

WORLD METEOROLOGICAL ORGANIZATION

**INTERGOVERNMENTAL OCEANOGRAPHIC
COMMISSION (OF UNESCO)**

DATA BUOY COOPERATION PANEL

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TWENTY-SEVENTH SESSION

ITEM: 13

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ENGLISH ONLY

NATIONAL REPORTS

(Submitted by Members/Member States)

Summary and purpose of the document

This documents provides for the reports on national activities during the last intersessional period.

ACTION PROPOSED

The Panel will review the information contained in this report and comment and make decisions or recommendations as appropriate. See part A for the details of recommended actions.

Appendices: National reports for:

- A. France
- B. Ireland
- C. Italy
- D. Republic of Korea
- E. South Africa
- F. Japan
- G. Canada
- H. China
- I. USA
- J. Brazil
- K. India
- L. New Zealand
- M. United Kingdom
- N. Australia
- O. Germany

APPENDIX A

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country: **FRANCE**

Year: **1 July 2010 – 30 June 2011**

This report concerns surface buoys only. Programmes using profilers (ARGO floats) are not described here.

PROGRAMMES

A. METEO-FRANCE

Number and type of buoys :

(a) 13 drifting buoys were deployed in last 12 months :

- 8 SVP-BS drifters (salinity measurements) with LPO and LOCEAN;
- 5 SVP-B (3 Argos, 2 Iridium) in the North Tropical Atlantic

(b) 19 SVP were upgraded to SVP-B (Iridium) and deployed in Indian Ocean

In addition, Meteo-France operated 3 moored buoy stations (plus two others in co-operation with UKMO), five directional waveriders and one automated stations put aboard aid-to-navigation buoy ;

(c) 66 buoys were operational at 30 June 2011 ;

(d) 66 buoys were reporting on GTS at 30 June 2011.

NB: The operational drifting buoys for the North Atlantic and the Mediterranean Sea are funded by E-SURFMAR (135 deployments in last 12 months, 89 operational and reporting on GTS at 30 June 2011).

Purposes of programme :

- (a) Operational : to provide Weather Forecast Centres with oceanographic and meteorological observations in real time (EUCOS/E-SURFMAR, French West Indies, IBPIO programme...);
- (b) Research : to provide scientists with in-situ observations close to the air-sea interface ;
- (c) Technical : to improve present materials (tests of new buoys, new sensors: compasses, barometers, conductivity probes, radiation sensors, sonic anemometer...). To validate wind, bathythermal and salinity measurements.

Main deployment areas :

North Atlantic.
Western Mediterranean Sea.
Indian Ocean.

Plans for the next 12 months :

Meteo-France will continue to operate drifting buoys in the Atlantic and Indian oceans through its contribution to the DBCP regional action groups (E-SURFMAR and IBPIO). The co-operation with the GDC will be pursued.

Meteo-France will continue to operate three ocean weather stations (one in West Indies and two in the Mediterranean Sea). The co-operation with the UK MetOffice to maintain the Brittany and Gascogne moored buoys will continue. The five waverider stations located in West Indies and the automated station put aboard aid-

to-navigation buoy will be also maintained.

Other Meteo-France activities in the frame of the DBCP are described further (see paragraphs on technical developments and special comments).

B. INSU

B1. LOCEAN (CARIOCA programme)

Number and type of buoys :

- (a) 1 CARIOCA II buoy deployed this year in Mediterranean Sea (LATEX Sep 2010)

Purposes of programmes :

- (a) Research: to understand, quantify and monitor the CO₂ fluxes exchanged at the air-sea interface ;

Web site : <http://www.lodyc.jussieu.fr/carioca/home.html>

Plans :

Two CARIOCA buoy will be deployed in South Indian Ocean in fall 2011 off Kerguelen Island (KEOPS2 experiment).

B2. LOCEAN (salinity drifters)

Number and type of buoys:

- (a) 11 Surplus salinity drifters deployed
- (b) 15 salinity Pacific Gyre drifters deployed: 3 in the western tropical Pacific Ocean, 12 in the tropical Atlantic Ocean.

Purposes of programmes :

- (a) Research : to understand, quantify and monitor the variability of near-surface salinity (in particular in regions with strong spatial variability due to river runoff or strong rainfall). In relation to GLOSCAL, an ESA project for the calibration/validation of the SMOS L-band radiometer mission.

- (b) Validation of past data from salinity drifters and transmission of the validated data to users through a website. Investigate more specifically daily cycles from the salinity drifters.

- (c) Technical : to develop drifters able to measure surface salinity over a multi-month mission with little drifts.

Web sites : <http://www.locean-ipsl.upmc.fr/smos/drifters/>

Plans:

Deployment of 2 salinity drifters in Atlantic (summer 2011)
Deployments of 3 salinity drifters in the tropical Atlantic (fall 2011).
Deployment of 2 to 5 salinity drifters N Atlantic (2012)
Deployment of 10 salinity drifters W Pacific (2012)
Deployment of 10 salinity drifters N sub-tropical Atlantic (2012)

C. CETMEF (Centre d' Etudes Techniques Maritimes Et Fluviales)

Number and type of buoys :

- (a) CETMEF operates a network of 6 scalar buoys and 22 directional buoys (DATAWELL).

In addition, CETMEF implemented wave measurement systems on two Aid-to-Navigation moored buoys.

- (b) 28 buoys were operational at 30 June;
- (c) 15 were reporting on GTS at 30 June.

Purpose of programme :

Operational : to maintain a long duration wave measurement network along the coast of the French mother and overseas territories coasts and to centralize the French wave data.

Deployment area :

French coasts, Guadeloupe, Guyana and La Reunion Island.

Plans for the next 12 months :

The network will be maintained. CETMEF plans to complete it with three directional buoys. Real time data are available on the Internet at <http://candhis.cetmef.developpement-durable.gouv.fr> and on the GTS thanks to Meteo-France.

D. IRD - French participation to PIRATA – (in cooperation with Meteo-France) and TACE-CLIVAR + AMMA2 + PROPAO/ALOC-GG programmes (international collaborations)

A) PIRATA:

Number and type of buoys:

IRD has been operating from 1997 a network of 5 Atlas buoys in the tropical Atlantic in co-operation with NOAA/PMEL; they are maintained yearly.

All the buoys have been replaced in September-October 2010 during the PIRATA-FR20 cruise and in May-June 2011 during the PIRATA-FR21 cruise.

Thus, 5 Atlas buoys under French responsibility were reporting on GTS from July 2007 in the central and eastern tropical Atlantic.

The deployment of a CO₂ sensor and an oxygen optode associated to the ATLAS buoy at 10°W-6°S, ensured in June 2006 during the EGEE 3 cruise, has been replaced in September 2010 and May 2011 during the PIRATA FR20 & FR21 cruises.

A CO₂ sensor and an oxygen optode installed on the ATLAS buoy at 38°W-8°N in April 2008 during the Brazilian PIRATA cruise, have been replaced in August 2010 during the PIRATA BR XII cruise.

One current meter mooring (ADCP) is maintained at 23°W-Equator by IRD from about height years. This mooring has been replaced in May 2011 during an IFM-GEOMAR cruise (on the MERIAN).

The current meter mooring (ADCP) deployed at 10°W-Equator for IRD (as part of PIRATA-France, EGEE/AMMA and TACE programs) by the German METEOR vessel in June 2006 is replaced every two years and has been replaced during the PIRATA-FR20 cruise in October 2010. It will be replaced in spring 2012 during the next French PIRATA cruise.

Purposes of programme:

The PIRATA programme is an extension of the TAO array in the Tropical Atlantic. Contributions are from Brazil, France and USA.

- (a) Operational: to provide oceanographic and meteorological observations in real time to Weather Forecast Centres as well as to ocean global circulation modes

(e.g. MERCATOR);

- (b) Research: to describe and understand the evolution of SST and salinity, of the fugacity of CO₂ and of dissolved oxygen concentration, upper ocean thermal structure and air-sea fluxes of momentum, heat and fresh water in the Tropical Atlantic.

Web site: <http://www.ifremer.fr/ird/pirata/>

Deployment area:

Tropical Atlantic Ocean, the 5 ATLAS buoys under French responsibility are located at: along the equator at 23°W, 10°W and 0°E, and at 10°W- 6°S, 10°W- 10°S.

Plans for the next 12 months:

IRD will continue to yearly maintain the five PIRATA ATLAS buoys and the two currentmeter moorings located in the eastern equatorial Atlantic, during French PIRATA dedicated cruises, and also in close collaboration with USA (NOAA/PMEL and NOAA/RSMAS) and Germany (IFM/GEOMAR).

The next French PIRATA cruise should take place in the tropical Atlantic Ocean in April-May 2012. Also, a German (IFM-GEOMAR) cruise is scheduled in October 2012 in the framework of TACE/CLIVAR program, between 23°W and 10°W during which the ADCP mooring will be replaced.

E. SHOM (Hydrographic and Oceanographic Service of the Navy)

Number and type of buoys:

- (a) 8 drifting buoys owned by SHOM were deployed in last 12 months:
3 Davis Drifter (lagrangian drifters for measuring water currents within one meter of sea surface);
2 WOCE (World Ocean Circulation Experiment) buoys drogued at 75 m;
5 WOCE (World Ocean Circulation Experiment) buoys drogued at 250 m;
- (b) 6 buoys were operational at 30 June 2011;
(c) None was reporting on GTS at 30 June 2010.

Purposes of program :

- (a) to get oceanic data (current and temperature in depth) that could be introduced in real time into prediction models.

Deployment area :

Bay of Biscay
Gulf of Aden

Plan for the next 12 months :

- 20 drifting buoys will be deployed in the next 12 months.

F. IFREMER (Institut Français de Recherche pour l'Exploitation de la MER)

F1. LPO

Number and type of buoys :

- (a) a total of 2 buoys were deployed in the last 12 months:
▪ 2 WOCE (World Ocean Circulation Experiment) buoys drogued at 15 m.

- (b) 0 buoy was operational as of June 30 th 2011;
- (c) None was reporting on GTS as of June 30th 2011.

Purposes of program :

To gather information on the mesoscale features of currents and the general circulation pattern on the continental shelf of the Bay of Biscay, both as part of focussed at-sea experiments and with the aim of feeding a regional database of drifter trajectories.

Deployment area :

Bay of Biscay

Plan for the next 12 months :

- on the order of 10 surface lagrangian drifters will be deployed in the next 12 months.

F2- MONDEDORO and LATEX

Number and type of buoys :

- (a) a total of 40 buoys were deployed in the last 12 months:
 - 15 SVP-GPS buoys drogued at 15 m.
 - 25 SVP-GPS buoys drogued at 50 m

- (b) None was reporting on GTS as of June 30th 2011.

Deployment area :

Mediterranean Sea

These 40 surface drifters are processed by the Coriolis data centre (<http://www.coriolis.eu.org>)

All the results are available on :

<http://www.coriolis.eu.org/Data-Services-Products/View-Download/Surface-drifters-data>

TECHNICAL DEVELOPMENTS

Instrumentation

- (i) Meteo-France continues to participate in the evaluation of SVP pressure drifters. In parallel to the use of drifters, Meteo-France continuously surveys the performances of air pressure measurement for almost of the drifters of that kind deployed over the World Ocean.
- (ii) The evaluation of SVP-B drifters fitted with a conductivity sensor is going on (co-operation between Meteo-France and LOCEAN).
- (iii) Meteo-France is participating in the evaluation of drifters fitted with thermistor string SVP-BTC.
- (iv) Meteo-France contributes to the DBCP Pilot Projects: Iridium and GHRSSST.

PUBLICATIONS (programme plans, technical developments, QC reports, data studies...)

Brandt, P., G. Caniaux, B. Bourlès, A. Lazar, M. Dengler, A. Funk, V. Hormann, H. Giordani and F. Marin, Equatorial upper-ocean dynamics and their interaction with the West African monsoon, *Atmospheric Science Letters*, doi: 10.1002/asl.287, 2010.

Caniaux, G., H. Giordani, J.L. Redelsperger, F. Guichard, E. Key, and M. Wade: Couplings between the Atlantic Cold Tongue, the Santa Helena Anticyclone, and the African Monsoon in boreal Spring and Summer, *J. Geophys. Res.*, in revision, 2011.

DeCoetlogon, G., S. Janicot and A. Lazar, Intraseasonal variability of the ocean – atmosphere coupling in the Gulf of Guinea during boreal spring and summer, *Q. J. R. Meteorol. Soc.* 136(s1): 426–441, 2010.

Dengler, M., B. Bourlès, J.M. Tool, and R. Chuchla, Enhanced upper ocean mixing and turbulent heat flux in the equatorial Atlantic at 10° W, *Geophys. Res. Lett.*, 2010GL044309, in revision, 2011.

Jouanno, J., F. Marin, Y. du Penhoat, J. Sheinbaum and J.M. Molines, Seasonal heat balance in the upper 100 m of the Equatorial Atlantic Ocean, *J. Geophys. Res.*, doi:10.1029/2010JC006912, in press, 2011.

Koffi, U., N. Lefevre, G. Kouadio and J. Boutin, Surface CO₂ parameters and air-sea CO₂ flux distribution in the eastern equatorial Atlantic Ocean, *J. Mar. Syst.*, 82, 135-144, doi:10.1016/j.jmarsys.2010.04.010, 2010.

Parard, G., Lefèvre, N., and Boutin, J., Sea water fugacity of CO₂ at the PIRATA mooring at 6oS, 10oW. *Tellus B*, 62(5), 636-648, 2010.

Rhein, M., M. Dengler, J. Sueltenfuss, R. Hummels, S. Huettl-Kabus, and B. Bourlès, Upwelling in the Equatorial Atlantic inferred from helium isotope disequilibrium, *J. Geophys. Res.*, 115, C8, C08021, doi:10.1029/2009JC005772, 2010.

Wade, M., G. Caniaux, and Y. DuPenhoat : Variability of the mixed layer heat budget in the Eastern Equatorial Atlantic during 2005-2007 as inferred from Argo floats. *J. Geophys. Res.*, doi:10.1029/2010JC006683, in press., 2011.

L. Barbero, J. Boutin, L. Merlivat, N. Martin, T. Takahashi, S. C. Sutherland and R. Wanninkhof, Importance of water mass formation regions for the air-sea CO₂ flux estimate in the Southern Ocean, *Global Biogeochemical Cycles* 25, GB1005, doi 10.1029/2010GB003818

Météo-France – Centre de Météorologie Marine, E-SURFMAR Data Buoys Monthly report.

SPECIAL COMMENTS

(a) Buoy QC

- (i) The Centre de Météorologie Marine (CMM) of Meteo-France continues to operate quality control procedures on drifting buoys data. Warning messages are sent to the buoy-qir@vedur.is mailing list of Internet when a problem appears (e.g. bad location detected) or when a modification seems needed (i.e. to recalibrate or to remove a sensor from GTS) via JCOMMOPS interface. Statistics on comparisons with analysis fields are set up for each buoy.
- (ii) Buoy data QC tools developed by Meteo-France are available on the Internet (<http://www.meteo.shom.fr/qctools>) to help buoy operators to check their buoys : Real time observations from buoys are subject to routine quality monitoring. Besides monthly statistics provided by various meteorological centres for individual buoys, tools are used by Meteo-France to identify buoys reporting dubious data as quickly

as possible. These tools have been enhanced.

(b) Buoy data

(i) The CMM reports the wave data collected by CETMEF in real time onto the GTS.

(ii) Since the 1st of January 2002, Meteo-France has been providing the Coriolis Data Centre with surface current data computed thanks to SVP drifter tracks. CORIOLIS contributes to the French operational oceanographic project with in-situ data. Buoy positions, get from the GTS, are interpolated every 3 hours. Surface current data are computed over 6 hours, on a weekly basis. Data are flagged with drogue presence indexes. Wind speed and wind stress data from ECMWF analysis model coupled with sampled surface current data has been provided too from mid-2004.

(c) Other activities

(i) For the sixteenth consecutive year, Meteo-France funded 10 barometers to be added to SVP drifters deployed in the Tropical Indian Ocean, each year in November. Twenty other upgrades were funded in 2011. These drifters are devoted to the Southern Ocean, south of 40°S in the Indian Ocean, as a principle. These 30 buoys of 2010 are upgraded to Iridium. These actions will be renewed in 2012.

(ii) IRD, also contributes to the deployment of SVP (and SVP-BS; 3 in 2010 and 5 in 2011) buoys and ARGO profilers (8 APEX in 2010 and 6 ARVOR in 2011) in the equatorial Atlantic during the PIRATA servicing cruises and also in the framework of the CORIOLIS programme.

(iii) IRD also maintains a meteorological station installed at Sao Tome in October 2003 in the framework of EGEE/AMMA, now part of PIRATA, along with a tide gauge. However, the tide gauge is no more operational (from August 2010) and has to be fully replaced.

(iv) During the PIRATA cruise, IRD provides CTD and XBT profiles in quasi-real time from the vessel for operational oceanography (MERCATOR).

(v): in May 2011, one glider (DT-INSU) has been deployed in order to provide T/S/O₂ profiles along 0°E between 2°S and 2°N during two monthes.

(vi) in order to increase the vertical resolution of salinity time series, 6 additional TC sensors have been bought and added in 2011 at the ATLAS buoys located at 10°W-6°S and 10°W-10°S. Also, current sensors has been added at 10°W-0°N and 0°E-0°N (HR RDI Sentinels) for a one year duration.

(vii) IRD, also contributes to the deployment of SVP buoys and ARGO profilers in the equatorial Atlantic during the PIRATA servicing cruises and also in the framework of the CORIOLIS programme. IRD maintains a meteorological station installed at Sao Tome in October 2003 in the framework of EGEE/AMMA, now part of PIRATA.

APPENDIX B

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	IRELAND
Year	2011

1. CURRENT PROGRAMME:

Agency or programme	National Weather Buoy Network	
Number and type of buoys -2x Fugro Oceanor -3x ODAS Mk2 Buoy	(a) deployed during the year	2
	(b) operational as of 31 August	5
	(c) reporting on GTS as of 31 August	5
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[√]
	(b) met / ocean research	[√]
	(c) developmental	[√]
Main deployment areas	Around Ireland	

Agency or programme	SEAI Belmullet Wave Energy Test Site	
Number and type of buoys -1x Fugro Oceanor -2x Datawell Wave Rider	(a) deployed during the year	3
	(b) operational as of 31 August	3
	(c) reporting on GTS as of 31 August	0
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[√]
	(b) met / ocean research	[√]
	(c) developmental	[√]
Main deployment areas	Belmullet (West Coast of Ireland)	

Agency or programme	Smart Bay	
Number and type of buoys	(a) deployed during the year	1
	(b) operational as of 31 August	1
	(c) reporting on GTS as of 31 August	0
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[√]
	(b) met / ocean research	[√]
	(c) developmental	[√]
Main deployment areas	West Coast of Ireland	

2. PLANNED PROGRAMMES:

Agency or programme	Commissioners of Irish Lights, Trial AIS Met Hydro Buoys	
Number and type of buoys	planned for deployment in the next 12 months	2 x Type 2 (3 m diameter steel hull) navigational buoys.
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	Splaugh 52 14..363N 6 16.774W South East Coast, Ireland. Entrance to Rosslare port Ballybunion 52.32.528N 9 46.944W West Coast, Ireland. Entrance to the Shannon Estuary.	

Agency or programme	National Weather Buoy Network	
Number and type of buoys -Buoy replacement from ODAS to Fugro Oceanor buoy	planned for deployment in the next 12 months	1
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	South East coast of Ireland	

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design National Weather Buoy network	<ul style="list-style-type: none"> National Weather Buoy network are moving towards the use of Fugro Oceanor Wavescan Buoys
(b) Instrumentation National Weather Buoy network	<ul style="list-style-type: none"> Ultrasonic Winds are now being used on National Weather Buoy Network Summary Spectral Data is being received hourly from the new Fugro Oceanor buoy network Real time surface salinity is being received from a number of locations

(a) Buoy design Commissioners of Irish Lights	<ul style="list-style-type: none"> • Standard GLA type 2 buoy – 3 meter Steel Hull with Aluminium Daymark • Solar Powered with 5 mile Aid to Navigation Light • AIS as an Aid to Navigation and for broadcasting monitoring and met hydro information
(b) Instrumentation Commissioners of Irish Lights	<ul style="list-style-type: none"> • Aanderaa 2740 Wind Speed sensor • Aanderaa 3590 Wind Direction sensor • Aanderaa 4164 Buoy Orientation sensor • Aanderaa 3595 Wave height sensor (accelerometer) • Aanderaa 4050 Water temperature sensor • Aanderaa 3660 18 channel data logger

4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

Ref	Title	Type1
1		
2		
3		
4		

5. SPECIAL COMMENTS :

(b) Communications National Weather Buoy network	<ul style="list-style-type: none"> • Currently moving towards Iridium SBD and is working well • •
(b) Communications Commissioners of Irish Lights	<ul style="list-style-type: none"> • Data transmitted by AIS using IMO mandated Met hydro binary message format
(c) Buoy lifetimes Commissioners of Irish Lights	<ul style="list-style-type: none"> • 6 year deployment with 2 yearly checks

1: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

APPENDIX C

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	ITALY
Year	2011

1. CURRENT PROGRAMME:

Agency or programme	Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) National Wave Meter Network (Rete Ondametrica Nazionale)	
Number and type of buoys	(a) deployed during the year	0
	(b) operational as of 31 August	15
	(c) reporting on GTS as of 31 August	15
Purpose of programme	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Mediterranean Sea 45° 20' 00" N / 37° 26' 24" N - 008° 06' 25" E / 17° 22' 40" E	

Agency or programme	National Research Council of Italy (CNR) W1-M3A Off-Shore Observing System	
Number and type of buoys	(a) deployed during the year	0
	(b) operational as of 31 August	1
	(c) reporting on GTS as of 31 August	1
Purpose of programme	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Ligurian Sea (North Western Mediterranean Sea) 43° 50' 04.26" N 009° 07' 25" 05.39" E	

2. PLANNED PROGRAMMES:

Agency or programme	Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) National Wave Meter Network (Rete Ondametrica Nazionale)	
Number and type of buoys	planned for deployment in the next 12 months	1
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>

Main deployment areas	Adriatic Sea
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Agency or programme	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS) ONR (COCES-II project)	
Number and type of buoys	planned for deployment in the next 12 months	30 SVP drifters
Purpose of programme (<i>check/uncheck boxes using [] or [x] as appropriate</i>)	(a) operational	
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	North Tropical Atlantic off Senegal	

Agency or programme	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS) Italian Ministry of Research (Argo-Italy project)	
Number and type of buoys	planned for deployment in the next 12 months	24 SVP drifters
Purpose of programme (<i>check/uncheck boxes using [] or [x] as appropriate</i>)	(a) operational	
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	Mediterranean	

3. TECHNICAL DEVELOPMENTS:

Agency or programme	Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) National Wave Meter Network (Rete Ondametrica Nazionale)	
(a) Buoy design	<input type="checkbox"/> AXYS WatchKeeper™ rotationally molded 1.7 m diameter polyethylene buoy. <input type="checkbox"/> Four 20W solar panels, 400 amp battery capacity. <input type="checkbox"/> Buoy supplied in yellow color with appropriate top marks in compliance with internationally recognized standards for navigation buoys.	
(b) Instrumentation	<input type="checkbox"/> Directional wave, SST, air temperature and relative humidity, wind, atmospheric pressure as operational moored buoys instrumentation set	
(c) Others	<input type="checkbox"/> GPS package indicates whether buoy is on station	

Agency or programme	National Research Council of Italy (CNR) W1-M3A Off-Shore Observing System
(a) Buoy design	<input type="checkbox"/> Large spare buoy (51 m long, 12 tons weight). <input type="checkbox"/> Eight solar panel plus a wind generator recharging a 200 Ah battery pack. <input type="checkbox"/> Yellow painted, 4 nm lamp radar reflector.
(b) Instrumentation	<input type="checkbox"/> Atmospheric pressure, wind speed and direction, air temperature and relative humidity, short-wave radiation, long-wave radiation, rainfall. <input type="checkbox"/> Acoustic-based package for wave measuring. <input type="checkbox"/> Temperature-conductivity sensors along the buoy body at 6, 20, 36 m depth.
(c) Others	<input type="checkbox"/> Chlorophyll-a, turbidity, dissolved oxygen at 36 m depth. <input type="checkbox"/> CO2 sensor at 6 m depth <input type="checkbox"/> Nutrient sensor at 36 m depth. <input type="checkbox"/> GPS

4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

Ref	Title	Type ²
1	P. Picco et al., "Upper layer current variability in the Central Ligurian Sea," <i>Ocean Sci.</i> , 6, 825-836, doi:10.5194/os-6-825-2010, 2010.	(7)
2	S. Pensieri et al., "Comparison between QuikSCAT and buoy wind data in the Ligurian Sea," <i>Journal of Marine Systems</i> , Vol. 81, 2010, pp. 286–296.	(7)
3	A.M. Sempreviva et. al., "Observed development of the vertical structure of the marine boundary layer during the LASIE experiment in the Ligurian Sea," <i>Annales Geophysicae</i> , 28, 17–25, 2010.	(7)

5. SPECIAL COMMENTS (if any):

Agency or programme	Istituto Superiore per la Protezione e la Ricerca Ambientale (ISPRA) National Wave Meter Network (Rete Ondametrica Nazionale)
(a) Quality of buoy data	<input type="checkbox"/> Good <input type="checkbox"/> 90% of expected moored buoy data delivered to users
(b) Communications	<input type="checkbox"/> VHF <input type="checkbox"/> INMARSAT D+

2: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

(c) Buoy lifetimes	<input type="checkbox"/> 2 years <input type="checkbox"/> Maintenance period beyond 6 months
(d) Other	<input type="checkbox"/> Real time data available on the website http://www.telemisura.it <input type="checkbox"/> Buoy network regularly reports on the GTS through the cooperation of the Meteorological Service of the Italian Air Force (USAM)

Agency or programme	National Research Council of Italy (CNR) W1-M3A Off-Shore Observing System
(a) Quality of buoy data	<input type="checkbox"/> Good <input type="checkbox"/> 92.8% of expected moored buoy data delivered to users in 2010; <input type="checkbox"/> 47.1% of expected moored buoy data delivered to users in 2011 (jan-jun);
(b) Communications	<input type="checkbox"/> Dual transmission systems used (IRIDIUM and GSM). <input type="checkbox"/> Proprietary protocol specifically developed to optimize data transmission. <input type="checkbox"/> 8 records per day at the synoptic hours transmitted ashore in pairs.
(c) Buoy lifetimes	<input type="checkbox"/> W1-M3A can survive at sea for more than 10 year. <input type="checkbox"/> Periodic maintenance surveys to the mooring line (every 3 years), to the superstructure (every year) and to the on board equipment (every 4 months).
(d) Other	<input type="checkbox"/> Real time data available on the website http://www.odas.ge.issia.cnr.it . <input type="checkbox"/> Buoy regularly reports on the GTS through the cooperation of the Meteorological Service of the Italian Air Force (USAM)

APPENDIX D

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Republic of KOREA
Year	2011

1. CURRENT PROGRAMME:

Agency or programme	Korea Meteorological Administration	
Number and type of buoys	(a) deployed during the year	10 Moored Buoys
	(b) operational as of 31 August	18
	(c) reporting on GTS as of 31 August	8
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	regional sea around the Korea Peninsula	

Agency or programme	National Institute of Meteorological Research	
Number and type of buoys	(a) deployed during the year	14 Argo floats
	(b) operational as of 31 August	58 Argo floats
	(c) reporting on GTS as of 31 August	58 Argo floats
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	The East Sea and Northwest Pacific Ocean	

Agency or programme	Korea Hydrographic and Oceanographic Administration / Ministry of Land, Transport and Maritime Affairs	
Number and type of buoys	(a) deployed during the year	8(SVP) Drifters, 15 Moored Buoys
	(b) operational as of 31 August	11
	(c) reporting on GTS as of 31 August	8
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	East Sea(drifters) Regional sea around the Korea Peninsula(moored)	

Agency or programme	Korea Ocean Research & Development Institute	
Number and type of buoys	(a) deployed during the year	0 Argo float
	(b) operational as of 31 August	44
	(c) reporting on GTS as of 31 August	44
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	the East Sea and the Antarctic Sea	

2. PLANNED PROGRAMMES:

Agency or programme	Korea Meteorological Administration	
Number and type of buoys	planned for deployment in the next 12 months	9 moored Buoy
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	regional sea around the Korea Peninsula	

Agency or programme	National Institute of Meteorological Research	
Number and type of buoys	planned for deployment in the next 12 months	15 Argo floats
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	The East Sea and Northwest Pacific Ocean	

Agency or programme	Korea Hydrographic and Oceanographic Administration / Ministry of Land, Transport and Maritime Affairs	
Number and type of buoys	planned for deployment in the next 12 months	7(SVP) Drifters, 1 moored Buoy(Tsunami detection Buoy)
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	East Sea(drifters) Regional sea around the Korea Peninsula(moored)	

Agency or programme	Korea Ocean Research & Development Institute	
Number and type of buoys	planned for deployment in the next 12 months	none
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	the East Sea and the Antarctic Sea	

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	<ul style="list-style-type: none"> • • •
(b) Instrumentation	<ul style="list-style-type: none"> • • •
(c) Others	<ul style="list-style-type: none"> • • •

4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

<i>Ref</i>	<i>Title</i>	<i>Type3</i>
1		
2		
3		
4		

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> • • •
(b) Communications	<ul style="list-style-type: none"> • • •
(c) Buoy lifetimes	<ul style="list-style-type: none"> • • •
(d) Other	<ul style="list-style-type: none"> • • •

3: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

APPENDIX E

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	SOUTH AFRICA
Year	2011

1. CURRENT PROGRAMME:

Agency or programme	South African Weather Service/University of Cape Town/Globe Africa/ 3405-Bayworld Centre for Research and Education/4936 – Dept of Environmental Affairs – Oceans & Coasts	
Number and type of buoys	(a) deployed during the year	78xSVP-B; 4xARGO Floats; 1x PIE
	(b) operational as of 31 August	48
	(c) reporting on GTS as of 31 August	Not sure
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	South Atlantic Ocean	

2. PLANNED PROGRAMMES:

Agency or programme	South African Weather Service/University of Cape Town/Globe Africa/ 3405-Bayworld Centre for Research and Education/4936 – Dept of Environmental Affairs – Oceans & Coasts	
Number and type of buoys	planned for deployment in the next 12 months	74 SVP-B
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas		

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	<ul style="list-style-type: none"> • Techocean, Metocean, Clearwater, Pacific Gyre • •
(b) Instrumentation	<ul style="list-style-type: none"> • • SST and Pressure •
(c) Others	<ul style="list-style-type: none"> • • N/A •

4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

Ref	Title	Type4
1		
2		
3		
4		

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> • • Good •
(b) Communications	<ul style="list-style-type: none"> • • Good •
(c) Buoy lifetimes	<ul style="list-style-type: none"> • • Varies (6 -18 Months) •
(d) Other	<ul style="list-style-type: none"> • • • N/A

4: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

APPENDIX F

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country: JAPAN

Year: 2011

CURRENT PROGRAMMES

A. Japan Meteorological Agency (JMA)

Number and type of buoys:

(a) deployed during year:

(Type 1) 16 drifting buoys with air pressure, SST, wave height and wave period sensors

(Type 2) 28 profiling floats

(b) operational at 31 August:

(Type 1) 7

(Type 2) 28

(c) reporting on GTS at 31 August:

(Type 1) 7

(Type 2) 28

Purpose of programme:

(Type 1) operational: weather and sea condition monitoring

(Type 2) operational: ocean state and climate monitoring

Main deployment areas:

seas around Japan

B. Japan Agency for Marine-Earth Science and Technology

Number and type of buoys:

(a) deployed during year:

(Type 1) 1 meteorological and 1 oceanographic drifter (1 Portable Polar Observation Platform (PPOP) and 1 Polar Ocean Profiling System (POPS))

(Type 2) 19 meteorological and subsurface oceanographic surface moorings (16 TRITON buoys, 2 m-TRITON buoys and 1 K-TRITON buoy)

(Type 3) 50 profiling floats

(b) operational at 31 August:

(Type 1) 2 (1 PPOP and 1 POPS)

(Type 2) 19

(Type 3) 237

(c) reporting on GTS at 31 August

(Type 1) 2

(Type 2) 16 (15 TRITON buoys and 1 K-TRITON buoy)

(Type 3) 237

Purpose of programme:

(Type 1) meteorological and oceanographic research (PPOP and POPS)

(Type 2) ENSO, IOD, Kuroshio and meteorological and oceanographic research monitoring

(Type 3) oceanographic research (Argo project)

Main deployment areas:

(Type 1) the Arctic Ocean (PPOP and POPS)

- (Type 2) the western tropical Pacific and the eastern Indian Ocean for TRITON and m-TRITON, and the north of Kuroshio Extension region for K-TRITON
- (Type 3) the North Pacific, the South Pacific, the South Indian, the Southern and the Arctic Oceans

C. Seikai National Fisheries Research Institute, Fisheries Research Agency

Number and type of buoys

(a) deployed during year: 3 surface drifters

(b) operational at 31 August: 3

(c) reporting on GTS at 31 August: 0

Purpose of programme: oceanographic research

Main deployment areas: the East China Sea, Tsushima Strait and the Japan Sea

D. Tohoku University

Number and type of buoys:

(a) deployed during year: 2 profiling floats

(b) operational at 31 August: 2 profiling floats

(c) reporting on GTS at 31 August: 2 profiling floats

Purpose of programme: oceanographic research

Main deployment areas: the North Pacific Ocean

E. Okinawa Institute of Science and Technology

Number and type of buoys

(a) deployed during year: 1 Argo equivalent float

(b) operational at 31 August: 1

(c) reporting on GTS at 31 August: 1

Purpose of programme: current circulation research in Okinawa Trough

Main deployment areas: Okinawa Trough

PLANNED PROGRAMMES

A. Japan Meteorological Agency

Number and type of buoys planned
for deployment in next 12 months:

(Type 1) 16 drifting buoys with air pressure, SST, wave height and wave
period sensors

(Type 2) 24 profiling floats

Purpose of programme:

(Type 1) operational: weather and sea condition monitoring

(Type 2) operational: ocean state and climate monitoring

Main deployment areas: seas around Japan

B. Japan Agency for Marine-Earth Science and Technology

Number and type of buoys planned
for deployment in next 12 months:

(Type 1) 1 meteorological and 1 oceanographic drifters (1 PPOP and 1 POPS)

(Type 2) 20 meteorological and subsurface oceanographic surface moorings
(15 TRITON buoys, 3 m-TRITON buoys and 2 K-TRITON
buoys)

(Type 3) 70 profiling floats

Purpose of programme:

(Type 1) meteorological and oceanographic research

(Type 2) ENSO, IOD and meteorological and oceanographic research
monitoring

(Type 3) oceanographic research (Argo project)

Main deployment areas:

(Type 1) the Arctic Ocean

(Type 2) the western tropical Pacific (15 TRITON buoys), the eastern Indian
Ocean (3 m-TRITON buoys) and the north of Kuroshio
Extension region (2 K-TRITON buoys)

(Type 3) the Pacific and the Indian Oceans

C. Seikai National Fisheries Research Institute, Fisheries Research Agency

Number and type of buoys
for deployment in next 12 months:

5 surface drifters

Purpose of programme: oceanographic research

Main deployment areas: the East China Sea, Tsushima Strait and the Japan
Sea

D. Tohoku University

Number and type of buoys planned
for deployment in next 12 months:

1 profiling float

Purpose of programme: oceanographic research

Main deployment areas: the North Pacific Ocean

APPENDIX G

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Canada
Year	2011

1. CURRENT PROGRAMME:

Agency or programme	Moored and drifting buoys in the Northeast Pacific Ocean Pacific and Yukon Region of Environment Canada	
Number and type of buoys	(a) deployed during the year	<ul style="list-style-type: none"> • 16 moored buoys maintained • 7 drifting buoys deployed • 1 waverider deployed
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 15 - 3 M Discus • 3 - 6 M NOMAD • 1 - 0.7 M waverider • 7 - SVP-B drifters
	(c) reporting on GTS as of 31 August	24
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	Coastal waters of British Columbia, as well as open ocean deployments of moored buoys (NOMADS) and drifting buoys.	

Agency or programme	Moored buoys on the Great Lakes and other interior lakes Prairie and Northern Region and Ontario Region of Environment Canada	
Number and type of buoys	(a) deployed during the year	19 (seasonal) moored buoys
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 10 - 3 M Discus • 9 - 1.7 M watchkeeper
	(c) reporting on GTS as of 31 August	19
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Canadian waters of the Great Lakes, and large interior lakes in central Canada. Note that all deployments are seasonal.	

Agency or programme	Moored buoys in the Northwest Atlantic Ocean and Gulf of St. Lawrence
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Atlantic Region and Quebec Region of Environment Canada		
Number and type of buoys	(a) deployed during the year	<ul style="list-style-type: none"> • 9 moored buoys maintained • 1 seasonal deployment • 1 waverider redeployed • 6 SVP-B drifting buoys deployed.
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 2 - 3 M Discus • 8 - 16 M NOMAD • 1 - 0.7 M waverider • 5 - SVPB
	(c) reporting on GTS as of 31 August	16
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Northwest Atlantic Ocean and Gulf of St. Lawrence	

Agency or programme		
Ice buoys deployed in the Arctic Basin and Eastern Arctic - in collaboration with International Arctic Buoy Program (IABP) and also to meet operational requirements of the Canadian Ice Service and new METAREA obligations.		
Number and type of buoys	(a) deployed during the year	<ul style="list-style-type: none"> • none
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 3 - ICEX Air • 3 - CALIB
	(c) reporting on GTS as of 31 August	6
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	Beaufort Sea, Canadian Archipelago, Eastern Arctic and Labrador Sea	

2. PLANNED PROGRAMMES:

Agency or programme		
Moored and drifting buoys in the Northeast Pacific Ocean Pacific and Yukon Region of Environment Canada		
Number and type of buoys	planned for deployment in the next 12 months	<ul style="list-style-type: none"> • 18 moored buoys maintained • 1 waverider buoy redeployed • 16 drifting buoys, including GDP buoys.

Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Coastal waters of British Columbia, as well as open ocean deployments of moored buoys (NOMADS) and drifting buoys.	

Agency or programme	Moored buoys on the Great Lakes and other interior lakes Prairie and Northern Region and Ontario Region of Environment Canada	
Number and type of buoys	planned for deployment in the next 12 months	<ul style="list-style-type: none"> • 20 (seasonal) moored buoys
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	Canadian waters of the Great Lakes, and large interior lakes in central Canada. Note that all deployments are seasonal. Hope to deploy Churchill buoy in James Bay pending availability of suitable logistical support.	

Agency or programme	Moored buoys in the Northwest Atlantic Ocean and Gulf of St. Lawrence Atlantic Region and Quebec Region of Environment Canada	
Number and type of buoys	planned for deployment in the next 12 months	<ul style="list-style-type: none"> • 9 moored buoys • 1 seasonal moored buoy • 1 waverider • 4 SVP-b drifting buoys
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Northwest Atlantic Ocean and Gulf of St. Lawrence. Note EC also provides logistical support for a number of E-SURFMAR drifting buoy deployments each year via the port of Halifax.	

Agency or programme	Ice buoys deployed in the Arctic Basin and Eastern Arctic - in collaboration with International Arctic Buoy Program (IABP) and also to meet operational requirements of the Canadian Ice Service and new METAREA obligations.	
Number and type of buoys	planned for deployment in the next 12 months	<ul style="list-style-type: none"> • 8-10 • Will include ICEx-Air, SVP-B, CALIB, and AXIB buoys.
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Northwest Atlantic Ocean and Gulf of St. Lawrence Beaufort Sea, Canadian Archipelago, Eastern Arctic and Labrador Sea	

3. TECHNICAL DEVELOPMENTS:

<p>(a) Buoy design</p>	<ul style="list-style-type: none"> • Integration of Iridium SBD modem into ICEX buoy: <p>Over the past year, EC worked with Christian Michelson Research (CMR) in Norway to arrange for the integration of a Iridium 9602 Short Burst Data modem into the existing and proven ICEX-Air drifting buoy. The buoy will also be equipped with a GPS. Following successful testing, 2 units were produced and delivered to EC. These will be deployed in the Arctic next summer, and we will further evaluate the buoy performance with the new communications system. This change was made to reduce communications costs VS use of ARGOS.</p> • Evaluation of AXIB Buoy: <p>EC has procured one Air Deployable Expendable Ice Buoy (AXIB) from LBI Corp. The buoy will be deployed this fall in the Beaufort Sea, and will contribute to field testing being undertaken by the International Arctic Buoy Program (IABP). The AXIB buoy is designed to survive operations in marginal ice conditions, and will be able to survive free-in. The buoy is also equipped with a 2 m mast for temperature observations above the ice or ocean surface.</p> • Integration of SUTRON SatLink2 GOES transmitters on moored buoys: <p>EC has completed testing, is now installing new GOES transmitters procured from SUTRON. The SatLink2 with a 40W linear signal amplifier was selected to allow EC buoys to transmit at higher baud rates. The decision was based in part on the use of the same equipment by the National Data Buoy Centre (NDBC) on their buoy network in North America. We expect to equip between 20 and 25 buoys with the new transmitters in 2011, and complete the rest of the network by the end of 2012.</p>
<p>(b) Instrumentation</p>	<ul style="list-style-type: none"> • Transition to sonic anemometers for moored buoy network: <p>Continue evaluation of ultrasonic anemometers (Vaisala ws425 and equivalent) on MSC 3 m and 6 m buoys, a number of buoys have ultrasonic as secondary wind. Awaiting results from our Engineering Test/Evaluation group as part of MSC procurement process for new wind sensors. Pending results of procurement and evaluation process, MSC buoys will continue to utilize ultrasonic anemometers only in secondary position. Given the results to date (comparison to existing wind system, performance in marine environment etc.), expect that 100% of</p>

	<p>buoys will utilize non-mechanical (sonic) anemometers in future.</p>
<p>(c) Others</p>	<p>Development of specification for next generation buoy system</p> <p>EC is actively developing a requirements and specification for future moored buoy and potentially ship-board automatic weather stations. EC's moored buoy and AVOS (automated VOS) both utilize the WatchMan100 system provided by AXYS Technologies. While this system has proven to be very reliable, there is a requirement to upgrade the buoy network with updated systems that can be supported into the future. We are also looking for a system that will more easily support functionality such bi-directional communications, as well as varied modes of operation (i.e. activation of "storm" mode with more frequent sampling and data transmission). EC will be finalizing our requirements later this year, and will follow-up with a competitive request for proposal to solicit interest from the private sector. An evaluation process will follow that will select a system that will meet our technical requirements and also be cost effective from both an initial purchase, as well as equipment life cycle.</p> <p>Routing of Third Party Drifting Buoys to GTS:</p> <p>As outlined at last year's DBPC meeting, Environment Canada has entered into a data sharing agreement with Jou Beh Technologies Inc. and Scotia Weather Services to facilitate the routing of buoy data to the GTS. Jou Beh is an Iridium value added reseller (VAR), and has identified a requirement from their clients working in the met/ocean field for end-to-end data management of their buoy data, including broadcast of data to the GTS. With the advent of Iridium buoys offering more timely data, and lower communication costs than the ARGOS system, a need was identified to ensure there was a cost-effective means of relaying Iridium equipped buoy data to the GTS.</p> <p>Scotia Weather Services provide the required 24/7/365 operations to process data received from the Iridium buoys and generate the required FM18 messages for distribution to the GTS. Scotia Weather has implemented a quality control system to validate each element of the buoy observation prior to transmission of the data. Environment Canada has provided a means to receive the FM18 messages at the Canadian Meteorological Centre in Montreal, and now routing the messages from non-MSB buoys to the GTS under the header: <i>SSVX02 CWAO</i>. Scotia Weather plans to develop the functionality to generate and disseminate buoy data in BUFR format by the end of 2011.</p>

	<p>To date, there have been over 30 buoys routed through this new system. Buoy operators include a number of University researchers, as well as two National Met Services. The majority of the buoy data routed to the GTS have been deployments in the Canadian Arctic, which would not have been broadly available without this new system to route Iridium buoy data to the GTS.</p>
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4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

Ref	Title	Type5
1	Monthly moored and drifting buoy status reports at http://thetis.pyr.ec.gc.ca/a-buoyestat.phtml	2, 3 ,6
2	Buoy data available at http://www.weatheroffice.ec.gc.ca/marine/index_e.html (real-time) http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/waves-vagues/index-eng.htm (DFO - ISDM archive of wave and atmospheric measurements from EC moored buoys)	8
3	Detailed network performance reports are available by contacting EC-MSM Marine Networks - Chris Marshall National Manager of Marine Network - chris.marshall@ec.gc.ca 1 (416) 739-4468	8

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> • For 2nd half of 2010 Data availability from moored buoys was 92% of expected observations received and delivered to clients. • For 1st half of 2011 Data availability from moored buoys was 82% of expected observations received and delivered to clients.
(b) Communications	<ul style="list-style-type: none"> • GOES is primary communication for moored buoys • ARGOS used as back-up for moored buoy, and primary for SVP-B and Ice buoys • Iridium is utilized for new SVP-B deployments, as well as moored buoy position beacons.
(c) Buoy lifetimes	<ul style="list-style-type: none"> • 2-4 years at which time they are refurbished (weld/leak tests, sandblasting, painting etc.) Experience has shown that extending maintenance period beyond 18 months results in loss of data (missing winds), and degradation quality and reliability of other parameters. • Drifting buoys 12-24 months • ICEx-Air buoys up to 36 months

5: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

Note: It is recommended that this form is filled in electronically and returned also electronically to the Secretariat. A template of the form can be downloaded from the following ftp site:

<ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/templates/Format-DBCP-National-Reports.doc>

APPENDIX H

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	China
Year	2010.7-2011.7

1. CURRENT PROGRAMME:

1)SOA

Agency or programme	State Oceanic Administration people's republic of China	
Number and type of buoys	(a) deployed during the year	18 Buoys, including 10m Moored Bouys, 3m Moored Buoys, Ice Buoys and Tsunami Buoy
	(b) operational as of 31 August	14 Buoys
	(c) reporting on GTS as of 31 August	3 Ice Buoys
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[]
	(c) developmental	[x]
Main deployment areas	China Sea , Indian Ocean	

2) CMA

Agency or programme	China Meteorological Administration	
Number and type of buoys	(a) deployed during the year	10 ,10m Moored Buoys
	(b) operational as of 31 August	10
	(c) reporting on GTS as of 31 August	[x]
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	China Sea	

2. PLANNED PROGRAMMES:

Agency or programme	State Oceanic Administration people's republic of China	
Number and type of buoys	planned for deployment in the next 12 months	8 Buoys
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas		

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design

National Ocean Technology Centre of SOA designed and developed middle-size multi-disciplines and multi-parameters buoy. This kind of buoy is light, simply structured, well-drifted with wave movement, easy to deploy and maintain. Meanwhile, it is equipped with beacon lights, radar reflector and a lightning rod to guarantee safe operation at sea. By equipped with different sensors, it can conduct long-term, continuous and automatic monitoring on marine and meteorology and water quality. According to buoy body size and material is divided into: 3m steel disc-shaped buoy (Figure 1) and 2.4m foam buoy (Figure 2).



4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

Ref	Title	Type6
1	Static Analysis and Attitude Calculation of Marine Submersible Buoy System and its applied the procedure development	technical developments

6: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

APPENDIX I

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	USA
Year	2011

1. CURRENT PROGRAMME:

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ National Weather Service (NWS)/ National Data Buoy Center (NDBC) Moored Buoys (Met/Ocean)	
Number and type of buoys	(a) deployed during the year	46
	(b) operational as of 1 August	115
	(c) reporting on GTS as of 1 August	90
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Atlantic and Pacific Oceans and coastal zone of the U.S., including the Bering Sea, Gulf of Mexico and Great Lakes	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ National Weather Service (NWS)/ National Data Buoy Center (NDBC) Tsunameter Stations	
Number and type of buoys	(a) deployed during the year	20
	(b) operational as of 1 August	39
	(c) reporting on GTS as of 1 August	34
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Atlantic and Pacific Oceans and Gulf of Mexico	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ National Weather Service (NWS)/ National Data Buoy Center (NDBC) Tropical Atmosphere Ocean (TAO) Project	
Number and type of buoys	(a) deployed during the year	55 surface toroids, 4 subsurface
	(b) operational as of 1 August	55 surface toroids, 4 subsurface
	(c) reporting on GTS as of 1 August	53 surface toroids, 4 subsurface
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Tropical Equatorial Pacific	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL)/ PIRATA	
Number and type of buoys	(a) deployed during the year	17 surface toroids
	(b) operational as of 1 August	17 surface toroids
	(c) reporting on GTS as of 1 August	17 surface toroids
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	Tropical Equatorial Atlantic	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL)/ RAMA	
Number and type of buoys	(a) deployed during the year	20 surface toroids, 6 subsurface
	(b) operational as of 1 August	15 surface, 10 subsurface
	(c) reporting on GTS as of 1 August	15
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	Tropical Equatorial Indian Ocean	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ Atlantic Oceanographic and Meteorological Laboratory (AOML) Global Ocean Observing System Center Global Drifter Program	
Number and type of buoys	(a) deployed during the year	945
	(b) operational as of 1 August	1065
	(c) reporting on GTS as of 1 August	1065
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	1065
	(b) met / ocean research	185
	(c) developmental	21
Main deployment areas	Global, All Oceans	

Agency or programme	Naval Oceanographic Office (NAVOCEANO)	
Number and type of buoys	(a) deployed during the year	20 APEX floats, 52 SLDMB Davis Drifters
	(b) operational as of 1 August	34 APEX Floats (Argos), 2 Iridium Floats (test floats not on GTS), 3 Davis surface drifters
	(c) reporting on GTS as of 1 August	34 APEX Floats, 3 Davis drifters
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Primarily Northern Hemisphere	

Agency or programme	Arctic Buoy Programme	
Number and type of buoys	(a) deployed during the year	32
	(b) operational as of 1 August	4
	(c) reporting on GTS as of 1 August	17
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Arctic Ocean	

Agency or programme	Antarctic Buoy Programme	
Number and type of buoys	(a) deployed during the year	0
	(b) operational as of 31 August	0
	(c) reporting on GTS as of 31 August	0
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	X
	(b) met / ocean research	X
	(c) developmental	X
Main deployment areas	Arctic Ocean	

Agency or programme	USACE Engineer Research and Development Center / Coastal Data Information Program (SIO) / US Navy	
Number and type of buoys	(a) deployed during the year	3
	(b) operational as of 1 August	54
	(c) reporting on GTS as of 1 August	51
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Atlantic, Pacific Oceans Gulf of Mexico and coastal zone of the U.S.	

2. PLANNED PROGRAMMES:

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ National Weather Service (NWS)/ National Data Buoy Center (NDBC) Moored Buoys (Met/Ocean)	
Number and type of buoys	planned for deployment in the next 12 months	40
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Atlantic and Pacific Oceans and coastal zone of U.S., including Bering Sea, Gulf of Mexico and the Great Lakes	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ National Weather Service (NWS)/ National Data Buoy Center (NDBC) Tsunameter Stations	
Number and type of buoys	planned for deployment in the next 12 months	25
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Atlantic and Pacific Oceans and Gulf of Mexico	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ National Weather Service (NWS)/ National Data Buoy Center (NDBC) Tropical Atmosphere Ocean (TAO) Project	
Number and type of buoys	planned for deployment in the next 12 months	55 surface toroids, 4 subsurface
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Tropical Equatorial Pacific	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL)/ PIRATA	
Number and type of buoys	planned for deployment in the next 12 months	17
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	Tropical Equatorial Atlantic	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL)/ RAMA	
Number and type of buoys	planned for deployment in the next 12 months	29 surface toroids, 10 subsurface
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	
Main deployment areas	Tropical Equatorial Indian Ocean	

Agency or programme	National Oceanic and Atmospheric Administration (NOAA)/ Atlantic Oceanographic and Meteorological Laboratory (AOML) Global Ocean Observing System Center Global Drifter Program	
Number and type of buoys	planned for deployment in the next 12 months	1000
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	800
	(b) met / ocean research	200
	(c) developmental	
Main deployment areas	Global, All Oceans	

Agency or programme	Naval Oceanographic Office (NAVOCEANO)	
Number and type of buoys	planned for deployment in the next 12 months	80 floats, 70 SLDMBS and 12 ISPHERE Iridium drifters
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Primarily Northern Hemisphere	

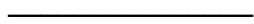
Agency or programme	Arctic Buoy Programme	
Number and type of buoys	planned for deployment in the next 12 months	38+
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	Arctic Ocean	

Agency or programme		
Number and type of buoys	planned for deployment in the next 12 months	12
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas		

Agency or programme	USACE Engineer Research and Development Center / Coastal Data Information Program (SIO) / US Navy	
Number and type of buoys	planned for deployment in the next 12 months	5 (3 spares)
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Atlantic, Pacific Oceans Gulf of Mexico and coastal zone of the U.S.	

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	<ul style="list-style-type: none"> • T-cup handle added to buoy tower to increase safety and success of operations. (PIRATA/RAMA) • Developing a seasonal ice buoy that may be able to withstand the harsher conditions of the increasing area of seasonal ice. (Arctic Ice Programme) • Tested medium frequency acoustic modems on tsunameter buoys to increase the acoustic cone to allow for stronger moorings (Tsunameter) •
(b) Instrumentation	<ul style="list-style-type: none"> • PMEL is testing “Tropica-Flex” moorings where Seabird electronics replace legacy PMEL temperature thermistors. Tflex moorings communicate via Iridium modem. • Ocean thermistor string buoys to measure upper ocean heating (Arctic Ice Programme) • New high density acoustic baffle for the Bottom Pressure Recorder (BPR) and low density acoustic baffle for the buoy that houses the Benthos Medium Frequency hydrophone and the electrical design to house the mid-frequency transmitter board with other electronic systems were completed.
(c) Others	<ul style="list-style-type: none"> • Survival of traditional ice buoys in the increasing area of seasonal ice is more challenging. • Upgrade radio telemetered data to IRIDIUM communications, requiring top-hat grade for remainder of buoys in network. • •



APPENDIX J

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Brazil
Year	Jul 2010 to Jul 2011

1. CURRENT PROGRAMME:

Agency or programme	DHN-CHM – National GOOS Programme that includes PNBOIA (National Buoy Program) MOVAR and PIRATA	
Number and type of buoys	(a) deployed during the year	08 PIRATA buoys 03 moored buoys of Platform type 00 moored buoy of Costal type 36 SVP drifters 24 SVP-B drifters
	(b) operational as of 31 August	08 PIRATA buoys 02 moored buoys of Platform type 00 moored buoy of Costal type 35 drifters
	(c) reporting on GTS as of 31 August	08 PIRATA buoys 02 moored buoys of Platform type 00 moored buoy of Costal type 35 drifters
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	BRAZILIAN EEZ	

2. PLANNED PROGRAMMES:

Agency or programme	DHN-CHM – National GOOS Programme that includes PNBOIA (National Buoy Program) MOVAR and PIRATA	
Number and type of buoys	planned for deployment in the next 12 months	56 SVP and 32 SVP-B and 3SVP-BW six moored buoys, additionally to 8 PIRATA ATLAS buoys.
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	BRAZILIAN EEZ	

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	<ul style="list-style-type: none"> Platform type : Axys 3M Coastal Type : Axys Watchkeeper PIRATA: ATLAS buoy
(b) Instrumentation	<ul style="list-style-type: none"> air temperature and relative humidity, SST, wind, atmospheric pressure, solar radiation, directional wave, ADCP, fluorometer and automatic identification system (AIS), as moored buoys instrumentation set for Platform type. Inclusion of thermistor chain for coastal moored buoy.
(c) Others	<ul style="list-style-type: none"> use of Inmarsat-C (two-way telemetry), in redundancy to Argos-CLS

4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

Ref	Title	Type⁷
1		

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	
(b) Communications	
(c) Buoy lifetimes	
(d) Other	Moored buoys are exposed to fishing vessels activities, and studies are necessary to avoid damages due to this problem.

7: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

APPENDIX K

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	India
Year	2011



NATIONAL INSTITUTE OF OCEAN TECHNOLOGY

(Ministry of Earth Sciences)

OCEAN OBSERVATION SYSTEMS

MOORED DATA BUOY PROGRAMME

During 2010-2011 under this moored buoy programme 41 moored met ocean buoy operations, 14 cruises involving 270 ship days, 2900 man days, 18000 nm of sailing distance in Bay of Bengal, Arabian Sea and Indian Ocean during 2010 -2011. The Buoy Network was re-established successfully on January 2011. The vessels Sagar Manjusha, Sagar Nidhi, Sagar Kanya and Borris Petrov were used execute the field operations at sea to achieve the buoy network.

Technical Accomplishments in Moored Data Buoy Programme

Establishment of subsurface Ocean Moored buoy Network for Indian monsoon in Bay of Bengal: In order to measure sub surface data upto 500m water depth along with met - ocean data to transmit real time for monsoonal studies next generation of moored buoy systems are established in 6 locations in deep waters in Bay of Bengal with one in Andaman Sea. These buoys which were established before the onset of North-East Monsoon could capture JAL cyclone with the onset of low pressure and its effects of atmosphere and ocean, which gave a new insight into this phenomenon.

Technological developments

Indigenized data buoy CPU developed for industry standard was deployed at BD06 location is functional and providing data from July 2010 to till date and collected data during JAL cyclone and one more is deployed in Arabian sea at AD05. These CPUs are upgraded for wave data measurements.

Coral Reef Buoy: On the request of Department of Environment and Forest (DOEF), Andaman & Nicobar, successfully deployed Coral Reef Buoy in Mahatma Gandhi Marine National Park, Wandoor, Andaman & Nicobar Island during February 2011. The buoy is fitted with meteorological sensors, water quality sensor to monitor the coral reef environment. The environmental sensors stopped after 4 or 6 weeks due to marine fouling. The mooring is experiencing severe current. The mooring designed to have double anchor and a shore anchor to withstand high current, wave and wind loading in Andaman island and is being closely monitored.

Data buoy as a reference platform was deployed Off Agatti, Lakshadweep and is functional from March 2011 with dual mast and redundant wind & humidity sensors for the first time. This is a challenging task to integrate and to deploy such a buoy system. This mooring has a shore anchor and is experiencing sever wave and wind loads.

Pilot Project Wave Measurement and Evaluation Test (PP-WET) - UNESCO-IOC

As a part of Inter Calibration exercise on the request of UNESCO-IOC global Pilot Project on Wave Measurement and Evaluation Test (PP-WET) is initiated. One wave rider buoy and data buoy were

successfully deployed in April 2011 Off Agatti Both Data buoy and wave rider buoy are working satisfactorily and inter comparison exercise is in progress. Preliminary report was submitted to the Ministry.

Best of Practice Method Manual for moored buoys was prepared and is being followed using the inputs from PMEL NOAA and vetted by NOAA NDBC to obtain quality data from moored buoys.

Anti-Vandal As a part of this activity protective hood, hidden antenna and surveillance camera were adopted. To avoid vandalism, the old design of hood was modified into conical shaped Hood. In the earlier design, it has flat at the top of the hood, which enables the person to stand over it and break the Components of the Buoy. In order to overcome the vandalism of Antenna fitted on top of the sensor mast of the buoy it was fitted inside a hood for data buoys and Tsunami Buoys. Three designs were evolved.

Challenges

Satellite communications through INMARSAT

Data buoys and Tsunami buoys are deployed in Bay of Bengal and Arabian Sea at selected locations. However, the project is suffering various constraints to provide continuous data from the sea bed to Tsunami Early Warning Centre. Important factors that decide the most appropriate satellite communication link to be used for tsunami buoy systems are: (a) power consumption of the transceiver electronics, (b) high data rate and (c) low latency. IRIDIUM satellite terminal supports 2400bps with very low power consumption of 250mW in standby mode and around 2.5W in transmit mode. Compared to this, INMARSAT terminal operates at a low data rate of 600bps with high power consumption of 2W in standby mode and 23W in transmit mode. Hence IRIDIUM communication is used in more than 90 % of the tsunami buoys operating globally. Due to the inherent disadvantages of high power consumption & low data rate it was observed on a number of occasions that (i) the battery on the buoys need frequent replacements, which is very tedious due to non-availability of ship time as well as (ii) high data latency and data gaps while operating in tsunami event mode.

Vandalism

A major challenge faced by this project is 'vandalism of surface buoys', destruction of solar panels, destruction of transmission units, destruction of sensors mounted on a 3 m tall mast on met-ocean data buoys, etc. Vandalism of these valuable ocean data buoys has been, and remains, a significant problem in many ocean areas. Simple acts of vandalism of these buoys, both deliberate and accidental, and problems linked with fishing are major ongoing problems in many parts of the world. For example, incidents of buoys caught in trawl-nets or entangled in fishing lines are fairly frequent. Several efforts were made such as awareness to Indian fishermen, by distribution of pamphlets, Buoy identification through WMO Identification code, Buoys are fitted with beacon lights as per international standard IALA code, Radar reflector as per standard, also special technological changes like slippery smooth, Protective hood to avoid tie-up by boats, Difficult to remove fixtures / fasteners. Also these buoy locations are notified through Mariners notice sent to Naval Hydrographic Organization, Monthly status report are sent to Navy and Coast Guard etc., These buoys are expensive and their set-up in the sea is a time-consuming exercise. Therefore, any loss of the buoys hampers global climate research, meteorological forecasts considerably. Further, it can also undermine the capacity to detect and warn the natural disasters and thus jeopardize the lives of millions of people. To address the issue of safety of data buoys and tsunami buoys, there is an urgent need for regional cooperation and regionally coordinated effort to protect these buoys.

Regional Workshop: Successfully conducted Regional Workshop on “*Establishing a Cooperative Mechanism for Protection of Met-ocean Data and Tsunami Buoys in the Northern Indian Ocean Region*” organized by the National Institute of Ocean Technology (NIOT) and the Bay of Bengal Programme – Inter Governmental Organization (BOBP-IGO) at NIOT Campus, Chennai from 6 – 7 May 2011. A total of 84 delegates representing 53 Organization participated in the Regional Workshop. The delegates included Government representatives from eight countries surrounding the Bay of Bengal viz., Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand; Inter-Governmental Organizations such as the United Nations Educational, Scientific and Cultural Organization- Intergovernmental Oceanographic Commission (UNESCO-IOC) and South Asia Co-operative Environment Programme (SACEP); Industry representative from USA, UK, Norway and India; and NGOs and Civil Society Organizations. The Indian delegation included senior officials from the coastal states of Tamil Nadu, Maharashtra, Karnataka, West Bengal, Union Territory of Puducherry; Indian Coast Guard, Navy; National Disaster Management Authority; Ministry of Earth Sciences; and Ministry of Agriculture. The workshop outcome was presented to UNESCO-IOC, National Disaster Management Authority and NOAA PMEL. The major outcome is formation of regional working group and effective strategy so that information on buoy deployments are communicated to the countries in the Bay of Bengal region

Piracy in Arabian Sea

In recent days piracy issue in Arabian Sea is affecting the servicing and deployment work in Arabian Sea.

Training

NOAA – NDBC Training : Capacity Building on “Moored Buoy Data Management and Quality Control” offered by two experts Mr Walter Henry McCall and Mr Micheal Nolan Huguet from National Data Buoy Centre(NDBC) – NOAA, USA was successfully completed during 18th – 29th April 2011 and two days training was organised for NIOT, INCOIS & IITM staff. It is jointly agreed to conduct these event annually.

Participated in the *JCOMM* Marine Instrumentation **Workshop** for the Asia Pacific **Region** from 11 to 13 July 2011 at Tianjin, **China**

APPENDIX L

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	New Zealand
Year	2011

CURRENT PROGRAMMES

(for period 1 Sept 2010 – 1Sept 2011)

- A Agency or programme:** Meteorological Service of NZ Ltd (MSNZ) using **Technocean** Buoys
- Number and type of buoys: (a) Deployed during the year: **5 SVPB**
 (b) Operational at 31 August: **5**
 (c) Reporting on GTS at 31 August: **5**
- Purpose of programme: Real-time buoy data for MetService Weather Forecasting activities
- Main deployment area: Tasman Sea including 1 buoy on a remote Island
-
- B Agency or programme:** MSNZ Barometer Upgrade Programme for SOBP using **Technocean** Buoys
- Number and type of buoys: (a) Deployed during the year: **10 SVPB**
 (b) Operational at 31 August: **2**
 (c) Reporting on GTS at 31 August: **2**
- Purpose of programme: To increase the number of pressure observations in the data-sparse Southern Ocean for MetService's Forecasting Operations and for ingest by global models.
- Main deployment area: Southern Pacific Ocean.
-
- C Agency or programme:** Global Drifter Programme for SOBP using **Technocean** Buoys
- Number and type of buoys: (a) Deployed during the year: **19 SVPB**
 (b) Operational at 31 August: **6**
 (c) Reporting on GTS at 31 August: **6**
- Purpose of programme: To provide deployment opportunities and logistical support to the GDP to increase the number of buoy observations in the Southern Ocean.
- Main deployment area: Southern Pacific Ocean.
-
- D Agency or programme:** Argos3 Pilot Project – **Marlin-Yug** Buoys
- Number and type of buoys: (a) Deployed during the year: **6ARGOS3 PMT**
 (b) Transmitting at 31 August: **4**
 (c) Reporting on GTS at 31 August: **0**

Purpose of programme: To participate in the Argos3 Pilot Project by deploying 6 Marlin-Yug buoys provided by Argos, in the sea around NZ to trial the two-way communications.

Main deployment area: Tasman Sea

- E Agency or programme:** Iridium Pilot Project – **MetOcean** Buoys
- Number and type of buoys: (a) Deployed during the year: **2Iridium**
 (b) Operational at 31 August: **2**
 (c) Reporting on GTS at 31 August: **2**
- Purpose of programme: To participate in the Iridium Pilot Project by deploying 2 MetOcean buoys, in the Tasman Sea to trial Iridium communications.
- Main deployment area: Tasman Sea

PLANNED PROGRAMMES (for period 1 Sept 2011 – 1 Sept 2012)

- A Agency or programme:** Meteorological Service of NZ Ltd (MSNZ)
- Number and type of buoys planned for deployment in next twelve months: **5 SVPB**
- Purpose of programme: Real-time buoy data for MetService Weather Forecasting activities
- Main deployment area: Tasman Sea
- B Agency or programme:** MSNZ Barometer Upgrade Programme for SOBP
- Number and type of buoys planned for deployment in next twelve months: **15 SVPB**
- Purpose of programme: To increase the number of pressure observations in the data-sparse Southern Ocean for MetService's Forecasting Operations and for ingest by global models.
- Main deployment area: Southern Pacific Ocean.
- C Agency or programme:** Global Drifter Programme Programme for SOBP
- Number and type of buoys planned for deployment in next twelve months: **10 SVPB**
- Purpose of programme: To provide deployment opportunities and logistical support to the GDP to increase the number of buoy observations in the Southern Ocean.
- Main deployment area: Southern Pacific Ocean.

- D Agency or programme:** Iridium Pilot Project – **MetOcean** Buoys
- Number and type of buoys planned for deployment in next twelve months: **TBC**
- Purpose of programme: To deploy Iridium buoys into South Pacific (area centred on a circle 25S 125W) to improve data timeliness.
- Main deployment area: South Pacific Ocean.

TECHNICAL DEVELOPMENTS

- (a) Buoy design:
- (b) Instrumentation:
- (c) Others: In early 2008, MetService placed an SVPB buoy on each of two remote islands to act as basic, autonomous AWS. The locations are: ThreeKingsIsland to the North of NZ, and AntipodesIsland to the SE of NZ. The pressure data has been corrected for height above MSL and the SST data is not disseminated on GTS. The buoy on Antipodes Island was replaced in December 2009, and the Three Kings buoy was replaced in October 2010.

SPECIAL COMMENTS

- (a) Quality of buoy data:
- (b) Communications:
MetService participated in both the Iridium Pilot Project and the Argos3 Pilot Project by deploying buoys to trial these new communications methods. The Iridium Buoy data is being processed by Joubeh Technologies and Scotia Weather Services and inserted on to the GTS through an Environment Canada portal. Typically the hourly Iridium data is received via GTS at about H + 12minutes, so delivery is very timely.

- (c) Buoy Lifetimes:

Technocean Buoys

In recent years MetService purchased buoys, Upgrade and GDC buoys all manufactured by Technocean have operated on average for around 20 months (Lifetime is counted until transmission failure, battery failure, or removal of air pressure data from GTS). In fact since 2000, 188 Technocean buoys (29 MetService, 68 Upgrades & 91 GDC) have given an average lifetime of 20.3 months with minimum lifetime = 0 months and maximum lifetime = 71.9months.

Over the last 12 months the situation has changed markedly with a significant number of failures within the first few months after deployment. In most cases the failures were unexplained with transmission just ceasing, in a few other cases, bad air pressure data led to the removal of data from GTS. Of the 10 Upgrade buoys deployed during the 10/11 southern summer, 8 lasted an average of 1.7 months (min 0.7 months, max 3.1 months). Of the 20 GDC buoys, 1 was identified as having transmitter problems during the pre-deployment testing and was returned to Technocean, while 13 buoys were dead at average 3.5months (min 0.6, max 7.3 months).

MetService has been working with Technocean to try to identify and offer suggestions regarding the problems.

Marlin-Yug Buoys

As part of the Argos3 PP, MetService deployed 6 Marlin-Yug Argos3 SVPB buoys in the period Sept – Nov 2010. 1 buoy failed soon after deployment and another ran ashore after 10months. The remaining 4 buoys are still operational at 10 -12 months. The Argos3 buoys with 34cm hulls have all exhibited pressure spiking. Marlin-Yug analysed the pressure data and produced a report on the possible causes of the spiking, with MetService providing feedback on the report.

MetOcean Buoys

2 SVPB Iridium buoys were deployed in July 2011 and both are operating well (as at 1 September 2011).

(d) Others:Nil.

APPENDIX M

FORMAT FOR NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	United Kingdom
Year	2011

1. CURRENT PROGRAMMES:

Agency or programme	Met Office: MAWS network	
Number and type of buoys Meteorological moored buoys	(a) deployed during the year	No new sites
	(b) operational as of 31 August	7
	(c) reporting on GTS as of 31 August	7
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	North-east Atlantic	

Agency or programme	National Oceanography Centre/Met Office: Porcupine Abyssal Plain OceanSITES station	
Number and type of buoys Meteorological moored buoy with oceanographic capability	(a) deployed during the year	n/a
	(b) operational as of 31 August	1
	(c) reporting on GTS as of 31 August	1
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/> (pre-operational)
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	North-east Atlantic: Porcupine Abyssal Plain	

Agency or programme	Met Office: Other moored buoys	
Number and type of buoys Meteorological moored buoys	(a) deployed during the year	1
	(b) operational as of 31 August	3
	(c) reporting on GTS as of 31 August	3
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/> all customer-funded
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	Off South Wales (2) and Weymouth Bay (1)	

Agency or programme	Plymouth Marine Laboratory: Western Channel Observatory	
Number and type of buoys Oceanographic moored buoy with meteorological capability	(a) deployed during the year	No new sites
	(b) operational as of 31 August	2
	(c) reporting on GTS as of 31 August	2
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[✓]
	(c) developmental	[x]
Main deployment areas	Western Channel	

Agency or programme	Centre for Environment, Fisheries and Aquatic Science (Cefas): SmartBuoy monitoring sites	
Number and type of buoys Oceanographic moored buoys	(a) deployed during the year	No new sites
	(b) operational as of 31 August	6
	(c) reporting on GTS as of 31 August	0
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[✓]
	(b) met / ocean research	[✓]
	(c) developmental	[x]
Main deployment areas	UK coastal waters	

Agency or programme	Centre for Environment, Fisheries and Aquatic Science (Cefas): WaveNet	
Number and type of buoys Waverider buoys	(a) deployed during the year	
	(b) operational as of 31 August	20
	(c) reporting on GTS as of 31 August	0
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[✓]
	(b) met / ocean research	[✓]
	(c) developmental	[x]
Main deployment areas	UK coastal waters	

Agency or programme	Met Office: Drifting buoys	
Number and type of buoys SVP-B drifting buoys	(a) deployed during the year	7
	(b) operational as of 31 August	13
	(c) reporting on GTS as of 31 August	13
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[✓]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	South Atlantic and Southern Ocean	

Agency or programme	Scottish Association for Marine Science	
Number and type of buoys SAMS Ice Mass Balance Arrays (SIMBAs)	(a) deployed during the year	16
	(b) operational as of 31 August	4
	(c) reporting on GTS as of 31 August	0
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[✓]
	(c) developmental	[x]
Main deployment areas	NE Greenland Sea, Weddell Sea, Bellinghausen Sea	

(repeat table above as often as necessary)

Agency or programme	Scottish Association for Marine Science	
Number and type of buoys SAMS Floating Ice Mass Balance Arrays (FIMBAs)	(a) deployed during the year	2
	(b) operational as of 31 August	0
	(c) reporting on GTS as of 31 August	0
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[✓]
	(c) developmental	[✓]
Main deployment areas	Bellinghausen Sea	

(repeat table above as often as necessary)

Agency or programme	Scottish Association for Marine Science	
Number and type of buoys Great Race Drifters SVP for coastal tidal systems	(a) deployed during the year	12
	(b) operational as of 31 August	n/a (2-day deployments)
	(c) reporting on GTS as of 31 August	0
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[✓]
	(c) developmental	[✓]
Main deployment areas	Great Race – West Scotland	

(repeat table above as often as necessary)

2. PLANNED PROGRAMMES:

Agency or programme		
Number and type of buoys	planned for deployment in the next 12 months	
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas		

(repeat table above as often as necessary)

3. TECHNICAL DEVELOPMENTS:

For the Met Office, refer to TT-MB and TT-IBP reports for technical developments with respect to moored buoys and drifting buoys respectively.

(a) Buoy design	• • •
(b) Instrumentation	• • •
(c) Others	• • •

4. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

Ref	Title	Type⁸
1	Assessment of a New Anemometry System for the Met Office's Moored Buoy Network.	J. Atmos. Oceanic. Technol, 27, pp 2031-2038.
2	Technology, Design and Operation of an Autonomous Buoy System in the Western English Channel.	J. Atmos. Oceanic. Technol, 27, pp 2056-2064.
3		
4		

(repeat rows in the table above as necessary)

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	• • •
(b) Communications	• • •
(c) Buoy lifetimes	• • •
(d) Other	• •

8: Types of publications: (1) Implementation, (2) Operations, (3) Instrumentation, (4) Quality Management, (5) Data Management, (6) Data collection and/or location, (7) Data use, (8) Other

	•
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Note: It is recommended that this form is filled in electronically and returned also electronically to the Secretariat. A template of the form can be downloaded from the following ftp site:

<ftp://ftp.wmo.int/Documents/PublicWeb/amp/mmop/documents/dbcp/templates/Format-DBCP-National-Reports.doc>

APPENDIX N

FORMAT FOR NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Australia
Year	2011

CURRENT PROGRAMMES *(for period 1 July 2010 – 30 June 2011)*

- A Agency or programme:** Australian Bureau of Meteorology (ABOM)
- Number and type of buoys: (a) Deployed during the year: 21
- 21 SVP-B
SVP-BW
- (b) Operational at 31 July: 18
- (c) Reporting on GTS at 31 July: 18
- Purpose of programme: To support the Bureau's operational forecasting and warning service.
- Main deployment area: Southern and Indian Oceans in support of:
- International Buoy Programme for the Indian Ocean
 - Southern Ocean Buoy Programme
 - International Programme for Antarctic Buoys.
- B Agency or programme:** ABOM Barometer Upgrade Program
- Number and type of buoys: (a) Deployed during the year: 8
- 2 SVP-B (Bureau sponsored upgrades)
- (b) Operational at 31 July: 6
- (c) Reporting on GTS at 31 July: 6
- Purpose of programme: To increase the number of pressure buoys in the Indian Ocean and to support the Bureau's operational forecasting and warning service.
- Main deployment area: Southern and Indian Oceans in support of:
- International Buoy Programme for the Indian Ocean
 - Southern Ocean Buoy Programme
- C Agency or programme:** ABOM deployments for the Global Drifter Program
- Number and type of buoys: (a) Deployed during the year: 18
- 18 SVP-B
- (b) Operational at 31 July: 7
- (c) Reporting on GTS at 31 July: 7
- Purpose of programme: To support the Global Drifter Program through the IBPIO, and to support the Bureau's operational forecasting and warning service.

Main deployment area: Southern and Indian Oceans in support of:
 - International Buoy Programme for the Indian Ocean
 - Southern Ocean Buoy Programme

- D Agency or programme:** Australian Antarctic Division (AAD)
- Number and type of buoys: (a) Deployed during the year: 2
 2 Stress-gauge buoys
 (b) Operational at 31 July: 2
 (c) Reporting on GTS at 31 July: 0
- Purpose of programme: To assist AAD's research program, especially the investigation of sea-ice motion and deformation off East Antarctica, as well as the exploration of internal ice physics
- Main deployment area: Southern Ocean, also contributing to the International Programme for Antarctic Buoys.

PLANNED PROGRAMMES (for period 1 July 2010 – 30 June 2011)

- A Agency or programme:** Bureau of Meteorology
- Number and type of buoys planned for deployment in next twelve months: 20
 20 SVP-B
- Purpose of programme: To support the Bureau's operational forecasting and warning service.
- Main deployment area: Southern and Indian Oceans.
- B Agency or programme:** Barometer Upgrade Program
- Number and type of buoys planned for deployment in next twelve months: 8
 8 SVP-B (Bureau sponsored upgrades)
- Purpose of programme: To increase the number of pressure buoys in the Indian Ocean and to support the Bureau's operational forecasting and warning service.
- Main deployment area: Indian Ocean
- C Agency or programme:** Global Drifter Program
- Number and type of buoys planned for deployment in next twelve months: 20
 20 SVP-B
- Purpose of programme: To support the Global Drifter Program through the IBPIO, and to support the Bureau's operational forecasting and warning service.

Main deployment area: Indian Ocean

D Agency or programme: Australian Antarctic Division (AAD)

Number and type of buoys planned for deployment in next twelve months: 1

1 Stress-gauge buoy

Purpose of programme: To assist AAD's research program, especially to explore the internal ice physics

Main deployment area: Southern Ocean, also contributing to the International Programme for Antarctic Buoys.

TECHNICAL DEVELOPMENTS

(a) Buoy design:

(b) Instrumentation:

(c) Others:

PUBLICATIONS (on programme plans, technical developments, QC reports, etc.)

The deployment plans for Bureau-owned buoys will be published on the JCOMMOPS website under deployment opportunities < http://www.jcommops.org/depl_opport/australia.html >.

SPECIAL COMMENTS (if any)

(a) Quality of buoy data:

(b) Communications:

(c) Buoy lifetimes:

Metocean: Three consecutive failures of Iridium buoys on deployment using water soluble tape over the magnet. In consultation with Metocean, the crews have been instructed to remove the water soluble tape prior to deployment.

Technocean: Problems with the last shipment from GDP with 8 of 10 buoys failing testing at store. These buoys were returned to Technocean. Of the remaining 10, 2 buoys were deployed and subsequently failed after 1 week and 4 weeks. The remaining 8 buoys are being returned to Technocean.

(d) Others:

APPENDIX O

FORMAT FOR NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Germany
Year	2011

CURRENT PROGRAMMES:

A. Agency or programme: Sea Ice Buoys, Processes in polar regions (ARGOS-No. 919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys: (a) deployed during 2011: 0
(b) operational as of 31 August: 0
(c) reporting on GTS as of 31 August: 0

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Weddell Sea, Arctic Ocean**

B. Agency or programme: Monitoring of subsurface mooring (ARGOS-No. 8919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys: (a) deployed during 2011: 24
(b) operational as of 31 August: 24
(c) reporting on GTS as of 31 August: 0

Purpose of programme: (a) operational: yes
(b) met / ocean research:
(c) developmental:

Main deployment areas: **Weddell Sea, Arctic Ocean**

C. Agency or programme: Argo-Floats studying Weddell Sea convection WCON (ARGOS-No. 10919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys: (a) deployed during 2011: 0
(b) operational as of 31 August: 5
(c) reporting on GTS as of 31 August: 5 (delays during winter season because of ice coverage)

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Weddell Sea**

D. Agency or programme: Gravimetric measurements on ice floes (ARGOS-No. 12919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys: (a) deployed during 2011: 0
(b) operational as of 31 August: 0
(c) reporting on GTS as of 31 August: 0

Purpose of programme: (a) operational: yes
(b) met / ocean research:
(c) developmental:

Main deployment areas: **Arctic Ocean**

E. Agency or programme: Migrating seals (ARGOS_No. 1535), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys: (a) deployed during 2011: 2
(b) operational as of 31 August: 2
(c) reporting on GTS as of 31 August: 0

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Antarctic Peninsula**

F. Agency or programme: University of Hamburg, Institute of Marine Research, SFB512-E2, Argo floats (ARGOS-No. 592)

Number and type of buoys: (a) deployed during 2011: 0
(b) operational as of 31 August: 31: 0
(c) reporting on GTS as of 31 August: 31: 0

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Nordic Seas**

G. Agency or programme: University of Hamburg/Meteorological Institute, Meteorological buoys measuring sea ice drift (DAMOCLES Project), (ARGOS-No 636)

Number and type of buoys: (a) deployed during 2011 : ?
(b) operational as of 31 August: ?
(c) reporting on GTS as of 31 August: 0

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Ice-covered Arctic Ocean**

H. Agency or programme: Research and Technology Centre Westcoast, Buesum / Ocean Monitoring Project Group, Kiel

Number and type of buoys: (a) deployed during 2011: None, data buoy programme ended in 2008, was replaced by fixed station
(b) operational at 31 August: 0
(c) reporting on GTS at 31 August: 0

Purpose of programme: (a) operational:
(b) met/ocean research: yes

(c) developmental: yes

Main deployment areas: **German North Sea Coast**

I. Agency or programme: IfM-GEOMAR Kiel, Argo floats, SFB Climate-Biogeochemistry interactions in the tropical ocean (ARGOS-No. 8165)

Number and type of buoys: (a) deployed during 2011 : 9
(b) operational as of 31 August: 26
(c) reporting on GTS as of 31 August: 21

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Tropical Atlantic, Pacific**

J. Agency or programme: German ARGO (ARGOS-No. 01895), Bundesamt für Seeschifffahrt und Hydrographie, Hamburg, Germany

Number and type of buoys: (a) deployed during 2011: 51
(b) operational as of 31 August: 116
(c) reporting on GTS as of 31 August: 116

Purpose of programme: (a) operational: yes
(b) met / ocean research:
(c) developmental:

Main deployment areas: **North Atlantic, Nordic Seas, Weddell Gyre**

K. Agency or programme: Marnet (ARGOS-NO. 2120), Bundesamt für Seeschifffahrt und Hydrographie, Hamburg Germany

Number and type of buoys: (a) deployed during 2011: only replacement of fixed stations after repairs
(b) operational as of 31 August: 8
(c) reporting on GTS as of 31 August: 8

Purpose of programme: (a) operational: yes
(b) met / ocean research:
(c) developmental:

Main deployment areas: **North Sea, Baltic Sea**

L. Agency or programme: Norwave: Monitoring of sea state ARGOS-No. 9481),
Bundesamt für Seeschifffahrt und Hydrographie, Hamburg Germany

Number and type of buoys: (a) deployed during 2011: 6 (replacement of
stations after repairs)
(b) operational as of 31 August: 6
(c) reporting on GTS as of 31 August: 6

Purpose of programme: (a) operational: yes
(b) met / ocean research:
(c) developmental:

Main deployment areas: **North Sea, Baltic Sea**

M. Agency or programme: Transdrift-TR (ARGOS-No. 3635), University of Trier,
Meteorology Department, Trier, Germany

Number and type of buoys: (a) deployed during 2011: 2
(b) operational as of 31 August: 0
(d) reporting on GTS as of 31 August: 0

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Laptev Sea**

N. Agency or programme: IFM-GEOMAR Kiel, Moored buoy, EU FP7 EuroSITES
project.

Number and type of buoys: (a) deployed during 2011 : 2
(b) operational as of 31 August: 1
(c) reporting on GTS as of 31 August:: 1

Purpose of programme: (a) operational: yes
(b) met / ocean research: yes
(c) developmental: yes

Main deployment areas: **Subpolar North Atlantic**

O. Agency or programme: IFM-GEOMAR Kiel, Glider surveys, BMBF North Atlantic, SFB 754

Number and type of buoys: (a) deployed during 2011 : 11
(b) operational as of 31 August: 0
(c) reporting on GTS as of 31 August: 0

Purpose of programme: (a) operational: yes
(b) met / ocean research: yes
(c) developmental: yes

Main deployment areas: **Tropical Atlantic, South Pacific**

PLANNED PROGRAMMES:

A. Agency or programme: Sea Ice Buoys, Processes in polar regions (ARGOS-No. 919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys planned for deployment in next 12 months: 0

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Weddell Sea, Arctic Ocean**

B. Agency or programme: Monitoring of subsurface mooring (ARGOS-No. 8919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys planned for deployment in next 12 months: 15

Purpose of programme: (a) operational: yes
(b) met / ocean research:

(c) developmental:

Main deployment areas: **Arctic Ocean**

C. Agency or programme: Argo-Floats studying Weddell Sea convection WCON (ARGOS-No. 10919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys planned for deployment in next 12 months: 0

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Weddell Sea**

D. Agency or programme: Gravimetric measurementments on ice floes (ARGOS-No. 12919), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys planned for deployment in next 12 months: 0

Purpose of programme: (a) operational: yes
(b) met / ocean research:
(c) developmental:

Main deployment areas: **Arctic Ocean**

E. Agency or programme: Migrating seals (ARGOS_No. 1535), Alfred-Wegener Insititute, Bremerhaven

Number and type of buoys planned for deployment in next 12 months: 5

Purpose of programme: (a) operational:
(b) met / ocean research: yes
(c) developmental:

Main deployment areas: **Indian sector of the Southern Ocean**

G. Agency or programme: University of Hamburg / Meteorological Institute, Meteorological buoys measuring sea ice drift (DAMOCLES Project), (ARGOS_No. 636)

Number and type of buoys planned for deployment in next 12 months: ?

Purpose of programme: (a) operational:

(b) met / ocean research: yes

(c) developmental:

Main deployment areas: **Ice-covered Arctic Ocean**

I. Agency or programme: IfM-GEOMAR Kiel, Argo floats, SFB Climate-Biogeochemistry interactions in the tropical ocean (ARGOS-No. 8165)

Number and type of buoys planned for deployment in next 12 months: None

Purpose of programme: (a) operational:

(b) met / ocean research:

(c) developmental:

Main deployment areas: **Oxygen minimum layer area in the Pacific**

J. Agency or programme: German ARGO (ARGOS-No. 01895), Bundesamt für Seeschifffahrt und Hydrographie, Hamburg, Germany

Number and type of buoys planned for deployment in next 12 months: 50

Purpose of programme: (a) operational: yes

(b) met / ocean research:

(c) developmental:

Main deployment areas: **North Atlantic, Nordic Seas, Weddell Gyre**

K. Agency or programme: Marnet (ARGOS-No. 2120), Bundesamt für Seeschifffahrt und Hydrographie, Hamburg Germany

Number and type of buoys planned for deployment in next 12 months: 0, but maintenance and replacement of exiting buoys 9-10

Purpose of programme: (a) operational: yes

(b) met / ocean research:

(c) developmental:

Main deployment areas: **North Sea, Baltic Sea**

L. Agency or programme: NORWAVE: Monitoring of sea state (ARGOS_No. 9481), Bundesamt für Seeschifffahrt und Hydrographie, Hamburg Germany

Number and type of buoys planned for deployment in next 12 months: 0, but maintenance and replacement of exiting buoys 7

Purpose of programme: (a) operational: yes

(b) met / ocean research:

(c) developmental:

Main deployment areas: **North Sea, Baltic Sea**

N. Agency or programme: IFM-GEOMAR Kiel, Moored buoy, EU FP7 EuroSITES project.

Number and type of buoys planned for deployment in next 12 months: 0

Purpose of programme: (a) operational: yes

(b) met / ocean research:

(c) developmental:

Main deployment areas: **Subpolar North Atlantic**

O. Agency or programme: IFM-GEOMAR Kiel, Glider surveys, BMBF North Atlantic, SFB 754

Number and type of buoys planned for deployment in next 12 months: 0

Purpose of programme: (a) operational: yes

(b) met / ocean research:

(c) developmental:

Main deployment areas: **Tropical Atlantic**

G. TECHNICAL DEVELOPMENTS:

(a) Buoy design: Meteorological and sea-ice drift

(b) Instrumentation: GPS-position, sea level pressure, wind speed, wind direction, temperature, humidity, ice temperature

(c) Others:

G. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

G. SPECIAL COMMENTS (if any):

(a) Quality of buoy data:

- (b) Communications: Iridium
- (c) Buoy lifetimes: approx. 1 year
- (d) Other: Producer of buoys: Metocean/Canada

H. TECHNICAL DEVELOPMENTS

- (a) Buoy design: Mooring design for shallow water application with cable connected bottom mounted ADCP
- (b) Instrumentation: GPRS telemetry unit and software
- (c) Others:

I. TECHNICAL DEVELOPMENTS:

- (a) Buoy design:
- (b) Instrumentation:
- (c) Others:

I. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

I. SPECIAL COMMENTS (if any):

- (a) Quality of buoy data:
- (b) Communications: every 7 days
- (c) Buoy lifetimes: > 3 year
- (d) Other: Data is distributed as TESAC

J. TECHNICAL DEVELOPMENTS:

- (a) Buoy design: APEX and Nemo Floats
- (b) Instrumentation: Seabird CTD measuring temperature and salinity
- (d) Others:

J. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

<http://www.german-argo.de/>

J. SPECIAL COMMENTS (if any):

- (a) Quality of buoy data: good
- (b) Communications: ARGOS
- (c) Buoy lifetimes: 4-6 years
- (d) Other:

K. TECHNICAL DEVELOPMENTS:

- (a) Buoy design: fixed stations of various types (unmanned lightships, piles, buoys, lighthouses and platforms).
- (b) Instrumentation: Temperature and salinity, oxygen sensors, ADCP and meteorological instruments operated by DWD
- (c) Others:

K. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

<http://www.bsh.de/de/Meeresdaten/Beobachtungen/MARNET-Messnetz/index.jsp>

K. SPECIAL COMMENTS (if any):

- (a) Quality of buoy data: good
- (b) Communications: Data transmission by Meteosat. Temperature profiles are communicated on the GTS by BSH. Weather data, SST and swell are combined by DWD and will be inserted in the GTS by DWD in the future

- (c) Buoy lifetimes: Buoy will continuously be serviced and replaced if necessary since Marnet is a governmental monitoring programme.
- (d) Other:

L. TECHNICAL DEVELOPMENTS:

- (a) Buoy design: fixed stations
- (b) Instrumentation: Waverider Buoys
- (c) Others:

L. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):
<http://www.bsh.de/de/Meeresdaten/Beobachtungen/Seegang/index.jsp>

L. SPECIAL COMMENTS (if any):

- (a) Quality of buoy data: good
- (b) Communications: Weather data, SST and swell are combined by DWD and are inserted in the GTS by DWD. Identifiers do not comply GTS standards.
- (c) Buoy lifetimes: Buoys will continuously be serviced and replaced if necessary.
- (d) Other:

N. TECHNICAL DEVELOPMENTS:

- (a) Buoy design: custom design IFM-GEOMAR based on 17" glass sphere for housing
- (c) Instrumentation:
- (c) Others:

N. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

J. Karstensen⁹, R. Bozzano, F. Brunetti, J. Campell, V. Cardin, A. Cianca, L. Coppola, A. Medina, K. Nittis, S. Osterhus, S. Pensieri, A. Pinck, Report on the existing platforms and telemetry used at each station, EuroSITES deliverable report D112, Sept. 2009

N. SPECIAL COMMENTS (if any):

- (a) Quality of buoy data: good until April 2011, reason for degraded quality unknown (not investigated yet)
- (b) Communications: every 4 hours
- (c) Buoy lifetimes: > 1 year
- (d) Other: Data is distributed as TESAC (via DAC at NOCS/GDAC at Coriolis)

O. TECHNICAL DEVELOPMENTS:

- (a) Buoy design: no
- (d) Instrumentation: no
- (c) Others: no

O. PUBLICATIONS (on programme plans, technical developments, QC reports, etc.):

O. SPECIAL COMMENTS (if any):

- (a) Quality of buoy data: good for real time;
- (b) Communications: variable, but less than 6 hours
- (c) Buoy lifetimes: from weeks up to 3 month
- (d) Other: Data is distributed as TESAC

⁹ Responsible for compilation of this report

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