EUMETNET Composite Observing System (EUCOS) - Status of operational networks and future development plans

12th Workshop on Meteorological Operational Systems
ECMWF, Reading, United Kingdom, 3rd November 2009

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Acknowledgements:

Tanja Kleinert and Jochen Dibbern, EUCOS-Team
Stig Carlberg, E-AMDAR PM, SMHI
Rudolf Krockauer, E-ASAP PM, DWD
Pierre Blouch, E-SURFMAR PM, Météo-France
Tim Oakley, E-WINPROF PM, Met Office

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Content

- About EUMETNET and EUCOS
- EUCOS objectives
- The current EUCOS network
- Quality Monitoring
- Studies Programme
- Outlook

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About EUMETNET and EUCOS (1)

Domains

Observations
- EUCOS
- E-AMDAR
- E-ASAP
- SURFMAR
- OPERA
- EUMETFREQ
- WINPROF
- E-GVAP

Forecasting
- SRNWP
- EMMA
- SatRep

Environment & Climate
- ECSN
- WG-ENV

Research & Training
- EUMETCAL
- EUMETRep

Old Programmes
- AWS
- PWS
- SWS
- OBS-INFO
- UNIDART
- TIPS
- MAP-NWS

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Home | Events | About us | Working Area Members only | Links

EUMETNET is a network grouping 26 European National Meteorological Services. EUMETNET provides a framework to organise co-operative programmes between the Members in the various fields of basic meteorological activities such as observing systems, data processing, basic forecasting products, research and development, training. Through EUMETNET Programmes, the Members intend to develop their collective capability to serve environment management and climate monitoring and to bring to all European users the best available quality of meteorological information. They will use EUMETNET to more efficiently manage their collective resources.

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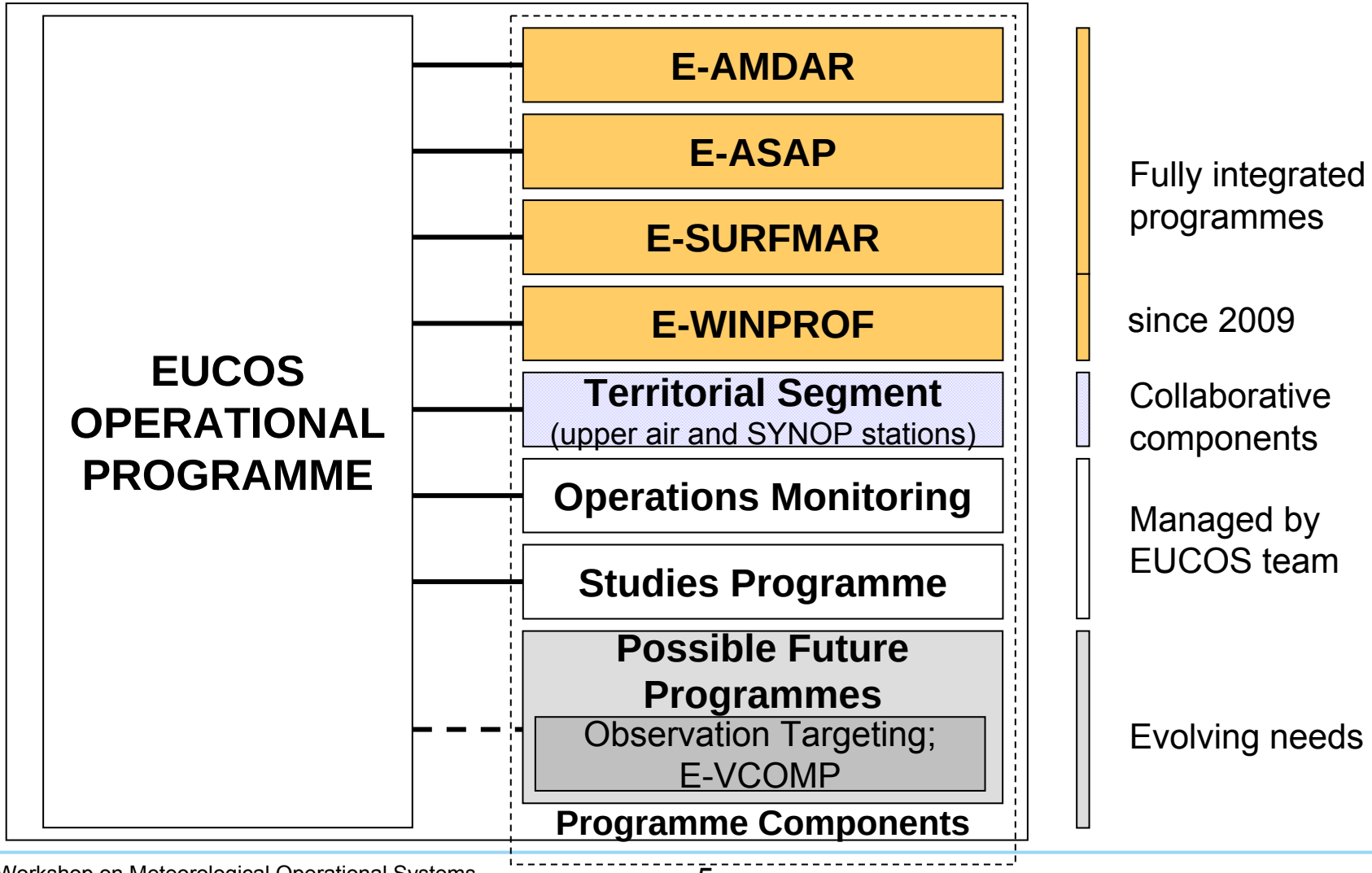
About EUMETNET and EUCOS (2)



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EUCOS Information System (www.eucos.net)

Imprint | Contact

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Referenz für Meteorologie
Deutscher Wetterdienst

EUCOS public
- About EUCOS
- EUCOS networks
- E-AMDAR
- E-ASAP
- E-SURFMAR
- E-WINPROF

EUCOS restricted
- EUCOS HL reports
- Subprogrammes
- Quality Monitoring
- Studies Programmes
- Meetings
- Documents, Protocols

Related Activities
- WG-INS
- WG-RS
- EUMETNET radiosonde
- RA VI Monitoring

Search

› EUCOS public

EUCOS Information System

The **EUMETNET Composite Observing System (EUCOS)** Operational Programme was established in 2002, based on recommendations resulting from the EUCOS Implementation Programme (1999-2001). It aims to establish and operate a truly European observing network under the auspices of the European Meteorological Network (EUMETNET), to deliver increased efficiency, leading to better-quality numerical and general forecasts, initially on a European scale.

The EUCOS Programme Management 2002-2006 rested with the Met Office, UK. Currently the Deutscher Wetterdienst (DWD) is responsible member of the EUCOS Programme Phase 2007-2011.

This website was established to provide all EUCOS members with necessary background information, documents and quality monitoring results. Due to this most of the topics are restricted by password login. Only general information about EUCOS and its subprogrammes provided under the topics About EUCOS and EUCOS networks are open to public. Please contact the EUCOS Team to receive login details.

News about the EUCOS programme

Last news update: 09.09.2009

› More

Contact Information

Contact the EUCOS Programme Management Team at DWD

› More

Related programmes and organizations

Links to EUMETNET, EUMETSAT, OPERA, ECMWF and others.

› More

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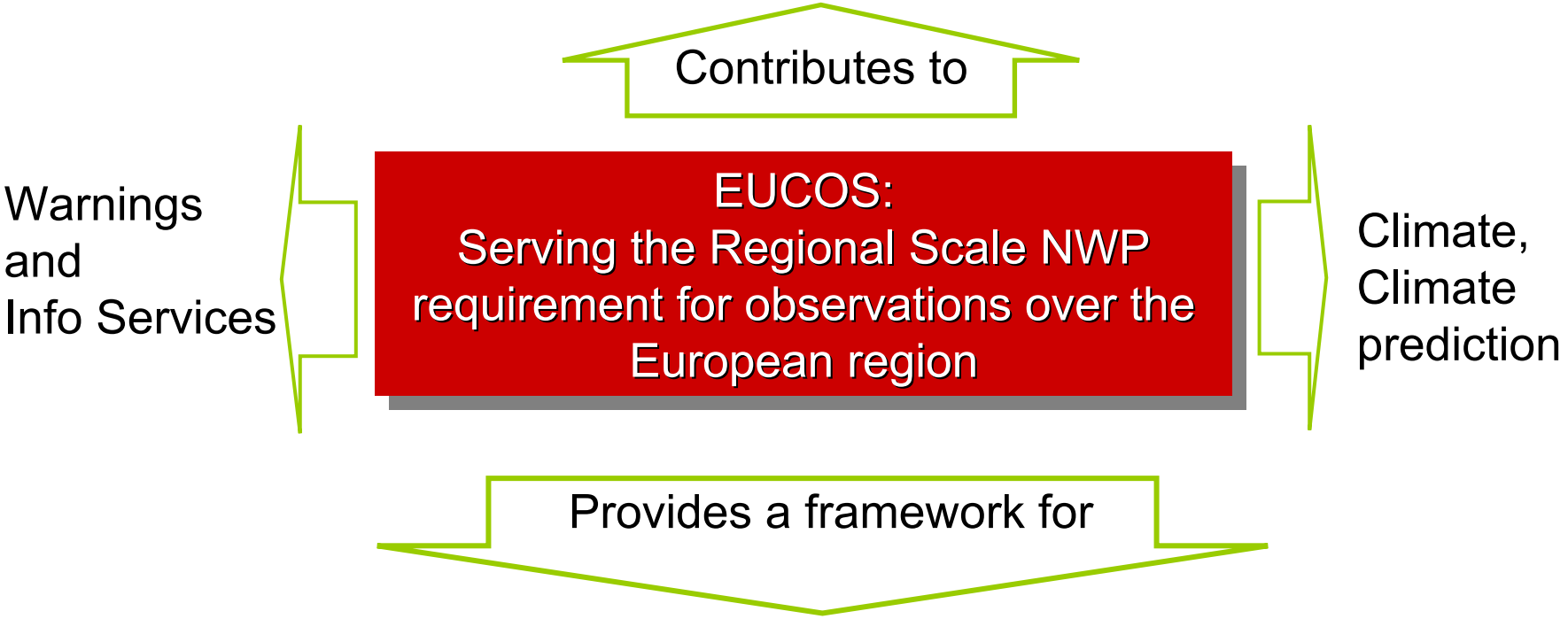
EUCOS objectives (1)

Medium and extended range weather prediction over the Globe



Very short range and nowcasting over national territories

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EUCOS objectives (2)

- Design and coordinate the evolution of the ground based EUMETNET composite observing system (EUCOS) to be optimized at European scale with a view to improve short range forecast over Europe without increasing the overall cost
- Monitor and control EUCOS performance
- Ensure integrated management for agreed components such as E-ASAP, E-AMDAR, E-SURFMAR and E-WINPROF
- Support the evolution of EUCOS through a studies programme

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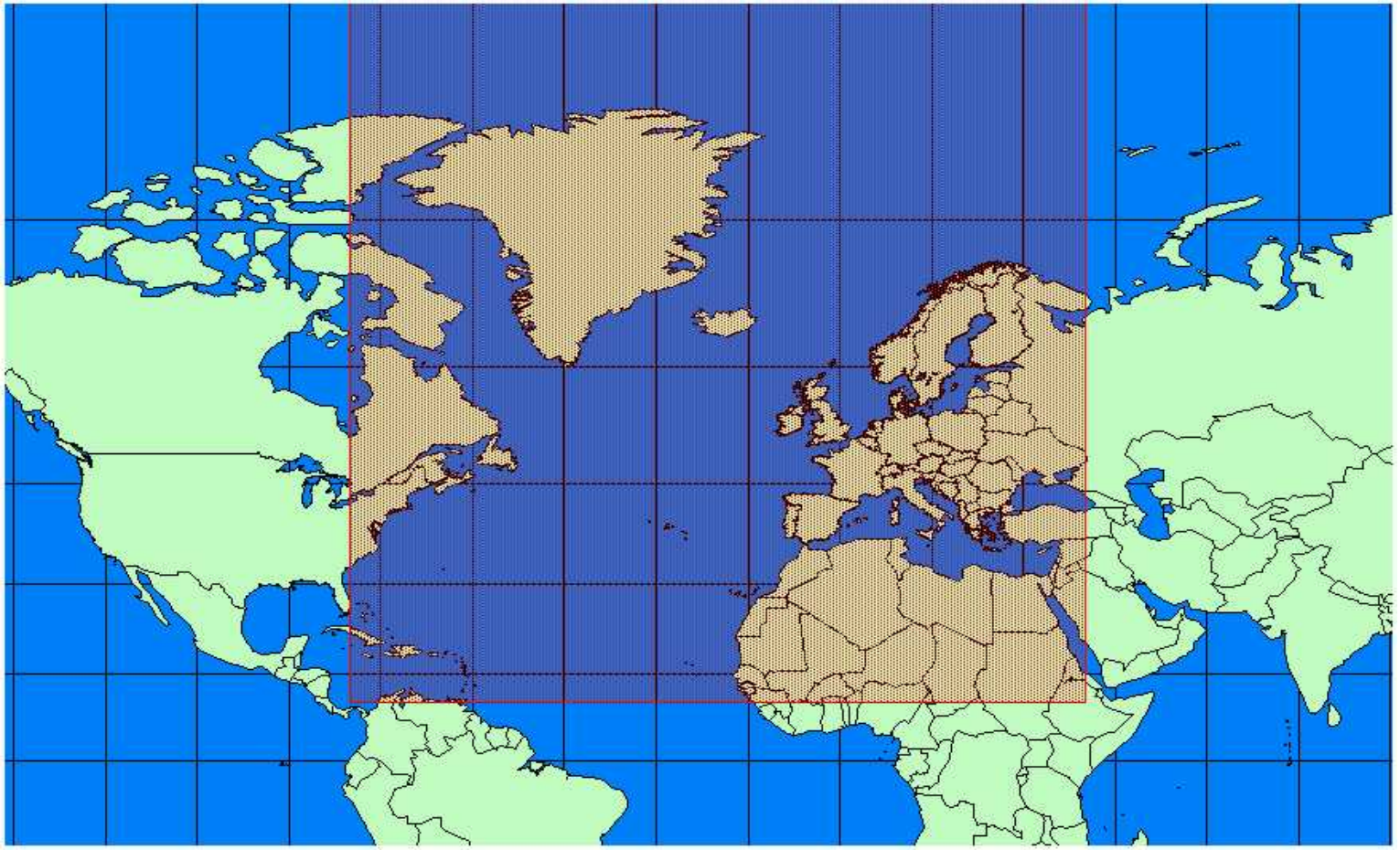
EUCOS objectives (3)

EUCOS area (10N-90N, 70W-40E)



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current EUCOS network

- All European ships of the **A**utomated **S**hip **A**erological **P**rogramme (10 E-ASAP integrated, 5 national)
- All measurements from European commercial aircraft (AMDAR)
- Ocean weather ship „M“ and Ekofisk oil platform
- Selected moored buoys and all European drifting buoys
- European Voluntary Observing Ships
- Selected European radiosonde stations
- Selected European synoptic weather stations
- Selected European wind profilers

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current EUCOS network: E-ASAP

Responsible Member: DWD

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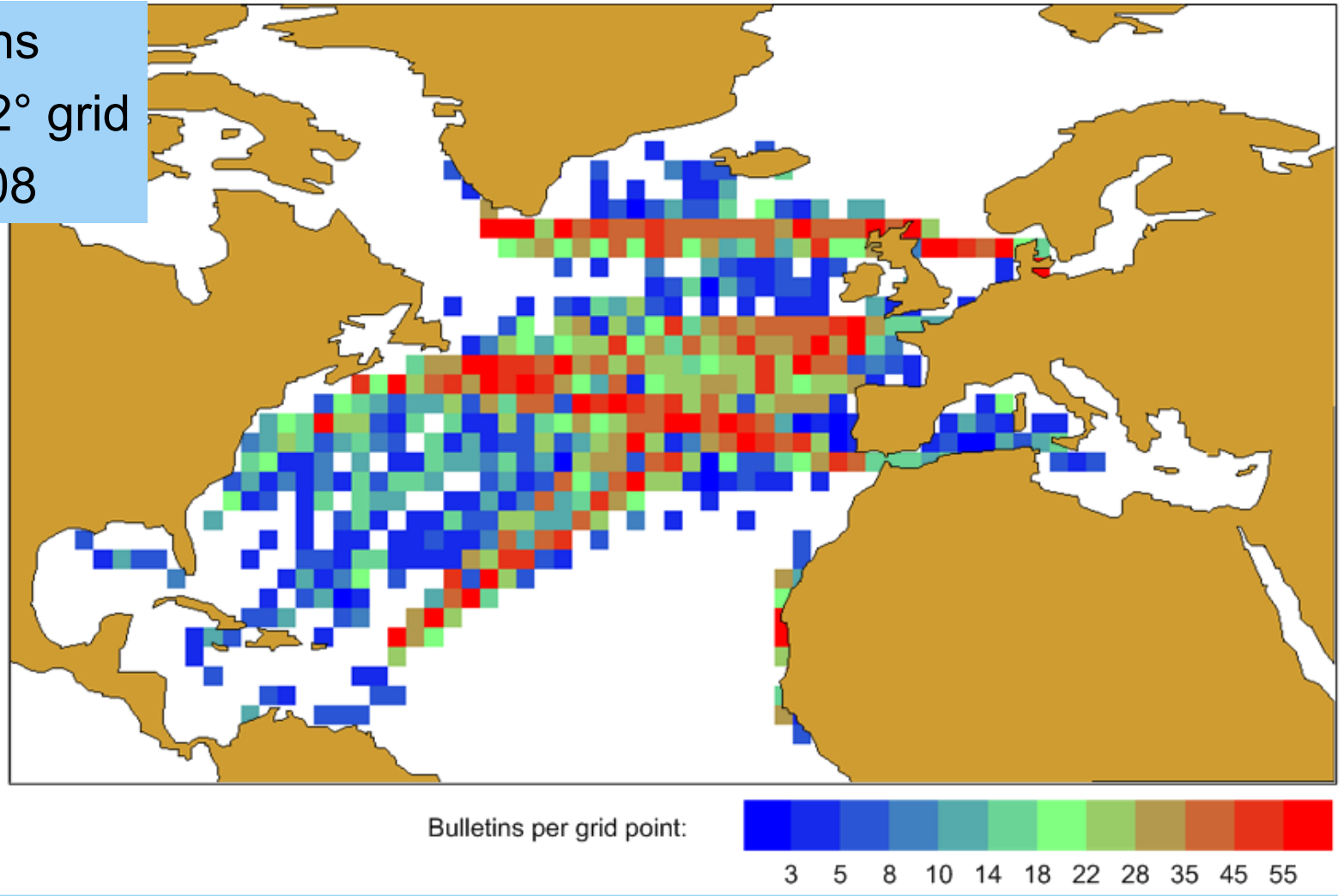
current EUCOS network: E-ASAP

RS bulletins
on a 2° x 2° grid
during 2008



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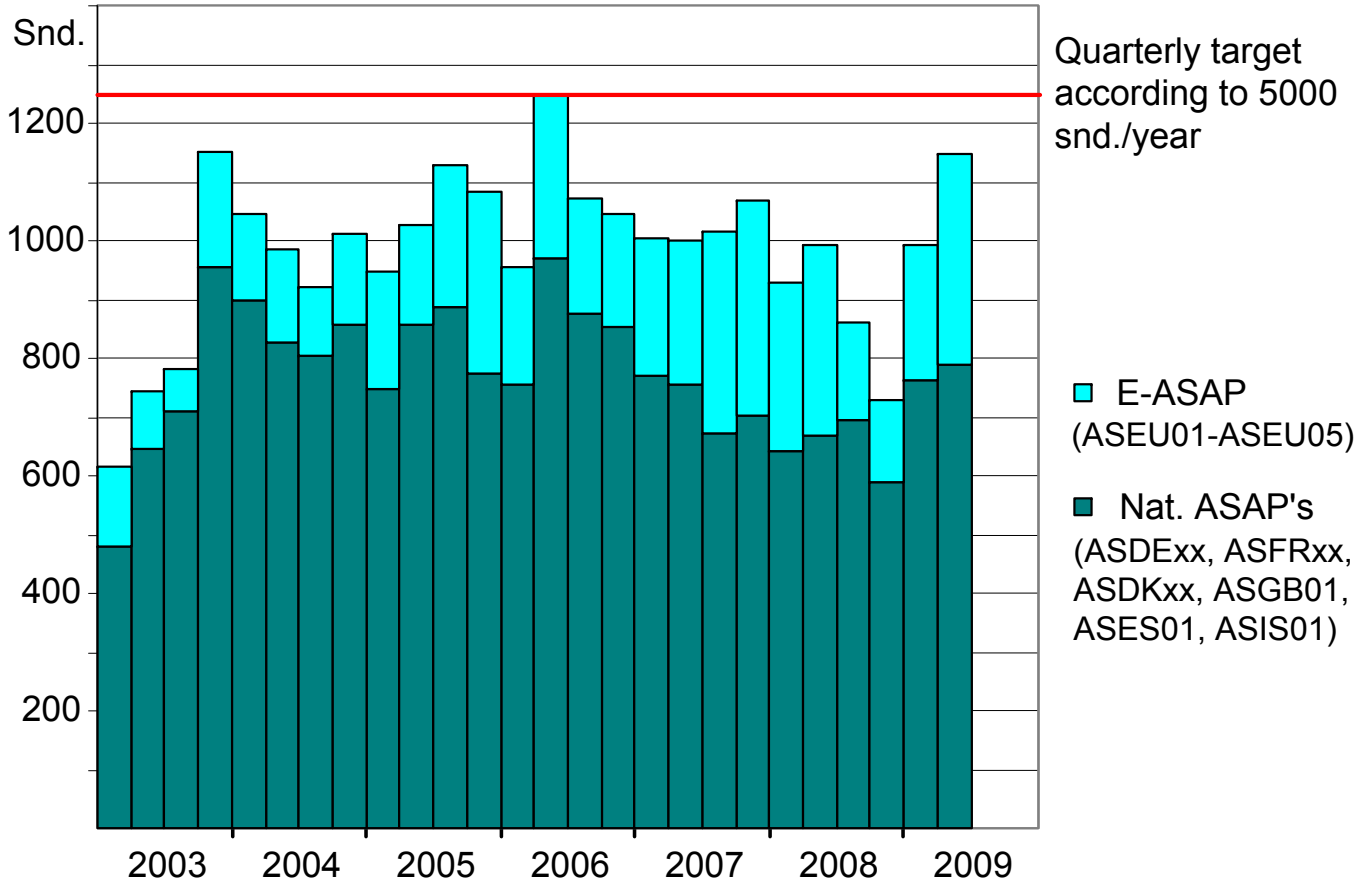
current EUCOS network: E-ASAP



Quarterly distribution of soundings from 2003 to 2009

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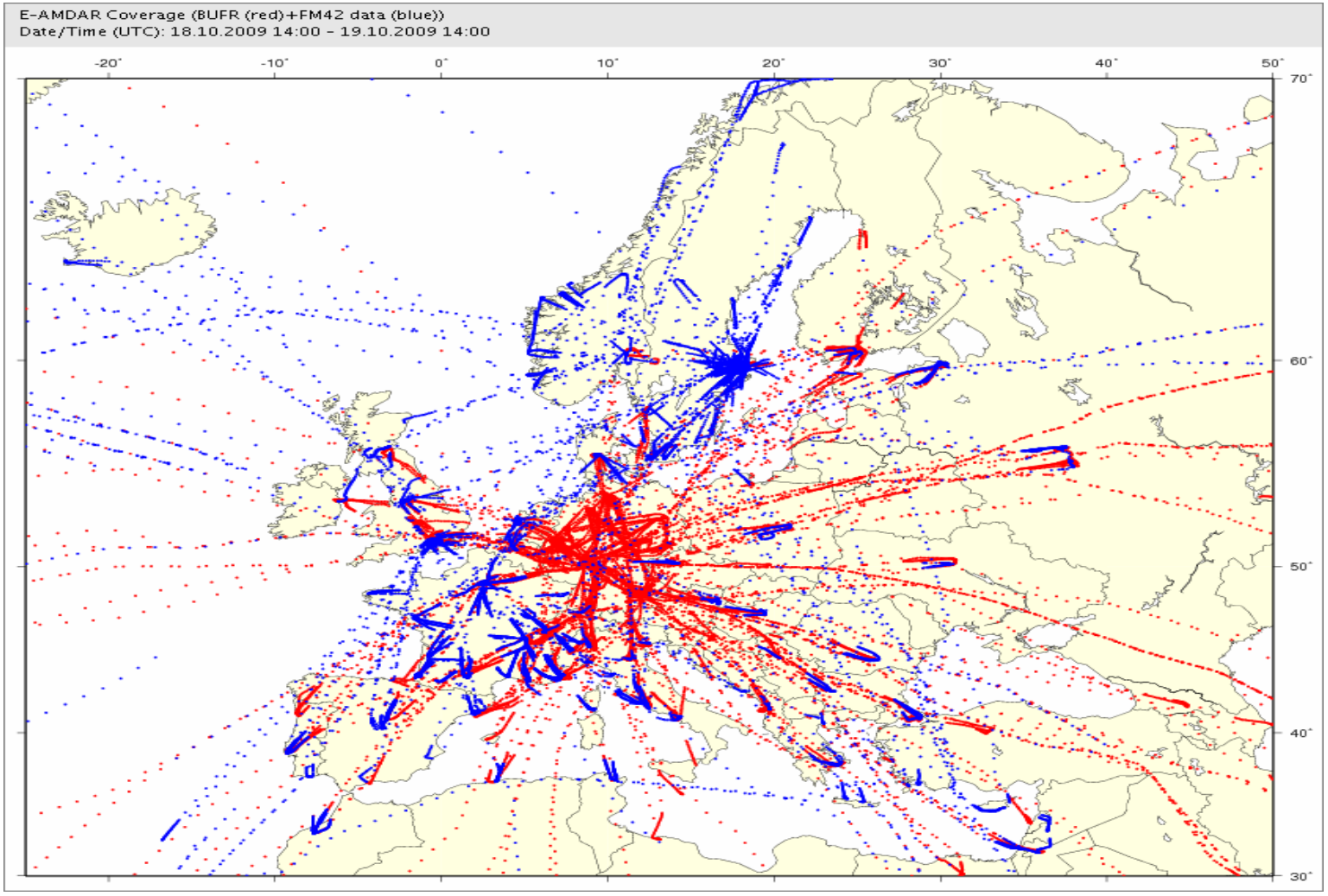
current EUCOS network: E-AMDAR

Data coverage: 18-19 Oct. 2009



Responsible Member: SMHI / Met Office

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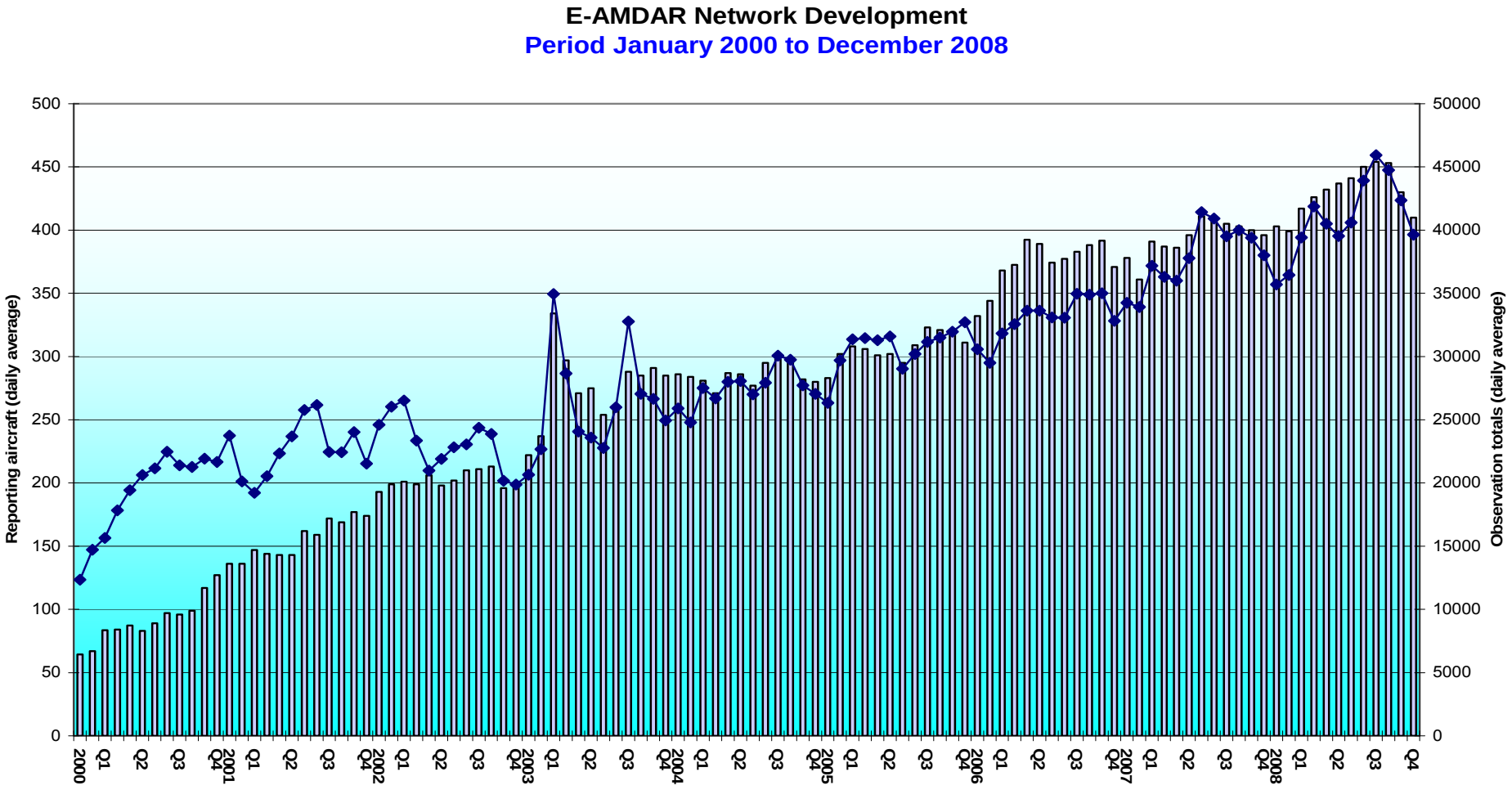
current EUCOS network: E-AMDAR



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current EUCOS network: E-SURFMAR

Responsible Member: Météo-France

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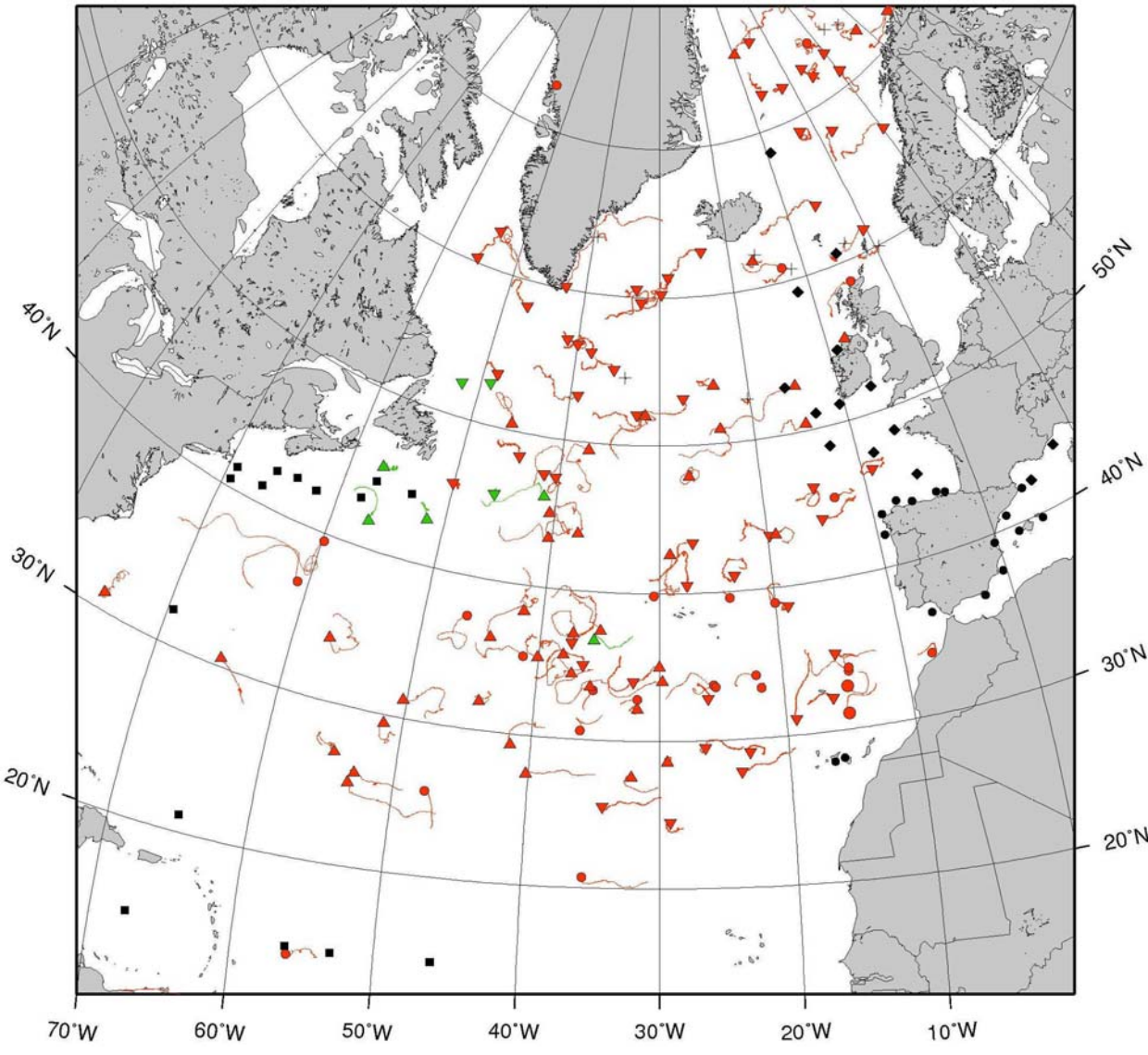
current EUCOS network: E-SURFMAR

Drifting buoy tracks

- Iridium SVP-B
- Argos SVP-B
- SVP-BW

- *(moored buoys)*



September 2009

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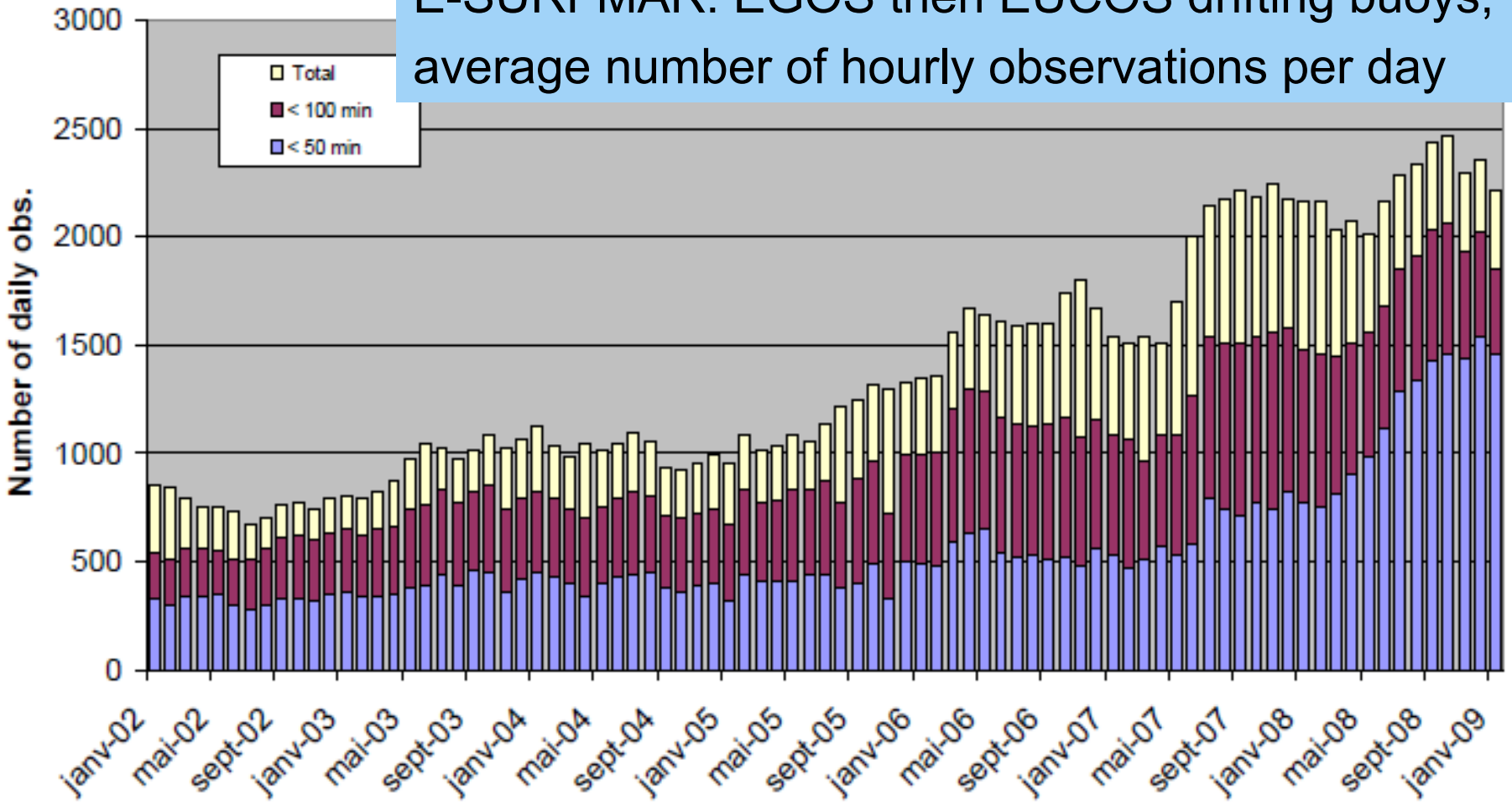
current EUCOS network: E-SURFMAR

E-SURFMAR: EGOS then EUCOS drifting buoys, average number of hourly observations per day



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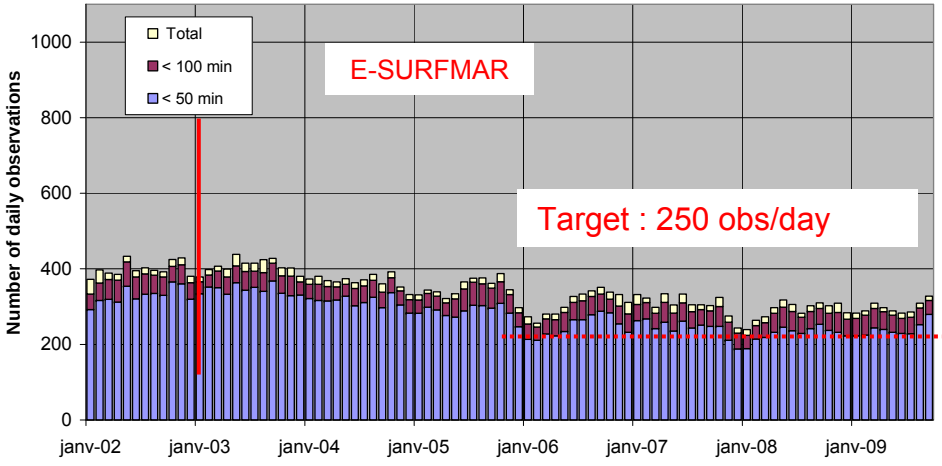
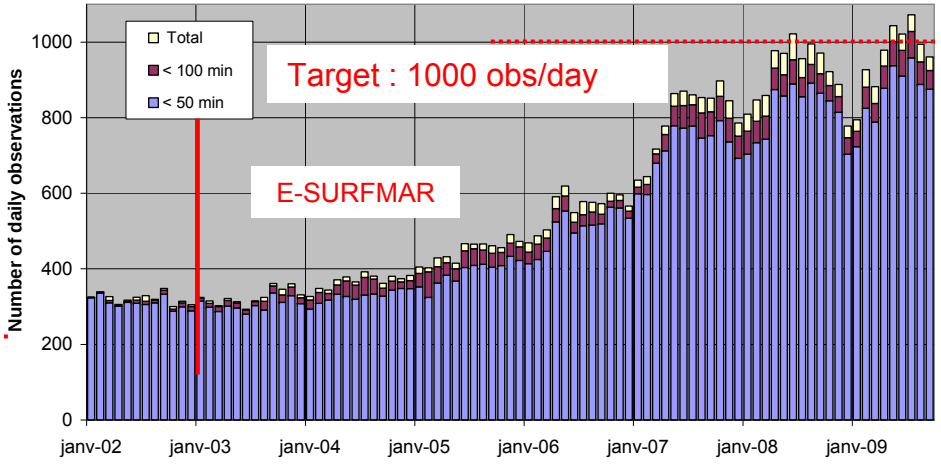
current EUCOS network: E-SURFMAR

EUMETNET manned VOS - Data availability in the EUCOS area
Average number of observations per day



Conventional VOS

EUMETNET automated VOS - Data availability in the EUCOS area
Average number of observations per day



Automated VOS (AWS)

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current EUCOS network: E-WINPROF








Responsible Member: UK Met Office

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current EUCOS network: E-WINPROF

E-WINPROF: wind profilers, which reach a certain level of quality and availability

+

Weather Radar Wind Profiles (WRWP) from about 100 sites which reach certain quality

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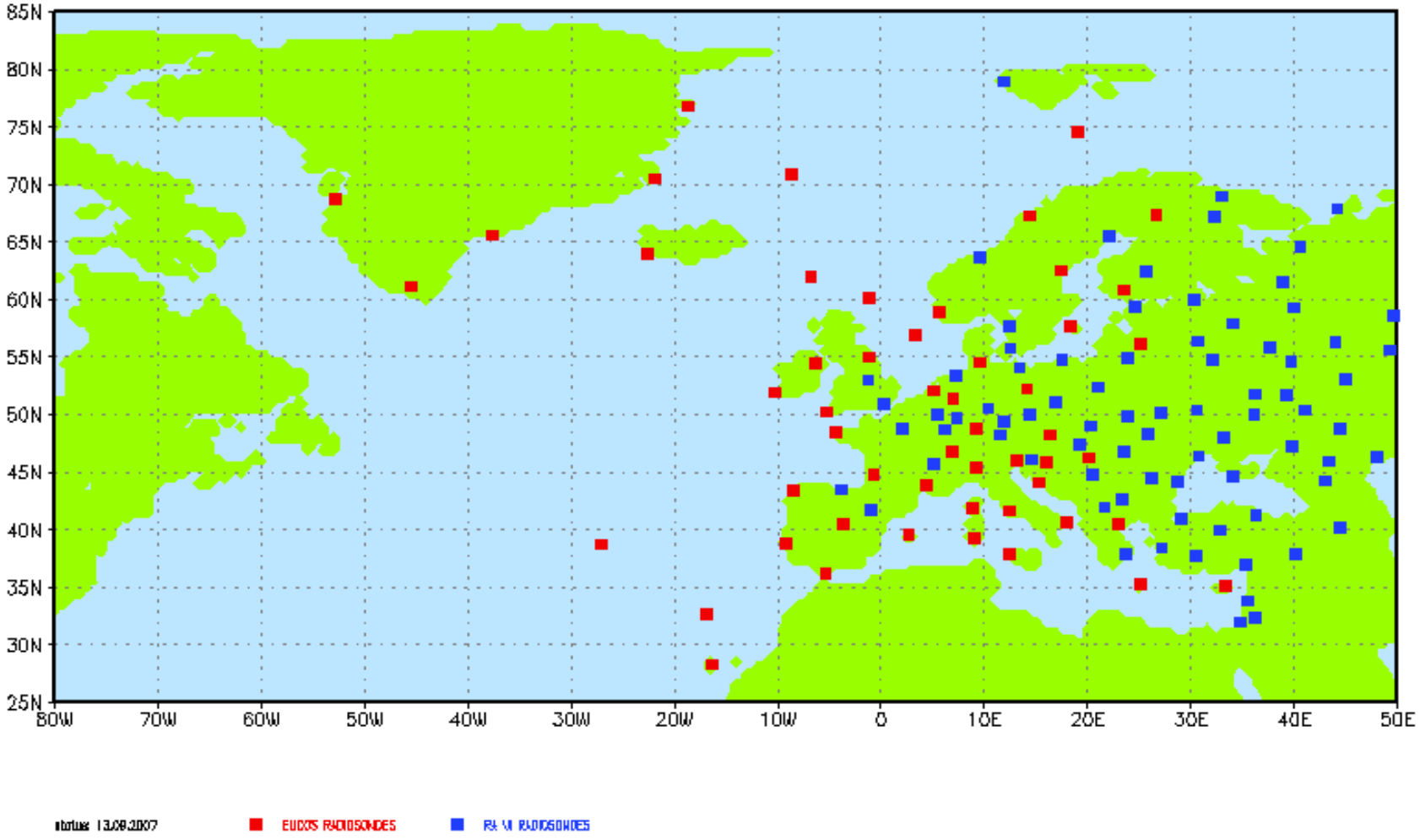
EUCOS radiosonde station network



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EUCOS Quality Monitoring

- Agreed performance standards for all networks;
- Web based Information Service www.eucos.net and Quality Monitoring Portal;
- Quarterly network performance summary.

EUMETNET data hubs

- CWINDE (WINPROF): Wind profiler and wind profiles from weather radar data
- OPERA: composite of weather radar data
- E-ADAS (E-AMDAR): data from commercial aircraft
- E-GVAP: water vapour measurements from GPS data

- Plans for a centralised data hub as a DCPC in the future
  WMO Information Systemunder dsevelopment

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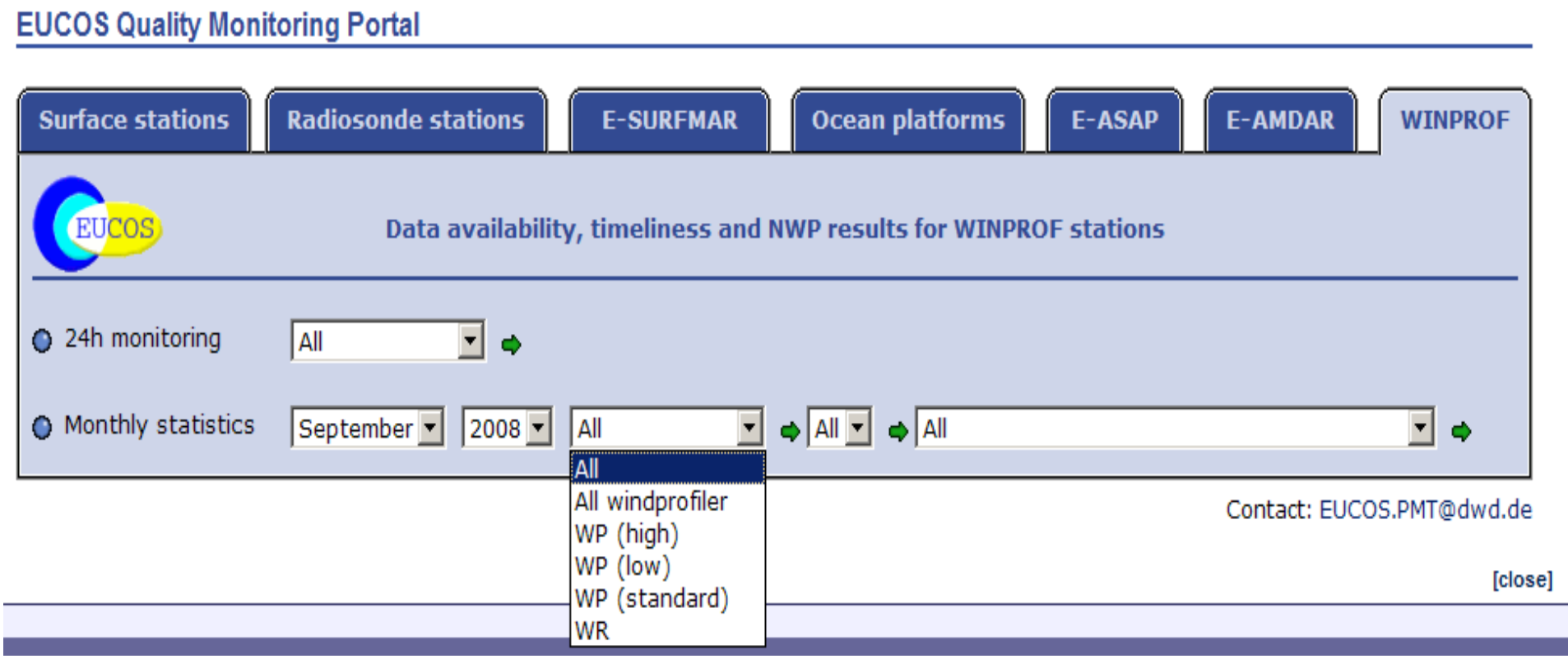
EUCOS Quality Monitoring Portal



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EUCOS network performance 2008

2008 Network	Data availability	Timeliness HH+50 (Radiosondes: TEMP AB)	Timeliness HH+100 (Radiosondes: TEMP CD)	Achieving 100 hPa	Achieving 50 hPa	Individual targets subprogrammes
Surface stations	**Target: 95%** **93%**	**Target: 90%** **97%**	**Target: 95%** **99%**	---	---	---
Radiosonde stations	**Target: 95%** **91%**	**New target: 75%** **65%**	**Target: 95%** **95%**	**Target: 97%** **96%**	**Target: 95%** **92%**	---
ASAP units	**Annual target:** **5150 obs** **3443 obs** **(equals 67%)**	**New target: 75%** **77%**	**Target: 95%** **91%**	**Target: 90%** **89%**	**Target: 75%** **82%**	**Loss rate** **Target: max. 20%** **16%**
Ocean platforms	**Target: 95%**	**New target: 75%**	**Target: 95%**	**Target: 95%**	**Target: 90%**	---
Average	**94%**	**91%**	**91%**	**96%**	**90%**	
LDWR	**95%**	**95%**	**96%**	**99%**	**96%**	
Ekofisk	**93%**	**87%**	**86%**	**93%**	**83%**	
E-AMDAR	**Annual target:** **12 Mio. obs** **13,670,000** **(equals 114%)**	**Target: 90%** **HH+50: 94%**	**Target: 95%** **97%**	---	---	***Profile distribution*** **daily profiles** **Target: 780** **771** **daily airports** **Target: 140** **114**
Moored buoys	**Target: 90%**	**Target: 90%**	**Target: 95%**	---	---	---
without Cabo Silleiro	**98%**	**100%**	**100%**			
Drifting buoys	**Target: 88%** **98%**	**Target: 90%** **50%**	**Target: 95%** **78%**	---	---	---
Automated VOS ships	**Daily avg target:** **1,000** **916** **(equals 92%)**	**Target: 90%** **89%**	**Target: 95%** **95%**	---	---	---
Conventional VOS ships	**Daily avg target:** **250** **291** **(equals 116%)**	**Target: 90%** **79%**	**Target: 95%** **94%**	---	---	---

NEW TARGET on timeliness of TEMP parts AB for all radiosonde data (agreed at PB-OBS18): **75% instead of 50%**

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

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EUCOS network performance 2008

2008 Network	Temperature RMSE	Wind Mean Vector	Specific Humidity Error dq/q*	O-B-Geopotential	Pressure RMSE
Surface stations	**Target: 1 K** **1.71 K**	**Target: 2.5 m/s** **2.72 m/s**	**Target: 10%** **8.63%**	---	**Target: 1 hPa** **0.80 hPa**
Radiosonde stations	**Target: 1 K** **1.11 K**	**Target: 2.5 m/s** **4.15 m/s**	**Target: 10%** **11.96%**	**Target: 65 m** **21.56 m**	---
ASAP units	**Target: 1 K** **1.10 K**	**Target: 2.5 m/s** **4.31 m/s**	**Target: 10%** **12.22%**	**Target: 65 m** **18.89 m**	---
Ocean platforms	**Target: 1 K**	**Target: 2.5 m/s**	**Target: 10%**	**Target: 65 m**	---
Average	**1.03 K**	**3.78 m/s**	**13.21%**	**24.15 m**	
LDWR	1.07 K	3.90 m/s	13.25%	23.80 m	
Ekofisk	0.99 K	3.67 m/s	13.16%	24.50 m	
E-AMDAR	**Target: 1.5 K** **1.07 K**	**Target: 2.5 m/s** **4.25 m/s**	**Target: 10%** **not provided yet**	---	---
Moored buoys	**Target: 1 K** **0.97 K**	**Target: 2.5 m/s** **3.34 m/s**	**Target: 10%** **7.79%**	---	**Target: 1 hPa** **0.77 hPa**
Drifting buoys	---	---	---	---	**Target: 1 hPa** **1.06 hPa**
VOS ships	**Target: 2 K**	**Target: 5.0 m/s**	**Target: 15%**	---	**Target: 1 hPa**
Automated	**1.10 K**	**3.18 m/s**	**7.10%**		**0.74 hPa**
Conventional	**1.42 K**	**4.98 m/s**	**9.79%**		**1.44 hPa**

EUCOS target achieved
within WMO target
below WMO target

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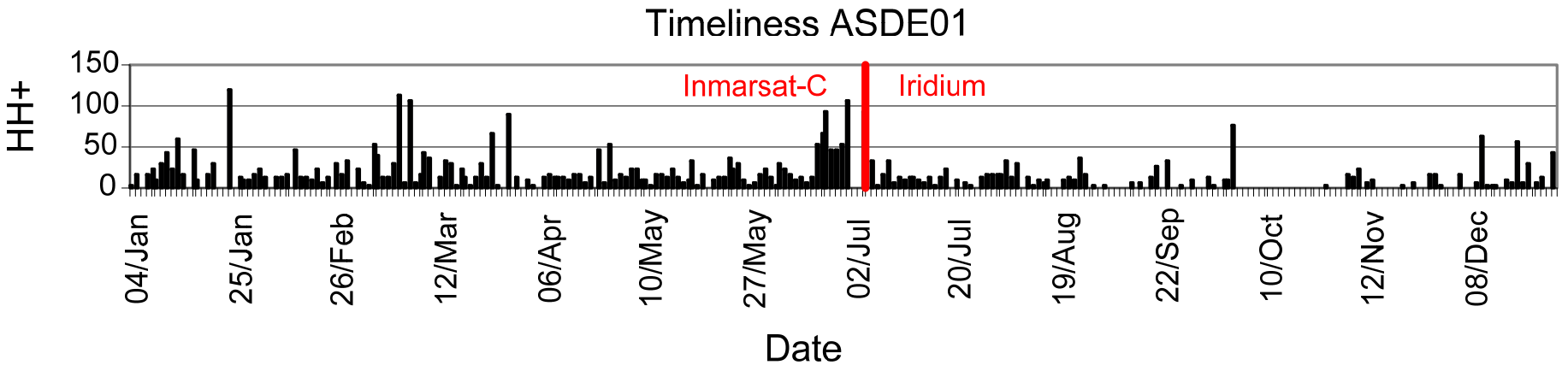
Quality monitoring example: E-ASAP

- Improvements in timeliness through Iridium satcom (First test system installed on ASDE01 in July 2008).



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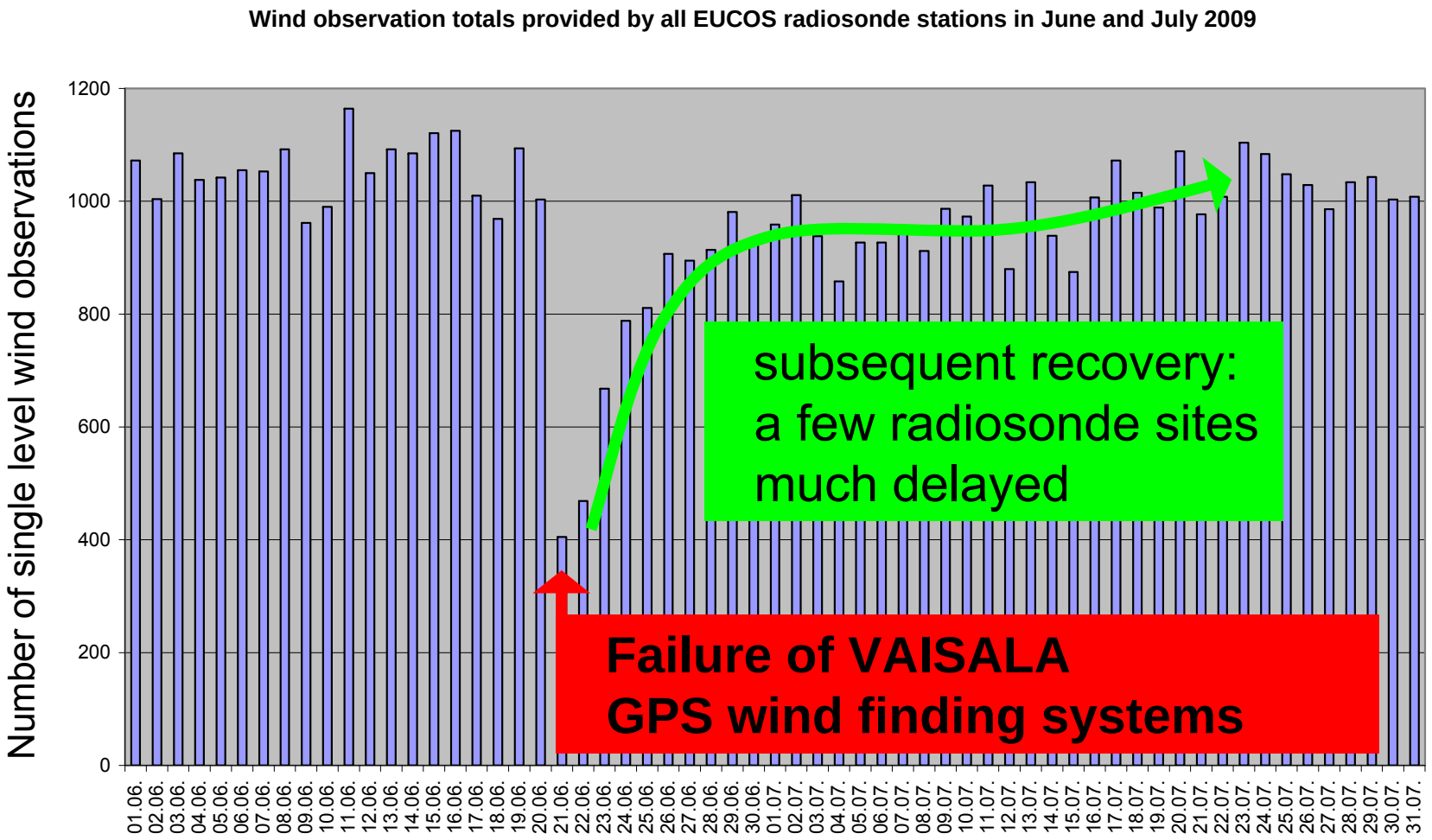
Quality Monitoring example: radiosondes



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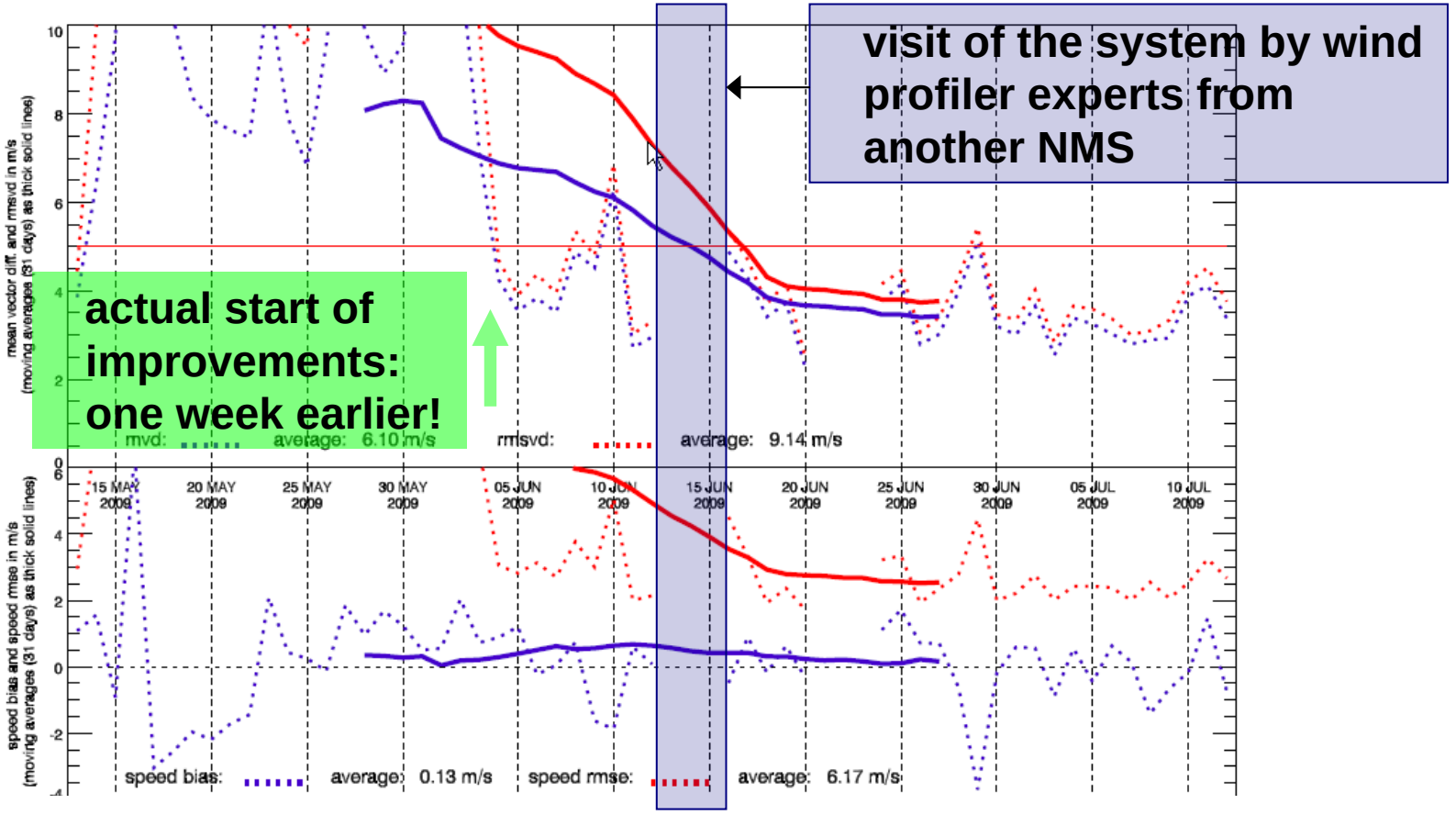
Quality Monitoring example: E-WINPROF

timeseries of daily mean **wind profiler** OBS-MOD differences
as obtained in COSMO-EU model domain:
for a specific wind profiler



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Studies Programme

Impact Studies as a measure to guideline the evolution of EUCOS: WHY?

(External) drivers and developments:

- Different observation networks evolve differently (e.g. regarding availability, accuracy, cost, ...)
- Data assimilation algorithms improve and can make use of more data

EUCOS objective:

- Design and coordinate the evolution of the ground based EUCOS to be optimized at European scale with a view to improve short range forecast ...

→ modification of the meteorological observing network might become necessary

EUCOS needs approval for network changes or modifications from PB-OBS and EUMETNET Council respectively

In order to get the 26 Members convinced of such changes it was decided to base them on scientific analyses (e.g. impact studies)

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Studies Programme

- The Space-Terrestrial Study (finished in 2007)
- current Observing System Experiments:
  - upper-air network redesign
  - OSE on impact of surface marine observations
- EURORISK PREVIEW Data Targeting System
- Second S-T study in 2009

Studies Programme:
Data Targeting System

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- Aim: make additional observations when and where they will be most beneficial to subsequent forecasts

- A pre-operational Data Targeting System (DTS) has been developed at ECMWF to assess the feasibility of operational adaptive control of the observing system

- DTS is described in issue No. 117 of the “ECMWF newsletter”

- Data Targeting might become operational within EUMETNET/EUCOS, if proven to be beneficial for NWP

Studies Programme:
Data Targeting System

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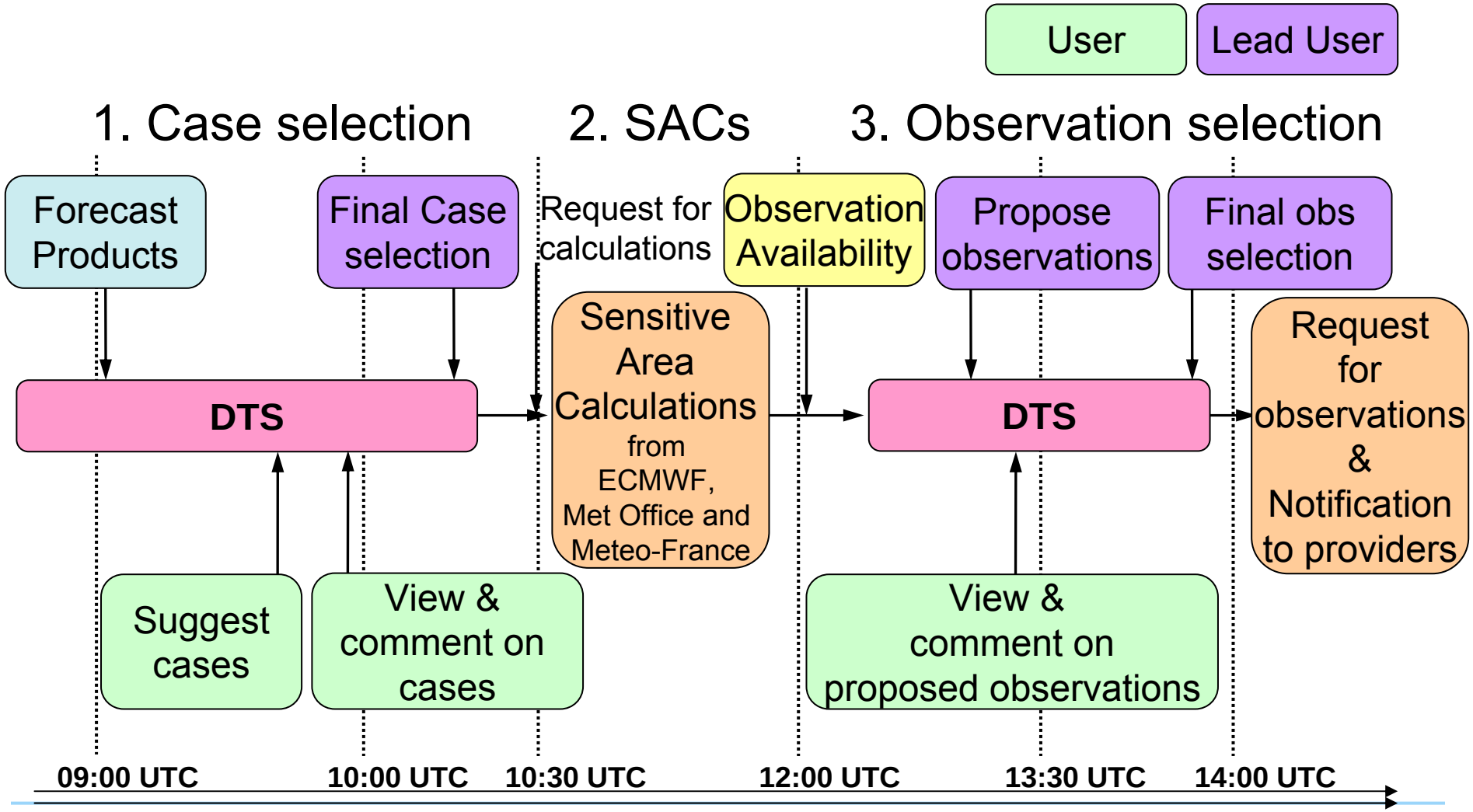

Studies Programme: Data Targeting System

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- In 2008 an 11 months trial, financed by EUCOS and the EC and managed by UK Met Office
  - Targetable data:
    - radiosoundings from merchant ships (E-ASAP) and land stations (at 6 and 18 UTC when no 'routine' launches are performed)
    - measurements from aircraft (E-AMDAR)
  - A total of 628 cases had been proposed
  - SACs were computed for 548 of these cases
  - From these, 184 sets of observations were requested
  - From these sets of observations resulted: 1400 requests for extra radiosonde launches
  - 87% of requested radiosonde ascents from land stations had been deployed and data had been ingested into GTS

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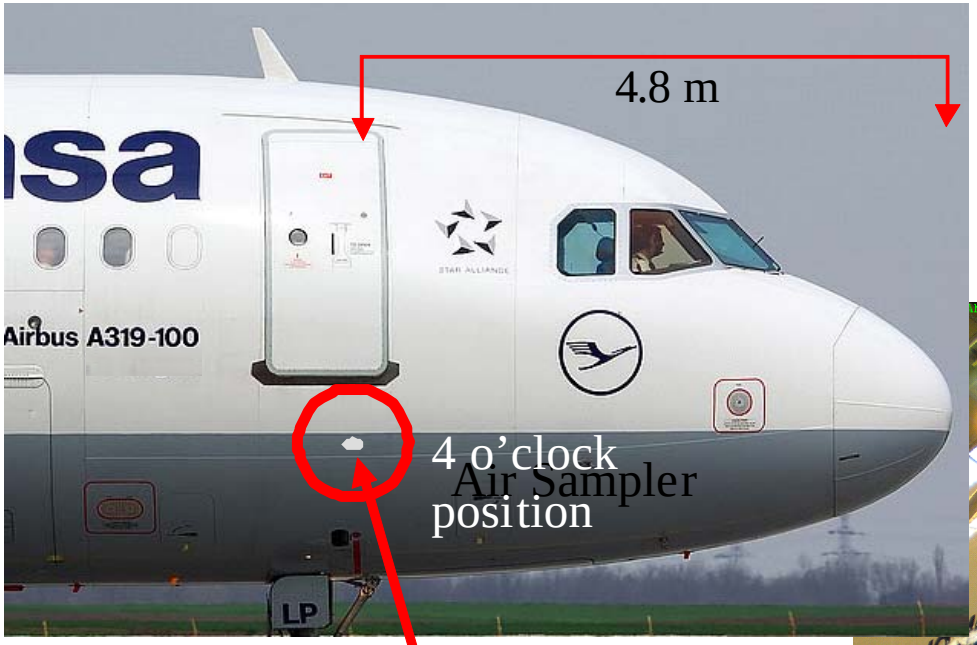
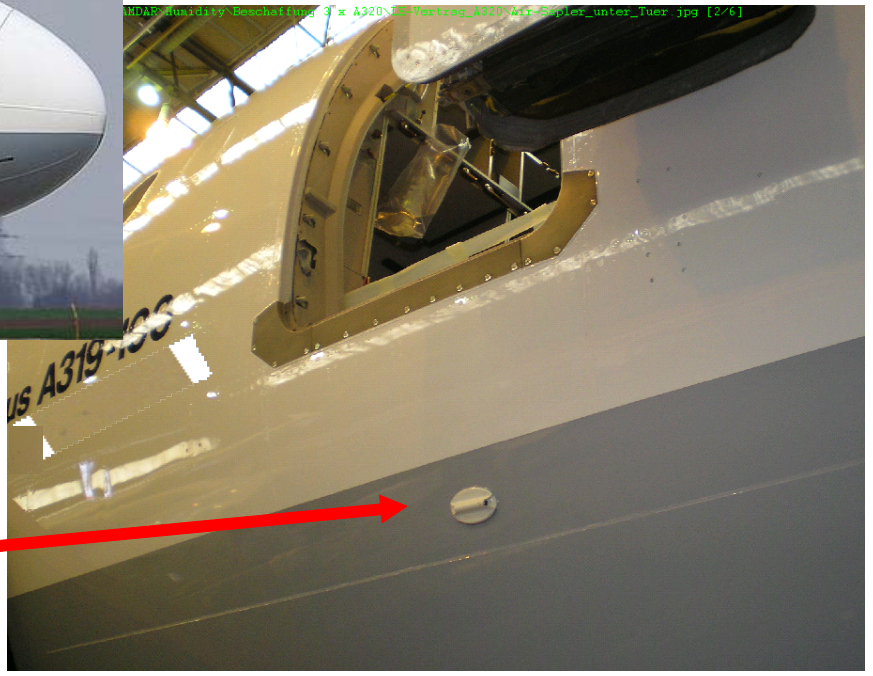
Outlook: E-AMDAR humidity trial

- Profile measurements are important for the improvement of Regional NWP
- Commercial aircraft measurements complement and have the potential to partly replace traditional radiosonde soundings
- For km scale models there is a strong requirement for humidity profile measurements
- Diode laser systems seem to fulfil the requirements on accuracy and operational stability

Outlook: E-AMDAR humidity trial





Air Sampler

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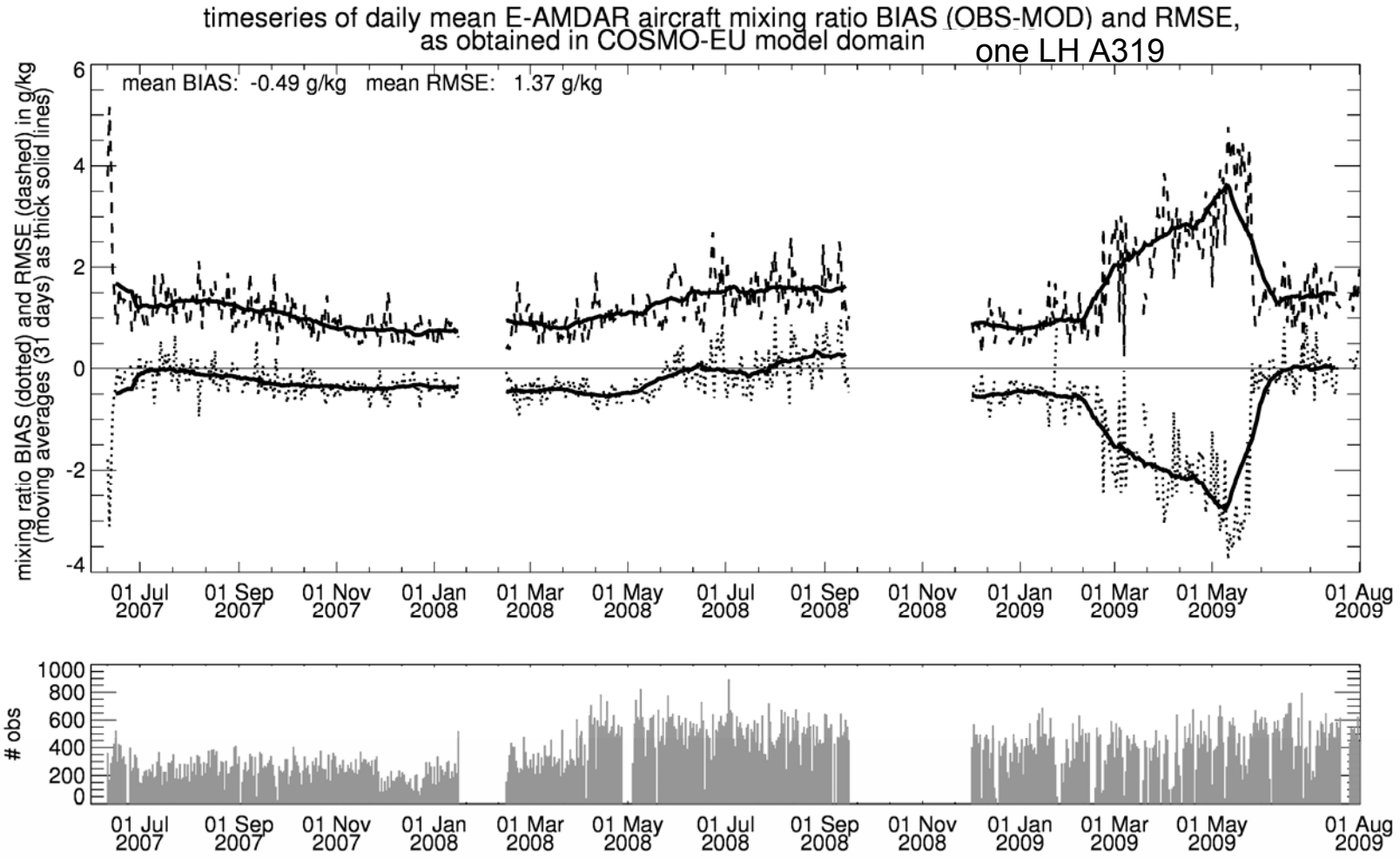
Outlook: E-AMDAR humidity trial



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Outlook

- upper-air network redesign studies to be finalised by Jan 2010 – afterwards proposal for a redesigned upper-air network to relevant bodies in EUMETNET
- Addition of humidity measurements to E-AMDAR observations
- Evaluation of the EUCOS/PREVIEW/MEDEX Data Targeting System Trial Phases by running data denial studies
- Establishing a centralised data hub for operational monitoring and product generation as a DCPC in the future WMO Information System


Questions and Comments?

Studies Programme:
Upper-air network redesign - Motivation (1)

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- Idea: definition of a European-wide network of ground-based upper-air observing systems for regional NWP requirements

- EUCOS upper-air network design for the previous programme phase 2003-2006 comprised of:
  - 50 selected radiosonde stations operated by Members,
  - The E-AMDAR network (3-hourly profile sites),
  - and was based on the WMO guidelines from 1999.

Studies Programme:
Upper-air network redesign - Motivation (2)

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The EUCOS upper-air network now requires a redesign because:

- Of the need to take into account the significant evolution of the AMDAR network;
- Members were not able to install the proposed EUCOS radiosonde network design with 4 ascents per day at most of the sites;
- Results from the Space Terrestrial Studies are available with recommendations for the network design;
- Data assimilation of NWP models has improved significantly with advanced capability to make use of high time resolution data;

Studies Programme:
Upper-air network redesign - Motivation (3)

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- expected result from the OSEs is to find an optimum setting of upper-air measurements in space and time which maintains forecast skill
- WMO user requirements for regional NWP are basis
- EUCOS configured a set of different networks (scenarios), each realising a specific setting of horizontal spacings of observations

- Current status: ECMWF, OMSZ (Hungary) and three HIRLAM members (IMO, Iceland; KNMI, The Netherlands; met.no, Norway) are contributing to this study and have partially completed their model runs.

Studies Programme:

Upper-air network redesign – example scenario

One of the scenarios under investigation:

- minimum horizontal spacing of airports/RS: 100km (right), could lead to a reduction of radiosonde launches, where airports are close
- all available airports and RS (left)