

INTERNATIONAL CIVIL AVIATION ORGANISATION



**REPORT OF THE TWELFTH MEETING OF THE
METEOROLOGICAL REQUIREMENTS WORKING GROUP
(MET/R WG/12)**

**INCLUDING THE ICAO APAC SEMINAR ON METEOROLOGY/AIR TRAFFIC
MANAGEMENT (MET/ATM SEMINAR)**

(Bangkok, Thailand, 1 – 5 May 2023)

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 ICAO APAC Seminar on Meteorology/Air Traffic Management (MET/ATM Seminar) and the Twelfth Meeting of the Meteorological Requirements Working Group (MET/R WG/12) in Bangkok, Thailand, from 1 to 5 May 2023.

2. Attendance

2.1. The MET/ATM Seminar was attended by fifty-three (53) participants from fourteen (14) States and Special Administrative Regions and three (3) International Organizations, including Australia, Bhutan, Brunei Darussalam, Hong Kong China, India, Japan, Malaysia, Pakistan, Philippines, Republic of Korea, Singapore, Thailand, United States, Viet Nam, IATA, IFATCA and ICAO. The list of Seminar participants is in **Appendix C** of this Report.

2.2. The MET/R WG/12 Meeting was attended by fifty-one (51) participants from fourteen (14) States and Special Administrative Regions and three (3) International Organizations, including Australia, Bhutan, Brunei Darussalam, Hong Kong China, India, Japan, Malaysia, Pakistan, Philippines, Republic of Korea, Singapore, Thailand, United States, Viet Nam, IATA, IFATCA and ICAO. The list of Meeting participants is in **Appendix C** of this Report.

3. Officers and Secretariat

3.1. The MET/ATM Seminar was moderated by Mr. Ashwin Naidu, Aviation Customer Lead, Australian Bureau of Meteorology, and Mr. Hiroyuki Takata and Mr Peter Dunda, Regional Officers, Air Traffic Management (ATM) and Aeronautical Meteorology and Environment (MET/ENV), ICAO APAC Office.

3.2. Mr. Ashwin Naidu, Aviation Customer Lead, Australian Bureau of Meteorology, chaired the MET/R WG/12 Meeting. As Secretary, he was assisted by Mr. Peter Dunda, Regional Officer, Aeronautical Meteorology and Environment (MET/ENV).

4. Language and Documentation

4.1. The working language of the MET/ATM Seminar and MET/R WG/12 Meeting was English, including all documentation and this Report. The Seminar considered thirteen (13) slide presentations (SPs), and the Meeting considered thirteen (13) working papers (WPs), six (6) information papers (IPs) and one (1) SP. The list of presentations and papers is in **Appendix D** of this Report.

5. Outcomes

5.1. The MET/R WG/12 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 regional applicability that, according to the MET SG's terms of reference, require the attention of

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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.

5.2. The Meeting formulated the following two (2) Decisions of the MET/R WG:

Decision MET/R WG/12-01: *Update on Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

- a) The MET/R WG members review the draft Guidance attached to MET/R WG/12 WP/11 and provide comments to the ICAO RO MET no later than 14 July 2023;
- b) The ad-hoc group, consisting of Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and IATA, finalizes the draft Guidance for approval at the MET SG/27; and
- c) MET/R WG members are invited to share the State's practices and challenges of verification and evaluation of impact-based MET information to support ATM operation to be included in the Guidance.

Decision MET/R WG/12-02: *APAC Use Cases and User Requirements for SWIM-Based MET Information Services Supporting ATFM*

- a) The MET/R WG members and ATFM SG members review the proposed updates to the draft reference document in Attachment A to MET/R WG/12 WP/12, provide comments and provide suggestions on additional use cases, if any, to the ICAO Secretariats by 14 July 2023; and
- b) Depending on the feedback and information received, the ad-hoc group would submit an updated reference document to MET SG for review.

5.3. In addition, the MET/R WG/12 Meeting reviewed and updated the List of Actions in **Appendix A** of this Report.

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

REPORT ON AGENDA ITEMS – MET/R WG/12

1. Organizational matters

WP/01 – Provisional Agenda (Secretariat)

1.1. The Meeting adopted the agenda as listed below:

- Agenda Item 1: Organizational matters
- Agenda Item 2: Review of MET/ATM Seminar
- 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 Seminar

SP/14 – REVIEW OF MET/ATM SEMINAR

2.1. The Seminar allowed States and Organizations to share information, experiences and ideas on planning and implementing meteorological (MET) services to support air traffic management (ATM) and air traffic flow management (ATFM) operations, focusing on collaborative arrangements and integrating MET information into ATM.

TOPIC 1 – ICAO PROVISIONS

2.2. In topic 1, ICAO Provisions, the Seminar considered the framework of ICAO provisions supporting integrating MET information into ATM.

SP/01 – DEVELOPMENT OF FUTURE AERONAUTICAL METEOROLOGICAL SERVICES TO BETTER MEET ATM REQUIREMENTS

2.3. Recent and ongoing developments by the ICAO Meteorology Panel (METP) on ICAO's global, MET-related provisions involved the following:

- ICAO Annex 3 and Procedures for Air Navigation Services – Meteorology (PANS-MET);
- MET information to support trajectory-based operations and Aviation System Block Upgrades (ASBUs);
- ICAO Meteorological Information Exchange Model (IWXXM) and System-Wide Information Management (SWIM);
- World Area Forecast System (WAFS);
- Space weather information service;
- Volcanic ash information and the International Airways Volcano Watch (IAVW);
- Hazardous weather information service (HWIS);
- Cost recovery and governance; and
- Quantitative volcanic ash concentration information.

2.4. The Seminar was informed that the HWIS-concept developments are in process, with the initial draft of ICAO Standards and Recommended Practices (SARPs) expected with an amendment to Annex 3 in November 2029.

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2.5. Concerning IWXXM, SWIM, the digitalization of MET information and migration from a “product-centric” to an “information-based” environment, the Seminar was informed that the METP was considering removing the (legacy) Annex 3 requirements for the global exchange of MET information in the traditional alpha-numeric code (TAC) form in 2029.

2.6. The METP will also develop the ICAO provisions facilitating the integration of MET information into ATM decision-making in close coordination with ICAO’s ATM-related Panels.

2.7. Future work for the METP will include addressing the requirements for MET information to support operations in the aerodrome domain, ultra-long-haul and high-altitude flight, including high-altitude ice crystal information and support for aircraft de-icing.

SP/02: ICAO ANNEX 3 AMENDMENT

2.8. ICAO recently circulated proposals for the amendment of Annex 3, which are envisaged for applicability on 28 November 2024, except for amendments related to quantitative volcanic ash information, which are envisaged for applicability on 27 November 2025. The proposals included the following:

2.8.1. Development of the restructured Annex 3 and the new PANS-MET – to facilitate the migration of the provision of aeronautical MET information from a “product-centric” to an “information-based” environment under SWIM and provide clear separation of performance and functional requirements in Annex 3 from the technical specifications to be transferred to the PANS-MET;

2.8.2. Update the provisions regarding space weather information services – to upgrade from Recommended Practices to Standards and clarify the roles of global and regional space weather centres, update the template for the space weather advisory, and delete the requirements for the issuance of NOTAM related to space weather in both Annex 3 and Annex 15;

2.8.3. Introduce new Recommended Practices for quantitative volcanic ash concentration information and the issuance of volcano observatory notice for aviation (VONA), and delete the aviation colour code from the volcanic ash advisory;

2.8.4. Provisions requiring the dissemination of WAFS forecasts (i.e. upper air gridded and significant weather (SIGWX) forecast) and VONA in IWXXM form, and remove the limitation of the number of runway visual range (RVR) values contained in a single METAR/SPECI in IWXXM form;

2.8.5. Updates to WAFS forecasts – to better serve as an enabler to the Global Air Navigation Plan (GANP), allow world area forecast centres (WAFCs) to issue upper air gridded information with an increased spatial and temporal resolution for extended forecast periods (up to 36 hours), and start the issuance of SIGWX forecast in IWXXM form;

2.8.6. Clarify the existing definition for “meteorological authority” and, in consequence, introduce a new definition for “meteorological service provider”, to better distinguish the roles and responsibilities of both entities and reflect the arrangements that are being implemented by an increasing number of States; and

2.8.7. Introduce a new Recommended Practice to ensure that the meteorological information supplied to the users is provided through “information services”, which, in the context of SWIM, the notion of information service addresses machine-to-machine interaction in a service-oriented architecture; with references to the proposed new Procedures for Air Navigation Services – Information Management (PANS-IM) (for further details of the procedures on information

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services), and the (under-development) Manual on SWIM Implementation (for guidance material on information services).

2.9. The ICAO Secretary General requested that Member States and appropriate international organizations to provide their comments to two State Letters, Ref. AN 10/1-23/1 and AN 2/36-23/6, relating to the proposals for amendment to ICAO Annex 3 no later than 26 July 2023[†] and 14 August 2023[‡], respectively.

SP/03: MET REQUIREMENTS IN REGIONAL FRAMEWORK FOR COLLABORATIVE ATFM

2.10. Development of the APAC Regional ATFM Framework, Version 4.0, October 2022, included references to MET information tailored for ATM and ATFM purposes.

2.11. MET requirements in the Regional ATFM Framework include:

2.11.1. MET information supporting enhanced efficiency and safety:

- Enhanced operational decisions through integrated MET information (planning and near-term services); and
- Integrated MET observation information in support of enhanced operational ground and air decision-making processes for all flight phases and corresponding air traffic control operations, allowing gate-to-gate seamless operations.

2.11.2. MET products for ATFM:

- Requirement for including MET information and services in post-operations analysis;
- Reference to APAC Regional Guidance for Tailored MET Information to Support ATM and suggestions on how the MET/R WG can improve the Guidance and socialize this among various communities; and
- Emphasis on the accuracy of pre-tactical and tactical demand and capacity assessment, which relies on the predictability of events (e.g. MET phenomena) that will impact capacity.

2.12. The Seminar was informed of the importance of MET information, especially for cross-border ATFM within the airport and terminal area and airspace, and the weather forecast for seasonal MET phenomena (e.g., typhoons, monsoons, fog).

TOPIC 2 – COLLABORATION WITHIN STATES

2.13. In topic 2, Collaboration within States, the Seminar considered the benefits and challenges of collaboration between MET service and ATM communities and integrating MET information within States' ATM systems.

SP/04: IMPROVEMENT OF IMPACT-BASED MET INFO TO SUPPORT ATM OPERATIONS (ADVERSE WEATHER IN AIRSPACE)

2.14. The Seminar was presented with an overview of efforts to enhance impact-based ATM-tailored MET information.

[†] ICAO State letter Ref.: AN 10/1-23/1, dated 26 January 2023

[‡] ICAO State letter Ref.: AN 2/36-23/6, dated 13 February 2023

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2.15. An improved category forecast included updates to the criteria used to translate information on MET conditions to indicate the expected level of impacts on ATFM based on the percentage of cumulonimbus (CB) cloud coverage within a limited detection area.

2.16. The steps included the development of provisional criteria for impact-level categories, trial provision of products based on the new criteria in actual operation and the post-trial evaluation of impact-based category forecasts reviewed by the ATFM unit.

2.17. The importance of effective coordination between MET services and ATM was highlighted as the key to success in making such improvements and translating information on MET conditions into impact levels for ATM.

2.18. Challenges and initiatives in assessing forecasting for weather-related impacts on ATFM, especially for objective evaluation of products, were also highlighted.

SP/05: DIURNAL WIND VARIATION STUDY FOR RUNWAY CAPACITY OPTIMIZATION AT HONG KONG INTERNATIONAL AIRPORT

2.19. The Seminar was informed of the runway capacity optimization efforts and its tangible benefits achieved through collaboration between the Hong Kong Civil Aviation Department and Hong Kong Observatory (HKO).

2.20. Historical daily wind data from anemometers located at various locations are used to identify when runway change is most likely to happen during the day and place the “firebreaks” in the correct position to optimize operational efficiency and minimize traffic delays.

SP/06: THREE-HOURLY UPDATES OF TAF FOR HONG KONG INTERNATIONAL AIRPORT

2.21. The Seminar was informed of the development of the 3-hourly issuance of aerodrome forecasts (TAFs) in Hong Kong, China, based on the feedback from the airline operators and pilots through customer surveys and liaison group meetings to boost the capacity of Hong Kong International Airport (HKIA) and facilitate flight planning.

2.22. The benefits included the ability to provide customers with an assessment of the subtle changes in conditions through more frequent updates of TAFs and to assist ATFM units in making decisions to implement or lift flow control with better estimation in capacity and precision in time.

2.23. Australia noted that implementing the 3-hourly issuance of TAF caused a lot of challenges, and one of them was identified as the increased workload for air traffic control (ATC) as they had to broadcast the changes in TAFs more often.

SP/07: MET SUPPORT FOR THE RUNWAY CONDITION REPORT SYSTEM

2.24. The Seminar was informed that the HKO developed an automatic system to monitor rainfall to provide real-time runway condition reports (RCRs) for HKIA.

2.25. The real-time RCRs were based on the actual rain rates and now-casting techniques, reporting on each runway third.

2.26. HKO established the empirical relationship between rain rate and water depth in partnership with the University of Hong Kong Hydraulics Team.

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SP/08: SURVEY OF STATE MET INFORMATION SUPPORTING ATM

2.27. The Seminar was updated with the survey results conducted by the ICAO APAC Office, via the online survey monkey tool, in October/December 2021.

2.28. The survey questionnaire was completed by twenty-three (23) ATM- and MET-related entities each and four (4) airlines.

2.29. Key takeaways included the following:

2.29.1. Legislation/regulations:

- A few States don't have legislation;
- Many States are considering MET information as an essential part of ATFM; and
- Many States have implemented ATFM with written agreements.

2.29.2. Key MET phenomena required by ATM and Airspace users:

- Aerodrome: wind, visibility, QNH and significant phenomena such as thunderstorms (TSs), tropical cyclones (TCs) and turbulence; and
- En-route: TSs (including convective cloud), TCs and wind factors (including turbulence).

2.29.3. MET information exchange:

- OPMET data is still considered very important; in addition, some States provide tailored information;
- Gridded MET information, such as WAFS, is very important;
- Timeliness and forecast quality are extremely important for effective ATFM; and
- Some States are still not using the standard exchange model.

2.29.4. Challenges and opportunities:

- Many States have a mutual understanding among ATM, MET services and airlines;
- Many States face technical and resource challenges; and
- Requirements for more MET-related guidance.

TOPIC 3 – COLLABORATION ON A BILATERAL OR MULTILATERAL BASIS BETWEEN STATES

2.30. In topic 3, Collaboration on a bilateral or multilateral basis between States, the Seminar considered the benefits and challenges of collaboration between MET service and ATM communities and integrating MET information within bilateral and multilateral ATM systems.

SP/09: SPACE WEATHER ADVISORY SERVICE FOR AVIATION

2.31. The Seminar was informed about the space weather advisory service and space weather impacts on aviation (i.e., high-frequency radio communications (HF COM), GNSS-based navigation and surveillance, radiation exposure at flight levels and communications via satellite (SATCOM)), including ICAO development of space weather information standards for aviation and the implementation of the global space weather advisory service by the space weather centres (four global and one regional).

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2.32. Space weather advisories are issued for GNSS, HFCOM and radiation impacts; however, advisories for SATCOM impacts are not provided at this stage.

2.33. The Seminar was informed that solar activity has increased as we progress toward the solar maximum (expected in 2025), and increased solar activities are already being observed.

2.34. The Seminar was reminded of the new SARPs for space weather advisory information in ICAO Annex 3 – *Meteorological Service for International Air Navigation* and guidance in the *Manual on Space Weather Information in Support of International Air Navigation* (ICAO Doc. 10100).

SP/10: SPACE WEATHER EXERCISE– 19 AND 26 OCT 2022

2.35. Australia[§], in coordination with New Zealand^{**}, ran a space weather exercise in October 2022 with a key focus on the following:

- raise awareness of space weather;
- work through the exercise in a collaborative format; and
- determine best practices for managing space weather events within the aviation system.

2.36. Outcomes and recommendations from the exercise were shared with the participants and included:

- Review and include space weather events into their existing contingency procedures;
- Consider the benefits of broadcasting moderate (MOD) and severe (SEV) space weather advisories when impacting the air navigation service provider's (ANSP's) airspace;
- Ensure systems are configured to support all ICAO space weather advisory headers (i.e., FNXX01 – FNXX04);
- Consider non-ICAO information sources to increase situational awareness to manage risks associated with space weather events;
- Consider sending operational and exercise (EXER) space weather advisories to operational briefing systems, and note that the TEST and EXER advisories do not need to be disseminated beyond the briefing systems.

2.37. Australia plans to conduct another space weather exercise, focusing on GNSS impacts, by the end of 2023.

SP/11: NARAHG – ATFM AND MET COLLABORATION TO MANAGE THE IMPACT OF TYPHOONS

2.38. The Seminar was informed of how the Northeast Asia Regional ATFM Harmonization Group (NARAHG) managed Typhoon detour flights through collaborative decision-making to accurately manage the number of detour flights and organize as many detour flights as possible without affecting regular flights.

2.39. The Seminar was reminded that airspace capacity is often reduced due to hazardous weather conditions, and weather forecasts' accuracy is key to balancing demand and capacity. Accurate and timely MET information supports optimum ATFM.

SP/12: STATE OF AVIATION POST-COVID 19

[§] Bureau of Meteorology

^{**} Civil Aviation Authority of New Zealand

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2.40. IATA shared a summary of aviation economic and traffic data illustrating the impacts of COVID-19 on the airline industry.

2.41. International air traffic recovery in APAC is still low, but it may increase rapidly with China's international air traffic recovery.

2.42. Traffic growth forecast over the next 20 years shows APAC will be the biggest aviation market.

2.43. Airlines have been facing increased labour and energy costs and geopolitical conflict- and climate change-related costs.

2.44. One of the keys to improving efficiency will be a collaboration between MET services, ATM and operators.

2.45. APAC region is forecast to lead traffic growth in the longer term (2040 horizon), surpassing other regions by 2028.

SP/13: CAN WE DO BETTER?

2.46. IFATCA provided background information on how MET services and ATM worked together and highlighted the importance of high-level communication, coordination, and working-level activities.

2.47. The presentation highlighted the importance of communication, coordination, cooperation and collaboration between MET services and ATM.

2.48. The following MET information is needed to assist ATM and to provide better ATC:

- Improved accuracy;
- Timely delivery;
- Extent and duration of the event;
- Predicted convective activity;
- Lead time for warnings of extreme conditions; and
- Colour-coded (impact) graphics.

3. Review of follow-up from previous meetings

WP/02 – FOLLOW-UP ACTION FROM MET/R WG/11 (Secretariat)

3.1. Draft Decision MET/R WG/11-02: *Update the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations* was presented to and considered further by the Twenty-sixth Meeting of the Meteorology Sub-group (MET SG/26), conducted online, from 1 to 5 August 2022. Further discussion on this matter is in paras. 3.22. to 3.28., below.

3.2. As a follow-up to Decision MET/R WG/11-01: *Update the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*, the designated ad hoc group presented proposed updates, including the enhancements discussed at MET/R WG/11 concerning the post-operational analysis of the impact of tailored MET information in the ATM decision process, in WP/10 at MET SG/26.

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

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designated ad hoc group reported on its further analysis of the Survey results and recommendations in WP/07 (MET/R WG/12). Further discussion on this matter is in para. 5.14, below.

3.4. As a follow-up to 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*, ATFM/SG/13 (3 – 7 April 2023) was informed that the designated ad hoc group would consult ATFM experts to understand better the APAC ATFM operations and supplement the use cases with detailed information. ATFM/SG/13 agreed to an action item on contributing to the MET/R WG to further refine SWIM-based MET information service scenarios and develop other scenarios.

3.5. As a follow-up to Decision MET/R WG/11-05: *Meteorological Information for ATFM in the Regional Framework Document for Collaborative ATFM*, ATFM/SG/12 (13 - 16 September 2022) thanked the MET/R WG for its support in updating the Regional Framework for Collaborative ATFM. As a result, the updated APAC Regional Framework for Collaborative Air Traffic Flow Management, Version 4.0, October 2022, was adopted by the tenth Meeting of the ATM Sub-Group (ATM/SG/10) and made available on the ICAO APAC Office website (Draft Conclusion ATFM/SG/12-1 and Conclusion ATM/SG/10-4 refer).

3.6. Follow-up on Action Item MET/R WG/11-01 to propose further updates to the (MET/R WG work plan) Deliverable 2^{††} and Deliverable 5^{‡‡} timeframe, responsibility, and requirements details were still in progress. Further discussion on this matter is in paras. 3.13. and 5.8. to 5.11., below.

3.7. The Meeting considered that Action Item MET/R WG/9-01 to publicize the SIGMET Guide and the importance of exchanging special air-reports for improving SIGMET service was more relevant to the terms of reference (ToR) of MET/S WG, and the Meeting agreed that this Action Item was superseded and be transferred to MET/S WG.

WP/03 – FOLLOW-UP ACTION FROM MET SG/26 (Secretariat)

3.8. Draft Conclusion MET SG/26/03: *WAFS, SADIS and WIFS upgrades*, and Draft Conclusion MET SG/26/04: *0.25-degree WAFS hazard data*, were presented to and considered further by the Thirty-third Meeting of APANPIRG (APANPIRG/33), held in Bali, Indonesia from 22 to 24 November 2022. Further discussion on this matter is in para. 3.14., below.

3.9. As a follow-up to Conclusion MET SG/26-05: *Encourage States to provide input on the online repository on SIGMET Coordination and the consolidation document on SIGMET Coordination Practices in the APAC region*, the Secretariat published the online repository for APAC SIGMET Coordination activities on the ICAO APAC [eDocuments website](#).

3.10. As a follow-up to Decision MET SG/26-01: *Updates to Regional SIGMET Guide*, the Secretariat published the APAC Regional SIGMET Guide, Tenth Edition, October 2022, on the ICAO APAC [eDocuments website](#).

^{††} Deliverable 2: Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ANS Plan, and 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,

^{‡‡} Deliverable 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

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3.11. MET SG/26 adopted Decision MET SG/26-02: *Update the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*, based on the Draft Decision formulated by MET/R WG/11, Draft Decision MET/R WG/11-02.

3.12. As a follow-up to Decision MET SG/26-02, the Secretariat published the *APAC Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*, Third Edition, August 2022, on the ICAO APAC [eDocuments website](#).

3.13. The Meeting reviewed the MET SG – List of Actions and considered that follow-up on Action No. 25/04 to revise the Work Plan of MET/R to take the lead in developing the proposed amendment to the Air Navigation Plan (ANP) Volume III was completed. In addition, action No. 26/07 to consider examples of ANP Volume III adopted by other ICAO Regions should be incorporated into the relevant deliverable (No. 5) in the MET/R WG work plan. Further discussion on this matter is in para. 5.17., below.

WP/04 – FOLLOW-UP ACTION FROM APANPIRG/33 (Secretariat)

3.14. As a follow-up to Conclusion APANPIRG/33/12: *WAFS, SADIS and WIFS upgrades* and Conclusion APANPIRG/33/13: *0.25-degree WAFS hazard data*, the Secretariat will issue a State letter promulgating the Conclusions with relevant guidance information.

3.15. In response to Conclusion APANPIRG/33/14: *Update of Information in APANPIRG Air Navigation Deficiencies Reporting Form*, the Secretariat updated the APANPIRG Air Navigation Deficiencies Database on the [ICAO Secure Web Portal](#).

3.16. The Meeting noted that, with APANPIRG's adoption of Conclusion APANPIRG/33/14, the air navigation deficiency AP-MET-23, concerning the lack of SIGMET issued for the Honiara FIR, was removed from the APANPIRG list of (open) air navigation deficiencies.

WP/10 – RELEVANT OUTCOMES FROM ATFM/SG/13 (Secretariat)

3.17. ATFM/SG/13 noted that the proposed ICAO APAC Webinar on the Space Weather Advisory Information Services was postponed to a date to be confirmed in 2023.

3.18. ATFM/SG/13 noted that the MET/R WG designated ad hoc group to identify and document use cases and user requirements for SWIM-based MET information services supporting ATFM in the APAC region would consult ATFM experts to better understand the APAC ATFM operations and supplement the use cases with detailed information.

3.19. Given the above, ATFM/SG/13 agreed to include an action item for the ATFM/SG to contribute to the MET/R WG to refine SWIM-based MET information service scenarios further and develop other scenarios and recorded the following actions: 13/7 – Update MET/R WG ad-hoc group member list (ATFM experts); and 13/8 – Provide feedback and additional use cases for *APAC User Requirements for SWIM-based MET Information Services Supporting ATFM* to MET R/WG ad-hoc group.

3.20. ATFM/SG/13 noted the results of MET-related ATFM initiatives in the region, including an operational trial procedure for typhoon detour flights conducted during September 2022, which achieved an average reduction of 50% in the duration of flight delays, and the benefits of runway capacity optimization efforts in Hong Kong, China.

3.21. In addition, ATFM/SG/13 proposed holding future ATFM/SG meetings in conjunction with MET/R WG meetings for better synergy. Therefore, ATFM/SG/14 was tentatively planned for April or

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May 2024, in conjunction with MET/R WG, including a joint plenary session and MET/ATM seminar. The Meeting supported the above proposal, and further discussion is in paras. 5.16. and 7.1., below.

*WP/11 – UPDATES OF ASIA/PACIFIC REGIONAL GUIDANCE FOR TAILORED
METEOROLOGICAL INFORMATION AND SERVICES TO SUPPORT AIR TRAFFIC
MANAGEMENT OPERATIONS (Ad hoc group)*

3.22. The designated ad hoc group presented proposed updates to the *Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations* to enhance the contents related to the improvement process of the MET information and services, including post-operational analysis on the effect of tailored MET information on ATM decisions.

3.23. The updates were prepared in response to MET/R WG/10 work plan, Deliverable 4, 4.9, and include relevant experiences from the States, as requested by MET/R WG/11 in Decision MET/R WG/11/01, including from Hong Kong China and Japan. In addition, the ad-hoc group was informed that China would provide information about its relevant experience.

3.24. Based on the ad hoc group’s analysis of the information provided by the States, the updates include a new section 3.7 on ‘Continuous improvement of MET information and services’, which summarises the procedures and essential points to perform post-operational analysis and continuous improvement.

3.25. The ad hoc group found it was necessary to collect other experiences of how the States conduct objective verification and to share the relevant experiences in Appendix 1 of the Guidance.

3.26. The term “post-operational analysis” is used in the update to cover the comprehensive framework of improvement of MET information and services; and replace the term “post-event analysis” used in the current Guidance, which is considered a particular case of the “post-operational analysis”.

3.27. In addition, the updates include a cross-reference to the Asia/Pacific Regional Framework for Collaborative ATFM (Version 4.0) in section 1.1 on ‘Purpose and overview of the Guidance’.

3.28. The Meeting congratulated the ad hoc group on its work and, given the discussion above, formulated the following Decision:

Decision MET/R WG/12-01: *Update on Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*

- a) The MET/R WG members review the draft Guidance attached to MET/R WG/12 WP/11 and provide comments to the ICAO RO MET no later than 14 July 2023;
- b) The ad-hoc group, consisting of Australia, China, Hong Kong, China, Japan (rapporteur), Republic of Korea, Singapore, Thailand, Vietnam and IATA, finalizes the draft Guidance for approval at the MET SG/27; and
- c) MET/R WG members are invited to share the State’s practices and challenges of verification and evaluation of impact-based MET information to support ATM operation to be included in the Guidance.

*IP/06 – THE IMPLEMENTATION EXAMPLE FROM NORTH CHINA FOR TAILORED
METEOROLOGICAL INFORMATION AND SERVICES TO SUPPORT AIR TRAFFIC
MANAGEMENT OPERATIONS (China)*

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3.29. China (not present in the Meeting) submitted information on its MET services for aviation, including tailored MET information and services to support ATM operations in North China and its post-assessment methods, in response to Decision MET/R WG/11/01 to support the work of the ad hoc group on the *Asia/Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*.

3.30. Given the information above, the Meeting requested the ad hoc group to review the information in IP/06 further and consider its possible inclusion as an example in the draft Guidance for review by MET SG/27. Further discussion on this matter is in para. 5.15, below.

WP/07 – SURVEY OF STATE METEOROLOGICAL INFORMATION SUPPORTING AIR TRAFFIC MANAGEMENT (Ad hoc group)

3.31. The Rapporteur (Australia) of the designated ad hoc group presented the ad hoc group's analysis of the December 2021 survey results on the States' provision of current and future MET information services to support ATM and in particular, ATFM.

3.32. The Meeting noted that, based on the ad hoc group's analysis, the ad hoc group formulated several recommendations, as follows:

- a) To consider the results of the survey when:
 - i. developing future MET requirements to support ATM/ATFM;
 - ii. developing and or updating future guidance material for tailored met information services to support ATM operations;
 - iii. developing 'APAC User Requirements for SWIM-based MET Information Services Supporting ATFM' .;
- b) Socialize the survey results with the ATM community via ATFM SG and ATM SG;
- c) Promote the document titled *Asia Pacific Regional Guidance for Tailored Meteorological Information and Services to Support Air Traffic Management Operations*; and
- d) The MET/R WG/12 identify any other follow-up actions for further consideration.

3.33. Given the above, the Meeting agreed to update the MET/R WG work plan (deliverable 1) considering the ad hoc group's recommendations. Further discussion on this matter is in para. 5.14., below.

4. Collaboration between MET services and ATM stakeholders

WP/08 – AVIATION RESEARCH AND DEVELOPMENT PROJECT PHASE 2 (AvRDP-2) (Hong Kong, China)

4.1. Hong Kong, China, presented an overview of the latest developments of the Aviation Research and Development Project Phase 2 (AvRDP-2) and the latest research efforts and trial products regarding en-route significant convection developed by HKO. The AvRDP-2 is a project under the World Weather Research Program (WWRP) led by the World Meteorological Organization (WMO) Research Board and the Services Commission (SERCOM) Standing Committee on Services for Aviation (SC-AVI). The project will focus on selected short and long-haul flight routes for areas prone to convection and crossing the tropics. In addition, trial products regarding en-route significant convection developed by HKO were introduced. The seamless forecast will be based on satellite now-casting and numerical weather models. The Meeting was invited to provide suggestions on relevant user requirements to be considered in AvRDP-2.

WP/09 – DIURNAL WIND VARIATION STUDY FOR RUNWAY CAPACITY OPTIMIZATION

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AT HONG KONG INTERNATIONAL AIRPORT (Hong Kong, China)

4.2. Hong Kong, China, presented the runway capacity optimization efforts and its tangible benefits achieved through collaboration between the Air Navigation Service Provider (Hong Kong Civil Aviation Department) and the Meteorological Authority (Hong Kong Observatory) in Hong Kong, China.

4.3. Through detailed analysis of climatological surface wind data collected at the HKIA, ‘firebreaks’ are built in the seasonal scheduling capacity of the HKIA to match the time with the highest frequency of runway change triggered by a diurnal wind variation. Based on the climatological information, strategic scheduling of the ‘firebreaks’ reduces possible delays to air traffic due to runway changes in the strategic planning phase of ATFM. The Meeting noted that this is an excellent example of a close collaboration between MET services and ATM.

IP/02 – METEOROLOGICAL SERVICES RELATED TO TROPICAL CYCLONES FOR INTEGRATED AIRPORT CENTRE OF HONG KONG INTERNATIONAL AIRPORT (Hong Kong, China)

4.4. Hong Kong, China, presented information on its initiative to dedicate a team of meteorologists from the HKO to provide services to the Integrated Airport Centre of the HKIA in June 2022. In addition, a few tailored MET products related to tropical cyclones for the Centre stakeholders in the tropical cyclone season of 2022 were introduced in the Meeting.

4.5. It was noted that ‘provisional TAF’ was provided through presentations to aviation users during tropical cyclone scenarios, and it should be clarified with users against the official TAF to avoid confusion. Furthermore, Hong Kong, China, supplemented that ‘provisional TAF’ provided as a heads-up to the users with one to two days of lead time on the impact of tropical cyclones for users’ planning purposes.

IP/03 – IMPROVEMENT OF IMPACT-BASED METEOROLOGICAL INFORMATION TO SUPPORT ATM OPERATION (Japan)

4.6. Japan gave an overview of its efforts to enhance impact-based ATM-tailored MET information, focusing on effective coordination between MET/ATM and translating information on MET conditions into ATM impacts. The overview included the challenges in predicting the impact of CB on air traffic, the improvements made based on ATFM requests, and the challenges and initiatives in assessing forecasts of weather-related impacts on ATFM.

IP/04 – COLLABORATIVE DECISION-MAKING BETWEEN AUSTRALIAN BUREAU OF METEOROLOGY, AIRSERVICES AUSTRALIA AND OTHER ATM STAKEHOLDERS (Australia)

4.7. Australia presented information on MET collaborative decision-making (MET CDM) to formulate aircraft arrival rates for ATFM. The benefits of MET CDM include pre-tactical arrival rates that better suit the weather conditions, enhanced planning, shared understanding and consensus between stakeholders, flexibility and responsiveness for setting arrival rates considering weather constraints, and reduction in airborne delay (holding) leading to fuel and cost savings for airlines.

4.8. Given the information provided above, the Meeting requested a) Australia to submit the example of its MET CDM for ATFM, following Decision MET/R WG/11/01, and b) the ad hoc group (ref: paras. 3.22. to 3.28., above) to consider the possible inclusion of the Australian example in the *Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations*. Further discussion on this matter is in para. 5.15., below.

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*IP/05 – ATM-TAILORED MET SERVICES STATUS IN THE REPUBLIC OF KOREA
(Republic of Korea)*

4.9. The Republic of Korea presented the current status of ATM-tailored MET services provided by the Aviation Meteorological Office (AMO) to support ATFM decision-making, including 24-hour service at the Air Traffic Control Center (ATCC) to support decision-making for ATFM and weather information for airports, airspace and air routes in Korea and other countries.

*WP/12 – APAC USE CASES AND USER REQUIREMENTS FOR SWIM-BASED MET
INFORMATION SERVICES SUPPORTING ATFM (Ad hoc group)*

4.10. The designated ad hoc group presented the recent updates on the work to identify and document use cases and user requirements for SWIM-based MET information services supporting ATFM in the APAC region in coordination with other working groups and an updated draft version of the document for consultation. The Meeting noted that the use cases document should clearly differentiate the current and future use cases to avoid confusion.

4.11. The ad hoc group proposed to update the draft reference document further to add two new use cases, USE CASE 4: Weather impact assessment based on the occupancy of holding area, and USE CASE 5: Aircraft spacing management based on real-time surveillance information shared in SWIM, which demonstrate the potential benefits of MET information services to APAC ATFM operations in SWIM. The Meeting requested the ad hoc group seek comments and suggestions from the MET/R WG and ATFM/SG members and submit the updates to the MET SG for further review. Further discussion on this matter is in para. 5.18., below. Given the discussion above, the Meeting adopted the following Decision:

Decision MET/R WG/12-02: APAC Use Cases and User Requirements for SWIM-Based MET Information Services Supporting ATFM

a) The MET/R WG members and ATFM SG members review the proposed updates to the draft reference document in Attachment A to MET/R WG/12 WP/12, provide comments and provide suggestions on additional use cases, if any, to the ICAO Secretariats by 14 July 2023; and

b) Depending on the feedback and information received, the ad-hoc group would submit an updated reference document to MET SG for review.

5. Future work program and terms of reference

WP/06 – PROPOSALS FOR THE AMENDMENT OF ICAO ANNEX 3 (Secretariat)

5.1. The Secretariat referred to proposals^{SS} for the amendment of ICAO Annex 3, which are envisaged for applicability on 28 November 2024 or 27 November 2025, and which States and appropriate international organizations should comment on no later than 26 July 2023 or 14 August 2023, respectively. The proposals for the amendment of ICAO Annex 3 were discussed in detail in the MET/ATM Seminar.

5.2. Concerning the proposal for the amendment of ICAO Annex 3 circulated in the ICAO State letter Ref.: AN 2/36-23/6 dated 13 February 2023, the amendment recommends States should ensure that the MET information supplied to the users is provided through “information services”.

^{SS} Circulated in the ICAO State letters, Ref.: AN 10/1-23/1 dated 26 January 2023, and Ref.: AN 2/36-23/6 dated 13 February 2023

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5.3. Furthermore, the proposal for amendment of ICAO Annex 3 notes that, in the context of SWIM, the notion of “information service” addresses machine-to-machine interaction in a service-oriented architecture, and the procedures on information services are contained in the Procedures for Air Navigation Services — Information Management (PANS-IM), which is also part of the proposal for amendment in AN 2/36-23/6.

5.4. However, the Meeting was informed that the Guidance for this interaction (namely the *Manual on System-wide Information Management Implementation* and the *Manual on Information Security*) remains under development and has not yet been published.

5.5. In addition, the recipients of MET information to be supplied through information services cover a broad scope and number of users: i.e., operators, flight crew members, air traffic services units, search and rescue services units, airport management and others concerned with the conduct or development of international air navigation.

5.6. Therefore, the proposed amendment may necessitate States, operators and service providers in the aviation system to implement significant changes by November 2024 to ensure the MET information is provided to users through information services.

5.7. Concerning the above and the transition to SWIM, the Meeting was informed that the METP was considering removing the (legacy) Annex 3 requirements for the global exchange of MET information in the traditional alpha-numeric code (TAC) form in 2029.

WP/13 – WORK PLAN DELIVERABLE 5 – IMPROVEMENTS TO THE APAC ANP VOLUME III (Secretariat)

5.8. The Secretariat discussed the MET/R WG work plan deliverable 5 to propose improvements to clarify the MET-related implementation planning guidance in the ANP Volume III.

5.9. The Meeting was reminded that APANPIRG had suggested that MET SG progress with its proposal to amend the MET-specific requirements in ANP Volume III and coordinate such proposal with the other APANPIRG Sub-Groups. Furthermore, under the ATM agenda, the Secretariat had informed APANPIRG/33 of a proposed project to migrate the APAC Seamless ANS Plan and other regional plans and guidance material into ANP Volume III. However, further details of the proposal were to be established.

5.10. Given the discussion above, the Meeting agreed to update the MET/R WG work plan (deliverable 5) to ensure the following:

- i. The development of proposals to clarify the MET-related implementation planning guidance in the ANP Volume III is coordinated with the other APANPIRG Sub-Groups; and
- ii. Concerning the work plan Deliverable 5, the MET/R WG considers the implications of the proposed project to migrate the APAC Seamless ANS Plan and other regional plans and guidance material into ANP Volume III.

5.11. Further discussion on this matter is in para. 5.17., below.

WP/05 – REVIEW MET/R WG WORK PROGRAM AND TERMS OF REFERENCE (Secretariat)

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5.12. The Secretariat presented the ToR and work program of the MET/R WG for the Meeting to review and propose updates as necessary for possible approval by the MET SG.

5.13. The Meeting conducted a session with the core members of the MET/R WG to propose several updates to the Membership of the WG and the work plan, as indicated in **Appendix B** of this Report.

5.14. The proposed updates to the work plan Deliverable 1 clarify the work of the ad hoc group designated to analyze the survey of state MET information supporting ATM results, as discussed in paras. 3.3., and 3.31.-3.33., above.

5.15. The proposed updates to the work plan Deliverable 3 reflect the Meeting's discussion and Decision on the Regional guidance material for tailored MET information supporting ATM operations in paras. 3.22.-3.28., 3.30. and 4.8., above.

5.16. The proposed updates to the work plan Deliverable 4 to strengthen collaboration and relationship between MET, ATM and Airspace Users reflect the Meeting's adoption of the proposal to conduct MET/R WG/13 in conjunction with ATFM/SG/14 including a joint plenary component and a Seminar on MET/ATM, as discussed in para. 3.21., above.

5.17. The proposed updates to the work plan Deliverable 5, on a coordinated review of the APAC ANP Volume III, reflect the Meeting's proposal and agreement as discussed in paras. 3.12. and 5.8. to 5.11., above.

5.18. The proposed updates to the work plan Deliverable 6 on developing APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM, reflect the outcomes from the Meeting discussion in paras. 4.10. and 4.11., above.

6. Any other business

6.1. Discussion on WP/06 – PROPOSALS FOR THE AMENDMENT OF ICAO ANNEX 3, was conducted under agenda item 5.

7. Next Meeting

7.1. Following the discussions on this matter in paras. 3.21. and 5.16. the Meeting agreed to plan to conduct MET/R WG/13 in conjunction with ATFM/SG/14 and a Seminar on MET/ATM in late May 2024.

7.2. The Chair invited Member States that wish to host MET/R WG/13 in conjunction with ATFM/SG/14 and a MET/ATM Seminar in 2024 to inform the Secretariat as soon as possible.

7.3. Hong Kong, China, expressed interest in hosting a MET/R WG meeting in conjunction with a MET/ATM Seminar in 2025.

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MET/R WG – LIST OF ACTIONS

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

New 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 In progress

Unresolved action items recorded by MET/R WG/09

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/REMARKS
MET/R WG/09 01	Publicise the SIGMET Guide and, in particular, the guidance indicating the importance of exchanging special air-reports between airlines, ATS units and MWOs (and aerodrome meteorological offices (AMOs)) in support of improved SIGMET service and flight safety, by way of ICAO State letter (and/or other channels) with distribution to pilots and ATS units supported by States and relevant 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]	July 2020 Ongoing	Secretary and MET/R WG members MET/S WG	In progress Superseded and be transferred to MET/S WG

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

TERMS OF REFERENCE AND WORK PROGRAM

Editorial note: Proposed updates show deleted text using strikethrough (~~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; and f) Report to the MET SG for further coordination through the ICAO Secretariat with APANPIRG and other relevant bodies.

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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]

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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
1. Documented analysis of MET information used in the Region specifically to support ATM operations
2. Draft regional guidance material on MET information needed to support the elements of the APAC Seamless ATM Plan
3. Draft regional guidance material for tailored MET information supporting ATM operations
4. Strengthen collaboration and relationship between MET, ATM and Airspace Users
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
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 1: Analysis of MET information requirements (current and future) used in for the Region specifically to support ATM operations			
1.1. Final draft documented analysis of the survey of MET information requirements (current and future) used in for the Region specifically to support ATM operations	MET/R WG/12 MET SG/27	Ad hoc Group-2: Rapporteur- Australia, Singapore, New Zealand, China, Japan, Thailand, Hong Kong China, Viet Nam	To begin In progress
1.2. Identify follow-up actions (including presenting the results at ATM and Airspace Forums)	MET/R WG/12 MET SG/27	Ad hoc Group 2 (above)	To begin In progress
2. Deliverable 2: Draft regional guidance material on MET information needed to support the elements of the APAC Seamless 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 in coordination with ATFM/SG	TBD MET/R WG/13	TBD Ad hoc group-3: Rapporteur- Singapore, Australia, China, Hong Kong China, Japan, Thailand	On hold
3. Deliverable 3: Draft Regional guidance material for tailored MET information supporting ATM operations			
3.1. Finalize and submit to MET SG/26 the proposed updates to the Regional Guidance for Tailored Meteorological	MET SG/26	Ad hoc group	In progress Completed

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MILESTONES	By date	Responsibility	Status
Information and Services to Support ATM Operations – as agreed in Decision MET/R WG/11/01, part a), and Draft Decision MET/R WG/11/02,			
3.2. Provide the Secretariat examples on State's post operational analysis and suggestions regarding the amendment to the Guidance document to enhance the post-operational analysis framework – as agreed in Decision MET/R WG/11/01, part b)	30 November 2022	MET/R WG members	To begin Completed
3.3. Enhance the contents relevant to post-operational analysis in the main body of the Guidance based on the information provided by the MET/R WG members	MET/R WG/12	Ad hoc group	To begin Superseded by 3.4
3.4. Review the draft Guidance attached to MET/R WG/12 WP/11 and provide comments to the ICAO RO MET	14 July 2023	MET/R WG and ATFM SG members	To begin
3.5. Consider including States implementation example reported by IP06 and IP04 and finalize and submit to MET SG the proposed updates to the Regional Guidance for Tailored Meteorological Information and Services to Support ATM Operations – as agreed in Decision MET/R WG/12/xx	MET SG/27	Ad hoc group: Rapporteur-Japan, Australia, China, Hong Kong, China, Republic of Korea, Singapore, Thailand, Vietnam and IATA	To begin
3.6. Share the States' practices and challenges of verification and evaluation of impact-based MET information to support ATM operation in the MET/ATM seminar and/or MET/R WG/13 and the ad-hoc group analyze provided information and consider appropriate actions, such as include it to the Guidance	MET/R WG/13	MET/R WG members	To begin
4. Deliverable 4: Strengthen collaboration and relationship between MET, ATM and Airspace Users			
4.1. 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 Completed
4.2. 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 Completed
4.3. Plan to conduct MET/R WG/13 in conjunction with ATFM/SG/14 to include a joint plenary component on matters of importance to both groups, including a Seminar on MET/ATM collaboration	MET SG/27	Chair and Secretariat in coordination with ATFM/SG Chair	To begin
5. Deliverable 5: A coordinated review of the APAC ANP Volume III, including proposals for improvements to the air navigation reporting form (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; giving consideration to: i. The need to coordinate development of proposals for the ANP Volume III with the other APANPIRG Sub-Groups; ii. The implications of the proposed project to migrate the APAC Seamless ANS Plan and other regional plans and guidance material into ANP Volume III; and iii. Examples of ANP Volume III from other ICAO regions	As required MET SG/27	MET/R WG Rapporteur-Secretariat, Australia, Hong Kong China, IATA, Japan, Singapore, Thailand	To begin
6. Deliverable 6: Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM			
6.1. 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 MET SG/27	Ad-hoc group 8 (see below)	In progress

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MILESTONES	By date	Responsibility	Status
6.2. Identify MET and ATFM data to be exchanged using SWIM-based Information Exchange Service	MET/R WG/12 MET SG/27	Ad-hoc group 8 (see below)	In progress
6.3. 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 MET SG/27	Ad-hoc group 8 (see below)	In progress
6.4. Review the proposed updates to the draft reference document in Attachment A to MET/R WG/12 WP/12 and provide comments and suggestions for additional use cases, if any, to the ICAO Secretariat	14 July 2023	MET/R WG members and ATFM/SG members	In progress
6.5. Submit an updated version of the reference document to MET SG for review, giving consideration to the comments and suggestions received in 6.4.	MET SG/27	Ad-hoc group (see below)	To begin
7. Promote and assist ATM-ANSPs and Airspace Users with user education on the Space Weather Advisory service			
7.1. Seek input from end users (by way of questionnaire) on the content of a SWX workshop or seminar	MET SG/26 MET SG/27	Secretariat and MET/R WG members	To begin
7.2. Seek input from end users on the content of a SWX advisory exercise	MET SG/26 MET SG/27	Secretariat and MET/R WG members	To begin
7.3. Deliver information on Space Weather service to participants at the ICAO APAC MET/ATM seminars	MET/ATM seminars 2022 and 2023	Australia	Completed
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 Completed
8.2. Provide input on seasonal meteorological information for the Regional Framework	TBC	MET/R WG members	

Ad-hoc group 8 for Deliverable 6: Development of APAC Use Case and User Requirements for SWIM-based MET Information Services Supporting ATFM

State / Administration / IO	Name	Position and/or Organisation	Expertise
Australia	Jesper Bronsvort	Airservices Australia	ATFM
Australia	Ashwin Naidu	BOM	MET
CANSO	Stuart Ratcliffe	CANSO	ATFM
Hong Kong China	Marco Kok (Rapporteur)	HKO	MET/SWIM
Hong Kong China	John Chong	HKO	MET
Hong Kong China	Anfernee Poon	Acting Senior Operations Officer (Strategic Planning) / HKCAD	ATFM
IATA	John Moore	IATA	ATFM/MET
Japan	ITOU Mitsu YONE Toshihiro	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	Zhang HuanBin	Head, ATM development/CAAS	ATFM
Singapore	Aw Ying Kit	Senior Engineer, ATM Systems /CAAS	ATFM
Singapore	Jack Toh	Head (ATM Info System)	ATFM
Singapore	Yeo Cheng Xun	MSS	MET
Thailand	Amornrat Jirattigalachote (Amo)	Strategic Planning Manager /AEROTHAI	ATFM/SWIM
Thailand	Dudsadee Sunthong	Strategic ATFM Team/AEROTHAI	ATFM
Vietnam	Mr. Nguyen Van Dung	VATM	MET/ATFM

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LIST OF PARTICIPANTS

1.	STATE/NAME		TITLE/ORGANIZATION	E-MAIL	ATTENDANCE	
					SEMINAR	MEETING
	AUSTRALIA (1)					
	1.	Mr. Ashwin Naidu	Aviation Customer Lead Australian Bureau of Meteorology	ashwin.naidu@bom.gov.au;	✓	✓
	BHUTAN (2)					
	2.	Mr. Tshering Nima	Assistant Meteorologist, National Center for Hydrology and Meteorology	tnima@nchm.gov.bt;	✓	✓
	3.	Ms. Ugyen Lhamo	Meteorology/Hydrology officer, National Centre for Hydrology and Meteorology(NCHM)	ulhamo@nchm.gov.bt;	✓	✓
	BRUNEI DARUSSALAM (2)					
	4.	Mr. Mohammad Affindi Haji Sabli	Meteorological Officer, Brunei Darussalam Meteorological Department	fnd291@gmail.com;	✓	✓
	5.	Mr. Hassanul Kamal Haji Adam	Meteorological Officer, Brunei Darussalam Meteorological Department	hassanul.adam@met.gov.bn;	✓	✓
	HONG KONG, CHINA (2)					
	6.	Mr. Man-Lok Chong	Scientific Officer, Hong Kong Observatory	mlchong@hko.gov.hk;	✓	✓
	7.	Mr. Marco Mang-hin KOK	Acting Senior Scientific Officer, Hong Kong Observatory	mhhok@hko.gov.hk;	✓	✓
	INDIA (1)					
	8.	Mr. Sourav Adhikary	Scientist E, India Meteorological Department	s.adhikary@imd.gov.in;	✓	✓

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	STATE/NAME		TITLE/ORGANIZATION	E-MAIL	ATTENDANCE	
6.	JAPAN (3)					
	9.	Ms. Michiko Ikeda	Scientific Officer, Japan Meteorological Agency	michi-ikeda@met.kishou.go.jp;	✓	✓
	10.	Mr. Kenji Uchida	Senior Forecaster, Air Traffic Meteorology Center (ATMetC), Japan Meteorological Agency	k-uchida@met.kishou.go.jp;	✓	✓
	11.	Mr. Toshihiro YONE	Special Assistant to the Director, Air Traffic Control Division, Japan Civil Aviation Bureau (JCAB)	yone-t46kg@mlit.go.jp;	✓ On-line	
7.	MALAYSIA (3)					
	12.	Mr. Syahrudin Mustafa	Principal Assistant Director, Civil Aviation Authority of Malaysia (CAAM)	syahrudin@caam.gov.my;	✓	✓
	13.	Mr. Muhammad Firdaus ismail	Principal Assistant Director, Civil Aviation Authority of Malaysia (CAAM)	firdaus.ismail@caam.gov.my;	✓	✓
	14.	Ms. Amzura Amran	Meteorology Officer, Malaysian Meteorological Department	amzura@met.gov.my;	✓	✓
8.	PAKISTAN (2)					
	15.	Mr. Syed Ali Baqadar Shah	Deputy Director (MET), Pakistan Civil Aviation Authority	baqadar@hotmail.com;	✓	✓
	16.	Mr. Imran Waris	Air Traffic Controller Pakistan Civil Aviation Authority	gurian22@gmail.com;		✓
9.	PHILIPPINES (1)					

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	STATE/NAME		TITLE/ORGANIZATION	E-MAIL	ATTENDANCE	
	17.	Mr. Mark Anthony Teves	ATMO III, air traffic service - Civil Aviation Authority of the Philippines	v1ctoryankee@yahoo.com;	✓	✓
10.	REPUBLIC OF KOREA (2)					
	18.	Mr. KIM Seong-Keun	Deputy Director, Aviation Meteorological Office	kimsk@kma.go.kr;	✓	✓
	19.	Mr. CHO Huen-Bog	Assistant Director, Aviation Meteorological Office	jolbog@korea.kr;	✓	✓
11.	SINGAPORE (7)					
	20.	Mr. Huanbin Zhang	Head (ATM-Development), Civil Aviation Authority of Singapore (CAAS)	Zhang_huanbin@caas.gov.sg;	✓	✓
	21.	Mr. Cheng Xun Yeo	Senior Meteorologist, Meteorological Services Singapore	YEO_Cheng_Xun@nea.gov.sg;	✓	✓
	22.	Mr. Yi Xiang Lim	Assistant Manager (Technology Solutions), Meteorological Services Singapore	maceonte@gmail.com;	✓	✓
	23.	Mr. Jeffrey Loke	Head ATS Regulation , Civil Aviation Authority of Singapore (CAAS)	jeff_loke@caas.gov.sg;	✓	✓
	24.	Mr. Clement Heng	Air Traffic Control Manager (ATM - Development), Civil Aviation Authority of Singapore (CAAS)	clement_heng@caas.gov.sg;	✓	✓
	25.	Mr. Yi Wei Yeoh	Senior Manager (CNS/MET regulation), Civil Aviation Authority of Singapore (CAAS)	yeoh_yi_wei@caas.gov.sg;	✓	✓

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	STATE/NAME		TITLE/ORGANIZATION	E-MAIL	ATTENDANCE	
	26.	Mr. Toh Han Cheng	Head (Air Traffic Management Info Systems) Civil Aviation Authority of Singapore (CAAS)	Jack_TOH@caas.gov.sg;		✓
12.	THAILAND (17)					
	27.	Ms. Achiraya Dechanuntasin	Officer, Civil Aviation Authority of Thailand (CAAT)	achiraya.d@caat.or.th;	✓	✓
	28.	Mr. Anusit Deepradit	Officer, The Civil Aviation Authority of Thailand	anusit.d@caat.or.th;	✓	✓
	29.	Mr. Prinya Viyasilpa	Air Traffic Engineering Manager, AEROTHAI, Aeronautical Radio of Thailand Ltd.	prinya.vi@aerothai.co.th;	✓	✓
	30.	Mr. Somchai Yimsricharoenkit	Meteorological Specialist, Civil Aviation Authority of Thailand (CAAT)	somchai.y@caat.or.th;	✓	✓
	31.	Mr. Putchaphan Sirisap	Director of Aeronautical Meteorology Research and Development Sub-division, Thai Meteorological Department	siri_putch@hotmail.com;	✓	✓
	32.	Ms. Rassmee Damrongkietwattana	Director of Aeronautical Weather Monitoring Sub-division, Thai Meteorological Department	rassmee@hotmail.com;	✓	✓
	33.	Mr. Maethee Riwsawai	Senior Air Traffic Systems Engineer, AEROTHAI, Aeronautical Radio of Thailand Ltd.	maethee.ri@aerothai.co.th;	✓	✓

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	STATE/NAME		TITLE/ORGANIZATION	E-MAIL	ATTENDANCE	
	34.	Mr. Bunpot Kujaphun	Acting Director Aeronautical Information and Flight Data Management, AEROTHAI, Aeronautical Radio of Thailand Ltd.	bunpot.ku@aerothai.co.th;	✓	✓
	35.	Mr. Worapong Jirojkul	Senior Air Traffic Systems Engineer, AEROTHAI, Aeronautical Radio of Thailand Ltd.	worapong.ji@aerothai.co.th;	✓	✓
	36.	Mr. Wanchai Rattanasing	Aeronautical Information Manager, AEROTHAI, Aeronautical Radio of Thailand Ltd.	wanchai.ra@aerothai.co.th;	✓	✓
	37.	Mr. Suttipong Kornrapat	air traffic engineer, Aeronautical Radio of Thailand (AEROTHAI),	suttipong.kr@aerothai.co.th;	✓	✓
	38.	Mr. Auttaphud Suebnuang	Executive Air Traffic Systems Engineer, AEROTHAI, Aeronautical Radio of Thailand Ltd.	auttaphud.se@aerothai.co.th;	✓	✓
	39.	Mr. Pongpob Mongkolpiyathana	Executive Air Traffic Systems Engineer, AEROTHAI, Aeronautical Radio of Thailand Ltd.	pongpob.mo@aerothai.co.th;	✓	✓
	40.	Mr. Napatra Chuepan	Officer, Civil Aviation Authority of Thailand (CAAT)	napatra.c@caat.or.th;	✓	✓
	41.	Mr. Chaiwat Saekhw	Officer, The Civil Aviation Authority of Thailand	chaiwat.s@caat.or.th;	✓	✓
	42.	Mr. Dudsadee Sungthong	Executive ATFM Officer, AEROTHAI, Aeronautical Radio of Thailand Ltd.	shart3035@gmail.com;	✓	✓

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	STATE/NAME		TITLE/ORGANIZATION	E-MAIL	ATTENDANCE	
	43.	Ms. Vanatta Noipan	Senior Officer, The Civil Aviation Authority of Thailand	vanatta.n@caat.or.th;	✓	✓
13.	USA (1)					
	44.	Mr. Daniel Jacob	Senior Foreign Affairs Specialist, Asia Pacific Federal Aviation Administration	daniel.jacob@faa.gov;	✓	✓
14.	VIET NAM (3)					
	45.	Mr. Hung Phan Ba	Deputy Director of AMC, Aviation Meteorological Centre (AMC)- VATM	hungphb@yahoo.com;	✓	✓
	46.	Ms. Linh Tran Hoang	Official, Viet Nam Air Traffic Management Corporation (VATM)	hoanglinhqlb@gmail.com;	✓	✓
	47.	Ms. Tran Thi Khanh Huong	Manager of Tansonnhat Aviation Meteorology Center, Viet Nam Air Traffic Management Corporation (VATM)	khanhhuong@vatm.vn;	✓	✓
15.	IATA (2)					
	48.	Mr. John Moore	Assistant Director, Safety & Flight Operations, ASPAC, International Air Transport Association (IATA)	moorej@iata.org;	✓	✓
	49.	Mr. Chee Seng Seow	Senior Manager TRP, Singapore Airlines	cheeseng_seow@singaporeair.com.sg;	✓	✓
16.	IFATCA (1)					
	50.	Mr. John Wagstaff	Representative IFATCA-Asia and Pacific	john.wags@gmail.com;	✓	
17.	ICAO (5)					

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	STATE/NAME		TITLE/ORGANIZATION	E-MAIL	ATTENDANCE	
	51.	Mr. Peter Dunda	Regional Officer MET International Civil Aviation Organization Asia and Pacific Office	PDunda@icao.int	✓	✓
	52.	Mr. Shane Sumner	Regional Officer, Air Traffic Management ICAO Asia and Pacific Regional Office	ssumner@icao.int;	✓	
	53.	Mr. Hiroyuki Takata	Regional Officer, Air Traffic Management ICAO Asia and Pacific Regional Office	htakata@icao.int;	✓	✓
	54.	Ms. Prakayphet Chalayonnawin	Programme Analysis Associate Air Traffic Management, ICAO	pchalayonnawin@icao.int;	✓	
	55.	Ms. Varapan Meefuengsart	Programme Assistant International Civil Aviation Organization Asia and Pacific Office	vmeeфуengsart@icao.int;	✓	✓

LIST OF PAPERS AND PRESENTATIONS

WORKING PAPERS			
Agenda Item	WP No.	Title	Presented by
1	WP/01	PROVISIONAL AGENDA	Secretariat
1	WP/02	FOLLOW-UP ACTION FROM MET/R WG/11	Secretariat
1	WP/03	FOLLOW-UP ACTION FROM MET SG/26	Secretariat
1	WP/04	FOLLOW-UP ACTION FROM APANPIRG/33	Secretariat
4	WP/05	EVIEW MET/R WG WORK PROGRAM AND TERMS OF REFERENCE	Secretariat
4	WP/06	PROPOSALS FOR THE AMENDMENT OF ICAO ANNEX 3	Secretariat
3	WP/07	SURVEY OF STATE METEOROLOGICAL INFORMATION SUPPORTING AIR TRAFFIC MANAGEMENT	Ad hoc group
4	WP/08	AVIATION RESEARCH AND DEVELOPMENT PROJECT PHASE 2 (AvRDP-2)	Hong Kong, China
4	WP/09	DIURNAL WIND VARIATION STUDY FOR RUNWAY CAPACITY OPTIMIZATION AT HONG KONG INTERNATIONAL AIRPORT	Hong Kong, China
3	WP/10	FOLLOW-UP ACTION FROM ATFM/SG/13	Secretariat
3	WP/11	UPDATING APAC REGIONAL GUIDANCE FOR TAILORED MET INFORMATION AND SERVICES TO SUPPORT ATM OPERATIONS	Ad hoc group
4	WP/12	APAC USE CASES AND USER REQUIREMENTS FOR SWIM-BASED MET INFORMATION SERVICES SUPPORTING ATFM	Ad hoc group
5	WP/13	WORK PLAN DELIVERABLE 5 – IMPROVEMENTS TO THE APAC ANP VOLUME III	Secretariat

INFORMATION PAPERS			
Agenda Item	IP No.	Title	Presented by
1	IP/01	MEETING BULLETIN	Secretariat
4	IP/02	METEOROLOGICAL SERVICES RELATED TO TROPICAL CYCLONES FOR INTEGRATED AIRPORT CENTRE OF HONG KONG INTERNATIONAL AIRPORT	Hong Kong, China

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4	IP/03	IMPROVEMENT OF IMPACT-BASED METEOROLOGICAL INFORMATION TO SUPPORT ATM OPERATION – ADVERSE WEATHER IN AIRSPACE	Japan
4	IP/04	COLLABORATIVE DECISION-MAKING BETWEEN THE AUSTRALIAN BUREAU OF METEOROLOGY, AIRSERVICES AUSTRALIA AND OTHER ATM STAKEHOLDERS	Australia
4	IP/05	ATM-TAILORED MET SERVICES STATUS IN THE REPUBLIC OF KOREA	Republic of Korea
3	IP/06	THE IMPLEMENTATION EXAMPLE FROM NORTH CHINA FOR TAILORED METEOROLOGICAL INFORMATION AND SERVICES TO SUPPORT AIR TRAFFIC MANAGEMENT OPERATIONS	China

PRESENTATIONS

Topic No.	SP No.	Title	Presented by
1	SP/01	REVIEW OF 2022 MET/ATM WEBINAR - DEVELOPMENT OF MET SERVICES TO BETTER MEET ATM REQUIREMENTS	Secretariat
1	SP/02	ICAO ANNEX 3 AMENDMENT	Secretariat
1	SP/03	MET REQUIREMENTS IN REGIONAL FRAMEWORK FOR COLLABORATIVE ATFM	Secretariat
2	SP/04	IMPROVEMENT OF IMPACT-BASED METEOROLOGICAL INFORMATION TO SUPPORT ATM OPERATION – ADVERSE WEATHER IN AIRSPACE	Japan
2	SP/05	DIURNAL WIND VARIATION STUDY FOR RUNWAY CAPACITY OPTIMIZATION AT HONG KONG INTERNATIONAL AIRPORT	Hong Kong, China
2	SP/06	THREE-HOURLY UPDATES OF TAF FOR HONG KONG INTERNATIONAL AIRPORT	Hong Kong, China
2	SP/07	MET SUPPORT FOR THE RUNWAY CONDITION REPORT SYSTEM	Hong Kong, China
2	SP/08	SURVEY OF STATE MET INFORMATION SUPPORTING ATM	Ad-hoc Group

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PRESENTATIONS

Topic No.	SP No.	Title	Presented by
3	SP/09	SPACE WEATHER INFORMATION SERVICE	Australia
3	SP/10	SPACE WEATHER EXERCISE– 19 AND 26 OCT 2022	Australia
3	SP/11	NARAHG – ATFM AND MET COLLABORATION TO MANAGE THE IMPACT OF TYPHOONS	China, Japan and Republic of Korea
3	SP/12	STATE OF AVIATION POST-COVID 19	IATA
3	SP/13	CAN WE DO BETTER?	IFATCA
2	SP/14	REVIEW OF MET/ATM SEMINAR	Chairperson
