



*International Civil Aviation Organization*

**FIFTEENTH MEETING OF THE  
COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND  
METEOROLOGY SUB-GROUP (CNS/MET SG/15) OF APANPIRG**

Bangkok, Thailand, 23 – 27 July 2012

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**Agenda Item 11: Implementation of SIGMET and warnings:**

4) review METWSG SIGMET advisory

**REVIEW AND EVALUATION OF SIGMET ADVISORY TRIAL IN ASIA**

(Presented by China)

**SUMMARY**

This paper presents results of SIGMET advisory trial in Asia hosted by China and the evaluation of its performance.

This paper relates to

**Strategic Objectives:**

A: Safety – Enhance global civil aviation safety

**Global Plan Initiatives:**

GPI-19 Meteorological Systems

**1. Introduction**

1.1 The third meeting of the ICAO Meteorological Warnings Study Group (METWSG/3) had identified China, France and South Africa to be the host States of the SIGMET advisory trials. China is responsible for conducting the SIGMET advisory trial in Asian region during 4 May to 30 July, covering 10 countries, namely Bangladesh, Cambodia, China, Democratic People's Republic of Korea, Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Thailand and Vietnam, 18 MWOs (19 FIRs), shown in Figure 1.

1.2 Since the second meeting of the ICAO Meteorological Warning Study Group (METWSG/2), China paid high attention to the SIGMET advisory feasibility study and SIGMET guidance study. A working group, with members from 9 Meteorological Watch Offices (MWOs) in China, was established in 2009 and three working group meetings were held in the past three years to discuss and carry out related studies and tasks.

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1.3 Meanwhile, a programme for SIGMET advisory study, collaborated with a University, was set up by China in April 2010, to carry out the study of techniques of SIGMET advisory issuance and to develop a system for weather monitoring and for the preparation, issuance and dissemination of SIGMET advisory. This system based on numerical weather prediction model system, meteorological satellite products, weather radar data and other weather information, named SIGMET Advisory Information System, contributed much to the conducting of the trial.

**2. Implementation of SIGMET advisory trial****2.1 Issuance and dissemination of SIGMET advisory**

2.1.1 The SIGMET advisories were issued only for thunderstorms and severe turbulence occurring above 10,000 feet (> FL100) during the trial as described in the summary discussions of METWSG/3. It is mainly due to the weather itself that no advisories issued for severe icing. And for the reason that no advisories issued for severe mountain wave, it is basically due to limit of observations or reports about severe mountain wave.

2.1.2 The SIGMET advisories were issued every 4 hours at about 2350Z, 0350Z, 0750Z, 1150Z, 1550Z and 1950Z regularly, with some timely updated advisories when a significant change in any of the above phenomena are expected before next suggested advisory, which were only issued for thunderstorms during the trial. The validity period is no greater than 6 hours.

2.1.3 The advisories were issued and disseminated through the above SIGMET Advisory Information System. The graphical advisory was first completed by forecasters based on the guidance of the advisory generated automatically by the system, through the man-machine interaction, and then the corresponding textual advisories were generated automatically. The textual advisories were disseminated via both AFTN and internet (the Asian Aeronautical Meteorology Service website, <http://www.aamets.org>), while the graphical ones were disseminated only via the internet.

**2.2 Feedbacks during the trial**

2.2.1 In order to further improve the issuance of SIGMET advisory, daily and weekly feedback forms were designed for MWOs participating in this trial to feedback the detailed performance of the SIGMET advisories. The daily feedback forms were designed for 9 MWOs in China and collected every day, while the weekly ones were designed for all MWOs participating in this trial and collected every week from 9 MWOs in China and several MWOs from some neighbouring States or every month from some other MWOs.

2.2.2 During the trial, more than 700 daily feedbacks and about 108 weekly feedbacks were received from the MWOs in China, and more than 50 weekly feedbacks were received from MWOs in Bangladesh, Thailand, Vietnam, Myanmar and Lao PDR, which made a contribution to the further improvement of the issuance of SIGMET advisory.

**2.3 Close contact with MWOs**

2.3.1 For better implementation of the SIGMET advisory trial in Asia, we kept in close touch with some participating MWOs by telephone or email mainly about the issuance of the advisory, the issuance of SIGMET and the feedbacks, especially during the trial. Most of the contact persons of the MWOs were the experts who participated in the regional seminar held in Beijing in April 2011, which made the communication easier and more effective.

### **3. Evaluation of the trial**

#### **3.1 Statistics of SIGMET advisories and SIGMETs**

3.1.1 The number of the textual SIGMET advisories issued by Beijing, China is 2533 (calculated for the advisory itself, one sequence number for one advisory), with 2411 advisories for thunderstorms and 122 for severe turbulence. When the advisories were decomposed for each FIR, there would be 6048 advisories (with 5738 about thunderstorms and 310 about severe turbulence) issued in Asia.

3.1.2 The comparison of the numbers of SIGMETs received from each MWO during the same period (May to July) for the recent three years (2009 to 2011) was shown in , where Wuhan and Haikou MWOs missed the data in 2009. Since no advisories for severe icing were issued, the comparison of SIGMETs for severe icing was not shown. Compared with the numbers of SIGMETs received in 2009 and 2010, for most MWOs, the numbers for all phenomena and for thunderstorms during the trial had an increase or were comparable.

3.1.3 During the trial, two MWOs with MET deficiency, namely, Lao PDR and DPR Korea issued some SIGMETs in response to the SIGMET advisories, which was a sign of improvement. Lao PDR issued their first SIGMET in 18 May 2011 after their MWO implemented and totally issued 18 SIGMETs during the trial (information from experts of Lao PDR). DPR Korea issued 7 SIGMETs in the same period with 3 SIGMETs with format errors in 2009, and no SIGMETs were issued in 2010. Though they issued only 4 SIGMETs during the trial but without any format errors, which was also a sign of improvement.

3.1.4 For Mongolia, SIGMETs for both thunderstorms and severe turbulence received from Ulaanbaatar MWO also had an increase during the trial.

3.1.5 It must be noted that, before the handover of Kunming MWO to Chengdu MWO in 2009 and 2010, the SIGMETs for Chengdu CTA and Lhasa CTA issued by Chengdu MWO were also included in the statistics of SIGMETs for Kunming FIR which sometimes were reissued by Kunming MWO for international exchange. This is why the numbers for Kunming MWO in 2009 and 2010 are much greater than that in 2011. For Myanmar, they had indicated that they cannot issue SIGMETs.

#### **3.2 Feedbacks for specific cases from MWO**

3.2.1 Three more detailed and much appreciated feedbacks with a particular evaluation of the SIGMET advisory trial were provided by Beijing MWO, Guangzhou MWO and Vientiane MWO. Details are given in Appendix A.

3.2.2 According to the comparison and verification, Beijing MWO reflected that the advisories were somewhat useful for them to prepare the content of SIGMETs, and had good practical guidance on their SIGMET issuance to a certain extent.

3.2.3 Guangzhou MWO gave a detailed verification using satellite observations, and concluded that most of the SIGMET advisories for thunderstorms agreed well with the satellite observations. Detailed verification and two examples are given in Appendix A. They considered that the advisories provided forecasts with sufficient lead time guiding their forecasters in advance to prepare and issue SIGMETs and proved to be effective. In addition, Guangzhou MWO also gave a comment that the graphical advisories were more friendly and convenient for application than the textual ones and the current SIGMETs (in text).

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3.2.4 The evaluation of SIGMET advisories received for Vientiane FIR was also carried out, and indicated that the issuance of SIGMET advisories was very useful to prepare the SIGMETs and improved the issuance of SIGMET for Vientiane FIR.

**3.3 Feedbacks for the overall performance from MWOs and users**

3.3.1 Fourteen completed feedback forms were received from MWOs in China (9 MWOs), Bangladesh, Lao PDR, Myanmar, Thailand and Vietnam after the trial. Most of the MWOs considered that the advisories are useful for SIGMET preparation, particularly for thunderstorms.

3.3.2 Seven completed feedback forms were received from ALPA Japan, ALPA Thai, Air China, China Southern Airline, Xiamen Airline and Hainan Airline (2 forms, from control section and flight section). The users also generally considered that the advisories are helpful for the improvement of SIGMET issuance by the MWOs.

**4. Summary and Experience****4.1 Summary**

4.1.1 Many efforts were put into the conducting of the SIGMET advisory trial and the improving of SIGMET issuance. Some achievements were made during the trial.

4.1.2 The VCP course of WMO arranged in Beijing in April 2011 for States involved in the SIGMET advisory trial, with the main purposes to introduce the SIGMET advisory trial, to enhance its application and to improve the issuance of SIGMET, was proved to be very useful for some States to develop the knowledge in the issuance of SIGMETs and in application of the SIGMET advisory information.

4.1.3 The statistics of the SIGMETs received during the same period for the past three years showed there were some improvements of the SIGMET issuance during the trial, where a sign of improvement was evident for two MWOs in LAO PDR and DPR Korea concerned with SIGMET deficiency.

4.1.4 The feedbacks from MWOs (both the feedbacks for specific cases and for overall performance) and users considered that the SIGMET advisories for thunderstorms were generally useful or helpful for SIGMET issuance, followed by severe turbulence and severe icing, and generally supported the permanent establishment of the regional SIGMET advisory centres.

4.1.5 The performance indicators of the results of the SIGMET advisory trial for all regions are summarized by the METWSG/4 as follow (cited from the Summary of Discussion of METWSG/4).

Performance indicator	Asia	AFI-N	AFI-S
Compliance index (issuance)	65.4%	46.1%	20%
Timeliness	Mostly within one hour from the advisory	Mostly within one hour from the advisory	One hour or longer
Percentage of SIGMETs with correct format	99.7%	99.8%	28%
User satisfaction	All satisfied “definitely” or “probably”	All satisfied “definitely” or “probably”	All satisfied “definitely” or “probably”

## 4.2 Experience

4.2.1 Some experiences for SIGMET advisory issuance are summarized from the view of the host States.

4.2.2 Firstly, a good system is essential for weather monitoring and for the preparation, issuance and dissemination of SIGMET advisory, without which the advisory, particularly the graphical one, is difficult to prepare. A dedicated website for the dissemination of graphical SIGMET advisory is necessary.

4.2.3 Secondly, it is very important that the forecasters in charge of the monitoring of weather and issuance of the advisory information should have relatively comprehensive knowledge about the weather and climate characteristics in the whole area involved.

4.2.4 Thirdly, it is also important that the regulation for the issuance of SIGMET advisory should be manoeuvrable in operation. For the trial in Asia, advisories were issued every 4 hours regularly, with some timely updated advisories when a significant change in any of the above phenomena are expected before next suggested advisory, which was considered to be more manoeuvrable than that all advisories were issued timely.

4.2.5 Fourthly, timely feedbacks from MWOs and users for performance of the SIGMET advisories are also vital for further improvement of the advisory.

4.2.6 Finally, more observations about local weather would be better for improved SIGMET advisory.

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**4.3 Acknowledgement**

4.3.1 The centre of the Asian SIGMET advisory trial, Beijing, China would like to express their appreciation and thanks to all the participating MWOs and users who gave valuable suggestions or comments that contributed much to the accomplishment of the trial in Asia.

**5. Action by the Meeting**

5.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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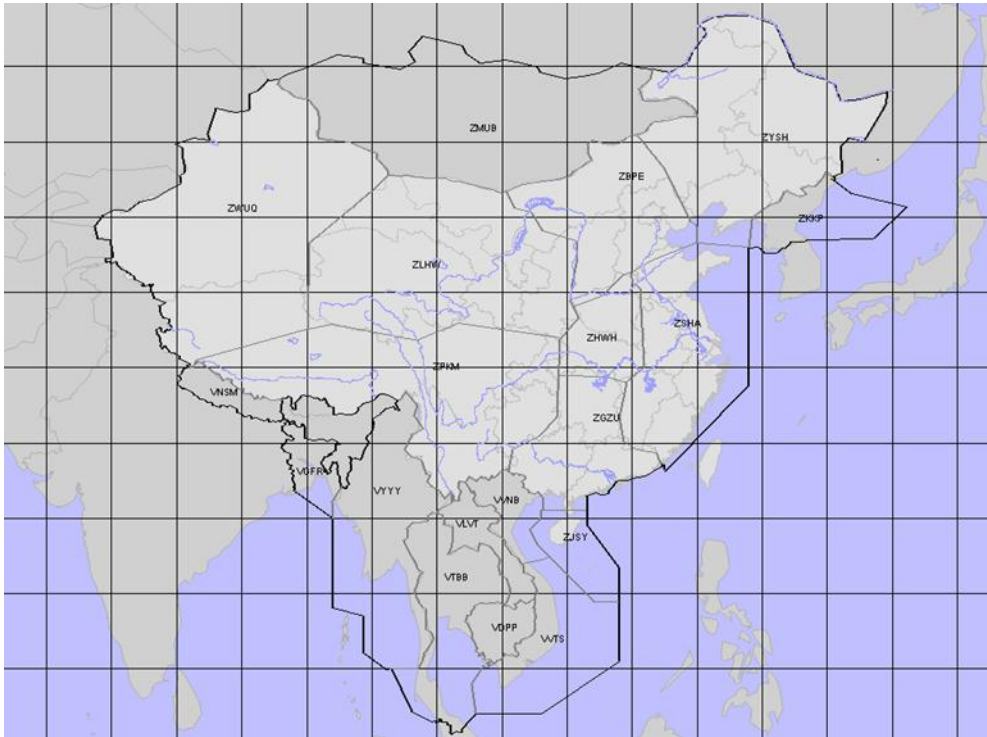


Figure 1. Geographical areas covered by the trial for Asia

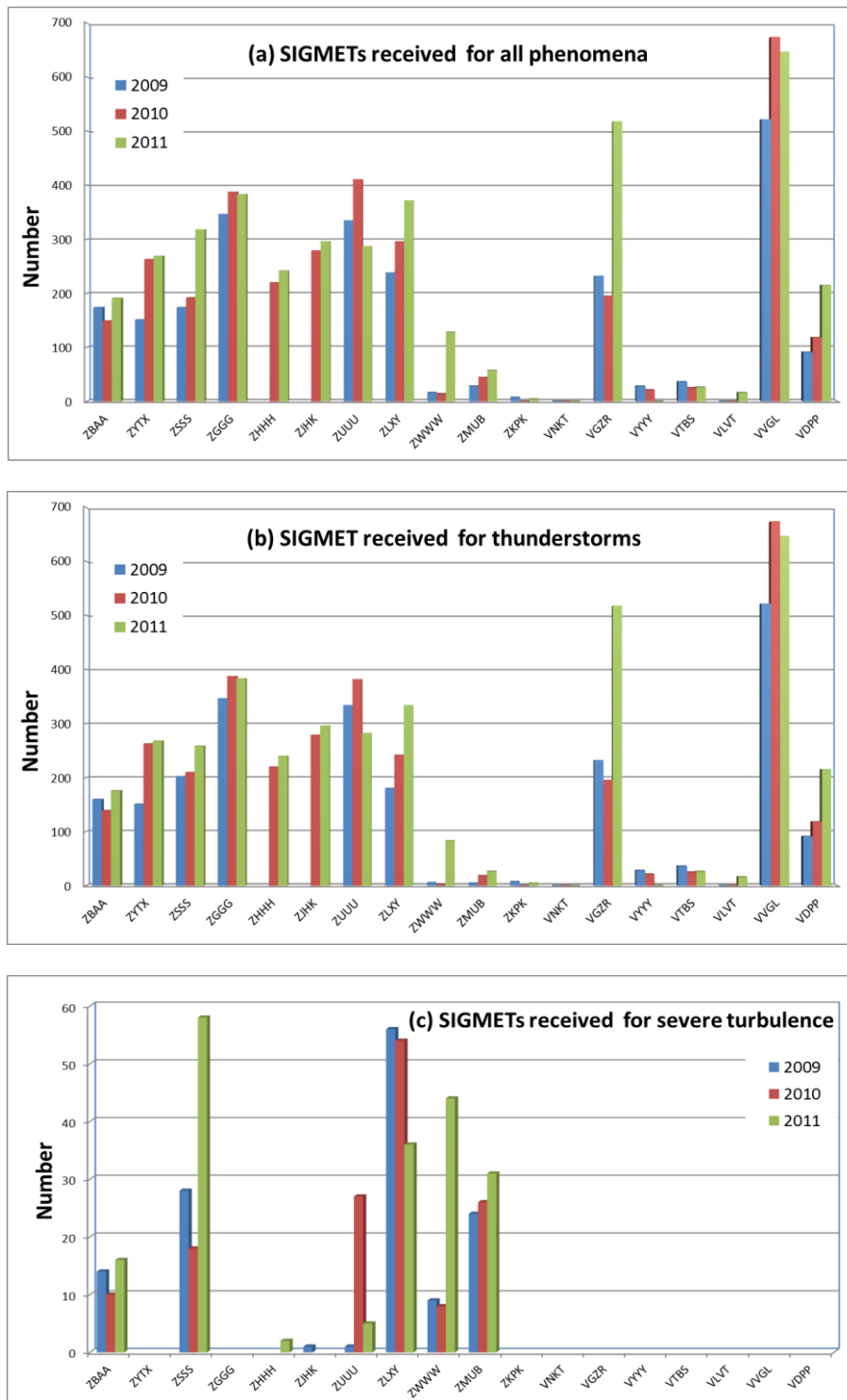


Figure 1. SIGMETs received during the same period (from May to July) in 2009, 2010 and 2011 for all phenomena (a), thunderstorms (b), and severe turbulence (c).