International Civil Aviation Organization

MIDANPIRG Meteorology Sub-Group
Sixth Meeting (MET SG/6)

(Cairo, Egypt, 1 - 3 March 2015)

Agenda Item 4.1: Review of the implementation of WAFS and SADIS

SUMMARY OF RECENT AND FORTHCOMING DEVELOPMENTS TO THE WAFS

(Presented by the SADIS Provider)

SUMMARY

This paper reports on the progress of the WAFS since the last meeting of the MID MET Sub Group in September of 2014. Some of these developments have had a direct impact on end users. A number of important developments are planned to the SADIS in future years and these are highlighted in this paper for the consideration of the group.

Action by the meeting is at paragraph 5.

1. INTRODUCTION

1.1 This paper presents developments to the WAFS since the fifth meeting of the MID MET Sub Group (2nd to 4th September 2014, Jeddah, Saudi Arabia). The WAFS Operations Group was disbanded in 2015, and the responsibility for overseeing the operational aspects of WAFS is now transferred to the Meteorological Operations Group Working Group (WG-MOG) of the Meteorological Panel (METP). The first meeting of the METP Meteorological Operations Group Working Group (WG-MOG/1) was held 8th to 11th September, Gatwick. It should be noted that the three other Working Groups[1] under METP will also have roles to play in the development of WAFS.

1.2 Users are encouraged to review information available on the ICAO MET Panel webpages at http://www.icao.int/airnavigation/METP/Pages/default.aspx, and provides access to all Working Groups that will report to the METP. Of particular interest will be the reference documents within the WG-MOG section at http://www.icao.int/airnavigation/METP/MOG/Pages/default.aspx. It is understood that for the foreseeable future, the WAFS Operations Group website at URL: http://www.icao.int/safety/meteorology/wafsopsg/Pages/default.aspx will be maintained *as a repository of historical information.*

[1] Meteorological Requirements and Integration (WG-MRI), Meteorological Information and Service Development (WG-MISD), and Meteorological Information Exchange Group (WG-MIE).

2. RECENT DEVELOPMENTS

2.1 Implementation of WAFS re-issuance policy for WAFS GRIB2 and WAFS SIGWX forecasts

In accordance with WAFSOPSG Conclusion 7/5; the WAFCs have implemented processes to enable the transmission of corrections to WAFS SIGWX and WAFS GRIB2 forecasts in the event that errors or corruptions are identified. Information with regard to the methodology is provided in the separate Appendix A. *Note: The above policy refers only to corrections and does not concern amendments for which there is no requirement.*

Suggested action: *It is recommended that users of WAFS data confirm with their software providers that their systems can process corrected WAFS data.*

2.2 Guidance and Training for States on the use and visualization of new gridded WAFS forecasts

The WAFCs have produced a training module regarding the use of WAFS gridded CB, icing and turbulence forecasts. This guidance is provided via the internet with an English language voiceover. In addition, ICAO has provided PDF versions of the training module in the following languages: Arabic, Chinese, English, French, Russian and Spanish.

The training module and the related PDFs are supplemental to the existing guidance material 'Guidance on the Harmonized WAFS Grids for Cumulonimbus Cloud, Icing and Turbulence Forecasts - 11 September 2012'[2].

All of the material above is available via:
http://www.icao.int/safety/meteorology/WAFSOPSG/Pages/GuidanceMaterial.aspx.

Suggested action: *Users should regularly review the guidance and training data.*

3 FORTHCOMING DEVELOPMENTS

3.1 Future Provision of additional flight levels to WAFS Upper Air Forecasts

Subject to the finalised version of Amendment 77 to ICAO Annex 3; it is expected that data for additional flight levels will be provided as part of the WAFS gridded upper air forecasts. The extra levels will be FL080 (750hPa); FL210 (450hPa); and FL480 (125hPa). Expected implementation will be November 2016. The WMO AHL bulletin assignment is provided at Appendix B.

[2] Note, at time of writing this guidance document is being revised and will be discussed at the WG-MOG/1 meeting, 8-11 September 2015, Gatwick, United Kingdom

Suggested action: *Contact your SADIS Workstation provider to ensure that software will be updated to take advantage of this change.*

4 STANDING ARRANGEMENTS

4.1 Access to Internet based services (Secure SADIS FTP/WIFS)

The policies regarding the development of clear guidelines with regard to the accessing of data from Secure SADIS FTP and from WIFS have been endorsed by WAFSOPSG, SADISOPSG[3] and SCRAG[4].

Suggested action: *Note this information. Users are encouraged to establish and regularly test backup accounts with the alternative provider to be used in the rare event that their normal service (Secure SADIS FTP or WIFS, as specified by Regional Air Navigation Plan) is unavailable. http://www.icao.int/safety/meteorology/sadisopsg/SADIS%20User%20Guide/Obtaining%20access%20to%20WIFS%20as%20a%20backup%20to%20SADIS%20FTP.pdf It is the user's responsibility to apply for and arrange backup accounts.*

4.2 Inclusion of WAFS GRIB2 CAT and CB verification data on the 'WAFC London Performance Indicators' page

Verification data for harmonized WAFS gridded upper air forecasts for Clear Air Turbulence potential and Cumulonimbus cloud forecasts is available from the "WAFC London Performance Indicators" webpage: http://www.metoffice.gov.uk/aviation/responsibilities/icao. The verification data should be used in conjunction with the guidance material noted in 2.2 above.

Suggested action: *It is recommended that this information be consulted regularly in order to obtain the most benefit from these forecast fields.*

4.3 Inclusion of WAFS GRIB2 ICING verification data on the WAFC Washington website

Verification data for harmonized WAFS gridded upper air forecasts for Icing potential is available from the "WAFC Washington webpage: http://www.emc.ncep.noaa.gov/gmb/icao/. The verification data should be used in conjunction with the guidance material noted in 2.2 above.

Suggested action: *It is recommended that this information be consulted regularly in order to obtain the most benefit from these forecast fields.*

[3] Satellite Distribution System Operations Group
[4] SADIS Cost Recovery Administrative Group

4.4 BUFR Edition used to encode WAFS SIGWX

The WAFC Provider's will continue to issue SIGWX forecasts in BUFR format using BUFR Edition 3. There are no current plans to migrate to BUFR Edition 4.

Suggested action: *Note this information and ensure that your systems remain compatible with the BUFR Edition 3 for decoding of SIGWX BUFR. Note also that the SIGWX forecasts in PNG form will continue to be issued until further notice.*

4.5 Quarterly WAFC SIGWX backup tests

The WAFC Provider States have continued to test their SIGWX backup procedures in the event that one WAFC is 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 in the document Forthcoming and Historical Record of WAFC Backup Tests' available via URL: http://www.icao.int/safety/meteorology/WAFSOPSG/Reference%20Documents/Forms/AllItems.aspx. Tests over the last 12 months have been largely successful and transparent for the overwhelming majority of WAFS users.

Forthcoming backup tests are outlined in the same document: 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 in the 'WAFC Backup Procedures' available from the same URL.

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

5. ACTION BY THE MEETING

5.1 The meeting is invited to:

a) note the information in this paper; and

b) consider the 'suggested actions' as appropriate.

APPENDIX A to 'SUMMARY OF RECENT AND FORTHCOMING DEVELOPMENTS TO THE WAFS

WAFC SIGWX and GRIB2 re-issuance policy with regard to WAFS SIGWX and WAFS GRIB2

1.0 Introduction

This document describes how the WAFCs will send corrected Significant Weather Forecasts (SIGWX) and GRIB2 Forecasts. Please note that the WAFCs will not update or amend previously issued forecasts because new weather information becomes available. The WAFCs will only issue corrections to fix errors, such as missing information or corruption.

2.0 General Methodology

2.1 When a BUFR, PNG or GRIB2 file needs to be corrected, it will have 'CCA' added to its WMO AHL. For example, if the original 'JUCE00 EGRR 191800' *bulletin* requires correction, then 'JUCE00 EGRR 191800 CCA' would be issued. If further corrections are necessary, the 2nd correction will have 'CCB' added to its WMO AHL, and the third correction will have 'CCC', and so on. For simplicity and brevity, only 'CCA' will be referenced subsequently in this document.

2.2 On WIFS and Secure SADIS FTP, all of the associated *files* will also have the 'CCA' indicator added to their WMO AHL as well. For example, if the Jets BUFR file needs to be corrected, the Jets BUFR file and all the other BUFR and PNG files, such as the Cloud and Trop files, will be renamed with 'CCA' appended to their filenames.

2.3 With regard to SADIS 2G, all of the associated bulletins will be re-transmitted. For example, if it is necessary to correct the High Level CAT BUFR file, all of the other BUFR files and PNG files for that SIGWX forecast package will be retransmitted, with 'CCA' added to their WMO AHLs. This process would also apply to the WAFS GRIB2 forecasts.

2.4 WIFS and Secure SADIS FTP will replace all the associated files with the re-distributed files, appending 'CCA' to the filenames. The original files will be deleted. See Appendix A for details on filename conventions for both WIFS and Secure SADIS FTP.

2.5 A strictly formatted administrative message will be sent to notify users of the correction. The format and proposed WMO headers of this administrative message can be found in Appendix B of this document.

2.6 Corrected PNG charts will have the 'CCA' added to the bulletin ID, found in the top left corner of the PNG chart.

2.7 User created visualizations of BUFR and GRIB2 forecasts should note that the underlying data was corrected in an appropriate manner.

2.8 Examples of corrected BUFR and GRIB2 files can be found in Appendices C and D.

2.9 WAFC London can supply complete sample files for original and corrected WAFC London SIGWX forecasts. Please contact chris.tyson@metoffice .gov.uk

Appendix A: Example file name convention relating to corrected data

The tables below provide examples of filenames of corrected products for both WIFS and Secure SADIS FTP. Note that the corrected files will be in the same directories as the original files, and the original files will be deleted.

Secure SADIS FTP

Product type	Example Original Filename	Example Corrected Filename
PNG	PGCE05_EGRR_0000.PNG	PGCE05_EGRR_0000_CCA.PNG
BUFR	JUCE00_EGRR_191800	JUCE00_EGRR_191800_CCA
GRIB2	T+06_0000	T+06_0000_CCA
Signature	JUCE00_EGRR_191800.SIG	JUCE00_EGRR_191800_CCA.SIG

WIFS

Product	Original Filename	Corrected Filename
PNG	20140127_0600_PGAE05_KKCI.png	20140127_0600_PGAE05_KKCI_CCA.png
BUFR	20140127_0600_JUBE99_KKCI.bufr	20140127_0600_JUBE99_KKCI_CCA.bufr
GRIB2	20140127_1800f18.grib2	20140127_1800f18_CCA.grib2

Appendix B: Format of FXUK66 EGRR and FXUS66 KKCI messages

Example of the format of the Administrative Message used to notify users of corrections to SIGWX or GRIB2 products. Note that WAFC London will use the WMO header FXUK66 EGRR, and WAFC Washington will use the WMO Header FXUS66 KKCI. Users should use this message as a trigger to update their software with new files.

```
FXUK66 EGRR 200343

RETRANSMITTED WAFC LONDON DATA:

DATA TYPE: WAFC LONDON SIGWX BUFR AND PNG

ORIGINAL WMO AHL: PG//// EGRR 191800

                  JU//// EGRR 191800

RETRANSMITTED WMO AHL: PG//// EGRR 191800 CCA

                       JU//// EGRR 191800 CCA

WHERE PG//// REPRESENTS ALL WAFC LONDON SIGWX PNG FILES

AND JU//// REPRESENTS ALL WAFC LONDON SIGWX BUFR FILES

ALL WAFC LONDON SIGWX BUFR AND PNG FILES INDICATED ABOVE ARE

NOW BEING RE-TRANSMITTED.

ISSUED BY WAFC LONDON=
```

Appendix C: Example corrected BUFR file content.

Example of the first few lines of a corrected BUFR file, if it were dumped to text by software such as Microsoft Notepad.

```
0000179500
958
JUCE00 EGRR 191800 CCA
BUFR   à————————————————————————           J                    @        -
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
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K   B   -      ,      ]ƒîÒr    »JH   2   z £H   @@ƒ   “ì   ÷‘}!Ä"£CÉD¾ˆô‰™šÂ/®-Ìa[
¹À©ñRñRbaC.Ä————————————————————————†ï1éÖ'*A Iˆoüò————————————————————————
}
_____________________________________________________________________________
ë5º7¬^\jD°`Ë9I1qÂ•b¢e_Ä×J,‰„”;é'&*–Nl_X¥Ë9q ¼C8C f·Fõ“ÿÍ  ; XA³%lKÈ‹4£—v)l-
ÜGH^¤…ÔËPüÑ¶Áë#bc¾å×±
—%•6$²+ÆPªWìªX¥¡kùYƒ————————————————————‘¿óH      8ˆ1Ç¹CyQþæ£„EL˜‰O˜ “è/
      &´]¢KT½À ±ƒY³ÑçÆ„#µMþÈ-
œ³‘8÷Oÿ4¿ÿÁ3DFZ¡WŒ!@¸ wž*äÄW´H»ÓO‘Àf#ÁL™:Ð¼2?jf-
üÏøP1-™“˜QJçÂûÐ ÆZ¡W ÿš@o Šb
_____________________________________________________________________________
¢N¼HŽ ÃÍ=2-¨|¸<Tþˆx2@ðdãˆW#Ø fGÆ 2 Û>Ã           özvD ñ$‘áÜÉ-c´RQ'^)ÿæ—ÿø,
±€ãˆ²²ç5eN¢É JH;™ä|:±ˆz2)áÔ€’-      .„ „‰z¤°‘ÑH@                    æ‹´?5
      ¼ƒÙõ9ÃÎ,Sˆ
_____________________________________________________________________________
üO2Ì»9;0q7þi ÿ,H
      |Pî"6¢p=HÐa’Èž…Ñé°bRj
_____________________________________________________________________________
I£³‰"EÖÐŠÎ-
¥L=,JX}Dµá*
_____________________________________________________________________________
"¼”Üc* ïR-"ø¡Ü7þi¾,u…—˜Zc+,®öTQ©ò [•ò¦Êe$ÔqJª————————————————————ÌW–
,ð³Ô^ai ?üÒ————————————————————Ùe2 ²ÐgÝc˜Ãr¸z•Só[†TLå¨ŠæR’-
"§ú[Ù[pÃrÆQ•–
 ¿óHô40ª3693Ö>rZì
_____________________________________________________________________________
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 ëuŠ!æÊEÁÈÈŠŽw(aã® ƒñÝì‡¼–’´yÌÿ4¿ÿÁÂ‰L½é’<|Î#:þÚDÒl‡éø#;0ä‘-
¬Ég¾/’™{ÓOÿ4¿ÿÁ3CÇøÄÄ e†L#jL5øè¡ÓØ QGœ¢“o
```

Appendix D: Example corrected GRIB2 file content.

Example of a corrected GRIB2 file if it were dumped to text by software such as Microsoft Notepad.

```
0002938400
639
YUXC85 EGRR 210000 CCA
GRIB         r¥    J Ý
       H————————————————————————   £                          ‘        …]J€
0]J€b0                                  Ð                                Ð@
"
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————————————————————————————-   d  Lÿ          £  (Ã’
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ÿd  ÓæÆmÑ×òmòð÷ÿ
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ÿ“Ïü0øPToìin€ÈjwE,£jU¥,o!FRð;Â}@Ó§————————————————————=iºåh]^’ðžW
etc etc
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YUXC70 EGRR 210000
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————————————————————————————————————————————————————————————————————————
————————————————————————————————————————————————————————————————————————
ÿd  ÓæÆmÑ×òmòð÷ÿ      n³ ÿ“Ïü0ìPToìin£³Ä»lÇmTL«¾Êüû`JÉì?b0Z%îG»
```

Appendix E: Secure SADIS FTP and SADIS 2G update policy.

Re-issuance of WAFC London corrected SIGWX.

On Secure SADIS FTP, SIGWX BUFR files are located in the 'BUFR' directory, under which there are two subfolders:

```
11/08/2010 12:00AM      Directory EGRR
09/01/2010 12:00AM      Directory KKCI
```

Within each of EGRR and KKCI, lie 'parameter' subfolders

```
10/21/2013 12:50PM      Directory H_CAT
10/21/2013 12:50PM      Directory H_EMBEDDED_CB
10/21/2013 12:50PM      Directory H_FRONTS
10/21/2013 12:50PM      Directory H_JETS
10/21/2013 12:50PM      Directory H_TROP
10/21/2013 12:50PM      Directory M_CAT
10/21/2013 12:50PM      Directory M_CLOUD
10/21/2013 12:50PM      Directory M_FRONTS
10/21/2013 12:50PM      Directory M_JETS
10/21/2013 12:50PM      Directory M_TROP
10/21/2013 12:50PM      Directory OTHER_PARAMETERS
```

SIGWX BUFR, files are presented thus within their 'parameter' folder:

```
10/20/2013 12:50AM          1,805 JUCE00_EGRR_191800
10/20/2013 12:50AM            256 JUCE00_EGRR_191800.SIG
10/20/2013 06:50AM          1,911 JUCE00_EGRR_200000
10/20/2013 06:50AM            256 JUCE00_EGRR_200000.SIG
10/20/2013 12:50PM          1,455 JUCE00_EGRR_200600
10/20/2013 12:50PM            256 JUCE00_EGRR_200600.SIG
10/20/2013 06:50PM          1,429 JUCE00_EGRR_201200
10/20/2013 06:50PM            256 JUCE00_EGRR_201200.SIG
10/21/2013 12:50AM          2,295 JUCE00_EGRR_201800
10/21/2013 12:50AM            256 JUCE00_EGRR_201800.SIG
10/21/2013 06:50AM          2,431 JUCE00_EGRR_210000
10/21/2013 06:50AM            256 JUCE00_EGRR_210000.SIG
10/21/2013 12:50PM          1,761 JUCE00_EGRR_210600
10/21/2013 12:50PM            256 JUCE00_EGRR_210600.SIG
```

Consider, the High Level CAT parameter (H_CAT):

```
10/20/2013 12:50AM          1,805 JUCE00_EGRR_191800
```

This is how the original data is represented as 'text' (for example in notepad), WMO AHL bulletin ID is highlighted.

```
0000179500
958
JUCE00 EGRR 191800
```

```
BUFR   à————————————————————————          J                    @        -
7777
```

This is how the corrected version of the file would be indicated

```
0000179500
958
JUCE00 EGRR 191800 CCA
BUFR   à————————————————————————          J                    @        -
0ýÆvs €çç!mM»;Zj„8µÌ    ÿÿ4€×Á:ÂÜ¿ˆ¹ÎÓu”'RêÜ[¥ÐXÉ‹«á Çy¢·Žð„Ë]‘š9Õþrþ   27þ
7777
```

Since the policy is that when a correction is issued for WAFS SIGWX forecasts, **all** SIGWX BUFR parameters originally issued by that WAFC will be re-issued (including those parameters that do not have an error). Similar actions will take place for all SIGWX BUFR files issued by that WAFC corrected from the original `191800` datatime in this example.

i.e. the following files would be issued:

`JUWE96_EGRR_191800_CCA`	(BUFR high level jetstreams)
`JUCE00_EGRR_191800_CCA`	(BUFR high level CAT)
`JUBE99_EGRR_191800_CCA`	(BUFR high level cloud)
`JUTE97_EGRR_191800_CCA`	(BUFR high level TROP)
`JUFE00_EGRR_191800_CCA`	(BUFR high level fronts)
`JUVE00_EGRR_191800_CCA`	(BUFR high level TRS, Volcano, Radiation)
`JUOE00_EGRR_191800_CCA`	(BUFR medium level TROP)
`JUTE00_EGRR_191800_CCA`	(BUFR medium level jetstreams)
`JUJE00_EGRR_191800_CCA`	(BUFR medium level fronts)
`JUNE00_EGRR_191800_CCA`	(BUFR medium level cloud)
`JUME00_EGRR_191800_CCA`	(BUFR medium level CAT)

The PNGs would also be reissued.
They are presented thus on Secure SADIS FTP:

In the 'SIGWX_PNG' folder there are two subfolders

```
09/01/2010 12:00AM      Directory SWH_PNG
09/01/2010 12:00AM      Directory SWM_PNG
```

In SWH_PNG:

```
10/21/2013 12:55PM      Directory AREA_A
10/21/2013 12:50PM      Directory AREA_B
10/21/2013 12:55PM      Directory AREA_B1
10/21/2013 12:50PM      Directory AREA_C
10/21/2013 12:50PM      Directory AREA_D
10/21/2013 12:50PM      Directory AREA_E
10/21/2013 12:55PM      Directory AREA_F
10/21/2013 12:50PM      Directory AREA_G
10/21/2013 12:55PM      Directory AREA_H
10/21/2013 12:55PM      Directory AREA_I
10/21/2013 12:55PM      Directory AREA_J
10/21/2013 12:50PM      Directory AREA_K
10/21/2013 12:55PM      Directory AREA_M
```

In SWM_PNG

```
10/21/2013 12:50PM      Directory AREA_ASIA_SOUTH
10/21/2013 12:50PM      Directory AREA_EURO
10/21/2013 12:50PM      Directory AREA_MID
10/21/2013 12:55PM      Directory AREA_NAT
```

As an example (from AREA E)

```
10/21/2013 06:50AM         89,817 PGCE05_EGRR_0000.PNG
10/21/2013 06:50AM            256 PGCE05_EGRR_0000.PNG.SIG
10/21/2013 12:50PM         88,168 PGCE05_EGRR_0600.PNG
10/21/2013 12:50PM            256 PGCE05_EGRR_0600.PNG.SIG
10/20/2013 06:50PM         87,399 PGCE05_EGRR_1200.PNG
10/20/2013 06:50PM            256 PGCE05_EGRR_1200.PNG.SIG
10/21/2013 12:50AM         90,284 PGCE05_EGRR_1800.PNG
10/21/2013 12:50AM            256 PGCE05_EGRR_1800.PNG.SIG
```

Corrected SIGWX PNGs would be replaced with the following:

```
10/21/2013 06:50AM         89,817 PGCE05_EGRR_1800 CCA.PNG
10/21/2013 06:50AM            256 PGCE05_EGRR_1800 CCA.PNG.SIG
```

All other SIGWX PNGs would be similarly re-issued with the following filenames on Secure SADIS FTP.

PGSE05_EGRR_191800_CCA(PNG ICAO High Level SIGWX Area B)
PGRE05_EGRR_191800_CCA(PNG ICAO High Level SIGWX Area C)
PGZE05_EGRR_191800_CCA(PNG ICAO High Level SIGWX Area D)

PGGE05_EGRR_191800_CCA(PNG ICAO High Level SIGWX Area E)
PGCE05_EGRR_191800_CCA(PNG ICAO High Level SIGWX Area G)
PGAE05_EGRR_191800_CCA(PNG ICAO High Level SIGWX Area H)
PGKE05_EGRR_191800_CCA(PNG ICAO High Level SIGWX Area M)
PGDE14_EGRR_191800_CCA(PNG ICAO Medium Level SIGWX Area EURO)
PGCE14_EGRR_191800_CCA(PNG ICAO Medium Level SIGWX Area MID)
PGZE14_EGRR_191800_CCA(PNG ICAO Medium Level SIGWX Area S ASIA)

An automated SIGWX Correction message would be sent with the following:

```
FXUK66 EGRR 200343

RETRANSMITTED WAFC LONDON DATA:

DATA TYPE: WAFC LONDON SIGWX BUFR AND PNG

ORIGINAL WMO AHL: PG//// EGRR 191800

                  JU//// EGRR 191800

RETRANSMITTED WMO AHL: PG//// EGRR 191800 CCA

                       JU//// EGRR 191800 CCA

WHERE PG//// REPRESENTS ALL WAFC LONDON SIGWX PNG FILES

AND JU//// REPRESENTS ALL WAFC LONDON SIGWX BUFR FILES

ALL WAFC LONDON SIGWX BUFR AND PNG FILES INDICATED ABOVE ARE

NOW BEING RE-TRANSMITTED.

ISSUED BY WAFC LONDON=
```

In addition, the usual FXUK65 EGRR message will be issued to inform those users who a) have not got systems that can re-process the re-issued files, or are – for whatever reason – unable to obtain updated visualisations (soft or hard copy).

1) Should further corrections be necessary, then the sequence CCB, CCC, CCD etc should be followed.

2) Should such messages be received from WAFC Washington, then they will be processed in the same fashion – distributed directly over SADIS 2G (SIGWX only,

Not GRIB2), and processed as described above for Secure SADIS FTP. The FXUS66 KKCI would be issued by WAFC Washington and distributed to inform users, and act as a trigger.

For GRIB2 data:

On Secure SADIS FTP, GRIB2 data is in the 'GRIB2' folder. There is a subfolder;

```
06/15/2011 12:00AM      Directory COMPRESSED
```

And two lower level subfolder for WAFC London and WAFC Washington data.

```
08/20/2013 12:14PM      Directory EGRR
08/20/2013 12:14PM      Directory KWBC
```

Folders for CB, icing and turbulence are provided, and time-step concatenated GRIB2 bulletins. (sub folders in the CAT, CB, ICE and INCLDTURB also concatenate the GRIB2 data into separate time steps).

```
08/20/2013 12:14PM      Directory CAT
08/20/2013 12:14PM      Directory CB
08/20/2013 12:14PM      Directory ICE
08/20/2013 12:14PM      Directory INCLDTURB
10/21/2013 12:45PM      Directory T+06
10/21/2013 12:45PM      Directory T+09
10/21/2013 12:45PM      Directory T+12
10/21/2013 12:45PM      Directory T+15
10/21/2013 12:45PM      Directory T+18
10/21/2013 12:45PM      Directory T+21
10/21/2013 12:45PM      Directory T+24
10/21/2013 12:45PM      Directory T+27
10/21/2013 12:45PM      Directory T+30
10/21/2013 12:45PM      Directory T+33
10/21/2013 12:45PM      Directory T+36
```

So, typically, for the T+06 folder:

```
10/21/2013 03:30AM      1,550,574 T+06_0000
10/21/2013 03:30AM            256 T+06_0000.SIG
10/21/2013 09:30AM      1,550,375 T+06_0600
10/21/2013 09:30AM            256 T+06_0600.SIG
```

A very truncated 'text' version of the T+06_0000 file is shown below, the WMO AHL of the *bulletin* is highlighted:

```
0002938400
639
YUXC85 EGRR 210000
GRIB         r¥    J Ý
```

```
       H————————————————————————   £                          ‘         …]J€
0]J€b0                                  Đ                                 Đ@
"
————————————————————————————————————————————————————————————————————————
————————————————————————————-   d  Lÿ          £  (Ã’
  ÿ    ÿ  qõÿOÿQ )         ‘              ‘          ÿ\ @€ˆˆ ˆˆ ˆˆ ˆˆ ˆˆ ÿR
————————————————————————————————————————————————————————————————————————
————————————————————————————————————————————————————————————————————————
ÿd  ÓæÆmÑ×òmòð÷ÿ
    q
ÿ“Ïü0øPToìin€ÈjwE,£jU¥,o!FRð;Â}@Ó§————————————————————=i°åh]^’ðžW
etc etc
640
YUXC70 EGRR 210000
GRIB         oË    J Ý
       H————————————————————————   £                          ‘         …]J€
0]J€b0                                  Đ                                 Đ@
"
————————————————————————————————————————————————————————————————————————
————————————————————————————-   d  pÿ          £  (Ã{
  ÿ    ÿ  oÿOÿQ )         ‘              ‘          ÿ\ @€ˆˆ ˆˆ ˆˆ ˆˆ ˆˆ ÿR
————————————————————————————————————————————————————————————————————————
————————————————————————————————————————————————————————————————————————
ÿd  ÓæÆmÑ×òmòð÷ÿ      n³ ÿ“Ïü0ìPToìin£³Ä»lÇmTL«¾Êüû`JÉì?b0Z%îG»
etc etc
```

In the event that GRIB2 had to be re-issued, then data will be distributed as normal over SADIS 2G.

On Secure SADIS FTP, each concatenated file will contain corrected bulletins (note modified WMO AHLs):

```
0002938400
639
YUXC85 EGRR 210000 CCA
GRIB         r¥    J Ý
       H————————————————————————   £                          ‘         …]J€
0]J€b0                                  Đ                                 Đ@
"
————————————————————————————————————————————————————————————————————————
————————————————————————————-   d  Lÿ          £  (Ã’
  ÿ    ÿ  qõÿOÿQ )         ‘              ‘          ÿ\ @€ˆˆ ˆˆ ˆˆ ˆˆ ˆˆ ÿR
————————————————————————————————————————————————————————————————————————
————————————————————————————————————————————————————————————————————————
ÿd  ÓæÆmÑ×òmòð÷ÿ
    q
ÿ“Ïü0øPToìin€ÈjwE,£jU¥,o!FRð;Â}@Ó§————————————————————=i°åh]^’ðžW
etc etc
```

```
640
YUXC70 EGRR 210000 CCA
GRIB         oË    J Ý
       H————————————————————————   £                              ‘         …]J€
0]J€b0                                   Ð                                    Ð@
"
```

```
————————————————————-   d  pÿ          £  (Ã{
  ÿ    ÿ  oÿOÿQ )         ‘               ‘          ÿ\ @€^^ ^^ ^^ ^^ ^^ ÿR
```

```
ÿd  ÓæÆmÑ×òmòð÷ÿ      n³ ÿ“Ïü0ìPToìin£³Ä»lÇmTL«¾Êüû`JÉì?b0Z%îG»
```

etc etc

An automated GRIB2 Correction message will be sent with the following:

```
FXUK66 EGRR 200343

RETRANSMITTED WAFC LONDON DATA:

DATA TYPE: WAFC LONDON GRIB2 UPPER AIR FORECASTS

ORIGINAL WMO AHL: Y/X/// EGRR 210000

RETRANSMITTED WMO AHL: Y/X/// EGRR 210000

WHERE Y/X/// REPRESENTS ALL WAFC LONDON GRIB2 WAFS FILES

ALL WAFC LONDON GRIB2 WAFS FILES INDICATED ABOVE ARE NOW

BEING RE-TRANSMITTED.

ISSUED BY WAFC LONDON=
```

1) Should further corrections be necessary, then the sequence will be CCB, CCC, CCD etc should be followed.

APPENDIX B: WMO Abbreviated Header Line Allocation for additional flight level data to be provided as part of WAFS gridded forecast data in GRIB2 code form

The $T_1T_2A_1A_2$ii allocation for additional flight level data to be provided as part of WAFS gridded forecast data in GRIB2 code form.

The CCCC allocation will be EGRR for WAFC London, KWBC for WAFC Washington.

	Geopotential Altitude			Temperature			U Component of Wind			V Component of Wind			Humidity
Unit	gpm	gpm	gpm	Kelvin	Kelvin	Kelvin	m/s	m/s	m/s	m/s	m/s	m/s	%
Pressure Level	750hPa	450hPa	125 hPa	750hPa	450hPa	125 hPa	750hPa	450hPa	125 hPa	750hPa	450hPa	125 hPa	750hPa
Nominal Flight Level	FL080	FL210	FL480	FL080	FL210	FL480	FL080	FL210	FL480	FL080	FL210	FL480	FL080
T+06 (C)	YHXC75	YHXC45	YHXC13	YTXC75	YTXC45	YTXC13	YUXC75	YUXC45	YUXC13	YVXC75	YVXC45	YVXC13	YRXC75
T+09 (D)	YHXD75	YHXD45	YHXD13	YTXD75	YTXD45	YTXD13	YUXD75	YUXD45	YUXD13	YVXD75	YVXD45	YVXD13	YRXD75
T+12 (E)	YHXE75	YHXE45	YHXE13	YTXE75	YTXE45	YTXE13	YUXE75	YUXE45	YUXE13	YVXE75	YVXE45	YVXE13	YRXE75
T+15 (F)	YHXF75	YHXF45	YHXF13	YTXF75	YTXF45	YTXF13	YUXF75	YUXF45	YUXF13	YVXF75	YVXF45	YVXF13	YRXF75
T+18 (G)	YHXG75	YHXG45	YHXG13	YTXG75	YTXG45	YTXG13	YUXG75	YUXG45	YUXG13	YVXG75	YVXG45	YVXG13	YRXG75
T+21 (H)	YHXH75	YHXH45	YHXH13	YTXH75	YTXH45	YTXH13	YUXH75	YUXH45	YUXH13	YVXH75	YVXH45	YVXH13	YRXH75
T+24 (I)	YHXI75	YHXI45	YHXI13	YTXI75	YTXI45	YTXI13	YUXI75	YUXI45	YUXI13	YVXI75	YVXI45	YVXI13	YRXI75
T+27 (J)	YHXJ75	YHXJ45	YHXJ13	YTXJ75	YTXJ45	YTXJ13	YUXJ75	YUXJ45	YUXJ13	YVXJ75	YVXJ45	YVXJ13	YRXJ75
T+30 (K)	YHXK75	YHXK45	YHXK13	YTXK75	YTXK45	YTXK13	YUXK75	YUXK45	YUXK13	YVXK75	YVXK45	YVXK13	YRXK75
T+33 (L)	YHXL75	YHXL45	YHXL13	YTXL75	YTXL45	YTXL13	YUXL75	YUXL45	YUXL13	YVXL75	YVXL45	YVXL13	YRXL75
T+36 (M)	YHXM75	YHXM45	YHXM13	YTXM75	YTXM45	YTXM13	YUXM75	YUXM45	YUXM13	YVXM75	YVXM45	YVXM13	YRXM75

The requirement will generate 143 additional bulletins per run. Following implementation there will be 858 (currently 715) WAFS GRIB2 bulletins for wind, temp, humidity, gph, and tropopause data. The number of CB, icing and turbulence bulletins, currently 407, will remain unchanged. As a consequence, the TOTAL number of bulletins issued per run by each WAFC will increase from 1122 to 1265.

– END –