

REPORT BY E-SURFMAR
EUCOS-SURFACE MARINE PROGRAMME
2006

1. INTRODUCTION

On 1st April 2003, an optional programme, E-SURFMAR, was established by the European Meteorological Network (EUMETNET) within the framework of its Composite Observing System (EUCOS). Its main objectives are to co-ordinate, optimise and progressively integrate the European activities for surface observations over the sea – including drifting and moored buoys, and voluntary observing ships. Fifteen EUMETNET members agreed to participate in the first four years of the programme (2003-2006): Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden and United Kingdom.

According to a Memorandum of Understanding, signed in 2004 between the European Group on Ocean Stations (EGOS) and E-SURFMAR, it was agreed that, from 1st January 2005, E-SURFMAR would assume overall responsibility for the moored and drifting buoy networks managed by EGOS. The responsibilities of EGOS members have been transferred to an E-SURFMAR Data Buoy Technical Advisory Group (DB-TAG). E-SURFMAR was adopted as an action group of the DBCP, replacing EGOS at the DBCP twentieth session (Chennai, India 18-22 October 2004).

Financial contributions to the programme are shared among the participants according to the GNI of their respective country. For data buoys, the E-SURFMAR budget includes : the funding of a part time Data Buoy Manager; the purchase of drifting buoys; funding of drifting buoy communication costs from 1st January 2006; compensations for the amortization and the maintenance of 4 moored buoys; and the contributions of participants to the DBCP fund.

2. PROGRAMME MEETINGS

-The first E-SURFMAR Data Buoy Technical Advisory Group (DB-TAG) meeting took place immediately following the closure of the final meeting of the EGOS Management Committee (Geneva 18-19 January 2005).

-The second DB-TAG meeting was held in Hamburg 31May to 1 June 2005.

-The third DB-TAG meeting was held in Galway 13-14 June 2006.

3. OPERATIONAL PROGRAMME

3.1 Drifting buoys

Year	SVP-B	SVP-BW	FGGE	FGGE-W	Other	Total
1996-97	13	0	17	13	0	43
1997-98	28	7	14	4	0	53
1998-99	30	4	21	6	6	67
1999-00	41	5	15	6	2	69
2000-01	19	2	7	4	0	32
2001-02	36	5	8	0	0	49
2002-03	45	5	8	2	0	60
2003-04	26	3	4	0	0	33
2004-05	51*	1	4	0	0	56
2005-06	56*	1	0	0	2	59
Total	345	33	98	35	10	521

Table 1. The number of drifting buoys deployed for according to buoy type
(Reference period : 1st Sept to 31st Aug.)

As shown in table 1, **59 drifting buoys** were deployed between September 2005 and August 2006 including (*) 14 upgrades of SVP drifters.

Many of the deployments in 2005/06, as in previous years, were carried out by research vessels, voluntary observing ships, and ships of opportunity plying the Atlantic Ocean from ports including Halifax (Canada), Reykjavik (Iceland), Le Havre (France), Fos (France), Brest (France), London (UK), Fairlie (UK), Charleston (USA), Norfolk (USA), Bergen (Norway). Five drifters were also deployed in the Western Mediterranean Sea, three were drifters from OGS, (Istituto Nazionale di Oceanografia e Geofisica Sperimentale, Italy) upgraded with barometers. Eleven drifters from GDP upgraded with barometers were deployed in May and July 2006 by a ship plying from USA to Europe.

Although the E-SURFMAR area of interest is mainly up to 70°N (i.e. to the ice limits), the EUCOS area actually extends to 90°N. Two IcxAir buoys were air deployed in Summer 2006 in the Arctic. These buoys which have a 3 year lifetime should remain operational during the whole IPY (International Polar Year, March 2007- March 2008) period.

Year	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Ship	39	45	46	24	39	50	33	56	57
Air	14	22	23	8	10	10	0	0	2
% Air	26%	33%	29%	25%	20%	17%	0%	0%	3%
Total	53	67	69	32	49	60	33	56	59

Table 2. The number of drifting buoys deployed for EGOS/E-SURFMAR
according to deployment method
(Reference period : 1st Sept to 31st Aug.)

The number of operational buoys providing Air Pressure (AP) measurements, generally between 40 and 50 since 2000, is now above 60. The deployment of SVP-B drifters has been growing every year, further increased by the use of barometer upgrades from 2005. In contrast the deployment of FGGE type buoys has been decreasing (see Figure 1) and this kind of buoy is no longer used within

E-SURFMAR. The minimum number of operational drifting buoys at the end of each month in 2005-2006 was 53 (in February 2006) and maximum was 72 (in April 2006).

The mean lifetime of the SVP-B drifters was approximately 12 months (372 days) if we exclude the 8 early failures, 10 months (306 days) if we include them. The average age of the network was 239 days by the end of August 2005 and 323 days by the end of August 2006. Forty five buoys failed to report air pressure measurements.

All drifting buoys use the Argos system to report their data. Most use the DBCP-M2 format which significantly increases the availability of the data to the GTS.

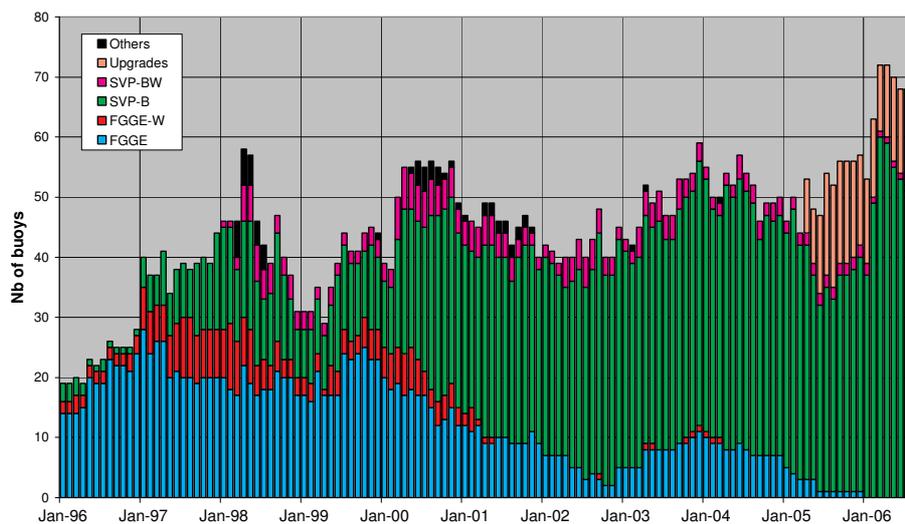


Figure 1. The number of operational EGOS/E-SURFMAR drifting buoys by the end of each month from 1996 to 2006

The availability, timeliness and quality of drifting buoy data continues to be carefully monitored.

The availability of data depends on the number of buoys operating in the EUCOS area. The number of reports received within 30 minutes remains stable (200 per day on average) whilst the total number of reports increased. About 1600 hourly observations per day had been reported on the GTS since April 2006.

The data are processed from 5 satellites by CLS Argos. About 80% are received by HH+120.

The AP differences from the French model outputs showed that the target of 1% of Gross Errors was easily being achieved. The RMS of AP differences had a significant seasonal variation, being higher in winter than in summer. This could be due to less accurate measurement in rough seas and also to more low pressure systems crossing the North Atlantic.

Real time observations from drifting buoys are subject to routine quality monitoring. Besides monthly statistics provided by various meteorological centres for individual buoys, tools have been developed by Meteo-France to identify buoys reporting dubious data as quickly as possible. Among these tools is a blacklist computed over the previous 14 days which is available on the web at: <http://www.meteo.shom.fr/qctools/eblackap.htm> .

3.2 Moored buoys

In 2004 the E-SURFMAR design study recommended that four moored buoys were needed to meet the EUCOS requirements, i.e. providing a suitable network to improve the quality of regional NWP over Europe, and for the validation and calibration of satellite wind and wave measurements. The four

E-SURFMAR moored buoys are operated by UK, Ireland, France and Spain. (i.e. three K-pattern buoys and one SeaWatch buoy respectively).

In accordance with the MOU between EGOS and E-SURFMAR the monitoring of the previous EGOS moored buoy network has been continued. The availability, timeliness and quality of moored buoys data are carefully monitored. By the end of August 2006, 15 K-pattern buoys and 10 Oceanor buoys were operating.

Operating EGOS moored buoys (K-pattern)

WMO	Name	nobs	Wi	AT	AP	dP	ST	Wa	Ws	Dr	Sb	U	SS	O	Start_end	Lat	Lon
61001	Cote d'Azur	719	X	X	X	X	X	X	X	-	-	X	-	O	0108-3108	43.40	7.80
61002	Lion	744	X	-	-	X	-	O	0108-3108	42.10	4.70						
62001	Gascogne	744	X	X	X	X	X	X	-	-	X	-	O	0108-3108	45.30	-5.00	
62029	K1	743	X	X	X	X	X	X	-	-	X	-	O	0108-3108	48.70	-12.50	
62052	Ushant	690	X	X	X	X	-	-	-	-	X	-	O	0108-3108	48.50	-5.80	
62081	K2	744	X	X	X	X	X	X	-	-	X	-	O	0108-3108	51.00	-13.20	
62090	M1	728	X	X	S	S	X	X	-	-	X	-	O	0108-3108	53.10	-11.20	
62091	M2	744	X	X	X	X	X	X	-	-	X	-	O	0108-3108	53.50	-5.40	
62092	M3	716	X	X	X	X	X	X	-	-	X	-	O	0108-3108	51.20	-10.50	
62093	M4	743	X	X	X	X	X	X	-	-	X	-	O	0108-3108	54.70	-9.10	
62094	M5	741	X	X	X	X	X	X	-	-	X	-	O	0108-3108	51.70	-6.70	
62105	K4	744	-	X	X	X	X	X	-	-	X	-	O	0108-3108	55.80	-11.40	
62108	K3	743	X	X	X	X	X	X	-	-	X	-	O	0108-3108	53.50	-19.50	
62163	Brittany	17	X	X	X	X	X	X	-	-	X	-	O	0808-3108	47.50	-8.40	
64045	K5	252	X	X	X	X	X	X	-	-	X	-	O	2108-3108	59.10	-11.70	
64046	K7	743	X	X	X	X	X	X	-	-	X	-	O	0108-3108	60.70	-5.20	

Comments:

- EUCOS moored buoys are presented in bold characters.
- K5 operating back on August 21st after several months of absence.
- Air pressure measurements failed on M1.
- Brittany has been reporting a few data since the 17th of July.

Operating EGOS moored buoys (Seawatch and Wavescans)

WMO	Name	nobs	Wi	AT	AP	dP	ST	Wa	Ws	Dr	Sb	U	SS	O	Start_end	Lat	Lon
13130	Gran Canaria		X	X	X	-	X	X	X	-	-	-	X	O		28.18	-15.82
13131	Tenerife Sur		X	X	X	-	X	X	X	-	-	-	X	O		28.00	-16.58
61196	C. Begur		-	-	-	-	-	-	-	-	-	-	-		41.92	3.65	
61197	Mahon		X	X	X	-	X	X	-	-	-	-	O		39.72	4.42	
61198	C. de Gata		-	X	X	-	X	X	-	-	-	-	O		36.57	-2.33	
61199	M. Alboran		-	-	-	-	-	-	-	-	-	-			36.23	-5.03	
61280	Tarragona		-	-	-	-	-	-	-	-	-	-			40.77	1.47	
61281	Valencia		X	X	X	-	X	X	X	-	-	-	X	O		39.47	-0.27
62024	Bilbao-Visc.		X	X	X	-	X	X	-	-	-	-	O		43.63	-3.03	
62025	C. de Penas		X	X	X	-	X	X	X	-	-	-	X	O		43.73	-6.17
62082	E. de Bares		X	X	X	-	X	X	X	-	-	-	O		44.07	-7.62	
62083	Villano-Sis.		-	-	-	-	-	-	-	-	-	-			43.48	-9.22	
62084	C. Silleiro		X	X	X	-	X	X	X	-	-	-	X	O		42.12	-9.40
62085	G. de Cadiz		X	X	X	-	X	X	X	-	-	-	X	O		36.48	-6.97

Comments:

- GTS BUFR data monitoring tools are not yet available. This explains why the number of reports and the observation period are missing.
- The snapshot for Seawatch and Wavescan buoys is dated 1st September 2006.
- The EUCOS buoy is presented in bold characters.

The INM (Spain) is reporting data from the Cabo Silleiro buoy (as well as others operated by Puertos del Estado) to the GTS in BUFR code. The messages received in Toulouse RTH are forwarded to Exeter and Offenbach. However, these data are apparently not yet being processed or used by forecast meteorological centres.

An action has been undertaken through the Technical Co-ordinator of the DBCP to propose a standard BUFR template for moored buoy data.

At present, of the 4 E-SURFMAR moored buoys, only Cabo Silleiro is able to provide directional wave spectra data. Lion is providing omni-directional wave spectra. Development work has been undertaken by the UK Met Office to permit the K series buoys to report directional wave spectra and a spectral wave system is expected to be installed on K5 in October 2006.

The availability of moored buoy data depends on the number of buoys operating. An average of more than 200 hourly observations per day have been reported on the GTS from the initial EUCOS buoys. About 70 messages per day were reported from the 3 K-pattern E-SURFMAR until January 2006 (when K5 went adrift).

More than 95% of data were received by HH+30 minutes (to be compared to the timeliness of the EUCOS target 85%) from the K-pattern buoys.

The Air Pressure (AP) differences with the French model outputs shows the target of 0.5% of Gross Errors is generally achieved. The RMS of AP differences is about 0.6 hPa.

Real time observations from moored buoys are subject to routine quality monitoring in the same way as drifting buoys.

4. PLANS

4.1 Drifting buoys

The E-SURFMAR design study has recommended the deployment of an average of 175 SVP-B type drifters per year. For financial reasons (buoy and transmission costs) this will take several years to achieve. However, the drifting buoy component has been fully funded by E-SURFMAR in 2006, i.e. in addition to the drifting buoy purchases, all the Argos communication costs are funded by E-SURFMAR. Within the allocated budget more than 80 (including 30 upgrades) buoys will be deployed in the E-SURFMAR area of interest in the coming year.

The transmission of drifting buoys data through Iridium will continue to be evaluated as an alternative to Argos.

E-SURFMAR will continue to contribute to the International Polar Year. Eight Ice beacons (Metocean) will be deployed by ship in 2007. The main challenge with the ice buoys is their ability to survive after being released from frozen ice. If it could be proven that NWP over Europe benefits from buoy data in the Arctic region (studies to be carried out), then E-SURFMAR could consider the regular deployment of such buoys.

4.2 Moored buoys

K5 (59.1N – 11.5 W), Cabo Silleiro (42.1N – 9.4W) and Lion (42.1N – 4.7E) are designated as E-SURFMAR moored buoys. The fourth buoy is currently M1 (53.1N – 11.2W). It is presently moored in 100 metres water depth, and so the fourth buoy will therefore need to be re-sited further west into deeper water, so that it will be able to provide wave data unaffected by the continental shelf. A new buoy M6 is expected to be in place at around 16W by October 2006.

The E-SURFMAR design study has recommended that directional wave spectra should be provided by all four buoys. By fall, K5 buoy should report directional wave spectra data through Iridium 4 times

each day at the main synoptic hours. Once proven the system could be procured and installed on the M6 and Lion buoys.

5. INFORMATION ON E-SURFMAR

A public E-SURFMAR web site was activated at <http://esurfmar.meteo.fr> during the spring 2006. It gives general information about the programme including the monthly reports.

In addition there is a restricted working area of the web site for E-SURFMAR participants, it is based on a collaborative scheme which allows the participants to easily create and modify certain pages on the site.

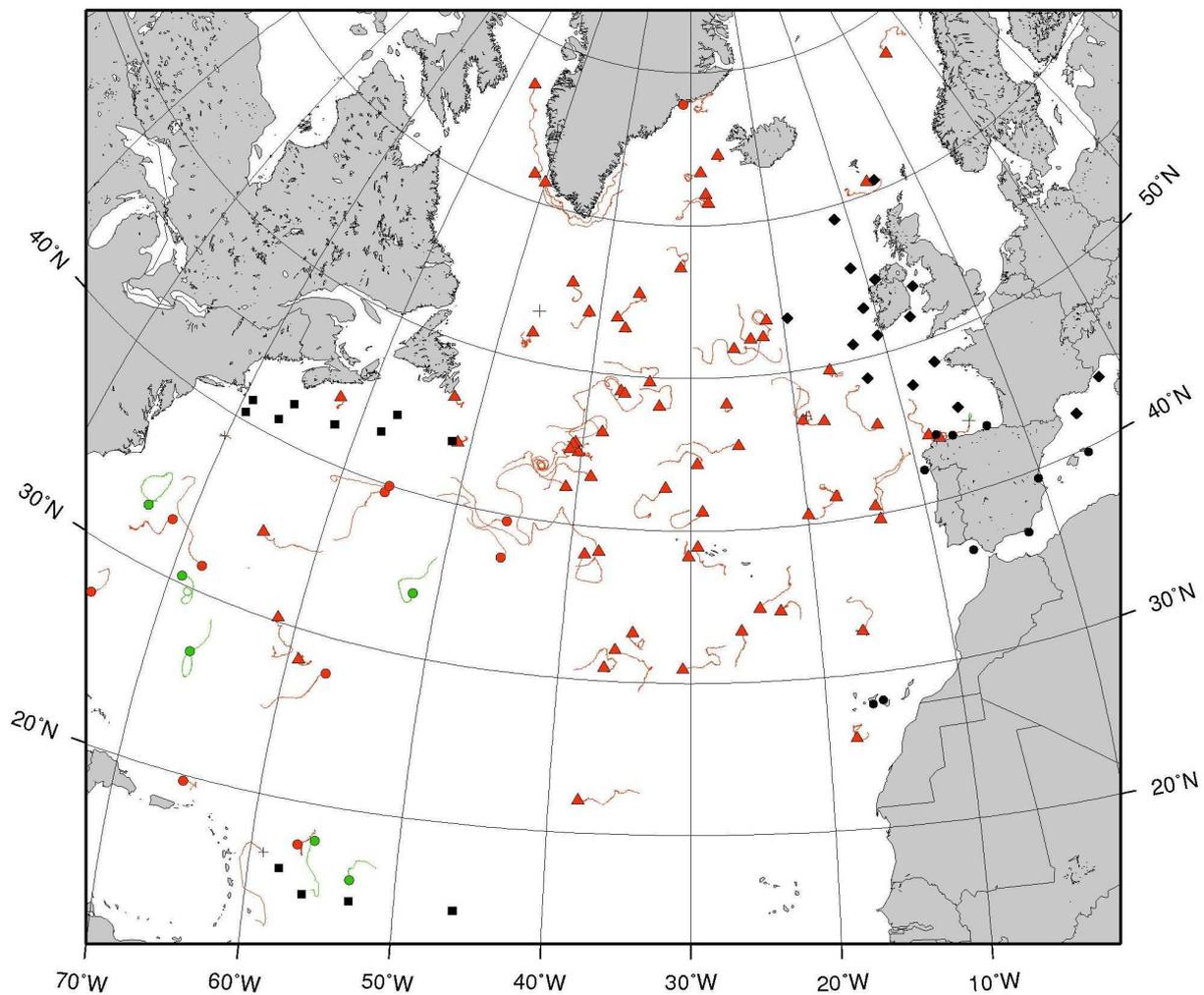
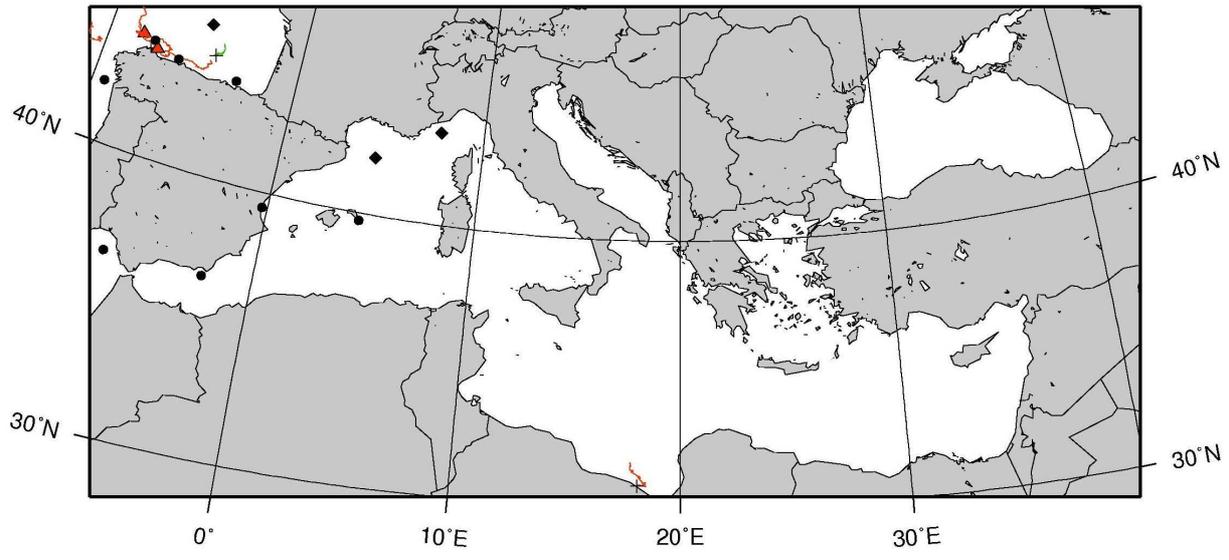


Figure 2. Operating Buoys in E-SURFMAR area
Drifting buoy trajectories and moored buoy positions
(August 2006)



- Drifting buoys AP
 - Drifting buoys wind
 - ▲ Esurfmar drifting buoys AP
 - ▲ Esurfmar drifting buoys wind
- Moored buoys
 - ◆ EGOS moored buoys
 - EGOS Spanish moored buoys