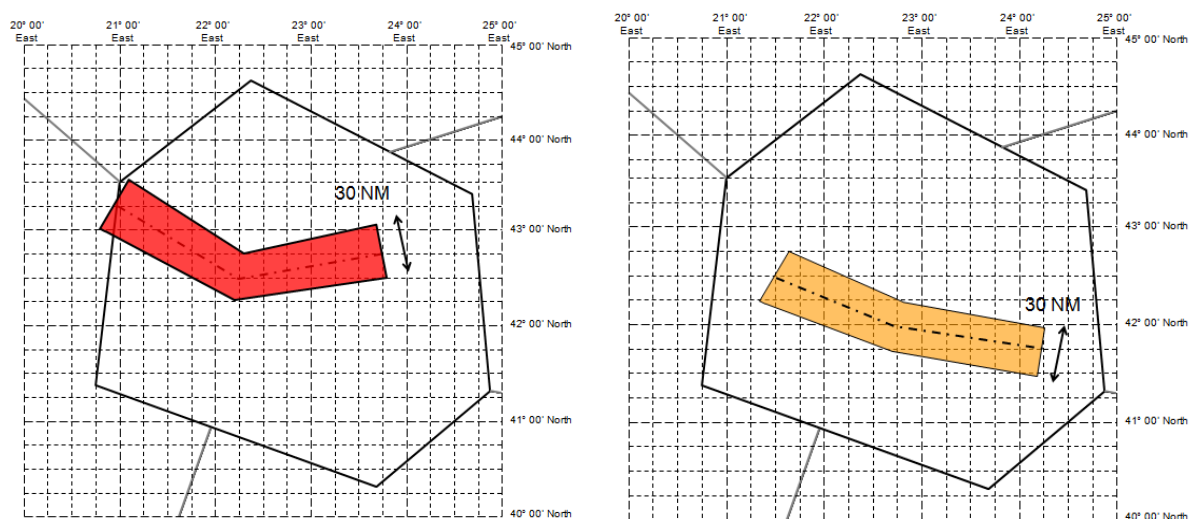
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST N OF N43³ FL250/370 WKN FCST AT
1600Z N OF N44=

³ It would be equally valid to use 'N4300'.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST N OF N43⁴ FL250/370 WKN FCST AT
1600Z N OF N44=

3) Defined by a 'corridor' of specified width, centred upon the line described;



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB FCST APRX 30NM WID LINE BTN N4315 E02100
- N4230 E02215 - N4245 E02345 FL250/370 WKN FCST AT 1600Z APRX 30NM
WID LINE BTN N4230 E02130 - N4200 E02245 - N4145 E02415=

Note: The nature of this option means that, as at N4315 E02100, it is inferred that there is some encroachment into the neighbouring FIR.

⁴ It would be equally valid to use 'N4300'.

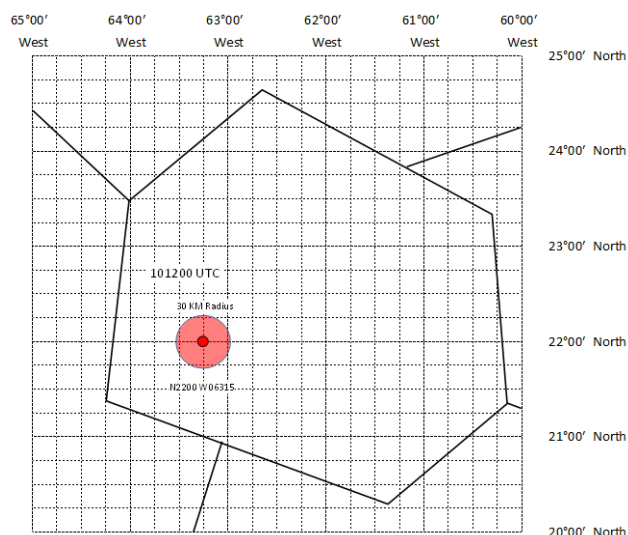
4) At a specific point within the FIR;

When the SIGMET does not include a 'forecast position' section.

YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR SEV TURB OBS N4245 E02230 FL250/370 STNR WKN=

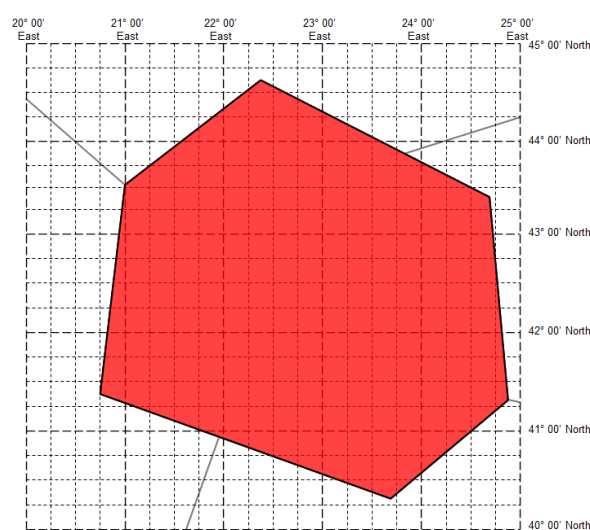
5) A vertical cylinder of specified radius.

For SIGMET messages for radioactive cloud, a cylinder of specified radius is used.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR RDOACT CLD OBS AT 1200Z WI 30KM OF N2200 W06315
SFC/3000FT NC FCST AT 1600Z WI 30KM OF N2200 W06315=

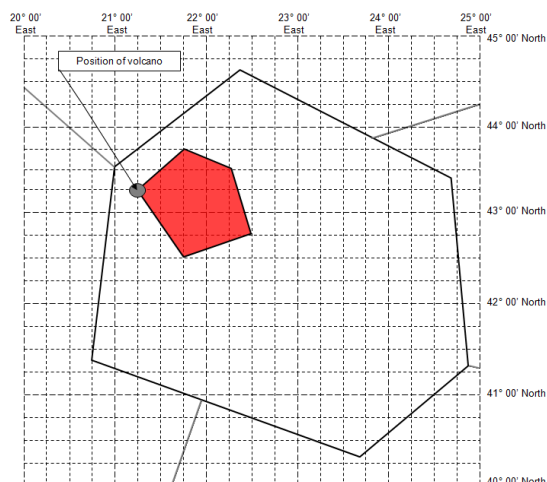
6) Covering entire FIR.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR VA CLD FCST AT 1200Z ENTIRE FIR FL250/370 STNR
WKN=

7) Additional examples using volcanic ash references applicable to volcanic ash SIGMET only

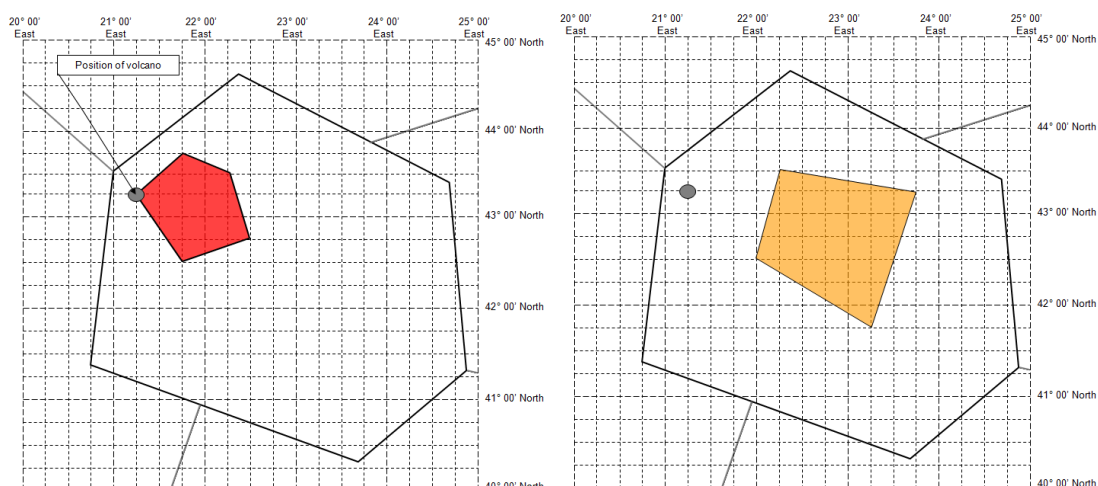
When the VA SIGMET does not include a ‘forecast position’ section.



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR VA ERUPTION MT ASHVAL PSN N4315 E02115 VA CLD OBS AT
1200Z WI N4315 E02115 - N4345 E02145 - N4330 E02215 - N4245 E02230 -
N4230 E02145 - N4315 E02115 FL250/370 MOV ESE 20KT NC=

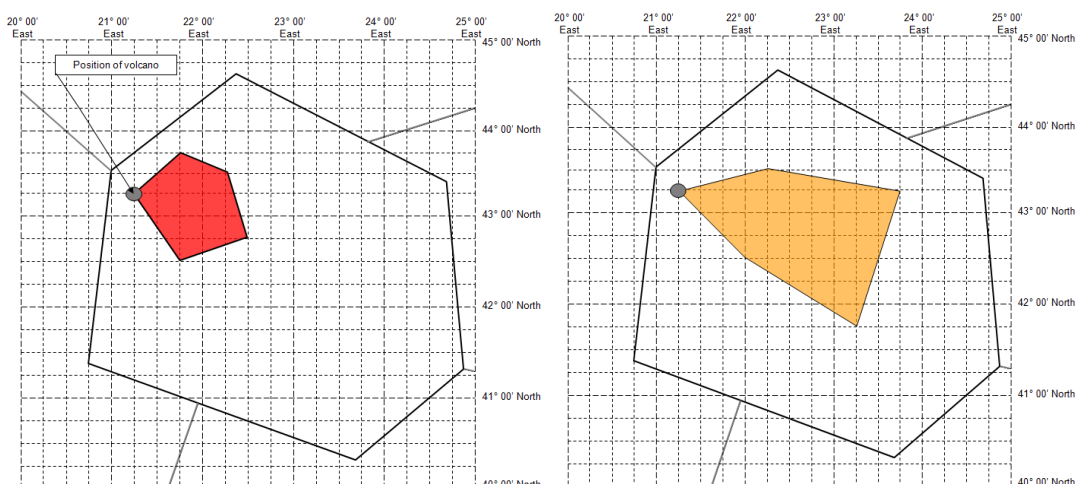
When the SIGMET does include a ‘forecast position’ section (no rate of movement).

For VA (eruption ceased, ash cloud persists downwind):



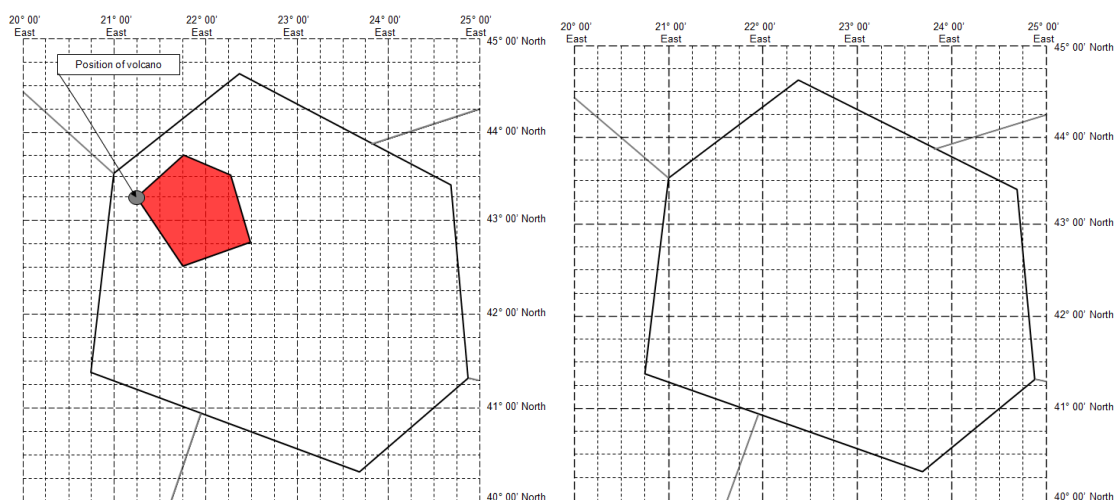
YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL PSN N4315 E02115 VA CLD OBS
AT 1200Z WI N4315 E02115 - N4345 E02145 - N4330 E02215 - N4245 E02230
- N4230 E02145 - N4315 E02115 FL250/370 NC FCST AT 1800Z WI N4330
E02215 - N4315 E02345 - N4145 E02315 - N4230 E02200 - N4330 E02215=

For VA (eruption on-going):



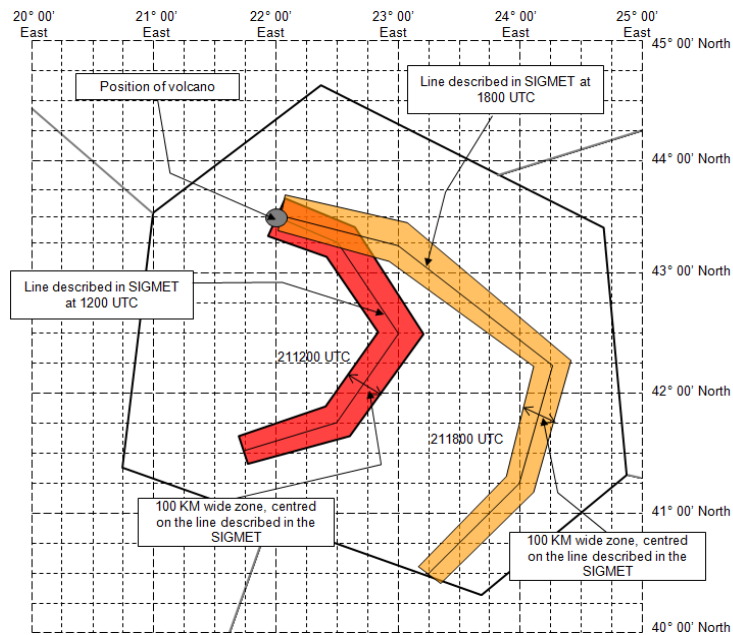
YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR VA ERUPTION MT ASHVAL PSN N4315 E02115 VA CLD OBS AT
1200Z WI N4315 E02115 - N4345 E02145 - N4330 E02215 - N4245 E02230 -
N4230 E02145 - N4315 E02115 FL250/370 NC FCST AT 1800Z WI N4315 E02115
- N4330 E02215 - N4315 E02345 - N4145 E02315 - N4230 E02200 - N4315
E02115=

For VA (eruption ceasing, ash dispersing):



YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR VA ERUPTION MT ASHVAL PSN N4315 E02115 VA CLD OBS AT
1200Z WI N4315 E02115 - N4345 E02145 - N4330 E02215 - N4245 E02230 -
N4230 E02145 - N4315 E02115 FL250/370 WKN FCST AT 1800Z NO VA EXP=

For VA (eruption on-going), defining the area affected as a corridor of specified width;

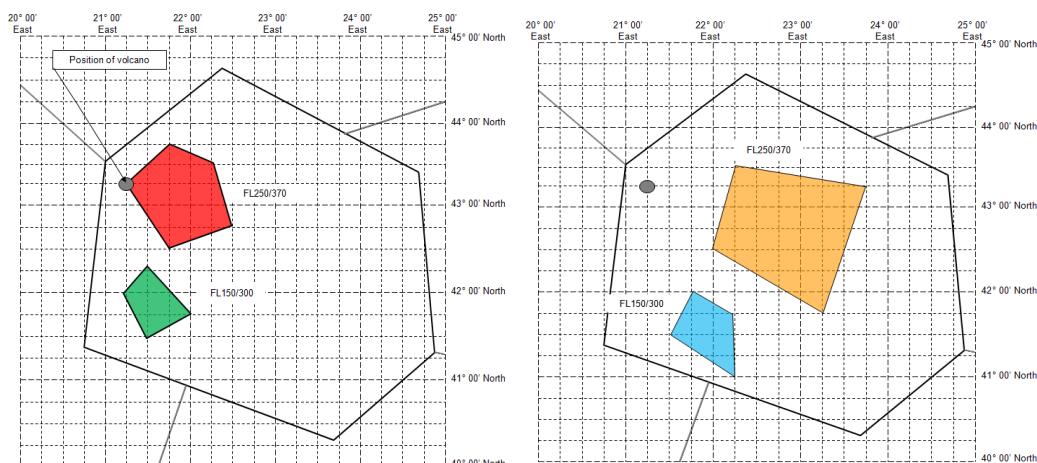


YUDD SIGMET 2 VALID 211200/211800 YUSO-
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL PSN N4330 E02200 VA CLD
FCST AT 1200Z APRX 100KM WID LINE BTN N4330 E02200 - N4315 E02230 -
N4230 E02300 - N4145 E02230 - N4130 E02145 FL310/450 NC FCST AT 1800Z
APRX 100KM WID LINE BTN N4330 E02200 - N4315 E02300 - N4215 E02415 -
N4115 E02400 - N4030 E02315=

8) Additional examples using volcanic ash references applicable to multiple areas in SIGMET for volcanic ash.

The only way to include a second instance of a volcanic ash cloud in a SIGMET message is to use the 'AND' option after the 'Forecast position' section.

In the example below, two areas of volcanic ash cloud (at different levels) are forecast to move as described. The normal courier font refers to the northernmost areas of ash, and the italicised font refers to the southernmost areas of ash during the period. 'AND' is highlighted in **bold** to identify the separation of the two features.

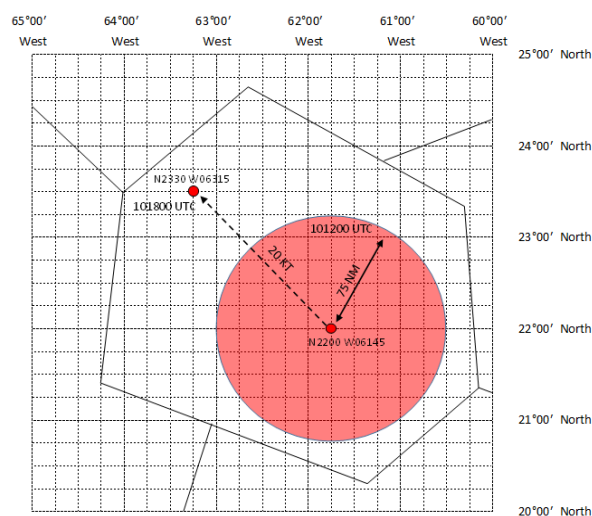


```
YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR VA ERUPTION MT ASHVAL PSN N4315 E02115 VA CLD OBS AT
1200Z WI N4315 E02115 - N4345 E02145 - N4330 E02215 - N4245 E02230 -
N4230 E02145 - N4315 E02115 FL250/370 NC FCST AT 1800Z WI N4330 E02215
- N4315 E02345 - N4145 E02315 - N4230 E02200 - N4330 E02215 AND OBS AT
1200Z WI N4200 E02115 - N4217 E02130 - N4145 E02200 - N4130 E02130 -
N4200 E02115 FL150/300 NC FCST AT 1800Z WI N4200 E02145 - N4145 E02215
- N4100 E02215 - N4130 E02130 - N4200 E02145=
```

The above only works if there are two instances of ash at the start and end of the period. If the number of ash areas is different at the start and end, it is recommended that separate SIGMETs be issued as necessary.

9) Additional example illustrating use of "WI nnnKM (or nnnNM) OF TC CENTRE " in Tropical Cyclone SIGMET only

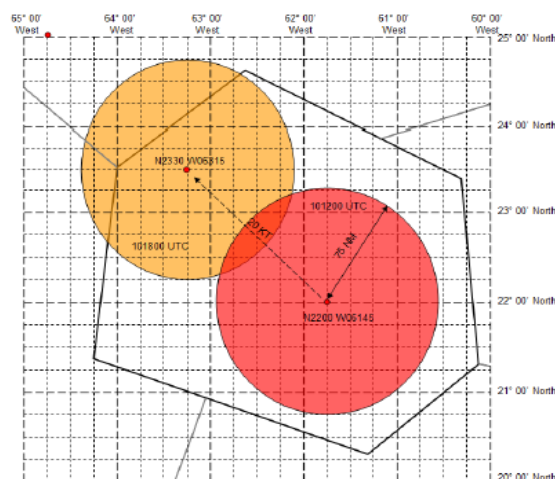
When the SIGMET does not include a 'forecast position' section.



YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N2200 W06145 CB OBS AT 1200Z WI 075NM
OF TC CENTRE TOP BLW FL500 MOV NW 20KT WKN=

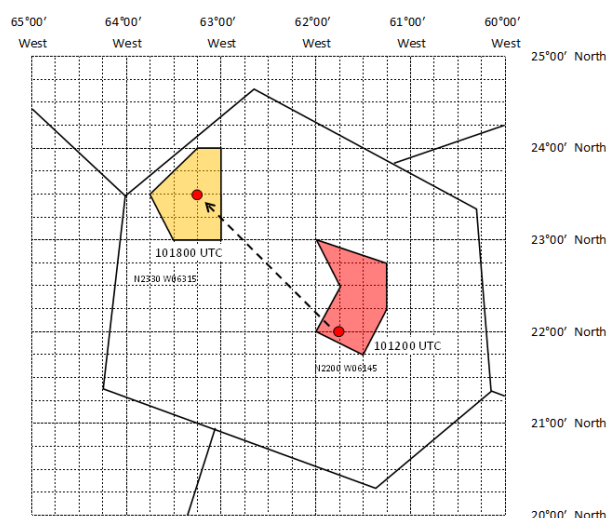
YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N2200 W06145 CB OBS AT 1200Z WI 075NM
OF TC CENTRE TOP BLW FL500 WKN FCST AT 1800Z TC CENTRE PSN N2330
W06315=

When the SIGMET does include 'TC forecast position' and 'Forecast position' sections.



YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N2200 W06145 CB OBS AT 1200Z WI 075NM
OF TC CENTRE TOP BLW FL500 WKN FCST AT 1800Z TC CENTRE PSN N2330 W06315
CB WI 075NM OF TC CENTRE=

It is acceptable to use the other 'Location' options to describe the area affected by the CB of a Tropical Cyclone:



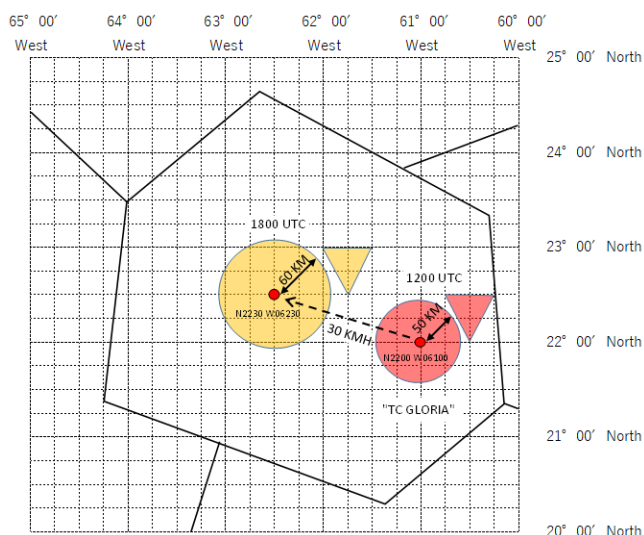
YUDD SIGMET 2 VALID 101200/101800 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N2200 W06145 CB OBS AT 1200Z WI N2200 W06200 - N2230 W06145 - N2300 W06200 - N2245 W06115 - N2215 W06115 - N2145 W06130 - N2200 W06200 TOP BLW FL500 WKN FCST AT 1800Z TC CENTRE PSN N2330 W06315 CB WI N2300 W06300 - N2400 W06300 - N2400 W06315 - N2330 W06345 - N2300 W06330 - N2300 W06300=

10) Additional example with multiple CB areas in SIGMET for tropical cyclone.

The only way to include a second instance of a tropical cyclone in a SIGMET is to use the 'AND' option after the 'Forecast position' section.

In the example below, two areas of CB cloud associated with a TC can be described. The normal courier font refers to the CB within a specified radius of a TC, and the italicised font refers to the northeast CB areas of a TC. 'AND' is highlighted in **bold** to identify the separation of the two features.

Note 1: If the number of cumulonimbus areas is different at the start and end, separate SIGMETs can be issued as necessary. For example, one SIGMET for the tropical cyclone and a separate SIGMET for the frequent or embedded cumulonimbus cloud.



When the WC SIGMET does include a ‘TC forecast position’ section and ‘forecast position’ sections of both of two CB areas.

YUDD SIGMET 3 VALID 251230/251830 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N22 W061 CB OBS AT 1200Z WI 050KM OF TC
CENTRE TOP FL500 INTSF FCST AT 1800Z TC CENTRE PSN N2230 W06230 CB WI
060KM OF TC CENTRE **AND** OBS AT 1220Z WI N2230 W06045 - N2230 W06015 -
N2200 W06030 - N2230 W06045 TOP ABV FL500 FCST AT 1800Z WI N2300 W06200
- N2300 W06130 - N2230 W06145 - N2300 W06200=

For the above case, referring to Note 1 of this section, an alternative is to use WS SIGMET to describe the CB. An example of pairing use of WS with WC SIGMET below:

YUDD SIGMET 3 VALID 251230/251830 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N22 W061 CB OBS AT 1200Z WI 050KM OF TC
CENTRE TOP FL500 INTSF FCST AT 1800Z TC CENTRE PSN N2230 W06300 CB WI
060KM OF TC CENTRE=

YUDD SIGMET 4 VALID 251230/25**1600** YUSO-
YUDD SHANLON FIR EMBD TS OBS AT 1220Z WI N2230 W06045 - N2230 W06015
- N2200 W06030 - N2230 W06045 TOP ABV FL500 **FCST AT 1600Z** WI N2245
W06130 - N2245 W06120 - N2230 W06125 - N2245 W06130=

When the WC SIGMET does not include a ‘TC forecast position’ section and ‘forecast position’ sections of both of two CB areas.

Although a second instance of a CB cloud is to use the 'AND' option after the 'Forecast position' section, 'Forecast position' is omitted.

YUDD SIGMET 3 VALID 251230/251830 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N22 W061 CB OBS AT 1200Z WI 050KM OF TC
CENTRE TOP FL500 MOV WNW 30KMH INTSF **AND** OBS AT 1220Z WI N2230 W06045
- N2230 W06015 - N2200 W06030 - N2230 W06045 TOP ABV FL500=

When the WC SIGMET does not include a ‘TC forecast position’ section and ‘forecast position’ section of the first instance of CB area but include a ‘forecast position’ section of the second instance of CB area.

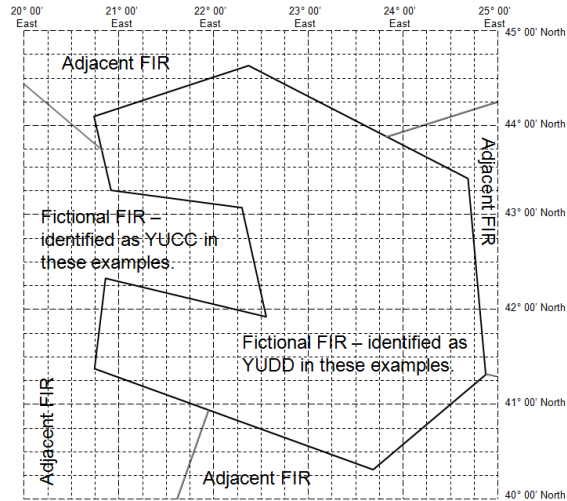
YUDD SHANLON SIGMET 3 VALID 251230/251830 YUSO-
YUDD SHANLON FIR TC GLORIA PSN N22 W061 CB OBS AT 1200Z WI 050KM OF TC
CENTRE TOP FL500 MOV WNW 30KMH INTSF **AND** OBS AT 1220Z WI N2230 W06045
- N2230 W06015 - N2200 W06030 - N2230 W06045 TOP ABV FL500 FCST AT
1800Z WI N2300 W06200 - N2300 W06130 - N2230 W06145 - N2300 W06200=

Note 2: In the case that ‘forecast position’ is available, including ‘forecast position’ is recommended instead of ‘movement’.

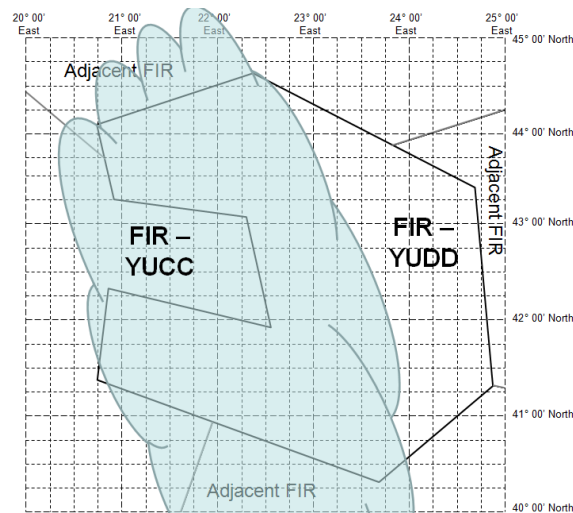
11) Additional examples of SIGMETs relating to ‘concave’ or ‘horseshoe’ shaped FIR’s

There are examples of FIRs that partially surround adjacent FIRs and are what might be described as concave or 'horseshoe' shaped. An example is given below.

a) Considering a concave, ‘horseshoe’ shaped FIR partially surrounding another FIR with ‘legs’ of similar different size



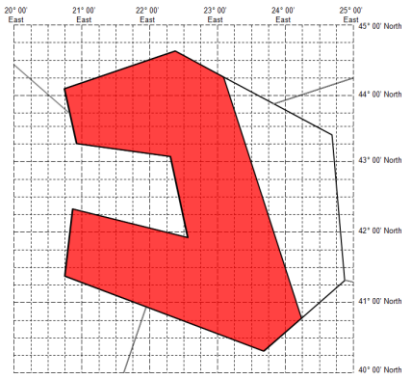
The question arises as to how to encode a SIGMET under circumstances where the hazard affects the outer FIR (YUDD in this case) and the FIR that is partially enclosed (YUCC in this case).



With due regard to removing any possible ambiguity, and also with regard to consistency with protocols for IWXXM versions of SIGMET, the following best practice is provided.

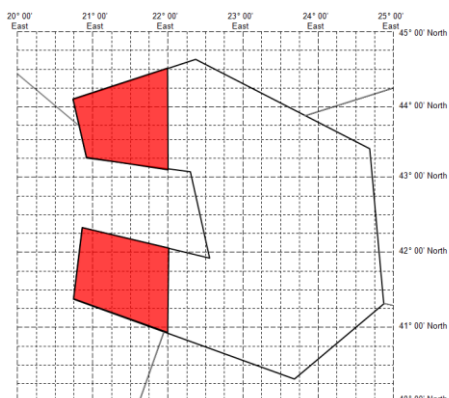
In the examples below, the area indicated in red is taken as representing the meteorological hazard.

Example 1) In this example, it is considered that the situation below could be encoded as a single, simple SIGMET. Users would be expected to interpret the SIGMET as indicating the area identified in red was affected by the hazard within the YUDD FIR.



YUDD SIGMET 2 VALID 101200/101600 YUSO—
YUDD SHANLON FIR/UIR SEV TURB FCST SW OF LINE N4415 E02305 – N4045 E02415
FL250/370 MOV SW 15KT WKN=

Example 2) In this example, in order to prevent any possible ambiguity and to prevent complications and inconsistencies with equivalent IWXXM versions of SIGMET then two separate SIGMETs should be issued.



In this case, the following is recommended:

One SIGMET (northern extension of the 'horseshoe' shape)

YUDD SIGMET 2 VALID 101200/101600 YUSO–

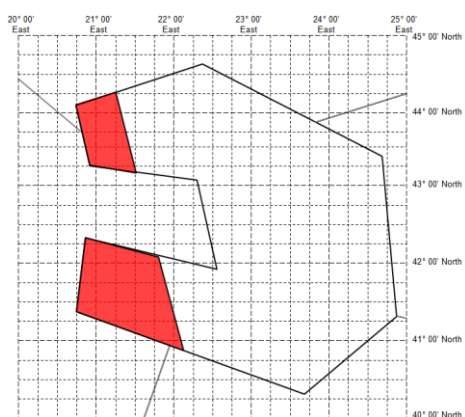
YUDD SHANLON FIR/UIR SEV TURB FCST W OF LINE N4430 E02200 – N4307 E02200
FL250/370 MOV W 15KT WKN=

AND a second SIGMET (southern extension of the 'horseshoe' shape)

YUDD SIGMET 3 VALID 101200/101600 YUSO–

YUDD SHANLON FIR/UIR SEV TURB FCST W OF LINE N4203 E02200 – N4058 E02200
FL250/370 MOV W 15KT WKN=

Where the line delineating the hazard is not a line of latitude or longitude, a similar process should be followed



One SIGMET (northern extension of the 'horseshoe' shape)

YUDD SIGMET 2 VALID 101200/101600 YUSO–

YUDD SHANLON FIR/UIR SEV TURB FCST SW OF LINE N4415 E02115 – N4312 E02130
FL250/370 MOV W 15KT WKN=

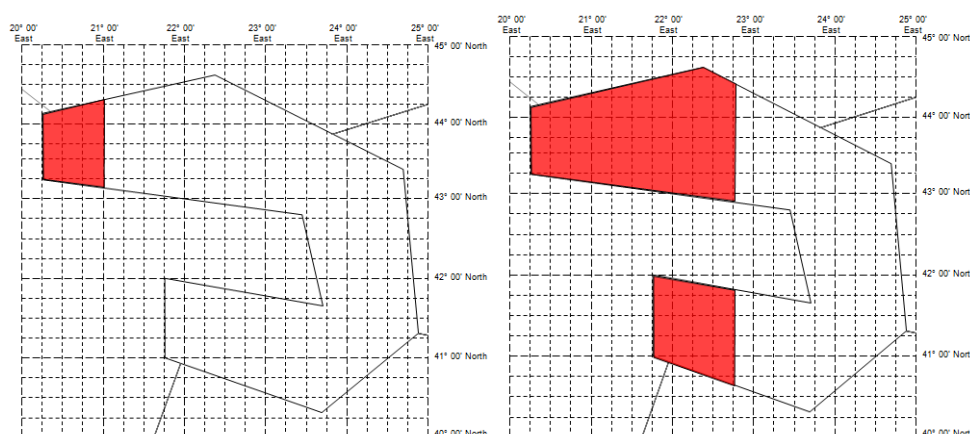
AND a second SIGMET (southern extension of the 'horseshoe' shape)

YUDD SIGMET 3 VALID 101200/101600 YUSO–

YUDD SHANLON FIR/UIR SEV TURB FCST SW OF LINE N4205 E02147 – N4052 E02206
FL250/370 MOV W 15KT WKN=

b) Considering a concave, 'horseshoe' shaped FIR partially surrounding another FIR with 'legs' of very different size.

If the southern 'leg' is expected to be affected during the forecasted validity period, as the example below then 2 SIGMETs should be issued.



YUDD SIGMET 2 VALID 101200/101600 YUSO–

YUDD SHANLON FIR/UIR SEV TURB FCST AT 1200Z W OF LINE N4416 E02100 – N4307
E02100 FL250/370 WKN FCST AT 1600Z W OF LINE N4427 E02245 – N4252 E02245=

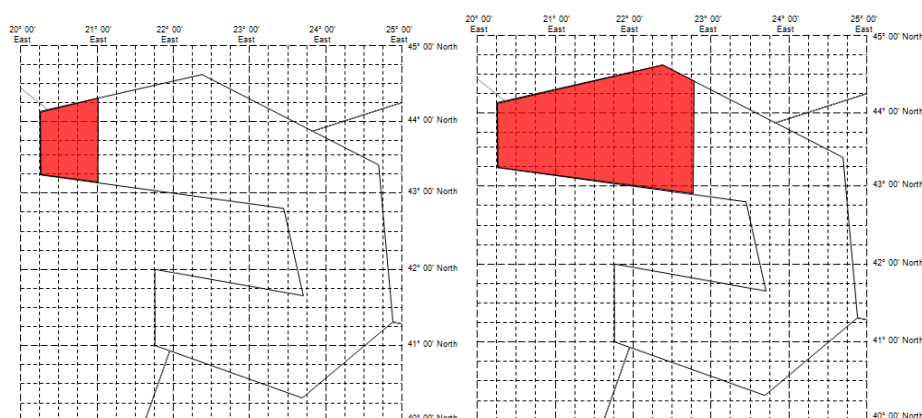
AND a second SIGMET

YUDD SIGMET 3 VALID 101330/101600 YUSO–

YUDD SHANLON FIR/UIR SEV TURB FCST AT 1330Z W OF LINE N4200 E02145 – N4100
E02145 FL250/370 WKN FCST AT 1600Z W OF LINE N4147 E02245 – N4038 E02245=

Note, the validity time (highlighted) of the second SIGMET commences sometime after that of the first since the southern extension of the horseshoe shape is not as far west.

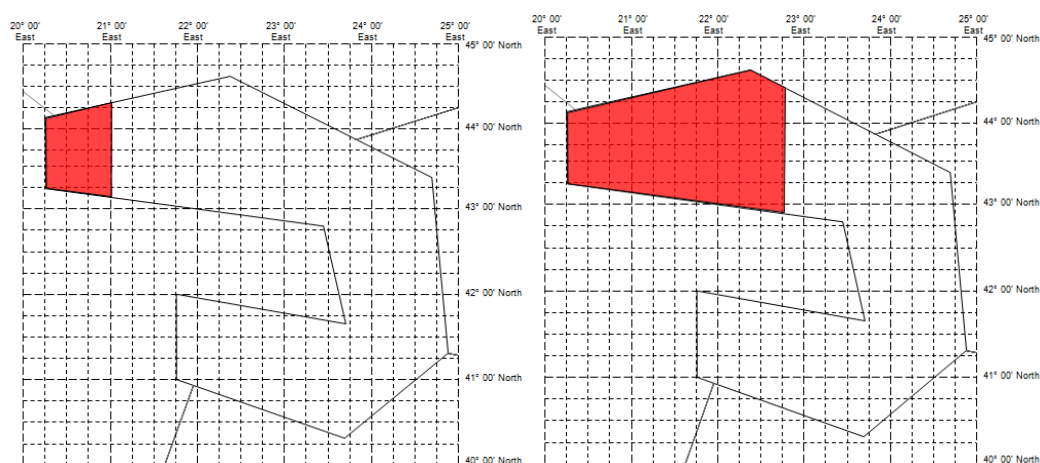
If the southern leg of the FIR is not expected to be affected, as in the example below,



Then a single SIGMET could be issued.

YUDD SIGMET 2 VALID 101200/101600 YUSO—
YUDD SHANLON FIR/UIR SEV TURB FCST AT 1200Z W OF LINE N4415 E02100 – N4307
E02100 FL250/370 MOV E 25KT WKN=

However, to remove any possible doubt it is better to include an explicit forecast position,



YUDD SIGMET 2 VALID 101200/101600 YUSO—
YUDD SHANLON FIR/UIR SEV TURB FCST AT 1200Z W OF LINE N4415 E02100 – N4307
E02100 FL250/370 WKN FCST AT 1600Z W OF LINE N4427 E02245 – N4252 E02245=

It should also be noted that in all of these examples relating to concave, horseshoe shaped FIRs, polygons could also be used to explicitly define the areas affected. The above examples are intended to show that the principle under such circumstances is that two SIGMETs should be issued. This, as noted, will prevent ambiguity and will permit straightforward translation of alphanumeric SIGMET into IWXXM versions of SIGMET.

12) Examples of Test and Exercise SIGMET indicators.

The principles of using the Test or Exercise indicators is straightforward. The fundamental and overriding principle is that SIGMET bulletins with the Test or Exercise indicators MUST NOT be used for operational decision making.

When using Test indicator, depending on the circumstances, the SIGMET may be truncated immediately after the word TEST, and this approach may be useful when simply testing routing of messages.

Alternatively, and again depending on the circumstances, realistic (although not necessarily valid) data may be included.

When using the Exercise indicator, it is expected that the SIGMET will contain realistic although not necessarily valid data. This will permit exercises at national or regional level to be undertaken.

In all instances, by including the TEST or EXER at a specified point in the SIGMET message, users and systems can immediately identify if the message should be used for operational decision making.

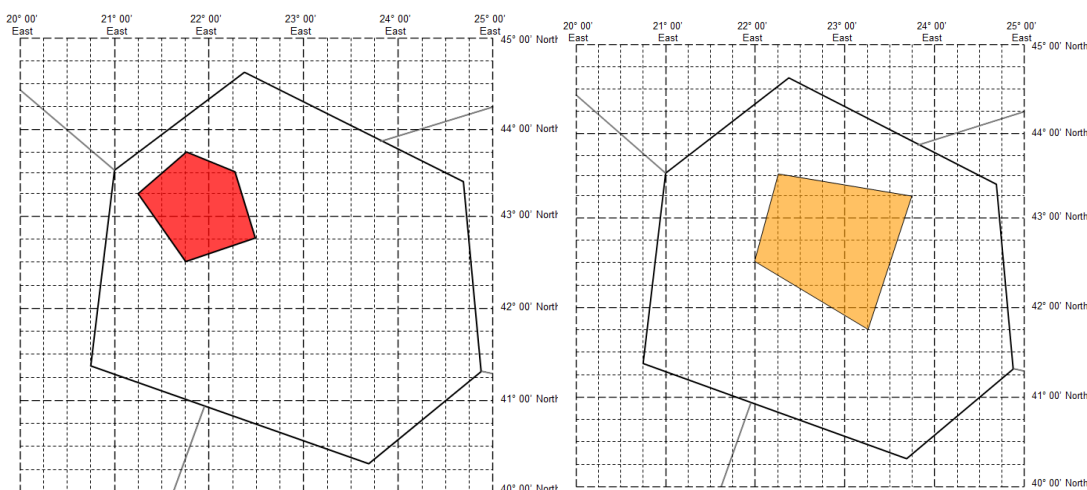
THIS DOES NOT REMOVE THE REQUIREMENT FOR ALL STAKEHOLDERS TO APPLY APPROPRIATE RIGOUR AND QUALITY CONTROL WITH REGARD TO CORRECT IDENTIFICATION AT ORIGATION AND CORRECT USE ON RECEIPT/PROCESSING

Test SIGMET message, with minimum content:

The example below may be used for ad hoc testing of routing, or for regional SIGMET routing tests.

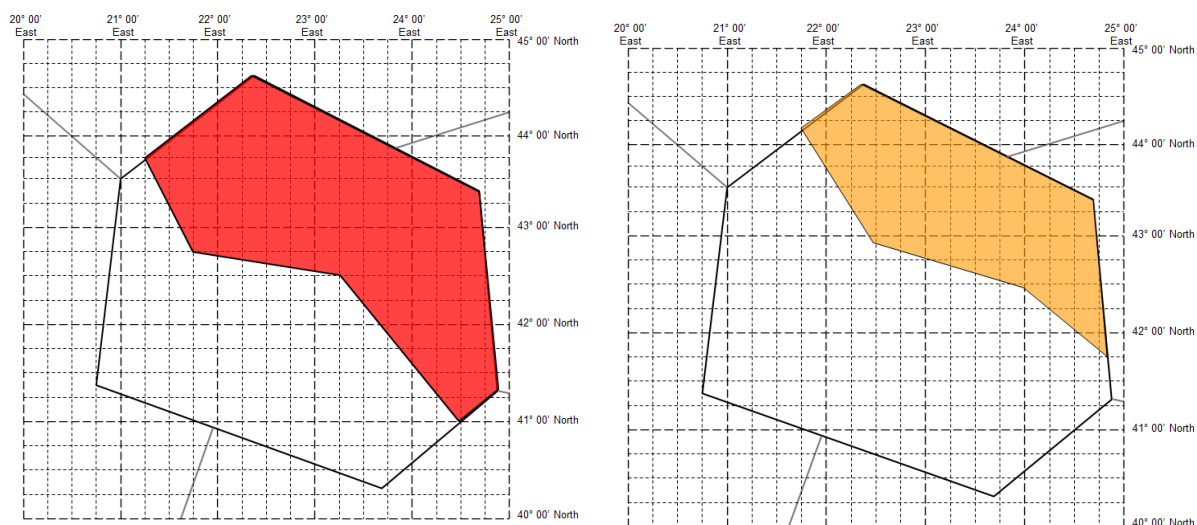
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR TEST=

Test SIGMET message, with realistic (though not necessarily valid) content:



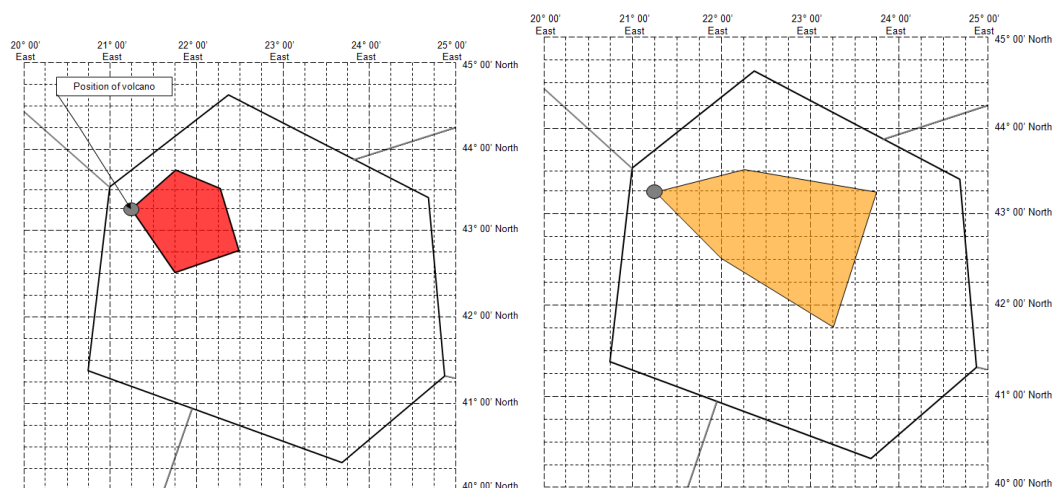
YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR/UIR TEST SEV TURB FCST WI N4230 E02145 - N4315 E02115
- N4345 E02145 - N4330 E02215 - N4245 E02230 - N4230 E02145 FL250/370
INTSF FCST AT 1600Z WI N4145 E02315 - N4230 E02200 - N4330 E02215 -
N4315 E02345 - N4145 E02315=

Exercise SIGMET message, with realistic (though not necessarily valid) content:



YUDD SIGMET 2 VALID 101200/101600 YUSO-
YUDD SHANLON FIR **EXER** SEV TURB FCST NE OF LINE N4345 E02115 - N4245
E02145 - N4230 E02315 - N4100 E02430 FL250/370 WKN FCST AT 1600Z NE OF
LINE N4411 E02145 - N4255 E02228 - N4228 E02400 - N4130 E02450=

The most common, organised Exercise – especially at regional level – is likely to be related to volcanic ash. On such occasions, 'historical' data is used in order to practice procedures over specific areas.



YUDD SIGMET 2 VALID 101200/101800 YUSO -
YUDD SHANLON FIR **EXER** VA ERUPTION MT ASHVAL PSN N4315 E02115 VA CLD
OBS AT 1200Z WI N4315 E02115 - N4345 E02145 - N4330 E02215 - N4245
E02230 - N4230 E02145 - N4315 E02115 FL250/370 NC FCST AT 1800Z WI
N4315 E02115 - N4330 E02215 - N4315 E02345 - N4145 E02315 - N4230
E02200 - N4315 E02115=

APPENDIX C

SIGMET TEST PROCEDURES

Note: While care is taken to ensure these instructions are correct, the instructions are for illustration only and may not be up to date. When participating in the annual SIGMET test, please follow the instructions supplied by ICAO specifically for that year's test.

1. INTRODUCTION

1.1. The Meteorology Divisional Meeting (2002) formulated Recommendation 1/12 b), *Implementation of SIGMET requirements*, which called, *inter alia*, for the relevant planning and implementation regional groups (PIRGs) to conduct periodic tests of the issuance and reception of SIGMET messages, especially those for volcanic ash.

1.2. This document describes the procedures for conducting regional SIGMET tests. The test procedures encompass all the three types of SIGMET messages, as follows:

- SIGMET messages for tropical cyclone (WC SIGMET);
- SIGMET messages for volcanic ash (WV SIGMET); and
- SIGMET messages for weather and other phenomena apart from tropical cyclone and volcanic ash (WS SIGMET).

1.3. The requirements for dissemination of SIGMET messages are specified in Annex 3 to the Convention on International Civil Aviation - *Meteorological Service for International Air Navigation*, Appendix 6, para. 1.2, and in this Guide, Section 3, para. 3.6 – 3.6.4.

1.4. SIGMET messages for tropical cyclone and volcanic ash cloud will be referred to hereafter as **WC** SIGMET (due to the **T₁T₂** section of the WMO AHL being set to **WC**) and **WV** SIGMET (due to the **T₁T₂** section of the WMO AHL being set to **WV**), respectively. All other types of SIGMET messages will be referred to as **WS** SIGMET (due to the **T₁T₂** section of the WMO AHL being set to **WS**).

2. PURPOSE AND SCOPE OF REGIONAL SIGMET TESTS

2.1. The purpose of the regional SIGMET tests is to check the awareness of participating MWOs of the ICAO requirements for the issuance of SIGMET messages and the compliance of the States' procedures for preparation and dissemination of SIGMET messages with the relevant ICAO Standards and Recommended Practices (SARPs) and regional procedures.

2.2. An MWO is at liberty to issue SIGMET *test* messages for local reasons (e.g., testing of local systems/routing etc.). It is recommended that MWO's consider issuing SIGMET test messages following upgrades to operational SIGMET or dissemination systems. Whilst such tests may not involve other MWOs or agencies directly, it is recommended that the general principles of this Guide be followed with regard to local, ad hoc testing.

2.3. For the purposes of this document, hereafter, references to 'SIGMET tests' or 'tests' should be understood to refer to regional SIGMET tests.

2.4. The scope of the tests is to check also the interaction (where appropriate, depending on regional requirements) between the tropical cyclone/volcanic ash advisory centres (TCACs/VAACs) and the MWOs located within the TCACs/VAACs' respective areas of responsibility. Therefore, where the issuance of **WC** and **WV** SIGMET messages is being tested, the SIGMET *test* messages initiated by the MWOs should normally be triggered by an advisory *test* message, issued by the responsible TCAC/VAAC.

2.5. The regional OPMET data banks (RODBs) will monitor the dissemination by filing all advisory and SIGMET test-messages and the corresponding reception times. The participating RODBs will provide the monitoring results from the [WC/WV/WS] SIGMET tests in the form of summaries to the two SIGMET test focal points (given in para. 6.4 of this document), with a copy to the ICAO APAC Office.

2.6. The SIGMET test focal points will prepare a consolidated summary report and submit to the ICAO APAC Office. The report will include recommendations for improvement of the SIGMET message exchange and availability. The results of the tests should be reported to the appropriate regional OPMET bulletin exchange/data management group and MET Sub-group meetings (i.e., in the APAC Region: MET/IE WG and APAC MET SG)¹.

2.7. The ICAO APAC Office will advise participating States of any discrepancies with respect to SIGMET issuance procedures or other findings identified by the tests and request the States concerned to take necessary corrective action.

3. PROCEDURES FOR WC/WV SIGMET TEST

Participating units

3.1. Participating units include the following:

- **Meteorological Watch Offices (MWOs)*** listed in para. 9.3, **Table 1** of this document with a 'WC' or 'WV' required SIGMET test task indicated;
- **Regional OPMET Data Banks (RODBs)** listed in para. 9.3, **Table 2** of this document;
- **Tropical Cyclone Advisory Centres (TCACs)** listed in para. 9.3, **Table 3** of this document;
- **Volcanic Ash Advisory Centres (VAACs)** listed in para. 9.3, **Table 4** of this document; and
- **World Area Forecast Centres (WAFCs)** listed in para. 9.3, **Table 5** of this document.

**Note. - The participation of MWOs of States outside APAC region should be coordinated through the ICAO Regional Office concerned.*

Issuance of the advisory test message

3.2. On the specified date for the test, each participating **TCAC/VAAC** should issue a single advisory test message (to trigger the associated MWOs to issue the WC/WV SIGMET test messages) at **0200 UTC**, apart from TCAC New Delhi and TCAC La Réunion (see below) *.

**Notes. –*

- i. *To accommodate the ICAO Middle East (MID) Region in the WC SIGMET test, TCAC New Delhi should issue the advisory test message at **0200 UTC** (to MWOs in the Asia Region, only) followed by another advisory test message at **0800 UTC** (to MWOs in the MID Region, only), as indicated in para 9.3, Table 3 and Table 6 of this document; and*
- ii. *To accommodate TCAC La Réunion in the WC SIGMET test, TCAC La Réunion should issue one advisory test message at **0500 UTC** (to MWOs in the Asia Region, only), as indicated in para. 9.3, Table 3 and Table 6 of this document.*

Dissemination of advisory test message

¹ Meteorological Information Exchange Working Group (MET/IE WG) and Meteorology Sub-group (MET SG)

3.3. The participating TCAC/VAAC should send the advisory test message to the recipient units** specified in the Regional Air Navigation Plan. Region specific documentation should identify the relevant AFTN addresses.

***Note. - The RODBs, MWOs and WAFCs to which the participating TCAC/VAAC should send the advisory test message are indicated in para. 9.3, Tables 2, 3, 4 and 5 of this document.*

Format of advisory test message

3.4. The structure of the TC/VA advisory test message should follow the standard format given in ICAO Annex 3, Appendix 2, Table A2-1 and A2-2, as shown in para. 7.1 and 7.2 of this document. Use of the status indicator, **TEST**, at the appropriate position of the advisory message, provides recipients with an indication that it is a test message.

Issuance of WC/WV SIGMET test message

3.5. Upon receipt*** of the advisory test message (from the TCAC/VAAC), the participating MWO should issue a WC/WV SIGMET test message accordingly, including sending it to all participating RODBs. See the examples of WC/WV SIGMET test messages in para. 7.3/7.4 of this document.

****Note. - If the MWO does not receive the advisory test message from its associated TCAC/VAAC within 30-minutes of the commencement time of the SIGMET test, the MWO should still issue a SIGMET test message, indicating that it did not receive the advisory test message.*

Special case for the non-issuance of WC/WV SIGMET test message

3.6. To avoid any possible risk of confusion during genuine tropical cyclone/volcanic ash events, in the case where at the time of the test there is a valid WC/WV SIGMET message for the MWO's area of responsibility, the MWO should not send a SIGMET test message of the same type. However, in this case, the MWO should notify the [WC/WV] SIGMET test focal point (as listed in para. 6.4 of this document) in order to be excluded, accordingly, from the analysis of the SIGMET test messages.

4. PROCEDURES FOR WS SIGMET TEST

Note. — The WS SIGMET test message is initiated by the MWO at the designated time in para. 4.2 of this document. It is not initiated by an advisory test message as in the WC/WV SIGMET tests.

Participating units

4.1. Participating units include the following:

- **Meteorological Watch Offices** (MWOs) listed in para. 9.3, **Table 1** of this document with a 'WS' required SIGMET test task indicated (i.e., all MWOs in the APAC Region);
- **Regional OPMET Data Banks** (RODBs) listed in para. 9.3, **Table 2** of this document; and
- **World Area Forecast Centres** (WAFCs) listed in para. 9.3, **Table 5** of this document.

Issuance of WS SIGMET test message

4.2. The participating MWO should issue a WS SIGMET test message during the 10-minute period between 0200 UTC and 0210 UTC. See an example of WS SIGMET test message in para. 7.5 of this document.

5. COMMON PROCEDURES FOR WC/WV/WS SIGMET TEST

Date and time of SIGMET test

5.1. The ICAO APAC Office will set a date and time for each SIGMET test after consultation with the participating VAACs, TCACs and RODBs. The information about the agreed date and time will be sent to all States concerned by a State letter and copied to the States' SIGMET test focal points.

5.2. Tests for different types (i.e., WC, WV and WS) of SIGMET messages should preferably be conducted on separate dates.

5.3. **WC/WV/WS** SIGMET tests should be conducted at least yearly.

Duration of SIGMET test

5.4. A SIGMET test should be terminated within 2-hours of the test start time. Exceptionally, where the test requires SIGMET messages to be valid for longer than 2-hours, the test may be extended to a maximum of 4-hours (for WS SIGMET) or 6-hours (for WC/WV SIGMET).

Validity period of SIGMET test message

5.5. The SIGMET test message should normally have a short validity period (i.e., 10-minutes), however, where appropriate it may be issued with a validity period up to the maximum allowed (i.e., 4-hours for WS SIGMET, 6-hours for WC/WV SIGMET).

Content and format of SIGMET test message

5.6. In accordance with ICAO Annex 3, Appendix 6, Table A6-1A, all the elements in the first line of the WC/WV/WS SIGMET test message, as well as the first element of the second line, should be valid entries. The remainder of the body of the message should contain only the status indicator, TEST, and may contain additional information that should not be used operationally, informing recipients in plain language that the message is a test. For example, the WC/WV SIGMET test message should contain information on the receipt or non-receipt of the relevant TC/VA advisory test message. See the examples of WC/WV/WS SIGMET test messages in para. 7.3/7.4/7.5 of this document.

Special procedure to avoid overwriting of a valid SIGMET message

5.7. The proper use in the SIGMET test message of the status indicator, TEST, and the next sequence number* for the flight information region (FIR), will ensure that the SIGMET test message is correctly processed (i.e., not used for operational decision making) and avoid over-writing of a previously issued and valid SIGMET message.

For example, a [WS] SIGMET test is scheduled for 0200 UTC on the 29th. The MWO has already issued three valid SIGMET messages for the FIR since 0001 UTC. Therefore, in this case the sequence number of the SIGMET test message, which will correspond with the number of SIGMET messages issued for the FIR since 0001 UTC on the day of the test, will be 4, as follows:

```
WSAU01 YBRF 290200  
YBBB SIGMET 4 VALID 290200/290210 YBRF-  
YBBB BRISBANE FIR TEST=
```

Note. - If required by local procedures, States may choose to continue the practice of replacing the next sequence number for the FIR with the special sequence number for SIGMET test messages: **Z99.*

Heading of meteorological bulletin for advisory/SIGMET test message

5.8. In accordance with ICAO Annex 3, Appendix 10, para. 2.1.3, the meteorological bulletin originating from a participating unit containing an advisory or SIGMET test message, should contain a valid heading (also known as the World Meteorological Organization abbreviated heading line (WMO AHL)).

5.9. The APAC Regional SIGMET Guide, Appendix D and E, lists the WMO AHLs for the meteorological bulletins containing SIGMET and TC/VA advisory messages used by the MWOs and TCACs/VAACs in the APAC Region.

Dissemination of SIGMET test message

5.10. The participating MWO should send the SIGMET test message to the recipient units** specified in the Regional Air Navigation Plan. Region specific documentation should identify the relevant AFTN addresses.

***Note. - The RODBs and WAFCs to which the MWO should send the SIGMET test message are listed in para. 9.3, Table 2 and Table 5 of this document.*

5.11. In accordance with ICAO Annex 10, Vol. II, 4.4.1.1.3, the priority indicator of flight safety messages (which includes TC/VA advisory messages and SIGMET messages) disseminated by the aeronautical fixed telecommunication network (AFTN) is FF.

5.12. An RODB that is also nominated as an Inter-Regional OPMET Gateway (IROG)² will relay the bulletins containing SIGMET test messages to its corresponding IROG.

Coordination with air traffic services (ATS) units

5.13. In accordance with Annex 3, 3.4, each participating MWO should inform its associated ATS unit/s by a suitable advanced notice of the forthcoming SIGMET test/s.

6. PROCESSING THE SIGMET TEST RESULTS

Role of the RODBs

6.1. Each participating RODB should file all incoming meteorological bulletins containing advisory/SIGMET test messages and perform an analysis of the availability and timeliness of arrival of the test messages and the correctness of the bulletin headings (WMO AHLs).

6.2. Each participating RODB should prepare a SIGMET test summary table, as shown in para. 8.1 of this document, and send it to the relevant SIGMET test focal point, as given in para. 6.4 of this document, with a copy to the ICAO APAC Office (E-mail: apac@icao.int).

SIGMET test focal points

6.3. The designated SIGMET test focal points, as given in para. 6.4 below, should prepare the final report of the SIGMET test/s and send it to the ICAO APAC Office for submission to the next meeting of the regional OPMET bulletin exchange/data management group and MET Sub-group (i.e., APAC MET/IE WG and APAC MET SG).

6.4. The current SIGMET test focal points for the APAC Region are as follows:

Focal point for WC/WV SIGMET test:

² The IROGs designated in the APAC Region are indicated in the ICAO (APAC) ROBEX Handbook

Mr. Kentaro Tsuboi
Japan Meteorological Agency
Information and Communications Technology Division / Forecast Department
1-3-4 Otemachi, Chiyoda-ku
Tokyo 100-8122
JAPAN
Tel: +81 (3) 3218 3825
Fax: +81 (3) 3211 8404
E-mail: k-tsuboi@met.kishou.go.jp

Focal point for WS SIGMET test:
Mr. CHOW Kwok Wah
Principal Meteorologist (Public and Agencies)
Weather Services Department
Meteorological Service Singapore
P.O. Box 8, Singapore Changi Airport Post Office
SINGAPORE 918141
Tel: +65 (3) 6542 4715
Fax: +65 (3) 6542 2915
E-mail: chow_kwok_wah@nea.gov.sg

7. FORMAT OF TEST MESSAGES

TC advisory test message

7.1. Format of the advisory test message for tropical cyclone:

```
TC ADVISORY
STATUS: TEST
DTG: YYYYMMDD/hhmmZ
TCAC: <location indicator or name of TCAC>
TC: TEST ADVISORY NR: YYYY/nn (actual number)
OBS PSN: NIL
CB: NIL MOV: NIL
C: NIL MAX WIND: NIL FCST PSN +6HR: NIL
FCST MAX WIND +6HR: NIL
FCST PSN +12HR: NIL FCST MAX WIND +12HR: NIL
FCST PSN +18HR: NIL FCST MAX WIND +18HR: NIL
FCST PSN +24HR: NIL FCST MAX WIND +24HR: NIL
RMK: THIS IS A TC ADVISORY TEST MSG. MWO SHOULD NOW ISSUE A
SIGMET TEST MSG FOR TC. PLEASE REF LETTER FROM ICAO ASIA AND
PACIFIC OFFICE DATED YYYYMMDD.
NXT MSG: NIL=
```

VA advisory test message

7.2. Format of the advisory test message for volcanic ash:

```
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/hhmmZ
VAAC: <name of VAAC>
VOLCANO: TEST [999999]
PSN: UNKNOWN
AREA: <name of VAAC> VAAC AREA
SUMMIT ELEV: UNKNOWN
ADVISORY NR: YYYY/nn
INFO SOURCE: NIL
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: NIL
OBS VA DTG: DD/GGggZ
OBS VA CLD: VA NOT IDENTIFIABLE FM SATELLITE DATA
FCST VA CLD +6 HR: NO VA EXP
FCST VA CLD +12 HR: NO VA EXP
FCST VA CLD +18 HR: NO VA EXP
RMK: THIS IS A VA ADVISORY TEST MSG. MWO SHOULD NOW ISSUE A
SIGMET TEST MSG FOR VA. PLEASE REF LETTER FROM ICAO ASIA AND
PACIFIC OFFICE DATED YYYYMMDD.
NXT ADVISORY: NO FURTHER ADVISORIES=
```

WC SIGMET test message

7.3. Format of the WC SIGMET test message for tropical cyclone:

```
WCA1A2ii CCCC YYGGgg
CCCC SIGMET [n][n]n VALID YYGGgg/YYGGgg CCCC-
CCCC <name> FIR TEST=
```

Example:

```
WCJP31 RJTD 130205
RJJJ SIGMET 1 VALID 130205/130215 RJTD-
RJJJ FUKUOKA FIR TEST=
```

or

To indicate receipt of the associated TC advisory test message:

```
WCA1A2ii CCCC YYGGgg
CCCC SIGMET [n][n]n VALID YYGGgg/YYGGgg CCCC-
CCCC <name> FIR TEST. TC ADVISORY TEST MSG NUMBER YYYY/nn
RECEIVED FM TCAC <name> AT YYGGggZ=
```

Example:

```
WCJP31 RJTD 130205
RJJJ SIGMET 1 VALID 130205/130215 RJTD-
RJJJ FUKUOKA FIR TEST. TC ADVISORY TEST MSG NUMBER 2019/01
RECEIVED FM TCAC TOKYO AT 130200Z=
```

or

To indicate non-receipt of the associated TC advisory test message:

```
WCA1A2ii CCCC YYGGgg  
CCCC SIGMET [n][n]n VALID YYGGgg/YYGGgg CCCC-  
CCCC <name> FIR TEST. TC ADVISORY TEST MSG NOT RECEIVED FM  
TCAC <name>=
```

Example:

```
WCJP31 RJTD 130230  
RJJJ SIGMET 1 VALID 130230/130240 RJTD-  
RJJJ FUKUOKA FIR TEST. TC ADVISORY TEST MSG NOT RECEIVED FM  
TCAC TOKYO=
```

WV SIGMET test message

7.4. Format of the WV SIGMET test message for volcanic ash:

```
WVA1A2ii CCCC YYGGgg  
CCCC SIGMET [n][n]n VALID YYGGgg/YYGGgg CCCC-  
CCCC <name> FIR TEST=
```

Example:

```
WVJP31 RJTD 200205  
RJJJ SIGMET 1 VALID 200205/200215 RJTD-  
RJJJ FUKUOKA FIR TEST=
```

or

To indicate receipt of the associated VA advisory test message:

```
WVA1A2ii CCCC YYGGgg  
CCCC SIGMET [n][n]n VALID YYGGgg/YYGGgg CCCC-  
CCCC <name> FIR TEST. VA ADVISORY TEST MSG NUMBER YYYY/nn  
RECEIVED FM VAAC <name> AT YYGGggZ=
```

Example:

```
WVJP31 RJTD 200205  
RJJJ SIGMET 1 VALID 200205/200215 RJTD-  
RJJJ FUKUOKA FIR TEST. VA ADVISORY TEST MSG NUMBER 2019/01  
RECEIVED FM VAAC TOKYO AT 200200Z=
```

or

To indicate non-receipt of the associated VA advisory test message:

```
WVA1A2ii CCCC YYGGgg  
CCCC SIGMET [n][n]n VALID YYGGgg/YYGGgg CCCC-  
CCCC <name> FIR TEST. VA ADVISORY TEST MSG NOT RECEIVED FM  
VAAC <name>=
```

Example:

```
WVJP31 RJTD 200230  
RJJJ SIGMET 1 VALID 200230/200240 RJTD-  
RJJJ FUKUOKA FIR TEST. VA ADVISORY TEST MSG NOT RECEIVED FM  
VAAC TOKYO=
```

WS SIGMET test message

7.5. Format of the WS SIGMET test message for weather and other phenomena apart from tropical cyclone and volcanic ash:

```
WSA1A2ii CCCC YYGGgg
CCCC SIGMET [n][n]n VALID YYGGgg/YYGGgg CCCC-
CCCC <name> FIR TEST=
```

Example:

```
WSJP31 RJTD 270205
RJJJ SIGMET A2 VALID 270205/270215 RJTD-
RJJJ FUKUOKA FIR TEST=
```

8. SIGMET TEST SUMMARY

SIGMET test summary table

8.1. Example of SIGMET test summary table used by RODBs:

Name of RODB: Tokyo
Date of Test: 2011/11/17
Target (VA or TC): VA

VA advisory test messages (FV)				
TTAAii	CCCC	YYGGgg	Received Time(UTC)	Comments/Remarks
FVAK23	PAWU	170159	01:59:29	
FVAU01	ADRM	170201	02:01:53	
FVFE01	RJTD	170200	02:00:09	
FVPS01	NZKL	170207	02:08:27	
FVXX02	LFPW	170202	02:02:41	
FVXX25	KNES	170200	02:02:01	

WV SIGMET test message						
TTAAii	CCCC	YYGGgg	Received Time(UTC)	MWO	FIR	Comments/Remarks
WVAK01	PAWU	170200	02:00:11	PAWU	PAZA	
WVAU01	ADRM	170201	02:02:04	YDRM	YBBB	
WVCI31	RCTP	170205	02:04:58	RCTP	RCAA	
WVCI33	ZBAA	170205	02:05:26	ZBAA	ZBPE	
WVCI34	ZSSS	170205	02:02:34	ZSSS	ZSHA	
WVCI35	ZJHK	170201	02:03:34	ZJHK	ZJSA	
WVCI36	ZUUU	170205	02:11:04	ZUUU	ZPKM	
WVCI37	ZLXY	170205	02:07:44	ZLXY	ZLHW	
WVCI38	ZYTX	170205	02:01:50	ZYTX	ZYSH	
WVCI39	ZWWW	170202	02:02:40	ZWWW	ZWUQ	
WVCI45	ZHHH	170204	02:08:52	ZHHH	ZHWH	
WVFJ01	NFFN	170000	02:15:46	NFFN	NFFF	
WVIN31	VOMM	170201	02:09:57	VOMM	VOMF	
WVJP31	RJTD	170205	02:06:24	RJTD	RJJJ	
WVKP31	ZUUU	170206	02:12:23	ZUUU	VDPP	
WVLA31	VLVT	170200	02:01:03	VLVT	VLVT	
WVMS31	WMKK	170205	02:04:28	WMKK	WBFC	
WVPA01	PHFO	170201	02:02:09	PHFO	KZAK	
WVPH31	RPLL	170210	02:08:43	RPLL	RPHI	
WVPN01	KKCI	170200	02:00:11	KKCI	KZAK	
WVRA31	RUIR	YYGGgg	hh:mm:ss	UIII	UIII	

MET SG/24
Appendix 9 to the Report

WVRA31	RUHB	170206	02:07:57	UHHH	UHHH	
WVRA31	RUKR	YYGGgg	hh:mm:ss	UNKL	UNKL	
WVRA31	RUMG	170205	02:08:59	UHMM	UHMM	
WVRA32	RUYK	170207	02:07:28	UELL	UELL	
WVRA33	RUYK	YYGGgg	hh:mm:ss	UERR	UERR	
WVRA31	RUYK	YYGGgg	hh:mm:ss	UEEE	UEEE	
WVRA31	RUPK	YYGGgg	hh:mm:ss	UHPP	UHPP	
WVSR20	WSSS	170205	02:05:38	WSSS	WSJC	
WVSS20	VHHH	170202	02:03:05	VHHH	VHHK	
WVTH31	VTBS	170211	02:13:53	VTBS	VTBB	
WVVS31	VVGL	170200	02:05:06	VVGL	VVNB	
WVVS31	VVGL	170208	02:14:38	VVGL	VVTS	

9. SIGMET TEST SUMMARY

Bilateral or multilateral arrangements between States

9.1. Example of SIGMET test summary table used by RODBs: Where bilateral or multilateral arrangements exist between States for the provision of MWO services, the State responsible for providing air traffic services within the FIR concerned should ensure that arrangements are also in place for the issuance of SIGMET test messages in accordance with the procedures set out in this document.

Coordination with other Regions

9.2. To facilitate additional monitoring of the SIGMET tests beyond the ICAO APAC Region, at each stage [of the SIGMET tests] the IROG Singapore will relay the meteorological bulletins containing the advisory/SIGMET test messages to the corresponding IROG in the ICAO European (EUR) Region.

Detailed list of participating States, operational units and tasks

9.3. The following tables indicate the participating States, operational units and tasks required for the APAC regional SIGMET tests:

Table 1: Participating MWOs

MWOs (listed by ICAO Region and State) with indication of the required SIGMET test task/s including, where applicable, the associated TCAC/VAAC

MWO DETAILS				REQUIRED SIGMET TEST TASK ID (Refer Table 6 for further details)														
				Associated TCAC							Associated VAAC							WS SIGMET test
				WC SIGMET test							WV SIGMET test							
ICAO REGION*	STATE	MWO NAME	ICAO Location Indicator	Darwin	Nadi	La Réunion	New Delhi	Tokyo	Honolulu	Miami	Darwin	Toulouse	Tokyo	Wellington	Anchorage	Washington		
A	AFGHANISTAN	KABUL	OAKB	-	-	-	-	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
A	AUSTRALIA	BRISBANE	YBRF	-	-	-	-	-	-	-	-	-	-	-	-	-	WS 1.0	
		MELBOURNE (RFC)	YMRP	-	-	-	-	-	-	-	-	-	-	-	-	-	WS 1.0	
		MELBOURNE (WMC)	YMMC	WC 1.1	WC 1.2	WC 2.1	-	-	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
A	BANGLADESH	DHAKA	VGHS	-	-	-	WC 1.3	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
A	CAMBODIA	PHNOM PENH	VDPP	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
A	CHINA	BEIJING	ZBAA	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		CHENGDU	ZUUU	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		GUANGZHOU	ZGGG	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		HAIKOU	ZJHK	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	WV 1.5	-	WS 1.0	
		HONG KONG	VHHH	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		SHANGHAI	ZSSS	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		SHENYANG	ZYTX	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		TAIBEI	RCTP	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		URUMQI	ZWWW	-	-	-	-	-	-	-	-	WV 1.2	WV 1.3	-	-	-	WS 1.0	
		WUHAN	ZHHH	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
		XI 'AN	ZLXY	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-	WS 1.0	

MET SG/24
Appendix 9 to the Report

MWO DETAILS				REQUIRED SIGMET TEST TASK ID (Refer Table 6 for further details)														
				Associated TCAC							Associated VAAC							WS SIGMET test
				WC SIGMET test							WV SIGMET test							
ICAO REGION*	STATE	MWO NAME	ICAO Location Indicator	Darwin	Nadi	La Réunion	New Delhi	Tokyo	Honolulu	Miami	Darwin	Toulouse	Tokyo	Wellington	Anchorage	Washington		
A	DPR KOREA	SUNAN	ZKPY	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
A	FIJI	NADI	NFFN	-	WC 1.2	-	-	WC 1.4	-	-	-	-	-	WV 1.4	-	WV 1.6	WS 1.0	
A	FRANCE French Polynesia	TAHITI	NTAA	-	WC 1.2	-	-	-	WC 1.5	WC 1.6	-	-	-	WV 1.4	-	-	WS 1.0	
A	INDIA	CHENNAI	VOMM	-	-	-	WC 1.3	-	-	-	WV 1.1	WV 1.2	-	-	-	-	WS 1.0	
		KOLKATA	VECC	-	-	-	-	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
		MUMBAI	VABB	-	-	WC 2.1	WC 1.3	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
		NEW DELHI	VIDP	-	-	-	-	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
A	INDONESIA	JAKARTA	WIII	WC 1.1	-	-	WC 1.3	WC 1.4	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
		MAKASSAR	WAAA	WC 1.1	-	-	-	WC 1.4	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
A	JAPAN	TOKYO	RJTD	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
A	LAO PDR	VIENTIANE	VLVT	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
A	MALAYSIA	KUALA LUMPUR	WMKK	-	-	-	WC 1.3	WC 1.4	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
A	MALDIVES	MALE	VRMM	-	-	WC 2.1	WC 1.3	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
A	MONGOLIA	ULAANBAATAR	ZMUB	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
A	MYANMAR	YANGON	VYYY	-	-	-	WC 1.3	-	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
A	NAURU	NAURU	ANYN	-	WC 1.2	-	-	-	-	-	-	-	-	WV 1.4	-	-	WS 1.0	
A	NEPAL	KATHMANDU	VNKT	-	-	-	-	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
A	NEW ZEALAND	WELLINGTON	NZKL	-	WC 1.2	-	-	-	-	-	-	-	-	WV 1.4	-	-	WS 1.0	
A	PAKISTAN	KARACHI	OPKC	-	-	-	WC 1.3	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
		LAHORE	OPLA	-	-	-	-	-	-	-	-	WV 1.2	-	-	-	-	WS 1.0	
A	PAPUA NEW GUINEA	PORT MORESBY	AYPY	WC 1.1	-	-	-	-	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
A	PHILIPPINES	MANILA	RPLL	-	-	-	-	WC 1.4	-	-	WV 1.1	-	WV 1.3	-	-	-	WS 1.0	
A	REPUBLIC OF KOREA	INCHEON	RKSI	-	-	-	-	WC 1.4	-	-	-	-	WV 1.3	-	-	-	WS 1.0	
A	SINGAPORE	SINGAPORE	WSSS	-	-	-	-	WC 1.4	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
A	SOLOMON ISLANDS	HONIARA	AGGH	WC 1.1	WC 1.2	-	-	-	-	-	WV 1.1	-	-	WV 1.4	-	-	WS 1.0	
A	SRI LANKA	COLOMBO	VCBI	WC 1.1	-	-	WC 1.3	-	-	-	WV 1.1	-	-	-	-	-	WS 1.0	
A	THAILAND	BANGKOK	VTBS	-	-	-	-	WC 1.4	-	-	WV 1.1	-	WV 1.3	-	-	-	WS 1.0	
A	UNITED STATES	HONOLULU		-	WC 1.2	-	-	WC 1.4	WC 1.5	WC 1.6	-	-	-	WV 1.4	-	-	WS 1.0	
A	VIET NAM	GIA LAM	VVGL	-	-	-	-	WC 1.4	-	-	WV 1.1	-	WV 1.3	-	-	-	WS 1.0	
E	RUSSIAN FEDERATION	CHULMAN	UELL	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-	-	
		IRKUTSK	UIII	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-	-	
		KHABAROVSK	UHHH	-	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-	-

MWO DETAILS				REQUIRED SIGMET TEST TASK ID (Refer Table 6 for further details)												
				Associated TCAC WC SIGMET test							Associated VAAC WV SIGMET test					
ICAO REGION*	STATE	MWO NAME	ICAO Location Indicator	Darwin	Nadi	La Réunion	New Delhi	Tokyo	Honolulu	Miami	Darwin	Toulouse	Tokyo	Wellington	Anchorage	Washington
		KRASNOYARSK	UNKL	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-
		MAGADAN	UHMM	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-
		MIRNY	UERR	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-
		YAKUTSK	UEEE	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-
		YELIZOVO/ PETROPVLOVS K-KAMCHATSKY	UHPP	-	-	-	-	-	-	-	-	-	WV 1.3	-	-	-
M	BAHRAIN	BAHRAIN	OBBI	-	-	-	WC 3.1	-	-	-	-	-	-	-	-	-
M	IRAN	TEHRAN	OIII	-	-	-	WC 3.1	-	-	-	-	-	-	-	-	-
M	KUWAIT	KUWAIT	OKBK	-	-	-	WC 3.1	-	-	-	-	-	-	-	-	-
M	OMAN	MUSCAT	OOMS	-	-	-	WC 3.1	-	-	-	-	-	-	-	-	-
M	SAUDI ARABIA	JEDDAH	OEJN	-	-	-	WC 3.1	-	-	-	-	-	-	-	-	-
M	UNITED ARAB EMIRATES	ABU DHABI	OMAA	-	-	-	WC 3.1	-	-	-	-	-	-	-	-	-
M	YEMEN	SANAA	OYSN	-	-	-	WC 3.1	-	-	-	-	-	-	-	-	-
N	UNITED STATES	ANCHORAGE	PAWU	-	-	-	-	-	WC 1.5	-	-	-	-	-	-	-
		KANSAS CITY	KMKC	-	-	-	-	WC 1.4	WC 1.5	WC 1.6	-	-	-	-	-	-

* A = APAC, E = EUR, M = MID, N = NAM

Table 2: Participating RODBs

RODBs listed by State and ICAO Region, with indication of the required SIGMET test tasks

STATE	ICAO REGION	RODB NAME	ICAO Location Indicator	AFTN ADDRESS	REQUIRED SIGMET TEST TASK (ID)*
AUSTRALIA	APAC	BRISBANE	YBBB	YBBBYPYX	WC 4.0, WV 2.0, WS 2.0
FIJI	APAC	NADI	NFFN	NFFNYPYX	WC 4.0, WV 2.0, WS 2.0
JAPAN	APAC	TOKYO	RJTD	RJTDYPYX	WC 4.0, WV 2.0, WS 2.0
SINGAPORE	APAC	SINGAPORE	WSSS	WSSSYZYX	WC 4.0, WV 2.0, WS 2.0
THAILAND	APAC	BANGKOK	VTBB	VTBBYPYX	WC 4.0, WV 2.0, WS 2.0

*Refer Table 6 for details

Table 3: Participating TCACs

TCACs listed by State and ICAO Region, with indication of the required SIGMET test tasks and the associated MWOs

STATE	ICAO REGION	TCAC NAME	ICAO Location Indicator	TASK (ID)*	Associated MWOs to which the advisory information on tropical cyclones should be sent
AUSTRALIA	APAC	DARWIN	YMMC	WC 1.0	COLOMBO, HONIARA, JAKARTA, MAKASSAR, MELBOURNE (WORLD MET CENTRE, BOM) PORT MORESBY
FIJI	APAC	NADI	NFFN	WC 1.0	HONIARA, HONOLULU, MELBOURNE (WORLD MET CENTRE, BOM) NADI, NAURU, TAHITI, WELLINGTON
FRANCE	AFI	LA RÉUNION	FMEE	WC 2.0	MALE, MELBOURNE (WORLD MET CENTRE, BOM) MUMBAI
INDIA	APAC	NEW DELHI	VIDP	WC 1.0 WC 3.0	APAC: CHENNAI, COLOMBO, DHAKA, JAKARTA, KARACHI, KUALA LUMPUR, MALE, MUMBAI, YANGON MID: ABU DHABI, BAHRAIN, JEDDAH, KUWAIT, MUSCAT, SANAA, TEHRAN

STATE	ICAO REGION	TCAC NAME	ICAO Location Indicator	TASK (ID)*	Associated MWOs to which the advisory information on tropical cyclones should be sent
JAPAN	APAC	TOKYO	RJTD	WC 1.0	BANGKOK, BEIJING, CHENGDU, GIA LAM, GUANGZHOU, HAIKOU, HONG KONG, HONOLULU, INCHEON, JAKARTA, KANSAS CITY, KUALA LUMPUR, MAKASSAR, MANILA, NADI, PHNOM PENH, SHANGHAI, SINGAPORE, SUNAN, TAIBEL, TOKYO, VIENTIANE
UNITED STATES	APAC	HONOLULU		WC 1.0	ANCHORAGE, HONOLULU, KANSAS CITY, TAHITI
	NAM	MIAMI		WC 1.0	HONOLULU, KANSAS CITY, TAHITI

*Refer Table 6 for further details

Table 4: Participating VAACs

Participating VAACs listed by State and ICAO Region, with indication of the required SIGMET test tasks and the associated MWOs

STATE	ICAO REGION	VAAC NAME	ICAO Location Indicator	TASK (ID)*	Associated MWOs to which the advisory information on volcanic ash should be sent
AUSTRALIA	APAC	DARWIN	YMMC	WV 1.0	BANGKOK, CHENNAI, COLOMBO, GIA LAM, HONIARA, JAKARTA, KUALA LUMPUR, MAKASSAR, MANILA, MELBOURNE (WORLD MET CENTRE, BOM), PORT MORESBY, SINGAPORE, YANGON
FRANCE	EUR	TOULOUSE	LFPW	WV 1.0	CHENNAI, DHAKA, KABUL, KARACHI, KATHMANDU, KOLKATA, LAHORE, MALE, MUMBAI, NEW DELHI, URUMQI
JAPAN	APAC	TOKYO	RJTD	WV 1.0	APAC: BANGKOK, BEIJING, CHENGDU, GIA LAM, GUANGZHOU, HAIKOU, HONG KONG, INCHEON, MANILA, PHNOM PENH, SHANGHAI, SHENYANG, SUNAN, TAIBEL, TOKYO, ULAANBAATAR, URUMQI, VIENTIANE, WUHAN, XI'AN EUR: CHULMAN, IRKUTSK, KHABAROVSK, KRASNOYARSK, MAGADAN, MIRNY, YELIZOVO/PETROPAVLOVSK-KAMCHATSKY, YAKUTSK
NEW ZEALAND	APAC	WELLINGTON	NZKL	WV 1.0	HONIARA, HONOLULU, MELBOURNE (WORLD MET CENTRE, BOM), NADI, NAURU, TAHITI, WELLINGTON
UNITED STATES	NAM	ANCHORAGE	PAWU	WV 1.0	HAIKOU
	NAM	WASHINGTON	KNES	WV 1.0	NADI

*Refer Table 6 for further details

Table 5: Participating WAFCs

WAFCs listed by State and ICAO Region, with indication of the required SIGMET test tasks

STATE	ICAO REGION	WAFc NAME	ICAO Location Indicator	AFTN ADDRESS	TASK (ID)*
UNITED KINGDOM	EUR	LONDON	EGZZ	EGZZMASI	WC 4.0, WV 2.0, WS 2.0
UNITED STATES	NAM	WASHINGTON	KWBC	KWBCYMYX	WC 4.0, WV 2.0, WS 2.0

*Refer Table 6 for further details

Table 6: SIGMET test tasks

Chronology and detailed description of tasks, listed by task ID

TASK ID.	WHO? Responsible unit/s	WHAT? Detailed description of the task	WHEN? Date/Time indicated in the following format: YYYYMMDD/HHMM UTC
SIGMET test for tropical cyclone (WC SIGMET test) - 20191113/0200, 20191113/0500 and 20191113/0800			
WC 1.0	TCACs listed in Table 3 except TCAC La Réunion	Send the TC advisory test message (see para. 7.1) to: i. MWOs as indicated in Table 3 (Note: at this time, TCAC New Delhi should <u>only</u> send the TC advisory test message to MWOs in the <u>APAC Region</u>); ii. RODBs listed in Table 2 (Note: this only applies to TCACs Darwin, Nadi, New Delhi and Tokyo); and iii. WAFCs listed in Table 5	20191113/0200
WC 1.1	MWOs associated with TCAC Darwin , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC Darwin (see para. 7.3) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the TC advisory test message from TCAC Darwin between 20191113/0200 and 20191113/0230; or b. At or as soon as practicable after 20191113/0230 , only when the MWO does not receive the TC advisory test message from TCAC Darwin
WC 1.2	MWOs associated with TCAC Nadi , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC Nadi (see para. 7.3) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the TC advisory test message from TCAC Nadi between 20191113/0200 and 20191113/0230; or b. At or as soon as practicable after 20191113/0230 , only when the MWO does not receive the TC advisory test message from TCAC Nadi
WC 1.3	MWOs associated with TCAC New Delhi , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC New Delhi (see para. 7.3) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the TC advisory test message from TCAC New Delhi between 20191113/0200 and 20191113/0230; or b. At or as soon as practicable after 20191113/0230 , only when the MWO does not receive the TC advisory test message from TCAC New Delhi
WC 1.4	MWOs associated with TCAC Tokyo , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC Tokyo (see para. 7.3) to: i. RODBs listed in Table 2 (Note: this only applies to MWOs in the APAC Region); and ii. WAFCs listed in Table 5	Either: a. On receipt of the TC advisory test message from TCAC Tokyo between 20191113/0200 and 20191113/0230; or b. At or as soon as practicable after 20191113/0230 , only when the MWO does not receive the TC advisory test message from TCAC Tokyo
WC 1.5	MWOs associated with TCAC Honolulu , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC Honolulu (see para. 7.3) to: i. RODBs listed in Table 2 (Note: this only applies to MWOs in the APAC Region); and	Either: a. On receipt of the TC advisory test message from TCAC Honolulu between 20191113/0200 and 20191113/0230; or b. At or as soon as practicable after

MET SG/24
Appendix 9 to the Report

TASK ID.	WHO? Responsible unit/s	WHAT? Detailed description of the task	WHEN? Date/Time indicated in the following format: YYYYMMDD/HHMM UTC
		ii. WAFCs listed in Table 5	20191113/0230 , only when the MWO does not receive the TC advisory test message from TCAC Honolulu
WC 1.6	MWOs associated with TCAC Miami , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC Miami (see para. 7.3) to: i. RODBs listed in Table 2 (Note: this only applies to MWOs in the APAC Region); and ii. WAFCs listed in Table 5	Either: a. On receipt of the TC advisory test message from TCAC Miami between 20191113/0200 and 20191113/0230; or b. At or as soon as practicable after 20191113/0230 , only when the MWO does not receive the TC advisory test message from TCAC Miami
WC 2.0	TCAC La Réunion	Send the TC advisory test message (see para. 7.1) to: i. MWOs as indicated in Table 3; ii. RODBs listed in Table 2; and iii. WAFCs listed in Table 5	20191113/0500
WC 2.1	MWOs associated with TCAC La Réunion , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC La Réunion (see para. 7.3) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the TC advisory test message from TCAC La Réunion between 20191113/0500 and 20191113/0530; or b. At or as soon as practicable after 20191113/0530 , only when the MWO does not receive the TC advisory test message from TCAC La Réunion
WC 3.0	TCAC New Delhi	Send the TC advisory test message (see para. 7.1) to: i. MWOs as indicated in Table 3 (Note: at this time, TCAC New Delhi should <u>only</u> send the test TCA to MWOs in the MID Region); ii. RODBs listed in Table 2; and iii. WAFCs listed in Table 5	20191113/0800
WC 3.1	MWOs in the MID Region associated with TCAC New Delhi , as indicated in Table 1 and Table 3	Send the WC SIGMET test message based on the TC advisory test message from TCAC New Delhi (see para. 7.3) to: i. WAFCs listed in Table 5	Either: a. On receipt of the TC advisory test message from TCAC New Delhi between 20191113/0800 and 20191113/0830; or b. At or as soon as practicable after 20191113/0830 , only when the MWO does not receive the TC advisory test message from TCAC New Delhi
WC 4.0	RODBs listed in Table 2 and WAFCs listed in Table 5	a. File all incoming TC advisory and WC SIGMET test messages; and b. Prepare and send the SIGMET test summary table (see para. 8.1) to: i. APAC SIGMET test focal points (see para. 6.4); and ii. Copy to the ICAO APAC Office	a. Between 20191113/0200 and 20191113/0830; and b. After 20191113/0830
SIGMET test for volcanic ash (WV SIGMET test) - 20191120/0200			
WV 1.0	VAACs listed in Table 4	Send the VA advisory test message (see para. 7.2) to: i. MWOs as indicated in Table 4;	20191120/0200

MET SG/24
Appendix 9 to the Report

TASK ID.	WHO? Responsible unit/s	WHAT? Detailed description of the task	WHEN? Date/Time indicated in the following format: YYYYMMDD/HHMM UTC
		ii. RODBs listed in Table 2 (Note: this only applies to VAACs Darwin, Tokyo and Wellington); and iii. WAFCs listed in Table 5	
WV 1.1	MWOs associated with VAAC Darwin, as indicated in Table 1 and Table 4	Send the WV SIGMET test message based on the VA advisory test message from VAAC Darwin (see para. 7.4) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the VA advisory test message from VAAC Darwin between 20191120/0200 and 20191120/0230; or b. At or as soon as practicable after 20191120/0230, only when the MWO does not receive the VA advisory test message from VAAC Darwin
WV 1.2	MWOs associated with VAAC Toulouse, as indicated in Table 1 and Table 4	Send the WV SIGMET test message based on the VA advisory test message from VAAC Toulouse (see para. 7.4) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the VA advisory test message from VAAC Toulouse between 20191120/0200 and 20191120/0230; or b. At or as soon as practicable after 20191120/0230, only when the MWO does not receive the VA advisory test message from VAAC Toulouse
WV 1.3	MWOs associated with VAAC Tokyo, as indicated in Table 1 and Table 4	Send the WV SIGMET test message based on the VA advisory test message from VAAC Tokyo (see para. 7.4) to: i. RODBs listed in Table 2 (Note: this only applies to MWOs in the APAC Region); and ii. WAFCs listed in Table 5	Either: a. On receipt of the VA advisory test message from VAAC Tokyo between 20191120/0200 and 20191120/0230; or b. At or as soon as practicable after 20191120/0230, only when the MWO does not receive the VA advisory test message from VAAC Tokyo
WV 1.4	MWOs associated with VAAC Wellington, as indicated in Table 1 and Table 4	Send the WV SIGMET test message based on the VA advisory test message from VAAC Wellington (see para. 7.4) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the VA advisory test message from VAAC Wellington between 20191120/0200 and 20191120/0230; or b. At or as soon as practicable after 20191120/0230, only when the MWO does not receive the VA advisory test message from VAAC Wellington
WV 1.5	MWOs associated with VAAC Anchorage, as indicated in Table 1 and Table 4	Send the WV SIGMET test message based on the VA advisory test message from VAAC Anchorage (see para. 7.4) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the VA advisory test message from VAAC Anchorage between 20191120/0200 and 20191120/0230; or b. At or as soon as practicable after 20191120/0230, only when the MWO does not receive the VA advisory test message from VAAC Anchorage
WV 1.6	MWOs associated with VAAC Washington, as indicated	Send the WV SIGMET test message based on the VA advisory test message from VAAC Washington (see para. 7.4) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	Either: a. On receipt of the VA advisory test message from VAAC Washington between 20191120/0200 and 20191120/0230; or

MET SG/24
Appendix 9 to the Report

TASK ID.	WHO? Responsible unit/s	WHAT? Detailed description of the task	WHEN? Date/Time indicated in the following format: YYYYMMDD/HHMM UTC
	in Table 1 and Table 4		b. At or as soon as practicable after 20191120/0230 , only when the MWO does not receive the VA advisory test message from VAAC Washington
WV 2.0	RODBs listed in Table 2 and WAFCs listed in Table 5	a. File all incoming VA advisory and WV SIGMET test messages ; and b. Prepare and send the SIGMET test summary table (see para. 8.1) to: i. APAC SIGMET test focal points (see para. 6.4); and ii. Copy to the ICAO APAC Office	a. Between 20191120/0200 and 20191120/0230 ; and b. After 20191120/0230
SIGMET test for weather and other phenomena apart from tropical cyclone and volcanic ash (WS SIGMET test) – 20191127/0200			
WS 1.0	MWOs in the APAC Region listed in Table 1	Send the WS SIGMET test message (see para. 7.5) to: i. RODBs listed in Table 2; and ii. WAFCs listed in Table 5	20191127/0200
WS 2.0	RODBs listed in Table 2 and WAFCs listed in Table 5	a. File all incoming WS SIGMET test messages ; and b. Prepare and send the SIGMET test summary table (see para. 8.1) to: i. APAC SIGMET test focal points (see para. 6.4); and ii. Copy to the ICAO APAC Office	a. Between 20191127/0200 and 20191127/0230 ; and b. After 20191127/0230
Final	APAC SIGMET test focal points listed in para. 6.4	Prepare the final report of the SIGMET tests	Sequential to Tasks WC 4.0 b., WV 2.0 b. and WS 2.0 b

APPENDIX D

WMO HEADINGS (WMO AHL) FOR SIGMET BULLETINS

Used by Asia/Pacific Meteorological Watch Offices

MWO location	ICAO location indicator	WMO SIGMET Headings			FIR/ACC served	Remarks
		WS	WC	WV	ICAO location indicator	
1	2	3	4	5	6	7
AFGHANISTAN KABUL AD	OAKB	WSAH31		WVAH31	OAKX	AFTN not available Headings not confirmed
AUSTRALIA BRISBANE/Brisbane MELBOURNE/Melbourne MELBOURNE (WORLD MET CENTRE, BUREAU OF METEOROLOGY)	YBRF YMRF YMMC	WSAU21 WSAU21 WSAU21	 WCAU01	 WVAU01	YBBB YMMM YBBB YMMM YBBB YMMM	
BANGLADESH DHAKA/Hazrat Shahjalal International Airport	VGHS	WSBW20	WCBW20	WVBW20	VGFR	
CAMBODIA PHNOM-PENH/Phnom Penh Intl	VDPP	WSKP31	WCKP31	WVKP31	VDPP	
CHINA BEIJING/Capital GUANGZHOU/Baiyun HAIKOU/Meilan CHENGDU/Shuangliu XI'AN/Xianyang SHANGHAI/Hongqiao SHENYANG/Taoxian TAIBEI/Taipei Intl URUMQI/Diwopu WUHAN/Tianhe HONG KONG/Hong Kong Intl	ZBAA ZGGG ZJHK ZUUU ZLXY ZSSS ZYTJ RCTP ZWWW ZHHH VHHH	WSC133 WSC135 WSC135 WSC136 WSC137 WSC134 WSC138 WSC131 WSC139 WSC145 WSSS20	WCC133 WCC135 WCC135 WCC134 WCC131 WCC131 WCSS20	WVC133 WVC135 WVC135 WVC136 WVC137 WVC134 WVC138 WVC131 WVC139 WVC145 WVSS20	ZBPE ZGZU ZJSA ZPKM ZLHW ZSHA ZYSH RCAA ZWUQ ZHWH VHHK	
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA SUNAN	ZKPY	WSKR31	WCKR31	WVKR31	ZKKP	
FIJI NADI/Nadi Intl	NFFN	WSFJ01,02,...	WCFJ01,02,...	WVFJ01,02,...	NFFF	
FRENCH POLYNESIA TAHITI/Faaa	NTAA	WSPF21,22	WCPF21	WVPF21	NTTT	
INDIA KOLKATA CHENNAI/Chennai DELHI/Indira Ghandi Intl MUMBAI/Chhatrapati Shivaji Intl.	VECC VOMM VIDP VABB	WSIN31 WSIN31 WSIN31 WSIN31	WCIN31 WCIN31 WCIN31 WCIN31	WVIN31 WVIN31 WVIN31 WVIN31	VECF VOMF VIDF VABF	
INDONESIA JAKARTA/Soekarno-Hatta (Comm Center)	WIII	WSID20	WCID20	WVID20	WIIZ	

MET SG/24
Appendix 9 to the Report

MWO location	ICAO location indicator	WMO SIGMET Headings			FIR/ACC served	Remarks
		WS	WC	WV	ICAO location indicator	
1	2	3	4	5	6	7
UJUNG PANDANG/Hasanuddin (Comm Center)	WAAA	WSID21	WCID21	WVID21	WAAZ	
JAPAN TOKYO (CITY)	RJTD	WSJP31	WCJP31	WVJP31	RJJJ	
LAO PEOPLE'S DEMOCRATIC REPUBLIC VIENTIANE/Wattay	VLVT	WSLA31	WCLA31	WVLA31	VLVT	
MALAYSIA SEPANG/KL International Airport	WMKK	WSMS31	WCMS31	WVMS31	WBFC WMFC	
MALDIVES MALE/Intl	VRMM	WSMV31	WCMV31	WVMV31	VRMF	
MONGOLIA ULAAN BAATAR	ZMUB	WSMO31		WVMO31	ZMUB	
MYANMAR YANGON/Yangon International	VYYY	WSBM31	WCBM31	WVBM31	VYYY	
NAURU NAURU	ANYN	WSNW20	WCNW20	WVNW20	ANAU	MWO not established however
NEPAL KATHMANDU	VNKT	WSNP31		WVNP31	VNSM	SIGMET currently not issued
NEW ZEALAND WELLINGTON (Meteorological Office)	NZKL	WSNZ21 WSPS21	WCNZ21 WCPS21	WVNZ21 WVPS21	NZZC NZZO	
PAKISTAN KARACHI/Jinnah Intl LAHORE/Allama Iqbal Intl	OPKC OPLA	WSPK31 WSPK31	WCPK31	WVPK31 WVPK31	OPKR OPLR	
PAPUA NEW GUINEA PORT MORESBY/Intl	AYPY	WSNG20	WCNG20	WVNG20	AYPY	
PHILIPPINES MANILA/Ninoy Aquino Intl, Pasay City, Metro Manila	RPLL	WSPH31	WCPH31	WVPH31	RPHI	
REPUBLIC OF KOREA INCHEON	RKSI	WSKO31	WCKO31	WVKO31	RKRR	
SINGAPORE SINGAPORE/Changi	WSSS	WSSR20	WCSR20	WVSR20	WSJC	
SOLOMON ISLANDS HONIARA/Henderson	AGGH	WSSO20	WCSO20	WVSO20	AGGG	
SRI LANKA COLOMBO/Bandaranaike International Airport Colombo	VCBI	WSSB31	WCSB31	WVSB31	VCBI	
THAILAND BANGKOK/Suvarnabhumi Intl Airport	VTBS	WSTH31	WCTH31	WVTH31	VTBB	
UNITED STATES						

MET SG/24
Appendix 9 to the Report

MWO location	ICAO location indicator	WMO SIGMET Headings			FIR/ACC served	Remarks
		WS	WC	WV	ICAO location indicator	
1	2	3	4	5	6	7
ANCHORAGE/Anchorage Intl	PAWU	WSAK01-09 PAWU	WCAK01-09 PAWU	WVAK01-09 PAWU	PAZA	
HONOLULU/Honolulu Intl	PHFO	WSPA01-13 PHFO	WCPA01-13 PHFO	WVPA 01-13 PHFO	KZAK	
KANSAS CITY	KKCI	WSNT01-13 KKCI	WCNT01-13 KKCI	WVNT01-13 KKCI	KZNY KZMA KZHU TJZU	
KANSAS CITY	KKCI	WSPN01-13 KKCI	WCPN01-13 KKCI	WVPN01-13 KKCI	KZAK	
VIET NAM						
Gia Lam	VVGL	WSVS31	WCVS31	WVVS31	VVNB VVTS	

APPENDIX E

WMO HEADINGS FOR TROPICAL CYCLONE AND VOLCANIC ASH ADVISORY BULLETINS (FK and FV)

Used by Asia/Pacific TCACs and VAACs

Explanation of Table

- Col. 1: Name of the TCAC or VAAC
- Col 2: ICAO location indicator used by the TCAC or VAAC
- Col 3: WMO heading (TTAAii CCCC) of the FK or FV bulletin
- Col 4: Remarks (e.g., Area of coverage of the advisory, or any other bulletin-specific information)

TCAC/VAAC (State)	ICAO location indicator	WMO Heading TTAAii CCCC	Remarks
1	2	3	4
TC Advisories (FK)			
Miami (United States)	KNHC	FKNT21-24 KNHC FKPZ21-25 KNHC	Atlantic For Northeast Pacific to 140°W; ii = 21 – 25; up to 5 different bulletins possible at a time according to the number of TCs in the TCAC's area of responsibility.
Honolulu (United States)	PHFO	FKPA21-25 KHFO	For North Central Pacific: 140°W – 180°W; ii = 21 – 25; up to 5 different bulletins possible at a time according to the number of TCs in the TCAC's area of responsibility.
New Delhi (India)	VIDP	FKIN20 VIDP FKIN21 VIDP	Bay of Bengal Arabian Sea
Darwin (Australia)	ADRM	FKAU01 - 06 ADRM	Area bounded by 0°S 90°E, 40°S 90°E, 40°S 160°E, 0°S 160°E, 0°S 90°E. (Advisories prepared by Brisbane or Perth)
Nadi (Fiji)	NFFN	FKPS01 NFFN	
Tokyo (Japan)	RJTD	FKPQ30-35 RJTD	
Réunion (France)	FMEE	FKIO20 FMEE	Southwest Indian Ocean N: 0°S S: 40°S W: African Coastline E: 90°E

TCAC/VAAC (State)	ICAO location indicator	WMO Heading TTAAii CCCC	Remarks
1	2	3	4
VA Advisories (FV)			
Anchorage (United States)	PAWU	FVAK21-25 PAWU	ii = 21 – 25; up to 5 different bulletins possible at a time according to the number of VA clouds in the VAAC's area of resp.
Darwin (Australia)	ADRM	FVAU01-06 ADRM	
Tokyo (Japan)	RJTD	FVFE01 RJTD	
Toulouse (France)	LFPW	FVXX01 LFPW	
Washington (United States)	KNES	FVXX20-27 KNES	ii = 20 – 27; up to 8 different bulletins possible at a time according to the number of VA clouds in the VAAC's area of responsibility
Wellington (New Zealand)	NZKL	FVPS01-05 NZKL	

APPENDIX F

ASIA/PACIFIC VAAC BACK-UP PROCEDURES

1. Situations in which Back-up Procedures should be considered

1.1 Situations that may require VAAC responsibilities to be handed over to the back-up partner include:

- Insufficient VAAC staff resources are available to adequately perform VAAC duties;
- VAAC forecasters are unable to access the information required to adequately monitor any volcanic activity;
- The VAAC is unable to generate VAAs;
- The VAAC is unable to disseminate VAAs;
- The VAAC is under threat from an event that may limit its ability to properly perform its functions in the near future; and
- During any other situation where the VAAC Shift Supervisor considers the VAAC is unable to properly perform its functions.

2. Actions to be taken by Routine VAAC to initiate handover to Back-up VAAC

2.1 The VAAC Shift Supervisor will request back-up from Back-up VAAC using the VAAC contact details contained within IAVW Handbook (ICAO Doc. 9766) Table 4-2. Requests are to be made using the following media in this order:

- a. Fax;
- b. Telephone; and
- c. Email.

2.2 Using the appropriate communications forms, provide detailed information regarding the following:

- a. Expected duration and nature of outage;
- b. Current Volcanic Ash Advisories including:
 - Volcano names
 - Next routine issue times
 - Sequence number
 - What has been observed on satellite imagery
 - What other reports have been received e.g. Volcanological Agency Reports, AIREPs, ASHTAMs, SIGMETs, phone calls or emails
 - Forecast strategy and expected developments; and
- c. Other volcanoes of interest including:
 - Any volcanoes for which an imminent eruption has been forecast
 - Any volcanoes exhibiting elevated levels of activity
 - Any recent volcanic activity reports received.

2.3 If possible, provide via email or fax, any information other than listed above that is not currently available to the Back-up VAAC.

2.4 Maintain a written logbook of actions taken for the duration of the back-up service.

3. Actions to be taken by the Back-up VAAC upon receipt of a back-up request

3.1 Commence satellite monitoring for the Routine VAAC.

3.2 Send a confirmation message using the appropriate communications forms indicating whether operational back-up for the Routine VAAC is able to be commenced.

3.3 Continue routine satellite monitoring and issue VAA as required to the relevant AFTN addresses.

3.4 Send VAA to external users advising of the outage and advising Back-up VAAC contact details as per appropriate VAA proforma.

3.5 Advise volcanological agencies that new information should be sent directly to the Back-up VAAC.

3.6 Maintain a written logbook of actions taken for the duration of the back-up service.

4. Actions to be taken by Routine VAAC to resume normal operations

4.1 Commence satellite monitoring for the Routine VAAC.

4.2 Send a notification of intent to resume normal operations to the Back-up VAAC, using the appropriate communications forms.

4.3 Upon receipt of confirmation from the Back-up VAAC, continue routine satellite monitoring and issue VAA as required to the appropriate AFTN addresses.

4.4 Issue VAA to external users advising of the resumption of normal operations by the Routine VAAC as per appropriate VAA pro forma.

4.5 Advise volcanological agencies that information should now be sent directly to the Routine VAAC.

4.6 Prepare an event report summarizing the significant actions and any other relevant information contained within the logbooks of the Back-up VAAC and Routine VAAC.

5. Actions to be taken by Back-up VAAC upon receipt of intent to resume normal operations notification from the Routine VAAC

5.1 Send a confirmation receipt for the intent to resume normal operations notification, using the appropriate communications forms.

5.2 Using the appropriate communications forms, provide detailed information regarding:

- a. Details of current Volcanic Ash Advisories including:
 - Volcano names
 - Next routine issue times
 - Sequence number
 - What has been observed on satellite imagery
 - What other reports have been received e.g. Volcanological Agency Reports, AIREPs, ASHTAMs, SIGMETs, phone calls or emails
 - Current forecast strategy and expected developments; and
- b. Other volcanoes of interest including:
 - Any volcanoes for which an imminent eruption has been forecast
 - Any volcanoes exhibiting elevated levels of activity
 - Any recent volcanic activity reports received.

5.3 Provide the Routine VAAC with copies of logbooks created by the Back-up VAAC during the back-up event.

5.4 Cease routine satellite monitoring for the Routine VAAC.

APPENDIX G

TOKYO/DARWIN VAAC BACK-UP TEST PROCEDURES

1. Introduction

- 1.1 The *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766) recommends that Volcanic Ash Advisory Centres (VAACs) should conduct back-up tests at least annually.
- 1.2 The Tokyo and Darwin VAACs have developed a mutual back-up arrangement that includes procedures for undertaking a back-up test as described in Doc 9766.

2. Purpose and Scope of VAAC Back-up tests

- 2.1 The purpose of the VAAC back-up test is to ensure that internal procedures for the handover of responsibility and the issue of products for the other VAAC's area of responsibility are robust and functional.
- 2.2 The scope of the test also includes checking the dissemination pathways of the volcanic ash advisory (VAA) messages. However it is not designed to check the issuance of volcanic ash SIGMET and so there is **no requirement** to issue test SIGMETs.

3. Back-up test of VAAC Darwin by VAAC Tokyo

- 3.1 On the specified date for the test, at 0100UTC on VAAC Darwin will request back-up services from VAAC Tokyo according to internal procedures and using the operational VAAC contact details contained within the IAVW Handbook (Doc 9766) Table 4-2. VAAC Tokyo will issue a VAA for commencement of back-up test to participating operational units as per the VAA example in Attachment 1A (i) and the AFTN addresses in Attachment 2A.
- 3.2 VAAC Tokyo will issue a VAA for VAAC back-up test to participating operational units as per the VAA example in Attachment 1A (ii) and the AFTN addresses in Attachment 2A. All recipients (ACCs/FICs, MWOs, WAFCS and RODBs) of this VAA are requested to **respond to VAAC Darwin** using the email address darwin.vaac@bom.gov.au and the subject 'VAA TEST' with an affirmative or negative response regarding the receipt of the test VAA.
- 3.3 At 0130UTC VAAC Darwin will notify of intent to resume normal operations to VAAC Tokyo, and at 0145UTC VAAC Darwin will issue a VAA for cessation of back-up test to participating operational units as per the VAA example in Attachment 1A (iii) and the AFTN addresses in Attachment 2A.
- 3.4 MWOs should NOT issue a test SIGMET at any stage of the test.

4. Back-up test of VAAC Tokyo by VAAC Darwin

- 4.1 At 0200UTC, the VAAC Tokyo will request back-up services from VAAC Darwin according to internal procedures and using the operational VAAC contact details contained within the IAVW Handbook (Doc 9766) Table 4-2. VAAC Darwin will issue a VAA for commencement of back-up test to participating operational units as per the VAA example in Attachment 1B (i) and the AFTN addresses in Attachment 2B.
- 4.2 VAAC Darwin will issue a VAA for VAAC back-up test to participating operational units as per the VAA example in Attachment 1B (ii) and the AFTN addresses in Attachment 2B. All recipients (ACCs/FICs, MWOs, WAFCS and RODBs) of this VAA are requested to **respond to**

VAAC Tokyo using the email address vaac.tokyo@volash.kishou.go.jp and the subject 'VAA TEST' with an affirmative or negative response regarding the receipt of the test VAA.

- 4.3 At 0230UTC VAAC Tokyo will notify of intent to resume normal operations to VAAC Darwin, and at 0245UTC VAAC Tokyo will issue a VAA for cessation of back-up test to participating operational units as per the VAA example in Attachment 1B (iii) and the AFTN addresses in Attachment 2B.
- 4.4 MWOs should NOT issue a test SIGMET at any stage of the test.
- 5. Back-up test termination and reporting**
 - 5.1 At 0300UTC the test will be terminated.
 - 5.2 In case of significant eruption, the test should be ceased.
 - 5.3 During the test each VAAC will maintain a logbook of events and will provide the other VAAC with a copy.
 - 5.4 Email responses to the VAA for VAAC back-up test will be analyzed by the VAACs. Both VAACs will analyze the responses to the test VAAs and will present the results to the conjoint meeting of the Asia/Pacific Meteorological Information Exchange Working Group or an appropriate expert group (or groups) that may be required to progress International Airways Volcano Watch (IAVW) related work..

ATTACHMENT 1A – SAMPLE VAA MESSAGES

(i) VAA for commencement of back-up test; AFTN message from VAAC Tokyo to operational units in VAAC Darwin area of responsibility:

FF *****
DDHHMM RJTDYMYX
FVAU01 ADRM DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: DARWIN
VOLCANO: NOTICE 999999
PSN: S8959 E9959
AREA: UNKNOWN
SUMMIT ELEV: 9999M
ADVISORY NR: YYYY/N
INFO SOURCE: NIL
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: NIL
OBS VA DTG: NIL
OBS VA CLD: NIL
FCST VA CLD +6HR: NO VA EXP
FCST VA CLD +12HR: NO VA EXP
FCST VA CLD +18HR: NO VA EXP
RMK: VAAC DARWIN AND VAAC TOKYO ARE CONDUCTING A BACK UP TEST NOW.
THIS IS A TEST NOTICE ISSUED BY VAAC TOKYO FOR THE VAAC DARWIN AREA
OF RESPONSIBILITY ANNOUNCING THE START OF BACK UP TEST FOR VAAC
DARWIN BY VAAC TOKYO.
NXT ADVISORY: NO FURTHER ADVISORIES.

(ii) VAA for VAAC back-up test; AFTN message from VAAC Tokyo to operational units in VAAC Darwin area of responsibility:

FF *****
DDHHMM RJTDYMYX
FVAU01 ADRM DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: DARWIN
VOLCANO: TEST 999999
PSN: S8959 E9959
AREA: UNKNOWN
SUMMIT ELEV: 9999M
ADVISORY NR: YYYY/N
INFO SOURCE: NIL
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: NIL
OBS VA DTG: NIL
OBS VA CLD: NIL
FCST VA CLD +6HR: NO VA EXP
FCST VA CLD +12HR: NO VA EXP
FCST VA CLD +18HR: NO VA EXP
RMK: THIS IS A TEST ADVISORY ISSUED BY VAAC TOKYO
FOR THE VAAC DARWIN AREA OF RESPONSIBILITY NORTH OF LATITUDE 20S. PLEASE
ACKNOWLEDGE RECEIPT OF THIS ADVISORY BY SENDING AN EMAIL TO
DARWIN.VAAC AT BOM.GOV.AU
NXT ADVISORY: NO FURTHER ADVISORIES.

(iii) VAA for cessation of back-up test; AFTN message from VAAC Darwin to operational units in VAAC Darwin area of responsibility:

FF *****
DDHHMM YPDMYMYX
FVAU01 ADRM DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: DARWIN
VOLCANO: NOTICE 999999
PSN: S8959 E9959
AREA: UNKNOWN
SUMMIT ELEV: 9999M
ADVISORY NR: YYYY/N
INFO SOURCE: NIL
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: NIL
OBS VA DTG: NIL
OBS VA CLD: NIL
FCST VA CLD +6HR: NO VA EXP
FCST VA CLD +12HR: NO VA EXP
FCST VA CLD +18HR: NO VA EXP
RMK: VAAC DARWIN AND VAAC TOKYO ARE CONDUCTING A BACK UP TEST NOW.
THIS IS A TEST NOTICE ISSUED BY VAAC DARWIN FOR THE VAAC DARWIN AREA
OF RESPONSIBILITY ANNOUNCING THE END OF BACK UP TEST FOR VAAC DARWIN
BY VAAC TOKYO.
NXT ADVISORY: NO FURTHER ADVISORIES.

(***** Indicates appropriate AFTN addresses as per Attachment 2A)

ATTACHMENT 1B – SAMPLE VAA MESSAGES

(i) VAA for commencement of back-up test; AFTN message from VAAC Darwin to operational units in VAAC Tokyo area of responsibility:

FF *****
DDHHMM YPDMYMYX
FVFE01 RJTD DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: TOKYO
VOLCANO: NOTICE 999999
PSN: S8959 E9959
AREA: UNKNOWN
SUMMIT ELEV: 9999M
ADVISORY NR: YYYY/N
INFO SOURCE: NIL
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: NIL
OBS VA DTG: NIL
OBS VA CLD: NIL
FCST VA CLD +6HR: NO VA EXP
FCST VA CLD +12HR: NO VA EXP
FCST VA CLD +18HR: NO VA EXP
RMK: VAAC DARWIN AND VAAC TOKYO ARE CONDUCTING A BACK UP TEST NOW.
THIS IS A TEST NOTICE ISSUED BY VAAC DARWIN FOR THE VAAC TOKYO AREA
OF RESPONSIBILITY ANNOUNCING THE START OF BACK UP TEST FOR VAAC
TOKYO BY VAAC DARWIN.
NXT ADVISORY: NO FURTHER ADVISORIES.

(ii) VAA for VAAC back-up test; AFTN message from VAAC Darwin to operational units in VAAC Tokyo area of responsibility:

FF *****
DDHHMM YPDMYMYX
FVFE01 RJTD DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: TOKYO
VOLCANO: TEST 999999
PSN: S89.59 E99.59
AREA: UNKNOWN
SUMMIT ELEV: 9999M
ADVISORY NR: YYYY/N
INFO SOURCE: NIL
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: NIL
OBS VA DTG: NIL
OBS VA CLD: NIL
FCST VA CLD +6HR: NO VA EXP
FCST VA CLD +12HR: NO VA EXP
FCST VA CLD +18HR: NO VA EXP
RMK: THIS IS A TEST ADVISORY ISSUED BY DARWIN
VAAC FOR THE VAAC TOKYO AREA OF RESPONSIBILITY. PLEASE
ACKNOWLEDGE RECEIPT OF THIS ADVISORY BY SENDING AN EMAIL TO
VAAC.TOKYO AT VOLASH.KISHOU.GO.JP
NXT ADVISORY: NO FURTHER ADVISORIES.

(iii) VAA for cessation of back-up test; AFTN message from VAAC Tokyo to operational units in VAAC Tokyo area of responsibility:

FF *****
DDHHMM RJTDYMYX
FVFE01 RJTD DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: TOKYO
VOLCANO: NOTICE 999999
PSN: S89.59 E99.59
AREA: UNKNOWN
SUMMIT ELEV: 9999M
ADVISORY NR: YYYY/N
INFO SOURCE: NIL
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: NIL
OBS VA DTG: NIL
OBS VA CLD: NIL
FCST VA CLD +6HR: NO VA EXP
FCST VA CLD +12HR: NO VA EXP
FCST VA CLD +18HR: NO VA EXP
RMK: VAAC DARWIN AND VAAC TOKYO ARE CONDUCTING A BACK UP TEST NOW.
THIS IS A TEST NOTICE ISSUED BY VAAC TOKYO FOR THE VAAC TOKYO AREA
OF RESPONSIBILITY ANNOUNCING THE END OF TEST FOR VAAC TOKYO BY VAAC
DARWIN.
NXT ADVISORY: NO FURTHER ADVISORIES.

(***** Indicates appropriate AFTN addresses as per Attachment 2B)

ATTACHMENT 2A

AFTN addresses for exchange of VAAC back-up test VAA messages in the VAAC Darwin area of responsibility

YBZZPUXX (VAAC Darwin)					
AGGGZQZX	NZKLYMYX	VTBSYMYX	WBFCZQZX	YAMBZGZA	YPDNZAZX
AGGHYMYX	RJAAJALO	VVGLYMYX	WBKKYMYX	YAMBZTZX	YPDNZGZA
AYPMZQZX	RJAANCAO	VVNBZQZX	WBKKZQZQ	YBBBVOZM	YPDNZTZX
AYPYANGM	RJTDYMYX	VVTSZQZX	WIIFZQZX	YBBBZRZA	YPRFMYX
AYPYANGO	RKSIYPYX	VVTSZRZX	WIIIFYMYX	YBBBZRZB	YPRMYMYX
AYPYMYX	RPHIZQZX	VYYFZQZX	WMFCZQZX	YBBBZRZG	YPTNZAZX
EGLLSITV	RPLLYMYX	VYYVYMYX	WMKKMASD	YBBBZRZX	YPTNZGZA
EGZZMASI	VHHHCPAO	VYYYYMYX	WMKKYMYX	YBRFMYX	YPTNZTZX
EGZZMPAC	VHHHYMYX	VYYYZQZX	WMKKZQZX	YMHFMYX	YSRFMYX
EGZZVANW	VOMFZQZX	WAAAYMYX	WRRRYNYX	YMMLJSTX	YSSYQFAM
KLGBPACO	VOMMYMYX	WAAAZQZX	WSJCZQZX	YMMZRZA	YSSYWZAX
KWBCYMYX	VOMMZQZQ	WAAFZQZX	WSSSSIAO	YMMZRZB	
LSZHSWRW	VTBBYPYX	WADDYMYF	WSSSYMYX	YMMZRZG	
NFFNYPYX	VTBBZQZX	WADDYMYX	WSSSYZYK	YMMZRZX	
NZAAANZO	VTBDYMYX	WADDYOYX	YAMBZAZX	YMRFYMYX	

ATTACHMENT 2B

AFTN addresses for exchange of VAAC back-up test VAA messages in the VAAC Tokyo area of responsibility

RJTDYMYX (VAAC Tokyo)					
CWAOYMYU	EGKKVIRW	EGLLSITV	EGRRYMYX	EGZZMASI	EGZZVANW
EHAMKLMD	EHAMKLMK	EHAMKLMW	KWBCYMYX	NFFNYPYX	NZAAANZO
NZKLYMYX	PANCYMYX	RCTPYMYX	RCAAZQZX	RKRRZQZX	RKSIYMYX
RPHIZRZX	RPLLYMYV	RPLLYMYX	SAZZMAMX	UEEEYMYX	UEEEZRZX
UELLYMYX	UELLZRZX	UERRYMYX	UERRZRZX	UHBBYMYX	UHBIYMYX
UHHHYMYX	UHHHZRZX	UHMMYMYX	UHMMZRZX	UHNMYMYX	UHOOYMYX
UHPPYMYX	UHPPZRZX	UHSYMYX	UHSSYMYX	UHWYMYX	UIAAYMYX
UIAAZRZX	UIBBYMYX	UIIIYMYX	UIIIZRZX	UIKKYMYX	ULMMYMYX
ULMMZRZX	UNKLYMYX	UNKLZRZX	UUUYNXYX	UUWZDZX	VDPPYFYX
VDPPYMYX	VDPPZRZX	VDPPZTZX	VHHHYMYX	VLVTYMYX	VTBBYPYX
VTBDYMYX	VTBSYMYX	VVGLYMYX	VVNBZRZX	VVTSZRZX	VYYYYMYX
VYYYZQZX	WSJCZRZX	WSSSYMYX	WSSSYZYX	YBBBYPYX	YBZZSQJX
YMMLJSTX	YPDMYMYX	ZBAAYMYX	ZBBBYPYX	ZGGGYMYX	ZHHHYMYX
ZJHKYMYX	ZKPYYMYX	ZLXYMYX	ZMUBYMYX	ZSSSYMYX	ZUUUYMYX
ZWWWYMYX	ZYTXYMYX				

ATTACHMENT 3

List of States, participating units and tasks required* for VAAC back-up test

STATE	UNIT TYPE	LOCATION NAME	LOC . ID .	TASK/S REQUIRED*	AFTN ADDRESS
AUSTRALIA	ACC/FIC	BRISBANE/BRISBANE INTL	YBBN	D	YBBBZRZA YBBBZRZB YBBBZRZG YBBBZRZX
AUSTRALIA	ACC/FIC	MELBOURNE ACC/FIC	YMMM	D	YMMMZRZA YMMMZRZB YMMMZRZG YMMMZRZX
AUSTRALIA	RODB	BRISBANE (FIR/FIC/ACC/COM/MET/NOF)	YBBB	D J	YBBYPYX
AUSTRALIA	VAAC	MELBOURNE (WORLD MET CENTRE, BOM)	YMMC	A E F H I M	YPDMYMYX
CAMBODIA	ACC/FIC	PHNOM PENH	VDPP	J	VDPPZRZX
CAMBODIA	MWO	PHNOM PENH	VDPP	J	VDPPYMYX
CHINA	ACC/FIC	TAIBEI CITY/TAIBEI INTL AP	RCAA	J	RCAAZQZX
CHINA	ACC/FIC	HONG KONG FIR	VHHK	J	VHHKZQZX
CHINA	ACC/FIC	HUHHOT/BAITA	ZBHH	J	ZBHHZQZX
CHINA	ACC/FIC	HULUNBEIER/HAILAR	ZBLA	J	ZBLAZQZX
CHINA	ACC/FIC	BEIJING FIR	ZBPE	J	ZBPEZQZX
CHINA	ACC/FIC	TAIYUAN/WUSU	ZBYN	J	ZBYNZQZX
CHINA	ACC/FIC	CHANGSHA CITY	ZGCS	J	ZGCSZQZX
CHINA	ACC/FIC	GUILIN/LIANGJIANG	ZGKL	J	ZGKLZQZX
CHINA	ACC/FIC	NANNING/WUXU	ZGNN	J	ZGNNZQZX
CHINA	ACC/FIC	GUANGZHOU FIR	ZGZU	J	ZGZUZQZX
CHINA	ACC/FIC	WUHAN FIR	ZHWH	J	ZHWHZQZX
CHINA	ACC/FIC	SANYA FIR/ACC	ZJSA	J	ZJSAZQZX
CHINA	ACC/FIC	LANZHOU CITY	ZLAN	J	ZLANZQZX
CHINA	ACC/FIC	LANZHOU FIR	ZLHW	J	ZLHWZQZX
CHINA	ACC/FIC	XI'AN CITY	ZLSN	J	ZLSNZQZX
CHINA	ACC/FIC	KUNMING FIR	ZPKM	J	ZPKMZQZX
CHINA	ACC/FIC	XIAMEN/GAOQI	ZSAM	J	ZSAMZQZX
CHINA	ACC/FIC	NANCHANG/CHANGBEI	ZSCN	J	ZSCNZQZX
CHINA	ACC/FIC	SHANGHAI FIR	ZSHA	J	ZSHAZQZX
CHINA	ACC/FIC	NANJING/LUKOU	ZSNJ	J	ZSNJZQZX
CHINA	ACC/FIC	HEFEI/XINQIAO	ZSOF	J	ZSOFZQZX
CHINA	ACC/FIC	QINGDAO/LIUTING	ZSQD	J	ZSQDZQZX
CHINA	ACC/FIC	JINAN CITY	ZSTN	J	ZSTNZQZX
CHINA	ACC/FIC	CHONGQING/JIANGBEI	ZUCK	J	ZUCKZQZX
CHINA	ACC/FIC	CHENGDU CITY	ZUDS	J	ZUDSZQZX
CHINA	ACC/FIC	URUMQI FIR	ZWUQ	J	ZWUQZQZX
CHINA	ACC/FIC	URUMQI/DIWOPU	ZWWW	J	ZWWWZQZX
CHINA	ACC/FIC	HARBIN/TAIPING	ZYHB	J	ZYHBZQZX
CHINA	ACC/FIC	SHENYANG FIR	ZYSH	J	ZYSHZQZX
CHINA	ACC/FIC	DALIAN/ZHOUSHUIZI	ZYTL	J	ZYTLZQZX
CHINA	MWO	TAIBEI CITY/TAIBEI INTL AP	RCTP	J	RCTPYMYX
CHINA	MWO	HONG KONG/INTERNATIONAL	VHHH	J	VHHHYMYX
CHINA	MWO	BEIJING/CAPITAL	ZBAA	J	ZBAAYMYX
CHINA	MWO	GUANGZHOU/BAIYUN	ZGGG	J	ZGGGYMYX
CHINA	MWO	WUHAN/TIANHE	ZHHH	J	ZHHHYMYX
CHINA	MWO	HAIKOU/MEILAN	ZJHK	J	ZJHKYMYX
CHINA	MWO	XI'AN/XIANYANG	ZLXY	J	ZLXYMYX
CHINA	MWO	SHANGHAI/HONGQIAO	ZSSS	J	ZSSSYMYX
CHINA	MWO	CHENGDU/SHUANGLIU	ZUUU	J	ZUUUYMYX

MET SG/24
Appendix 9 to the Report

STATE	UNIT TYPE	LOCATION NAME	LOC . ID .	TASK/S REQUIRED*	AFTN ADDRESS
CHINA	MWO	URUMQI/DIWOPU	ZWWW	J	ZWWWYMYX
CHINA	MWO	SHENYANG/TAOXIAN	ZYTX	J	ZYTXYMYX
DPR KOREA	ACC/FIC	PYONGYANG (FIR)	ZKKP	J	ZKPYYMYX
DPR KOREA	MWO	SUNAN	ZKPY	J	ZKPYYMYX
FIJI	RODB	NADI/INTL	NFFN	D J	NFFNYPYX
INDIA	ACC/FIC	CHENNAI (FIC)	VOMF	D	VOMFZQZX
INDIA	MWO	CHENNAI	VOMM	D	VOMMYMYX
INDONESIA	ACC/FIC	MAKASSAR/SULTAN HASANUDDIN	WAAA	D	WAAAZQZX
INDONESIA	ACC/FIC	JAKARTA INTL/SOEKARNO-HATTA	WIII	D	WIIIZQZX
INDONESIA	MWO	MAKASSAR/SULTAN HASANUDDIN	WAAA	D	WAAAYMYX
INDONESIA	MWO	JAKARTA INTL/SOEKARNO-HATTA	WIII	D	WIIYMYX
JAPAN	ACC/FIC	SAPPORO ACC	RJCG	J	RJCGZQZX
JAPAN	ACC/FIC	FUKUOKA ACC	RJDG	J	RJDGZQZX
JAPAN	ACC/FIC	TOKYO ACC	RJTG	J	RJTGZQZX
JAPAN	ACC/FIC	NAHA ACC	RORG	J	RORGZQZX
JAPAN	MWO	TOKYO (CITY)	RJTD	J	RJTDYMYX
JAPAN	RODB	TOKYO (CITY)	RJTD	D J	RJAAYMYX
JAPAN	VAAC	TOKYO (CITY)	RJTD	B C G K L M	RJTDYMYX
LAO PDR	ACC/FIC	VIENTIANE (WATTAY)	VLVT	J	VLVTZQZX
LAO PDR	MWO	VIENTIANE (WATTAY)	VLVT	J	VLVTYMYX
MALAYSIA	ACC/FIC	KOTA KINABALU ACC/FIC	WBFC	D	WBFCZQZX
MALAYSIA	ACC/FIC	KUALA LUMPUR ACC/FIC	WMFC	D	WMFCZQZX
MALAYSIA	MWO	SEPANG/KL INTERNATIONAL AIRPORT	WMKK	D	WMKKYMYX
MONGOLIA	ACC/FIC	ULAANBAATAR/CHINGGIS KHAAN	ZMUB	J	ZMUBZQZX
MONGOLIA	MWO	ULAANBAATAR/CHINGGIS KHAAN	ZMUB	J	ZMUBYMYX
MYANMAR	ACC/FIC	YANGON INTERNATIONAL	VYYY	D	VYYYZQZX
MYANMAR	MWO	YANGON INTERNATIONAL	VYYY	D	VYYYMYX
PAPUA NEW GUINEA	ACC/FIC	PORT MORESBY ACC/FIC/COM	AYPM	D	AYPMZGZX
PAPUA NEW GUINEA	MWO	PORT MORESBY ACC/FIC/COM	AYPM	D	AYPMYMYX
PHILIPPINES	ACC/FIC	MANILA (ACC/FIC/COM)	RPHI	D J	RPHIZRZX
PHILIPPINES	MWO	NINYO AQUINO INTERNATIONAL AIRPORT, MANILA	RPLL	D J	RPLLYMYX
REPUBLIC OF KOREA	ACC/FIC	INCHEON ACC	RKRR	J	RKRRZQZX
REPUBLIC OF KOREA	MWO	INCHEON INTL	RKSI	J	RKSIYMYX
RUSSIAN FEDERATION	ACC/FIC	CHULMAN	UELL	J	UELLZRZX
RUSSIAN FEDERATION	ACC/FIC	KHABAROVSK/NOVY	UHHH	J	UHHHZRZX
RUSSIAN FEDERATION	ACC/FIC	MAGADAN/SOKOL	UHMM	J	UHMMZRZX
RUSSIAN FEDERATION	ACC/FIC	PETROPAVLOVSK-KAMCHATSKY/YELIZOVO	UHPP	J	UHPPZRZX
RUSSIAN FEDERATION	ACC/FIC	IRKUTSK	UIII	J	UIIIZRZX
RUSSIAN FEDERATION	MWO	CHULMAN	UELL	J	UELLYMYX

MET SG/24
Appendix 9 to the Report

STATE	UNIT TYPE	LOCATION NAME	LOC . ID .	TASK/S REQUIRED*	AFTN ADDRESS
RUSSIAN FEDERATION	MWO	KHABAROVSK/NOVY	UHHH	J	UHHHYMYX
RUSSIAN FEDERATION	MWO	MAGADAN/SOKOL	UHMM	J	UHMMYMYX
RUSSIAN FEDERATION	MWO	PETROPAVLOVSK-KAMCHATSKY/YELIZOVO	UHPP	J	UHPPYMYX
RUSSIAN FEDERATION	MWO	IRKUTSK	UIII	J	UIIIYMYX
SINGAPORE	ACC/FIC	SINGAPORE ACC/FIC	WSJC	D	WSJCZRZX
SINGAPORE	MWO	SINGAPORE/CHANGI	WSSS	D	WSSSYMYX
SINGAPORE	RODB	SINGAPORE/CHANGI	WSSS	D J	WSSSYZYX
SOLOMON ISLANDS	ACC/FIC	HONIARA (HENDERSON)	AGGH	D	AGGHYMYX
SOLOMON ISLANDS	MWO	HONIARA (HENDERSON)	AGGH	D	AGGHYMYX
SRI LANKA	ACC/FIC	KATUNAYAKE/BANDARANAIKE INTERNATIONAL AIRPORT COLOMBO	VCBI	D	VCBIZQZX
SRI LANKA	MWO	KATUNAYAKE/BANDARANAIKE INTERNATIONAL AIRPORT COLOMBO	VCBI	D	VCBIYMYX
THAILAND	ACC/FIC	BANGKOK (ACC/FIC/COM CENTRE)	VTBB	D J	VTBBYPYX
THAILAND	MWO	BANGKOK/SUARNABHUMI INTL AIRPORT	VTBS	D J	VTBSYMYX
THAILAND	RODB	BANGKOK (ACC/FIC/COM CENTRE)	VTBB	D J	VTBBYPYX
UNITED KINGDOM	WAFC	UK PDAI (GEN)	EGZZ	D J	EGZZMASI
UNITED STATES	WAFC	WASHINGTON (NWS NATIONAL MET CENTER), DC.	KWBC	D J	KWBCYMYX
VIET NAM	ACC/FIC	HA NOI/NOI BAI INTERNATIONAL	VVNB	D J	VVNBZRZX
VIET NAM	ACC/FIC	HO CHI MINH/TAN SON NHAT INTERNATIONAL	VVTS	D J	VVTSZRZX
VIET NAM	MWO	GIA LAM	VVGL	D J	VVGLYMYX

*Tasks required for VAAC back-up test

TASK ID.	TIME UTC	TASK DESCRIPTION
A	0100	VAAC Darwin will request VAAC Tokyo to commence back-up services
B	Sequential	VAAC Tokyo will issue a VAA (commencement of test) for VAAC Darwin area of responsibility
C	Sequential	VAAC Tokyo will issue a VAA (test) for VAAC Darwin area of responsibility
D	Sequential	MWOs/ACCs/FICs in VAAC Darwin area of responsibility and RODBs/WAFCs will respond to VAAC Darwin (using email) to confirm receipt or non-receipt of test VAA issued by Tokyo VAAC for the VAAC Darwin area of responsibility
E	0130	VAAC Darwin will notify VAAC Tokyo of intent to resume normal operations
F	0145	VAAC Darwin will issue a VAA (cessation of test) for VAAC Darwin area of responsibility
G	0200	VAAC Tokyo will request VAAC Darwin to commence back-up services

TASK ID.	TIME UTC	TASK DESCRIPTION
H	Sequential	VAAC Darwin will issue a VAA (commencement of test) for VAAC Tokyo area of responsibility
I	Sequential	VAAC Darwin will issue a VAA (test) for VAAC Tokyo area of responsibility
J	Sequential	MWOs/ACCs/FICs in VAAC Tokyo area of responsibility and RODBs/WAFCs will respond to VAAC Tokyo (using email) to confirm receipt or non-receipt of test VAA issued by VAAC Darwin for the VAAC Tokyo area of responsibility
K	0230	VAAC Tokyo will notify VAAC Darwin of intent to resume normal operations
L	0245	VAAC Tokyo will issue a VAA (cessation of test) for VAAC Tokyo area of responsibility
M	0100 - 0245	VAAC Tokyo and VAAC Darwin will maintain a log of events

APPENDIX H

WELLINGTON/DARWIN VAAC BACKUP TEST PROCEDURES

1. Introduction

1.1. The International Airways Volcano Watch Operations Group (IAVWOPSG) recognized the need for the regular testing of VAAC backup procedures that would ensure the continuing availability of Volcanic Ash Advises and identify deficiencies in the dissemination procedures of backup products. Therefore, the second meeting of IAVWOPSG held in Bangkok, 15 to 19 March 2004, adopted Conclusion 2/19, as follows:

Conclusion 2/19 – Inclusion of VAAC backup procedures in Doc 9766
That the Secretariat include in Doc 9766, Handbook on the International Airways Volcano Watch (IAVW) – Operational Procedures and Contact List, the VAAC backup procedures agreed by the group.

1.2. Appendix D, paragraph f) of ICAO Doc.9766 - Handbook on International Airways Volcano Watch (IAVW) states that:

The backup arrangements should be tested at least annually.

1.3. The Wellington and Darwin VAACs have developed a mutual backup arrangement that includes procedures for undertaking a backup test as described in this document.

2. Purpose and Scope of VAAC Backup tests

2.1. The purpose of the VAAC backup test is to ensure that internal procedures for the handover of responsibility and the issue of products for the other VAAC's area of responsibility are robust and functional.

2.2. The scope of the test also includes checking the dissemination pathways of the Volcanic Ash Advisory (VAA) messages.

2.3. The test is not designed to check the issuance of Volcanic Ash SIGMET and so there is **no requirement** to issue test SIGMETs.

3. Backup test Procedures

3.1. Procedures for Wellington – Darwin VAAC Backup tests

3.1.1. Internal procedures related to handover of responsibility and issuance of VAAs for the other VAAC's area of responsibility will be tested and the results included in a final report.

3.2. Procedures for testing the dissemination of backup VAAs

3.2.1. On the specified date at 0100 UTC VAAC Darwin will request backup services from VAAC Wellington. VAAC Wellington will issue a test Volcanic Ash Advisory (VAA) for the

Darwin VAAC area of responsibility south of latitude 20S. The message will indicate that it is a TEST and will follow the format given in **Section 4** of these procedures.

3.2.2. Recipients of the message **should send a confirmation email** to the email address given in the RMK section of the VAA, including the message text and the time received. If no VAA is received by 0130 UTC on the specified date, test participants are requested to **send an email advising of negative receipt** of the test VAA.

3.2.3. MWOs should NOT issue a test SIGMET.

3.2.4. At 0130 UTC on the specified date, VAAC Darwin will notify VAAC Wellington of intent to resume normal operations.

3.2.5. On the specified date at 0145 UTC VAAC Wellington will request backup services from VAAC Darwin. VAAC Darwin will issue a test Volcanic Ash Advisory (VAA) for the Wellington VAAC area of responsibility. The message will indicate that it is a TEST and will follow the format given in **Section 4** of these procedures.

3.2.6. Recipients of the message **should send a confirmation email** to the email address given in the RMK section of the VAA, including the message text and the time received. If no VAA is received by 0215 UTC on the specified date, test participants are requested to **send an email advising of negative receipt** of the test VAA.

3.2.7. MWOs should NOT issue a test SIGMET.

3.2.8. In the event of a major eruption in either area the test may be cancelled.

3.3. Processing of the test results

3.3.1. The participating Asia/Pacific VAACs, in conjunction with the Asia/Pacific Regional OPMET Databanks (RODBs), will analyse the received responses to the test messages and present the results to the APANPIRG Meteorology Sub Group (MET SG) or an appropriate expert group (or groups) that may be required to progress international airways volcano watch (IAVW) related work.

4. Format of test VAA for Backup Test

4.1. From VAAC Wellington for VAAC Darwin

FVAUii ADRM DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: DARWIN
VOLCANO: TEST 999999
PSN: N1000 E10000
AREA: UNKNOWN
SUMMIT ELEV: 9999M

ADVISORY NR: YYYY/N
INFO SOURCE: TEST TEST TEST
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: TEST TEST TEST
OBS VA DTG: DD/HHMMZ
OBS VA CLD: WIND FL099/099 VRB/99KT
FCST VA CLD +6 HR: DD/HHMMZ NO VA EXP
FCST VA CLD +12 HR: DD/HHMMZ NO VA EXP
FCST VA CLD +18 HR: DD/HHMMZ NO VA EXP
RMK: THIS IS A TEST ADVISORY ISSUED BY WELLINGTON VAAC FOR THE DARWIN
VAAC AREA OF RESPONSIBILITY SOUTH OF LATITUDE 20S. PLEASE ACKNOWLEDGE
RECEIPT OF THIS ADVISORY BY SENDING AN EMAIL TO DARWIN.VAAC (AT)
BOM.GOV.AU.
NXT ADVISORY: NO FURTHER ADVISORIES=

4.2 From VAAC Darwin for VAAC Wellington

FVPSii NZKL DDHHMM
VA ADVISORY
STATUS: TEST
DTG: YYYYMMDD/HHMMZ
VAAC: WELLINGTON
VOLCANO: TEST 999999
PSN: N1000 E10000
AREA: UNKNOWN
SUMMIT ELEV: 9999M
ADVISORY NR: YYYY/N
INFO SOURCE: TEST TEST TEST
AVIATION COLOUR CODE: NIL
ERUPTION DETAILS: TEST TEST TEST
OBS VA DTG: DD/HHMMZ
OBS VA CLD: WIND FL099/099 VRB/99KT
FCST VA CLD +6 HR: DD/HHMMZ NO VA EXP
FCST VA CLD +12 HR: DD/HHMMZ NO VA EXP
FCST VA CLD +18 HR: DD/HHMMZ NO VA EXP
RMK: THIS IS A TEST ADVISORY ISSUED BY DARWIN VAAC FOR THE WELLINGTON
VAAC AREA OF RESPONSIBILITY. PLEASE ACKNOWLEDGE RECEIPT OF THIS ADVISORY
BY SENDING AN EMAIL TO VAAC (AT) METSERVICE.COM
NXT ADVISORY: NO FURTHER ADVISORIES=

APPENDIX I

ADDITIONAL CRITERIA FOR ISSUANCE OF SIGMET FOR THUNDERSTORM

1. Introduction

1.1 As defined in ICAO Annex 3 Appendix 6, SIGMET are required to be issued for thunderstorms when they are:

- (i) obscured with or without hail (OBSC TS /TSGR);
- (ii) embedded with or without hail (EMBD TS/TSGR);
- (iii) frequent with or without hail (FRQ TS/TSGR); and
- (iv) squall line with or without hail (SQL TS/TSGR).

1.2 ICAO Annex 3, Appendix 6 further defines that an area of thunderstorms and cumulonimbus clouds should be considered:

- (i) **Obscured (OBSC)** if it is obscured by haze or smoke or cannot be readily seen due to darkness;
- (ii) **Embedded (EMBD)** if it is embedded within cloud layers and cannot be readily recognized;
- (iii) **Frequent (FRQ)** if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity); and
- (iv) **Squall line (SQL)** should indicate a thunderstorm along a line with little or no space between individual clouds.

1.3 Some States have developed additional criteria, such as minimum area of coverage of thunderstorms and minimum length of squall line, for the issuance of SIGMET for thunderstorms. Examples of additional criteria developed by the Bureau of Meteorology, Australia (The Bureau) and the Japan Meteorological Agency (JMA) are provided in Section 2 and Section 3 below. Individual States may consider developing additional criteria in consultation with users.

2. Additional Criteria for Issuance of SIGMET for Thunderstorms Developed by the Bureau of Meteorology, Australia.

2.1 Minimum area affected:

2.1.1 A minimum area was introduced for the area affected by embedded (EMBD TS) and frequent (FRQ TS) thunderstorm SIGMETs as follows:

- (i) For areas where low-level area forecasts are valid, EMBD and FRQ TS should be affecting an area of 3000 NM² (approximately 1 degree

squared) or more. This covers areas of high-level air traffic movements and low-level flights; and

- (ii) For areas outside of where low-level area forecasts are valid, EMBD and FRQ TS should be affecting an area of 7200 NM² (approximately 2 degree by 1 degree) or more. This covers areas where there are lower air traffic movements and generally high-level flights with airborne radar to tactically fly around thunderstorms.

2.2 Definition of “little or no separation”:

2.2.1 When determining if thunderstorms have “little or no separation”, as required for FRQ and SQL TS SIGMET, the following criterion is used:

- (i) The distance between adjacent thunderstorm cells to be applied for frequent (FRQ TS) and squall line (SQL TS) SIGMETs shall be approximately 40 NM between identifiable thunderstorm cells.

2.2.2 This criterion is based on the Australian Civil Aviation Safety Authority and the Federal Aviation Administration recommendations for thunderstorm avoidance which recommends pilots avoid any thunderstorm identified as severe, or giving an intense radar echo, by at least 20NM.

2.3 Length of squall line:

2.3.1 When determining if a line of thunderstorms requires a squall line SIGMET, the following criteria is applied:

- (i) A squall line (SQL TS) SIGMET is issued for thunderstorms along a line of approximately 100 NM or more in length, with little or no separation between the clouds

3. **Additional Criteria for Issuance of SIGMET for Thunderstorms Developed by the Japan Meteorological Agency.**

3.1 FRQ TS

3.1.1 FRQ TS SIGMETs are issued for CB clouds associated with lightning covering greater than or equal to 50% of the area concerned (CB coverage is greater than or equal to OCNL). If there are developing CB clouds with their coverage of OCNL, it is considered they will become FRQ CB. The criteria for minimum size required for SIGMET issuance are as below;

- (1) Approach control areas around congested airports : 10,000 sq. km (100km x 100km)
- (2) Around main air routes in Japan : 22,500 sq.km (150km x 150km)
- (3) Other area (oceanic region) : 40,000 sq.km (200km x 200km)

3.2 EMBD TS

- 3.2.1 The criteria of CB coverage and minimum size for EMBD TS SIGMET are same as those of FRQ TS. If CB areas are embedded within cloud layers and cannot be readily recognized, EMBD TS SIGMETs are issued.

3.3 SQL TS

- 3.3.1 SQL TS SIGMETs are issued for line-shaped CB clouds with length of more than 500km and width of more than 100km.
-

APPENDIX J

SPACE WEATHER ADVISORIES (SWXA)

1. Introduction

1.1 ICAO Annex 3 Amendment 78 (effective November 2018) introduced the provision of Space Weather Advisories (SWXA) issued by designated Space Weather Centres.

1.2 **SIGMETs are not issued for Space Weather.** The purpose of this appendix is to provide a brief description on the SWXA products.

2. Example Space Weather Advisories

Space weather advisory message (GNSS effects)

SWX ADVISORY
DTG: 20161108/0100Z
SWXC: DONLON*
ADVISORY NR: 2016/2
NR RPLC: 2016/1
SWX EFFECT: GNSS MOD
OBS SWX: 08/0100Z HNH HSH E18000 – W18000
FCST SWX +6 HR: 08/0700Z HNH HSH E18000 – W18000
FCST SWX +12 HR: 08/1300Z HNH HSH E18000 – W18000
FCST SWX +18 HR: 08/1900Z HNH HSH E18000 – W18000
FCST SWX +24 HR: 09/0100Z NO SWX EXP
RMK: LOW LVL GEOMAGNETIC STORMING CAUSING INCREASED AURORAL ACT
AND SUBSEQUENT MOD DEGRADATION OF GNSS AVBL IN THE AURORAL ZONE.
THIS STORMING EXP TO SUBSIDE IN THE FCST PERIOD. SEE
WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY: NO FURTHER ADVISORIES

Space weather advisory message (RADIATION effects)

SWX ADVISORY
DTG: 20161108/0000Z
SWXC: DONLON*
ADVISORY NR: 2016/2
NR RPLC: 2016/1
SWX EFFECT: RADIATION MOD
FCST SWX: 08/0100Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +6 HR: 08/0700Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +12 HR: 08/1300Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +18 HR: 08/1900Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +24 HR: 09/0100Z NO SWX EXP
RMK: RADIATION LVL EXCEEDED 100 PCT OF BACKGROUND LVL AT FL350 AND
ABV. THE CURRENT EVENT HAS PEAKED AND LVL SLW RTN TO BACKGROUND
LVL. SEE WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY: NO FURTHER ADVISORIES

Space weather advisory message (HF COM effects)

SWX ADVISORY
DTG: 20161108/0100Z
SWXC: DONLON*
ADVISORY NR: 2016/1
SWX EFFECT: HF COM SEV
OBS SWX: 08/0100Z DAYLIGHT SIDE
FCST SWX +6 HR: 08/0700Z DAYLIGHT SIDE
FCST SWX +12 HR: 08/1300Z DAYLIGHT SIDE
FCST SWX +18 HR: 08/1900Z DAYLIGHT SIDE
FCST SWX +24 HR: 09/0100Z NO SWX EXP
RMK: PERIODIC HF COM ABSORPTION AND LIKELY TO CONT IN THE NEAR
TERM. CMPL AND PERIODIC LOSS OF HF ON THE SUNLIT SIDE OF THE EARTH
EXP. CONT HF COM DEGRADATION LIKELY OVER THE NXT 7 DAYS. SEE
WWW.SPACEWEATHERPROVIDER.WEB
NXT ADVISORY: 20161108/0700Z

*DONLON is a fictitious Space Weather Centre

APPENDIX K

GUIDELINES FOR OPERATIONAL SIGMET COORDINATION

1. Inconsistencies in SIGMET information issued by different Meteorological Watch Offices (MWOs) across Flight Information Region (FIR) boundaries pose safety concerns to airspace users. Improved cross-FIR-boundary coordination and sharing of meteorological (MET) information between MWOs concerned is necessary to ensure seamlessness in SIGMET information across FIR boundaries.

2. A concerted effort within the MET community to improve operational coordination across FIR boundaries to provide harmonized MET information for hazardous weather phenomena is of great benefit to airspace users. To this end, the Asia/Pacific Air Navigation Planning and Implementation Group (APANPIRG) adopted the following conclusions in 2015 and 2017:

- **Conclusion APANPIRG/26/62** – Cross-border MET Collaboration and Coordination

Recognising the presence of SIGMET weather phenomena that straddles across boundaries, States/Administrations are encouraged to promote cross-border collaboration and coordination to harmonise the MET products of such phenomena between Meteorological Authorities to enhance MET support for ATM in the Asia/Pacific Region.

- **Conclusion APANPIRG/28/30** – SIGMET coordination in the APAC Region

That, States and Administrations are encouraged to:

- a) Participate in cross-FIR-boundary SIGMET coordination on a bilateral or multilateral basis for seamless hazardous weather information for the benefit of aviation users, as well as advancing the capabilities of participating MWOs in the issuance of SIGMETs for cross-border hazardous weather phenomena; and*
- b) Continue to share outcomes from SIGMET coordination activities and consider a step-by-step integration of SIGMET coordination activities in the region when operationally ready.*

3. In Amendment 78 to ICAO Annex 3 "Meteorological Services for International Air Navigation", a reference to ICAO Doc. 8896 "Manual of Aeronautical Meteorological Practices" was incorporated, which provides guidance on coordination between MWOs on a bilateral or multilateral basis to encourage MWOs to adopt a coordinated approach in SIGMET issuance.

4. This document was developed to provide MWOs with guidelines on SIGMET coordination, including planning and implementing operationally.

Objectives and Guiding Principles

5. Prior to implementing SIGMET coordination with neighboring MWOs it is important for the participating MWOs to agree to the following objectives and guiding principles:

- To share information and enhance coordination between MWOs to ensure seamless MET information across borders improved quality of SIGMET information;
- To undertake effective and efficient coordination between MWOs to avoid any delays. Coordination should not be conducted at the expense of the quality and timeliness of the issuance of SIGMET;
- To put in place a consultative coordination process to facilitate consensus between participating MWOs. However, each MWO remains responsible for the SIGMET(s) issued within their respective area of responsibility (AoR) and in the event that consensus cannot be reached, each MWO retains the right to adjust parameters and assess SIGMETs in their AoR;
- To ensure subsequent issuance of SIGMETs are in line with the guidance provided in the "ICAO Asia/Pacific Regional SIGMET Guide" and ICAO Doc 8896 "*Manual of Aeronautical Meteorological Practice*", and complies with relevant provisions on SIGMET content and issuance in accordance with ICAO Annex 3 on "*Meteorological Service for International Air Navigation*".

Preliminary Requirements

6. Prior to operationalising SIGMET coordination, the following requirements should be considered.

6.1. Bilateral or multilateral coordination

- 6.1.1. MWOs should determine whether coordination is required on a bilateral or multilateral basis.
- 6.1.2. Bilateral coordination is considered straightforward since consensus is only required between two MWOs. Interaction with only one MWO may assist with timely issuance of SIGMETs.
- 6.1.3. Multilateral coordination is necessary for the issuance of harmonized SIGMETs for multiple FIRs. However, there may be added complexities arising from diversity of views in multilateral discussions that may cause issues in reaching consensus.

6.2. Formalizing coordination arrangements

- 6.2.1. MWOs should formalize operational arrangements for SIGMET coordination to establish a common understanding on what SIGMET coordination entails. The different modalities include a Letter of Agreement, the Exchange of Letters or a Memorandum of Understanding. Such arrangements can be made on a bilateral or multilateral basis, depending on how coordination is conducted.

6.3. Coordination procedures

- 6.3.1. MWOs should jointly develop and endorse a set of clear procedures for SIGMET coordination, which then should be adopted when facilitating SIGMET coordination process.

6.3.2. While there are special circumstances for each region (or sub-region) and different challenges (e.g. availability of communications link, language differences, in-house processes), procedures that are developed based on commonalities shared amongst the participating MWOs (e.g. weather pattern and climatology) are the most helpful tools in overcoming differences and challenges.

6.3.3. Procedures may include methodology of coordination (including common situational awareness tools), a communications protocol, criterion for issuances, and methodology for review and evaluation. Each of these is discussed in greater detail in subsequent sections.

Operational Coordination

7. The aim of SIGMET coordination is to consult with the participating MWOs, exchange content and reach an agreement.

8. Content to be discussed includes:

- vertical extent;
- boundaries;
- direction and speed of movement of the SIGMET phenomenon observed, and/or expected to affect, two or more areas of responsibility.

9. Initiation of SIGMET coordination

9.1. Coordination can be initiated by any of the participating MWOs. However, the following protocols are recommended:

- When hazardous weather phenomenon warranting a SIGMET is observed or forecast in an AoR and is expected to move in a direction such that an adjacent FIR(s) may be affected, the MWO that issued the initial SIGMET should initiate consultation with the neighboring MWO(s).
- When hazardous weather phenomenon warranting a SIGMET is observed or forecast across FIR boundaries, the MWO with the largest proportion of the hazardous weather phenomenon in its FIR should initiate consultation with the neighboring MWO(s).

10. Common interface

10.1. It is helpful to have access to a common interface (such as a web application) where observational and/or Numerical Weather Prediction (NWP) data can be shared to enable common situational awareness amongst the operational meteorologists. The interface allows operational meteorologists on duty at each MWO to have a shared view of the weather situation and prognosis, before coming to a consensus on the area and parameters to be included in the SIGMET. Hence, graphical presentation of observations, NWP data, and SIGMETs issued on the common interface would be particularly helpful.

10.2. If a web application is available, the application should be interactive to enable technical

discussions between MWOs. Therefore, any such tools developed should incorporate functionalities that would support technical discussions, in graphical, textual and/or verbal form. Due to this requirement, it is recommended that such tools be the primary mode of communication between the participating MWOs.

11. Communications protocol

11.1. To ensure effective communication that helps to facilitate discussion whilst arriving at a consensus in a timely manner it may be necessary to develop a communications protocol that includes preset syntax, particularly for the most commonly encountered weather phenomena. Preset syntax can overcome difficulties in communications due to language differences.

12. Alternative communication modes

12.1. Alternative means of communication for operational coordination can serve as redundancy in the event of non-availability of the primary mode of communication. Participating MWOs can use various communication modes, such as telephone and mobile applications (e.g. WhatsApp), as their common contingency or complementary measure.

12.2. Other channels of communication such as video-conferencing and emails can facilitate more in-depth discussion on issues outside of operational coordination or for long-lived and prolonged weather phenomena (e.g. tropical cyclones, sand storms).

13. Establishing what constitutes consensus

13.1. It may be necessary to identify indicators of consensus. These should form part of the preliminary requirements as agreed by the participating MWOs. This establishes a common understanding of what constitutes consensus and can help focus consultation efforts to ensure consensus can be arrived at more often than not.

14. Timeliness in issuance of coordinated SIGMETs

14.1. Certain weather phenomena, such as thunderstorms, can undergo rapid development and therefore, efficient coordination is critical to ensure coordinated SIGMETs are issued in a timely manner. Participating MWOs may set time limits for consultation so that technical discussions do not become so protracted that SIGMET issuance is delayed. In most cases, discussions should not take longer than 15 minutes to complete.

15. Record of consultation cases

15.1. It is a good practice to log all cases of consultation. Items to log include the date and time of consultations, whether consensus was reached and the SIGMETs that were issued. For cases where consensus was not reached reasons should be logged. In case there is not enough time to log all elements in real time, participating MWOs can log remaining elements post event or log

only specific cases, such as instances when consensus was not reached.

- 15.2. Records should be compiled and reviewed regularly to identify difficult cases, common issues that affect coordination and achieve consensus, etc. This will contribute to continuous improvement of the coordination procedures and cooperation between MWOs. The records may also help to highlight important technical issues which may have contributed to difficulties in SIGMET coordination. This will be discussed in a later section.

Common Technical Difficulties Encountered in SIGMET Coordination

16. Criteria for issuance

- 16.1. Subjectivity is inherent in weather forecasting and each MWO will have its own analysis tools and suite of NWP data to be used for analysis, assessment and forecasting. Each operational meteorologist's assessment will be informed by his or her own experience and skills. For a given set of weather conditions and NWP data, the permutation of forecasts that can be issued may have considerable spread.
- 16.2. The element of subjectivity is known to affect harmonization of SIGMET information. Therefore, setting objective criteria for SIGMET issuance can enable consistency in SIGMET information. The *ICAO Asia/Pacific Regional SIGMET Guide* provides general guidance, however, it should be noted that there is no one-size-fits-all guidance. Issuance criteria generally vary from region to region given that each region has its own unique weather, climate characteristics and challenges.
- 16.3. SIGMET coordination initiatives have brought MWOs together to discuss such technical issues but the problems are often linked to fundamental meteorological science, which require more focused efforts by the scientific community to resolve. Where appropriate, these issues could be discussed at relevant ICAO and WMO meetings so that a global perspective can be developed which in turn can provide useful guidance and standardised procedures for issuance of coordinated SIGMET. In addition, conducting a stock take of the practices and assessment methodology amongst the MWOs would help to form the basis for the development of a common set of criteria for issuance.

17. Harmonization of SIGMET across regions with different weather characteristics

- 17.1. As the network of MWOs participating in SIGMET coordination expands, the likelihood of coordination with an MWO with different meteorological characteristics increases. MWOs will have to factor in the different climatology of the different AoRs when drawing up coordination procedures. This information should be included in the preliminary requirements.

Post Event Assessment

18. Regular reviews

18.1. Post event, offline reviews should be conducted regularly to ensure continuous improvement is incorporated in the process. For example, regular post event review meetings at the senior meteorologists / chief meteorologists' level with input from operational meteorologists can work on resolving persistent coordination issues and refining procedures, so that the process becomes more efficient. It also promotes harmonization of SIGMET information when coordination amongst MWOs becomes more effective. Technical issues hampering consensus can also be raised for discussions at such fora.

18.2. The MWOs may consider developing case studies based on the findings from the post review events and use these for further improvements.

19. Evaluation of performance

19.1. Similar to other aviation MET products issued, there is a need to verify the forecast and evaluate the quality of the product. Participating MWOs are encouraged to conduct objective verification and evaluation of coordinated SIGMETs issued to measure the performance of the coordination effort.

20. User / stakeholder feedback

20.1. User feedback is critical in improving the SIGMET product. MWOs participating in SIGMET coordination should regularly engage users and stakeholders to solicit feedback on the utility of their SIGMETs, so as to identify areas for improvement. Verification and evaluation of SIGMET and collection of user feedback should be conducted within the States' quality management system.

— END —

INTERNATIONAL CIVIL AVIATION ORGANIZATION



ASIA PACIFIC REGION ROBEX HANDBOOK

Fourteenth Edition — November 2020

**Prepared by the ICAO Asia and Pacific Office
and Published under the Authority of the Secretary General**

RECORD OF AMENDMENTS AND CORRIGENDA

Amendments			
No.	Date of issue	Date entered	Entered by
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Corrigenda			
No.	Date of issue	Date entered	Entered by

Table of Contents

RECORD OF AMENDMENTS AND CORRIGENDA	2
Acronyms and Abbreviations	3
1. INTRODUCTION	1
2. ROBEX SCHEME – GENERAL	2
2.1 Objective.....	2
2.2 Structure.....	2
2.3 Purpose.....	2
2.4 Introduction of IWXXM Exchange.....	2
2.5 Management	3
2.6 Requests for OPMET (Request and Reply).....	3
3. OPMET INFORMATION AND OPMET EXCHANGE	4
3.1 OPMET data types	4
3.2 OPMET bulletins.....	4
3.3 Types of OPMET exchange.....	4
4. THE COMPOSITION OF ROBEX.....	6
5. COMMUNICATIONS - GENERAL.....	8
5.1 Exchange of OPMET.....	8
5.2 Use of AFTN/AMHS.....	8
6. METAR/SPECI EXCHANGE	9
6.1 General	9
6.2 Responsibilities of originating stations and NOCs	9
6.3 ROCs – METAR and SPECI Responsibilities	10
6.4 METAR Bulletins in TAC - Format and Content.....	11
6.5 SPECI Bulletins in TAC - Format and Content.....	11
6.6 METAR and SPECI Bulletins in IWXXM - Format and Content.....	12
7. TAF EXCHANGE	13
7.1 General	13
7.2 Aerodrome meteorological offices (AMO) and NOCs responsibilities.....	13
7.3 ROCs – TAF Responsibilities	14
7.4 TAF Bulletins in TAC - Format and Content.....	14
7.5 TAF Bulletins in IWXXM - Format and Content.....	16
7.6 Summary of OPMET data issuance.....	17
8. EXCHANGE OF SIGMET, TCA and VAA.....	19
9. AIREP/AIREP SPECIAL EXCHANGE.....	20
10. REGIONAL OPMET DATA BANKS (RODB)	21
11. INTER-REGIONAL OPMET EXCHANGE	22
12. MANAGEMENT OF OPMET EXCHANGE	23
12.1 Changes to OPMET Bulletin Procedures	23
12.2 Quality Management - OPMET Exchange.....	23
12.3 OPMET Monitoring.....	24
12.4 ROBEX Focal Points	25

Appendices	1
APPENDIX A - Collection and Dissemination of METAR (SA) Bulletins.....	1
APPENDIX B - Collection and Dissemination of TAF (FT) Bulletins.....	1
APPENDIX C - IROG Back-up Procedures	1
APPENDIX D - Use of WMO Abbreviated Heading.....	1
APPENDIX E – Procedure and Format of METNO bulletin for APAC ROBEX Bulletins	1
APPENDIX F - OPMET Quality Control and Monitoring Procedures	1
APPENDIX G - ROBEX Scheme Diagram.....	1
APPENDIX H – RODB OPMET Interrogation Procedures.....	1
APPENDIX I - ROBEX FOCAL POINTS.....	1

Acronyms and Abbreviations

ACC	Area Control Centre
ADMIN	Administrative message
AFI	Africa-Indian Ocean Region
AFS	Aeronautical Fixed Service
AFTN	Aeronautical Fixed Telecommunication Network
AIREP	Air-report
AMHS	ATS Message Handling System
AMO	Aerodrome Meteorological Office
AMS	Aeronautical Meteorological Station
ANP	Air Navigation Plan
AOP	Aerodrome Operations
APAC	Asia Pacific Region
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
ARS	Special Air-report indicator
ASIA	Asia Region
ASIA/PACIFIC	Asia and Pacific Regions
ATM	Air Traffic Management
ATS	Air Traffic Services
COM	Communications
CTA	Control Area
eANP	Electronic Air Navigation Plan
eDocuments	Electronic documents
EUR	European Region
FASID	Facilities And Services Implementation Document
FIR	Flight Information Region
GML	Geography Mark-up Language
HF	High Frequency
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
IROG	Inter-regional OPMET Gateway
IWXXM	ICAO Meteorological Information Exchange Model
METAR	Aerodrome Routine Meteorological Report
MET/IE WG	Meteorological Information Exchange Working Group
MID	Middle East Region
MWO	Meteorological Watch Office
NOC	National OPMET Centre
OPMET	Operational Meteorological Information

MET SG/24
Appendix 10 to the Report

PAC	Pacific Region
PIRG	Planning and Implementation Regional Group
ROBEX	Regional OPMET Bulletin Exchange
ROC	Regional OPMET Centre
RODB	Regional OPMET Data Banks
SADIS	Secure Aviation Data Information Service
SAM	South American Region
SIGMET	Significant Meteorological Information
SPECI	Aerodrome Special Meteorological Report
SUG	SADIS User Guide
TAC	Traditional Alphanumeric Code
TAF	Aerodrome Forecast
TC	Tropical Cyclone
TCA	Tropical Cyclone Advisory
TCAC	Tropical Cyclone Advisory Centre
VA	Volcanic Ash
VAA	Volcanic Ash Advisory
VAAC	Volcanic Ash Advisory Centre
WAFC	World Area Forecast Centre
WAFS	World Area Forecast System
WG	Working Group
WIFS	WAFS Internet File Service
WMO	World Meteorology Organization
XML	Extensible Mark-up Language

1. INTRODUCTION

- 1.1 The Regional Operational Meteorological (OPMET) Bulletin Exchange (ROBEX) scheme was established by the MID/SEA COM/MET Regional Planning Group at its first meeting in Bangkok, July 1972. The scheme became operational in 1974 and has since been successfully exchanging OPMET information in the ASIA/PAC (APAC) region and inter-regionally with the AFI, EUR, MID, NAM and SAM regions.
- 1.2 The ROBEX scheme was intended initially only for METAR exchange; AIREP and TAF exchanges were added to the scheme at a later stage. The operation of the ROBEX scheme included exchange of OPMET bulletins between the originating tributary offices and the bulletin compiling centres, which, according to their functions and responsibilities, were classified as Main Collection Centres or Sub-collection Centres, or TAF Collection Centres. The operational exchange has been carried out according to agreed transmission schedules; the bulletin contents were specified in the ROBEX Handbook.
- 1.3 Based on COM facilities of very limited capacity in the early seventies, the ROBEX scheme was strictly planned to accommodate only those OPMET exchanges considered vital for the flight operations. Over the years, the COM facilities have improved considerably and the ROBEX scheme has developed accordingly. The ROBEX Handbook is dynamic in nature in that it is updated regularly to reflect current communications (COM) facilities and the requirements of users for OPMET.
- 1.4 The ROBEX Handbook is the main guidance material providing detail on the procedures for OPMET exchange under the ROBEX scheme. The Handbook defines the responsibilities of the Regional OPMET Centres (ROCs) and the procedures to be followed. It also defines the content and format of the ROBEX bulletins.
- 1.5 The ROBEX Handbook is published and kept up-to-date by the ICAO APAC Office (Bangkok).
- 1.6 Although the ROBEX Handbook primarily covers the exchange of OPMET in the ASIA/PAC Region, it also provides information on the exchange of OPMET inter-regionally as agreed with the other regions.

2. ROBEX SCHEME – GENERAL

2.1 Objective

2.1.1 The main purpose of the Regional Operational Meteorological Bulletin Exchange (ROBEX) Scheme is to ensure the;

- a) Most efficient exchange of OPMET information within APAC and with the other ICAO regions to meet the requirements of the users of OPMET information; and
- b) Implementation of the OPMET-related SARPs in *Annex 3* and *Annex 10*, and the relevant provisions of the APAC Air Navigation Plan (ANP) in a highly efficient and standardized way.

2.2 Structure

2.2.1 The above objective is achieved by implementing a number of Regional OPMET Centres (ROC), Regional OPMET Data Banks (RODB), and Inter-regional OPMET Gateways (IROG). All these operational units form the ROBEX scheme. In order to ensure seamless global exchange of the required OPMET information, the ROBEX scheme is consistent with similar schemes in the other ICAO regions, as well as with the AFS distribution systems used to disseminate OPMET data.

2.3 Purpose

2.3.1 The ROBEX scheme produces and delivers to the aviation users the required OPMET information in the form of predefined bulletins. The scheme should handle all types of OPMET information in the Traditional Alphanumeric Code (TAC) and the new ICAO Meteorological Exchange (IWXXM) form and should provide facilities and services for scheduled and non-scheduled delivery of OPMET information to the users.

2.4 Introduction of IWXXM Exchange

2.4.1 ICAO Annex 3 Amendments 76, 77 and 78 provide the first steps to the transition of Traditional Alphanumeric Code (TAC) formatted OPMET data towards XML formatted data in compliance with the ICAO Meteorological Information Exchange Model (IWXXM).

Amendment 76 (14 November 2013) enabled the bilateral exchange of XML data for those States in a position to do so.

[SEP]

Amendment 77 (10 November 2016) enables the international exchange of XML-formatted METAR/SPECI, TAF, AIRMET and SIGMET, VAA and TCA. [SEP]

Amendment 78 (8 November 2018) will require the international exchange of XML-formatted METAR/SPECI, TAF, AIRMET and SIGMET, VAA and

TCA to be raised to a standard although the provisions relating specifically to IWXXM will not become applicable until 5 November 2020.

- 2.4.2 The phased transition of TAC OPMET data to IWXXM OPMET data is to be considered as a first step towards the ICAO System Wide Information Management (SWIM) concept.
- 2.4.3 This edition of the Handbook focuses largely on the exchange of OPMET in TAC form because all States currently have the ability to send and receive OPMET in TAC form. Only a limited number of States have developed the capability to send and receive OPMET in IWXXM. In addition, AMHS with FTBP has yet to be implemented in a number of APAC States. It should be noted that AFTN cannot be used to disseminate IWXXM coded OPMET. However, some information on the exchange of OPMET in IWXXM is provided in this Handbook, but detailed information on IWXXM, and the transition from TAC to IWXXM, is provided in the document *Guidelines for the Implementation of OPMET Data Exchange using IWXXM* available on the APAC website in the MET section under APAC eDocuments (<https://www.icao.int/APAC/Pages/edocs.aspx>).

2.5 Management

- 2.5.1 Monitoring of the OPMET exchange under the ROBEX scheme, and planning for improvements and preparation of proposals for any changes of the scheme that may become necessary, are carried out by the ASIA/PAC Air Navigation Planning and Implementation Regional Group (APANPIRG). In order to achieve these tasks, the ROBEX implementation status and planning is part of the agenda of the MET sub-groups of APANPIRG, and in particular the MET Information Exchange (MET/IE) Working Group (WG).
- 2.5.2 Any proposals for amendments to the ROBEX scheme, which States or international organizations concerned consider necessary, due to changes in the operational requirements for OPMET data or to developments of the AFS system, are normally forwarded for consideration to the ICAO Asia and Pacific Office, Bangkok.

2.6 Requests for OPMET (Request and Reply)

- 2.6.1 The RODBs provide a request and reply facility to allow users to request OPMET on a non-regular or occasional basis. This is not intended for routine requests, which should be arranged through the implementation of predetermine regular OPMET exchange.
- 2.6.2 Guidance on the interrogation procedures for access to the designated RODBs in the ASIA/PAC Region to request OPMET is provide in [Appendix H](#).

3. OPMET INFORMATION AND OPMET EXCHANGE

3.1 OPMET data types

3.1.1 The following OPMET data types should be handled by the ROBEX scheme:

Data type	Abbreviated name	WMO data type designator	
		TAC	IWXXM
Aerodrome reports	METAR	SA	LA
	SPECI	SP	LP
Aerodrome forecasts	TAF: 12 to 30 hour	FT	LT
SIGMET information	SIGMET	WS	LS
	SIGMET for TC	WC	LY
	SIGMET for VA	WV	LV
AIRMET information	AIRMET	WA	LW
Volcanic Ash and Tropical Cyclone Advisories	Volcanic Ash Advisory	FV	LU
	Tropical Cyclone Advisory	FK	LK
Air-reports	AIREP SPECIAL (ARS)	UA	N/A
Space Weather Advisory	SWXA	FN	LN
Administrative	METNO	NO	N/A

Note: IATA TAF requirements in the ASIA/PAC region are for TAF validity of either 24 or 30 hours. Some States issue 12- and 18-hour TAF, which don't meet IATA requirements, but are nevertheless classified as FT for the WMO data type designator.

3.2 OPMET bulletins

3.2.1 The exchange of OPMET data is carried out through bulletins containing one or more meteorological messages (METAR, SPECI, TAF or other OPMET information). An OPMET bulletin contains messages of the same type.

3.2.2 The format of OPMET bulletins is determined by:

ICAO Annex 10, Aeronautical telecommunications - AFTN envelope of the bulletin;

WMO-No.386, WMO Manual on the Global telecommunication System - WMO abbreviated heading of the bulletin;

ICAO Annex 3 and WMO-No.306, Manual on Codes - format and coding of the information included in the bulletin.

3.3 Types of OPMET exchange

3.3.1 Regional exchange – ROBEX scheme

3.3.1.1 The ROBEX scheme covers the exchange of OPMET information within the APAC region and to and from adjacent ICAO regions. It includes several types of exchanges as described below.

- 3.3.1.1.1 Regular exchange is a scheduled exchange that encompasses collection of messages from the originating stations, compiling of bulletins and their dissemination according to predetermined distribution schemes. The collection and distribution is carried out at fixed times and the bulletin content is defined in this Handbook.
- 3.3.1.1.2 Non-regular exchange

The RODBs store OPMET data and make this available on request. The procedure for requesting OPMET is provided in the [Appendix H](#).
- 3.3.2 ***Inter-regional OPMET exchange***
 - 3.3.2.1 Exchange of OPMET data between the APAC region and the other ICAO regions is carried out via designated centres, which serve as Inter-regional OPMET Gateways (IROG). An IROG is set up for sending and receiving specified OPMET data between the APAC region and other ICAO regions.
 - 3.3.2.2 Inter-regional OPMET exchange via IROGs is carried out through the ground segment of the AFS (AFTN/AMHS).
- 3.3.3 ***Exchange of OPMET information through the Internet.***
 - 3.3.3.1 All APAC OPMET data handled by the ROBEX scheme is relayed to the SADIS and WIFS Service Providers allowing users to retrieve the data via SADIS and WIFS.
- 3.3.4 ***Other OPMET exchanges***
 - 3.3.4.1 Where OPMET exchanges described in the above paragraphs are not sufficient, direct AFTN/AMHS addressing can be utilized by the originating centres or NOCs.

4. THE COMPOSITION OF ROBEX

4.1 The ROBEX scheme involves a number of aeronautical meteorological stations, aeronautical telecommunication stations, aerodrome meteorological offices and other operational units. The following operational units are considered to be components of the ROBEX scheme:

4.1.1 **Originating station** – an aeronautical meteorological station, aerodrome meteorological office, forecasting office, MWO, TCAC, or a VAAC. The duties and responsibilities of these originating stations are defined by the State's meteorological authority.

4.1.2 **National OPMET centre (NOC).** Normally, a NOC is associated with the State's national AFTN/AMHS COM centre. The role of the NOC is to collect all OPMET messages generated by the originating stations in the State and to send them to the responsible ROBEX bulletin-compiling centre (ROC). Some NOCs serve also as ROCs. National regulations should be developed to ensure that NOCs disseminate the international OPMET data within their own State, as necessary.

4.1.3 Regional OPMET Centre (ROC).

4.1.3.1 ROCs are responsible for the collection of OPMET messages from the originating stations or NOCs in their area of responsibility and for compiling these messages into ROBEX bulletins. *Tables A and B of the ROBEX Handbook* define the areas of responsibility (or collection areas) of the ROCs for METAR/SPECI and TAF.

4.1.3.2 The ROCs are responsible for the dissemination of bulletins compiled by them to:

- Other ROCs, according to predefined distribution lists, specific for each bulletin;
- APAC RODBs;
- NOCs or other COM or MET offices in the States in their area of responsibilities, as agreed between the ROC and the States' authorities concerned.

4.1.4 **Regional OPMET Data Banks (RODB)**

4.1.4.1 Five centres have been designated by APANPIRG to serve as Regional OPMET Data Banks (Bangkok, Brisbane, Nadi, Singapore and Tokyo).

4.1.4.2 The **main responsibilities** of the RODBs are defined as follows:

- To support the ROBEX Scheme and to facilitate a regular exchange of OPMET information based on predetermined distribution within the APAC Region; and

- To provide facilities for request/response type of access to the stored OPMET data for users to obtain non-regular or occasional information.

Note 1: The interrogation procedures applicable to the OPMET data banks and catalogues are provided in [Appendix H](#).

Note 2: Responsibilities of RODBs are given in 4.1.4.2, 10.2, 10.3 and 12.3

- 4.1.5 **Inter-regional OPMET Gateways (IROG).** The Inter-regional OPMET Gateways in the APAC Region are the designated RODBs. Each RODB is assigned responsibility for the exchange of OPMET information with other ICAO Regions. The responsibilities of the IROGs are shown in 11.1 of this Handbook.
- 4.1.6 **Support to SADIS and WIFS.** The IROGs should facilitate the global exchange of OPMET data carried out through SADIS and WIFS. In order to achieve this, close liaison should be maintained between the IROGs and the corresponding SADIS and WIFS gateways. Availability of APAC data on SADIS and WIFS should be monitored and any systematic shortfalls of data identified should be reported to the relevant ICAO regional office.
- 4.2 The overall structure of the ROBEX scheme is presented in [Appendix G](#).

5. COMMUNICATIONS - GENERAL

5.1 Exchange of OPMET

- 5.1.1 According to *Annex 3, Chapter 11, 11.1.9*, the telecommunications facilities used for the exchange of OPMET should be the aeronautical fixed service (AFS) or, for the exchange of non-time critical OPMET, the public internet, subject to availability, satisfactory operation and bilateral/multilateral and/or regional air navigation agreement.

Note 1: Aeronautical fixed service Internet-based services, operated by the World Area Forecast Centres (WAFC), support the global exchanges of OPMET.

Note 2: Guidance material on non-time critical OPMET and relevant aspects of the public Internet is provided in the Guidelines on the Use of the Public Internet for Aeronautical Applications (Doc 9855).

5.2 Use of AFTN/AMHS

- 5.2.1 The AFTN is used for the exchange of OPMET in TAC form, and AMHS is used for the exchange in IWXXM form. It is to be noted that IWXXM cannot be exchanged over the AFTN due to the character set included in IWXXM. When AMHS is used this must be either AMHS Extended or AMHS with File Transfer Body Part (FTBP).
- 5.2.2 AFTN/AMHS circuits are used for the collection of OPMET messages by the ROCs, and for regional and inter-regional exchanges of OPMET bulletins. However, the exchanges are subject to the use of AFTN and AMHS as noted in 5.2.1.
- 5.2.3 OPMET bulletins containing TAC or IWXXM formatted OPMET transmitted via AFTN/AMHS shall be encapsulated in the normal AFTN envelope (for TAC), and for IWXXM as described in the *Guidelines for the Implementation of OPMET Data Exchange using IWXXM* available at <https://www.icao.int/APAC/Pages/edocs.aspx>.
- 5.2.4 AFTN/AMHS messages and bulletins containing OPMET shall achieve transit times of less than 5 minutes unless otherwise determined by regional air navigation agreement.
- 5.2.5 OPMET bulletins (TAC) transmitted via AFTN shall use the following priority indicators:
- FF – for SIGMET, AIREP SPECIAL, VAA, TCA and TAF AMD;
- GG – for TAF, METAR and SPECI
- 5.2.6 For information about the transmission of OPMET bulletins (IWXXM) via AMHS, refer to the document *Guidelines for the Implementation of OPMET Data Exchange using IWXXM* available on the APAC website in the MET section under APAC eDocument (<https://www.icao.int/APAC/Pages/edocs.aspx>).

6. METAR/SPECI EXCHANGE

6.1 General

6.1.1 Routine METAR reports should be prepared for the international aerodromes listed in the *eANP, Volume I, Table AOP I-1*, and in *Volume II, Table MET II-2*. METAR should be issued hourly or half-hourly throughout the 24 hours of each day as determined by regional air navigation agreement or by agreement by individual States (refer to 6.1.2).

6.1.2 METAR from all international aerodromes (referred to as AOP aerodromes) listed in the Tables referred to in 6.1.1, should be included in the regular ROBEX exchange. This also includes METAR from a number of domestic aerodromes, required by the users as alternate aerodromes (referred to as non-AOP aerodromes), and should be included in the regular ROBEX exchange, if so agreed by the States concerned.

Note: When OPMET data from non-AOP aerodromes is required by users, the corresponding State is consulted on its agreement to provide the additional information.

6.1.3 A description of the ASIA/PAC METAR bulletins provided in the regular ROBEX exchange, including the responsible compiling ROC, WMO bulletin identification, list of aerodromes, observation times and AFTN distribution are given in [Appendix A](#).

6.1.4 SPECI reports are included in separate bulletins and should be disseminated in the same way as the METAR reports originated by the same aerodromes. It should be noted that METAR and SPECI reports are not to be included together in a bulletin.

6.1.5 The exchange of METAR/SPECI messages outside the ROBEX scheme, if necessary, should be carried out by direct AFTN/AMHS addressed messages.

6.2 Responsibilities of originating stations and NOCs

6.2.1 The originating stations (aeronautical meteorological stations) and/or NOCs should prepare METAR messages for the observation times indicated in [Appendix A](#) and send them to their responsible ROC.

6.2.2 SPECI should be prepared between the regular observation times, following the requirements set out in Annex 3, and sent with no delay to the responsible ROC.

6.2.3 In preparing METAR and SPECI messages, the originating stations should follow strictly the specifications for METAR and SPECI in *Annex 3 (Chapter 4 and Appendix 3 including the template in Table A3-2)* and the WMO METAR and SPECI code forms (*FM 15-XII METAR and FM 16-XII SPECI, WMO – No. 306, Manual on Codes, Volume I.1, Part A – Alphanumeric Codes*).

6.2.4 METAR messages should be sent to the responsible ROC before the cut-off time specified by the ROC, to allow for timely compilation of the METAR bulletin. If for some reason a METAR message has not been sent before the cut-off time, the originating station/NOC should send it as soon as possible after that, as a delayed message. The originating stations/NOCs should follow strictly the schedules specified for METAR messages and keep to a minimum the number of delayed messages.

6.2.5 METAR and SPECI messages should be quality controlled by the originating stations/NOCs and, when necessary, a corrected message should be sent immediately after an error in an already transmitted message had been identified.

Note: Procedures applying to the corrected and delayed messages are given in [Appendix D](#).

6.3 ROCs – METAR and SPECI Responsibilities

6.3.1 ROCs should collect METAR messages from the aerodromes in their area of responsibility and compile METAR bulletins, according to [Appendix A](#). The content of bulletins and the order of stations in each bulletin should be kept fixed until a bulletin change is requested and coordinated according to the established procedure.

6.3.2 ROCs should determine a cut-off time for the reception of METAR from the stations in their area of responsibility. At the cut-off time, the ROC should compile METAR bulletin(s) containing all prescribed aerodromes, indicating any missing METAR with “NIL”.

6.3.3 At scheduled transmission times, ROCs should transmit the compiled METAR bulletins to other ROCs and RODBs according to the distribution lists specified for each METAR bulletin in [Appendix A](#). METAR bulletins should be filed for transmission not later than 5 minutes after the observation time.

6.3.4 ROCs should transmit the METAR bulletins compiled by them, as well as bulletins received from other ROCs, as necessary, to the NOCs and/or other offices in the States in their area of responsibility, as agreed between the ROC and the meteorological authorities of the States concerned.

6.3.5 A SPECI when received by a ROC should be sent as a SPECI bulletin to the same addresses, to which METAR from the issuing aerodrome are sent. Normally, a SPECI bulletin should contain a single SPECI and must not be included in any METAR bulletin.

6.3.6 The WMO heading of a SPECI bulletin should be constructed in the same way as the WMO heading of the METAR bulletin, which contains the aerodrome, for which the SPECI is issued, by using SP data type designator instead of SA.

6.3.7 A METAR message received by the ROC after the scheduled transmission of the corresponding bulletin is a delayed METAR. The ROC should send a delayed bulletin as soon as one or more delayed messages are received or at

specified times after the scheduled bulletin time (e.g., the first delayed bulletin (RRA) issued 10 minutes after the regular time; the second delayed bulletin (RRB) issued 20 minutes after the regular time, etc.).

- 6.3.8 As soon as a corrected METAR or SPECI message is received from a station the ROC should transmit it as a corrected bulletin to all recipients.

6.4 METAR Bulletins in TAC - Format and Content

- 6.4.1 Each METAR message in a METAR bulletin should start with the code word METAR followed by the ICAO location indicator (CCCC) of the aerodrome and the date/time group (YYGGggZ), indicating the official time of observation. Corrected METAR messages, should start with METAR COR.
- 6.4.2 The following is an example of the format to be applied in preparing a METAR bulletin by the ROCs:

Parts of Message	ROBEX SA Bulletin
AFTN header	
Priority Indicator and Address Date and Time of filing and Originator	GG VTBBYPYX 271304 ZBBBYPYX
WMO Abbreviated Heading	SACI31 ZBBB 271300
METAR messages	METAR ZBAA 271300Z = METAR ZBTJ 271300Z=
AFTN Normal Ending	NNNN

Note: The inclusion of the code name METAR in front of each message in the METAR bulletin is mandatory.

- 6.4.3 The rules related to the use of the BBB group in the WMO abbreviated heading, with regard to delayed or corrected bulletins, are given in [Appendix D](#).
- 6.4.4 For METARs, which are not available at the time of compilation of the bulletin, the word NIL should be inserted following the date/time group indicating the time of the observation.

Example: METAR ZBTJ 271200Z NIL =

6.5 SPECI Bulletins in TAC - Format and Content

- 6.5.1 A SPECI message included in a SPECI bulletin should start with the code word SPECI followed by the ICAO location indicator (CCCC) of the aerodrome and a date/time group (YYGGggZ) indicating the time of the observation of the meteorological conditions for which the SPECI is issued. Corrected SPECI messages, should start with SPECI COR.
- 6.5.2 The following is an example of the format to be applied in preparing a SPECI bulletin by the ROC:

Parts of Message	ROBEX SP Bulletin
<i>AFTN header</i>	
Priority Indicator and Address	GG VTBBYPYX
Date and Time of filing and Originator	081647 ZBBBYPYX
<i>WMO Abbreviated Heading</i>	SPCI31 ZBBB 081645
<i>SPECI message</i>	SPECI ZBAA 081645Z =
<i>AFTN Normal Ending</i>	NNNN

6.6 METAR and SPECI Bulletins in IWXXM - Format and Content

- 6.6.1 Refer to the document *Guidelines for the Implementation of OPMET Data Exchange using IWXXM* available on the APAC website in the MET section under APAC eDocuments (<https://www.icao.int/APAC/Pages/edocs.aspx>).

7. TAF EXCHANGE

7.1 General

7.1.1 Aerodrome forecast (TAF) should be prepared by the aerodrome meteorological offices (AMO) or other meteorological offices, designated for the provision of TAF by the State's meteorological authority, for all international aerodromes, for which TAF is required (refer to the *eANP, Volume II, Table MET II-2*

7.1.2 All TAFs required should be included in the regular ROBEX exchange. In addition, TAFs from a number of domestic aerodromes required by the users as alternate aerodromes, should also be included in the regular ROBEX exchange, if so agreed by the States concerned.

Note: Airline users require that TAF for all international aerodromes listed in the eANP, Volume I, Table AOP I-1, and in Volume II, Table MET II-2, should be available through regular exchange and through the Internet distribution systems SADIS and WIFS.

7.1.3 TAF exchanges not covered by the ROBEX Scheme, but required operationally, should be met by means of direct addressed AFTN/AMHS messages.

7.1.4 The requirements for the exchange of 24 or 30-hour TAFs are listed in the *eANP, Volume II, Table MET II-2*.

7.2 Aerodrome meteorological offices (AMO) and NOCs responsibilities

7.2.1 Originating AMOs (or other designated forecasting offices) should prepare the required TAF messages for the periods of validity indicated in [Appendix B](#). TAFs from international aerodromes shall not be issued earlier than one hour prior to the beginning of its validity period. TAFs are to be sent by the AMOs or NOCs to the responsible ROC before the cut-off time determined by the centre, e.g., 5 minutes before the filing/transmission times specified in [Appendix B](#).

7.2.2 Aerodrome meteorological offices in preparing TAF should follow strictly the template for TAF in *Annex 3, Appendix 5* and the WMO TAF code form (*FM 51-XII TAF, WMO – No. 306, Manual on Codes, Volume I.1, Part A – Alphanumeric Codes*).

7.2.3 The originating AMOs should monitor TAFs and amended TAF (TAF AMD) should be issued according to the established criteria. Amended TAFs should be sent by the originating station to the responsible ROC with no delay. The optional group BBB should be used in the WMO abbreviated heading to indicate amended TAF in accordance with [Appendix D](#).

7.2.4 TAF messages should be quality controlled by the originating meteorological offices and, when necessary, a corrected TAF (TAF COR) should be sent immediately after an error in an already transmitted message had been identified.

7.3 ROCs – TAF Responsibilities

- 7.3.1 ROCs should collect TAFs from the AMOs and/or NOCs in their area of responsibility and compile TAF Bulletins according to [Appendix B](#). The areas of responsibility, as far as practicable, should group together aerodromes and their alternates. ROCs should ensure that TAFs in a single bulletin have common periods of validity.
- 7.3.2 If necessary, ROCs should prepare two or more separate TAF bulletins using different “ii” values (e.g., “31” and “32”) in the WMO heading. The content of the ROBEX TAF bulletins is specified in [Appendix B](#).
- 7.3.3 ROCs should establish a cut-off time for reception of TAFs from AMOs and/or NOCs in their area of responsibility, e.g., 5 minutes before the filing/transmission times specified in [Appendix B](#). At the cut-of time ROCs should compile TAF bulletin(s) containing all prescribed aerodromes, indicating any missing TAF with “NIL”.
- 7.3.4 The filing/transmission times specified in [Appendix B](#) ensure the OPMET information is available to the users twenty-five (25) minutes prior to the beginning of the TAF validity period.
- 7.3.5 ROCs should transmit the compiled TAF bulletins, to other ROCs and the RODBs according to the distribution lists as specified for each TAF bulletin in [Appendix B](#).
- 7.3.6 ROCs should transmit the TAF bulletins compiled by them, as well as TAF bulletins received from other ROCs, as necessary, to the NOCs and/or other offices in the States in their area of responsibility, as agreed between the ROC and the meteorological authorities of the States concerned.
- 7.3.7 A TAF message received by a ROC after the scheduled transmission of the corresponding bulletin is a delayed TAF. The ROC should send a delayed TAF bulletin as soon as one or more delayed messages are received or at specified times after the scheduled bulletin time. The optional BBB group should be used in the WMO bulletin heading accordingly.
- 7.3.8 Amended TAF (TAF AMD) received from an AMO or NOC should be distributed with no delay as an amended TAF bulletin to all recipients in the distribution list for the TAF bulletin, to which the originating aerodrome belongs. The optional BBB group should be used in the WMO bulletin heading accordingly.

7.4 TAF Bulletins in TAC - Format and Content

- 7.4.1 Issuance and period of validity
- 7.4.1.1 24- and 30-hour TAFs should be issued at intervals of six hours, with the period of validity beginning at one of the main synoptic hours (00, 06, 12, 18 UTC), as shown in the table below.

- 7.4.1.2 All TAFs in a ROBEX TAF bulletin should have a common period of validity. It is not permitted to mix TAF with different periods of validity in one bulletin.

Synoptic hours (UTC)	24-hour TAF		30-hour TAF	
	Period of validity	Filing time (not prior to)	Period of validity	Filing time (not prior to)
00	00-00	23 (-1)*	00-06 (+1)	23 (-1)
06	06-06	05	06-12 (+1)	05
12	12-12	11	12-18 (+1)	11
18	18-18	17	18-00 (+1)	17

*Note: “-1” indicates the previous day and “+1” indicates the next day

- 7.4.2 Each TAF message in a TAF bulletin should start with the code word TAF followed by the ICAO location indicator (CCCC) of the aerodrome and the date/time group (YYGGggZ), indicating the official time of issuance. Corrected TAF messages, should start with TAF COR. Amended forecasts should start with TAF AMD.
- 7.4.3 The use of the BBB group in the WMO heading for delayed, corrected, or amended TAFs is described in [Appendix D](#).
- 7.4.4 The following is an outline of the format to be applied by a ROC in preparing a TAF TAC bulletin, containing FT TAFs (24 or 30 hour) :

Parts of Message	ROBEX FT Bulletin
AFTN header	
Priority Indicator and Address	GG YBBBYPYX
Date and Time of filing and Originator	271104 ZBBBYPYX
WMO Abbreviated Heading	FTCI31 ZBBB 271100
TAF messages	TAF ZBAA 271100Z 2712/2812.....= TAF ZBTJ 271100Z 2712/2812.....=
AFTN Normal Ending	NNNN

- 7.4.5 A missing TAF in a TAF bulletin should be indicated with “NIL”, as shown in the following example:

TAF VTBD 281000Z NIL=

- 7.4.6 A cancelled TAF in a TAF bulletin should be indicated with “CNL”, as shown in the following example:

TAF VTBD 281100Z 2812/2912 CNL=

7.5 TAF Bulletins in IWXXM - Format and Content

- 7.5.1 Refer to the document *Guidelines for the Implementation of OPMET Data Exchange using IWXXM* available on the APAC website in the MET section under APAC eDocuments (<https://www.icao.int/APAC/Pages/edocs.aspx>).

7.6 Summary of OPMET data issuance

7.6.1 A summary of correct methods of issuing OPMET data is provided in the following two tables:

METAR observation, compiling and filing

Function	Responsible Entity	Explanation of Time	Time of task (min)
METAR Observation	Originating stations (AMS, AMO, forecast office)	State determines how often and when, e.g., 30 minutes past the hour 24/7. Examples : H+00, H+30 <i>Note that the observation time is used in the METAR report</i>	0
Send METAR observation to NOC	Originating station		<5
Send METAR observations to ROC	NOC		
Bulletin compiling and filing	ROC	Up to 5 minutes after actual time of observation <i>Note 1: The observation time of the METAR is used in the DTG – YYGGgg of the bulletin header.</i> <i>Note 2: The filing time is used in the AFTN header and should be up to 5 minutes after the observation time given in the bulletin header also referred to as the WMO Abbreviated Heading.</i>	
Send METAR bulletin to: ROCs (predefined distribution list) RODBs NOCs Other MET offices	ROC via AFTN or AMHS	Less than 5 minutes	<5
Acceptable time from observation at originating stations to reception by user			<10

TAF issuance, compiling and filing

Function	Responsible Entity	Explanation of Time	Time of task (min)
TAF Issuance	AMO or NOC	State determines time of the beginning of the validity period for four (4) scheduled TAFs each day, i.e. 00, 06, 12, 18Z. <i>Note: That issuance time of TAF (which is not earlier than one hour prior to the beginning of its validity period) is used in the date/time group (DTG) (YYGGggZ) of TAF messages).</i> TAF is sent to ROC before the cut-off time of accepting TAF for filing as indicated in Appendix B (typically 5 minutes before filing).	Allow enough time to reach ROC before cut-off time
Bulletin compiling and filing	ROC	Bulletins are compiled during the 15 minutes before filing. <i>Note 1: The TAF issuance time (official filing time) is used in the DTG – YYGGgg of the bulletin header</i> <i>Note 2 : The <u>actual</u> filing time is used in the AFTN header and should be after the time given in the bulletin header also referred to as the WMO Abbreviated Heading.</i> TAF should be filed for transmission not earlier than one hour prior to the beginning of their validity period.	<15
Send TAF bulletin to: ROCs (predefined distribution list) RODBs NOCs Other MET offices	ROC via AFTN or AMHS	In less than 5 minutes	<5
Acceptable time for ROC compiling and filing to reception by user			<5

8. EXCHANGE OF SIGMET, TCA and VAA

8.1 SIGMET should be prepared by the meteorological watch offices (MWO) designated by the State's meteorological authority. The MWOs and their areas of responsibility are given in *eANP, Volume II, Table MET II-1*.

8.2 SIGMET messages should be distributed to all RODBs within the Region who should also make the SIGMET messages available on request. In order to facilitate that, the originating MWOs should use the WMO headings given in the *ASIA/PAC Regional SIGMET Guide, Appendix D* for their SIGMET bulletins

Note: The required distribution of SIGMET to MWOs and ACCs in the adjacent FIRs described in the ASIA/PAC Regional SIGMET Guide is not part of the ROBEX exchange and should be arranged by the States outside the ROBEX scheme.

8.3 SIGMET messages should be distributed to other ICAO regions and made available for redistribution through SADIS and WIFS. This distribution should be carried out through the relevant IROGs.

8.4 Detailed information on the format of the SIGMET messages is provided in the *ASIA/PAC Regional SIGMET Guide*.

8.5 Tropical cyclone advisories (TCA) and volcanic ash advisories (VAA) should be issued by the designated tropical cyclone and volcanic ash advisory centres (TCAC and VAAC), as indicated in *FASID Table MET 3A and MET 3B*.

8.6 The TCACs and VAACs should send their advisories to the APAC RODBs. The RODBs should make TCAs and VAAs messages available on request. In order to facilitate that, the originating TCACs and VAACs should use the WMO headings given in the *ASIA/PAC Regional SIGMET Guide, Appendix D*.

8.7 VAA and TCA messages should be distributed to other ICAO regions and made available for redistribution through SADIS and WIFS. This distribution should be carried out either directly by the VAACs and TCACs or through the relevant IROGs.

9. AIREP/AIREP SPECIAL EXCHANGE

- 9.1 Routine voice air-reports are not required and therefore are not exchanged under the ROBEX scheme (refer to *Annex 3, Appendix 4*).
- 9.2 Routine air-reports received by data-link communications should be relayed directly to the WAFCs by the ATS units.
- 9.3 Special voice air-reports received by MWOs are to be sent to WAFCs without delay.
- 9.4 Special air-reports of pre-eruption volcanic activity should also be sent to the appropriate VAAC. Special air-reports received at the meteorological watch office that are deemed to not warrant issuance of a SIGMET, shall be disseminated in the same way as SIGMET messages.
- 9.5 When supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, such dissemination should be arranged and agreed between the meteorological authorities concerned.

An example AIREP SPECIAL is given below:

```
FF EGRRVANW KWBCYMYX EGZZMASI RJTDYPYX RKSIPYX VTBBYPYX
WSZZWWBX YBBBYPYX YPDNYMYX ZJSYYMYX
090726 WSSSYMYX
UASR71 WSSS 090700
ARS QFA129 0328N 12831E 0639 FL380 VOLCANO DUKONO 0608-01
DRIFT OF VA SE PLUME HGT EST FL100 OR LOWER SUP INFO REPORTS
GOOD VISIBILITY=
```

10. REGIONAL OPMET DATA BANKS (RODB)

10.1 The ASIA/PAC Regional OPMET Data Banks and the AFTN addresses to be used for direct access to the data banks are shown below:

RODB	AFTN ADDRESS	ROCs IN THE AREA OF RESPONSIBILITY
Bangkok	VTBBYZYX	Bangkok/VTBB Mumbai/VABB Colombo/VCCC Delhi/VIDP Karachi/OPKC Kolkata/VECC
Brisbane	YBBBYZYX	Brisbane/YBBN Wellington/NZKL
Nadi	NFFNYZYX	Nadi/NFFN
Singapore	WSSSYZYX	Jakarta/WIII Kuala Lumpur/WMKK Singapore/WSSS
Tokyo	RJTDYZYX	Beijing/ZBBB Hong Kong/VHHH Incheon/RKSI Tokyo/RJTD

10.2 Responsibilities

10.2.1 Collect OPMET bulletins from the ROCs in the area of responsibility and store them in a database.

10.2.2 Handle all type of OPMET bulletins, as described in 3.1.1.

10.2.3 Provide facilities for “request-reply” service to the authorized users.

10.2.4 Maintain a catalogue of bulletins and introduce changes to the bulletins when necessary according to the established procedures.

10.2.5 Quality control the incoming bulletins and inform the ROCs of any discrepancies or shortfalls.

10.2.6 Monitor the OPMET traffic by carrying out regular tests on the availability and timeliness of the bulletins; report to the ICAO Regional Office on the results.

10.3 The interrogation procedures applicable to the designated RODBs are provided in [Appendix H](#).

10.4 Guidance on the management and quality control is provided in *Chapter 12* of this Handbook.

11. INTER-REGIONAL OPMET EXCHANGE

- 11.1 Inter-regional OPMET Gateways (IROG) are designated for the purpose of exchanging OPMET data between ASIA/PAC and the other ICAO Regions, as shown in the table below.

ROBEX IROG	For exchange of OPMET data between Regions
Bangkok (VTBB)	ASIA/PAC and MID (OEJD, OBBI*) ASIA and AFI (FAPR, GOOY)
Brisbane (YBBN)	ASIA/PAC and SAM (SBBR) PAC and AFI (FAPR, GOOY)
Nadi (NFFN)	S. PAC and NAM (KWBC)
Singapore (WSSS)	ASIA/PAC and EUR (EGZZ)
Tokyo (RJTD)	ASIA/PAC and NAM (KWBC)

* Backup to OEJD

- 11.2 IROGs arrange for relaying all ROBEX bulletins to a corresponding OPMET Gateway in the other ICAO regions concerned. In this regard, detailed OPMET exchange arrangements should be developed by each IROG based on the requirements indicated in the APAC eANP.
- 11.3 The following principles are applied to IROGs:
- IROGs should;
- Have reliable and efficient AFTN/AMHS connection to the regions, for which they have exchange responsibilities, with adequate capacity to handle the OPMET data flow between the regions;
 - Be associated with AFTN/AMHS relay centres capable of handling efficiently the volume of traffic anticipate; and
 - Be capable of handling all OPMET data types, as described in 3.1.1.
- 11.4 In order to avoid duplication of the OPMET traffic and information, all inter-regional OPMET exchange should be directed through the IROGs. Inter-regional exchange via direct AFTN/AMHS addressing from the originator or ROC to recipients in the other ICAO Regions should be avoided, except when bilateral or other agreements require such direct exchanges.
- 11.5 In order to ensure the global availability of all ROBEX bulletins at the SADIS and WIFS gateways, IROG Singapore should relay all APAC bulletins to the SADIS gateway (London), and IROGs Tokyo and Nadi should relay the bulletins to the WIFS gateway (Washington).

12. MANAGEMENT OF OPMET EXCHANGE

12.1 Changes to OPMET Bulletin Procedures

- 12.1.1 Information about changes to ROBEX bulletins should be disseminated to all ROCs and national OPMET centres (NOC) concerned well in advance in order to allow the centres to introduce the necessary changes to their message handling systems. In this regard, a lead time of two months (or two AIRAC cycles) is considered appropriate.
- 12.1.2 The ROC planning the change, should send a notification by e-mail to the ICAO Office, Bangkok with a copy to all ROBEX Focal Points. The notification should include detailed information about the changes and the proposed time schedule. The Regional Office should inform all other ICAO Regional Offices of the changes to be introduced and the effective date of implementation.
- 12.1.3 Notification via AFTN/AMHS should be done by means of a METNO message, which is to be sent by the originating ROC to all other ROCs and to the respective IROGs in the other ICAO regions two weeks prior to the implementation date. The format of the METNO message is given in [Appendix E](#).
- 12.1.4 All requests by users for changes to ROBEX bulletins should be addressed to the ICAO Regional Office. The Regional Office should carry out the necessary coordination with the States and ROCs concerned. The duration of the coordination process should be minimized so that the period between the user request and the implementation of the change (if agreed) should normally be less than 3 months.

12.2 Quality Management - OPMET Exchange

12.2.1 Objectives and Scope

- 12.2.1.1 **Objectives:** Develop a management system that provides general guidance on procedures applied to OPMET exchange, which includes quality control aspects and introduces a non-real-time monitoring for OPMET exchange.

- 12.2.1.2 **Scope:** Management of OPMET data exchange will be organized in the following sections:

<i>Quality Control</i>	<i>Data quality control applies to OPMET validation and correction during data processing and during preparation of messages.</i>
<i>OPMET Monitoring</i>	<i>Monitor and evaluate the performance indicators for the scheduled OPMET data.</i>

12.2.2 Quality Control – general requirements

- 12.2.2.1 Quality control (QC) consists of the examination of OPMET data at NOCs, ROCs and RODBs to check the messages for formatting and coding errors, as well as, for time and space consistency.

- 12.2.2.2 OPMET data should be checked in real time or as close to it as possible, at the first point, i.e., the originator, which may be: meteorological station, aerodrome meteorological office or meteorological watch office. Errors may occur during coding or transcription of meteorological messages by the observer or forecaster. The originating office should apply quality control procedures during data processing and preparation of messages, in order to eliminate the main sources of errors.
- 12.2.2.3 The National OPMET centre (NOC) should apply QC procedures on the incoming messages from national sources and on the compiled national bulletins.
- 12.2.2.4 It is also advisable to apply QC checks at the ROC, where the ROBEX bulletins are received or compiled. If automation is available it should be used, or partly assisted by computing facilities. The principle is that every message should be checked, preferably at the various points along the data chain.
- 12.2.2.5 The checks that have already been performed by originating offices and ROCs are usually repeated at the OPMET data banks. Erroneous messages found by the RODB should be either rejected or corrected by reference back to the source or by the databank itself. Data corrected by the databanks should be flagged in the database for record purpose.
- 12.2.2.6 As a result of the quality control process described above, OPMET data of established quality will be used in the exchange and stored in the databanks. The RODBs should compile information with regard to errors that were found and compile records, such as the numbers and types of errors detected during quality control. Such non-conformities should be reported to ICAO Regional Office, Bangkok for follow-up action.

12.2.3 **Quality Control Procedures**

- 12.2.3.1 General guidance on the quality control procedures for each type of OPMET is outlined in [Appendix F](#).

12.3 **OPMET Monitoring**

12.3.1 **Monitoring of Scheduled OPMET data**

- 12.3.1.1 The monitoring shall focus on the measurement of three performance indicators (PIs), (Compliance, Availability and Regularity indices) of the scheduled, routine METAR and TAF OPMET data (TAC - SA and FT; IWXXM – LA and LC)) exchanged in the region. The PIs are described in detail in [Appendix F](#).

12.3.1.2 **Monitoring Reference**

The monitoring shall involve the recording and analysis of data provided by the AFTN/AMHS circuit. The three PIs should be monitored against the respective ROBEX Tables.

12.3.1.3 Methodology

Data is monitored with reference to the procedures defined in [Appendix F](#).

12.3.2 **Monitoring of Non-Scheduled OPMET data**

12.3.2.1 Monitoring of non-routine OPMET data shall include;

- (a) TAC - TCA (FK), VAA (FV) and SIGMET (WC, WS, and WV).
- (b) IWXXM – TCA (LK), VAA (LU), SIGMET (LY, LS, LV).

12.3.2.2 Monitoring of SIGMET, VAA and TCA should be performed during the scheduled regional SIGMET tests in accordance with the procedures published by the APAC Office, Bangkok.

12.3.2.3 Additional monitoring of SIGMET issuance may be scheduled as necessary to monitor the issuance of SIGMET in specific FIRs over specific periods when such monitoring would be useful to support the rectification of deficiencies in the provision of SIGMET services.

12.3.2.4 The monitoring results shall be presented in bulletin-oriented format, one line per bulletin indicating the abbreviated header (TTAAii CCCC YGGgg), the FIR/UIR where applicable, receipt time and originator.

12.3.3 **Reporting OPMET monitoring results**

12.3.3.1 OPMET monitoring reports should provide data for all locations where OPMET is required (i.e. locations in *eANP Table MET II-1* and *Table MET II-2*), and additional locations where States have been consulted and agreed to provide this additional information.

12.3.3.2 OPMET monitoring reports should provide sufficient data to help States identify problems in OPMET issuance, e.g., the actual number of messages received per day at locations where OPMET monitoring identifies that the number of messages received does not meet the given percentage of the total number of messages expected.

12.3.3.3 Reports of the results of OPMET monitoring conducted in accordance with the guidelines in this Handbook should be presented in a format that enables ease of comparison between the reports from the various designated OPMET monitoring entities (e.g., IATA and RODBs) and ease of interpretation of the data by States and users concerned.

12.4 ROBEX Focal Points

12.4.1 In order to facilitate the exchange of information between the ROCs a system of ROBEX focal points has been developed. Contact details of the persons designated as ROBEX focal points by the relevant State's authorities are provided in [Appendix I](#).

Appendices

APPENDIX A - Collection and Dissemination of METAR (SA) Bulletins

Table A : METAR

Explanation of Table

Col.1:	Name and ICAO location indicator of the ROC compiling the bulletin.
Col.2:	Description of the METAR Bulletin
Col.3:	Official observation time of the bulletin
Col.4:	Time when bulletin available <i>Note: O/R indicates Bulletin available on request and NR indicates no report is available</i>
Col.5:	Dissemination of the bulletin to other ROCs and RODBs

- Notes:
- 1 The RODB responsible for storing the bulletin is in **bold**
 - 2 Aerodromes not listed in Table AOP 1-1 indicated in italics
 - 3 METAR included in VOLMET broadcasts are listed in APAC, ANP, VOL II, Table MET II-3, VOLMET Broadcasts

Table A : Collection and Dissemination of METAR (SA) Bulletins

1		2			3	4	5		
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO		
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address	
ASIA/PAC REGION									
Bangkok	VTBB	SAAE31	VTBD	BANGKOK/Don Mueang Intl Airport	HH + 00		BANGKOK	VTBBYPYX	
			VTBS	BANGKOK/Suvarnabhumi Intl Airport	HH + 30		BRISBANE	YBBBYPYX	
			VTBU	RAYONG/U-Taphao Intl Airport			SINGAPORE	WSZZYPYM	
			VTCC	CHIANG MAI/Chiang Mai Intl. Airport			TOKYO	RJTDYPYX	
			VTCT	CHIANG RAI/Chiang Rai Intl Airport			Kolkata	VECCYPYX	
			VTSG	KRABI			Colombo	VCCCYPYX	
			VTSP	PHUKET/Phuket Intl Airport			Delhi	VIDPYPYX	
			VTSS	SONGKHLA/Hat Yai Intl Airport			Hong Kong	VHZZYPYX	
			SAAE32	VDPP VDSR VLVT VYMD VYNT VYYY	PHNOM PENH SIEM REAP VIENTIANE (Wattay) MANDALAY INTERNATIONAL NAYPYITAW INTERNATIONAL YANGON INTERNATIONAL	HH + 00 HH + 30		BRISBANE	YBBBYPYX
								SINGAPORE	WSZZYPYM
								TOKYO	RJTDYPYX
								Collombo	VCCCYPYX
								Delhi	VIDPYPYX
								Hong Kong	VHZZYPYX
								Incheon	RKSIYPYX
								Jakarta	WIZZMCMC
		Kolkata	VECCYPYX						
		Kuala Lumpur	WMZZYPYR						
		Mumbai	VABYPYX						
			SAAE33	VLLB VLLN VLPS VLSK	LUANG PRABANG LUANG NAMTHA PAKSE SAVANNAKHET	HH + 00	2300-1400 2300-1400 2300-1400 2300-1400	BANGKOK	VTBBYPYX
								BRISBANE	YBBBYPYX
								SINGAPORE	WSZZYPYM
								TOKYO	RJTDYPYX
			SAAE34	VVCI VVCR VVCT VVDN VVNB VVPB VVPQ VVTS	CAT BI KHANH HOA/Cam Ranh CAN THO DA NANG HA NOI/Noi bai HUE/Phu Bai KIEN GIANG/Phu Quoc HO CHI MINH/Tan Son Nhat	HH + 00 HH + 30		BANGKOK	VTBBYPYX
								BRISBANE	YBBBYPYX
								SINGAPORE	WSZZYPYM
								TOKYO	RJTDYPYX
								Collombo	VCCCYPYX
Delhi	VIDPYPYX								
Hong Kong	VHZZYPYX								
Incheon	RKSIYPYX								
Jakarta	WIZZMCMC								
Kolkata	VECCYPYX								
Kuala Lumpur	WMZZYPYR								
Mumbai	VABYPYX								
	SATH31	VTCH VTCL VTCN VTCP VTPH VTPO VTPP VTPB VTPM VTBO	MAE HONG SON LAMPANG NAN PHRAE PRACHUAP KHIRI KHAN/Hua Hin SUKHOTHAI PHITSANULOK PHETCHABUN TAK/Mae Sot TRAT/Khao Sming	HH + 00	0000-1100	BANGKOK	VTBBYPYX		
					2300-1200	BRISBANE	YBBBYPYX		
					0000-1100	SINGAPORE	WSZZYPYM		
					0000-1100	TOKYO	RJTDYPYX		
					0000-1100				
					2300-1400				
					2300-1400				
					0000-1100				
					0000-1100				
					0000-1100				
					0000-1100				

Table A : Collection and Dissemination of METAR (SA) Bulletins

1		2			3	4	5	
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO	
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address
		SATH32	VTSB	SURAT TANI	HH + 00	2300-1400	BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX
			VTSC	NARATHIWAT		0000-1100		YBBBBYPYX
			VTSE	CHUMPHON/Tab Gai		2300-1400		WSZZYPYM
			VTSF	NAKHON SI THAMMARAT		0000-1100		RJTDYPYX
			VTSH	SONGKHLA				
			VTSK	PATTANI				
			VTSM	SURAT THANI/Samui		2300-1400		
			VTSR	RANONG		2300-1300		
			VTST	TRANG		0000-1100		
		SATH33	VTUD	UDON THANI	HH + 00	2300-1400	BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX
			VTUI	SAKON NAKHON/Ban Khai		2200-1500		YBBBBYPYX
			VTUK	KHON KAEN		2300-1400		WSZZYPYM
			VTUL	LOEI		2300-1200		RJTDYPYX
			VTUO	BURI RAM		2200-1300		
			VTUQ	NAKHON RATCHASIMA		2300-1400		
			VTUV	ROI ET		2200-1400		
			VTUW	NAKHON PHANOM		0000-1400		
			VTUJ	SURIN				
			VTUU	UBON RATCHATHANI				
Beijing	ZBBB	SACI31	ZBAA	BEIJING/Capital	HH + 00 HH + 30		BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX
			ZBSJ	SHIJIAZHUANG/Zhengding				YBBBBYPYX
			ZBTJ	TIANJIN/Binhai				WSZZYPYM
			ZBYN	TAIYUAN/Wusu				RJTDYPYX
			ZGGG	GUANGZHOU/Baiyun				VHZZYPYX
			ZSHC	HANGZHOU/Xiaoshan				WIZZMZBB
			ZSPD	SHANGHAI/Pudong				OPZZYPYX
			ZSSS	SHANGHAI/Hongqiao				VABBYPYX
			ZWSH	KASHI/Kashi				RKSIYPYX
			ZWWW	URUMQI/Diwopu				ZMUBMYX
			ZYTL	DALIAN/Zhoushuizi				
			ZYTX	SHENYANG/Taoxian				
		SACI32	ZGKL	GUILIN/Liangjiang	HH + 00		BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX
			ZGNN	NANNING/Wuxu				YBBBBYPYX
			ZGOW	SHANTOU/Waisha				WSZZYPYM
			ZGSZ	SHENZHEN/Baoan				RJTDYPYX
			ZLXY	XI'AN/Xianyang				VHZZYPYX
			ZMUB	ULAANBAATAR				WIZZMZBB
			ZPPP	KUNMING/Wujiaba				WMZZYPYX
			ZSAM	XIAMEN/Gaoqi				RKSIYPYX
			ZSFZ	FUZHOU/Changle				NZZZYPYX
			ZSNB	NINGBO/Lishe				
			ZSQD	QINGDAO/Liuting				
			ZUUU	CHENGDU/Shuangliu				
		SACI41	ZBHH	HOHHOT/Baita	HH + 00		BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX
			ZGHA	CHANGSHA/Huanghua				YBBBBYPYX
			ZHCC	ZHENGZHOU/Xinzheng				WSZZYPYM
			ZHHH	WUHAN/Tianhe				RJTDYPYX
			ZJHK	HAIKOU/Meilan				VHZZYPYX
			ZJSY	SANYA/Phoenix				WIZZMZBB
			ZLLL	LANZHOU/Zhongchuan				OPZZYPYX
			ZSNJ	NANJING/Lukou				VABBYPYX
			ZSOF	HEFEI/Luogang				RKSIYPYX
			ZUCK	CHONGQING/Jiangbei				ZMUBMYX

Table A : Collection and Dissemination of METAR (SA) Bulletins

1		2			3	4	5	
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO	
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address
			ZYCC ZYHB	CHANGCHUN/Longjia HARBIN/Taiping			Wellington	NZZZYPYX
Brisbane	YBBN	SAAU31	YPAD	ADELAIDE/Adelaide Intl	HH + 00		BANGKOK	VTBBYPYX
			YBBN	BRISBANE/Brisbane Intl	HH + 30		BRISBANE	YBBBYPYX
			~~YBCS~~	CAIRNS/Cairns Intl			NADI	NFZZRFXX
			~~YSCB~~	CANBERRA			SINGAPORE	WSZZYPYX
			YPDN	DARWIN/Darwin Intl			TOKYO	RJTDYPYX
			~~YBCG~~	GOLD COAST			Beijing	ZBBBYPYX
			~~YMHB~~	HOBART			Hong Kong	VHZZYPYX
			YMML	MELBOURNE/Melbourne Intl			Incheon	RKSIYPYS
			YPPH	PERTH/Perth Intl			Jakarta	WIZZYPYX
			YSSY	SYDNEY/Sydney (Kingsford Smith) Intl			Manila	RPLLYPYX
							Mumbai	VABBYPYX
							Wellington	NZZZYPYX
		SAAU32	YBAS	ALICE SPRINGS	HH + 00		BANGKOK	VTBBYPYX
			YMAV	AVALON	HH + 30		BRISBANE	YBBBYPYX
			~~YBWW~~	Brisbane West Wellcamp			NADI	NFZZRFXX
			YBRM	BROOME/Broome Intl			SINGAPORE	WSZZYPYX
			~~YBLN~~	Busselton			TOKYO	RJTDYPYX
			~~YBCS~~	CAIRNS/Cairns Intl			Beijing	ZBBBYPYX
			~~YSCB~~	CANBERRA			Hong Kong	VHZZYPYX
			YPXM	CHRISTMAS ISLAND			Incheon	RKSIYPYS
			YPCC	COCOS (KEELING) ISLAND Intl			Jakarta	WIZZYPYX
			YCFS	COFFS HARBOUR			Manila	RPLLYPYX
			~~YBCG~~	GOLD COAST			Mumbai	VABBYPYX
			~~YMHB~~	HOBART			Wellington	NZZZYPYX
			YPKG	KALGOORLIE-BOULDER				
			YMLT	LAUNCESTON				
			YPLM	LEARMONTH				
			YLHI	LORD HOWE ISLAND				
			YSNF	NORFOLK ISLAND Intl				
			YPPD	PORT HEDLAND				
			YBRK	ROCKHAMPTON				
			~~YPTN~~	TINDAL				
			~~YBTL~~	TOWNSVILLE/Townsville Intl				
			~~YWLM~~	WILLIAMTOWN				
		SAAU33	~~YAMB~~	AMBERLEY	HH+00		BANGKOK	VTBBYPYX
			YGEL	GERALDTON	HH+30		BRISBANE	YBBBYPYX
			YGLA	GLADSTONE			NADI	NFZZRFXX
			YHID	HORN ISLAND			SINGAPORE	WSZZYPYX
			~~YPEA~~	PEARCE			TOKYO	RJTDYPYX
			YPJT	PERTH/Jandakot			Beijing	ZBBBYPYX
			YPWR	WOOMERA			Hong Kong	VHZZYPYX
			YSDU	DUBBO			Incheon	RKSIYPYS
			YSRI	RICHMOND, NSW			Jakarta	WIZZYPYX
			YSTW	TAMWORTH			Manila	RPLLYPYX
							Mumbai	VABBYPYX
							Wellington	NZZZYPYX
		SAAU34	YBHM	HAMILTON ISLAND	HH+00		BANGKOK	VTBBYPYX
			YBMA	MOUNT ISA	HH+30		BRISBANE	YBBBYPYX

Table A : Collection and Dissemination of METAR (SA) Bulletins

1		2			3	4	5	
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO	
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address
							NADI SINGAPORE TOKYO	NFZZRFX WSZZYPYX RJTDYPYX
							Hong Kong Incheon Jakarta Wellington	VHZZYPYX RKSIYPYS WIZZYPYX NZZZYPYX
							BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFZZRFX WSZZYPYX RJTDYPYX
							Hong Kong Incheon Jakarta Wellington	VHZZYPYX RKSIYPYS WIZZYPYX NZZZYPYX
		SAAU35	Y CIN YFRT Y PKU Y PGV	CURTIN FORREST KUNUNURRA GOVE	HH+00 HH+30		BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFZZRFX WSZZYPYX RJTDYPYX
							Hong Kong Incheon Jakarta Wellington	VHZZYPYX RKSIYPYS WIZZYPYX NZZZYPYX
							BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFZZRFX WSZZYPYX RJTDYPYX
							Beijing Hong Kong Incheon Jakarta Manila Mumbai Wellington	ZBBBYPYX VHZZYPYX RKSIYPYS WIZZYPYX RPLLYPYX VABBYPYX NZZZYPYX
		SAAU36	Y AMB Y PEA Y PTN Y BTL Y WLM	AMBERLEY PEARCE TINDAL TOWNSVILLE/Townsville Intl WILLIAMTOWN	HH + 00 HH + 30		BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFZZRFX WSZZYPYX RJTDYPYX
							Beijing Hong Kong Incheon Jakarta Manila Mumbai Wellington	ZBBBYPYX VHZZYPYX RKSIYPYS WIZZYPYX RPLLYPYX VABBYPYX NZZZYPYX
							BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFFNYPYX WSZZPYM RJTDYPYX
							Beijing Hong Kong Jakarta Wellington	ZBBBYPYX VHZZYPYX WIZZMIMI NZZZYPYX
		SANG31	A YPY A YWK A YVN A YNZ A YMH A YGN A YMO A NYN A GGH	PORT MORESBY Intl WEWAK VANIMO NADZAB MOUNT HAGEN GURNEY MOMOTE NAURU I. HONIARA (HENDERSON)	HH+00	NR NR NR NR NR NR	BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFFNYPYX WSZZPYM RJTDYPYX
							Beijing Hong Kong Jakarta Wellington	ZBBBYPYX VHZZYPYX WIZZMIMI NZZZYPYX
							BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFFNYPYX WSZZPYM RJTDYPYX
							Beijing Hong Kong Jakarta Wellington	ZBBBYPYX VHZZYPYX WIZZMIMI NZZZYPYX
Colombo	VCCC	SASB31	VCBI VCRI VCCH	BANDARANAIKE INTL AP COLOMBO MATTALA RAJAPAKSA INTERNATIONAL AIRPORT HINGURAKGODA/MINNERIYA	HH + 10		BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX YBBBYPYX WSZZPYM RJTDYPYX
							Hong Kong Kuala Lumpur Mumbai	VHZZYPYX WMZZYPYR VABBYPYX
Delhi	VIDP	SAIN32	VIDP VILK VIAR VEBN VIJP	DELHI/Indira Gandhi Intl LUCKNOW AMRITSAR VARANASI JAIPUR	HH + 00 HH + 30		BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX YBBBYPYX WSZZPYM RJTDYPYX
							Kolkata Hong Kong	VECCYPYX VHZZYPYX

Table A : Collection and Dissemination of METAR (SA) Bulletins

1		2			3	4	5	
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO	
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address
							Karachi Mumbai	OPZZYPYX VABBYPYX
Hong Kong	VHHH	SAHK31	VHHH	HONG KONG/International	HH + 00	2200-1200	BANGKOK	VTBBYPYX
			RCTP	TAIBEI CITY/Taibei Intl Ap	HH + 30		BRISBANE	YBBBYPYX
			RCKH	GAOXIONG			SINGAPORE	WSZZYPYM
			RCSS	TABEI/Songshan			TOKYO	RJTDYPYX
			RCMQ	TAICHUNG/Qingquangang			Beijing	ZBBBYPYX
			RCNN	TAINAN			Kuala Lumpur	WMZZYPYR
			RCFN	TAIDONG/Fengnian			Incheon	RKSIYPYX
			VMMC	MACAO/Intl Airport			Wellington	NZZZYPYX
			RPLL	MANILA/Ninoy Aquino Intl				
			RPVM	LAPU-LAPU/Mactan-Cebu				
			RPMD	DAVAO/Francisco Bangoy Intl				
			RPLB	SUBIC BAY, Subic Bay Intl				
			RPLI	LAOAG, Laoag Intl				
			RPMZ	ZAMBOANGA, Zamboanga Intl				
Incheon	RKSI	SAKO31	RKSI	INCHEON	HH + 00		BANGKOK	VTBBYPYX
			RKSS	GIMPO	HH + 30		BRISBANE	YBBBYPYX
			RKPC	JEJU			SINGAPORE	WSZZYPYM
			RKPK	GIMHAE			TOKYO	RJTDYPYX
			RKTU	CHEONGJU			Beijing	ZBBBYPYX
			RKNY	YANGYANG			Hong Kong	VHZZYPYX
			RKTN	DAEGU			Singapore	WSZZYPYM
			RKJB	MUAN			Tokyo	RJTDYPYX
							Wellington	NZZZYPYX
							Mumbai	VABBYPYX
Jakarta	WIII	SAID31	WAAA	UJUNG PANDANG/Hasanuddin	HH + 00	2200-1700	BANGKOK	VTBBYPYX
			WABB	BIAK/Frans Kaisiepo	HH + 30		BRISBANE	YBBBYPYX
			WIIH	JAKARTA/Halimperdana Kusuma			SINGAPORE	WSZZYPYM
			WIII	JAKARTA/Soekarno Hatta (COMM CENTER)			TOKYO	RJTDYPYX
			WIDD	BATAM/Hang Nadim			Hong Kong	VHZZYPYX
			WIMM	MEDAN/Polonia			Kuala Lumpur	WMZZYPYR
			WADD	BALI/Ngurah Rai			Wellington	NZZZYPYX
			WARR	SURABAYA/Juanda				
		SAID32	WAMM	MANADO/Sam Ratulangi	HH + 00	2200-0500	BANGKOK	VTBBYPYX
			WIBB	PEKANBARU/Sultan Syarif Kasim II	HH + 30		BRISBANE	YBBBYPYX
			WIDN	TANJUNG PINANG/Kijang			SINGAPORE	WSZZYPYM
			WIEE	PANDANG/MINANGKABAU			TOKYO	RJTDYPYX
			WIOO	PONTIANAK/Supadio			Hong Kong	VHZZYPYX
			WIPP	PALEMBANG/Sultan Mahmud Badaruddin II			Kuala Lumpur	WMZZYPYR
			WAOO	BANJARMASIN/Syamsuddin Noor			Wellington	NZZZYPYX
			WALL	BALIK PAPAN/Sepinggan				
			WADL	PRAYA/LOMBOK INTERNATIONAL				
		SAID33	WAYY	TIMIKA/Moses Kilangin	HH + 00	2100-0800	BANGKOK	VTBBYPYX
			WAJJ	JAYAPURA/Sentani	HH + 30		BRISBANE	YBBBYPYX
			WAKK	MERAUKE/Mopah			SINGAPORE	WSZZYPYM
			WAPP	AMBON/Pattimura			TOKYO	RJTDYPYX
			WAHS	SEMARANG/A. Yani			Hong Kong	VHZZYPYX
			WILL	BANDAR LAMPUNG/Radin Inten			Kuala Lumpur	WMZZYPYR
			WATT	KUPANG/Ei Tari			Wellington	NZZZYPYX

Table A : Collection and Dissemination of METAR (SA) Bulletins

1		2			3	4	5	
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO	
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address
			WAQQ	TARAKAN/Juwata		2000-1300		
Kolkata	VECC	SAIN33	VECC	NETAJI SUBHASH CHANDRA BOSE INTERNATIONAL AIRPORT, KOLKATA	HH + 00		BANGKOK	VTBBYPYX
			VEPT	PATNA	HH + 30		BRISBANE	YBBBYPYX
			VEGY	GAYA			SINGAPORE	WSZZYPYM
			VEGT	GUWAHATI			TOKYO	RJTDYPYX
		SABW31	VGEG	M.A. HANNAN INTL. CHITTAGONG			Colombo	VCCCYPYX
			VGHS	HAZRAT SHAHJALAL INTERNATIONAL AIRPORT			Delhi	VIDPYPYX
			VGSY	OSMANI INTERNATIONAL AIRPORT, SYLHET			Hong Kong	VHZZYPYX
		SAAS31	VNKT	KATHMANDU			Karachi	OPZZYPYX
			VQPR	PARO/Intl.			Mumbai	VABBYPYX
Karachi	OPKC	SAPK31	OPKC	KARACHI/Jinnah Int'l	HH + 00		BANGKOK	VTBBYPYX
			OPRN	ISLAMABAD/Chaklala	HH + 30		BRISBANE	YBBBYPYX
			OPLA	LAHORE/Allama Iqbal Int'l			SINGAPORE	WSZZYPYM
			OPNH	NAWABSHAH			TOKYO	RJTDYPYX
			OPGD	GWADAR			Abu Dhabi	OMZZYPYX
			OPPS	PESHAWAR			Bahrain	OBZZYPYX
			OPSK	SUKKUR			Beijing	ZBBBYPYX
							Kolkata	VECCYPYX
							Delhi	VIDDYPYX
							Hong Kong	VHZZYPYX
							Mumbai	VABBYPYX
							Tehran	OIZZYPYX
Kuala Lumpur	WMKK	SAMS31	WBGG	KUCHING/Intl	HH + 00		BANGKOK	VTBBYPYX
			WBKK	KOTA KINABALU/Intl	HH + 30		BRISBANE	YBBBYPYX
			WBSB	BRUNEI/Intl			SINGAPORE	WSZZYPYM
			WMKK	SEPANG/KL International Airport			TOKYO	RJTDYPYX
			WMKP	PENANG/Intl			Colombo	VCCCYPYX
			WSSS	SINGAPORE/Changi			Hong Kong	VHZZYPYX
			WSSL	SELETAR			Jakarta	WIZZMBMB
							Manila	RPLLYPYX
							Mumbai	VABBYPYX
							Incheon	RKSIYPYX
							Wellington	NZZZYPYX
		SAMS38	WBGB	BINTULU	HH + 00		BANGKOK	VTBBYPYX
			WBGR	MIRI			BRISBANE	YBBBYPYX
			WBGS	SIBU			SINGAPORE	WSZZYPYM
			WBKL	LABUAN			TOKYO	RJTDYPYX
			WBKS	SANDAKAN			Colombo	VCCCYPYX
			WBKW	TAWAU			Hong Kong	VHZZYPYX
			WMKD	KUANTAN			Jakarta	WIZZMBMB
			WMKL	PULAU LANGKAWI/Intl			Manila	RPLLYPYX
			WMKM	MALACCA			Mumbai	VABBYPYX
							Incheon	RKSIYPYX
							Wellington	NZZZYPYX
Mumbai	VABB	SAIN31	VAAH	AHMEDABAD	HH + 00		BANGKOK	VTBBYPYX
			VABB	MUMBAI/Chhatrapati Shivaji Intl.	HH + 30		BRISBANE	YBBBYPYX
			VANP	NAGPUR			SINGAPORE	WSZZYPYM
			VOMM	CHENNAI			TOKYO	RJTDYPYX
			VOTR	TIRUCHCHIRAPPALLI			Abu Dhabi	OMZZYPYX

Table A : Collection and Dissemination of METAR (SA) Bulletins

1		2			3	4	5	
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO	
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address
			VOTV VOHS VOBL VOCL VOCI VOCB VOML	TRIVANDRUM HYDERABAD BANGALORE INTL APT CALICUT COCHIN INTERNATIONAL COIMBATORE MANGALORE			Bahrain Colombo Delhi Hong Kong Karachi Kolkata Tehran	OBZZYPYX VCCCYPYX VIDPPYX VHZZYPYX OPZZYPYX VECCYPYX OIZZYPYX
Nadi	NFFN	SAPS31	NCRG	RAROTONGA Intl.	HH+00		BANGKOK	VTBBYPYX
			NFFN	NADI/Intl			BRISBANE	YBBBYPYX
			NFNA	NAUSORI/Intl			NADI	NFFNYPYX
			NFTF	FUA'AMOTU INTL.			SINGAPORE	WSZZPYM
			NFTV	VAVA'U			TOKYO	RJTDYPYX
			NGFU	FUNAFUTI/Intl			Wellington	NZZZYPYX
			NGTA	TARAWA/Bonriki Intl				
			NIUE	NIUE Intl				
			NLWW	WALLIS HIHIFO				
			NSFA	FALEOLO/Intl				
Tokyo	RJTD	SAJP31	NSTU	PAGO PAGO Intl, Tutuila I.	HH + 00		BANGKOK	VTBBYPYX
			NTAA	TAHITI FAAA			BRISBANE	YBBBYPYX
			NVSS	SANTO/Pekoa			NADI	NFFNYPYX
			NVVV	PORT VILA/Bauerfield			SINGAPORE	WSZZPYM
			NWWW	NOUMEA LA TANTOUTA			TOKYO	RJTDYPYX
			PLCH	CHRISTMAS ISLAND			Wellington	NZZZYPYX
Tokyo	RJTD	SAJP32	RJAA	NARITA Intl	HH + 00		BANGKOK	VTBBYPYX
			RJBB	KANSAI Intl			BRISBANE	YBBBYPYX
			RJCH	HAKODATE			NADI	NFFNYPYX
			RJGG	CHUBU CENTRAIR Intl			SINGAPORE	WSZZPYM
			RJOO	OSAKA Intl			TOKYO	RJTDYPYX
			RJSS	SENDAI			Beijing	ZBBBYPYX
			RJTT	TOKYO Intl			Guam	PGUMCOAX
			ROAH	NAHA			Hong Kong	VHZZYPYX
							Incheon	RKSIYPYX
							London	EGZZMASI
Tokyo	RJTD	SAJP32			HH + 00		Wellington	NZZZYPYX
			RJCC	SAPPORO/New Chitose			BANGKOK	VTBBYPYX
			RJFF	FUKUOKA			BRISBANE	YBBBYPYX
			RJFK	KAGOSHIMA			NADI	NFFNYPYX
			RJFU	NAGASAKI			SINGAPORE	WSZZPYM
			RJOA	HIROSHIMA			TOKYO	RJTDYPYX
			RJFT	KUMAMOTO			Beijing	ZBBBYPYX
			RJSN	NIIGATA			Guam	PGUMCOAX
			RJFO	OITA			Hong Kong	VHZZYPYX
			RJOB	OKAYAMA			Incheon	RKSIYPYX
Tokyo	RJTD	SAJP32	RJOT	TAKAMATSU	HH + 00		London	EGZZMASI
			RJNK	KANAZAWA/Komatsu			Wellington	NZZZYPYX
			RJNT	TOYAMA				
Tokyo	RJTD	SAJP38	RJCK	KUSHIRO	HH + 00		BANGKOK	VTBBYPYX
			RJCM	MEMANBETSU			BRISBANE	YBBBYPYX

Table A : Collection and Dissemination of METAR (SA) Bulletins

1								
2		3			4		5	
ROC		METAR Bulletin			Bul. Time	Available	DISSEMINATION TO	
Name	CCCC	BUL No.	CCCC	Aerodrome			RODB/ROC	AFTN Address
			RJCB	OBIHIRO			NADI	NFFNYPYX
			RJOC	IZUMO			SINGAPORE	WSZZYPYM
			RJOH	MIHO			TOKYO	RJTDYPYX
			RJOK	KOCHI			Beijing	ZBBBYPYX
			RJFM	MIYAZAKI			Brasilia	SBBRYZYX
			ROIG	ISHIGAKI JIMA			Hong Kong	VHZZYPYX
			RJNS	SHIZUOKA			Incheon	RKSIYPYX
			RJSA	AOMORI			London	EGZZMASI
			RJSF	FUKUSHIMA			Rayong	VTBUYMYX
			RJOM	MATSUYAMA				
			RJEC	ASAHIKAWA				
			RJSK	AKITA				
			RJAH	HYAKURI				
			RJFR	NEW KITAKYUSHU				
			RJFS	SAGA				
Wellington	NZKL	SANZ31	NZWN	WELLINGTON Intl	HH + 00		BANGKOK	VTBBYPYX
			NZAA	AUCKLAND Intl	HH + 30		BRISBANE	YBBBYPYX
			NZCH	CHRISTCHURCH Intl			SINGAPORE	WSZZYPYM
		SANZ32	NZQN	QUEENSTOWN	HH + 00		TOKYO	RJTDYPYX
					HH + 30		NADI	NFFNYPYX
							Beijing	ZBBBYPYX
							Hong Kong	VHZZYPYX
							Incheon	RKSIYPYX
							Jakarta	WIZZYPYX

APPENDIX B - Collection and Dissemination of TAF (FT) Bulletins

Table B : FT TAF

Explanation of the Table

Col. 1:	Name and ICAO location indicator of the ROC compiling the bulletin
Col. 2:	Description of the TAF Bulletin
Col. 3:	Dissemination of the bulletin to other ROCs and RODBs

<u>Notes:</u>	1	<i>The RODB responsible for storing the bulletin is in bold.</i>
	2	<i>The TAF filing time should be not earlier than 1 hour before the start of the period of validity.</i>
	3	<i>TAF that do not meet 24- and 30-hour IATA requirements are indicated in the TAF validity column with the required validity shown in parenthesis.</i>
	4	<i>TAF included in VOLMET broadcasts are listed in APAC, ANP, VOL II, Table MET II-3, VOLMET Broadcasts.</i>
	5	<i>Aerodromes not listed in Table AOP 1 are indicated in italics.</i>

Table B : Collection and Dissemination of TAF (FT) Bulletins									
1 ROC		2 TAF Bulletin						3 Dissemination	
Name	CCCC		CCCC	Aerodrome	Filing time	Start of validity	TAF validity	RODB/ROC	AFTN address
ASIA/PAC REGION									
Bangkok	VTBB	FTAE31	VTBD	BANGKOK/Don Mueang Intl Airport	0535	0600	30	BANGKOK	VTBBYPYX
			VTBS	BANGKOK/Suvarnabhumi Intl Airport	1135	1200	30	BRISBANE	YBBBYPYX
			VTBU	RAYONG/U-Tapao Intl	1735	1800	24	SINGAPORE	WSZZYPYX
			VTCC	CHIANG MAI/Chiang Mai Intl. Airport	2335	0000	30	TOKYO	RJTDYPYX
			VTCT	CHIANG RAI/Chiang Rai Intl Apt			24	Abu Dhabi	OMZZYPYX
			VTSG	KRABI			30	Bahrain	OBZZYPYX
			VTSP	PHUKET/Phuket Intl			30	Beijing	ZBBBYPYX
			VTSS	SONGKHLA/Hat Yai Intl			24	Beirut	OLLLYPYX
		FTAE32						Hong Kong	VHZZYPYX
								Jeddah	OEJDYPYX
								Karachi	OPZZYPYX
								Kuala Lumpur	WMZZYPYR
								Mumbai	VABBYPYX
								Incheon	RKSIYPYX
								Tehran	OIIYPYX
								Wellington	NZZZYPYA
			VDPP	PHNOM PENH	0535	0600	18 (24)	BANGKOK	VTBBYPYX
			VDSR	SIEM REAP	1135	1200	18 (24)	BRISBANE	YBBBYPYX
			VGHS	HAZRAT SHAHJALAL INTL APT	1735	1800	30	SINGAPORE	WSZZYPYX
			VLVT	VIENTIANE (Wattay)	2335	0000	24	TOKYO	RJTDYPYX
			VYMD	MANDALAY INTERNATIONAL *			24	Bahrain	OBZZYPYX
			VYNT	NAYPYITAW INTERNATIONAL			24	Beijing	ZBBBYPYX
			VYYY	YANGON INTERNATIONAL			24	Beirut	OLLLYPYX
							-	Hong Kong	VHZZYPYX
								Jeddah	OEJDYPYX
								Karachi	OPZZYPYX
								Kuala Lumpur	WMZZYPYR
								Mumbai	VABBYPYX
								Incheon	RKSIYPYX
								Tehran	OIIYPYX
								Wellington	NZZZYPYA
		FTAE33	VLLB	LUANG PRABANG	0535	0600	18	BANGKOK	VTBBYPYX
			VLLN	LUANG NAMTHA	1135	1200	18	BRISBANE	YBBBYPYX
			VLPS	PAKSE	2335	0000	18	SINGAPORE	WSZZYPYX
			VLSK	SAVANNAKHET			18	TOKYO	RJTDYPYX
		FTAE34						Bahrain	OBZZYPYX
								Beijing	ZBBBYPYX
								Beirut	OLLLYPYX
								Hong Kong	VHZZYPYX
								Jeddah	OEJDYPYX
								Karachi	OPZZYPYX
								Kuala Lumpur	WMZZYPYR
								Mumbai	VABBYPYX
								Incheon	RKSIYPYX
								Tehran	OIIYPYX
								Wellington	NZZZYPYA
			VVCI	CAT BI	0535	0600	24	BANGKOK	VTBBYPYX
			VVCR	KHANH HOA/Cam Ranh Int'l	1135	1200	30	BRISBANE	YBBBYPYX
			VVCT	CAN THO/Can Tho Int'l	1735	1800	24	SINGAPORE	WSZZYPYX
			VVDN	DA NANG	2335	0000	24	TOKYO	RJTDYPYX
			VVNB	HA NOI/Noi Bai			24	Abu Dhabi	OMZZYPYX
			VVPB	HUE/Phu Bai			24	Bahrain	OBZZYPYX
			VVPQ	KIEN GIANG/Phu Quoc Int'l			24	Beijing	ZBBBYPYX
			VVTS	HO CHI MINH/Tan Son Nhat			24	Beirut	OLLLYPYX
								Hong Kong	VHZZYPYX
								Jeddah	OEJDYPYX
								Karachi	OPZZYPYX
								Kuala Lumpur	WMZZYPYR
								Mumbai	VABBYPYX
								Incheon	RKSIYPYX
								Tehran	OIIYPYX
								Wellington	NZZZYPYA
		FTTH31	VTBO	TRAT/Khao Sming	0535	0600	24	BANGKOK	VTBBYPYX
			VTCH	MAE HONG SON	1135	1200	24	BRISBANE	YBBBYPYX
			VTCL	LAMPANG	1735	1800	24	SINGAPORE	WSZZYPYX

Table B : Collection and Dissemination of TAF (FT) Bulletins									
1 ROC		2 TAF Bulletin						3 Dissemination	
Name	CCCC		CCCC	Aerodrome	Filing time	Start of validity	TAF validity	RODB/ROC	AFTN address
			VTCTN	NAN	2335	0000	24	TOKYO	RJTDYPYX
			VTCP	PHRAE			24		
			VTPB	PHETCHABUN			24		
			VTPH	PRACHUAP KHIRI KHAN/Hua Hin			24		
			VTPM	TAK/MAE SOT			24		
			VTPO	SUKHOTHAI			24		
			VTTP	PHITSANULOK			24		
			VTPT	TAK			24		
		FTTH32	VTSB	SURAT THANI	0535	0600	24	BANGKOK	VTBBYPYX
			VTSC	NARATHIWAT	1135	1200	24	BRISBANE	YBBBYPYX
			VTSE	CHUMPHON/Tab Gai	1735	1800	24	SINGAPORE	WSZZYPYX
			VTSF	NAKHON SI THAMMARAT	2335	0000	24	TOKYO	RJTDYPYX
			~~VTSH~~	~~SONGKHLA~~			~~24~~		
			~~VTSK~~	~~PATTANI~~			~~24~~		
			VTSM	SURAT THANI/Samui			24		
			VTSR	RANONG			24		
			VTST	TRANG			24		
		FTTH33	VTUD	UDON THANI	0535	0600	24	BANGKOK	VTBBYPYX
			VTUI	SAKON NAKHON/Ban Khai	1135	1200	24	BRISBANE	YBBBYPYX
			~~VTUJ~~	~~SURIN~~	1735	1800	24	SINGAPORE	WSZZYPYX
			VTUK	KHON KAEN	2335	0000	24	TOKYO	RJTDYPYX
			VTUL	LOEI			24		
			VTUO	BURI RAM			24		
			VTUQ	NAKHON RATCHASIMA			24		
			VTUU	UBON RATCHATHANI			24		
			VTUV	ROI ET			24		
			VTUW	NAKHON PHANOM			24		
Beijing	ZBBB	FTCI31	ZBAA	BEIJING/Capital	0535	0600	30	BANGKOK	VTBBYPYX
			ZBSJ	SHIJIAZHUANG/Zhengding	1135	1200	24	BRISBANE	YBBBYPYX
			ZBTJ	TIANJIN/Binhai	1735	1800	24 (30)	SINGAPORE	WSZZYPYX
			ZBYN	TAIYUAN/Wusu	2335	0000	24	TOKYO	RJTDYPYX
			ZGGG	GUANGZHOU/Baiyun			30	Hong Kong	VHZZYPYX
			ZSHC	HANGZHOU/Xiaoshan			24	Karachi	OPZZYPYX
			ZSPD	SHANGHAI/Pu Dong			30	Mumbai	VABBYPYX
			ZSSS	SHANGHAI/Hongqiao			24	Incheon	RKSIYPYX
			ZWSH	KASHI/Kashi			24 (30)	Ulan Bator	ZMUBMYX
			ZWWW	URUMQI/Diwopu			24 (30)	Wellington	NZZZYPYA
			ZYTL	DALIAN/Zhoushuizi			24		
			ZYTX	SHENYANG/Taoxian			24		
		FTCI32	ZGKL	GUILIN/Lianjiang	0535	0600	24	BANGKOK	VTBBYPYX
			ZGNN	NANNING/Wuxu	1135	1200	24	BRISBANE	YBBBYPYX
			ZGOW	SHANTOU/Waisha	1735	1800	24	SINGAPORE	WSZZYPYX
			ZGSZ	SHENZHEN/Baoan	2335	0000	24 (30)	TOKYO	RJTDYPYX
			ZLXY	XI'AN/Xianyang			24	Hong Kong	VHZZYPYX
			ZMUB	ULAANBAATAR			30	Jakarta	WIZZYPYX
			ZPPP	KUNMING/Wujiaba			24 (30)	Karachi	OPZZYPYX
			ZSAM	XIAMEN/Gaoqi			24	Kuala Lumpur	WMZZYPYR
			ZSFZ	FUZHOU/Changle			24	Mumbai	VABBYPYX
			ZSNB	NINGBO/Lishe			24	Wellington	NZZZYPYA
			ZSQD	QINGDAO/Liuting			24		
			ZUUU	CHENGDU/Shuangliu			24		
		FTCI41	ZBHH	HUHHOT/Baita	0535	0600	24	BANGKOK	VTBBYPYX
			ZGHA	CHANGSHA/Huanghua	1135	1200	24	BRISBANE	YBBBYPYX
			ZHCC	ZHENGZHOU/Xinzheng	1735	1800	24	SINGAPORE	WSZZYPYX
			ZHHH	WUHAN/Tianhe	2335	0000	24	TOKYO	RJTDYPYX
			ZJHK	HAIKOU/Meilan			24 (30)	Hong Kong	VHZZYPYX
			ZJSY	SANYA/Phoenix			24	Jakarta	WIZZYPYX
			ZLLL	LANZHOU/Zhongchuan			24	Karachi	OPZZYPYX
			ZSNJ	NANJING/Lukou			24	Mumbai	VABBYPYX
			ZSOF	HEFEI/Luogang			24	Incheon	RKSIYPYX
			ZUCK	CHONGQING/Jiangbei			24	Ulan Bator	ZMUBMYX
			ZYCC	CHANGCHUN/Longjia			24	Wellington	NZZZYPYX
			ZYHB	HARBIN/Taiping			24		
Brisbane	YBBN	FTAU31	YPAD	ADELAIDE/Adelaide Intl	0235	0300	30	BANGKOK	VTBBYPYX
			YBBN	BRISBANE/Brisbane Intl	0535	0600	30	BRISBANE	YBBBYPYX
			YBCS	CAIRNS/Cairns Intl	0835	0900	24	NADI	NFZZRFX
			YSCB	CANBERRA	1135	1200	24	SINGAPORE	WSZZYPYX
			YPDN	DARWIN/Darwin Intl	1435	1500	30	TOKYO	RJTDYPYX
			YBCG	GOLD COAST	1735	1800	24	Beijing	ZBBBYPYX

Table B : Collection and Dissemination of TAF (FT) Bulletins									
1 ROC		2 TAF Bulletin						3 Dissemination	
Name	CCCC		CCCC	Aerodrome	Filing time	Start of validity	TAF validity	RODB/ROC	AFTN address
			YMHB	HOBART	2035	2100	24	Hong Kong	VHZZYPYX
			YMMML	MELBOURNE/Melbourne Intl	2335	0000	30	Jakarta	WIZZYPYX
			YPPH	PERTH/Perth Intl			30	Manila	RPLLYPYX
			YSSY	SYDNEY/Sydney (Kingsford Smith) Intl			30	Mumbai	VABBYPYX
								Wellington	NZZZYPYX
		FTAU32	YBAS	ALICE SPRINGS	0535	0600	24	BANGKOK	VTBBYPYX
			YMAV	AVALON	1135	1200	24	BRISBANE	YBBBYPYX
			YBWW	Brisbane West Wellcamp	1735	1800	24	NADI	NFZZRFXX
			YBRM	BROOME/Broome Intl	2335	0000	24	SINGAPORE	WSZZYPYX
			YBLN	Busselton			24	TOKYO	RJTDYPYX
			YBCS	CAIRNS/Cairns Intl			24	Beijing	ZBBBYPYX
			YSCB	CANBERRA			24	Hong Kong	VHZZYPYX
			YPXM	CHRISTMAS ISLAND			24	Jakarta	WIZZYPYX
			YPCC	COCOS (KEELING) ISLAND Intl			24	Manila	RPLLYPYX
			YCFS	COFFS HARBOUR			24	Mumbai	VABBYPYX
			YBCG	GOLD COAST			24	Wellington	NZZZYPYX
			YMHB	HOBART			24		
			YPKG	KALGOORLIE-BOULDER			24		
			YMLT	LAUNCESTON			24		
			YPLM	LEARMONTH			24		
			YLHI	LORD HOWE ISLAND			24		
			YSNF	NORFOLK ISLAND Intl			24		
			YPPD	PORT HEDLAND			24		
			YBRK	ROCKHAMPTON			24		
			YPTN	TINDAL			24		
			YBTL	TOWNSVILLE/Townsville Intl			24		
			YWLM	WILLIAMTOWN			24		
		FTAU33	YAMB	AMBERLEY	0535	0600	18	BANGKOK	VTBBYPYX
			YSDU	DUBBO	1135	1200	18	BRISBANE	YBBBYPYX
			YGEL	GERALDTON	1735	1800	18	NADI	NFZZRFXX
			YGLA	GLADSTONE	2335	0000	18	SINGAPORE	WSZZYPYX
			YHID	HORN ISLAND			18	TOKYO	RJTDYPYX
			YPEA	PEARCE			18	Beijing	ZBBBYPYX
			YPJT	PERTH/Jandakot			18	Hong Kong	VHZZYPYX
			YSRI	RICHMOND, NSW			18	Jakarta	WIZZYPYX
			YSTW	TAMWORTH			18	Manila	RPLLYPYX
			YPWR	WOOMERA			18	Mumbai	VABBYPYX
								Wellington	NZZZYPYX
		FTAU34	YBHM	HAMILTON ISLAND	0500	0600	12	BANGKOK	VTBBYPYX
			YBMA	MOUNT ISA	1100	1200	12	BRISBANE	YBBBYPYX
					1700	1800		NADI	NFZZRFXX
					2300	0000		SINGAPORE	WSZZYPYX
								TOKYO	RJTDYPYX
								Beijing	ZBBBYPYX
								Hong Kong	VHZZYPYX
								Jakarta	WIZZYPYX
		FTAU35	YGIN	CURTIN	0100	0200	12	BANGKOK	VTBBYPYX
			YFRT	FORREST	0700	0800	12	BRISBANE	YBBBYPYX
			YPGV	GOVE	1300	1400	12	NADI	NFZZRFXX
			YPKU	KUNUNURRA	1900	2000	12	SINGAPORE	WSZZYPYX
								TOKYO	RJTDYPYX
								Beijing	ZBBBYPYX
								Hong Kong	VHZZYPYX
								Jakarta	WIZZYPYX
		FTAU36	YAMB	AMBERLEY	0235 (M-F)	0300 (M-F)	24	BANGKOK	VTBBYPYX
			YPEA	PEARCE	0535	0600	18	BRISBANE	YBBBYPYX
			YPTN	TINDAL	1135	1200	24	NADI	NFZZRFXX
			YBTL	TOWNSVILLE/Townsville Intl	1735	1800	24	SINGAPORE	WSZZYPYX
			YWLM	WILLIAMTOWN	2035 (M-F)	2100 (M-F)	24	TOKYO	RJTDYPYX
					2335	0000		Beijing	ZBBBYPYX

Table B : Collection and Dissemination of TAF (FT) Bulletins									
1 ROC		2 TAF Bulletin						3 Dissemination	
Name	CCCC		CCCC	Aerodrome	Filing time	Start of validity	TAF validity	RODB/ROC	AFTN address
								Hong Kong Jakarta Manila Mumbai Wellington	VHZZYPYX WZZYPYX RPLLYPYX VABBYPYX NZZZYPYX
		FTTM31	WPDL WPDB	DILI/Presidente Nicolau Lobato Intl SUAI *	0535 1135 1735 2335	0600 1200 1800 0000	12	BANGKOK BRISBANE NADI SINGAPORE TOKYO	VTBBYPYX YBBBYPYX NFZZRFX WSZZYPYX RJTDYPYX
								Beijing Hong Kong Jakarta Manila Mumbai Wellington	ZBBBYPYX VHZZYPYX WZZYPYX RPLLYPYX VABBYPYX NZZZYPYX
		FTNG31	AYPY AYWK AYVN AYNZ AYMH AYMO ANYN AGGH	PORT MORESBY Intl WEWAK VANIMO NADZAB MOUNT HAGEN MOMOTE NAURU I. HONIARA (HENDERSON)	0535 1135 1735 2335	0600 1200 1800 0000	24 24 24 24 24 24 24 24	BANGKOK BRISBANE NADI SINGAPORE TOKYO Beijing Hong Kong Jakarta Manila Mumbai Wellington	VTBBYPYX YBBBYPYX NFZZRFX WSZZYPYX RJTDYPYX ZBBBYPYX VHZZYPYX WZZYPYX RPLLYPYX VABBYPYX NZZZYPYX
Hong Kong	VHHH	FTHK31	VHHH RCTP RCKH RCSS RCMQ RCNN RCFN VMC RPLL RPVM RPM RPLB RPMZ RPLI	HONG KONG/International TAIBEI CITY/Taipei Intl Ap GAOXIONG TAIBEI/Songshan TAICHUNG/Qingquangang TAINAN TAIDONG/Fengnian MACAOU/Intl Airport MANILA/Ninoy Aquino Intl, Pasay City, Metro Manila LAPU-LAPU/Mactan, Cebu DAVAO/Francisco Bangoy Intl, Davao Del Sur SUBIC BAY, Subic Bay Intl, Olongapo City, Zambales ZAMBOANGA, Zamboanga Intl, Zamboanga Del Norte LAOAG, Laoag Intl, Ilocos Norte	0535 1135 1735 2335	0600 1200 1800 0000	30 30 30 24 24 24 30 30 30 24 24 24 24	BANGKOK BRISBANE NADI SINGAPORE TOKYO Beijing Mumbai Incheon Wellington London Washington	VTBBYPYX YBBBYPYX NFFNYMYX WSZZYPYX RJTDYPYX ZBBBYPYX VABBYPYX RKSIPYX NZZZYPYA EGZZMASI KWBCYMYX
Incheon	RKSI	FTK031	RKSI RKSS RKPC RKPK RKTU RKNY RKTN RKJB	INCHEON Intl GIMPO Intl JEJU Intl GIMHAE Intl CHEONGJU Intl YANGYANG Intl DAEGU INTL MUAN Intl	0535 1135 1735 2335	0600 1200 1800 0000	30 30 30 30 30 30 30 30	BANGKOK BRISBANE SINGAPORE TOKYO Hong Kong Karachi Wellington	VTBBYPYX YBBBYPYX WSZZYPYX RJTDYPYX VHZZYPYX OPZZYPYX NZZZYPYX
Karachi	OPKC	FTPK31	OPKC OPRN OPLA OPNH OPPS OPGD OPSK	KARACHI/Jinnah Intl ISLAMABAD/Chaklala LAHORE/Allama Iqbal Int'l NAWABSHAH PESHAWAR GWADAR SUKKAR	0535 1135 1735 2335	0600 1200 1800 0000	30 30 30 30 24 24	BANGKOK BRISBANE SINGAPORE TOKYO Abu Dhabi Bahrain Beijing Beirut Hong Kong Jeddah Karachi Tehran	VTBBYPYX YBBBYPYX WSZZYPYX RJTDYPYX OMZZYPYX OBZZYPYX ZBBBYPYX OLLLYPYX VHZZYPYX OEJDYPYX OPZZYPYX OIIYPYX
Mumbai	VABB	FTIN31	VAAH	AHMEDABAD	0535	0600	30	BANGKOK	VTBBYPYX

Table B : Collection and Dissemination of TAF (FT) Bulletins											
1 ROC		2 TAF Bulletin						3 Dissemination			
Name	CCCC		CCCC	Aerodrome	Filing time	Start of validity	TAF validity	RODB/ROC	AFTN address		
			VABB	MUMBAI/Chhatrapati Shivaji Intl.	1135	1200	30	BRISBANE	YBBBYPYX		
			VANP	NAGPUR	1735	1800	30	SINGAPORE	WSZZYPYX		
			VOBL	BANGALORE INTL APT	2335	0000	30	TOKYO	RJTDYPYX		
			VOCB	COIMBATORE			30	Abu Dhabi	OMZZYPYX		
			VOCI	COCHIN INTERNATIONAL AIRPORT			30	Bahrain	OBZZYPYX		
			VOCL	CALICUT			30	Beijing	ZBBBYPYX		
			VOHS	HYDERABAD INTERNATIONAL AIRPORT			30	Beirut	OLLLYPYX		
			VOML	MANGALORE			30	Hong Kong	VHZZYPYX		
			VOMM	CHENNAI			30	Jeddah	OEJDYPYX		
			VOTR	TIRUCHCHIRAPPALLI			30	Karachi	OPZZYPYX		
			VOTV	TRIVANDRUM			30	Tehran	OIIIPYX		
			FTIN32	VIDP	DELHI/Indira Gandhi Intl	0535	0600	30			
		VEBN		VARANASI	1135	1200	30				
		VIAR		AMRITSAR	1735	1800	30				
		VIJP		JAIPUR	2335	0000	30				
		VILK		LUCKNOW			30				
		FTIN33	VECC	NETAJI SUBHASH CHANDRA BOSE INTERNATIONAL AIRPORT, KOLKATA	0535	0600	30				
			VEPT	PATNA	1135	1200	30				
			VEGY	GAYA	1735	1800	30				
			VEGT	GUWAHATI	2335	0000	30				
		FTSB31	VCBI	BANDARANAIKE INTL AP COLOMBO	0535	0600	30				
			VCRI	MATTALA RAJAPAKSA INTERNATIONAL AIRPORT	1135	1200	30				
					1735	1800					
					2335	0000					
		FTMV31	VRMG	GAN INTERNATIONAL AIRPORT	0535	0600	30				
			VRMH	HANIMAADHOO INTERNATIONAL AIRPORT	1135	1200	30				
			VRMM	MALE INTERNATIONAL AIRPORT	1735	1800	30				
					2335	0000					
		Kolkata	VECC	FTBW31	VGEG	M.A. HANNAN INTL. CHITTAGONG	0535	0600	30		
					VGHS	HAZRAT SHAHJALAL INTERNATIONAL AIRPORT	1135	1200	30		
VGSY	OSMANI INTERNATIONAL AIRPORT,SYLHET				1735	1800	30				
					2335	0000					
FTAS31	VNKT			KATHMANDU	0535	0600	30				
					1135	1200					
					1735	1800					
					2335	0000					
Nadi	NFFN	FTPS31	NCRG	RAROTONGA INTL.	0535	0600	24	BANGKOK	VTBBYPYX		
			NFFN	NADI/Intl	1135	1200	24	BRISBANE	YBBBYPYX		
			NFTF	FUA'AMOTU INTL.	1735	1800	24	SINGAPORE	WSZZYPYX		
			NFTV	VAVA'U	2335	0000	24	NADI	NFZZRFX		
			NGTA	TARAWA/Bonriki Intl			24	TOKYO	RJTDYPYX		
			NIUE	NIUE Intl			24				
			NVSS	SANTO/Pekoa			24	Hong Kong	VHZZYPYX		
			NVVV	PORT VILA/Bauerfield			24	Wellington	NZZZYPYA		
			PLCH	CHRISTMAS ISLAND			24				
			NSTU	PAGO PAGO Intl, Tutuila I.			24				
			NFNA	NAUSOR/Intl			24				
			NTAA	TAHITI FAAA			30				
			NWWW	NOUMEA LA TANTOUTA			24				
			NSFA	FALEOLO/Intl			24				
			NLWW	WALLIS HIHIFO			24				
			Singapore	WSSS	FTSR31	WSSS	SINGAPORE/Changi	0535	0600	30	BANGKOK
WSAP	PAYA LEBAR (RSAF)	1135				1200	30	BRISBANE	YBBBYPYX		
WSSL	SELETAR	1735				1800	30	SINGAPORE	WSZZYPYX		
WAAA	UJUNG PANDANG/Hasanuddin (Comm Center)	2335				0000	30	TOKYO	RJTDYPYX		
WABB	BIAK/Frans Kaisiepo						30	NADI	NFZZRFX		
WADD	BALI/Ngurah Rai						24 (30)	Abu Dhabi	OMZZYPYX		
WARR	SURABAYA/Juanda						24	Bahrain	OBZZYPYX		
WIHH	JAKARTA/Halimperdana Kusuma						24	Beijing	ZBBBYPYX		
WIII	JAKARTA/Soekarno Hatta (COMM CENTER)						30	Beirut	OLLLYPYX		
WIMM	MEDAN/Polonia						24	Colombo	VCCCYPYX		
								Hong Kong	VHZZYPYX		
								Karachi	OPZZYPYX		

Table B : Collection and Dissemination of TAF (FT) Bulletins									
1 ROC		2 TAF Bulletin						3 Dissemination	
Name	CCCC		CCCC	Aerodrome	Filing time	Start of validity	TAF validity	RODB/ROC	AFTN address
								Manila Mumbai Incheon Tehran Wellington	RPLLYPYX VABBYPYX RKSIYPYX OIIYPYX NZZZYPYA
								BANGKOK BRISBANE SINGAPORE TOKYO	VTBBYPYX YBBBYPYX WSZZYPYX RJTDYPYX
								Beirut Hong Kong Manila Mumbai Wellington	OLLLYPYX VHZZYPYX RPLLYMYX VABBYPYX NZZZYPYX
Tokyo	RJTD	FTJP31	RJAA	NARITA Intl	0235	0300	30	BANGKOK	VTBBYPYX
			RJBB	KANSAI Intl	0835	0900	30	BRISBANE	YBBBYPYX
			RJCH	HAKODATE	1435	1500	30	NADI	NFZZRFX
			RJGG	CHUBU CENTRAIR Intl	2035	2100	30	SINGAPORE	WSZZYPYX
			RJOO	OSAKA Intl			30	TOKYO	RJTDYPYX
			RJSS	SENDAI			30	Beijing	ZBBBYPYX
			RJTT	TOKYO Intl			30	Beirut	OLLLYPYX
			ROAH	NAHA			30	Brasilia	SBBRYZYX
								Colombo	VCBIYMYX
								Guam	PGUMCOAX
								Hong Kong	VHZZYPYX
								Karachi	OPZZYPYX
								London	EGZZMASI
								Mumbai	VABBYPYX
								Noumea	NWCCYMYX
		FTJP32	RJCC	SAPPORO/New Chitose	0235	0300	30	BANGKOK	VTBBYPYX
			RJFF	FUKUOKA/Fukuoka	0835	0900	30	BRISBANE	YBBBYPYX
			RJFK	KAGOSHIMA	1435	1500	30	NADI	NFZZRFX
			RJFO	OITA	2035	2100	30	SINGAPORE	WSZZYPYX
			RJFT	KUMAMOTO			30	TOKYO	RJTDYPYX
			RJFU	NAGASAKI			30	Beijing	ZBBBYPYX
			RJNK	KANAZAWA/Komatsu			30	Beirut	OLLLYPYX
			RJNT	TOYAMA			30	Brasilia	SBBRYZYX
			RJOA	HIROSHIMA			30	Colombo	VCBIYMYX
			RJOB	OKAYAMA			30	Guam	PGUMCOAX
			RJOT	TAKAMATSU			30	Hong Kong	VHZZYPYX
			RJSN	NIIGATA			30	Incheon	RKSIYPYX
								Karachi	OPZZYPYX
								London	EGZZMASI
								Mumbai	VABBYPYX
		FTJP38	RJSA	AOMORI	0235	0300	30	BANGKOK	VTBBYPYX
			RJSF	FUKUSHIMA	0835	0900	30	BRISBANE	YBBBYPYX
			RJSK	AKITA	1435	1500	30	NADI	NFZZRFX
			RJOM	MATSUYAMA	2035	2100	30	SINGAPORE	WSZZYPYX
			RJNS	SHIZUOKA			30	TOKYO	RJTDYPYX
			RJEC	ASAHIKAWA (civil)			30	Beijing	ZBBBYPYX
			RJAH	HYAKURI			30	Incheon	RKSIYPYX

Table B : Collection and Dissemination of TAF (FT) Bulletins									
1 ROC		2 TAF Bulletin						3 Dissemination	
Name	CCCC		CCCC	Aerodrome	Filing time	Start of validity	TAF validity	RODB/ROC	AFTN address
			RJCM RJCK RJCB RJOC RJOH RJOK RJFM ROIG RJFR RJFS	MEMANBETSU KUSHIRO OBIHIRO IZUMO MIHO KOCHI MIYAZAKI ISHIGAKI JIMA NEW KITAKYUSHU SAGA			30 30 30 30 30 30 30 30 30 30		
Wellington	NZKL	FTNZ31	NZWN	WELLINGTON Intl	0535	0600	24	BANGKOK	VTBBYPYX
			NZAA	AUCKLAND Intl	1135	1200	24	BRISBANE	YBBBYPYX
			NZCH	CHRISTCHURCH Intl	1735	1800	24	NADI	NFZZRFXX
					2335	0000		SINGAPORE	WSZZYPYX
								TOKYO	RJTDYPYX
								Beijing Hong Kong	ZBBBYPYX VHZZYPYX
		FTNZ32	NZQN	Queenstown	1130 1730	1200 1800	18		

APPENDIX C - IROG Back-up Procedures

1. Introduction

1.1 In order to ensure the continuity of OPMET exchange with the European Region (EUR), and the availability of the ASIA/PAC OPMET on the SADIS Gateway, Bangkok RODB will take over the role of the Singapore RODB whenever operational interruption occurs at the Singapore RODB.

1.2 Both RODBs, in coordination with the Secretariat and London IROG, should perform a real-time test of the procedures in order to practice and maintain regularity and currency in the event of an outage affecting OPMET exchange with EUR.

1.3 The Bangkok and Singapore RODBs have developed a mutual back-up arrangement that includes procedures for undertaking a back-up test.

2. Purpose

2.1 The purpose of the back-up test is to validate the dissemination process for notification messages between IROGs and ensure that the Procedures for handover and takeover of responsibility are functional.

3. Procedures

3.1 Singapore IROG provides the ASIA/PAC OPMET bulletins information to Bangkok IROG to establish the back-up distribution arrangement. Both IROGs are responsible to update the distribution list as and when required.

3.2 To activate the back-up plan, both IROGs will communicate through facsimile and email.

3.3 Bangkok IROG will provide the contact points information and update periodically if required.

3.4 Both IROGs will review the back-up procedures and identify areas for improvement.

4. Real-time Back-up Test Procedure

4.1 As the back-up test and monitoring could consume considerable resources, both IROGs have agreed to monitor a list of selected ASIA/PAC OPMET bulletins. IROG back-up procedures are to be tested at least annually and will normally be of 6 hours duration, between 0200 and 0800 UTC.

4.2 Communication test

4.2.1 The communication test between the IROGs should be conducted through facsimile and email and advised two days before the test.

4.3 Real-time back-up exercise

4.3.1 At the day of exercise, Singapore IROG shall inform Bangkok IROG to take over its role when it stops sending the selected OPMET messages on the AFTN.

4.3.2 Bangkok IROG shall acknowledge the notification messages and start relaying Asia Pac OPMET Information to WAFC, London.

4.3.3 Both IROGs shall record the reception and transmission of the monitored OPMET bulletins during the exercise.

4.3.4 At the end of back-up test, both IROGs shall resume message switching as per normal after exercising stand-down procedures.

5. **Assessment**

5.1 Both IROGs shall evaluate the monitoring result and address the following issues during the ROBEX WG meeting:

- (i) Monitoring result in term of message throughput (comparison of percentage of messages received against messages relayed);
- (ii) Transit time of the relayed messages;
- (iii) Undertake the necessary follow-up of issues arose from the exercise; and
- (iv) Verify and develop existing procedures.

APPENDIX D - Use of WMO Abbreviated Heading

(For use in ROBEX Messages and Bulletins)

1. Each ROBEX bulletin should have a WMO abbreviated heading in accordance with *WMO No. 386, Manual on the Global Telecommunication System, Part II – Operational Procedures for the GTS*. The symbolic form of the WMO abbreviated heading is as follows:

T₁T₂A₁A₂ii CCCC YYGGgg (BBB)

2. Explanation of the symbols
- 2.1. **T₁T₂A₁A₂ii** – this group is used in accordance with *WMO No. 386, Manual on the Global Telecommunication System, Part II – Operational Procedures for the GTS, Attachment II-5*.

- 2.1.1 **T₁T₂** - Data type designator, used for OPMET data as follows:

Data type	Abbreviated name	WMO data type designator	
		TAC	IWXXM
Aerodrome reports	METAR	SA	LA
	SPECI	SP	LP
Aerodrome forecasts	TAF: 12 to 30 hour	FT	LC
SIGMET information	SIGMET	WS	LS
	SIGMET for TC	WC	LY
	SIGMET for VA	WV	LV
AIRMET information	AIRMET	WA	LW
Volcanic Ash and Tropical Cyclone Advisories	Volcanic Ash Advisory	FV	LU
	Tropical Cyclone Advisory	FK	LK
Air-reports	AIREP SPECIAL (ARS)	UA	N/A
Space Weather Advisory	SWXA	FN	LN
Administrative	METNO	NO	N/A

Note: IATA TAF requirements in the ASIA/PAC region are for TAF validity of either 24 or 30 hours. Some States issue 12- and 18-hour TAF, which don't meet requirements, but are nevertheless classified as FT for the WMO data type designator.

- 2.1.2 **A₁A₂** - Geographical designator, composed of two letters, according to *WMO No. 386, Manual on the Global Telecommunication System, Part II – Operational Procedures for the GTS, Attachment II-5, Table C1*. The following principles shall apply:

- a) For ROBEX bulletins containing OPMET data from a single State or territory, the A₁A₂ designator should be chosen from Table C1, Part I – Country or territory designator;

- b) For ROBEX bulletins containing OPMET data from more than one State or territory, a suitable A₁A₂ designator should be chosen from Table C1, Part II – Area Designators;
- c) The part of the Table C1, Part II – Area Designators, which is relevant to the ROBEX scheme is reproduced below.

A₁A₂	Country or territory
AH	Afghanistan
AS	Asia
AU	Australia
BD	Brunei Darussalam
BM	Myanmar
BW	Bangladesh
CI	China
ER	United Arab Emirates
GM	Guam Islands
HK	Hong Kong, China
ID	Indonesia
IN	India
JP	Japan
KB	Kiribati
KO	Republic of Korea
KP	Cambodia
KR	Democratic People's Republic of Korea
KU	Cook Islands
LA	Lao People's Democratic Republic
MH	Marshall Islands
MS	Malaysia
MU	Macao
MV	Maldives
NC	New Caledonia
NG	Papua New Guinea
NP	Nepal
NV	Vanuatu
NW	Nauru Island
NZ	New Zealand
OC	Oceania
PA	Pacific area
PF	French Polynesia

A₁A₂	Country or territory
PH	Philippines
PK	Pakistan
PS	South Pacific area
QT	Qatar
SB	Sri Lanka
SD	Saudi Arabia
SO	Solomon Islands
SR	Singapore
TH	Thailand
TM	Timor
TO	Tonga
TV	Tuvalu
US	United States of America
VS	Vietnam
ZM	Western Samoa

2.1.3 **ii** - series number of the bulletin. It shall be a number with two digits used to differentiate two or more bulletins with the same TTAA issued by an originator or a compiler of bulletins. “ii” will be unique to each bulletin.

2.1.3.1 The assignment of “ii” to bulletins should be selected from within the following sets;

- ii = 01-19 inclusive for global distribution
- ii = 20-39 inclusive for regional and inter-regional distribution
- ii = 40-89 inclusive for national and bilaterally agreed distribution

2.1.3.2 For most of the ROBEX bulletins “ii” should be selected from the set “20 – 39”. In case of METAR/TAF bulletins, ROCs issuing only one bulletin should use "31", whilst ROCs issuing more than one bulletin should use "31", "32", etc.

2.2. **CCCC** - ICAO location indicator, according to Location Indicators, ICAO Doc 7910, of the ROBEX centre preparing the ROBEX Bulletin, or of the originator (aeronautical meteorological station, aerodrome meteorological office or NOC).

2.3. **YYGGgg** – Date-time group as follows:

2.3.1 YY - Day of the month.

2.3.2 GGgg - Hours and minutes

- For METAR bulletins: the standard time of observation in UTC.

- For TAF bulletins: the full hour in UTC (the last two digits shall be 00) preceding the transmission time.
- For all other bulletin/messages: the time of compilation in UTC.

2.4. **BBB** - Optional group indicating an amended, corrected or delayed bulletin.

2.4.1 An abbreviated heading defined by TTAAii CCCC YYGGgg shall be used only once. Consequently, if this abbreviated heading has to be used again for an addition, a correction or an amendment, it is mandatory to add an appropriate BBB indicator, which shall be added after the date-time group. The indicator BBB shall be used as follows;

- RRx - for delayed routine meteorological messages/bulletins, and for segmenting a large set of information into several bulletins;
- CCx - for corrections to previously relayed messages/bulletins;
- AAx - for amendments to TAF messages/bulletins;

The “x” above is an alphabetic character of A through X, indicating the sequential number of the irregular bulletin of certain type. For instance, for amended TAFs, AAA is used for the first amendment, AAB for the second, AAC for the third, etc; for delayed METARs or TAFs, RRA is used for the first delayed message, RRB for the second, etc.; and, for corrections to any OPMET bulletin, CCA is used for the first correction, CCB for the second, etc.

2.4.2 The current limitation of the AFTN regarding the length of the bulletins is up to 1800 characters (note that the WMO Header and spaces are counted as characters). Bulletins longer than this will be split into two parts; in such a case, the optional group RRx is used for additional or subsequent issuances of messages with the same abbreviated heading line including the YYGGgg regardless of whether these reports are on time, late or delayed. In the ASIA/PAC Region, RRA is used for the second part of a split bulletin. An example of a split bulletin using RRA is shown below.

Example

First Part

```
GG WSSSYMYX
171000 VABBYMYX
FTIN32 VABB 170900
TAF VCBI 170940Z 1712/1812 23012KT 9999 SCT016 TX30/1808Z
TN27/1723Z TEMPO 1714/1718 7000 -SHRA FEW010 SCT016
TEMPO 1723/1802 7000 -SHRA SCT010 BKN016=
TAF VNKT 170900Z NIL=
TAF VOCL 170900Z 1712/1818 29005KT 4000 -RA/HZ SCT015 SCT020
FEW025CB BKN100 BECMG 1716/1717 3000 -RA/HZ TEMPO 1712/1721
1500 TSRA/SHRA SCT008 SCT012 FEW025CB OVC080 BECMG
1804/1805 30005KT 4000 HZ BECMG 1806/1807 27010KT 5000 -RA/HZ
TEMPO 1809/1815 1500 TSRA/SHRA SCT008 SCT012 FEW025CB
OVC080 BECMG 1816/1817 3000 HZ=
TAF VOCL 170900Z 1712/1818 33005KT 4000 -RA/HZ SCT015 SCT020
FEW025CB BKN100 BECMG 1716/1717 3000 -RA/HZ TEMPO 1712/1721
2000 TSRA/SHRA SCT008 SCT012 FEW025CB OVC080 BECMG
1804/1805 35005KT 5000 HZ BECMG 1806/1807 32010KT 5000 -RA/HZ
```

TEMPO 1809/1815 2000 TSRA/SHRA SCT008 SCT012 FEW025CB
OVC080 BECMG 1816/1817 3000 HZ=
TAF VOHS 170900Z 1712/1818 27010G20KT 6000 SCT020 SCT100
TEMPO 1712/1718 3000 -TSRA/RA SCT015 FEW025CB BKN080 TEMPO
1721/1803 3000 -TSRA/RA/HZ SCT015 FEW025CB BKN080 TEMPO
1809/1818 3000 -TSRA/RA SCT015 FEW025CB BKN080=
TAF VOHY 170900Z NIL=
TAF VOMM 170900Z 1712/1818 17010KT 6000 SCT020 BKN100 TEMPO
1712/1718 SCT015 FEW025CB BKN100 BECMG 1720/1721 21010KT
SCT020 BECMG 1803/1804 27010KT 8000 FEW020 SCT100 BECMG
1810/1811 13010KT TEMPO 1812/1815 SCT015 FEW025CB BKN100
BECMG 1813/1814 6000=
TAF VOTR 170900Z 1712/1818 27010KT 6000 SCT020 SCT100 TEMPO
1712/1715 SCT015 FEW025CB BKN100 BECMG 1716/1717 33005KT
FEW020 BECMG 1803/1804 27010G20KT 8000 FEW020 SCT250 BECMG
1812/1813 27005KT 6000 TEMPO 1812/1815 SCT015 FEW025CB
BKN100=

Second Part

GG WSSSYMYX
171000 VABBYMYX
FTIN31 VABB 170900 **RRA**
TAF VIJP 170900Z 1712/1818 28006KT 4000 HZ FEW030 BECMG
1803/1805 29005G15KT 3000 HZ FEW030 SCT100 TEMPO 1712/1716
FEW030CB=
TAF VILK 170900Z 1712/1721 34005KT 6000 NSC BEC 1716/1718
VRB02KT 5000 HZ=

APPENDIX E – Procedure and Format of METNO bulletin for APAC ROBEX Bulletins

METNO Message Format (Example)

Priority	GG
Addressees of ROCs and RODBs	~~VTBBYPYX ZBBBYPYX YBBNYPYX VCCCYPYX VIDPYPYX VHZZYPYX RKSIYPYX WIZZYPYX VECCYPYX OPZZYPYX WMZZYPYR VABBYPYX NFFNYPYX RJTDYPYX NZZZYPYX WSZZYPYM~~
Origin	~~ddhhmm WSSSYPYX~~
Abbreviated header	TTAA99 CCCC YYGGgg Example: NOSR99 WSSS 180200
Message identifier, region description, date of implementation (year, month, date):	~~METNO APAC OPMET YYMMDD~~
New Bulletin (NEWBUL)	~~NEWBUL (description of new bulletin and content)~~
Delete Bulletin (DELBUL)	~~DELBUL (description of bulletin to be deleted and content)~~
Add Report to existing bulletin (ADDRPT)	~~ADDRPT (description of added aerodromes to existing bulletin)~~
Remove Report from existing bulletin (RMVRPT) + Bulletin/Report key (TTAAii CCCC Station)(1)	~~RMVRPT (description of aerodromes to be deleted from existing bulletin)~~
End of METNO	END=

(1) The METNO Bulletin/Report reference only contains the Bulletin/Report index TTAAii CCCC₁ CCCC₂ where:

- _____ TTAAii is the abbreviated header
- _____ CCCC₁ the compiling centre
- _____ CCCC₂ the Report | FIR location indicator.

The index refers to the modified record in the OPMET catalogue published on the FTP server(s). The dates on the relevant records shall contain the AIRAC date in the line after the abbreviated header.

Example of a METNO message in AFTN format:

```
GG
NOSR99 WSSS 180200
METNO APAC OPMET 061115
NEWBUL FTSR33 WSSS WBSB WBCB WBGG WBGR WBGS
_____ WBKK WBKL WBKS WBKW
RMVRPT FTSR31 WSSS WMKK WMSA WMKP WMKJ
ADDRPT FTSR31 WSSS WAAA WABB WIMM
RMVRPT FTSR32 WSSS WBSB WBKK WBGG WIMM
ADDRPT FTSR32 WSSS WMKJ WMKK WMKL WMKM WMKP WMSA
END=
```

1. METNO Procedure – General rules

1.1. Modification requests to the production of national OPMET-data shall be reported by the NOC (National OPMET Centre) to the Regional OPMET Centre (ROC). The ROC then forwards the requests to the regional Focal point (FP) or regional Team for publication, evaluation and FP processing accepted changes.

1.1.1. The regional FP or regional Team verifies the conformity of the change proposal against ICAO DOC7910 (only registered Location Indicators can be accepted), electronic ANP (eANP) Volume II MET tables, WMO No. 386 documents and that the syntax is conform to the METNO procedure. Implementation of IWXXM data: no IWXXM without TAC will be accepted. In addition, separated bulletins will be produced for AOP airport and agreed exchanged non AOP airports OPMET data.

1.2. Modification requests for an upcoming AIRAC date have to be sent at the latest by the preceding AIRAC date. This will guarantee that all subsequent steps can be performed in time. For planning purposes modification requests should be provided well in advance (between 30 and 60 days before the AIRAC date) to allow full assessment by the regional FP (or regional group in charge of OPMET) and to provide confirmation to the originator that all changes will be made at the required date.

1.3. The regional FP will summarize all requests and present those via email to the regional group in charge of OPMET at the latest 7 days after the preceding AIRAC date.

1.4. The regional group members will review the requests and shall communicated any comments to the FP at the latest 14 days after the preceding (14 days before the upcoming) AIRAC date. Nil comments shall be considered as a positive response.

1.5. At 21 days after the preceding (7 days before the upcoming) AIRAC date, the FP shall announce the list of accepted amendments to the ICAO Regional Office, the NOCs by means of a standard formatted METNO message for routine meteorological information sent via Aeronautical Fixed Service (AFS - SADIS and WIFS by their regional associated ROC).

1.6. The involved NOCs in turn shall notify users in their State about their requested modifications.

1.7. In addition, regional contacts (as agreed during regional MET meeting) will receive a confirmation by email. Motivated subscription to (or to unsubscribe from) the METNO Bulletins can be submitted via the regional MET Group or directly by utilizing the contact form provided on the regional Website (where available).

1.8. The modifications shall be implemented by all affected centres on AIRAC date, at 02:00 UTC or when a new bulletin header is created, on opening hours the day before the implementation date.

1.9. The AIRAC OPMET data updates shall be applied by: The ROCs and IROGs for routing the current OPMET data in accordance with the dissemination regional Schema.

1.10. In order to avoid difficulties in processing OPMET Data modifications during major holidays, it can be decided to skip a particular AIRAC Cycle occurring in these periods.

1.11. For urgent modification, it can be decided with the explicit agreement of the regional METNO focal point/regional team to proceed more quickly by deviation to the normal

schedule. The FP/regional team will compile AIRAC METNO, or EXTRA METNO for intermediate updates with immediate implementation of new or expiring bulletins.

1.12. Key issues to be considered for the management of AFS data traffic volumes are:

- Avoid data duplication
- Authenticated data only
- ANP required data (AOP)
- Agreed exchanged Non-AOP data

1.13. Standardized Regional OPMET Data Catalogues including METNO-registered data can be compiled from the database of METNO-registered OPMET data: TAC & IWXXM, on AFS:

- Regional OPMET Database (RODB) catalogue
- Regional and Global OPMET data catalogues

2. Format and Content of the METNO-message

2.1. The METNO Syntax: The syntax of a METNO statement is presented hereafter. It may also include the list of AFS addressees actually used as well as examples for the various OPMET data update METNO statements.

2.2. The METNO Header: The header of the METNO bulletin is NOXX31 CCCC YYGGgg, where:

- XX is a general area designator (example : EU for EUR, AF for AFI ...)
- CCCC is the AFTN location indicator of the regional FP Centre (example: EBBR for EUR)

2.3. The METNO statements for registration and updating of OPMET / IWXXM data are:

- ADDRPT / RMVRPT: for adding / removing Routine OPMET data in an already registered bulletin
- NEWBUL / DELBUL: for registering a new / unregistering an expiring (Non-)Routine OPMET bulletin and its contained data

2.3.1. ADDRPT

2.3.1.1. This statement is used when a new location indicator is added to an already registered bulletin. It can be used in combination with METAR or TAF bulletins.

2.3.1.2. Adding TAC-formatted METARs/TAFs to a registered bulletin does not automatically register the IWXXM equivalent data. TAC data can exist without a IWXXM until November 2020.

2.3.1.3. Adding IWXXM METARs/TAFs to a registered bulletin will by default result in adding the equivalent TAC METARs/TAFs for their parallel distribution. There can be no IWXXM data without any equivalent TAC-formatted version of the data.

2.3.2. RMVRPT

2.3.2.1. This statement is used for METARs/TAFs planned to be removed from an already registered bulletin. Removed reports can possibly be registered for all location in other existing or in new registered bulletins.

2.3.2.2. Removing TAC-formatted METARs/TAFs from a registered bulletin will also remove the equivalent IWXXM data from the OPMET data register in case it has already been registered. There is no IWXXM data without equivalent TAC-formatted data.

2.3.2.3. Removing IWXXM METARs/TAFs will by default result in removing equivalent TAC METARs/TAFs from the OPMET data register. If the TAC data need to be continued, it has to be re-registered explicitly, using ADDRPT.

2.3.3. NEWBUL

2.3.3.1. This statement is used for the registration of a new bulletin. It can be used for all supported data.

2.3.3.2. The registration of a new IWXXM bulletin by default implies the introduction of the TAC equivalent.

2.3.4. DELBUL

2.3.4.1. This statement is used for the deletion of a registered bulletin. It can be used for all supported data types.

2.3.4.2. The deletion of a registered IWXXM bulletin implies automatically the deletion of the TAC equivalent. TAC equivalents which are meant to be continued have to be re-introduced explicitly by applying NEWBUL.

2.3.4.3. Deletion of TAC OPMET bulletin by default also deletes the IWXXM equivalent.

3. METNO Focal Point – Prerequisites and Actions

3.1. The Focal Point (FP)/regional group prerequisites are:

- Generic email address (including FP persons and backups)
- AFS connection address
- Access to ICAO references (documents and Regional contacts)
- Data management software for processing basic lists of METNO-registered data to be shared inter-regionally in standardized international data formats (*.csv, *.txt)

3.2. The FP/regional group receives update requests any time by email:

- Preferably via ROC, but also from NOCs
- After authentication, sort updates based on suggested implementation date (AIRAC if no date proposed)
- Compiles AIRAC METNO or EXTRA METNO for intermediate updates with immediate implementation of new or expiring bulletins

3.3. Forward requests for ANP additional OPMET data via email to the Regional ICAO Office contact.

3.4. Co-ordination and evaluation of received update requests via email.

3.5. Compilation of AIRAC / EXTRA METNO bulletin for distribution to regional ROCs / IROGs.

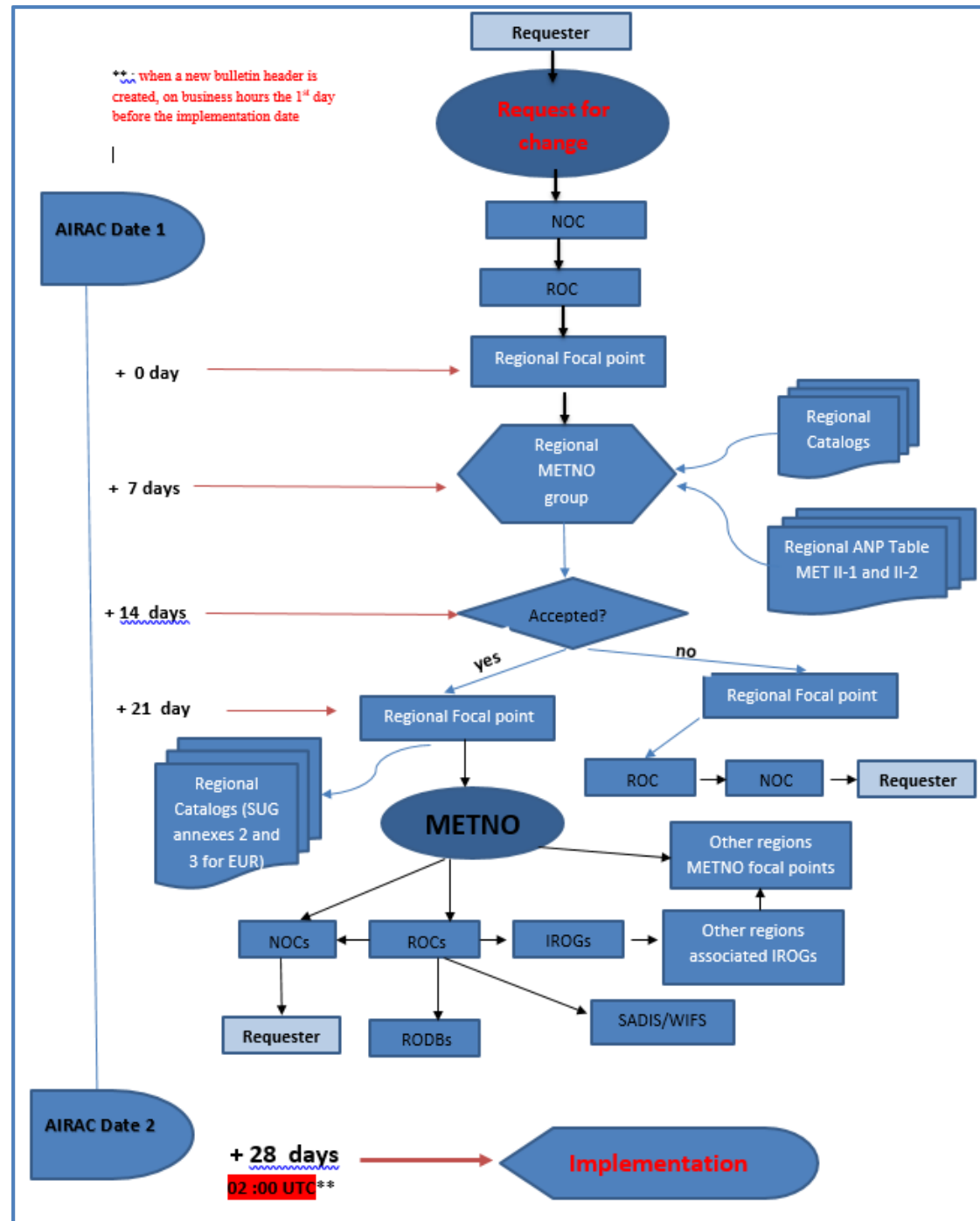
3.6. Maintenance of regional METNOs and registered OPMET data.

3.7. Reports to OPMET regional group.

3.8. Facilitates OPMET data monitoring.

3.9. The regional focal point and team for management of the METNO process would include the relevant ICAO Regional Officer and ROBEX Focal Points from Australia, Hong Kong China, Japan and Singapore.

4. METNO Process Diagram



APPENDIX F - OPMET Quality Control and Monitoring Procedures

1 Quality Control Procedures

1.1 OPMET Data Validation

1.1.1 The ROCs and RODBs should not modify the content of the meteorological data, e.g. visibility, QNH etc., but only items contained in the WMO bulletin headings, such as, location indicators or observation times.

1.1.2 WMO Abbreviated Heading (TTAAii CCCC YYGGgg BBB) Validation

TT	Message Type, shall comprise two alphabetical characters
AA	Location Indicator, shall comprise two alphabetical characters
ii	comprise two digits, from 01 to 99
CCCC	A 4-letter ICAO location indicator shall comprise 4 alphabetical characters.
YYGGgg	The date time group of the bulletin, shall be configured to validate it with the current time
BBB	BBB is an optional group. The use of BBB group shall comply with the rules in the WMO abbreviated heading, in regard to delayed, corrected and amended bulletins.

Examples	After QC check
METAR with incorrect YYGGgg: SABM31 VYMD 100830 UTC VYMD 100830Z 18005KT 8000 FEW025 31/18 Q1000 =	SABM31 VYMD 100830 VYMD 100830Z 18005KT 8000 FEW025 31/18 Q1000 =
TAF without AHL: 112324 WIDDYMYX TAF WIDD 112324Z 1200/1224 00000KT 4000 RA BKNT017 BECMG 1203/1205 20010KT 9000 SCT017=	FTID31 WIDD 112300 TAF WIDD 112324Z 1200/1224 00000KT 4000 RA BKNT017 BECMG 1203/1205 20010KT 9000 SCT017=
TAF with invalid BBB: FTBN31 OBBI 030525 AMD TAF AMD OBBI 030525Z 0306/0406 16010KT CAVOK BECMG 0308/0312 33017KT 5000 PROB30 TEMPO 0308/0314 0800 DU=	FTBN31 OBBI 030525 AAA TAF AMD OBBI 030525Z 0306/0406 16010KT CAVOK BECMG 0308/0312 33017KT 5000 PROB30 TEMPO 0308/0314 0800 DU=

1.1.3 METAR/SPECI Validation

For each individual METAR or SPECI within a bulletin the following additional fields shall be validated:

Prefix checks	METAR METAR COR SPECI SPECI COR	SA SA SP SP
Observation Time YYGGggZ	The report shall have a valid date and time of observation, including the character 'Z'. In a SPECI bulletin, this group will be same as (or very close to) the YYGGgg, part of the abbreviated bulletin heading.	
End-of-message format “=”	Each METAR or SPECI report shall be terminated by the "=" character.	

Examples:	After QC check
METAR with Observation Time error: SAPK31 OPKC 030159 RRA OPKC 030200 26004 8000 BKN020 27/23 Q1007 NOSIG=	SAPK31 OPKC 030200 RRA OPKC 030200 26004 8000 BKN020 27/23 Q1007 NOSIG=
METAR with mistyped observation time: SAID31 WADD 120100 METAR WADD 121000Z 17004KT 9999 FEW018CB SCT120 BKN300 28/26 Q1005=	SAXX31 WADD 120100 METAR WADD 120100Z 17004KT 9999 FEW018CB SCT120 BKN300 28/26 Q1005=
SPECI with incorrect Message Type, TT: SANZ31 NZKL 040000 SPECI NZWP 040000Z 17005KT 010V240 25KM FEW020 FEW020CB SCT035 BKN050 18/15 Q1018 NOSIG=	SPNZ31 NZKL 040000 AAA SPECI NZWP 040000Z 17005KT 010V240 25KM FEW020 FEW020CB SCT035 BKN050 18/15 Q1018 NOSIG=

1.1.4

TAF Validation

For each individual TAF within a bulletin, the following additional items shall be validated:

Prefix checks	TAF TAF COR TAF AMD	FT or FC FT or FC FT or FC
Issue Time YYGGggZ	If the field is included, it shall have a valid date and time of origin of forecast including 'Z'.	
Validity Y ₁ Y ₁ G ₁ G ₁ /Y ₂ Y ₂ G ₂ G ₂	Some TAFs are still produced with a 4-digit validity period. These shall be corrected by inserting a date consistent with the current date and the date time group of the bulletin header. If a TAF is received without a validity period it shall be discarded.	
End-of-Message format “=”	Each forecast shall be terminated by the "=" character.	

Examples:	After QC check
TAF with issue time error (wrong date): FCID31 WIII 181630 TAF WIII 041630Z 0418/0503 00000KT 9000 FEW025 BECMG 0422/0424 16005KT=	FCID31 WIII 181630 TAF WIII 181630Z 0418/0503 00000KT 9000 FEW025 BECMG 0422/0424 16005KT=
TAF with mistyped Validity Period: FTPH31 RPLL 132200 TAF RPLC 132200Z 1400/1428 04006KT 9999 SCT036 BKN300 TEMPO 1400/1406 02010KT 5000 –SHRA FEW020 BKN270 TX32/1405Z TN22/1421Z=	FTPH31 RPLL 132200 TAF RPLC 132200Z 1400/1424 04006KT 9999 SCT036 BKN300 TEMPO 1400/1406 02010KT 5000 –SHRA FEW020 BKN270 TX32/1405Z TN22/1421Z=
TAF with Validity error (wrong date): FCMS33 WMKK 170748 TAF WMKK 170700Z 3009/3018 30005KT 9999 FEW017CB SCT140 BKN270=	FCMS33 WMKK 170748 TAF WMKK 170700Z 1709/1718 30005KT 9999 FEW017CB SCT140 BKN270=
TAF with 4-digit Validity period: FTXX31 WIDD 170121 TAF WIDD 0618 06010G20KT 9999 SCT018 BECMG 1712/1714 00000KT 7000=	FTXX31 WIDD 170121 TAF WIDD 1706/1718 06010G20KT 9999 SCT018 BECMG 1712/1714 00000KT 7000=

1.1.5

SIGMET Validation

CCCC on the AHL	A valid 4-letter ICAO location indicator indicating the FIR for which the SIGMET was.	
Prefix checks	SIGMET for TS, TURB, ICE, MTW, DS, SS and RDOACT CLD SIGMET for VA SIGMET for TC	WS WV WC
Validity Period DDHHMM/DDHHMM	Shall have a valid period of validity. Validity periods may be corrected if: • Missing VALID string • Incorrect SIGMET number format • Incorrectly formatted validity period	
Note: For SIGMET validation, please refer to the format described in the ASIA/PAC Regional SIGMET Guide.		

Examples:	After QC check
SIGMET without TTAAii: SIGMET OYSN 121525Z OYSC SIGMET 1 VALID 121530/122130 OYSN- SANAA FIR EMBD TS OBS/FCST OVER WESTERN AND SOUTHWESTERN MOUNTAINS AND COASTAL AREAS CB TOPS FL36 NC=	WSXX31 OYSN 121525Z OYSC SIGMET 1 VALID 121530/122130 OYSN- SANAA FIR EMBD TS OBS/FCST OVER WESTERN AND SOUTHWESTERN MOUNTAINS AND COASTAL AREAS CB TOPS FL36 NC=
SIGMET with incorrect number format WCPH30 RPLL 210445 SIGMET NO 01 VALID 210000/210600 RPLL TC OBS N0830 E12900=	WCPH30 RPLL 210445 SIGMET 01 VALID 210000/210600 RPLL TC OBS N0830 E12900 ... =
SIGMET with incorrect formatted validity period: WSIN90 VIDP 181800 VIDP SIGMET 06 VALID 18/1600 TO 18/2000 UTC VIDP- DELHI FIR EMBD TS ... = WSSD20 OEJD 220503 OEJD SIGMET 01 VALID 220500 TO 220900 OEJN- JEDDAH FIR=	WSIN90 VIDP 181800 VIDP SIGMET 06 VALID 181600/182000 VIDP- DELHI FIR EMBD TS ... = WSSD20 OEJD 220503 OEJD SIGMET 01 VALID 220500/220900 OEJN- JEDDAH FIR ... =

1.2

Quality Control Methods

OPMET Data	Elements Defining	Control Methods
METAR METAR COR SPECI (SA,SP)	- AHL - Code name - Observation date/time	Software verification Manual validate Periodic Quality Control & PI Monitoring
TAF TAF AMD TAF COR (FT,FC)	- AHL - Code name - Originating station ICAO location indicator - Date/time of issue - Date, time of starting, time of end of the period the forecast refers to	Software verification Manual validate Periodic Quality Control & PI Monitoring
SIGMET (WS, WC, WV)	- AHL - SIGMET Sequence No - Date/time groups indicating the period of validity Additional Checks (recommended):	Software verification Manual validate Periodic SIGMET Quality Control Monitoring

	- Name of the FIR or the CTA the message is issued for - Location indicator of the MWO originating the message	
Volcanic Ash Advisory FV	- Type of message - Issue date and time Additional Checks (recommended): - Location indicator or name of the VAAC centre originating the message	Software verification Manual validate Periodic VA Quality Control Monitoring
Tropical Cyclone Advisory FK	- Type of message - Issue date and time Additional Checks (recommended): - Location indicator or name of the TCAC centre originating the message	Software verification Manual validate Periodic TC Quality Control Monitoring

2 OPMET Monitoring

2.1 Monitoring of Scheduled OPMET data

2.1.1 Performance Indicators (PIs). The indices to be used by the RODBs are based on those developed by the European Bulletin Management Group BMG) (refer to the *EUR OPMET Data Management Handbook, Appendix F, Output Performance Indices*).

(i) Compliance Index

The ROBEX Compliance index can be calculated from:

$$V_{bul\ compliance} = \frac{\text{No of reports received for a bulletin}}{\text{No of reports required for the bulletin}}$$

The Compliance Index is to assess the level of compliance to the ROBEX scheme. The determination of the compliance index is performed as follows:

- Total number of reports received for ROBEX bulletin during the monitoring period, include reports in the retard bulletins.
- Weed out correction and amendment bulletins, as these are re-transmitted messages, can be disregarded.

Explanation:

No. of reports received for a bulletin is the number of reports that are not “NIL.” In other words, do not count the reports that are “NIL.” In addition, do not count reports that are correction and amendment in nature. However, the assessment should include the delayed reports in the retard bulletins.

No. of reports required for a bulletin is the number of reports that each RODB should expect to receive within each particular bulletin.

Procedure:

1. For each day, run through the aerodromes within each bulletin. Count the number of reports that do not contain optional elements and are not “NIL.” Alternatively count the number of reports that contain “Optional RRX
2. For each day, calculate the required number of reports for each bulletin by adding the number of required reports for each aerodrome listed in each bulletin.
3. For each day, calculate the compliance index by taking the ratio of the No. of reports received for a bulletin (calculated in 1.) and the number of reports required for a bulletin (calculated in 2.).
4. To calculate the monthly compliance index, add up the compliance index (calculated in 3.) of all the days in a month and divide by the number of days in month, e.g., $288/288 + 240/288 + 288/288 + \dots + 288/288 \Rightarrow$ (31 elements for 31 days)
5. Alternatively, to calculate monthly compliance index, add up the number of reports received for a bulletin (calculated in 1.) for all the days in a month and divide by the number of reports required for a bulletin (calculated in 2.) in that month.

Example 1:

Bulletin SAIN33 includes 6 aerodromes (VECC, VEPT, VGEG, VGHS, VNKT and VQPR). For each aerodrome, the number of reports required for a bulletin equals $2 \times 24 = 48$ reports. Because the official observation time of the bulletin is at every hour and half-hour (i.e., HH+00 and HH+30) resulting in two reports for each of the 24 hours in each day. If only on the 2nd of March, the RODB does not receive reports from one aerodrome. Calculate the compliance index for Bulletin SAIN33 in March.

Answer:

No. of reports received for a bulletin
 $= (6 \text{ aerodromes} \times 48 \text{ reports} \times 30 \text{ days}) + (5 \text{ aerodromes} \times 48 \text{ reports} \times 1 \text{ day})$
 $= 8,640 + 240$
 $= 8,880$
No. of reports required for a bulletin
 $= (6 \text{ aerodromes} \times 48 \text{ reports} \times 31 \text{ days}) = 8,928$
March compliance index $= 8,880/8,928 = 0.9946$

(ii) Availability Index

The availability index measures the current coverage of the OPMET distribution against the ROBEX exchange requirements. The determination of the availability index is performed on a daily basis from the data captured

during the monitoring period. If at least one non-NIL report is received from the aerodrome during the 24-hour period, that aerodrome is considered to have been available. The daily availability index of a particular bulletin can be calculated as:

$$V_{bul\ availability} = \frac{\text{No of aerodromes for which one or more non-NIL data type are received}}{\text{No of aerodromes required in the bulletins}}$$

NIL data type is defined as data element that reports there are no observations (SA) or forecast (FT).

Non-NIL data type is defined as data element that is not “NIL” i.e. not (METAR VTBD 270200Z NIL=).

No of aerodromes for which one or more non-NIL data type are received is the number of aerodromes which receives one or more Non-NIL data type within a period of one day or 24 hours.

No of aerodromes required in the bulletins is the total number of aerodromes listed in the bulletin from which RODB should receive data from.

For example, the Bulletin SAIN33:

SAIN33 VECC 012350
METAR VECC 012350Z 16004KT 2500 HZ SCT018 BKN100 28/26 Q0996
NOSIG=
METAR VEPT 012350Z NIL=
METAR VGEG 012350Z 14007KT 6000 SCT015 BKN100 27/26 Q0998
NOSIG=
METAR VGHS 012350Z 17005KT 4000 HZ BKN010 OVC100 28/25 Q0997
TEMPO RA=
METAR VNKT 012350Z NIL=
METAR VQPR 012350Z NIL=

The number of aerodromes required in the bulletin SASD31 for that particular day is 6 aerodromes.

Procedure:

1. For each day or the period of 24 hours, obtain the number of aerodromes required in the bulletin.
2. For each day or the period of 24 hours, run through the aerodromes within each bulletin. Count the numbers reports received from each aerodrome that contain Non-NIL data type. If the number exceeds zero, then that aerodrome receives one point, else zero point. Add up the points of each aerodrome to obtain the number of aerodromes for which one or more non-NIL data type is received.
3. For each day, calculate the availability index by taking the ratio of the number of aerodromes for which one or more non-NIL data type are

- received (calculated in 2.) and the number of aerodromes required in the bulletin (calculated in 1.).
4. To calculate monthly availability index, add up the daily availability index (calculated in 3.) of all the days in a month and divide by the number of days in month, e.g., $6/6 + 6/6 + 6/6 + 5/6 + 4/6 + 6/6 + \dots + 2/6 \Rightarrow$ (31 elements for 31 days).
 5. Alternatively, to calculate monthly availability index, add up the number of aerodromes for which one or more non-NIL data type are received (calculated in 2.) for all the days in a month and divide by the number of aerodromes required in the bulletin (calculated in 1.) in that month.

Example 2:

Bulletin SAIN33 continued from example 1.

Calculate the availability index for Bulletin SAIN33 in March.?

Answer:

No. of aerodromes required in the bulletin

= 6 aerodromes * 31 days

= 186

No of aerodromes for which one or more non-NIL data type are received

= (6 aerodromes * 30 days) + (5 aerodromes * 1 day)

= 180 + 5

= 185

March availability index = $185/186 = 0.9946$

(iii) Regularity Index

The regularity index measures the consistency in the number of reports provided by an aerodrome. The computation of Regularity Index assumes that the number of reports follows a normal distribution and attempts to ascertain the distribution characteristics (mean and standard deviation) from a set of data. These characteristics are used to determine if the subsequent number of reports from an aerodrome is “regular”.

Denoting mean and standard deviation by μ and σ , a threshold report numbers (τ) can be established as:

$$\tau = \mu - \sigma$$

The threshold is a reporting characteristic of an aerodrome. If the subsequent daily number of reports meets or exceeds the threshold, it is considered “regular”. The daily regularity index for a bulletin can be expressed as:

$$V_{bul\ regularity} = \frac{\text{No of aerodromes for which the number of reports equals or exceeds the threshold}}{\text{No of aerodromes required in the bulletin}}$$

The **threshold** is the number of reports provided by the aerodrome which is considered “regular.” This number is defined by calculating the

statistics (mean and standard deviation) of the number of reports provided by the aerodrome within a time frame e.g., a period of 6 months, 1 year, or 5 years.

No of aerodromes which the number of reports exceeds the threshold is the number of aerodromes which provide more than τ reports within a period of one day or 24 hours.

No of aerodromes required in the bulletin is the total number of aerodromes listed in the bulletin from which RODB should receive data from.

Procedure:

1. Calculate the threshold for each aerodrome within the RODB's responsibility by collecting the number of reports each aerodrome receives within the given time frame.
2. For each aerodrome, find the mean (average) and standard deviation (deviation from the mean), e.g., for a time frame of five days (for simplicity), VECC provides daily 10, 7, 10, 8, and 9 reports respectively, therefore, Mean = $(10+7+10+8+9)/5 = 8.8$ and Standard deviation = $\sqrt{[(10-8.8)^2 + (7-8.8)^2 + (10-8.8)^2 + (8-8.8)^2 + (9-8.8)^2] / 5} = 1.304$
3. Calculate the threshold by subtracting the standard deviation from the mean. From the above example, the threshold $\tau = 8.8 - 1.304 = 7.45$ reports.
4. For each day or the period of 24 hours, run through the aerodromes within each bulletin. Count the number of reports received from each. If the number exceeds τ , then that aerodrome receives one point, else zero point. Add up the points of each aerodrome to obtain the No of aerodromes which the number of reports exceeds the threshold.
5. For each day or the period of 24 hours, obtain the number of aerodromes required in the bulletin.
6. For each day, calculate the regularity index by taking the ratio of the number of aerodromes which the number of reports exceeds the threshold (calculated in 4) and the number of aerodromes required in the bulletin (calculated in 5).
7. To calculate monthly regularity index, add up the daily availability index (calculated in 3) of all the days in a month and divide by the number of days in month, e.g., $6/6 + 6/6 + 6/6 + 5/6 + 4/6 + 6/6 + \dots + 2/6 \Rightarrow$ (31 elements for 31 days).
8. Alternatively, to calculate monthly availability index, add up the number of aerodromes which the number of reports exceeds the threshold (calculated in 4) for all the days in a month and divide by the number of aerodromes required in the bulletin (calculated in 5) in that month.

Example 3:

Bulletin SAIN33 continued from example 1.

Aerodrome	Threshold
VECC	10 reports
VEPT	10 reports
VGEG	10 reports
VGHS	10 reports
VNKT	10 reports
VQPR	10 reports

If on the 2nd and 15th of March, the RODB does not receive reports from VQPR and on 15th of March, the RODB does not receive reports from VGEG. On any other days, all the aerodromes provided more than 10 reports. Calculate the regularity index for Bulletin SAIN33 in March.

Answer:

No. of aerodromes required in the bulletin = 6 aerodromes *31 days = 186

No of aerodromes which the number of reports exceeds the threshold
= (6 aerodromes*29 days) + (5 aerodromes*2 days)
= 174 + 10 = 184

March regularity index = 184/186 = 0.9892

2.2 Monitoring of non-scheduled OPMET data

2.2.1 Monitoring of non-scheduled OPMET data should be executed for FK, FV, WC, WS, and WV types of bulletins.

2.2.2 The monitoring results should be presented in bulletin-oriented format, one line per bulletin indicating the abbreviated header (TTAAii CCCC YGGgg), the FIR/UIR where applicable, receipt time and originator.

2.2.3 Example non-routine OPMET monitoring result file formats:

TT	AAii	CCCC	YYGGgg	FIR/UIR	Rx Time	Origin
WS	PF21	NTAA	271004	NTTT	271004	NTAAYMYX
WS	IN90	VIDP	271000	VIDP	271007	VECCYMYX
WS	BW20	VGZR	271100	VGZR	271030	VGZRYMYX
WS	CI31	RCTP	271150	RCTP	271150	RCTPYMYX
WS	MS31	WMKK	272013	WBFC	272013	WMKKYMYX
WS	CI35	ZGGG	272225	ZGZU	272228	ZGGGYZYX
FV	AU01	ADRM	270323		270330	YMMCYMYX
FK	PQ30	RJTD	270500		270504	RJTDYMYX

Explanation of the table:

- TT: Type of bulletin FK, FV, WC, WS, WV
- AAii: Bulletin ID
- CCCC: Compiling Station
- YYGGgg: Standard time of report
- FIR/UIR: ICAO Location indicator of the FIR/UIR or blank (4 spaces) as applicable

- *RxTime: Time of receipt*
- *Origin: Originator address.*

2.2.4 Analysis of Monitoring Results:

2.2.4.1 Each RODB collects and analyses the relevant result in order to determine the effectiveness and suitability of the quality management system and to highlight any possible improvement to ICAO Regional Office, Bangkok.

2.3 Examples of Monitoring Results – PI Measurements

The following tables show values of Compliance, Availability and Regularity Index for ASIA/PAC OPMET bulletins compiled by the Singapore RODB in March 2005:

TABLE A	ROBEX Compliance Index		
	SA	FT	FC
AE31 VECC	0.81	--	
AS31 VABB	---	0.99	
AS31 VTBB	0.96	0.99	
SA32 VABB	--	0.98	
AS32 VTBB	--	0.85	
AU31 YBBN	1.00	0.99	0.97
AU32 YBBN	0.98	0.94	
BN31 OBBI	0.96	0.92	
BN32 OBBI	0.94	0.95	
CI31 ZBBB	0.99	0.99	
CI32 ZBBB	0.99	0.99	
CI41 ZBBB	0.93	0.99	
EG31 HECA	--	0.85	
HK31 VHHH	0.99	0.99	1.00
ID31 WIII	0.74	--	
IN31 VIDP	--	0.97	
IN31 VABB	0.74	--	0.97
IN32 VIDP	0.73	--	
IR31 OIII	0.84	0.93	
JP31 RJTD	1.00	1.00	1.00
JP32 RJTD	1.00	1.00	1.00
KO31 RKSI	1.00	0.96	
ME31 OLBA	--	0.86	
MS31 WMKK	1.00	--	
NZ31 NZKL	0.95	1.00	
PK31 OPKC	0.91	0.80	
SB31 VCCC	0.97	--	
SD31 OEJD	0.95	--	
SR31 WSSS	--	0.98	0.99
SR32 WSSS	--	1.00	
TH31 VTBB	0.67	1.00	
TH32 VTBB	0.76	0.91	
TH33 VTBB	0.75	0.94	

Note: Entry dashed out (--) means no reports of this type (SA or FT) are required

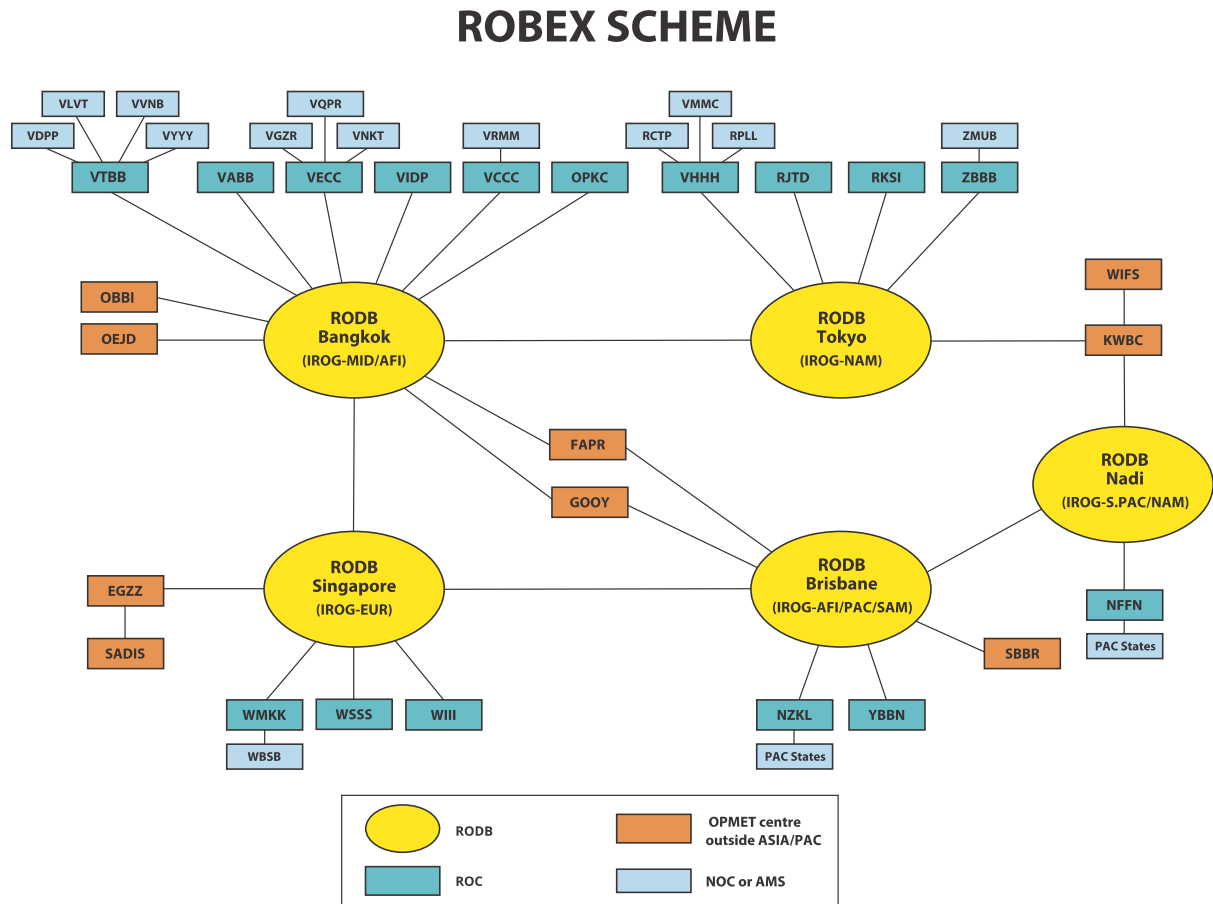
TABLE B	Availability Index		
	SA	FT	FC
AE31 VECC	0.98	--	
AS31 VABB	--	1.00	
AS31 VTBB	0.99	1.00	
SA32 VABB	--	0.99	
AS32 VTBB	--	0.96	
AU31 YBBN	1.00	1.00	1.00
AU32 YBBN	1.00	1.00	
BN31 OBBI	1.00	1.00	
BN32 OBBI	1.00	0.99	
CI31 ZBBB	1.00	1.00	
CI32 ZBBB	1.00	1.00	
CI41 ZBBB	1.00	1.00	
EG31 HECA	--	1.00	
HK31 VHHH	1.00	1.00	1.00
ID31 WIII	0.98	--	
IN31 VIDP	--	1.00	
IN31 VABB	1.00	--	1.00
IN32 VIDP	0.98	--	
IR31 OIII	1.00	1.00	
JP31 RJTD	1.00	1.00	1.00
JP32 RJTD	1.00	1.00	1.00
KO31 RCSI	1.00	1.00	
ME31 OLBA	--	0.99	
MS31 WMKK	1.00	--	
NZ31 NZKL	--	1.00	
PK31 OPKC	1.00	0.99	
SB31 VCCC	1.00	--	
SD31 OEJD	1.00	--	
SR31 WSSS	--	1.00	1.00
SR32 WSSS	--	1.00	
TH31 VTBB	0.97	1.00	
TH32 VTBB	0.88	1.00	
TH33 VTBB	0.83	1.00	

TABLE C	Regularity Index		
	SA	FT	FC
AE31 VECC	0.86	--	
AS31 VABB	--	0.96	
AS31 VTBB	0.93	0.96	
AS32 VABB	--	0.96	
AS32 VTBB	--	0.96	
AU31 YBBN	0.90	0.90	0.96
AU32 YBBN	0.93	0.91	

MET SG/24
Appendix 10 to the Report

BN31 OBBI	0.93	0.94	
BN32 OBBI	0.82	0.89	
CI31 ZBBB	0.96	0.94	
CI32 ZBBB	0.93	0.91	
CI41 ZBBB	0.94	0.97	
EG31 HECA	--	0.77	
HK31 VHHH	0.93	0.97	0.85
ID31 WIII	0.92	--	
IN31 VIDP	--	0.84	
IN31 VABB	0.84	--	0.97
IN32 VIDP	0.88	--	
IR31 OIII	0.71	1.00	
JP31 RJTD	1.00	1.00	1.00
JP32 RJTD	1.00	1.00	1.00
KO31 RKSI	0.84	1.00	
ME31 OLBA	--	0.97	
MS31 WMKK	0.98	--	
NZ31 NZKL	0.82	1.00	
PK31 OPKC	0.84	0.97	
SB31 VCCC	0.96	--	
SD31 OEJD	0.89	--	
SR31 WSSS	--	0.99	0.95
SR32 WSSS	--	0.99	
TH31 VTBB	0.92	1.00	
TH32 VTBB	0.85	0.96	
TH33 VTBB	0.89	0.94	

APPENDIX G - ROBEX Scheme Diagram



APPENDIX H – RODB OPMET Interrogation Procedures

This Appendix describes the standard interrogation procedures for access to the designated Regional OPMET Databanks (RODB) in the ASIA/PAC Region. This information was previously provided in the ASIA/PACIFIC OPMET DATA BANKS INTERFACE CONTROL DOCUMENT.

Note: The provision by RODBs of facilities for request/response type of access to the stored OPMET data is primarily for users to obtain non-regular or occasional information and is not intended for routine requests which should be arranged through the efficient implementation of predetermined, regular OPMET exchange.

REQUEST/REPLY MESSAGE FORMAT

1. Request messages

- 1.1 Request messages should follow the AFTN standard telecommunication procedures as defined in Annex 10, Volume II. The text part of the messages should be as defined in this Appendix.

Note: The standard AFTN message start and end characters and alignment characters (SOH, STX and ETX for ITA-5 format or ZCZC and NNNN for ITA-2 format) have been omitted for clarity in the following examples.

- 1.2 Request messages should use the AFTN priority **GG**.

- 1.3 The general format of the request message is as follows:

```
GG xxxxYZYX
YYGGgg yyyyyyyy
RQM/TTCCCC,(report(s)).../TTAAii, (bulletin(s))...=
RQM/TTCCCC,(report(s)).../TTAAii, (bulletin(s))...=
....
```

The meaning of the groups and symbols in the request message is as follows:

- 1.3.1 In the AFTN heading:

GG	priority indicator
xxxxYZYX	AFTN address of the databank
YYGGgg	date-time group specifying the filing time of the request message
yyyyyyyy	AFTN address of the originator of the request

1.3.2 Each data request line is composed of the following elements:

RQM/	indicates the start of a data request line
TT	WMO data type identifier (<i>refer to 2.7</i>)
CCCC	4-letter location indicator (as per <i>ICAO Doc 7910 – Location Indicators</i>)
	or
AAii	bulletin identifier (<i>WMO manual 386, table C1 for AA</i>)
=	indicator of the end of a request line.

1.3.3 Delimiters can be used within a request line as follows:

, indicates more requests for reports or bulletins for the same data type or different data types for one location;
/ indicates a new data type request within the same data request line.

1.3.4 The length of the request line should not exceed 69 characters including 'RQM' and the '=' signal. Up to ten request lines can be included in one AFTN request message, unless otherwise specified by the RODB.

1.3.5 Examples of request types

1.3.5.1 *Request for one data type at one location*

The format of the request line to obtain one meteorological data type for one location is as follows:

RQM/TTCCCC=

Examples:

1. RQM/SAYSSY=
2. RQM/FCWSSS=

1.3.5.2 *Request for one data type at two or more locations*

The format of the request line to obtain one meteorological data type for two or more locations is as follows:

RQM/TTCCCC₁,CCCC₂,.....,CCCC_n=

Note: Up to ten locations can be included in a request line.

Examples:

1. RQM/SAYSSY,YBBN,YMML=
2. RQM/FTNZAA,NZCH=

1.3.5.3 *Request for two or more data types at one location*

The format of the request line to obtain two or more meteorological data types for one location is as follows:

RQM/TT₁CCCC,TT₂,.....,TT_n=

Examples:

1. RQM/SAYMML,FC=
2. RQM/FTNFFN,SA,WC=

1.3.5.4 ***Request for different data types at different locations***

The format of the request line to obtain different meteorological data types for a number of locations is as follows:

**RQM/TT₁CCCC,CCCC,.../TT₂CCCC,CCCC,.../...../TT_nCCCC,CCCC,
...=**

Example:

1. RQM/SAYSSY/FCYBBN,YMML/FTYMML=

1.3.5.5 ***Request for a meteorological bulletin***

The format of the request line to obtain a Meteorological Bulletin is as follows:

RQM/TTAAii=

Examples:

1. RQM/FTAE31=
2. RQM/SATH33=

Note: Only one bulletin can be requested in a RQM request line. Up to six bulletins can be included in a request message

2. **Reply messages**

- 2.1 If the AFTN address of the originator of a request is authorised, the databank should automatically reply to the AFTN originator address given in the request message.
- 2.2 Valid requests for bulletins and/or messages should produce an answer, which should be returned in a standard WMO bulletin format embedded as text in a standard AFTN message. Each bulletin should be sent as a separate message.
- 2.3 For valid requested bulletin or message(s) belonging to the same type and concerning valid stored messages, one or more reply bulletins should be generated. Non-valid requested groups should be replied by an appropriate *Information* or *Error* reply message.
- 2.4 In preparing the reply messages by the RODBs the following should apply:

2.4.1 A reply to a METAR request should consist of the latest METAR and/or SPECI reports available for the requested station.

2.4.2 When a request for SIGMET of any type (WS, WC or WV) is received, the reply should contain all valid WS, WV and WC SIGMETs that are available for the FIR concerned.

2.5 **Format of the reply message**

2.5.1 The WMO abbreviated heading of a reply message will be constructed as:

TTAAii CCCC YYGGgg

where,

TT	the requested (e.g., SA)
AA	XX : fixed geographical designator for database reply or as specified by the RODB
ii	99 : fixed bulletin number for database reply or as specified by the RODB
CCCC	location indicator of the reply database (e.g. VTBB, WSSS, etc.)
YYGGgg	date-time group (DTG) depending on the original DTG of the bulletin header

Note: For the issuing time of TAF and the observation time of METAR the user should refer to the DTG in the reports, which might be different from the DTG in the header.

Example:

SAXX99 VTBB 031200
METAR CCCC 031200Z ...
METAR CCCC 031200Z ...
...

2.6 **Format of the *Information* and *Error* reply messages**

2.6.1 RODBs send to the originator of the request an *Information* or *Error* message when a RODB is not in a position to send back valid OPMET data.

2.7 **OPMET Data Types**

The following meteorological data types, as defined by the WMO data designator indicator, are stored and available on request from the RODBs:

TT	Message Type
SA	METAR
SP	SPECI
FT	12 to 30 HR TAF
WS	SIGMET
WC	Tropical Cyclone SIGMET

MET SG/24
Appendix 10 to the Report

WV	Volcanic Ash SIGMET
FV	Volcanic Ash Advisory (VAA)
FK	Tropical Cyclone Advisory (TCA)

APPENDIX I - ROBEX FOCAL POINTS

State/ ADMINISTRATION	NAME/DESIGNATION AND ADDRESS	Tel/Fax/e-mail
AUSTRALIA	Mr. Tim Hailes National Manager Regional Aviation Weather Services Weather Policy Branch Australian Bureau of Meteorology GPO Box 1289 Melbourne VIC 3001	Tel: +61 (0) 3 9669 4273 Fax: +61 (0) 4 2784 0175 e-mail: tim.hailes@bom.gov.au , sral@bom.gov.au
	Mr. Pierre Kemmers AIS Business Manager Airservices Australia GPO Box 367 Canberra ACT 2601	Tel: +61 2 6268 4426 e-mail: pierre.kemmers@airservicesaustralia.com (primary) / YBBBYPYX@airservicesaustralia.com (secondary)
CHINA	Ms. ZOU Juan Meteorologist Meteorology Division Air Traffic Management Bureau Civil Aviation Administration of China (CAAC) No.12 East San-huan Road Middle Chaoyang District Beijing 100022	Tel: +86 (10) 87786826 Fax: +86 (10) 87786820 e-mail: zoujuan@atmb.net.cn
HONG KONG CHINA	Mr. Patrick Lam Senior Aeronautical Communications Supervisor, Telecommunications Unit of Air Traffic, Management Division Room 315, 3/F, Office Building, Civil Aviation Department Headquarters 1 Tung Fai Road, Hong Kong International Airport, Lantau, Hong Kong, China	Tel: +852 2910 6211 Fax: +852 2910 1160 e-mail: hhlam@cad.gov.hk
	Mr. B.L. Choy Hong Kong Observatory	Tel : +852 2926 8350 Fax : +852 2311 9448 e-mail : blchoy@hko.gov.hk
FIJI	Mr. William L. REECE Aeronautical Technical Officer – ATM Airports Fiji Limited P.O. Box 9210 Nadi Airport	Tel: +679 (6) 731198 Fax: +679 e-mail: williamr@afl.com.fj
INDIA	Shri Gajendra Kumar Scientist-E India Meteorological Dept. New Delhi	Tel: +91 (11) 2462 5547 Fax: +91 (11) 24615371 e-mail: gkumarimd@gmail.com ; gajendra71.kumar@imd.gov.in

Administration units OPMET/ROBEX

Director General of Meteorology
India Meteorological Department
Lodi Road, New Delhi – 110 003
India

INDONESIA

Mrs. Herlina
Head of Sub Division for Dissemination
of Aeronautical Meteorological Information
Indonesian Agency for Meteorology
Climatology and Geophysics
Jalan Angkasa I No.2 Kemayoran, Jakarta,
Indonesia - 10720

Tel : +62 (21) 4246321
Fax : +62 (21) 6546315
e-mail: herlina@bmkg.go.id;
herlina_270963@yahoo.com

Mrs. Ni Ketut Feny P
Staff of Sub Division for Dissemination
of Aeronautical Meteorological Information
Indonesian Meteorological Climatological
and Geophysical Agency
Jalan Angkasa I No.2 Kemayoran, Jakarta,
Indonesia - 10720

Tel : +62 (21) 424 6321
Fax : +62 (21) 6546315
e-mail : fenypermatasari@bmkg.go.id;
fenypermatasari@gmail.com

JAPAN

Mr. Kentaro Tsuboi
Scientific Officer
Information and Communications
Technology Division
Forecast Department
Japan Meteorological Agency (JMA)
1-3-4 Otemachi, Chiyoda-ku
Tokyo 100-8122

Tel: +81 (3) 3212-8341 (ext, 3283)
Fax: +81 (3) 3211 8404
e-mail: k-tsuboi@met.kishou.go.jp

MALAYSIA

Dr. Mohd Hisham Bin Mohd Anip
Senior Director
Pejabat Meteorologi Penerbangan Nasional
Tingkat 1, Bangunan Pusat Pentadbiran
Kuala Lumpur International Airport
1st Floor, Airport Management
64000 Sepang, Selangor Darul Ehsan

Tel: +60 (3) 87873360
Fax: +60 (3) 87871019/20
e-mail: hisham@met.gov.my;
tehvakumari@met.gov.my

Administration units OPMET/ROBEX

Mr. Lim Ze Hui
Assistant Director
Sabah, Tingkat 7, Wisma Dang Bandang
8800 Kota Kinabalu Sabah
Malaysia

Tel: +60 (88) 256054
Fax: +60 (88) 211019
e-mail: zhlim@met.gov.my

NEW ZEALAND

Ms. Paula Acethorp
Chief Meteorological Officer
Civil Aviation Authority of New Zealand
PO Box 3555
Wellington 6140
NEW ZEALAND

Tel: +64 4 830 2611
~~Fax: +64 4 569 2024~~
e-mail: paula.acethorp@caa.govt.nz

PAKISTAN

Mr. Abdul Sattar Bhutto (27 Nov. 19)
Senior Joint Director Com-Ops.
Communication Operations Branch
Operations Directorate
Terminal 1, HQ CAA
JIAP Karachi

Tel: +92 (21) 9907 2428
Fax: +92 (21) 9924 2187
e-mail: adld.comops@caapakistan.com.pk

Administration units OPMET/ROBEX

Senior Joint Director
Communication Operations Branch
Operations Directorate
Terminal 1, HQ CAA
JIAP Karachi

Mr. Akhlaq Ahmed
Senior Meteorologist
Meteorological Office Room No. 3106
JTC, Jinnah International Airport
Karachi

Tel: +92 (21) 9907 1300
+92 (21) 9907 1302
Fax: +92 (21) 9924 8282
e-mail: pmdmmokarachi@gmail.com

Administration units OPMET/ROBEX

Main Meteorological Office
Jinnah International Airport
Karachi

PAPUA NEW GUINEA

Mr. Tau Gabi
National Weather Service
Port Moresby
PNG

Tel:
Fax:
e-mail: tgabi@png.met.gov.pg

REPUBLIC OF KOREA

Mr. Kim Yeong-hun
Assistant Director
Aviation Meteorological Office of Korea
Meteorological Administration
(AMO/KMA)
Planning and General Affairs Division
444 Je2terminal-daero, Jung-gu
Incheon, 22382 (P.O. Box 43)

Tel: +82 (32) 222 3030
Fax: +82 (32) 740 2807
e-mail: av_pod@korea.kr;
kyh13@korea.kr

Mr. Lee Dong-Won
Assistant Director
Aviation Meteorological Office of Korea
Meteorological Administration
(AMO/KMA)
Information and Technology Division
444 Je2terminal-daero, Jung-gu
Incheon, 22832 (P.O. Box 43)

Tel: +82 (32) 222 3030
Fax: +82 (32) 740 2807
e-mail: dwlee5@korea.kr

Administration units OPMET/ROBEX

Aviation Meteorological Office of Korea
Meteorological Administration
(AMO/KMA)
444 Je2terminal-daero, Jung-gu
Incheon, 22382 (P.O. Box 43)
(Location Indicator : RKSIPYX)

SINGAPORE

Mr Chow Kwok Wah
Principal Meteorologist, Central Forecast
Office
P.O. Box 8
Singapore Changi Airport
Singapore 918141

Tel: +65 6542 4715
Fax: +65 6542 7192
e-mail: chow_kwok_wah@nea.gov.sg

Administration units OPMET/ROBEX

Central Forecast Office/Weather Services
Department
P.O. Box 8
Singapore Changi Airport
Singapore 918141

SRI LANKA

Mr. E. S. Silva
Meteorologist in charge
Katunayake International Airport
Colombo
Sri Lanka

Tel: +94 11 2252721
Fax: +94 11 2252319
e-mail: meteo3@sltnet.lk

THAILAND

Ms. Sujin Promduang
Director, Aeronautical Information and
Flight Data Management Centre
Aeronautical Radio of Thailand Ltd.,
102 Soi Ngamduplee, Tunkmahamek
Sathorn, Bangkok 10120

Tel: +66 (2) 2859083
Fax: +66 (2) 2878645
e-mail: sujin@aerorhai.co.th

Mr. Somchai Yimsricharoenkit
Head of Aeronautical Meteorology
Civil Aviation Authority of Thailand
333/105 Lak Si Plaza
Khamphaeng Phet 6 Road
Talat Bang Khen, Lak Si
Bangkok 10210

Tel: +66 (2) 568 8825
Fax: +66 (2) 568 8847
e-mail: somchai.y@caat.or.th

USA

Mr. Walter Smith
National Weather Service

Tel: +1 (301) 427 9618 Ext. 139
Fax: +1 (301) 713 1409
e-mail: Walter.Smith@noaa.gov

Mr. Michael (Pat) Murphy
Federal Aviation Administration

Tel: +1 (202) 267 2788
e-mail: michael.murphy@faa.gov

Karen Shelton-Mur
Federal Aviation Administration

Tel: +1 (202) 267 7985
e-mail: Karen.shelton-mur@faa.gov

INTERNATIONAL CIVIL AVIATION ORGANIZATION



**ASIA/PACIFIC REGIONAL GUIDANCE
FOR
TAILORED METEOROLOGICAL INFORMATION AND SERVICES
TO SUPPORT AIR TRAFFIC MANAGEMENT OPERATIONS**

Second Edition, XX 20xx

Adopted by MET SG/xx in xx 20xx

RECORD OF AMENDMENTS AND CORRIGENDA

Amendments			
No.	Date of issue	Date entered	Entered by

Corrigenda			
No.	Date of issue	Date entered	Entered by

TABLE OF CONTENTS

1. Introduction	5
1.1 Purpose and overview of the guidance	5
1.2 Development of the regional implementation guide	5
1.3 Importance of ATM-tailored MET information and services	5
1.4 Historical backgrounds	6
2. Implementation procedures.....	6
2.1 Preparatory phase (processes toward implementation)	6
2.2 Operational phase (processes for continuous improvement).....	8
3. MET information and services in support of ATM.....	9
3.1 Participation of MET organizations in CDM	9
3.2 Weather briefing in support of ATM.....	9
3.3 ATM-tailored meteorological information	10
3.4 Information and products developed for other use	10
3.5 Means of provision	10
4. Future progress in MET/ATM services.....	11
4.1 Global Air Navigation Plan (GANP).....	11
4.2 Future integration of MET information into ATM decision-making	11
4.3 Next generation air transportation system developments	11

1. Introduction

1.1 Purpose and overview of the guidance

1.1.1 This guidance aims to foster States' implementation and enhancement of meteorological (MET) information and services for air traffic management (ATM)¹ within Asia/Pacific (APAC) region.

1.1.2 The guidance captures most of the necessary processes from preparatory to operational phases. Furthermore, it provides detailed operational services, with specific examples and an operational scenario on ATM-tailored MET information and services. Information in this guide can also be used to facilitate further improvement by the States who have already implemented ATM-tailored MET services.

1.1.3 A stepwise (process-wise) structure of the guidance is expected to allow each State to refer to chapters, sections or subsections useful for the commencement, implementation or improvement of its MET information and services to support effective ATM.

1.2 Development of the regional implementation guide

1.2.1 ICAO APAC Meteorological Requirements Task Force (MET/R TF) 4th meeting, held in July 2015 in Tokyo, noted that so-called 'ATM-tailored' MET information, when provided to support international air navigation, is still required to comply with the Annex 3 - *Meteorological Service for International Air Navigation*, 'General Provisions'. However, the detailed technical specifications for the information has not yet been specified in Annex 3. The meeting also noted that specific regional guidance material is necessary to assist States in developing and implementing tailored meteorological information and services to support effective ATM and agreed to develop the regional guidance material.

1.2.2 An ad-hoc group consisting of Australia, China, Hong Kong, China, Japan (rapporteur), New Zealand, Republic of Korea, Singapore, Thailand and Vietnam was tasked to develop a regional guidance material for tailored meteorological information to support ATM operations.

1.2.3 Detailed historical background of efforts for implementation and enhancement of MET information and services for ATM in APAC Region is described in section 1.4.

1.3 Importance of ATM-tailored MET information and services

1.3.1 With unprecedented growth in air traffic movements in the Asia/Pacific Region, ATM is paramount for the continued assurance of safe, efficient and timely aircraft operations. Recognizing the importance, various States have continued to evolve their ATM systems and procedures to meet the growing demand and to maintain safety as the priority. Additionally, neighbouring States are increasingly collaborating on activities such as Air Traffic Flow

¹ Note. ATM is defined in PANS-ATM (Doc 4444) as follows:

The dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management – safely, economically and efficiently – through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.

Management (ATFM²), which are enhanced by the incorporation of dedicated support from MET services.

1.3.2 Information sharing and collaborative decision-making (CDM) by relevant stakeholders are indispensable for the successful provision of effective and efficient ATM. Aircraft operations are influenced by atmospheric conditions and meteorological phenomena, and so adverse conditions can have a significant impact on ATFM planning and provision.

1.3.3 In APAC, we experience diverse weather features on a daily basis as the region is influenced by climates varying from tropic to sub-polar and is further complicated by geography including both broad land masses and wide oceanic areas. It is therefore critical that the region's ATM, and particularly ATFM operations are supported by tailored MET information and services to ensure safe, efficient and orderly aircraft operations.

1.4 Historical backgrounds

1.4.1 Since ICAO endorsed the *Global Air Traffic Management Operational Concept* (GATMOC, Doc 9854) in 1996, States have worked on the enhancement of ATM. In the APAC Region, since the late 1990s, ATM (and ATFM) has evolved significantly in many States. Subsequently, tailored MET information and services has been recognised as critical information for the effective provision of ATM and subsequently has been incorporated as part of the strategic and tactical ATM operations of those States. For example, in Japan, the Air Traffic Meteorology Center (ATMetC) of the Japan Meteorological Agency (JMA) was established in February 2006, as a specialized MET service provider for the Air Traffic Management Center (ATMC) of the Japan Civil Aviation Bureau (JCAB).

1.4.2 In 2001, the ICAO APANPIRG Communications/Navigation/Surveillance and Meteorology Sub-Group (CNS/MET SG) formed the MET/ATM Task Force (TF) to facilitate regional implementation of meteorological services in support of ATM. The first Regional MET/ATM Seminar was held at the ICAO Regional Office in Bangkok, Thailand, in February 2006. In order to enhance regional implementation, in 2009, APANPIRG agreed to call for the 1st meeting of the MET/ATM TF to plan the 2nd Regional MET/ATM Seminar and TF Meeting in the 2010 timeframe. In February 2011, the Seminar and the 2nd meeting of the TF were held in Fukuoka, Japan, where experts from MET, ATM and other international organizations in the APAC region gathered to discuss their plans and best practices on the development and implementation of meteorological services in support of ATM. The meeting also included a technical tour to the ATMetC to provide an example of the collaborative work undertaken between MET and ATM organisations. Subsequent TF meetings, and later the MET/R Working Group, successor to the MET/ATM TF, continued the important work of developing regional guidance to assist Asia/Pacific States with implementation or improvement of MET information and services to support ATM.

2. Implementation procedures

2.1 Preparatory phase (processes toward implementation)

² Note. ATFM is defined in PANS-ATM (Doc 4444) as follows:

A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible, and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

2.1.1 Communication channel establishment

2.1.1.1 The most important step in the implementation of ATM-tailored MET information and services is to establish a good communication channel for mutual collaboration between MET and ATM organizations through periodic meetings, tours to each operation room and so on. To develop and facilitate an implementation plan, it would be useful to exchange views and information and build mutual understanding of each other's services, through regular consultations and meetings with clear focus.

2.1.1.2 In addition, consultation with collaborative decision-making (CDM) stakeholders from the initial stage will be desirable for smoother and better planning. This will further assist in the implementation process, given that CDM is an essential element in the ATM operational concept and concerned parties including airspace users³, such as major airlines, are encouraged to participate in CDM.

2.1.2 Service Identification

2.1.2.1 Understanding ATM and aircraft operations

ATM operations vary in each State depending on its technical capabilities and characteristics of their responsible airspace. Better understanding of the State's ATM system is necessary to determine the scope of MET information and services to support ATM. This aspect will assist in understanding the local ATM requirements and determining the most appropriate process.

Additionally, procedures for aircraft operations adopted by airlines are also important in defining ATM-tailored MET information and services. The safety and efficiency of aircraft operations are fundamentally dependent on weather conditions. For example, each aircraft has maximum crosswind threshold values for take-off and landing. Adverse weather conditions may force aircraft to fly irregular flight routes and conduct unusual operations, which could result in significant diversion from the normal and planned distribution of air traffic. In this context, understanding aircraft operational procedures is helpful in designing a *fit-for-purpose* MET information and services.

2.1.2.2 Past Events and Case Studies

Investigation of MET-related impacts on air traffic flow is essential to determine what kind of MET information and services are required to effectively support ATM. One practical approach, in cooperation with airlines, is to compare operational records (including causes of delay, if available) with past weather data.

Once ATFM is implemented, focus could be on more direct ways to use the flow management records in the ATFM process in addition to the aircraft operations records for the comparison with past MET data.

2.1.2.3 Service proposal (Proposal from MET organization)

Through the process mentioned in 2.1.2.1 and 2.1.2.2, it is expected to obtain better understanding of the ATM processes based on aircraft operational procedures and possible weather impact on air traffic flow. The next step would be to develop a draft plan for MET information and services in support of ATM and to provide a proposal to the ATM organization. The proposed plan could be conceptual process with specific explanation and prototypes of MET information or services, should be sought on the proposal.

2.1.2.4 Service development (Requirements from ATM organization)

³ Note. Airspace users is defined in *Global Air Traffic Management Operational Concept (GATMOC)* (Doc 9854) as follows;

The term airspace users mainly refers to the organizations operating aircraft, and their pilots.

With the feedback from the ATM organization described in 2.1.2.3, the MET and ATM organisations could modify and make necessary changes to the proposed plan. This will ensure that both parties (MET and ATM) are aware of the requirements and limitations and are able to adopt a practical plan for the region.

This would be an iterative process, until the proposed plan for MET information and services becomes matured.

2.1.2.5 Service definition

Once the proposed plan is mature, the provision of MET information and services in support of ATM can be formalized. The plan should also describe how the ATM tailored MET products will be utilised in conjunction with the other MET products, are made available to the airspace users in a timely fashion so that all stakeholders are in possession of the same information at the same time. It may be that bespoke MET information solutions, tailored to the specific ATM service provider, are also made available to the airspace users as part of CDM arrangements.

2.1.3 System development: The next step is to develop a system and associated software applications necessary to provide ATM-tailored information and services defined in section 2.1.2.5.

2.1.4 Trial run of the system and service: It is essential to conduct a trial of the system and procedures to test secure delivery of the defined MET information and services. If any issues are identified through the trial, they should be resolved through close consultation with the stakeholders concerned (mainly the ATM organizations), before the service becomes operational. In addition, the trial process will assist in determining the system reliability. The outcomes of the trial and lessons learnt should be well documented to assist with future requirements.

2.1.5 Service provision agreement: In parallel with the system development, to ensure that continuous provision of the defined MET information and services is maintained, it is important to formalize a written agreement (or to amend an existing agreement, if applicable) between the MET and ATM organizations. The Agreement should include the MET and ATM capabilities, and outline the operational processes, the working relationship and the communication channels. When such an agreement is later implemented with airlines or other stakeholders, existing agreements should also be amended accordingly.

2.2 Operational phase (processes for continuous improvement)

2.2.1 Operational trial: Before MET information and services are provided operationally, an operational trial should be conducted so that forecasters and ATM officers can familiarize themselves with the provision and usage of the new information and services. The trial period should be set based on agreement between the parties concerned. A post implementation of the operational trial should be conducted to ensure lessons learned from the process are documented and improvements are made prior to implementation.

2.2.2 Provision of MET information and services: MET information and services developed according to the process described in 2.1 are provided to ATM officers in accordance with the service provision agreement between the MET and ATM organizations.

2.2.3 Verification and evaluation: After the implementation of ATM-tailored MET information and services, it is required (i) to regularly verify and evaluate its quality to ensure that it practically supports ATM and (ii) to improve MET information and services.

2.2. Continuous improvement: Regular evaluation meetings between relevant parties such as airspace users, ATM and MET organizations are one of the basic approaches to continuously improve the implemented information and services. When a meteorological condition has a significant impact on ATM, it is also recommended that stakeholders conduct a post-event analysis to identify lessons learnt and subsequent improvements.

3. MET information and services in support of ATM

In this chapter, some examples of MET information and services that are effective for supporting ATM operations are discussed. As it will require budget, resources, technology, and time to introduce relevant MET information and services, some of which may not be defined in ICAO Annex 3, it is worthwhile to consider implementing them in a stepwise manner, depending on the situation in each State.

Examples of MET information and services for ATM in some States are described in Appendix 1. In addition, operational scenarios of MET/ATM collaboration, such as how MET information and services are provided to ATM officers, are described in Appendix 2.

3.1 Participation of MET organizations in CDM

3.1.1 CDM is an approach where relevant stakeholders share necessary information in order to make decisions collaboratively to enable enhanced ATM operations. This process involves a collaboration of stakeholders to generate products suitable for better pre-tactical traffic management strategies and optimised use of available capacity. The expected role of a MET organization in CDM is for aviation forecasters with an understanding of the effects of meteorology on ATM to provide necessary meteorological information at and around relevant aerodromes and air routes in a timely manner.

3.1.2 To achieve effective CDM, aviation forecasters should have a basic understanding of ATM and Air Traffic Control (ATC) procedures, such as, inter alia, runway weather minima and aircraft operating criteria so that they would be able to foresee aviation impacting weather and provide appropriate briefings to ATM and ATC in a timely manner.

3.1.3 Where an event or phenomena has a significant impact on normal air traffic flows (e.g.: mass deviation of aircraft), it is vital to ensure that common situational awareness is maintained at all times among affected stakeholders. Rapid identification of the possible cause of such a situation (e.g. adverse meteorological conditions, runway closure) allows both ATM and MET organizations to take immediate action in a collaborative manner to mitigate the impact.

3.2 Weather briefing in support of ATM

3.2.1 Direct weather briefings for ATM officers is an effective method to share current and expected weather assessments in and around major aerodromes and air routes, including any expected impacts on aircraft operation and air traffic flow.

3.2.2 Regular weather briefings in support of ATM may be provided several times per day. Depending on rostered shift arrangements in ATC centres, MET briefings may be scheduled for groups of controllers just prior to commencing their operational duty.

3.2.3 Where unexpected weather phenomena may affect aircraft operation and/or air traffic flow, or the actual weather deviates significantly from that forecast, a special briefing should be provided by aviation forecasters. Special briefings can be either proposed by aviation forecasters or requested by ATM officers.

3.3 ATM-tailored meteorological information

3.3.1 Impact-based weather information

3.3.1.1 Tailored MET information that shows possible impact on air traffic flow (e.g. when and where the weather phenomenon affects air traffic flow) can be useful to support the management of air traffic capacity in each ATC sector and execution of air traffic flow controls.

3.3.1.2 Information that is relevant to the impact to air traffic flow will be extremely valuable; for example, a probabilistic forecast of impact to ATFM may provide a quantitative estimate of reduction in air traffic capacity. To develop such *impact-based* information, consensus among stakeholders has to be developed regarding relationships between specific meteorological conditions and their possible impacts on air traffic flow.

3.3.2 Information for common situational awareness

3.3.2.1 It would be helpful for ATM representatives and other relevant stakeholders to understand the background of relevant meteorological conditions (e.g. occurrence process and characteristics), as well as the associated forecast confidence, which would facilitate risk assessment to enable more effective and efficient ATM operations. It is desirable to provide relevant graphical information which can explain meteorological conditions effectively, such as pressure distribution charts, weather radar and satellite imagery, and/or weather advisories with simple associated descriptions.

3.4 Information and products developed for other use

3.4.1 Existing meteorological information may also be useful to support ATM. Some examples are listed below.

- ➔ OPMET information
- ➔ Volcanic ash advisory (VAA) and tropical cyclone advisory (TCA)
- ➔ WAFS products (Wind and Temperature (WINTeM) chart, SIGWX chart and gridded global forecast of wind, temperature, cumulonimbus clouds, icing and turbulence)
- ➔ Real-time observational data at congested aerodromes
- ➔ Weather radar imagery
- ➔ Specific phenomena based information, such as Thunderstorm and lightning information
- ➔ Satellite imagery and derived products
- ➔ Nowcasting products
- ➔ Numerical weather prediction data and derived products
- ➔ Earthquake and tsunami information
- ➔ Space weather

3.5 Means of provision

3.5.1 Dedicated information sharing system

3.5.1.1 To facilitate CDM, information sharing among all relevant stakeholders in MET and ATM is necessary, to ensure common situational awareness is maintained. In order to support ATM operations, a system should be acquired or developed which enables ATM officers to utilize MET information at any time. Similarly, aviation forecasters need an environment through which they can look at ATM-related information to provide appropriate MET information. It is thus required that dedicated systems for information sharing between MET

and ATM organizations be established, so that ATC officers and aviation forecasters can effectively exchange information operationally.

3.5.2 Means of communication

3.5.2.2 Listed below are some examples of how ATM stakeholders can communicate and share necessary information.

- ➔ The aeronautical fixed service (i.e. AFTN/AMHS)
- ➔ Hotline (direct phone line)
- ➔ Web-chatting system
- ➔ Telephone or video conference system
- ➔ Use of common CDM software/application
- ➔ Joint use of an operation room
- ➔ Information sharing web-portal

4. Future progress in MET/ATM services

4.1 Global Air Navigation Plan (GANP)

4.1.1 In 2014, the 38th Session of the ICAO Assembly amended the Global Air Navigation Plan (GANP) and formulated the Aviation Systems Block Upgrades (ASBUs), the implementation plan of the GANP, as proposed by the twelfth ICAO Air Navigation Conference (AN-Conf/12). The ICAO Meteorology Panel (METP) was established in September 2014 is tasked with providing standard and recommended practices for MET information and services in support of ATM for the terminal area and in line with the aviation system block upgrades (ASBU).

4.1.2 In the future, States in a position to do so would be required to provide ATM-tailored MET services based on globally consistent requirements. Since this global standardization is being welcomed among users such as airlines and pilots, the States in the APAC Region may adapt their systems accordingly when such standards are available.

4.2 Future integration of MET information into ATM decision-making

4.2.1 The ICAO Air Traffic Management Requirements and Performance Panel (ATMRPP), in coordination with the METP and other panels concerned, has discussed future integration of MET information into ATM decision-making system, along with the Global Air Traffic Management Operational Concept (GATMOC) (ICAO Doc 9854). The “Concept for the integration of Meteorological information for ATM” has been developed by the ATMRPP and other bodies concerned. It provides guidance on methods and procedures to interpret MET information as it relates to possible constraints on air traffic flow. It supports estimation of the potential impact of the meteorological condition to ATM and provides ATM officers with possible actions to be taken, e.g. selecting the safest routes while minimising diversions.

4.3 Next generation air transportation system developments

4.3.1 To deal with growing air traffic congestion, some States or Regions have been planning the development of next generation air transportation systems. These include NextGen (United States), SESAR (Europe) and CARATS (Japan). It is important for MET organizations to make the best effort to improve their capability in the provision of MET information and services to meet such future requirements and facilitate the development of a new generation air transportation system.

References

- International Civil Aviation Organization (ICAO) Annex 3 - Meteorological Service for International Air Navigation
- Global Air Traffic Management Operational Concept (Doc 9854)
- Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377)
- Air Traffic Management (Doc 4444)
- GANP Portal (<https://www4.icao.int/ganpportal/>)

Acronyms

AN-Conf	Air Navigation Conference
APAC	Asia and Pacific region
APANPIRG	Asia/Pacific Air Navigation Planning and Implementation Regional Group
ASBU	Aviation System Block Upgrades
ATC	Air traffic control
ATFM	Air traffic flow management
ATM	Air traffic management
ATMC	Air Traffic Management Center
ATMetC	Air Traffic Meteorology Center
ATMRPP	Air Traffic Management Requirements and Performance Panel
CARATS	Collaborative Actions for Renovation of Air Traffic Systems
CDM	Collaborative Decision Making
GANP	Global Air Navigation Plan
GATMOC	Global ATM Operational Concept
ICAO	International Civil Aviation Organization
JCAB	Japan Civil Aviation Bureau
JMA	Japan Meteorological Agency
MET	Meteorological services for air navigation
MET/ATM TF	Meteorology/Air Traffic Management Task Force
METP	Meteorology Panel
MET/R WG	Meteorological Requirements Working Group
OPMET	Operational Meteorological/Meteorology
SESAR	Single European Sky ATM Research
SIGWX	Significant Weather
TCA	Tropical Cyclone Advisory
VAA	Volcanic Ash Advisory
WAFS	World Area Forecast System
WINTeM	Wind and Temperature

Appendix 1 Specific Implementation Examples

Hong Kong, China

1. **ATM-tailored MET information and services:** Under the agreement between the Hong Kong Observatory (HKO) and Civil Aviation Department (CAD), HKO provides a suite of ATM-tailored MET information and services in support of international air navigation.

1.1 Tactical Decision Products

1.1.1 Taking the opportunity of the replacement of CAD's Air Traffic Management System (ATMS), closer integration of tailored MET information with ATMS was realized to support ATC in tactical decision making. These include a) 10 layers of Constant Altitude Plan Position Indicator (CAPPI) imagery from 1 km to 10 km with range 256 km of the two Doppler weather radars in Hong Kong; and b) 1 layer of the HKO Aviation Thunderstorm Nowcasting System (ATNS) 1hr forecast for the assessment of the significant convection over HKFIR at 3 km height.

1.1.2 On the ATC console of the new ATMS, either weather radar imagery of a specific height or an ATNS forecast can be chosen to be overlaid with the aircraft indicators (Figure 1). Further details can be found in the presentation included in Joint Session ATFM/SG/7 and MET/R WG/6.

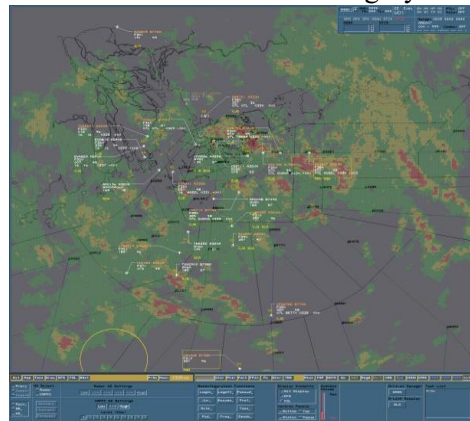


Figure 1 ATC console display showing aircraft positions overlaid on a CAPPI imagery

1.2 Meteorological Services for Terminal Area (MSTA) Products

1.2.1 The Hong Kong Air Traffic Flow Management Unit (ATFMU) of CAD regularly assesses the capacity of the Hong Kong International Airport (HKIA), which depends on both the runway and airspace capacity, in the next few hours. In collaboration with CAD, HKO has been providing tailored MSTA, grouped under the product named Significant Convection Monitoring and Forecast (Figure 2), to support ATFM operation since 2010. These are briefly summarized in the following paragraphs. Further details can be found in MET/R TF/3 WP07.

1.2.2 The suite of MSTA products to support runway capacity estimation includes amongst others, ATNS to automatically forecast the future location of weather cells that may block the intended flight path or significant points in the airspace. While forecasts of products D, E, and G in Figure 2 are generated automatically, they could be adjusted manually by Aviation Forecasters.

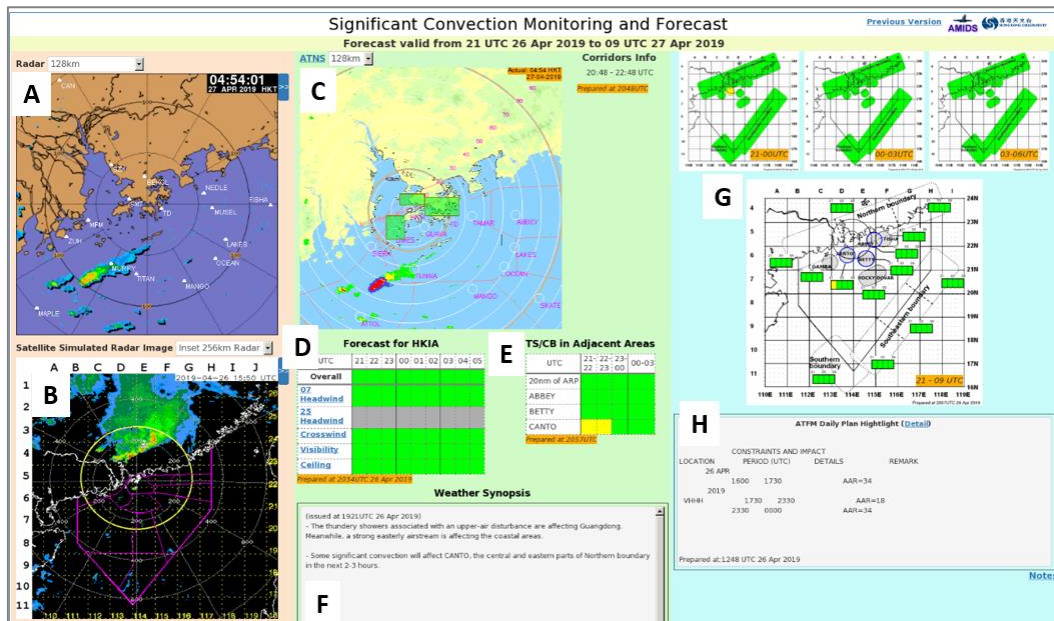


Figure 2. Integrated display of the MSTA: A) Choice of actual radar at different ranges and lightning overlays; B) Radar blended with satellite simulated radar image developed using Artificial Neural Network technology; C) 2hr convection nowcast for arrival/departure corridors by ATNS; D) 9hr performance-based weather forecast for the aerodrome; E) 6hr convection forecast around HKIA and major waypoints; F) weather synopsis around HKIA and the major waypoints; G) 12hr significant convection forecast time series for key ATC areas based on blended NWP and nowcasting outputs; and H) ATFM Daily Plan.

1.2.3 All the above products/systems use three levels of colour code to indicate the impact to air traffic, viz GREEN for mild or no impact, AMBER for medium impact and RED for significant impact. Though the actual criteria for defining the colour codes vary across different forecast products, the simple three levels of colour code are adopted uniformly in all the products described above. The Significant Convection Monitoring and Forecast also includes the latest ATFM Daily Plan issued by ATFMU after taking into account the above significant convection nowcast and forecast information as well as consultation by Aviation Forecaster via regular and ad hoc weather briefings (para.1.5 below).

1.3 Arrival Management and other Miscellaneous tailored Products

1.3.1 25 layers of gridded upper wind and temperature forecasts over HKFIR at a resolution of 0.2 degrees at hourly interval for up to 24 hours are provided to ATMS for trajectory prediction of individual aircraft and a system for aircraft arrival sequencing.

1.3.2 Apart from the above products, other major tailored products include a) Weather Summary for HKIA which includes, inter alia, local winds, radar, satellite, lightning information and lightning alert for the airport, weather synopsis, aerodrome forecast with possible alternative scenario, TAFs of nearby airports, SIGMET for the HKFIR, TC track, weather

analysis and forecast charts (Figure 3); b) HKIA Local Routine/Special Report and c) MET page showing the latest observation, data from the Automatic Meteorological Observing System, windshear alerts, forecast of HKIA and neighbouring aerodrome.

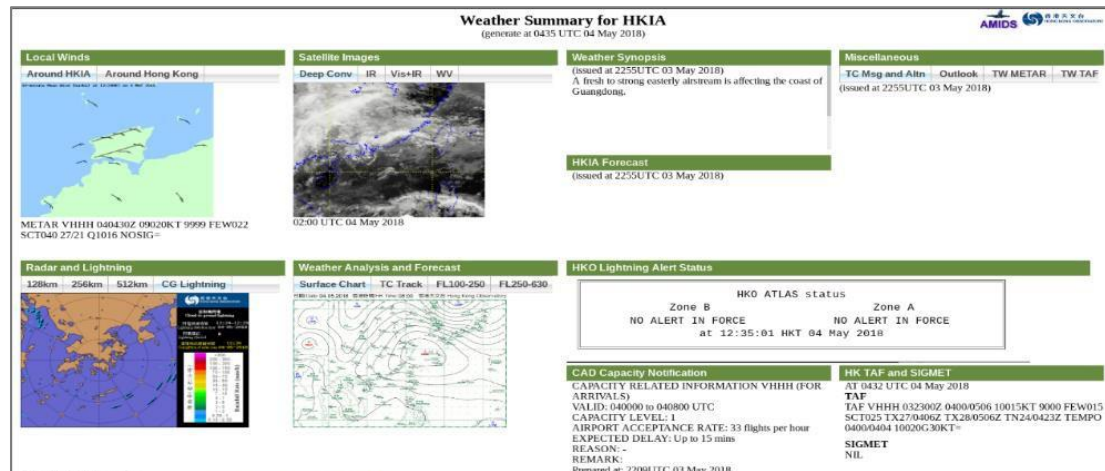


Figure 3. HKO Weather Summary for HKIA

1.4 Lightning Nowcast Products

1.4.1 For the protection of ground personnel from being injured by lightning strikes, HKO has developed the Airport Thunderstorm and Lightning Alerting System (ATLAS), a nowcasting system for detecting and nowcasting lightning activities over HKIA. The system generates RED or AMBER alerts based on either detection or forecast of cloud-to-ground lightning activities (CG). When CG is detected within 10 km or forecast to be within 5 km from the ARP, AMBER alert will be issued. When CG is detected or forecast to be within 1 km boundary of the alert zones (respectively encompass the Chek Lap Kok Island, and the majority of passenger and cargo apron), RED alert will be issued for the corresponding zone.

1.5 Integrated monitoring system for MET-ATM

1.5.1 HKO has developed two integrated monitoring pages for aviation forecasters to appreciate the weather impact on air traffic. One displays the real time aircraft positions together with weather radar (Figure 5, Left). Another one displays arrival and departure rates and any traffic interruption messages from ATIS and NOTAM (Figure 5, Right). These two pages heighten common situation awareness and enhance the communications between MET and ATM office particularly during weather briefings (para. 1.6 below).

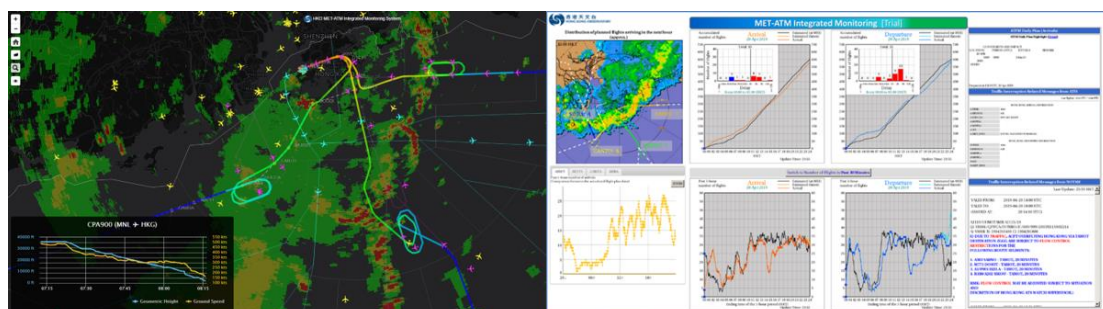


Figure 5. MET-ATM Integrated Displays showing arrival flights forced into holding patterns due to convective activities (Left) and the arrival/departure rates (Right).

1.6 Regional SIGMET monitoring

1.6.1 To support Hong Kong ATFMU's participation in Distributed Multi-Nodal ATFM Network trial operation, HKO has developed an Integrated Monitoring webpage to show real-time en-route hazardous weather within the APAC region. Information provided includes SIGMET and advisory information, as well as VONA, METAR, TAF, PIREP, global satellite imageries, radar reflectivity, lightning, numerical weather prediction data, significant convection and turbulence forecast, etc., for ATFMU's reference (Figure 6).

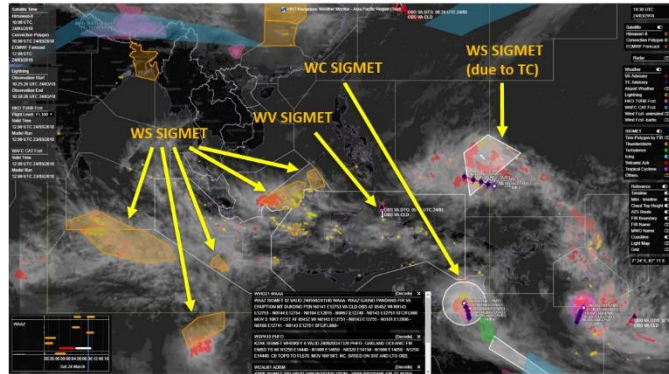


Figure 6. HKO Regional SIGMET Monitoring Page.

1.7 Weather briefing

1.7.1 HKO provides MET weather briefings to ATFMU/ATC three times a day, once in the early morning, once at noon and once in the early evening, through teleconference. The briefing mainly makes use of the MSTA products and the Weather Summary for HKIA discussed under 1.2 and 1.3.2 above. Timely updates are also provided through a hotline should there be any change in the weather conditions.

1.7.2 In preparation for adverse weather such as the approach of tropical cyclone (TC), additional weather briefings are conducted for the whole aviation community at HKIA to heighten common situation awareness and to support Collaborative Decision Making.

2. Means of Provision

2.1 The tactical decision products and the arrival management products discussed under para. 1.2 and 1.3.1 respectively are ingested directly into CAD's ATMS. Products under para. 1.3.2 b) are sent to CAD's ATS Data Management System(ATSDMS).

2.2 The rest of the products, including MSTA and miscellaneous tailored products are provided via the web-based Aviation Meteorological Information Dissemination System.

3. Other useful information

3.1 Regular high level meetings with CAD and the Airport Authority Hong Kong are held on an annual basis. Regular working level meetings with ATC are held generally a few times every year.

3.2 A Verification System has been set up for verification of both the ICAO Annex 3 and MSTA products.

Japan

1. ATM-tailored MET information and Services

1.1 ATMetC

The Japan Civil Aviation Bureau (JCAB) established the Air Traffic Management Center (ATMC) in Fukuoka in 2005 as a core organization for ATM in Fukuoka FIR. In line with ICAO's global concept for ATM, ATMC facilitates safe and efficient flight operation through ATM close cooperation with Airspace Management (ASM), Air Traffic Flow Management (ATFM) and oceanic ATM. At the same time as ATMC began operation, the Japan Meteorological Agency (JMA) established the Air Traffic Meteorology Center (ATMetC) to provide meteorological information and services in support of ATMC. ATMetC forecasters work in the same operation room as ATM officers to directly provide weather information and briefings tailored to ATM officers' needs. MET information and services specifically tailored for ATM requirements are as follows.

1.1.1 Air Traffic Meteorological Forecast (ATMet Category Forecast) (Figure 1)

- Target areas: major aerodromes and ATC sectors
- Contents: the potential for meteorological impact on air traffic flow with four color-coded categories (red, yellow, blue and white)
- Issuance time: every hour except from 14 to 16 UTC (midnight)
- Forecast time: up to 6 hours

(UTC)	02	03	04	05	06	07	08
RJCC							
RJAA			CROSS			SELT-CR	
RJTT		AC-CROSS		WIND AC-CROSS		AC-CROSS	
RJGG							
RJBB							
RJFF							
ROAH							
S01							
S02							
S03							
S04							
S31							
S34							
T01				CR			
T02							
T03				CR			
T04							
T09							
T10							
T11							
T12				CR			
T13							
T14							
T17				CR			
T21				CR			
T22				CR			
T23				CR			
T24						CR	
T26				CR			
T27				CR			
T28				CR			CR
F01				CR			
F02							CR
F03							
F05				CR			
F06							
F07							
F08							
F11				CR			
F15				CR			
F16							
F17							
N01							
N02							
N06							

Figure 1 ATMet Category

1.1.2 Briefing sheet (Figure 2)

Target: Strong wind for Tokyo (RJTT) and Heavy snow for New Chitose (RJCC)

- Contents: the probability of occurrence of impact on air traffic flow with four color-coded categories
- Issuance time: when significant weather is forecasted within 12 to 15 hours
- Forecast time: up to 16 hours

1.1.3 CDM conference

- Target areas: Fukuoka FIR and neighbor FIRs
- Providing methods: TV teleconference system
- Regular conference: 0620 and 2345 UTC
- Extra conference: As necessary (except midnight)

1.1.4 Briefing (regular/extra)

- Target areas: Fukuoka FIR
- Providing methods: Face to face or information-sharing terminal at ATM officer's desk
- Regular briefings: 0130, 0445, 0550, 0915, 1200, 1945, 2000, 2220, 2315 UTC
- Extra briefings: As necessary (24 hours)

1.2 TMAP

To deal with increasing air traffic demands in Tokyo metropolitan area, JCAB organized the Traffic Management Units (TMUs) in 2011 as a branch of ATMC and they were placed at Tokyo international airport and Tokyo Area Control Center in order to conduct tactical and flexible ATFM in and around the Tokyo metropolitan area. JMA organized Tokyo Metropolitan Area Team (TMAT) at Tokyo international airport in 2014 as a branch of ATMetC to provide TMUs with meteorological information and detailed briefings focused on significant weather which affects air traffic flow in and around the Tokyo metropolitan area, including the approach control area of Tokyo / Narita international airport and its neighboring area.

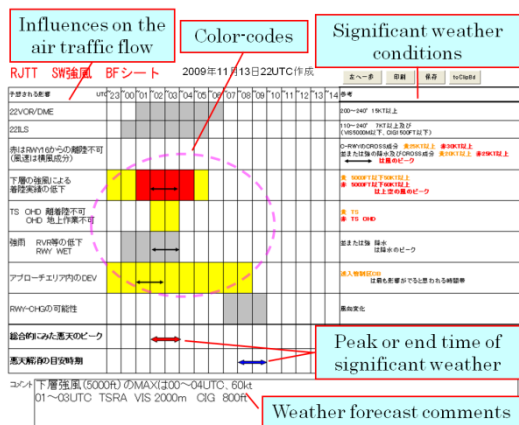


Figure 2 SIGWX Briefing sheet

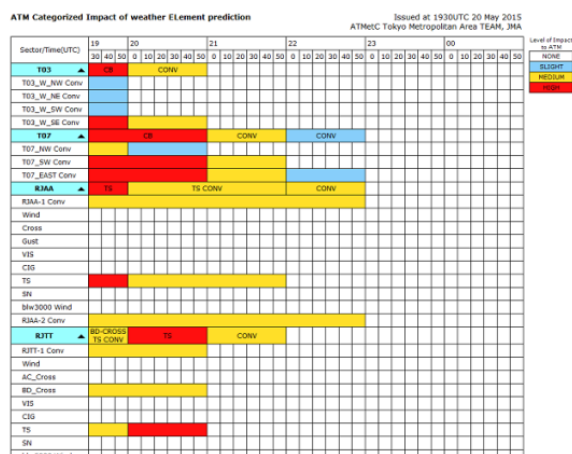


Figure 3 ATM CIEL

1.2.1 ATM CIEL (Figure 3)

- Target areas: Tokyo/Narita international airport, Tokyo approach control area and ATC sectors around Tokyo metropolitan area
- Contents: Level of expected impact of significant weather on ATM
 - ✧ High : Need to reduce capacity value (CAPA) significantly

- ✧ Medium : Need to reduce CAPA
- ✧ Slight : Need to reduce CAPA slightly
- ✧ None : Not need to reduce CAPA
- Issuance time: every hour except from 14 to 16 UTC
- Forecast time : up to 6 hours (temporal resolution: 10 minutes to 1 hour)
- Targeted weather phenomena:
 - ✧ Tokyo/Narita international airport: Thunderstorm, Visibility, Ceiling, Wind, etc.
 - ✧ In and around the Tokyo approach control area: CBs, Convective clouds and Wind

1.2.2 Wx Bulletin (Figure 4)

- Target areas: Tokyo/Narita international airport, Tokyo approach control area and ATC sectors around Tokyo metropolitan area
- Contents: Brief comments on phenomena expected to affect air traffic flow, and appropriate images to explain weather conditions and forecast
- Issuance time: 00 and 06 UTC
- Forecast time: up to 6 hours

1.2.3 Briefing (regular/extra)

- Providing methods: Video conference, telephone and online chat
- Regular briefings: 0500, 1130, 2030 and 2250 UTC (four times/day)
- Extra briefings: As necessary (24 hours)
- Target areas: Responsibility area of Tokyo ACC and Tokyo approach control area

2. Means of Provision

2.1 ATMets2

JMA established dedicated information distribution system, called ATMets (“2” means second generation system). Terminals for the system are located at each ATM officer's desk.

2.2 MetAir

JMA has developed aviation weather information provision system, called MetAir. Users can obtain forecast products for airspace and aerodrome in a real time basis. Airlines can receive MET products through MetAir.

2.3 Web chat system (Figure 5)

As prompt decision making is required for ATM within terminal area, speedy and appropriate information sharing is necessary. Especially for weather briefing services, TMAAT coordinates with TMUs whenever needed using online chat tool developed by JMA which

enables quick information provision, in addition to video conference and telephone. As text information remains in the chat tool, TMU officers can reaffirm the contents of briefings at any time. Also, graphical information can be posted on the tool. This function helps TMU officers

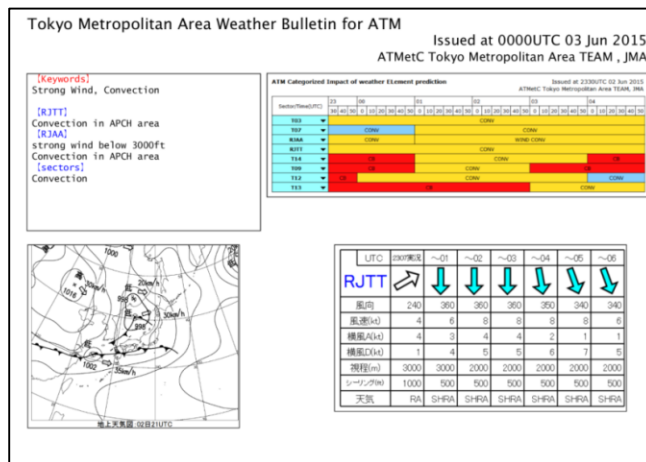


Figure 4 WX Bulletin

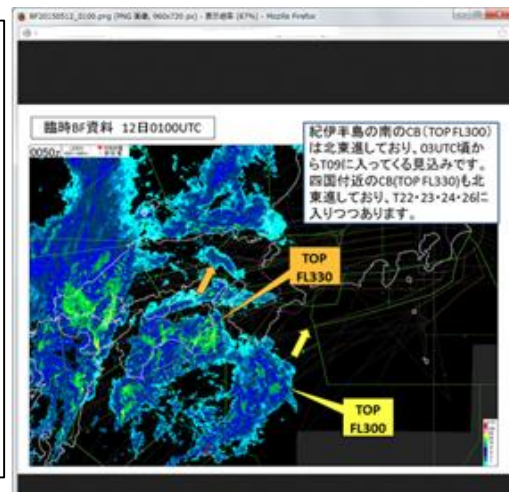


Figure 5 Graphical info on online

to easily understand the weather condition which is sometimes difficult to grasp only by the explanation on the telephone.

3. Other

3.1 Verification

ATMet category forecast criteria are weather conditions (or sometimes a combination thereof) defined through verification processes carried out by ATMETC in coordination with ATMC. This process involves three main steps:

- Investigation of impacts on ATM in previous significant cases;
- Confirmation of operational rules and conditions with reference to aircraft operation manuals and flight operations manuals; and
- Checking of the latest requirements from ATM officers, such as high-priority airways and altitude, and important air navigation facilities (waypoints or typical holding areas).

Each criterion is verified by calculating the Weather Impact Ratio (WXIR), which is the ratio of the frequency of cases in which a weather condition has influenced air traffic flow to all cases of the weather condition concerned.

$$\text{WXIR} = (\text{Number of occurrence of air traffic controls}) / (\text{Number of occurrence of WX conditions})$$

Meteorological services provided to support ATM need to be flexibly applicable to the various operational variables of such management, including ATC procedures, airways and aircraft types, which are also developed in parallel. It is therefore highly important to ensure close and continuous coordination with ATM officers in order to revise criteria appropriately based on the results of verification using WXIR in consideration of operational requirements.

Through such continuous improvement, the gap between ATM operational requirements and MET capability can finally be closed (Figure 6).

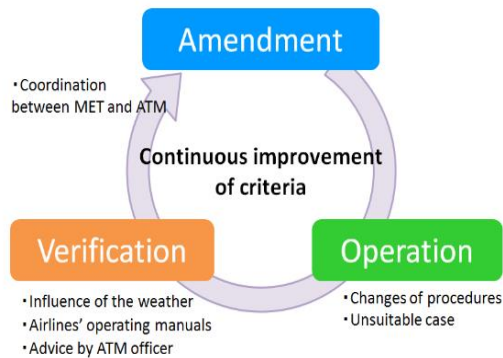


Figure 6 Continuous improvement of criteria

Singapore

1. ATM-tailored MET information and services

Meteorological and Air Traffic Management (MET/ATM) Collaboration in Singapore

The provision of air navigation services in the Singapore Flight Information Region (FIR) is undertaken by the Civil Aviation Authority of Singapore (CAAS), and Meteorological Service Singapore (MSS) is the aeronautical meteorological service provider. CAAS and MSS collaborated to develop ATM-tailored MET information and services aimed at enhancing the safety, efficiency and orderly flow of air traffic. The following lists some examples of MET information and services implemented in Singapore.

1.1 Weather briefing for ATC

MSS provides daily MET weather briefings through teleconference to air traffic controllers at the start of the morning and afternoon shifts of ATC units. Aided by visuals from a dedicated weather information portal which provides an integrated view of meteorological information in graphical and tabular formats (Figures 1), operational meteorologists brief the air traffic controllers on the weather conditions that can be expected around Singapore and the surrounding region. Timely updates are also provided by operational meteorologists through a direct communication line (dedicated hotline) should there be any change in the weather conditions.

1.2 Weather Window Products

Given that thunderstorms are common weather hazards in the deep tropics, MSS has been delivering categorical forecast on the occurrence of thunderstorms over critical watch

areas. The watch areas are determined in consultation with the CAAS ATS units to align with their operational requirements. The enhanced categorical forecast (called the ‘Weather Window’) augments the standard Annex 3 products and provides information on the forecast of not only the occurrence of thunderstorms, but also their areal extent. The forecast is valid for 24 hours and is updated every 3 hours or on an ad-hoc basis when changes to the weather situation warrants it. The temporal resolution is higher in the shorter forecast range to provide more detailed information of a possible rapid development of adverse weather (considering the dynamic nature of tropical weather systems). The temporal resolution becomes coarser at longer forecast range to reflect the lower predictability of tropical convective-scale weather. The weather window is presented in colour-coded, tabular format for easy interpretation and is used for air traffic flow management planning.

1.3 Improvements to SIGMET Information

Apart from the weather window products, MSS has been leading the coordination with MET Watch Offices (MWOs) of neighbouring States under the Operational SIGMET Coordination (OSC) for Southeast Asia initiative on the issuance of harmonised cross-FIR SIGMETs to airspace users, air traffic controllers and planners.

1.4 Nowcasting for convective weather

Tropical weather systems tend to be dominated by thunderstorms that are localized and short-lived and have significant impact on air traffic operations. Given the nature of our local weather systems, there is limited predictability, and forecasts tend to be short range. This poses difficulties for ATM. To address these challenges, MSS in collaboration with the UK Met Office has developed a convective-scale Numerical Weather Prediction (NWP) model – SINGV to better predict convective-scale weather in the tropics. In addition, Singapore is developing capabilities in nowcasting model, leveraging on techniques such as machine learning with radar and satellite data. This is a tropical convective-scale NWP/Nowcasting system that is continuously being fine-tuned to provide improved weather forecasts to support ATM decision making.

2. Means of Provision

2.1. Analysis by Operational Meteorologist

While outputs from numerical weather predictions are used to provide a first-cut forecast of the weather situation, these numerical predictions have limitations in predicting convective weather in the tropics. Local knowledge and expertise of operational

meteorologists are essential and continue to be integrated in the provision of MET information and services to the users.

2.2 ATC Weather Information Portal

A dedicated web portal (ATC web portal) has been developed for the provision of more MET information in support of ATM decision-making. The web portal is an integrated platform that allow users to view the current observations and weather window forecast products to enhanced situational awareness for ATC, and to aid users in pre-tactical air traffic flow management planning. In addition, for ease of visualization that may not be best served by a tabular format of weather window, thunderstorm areas are also presented on geospatial maps. Weather briefings using this web portal allows the operational meteorologists and the users to establish a common understanding of the weather situation and to discuss on any possible adverse weather that may affect operations.

2.3. Direct Communication Line A direct communication line has been established to facilitate exchange of information in a timely manner. This enables the operational meteorologists and ATC officers to readily react to changes in weather situation.

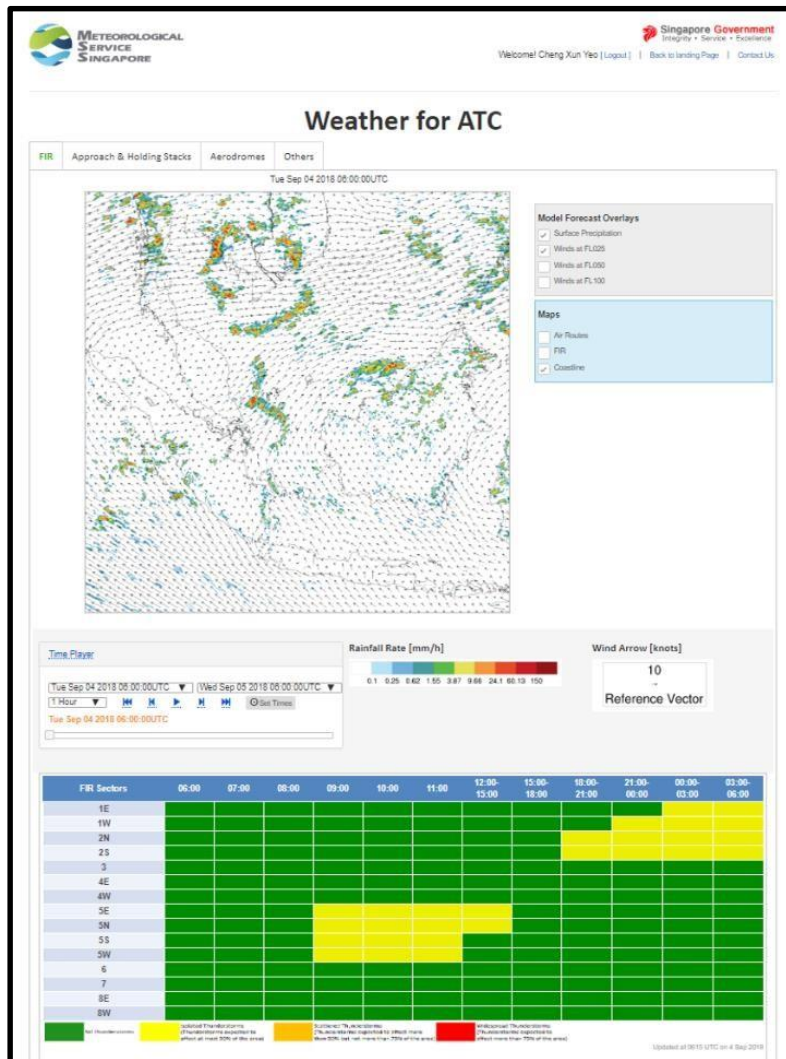


Figure 1a: Dedicated Web Portal for ATC showing Categorical Forecast of Thunderstorms.

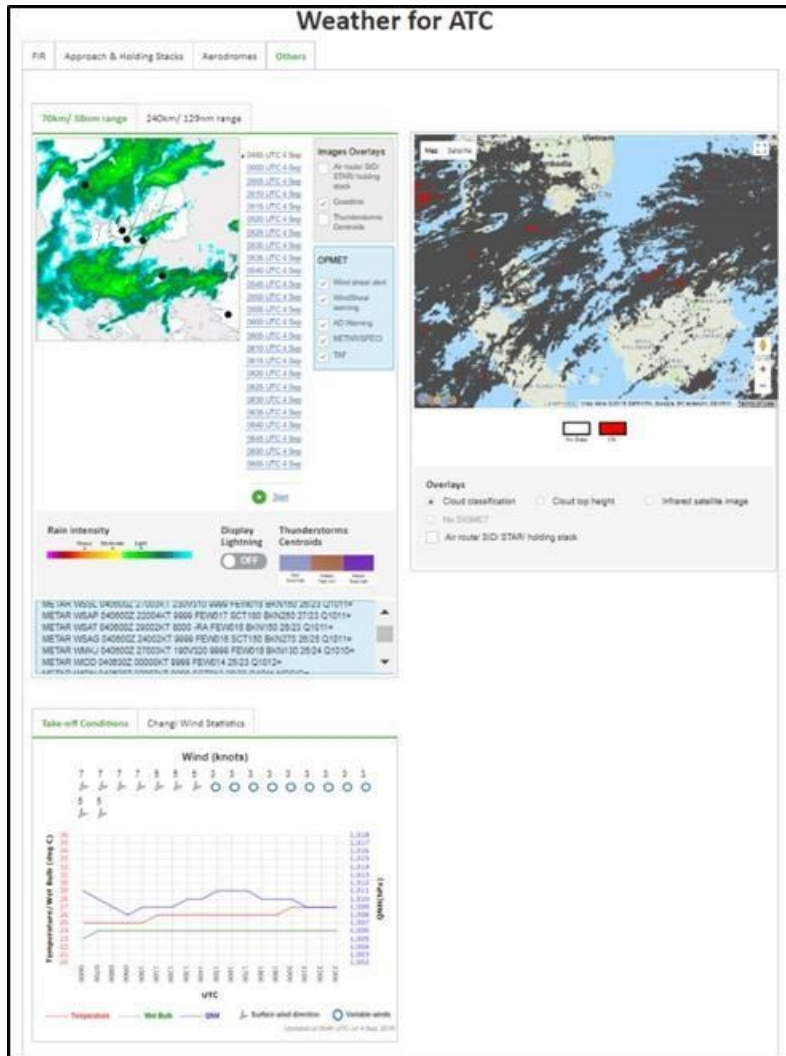


Figure 2b: Dedicated Web Portal for ATC showing observations including satellite and radar images, OPMET and AD warning information.

Republic of Korea

1. ATM-tailored MET Information and Services

To improve the safety of air-navigation and efficiency of ATFM, the Ministry of Land, Infrastructure and Transport (MOLIT) of Korea has been operating the Air Traffic Command Center (ATCC) in Daegu since July 2017. The Korea Aviation Meteorological Office (AMO) works with the Korean Air Force 24 hours a day at the ATCC, to frequently provide MET information on major airports in and out of Korea as well as expected weather phenomena within Incheon FIR. AMO also participates in CDM conferences to support stakeholders' ATFM-related decisions.

1.1 CDM Conference

The ATCC regularly holds a CDM teleconference once a day (0700UTC). At the conference, AMO provides a weather briefing to CDM members. If significant weather conditions are expected to affect aircraft operations, AMO also joins a CDM teleconference to provide briefing services.

1.2 Weather Analysis

AMO issues a weather analysis twice a day (0000/0700UTC) for ATCC stakeholders. The analysis is distributed through the ATFM System and includes the following (Fig 1):

- Target: Major airports, Incheon and Nearby FIRs
- Issuance time: 0000/0700UTC
- Content: Summary of meteorological phenomena expected to affect ATFM within about 24 hours (TAF, SIGMET information, satellite images, radar images, numerical model-predicted weather charts, WINTeM, turbulence, volcanic ash information, etc.)

In particular, when a significant phenomenon that may cause the ATFM restriction is expected in the neighboring FIR, the analysis also includes COMS satellite images and radar images provided by the Korea Meteorological Administration (KMA), and overseas SIGMET information.

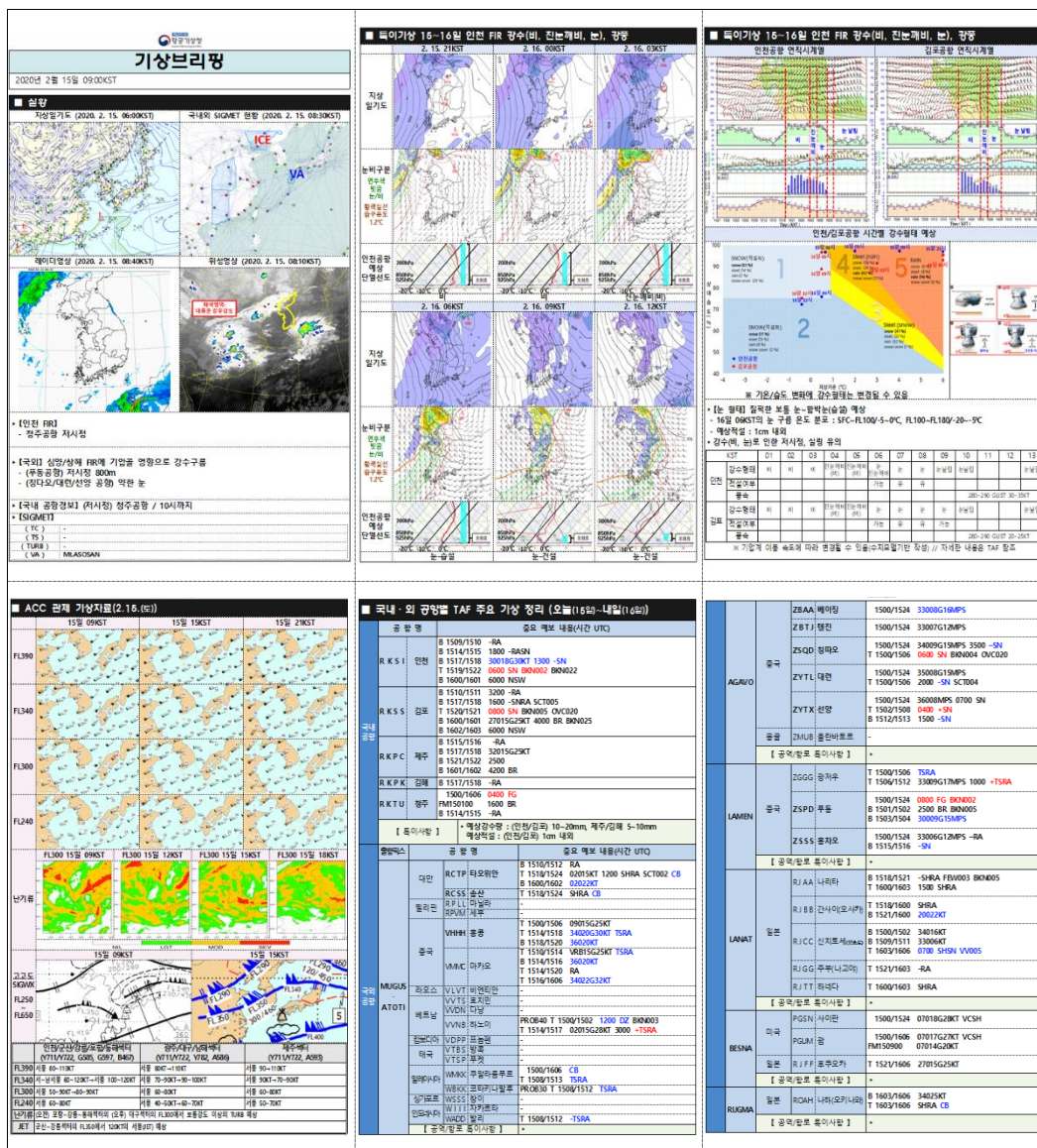


Fig 1. Weather analysis provided by AMO (twice a day), which includes i) real-time weather conditions, ii) significant weather forecasts in and out of Korea, and iii) weather charts for forecasting period.

1.3 Special MET Information

1.3.1 Typhoons

If a typhoon is expected to affect the Incheon FIR, the expected typhoon path up to five days ahead will be provided based on the typhoon information released by the KMA's National Typhoon Center. In particular, forecasters analyze numerical prediction models and cases of typhoons that followed a similar path to provide forecasts for major airports (Incheon, Gimpo, Jeju and Gimhae airports) and air routes (Fig 2).

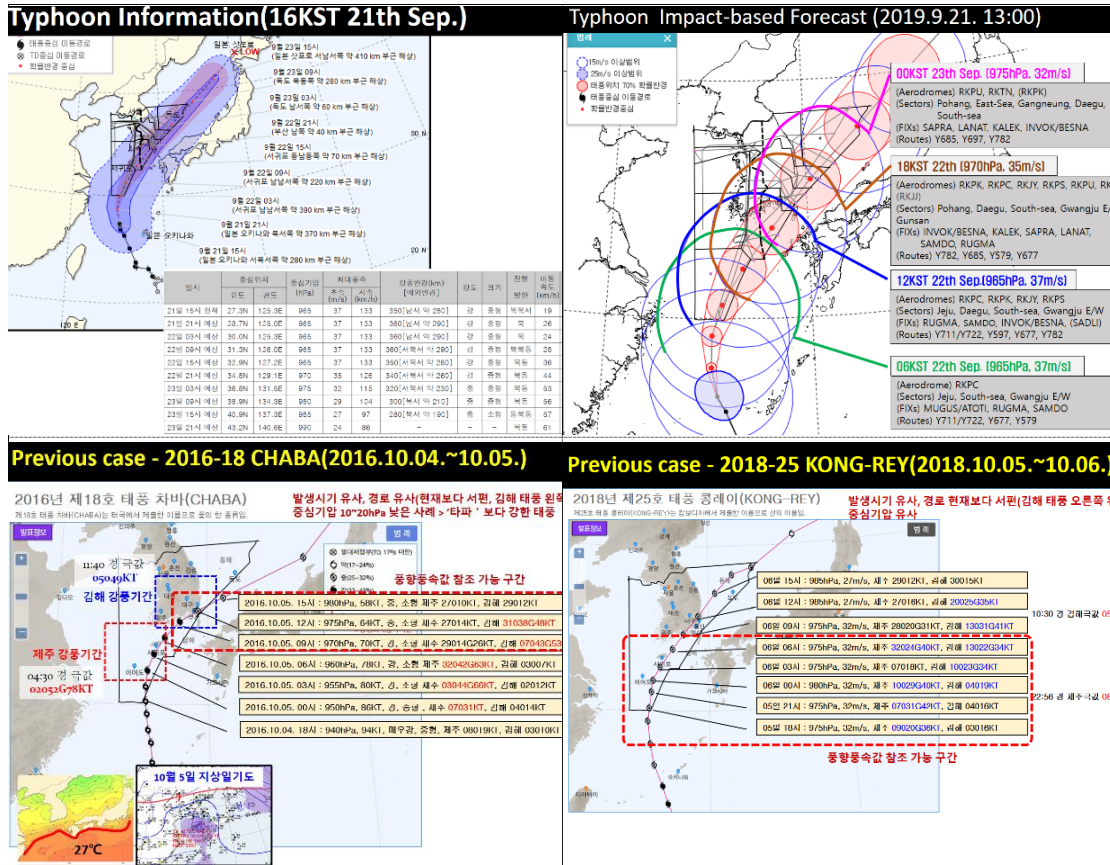


Fig 2. Typhoon forecast information: expected typhoon paths, typhoon impact areas, previous cases, etc.

1.3.2 Volcanic Ash

An analysis of the VAACs' forecasts for volcanic ash and low/medium-level winds is provided to give information on the volcanic ash dispersion paths and flight level (Fig 3).

1.3.3. MET Information Service on Holiday Seasons

The number of flights in Korea usually increases dramatically during holidays and summer vacations. AMO provides MET information for major airports about a week before the holiday seasons, and this information is used for ATM operators' flight planning and decision-making (Fig 4).

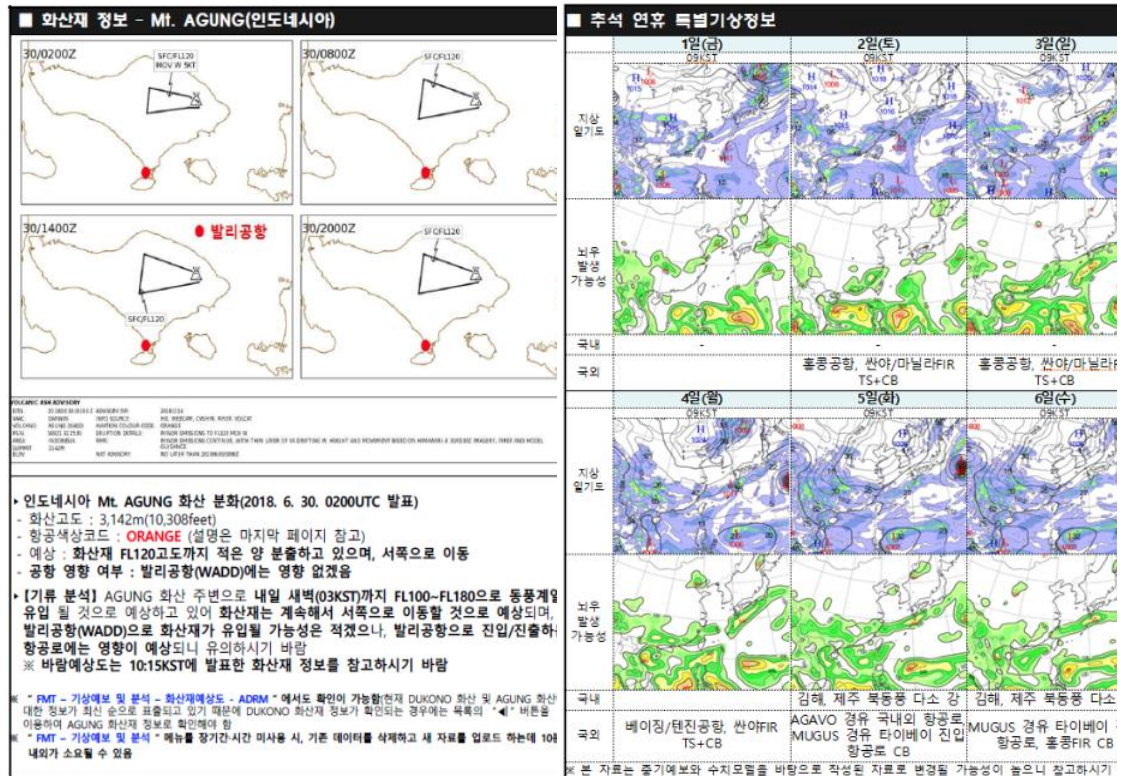


Fig 3. Volcanic ash information (expected ash routes, air flow forecasts)

Fig 4. MET information service on holiday seasons

1.4 Weather Briefing for ATC

AMO provides weather briefings once or twice a day for controllers in Daegu and Incheon ACC. The briefing includes descriptions and forecasts for weather events expected during their work time and is provided to the controllers at the time of their shift changes.

2. Means of Provision

2.1 Flow Management Terminal (FMT) System

Weather information, such as radar images, satellite images, TAF and METAR, is being provided in real-time through the FMT system operated by MOLIT.

2.2 AMO Website

All MET information issued by AMO is provided on its website. In particular, TAF bulletin boards are provided to help visitors see significant weather forecasts for each airport at a glance (Fig 5).

MET SG/24
Appendix 11 to the Report

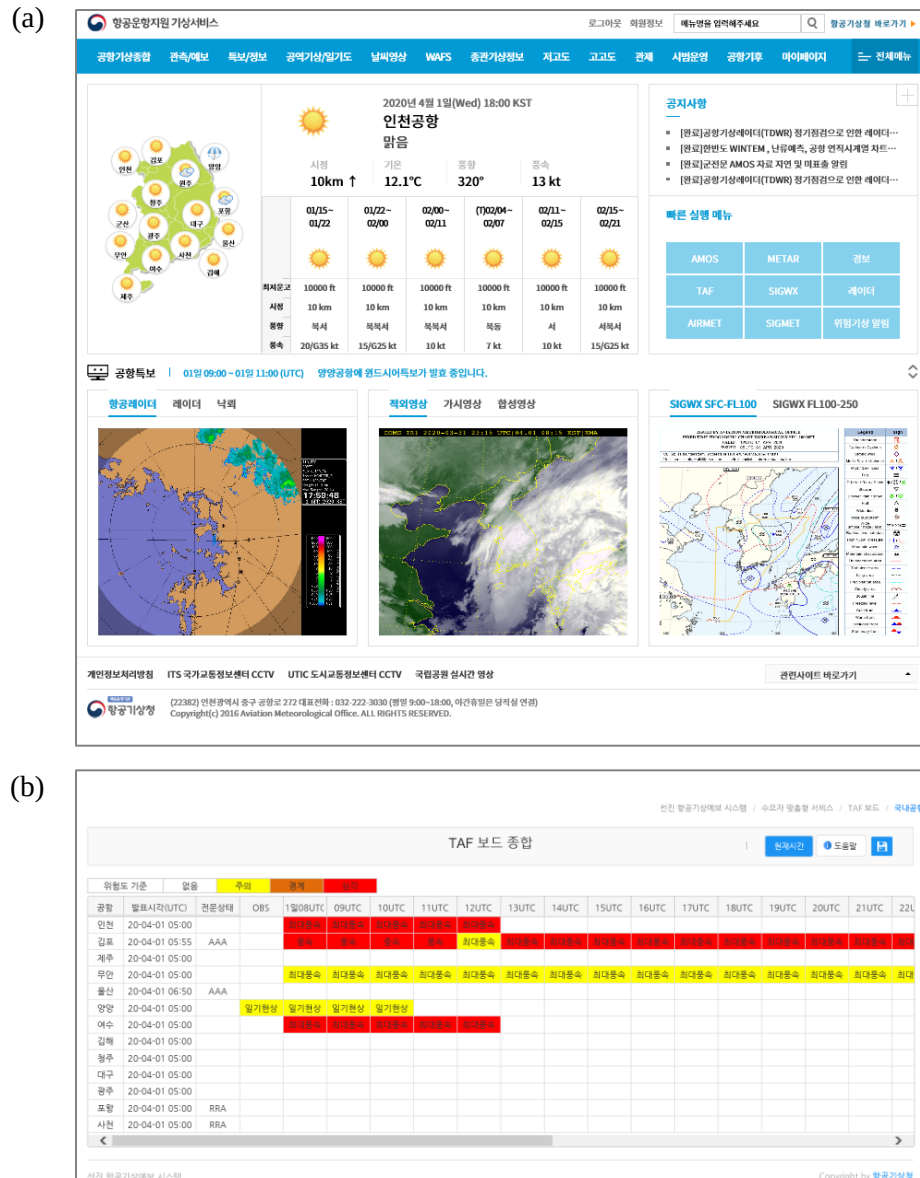


Fig 5. (a) AMO website (<https://global.amo.go.kr>) and (b) TAF bulletin board

<Intentionally left blank>

Appendix 2 Operational Scenario – Case of MET/ATM Collaboration –

Scenario 1:

CBs affected air traffic flow around approach control area of Tokyo International Airport (18 August, 2015)

1. Overview

A developing squall line was moving eastward along the coast of Tokai and Kanto Region of Japan. It caused many deviations from the planned air-routes and holdings in and around the terminal area, for aircraft approaching from west to Tokyo International Airport (RJTT). The Air Traffic Management Center (ATMC) reduced air traffic capacity (CAPA) in the affected ATC sectors, such as sector T09 and T14, and executed air traffic flow controls for aircraft flying in / heading to the air space. In addition, because some westbound aircraft departed from RJTT were forced to enter into neighboring sectors, such as sector T12 and T13, to avoid developed CBs of the squall line, ATMC finally conducted capacity reduction and flow controls for those ATC sectors to prevent possible conflicts between eastbound and westbound aircraft within those sectors (See Fig. 1 and Fig. 2).

This case shows how MET forecasters and ATM officers collaboratively dealt with this adverse weather condition described above, which occurred around a congestive international airport.

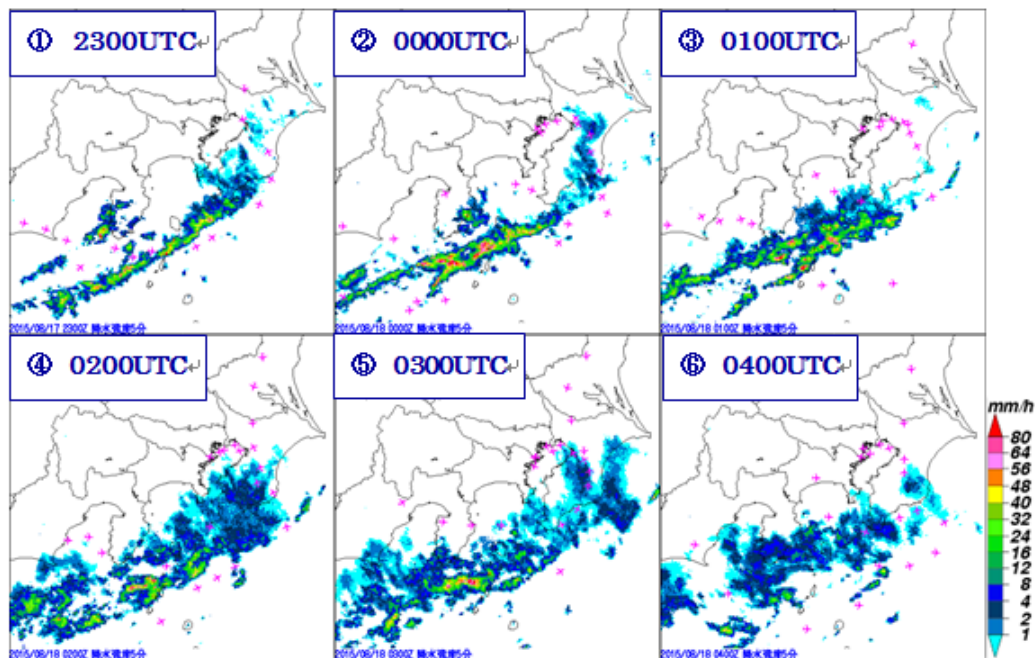


Figure 1 Radar echo intensity from 23:00 UTC 17th August to 04:00 UTC 18th August. Airplane-shaped marks indicate aircraft positions.

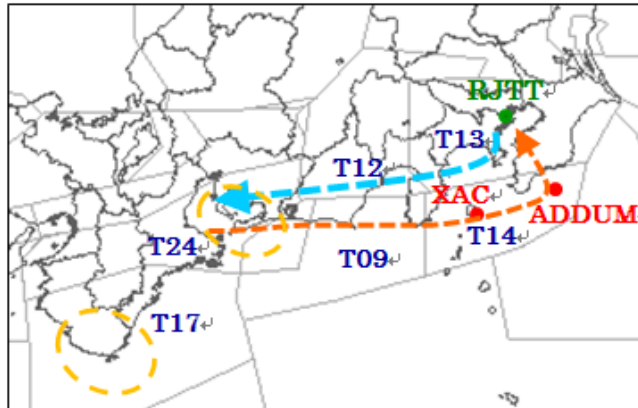


Figure 2 Name of ATC sectors (blue text) and reporting points (red text)

- Yellow circle: Holding area for aircraft flying to RJTT
- Orange arrow: Regular air-routes for aircraft approaching from western Japan to RJTT
- Light blue arrow: Regular air-routes for aircraft flying from RJTT to western Japan

2. MET/ATM collaboration

Described below is the collaborative actions taken by MET forecasters and ATM officers in this case (MET: Air Traffic Meteorology Center, Japan Meteorological Agency (ATMetC/JMA), ATM: Air Traffic Management Center, Japan Civil Aviation Bureau (ATMC/JCAB))

17th August 2015

20:00 UTC Special briefing was provided by MET

MET: “Echo top height of the CB clouds would reach more than FL460 in sector T09.”

MET: “CB clouds will approach sector T14 around 21 UTC and then Tokyo Approach Control Area (ACA) around 22 UTC.”

20:40 UTC Latest status of air traffic was reported by ATM

ATM: “Deviations have occurred in sector T17 and T09, because of CB clouds. We are now watching the situation of these CB clouds carefully.”

21:00 UTC Special briefing was provided by MET

MET: “The CBs in sector T09 will approach XAC (reporting point) around 22 UTC and then ADDUM (reporting point) around 23 UTC.

ATM: “When will the CBs go away from Tokyo ACA?”

MET: “It will be after 00 UTC of 18th.”

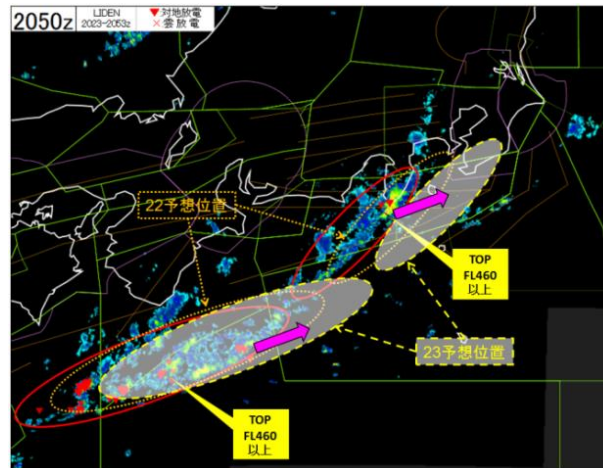


Figure 3 Material for non-regular briefing at 21:00 UTC on 17th August

21:20 UTC EDCT⁴ was issued for flights heading to RJTT from west

22:00 UTC CAPA⁵ was reduced to 93% in sector T09

22:10 UTC EDCT was issued for flights heading to RJTT through sector T09

23:08 UTC Special briefing was provided by MET

MET: “The CBs near XAC are now moving east and will approach ADDUM around 00 UTC.”

MET: “The CBs newly developed around sector T09 will move to the eastward. Then it will be merged with CB cloud area of the east.”

⁴ Expected Departure Clearance Time (EDCT) is assigned for the flights to certain aerodrome or airspace when air traffic volume is expected to exceed the ATC capacity of the aerodrome of the airspace.

⁵ CAPA is an acronym for the ATC capacity of an aerodrome or an ATC sector.

23:10 UTC	Entrance Interval was reduced for sector T09
23:30 UTC	CAPA was reduced to 88% in sector T12, 89% in sector T13
23:35 UTC	Departure Interval was reduced for sector T12
23:40 UTC	EDCT was cancelled for flights heading to RJTT through sector T09

18th August 2015

01:10 UTC Special briefing provided by MET

MET: "Developing CB area in T14 and T09 sectors will move to the northeast or the east-northeast and the peak of the development will continue until around 03 UTC."

MET: "A part of the CBs may spread to sector T12 and T13, but it would not be expected to spread largely to the north. CB clouds in T17 sector will move to the northeast or the east-northeast and spread into T09 sector around 09 UTC, but it will eventually weaken from around 06 UTC."

Figure 4 Material for non-regular briefing at 23:08 UTC on 17th August

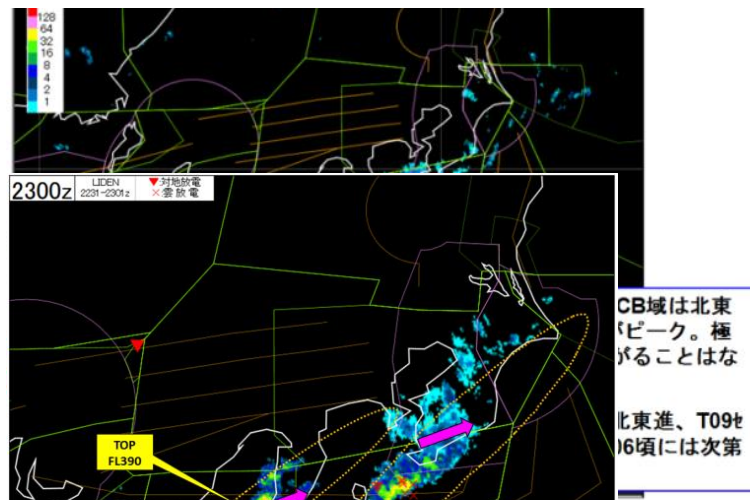
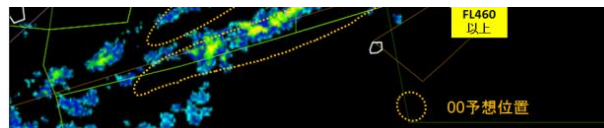


Figure 5 Material for non-regular briefing at 01:10 UTC on 18th August



02:00 UTC	Entrance Interval was restored for T09 sector
06:00 UTC	Departure Interval was restored for T12 sector
09:30 UTC	EDCT was cancelled for flights heading to RJTT from west

3. Summary

In this case, ATM officers shared the latest situation of air traffic flow with MET forecasters and on the other hand, MET forecasters provided special briefings for ATMC with regard to prediction of CB clouds which affected ATC sectors, such as T09 and T14. Additionally, MET forecasters paid attention also to the situation of CB clouds developed in T12 sector, because a number of westbound aircraft departed from RJTT flew into T12 and T13 sectors and, as a result, significant conflicts between eastbound and westbound aircraft were anticipated in those sectors. Based on such interactions, ATMC officers appropriately managed air traffic flow with frequent special briefings from MET forecasters.

This case shows how mutual coordination between MET forecasters and ATM officers will improve the efficiency and the safety of air traffic flow under adverse weather conditions.

LIST OF PAPERS AND PRESENTATIONS

WP/IP/SP No.	Agenda Item No.	Subject	Presented by
WORKING PAPERS			
WP/01	1	Adoption of the Agenda	Secretariat
WP/02	1	Review the Terms of Reference	Secretariat
WP/03	2	Review Outcomes from MET SG/23	Secretariat
WP/04	2	Review Outcomes from APANPIRG/30	Secretariat
WP/05	2	Review of the Ninth Meeting of Asia/Pacific Meteorological Requirements Working Group (MET/R WG/9)	Chair of MET/R WG
WP/06	2	Review Outcomes from MET/IE WG/18	Chair of MET/IE WG
WP/07	2	Review Outcomes from MET/S WG/10	Chair of MET/S WG
WP/08	2	Review Outcomes from the IWXXM Webinar	Chair of MET/IE WG and the Secretariat
WP/09	3	Review of the Asia/Pacific Air Navigation Plan	Secretariat
WP/10	3	Amendment 79 to Annex 3	Secretariat
WP/11	3	Survey of State Meteorological Information Supporting Air Traffic Management	Chair of MET/R WG
WP/12	4	Review APANPIRG Air Navigation Deficiencies	Secretariat
WP/13	4	Air Navigation Deficiencies – Meteorology	Australia
WP/14	5	VOLCEX 20/02 Exercise Outcomes	New Zealand
WP/15	6	Update to Regional SIGMET Guide	MET/S WG Ad Hoc Group
WP/16	6	ROBEX Handbook Updates	Secretariat
WP/17	6	Updates of Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations	MET/R WG Ad Hoc Group
WP/18	7	Review Plan of Work	Secretariat

MET SG/24
Appendix 12 to the Report

WP/IP/SP No.	Agenda Item No.	Subject	Presented by
WP/19	8	Election of Chairperson for MET SG	Secretariat
WP/20	5	SADIS and WAFS Update	ICAO Secretariat on behalf of the SADIS Provider
WP/21	5	Hand Over SIGMET Issuance from Southwest ATMB of CAAC to State Secretariat of Civil Aviation, Cambodia	Cambodia
WP/22	4	Implementation of the Corrective Action to Close the Solomon Islands Deficiency AP-MET-01 and AP-MET-20	Solomon Islands
WP/23	4	Implementation of the Corrective Action to Close the Solomon Islands Deficiency AP-MET-23	Solomon Islands
WP/24	5	APAC User Requirements for SWIM-based MET Information Services Supporting ATFM	Australia, Hong Kong China and Thailand on behalf of MET/R WG Ad-hoc Group
WP/25	5	Changes to OPMET Exchange and IWXXM Exchange Register	Australia and Hong Kong China

INFORMATION PAPERS

IP/01	-	Meeting Bulletin	Secretariat
IP/02	2	Review of ICAO ACCRPG	Secretariat
IP/03	5	Review Outcomes from SWIM TF	Secretariat
IP/04	3	Space Weather Updates	Secretariat
IP/05	3	The Introduction of the Progress of CRC	China
IP/06	3	Activities of the ICAO METP WG-MOG IAVW and WG-MISD VASD	New Zealand
IP/07	5	Update of the SIGMET Coordination Efforts by the Hong Kong Observatory for the Compliance of Amendment 79 to Annex 3	Hong Kong, China

MET SG/24
Appendix 12 to the Report

WP/IP/SP No.	Agenda Item No.	Subject	Presented by
IP/08	5	Recent Progress of International Cooperation Scheme on Collaborative SIGMET Issuance (CSI)	Japan, Lao PDR, Myanmar, Philippines, Thailand and Vietnam
IP/09	5	Development of Meteorological Products for New ATC Operation in the Tokyo Approach Control Area	Japan
IP/10	5	Updates to Tailored MET Information Supporting ATM	Singapore
IP/11	5	Detection and Nowcasting of Thunderstorms with Meteorological Satellite Data for En-route Aeronautical Operations	Singapore
IP/12	5	Development of ETE for Provision of High Resolution Turbulence Forecast	Hong Kong, China
IP/13	5	VAAC Wellington Management Report	New Zealand
IP/14	5	VAAC Darwin Management Report	Australia
IP/15	5	Status of IWXXM Implementation in Australia	Australia
IP/16	5	Operational SMS in New Zealand	New Zealand
IP/17	5	WMO Activities of Relevance to ICAO including the Response to the Coronavirus (COVID-19) Pandemic	WMO
IP/18	5	Update on the Global Space Weather Advisory Service	Australia
IP/19	5	The Progress of Coordination between MET and ATM	China
IP/20	5	Improvements in MDRS Meteorological Information	China
IP/21	8	Change of Hanoi and Ho Chi Minh FIR Location Indicator	Viet Nam
IP/22	5	VAAC Tokyo Management Report	Japan

MET SG/24
Appendix 12 to the Report

WP/IP/SP No.	Agenda Item No.	Subject	Presented by
IP/23	5	Status of IWXXM implementation in Hong Kong, China	Hong Kong, China
IP/24	8	Amendments of Tropical Cyclone Advisory – TCAC Tokyo	Japan
IP/25	5	Current Status and Plan of IWXXM Implementation in Indonesia	Indonesia
IP/26	5	Indonesian SIGMET Coordination Progress with Neighbouring FIR	Indonesia
IP/27	5	Tailored Weather Service Focused on Air Traffic Flow Management	Republic of Korea
IP/28	5	Implementation of IWXXM and Translation Service of the Republic of Korea	Republic of Korea
IP/29	8	Payment Deferral of Aeronautical Meteorological Service Charges as a Measure to Help Aviation Industry Overcome COVID-19 Recession	Republic of Korea
PRESENTATION			
SP/01	5	Improvements to the World Area Forecast System (WAFS)	SADIS and WAFS manager, UK Met Office

LIST OF PARTICIPANTS

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
1.	AFGHANISTAN (6)			
	1.	Mr. Zabihullah Usmani	Meteorology Manager Herat International Airport Afghanistan Civil Aviation Authority	usmani6363@gmail.com ;
	2.	Mr. Shahabuddin	MET General Manager Mawlana J.M.B. Airport (MZR)	Shahab.hamidy1369@gmail.com ;
	3.	Mrs. Zuhra Sadaat	Forecast Manager Afghanistan Civil Aviation Authority	MOON.AFGHAN@yahoo.com ;
	4.	Mr. Mohammad Nazim Muradi	Head of Forecast Division Afghanistan Meteorological Department	Nasim.muradi786@gmail.com ;
	5.	Mr. Enayatullah Ghooryani	Flight Safety Officer Herat International Airport Afghanistan Civil Aviation Authority	enayat.ghooryani@gmail.com ;
	6.	Mr. Najeeb Saraj	MET Inspector Afghanistan Civil Aviation Authority	najeebsaraj@hotmail.com ;
2.	AUSTRALIA (6)			
	7.	Mrs. Amber Raman	Manager Meteorological Authority Office Australian Bureau of Meteorology	amber.raman@bom.gov.au ;
	8.	Mr. Tim Hailes	National Manager – Aviation Service Department Australian Bureau of Meteorology	tim.hailes@bom.gov.au ;
	9.	Mrs. Susan O'Rourke	National Manager Aviation International Engagement Australian Bureau of Meteorology	sue.orourke@bom.gov.au ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	10.	Dr. Jarrad Denman	Volcanic Ash Advisory Centre (VAAC) Darwin Manager Australian Bureau of Meteorology	jarrad.denman@bom.gov.au ;
	11.	Mr. Ashwin Naidu	Aviation Customer Lead Australian Bureau of Meteorology	ashwin.naidu@bom.gov.au ;
	12.	Mr. David House	Operation System Specialist Australian Bureau of Meteorology	david.house@bom.gov.au ;
3.	BANGLADESH (3)			
	13.	Mr. Syed Abul Hasanat	Assistant Director Bangladesh Meteorological Department	hasanat2001@yahoo.com ;
	14.	Mr. Kshitindra Chandra Baisya	ANS Inspector (MET) Civil Aviation Authority of Bangladesh	baisyadelip@gmail.com ;
	15.	Mr. Mohammad Manzurul Hoque Khan	MET Inspector & Consultant Civil Aviation Authority of Bangladesh	mhkhan1953@gmail.com ;
4.	BHUTAN (2)			
	16.	Mr. Yonten Dendup	ANS Officer Bhutan Civil Aviation Authority	ydendup@bcaa.gov.bt ;
	17.	Mr. Sonam Rabten	Senior MET Officer National Center for Hydrology and Meteorology	srabten@nchm.gov.bt ;
5.	CAMBODIA (5)			
	18.	Mr. Heang Vandy	Director of Aeronautical Services Department State Secretariat of Civil Aviation of Cambodia	heangvandyssca@gmail.com ; heangvandy@ssca.gov.kh ;
	19.	Mr. Chvea Thol	Chief of Aeronautical Standard Office State Secretariat of Civil Aviation of Cambodia	chveathol@yahoo.com ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	20.	Mr. Khun Chantheara	Deputy Chief of Aeronautical Standard Office State Secretariat of Civil Aviation of Cambodia	kctkhunchantheara@gmail.com ;
	21.	Mr. Chhin Pavming	Forecaster at Aeronautical Meteorological Office State Secretariat of Civil Aviation of Cambodia	paving.chhin@yahoo.com ;
	22.	Mr. Moeun Bunheng	Forecaster at Aeronautical Meteorological Office State Secretariat of Civil Aviation of Cambodia	hengmoeun66@gmail.com ;
6.	CHINA (4)			
	23.	Mr. Han Qingyuan	Deputy Director MET Division of Air Traffic Management Bureau of CAAC	hanqingyuan@atmb.net.cn ;
	24.	Dr. Zhang Zhongfeng	Deputy Director AMC, Air Traffic Management Bureau, CAAC	mazzf@vip.sina.com ;
	25.	Mrs. Qin Ting	Forecaster (Senior Engineer) MET Center of East China Air Traffic Management Bureau of CAAC	qintingcaac@126.com ;
	26.	Ms. Li Xiya	Forecaster (Engineer) Meteorological Center of Central Southern Air Traffic Management of CAAC	gzlixiya@qq.com ;
7.	HONG KONG, CHINA (8)			
	27.	Mr. Lam Heung Hoo, Patrick	Senior Aeronautical Communication Supervisor Civil Aviation Department of Hong Kong, China	hhlam@cad.gov.hk ;
	28.	Mr. Cheung Chi Keung	Aeronautical Communication Supervisor Civil Aviation Department of Hong Kong, China	ckcheung@cad.gov.hk ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	29.	Ms. Yan-yu Leung, Christy	Scientific Officer Hong Kong Observatory	yyleung@hko.gov.hk ;
	30.	Dr. Chi-wai Lee, Jeffrey	Acting Senior Scientific Officer Hong Kong Observatory	jeffreylee@hko.gov.hk ;
	31.	Mr. Marco Mang-hin Kok	Scientific Officer Hong Kong Observatory	mhkok@hko.gov.hk ;
	32.	Dr. Ping-wah Li	Senior Scientific Officer Hong Kong Observatory	pwli@hko.gov.hk ;
	33.	Mr. Pak-wai Chan	Assistant Director Hong Kong Observatory	pwchan@hko.gov.hk ;
	34.	Ms. Sum-yee Lau, Sharon	Assistant Director Hong Kong Observatory	sylau@hko.gov.hk ;
8.	MACAO, CHINA (1)			
	35.	Mr. Chan Cheng Hou	Acting Chief of Aeronautical Meteorological Centre Macao Meteorological and Geophysical Bureau	chchan@smg.gov.mo ;
9.	FIJI (1)			
	36.	Mr. Makiti Raratabu	Air Navigation Services Inspector – ATM/MET Civil Aviation Authority of Fiji (CAAF)	Makiti.Raratabu@caaf.org.fj ;
10.	INDIA (2)			
	37.	Mr. Samay Singh Meena	Assistant Director (MET) Directorate General of Civil Aviation (DGCA)	samay.dgca@gov.in ;
	38.	Dr. Rajendra Kumar Jenamani	Scientist – F India Meteorological Department	rjenamani1@yahoo.co.in ;
11.	INDONESIA (9)			

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	39.	Ms. Dina Yunita	Aeronautical Information Management MET and SAR Section Head DGCA Indonesia	dn.yunita22@gmail.com ;
	40.	Mrs. Erika Meinofelia	Head of Sub-division for Public Weather Services Operational Management Indonesia Agency for Meteorology, Climatology and Geophysics	erikadusovi@gmail.com ;
	41.	Mr. Ogi Gustira	Air Navigation Inspector DGCA Indonesia	ogigustira@gmail.com ;
	42.	Mr. Iqbal Maududi	Air Navigation Inspector DGCA Indonesia	iqbal.maududi8909@gmail.com ;
	43.	Mr. Suyanti Aviani	Air Navigation Inspector DGCA Indonesia	aviakennia@gmail.com ;
	44.	Mrs. Resa Pratikasari	Head of Sub-division for Public Weather Services Operational Management Indonesia Agency for Meteorology, Climatology and Geophysics	resapratikasari@yahoo.com ;
	45.	Mrs. Nurul Hidayati	Staff of Sub-division for Aeronautical Meteorology Operational Management Indonesia Agency for Meteorology, Climatology and Geophysics	idakira2@gmail.com ;
	46.	Mrs. Sabitul Hidayati	Staff of Sub-division for Aeronautical Meteorology Information Services Indonesia Agency for Meteorology, Climatology and Geophysics	sabitul.hidayati@gmail.com ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	47.	Mr. Rachmat Widiyana	ATFM & CDM Planning Manager AirNav Indonesia	rachmat.widiyana@airnavindonesia.co.id
12.	JAPAN (7)			
	48.	Mr. Kazuya Kawaguchi	Senior Scientific Officer/VAAC Tokyo Japan Meteorological Agency	kazuya_kawaguchi@met.kishou.go.jp
	49.	Mr. Jun Ryuzaki	Senior Coordinator for International Aeronautical Meteorology Japan Meteorological Agency	jryuzaki@met.kishou.go.jp ; jryuzaki18@gmail.com ;
	50.	Mr. Kentaro Tsuboi	Scientific Officer Japan Meteorological Agency	k-tsuboi@met.kishou.go.jp tubokkn@gmail.com ;
	51.	Mr. Kazuki Yasui	Scientific Officer Office of Aviation Weather Forecasting Japan Meteorological Agency	k_yasui@met.kishou.go.jp ;
	52.	Ms. Keiko Ito	Scientific Officer Japan Meteorological Agency	ito.keiko@met.kishou.go.jp ;
	53.	Ms. Michiko Ikeda	Forecaster, Office of Aviation Weather Forecasting Forecast Division Japan Meteorological Agency	michi-ikeda@met.kishou.go.jp ;
	54.	Mr. Yo Kanno	Assistant Scientific Officer/VAAC Tokyo Japan Meteorological Agency	yokanno@met.kishou.go.jp ;
13.	KIRIBATI (3)			
	55.	Mr. Uneta Toorua	Director Kiribati MET Service Kiribati Meteorological Services Division	dmet@met.gov.ki ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	56.	Mr. Tiamwa Taiiwa	Air Navigation and Aerodrome Inspector Kiribati Meteorological Services	ans.ai@met.gov.ki ;
	57.	Mr. Mauna Eria	Quality Assurance Officer Kiribati Meteorological Services	gao@met.gov.ki ;
14.	LAO PDR (4)			
	58.	Mr. Xayphone Latxavong	Air Navigation Standards Division's Officer Department of Civil Aviation of Lao PDR	xayphone@dcav.gov.la ; xayphone1991@gmail.com ;
	59.	Mr. Bounnao Xiong	Air Navigation Standards Division's Officer Department of Civil Aviation of Lao PDR	bounnao@dcav.gov.la ; bounnaonao@gmail.com ;
	60.	Mr. Khampun Chanthasone	Deputy Director of AIS of Laos Air Navigation Service (LANS)	ckhampoun@gmail.com ;
	61.	Mr. Thatsana Chanvilay	Deputy Head of Aeronautical MET Division Department of Meteorology and Hydrology (DMH)	thatsana_c@yahoo.com ;
15.	MALAYSIA (4)			
	62.	Mr. Hajjah Mohd Bujang	Principal Assistant Director Civil Aviation of Malaysia	hajjah@caam.gov.my ;
	63.	Mr. Mohd Azizul Hakeem Bin Tamarun	Senior Assistant Director Civil Aviation of Malaysia	azizulhakeem@caam.gov.my ;
	64.	Mr. Lim Ze Hui	Senior Director Malaysian Meteorological Department	zhlim@met.gov.my ;
	65.	Mr. Muhammad Nazri Noordin	Principal Assistant Director Malaysian Meteorological Department	mnazri@met.gov.my ;
16.	MALDIVES (2)			

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	66.	Mr. Ali Shareef	Deputy Director General Meteorology Maldives Meteorological Service	ali.shareef@met.gov.mv ;
	67.	Mr. Ahmed Rasheed	Director Meteorology Maldives Meteorological Service	ahmed.rasheed@met.gov.mv ;
17.	MONGOLIA (1)			
	68.	Mr. Banidsuren Byambaa	Director of Aviation Meteorological Center Aviation Meteorological Center of NAMEM	banidsuren.b@mcaa.gov.mn ; amc@namem.gov.mn ;
18.	MYANMAR (2)			
	69.	Mr. Win Maw	Deputy Director Department of Meteorology and Hydrology	winmaw.kk@gmail.com ;
	70.	Mrs. Ni Ni Khine	Assistant Director Department of Meteorology and Hydrology	nikhine@mail.com ;
19.	NEPAL (10)			
	71.	Dr. Archana Shrestha	Deputy Director General Meteorological Forecasting Division/Department of Hydrology and Meteorology	shresthamet@gmail.com ;
	72.	Mr. Suresh Prasad Khanal	Deputy Director DAD Civil Aviation Authority of Nepal	suresh1khanal@yahoo.com ;
	73.	Mr. Sanjeev Singh Kathayat	Deputy Director, ANSSD Civil Aviation Authority of Nepal	kathayat@hotmail.com ;
	74.	Mr. Dinesh Raj Ghimire	Manager, ATM Civil Aviation Authority of Nepal	dnghimire@gmail.com ;
	75.	Mr. Subash Khadka	Manager, ATS/SAR, TIA Civil Aviation Authority of Nepal	subashkdk@gmail.com ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	76.	Mr. Niranjan Dalkoti	Manager, ATS/SAR, TIA Civil Aviation Authority of Nepal	niranjandallakoti@yahoo.com ;
	77.	Mr. Baburam Ghimire	Manager, ATS/SAR, TIA Civil Aviation Authority of Nepal	atcbaburam@gmail.com ;
	78.	Mr. Suraj Bishankha	Deputy Manager, ATS/SAR, TIA Civil Aviation Authority of Nepal	suraj.apple@gmail.com ;
	79.	Mrs. Susmita Rawat	Senior Officer, ATS/SAR, TIA Civil Aviation Authority of Nepal	sushmitarawat13@gmail.com ;
	80.	Mrs. Bibhuti Pokharel	Senior Divisional Meteorologist Department of Hydrology and Meteorology	bibhel@gmail.com ;
20.	NEW ZEALAND (3)			
	81.	Ms. Paula Acethorp	Chief Meteorological Officer Civil Aviation Authority of New Zealand	paula.acethorp@caa.govt.nz ;
	82.	Mr. Marcel Roux	Manager Wellington VAAC MetService – Te Ratonga Tirorangi	Marcel.Roux@metservice.com ;
	83.	Mr. Ray Thorpe	General Manager Aviation Business MetService New Zealand Limited	Ray.Thorpe@metservice.com ;
21.	PAPUA NEW GUINEA (1)			
	84.	Mr. Jimmy Gomoga	Acting Director PNG National Weather Services	jgomoga@gmail.com ;
22.	PHILIPPINES (6)			

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	85.	Ms. Hannagrace F. Cristi	Assistant Weather Services Chief Aeronautical Meteorology Services Section Weather Division Philippine Atmospheric, Geophysical and Aeronautical Services Administration (PAGASA)	hannacristi@yahoo.com ;
	86.	Mr. Arnold A. Santamaria	Air Traffic Management Officer V ATPPD, ATS Civil Aviation Authority of the Philippines	arnoldsaint102@gmail.com ;
	87.	Mr. Diego Eric L. Abecendario	ATS Area Head, Area VI ATCAMD, ATS Civil Aviation Authority of the Philippines	diegoabecendario@gmail.com ;
	88.	Mr. Jose V. Festejo	Acting Chief, MET Inspectorate Section AANSOO Civil Aviation Authority of the Philippines	jadper_fr@yahoo.com ;
	89.	Ms. Marianne O. Mamuad	Air Traffic Management Officer IV ATCAMD, ATS Civil Aviation Authority of the Philippines	ianne_control@yahoo.com ;
	90.	Mr. Michael D. Madrid	Air Traffic Management Officer III ATCAMD, ATS Civil Aviation Authority of the Philippines	michaeldmadrid@yahoo.com ;
23.	REPUBLIC OF KOREA (6)			
	91.	Mr. Seungju Lee	Assistant Director Aviation Meteorological Office Korea Meteorological Administration	lee_sj@kma.gov.kr ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	92.	Mr. Yeonghun Kim	Assistant Director Aviation Meteorological Office Korea Meteorological Administration	kyh13@korea.kr ;
	93.	Ms. Raehyun Chung	Assistant Director Aviation Meteorological Office Korea Meteorological Administration	rhchung@korea.kr ;
	94.	Ms. Jiwon Lee	Assistant Director Aviation Meteorological Office Korea Meteorological Administration	jwle1234@korea.kr ;
	95.	Mr. Dongwon Lee	Assistant Director Aviation Meteorological Office Korea Meteorological Administration	dwlee5@korea.kr ;
	96.	Ms. Mijeong Shim	Assistant Director Aviation Meteorological Office Korea Meteorological Administration	mjshim@korea.kr ;
24.	SINGAPORE (5)			
	97.	Mr. Victor Lee	Principal Manager (CNS Regulation) Civil Aviation Authority of Singapore	victor_lee@caas.gov.sg ;
	98.	Ms. Lim Lay Eng	Principal Manager (MET Regulation) Civil Aviation Authority of Singapore	lim_lay_eng@caas.gov.sg ;
	99.	Mr. Cheong Wee Kiong	Deputy Director Meteorological Service Singapore	CHEONG_Wee_Kiong@nea.gov.sg ;
	100.	Mr. Tham Yap Fung	Executive Meteorologist Meteorological Service Singapore	THAM_Yap_Fung@nea.gov.sg ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	101.	Mr. Yeo Cheng Xun	Executive Meteorologist Meteorological Service Singapore	YEO_Cheng_Xun@nea.gov.sg ;
25.	SOLOMON ISLANDS (6)			
	102.	Mr. Solomon Sammy	Quality Manager Meteorological Service	s.sammy@met.gov.sb ;
	103.	Mr. Paul Kito	Principal Air Traffic Service Officer Ministry of Communication & Aviation	pkito@mca.gov.sb ;
	104.	Mr. Robert Haukare	Chief Observations Officer Solomon Islands Meteorology Department	r.haukare@met.gov.sg ;
	105.	Mr. Edward Maru	Chief MET Forecaster Meteorological Service	eddie.maru9@gmail.com ;
	106.	Mr. Lazarus Mela	Senior MET Forecaster Meteorological Service	lazamelz@gmail.com ;
	107.	Mr. Allen Kelly Zunia	ANS Tech Officer Civil Aviation Authority of Solomon Islands	zunia_@caasi.com.sb ;
26.	TIMOR-LESTE (1)			
	108.	Mr. Terencio Fernandes Moniz	Director of Meteorology and Geophysics National Directorate Meteorology and Geophysics, Ministry of Transports and Communications	tfmoniz.moniz@gmail.com
27.	THAILAND (13)			
	109.	Mr. Somchai Yimsricharoenkit	Head of Aeronautical Meteorological Oversight Division Civil Aviation Authority of Thailand	somchai.y@caat.or.th ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	110.	Mr. Anusit Deepradit	ANS Officer Civil Aviation Authority of Thailand	anusit.d@caat.or.th ;
	111.	Mr. Bancha Kaewngam	Director of Aeronautical Weather Forecast Sub-division Thai Meteorological Department	bancha0110@gmail.com ;
	112.	Ms. Rassmee Damrongkietwattana	Director of Aeronautical Weather Monitoring Sub-division Thai Meteorological Department	rassmee@hotmail.com ;
	113.	Mrs. Tipsudawan Ruenchinda	Acting Director of Aeronautical Meteorology Standard Sub-division Thai Meteorological Department	rtipsuda2559@gmail.com ;
	114.	Mrs. Wattana Singtuy	Director of RTH-Bangkok Thai Meteorological Department	wattana_123@yahoo.co.th ;
	115.	Mr. Wanchalearn Petsuwan	Computer Technical Officer Thai Meteorological Department	wpetsuwan@hotmail.com ;
	116.	Ms. Sujin Promduang	Director of Aeronautical Information and Flight Data Management Aeronautical Radio of Thailand Ltd.	sujin.p@aerothai.co.th ;
	117.	Mr. Worapoj Yodjabog	Aeronautical Information Manager Aeronautical Radio of Thailand Ltd.	worapoj.yo@aerothai.co.th ;
	118.	Acting Sub. Lt. Prinya Viyasilpa	Air Traffic Engineering Manager Aeronautical Radio of Thailand Ltd.	prinya.vi@aerothai.co.th ;
	119.	Mrs. Amornrat Jirattigalachote	Strategic Planning Manager (Engineering) Aeronautical Radio of Thailand Ltd.	amo.jirat@gmail.com ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	120.	Mr. Worapong Jirojkul	Senior Air Traffic Systems Engineer Aeronautical Radio of Thailand Ltd.	worapong.j@aerothai.co.th ;
	121.	Mr. Pongpob Mongkolpiyathana	Executive Air Traffic Systems Engineer Aeronautical Radio of Thailand Ltd.	pongpob.mo@aerothai.co.th ;
28.	TONGA (1)			
	122.	Ms. Vaiola Vainikolo	Meteorologist Tonga Meteorological Services	vaiolav@met.gov.to ;
29.	USA (3)			
	123.	Ms. Karen Shelton-Mur	Meteorologist, International Aviation Weather Programme Lead Policy and Requirements Branch, Aviation Weather Division, FAA, NextGen Federal Aviation Administration	karen.shelton-mur@faa.gov ;
	124.	Mr. Michael Graf	Meteorologist/International Liaison Department of Commerce Meteorologist, Aviation and Space Weather Services Branch National Weather Service	michael.graf@noaa.gov ;
	125.	Mr. Michael Watkins	Senior Air Traffic Representative, Asia Pacific Federal Aviation Administration Air Traffic Organization, System Operations American Embassy, Singapore	michael.w.watkins@faa.gov ;
30.	VANUATU (1)			
	126.	Mr. Allan Rarai	Acting Director Vanuatu Meteorology & Geo-hazards Department	ararai@meteo.gov.vu ;
31.	VIET NAM (10)			

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	127.	Ms. Nguyen Lan Oanh	Deputy Director of Air Navigation Department Civil Aviation Authority of Vietnam	lanoanh@caa.gov.vn ; lanoanh@gmail.com ;
	128.	Ms. Vu Thi Thanh Tam	Official of Air Navigation Department Civil Aviation Authority of Vietnam	tamvtt@caa.gov.vn ; Vuthithanhtam86@gmail.com ;
	129.	Mr. Khan Quoc Le	Deputy Director General Viet Nam Air Traffic Management Corporation (VATM)	lequockhanh@vatm.vn ;
	130.	Ms. Nguyen Van Dung	Deputy Director of ATS Department Viet Nam Air Traffic Management Corporation (VATM)	nguyendung.acc@gmail.com ;
	131.	Mr. Phan Ba Hung	Head of Meteorological Watches Office Viet Nam Air Traffic Management Corporation (VATM)	hungphb@yahoo.com ;
	132.	Mr. Do Tien Duc	Meteorologist Viet Nam Air Traffic Management Corporation (VATM)	dotienduc@gmail.com ;
	133.	Mr. Tung Thanh Le	Manager of Noi Bai Meteorological Center Viet Nam Air Traffic Management Corporation (VATM)	lttnb@yahoo.com ;
	134.	Mr. Thi Hanh Le	Deputy Manager of Noi Bai Meteorological Center Viet Nam Air Traffic Management Corporation (VATM)	lehanhktnb@gmail.com ;
	135.	Mr. Viet Lam Cao	Forecaster Viet Nam Air Traffic Management Corporation (VATM)	caovietlam@gmail.com ;

MET SG/24
Appendix 13 to the Report

	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL
	136.	Ms. Tran Thi Khanh Huong	Manager of Tansonnhat Aviation Meteorological Center Viet Nam Air Traffic Management Corporation (VATM)	khanhhuong@vatm.vn ;
32.	ICAO (2)			
	137.	Mr. Mior Adli Bin Mior Sallehhuddin	Regional Officer Air Traffic Management (AOM-ASM) Asia & Pacific Regional Sub-Office (APAC RSO)	msallehhuddin@icao.int ;
	138.	Mr. Peter Dunda	Regional Officer MET International Civil Aviation Organization Asia and Pacific Office	PDunda@icao.int ;
