

INTERNATIONAL CIVIL AVIATION ORGANIZATION



**REPORT OF SIXTH MEETING OF THE ASIA/PACIFIC (APAC)
METEOROLOGICAL SERVICES WORKING GROUP
(MET/S WG/6)**

Bangkok, Thailand, 9 – 11 March 2016

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

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

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INTRODUCTION

1. Meeting

1.1 The Sixth Meeting of the Asia/Pacific (APAC) Meteorological Services Working Group (MET/S WG/6) of the APAC Air Navigation Planning and Implementation Regional Group (APANPIRG) was held at the ICAO Asia and Pacific Regional Office, Bangkok, Thailand from 9 – 11 March 2016.

1.2 The MET/S WG was established at the Nineteenth Meeting of the Meteorology Sub-group of APANPIRG (MET SG/19), Decision 19/2 - *Expert working groups of the Meteorology Sub-group (MET SG)*, refers, and replaces the former expert group known as the Meteorological Hazards Task Force (MET/H TF) and incorporates the activities of the former (APAC) World Area Forecast System Task Force (WAFS TF).

1.3 The meeting included a conjoint session on 9 March 2016 with the Fourteenth Meeting of the APAC Meteorological Information Exchange Working Group (MET/IE WG/14) to discuss items of interest to both groups. A report on discussions from the conjoint session is included at the end of this Report.

2. Attendance

2.1 The meeting was attended by 63 participants from 17 States and two International Organizations, including Australia, Bangladesh, Bhutan, Cambodia, China, Hong Kong China, Indonesia, Japan, Lao People's Democratic Republic (Lao PDR), Malaysia, New Zealand, Philippines, Republic of Korea, Singapore, Thailand, United States, Viet Nam, the International Air Transport Association (IATA) and ICAO. A list of participants is provided at **Attachment 1** to this Report.

3. Officers and Secretariat

3.1 Mr. Chan Pak Wai, Senior Scientific Officer, Hong Kong Observatory, Hong Kong, China, presided as Chair of the meeting.

3.2 Mr. Peter Dunda, Regional Officer Aeronautical Meteorology, ICAO Asia and Pacific Office, acted as Secretary for the meeting.

4. Language and Documentation

4.1 The MET/S WG met as a plenary throughout the meeting, including the conjoint session with the MET/IE WG. The working language of the meeting was English inclusive of all documentation and this Report. A total of 7 Working Papers (WP) and 3 Information Papers (IP) were considered by the meeting. An additional 7 WPs and 6 IPs were considered during the conjoint session. The list of working and information papers is provided at **Attachment 2** to this Report.

Agenda Item 1: Organizational matters

WP/1 – adoption of the agenda

1.1 The meeting adopted the provisional agenda as circulated prior to the meeting and shown below:

MET/S WG/6

- Agenda Item 1: Organizational matters
- Agenda Item 2: Review of follow-up from previous meetings
- Agenda Item 3: Quality management of meteorological services
- Agenda Item 4: Planning and implementation of meteorological services (e.g., WAFS, meteorological offices, observations/reports, forecasts, warnings and alerts, climatological information and other services)
- Agenda Item 5: Review and rectification of deficiencies in meteorological services
- Agenda Item 6: Future work programme
- Agenda Item 7: Any other business

Conjoint session: MET/S WG/6 and MET/IE WG/14

- Agenda Item 1: Review and optimization of VAAC Backup Tests
- Agenda Item 2: SIGMET and (volcanic ash and tropical cyclone) advisory information (including SIGMET tests)
- Agenda Item 3: Any other business

Agenda Item 2: Review of follow-up from previous meetings

WP/2 – follow-up of action items from MET/H TF/5

2.1 The previous meeting, i.e., the fifth meeting of the Meteorological Hazards Task Force (MET/H TF/5), developed a task list of 7 action items. The meeting considered that 5 as action items were completed; 1 was in progress; and 1 was yet to commence. The meeting updated the status of the action items in the MET/H TF/5 task list, a copy of which is provided at the **Attachment 3** to this report.

2.2 With respect to progress on the action item 5/7 – *confirmation of membership contact details* – the meeting noted that the International Air Transport Association (IATA) and the International Federation of Air Line Pilots' Associations (IFALPA) were invited to participate in MET/S WG/6, but were unable to provide representatives at the meeting, therefore, the time frame for confirmation of contact details for IATA and IFALPA, as members of the MET/S WG, was revised by the meeting and was reflected in the updated action items list.

Agenda Item 3: Quality management of meteorological services

3.1 No papers were submitted for discussion under this agenda item.

3.2 The new terms of reference provided by the MET SG (MET SG/19 Decision 19/2 — *Expert working groups of the Meteorology Sub-group*, refers), requires the MET/S WG to promote the requirement of quality management for meteorological services and competency of aeronautical meteorological personnel.

3.3 The meeting noted that the 26th meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/26), in its Conclusion 26/58 – *Competency of aeronautical meteorological personnel*, invited ICAO to consider inclusion in Annex 3 of a new provision on the competency of aeronautical meteorological personnel, which would facilitate States with planning and implementation of the competency standards for aeronautical meteorological personnel.

Agenda Item 4: Planning and implementation of meteorological services

WP/4 – Report on APAC VOLCEX/SG/2

4.1 The second meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group (APAC VOLCEX/SG/2) was held in Bangkok, Thailand, from 14 to 16 September 2015.

4.2 In accordance with the guidance for conducting volcanic ash exercises in ICAO regions, provided in ICAO Doc 9766 – *Handbook on the International Airways Volcano Watch*, Appendix F, VOLCEX/SG/2 conducted both a debrief meeting and a planning meeting, to discuss the reports from the first ICAO APAC volcanic ash exercise (VOLPHIN15/01), which was conducted in Philippines on 11 August 2015, and to organize the second ICAO APAC volcanic ash exercise (VOLPHIN16/01), which was subsequently conducted in Indonesia on 17 February 2016.

4.3 Outcomes from VOLCEX/SG/2 included recommendations to review and update guidance material related to the distribution of volcanic ash advisory information to meteorological watch office (MWO) and area control centre (ACC) locations (e.g., as listed in the APAC Regional Air Navigation Plan (ANP), Facilities and Services Implementation Document (FASID) Table MET 3B and in ICAO Doc 9766, Part 2).

4.4 With respect to the above, it was noted that an outcome of discussions related to FASID Tables MET at the preceding 14th meeting of the Meteorological Information Exchange Working Group (MET/IE WG/14), included the need to seek confirmation on where the information contained in FASID Table MET 3B (as well as Tables MET 3A, 3C, 5 and 6 and Charts MET 1 and 2) will be available longer term, noting that the new APAC regional ANP format, Volumes I and II, do not contain the information from the above mentioned FASID Tables (MET/IE WG/14 action item 14/12 refers).

4.5 The third meeting of the APAC Volcanic Ash Exercises Steering Group (APAC VOLCEX/SG/3), will be held in Bangkok, Thailand, from 14 - 16 March 2016 and will include a debrief meeting for VOLPHIN16/01 and a planning meeting for future ICAO APAC volcanic ash exercise/s in accordance with the future work schedule of the APAC VOLCEX/SG.

WP/5 – The APAC regional guidance on aerodrome tsunami warnings

4.6 The second draft of the “*Asia/Pacific Regional Guidance on Integration of Aerodrome Tsunami Warnings into the National Tsunami Warning Systems for Public*”, developed by the ad-hoc group comprising Indonesia and Japan (Rapporteur), as appointed by the (former) MET/H TF, was reviewed by the 19th meeting of the Meteorology Sub-group (MET SG/19), which agreed that additional input from States should be sought to further develop the draft guidance.

4.7 The ad-hoc group, with assistance from Australia, prepared a revised draft under the revised title “*Asia/Pacific Regional Guidance on Aerodrome Tsunami Warnings and their integration into National Public Safety Plan for Tsunami*”. A copy of the revised draft is provided at the Attachment to WP/5.

4.8 The ad-hoc group agreed to consider additional input provided by States, as necessary, and to revise the draft document accordingly if necessary, and to arrange for presentation of the draft guidance material to MET SG/20 for review and further advice as to the possible future use of the document as regional guidance material.

IP/2 – Development and use of digital TAF and METAR automatic production program

4.9 Republic of Korea, Aviation Meteorological Office (AMO), was developing an automatic production system for meteorological forecasts and reports, utilizing numerical weather prediction (NWP) systems and automated meteorological observation systems to generate aerodrome forecasts and meteorological reports in the TAF and METAR code. The system was under development and intended for use to assist aeronautical meteorological personnel (e.g., forecasters), only.

IP/3 – Survey on operational use of WAFS and WAFS training needs in APAC

4.10 The sixth annual survey to solicit information on: (a) the operational use of services and products from service providers of the World Area Forecast System (WAFS) in the APAC Region; and (b) the training needs of APAC States on the use of WAFS information, was conducted by the (former) WAFS Task Force (WAFS TF) from mid-December 2015 to mid-January 2016.

4.11 The survey questionnaire was sent to 29 APAC States/Territories, of which 19 responded. A detailed analysis of the responses and a copy of the questionnaire are provided in the Appendixes to IP/3.

4.12 Noting that the tasks of the (former) WAFS TF would be transferred to the MET/S WG (MET SG/19 Decision 19/2 — *Expert working groups of the Meteorology Sub-group*, refers), MET/S WG should consider the objectives of the survey and the required frequency of future surveys (Note: the meeting recommended once every two years) when updating the work programme (further discussion on the work programme is reported under Agenda Item 6).

Agenda Item 5: Review and rectification of deficiencies in meteorological services

WP/6 – Review of deficiencies in meteorological services

5.1 At the time of the meeting there were twenty (20) air navigation deficiencies in the aeronautical meteorology (MET) field in the APANPIRG list of air navigation deficiencies. These were listed against eleven (11) APAC States and related to the following facilities, services or

procedures: SIGMET¹ information; WAFS forecasts for flight briefings; aerodrome meteorological observations; and volcanic ash/activity information.

5.2 Overall progress towards resolution and removal of the MET deficiencies in the APANPIRG list was negligible over a period of several years since the deficiencies were first reported, which in some cases dated back to 1995 (Attachment to WP/6 refers).

5.3 Noting that the resolution of air navigation deficiencies has been given the highest priority by APANPIRG, the long-term lack of significant progress in resolving the air navigation/MET deficiencies in the APANPIRG list could not be considered as an acceptable situation for APANPIRG.

5.4 APANPIRG/26 (held in September 2015) urged States with air navigation deficiencies to put in additional resources to resolve the deficiencies and inform the ICAO Regional Office on the action taken, noting that it is the responsibility of States with deficiencies to provide updates to the information in the deficiencies database. It was noted that the provision of periodic updates to the ICAO Regional Office should be provided annually (at the least), and preferably not later than in April each year in order to be available for review by the annual meetings of APANPIRG and its Sub-Groups.

5.5 However, with few exceptions, the updates on corrective actions taken by States (to resolve the air navigation/MET deficiencies in the APANPIRG list) have been infrequent and, in most cases, the descriptions of corrective action plans (which are recorded in the list) were not concise and lacked defined target dates.

ACTION – Provide updates to MET SG and APANPIRG on the status of corrective action for the air navigation/MET deficiencies in the APANPIRG list [States with assistance from Secretariat].

5.6 It was noted that, in accordance with the terms of reference, APANPIRG (and its contributory bodies) shall facilitate the conduct of any necessary systems performance monitoring to assist the development and implementation of action plans by States to resolve identified air navigation deficiencies, where necessary.

5.7 In view of the discussion above, specially organized and targeted SIGMET performance monitoring, over a defined area/s and period/s, and/or triggered by a tropical cyclone and/or volcanic ash event/s, and/or a targeted program to capture SIGMET information could be utilised to garner updated information on the status of SIGMET-related deficiencies to further assist the MET SG and APANPIRG in monitoring and facilitating the resolution of air navigation deficiencies.

ACTION – Organise and conduct targeted SIGMET performance monitoring based on SIGMET-related air navigation/MET deficiencies in the APANPIRG list [RODBs with assistance from Secretariat/chair].

¹ Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations

Agenda Item 6: Future work programme

WP/7 – Review MET/S WG terms of reference and work programme

6.1 The terms of reference for the MET/S WG were provided by the MET SG when it established the MET/S WG as the replacement for the MET/H TF, incorporating the functions of the (former) WAFS TF (MET SG/19 Decision 19/2 — *Expert working groups of the Meteorology Sub-group*, refers).

6.2 The meeting reviewed and revised a work programme document for the MET/S WG, incorporating the terms of reference provided by the MET SG and the existing membership, tasks and work programmes of the (former) MET/H TF and WAFS TF. A copy of the revised terms of reference and work programme document of the MET/S WG is provided at the **Attachment 4** to this report.

Agenda Item 7: Any other business

7.1 No papers were submitted for discussion under this agenda item.

Task List

7.2 The meeting agreed to the action items as recorded in the task list at the **Attachment 3** to this Report.

Next Meeting

7.3 The next meeting was tentatively scheduled for 22 to 24 March 2017 in Bangkok, Thailand, with the inclusion of a conjoint session with the MET/IE WG on 22 March 2017.

Report on Conjoint Session

Agenda Item 1: Review and optimization of VAAC Backup Tests

WP/C6 – Follow-up from previous meetings

1.1 The previous conjoint session, i.e., of the thirteenth meeting of the Regional OPMET² Bulletin Exchange Working Group (ROBEX WG/13) and the fifth meeting of the Meteorological Hazards Task Force (MET/H TF/5), developed a task list of 8 action items. The meeting considered that 5 action items were completed; 1 was on hold; 1 was in progress; and 1 was yet to commence. An updated task list showing the status of the action items is contained at the **Attachment C1** to this report.

1.2 Although the action item number 7 concerning guidance supporting clarity and consistency of information within tropical cyclone advisory and SIGMET³ messages in the Region was completed, insofar as the proposed draft conclusion was adopted at the 26th meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/26), the

² Operational meteorological (information)

³ Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of aircraft operations

follow-up on the resultant APANPIRG Conclusion 26/53, which was envisaged to be assigned by ICAO to the Meteorology Panel (METP) for further action, should be expedited to meet the timeframe for possible Annex 3 amendments to be considered.

1.2 Advisers or members of the METP from Australia and Japan were encouraged to raise the issues discussed above at the earliest opportunity with the METP and/or appropriate working groups of the METP so that the proposals concerning clarity and consistency of information within tropical cyclone advisory and SIGMET messages may be considered for incorporation in the development of proposals for future Amendments to Annex 3. **Note:** The meeting discussed a related paper, IP/C5, at paragraphs 2.24 – 2.25 of this report, which pointed out that (within the context of current Annex 3 provisions) careful consideration would be required in the preparation of SIGMET information based on tropical cyclone advisory information in graphical format (TCG) when the extent of frequent cumulonimbus clouds (FRQ CB) depicted in the TCG does not exhibit a uniform radius from the centre of the tropical cyclone concerned.

ACTION – Secretariat to provide further information with respect to the possible actions related to APANPIRG Conclusion 26/53, noting the information provided in IP/C5 as supporting information.

1.3 Follow-up on the action item number 8 (promotion of the requirements for issuance of special air-reports) was considered to be important and warranted progress as soon as possible.

1.4 Action item 6 was considered to be closed based on discussion at the meeting, which indicated that Australia, Japan and New Zealand considered it would not be feasible for volcano observatory notice for aviation (VONA) information to be distributed onwards (via social media or other channels) by the volcanic ash advisory centres (VAACs).

1.5 With respect to action item 1 (VAAC back-up test State letter invitations and supporting documentation), the VAACs indicated that direct email notification from VAACs would be sufficient to advise those concerned about the conducting of back-up tests.

1.6 With respect to the action item 4 (SIGMET workshop), Japan advised that planning was underway and dates for a proposed 2016 workshop would be available in due course.

WP/C1 – Back-up operations between VAACs Tokyo and Darwin

1.7 Mutual back-up test was conducted between the VAAC Darwin and VAAC Tokyo on 25 November 2015 and 27 January 2016. Recommendations arising from the back-up test included:

- a) VAACs (Darwin and Tokyo) continue to promote the implementation and understanding of the International Airways Volcano Watch (IAVW) through active engagement with regional meteorological watch offices (MWOs);
- b) VAACs use test results to identify the necessity to update the list of aeronautical fixed telecommunication network (AFTN) addresses used for the provision of volcanic ash (VA) advisory information; and use airlines' feedback concerning the provision of VA advisory information in graphical format (VAG) to enhance the back-up operations performance; and
- c) VAACs continue to conduct annual back-up testing.

1.9 Future back-up test reports should include responses received to the volcanic ash test message; listed by State, and should the list of email addresses to which the notice of the back-up test was disseminated.

Agenda Item 2: SIGMET and (volcanic ash and tropical cyclone) advisory information (including SIGMET tests)

WP/C2 and WP/C3 – SIGMET tests

2.1 Annual SIGMET tests were conducted in the APAC Region on 4 November 2015 (WC SIGMET test for tropical cyclone), 11 November 2015 (WV SIGMET test for volcanic ash) and 18 November 2015 (WS SIGMET test for phenomena other than tropical cyclone and volcanic ash).

2.2 The meeting noted that a relatively short lead time was provided by the ICAO State letter invitation to participate in the SIGMET tests and considered that this would have resulted in some MWOs having insufficient time to prepare for and hence participate in the tests (in particular the WC SIGMET test on 4 November), which would have contributed to the significantly lower level of participation (20%) recorded in the SIGMET test results as compared with the previous year.

2.3 In view of the above, the feasibility of re-conducting the WC SIGMET test was discussed, but it was not considered this would be useful or necessary as the next, scheduled annual SIGMET tests (WC, WV and WS) were due to be held in 2016. For future SIGMET tests, however, the formal notification of the conduct of SIGMET tests should be distributed to States no later than 1 month prior to the scheduled test.

2.4 In addition to the discussion above, an unexpected delay in the issuance of the triggering test tropical cyclone advisory message from tropical cyclone advisory centre (TCAC) Tokyo, at the start of the WC SIGMET test, which was attributed to an internal TCAC system error, was considered to also have contributed to the lower level of participation of MWOs that was highlighted in the WC SIGMET test results.

2.5 In general, the errors recorded in the test SIGMET messages issued by some States included incorrect usage of codes, namely the message priority code, abbreviated header information, SIGMET message sequence number and the flight information region (FIR) identifier. Australia noted that it had implemented some internal system changes since the SIGMET tests were conducted and that this would have resolved the errors reported in test SIGMET messages issued from Australia.

2.6 Some MWOs issued multiple SIGMET bulletins (during the WC SIGMET test) containing the same test SIGMET messages, which was not desirable as it could result in confusion for the recipients, including Regional OPMET Databanks (RODBs) that analyse the SIGMET test data.

2.7 In accordance with expectations for the SIGMET test for volcanic ash, test WV SIGMET messages were issued by and received from the 9 designated MWOs in the Russian Federation – located in the neighbouring ICAO European (EUR) Region.

2.8 4 States (i.e., Democratic People's Republic of Korea, Maldives, Republic of Korea and Sri Lanka), including 11 MWOs, did not participate in the WS SIGMET test on 18 November 2015.

2.9 Notwithstanding the shorter lead time provided by the invitation letter for the SIGMET tests (as already discussed at 2.2), 2 States and 2 MWOs, namely Afghanistan (MWO Kabul) and Papua New Guinea (MWO Port Moresby), have not participated in any of the SIGMET tests conducted in the APAC Region since 2006.

2.10 The WS SIGMET test results showed that the rate of reception of SIGMET test messages at the APAC RODBs and the EUR Regional OPMET Centres (ROCs) and RODBs, varied, with fewer WS SIGMET test messages being received at the EUR ROC/RODBs than at the APAC RODBs.

2.11 Clarification of the responsibilities and the correct path for the relay of SIGMET messages (from the source) to the Satellite Distribution System [for meteorological information] (SADIS) and the World Area Forecast System Internet File Service (WIFS) gateways may help to address the discrepancies in SIGMET message reception discussed above.

2.12 The overall reception rate of WS SIGMET test messages at the APAC RODBs was slightly higher than the previous year.

ACTION – Advise States concerned about the 2015 SIGMET test results to facilitate resolution of SIGMET test non-participation and/or rectification of errors identified in the SIGMET test messages

IP/C6 – Cooperation on SIGMET tests between Japan, Lao PDR and Myanmar

2.13 The meteorological service provider for Japan⁴ has been providing cooperative technical assistance to the meteorological service providers in Lao People's Democratic Republic⁵ (Lao PDR) and Myanmar⁶ since 2014 to support improvement in the issuance of SIGMET information in Lao PDR and Myanmar.

2.14 The cooperative assistance resulted in improved SIGMET test participation for both Lao PDR and Myanmar, which indicated that cooperative technical assistance (between States) can be a most effective way to support improvement in the provision of aeronautical meteorological services, such as SIGMET information.

WP/C4 – SIGMET Guide

2.15 Proposed amendments to the Regional SIGMET Guide drafted by the previous conjoint session (ROBEX WG/13 and MET/H TF/5) were reviewed and expanded by MET SG/19 and finally endorsed by APANPIRG/26 (APANPIRG/26 Conclusion 26/60 refers). Subsequently, the new [5th Edition] APAC Regional SIGMET Guide was published by ICAO (State letter Ref.: T 4/8.3.2 & T 4/10.2: AP155/15 (MET), dated 06 October 2015, refers).

2.16 To assist the MET SG with the regular review and update of the Regional SIGMET Guide, consideration should be given to the need to reflect any changes necessary for alignment with Amendment 77 to Annex 3. The meeting noted that coordination with other ICAO Regions would be important to maintain consistency with other Regional SIGMET Guides and assistance should be sought from the ad-hoc group members that developed the common Regional SIGMET Guide template, which included a member from the SADIS Provider State.

ACTION – Prepare draft amendment to the APAC Regional SIGMET Guide to align with Amendment 77 to Annex 3.

⁴ Japan Meteorological Agency (JMA)

⁵ Lao PDR Department of Meteorology and Hydrology (LDMH)

⁶ Myanmar Department of Meteorology and Hydrology (MDMH)

WP/C5 – SIGMET pamphlets

2.17 As follow-up to the decision made by the MET/H TF/5 meeting (Decision 5/1 – *Regional guidance material: SIGMET pamphlets*, refers) the SIGMET pamphlets developed by the ad-hoc group of MET/H TF, which were intended as a quick reference guide for States to use in the preparation of [WC and WS] SIGMET messages, were approved by APANPIRG/26 (Conclusion APANPIRG/26/59 refers) and published by ICAO (and are now available on the ICAO APAC website, under “APAC eDocuments”).

2.18 Also, a draft new SIGMET pamphlet was developed as a quick reference guide for States to use in the preparation of [WV] SIGMET messages. The ad-hoc group will present the final draft of the new WV SIGMET pamphlet for review by the MET SG and possible adoption and distribution for use by States.

2.19 In view of the above, the meeting formulated the following draft conclusion for the MET SG:

MET SG/20 Draft Conclusion 20/X – SIGMET Pamphlets

That, ICAO be invited to adopt the SIGMET Pamphlet, provided by the ad-hoc group (in WP/C5), as Regional guidance material and distribute to States to facilitate improved format of SIGMET information for volcanic ash

WP/C7 – Regional guidance on SIGMET for radioactive cloud

2.20 Draft regional guidance material on the issuance of SIGMET for radioactive cloud, for possible inclusion in the Regional SIGMET Guide, developed by the ad-hoc group specially assigned by MET/H TF, was presented to MET SG for further review and consideration and subsequently forwarded to the Meteorology Panel (METP) Meteorological Information and Service Development Working Group (WG-MISD) held in Washington D.C., United States, from 16 to 19 November 2015, which is the global group primarily responsible for developing the guidance material to support Annex 3 provisions.

2.21 Further work by the (MET/H TF) ad-hoc group would not be necessary as the ad-hoc group would wait for global developments in this area, which may be expected within 1 year, and further advice from the MET SG as necessary, which would follow the MET SG’s review of the outcomes from the METP WG-MISD activities.

IP/C4 – Automated guidance for SIGMET information on thunderstorms

2.22 Australia has developed a thunderstorm decision support tool, referred to as the “Cloud Object Tracking and Classification” or COTAC software, which utilises a machine learning algorithm, coupled with meteorological satellite imagery and lightning detection technology to detect and track areas of thunderstorm activity, and is used to support the issuance of SIGMET information.

2.23 Criteria used in conjunction with the tool, to determine whether the detected and tracked thunderstorm activity warrants issuance of SIGMET information, are provided in detail in the IP/C4.

IP/C5 – Issuance of tropical cyclone advisory information in graphical format by TCAC Tokyo

2.24 The issuance of tropical cyclone advisory information in graphical format (TCG) by TCAC Tokyo commenced from 06 UTC 26 August 2015. The TCG information is prepared in accordance with Annex 3 requirements and is made available at the TCAC Tokyo website and via the World Area Forecast Centre (WAFC) information services.

2.25 The system used to generate the TCG is not limited to the use of a circle-shaped area for the depiction of the geographical extent of [frequent] cumulonimbus (CB) clouds. Rather, it is enabled to more precisely reflect the true shape of the observed extent of CB clouds associated with a tropical cyclone.

IP/C3 – Darwin VAAC Management Report

2.26 Darwin VAAC issued in total 2592 volcanic ash advisory messages in abbreviated plain language (VAA), and corresponding VAG, in the 12 months from 1 February 2015 to 31 January 2016 – representing a substantial increase in the provision of VAA/VAG compared with previous years.

2.27 Several factors were attributed to the increase in VAA/VAG issuance, including: introduction of a more frequent updating cycle for VAA/VAG (i.e., during significant events, routine issuance increased from 6-hourly to 3-hourly); increased availability and quality of observational data (such as meteorological satellite imagery) resulted in more detections of VA; and an overall increase in the level volcanic activity that occurred in the VAAC's area of responsibility.

IP/C1 – Monthly VONA issuance drill between PHIVOLCS and VAAC Tokyo

2.28 The national provider of volcano observatories in Philippines (PHIVOLCS⁷) and the VAAC Tokyo have established and implemented a cooperative, monthly VONA issuance drill to facilitate improved issuance of VONA by all the volcano observatories of PHIVOLCS and, hence, to support the issuance and exchange of timely volcanic ash advisory information in the Region and safety of aviation in volcanic ash events.

IP/C2 – Report of VOLKAM15 and aim of VOLKAM16

2.29 The third ICAO EUR (EAST) volcanic ash exercise (VOLKAM15) was conducted during 15-16 April 2015, and demonstrated the exchange of VONA, SIGMET information for VA, VAA and Notice to Airmen (NOTAM), issued via AFTN and/or via email, and the responses of aircraft operators, meteorological offices and Air Traffic Services (ATS) units. VAACs Tokyo and Anchorage demonstrated enhanced communication and coordination with the practice of VAAC handover procedures. More detailed discussion on highlights from VOLKAM15 is provided in IP/C2.

2.30 The fourth ICAO EUR (EAST) volcanic ash exercise (VOLKAM16) will be conducted during 21-22 April 2016, and then reviewed in May 2016 by the EUR (EAST) VOLCEX/SG.

⁷ Philippine Institute of Volcanology and Seismology

Agenda Item 3: Any other business

Task List

3.1 The meeting agreed to the tasks as recorded in the task list at the **Attachment C1** to this report.

**FOURTEENTH MEETING OF THE ASIA/PACIFIC METEOROLOGICAL
INFORMATION EXCHANGE WORKING GROUP
(MET/IE WG/14)**

(Bangkok, Thailand, 7 – 9 March 2016)

**SIXTH MEETING OF THE ASIA/PACIFIC METEOROLOGICAL
SERVICES WORKING GROUP (MET/S WG/6)**

(Bangkok, Thailand, 7 – 9 March 2016)

LIST OF PARTICIPANTS

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International Civil Aviation Organization

SIXTH MEETING OF THE ASIA/PACIFIC METEOROLOGICAL SERVICES WORKING GROUP (MET/S WG/6)

Bangkok, Thailand, 9 – 11 March 2016

WP/IP No.	Agenda Item	Subject	Presented by
WP/1		Provisional Agenda	Secretariat
WP/2	2	Review of Follow-up from Previous Meetings	Secretariat
WP/3			
WP/4	4	Report on APAC VOLCEX/SG/2	Chair of APAC VOLCEX/SG
WP/5	4	The Asia/Pacific Regional Guidance on Aerodrome Tsunami Warnings	Ad Hoc Group - Australia, Indonesia and Japan (Rapporteur)
WP/5	4	The Asia/Pacific Regional Guidance on Aerodrome Tsunami Warnings	
WP/6	5	Review of Deficiencies in Meteorological Services	Secretariat
WP/7	6	Review MET/S WG Terms of Reference and Work Programme	Secretariat
INFORMATION PAPERS			
IP/1		Meeting Bulletin	Secretariat
IP/2	4	Development and Use of Digital TAF & METAR Automatic Production Programme	Republic of Korea
IP/3	4	Survey on Operational Use of Services and Products from Service Providers of World Area Forecast System (WAFS) in Asia/Pacific Region and WAFS Training Needs of Asia/Pacific States	Chairman, MET/S WG
CONJOINT WORKING PAPERS			
WP/C1	1	Mutual back-up Operations between VAACS Tokyo and Darwin	Australia and Japan

WP/IP No.	Agenda Item	Subject	Presented by
WP/C2	2	Review of WS SIGMET Test 11	Singapore RODB
WP/C3	2	Progress with SIGMET Tests – WC and WV	Japan
WP/C4	2	Regional SIGMET Guide	Secretariat
WP/C5	2	SIGMET Pamphlets	MET/S WG Ad Hoc Group
WP/C6	1 & 2	Review of Follow-up from Previous Meetings	Secretariat
WP/C7	2	The Asia/Pacific Regional Guidance on the Issuance of SIGMET for Radioactive Cloud	Rapporteur, MET/S WG, Ad Hoc Group

CONJOINT INFORMATION PAPERS

IP/C1	2	Monthly VONA Issuance Drill between PHIVOLCS and VAAC Tokyo	Japan
IP/C2	2	Report of VOLKAM 15 and Aim of VOLKAM 16	Japan
IP/C3	2	Darwin VAAC Management Report	Australia
IP/C4	2	Automated Thunderstorm SIGMET Guidance	Australia
IP/C5	2	Issuance of Graphical Tropical Cyclone Advisory by TCAC Tokyo	Japan
IP/C6	2	Cooperation on SIGMET Tests between Japan, Lao PDR and Myanmar	Japan, Lao PDR and Myanmar

MET/S WG/6
Attachment 3 to the Report

TASK LIST

MET/H TF/5 – Adapted from Appendix D to the Report of MET/H TF/5
(Highlighted text indicates updated information)

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/REMARKS
5/1	Submit paper including draft [WC and WS] SIGMET pamphlets and a proposal for appropriate publication/distribution of the (approved) pamphlets in electronic form through MET SG/19 to APANPIRG/26 and/or ICAO HQ and WMO for adoption as regional guidance material.	July 2015	Ad-hoc group, comprising Australia, Hong Kong-China and New Zealand (Rapporteur)	COMPLETED Related to MET/H TF/5 Decision 5/1
5/2	Develop a draft [WV] SIGMET pamphlet for review and approval (include in 5/1 if possible).	February 2016	Ad-hoc group, comprising Australia, Hong Kong-China and New Zealand (Rapporteur)	COMPLETED Related to MET/H TF/5 Decision 5/1
5/3	Revise all SIGMET pamphlets as necessary, and submit drafts for approval, to align with, in time for the applicability of, Amendment 77 to ICAO Annex 3.	August 2016	Ad-hoc group, comprising Australia, Hong Kong-China, Japan and New Zealand (Rapporteur)	To commence Related to MET/H TF/5 Decision 5/1
5/4	Obtain further comments on the draft tsunami warning guidance in WP/5 and the draft regional guidance material on SIGMET for radioactive clouds in IP/3.	July 2015	Secretariat and MET/H TF	COMPLETED Related to MET/H TF/5 Decision 5/2 and 5/3
5/5	Revise the draft guidance material on tsunami warning as necessary, and ensure that end user consultation is a key component during the integration of aerodrome tsunami warning service into national tsunami warning systems, and submit a paper to MET SG/19	July 2015	Ad-hoc group comprising Indonesia and Japan	COMPLETED Related to MET/H TF/5 Decision 5/2
5/6	Revise the draft guidance material on SIGMET for radioactive clouds as necessary and submit a paper to MET SG/19.	July 2015	Ad-hoc group comprising China (rapporteur), Hong Kong-China and Japan	COMPLETED Related to MET/H TF/5 Decision 5/3
5/7	Confirm the MET/H TF membership contact details and invite IATA and IFALPA to nominate relevant experts for membership.	June 2016	Secretariat	IN PROGRESS Related to MET/H TF/5 Decision 5/4

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TASK	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/REMARKS
6/1	Provide updates to MET SG and APANPIRG on the status of corrective action for the air navigation deficiencies in the MET field in the APANPIRG list	Jun 2016	Members, Secretary	TO BEGIN [Ref: MET/S WG/6 Report para. 5.5]
6/2	Organise and conduct targeted SIGMET performance monitoring based on SIGMET-related air navigation/MET deficiencies in the APANPIRG list	Jun 2016	Members, Secretary	TO BEGIN [Ref: MET/S WG/6 Report para. 5.7]

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

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2.DESCRPTION	
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	Under guidance from ICAO APAC MET Secretariat: <ol style="list-style-type: none"> a) 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); b) Promote the implementation of meteorological services; c) Promote the requirement for, and benefits of, QMS for MET services and competency of aeronautical meteorological personnel; d) Maintain awareness of, and identify new, meteorological deficiencies and formulate strategies to resolve these deficiencies;

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	<p>e) 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);</p> <p>f) Monitor the relevant activities of the MET Panel and appropriate bodies; and</p> <p>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.</p>
Work Program	<p>The work to be addressed by the ASIA/PAC MET/S WG includes:</p> <ul style="list-style-type: none"> • 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 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 Task Force (RACP/TF).

3. COMMUNICATION STRATEGIES				
Description	Target Audience	Delivery Method	Frequency/ Date	Responsibility
Work Plan	Working Group Members	Document via email and posted on ICAO Bangkok website	As required but reviewed at least quarterly	Chair
General correspondence	Working Group Members	Email	As required	Working Group Members
Working Group Meeting	Working Group Members	Meeting in conjunction with MET/IE WG	Yearly in March	Chair

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Status& Milestone Reports	ICAO Secretariat and Working Group Members	Report via email	Quarterly	Chair
Working Group Report	MET/S WG and MET/IE WG	Working Paper	Yearly	Chair
Working Group Report	MET SG	Working Paper	Yearly	Secretariat

4. PERFORMANCE FRAMEWORK FORM (PFF)				
Tasks	Time Frame	Responsibility	Status	Milestone
Task 1: Monitor and provide assistance to the regional implementation of meteorological observations, forecasts, warnings and advisories	2016-2019	MET/S WG	In progress	1
Task 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	2016-2018	MET/S WG and MET/IE WG	In progress	1,2
Task 3: Review WC, WV & WS SIGMET test results and implement improvements.	2016-2018	MET/S WG	In progress	1
Task 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.	2016	R/O, MET/S WG and MET/IE WG	In progress	1,3
Task 5: Provide input into regional operational plans as required for specific phenomenon, including VA, radioactive cloud, TC, Tsunami and Space Weather, with consideration to global ICAO groups and WMO developments.	2016-2018	MET/S WG and MET/R WG	In progress	3
Task 6: Investigate, and implement as appropriate, options to assist States in resolving air navigation deficiencies in the field of meteorological service.	2016	MET/S WG	In progress	4
Task 7: Monitor the implementation and utilization of WAFS and training needs within the ASIA/PAC Region, and report to MET SG	2016-2019	MET/S WG	In progress	5

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5. MILESTONES			
Milestone	Accountability	Dates	Status
<i>Milestone 1: Report on SIGMET test results and regional performance to MET SG</i>	<i>Chair</i>	<i>Annually</i>	
<i>Milestone 2: Guidance and educational material available</i>	<i>Chair</i>	<i>TBD</i>	
<i>Milestone 3: MET input provided for ASIA/PAC Regional ATM Contingency Plans</i>	<i>ad-hoc group</i>	<i>Next meeting</i>	
<i>Milestone 4: Reduction in air navigation deficiencies in the field of meteorological service.</i>	<i>States</i>	<i>TBD</i>	
Milestone 5: Conduct survey on the implementation and utilization of WAFS and training needs within the ASIA/PAC Region and report to MET SG	Chair	Every 2 years	

6. WORK PLAN				
Task / Milestone	Accountability	Predecessors	Date	Status
Activity 1: SIGMET TESTS				
Task 1.1: Review SIGMET tests (conjoint session with MET/IE WG)	Working Group	-	Annually	
Task 1.2: Develop action plan to fix identified deficiencies	Chair in conjunction with the Working Group	conjoint session with MET/IE WG	During meeting	
Task 1.3 Report back to MET SG on regional performance and action plan	Chair		Annually	
<i>Milestone 1: Report on SIGMET test results and regional performance to MET SG</i>	Chair	-	<i>Annually</i>	
Activity 2: GUIDANCE AND EDUCATIONAL MATERIAL				
Task 2.1: a) Review current SIGMET poster information b) Publish information in pamphlet form c) Review SIGMET pamphlets with future regard to Annex 3 Amendments 77	Australia, Hong Kong, China, Japan and New Zealand (Rapporteur) in conjunction with ICAO HQ and WMO	-	TBD August 2016	
Task 2.2: Review radioactive cloud survey results and develop guidance Monitor international development for of radioactive cloud SIGMET inclusion in the	China (Rapporteur), Hong Kong, China, Japan	-	TBD	

6. WORK PLAN				
Task / Milestone	Accountability	Predecessors	Date	Status
SIGMET Guide				
Task 2.3: Review tsunami survey results and develop the draft guidance of tsunami warning in line with proposal for Amendment 77 to Annex 3 and present the guidance to MET SG for endorsement	Japan (rapporteur), Australia, Indonesia		TBD June 2016	
Task 2.4: Forward proposed amendments to the SIGMET Guide template to appropriate expert group determined by MET Panel Review the regional SIGMET Guide to be in line with Amendment 77 to Annex 3	Australia (rapporteur), Japan, Hong Kong, China and New Zealand in conjunction with Secretariat		TBD June 2016	
<i>Milestone 2: Guidance and educational material available</i>	Chair		2016 TBD	
Activity 3: REGIONAL CONTINGENCY PLANS				
Task 3.1: Get a list of requirements from RACP/TF	Secretariat	-	Next RACP/TF	
Task 3.2: Provide information on hazardous meteorological phenomena to ATM group for inclusion in the ATM contingency plan, if required (after outcome of RACPTF is known)	ad-hoc group (TBC)	-	Next meeting	
<i>Milestone 3: MET input provided for ASIA/PAC Regional ATM Contingency Plans</i>	Secretariat ad-hoc group	3.1-3.2	Next meeting	
Activity 4 – SIGMET Deficiencies				
Task 4.1: Investigation Review options to eliminate SIGMET deficiencies:	ad hoc group #1: New Zealand (rapporteur), Australia, China, Japan, Indonesia, and Hong Kong, China		Oct 2014 Sep 2016	Complete
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	4.1	May 2016 and Feb/Mar 2017	

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6. WORK PLAN				
Task / Milestone	Accountability	Predecessors	Date	Status
	WG chair and Secretariat			
Task 4.23: Assist the ICAO Secretariat in the facilitation of discussion of viable options with relevant States.	ad hoc group #1	4.1	TBD Ongoing	
Task 4.34: Monitor the implementation of the solution/s to remove deficiencies.	ad hoc group #1	4.2	Ongoing	
Task 4.45: Monitor global development on the establishment of a regional advisory system for hazardous weather.	ad hoc group #1		Ongoing	
Task 4.56: Report progress to MET SG	Rapporteur of ad hoc group #1	4.3	Jun 2016 Ongoing	
<i>Milestone 4: Reduction in SIGMET deficiencies.</i>	<i>States</i>		<i>2016</i>	

Activity 5 – Conduct survey on implementation and utilization of WAFS (including SADIS and WIFS services) and training needs within the ASIA/PAC Region and report to MET SG				
Task 5.1: Develop a survey on the current and future implementation of WAFS (including SADIS and /WIFS services), the utilization of WAFS forecasts and WAFS training needs	MET/S WG		Nov 2017 2-yearly	
Task 5.2: Distribute the survey to States	MET/S WG chair	5.1	Dec 2017 2-yearly	
Task 5.3: States to respond to survey	States	5.2	Jan 2018 2-yearly	
Task 5.4: Analyse survey results	MET/S WG chair	5.3	Feb 2018 2-yearly	
Task 5.5: Present findings to MET/S WG and MET SG	MET/S WG chair	5.4	Mar and June 2018 2-yearly	
<i>Milestone 5: Conduct survey on implementation and utilization of WAFS (including SADIS and WIFS services) and training needs within the ASIA/PAC Region and report to MET SG</i>	<i>MET/S WG chair</i>	<i>5.1 – 5.5</i>	<i>2-yearly</i>	

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TASK LIST

CONJOINT SESSION OF ROBEX WG/13 AND MET/H TF/5 – Adapted from Appendix C to the Report of the Conjoint Session of ROBEX WG/13 and MET/H TF/5 (Highlighted text indicates updated information)

ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS/REMARKS
1	Review and update, as necessary, the distribution list for the VAAC back-up test State letter invitations and supporting documentation.	Jun 2015	Secretariat in consultation with VAACs and States	ON HOLD Related to Decision (ROBEX WG/13-MET/H TF/5)/1
2	Review and update the lists of AFTN addresses used for MWOs and ACCs in VAAC back-up tests, including in VAAC Wellington's area of responsibility.	Jun 2016	Secretariat in consultation with VAACs and States	IN PROGRESS Related to Decision (ROBEX WG/13-MET/H TF/5)/2
3	Promulgate the detailed data in Appendices 1 and 2 to WP/C2, Tables 1 and 2 in WP/C3 and Tables 1 and 2 in WP/C4 to highlight problems in test SIGMET issuance to the States/MWOs concerned.	Nov 2015	Secretariat	COMPLETED Related to Decision (ROBEX WG/13-MET/H TF/5)/3
4	Investigate and report (to MET SG/19) on the feasibility of collaboration between ICAO, Japan and WMO with respect to a proposed SIGMET workshop (hosted by Japan in 2016) to facilitate improved issuance of SIGMET in the Asia/Pacific.	Jul 2015	Secretariat in consultation with Japan	COMPLETED Related to Decision (ROBEX WG/13-MET/H TF/5)/4
5	Review the draft Regional SIGMET Guide provided in the revised Attachments 1 and 2 in WP/C5 then submit for final approval process and dissemination to States for use as Regional guidance.	Oct 2015	Secretariat and ad hoc group: Australia (Rapporteur), Hong Kong-China, Japan, New Zealand	COMPLETED Related to Decision (ROBEX WG/13-MET/H TF/5)/5
6	Further investigate the feasibility of the use of social media sites to make the VONA information accessible to users.	Mar 2016	Secretariat in consultation with VAACs	COMPLETED Related to Decision (ROBEX WG/13-MET/H TF/5)/6
7	Develop a working paper for MET SG/19 (highlighting the issues raised in WP/C8 and IP/C5) with proposal(s) for the improvement of guidance supporting clarity and consistency of information within tropical cyclone advisory and SIGMET messages in the Region.	Jul 2015	Ad hoc group: Australia (rapporteur), Hong Kong-China and Japan (note: Secretariat to invite India), IATA and/or IFALPA	COMPLETED Related to Decision (ROBEX WG/13-MET/H TF/5)/7

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ACTION ITEM	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS/REMARKS
8	Consider the promotion of the issuance of special air-reports to support information sharing, especially with respect to hazardous phenomena, in a consistent manner as required throughout the Region.	Jun 2016	Secretariat in consultation with IFALPA	To commence Related to Decision (ROBEX WG/13-MET/H TF/5)/8

CONJOINT SESSION OF MET/IE WG/14 AND MET/S WG/6 – Adapted from the Report of the Conjoint Session of MET/IE WG/14 and MET/S WG/6

TASK	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/REMARKS
1	Report on follow-up related to APANPIRG Conclusion 26/53	Jun 2016	Secretary	TO BEGIN [Ref: Conjoint Session Report para. 1.3]
2	Promulgate results of the 2015 SIGMET test to States concerned	Jun 2016	Secretary	TO BEGIN [Ref: Conjoint Session Report para. 2.12; MET/IE WG work programme Activity 3.9]
3	Prepare draft amendment to the APAC Regional SIGMET Guide to align with Amendment 77 to Annex 3.	Jun 2016	Chairs, Secretary	TO BEGIN [Ref: Conjoint Session Report para. 2.16]