WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

DATA BUOY COOPERATION PANEL

DBCP-32/ Doc. 5
(23-Sep-16)

THIRTYSECOND SESSION

ITEM: 5

LA JOLLA, USA
17-21 OCTOBER 2016

ENGLISH ONLY

REPORT BY THE TECHNICAL CO-ORDINATOR

(Submitted by theTechnical Coordinator, Champika Gallage, JCOMMOPS)

SUMMARY AND PURPOSE OF DOCUMENT

This document provides information on the work undertaken by the Technical Coordinator of the DBCP during the last intersessional period.

ACTION PROPOSED

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

Appendices: **A.** Monthly Maps for July 2016

B. Data availability on the GTS

C. Key Performance Indicators

D. Technical Coordinator non-routine Tasks

-A- DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

5.1 The Technical Coordinator (TC), Ms Champika Gallage reported on her activities on behalf of the Panel during the last intersessional period from 1 September 2015 to 31 August 2016. On average, the TC DBCP spends 70% of her time on DBCP-related matters and 30% of her time for OceanSITES Project Office activties.

5.2 The TC of DBCP reminded the panel that starting from 12 September 2016, MS. Gallage has moved to a new position in WMO as a Scientific Officer for Marine and Ocean Meteorological Observations and Data Management(MAR)unit. The panel should begin the process for hiring a replacement to be stationed in Brest where JCOMMOPS is currently located.

5.3 During the previous year, Ms. Gallage's time as TC was spent on the following:

- Review database design, metadata loading and reporting on new JCOMMOPS website
- Collect and prepare metadata to ingest to the new JCOMMOPS database
- Work on new JCOMMOPS database to populate the system with DBCP and OceanSITES information
- Review new website tools and functionalities
- Maintaining metadata in the JCOMMOPS database
- Producing monthly maps and GTS timeliness reports
- Producing monthly reports with information on network status, network performance and BUFR migration
- Provide user assistance and activity coordination
- Assisting Panel members with technical and programmatic issues
- Updating and maintaining DBCP and OceanSITES websites
- Maintaining mailing lists, contact details and user groups on DBCP, JCOMMOPS, and OceanSITES websites
- Monitoring the Quality-Control Relay traffic
- Tracking all buoy deployments, and mooring maintenance/installations
- Preparing for and attending meetings
- Organizing meetings, preparing meeting reports and documents
- Travelling to meet with various DBCP Members, Action Groups, and Teams

5.4 Great amount of TC time was spent essentially on new database development work. New JCOMMOPS web application was officially introduced to the DBCP community on 20 July 2016. Most of the essential features of the website are operational. Website improvement work will continue to add more features and to improve the functionality. Historical data of DBCP networks is not yet available in new database and will be gradually transferred from old to new database. ***(action: JCOMMOPS to populate new JCOMMOPS database with historical data and metadata; DBCP-33)***

5.5 The TC outlined the current status of the data buoy network. During the past 12 months, the monthly average number of drifting buoys reporting on the Global Telecommunications System (GTS) was 1539, 422 moored buoys and 103 fixed platforms (Figure 1). During the intersessional period, the average number of drifting buoys per month has not increased significantly. The average monthly increase in operational drifting buoys is 2.3%. The number of operational drifters on the GTS for July, 2016 was at 1488. There were 337 coastal/national moored buoys, 96 tropical moored buoys, 33 tsunameter buoys and 103 fixed platforms were reporting on the GTS in July, 2016 (Figure 2).

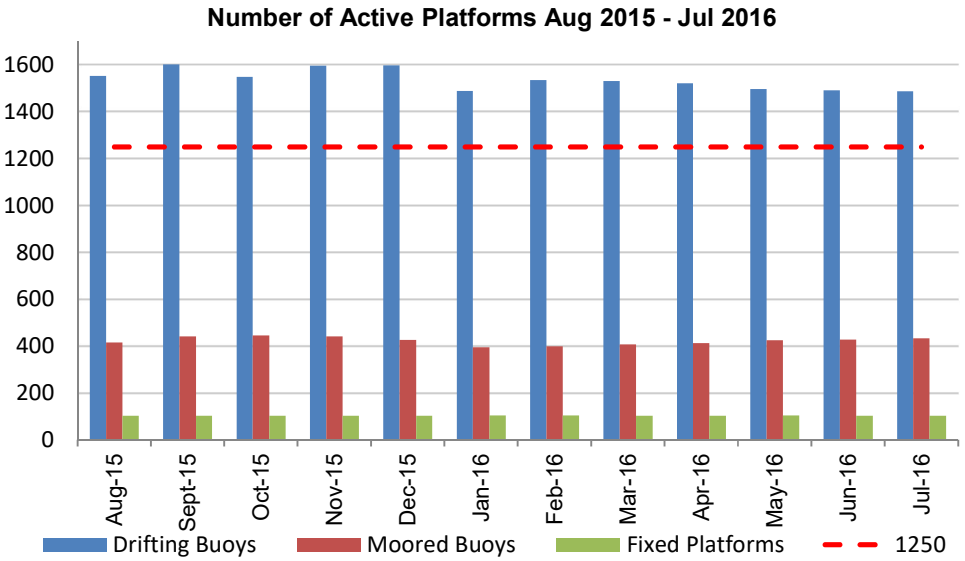

Figure 1 - Number of operational drifting buoys, moored buoys and fixed platforms during the intersessional period

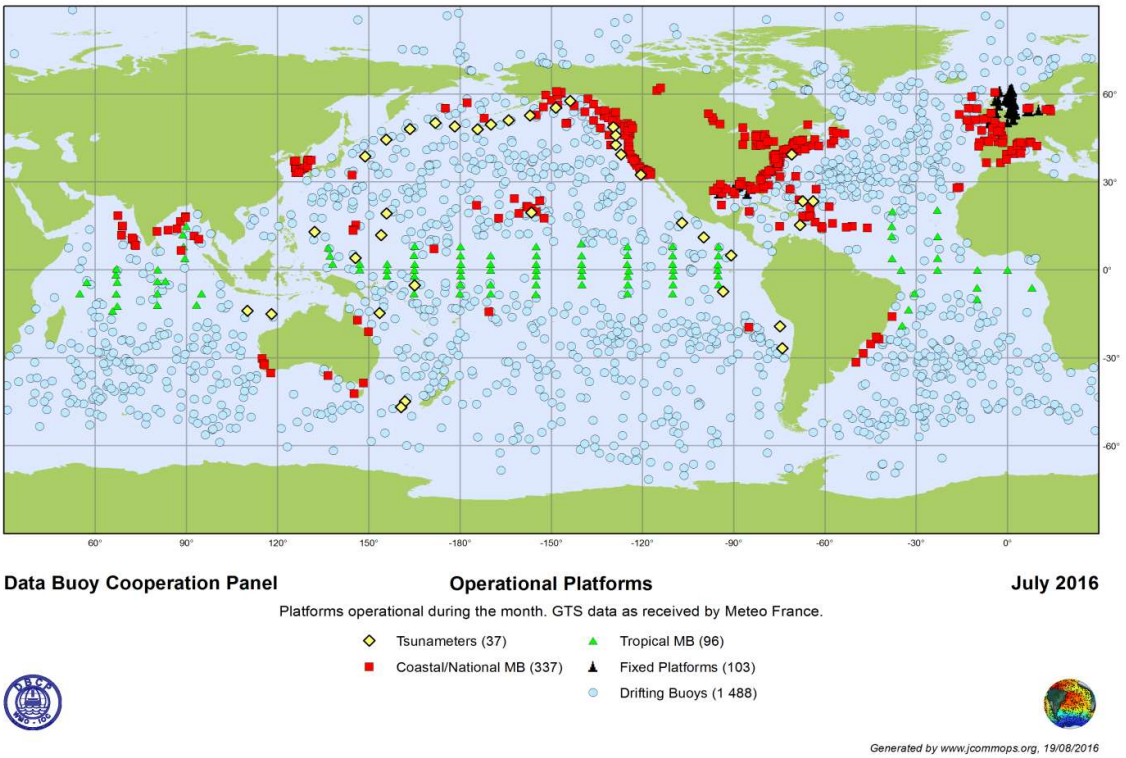

Figure 2 - Status of the operational array in July 2016.

The average number of barometer drifting buoys during this intersessional period is 856 that has increased from 812 which is a 5% increase from the previous intercessional period. While the total number of drifting buoys reporting on the GTS has not changed significantly throughout the intersessional period, the yearly average percentage of barometer drifters has been around 56% yet showing a slight increasing trend (Figure 3)

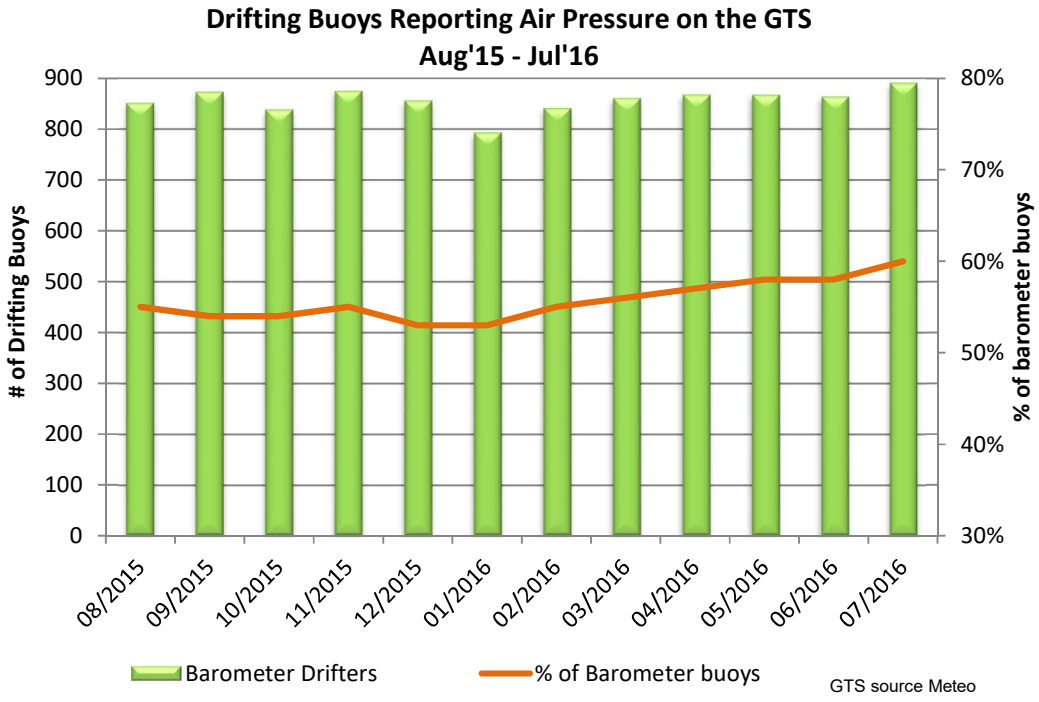

Figure 3 - Status of Barometer drifting buoys during the last intersessional period.

Atmospheric pressure measurements from moored buoys and fixed platforms have not changed significantly and maintained at average of 57% and 85% respectively during this intersessional period.

5.6 The Technical Coordinator reported that among the drifting buoys, moored buoys and fixed platforms reporting on the GTS in BUOY and/or BUFR formats, the following variables were reported in July 2016. Sea surface salinity measurement information is not available due to suspected decoding issue. TC is working with MeteoFrance to resolve the issue.

Variable	Any	Air T	Air P	SST	Sub Curr	Sub Sal	Sub T	Wave	Wind D	Wind S	RH
Drifting Buoys	1488	45	890	1409	00	06	08	04	00	00	01
Moored Buoys	433	320	265	363	24	100	114	282	328	325	154
Fixed Platforms	103	85	85	08	01	00	04	55	87	64	81

5.7 TC presented the status of drifting buoy and moored buoy networks together with number

of barometer drifting buoys (Figure 4). It is apparent that number of platforms in each category has not changed significantly over the last intersessional period. However the significant decrease in drifting buoys during 2012-13 has recovered to acceptable levels since 2014 and stayed at around 1500 with approximately 55% barometer drifters. Total number of moored buoys has not changed significantly over the past few years.

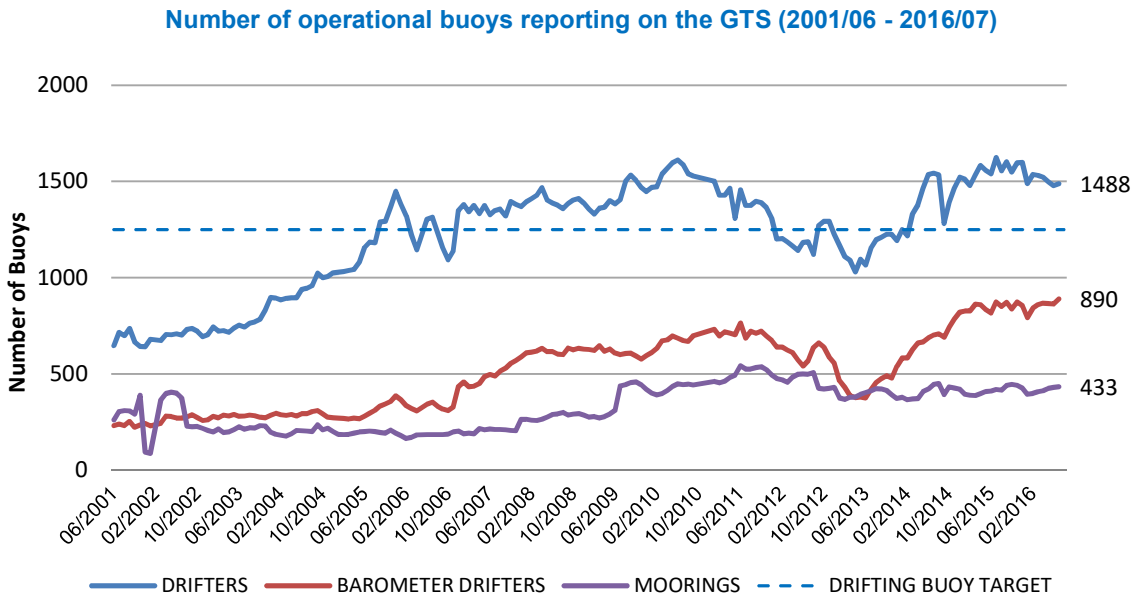

Figure 4 – Growth of drifting buoys, moored buoys and drifters with barometers over the years from 2001

5.8 Ms Gallage informed that starting from June 2016 most of the monthly maps are created automatically from pre-defined scripts using the information available on the new JCOMMOPS database by the end of the month. This has freed-up some time of TC. Nevertheless TC has to spent time to keep the database with accurate and up-to-date information and to review monthly maps. Therefore TC request all platform operators to provide platform metadata information using tools provided on the new JCOMMOPS web application or send them to the TC in timely manner.

5.9 The TC reported that she modified few monthly maps during this intersessional period to better illustrate the status of networks. Monthly map on all active buoys now identifies coastal/National moored buoys and tropical moored buoys as two distinct networks (Figure2). Map of Antarctic region was modified to present together with Arctic region map. New combined map of Polar regions provides a focused view of active drifting buoys with their last location (Figure 5).

5.10 In addition to the changes shown above, the DBCP TC has created separate maps to show the drifter buoy observations density in 5X5 degree grid excluding high death rate regions, marginal seas and polar regions. This map provides a realistic representation of observations density throughout the month (Figure 6).

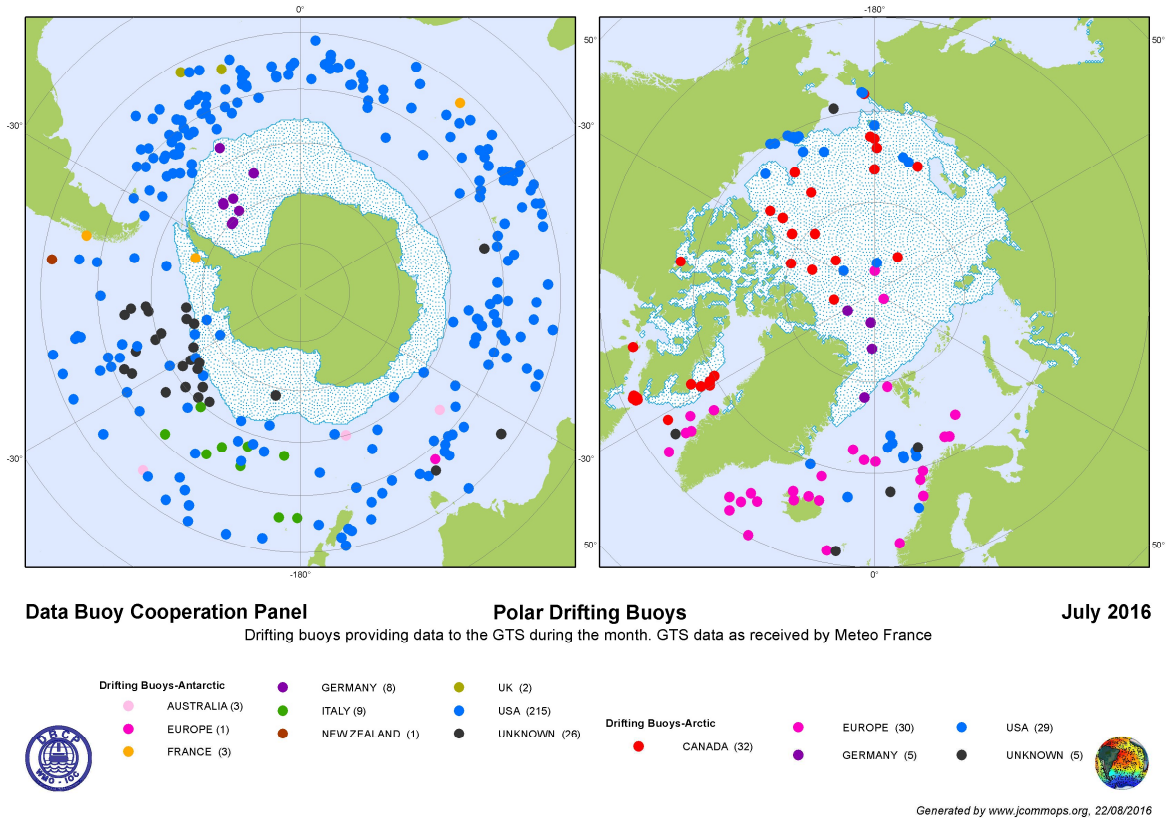

Figure 5 – Status of buoy network in Arctic and Antarctic regions.

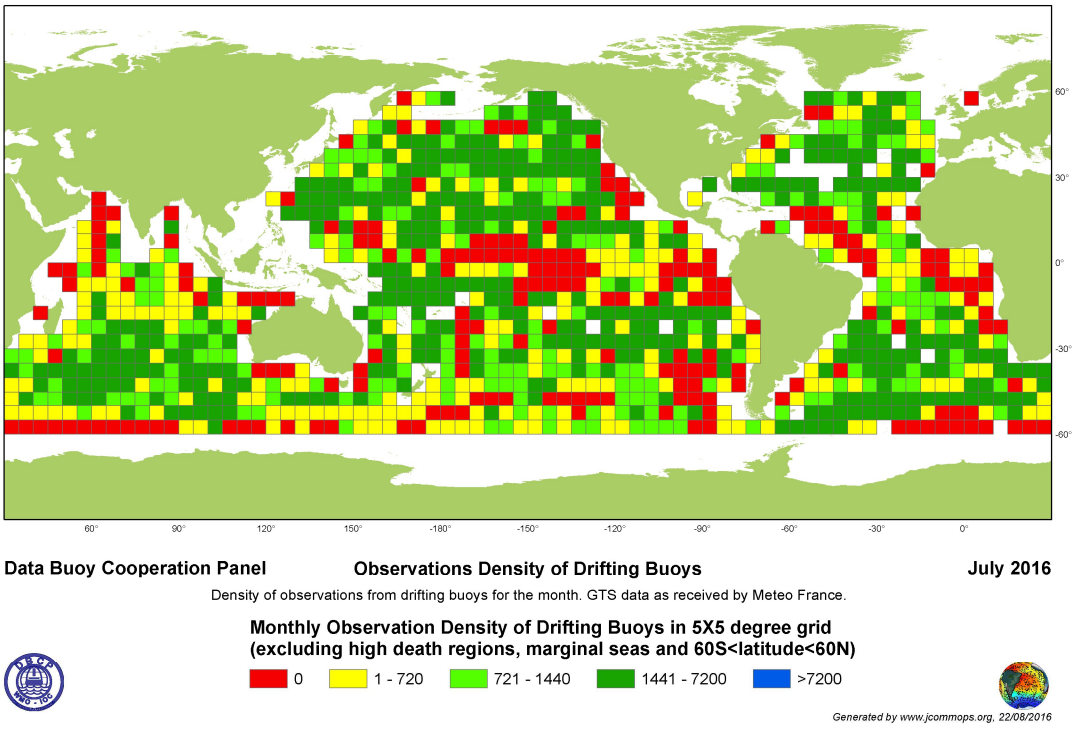

Figure 6 - Map of observation density of drifting buoys for July 2016

5.11 The TC reported on the status of the Tropical Atmospheric Ocean (TAO) buoy array. Starting from March 2015, monthly maps provide the Tropical moored buoy array (TAO/TRITON,RAMA,PIRATA) information separated from coastal/national moored buoy array. TAO array has been operating at a monthly average of 75% data availability during the intercessional period. This is a 5% average reduction in data availability compared to the previous reporting period. TC also highlighted that TAO data has been reporting on the GTS in BUFR format starting from 02nd March 2015. In the mean time, ASCII formatted messages in FM18 BUOY format continue to be distributed under the same headers as usual.

5.12 The TC reminded the panel that Deep-Ocean Assessment and Reporting of Tsunami (DART) Buoys information are available on JCOMMOPS database. The locations of these buoys are included on the monthly maps and in the reporting. Currently JCOMMOPS acquire data from DART buoys through Observing System Monitoring Center (OSMC). Starting from May 2016 machine to machine information transfer is in place to populate the JCOMMOPS database with DART buoy information. Yet, TC relies on monthly data availability reports produced by National Data Buoy Center to cross check the information on JCOMMOPS system.

5.13 The Southern Ocean Buoy Programme (SOBP), as part of the DBCP Implementation Strategy, aims to have 300 operational drifting buoys with barometers distributed across the Seas south of 40°S. As of July 2016, there were 269 drifters in the Southern Ocean and 188 (81%) of these were barometer drifters. Little progress has been made compared to the August 2015 number which was 244. A total of 216 drifting buoys deployed in the Southern Ocean during the this intersessional period which is an 84% increase (117) compared to previous intersessional period. DBCP members should continue to look for deployment opportunities in this region to reach the target number of 300 buoys in the region (***action; Continue to look for deployment opportunities in SOBP region DBCP Members; ongoing***).

5.14 Ms Gallage reported the Panel that monthly DBCP reports are made available to the DBCP community starting from January 2016. Monthly report includes information on network status for drifter buoys, coastal/national moored buoys, Tropical array, DART array and fixed networks. This report also includes the information on performance indicators and data format transition from Traditional Alphanumeric Codes (TAC) to Binary Universal Form for the Representation of meteorological data (BUFR).

5.15 The TC mentioned the importance of performance indicators that should capture performance of network status, data delivery, international cooperation, instrumentation, and operation aspects of the buoy arrays. She further reminded related discussions took place at DBCP-31 meeting including the proposed performance indicators for each network. Accordingly TC worked with network groups to finalize the details. Performance indicators for Drifter Buoy network and coastal/national moored buoy network were reviewed by the respective network leads. Performance indicators for other networks are yet to be reviewed and finalized. TC requested Tropical buoy network, Tsunameter network, Arctic buoy network and Antarctic buoy network-leads to review and provide feedback on appropriate performance indicators for those networks. (***action; Tropical buoy network, Tsunameter network, Arctic buoy network and Antarctic buoy network to review and provide feedback on performance indicators; Network leads ; asap)***

5.16 TC reported the Panel that starting from February 2016, number of Performance Indicators are calculated and provided to the DBCP community on monthly reports. More developed performance indicators are now available through new JCOMMOPS web application starting from July 2016. Indicators for Global Drifter buoys network and national/coastal moored buoy network are validated through group leads. For all other networks few proposed Performance Indicators are

available through the JCOMMOPS website.

5.17 DBCP community has been working on data format transition from TAC to BUFR for several years. TC reported that starting from March 2016 all drifter buoys are reporting in BUFR format to the GTS. All the drifter buoys except few from Japan are using validated BUFR format TM 315009. Currently majority of drifter buoys provided data to the GTS in BUFR and parallel TAC formats. The National Metereological Centers which are not yet ready to accept BUFR data have request to continue to provide TAC data in parallel with BUFR until 01 November 2016, at which point data providers are ready to discontinue parallel TAC data to the GTS. In July 2016, 34% of moored buoys reported on the GTS in BUFR format where 8% of them report only in BUFR.

5.18 During previous intercessional period TC established procedures to collect moored buoy metadata. Majority of moored buoy operators have provided metadata in proposed format. As of July 2016 73% of national/coastal moored buoys and 98% of tropical moored buoys have submitted metadata. 16 agencies from 13 countries have provided moored buoy metadata to the DBCP. Compiled metadata CSV files and data submission instructions are accessible through a FTP site. TC has to work with JCOMMOPS IT to integrate moored buoy metadata into the JCOMMOPS database. JCOMMOPS should make this a priority in IT development. ***(action: JCOMMOPS to integrate moored buoy metadata into the JCOMMOPS database; DBCP-33)***

5.19 TC has been emphasizing the importance of receiving metadata and deployment information in timely fashion at the DBCP. With new JCOMMOPS website tools, platform operators are able to upload the deployment information directly to the database without delay. She further elaborated the significance of receiving timely deployment information and metadata to include in interactive maps and statistical summaries available through the JCOMMOPS web tool and to feed the OSCAR system within WIGOS framework. JCOMMOPS provides metadata to OSCAR system for all networks coordinated through JCOMMOPS.***(action; Buoy Operators provide deployment and platform metadata information to DBCP; ongoing***)

5.20 TC informed the panel that, there are many organizations which do not have direct connection with NWS are providing data or involved in other ways to submit data to the GTS. These groups want to check and access the data on the GTS. Currently this is possible only through NWS or Regional Telecommunication Hubs (RTH) where many of these data contributes do not have direct access to. Thus there is a growing need to have a tool available to access and download data in real (or near real) time from the GTS. TC suggested the Global data assembly centre (GDAC) is a suitable place for such a tool. TC recommended the panel to make a proposal to the GDACs to make available a tool to access (near) real time data for a wider audiance.

5.21 TC thanked platform operators for following the WMO ID handling best practices proposed during DBCP-31. Proposed best practices are in line with WIGOS ID allocation principles and expect to have no issues when adopting to the WIGOS requirements. Further she requested DBCP members to continue to follow the proposed best practise.

5.23 MS Gallage highlighted new information added to the DBCP static website during this intersessional period. Information on “Evaluation of Unmanned Surface Vehicles” and a “Bibliography” has been added to the DBCP website. TC requested DBCP members to submit publications information in the format identified on the DBCP website under Bibliography. (***action: Submit publications information to TC; ongoing)***

5.21 The outgoing TC, Champika Gallage, wish to thank the DBCP Members, Task Teams, Chairs and Executive Board for their support and guidance during her tenure. She further thanked all DBCP members for an eventful 2 years and wishes the best to all members.

5.22 **The meeting made the following recommendations**:

(i.) The panel recommended the IRIDIUM service providers to provide deployment information to JCOMMOPS in agreed upon data format ;

(ii.) The panel recommended it's members to continue providing buoy deployment information thorough the new web tools or send them to the Technical Coordinator in the agreed upon format;

(iii.) The Panel recommended to continue to follow guidelines proposed to better handle WMO IDs;

(iv.) The panel recommended moored buoy operators who are not yet transmitting data to the GTS in BUFR format to start doing so using appropriate data formats

(v.) The panel recommended the moored buoy operators to provide Moored Buoy metadata in the appropriate data format to the TC; and

(vi.) The panel agreed to communicate with GDACS to establish appropriate tools to access (near) real-time data from the GTS.

5.23 **The meeting decided on the following action items**:

(i.) Populate new JCOMMOPS database with historical data and metadata ***(action; JCOMMOPS, DBCP-33)***

(ii.) DBCP members should continue to look for deployment opportunities in SOBP region ***(action; DBCP members)***

(iii.) TAO network, Tsunameter network, Arctic buoy network and Antarctic buoy network communities to review and provide feedback on performance indicators***; (action; Network leads)***

(iv.) JCOMMOPS to integrate moored buoy metadata into the JCOMMOPS database***(action; JCOMMOPS, DBCP-33)***

(v.) Buoy Operators to provide deployment and platform metadata information to DBCP***; (action; Buoy operators, ongoing)***

(vi.) DBCP members should upload deployment information to the new website in timely manner. (***action; Buoy Operators)***

-B- BACKGROUND INFORMATION

This report covers the activities of the Technical Coordinator of the DBPC for the period of 1 September 2015 to 31 August 2016.

1 During the period from 1 September 2015 to 31 August 2016, Ms. Champika Gallage worked as Technical Coordinator (TC) of the Data Buoy Cooperation Panel (DBCP), on contract to UNESCO until March 07. Starting from March 07, 2016 DBCP-TC position was moved to World Meteorological Organization as a Secondment for a two year period. On average, the TC spends

70% of her time on DBCP-related matters and 30% of her time on OceanSITES Project Office activities .

2 The TC of DBCP reminded the panel that starting from 12 September 2016, MS. Gallage has moved to a new position in WMO as a Scientific Officer for Marine and Ocean Meteorological Observations and Data Management(MAR)unit. The panel should begin the process for hiring a replacement to be stationed in Brest where JCOMMOPS is currently located.

3 During the previous year, Ms. Gallage's time as TC was spent on the following:

- Review database design, metadata loading and reporting on new JCOMMOPS website
- Collect and prepare metadata to ingest to the new JCOMMOPS database
- Work on new JCOMMOPS database to populate the system with DBCP and OceanSITES information
- Review new website tools and functionalities
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- Updating and maintaining DBCP and OceanSITES websites
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- Monitoring the Quality-Control Relay traffic
- Tracking all buoy deployments, and mooring maintenance/installations
- Preparing for and attending meetings
- Organizing meetings, preparing meeting reports and documents
- Travelling to meet with various DBCP Members, Action Groups, and Teams

4 Great amount of TC time was spent essentially on new database development work. Much time was spent on data cleansing, data uploading, functionality checking and verification, website testing. New JCOMMOPS web application was officially introduced to the DBCP community on 20 July 2016. Most of the essential features of the website are operational. More development work to add new tools, improve performance, populating database with historical information yet to be completed.

Current status of the data buoy network

5 The TC outlined the current status of the data buoy network. During past 12 months, the monthly average number of drifting buoys reporting on the Global Telecommunications System (GTS) was 1534, 422 moored buoys and 103 fixed platforms (Figure 7). During the intersessional period, the average number of drifting buoys per month has not increased significantly. The

average monthly increase in operational drifting buoys is 2.3%. The number of operational drifters on the GTS for July, 2016 was at 1488. There were 337 coastal/national moored buoys, 96 tropical moored buoys, 33 tsunameter buoys and 103 fixed platforms were reporting on the GTS in July, 2016 (Figure 8).

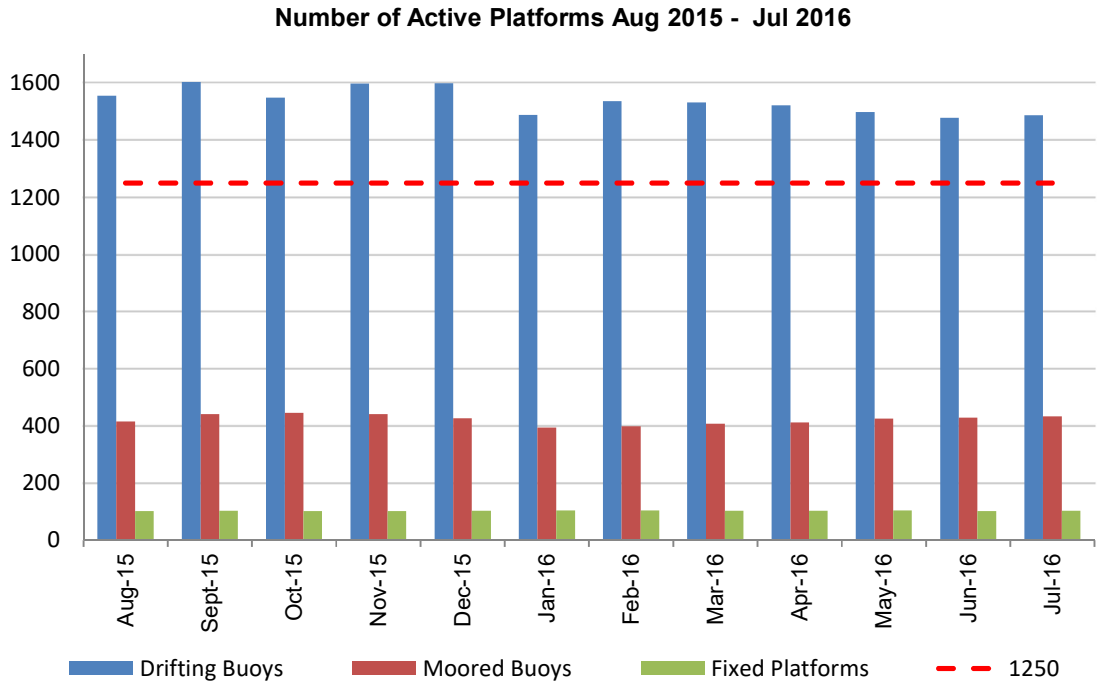

Figure 7: Number of operational drifting and moored buoys during the last intersessional period

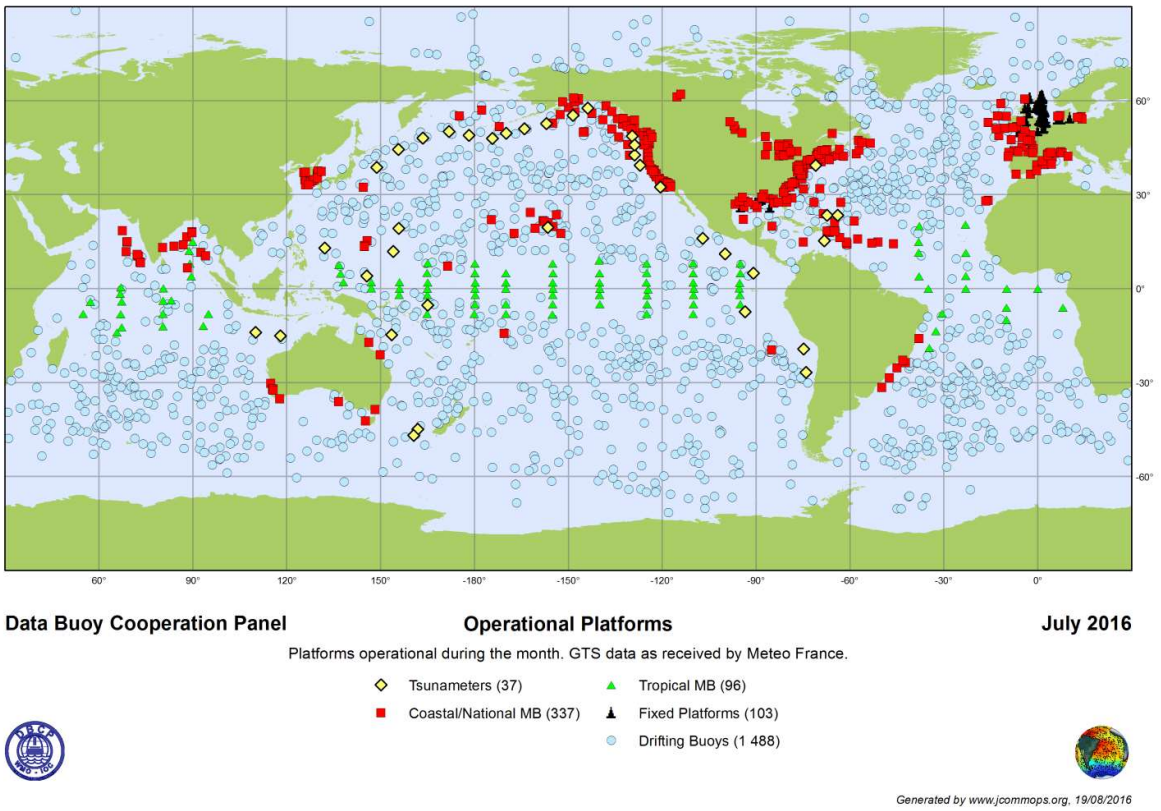

Figure 8: Status of the operational array in July 2016.

TC presented the status of drifting buoy and moored buoy networks together with number of barometer drifting buoys (Figure 9). It is apparent that number of platforms in each category has not changed significantly over this intersessional period. However the significant decrease in drifting buoys during 2012-13 has recovered to acceptable levels since 2014 and stayed at around 1500 with approximately 55% barometer drifters. Total number of moored buoys has not changed significantly over the past few years.

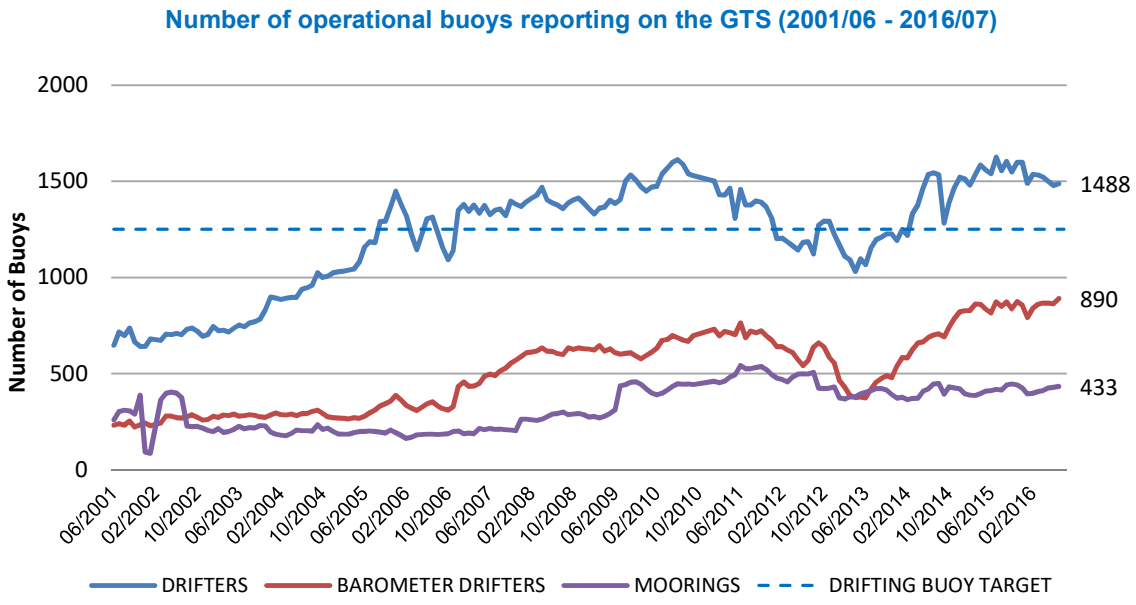

Figure 9 – Growth of drifting buoys, moored buoys and drifters with barometers over the years from 2001

Table 1. below shows the average number of platforms together with atmospheric pressure measuring platforms for last few years. As mentioned previously number of platforms has not changed significantly. Atmospheric pressure measurements from moored buoys and fixed platforms have not changed and maintained at average of 59% and 85% respectively during this intersessional period (Table 1).

	2012-13	2013-14	2014-15	2015-16
Average number of Drifting buoys	1168	1340	1504	1537
% of barometer Drifting buoys	40%	50%	54%	56%
Average number of Moored buoys	453	406	407	422
% of barometer Moored buoys	-	-	59%	59%
Average number of Fixed platforms	-	-	102	103
% of barometer Fixed platforms	-	-	85%	85%

Table 1: Average number of platforms deporting on the GTS and the percentage of platforms reporting atmospheric pressure over the last few years.

The status of the national/coastal moored buoy network from each contributing country in July 2015 and July 2016 is shown in Figure 10. The total number of moored buoys are almost the same in July 2015 and 2016. There were 12 countries contributing to the moored buoy network in July 2015 and 2016.

One major concern of moored buoy operators continue to be the resources to maintain the systems. Many organizations are challenged with budget constraints. Ship-time cost for moored buoy services is increasing in an alarming rate. As a result, reduced maintenance frequency, getting rid of bigger platforms and harder to maintain platforms are seen as short-term resolutions. New technologies as Self-Contained Ocean Observations Payload (SCOOP) developed by NDBC,

wave gliders and profiling gliders are becoming more popular among buoy operators. Vandalism on moored buoys has added another layer to the cost of maintaining moored buoy networks. Please refer to Document 10.2 for more information on vandalism.

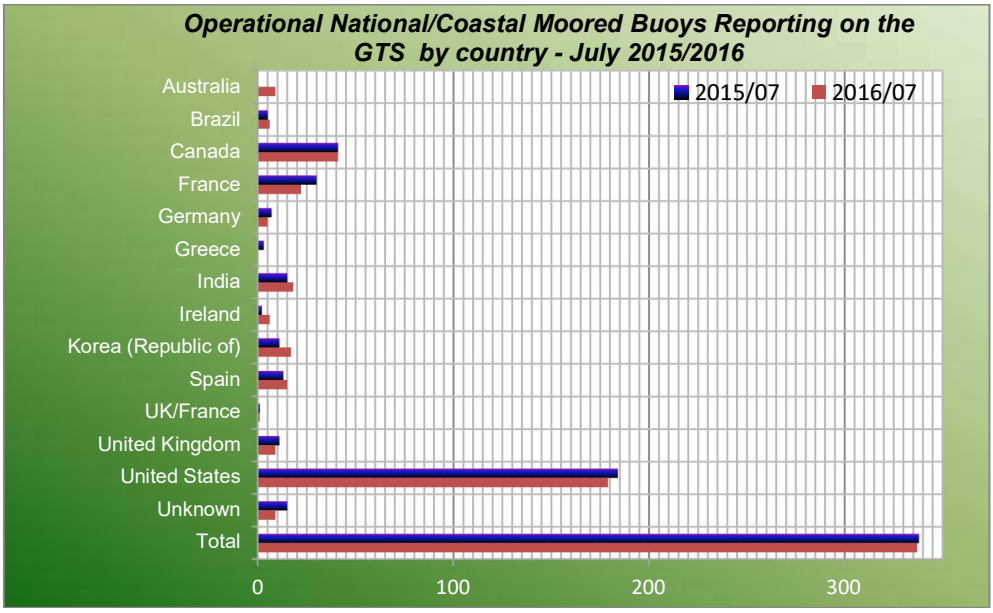

Figure 10 Number of moored buoys per country in July 2015/2016

6 The TC reported on the status of the Tropical Atmospheric Ocean (TAO) buoy array. TAO array has been operating at a monthly average of 75% data availability during the intercessional period. This is a 5% reduction in data availability compared to the previous reporting period. Looking at the vandalism events on TAO array between Aug. 2015 - June 2016 and compared it to the same time of the previous year; the overall number of incidents remains the same at 28, but comparing April - June there were 9 vandalism events in the previous year and 27 for the current year which is a significant increase.

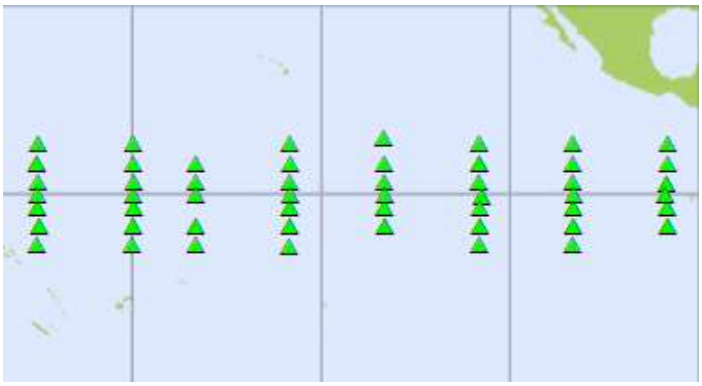

Figure 11 : Status of TAO array in July 2016

TC also highlighted that TAO data has been reporting on the GTS in BUFR format starting from 02nd March 2015. In the mean time, ASCII formatted messages in FM18 BUOY format will continue to be distributed under the same headers as usual. Metadata for TAO array is also available through DBCP website.

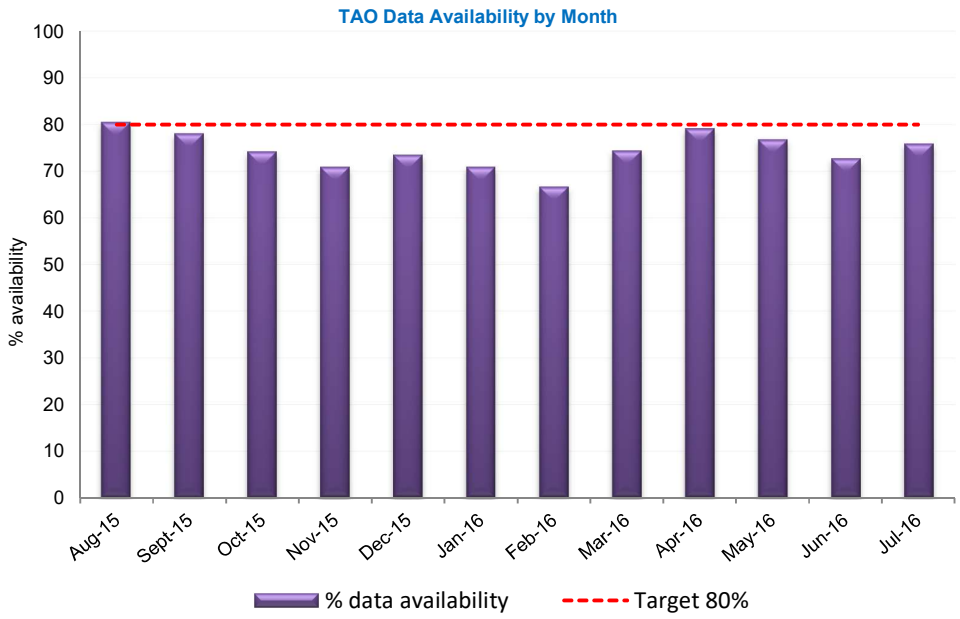

Figure 12 : TAO array data availability Aug.2015 – July 2016

Starting from March 2015, monthly maps provide the Tropical moored buoy array (TAO/TRITON, RAMA, PIRATA) information separated from coastal/national moored buoy array. Tropical array has grown with few new additions to RAMA network (Figure 13, Figure 14).

Figure 13: Tropical moored buoy array, operational platforms in July 2016

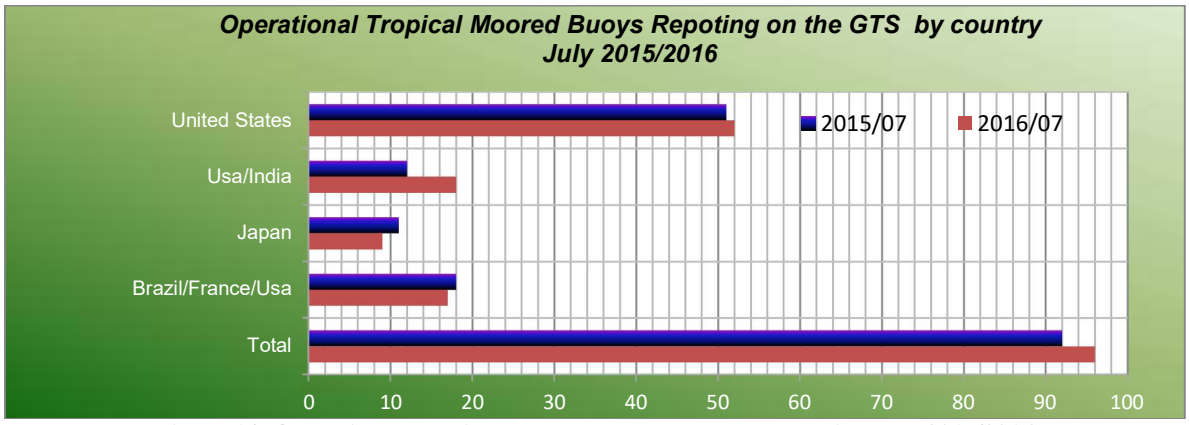

Figure 14: Operational Tropical Moored buoys by country during July 2015/2016

7 Number of drifting buoys operational during July 2015/2016 by county is shown in Figure 15. There are 13 countries contributed to the drifter buoy network in July 2016 compared to 11 participating countries in July 2015. The total number of drifters during July 2015 is higher than in July 2016. There is a high number of drifters with unknown operators. TC is continuously updating

the platform information on JCOMMOPS database. TC requested all buoy operators to check their platform information and update the information on JCOMMOPS website.

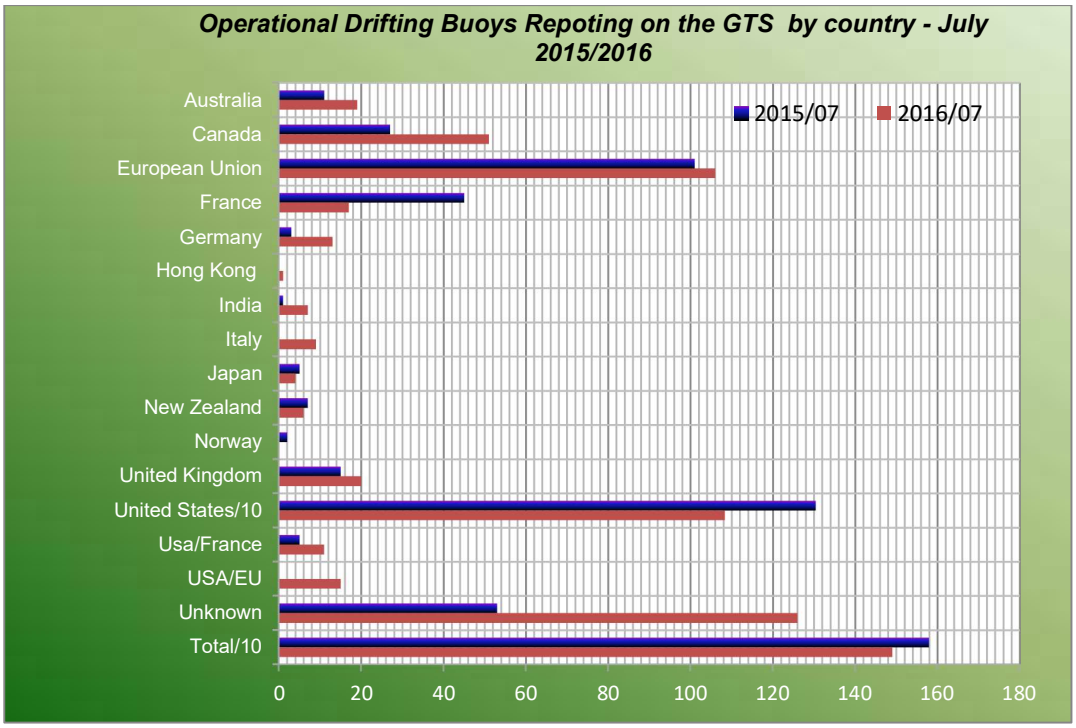

Figure 15 : Operational Drifter buoys in July 2015/2016

Variables measured from boys and reporting on the GTS

8 The Technical Coordinator reported that among the drifting buoys, moored buoys and fixed platforms reporting on the GTS in BUOY and/or BUFR formats, the following variables were measured in July 2016 (Table 2). Sea surface salinity measurement information is not available due to an decoding issue. TC has been working with MeteoFrance to resolve the issue.

Variable	Any	Air T	Air P	SST	Sub Curr	Sub SAL	Sub T	Wave	Wind D	Wind S	RH
Drifting Buoys	1488	45	890	1409	00	06	08	04	00	00	01
Moored Buoys	433	320	265	371	13	83	93	316	328	325	154
Fixed Platforms	103	85	85	08	01	00	04	55	87	64	81

Table 2: Variables reported on the GTS from Drifting Buoys, Moored Buoys and Fixed Platforms during July 2016

The monthly average number of barometer drifting buoys during this intersessional period is 856 that has increased from 812 which is a 5% increase from the previous intercessional period. While the total number of drifting buoys reporting on the GTS has not changed significantly throughout the intersessional period, the yearly average percentage of barometer drifters has been around 56% yet showing a small increasing trend during the latter half of this intersessional period (Figure 14).

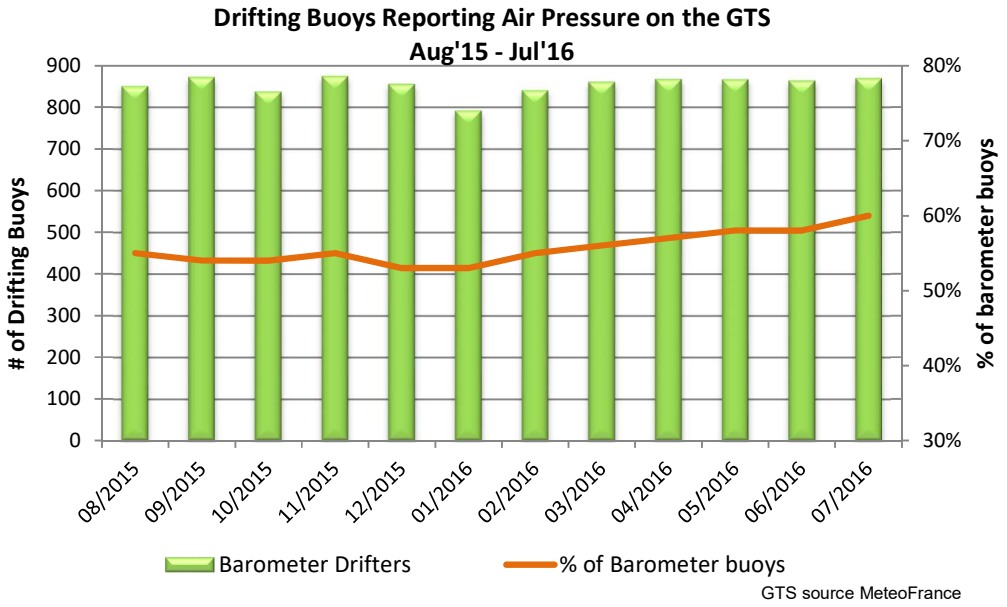

Figure 14: Status of Barometer drifting buoys during the last intersessional period

Wave measurement information became available after fixing the data decoding issues in September 2015 and TC provides monthly maps of platforms providing wave measurement information to the GTS since then. There may be some moored buoys which provide data to the GTS in old BUFR template may not appear on the maps. TC advice all moored buoy operators who are using old BUFR template to move to the new, validated BUFR template TM315008. Refer to Documet 9.3 of DBCP-32 document for further information.

Status of Deep-Ocean Assessment and Reporting of Tsunami (DART) network

9 The TC reminded the panel that Deep-Ocean Assessment and Reporting of Tsunami (DART) Buoys information are available on JCOMMOPS database. The locations of these buoys are included on the monthly maps and in the monthly report. Currently JCOMMOPS acquire data from DART buoys through Observing System Monitoring Center (OSMC). Starting from May 2016 machine to machine data transfer is in place to populate the JCOMMOPS database with DART buoy information daily. Figure 15 shows the active DART buoys during July 2016. Currently TC relies on monthly data availability reports produced by National Data Buoy Center to prepare summary reports.

Entire network of DART buoys are operated by nine countries (Australia, Chile, Colombia, Ecuador, India, Japan, Russian Federation , Thailand, and USA). Figure 16 includes statistics from 45 DART buoys (39-USA, 2-Russian Federation, 2-Chile, 1-Thailand, 1-Colombia) summarize the data availability from DART buoys during previous 12 months. Data availability has been decreasing from Feb 2016. Failure of number of USA DART buoys in Feb-April and also 3 DART buoys from Russian Federation, Chile and Colombia being out of order from May-July has reduced the percentage data availability during later part of the intersessional period. Countries are constantly servicing the network to get data availability to the expected levels. TC is working on to gather required information to include the other DART buoys from Australia, Ecuador, and India to the monthly statistics.

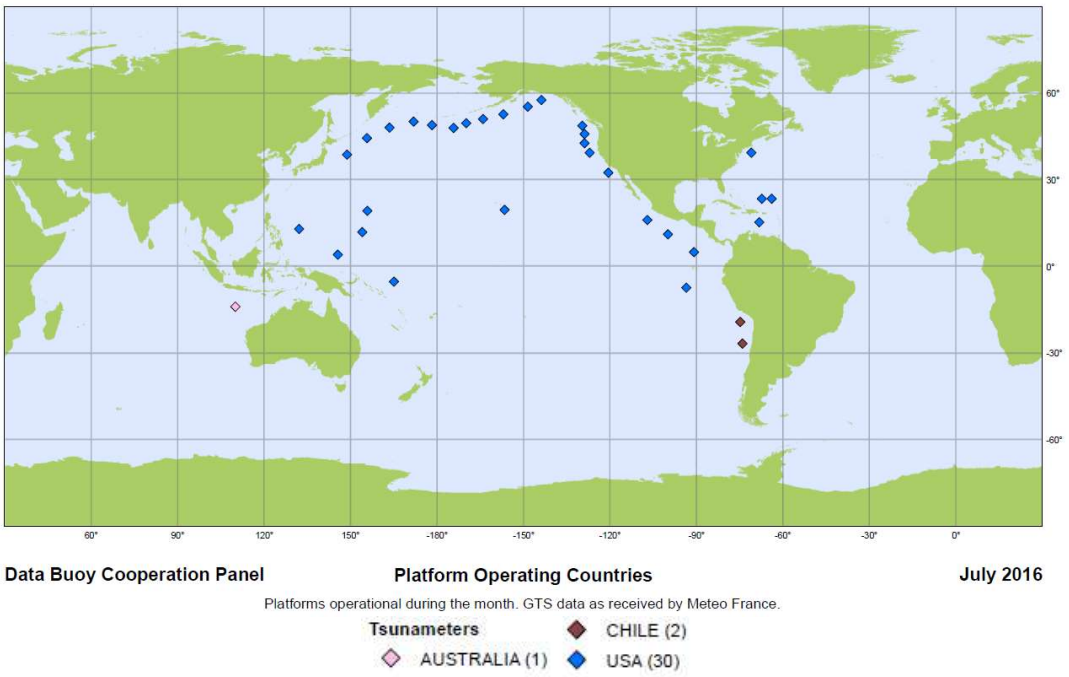

Figure 15: DART buoys operational during July 2016

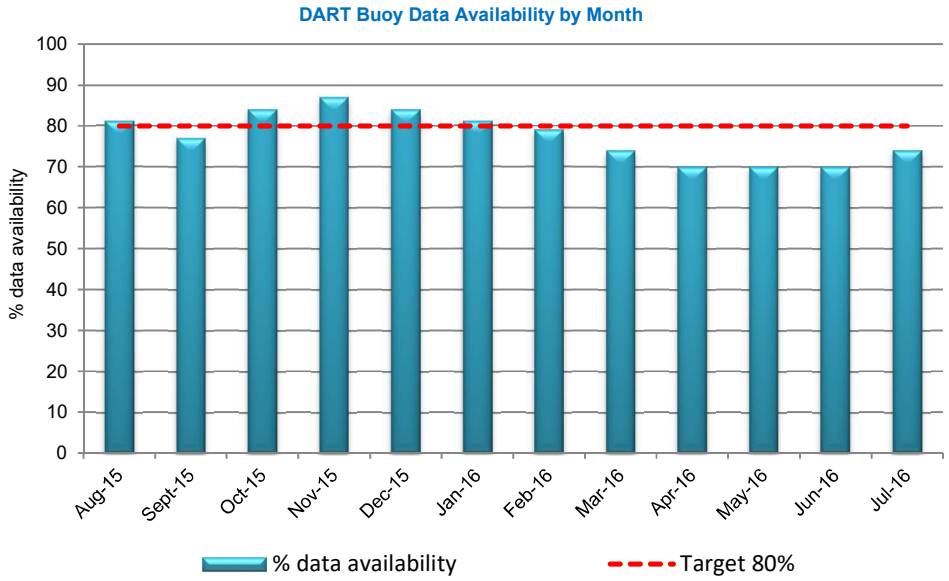

Figure 16 : Monthly Dart data availability from Aug1215 - July 2016

Updates to Monthly Maps

10 The TC reported that she modified few monthly maps during this intersessional period to better illustrate the status of networks. Monthly map on all active buoys now identifies coastal/National moored buoys and tropical moored buoys as two distinct networks (Figure 8). Previously existed map of Antarctic region has modified to include Arctic region. New combined map of Polar Regions provides a focused view of operational drifting buoys with their last location (Figure 17). Number of platforms identified in black dots on the Antarctic region map are without complete metadata information. TC request the buoy operators to check their platform information

regularly and complete the gaps

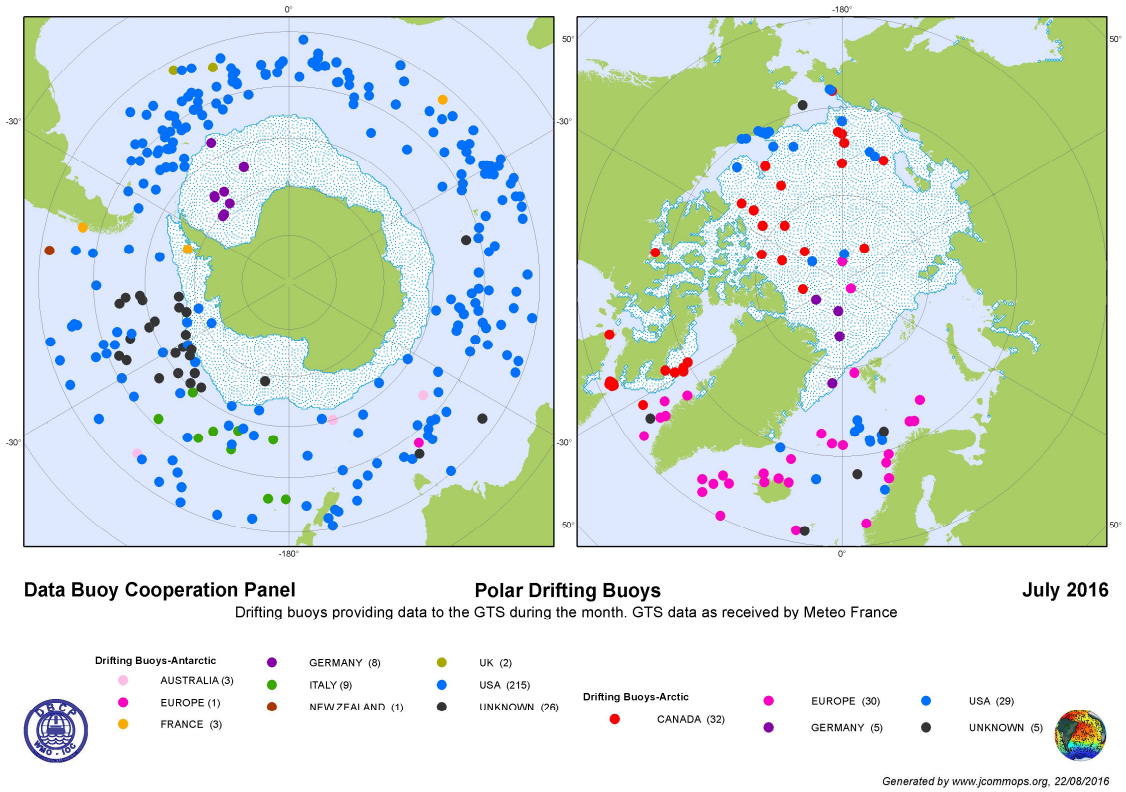

Figure 17 – Status of buoy network in Arctic and Antarctic regions.

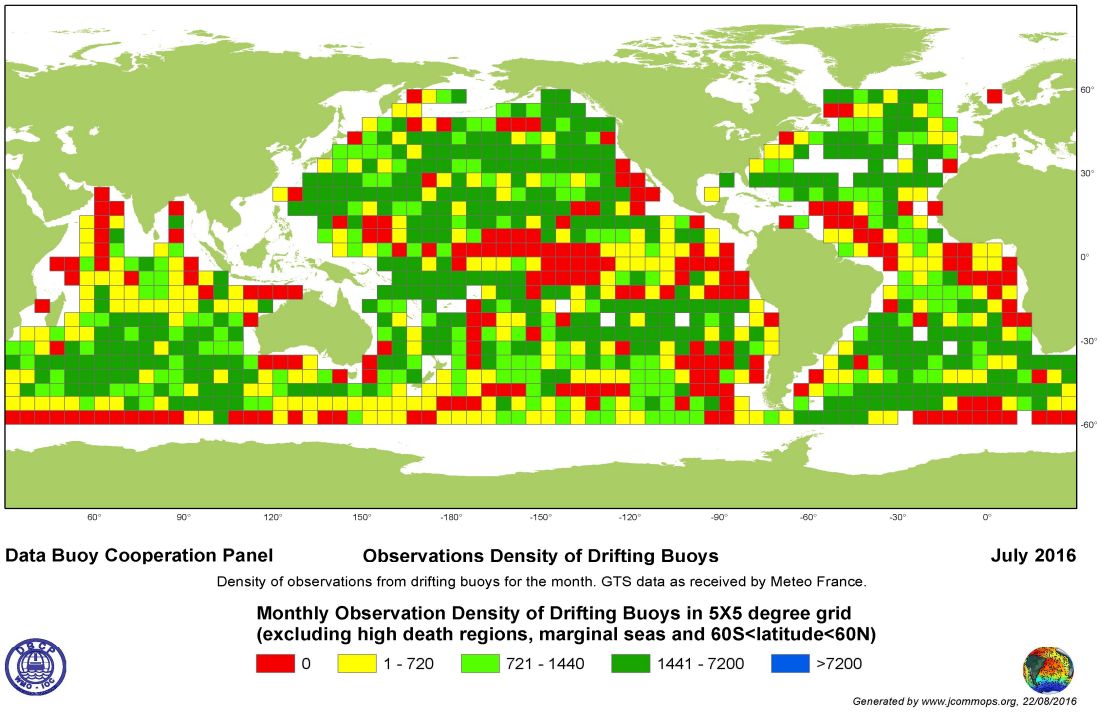

Figure 18 - Map of observation density of drifting buoys for July 2016

In addition to the changes mentioned above, the DBCP TC has also created new map to show the density of drifter buoy observations in 5X5 degree grid excluding high death rate regions, marginal

seas and polar regions. This map provides a realistic representation of observations density throughout the month (Figure 18). Colour coding is assigned based on the number of observations which is based on the ideal situation of a drifter buoy platform provides 24 observations per day for 30 days making 720 observations per month.

Southern Ocean Buoy Programme (SOBP)

11 The Southern Ocean Buoy Programme (SOBP), as part of the DBCP Implementation Strategy, aims to have 300 operational drifting buoys with barometers distributed across the Seas south of 40°S. In July 2016 there were 269 buoys operational in the region (Figure 19) where 70% of them were providing barometric pressure measurements. This is a considerable reduction in the percentage number of barometer drifters compared to the previous year where in August 2015, there were 244 drifters in the Southern Ocean and 221 (90%) of these were equipped with barometers.

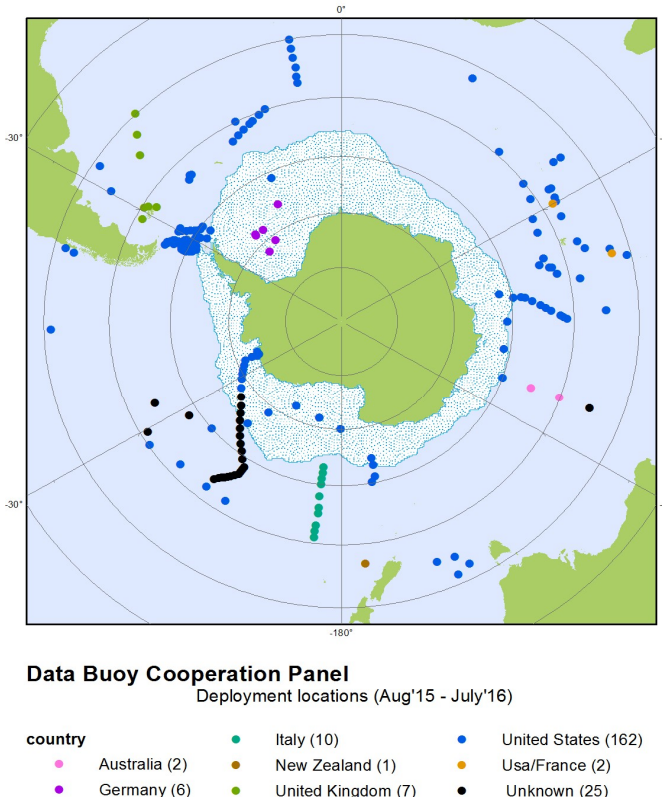

Figure 19 – Deployment location of drifters during Aug 2015- Jul 2016

Country	Barometer upgrades	Total # of platforms
Australia	2	2
Germany	0	6
Italy	0	10
New Zealand	0	1
UK	1	7
USA	151	162
USA/France	2	2
Unknown	0	26
Total	**156**	**216**

Table 3 – Drifter deployments in SOBP area during Aug'15 to Jul'16

DBCP members planned to deploy 115 buoys in the SOBP region in previous intersessional period. The actual number of deployments exceeds the planned number and totaled at 216 with 73% of the drifters equipped with barometers (Table 3). A map of deployment location of drifter buoys during intersessional period is on Figure 19.

As it is very difficult to predict deployment opportunities in SOBP area, thus hard to predict and provide firm commitments. JCOMMOPS Ship Coordinator is instrumental in finding new deployment opportunities especially in the areas like SOBP where ship traffic is not regular.

The planed deployments for August 2016 – July 2017 are shown in Table 4. As mentioned above, the southern ocean is the hardest ocean basin to predict drifter deployment numbers. As we have experienced, there are normally few deployment opportunities, limited lead times, and equipment shipping difficulties, makes it challenging to seed these areas. There are no regular ships traversing in southern ocean, yet new deployment opportunities become available time to time. DBCP members are advised to inform JCOMMOPS Ship Coordinator, with deployment requirements for assistance.

Country	Planned deployments	Additional (Baro)Upgrades	Total	Comment
Italy	15	0	15	Southern Ocean
USA (AOML)	10-15	0	15	Deployment by New Zealand and Chile
UK	10	0	10	ISABP area
Australia (ABOM)	25	15	40	6 drifting buoys to be deployed in early December from the Japanese Antarctic re-supply vessel, Shirase, between 45S 110E and 60S 80E. 2 drifting buoys to be deployed near 50S 74E from a Border Force vessel during their annual Southern Ocean patrol (dates can vary). The regular re-seeding of drifting buoys (13) along XBT sampling lines IX01 and IX12.The regular re-seeding of drifting buoys (4) in the Indian Ocean gyre, near 30°S 90°E. 15 barometer upgrade drifting buoys to be deployed from La Reunion & Cape Town, targeting the Southern Ocean and Southern Indian Ocean.
New Zealand	0	8	8	Deployed mainly in the Tasman Sea
South Africa	15	0	-	Planned deployments during the annual SANAP cruise to Antarctica 2016 and by Falklands fisheries
France	15	0	15	Indian Ocean, IPBIO
Total			**103**	

Table 4 - Barometer Drifter deployment plans for the period August 2016 to July 2017 as proposed to be agreed at DBCP-32.

Key Performance Indicators

12 Key Performance Indicators (KPI) was initially discussed during the DBCP-31. TC mentioned that she was able to work with two network leads, Global Drifter Network and National/Coastal Moored Buoy Network, and finalize the KPIs. TC request other network leads to

work with their communities to finalize the KPIS for their respective networks flowing the information TC has already provided. Remaining networks to work on KPIS are, Global Tropical Moored Buoy Network, Arctic buoy network, Antarctic Buoy Network and Global Tsunami Buoy Network.

TC has started to report number of KPIs in her monthly report starting from February 2016. From June 2016 the KPIs are integrated into the JCOMMOPS website. KPIS are reported under four categories, Implementation, Data flow, Instrumentation and International colloboration. KPIs are also available for individual Ocean basins, Atlantic Ocean, Indian Ocean, and Pacific Ocean. Figure 20 shows a snapshot of some KPIs for DBCP networks on JCOMMOPS website.

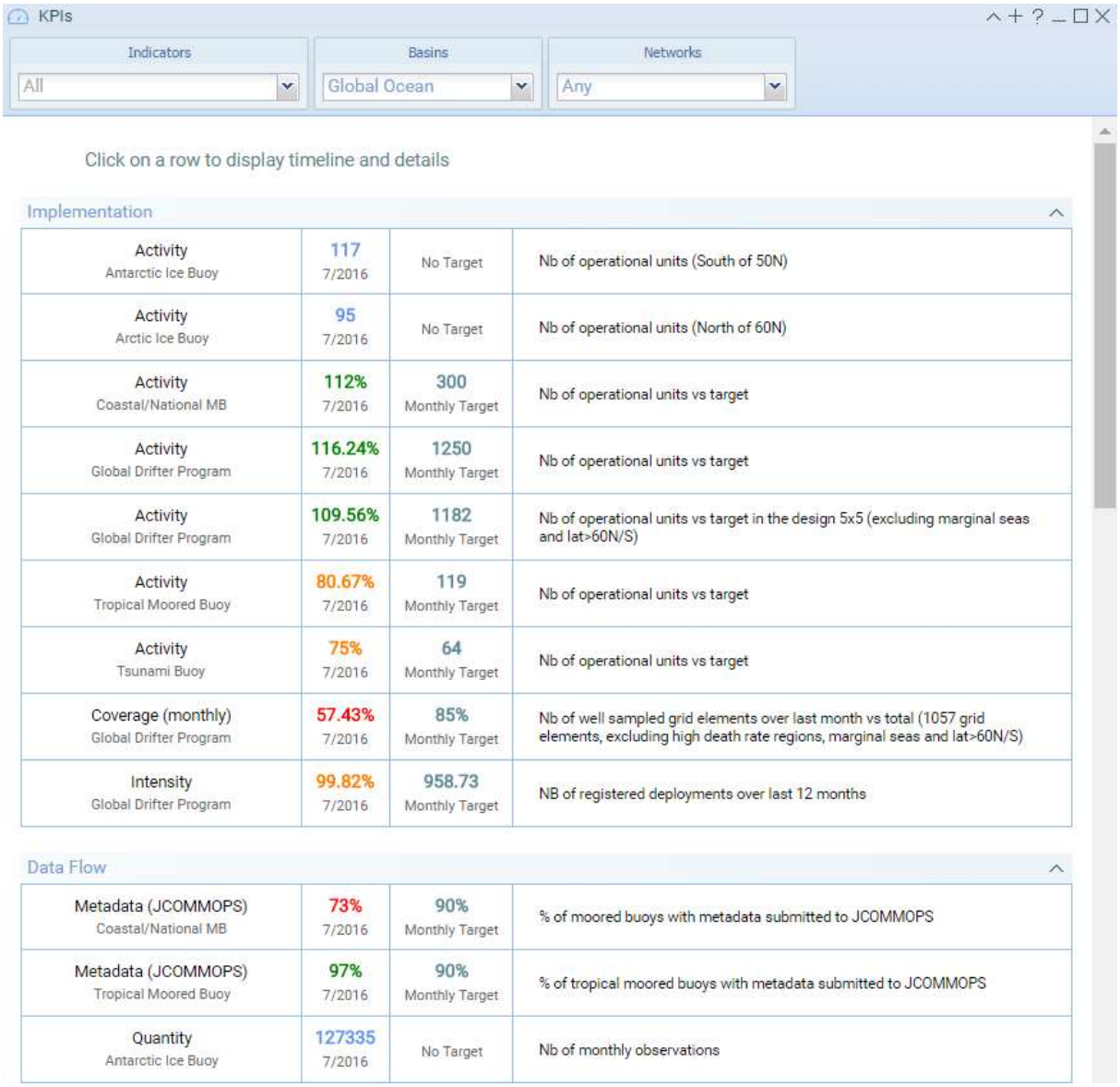

Figure 20: Network implementation related KPIs for DBCP

BUFR Migration

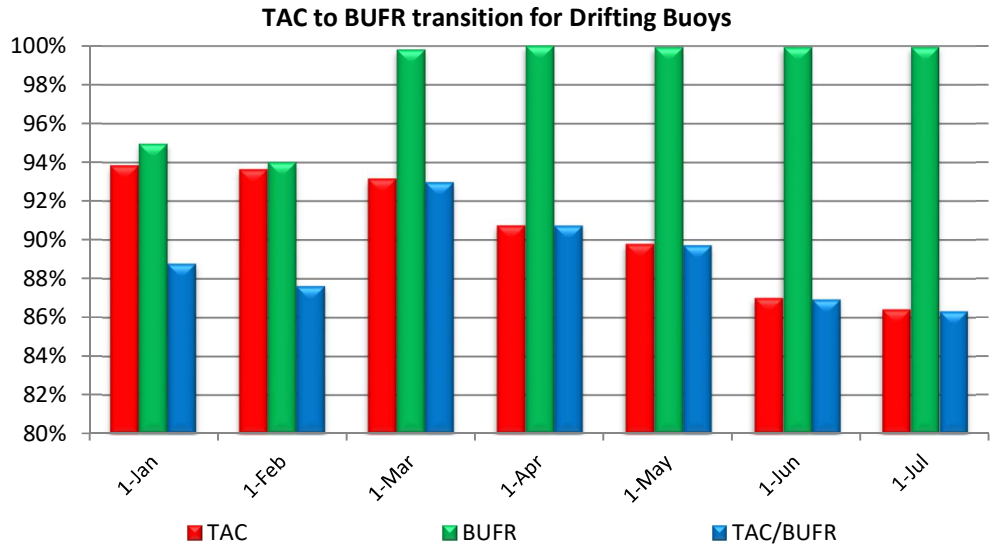

Figure 21: TAC to BUFR transition for Drifting Buoys

13 DBCP community has been working on data format transition from TAC to BUFR for several years. TC reported that starting from March 2016 all drifter buoys are reporting in BUFR format to the GTS. All the drifter buoys except few from Japan are using validated TM 315009 data format. Therefore it can be concluded that TAC to BUFR transition is complete for Drifting buoy network. Figure 21 shows the progress of TAC to BUFR transition for drifting buoys.

Moored buoys community has not made much progress in TAC to BUFR transition during this intersessional period. Figure 22 shows the progress of the transition for moored buoys that includes national/coast moored buoys and tropical moored buys. Around 35% of moored buoys are reporting on the GTS in BUFR format. Some of these are using old BUFR template instead of validated and approved moored buoy BUFR format TM315008. This has created data decoding issues, thus some of the moored buoys reporting in old BUFR format may not appear on the monthly maps.

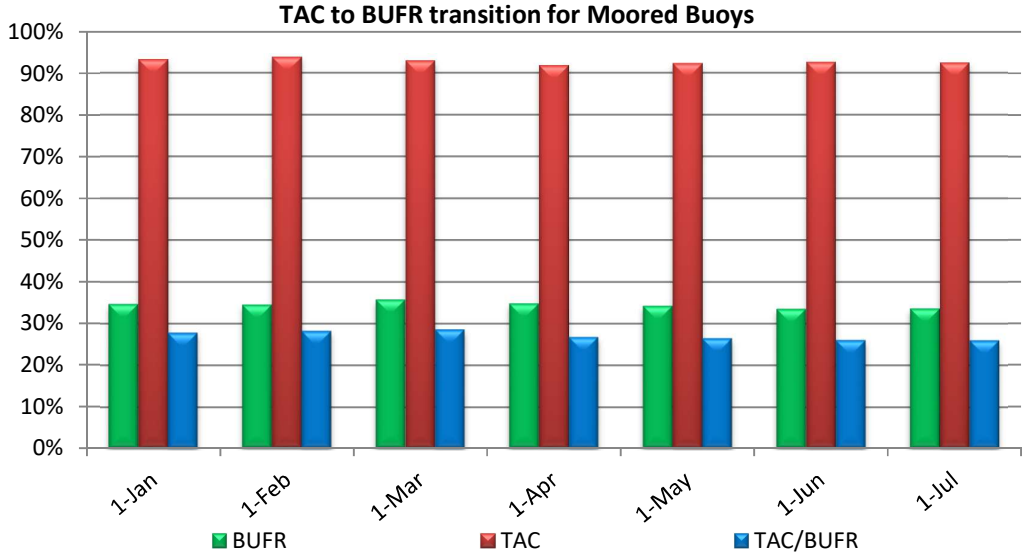

Figure 22: TAC to BUFR transition for Moored Buoys

Figure 23 shows the status of TAC to BUFR transition for moored and drifting buoys in July 2016. 14% of drifting buoys are reporting only in BUFR while the rest report in BUFR and TAC in parallel. 34% of moored buoys reporting on the GTS in BUFR format where 8% of them report only in BUFR.

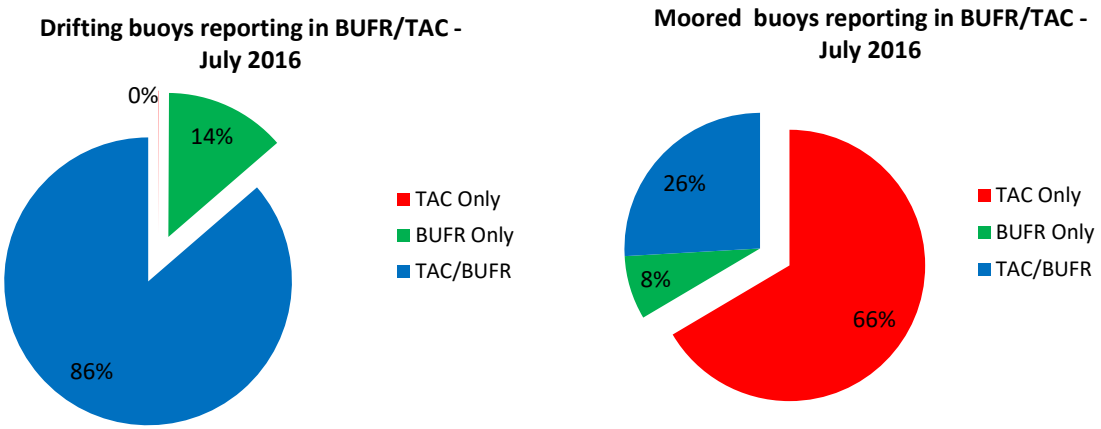

Figure 23: Status of TAC to BUFR migration in July 2016

Majority of drifter buoy data continues to provide in BUFR and parallel TAC formats.

All the Fixed platforms are providing the data to the GTS only in TAC format. It is required to develop a new BUFR template or adopt an existing BUFR template for fixed platform data.

The National Metereological Centers which are not yet ready to accept BUFR data have made the request to continue to provide TAC data in parallel with BUFR until 01 November 2016, at which point data providers are ready to discontinue parallel TAC data to the GTS. There have been numerus issues with parallel data posting on the GTS due to limitation in WMO ID with TAC format.(Please refer to the TT-DM report for further details.) Therefore GTS data providers highly recommend discontinue parallel data posting to the GTS at an earliest possible opportunity.

Moored Buoy Metadata

14 During previous intercessional period TC established procedures to collect moored buoy metadata. Majority of moored buoy operators have provided metadata in proposed format. As of July 2016, 73% of national/coastal moored buoys and 97% of tropical moored buoys which were operational have submitted metadata. 16 agencies from 13 countries have provided moored buoy metadata to the DBCP(Table 5). Compiled metadata CSV files and data submission instructions are accessible through a FTP site. TC has to work with JCOMMOPS IT to integrate moored buoy metadata into the JCOMMOPS database.

Country	#of records	Institute
Brazil	6	Navy Hydrographic Center
Canada	50	Environment Canada
Chile	23	Hydrographic and Oceanographic Service of the Chilean Navy
France	28	Meteo-France
France	3	Meteo-France

Germany	14	Federal Maritime and Hydrographic Agency (BSH)
Greece	10	HELLENIC NATIONAL METEOROLOGICAL SERVICE (EMY)
INDIA	19	NIOT
Italy	15	Italian Institute for Environmental Protection and Research
Japan	11	Global Environment and Marine Department Japan Meteorological Agency
Korea	11	Action officer / Marine Meteorology Division / KMA
Portugal	5	Hydrographic Institute
Slovenia	3	Slovenian Environment Agency
USA	226	PMEL-PIRATA
USA	120	PMEL-RAMA
USA	55	NDBC-TAO
USA	161	NDBC-Meteorological Buoys
USA	727	USACE Engineer Research and Development Center
USA	23	NOAA/PMEL

Table 5: Moored buoy metadata submission by different agencies

GTS Data Access

15 DBCP community has been growing over the years with adding rich diversity to the community. Majority of the buoy platform operators in the past were NW. This has changed over the years. There are many other disciplines contributing to the DBCP community as well as benefit from the DBCPactivities. Most of these groups would like to have access to the GTS data directly. TC has received many such requests during this intersessional period alone. Direct access to the GTS data has become a requirement. Currently access to GTS data is possible only through NWS or RTH where many of these individuals do not have direct contact with.
There were few third-party resources available in the past (Sailwx.info) which are no longer providing the information with data format transition from TAC to BUFR. Thus there is a growing need to have a tool available to access and download data in real (or near real) time from the GTS. TC suggested the Global data assembly centre (GDAC) is a suitable place for such a tool. TC recommended the panel to make a proposal to the GDACs to make available a tool to access (near) real time data for a wider audiance.

TC priorities

16 The priorities and actions as outlined at the previous DBCP Session were addressed as following.

1. Investigate distributing data from Tsunami buoys (TSB) on the GTS

   TSB provides data to the GTS in non WMO approved format. Majority use product specific "DART" format. This issue was raised with ITP and requested their assistance to adopt a consistent data format across the network.

2. Work with NDBC or Météo France on an automated process for receiving tsunameter information

   Due to decoding issues with non approved TSB data going to the GTS, regular data provider(Meteo France) to JCOMMOPS was not able to facilitate this requirement. Therefore

TSB information is collected through an automated process from OSMC and populates the JCOMMOPS database daily.

3. The Panel requested the Technical Coordinator to work with Iridium VARs to obtain drifting buoy data

   Iridium VARs providing monthly reports in a set format. This needs to be automated.

4. The Panel requested the Technical Coordinator in liaison with some Panel members to discuss the rules for allocating WMO numbers with the Secretariat in the view to make a proposal to the next Panel Session for updating those rules.

   This has been discussed and finalized in line with WIGOS Identification requirements. Some of the rules were proposed and discussed at DBCP-31. DBCP has implemented WMO ID based platform identifications which also fulfil the WIGOS identification requirements in JCOMMOPS database

5. Establish KPIS for DBCP networks with network leads.

   KPIS are finalized for Global Drifter buoy network and national/coastal moored buoy network. Rest of the networks need to finalize the KPIs. KPIs are been reported in monthly report and established in JCOMMOPS website.

6. The Panel recognized the importance of collecting metadata from fixed platforms and formed an ad□ hoc Task Team to develop the metadata template for fixed platforms.

   TC has prepared a draft template and needs to be reviewed by the task team.

7. Requested the Technical Coordinator to investigate the problem that not all operational wave observation systems currently appear on the JCOMMOPS status maps, and ensure that the maps include all wave observing buoys

   Most of the issues with data received from MeteoFrance has been resolved. Wave buoy maps are produced monthly starting from September 2015.

In progress

1. Investigate the addition of a DBCP FAQ to the JCOMMOPS website.

   No progress has been made.

2. To investigate timeliness of the moored array and determine the best way to represent these in the reports

   No progress has been made.

3. All regular tasks as outlined in the Terms of Reference for the Technical Coordinator of the DBCP

Appendices : 4

APPENDIX A

DBCP MONTHLY MAPS – JULY 2016

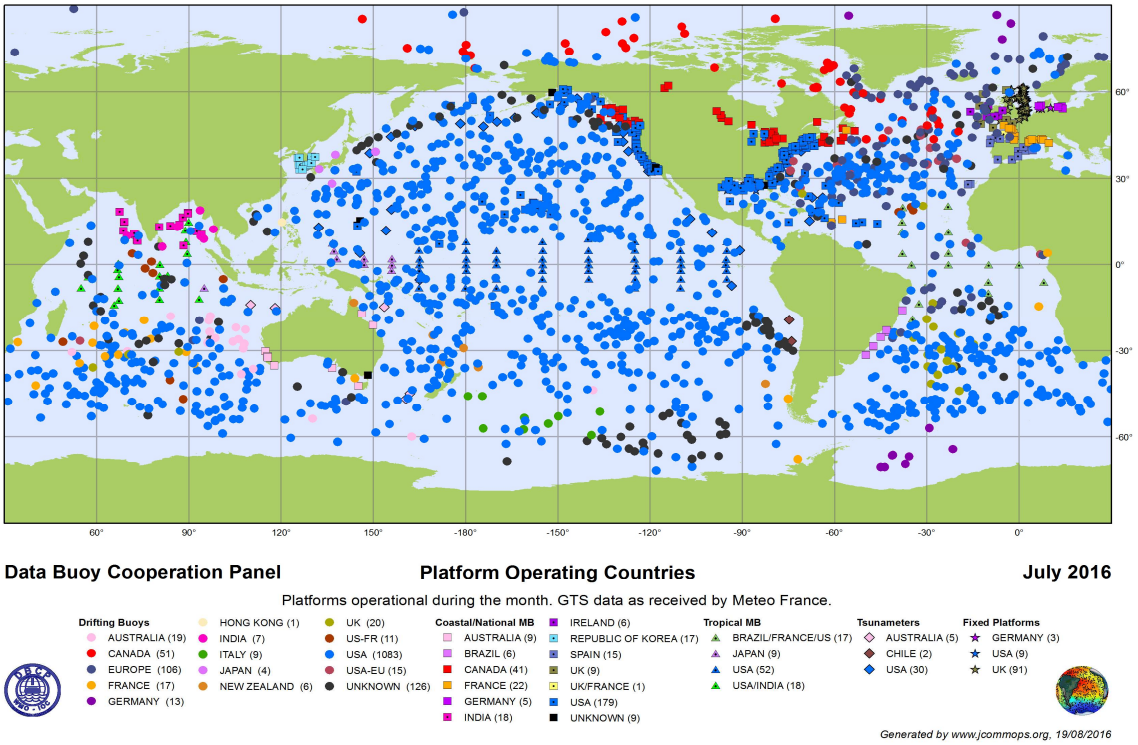

Figure 24 - Buoy networks by country - July 2016.

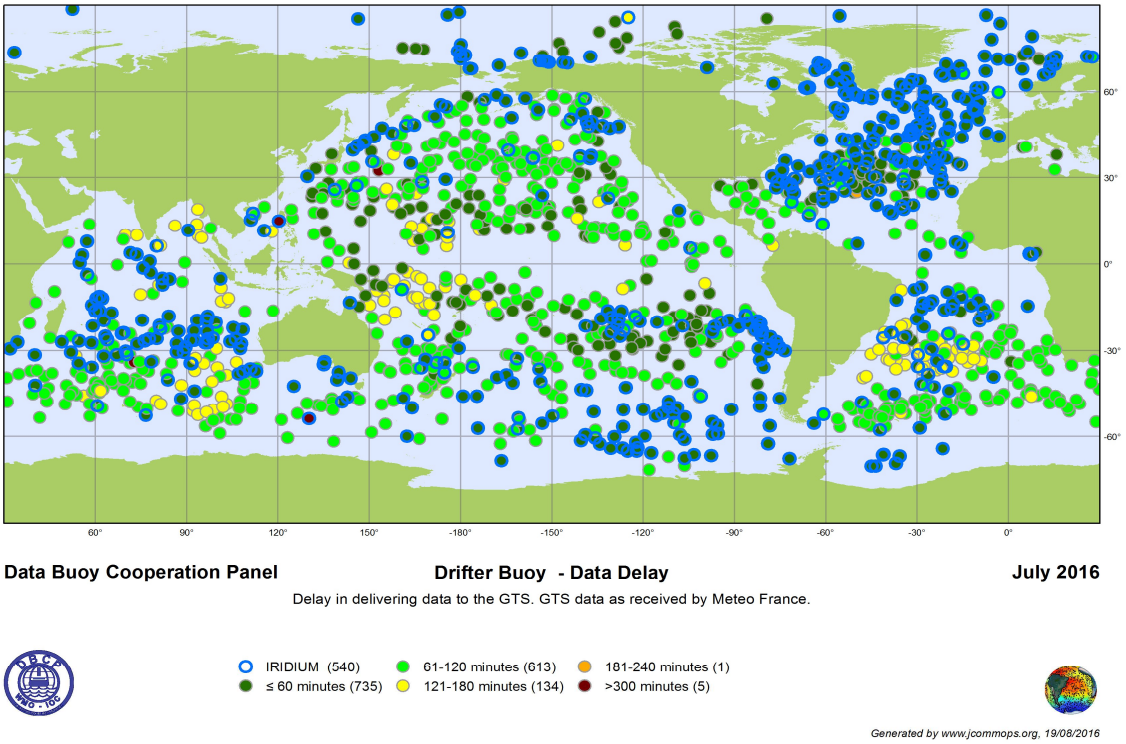

Figure 25 - GTS delays for drifting buoys - July 2016. Iridium drifters outlined in blue.

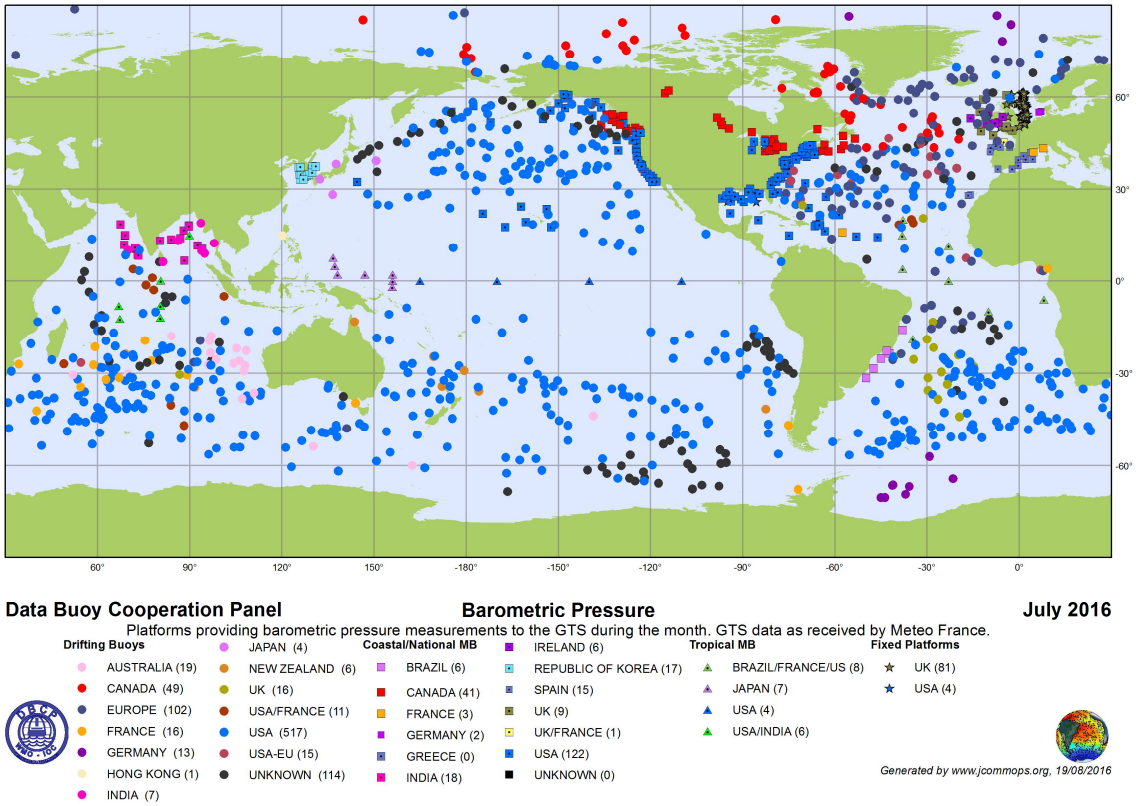

Figure 26 – Platforms reporting Atmospheric Pressure – July 2016.

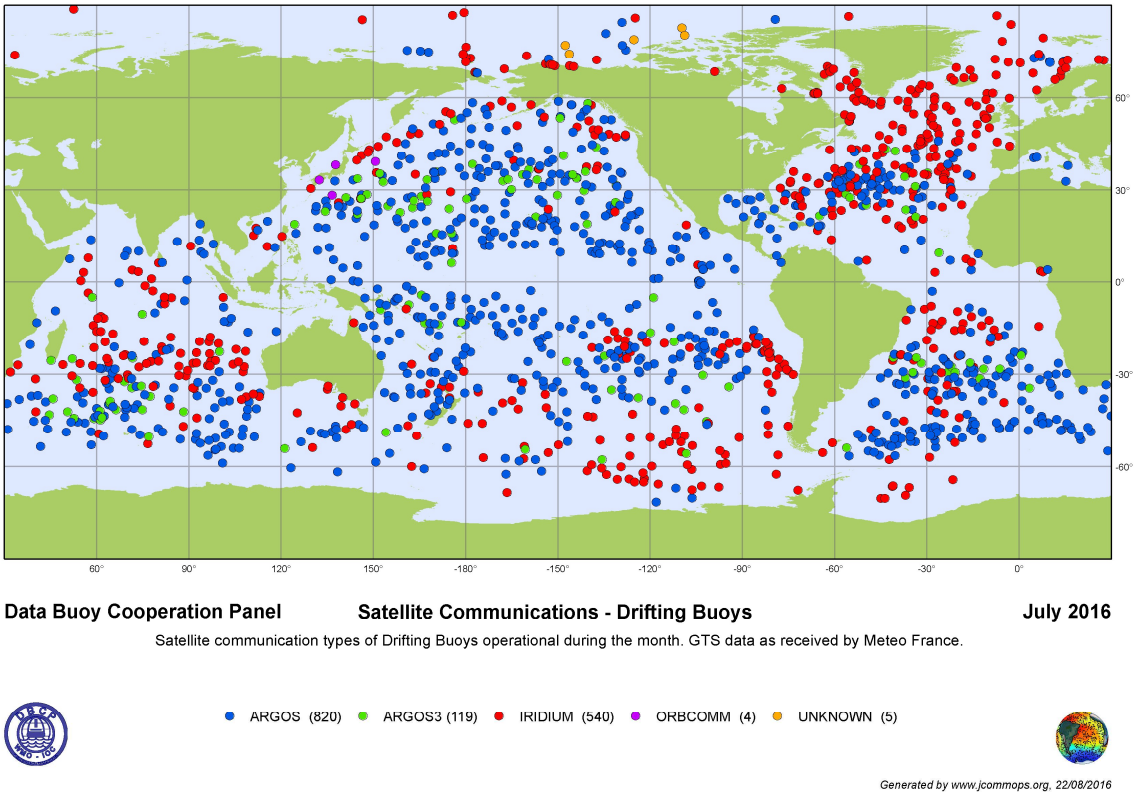

Figure 27 - Drifting Buoy by satellite communications system –July 2016.

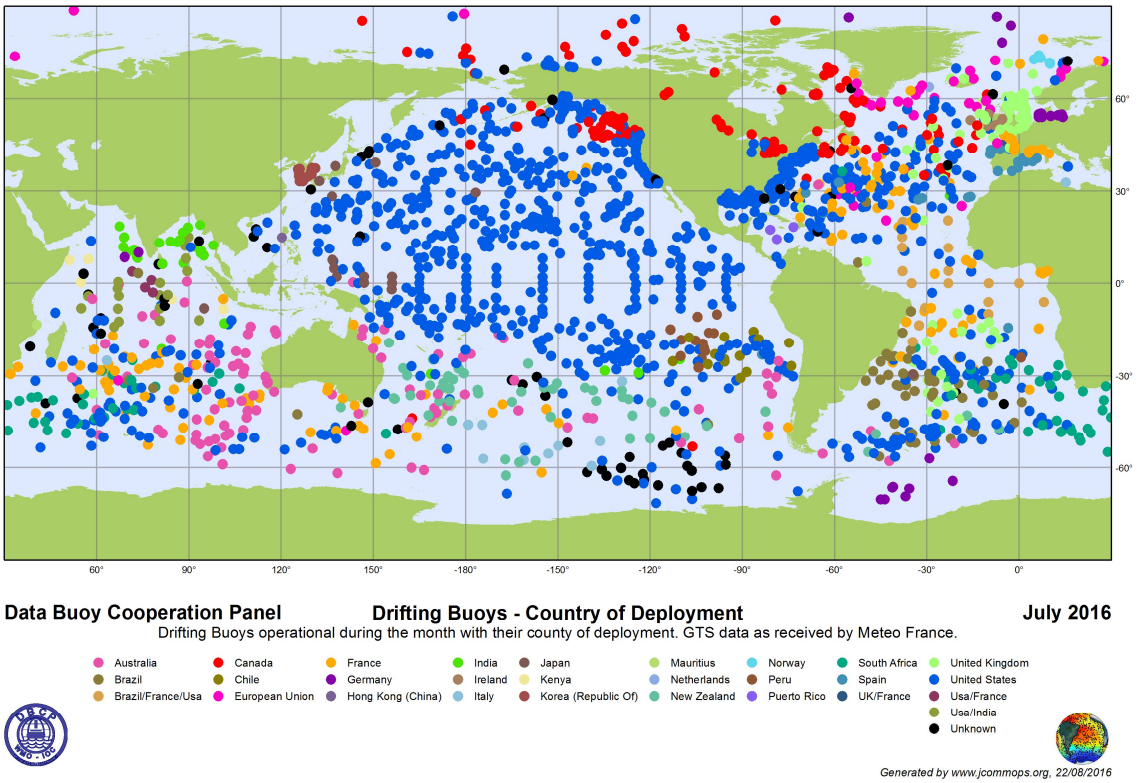

Figure 28 - Map showing country of deployment for all drifting buoys reporting on the GTS – July 2016.

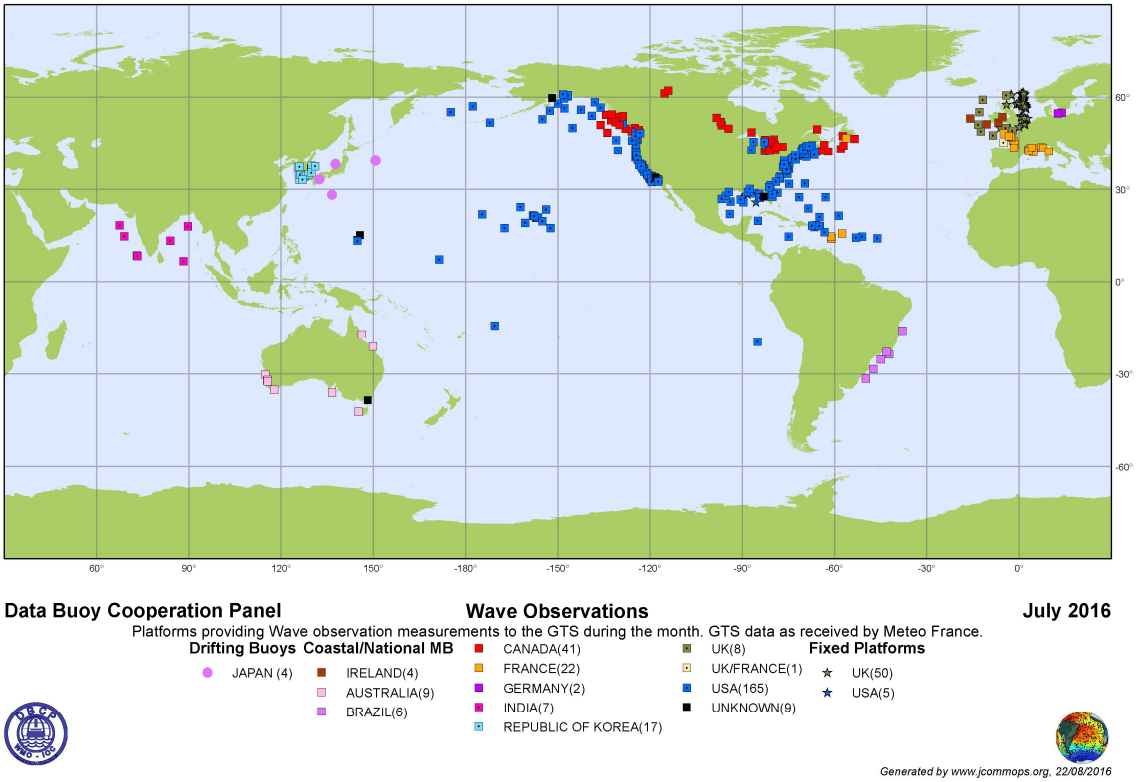

Figure 29 –Platforms reporting wave observations by country – July 2016

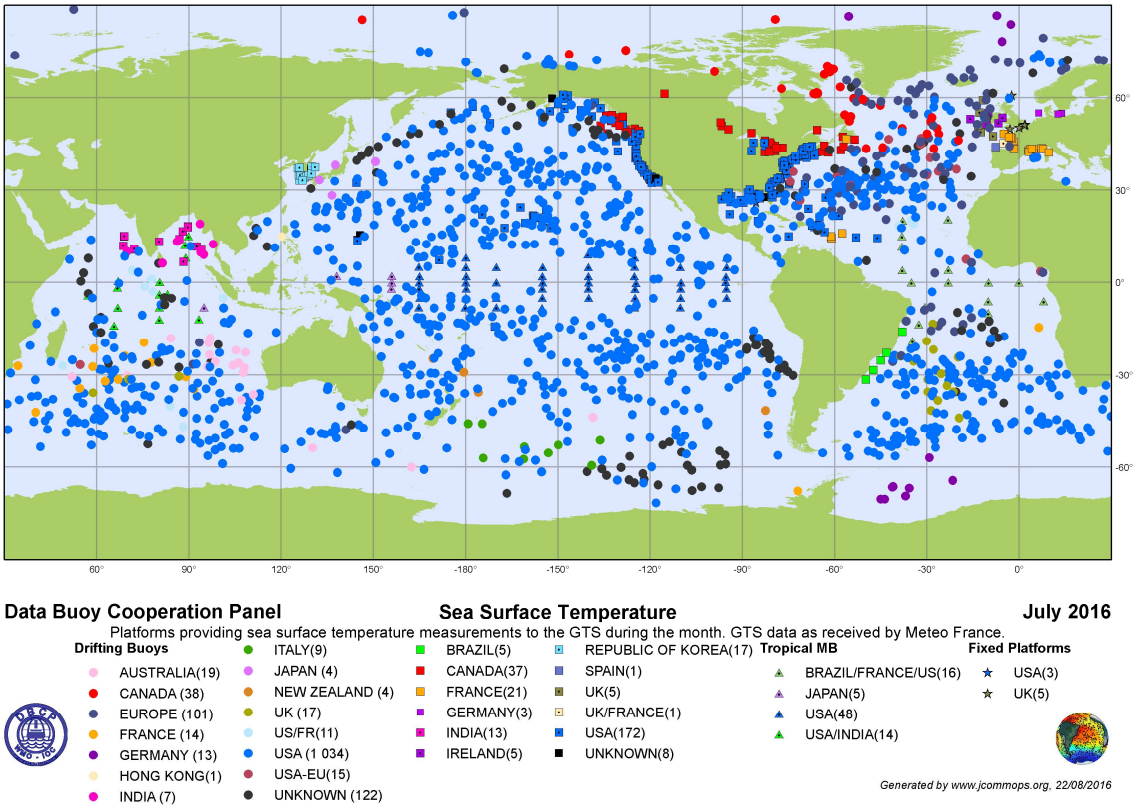

Figure 30 –Platforms reporting sea surface temperature by country – July 2016

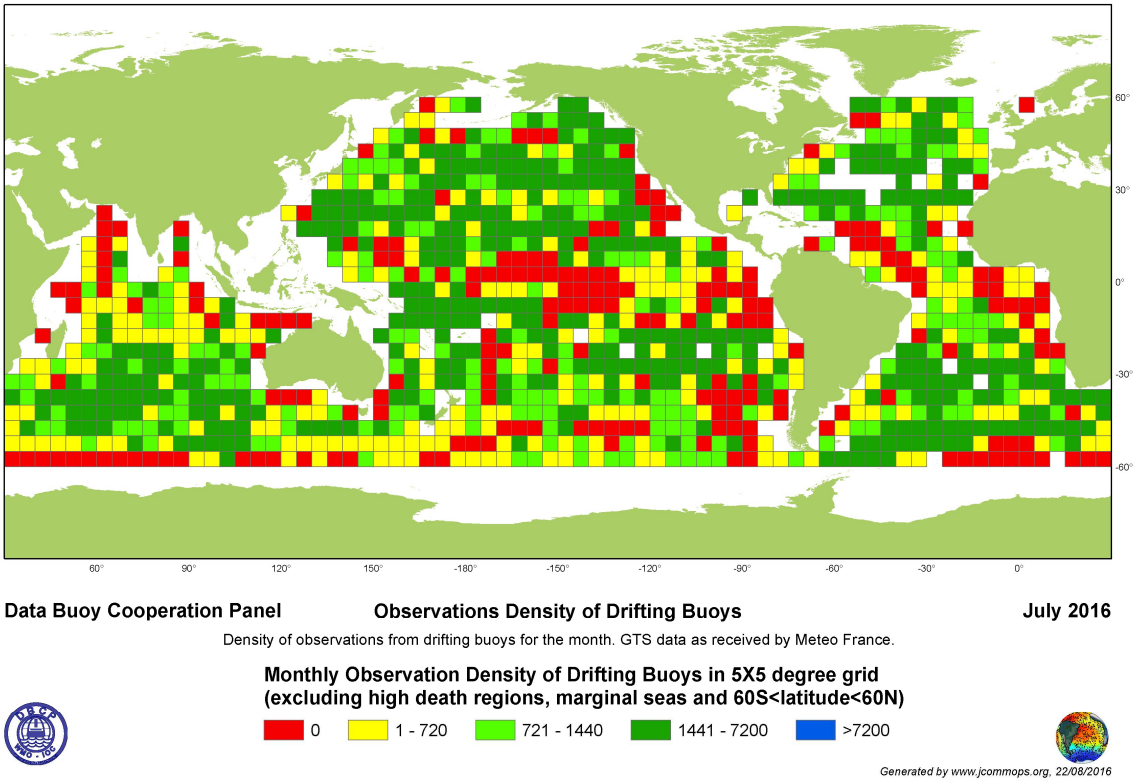

Figure 31 –Observation density map for drifting buoys – July 2016.

APPENDIX A

Data availability on the GTS

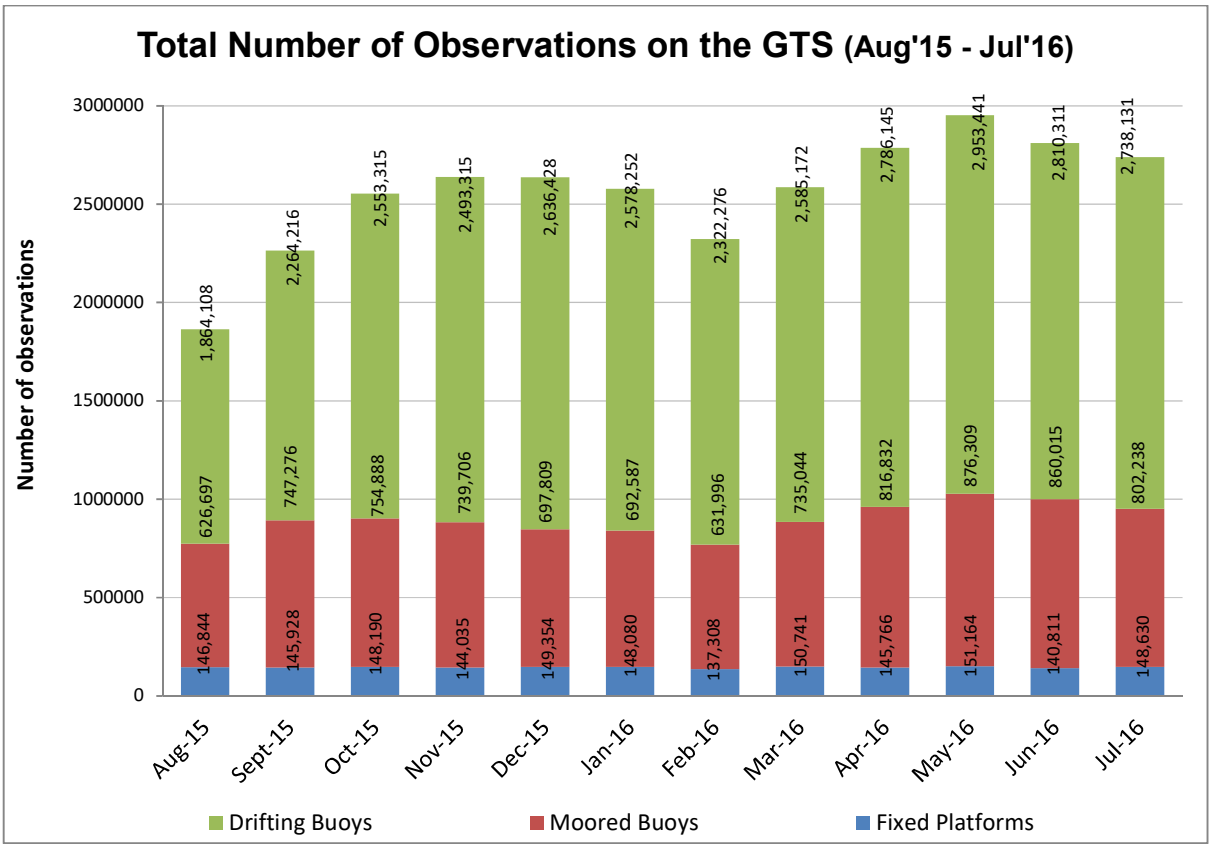

Figure 30 –Number of observations by platform type on the GTS in -August 2015 – July 201

APPENDIX C

Key Performance Indicators (Approved)

(1) Global Surface Drifting Buoy Network

1. Percent coverage of 5x5 degree boxes (excluding marginal seas, latitude>60N/S, and any box with a death rate >20% in 30 days). (green>85%, Amber 70-85%, Red<70%).
   Total number of 5X5 degree boxes excluding marginal seas and Lat >60N/S = 1182

2. Number of active drifting (all SVP) buoys reporting. (green>=1250, amber 1000-1249, red<1000).

3. Number of drifters deployed each year. No color code assigned.

4. Mean/median age of drifters in array. No color code assigned.

5. % of active drifters delivering data in real-time (within 60 min) to GTS. (green >90%, amber 80-90%, red<80%).

6. % of active drifters delivering air pressure data to GTS. (Green>80%, amber 40-80%, red<40%).

7. Average drifter half-life (excluding ran aground/picked up). Green>=450 days, amber 350-449 days, red<350 days.

(2) Coastal/National Moored Buoys (all moored buoys except TAO/PIRATA/RAMA/TRITON arrays and DART buoys)

1. Number of active moored buoys operating and delivering real-time data to GTS, (green ≥ 300, red ≤ 200, amber 200 to 300).

2. % of active moored buoys for which their metadata have been submitted to JCOMMOPS; (green ≥ 90%, amber 75% to 90%, red < 75%).

3. Number of Countries operating moored buoys
4. Variables disseminated to the GTS (divide into three categories, Atmospheric , Wave and Oceanographic)
   Atmospheric – AT, AP,WS,WD each with a 25% weight
   Waves
   Oceanographic - SST-50%, SubC-25%, SubT-25%
5. Network data availability (if all in 4 is available 100%)

APPENDIX D

Technical Coordinator non-routine Tasks

The following is a short list of highlighted items specific TC DBCP non-regular tasks undertaken during the intersessional period.

These tasks are in addition to the normal monthly maps, metadata and database updates and tracking down drifter and mooring deployments and maintenance, monthly teleconferences, and providing technical and other adhoc support to the DBCP and OceanSITES community .

1. **October 2015**
   1. Prepared for DBCP-31 and regular duties
   2. Attended DBCP-31 meeting in Geneva, Switzerland

2. **November 2015**

   1. Attended Fourth Capacity Building Workshop of the WMO/IOC Data Buoy Cooperation Panel (DBCP) for the North Pacific Ocean and Its Marginal Seas (NPOMS-4), 2- 4 November 2015, Busan, Republic of Korea
   2. Majority of time spent in reviewing and working on the new website development to identify the tools required for DBCP and OceanSITES communities.

3. **December 2015**

   1. Compiled metadata received for TAO array and Slovenia. Updates were made to the Metadata template to accommodate DART metadata collection.
   2. New JCOMMOPS website tested by selected community members from each network

4. **January 2016**

   1. Attended the workshop on “In-situ data for satellite SST validation” organized by IFREMER on 27 January 2016. Presented the work of JCOMMOPS and DBCP
   2. New JCOMMOPS website tools review

5. **February 2016**

   1. Attended Ocean Sciences 2016 meeting, Feb 22-26, 2016, in New Orleans, Louisiana http://osm.agu.org/2016/
   2. Connected OceanSITES information with Coriolis GDAC in new JCOMMOPS database.

6. **March 2016**

   1. GTS data comparison performed by GDACS, ISDM and MeteoFrance
   2. Attended JCOMM Regional Instrument Centre Coordination Group (RMIC) IV Meeting organized by NDBC at Gulfport, Mississippi, USA and presented JCOMMOPS activities
   3. Continued with new JCOMMOPS website development activities

7. **April 2016**

   1. Attended seventh Session of the JCOMM Observations Coordination Group (OCG) meeting 4 - 6 April 2016, Esporles, Spain
   2. Organized and attended OceanSITES 2016: 11th Steering Committee and 8th Data Management Team Meeting, 25 - 29 April 2016, Southampton, United Kingdom

8. May 2016

1. Attended Capacity Building workshop for Pacific Islands 2, in Noumea, New Caledonia, 24-27 May

9. June 2016

1. Worked on integrating and implementing the QC tool to the new JCOMMOPS website.

10. July 2015

2. Mission to WMO Geneva, Switzerland to meet with personnel in HR/Finance/Travel as a new employee to WMO on 11-12 July,

11. August 2015

1. Attend WIGOS workshop for RA-VI with focus on marine meteorological and oceanographic observing requirements
2. Preparation for DBCP-32 meeting in La Jolla, USA