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(ICT-IOS)
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REVIEW OF THE STATUS OF THE SURFACE-BASED COMPONENTS OF THE GOS

STATUS OF THE SURFACE-BASED SUB-SYSTEM OF THE GOS IN REGION VI

(Submitted by Jochen Dibbern (Germany), and,
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and the PM of the OPERA Programme)

SUMMARY AND PURPOSE OF DOCUMENT

The document provides information on the Status of the surface-based sub-system of the GOS in Region VI.

ACTION PROPOSED

The Meeting is invited to note the information contained in this document when discussing how it organises its work and formulates its recommendations.

STATUS OF THE SURFACE BASED SUB-SYSTEM OF THE GOS IN REGION VI

1. Introduction

1.1 This report provides the status of the EUCOS (EIG EUMETNET Composite Observing System) programme, information on other EUMETNET observing system programmes, on the status of RBSN/RBCN in Region VI and on the redesign of the basic observing network as well as a near future outlook relevant to the evolution of the GOS.

1.2 The EUCOS Programme is responsible for improvements in the delivery of terrestrial observations in order to improve regional NWP in the European Domain area. The work content of the EUCOS Programme includes the management of the operational observing networks, through the E-AMDAR, E-ASAP, E-GVAP, E-PROFILE, E-SURFMAR Operational Services and the OPERA Project. The coordination of NMHSs owned territorial networks, data quality monitoring, fault reporting and recovery, a studies programme for the evolution of the observing networks and liaison with other organisations like WMO are among the tasks of the programme.

1.3 The new list of RBSN and RBCN stations for Region VI was approved at RA-VI-16 Session in September 2013 in Helsinki.

2. Current status of the EUMETNET Observations Programme

2.1 General developments and outlook on the new programme phase 2013-2017

2.1.1 During 2011 the Obs PMT (Observations Programme Management Team) coordinated and contributed to the development of the EIG EUMETNET Observations Roadmap for the period 2012-2020. An EIG EUMETNET Observations Roadmap Drafting Team had been introduced. In the beginning a gap analysis and a brainstorming for potential “high-level activities” during the envisaged period were conducted. In parallel to a ranking (prioritisation) of these potential new high-level activities the existing ground-based EIG EUMETNET observing capabilities operated by either Members or by the EIG EUMETNET programmes E-AMDAR, E-ASAP, E-GVAP, E-SURFMAR, E-WINPROF (now E-PROFILE), OPERA and EUCOS have been reviewed with respect to the newly set EIG EUMETNET observation goals. This review revealed that the existing EIG EUMETNET observations programmes are essential for a comprehensive supply of EIG EUMETNET Members with observations. The range of activities which are undertaken by these programmes was considered being of appropriate size. No possibilities for cancelling certain activities or reducing tasks had been identified.
The Observations Roadmap Drafting Team was asked to prepare a proposal how to save approx. 10% of the overall EIG EUMETNET Observations Programme budget. The Drafting Team proposed a 5% reduction of management costs and an almost 10% reduction of data procurement costs and only a smaller reduction of R&D expenses. As a consequence approx. 10% less observations could be provided to Members in future.
In the first quarter 2012 the EUCOS Programme coordinated the development of the EIG EUMETNET Observations Programme Requirements document for the next programme phase 2013-2017. Considering the Observations Roadmap as framework

the Requirements document breaks down the roadmap into more specific actions and deliverables for the Observations Programme in the next five years.

2.1.2 The priorities for the Observations Programme during the phase 2013-2017 will be:

- To foster the OPERA (Weather Radar Operational Service) developments in order to be able to produce quantitatively usable 2D radar products and to exchange single site 3D volume data (reflectivity, Doppler winds) by the end of the programme phase;
- To further expand the E-AMDAR Operational Service by trying to extend the horizontal coverage over the EUCOS area and by considering a further roll-out of humidity sensors on board E-AMDAR aircraft;
- To extend the remit of the E-WINPROF (now E-PROFILE) Operational Service with the aim to include Lidar/Ceilometer Observations for the main purpose of volcanic ash monitoring and
- To improve the user consultation process with data users from the Climate and Forecasting Programmes and Members via the central Observation Programme and its Scientific Advisory Team.

2.2 2013 EUCOS Network

2.2.1 The EUCOS network design has broadly been fully implemented during the 2002-2006 operational phase. In spring 2010 the EUCOS surface land station list was updated to close major gaps in the network and to allow new EUCOS members to add surface land stations to the network. Further the upper-air network was redesigned according to the Observing System Experiments (OSE) study in 2010.

2.2.2 In 2011 no major changes in the EUCOS networks were proposed. End of 2011 4 Czech wind profilers were introduced to the E-WINPROF wind profiler network.

2.2.3 Table 1 summarises the 2013 EUCOS Composite Observing Network.

EUCOS 2013		
Oceanic segment	Ocean platforms	Ekofisk oil rig (2 RW/day), 663 TEMPs in 2013
	ASAP units (E-ASAP)	18+1 units operated by E-ASAP producing 4,294 TEMPSHIPs in 2013 (temporary land station Egilstadir 04089 provided soundings on behalf of E-ASAP)
	Drifting Buoys (E-SURFMAR)	On average 119 operational drifting buoys providing 894,899 messages in 2013
	Moored Buoys (E-SURFMAR)	4 moored buoys providing 32,250 messages in 2013
	Ships (E-SURFMAR)	On average 108 daily operating ***conventional VOS ships*** providing 244 daily observations (annual total 88,993 obs.) and

		92 daily operating ***automated VOS ships*** providing on average 1,566 daily observations (annual total 589,424 obs.)
Aeronautic segment E-AMDAR	AMDAR units	In total 16.13 Mio. AMDAR observations including additional data for DWD, KNMI, Météo-France, UKMO. On daily average 967 profiles from 173 European airports. **Taking only EUCOS funded observations into account 12.72 Mio. AMDAR observations were provided.**
Territorial segment	Radiosonde stations	87 selected stations based on a 500 km spacing providing 2 RW/day: 56,168 TEMPs in 2013
	Surface stations	274 selected surface synoptic stations according to a 250 km spacing, providing hourly or 3-hourly messages: 1,996,809 SYNOPs in 2013
Vertical profiles segment	Wind profilers (E-PROFILE)	24 operational wind profilers (WP) providing vertical wind profiles: 2,406,520 observations in 2013 (non-operational WPs providing 38,079 profiles)
	Weather radars (E-PROFILE)	63 operational weather radars (WRWP) providing vertical wind profiles: 2,406,520 observations in 2013 (45 non-operational WRWPs due to quality or timeliness issues providing 2,060,867 profiles)
	Weather radars (OPERA	134 weather radar sites provided 8,613,586 input radar data to Odyssey/OPERA of which 3,966,681 have been pre-processed from 126 sites in 2013. OPERA provided in 2013: • 34,812 composites on hourly accumulation • 34,974 composites on max reflectivity and • 34,974 composites on surface rain rate.

Table 1: 2013 EUCOS Composite Observing Network.

2.3 Network Performance

<u>Data availability, timeliness and achieving geopotential height</u>

2.3.1 The performance of most of the EUCOS networks remained stable compared to the performance of 2012. Most of the targets have been achieved by the networks in 2013.

The EUCOS radiosonde station network performance decreased compared to the previous year and only achieved the target reaching 100 hPa in 97%. The timeliness of the moored buoy network improved due to change in data transmission method of Spanish moored buoy Cabo Silleiro in June 2013 and it is expected that the timeliness target will be achieved by the moored buoy network in 2014. The performance of conventional VOS ships - especially concerning data availability - decreased compared to the previous years. Availability of OPERA incoming data improved within 2013 but the target receiving 95% of required data hasn´t been achieved on annual average. Also the timeliness target receiving weather radar data of the members hasn´t been achieved in 2013.

2.3.2 A summary of the network performance regarding data availability and timeliness during 2013 compared to the EUCOS performance targets is provided in Table 2 (achieved targets are marked green).

2013 Network	Data availability	Timeliness HH+50 (Radiosondes: TEMP AB)	Timeliness HH+100 (Radiosondes: TEMP CD)	Average Timeliness	Achieving 100 hPa	Achieving 50 hPa	Individual targets subprogrammes
Territorial networks							
Surface stations	Target: 95% 94.1%	Target: 90% 99.3%	Target: 95% 99.8%		---	---	---
Radiosonde stations	Target: 95% 83.3%	Target: 75% 70.9%	Target: 95% 93.3%		Target: 97% 97.7%	Target: 95% 92.7%	---
E-AMDAR							
AMDAR aircraft	Annual based target: 11 Mio. obs 16.13 Mio. obs incl. additional funded data of DWD, UKMO, MF and KNMI 12.72 Mio. obs E-AMDAR funded observations	Target: 90% 93.7%	Target: 95% 97.1%		---	---	*Profile distribution* daily profiles Target: 718 967 daily airports Target: 129 173
E-ASAP							
ASAP units	Annual based target: 4,180 obs 4,294 obs (equals 103%)	Target: 75% 97.9%	Target: 95% 95.5%		Target: 90% 85.7%	Target: 75% 78.5%	---
E-PROFILE		Timeliness HH+60					
Wind profilers (WP)	Target: 85%	Target: 85%					
Total WP network	81.1%	95.8%					
24 operational WP	94.5%	99.7%					
7 non-operational WP	22.3%	78.0%					
Weather radars (WRWP)	No target defined**	Target: 85%					
Total WRWP network	77.2%	99.6%			---	---	---
63 operational WRWP	81.1%	99.3%					
45 non-operational WRWP	73.1%	99.9%					
E-SURFMAR							
Moored buoys	Target: 90% 92.0%	Target: 90% 87.4%	Target: 95% 99.7%		---	---	---
Drifting buoys	Target: 88% 97.8%	Target: 90% 93.4%	Target: 95% 97.6%		---	---	---
Automated VOS ships	Daily avg target: 1,000 obs 1,566 obs (equals 157%)	Target: 90% 96.8%	Target: 95% 98.9%		---	---	---
Conventional VOS ships	Daily avg target: 250 obs 244 obs (equals 98%)	Target: 90% 84.1%	Target: 95% 94.5%		---	---	---
OPERA							
Incoming data (ICD)	Target: 95% 91.2%	Timeliness HH+08 Target: 90% 89.9%	Timeliness HH+10 Target: 95% 95.4%		---	---	---
Pre-processed data (PPD)	Target: 95% 92.4%	---	---	---	---	---	---
Composite products	Target: 95% 99.7%	Timeliness HH+20 Target: 95% 99.0%			---	---	---

target achieved
<10% below target
=>10% below target

Table 2: EUCOS Network Performance Summary 2013.

Results of comparisons of observations and first-guess fields of ECMWF

2.3.3 Table 3 provides the annual averages of comparisons of observations and ECMWF NWP first guess fields in 2013. The figures show that most of the networks achieved the agreed targets. Only the surface land station network slightly exceeded the targets on temperature RMSE and specific humidity. The E-ASAP fleet slightly exceeded the target on temperature RMSE, too. The conventional VOS ship fleet again didn´t meet the target on pressure RMSE in 2013 as the years before. Due to quality issues several wind profilers of the E-PROFILE network have been declared to be non-operational in 2013.

2013 Network	Temperature RMSE	Vector Difference RMSE	Specific Humidity Error dq/q*	O-B- Geopotential Height Difference	Pressure RMSE	Temperature RMSE	Individual targets subprogrammes
Territorial networks							
Surface stations	**Target: 1 K** **2.03 K**	**Target: 5.0 m/s** **2.65 m/s**	**Target: 10%** **10.03%**	---	**Target: 1 hPa** **0.63 hPa**	---	---
Radiosonde stations	**Target: 1 K** **0.98 K**	**Target: 5.0 m/s** **3.60 m/s**	**Target: 10%** **9.19%**	**Target: 65 m** currently not available	---	---	---
E-AMDAR							
AMDAR aircraft	**Target: 1.5 K** **0.98 K**	**Target: 5.0 m/s** **3.47 m/s**	**Target: 10%** cannot be provided yet	---	---	---	---
E-ASAP							
ASAP units	**Target: 1 K** **1.06 K**	**Target: 5.0 m/s** **3.69 m/s**	**Target: 10%** **9.87%**	**Target: 65 m** currently not available	---	---	---
E-PROFILE							
Wind profilers (WP) **Total WP network** 24 operational WP 7 non-operational WP	---	**Target: 5.0 m/s** **3.68 m/s** 3.65 m/s 3.55 m/s	---	---	---	---	---
Weather radars (WRWP) **Total WRWP network** 63 operational WRWP 45 non-operational WRWP	---	**Target: 5.0 m/s** **Several WR haven´t been monitored by new ECMWF monitoring !** 4.36 m/s 10.81 m/s	---	---	---	---	---
E-SURFMAR							
Moored buoys	**Target: 1 K** **0.84 K**	**Target: 5.0 m/s** **3.36 m/s**	**Target: 10%** **7.16%**	---	**Target: 1 hPa** **0.80 hPa**	**Target: 1 K** not provided yet	**Wave direction** **Target: 20°**
Drifting buoys	---	---	---	---	**Target: 1 hPa** **0.58 hPa**	**Target: 1 K** not provided yet	---
VOS ships Automated Conventional	**Target: 2 K** **1.20 K** **1.54 K**	**Target: 5.0 m/s** **3.65 m/s** **4.24 m/s**	**Target: 15%** **6.46%** **9.43%**	---	**Target: 1 hPa** **0.83 hPa** **1.15 hPa**	**Target: 1 K** not provided yet	---

EUCOS target achieved
within WMO target
below WMO target

Table 3: Annual average of EUCOS Network Performance of NWP comparison results 2013.

2.3.4 More detailed information on Observations Programme quality monitoring and network performance are provided in the Observations Programme Quality Monitoring quarterly reports of 2013.

2.3.1 E-ASAP

2.3.1.1 The following can be noted with regard to E-ASAP:

- During 2013 the number of active stations was 19. One of the stations is operated as land station in NE Iceland.
- 4308 soundings were disseminated over the GTS from all stations (including the Icelandic land station). On average, 91% of the performed launches were disseminated over the GTS.
- The station ASEU03 was transferred-to another ship.

2.3.1.2 The routine sounding schedule was 3 soundings per day (>75 nm off mainland) for most stations under E-ASAP management. Later, the schedule had to be reduced to 2 snd/day to reduce the over-performance.

2.3.1.3 Figure 1 shows the distribution of TEMP bulletins in 2013 on a 2x2° grid without interpolation. The Black Sea is not outlined in the map of Figure 1. However, the research vessel Maria S. Merian (ASEU01) transmitted 13 soundings from the Black Sea in the period Nov/Dec 2013.

2.3.1.4 Three main legs can be clearly identified:

- Northern leg: Danish ASAP stations sailing between Denmark and Greenland.
- Fifties leg: Sailing routes between Europe and North America around 50°N.
- Southern leg: Sailing routes between Europe and Central America.

2.3.1.5 Most soundings away from the main legs were performed by the research vessels Meteor (ASDE02) and Maria S. Merian (ASEU01) and the hospital ship Esperanza del Mar (ASES01). Soundings in the Black Sea on board the Maria S. Merian are not visible in figure 1 due to the shape of Europe as landmass.

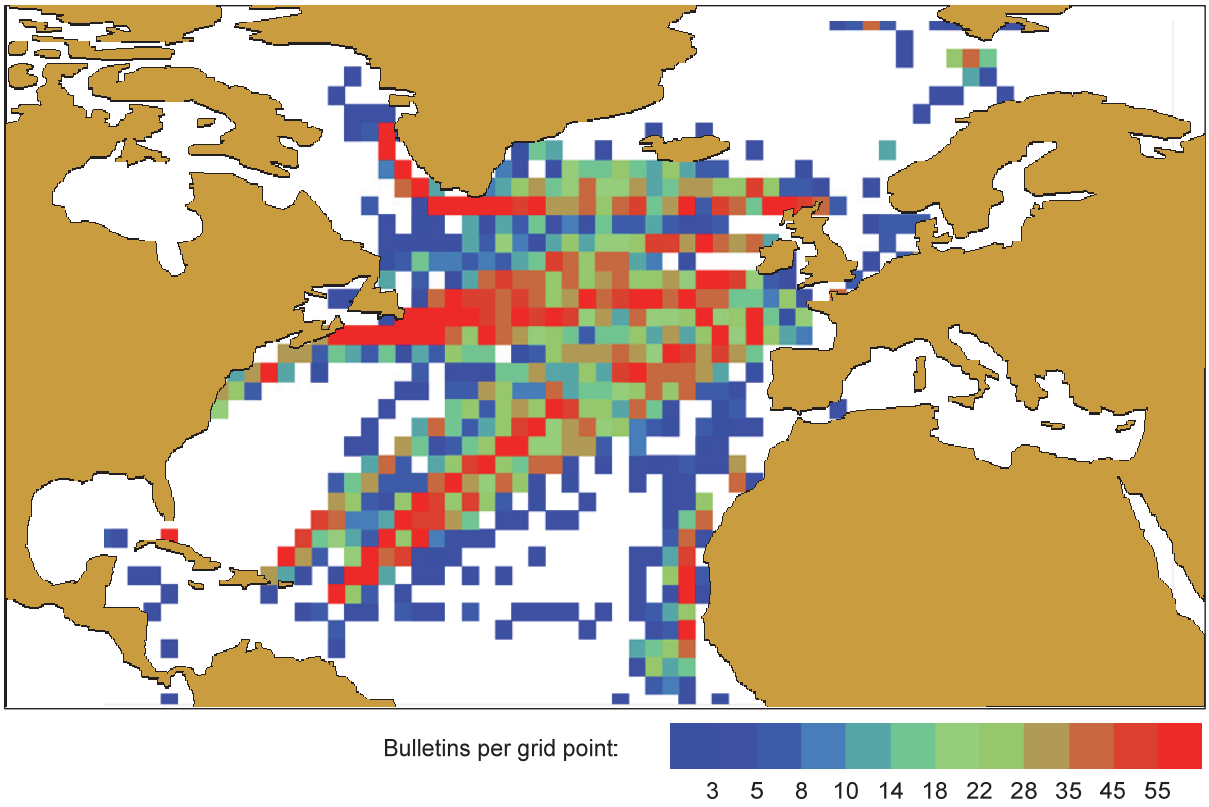


Figure 1: Distribution of TEMP bulletins in 2013 on a 2° x 2° grid without interpolation.

2.3.2 E-AMDAR

2.3.2.1 One of the challenges for 2013 (and phase as a whole) was to increase profile coverage over Europe, particularly in Scandinavia, Iberian peninsula and eastern Europe – areas previously identified to be data sparse. The following figures, Fig 1, 2 & 3, show results of a comparison between similar periods in the October of 2011 and of 2013.

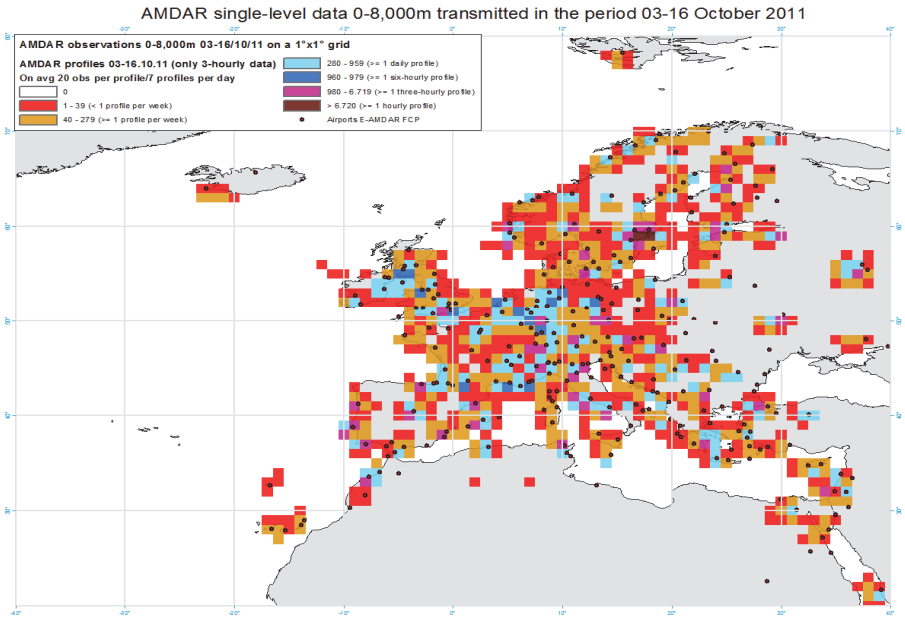


Fig.1: AMDAR single level data (0-8000m) on a 1°x1° grid for period 3rd-16th Oct 2011

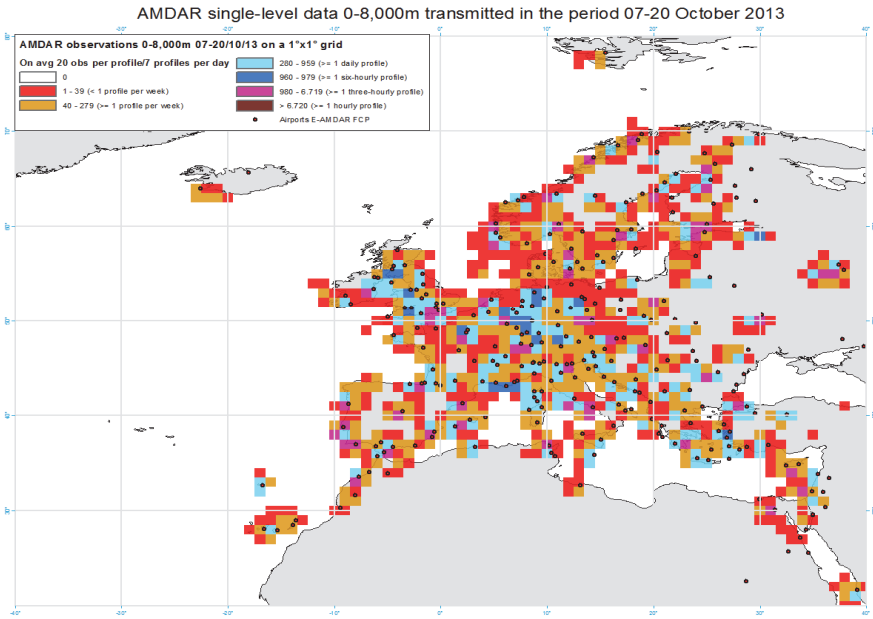


Fig.2: AMDAR single level data (0-8000m) on a 1°x1° grid for period 7th-20th Oct 2013

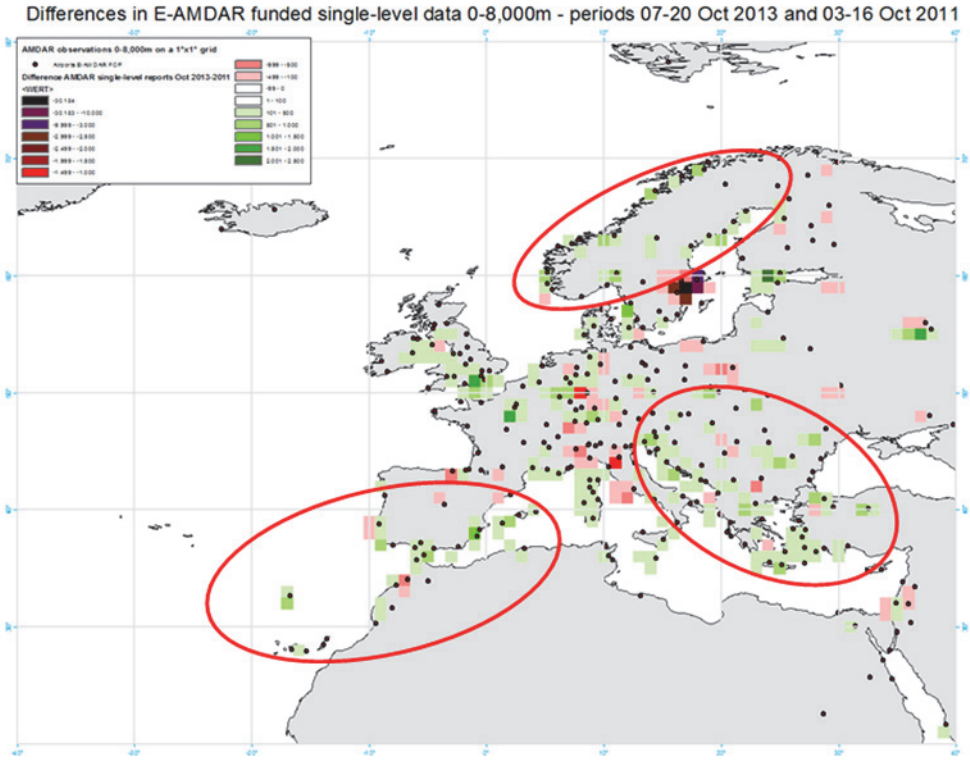


Fig.3: Differences between similar periods October 2013-2011

2.3.2.2 Positive differences (shown in green) indicate an increase in the number of profile observations from 2011 to 2013, confiming improvements have been achieved, both in the targetted areas and for Europe overall. Note: Increases in both Paris and London areas as result of national hourly data & inefficiencies in the FSS/optimisation systems, and the large decrease at Stockhomdue to the high frequency trial held in 2011 but that has since ceased.

2.3.3 E-SURFMAR

2.3.3.1 The main features of 2013 were:

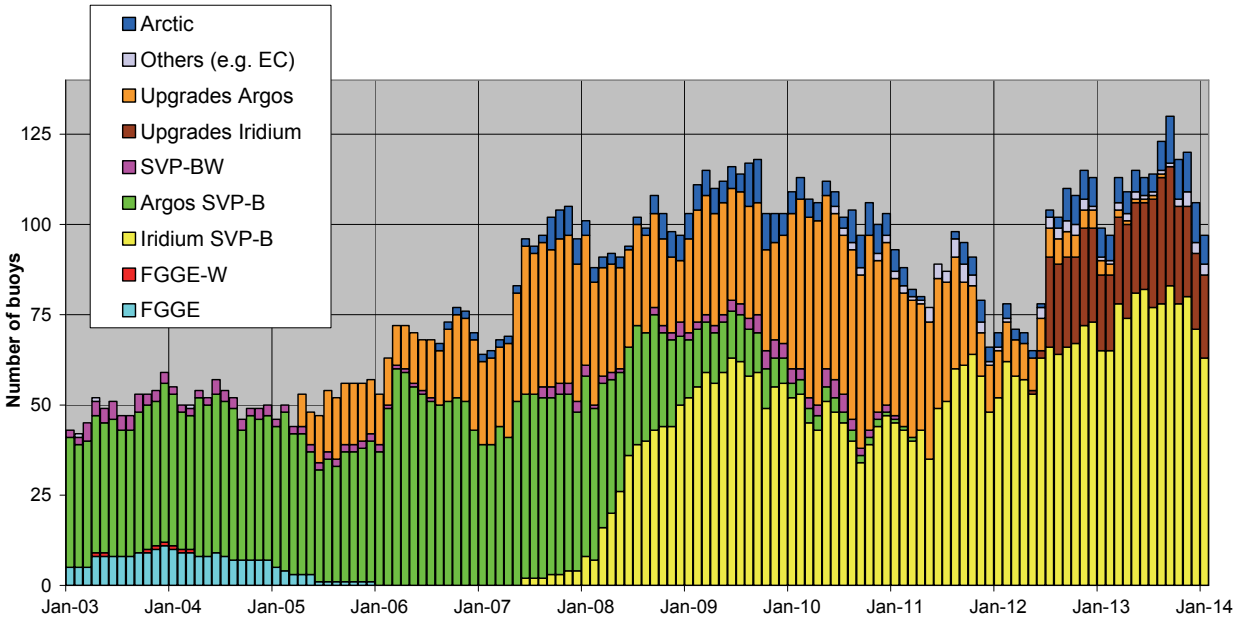
- The number of E-SURFMAR drifting buoys in operation was maintained above the target of 100;
- It is now obvious that lifetimes of buoys provided by Metocean significantly increased. Despite some persistent problems (quality of pressure measurements on some buoys), the situation is globally positive;
- 9 buoys were deployed on sea ice in the Arctic by RV Academik Fedorov in summer;
- E-SURFMAR pursued its cooperation with the DBCP-GHRSST Pilot Project which aims to improve Sea Surface Temperature measurements by drifting buoys. Nine more HRSST-2 buoys were deployed in 2013;
- Moored buoy networks operated by non-EUMETNET members into the EUMETNET area continued to be monitored. Improvements appeared on the

Greek and Italian networks: several buoys became operational back and quality pressure data are now reported by the Italian buoys;

- The number of observations reported by European S-AWS remained stable compared to 2012 whilst this of observations reported by E-SURFMAR S-AWS significantly increased (+23%);
- The installations/maintenance of BaRos S-AWS onboard ships plying in the Mediterranean Sea continued thanks to participants in MOON and most especially to ENEA. A BaRos+ station was successfully installed on a Portuguese ship thanks to the assistance of IMPA;
- The number of conventional Dutch Voluntary Observing Ships, using the "half compression" message technique[1] to report their data onto the GTS, decreased in 2013;
- A subsequent contract was signed by Meteo-France and Sterela for the procurement of three prototypes of the common AWS now called EUCAWS. The developments and prototypes are funded by EUMETNET/E-SURFMAR;
- The Memorandum of Agreement between EUMETNET and MOON was finalized and signed;

Network status

2.3.3.2 The number of E-SURFMAR operating drifting buoys was maintained above the target of 100 during the year (see figure 1). By the end of December, 106 E-SURFMAR drifting buoys were operating in the North Atlantic and in the Arctic.
In addition to E-SURFMAR drifting buoys, 41 non-E-SURFMAR buoys, reporting at least air pressure observations onto the GTS, were operating in the EUMETNET area of interest. These included 7 salinity drifters (SVP-BS) which aim is to calibrate and validate sea surface salinity measured by SMOS and Aquarius satellites.



[1] A technique which allows to globally make significant savings on communication costs for this category of VOS

Figure 1: Number of drifting buoys operated by E-SURFMAR according to their type, since 2003.

2.3.4 E-PROFILE

2.3.4.1 Status report on automatic lidars and ceilometers (ALC)

In Q4 the status report on the national networks of ALC's has been finalized. Within E-PROFILE members a total of 700 ALC units are in operation, most of them ceilometers. By the end of 2014, 12 out of the 18 E-PROFILE members will provide profile data. The full report is available on the EUMETNET portal.

2.3.4.2 Data blocking procedure approved by ET-RWP

The data blocking allows to interupt the data flow from a specific windprofiler to the GTS in case of severe issues with the data quality. Data blocking is technically possible since the end of the E-WINPROF phase. Now, the ET-RWP (expert team on radar wind profilers) defined and approved a clear procedure when and how the data blocking has to be used. The RWP data blocking procedure is available on the EUMETNET portal.

2.3.4.3 Frequent use of data blocking

The data blocking is now fully implemented in the network operations and has already been used at several occasions. A full track of the network performance and operations (including data blocking events) can be found in the monthly monitoring reports on the EUMETNET portal.

Operational Targets:

Target No.	Target	Performance (Q1 2013)
1. CWINDE Server	95%	100%
2. Data blocking	Capability for all wind-profiler systems to be available by the end of 2012	Met
3. Technical Support	Best Endeavors, technical support under lead of MeteoSwiss.	No problems/complaints to report
4. Number of Systems (operational)	Status at 31/12/12	ALL / OP / System 29 / 19 / WPRO 107 / 51 / WRAD
	Status at 31/03/13	ALL / OP / System 30 / 23 / WPRO 107 / 51 / WRAD

5. Data Availability	Target 95%													
	01	02	03	04	05	06	07	08	09	10	11	12		AVR
WPRO(OP)	*91*	*96*	*97*	95	93	98	95	99	97	98	97	96		96
WPRO(ALL)	*85*	*88*	*89*	*91*	*92*	*95*	90	98	92	*95*	*95*	*95*		*92*
WRAD(OP)	*80*	*84*	*85*	*82*	*88*	*85*	90	89	88	*90*	*86*	*80*		*86*
WRAD(ALL)	*78*	*81*	*76*	*75*	*78*	*79*	81	80	78	*72*	*71*	*66*		*76*

6. Data Timeliness (UT + 30min)	Target 90%													
	01	02	03	04	05	06	07	08	09	10	11	12		AVR
WPRO(OP)	*97*	*100*	*100*	99	100	95	99	99	99	99	99	99		99
WPRO(ALL)	*96*	*97*	*97*	*98*	*99*	*94*	*96*	*99*	*99*	*98*	*99*	*99*		*98*
WRAD(OP)	*99*	*100*	*100*	99	100	100	100	100	100	100	99	99		99
WRAD(ALL)	*96*	*96*	*96*	*95*	*96*	*97*	*97*	*97*	*97*	*100*	*96*	*96*		*97*

7. Data Quality (RMS vector error < 5.0m/s)	Target 5 m/s over 1 month													
	01	02	03	04	05	06	07	08	09	10	11	12		AVR
WPRO(OP)	*3.6*	*3.4*	*3.4*	3.5	3.6	3.4	3.2	3.4	3.4	3.9	3.8	4.2		3.6
WPRO(ALL)	*3.8*	*3.4*	*3.5*	*3.6*	*4.2*	*4.1*	*4.2*	*4.1*	*4.1*	*4.5*	*4.7*	*4.9*		*4.1*
WRAD(OP)	*4.1*	*4.1*	*4.5*	4.7	4.2	4.0	3.9	4.2	4.2	5.4	4.9	6.2		4.5
WRAD(ALL)	*5.2*	*5.7*	*6.5*	*6.7*	*7.9*	*8.2*	*5.7*	*5.8*	*5.9*	*7.3*	*6.9*	*11.6*		*6.7*

2.3.4.4 The significantly higher values in terms of data quality for WRAD(OP) and WRAD(ALL) in December is explained by the fact that significantly more stations are monitored combined with the fact that quality flags are not considered in the calculation (see monthly monitoring report on the EUMETNET portal.). Especially the Spanish network shows very high RMSVD values because they submit flagged data. This issue is known to E-PROFILE, OPERA and Obs-PMT and is under investigation.

2.3.5 E-GVAP (EIG EUMETNET GNSS Water Vapour) Operational Service

2.3.5.1 Since 2013, E-GVAP is one of the Operational Services in the EUMETNET Observations Programme.

- The E-GVAP observing system continues to grow. There is now nearly 2500 unique GNSS sites included in the dataset. Some of these are still in test-mode, not included in the operational stream. Most recently additional sites have become available from Hungary, processed by the new analysis center SGOB, Satellite Geodetic Observatory, IGCRS – Dept. of Geodesy and Surveying, TU Budapest.
- MoU finalised with EUPOS**.** The MoU between EUMETNET and EUPOS has been signed, May 27, 2013. That is important for our future collaboration with geodetic institutions in Eastern Europe.
- Global data. NOAA/NCEP has accepted the WMO approved BUFR format used by E-GVAP, and have started their own BUFR encoding and submission on GTS.
- GNSS4SWEC (the EU cost action on ground-based meteorology). Workshops held at the Institute of Geodesy, Cartography and Topography at the Polytechnical University of Valencia, in Valencia 16-17 October.

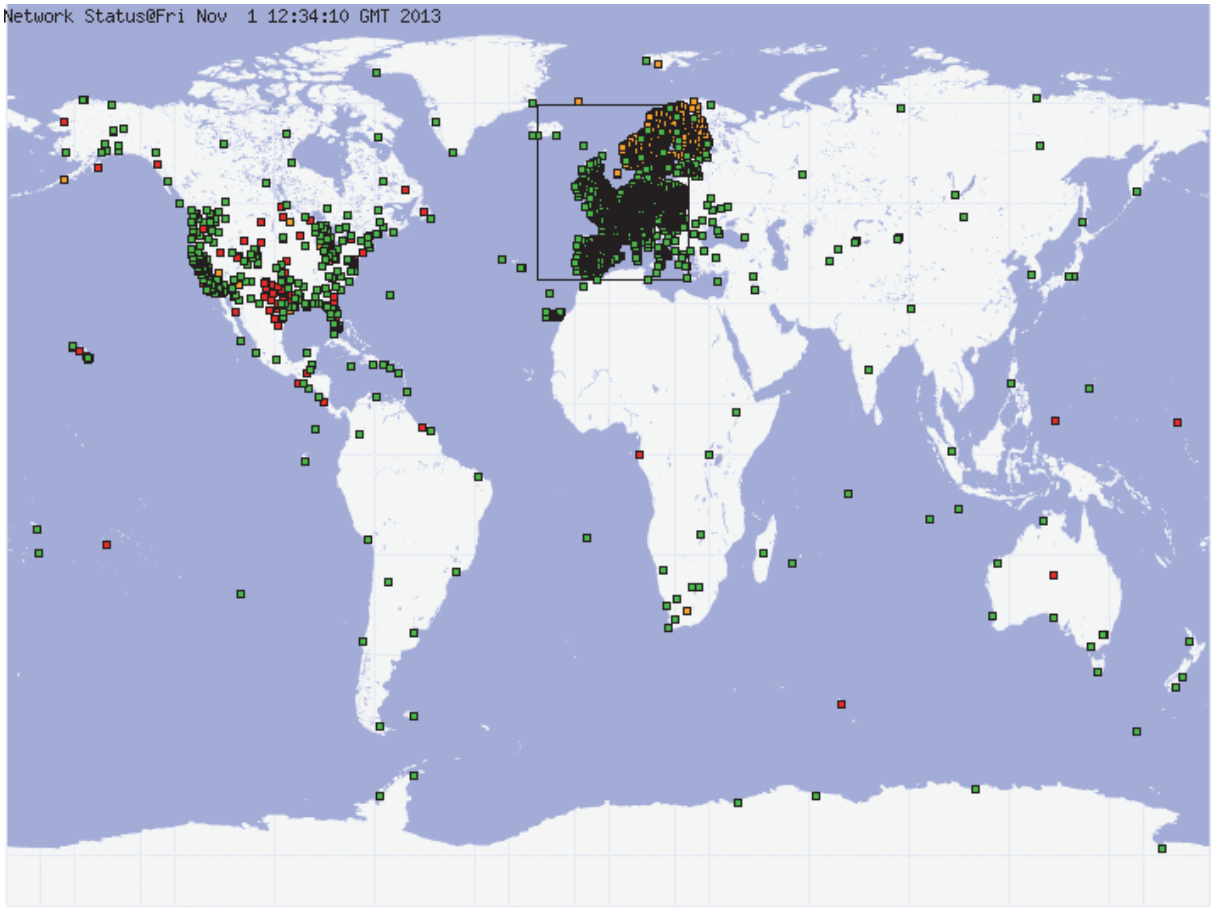


Figure 1: New sites in and outside Europe

2.3.5.2 We continue to see an expansion in the number of sites, now about 2500 unique sites are involved and many of these are processed by more than one AC, enabling

better quality control and definition of best practices.The majority of the new sites are located in Poland, Latvia, Italy, Luxembourg, and outside Europe (figures 1 and 2). Late October additional sites became available from Hungary, processed by a new, Hungarian AC: SGOB, Satellite Geodetic Observatory, IGCRS – Dept. of Geodesy and Surveying, TU Budapest. NOAA/NCEP data have now become available in BUFR format via GTS, with encoding and GTS sending taking place at NOAA/NCEP. NOAA/NCEP has accepted using the “E-GVAP”/European BUFR format.

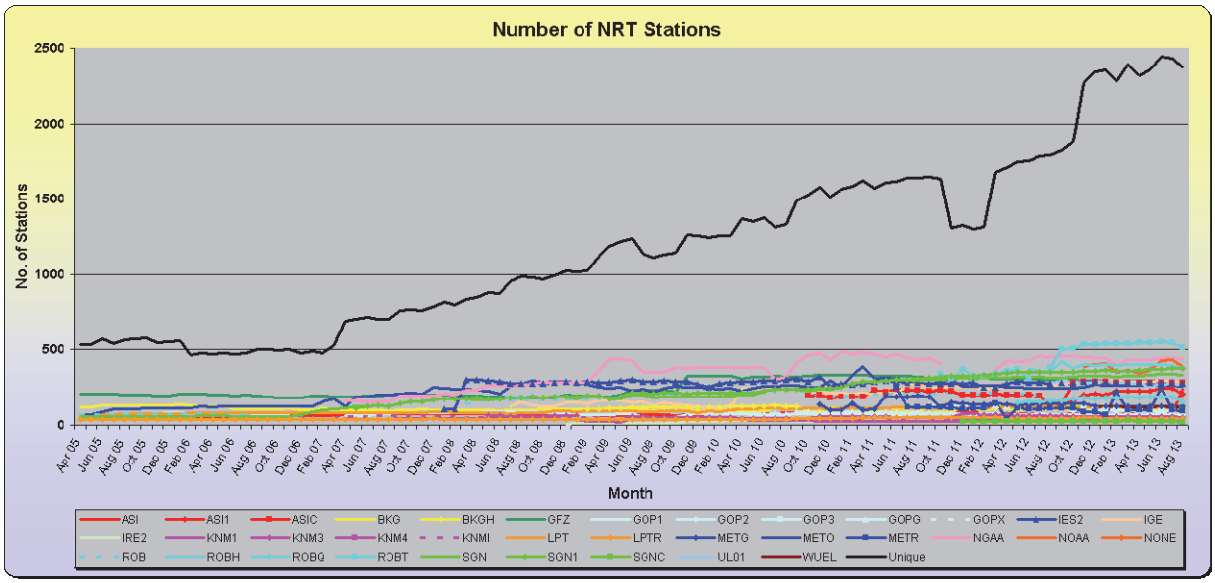


Figure 2: Expansion in the number of sites, now about 2500 unique sites.

2.3.6 OPERA

2.3.6.1 Since 2013 OPERA is a project in the EUMETNET Observations Programme. Vivid discussions with NWP lead to earlier-than expected delivery of radial winds and improvement of metadata descriptions in ODIM data model.

2.3.6.2 Wind farms cause alarming amount of disturbances, programme change request is made to start studies earlier than planned in programme decision, and to write a consolidated European statement of how the issues should be managed.

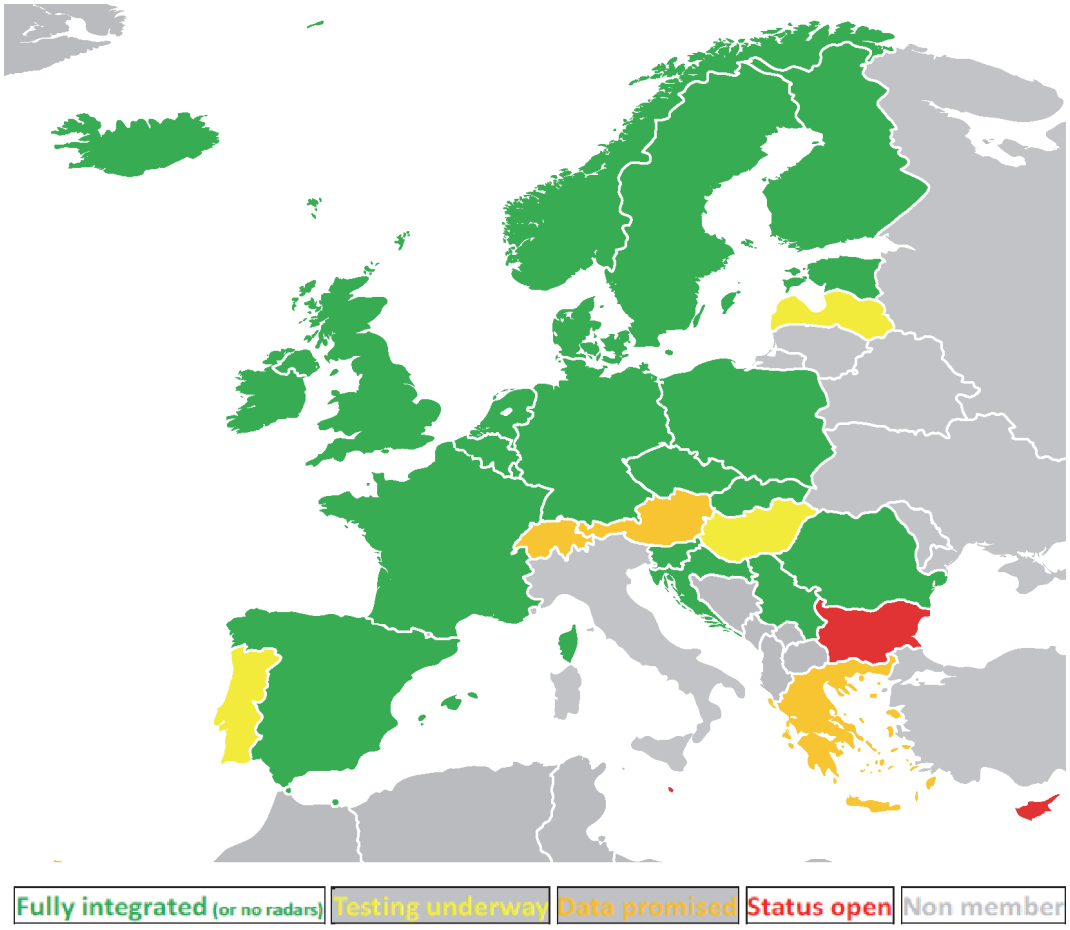


Figure 1: OPERA composit, countries delivering data to Odyssey.

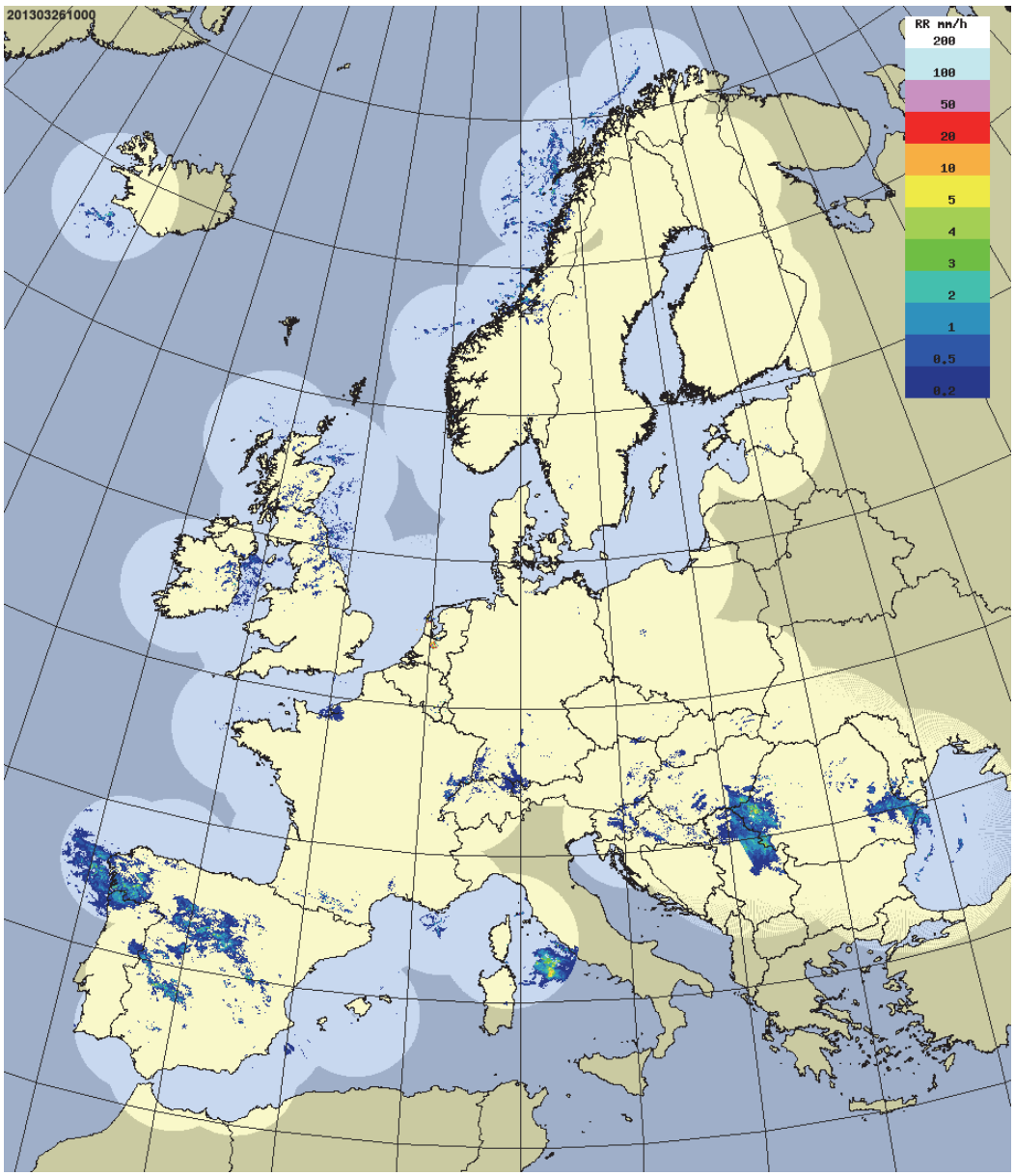


Figure 2: OPERA composit March 2013. Note wider coverage and decreased problems in Eastern Europe.

2.4 Current Studies Programme Activities

2.4.1 A second Space-Terrestrial Study had been initiated in 2010 to assess the impact of reduced ground-based observing systems on satellite data assimilation. An interim report was compiled by Gabor Radnoti, ECMWF end of Feb 2011 and a corresponding presentation of first results had been given at the 2011 E-SAT meeting at ECMWF in early March 2011. Key objectives of this study were to assess the impact of a thinned terrestrial observing system on radiance bias correction anchoring and to investigate the impact of a reduced conventional observing system on NWP following the most successful scenarios (3b) and (4) of the EUCOS Upper-air Network Redesign Study. Experiments had been carried out, investigating the impact of the global

radiosonde and aircraft data in different GPS radio occultation (GPSRO) data coverage. Presentation of final results and delivery of the final study report were given in 2012.

2.5 THORPEX and Related Activities

2.5.1 WMO RAVI Monitoring workshop

The Obs PM participated in an open workshop "RA VI Regional WIGOS Workshop", which was held in Madrid, Spain from 6th to 8th May 2013. He gave a presentation entitled "EUMETNET Observations Programme: the road map to develop an integrated observing network fulfilling NWP and Climate requirements". The RAVI WIGOS community present at the workshop has shown much interest in the EUMETNET Observations Programme monitoring activities, especially the EUCOS Quality Monitoring Portal.

2.5.2 WMO RAVI Regional Conference (Challenges and Opportunities for European NMHSs) and Sixteenth Session

2.5.2.1 The Observations Programme Manager has attended the WMO RAVI Regional Conference (Challenges and Opportunities for European NMHSs) and the Sixteenth Session during the week 9-13 September 2013 as a member of the EUMETNET delegation. During a side meeting to the Sixteenth Session EUMETNET presented itself with a special focus on explaining EUMETNET mission and deliverables to non-EUMETNET members. The Obs PM gave a presentation on the Observations Programme.

2.5.2.2 Among other things the regional WIGOS implementation has been discussed during the session. Prior to and during this RAVI meeting and also afterwards the Obs PM has been involved in discussions with the EUMETNET Secretariat and the WMO Secretariat in order to identify and propose activities where the Obs Programme can support EUMETNET Members in delivering the various WIGOS implementation projects foreseen for RAVI. The coordination of tasks which can and should be delivered centrally through EUMETNET is still underway. An initial presentation of a draft MoU describing the envisaged collaboration between WMO Secretariat and EUMETNET to STAC and PFAC happened in autumn 2013. STAC and PFAC asked the Obs PMT and WMO Secretariat to revise the list of proposed activities and to come back to STAC and PFAC with more explanations and potential benefits and risks for EUMETNET and WMO in spring 2014. Please also refer to DECISION STAC7.18 [WIGOS cooperation with WMO – Agenda Item 8f], ACTION STAC7.20 [WIGOS cooperation with WMO – Agenda Item 8f] and DECISION PFAC7.13 [WMO MOU – Agenda Item 12b].

2.5.3 THORPEX European Regional Meetings

6th WMO Symposium on Data Assimilation

2.5.3.1 The 6th WMO Symposium on Data Assimilation has been organized by an international scientific steering committee in collaboration with members of the THORPEX ICSC DAOS working group. The Obs PM, as a member of the DAOS WG, served as a session chair for the Satellite, In Situ, and Radar data assimilation session during the Symposium.

2.5.3.2 Regarding the Satellite, In Situ and Radar data assimilation session and with respect to the EUMETNET Observations Programme activities it is worthwhile mentioning that several presentations were given dealing with the assimilation of radar reflectivity data. Especially usage of radar data through Ensemble Kalman Filtering techniques for regional-scale modeling was shown. Another interesting aspect is that data assimilation experts put much effort into properly assimilating satellite-derived Atmospheric Motion Vectors (AMV). It appears that there's still a high demand for many wind observations through the atmosphere.

6th THORPEX ICSC DAOS Working Group meeting

2.5.3.3 As usual the Obs PM was asked to give a presentation on the current global status of in-situ observations. He has been strongly supported prior to the meeting by the Managers of the Operational Services and Projects to collect relevant information regarding global AMDAR, ASAP, ground-based GPS data, wind profiling, Lidar and Ceilometer, surface marine and Weather Radar observing activities. The Working Group also reflected on the 6th WMO Symposium on Data Assimilation, especially its scientific outcomes.

THORPEX legacy projects

2.5.3.4 As so-called THORPEX legacy projects there are two activities under preparation which will have a strong observation-related part in their list of deliverables.
The first project is the 'Polar Prediction Project' (PPP) which has already been approved by WMO EC. A science plan and an implementation plan exist. Currently it is envisaged organising a so-called Year of Polar Prediction (YOPP) in the period: mid 2017-mid 2019. Among other things there's the aim of improving the observational coverage with e.g. more VOS data in the Arctic and Antarctic.

2.5.3.5 For a second project with potentially strong links to observations a proposal is currently being drafted. This project aims at improving prediction and communication of forecasts of 'High Impact Weather' (HIW) events. As one of several cross-cutting activities within this project the 'design of observing strategies' has been identified. The Observations PM is member of the drafting team of the HIW proposal. He has contributed to the drafting of text concerning one of the HIW hazards. This is 'urban flooding'. Under the headlines 'research themes' and 'cross-cutting activities' 'key challenges', 'selected activities' and 'relevant current programmes' have been identified. The drafting of the HIW proposal is still under way.

2.5.3.6 It is expected that during the next few years measurement campaigns in relation to these THORPEX legacy projects will be launched. On the one hand there will be requests from scientists for extra observations from routine observation networks of Members on the other hand there's the possibility of scoping for new observation techniques or extending existing networks under the umbrella of such research activities. The Obs PMT will closely follow the developments in these THORPEX legacy projects and provide Members with updated information in quarterly reports and at STAC meetings.

3. RA-VI Regional Basic Observing Network

3.1 The RA-VI Working Group on Technology Development and Implementation (WG-TDI) has initiated the task of integrating the RBSN and RBCN networks into a new re-designed Regional Basic Observing Network (RBON). At its 16th session in September 2013 the Association encouraged that this activity be pursued as part of the regional WIGOS implementation.

3.2 By adopting Resolution 4.4/2 (RA VI-16), the Association approved the new list of RBSN and RBCN stations as given on the WMO website[2].

4. Achievements, Issues and Recommendations

4.1 Owing to Members' efforts, the RBSN and RBCN have demonstrated sustainable performance. The work done by the EUCOS and ECMWF to improve monitoring procedures and for the presentation and distribution of monitoring results on the availability and quality of land surface-based observational data is appreciated.

RA-VI Issues:

- There are still deficiencies in the implementation and operation of the RBSN and RBCN in some areas of the Region as revealed by the WMO Secretariat monitoring exercises.
- For some Members, the migration to TDCF is an issue, because they do not have the necessary resources for the migration process.
- Under the current working structure of RA-VI and their Working Group on Technology Development and Implementation there is no "Rapporteur or focal Point" being responsible to report on the status of the surface based component of the GOS.

RA-VI Recommendations:

- Organize and conduct a regional WIGOS Workshop to support the WIGOS implementation in RA VI at national level.
- Continue supporting the migration to Table Driven Code Forms

2 http://www.wmo.int/pages/prog/www/ois/rbsn-rbcn/rbsn-rbcn-home.htm