International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)
Tenth Meeting of the GREPECAS Aeronautical Meteorology Subgroup (AERMETSG/10)
Buenos Aires, Argentina, 19 to 23 October 2009

Agenda Item 2: Implementation of the World Area Forecast System (WAFS)

a) Review of the outcome of WAFSOPSG/4 Meeting

FOLLOW-UP TO WAFSOPSG/4 CONCLUSIONS

(Presented by the Secretariat)

1. Introduction

1.1 The Fourth Meeting of the World Area Forecast System Operations Group (WAFSOPSG/4) was carried out from 26 to 28 February 2008 in Cairo, Egypt. The meeting formulated 14 conclusions and 10 decisions. Complete information regarding WAFSOPSG meetings can be found at WAFSOPSG website: http://www2.icao.int/en/anb/met-aim/met/wafsopsg, available in English only.

2. Implementation status of WAFSOPSG/4 Meeting conclusions

2.1 Considering that the follow-up information of the conclusions of the Fourth Meeting of the World Area Forecast System Operations Group (WAFSOPSG/4) is published in English in the above mentioned website, the **Appendix** to this information paper includes the Follow-up Table to the conclusions formulated by this operations group.

3. Action suggested by the AERMETSG

3.1 The Subgroup is invited to take note of the information provided in this information paper.

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APPENDIX

FOLLOW-UP WAFSOPSG/4 CONCLUSIONS (C)

Status on 22 January 2009

● = action by the Air Navigation Commission
√ = action completed
X = action not completed

Note. — No follow-up will be undertaken on the WAFSOPSG decisions.

No.	Title/Action	Follow-up action (target/completion date in brackets)
4/2 √	**Amendment to WAFS-related regional procedures in the ANP/FASID** That, the Secretariat forwards the WAFS-related regional procedures as shown in Appendix B to this report to the ICAO Regional Offices concerned for onward transmission to States for comment, as necessary in view of their early inclusion in the ANP/FASID concerned.	ICAO Memo to regional offices containing the updated regional procedures. (14 May 2008)
4/3 ● √	**Amendment to Annex 3** That, the proposal to amend Annex 3 — *Meteorological Service for International Air Navigation* given in Appendix C to this report be included as part of Amendment 75 to Annex 3.	ICAO Preliminary review by ANC. (13 May 2008)
4/4 √	**Harmonization of the OPMET bulletin format in the ISCS broadcast with that used in the SADIS broadcast** That, ISCS Provider State be invited to harmonize the OPMET bulletin format with that provided via the SADIS satellite broadcast by August 2008. *Note. — This plan will allow time for ISCS vendors and users to make the necessary changes*.	ISCS Provider State The OPMET bulletin format harmonized with SADIS. (17 September 2008)
4/6	**Height coordinate of the tropopause and maximum wind in WAFS gridded forecasts** That, the WAFC Provider States be invited to: a) use flight levels as the height co-ordinates for the tropopause and maximum wind; b) increase the maximum forecast flight level of the tropopause to flight level 600; and c) implement the changes referred to in a) and b) above simultaneously with the introduction of WAFS forecasts in the GRIB 2 code form. *Note 1. — Units used are geopotential metres referenced to the ICAO Standard Atmosphere rounded to the nearest flight level.* *Note 2. — ISCS users' attention will be drawn to the use of altitudes above mean sea level in connection with tropopause and maximum wind by WAFC Washington in the ISCS User Guide.*	WAFC Provider States Harmonize the height coordinates for tropo-pause and maximum wind as called for a) to b). (September 2009)

No.	Title/Action	Follow-up action (target/completion date in brackets)
4/8	**Coordination between WAFCs and TCACs** That, the WAFC Provider States be invited to: a) assess the feasibility of, and benefits for the WAFS from, establishing and maintaining contact with the TCACs in order to harmonize the information on tropical cyclones in the WAFS SIGWX forecasts and the TCAC advisories; and b) report their findings to the WAFSOPSG/5 Meeting.	WAFC Provider State Assess the feasibility of coordination; report to the WAFSOPSG/5. (May 2009)
4/11 **X**	**Further development of WAFS output performance indicators** That, the a) WAFSOPSG Members from Australia and New Zealand, in coordination with the WAFSOPSG Members from IATA and WMO, be invited to undertake a study in view of developing proposals for user-oriented WAFS output performance indicators by the end of 2008; b) WAFC Provider States be invited to: 1) assess the possibility of — providing output performance indicators as outlined in the proposals developed under a) above; — including performance indicators for wind and temperature for the WMO defined verification area covering Australia and New Zealand, in view of the high number of extra long-haul operations in that region; — providing wind and temperature performance indicators globally for all standard forecast levels (in digital and chart format, as appropriate); and 2) report back to the WAFSOPSG/5 Meeting.	WAFSOPSG Members from Australia and New Zealand Study the development of user-oriented output performance indicators could not be completed due to the lack of progress. WAFC Provider States Assessment of the proposals could not be undertaken since no proposals were developed under a). (31 December 2008)

No.	Title/Action	Follow-up action (target/completion date in brackets)
4/12	**Improvements in the temporal and spatial resolutions of WAFS upper wind and other upper-air forecasts** That, the WAFC Provider States be invited to: a) provide two additional levels at FL 320 (275 hPa) and FL 360 (225 hPa); b) replace the current thinned grid with a regular grid with a resolution of 1.25 degrees; c) change the temporal resolution from 6 to 3 hours, i.e. provide forecasts at time steps of T+6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36 hours from the analysis time; and *Note 1. — The spatial resolution and the update cycle (i.e. 4 times per day for upper-air forecasts based on observation times of 00, 06, 12 and 18 UTC) would remain unchanged.* *Note 2. — The corresponding draft amendment to Annex 3 is presented under Agenda Item 4.* √ d) study, in coordination with the WAFSOPSG Member from IATA, the desirability of improving vertical resolution below FL 300 to address the specific needs of flight operations over polar regions.	WAFC Provider States Indicate the readiness to implement the improvements to temporal and spatial resolutions by November 2010. (September 2009) An additional level (FL 270 (350 hPa)) considered desirable (30 September 2008)
4/13	**Implementation of the high-resolution upper wind and other upper-air forecasts** That, the WAFC Provider States be invited to develop the higher resolution upper air forecasts, as per the specification given in Appendix D to this report, in time for the WAFSOPSG/5 Meeting.	WAFC Provider States Indicate the readiness to implement the high-resolution forecasts by November 2010. (September 2009)

No.	Title/Action	Follow-up action (target/completion date in brackets)
4/14	**Introduction of the gridded forecasts of turbulence, icing and cumulonimbus clouds** That, concerning the introduction of gridded forecasts of turbulence, icing and cumulonimbus (CB) clouds, the WAFC Provider States be invited to: a) minimize the time where both human and gridded forecasts are considered operational; *Note. — Longer periods where gridded test forecasts are available are fully acceptable provided that they are clearly labelled as such.* b) design the gridded forecasts with a high "at a glance" value; *Note. — The gridded forecasts do not have to replicate the existing SIGWX forecasts; however, they must provide the same ease of use.* c) ensure that terms and values used in the gridded forecasts relate to commonly understood terms; d) make no distinction between embedded and non-embedded CB fields; e) undertake studies of the accuracy of the gridded forecasts in view of ensuring that their accuracy be comparable to the current human-generated SIGWX forecasts; and f) report back on action taken on items a) to e) to the WAFSOPSG/5 Meeting.	WAFC Provider States Take action on a) to e); report thereon to the WAFSOPSG/5. (May 2009)
4/16	**Development of guidance for the use of gridded WAFS forecasts of turbulence, icing and cumulonimbus clouds** That, the WAFC Provider States, in coordination with the WAFSOPSG Members of IATA, IFALPA and WMO, be invited to produce a general guidance document on the intended use of the gridded WAFS forecasts of turbulence, icing and cumulonimbus clouds, in time of the WAFSOPSG/5 Meeting. *Note. — The guidance to be developed will be placed on the WAFSOPSG website.*	WAFC Provider States Develop guidance. (May 2009)
4/17	**Outstanding issues related to WAFS gridded forecasts for icing, turbulence and cumulonimbus clouds** That, a) the WAFC Provider States, in coordination with the WAFSOPSG Members from IATA, IFALPA and WMO, be invited to: 1) undertake systematic comparisons of the trial gridded forecasts of icing, turbulence and cumulonimbus clouds of the two WAFC models, highlighting characteristics of areas with different values; 2) report on their findings on the characteristics and limitations of these forecasts, together with appropriate guidance, to the WAFSOPSG/5 Meeting; 3) agree on the aligned algorithms to be adopted by the WAFCs for generating these forecasts based on the results of the systematic comparisons, and 4) design training for States and WAFS users after completion of 1) to 3) above; and b) the WMO Member of the WAFSOPSG, based on information to be provided by the WMO AMDAR Panel, report on progress on the implementation of EDR	WAFC Provider States Undertake the required assessment and alignment; report to the WAFSOPSG/5. (May 2009) WAFSOPSG Member from WMO

No.	Title/Action	Follow-up action (target/completion date in brackets)
	turbulence reporting in routine AMDAR reports at the WAFSOPSG/5 Meeting.	Prepare progress report. (May 2009)
4/19	**Use of concatenated WAFS forecasts in particular for long-haul flights** That, a) the ICAO Secretariat, in coordination with WMO, develop Annex 3 provisions to enable the provision of concatenated route-specific wind/temperature forecasts generated preferably from interpolating data from consecutive forecast times, for review by the WAFSOPSG/6 Meeting; and b) the WAFSOPSG Members from China (Rapporteur), France and Oman, in coordination with the WAFS Provider States and WAFSOPSG Members from IATA, IFALPA and WMO, study if the interpolation could similarly be applied to the gridded forecasts of cumulonimbus clouds, icing and turbulence and report back to the WAFSOPSG/5 Meeting.	ICAO Include as an element of draft Amendment 76 to Annex 3. (January 2011) WAFSOPSG Member from China Undertake the study; report to the WAFSOPSG/5. (May 2009)
4/20 ●	**Development of a web-based distribution of WAFS forecasts for the future intended use in flight documentation for improved access and visualization of WAFS forecasts** That, the WAFC Provider States, in coordination with the WAFSOPSG Members form IATA and IFALPA, be invited to proceed with the development of a web-based interface (one from each WAFC) for the provision of a minimum set of WAFS charts. *Note. — The new service will:* a) *provide objective gridded forecasts of icing, turbulence and cumulonimbus clouds, derived from GRIB 2 formatted data, for intended use in flight documentation;* b) *once operational, conform to guidance in Doc 9855, Guidelines on the Use of the Public Internet for Aeronautical Applications and the Guidelines on the authorized access to WAFS forecasts (Appendix 1 to the Doc 8896, Manual of Aeronautical Meteorological Practice; and* c) *be targeted primarily at the least developed countries, which may not be in a position to convert the GRIB and/or BUFR coded forecasts into chart form.*	WAFC Provider States Develop a web-based interface. (May 2009)
4/24 ● √	**Workshop on the gridded forecasts of cumulonimbus clouds, icing and turbulence** That, in view of facilitating the implementation of the gridded forecasts of cumulonimbus clouds, icing and turbulence, the WAFC Provider States, in coordination with ICAO and WMO, be invited to convene a workshop on the use and visualization of gridded WAFS forecasts of cumulonimbus clouds, icing and turbulence. *Note. — The workshop is expected to be held during the week of the WAFSOPSG/5 Meeting.*	ICAO Letter to WAFC Provider States and WMO. (27 May 2008)

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