International Civil Aviation Organization

WORKING PAPER

Asia and Pacific (APAC)
Thirteenth Meeting of the Meteorological Requirements Working Group (MET/R WG/13)

Bangkok, Thailand, 22 to 26 April 2024

Agenda Item 3: Collaboration between MET and ATM stakeholders

SIGMET COORDINATION COMMON PRACTICES AND GUIDELINES

(Presented by MET/R ad hoc group on SIGMET Coordination)

SUMMARY

This paper presents the identified common practices of SIGMET Coordination in the Asia/Pacific Region and proposes updates of related guidance materials.

1. INTRODUCTION

1.1 Under Amendment 79 to Annex 3, SIGMET Coordination has become a recommended practice on 5 November 2020:

> *3.4.4 Recommendation --- An MWO should coordinate SIGMET with neighbouring MWO(s), especially when the en-route weather phenomenon extends or is expected to extend beyond the MWO's specified area of responsibility, in order to ensure harmonized SIGMET provision.*

1.2 In 2020, an ad hoc group on SIGMET Coordination was formed at MET/S WG/10. The group members include China, Fiji, India, Indonesia, Malaysia, Thailand, Vietnam and IFALPA; while Hong Kong China, Japan and Singapore are the joint rapporteurs. Following the Decision MET SG/27-07 on the dissolution of MET/S WG, the ad hoc group on SIGMET coordination would be reporting to MET/R WG.

1.3 In ICAO MET/SG 27 in September 2023, the meeting tasked the ad hoc group to identify common SIGMET coordination practices from the document of cases of SIGMET coordination in MET SG/27 WP/11 and develop further the document to separate the procedural information, which could potentially be used to supplement to the Asia/Pacific Regional SIGMET Guide (Action Item MET SG/27-05).

1.4 This paper presents the latest progress on identifying common practices of SIGMET Coordination in the Asia/Pacific Region and a proposal on enhancing the related guidance in the Asia/Pacific Regional SIGMET Guide.

2. DISCUSSION

2.1 In section 2.7 of the Asia/Pacific Regional SIGMET Guide, it mentioned neighbouring MWOs should coordinate SIGMET provision in accordance with ICAO Annex 3 Recommendation and refers to guidelines on SIGMET coordination in Appendix L. Appendix L provides guidelines on the planning and operational implementation of SIGMET coordination, including how to formalize coordination arrangements and procedures, the key on having a common interface, communication protocols, and record of coordination, etc. However, it does not provide guidance on the operational procedures for SIGMETs issued for specific weather phenomenon, such as the procedural guidance of WC SIGMET coordination and guidance on the issuance criteria for WS SIGMET.

2.2 In view of the experiences gained in the past few years in various SIGMET coordination projects, identifying common coordination procedures or issuance criteria would help improving the efficiency of SIGMET coordination in the operational environment. In the following sections, some discussions and findings from the practices, specifically for WC SIGMET on tropical cyclones and WS SIGMET on thunderstorms, are presented.

WC SIGMET on tropical cyclones

2.3 As a synoptic scale weather system, tropical cyclone (TC) could affect multiple FIRs in its lifespan and would warrant close coordination across multiple MWOs in the issuance of WC SIGMET. As given in the **Appendix A** to this paper, the ad hoc group has collected practices of WC SIGMET handover procedures some of which could be sub-regionally general guidance on the issuance of WC SIGMET across FIR boundaries.

2.4 To enrich the collection of WC SIGMET issuance practices and consolidate regionally or sub-regionally general guidance, it is needed to encourage the member States in the Asia/Pacific Region whose practices are not included in the **Appendix A** to provide their practices to the ad hoc group, preferably as experiences learnt from coordination with neighbouring States.

2.5 It should be noted while the Annex 3 to the *Convention on International Civil Aviation* recommends that SIGMET messages concerning tropical cyclones should be based on advisory information provided by TCACs designated by regional air navigation agreement (Annex 3, Chapter 7, 7.1.4), in some cases, MWOs are required to consider consistency with other information (such as their domestic TC information published for disaster risk reduction purposes, local warning bulletins at specific update frequencies, any FORECAST SIGMETs issued by MWOs, etc.), which could be slightly different from the advisory information. Therefore, SIGMET coordination including information sharing among MWOs (and TCACs if needed) concerned is important.

WS SIGMET on thunderstorms

2.6 Appendix J of Asia/Pacific Regional SIGMET Guide presented examples of additional criteria for issuance of SIGMET on thunderstorm developed by the Bureau of Meteorology, Australia and the Japan Meteorological Agency. It is understood that the issuance criteria generally vary from region to region given that each region has its own unique weather, climate characteristics, challenges and users' requirements. However, it is also noted that SIGMET coordination could be facilitated through better alignment in SIGMET issuance practices among the MWOs.

2.7 With reference to the document on "Cases of SIGMET Coordination Practices in the APAC Region" in Appendix of MET SG/27 WP/11, the ad hoc group has developed a possible guidance of issuance criteria for WS SIGMET regarding thunderstorms as **Appendix B**.

2.8 The draft guidance given as the **Appendix B** is expected to be reviewed by the meeting, and if agreeable, passed to the ad hoc group on the APAC Regional SIGMET Guide for their consideration to include the information into the SIGMET Guide as a separate appendix titled "Additional guidelines on SIGMET coordination (for WS SIGMET)" or incorporate into Appendix L as a separate section.

2.9 Following a discussion on SIGMET issuance for convective systems over multiple FIRs during the MET/S WG/13 held in March 2023, the ad hoc group has developed a supplementary guidance as given in the **Appendix C**. Background of this issue can be found in the WP/14 and meeting report (para 3.11 – 3.18) of the MET/S WG/13 and IP/XX of this meeting.

2.10 The draft text given in the **Appendix C** is expected to be reviewed by the meeting, and if agreeable, passed to the ad hoc group on the APAC Regional SIGMET Guide for their consideration to include the information into the SIGMET Guide between the paragraphs 16.2 and 16.3, provided in Appendix C.

2.11 The consolidation and incorporation of the guidance developed based on the collected practices in the Asia/Pacific Regional SIGMET Guide would enhance MWO's mutual understanding and increase the efficiency on SIGMET Coordination. Overall, it would improve the quality of SIGMET services in the APAC Region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note and review the information contained in this paper including the Appendices; and

b) consider formulating actions or Draft Conclusions as necessary based on the para 2.4, 2.8, and 2.10.

– – – – – – – – – – – – – – –

Appendix A: collection of WC SIGMET issuance practices in the Asia/Pacific Region

The followings are the common practices in the GHKPSV SIGMET Coordination group (MET/S WG/11 IP/03) and Collaborative SIGMET Issuance project (MET/S WG/11 IP/05):

- MWO's responsibility for WC SIGMET issuance depends on the observed location of the TC center. The MWO should cease to update the related WC SIGMET once the observed TC center is located outside its FIR. When the TC centre is located outside its FIR, CB clouds associated with tropical cyclones are covered by WS SIGMETs for thunderstorms.
- ICAO Annex 3 7.1.6 stipulates that a WC SIGMET shall be issued as soon as possible but not more than 12 hours before the commencement of the period of validity. For early alert of the threat of an approaching TC and to facilitate coordination in advance, it is suggested that a forecast WC SIGMET to be issued at least 6 hours but no more than 12 hours before a TC of tropical storm or above intensity is expected to enter ones' FIR. Similarly, it is suggested that a forecast WC SIGMET to be issued for the expected intensification of a TC inside one's FIR at least 6 hours but no more than 12 hours before the TC intensifying into a tropical storm.
- To avoid or minimise null period(s) of WC SIGMETs when a TC with intensity tropical storm or above affecting the FIRs, considering a case when a TC moves from FIR A under MWO A (upstream MWO) to FIR B under MWO B (downstream MWO),
    - MWO A and B shall start to coordinate a few hours (e.g. about 6 hours) ahead on the estimated time and position of TC crossing the FIR boundary or the time to update/cancel/issue related WC SIGMETs.
    - As the TC center leaves FIR A, MWO A should confirm with MWO B on the issuance by MWO B of "OBSERVED" or "FORECAST" WC SIGMET before cancelling its "OBSERVED" WC SIGMET.
    - MWO B is advised to inform MWO A their "FORECAST" WC SIGMET being issued and the time of issuing "OBSERVED" WC SIGMET to replace their "FORECAST" WC SIGMET when the TC enters FIR B.
    - The communication is suggested to be carried out via a communication platform agreed by MWO A and B to ensure mutual understanding. Whenever there are changes on the assessment of WC SIGMET issuance, both MWO A and MWO B are encouraged to provide timely updates and carry out further coordination.
    - If there are discrepancies in the WC SIGMET issuance expected by MWO A and B, both MWOs may follow their own local operational practices in handling the WC SIGMETs while ensuring at least one "OBSERVED" or "FORECAST" WC SIGMET is valid.

The followings are the practices in Australia MWOs:

- MWOs issue a TC SIGMET whenever a TC, or part thereof, is impacting its FIR of responsibility. This includes CB contained within the Tropical Cyclone Advisory. Therefore, MWOs issue a TC SIGMET regardless of whether the centre is in their FIR or within a neighbouring FIR.
- Both MWOs issue WC SIGMETs based on the information contained within the Tropical Cyclone advisory.

Appendix B: a draft of common WS SIGMET (TS) issuance criteria in the Asia/Pacific Region

Thunderstorm is the most common weather phenomenon that happens across MWOs in the Region. Gathering local practices from different MWOs, generally, common characteristics were observed as following. MWOs who have not developed issuance criteria may take note of the criteria below when seeking users' requirements for developing their issuance criteria.

Issuance criteria for WS SIGMETs for thunderstorms	
Minimum dimension for SIGMET issuance for areas with higher air traffic movements (e.g. near airport)	60 NM x 60 NM (1^o x 1^o)
Minimum dimension for SIGMET issuance for areas with lower air traffic movements (e.g. oceanic areas)	120 NM x 120 NM (2^o x 2^o)
Minimum separation between two SIGMET areas	45 NM
Length of thunderstorms requiring the issuance of squall line SIGMET	270 NM (Length) x 54 NM (Width)

Appendix C: a draft of APAC Regional SIGMET Guide update

ASIA/PACIFIC REGIONAL SIGMET GUIDE
Appendix L – Guidelines for Operational SIGMET Coordination

e. Common Technical Difficulties Encountered in SIGMET Coordination

16. Criteria for issuance

16.1. Subjectivity is inherent in weather forecasting and each MWO will have its own analysis tools and suite of NWP data to be used for analysis, assessment and forecasting. Each operational meteorologist's assessment will be informed by his or her own experience and skills. For a given set of weather conditions and NWP data, the permutation of forecasts that can be issued may have considerable spread.

16.2. The element of subjectivity is known to affect harmonization of SIGMET information. Therefore, setting objective criteria for SIGMET issuance can enable consistency in SIGMET information. The ICAO *Asia/Pacific Regional SIGMET Guide* provides general guidance, however, it should be noted that there is no one-size-fits-all guidance. Issuance criteria generally vary from region to region given that each region has its own unique weather, climate characteristics and challenges.

16.3. When a significant convective system straddle across multiple FIRs, even if the affected area with in a FIR is smaller than the responsible MWO's SIGMET issuance criterion, all affected MWOs are encouraged to consider issuing SIGMET information for the area concerned within their FIRs for that significant convective system. Movement and development of significant convection cloud system should also be considered.

16.~~3~~4. SIGMET coordination initiatives have brought MWOs together to discuss such technical issues but the problems are often linked to fundamental meteorological science, which require more focused efforts by the scientific community to resolve. Where appropriate, these issues could be discussed at relevant ICAO and WMO meetings so that a global perspective can be developed which in turn can provide useful guidance and standardised procedures for issuance of coordinated SIGMET. In addition, conducting a stock take of the practices and assessment methodology amongst the MWOs would help to form the basis for the development of a common set of criteria for issuance.