

E-SURMAR position paper prepared for the EEA workshop on GMES in-situ data requirements

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1. Overview of the E-SURFMAR programme

The Surface Marine observation programme (E-SURFMAR) of the EUMETNET (Conference of European National Meteorological Services) Composite Observing System (EUCOS) started in April 2003. It is an optional programme supported by 17 countries and is managed by Météo-France. Its main objectives are to co-ordinate, optimise and progressively integrate the European activities for surface meteorological observations over the sea.

The programme delivers marine observations from Voluntary Observing Ships (VOS) operated by EUMETNET members, as well as from drifting and moored buoys. The programme has led to significant reorganisation in the management of drifting buoy observing programmes within Europe, as all E-SURFMAR drifter activities (e.g. purchase of buoys, network monitoring, deployment coordination etc.) are managed directly by an E-SURFMAR Data Buoy Manager.

2. Main drivers and applications

The main aim of EUCOS is to improve the quality of numerical weather prediction (NWP) and general forecasts over Europe, for which the most important parameter over the sea is surface air pressure. As it cannot be measured by satellites, in-situ observations are needed.

A network design study was carried out in 2004, which recommended one observation every 12 hours at a density $225 \text{ km} \times 225 \text{ km}$. This represents 125% of the threshold density ($250 \text{ km} \times 250 \text{ km}$) required for regional NWP (the optimum is $10 \text{ km} \times 10 \text{ km}$). The other requirements (optimum/threshold) for time resolution, accuracy and timeliness being 0.5h/12h, 0.5hPa/1hPa and 0.5h/2h respectively.

Hence, a priority for E-SURFMAR was to increase the density of in-situ air pressure observations over the ocean. This is being achieved through the introduction of Automatic Weather Stations (AWS) on ships alongside an increase in the number of drifting buoys deployed. To achieve the target density would require the deployment of 160 - 175 SVP-B drifters per year plus 45 ship-borne AWS systems in addition to the VOS ships presently operating in the North Atlantic and the Mediterranean. Another key issue for the programme is to improve the quality and timeliness of the observations, whilst reducing operating costs.

3. E-SURFMAR and the GMES Marine Core Service

By mid 2009, more than 1,300 observations from the Atlantic Ocean and the Mediterranean Sea were being reported daily by EUMETNET VOS and disseminated via the WMO Global Telecommunications System (GTS). Around 1,000 of these daily observations are now made using ship-borne AWS. At the same time, around 2,500 daily observations from drifting buoys are also transmitted onto the GTS. E-SURFMAR has seen a steady increase in the number of surface marine observations being reported since it began in 2003.

All ocean forecasting systems require forcing from atmospheric models, whether run as fully coupled ocean-atmosphere NWP systems or separately. Without reliable atmospheric forcing

such ocean forecasts will have little skill. E-SURFMAR delivers the surface marine observations needed for NWP systems. Although it has a particular focus on the North Atlantic and Mediterranean Sea, E-SURFMAR delivers observations from all ocean areas. E-SURFMAR also delivers many of the in-situ sea surface temperature measurements from drifting buoys and VOS that are assimilated into ocean forecasting models, are a major input to MCS SST products (e.g. OSTIA) and are key networks for the Global Climate Observing System (GCOS). Hence, E-SURFMAR is an essential observing system required to support the ocean forecasts produced under the GMES Marine Core Service.

In addition E-SURFMAR supports the operation of 4 moored buoys (K5 - UK, M6 - Ireland, Lion - France and Cabo-Silleiro - Spain) as a baseline for calibration/validation of satellite-derived wind and wave observations. These buoys also contribute to the NOOS (North-west European shelf Operational Oceanography System and IBI-ROOS (Ireland-Biscay-Iberia Regional Operational Oceanographic System).

E-SURFMAR is a mature programme and is presently in an operational implementation phase (2009-2012), after which it is expected to continue (subject to approval of EUMETNET EIG members).

4. Costs

Expected costs for E-SURFMAR for 2010 are given below. While the drifting buoy activities are fully integrated within E-SURFMAR, the VOS and moored buoy components remain distributed activities within the participating countries. The cost of the E-SURFMAR programme is about 850 M€/year (funded by contributions from the 17 participating countries), plus an estimated annual cost for the supporting national VOS activities of 1.8 M€ and 4.1 M€ for the contributing moored buoy networks (in France, Ireland, Spain and UK).

E-SURFMAR central programme	Cost (k€)
Programme management	132
VOS	
VOS support (compensation to national operators)	173
New ship AWS purchases (will increase for 2011)	8
Additional support	10
Data Buoys	
Drifting buoy purchases and telecoms costs	311
Additional buoys for Arctic regions	50
Moored buoy support (compensation to national operators)	120
Contribution to international infrastructure (DBCP)	40
Total	844

E-SURFMAR distributed programmes	Estimated cost (k€)
National VOS activities	1,800
National drifting buoy activities	100
Operational of contributing national moored buoy networks	4,100
Total	6,000

Table 1: Estimated annual E-SURFMAR programme costs for 2010.

5. Operators

As noted earlier E-SURFMAR is an optional programme of the EUCOS supported by 17 countries, specifically the National Meteorological Services of Belgium, Croatia, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and United Kingdom. In addition the Irish Marine Institute and Puertos del Estado (Spain) contribute to the moored buoy activities.

The Programme Management team at Météo-France are supported by 2 Technical Advisory Groups (TAGs), on VOS (VOS-TAG) and Data Buoys (DB-TAG). Both of these TAGs contribute internationally to the activities of the Ship Observations Team (SOT) and the Data Buoy Cooperation Panel (DBCP) of the Joint (WMO-IOC) Commission for Oceanography and Marine Meteorology (JCOMM).

6. Gaps and evolution

Although E-SURFMAR has seen a significant increase in the number of surface marine observations being reported since 2003, this has been limited by the funding committed by members and so it has not yet achieved the target observation density specified in the 2004 design study. As noted earlier this is being achieved through the introduction of Automatic Weather Stations (AWS) on VOS alongside an increase in the number of drifting buoys deployed.

The network design is currently being reviewed, through a series of observing system experiments (OSE's) which have examined the impact of the data through three scenarios: (i) all drifting buoy and all non synoptic ships data will be removed, (ii) half of the drifting buoys and all non synoptic ships data will be removed, and (iii) all data will be assimilated. It is likely that the results of these OSE's will define the coverage of surface marine observations that E-SURFMAR will aim to sustain over the coming years.

Other objectives are to continue to reduce communications costs for VOS and the data buoys, as and when technology permits, and to complete the operational deployment of spectral wave and 10-minute wind measurement capability on the 4 E-SURFMAR moored buoys and to move towards 100% compensation for their operation.

7. Main priorities for consolidation

E-SURFMAR provides the surface marine observations that are essential for both the European National Meteorological Services and the GMES MCS. The programme is mature and technology improvements are continually being implemented to improve the efficacy of the surface marine observing networks. Through the EUMETNET EIG EUCOS programme a well-established European structure is in place to provide funding and direction to the European surface marine observing programme. However, future funding is dependent on the decisions of the EUMETNET members, individually and collectively, and while the programme is expected to continue post-2012 this has not yet been agreed by EUMETNET EIG Assembly of Members.

Reference

Further details on E-SURFMAR are given in the accompanying paper prepared for OceanObs09.