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)

(Presented by the Secretariat)

SUMMARY

This working paper presents information on the progress of the World Area Forecast System (WAFS), in accordance with the results of the Fifth Meeting of the WAFS Operations Group (WAFSOPSG/5), and the implementation status in CAR/SAM States.

References:

- Report of the Fifth Meeting of the World Area Forecast System Operations Group (WAFSOPSG/5, Paris, France, 16 to 18 September 2009).

1. Introduction

1.1 The Meeting will recall that, according to its Terms of Reference, the WAFSOPSG, among others, reviews regularly "WAFS global procedures" contained in the air navigation plans/documents on facilities and services (ANP/FASID), and initiates amendments to all the ANP/FASID. Such proposals for amendment are subsequently referred to ICAO Regional Offices to be processed and retransmitted to the States, as appropriate. Likewise, the WAFSOPSG prepares proposals for the development of the WAFS in order to ensure that it continues to meet evolving global, and, where appropriate, regional operational requirements, under ICAO procedures for the amendment to Annex 3.

2. Discussion

a) Review the outcome of WAFSOPSG/5 Meeting

2.1 The Fifth Meeting of the WAFS Operations Group (WAFSOPSG/5) was carried out from 16 to 18 September 2009 in Paris, France; the Group formulated 12 Conclusions and 8 Decisions. The executive summary is reproduced in **Appendix A** to this working paper. Complete information regarding this and other WAFSOPSG meetings can be found, only in English, at the WAFSOPSG website: http://www.icao.int/anb/wafsopsg.

Review of ANP/FASID procedures

2.2 The Group, when reviewing the global WAFS procedures, approved a draft modification to the regional procedures in order to introduce the following changes:

a) introduction of a reference to the ISCS and SADIS FTP services used in parallel with the satellite broadcasts;

b) deletion of FASID Tables MET 6 concerning the responsibilities of world area forecast centres (WAFC); these tables had become redundant since such responsibilities were now global and included in detail in Annex 3; and

c) replacement of FASID Tables MET 7 by links to the appropriate websites containing the up-to-date lists of international satellite communications system (ISCS) and satellite distribution system for information relating to air navigation (SADIS) users.

2.3 In this regard, the Group approved Conclusion 5/2, urging the Secretariat to forward the WAFS-related regional procedures, as shown in **Appendix B** to this working paper, to the ICAO Regional Offices. These amendments will be included in the consolidated proposal for amendment, which is normally prepared and circulated to CAR/SAM States and international organizations annually by the South American Regional Office of Lima.

b) Review the status of implementation of ISCS

2.4 The group noted the plan by the ISCS Provider State to replace its second-generation ISCS (ISCS-G2), since the existing service contract for the ISCS-G2 was nearing its termination and could not be extended beyond 2012. It was highlighted by the ISCS Provider State that at this stage, the future methods of dissemination of WAFS forecasts and OPMET data had not been established and that two scenarios were envisaged:

a) use of a combination of the third-generation ISCS (ISCS-G3) and an Internet-based service called “WAFS Internet File Server (WIFS)”; or

b) exclusive use of the WIFS.

2.5 The group noted that the WIFS, which was being developed to support the distribution of all WAFS forecasts, would allow States, through the use of the Public Internet, to have access to all WAFS forecasts and OPMET data currently available through the ISCS. In view of the cost effectiveness of Internet-based distribution systems, both for the service provider and users, the WIFS will be implemented by the ISCS Provider State as soon as possible and no later than March 2010.

2.6 In addition, the group considered the possibility of allowing the use of the public Internet for the distribution of all WAFS forecasts and OPMET data for flight planning purposes and agreed that the use of the public Internet for disseminating OPMET data for such purposes was non-time critical (Decision 5/9) and therefore is considered to be in full agreement with ICAO provisions, expected to be applicable in 2010.

2.7 In this regard, it is expected that on the basis of the information presented by the WAFS and ISCS Provider State to the Meeting, the Subgroup could adopt a position in this respect and update the current implementation plan for the transition from GRIB 1 to GRIB 2 code, which is presented as **Appendix C** to this working paper.

2.8 Concerning the distribution of WAFS forecast the Group agreed that, in view of their trial nature, the new gridded forecasts for CB clouds, icing and turbulence in the GRIB 2 code form should not yet be made available on satellite broadcasts. However, concurred that they should be available in the ISCS and SADIS FTP services with a disclaimer that would identify them as "GRIB2 trial forecasts" or similar. It was noted that the gridded forecasts would be available to authorized users on the FTP services in the GRIB 2 code form by March 2010 (Conclusion 5/17).

2.9 The WAFSOPSG had developed draft guidance on the intended use of the gridded forecasts; it had been recognized by the group as a good starting point, however it was considered that additional work was necessary to reflect the expected changes. Therefore the WAFSOPSG was tasked to look into issues such as visualization and interpretation of the gridded forecasts(Conclusion 5/11 refers)

2.10 In response to GREPECAS Conclusion 13/17, Lima and Mexico Regional Offices consulted States. The list of ISCS focal points, including the information of the personnel responsible for the operation of the workstations, according to the request of the WAFC Provider State, is presented in **Appendix D**, and the surveys received from eleven States of the SAM Region and 3 from the CAR Region were sent to the WAFC Washington Provider State.

3. Action required

3.1 The meeting is invited to:

a) take note of the contents of this working paper;

b) take note of the contents of Appendices A, B and C to this working paper;

c) update, if required, the ISCS list of focal points presented in Appendix D; and

d) agree on other actions as necessary.

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APPENDIX A

FIFTH MEETING

WORLD AREA FORECAST SYSTEM OPERATIONS GROUP

(Paris, France, 16 to 18 September 2009)

EXECUTIVE SUMMARY[1]

1. INTRODUCTION

1.1 The fifth meeting of the World Area Forecast System Operations Group (WAFSOPSG/5) was held in the European and North Atlantic (EUR/NAT) Regional Office, Paris, 16 to 18 September 2009. The meeting was attended by thirty three experts from fifteen States and three international organizations, (the International Air Transport Association (IATA), the International Federation of Air Line Pilots' Associations (IFALPA) and the World Meteorological Organization (WMO)).

1.2 The Chairman, Mr. Dorinel Visoiu, presided over the meeting throughout its duration.

2. FOLLOW-UP OF WAFSOPSG/3 CONCLUSIONS

2.1 With regard to the follow-up of the conclusions, the group noted that action had been completed on all the issues except for Conclusions 4/11 related to the further development of WAFS output performance indicators, and 4/19 a) related to draft Amendment 76. Work on the outstanding issues would be pursued for review by the WAFSOPSG/6 (Decision 5/1).

3. REVIEW OF ICAO PROVISIONS RELATED TO WAFS

3.1 Under this agenda item, the group reviewed the regional procedures related to world area forecast system (WAFS) and proposed amendments regarding, inter alia, the introduction of a reference to the international satellite communications system (ISCS) and satellite distribution system for information relating to air navigation (SADIS) file transfer protocol (FTP) services used in parallel with the satellite broadcasts (Conclusion 5/2).

4. OPERATION OF THE WAFS

4.1 The group took note of the WAFS management report which had been prepared by the WAFC Provider States and placed on the WAFSOPSG website. The group reviewed the management report, noted its content and expressed satisfaction with the scope of information provided.

4.2 The group noted that the updated version of the *ISCS User Guide* could be retrieved at: www.nws.noaa.gov/iscs. To ensure the currency of the information contained, the group agreed that the *ISCS User Guide* on the WAFSOPSG website should be replaced by a link to the NOAA website (Conclusion 5/3).

[1] The full report is available at the following website: www.icao.int/anb/wafsopsg

4.3 The group reviewed the progress report by world area forecast centre (WAFC) Provider States which outlined their compatibility with Quality Management System (QMS) principles as far as the update of the forecasts was concerned. In order to render their practices in compliance with the Quality Management System (QMS) principles the group agreed to support the implementation of corrections to WAFS significant weather (SIGWX) (Conclusion 5/4).

4.4 With regard to the harmonisation of the information on tropical cyclones (TC) in the WAFS SIGWX forecasts and TC advisories the group noted that a web chat trial between the WAFCs and tropical cyclone advisory centres had taken place. The group considered that the trial had been beneficial for the WAFS and, agreed that such coordination should continue on an operational basis (Decision 5/5).

4.5 The group addressed the implementation of the dissemination of GRIB 2 coded WAFS forecasts on the ISCS and SADIS satellite broadcasts. With regard to the GRIB 2 WAFS forecasts for CB clouds, icing and turbulence the group considered that they were currently experimental in character and should not yet be used operationally. It was agreed that only the fully operational WAFS upper wind/temperature/humidity/tropopause forecasts in the GRIB 2 code form should be available on the ISCS and SADIS broadcasts (Decision 5/6). The introduction of the WAFS forecasts for CB clouds, icing and turbulence therein would be postponed until such a time that the new forecasts would reach a standard deemed acceptable by the WAFSOPSG for flight planning applications.

4.6 The group noted that performance indicators for wind and temperature for the WMO defined area of Australia and New Zealand had been added to the WAFCs websites In this regard it was noted that the WAFC Washington site depicted performance indicators for Flight Levels 050, 100, 180, 240, 300, 320, 360, 390, 450 and 530 while information related to Flight Level 340 was provided by both WAFCs. The group agreed that WAFC London should implement the performance indicators for the additional levels, with the understanding that it would increase their costs by about £ 5000 (Conclusion 5/7).

4.7 In view of ensuring that all SIGWX forecasts contain consistent information at all times, in particular with regard to volcanic ash (VA) and TC, the group agreed to harmonize the issuance times of all SIGWX forecast (Conclusion 5/8).

4.8 The group considered the possibility of allowing the use of the public Internet for the distribution of all WAFS forecasts and OPMET data for flight planning purposes and agreed that the use of the public Internet for disseminating OPMET data for such purposes was non-time-critical (Decision 5/9) and thus in full agreement with the ICAO provisions which were expected to become applicable in 2010.

5. DEVELOPMENT OF THE WAFS

5.1 The group noted a progress report prepared by the WAFCs Provider States dealing with issues concerning the new gridded forecasts for convective clouds, icing and turbulence. The group concurred that the development of gridded (GRIB 2) forecasts for CB clouds, icing and turbulence had progressed well; however, feed-back from the user organizations and user States during the WAFS workshop related to the visualization of the new gridded forecasts indicated that further work was still necessary to improve these forecasts (Conclusion 5/10).

5.2 The group also noted that draft guidance on the intended use of the gridded WAFS forecasts for CB clouds, icing and turbulence in flight documentation had been developed; the group considered that this draft guidance while it was a good starting point, further work by the WAFC

Provider States was required to reflect the expected changes in the visualisation, and to assist in the interpretation, of the gridded forecasts (Conclusion 5/11).

5.3 The group noted that 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 . In addition to these seminars, 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 (Conclusion 5/12).

5.4 With regard to the development of a web-based distribution service (which would provide a minimum set of WAFS charts, intended for flight planning), the group felt that the products that were proposed to be included therein were unsuitable for use in flight documentation and that therefore, the further development of this service should be temporarily suspended until such a time that visualisation standards were resolved to the full satisfaction of the users (Decision 5/13).

5.5 The continued need for receiving information presented similar to the existing SIGWX charts was reiterated by the users; therefore, the group agreed that the WAFC Provider States should develop a proposal for the future visualisation of SIGWX forecasts making increased use of automated forecast data which would allow the presentation of the information similar to the current SIGWX charts (Conclusion 5/14).

5.6 Concerning the use of concatenated WAFS forecasts to meet the needs for long-haul flights the group agreed that it would be desirable to develop Annex 3 provisions to enable the provision of concatenated route-specific gridded forecast charts of CB clouds, icing and turbulence, generated from interpolating data from consecutive forecast times and that the production of such forecasts would be technically feasible as soon as the visualisation standards have been resolved. (Decision 5/15).

5.7 The group considered that there was a need to include, in the legend box of flight documentation, the name of the centre supplying the WAFS forecast to the end user, in view of ensuring traceability. The group realized that to achieve this, a revision to the model charts in Annex 3 would be required (Conclusion 5/16). It was noted that the implementation of this revision would require minor software updates on end-user workstation software.

5.8 Concerning the distribution of WAFS forecast the group agreed that, in view of their trial nature, the new gridded forecasts for CB clouds, icing and turbulence in the GRIB 2 code form should not yet be made available on satellite broadcasts where their experimental nature could not be indicated. However, the group concurred that the gridded WAFS forecasts for CB clouds, icing and turbulence should be included in the ISCS and SADIS FTP services with a disclaimer that would identify them as "GRIB2 trial forecasts" or similar. It was noted that the gridded forecasts would be available to authorized users on the FTP services in the GRIB 2 code form by March 2010(Conclusion 5/17).

6. LONG-TERM PLANNING OF THE WAFS IMPLEMENTATION

6.1 The group reviewed the WAFS 5-year plan to take into account the latest developments and to add expected milestones for the year 2013. (Decision 5/18).

7. FUTURE WORK PROGRAMME

7.1 The group endorsed its work programme where tasks related to the replacement of WAFS SIGWX forecasts and the migration plan to the GRIB 2 code form had been merged into closely related deliverables (Decision 5/19**)**.

7.2 With regard to need for additional items, the group agreed that a new deliverable entitled "migration plan to the NextGen/SESAR" be added to its work programme (Conclusion 5/20) to take account of the influence of such concepts as "4-dimensional weather data cube" and "single authoritative source" included in the United States Federal Aviation Administration (FAA) NextGen/EUROCONTROL SESAR programmes.

— END —

APPENDIX B

MET **VI-S-1**

BASIC ANP

WORLD AREA FORECAST SYSTEM (WAFS)
(FASID Table~~s~~ MET 5~~, MET 6 and MET 7~~)

27. FASID Table MET 5 sets out the CAR/SAM Regions requirements for WAFS forecasts to be provided by WAFC Washington.
[WAFSOPSG, Conclusion 1/2]

28. ~~FASID Table MET 6 sets out the responsibilities of WAFCs London and Washington for the production of WAFS forecasts~~. For back-up purposes, each WAFC should have the capability to produce WAFS forecasts for all the required areas of coverage.

[WAFSOPSG, Conclusion ~~1/2~~5/2]

29. WAFS forecasts should be disseminated by WAFC Washington using the international satellite communications system (ISCS1) covering the reception area shown in FASID Chart CNS [4] or using the ISCS FTP service.
[WAFSOPSG, Conclusion ~~4/2~~5/2]

Editorial Note:- Insert "or using the ISCS FTP service" in the corresponding CNS procedure contained in Part IV of the ANP.

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30. Each State should make the necessary arrangements to receive and make full ~~operational~~ use of operational WAFS forecasts disseminated by WAFC Washington. ~~FASID Table MET 7~~ The lists of the authorized users of the ISCS1 ~~satellite broadcast~~system in the CAR/SAM Regions and location of the operational VSATs and FTPs are available from the following website:

www.weather.gov/iscs (click: "Documents" and "Status of implementation of ISCS listed by ICAO regions") for ISCS.

[WAFSOPSG, Conclusion ~~4/2~~5/2]

FASID

WORLD AREA FORECAST SYSTEM (WAFS)
(FASID Table~~s~~ MET 5~~, MET 6 and MET 7~~)

9. FASID Table MET 5 sets out the CAR/SAM regions= requirements for WAFS forecasts to be provided by WAFC Washington.

~~10. FASID Table MET 6 sets out the responsibilities of WAFCs London and Washington for the production of WAFS forecasts. .~~

~~11. FASID Table MET 7 lists the authorized users of the ISCS1 satellite broadcast in the CAR/SAM regions and location of the operational VSATs. The table is included in the FASID for information purposes and kept up-to-date by the Regional Offices concerned.~~

FASID TABLE MET 5/TABLA MET 5 DEL FASID

REQUIREMENTS FOR WAFS FORECASTS

REQUISITOS DE PRONÓSTICOS ELABORADOS POR EL WAFS

EXPLANATION OF THE TABLE

Column

1 WAFS forecasts required by the CAR/SAM States, to be provided by WAFC Washington.

2 Area of coverage required for the WAFS forecasts, to be provided by WAFC Washington.

EXPLICACIÓN DE LA TABLA

Columna

1 Pronósticos del WAFS requeridos por los Estados CAR/SAM, que ha de proporcionar el WAFC de Washington.

2 Zona de cobertura requerida para los pronósticos del WAFS, que ha de proporcionar el WAFC de Washington.

Forecast required/Pronóstico requerido	Areas required/Zonas requeridas
1	2
SWH forecasts (FL 250 – 630) in the BUFR code form/ Pronósticos de SWH (FL 250 – 630) en la clave BUFR	Global/Mundial
SWM forecasts (FL 100 – 250) in the BUFR code form/ Pronósticos de SWM (FL 100 – 250) en la clave BUFR	NIL
Forecasts of upper-air wind, temperature and humidity, cumulonimbus cloud, icing, and clear-air and in-cloud turbulence and of altitude of flight levels in the GRIB code form Pronósticos de vientos temperatura y humedad en altitud, nubes cumulonimbus, engelamiento, y turbulencia en aire claro y en las nubes y de niveles de vuelo en altitud en la clave GRIB	Global/ Mundial

Note 1. — SWM forecasts are provided for limited geographical areas as determined by regional air navigation agreement. Areas "ASIA SOUTH", "EUR" and "MID"provided by WAFC London; area "NAT" provided by WAFC Washington.

Nota 1. — Se proporcionan pronósticos SWM para zonas geográficas limitadas según se determine por acuerdo regional de navegación aérea. A las áreas "ASIA SUR", "EUR" y "MID" se los proporcina el WAFC de Londres; al área "NAT" el WAFC de Washington.

Note 2. — WAFCs will continue to issue forecasts of SIGWX in PNG chart form for back-up purposes for fixed areas of coverage as specified in Annex 3.

Nota 2. — Los WAFC continúan emitiendo mapas PNG pronosticados de SIGWX con fines de respaldo para zonas de cobertura según se especifica en el ANEXO 3.

Note 3. — Forecasts of cumulonimbus clouds, icing and clear-air and in-cloud turbulence are experimental forecasts which are expected to become available by the end of 2009.

Nota 3. — Los pronósticos de nubes cumulonimbus, engelamiento, y turbulencia en aire claro y en las nubes son experimentales los cuales se espera estén disponibles a finales de 2009.

FASID TABLE MET 6/TABLA MET 6 DEL FASID

RESPONSIBILITIES OF THE WORLD AREA FORECAST CENTRES
RESPONSABILIDADES DE LOS CENTROS MUNDIALES DE PRONÓSTICOS DE ÁREA

Editorial Note.-	Delete in *toto*

FASID Table MET 7/Tabla MET 7 DEL FASID

AUTHORIZED USERS OF THE ISCS/1 SATELLITE BROADCAST AND THE INTERNET-BASED WAFS FTP SERVICE IN THE CAR/SAM REGIONS

USUARIOS AUTORIZADOS PARA LA RADIODIFUSIÓN POR SATÉLITE ISCS/1 Y EL SERVICIO FTP DEL WAFS BASADO EN INTERNET EN LAS REGIONES CAR/SAM

Editorial Note.- Delete in *toto*

APPENDIX C

TRANSITION PLAN FOR THE IMPLEMENTATION OF GRIB 2 CODE FORM

	Date	Status
WAFCs develop and test WAFS forecasts in the GRIB 2 code form, encompassing higher-resolution data, as well as gridded icing, turbulence and cumulonimbus cloud forecasts	April 2008 to September 2009	
SADIS and ISCS Provider States implement increased satellite bandwidth for WAFS broadcasts, if required, to facilitate parallel broadcasting of GRIB 1 and GRIB 2 forecasts	September 2009	
GRIB 2 code form available on ISCS and SADIS FTP services, in parallel with GRIB 1 code form	September 2009	
WAFS workstation vendors develop GRIB 2 decoders and software to enable the visualisation of WAFS upper-air forecasts (including higher-resolution fields and gridded icing, turbulence and cumulonimbus cloud forecasts)	September 2009 to November 2011	
Training on the new gridded forecasts of cumulonimbus clouds, icing and turbulence	2009	
Applicability of enabling clauses in Annex 3 for the use of gridded WAFS forecasts for icing, turbulence and cumulonimbus clouds	November 2010 (Amendment 75)	
Confirm date for the cessation of satellite broadcast of forecasts in the GRIB 1 code form	February 2011	
States upgrade workstations to accept GRIB 2 code form	November 2011 to November 2013	
Cessation of WAFS forecasts in the GRIB 1 code form	November 2013 (Amendment 76)	

APÉNDICE / APPENDIX D

ISCS OPERATIONAL FOCAL POINTS/ PUNTOS FOCALES OPERACIONALES DEL ISCS

Updated July 2009 /Actualizada Julio 2009

Note. - This list is kept up-to-date by the ICAO Secretariat based on the input from States
Nota. - Esta lista será actualizada por la Secretaría de la OACI con base en la información suministrada por los Estados

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Nota: El AERMETSG consideró necesario incluir la información de contacto de los Oficiales Regionales MET de las Oficinas de la OACI de Lima y México, con el fin de que sean incluidos en la lista de destinatarios que recibirá la información sobre las mejoras del ISCS.

Note: The AERMETSG considered necessary to include the contact information of the ICAO Lima and Mexico MET Regional Officers in order to be included in the list of addressees that will receive the information on ISCS improvements.