



*International Civil Aviation Organization*

**Ninth Meeting of the Communications/Navigation/Surveillance and Meteorology Sub-Group (CNS/MET/SG/9) of APANPIRG**

Bangkok, Thailand, 11 – 15 July 2005

**Agenda Item 8(2): Review of the implementation of WAFS:  
Transition to GRIB and BUFR coded WAFS products**

**REGIONAL PROGRESS IN WAFS IMPLEMENTATION**

(Presented by Chairman, WAFS Implementation Task Force)

**SUMMARY**

This paper reports on the progress of WAFS transition to GRIB and BUFR coded WAFS products and WAFS implementation in the Asia/Pacific Region.

**1. INTRODUCTION**

1.1 Subsequent to CNS/MET SG/8, the second meeting of the WAFSOPSG (WAFSOPSG/2) was held during 8-11 March 2005 to discuss the operation and development of WAFS. This paper presents the major outcomes of WAFSOPSG/2 in respect of GRIB and BUFR migration and discusses the follow-up actions that are needed to ensure smooth transition in the ASIA/PAC Region.

**2. WAFSOPSG/2 OUTCOMES IN RELATION TO GRIB AND BUFR MIGRATION**

2.1 The executive summary and full report of WAFSOPSG/2 are available on the WAFSOPSG website at <http://www.icao.int/anb/wafsopsg/meetings/wafsopsg2/report/>. In particular, the meeting may like to note the following outcomes related to GRIB and BUFR migration.

2.2 The meeting may recall that CNS/MET SG/8 formulated Draft Conclusion 8/23 to invite the WAFSOPSG to consider, as a matter of urgency, the continuation of the issuance of WAFS SIGWX forecasts in a chart form, for a limited period of time after 1 July 2005 to ensure that the WAFS users be prepared to operationally use BUFR-coded WAFS products in SIGWX chart production. This was subsequently endorsed by APANPIRG/15 as Conclusion 15/32. WAFSOPSG/2 concurred that the issuance of SIGWX forecasts in T4 chart form should be continued, in parallel with the use of BUFR code form, for a limited period of time until 30 November 2006. On the other hand, it was emphasized that this extension did not concern the GRIB code form, i.e. the exclusive use of the GRIB code form for the Wind/Temp forecasts within the WAFS would take place on 1 July 2005 as scheduled.

2.3 WAFSOPSG/2 also felt that ICAO Regional Offices should carry out a survey in

May 2006 to verify the implementation of the reception and utilization of BUFR-coded SIGWX forecasts by States, and that the Secretariat should present the results of this consultation for consideration and future action by WAFSOPSG/3 scheduled to be held in September 2006. States and users are expected to be able to purchase the necessary BUFR decoding software in time for the new cut-off date; if an additional extension were considered necessary, WAFSOPSG/3 would still be in a position to consider prolonging the provision of SIGWX forecasts in chart form beyond 30 November 2006. As the WAFS Implementation Task Force (WAFS/I TF) is responsible for coordinating the replacement of SIGWX charts in T4 facsimile format by BUFR encoded products in the Asia/Pacific Region, the meeting may wish to consider requesting the TF to conduct the above-mentioned survey and formulate the following draft Conclusion:

**Draft Conclusion 9/xx – Survey on the Implementation of the Reception and Utilization of BUFR-coded SIGWX Forecasts in ASIA/PAC**

That, the WAFS Implementation Task Force (WAFS/I TF) be requested to conduct a survey in May 2006, with assistance of the ICAO Regional Office, to verify the implementation of the reception and utilization of BUFR-coded SIGWX forecasts by States in the Asia/Pacific Region.

2.4 Another proposal related to SIGWX forecasts in chart form was formulated by WAFSOPSG/2 calling for the WAFS Provider States to provide, on a trial basis, WAFS SIGWX forecasts in chart form for the fixed ICAO areas of coverage using the industry standard Portable Network Graphics (PNG) graphical format or an equivalent industry standard, place these charts on the WAFS FTP server by 1 July 2005 and to report back to WAFSOPSG/3 which would assess the desirability of continuing the provision of WAFS SIGWX forecasts in chart form using the PNG format or an equivalent industry standard. The meeting may like to note that WAFS London SIGWX forecasts in PNG format have been made available on the WAFS FTP server since May 2005.

2.5 WAFSOPSG/2 also agreed that, in response to APANPIRG Conclusion 15/34 formulated by this sub-group, WAFS London should amend the *Guidelines for representing WAFS significant weather (SIGWX) data in BUFR* requiring that the WAFS visualization software should automatically generate compliant SIGWX charts from the BUFR code for the standard ICAO areas and bring the amended guidelines to the attention of software vendors. The meeting may wish to note that the amendments have been made by WAFS London and the latest version (Version 2.6) of the Guidelines have been made available on the ICAO WAFSOPSG website: [http://www.icao.int/anb/wafsopsg/WAFS\\_SIGWX\\_BUFR-V2.pdf](http://www.icao.int/anb/wafsopsg/WAFS_SIGWX_BUFR-V2.pdf). The updated Guidelines have also addressed a number of technical issues, including:

- (a) plotting scheme for coinciding tropical cyclone, volcano and/or radiation events, which would give the highest priority to volcanic ash, followed by radiation events and tropical cyclones;
- (b) plotting scheme giving preference to the letters of the cities over labels and text boxes with the understanding that the meteorological phenomena would continue to maintain the highest priority at all times as far as the display was concerned; and
- (c) a recommendation that the workstation software complies fully with ICAO Annex 3 (especially the Appendix 8 SARPs).

### 3. REGIONAL PROGRESS

3.1 The progress of WAFS implementation in the ASIA/PAC Regions 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/8 in July 2004 and is included as the Appendix to this paper for review and necessary updating by this meeting.

3.2 The meeting is invited to review the progress of WAFS implementation in the Asia/Pacific Region against the “Indicative Timetable for Implementation of WAFS” given in the “ASIA/PAC WAFS Implementation Plan and Procedures” (see Attachment 1 of Appendix), in particular the progress of the following items which are already due for completion: -

<b>Item</b>	<b>Task/Stage of Implementation of WAFS</b>	<b>Anticipated Date</b>
4	All states that receive GRIB products capable of converting GRIB forecasts to Wind/Temp charts	early 2005
5	Removal of T4 Facsimile Wind/Temp charts from the satellite broadcast	1 July 2005
7	States having the ability to operate the decoding software to convert BUFR SIGWX messages into graphical format	early 2005
8	The satellite distribution by the two WAFCs of global SWH and of SWM for limited geographical areas in BUFR format	June 2003 (SADIS SWH) late 2004 (SADIS SWM) late 2004 (ISCS SWH & SWM)

3.3 As regards items 4 and 5, by the time of the meeting in July 2005, the exclusive use of the GRIB code form for the Wind/Temp forecasts within the WAFS should have already been achieved. As regards item 7, the meeting may wish to note that SADIS and ISCS Provider States had provided a conjoint training on the operational use of GRIB and BUFR coded WAFS products for both SADIS and ISCS user States in the ASIA/PAC Region at the ICAO regional office in January 2005. Experts of this meeting are invited to provide updates of the States’ readiness in the production of charts from GRIB and BUFR coded WAFS forecasts at the meeting.

3.4 As regards item 8, the meeting may wish to note that the satellite distribution of SWM for limited geographical areas in BUFR format was achieved by WAFS London in early April 2005. The satellite distribution of SWH and SWM in BUFR format by WAFS Washington was expected to be achieved in June 2005. BUFR data for testing purpose generated by WAFS Washington had become available on the ISCS satellite broadcast and via Internet since January 2005.

3.5 In view of the need of continuous monitoring of the progress of BUFR migration in the Asia/Pacific Region and providing survey feedback to WAFSOPSG/3 for deciding on whether additional extension of the provision of SIGWX forecasts in chart form will be required, the meeting may wish to consider the need for updating the ASIA/PAC WAFS Implementation Plan and Procedures and the work programme of the WAFS/I TF, and formulate the following draft Conclusion:

**Draft Conclusion 9/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 \_ to the report;
- (b) the work programme of the WAFS Implementation Task Force be amended as given in Appendix \_ to the report.

**4. OTHER ISSUES IN RELATION TO BUFR MIGRATION**

4.1 During 30 November – 23 December 2004, Hong Kong, China conducted a survey to collect feedback from airlines operating at the Hong Kong International Airport on the new SIGWX charts generated from BUFR coded WAFS data using one of the visualization software packages evaluated by WAFC London. The majority of the airlines found the new BUFR charts an improvement over the existing T4 charts and support them replacing the existing T4 charts. In view of this positive feedback, Hong Kong, China is planning for the operational use of BUFR charts and to progressively introduce new customized BUFR charts for additional areas based on airlines' requests. Details of the survey results can be found in a working paper (WP/17) discussed at WAFSOPSG/2 (<http://www.icao.int/anb/wafsopsg/meetings/wafsopsg2/wp/Wp17.pdf>).

4.2 Based on users' feedback to the survey, it was suggested that aerodromes on the SIGWX charts should be indicated using the standard ICAO location indicator, instead of the first letter of the city, as currently stipulated by Appendix 8 para. 4.1.1.1 d) of Annex 3. The initial view of WAFSOPSG/2 was that the proposed addition of three letters could, under certain circumstances, increase clutter and might therefore be undesirable. Unless there was a general requirement, they would not further consider the proposed change. However, on further discussions with airline users and IFALPA representatives on this outcome, the request for indicating the aerodromes on the SIGWX charts using the standard ICAO location indicator is maintained and strongly supported. The meeting may therefore wish to consider whether there are merits in this request, and if so, formulate the following draft Conclusion:

**Draft Conclusion 9/xx – Depiction of Aerodromes on SIGWX Charts**

That, ICAO be invited to consider amending Annex 3 so that the aerodromes on the SIGWX charts should be required to be indicated using the standard ICAO location indicator, instead of the first letter of the city.

4.3 In the course of discussion with airline users on the operational use of the new BUFR charts, the uninterrupted availability of these charts were highlighted. The meeting may recall that in early April 2005 when BUFR coded SWM became available from WAFC London, a number of other changes were made at the same time to the BUFR descriptors/message header affecting the

encoding/decoding of turbulence, jet streams, tropical cyclones, volcanoes, sandstorms, and radiation events. These changes to the BUFR coded SIGWX forecasts, which were not backward compatible, led to interruption of the new BUFR chart service for many days, possibly due to the lack of sufficient time for the software modifications and/or adequate testing of the modified software. The meeting may like to consider inviting the WAFM Provider States to review the current procedures for implementation of changes to the BUFR coded SIGWX forecasts so that all the stakeholders involved will be well prepared for future changes and formulate the following draft Conclusion:

**Draft Conclusion 9/xx – Procedures for Implementation of Changes to the BUFR coded SIGWX Forecasts**

That, the WAFM Provider States be invited to review the current procedures for implementation of changes to the BUFR coded SIGWX forecasts with a view to ensure that all the stakeholders involved will be well prepared for future changes.

**5. ACTION BY THE MEETING**

5.1 The meeting is invited to:

- (a) note the information in this paper;
- (b) agree on the proposed draft conclusions; and
- (c) consider further actions to be taken to foster WAFS implementation in the ASIA/PAC Region.

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# **ASIA/PAC WAFS Implementation Plan and Procedures**

7<sup>th</sup> Edition - July 2004

## ASIA/PAC WAFS Implementation Plan and Procedures

7th Edition - July 2004

### Introduction

1. The Asia/Pacific WAFS Implementation Plan and Procedures has been revised to take account of progress already made and in recognition of the impact of the migration to GRIB and BUFR.

### The Implementation of WAFS

2. This plan is based on the understanding that the implementation of WAFS in the Asia/Pacific Regions involves:

- a. Production and dissemination by the WAFCs of global forecast winds, temperatures, tropopause height, tropopause temperature and humidity in GRIB format.
- b. The transfer of responsibility for the production for SWH from RAFCs to the two WAFCs, and hence the closing down of the RAFCs.
- c. The implementation of a communication system/s for the distribution of WAFS products in the Asia/Pacific Regions, to all the States that require the products in support of international air navigation. This will be achieved via satellite broadcast (SADIS and ISCS/2). States may need to use an alternative distribution system.
- d. The production and distribution (via satellite broadcast) by the WAFCs, of Global, quality controlled SWH (FL 250 - 630) in BUFR format.
- e. The production and distribution (via satellite broadcast) by the WAFCs of quality controlled SWM (FL 100 - 250) in BUFR format over limited geographical areas where required by PIRGs.
- f. The capability of States to convert BUFR and GRIB messages to graphical products on an operational basis.

### SIGWX Charts

3. The table below shows the status of the SIGWX charts and responsible WAFCs.

Chart area & responsible WAFC	
G	London (SWH)
K	London (SWH)
D	London (SWH)
J	Washington (SWH)
E	London (SWH)

F	Washington (SWH)
I	Washington (SWH)
M	Washington (SWH)

4. There will be an ongoing requirement for NMSs to monitor the quality of WAFC products.
5. Action required to be taken by States to adhere to the provision of Annex 3 to ensure the relevant advisories for tropical cyclones, volcanic ash, the accidental release of radio active material and SIGMETs are made available to the WAFCs in a timely manner.
6. The SIGWX charts produced by WAFC Washington are also available on the US NWS Aviation Weather Center Internet site at: <http://www.nws.noaa.gov/iscs>. All WAFC London products are available on a password controlled internet-based FTP site, together with appropriate GRIB and BUFR decoding facilities.
7. States are encouraged to send comments to the WAFCs about the quality and accuracy of SIGWX on a frequent and regular basis. Contact details for comments are:

**WAFC Washington**

- i. NWS/Aviation Weather Center  
Attention: Mr Mike Campbell  
7220 NW 101<sup>st</sup> Terrace  
Kansas City, Missouri  
USA 64153-2371
- ii. E-mail addressed to: [mike.campbell@noaa.gov](mailto:mike.campbell@noaa.gov)
- iii. Fax number: 1 816 880 0650

**WAFC London**

- i. The Met. Office  
Attention: Mr. Nigel Gait  
International Aviation Manager  
Fitzroy Road  
Exeter  
Devon EX1 3PB  
United Kingdom
- ii. E-mail addressed to: [nigel.gait@metoffice.com](mailto:nigel.gait@metoffice.com)
- iii. Fax number: +44 (1392) 885 681

**Distribution of WAFS Products**

8. Most States in the Asia/Pacific Regions are receiving wind, temperature and humidity forecasts in GRIB, and SIGWX in T4 facsimile format from the two WAFCs by VSAT, either SADIS or ISCS/2. A range of WAFS products are available via the Internet and through bilateral arrangements with neighbouring national meteorological services.

Appendix

9. The two WAFCs will distribute by satellite broadcast Global, quality controlled SWH and quality controlled SWM for limited geographical areas (Note: WAFC London started the operational distribution of Global, quality controlled SWH by satellite broadcast in June 2003) . Once suitable decoding and visualization software has been acquired by States in the Asia/Pacific Regions, to provide them with the ability to operationally construct graphical SIGWX from the BUFR messages, and graphical products from the GRIB messages, the T4 facsimile format charts will be eliminated from the satellite broadcasts.

**Indicative Timetable for Achieving the Final Phase of WAFS**

10. The table given in Attachment 1 provides an indicative timetable for the implementation of WAFS within the Asia/Pacific Regions.

**Volcanic Ash Advisory Centres (VAACs)**

11. The VAACs will have an ongoing role of monitoring WAFS SIGWX charts that cover their areas of responsibility, and advising the appropriate WAFC to ensure the accurate inclusion of the volcanic ash symbol.

**Tropical Cyclone Advisory Centres (TCAC)**

12. The TCACs will have an ongoing role of monitoring WAFS SIGWX charts that cover their areas of responsibility, and advising the appropriate WAFC to ensure the accurate inclusion of the tropical cyclone symbol.

**ASIA/PAC WAFS Implementation Plan and Procedures****Attachment 1***Indicative Timetable for Implementation of WAFS*

<b>Item</b>	<b>Task/Stage of Implementation of WAFS</b>	<b>Anticipated Date</b>
1	W AFC London products on access controlled internet site	completed
2	The establishment of back-up distribution arrangements for WAFS products	completed
3	Training in the operational conversion of GRIB forecasts to Wind / Temp charts	late 2002 (SADIS) January 2005 (ISCS)
4	All states that receive GRIB products capable of converting GRIB forecasts to Wind / Temp charts	early 2005
5	Removal of T4 Facsimile Wind / Temp charts from the satellite broadcast	1 July 2005
6	Training in the operational conversion of BUFR to SIGWX charts	late 2002 (SADIS) January 2005 (ISCS)
7	States having the ability to operate the decoding software to convert BUFR SIGWX messages into graphical format	early 2005
8	The satellite distribution by the two WAFCs of global SWH and of SWM for limited geographical areas in BUFR format	June 2003 (SADIS SWH) late 2004 (SADIS SWM) late 2004 (ISCS SWH & SWM)
9	Removal of T4 Facsimile SIGWX products from the satellite broadcast	1 July 2005