International Buoy Programme for the Indian Ocean
~ an Action Group of the Data Buoy Cooperation Panel ~

World Meteorological Organization

Intergovernmental Oceanographic Commission of UNESCO

IBPIO Report to DBCP-XXIII

(International Buoy Programme for the Indian Ocean)

Jeju, Republic of Korea
15-19 October 2007

Presented by Graeme Ball
Chairman, IBPIO

Outline

- Overview of the IBPIO
  - » Establishment, Objectives, Requirements & Participation.
- Members, Programme Committee & Meetings
- Status Report
  - » Programme Review, Network Status, Data Timeliness, Quality Monitoring & Daily Monitoring
- Programme Plans
- More Information

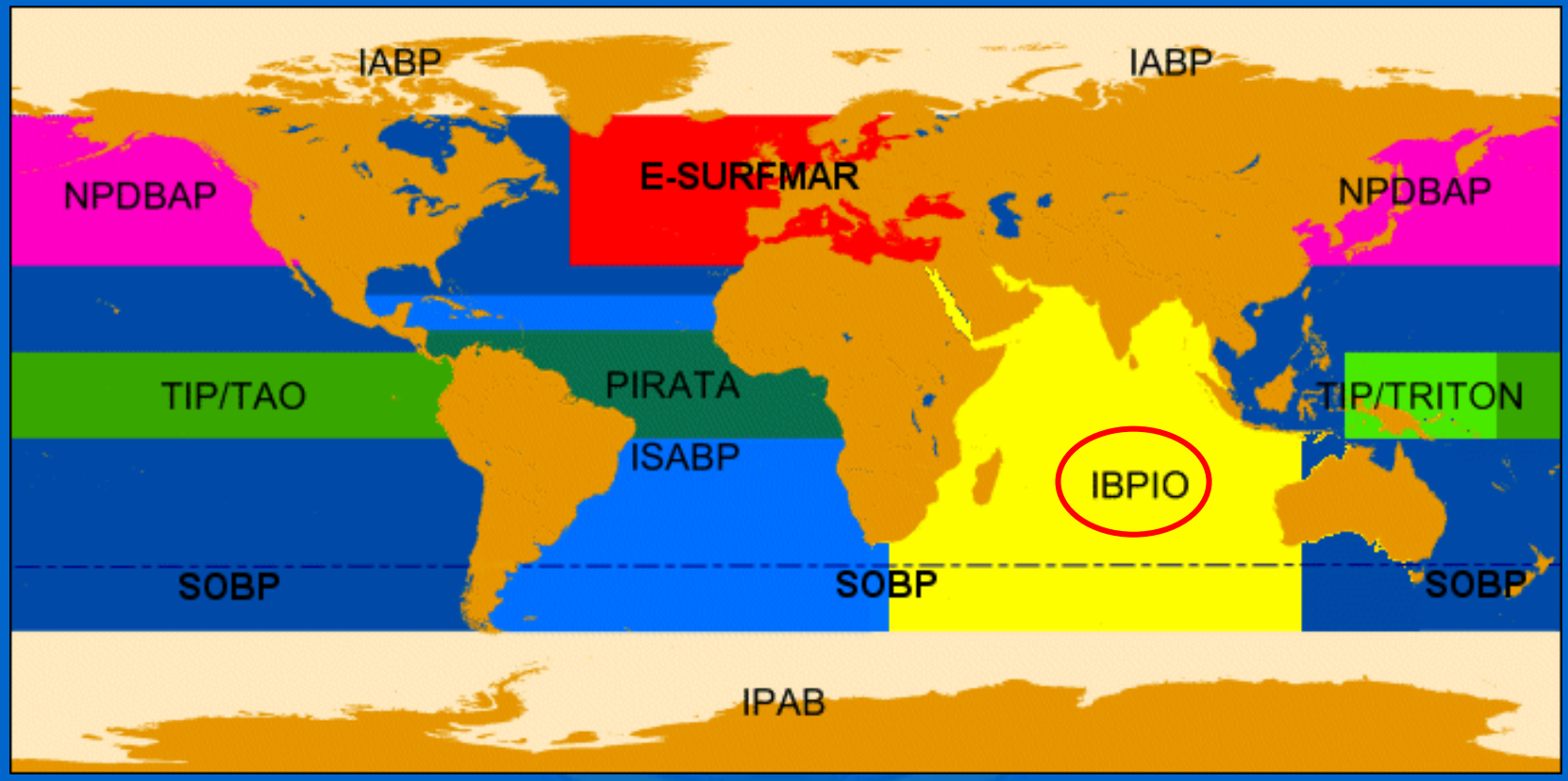
Overview of the IBPIO

Establishment of the IBPIO

- The International Buoy Programme for the Indian Ocean (IBPIO) was established as an Action Group of the DBCP (Data Buoy Cooperation Panel) in 1996 after preparatory meetings in Goa (February 1996) and in La Reunion (September 1996).

- Terms of Reference and operating principles were modelled on the International South Atlantic Buoy Programme (ISABP).

Action Groups of the DBCP



+ OceanSITES (Ocean Sustained Interdisciplinary Time-series Environmental Observation System)

Objective of the IBPIO

- To establish and maintain a network of platforms in the Indian Ocean, to provide real-time meteorological and oceanographic data to meet a range of operational and research requirements:
  - » World Weather Watch (WWW);
  - » Global Climate Observing System (GCOS);
  - » World Climate Research Programme (WCRP);
  - » Global Ocean Observing System (GOOS);
  - » Tropical cyclone forecasting and monitoring; and
  - » Research activities of the participating institutions.

Network Requirements

- Initial target of 100 evenly spaced buoys measuring:
  - » Atmospheric pressure;
  - » Sea surface temperature; and
  - » Surface Lagrangian current.

- Other meteorological and oceanographic parameters:
  - » Air temperature (optional);
  - » Wind speed and wind direction (optional);
  - » Waves (desirable);
  - » Sub-surface temperatures (desirable); and
  - » Surface conductivity/salinity (desirable).

Network Requirements (cont)

- Network requirements are reviewed from time-to-time by expert panels for GCOS/GOOS, complemented by national requirements.

Participation in the IBPIO

- Open to meteorological services, oceanographic institutions, research organisations and other agencies with an interest in the Indian Ocean.

- Self sustaining and supported by the voluntary contributions of:
  - » Drifting buoys, including barometer upgrades;
  - » LUTs for data transmission;
  - » Coordination, data monitoring and archival;
  - » Pre-deployment buoy storage; and
  - » Deployment opportunities.

Members, Programme Committee & Meetings

Members of the IBPIO

- Australian Bureau of Meteorology (1997).
- Global Drifter Center of NOAA/AOML, USA (1997).
- Météo France (1997).
- National Institute of Oceanography, India (1997).
- National Institute of Ocean Technology, India (2001).
- Navoceano, USA (2001).
- South African Weather Service (1997).
- Eduardo Mondlane University, Mozambique (2007)

- Expressions of Interest: Malaysia, Mauritius & Kenya.

IBPIO Programme Committee

Chairman	Graeme Ball, Bureau of Meteorology, Australia.
Vice Chairman	Shaun Dolk, NOAA/AOML/GDC, USA.
Programme Coordinator	Jean Rolland, Météo France.
Members	Johan van de Merwe, SAWS, South Africa.
	Dr. Sateesh Shenoi, NIO, India.
	Mayra Pazos, NOAA/AOML/GDC, USA.

Mailing List ibpio@shom.fr

Sessions of the IBPIO

Session	Date	Location
1	Sept 1996	St Denis, La Reunion.
2	July 1997	Perth, Australia.
3	July 1998	Kuala Lumpur, Malaysia.
4	July 1999	Cape Town, South Africa.
5	Oct 2001	Perth, Australia (with DBCP-17).
6	July 2002	Cape Town, South Africa (with ISABP-IX).
7	Oct 2004	Chennai, India (with DBCP-20).
8	Oct 2005	Buenos Aires, Argentina (with DBCP-21).
9	Oct 2006	La Jolla, USA (with DBCP-22).
10	Oct 2007	Jeju, Republic of Korea (with DBCP-23).

IBPIO-X (Jeju)

Status Report

Programme Review

IBPIO CONSOLIDATED BUOY DEPLOYMENT PLAN - 2006/2007

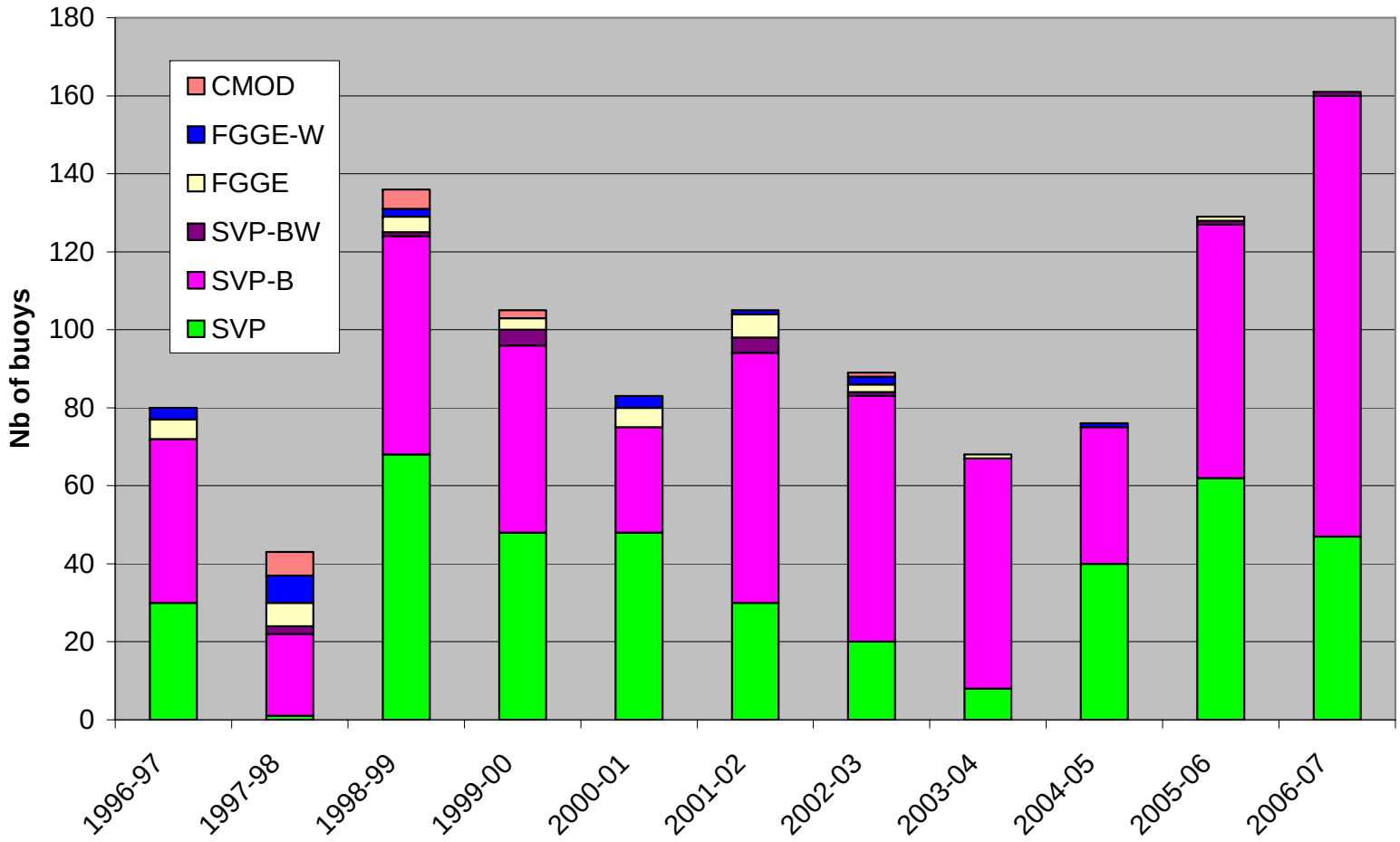
AGENCY	AGENCY PROGRAMS						FOR THE GDP			TOTAL
	Moored	FGGE	FGGE-W	SVP	SVP-B	SVP-BW	UPG	SVP	SVP-B	
ABOM	0	0	0	0	16	1	8	10	4	39
GDC	0	0	0	45	20	0	-	-	-	65
Météo France	0	0	0	0	0	0	20	0	0	20
Navo	0	0	0	0	0	0	0	0	0	0
NIO	0	0	0	0	15	0	0	0	0	15
NIOT	28	0	0	0	0	0	0	0	0	28
SAWS	0	0	0	0	0	0	0	0	0	0
TOTAL	28	0	0	45	51	1	28	10	4	167

Record number of deployments

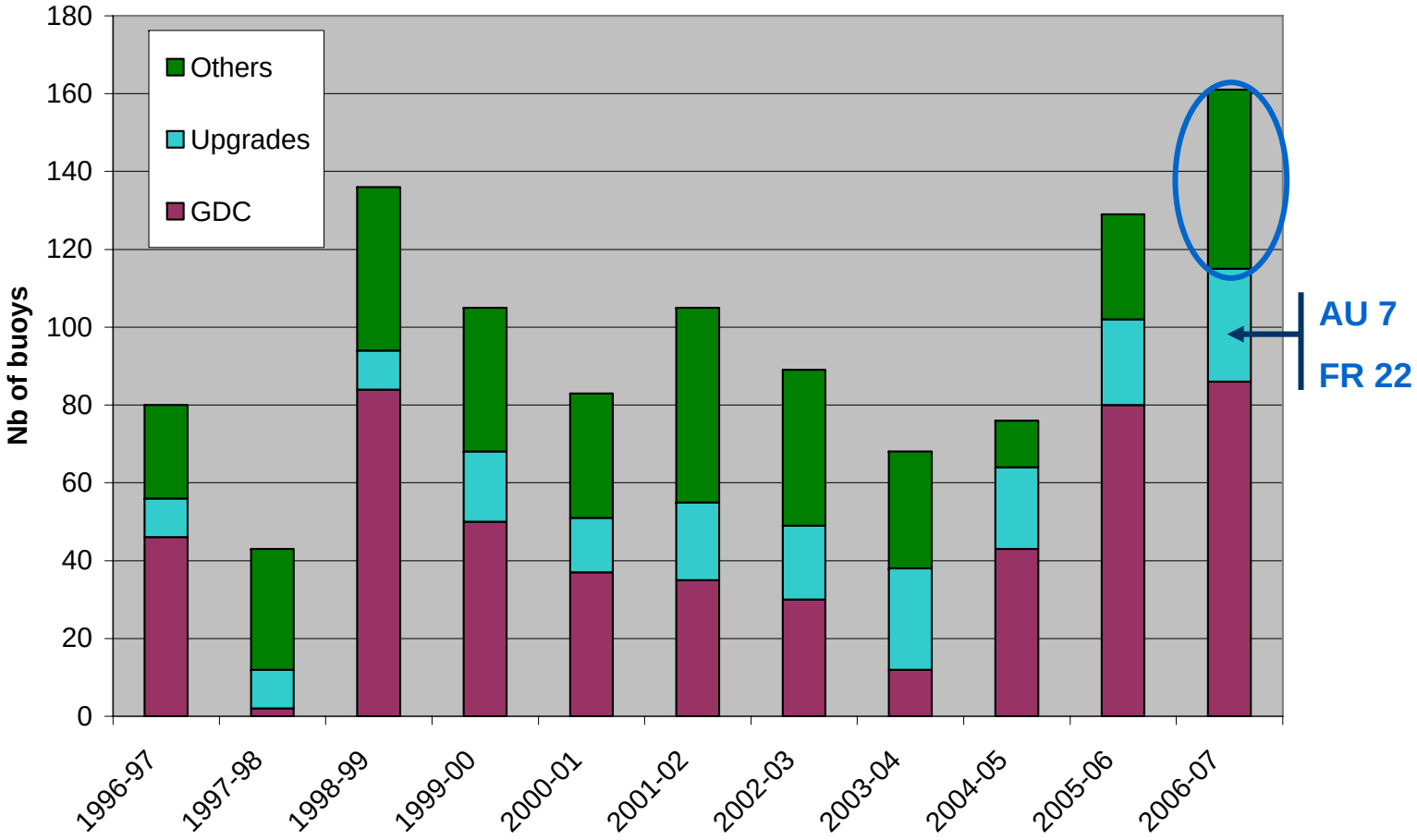
Deployments by Year

Year	SVP	SVP-B	SVP-BW	FGGE	FGGE-W	CMOD	Total
1996-97	30	42	0	5	3	0	**80**
1997-98	1	21	2	6	7	6	**43**
1998-99	68	56	1	4	2	5	**136**
1999-00	48	48	4	3	0	2	**105**
2000-01	48	27	0	5	3	0	**83**
2001-02	30	64	4	6	1	0	**105**
2002-03	20	63	1	2	2	1	**89**
2003-04	8	59	0	1	0	0	**68**
2004-05	40	35	0	0	1	0	**76**
2005-06	62	65	1	1	0	0	**129**
2006-07	**42**	**118**	**1**	**0**	**0**	**0**	**161**
Total	**397**	**598**	**14**	**33**	**19**	**14**	**1075**

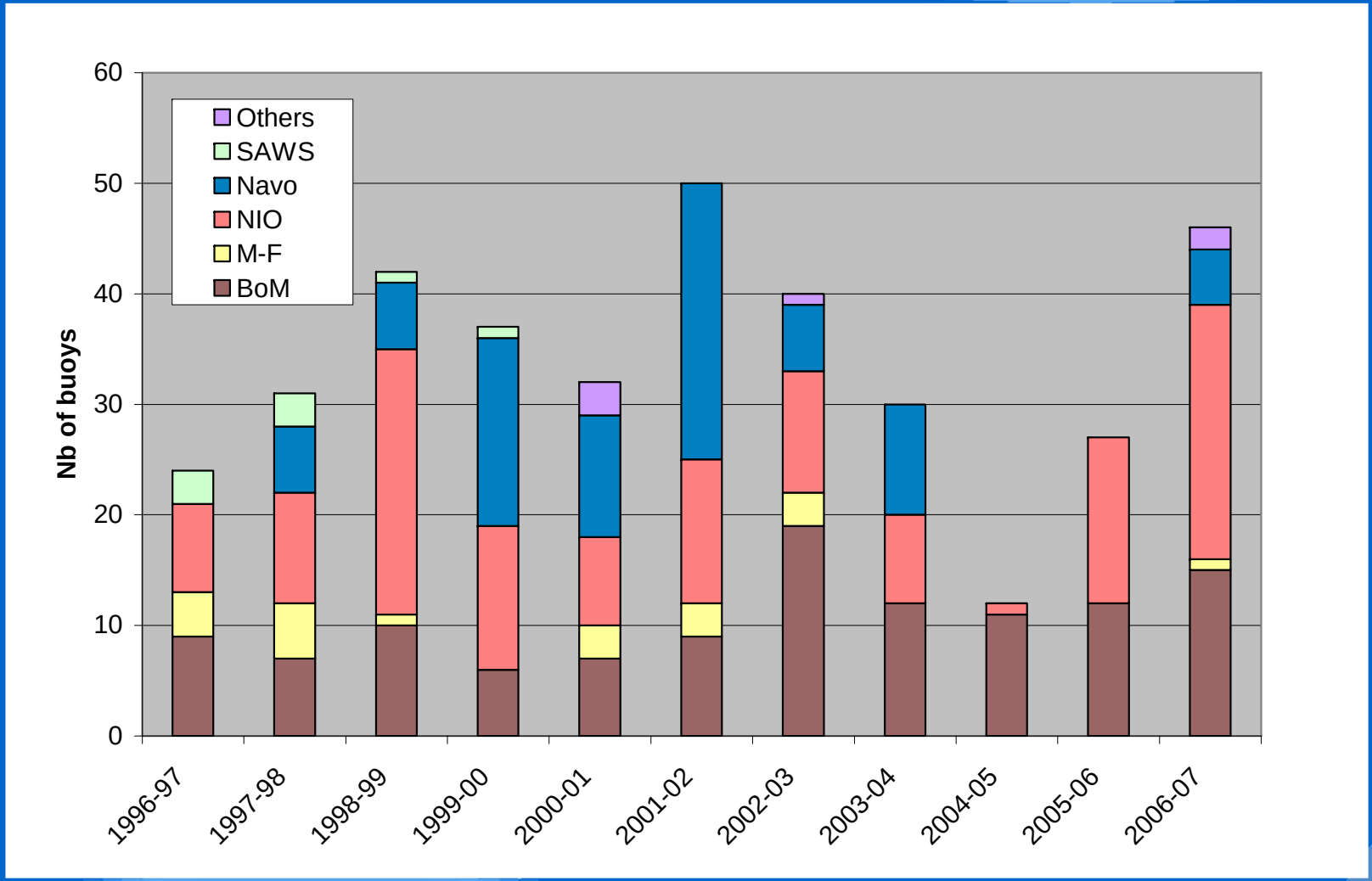
Drifting Buoy Deployments by Type



Drifting Buoy Contributions by Members



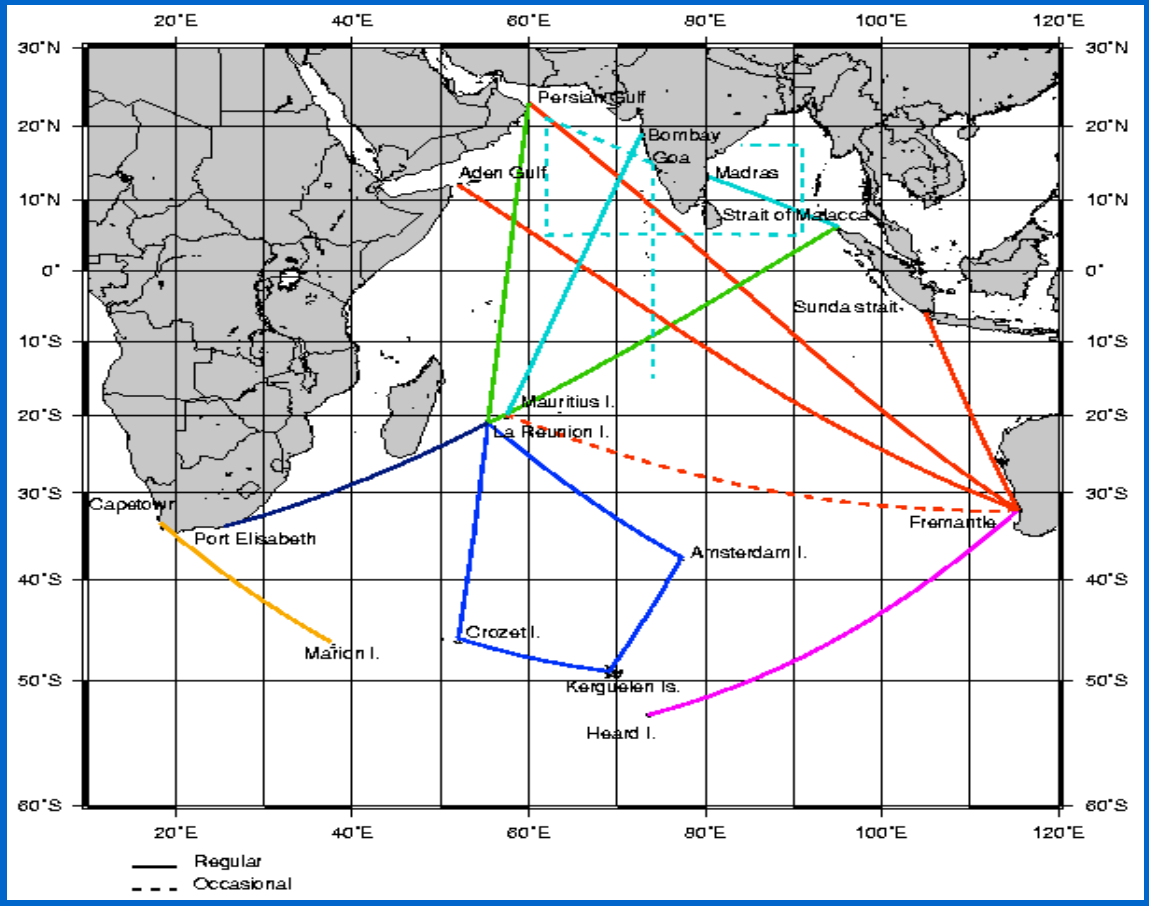
Contributions – excluding GDP & Upgrades



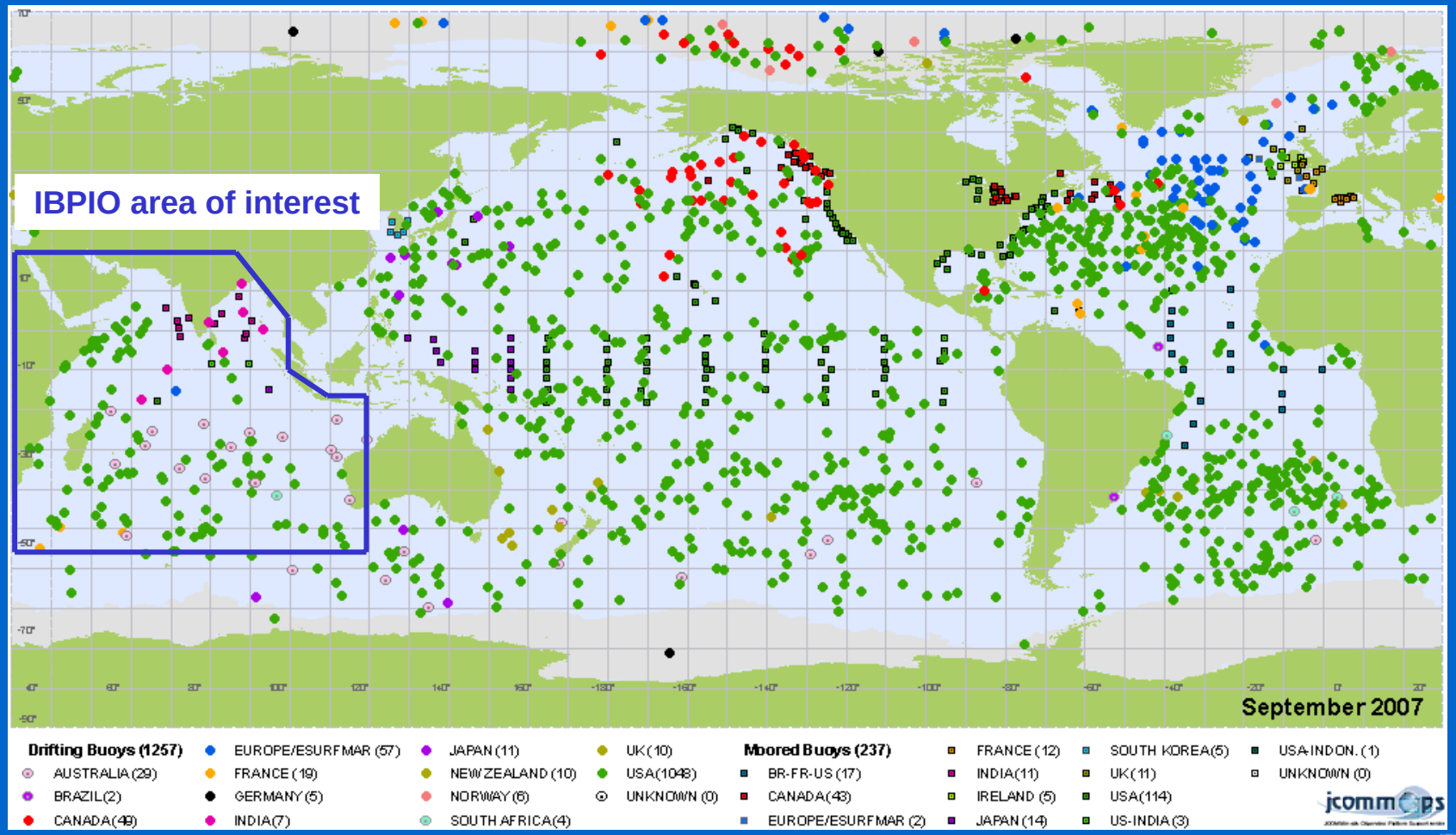
Mode of Deployment

Year	Ship	Air	% Air	Total
1996-97	54	26	33 %	80
1997-98	27	16	37 %	43
1998-99	116	20	15 %	136
1999-00	75	30	29 %	105
2000-01	54	29	35 %	83
2001-02	61	44	44 %	105
2002-03	74	15	44 %	89
2003-04	48	20	44 %	68
2004-05	64	12	16%	76
2005-06	119	10	8%	129
2006-07	**148**	**13**	**8%**	**161**
Total	**840**	**235**	**22 %**	**1075**

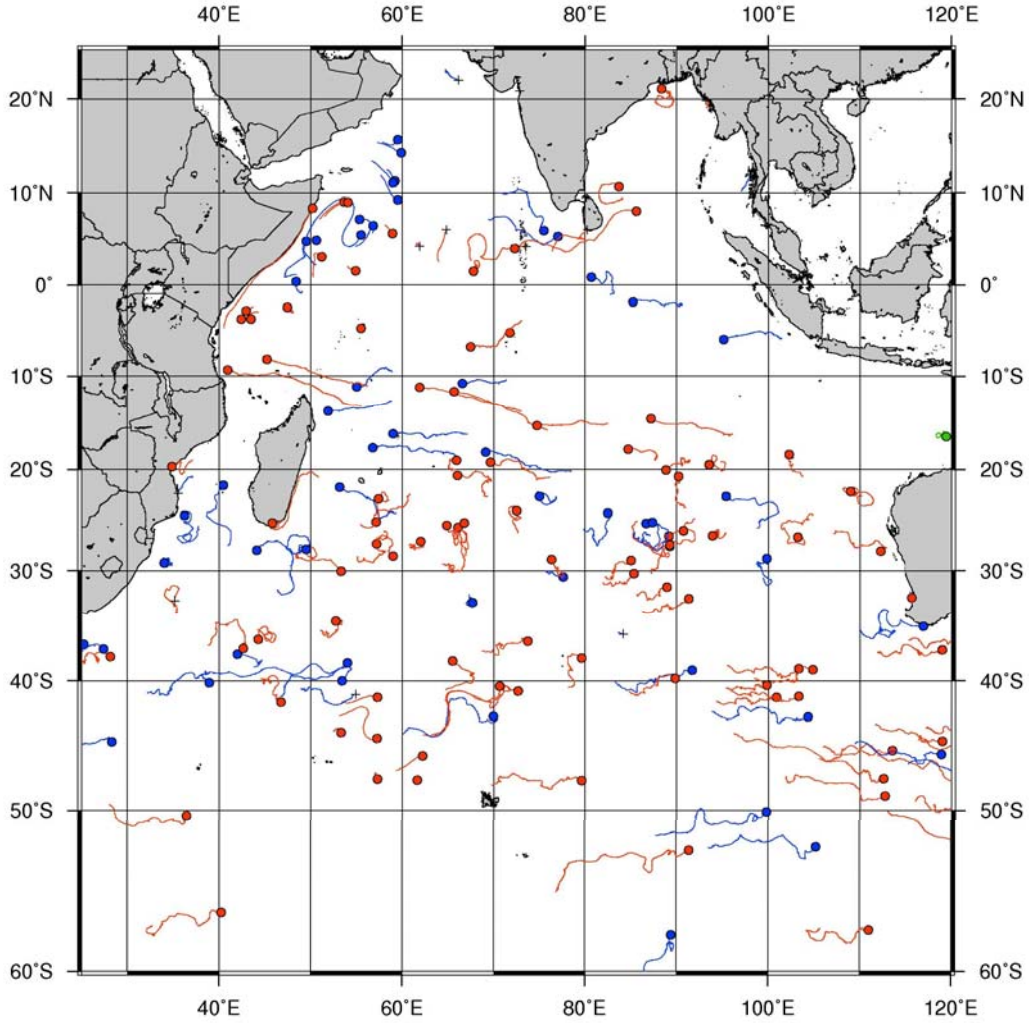
Ship-based Deployment Opportunities



Global Buoy Network

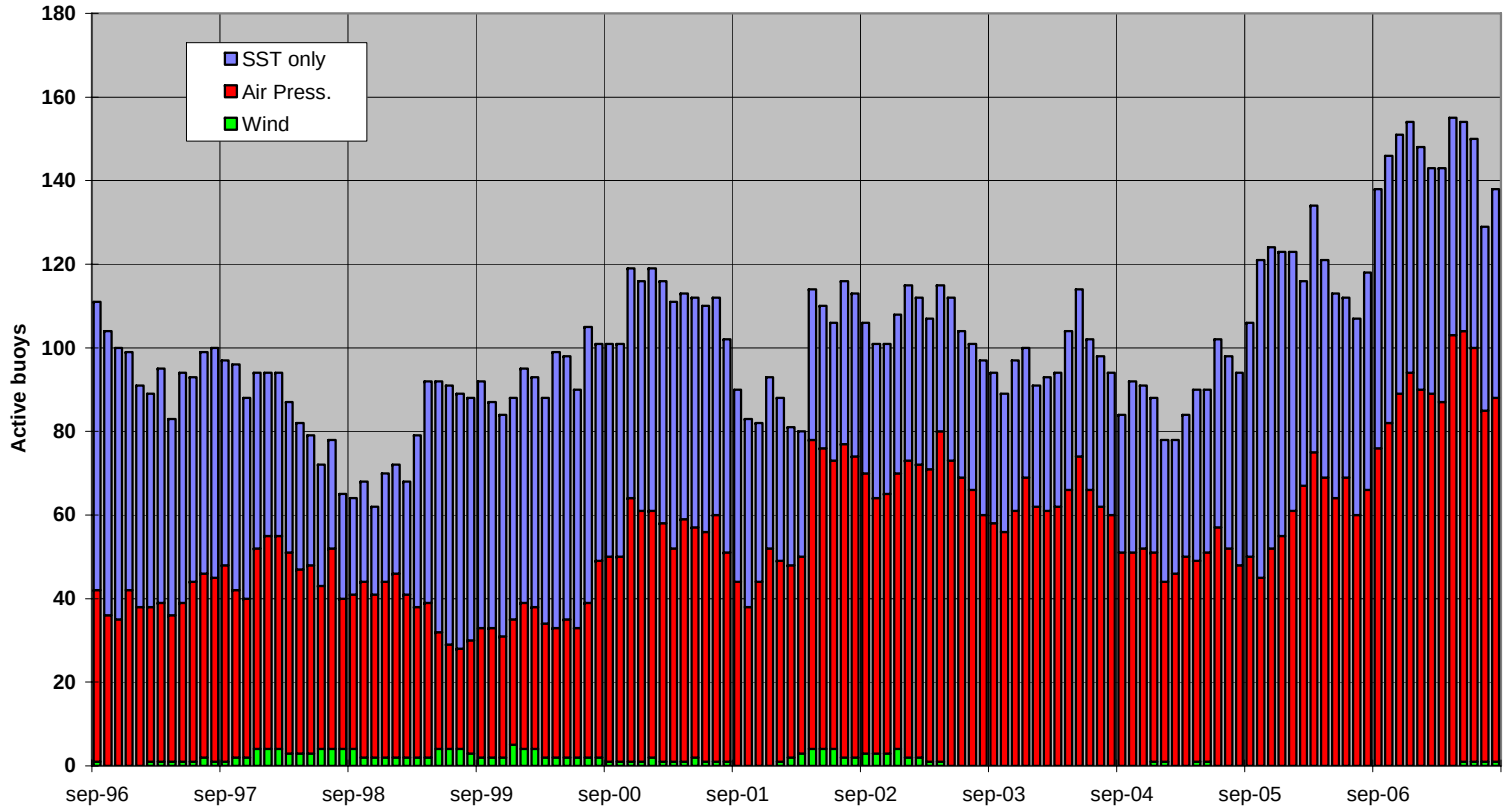


Trajectories in 2007

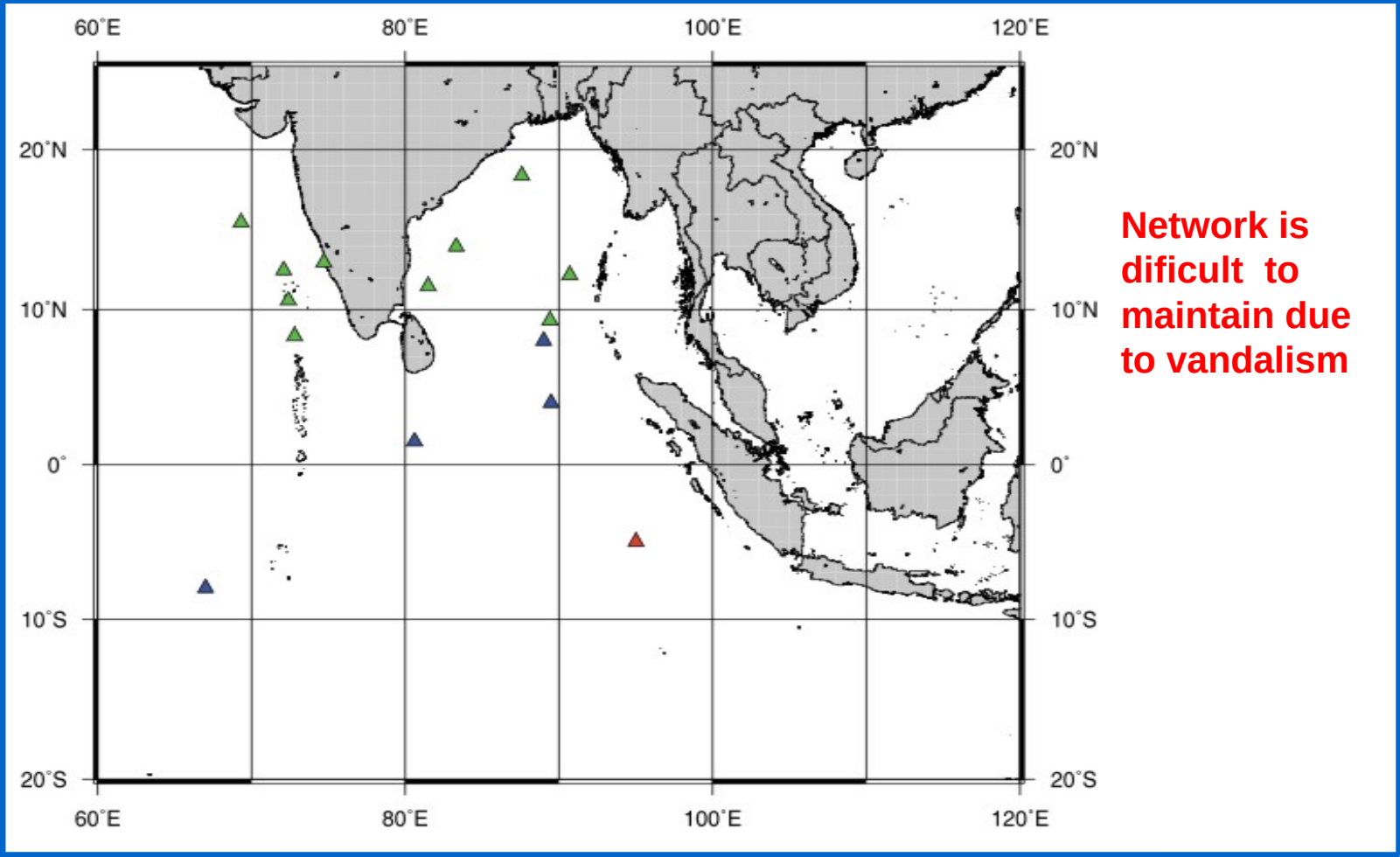


SST only
Air pressure
Wind

Buoy Network (Drifting Buoys)

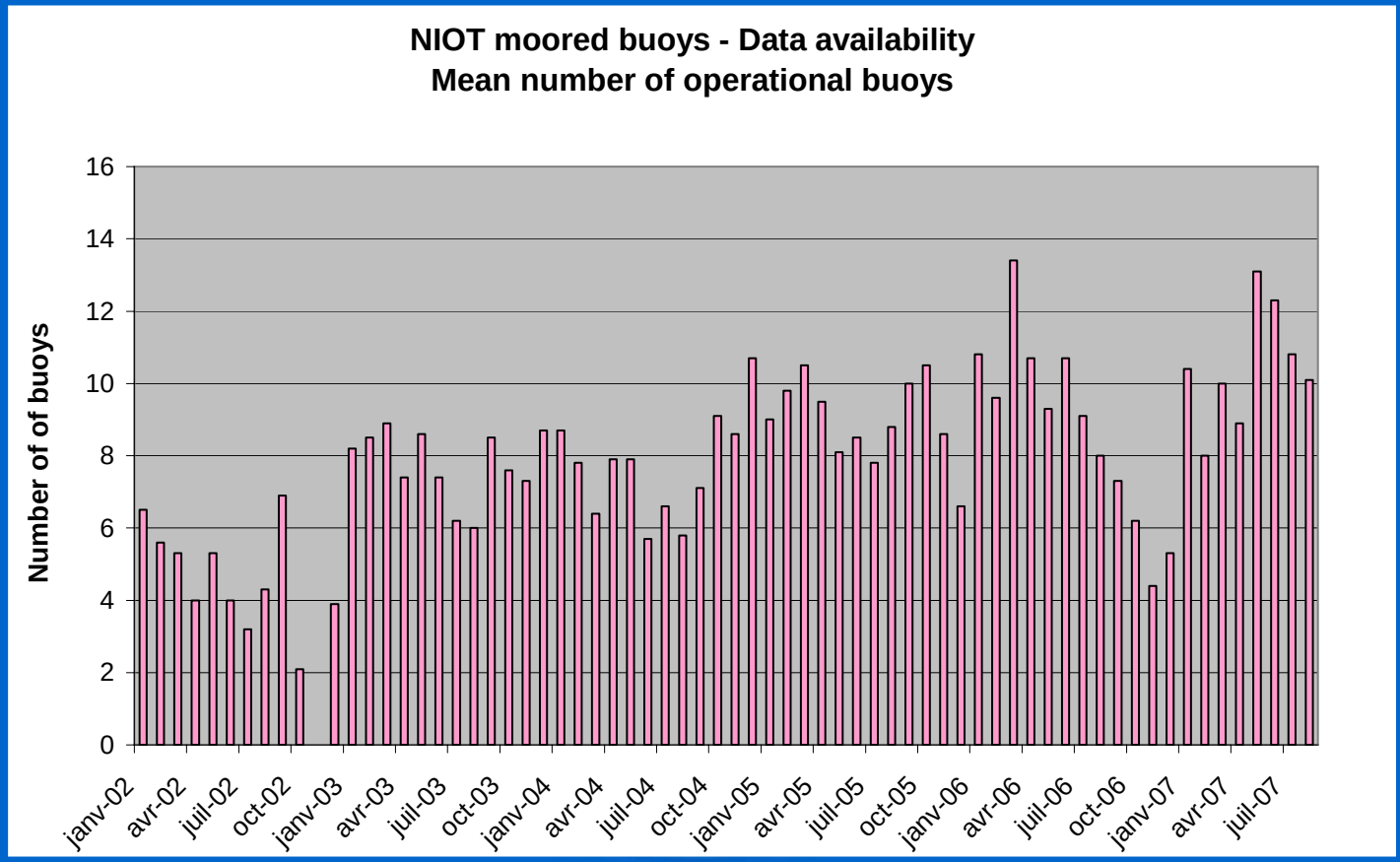


Buoy Network (Moored Buoys)

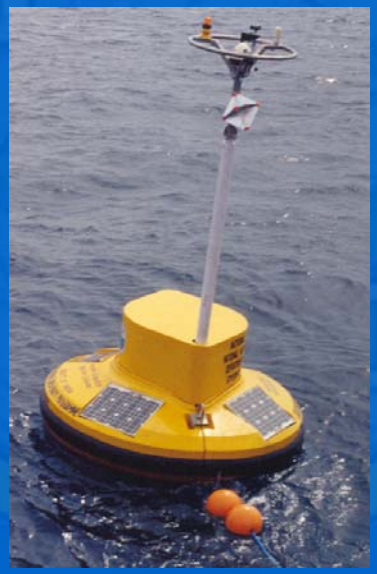


Network is dificult to maintain due to vandalism

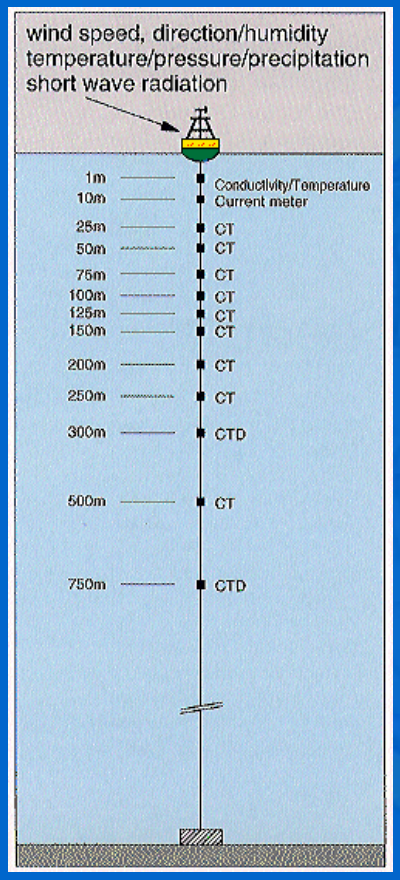
Buoy Network (NIOT)



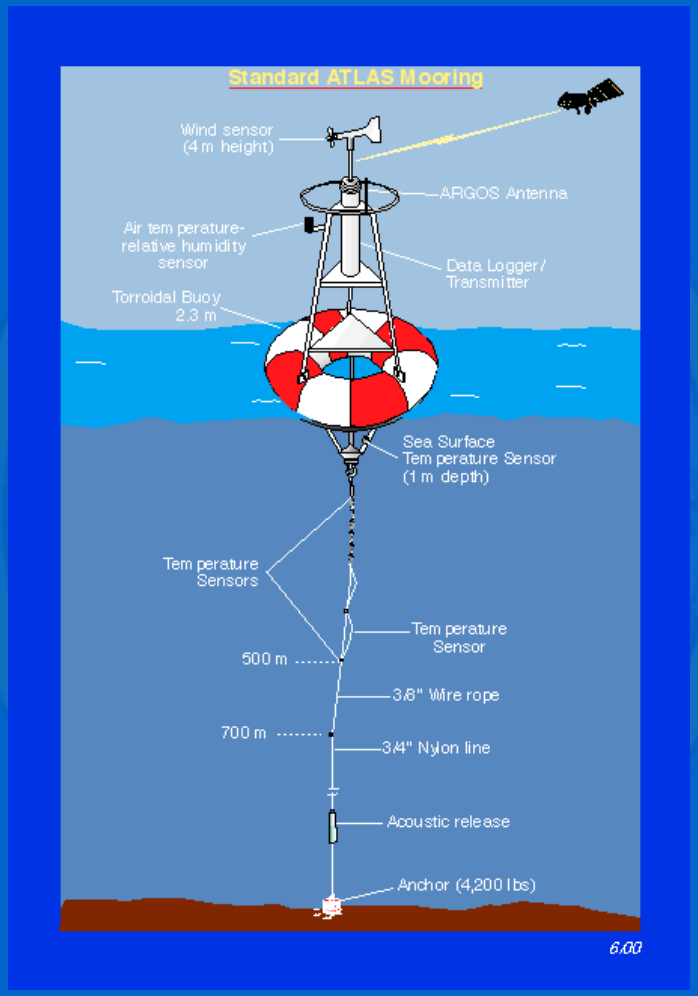
NIOT Moored Buoys



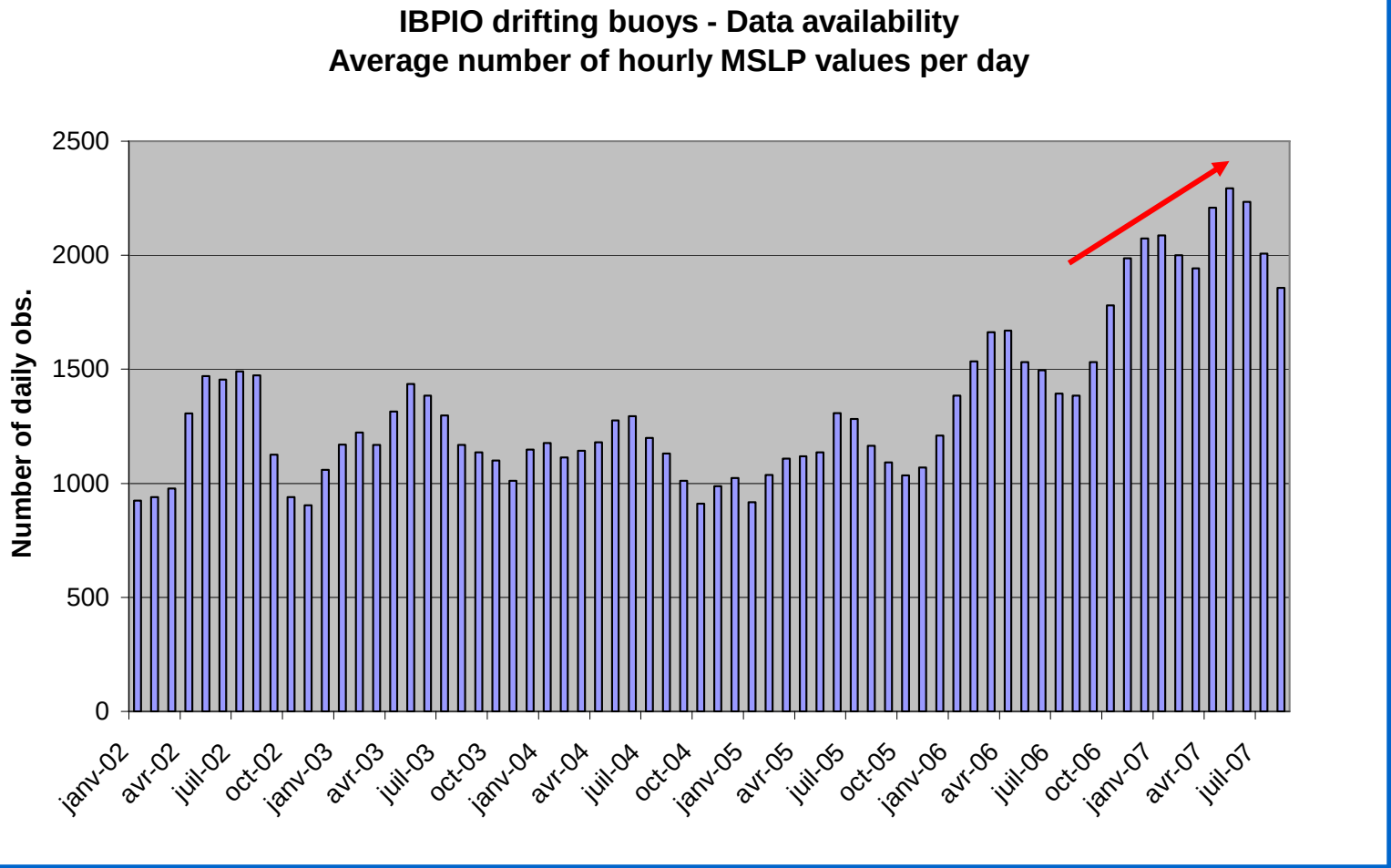
TRITON Moored Buoys



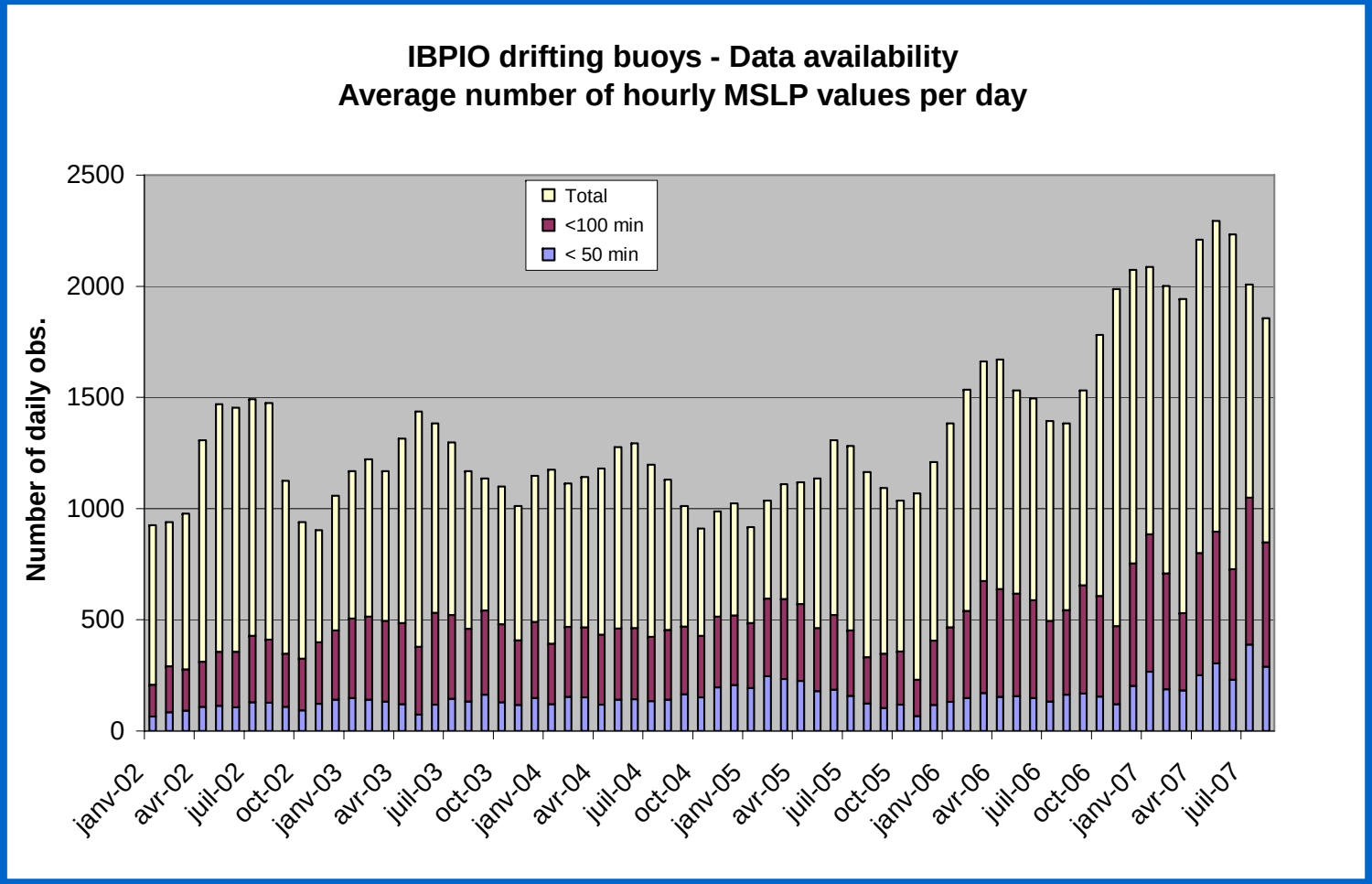
PMEL Moored Buoy



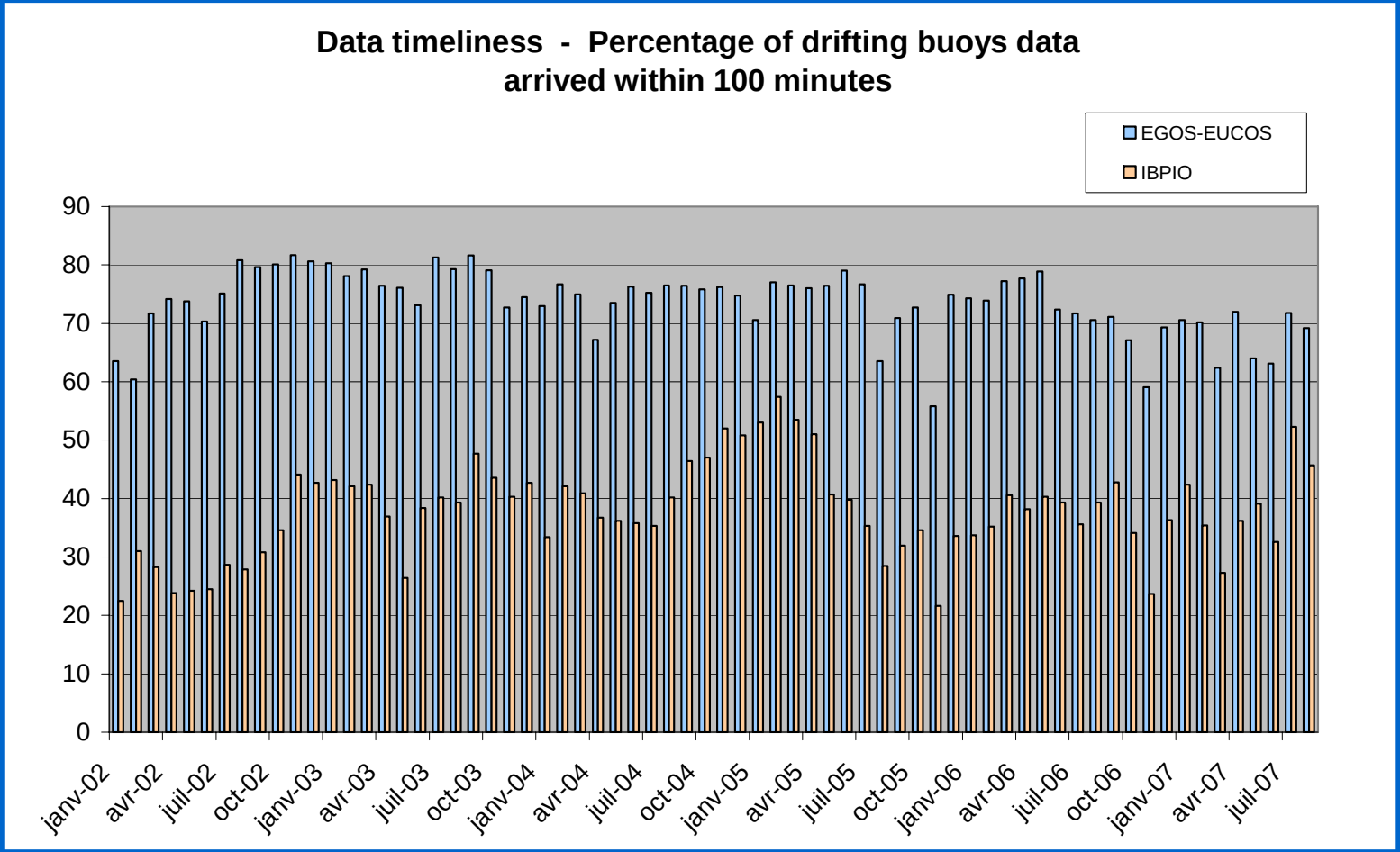
Daily MSLP Observations (Drifting Buoys)



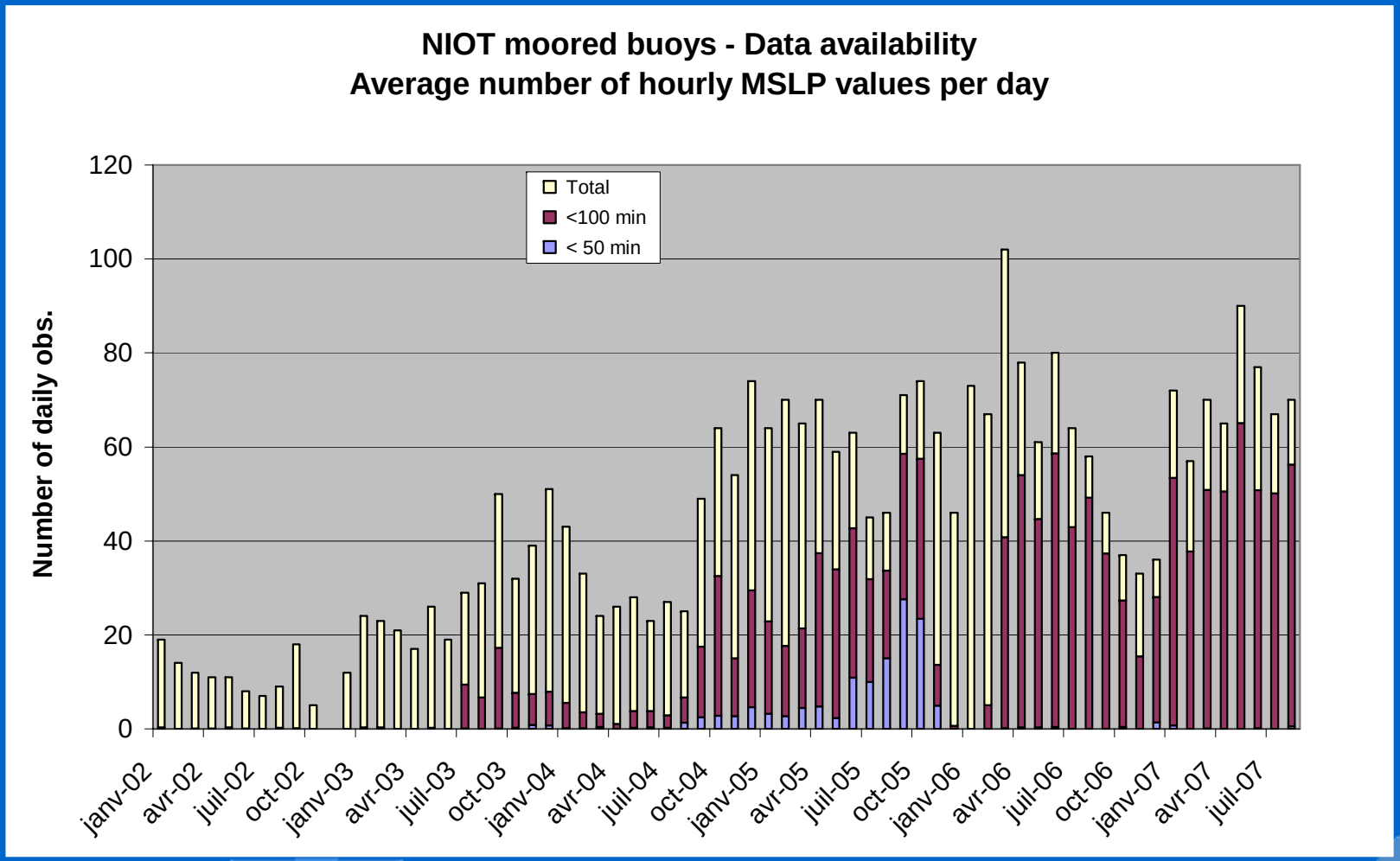
Timeliness of Observations (Drifting Buoys)



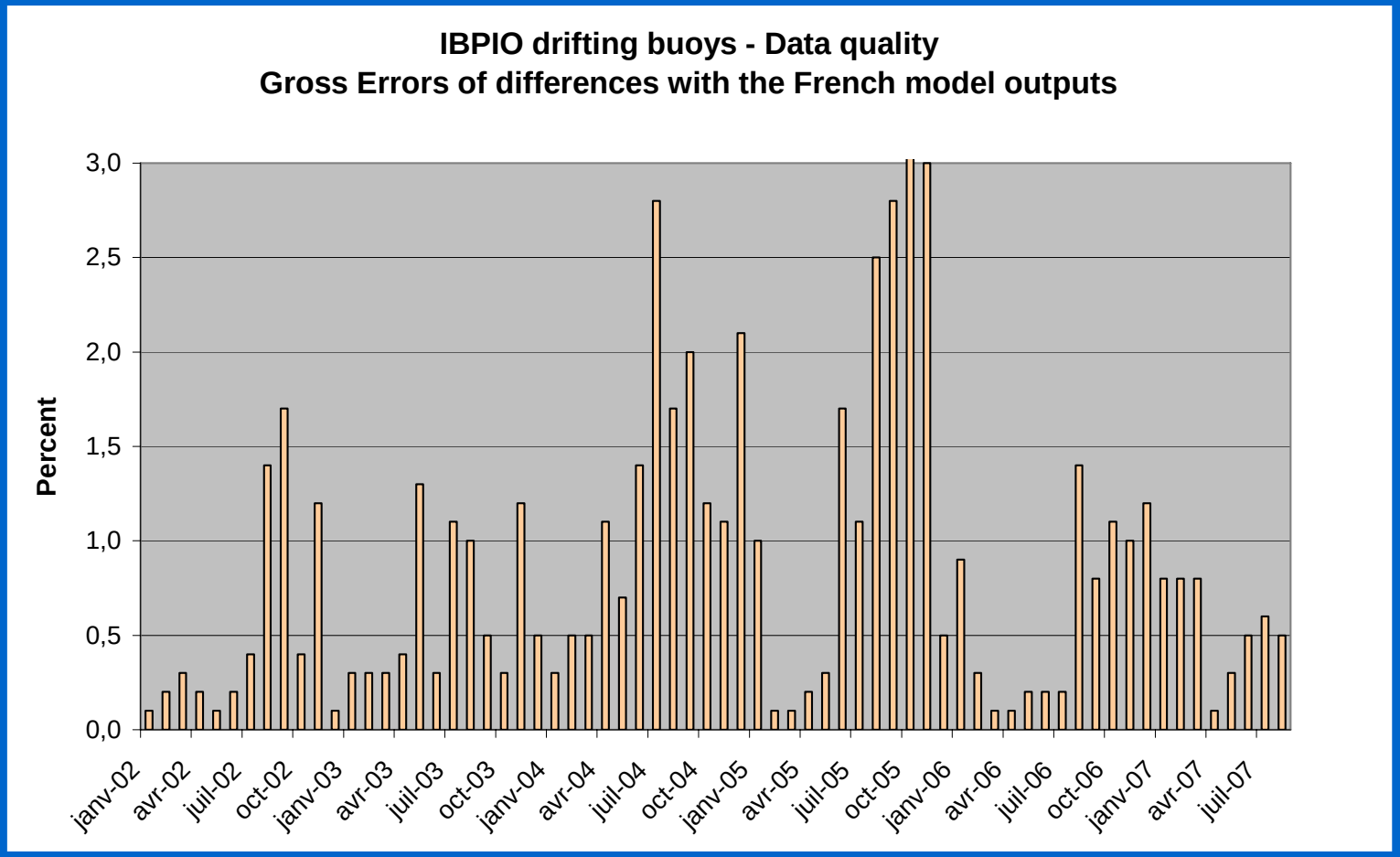
Timeliness – IO v NA (Drifting Buoys)



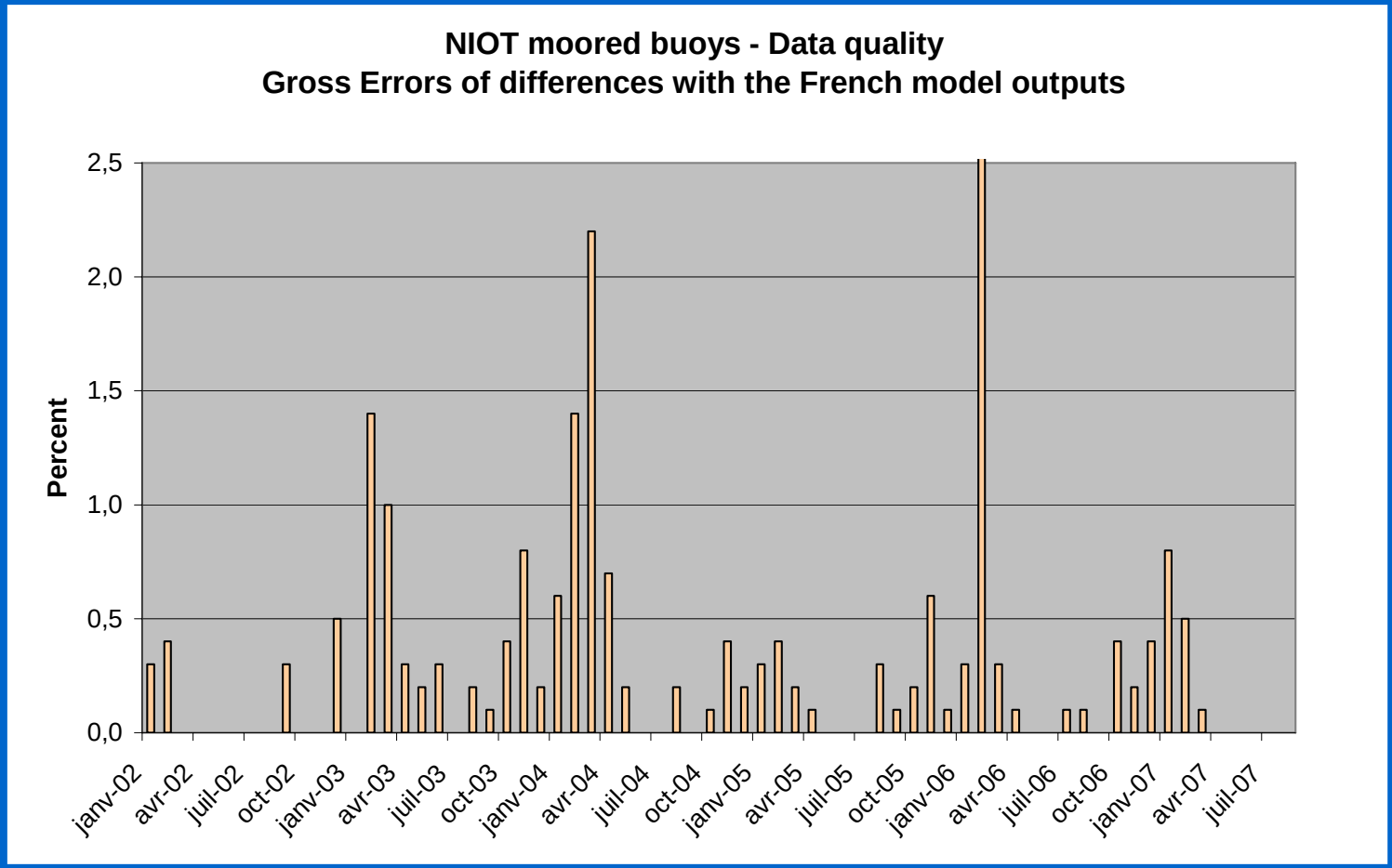
Timeliness of Observations (NIOT)



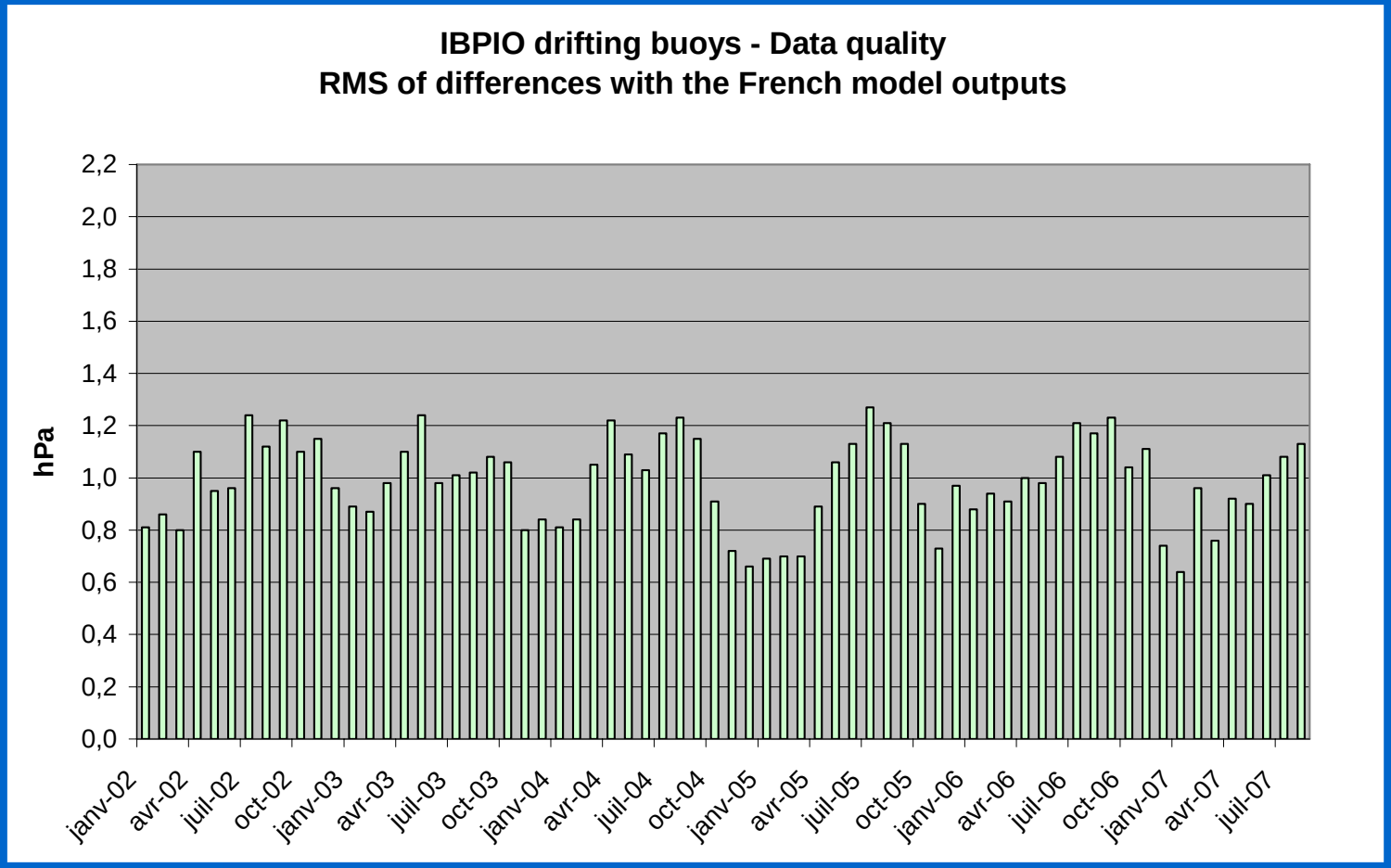
Gross Errors (Drifting Buoys)



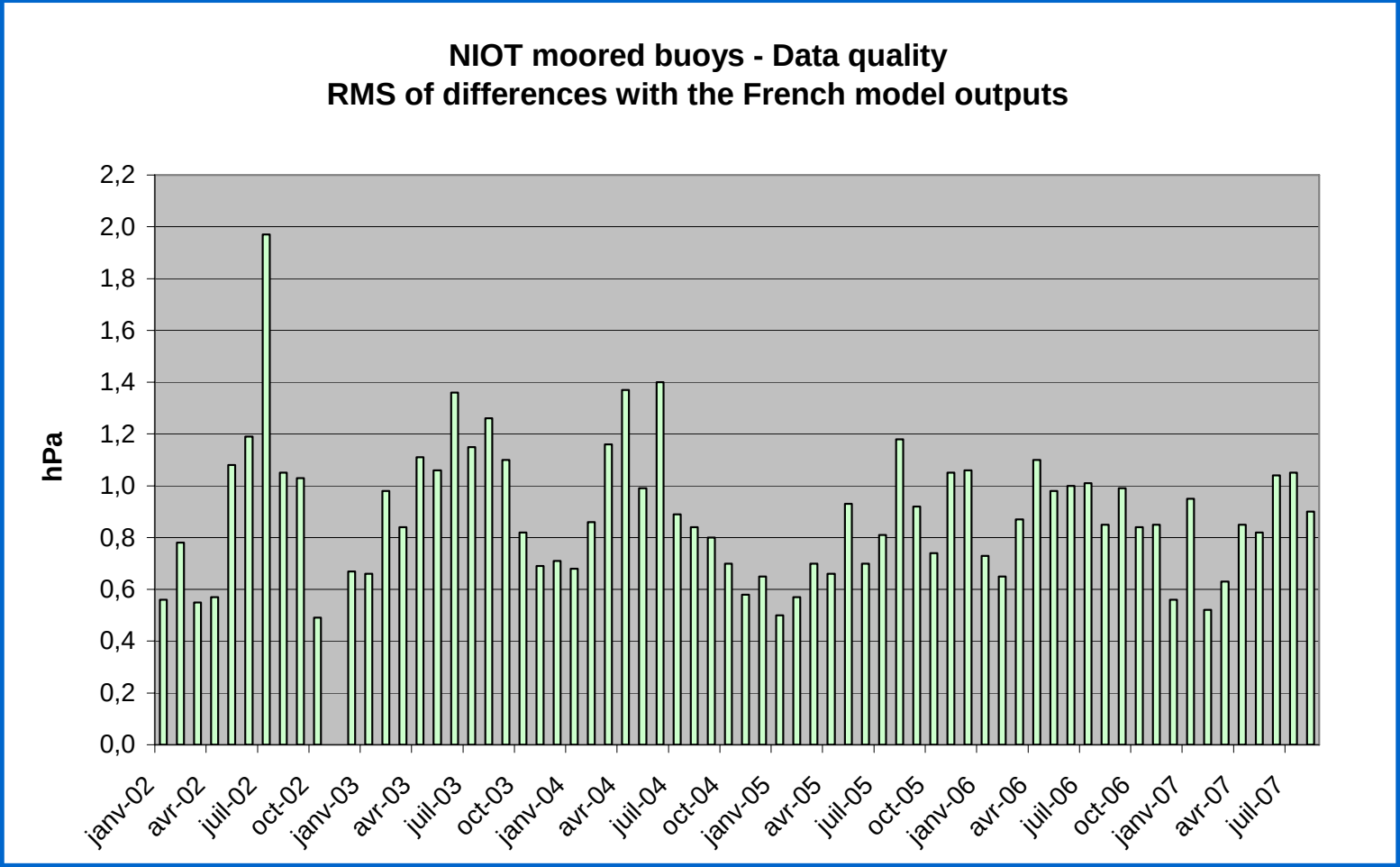
Gross Errors (NIOT)



MSLP RMS Errors (Drifting Buoys)



MSLP RMS Errors (NIOT)



Daily Performance Monitoring

QC Statistics - Platforms providing dubious AP values

List of platforms for which the number of gross errors is higher than 2 and higher than 5%
standard deviation is higher than 3 hPa
or bias is higher than 5 hPa in absolute value
over the past two weeks.

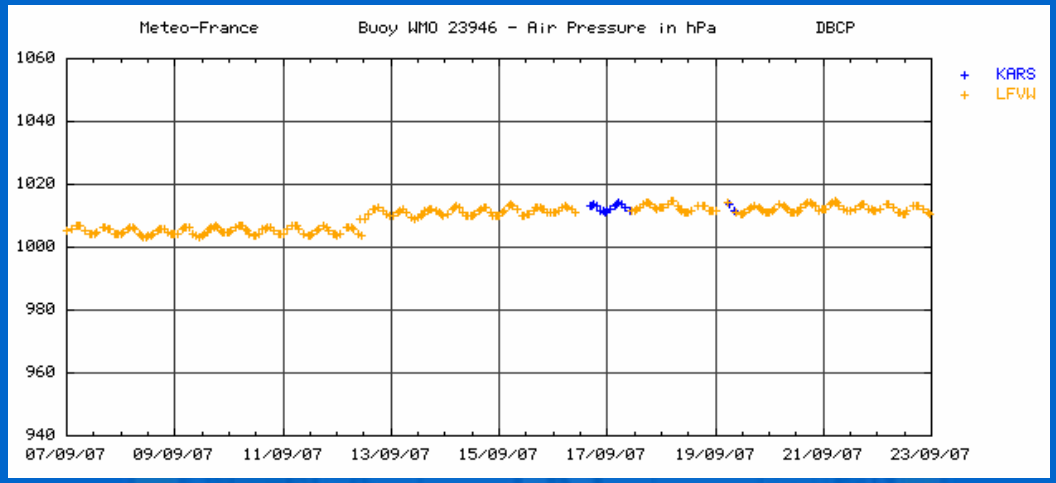
WMO	Argos	Prgm	Own	End Date	Lat	Lon	Nobs	GE	Bias	Sd	Stat	Data	Comp	Near	Map
13980	42654	655	CMM	20070909	7.1	-16.9	380	0	-0.9	3.2					
17650	41290	243	SAWS	20070909	-35.4	-11.0	384	50	-1.1	0.7					
17658	55342	9325	AOML	20070909	-59.5	171.7	376	69	-0.7	4.5					
17810	63878	7325	AO												
21543															
21548															
21963	56557	8325	AOML	20070909	37.1	-126.1	238	41	7.4	1.3					
23946	70695	336	NIO	20070909	-6.8	65.7	284	0	-5.0	0.6					
33947	63872	7325	AOML	20070909	-50.7	38.4	376	5	-0.5	3.5					
48530	35094	627	EC	20070830	51.3	-152.6	155	27	-3.1	2.8					
48538	35239	1053	NESD	20070829	80.0	-158.1	90	90							
54824	67888	7325	AOML	20070909	-42.5	-177.5	111	47	-2.4	4.4					
55616	63783	7325	AOML	20070909	-60.5	-129.9	380	82	0.6	2.7					
55913	46061	9325	AOML	20070909	-40.0	-96.2	378	32	-0.1	3.3					
56565	62559	9325	AOML	20070909	-60.9	149.9	362	71	-2.2	3.5					
71603	63869	7325	AOML	20070909	-56.1	-9.3	491	29	-0.1	3.2					
71629	63880	7325	AOML	20070909	-53.1	16.7	381	45	0.1	2.0					
71630	63881	7325	AOML	20070909	-53.1	20.1	382	173	-2.0	4.2					
TESTC				20070909	43.8	-79.5	120	120							

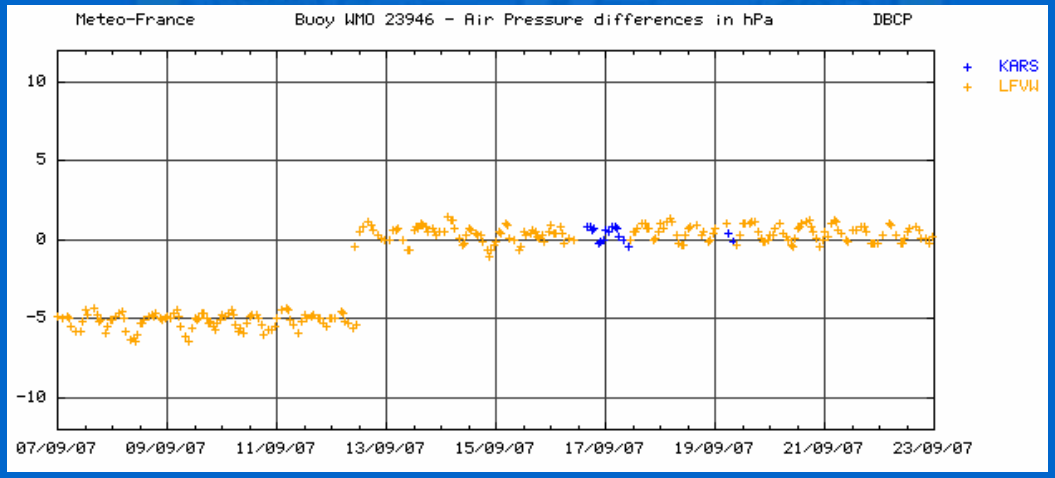
GTS data transmission was stopped

http://www.meteo.shom.fr/qctools

Criteria

Daily Monitoring (Drifting Buoy)

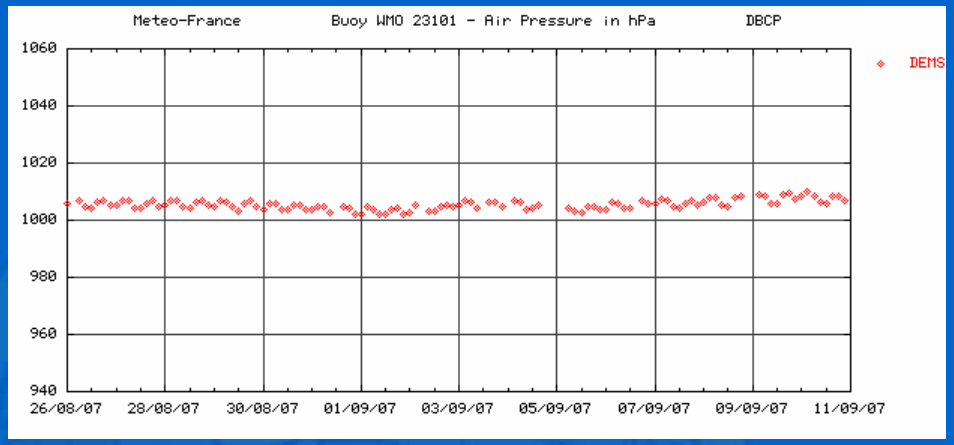


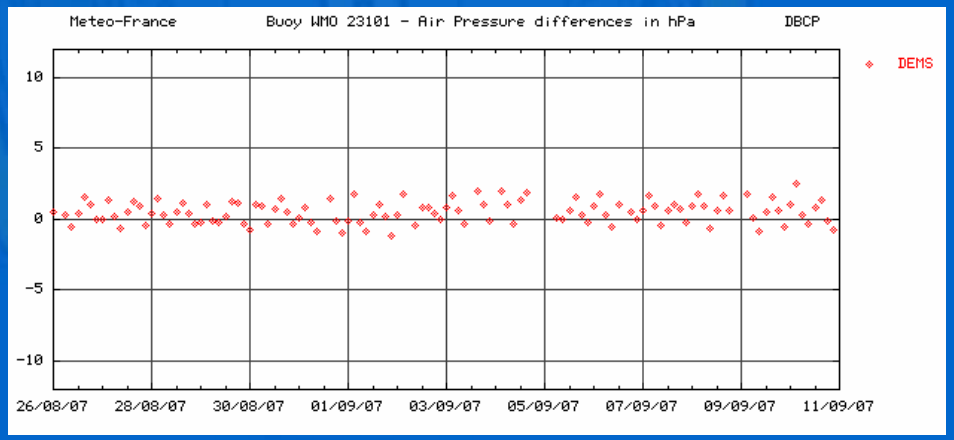


Daily Monitoring (NIOT)

WMO 23101

14°N 83.3°E





Programme Plans

Deployment Plans

IBPIO CONSOLIDATED BUOY DEPLOYMENT PLAN - 2007/2008

AGENCY	AGENCY PROGRAMS						FOR GDP			TOTAL
	Moored	FGGE	FGGE-W	SVP	SVP-B	SVP-BW	UPG	SVP	SVP-B	
ABOM	0	0	0	0	16	2	8	0	16	42
GDC	0	0	0	55	6	0	-	-	-	61
Météo France	0	0	0	0	3	0	25	0	0	28
Navo	0	0	0	0	0	0	0	0	0	0
NIO	0	0	0	0	15	4	0	0	0	19
NIOT	0	0	0	0	0	0	0	0	0	0
SAWS	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	55	40	6	33	0	16	150

More Information

IPBIO Website

http://www.meteo.shom.fr/ibpio/


IBPIO

IBPIO-V (Perth)

IBPIO-VI & ISABP-IX (Cape Town)

IBPIO-VII (Chennai)

IBPIO-VIII (Buenos Aires)

IBPIO-IX (La Jolla)