EUMETNET
European Meteorological Services Network

E-GVAP-III

The EIG EUMETNET GNSS Water Vapour Programme, phase III

Expert team & members meeting
December 6 to 7, 2016, DMI

Agenda

Reporting from experts & members

SGN, from Lila

Short sum up of what have changed this year :

- **- For SGN_, SGN1 and SGNC the number of stations has increased : there is now 381 in SGN_ (France and Europe), 481 in SGN1 (France and Europe) and 36 in SGNC (Caribbean French stations and other stations in North America)**
- **- For SGNC : 3 French stations were installed in French territories (in Guadeloupe, Martinique and French part of Saint Martin). Rinex data is available on our FTP server (rgpdata.ign.fr).**
- **- ABMF (IGS station in Guadeloupe) : Since June we encountered a lot of tracking issues on IGN station ABMF in Guadeloupe. We had to stop processing this data. Some tests are currentlty done to understand what is happenning. Sorry for any inconvenience it may cause.**
- **- We have changed our 3 daily processing (on France and Europe, on Indian Ocean and on "North America"), now we use observations from GPS and GLONASS. And all these processing were moved to a more secure server in a data center.**

SGN, from Lila

Plans for next year :

- **- All hourly processings (SGN_, SGN1, SGNC) are going to be GPS+GLONASS at the end of 2017 and will also be moved on a more secure server in our data center. So, there should be less gaps. The new server is more powerfull so adding Glonass shouldn't result in much more delay in our products.**

- **- We met Meteo France two weeks ago and we decided to make some tests to estimate horizontal gradient, at the same time we will add Glonass. We will submit a "test" solution to E-GVAP. I think "SGNT" is avalaible for that. I will contact you when we will be ready**
- **- We also plan to switch from IGS08 to IGS14**

Denmark, DMI

Ground-based GNNS data. Access and processing.

- **The NMA uploads hourly 30 s files to DMI shortly after the full hour. The files are available with a very small delay.**
- **The Danish GNSS data are processed by ROBH.**
- **They used to be processed by NGAA, but have not been included in the NGA1 processing at present.**
- **The Danish GNSS data currently come from one source, the national Danish mapping agency.**
- **Potentially data from a private network are available, but currently there is no agreement on access to those data.**

GPSnet (green, names) + Trimble network (red, numbers)

DMI

- **O-B derivation and use of ZTDs in DMI NWP has been hybernating for a period, due to lack of good quality data from Scandinavia.**
- **The quality of ROBH and NGA1 ZTDs is good, according to UKMO Global model O-Bs.**
- **Derivation of error statistics against DMI models, followed by assimilation is now being set up (again).**

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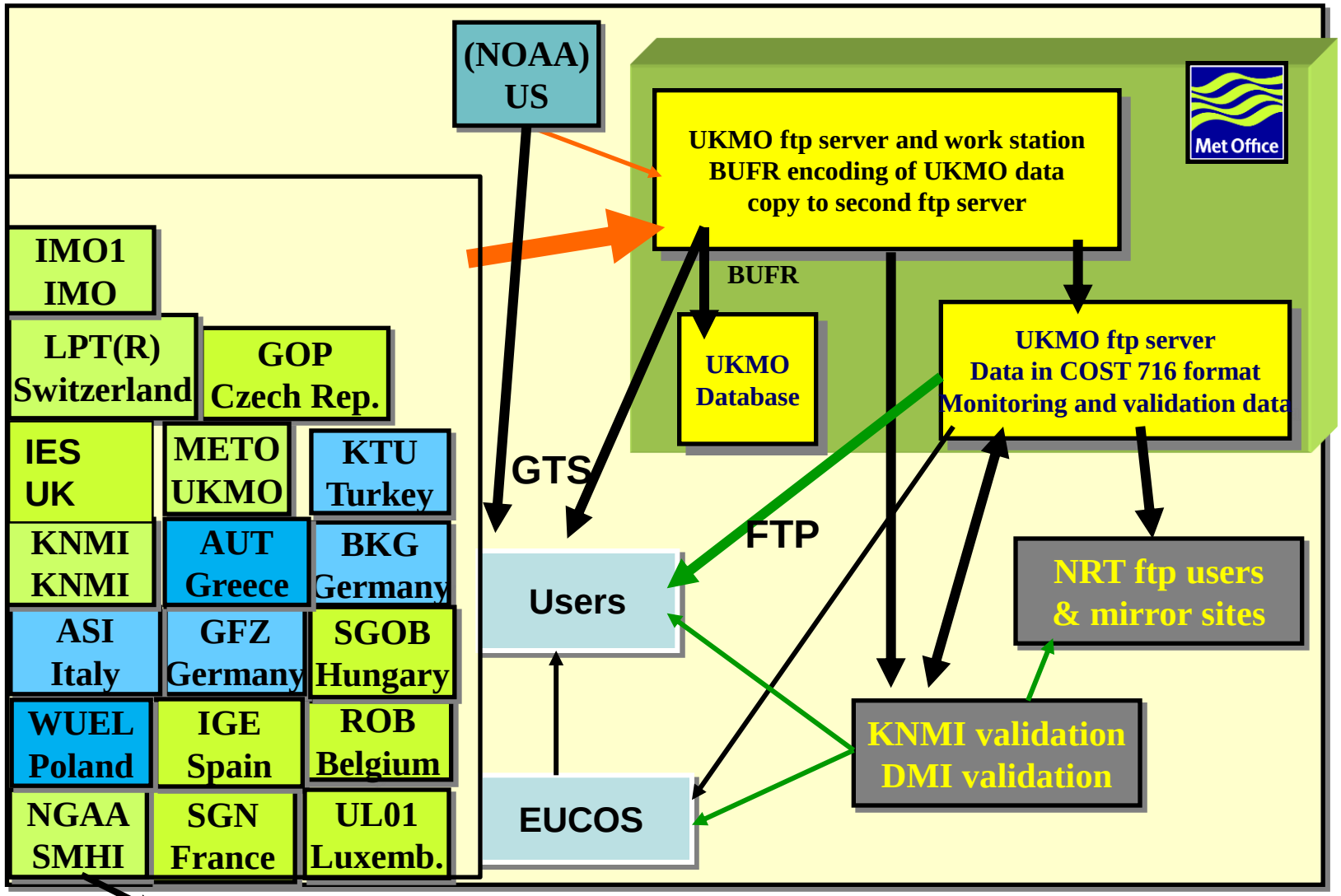
E-GVAP status and outlook.

OBS system overview

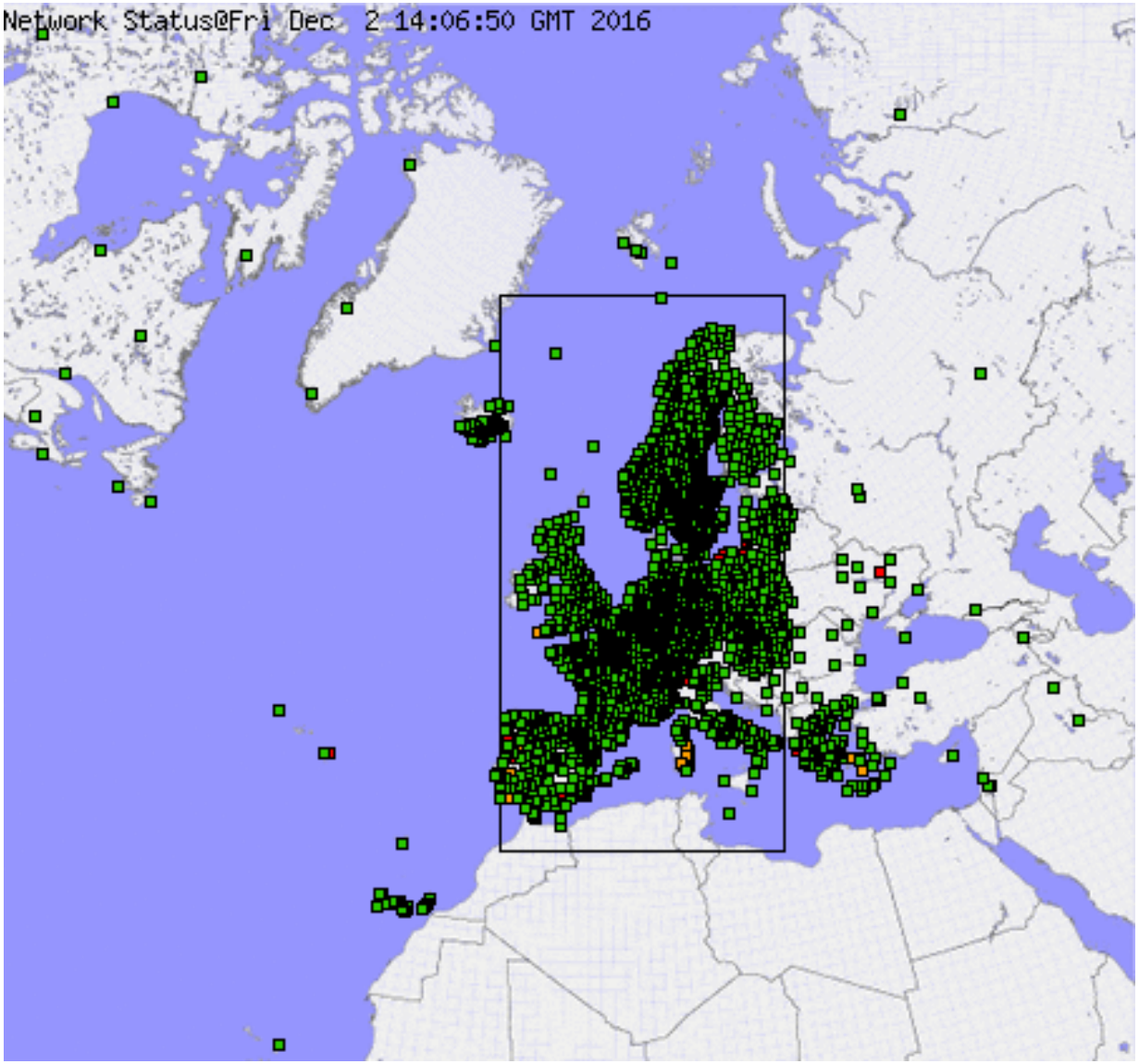
NRT GNSS ZTD data flow



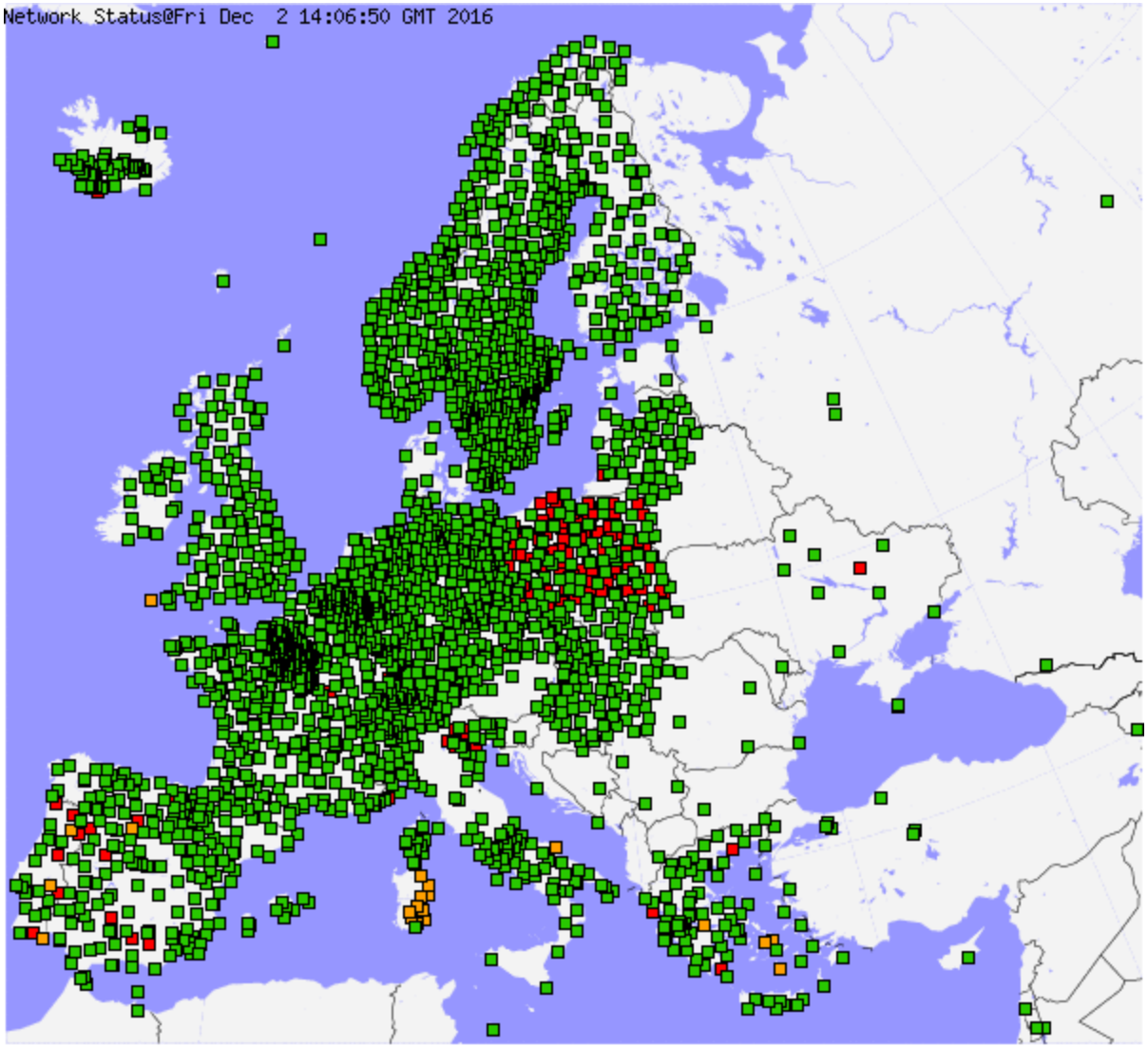
Analysis centres (ACs), each processing raw GNSS data from many sites. Each AC send data to UKMO.

AC	Institution
AUT	Aristotle Univ. of Thessaloniki Analysis Center
ASI	e-geos/Telespazio, Italy
BKG	Federal Agency for Cartography and geodesy, Germany
GFZ	Helmholz Centre Potsdam, GFZ German Res. Cen. f Geosciences
GOPE	Geodectic Observatory Pecny, Czech Republic
IES	Inst. of Eng., Surv. And Space Geodesy, Univ of Nottingham, UK
IGE	Instituto Geografica National, Spain
IMO	Icelandic Met Office - New autumn 2016
KNMI	Royal Meteorological Institute of the Netherlands
KTU	Karadeniz Technival Univ. Analsis Center
LPT	SwissTopo, Switzerland
METO	UK Met Office
NGA1	Swedish national mapping agency (Lantmaeteriet), Uppsala
NOAA	NOAA/NCEP, USA - Stopped autumn 2016
ROB	Royal Observatory of Belgium
SGN	Institut Geographique National, France
SGOB	Satellite Geod. Obs, IGCRS + Technical Univ. Budapest, Hungary
UL01	University of Luxembourg, Fac. Of Science and Communication
WUEL	Wroclaw University + Inst. Of Geodesy and Geoinformatics, Poland

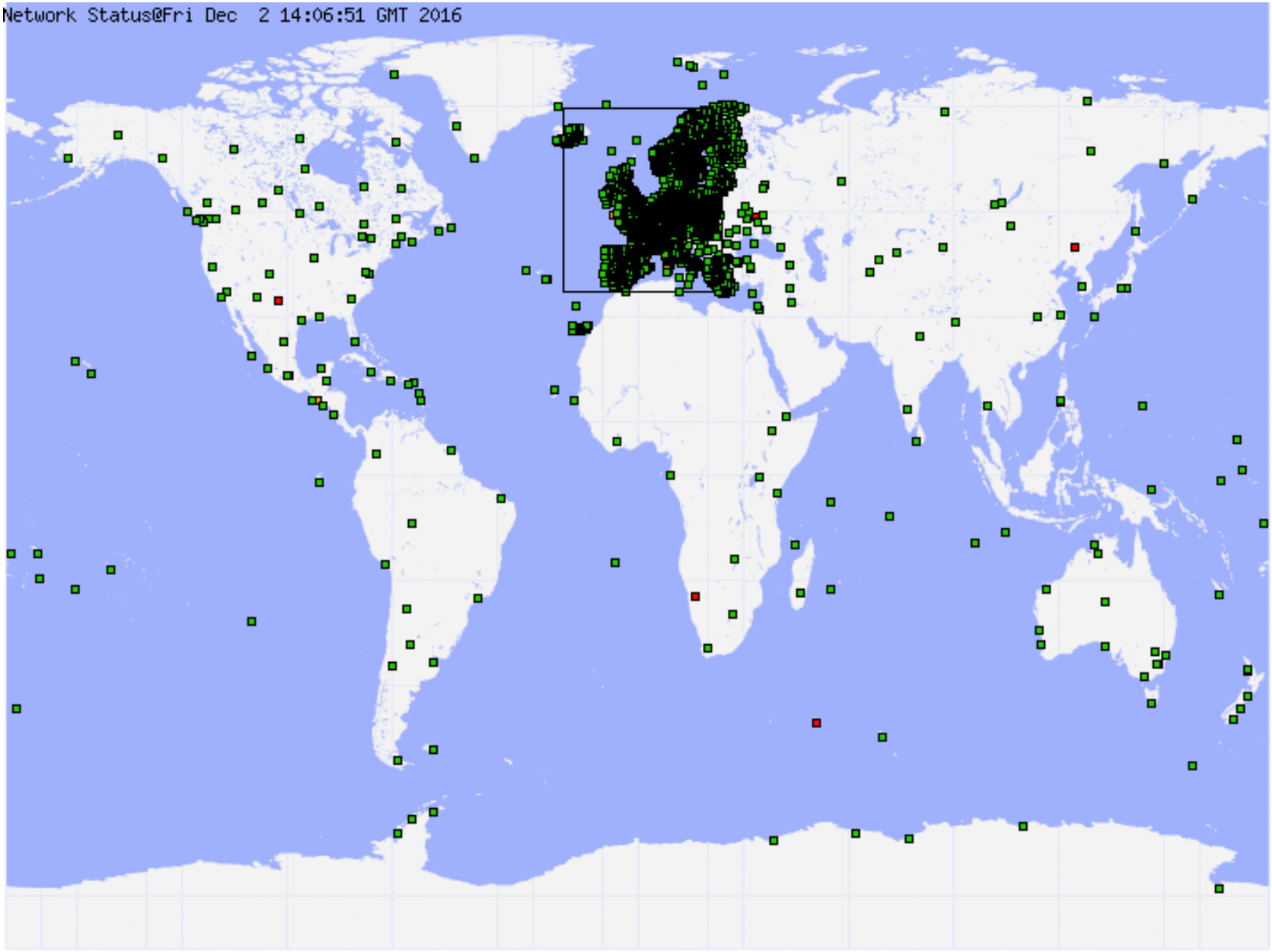
Coverage

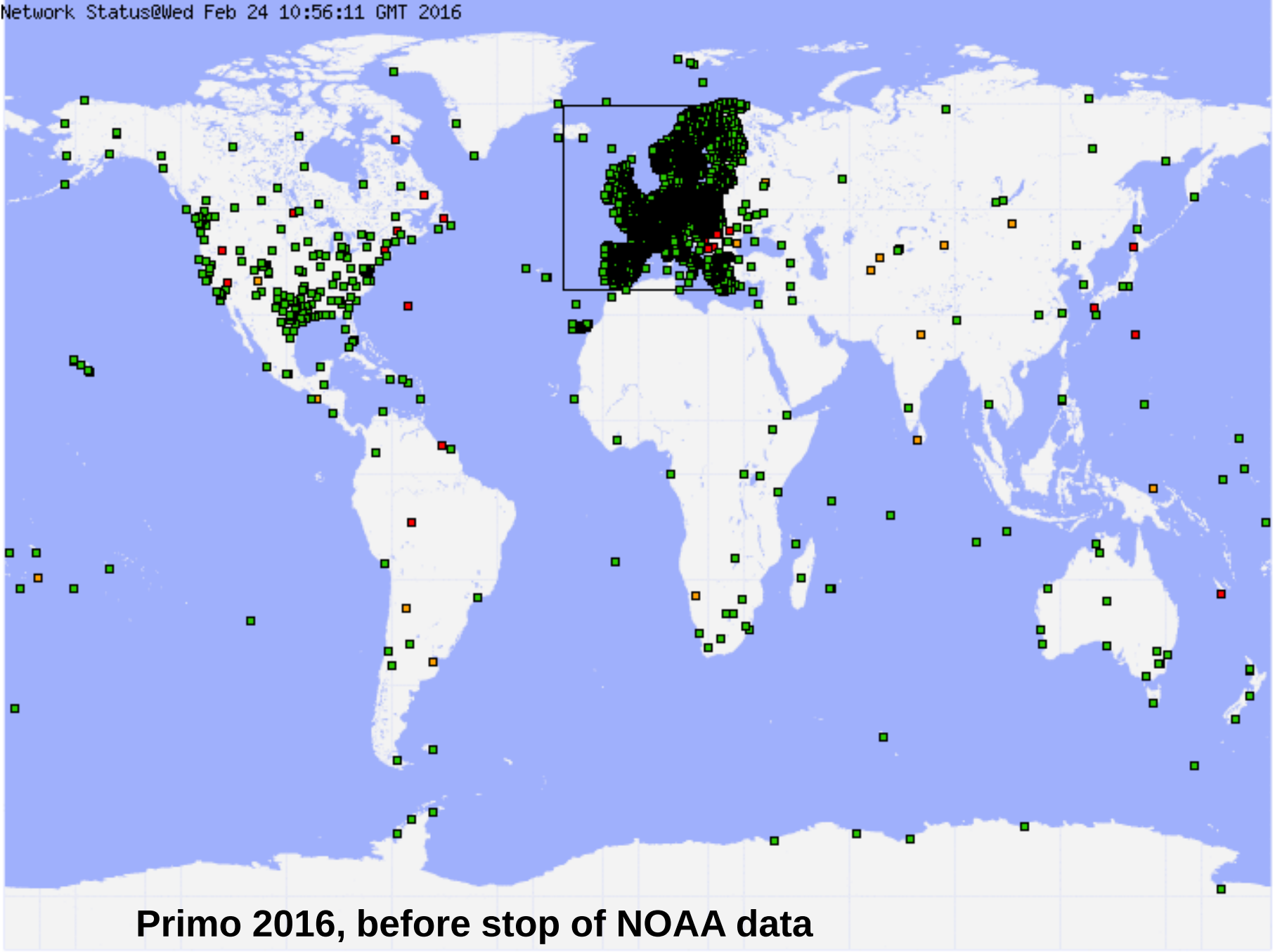


Coverage

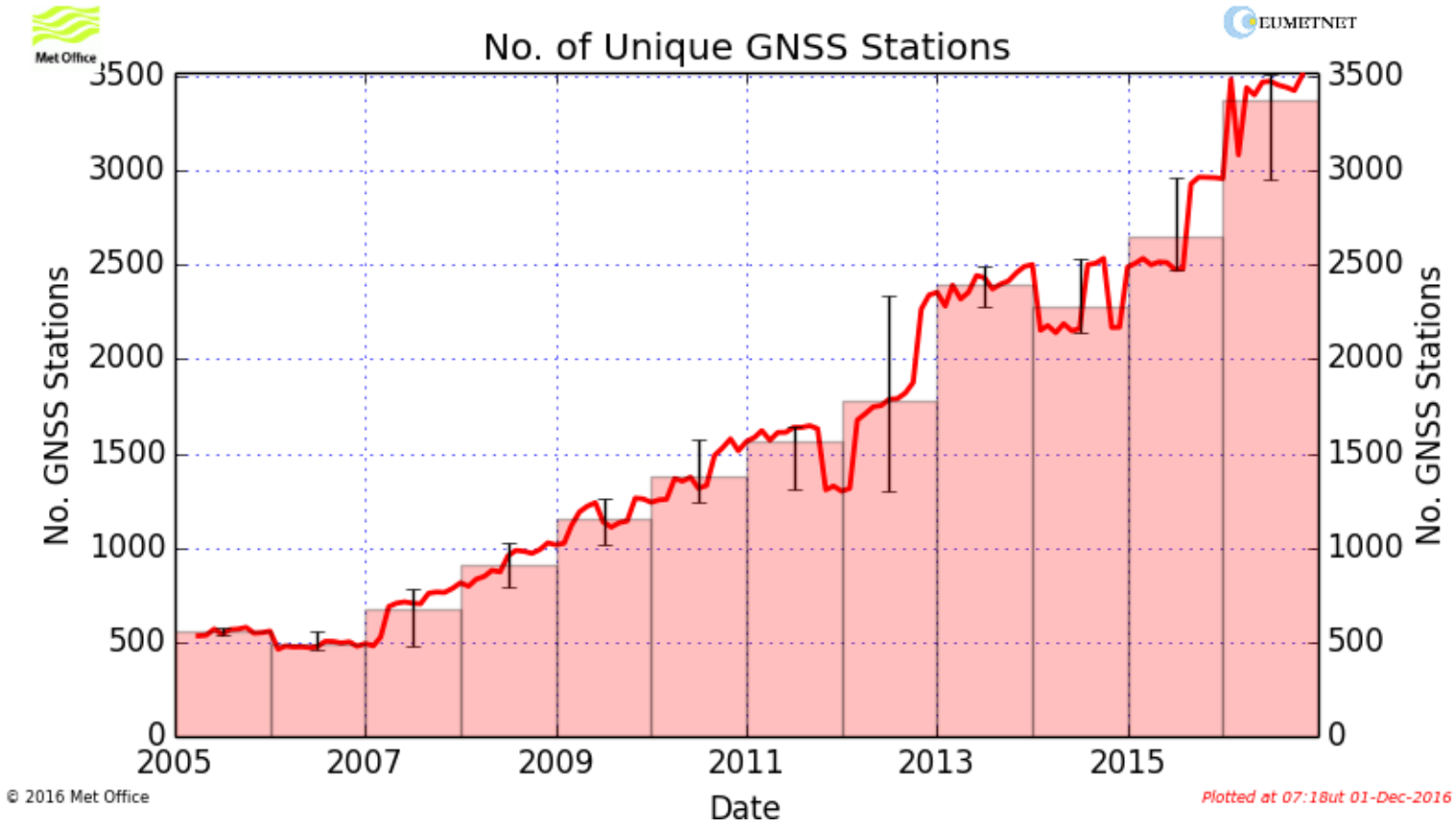


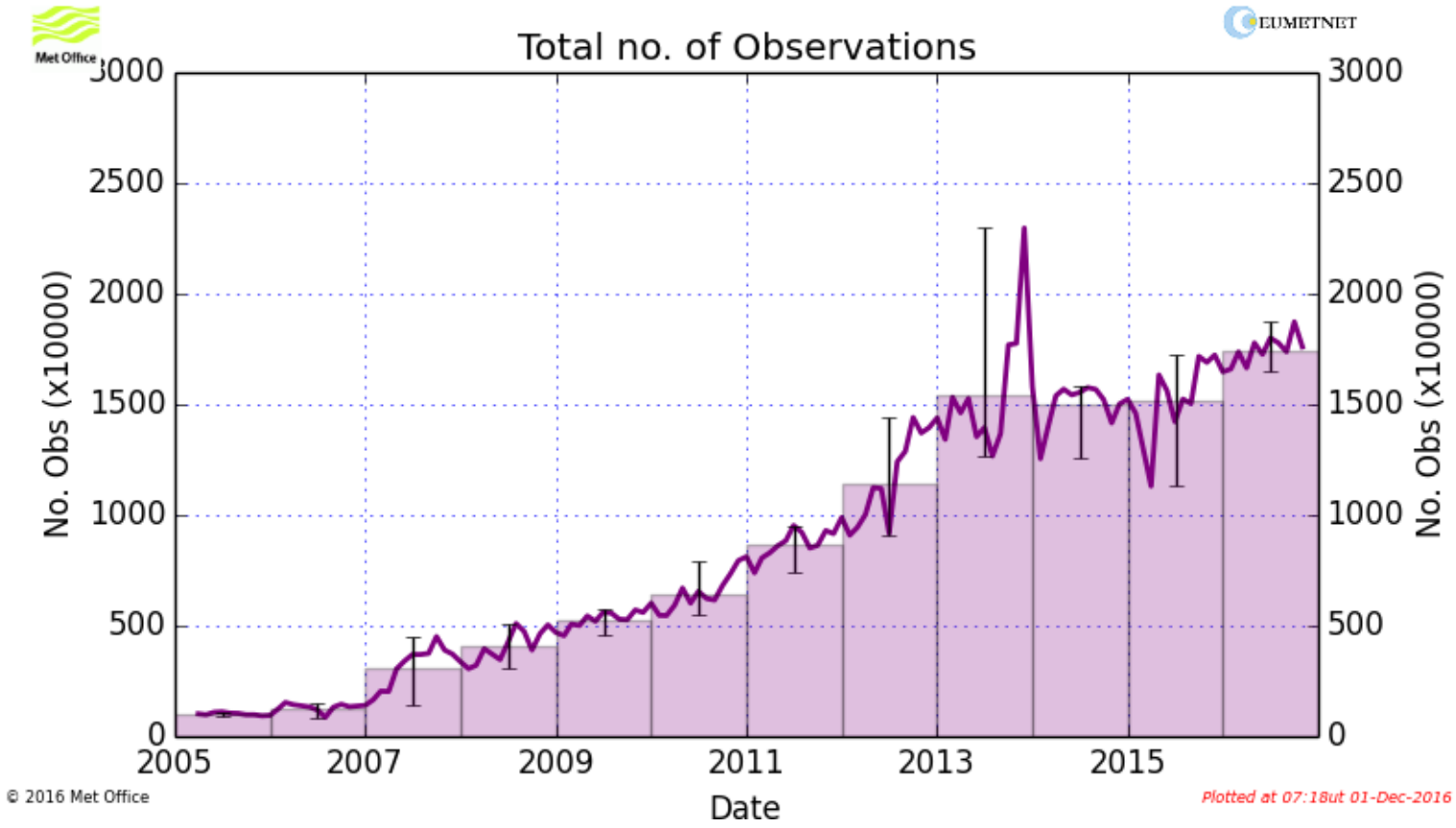
Coverage

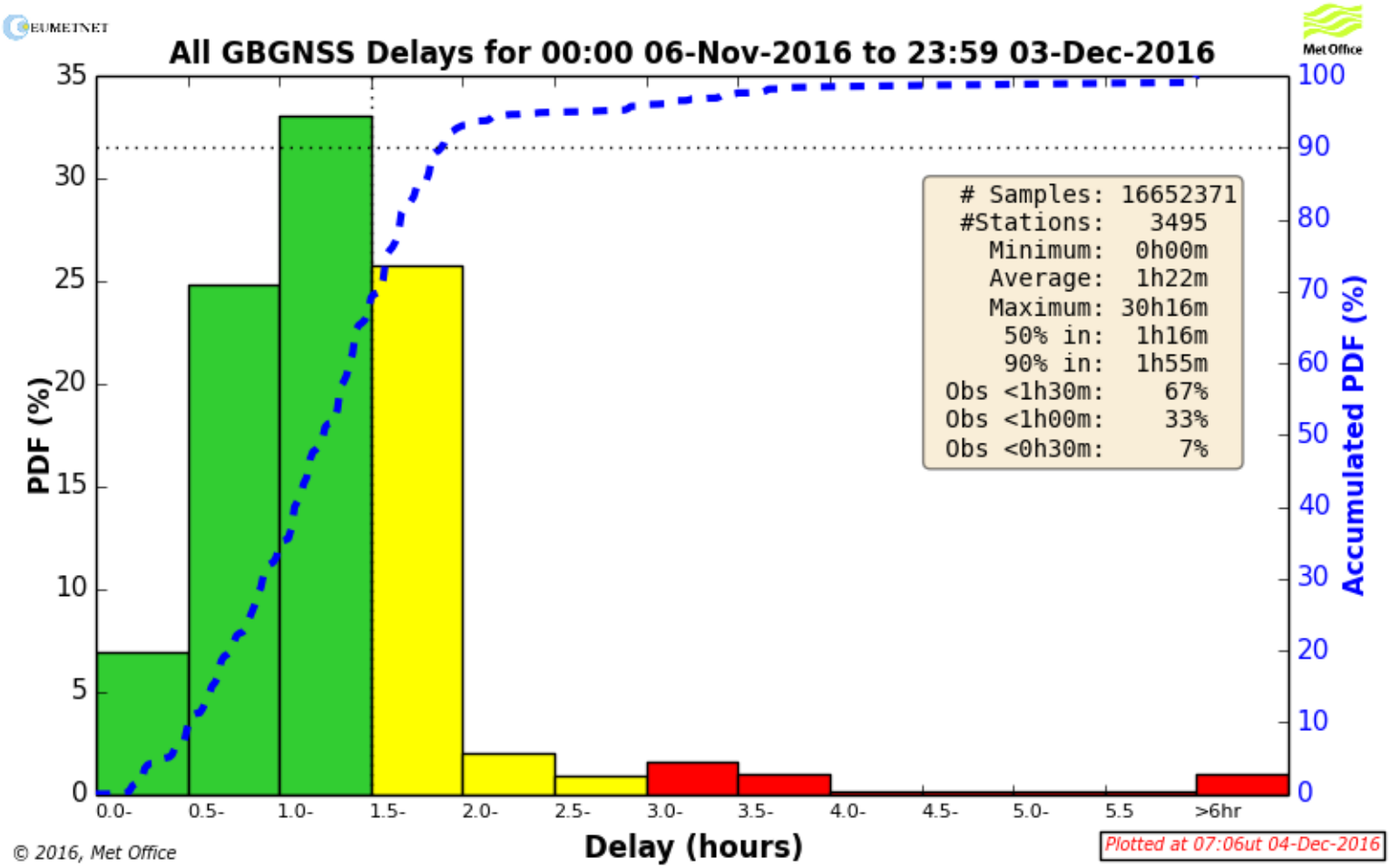


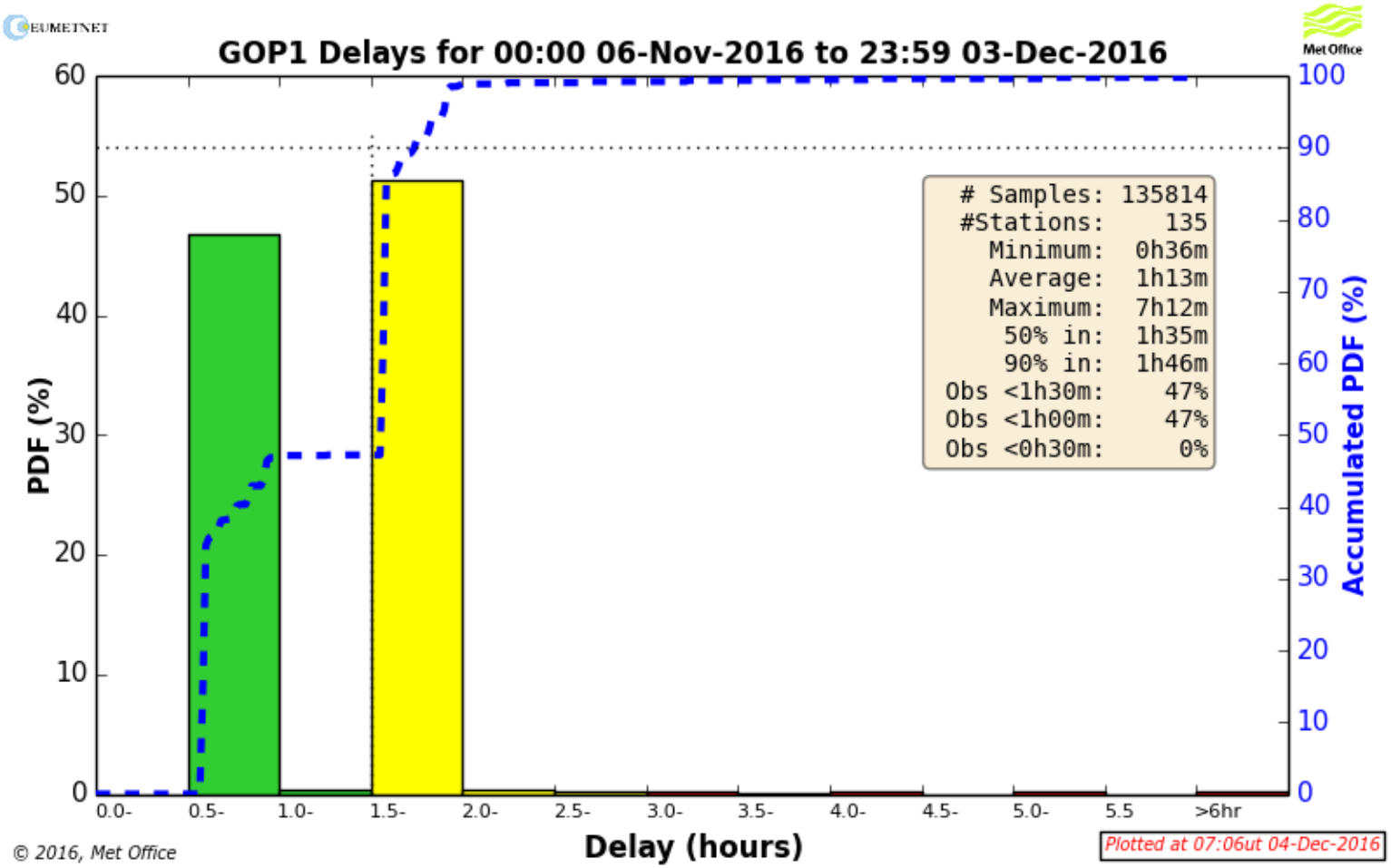


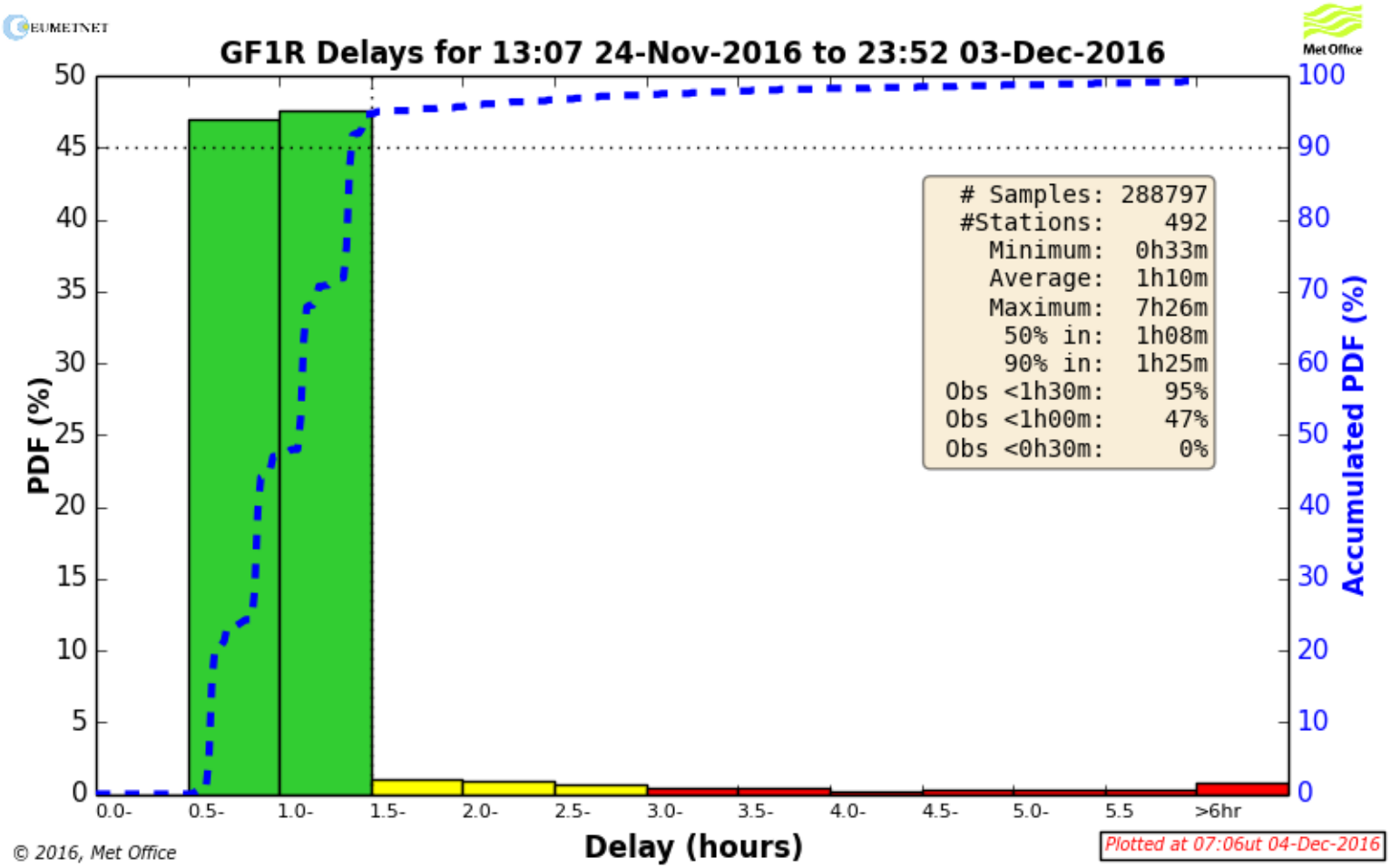
Primo 2016, before stop of NOAA data


Met Office
EUMETNET
No. of Unique GNSS Stations
No. GNSS Stations
No. GNSS Stations
0
500
1000
1500
2000
2500
3000
3500
2005
2007
2009
2011
2013
2015
Date
© 2016 Met Office
Plotted at 07:18ut 01-Dec-2016


Met Office
EUMETNET
Total no. of Observations
No. Obs (x10000)
3000
2500
2000
1500
1000
500
0
2005
2007
2009
2011
2013
2015
Date
© 2016 Met Office
Plotted at 07:18ut 01-Dec-2016


EUMETNET
All GBGNSS Delays for 00:00 06-Nov-2016 to 23:59 03-Dec-2016
Met Office
PDF (%)
Accumulated PDF (%)
Samples: 16652371
#Stations: 3495
Minimum: 0h00m
Average: 1h22m
Maximum: 30h16m
50% in: 1h16m
90% in: 1h55m
Obs <1h30m: 67%
Obs <1h00m: 33%
Obs <0h30m: 7%
0.0-
0.5-
1.0-
1.5-
2.0-
2.5-
3.0-
3.5-
4.0-
4.5-
5.0-
5.5
>6hr
Delay (hours)
© 2016, Met Office
Plotted at 07:06ut 04-Dec-2016


EUMETNET
GOP1 Delays for 00:00 06-Nov-2016 to 23:59 03-Dec-2016
Met Office
PDF (%)
Accumulated PDF (%)
Samples: 135814
#Stations: 135
Minimum: 0h36m
Average: 1h13m
Maximum: 7h12m
50% in: 1h35m
90% in: 1h46m
Obs <1h30m: 47%
Obs <1h00m: 47%
Obs <0h30m: 0%
0.0-
0.5-
1.0-
1.5-
2.0-
2.5-
3.0-
3.5-
4.0-
4.5-
5.0-
5.5
>6hr
Delay (hours)
© 2016, Met Office
Plotted at 07:06ut 04-Dec-2016


EUMETNET
GF1R Delays for 13:07 24-Nov-2016 to 23:52 03-Dec-2016
Met Office
Samples: 288797
#Stations: 492
Minimum: 0h33m
Average: 1h10m
Maximum: 7h26m
50% in: 1h08m
90% in: 1h25m
Obs <1h30m: 95%
Obs <1h00m: 47%
Obs <0h30m: 0%
PDF (%)
Accumulated PDF (%)
0.0-
0.5-
1.0-
1.5-
2.0-
2.5-
3.0-
3.5-
4.0-
4.5-
5.0-
5.5
>6hr
Delay (hours)
© 2016, Met Office
Plotted at 07:06ut 04-Dec-2016

EUMETNET/Obs Programme Quality Monitoring

See separate report: ObsPMT_REP_2016_004_QM_Q32016.pdf

Note, the timeliness in the Obs Programme reporting is as seen by the database at DWD. The O-B statistics is based on UKMO Global model O-Bs, with the statistics derived at DMI.

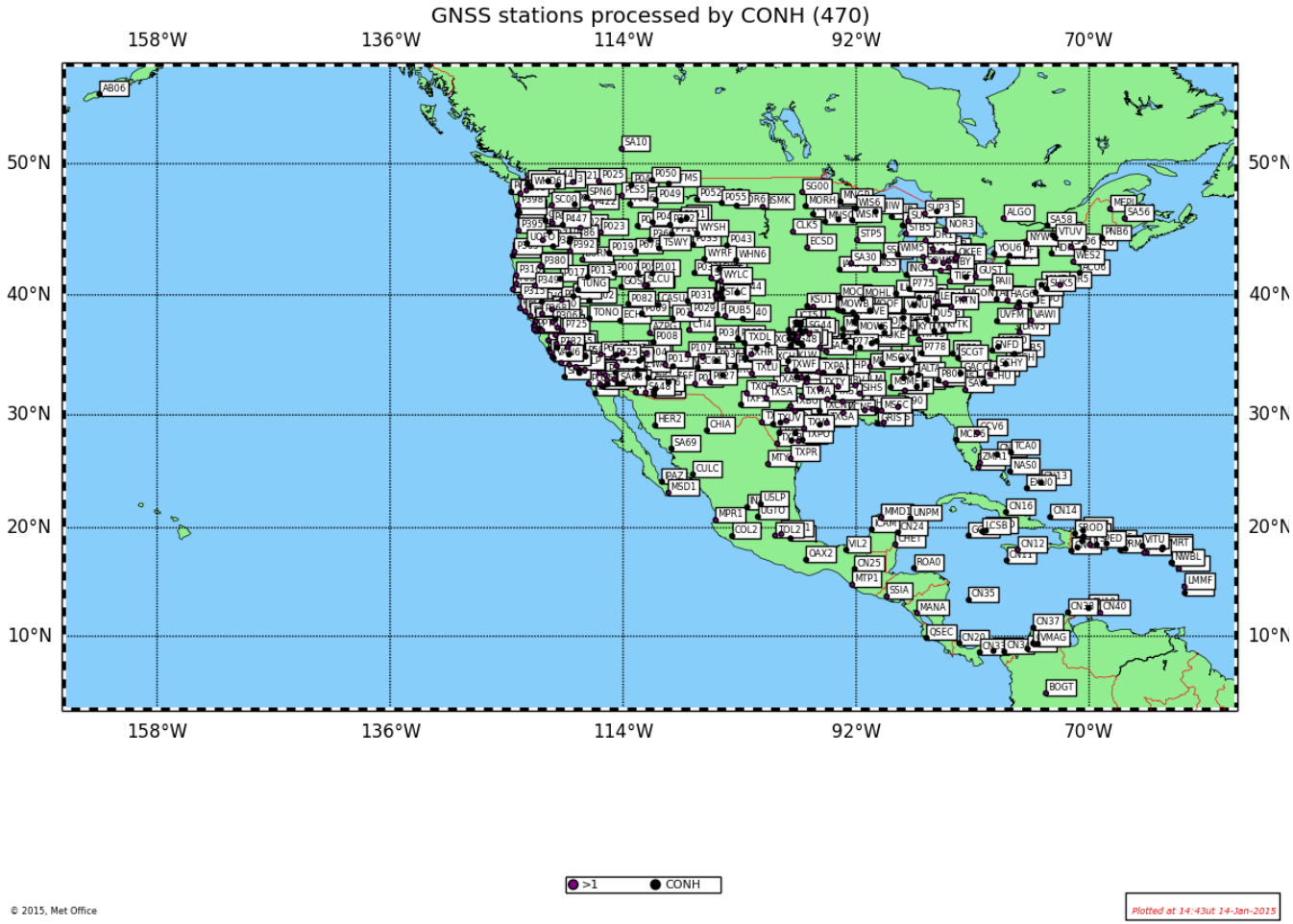
Update on data format developments and needs.

On the stop of NOAA data

- **The processing of NOAA data has been transfered from NOAA to a private company, Earth Networks.**
- **The processing is done under a contract not allowing NOAA/NWS to further the data outside of their organisation.**

On alternative sources of North American NRT ZTDs

CONUS Hourly (CONH) is processed by UCAR (COSMIC Office) under the SuomiNet project.



- **E-GVAP is not allowed to obtain and distribute CONH data at present.**

- **Individual NWP institutions can obtain permission to download CONH data. The UK Met Office does so.**

- **Dave Offiler has expanded his suite of format converting software, to include software capable of converting from the format used by CONH to E-GVAP format v2.2a.**
- **Further there is software converting from COST to BUFR format.**

Advertising the ROMSAF GB GNSS software

- The ROMSAF is a EUMETSAT programme handling processing and distribution of GNSS radio occultation data for meteorology. Further it provides help to users, in the form of software and documentation.
- The ROMSAF offers a solid platform for controlled access by users with a low amount of manual involvement.
- Dave Offilers software for format conversion and control of GB GNSS COST files data has been updated and transferred to the ROMSAF environment.
- The software is currently undergoing beta testing. After a final review it is expected to be officially launched early next year.

- If you are very eager, it is possible to get your hands on an un-official version.

Preparing move of solutions from ”test” to ”operational”

- **At present no formal set of rules control when ACs/AC-solutions are moved from *test* to *operational***
- **Many test ACs / AC-solutions have a quality relative to the operational ones, calling for a change in their status, and distribution in BUFR on the GTS.**

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First column is average O-B over all the sites of the AC. Second column is the standard deviation. Third column is the number of AC sites

All calculations based on O-B from UKMO Global NWP model.

June 2016

2.8	10.3	91	3.0	10.0	90	ASIC
-0.7	18.4	39	-1.1	17.2	38	ASIR
-2.1	13.5	14	-2.1	13.5	14	ASIS
1.7	12.0	251	1.7	11.8	250	ASI_
5.9	14.2	110	5.9	14.2	110	AUT1
2.4	11.4	126	2.4	11.4	126	BKGH
1.7	10.6	98	1.7	10.6	98	BKG_
6.3	15.0	547	6.3	14.8	545	CONH
21.0	91.7	18	21.0	91.7	18	DITT
8.8	9.6	285	8.9	9.6	284	GFZ_
1.9	11.2	116	1.9	11.2	116	GOP1
3.1	15.5	116	3.8	11.7	115	GOPG
0.7	9.9	247	0.7	9.9	247	IES2
4.1	14.0	336	3.5	12.3	334	IGE2
2.3	10.9	43	2.3	10.9	43	KNM3
-4.1	15.5	32	-4.1	15.5	32	KNM4
-1.6	15.0	44	-1.6	15.0	44	LPTR
2.6	10.7	205	2.6	10.7	205	LPT_
3.4	11.9	131	3.4	11.6	130	METG
0.6	9.9	259	0.6	9.9	259	METO
-0.5	13.1	127	-0.5	13.1	127	METR
-1.2	9.7	590	-1.2	9.6	588	NGA1
5.5	22.9	294	5.3	22.2	291	NOAA
3.1	12.3	302	3.1	12.3	302	ROBG
1.6	11.8	361	1.6	11.8	361	ROBH
1.1	11.6	234	1.1	11.6	234	ROBQ
1.7	13.3	775	1.7	13.3	775	ROBT
-1.4	11.0	462	-1.4	11.0	462	SGN1
7.9	17.9	30	7.9	17.9	30	SGNC
-1.2	10.9	366	-1.2	10.9	366	SGN_
2.4	12.9	102	2.4	12.9	102	SGO1
1.7	10.8	218	1.7	10.8	218	ULO1
0.6	15.8	47	0.6	15.8	47	WLIT
-0.9	12.2	264	-0.9	12.2	264	WUEL

AC stats 201606 (END)

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First column is average O-B over all the sites of the AC. Second column is the standard deviation. Third column is the number of AC sites

July 2016

2.0	10.8	89	2.0	10.8	89	ASIC
0.3	25.4	38	0.3	23.8	37	ASIR
-1.4	17.2	13	-1.4	17.2	13	ASIS
-0.1	13.6	249	0.2	13.2	246	ASI_
7.4	13.8	118	7.4	13.8	118	AUT1
1.8	12.2	126	1.8	12.2	126	BKGH
0.8	11.2	102	0.8	11.2	102	BKG_
4.1	18.8	553	4.6	17.1	543	CONH
15.2	80.4	18	15.2	80.4	18	DITT
7.6	9.9	284	7.6	9.9	284	GFZ_
1.8	11.3	138	1.8	11.3	138	GOP1
2.3	14.3	116	3.2	11.9	115	GOPG
-1.0	10.5	242	-0.9	10.3	240	IES2
2.0	14.1	330	1.6	12.8	328	IGE2
1.9	10.5	41	1.9	10.5	41	KNM3
0.4	13.0	30	-0.2	12.0	29	KNM4
-5.3	18.3	44	-4.6	17.2	43	LPTR
0.6	12.7	206	1.3	11.5	200	LPT_
3.0	11.7	141	3.0	11.7	141	METG
-1.1	10.6	257	-1.0	10.4	255	METO
-0.7	12.9	127	-0.7	12.7	126	METR
-1.3	10.0	589	-1.3	10.0	589	NGA1
4.9	16.2	274	4.6	15.3	272	NOAA
2.5	12.9	298	2.5	12.9	298	ROBG
0.7	12.4	361	0.7	12.4	361	ROBH
-0.0	12.3	201	-0.0	12.3	201	ROBQ
-0.8	13.1	682	-0.8	13.1	681	ROBT
-1.8	11.3	463	-1.6	11.0	459	SGN1
7.3	18.6	29	7.3	18.6	29	SGNC
-1.6	11.6	367	-1.4	11.3	364	SGN_
1.3	13.7	106	1.3	13.7	106	SG01
0.2	11.4	220	0.4	11.2	218	UL01
1.3	14.6	47	1.3	14.6	47	WLIT
-1.2	11.8	266	-1.2	11.8	266	WUEL

AC stats 201607 (END)

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First column is average O-B over all the sites of the AC. Second column is the standard deviation. Third column is the number of AC sites

August 2016

2.0	10.6	86	2.0	10.6	86	ASIC
1.0	20.4	37	1.5	19.2	36	ASIR
-0.3	14.1	12	-0.3	14.1	12	ASIS
-0.2	13.0	247	-0.0	12.7	245	ASI_
6.7	12.9	112	6.7	12.9	112	AUT1
1.3	11.5	126	1.3	11.5	126	BKGH
-0.0	10.7	101	-0.0	10.7	101	BKG_
5.0	16.0	547	5.0	15.6	544	CONH
58.1	164.3	18	58.1	164.3	18	DITT
7.3	9.2	286	7.1	9.1	285	GFZ_
1.2	10.3	136	1.2	10.3	136	GOP1
3.1	11.8	115	3.1	11.8	115	GOPG
-1.4	10.9	243	-1.4	10.9	243	IES2
1.4	14.9	328	1.2	13.5	325	IGE2
-0.0	10.7	28	-0.0	10.7	28	KNM3
-3.5	13.6	17	-3.5	13.6	17	KNM4
-4.2	18.4	44	-4.2	18.4	44	LPTR
0.7	12.0	204	0.7	11.8	202	LPT_
3.1	11.7	141	3.1	11.7	141	METG
-1.7	10.9	254	-1.7	10.9	254	METO
-3.0	13.6	127	-3.0	13.4	126	METR
-0.6	9.0	586	-0.6	8.9	585	NGA1
4.7	16.1	273	4.8	15.6	270	NOAA
2.5	12.4	302	2.5	12.4	302	ROBG
-0.3	12.7	357	-0.3	12.6	356	ROBH
-1.2	13.0	203	-1.2	13.0	203	ROBQ
-0.7	13.8	678	-0.6	13.7	677	ROBT
-1.8	12.3	454	-1.8	12.2	453	SGN1
6.0	17.5	30	6.0	17.5	30	SGNC
-1.4	12.2	360	-1.3	12.1	359	SGN_
0.4	12.0	104	0.4	12.0	104	SG01
-1.2	11.4	220	-1.2	11.4	220	UL01
-0.2	13.7	47	-0.2	13.7	47	WLIT
-1.7	10.5	263	-1.7	10.5	263	WUEL

AC_stats_201608 (END)

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First column is average O-B over all the sites of the AC. Second column is the standard deviation. Third column is the number of AC sites

September 2016

-0.4	10.1	158	-0.2	9.9	157	ASIC
-0.4	14.6	44	-0.4	13.8	43	ASIR
-2.1	13.2	17	-2.1	13.2	17	ASIS
0.0	11.5	244	0.2	11.2	242	ASI_
5.9	13.0	117	5.9	13.0	117	AUT1
2.7	9.1	30	2.7	9.1	30	BEU1
1.4	10.9	126	1.4	10.9	126	BKGH
0.2	9.6	101	0.2	9.6	101	BKG_
4.8	14.1	505	4.8	14.1	505	CONH
11.0	29.4	18	11.0	29.4	18	DITT
7.0	8.6	284	6.8	8.6	283	GFZ_
1.2	9.3	137	1.2	9.3	137	GOP1
3.2	11.2	113	3.2	11.2	113	GOPG
-1.5	10.9	244	-1.5	10.9	244	IES2
0.3	13.7	328	0.9	12.8	327	IGE2
3.3	5.8	94	3.1	5.6	93	IMO1
-0.1	10.6	19	-0.1	10.6	19	KNM3
-6.7	13.9	9	-6.7	13.9	9	KNM4
2.5	8.7	31	2.5	8.7	31	KTU1
-8.9	18.8	44	-8.7	17.7	43	LPTR
0.6	11.3	206	0.8	10.4	202	LPT_
3.3	11.3	141	3.3	11.3	141	METG
-1.9	10.8	256	-1.9	10.8	256	METO
-1.8	14.6	122	-1.8	14.6	122	METR
-1.5	9.7	588	-1.4	9.7	587	NGA1
3.3	14.4	241	3.4	14.3	240	NOAA
2.2	11.7	298	2.2	11.7	298	ROBG
-0.6	11.5	361	-0.5	11.4	360	ROBH
-0.9	13.4	204	-0.9	13.4	204	ROBQ
-0.4	12.7	683	-0.4	12.7	682	ROBT
-1.1	11.8	457	-0.9	11.6	454	SGN1
5.3	18.3	29	5.3	18.3	29	SGNC
-1.4	11.8	362	-1.2	11.5	359	SGN_
2.3	28.5	104	2.3	27.9	103	SGO1
-0.9	11.0	187	-0.9	11.0	187	UL01
-2.2	11.0	47	-2.2	11.0	47	WLIT
-3.0	10.1	264	-3.0	10.1	264	WUEL

AC stats 201609 (END)

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First column is average O-B over all the sites of the AC. Second column is the standard deviation. Third column is the number of AC sites

October 2016

-0.3	9.3	183	0.2	8.1	181	ASIC
-3.6	21.7	44	-2.7	18.4	42	ASIR
-3.6	12.1	16	-3.6	12.1	16	ASIS
-0.3	10.8	240	0.2	10.0	235	ASI_
6.3	12.2	117	6.3	12.2	117	AUT1
-13.3	11.6	38	-5.7	9.1	36	BEU1
1.5	8.8	125	1.5	8.8	125	BKGH
0.3	7.5	100	0.3	7.5	100	BKG_
4.9	11.9	484	4.9	11.9	484	CONH
8.2	16.7	18	8.2	16.7	18	DITT
9.0	6.9	282	8.7	6.8	281	GFZ_
1.1	7.6	135	1.1	7.6	135	GOP1
3.4	10.6	110	3.7	10.4	109	GOPG
-2.3	8.6	234	-2.1	8.0	233	IES2
4.7	13.0	313	4.1	11.4	312	IGE2
-0.0	10.8	99	-0.0	10.8	99	IMO1
-1.5	8.3	41	-1.5	8.3	41	KNM3
-1.1	12.5	32	-2.9	11.3	31	KNM4
0.5	8.1	31	0.5	8.1	31	KTU1
-11.5	19.2	45	-8.7	11.7	40	LPTR
0.6	12.3	209	2.1	7.8	197	LPT_
3.7	10.8	136	3.6	10.3	133	METG
-2.2	8.6	261	-2.1	8.0	260	METO
-2.8	10.6	122	-2.8	10.4	121	METR
-2.7	8.0	587	-2.3	7.0	578	NGA1
2.8	12.0	191	2.8	11.1	188	NOAA
2.2	12.0	299	2.7	11.5	295	ROBG
0.3	9.7	357	0.6	9.0	353	ROBH
-0.7	11.6	203	-0.8	11.1	199	ROBQ
-0.9	12.6	690	-0.7	12.2	687	ROBT
-1.9	9.1	457	-1.6	8.4	453	SGN1
7.3	17.7	29	7.3	17.7	29	SGNC
-2.1	9.5	362	-1.7	8.6	358	SGN_
2.4	15.8	103	2.3	15.5	102	SGO1
-0.8	9.5	185	-0.4	8.7	183	ULO1
0.2	9.6	47	0.2	9.6	47	WLIT
0.3	8.0	260	0.3	8.0	260	WUEL

Clearly many AC deserves to be moved to operational status.

How to go about this, without suddenly flooding operational NWP DA?

Similar, but for sites, not ACs.

1.5	19.7	1	1.5	19.7	1	ANTW
-5.0	9.6	4	-5.0	9.6	4	APEL
-6.3	8.4	3	-6.3	8.4	3	APPL
-26.4	23.9	1	-26.4	23.9	1	AQRA
-10.1	21.5	12	-10.1	21.5	12	AQUI
3.6	9.6	3	3.6	9.6	3	ARAN
0.1	10.2	1	0.1	10.2	1	ARBT
-2.1	6.5	1	-2.1	6.5	1	ARDO
2.2	12.8	1	2.2	12.8	1	ARD1
-20.6	72.8	2	-20.6	72.8	2	ARD2
-20.7	38.1	1	-20.7	38.1	1	ARDA
-12.7	73.8	1	-12.7	73.8	1	ARDE
-3.5	7.7	5	-3.5	7.7	5	ARDL
-3.4	8.1	3	-3.4	8.1	3	ARDN
2.9	10.3	3	2.9	10.3	3	ARDU
-1.8	7.6	1	-1.8	7.6	1	AREC

For individual sites, the variation can be quite large, indicating O-B based white/black listing is still important.

-2.0	19.5	2	-2.0	19.5	2	ZHN1
-5.8	12.8	2	-5.8	12.8	2	ZHU1
0.7	7.4	1	0.7	7.4	1	ZIEL
0.6	7.3	1	0.6	7.3	1	ZIGR
2.4	9.2	11	2.4	9.2	11	ZIM2
-1.7	8.7	2	-1.7	8.7	2	ZIM3
5.1	7.7	20	5.1	7.7	20	ZIMM
4.2	14.3	2	4.2	14.3	2	ZJX1
7.1	10.1	1	7.1	10.1	1	ZKC1
-4.1	10.5	1	-4.1	10.5	1	ZLA1
0.7	12.2	1	0.7	12.2	1	ZLC1
0.7	18.7	3	0.7	18.7	3	ZMA1
4.2	6.2	1	4.2	6.2	1	ZME1
1.2	12.8	1	1.2	12.8	1	ZMP1
6.7	10.4	1	6.7	10.4	1	ZMRA

20 AC solutions for station ZIMM!

EUMETNET
European Meteorological Services Network

Individual AC-solutions (avg, st.dev., rms, N, name for station ZIMM.

3.9	6.9	7.9	2464	ZIMM-ASIC
4.0	7.1	8.2	2632	ZIMM-ASI_
6.4	7.4	9.8	1413	ZIMM-AUT1
5.2	7.6	9.2	1280	ZIMM-BEU1
3.4	7.3	8.1	683	ZIMM-BKG_
14.3	7.1	16.0	2248	ZIMM-GFZ_
4.4	7.4	8.5	1406	ZIMM-GOP1
4.8	7.1	8.6	2440	ZIMM-IGE2
4.9	7.3	8.8	1416	ZIMM-IMO1
3.9	5.7	6.9	802	ZIMM-KTU1
6.2	7.1	9.4	1398	ZIMM-LPT_
3.2	7.5	8.1	3450	ZIMM-METO
5.3	7.9	9.5	2468	ZIMM-NGA1
3.5	7.4	8.2	3503	ZIMM-ROBG
3.0	7.4	8.0	3355	ZIMM-ROBH
2.1	12.2	12.4	3510	ZIMM-ROBT
3.3	7.5	8.2	3510	ZIMM-SGN1
2.9	6.9	7.5	1055	ZIMM-SGN_
4.9	10.3	11.4	2118	ZIMM-SGO1
11.5	9.0	14.6	3510	ZIMM-ULO1
1.6	13.1	13.2	1280	ZJX1-CONH
6.8	15.6	16.9	58	ZJX1-NOAA

Update of Product Requirements doc?

Subhourly processing +file naming & formats

It would be helpful to the handling of COST files at UKMO, as well as to NWP users of COST data, if ACs that have not already done so, switch to the latest version of the COST format and the file naming scheme described in the same document.

The latest version is egvap_cost_v22a.pdf. It is available both at the E-GVAP homepage (under ”support”) and from the download ftp-server at UKMO.

- **E-GVAP expert team and plenary meeting, November 2013, DMI**
- **AGU, December 2013**
- **EUCOS PM & EUMETNET Core Team meetings, Jan 13-17, 2014, DWD**
- **GNSS4SWEC workshop in connection with data assimilation symposium, February, Munich.**
- **Session on GNSS geodesy and atmosphere, EGU, April 2014, Vienna**
- **ESAT, May 2014, ECMWF**
- **EUREF annual symposium, May 2014, Vilnius.**
- **GNSS4SWEC summer school and WG meeting, Sept. 8-11, Varna, Bulgaria**
- **E-GVAP expert teams and members meeting, October 22-23. 2014, UK Met Office, Exeter**
- **EUMETNET PM meeting, December 2014**
- **Obs PM meeting, primo 2015**
- **EGU, 12-17 April 2015**
- **GNSS4SWEC, mid May 2015**
- **EUREF, late May/early June, 2015**
- **E-GVAP expert teams and members meeting, ultimo 2015.**

- GNSS4SWEC meeting September 29 – October 1, Wroclaw, Poland
- E-GVAP expert teams and members meeting, October 1-2, Wroclaw, Poland
- EUMETNET PM-meeting, Jan., FMI, Helsinki
- EUMETNET OBS PM-meeting, Feb., Meteo France, Brest
- GNSS4SWEC meeting, March, IMO, Iceland
- EGU, April, Vienna
- EUREF annual symposium, May
- ObsSet expert team meeting, June, ECMWF
- GNSS4SWEC summer school and working group meeting, September
- E-GVAP expert team and members meeting, December
- EUMETNET PM meeting, Jan 2017, Budapest, Hungary
- Obs programme meeting, Feb 2017, Exeter UK
- GNSS4SWEC final workshop & MC meeting, March 2017
- EGU, April 2017
- ObsSet expert team meeting, May 2017
- EUREF annual symposium

Expert team on data processing

The primary contact point between the meteorological and geodetic side.

Team involves both the real processing experts, and people from institutes starting to process GNSS data for delivery to E-GVAP.

Rosa Pacione/Brigida Pace, e-geos, Italy

Jan Dousa, GOP, Czeck Republic.

Elmar Brockmann, Swisstopo, Switzerland

Galina Dick/Florian Zus, GFZ, Germany

Tong Ning, Swedish Mapping Agency

Jose Antonio Sánchez Sobrino, IGE/IGN, Spain

Lila Jean-Louis, SGN/IGN, France.

Eric Pottiaux/Carine Bruyninx, ROB, Belgium

Wolfang Soehne/Yuksel Altiner, BKG, Germany

Ambrus Kenyeres /Szabolcs Rozsa/Tivadar Horvath, SGOB, Hungary

Norman Terfele, UL01, University of Luxemburg, Luxemburg

Jaroslaw Bosy, WUEL, Poland

Jonathan Jones, Siebren de Haan, Henrik Vedel.

Responsible person: Jonathan Jones.

Expert team on GNSS observation usage

Purpose: To further the use of gb GNSS data in NWP and now-casting through sharing of results and expertise, to provide guidance material for others, and to provide feedback to processing centres.

Gemma Halloran, UKMO,
Jana Sanchez Arriola, AEMET, Spain
Patrick Moll, Meteo-France.
Klaus Stephan/Michael Bender, DWD.
Henrik Vedel, DMI and E-GVAP
Jonathan Jones, UK Met Office and E-GVAP
Siebren de Haan, KNMI and E-GVAP.

Other?
The experts should cover the ”big nwp consortia” and be people active in using ground-based GNSS data in NWP and/or forecasting.

Responsible person: Henrik Vedel.

Literature study of impact of GB GNSS data in NWP for Obs Set

- In Obs Set/EUMETNET it has been discussed whether to spend Obs programme funds on an impact study regarding GB GNSS ZTDs.
- From E-GVAP it was argued that documentation of a positive impact already exists. A literature study, including peer reviewed papers as well as NWP centre reports was suggested.
- Now the accepted GNSS4SWEC review paper has been accepted by EUMETNET as proof of impact.

- Potentially the saved Obs Set funds might be used to help finance impact studies regarding impact of ”second generation” GB GNSS data, such as gradients, slants, 3D water vapour or rapid update, short cutoff time NWP with sub-hourly ZTDs.

O-B and other NWP data for statistics (E-GVAP), and for use in realtime positioning experiments (GNSS4SWEC).

- **Currently O-B from UK Metoffice global model as regards EUCOS QMP, and from KNMI HIRLAM regarding the E-GVAP validation page.**
- **Need global coverage.**

  Need also European coverage with higher resolution models.
  - **For E-GVAP O-B.**
  - **For GNSS4SWEC need ZTD, surface pressure, T2m and <T>.**

- **List of cut off times at NWP centres**
- **Requirements regarding solution updates.**

E-GVAP economy

The ordinary yearly E-GVAP-II budget is:

•Project manager	43.0 k€	DMI
•Contract to support hub/central processing	25.5 k€	UK Metoffice
•Contract to quality control facility	25.5 k€	KNMI
•Expert teams, liaison and project travel	25.0 k€	
•Total	119.0 k€	

The actual payment from members is less these years, due to the use of surplus money from previous years.

The surplus money are handled by the EUMETNET Secretariat in Brussels.

Milestones 2016 and 17.

Year 4

- Continuation of existing E-GVAP-II data processing and distribution
- A review/discussion of the future route for European ground based GNSS observations for meteorology
- Draft proposal for the future of E-GVAP.
- Reports from expert teams and E-GVAP team

Year 5

- Continuation of existing E-GVAP-II data processing and distribution.
- Preparation for the next phase. Including enhancing the portability of the current system to ease potential takeover by another team, e.g., implementation into EUCOS as a mandatory programme, by using "standard" software where practical, and by documenting the setup, making it easier for other, to setup what cannot be copied directly.
- Reports from expert teams and E-GVAP team
- Final report

The decision to extend the EUMETNET obs. programmes by a year, to end 2018, means the review of the future of European GB GNSS meteorology and planning the next phase is postponed. Most of it will take place in 2017 and early 2018. The outcome of GNSS4SWEC, and the final report from there, is obviously important in this context

Other key focus areas

- **More upload and distribution of sub-hourly GNSS delay data.**
- **Active quality control, AQC.**
- **Expanded coverage in data poor areas, both European and global.**

Next meeting?

Any other matter?

Fin

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European Meteorological Services Network

FIN

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