



*International Civil Aviation Organization*

**SIXTEENTH MEETING OF THE  
COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND  
METEOROLOGY SUB-GROUP (CNS/MET SG/16) OF APANPIRG**

Bangkok, Thailand, 23 – 27 July 2012

**Agenda Item 8: Regional Implementation of World Area Forecast System (WAFS)**

- 2) Current status of WAFS implementation

**REGIONAL PROGRESS IN WAFS IMPLEMENTATION**

(Presented by Chairman, WAFS Implementation Task Force)

**SUMMARY**

This paper provides an update on the progress of WAFS implementation in the ASIA/PAC Region.

This paper relates to –

**Strategic Objectives:**

**A: Safety** - *Enhance global civil aviation safety*

**C: Environmental Protection and Sustainable Development of Air Transport** -  
*Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

**Global Plan Initiatives:**

GPI-19 Meteorological systems

**1. Introduction**

1.1 This paper provides an update on the progress of WAFS implementation in the ASIA/PAC Region subsequent to CNS/MET SG/15 and discusses the follow-up actions that are needed to ensure implementation and utilization of the WAFS products in the ASIA/PAC Region.

**2. Regional Progress**

2.1 The progress of WAFS implementation in the ASIA/PAC Region has been tracked by the document ASIA/PAC WAFS Implementation Plan and Procedures developed and maintained by the WAFS/I TF since 1998. This document was last updated by CNS/MET SG/15 in July 2011. A draft revision to the document based on recent progress of WAFS implementation in the ASIA/PAC Region is included as Appendix A to this paper for review and necessary updating by this meeting.

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2.2 The meeting is invited to review the progress of WAFS implementation in the ASIA/PAC Region as given in the “Indicative Timetable for Implementation of WAFS” in Appendix A, in particular the following items that are already due for completion or will be due for completion within the next year:

<b>Item</b>	<b>Task/Stage of Implementation of WAFS</b>	<b>Anticipated Date (as in CNS/MET SG/15)</b>
19	WAFCs provide web-based gridded forecasts of icing, turbulence and CB	Suspended until further notice
20	Regional training on the use of the gridded forecasts	To be discussed at WAFSOPSG/7 Sep 2012
21	WAFS end-user workstations upgraded to accept the GRIB2 code form	May 2011 – November 2013
22	Termination of the ISCS-G2 service	1 July 2012
23	Broadcast of WAFS forecasts in GRIB1 ceases	November 2013
25	Re-prioritization of GRIB2 over GRIB1	5 July 2012
26	SADIS FTP will be ceased. Secure SADIS FTP will be the sole Internet based service provided by the UK.	30 November 2012
27	Planned cessation of WAFS Upper Air Forecasts in GRIB1 form. GRIB2 will be the sole format provided.	November 2013
28	The GRIB2 forecasts for CB, icing and turbulence parameters expected to be endorsed for operational use with Amendment 76 to ICAO Annex 3.	November 2013

2.3 Regarding item 20, training through the provision of computer-based training products and web-based training package for States on the operational use of new gridded WAFS forecasts would be discussed at WAFSOPG/7 meeting. However, to support the operational use of the new gridded WAFS forecasts, WAFSOPSG/6 agreed to develop guidance on their interpretation (WAFSOPSG/6 Conclusion 6/12). In addition it was agreed that the WAFS Provider States would review the training requirements for the new gridded WAFS forecasts for CB clouds, icing and turbulence in light of the development of the guidance on their interpretation (WAFSOPSG/6 Conclusion 6/13).

2.4 Items 22 and 25, namely, termination of ISCS-G2 service and re-prioritization of GRIB2 over GRIB1, would have been completed by the time of this meeting. Regarding item 26, SADISOPSG/16 agreed to extend the SADIS FTP Service until 30 November 2012 (SADISOPSG/16 Conclusion 16/15). SADISOPSG/17 also asked the SADIS Provider State and Secretariat to remind all SADIS FTP users of the importance of registering for, migrating to and making operation use of the Secure SADIS FTP Service (SADISOPSG/17 Conclusion 17/21).

2.5 The meeting may wish to note that, at the WAFSOPSG/6 meeting, the users reiterated the requirement for SIGWX forecasts in their current format. However, it is noted that the WAFS SIGWX charts were not the same as the WAFS upper-air gridded forecasts. Visualization of the WAFS upper-air gridded forecasts could not be expected to duplicate or align with the current WAFS SIGWX forecasts since the latter were produced manually while the former were not. In this connection, the WAFSOPSG/6 meeting agreed that the WAFS Provider States should continue with the provision of WAFS SIGWX forecasts in the current formats, viz. BUFR code and PNG chart forms (WAFSOPSG/6 Decision 6/17). In addition, the IATA member was invited to develop, in consultation with the World Meteorological Organization (WMO), a detailed concept of operations, which would include requirements for the provision of probabilistic forecasts of icing and turbulence expressed in terms of indices rather than categories (WAFSOPSG/6 Conclusion 6/16).

2.6 The WAFSOPSG/6 meeting endorsed the draft Amendment 76 to Annex 3 - *Meteorological Service for International Air Navigation* (WAFSOPSG/6 Conclusion 6.3), which would:

- a) enable the provision of concatenated route-specific wind/temperature forecasts;
- b) introduce additional wind and temperature forecasts for FL 410 (175 hPa) prepared by the World Area Forecast Centres (WAFS);
- c) introduce additional geopotential altitude forecasts for FL 270 (350 hPa) and FL 410 (175 hPa) prepared by the WAFS;
- d) render operational the WAFS gridded significant weather (SIGWX) forecasts for CB clouds, icing and turbulence<sup>1</sup>; and
- e) enable the alignment of SIGWX charts during back-up operations between WAFS.

### **3. Future Work Programme**

3.1 In the light of the above discussion, the meeting may wish to consider the necessary changes to the ASIA/PAC WAFS Implementation Plan and Procedures, and to review the work programme and composition of the WAFS/I TF (Appendix B) and formulate the following decision:

**Decision 16/xx – ASIA/PAC WAFS Implementation Plan and WAFS Implementation Task Force**

That,

- (a) the ASIA/PAC WAFS Implementation Plan and Procedures be amended as shown in Appendix xx to the report; and
- (b) the work programme and composition of the WAFS Implementation Task Force be amended as given in Appendix xx to the report.

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<sup>1</sup> The rendering of the "operational" status of the gridded forecasts for CB, icing and turbulence is conditional upon the successful harmonization of the WAFS gridded data sets for these products; positive results of the forthcoming verification of the forecasts; and provision of updated guidance material on the new gridded data.

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**4. Issues on WAFS Trial Gridded Forecasts**Harmonization between WAFCs

4.1 According to notices to SADIS users issued in November 2011, the gridded forecasts from WAFc London and WAFc Washington were harmonized with effect from 1200UTC 29 November 2011. A comparison was made between the CAT potential from WAFc London and WAFc Washington subsequent to the harmonization. While the gridded forecasts from the two centres were mostly comparable to each other, there remained occasions when there were minor differences as highlighted in Table 1, and noticeable differences between the forecasts as highlighted in Tables 2 to 3 and Figures 1 to 2. The differences merit investigation, especially as some concerned values could potentially exceed the threshold for significant turbulence. Moreover, on these occasions, no ADMIN messages were sent to inform users of issuance of non-harmonized data.

Updated Guidance Material on the New Gridded Data

4.2 Description of trial gridded forecasts was given in earlier version of “The SADIS FTP Service” and “SADIS Secure FTP User Guide”. The level of details however varied. For CAT potential, a threshold value of 4% was given as an indication of possibility of moderate to severe CAT in “The SADIS FTP Service (Version 4.3 March 2010)” and “SADIS Secure FTP User Guide (Version 1.0 November 2010)”. Yet, similar threshold is not available for other elements. Since the harmonization, a “Guidance on the Harmonized WAFS Forecasts for Cumulonimbus Cloud, Icing and Turbulence Forecasts (Version 1.0 28 November 2011)” was published. While it was stated that the Icing products has not been calibrated, the above guidance document specified that a value of 0.1 should be used as a threshold for trace icing for Extended Diversion Time Operations (EDTO) fuel use planning. Similar thresholds however are not available for other products. Furthermore, the threshold value of 4% for CAT potential has since been removed from the latest version of the guidance materials including “The SADIS FTP Service (Version 4.4 November 2011)”, “SADIS Secure FTP User Guide (Version 1.1 November 2012)” and the “Guidance on the Harmonized WAFS Forecasts for Cumulonimbus Cloud, Icing and Turbulence Forecasts (Version 1.0 28 November 2011)”.

4.3 WAFSOPSG/6 Decision 6/17 mentioned that States and/or commercial vendors are best suited to be the developers and providers of visualized products derived from the WAFS gridded forecast data sets. However, without further guidance from WAFc on the interpretation of the new gridded forecasts and the respective recommended threshold values, different States/vendors may adopt different thresholds for their visualized products which may lead to confusion, potentially posing negative impact to aviation safety. As an illustration, Figure 3 shows a comparison of WAFc London mean CAT potential forecast chart based on (i) 4% (as stipulated in earlier version of SADIS documents) as lowest threshold plus 8%, 16%, 24%, etc. as higher thresholds and (ii) 0.1% (lowest non-zero value) as lowest threshold plus 1%, 2%, 4%, etc. as higher thresholds. Location of a pilot report of moderate turbulence marked in red circle is highlighted in both cases. It can be seen that the location of pilot report is not covered by area of CAT potential based on the 4% lowest threshold. This example highlights the importance of interpretation of new gridded forecasts and appropriate threshold value setting. Development of visualization products would not be made possible without further guidance on the threshold values, which should be determined based on comprehensive verification by the WAFcs. Without such guidance to aid clear interpretation of the products, the new gridded forecasts should not be used operationally.

4.4 Currently, the latest guidance materials are posted on WAFSOPSG and SADISOPSG Guidance Material webpage. As there is no notification on the updates of guidance materials, Member States have to check the website to see if there are updates from time to time and download the document to check if and where the content is update. WAFIC Provider States are requested to notify users the availability of updated documents via email or ADMIN message, and preferably with version number or update time posted on the website to facilitate checking.

## **5. SIGWX Correction Message**

5.1 During the period from October 2011 to June 2012, there were 5 cases that the symbol of radioactive materials in the atmosphere for Fukushima Daiichi was found missing in SIGWX forecasts issued by WAFIC London who was notified subsequently. There were also another 13 cases that error, such as missing jet stream and CB area, was identified in SIGWX forecast. A summary of errors either identified by the Hong Kong, China or notified by WAFIC London during the said period is given in Table 4.

5.2 While SIGWX correction messages were received in most of the cases, WAFIC Provider States are invited to step up quality check on these SIGWX forecasts before dissemination.

5.3 For the issuance of SIGWX correction messages, “Guidance for handling WAFS SIGWX Correction Messages” available on WAFSOPSG website stipulates the following :

Plain-text administrative messages, to be issued in the event of an error identified in the <u>most recently issued</u> WAFS SIGWX forecast (in BUFR code and/or PNG chart form) have been implemented by WAFIC London and WAFIC Washington. ....
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5.4 As such, correction message would only be issued for error identified in the most recently issued SIGWX forecast. This follows the Conclusion 5/4 of WAFSOPSG/5 held in September 2009. However, there were cases that, after the latest SIGWX forecast was issued, error on SIGWX forecast valid at an earlier time step was observed. Before the expiry of the SIGWX forecast valid at an earlier time step, some flights, in particular short haul flights, would keep using the previous set of SIGWX forecast because the valid time was closest to flight time. However, according to the aforementioned guidance, the WAFIC concerned would only acknowledge the error and no correction message would be issued despite error was observed by individual meteorological office. On the other hand, from quality management perspective, as long as the SIGWX forecast is still being used by airlines, correction message should still be issued. WAFIC Provider States are invited to consider issuing correction message in the event of errors identified in the latest TWO sets of SIGWX forecasts, instead of only the most recent one.

## **6. Action by the Meeting**

6.1 The meeting is invited to note the information provided in this paper and to exchange views on the progress of WAFS implementation in the Asia/Pacific Region. Following the discussions on the issues highlighted in Sections 4 and 5 above, the meeting may wish to formulate the following draft Conclusion:

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**Draft Conclusion 16/xx – Improvements of WAFS Implementation**

That,

- a) The WAFS Provider States be urged to further improve the harmonization of the new gridded forecast products. In the event that the harmonization process cannot be performed for some reason, WAFS Provider States should alert users via ADMIN message;
- b) The WAFS provider States be urged to provide guidance on the interpretation of and the threshold values to be adopted in the trial gridded forecast products based on comprehensive verification;
- c) The WAFS provider States be urged to notify users of the availability of updated guidance materials, and preferably with version number or update time posted on the respective websites to aid checking;
- d) The WAFS Provider States be urged to enhance quality check on SIGWX forecasts before transmission; and
- e) The WAFS Provider States be requested to consider issuing correction message in the event of error identified in the TWO most recently issued SIGWX forecasts.

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