

**INTERGOVERNMENTAL OCEANOGRAPHIC
COMMISSION (OF UNESCO)**

DATA BUOY COOPERATION PANEL

TWENTY-NINTH SESSION

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23-27 SEPTEMBER 2013

WORLD METEOROLOGICAL ORGANIZATION

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(17-Sep-13)

ITEM: 10.2

ENGLISH ONLY

REPORT BY THE BUOY DATA MANAGEMENT CENTRES (2012 – 2013)

*(Submitted by Jean Rolland, (Météo-France) for SOC/DB and Joe Linguanti, (Canada) for
RNODC/DB)*

Summary and purpose of the document

This document contains the report of the Specialized Oceanographic Center (SOC) for Drifting Buoys and the report of the Canadian Global Data Assembly Centers (GCAC) for drifting buoys.

ACTION PROPOSED

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

Appendices:

- A. SOC Monthly Products for Buoys, Moored Buoys, Drifting Buoys, and Ships
- B. Report of the Canadian Global Data Assembly Centers (GDAC) for Drifting Buoys (July 2012 – June 2013)

-A- DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

10.2.1 Mr Joe Linguanti (Canada) reported on the activities of the IOC International Oceanographic Data and Information Exchange (IODE) Responsible National Oceanographic Data Centre (RNODC) for drifting buoys (RNODC / DB), operated by the Integrated Science Data Management (ISDM, formerly MEDS) of Canada.

10.2.2 [specific issues of interest to the Panel on RNODC/DB activities to be added here according to actual discussion during the Session]

10.2.3 The Panel then reviewed the report of the JCOMM Specialized Oceanographic Centre (SOC) for drifting buoys, operated by Météo-France, presented by Mr Jean Rolland (France).

10.2.4 [specific issues of interest to the Panel on SOC/DB activities to be added here according to actual discussion during the Session]

10.2.5 The Panel thanked both centres for their reports. The full reports are provided in Appendices A and B and will be included in the CD-ROM that will be distributed with the Session final report.

Appendices: 2

APPENDIX A

SOC MONTHLY PRODUCTS FOR BUOYS, MOORED BUOYS, DRIFTING BUOYS, SHIPS

10.2.1 The Specialized Oceanographic Center (SOC) for Drifting Buoys has been run continuously during year 2012-2013. SOC is made of Météo-France teams in Toulouse and Brest as well as teams involved in the French inter-agency program Coriolis (Ifremer leading the program, and in charge for delayed mode aspects, portal to external users, etc). A daily collection and archiving of buoy reports from the global ocean is performed by Météo-France. Collaboration within the Coriolis project (www.coriolis.eu.org), with JCOMMOPS and also CLS-Argos are main aspects of this SOC, beside regular exchanges with other data centres, measurement teams and agencies, and with users.

10.2.2 Météo-France operates quality control (QC) 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, wrong acceleration and loss of drogue, sensor drift, etc) or when a modification seems needed (i.e. to recalibrate or to remove a sensor from GTS) via the JCOMMOPS interface. Statistics on comparisons with analysis fields are set up for each buoy. Monthly statistics are sent to the buoy-qir@vedur.is mailing list too.

10.2.3 Buoy data QC tools developed by Météo-France are available on the Internet (www.meteo.shom.fr/qctools) to help buoy operators to check their own buoys: monthly statistics carried out by 4 meteorological centres for individual buoys; plots of data and differences with model outputs; blacklists of buoys reporting dubious air pressure values or being perhaps ashore can be seen.

10.2.4 In addition to the products linked to buoy QC, the SOC for Drifting Buoys produces monthly products for buoys, moored buoys, drifting buoys, ships. Data are delivered on request, or on a regular basis and via Internet (<http://esurfmar.meteo.fr/doc/o/daim>). Examples are given in Appendix.

10.2.5 Since the 1st of January 2002, Météo-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, obtained 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. Since mid-2004, wind speed and wind stress data from ECMWF analysis model coupled with sampled surface current data are delivered too and used by operational oceanography centres (such as Mercator, French component of the GODAE international experiment).

In addition to the products linked to buoy QC, the SOC for Drifting Buoys produces monthly products for buoys, moored buoys, drifting buoys, ships. Data are delivered on request, or on a regular basis and via Internet (<http://esurfmar.meteo.fr/doc/o/daim>). Examples are given for the last year.

- Figures 1, 2, 3 and 4 show the time evolution of reports for wind and for pressure respectively for all BUOY reports (showing all buoys, moored buoys and Drifting Buoys) and SHIP reports, since January 2012.
- Figure 5 shows the time evolution of WAVEOB reports and sensors since January 2012.

Each month, mapping position plot charts and Marsden square distribution are produced for BATHY, TESAC, SHIP, BUOY and TRACKOB.

- Figures 6a,b to 10a,b show these products for June 2013. "a" stands for mapping position plot charts, and "b" for Marsden square distribution :
 - Figures 6a and 6b: BATHY,
 - Figures 7a and 7b: BUOY,
 - Figures 8a and 8b: SHIP,
 - Figures 9a and 9b: TESAC
 - Figures 10a and 10b: TRACKOB.

Each month, Marsden square distribution charts of mean monthly data availability (top) and percentage of BUOY reports compared to SHIP + BUOY reports (bottom) for wind, pressure, air temperature, sea surface temperature are produced.

- Figures 11 to 14 show such products for June 2013.
 - Figure 11: Wind,
 - Figure 12: Pressure,
 - Figure 13: Air temperature,
 - Figure 14: Sea surface temperature.
-

Time evolution of BUOY reports for wind and pressure

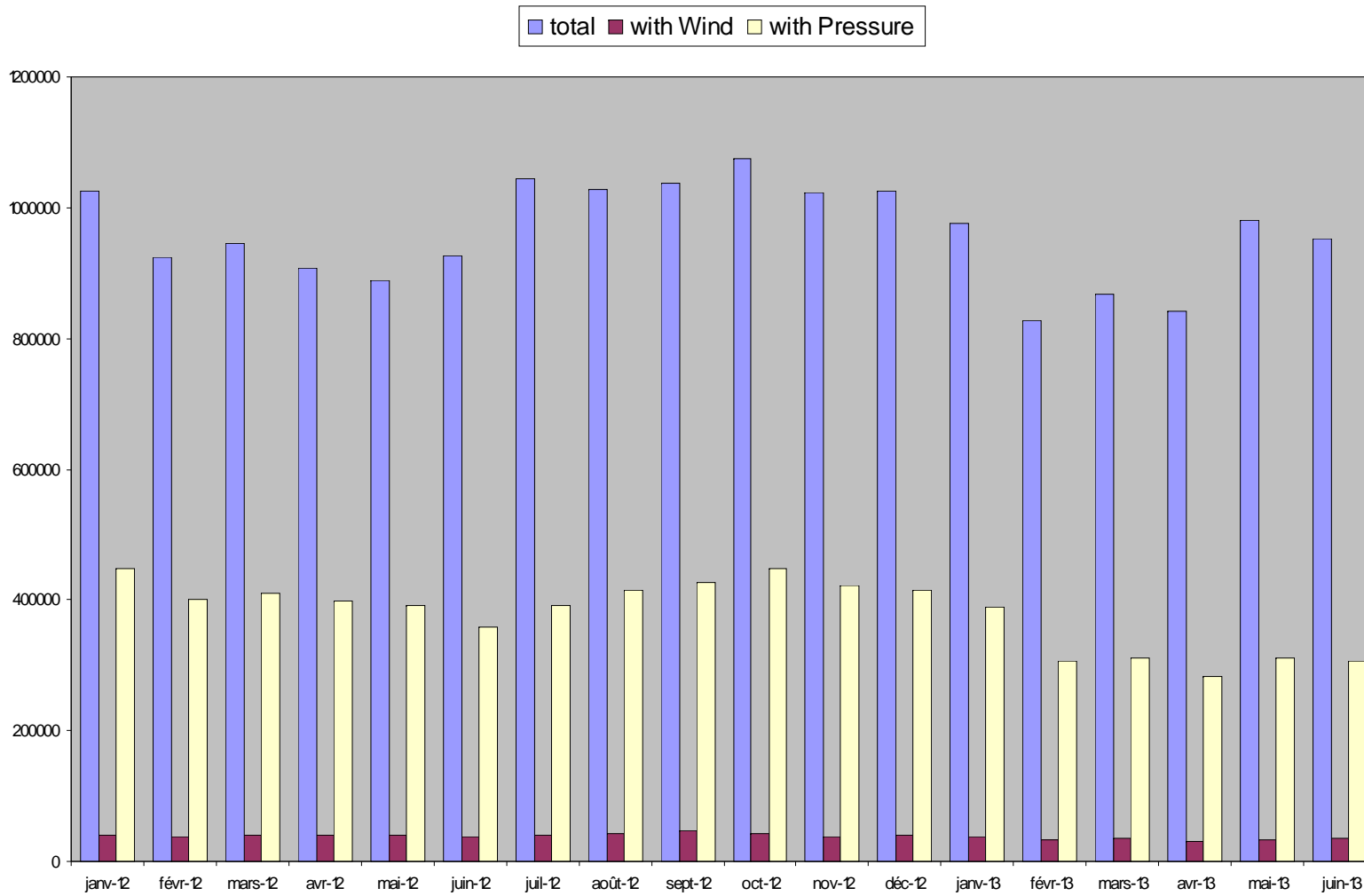


Figure 1

Time evolution of Moored BUOY reports for wind and pressure

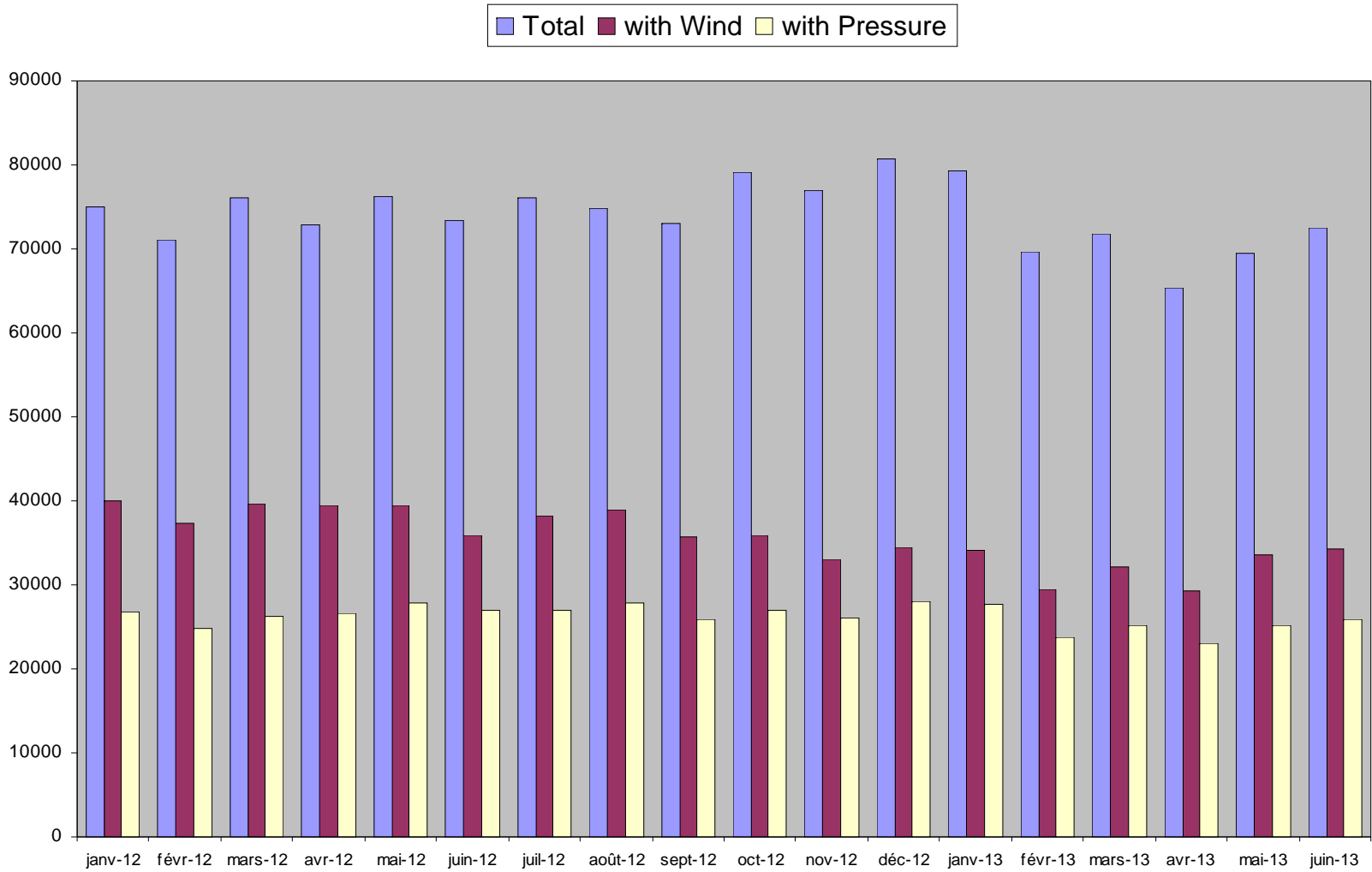


Figure 2

Time evolution of Drifting BUOY reports for wind and pressure

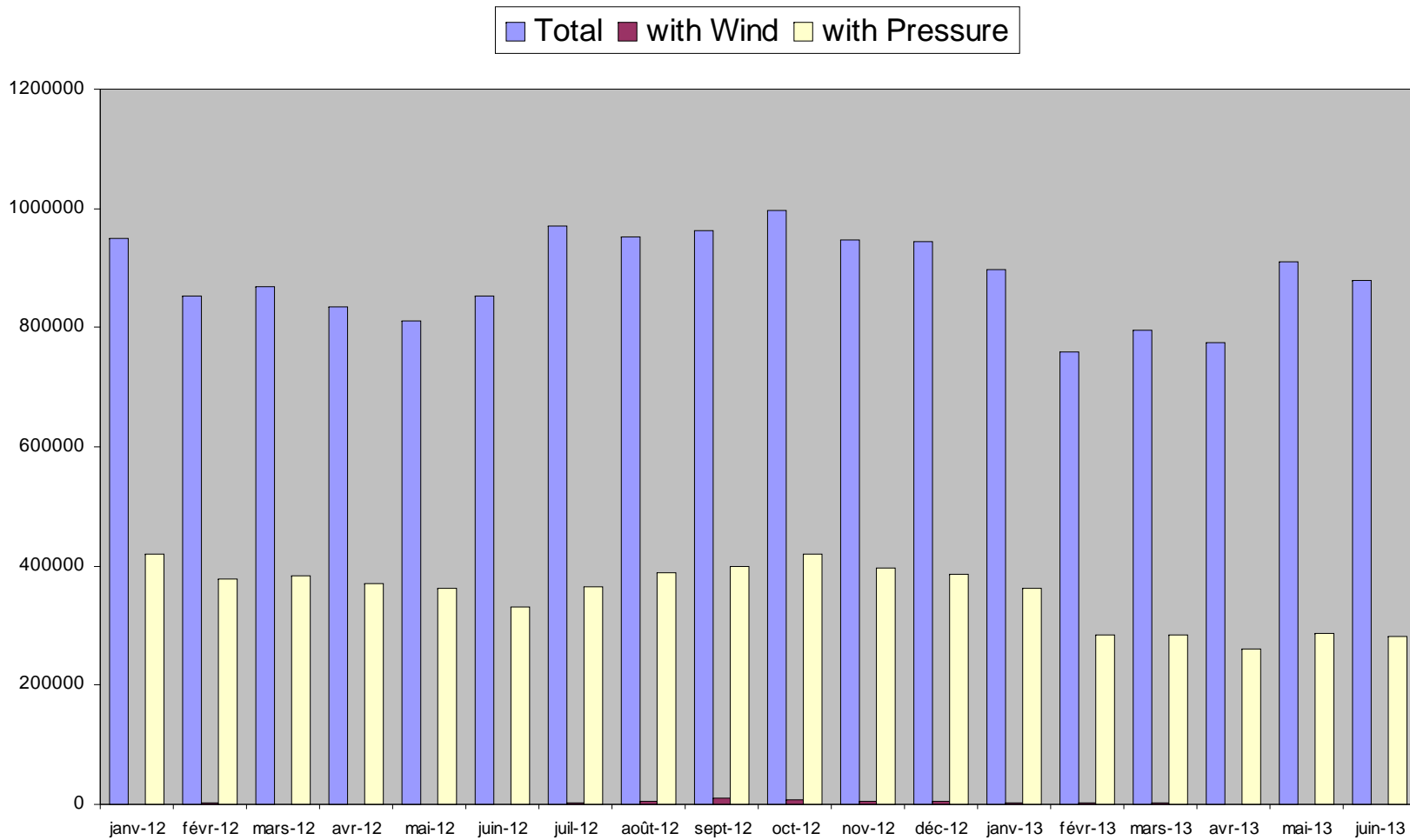


Figure 3

Time evolution of SHIP reports for wind and pressure

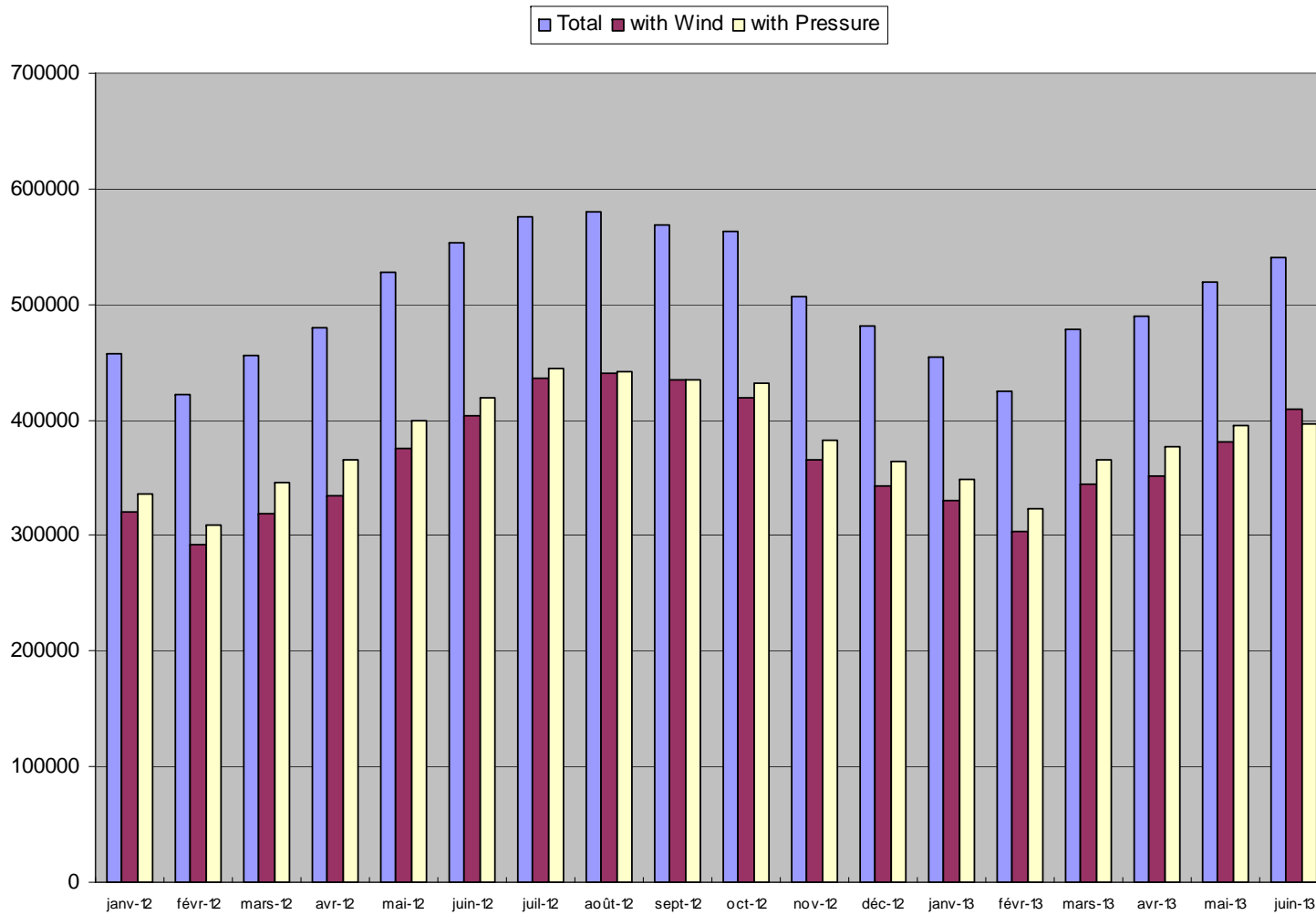


Figure 4

WAVEOB reports/sensors

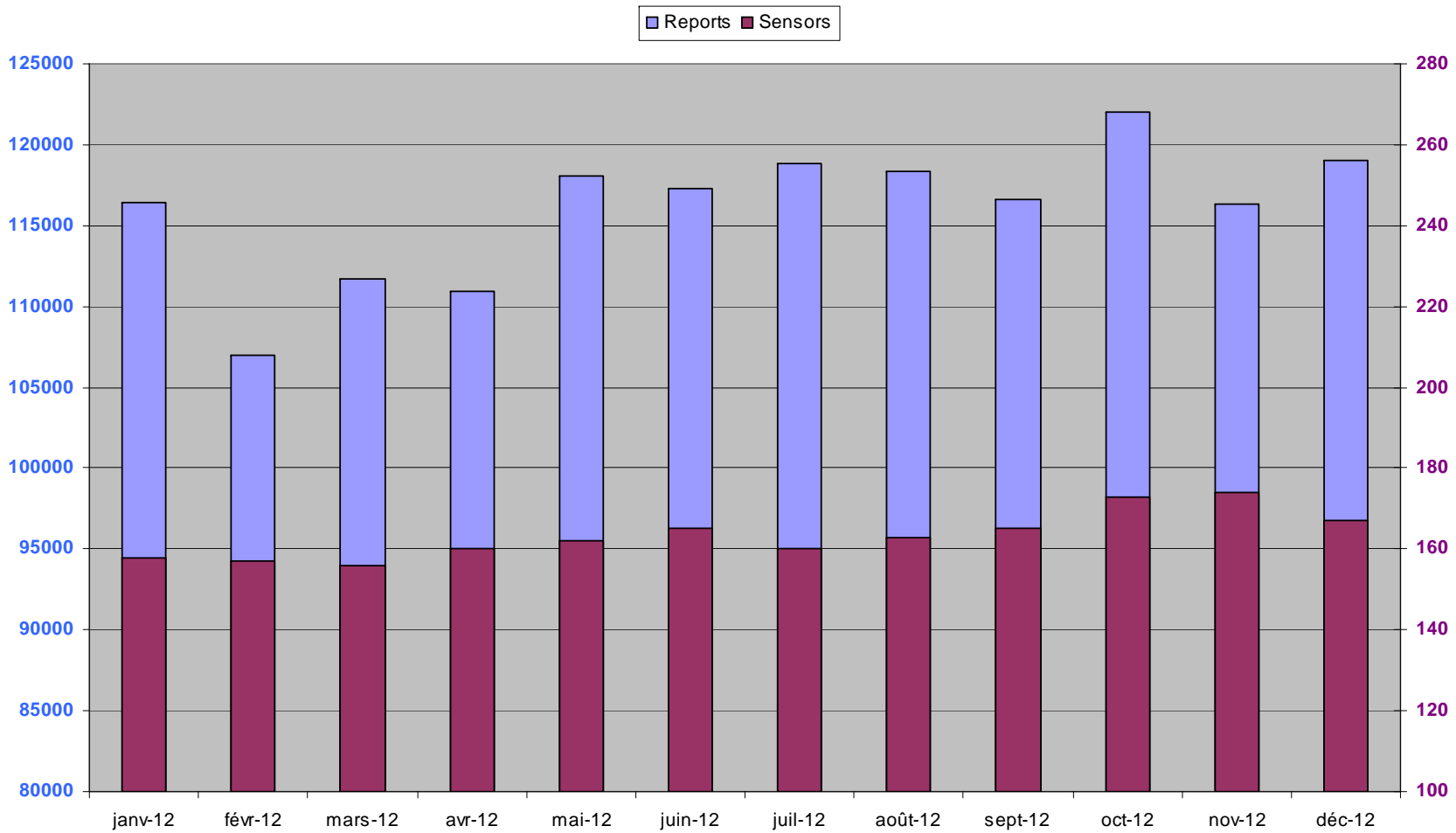


Figure 5

Carte de pointage des observations recues en juin 2013

Mapping position plot chart of data received during June 2013

Messages : BATHY

Total : 1482

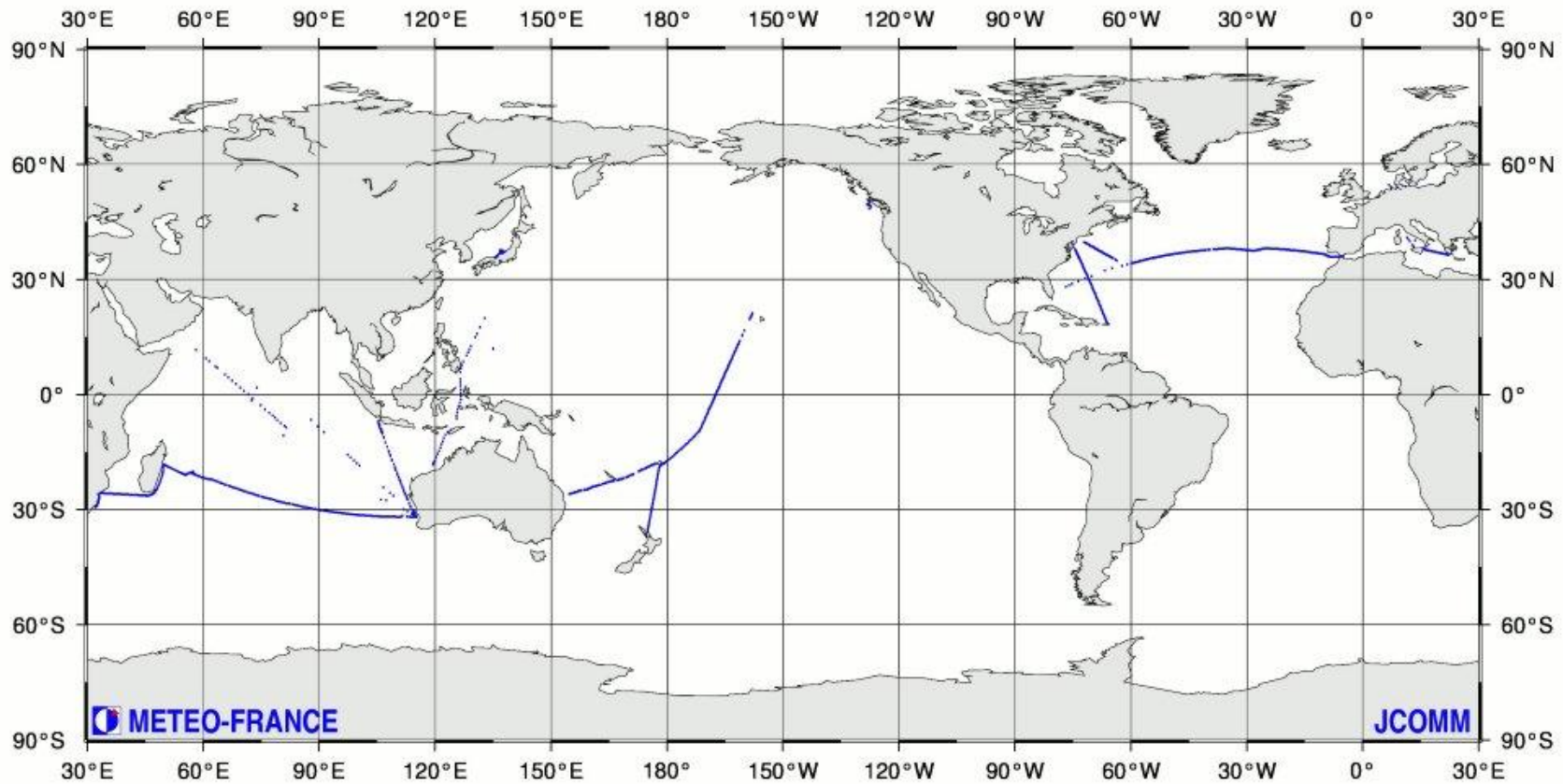


Figure 6a BATHY 2013.06

Repartition par carre Marsden des observations recues en juin 2013
Marsden square distribution chart of data received during June 2013

Messages : BATHY

Total : 1482

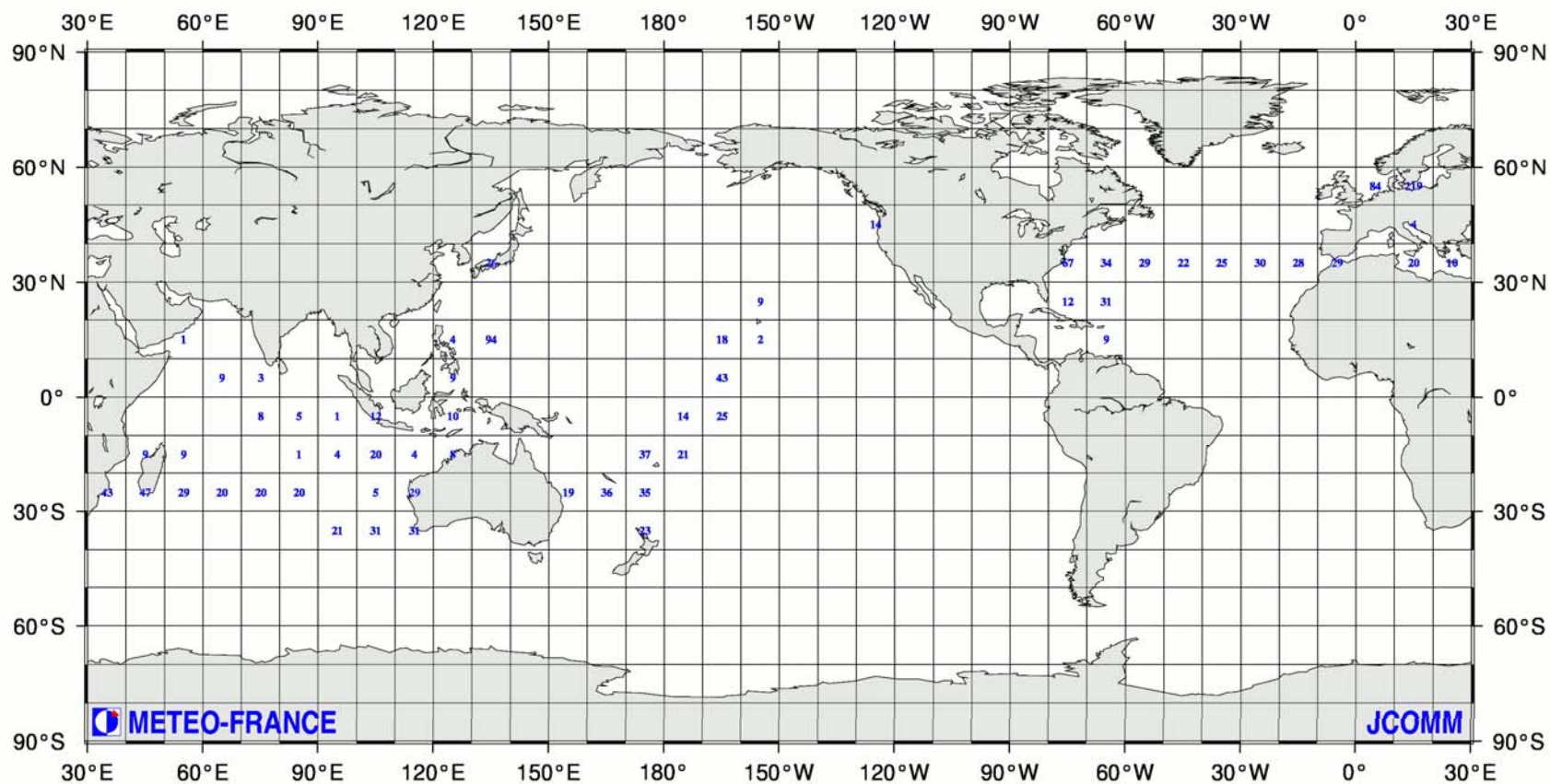


Figure-06b-BATHY_car.2013.06

Carte de pointage des observations recues en juin 2013

Mapping position plot chart of data received during June 2013

Messages : BUOY

Total : 951857

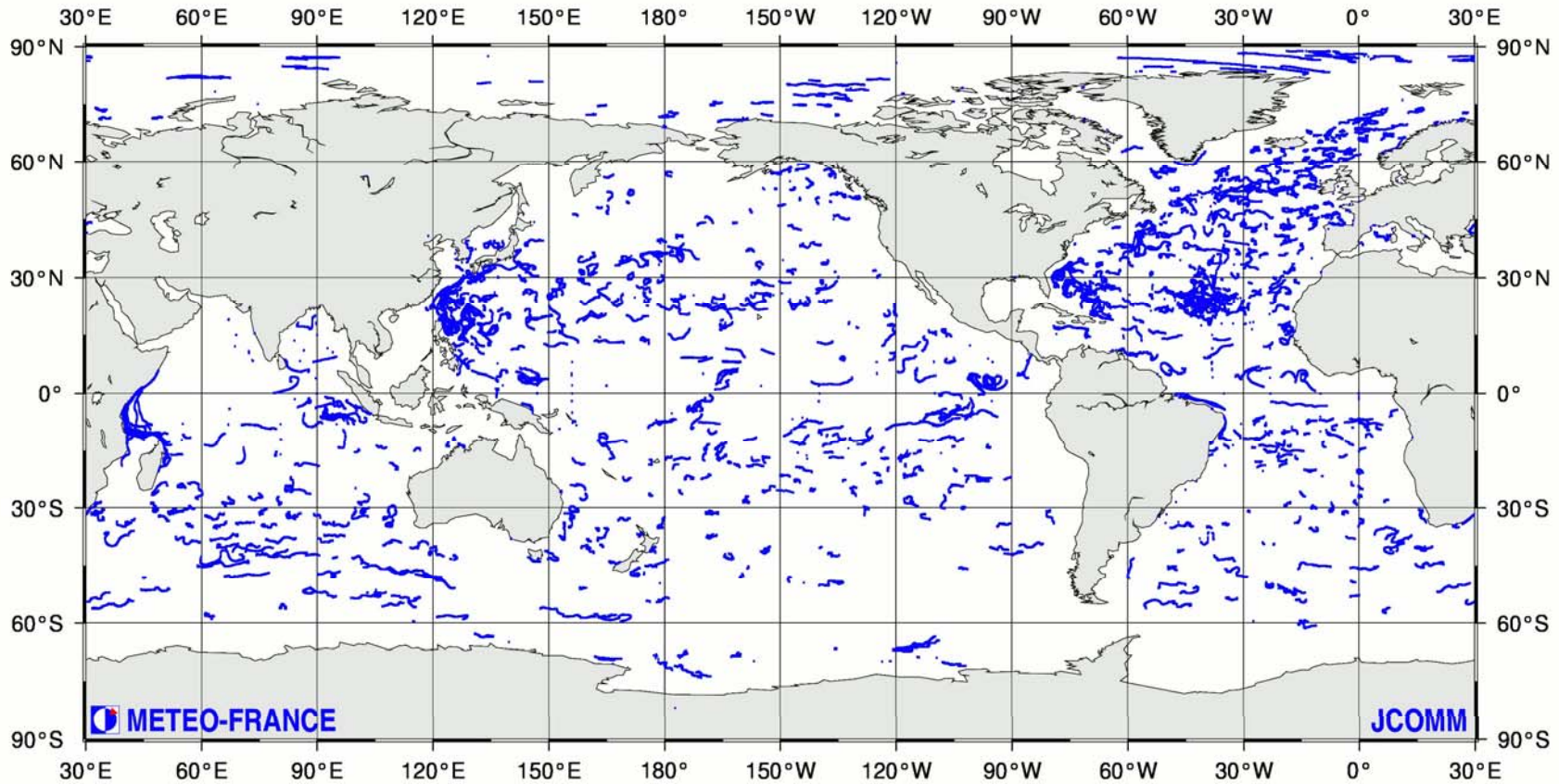


Figure-07a-BUOY_pos.2013.06

Repartition par carre Marsden des observations recues en juin 2013

Marsden square distribution chart of data received during June 2013

Messages : BUOY

Total : 951857

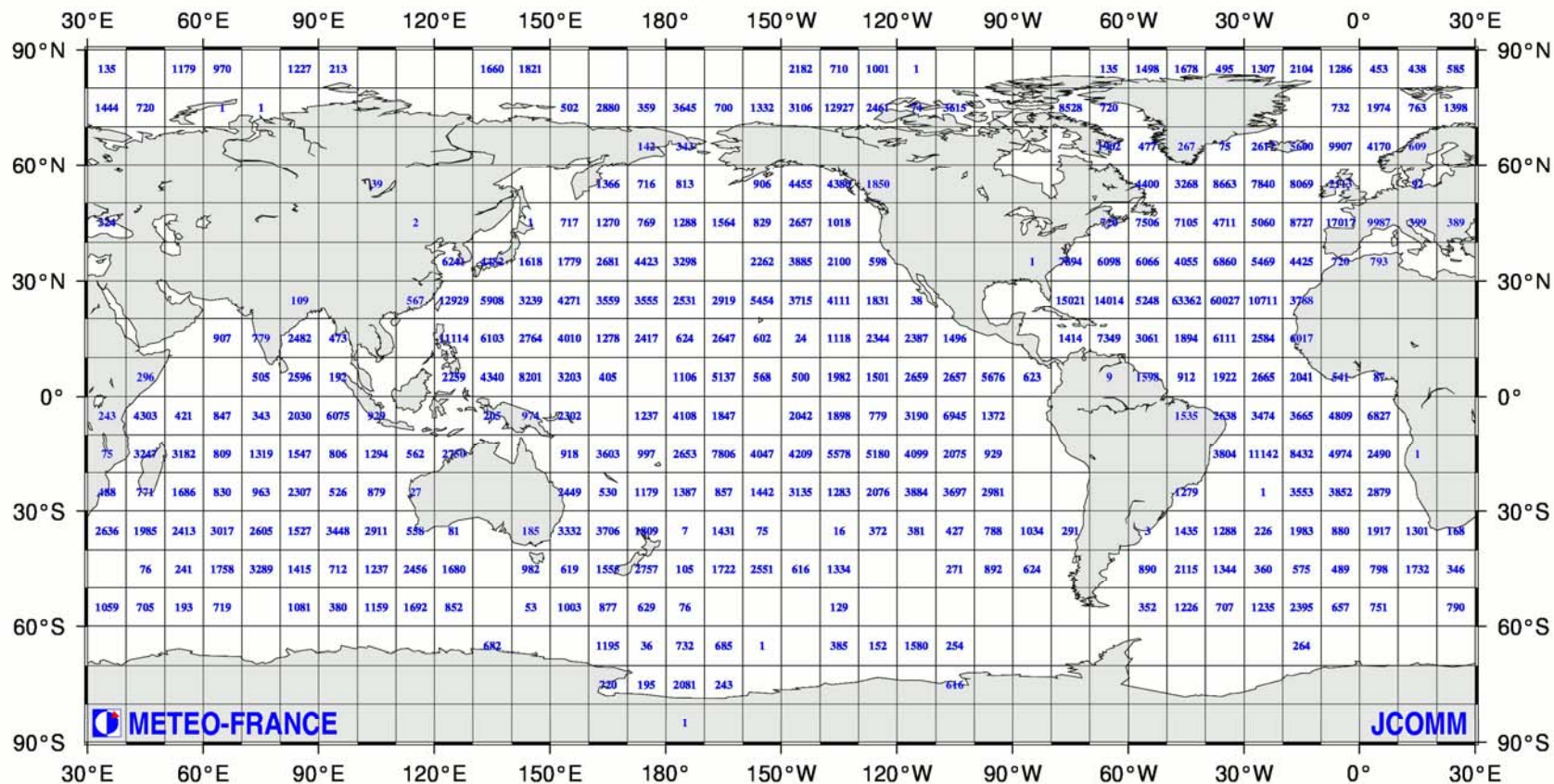


Figure-07b-BUOY_car.2013.06

Carte de pointage des observations recues en juin 2013

Mapping position plot chart of data received during June 2013

Messages : SHIP

Total : 539935

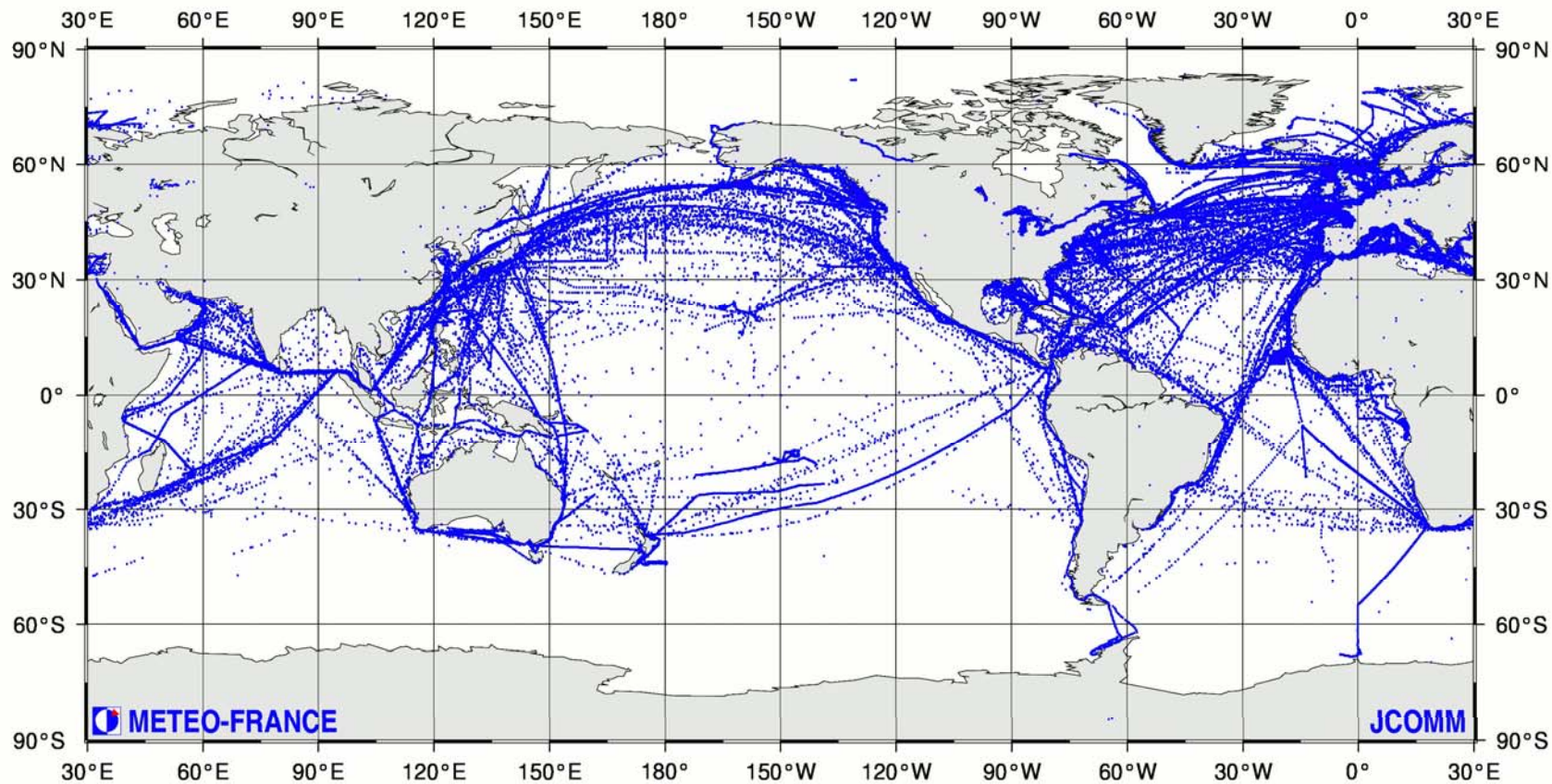


Figure-08a-SHIP_pos.2013.06

Repartition par carre Marsden des observations recues en juin 2013

Marsden square distribution chart of data received during June 2013

Messages : SHIP

Total : 539935

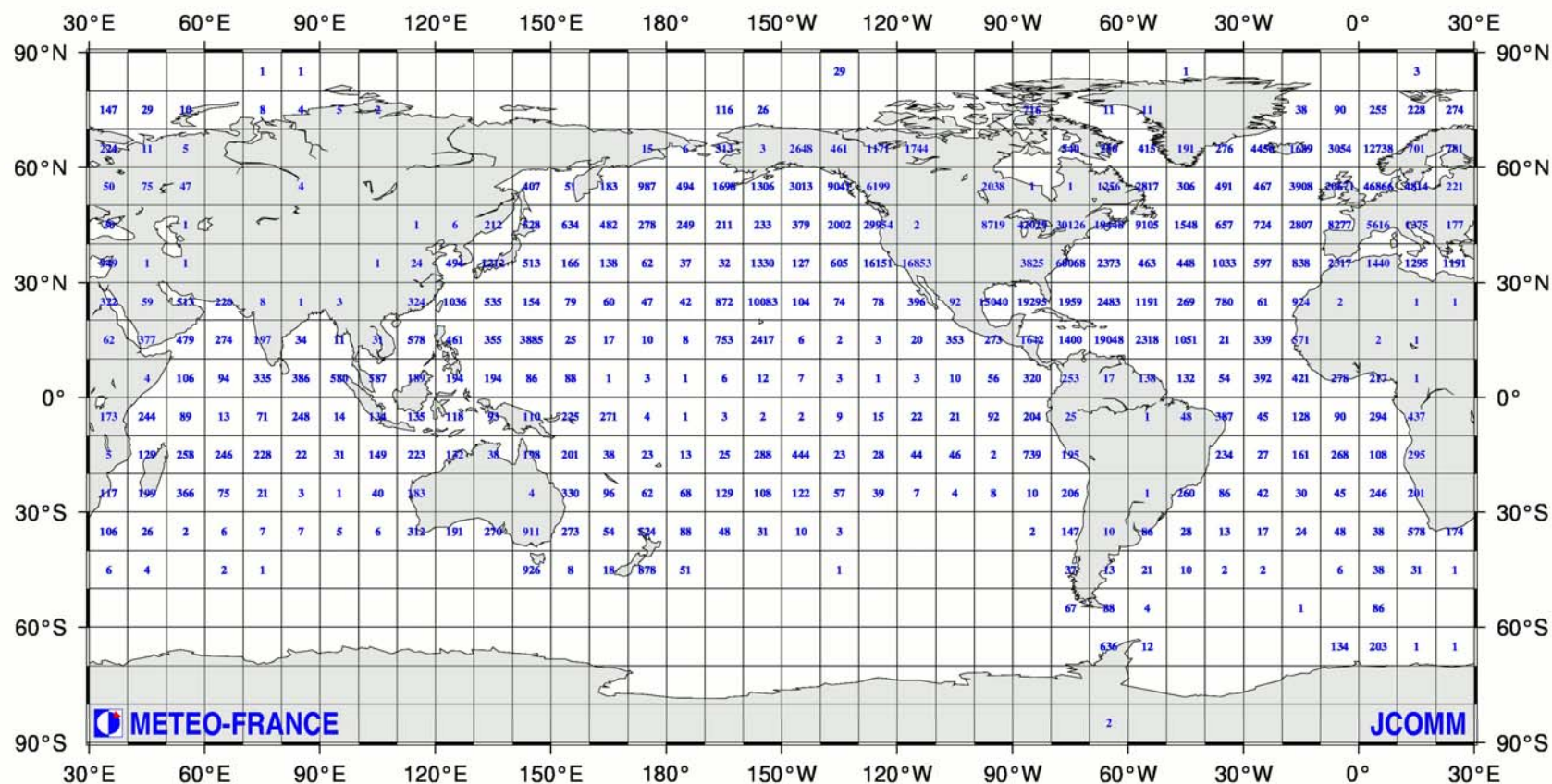


Figure-08b-SHIP_car.2013.06

Carte de pointage des observations recues en juin 2013

Mapping position plot chart of data received during June 2013

Messages : TESAC

Total : 70072

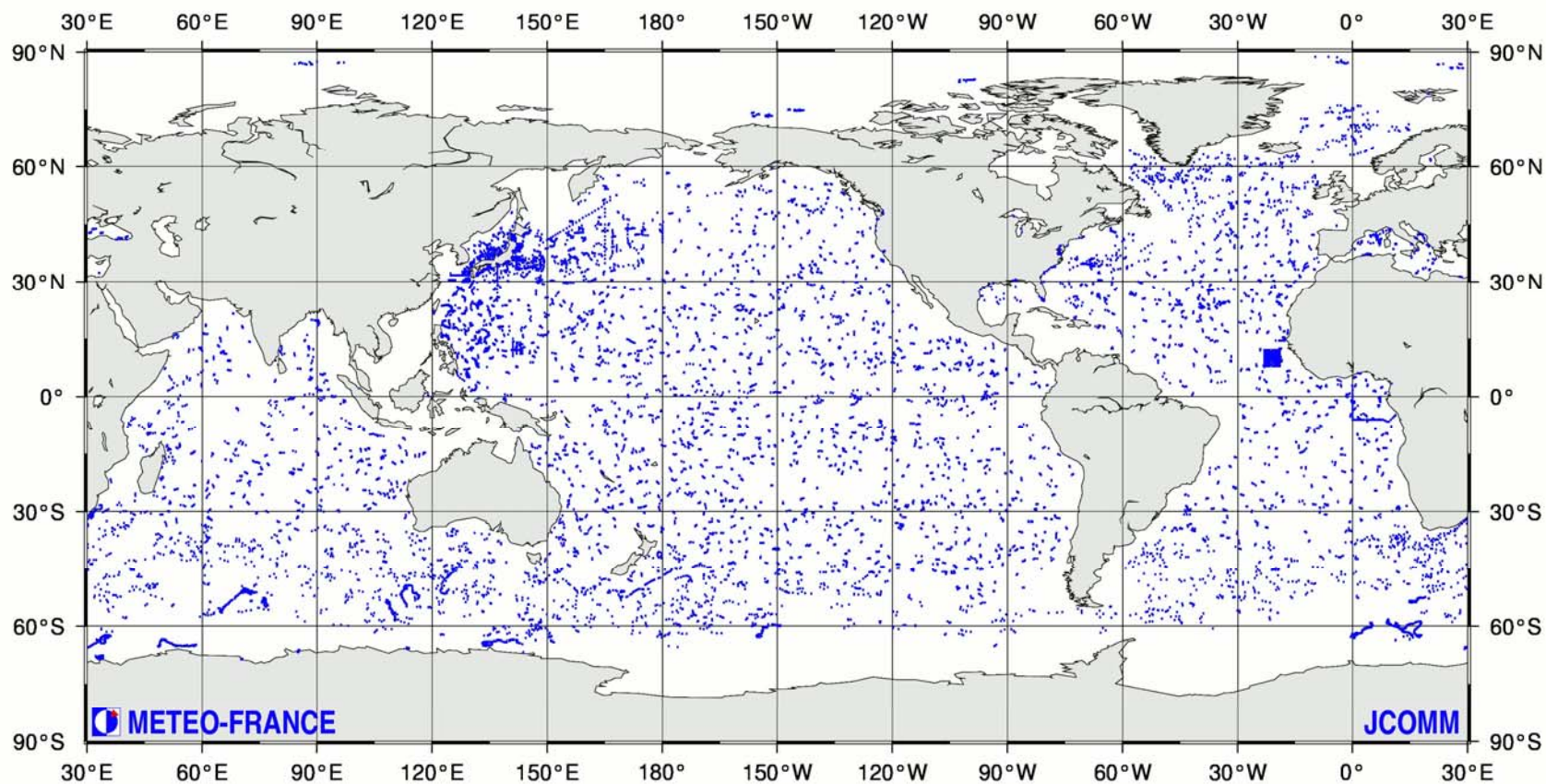


Figure-09a-TESAC_pos.2013.06

Repartition par carre Marsden des observations recues en juin 2013

Marsden square distribution chart of data received during June 2013

Messages : TESAC

Total : 70072

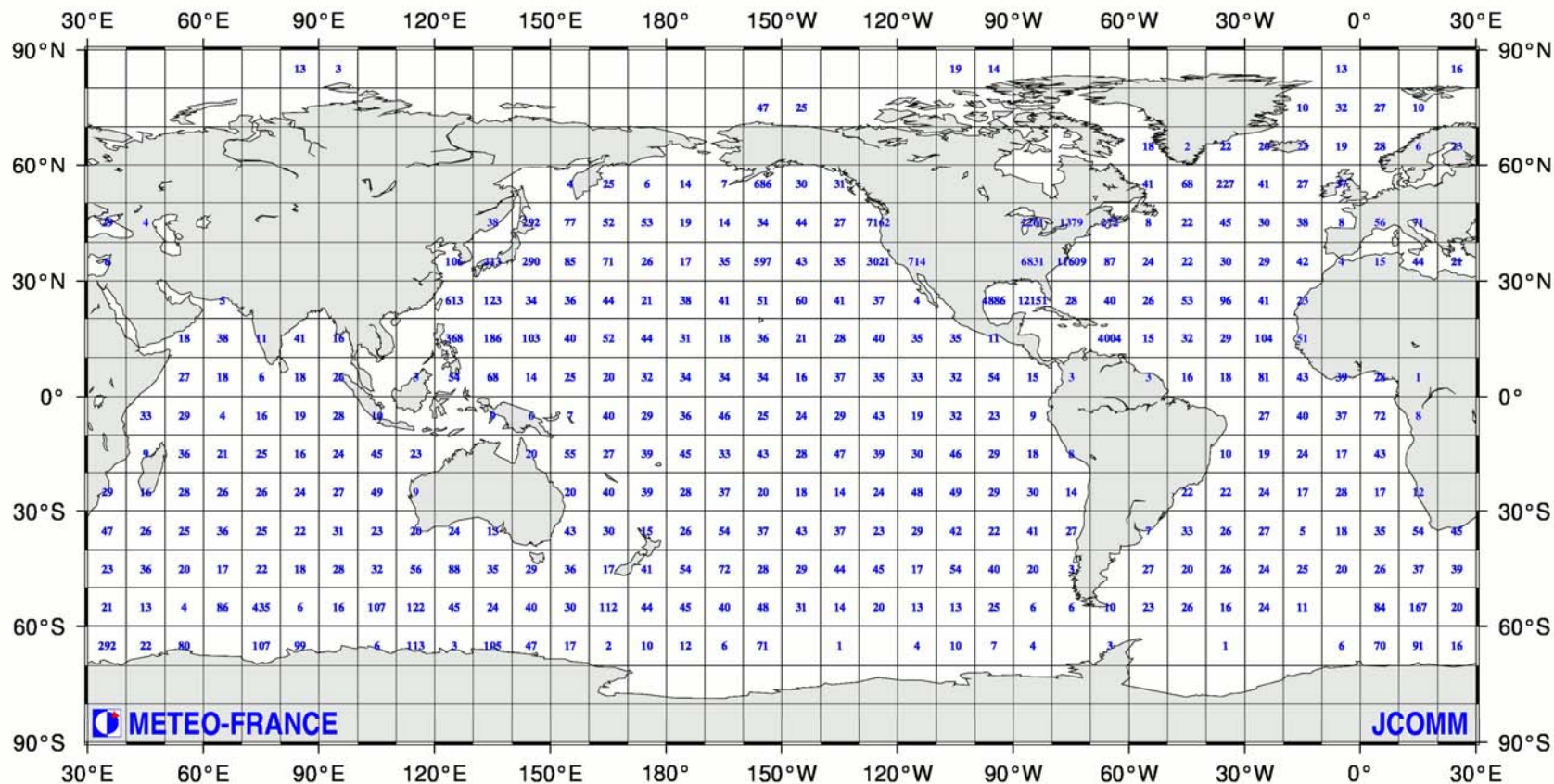


Figure-09b-TESAC_car.2013.06

Carte de pointage des observations recues en juin 2013

Mapping position plot chart of data received during June 2013

Messages : TRACKOB

Total : 79063

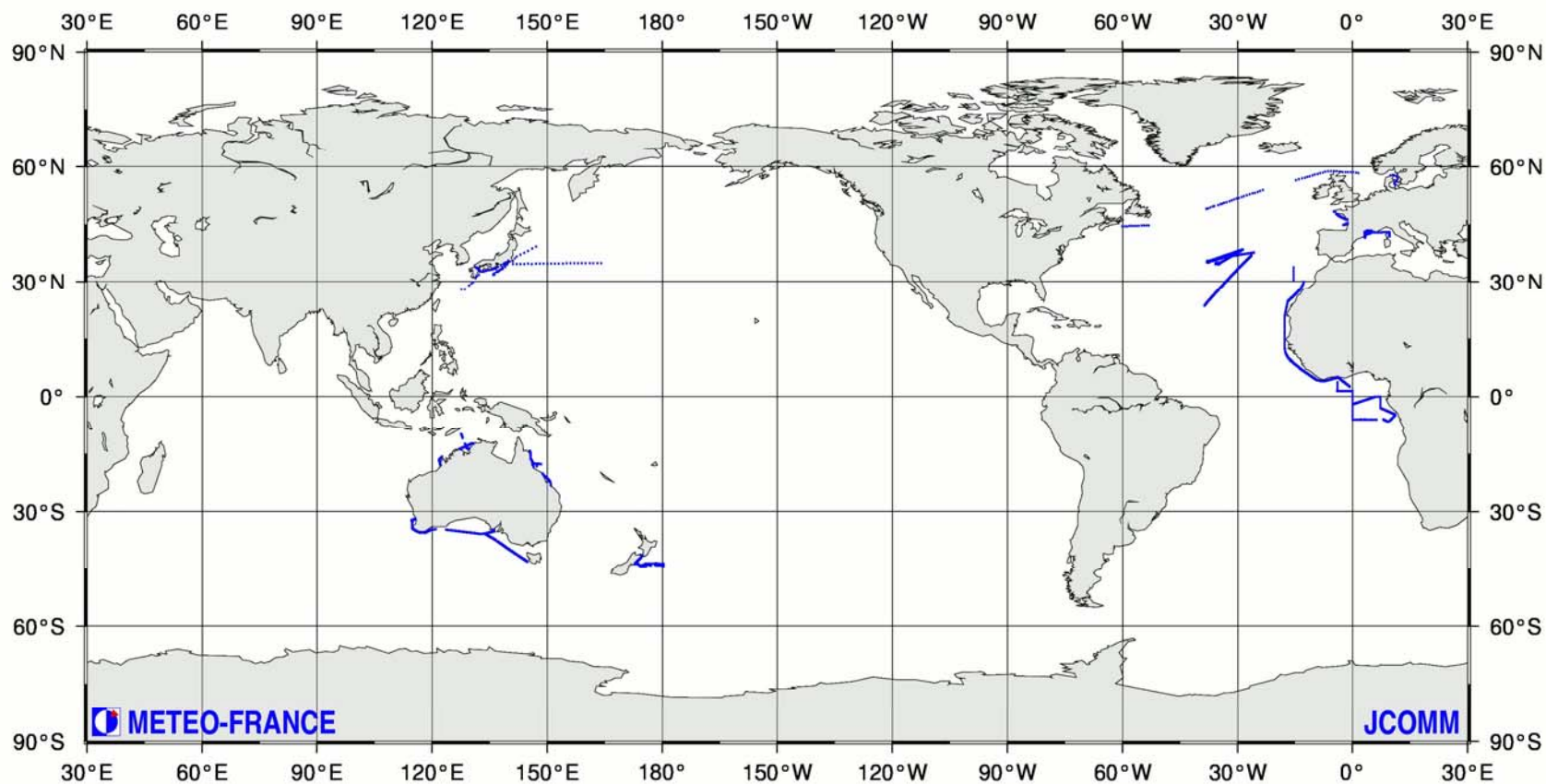


Figure-10a-TRACKOB_pos.2013.06

Repartition par carre Marsden des observations recues en juin 2013
Marsden square distribution chart of data received during June 2013

Messages : TRACKOB

Total : 79063

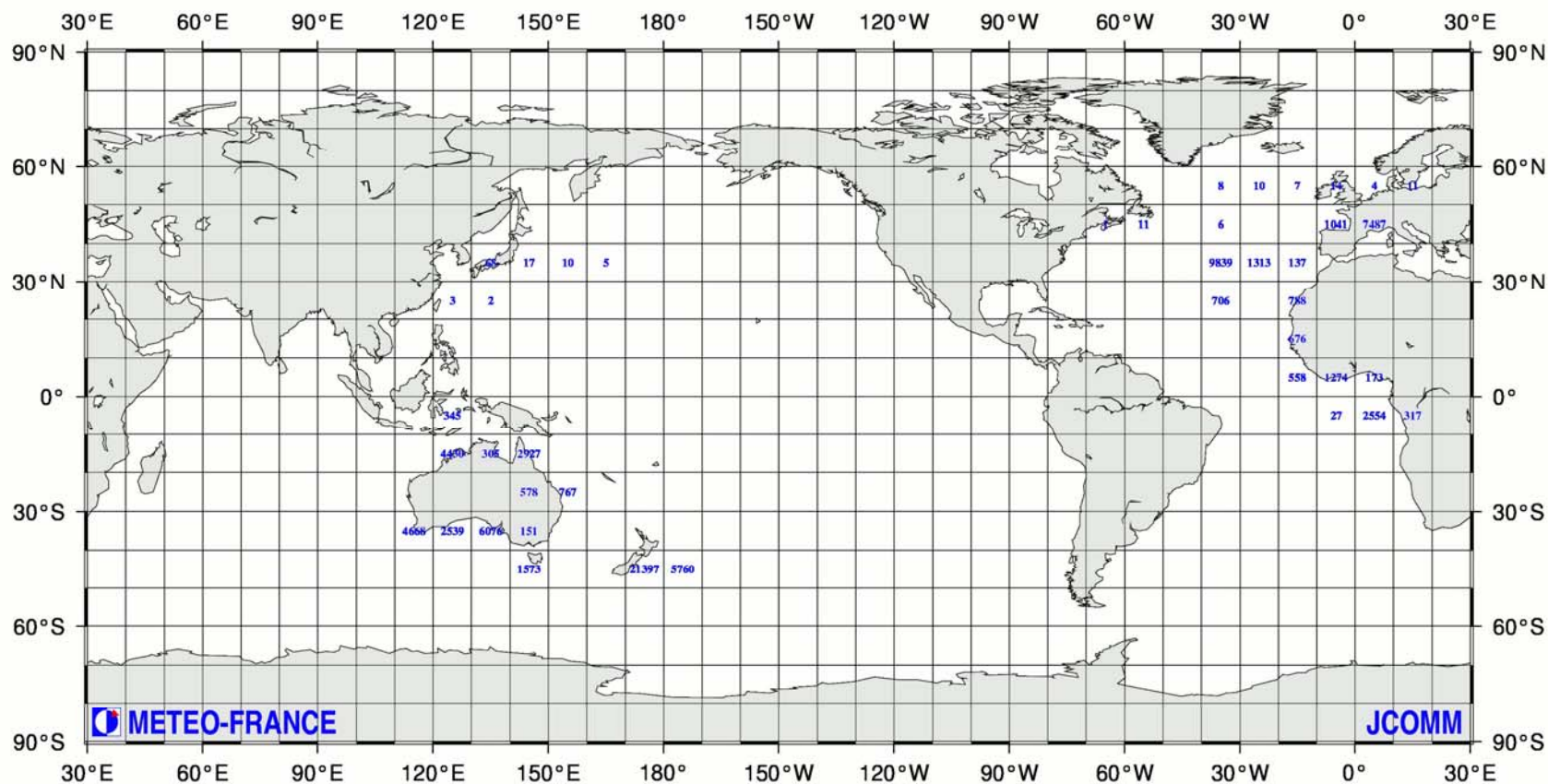


Figure-10b-TRACKOB_car.2013.06

METEO-FRANCE

WIND

JUNE 2013

Marsden square distribution chart of mean monthly data availability index (top)
 (Index 100 = 8 obs. per day per 500km * 500km area of SHIP and BUOY reports)
 and
 Percentage of BUOY reports compared to SHIP+BUOY reports (bottom)

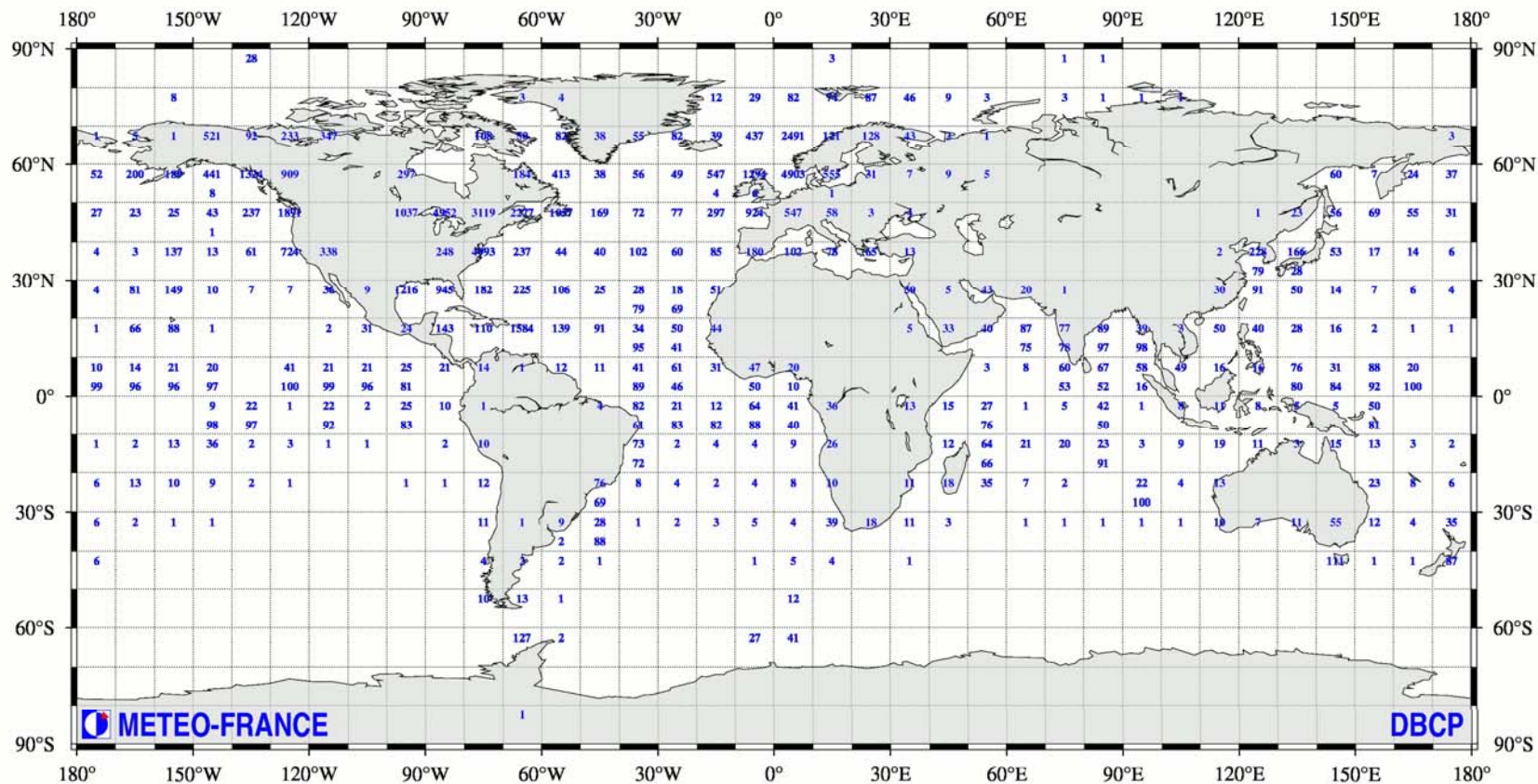


Figure-11-DAIM.W.2013.06

METEO-FRANCE

PRESSURE

JUNE 2013

Marsden square distribution chart of mean monthly data availability index (top)
(Index 100 = 8 obs. per day per 500km * 500km area of SHIP and BUOY reports)
and

Percentage of BUOY reports compared to SHIP+BUOY reports (bottom)

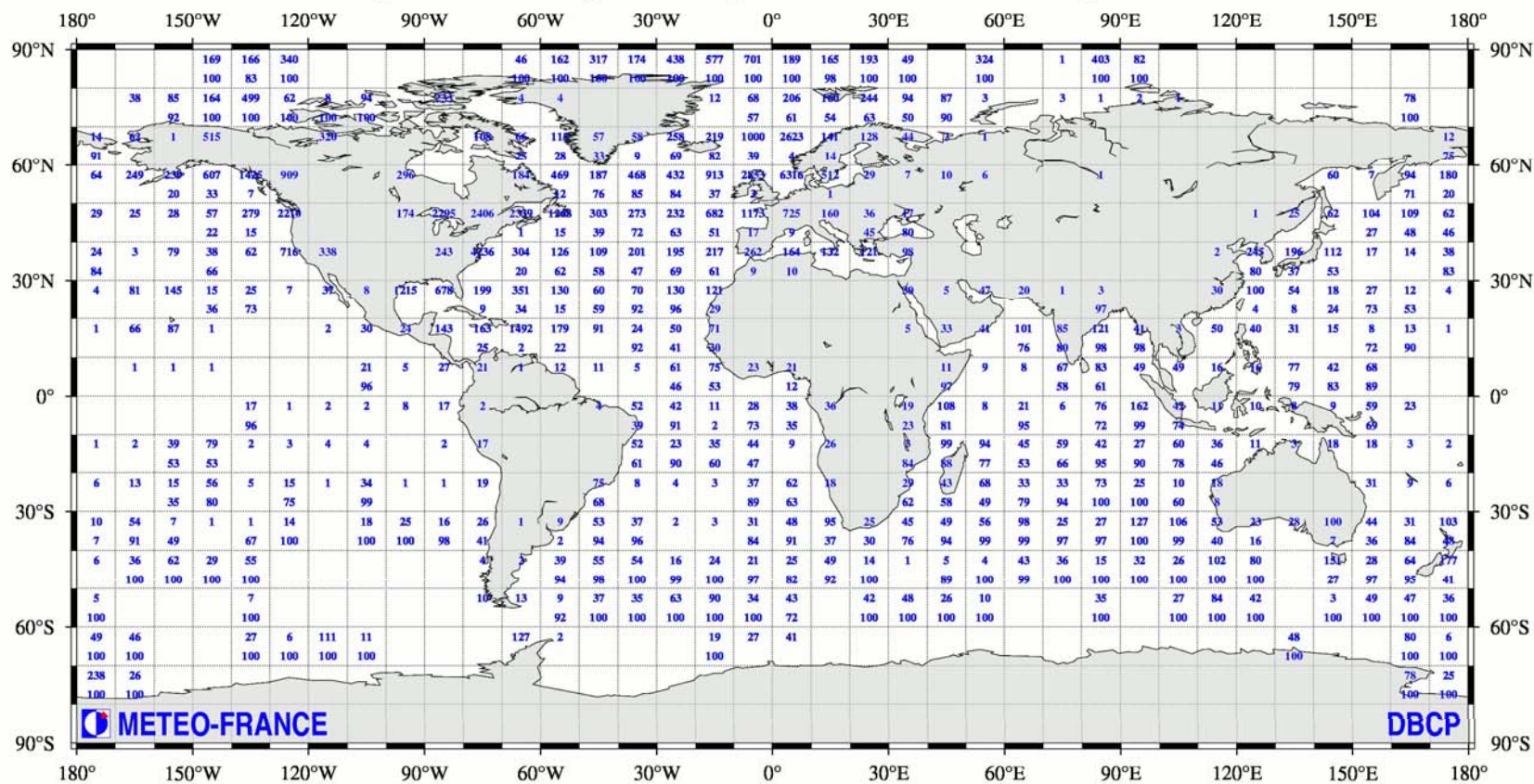


Figure-12-DAIM.P.2013.06

METEO-FRANCE

TEMPERATURE

JUNE 2013

**Marsden square distribution chart of mean monthly data availability index (top)
(Index 100 = 8 obs. per day per 500km * 500km area of SHIP and BUOY reports)
and
Percentage of BUOY reports compared to SHIP+BUOY reports (bottom)**

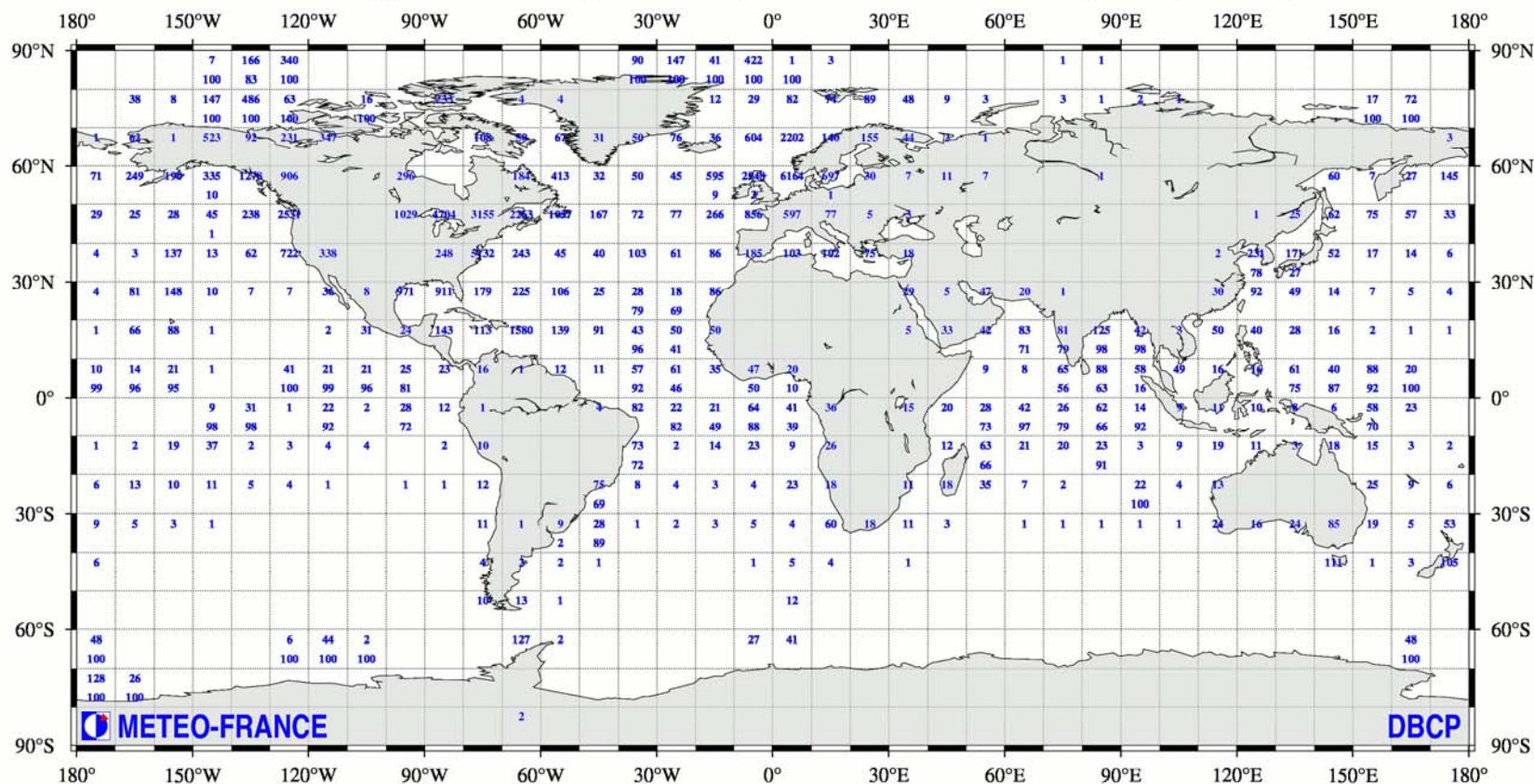


Figure-13-DAIM.T.2013.06

METEO-FRANCE

SEA SURFACE TEMPERATURE

JUNE 2013

Marsden square distribution chart of mean monthly data availability index (top)
(Index 100 = 8 obs. per day per 500km * 500km area of SHIP and BUOY reports)
and

Percentage of BUOY reports compared to SHIP+BUOY reports (bottom)

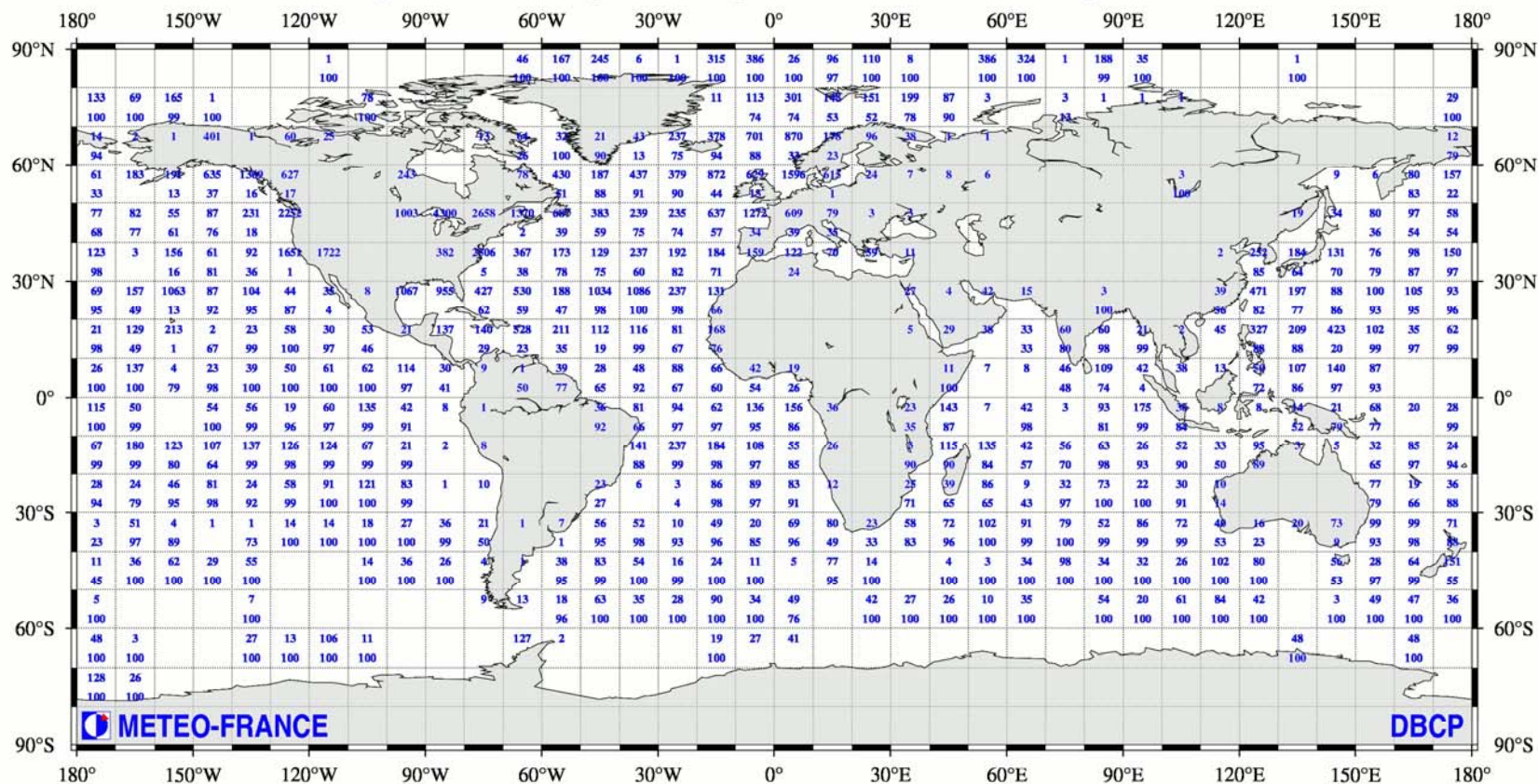


Figure-14-DAIM.S.2013.06

APPENDIX B
REPORT OF THE CANADIAN GLOBAL DATA ASSEMBLY CENTERS (GDAC) FOR
DRIFTING BUOYS (JULY 2012 – JUNE 2013)
Integrated Science Data Management (ISDM)
Bruce.Bradshaw@dfo-mpo.gc.ca

Introduction and Historical Perspective

Integrated Science Data Management (ISDM), previously the Marine Environmental Data Service (MEDS), of the Department of Fisheries and Oceans Canada became a Responsible National Oceanographic Data Centre (RNODC) for Drifting Buoy Data on behalf of the Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO) in January 1986. The Fourth JCOMM session (JCOMM-4/Doc. 7.2.7) approved the recast of ISDM RNODC-DB as provisional Global Data Assembly Centers for all Data Buoys (GDAC-DB) under JCOMM and IODE to continue in their role. This provisional designation is to prevail until the functions of GDACs under the new Marine Climate Data System (MCDS) is further clarified.

As part of its role of GDAC-DB ISDM acquires, processes, quality controls and archives real-time drifting and moored buoy messages reporting in FM18 Buoy Code and BUFR over the Global Telecommunications System (GTS), as well as delayed mode data acquired from other sources. All data are made available to the international scientific community through online products and custom requests. Although ISDM was officially recognized as an RNODC in 1986, its archive started in late 1978 with the First GARP Global Experiment (FGGE) and is currently growing at a rate of approximately 1 million unique messages per month.

Overall annual statistics summary

All statistics, unless otherwise stated, refer to GTS data received in FM-18 XII BUOY Code, which includes both drifting and moored buoys. To distinguish between drifting and moored buoys in this report we use the WMO rule for allocating WMO numbers (A_1b_wnnn where $nnn < 500$ for moored buoys).

During the 12 month period from July 2012 to June 2013 ISDM archived 9,886,157 messages (10,473,313 from same period last year) from 2320 platforms (2537 from same period last year). Moored and drifting buoy locations for the 12 month period are represented in Figure 1. Of the GTS messages processed, over 99% of the locations were quality flagged as good. The ISDM archives are normally updated in the third week of the month after an entire calendar month of data is assembled, merged, duplicates removed and quality control flags applied.

The size of the buoy archive is currently over 60 GB with 126 million records from December 1978 and growing at a rate of nearly 1 million unique records per month. The most recent month of data is available online with custom charts, inventories and map displays. All historical data in a variety of formats is freely available by request through the ISDM web site (<http://www.meds-sdmm.dfo.gc.ca>).

At this time we recognize that some platforms are reporting only in BUFR code and this data is not readily available from our normal products. This BUFR only data is being collected and archived and will be added to the archives when the new BUFR processing procedures are fully operational.

Summary of work carried out during the year

Monthly Maps and Data Visualization using Google Earth

We now provide monthly Google Earth KML files immediately following archive updates that show drifting buoy tracks and moored buoy locations. These interactive maps provide direct access to data, meta-data, products, inventories and external links to JCOMMOPS. <http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/drib-bder/KML/MonthlyKML-eng.htm>

Implementation of BUFR Processing Software

Drifting buoy data is now widely reported in both BUFR (Binary Universal Form for Data Representation) and FM18 BUOY Code formats. The ISDM BUFR decode software for both compressed and uncompressed BUFR formats has been tested and verified against the Buoy Code data stream.

Once the final BUFR templates for Drifting and Moored buoy platforms are adopted, ISDM will have to deal with several technical challenges in order to implement an operational process to merge the BUFR GTS into our existing procedures.

Each month after the archives are updated a report is generated that summarizes the differences in WMO Buoy ID's, Bulletin Headers and message counts between the two data streams.

ISDM and Meteo-France (both GDAC-DB) have developed an interchange format to allow us to compare the numbers of messages we each receive under various GTS Bulletin headers. Once we begin regular monthly exchanges of our GTS Bulletin statistics we will be able to better identify GTS routing problems and verify that we are each receiving all messages possible for our respective archives.

Update SVP Data Submission

Data collected and processed by the Atlantic Oceanographic and Meteorological Laboratory (AOML) under the Global Drifter Program formerly World Ocean Circulation Experiment - Surface Velocity Programme (WOCE-SVP) is available from ISDM by agreement with AOML. The collection currently covers the period 1979 to 2012 and will be updated again in 2013 with the most recent data submissions from AOML (<http://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/drib-bder/svp-vcs/index-eng.asp>).

ISDM has agreed to use our processing procedures to send a complete copy of the AOML quality controlled, interpolated SVP data set to NODC in 2013 with annual updates in subsequent years.

Goals for 2012/2013

Process and update 2013 SVP submission from AOML and send a complete copy to NODC.

Increase the functionality and availability of online inventories, data and visualization capabilities to support the DBCP and the Action Groups.

We look forward to working collaboratively with all participants in the Task Team - MCDS to modernize and enhance the delayed mode and realtime Marine-meteorological and Oceanographic systems and overall data management processes.

Work with JCOMMOPS and the international community to implement BUFR as the standard

Data flow to ISDM

In the real-time drifting buoy processing system, GTS data are ftp'd to ISDM every half hour from the Canadian Ice Service, a branch of the Meteorological Service of Canada (MSC) of Environment Canada (EC). Every hour these messages are processed to extract BUOY messages, as well as other oceanographic reports such as Argo, BATHY and TESAC. Once a day, the BUOY messages are decoded to an in-house format after which automated tests are run to check for acceptable ranges of values in several measurements (SST, atmospheric pressure, air temperature, wind direction/speed, sub-surface temperature/salinity and wave height/period) and reported position/date/time information. After collecting the data for an entire calendar month several automatic and interactive processes are run to detect and resolve best versions of duplicate messages, flag erroneous data and run in-house quality control procedures to validate and flag individual measurements. Trained scientific personnel review displays of time-series measurements, drift tracks and speed charts. Flags are set according to the international QC flag definitions derived from IGOSS and JCOMM. Once completed, the data are merged into the archive and the website is updated.

With a monthly QC system, it takes anywhere between one and eight weeks for individual BUOY reports to be added to the archive. The average delay between reception and update is 27 days. ISDM continues to develop and enhance applications that improve processing systems and allow for more frequent updates and access to improved data and products.

Data distribution

Data is freely available online and by request. The ISDM web site (<http://www.meds-sdmm.dfo-mpo.gc.ca>) provides inventories and maps designed to help clients refine temporal and spatial criteria for custom offline requests. Last year ISDM received over 50 requests for drifting buoy data. Requests come from universities, government organizations, private consulting companies and individuals.

A number of automated processes provide regular daily data distributions of raw 'off the wire' products to various clients including the US National Oceanographic Data Center (NODC). Where other services are not already in place ISDM can provide specialized products before our normal monthly QC and archive updates.

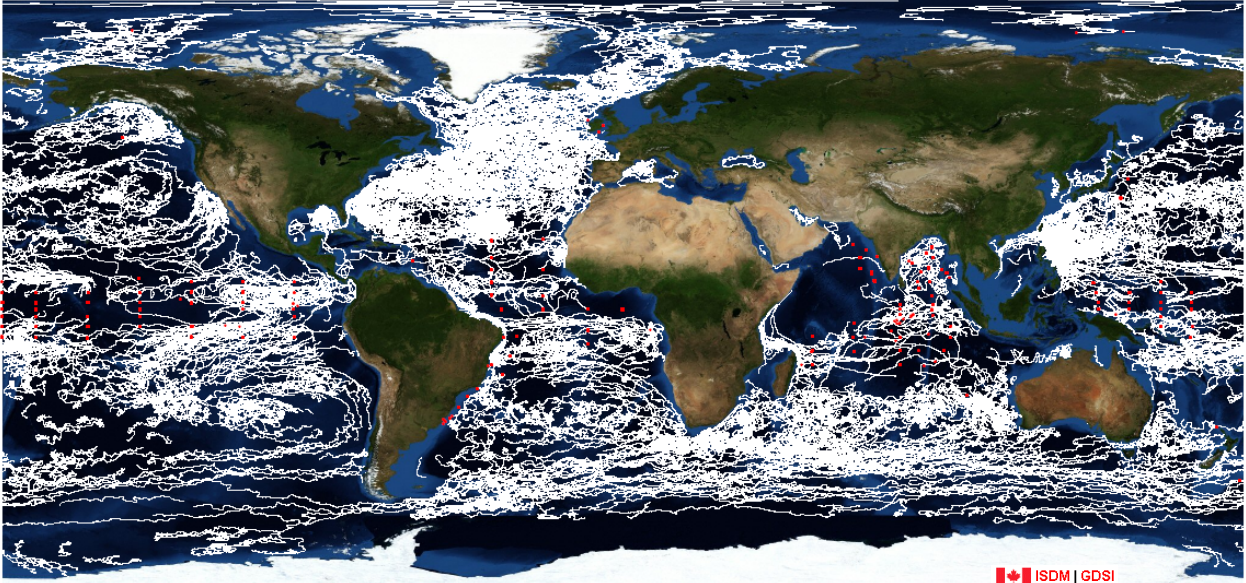


Figure 1
Track and Location Map (July 2012 to June 2013)

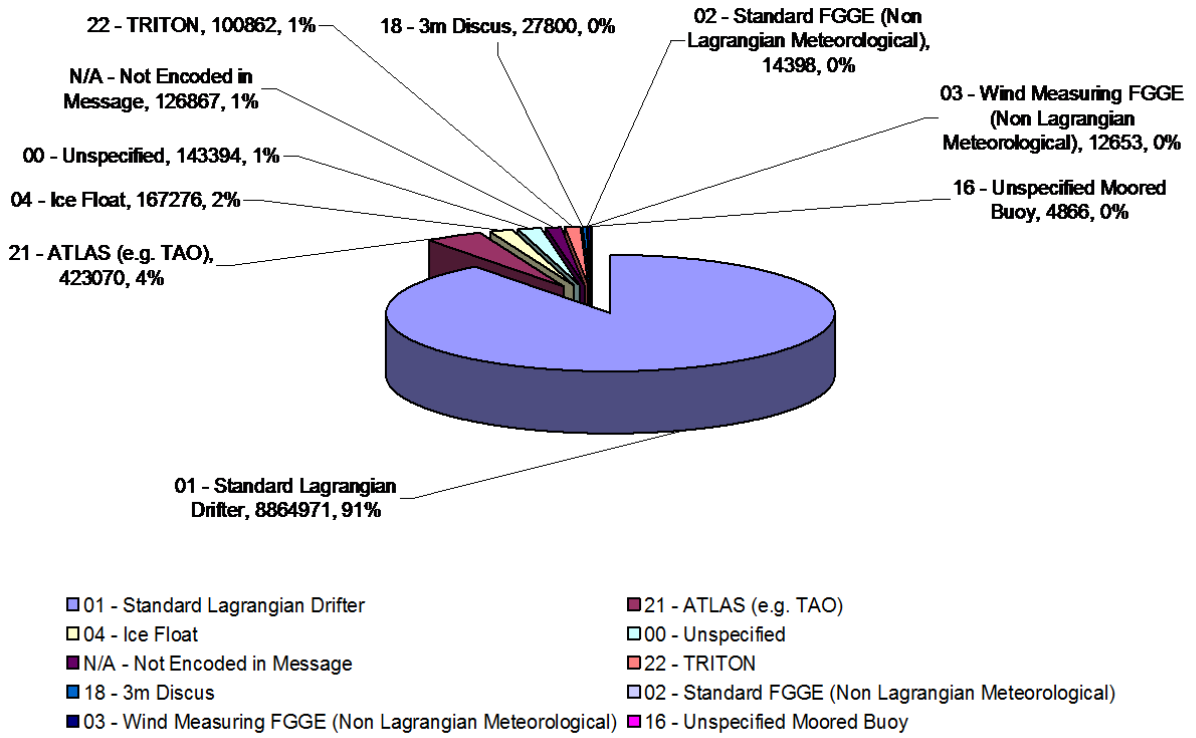


Figure 2
Reported Buoy Types

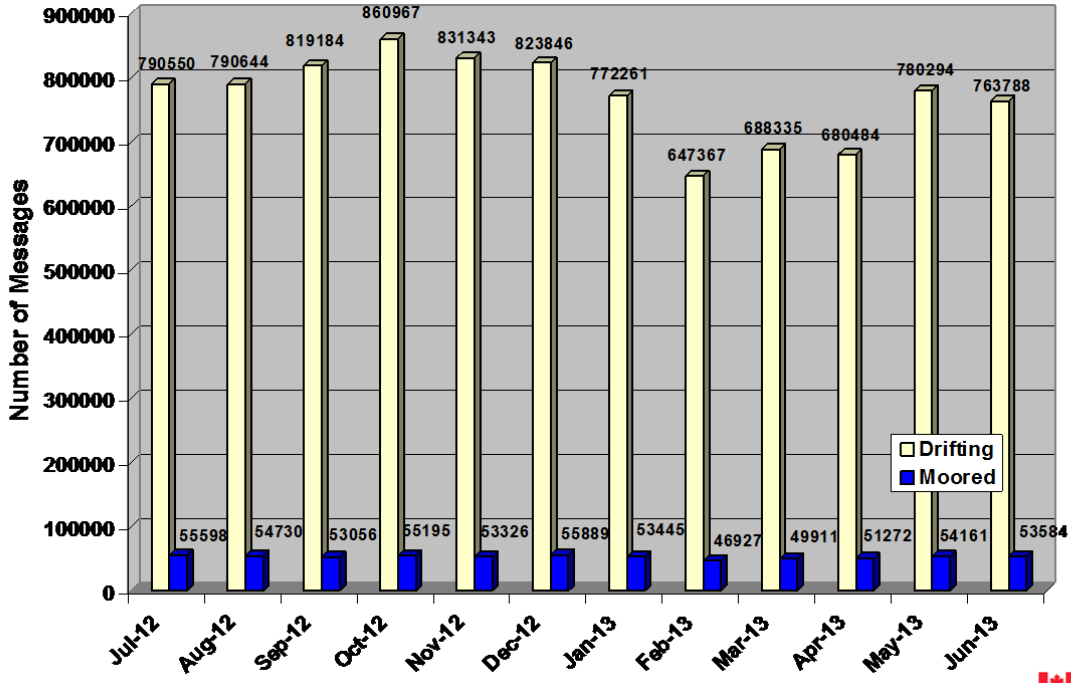


Figure 3
Number of Drifting and Moored Buoy Messages by Month

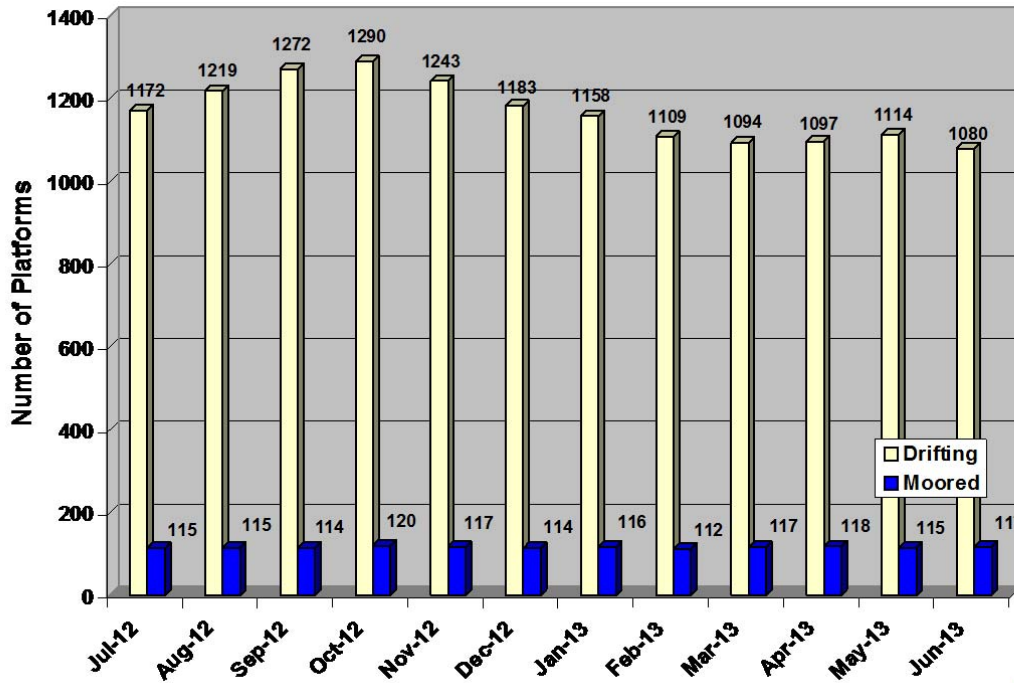
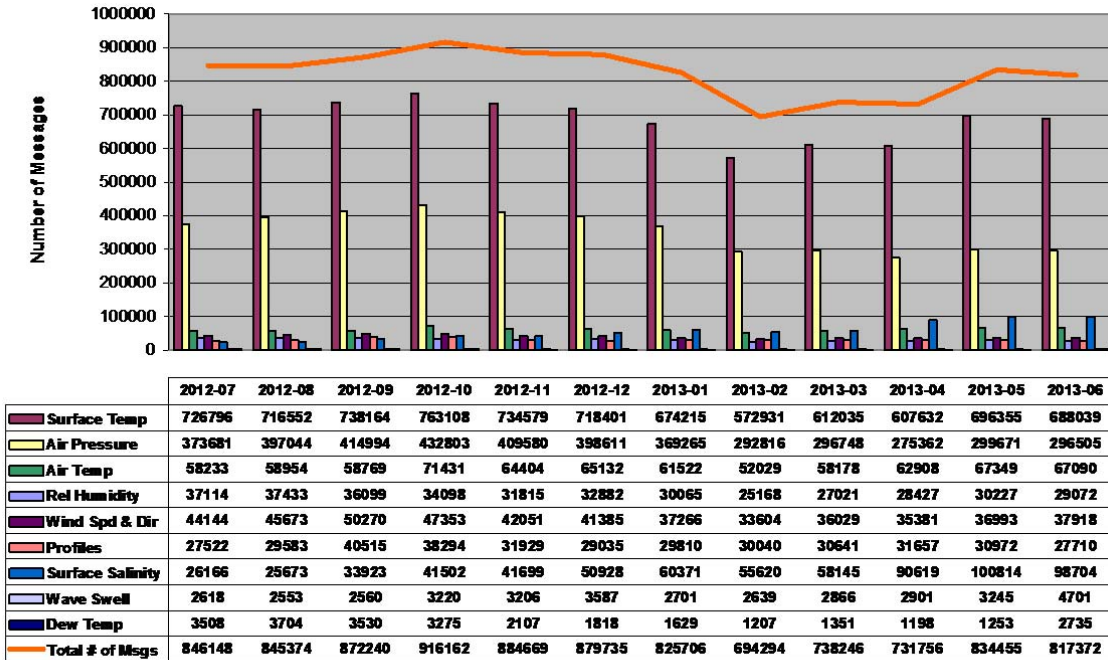
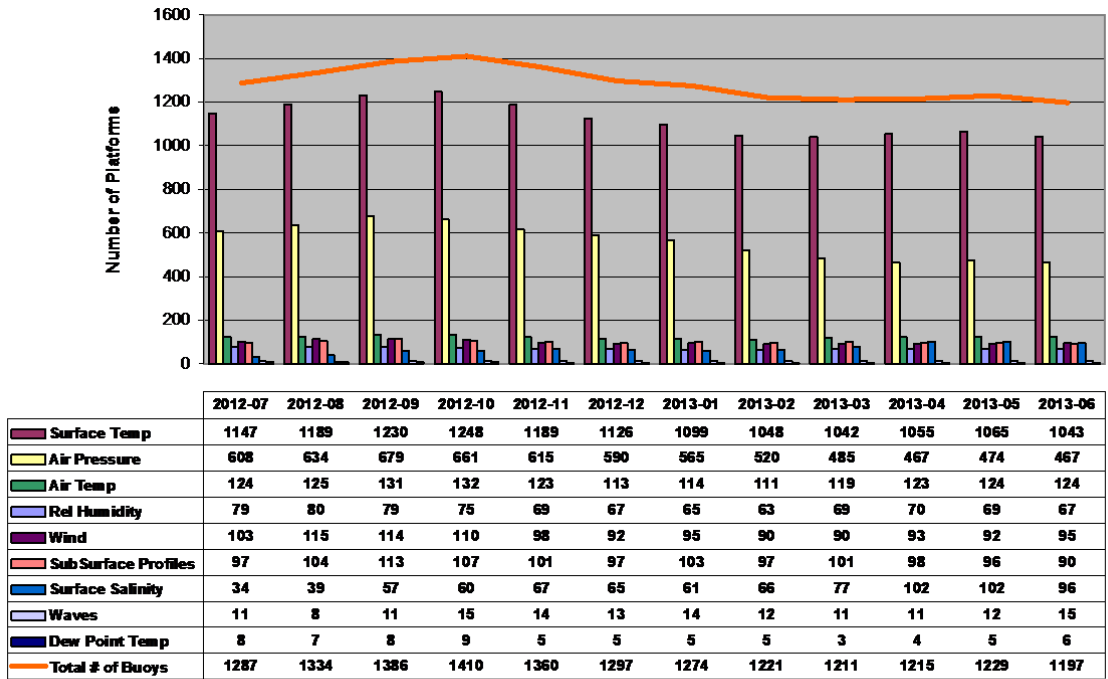


Figure 4
Number of Drifting and Moored Buoy Platforms by Month



ISDM | GDSI

Figure 5
Type and Number of Parameters Reported from all Platforms by Month



ISDM | GDSI

Figure 6
Number of Platforms Reporting Different Parameters by Month