WORLD METEOROLOGICAL ORGANIZATION

DATA BUOY COOPERATION PANEL

THIRTY-FIRST SESSION

GENEVA, SWITZERLAND
19-23 OCTOBER 2015

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

DBCP-31 / Doc. 10.2
(21-Sep-15)

ITEM: 10.2

ENGLISH ONLY

BUOY DATA MANAGEMENT CENTRES

(Submitted by Gilbert Emzivat (France), and Mathieu Ouellet (Canada))

SUMMARY AND PURPOSE OF DOCUMENT

The document provides for the reports by the Marine Climate Data System (MCDS) trial Global Data Assembly Centres (GDACs), operated by the Canadian Oceanography and Scientific Data (OSD) branch and Météo-France.

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.

Appendix: A. Canadian MCDS trial GDAC report
B. French MCDS trial GDAC report

DISCUSSION

-A- DRAFT TEXT FOR INCLUSION IN THE FINAL REPORT

10.2.1 Mathieu Ouellet (Canada) reported on the activities of the Marine Climate Data System (MCDS) trial Global Data Assembly Centres (GDACs), operated by the Oceanography and Scientific Data branch of Canada.

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

10.2.3 The Panel then reviewed the report of the Marine Climate Data System (MCDS) trial Global Data Assembly Centres (GDACs), operated by Météo-France, presented by Mr Gilbert Emzivat (France).

10.2.4 specific issues of interest to the Panel on GDAC/France 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 respectively and will be included in the DBCP annual report for 2015.

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

(i.) Rec1;

(ii.) Rec2;

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

(i.) Action1 (**action; by; deadline**);

(ii.) Action2 (**action; by; deadline**);

-B- BACKGROUND INFORMATION *(if necessary, provide additional material to further explain the information in part A but that will not be included in the report of the meeting)*

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APPENDIX A

REPORT OF THE CANADIAN MARINE CLIMATE DATA SYSTEM (MCDS) TRIAL

GLOBAL DATA ASSEMBLY CENTRE (GDAC)

Introduction

The Canadian GDAC for buoys has regained its former name, Marine Environmental Data Service (MEDS), in 2015. MEDS is now operating under the new Ocean Sciences Branch at Fisheries and Oceans Canada, which was previously known as the Oceanography and Scientific Data Branch.

MEDS was designated as the Responsible National Oceanographic Data Centre (RNODC) for Drifting Buoy data (RNODC-DB) under the auspices of the International Oceanographic Data Exchange system (IODE) of the Intergovernmental Oceanographic Commission (IOC) in 1986. In 2005, the Eighteenth IODE session decided to abolish the RNODC system and MEDS' role has since been recast as that of a Global Data Assembly/Acquisition Center (GDAC-DB).

As part of its role of GDAC-DB, MEDS acquires, processes, quality controls and archives data from real-time drifting and moored buoy reporting messages in FM 18 BUOY code form and FM 64 BUFR format over the 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.

Data Flow to MEDS

In the real-time drifting buoy processing system, GTS data are ftp'd to MEDS every half hour from the Canadian Ice Service, a division of Environment Canada's Meteorological Service). Every hour, these messages are processed to extract BUOY messages, as well as other oceanographic reports such as TRACKOB, 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 IODE and JCOMM. Once completed, the data are merged into the archive and the website is updated.

With a monthly QC system, it takes 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. Messages in BUFR format are also from the Canadian Ice Service to MEDS, and their data are decoded and archived in a sequential file which can be harvested for special requests and for monitoring purposes. MEDS and Météo-France run comparisons of their respective incoming BUFR buoy stream. Details on this activity are provided in the Report by the Task Team on Data Management.

MEDS also receives, decodes and archives, as part of its involvement in the Global Temperature Salinity Profile Programme, a large volume of messages (>2M / year) from moored data buoys transmitting in TESAC or BATHY code form over the GTS. These buoys belong to various organizations, the majority of which are located in the USA and affiliated with the National Data Buoy Center of NOAA; for instance, the National Estuarine Research Reserve System, the Center for Coastal Margin Observation and Prediction, etc. The data from those buoys are not integrated with the data from BUOY code form messages, but are rather included in the data provided by MEDS to the Global Temperature Salinity Profile Programme's Continuously Managed Database at the NOAA NCEI National Oceanographic Data Center (NODC), three times a week.

Data Distribution

Data is freely available through a request system provided on the MEDS website (www.meds-sdmm.dfo-mpo.gc.ca). Additionally, the data from Buoy code form messages processed by MEDS

are deposited yearly in the US NCEI/NODC (of NOAA) ocean archive system, from where they are publically available.

Summary of Work carried during the Year

- Sent NOAA NCEI/NODC's Ocean Archive System a submission containing all GTS Buoy code form data from 2014. The submission received accession number 126576: http://www.nodc.noaa.gov/cgi-bin/OAS/prd/accession/details/126576. The data are available in NODC ASCII format, with all metadata elements, and also as a product in CSV format with more requested data fields.

- Sent updates to NOAA NCEI/NODC for previous submission packages (1993-2008) to ensure both NODC ASCII data and CSV product files were available.

- Provided the 2008-2014 dataset to NOAA NCEI ICOADS in prevision for the ICOADS Release 3.0

- Carried two BUFR stream comparison exercises with Météo-France

MEDS also received a submission of new data collected and processed by the AOML (Global Drifter Program), but has not yet integrated it.

Annual Statistics Summary

All statistics in this section refer to GTS data received in FM-18 BUOY code form, which includes both drifting and moored buoys. Data from BUFR messages were not integrated in this summary since the mapping of BUFR messages to a common data model, to allow identification of duplicates and to correctly map WMO IDs to platform types, is still a work in progress given the plurality of templates in which buoy BUFR data are currently encoded. BUFR monitoring is otherwise performed at MEDS in order to enable comparisons with the monitoring performed at Météo-France.

To distinguish between drifting and moored buoys in this report we use the WMO rule for allocating WMO identifiers (A1bwnnn where nnn < 500 for moored buoys in the 5 digit scheme). There are however cases where moored buoys break from their mooring and start drifting.

During the 12 month period from July 2014 to June 2015 OSD archived 12,711,186 unique messages (9,613,158 from same period last year) from 2390 platforms (2515 from same period last year). Of the GTS messages processed, 98.5% of the buoy positions were flagged as good after the quality control performed at MEDS.

Moored and drifting buoy locations for the 12 month period are represented in Figure 1 and a plot showing the density of measurements, as number of days with at least one measurement per degree square, are represented in Figure 2. Only data with good position quality flags are shown.

Figure 3a shows counts of BUOY messages per month, by buoy type (moored and drifting). Each message is equivalent to an observation performed by a platform at a given geographical point in time.

Figure 3b shows the counts of buoys reporting per month, by type (moored and drifting).

Figure 4a shows the counts of BUOY messages from drifting buoys, by variable reported (wind, pressure).

Figure 4b shows the counts of drifting buoys reporting per month, by variable reported (wind, pressure).

Figure 5a shows the counts of BUOY messages from moored buoys, by variable measured (wind, pressure).

Figure 5b shows the counts of moored buoys reporting per month, by variable reported (wind, pressure).

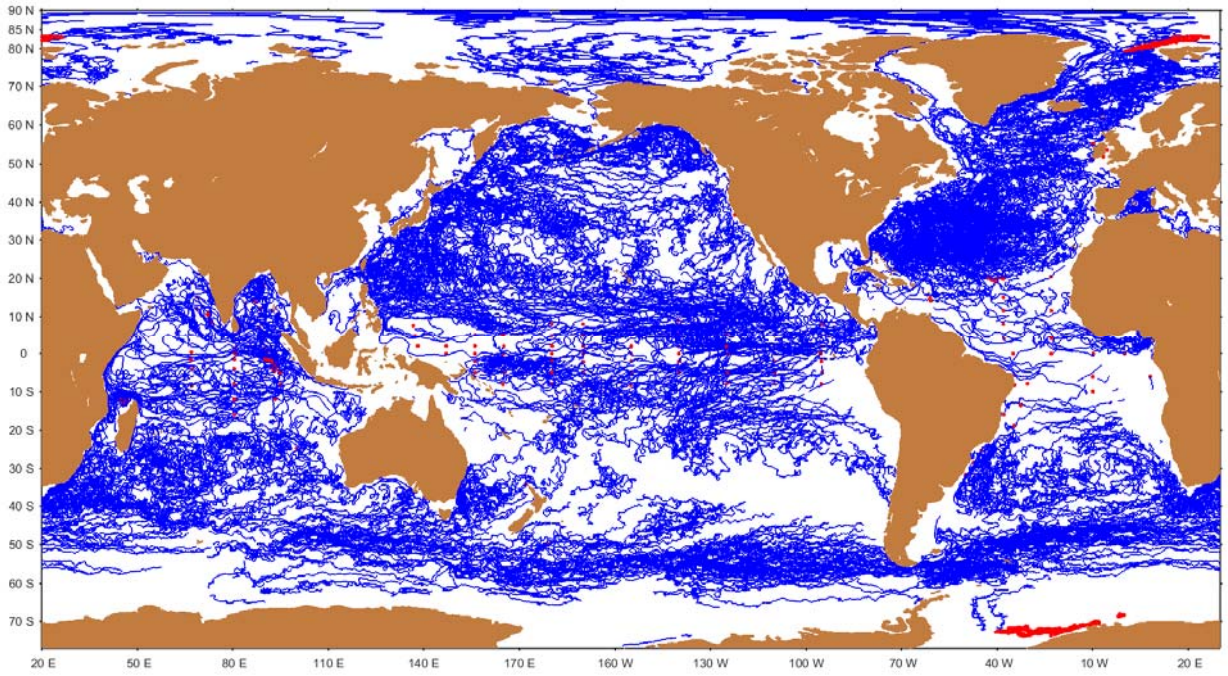

Figure 1: Moored and drifting buoy locations, July 2014-June 2015

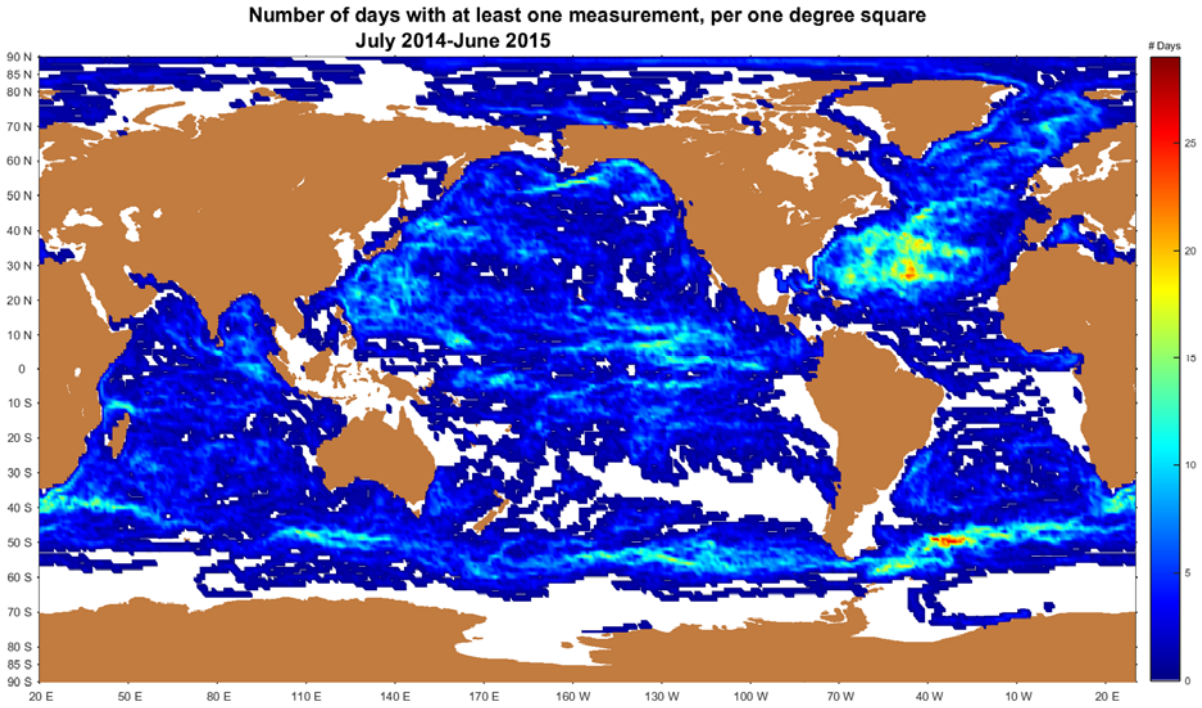

Figure 2: Number of days with at least one measurement per degree square

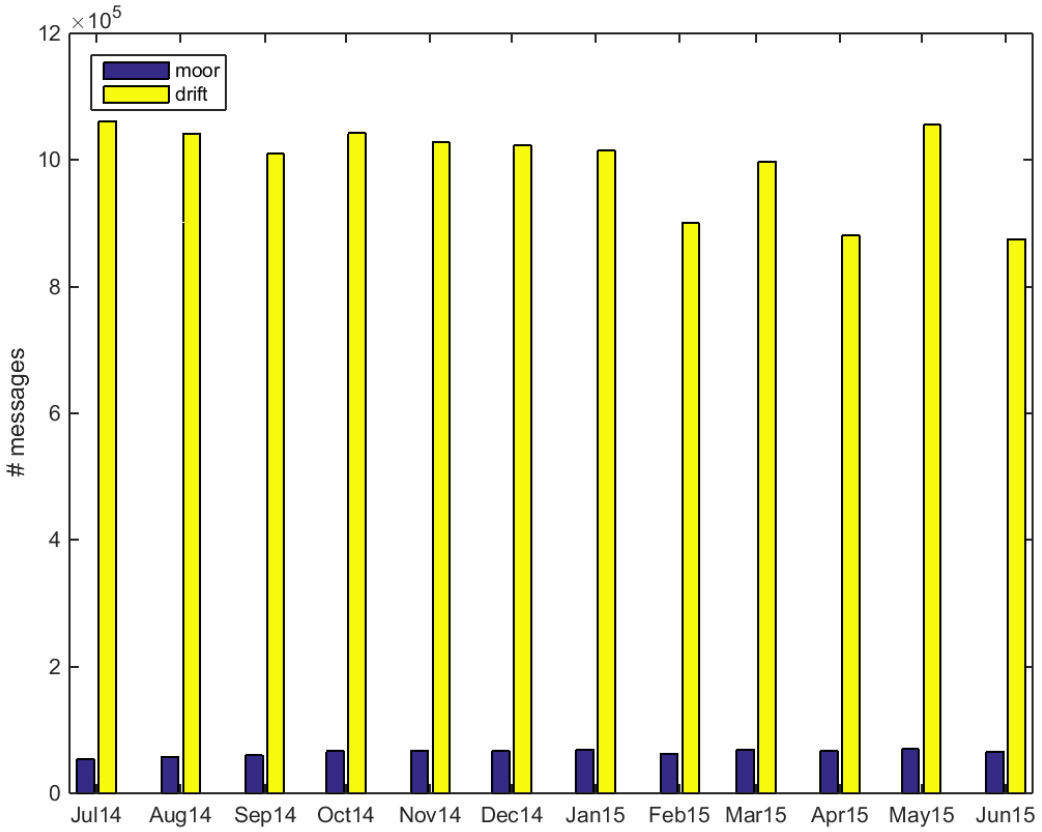

Figure 3a: Counts of BUOY messages by moored and drifting buoys

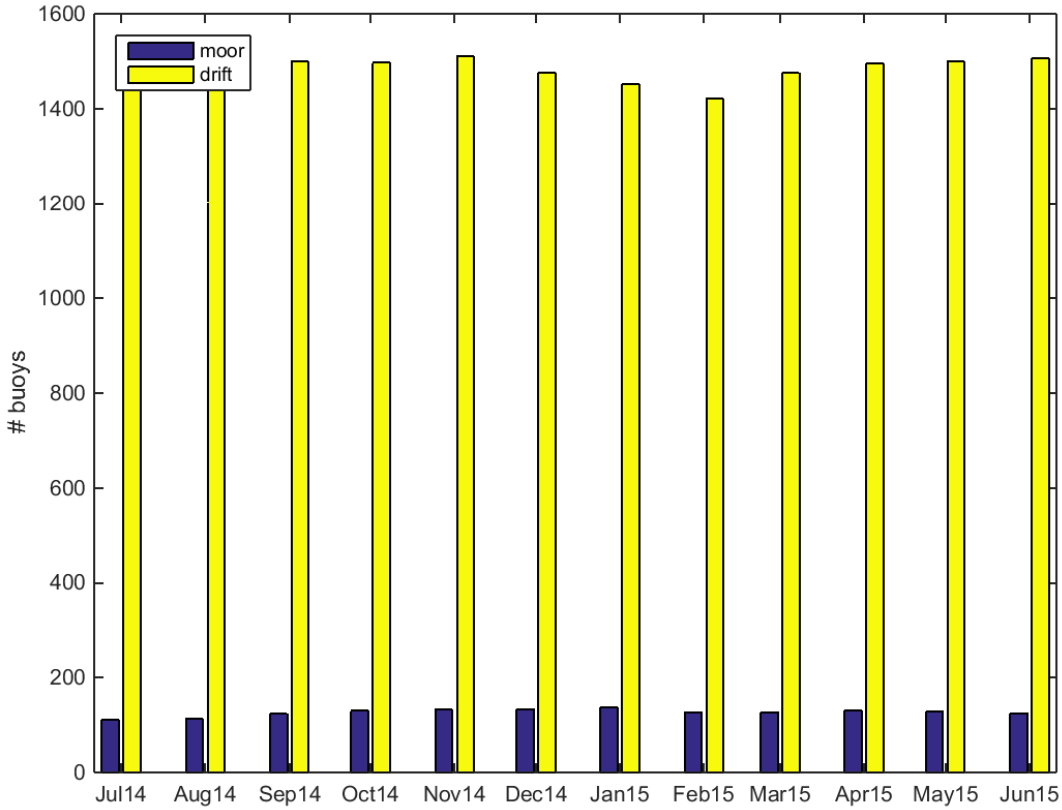

Figure 3b: Number of moored and drifting buoys reporting

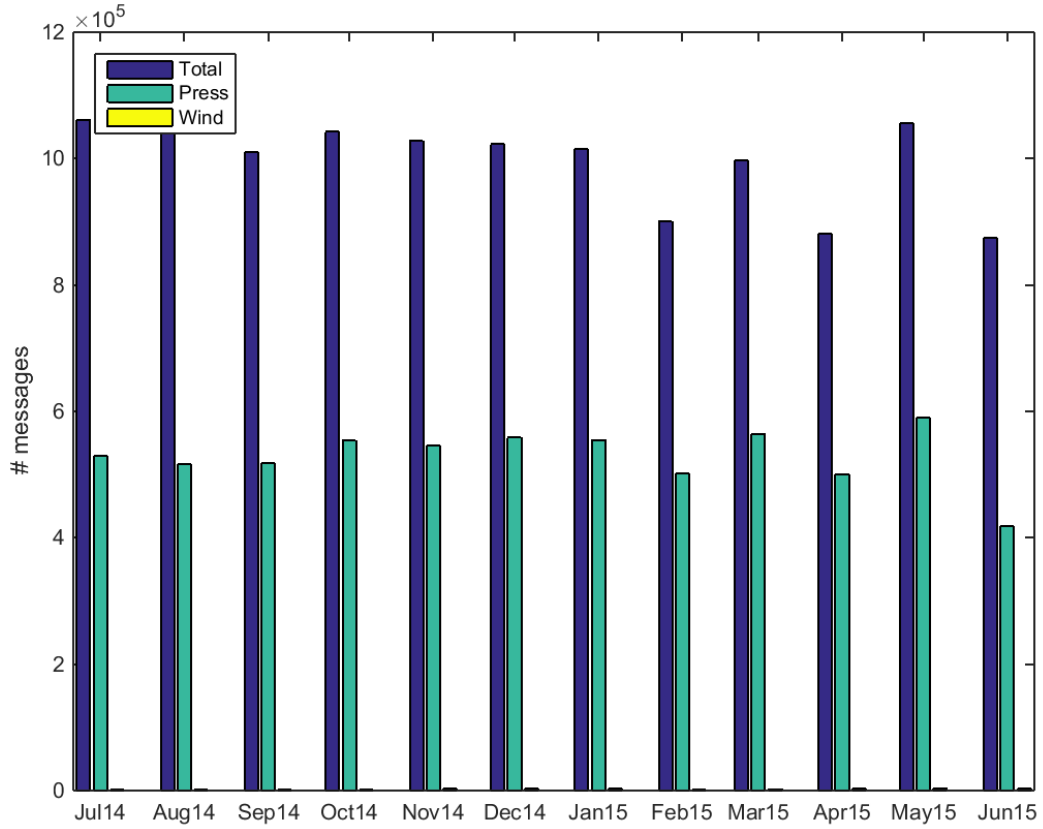

Figure 4a: Counts of drifting buoy messages with wind and pressure variables

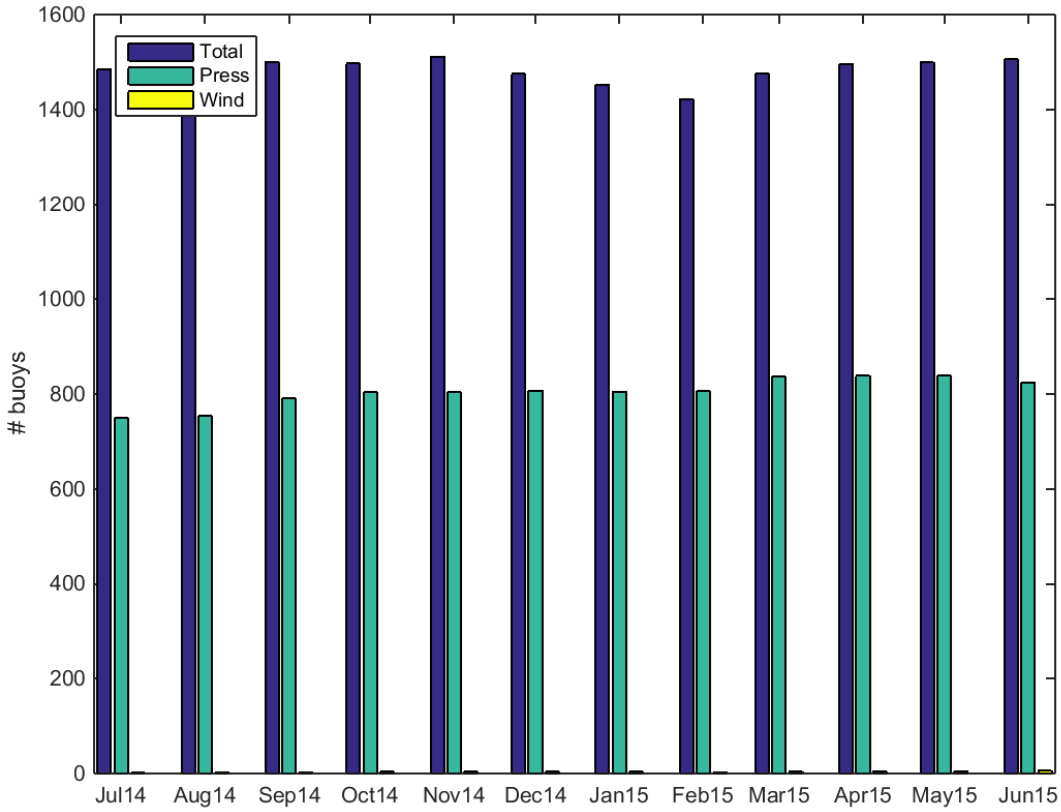

Figure 4b: Number of drifting buoys reporting wind and pressure variables

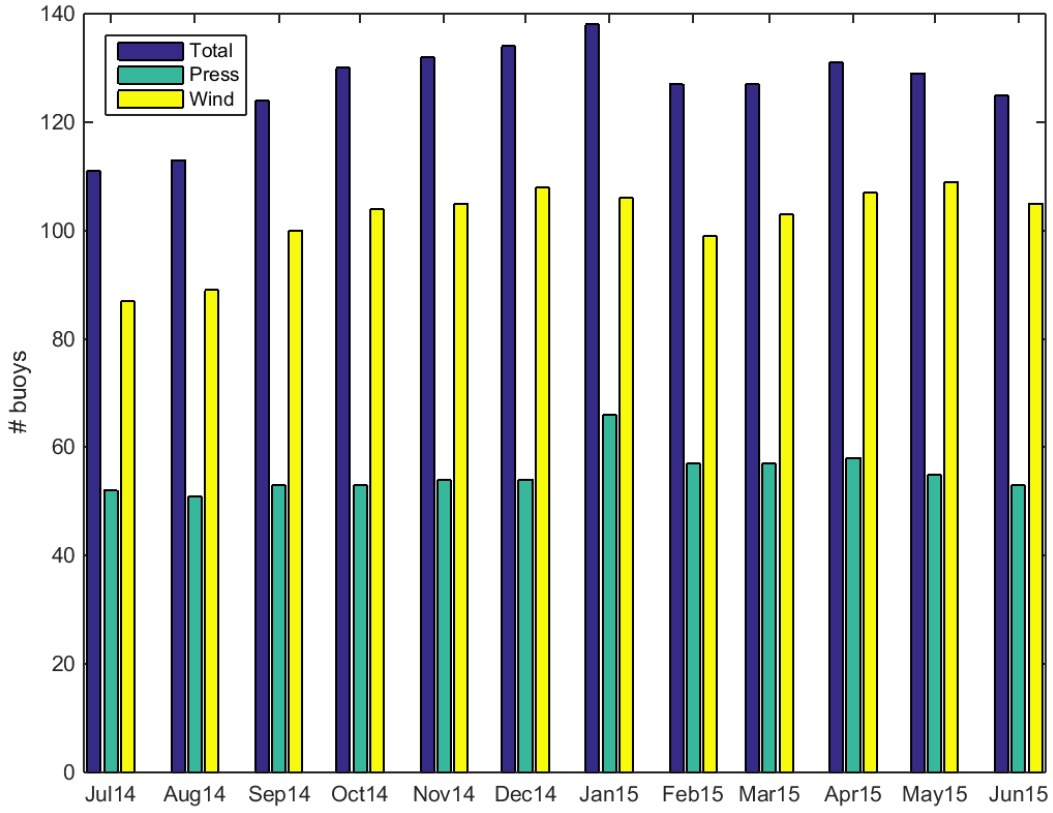

Figure 5a: Counts of moored buoy messages with wind and pressure variables

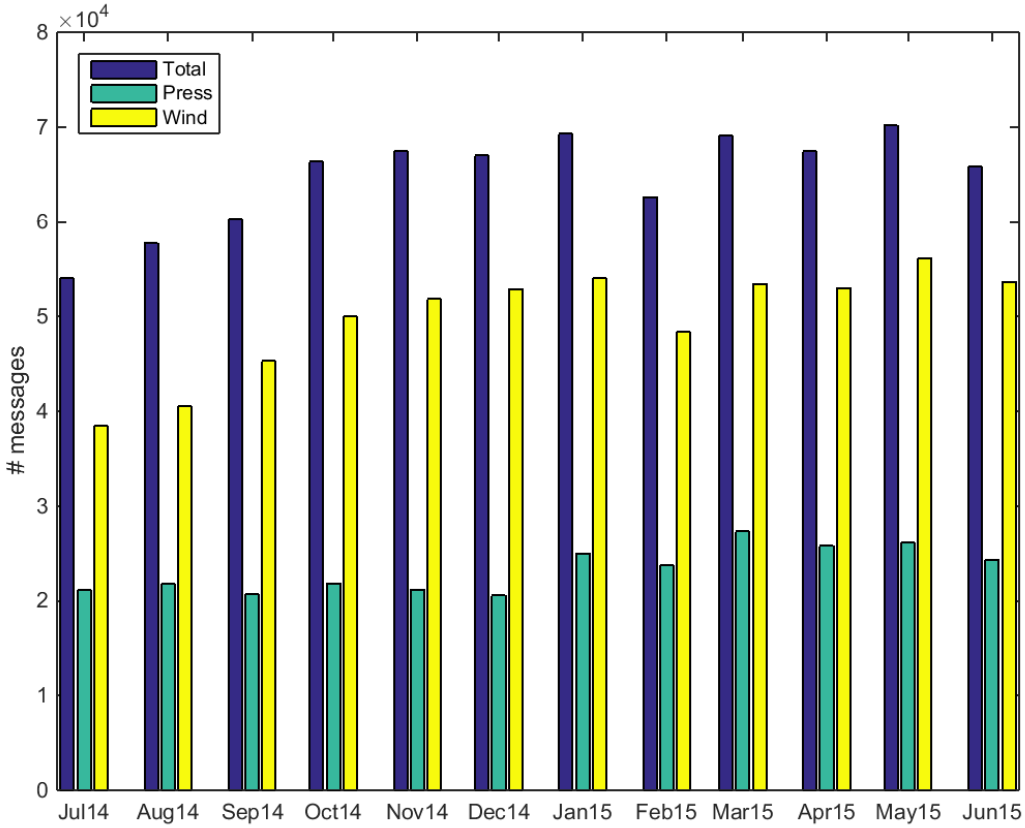

Figure 5b: Number of moored buoys reporting wind and pressure variables

There was a noticeable drop in drifting buoy messages in April 2015 due to a temporary problem upstream with buoys normally encoding their messages under bulletin SSVX02 encoding them as SVBX02 from April 2nd to April 6th. MEDS will recover the missing data from the corresponding BUFR

messages before the submission to US NCEI NODC (NOAA) Ocean Archive (2016). The drifting buoy messages drop observed in June 2015 is likely due to a transition from certain buoys to BUFR, but an assessment will be made at MEDS to confirm this and assess further action.

Objectives 2015/2016

- Recover missing April 2nd-6th 2015 data from SSVX02 and assess June 2015 decrease prior to submission of the 2015 dataset to NOAA NCEI/NODC Ocean Archives

- Submit data from buoys reporting in BUFR only to NOAA NCEI/NODC Ocean Archives; for addition to past submissions first, and on a yearly basis onward

- Re-ingest the AOML GDP data received at MEDS so far, to address previous identified buoy id conversion issues, and add the data from the update received in late 2014

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APPENDIX B

FRENCH MARINE CLIMATE DATA SYSTEM (MCDS) TRIAL GLOBAL DATA ASSEMBLY CENTRE (GDAC) REPORT

The Specialized Oceanographic Center (SOC) for Drifting Buoys has been run continuously during year 2014-2015. 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.

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.

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.

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 2014.
- Figure 5 shows the time evolution of WAVEOB reports and sensors since January 2014.

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 2015. "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 2015.

- Figure 11: Wind,
- Figure 12: Pressure,
- Figure 13: Air temperature,
- Figure 14: Sea surface temperature.
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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).

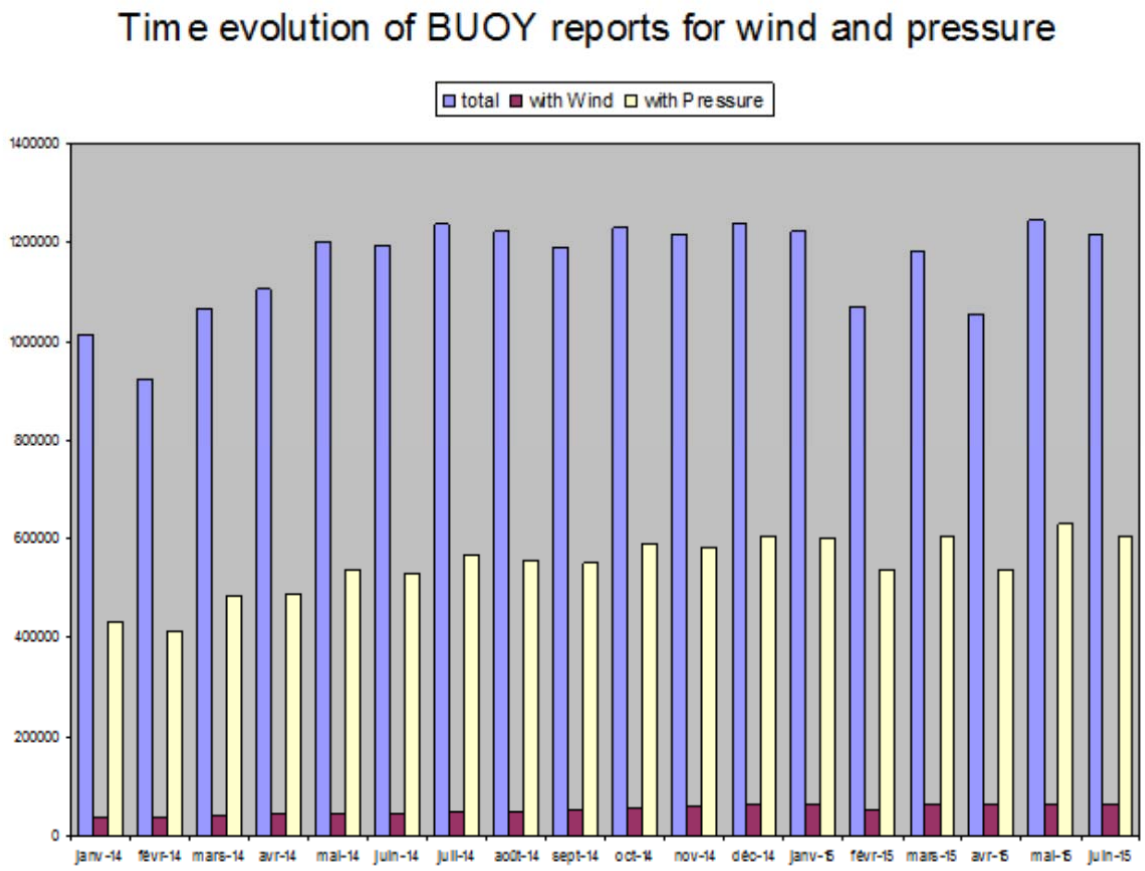

Fig. 1

Time evolution of moored BUOY reports for wind and pressure

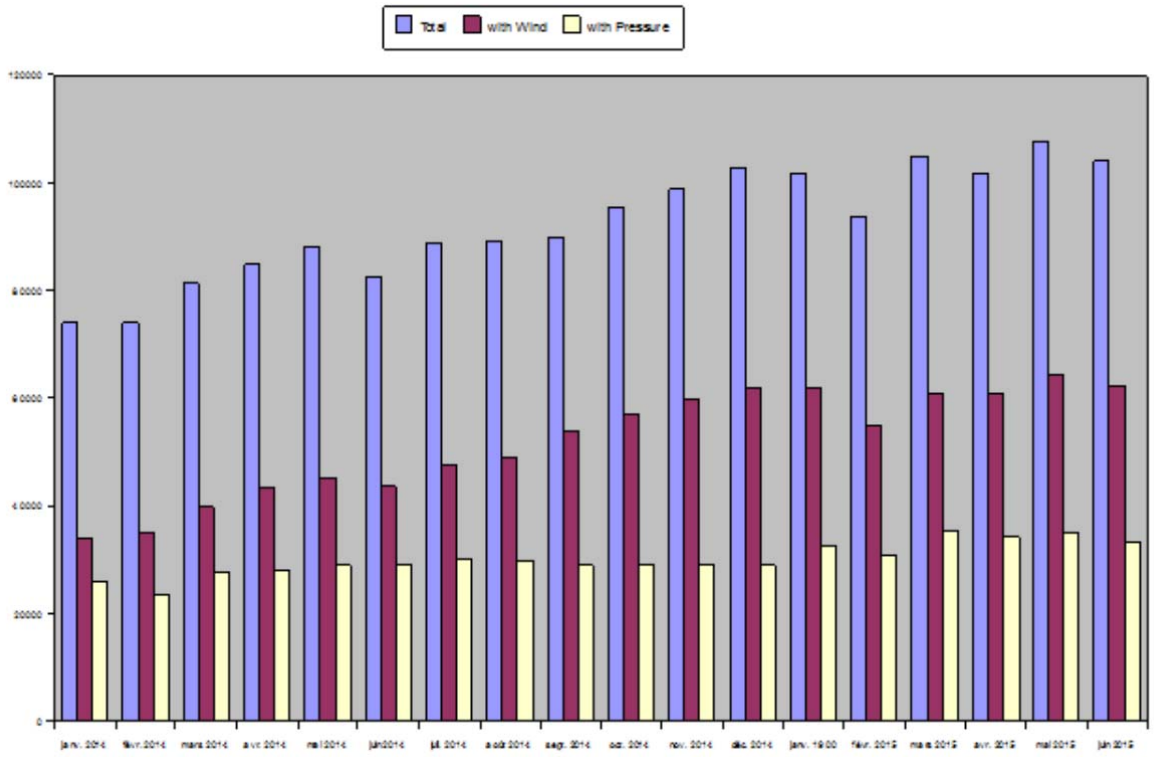

Fig. 2

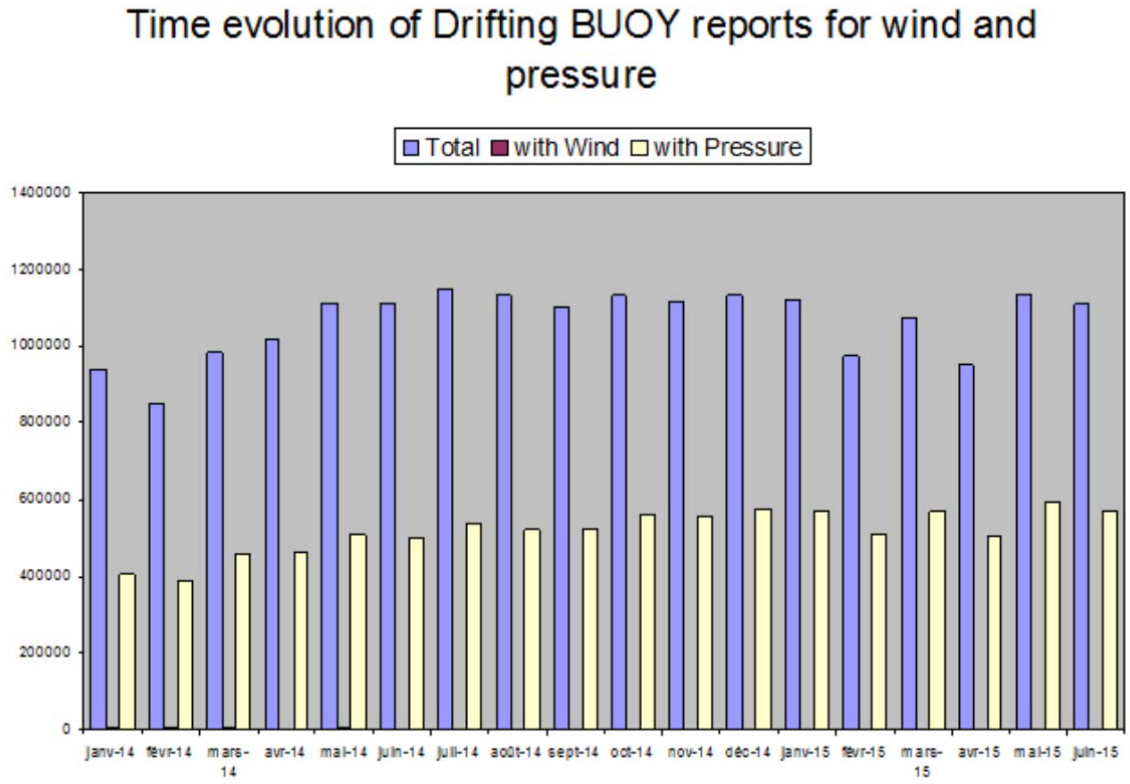

Fig. 3

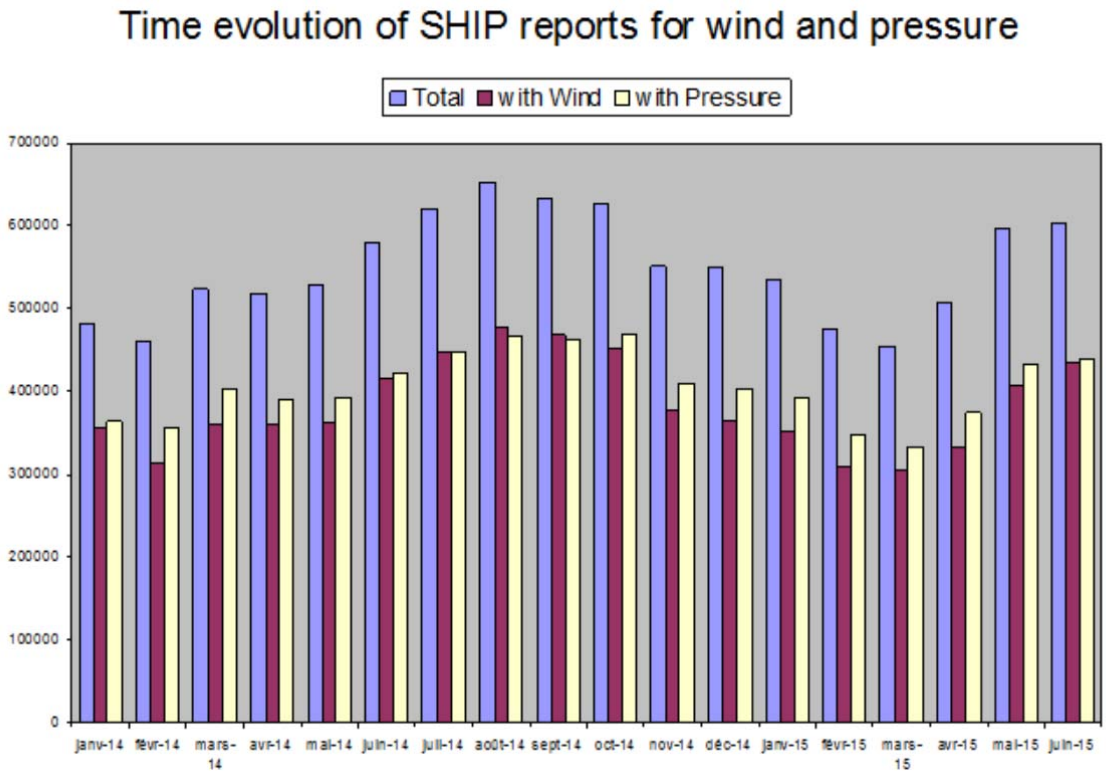
Time evolution of SHIP reports for wind and pressure
Total
with Wind
with Pressure
700000
600000
500000
400000
300000
200000
100000
0
janv-14
févr-14
mars-14
avr-14
mai-14
juin-14
juil-14
août-14
sept-14
oct-14
nov-14
déc-14
janv-15
févr-15
mars-15
avr-15
mai-15
juin-15

Fig. 4

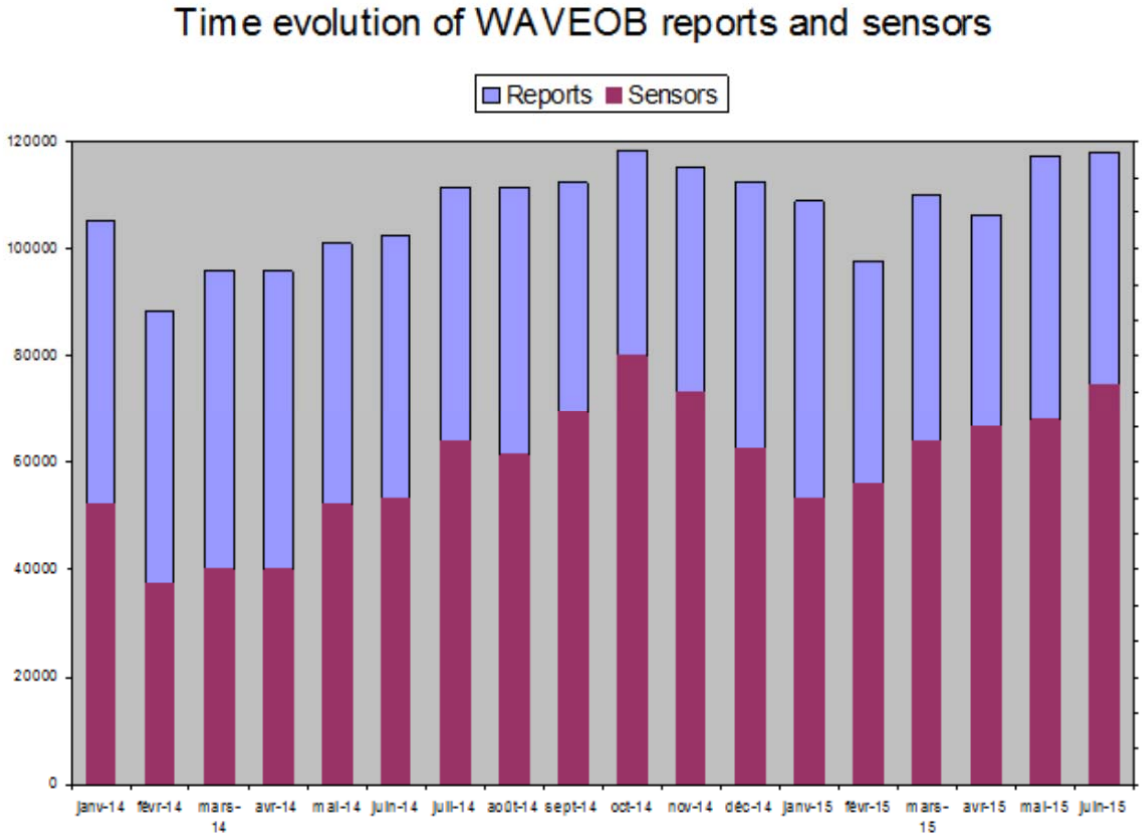
Time evolution of WAVEOB reports and sensors
Reports
Sensors
120000
100000
80000
60000
40000
20000
0
janv-14
févr-14
mars-14
avr-14
mai-14
juin-14
juil-14
août-14
sept-14
oct-14
nov-14
déc-14
janv-15
févr-15
mars-15
avr-15
mai-15
juin-15

Fig. 5

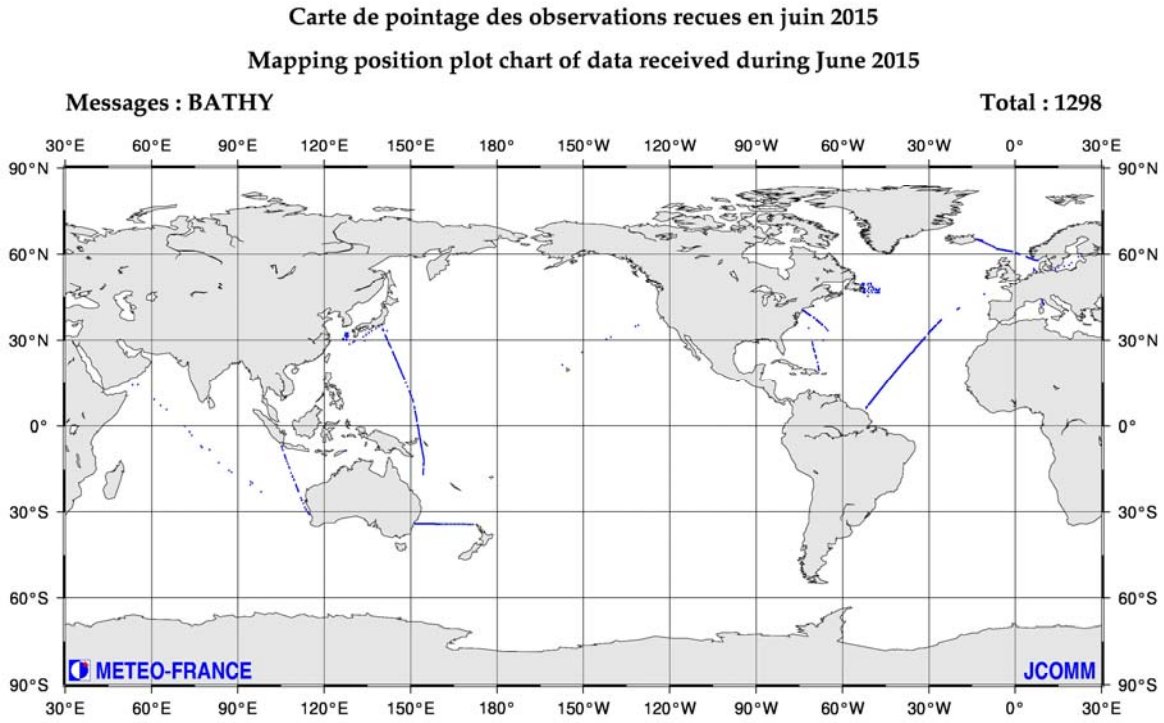

Fig. 6a: Mapping position plot chart of data received during June 2015 (BATHY)

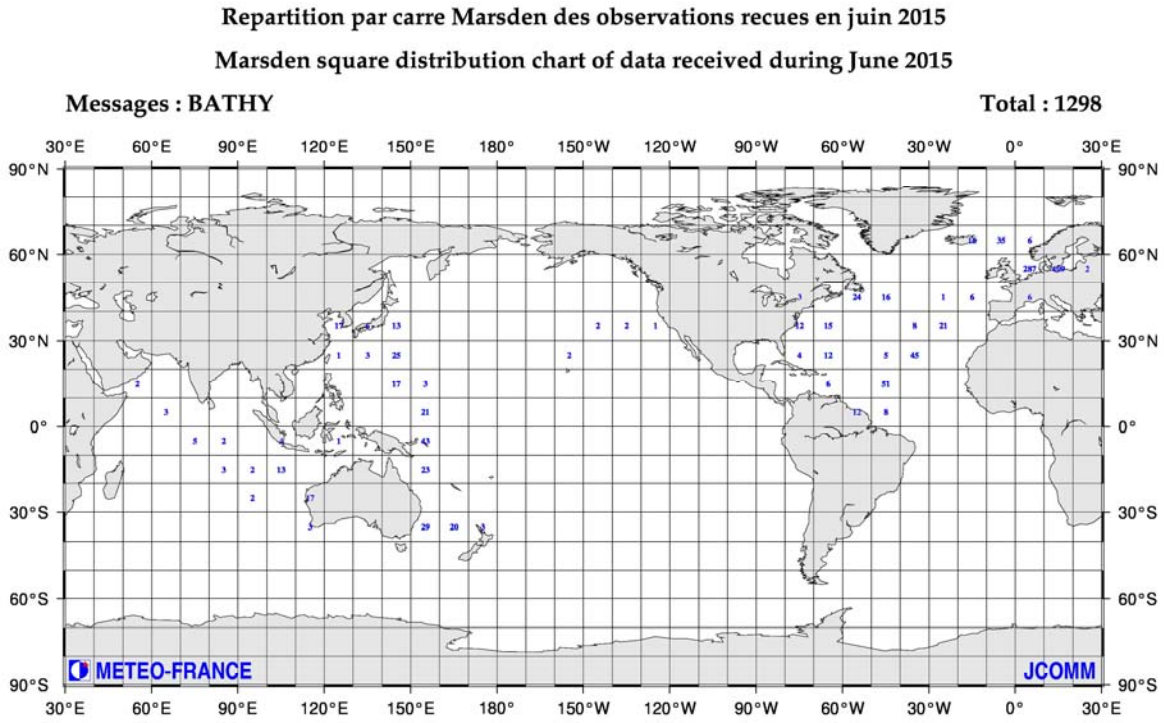

Fig. 6b: Marsden square distribution chart of data received in June 2015 (BATHY)

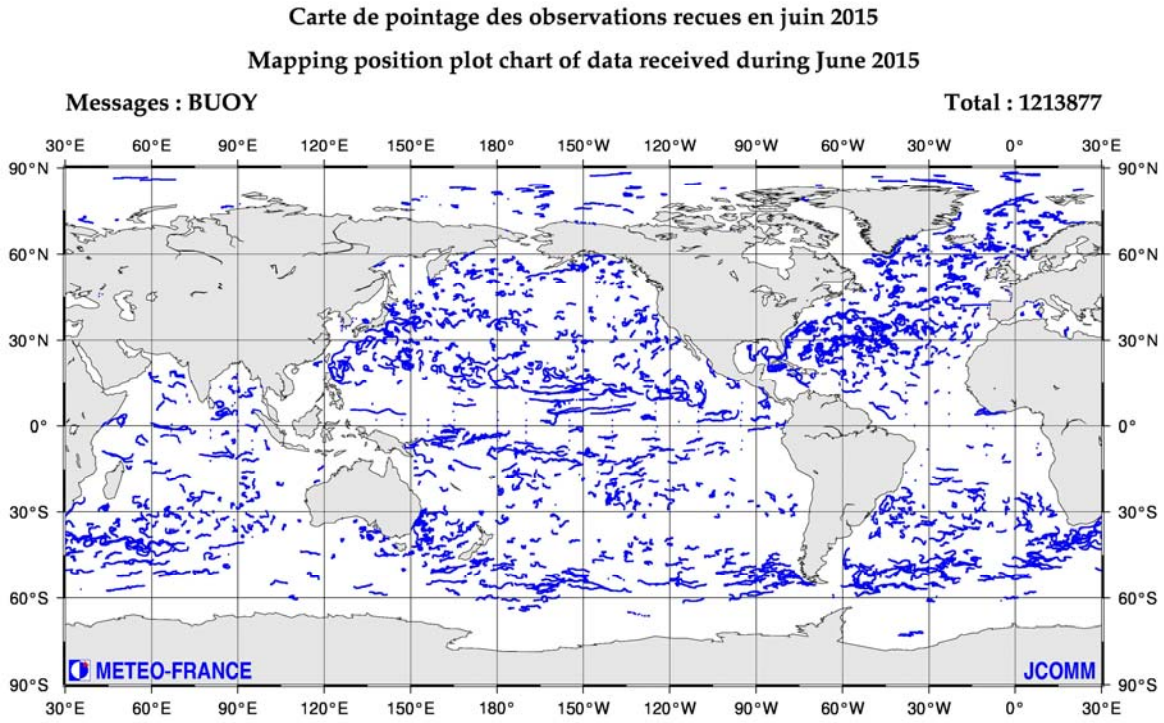

Fig. 7a: Mapping position plot chart of data received during June 2015 (BUOY)

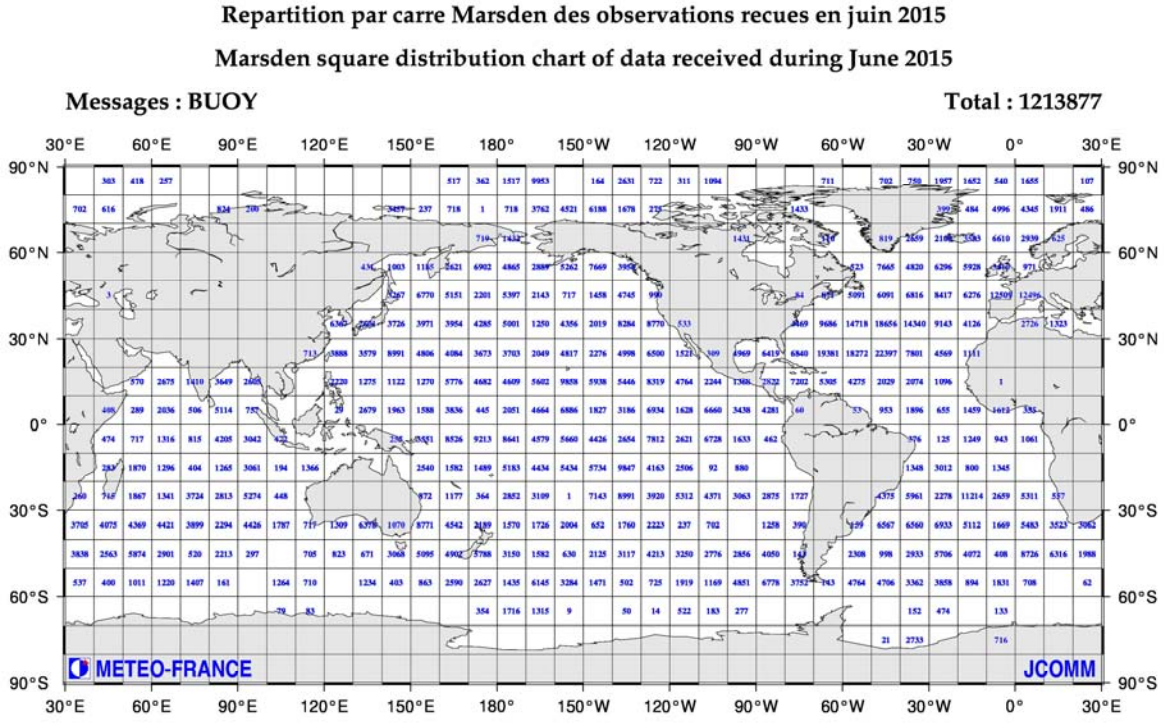

Fig. 7b: Marsden square distribution chart of data received in June 2015 (BUOY)

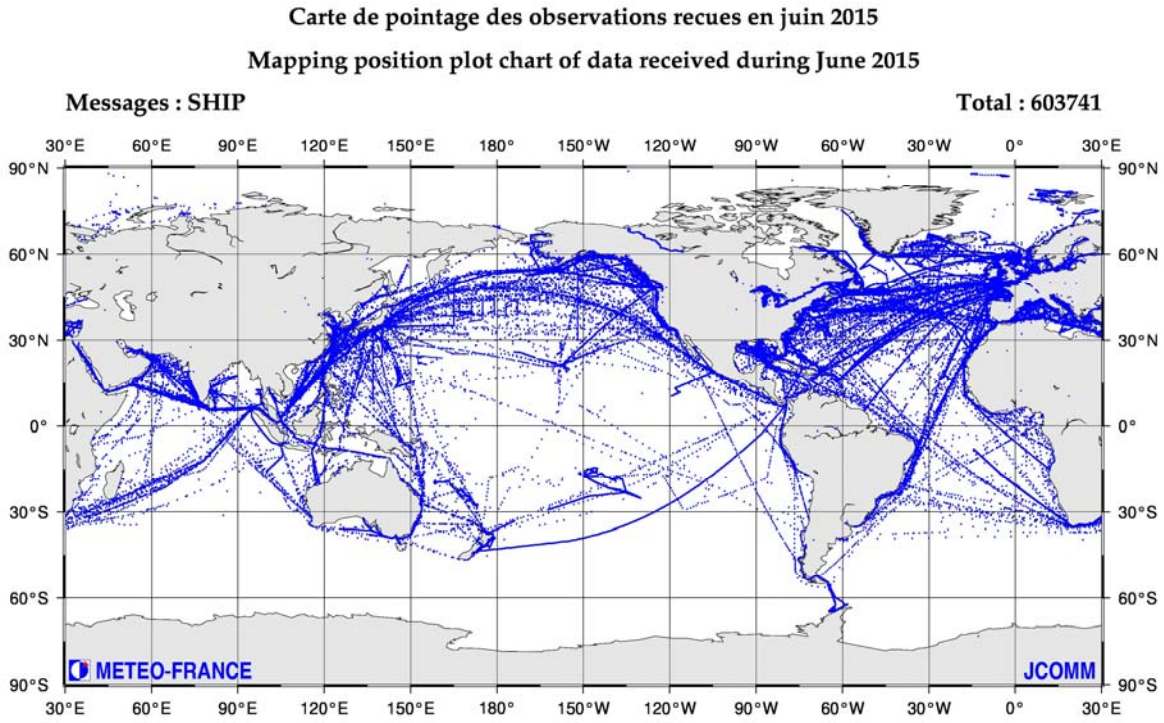

Fig. 8a: Mapping position plot chart of data received during June 2015 (SHIP)

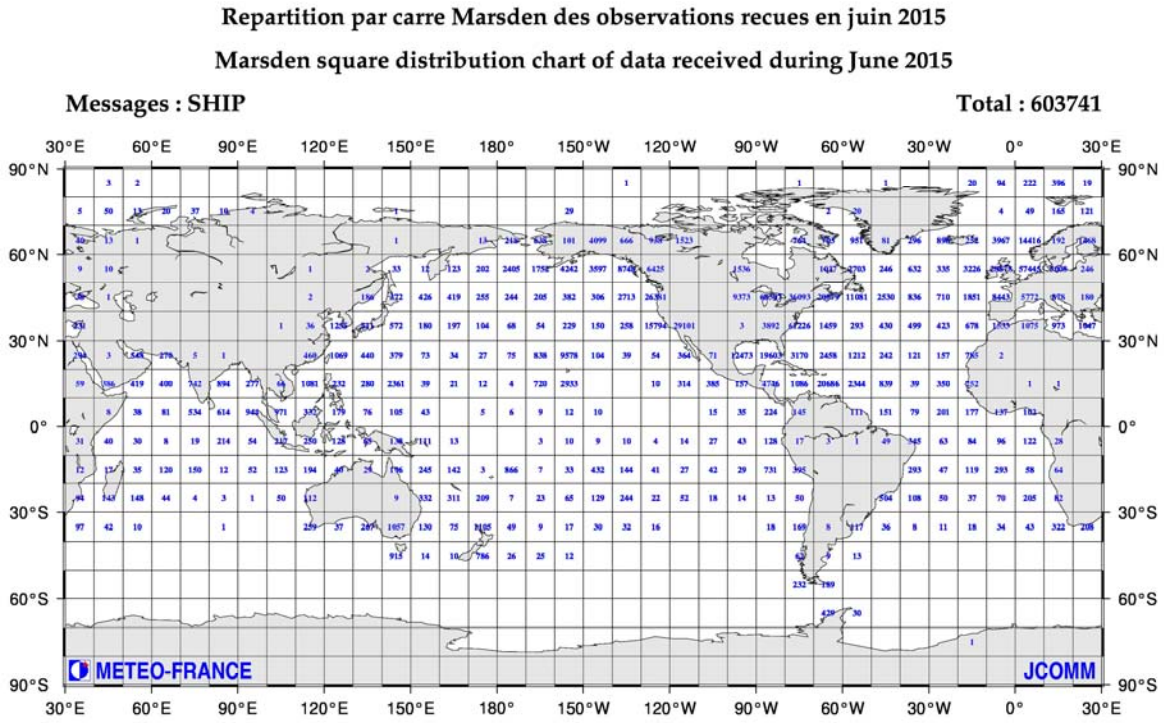

Fig. 8b: Marsden square distribution chart of data received in June 2015 (SHIP)

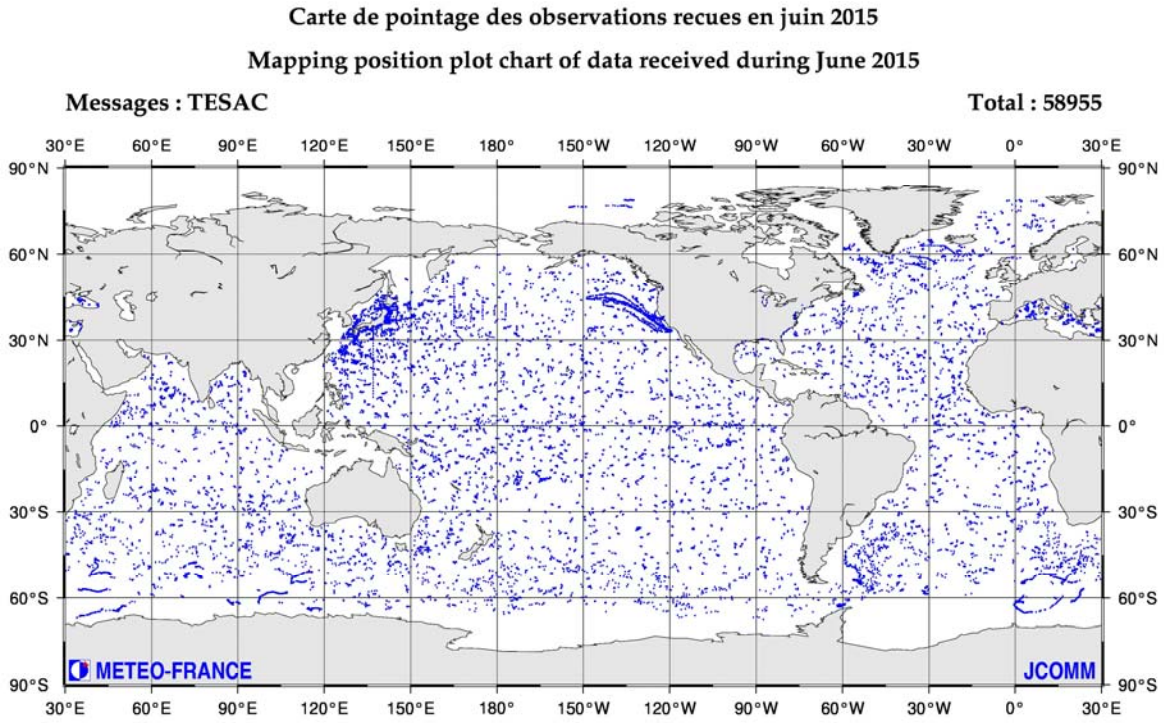

Fig. 9a: Mapping position plot chart of data received during June 2015 (TESAC)

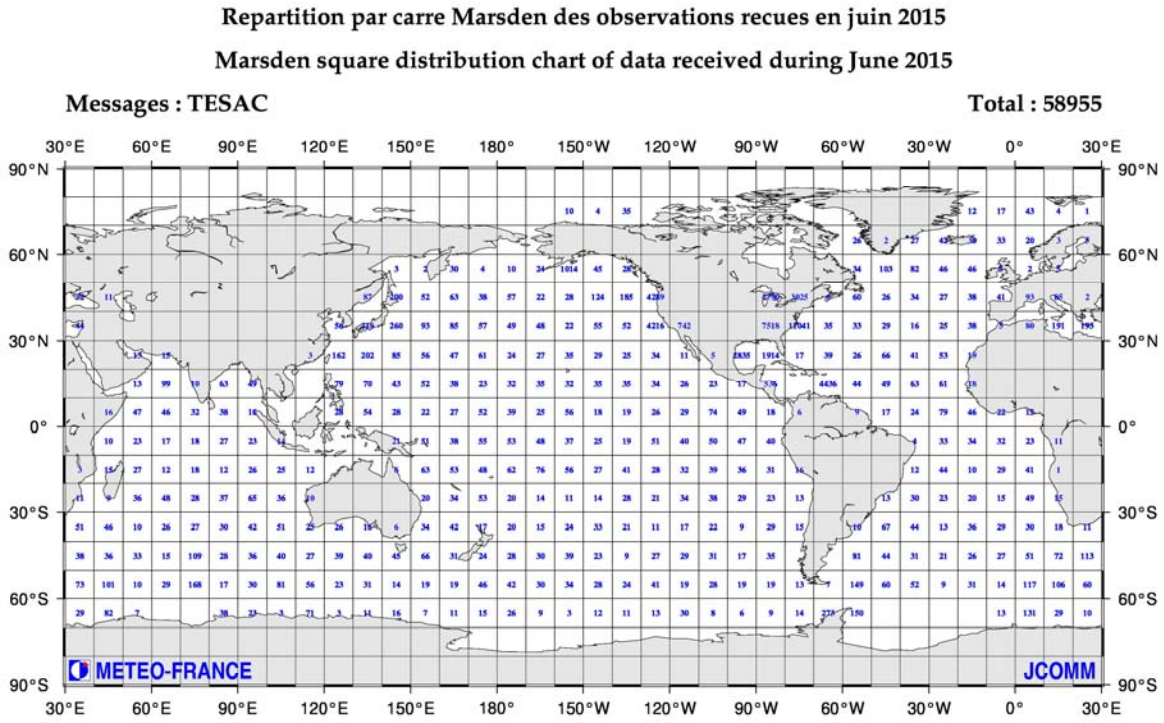

Fig. 9b: Marsden square distribution chart of data received in June 2015 (TESAC)

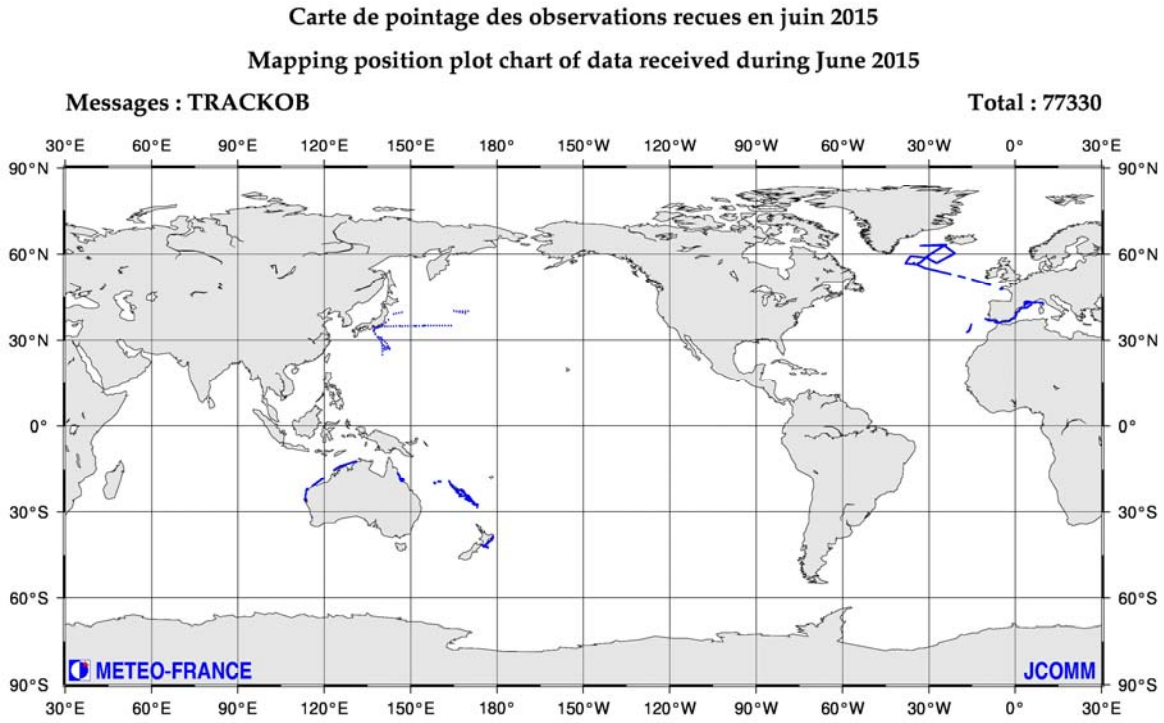

Fig. 10a: Mapping position plot chart of data received during June 2015 (TRACKOB)

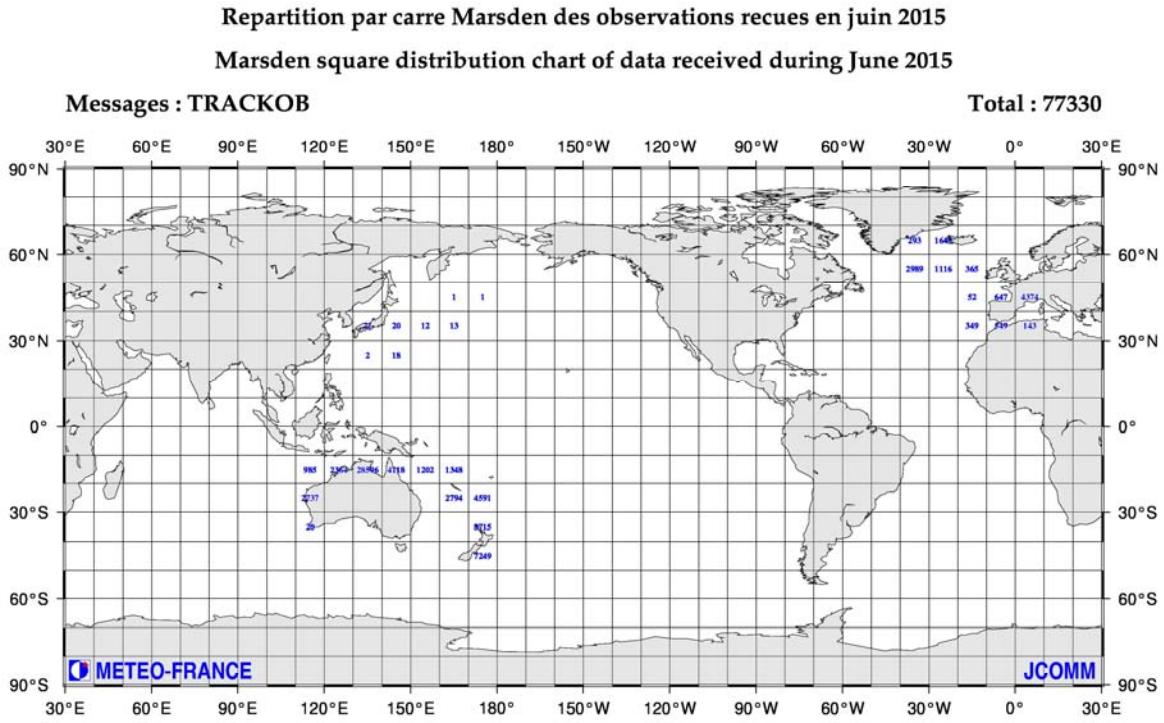

Fig. 10b: Marsden square distribution chart of data received in June 2015 (TRACKOB)

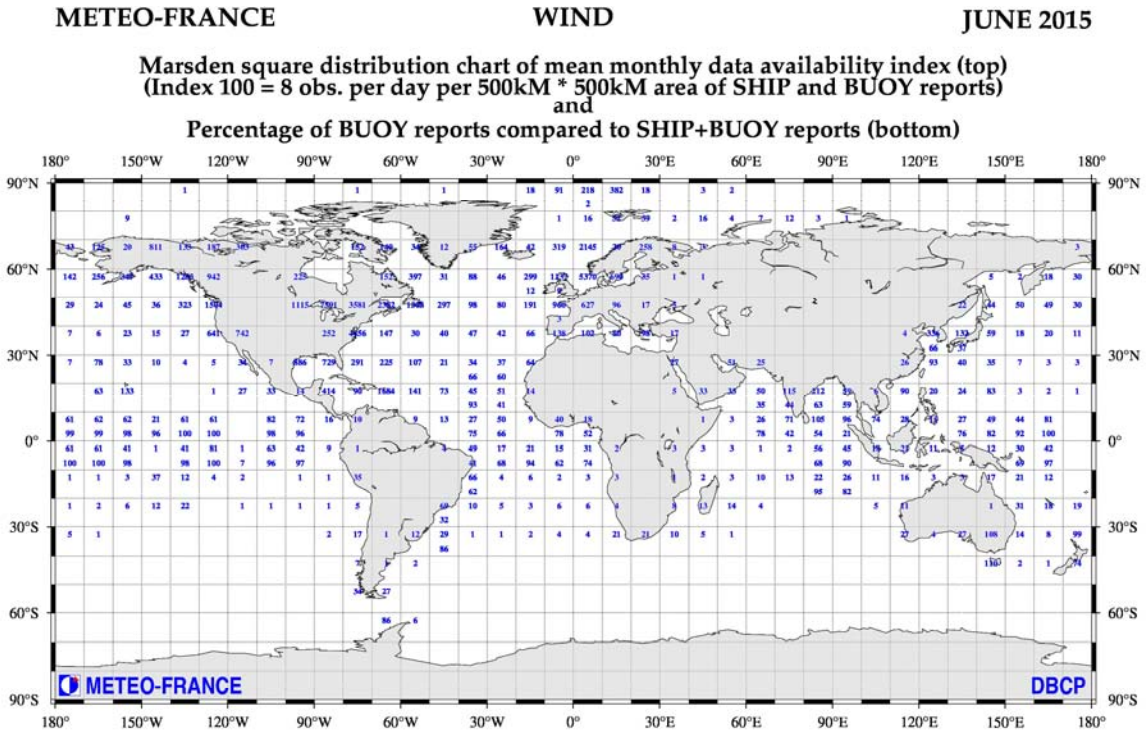

Fig. 11: Marsden square distribution of mean monthly data availability index for wind observations.

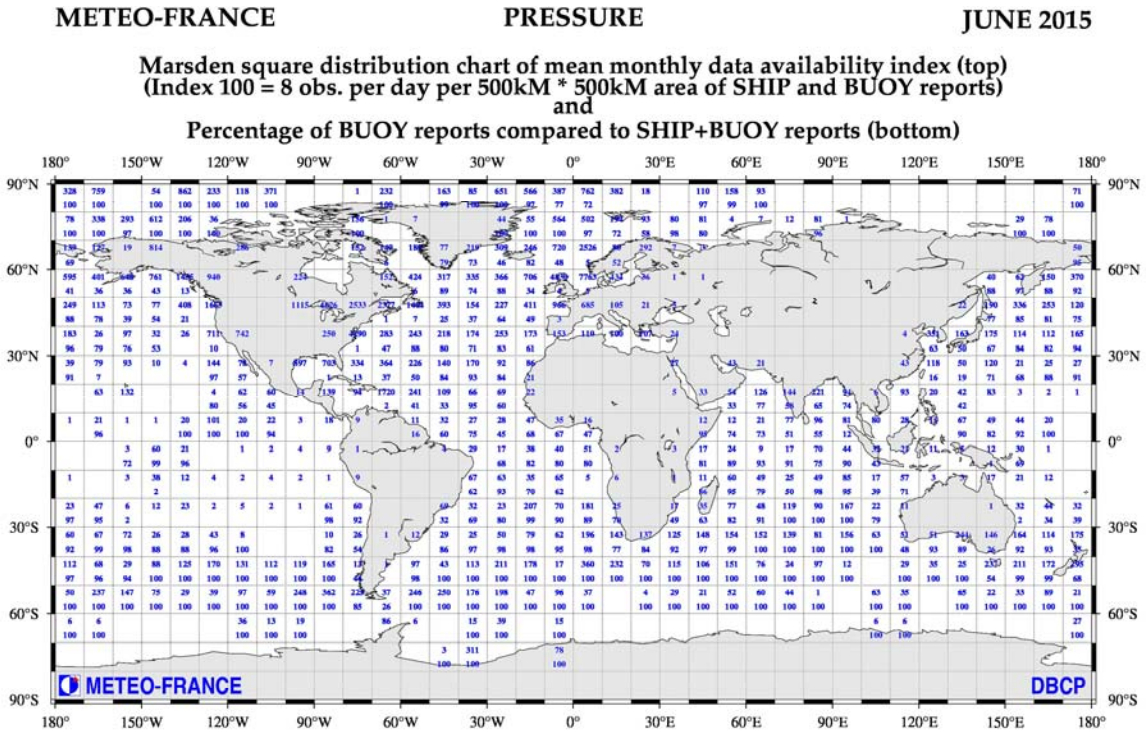

Fig. 12: Marsden square distribution chart of mean monthly data availablility index for pressure observations.

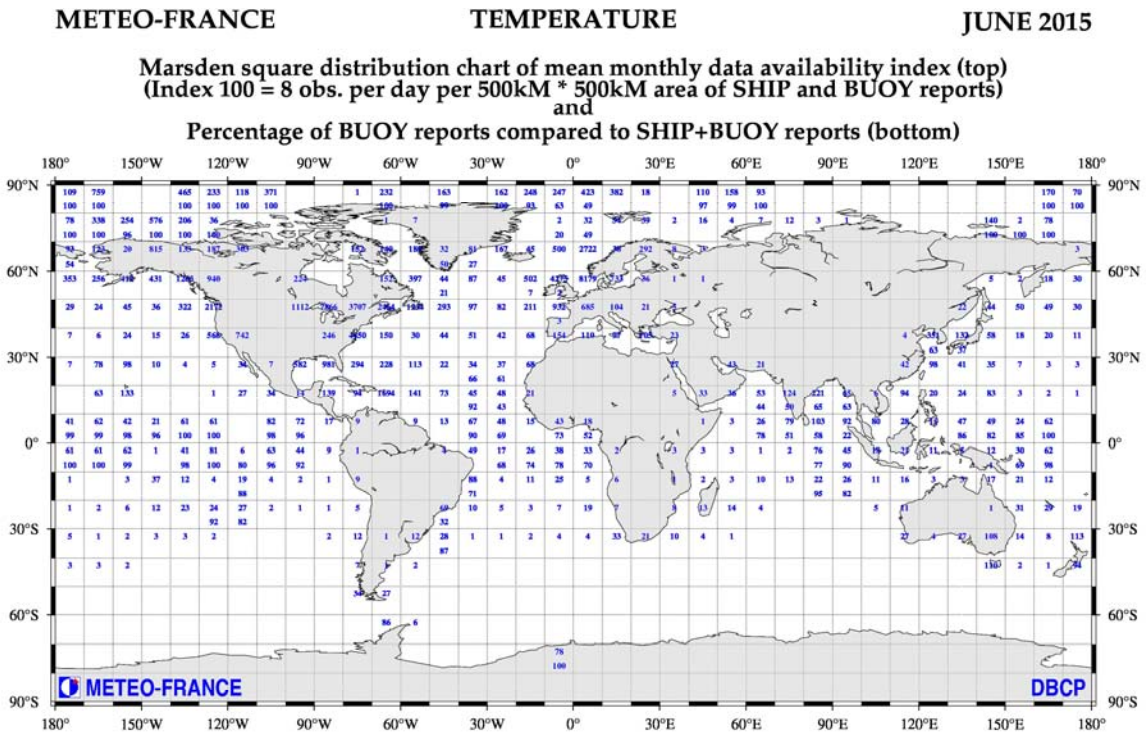

Fig. 13: Marsden square distribution chart of mean monthly data availability

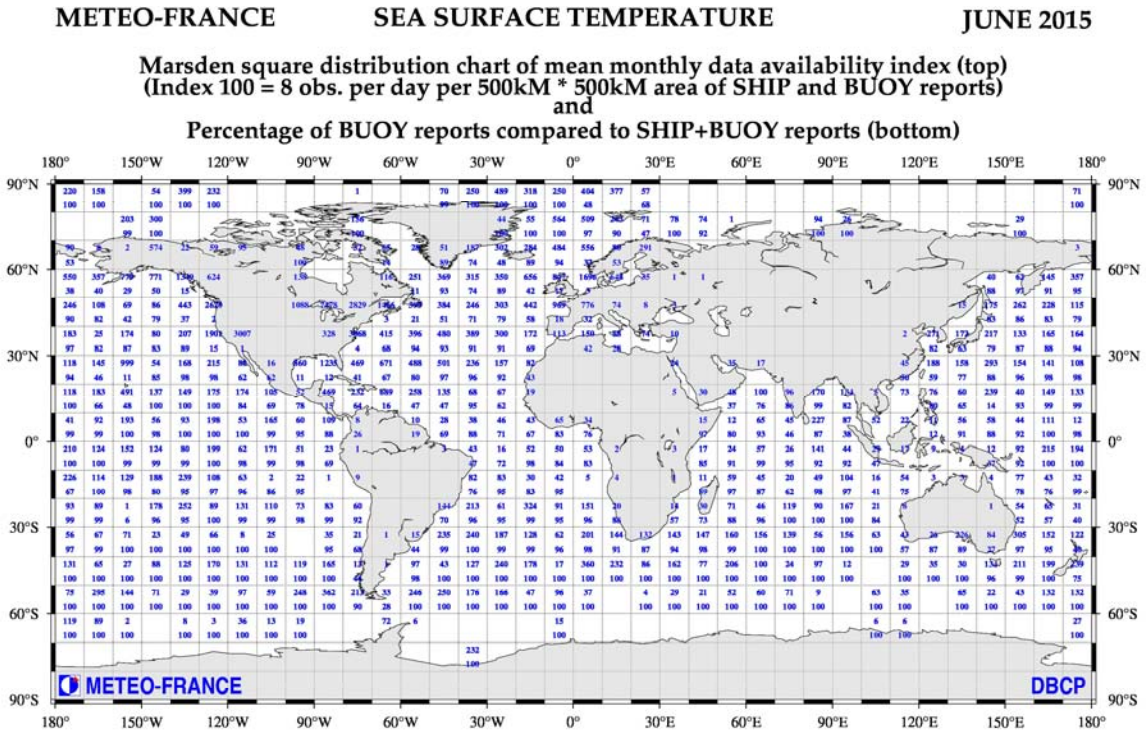

Fig. 14: Marsden square distribution chart of mean monthly data availablility index for sea surface temperature observations.