International Civil Aviation Organization

WORKING PAPER (WP/13)

ICAO Asia and Pacific (APAC)
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Bangkok, Thailand, 28 April to 2 May 2025

Agenda Item 4: SIGMET coordination

OUTCOMES OF CSI PROJECT ACTIVITIES

(Presented by Cambodia, Japan, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, and Vietnam)

SUMMARY

This paper outlines highlights of the recent CSI activities and presents outcomes of the discussion including early warnings on enroute hazardous weather. Update to the APAC Regional SIGMET Guide is suggested as outcomes of discussion.

1. INTRODUCTION

1.1 The eight organizations of the Collaborative SIGMET Issuance (CSI) project, namely, Cambodia's State Secretariat of Civil Aviation (SSCA), Japan Meteorological Agency (JMA), Lao PDR's Department of Meteorology and Hydrology (LDMH), Malaysian Meteorological Department (MET Malaysia), Myanmar's Department of Meteorology and Hydrology (MDMH), Philippine Atmospheric, Geophysical and Astronomical Service Administration (PAGASA), Thai Meteorological Department (TMD), and Vietnam Air Traffic Management Corporation (VATM), coordinate for the harmonized SIGMET issuance between their areas of responsibility. The activities have been reviewed regularly at the opportunities of the regular on-line meetings and CSI Workshops to improve the SIGMET issuance/coordination among the project members.

1.2 In the recent discussion, the focus was on the phenomena that member MWOs have not frequently experienced, such as clear air turbulence, widely spread volcanic ash clouds covering multiple FIRs and TC SIGMET handover. Turbulence caused by rapidly developing convective clouds was also focused on to inform at the earlier stage of development. This paper reports the outcomes of the discussion including challenges and solutions identified and resulting suggestion on updating APAC Regional SIGMET Guide for better harmonization of SIGMET issuance.

2. DISCUSSION

Importance of air reports in SIGMET issuance for clear air turbulence

2.1 In recent years, several clear air turbulence cases were shared by member MWOs and reviewed. Appendix A shows a review of SIGMET issuance for severe turbulence in the Hanoi FIR. Past several cases including the above case showed that AIREPs are the important source as the basis

of WS SIGMET issuance for turbulence. CSI member MWOs also recognized that ICAO AN-Conf/14 delivered the Recommendation to the States as extracted as follows:

> ***Recommendation 2.3/2 – Turbulence encounters as a global operational safety risk***
> *That States:*
> *a) share experiences and best practices related to turbulence encounters; and*
> *b) establish mechanisms to improve the availability of air-reports, including special air reports, especially those made routinely and containing quantitative turbulence information.*

In addition, the discussion suggested that when the turbulence could extend over multiple FIRs, such as turbulence accompanied by the jet stream, there is a room for coordinating the SIGMET issuance between multiple MWOs based on the AIREP information shared among the States.

Challenges of SIGMET issuance for turbulence caused by rapidly developing convective clouds

2.2 CSI members also discussed the turbulence case that can occur outside the convective clouds, known as convectively induced turbulence. The discussion identified challenges of WS SIGMETs for thunderstorms (TS) as observed phenomenon ("observation SIGMET" hereafter) to deal with the turbulence especially caused by rapidly developing convective clouds, because issuing such SIGMETs practically requires enough cloud coverage satisfying the certain issuance criteria (See APAC Regional SIGMET Guide, Appendix K, 16.3).

2.3 Discussion was made to explore MWOs' capability to provide information for aviation hazards caused by such rapidly developing convective clouds at the beginning stage of spreading. The member MWOs identified necessity of the novel information to provide high temporal/spatial resolution with frequent update to cover such limited capability of SIGMET information.

2.4 On the other hand, CSI members also identified that issuing WS SIGMET for TS as a "forecast" phenomenon ("forecast SIGMET" hereafter) could be one of the possible solutions under the current practices, as it can inform about possible development of the convective clouds before the clouds maturely spread. CSI members recognized that CB Nowcast which JMA provides on the SIGMET coordination web platform is useful for preparation of SIGMET for such phenomenon, and RDCA (Rapidly Developing Cumulus Area) derived by Himawari-9 data is as well. (See MET/R WG/14 IP09)

2.5 CSI members also discussed the cons of the forecast SIGMET when the forecast could overestimate the situation. Observed/analysed information (e.g. weather radar, RDCA) would work for assessing the actual situation and increase the reliability of forecast reducing overestimation. Sharing each MWO's knowledge of local meteorological characteristics, such as diurnal cycle of CB cloud development, would also contribute to better forecast based on the SIGMET coordination.

2.6 Practices of forecast SIGMET issuance procedure has been shared by JMA to clarify the members' concern, such as:

- Both observation and forecast SIGMETs can be issued in one FIR during the same period of validity.
- Even in the case where MWOs issue TS SIGMET based on observation/analysis, if the location of the SIGMET includes a forecast area for the next four hours (maximum), it can be issued as a forecast SIGMET. On the other hand, if the location of SIGMET represents only the observed area, it should be an observation SIGMET.

2.7 After the discussion, MDMH started their forecast SIGMET issuance from October 2024, concerning the multiple cases that turbulence and thunderstorms affect aircraft operation in the

Yangon FIR. PAGASA is also planning to start forecast SIGMET issuance. On the other hand, since convections in the tropic usually develop quite rapidly and do not move drastically, some MWOs issued only observation SIGMET.

Minimum duration of WS SIGMET validity period

2.8 Discussion also covered how long the minimum duration of WS SIGMET validity period should be, and it was realized that most of the CSI member MWOs have common practices on the minimum duration as 2 hours. CSI member MWOs referred to the EUR Regional SIGMET and AIRMET Guide (EUR Doc014) which gives a guideline on this matter as follows:

> *3.4.2.4. In addition, the minimum horizontal extent and duration of the hazardous phenomenon for reporting TURB, ICE, MTW, TS and TSGR in SIGMET should have, respectively:*
> *- have a longest diagonal or side of the polygon representative of the whole hazardous area (independent of the FIR boundaries) of 100 km*
> *- have a minimum duration of 30 minutes.*

In view of that the ad-hoc group of Regional SIGMET Guide (now under the MET SG) worked on harmonization of the Guides with EUR Region, it is desirable that the APAC Regional SIGMET Guide to describe a similar guidance on this matter in consideration of the Region's own practice in the APAC.

2.9 It is recommended that MET/R WG ad hoc group on SIGMET coordination collects practices of States in the Region and identify the possible common criteria that can be included in the APAC Regional SIGMET Guide as a guidance for minimum duration of the validity period of WS SIGMET for TS.

2.10 In consideration of the discussion in 2.8 and 2.9, the meeting is invited to consider formulating following Decision regarding the preparation for updating the APAC Regional SIGMET Guide:

Decision MET/R WG/14/x: *Preparation for the update to APAC Regional SIGMET Guide*

The ad-hoc group, consisting of Hong Kong, China, Japan, Singapore (co-rapporteurs), China, Fiji, IFALPA, India, Indonesia, Malaysia, Thailand and Vietnam, is requested to;

a) Collect and analyze the States' practices of minimum duration of the validity period of WS SIGMET for TS; and
b) Consider possible update to the APAC Regional SIGMET Guide in coordination with the ad hoc group concerned under the MET SG in consideration of a) and other points discussed in the WP/13.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss the matter raised in the above discussion; and

c) consider formulating the Decision in 2.10.

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APPENDIX A

Case study: SIGMET issuance for clear air turbulence (Hanoi FIR)

At 0150UTC on 28 July 2024, VATM has been shared AIREPs of moderate turbulence by Hanoi ACC and many flights did not keep on FL320/400 in the target sector of the FIR. VATM forecasters on duty confirmed there were no CB clouds in the area based on the Himawari-9 imagery and expected that turbulence in severe intensity may occur and affect flight operations in the area, then issue a SIGMET for severe turbulence as a "forecast" phenomenon.

According to the review by CSI member MWOs, there were convective clouds west of the Hanoi FIR and no AIREPs received. Therefore, clear air turbulence area was not estimated to extend west of the Hanoi FIR, so it was not necessary to coordinate with neighboring MWOs to issue SIGMETs for severe turbulence in this case. On the other hand, in the case that the area of turbulence accompanied by the jet stream could spread over other FIRs, MWOs could have a room for coordination with other MWOs for SIGMET issuance.

Through the case study, the member MWOs recognized that the information from ATC was the most important information as strong evidence to verify any observed/forecast indices.