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**STUDY NOTE**

# MEETING OF THE METEOROLOGY PANEL (METP) METEOROLOGICAL INFORMATION AND SERVICE DEVELOPMENT WORKING GROUP (WG-MISD)

**SECOND MEETING**

**Montreal, Canada, 11 to 13 July 2016**

**Agenda Item 4: Matters Relating to WG-MISD RHWAC Work Stream**
**4.1: Review and Discuss RHWAC Work Stream Deliverables**

## Implementation of a Regional Advisory System for Hazardous Meteorological Conditions

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**SUMMARY**

This study note highlights the necessity to organize the provision of hazardous weather advisories on a regional basis.

Action by the METP-WG/MISD RHWAC work stream is in paragraph 4.

## 1. INTRODUCTION

1.1 The recommendation 2/9 of the Meteorology Divisional meeting in July 2014 (MET/14) noted that there had been long-standing SIGMET deficiencies in some States and Regions and expressed some requirements from users for harmonized, phenomenon-based hazardous weather information. In this regard, there was an urgent need demonstrated by aviation users for the establishment of regional hazardous weather advisory centres (RHWACs) to assist meteorological watch offices (MWOs) with the provision of SIGMET information for selected hazardous meteorological conditions. Moreover, the strategy accompanying the MET/14 recommendation stipulates that a regional system should be implemented first and as soon as possible, then a review of the performance of this system should be carried out and finally in a future phase, a more global solution would be envisaged based on this performance evaluation and possibly recommended by the appropriate ICAO body.

1.2 In April 2015, the Met Panel recommended through the Job Card METP 007.01that an appropriate ICAO expert group, in close coordination with WMO, expeditiously develop provisions

supporting the implementation of a phenomenon-based regional advisory system for selected en-route hazardous meteorological conditions considering users' long-standing requirements for those States where notable SIGMET-related deficiencies persist. Such requirements should be integrated into the SWIM environment with appropriate guidance to support the selection criteria of centres.

1.3 This study note discusses the user need, the state-of-the-art of the SIGMET issuance, an analysis of the consistency issues and finally proposes an organization for an efficient RHWAC system.

## 2. DISCUSSION

2.1 Airlines operators and crews need timely and consistent information regarding hazardous weather information conditions along flight routes. ATM operators also need timely and consistent information regarding hazardous weather over ATC sectors - so basically to assist in the Air Traffic Flow Management (is one ATC sector safe to fly through or should it be avoided ?). ATM operators are today one of the primary users of the current SIGMET information and would remain a major one of the foreseen advisory.

2.2 An analysis of these needs leads to work on the definition of phenomenon-based en-route hazardous meteorological information, to minimize discontinuities when the phenomena exist across MWO/FIR boundaries. But consistency across boundaries doesn't compulsorily mean a single source of information; coordinated sources of information can work efficiently.

2.3 Therefore, it does not automatically follow that this phenomenon-based hazardous meteorological information service required by users must be similar to a global aeronautical meteorological en-route gridded forecasts service, such as the one provided by world area forecast centres.

2.4 In that sense, three main differences must be highlighted :

2.4.1 First, according to the warning type of information delivered, the meteorological information has to be reported and issued as rapidly as possible, as soon as the hazardous weather occurs or is expected to occur, in order to be efficient and reliable information. Moreover, to forecast the future intensity, location and extent of hazardous weather conditions, it's necessary to implement enhanced NWP forecast capabilities, especially with enough accuracy, high to very high spatial/temporal resolution and a high to very high update frequency, which is not reachable on a global scale. Global and regional – for a limited area – models have different capabilities (such as continuous data assimilation) as they serve different needs.

2.4.2 Secondly, the meteorological information delivered must offer expected occurrence of hazardous phenomena but also a reporting of observed phenomena, both with high update rates. Bearing this out, the group is invited to note that nearly half of SIGMETs issued over the whole globe in 2015 are observed (OBS) SIGMETs. More statistics about SIGMET are provided in Annex 1 to this document.

2.4.3 Thirdly, as for the nature of hazardous weather - tropical convection, dust and sandstorms, mountain waves and so on are definitely confined to particular geographical regions. Forecasting of those weather phenomena will be more reliable and accurate at a regional level thanks to existing best practices, and appropriate high skill level and expertise.

2.5 Then, the provider of this observed hazardous meteorological information needs to collect and analyse various data like:

- real time radar and lightning data,

- surface observations,

- aircraft observations: numerical automatic information such AMDAR but also information from pilots.

2.5.1 A close cooperation with MWOs is and will remain necessary to acquire this variety of information. It is very difficult or even impossible to obtain such data with one to four global centres, without substantially degrading the quality level of services.

2.6 Due to the nature of needs, and according to the actual and foreseen state of the art, the most efficient and performant system for hazardous weather information service that responds to the Met Divisional meeting recommendation and to the associated Job Card would be a regional system.

2.7 One deficiency of the current SIGMET system recently pointed out and brought into the discussion of the MISD RHWAC work stream is the inconsistencies at FIRs boundaries currently noted in some regions. This risk is also argued with a regional advisory system, where they might exist at boundaries of RHWAC areas of responsibility. But actually, this risk is not limited to providers in a regional system as global providers would also have to face with the same challenge: to organize efficient coordination between them, to ensure global consistency.

2.8 Within a regional advisory system, the users' requirement for a globally harmonized product will be fulfilled thanks to an efficient coordination process between regional centres. Thus provisions such as recommended practices at a first stage, but quickly becoming standards, will need to be included in the Annex 3, with corresponding provisions in the foreseen PANS-MET if appropriate.

2.9 Moreover, this coordination process will be facilitated in the next future by the evolution of data format. The use of digital format (IWXXM), for information exchanged between regional centres, will improve their ability to converge their advisory production, which is much more difficult today with the TAC format. It will also allow the integration of the information produced by the referred system into the future system-wide information management (SWIM) environment underpinning the future globally interoperable air traffic management system

2.10 Finally, it is fully conceivable to work efficiently with regional centres, within the limit of reasonable number of neighbouring centres, as it works already in some part of the world between MWOs to issue SIGMETs. The current volcanic ash advisory system should also be considered for the estimation of the RHWAC number. This system's structure consists of nine centres, for a hazard that has a larger scale than the hazardous phenomena considered hereby. Consequently, on a global scale, and taking into account regional climatology, around fifteen RHWACs would be necessary and optimal. In such a frame, coordination about phenomena to guarantee harmonized advisory forecast would very rarely involve more than two RHWACs.

## 3. CONCLUSION

3.1 Considering the discussion above and the essential requirement from the Met Divisional meeting and approved by the Air Navigation Commission, for an expeditious implementation of a phenomenon-based regional advisory system for hazardous weather, the meeting is invited to consolidate the already draft Concept of Operations and other already coordinated draft provisions and guidance

supporting this implementation, taking into account the phased strategy approved by the Met Divisional meeting and based on consolidated user requirements and their associated time frame.

## 4. ACTION BY THE METP-WG/MISD RHWAC WORK STREAM

4.1 The METP-WG/MISD RHWAC work stream is invited to:

a) note the information contained in this paper; and

b) decide on activities and milestones of the work stream over the next months and in preparation of the MET Panel meeting in October 2016.

ANNEX 1

STATISTICS ABOUT SIGMETs

Year : 2015

Area : globe

Source : SADIS FTP

Overall number of SIGMETs : 87 453

Decodable SIGMETs : 47 289

| Category | FCST + OBS | OBS | FCST | TOTAL |
|---|---|---|---|---|
| Number of SIGMETs | 1685 | 20 196 | 25 408 | 47 289 |
| Percentage | 3.6 % | 42.7 % | 53.7 % | 100 % |

Number of non easily decodable SIGMETs : 40 165 (no OBS or FCST mentioned)

If we consider that for SIGMETs which have emission time ≥ validity time are OBS SIGMET
And that SIGMETs which have emission time ≤ validity time are FCST SIGMET
Then there are :

- 12 478 OBS SIGMET
- 15 785 FCST SIGMET
- 11 902 SIGMET, which are impossible to decode clearly their category (OBS .? FCST?)