International Civil Aviation Organization

WORKING PAPER

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(MET SG/27)

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Agenda Item 4 : Regional guidance material

DOCUMENT ON CASES OF SIGMET COORDINATION PRACTICES IN THE APAC REGION

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

SUMMARY

This paper presents the latest development of the document on cases of SIGMET Coordination practices in the APAC Region and recent progress on resolving issues related to SIGMET Coordination activities.

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. Hong Kong China, Japan and Singapore are the joint rapporteurs. MET/S WG/13 – WP/10 reported on the work of the ad hoc group on SIGMET Coordination in 2022–23.

1.3 This paper presents the latest version of the document on cases of SIGMET Coordination Practices in the APAC Region developed by the ad hoc group and discusses relevant matters related to SIGMET Coordination activities.

2. DISCUSSION

Document on cases of SIGMET Coordination practices in the APAC Region

2.1 Since 2016, various SIGMET Coordination initiatives have been developed and SIGMET Coordination workshops organised in the Region. Gathering the key lessons learnt from the coordination activities, the ad hoc group drafted a document on cases of SIGMET Coordination

practices in the APAC Region. The document showcases the latest practice on SIGMET Coordination for different weather phenomena, spatial coverage and groups in the Region and serves as a demonstration to other MWOs or coordination groups in the Region. MWOs are encouraged to understand the SIGMET issuance criteria of neighbouring MWOs to facilitate the coordination work. Ultimately, the document will facilitate more efficient and better coordinated SIGMET service for aviation users in the Region.

2.2 The document includes several sections: (i) Introduction, (ii) SIGMET issuance practice, (iii) Meaning of "Consensus" and (iv) Conclusion. The latest document was attached in APPENDIX A. The document was also uploaded to OneDrive and available for access by States/Administrations via the Link to document on cases of SIGMET Coordination practices in the APAC Region.

2.3 Besides, MWOs are also encouraged to make reference to Appendix L "Guidelines for Operational SIGMET Coordination" in the Asia/Pacific Regional SIGMET Guide on planning and implementing coordination activities operationally with neighbouring MWOs.

2.4 At MET/S WG/13, the meeting agreed to formulate the following Draft Conclusion for consideration by the MET SG:

Draft Conclusion MET/S WG/13-01: PUBLICATION AND FURTHER DEVELOPMENT OF THE DOCUMENT ON CASES OF SIGMET COORDINATION PRACTICES IN THE APAC REGION

That, the MET SG approves publishing the document on Cases of SIGMET Coordination Practices in the APAC Region on the ICAO APAC Office website as a living document and States are invited to provide further input to facilitate more efficient and better coordinated SIGMET service to meet aviation users' expectations and operational requirements in the Region.

Recent progress on other issues related to SIGMET Coordination

2.5 In MET/S WG/12, the participants raised their concerns that it could be challenging for MWOs involved in more than one SIGMET coordination scheme to ensure harmonised SIGMET details when the coordination was carried out via different SIGMET Coordination platforms. Recently, two of the platform providers in the APAC Region, namely Hong Kong Observatory and Japan Meteorological Agency, have exchanged proposed technical specifications on real-time sharing of chat messages for coordination groups utilising both platforms. MWOs' consent on exchanging chat messages for the Operational SIGMET Coordination (OSC) group was sought in 2022. The technical implementation and trial exchange would be performed in due course and would consult the OSC group as and when necessary.

3. ACTION BY THE MEETING

3.1 The meeting is invited to

a) note the information in the document on SIGMET Coordination practices;

b) consider the Draft Conclusion in para. 2.4;

c) provide further input to the document;

d) discuss any relevant matter as appropriate.

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APPENDIX

Cases of SIGMET Coordination Practices in the APAC Region

1. Introduction

1.1 Inconsistencies in SIGMET information across Flight Information Regions (FIRs) issued by different Meteorological Watch Offices (MWOs) will pose safety concerns and confusion to airspace users. Section 16 of Appendix L, Asia/Pacific Regional SIGMET Guide mentions that the subjectivity inherent in weather forecasting would affect harmonization of SIGMET information. One way to address this problem is by setting objective criteria for SIGMET coordination that ensures better consistency in SIGMET information.

1.2 In this document, a consolidation of the various practices developed from different SIGMET Coordination groups, results of user surveys and local practices of various MWOs in the APAC Region are provided as the current status. Please note that the SIGMET coordination procedures described in this document include some contents that have not yet been agreed within the whole Region.

2. SIGMET issuance practice

2.1 SIGMET coordination could be facilitated through better alignment in SIGMET issuance practices among the MWOs. However, issuance criteria generally vary from region to region given that each region has its own unique weather, climate characteristics and challenges. Apart from subjectivity in the assessment of the weather situation, other local considerations such as number of aircraft movements, size of the FIR, user requirements, etc. would also affect the SIGMET issuance practices.

2.2 Below is a consolidation of the various local practices for SIGMET issuance in the APAC Region. These local practices are consolidated from the Issuance criteria for thunderstorms in Appendix J, Asia/Pacific Regional SIGMET Guide, and/or supplemented by States via various SIGMET Coordination activities and workshops in the region.

Phenomenon	**Issuance criteria**	**MWOs practice**
Bangkok FIR		
Thunderstorms	Minimum dimension for SIGMET issuance	60 NM x 60 NM
	Minimum gap between two SIGMET areas	60 NM
Brisbane & Melbourne FIR		
Thunderstorms	Minimum dimension for areas of high-level air traffic movements and low-level flights	3000 NM^2
	Minimum dimension for areas with lower air traffic movements and generally high-level flights with airborne radar	7200 NM^2

	Distance between adjacent thunderstorm cells to be applied for frequent and squall line SIGMETs	40 NM
	Length of thunderstorms requiring the issuance of squall line SIGMET	≥ 100 NM
Chennai FIR		
Thunderstorms	Minimum dimension for land areas	≥ 30 NM x 30 NM
	Minimum dimension for ocean areas	≥ 50 NM x 50 NM
Colombo FIR		
Thunderstorms	Minimum dimension for land areas	≤ 30 NM x 30 NM
	Minimum dimension for ocean areas	30 NM x 30 NM
Fukuoka FIR*		
Thunderstorms	Minimum dimension for the approach control areas around congested airports	100 km x 100 km [54 NM x 54 NM]
	Minimum dimension for areas around main air routes in Japan	150 km x 150 km [81 NM x 81 NM]
	Minimum dimension for other oceanic areas	200 km x 200 km [108 NM x 108 NM]
	Length of thunderstorms requiring the issuance of squall line SIGMET	500 km (Length) x 100 km (Width) [270 NM x 54 NM]
Hanoi & Ho Chi Minh FIR*		
Thunderstorms	Minimum dimension for areas within TMA of international airports or over air routes with dense flight operations	100 km x 100 km [54 NM x 54 NM]
	Minimum dimension for other areas	200 km x 200 km [108 NM x 108 NM]
	Length of thunderstorms requiring the issuance of squall line SIGMET	500 km (Length) x 100 km (Width) [270 NM x 54 NM]
Hong Kong FIR		
Thunderstorms	Minimum dimension for SIGMET issuance	60 NM x 60 NM
	Length of thunderstorms requiring the issuance of squall line SIGMET	270 NM (Length) x 54 NM (Width)
Jakarta FIR		
Thunderstorms	Minimum dimension for SIGMET issuance	60 NM x 60 NM
	Minimum separation between two identifiable SIGMET areas	45 NM
	Length of thunderstorms requiring the issuance of squall line SIGMET	270 NM (Length) x 55 NM (Width)
Manila FIR		
Thunderstorms	Minimum dimension for land areas	60 NM x 60 NM
	Minimum dimension for ocean areas	120 NM x 120 NM
Singapore FIR		
Thunderstorms	Minimum dimension for SIGMET issuance	60 NM x 60 NM
Ujung Pandang FIR		
Thunderstorms	Minimum dimension for SIGMET issuance	60 NM x 60 NM

	Minimum separation between two identifiable SIGMET areas	45 NM
	Length of thunderstorms requiring the issuance of squall line SIGMET	270 NM (Length) x 55 NM (Width)
Yangon FIR		
Thunderstorms	Minimum dimension for SIGMET issuance	60 NM x 60 NM

** Original sizes provided in km. Square brackets are used to provide their corresponding sizes in NM.*

2.3 In the consolidation process, it is noted that user surveys were conducted to understand the user preferences on SIGMET issuance. Below is a consolidation of the user preferences on SIGMET issuance in the APAC Region:

2.3.1 Based on the user survey collected during the Hong Kong Observatory (HKO) SIGMET Coordination Workshop (ICAO MET SG/25 – WP/15) with targeted participants from pilots, air traffic controllers, operational centre personnel, the user preferences on SIGMET issuance were summarized below:

Phenomenon	**Issuance criteria**	**User preference**
Thunderstorms	Minimum dimension in Terminal area	30 NM x 30 NM
	Minimum dimension En-route	30 NM x 30 NM
	Minimum gap between two SIGMET areas	60 NM
Turbulence	Horizontal extent based on report	30 NM
	Vertical extent based on report	2000 FT
Icing	Horizontal extent based on report	60 NM
	Vertical extent based on report	4000 FT
	Minimum dimension of an icing area	60 NM x 60 NM

2.4 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. Gathering lessons learnt from SIGMET Coordination activities in the APAC Region, a consolidation on the issuance of WC SIGMET across FIR boundaries was summarized below:

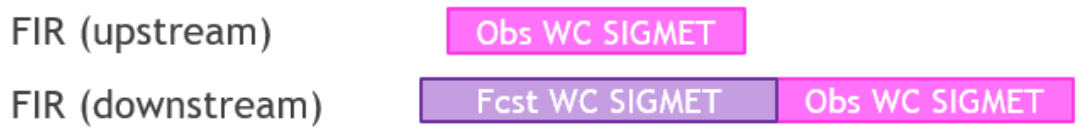
- MWO responsibility for WC SIGMET issuance depends on which FIR the TC center is observed in.
- When handling a TC leaving one's FIR, the MWO concerned is advised to seek confirmation with the neighbouring MWO that they have issued a related observed/forecast WC SIGMET before the lapse of or cancelling the original WC SIGMET. This is to avoid a null period of WC SIGMET for the TC.
- *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 alerting of the threat of TC approach and to facilitate coordination in advance, it is suggested that a forecast WC SIGMET 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 be issued for the expected intensification of the TC inside one's FIR at least 6 hours but no more than 12 hours before the TC is expected to intensify into a tropical storm.

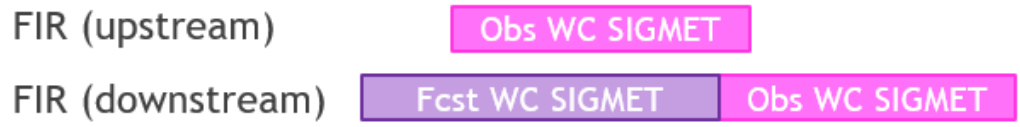
2.4.1 In 2022, gathering experience from various TCs affecting the northern part of South China Sea, the GHKPSV SIGMET Coordination group (MET/S WG/11 IP/03) and Manila FIR adopted the following guidelines when conducting SIGMET Coordination:

- Upon group member's request or where situation warrants, the Project Coordinator (HKO) would initiate an ad hoc TC briefing.
- To avoid or minimise null period(s) of WC SIGMETs when a TC with intensity tropical storm or above affect the FIRs under the responsibility of MWOs in the group, cooperative effort will be made to achieve one of the following cases:
- Case 1:

- Case 2 (likely to be the most common scenario):



- Case 3:



- If a TC with intensity tropical storm or above is expected to move from one FIR to another FIR under the responsibility of MWOs within the group, MWOs 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 between upstream and downstream MWOs.
- Downstream MWO is encouraged to issue "FORECAST" WC SIGMET 6 hours (or at least 3 hours) in advance following the coordination on the time and position of TC crossing the boundary. Downstream MWO is advised to inform upstream MWO their "FORECAST" WC SIGMET being issued via chatroom.
- Upstream MWO is encouraged to inform downstream MWO when TC leaves their FIR via the chatroom before cancelling their "OBSERVED" WC SIGMET. Downstream

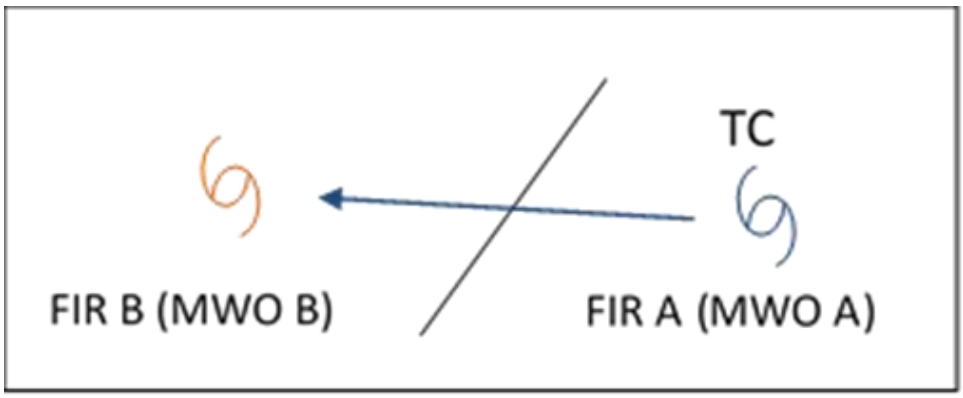
MWO may then issue "OBSERVED" WC SIGMET to replace their "FORECAST" WC SIGMET when the TC enters their FIR.

- Whenever there are significant changes on the assessment of the time and position of TC crossing the FIR boundary, both upstream and downstream MWOs are encouraged to provide timely updates and carry out further coordination via the chatroom.
- If there are discrepancies in the time and position of TC crossing the FIR boundary expected by upstream and downstream MWOs, both upstream and downstream MWOs may follow their own local practices in handling the WC SIGMETs while ensuring at least one "OBSERVED" or "FORECAST" WC SIGMET is valid.

2.4.2 CSI project member States are adopted following TC SIGMET handover procedure at the CSI Workshop held in January 2021, other than that mentioned in 2.4 (MET/S WG/11 IP/05):

- MWOs involved in WC SIGMET handovers should liaise via the chat system of the web platform and ensure mutual understanding of the following points for continuous WC SIGMET issuance at FIR boundaries:
  - when will the MWO, responsible for the FIR from which a TC is moving out (referred to here as "MWO A" and "FIR A" (see Figure 1)), ends the related WC SIGMET updating or cancel the existing WC SIGMET?; and
  - when will the adjacent MWO, responsible for the FIR into which a TC is moving in (referred to here as "MWO B" and "FIR B" (see Figure 1)), starts the issuance of the related WC SIGMET?

Both MWOs should coordinate WC SIGMET issuance scheduling as necessary.



- WC SIGMET-issuing MWO:
  - MWO A should consider itself no longer responsible for the WC SIGMET issuance if the observed TC center is located outside FIR A, and should cease to update related WC SIGMETs thereafter.
  - MWO B should take the responsibility for the issuance if the observed center is located within the FIR B, and should issue related WC SIGMETs thereafter.
- WC SIGMET handling once a TC center leaves a FIR: MWO A should wait for MWO B to issue WC SIGMET till the end of validity period

of the WC SIGMET issued by MWO A or cancel the existing WC SIGMET after MWO B is confirmed to have issued a related OBS or FCST WC SIGMET and the TC center has already crossed the boundary.

- Preliminary issuance of WC SIGMET based on forecasts: MWO B can issue WC SIGMET in advance with lead times based on six-hour forecasts of the TC center in FIR B in consideration of chat messages from MWO A.

3. Meaning of "Consensus"

3.1 A common understanding of what constitutes consensus can help focus consultation efforts to ensure consensus can be arrived. In this regard, Section 13 of Appendix L, Asia/Pacific Regional SIGMET Guide indicates that it may be necessary to identify indicators of consensus, which should form part of the preliminary requirements as agreed by the participating MWOs. A consolidation of the maximum acceptable difference between WS SIGMETs across FIRs from various SIGMET Coordination activities and workshops were given below:

3.1.1 JMA as a CSI member State conducted a survey for airlines about the acceptable difference of SIGMETs issued by neighbouring MWOs (MET SG/24 WP/14) and proposed a draft guideline of acceptable difference as follows:

WS SIGMET – Thunderstorms	**Maximum acceptable difference across FIRs**
Cloud top height	≤ 5000 FT (≤ 2000 FT at cruising altitude, viz. FL300 – FL400 desirable)
Movement direction	≤ 90 degree (≤ 45 degree desirable)

3.1.2 HKO conducted a survey during the HKO SIGMET Coordination Workshop (ICAO MET SG/25 – WP/15) with targeted participants from pilots, air traffic controllers, operational centre personnel, the maximum acceptable difference between SIGMETs across FIRs were as follows:

	User preference	**MWO practice**
WS SIGMET – thunderstorms		
• Cloud top height	≤4000 FT	≤4000 FT
• Movement speed	≤10 KT	≤5 KT
• Movement direction	≤45 degree	≤45 degree
WS SIGMET – turbulence		
• Height level	≤2000 FT	Spread between 1000 – 5000 FT
WS SIGMET – icing		
• Height level	≤2000 FT	≤4000 FT

Note: There is greater difficulty in arriving a consensus view of the height of turbulence and icing with a more stringent criterion from user's expectation.

3.1.3 Noting the outcome from 3.1.2, the GHKPSV SIGMET Coordination group (MET/S WG/11 IP/03) and SSEA SIGMET Coordination (MET/S WG/11 IP/04) have adopted the following objective criteria as reference when conducting SIGMET Coordination:

WS SIGMET – Thunderstorms	Acceptable difference across FIRs
Cloud top height	≤4000 FT
Movement speed	≤10 KT
Movement direction	≤45 degree
WS SIGMET – Turbulence	
Height level	≤2000 FT
WS SIGMET – Icing	
Height level	≤2000 FT

4. Conclusion

4.1 SIGMET Coordination projects and initiatives have enhanced technical discussions among MWOs. Related workshops and user surveys conducted have further allowed the consolidation of practices across the APAC Region. This document serves as a reference for all MWOs participating in SIGMET Coordination activities in the Region. Inputs and updates from MWOs are welcome for a more comprehensive summary of the current practices adopted by various FIRs and development of an updated guidance for enhancement of SIGMET Coordination activities in the Region.

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