

## Ship Observations Team

~ integrating & coordinating international ship-based observing programmes for JCOMM ~



# Data Quality Monitoring

**PMO-IV and Support to Global Ocean Observations using Ship Logistics**  
8-10 December 2010, Orlando, FL, USA

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# Outline of Presentation

- **Met Office RSMC Quality Monitoring  
( for VOS & Marine Data )**
- **Met Office RTMC Quality Monitoring  
( for VOSCLIM )**
- **Météo France Quality Monitoring  
( for E-SURFMAR & ALL VOS )**

*RSMC = Regional Specialised Monitoring Centre*

*RTMC = Real Time Monitoring Centre*

*E-SURFMAR = EUMETNET Surface Marine Programme*



# 1 - Met Office QC Monitoring

# Met Office RSMC Quality Monitoring ( for VOS )

The Met Office is the WMO designated lead centre for monitoring the quality of surface marine data


- **Monthly statistics are produced for ships, buoys, and other marine platforms comparing observations with Met Office's global model background forecast fields for each variable**
- **The monitoring stats are available on the Met Office website**


<http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/>

- **Detailed monitoring lists are also sent to WMO on a 6 monthly basis. Statistics related to suspect VOS are extracted by WMO and sent to national VOS focal points, requesting corrective action to be taken.**

# Met Office Observation Monitoring web site

<http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/>





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[NWP](#) | [Climate](#) | [Seasonal forecasting](#) | [Atmospheric processes](#) | [Oceanography](#) | [Projects](#) | [The stratosphere](#)

## Observation Monitoring

### Monitoring of Surface Marine Data

The Met Office shares in WMO co-ordinated monitoring of the Global Observing System, by acting as lead centre for monitoring the quality of surface marine observations. This encompasses observations from [ships](#), [drifting buoys](#), moored buoys and other fixed marine platforms. One of the tasks as lead centre is to compile the [Biannual Report on the Quality of Marine Surface Observations](#).

The Met Office also holds a monitoring role in the international [Voluntary Observing Ships \(VOS\)](#) scheme and is the Real-Time Monitoring Centre for the international [Voluntary Observing Ships Climate \(VOS-Clim\) Project](#) which aims to provide a high-quality subset of marine meteorological data to support global climate studies. Tables of monitoring statistics for the individual ships in the VOS fleets (as listed in WMO's "Pub 47" document) and overall timeliness data are now produced by the Met Office each month and can be found via the links below.

- [VOS Monthly Monitoring Reports](#)
- [VOS Time of Receipt Statistics](#)
- [Monthly Drifting Buoy Monitoring Statistics](#)
- [Biannual Report on the Quality of Marine Surface Observations](#)
- [Annual VOS Ranking List](#)

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# Met Office Observation Monitoring web site

## Pub47 VOS Suspects for Oct 2010

To view the suspect threshold for each variable and statistic, hover your cursor over the relevant column. Please note that the bias and standard deviation statistics listed below exclude observations having gross errors.

### PRESSURE (hPa)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
CA	DUMIT	CG2522	368	58	-8.3	3.6	<a href="#">QC plot</a>
CA	LIMNOS	CG2350	659	0	-1.7	11.0	<a href="#">QC plot</a>
GB	Boston	MLFB4	53	0	4.7	1.3	<a href="#">QC plot</a>
GB	CSCL Dalian	VRBH4	34	0	4.5	3.3	<a href="#">QC plot</a>
HK	OOCL Tokyo	VRCI9	42	0	7.8	6.0	<a href="#">QC plot</a>
RU	ELENA SHATROVA	UITR	31	3	-6.7	3.5	<a href="#">QC plot</a>
US	ALASKAN NAVIGATOR	WDC6644	70	0	-8.1	2.9	<a href="#">QC plot</a>
US	ALGOWOOD	VCTD	22	32	-1.2	6.7	<a href="#">QC plot</a>
US	ALPENA	WAV4647	60	22	-2.4	7.7	<a href="#">QC plot</a>
US	AMERICAN INTEGRITY	WDD2875	75	35	-6.9	5.9	<a href="#">QC plot</a>
US	EVEREST SPIRIT	C6FY8	50	2	-5.8	4.1	<a href="#">QC plot</a>
US	JOHN G. MUNSON	WE3806	57	28	-4.1	6.3	<a href="#">QC plot</a>
US	MINERAL TIANJIN	ONBF	28	0	5.0	3.4	<a href="#">QC plot</a>
US	OCEAN MARINER	WCF3990	72	3	4.2	2.3	<a href="#">QC plot</a>
US	OVERSEAS ALCESMAR	V7HP2	52	0	4.8	1.8	<a href="#">QC plot</a>
US	RADIANCE OF THE SEAS	C6SE7	57	0	4.1	1.3	<a href="#">QC plot</a>
US	RYNDAM	PHFV	75	0	-4.1	2.0	<a href="#">QC plot</a>
US	ZIM SHENZHEN	VQUQ4	77	0	4.7	1.6	<a href="#">QC plot</a>

### TEMPERATURE (deg C)

CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
US	ALGOLAKE	VCPX	45	36	1.8	1.6	<a href="#">QC plot</a>
US	ALGOWOOD	VCTD	25	52	1.0	2.5	<a href="#">QC plot</a>
US	ALPENA	WAV4647	58	62	1.0	1.5	<a href="#">QC plot</a>
US	AMERICAN INTEGRITY	WDD2875	75	72	3.2	2.5	<a href="#">QC plot</a>
US	BURNS HARBOR	WDC6027	75	29	1.8	2.3	<a href="#">QC plot</a>
US	CELEBRITY CENTURY	9HJI9	80	0	4.3	4.5	<a href="#">QC plot</a>
US	EDGAR B. SPEER	WQZ9670	195	29	1.1	1.7	<a href="#">QC plot</a>
US	JOHN G. MUNSON	WE3806	56	61	-0.3	1.3	<a href="#">QC plot</a>
US	STALWART	WBN6512	27	0	5.3	1.9	<a href="#">QC plot</a>

### WIND SPEED (m s-1)

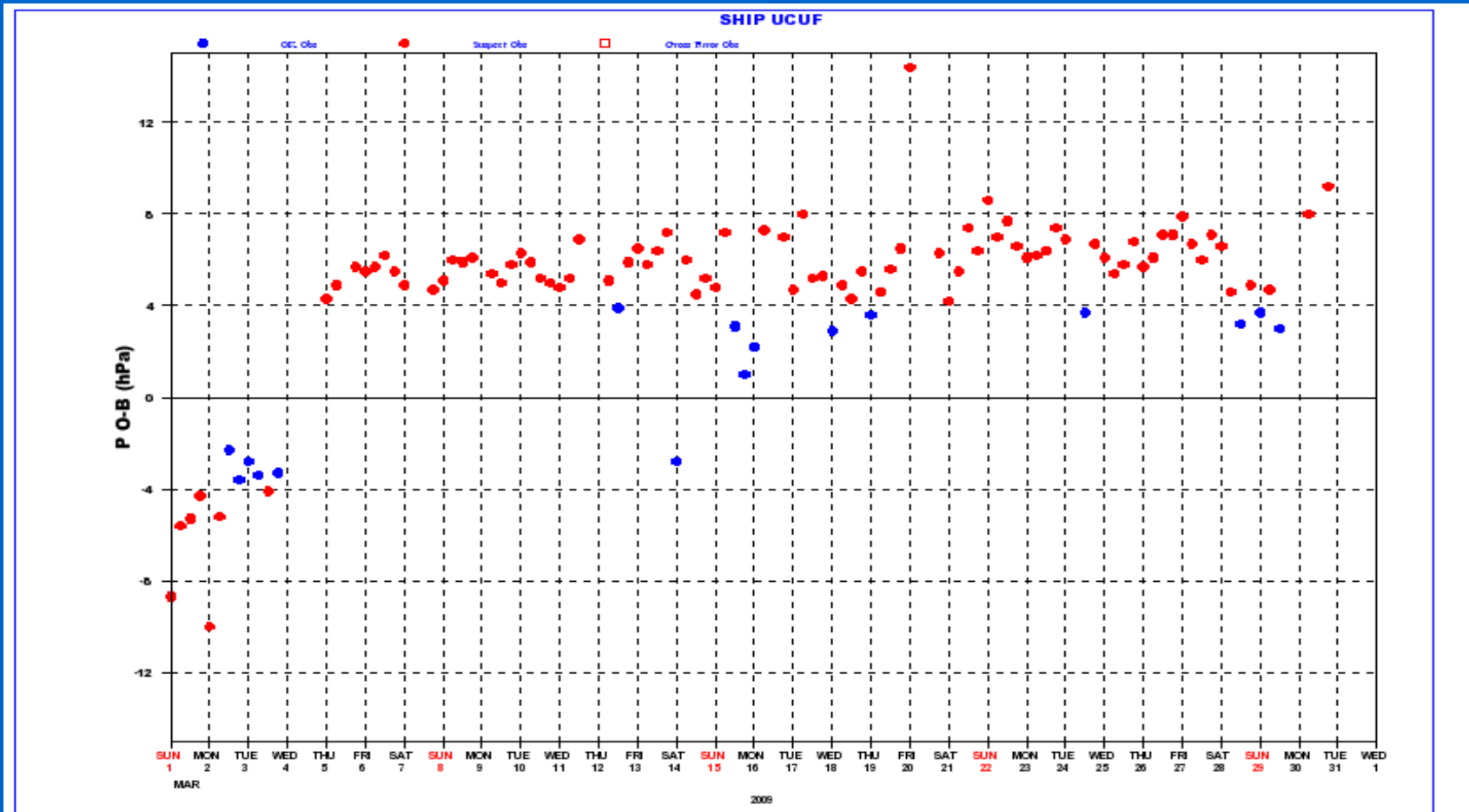
CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
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### WIND DIRECTION (deg)

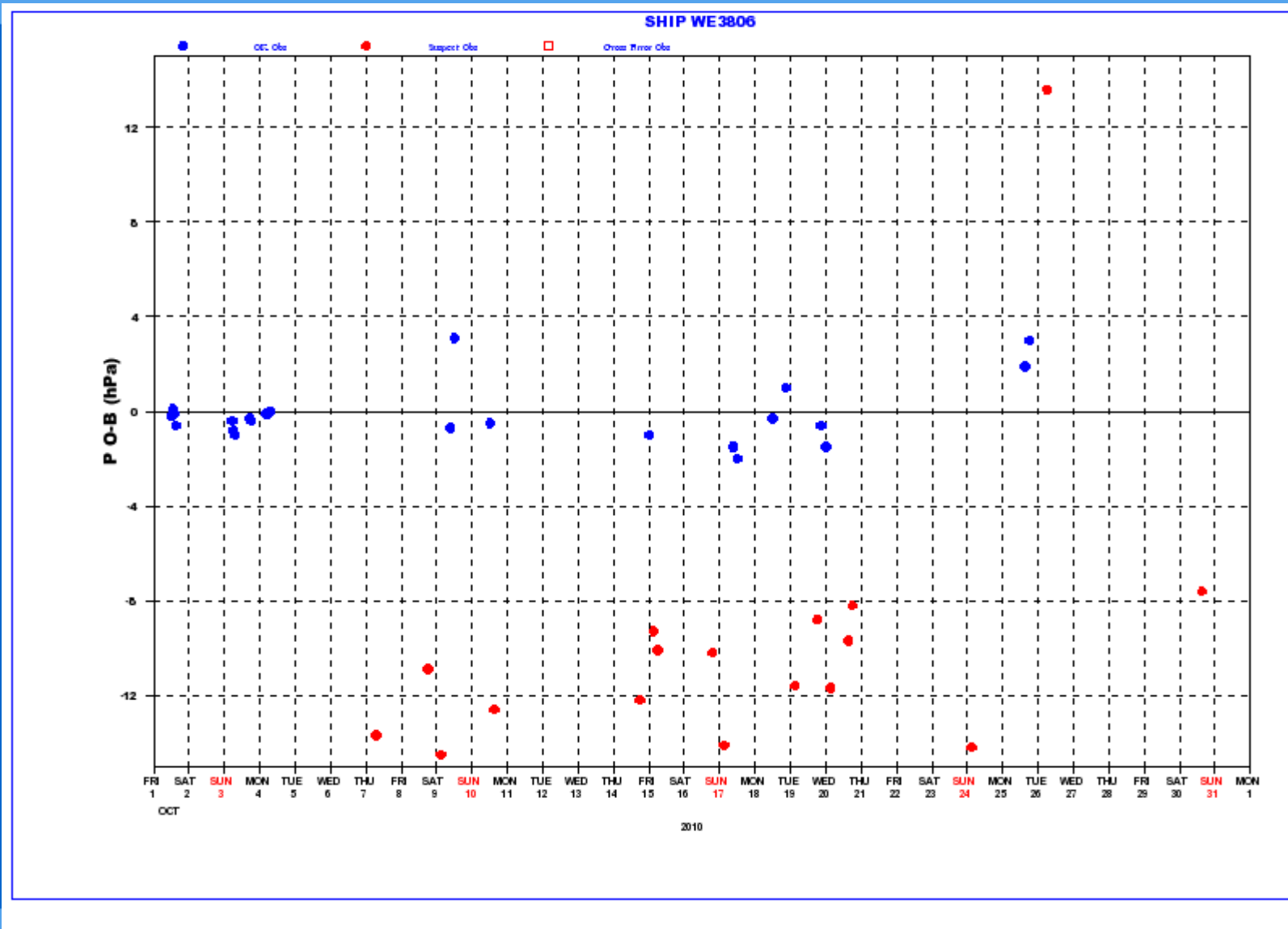
CTRY CODE	SHIP NAME	CALL SIGN	TOTAL	GE (%)	BIAS	SD	Graph
CA	C. T. M. A. VACANCIER	CFN3031	358	2	30.9	75.8	<a href="#">QC plot</a>
CA	NUNAKPUT	VC6750	80	0	74.8	32.4	<a href="#">QC plot</a>
DE	ATAIR	DRBL	172	1	22.2	72.2	<a href="#">QC plot</a>

# Met Office Observation Monitoring web site

## Example of QC plot for pressure



# Met Office Observation Monitoring web site





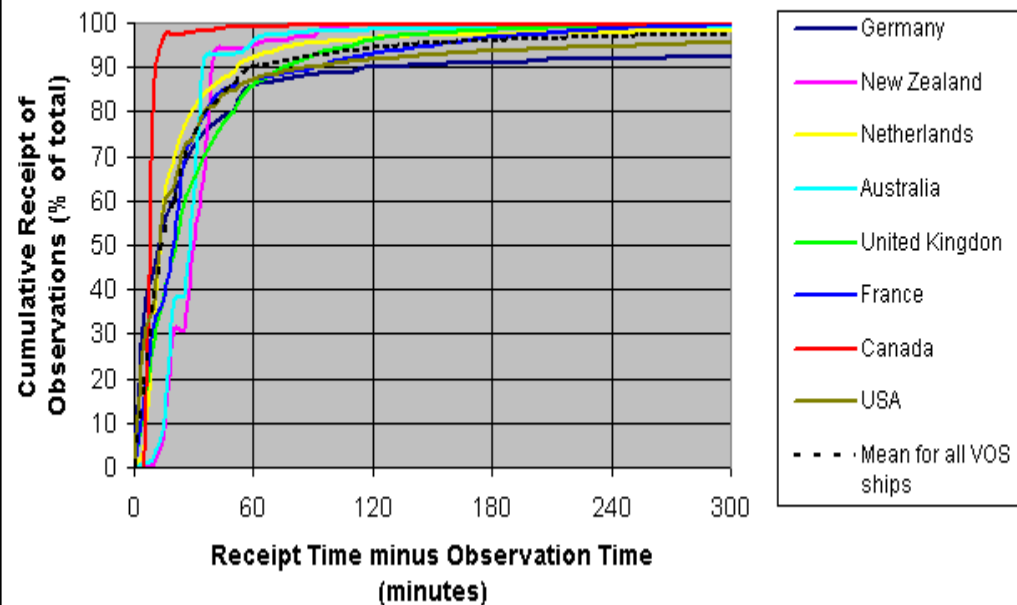
# Monthly Monitoring Statistics

- **The Met Office also produces monthly monitoring statistics for a number of national VOS fleets**
- **To maintain ship lists we use the online E-SURFMAR meta-data, as it is more up to date than the WMO Pub47 list, although the latter is still used for the VOS fleets not in the E-SURFMAR data base**
- **The JCOMMOPS SOT, VOS & PMO mailing lists are e-mailed when new monthly suspect lists are posted on the Met Office web site (it is important to keep the Focal Point & JCOMMOPS mailing lists up to date)**
- **Monthly suspect lists also emailed directly to some VOS operating countries and focal points**

# Observation Monitoring Web site - Timeliness

<http://research.metoffice.gov.uk/research/nwp/observations/monitoring/marine/TOR/index.html>

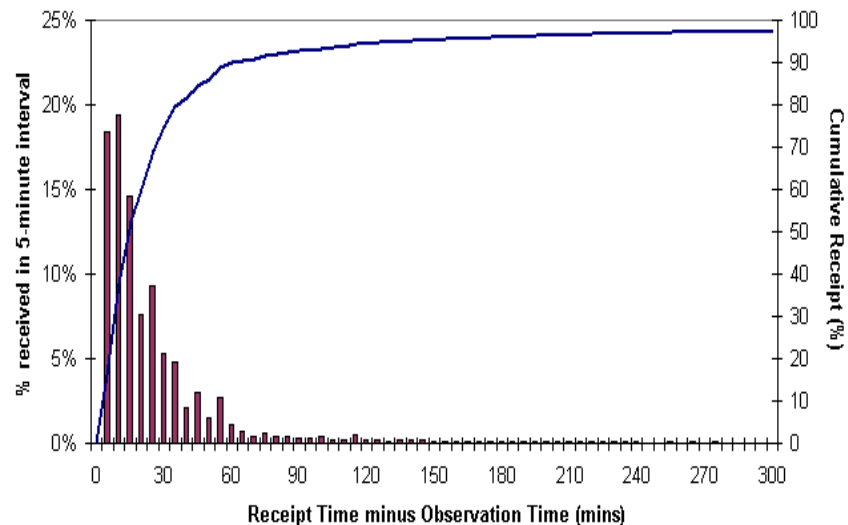
Timeliness of Receipt for ship observations from national VOS fleets for October 2010



Timeliness of VOS observations received at the Met Office (UK), October 2010

- 90% received within 60 mins

All VOS Ships - October 2010



# Met Office Observation Monitoring web site

## Pub47 Time of Receipt Statistics by COUNTRY for October

COUNTRY	Ships	Observations	Average (Obs/Ships)	N<30 mins	N<60 mins	N<120 mins	N>360 mins	%<30 mins	%<60 mins	%<120 mins	%>360 mins	Average (R-O) (mins)
AU	59	5521	93.6	3469	5308	5442	41	63%	96%	99%	1%	31.9
DK	2	804	402.0	724	790	804	0	90%	98%	100%	0%	16.3
ES	1	215	215.0	141	197	212	0	66%	92%	99%	0%	33.6
EU	25	10282	411.3	9620	9912	10280	1	94%	96%	100%	0%	11.9
FR	55	18547	337.2	13922	16189	17282	30	75%	87%	93%	0%	34.4
GB	211	17100	81.0	11151	14692	16504	76	65%	86%	97%	0%	35.4
NL	162	7807	48.2	6310	7213	7540	124	81%	92%	97%	2%	37.8
CA	38	17165	451.7	16834	17015	17072	0	98%	99%	99%	0%	10.1
DE	505	19401	38.4	14083	16683	17485	159	73%	86%	90%	1%	48.9
GR	5	29	5.8	6	16	18	5	21%	55%	62%	17%	153.7
HK	26	492	18.9	83	455	486	6	17%	92%	99%	1%	61.4
IE	6	14	2.3	6	7	10	0	43%	50%	71%	0%	72.6
IL	4	120	30.0	48	52	57	53	40%	43%	48%	44%	762.5
IN	19	213	11.2	129	162	187	6	61%	76%	88%	3%	76.9
IS	4	335	83.8	283	320	335	0	84%	96%	100%	0%	14.0
JP	6	629	104.8	581	624	628	0	92%	99%	100%	0%	29.2
KR	7	21	3.0	0	1	12	2	0%	5%	57%	10%	159.9
MY	8	59	7.4	7	43	58	1	12%	73%	98%	2%	75.9
NO	11	5244	476.7	4986	5237	5243	0	95%	100%	100%	0%	15.3
NZ	25	1321	52.8	671	1257	1314	0	51%	95%	99%	0%	30.5
RU	70	1808	25.8	1059	1536	1629	97	59%	85%	90%	5%	67.4
SE	21	778	37.0	578	753	762	11	74%	97%	98%	1%	37.8
US	540	36327	67.3	27231	31739	33370	1414	75%	87%	92%	4%	52.9
ZA	2	63	31.5	42	57	61	1	67%	90%	97%	2%	54.9
Total	1812	144295	79.6	111964	130258	136791	2027	78%	90%	95%	1%	37.1

[www.metoffice.gov.uk](http://www.metoffice.gov.uk)

# Call Sign Masking

The increasing use of Masked call signs – and particularly the use of ‘SHIP’ instead of the ships assigned call sign - is preventing data from being properly monitored

## Non Unique ‘SHIP’ masked call signs (*Japan + US*)

- real call sign data available (under license) for JMA ftp server
- data cannot be safely routed into our databases or monitored

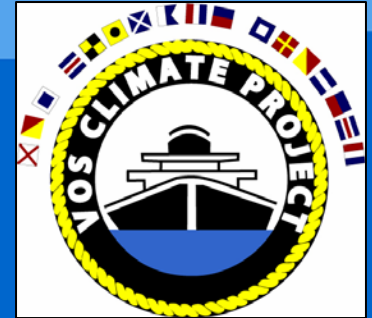
## Unique masked call signs (*Europe + Australia*)

- real call signs available in a JCOMMOPS lookup table

# VOS Ranking Scheme

- **The RSMC has recently set up a new scheme for ranking the UK VOS fleet in terms of the quality, quantity and timeliness of reports from each ship**
- **It is intended to assist in presenting awards to the best performing ships.**
- **National VOS performance rankings available on the Met Office web site**

# VOSCLim Real Time Monitoring Centre (RTMC)



*In accordance with its Terms of Reference the Met Office RTMC....*

- **extracts ship observation reports from the GTS**
- **associates the observed variables (pressure, air temp, humidity, wind speed, wind direction & SST) with co-located model field values and compiles it into BUFR data sets**
- **transfers the BUFR data sets to Data Assembly Centre via GTS and also puts a copy of the data on Met Office external FTP server in case of problems with GTS**
- **provides monitoring statistics for observed variables**

# VOSCLim Real Time Monitoring Centre (RTMC)

*The RTMC produces monthly monitoring statistics...*

- for all project ships
- for ships identified as 'Suspect' vs criteria for 6 variables

*To do this the RTMC requires...*

- Email addresses/Contact details for national focal points to be kept up to date
- Call Sign details on project website (and on the E-SURFMAR metadata database) to be kept up to date

# Monitoring Criteria for 'Suspect' VOS & VOSCLim ships

(a) VOSCLim (b) VOS (20 Obs required)

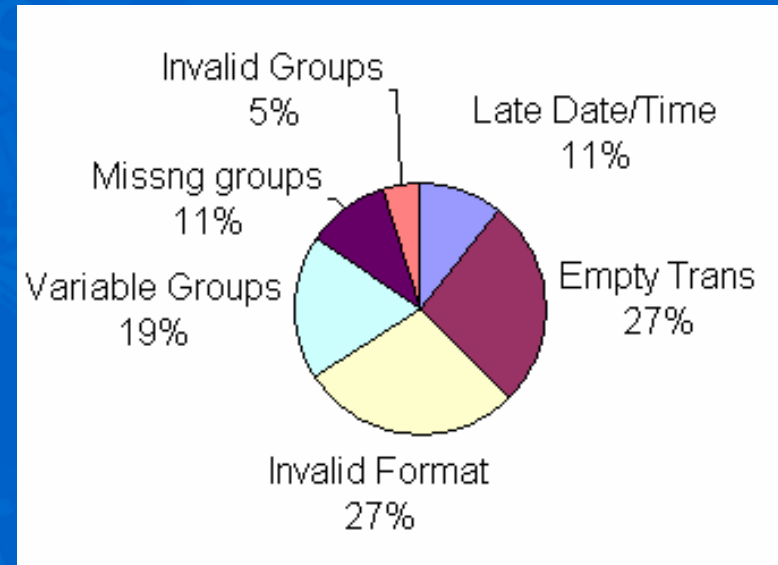
Variable	(a) Mean o-b limit	(a) Std Dev o-b limit	(a) Gross error limit
Pressure (hPa)	2.5	5.0	15.0
Wind Speed (m/s)	5.0	10.0	25.0
Wind Direction (°)	30.0	60.0	150.0
Air Temp. (° C)	2.0	4.0	10.0
Rel. Humidity (%)	12.0	20.0	50.0
Sea surf Temp (°C)	2.0	4.0	10.0

(b) Mean o-b limit	(b) Std. Dev. o-b limit	(b) Gross error limit
4.0	6.0	15.0
5.0	-	25.0
30.0	80.0	-
4.0	6.0	15.0
15.0	25.0	50.0
3.0	5.0	10.0



# Coding and Transmission Monitoring

- A substantial number of observations are rejected for a variety of coding errors e.g. BBXX or call sign missing, empty transmissions with no data, use of O instead of 0, incorrect code group lengths etc. These errors represent wasted communications costs.
- Details of transmission errors arising from Goonhilly LES continue to be circulated by the Met Office to VOS operators via the JCOMMOPS mailing lists, so that remedial action can be taken.



# E-SURFMAR QC Monitoring

The screenshot shows a web browser window displaying the METEO FRANCE Quality Control Tools website. The browser's address bar shows the URL <http://www.meteo.shom.fr/qctools/>. The website features the METEO FRANCE logo with the tagline "Toujours un temps d'avance" and the EUMETNET logo with the tagline "The Network of European Meteorological Services".

The main content area is titled "Quality Control Tools" and is organized into several sections:

- Data Buoys**: Includes a link for "Buoy and VOS monthly statistics".
- Vos Ships**: Includes a link for "Statistics of comparisons with models outputs established by different meteorological centres. Enter the parameter and the station(s) you wish."
- Monthly Statistics**: A section for monthly data analysis.
- Blacklists**: Contains links for "BUOYS Pressure ( global )", "BUOYS Pressure ( Surfmar )", "BUOYS SST ( global )", "BUOYS Positions ( global )", "DRIFTERS ASHORE", and "Some explanations here...". It also includes a "Blacklists" description: "List of stations with dubious values for a given parameter ( pressure, wind, sst or positions ) for all stations or E-SURFMAR stations only." and links for "VOS Pressure ( Global )", "VOS Pressure ( Surfmar )", "VOS Positions ( Global )", and "VOS Wind (Surfmar)".
- Daily Data plots**: Includes a link for "Plots of data and differences with model outputs for BUOYS and VOS..." and another for "Plots of data and plots of differences with some model outputs (QC plots) over the past two weeks for buoys or VOS."
- Other Tools**: Includes links for "Nearest BUOYS", "BUOYS location on map...", "VOS Indiv Control Panels...", "VOS Observation Counters...", "VOS : European AWS list...", and "Location of a buoy on a map. Search for buoys close to another one or a given location. Access to individual control panels for VOS and consult VOS observation counters."

At the bottom, there is a "Usefull internet Links" section with links to EUCOS Monitoring, Met Office Monitoring, EUMETSAT SAF Ocean comparisons, JQuam - NOAA/NESDIS/STAR Quality Monitor, Density maps, Network Status JCOMM, and a feedback link. A small globe image is also present.

The footer of the website states: "WEB Designed by Jean-Pierre KERSERHO - Météo France - Août 2009 - Any comments".

The browser's taskbar at the bottom shows the system tray with the date "10-05-18" and time "15:52". Open applications include Firefox, preparation, 033-VOS..., gimp, and surfmar\_v...

# E-SURFMAR QC Monitoring Tools

## Observation Counters

- <http://www.meteo.shom.fr/vos-monitoring/counters.htm>

## Main QC Tools Page

- <http://www.meteo.shom.fr/qctools/>

## Blacklisted ships

- <http://www.meteo.shom.fr/qctools/svblackap.htm>

## Recent Obs Quality plots (last two weeks)

- <http://www.meteo.shom.fr/qctools/dataplotsurfmar.htm>

## Monthly Monitoring Data

- [http://www.meteo.shom.fr/qctools/rechstat\\_surfmar.htm](http://www.meteo.shom.fr/qctools/rechstat_surfmar.htm)

## Position & Track Monitoring

- [http://www.meteo.shom.fr/qctools/track\\_check\\_black\\_list/vosblackpos.html](http://www.meteo.shom.fr/qctools/track_check_black_list/vosblackpos.html)

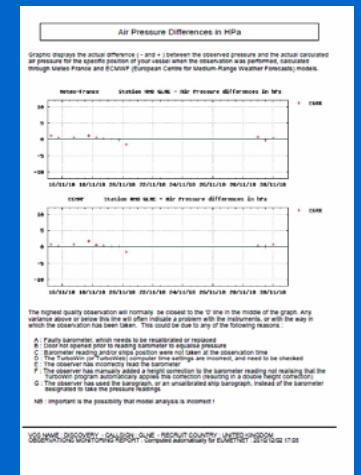
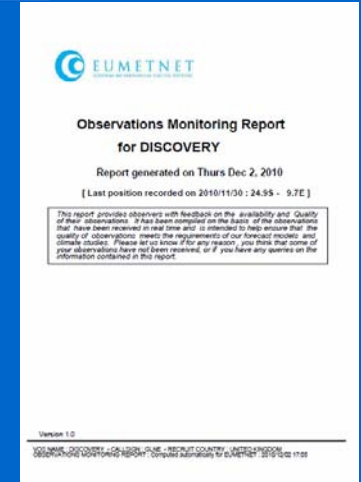
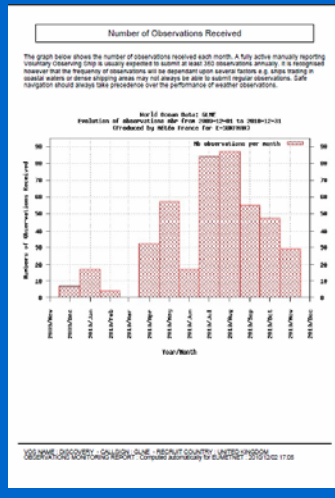
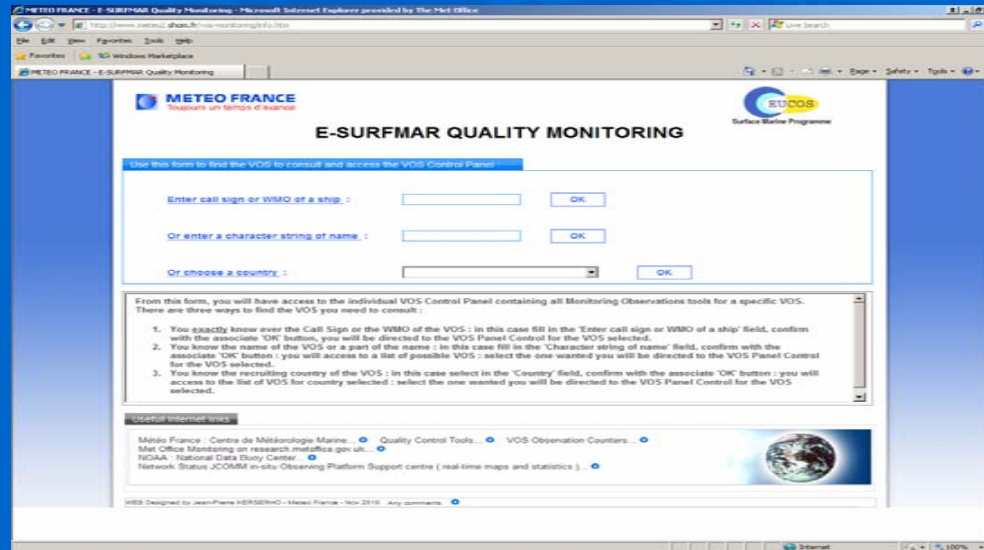
## VOS Information

- <http://www.meteo.shom.fr/vos-monitoring/info.htm>

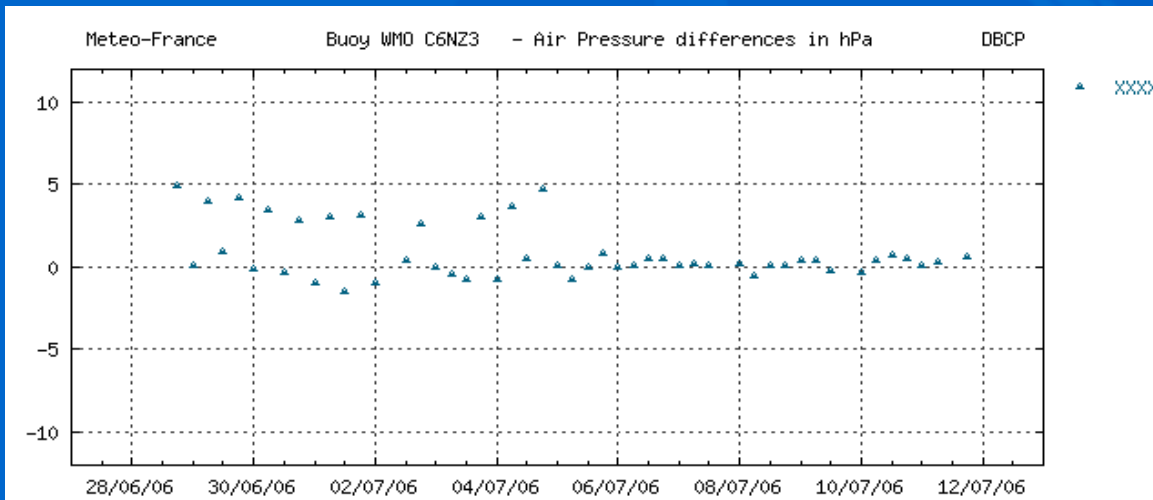
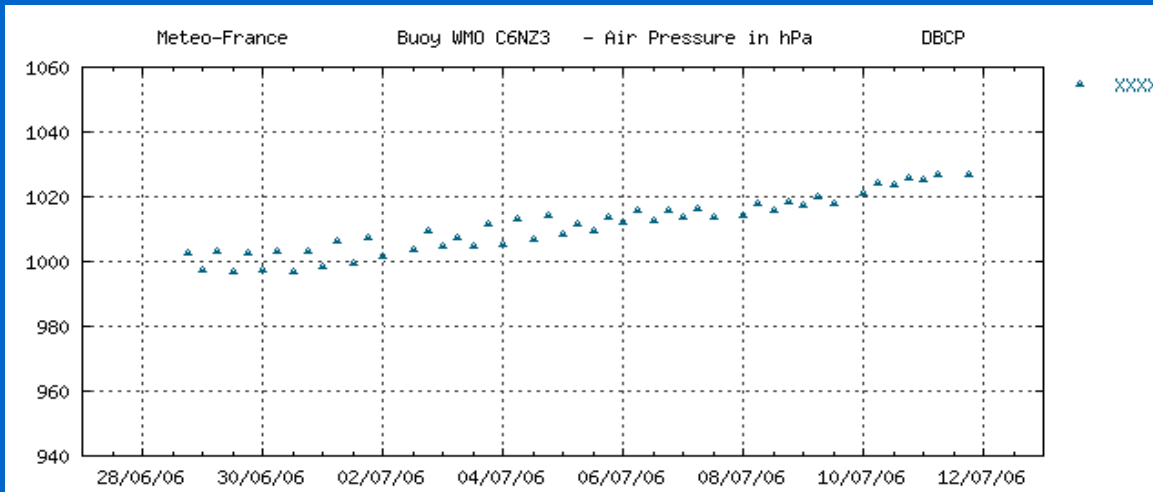
# E-SURFMAR - Automatically generated QC monitoring reports



• <http://www.meteo.shom.fr/vos-monitoring/info.htm>



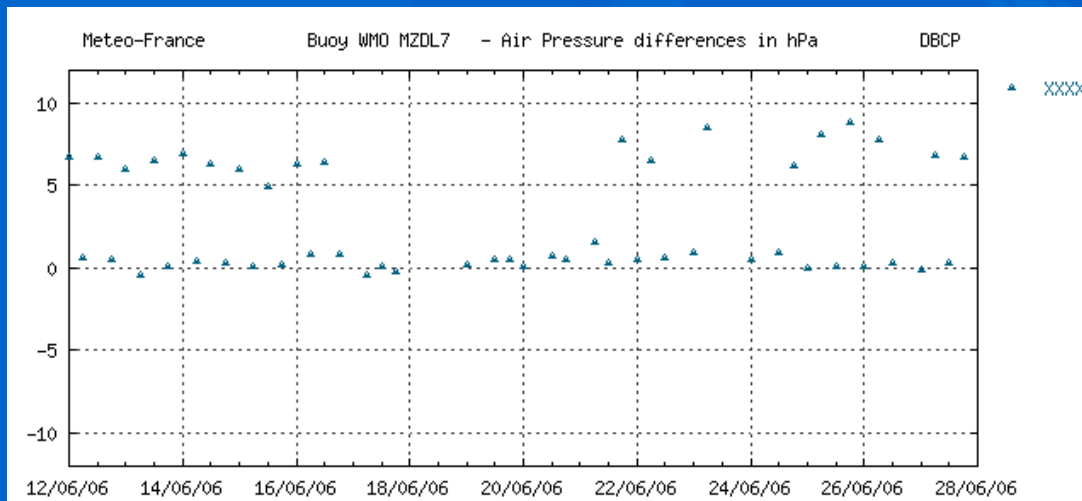
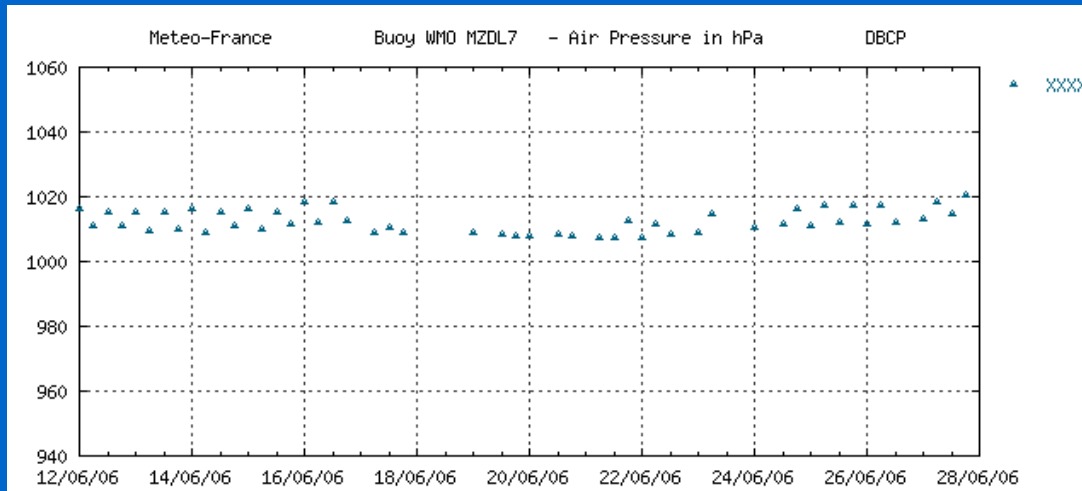
# “Double height correction”



- Probably the most common error
- Observer(s) adding effective height correction to as-read pressure reading to reduce it to MSL, unaware that TurboWin software adds this correction automatically

(Pine Arrow)

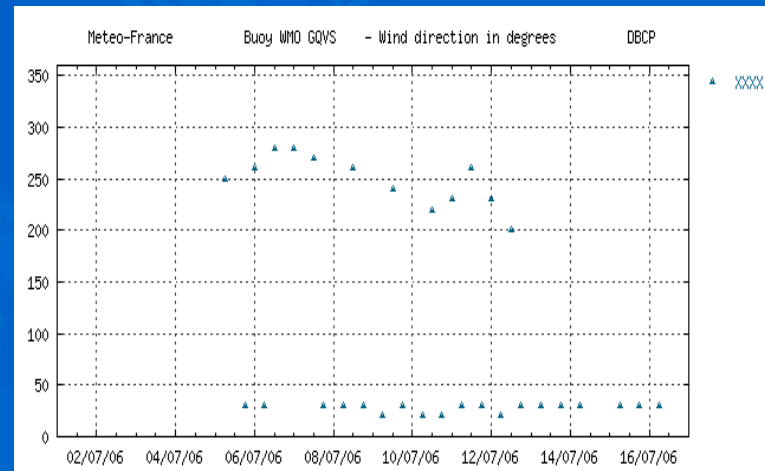
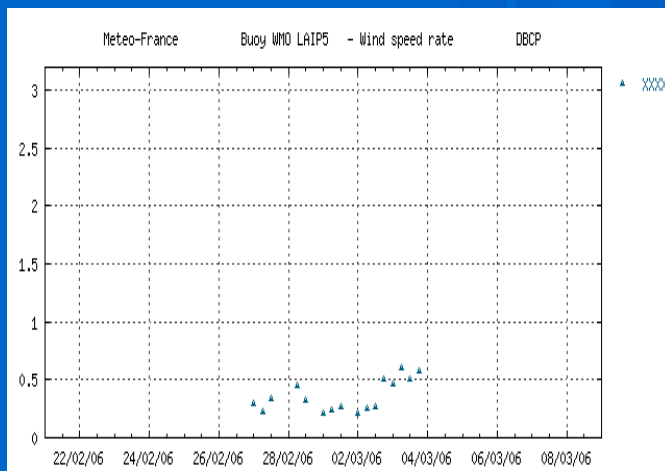
# “Triple height correction”



- One Observer taking pressure reading from the barograph,
- adding a “manual” height correction,
- TurboWin adds a third height correction

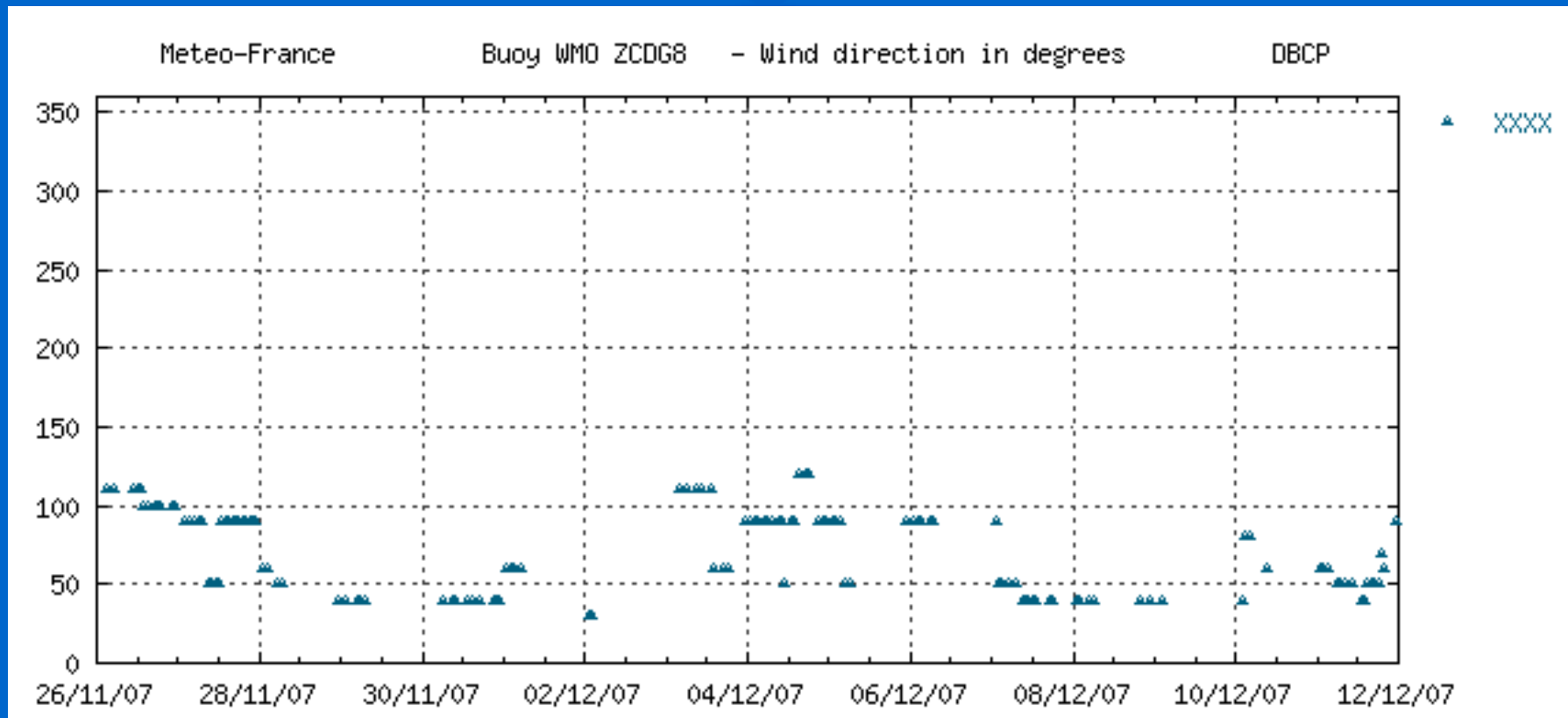
# Wind Problems

- Observers reporting Beaufort force in observation rather than equivalent windspeed in knots
- Wind direction being correctly estimated - but entered as 2 figures (rather than 3)
- Windspeeds being correctly entered into TurboWin in knots - but the “Always m/s” box on the Station Data panel left unticked!



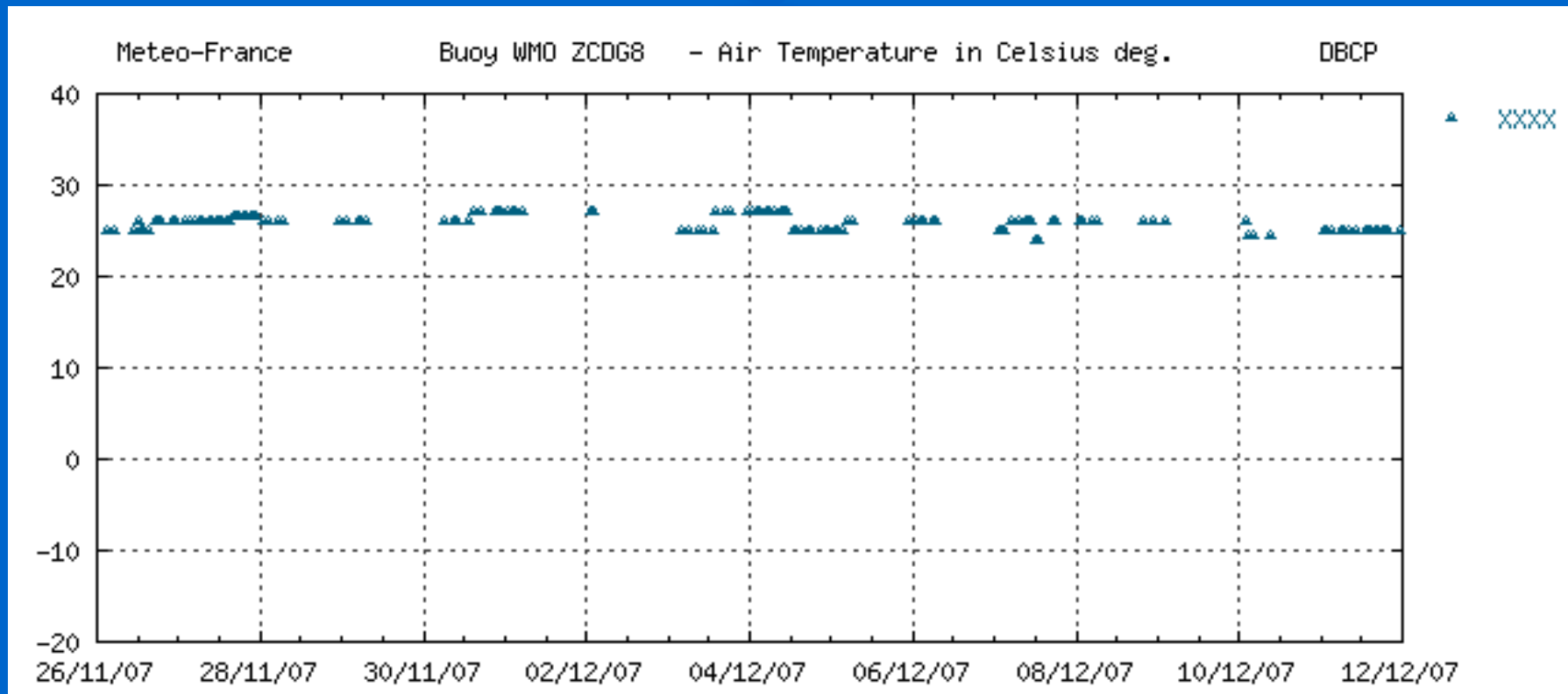
# Wind Problems

## Copying Observations





# Copying Observations - Temperature



WEB MetDB SHPSYN Retrieval - Microsoft Internet Explorer provided by The Met Office

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites

Address [http://ukmet/MetDDBCIG/MDb\\_WEBRET\\_IBMDE.REXX?subtype=SHPSYN&str01=zcdg8&str02=&str03=&str04=&str05=&str06=&str07=&str08=&str09=&str10=&startdate=20071229&starthour=00&startminute=00&enddate=20080111&](http://ukmet/MetDDBCIG/MDb_WEBRET_IBMDE.REXX?subtype=SHPSYN&str01=zcdg8&str02=&str03=&str04=&str05=&str06=&str07=&str08=&str09=&str10=&startdate=20071229&starthour=00&startminute=00&enddate=20080111&) Go

	0100Z	10/01/08	18.00N	63.40W	CC=PANC	TOR=10/0226	AMD=0	COR=0			
100200Z	ZCDG8	10024	99180	70636	41298	50213	10242	20230	40125	51005	70282
		8527/	22262	00260	20202	305//	40202	5////	80234		
0200Z		10/01/08	18.00N	63.60W	CC=PANC	TOR=10/0227	AMD=0	COR=0			
100300Z	ZCDG8	10034	99180	70637	41298	50212	10242	20230	40142	51008	70282
		8527/	22262	00260	20202	305//	40202	5////	80234		
0300Z		10/01/08	18.00N	63.70W	CC=PANC	TOR=10/0348	AMD=0	COR=0			
100400Z	ZCDG8	10044	99180	70639	41298	50212	10242	20230	40146	51004	70282
		8527/	22262	00260	20202	305//	40202	5////	80234		
0400Z		10/01/08	18.00N	63.90W	CC=PANC	TOR=10/0349	AMD=0	COR=0			
100600Z	ZCDG8	10064	99180	70632	41298	50409	10242	20230	40154	57004	70282
		8527/	22262	00260	20202	305//	40202	5////	80234		
0600Z		10/01/08	18.00N	63.20W	CC=PANC	TOR=10/0611	AMD=0	COR=0			
100700Z	ZCDG8	10074	99180	70643	41298	50409	10242	20230	40154	54000	70282
		8527/	22262	00260	20202	305//	40202	5////	80234		
0700Z		10/01/08	18.00N	64.30W	CC=PANC	TOR=10/0707	AMD=0	COR=0			
110200Z	ZCDG8	11024	99188	70659	41298	40418	10242	20230	40148	51005	70282
		8427/	22274	00260	20304	305//	40304	5////	80234		
0200Z		11/01/08	18.80N	65.90W	CC=PANC	TOR=11/0219	AMD=0	COR=0			
110300Z	ZCDG8	11034	99190	70662	41298	40420	10242	20230	40145	50003	70282
		8427/	22274	00260	20304	305//	40304	5////	80234		
0300Z		11/01/08	19.00N	66.20W	CC=PANC	TOR=11/0309	AMD=0	COR=0			
110500Z	ZCDG8	11054	99193	70668	41298	40418	10242	20230	40159	51008	70282
		8427/	22274	00260	20304	305//	40304	5////	80234		
0500Z		11/01/08	19.30N	66.80W	CC=PANC	TOR=11/0506	AMD=0	COR=0			
110600Z	ZCDG8	11064	99195	70671	41298	40415	10242	20230	40159	54000	70282
		8427/	22274	00260	20304	305//	40304	5////	80234		
0600Z		11/01/08	19.50N	67.10W	CC=PANC	TOR=11/0608	AMD=0	COR=0			
110700Z	ZCDG8	11074	99197	70674	41298	40415	10242	20230	40159	54000	70282
		8427/	22274	00260	20304	305//	40304	5////	80234		
0700Z		11/01/08	19.70N	67.40W	CC=PANC	TOR=11/0706	AMD=0	COR=0			
111300Z	ZCDG8	11134	99207	70694	41298	40622	10242	20230	40160	53001	70282
		84161	22274	00260	20304	305//	40304	5////	80234		
1300Z		11/01/08	20.70N	69.40W	CC=PANC	TOR=11/1322	AMD=0	COR=0			
111400Z	ZCDG8	11144	99209	70696	41298	40622	10242	20230	40160	53001	70282
		84161	22274	00260	20304	305//	40304	5////	80234		
1400Z		11/01/08	20.90N	69.60W	CC=PANC	TOR=11/1406	AMD=0	COR=0			
111600Z	ZCDG8	11164	99213	70702	41298	50622	10242	20230	40167	51004	70282
		85161	22274	00260	20304	305//	40304	5////	80234		
1600Z		11/01/08	21.30N	70.20W	CC=PANC	TOR=11/1602	AMD=0	COR=0			

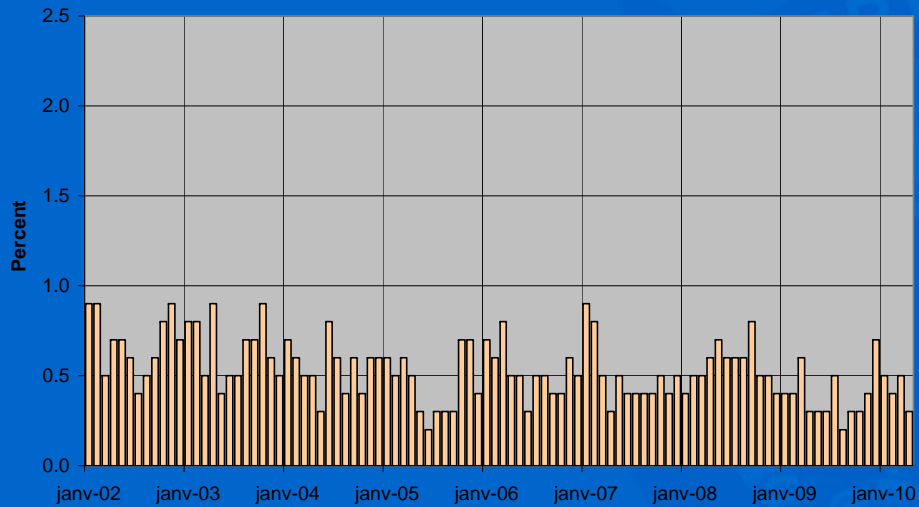
Done

1 of 24 - Clipboard  
Item collected.

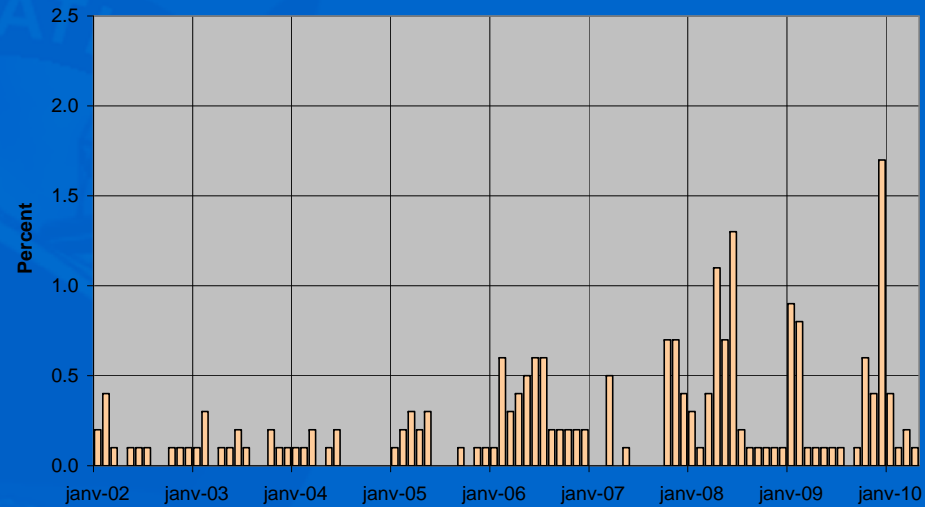
# E-SURFMAR QC Monitoring

% Gross Errors (air pressure)

Manned VOS



S-AWS

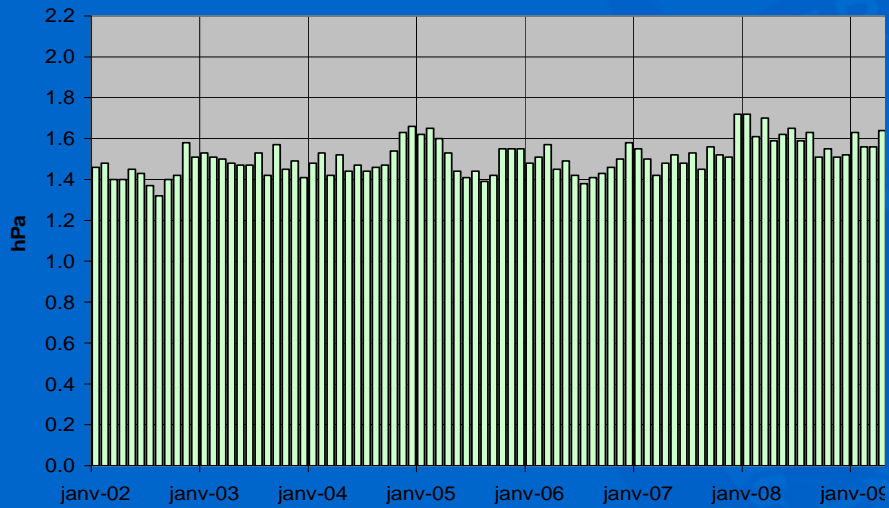


Observations carried out by EUMETNET ships  
Inside the EUCOS area

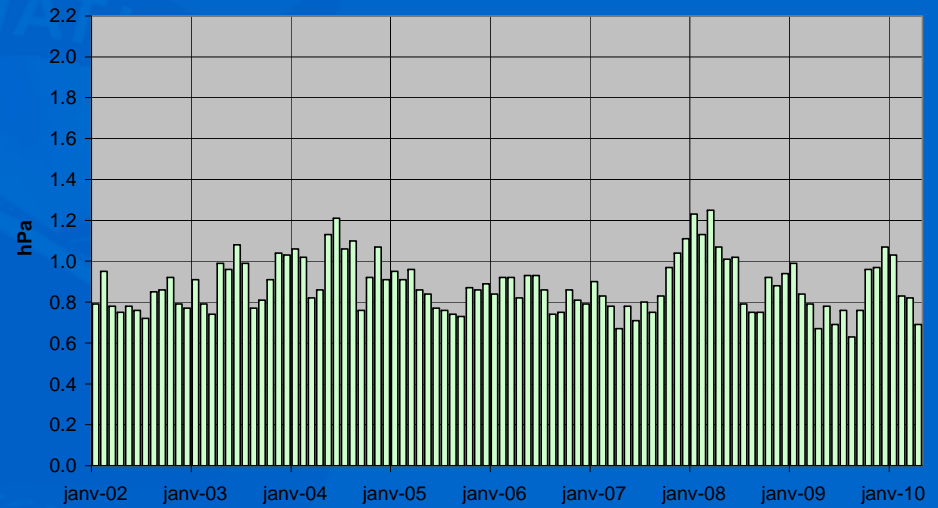
# E-SURFMAR QC Monitoring

## RMS (air pressure)

Manned VOS



S-AWS

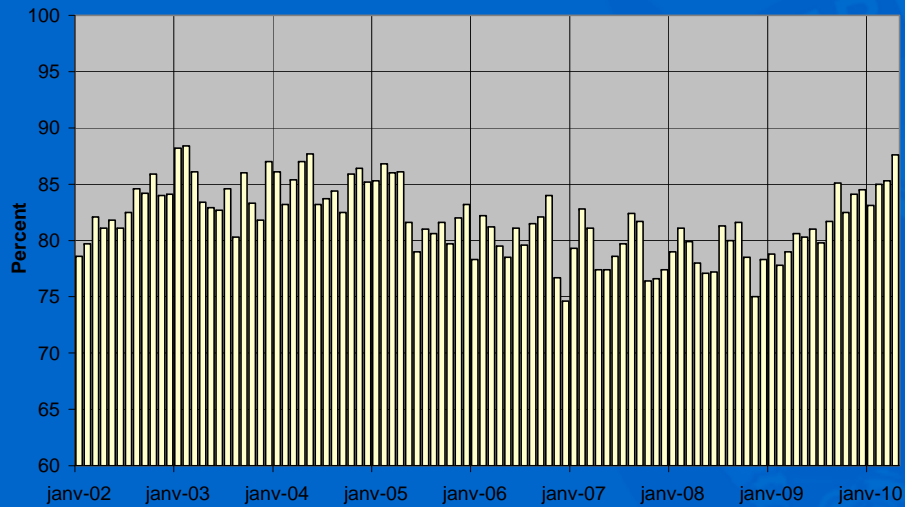


Observations carried out by EUMETNET ships  
Inside the EUCOS area

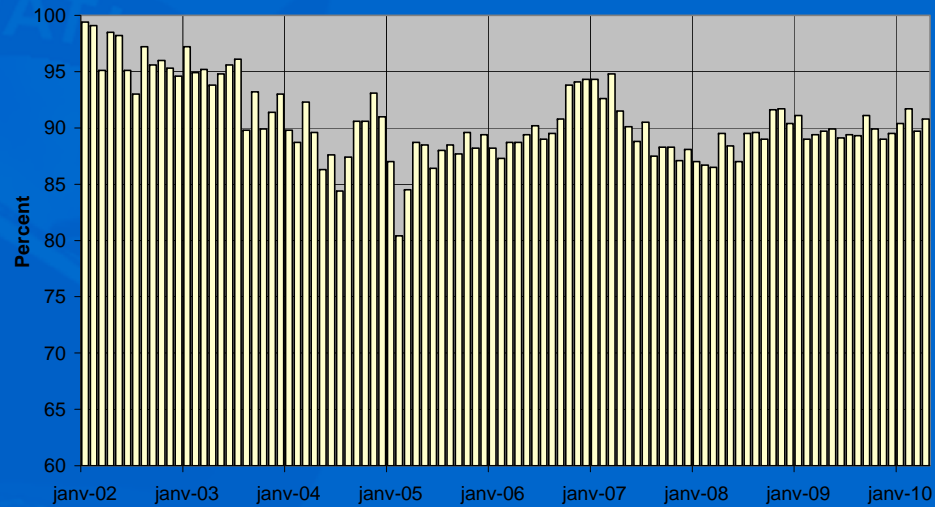
# E-SURFMAR QC Monitoring

## Data Timeliness HH+50 min

Manned VOS



S-AWS

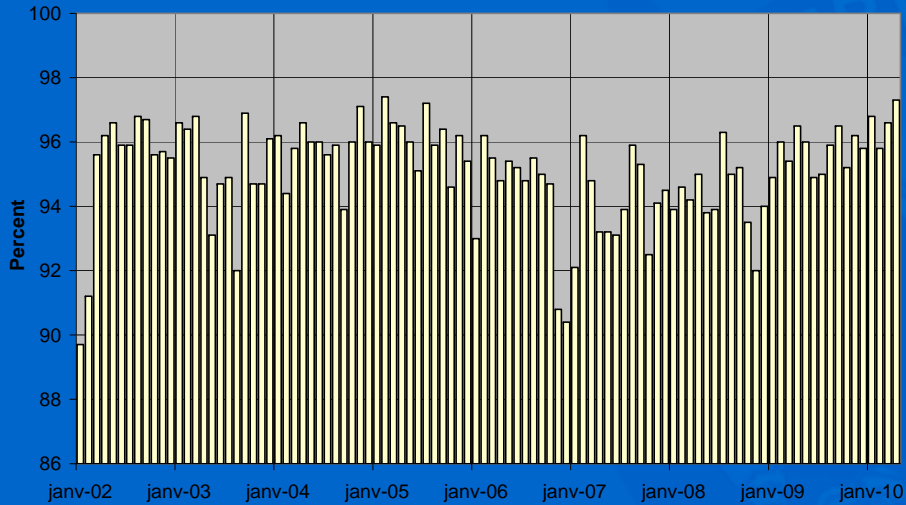


Observations carried out by EUMETNET ships  
Inside the EUCOS area

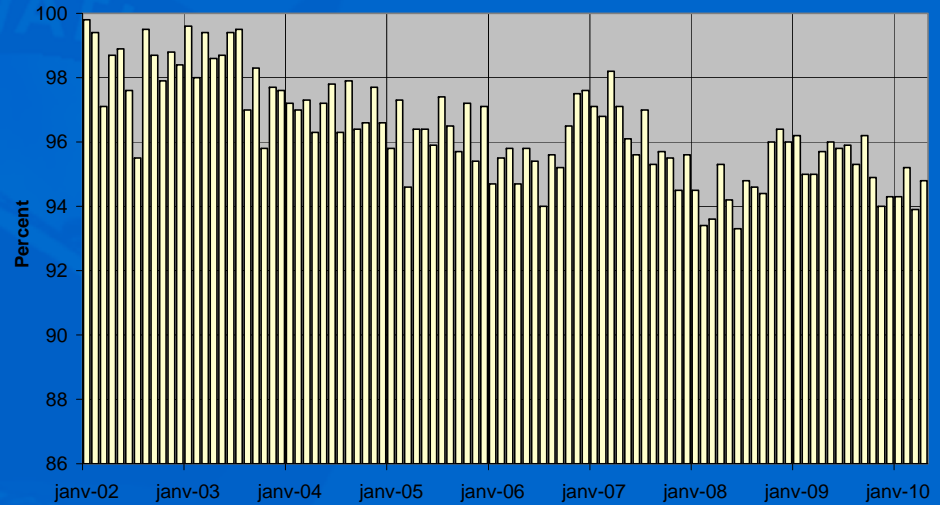
# E-SURFMAR QC Monitoring

## Data Timeliness HH+100 min

Manned VOS



S-AWS



Observations carried out by EUMETNET ships  
Inside the EUCOS area

