*International Civil Aviation Organization*

**FOURTEENTH MEETING OF THE COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND METEOROLOGY SUB-GROUP OF APANPIRG (CNS/MET SG/14)**

Jakarta, Indonesia, 19 – 22 July 2010

---

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

**3) other WAFS (ISCS & SADIS) implementation issues**

# SUMMARY OF RECENT AND FORTHCOMING DEVELOPMENTS TO THE WAFS

(Presented by the WAFC Provider States)

**SUMMARY**

This paper describes WAFS developments since the APANPIRG CNS/MET SG/13 meeting (July 2009). Some of these developments have had a direct impact on end users. A number of important developments are planned to the WAFS in future years and these are highlighted in this paper for the consideration of the group.

This paper relates to

**Strategic Objectives:**
A: Safety – Enhance global civil aviation safety
D: Efficiency – Enhance the efficiency of aviation operations

**Global Plan Initiatives:**
GPI-18 Aeronautical Information
GPI-19 Meteorological Systems

## 1. Introduction/Background

1.1 This paper presents developments to the WAFS since the 13th meeting of the APANPIRG CNS/MET Sub-Group in July 2009. For more details of the activities of the WAFS, users may wish to review information available on the ICAO WAFS Operations Group website at URL: www.icao.int/anb/wafsopsg/

## 2. Recent Developments

### 2.1 Development of WAFS upper-air data in the GRIB 2 code form

WAFSOPSG/5 re-affirmed the endorsement of WAFSOPSG/4 that the WAFC Provider States continue the development and implementation of WAFS upper-air forecasts in the GRIB 2 code form - including the forecast parameters for CB, icing and turbulence. The two WAFCs have coordinated their development efforts to ensure that these gridded forecasts are harmonised with respect to content, encoding and compression algorithms. With regard to forecast parameters for CB cloud, icing and turbulence further efforts by both WAFCs to converge and align forecasts is ongoing, and is referred to in section 3.4 of this paper.

Both WAFCs implemented the provision of WAFS Aviation GRIB 2 data (in compressed form) on each of their respective server based systems (SADIS FTP for WAFC London; 'WAFS Internet File Server' (WIFS) for WAFC Washington) on 2nd March 2010. The parameters for CB, icing and turbulence are made available as trial forecasts products for evaluation only on these systems. The implementation of WAFS Aviation GRIB 2 data on the Satellite based systems (SADIS 2G; ISCS) is referred to in section 3.1 of this paper.

Appendix A to this paper provides basic details on the differences between GRIB 1 and GRIB 2.

***Suggested action:*** *Review discussions at WAFSOPSG and associated guidance material.*

### 2.2 Alignment of SIGWX issue times

WAFSOPSG/5 endorsed the alignment of SIGWX issue times such that all SIGWX forecast data (High Level SIGWX (SWH) BUFR, Medium Level SIGWX (SWM) BUFR and all SIGWX PNG SIGWX charts) were issued at the same time. The issue times would be 17 hours ahead of validity under normal operations, but 15 hours ahead of validity under WAFC backup scenarios (test or real).

Both WAFCs implemented the change as scheduled on 15th June 2010.

***Suggested action:*** *Note this information only.*

### 2.3 WAFC backup tests

The WAFC Provider States have continued to test their SIGWX backup procedures in the event that one WAFC was unable to produce SIGWX forecasts in the BUFR-code and PNG-chart format. Routine backup tests are conducted quarterly, with the results posted on the WAFSOPSG website at URL: http://www.icao.int/anb/wafsopsg/Recent%20Chronology%20of%20WAFC%20Backup%20Tests.pdf. Tests over the last 12 months have been successful, and transparent for the overwhelming majority of WAFS users.

Forthcoming backup tests are outlined at URL: http://www.icao.int/anb/wafsopsg/Forthcoming%20WAFC%20Backup%20Tests.pdf. Notification of WAFC backup tests is promulgated on the SADIS broadcasts in advance, by way of administrative messages.

In addition, WAFC backup procedures are outlined at: http://www.icao.int/anb/wafsopsg/backup.pdf.

***Suggested action:*** *Note this information and consider visiting the WAFSOPSG website to obtain information pertaining to WAFC backup tests and procedures.*

## 2.4 Corrections to WAFS SIGWX forecasts

Following endorsement by WAFSOPSG/5, administrative bulletins to advise of necessary corrections to WAFS SIGWX forecasts were implemented as scheduled on 31st December 2009.

The WAFC Provider States were to introduce a practical and minimal process to handle corrections to WAFS SIGWX forecasts (in BUFR code and/or PNG chart form). The procedure would involve the issuance of a plain text administrative message drawing user attention to the identified error. The BUFR data and/or PNG charts themselves, which contain erroneous data, would not be re-issued due to downstream implications detailed in the WAFSOPSG/4 report.

Before 15 June 2010 a large number of such bulletins were issued to advise users of the receipt of Volcanic Ash or Tropical Cyclone advisories after the issuance of SWH BUFR data but before the issuance of SWM BUFR and all PNG SIGWX charts. Since the alignment of SIGWX forecast issue times (2.2 above) the need to issue administrative bulletins for this purpose has ceased.

The administrative bulletins have also been used for advising of other necessary corrections to SIGWX forecasts, and in this regard the implementation appears successful.

Guidance for users regarding these bulletins is available on the WAFSOPSG website at URL: http://www2.icao.int/en/anb/met-aim/met/wafsopsg/Pages/GuidanceMaterial.aspx.

***Suggested action:*** *Review discussions and guidance available on WAFSOPSG webpages.*

## 2.5 Workshop on the gridded WAFS forecasts for icing, turbulence and CB cloud

A workshop on the provision of gridded WAFS forecasts for CB cloud, icing and turbulence was held in Paris, 14th – 15th September 2009.

The main outcomes from the Workshop and subsequent WAFSOPSG/5 meeting were that:

a) it was evident that there was an ongoing preference for WAFS forecasts to be provided in their current form; and

b) WAFS Aviation GRIB data (in GRIB 1 or GRIB 2 forms) and WAFS SIGWX BUFR should be provided as raw data and visualised by workstation software.

c) further work was necessary by both WAFCs in order to align and converge forecast solutions for CB cloud, icing and turbulence including calibration and verification of the data; and to subsequently provide updated guidance on the use of these products. The WAFCs will provide updates and reports to WAFSOPSG/6.

The implications for a) and b) are discussed below in 2.6. The implications of c) are discussed below in 3.4 and 3.5.

## 2.6 Development of WAFS web-based server forecasts

Following on from the Workshop on the gridded WAFS forecasts for CB cloud, icing and turbulence (Paris, September 2009) immediately preceding the WAFSOPSG/5 meeting, and for the reasons given above in 2.5 a) and b), the requirement for the WAFCs to develop WAFS web-based servers was temporarily suspended.

***Suggested action:*** *Note this information only.*

2.7 **WAFS output performance indicators**

WAFSOPSG/5 endorsed the implementation by WAFC London of additional performance indicators for 850, 700, 500, 400, 300, 275, 225, 200, 150 and 100hPa standard levels to the WAFC London website.

This was implemented by WAFC London on 9th February 2010.

***Suggested action:*** *Note this information only.*

**3. Forthcoming Developements**

3.1 **Provision of WAFS Aviation GRIB 2 data via Satellite (SADIS 2G and ISCS).**

WAFS Aviation GRIB 2 data is planned to be made available (in compressed form) via SADIS 2G and ISCS G2 in compliance with Amendment 75 of Annex 3 – *Meteorological Service for International Air Navigation*, effective 18th November 2010. Note, initially the parameters for CB Cloud, icing and turbulence will *not* be transmitted. Transmission of these parameters will be implemented following endorsement by WAFSOPSG.

***Suggested action:*** *Note this information and monitor the WAFS Change Implementation Notice Board on WAFSOPSG for further information on implementations.*

3.2 **Update to the legend box text of WAFS forecasts.**

WAFSOPSG/5 endorsed the need to more explicit information on the issuer and the provider of WAFS Aviation GRIB (GRIB 1 or GRIB 2) and SIGWX BUFR/PNG forecasts. This primarily requires the provider of the data to be explicitly stated along with the issuer of the source data (one of the WAFCs).

The change to legend information is due to be implemented on 18th November 2010.

Appendix B to this paper provides example templates for the updated Legend boxes.

***Suggested action:*** *Note this information and consider visiting the WAFSOPSG website to obtain information relating to the updated WAFS forecast legend boxes.*

3.3 **Coordination between the WAFCs and the TCACs**

Following successful trials of web-based coordination between WAFCs and the Tropical Cyclone Advisory Centres (TCACs) for the purposes of increased harmonisation of tropical cyclone information, WAFSOPSG/5 endorsed the decision to maintain such coordination procedures.

***Suggested action:*** *Note this information and monitor the WAFS Change Implementation Notice Board on the WAFSOPSG website for further information on implementation.*

3.4 **Further development of WAFS upper-air forecasts for CB Cloud, icing, and turbulence.**

Following on from feedback gained at the WAFS workshop for gridded CB cloud, icing and turbulence (Paris, September 2009) and subsequent WAFSOPSG/5 meeting, the two WAFCs continue to harmonise the calibration and verification of the products as well as converging the consistency of the forecasts.

The WAFCs will provide a progress report to the WAFSOPSG/6 meeting.

***Suggested action:*** *Note this information and monitor WAFSOPSG website for information on ongoing development.*

3.5 **Guidance and training for States on the use and visualisation of new gridded WAFS forecasts**

Draft guidance in the use of the gridded WAFS forecasts for CB clouds, icing and turbulence was presented to WAFSOPSG/5. Whilst a good starting point, in light of ongoing development, updates to the guidance are expected to be provided to WAFSOPSG/6 as part of the endorsement process for these forecasts.

In addition, The WAFSOPSG/5 noted that the need for training related to the "roll-out" of the new gridded forecasts had been recognized by most planning and implementation regional groups (PIRGs) which had formulated conclusions calling for the WAFC Provider States to organize training seminars on the use of the new gridded WAFS forecasts for CB clouds, icing and turbulence.

The group agreed that the availability of continuous training would be highly useful; therefore, it was considered important to develop computer-based training products for distribution to States and a web-based training package. The web-based training package will be based around a free and open-source e-learning software platform and available to all States and WAFS users; and the outline of proposed training, including associated costs, will be tabled for endorsement by the WAFSOPSG/6 Meeting.

***Suggested action:*** *Consider what training needs your State will have regarding the interpretation and use of the new gridded products.*

## 4. Action required by the Meeting

4.1 The APANPIRG CNS/MET Sub-Group is invited to review the content of this working paper and to consider suggested actions.

– – – – – – – – – – – –

## APPENDIX A

## BRIEF REVIEW OF DIFFERENCES BETWEEN WAFS AVIATION GRIB 2 AND GRIB 1 DATASETS.

WAFS Aviation GRIB 2 data benefits over WAFS Aviation GRIB 1 by:

a) higher spatial and temporal resolution

1) being based on a regular 1.25*1.25 degree (unthinned) grid

2) higher temporal resolution - T+6 to T+36 at 3-hourly time intervals

3) additional flight level information at FL270, FL320 and FL360

b) expected future operational implementation of icing, turbulence and CB cloud forecasts (Note, GRIB 1 versions of these parameters are expected to be withdrawn)

**APPENDIX B**

**Example of proposed format of WAFS GRIB (GRIB 1 and GRIB 2), SIGWX BUFR and SIGWX PNG Legend Boxes (from 18th November 2010).**

Adopt the following text in the legend box of WAFS charts. For charts:

1) based on GRIB data:

**ISSUED BY WAFC [LONDON/WASHINGTON]**
**PROVIDED BY [COMPANY NAME]**
**[PRODUCT NAME]**
**FL[XXX]**
**FIXED TIME PROGNOSTIC CHART**
**VALID [XX] UTC ON [XX XXX XXXX]**
**BASED ON [XX] UTC DATA ON [XX XXX XXXX]**
**UNITS USED: [UNITS]**
**HEIGHTS IN FLIGHT LEVELS**
**TEMPERATURES NEGATIVE**
**UNLESS PREFIXED BY A + OR PS**

2) based on BUFR data:

**ISSUED BY WAFC [LONDON/WASHINGTON]**
**PROVIDED BY [COMPANY NAME]**
**FIXED TIME PROGNOSTIC CHART**
**ICAO AREA [X] SIGWX**
**FL[XXX-XXX]**
**VALID [XX] UTC ON [XX XXX XXXX]**
**CB IMPLIES TS, GR MOD OR SEV TURB AND ICE**
**UNITS USED: HEIGHTS IN FLIGHT LEVELS**
**CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA**