



International Civil Aviation Organization

STUDY NOTE

METP-
WG/MOG/3-
SN/xx
30/5/16

MEETING OF THE METEOROLOGY PANEL (METP) WORKING GROUP MOG

THIRD MEETING

Gatwick, London, United Kingdom, 13 to 16 June 2016

Agenda Item 6: Matters relating to the WAFS
6.2.1: WAFS Management Report

MANAGEMENT REPORT OF THE WAFS OPERATIONS

(Presented by the WAFS Provider States)

SUMMARY

This paper provides the WAFS management report for the period July 2015 through April 2016, inclusive.

1. INTRODUCTION

1.1 In response to the World Area Forecast System Operations Group (WAFSOPSG¹) Conclusion 1/3, World Area Forecast Center (WAFSOPSG) Provider States are required to provide a joint world area forecast system (WAFS) management report at each WG-MOG (WAFS) meeting. The current report covering the period of July 2015 through April 2016 inclusive, addresses recent developments related to the main operational functions of the WAFS.

2. DISCUSSION

2.1 The WAFS management report is included in the **Attachment** to this paper. The group may wish to note the major developments highlighted in the executive summary on page A-2 of the report, followed by sections on “Progress on the development of the WAFS”, and “Development or operational difficulties with the WAFS”

¹ Although WAFSOPSG was disbanded in 2015, it is understood that WAFSOPSG Conclusions/Decisions remain extant unless superseded by the Meteorological Panel (METP) and/or its Working Groups as appropriate.

3. **ACTION BY THE METP-WG/MOG**

3.1 The METP-WG/MOG is invited to:

- a) review the management report given in the **Attachment** to this paper;
- b) note its content; and
- c) agree that it meets the intent of the WAFSOPGS Conclusion 1/3.

ATTACHMENT

**WORLD AREA FORECAST SYSTEM
MANAGEMENT REPORT**

July 2015 – April 2016

World Area Forecast Center (WAFC) London
World Area Forecast Center (WAFC) Washington

EXECUTIVE SUMMARY

Main milestones:

- 1) Sample datasets and matching visualizations published.
- 2) User's Guide for WAFS Turbulence, Icing and Cumulonimbus (Cb) Cloud updated.
- 3) Extra Flight Levels available in trial format.
- 4) Icing Severity available in trial format.
- 5) Eight (8) scheduled WAFC SIGWX backup tests were conducted. Details are provided in Appendix B to this Management Report.
- 6) Updated information relating to the SIGWX Correction process (not amendments, for which there is no requirement) made available on the WG-MOG webpages.

FULL MANAGEMENT REPORT

1. PROGRESS ON THE DEVELOPMENT OF THE WAFS

1.1 WAFS Operational Product Changes

1.1.1 **Sample Datasets Made Available** – In response to WG-MOG/1 Decision 1/2, the WAFCs have provided samples of generic gridded data and matching visualizations. These visualizations are not intended to represent a recommended way of displaying the data. They are instead intended only to serve as a comparison of the data to a visualization, so that users can confirm that their software is displaying the data correctly (orientation, correct scaling etc) manner . The samples are available on the METP WG-MOG website under Reference Documents <http://www.icao.int/airnavigation/METP/MOG/Pages/default.aspx> .

1.1.2 **Additional Flight Levels** – In response to WG-MOG/1 Decision 1/1, the WAFCs will begin providing data for FL080(750hPa), FL210(450hPa), and FL480 (125hPa) on 9 November, 2016. The WAFCs are making trial versions of the data available via methods described in a separate paper to be delivered at METP WG-MOG/3.

1.2 Harmonization of WAFS data

1.2.1 **Guidance material on the harmonized grids for icing, turbulence, and Cumulonimbus (CB):**– The WAFCs updated the User’s Guide for harmonized grids for icing, turbulence and Cb. This material can be found on the WG-MOG Webpages under WAFS.

1.2.2 **WAFS Coordination:**– The WAFCs continue to conduct routine coordination of the SIGWX forecasts, including harmonization of Tropical Cyclones and Volcanic Eruptions placed on all SIGWX forecasts. This routine coordination is accomplished via an interactive web chat portal prior to SIGWX dissemination, every 6 hours.

1.2.3 **WAFS TCAC Coordination** – In response to WAFSOPSG/4 Conclusion 4/8, the WAFCs, in cooperation with WMO and the Tropical Cyclone Advisory Centers (TCAC), continue to invite the TCACs to participate in the WAFS coordination web chats.

1.2.4 WAFS Quality Management System –

1.2.4.1 WAFS London – as a function of the Met Office, is ISO 9001:2008 and ISO 14001:2004 compliant. Twice per year, SGS (certification partners) visit the Met Office to monitor its compliance with ISO 9001 and ISO 14001. These visits usually take place during May and November. Both the ISO 9001:2008 and the ISO 14001:2004 certificates are valid until 13 August 2017.

1.2.4.2 WAFS Washington, as a function of the Aviation Weather Center in Kansas City, continues to maintain ISO9001:2008 QMS certification, and is working towards upgrading to the new ISO9001:2015 standard. The ISO 9001:2008 certificate is valid until 15 September, 2018.

1.3 WAFS Workshops/Seminars

1.3.1 WAFS Coordination Meeting – WAFCs London and Washington held a Coordination meeting at NCAR's Foothills Laboratory facilities, Boulder, Colorado, United States of America (8-12 June 2015).

1.3.2 WAFS Science Meeting – A WAFS Science Meeting between WAFS scientists was conducted at the WAFS Coordination Meeting listed above. The results of this meeting were briefed at WG-MOG/1. Since that time, the WAFS scientists have conducted several teleconferences to discuss how to implement necessary improvements to the WAFS hazard algorithms. The results of these discussions will be presented in a separate paper to be delivered at METP-WG-MOG/3.

1.4 **Development of improved forecasts for Icing, Turbulence, and CB in the grid-point format**

1.4.1 WAFS Washington has made icing severity available through one of its web servers. Details will be provided in the same science paper mentioned in 1.3.2 above.

1.5 **WIFS Enhancements**

1.5.1 No changes or enhancements to WIFS occurred during the period of this report

1.6 **SADIS Enhancements**

1.6.1 At time of submission, the SADIS 2G service has less than two months remaining before its withdrawal at 1200 UTC on 31 July 2016. The SADIS Provider has undertaken a number of activities to inform SADIS 2G users of the impending cessation and, as far as practicable, facilitate their transition to Secure SADIS FTP.

1.6.2 Secure SADIS FTP bandwidth was increased from 16Mbit/sec bursting 24Mbit/sec to 24Mbit/sec bursting 42Mbit/sec effective 1200 UTC 27 October 2015. At the same time individual client limit was increased from 1024Kbit/sec to 2048Kbit/sec.

1.7 **WAFS Performance Indicators**

1.7.1 WAFS London performance indicators are online at <http://tinyurl.com/hwgzchj>

1.7.2 WAFS Washington performance indicators are online at <http://www.emc.ncep.noaa.gov/gmb/icao/>

1.8 **WAFS SIGWX Backup Tests**

1.8.1 The WAFCs conducted SIGWX backup tests during the management report period. **Appendix B** to this **Attachment** lists all the test and genuine backup events during the period of the management report. The backup test schedule and test results are also available from the WAFSOPSG web site at URL <http://www.icao.int/safety/meteorology/WAFSOPSG/Reference%20Documents/Forms/AllItems.aspx> and select 'Recent and Forthcoming chronology of WAFS Backup Tests'.

2. **DEVELOPMENTAL OR OPERATIONAL DIFFICULTIES WITH THE WAFS**

2.1 **Service Interruptions**

2.1.1 WAFC London –

There have been no interruptions to WAFC London's capability to provide SIGWX forecasts during the period.

2.1.2 WAFC Washington –

There have been no interruptions to WAFC Washington's capability to provide SIGWX forecasts during the period.

However, WAFC Washington did experience infrequent outages of its FTP server that provides WAFC London with WAFC Washington's turbulence, icing and Cb forecasts. These failures resulted in WAFC London having to release unharmonized data. The failures were caused by problems with both communications circuits and servers as WAFC Washington transitioned the ftp service to a new location.

Appendix A to WAFC Management Report Attachment WAFS Performance Indicator Tables

The following tables provide information on:

WAFC London SIGWX BUFR availability on Secure SADIS FTP
WAFC Washington SIGWX BUFR availability on WIFS

WAFC London SIGWX PNG availability on Secure SADIS FTP
WAFC Washington SIGWX PNG availability on WIFS

WAFC London GRIB2 availability on Secure SADIS FTP (not including CB, icing or turbulence parameters)
WAFC Washington GRIB2 availability (not including CB, icing or turbulence parameters) on WIFS

WAFC London GRIB2 CB, Icing and Turbulence availability on Secure SADIS FTP
WAFC Washington GRIB2 CB, Icing, Turbulence availability on WIFS

The number of WAFC London SIGWX Correction messages, by month
The number of WAFC Washington SIGWX Correction messages, by month

The number of harmonization failures of WAFS GRIB2 CB, icing, and turbulence by WAFC London, by month
The number of harmonization failures of WAFS GRIB2 CB, icing, and turbulence by WAFC Washington, by month

W AFC London SIGWX BUFR Availability on Secure SADIS FTP

Month	Total sets	Complete sets by +7:00	Complete sets by +7:30	Complete sets by +9:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Aug-15	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Sep-15	120	120 (100%)	120 (100%)	120 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Oct-15	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Nov-15	120	120 (100%)	120 (100%)	120 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Dec-15	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Jan-16	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Feb-16	116	116 (100%)	116 (100%)	116 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Mar-16	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Apr-16	120	119 (99.2%) ²	119 (99.2%)	120 (100%)	T+6:50	T+7:35	T+6:55	0 (0%)
TOTAL	1220	1219 (99.9%)	1219 (99.9%)	1220 (100.0%)	T+6:50	T+7:35	T+6:52	0 (0%)

W AFC Washington SIGWX BUFR Availability on WIFS

Month	Total sets	Complete sets by +7:00	Complete sets by +7:30	Complete sets by +9:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	122 (98.4%)	123 (99.2%)	123 (99.2%)	T+6:45	T+11:37	T+6:53	1 (0.8%)
Aug-15	124	123 (99.2%)	123 (99.2%)	123 (99.2%)	T+6:45	T+6:58	T+6:50	1 (0.8%)
Sep-15	120	117 (97.5%)	120 (100.0%)	120 (100.0%)	T+6:45	T+7:10	T+6:52	0 (0%)
Oct-15	124	121 (97.6%)	124 (100.0%)	124 (100.0%)	T+6:45	T+7:10	T+6:51	0 (0%)
Nov-15	120	115 (95.8%)	117 (97.5%)	118 (98.3%)	T+6:45	T+10:05	T+6:55	2 (1.7%)
Dec-15	124	122 (98.4%)	124 (100.0%)	124 (100.0%)	T+6:45	T+7:10	T+6:51	0 (0%)
Jan-16	124	111 (89.5%)	124 (100.0%)	124 (100.0%)	T+6:45	T+7:24	T+6:53	0 (0%)
Feb-16	116	104 (89.7%)	115 (99.1%)	115 (99.1%)	T+6:45	T+7:29	T+6:53	1 (0.9%)
Mar-16	124	107 (86.3%)	122 (98.4%)	123 (99.2%)	T+6:45	T+7:41	T+6:53	1 (0.8%)
Apr-16	120	115 (95.8%)	118 (98.3%)	120 (100.0%)	T+6:45	T+7:38	T+6:52	0 (0%)
TOTAL	1220	1157 (94.8%)	1210 (99.2%)	1214 (99.5%)	T+6:45	T+11:56	T+6:51	6 (0.5%)

² DT250600 UTC: Single instance of late bulletin due to message switch problem at W AFC London

WAFc London SIGWX PNG Availability on Secure SADIS FTP

Month	Total sets	Complete sets by +7:00	Complete sets by +7:30	Complete sets by +9:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Aug-15	124	123 (99.2%) ³	123 (99.2%)	124 (100%)	T+6:50	T+7:45	T+6:54	0 (0%)
Sep-15	120	120 (100%)	120 (100%)	120 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Oct-15	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Nov-15	120	120 (100%)	120 (100%)	120 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Dec-15	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Jan-16	124	123 (99.2%) ⁴	124 (100%)	124 (100%)	T+6:50	T+7:10	T+6:52	0 (0%)
Feb-16	116	116 (100%)	116 (100%)	116 (100%)	T+6:50	T+6:55	T+6:52	0 (0%)
Mar-16	124	124 (100%)	124 (100%)	124 (100%)	T+6:50	T+6:55	T+6:51	0 (0%)
Apr-16	120	120 (100%)	120 (100%)	120 (100%)	T+6:50	T+7:00	T+6:51	0 (0%)
TOTAL	1220	1218 (99.8%)	1219 (99.9%)	1220 (100%)	T+6:50	T+7:45	T+6:51	0 (0%)

WAFc Washington SIGWX PNG Availability on WIFS

Month	Total sets	Complete sets by +7:00	Complete sets by +7:30	Complete sets by +9:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	122 (98.4%)	124 (100.0%)	124 (100.0%)	T+6:45	T+7:09	T+6:51	0 (0%)
Aug-15	124	122 (98.4%)	124 (100.0%)	124 (100.0%)	T+6:45	T+6:59	T+6:50	0 (0%)
Sep-15	120	117 (97.5%)	120 (100.0%)	120 (100.0%)	T+6:45	T+7:10	T+6:52	0 (0%)
Oct-15	124	123 (99.2%)	124 (100.0%)	124 (100.0%)	T+6:45	T+7:02	T+6:51	0 (0%)
Nov-15	120	115 (95.8%)	117 (97.5%)	118 (98.3%)	T+6:45	T+9:27	T+6:53	2 (1.7%)
Dec-15	124	121 (97.6%)	124 (100.0%)	124 (100.0%)	T+6:45	T+7:27	T+6:50	0 (0%)
Jan-16	124	118 (95.2%)	124 (100.0%)	124 (100.0%)	T+6:45	T+7:24	T+6:51	0 (0%)
Feb-16	116	106 (91.4%)	116 (100.0%)	116 (100.0%)	T+6:45	T+7:29	T+6:53	0 (0%)
Mar-16	124	111 (89.5%)	123 (99.2%)	124 (100.0%)	T+6:45	T+7:41	T+6:53	0 (0%)
Apr-16	120	115 (95.8%)	118 (98.3%)	120 (100.0%)	T+6:45	T+7:38	T+6:52	0 (0%)
TOTAL	1220	1170 (95.9%)	1214(99.5%)	1218 (99.8%)	T+6:45	T+9:27	T+6:52	2 (0.2%)

WAFc London GRIB2 Availability on Secure SADIS FTP (not including CB, icing or turbulence parameters)

³ DT101200: One SIGWX PNG chart issued late - Human error. Monitoring alert not actioned in a timely fashion – human error.

⁴ DT171800: One SIGWX PNG chart issued late due to delay in dissemination services.

Month	Total sets	Complete sets by +4:20	Complete sets by +6:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	124 (100%)	124 (100%)	T+3:35	T+4:05	T+3:38	0 (0%)
Aug-15	124	123 (99.2%) ⁵	124 (100%)	T+3:30	T+4:25	T+3:39	0 (0%)
Sep-15	120	120 (100%)	120 (100%)	T+3:40	T+4:10	T+3:43	0 (0%)
Oct-15	124	124 (100%)	124 (100%)	T+3:40	T+4:05	T+3:43	0 (0%)
Nov-15	120	120 (100%)	120 (100%)	T+3:40	T+3:55	T+3:43	0 (0%)
Dec-15	124	124 (100%)	124 (100%)	T+3:40	T+4:00	T+3:44	0 (0%)
Jan-16	124	124 (100%)	124 (100%)	T+3:40	T+4:05	T+3:48	0 (0%)
Feb-16	116	116 (100%)	116 (100%)	T+3:40	T+4:00	T+3:47	0 (0%)
Mar-16	124	124 (100%)	124 (100%)	T+3:40	T+4:10	T+3:46	0 (0%)
Apr-16	120	119 (99.2%) ⁶	120 (100%)	T+3:30	T+4:40	T+3:42	0 (0%)
TOTAL	1220	1218 (99.8%)	1220 (100%)	T+3:30	T+4:40	T+3:44	0 (0%)

WAFc Washington GRIB2 Availability on WIFS (not including CB, icing or turbulence parameters)

Month	Total sets	Complete sets by +4:20	Complete sets by +6:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	124 (100.0%)	124 (100.0%)	T+3:45	T+3:55	T+3:49	0 (0%)
Aug-15	124	124 (100.0%)	124 (100.0%)	T+3:45	T+3:55	T+3:50	0 (0%)
Sep-15	120	119 (99.2%)	119 (99.2%)	T+3:45	T+3:50	T+3:49	1 (0.8%)
Oct-15	124	120 (96.8%)	122 (98.4%)	T+3:45	T+4:40	T+3:51	2 (1.6%)
Nov-15	120	115 (95.8%)	117 (97.5%)	T+3:45	T+5:55	T+3:53	3 (2.5%)
Dec-15	124	123 (99.2%)	123 (99.2%)	T+3:40	T+6:39	T+3:47	1 (0.8%)
Jan-16	124	124 (100.0%)	124 (100.0%)	T+3:45	T+3:45	T+3:45	0 (0%)
Feb-16	116	116 (100.0%)	116 (100.0%)	T+3:40	T+3:50	T+3:45	0 (0%)
Mar-16	124	123 (99.2%)	124 (100.0%)	T+3:45	T+5:35	T+3:46	0 (0%)
Apr-16	120	120 (100.0%)	120 (100.0%)	T+3:45	T+4:15	T+3:45	0 (0%)
TOTAL	1220	1208 (99.0%)	1213 (99.4%)	T+3:40	T+6:39	T+3:48	7 (0.6%)

⁵ DT290600 UTC: 133 bulletins missed the target time (T+4:20) by 5 minutes.

⁶ DT250600 UTC: Message switch problems at WAFc London generated delays to distribution.

WAFAC London GRIB2 CB, Icing and Turbulence Availability on Secure SADIS FTP

Month	Total sets	Complete sets by +4:35	Complete sets by +4:50	Complete sets by +6:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	124 (100%)	124 (100%)	124 (100%)	T+4:10	T+4:15	T+4:10	0 (0%)
Aug-15	124	124 (100%)	124 (100%)	124 (100%)	T+4:10	T+4:35	T+4:10	0 (0%)
Sep-15	120	120 (100%)	120 (100%)	120 (100%)	T+4:10	T+4:30	T+4:11	0 (0%)
Oct-15	124	122 (98.4%) ⁷	124 (100%)	124 (100%)	T+4:10	T+4:50	T+4:11	0 (0%)
Nov-15	120	119 (99.2%) ⁸	120 (100%)	120 (100%)	T+4:10	T+4:50	T+4:12	0 (0%)
Dec-15	124	124 (100%)	124 (100%)	124 (100%)	T+4:10	T+4:20	T+4:10	0 (0%)
Jan-16	124	123 (99.2%) ⁹	124 (100%)	124 (100%)	T+4:10	T+4:45	T+4:12	0 (0%)
Feb-16	116	113 (97.4%) ¹⁰	116 (100%)	116 (100%)	T+4:10	T+4:50	T+4:13	0 (0%)
Mar-16	124	122 (98.4%) ¹¹	124 (100%)	124 (100%)	T+4:10	T+4:50	T+4:12	0 (0%)
Apr-16	120	119 (99.2%) ¹²	120 (100%)	120 (100%)	T+4:10	T+4:45	T+4:17	0 (0%)
TOTAL	1220	1210 (99.2%)	1220 (100%)	1220 (100%)	T+4:10	T+4:50	T+4:12	0 (0%)

⁷ DT111800 UTC: 54 bulletins missed the target time (T+4:35) due to late availability of WAFAC London data; DT171200 UTC: 407 bulletins missed the target time (T+4:35) due to late availability of WAFAC Washington data.

⁸ DT160600 UTC: 407 bulletins missed target time (T+4:35) due to late availability of WAFAC Washington data.

⁹ DT201200 UTC: 407 bulletins missed target time (T+4:35) due to delay in WAFAC London distribution processes.

¹⁰ DT191200 UTC; DT191800 UTC and DT221200 UTC: Non-harmonised data issued by WAFAC London due to late availability of WAFAC Washington raw data. NOUK10 administrative messages issued.

¹¹ DT201200 UTC and DT210000 UTC: Non-harmonised data issued by WAFAC London due to late availability of WAFAC Washington raw data. NOUK10 administrative messages issued.

¹² DT061800 UTC: Non harmonised data issued by WAFAC London due to late availability of WAFAC Washington raw data. NOUK10 administrative message issued.

W AFC Washington GRIB2 CB, Icing, Turbulence Availability on WIFS

Month	Total sets	Complete sets by +4:35	Complete sets by +4:50	Complete sets by +6:00	Earliest time for complete set	Latest time for complete set	Average time for complete set	Incomplete sets
Jul-15	124	117 (94.4%)	124 (100.0%)	124 (100.0%)	T+4:35	T+4:40	T+4:35	0 (0%)
Aug-15	124	110 (88.7%)	124 (100.0%)	124 (100.0%)	T+4:35	T+4:40	T+4:35	0 (0%)
Sep-15	120	117 (97.5%)	120 (100.0%)	120 (100.0%)	T+4:35	T+4:45	T+4:35	0 (0%)
Oct-15	124	115 (92.7%)	124 (100.0%)	124 (100.0%)	T+4:35	T+4:45	T+4:35	0 (0%)
Nov-15	120	112 (93.3%)	118 (98.3%)	119 (99.2%)	T+4:35	T+4:55	T+4:35	1 (0.8%)
Dec-15	124	120 (96.8)	123 (99.2%)	123 (99.2%)	T+4:35	T+6:39	T+4:36	1 (0.8%)
Jan-16	124	123 (99.2%)	124 (100.0%)	124 (100.0%)	T+4:35	T+4:40	T+4:35	0 (0%)
Feb-16	116	116 (100.0%)	116 (100.0%)	116 (100.0%)	T+4:35	T+4:35	T+4:35	0 (0%)
Mar-16	124	123 (99.2%)	123 (99.2%)	124 (100.0%)	T+4:35	T+5:35	T+4:35	0 (0%)
Apr-16	120	119 (99.2%)	119 (99.2%)	120 (100.0%)	T+4:35	T+5:05	T+4:35	0 (0%)
TOTAL	1220	1172 (96.1%)	1215 (99.6%)	1218 (99.8%)	T+4:35	T+6:39	T+4:35	2 (0.2%)

Log of SIGWX Correction Messages issued by WAFc London and WAFc Washington:

Month	WAFc London		WAFc Washington	
	Number of occasions	Notes	Number of occasions	Notes
Jul 2015	3	VT 151800 UTC, 170000 UTC, and 171800 UTC: Volcanoes RUANG and RAUNG inadvertently transposed (not identified in sufficient time to issue correction) – human error, though both almost identical names for genuine volcanoes contributed to the error not being easily identified. In each case, the error was identified too late to issue corrections.	0	N/A
Aug 2015	2	VT241800 UTC: Tropical Cyclones GONI and ATSANI inadvertently transposed – human error; VT261800 UTC: Tropical Cyclone ERIKA incorrectly labelled as IGNACIO – human error. It was identified that on both of these occasions a full set of corrected data had not been issued. This was also identified as human error.	0	N/A
Sep 2015	0	N/A	2	VT2112 Labels missing on some objects VT2000 TC Ida in wrong location.
Oct 2015	1	VT031800 UTC: Tropical Cyclone MUJIGAE incorrectly positioned – human transcription error from Tropical Cyclone advisory. Identified too late to issue a correction.	1	VT1712 Mid-Level charts sent without icing layer on them.
Nov 2015	0	N/A	1	VT2000 Corrected location of TC symbol
Dec 2015	0	N/A	0	N/A
Jan 2016	1	VT101800 UTC: Incorrect CB TOP – FL250 should have been FL420. Human error, not identified during cross checks.	0	N/A
Feb 2016	1	VT071200 UTC: Correction created, but not issued due to technical issues. This was identified as being due to a configuration change that was not identified in testing. Change implemented to resolve this matter the following day, 8 Feb 2016.	0	N/A
Mar 2016	0	N/A	0	N/A
Apr 2016	0	N/A	0	N/A
TOTAL	8	-----	4	-----

Log of occasions where non-harmonized WAFS CB, Icing and Turbulence Harmonization issued:

Month	WAFS London		WAFS Washington	
	Number of occasions	Notes	Number of occasions	Notes
Jul 2015	0	N/A	0	N/A
Aug 2015	0	N/A	0	N/A
Sep 2015	0	N/A	0	N/A
Oct 2015	0	N/A	0	N/A
Nov 2015	1	DT160600 UTC: Non-harmonised data issued by WAFS London due to late availability of WAFS Washington raw data. NOUK10 administrative messages issued.	0	N/A
Dec 2015	0	N/A	0	N/A
Jan 2016	0	N/A	0	N/A
Feb 2016	3	DT191200 UTC; DT191800 UTC and DT221200 UTC: Non harmonised data issued by WAFS London due to late availability of WAFS Washington raw data. NOUK10 administrative messages issued.	0	N/A
Mar 2016	2	DT201200 UTC and DT210000 UTC: Non-harmonised data issued by WAFS London due to late availability of WAFS Washington raw data. NOUK10 administrative messages issued.	0	N/A
Apr 2016	1	DT061800 UTC: Non harmonised data issued by WAFS London due to late availability of WAFS Washington raw data. NOUK10 administrative message issued.	0	N/A
TOTAL	7	-----	0	-----

Appendix B to WAFC Management Report Attachment History of Scheduled and un-scheduled WAFC SIGWX Backups

DATE	ISSUES
15 July 2015 - WAFC London provided backup SIGWX products on behalf of WAFC Washington.	No
29 July 2015 - WAFC Washington successfully provided backup SIGWX products on behalf of WAFC London.	No
14 October 2015 - WAFC London provided backup SIGWX products on behalf of WAFC Washington.	No
28 October 2015 - WAFC Washington successfully provided backup SIGWX products on behalf of WAFC London.	No
13 January 2016 - WAFC Washington successfully provided backup SIGWX products on behalf of WAFC London.	No
27 January 2016 - WAFC London provided backup SIGWX products on behalf of WAFC Washington.	No
13 April 2016 - WAFC Washington successfully provided backup SIGWX products on behalf of WAFC London.	No
27 April 2016 - WAFC London provided backup SIGWX products on behalf of WAFC Washington.	No

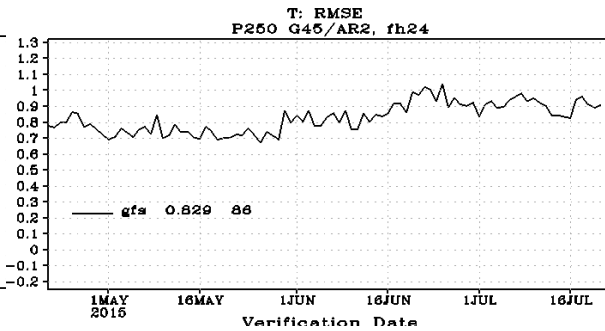
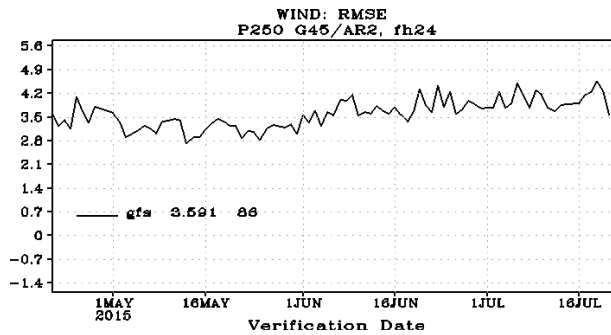
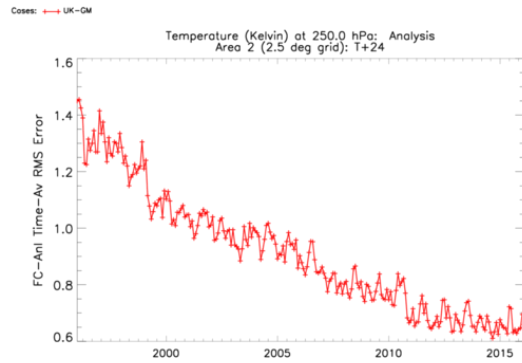
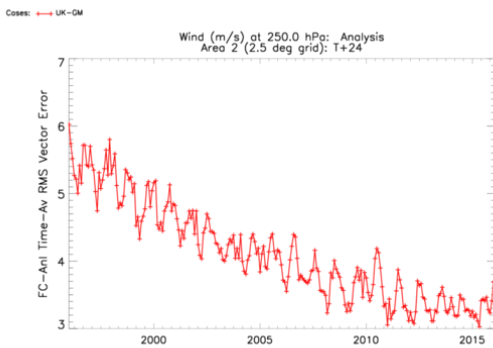
Appendix C to WAFC Management Report Attachment WAFC Meetings and Seminar Participation

Meeting	Location	Date	WAFC London	WAFC Washington
WMO AvRDP	Shanghai, China	June 2015	No	Yes
APANPIRG MET SG/19	Bangkok, Thailand	August 2015	Yes	Yes
WG-MOG/1	Gatwick, United Kingdom	September 2015	Yes	Yes
WMO ET-ABO	Geneva, Switzerland	October 2015	Yes	Yes
WG-MISD/1 and WG-MRI/1	Washington DC, United States of America	November 2015	Yes	Yes
WG-MIE/1	Montreal, Canada	November 2015	Yes	Yes
WG-MOG/2	Buenos Aires, Argentina	April 2016	Yes	Yes
WG-MIE/2	Paris, France	May 2016	Yes	Yes

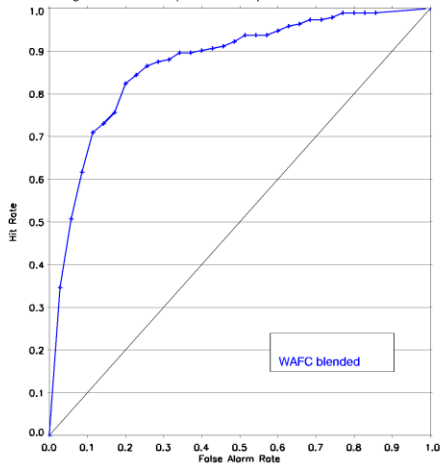
Appendix D to WAFC Management Report Attachment : Verification Statistics

North Atlantic:

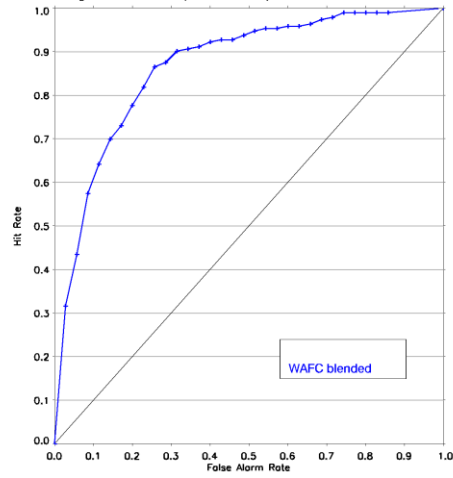
- WAFC London 250hPa T+24 Wind
- WAFC London 250hPa T+24 Temperature
- WAFC Washington 250hPa T+24 Wind
- WAFC Washington 250hPa T+24 Temperature
- Harmonized T+24 Mean CAT
- Harmonized T+24 Max CAT
- Harmonized T+24 Mean Icing
- Harmonized T+24 Max Icing
- Harmonized T+24 Horizontal Extent



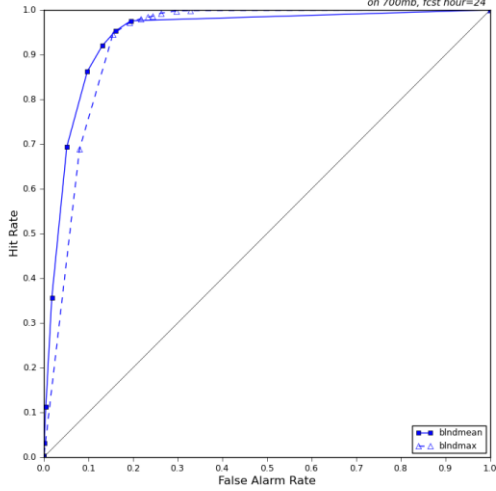
Forecasts 022015-012016 against GADS data in WMO area 2 for moderate or greater turbulence (DEVG >= 4.5)



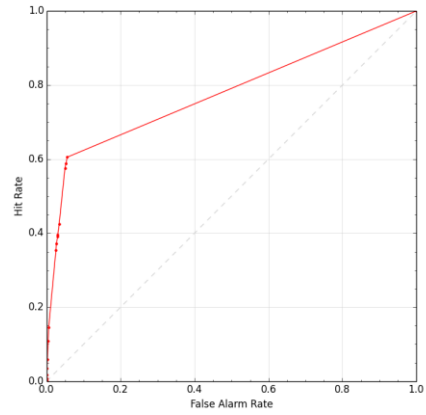
Forecasts 022015-012016 against GADS data in WMO area 2 for moderate or greater turbulence (DEVG >= 4.5)



ICING ROC against GCIP, 20150701-20160430 on 700mb, fcst hour=24

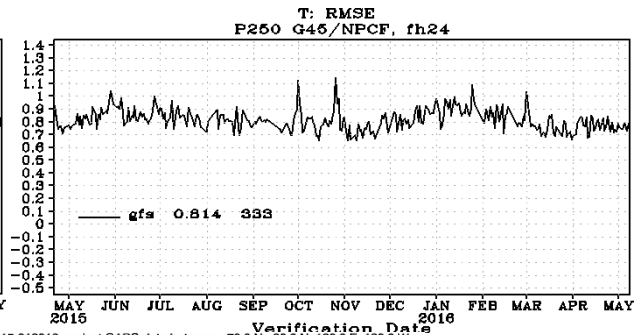
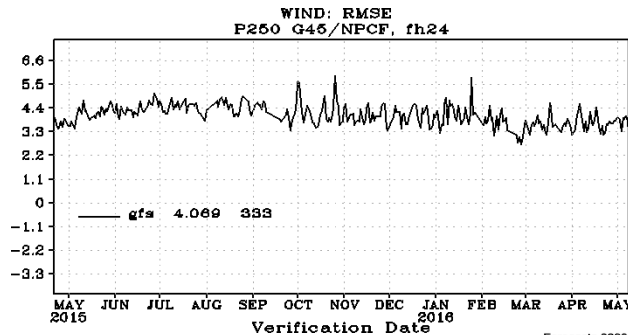
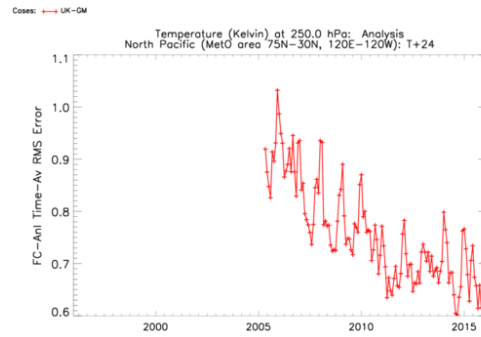
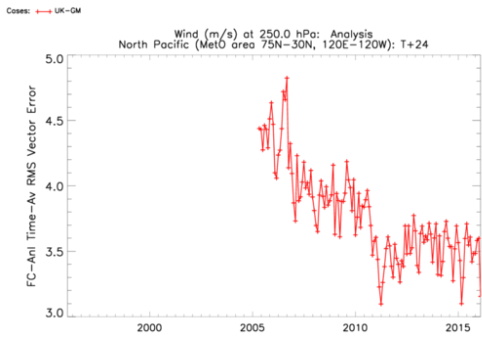


ROC for global WAFC Cb forecasts against SFERICS lightning data, Jan 2015 - Dec 2015 Area 2 : North Atlantic T+24

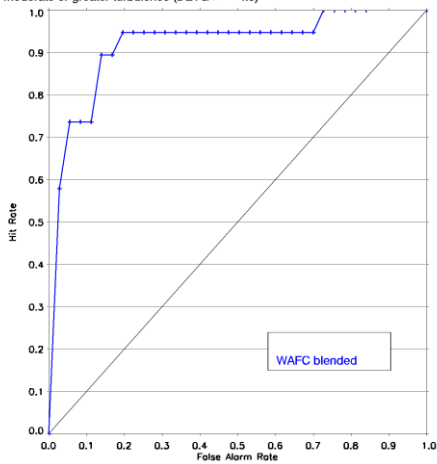


North Pacific:

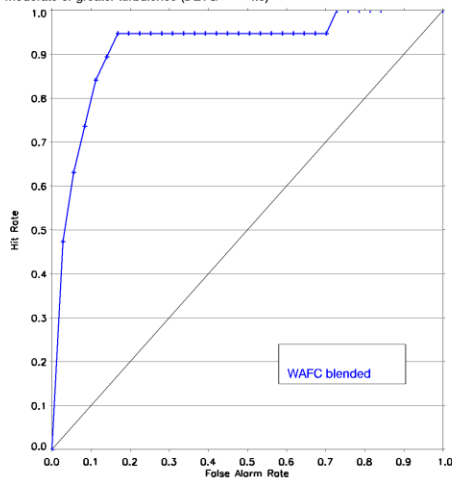
- WAFc London 250hPa T+24 Wind
- WAFc London 250hPa T+24 Temperature
- WAFc Washington 250hPa T+24 Wind
- WAFc Washington 250hPa T+24 Temperature
- Harmonized T+24 Mean CAT
- Harmonized T+24 Max CAT
- Harmonized T+24 Mean Icing
- Harmonized T+24 Max Icing
- Harmonized T+24 Horizontal Extent

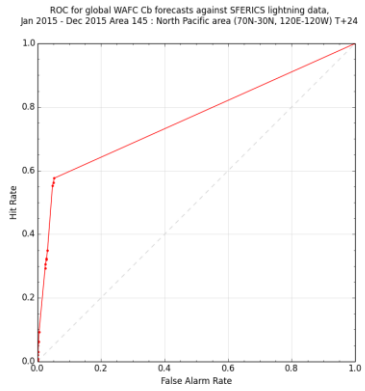
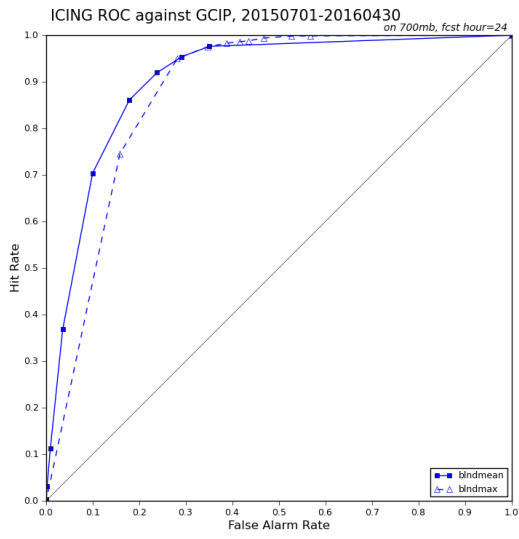


Forecasts 022015-012016 against GADS data between 70.0 N 30.0 N 120.0 E 120.0 W for moderate or greater turbulence (DEVG >= 4.5)



Forecasts 022015-012016 against GADS data between 70.0 N 30.0 N 120.0 E 120.0 W for moderate or greater turbulence (DEVG >= 4.5)





— END —