

International Civil Aviation Organization

ICAO

WORKING PAPER**ICAO Asia and Pacific (APAC)**Twenty-Sixth Meeting of the Meteorology Sub-Group
(MET SG/26)

Online, 1 to 5 August 2022

Agenda Item 2: Review outcomes from previous meetings**REVIEW OF THE ELEVENTH MEETING OF ASIA/PACIFIC METEOROLOGICAL
REQUIREMENTS WORKING GROUP (MET/R WG/11)**

(Presented by Chair of MET/R WG)

SUMMARY

This paper presents a summary of the Meteorology/Air Traffic Management (MET/ATM) Webinar and the Eleventh Meeting of the Meteorological Requirement Working Group (MET/R WG/11), held via Web-conference, 30 May to 3 June 2022, including agreed actions and work plan.

1. INTRODUCTION

1.1. The ICAO Asia and Pacific (APAC) Office hosted the Eleventh Meeting of the Meteorological Requirements Working Group (MET/R WG/11) online from 31 May to 3 June 2022 in conjunction with the ICAO APAC Webinar on Meteorology/Air Traffic Management (MET/ATM Webinar) online on 30 May 2022.

1.2. The MET/R WG/11 Meeting had one hundred and forty-five (145) registered participants from twenty-four (24) States and Special Administrative Regions and two (2) International Organizations, including Australia, Bangladesh, Cambodia, China, Hong Kong China, Fiji, India, Indonesia, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, United States, Vanuatu, Viet Nam, IATA and ICAO.

1.3. The MET/ATM Webinar had one hundred and ninety-four (194) registered participants from twenty-five (25) States and Special Administrative Regions and three (3) International Organizations, including Australia, Bangladesh, Cambodia, Canada, China, Hong Kong China, Fiji, India, Indonesia, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Mongolia, Nepal, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, United States, Vanuatu, Viet Nam, IATA, IFATCA and ICAO.

1.4. Mr. Ashwin Naidu, Australian Bureau of Meteorology, presided as Chair of the meeting. He

was assisted in the role of Secretary by Mr Peter Dunda, Regional Officer Aeronautical Meteorology and Environment, ICAO APAC Office.

1.5. The facilitators of the MET/ATM Webinar were: Mr Ashwin Naidu, Aviation Customer Lead, Australian Bureau of Meteorology; Mrs Nguyen Lan Oanh, Deputy Director of Air Navigation Department, Civil Aviation Authority of Vietnam; Ms Leung Yan Yu Christy, Scientific Officer, Hong Kong Observatory; Mr Hiroyuki Takata, Regional Officer, Air Traffic Management, ICAO APAC Office; and Mr Peter Dunda, Regional Officer Aeronautical Meteorology and Environment, ICAO APAC Office.

1.6. The working language of the MET/R WG/11 Meeting and MET/ATM Webinar were English, inclusive of all documentation and this Report. The Meeting considered ten (10) Working Papers (WPs) and six (6) Information Papers (IPs) and the Webinar considered eleven (11) Slide Presentations (SPs). The full report and the papers of the MET/R WG/11 can be accessed at the following website: https://www.icao.int/APAC/Meetings/2022%20METR%20WG11/MET-R-WG-11_Final%20Report.pdf

2. DISCUSSION

Organisation Matters

- 2.1 The Meeting adopted the agenda as listed below:
- Agenda Item 1: Organizational matters
 - Agenda Item 2: Review of MET/ATM Webinar
 - Agenda Item 3: Review of follow-up from previous meetings
 - Agenda Item 4: Collaboration between MET services and ATM stakeholders
 - Agenda Item 5: Future work program and terms of reference
 - Agenda Item 6: Any other business
 - Agenda Item 7: Next Meeting

Review of MET/ATM Webinar

2.2 The objective of the Webinar was to provide an opportunity for States and Organizations to share information, experiences and ideas on planning and implementing meteorological (MET) services to support air traffic management (ATM) operations. The Webinar focused on recent innovations in collaborative arrangements between MET services and ATM stakeholders and the integration of MET information into ATM systems.

- 2.3 The Webinar session covered a series of presentations, as follows:
- ICAO provisions: latest developments on the framework of ICAO provisions supporting the integration of MET information into ATM systems.
- *SP/01 – Development of future aeronautical meteorological services to better meet ATM requirements (ICAO METP Technical Officer Meteorology); and*
 - *SP/02 – Regional ICAO Updates (Secretariat).*

Collaboration within States – Participants presented recent innovations highlighting the benefits and challenges of collaborative arrangements between MET services and ATM stakeholders and the integration of MET information into ATM systems within States.

- *SP/03 – Australian ATFM Meteorological Information (Australia);*

- *SP/04 – MET Services in support of ATM Operations (China);*
- *SP/05 - MET/ATM Collaborations in Hong Kong, China (Hong Kong China);*
- *SP/06 – Post-Operational Analysis of ATM Tailored Met Information (Japan);*
- *SP/07 – Reorganisation of State Aviation Service and Arrangements of MET Service for ATM in Central od Vietnam (Vietnam);*
- *SP/08 – Modernising MET Provision for the Future Needs of Airspace Users (IATA); and*
- *SP/09 – When ATCs Meet MET (IFATCA).*

Collaboration on a bilateral or multilateral basis between States – Participants presented recent innovations highlighting the benefits and challenges of collaborative arrangements between MET services and ATM stakeholders and the integration of MET information into ATM systems on a bilateral or multilateral basis between States.

- *SP/10 - MET-ATM Survey (Ad hoc group); and*
- *SP/11 - Space Weather Advisory Service for Aviation (Australia).*

Copies of all the Seminar presentations, including a summary of the Seminar discussions, are available at the ICAO APAC Office website (www.icao.int/apac > Meetings)

2.4 The Meeting considered Seminar discussions to assist in its deliberations and in its review and development of the MET/R WG plan of work.

Outcomes from the Meeting

2.5 The Meeting recorded outcomes of its discussions in the form of Draft Conclusions, Draft Decisions and Decisions within the following definitions:

- Draft Conclusions:** formulated for further consideration by the Meteorology Sub-group (MET SG), deal with matters of a technical nature and of regional applicability that, according to the MET SG’s terms of reference, require the attention of States, or action by the ICAO, in accordance with established APANPIRG procedures;
- Draft Decisions:** formulated for further consideration by the MET SG, relate solely to matters dealing with the internal working arrangements of APANPIRG and its contributory bodies; and
- Decisions:** adopted by the MET/R WG, relate solely to matters dealing with the internal working arrangements of the MET/R WG.

2.6 The MET/R WG Meeting formulated (1) Draft Decision and four (4) Decisions for consideration by the MET SG :

Decision MET/R WG/11/01: *Update to the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

That,

- a) the ad-hoc group finalize the updates to the Guidance for possible approval by MET SG/26, including the modifications described in Appendix A of the WP/05 and paragraph 2.5 of the

WP/06, and expansion of the maximum number of pages for each State's example in Appendix 1 of the Guidance to five, to allow States to include their experience on the post operational analysis; and

b) the MET/R WG members are invited to provide the ICAO RO MET, by 30 November 2022, their State's example on post operational analysis and their suggestions regarding the amendment to the Guidance to enhance the post operational analysis framework in the Guidance.

Draft Decision MET/R WG/11/02: *Update to the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

That, the MET SG approve the proposed updates to the *Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*

Decision MET/R/11/03: *Further analysis of ICAO APAC Regional Survey on the provision of MET services to support ATM and ATFM and Follow-up Actions*

That, the established ad-hoc group with subject matter experts from MET/R WG undertake further analysis of the ICAO APAC Regional Survey on the provision of MET services to support ATM and ATFM and prepare a report identifying follow-up actions for further consideration by MET SG and ATM SG.

Why: To facilitate a coordinated approach to the further development of MET services in the Asia/Pacific Region and promote the results among other related Working Groups

Decision MET/R WG/11/04: *Proposed updates to the draft reference document and ToR for the ad hoc group for APAC user requirements for SWIM-based MET information services supporting ATFM*

Endorse the proposed updates to the draft reference document and ToR for the ad hoc group

Decision MET/R WG/11/05: *Meteorological Information for ATFM in the Regional Framework Document for Collaborative ATFM*

Review Meteorological Information for ATFM (paragraphs 5.59-5.67) in the Regional Framework Document for Collaborative ATFM and provide inputs of the latest examples to the ICAO Secretariat and the task coordinators

2.7 In addition, the MET/R WG/11 Meeting agreed to one (1) new action item, as indicated in the *Report on Agenda Items* below and presented in the *List of Actions* in **Appendix A** to this Report.

Review of follow-up from previous meetings

2.8 The meeting reviewed the status of follow-up action from MET/R WG/10 and updated the MET/R WG Task List accordingly.

2.8.1 The meeting reviewed the outcomes from the Tenth Meeting of the Meteorological Requirements Working Group (MET/R WG/10), including the formulation of two (2) Draft Conclusions, adoption of one (1) Decision of the MET/R WG, and agreement on four (4) new Action Items for the MET/R WG.

2.8.2 Furthermore, MET/R WG/10 recorded four (4) new Action Items and one (1) unresolved Action Item from the previous MET/R WG/09 in the MET/R WG – List of Actions in Appendix A.

2.8.3 Follow-up action on the MET/R WG/10 Action Items Nos. 01, 02 and 03, concerning proposed updates to the APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations was completed with the MET SG’s approval of the proposed updates (Conclusion MET SG/25-10: Update to Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations refers) and the subsequent publishing of the updated Guidance document on the ICAO APAC website.

2.8.4 Follow-up action on the MET/R WG/09 Action Item No. 01, concerning providing guidance to pilots and air traffic services (ATS) units on the exchange of special air-reports in support of SIGMET service, was still in progress. In addition, the Meeting recalled that on 17 June 2021, ICAO with the support of experts from the Hong Kong Observatory had delivered a webinar to the APAC Member States and international organizations titled ‘Special Air-Reports needed by MET to Support Flight Safety’. Therefore, the Meeting noted that the proposed provision of guidance in MET/R WG/09 Action item No. 01 should include reference to the above webinar material (which is available on the ICAO APAC website).

2.9 The meeting reviewed outcomes from MET SG/25 and noted the following:

2.9.1 Follow-up actions on the Draft Conclusions and Draft Decision formulated by MET SG/25 for further consideration by the APAC Air Navigation Planning and Implementation Regional Group (APANPIRG) are discussed in this Report under WP/04 – FOLLOW-UP ACTION FROM APANPIRG/32.

2.9.2 The Meeting noted that MET SG/25 had adopted Conclusion MET SG/25-10: *Update to Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations* based on Draft Conclusion MET/R WG/10/01. Furthermore, follow-up action on Conclusion MET SG/25-10 included the *Guidance* document being published on the ICAO APAC Office website¹.

¹ <https://www.icao.int/APAC/Pages/eDocs.aspx>

2.9.3 Regarding the MET SG action item 25/13: Coordinate possible SWX advisory exercise/s and training workshop/s with the appropriate body under METP, the Secretariat informed the Meeting that ICAO would organize (on a date to be decided in Q3/Q4 2022) an APAC webinar on the space weather (SWX) information service.

2.9.4 The Meeting considered how the MET/R WG could support the above MET SG action and proposed to include in the MET/R WG work plan a deliverable to promote and assist ATM and Airspace Users with user education on the Space Weather Advisory service, including seeking input from end users (by way of questionnaire) on the required content of a space weather information service workshop or seminar and exercise. The proposed additional deliverable in the MET/R WG work plan is highlighted in the Appendix B to this Report.

2.10 The meeting reviewed the outcomes from APANPIRG/32, which included three (3) Conclusions and one (1) Decision relevant to the MET SG work plan.

Collaboration between MET services and ATM stakeholders

2.11 The recent reorganization of the system for provision of aeronautical meteorological service (MET) in Vietnam includes collaborative arrangement between MET and ATM services in Central region of Vietnam to help highlight benefits and challenges of the pattern of MET service from the perspective of safety and effectiveness of flight operation.

2.12 The Integrated Airport Centre (IAC) of the Hong Kong International Airport (HKIA) monitors all aspects of real-time operations of the airport round the clock and responds to unexpected issues. The IAC houses the Airport Authority Hong Kong and other key stakeholders, including airlines and ground service handlers. ATM and other departments integral to the operation of HKIA would also be convened to the IAC in case of emergency. With the new IAC expected to commence operation from the 3rd quarter, 2022, a team of meteorologists from the Hong Kong Observatory (HKO) would station at the new IAC to strengthen current services for the aviation community. Attention would be focused on events that may cause disruptions to apron operations or adversely affect flow control, with a view to supporting early planning of relevant operators and government departments.

2.13 In response to WP/06, Japan presented a post-operational analysis, and the framework for refining MET information and services for ATM. In addition, to effective post-operational analysis through regular meetings between MET and ATM, the MET product itself is also verified.

2.14 Hong Kong, China, presented an updated implementation example for Appendix 1 of the APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations for discussion and adoption by the MET/R WG. Hong Kong, China's updated implementation example, describes the latest developments on its ATM-tailored MET information and services and includes a description of the post-operational analysis and continuous service improvement.

2.15 In the Republic of Korea, ATM-tailored MET services are provided by the Aviation Meteorological Office (AMO) to support Decision making for ATFM. In addition, the AMO provides weather briefings, weather analysis, significant weather scenarios and weather services for terminal areas. The AMO operates 24-hours/7-days at the Air Traffic Control Center (ATCC) to cooperate in decision-making for ATFM and provide weather information for domestic and foreign airports,

airspace, and air route.

Updates on APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations

2.16 Following the MET/R WG work plan, the designated ad hoc group presented its proposal to expand the APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations document. The proposed update defines a framework to capture post-operational analysis on the impact of tailored MET information on ATM decisions.

2.17 The ad hoc group considered that the above framework should reflect the various practices for post-operational analysis employed by States. Therefore, the ad hoc group planned to collect information on States' experiences to determine common procedures that could be included in the Guidance document. In addition, the ad hoc group proposed that Appendix 1 (of the Guidance document) should be expanded to accommodate the States' individual examples of post-operational analysis.

2.18 In addition, the ad hoc group proposed some changes to various Sections of the document. The Meeting supported the proposals above and, in conjunction with its support for the adoption of Hong Kong, China's updated implementation example presented under WP/05 above, adopted the following Decision and formulated the following Draft Decision:

Decision MET/R WG/11/01: *Update to the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

That,

- a) the ad-hoc group finalize the updates to the Guidance for possible approval by MET SG/26, including the modifications described in Appendix A of the WP/05 and paragraph 2.5 of the WP/06, and expansion of the maximum number of pages for each State's example in Appendix 1 of the Guidance to five, to allow States to include their experience on the post operational analysis; and
- b) the MET/R WG members are invited to provide the ICAO RO MET, by 30 November 2022, their State's example on post operational analysis and their suggestions regarding the amendment to the Guidance to enhance the post operational analysis framework in the Guidance.

Draft Decision MET/R WG/11/02: *Update to the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

That, the MET SG approve the proposed updates to the *Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*

Survey of State Meteorological Information Supporting Air Traffic Management

2.19 Following the MET/R WG work plan, a 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), was conducted in October to December 2021.

2.20 States were urged to complete the online survey questionnaire (ICAO State letter Ref.: T 4/3.2.7 - AP170/21 (MET) refers). The Meeting acknowledged the assistance provided by the Hong Kong Observatory through its application to the survey of the online survey tool.

2.21 The Meeting noted the preliminary results presented in SP/10 and considered that further analysis of the results was necessary to achieve the survey's terms of reference objectives.

2.22 Considering the discussion above, the Meeting adopted the following Decision:

Decision MET/R/11/03: *Further analysis of ICAO APAC Regional Survey on the provision of MET services to support ATM and ATFM and Follow-up Actions*

That, the established ad-hoc group with subject matter experts from MET/R WG undertake further analysis of the ICAO APAC Regional Survey on the provision of MET services to support ATM and ATFM and prepare a report identifying follow-up actions for further consideration by MET SG and ATM SG.

Why: To facilitate a coordinated approach to the further development of MET services in the Asia/Pacific Region and promote the results among other related Working Groups

APAC User Requirements for SWIM-based MET Information Services Supporting ATFM

2.23 Based on relevant outcomes of MET/R WG/10, the designated ad hoc group proposed to identify, and document use cases and user requirements for SWIM-based MET information services supporting ATFM in the APAC region.

2.24 The ad hoc group updated the draft reference document based on comments from MET/R WG/10 and ad hoc group's members. In addition, a use case on volcanic ash avoidance and diversion due to fog, which was demonstrated in SWIM in ASEAN Demonstration, was added. The reference document should assist in developing information services and exchange model extensions, if required, to meet operational needs.

2.25 The ad hoc group consulted ATFM experts to better understand the APAC ATFM operations and improve use cases with detailed event flows. The ad hoc group also conducted activities outlined in the MET/R WG work plan. The ad hoc group proposed updates to its ToR (as shown in Attachment C to WP/08) to reflect key deliverables identified in the MET/R WG Work plan.

2.26 The Meeting supported the proposals presented above and adopted the following Decision:

Decision MET/R WG/11/04: *Proposed updates to the draft reference document and ToR for the ad hoc group for APAC user requirements for SWIM-based MET information services supporting ATFM.*

Endorse the proposed updates to the draft reference document and ToR for the ad hoc group

Update to APAC Regional Framework for Collaborative ATFM-MET Information for ATFM

2.27 The ATFM/IR/SWG has been tasked to review the Asia Pacific Regional Framework for Collaborative ATFM (ATFM/SG/11 – Action item 11/8). The scope of work is provided in the ATFM/SG/11 Report, Appendix E.

2.28 The ATFM IR SWG intends to submit the updated Regional Framework document for consideration by ATFM/SG/12 (to be held in September 2022).

2.29 The Asia Pacific Regional Framework for Collaborative ATFM (Version 3.0, August 2017) includes a section on Meteorological Information for ATFM (in paragraphs 5.59-5.67). The ATFM IR SWG will update the section on Meteorological Information for ATFM to include examples of the latest information available to advanced air navigation service providers (ANSPs) and direct reference to the Regional Guidance for Tailored MET Information to Support ATM.

2.30 Considering the discussion above, the Meeting adopted the following Decision:

Decision MET/R WG/11/05: *Meteorological Information for ATFM in the Regional Framework Document for Collaborative ATFM*

Review Meteorological Information for ATFM (paragraphs 5.59-5.67) in the Regional Framework Document for Collaborative ATFM and provide inputs of the latest examples to the ICAO Secretariat and the task coordinators.

Review of MET/R WG Work Program and Terms of Reference

2.31 The Meeting reviewed the MET/R WG terms of reference and work plan document, last reviewed and endorsed by the MET SG/25. In addition, the Meeting formulated proposed updates to the MET/R WG membership details based on information provided by members and amendments to the work plan of the MET/R WG based on the outcomes of discussion throughout the Meeting.

2.32 The Meeting noted a lack of progress on (MET/R WG work plan) Deliverable No. 2: Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ANS Plan, and Deliverable No. 5: A 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. Therefore, the Meeting requested the Chair and Secretariat to propose further updates to the (Deliverable No. 2 and Deliverable No. 5) timeframe, responsibility, and requirements details. [ACTION ITEM: 01].

2.33 The proposed updates to the MET/R WG terms of reference and work plan document, for further review and endorsement by MET SG, are highlighted in Appendix B to MET/R WG/11 Report.

Next Meeting

2.34 The Meeting proposed the following tentative dates for MET/R WG/12 (including a MET/ATM Seminar): 22 to 26 May 2023.

2.35 The Meeting noted that subject to the resumption of in-person meetings in 2023, MET/R WG/12 (including a MET/ATM Seminar) may be conducted in person at the ICAO APAC Office (or

by a host State). The ICAO APAC Office has the capability to conduct a “hybrid” meeting supporting in-person and online participation.

3. ACTION BY THE MEETING

- 3.1 The meeting is invited to:
- a) note the information in this paper;
 - b) propose further updates to the Terms of Reference, Future Work Programme and/or Task List.

APPENDIX A

MET/R WG – LIST OF ACTIONS

(Note: Proposed updates are indicated with ~~strike through~~ and highlighted text)

Action items recorded by MET/R WG/11

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/REMARKS
MET/R WG/11 01	Propose updates to the MET/R WG Work Pan, Deliverables 3 and 5, including the timeframe and responsibility for the work and detailed requirements. Deliverable 3: <i>Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ANS Plan</i> Deliverable 5: <i>A 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</i>	MET/R WG/12	Chair and Secretariat	To begin

Action items recorded by MET/R WG/10

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/REMARKS
MET/R WG/10 01	Review the proposed updates (to the <i>APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations</i>), including the proposed updates to the format for the Appendices (1 and 2), the document maintenance procedure and the method of publication, and provide feedback to the ICAO RO MET [Ref: MET/R WG/10 Report, 5.1]	no later than 11 June 2021	MET/R WG members	Completed; Ref: MET SG/25, WP/20
MET/R WG/10 02	Finalize the proposed updates (to the <i>APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations</i>) and present a proposal for review and possible approval by the MET SG/25 meeting. [Ref: MET/R WG/10 Report, 5.2]	July 2021	Ad hoc group, comprising members from Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and IATA	Completed; Ref: MET SG/25, WP/20
MET/R WG/10 03	Consider the proposed format for publishing the updates (to the <i>APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations</i>) on the ICAO APAC Office web page. [Ref: MET/R WG/10 Report, 5.2]	July 2021	ICAO (RO MET)	Completed; Ref: MET SG/25, WP/20; Conclusion MET SG/25-10; published on ICAO APAC eDocuments website
MET/R WG/10 04	Conduct the <i>Survey of State Meteorological Information Supporting Air Traffic Management</i> via ICAO State letter and using an online survey tool. [Ref: MET/R WG/10 Report, 5.5]	August 2021	Ad hoc group and Secretariat	Completed; Ref: MET SG/25, WP/09; ICAO State letter Ref.: T 4/3.2.7 – AP170/21 (MET), 22 October 2021; MET/R WG/11, WP/07

Unresolved action items recorded by MET/R WG/09

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/REMARKS
MET/R WG/09 01	Publicise the SIGMET Guide and, in particular, the guidance indicating the importance of exchanging special air-reports between airlines, ATS units and MWOs (and aerodrome meteorological offices (AMOs)) in support of improved SIGMET service and flight safety, by way of ICAO State letter (and/or other channels) with distribution to pilots and ATS units supported by States and relevant organizations, as appropriate [include reference to the ICAO APAC Webinar on <i>Special Air-Reports needed by MET to Support Flight Safety</i> , conducted on 17 June 2021]	July 2020	Secretary and MET/R WG members	In progress

APPENDIX B

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

TERMS OF REFERENCE AND WORK PLAN

Proposed updates by MET/R WG/11

Editorial note: Proposed updates show deleted text using ~~text to be deleted~~ and added text with grey shading (text to be inserted).

TERMS OF REFERENCE

DESCRIPTION	
Name and establishment of the 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 following the working arrangements and instructions provided in the APANPIRG Procedural Handbook.
Reporting mechanism	The MET/R WG shall report its work progress and coordination requirements to the MET SG, generally in 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 ²) 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: <ul style="list-style-type: none"> 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 the 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 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 coordination through the ICAO Secretariat with APANPIRG and other relevant bodies.

² 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]

MEMBERSHIP		
State/Organization Name	Position/organization (field of expertise)	Contact
AUSTRALIA Mr. Ashwin NAIDU (Chair)	Manager 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
CHINA Ms Li Xiya	Engineer Meteorological Center of Middle South Regional Air Traffic Management Bureau of Civil Aviation of China (MET)	E-mail:gzlixiya@qq.com
HONG KONG, CHINA Mr. Marco Mang-hin KOK	Acting Senior Scientific Officer Hong Kong Observatory (MET)	Tel: +852 2926 8702 8441 Mobile: +852 6226 7907 Fax: +852 2375 2645 E-mail: mhkok@hko.gov.hk
HONG KONG, CHINA Ms. Christy Leung Yan Yu	Scientific Officer Hong Kong Observatory (MET)	Tel: +852 2926 5013 Fax: +852 2375 2645 E-mail: yyleung@hko.gov.hk
JAPAN Ms. KOMATSU Naoko (Vice Chair)	Senior Coordinator for International Aeronautical Meteorology Planning Division Japan Meteorological Agency (MET)	Tel: +81 (3) 3212 8341 x2265 Fax: +81 (3) 3212 8377 E-mail: n.komatsu@met.kishou.go.jp
JAPAN HAYAMI, Erika (Ms)	Senior Coordinator for International Aeronautical Meteorology Planning Division, Administration Department, Japan Meteorological Agency (JMA)	E-mail: e-hayami@met.kishou.go.jp
JAPAN Ms. IKEDA Michiko	Scientific Officer Office of Aviation Weather Forecasting Forecast Division Japan Meteorological Agency (MET)	E-mail: michi-ikeda@met.kishou.go.jp
JAPAN Ms. ITOU Miho	Special assistant to the Director Air Traffic Control Division, Japan Civil Aviation Bureau (ATM)	tel: +81-3-5253-8749 E-mail: itou-m46be@mlit.go.jp
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
PAKISTAN Mr. Syed Ali Baqadar Shah	Deputy Director (MET / Meteorological Inspector)	Tel: +92-21-99072758 Fax No: +92-21-99242676 E-mail: baqadar@hotmail.com baqadar.shah@caapakistan.com.pk
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
SINGAPORE Mr. Yeo Cheng Xun	Executive Meteorologist Meteorological Services Singapore Singapore Changi Airport P.O. Box 8, Singapore 918141 (MET)	E-mail: YEO_Cheng_Xun@nea.gov.sg

MEMBERSHIP		
State/Organization Name	Position/organization (field of expertise)	Contact
SINGAPORE Mr. Wong Songhan	Senior Meteorologist Meteorological Service Singapore	E-mail: WONG_Songhan@nea.gov.sg
THAILAND 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: wut.tmd@gmail.com
THAILAND Mr. Somchai Yimsrichaenkit	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@aerothai.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 Ms. Thi Thanh Tam VU	Meteorological Official Department of Air Traffic Services Viet Nam Air Traffic Management Corporation (MET)	Tel: +84 (24) 3873 0320 E-mail: tamvtt@vatm.vn Vuthithanhtam86@gmail.com
IATA Mr. John MOORE	Assistant Director (Infrastructure) Safety and Flight Operations Asia-Pacific (Airline operators)	Tel: +65 6499 2529 E-mail: moorej@iata.org
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
Interim Work Program Progress Report	MET/R WG Members	Web-conference E-mail	Quarterly/as determined by Chair	Chair and Secretariat
MET Chairs Coordination Meeting	Chairs of MET SG and its contributory working groups	Web-conference E-mail	Quarterly	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	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 ATFM 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

PLAN OF WORK

DELIVERABLES
2 1. Documented analysis of MET information used in the Region specifically to support ATM operations
3 2. Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ATM Plan
4 3. Draft regional guidance material for tailored MET information supporting ATM operations
5 4. Strengthen collaboration and relationship between MET, ATM and Airspace Users Seminar on regional implementation of MET information to support ATM operations
6 5. 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 the APAC Region; Coordinate steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.
8 6. Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM
7. Promote and assist ATM and Airspace Users with user education on the Space Weather Advisory service
8. Meteorological Information for the Asia Pacific Regional Framework for Collaborative ATFM

MILESTONES	By date	Responsibility	Status
1. Deliverable 2 1: Analysis of MET information used in the Region specifically to support ATM operations			
1.1. Conduct the Regional survey (via State Letter and Online)	Aug 2021	Ad hoc group 2: Australia (Rapporteur), Singapore, New Zealand, China, Japan, Thailand, Hong Kong China, Viet Nam	To begin Completed [Ref: MET/R WG/11 – WP/07]
1.2. Preliminary draft analysis of MET information used in the Region specifically to support ATM operations	May 2022	Ad hoc group 2	Completed [Ref: MET/R WG/11 – WP/07]
1.3. Final draft documented analysis of MET information used in the Region specifically to support ATM operations	MET/R WG/12	Ad hoc Group 2	To begin

MILESTONES	By date	Responsibility	Status
1.4. Identify follow-up actions (including presenting the results at ATM and Airspace Forums)	MET/R WG/12	Ad hoc Group 2	To begin
2. Deliverable 3 2: Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ATM ANS Plan			
2.1. Further development (of the list of MET information or services necessary to support the implementation of each element of the Asia/Pacific Seamless ANS Plan) pending outcomes of the ICAO A40 review of GANP 2019	TBD	TBD	On hold
3. Deliverable 4 3: Draft regional guidance material for tailored MET information supporting ATM operations			
3.1. Review the working draft guidance and provide comments to the ICAO RO MET	11 June 2021	MET/R WG	To begin Completed [Ref: MET SG/25, WP/20]
3.2. Finalize the updated guidance for approval at the MET SG in July 2021	July 2021	Ad-hoc group, consisting of Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and IATA	To begin Completed [Ref: MET SG/25, WP/20; Conclusion MET SG/25-10; published on ICAO APAC eDocuments website]
3.3. Consider expanding the Guidance document to define a framework to capture post-operational analysis on the impact of tailored met information on ATM decisions	MET/R WG/11	Ad hoc group	To begin Completed [Ref: MET/R WG/11 – WP/06]
3.4. Finalize and submit to MET SG/26 the proposed updates to the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations – as agreed in Decision MET/R WG/11/01, part a), and Draft Decision MET/R WG/11/02,	MET SG/26	Ad hoc group	In progress
3.5. Provide the Secretariat examples on State's post operational analysis and suggestions regarding the amendment to the Guidance document to enhance the post-operational analysis framework – as agreed in Decision MET/R WG/11/01, part b)	30 November 2022	MET/R WG members	To begin
3.6. Enhance the contents relevant to post-operational analysis in the main body of the Guidance based on the information provided by the MET/R WG members	MET/R WG/12	Ad hoc group	To begin
4. Deliverable 5 4: Strengthen collaboration and relationship between MET, ATM and Airspace Users Seminar on regional implementation of MET information to support ATM operations			
4.1. Plan for a future 2022 seminar on regional implementation of MET information to support ATM operations	MET/R WG/11	Chair and Secretariat	Completed [Ref: MET SG/25, WP/09; ICAO State letter Ref.: T 4/3.2.7 – AP170/21 (MET), 22 October 2021; MET/R WG/11, WP/07]
4.2. Report to ATFM/SG (and ATM SG) (including the following topics: MET/ATM webinar 2022 outcomes,	ATFM/SG/12	Chair and Secretariat	To begin

MILESTONES	By date	Responsibility	Status
MET/ATM survey results, updates on the regional MET/ATM guidance document, education on the SWX advisory service, guidance on exchanging special air-reports, etc)			
4.3. Plan for a future seminar on regional implementation of MET information to support ATM operations	MET SG/26	Chair and Secretariat in coordination with ATM/SG	To begin
5. Deliverable 6 5: A 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			
5.1. Support MET SG with the development of MET-specific requirements in the ANP, Volume III	As required	MET/R WG	In progress To begin
Deliverable 7: SIGMET coordination activities in the APAC Region; Coordinate steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.			
[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]		MET group Chairs considered this task is more appropriate to be included under the work plan of MET/S WG	
6. Deliverable 8 6: Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM			
6.1. [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] <i>Note: this row will be removed after agreement by the meeting on the points below</i> Also take into consideration outcomes from MET/R WG/10, esp. WP/07 – APAC User Requirements for SWIM-based MET Information Services Supporting ATFM (Australia, Hong Kong China, and Thailand), including the proposed collaborative approach (flow chart) at 2.3, and the MET/R WG/10 suggestions as follows: i) take into consideration the results of the Survey of State MET Information Supporting ATM at WP/06; ii) identify related global discussion and plan led by ICAO MET Panel and relevant groups; iii) define the meaning of “use case”; and iv) ensure readers understand the document does not represent an obligation for States to implement the SWIM-based MET Information Services	MET/R WG/11	An ad-hoc group comprising SMEs from both MET/R WG and ATFM/SG Rapportuer (Marco)	In progress Completed [Ref: MET/R WG/11 – WP/08]
6.2. In coordination with other related sub-groups, working groups, etc., identify: i) SWIM-based MET information affecting ATFM operations; ii) how often these products be provided and rules for updates to meet the ATFM needs; and (iii) identify any other information required by ATFM and gaps to meet the needs of ATFM users	MET/R WG/12	Ad-hoc group 8 (see below)	In progress
6.3. Identify MET and ATFM data to be exchanged using SWIM-based Information Exchange Service	MET/R WG/12	Ad-hoc group 8 (see below)	In progress
6.4. Based on the findings (above), develop APAC use cases and a user requirements document for future SWIM-based MET information services supporting ATFM	MET/R WG/12	Ad-hoc group 8 (see below)	In progress
7. Promote and assist ATM and Airspace Users with user education on the Space Weather Advisory service			
7.1. Seek input from end users (by way of questionnaire) on the content of a SWX workshop or seminar	MET SG/26	Secretariat and MET/R WG members	To begin
7.2. Seek input from end users on the content of a SWX advisory exercise	MET SG/26	Secretariat and MET/R WG members	To begin
8. Meteorological Information for the Asia Pacific Regional Framework for Collaborative ATFM			
8.1. Review Meteorological Information for ATFM (paragraphs 5.59-5.67) in the Regional Framework Document for Collaborative ATFM and provide inputs of the latest examples to the ICAO Secretariat and the task coordinators [Ref: Decision MET/R WG/11/05]	17 June 2022	MET/R WG members	To begin

Ad-hoc group 8			
State / Administration / IO	NamePosition	Position and/or Organisation	Expertise
Australia	Jesper Bronsvort	Airservices Australia	ATFM
Australia	Ashwin Naidu	BOM	MET
CANSO	Stuart Ratcliffe	CANSO	ATFM
Hong Kong China	Marco Kok (Rapporteur)	HKO	MET/SWIM
Hong Kong China	Peter Chadwick	Senior Air Traffic Control Specialist (Strategic Planning) / HKCAD	ATFM
Hong Kong China	Anfernee Poon	Acting Senior Operations Officer (Strategic Planning) / HKCAD	ATFM
IATA	John Moore	IATA	ATFM/MET
Japan	ITOU Miho	JCAB	ATFM
Japan	IKEDA Michiko	JMA	MET
Pakistan	Fazal Ur Rehman	PCAA	ATFM
Pakistan	Syed Ali Baqadar Shah	PCAA	MET
Republic of Korea	Dong-won, LEE	Assistant of Director / KMA	MET
Republic of Korea	Jiwon, LEE	Assistant of Director / KMA	MET
Singapore	Clarence Foo	Head, ATM development/CAAS	ATFM
Singapore	Zhang HuanBin	Head, ATM development/CAAS	ATFM
Singapore	Aw Ying Kit	Senior Engineer, ATM Systems /CAAS	ATFM
Singapore	Yeo Cheng Xun	MSS	MET
Thailand	Amornrat Jirattigalachote (Amo)	Strategic Planning Manager /AEROTHAI	ATFM/SWIM
Thailand	Dudsadee Sungthong	Strategic ATFM Team/AEROTHAI	ATFM
Vietnam	Mr. Nguyen Van Dung	VATM	MET/ATFM
