
DATA BUOY COOPERATION PANEL

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THIRTIETH SESSION

ITEM: 13

WEIHAI, CHINA
27-31 OCTOBER 2014

ENGLISH ONLY

NATIONAL REPORT

(Submitted by Members/Member States¹)

SUMMARY AND PURPOSE OF DOCUMENT

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

ACTION PROPOSED

The Meeting is invited to note the information contained in this document when discussing how it organises its work and formulates its recommendations.

Appendices: National reports for:

1. Turkey
2. France
3. USA
4. Republic of Korea
5. China
6. Sweden
7. Japan
8. New Zealand
9. Australia
10. Netherlands
11. Canada
12. India
13. Germany
14. United Kingdom
15. Brazil

¹ The content of national reports included in this document is the sole responsibility of the authors of the reports, and not of the Secretariat. Please be informed that "Sea of Japan" is the standard geographical term used by the Secretariat of the United Nations, in its own documents, for the body of water separated from the Pacific Ocean by the Japanese Archipelago and Sakhalin.

APPENDIX 1

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Turkey
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	TURKISH STATE METEOROLOGICAL SERVICE (TSMS)	
Number and type of buoys	(a) deployed during the year	1 SEAWATCH 185 Midi Buoy
	(b) operational as of 31 August	1 SEAWATCH 185 Midi Buoy
	(c) reporting on GTS as of 31 August	0
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x] to support preparing marine reports, forecasts and warnings
	(b) met / ocean research	[x] to support universities and marine institutes to make research
	(c) developmental	<input type="checkbox"/>
Main deployment areas	The Sea of Marmara – off shore of Silivri	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

(repeat table above as often as necessary)

2. PLANNED PROGRAMMES:

Agency or programme	TURKISH STATE METEOROLOGICAL SERVICE (TSMS)	
Number and type of buoys	planned for deployment in the next 12 months	5 ENVIRTECH MKI-3 BUOY
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x] to support preparing marine reports, forecasts and warnings.
	(b) met / ocean research	[x] in order to support universities and marine institutes to make research and to progress wave model
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Samsun Bay (Black Sea), Bosphorous Straight entry of Black Sea, Northern Aegean, Antalya Bay (Mediterranean Sea), Taşucu (Mediterranean Sea)	

(repeat table above as often as necessary)

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	<ul style="list-style-type: none"> Moored Turkish buoy is SEAWATCH 185 Midi Buoy. It has been measuring parameters since 1st of February 2013
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(b) Instrumentation	<ul style="list-style-type: none"> • Wind, air temperature, sea surface temperature, pressure, humidity, wave and adcp current profiler sensors installed onto the buoy. • •
(c) Others	<ul style="list-style-type: none"> • • •

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

Ref	Title	Type²
1		
2		
3		
4		

(repeat rows in the table above as necessary)

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> • Buoy has been sending data since 1st of February 2013. There was only interruption between 23 January 2014 and 18 February 2014. It was because of the energy problem. Rest of the period system worked in %100 performance. • •
(b) Communications	<ul style="list-style-type: none"> • • Buoy sends data via GPRS transmission system. •
(c) Buoy lifetimes	<ul style="list-style-type: none"> • • •
(d) Other	<ul style="list-style-type: none"> • • •

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

APPENDIX 2

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	France
Year	2014 (1 July 2013 – 30 June 2014)

1. CURRENT PROGRAMME:

Agency or programme	Météo-France	
Number and type of buoys	(a) deployed during the year	- 16 drifting buoys : 4 SVP-BS drifters with LPO and LOCEAN, 4 SVP-BTC, 8 SVP-B - 52 upgrades : 52 SVP-B - 3 moored buoys (plus 2 in cooperation with UKMO) - 119 SVP-B for E-SURFMAR
	(b) operational as of 31 August	77 (+ 109 for E-SUFMAR) buoys were operational at 30 June 2014
	(c) reporting on GTS as of 31 August	77 (+ 109 for E-SUFMAR) buoys were reporting on GTS at 30 June 2014
Purpose of programme	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	North Atlantic Indian Ocean	
Vandalism incidents		

Agency or programme	INSU – LOCEAN (Salinity drifters)	
Number and type of buoys	(a) deployed during the year	11 Pacific Gyre SVP-BS drifters deployed: - 4 in the eastern tropical Pacific Ocean - 4 in the Indian Ocean - 3 in the North Atlantic subtropical gyre
	(b) operational as of 31 August	
	(c) reporting on GTS as of 31 August	
Purpose of programme	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	Eastern tropical Pacific Ocean Indian Ocean North Atlantic subtropical gyre	
Vandalism incidents		

Agency or programme	CEREMA/DTecEMF (Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement / Direction technique eau, mer et fleuves), ex-CETMEF	
Number and type of buoys	(a) deployed during the year	
	(b) operational as of 31 August	22 buoys were operational at 30 June 2014
	(c) reporting on GTS as of 31 August	20 were reporting on GTS at 30 June 2014
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	French coasts, Saint Pierre & Miquelon, Guyana and La Reunion Island	
Vandalism incidents		

Agency or programme	IRD - French participation to PIRATA – (in cooperation with Meteo-France) and CLIVAR-Atlantic, AMMA2 + EU PREFACE programmes (international collaborations)	
Number and type of buoys	(a) deployed during the year	Network of 6 Atlas buoys (All the buoys have been replaced in April-May 2014 during the PIRATA-FR24 cruise). 2 current meter mooring (ADCP) replaced during the PIRATA-FR24 cruise in April 2014. In April-May 2014 during the PIRATA-FR24 cruise, 4 surface drifters (SVP-BS PacifiGyres, two equipped with Surplax) have been deployed between 23°W and 10°W close to the equator.
	(b) operational as of 31 August	6 buoys were operational at 30 June 2014
	(c) reporting on GTS as of 31 August	6 buoys were reporting on GTS at 30 June 2014
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	Tropical Atlantic Ocean	
Vandalism incidents		

Agency or programme	SHOM (Hydrographic and Oceanographic Service of the Navy)	
Number and type of buoys	(a) deployed during the year	17 drifting buoys owned by SHOM were deployed in last 12 months: - 2 Davis Drifter (lagrangian drifters for measuring water currents within one meter of sea surface); - 6 WOCE (World Ocean Circulation Experiment) buoys drogued at 75 m; - 4 WOCE (World Ocean Circulation Experiment) buoys drogued at 80 m; - 4 WOCE (World Ocean Circulation Experiment) buoys drogued at 300 m; - 1 WOCE (World Ocean Circulation Experiment) buoys drogued at 750 m;
	(b) operational as of 31 August	4 buoys were operational at 30 June 2014
	(c) reporting on GTS as of 31 August	All WOCE were reporting on GTS at 30 June 2014
Purpose of programme	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input checked="" type="checkbox"/>
Main deployment areas	Bay of Biscay and Arabian Basin	
Vandalism incidents		

Agency or programme	IUEM (European Institute for Marine Studies, UBO)	
Number and type of buoys	(a) deployed during the year	
	(b) operational as of 31 August	1 buoy (MAREL Iroise) was operational at 30 June 2014
	(c) reporting on GTS as of 31 August	
Purpose of programme	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	French coast at the Brest-Bay outlet, at the interface with the Iroise sea (48°21'29" N, 4°33'05.48" W)	
Vandalism incidents		

2. PLANNED PROGRAMMES:

Agency or programme	Météo-France	
Number and type of buoys	planned for deployment in the next 12 months	About 100 SVP-B 30 upgrades
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	North Atlantic Indian Ocean	

Agency or programme	INSU	
Number and type of buoys	planned for deployment in the next 12 months	2 to 4 salinity drifters 2 surpact drifters 1 surpact drifter (attached to an SVP drifter)
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Equatorial Tropical Atlantic Ocean	

Agency or programme	CEREMA/DTecEMF	
Number and type of buoys	planned for deployment in the next 12 months	To maintain the network
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	French coasts, Saint Pierre & Miquelon, Guyana and La Reunion Island	

Agency or programme	IRD	
Number and type of buoys	planned for deployment in the next 12 months	To maintain the 6 Atlas Network and the 2 currentmeter moorings. An additional ADCP mooring at 0°E-0°N should be deployed
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	Tropical Atlantic Ocean	

Agency or	SHOM	
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programme		
Number and type of buoys	planned for deployment in the next 12 months	15 drifting 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		

Agency or programme	IUEM	
Number and type of buoys	planned for deployment in the next 12 months	To maintain the "MAREL Iroise" buoy
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	French coast at the Brest-Bay outlet, at the interface with the Iroise sea (48°21'29" N, 4°33'05.48" W)	

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	•
(b) Instrumentation	<ul style="list-style-type: none"> • In parallel to the use of SVP-B drifters, Meteo-France continuously surveys the performances of air pressure measurement for almost of the drifters of that kind deployed over the World Ocean. • The evaluation of SVP-B drifters fitted with a conductivity sensor is going on (co-operation between Meteo-France and LOCEAN) • Meteo-France is participating in the evaluation of drifters fitted with thermistor string SVP-BTC. • Meteo-France contributes to the DBCP Pilot Project GHSST. • Meteo-France is developing news electronics for the french open ocean moored buoys, transmitting through Iridium system. • E-SURFMAR is developing a SAWS (Ship Automated Weather Station), so called EUCAWS for its VOS fleet. • INSU will investigate the use of inexpensive CT cells in order to estimate ocean salinity. Work will have to be done on proper antifouling protection.
(c) Others	•

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

Ref	Title	Type³
1	Blain S., Guillou J., Tréguer P., Woerther P., Delauney L., Follenfant E., Gontier O., Hamon M., Leildé B., Masson A., Tartu C., Vuillemin R., 2004. High frequency monitoring of the coastal marine environment using the MAREL buoy. <i>Journal of environmental monitoring</i> , 6 : 569-575.	6
2	Boutin, J., N. Martin, G. Reverdin, S. Morisset, X. Yin, L. Centurioni, and N. Reul. Sea surface salinity under rain cells: SMOS satellite and in-situ drifters observations. <i>J. Geophys. Res.</i> , accepté, 2014.	3
3	Bozec, Y., Merlivat, L., Baudoux, A.-C., Beaumont, L., Blain, S., Bucciarelli, E., Danguy, T., Grossteffan, E., Guillot, A., Guillou, J., Répécaud, M., Tréguer, P., 2011. Diurnal to inter-annual dynamics of pCO ₂ recorded by a CARIOCA sensor in a temperate coastal ecosystem (2003-2009). <i>Marine Chemistry</i> , 126: 13-26.	7
4	Da-Allada, C. Y., G. Alory, Y. du Penhoat, E. Kestenare, F. Durand, and N. Hounkonnou, Seasonal mixed-layer salinity balance in the tropical Atlantic Ocean: Mean state and seasonal cycle, <i>J. Geophys. Res.</i> , 118, 332–345, doi:10.1029/2012JC008357, 2013.	7
5	Da-Allada, C. Y., G. Alory, Y. du Penhoat, J. Jouanno, N. Hounkonnou, and E. Kestenare, Causes for the recent increase for sea surface salinity in the northeast Gulf of Guinea, in press in <i>Afr. J. of Mar. Scien</i> , 2014.	7
6	G. Charria, M. Repecaud, L. Quemener, A. Ménesguen, P. Rimmelin-Maury, S. L'Helguen, L. Beaumont, A. Jolivet, P. Morin, E. Macé, P. Lazure, R. Le Gendre, F. Jacqueline, R. Verney, L. Marié, P. Jegou, S. Le Reste, X. André, V. Dutreuil, J.-P. Regnault, H. Jestin, H. Lintanf, P. Pichavant, M. Retho, J.-A. Allenou, J.-Y. Stanisière, A. Bonnat, L. Nonnotte, W. Duros, S. Tarot, T. Carval, P. Le Hir, F. Dumas, F. Vandermeirsch, F. Lecornu. 2014. PREVIMER: a contribution to in situ coastal observing systems. <i>Mercator Ocean - Quarterly Newsletter</i> , 49, 9-21.	7
7	Giordani, H., G. Caniaux, and A. Voltaire: Intraseasonal mixed layer heat budget in the equatorial Atlantic during the cold tongue development in 2006. <i>J. Geophys. Res.</i> , 118, 650-671, doi:10.1029/2012JC008280, 2013.	7
8	Hummels, R., M. Dengler, and B. Bourlès, Seasonal and regional variability of upper ocean diapycnal heat flux in the Atlantic Cold Tongue, <i>Progress in Oceanography</i> , 111, p. 52-74. ISSN 0079-6611, 2013.	7
9	Johns, W.E., P. Brandt, B. Bourlès, A. Tantet, A. Papapostolou and A. Houk, Zonal Structure and Seasonal Variability of the Atlantic Equatorial Undercurrent, in press in <i>Clim. Dyn.</i> , published online, doi:10.1007/s00382-014-2136-2, 2014.	7
10	Jouanno, J., F. Marin, Y. du Penhoat and J.-M. Molines : Intraseasonal modulation of the surface cooling in the Gulf of Guinea. <i>J. Phys. Oceanogr.</i> , 43 (2), doi: 10.1175/JPO-D-12-053.1, 2013.	7
11	Kolodziejczyk, N., F. Marin, B. Bourlès, Y. Gouriou, and H. Berger, Seasonal variability of the Equatorial Undercurrent termination and associated salinity maximum in the Gulf of Guinea, in press in <i>Clim. Dyn.</i> , published online, doi:10.1007/s00382-014-2017-7, 2014.	7
12	Lefèvre, N., G. Caniaux, S. Janicot, and A.K. Gueye: Increased CO ₂ outgassing in February-May 2010 in the tropical Atlantic following the 2009 Pacific El Niño. <i>J. Geophys. Res.</i> , 118, 1645-1657, doi:10.1002/jgrc.20107, 2013	7
13	Lefèvre, N., D.F. Urbano, F. Gallois and D. Diverres, Impact of physical processes on the seasonal distribution of the fugacity of CO ₂	7

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

	in the western tropical Atlantic, <i>J. Geophys. Res.</i> , 119, 646–663, doi:10.1002/2013JC009248, 2014.	
14	Paul Tréguer, Eric Goberville, Nicolas Barrier, Stéphane L'Helguen, Pascal Morin, Yann Bozec, Peggy Rimmelin-Maury, Marie Czamanski, Emilie Grossteffan, Thierry Cariou, Michel Répécaud, Loic Quémener, 2014. Large and local-scale influences on physical and chemical characteristics of coastal waters of Western Europe during winter. <i>Journal of Marine Systems</i> 139, 79–90.	7
15	Perez, R.C., V. Hormann, R. Lumpkin, P. Brandt, W.E. Johns, F. Hernandez, C. Schmid, and B. Bourlès, Mean meridional currents in the central and eastern equatorial Atlantic, in press in <i>Climate Dynamics</i> , published online DOI 10.1007/s00382-013-1968-5, 2013.	7
16	Pinker, R. T., A. Bentamy, K. B. Katsaros, Y. Ma, and C. Li, Estimates of net heat fluxes over the Atlantic Ocean, <i>J. Geophys. Res. Oceans</i> , 119, 410–427, doi:10.1002/2013JC009386, 2014.	7
17	Praveen Kumar, B., J. Vialard, M. Lengaigne, V.S.N. Murty, M.J. McPhaden, M.F. Cronin, F. Pinsard and K. Gopala Reddy, 2013: TropFlux wind stresses over the tropical oceans: evaluation and comparison with other products. <i>Clim. Dynamics</i> , 40 , 2049-2071, http://dx.doi.org/10.1007/s00382-012-1455-4	7
18	Prigent, C., F. Aires, F. Bernardo, J.-C. Orhac, J.-M. Goutoule, H. Roquet, and C. Donlon: Analysis of the potential and limitations of microwave radiometry for the retrieval of sea surface temperature: Definition of MICROWAT, a new mission concept. <i>J. Geophys. Res. Oceans</i> , 118 , 3074–3086, http://dx.doi.org/10.1002/jgrc.20222 , 2013	3
19	Reverdin, G., S. Morisset, J. Boutin, N. Martin, M.-S. Martins, F. Gaillard, P. Blouch, J. Rolland, J. Font, J. Salvador, and D. Stammer. Validation of surface salinity from drifters. JAOT-O, 2014.	3
20	Roehrig, R., D. Bouniol, F. Guichard, F. Hourdin, and J.-L. Redelsperger: The Present and Future of the West African Monsoon: A Process-Oriented Assessment of CMIP5 Simulations along the AMMA Transect. <i>J. Climate</i> , 26 , 6471–6505, http://dx.doi.org/10.1175/JCLI-D-12-00505.1 , 2013	7
21	SO PIRATA, IRD – Yearly PIRATA cruise reports and PIRATA international meetings	2
22	Météo-France – Centre de Météorologie Marine, E-SURFMAR Data Buoys Monthly report.	4

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> • 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. • 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
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	<p>identify buoys reporting dubious data as quickly as possible.</p> <ul style="list-style-type: none"> • The CMM reports the wave data collected by CETMEF in real time onto the GTS. • 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. •
(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"> • For the nineteenth consecutive year, Meteo-France funded 10 barometers to be added to SVP drifters deployed in the Tropical Indian Ocean, each year in November. Fifteen other upgrades were funded in 2014. These drifters are devoted to the Southern Ocean, south of 40°S in the Indian Ocean, as a principle. These 25 buoys of 2014 are upgraded to Iridium. These actions will be renewed in 2015. • IRD, also contributes to the deployment of SVP (4 SVP-BS in 2014) buoys and ARGO profilers (6 ARVOR in 2014) in the equatorial Atlantic during the PIRATA servicing cruises and also in the framework of the CORIOLIS programme. • During the PIRATA cruise, IRD provides CTD (48 in 2014) and XBT (92 in 2014) profiles in quasi-real time from the vessel for operational oceanography (MERCATOR).

APPENDIX 3

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	United States of America
Year	2014

CURRENT PROGRAMMES:

A. Agency or programme: National Oceanic and Atmospheric Administration (NOAA)/ Atlantic Oceanographic and Meteorological Laboratory (AOML) and Scripps Institution of Oceanography (SIO)

Global Drifter Program (GDP)

- Number and type of buoys:
- (a) deployed during 1 August 2013 – 31 Jul 2014: 1660 drifters
 - (b) operational as of 1 August 2014: 1383
 - (c) reporting on GTS as of 1 August: 1383

- Purpose of programme:
- (a) operational: [x]
 - (b) met / ocean research: [x]
 - (c) developmental:

Main deployment areas: Global.

The Global Drifter Program (GDP) is the principle component of the Global Surface Drifting Buoy Array, a branch of NOAA's Global Ocean Observing System (GOOS) and a scientific project of the DBCP. Its objectives are to (1) Maintain a global 5x5 degree array of 1250 satellite-tracked surface drifting buoys to meet the need for an accurate and globally dense set of in-situ observations of mixed layer currents, sea surface temperature, atmospheric pressure, winds and salinity, and (2) provide a data processing system for scientific use of these data. These data support short-term (seasonal to interannual) climate predictions as well as climate research and monitoring. For more information, see http://www.aoml.noaa.gov/phod/dac/gdp_objectives.php.

The current array design is for 1250 drifters globally, at an approximate resolution of 5x5 degrees. This goal was reached in September 2005. The instantaneous size of the array is expected to fluctuate through the year.

B. 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 26 July 2013–1 August 2014: 33
 - (b) operational as of 1 August 2014: 92
 - (c) reporting on GTS as of 1 August 2014: 92

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

Main deployment areas: Atlantic and Pacific Oceans and Coastal Zone of the US, including the Bering Sea, Gulf of Mexico, and Great Lakes.

NDBC's moored buoys measure and transmit barometric pressure; wind direction, speed, and gust; air and sea temperature; and wave energy spectra from which significant wave height, dominant wave period, and average wave period are derived. Even the direction of wave propagation is measured on many moored buoys. For more information, see <http://www.ndbc.noaa.gov/mooredbuoy.shtml>.

C. Agency or programme: National Oceanic and Atmospheric Administration (NOAA)/ National Weather Service (NWS)/ National Data Buoy Center (NDBC)

Tsunami Stations

- Number and type of buoys:
- (a) deployed during 26 July 2013–1 August 2014: 26
 - (b) operational as of 1 August 2014: 29
 - (c) reporting on GTS as of 1 August 2014: 29

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

Main deployment areas: Atlantic and Pacific Oceans and Gulf of Mexico

To ensure early detection of tsunamis and to acquire data critical to real-time forecasts, NOAA has placed Deep-ocean Assessment and Reporting of Tsunami (DART) stations at sites in regions with a history of generating destructive tsunamis. NOAA completed the original 6-buoy operational array (map of original six stations) in 2001 and expanded to a full network of 39 stations in March, 2008. Originally developed by NOAA, as part of the U.S. National Tsunami Hazard Mitigation Program (NTHMP), the DART Project was an effort to maintain and improve the capability for the early detection and real-time reporting of tsunamis in the open ocean. DART presently constitutes a critical element of the NOAA Tsunami Program. The Tsunami Program is part of a cooperative effort to save lives and protect property through hazard assessment, warning guidance, mitigation, research capabilities, and international coordination. NOAA's National Weather Service (NWS) is responsible for the overall execution of the Tsunami Program. This includes operation of the U.S. Tsunami Warning Centers (TWC) as well as leadership of the National Tsunami Hazard Mitigation Program. It also includes the acquisition, operations and maintenance of observation systems required in support of tsunami warning such as DART, local seismic networks, coastal, and coastal flooding detectors. NWS also supports observations and data management through the NDBC. For more information, see <http://www.ndbc.noaa.gov/dart/dart.shtml>.

D. 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 26 July 2013 - 1 August 2014: 44
toroids and 3 subsurface

- (b) operational as of 1 August 2014: 36
- (c) reporting on GTS as of 1 August 2014: 36

- Purpose of programme:
- (a) operational: [x]
 - (b) met / ocean research: [x]
 - (c) developmental:

Main deployment areas: Equatorial Pacific Ocean

The TAO array (renamed the TAO/TRITON array on 1 January 2000) consists of approximately 70 moorings in the Tropical Pacific Ocean, telemetering oceanographic and meteorological data to shore in real-time. The array is a major component of the El Niño/Southern Oscillation (ENSO) Observing System, the Global Climate Observing System (GCOS) and the Global Ocean Observing System (GOOS). Support is provided primarily by the United States (National Oceanic and Atmospheric Administration) and Japan (Japan Agency for Marine-earth Science and TEChnology). For more information, see http://www.pmel.noaa.gov/tao/proj_over/proj_over.html.

E. Agency or programme: National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL) and Atlantic Oceanographic and Meteorological Agency (AOML)

Prediction and Research moored Array in the Tropical Atlantic (PIRATA)

- Number and type of buoys:
- (a) deployed during 1 Aug 1 2013 – 31 Jul 2014:
12 surface toroids, 1 developmental surface toroid
 - (b) operational as of 1 August 2012: 15 surface toroids
 - (c) reporting on GTS as of 1 August 2012: 13 surface toroids

- Purpose of programme:
- (a) operational:
 - (b) met / ocean research: [x]
 - (c) developmental: [X]

Main deployment areas: Tropical Atlantic Ocean

PIRATA is a multinational observation network, established to improve our knowledge and understanding of ocean-atmosphere variability in the tropical Atlantic. It is a joint project of Brazil, France and the United States of America. PIRATA is motivated by fundamental scientific issues and by societal needs for improved prediction of climate variability and its impact on the countries surrounding the tropical Atlantic basin. The overarching goals of the project are to (1) improve the description of the intra-seasonal to interannual variability in the atmospheric and oceanic boundary layers of the tropical Atlantic Ocean; (2) improve our understanding of the relative contributions of air-sea fluxes and ocean dynamics to variability in sea surface temperature and sub-surface heat content; (3) provide a set of data useful for developing and improving the predictive models of the ocean-atmosphere coupled system; (4) document interactions between tropical Atlantic climate and variability outside the region, such as ENSO and the North Atlantic Oscillation; and (5) design, deploy, and maintain an array of moored oceanic buoys and collect and transmit a set of oceanic and atmospheric data, via satellite in near-real time, to monitor and study the upper ocean and atmosphere of the tropical Atlantic Ocean. For more information, see <http://www.pmel.noaa.gov/pirata/>.

The current array design for PIRATA calls for 18 surface buoys; this network is 100% completed. Future extensions and additions may be added, as demanded by research and operational needs.

F. Agency or programme: National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL)

Research Moored Array for African-Asian-Australian Monsoon Analysis and prediction (RAMA)

- Number and type of buoys:
- (a) deployed during 1 Aug 2013 – 31 Jul 2014: 7 surface toroids, 2 subsurface moorings
 - (b) operational as of 1 August: 12 surface toroids, 10 subsurface
 - (c) reporting on GTS as of 1 August: 13

- Purpose of programme:
- (a) operational:
 - (b) met / ocean research: [x]
 - (c) developmental: [X]

Main deployment areas: Tropical Indian Ocean

RAMA addresses the needs for comprehensive, long term, high quality real-time measurements in the Indian Ocean suitable for climate research and forecasting. RAMA is targeted at understanding and prediction of the east African, Asian and Australian monsoons, and benefits nations outside the Indian Ocean region due to atmospheric teleconnections which influence the far field. For more information, see <http://www.pmel.noaa.gov/tao/rama/>.

The current array design for RAMA calls for 46 moored buoy sites, of which 32 (70%) are currently occupied by surface or subsurface toroids or developmental moorings. Future additions may be added, as demanded by research and operational needs

G. Agency or programme: Naval Oceanographic Office (NAVOCEANO)

- Number and type of buoys:
- (a) deployed 1 August 2013 – 31 July 2014: 61 Argo floats, 2 Iridium floats, 18 MetOcean Argos SLDMB drifters, 6 MetOcean Iridium iSphere drifters, 6 MetOcean Iridium iSVP drifters, 9 MetOcean Iridium iSLDMB drifters
 - (b) operational as of 31 July 2014: 102 Argo floats, 2 Iridium floats, 3 Iridium iSVP drifters
 - (c) reporting on GTS as of 31 July 2014 : 102 Argos floats, 2 Iridium floats, 3 Iridium iSVP drifters

- Purpose of programme:
- (a) operational: [x]
 - (b) met / ocean research:
 - (c) developmental:

Main deployment areas: Global.

The purpose of NAVOCEANO deployments is to support US Navy operations globally. Deployment plans are dictated by operational needs.

PLANNED PROGRAMMES:

A. Agency or programme: National Oceanic and Atmospheric Administration (NOAA)/ Atlantic Oceanographic and Meteorological Laboratory (AOML) and Scripps Institution of Oceanography (SIO)

Global Drifter Program (GDP)

Number and type of buoys planned for deployment in the next 12 months: 1000 drifters, 800 funded by NOAA's Climate Program Office and 200 by Consortium Research partners.

Purpose of programme: (a) operational: [x]
(b) met / ocean research: [x]
(c) developmental:

Main deployment areas: Global.

B. 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 next 12 months: 20

Purpose of programme: (a) operational: [x]
(b) met / ocean research:
(c) developmental:

Main deployment areas: Atlantic and Pacific Oceans and Coastal Zone of the US, including the Bering Sea, Gulf of Mexico, and Great Lakes.

C. 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: 20

Purpose of programme: (a) operational: [x]
(b) met / ocean research:
(c) developmental:

Main deployment areas: Atlantic and Pacific Oceans and Gulf of Mexico

D. 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: 34
toroids, 4 subsurface

Purpose of programme: (a) operational: [x]
(b) met / ocean research: [x]
(c) developmental:

Main deployment areas: Equatorial Pacific Ocean

E. Agency or programme: National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL) and Atlantic Oceanographic and Meteorological Agency (AOML)

Prediction and Research moored Array in the Tropical Atlantic (PIRATA)

Number and type of buoys planned for deployment in the next 12 months: 18 + 1
developmental

Purpose of programme: (a) operational:
(b) met / ocean research: [x]
(c) developmental: [X]

Main deployment areas: Equatorial Atlantic Ocean

F. Agency or programme: National Oceanic and Atmospheric Administration (NOAA)/ Pacific Marine Environmental Laboratory (PMEL)

Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA)

Number and type of buoys planned for deployment in the next 12 months: 23 surface toroids and 11 subsurface + 2 developmental

Purpose of programme: (a) operational:
(b) met / ocean research: [x]
(c) developmental: [x]

Main deployment areas: Tropical Equatorial Indian Ocean

G. Agency or programme: Naval Oceanographic Office (NAVOCEANO)

Number and type of buoys planned for deployment in the next 12 months: ~50 buoys world wide and 100 floats worldwide.

Purpose of programme: (a) operational: [x]
(b) met / ocean research:
(c) developmental:

Main deployment areas: Global.

TECHNICAL DEVELOPMENTS:

PMEL continues to test "Tropical-Flex" moorings alongside PMEL legacy moorings. T-Flex moorings communicate via Iridium modem and Seabird electronics replace legacy PMEL temperature thermistors.

NDBC has deployed 35 TAO Refresh moorings in the TAO array since 26 July 2013, and will continue deploying them until the TAO array is completely refreshed.

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Zhurbas, V., D. Lyzhkov, and N. Kuzmina, 2013: Drifter-derived estimates of lateral eddy diffusivity in the World Ocean with emphasis on the Indian Ocean and problems of parameterization. Deep Sea Research Part I: Oceanographic Research Papers, 83, 1-11, <http://dx.doi.org/10.1016/j.dsr.2013.09.001>.

SPECIAL COMMENTS (if any):

(a) Quality of drifting buoy data and lifetimes:

During the 2013-2014 inter-sessional period the GDP did not deploy any new clusters of drifters for inter-comparison and evaluation due to delays in acquisition and recalls of drifters from two manufacturers. Instead the GDP has been focusing on lifetimes of drifters across the entire global array since 2005, by manufacturer and buoy type.

Drifting buoy lifetimes as reflected by the number of drifters dying each month has improved significantly over the period Jan 2013—July 2014, and is now comparable to levels last seen in mid-2010. For detailed information on quantifying buoy lifetimes and efforts to increase the lifetimes of drifting buoys, the reader is referred to the report from the Global Drifter Program and from the DBCP Task Team on Best Practices.

(b) Tropical Pacific Observing System (TPOS) 2020 meeting:

The TPOS 2020 meeting was held on 27-30 January 2014 in La Jolla, California USA. As noted on the meeting web site (http://www.ioc-goos.org/index.php?option=com_oe&task=viewEventRecord&eventID=1383)

The workshop was attended by 65 invitees from 13 countries and 35 institutes. There were various invited talks based on 14 whitepapers and 9 agency presentations and extensive time for discussion. The review committee was made up of the Scientific Organizing Committee plus three independent experts. The Terms of Reference for the review can be found within the list of supporting documents, whitepapers can be found in 'Report of the Tropical Pacific Observing System 2020 Workshop - Volume II' within the same list.

Organizationally, it was recommended to establish a TPOS 2020 project. This would oversee the transition to a more resilient and integrated observing system to meet the identified gaps as well as future needs as they are identified. It was considered essential that the organizations interested in tropical Pacific observations maintain proper dialogue. The goals of the proposed TPOS 2020 project are:

- To refine and adjust the TPOS to monitor, observe and predict the state of ENSO and advance scientific understanding of its causes.
- To determine the most efficient and effective method for sustained observations to support prediction systems for ocean, weather and climate services of high societal and economic utility, including underpinning research.
- To advance and refine the knowledge of the predictability horizon of the tropical Pacific variability (physical and biogeochemical), as well as its impacts in global climate.
- To determine how interannual to multidecadal variability and human activities impact the relation between marine biogeochemistry and biology to carbon budgets, food security and biodiversity.

(c) Changes made to Tropical Atmosphere Ocean (TAO) Mooring Array position information:

The TAO moorings are run by the NOAA National Data Buoy Center (NDBC), and are part of the TAO/TRITON mooring array which spans the Tropical Pacific. The NDBC has been informed that vandalism continues to plague the TAO array, especially in the eastern sector, which drastically reduces the data available for assimilation into models and for climate research. Therefore, the NDBC has decided to reduce the publically available position information on its website, as one of several counter-vandalism measures. The mooring positions are available to the nearest 0.1 degree when transmitted through the Global Telecommunications System (GTS), and to nominal mooring position on the TAO website.

NDBC will provide the high resolution position of each TAO Mooring to stakeholders and members of the climate and research community who request this information. Questions or queries should be directed to shannon.mcarthur@noaa.gov.

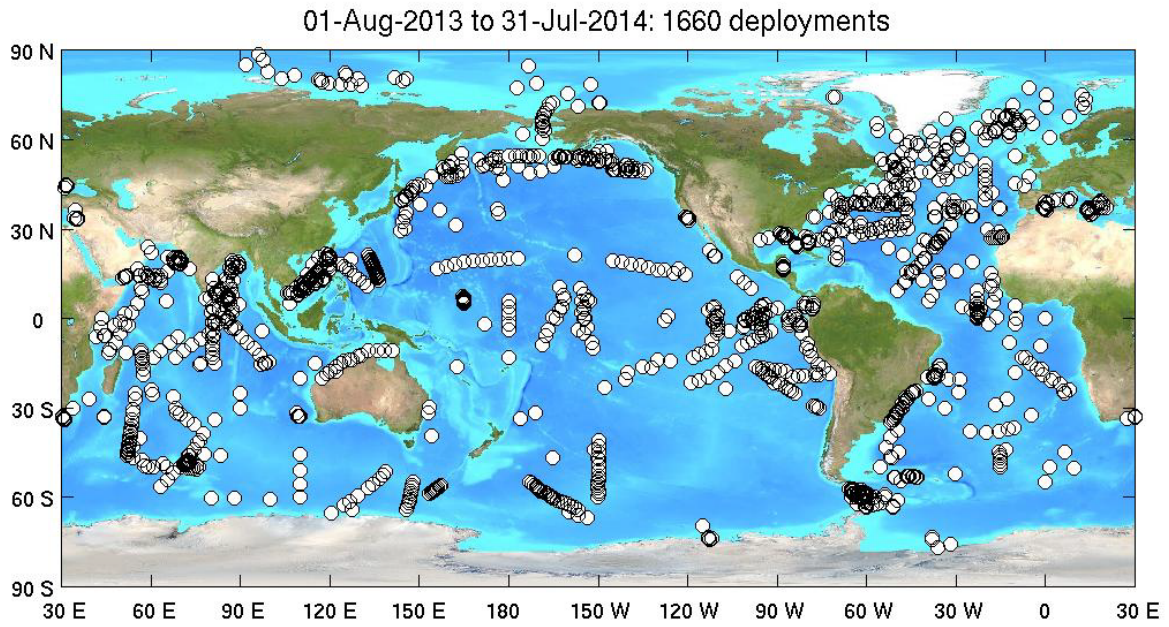


Fig. 1: Global Drifter Program deployment locations during the year.

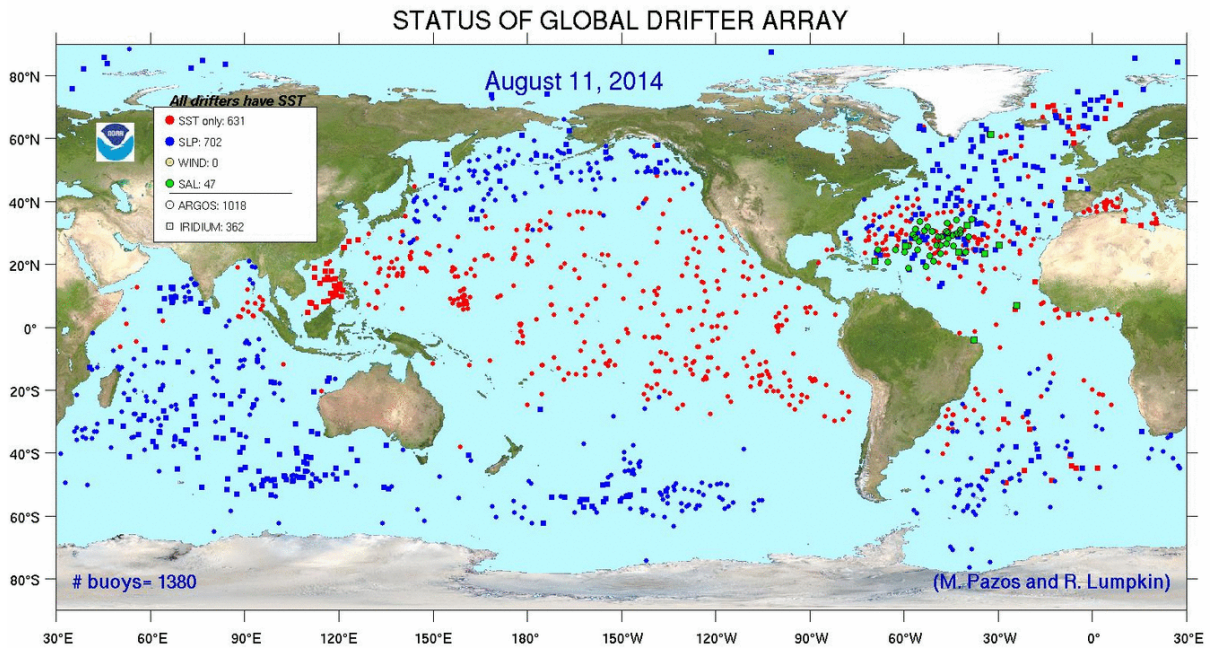


Fig. 2: Global drifter array status as of 11 August 2014. Figure from <http://www.aoml.noaa.gov/phod/dac>.

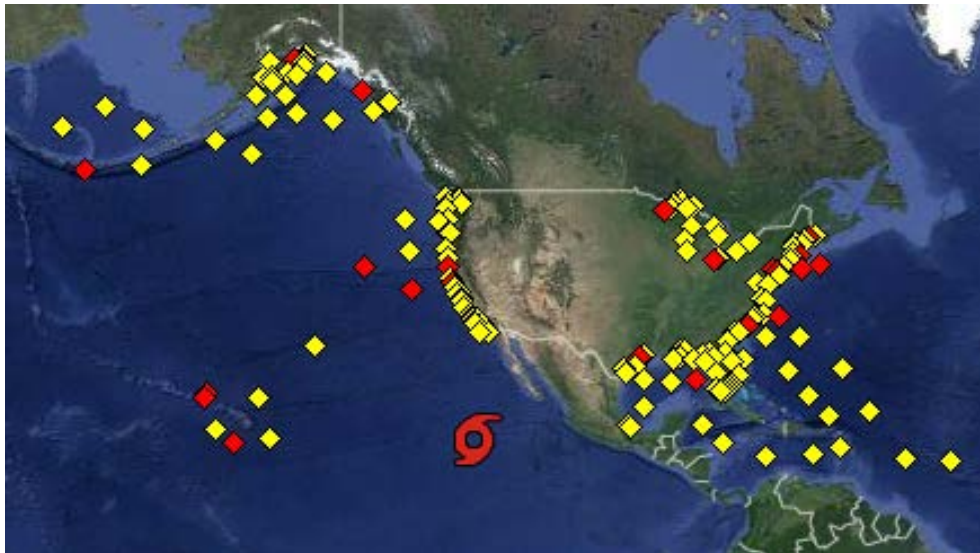


Fig. 3: NDBC Moored Buoys (MET/OCEAN), showing stations reporting in the last 8h (yellow) or not (red). Figure from <http://www.ndbc.noaa.gov/obs.shtml>. This image, for 15 August 2014, includes the location of Hurricane Karina in the eastern Pacific.

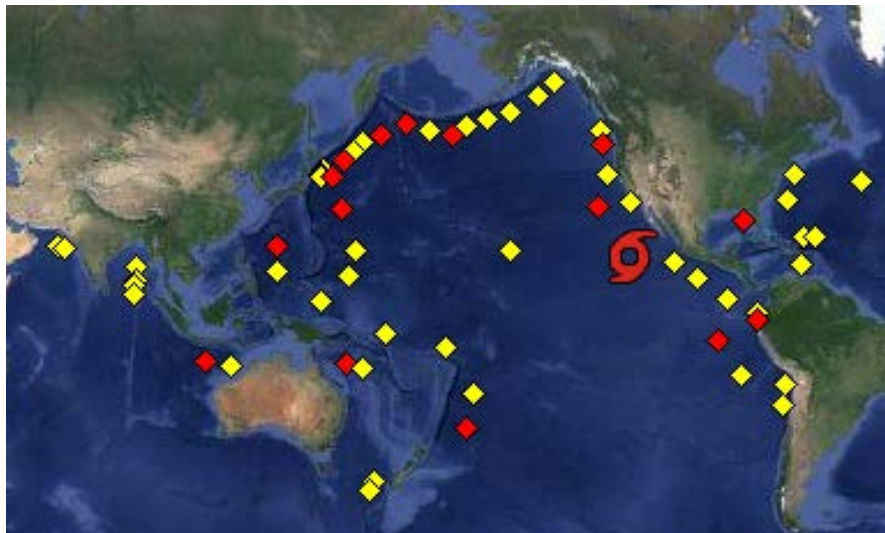


Fig 4: International Tsunami Network status, showing stations reporting in the last 24h (yellow) or not (red). Figure from <http://www.ndbc.noaa.gov/obs.shtml>. This image, for 15 August 2014, includes the location of Hurricane Karina in the eastern Pacific.

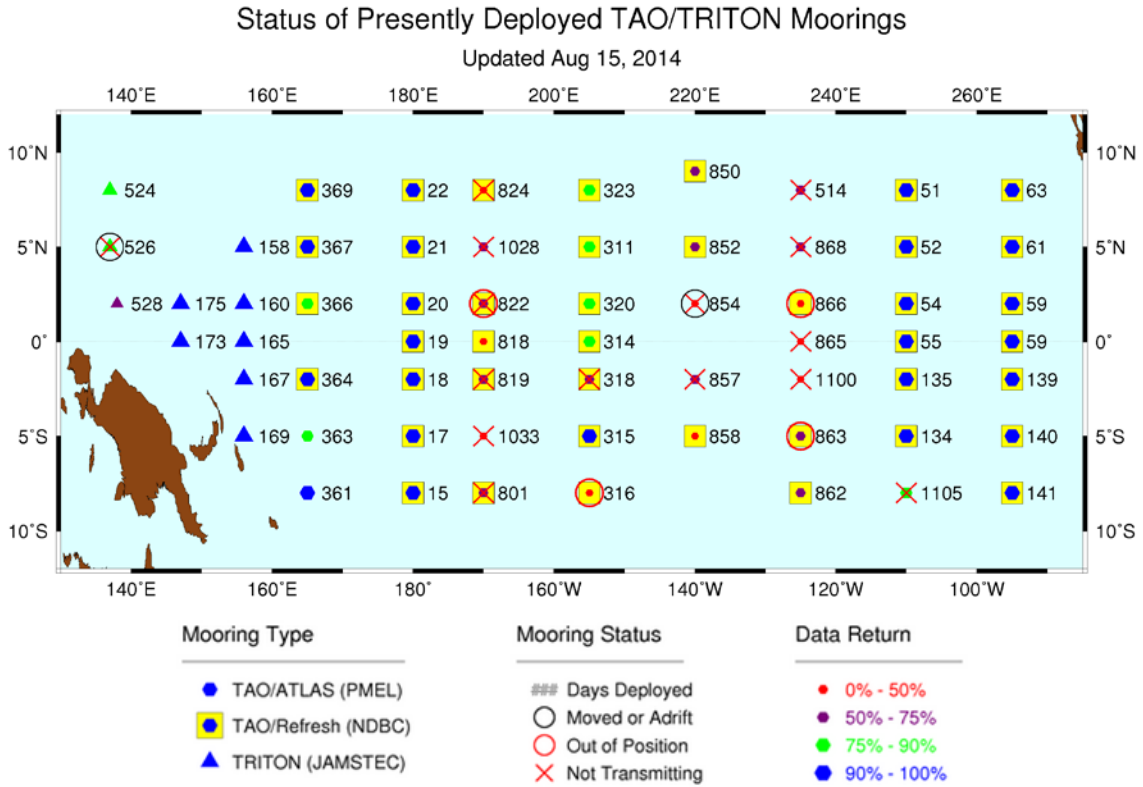


Fig. 5: NDBC Tropical Atmosphere Ocean (TAO) Array and TRITON Array status on 15 August 2014. The numbers indicate how many days have passed since last servicing (ideally <365). Figure from <http://www.pmel.noaa.gov/tao/global/status/>.

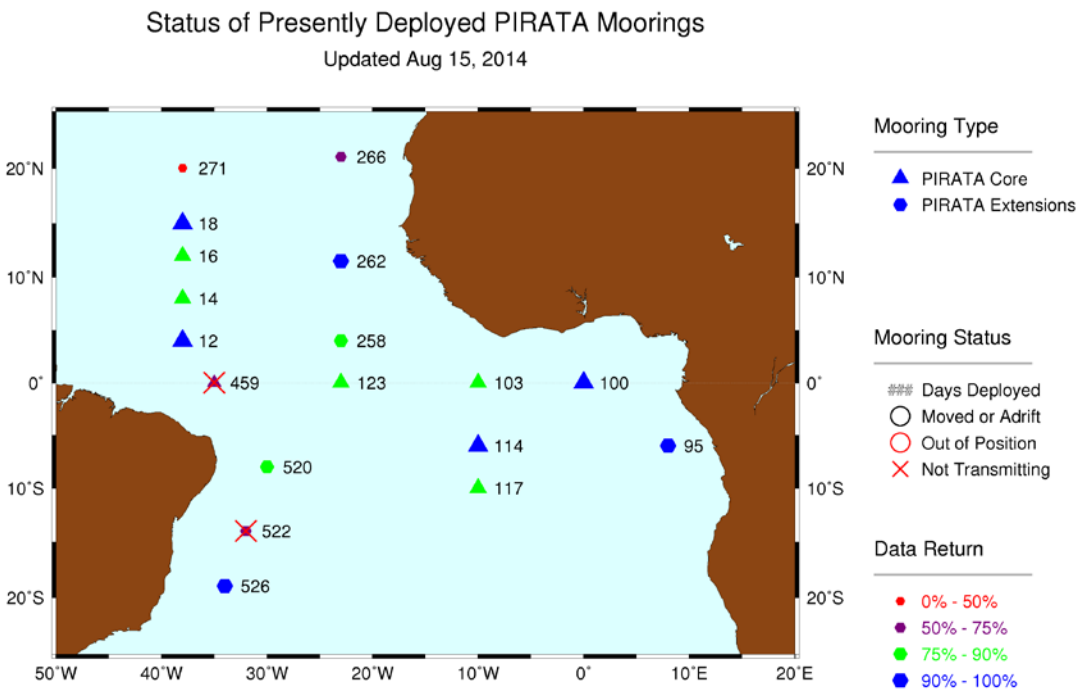


Fig. 6: PIRATA Array including PMEL/AOML Northeast Extension status on 15 August 2014. The numbers indicate how many days have passed since last servicing (ideally <365). Figure from <http://www.pmel.noaa.gov/tao/global/status/>.

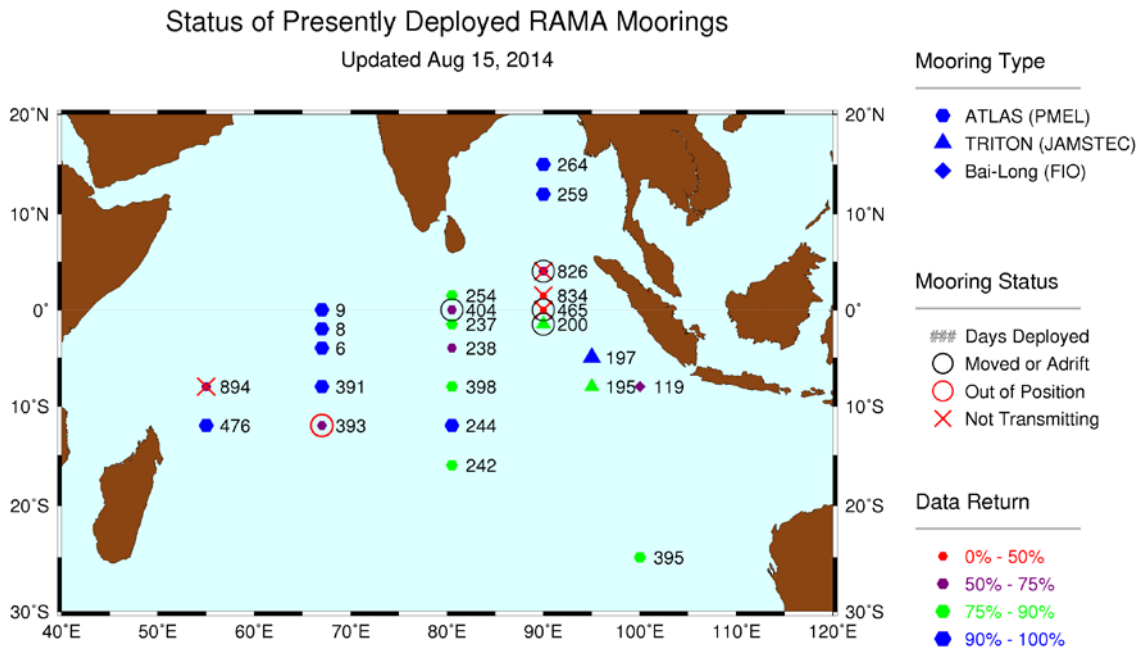


Fig. 7: International RAMA Array status on 15 August 2014. The numbers indicate how many days have passed since last servicing (ideally <365).). Figure from <http://www.pmel.noaa.gov/tao/global/status/>.

APPENDIX 4

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Republic of Korea
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	Korea Meteorological Administration	
Number and type of buoys	(a) deployed during the year	9
	(b) operational as of 31 August	49
	(c) reporting on GTS as of 31 August	11
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas		
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	
Agency or programme	National Institute of Meteorological Research	
Number and type of buoys	(a) deployed during the year	15 Argo floats
	(b) operational as of 31 August	61 Argo floats
	(c) reporting on GTS as of 31 August	61 Argo floats
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas		
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	
Agency or programme	Korea Hydrographic and Oceanographic Administration	
Number and type of buoys	(a) deployed during the year	23 Moored buoy(include 8 ATON Mount)
	(b) operational as of 31 August	23
	(c) reporting on GTS as of 31 August	-
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	To provide information for navigational safety , warning service and ocean research	
	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	EAST SEA and YELLOW SEA	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

(repeat table above as often as necessary)

2. PLANNED PROGRAMMES:

Agency or programme	Korea Meteorological Administration	
Number and type of buoys	planned for deployment in the next 12 months	4 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		
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	[x]
	(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	
Number and type of buoys	planned for deployment in the next 12 months	30 Moored buoy(include 13 ATON Mount), 5 SVP
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	EAST SEA and YELLOW SEA	

(repeat table above as often as necessary)

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.):

Ref	Title	Type⁴
1		
2		
3		
4		

(repeat rows in the table above as necessary)

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"> • • •

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>

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

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country								
Contact person e-mail								
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met -Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
Efforts taken against vandalism								
Awareness meeting Organised								
Suggestions (if any)								
Photos on Vandalism		(please include pictures if available; and email electronic versions to support@jcommops.org)						

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). 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-Buoy-Vandalism-Reports.doc>

APPENDIX 5

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	China
Year	2013.08 - 2014.07

1. CURRENT PROGRAMME:

Agency or programme	State Oceanic Administration	
Number and type of buoys	(a) deployed during the year	121 buoys, including 3m, 6m and 10m discus moored buoys, Tsunami buoys, drifters, and 84 Argo floats
	(b) operational as of 31 August	5 drifters 39 moored buoys 108 Argo float
	(c) reporting on GTS as of 31	108
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	China Seas and adjacent waters	
Vandalism incidents	9	

Agency or programme	China Meteorological Administration	
Number and type of buoys	(a) deployed during the year	0
	(b) operational as of 31 August	25
	(c) reporting on GTS as of 31	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	China Seas	
Vandalism incidents	none	

2. PLANNED PROGRAMMES:

Agency or programme	State Oceanic Administration	
Number and type of buoys	planned for deployment in the next 12 months	5 moored buoys, 2 deep sea mooring, 3 multi-parameter buoy of 10m discus, 4 SAMS
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	South China Sea, Bohai Sea, Arctic	

Agency or programme	China Meteorological Administration	
Number and type of buoys	planned for deployment in the next 12 months	8 met-ocean buoys: 4 -- 6m discus, 1—10m discus, 2—11m discus, 1-- 12m discus.
Purpose of programme (check/uncheck boxes using [-] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	China Seas and adjacent waters	

3. TECHNICAL DEVELOPMENTS:

In order to meet the growing needs for ocean observations, the State Oceanic Administration (SOA) carried out a series of technical studies and demonstration applications on the buoys body, instruments, data acquisition systems, data transmission and monitoring systems.

East China Sea Branch undertook the project of "Assembled large moored data buoys R&D". Efforts were made on the study of assemble technique and material to facilitate easier transport. In cooperation with Ocean University of China, new data acquisition system on the large buoy was studied under the support of "Large ocean buoys data integration technology" project. "The application of Compass receiver in large buoy data transmission and monitoring" is a project focusing on the buoy data transmission and surveillance. Buoy observations parameters are expanded through a series of studies on the air-sea flux and marine nuclear radiation monitoring.

To meet the needs of ocean observing operations, the **National Ocean Technology Center** designed a series of new assembled foam multifunction marine environment observation buoys, such as the small wave buoys and ecological water quality monitoring buoys. The assembled foam buoy body is made of waterproof closed cell elastomeric foam, with polyurea on the outer surface, so that the body has good resistance to compression and collision. To facilitate the land and sea transport, easy

deployment and recovery, the newly designed 10m discus buoy and 6m discus buoy are detachable, consisting of a foam floating body and skeleton alloy.

Small wave buoy body is made of polycarbonate material not only with outstanding impact toughness and creep resistance, but also has good heat, cold and certain corrosion resistance. Powered by solar panels and batteries, the buoy can provide long time series of fixed-point wave observations, using multi means of communication such as CDMA/GPRS, Compass satellite and FM.

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

Ref	Title	Type⁵
1	Tang Yuanguang, Zhou Jinyuan, Li Siwei. 2013: Development of 3m multi-parameter wave buoys <i>Meteorological, Hydrological and Marine Instruments</i> , 2, 1-5.	Instrumentation
2	LIU Yuqiang, WANG Junqin, and GOU Yanfen. 2013: Discussion on the Analysis Calculation of the Deep Sea Multi-parameter Buoy Force. <i>Ocean Technology</i> . 32(3), 27-29.	Instrumentation
3	Tang Yuanguang, Sun Lei. 2014: SZF wave buoy receiving and playback system of double communication. <i>Computer Technology and Development</i> , 24(6)	Data collection
4	Lei, R., N. Li, P. Heil, B. Cheng, Z. Zhang, and B. Sun. 2014: Multiyear sea-ice thermal regimes and oceanic heat flux derived from an ice mass balance buoy in the Arctic Ocean, <i>J. Geophys. Res. Oceans</i> , 119, 537–547, doi: 10.1002/2012JC008731.	Data use
5	Tang Yuanguang, and Wang Ping. 2014: Design and implementation of U-disk memorizer on SZF Wave Buoys. <i>Ocean Technology</i> . 33(3), 1-5.	Instrumentation
6	Lan Hui, Wu Sheng, Chen Min, Li jianshun, Jia Wenjuan and Liao Heqin, 2014: Research on the key technologies of a novel inductive conductivity sensor. <i>Ocean Technology</i> . 33(3), 18-22.	Instrumentation
7	Sun Dongbo, Zhang Suoping Qi Zhanhui, Dong Tao, and Zhao Jiangtao, 2014: Study on the influence of the structural parameters of spherical wave buoys on their undulate motion responses. <i>Ocean Technology</i> . 33(3), 23-26.	Instrumentation

5. SPECIAL COMMENTS (if any):

None.

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

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country			China					
Contact person e-mail			Yu Ting, National Marine Data and Information Service, email: julia_yu_nmdis@163.com					
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met - Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
2013.10			Met-ocean buoy	Ship collision damage	QF153		40K USD	Yes
2014.05			Met-ocean buoy	Intentional damage		30	20K USD	Yes
2014			10m multi-parameter buoy	Sensor damage			30K USD	No
2013	8S	100E	Met-Ocean Buoy	Anchor chain lost, and rusting	Bailong Buoy #1			No
2014	9.6N	95.6E	Met-Ocean Buoy	Rusting	Bailong Buoy #2			No
2014.6.21			Tsunami Buoy	To be determined	HX2	40	To be determined	No
2014.2.18-2014.2.27			Met-Ocean Buoy	Intentional damage	QF304	10	25K USD	Yes
2014.3.19-2014.3.22			Met-Ocean Buoy	Intentional damage	QF304	4	20K USD	Yes
2014.4.1-2014.4.5			Met-Ocean Buoy	Intentional damage	QF304	5	13K USD	Yes
Efforts taken against vandalism			<ol style="list-style-type: none"> 1. Improve the platform design to make more impervious to damage and install other mechanisms such as anti-climb fence and theftproof turnbuckle fence to prevent access to the individual instruments. 2. Improve the remote monitoring of buoy, such as install video camera and alarm system 3. Upgrade network operations to improve their availability 					
Awareness meeting Organised								
Suggestions (if any)			Further inform the mariners and in particular the fishing communities the existence, application and importance of these data buoys, through direct discussions, the distribution of brochures.					
Photos on Vandalism								

Photo on vadalism



Fig.1 Ship collision damage to QF 153



Fig.2 Sensor damage



Fig. 3 Sensor lost and superstructure damage (2014.06)



Fig.4 Entangled fishing nets at QF304 (2014.2.18-2014.2.27)

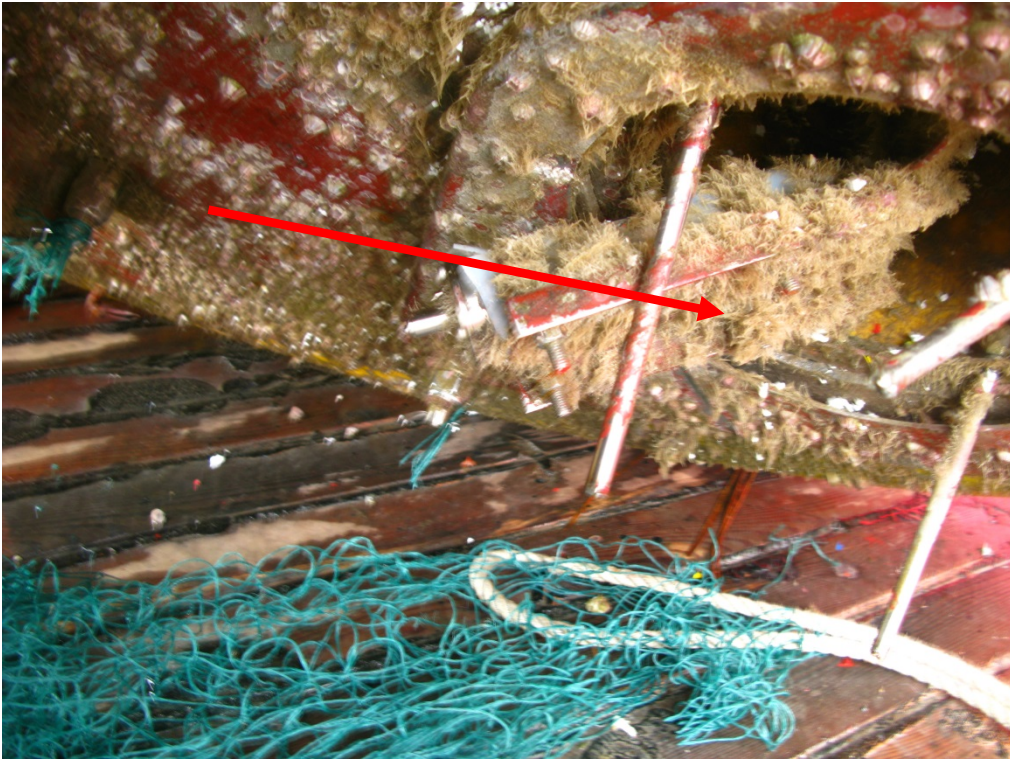


Fig. 5 Current meter probe lost (2014.2.18-2014.2.27)



Fig. 6 Fishing line entanglement of mooring (2014.3.19-2014.3.22)



Fig.7 Sensor damage by collision (2014.3.19-2014.3.22)



Fig. 8 Damaged buoy QF 304 by ship collision (2014.4.1-2014.4.5)

APPENDIX 6

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Sweden
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	SMHI	
Number and type of buoys	(a) deployed during the year	
	(b) operational as of 31 August	2 wave buoys, 1 ocean buoy
	(c) reporting on GTS as of 31 August	No
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		
Vandalism incidents	(a) Number of incidents The wave buoy at position Finngrundet (Bothnian Sea) has been hit by vessels, twice	

(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	2 coastal buoys
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	Baltic Sea, Swedish coastal waters	

(repeat table above as often as necessary)

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	<ul style="list-style-type: none"> • Ocean buoy from Axys. Under water measurement chain consisting of a conductive wire equipped with several instrument for salinity (conductivity) and temperature measurements. • Wave buoys from Datawell. 0.7 m hull, also measuring SST • Coastal buoys from Tech Works Marine
(b) Instrumentation	<ul style="list-style-type: none"> • Met: Air temp, humidity and wind • Oce: Oxygen, current and wave. Conductivity and sea temp. between about 10-80 m (several levels) • Wave buoy: Wave sensor and thermistor • Coastal buoys: Met, currents, salinity, chlorophyll, oxygen, turbidity on several depths
(c) Others	<ul style="list-style-type: none"> •

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

Ref	Title	Type⁶
1		
2		
3		
4		

(repeat rows in the table above as necessary)

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> • Wave buoy: Good. Well-tested and calibrated sensors • Ocean buoys: New parameters and sensors have to be verified.
(b) Communications	<ul style="list-style-type: none"> • Ocean buoy: Iridium • Wave riders: Two with Iridium and one with Orbcomm • Coastal buoys: Iridium
(c) Buoy lifetimes	<ul style="list-style-type: none"> • New ocean buoys estimated to about 5-8 years. But individual sensors 1-5 years. • Waveriders estimated to about 5-8 years
(d) Other	<ul style="list-style-type: none"> • Long term goal - to operate: <ul style="list-style-type: none"> ○ Two ocean buoys, with one complete spare unit. ○ Three wave buoys, with two spare unit. ○ Six coastal bouys with one spare unit

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>

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

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country								
Contact person e-mail								
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met -Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
Efforts taken against vandalism								
Awareness meeting Organised								
Suggestions (if any)								
Photos on Vandalism		(please include pictures if available; and email electronic versions to support@jcommops.org)						

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). 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-Buoy-Vandalism-Reports.doc>

APPENDIX 7

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Japan
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	Japan Meteorological Agency (JMA)	
Number and type of buoys	(a) deployed during the year	- 16 drifting buoys with air pressure, SST, wave height and wave period sensors - 27 profiling floats - 3 Tsunami buoys
	(b) operational as of 31 August	- 5 drifting buoys with air pressure, SST, wave height and wave period sensors - 38 profiling floats - 3 Tsunami buoys
	(c) reporting on GTS as of 31 August	- 5 drifting buoys with air pressure, SST, wave height and wave period sensors - 38 profiling floats - 3 Tsunami buoys
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	[x] - weather and sea condition monitoring (drifting buoys) - ocean state and climate monitoring (profiling floats) - Tsunami monitoring (Tsunami buoys)
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	- seas around Japan (drifting buoys and profiling floats) - the Pacific Ocean (off the coast of Tohoku, Japan) (Tsunami buoys)	
Vandalism incidents	(a) Number of incidents: None	

Agency or programme	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	
Number and type of buoys	(a) deployed during the year	- 71 profiling floats - 10 surface moorings for meteorological and subsurface oceanographic (7 TRITON buoys and 3 RAMA buoys)
	(b) operational as of 31 August	- 238 profiling floats - 13 surface moorings for meteorological and subsurface oceanographic (10 TRITON buoys, 3 RAMA buoys)
	(c) reporting on GTS as of 31 August	- 220 profiling floats - 13 surface moorings for meteorological and subsurface oceanographic (10 TRITON buoys, 3 RAMA buoys)

Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	<input checked="" type="checkbox"/> (TRITON and RAMA buoys)
	(b) met / ocean research	<input checked="" type="checkbox"/> (profiling floats and TRITON and RAMA buoys)
	(c) developmental	<input checked="" type="checkbox"/> (profiling floats)
Main deployment areas	- the North Pacific and the Southern Ocean (profiling floats) - the Western tropical Pacific (TAO/TRITON array) and the Eastern Indian Ocean (RAMA array)	
Vandalism incidents	(a) Number of incidents: 2 (see annex for details)	

Agency or programme	Seikai National Fisheries Research Institute, Fisheries Research Agency	
Number and type of buoys	(a) deployed during the year	5 surface drifters
	(b) operational as of 31 August	2 surface drifters
	(c) reporting on GTS as of 31 August	0
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"/> oceanographic research
	(c) developmental	<input type="checkbox"/>
Main deployment areas	the East China Sea, Tsushima Strait and the Sea of Japan	
Vandalism incidents	(a) Number of incidents: None	

Agency or programme	Okinawa Institute of Science and Technology Graduate University	
Number and type of buoys	(a) deployed during the year	- 2 surface drifters - 7 profiling floats
	(b) operational as of 31 August	- 2 surface drifters - 7 profiling floats
	(c) reporting on GTS as of 31 August	N/A
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"/> current circulation research
	(c) developmental	<input type="checkbox"/>
Main deployment areas	mainly Okinawa Trough	
Vandalism incidents	(a) Number of incidents: None	

Agency or programme	Tsurumi-Seiki Co., Ltd.	
Number and type of buoys	(a) deployed during the year	0 profiling float
	(b) operational as of 31 August	1 profiling float
	(c) reporting on GTS as of 31 August	0
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 checked="" type="checkbox"/>
Main deployment areas	the North Pacific and the Southern Ocean	
Vandalism incidents	(a) Number of incidents: None	

(repeat table above as often as necessary)

2. PLANNED PROGRAMMES:

Agency or programme	Japan Meteorological Agency (JMA)	
Number and type of buoys	planned for deployment in the next 12 months	- 16 drifting buoys with air pressure, SST, wave height and wave period sensors

		- 27 profiling floats
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	<input checked="" type="checkbox"/> - weather and sea condition monitoring (drifting buoys) - ocean state and climate monitoring (profiling floats)
	(b) met / ocean research	<input type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	seas around Japan	

Agency or programme	Japan Agency for Marine-Earth Science and Technology (JAMSTEC)	
Number and type of buoys	planned for deployment in the next 12 months	- 24 profiling floats - 13 meteorological and subsurface oceanographic surface moorings (10 TRITON buoys, 3 RAMA buoys)
Purpose of programme (check/uncheck boxes using <input type="checkbox"/> or <input checked="" type="checkbox"/> as appropriate)	(a) operational	<input checked="" type="checkbox"/> (TRITON and RAMA buoys)
	(b) met / ocean research	<input checked="" type="checkbox"/> (profiling floats and TRITON and RAMA buoys)
	(c) developmental	<input checked="" type="checkbox"/> (profiling floats)
Main deployment areas	the Western tropical Pacific (TAO/TRITON array) and the Eastern Indian Ocean (RAMA array)	

Agency or programme	Seikai National Fisheries Research Institute, Fisheries Research Agency	
Number and type of buoys	planned for deployment in the next 12 months	4 surface drifters
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"/> oceanographic research
	(c) developmental	<input type="checkbox"/>
Main deployment areas	the East China Sea, Tsushima Strait and the Sea of Japan	

Agency or programme	Okinawa Institute of Science and Technology Graduate University	
Number and type of buoys	planned for deployment in the next 12 months	6 profiling floats
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"/> current circulation research
	(c) developmental	<input type="checkbox"/>
Main deployment areas	mainly Okinawa Trough	

Agency or programme	Tsurumi-Seiki Co., Ltd.	
Number and type of buoys	planned for deployment in the next 12 months	0 profiling float
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 checked="" type="checkbox"/>
Main deployment areas	N/A	

(repeat table above as often as necessary)

3. TECHNICAL DEVELOPMENTS:

(a) Buoy design	• JAMSTEC
-----------------	-----------

	<p>deployed 7 Deep NINJA floats in the Southern Ocean during January-March 2014. The 6 floats are now active. Their information and data are available at http://www.jamstec.go.jp/ARGO/deepninja/.</p>
(b) Instrumentation	•
(c) Others	•

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

Ref	Title	Type⁷
1	Japan National Report, Appendix 6, Report of the 15th meeting of the International Argo Steering Team.	(1) Implementation, (2) Operations, (3) Instrumentation, (5) Data Management, (7) Data use
2	Argo National Data Management Report of Japan, 2013, Appendix 5, Report of the 14th Argo Data Management Meeting.	(4)Quality Management, (5)Data Management, (7)Data use
3	Masuda, S. and S. Hosoda : Effective Design of Profiling Float Network for Oceanic Heat-Content Monitoring, <i>The Scientific World Journal</i> , vol. 2014, Article ID 340518, 2014. doi:10.1155/2014/340518.	(1) Implementation, (8) Other
4	Masuda, S., N. Sugiura, S. Osafune, and T. Doi : Improvement of Ocean State Estimation by Assimilating Mapped Argo Drift Data, <i>The Scientific World Journal</i> , 2014, 16,doi:10.1155/2014/975618.	(7) Data use, (8) Other

(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	• • •

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

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>

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country		Japan						
Contact person e-mail		triton@jamstec.go.jp						
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met -Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
2014	5N	137E	Met-Ocean Buoy	Lost	11011 / 52073	433 days		
2014	1.5S	90E	Met-Ocean Buoy	Drift	18507 / 53057	N/A		
Efforts taken against vandalism								
Awareness meeting Organised								
Suggestions (if any)								
Photos on Vandalism		(please include pictures if available; and email electronic versions to support@jcommops.org)						

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). 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-Buoy-Vandalism-Reports.doc>

APPENDIX 8

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	New Zealand
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	Meteorological Service of New Zealand (MSNZ)	
Number and type of buoys	(a) deployed during the year	8 SVPB
	(b) operational as of 31 August	9
	(c) reporting on GTS as of 31 August	9
Purpose of programme	Provide real-time data for MetService weather forecasting needs.	
Main deployment areas	Tasman Sea, Southern Ocean	
Vandalism incidents	None	

2. PLANNED PROGRAMMES: (for period 1st Sept 2014 – 31st August 2015)

A. Agency or programme	Meteorological Service of New Zealand (MSNZ)	
Number and type of buoys	Planned for deployment in the next 12 months	5 SVPB
Purpose of programme	Provide real-time data for MetService weather forecasting needs.	
Main deployment areas	Tasman Sea, Southern Ocean	

B. Agency or programme	MSNZ Barometer Upgrade Program	
Number and type of buoys	Planned for deployment in the next 12 months	10 SVPB
Purpose of programme	To increase the number of pressure observations in the regions required for MetService forecasting operations	
Main deployment areas	Tasman Sea, Southern Ocean	

C. Agency or programme	MSNZ deployments for Global Drifter Program	
Number and type of buoys	Planned for deployment in the next 12 months	10 SVPB
Purpose of programme	To support the GDP to increase the number of buoy observations in the Southern Ocean	
Main deployment areas	Southern Pacific Ocean	

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.):

Ref	Title	Type⁸
1		
2		
3		
4		

(repeat rows in the table above as necessary)

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> •
(b) Communications	<ul style="list-style-type: none"> • Iridium drifter data was severely delayed during one day period when Scotia Weather Services experienced data processing problems. Scotia resolved the issue quickly with an incident that managed to occur through their checks and processes. Their communication with MetService was quick and their explanations thorough.
(c) Buoy lifetimes	<ul style="list-style-type: none"> • MetOcean Iridium buoy on Antipodes Island had been in operation for 23 months before buried by a landslide a few months prior to a planned replacement and redeployment. • Marlin-Yug Argos buoy redeployed after 1 year in storage having the pressure sensor fail with a total of over 12 months active life. • Marlin-Yug Argos buoy lasted over 18months before being beached and battery failure. • Marlin-Yug Argos buoy is still in operation after 27 months of active life.
(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

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country								
Contact person e-mail								
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met -Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
Efforts taken against vandalism								
Awareness meeting Organised								
Suggestions (if any)								
Photos on Vandalism		(please include pictures if available; and email electronic versions to support@jcommops.org)						

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). 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-Buoy-Vandalism-Reports.doc>

APPENDIX 9

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Australia
Year	2014

CURRENT PROGRAMMES

(for period 1 July 2013– 30 June 2014)

- A Agency or programme:** Australian Bureau of Meteorology (ABOM)
- Number and type of buoys:
- | | |
|----------------------------------|----|
| (a) Deployed during the year: | 16 |
| 16 SVP-B | |
| (b) Operational at 31 July: | 14 |
| (c) Reporting on GTS at 31 July: | 14 |
- 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: | 5 |
| 5 SVP-B (Bureau sponsored upgrades) | |
| (b) Operational at 31 July: | 0 |
| (c) Reporting on GTS at 31 July: | 0 |
- 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: | 33 |
| 33 SVP-B | |
| (b) Operational at 31 July: | 30 |
| (c) Reporting on GTS at 31 July: | 30 |
- 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:	16
	12 Sea-ice buoys	
	2 Sea-ice mass-balance buoys	
	2 Stress-gauge buoys	
	(b) Operational at 31 July:	8
	(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 2014 – 30 June 2015)

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:		40
	40 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:		8
	4 Sea-ice buoys	
	2 Sea-ice mass-balance buoys	
	2 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:
 - (d) Others:
-

APPENDIX 10

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Netherlands
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	Argo – Dutch Argo Programme	
Number and type of buoys	(a) deployed during the year	2
	(b) operational as of 31 August	15
	(c) reporting on GTS as of 31 August	
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		
Vandalism incidents	(a) Number of incidents None If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

(repeat table above as often as necessary)

2. PLANNED PROGRAMMES:

Agency or programme	Argo – Dutch Argo Programme	
Number and type of buoys	planned for deployment in the next 12 months	7
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	South Atlantic Ocean / ACC	

(repeat table above as often as necessary)

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.):

Ref	Title	Type⁹
1	-	
2		
3		
4		

(repeat rows in the table above as necessary)

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"> • • •

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>

⁹

: 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

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country								
Contact person e-mail								
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met -Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
Efforts taken against vandalism								
Awareness meeting Organised								
Suggestions (if any)								
Photos on Vandalism		(please include pictures if available; and email electronic versions to support@jcommops.org)						

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). 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-Buoy-Vandalism-Reports.doc>

APPENDIX 11

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Canada
Year	2014

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"> • 17 moored buoys maintained (including 1 test buoy) • 40 GDP Barometer Upgrade buoys deployed (not counted in GTS totals) • 0 waverider deployed
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 14 - 3 M Discus • 3 - 6 M NOMAD • 0 – 0.7 M waverider
	(c) reporting on GTS as of 31 August	14 – Moored Buoys (3 stations offline due to technical problems)
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	Coastal waters of British Columbia, open ocean deployments of moored buoys (NOMADS and 3-Meters Discus Buoys), and GDP drifting buoys at Northeast Pacific Ocean.	

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	<ul style="list-style-type: none"> • 20 (seasonal) moored buoys • 1 Moored Buoy in support of the 2015 PanAM Games in Toronto • 1 TriAXYS Wave Buoy in support of the 2015 PanAM Games in Toronto
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 10 – 3 M Discus • 11–1.7M WKR • 1 Pan Am TriAXYS Wave Buoy

	(c) reporting on GTS as of 31 August	19
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.	

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	(a) deployed during the year	<ul style="list-style-type: none"> • 9 moored buoys maintained (8 NOMADs and one 3MD in NW Atlantic) • 2 seasonal deployments (Gulf of St. Lawrence) • 0 waverider • 1 SVP-B drifting buoy deployed on 2013-09-07 (currently transmitting at 50.5N 17.1W)
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 1 - 3 M Discus • 5 - 6 M NOMAD • 2 - 1.7 M Watchkeeper • 0 - 0.7 M waverider • 1 - SVPB
	(c) reporting on GTS as of 31 August	8 – Moored Buoys 1 - SVPB
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	Northwest Atlantic Ocean and Gulf of St. Lawrence. Note EC also provides logistical support for a number of E-SURFMAR drifting buoys deployments each year via the port of Halifax, as well as when ship deployment opportunities are available. When possible, deployments will focus on the Labrador Sea, an area with few in-situ ocean or weather observations.	

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"> • 13 drifters • 1 (seasonal) Watchkeeper moored buoy in Beaufort Sea
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 15 (including Polar SVP and iCALIB deployed by Carlton U on Aug 05)

		<ul style="list-style-type: none"> • 1 WKR MB
	(c) reporting on GTS as of 31 August	15
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	Beaufort Sea, Canadian Archipelago, Eastern Arctic and Labrador Sea. Note that a Watchkeeper Moored buoy has been deployed at the Beaufort Sea on August 1 st , 2014 from CCGS Wilfred Laurier.	

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"> • 17 moored buoys maintained • 1 waverider buoy redeployed • 20-30 drifting buoys, including mix of MSC funded buoys and GDP barometer upgrade 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, open ocean deployments of moored buoys (NOMADS and 3-Meters Discus Buoys). Drifting buoy deployments will be coordinated with GDP/AOML.	

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 • 1 Moored Buoy in support of the 2015 PanAM Games in Toronto • 1 TriAXYS Wave Buoy in support of the 2015 PanAM Games in Toronto
Purpose of programme	(a) operational	[x]

<i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(b) met / ocean research	[x]
	(c) developmental	[x]
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 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 • 2 seasonal moored buoys • 1 waverider buoy • 4-5 SVP-B drifting buoys
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	Northwest Atlantic Ocean and Gulf of St. Lawrence. Note EC also provides logistical support for a number of E-SURFMAR drifting buoys deployments each year via the port of Halifax, as well as when ship deployment opportunities are available. Will continue to seep deployment opportunities in the Labrador Sea from commercial, research, or military vessels.	

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	23 include 6 Polar SVP-B, 7 ICEX-Air, 3 Polar SVP-B (air), 2 POPs, and 2 ICALIB, 2 SVP-B, 1 Ice mass balance buoy (IMB)
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	Northwest Atlantic Ocean and Gulf of St. Lawrence, Beaufort Sea, Canadian Archipelago, Eastern Arctic and Labrador Sea. Note that the METAREA project will facilitate a significant increase in number of deployments in the Arctic, and the MSC will benefit from air deployment support from Royal Canadian Air Force for planned deployment of up to 4-6 ICEX-Air and and 4-6 Polar SVP-B (both air deployed).	

3. TECHNICAL DEVELOPMENTS:

<p>(a) Buoy design</p>	<ul style="list-style-type: none"> • Integration of Iridium SBD modem Moored Buoy Payload: <ul style="list-style-type: none"> ○ Over the past year, EC the EC has worked with AXYS Technologies to integrate an Iridium short burst data (SBD) modem into the existing “payload”. ○ At current, there are 9 GOES/Iridium units installed at operational moored buoys at the Pacific & Yukon Region, as well as 2 GOES/Iridium units installed at Atlantic Ocean. A few more will deployed in the upcoming Buoy Service Tender Trip at Atlantic Ocean. ○ Working towards having 100% of moored buoys in coastal or open Ocean waters completed in the next 1-2 years.
<p>(b) Instrumentation</p>	<ul style="list-style-type: none"> • Transition to sonic anemometers for moored buoy network: <p>Following a competitive procurement and technical evaluation process, EC is procuring and integrating Vaisala WS-702 sonic anemometers into the operational moored buoy network. Intention will be to install the new sensors at both wind position 1 and 2 (redundant sensors). Note that this work builds upon EC-MSD field evaluation of the previous generation sensor from Vaisala WS425)</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 in late 2014 following a number of delays due to staffing shortfalls.</p> <p>Routing of Third Party Drifting Buoys to GTS:</p> <p>As highlighted at previous sessions of DBCP, 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</p>

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.

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: **SSVX02 CWAO**. Earlier this year, Scotia Weather has developed and tested the functionality to generate and disseminate buoy messages in BUFR format.

To date, there have been over hundreds of 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.

Continued discussions with Canadian Coast Guard regarding Buoy Tender Services:

Over the past two decades, buoy tendering services have been provided for the Canadian Moored Buoy Network by the Canadian Coast Guard (CCG) at no direct cost to Environment Canada. Resource and capacity pressures at CCG have necessitated discussions on cost-recovery for this service, which include between 60-70 days of ship-time per year. EC-MSB and CCG are undergoing negotiation of a new agreement which will see EC-MSB fund a significant proportion of the operational costs associated with buoy tender services, putting a very significant pressure on budgets and overall costs to EC maintain and operate the moored buoy network in its current configuration. Annual costs for ship-time will likely be in the \$1-2 M/year (CAN) range on an ongoing basis.

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

Ref	Title	Type ¹⁰
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-vaques/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 – Senior Manager or Network Operations - chris.marshall@ec.gc.ca 1 (416) 739-4468	8
4	<i>Buoy wind inhomogeneities related to averaging method and anemometer type: application to long time series</i> --- B.R. Thomas and V.R. Swail - Environment Canada Science and Technology Branch, Climate Research Division International Journal of Climatology 31: 1040-1055 (2011)	3, 4, 5

(repeat rows in the table above as necessary)

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> For 2nd half of 2013 (July to December) Data availability from moored buoys was 83% of expected observations received and delivered to clients. For 1st half of 2014 (January to June) Data availability from moored buoys was 77% of expected observations received and delivered to clients. Note that buoy availability has been impacted by a reduction in CCG ship-time, leading to both equipment and mooring failure. Loss of data has been highest on the Atlantic coast, where impacts of reduced ship-time have directly affected performance of the network.
(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 now utilized for new SVP-B deployments, as well as moored buoy position beacons. On-going deployment of Iridium into moored buoys as back-up system to offer redundant communication, and bi-directional capabilities.
(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 --- Average over past 2 years (all buoy types) is 393 days, with ~10% failures on deployment, or within 45 days.

¹⁰: 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

	<ul style="list-style-type: none"> • ICEX-Air buoys up to 48 months
(d) Other	<ul style="list-style-type: none"> • • •

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>

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country		Canada						
Contact person e-mail		chris.marshall@ec.gc.ca						
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met -Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
			No significant reports of vandalism for the Canadian Moored buoy network (~50 stations operated on year-round or seasonal basis).					
Efforts taken against vandalism								
Awareness meeting Organised								
Suggestions (if any)								
Photos on Vandalism		(please include pictures if available; and email electronic versions to support@jcommops.org)						

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). A template of the form can be downloaded from the following ftp site: <ftp://ftp.wmo.int/Documents/PublicWeb/amp/mop/documents/dbcp/templates/Format-DBCP-Buoy-Vandalism-Reports.doc>

APPENDIX 12

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	India
Year	2014

Considering the importance of ocean observations in terms of understanding the ocean environment and to utilize them for operational oceanography, a large number of platforms were deployed in the Indian Ocean, to acquire data on ocean variables in and around the Indian Seas. Under the Ocean observation Network programme of Ministry of Earth Sciences involving multi institutions different platforms were deployed in the Ocean such as the moored met-ocean data buoys, XBTs, drifters, Argo floats, ship board AWS, HF radars, ADCPs, current meter moorings at equator, wave rider buoys, sea level gauges, tsunami monitoring buoys, etc., Many useful insights about the Indian Ocean have been identified by extensively utilizing the data sets. The above observational program are being effectively utilized for understanding the marine environment, validation of ocean models and satellite derived parameters, and assimilated into ocean models for better now-casting and forecasting.

NIOT OOS group is continuing the work for maintaining the Moored Buoy Network in the North Indian Ocean. This network is performing successfully and providing valuable data till date despite many challenges faced. During this period from September 2013 to August 2014 the OOS Group has completed the major task which includes 57 deployments/retrievals for which 12 cruises of 184 ship-days covering 20000nm (nautical miles) with 1925 man-day were undertaken. NIOT continued its efforts to analyze performance of sensors for long term moored buoy applications.

CAL-VAL project has been implemented for validating satellite ocean color sensors, particularly for data products used in long-term multisensory time series studies. The new underwater structure has a phase shift of 15° between its two poles to avoid the shadow effect. Under CAL-VAL phase-II the buoy deployed in CAL-VAL site at 10.5N/72.25E position off Lakshadweep islands.

Indian made Moored buoy system with met, surface and subsurface sensors up to 500m depth called **Prakruti** worked successfully Off Lakshadweep for 8 months transmitting 106 parameters in real time through INMARSAT telemetry. This is powered by Lithium Primary battery and Solar panel & Lead acid battery with a change over mechanism in built in the system

Met Ocean buoy was interfaced with dual transceiver system (GPRS and INSAT). The main data transmission components consist of data logger, GPRS modem, INSAT transceiver and receiving server. Every three hours (UTC) the raw data are collected by the sensors and processed by CPU and stored in the data logger. The stored data are sent through GPRS modem using GSM network as well as through INSAT communication to Mission Control Center.

As the complete tsunami buoy system is being indigenized, the Indian satellite (INSAT) technology is also proposed for telemetry of tsunami buoy data in real time. Also this is a strategic planning of data security and cost reduction of data transmission. There is limitation of using INSAT in tsunami mode so INMARSAT would be used for tsunami mode and INSAT for health monitoring mode (INSAT for normal mode and INMARSAT for event mode data transmission). The buoy ITB03 in Bay of Bengal was deployed with this facility on August 2013 and this buoy captured the tsunami events on 24th March 2014. This technology achievement greatly reduces the cost involved in the data transmission, less latency and ensures security of data with technology independence. The Tsunami buoy is deployed with indigenous surface buoy system consisting of in-housed CPU and other components. Currently, seven Tsunami buoy systems are being maintained in Northern Indian Ocean, out of which, 5 are from NIOT called Indian Tsunami Buoy System and 2 systems are from SAIC, USA. Indian Tsunami buoy data is available in NDBC-NOAA website to sharing other warning centres and scientific communities. Further details are available at <http://www.ndbc.noaa.gov/>

NIOT developed new moored buoy which is designed after through model studies, numerical analysis for stability of the buoy and same has been compared with the existing discus buoy stability. This

new- gen buoy was deployed in Bay of Bengal at the 17.5N/89.5E (TB09) location and is performing well.

A prototype Passive monitoring system was developed in house for marine grade application. AIS (Automatic Identification System) aid to Navigational system was successfully deployed at CB04 location in Goa coastal waters. It captured the passing vessel information it is used get the information about the vessel passing around the CB04 buoy location. This buoy deployed and worked satisfactorily for the 146 days continuously. In the second phase of its development it is planned to transmit real time vessel passing information around the deployment locations to NIOT shore station through GPRS/ INMARSAT techniques.

Arctic Observation –IndARC Mooring : The first underwater moored observatory was deployed by India in Polar Waters at Kongsfjorden Fjord in Arctic Ocean called as “indARC” at a location 78° 56.78’ N & 12° 00.889’ E on 23rd July 2014. The moored observatory consist of a suite of ten oceanographic sensors from international reputed measuring temperature, salinity, current profiles and other vital parameters. The information measured and recorded by the sensors would yield much needed data to understand the cause and impact of climate variability in a regional to global perspective. The design, development and installation of this underwater moored observatory were successfully executed by OOS-NIOT in collaboration with NCAOR Goa. This in-house effort designed to withstand harsh polar region is a milestone achievement for MoES and India. The deployed Mooring configuration is capable of measuring parameters such as speed and direction of currents, physical parameters like conductivity (salinity), temperature, DO etc at various depth. As a part of the technological developmental projects undertaken by OOS, development of the laboratory scale robotic fish prototype with individually controlled pectoral fins for the pitch control and caudal fin for propulsion is manufactured. The present prototype was tested on in calm sea environment to check the behavior in salt water and sea conditions.

Out of four coastal buoys, a unique feature (IMSS) is called as R-dharsh is introduced to have real time visual observation from a moored buoy far away from the Shore. Three Cameras are installed on a mast at 3m height above mean sea level at 120° displacement covering 360° to capture video and still pictures of the entire surrounding of the buoy system. Apart from standard met-ocean and oceanographic measurements the buoy can also transmit real-time day and night video and still photographs of the surrounding environment that are captured using high resolution video camera encapsulated to work in hostile marine environment. The video and photographs are transmitted through 3G telemetry. The above facility would help to view the present sea conditions remotely, which would be more useful for the fishermen community. In addition, this feature helps to track the buoy system for its continuous functioning and also alert the respective authorities, in case of any disturbances to the buoy system. This is accomplished above water and could be implemented underwater also. This buoy can also capture information about passing ship using Automatic Identification System. Indian Patent filled and yet to obtain for the same.

A standalone buoy position tracker developed using INSAT communication for replacement of ARGO position tracker. In order to ascertain perfect installation a buoy position tracker developed and implemented using a standalone Mobile Satellite System (MSS) Transmitter system. Automatically every one hour, the MSS transmitter will get the GPS position from the satellite and transmit through the INSAT 3C geo stationary satellite using S band frequency. The Date Time and GPS position of the buoy will be received at the reception end.

The efforts to conduct awareness among fishermen continue by organizing an awareness programme through a coastal sea Fishermen meet on 20th May 2014 at at Muthkur, near Krishnapatnam Port India. The programme comprises of deliberations from both NIOT officials and Fishermen. Topics include various coastal environment issues and challenges. A Successful awareness campaign was conducted with posters and pamphlets and these were distributed in different locations along the villages to show cause the importance of moored buoys and need to protect them in line with the interests of people and fishermen. More than 50 fishermen have attended the programme. Also stall was erected during fishermen annual meet to bring awareness among the deep sea fishers at Chennai India. Also through Government of Sri Lanka similar awareness programmes were organized and posters and other display materials were distributed to major Ports such as Mumbai Chennai etc. and Department of fisheries in coastal places in India and

to Indian Coast Guard etc., OOS doing systematic efforts to campaign on safe guarding the buoy systems.

Indo US collaboration

Four cruises onboard US Ship, RV Roger Revelle during the 2013 - 14 to study the upper ocean processes in Bay of Bengal as a part of Air – Sea Interaction Research Initiative (ASIRI) programme. In 2013 cruises comprised of three legs, out of which the first leg objectives were to understand upper ocean process, measurement of turbulence and study on biophysical processes and the second leg objectives were Large scale north-south hydrographic survey of the Bay of Bengal and short process study in the southern Bay of Bengal for comparison with data collected during Leg1 and to understand the north-south (NS) variability in atmospheric conditions, upper layer properties and vertical mixing and thus understanding the processes that govern monsoon initiation. In continuation Roger Revelle had a Port call at Chennai and a cruise was undertaken. During this period Indian research vessel Sagar Nidhi was used for two more cruises. Also a summer school workshop was organised with participation of US Researchers to train Indian young researchers. Under Indo US collaboration Indian and US Institutions are working on Monsoonal studies in Bay of Bengal a fully instrumented flux mooring by WHOI USA will be installed in Bay of Bengal

Indo - Japan collaboration

Under Indo Japan collaborative programme Ministry of Earth Sciences and JAMSTEC Japan will work on Ocean observation and LOA is signed. During the visit of Hon ble Indian Prime Minister of India on 1 September 2014 in the Joint Statement of Prime Ministers, has a mention of Ocean Observation

Overall it was a very successful period for Indian Observational programme with a global outlook. Cruises are undertaken in Arabian Sea without armed Guards as there were no reports of piracy incidents. In spite of many challenges India is maintaining and pursuing ocean observational activities and getting equipped with newer tools and expertise

APPENDIX 13

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	Germany
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	GEOMAR Kiel, Argo floats, SFB Climate-Biogeochemistry interactions in the tropical ocean (ARGOS-No. 8165)	
Number and type of buoys	(a) deployed during the year	7
	(b) operational as of 31 August	12
	(c) reporting on GTS as of 31 August	12
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	Tropical Pacific	
Vandalism incidents	(a) Number of incidents 0 If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	GEOMAR Kiel, Glider survey, SFB 754, BMBF AWA, EU FP7 GROOM	
Number and type of buoys	(a) deployed during the year	10
	(b) operational as of 31 August	1
	(c) reporting on GTS as of 31 August	1
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	West African Coast / Cape Verde	
Vandalism incidents	(a) Number of incidents 0 If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	GEOMAR Kiel, Moored bouys (EU FP7 NACLIM; GEOMAR)	
Number and type of buoys	(a) deployed during the year	2
	(b) operational as of 31 August	2
	(c) reporting on GTS as of 31 August	1
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	Subpolar North Atlantic & Cape Verde	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung
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	Snow Depth Buoys	
Number and type of buoys	(a) deployed during the year	8
	(b) operational as of 31 August	6
	(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	[x]
	(c) developmental	[]
Main deployment areas	Arctic Ocean and Weddell Sea	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung	
	Thermistor Buoys for Sea Ice Mass Balance	
Number and type of buoys	(a) deployed during the year	9
	(b) operational as of 31 August	6
	(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	[x]
	(c) developmental	[]
Main deployment areas	Arctic Ocean and Weddell Sea	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung	
	Sea Ice Beacon	
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	[x]
	(c) developmental	[]
Main deployment areas	Weddell Sea	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung	
	Acoustic Doppler Current Profiler (ADCP)	
Number and type of buoys	(a) deployed during the year	1
	(b) operational as of 31 August	0
	(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	[x]

<i>[] or [x] as appropriate)</i>	(c) developmental	<input type="checkbox"/>
Main deployment areas	Weddell Sea	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Subsurface mooring monitoring (ARGOS-No. 8919)	
Number and type of buoys	(a) deployed during the year	50
	(b) operational as of 31 August	50
	(c) reporting on GTS as of 31 August	0
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Weddell Sea, Arctic	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Argo Subsurface (ARGOS-No. 10919)	
Number and type of buoys	(a) deployed during the year	0
	(b) operational as of 31 August	4
	(c) reporting on GTS as of 31 August	4
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Weddell Sea, Arctic	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Seismic ice flow drift (ARGOS-No. 12919)	
Number and type of buoys	(a) deployed during the year	6 (short term deployments)
	(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	<input type="checkbox"/>
	(b) met / ocean research	<input checked="" type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	Weddell Sea, Arctic	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Alfred-Wegener-Institut	
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	Helmholtz-Zentrum für Polar- und Meeresforschung Migrating seals (ARGOS-No. 1535)	
Number and type of buoys	(a) deployed during the year	5
	(b) operational as of 31 August	5
	(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	[x]
	(c) developmental	[]
Main deployment areas	Marion Island (Indian Ocean)	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Bundesamt für Seeschifffahrt und Hydrographie, German Argo (ARGOS-No. 1895)	
Number and type of buoys	(a) deployed during the year	41
	(b) operational as of 31 August	101 (2 floats with Iridium)
	(c) reporting on GTS as of 31 August	101
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	North Atlantic, Nordic Seas, Weddell Gyre	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Bundesamt für Seeschifffahrt und Hydrographie, Marnet (ARGOS-No. 2120)	
Number and type of buoys	(a) deployed during the year	xx
	(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	[x]
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	North Sea, Baltic	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Bundesamt für Seeschifffahrt und Hydrographie, Norwave (ARGOS-No. 9981)	
Number and type of buoys	(a) deployed during the year	6
	(b) operational as of 31 August	6
	(c) reporting on GTS as of 31 August	6
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	North Sea, Baltic	
Vandalism incidents	(a) Number of incidents	

	If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	
Agency or programme	University of Hamburg, SFB512-E2 (ARGOS-No. 592)	
Number and type of buoys	(a) deployed during the year	0
	(b) operational as of 31 August	3
	(c) reporting on GTS as of 31 August	3
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	Nordic Seas	
Vandalism incidents	(a) Number of incidents If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

Agency or programme	Helmholtz-Zentrum Geesthacht, Centre for Materials and Coastal Research: Waverider-buoys	
Number and type of buoys	(a) deployed during the year	3
	(b) operational as of 31 August	3
	(c) reporting on GTS as of 31 August	3
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas	North Sea	
Vandalism incidents	(a) Number of incidents 0 If vandalism incidents have occurred during the year, please provide the details using the form in the annex.	

2. PLANNED PROGRAMMES:

Agency or programme	GEOMAR Kiel, Argo floats, SFB Climate-Biogeochemistry interactions in the tropical ocean (ARGOS-No. 8165)	
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	[]
	(b) met / ocean research	[x]
	(c) developmental	[]
Main deployment areas		

Agency or programme	GEOMAR Kiel, Glider survey, SFB 754, BMBF AWA, EU FP7 GROOM	
Number and type of buoys	planned for deployment in the next 12 months	2
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	West African Coast / Cape Verde	

Agency or programme	GEOMAR Kiel, Moored buoys (EU FP7 NAACLIM; GEOMAR, AtlantOS H2020 proposal)	
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Number and type of buoys	planned for deployment in the next 12 months	3
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	Subpolar North Atlantic & Cape Verde	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Snow Depth Buoys	
Number and type of buoys	planned for deployment in the next 12 months	8
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 checked="" type="checkbox"/>
Main deployment areas	Arctic Ocean and Weddell Sea	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Thermistor Buoys for Sea Ice Mass Balance	
Number and type of buoys	planned for deployment in the next 12 months	4
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	Weddell Sea	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Ice Surface Velocity Profiler	
Number and type of buoys	planned for deployment in the next 12 months	10
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	Weddell Sea	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Spectral Radiation Stations	
Number and type of buoys	planned for deployment in the next 12 months	2
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 checked="" type="checkbox"/>
Main deployment areas	Weddell Sea	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Subsurface mooring monitoring (ARGOS-no. 8919)	
Number and type of buoys	planned for deployment in the next 12 months	50

	months	
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Weddell Sea	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Argo Subsurface (ARGOS-no. 10919)	
Number and type of buoys	planned for deployment in the next 12 months	0
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Weddell Sea	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Seismic ice flow drift (ARGOS-no. 12919)	
Number and type of buoys	planned for deployment in the next 12 months	6
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Weddell Sea	

Agency or programme	Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung Migrating Seals (ARGOS-no. 1535)	
Number and type of buoys	planned for deployment in the next 12 months	2
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[]
	(b) met / ocean research	[x]
	(c) developmental	[x]
Main deployment areas	Indian Sector of Southern Ocean	

Agency or programme	Bundesamt für Seeschifffahrt und Hydrographie, German Argo (ARGOS-No. 1895)	
Number and type of buoys	planned for deployment in the next 12 months	50
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[]
	(c) developmental	[]
Main deployment areas	North Atlantic, Nordic Seas Weddell Gyre	

Agency or programme	Bundesamt für Seeschifffahrt und Hydrographie, Marnet (ARGOS-No. 2120)	
Number and type of buoys	planned for deployment in the next 12 months	11 (replacement and maintenance of existing buoys)
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[]

<i>[] or [x] as appropriate)</i>	(c) developmental	<input type="checkbox"/>
Main deployment areas	North Sea, Baltic	

Agency or programme	Bundesamt für Seeschifffahrt und Hydrographie, Norwave (ARGOS-No. 9981)	
Number and type of buoys	planned for deployment in the next 12 months	9 (replacement and maintance of existing 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 type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas	North Sea, Baltic	

Agency or programme	University of Hamburg, SFB512-E2 (ARGOS-No. 592)	
Number and type of buoys	planned for deployment in the next 12 months	0 has been merged into German Argo
Purpose of programme <i>(check/uncheck boxes using [] or [x] as appropriate)</i>	(a) operational	<input checked="" type="checkbox"/>
	(b) met / ocean research	<input type="checkbox"/>
	(c) developmental	<input type="checkbox"/>
Main deployment areas		

Agency or programme	Helmholtz-Zentrum Geesthacht, Centre for Materials and Coastal Research: Waverider-buoys	
Number and type of buoys	planned for deployment in the next 12 months	3 serviced stations
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 Sea	

3. TECHNICAL DEVELOPMENTS Geomar:

(a) Buoy design	<ul style="list-style-type: none"> • 17" surface buoys with Iridium based telemetry unit • Implementation of a meteorology package into small telemetry buoy (air temperature & air pressure is under development) in collaboration with company (Develogic) • Winched profiler (upper 150m) based on NGK winch but with a new instrument float and real-time data telemetry for open ocen applications in intermediate energetic current regimes • Planned: data capsule telemetry for deep sea moorings without a surface element
(b) Instrumentation	<ul style="list-style-type: none"> • Realtime nitrate data access from SUNA sensor mounted on a glider
(c) Others	<ul style="list-style-type: none"> •

3. TECHNICAL DEVELOPMENTS AWI:

(a) Buoy design	<ul style="list-style-type: none"> • Improvement of Snow Depth buoy design •
(b) Instrumentation	<ul style="list-style-type: none"> • New concept and prototype of hyper-spectral light

	<p>measurements above and under sea ice (Spectral Radiation Station)</p> <ul style="list-style-type: none"> • • •
(c) Others	<ul style="list-style-type: none"> • Development and launch of online data portal for AWI sea ice buoys: www.Meereisportal.de • •

3. TECHNICAL DEVELOPMENTS BSH:

(a) Buoy design	<ul style="list-style-type: none"> • APEX floats (German Argo) • Unmanned lightships, piles, buoys, lighthouses, platforms (Marnet) • Waveridery buoys, communication through Meteosat
(b) Instrumentation	<ul style="list-style-type: none"> • CTD (TS) • CTD (TS), ADCP, Oxygen • Wave sensors, weather data, swell
(c) Others	<ul style="list-style-type: none"> • • •

3. TECHNICAL DEVELOPMENTS Uni Hamburg:

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

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

Ref	Title	Type ¹¹
1 Geomar	Data telemetry systems to access climate sensitive data from moored instrumentation (Karstensen et al.) <i>www.develogic.de/wp-content/uploads/2011/05/THOR-project.pdf</i>	Poster at science conference
2 Geomar	Report on test field deployment and system handling of the Kiel and Bergen systems (Karstensen et al.) <i>http://www.eu-thor.eu/fileadmin/user_upload/thor/template/Deliverables/THOR_Deliverable_D_18_WP_5.1_2010-11-16_v.0.1.pdf</i>	EU Report (FP 6 project THOR)
3 Geomar	Report on the initial system performance of both systems (Karstensen et al.) <i>http://www.eu-thor.eu/Members-only-area.556.0.html</i> (on request)	EU Report (FP 6 project THOR)
4 AWI	Observing snow depth on sea ice with a new affordable buoy	Poster presentation
5 AWI	Autonomous observations of solar energy partitioning in first-year sea ice in the Arctic Basin	Scientific article

(repeat rows in the table above as necessary)

5. SPECIAL COMMENTS (if any):

(a) Quality of buoy data	<ul style="list-style-type: none"> • Real-time quality control of Argo physical data via Coriolis data centre •
(b) Communications	<ul style="list-style-type: none"> • Geomar observes the enhanced use of Iridium communication for data telemetry of any kind (position data for mooring finder, real-time data access). Iridium provide higher data transfer volume and, in combination with implemented GPS, an improved positioning
(c) Buoy lifetimes	<ul style="list-style-type: none"> • Geomar is working on extension >2.5 yrs for moored buoys • Awi reports that Most sea ice buoy's lifetime depends on ice conditions more than on technical issues or battery lifetime • •
(d) Other	<ul style="list-style-type: none"> • •

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>

¹¹: 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

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country								
Contact person e-mail								
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met -Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
Efforts taken against vandalism								
Awareness meeting Organised								
Suggestions (if any)								
Photos on Vandalism		(please include pictures if available; and email electronic versions to support@jcommops.org)						

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). 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-Buoy-Vandalism-Reports.doc>

APPENDIX 14

NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	UK
Year	2014

1. CURRENT PROGRAMMES:

Met Office	Marine Automated Weather Station network moored buoys	
Number and type of 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 (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	North-east Atlantic (2 of the buoys in Biscay jointly operated with Meteo-France)	
Vandalism incidents	none	

Met Office	Near-shore moored buoys	
Number and type of buoys	(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 (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	Off South-west Wales	
Vandalism incidents	none	

Met Office/NOCS	Porcupine Abyssal Plain OceanSITES mooring Celtic Sea CANDYFLOSS buoy	
Number and type of buoys	(a) deployed during the year	1 (Celtic Sea)
	(b) operational as of 31 August	2
	(c) reporting on GTS as of 31 August	2
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	Pre-operational
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	North-east Atlantic	
Vandalism incidents	none	

PML/Met Office	Western Channel Observatory (E1 and L4 buoys)	
Number and type of buoys	(a) deployed during the year	No new sites
	(b) operational as of 31 August	1 (E1 off station)
	(c) reporting on GTS as of 31 August	1
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	Pre-operational
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	Western Channel	
Vandalism incidents	None. E1 off station for repair after having been hit by a ship	

Cefas	SmartBuoy monitoring sites	
Number and type of buoys	(a) deployed during the year	No new sites
	(b) operational as of 31 August	2
	(c) reporting on GTS as of 31 August	0
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x] for monitoring
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	North Sea, Celtic Sea and Liverpool Bay	
Vandalism incidents	None	

Cefas	WaveNet (waverider buoys)	
Number and type of buoys	(a) deployed during the year	No new sites
	(b) operational as of 31 August	25 (17 Cefas plus 8 others)
	(c) reporting on GTS as of 31 August	0 (data available via WaveNet website)
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x] for coastal flood management
	(b) met / ocean research	
	(c) developmental	
Main deployment areas	North Sea, Celtic Sea and Liverpool Bay	
Vandalism incidents	None	

Met Office	Drifting buoys	
Number and type of buoys	(a) deployed during the year	9
	(b) operational as of 31 August	20
	(c) reporting on GTS as of 31 August	20
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[x]
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	South Atlantic, Southern Ocean and subtropical North Atlantic (for GHRSSST drifters)	
Vandalism incidents	N/A	

SAMS	FASTNEt (Fluxes Across Sloping Topography of the North East Atlantic) project drifters (30 drifters deployed July 2013)	
Number and type of buoys	(a) deployed during the year	0
	(b) operational as of 31 Aug	7
	(c) reporting on GTS as of 31 Aug	7
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	
	(b) met / ocean research	[x]
	(c) developmental	
Main deployment areas	North-east Atlantic (Malin shelf)	
Vandalism incidents	N/A.	

2. PLANNED PROGRAMMES:

None at present.

3. TECHNICAL DEVELOPMENTS:

The winter of 2013/14 was notable for the number of severe storms that hit the UK, with the south-west coast in particular frequently battered by high waves. Unfortunately, all three offshore buoys in the south-west (K1, K2 and PAP) broke their moorings at some time during the winter season. This is believed to be due to a change made by the mooring suppliers in the design of the mooring thimbles, leading to increased wear on the rope. As a result, the thimble design has been further modified which hopefully will alleviate this problem and the buoys have been reinstated.

At present we have 3 new design Hydrosphere/Mobilis buoys in operation: K7, K1 and E1 (presently off-station) with several other builds being readied for deployment. We are presently addressing, with Axys, the problem of water ingress through cable connectors on the Watchman and Triaxys boxes.

During the autumn, initial comparisons will be made comparing data measured from a number of ASVs (Autonomous Surface Vehicles) against the Celtic Sea metocean and SmartBuoys as part of the MASSMO (Marine Autonomous Systems in Support of Marine Observations) project.

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

Atkinson, C. P., Rayner, N. A., Roberts-Jones, J., and Smith, R. O., 2013: Assessing the quality of sea surface temperature observations from drifting buoys and ships on a platform-by-platform basis. *J. Geophys. Res.*, 118, 1-23. doi:10.1002/jgrc.20257.

Lean, K. and Saunders, R.W., 2013: Validation of the ATSR reprocessing for climate (ARC) dataset using data from drifting buoys and a three-way error analysis. *Journal of Climate*. Vol. 26 No. 13, 2013.

5. SPECIAL COMMENTS (if any):

All UK Met Office buoys are routinely monitored by Meteo-France as part of their E-SURFMAR responsibility. Meteo-France also handle GTS data distribution for the Met Office and SAMS (FASTNet) drifters.

The Met Office shares in WMO co-ordinated monitoring of the Global Observing System, by acting as a lead centre for monitoring the quality of surface marine observations. This includes observations from ships, drifters, moored buoys and other fixed marine platforms.

APPENDIX 15

FORMAT FOR NATIONAL REPORTS ON CURRENT AND PLANNED BUOY PROGRAMMES

Country	BRAZIL
Year	2014

1. CURRENT PROGRAMME:

Agency or programme	Brazilian National Buoy Program (PNBOIA), part of the GOOS/Brazil Programme	
Number and type of buoys	(a1) deployed during the year 2013, after DBCP29	<ul style="list-style-type: none"> • 05 SVP drifters • 26 SVP-B drifters
	(a2) deployed during the year 2014	<ul style="list-style-type: none"> • 09 SVP drifters • 06 SVP-B drifters
	(b) operational as of 31 August	<ul style="list-style-type: none"> • 03 moored (Axys 3M) • 15 drifters
	(c) reporting on GTS as of 31 august	<ul style="list-style-type: none"> • 03 moored (Axys 3M) • 15 drifters
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[X]
	(b) met / ocean research	[X]
	(c) developmental	[]
Main deployment areas	Brazilian EEZ, South and Topical Atlantic Ocean	
Vandalism incidents	(a) Number of incidents: 0	

(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	04 moored buoys of Platform type
Purpose of programme (check/uncheck boxes using [] or [x] as appropriate)	(a) operational	[X]
	(b) met / ocean research	[X]
	(c) developmental	[]
Main deployment areas		

(repeat table above as often as necessary)

3. TECHNICAL DEVELOPMENTS:

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

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

Ref	Title	Type ¹²
1		

¹²: 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

2		
3		
4		

(repeat rows in the table above as necessary)

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) Training	<ul style="list-style-type: none"> • One Navy officer did a four months training in QC and buoys management, at NDBC (NOAA)

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>

ANNEX - FORM FOR REPORTING INCIDENTS OF VANDALISM ON DATA BUOYS

Country		BRAZIL						
Contact person e-mail		felipe.santos@chm.mar.mil.br (Cdr Felipe Santos)						
Year	Buoy Location		Type of Buoy (e.g. Tsunami / Met - Ocean Buoy/Drifter/ARGO floats/ Other)	Type of damage to buoy	Buoy id/WMO id	Number of days of transmission lost	Cost of replacement	Remarks (e.g. whether photos have been taken)
	Latitude	Longitude						
Efforts taken against vandalism		A warning board and fake cameras placed on buoys.						
Awareness meeting Organised		None						
Suggestions (if any)		Raising awareness of fishing colonies						
Photos on Vandalism								

Note: It is recommended that this form is filled in electronically and returned electronically also to JCOMMOPS (support@jcommops.org). 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-Buoy-Vandalism-Reports.doc>