

**REPORT BY EGOS/E-SURFMAR
EUROPEAN GROUP ON OCEANIC STATIONS
EUCOS-SURFACE MARIME PROGRAMME
2005**

1. INTRODUCTION

The European Group on Oceanic Stations (EGOS) was established on December 1st 1988, as a continuation of the COST-43 buoy programmes. It was a joint operational project using moored and drifting buoys for near real-time acquisition of meteorological and oceanographic data from the North Atlantic and adjacent seas. By 2004, organisations from ten countries were participating in the EGOS programme: Denmark, France, Germany, Iceland, Ireland, Netherlands, Norway, Spain, Sweden and United Kingdom.

On 1st April 2003, an optional integrated 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. EGOS members would then transfer its responsibilities to an E-SURFMAR Data Buoy Technical Advisory Group (DB-TAG).

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.

E-SURFMAR was adopted as an action group of the DBCP, replacing EGOS at the DBCP twentieth session (Chennai, India 18-22 October 2004).

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).

A second DB-TAG meeting was held in Hamburg by 31May and 1 June 2005.

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
Total	289	32	98	35	8	462

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, **56 drifting buoys** were deployed between September 2004 and August 2005 including (*) 19 upgrades of SVP drifters. All but four were Lagrangian drifters.

Participants in EGOS/E-SURFMAR contribute to the programme in various ways: the provision of moored and drifting data buoys; the funding of barometer upgrades to SVP drifters provided by GDC; deployment arrangements; buoy storage facilities, co-ordination and data transmission etc.

Many of the deployments in 2004/05, as in previous years, were carried out by research vessels, voluntary observing ships, and ships of opportunity plying the Atlantic Ocean from ports including Reykjavik (Iceland), Le Havre (France), Fos (France), Brest (France), London (UK), Charleston (USA), Norfolk (USA), Bergen (Norway). Two drifters were also deployed in the Western Mediterranean Sea, as part of a trial to assess the lifetime of drifting buoys in this area. The first drifters from GDP upgraded with barometers were deployed in mid-April (five by a vessel plying from USA to Iceland, five by a ship plying from USA to Europe).

Year	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05
Ship	43	39	45	46	24	39	50	33	56
Air	0	14	22	23	8	10	10	0	0
% Air	0%	26%	33%	29%	25%	20%	17%	0%	0%
Total	43	53	67	69	32	49	60	33	56

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 has generally remained, between 40 and 50, since 2000. The deployment of SVP-B drifters has been growing every year, helped by the use barometer upgrades from 2005. By contrast the deployment of FGGE type buoys has been decreasing (see Figure 1). The minimum number of operational drifting buoys at the end of each month in 2004-2005 was 44 (in March 2005) and maximum was 54 (in July 2005).

The mean lifetime of the SVP-B drifters was approximately 12 months (372 days). The average age of the network was 254 days at the beginning of 2005, and 239 days by the end of August. Fifty 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 onto the GTS.

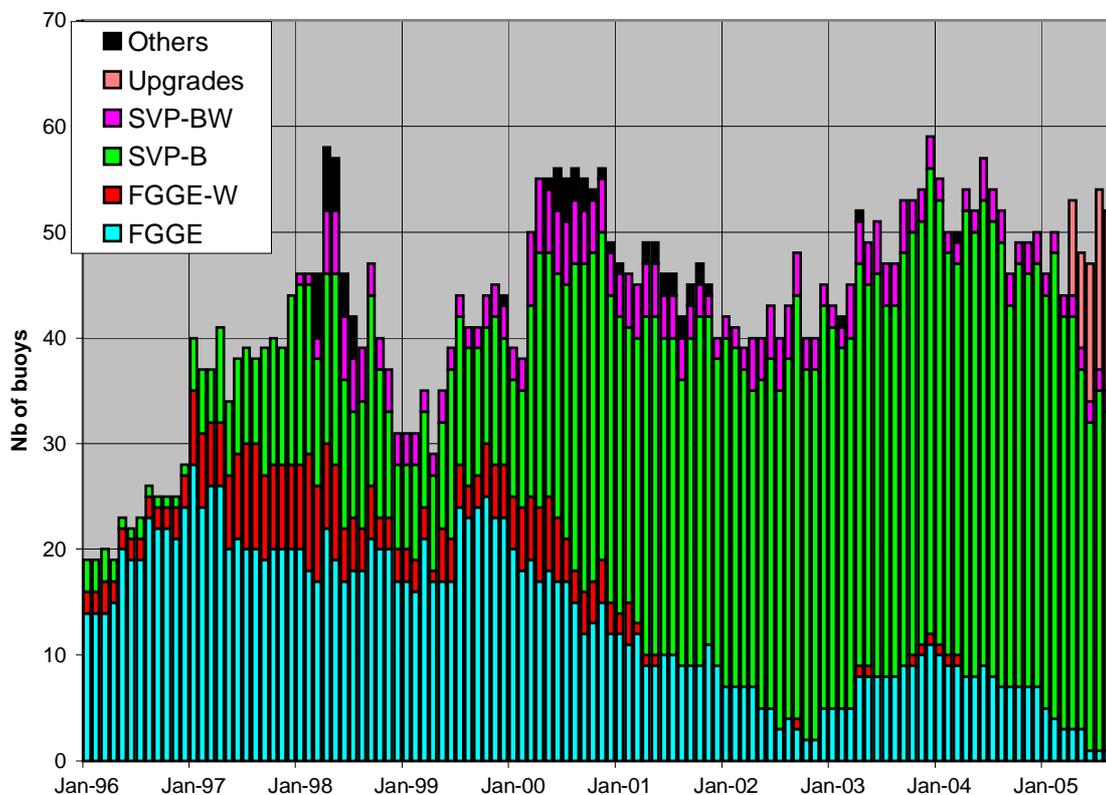


Figure 1. The number of operational EGOS/E-SURFMAR drifting buoys by the end of each month from 1996 to 2005

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

The availability of data depends on the number of buoys operating in the area. Since mid-2003 an average of more than 1000 hourly observations per day had been reported on the GTS.

Since the 31st of January 2005 the “multisat” service at CLS Argos was applied to all platforms i.e. data is now received and processed from 5 satellites compared to the 2 nominal satellites previously. The timeliness at HH+120 minutes is about 85%.

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 running over 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 Météo-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/gctools/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. By the end of August, **15** K-pattern buoys and **12** 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	721	X	X	X	X	X	X	X	-	-	X	-	O	0108-3108	43.40	7.80
61002	Lion	740	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	42.10	4.70
62001	Gascogne	739	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	45.30	-5.00
62029	K1	739	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	48.70	-12.50
62052	Ushant	727	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	48.50	-5.80
62081	K2	737	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	51.00	-13.20
62090	M1	738	X	X	X	X	X	X	-	-	-	X	-	O	0108-3108	53.10	-11.20
62091	M2	739	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	53.50	-5.40
62092	M3	739	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	51.20	-10.50
62093	M4	738	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	54.70	-9.10
62094	M5	736	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	51.70	-6.70
62105	K4	738	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	54.90	-12.40
62108	K3	738	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	53.50	-19.50
62163	Brittany	739	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	47.50	-8.40
64045	K5	739	X	X	X	X	X	X	-	-	-	X	-	O	0108-3108	59.00	-11.40
64046	K7	739	X	X	X	X	X	-	-	-	-	X	-	O	0108-3108	60.70	-5.20
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	-	-	-	-	-	-	-	-	-	-	-	-	-		28.18	-15.82
13131	Tenerife Sur	X	X	X	-	X	X	X	-	-	-	-	-	O		28.00	-16.58
61196	C. Begur	X	X	X	-	-	X	X	-	-	-	-	-	O		41.92	3.65
61197	Mahon	X	X	X	-	-	X	X	-	-	-	-	-	O		39.72	4.42
61198	C. de Gata	X	X	X	-	X	X	X	-	-	-	-	-	O		36.57	-2.33
61199	M. Alboran	-	-	-	-	-	-	-	-	-	-	-	-	-		36.23	-5.03
61280	Tarragona	X	X	X	-	X	X	X	-	-	-	X	O		40.77	1.47	
61281	Valencia	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.	X	X	X	-	X	X	X	-	-	-	X	O		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	-	-	-	-	O		36.48	-6.97	
Comments:																	
- GTS BUFR data monitoring tools are not yet available. This explains why the number reports and the observation period are missing.																	
- The EUCOS buoy is presented in bold characters.																	

The availability, timeliness and quality of moored buoys data are carefully monitored.

Since mid-December 2004, the INM (Spain) had been reporting the data of the Cabo Silleiro buoy (as well as the others ones 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 and so cannot be monitored.

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

The availability of moored buoy data depends on the number of buoys operating. Since the beginning of 2005 an average of more than 200 hourly observations per day have been reported on the GTS from the 12 initial EUCOS buoys.

Since the Met Office modified their distribution of GTS data to Météo-France, improved timeliness of moored buoy data at HH+15 minutes had been observed, with more than 85% now within this time limit (the EUCOS target) instead of less than 10% for the 12 initial EUCOS buoys.

The AP differences compared to the French model outputs shows that the target of 0.5% of Gross Errors is being achieved. The RMS of AP differences is about 0.4 – 0.8 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 per year. For financial reasons (buoys and transmission costs) this will take several years to achieve. However, the drifting buoy component will be fully integrated within E-SURFMAR in 2006, i.e. in addition to the drifting buoy purchases, all the Argos communication costs will be funded by E-SURFMAR. Within the allocated budget about 80 (including 30 upgrades) buoys will be deployed in the E-SURFMAR area of interest.

To improve the lifetime and the efficiency of drifting buoys, there is now the possibility to build "smart buoys". Such buoys can be designed to report their observations only (or more frequently) when they are most needed; the rest of the time, they can be set to report less frequently, or to only report their positions to show that they are still operating. The criteria for the data transmission could therefore be based on the barometric tendency, with the buoy being less active in higher pressure areas. Battery energy and communications costs could therefore be saved. Interaction with data users will be needed in order to develop the best specifications for such drifters. With the appropriate transmission strategy it should therefore be possible to substantially increase buoy lifetimes.

E-SURFMAR plans to contribute to the International Polar Year, which will take place in 2007/2008,. 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. E-SURFMAR will contribute to the funding of one extra arctic buoy through the International Arctic Buoy Programme (IABP). However, due to the additional cost of ice buoys, this is likely to result in 3 SVP-B buoys less being available for deployment in the Atlantic Ocean in 2007.

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 M1 (53.1N – 11.2W). It is presently moored in 100

metres water depth, and 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. Bilateral discussions are ongoing between Met Eireann and the Met Office to arrange either the relocation of M1, or the transfer of K3 to the Irish Marine Institute, to operate at the new position.

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. The E-SURFMAR design study has recommended that directional wave spectra should be provided by all four buoys. Development will therefore be needed before all the K series buoys are able to report directional wave spectra.

5. INFORMATION ON EGOS and E-SURFMAR

EGOS information was previously available on the World Wide Web at <http://www.meteo.shom.fr/egos/>.

A restricted working area of the web site for E-SURFMAR participants was activated at the end of January 2005. It is based on a collaborative scheme which allows the participants to easily create and modify certain pages on the site at <http://www.esurfmar.meteo.fr>. Following discussion at the second DB-TAG meeting, it was recommended that a formal E-SURFMAR web site was needed to replace the previous EGOS one, and that this should be incorporated in the main EUCOS web pages at <http://www.eucos.net>.

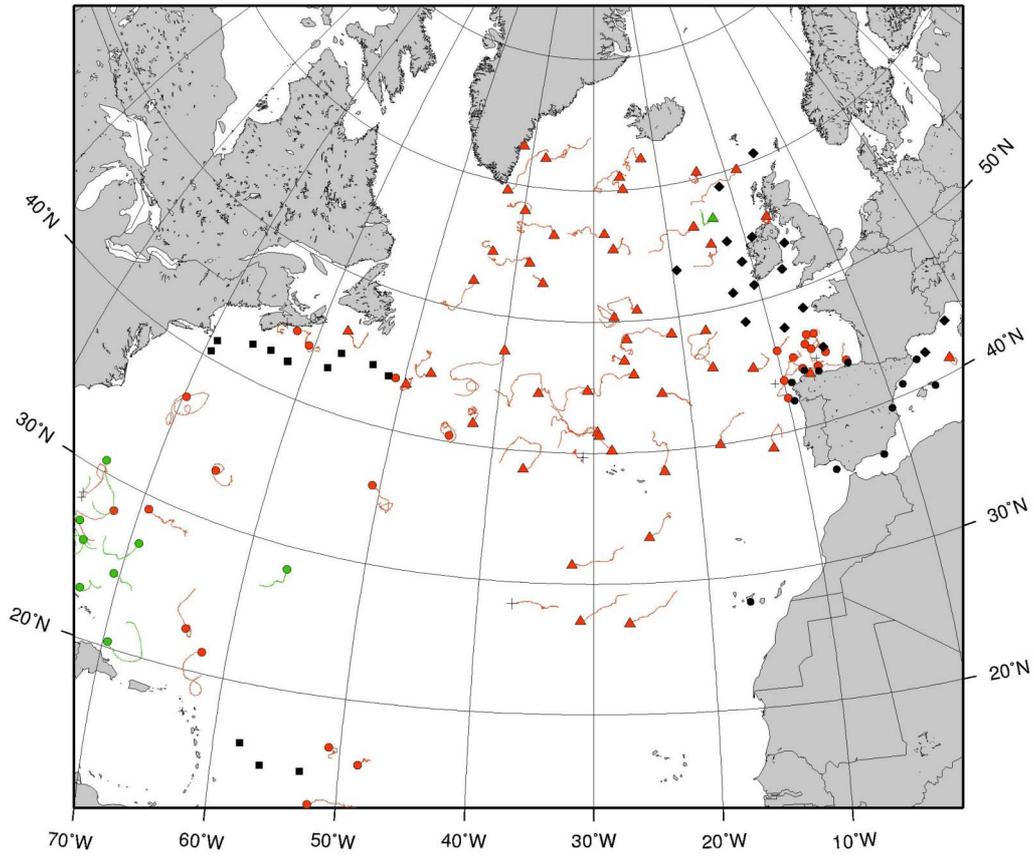
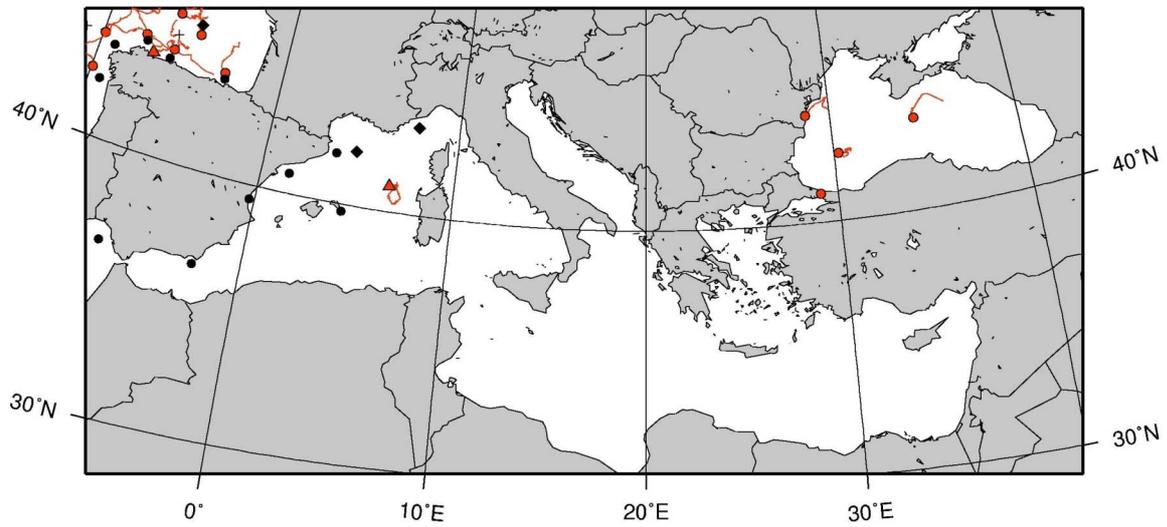


Figure 2. Operating Buoys in E-SURFMAR area
 Drifting buoy trajectories and moored buoy positions
 (August 2005)



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