INTERNATIONAL CIVIL AVIATION ORGANISATION

REPORT OF THE TWELFTH MEETING OF THE METEOROLOGICAL SERVICES WORKING GROUP (MET/S WG/12)

(Online, 30 March – 01 April 2022)

The views expressed in this Report are those of the Meeting and not the Organization

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

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HISTORY OF THE MEETING

1. Dates and venue

1.1. The ICAO Asia and Pacific (APAC) Regional Office hosted the Twelfth Meeting of the Meteorological Services Working Group (MET/S WG/12) online from 30 March to 01 April 2022.

1.2. The first day of the Meeting, 30 March 2022, included a conjoint session with the Twentieth Meeting of the Meteorological Information Exchange Working Group (MET/IE WG/20) to jointly discuss agenda items relevant to both the MET/IE WG and MET/S WG.

2. Attendance

2.1. One hundred and thirty-eight (138) participants registered their attendance at the Meeting from twenty-five (25) States/Administrative Regions and two (2) International Organizations, including Australia, Bangladesh, Bhutan, Cambodia, China, Cook Islands, Fiji, Hong Kong China, India, Indonesia, Japan, Lao People's Democratic Republic, Malaysia, Maldives, Mongolia, New Zealand, Pakistan, Philippines, Republic of Korea, Singapore, Solomon Islands, Sri Lanka, Thailand, United States, Viet Nam and IFALPA and ICAO. The list of participants is in **Appendix D** to the Report.

3. Officers and Secretariat

3.1. Ms Paula Acethorp, Chief Meteorological Officer, Civil Aviation Authority of New Zealand, presided as Chair of the Meeting, following the election of Chairperson in agenda item 1.

3.2. Mr Chan Pak Wai, Assistant Director, Hong Kong Observatory, Hong Kong China, and Chair of the Meteorology Sub-Group (MET SG) presided as Chair of the Meeting from the opening session (of MET/S WG/12) to the election of Chairperson in agenda item 1.

3.3. Mr Tim Hailes, National Manager, Transport Customer Engagement, Bureau of Meteorology, Australia, and Chair of the MET/IE WG, presided as Chair of the Meeting for the conjoint session (of MET/IE WG/20 and MET/S WG/12).

3.4. 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 three (3) WPs and two (2) IPs in the conjoint session between MET/IE WG/20 and MET/S WG/12 on the first day, and nine (9) Working Papers (WPs) and twelve (12) Information Papers (IPs) in the final two days of the Meeting. The list of papers is in **Appendix E** of this Report.

5. Outcomes

5.1. The Meeting recorded outcomes of its discussions in the form of Draft Conclusions (for further consideration by the Meteorology Sub-group (MET SG)) within the following definition:

a) **Draft Conclusions:** formulated by the MET/S WG for further consideration by the Meteorology Sub-group (MET SG), deal with matters of a technical nature and regional

applicability that, according to the MET SG's terms of reference, require the attention of States, or action by the ICAO, following established APANPIRG procedures.

5.2. The Meeting formulated the following (1) Draft Conclusion:

Draft Conclusion MET/S WG/12/01: *Updating the online repository on SIGMET Coordination and the consolidation document on SIGMET Coordination Practices in the APAC region*

That, States be invited to provide regular updates to the online repository on SIGMET Coordination and the consolidation document on SIGMET Coordination practices in the APAC region (using the contact details provided in the documents) to contribute to the ad-hoc group on SIGMET coordination in developing further guidance for enhancement of SIGMET coordination in the Region by gathering lessons learnt from existing SIGMET coordination activities to facilitate more efficient and better coordinated SIGMET service to meet aviation users' expectations and operational requirements in the Region.

5.3. In addition, the Meeting agreed to five (5) new action items, including one (1) from the conjoint session, as indicated throughout the *Report on Agenda Items* below and presented in the *List of Actions* in **Appendix A** to this Report.

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REPORT ON AGENDA ITEMS – CONJOINT SESSION OF MET/IE WG/20 AND MET/S WG/12

1. Volcanic ash advisory centre (VAAC) backup tests

IP/C01 – UPDATE TO WASHINGTON VAAC BACKUP PROCEDURES (United States)

1.1. On 01 November 2021, VAAC Washington changed its backup procedures such that VAACs Montreal and Darwin are now the primary backup centres for VAAC Washington. VAAC Montreal will monitor the United States (except for Alaska), Mexico, the Caribbean, and parts of the Pacific and the Atlantic Ocean during backup operations. VAAC Darwin will monitor Central America and northern South America, including the Galapagos Islands, parts of the Pacific Ocean, and the Marianas Islands.

1.2. If the VAACs Montreal or Darwin could not provide backup support, the U.S. Air Force 557th Weather Wing (557WW) would take over backup operations[*] for VAAC Washington.

1.3. The Chair of MET/IE WG suggested MET/IE WG considers the possibility of using the information from IP/C01 to supplement the *APAC VAAC Backup Procedures* (in the *APAC Regional SIGMET Guide*, Appendix G).

1.4. Considering the guidelines[†] recommend that VAACs test the backup arrangements annually, the Meeting requested VAAC Darwin to coordinate a proposal to supplement the *VAAC Backup Test Procedures* in the Appendices of the *APAC Regional SIGMET Guide* with information on the backup arrangement with VAACs Washington and Montreal. **[MET/IE WG/20 – ACTION 13]**

IP/C02 – VAAC DARWIN AND VAAC WELLINGTON BACKUP TEST (Australia/New Zealand)

1.5. Following the guidelines (mentioned above), VAACs Darwin and Wellington completed a backup test on 01 December 2021. Airways New Zealand assisted with disseminating the test message from VAAC Wellington as an interim solution pending required system changes at VAAC Wellington. The VAACs coordinated the backup test using the Microsoft Teams chat application (which, in operational scenarios, had proved to be a helpful tool).

1.6. Confirmation emails were received from only a limited number of the expected backup test message recipient operational units. These included the VAAC Washington, Regional OPMET Data Bank (RODB) Bangkok, and Meteorological Watch Offices (MWOs) located in Fiji, Sri Lanka and Vietnam.

1.7. When the (abovementioned) VAAC Wellington system changes are complete, VAACs Darwin and Wellington will conduct a follow-up backup test. In addition, the VAACs will develop procedures to disseminate backup test messages to the recipient operational units without AFTN[‡] access, such as State volcano observatories, and endeavour to notify States early to facilitate their participation in the backup tests.

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[*] Following the guidelines in ICAO Doc 9766 – *Handbook on the International Airways volcano watch (IAVW) Operational Procedures and Contact List*, Second Edition, 2004, Appendix D, *Backup Procedures for VAACs*

[†] ICAO Doc 9766, Appendix D, part f)

[‡] Aeronautical Fixed Telecommunication Network

2. SIGMET tests

WP/C01 – REVIEW OF WS SIGMET TEST 2021 (Singapore)

2.1. The member from Singapore (as the APAC WS[§] SIGMET test focal point) presented results from the 2021 APAC WS SIGMET Test, conducted on 22 December 2021.

2.2. Regarding the rate of participation by States in 2021, the WS SIGMET test result was 79%, i.e., equivalent to the 2020 WS SIGMET test result. Twenty-nine (29) participating States were expected in 2021, and six (6) States did not participate, namely: Afghanistan, Maldives[1], Myanmar[2], Nauru, Papua New Guinea and Philippines[3]. *Notes: [1]refer to paragraph 2.8 (below) for further discussion; [2]refer to paragraphs 2.22 to 2.23 (below) for further discussion; and [3]refer to paragraphs 2.6 to 2.7 (below) for further discussion.*

2.3. Regarding the rate of issuance of WS SIGMET test messages in 2021, the WS SIGMET test result was 86%, i.e., lower than the 2020 WS SIGMET test result of 89%. Forty-nine (49) SIGMET test messages were expected in 2021; the number of SIGMET test messages MWOs issued was forty-two (42).

2.4. Regarding the rate of reception of WS SIGMET test messages in 2021, the WS SIGMET test result was 97%, i.e., slightly higher than the 2020 WS SIGMET test result of 96%. MWOs issued forty-two (42) SIGMET test messages in 2021; the number of SIGMET test messages received by the participating RODBs and ROC was, on average, forty-one (41).

2.5. The member from Australia informed the Meeting that SIGMET test data from MWO Melbourne was missing (from the results in WP/C01) due to an internal procedural error [at the MWO], which Australia had since identified and resolved. Therefore, Australia anticipated full participation of its MWOs in future SIGMET tests.

2.6. The Member from Philippines informed the Meeting that MWO Manila could not participate in the 2021 SIGMET tests due to an internal technical issue that Philippines was still resolving. Philippines sent an email about the above problem to ICAO.

2.7. Furthermore, OPMET data from Philippines were temporarily disseminated internationally through an arrangement with the Hong Kong Observatory; thus, the OPMET data were disseminated without interruption.

2.8. The Member from Maldives informed the Meeting that MWO Male missed the 2021 SIGMET tests but confirmed that the MWO Male was operating without interruption [to its services] and will participate in future SIGMET tests.

WP/C02 – RESULTS OF SIGMET TESTS 2021 – WC and WV (Japan)

2.9. The member from Japan (as the APAC WC[**] and WV[††] SIGMET test focal point) presented results from the 2021 APAC WC and WV SIGMET Tests conducted on 08 and 15 December 2021, respectively.

2.10. In the 2021 APAC WC and WV SIGMET Tests, advisory test messages were issued as anticipated by the following five (5) Tropical Cyclone Advisory Centres (TCACs): Nadi, New Delhi,

[§] SIGMET for phenomena other than volcanic ash cloud or tropical cyclone
[**] SIGMET for tropical cyclone
[††] SIGMET for volcanic ash cloud

Reunion, Tokyo and Honolulu, and the following six (6) VAACs: Anchorage, Darwin, Toulouse, Tokyo, Washington and Wellington.

2.11. Regarding the rate of issuance of WC and WV SIGMET test messages in 2021, the WC and WV SIGMET test results were 76% and 86%, respectively; i.e., lower than the 2020 WC and WV SIGMET test results of 82% and 91%, respectively. Fifty (50) and fifty-six (56) WC and WV SIGMET test messages, respectively, were expected to be issued in 2021; the number of WC and WV SIGMET test messages MWOs issued was thirty-eight (38) and forty-eight (48), respectively.

2.12. In 2021, the following five (5) APAC States did not issue WC SIGMET test messages: Maldives[1], Myanmar[2], Nauru, Papua New Guinea and Philippines[3]. In addition, the following eight (8) APAC States did not issue WV SIGMET test messages: Afghanistan, Bangladesh, Maldives[1], Mongolia, Myanmar[2], Nauru, Papua New Guinea and Philippines[3]. *Notes:* [1]*refer to paragraph 2.8 (above) for further discussion;* [2]*refer to paragraphs 2.22 to 2.23 (below) for further discussion; and* [3]*refer to paragraphs 2.6 to 2.7 (above) for further discussion.*

2.13. In 2021, thirteen (13) of the WC or WV SIGMET test messages (issued by MWOs with areas of responsibility within the APAC Region) contained errors. According to the detailed table in WP/C02 (Appendices 5 and 6, refer), the errors occurred in the SIGMET test message "priority indicator" or in specific elements of the "(WMO[‡‡]) abbreviated heading", i.e., the time group, data type indicator, bulletin number and location indicator.

2.14. The member from New Zealand informed the Meeting that participation by MWO Tahiti (French Polynesia) in the SIGMET tests had facilitated the identification and rectification of issues concerning message routing and internal systems, which had prevented MWO Tahiti from receiving some advisory messages. In addition, French Polynesia sent an email about the above matter to ICAO.

2.15. The Chair MET/IE WG reminded the Meeting that during the APAC Region SIGMET tests, the procedures require an MWO to issue a SIGMET test message even when the MWO does not receive the expected advisory test message from its associated TCAC or VAAC. Furthermore, ICAO Annex 3 – *Meteorological Service for International Air Navigation* (Tables A2-1, A2-2, A2-3 and A6-1A) enables MWOs and advisory centres to issue test messages at any time; in addition to the Region-wide tests. Therefore, States can perform individual SIGMET tests as needed, e.g. when making changes to or resolving issues in their systems. *Note: refer to paragraph 2.20 (below, under WP/C03) for further discussion*

2.16. The Meeting noted that the results presented in WP/C02, Appendix 2, identified States that did not participate in the last two APAC Region SIGMET tests (2020 and 2021). The Meeting considered this information helped identify States that may need some assistance regarding SIGMET issuance. *Note: refer to paragraphs 2.22 to 2.26 (below, under WP/C03) for further discussion.*

2.17. In discussing the inclusion of MWOs not located in the APAC Region, the Meeting requested the Secretariat to cross-check the ICAO APAC *SIGMET Test Procedures* against the information in the legacy FASID[§§] Tables MET 3A – *Tropical Cyclone Advisory Centres* and 3B – *Volcanic Ash Advisory Centres*. **[MET/IE WG/20 – ACTION 14]**

2.18. The Chair MET/IE WG recommended the MET/IE WG consider how to incorporate (in the APAC Region SIGMET tests) the dissemination of SIGMET and advisory messages in the ICAO Meteorological Information Exchange Model (IWXXM) form. The Meeting agreed to the recommendation and requested that MET/IE WG and MET/S WG designate an ad hoc group[***] to

[‡‡] World Meteorological Organization
[§§] (Air Navigation Plan) Facilities and Services Implementation Document
[***] In alphabetical order: Christy, Marco, Kentaro, Paula [Rapporteur]

develop a proposal to update the *SIGMET Test Procedures* accordingly. **[MET/IE WG/20 – ACTION 15]**

WP/C03 – APPLICATION OF MET DEFICIENCY IDENTIFICATION METHODOLOGY TO 2021 ANNUAL SIGMET TESTS (New Zealand)

2.19. Following the discussion at MET SG/25 on air-navigation deficiencies in the MET field (Report of MET SG/25, paragraphs 4.5 and 4.11, refer), a methodology has been applied using the 2021 ICAO APAC SIGMET test results to identify issues in SIGMET information. The method helped identify issues concerning the coding and dissemination of SIGMET- and advisory- test messages and opportunities for MWOs, TCACs and VAACs concerned to resolve the deficiencies in SIGMET test messages and where applicable, operational SIGMET messages.

2.20. WP/C03 reaffirmed the value of SIGMET tests, either periodically or whenever SIGMET issuance systems are upgraded or changed, in helping to identify and eliminate errors in SIGMET service.

2.21. Additional outcomes from the above activity included suggestions for improving (a) the *SIGMET test procedures*; regarding the SIGMET heading time group (GGgg) and the association between MWOs and TCACs/VAACs, and (b) the presentation of SIGMET test results; regarding MWOs not in the APAC region and MWOs associated with more than one TCAC or VAAC.

2.22. Regarding the non-participation of some States in the 2021 APAC Region SIGMET tests, as noted in WP/C03 (in the table in paragraph 2.5), the Meeting was informed that an MWO concerned did not receive from ICAO the letter on the subject *Schedule for SIGMET tests in the ICAO Asia and Pacific Region – 2021*.

2.23. Given the discussion above, the Meeting requested the Secretariat follow up with Myanmar on the appropriate addressing of letters from ICAO inviting participation in SIGMET tests. **[MET/IE WG/20 – ACTION 16]**

2.24. In addition, the Meeting requested the Secretariat to submit a paper to MET SG requesting States to provide up to date contact information for letters from ICAO requesting the States to participate in SIGMET tests. **[MET/IE WG/20 – ACTION 17]**

2.25. The Meeting noted the corrective actions suggested in WP/C03 to resolve issues identified in the SIGMET test results as presented in WP/C01 and WP/C02 required the involvement of the MET/S WG ad hoc group on MET deficiencies. Therefore, the Meeting requested the Secretariat coordinate with the ad hoc group to prepare the ICAO letter advising States of SIGMET test deficiencies. **[MET/S WG/12 – ACTION 01]**

2.26. The Meeting considered that the MET/IE WG and MET/S WG should continue to monitor the non-participation of States in the APAC Region SIGMET tests as part of the WG's post-analysis activities that support the States' corrective actions.

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(assisted by Humphrey), Pierre and Tim

REPORT ON AGENDA ITEMS – MET/S WG/12

1. Organisational matters

WP/01 – Provisional Agenda (Secretariat)

1.1. The Meeting adopted the agenda as listed below:

Conjoint session of MET/IE WG/20 and MET/S WG/12 (30 March 2022)
Agenda Item 1: Volcanic ash advisory centre (VAAC) backup tests
Agenda Item 2: SIGMET tests

MET/S WG/12 (31 March – 01 April 2022)
Agenda Item 1: Organisational matters (including the election of Chairperson)
Agenda Item 2: Review of follow-up from previous meetings
Agenda Item 3: Planning and implementation of meteorological services
Agenda Item 4: Quality management of meteorological services
Agenda Item 5: Deficiencies in the provision of meteorological services
Agenda Item 6: Guidance and education related to the provision of meteorological services
Agenda Item 7: Future work programme and terms of reference
Agenda Item 8: Any other business
Agenda Item 9: Next Meeting

Order of discussion (Secretariat)

1.2. In response to suggestions from some participants, the Meeting decided to move the discussion on the following papers to agenda item 3:

IP/06 – VAAC DARWIN MANAGEMENT REPORT (Australia)
IP/07 – VAAC TOKYO MANAGEMENT REPORT (Japan)
IP/08 – VAAC WELLINGTON MANAGEMENT REPORT (New Zealand)
WP/08 – PROGRESS OF THE AD HOC GROUP ON SIGMET COORDINATION (Ad hoc group)

Election of Chairperson (presiding Chair and Secretariat)

1.3. The presiding Chair, Mr Chan Pak Wai, informed the Meeting that he would hand over his role as Chair of the MET/S WG to concentrate on his responsibilities as the newly elected Chair of the MET SG. The participants congratulated Mr Chan Pak Wai and expressed their appreciation for his leadership and achievements as Chair of the MET/S WG.

1.4. The Meeting elected Ms Paula Acethorp as the new Chair of the MET/S WG. The participants congratulated Ms Acethorp and expressed their appreciation for her acceptance of the role. Ms Acethorp then presided as Chair of the Meeting.

2. Review of follow-up from previous meetings

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

2.1. The Secretariat presented the follow-up status on the *List of Actions* from MET/S WG/11, including the unresolved action items from the MET/S WG previous meetings.

2.2. The Chair noted that the Secretariat had published WP/02 in the week before the Meeting, limiting the participants' time to consider updates to the follow-up status on the *List of Actions*, as proposed in the paper. Furthermore, the updated MET/S WG terms of reference document requests that the Secretariat publish meeting papers fourteen days or more before the Meeting.

2.3. Regarding the unresolved action items included in the *List of Actions* in Appendix A to WP/02 and recorded by MET/IE WG/18 and MET/S WG/10 as action items No. 11, 13, 14, 15, 19 and 20, the Chair MET/IE WG reminded the Meeting that the MET/IE WG was monitoring the progress. Therefore, the Meeting agreed to remove these from the list of unresolved action items to be monitored by MET/S WG.

2.4. Updated action items' status, agreed upon by the Meeting, are provided in the *List of Actions* in **Appendix A** to the Report.

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

2.5. The Secretariat presented the status of follow-up action on outcomes from the Twenty-Fifth Meeting of the Meteorology Sub-group (MET SG/25), including The Conclusions and Decisions adopted by MET SG/25 in Appendix B to WP/03 and the MET SG/25 action items in Appendix C to WP/03.

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

2.7. In addition, the Meeting noted that MET/IE WG/20 agreed on action for the Secretariat to follow up with Australia concerning possible opportunities to combine the above ICAO event with Australia's plan to run a Space Weather Exercise in 2022.

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

2.8. The Secretariat presented the status of follow-up action (in Appendix A to WP/04) on the Conclusions and Decision of the Thirty-Second Meeting of the Asia and Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/32), which related to the work plan of MET SG and MET/S WG.

2.9. In addition, to address concerns reported by MET SG/25 about the negative impact of delayed Secretariat actions on the MET work plan, the Secretariat is considering the possibility of advertising for the secondment of an Aviation Meteorology subject matter expert to supplement the Secretariat resources for the APANPIRG MET-related work.

2.10. Concerning Draft-Conclusion MET SG/25-07: *SWIM architecture to enable the cost-effective and efficient provision and consumption of MET information services* (not discussed in WP/04), the Secretariat informed the Meeting that APANPIRG/32 did not adopt the Conclusion. The Report of MET/IE WG/20 contains further discussion.

2.11. Furthermore, the Chair MET/IE WG reminded the Meeting that the MET community was underrepresented in the ICAO APAC SWIM/TF participation. He strongly encouraged the Meeting to ensure States' MET service providers participate in future meetings of the SWIM/TF and contribute essential input to SWIM/TF outcomes related to meteorological information for international air navigation.

3. Planning and implementation of meteorological services

IP/06 – VAAC DARWIN MANAGEMENT REPORT (Australia)

3.1. The IAVW Management Report for VAAC Darwin covering 1 July 2021 to 31 January 2022 was presented in Appendix A to IP/06, providing detailed information on current VAAC Darwin activities, including significant changes in operation, training and development, and stakeholder collaboration and engagement.

3.2. VAAC Darwin issued 642 volcanic ash advisories for several volcanoes, including four "high impact" events. The response to the extensive, high altitude, westward-moving volcanic ash cloud generated by the (15 January 2022) Mt Hunga Tonga-Hunga Ha'apai eruption included coordinating the transfer of responsibilities for the volcanic ash advisories between the neighbouring VAACs Wellington, Darwin and Toulouse.

3.3. Regarding the backup procedures to be used in case of interruption of the operation of a VAAC, following the establishment of new arrangements commencing 1 November 2021, VAAC Darwin, in collaboration with VAAC Montreal, will provide backup service for VAAC Washington.

3.4. VAACs Darwin and Wellington strengthened their collaboration on operational processes and procedures, including volcanic ash dispersion models, advisories and forecasts, and backup services and exercises. In addition, VAACs Darwin and Wellington conducted a volcanic ash exercise in Solomon Islands on 30 September 2021 and one month of SIGMET monitoring to support Solomon Islands with resolving the APANPIRG air navigation deficiency (AP-MET-23) concerning SIGMET provision.

IP/07 – VAAC TOKYO MANAGEMENT REPORT (Japan)

3.5. The IAVW Management Report for VAAC Tokyo covering 1 February 2021 to 28 February 2022 was presented in IP/07. The report provides detailed information on VAAC Tokyo activities, including significant volcanic eruptions and operational and technical changes, VAAC backup arrangements, and planned VAAC developments.

3.6. VAAC Tokyo issued 2822 volcanic ash advisories for 18 volcanoes, including 1636 volcanic ash advisories for the "Suwanosejima" volcano eruption. As a result, some volcanic ash events affected aviation operators using the Northern Pacific (NOPAC) and Pacific Organized Track System (PACOTS) routes. The "Fukutoku-Oka-No-Ba" volcano eruption (which began on 12 August 2021) generated a high altitude volcanic ash cloud, which required the VAAC Tokyo to liaise with the Japan Civil Aviation Bureau Air Traffic Control and civil airlines concerning impacts on air routes. In addition, VAAC Tokyo issued volcanic ash advisory test messages as part of the ICAO APAC SIGMET test in December 2021 and a VAAC system update in March 2021.

3.7. In November 2020, the Japan Meteorological Agency moved its headquarters to a new location, including the VAAC Tokyo. Accordingly, Japan has requested a corresponding revision of the VAAC Tokyo contact details in the ICAO (Doc 9766) *Handbook on the International Airways Volcano Watch (IAVW) Operational Procedures and Contact List*.

3.8. Updates to the volcanic ash advisory distribution system used by VAAC Tokyo will enable the dissemination of advisory information in the IWXXM form from the end of March 2022.

3.9. Regarding the backup procedures to be used in case of interruption of a VAAC, VAAC Tokyo performed backup operations on behalf of VAAC Darwin on 27 April 2021. However, on this occasion, no volcanic ash advisories were issued.

IP/08 – VAAC WELLINGTON MANAGEMENT REPORT (New Zealand)

3.10. The IAVW Management Report for VAAC Wellington covering 1 July 2021 to 31 January 2022 was presented in IP/08. The report provides detailed information on VAAC Wellington activities.

3.11. VAAC Wellington issued 129 volcanic ash advisories, including 79 in response to the "Hunga Tonga-Hunga Ha'apai" volcano eruptions on 20 December 2021, 14 January 2022 and 15 January 2022. In addition, the very significant, high altitude volcanic ash cloud generated on 15 January 2022 required close collaboration between the VAACs Wellington and Darwin to issue 17 volcanic ash advisories. In addition, the above total included nine (9) advisory messages concerning VAAC backup, SIGMET tests or volcanic ash exercises.

3.12. Following a review of the "Whakaari-White Island" volcano eruption in September 2021 and recommendations from the volcanic ash exercise VOLCEX 19/01, New Zealand implemented changes in volcanic ash events for issuing the initial, Annex 3 compliant SIGMET.

3.13. VAAC Wellington has been assisting Tonga with resolving the APANPIRG air navigation deficiency (AP-MET-17) concerning information on volcanic activity. During the "Hunga Tonga-Hunga Ha'apai" volcano eruptions, Tonga issued around 53 VONA messages.

3.14. As discussed in IP/06, VAACs Wellington and Darwin conducted a volcanic ash exercise in Solomon Islands on 30 September 2021 to support Solomon Islands with resolving the long-standing deficiency concerning SIGMET provision. In addition, the two VAACs conducted an annual backup test on 1 December 2021, as discussed in IP/C02.

WP/05 – RECENT PROGRESS OF INTERNATIONAL COOPERATION SCHEME ON COLLABORATIVE SIGMET ISSUANCE (CSI) (Japan, Lao PDR, Myanmar, Philippines, Thailand and Vietnam)

3.15. WP/05 presents the recent progress of the international cooperation scheme of the Collaborative SIGMET Issuance (CSI), including outcomes of the CSI workshop held in January 2022. In the workshop, it was agreed to suggest conducting a further survey for users in the Region for more efficient SIGMET coordination regarding relevant issues such as acceptable differences of SIGMETs and encourage tool providers for SIGMET coordination to discuss improving the convenience of utilising multiple web platforms.

3.16. The Meeting noted the progress made by the international cooperation scheme of the Collaborative SIGMET Issuance (CSI), including outcomes of the CSI workshop held in January 2022, which discussed:

- WC SIGMET Handover
- Expansion of SIGMET coordination
- Dealing with the increased workload on forecasters due to the expansion of SIGMET coordination
- Acceptable differences between SIGMETs and further survey

3.17. The Meeting noted the following two proposals regarding issues identified in the CSI workshop:

- Conducting a further survey for a wide range of users in the Region for more efficient SIGMET coordination regarding relevant issues such as acceptable differences of SIGMETs.
- Encouraging tool providers for SIGMET coordination to discuss feasible solutions to improve the convenience of utilising multiple web platforms.

3.18. Concerning the proposal for a survey on SIGMET coordination, including relevant issues such as the acceptable difference between SIGMET, the Meeting participants suggested that the CSI participants and MET/S WG ad hoc group on SIGMET Coordination collaborate on this initiative. *[Note: further discussion on this matter in WP/08, below]*

3.19. The Meeting heard from some members that for MWOs involved in more than one SIGMET coordination scheme, ensuring harmonised SIGMET information could be challenging when moving between the different SIGMET coordination platforms. However, the Meeting noted that tool providers for SIGMET coordination agreed to discuss a feasible solution to improve the convenience of utilising multiple web platforms.

3.20. The Meeting noted that the CSI participants reconfirmed the importance of their MWOs coordinating SIGMET with the neighbouring MWO Phnom Penh in Cambodia. Therefore, the Meeting encouraged the States concerned to seek opportunities to enhance the SIGMET coordination with Cambodia.

WP/08 – PROGRESS OF THE AD HOC GROUP ON SIGMET COORDINATION (Ad hoc group)

3.21. The Meeting noted the progress of the ad hoc group on SIGMET Coordination, which comprises members from China, Fiji, India, Indonesia, Malaysia, Thailand, Vietnam and IFALPA, with members from Hong Kong, China, Japan and Singapore as the joint rapporteurs.

3.22. The Meeting commended the ad hoc group on developing an online repository of SIGMET coordination activities to facilitate information sharing by States on the various SIGMET coordination activities in the APAC Region. Noting it would be a living document, the Meeting requested the Secretariat publish the link to the online repository on the ICAO APAC Office website. **[MET/S WG/12 – ACTION 02]**

3.23. The Meeting also commended the ad hoc group on developing the document titled *Consolidation of SIGMET Coordination Practices in the APAC Region*, which summarises the local practices adopted by MWOs. Furthermore, the ad hoc group proposes a meaning for "consensus" based on what users would consider the maximum acceptable difference in the context of harmonised SIGMET. In this regard, the Meeting heard that some States would provide further inputs to supplement the information contained in the document.

3.24. The Meeting noted that the information contained in Appendix B in WP/08 on the consolidation of SIGMET coordination practices in the APAC Region, with further development, would be suitable for inclusion in the *APAC Regional SIGMET Guide* in conjunction with the *Guidelines for Operational SIGMET Coordination*.

3.25. To further develop the guidance material presented in Appendix A and B in WP/08, the Meeting formulated the following Draft Conclusion:

Draft Conclusion MET/S WG/12/01: *Updating the online repository on SIGMET Coordination and the consolidation document on SIGMET Coordination Practices in the APAC region*

That, States be invited to provide regular updates to the online repository on SIGMET Coordination and the consolidation document on SIGMET Coordination practices in the APAC region (using the contact details provided in the documents) to contribute to the ad-hoc group on SIGMET coordination in developing further guidance for enhancement of SIGMET coordination in the Region by gathering lessons learnt from existing SIGMET coordination activities to facilitate more efficient and better coordinated SIGMET service to meet aviation users' expectations and operational requirements in the Region.

IP/02 – UPDATE ON THE SOUTH AND SOUTH-EASTERN ASIA SIGMET COORDINATION PROJECT (Hong Kong, China, India, Indonesia and Sri Lanka)

3.26. The Meeting noted the progress and updates of the South and South-eastern Asia SIGMET Coordination project, which has since expanded to cover six flight information regions, with India joining Indonesia and Sri Lanka in the project in 2021. The project achieved an increase of 280% in the total number of coordination cases in 2021 compared with 2020 due to the transition of the project to operational status and covering more FIRs.

IP/03 – MEKONG SIGMET COORDINATION (Cambodia, Hong Kong, China, Thailand and Viet Nam)

3.27. The Meeting noted the setup of the Mekong SIGMET Coordination between Cambodia, Thailand and Viet Nam in August 2020 with round-the-clock coordination. Review meetings were conducted and allowed effective communication among the Meteorological Watch Offices (MWOs). In addition, the display of real-time observational data on the SIGMET Coordination web platform made available by the Hong Kong Observatory has raised the common-situational awareness among MWOs. These cooperative efforts made the coordination process more accessible and more effective.

IP/04 – SIGMET COORDINATION UPDATES IN INDONESIA (Indonesia)

3.28. Indonesia has participated in SIGMET coordination activities with neighbouring States, including Singapore and Malaysia (Southeast Asia Operational SIGMET Coordination Project, August 2017), Sri Lanka and India (South and Southeast Asia SIGMET Coordination Project, December 2019 trial phase and operation in February 2021), Australia (trials in November 2018 and March-August 2021), Philippines (January 2022 trial) and United States/Honolulu (March 2022 trial).

3.29. In addition to the benefits provided by the coordination activities to both the users and providers of SIGMET, the use of several different communication platforms in the various SIGMET coordination activities presents workload challenges for the meteorological personnel providing service for international air navigation. Therefore, a standard, single communication platform for SIGMET coordination would be preferred.

IP/10 – MET SERVICES SUPPORT HIGH EFFICIENCY OF AIR TRAFFIC MANAGEMENT IN SOUTHWEST CHINA (China)

3.30. Meteorological information provided under the Civil Aviation Administration of China's (CAAC) Massive Delay Response System (MDRS) is designed to support the pre-tactical and tactical phases of Air Traffic Flow Management (ATFM) and Air Traffic Control (ATC) operations.

3.31. In the pre-tactical phase, the provision of MET information with up to 30 hours of lead time and close collaboration of MET personnel in ATFM decision making has led to improvement in the performance of the MDRS during the 2021 thunderstorm season.

3.32. In the tactical phase, the provision of MET information with up to 6-12 hours of lead time and detailed advice on adverse weather affecting aircraft operations promotes a shared situational awareness contributing to more efficient ATM operations.

IP/05 – CHANGING PHNOM PENH FIR LOCATION INDICATOR (Cambodia)

3.33. In 2020, Cambodia's State Secretariat of Civil Aviation (SSCA) proposed an amendment to the ICAO Location Indicators (Doc 7910) to change the location indicator for Phnom Penh FIR from VDPP to VDPF. Accordingly, the SSCA amended the AIP to reflect the above change (Cambodia AIP AMDT 2/20, dated 27 March 2020, refers). In addition, consequential amendments are now required to the references to the Phnom Penh FIR location indicator in the ICAO APAC Regional SIGMET Guide.

3.34. The Meeting noted the ANP was not yet amended to reflect the change in location indicator for Phnom Penh FIR from VDPP to VDPF. Therefore, the Meeting requested the Secretariat coordinate with Cambodia the consequential proposals for amendment to the ANP and other Regional Guidance accordingly. **[MET/S WG/12 – ACTION 03]**

IP/12 – WIND SHEAR PREDICTION SYSTEM IN THE REPUBLIC OF KOREA (Republic of Korea)

3.35. The Republic of Korea has developed a wind shear prediction system to provide information on the expected existence of wind shear, which could adversely affect aircraft between runway level and 2000 ft above that level at and surrounding its airports. The system provides the predictions with up to 48-72 hours of lead time.

4. Quality **management of meteorological services**

4.1. No discussion under this item.

5. Deficiencies in the provision of meteorological services

WP/06 – REVIEW OF AIR NAVIGATION DEFICIENCIES IN THE MET FIELD (Secretariat)

5.1. As endorsed by APANPIRG/32, the current list of air navigation deficiencies contains thirteen (13) open deficiencies in the MET field. The MET deficiencies are related to facilities and services in seven (7) APAC States, as listed in **Table 1** below:

Table 1: Summary of APANPIRG air navigation deficiencies in the MET field

MET facilities and services	Asia/Pacific States	Def. ID	Status
Aerodrome meteorological observations or reports	Kiribati Nauru	AP-MET-02 AP-MET-21	open open
Meteorological watch office (MWO) or SIGMET information	Democratic Peoples' Republic of Korea Nauru Nepal Papua New Guinea Papua New Guinea Solomon Islands	AP-MET-16 AP-MET-24 AP-MET-14 AP-MET-08 AP-MET-22 AP-MET-23	open open open open open open
Volcanic ash/activity information	Papua New Guinea Tonga	AP-MET-04 AP-MET-17	open open
WAFS forecasts or flight briefings	Kiribati Nauru	AP-MET-18 AP-MET-19	open open

MET facilities and services	Asia/Pacific States	Def. ID	Status
	Solomon Islands	AP-MET-20	open

5.2. A detailed copy of the APANPIRG *Reporting Form on Air Navigation Deficiencies* in the MET field, which includes detailed notes appended to the *form*, is provided in **Appendix C** to this Report.

5.3. The Chair informed the Meeting that the PIAWS Panel continues to work with the States concerned and will prepare a progress report for submission to MET SG/26. In addition, Tonga will also prepare a progress report for submission to MET SG/26 on the deficiency AP-MET-17.

IP/11 – ACTION WORK PLAN TO ADDRESS SIGMET DEFICIENCIES IN THE PROVISION OF METEOROLOGICAL SERVICES FOR HONIARA FIR IN SOLOMON ISLANDS (Solomon Islands)

5.4. Regarding the APANPIRG air navigation deficiency AP-MET-23, concerning the provision of SIGMET information for Honiara FIR, the participant from Solomon Islands provided updates on the corrective action to resolve the deficiency. Per the action agreed by MET SG/25 (Action No. 25/10, refers), MWO Honiara, RODB Brisbane and ROC Wellington monitored the SIGMET messages issued by Solomon Islands for 30 days commencing 1 March 2022.

5.5. In addition, the participant from Solomon Islands informed the Meeting that Solomon Islands would prepare updates on the corrective action taken at the end of April 2022. The Secretariat will then coordinate with Solomon Islands the action[†††] regarding reporting the resolution of the deficiency AP-MET-23.

5.6. Solomon Islands had also successfully participated in the 2021 ICAO APAC SIGMET tests. The participant from Solomon Islands reiterated the helpfulness towards resolving SIGMET-related deficiencies of participating in the APAC SIGMET tests.

6. Guidance and education related to the provision of meteorological services

WP/07 – UPDATES TO THE ASIA/PACIFIC SIGMET GUIDE (Indonesia)

6.1. Indonesia has responsibility for providing meteorological services in two FIRs: Jakarta and Ujung Pandang. The location indicators for FIR Jakarta and FIR Ujung Pandang were changed in ICAO Doc. 7910/182. As a result, the location indicator for FIR Jakarta changed from WIIZ to WIIF and for FIR Ujung Pandang from WAAZ to WAAF.

6.2. However, the ICAO APAC Regional SIGMET Guide, Appendix D, *WMO Headings (WMO AHL) for SIGMET Bulletins*, currently refers to FIR Jakarta and FIR Ujung Pandang using the (no longer valid) location indicators WIIZ and WAAZ, respectively. Therefore, the SIGMET Guide requires a consequential amendment to realign with the changes in ICAO Doc 7910/182.

6.3. In addition, Indonesia will initiate a necessary consequential amendment to the references to FIR Jakarta and FIR Ujung Pandang in the ICAO APAC Regional Air Navigation Plan (ANP), Volume II, Table MET II-1 – *Meteorological Watch Offices*, in a separate Proposal for Amendment (PfA) to be submitted to the ICAO APAC office.

6.4. Given the discussion above, the Meeting noted that the Secretariat would coordinate with Indonesia on the necessary proposal for amendment of the ANP (Table MET II-1 – *Meteorological*

[†††] MET SG/25 Report, Action No. 25/10 and 25/11, refer

Watch Offices) and requested the Secretariat to include the changes to the location indicators for Jakarta and Ujung Pandang FIRs from WIIZ to WIIF and WAAZ to WAAF, respectively, in the *APAC Regional SIGMET Guide*, Appendix D. **[MET/S WG/12 – ACTION 04]**

IP/09 – NEW ZEALAND SYSTEM ASSESSMENT LESSONS ON SPACE WEATHER (SWX) EDUCATION (New Zealand)

6.5. The New Zealand Government's New Southern Sky (NSS) Programme aims to modernise the national airspace system of New Zealand. Two significant changes under the NSS are the implementation of Performance Based Navigation (PBN) and Automatic Dependent Surveillance-Broadcast (ADS-B). Both changes involve an increasing dependence on the Global Navigation Satellite System (GNSS) and the Global Positioning System (GPS).

6.6. To assess the NSS's mitigation of potential disruptions to the GNSS and GPS, New Zealand conducted a series of simulation exercises, including a simulated impact of a space weather phenomenon (i.e., solar storm) on GNSS-based navigation and surveillance. The exercises, involving qualified specialists from diverse aviation disciplines, highlighted the need for stakeholders to improve (a) their awareness of the impact of space weather on navigation and surveillance systems and (b) their ability to interpret the ICAO space weather advisory messages.

6.7. The ICAO (Doc 10100) *Manual on Space Weather Information in Support of International Air Navigation* provides guidance on the practices to be applied in the provision, reception and use of information on space weather phenomena affecting international air navigation. In addition, the following web resources provide helpful information on the space weather impacts and advisory services:

- Australian Government Bureau of Meteorology (Knowledge Centre)
  - http://www.bom.gov.au/aviation/data/education/space-weather.pdf
  - http://www.bom.gov.au/aviation/data/education/space-wx-advisories.pdf

- United Kingdom Civil Aviation Authority (Publications)
  - https://publicapps.caa.co.uk/docs/33/CAP1428%20Issue2%20OCT2020.pdf

6.8. The member from Australia suggested that, in addition to related outcomes from the (APANPIRG) Conclusion APANPIRG/32/13 and MET SG/25 action item 25/13, users in States would benefit from more education material or activities on the SWX service. The Meeting requested delegating an ad hoc group to investigate further possible education opportunities for the APAC region. **[MET/S WG/12 – ACTION 05]**

7. Future work program and terms of reference

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

7.1. The Secretariat presented the MET/S WG terms of reference and work plan document in Appendix A to WP/09.

7.2. In addition, the Secretariat reminded the Meeting about the related action concerning a review of the consistency in terminology and reporting format of the working groups (Decision MET SG/25-02 refers).

7.3. The Meeting proposed some updates to the terms of reference and work plan document as follows:

- Membership details of the group
- Improvements to the objective statement in the terms of reference
- Revised date for activity 4.1
- Membership of the ad hoc group on deficiencies
- Activity 4.2 completed
- Revised Activity 8 (8.1-8.3)

7.4. The updates to the MET/S WG terms of reference and work program as agreed upon by the Meeting are indicated in **Appendix B** to the Report.

8. Any other business

8.1. No discussion under this item.

9. Next Meeting

9.1. Following the MET/IE WG/20 proposals, the Meeting proposed the following (tentative) dates (TBC) for the next Meeting of the MET/S WG:

- **22** or **29 March 2023** – Conjoint session of MET/IE WG/21 and MET/S WG/13
- **23-24** or **30-31 March 2023** – MET/S WG/13

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APPENDIX A

MET/S WG – LIST OF ACTIONS

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

New action items recorded by MET/S WG/12

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/ REMARKS
MET/S WG/12 **01**	Prepare and disseminate the ICAO letter advising States of SIGMET test deficiencies. *[Ref: Report of Conjoint Session of MET/IE WG/20 and MET/S WG/12, para. 2.25.]*	Before the next SIGMET test	Secretariat, in coordination with the ad hoc group (on AN deficiencies)	
MET/S WG/12 **02**	Publish the link to the *online repository of SIGMET coordination activities* on the ICAO APAC Office website. *[Ref: Report of MET/S WG/12, para. 3.22.]*	Before MET SG/26	Secretariat	
MET/S WG/12 **03**	Prepare and process proposals for amendment to the ANP and other Regional Guidance to reflect the change in Phnom Penh FIR's location indicator from VDPP to VDPF. *[Ref: Report of MET/S WG/12, para. 3.34.]*	Before MET SG/26	Secretariat, in coordination with participants from Cambodia	
MET/S WG/12 **04**	Prepare and process proposals for amendment to the ANP (Table MET II-1 – Meteorological Watch Offices) and the APAC Regional SIGMET Guide, Appendix D, to reflect the changes in Jakarta and Ujung Pandang FIR's location indicators from WIIZ to WIIF and WAAZ to WAAF, respectively. *[Ref: Report of MET/S WG/12, para. 6.4.]*	Before MET SG/26	Secretariat, in coordination with participants from Indonesia	
MET/S WG/12 **05**	Delegate an ad hoc group to investigate further opportunities for educating users on the ICAO SWX service (e.g., education material or activities). *[Ref: Report of MET/S WG/12, para. 6.8.]*	Before MET SG/26	Secretariat and Chair	

Unresolved action items recorded by the conjoint session of MET/IE WG/19 and MET/S WG/11

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/ REMARKS
01	State letter request to user States to ensure the relevant operational units participate in the VAAC back-up tests and provide the VAACs with their current, valid AFTN addresses for receipt of the VAA messages.*[Ref: para. 1.1.-1.3., MET/IE WG/19 and MET/S WG/11 conjoint session]*	Before next scheduled test	Australia, New Zealand, Secretariat	TO COMMENCE
02	Investigate possible improvements to the template for the SIGMET test summary table to enable a more detailed analysis of the SIGMET tests, including analysis of more than one WC and/or WV SIGMET test message issued by the same MWO (which receives TCA and/or VAA from more than one TCAC and/or VAAC). *[Ref: para. 2.16., MET/IE WG/19 and MET/S WG/11 conjoint session]*	Before next scheduled test	SIGMET test Focal Points, Secretariat	TO COMMENCE

Unresolved action items recorded by MET/S WG/11

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/
02	State letter to: a) Inform States of the need to prepare for the proposed WAFS and SADIS changes planned for November 2023; and b) Invite States to inform ICAO of any need for related technical assistance. *[Ref: para. 2.15., MET/S WG/11]*	Before MET SG/26 ~~MET SG/25~~	Secretariat	IN PROGRESS; Ref: Decision MET SG/24-07
04	Continue to develop the proposed guidance for possible inclusion in the APAC Regional SIGMET Guide on SIGMET issuance where volcanic ash is forecast to cross FIR boundaries, taking into consideration the need for input from the end user community and consider global coordination with ICAO regions. *[Ref: para. 6.2.-6.3., MET/S WG/11]*	Before MET SG/26 ~~MET SG/25~~	Ad hoc group	IN PROGRESS

Unresolved action items recorded by MET/IE WG/18 and MET/S WG/10

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILTY	STATUS/ REMARKS
	Terms of Reference and Work Program			
01	**Terms of Reference and Work Program – online coordination:** Make use of regular online coordination meetings to facilitate progress on follow-up on the action items in the Task List/s [Ref: para. 2.3. and 7.3.]	As necessary	Secretariat and WG Chairs and members	IN PROGRESS
	OPMET Monitoring			
07	**OPMET performance indices – States' follow-up:** Inform States concerned of the locations with low performance indices and advise the States to take appropriate corrective actions; address the above communication also the Regional OPMET Centres (ROCs) responsible for the collection of OPMET messages from the originating stations [Ref: para. 3.4. and 3.5.]	Before MET SG/26 ~~Sep 2020~~	Secretariat	IN PROGRESS; Ref: MET/IE WG, 5. Work Plan, Activity 1 and Activity 2
	Regional Guidance Materials			
21	**ANP updates – State Volcano Observatories:** Designate an ad-hoc group consisting of the Secretariat and members from the VAACs and RODBs to identify the APAC States with active or potential active volcanoes, which do not have a designated State volcano observatory listed in the APAC ANP, Vol I, Table MET I-1; conduct the necessary coordination to facilitate the States concerned with the designation of a State volcano observatory and listing it in the APAC ANP; coordinate the action above with the development of a comprehensive proposal for amendment of the ANP to reflect APAC States' current requirements for State volcano observatories [Ref: para. 4.17., 8.3. and 8.4.]	Before MET SG/26~~24~~	MET/S WG and Secretariat	IN PROGRESS; Amendment of ANP still pending
	SIGMET test			
28	**SIGMET test results – corrective action plan:** Investigate the reason for the reduced reception of SIGMET test messages at Regional OPMET Centre (ROC) London compared to APAC RODB's and share the results with MET/S for potential corrective action [Ref: para. 6.12.]	Before MET SG/26~~24~~	MET/IE WG	IN PROGRESS; Ref: MET/IE WG, 5. Work Plan, Activity 3 AND Ref: MET/S WG, 5. Work Plan, Activity 3
	Other			
30	**VAAC back-up test procedures – review and update:** Refer to the pertinent information from IP/08 and determine appropriate action for the next review and update of the VAAC back-up test procedures [Ref: para. 8.25.]	Before MET SG/26~~24~~	MET/IE WG and MET/S WG	IN PROGRESS; Ref: MET/IE WG, 5. Work Plan, Activity 4
31	**Special air-reports – promoting issuance of:** Continue to coordinate the required follow-up action (outstanding action item no. 8) concerning promoting the issuance of special air-reports; publicise by way of State letter (and/or other channels) the importance of exchanging special air-reports between airlines, ATS units and MWOs (and aerodrome meteorological offices) [Ref: para. 7.2. and 8.21.]	Before MET SG/26~~24~~	Secretariat	IN PROGRESS; Ref: Action Item MET/R WG 9/1; Webinar on Special Air-Reports, 17 June 2021
32	**Air navigation deficiencies – resolution of:** Continue to support States, as necessary, such as Nepal, with developing and implementing their corrective action plans for the resolution of air navigation deficiencies [Ref: para. 9.4.]	Before MET SG/26~~24~~	Secretariat	IN PROGRESS; Ref: MET/S WG, 5. Work Plan, Activity 6
33	**WAFS and SADIS – preparation for proposed changes:** Develop appropriate actions in the work program to facilitate States' awareness of and planning for the proposed (WP/25) WAFS and SADIS changes in November 2023 [Ref: para. 10.5.]	Before MET SG/26~~24~~	MET/S WG	IN PROGRESS

Unresolved action items recorded by MET/S WG/09

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/ REMARKS
9/5	Submit a proposal to MET/SG/23 for further review and possible adoption of the proposed update to the Asia/Pacific Regional SIGMET Guide developed by the designated ad-hoc group, incorporating the consequential changes identified by the meeting arising from the following:	Before MET SG/26	Designated ad-hoc group and Secretariat	IN PROGRESS; Amendment of ANP Vol. II still pending

ACTION ITEM	DESCRIPTION	BY DATE	RESPONSIBILITY	STATUS/ REMARKS
	i. Development of MWO Phnom Penh in Cambodia (MET/IE WG/17 – WP/03, Appendix II, refers); ii. Proposals made by Australia in relation to WV SIGMET (MET/IE WG/17 – MET/ S WG/9 – WP/C4, para. 3.1, (b) and (c), refers); and iii. Introduction of space weather advisory information (MET/IE WG/17 – WP/05, para. 3.1 (c), refers). *[Report of MET/S WG/9, para. 6.8 – 6.9, refers]*	~~17 June 2019~~		

APPENDIX B

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

TERMS OF REFERENCE AND WORK PLAN

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

TERMS OF REFERENCE

1. MEMBERSHIP – The MET/S WG comprises experts provided by States, International Organizations and bodies and organizations having experience in the provision of aeronautical meteorological services.		
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2. DESCRIPTION	
Objective	Improve the availability, timeliness and quality of meteorological services, in particular, observations, forecasts, advisories and warnings, and facilitate the implementation of new meteorological services ~~– including facilitating implementation of the International Airways Volcano Watch (IAVW) and International Tropical Cyclone Watch (ITCW)~~ –in support of the global air navigation plan framework and the aviation system block upgrade (ASBUs) methodology.
Benefits	Improve the safety and efficiency of flight and ground operations.
Functions of the group	Under guidance from ICAO APAC MET Secretariat: a) Promote the implementation of meteorological services, in particular, observations, forecasts, advisories and warnings, in support of the aviation system block upgrades (ASBUs), System Wide Information Management (SWIM), MET support to Air Traffic Management, etc.; b) Promote the requirement for, and benefits of, QMS for MET services and competency of aeronautical meteorological personnel; c) Maintain awareness of and identify new meteorological deficiencies and formulate strategies to resolve these deficiencies; d) Continually seek ways to improve the quality, compliance against SARPs and operational effectiveness of the meteorological services; Monitor the implementation and use of products and services under the framework of the World Area Forecast System (WAFS), the International Airway Volcano Watch (IAVW) and the International Tropical Cyclone Watch (ITCW); e) Monitor the relevant activities of the MET Panel and appropriate bodies; f) Monitor the relevant activities of VOLCEX/SG; and g) Provide advice and report to the MET Sub-group on the above issues for further coordination through the ICAO Secretariat with other appropriate bodies.
Work Programme	The work to be addressed by the ASIA/PAC MET/S WG includes: • Review procedures for the issuance of meteorological observations, forecasts, advisories and warnings in the region and propose actions for their improvement to related performance objectives; • In conjunction with MET/IE WG, investigate the deficiencies in the format and dissemination of meteorological observations, forecasts, advisories and warnings and propose remediation plans; • Respond to the needs of the guidance and training related to the implementation of meteorological observations, forecasts, advisories and warnings and inform MET/IE WG of changes required to the SIGMET

2. DESCRIPTION	
	guide; • In conjunction with MET/R WG and to support the ASBUs, provide meteorological input for operational planning for specific phenomena, including volcanic ash cloud, radioactive cloud, tropical cyclone, tsunami and space weather; • Follow the developments in the States related to the improvement of meteorological observations, forecasts, advisories and warnings and provide regional input on these matters to relevant ICAO and WMO groups and gather user requirements from ANSPs, IATA, IFATCA and IFALPA; • Investigate options for rectification of air navigation deficiencies in the field of meteorological services in the APAC States; • Provide support for the ICAO APAC volcanic ash exercises; • Report on its work to the MET Sub-group of APANPIRG; and • Maintain a link to the Regional ATM Contingency Plan through the ATM SG.

3. COMMUNICATION STRATEGIES				
Description	**Target Audience**	**Delivery Method**	**Frequency/ Date**	**Responsibility**
Interim Work Programme Progress Report	MET/S WG Members	Email and web-conference	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
Major Work Programme Progress Report	MET/S WG Members	Working Paper (MET/S WG meeting)	Annually/published 14-days or more before the meeting	Chair and Secretariat
General correspondence	MET/S WG Members	Email	As required	MET/S WG Members
New, specific proposal for action (WP)	MET/S WG Meeting	Working Paper (MET/S WG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	MET/S WG Members or States
New, specific information (IP)	MET/S WG Meeting	Information Paper (MET/S WG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	MET/S WG Members or States
Working Group Meeting Report	MET/S WG Members and all APAC States	MET/S WG Meeting Report	Annually/published 21-days or less after the meeting	Chair and Secretariat
Working Group Progress Report	MET SG Meeting	Working Paper (MET SG meeting)	Annually/submitted 28-days or more before the meeting (published 14-days or more before the meeting)	Chair and Secretariat

WORK PROGRAM

Activity	Time Frame	Responsibility	Status
Activity 1: Monitor and provide assistance to the regional implementation of meteorological observations, forecasts, warnings and advisories	2022-2023 ~~2020-2021~~	MET/S WG	In progress
Activity 2: Track and investigate deficiencies in the format and dissemination of meteorological observations, forecasts, warnings and advisories and propose corrective action and provide information to ICAO and WMO groups for possible assistance	2022-2023 ~~2020-2021~~	MET/S WG and MET/IE WG	In progress
Activity 3: Review WC, WV & WS SIGMET test results and implement improvements.	2022-2023 ~~2020-2021~~	MET/S WG	In progress
Activity 4: Provide guidance and/or training related to the implementation of meteorological observations, forecasts, warnings and advisories, including input to the Regional SIGMET Guide as they relate to the Annex 3 amendment cycle and SIGMET tests.	2022-2023 ~~2020-2021~~	R/O, MET/S WG and MET/IE WG	In progress
Activity 5: Provide input into regional-operational plans as required for specific phenomenon, including VA, radioactive cloud, TC, Tsunami and Space Weather, with consideration to global ICAO groups and WMO developments.	2022-2023 ~~2020-2021~~	MET/S WG and MET/R WG	In progress
Activity 6: Investigate, and implement as appropriate, options to assist States in resolving air navigation deficiencies in the field of meteorological service.	2022-2023 ~~2020-2021~~	MET/S WG	In progress
Activity 7: Cost recovery – assist the PMC with development of an effective cost recovery strategy for the Pacific SIDS.	2022-2023 ~~2020-2021~~	MET/S WG	To commence
Activity 8: SIGMET coordination	2022-2023 ~~2020-2021~~	MET/S WG	In progress

5. WORK PLAN				
Activity / Milestone	**Accountability**	**Predecessors**	**Date**	**Status**
Activity 3: Review SIGMET test results and implement improvements				
Activity 3.1: Review SIGMET tests (conjoint session with MET/IE WG)	MET/S WG	-	Annually Mar	
Activity 3.2: Develop action plan to fix identified deficiencies	MET/S WG	3.1	Annually Mar	
Activity 3.3: Report back to MET SG on regional performance and action plan	Chair	3.2	Annually May	
Activity 3.4: Advise States of SIGMET deficiencies	Secretariat	3.3	Annually Jun	
Milestone 3***:*** *Improved issuance and compliance of SIGMETs*	MET/S WG	3.4	*Annually*	
Activity 4: GUIDANCE AND EDUCATIONAL MATERIAL				
Activity 4.1: Review the regional SIGMET Guide in coordination with the other ICAO Regions to be in line with Amendment 81 to Annex 3	MET/S WG Australia (rapporteur), Hong Kong China, Japan, and Singapore, in conjunction with Secretariat		~~2023~~ 2024	
Activity 4.2: develop proposals for SIGMET Guide updates to include guidance relevant to SIGMET information in IWXXM form	Australia (rapporteur), Hong Kong China, Japan, and Singapore, in conjunction with Secretariat		2022 ~~2021~~	
Activity 4.3: Develop and implement a plan to educate MET service providers and aviation users on the new ICAO SWX provisions – based on SWXC coordination group (METP)	Secretary		2022 ~~2021~~	
Activity 4.4: Develop proposal to amend the ROBEX Handbook to facilitate the exchange of routine TAF for locations where States issue routine TAF every three hours instead of the recommended practice of every six hours [Report of MET/S WG/8, paragraph 3.5 refers].	Chair, Secretariat and State/s concerned		As advised by State/s concerned	
Activity 4.5: Develop proposal to amend ANP Volume III to clarify MET-related implementation planning guidance.	Chair, Secretariat		2022 ~~2021~~	
Milestone 4: Guidance and educational material available	MET/S WG		*TBD*	
Activity 6 – Air Navigation Deficiencies				
Activity 6.1: Assist the ICAO Secretariat with the following: a) Define a process, based on the APANPIRG Procedural Handbook, for identifying, analysing, removing and proposing MET Deficiencies; b) Develop templates to be used for Deficiency Corrective Action Plans (CAP), Progress Reports and Final Reports; c) Develop thresholds for Deficiencies based on OPMET Monitoring performance indicators and SIGMET testing; d) Review the analysis of the annual, and any ad hoc, OPMET Monitoring, and SIGMET Tests against agreed thresholds; e) Identify deficiencies from the OPMET Monitoring and SIGMET Test analysis, along with other tests and exercises, mission reports, analysis of differences against ICAO provisions, aircraft accident and incident reports and reports provided by users of air navigation services; f) Work with States concerned to develop a CAP, arrange for testing and monitoring and assist with the reporting to ICAO on the resolution of air navigation deficiencies; and g) Report recommended updates to MET Deficiencies, through MET/S WG, to MET SG.	Paula ACETHORP (Rapporteur) Secretariat CHEONG Wee Kiong Jarrad DENMAN Mike GRAF Keiko ITO Christy Y.Y. LEUNG Sujin PROMDUANG THAM Yap Fung Kentaro TSUBOI	4.1	Ongoing	

Activity 6.2: Monitor the implementation of the solution/s to remove deficiencies.	MET/S WG	4.2	Ongoing	
Activity 6.3: Monitor global development on the establishment of a hazardous weather information system.	MET/S WG		Ongoing	
Activity 6.4: Report progress to MET SG	Secretariat	4.3	Ongoing	
Milestone 6: Reduction in air navigation deficiencies.	MET/S WG		2022 ~~2021~~	
Activity 7 – Cost recovery strategy				
Activity 7.1: Cost recovery – assist the PMC with development of an effective cost recovery strategy for the Pacific SIDS.	Secretariat		2022 ~~2021~~	
Activity 8 – SIGMET coordination activities in APAC Region Coordinate on the next steps to promote integration and expansion of SIGMET coordination activities among States/Administrations.				
~~Activity 8.1 Consolidated progress report on SIGMET coordination activities in the APAC Region and recommendations based on lessons learnt:~~ ~~- new and existing SIGMET coordination activities - WP (MET/R WG) and SP (MET/ATM Seminar) MET/IE WG and MET/S WG~~ ~~- key lessons learnt/recommendations for regional guidance on SIGMET coordination~~ ~~- identify opportunities for integration and expansion of SIGMET coordination activities~~ Activity 8.1 Update the online repository on SIGMET coordination activities in the APAC Region. Activity 8.2 Enrich the consolidation document of SIGMET Coordination practices with further inputs from States and update the SIGMET coordination guidance in the Regional SIGMET Guide. Activity 8.3 Review, organise and support surveys on user requirements of SIGMET coordination.	Ad-hoc group: Japan, Singapore, Hong Kong China, (Joint Rapporteurs) China, Indonesia, Malaysia, India, Viet Nam, Thailand, Fiji and IFALPA, coordinated by the Chairperson and Secretary		2022-2023	

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APPENDIX C

APANPIRG REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION

Notes:

i. Extracted from APANPIRG/32, Appendix D to the Report on Agenda Item 4

ii. Updates endorsed by APANPIRG/32 shows deleted text using strikeout (~~text to be deleted~~), and added text with grey shading (text to be inserted).

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ Facilities** (Index No.)	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
MWO and SIGMET service (Annex 3: Chapter 3, 3.4 and Chapter 7)	**Democratic Peoples' Republic of Korea** (DPRK) (AP-MET-16)	Requirements for MWO and SIGMET service not established for Pyongyang FIR	2008	Reported by ICAO Regional Office mission	Establish MWO to provide required service, including SIGMET information for Phnom Penh FIR. **See notes below for more information.**	GACA, Democratic Peoples' Republic of Korea	TBC	A

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ Facilities** (Index No.)	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Meteorological observations and reports. (Annex 3: Chapter 4)	**Kiribati** (AP-MET-02)	METAR from Kiribati not available on regular basis.	1998	Reported by airlines	Equipment to be installed and arrangements to be made for regular observations and reports, including: training of personnel; maintenance of equipment; calibration and verification of meteorological observations; and proper/secure transmission of data. **See notes below for more information.**	State designated MET authority	TBC	A

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ Facilities** (Index No.)	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Meteorological information for operators and flight crew members, including forecasts provided by the WAFCs (Annex 3: Chapter 9)	**Kiribati** (AP-MET-18)	WAFC forecasts not available for inclusion in flight briefings and documentation	2008	Reported by TCB CAEMSA-SP Technical Expert	Implement procedures and systems for the required meteorological information to be supplied to operators and flight crew members, including forecasts generated from the digital forecasts provided by the WAFCs. **See notes below for more information.**	State designated MET authority	TBC	U
Meteorological information for operators and flight crew members, including forecasts provided by the WAFCs (Annex 3: Chapter 9)	**Nauru** (AP-MET-19)	WAFC forecasts not available for inclusion in flight briefings and documentation	2008	Reported by TCB CAEMSA-SP Technical Expert	Implement procedures and systems for the required meteorological information to be supplied to operators and flight crew members, including forecasts generated from the digital forecasts provided by the WAFCs. **See notes below for more information.**	State designated MET authority	TBC	U

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ Facilities** (Index No.)	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Meteorological observations and reports. (Annex 3: Chapter 4)	**Nauru** (AP-MET-21)	METAR/SPECI service not provided	2008	Reported by TCB CAEMSA-SP Technical Expert	Equipment to be installed and arrangements to be made for regular observations and reports, including: training of personnel; maintenance of equipment; calibration and verification of meteorological observations; and proper/secure transmission of data. **See notes below for more information.**	State designated MET authority	TBC	U
Provision of SIGMET information (Annex 3, Chapter 7)	**Nauru** (AP-MET-24)	Lack of SIGMET issued for the Nauru FIR.	Sep 2011	IATA deemed this situation unsafe and unacceptable to airline operations.	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. **See notes below for more information.**	State designated MET authority	TBC	U
Provision of SIGMET information (Annex 3: Chapter 7)	**Nepal** (AP-MET-14)	Requirements for issuance and dissemination of SIGMET information for Kathmandu FIR have not been fully implemented	2000		Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. **See notes below for more information.**	State designated MET authority	TBC	A
Reporting of information on volcanic eruptions to civil aviation units. (Annex 3, 3.6, 4.8)	**Papua New Guinea** (AP-MET-04)	Information on volcanic activity not provided regularly to ATS units, MWOs and VAACs.	1995	Observed by States concerned. Reported at the WMO/ICAO Workshop on Volcanic Ash Hazards (Darwin, 1995)	Establish arrangements for State volcano observatories to send the required volcano observation information as quickly as practicable to the associated ACC/FIC, MWO and VAAC. **See notes below for more information.**	Rabaul Volcano Observatory, NWS and ASL of Papua New Guinea	TBC	A
Provision of SIGMET for volcanic ash (Annex 3: Chapter 7)	**Papua New Guinea** (AP-MET-08)	Requirements for issuance and proper dissemination of SIGMET for volcanic ash have not been fully implemented	Dec 2003	Reported by airlines, noted by Volcanic Ash Advisory Centres and confirmed by ICAO mission	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of volcanic ash. **See notes below for more information.**	NWS of Papua New Guinea	TBC	U

REPORTING FORM ON AIR NAVIGATION DEFICIENCIES IN THE MET FIELD IN THE ASIA/PAC REGION								
Identification		**Deficiencies**			**Corrective action**			
Requirements	**States/ Facilities** (Index No.)	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date for completion**	**Priority for action ***
Provision of SIGMET information (Annex 3, Chapter 7)	**Papua New Guinea** (AP-MET-22)	Lack of SIGMET issued for the Port Moresby FIR.	Sep 2011	IATA deemed this situation unsafe and unacceptable to airline operations.	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. **See notes below for more information.**	State designated MET authority	TBC	U
Meteorological information for operators and flight crew members, including forecasts provided by the WAFCs (Annex 3: Chapter 9)	**Solomon Islands** (AP-MET-20)	WAFC forecasts not available for inclusion in flight briefings and documentation	2008	Reported by TCB CAEMSA-SP Technical Expert	Implement procedures and systems for the required meteorological information to be supplied to operators and flight crew members, including forecasts generated from the digital forecasts provided by the WAFCs. **See notes below for more information.**	State designated MET authority	TBC	U
Provision of SIGMET information (Annex 3, Chapter 7)	**Solomon Islands** (AP-MET-23)	Lack of SIGMET issued for the Honiara FIRs.	Sep 2011	IATA deemed this situation unsafe and unacceptable to airline operations.	Implement procedures for SIGMET information to be issued by the designated meteorological watch office/s concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations. **See notes below for more information.**	State designated MET authority	TBC	U
Reporting of information on volcanic eruptions to civil aviation units. (Annex 3: 3.6, 4.8)	**Tonga** (AP-MET-17)	Information on volcanic activity not provided regularly to ATS units, MWOs and VAACs	2008	Reported by TCB CAEMSA-SP technical expert	Establish arrangements for State volcano observatories to send the required volcano observation information as quickly as practicable to the associated ACC/FIC, MWO and VAAC. **See notes below for more information.**	MOI and MEIDECC	TBC	U

NOTES:

Index No.	State	Update Date	NOTES ON <u>OPEN</u> DEFICIENCIES
AP-MET-02	Kiribati	September 2017	APANPIRG/28 noted that Kiribati should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.

Index No.	State	Update Date	NOTES ON OPEN DEFICIENCIES
AP-MET-04	Papua New Guinea	September 2017	APANPIRG/28 noted that Papua New Guinea should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-08	Papua New Guinea	September 2017	APANPIRG/28 noted that Papua New Guinea should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-14	Nepal	September 2017	APANPIRG/28 noted that Nepal should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-16	Democratic People's Republic of Korea	September 2017	APANPIRG/28 noted that DPRK should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-17	Tonga	10 May 2013	Ministry of Infrastructure (MOI), Civil Aviation Division, advised that: • MOU established between the national authority providing volcano monitoring (Ministry of Lands, Environment, Climate Change and Natural Resources – MLECCNR) and the national authority providing meteorological service for international air navigation (MOl) for the reporting of volcanic activity to the associated ACCs, MWOs and VAACs in accordance with the relevant ICAO SARPs.
		29 May 2017	MOI, Civil Aviation Division, advised that: • Relevant operating procedures implemented in the units concerned and case studies of real volcanic events presented as evidence of the State volcano observatory's issuance of the required volcano observation information.
		September 2017	APANPIRG/28 noted that: • Removal of the Deficiency from the open list is subject to the concurrence of the ATS units, MWOs and VAACs concerned that the Deficiency is resolved.
		June 2018	MET SG/22 noted that: • VAAC Wellington was coordinating with Tonga on the validation of corrective action taken to resolve the Deficiency.

Index No.	State	Update Date	NOTES ON OPEN DEFICIENCIES
AP-MET-18	Kiribati	September 2017	APANPIRG/28 noted that Kiribati should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-19	Nauru	September 2017	APANPIRG/28 noted that Nauru should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-20	Solomon Islands	September 2017 June 2019	APANPIRG/28 noted that Solomon Islands should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency. MET SG/23 requested the Secretary in conjunction with support from other States to provide Solomon Islands with assistance in preparing the full report on rectification of the Deficiency.
AP-MET-21	Nauru	September 2017	APANPIRG/28 noted that Nauru should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-22	Papua New Guinea	September 2017	APANPIRG/28 noted that Papua New Guinea should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.
AP-MET-23	Solomon Islands	September 2017 June 2019 October 2021	APANPIRG/28 noted that Solomon Islands should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency. MET SG/23 requested the Secretary in conjunction with support from other States to provide Solomon Islands with assistance in preparing the full report on rectification of the Deficiency. MET SG/25 requested the Solomon Islands, with assistance from its partner States, to conduct additional corrective action to enable the MET SG to confirm that Solomon Islands had fully resolved the Deficiency; maintain a log of all SIGMETs issued over at least one month to capture the operational WC-, WS- and WV-SIGMETs, plus any test WV-SIGMETs; pass the details [of the log] to the ad hoc group [on AN Deficiencies] to compare against SIGMETs received by RODB Brisbane [MET SG/25, Action No. 25/10]. Subject to Solomon Islands demonstrating resolution of the issues concerning content,

Index No.	State	Update Date	NOTES ON OPEN DEFICIENCIES
			format and timeliness of SIGMET information (as discussed in MET SG/25, WP/12) and sustainable provision of ICAO-compliant SIGMET service, MET SG would support the removal of Deficiency AP-MET-23 from the APANPIRG open list. Therefore, to facilitate the removal of the Deficiency from the open list, MET SG/25 requested the Secretariat coordinate with the Solomon Islands to report the resolution of the Deficiency to APANPIRG [MET SG/25, Action No. 25/11].
AP-MET-24	Nauru	September 2017	APANPIRG/28 noted that Nauru should: • Verify the status of implementation of CAP; and • Work together with ICAO to develop and properly record the remaining steps of the CAP to resolve the Deficiency.

Index No.	State	Update Date	NOTES ON CLOSED DEFICIENCIES
AP-MET-01	Solomon Islands	December 2020	Removed from the open list; APANPIRG/31 Conclusion 31/19, refers.
AP-MET-03	Indonesia	September 2017	Removed from the open list, APANPIRG/28 Conclusion 28/29 refers.
AP-MET-05	–	–	This Index No. is not used.
AP-MET-06	Indonesia	September 2017	Removed from the open list, APANPIRG/28 Conclusion 28/29 refers.
AP-MET-07	Philippines	November 2019	Removed from the open list, Conclusion APANPIRG/30/19, refers.
AP-MET-09	Cambodia	September 2018	Removed from the open list, APANPIRG/29 Decision 29/23 refers
AP-MET-10	–	–	This Index No. is not used.
AP-MET-11	Cambodia	September 2018	Removed from the open list, APANPIRG/29 Decision 29/24 refers

Index No.	State	Update Date	NOTES ON CLOSED DEFICIENCIES
AP-MET-12	Lao PDR	September 2018	Removed from the open list, APANPIRG/29 Decision 29/24 refers
AP-MET-13	–	–	This Index No. is not used.
AP-MET-15	–	–	This Index No. is not used.

Acronyms/Abbreviations/Definitions

ACC — Area control centre
ASL — Air Services Ltd.
ATS — Air traffic services
CAEMSA-SP — Cooperative Agreement for the Enhancement of Meteorological Services to Aviation - South Pacific
CAAP — Civil Aviation Authority Philippines
CAP — Corrective action plan
FIC — Flight information centre
FIR — Flight information region
GACA — General Administration of Civil Aviation
IATA — International Air Transport Association
MEIDECC — Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication
MET — Meteorological
METAR — Aerodrome routine meteorological report *(in meteorological code)*
MWO — Meteorological watch office
NWS — National Weather Service
PAGASA — Philippine Atmospheric, Geophysical and Astronomical Services Administration
PHIVOLCS — Philippine Institute of Volcanology and Seismology
SIGMET — Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations

Acronyms/Abbreviations/Definitions

SPECI — Aerodrome special meteorological report *(in meteorological code)*
SSCA — State Secretariat of Civil Aviation
TBC — To be confirmed
TCB — Technical Cooperation Bureau (of ICAO)
VAAC — Volcanic ash advisory centre
WAFC — World area forecast centre
WMO — World Meteorological Organization

APPENDIX D

LIST OF PARTICIPANTS

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9.		**INDIA (7)**		

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APPENDIX E

LIST OF PAPERS

WORKING PAPERS			
Agenda Item	**WP No.**	**Title**	**Presented by**
1	WP/01	PROVISIONAL AGENDA	Secretariat
2	WP/02	FOLLOW-UP ACTION FROM MET/S WG/11	Secretariat
2	WP/03	FOLLOW-UP ACTION FROM MET SG/25	Secretariat
2	WP/04	FOLLOW-UP ACTION FROM APANPIRG/32	Secretariat
3	WP/05	RECENT PROGRESS OF INTERNATIONAL COOPERATION SCHEME ON COLLABORATIVE SIGMET ISSUANCE (CSI)	Japan, Lao PDR, Myanmar, Philippines, Thailand and Vietnam
5	WP/06	REVIEW OF AIR NAVIGATION DEFICIENCIES IN THE MET FIELD	Secretariat
6	WP/07	UPDATES TO THE ASIA/PACIFIC SIGMET GUIDE	Indonesia
6	WP/08	PROGRESS OF THE AD HOC GROUP ON SIGMET COORDINATION	Ad hoc group
7	WP/09	REVIEW MET/S WG WORK PROGRAM AND TERMS OF REFERENCE	Secretariat
Conjoint session of MET/IE SG/20 and MET/S WG/12			
C2	WP/C01	REVIEW OF WS SIGMET TEST 2021	Singapore
C2	WP/C02	RESULTS OF SIGMET TESTS 2021 – WC and WV	Japan
C2	WP/C03	APPLICATION OF MET DEFICIENCY IDENTIFICATION METHODOLOGY TO 2021 ANNUAL SIGMET TESTS	New Zealand

INFORMATION PAPERS			
Agenda Item	**IP No.**	**Title**	**Presented by**
1	IP/01	MEETING BULLETIN	Secretariat
3	IP/02	UPDATE ON THE SOUTH AND SOUTH-EASTERN ASIA SIGMET COORDINATION PROJECT	Hong Kong China, India, Indonesia and Sri Lanka
3	IP/03	MEKONG SIGMET COORDINATION	Cambodia, Hong Kong China, Thailand and Viet Nam
3	IP/04	SIGMET COORDINATION UPDATES IN INDONESIA	Indonesia
3	IP/05	CHANGING PHNOM PENH FIR LOCATION INDICATOR	Cambodia

INFORMATION PAPERS			
Agenda Item	**IP No.**	**Title**	**Presented by**
6	IP/06	VAAC DARWIN MANAGEMENT REPORT	Australia
6	IP/07	VAAC TOKYO MANAGEMNET REPORT	Japan
6	IP/08	VAAC WELLINGTON MANAGEMENT REPORT	New Zealand
6	IP/09	NEW ZEALAND SYSTEM ASSESSMENT LESSONS ON SPACE WEATHER (SWX) EDUCATION	New Zealand
3	IP/10	MET SERVICES SUPPORT HIGH EFFICIENCY OF AIR TRAFFIC MANAGEMENT IN SOUTHWEST CHINA	China
5	IP/11	ACTION WORK PLAN TO ADDRESS SIGMET DEFICIENCIES IN THE PROVISION OF METEOROLOGICAL SERVICES FOR HONIARA FIR IN SOLOMON ISLANDS	Solomon Islands
3	IP/12	WIND SHEAR PREDICTION SYSTEM IN THE REPUBLIC OF KOREA	Republic of Korea
Conjoint session of MET/IE SG/20 and MET/S WG/12			
1	IP/C01	UPDATE TO WASHINGTON VAAC BACKUP PROCEDURES	United States
1	IP/C02	VAAC DARWIN AND VAAC WELLINGTON BACKUP TEST	Australia/New Zealand

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