INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE ICAO ASIA AND PACIFIC METEOROLOGY/AIR TRAFFIC MANAGEMENT WEBINAR AND TENTH MEETING OF THE METEOROLOGICAL REQUIREMENTS WORKING GROUP (MET/ATM WEBINAR AND MET/R WG/10)

Online, 24 – 28 May, 2021

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

CONTENTS

INTRODUCTION

1. Meeting

1.1. The ICAO Asia and Pacific (APAC) Regional Office hosted the Meteorology/Air Traffic Management (MET/ATM) Webinar and Tenth Meeting of the Meteorological Requirements Working Group (MET/R WG/10), online from Bangkok, Thailand on 24 to 28 May, 2021.

2. Attendance

2.1. One-hundred-and-forty-seven (147) participants attended the webinar and meeting from the following twenty-five (25) States and Special Administrative Region and three (3) International Organizations: Afghanistan, Australia, Bangladesh, Cambodia, China, Hong Kong, China (SAR), Fiji, Indonesia, Japan, Lao PDR, Malaysia, Mongolia, Myanmar, Nepal, New Zealand, Pakistan, Papua New Guinea, Philippines, Republic of Korea, Singapore, Solomon Islands, Sri Lanka, Thailand, United States, Viet Nam, International Air Transport Association (IATA), International Federation of Air Line Pilot's Associations (IFALPA) and ICAO. The list of participants is at **Appendix C** to this Report.

3. Officers and Secretariat

3.1. Mr. Ashwin Naidu, *Senior Aviation Customer Lead, Australian Bureau of Meteorology*, presided as Chair of the meeting. Ms. Naoko Komatsu, *Senior Coordinator for International Aeronautical Meteorology, Planning Division, Japan Meteorological Agency (JMA)*, assisted as Vice-Chair of the meeting.

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

4. Language and Documentation

4.1. The working language of the meeting was English, inclusive of all documentation and this Report. The meeting considered fifteen (15) slide presentations, eight (8) Working Papers (WPs), nine (9) Information Papers (IPs) and one (1) flimsy. The list of presentations/papers/flimsy is at **Appendix D** to this Report.

5. Outcomes from the meeting

5.1. The Meeting recorded outcomes of its discussions in the form of Draft 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 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;

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.

5.2. The Meeting formulated the following two (2) Draft Conclusions and adopted the

following Decision:

Draft Conclusion MET/R WG/10/01: ***Update on Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations***

That, the MET SG approves the updates to the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*, for use by States, including the proposed updates to the format for the Appendices (1 and 2), the document maintenance procedure and the format for publishing the guidance on the ICAO APAC Office Website

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

That, the MET/R WG approves circulation of the survey questionnaire (at Attachment A to WP/06) for responses from APAC States in August 2021

Draft Conclusion MET/R WG/10/03: ***Updates to the MET/R WG Terms of Reference and Work Plan***

That, the MET SG approves the proposed updates to the MET/R WG Terms of Reference and Work Plan as indicated at the Appendix B to the MET/R WG/10 Report

5.3. In addition, the meeting agreed to four (4) action items, as indicated throughout the *Report on Agenda Items* and recorded in the *Task List* at the **Appendix A** to this Report.

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REPORT ON AGENDA ITEMS

1. Opening of the meeting and organizational matters

1.1. The Secretary and Chair officially opened the meeting at 10:00 hrs. ICT (UTC+7) on 24 May 2021. The Chair provided opening remarks and welcomed all participants to the meeting.

Adoption of the agenda (WP/01)

1.2. The meeting adopted the provisional agenda as circulated to participants prior to the meeting and as shown below:

Agenda Item 1: Opening of the meeting and organizational matters

Agenda Item 2: MET/ATM Webinar

Agenda Item 3: Review of MET/ATM Webinar

Agenda Item 4: Review of outcomes from related meetings

Agenda Item 5: Coordination between MET and ATM services

Agenda Item 6: Review of MET/R WG work program and terms of reference

Agenda Item 7: Any other business

Agenda Item 8: Next meeting

2. MET/ATM Webinar

2.1. The meeting reviewed topics in the following order of presentation:

- *SP/01 – Meteorological Service for International Air Navigation (Secretariat)*
- *SP/02 – Introduction to APAC Regional Guidance for Tailored MET Information and Services to Support ATM (Ad hoc group)*
- *SP/03 – Development and Updating of ATM tailored Meteorological Information (Japan)*
- *SP/04 – Australian ATFM Meteorological Information (Australia)*
- *SP/05 – MET-ATM Collaboration in Singapore (Singapore)*
- *SP/06 – Utilizing weather information in improving arrival flight time prediction in the terminal area (Hong Kong China)*
- *SP/07 – Assessing the Impact of Convective Weather on Airport Departure Rate (Hong Kong China)*
- *SP/08 – Integration of MET Information into Approach Spacing Tool (Hong Kong China)*
- *SP/09 – Development of the Aviation Multi-Data Fusion System (China)*
- *SP/10 – Australian Thunderstorm Alerting Capability (Australia)*
- *SP/11 – Space Weather Advisory Service for Aviation (Australia)*
- *SP/12 – Implementation of MET Information Exchange in IWXXM format (Hong Kong China)*
- *IP/09 – Update on SWIM Regional Coordination (IATA/SWIM TF)*
- *SP/13 – Use case and requirements for SWIM-based MET information services (Ad hoc group)*

3. Review of MET/ATM Webinar

SP/15 – Review of MET/ATM Webinar (Secretariat)

3.1. The following paragraphs highlight some of the key points discussed in the Webinar (at Agenda Item 2).

SP/01 – Meteorological Service for International Air Navigation (Secretariat)

3.2. Up until recently, Annex 3 provisions have been restricted to traditional means of dissemination of MET information, supplied to traditional users, for use in traditional forms.

3.3. The aviation system is coming under increasing pressure to meet the demands for aerodrome and airspace capacity. ICAO's Global Air Navigation Plan (GANP) explores the need for more integrated aviation planning that will eventually realize a fully-harmonized global air navigation system.

3.4. For aeronautical meteorological service, the GANP sets out a path for transition to globally interoperable systems and data. Through this concept of system-wide information management (SWIM), meteorological information will be a key enabler to the realization of this global air traffic management operational concept that is envisioned by the GANP.

3.5. ICAO, in close coordination with WMO, has embarked on enabling the transition to digital meteorological information exchange that will support the meteorological-component of SWIM.

SP/02 – Introduction to APAC Regional Guidance for Tailored MET Information and Services to Support ATM (Ad hoc group)

3.6. The guidance is based on the need for a reference document for States to share detailed technical specifications on the implementation and enhancement of MET information to support ATM, that are not already specified in Annex 3.

3.7. Section 2 of the guidance outlines a step-by-step process based on real experiences of how a State might implement ATM-tailored MET service; from the preparatory phase through to the operational phase. Section 3 focuses on examples of MET information and services that are effective for supporting ATM operations.

3.8. In the appendices, the guidance shares specific examples of ATM-tailored MET information provided by States, including Hong Kong-China, Japan, Republic of Korea and Singapore. It also presents a case study of operational MET-ATM collaboration.

3.9. The examples of ATM-tailored MET information presented in the guidance commonly make use of colour codes to indicate to users the likelihood and/or severity of MET-related impacts on ATM operations.

3.10. Prior to commencing an operational ATM-tailored MET service, the guidance recommends the conduct of an operational trial, for a period set by the parties concerned, to ensure the service is improved based on the lessons learned in an operational environment.

3.11. Based on a participant's question on how to analyse the impact of ATM-tailored MET service on ATM decisions and flight operations, the meeting considered it might be beneficial to expand the scope of the regional guidance [this was further discussed with the MET/R WG work plan at para. 6.2].

SP/03 – Development and Updating of ATM tailored Meteorological Information (Japan); and
SP/04 – Australian ATFM Meteorological Information (Australia)

SP/05 – MET-ATM Collaboration in Singapore (Singapore)

3.12. ATM-tailored MET information provided by States commonly focuses on thunderstorms, CB clouds and convective clouds in airspace and visibility, cloud ceiling and wind at aerodromes. The ATM scenarios in which the MET information is commonly used includes airport operations (e.g., ground delay programs), approach control areas and ATC sectors.

3.13. States encountered several challenges in implementing effective ATM-tailored MET service, such as: the verification and validation of the service; development of efficient methods to tailor MET information to often complex and changing ATM scenarios; and limitations in the accuracy of numerical weather prediction methods.

3.14. Key attributes of effective ATM-tailored MET service include: mutual understanding of ATM requirements, including changes in ATC operations, and MET capabilities (i.e., MET/ATM collaboration); value-adding to the NWP data, as necessary; and implementation of a process for continual service improvement.

3.15. All presentations highlighted that, to ensure the effectiveness of collaborative decision making and ATFM, there is a need for strong coordination and collaboration between MET and ATM personnel.

SP/06 – Utilizing weather information in improving arrival flight time prediction in the terminal area; SP/07 – Assessing the Impact of Convective Weather on Airport Departure Rate; and SP/08 – Integration of MET Information into Approach Spacing Tool (Hong Kong, China)

3.16. The presentations demonstrated the following:

- Integrating MET information with Artificial Intelligence (AI) technology could be a feasible means by which to improve airline operations, such as flight time prediction or fuel planning;

- Integrating MET information (i.e., significant convective weather) with an algorithm could be useful in estimating the reduction in airport departure rate;

- Integrating MET information (wind and weather radar) with a numerical statistical method (e.g., an approach spacing tool) could improve decisions on the spacing between flights along the final approach path, including enhanced wake turbulence separation; and

- Availability of information on air traffic conditions and flight restrictions is critical in the development of ATM-tailored MET services.

SP/09 – Development of the Aviation Multi-Data Fusion System (China)

3.17. An integrated MET data display system, performing the combined functions of weather analysis, weather briefing and weather forecast production, supports both MET service providers and ATM users, especially with common situation awareness of MET situation.

SP/10 – Australian Thunderstorm Alerting Capability (Australia)

3.18. An automated, graphical thunderstorm display and tracking system, which integrates lightning detection data, weather radar data and a thunderstorm identification, tracking, analysis and nowcasting (TITAN) application, delivers alerts to support airport ground operations with risk management related to lightning strikes.

3.19. Some States are developing new and innovative capabilities to provide information on convective weather to operators and the ATM community.

SP/11 Space Weather Advisory Service for Aviation (Australia)

3.20. In accordance with ICAO Annex 3, space weather advisory centres provide advisory information for space weather phenomena that have an impact on: 1) high frequency (HF) radio communications; 2) communications via satellite; 3) GNSS-based navigation and surveillance; and 4) radiation exposure at flight levels.

3.21. The system of global space weather advisory centres commenced operations in November 2019 with three centres providing a 24/7 global space weather advisory service for aviation. This is soon to become a system of four centres (with the integration of the China-Russia consortium).

3.22. Space weather advisory information is disseminated by the centres in TAC- and IWXXM-form and exchanged via the established OPMET exchange schemes. The space weather centres expect that the need to issue advisory information (to international civil aviation) will become more commonplace with the approach of the next solar maximum around 2024.

3.23. The ICAO Doc 10100 – *Manual on Space Weather Information in Support of International Air Navigation*, provides more information, including in Chapter 4 – *Use of space weather advisory information*, e.g., for flight crew, operators, air navigation service providers and civil aviation authorities.

SP/12 – Implementation of MET Information Exchange in IWXXM format (Hong Kong, China)

3.24. Whereas MET information in TAC form is designed to be human readable, IWXXM is a machine readable, interoperable, non-proprietary form, which enables systems to more accurately decode the MET information. The presence of metadata in IWXXM also allows user systems to easily integrate the geographic position and time of MET information.

3.25. In the future, MET information in IWXXM form could provide more detailed information than currently possible with TAC because IWXXM enables the exchange of MET information with much higher fidelity than (TAC) at present. IWXXM is one of the key enablers of SWIM and supports integration of MET with ATM decision supporting tools.

3.26. For end users, the decoding and rendering of IWXXM information can be done by off-the-shelf packages developed by the vendors.

IP/09 – Update on SWIM Regional Coordination (IATA/SWIM TF)

3.27. The Common aeRonautical Virtual Private Network (CRV) being implemented in the APAC region to support SWIM, can also support the dissemination and exchange of MET information in IWXXM form. States are also establishing AMHS capabilities to support SWIM and, in particular, the exchange of IWXXM messages.

SP/13 – Use case and requirements for SWIM-based MET information services (Ad hoc group)

3.28. To support MET/ATM integration, the MET SG (in particular, an ad hoc group of MET/R WG) has embarked on developing examples of use cases and user requirements for SWIM-based MET information services, specifically to meet the needs of ATFM in the APAC Region.

3.29. Examples of SWIM-based MET information services may include integration of

aerodrome forecast in IWXXM-form into ATC decision-making tools for prediction of airport arrival rate, or the integration of SIGMET information in IWXXM-form, along with flight information in FIXM-form, into ATFM decision-support tools.

4. Review of outcomes from related meetings

WP/02 – Follow-up Action from MET/R WG/09 (Secretariat)

4.1. The meeting reviewed the status of follow-up action from MET/R WG/09 and updated the MET/R WG Task List accordingly, as indicated at the **Appendix A** to this Report.

4.2. With respect to follow-up action on item 9/1 on the list, the Secretariat informed the meeting of the schedule of upcoming ICAO APAC Webinars, including a webinar titled *Special Air-Reports needed by MET to Support Flight Safety* on 17 June 2021.

WP/03 – Follow-up Action from MET SG/24 (Secretariat)

4.3. The meeting reviewed outcomes from MET SG/24 and noted the following:

4.3.1. Follow-up action on Conclusion MET SG/24-03: *Survey of State Meteorological Information Supporting Air Traffic Management*, would be further discussed in WP/06 – *Survey of State Meteorological Information Supporting Air Traffic Management*;

4.3.2. Follow-up action on Decision MET SG/24-13: *Development of APAC User Requirements for SWIM-based MET Information Services Supporting ATFM*, would be further discussed in WP/07 – *Use case and requirements for SWIM-based MET information services*; and

4.3.3. Although follow-up action on Decision MET SG/24-16: *Updates to Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*, was completed, subsequent development of this work would be further discussed in WP/05 – *Updates on APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*.

4.4. The meeting also noted that, in Decision MET SG/24-18: *Updates to terms of reference and work plan of and MET/R WG, MET/IE WG and MET/S WG*, the MET SG had approved the updated terms of reference and work plan of the MET/R WG (as presented in WP/08 – *Review the Work Program and Terms of Reference*).

WP/04 – Follow-up Action APANPIRG/31 (Secretariat)

4.5. The meeting reviewed the outcomes from APANPIRG/31, and proposed appropriate updates to the MET/R WG terms of reference and work plan, as follows:

4.5.1. With respect to APANPIRG/31 Decision 31/16 – *Updates to Terms of Reference and Work Plan of MET SG*, MET/R WG to participate in an annual schedule of quarterly coordination meetings for the Chairs of MET SG and its contributory working groups; and

4.5.2. Noting that APANPIRG/31 did not adopt a specific Conclusion based on the MET SG/24 Draft Conclusion MET SG/24-02: *APAC Regional Air Navigation Plan (ANP), Volume III*, but that APANPIRG/31 did suggested that MET SG should progress with its development of a proposal for amendment to the ANP, Volume III, MET/R WG to further support the MET SG with development of MET-specific requirements in the ANP, Volume III.

4.6. The proposed updates to the MET/R WG terms of reference and work plan (as

discussed above) are presented at the **Appendix B** to this Report.

5. Coordination between MET and ATM services

WP/05 and SP/14 – Updates on APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations (Ad hoc group)

5.1. The meeting reviewed the proposed updates to the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*, and agreed that MET/R WG members should further review the proposed updates, 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 no later than 11 June 2021 [ACTION 10/01].

5.2. The meeting also requested the ad-hoc group, comprising members from Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and IATA, to finalize the proposed updates to the guidance for further presentation to, and possible approval by, the MET SG/25 meeting in July 2021 [ACTION 10/02], and the ICAO (RO MET) to consider the proposed format for publishing the guidance on the ICAO APAC Office web page [ACTION 10/03].

5.3. In view of the discussion above, the meeting formulated the following Draft Conclusion, for possible adoption by the MET SG/25 meeting:

Draft Conclusion MET/R WG/10/01: ***Update on Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations***

That, the MET SG approves the updates to the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*, for use by States, including the proposed updates to the format for the Appendices (1 and 2), the document maintenance procedure and the format for publishing the guidance on the ICAO APAC Office Website

WP/06 – Survey of State Meteorological Information Supporting Air Traffic Management (Ad hoc group)

5.4. The meeting reviewed the *Survey of State Meteorological Information Supporting Air Traffic Management* proposed by the dedicated ad hoc group and recalled that MET SG/24 had already approved the terms of reference for this work and the survey questionnaire in its Conclusion MET SG/24-03: *Survey of State Meteorological Information Supporting Air Traffic Management*.

5.5. The meeting further noted that MET SG had approved circulation of the survey questionnaire for States to respond in early 2021. The Chair informed the meeting that the circulation of the survey questionnaire had been delayed somewhat due to the ongoing disruptions caused by the COVID-19 pandemic, and invited the meeting to agree to revise the proposed circulation timeline and to conduct the survey via ICAO State letter and using an online survey tool in August 2021 [ACTION 10/04].

5.6. In view of the discussion above, the meeting adopted the following Decision:

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

That, the MET/R WG approves circulation of the survey questionnaire (at Attachment A to

WP/06) for responses from APAC States in August 2021

WP/07 – APAC User Requirements for SWIM-based MET Information Services Supporting ATFM (Australia, Hong Kong China, and Thailand)

5.7. The meeting reviewed the draft *APAC User Requirements for SWIM-based MET Information Services Supporting ATFM*, prepared by Australia, Hong Kong China and Thailand, and recalled that MET SG/24 had already approved the terms of reference for this work in its Conclusion MET SG/24-13: *Development of APAC User Requirements for SWIM-based MET Information Services Supporting ATFM*.

5.8. The meeting also reviewed the proposed collaborative approach, involving both MET and ATFM experts, and the draft reference document containing sample use cases in the Attachment to WP/07, by which the dedicated ad hoc group, comprising MET and ATFM subject matter experts from Australia, Hong Kong China, Japan, Pakistan, Republic of Korea, Singapore, Thailand, Vietnam, CANSO, and IATA, would identify the use cases and user requirements.

5.9. Some meeting participants raised concern regarding the consistency of the work discussed above with the global discussion and plan (on MET in SWIM) being led by the ICAO Meteorology Panel (METP) in collaboration with other relevant groups.

5.10. The meeting noted that a number of the APAC ad hoc group members (referred to above) are also members of the METP Working Group on Meteorological Information Exchange (WG-MRI). In addition to the meeting secretary, these members can assist in coordinating and communicating with the METP regarding the global (MET in SWIM) requirements and updates. These updates will be fed to the proposed work and reference documents of the ad hoc group.

5.11. The meeting was informed of the METP's relevant global developments and understood these did not restrict the regional groups (such as MET/R WG) from collecting user information (for MET in SWIM). The meeting also recalled that the need (for the APAC work) to consider the global discussion in METP and other groups was already acknowledged and reflected in Item 3 of the ad hoc group's terms of reference document.

5.12. Based on further discussion, the meeting requested the ad hoc group to review the proposed approach and document with consideration to the following points:

- Results from the *Survey of State Meteorological Information Supporting Air Traffic Management* (as discussed above at para. 5.4 to 5.6);
- Identify related global discussion and plan led by ICAO METP in collaboration with other relevant groups;
- Define the meaning of "use case";
- Ensure the document does not infer any obligation on States to implement the SWIM-based MET Information Services described; and
- Coordinating the ad hoc group's work with other related sub groups and working groups.

5.13. In view of the discussion above, the meeting proposed appropriate updates to the relevant parts of the MET/R WG work plan. These are indicated in the proposed updates to the MET/R WG terms of reference and work plan at the **Appendix B** to this Report.

IP/02 – Information Exchange Between Aviation MET and ATM Services (Nepal)

5.14. The meeting noted the current status and future areas of coordination for the information exchange between MET and ATM services for safety of aircraft operation in Nepal. The meeting acknowledged significant progress in the provision of Met information to ATM in Nepal, the implementation of IWXXM and the development of QMS for the MET services.

IP/03 – ATM-tailored MET information and Services in the Republic of Korea (Republic of Korea)

5.15. The meeting noted ATM-tailored MET information and services currently provided by the Aviation Meteorological Office (AMO) of the Republic of Korea for the safe aircraft operation and the efficient air traffic flow.

IP/04 – Development and Updating of ATM Tailored Meteorological Information (Japan)

5.16. The meeting noted the development and updating of ATM tailored meteorological products from the Japan Meteorological Agency (JMA). The product specifications are updated based on the verification/research in the wake of adverse weather conditions seriously affecting air traffic flow, and in line with changes in ATC operations. Effective support for ATFM operations requires appropriate updating of information specifications based on consideration of events in actual operation with identifying requirements from ATM officers and understanding changes in ATC operations as well as aircraft operations.

IP/05 – Utilizing weather information in improving arrival flight time prediction in the terminal area

5.17. The meeting noted the study on improving the arrival flight time prediction under significant weather over the terminal area of HKIA conducted by Hong Kong Observatory. This study showcases the initial use of Artificial Intelligence for constructing impact-based forecasting product which may better serve the airline users. The meeting also noted some of the limitations in undertaking this work, such as limitations in the availability of information on the air traffic condition and flight restriction imposed over the area.

IP/06 – Assessing the Impact of Convective Weather on Airport Departure Rate (Hong Kong China)

5.18. The meeting noted a study on modelling the impact of significant convective weather on Airport Departure Rate (ADR) at Hong Kong International Airport (HKIA).

IP/07 – Integration of MET Information into Approach Spacing Tool (Hong Kong China)

5.19. The meeting noted outcomes of work on the integration of MET information into a distance-based Approach Spacing Tool being implemented in Hong Kong, China for assisting controllers to handle air traffic under enhanced Wake Turbulence Separation scheme and improve runway capacity.

IP/08 – Development of the Aviation Multi-Data Fusion System (China)

5.20. The meeting noted development of a data display system in the middle-south region of China, known as the “Aviation Multi-data Fusion System”, which supports multi-data storage and analysis, data fusion and display, and integrated weather service. It provides visual products for weather forecasters and ATM controllers to make collaborative decisions through face-to-face or remote

consultation, which helps to optimize the regional flights operation.

IP/09 – Update on SWIM Regional Coordination (IATA/SWIM TF)

5.21. The meeting noted key SWIM activities being undertaken in Asia and Pacific Region including topics discussed in the SWIM Task Force/4 meeting in November 2020.

6. Review of MET/R WG work program and terms of reference

WP/08 – Review the Work Program and Terms of Reference (Secretariat)

6.1. The meeting recalled that the MET SG/24 approved updates to the MET/R WG terms of reference and work plan with its adoption of Decision MET SG/24-18: *Updates to terms of reference and work plan of and MET/R WG, MET/IE WG and MET/S WG*.

6.2. Recalling the discussion in the Webinar (Agenda Item 2, SP/02) on how to analyse the impact of ATM-tailored MET service on ATM decisions and flight operations, the meeting decided to include a new task in the work plan further development of the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*.

6.3. The meeting recalled that the lead on SIGMET coordination activities in the APAC Region moved to the MET/S WG. However, under its terms of reference, the MET/R WG will continue to assist MET/S WG and MET/SG on the user requirements on integration and expansion of SIGMET coordination activities among States/Administrations.

6.4. Based on the discussions of the meeting and some updates provided by participants, the meeting proposed a number of further updates to the terms of reference and work plan document for review and possible approval by MET SG/25. All the proposed updates are indicated in the MET/R WG terms of reference and work plan at the **Appendix B** to this Report.

6.5. In view of the discussion above, the meeting formulated the following Draft Conclusion:

Draft Conclusion MET/R WG/10/x – *Updates to the MET/R WG Terms of Reference and Work Plan*

That, the MET SG approves the proposed updates to the MET/R WG Terms of Reference and Work Plan as indicated at the Appendix B to the MET/R WG/10 Report

7. Any other business

Flimsy/01 – IATA's economic analysis (IATA)

7.1. IATA Economics analysis data illustrated the impacts of COVID-19 pandemic on the international air transport system.

8. Next meeting

8.1. The meeting noted that the MET/R WG work plan included (at Deliverable 5) a seminar on regional implementation of MET information to support ATM operations.

8.2. In view of the above, the meeting decided to tentatively schedule the next meeting, MET/R WG/11, in conjunction with a MET/ATM seminar, in approximately one-year (i.e., 3rd or 4th

week of May 2022). Depending on the prevailing global situation with respect to travel restrictions, the meeting would be conducted either online or in person at the ICAO APAC Office.

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TASK LIST – MET/R WG/10

TASK No.	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS/ REMARKS
01	Review the proposed updates (to the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*), 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	In progress
02	Finalize the proposed updates (to the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*) 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	In progress
03	Consider the proposed format for publishing the updates (to the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*) on the ICAO APAC Office web page. [Ref: MET/R WG/10 Report, 5.2]	July 2021	ICAO (RO MET)	In progress
04	Conduct the *Survey of State Meteorological Information Supporting Air Traffic Management* 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	In progress

OUTSTANDING TASK LIST – MET/R WG/09

TASK No.	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS/ REMARKS
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	July 2020	Secretary and MET/R WG members	In progress

TASK No.	DESCRIPTION	TIME FRAME	RESPONSIBLE PARTY	STATUS/ REMARKS
	of ICAO State letter (and/or other channels) with distribution to pilots and ATS units supported by States and relevant organizations, as appropriate.			

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

TERMS OF REFERENCE AND WORK PLAN

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

TERMS OF REFERENCE

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

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

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

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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
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 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
~~1. Input to the draft update to the Regional SIGMET Guide to assist States in aligning cross-FIR boundary SIGMET information in coordination with MET/S WG~~
2. Documented analysis of MET information used in the Region specifically to support ATM operations
3. Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ATM Plan
4. Draft regional guidance material for tailored MET information supporting ATM operations
5. Seminar on regional implementation of MET information to support ATM operations
6. Coordinated review of the APAC ANP Volume III, including proposals for improvements to the ANRF and other parts of Volume III, to clarify the MET-related implementation planning guidance

7. SIGMET coordination activities in APAC Region; Coordinate on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.
8. Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM

MILESTONES	By date	Responsibility	Status
~~**Deliverable 1:** Input to the draft update to the Regional SIGMET Guide to assist States in aligning cross-FIR-boundary SIGMET information in coordination with MET/S WG~~			
~~1.1 Input to First draft of guidance for inclusion in Regional SIGMET Guide for review by MET/R WG members (taking into consideration lessons learnt from the SIGMET coordination projects occurring in the Region)~~	~~next meeting of MET/R WG~~	~~Ad hoc group 1: Japan, Singapore and Secretariat in coordination with MET/S WG~~	~~Completed~~
~~1.2 First draft of guidance for inclusion in Regional SIGMET Guide for review by MET SG~~	~~MET SG/22~~	~~Secretariat in coordination with MET/S WG, MET SG~~	~~Completed~~
~~1.3 Submit the latest version of the guidance for possible approval by MET SG~~	~~MET SG/23~~	~~Ad hoc group 1: Japan, Singapore and Secretariat in coordination with MET/S WG~~	~~Closed~~ Completed

MILESTONES	By date	Responsibility	Status
Deliverable 2: Analysis of MET information used in the Region specifically to support ATM operations			
2.1 Survey on regional requirements for MET information to support ATM operations	Oct/Nov 2015	Secretariat	Completed
2.2 Preliminary draft documented analysis of MET information used in the Region specifically to support ATM operations	Jun 2016	Secretariat and Chair	Completed
2.3 Final draft documented analysis of MET information used in the Region specifically to support ATM operations	Next meeting	Ad hoc group 2: Australia (Rapporteur), Singapore, New Zealand, China, Japan, Thailand, Hong Kong China, Viet Nam	Completed
2.4 Develop a revised questionnaire and conduct a survey, taking into account outcomes from the review of the survey results by the MET SG and ATM/SG and how this can support the next MET/ATM seminar	By 10 June 2019	Ad hoc group 2	Closed-Completed
2.5 Submit draft survey questionnaire to MET SG/23 for approval	By 10 June 2019 for MET SG/23 on 17 June	As above	Closed-Completed
2.6 Revise questionnaire taking into account outcomes from MET/R WG/9 and further feedback and comments from the WG members	29 May 2020	As above	~~To begin~~ Completed
2.7 Conduct a small trial-run of the survey questionnaire	29 Jun 2020	As above	~~To begin~~ Completed
2.8 Submit final draft survey questionnaire to MET SG/24 for approval	29 Jun 2020	As above	~~To begin~~ Completed

2.9 Conduct the Regional survey (via State Letter and Online)	~~Q3 4 2020 or as decided by MET SG~~ Aug 2021	As above	To begin

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

MILESTONES	By date	Responsibility	Status
Deliverable 4: Draft regional guidance material for tailored MET information supporting ATM operations			
4.1 List of tailored MET information or services used in the region to support ATM operations	Jun 2016	Ad hoc group 4: Australia, China, Hong Kong, China, IATA, Japan (Rapporteur), Republic of Korea, Singapore, Thailand and Viet Nam	Completed
4.2 List of sub-regional exchange of MET information and associated agreements that facilitate ATM operations, particularly where major traffic flows affect multiple FIRs	Jun 2016	As above	Completed
4.3 First draft of regional guidance material for tailored MET information supporting ATM operations	Aug 2016	As above	Completed
4.4 Draft of version 2 produced, based on survey results and outcomes/recommendations provided by MET SG and/or ATM/SG	Jun 2018	As above	Completed
4.5 Submit the regional guidance material for tailored MET information supporting ATM operations for possible approval by MET SG and inform the ATM/SG	By 10 June 2019 for MET SG/23 on 17 June	As above	Closed-Completed
4.6 Review the regional guidance material for tailored MET information supporting ATM operations and propose updates as necessary for possible approval by MET SG	Next meeting of MET/R WG	As above	Closed-Completed
4.7 Review the working draft guidance and provide comment to the ICAO RO MET	~~12 June 2020~~ 11 June 2021	MET/R WG	To begin

4.8 Finalize the updated guidance for approval at the MET SG in ~~July 2020~~ July 2021	~~29 June 2020~~ July 2021	Ad-hoc group, consisting of Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and IATA	To begin
4.9 Consider expanding the Guidance document to define a framework to capture post operational analysis on the impact of tailored met information on ATM decisions	Next MET/R WG meeting	Ad hoc group	To begin

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

MILESTONES	By date	Responsibility	Status
Deliverable 6: Coordinated review of the APAC ANP Volume III, including proposals for improvements to the ANRF and other parts of Volume III, to clarify the MET-related implementation planning guidance			
6.1 ~~First draft of proposed APAC ANP Volume III improvements (pending outcomes from the ICAO eANP WG development on ANP Vol III common template)~~ Support MET SG with development of MET-specific requirements in the ANP, Volume III	~~TBD~~ As required	~~TBD~~ MET/R WG	~~On hold~~ In progress

MILESTONES	By date	Responsibility	Status
Deliverable 7: SIGMET coordination activities in APAC Region; Coordinate on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.			
[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	

MILESTONES	By date	Responsibility	Status
Deliverable 8: Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM			

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

Ad-hoc group 8

State / Administration / IO	**NamePosition**	**Position and/or Organisation**	**Expertise**
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Australia	Ashwin Naidu	BOM	MET
CANSO	Stuart Ratcliffe	CANSO	ATFM
Hong Kong China	Marco Kok (**Rapportuer**)	HKO	MET/SWIM
Hong Kong China	Peter Chadwick	Senior Air Traffic Control Specialist (Strategic Planning) / HKCAD	ATFM
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IATA	John Moore	IATA	ATFM/MET
Japan	~~SHIGENOBU Toshiya~~	JCAB	ATFM

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	Syed Ali Baqadar Shah		
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Republic of Korea	Jiwon, LEE	Assistant of Director / KMA	MET
Singapore	Clarence Foo	Head, ATM development/CAAS	ATFM
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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
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LIST OF PAPERS AND PRESENTATIONS

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WP/05	5	Updates on APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations	Ad hoc group
WP/06	5	Survey of State Meteorological Information Supporting Air Traffic Management	Ad hoc group
WP/07	5	APAC User Requirements for SWIM-based MET Information Services Supporting ATFM	Australia, Hong Kong China and Thailand
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		INFORMATION PAPERS	
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IP/05	5	Utilizing weather information in improving Arrival Flight Time Prediction in the Terminal Area	Hong Kong, China
IP/06	5	Assessing the Impact of Convective Weather on Airport Departure Rate	Hong Kong, China
IP/07	5	Integration of MET Information into Approach Spacing Tool	Hong Kong, China
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