

INTERNATIONAL CIVIL AVIATION ORGANISATION



**REPORT OF THE ELEVENTH MEETING OF THE
METEOROLOGICAL REQUIREMENTS WORKING GROUP
(MET/R WG/11)**

**[INCLUDING THE ICAO APAC WEBINAR ON METEOROLOGY/AIR TRAFFIC
MANAGEMENT (MET/ATM WEBINAR)]**

(Online, 30 May – 3 June 2022)

The views expressed in this Report are 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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HISTORY OF THE MEETING

1. Dates and venue

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.

2. Attendance

2.1. 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. The list of participants is in **Appendix C** of this Report.

2.2. 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. The list of participants is in **Appendix C** of this Report.

3. Officers and Secretariat

3.1. The MET/R WG/11 Meeting was Chaired by Mr Ashwin Naidu – Aviation Customer Lead, Australian Bureau of Meteorology. He was assisted, in the role of Secretary, by Mr Peter Dunda – Regional Officer, Aeronautical Meteorology and Environment, ICAO APAC Office.

3.2. The MET/ATM Webinar was facilitated by the following participants:

- 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.

4. Language and Documentation

4.1. The working language of the MET/R WG/11 Meeting and MET/ATM Webinar was English, inclusive of all documentation and this Report. The Meeting considered ten (10) Working Papers (WPs) and six (6) Information Papers (IPs). The Webinar considered eleven (11) Slide Presentations (SPs). The list of papers and presentations is in **Appendix D** of this Report.

5. Outcomes

1.2. The MET/R WG/11 Meeting recorded outcomes of its discussions in the form of Draft

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Conclusions, Draft Decisions and Decisions within the following definitions:

- a) **Draft Conclusions:** formulated by the Meeting for further consideration by the Meteorology Sub-Group (MET SG), deal with matters of a technical nature and regional applicability that, according to the MET SG's terms of reference, require the attention of States, or action by the ICAO, following established APANPIRG¹ procedures;
- b) **Draft Decisions:** formulated by the Meeting for further consideration by the MET SG, relate solely to matters dealing with the internal working arrangements of APANPIRG and its contributory bodies; and
- c) **Decisions:** adopted by the Meeting relate solely to matters dealing with the internal working arrangements of the MET/R WG.

5.1. The Meeting formulated the following (1) Draft Decision for further consideration by the MET SG and adopted the following four (4) Decisions of the MET/R WG:

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

That,

a) the ad hoc group finalise 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 the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

That, the MET SG approves 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

¹ ICAO Asia/Pacific Air Navigation Planning and Implementation Regional Group

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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*

That, the MET/R WG Members are invited to review the Meteorological Information for ATFM (paragraphs 5.59-5.67) in the *Asia Pacific Regional Framework for Collaborative ATFM* document and provide inputs of the latest examples to the ICAO Secretariat and the task coordinators by 17 June 2022.

5.2. 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.

REPORT ON AGENDA ITEMS – MET/R WG/11

1. Organisational matters

WP/01 – Provisional Agenda (Secretariat)

1.1. The Meeting adopted the agenda as listed below:

- Agenda Item 1: Organisational 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

2. Review of MET/ATM Webinar

2.1. The Webinar's objective was to allow States and Organisations to share information, experiences and ideas on planning and implementing meteorological (MET) services to support air traffic management (ATM) operations. In addition, the Webinar focused on recent innovations in the collaborative arrangements between MET services and ATM stakeholders and the integration of MET information into ATM systems.

2.2. The Meeting noted the following key points from the Webinar's presentations and subsequent discussions under the following topics:

1) ICAO provisions – The Secretariat presented the 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 (Mr Jun Ryuzaki, Technical Officer Meteorology, ICAO)

- Key areas of work of the ICAO Meteorology Panel (MET-P) include the following:
 - Development and implementation of ICAO Annex 3 and “PANS-MET”;
 - Support for Trajectory-based Operations (TBO) and Aviation System Block Upgrades (ASBU);
 - Development and implementation of provisions for the ICAO Meteorological Information Exchange Model (IWXXM) and System-Wide Information Management (SWIM);
 - Further development of the World Area Forecast System (WAFS);
 - Further development of the Space Weather, Volcanic Ash and Hazardous Weather information services;
 - Development of MET-related cost recovery and governance provisions; and
 - Structural enhancement of the MET-P to ensure closer cooperation and collaboration with the World Meteorological Organisation (WMO).

SP/02 – ICAO UPDATES – REGIONAL (Mr Peter Dunda, Regional Officer Aeronautical Meteorology and Environment, ICAO)

- Structure of APANPIRG and how the MET Requirements Working Group (MET/R WG) fits into the system to improve the safety, efficiency and sustainability of ATM operations by

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providing MET information needed to meet current and future requirements of the ATM system.

- 2) 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 (Mr Ashwin Naidu, Aviation Customer Lead, Australian Bureau of Meteorology, and Mr Jesper Bronsvort, Network Performance and Analysis Manager, Airservices Australia)

SP/04 – MET SERVICES IN SUPPORT OF ATM OPERATIONS (Ms Li Xiya, Aviation Weather Forecaster, Civil Aviation Administration of China)

SP/05 – MET/ATM COLLABORATIONS IN HONG KONG, CHINA (Ms Christy LEUNG Yan Yu, Scientific Officer, Hong Kong Observatory, and Mr Anfernee POON, Senior Operations Officer, Hong Kong Civil Aviation Department)

- SP/03, SP04 and SP05 highlighted the importance of strong coordination and collaboration between MET and ATM personnel to ensure the effectiveness of collaborative decision making and Air Traffic Flow Management (ATFM).
- Weather conditions are a significant factor affecting capacity at international aerodromes; the States' MET service providers are working collaboratively with ATM to provide tailored meteorological services and products to support air traffic management.

SP/06 – POST-OPERATIONAL ANALYSIS OF ATM-TAILORED MET INFORMATION (Ms Michiko IKEDA, Scientific Officer, Japan Meteorological Agency (JMA), and Ms Miho ITOU, Special Assistant to the Director, Air Traffic Control Division, Japan Civil Aviation Bureau (JCAB))

- JMA and JCAB highlighted the importance of post-operational analysis of tailored meteorological information and services for air traffic management and how continual improvements are made to these products and services with close collaboration between the stakeholders concerned with the use and supply of the information. They presented that mutual coordination between MET and ATM is important not only for operation but also for such improvements activity of MET services to support ATM operations.

SP/07 – RE-ORGANISATION OF THE STATE AVIATION MET SERVICE AND ARRANGEMENT OF MET SERVICE FOR ATM IN CENTRAL OF VIETNAM (Mr Cao Viet Lam, Deputy Manager of Da Nang Aeronautical Meteorological Centre of the Vietnam Air Traffic Management Corporation (VATM))

- The recent re-organisation of the meteorological services in Vietnam to support effective and efficient air traffic services highlighted the benefit of collaborative arrangements between MET and ATM services in the Central region of Vietnam and some of the challenges. One of the biggest challenges of the arrangement that MET service for aviation is provided by an air navigation service provider but not the State's National MET service is the cost of developing the aeronautical meteorological services.

SP/08 – MODERNISING MET PROVISION FOR THE FUTURE NEEDS OF AIRSPACE USERS (Mr John Moore, Assistant Director, Safety and Flight Operations, IATA Asia-Pacific Office)

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- Highlighted the importance of collaboration between MET and ATM from an airline’s perspective, including access to MET information, translation of MET information into ATM constraints and the impact of these on an ATM environment and processes, and new technologies for providing MET information, including within SWIM environment.
- It focussed on three decision-making horizons: strategic horizon (planning), pre-tactical horizon (near-real-time) and tactical horizon (real-time), and the importance of accurate and timely MET information for effective flight planning and decision making.

SP/09 – WHEN ATCs MEET MET (Ms Cheryl Chen, IFATCA North Asia Regional Vice President)

- Highlighted the importance of MET information to air traffic controllers at different phases of control, i.e. Tower Controller (departure and arrival), Terminal Controller (departure and arrival) and Enroute Controller. Reiterated the requirements for strengthening the relationship between MET and Air Traffic Control (ATC) communities and the importance of education, training and competency, and familiarisation between MET and ATM stakeholders.

- 3) 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[†] (Mr Ashwin Naidu, Aviation Customer Lead, Australian Bureau of Meteorology)

- Preliminary analysis of the recent survey conducted by the ICAO APAC Office to inform ICAO (and States) of the provision of current and future MET information services by States specifically to support ATM, particularly ATFM. The results from the survey will assist the MET/R WG in understanding the current status and requirements of MET information to support ATM and explore opportunities and enhance MET-ATM integration within the APAC region.

SP/11 – SPACE WEATHER ADVISORY SERVICE FOR AVIATION (Mr Ashwin Naidu, Aviation Customer Lead, Australian Bureau of Meteorology)

- Overview of space weather phenomena and their impacts on aviation, including high frequency (HF) radio communications, communications via satellite, GNSS[‡]-based navigation and surveillance, and radiation exposure at flight levels. Following ICAO Annex 3, four (4) global space weather advisory centres were established to provide advisory information on space weather phenomena.
- Highlighted the importance of understanding the impact of space weather events and the space weather advisory service, given that the next “solar maximum” is expected to occur in 2024. Referenced the ICAO Doc 10100 (*Manual on Space Weather Information in Support of International Air Navigation*) and some of the other relevant educational information currently provided by the Australian Bureau of Meteorology.

[†] Note: (SP/10) slides no. 1 to 28 were presented in the MET/ATM Webinar

[‡] Global Navigation Satellite System

3. Review of follow-up from previous meetings

WP/02 – FOLLOW-UP ACTION FROM MET/R WG/10 (Secretariat)

3.1. Outcomes from the Tenth Meeting of the Meteorological Requirements Working Group (MET/R WG/10) included the formulation of two (2) Draft Conclusions for further consideration by the MET SG, adoption of one (1) Decision of the MET/R WG, and agreement on four (4) new Action Items for the MET/R WG – List of Actions.

3.2. MET/R WG/10 formulated the following Draft Conclusions for further consideration by the MET SG:

- Draft Conclusion MET/R WG/10/01: *Update on Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*
- Draft Conclusion MET/R WG/10/03: *Updates to the MET/R WG Terms of Reference and Work Plan*

3.3. Follow-up actions related to the above Draft Conclusions are discussed later in this Report under *WP/03 – FOLLOW-UP ACTION FROM MET SG/25*.

3.4. MET/R WG/10 adopted the following Decision:

- Decision MET/R WG/10/02: *Survey of State Meteorological Information Supporting Air Traffic Management*

3.5. Follow-up action related to the above Decision (and the related MET/R WG/10 Action Item No. 04, on the same subject) was completed with the circulation of the survey questionnaire in ICAO State letter Ref.: T 4/3.2.7 – AP170/21 (MET), dated 22 October 2021, and the analysis of the survey results, which is discussed later in this Report under *WP/07 – MET/ATM Survey*.

3.6. 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** to this Report.

3.7. 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.

3.8. 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.

3.9. 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 organisations 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).

3.10. Updates to the MET/R WG – List of Actions agreed by the Meeting are highlighted in **Appendix A** to this Report.

WP/03 – FOLLOW-UP ACTION FROM MET SG/25 (Secretariat)

3.11. Outcomes from the Twenty-Fifth Meeting of the Meteorology Sub-group (MET SG/25) included the formulation of three (3) Draft Conclusions and one (1) Draft Decision for further consideration by the APANPIRG, adoption of three (3) Conclusions and four (4) Decisions for the MET SG, and agreement on fifteen (15) new action items for the MET SG – List of Actions.

3.12. Follow-up actions on the Draft Conclusions and Draft Decision formulated by MET SG/25 for further consideration by the APANPIRG are discussed later in this Report under *WP/04 – FOLLOW-UP ACTION FROM APANPIRG/32*.

3.13. Follow-up actions on the Conclusions and Decisions adopted by MET SG/25 are annotated in Appendix B to WP/03.

3.14. 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 the Draft Conclusion MET/R WG/10/01. Furthermore, the follow-up action on Conclusion MET SG/25-10 included the *Guidance* document published on the ICAO APAC Office website[§].

3.15. In addition, MET SG/25 endorsed the MET/R WG/10 proposed updates to the MET/R WG terms of reference and work plan.

3.16. MET SG/25 recorded fifteen (15) new Action Items in the MET SG – List of Actions, as listed in Appendix C to WP/03. In addition, follow-up actions on the MET SG – List of Actions are also annotated in Appendix C to WP/03.

3.17. 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 organise (on a date to be decided in the 3rd or 4th quarter, 2022) an APAC webinar on the space weather advisory information services.

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

WP/04 – FOLLOW-UP ACTION FROM APANPIRG/32 (Secretariat)

3.19. Outcomes from the Thirty-Second Meeting of the Asia and Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/32) included three (3) Conclusions and one (1) Decision relevant to the MET SG work plan, as listed in Appendix A to WP/04. Follow-up actions on the APANPIRG/32 Conclusions and Decision above are also annotated in Appendix A to WP/04.

3.20. Furthermore, APANPIRG/32 considered the Draft Conclusion MET SG/25-07: *SWIM architecture to enable the cost-effective and efficient provision and consumption of MET information services*. However, APANPIRG/32 also noted that the Draft Conclusion would be captured in the

[§] <https://www.icao.int/APAC/Pages/eDocs.aspx>

^{**} Space weather

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ongoing review by the SWIM TF^{††} of its terms of reference (ToR) and therefore concluded that there was no need to consider further Draft Conclusion MET SG/25-07.

3.21. Concerning the above, the Meeting noted that the SWIM TF/06 meeting, from 17 – 20 May 2022, had proposed updates to the (SWIM TF) ToR, which addressed, inter alia, the concerns raised by MET SG/25 in Draft Conclusion MET SG/25-07, for further consideration by CNS SG/26^{‡‡}.

4. Collaboration between MET services and ATM stakeholders

IP/02 – RE-ORGANISATION OF THE STATE AERONAUTICAL METEOROLOGICAL SERVICE AND ARRANGEMENT OF WEATHER SERVICE FOR AVIATION IN CENTRAL OF VIETNAM (Vietnam)

4.1. The recent re-organisation 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.

IP/03 – NEW METEOROLOGICAL SERVICES TO SUPPORT THE OPERATION OF INTEGRATED AIRPORT CENTRE (Hong Kong, China)

4.2. 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.

4.3. 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.

IP/04 – POST-OPERATIONAL ANALYSIS OF ATM-TAILORED MET INFORMATION (Japan)

4.4. 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.

WP/05 – UPDATING THE IMPLEMENTATION EXAMPLE FROM HONG KONG CHINA IN THE REGIONAL GUIDANCE FOR TAILORED METEOROLOGICAL INFORMATION AND SERVICES TO SUPPORT AIR TRAFFIC MANAGEMENT OPERATIONS (Hong Kong, China)

4.5. 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

^{††} ICAO APAC System Wide Information Management Task Force

^{‡‡} ICAO APAC Twenty Sixth Meeting of the Communications, Navigation and Surveillance Sub-group, 15 – 19 August 2022

services and includes a description of the post-operational analysis and continuous service improvement.

4.6. The Meeting supported the adoption of Hong Kong, China's updated implementation example, as reflected in the Draft Decision MET/R WG/11/02 discussed under WP/06 below.

IP/06 – STATUS OF ATM-TAILORED MET SERVICES IN THE REPUBLIC OF KOREA (Republic of Korea)

4.7. 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.

4.8. 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.

WP/06 – PREPARATION FOR UPDATING ASIA/PACIFIC REGIONAL GUIDANCE FOR TAILORED METEOROLOGICAL INFORMATION AND SERVICES TO SUPPORT AIR TRAFFIC MANAGEMENT OPERATIONS (Ad hoc group)

4.9. 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.

4.10. 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.

4.11. In addition, the ad hoc group proposed the following changes to Section 2.2 (of the *Guidance* document):

2.2.3 Verification and evaluation

After the implementation of ATM-tailored MET information and services, it is required (i) to regularly verify and evaluate its quality to ensure that it practically supports ATM and (ii) to improve MET information and services. Also, when a meteorological condition has a significant impact on ATM, it is also recommended that stakeholders conduct a post-event analysis to identify lessons learnt.

2.2.4 Continuous improvement

Regular evaluation meetings between relevant parties such as airspace users, ATM and MET organisations are one of the basic approaches to continuously improve the implemented information and services. When a meteorological condition has a significant impact on ATM, it is also recommended that stakeholders conduct a post-event analysis to identify lessons learnt and subsequent improvements. These meetings should draw from the results of verification and evaluation as well as lessons learnt from significant events, to identify changes and innovations to continually improve MET information and services.

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4.12. 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 the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

That,

a) the ad hoc group finalise 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 the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

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

WP/07 – SURVEY OF STATE METEOROLOGICAL INFORMATION SUPPORTING AIR TRAFFIC MANAGEMENT (Ad hoc group)
SP/10 – MET-ATM SURVEY (Australia)

4.13. Following the MET/R WG work plan, a survey on the provision of current and future MET information services by States to support ATM, particularly ATFM, was conducted from October to December 2021.

4.14. 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.

4.15. 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.

4.16. 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

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Asia/Pacific Region and promote the results among other related Working Groups

WP/08 – APAC USER REQUIREMENTS FOR SWIM-BASED MET INFORMATION SERVICES SUPPORTING ATFM (Ad hoc group)

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

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

4.19. The ad hoc group would consult further with ATFM experts to better understand the APAC ATFM operations and improve the use cases with the detailed event flows. The ad hoc group would also conduct the 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.

4.20. 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

WP/10 – UPDATE TO APAC REGIONAL FRAMEWORK FOR COLLABORATIVE ATFM – MET INFORMATION FOR ATFM (Australia and Hong Kong, China)

4.21. 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.

4.22. The ATFM IR SWG intends to submit the updated *Regional Framework* document for consideration by ATFM/SG/12^{†††} (to be held tentatively in August ~~September~~ 2022).

4.23. 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*.

4.24. Considering the discussion above, the Meeting adopted the following Decision:

^{§§} ATFM Information Requirements Small Working Group (formed by the ICAO APAC Air Traffic Flow Management Steering Group (ATFM/SG))

^{***} Eleventh Meeting of the ICAO APAC Air Traffic Flow Management Steering Group, 2–6 August 2021

^{†††} Twelfth Meeting of the ICAO APAC Air Traffic Flow Management Steering Group, 12–16 September 2022

REPORT OF MET/R WG/11
Report on Agenda Items

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

That the MET/R WG Members are invited to review the Meteorological Information for ATFM (paragraphs 5.59-5.67) in the *Asia Pacific Regional Framework for Collaborative ATFM* document and provide inputs of the latest examples to the ICAO Secretariat and the task coordinators by 17 June 2022.

5. Future work program and terms of reference

WP/09 – REVIEW MET/R WG WORK PROGRAM AND TERMS OF REFERENCE (Secretariat)

5.1. 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.

5.2. 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**]

5.3. 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 this Report.

6. Any other business

IP/05 – NORTH CHINA METEOROLOGICAL CENTER RAPID REFRESH PREDICT SYSTEM (China)

6.1. Convective weather, especially thunderstorms, is the most significant weather affecting north China flights. Therefore, to provide ATM controllers and stakeholders with more effective MET information to optimise the regional flight operations, the North China Meteorological Centre Rapid Refresh Predict System (NMC-RAP) has been developed.

7. Next Meeting

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

7.2. The Meeting noted that subject to the resumption of in-person meetings in 2023, MET/R WG/12 (including a MET/ATM Seminar) might tentatively be conducted in person at the ICAO APAC Office (or by a host State). The ICAO APAC Office would have the capability to conduct a “hybrid” meeting supporting in-person and online participation.

MET/R WG/11
Appendix A to the Report

MET/R WG – LIST OF ACTIONS

(Note: Proposed updates are indicated with ~~strikethrough~~ 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 further updates to the (MET/R WG work plan) Deliverable No. 2 and Deliverable No. 5 timeframe, responsibility, and requirements details. [Ref: MET/R WG/11 Report, 5.2.] - Deliverable 2: <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	Finalise 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	July 2020	Secretary and MET/R WG members	In progress

MET/R WG/11
Appendix A to the Report

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/ REMARKS
	letter (and/or other channels) with distribution to pilots and ATS units supported by States and relevant s organisations, 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]			

MET/R WG/11
Appendix B to the Report

**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 ¹) operations by providing meteorological (MET) information needed to meet current and future requirements of the ATM system.
Benefits	Increase safety – optimize safety risk management Increase efficiency – save time and fuel Increase sustainability – reduce carbon emissions
Functions and delegated authority	Under Guidance from the ICAO Secretariat, support the MET SG to assist APANPIRG in its planning and implementation work by carrying out designated tasks on specifically defined problems, including: <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; andf) Report to the MET SG for further coordination through the ICAO Secretariat with APANPIRG and other relevant bodies.

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

MET/R WG/11
Appendix B to the Report

MEMBERSHIP		
State/Organization Name	Position/organization (field of expertise)	Contact
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MEMBERSHIP		
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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 6. 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
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

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MILESTONES	By date	Responsibility	Status
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 <i>Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations</i> – 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 of State’s post-operational analysis and suggestions regarding the amendment to the <i>Guidance</i> 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 <i>Guidance</i> 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, 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)	ATFM/SG/12	Chair and Secretariat	To begin

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MILESTONES	By date	Responsibility	Status
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] Note: this row will be removed after agreement by the meeting on the points below 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 Rapporteur (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 a questionnaire) on the content of a Space Weather Advisory service 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 Space Weather Advisory service 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

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Ad-hoc group 8			
State / Administration / IO	NamePosition	Position and/or Organisation	Expertise
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

MET/R WG/11
Appendix C to the Report

LIST OF PARTICIPANTS

1.	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
	AUSTRALIA (2)				WEBINAR	MEETING
	1.	Mr. Ashwin Naidu	Aviation Customer Lead Australian Bureau of Meteorology	ashwin.naidu@bom.gov.au;	✓	✓
	2.	Dr. Jesper Bronsvort	Network Performance & Analysis Manager Airservices Australia	Jesper.Bronsvort@Airservices Australia.com;	✓	✓
	3.	Ms. Jessica Neaves	Meteorological Technical Advisor Australian Bureau of Meteorology	jessica.neaves@bom.gov.au;	✓	
	4.	Mr. Tim Hurley	Aviation Safety Inspector Civil Aviation Safety Authority	TIMOTHY.HURLEY@CASA. GOV.AU;	✓	
	5.	Mr. Ken Morris	CNS/ATM Inspector Civil Aviation Safety Authority	ken.morris@casa.gov.au;	✓	
2.	BANGLADESH (2)					
	6.	Mr. Syed Abul Hasanat	Deputy Director Meteorological and Geophysical Centre	Hasanat2001@yahoo.com;	✓	✓
	7.	Dr. Md. Shadukul Alam	Assistant Director Meteorological and Geophysical Centre	shadukul@gmail.com;	✓	✓
3.	CAMBODIA (4)					
	8.	Mr. Chhin Pavming	Deputy Chief of Bureau State Secretariat of Civil Aviation	pavming.chhin@yahoo.com;	✓	✓
	9.	Mr. Sakeda YOUS	Deputy Chief of Bureau State Secretariat of Civil Aviation	sakeda.yous@gmail.com;	✓	✓

MET/R WG/11
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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
10.	Mr. Thol Chvea	Chief of MET Standard Office State Secretariat of Civil Aviation	chveathol@yahoo.com;	✓	✓
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4.	CANADA (1)				
12.	Mr. Kaleab Yirgu	Research Assistant UNIVERSITY OF BRITISH COLUMBIA	yirgu@ualberta.ca;	✓	
5.	CHINA (3)				
13.	Mr. Qingyuan Han	Deputy Director MET Division of Air Traffic Management Bureau Civil Aviation Administration of China (CAAC)	hanqingyuan@atmb.net.cn;	✓	✓
14.	Ms. Miao Huo	Senior Engineer MET Center of North China, Air Traffic Management Bureau Civil Aviation Administration of China (CAAC)	huomiao0826@163.com;	✓	✓
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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
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	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
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88.	Mr. MOHD KHAIRIL JOHARI	Senior Assistant Director (Airspace Unit)) Civil Aviation Authority of Malaysia	khairil.johari@caam.gov.my;	✓	✓
14.	MONGOLIA (1)				
89.	Mr. Baigalmaa Erdenepel	Senior engineer of projects and research Aviation Meteorological Center of National Agency for Meteorology and Environment Monitoring of Mongolia	Baigalmaa.pel@gmail.com; amc@namem.gov.mn;	✓	✓
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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
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138.	Mr. Sachith Wickramasuriya	Meteorologist Department of Meteorology	wicksmet@gmail.com;	✓	
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	159.	Mr. Sikarate Tarasak	Officer Civil Aviation Authority of Thailand	sikarate.t@caat.or.th;	✓	
23.	USA (2)					

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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
160.	Mr. Michael Watkins	Senior Air Traffic Representative, Asia Pacific Federal Aviation Administration	michael.w.watkins@faa.gov;	✓	✓
161.	Ms. Aishat Nauzo	Aeronautical Information Specialist Federal Aviation Administration	aishat.nauzo@faa.gov;	✓	✓
24.	VANUATU (4)				
162.	Mr. Jino Moli	Electronic Engineer Met System Vanuatu Government Dept. Meteo & Geohazards	jmoli@meteo.gov.vu;	✓	✓
163.	Ms. Esther Saul	Principal Scientific Officer Systems Administrator Vanuatu Government Dept. Meteo & Geohazards	esaul@meteo.gov.vu;	✓	✓
164.	Mr. Jerry Timothy	PSO Aviation Weather Services Vanuatu Meteorological Services	jtimothy@meteo.gov.vu;	✓	✓
165.	Ms. Grace Johnolson	Principal Scientific Officer Vanuatu Meteorological Services	sjohnolson@meteo.gov.vu;		✓
25.	VIET NAM (22)				
166.	Mrs. Nguyen Lan Oanh	Deputy Director of Air Navigation Department (AND) Vietnam/Civil Aviation Authority of Vietnam (CAAV)	lanoanh@caa.gov.vn;	✓	✓
167.	Mrs. Ho Thi Doan Trang	Official of Air Navigation Department (AND) Vietnam/Civil Aviation Authority of Vietnam (CAAV)	hodoantrang@caa.gov.vn;	✓	✓

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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
168.	Mr. Le Quoc Khanh	Deputy General Director Vietnam/Vietnam Air Traffic Management Corporation (VATM)	lequockhanh@vatm.vn;	✓	✓
169.	Mr. Nguyen Van Dung	Deputy Director of Department of Air Traffic Services Vietnam/Vietnam Air Traffic Management Corporation (VATM)	nguyendung.acc@gmail.com;	✓	✓
170.	Mrs. Vu Thi Thanh Tam	Official - Department of Air Traffic Services Vietnam/Vietnam Air Traffic Management Corporation (VATM)	vuthithanhtam86@gmail.com;	✓	✓
171.	Mr. Nguyen Hoai Nam	Official – Technical Department Vietnam/Vietnam Air Traffic Management Corporation (VATM)	hoainamats@gmail.com;	✓	✓
172.	Mrs. Nguyen Thi Thom	Deputy Manager of Air ATFM Service Division –ATFMC Vietnam/Vietnam Air Traffic Management Corporation (VATM)	nguyenthithom.atmfc@gmail.com;	✓	✓
173.	Mrs. Pho Thi Thu Huong	Official of ATFM Service Division – ATFMC Vietnam/Vietnam Air Traffic Management Corporation (VATM)	Huongpvt.vatm@gmail.com;	✓	✓
174.	Mr. Nguyen Manh Quan	Official of SMS Division, ATFMC Vietnam/Vietnam Air Traffic Management Corporation (VATM)	Ngmanhquan1306@gmail.com;	✓	✓

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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
175.	Mrs. Lam Thi Kim Huyen	Official of ATFM Unit, ATFM Vietnam/Vietnam Air Traffic Management Corporation (VATM)	Lamkimhuyenqlb401@gmail.com;	✓	✓
176.	Mrs. Vo My Duyen	Official of ATFM Unit, ATFM Vietnam/Vietnam Air Traffic Management Corporation (VATM)	Vomyduyen2105@gmail.com;	✓	✓
177.	Mr. Phan Ba Hung	Deputy Director of Aeronautical Meteorological Centre (AMC) Vietnam/Vietnam Air Traffic Management Corporation (VATM)	hungpb@vatm.vn; hungpb@yahoo.com;	✓	✓
178.	Mr. Do Tien Duc	Head of Operational Division – AMC Vietnam/Vietnam Air Traffic Management Corporation (VATM)	dotienduc@gmail.com;	✓	✓
179.	Mr. Nguyen Van Hong	Deputy Manager of Met Watch Office (MWO) – AMC Vietnam/Vietnam Air Traffic Management Corporation (VATM)	hongnv@vatm.vn;	✓	✓
180.	Mr. Le Thanh Tung	Manager of Noibai Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	ltnb@yahoo.com;	✓	✓
181.	Mr. Pham Huy Hieu	Forecaster Team Leader of Noibai Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	dubaonba@gmail.com;	✓	✓

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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
182.	Mr. Nguyen Cong Dung	Manager of Da Nang Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	ncdung0520@gmail.com;	✓	✓
183.	Mr. Cao Viet Lam	Deputy Manager of Da Nang Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	caovietlam@gmail.com;	✓	✓
184.	Mrs. Vu Thi Hang	Forecaster Team Leader of Da Nang Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	Hangmet2015@gmail.com;	✓	✓
185.	Mrs. Tran Thi Khanh Huong	Manager of Tan Son Nhat Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	khanhhuong@vatm.vn;	✓	✓
186.	Mr. Phan Nhat Bang	Forecaster of Tan Son Nhat Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	Nhatbang3589@gmail.com;	✓	✓
187.	Mr. Ha Vinh Long	Forecaster of Tan Son Nhat Aeronautical Meteorological Centre Vietnam/Vietnam Air Traffic Management Corporation (VATM)	Havinh_long@yahoo.com;	✓	✓
26.	IATA (6)				

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STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
188.	Mr. John Moore	Assistant Director, Operations, Safety and Security, ASPAC International Air Transport Association (IATA)	moorej@iata.org;	✓	✓
189.	Mr. Muhammad Arfani Setia Sugiri	Fuel management Analyst PT. Batik Air Indonesia/IATA	arfani.setia_floe@batikair.com;	✓	✓
190.	Mr. Imshik Shin	Deputy General Manager – CNS/ATM Korean Air/IATA	Imshik.shin@koreanair.com;	✓	✓
191.	Mr. Daniel Smith	Manager ATM Qantas Group	danielsmith@qantas.com.au;	✓	✓
192.	Mr. Jerome Galicia	Flight Dispatcher Philippine Airlines	jerome_galicia@pal.com.ph;	✓	✓
193.	Mr. Jacobus Cronje	Meteorologist Qantas Airways	jacobuscronje@qantas.com.au;	✓	✓
27.	IFATCA (2)				
194.	Ms. Cheryl YC Chen	EVP IFATCA-Asia and Pacific	cheryl.chen@ifatca.org;	✓	
195.	Ms. John Wagstaff	Representative IFATCA-Asia and Pacific	john.wags@gmail.com;	✓	
28.	ICAO (6)				
196.	Mr. Peter Dunda	Regional Officer MET International Civil Aviation Organization Asia and Pacific Office	PDunda@icao.int	✓	✓

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	STATE/NAME		TITLE/ORGANIZATION	TEL/FAX/E-MAIL	ATTENDANCE	
	197.	Mr. Shane Sumner	Regional Officer, Air Traffic Management ICAO Asia and Pacific Regional Office	ssumner@icao.int;	✓	✓
	198.	Mr. Hiroyuki Takata	Regional Officer, Air Traffic Management ICAO Asia and Pacific Regional Office	htakata@icao.int;	✓	✓
	199.	Mr. Weng Kit Ying	Air Traffic Management Officer ICAO Asia and Pacific Regional Office	wying@icao.int;	✓	✓
	200.	Mr. Jun Ryuzaki	Technical Officer, Meteorology, ICAO Air Navigation Branch	jryuzaki@icao.int;	✓	
	201.	Ms. Sunok LEE	Regional Officer ATM, APAC RSO International Civil Aviation Organization	slee@icao.int;	✓	✓
	202.	Ms. Varapan Meefuengsart	Program Assistant International Civil Aviation Organization Asia and Pacific Office	vmeeфуengsart@icao.int;	✓	✓

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LIST OF PAPERS AND PRESENTATIONS

WORKING PAPERS			
Agenda Item	WP No.	Title	Presented by
1	WP/01	PROVISIONAL AGENDA	Secretariat
3	WP/02	FOLLOW-UP ACTION FROM MET/S WG/10	Secretariat
3	WP/03	FOLLOW-UP ACTION FROM MET SG/25	Secretariat
3	WP/04	FOLLOW-UP ACTION FROM APANPIRG/32	Secretariat
4	WP/05	UPDATING THE IMPLEMENTATION EXAMPLE FROM HONG KONG, CHINA, IN THE REGIONAL GUIDANCE FOR TAILORED METEOROLOGICAL INFORMATION AND SERVICES TO SUPPORT AIR TRAFFIC MANAGEMENT OPERATIONS	Hong Kong, China
4	WP/06	PREPARATION FOR UPDATING ASIA/PACIFIC REGIONAL GUIDANCE FOR TAILORED METEOROLOGICAL INFORMATION AND SERVICES TO SUPPORT AIR TRAFFIC MANAGEMENT OPERATIONS	Ad hoc group
4	WP/07	SURVEY OF STATE METEOROLOGICAL INFORMATION SUPPORTING AIR TRAFFIC MANAGEMENT	Ad hoc group
4	WP/08	APAC USER REQUIREMENTS FOR SWIM-BASED MET INFORMATION SERVICES SUPPORTING ATFM	Ad hoc group
5	WP/09	REVIEW MET/R WG WORK PROGRAM AND TERMS OF REFERENCE	Secretariat
4	WP/10	UPDATE TO APAC REGIONAL FRAMEWORK FOR COLLABORATIVE ATFM – MET INFORMATION FOR ATFM	Australia and Hong Kong, China

INFORMATION PAPERS			
Agenda Item	IP No.	Title	Presented by
1	IP/01	MEETING BULLETIN	Secretariat
4	IP/02	RE-ORGANIZATION OF THE STATE AERONAUTICAL METEOROLOGICAL SERVICE AND ARRANGEMENT OF WEATHER SERVICE FOR AVIATION IN CENTRAL OF VIETNAM	Vietnam
4	IP/03	NEW METEOROLOGICAL SERVICES TO SUPPORT THE OPERATION OF INTEGRATED AIRPORT CENTRE	Hong Kong, China
4	IP/04	POST-OPERATIONAL ANALYSIS OF ATM-TAILORED MET INFORMATION	Japan
6	IP/05	NORTH CHINA METEOROLOGICAL CENTER RAPID REFRESH PREDICT SYSTEM	China
4	IP/06	STATUS OF ATM-TAILORED MET SERVICES IN THE REPUBLIC OF KOREA	Republic of Korea

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SP/01	DEVELOPMENT OF FUTURE AERONAUTICAL METEOROLOGICAL SERVICES TO BETTER MEET ATM REQUIREMENTS	Mr. Jun Ryuzaki (ICAO)
SP/02	ICAO UPDATES – REGIONAL	Mr. Peter Dunda (ICAO)
SP/03	AUSTRALIAN ATFM METEOROLOGICAL INFORMATION	Mr. Ashwin Naidu (BoM), Mr. Jesper Bronsvort (AsA)
SP/04	MET SERVICES IN SUPPORT OF ATM OPERATIONS	Ms. Li Xiya (CAAC)
SP/05	MET/ATM COLLABORATIONS IN HONG KONG, CHINA	Ms. Christy Leung (HKO), Mr. Anfernee Poon (HKCAD)
SP/06	POST-OPERATIONAL ANALYSIS OF ATM-TAILORED MET INFORMATION	Ms. Michiko IKEDA (JMA), Ms. Miho ITOU (JCAB)
SP/07	RE-ORGANIZATION OF THE STATE AVIATION MET SERVICE AND ARRANGEMENT OF MET SERVICE FOR ATM IN CENTRAL OF VIETNAM	Mr. Cao Viet Lam (VATM)
SP/08	MODERNISING MET PROVISION FOR THE FUTURE NEEDS OF AIRSPACE USERS	Mr. John Moore (IATA)
SP/09	WHEN ATCs MEET MET	Ms. Cheryl Chen (IFATCA)
SP/10	MET-ATM SURVEY	Mr. Ashwin Naidu (BoM)
SP/11	SPACE WEATHER ADVISORY SERVICE FOR AVIATION	Mr. Ashwin Naidu (BoM)
