

WORLD METEOROLOGICAL ORGANIZATION

INTERGOVERNMENTAL OCEANOGRAPHIC
COMMISSION (OF UNESCO)

DATA BUOY COOPERATION PANEL

DBCP-XXIII/Doc. 7.1
(1.IX.2007)

TWENTY-THIRD SESSION

ITEM: 7.1

JEJU, REPUBLIC OF KOREA
15-19 OCTOBER 2007

ENGLISH ONLY

REPORT BY THE BUOY DATA MANAGEMENT CENTRES

(Submitted by ISDM, Canada, and Météo France)

Summary and purpose of document

This document contains reports by the two buoy data management centres, the Responsible National Oceanographic Data Centre for Drifting Buoys, operated by ISDM, Canada, and the Specialized Oceanographic Centre for Drifting Buoys, operated by Météo France.

ACTION PROPOSED

The panel will be invited to comment, and particularly make decisions or recommendations, as appropriate on the following topics:

- (a) Note and comment on the information contained in this document;
- (b) Advise the data centres of any additional actions required, as necessary.

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- Appendices:** A. Report of the RNODC for Drifting Buoys (August 2006 – July 2007)
B. SOC for Drifting Buoys Report 2006 – 2007

Appendix A

Report of the RNODC for Drifting Buoys Integrated Science Data Management (ISDM) (August 2006 to July 2007)

Submitted to the DBCP-23
15-19 October 2007
Jeju, South Korea

Introduction

The Integrated Science Data Management (ISDM), previously the Marine Environmental Data Service (MEDS), of the Department of Fisheries and Oceans in 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 RNODC is a national data centre assisting the World Data Centres (WDCs) for Oceanography and was developed to enable the international exchange system to cope with the increasing variety and volume of oceanographic data being collected. As part of its role, RNODC-ISDM acquires, processes, quality controls and archives real-time drifting buoy messages reporting 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 an online request system. Although ISDM was officially recognized as an RNODC in 1986, its archive started in late 1978 with the First GARP Global Experiment (FGGE) program and is currently growing at a rate of over 850,000 messages per month

At IODE-XVIII (Oostende Belgium, April 2005) a resolution was adopted to abolish the system of RNODC's. This was in response to a review of IODE activities and in particular, the lack of understanding and use of the RNODC system. The resolution instructed the Chair of IODE to discuss with RNODC host centres how their operations, if considered essential for the international community, could be maintained and properly acknowledged. The services provided by ISDM as the RNODC for drifting buoys were determined to be essential for the international community and as such will continue operating as an RNODC until the proper accreditation has been established.

Overall annual statistics summary

All statistics, with the exception of the maps and unless otherwise stated, refer to data received in BUOY code which includes both drifter and moored buoys.

During the period August 2006 to July 2007, ISDM archived an average of 855,000 BUOY reports per month (Figure 1) and received reports from an average of 1483 buoys per month (Figure 2), which is about the same as last year. On average each drifting buoy is reporting 19 messages a day (Figure 3). Figure 4 shows the number of some of the meteorological/oceanographic observations posted on the GTS and Figure 5 shows the number of drifting buoys that reported Sea Surface Temperature (SST) and other meteorological observations. Drifting buoy tracks during the year can be seen in Figure 6. Of the BUOY messages received, 98% of the locations were quality flagged as good (Figure 7) and required on average 32 days from observation to reach the archive (Figure 8) (See Data Flow to ISDM). The size of the drifting buoy archive continues to grow (Figure 9) with about 53 million records containing 23 Gigabytes of data from 1978-2006.

Summary of work carried out during the year

DBCP QC Guidelines for Location Data

ISDM sent its first message on the BUOY-QC distribution list (buoy-qc@vedur.is) in October 2002 and continues to participate by sending monthly statistics on the number of erroneous positions on the distribution list. Maps displaying buoys tracks of the previous month for the Arctic, Antarctic and the rest of the world can be seen here: http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/RNODC/Buoy-QC/Buoy-QC.htm. The maps serve as a visual aid to the statistics file and allows the user to “mouse over” tracks to determine which buoys are reporting erroneous locations. Figure 7 shows quality control percentages of all position data during this past year.

Implementing New BUFR Software

Drifting buoy data is now being reported on the GTS in both BUOY and BUFR (Binary Universal Form for Data Representation) format. New software was written to read and decode each BUFR message into an internal format for update to our archives. Functionality related to new editions was added, decoding compressed data is almost completed and a thorough comparison of the two formats to ensure consistency is still needed. The software was also successful in an initial test to decode Argo data reported in BUFR.

Update SVP Data Submission

ISDM is, along with Atlantic Oceanographic and Meteorological Laboratory (AOML), the Data Assembly Centre (DAC) for Surface Velocity Profile (SVP) data collected by drifting buoys. AOML handles the initial processing of the data received through Service Argos. They carry out quality control on the data and generate the interpolated files. On a regular basis, they forward the data (krigged, edited and raw) to ISDM who function as the archive and distribution centre. During the year, a submission of data from 2003-2005 was received. The krigged and edited data have been updated in our archives and the raw data are currently being added. The data in our archives is available through the ISDM web site.

Goals for 2007/2008

Compare data in BUOY and BUFR formats to ensure consistency.

Update new data submission (2006) from AOML.

ISDM expects an increase of data from the Polar Regions due to activities in support of the International Polar Year (IPY) initiative.

ISDM is currently undergoing an organizational restructuring and as such all of our systems and software will be upgraded to newer technology. This upgrade will require a significant amount of time and resources with the effect that ISDM will be reluctant to undertake new developments with the current system.

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 Met Service of Canada (MSC) of Environment Canada (EC). Every hour, these messages are sorted through to extract BUOY messages, as well as other oceanographic reports such as BATHY and TESAC. Once a day, the BUOY messages are decoded into 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 meta-data (date/time, latitude and longitude). The data are stored in a file for a month at which time software to detect duplicates is run making the data available for quality control. Trained scientific personnel review plots of buoy time series of the measurements, drift tracks and speed graphs. Flags are set according to the international QC flag definitions derived from IGOSS, now JCOMM. Once completed, the data are added into the archive and the website is updated.

With a monthly QC system, it takes anywhere between one and eight weeks for BUOY data to be added into the archive. Last year on average, the delay between reception and update was 32 days. Frequency of the data arriving into the archive as compared to observation date and time can be seen in Figure 8. With the increasing number of messages received each month, the QC process takes longer and therefore increases the time it takes to update the archive. This, along with a growing need for real-time drifter data in a timelier manner, is prompting ISDM to look at increasing the frequency of its archive updates.

Data distribution

ISDM continues to distribute the data upon request, on a regular basis and via the web. Last year, ISDM received 22 requests for drifting buoy data. Requests came mostly from universities, government organizations and private consulting companies. Of the 22 requests, 4 were for the International Arctic Buoy Programme (IABP) CD that was created by ISDM in 2000. The CD contains data, products and documents that were produced under the IABP between 1979 and 1999.

Regular data distributions include sending raw drifting buoy GTS messages daily to the US National Oceanographic Data Center (NODC) by FTP, as well, a yearly file of all the QC'd drifting buoy data on CD. Hourly raw data of buoy id, date/time, and meteorological data are posted on our ftp site for use by the Canadian Coast Guard in Search and Rescue.

ISDM website is updated after the monthly QC and contains many trajectories, inventories and statistics of the buoy archive by month and year on a global scale, as well as for specific regions such as the Arctic, Antarctic, North Pacific, Southern Atlantic, EGOS (European Group on Ocean Stations) and Indian Ocean. Except for Arctic data for the current month, data are not available on the website and must be requested through the on-line Data Request Form. The current month's data for the Arctic is made available through a special application designed for the IABP region which shows real-time tracks of Arctic floats on a scalable map with the option to view specific buoy data. The URL for drifting buoy data and information at ISDM is http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Databases/DRIBU/drifting_buoys_e.htm.

Archive Information

Figures 10-13 show information derived from the entire archive. The maps show all the buoy tracks in three projections, global, Arctic and Antarctic and the graph displays the growth of the top five parameters (from both drifter and moored buoys) throughout the years 1978-2006.

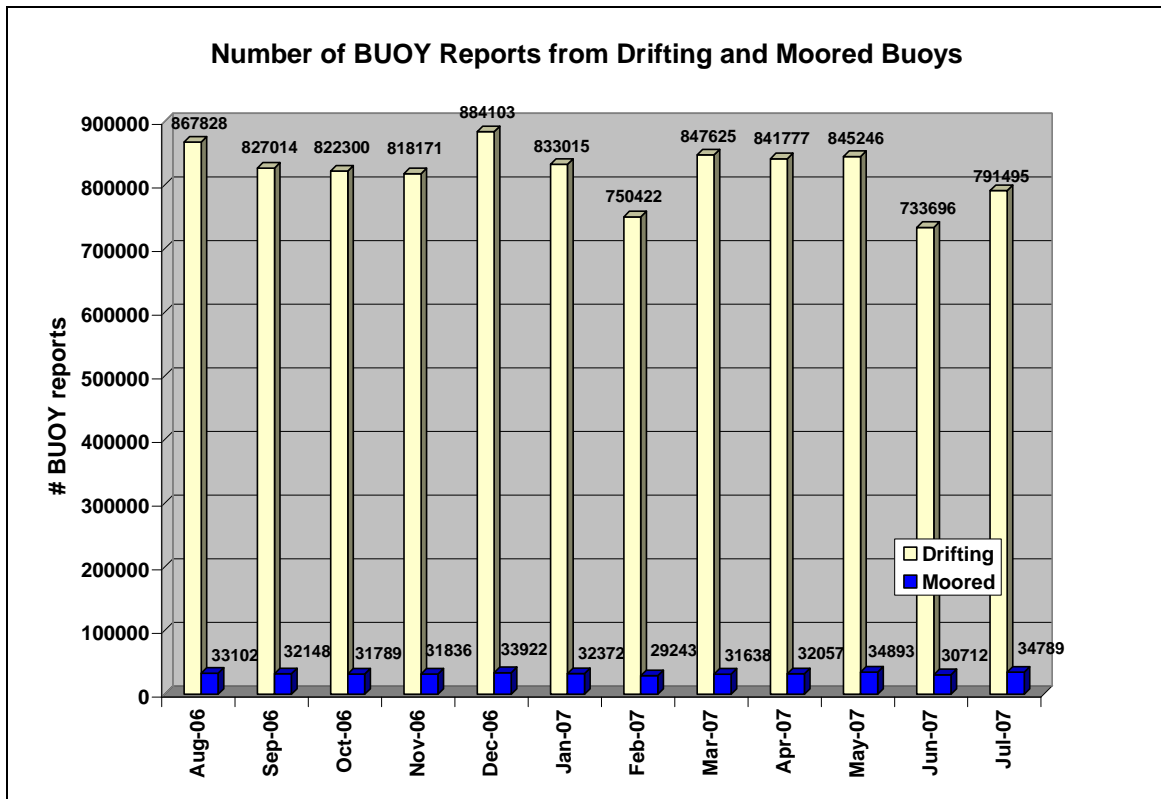


Figure 1

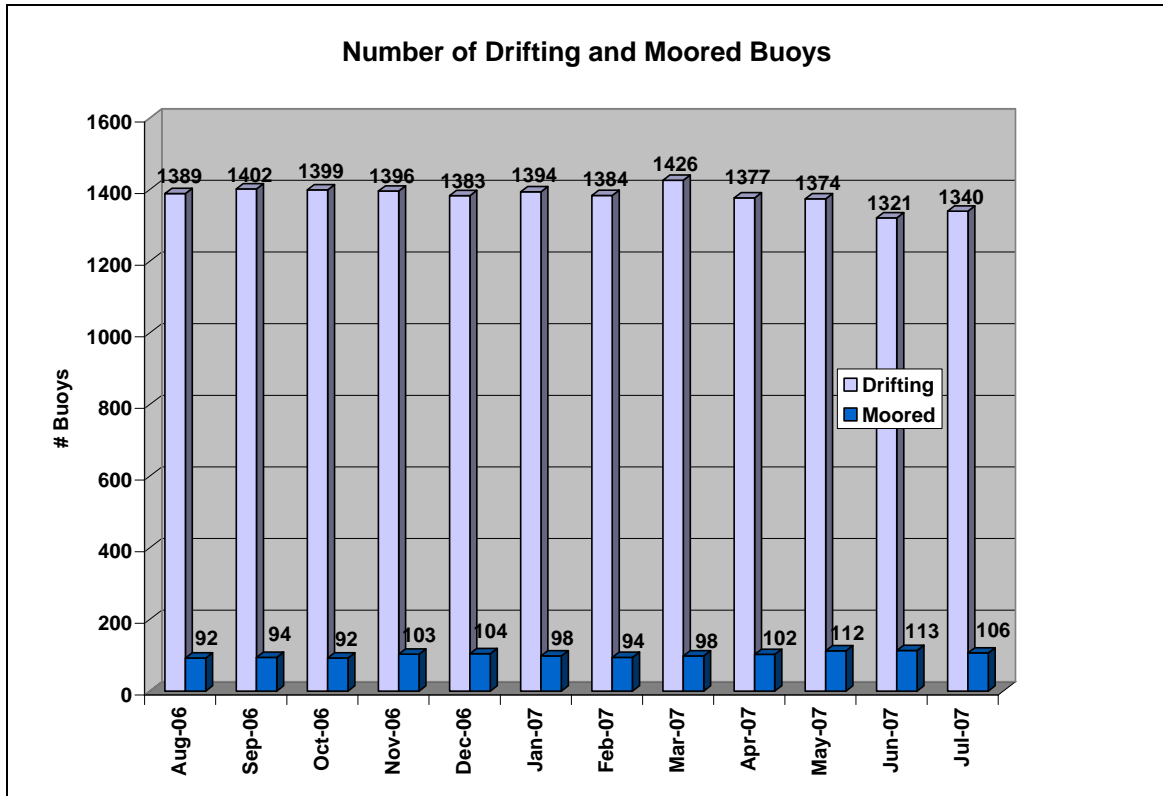


Figure 2

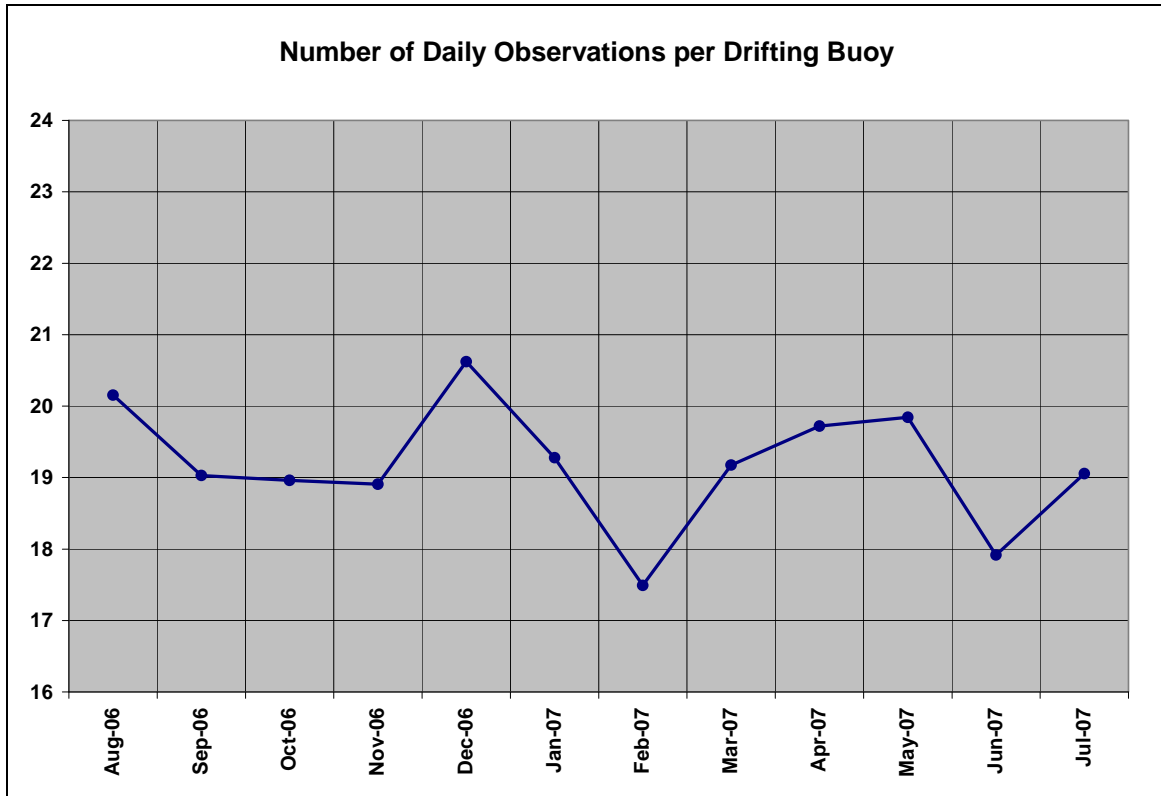


Figure 3

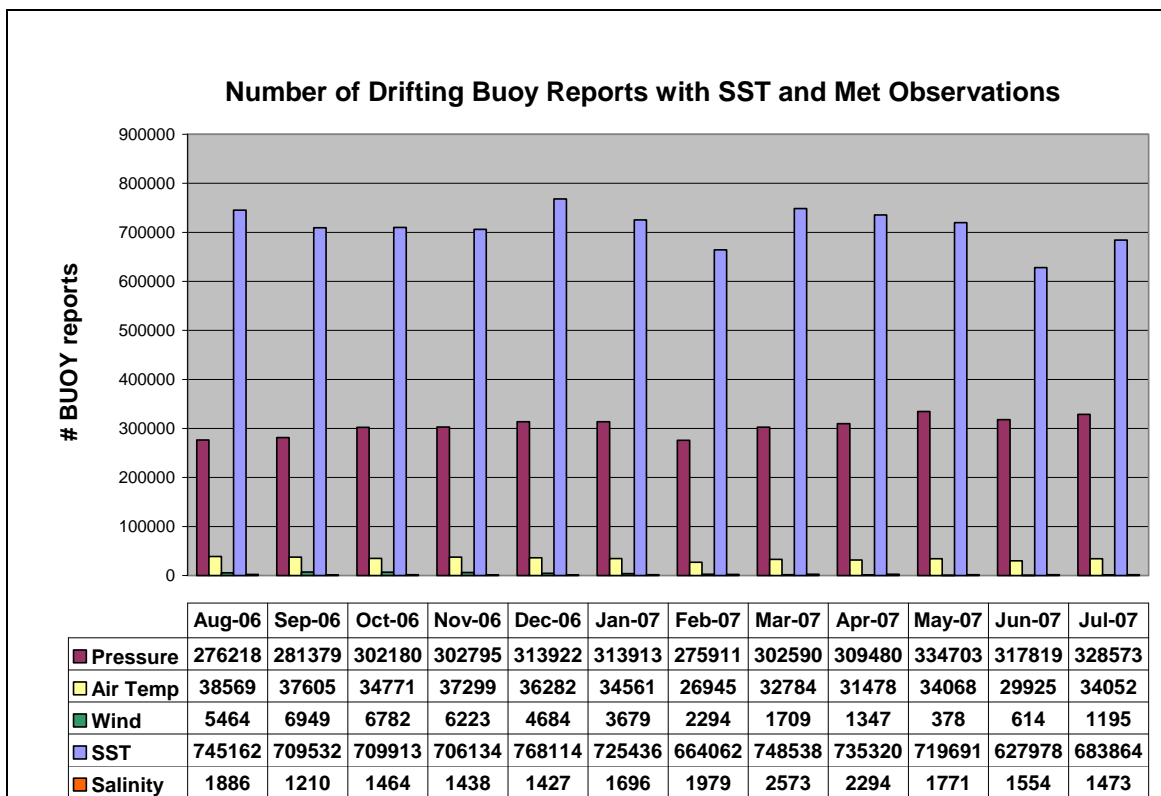


Figure 4

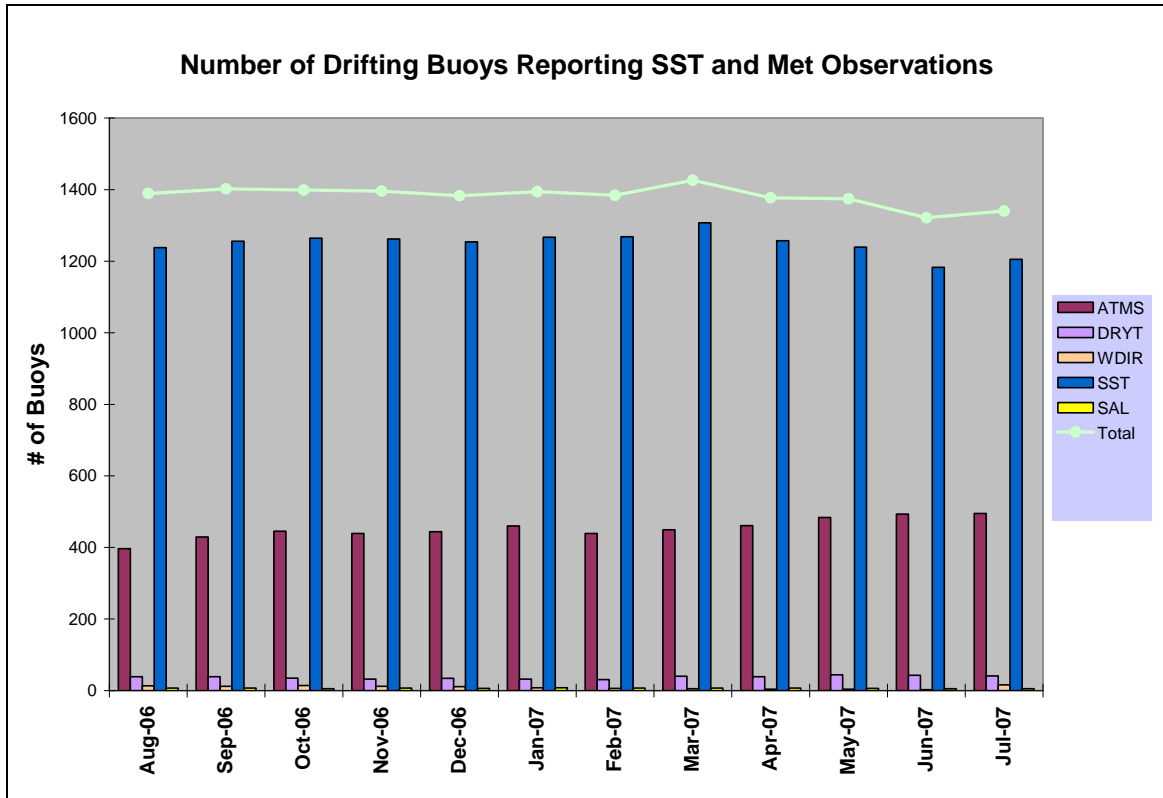


Figure 5

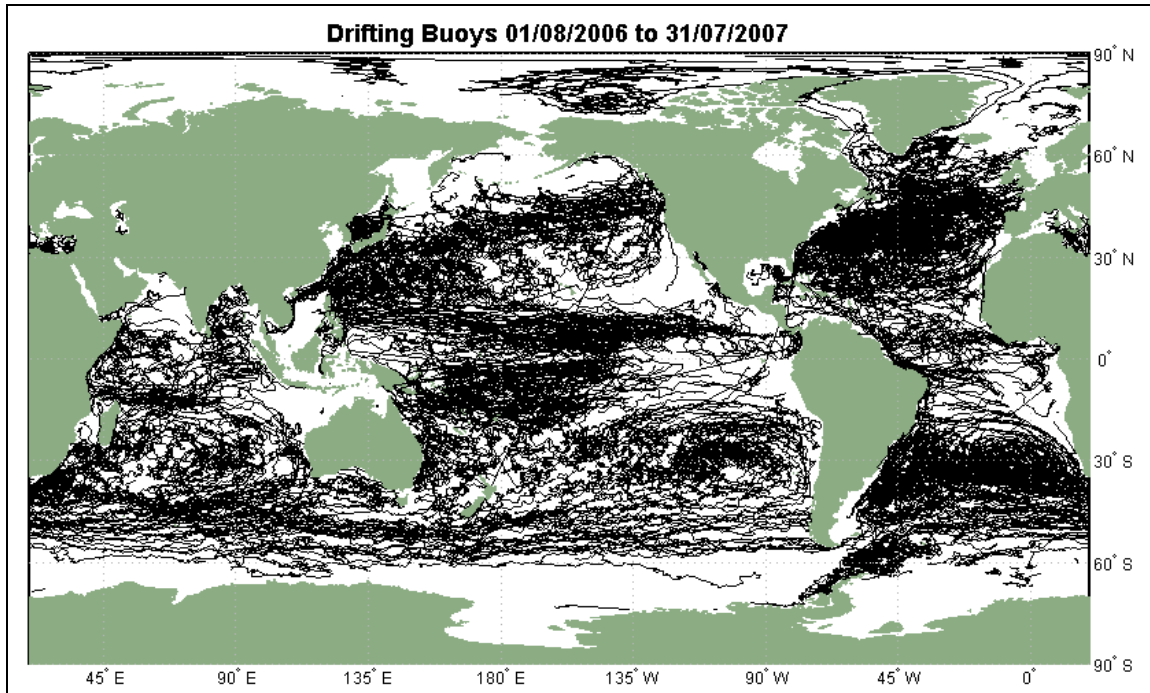


Figure 6

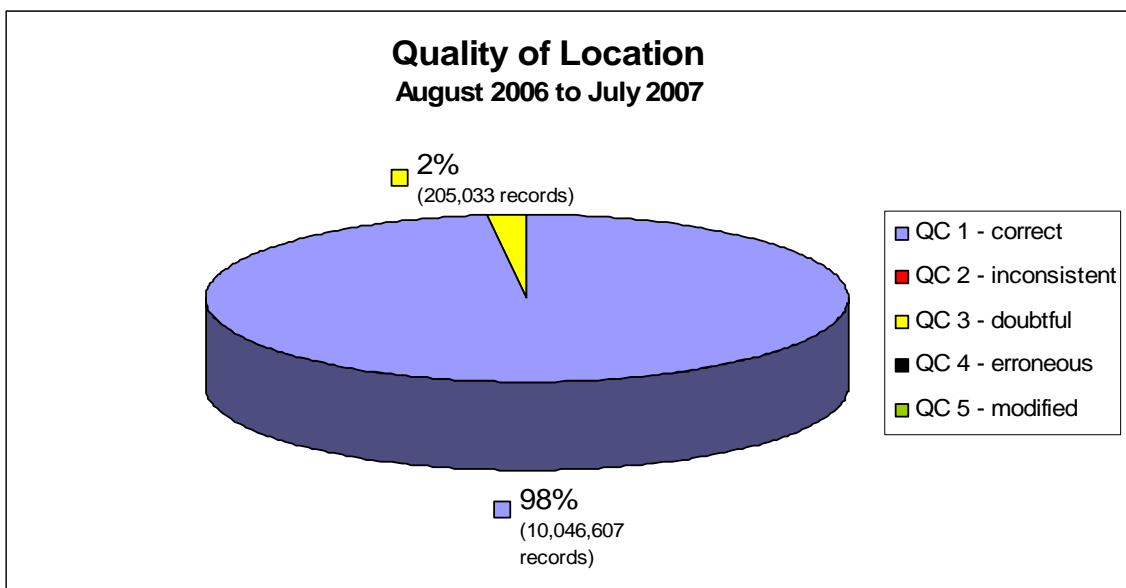


Figure 7

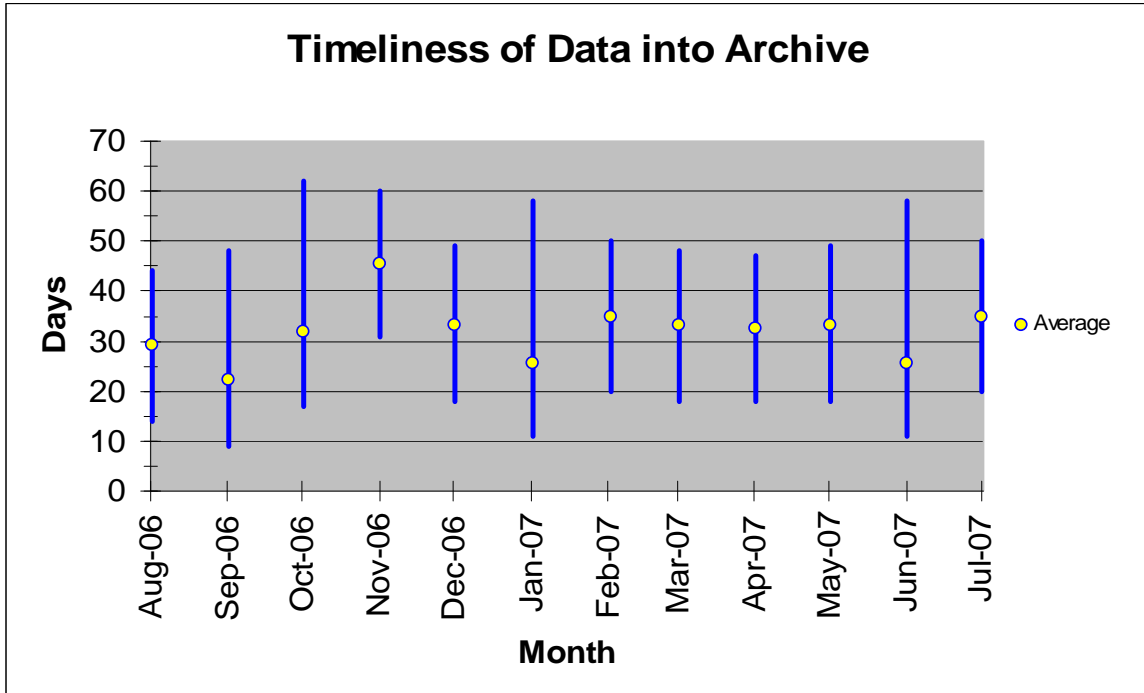


Figure 8

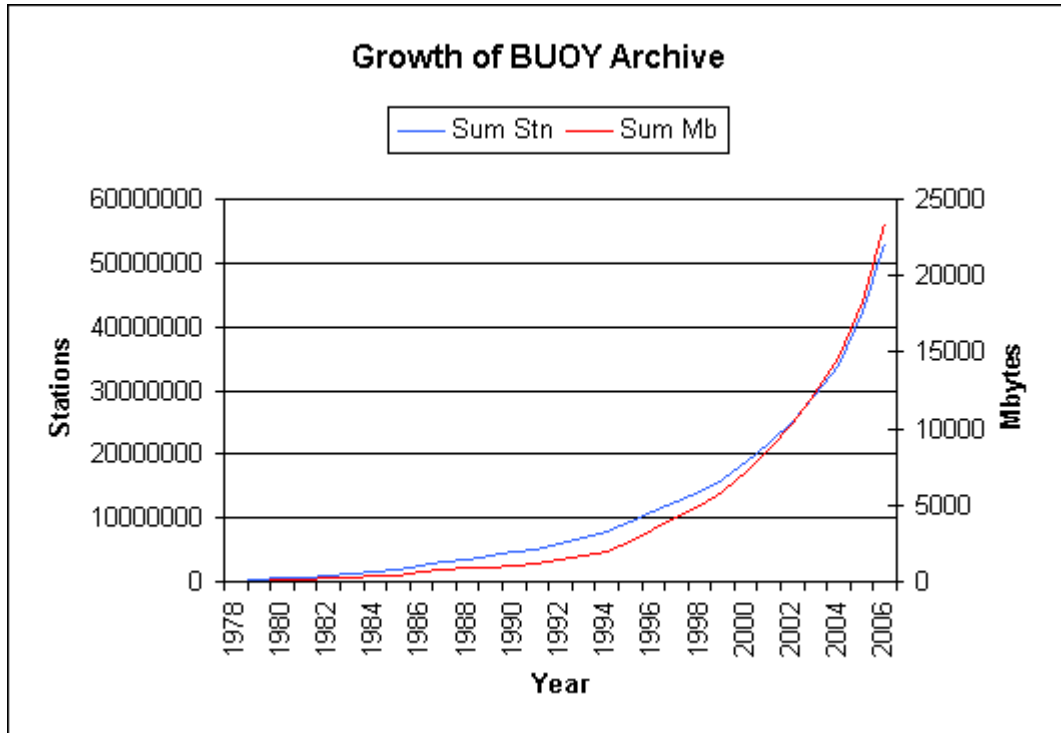


Figure 9

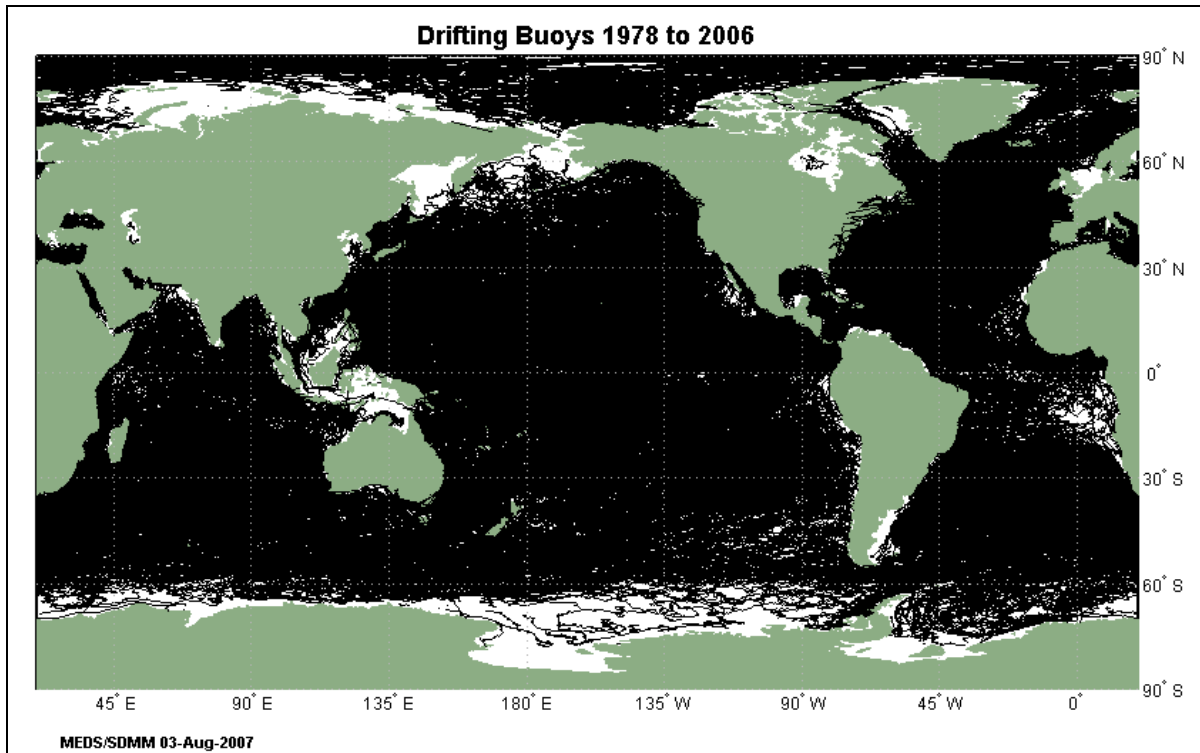


Figure 10

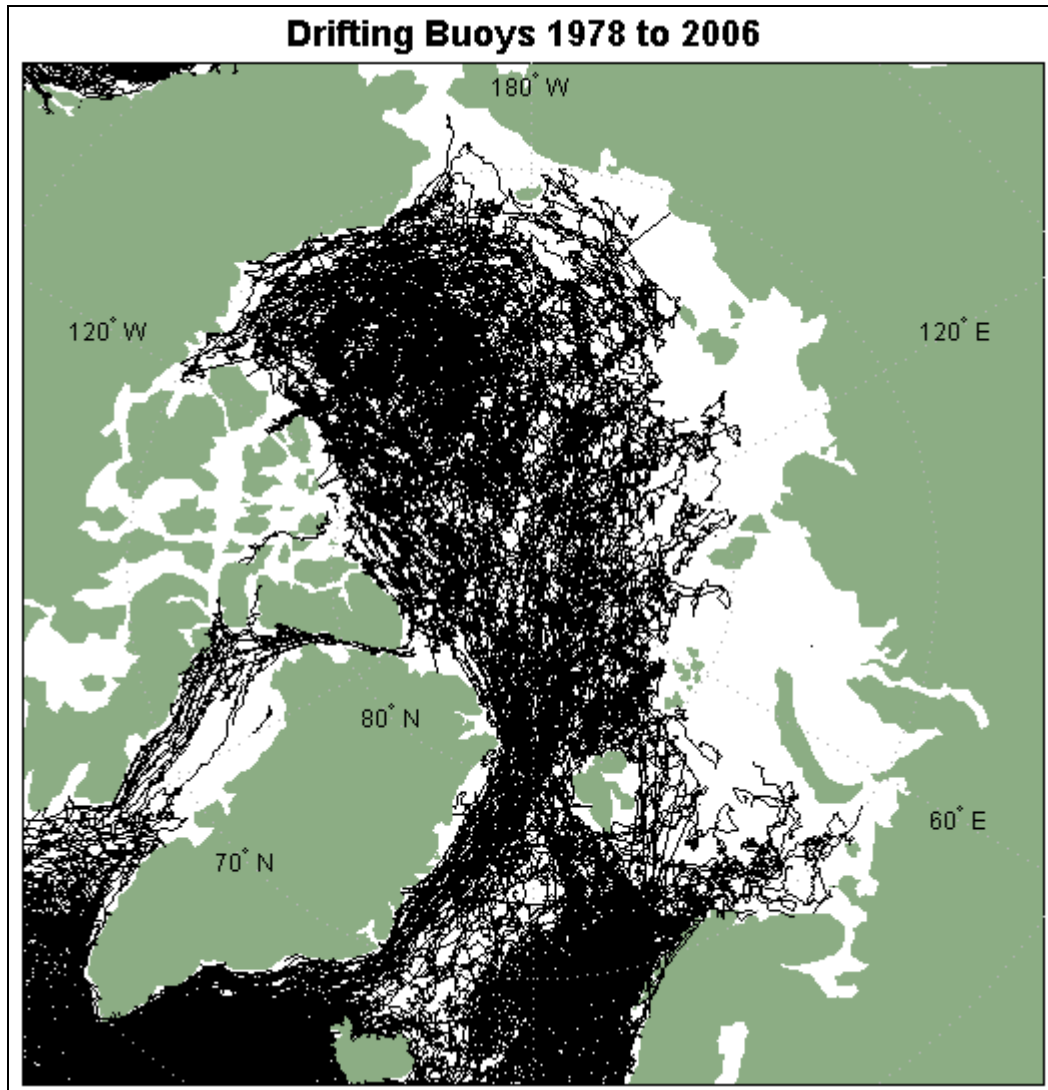
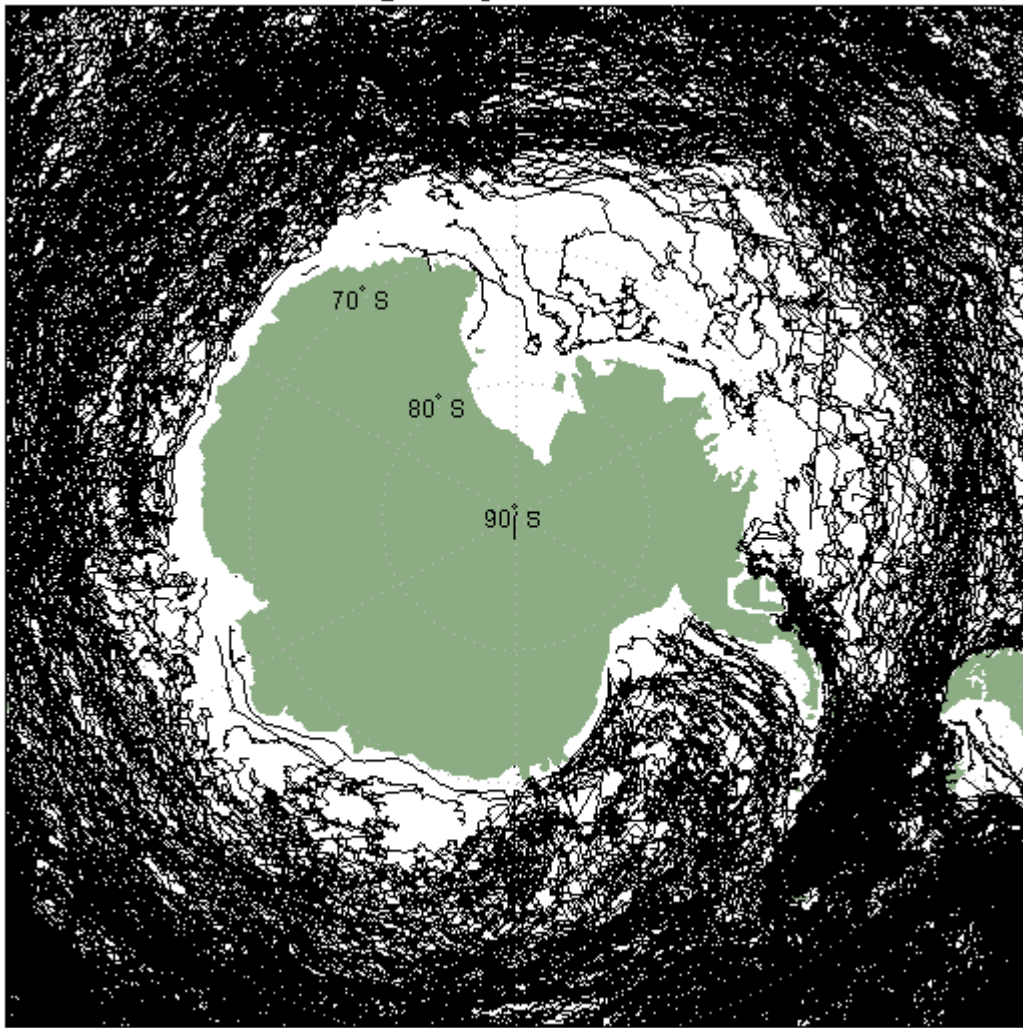


Figure 11

Drifting Buoys 1978 to 2006



MEDS/SDMM 03-Aug-2007

Figure 12

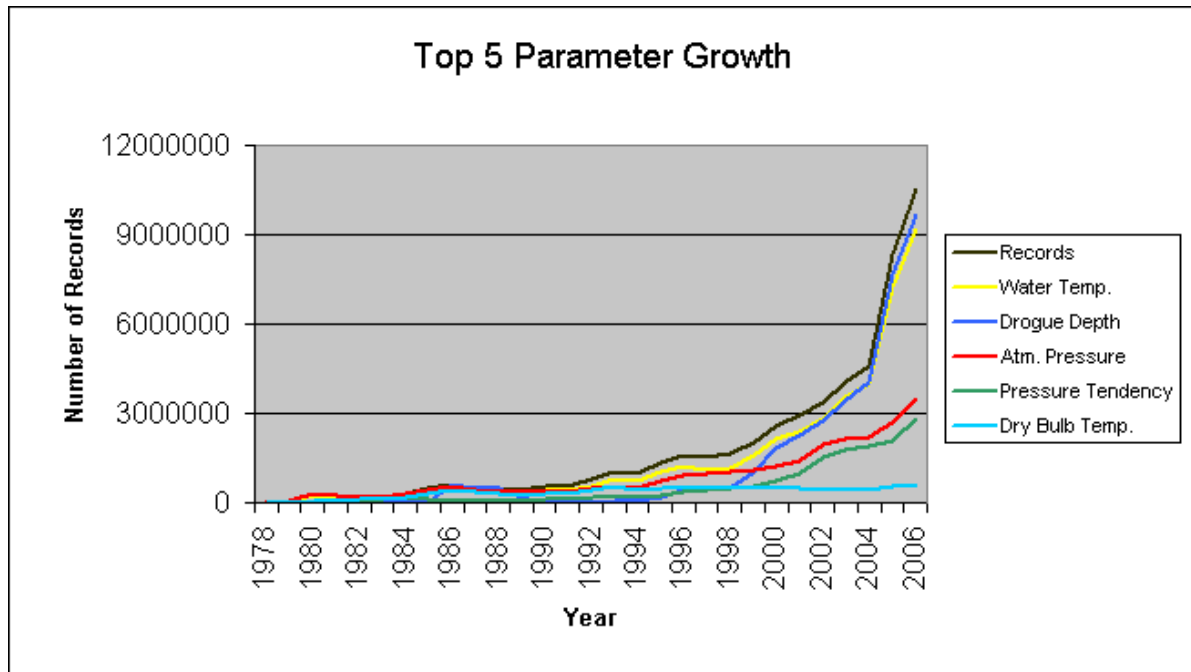


Figure 13

Appendix B

SOC for Drifting Buoys Report

2006 – 2007

The Specialized Oceanographic Center (SOC) for Drifting Buoys has been run continuously during year 2006-2007. SOC is made of Météo-France teams in Toulouse and Brest as well as teams involved in the 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 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 2006.
- Figure 5 shows the time evolution of WAVEOB reports and sensors since January 2006.

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 2007. "a" stands for mapping position plot charts, and "b" for Marsden square distribution. Figure 6: BATHY, 7: TESAC, 8: SHIP, 9: BUOY, and 10: 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 2007. Figure 11: Wind, 12: Pressure, 13: Air temperature, 14: Sea surface temperature.

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).

DBCP ANNUAL REPORT 2006-2007

Time evolution of BUOY reports for wind and pressure

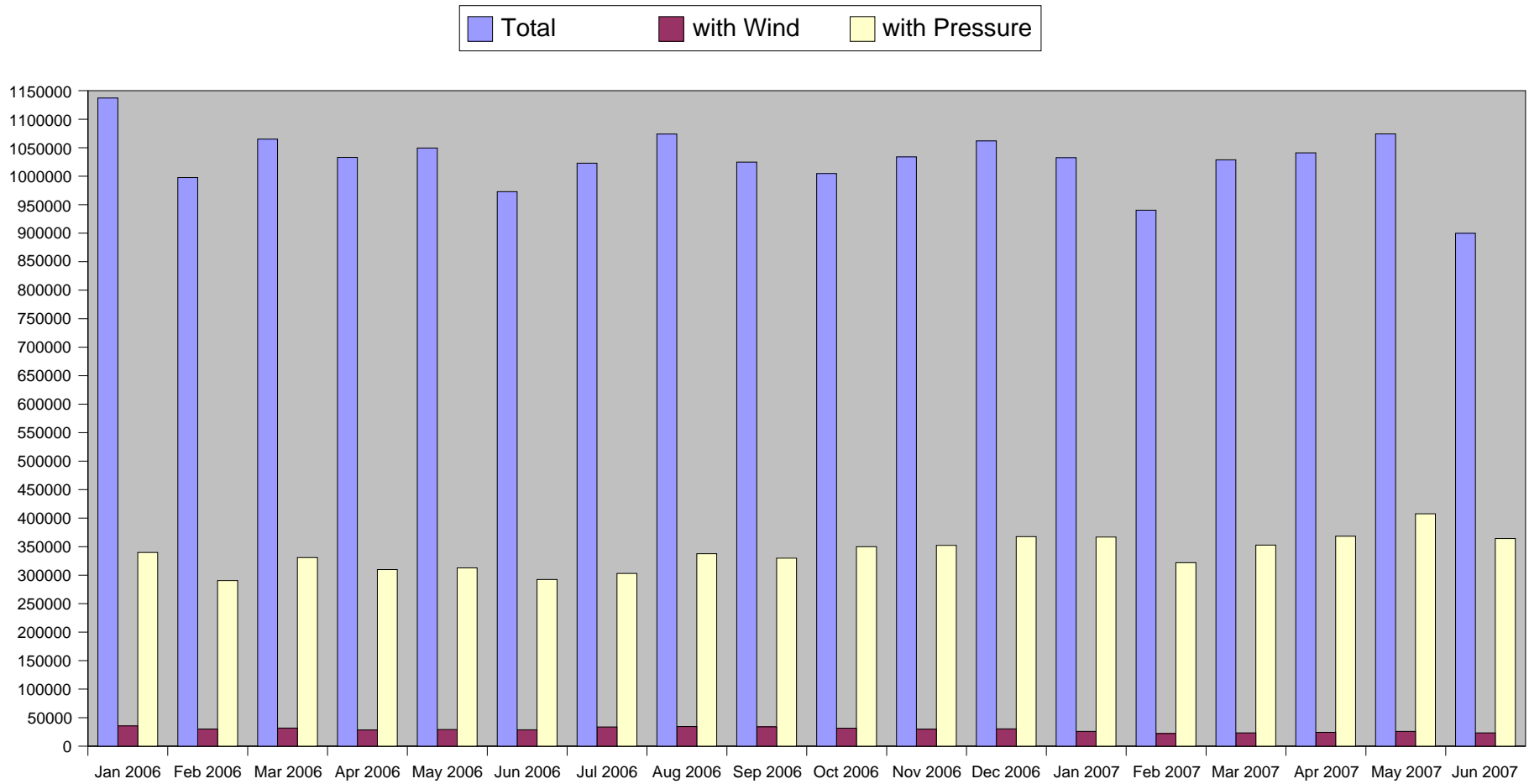


FIGURE 1

Time evolution of Moored BUOY reports for wind and pressure

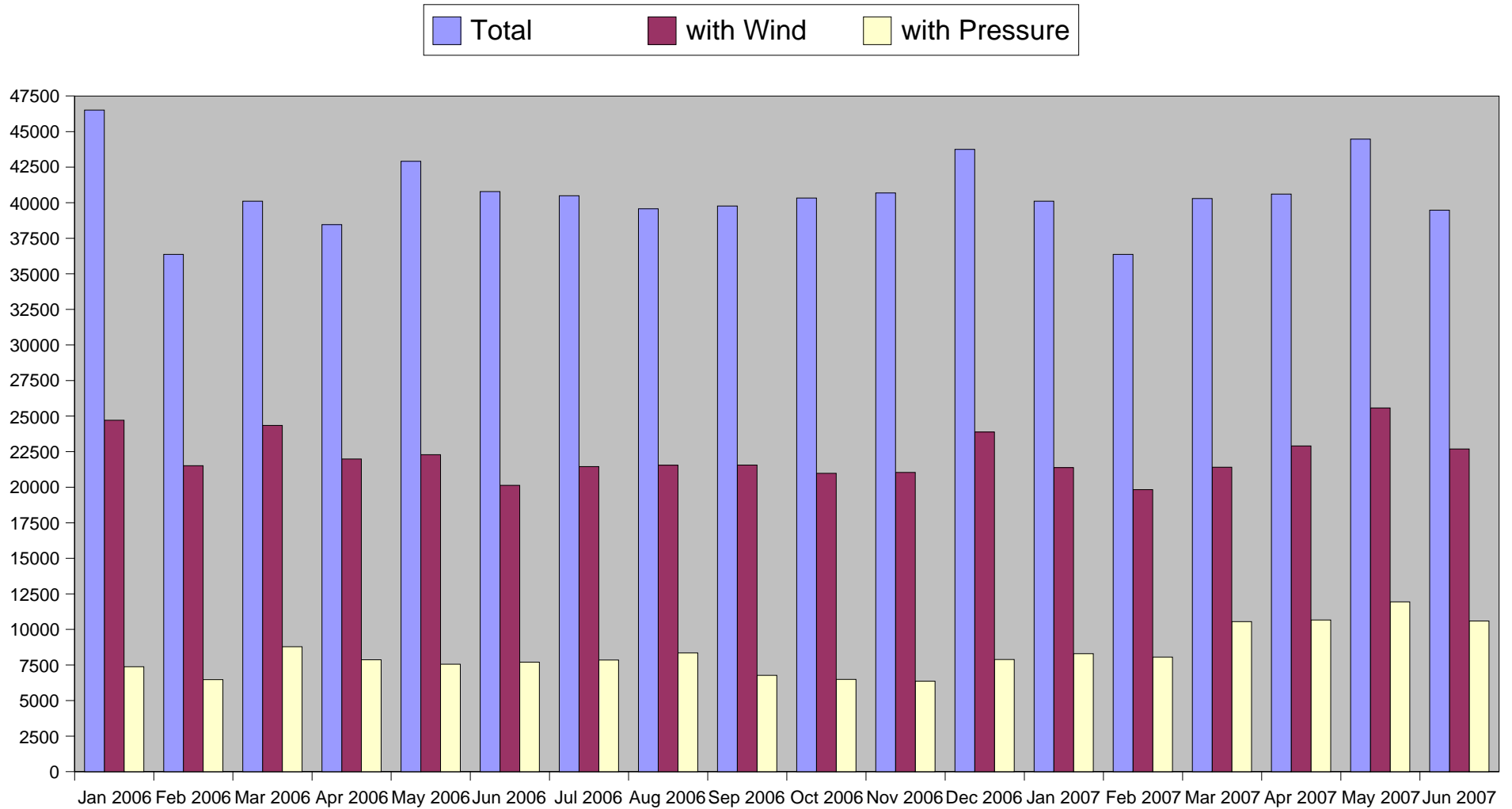


FIGURE 2

DBCP ANNUAL REPORT 2006-2007

Time evolution of Drifting BUOY reports for wind and pressure

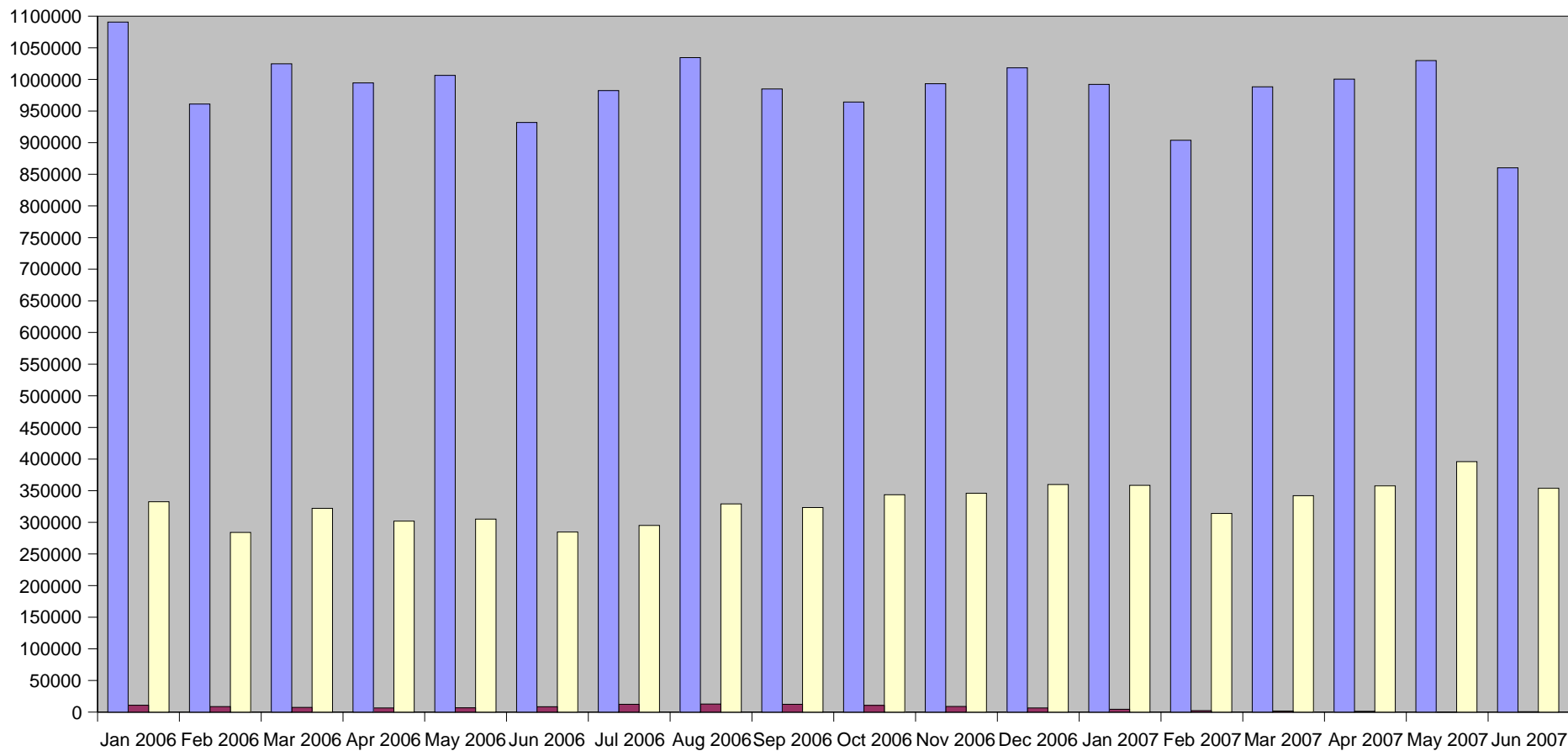


FIGURE 3

Time evolution of SHIP reports for wind and pressure

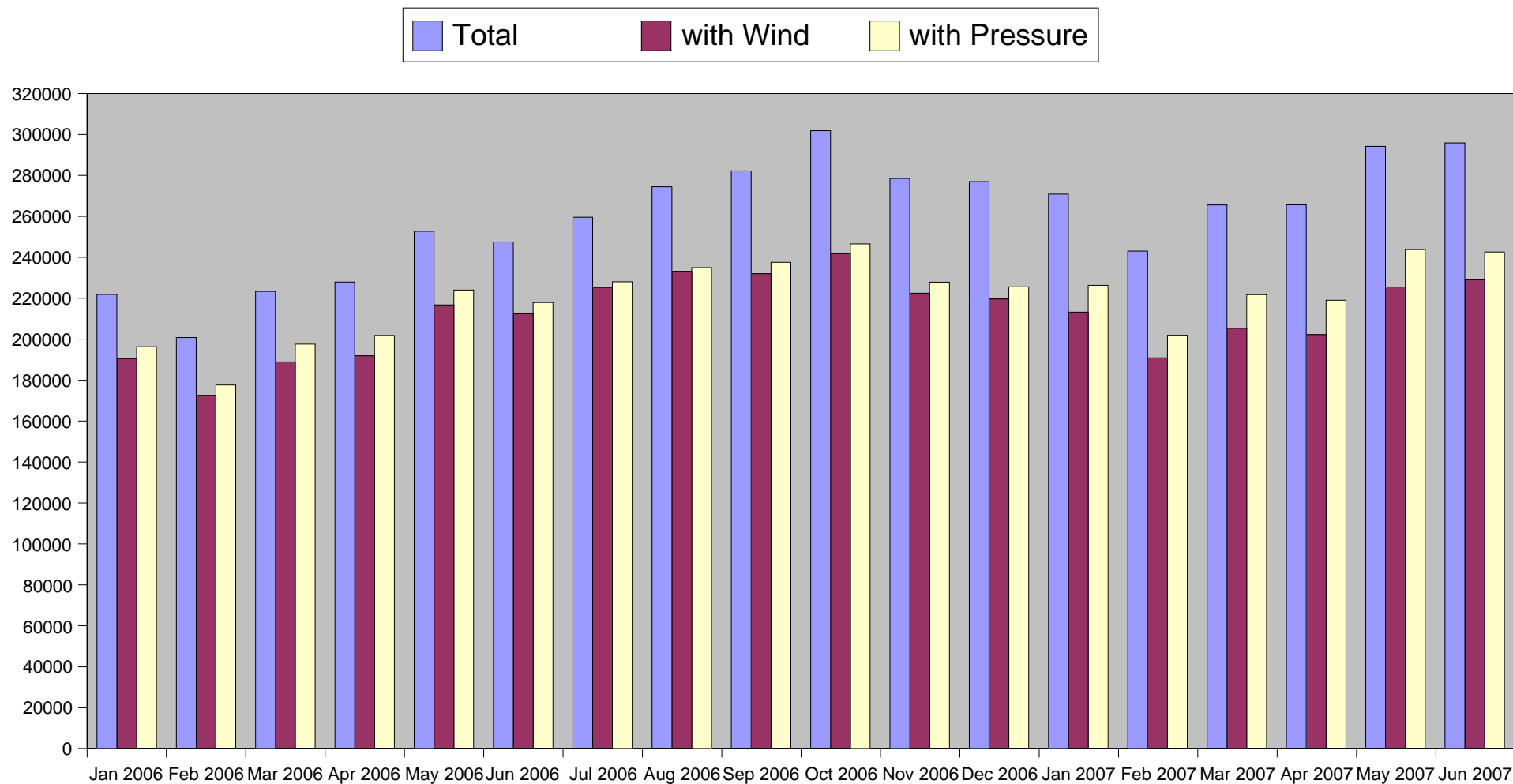


FIGURE 4

Time evolution of WAVEOB reports and sensors

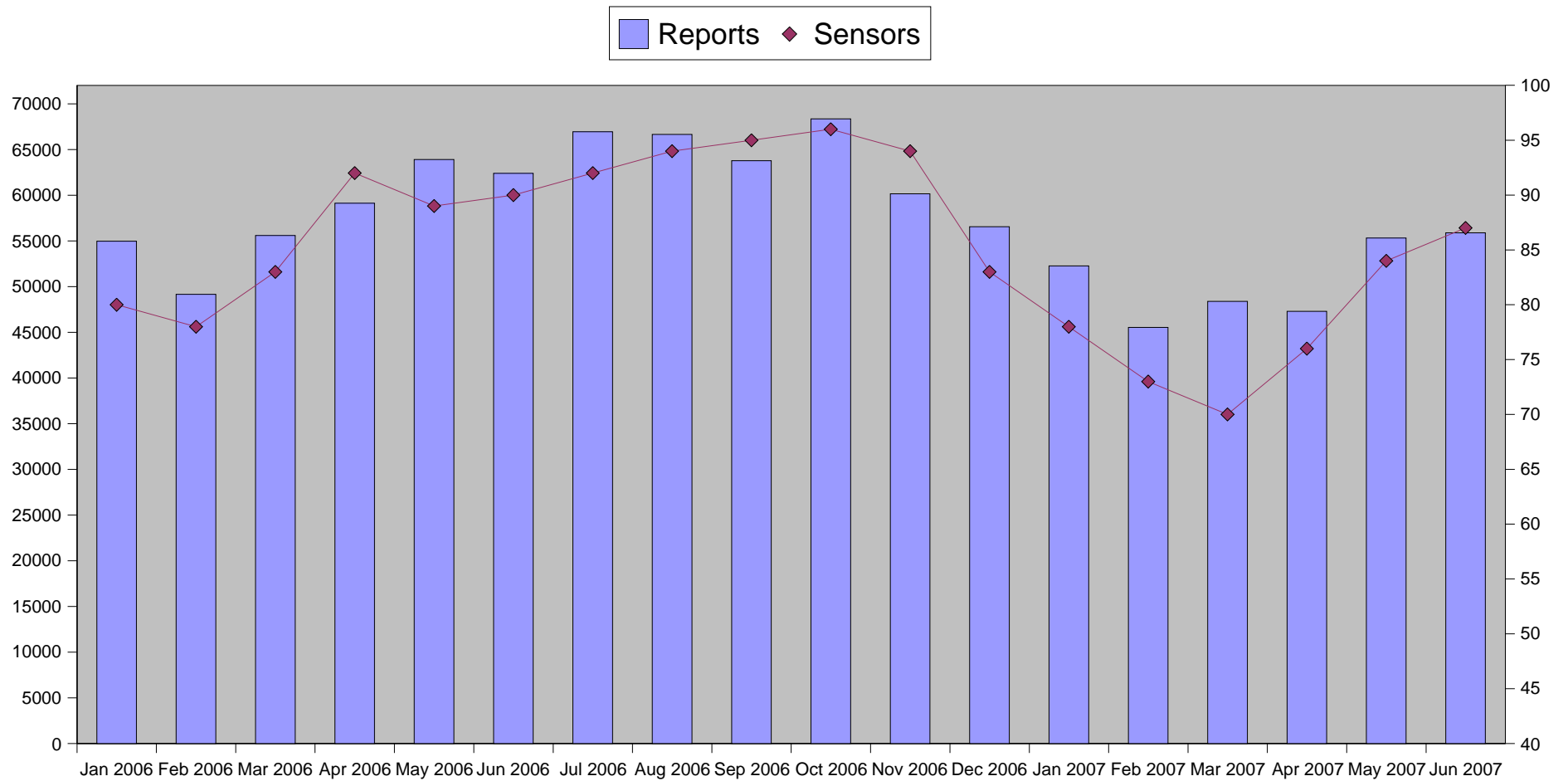


FIGURE 5

Carte de pointage des observations reçues en juin 2007

Mapping position plot chart of data received during June 2007

Messages : BATHY

Total : 1805

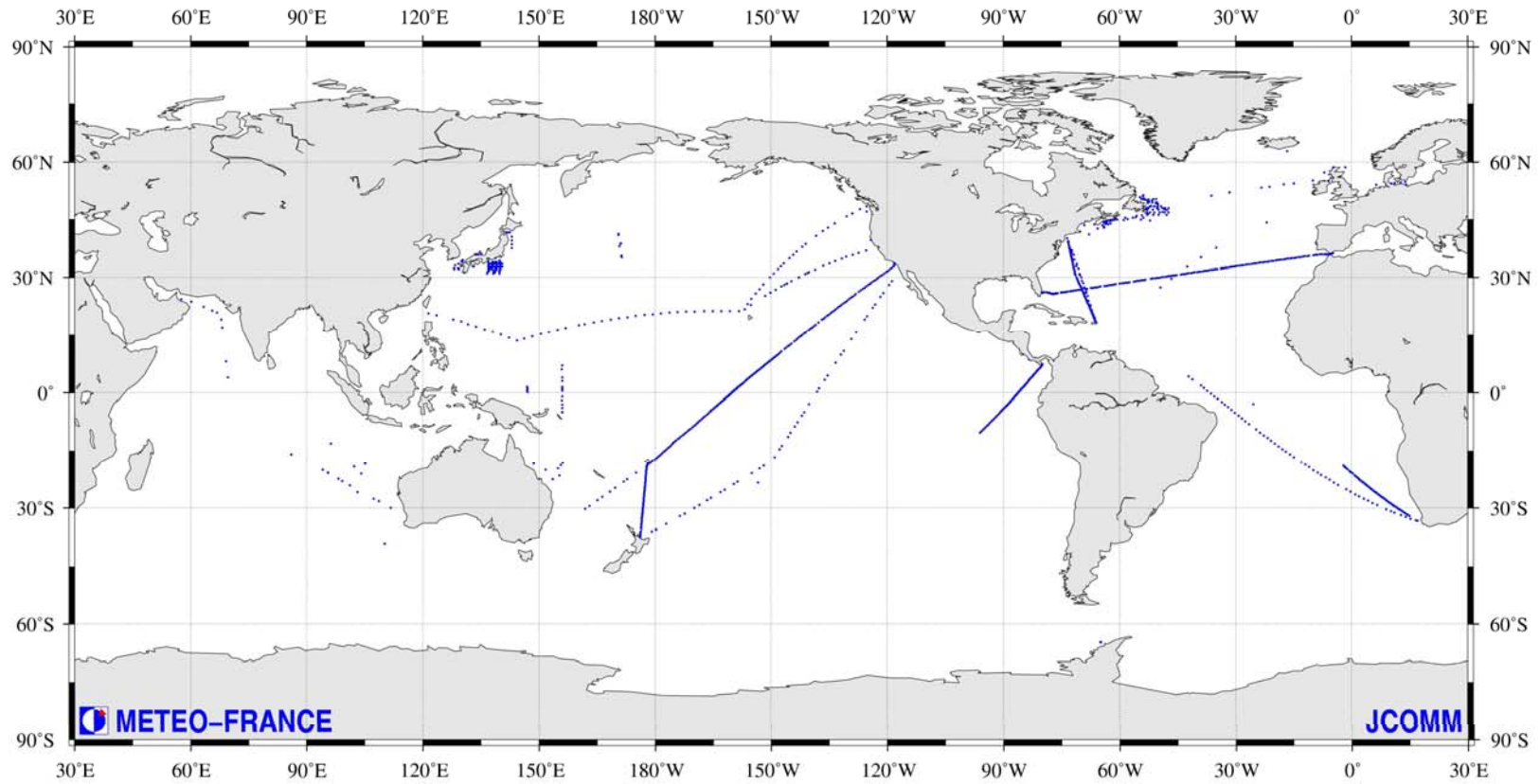


FIGURE 6a

Répartition par carré Marsden des observations reçues en juin 2007
Marsden square distribution chart of data received during June 2007

Messages : BATHY

Total : 1805

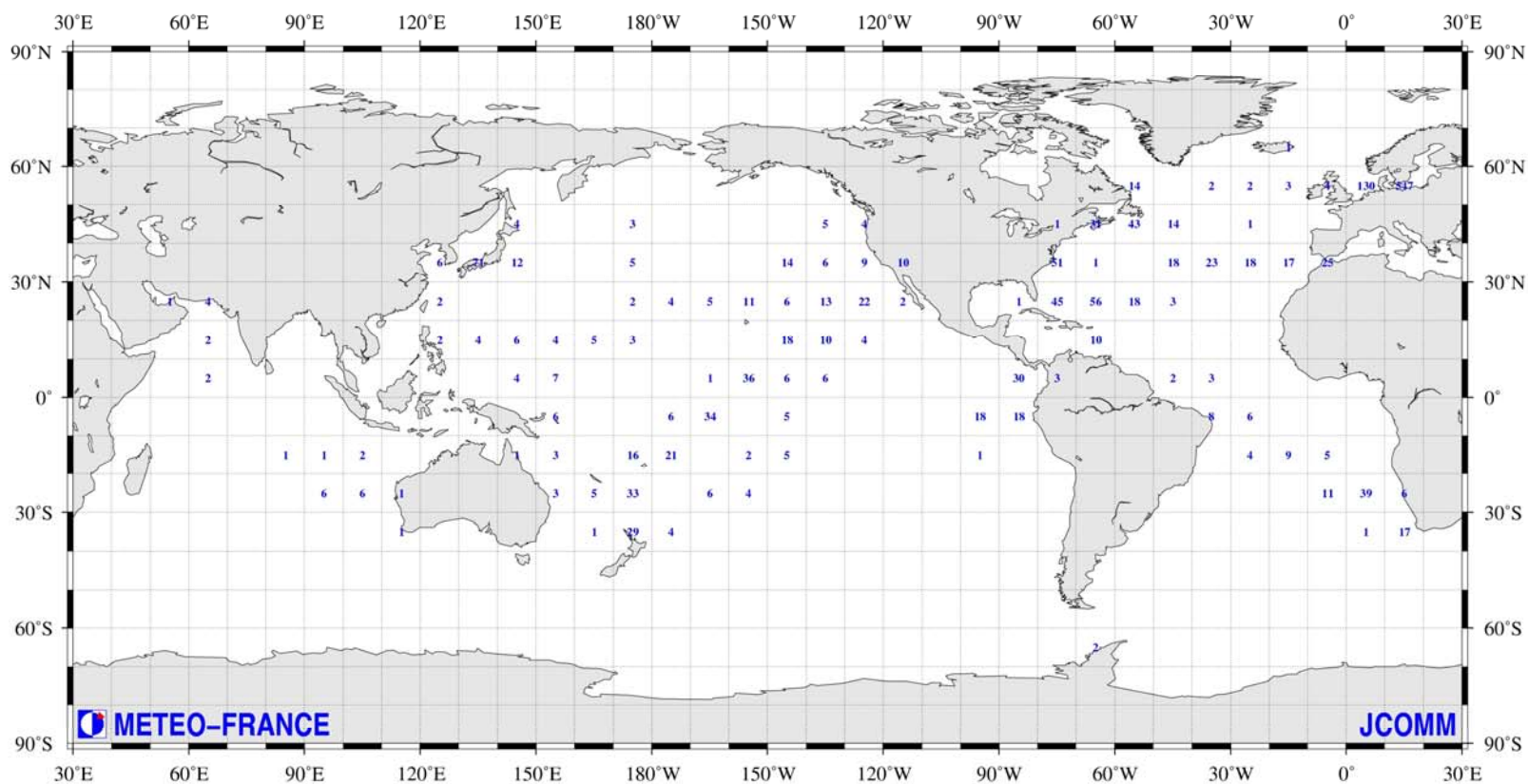


FIGURE 6b

Carte de pointage des observations reçues en juin 2007

Mapping position plot chart of data received during June 2007

Messages : TESAC

Total : 20265

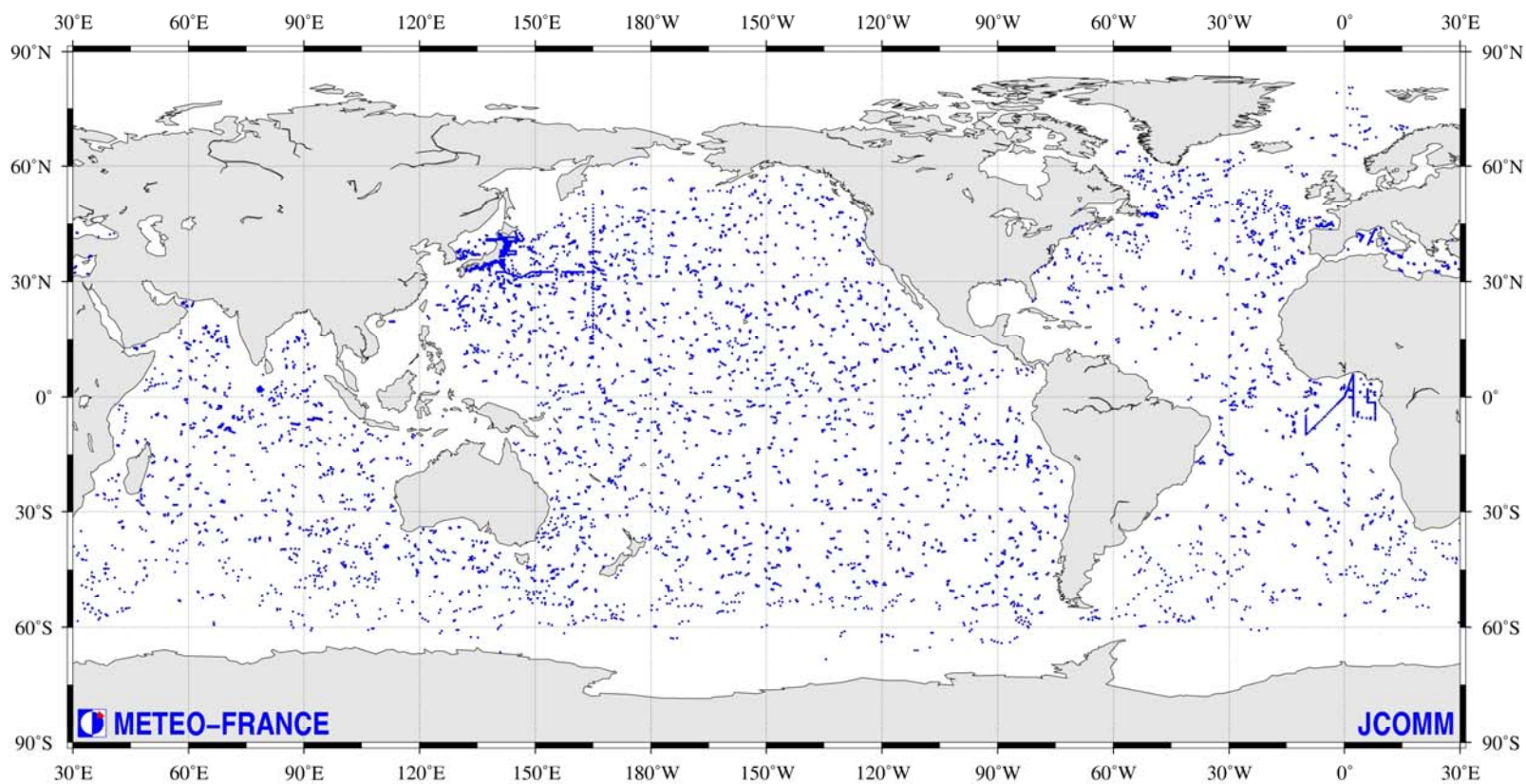


FIGURE 7a

Répartition par carré Marsden des observations reçues en juin 2007
Marsden square distribution chart of data received during June 2007

Messages : TESAC

Total : 20265

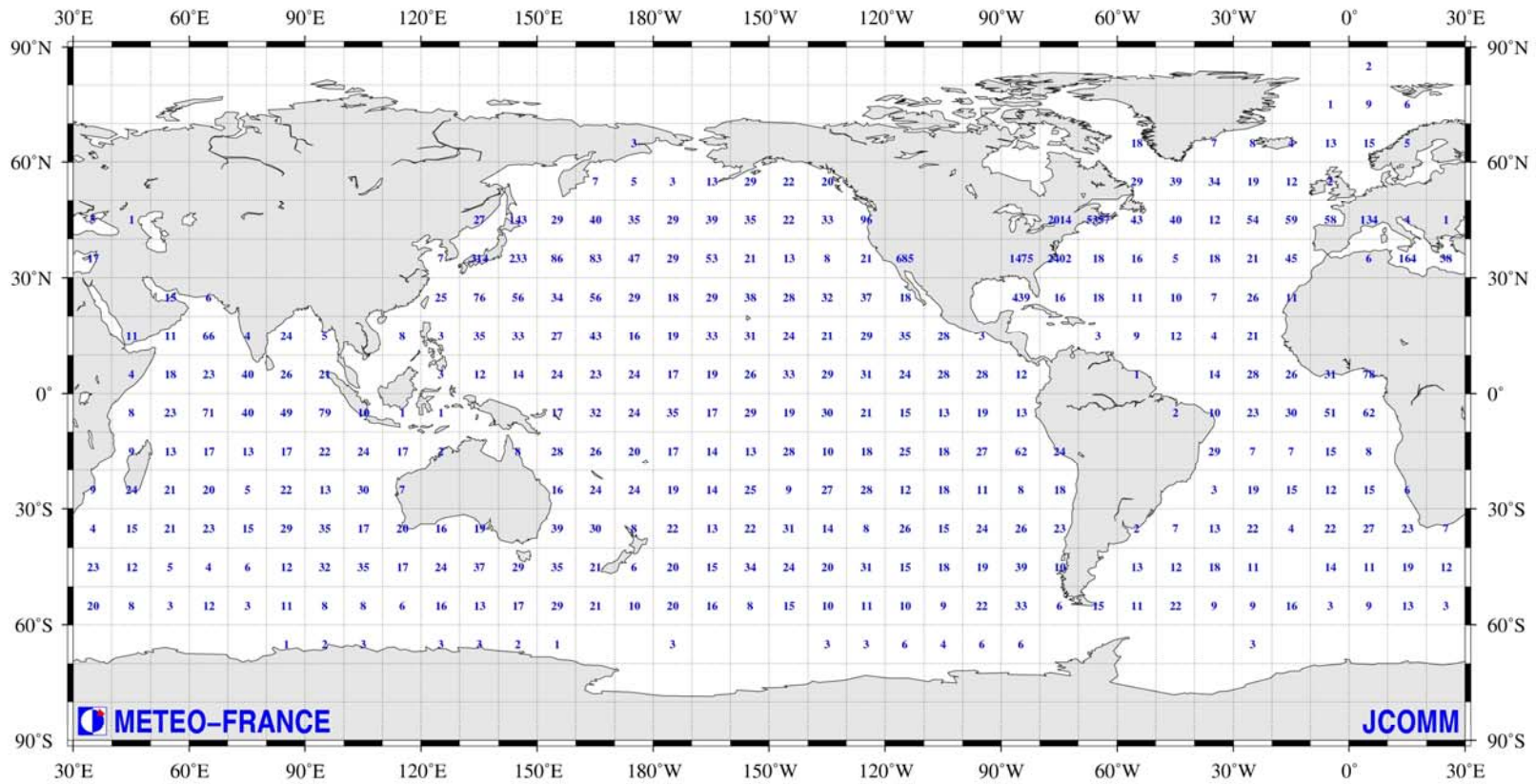


FIGURE 7b

Carte de pointage des observations reçues en juin 2007

Mapping position plot chart of data received during June 2007

Messages : SHIP

Total : 295874

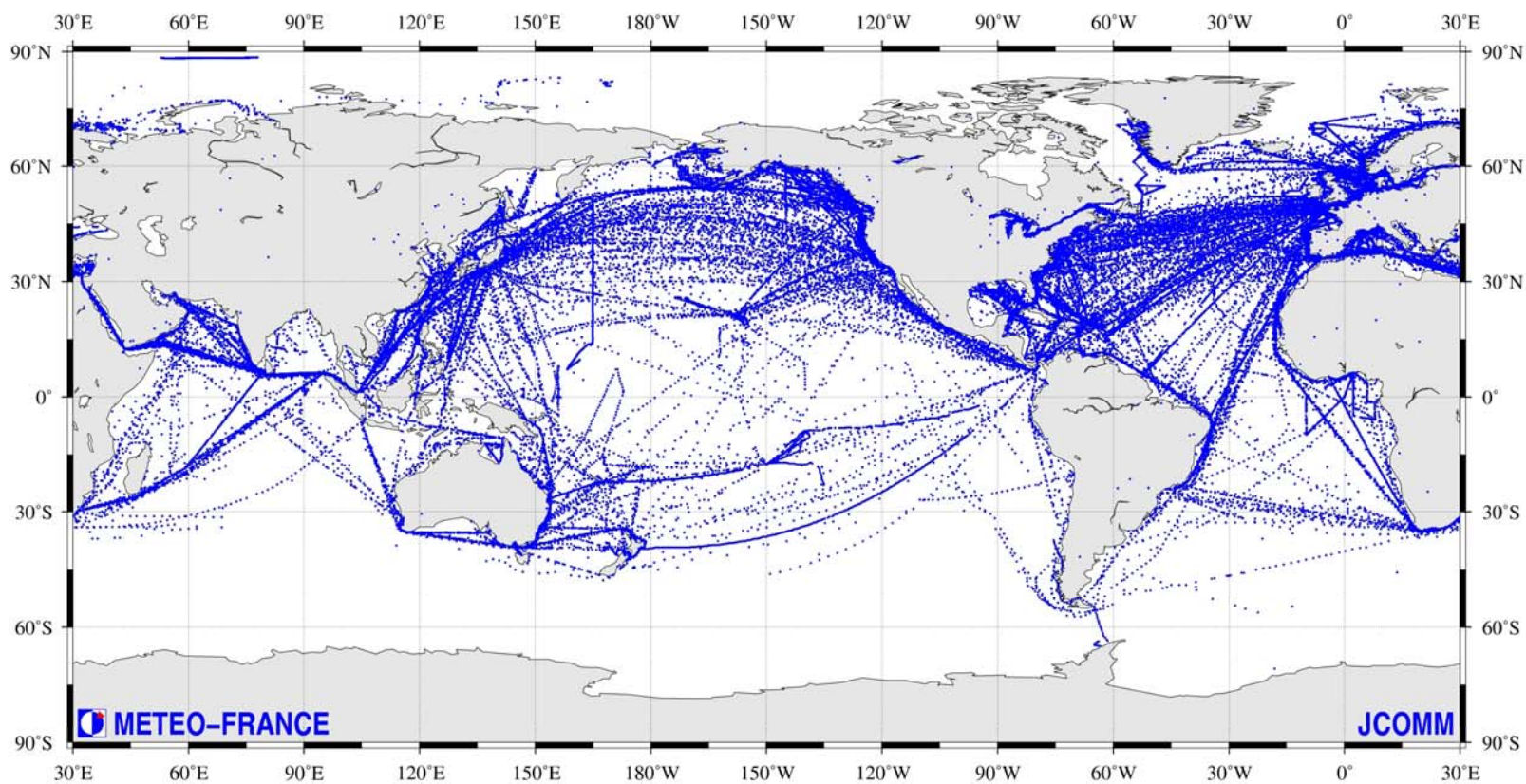


FIGURE 8a

Répartition par carré Marsden des observations reçues en juin 2007
Marsden square distribution chart of data received during June 2007

Messages : SHIP

Total : 295874

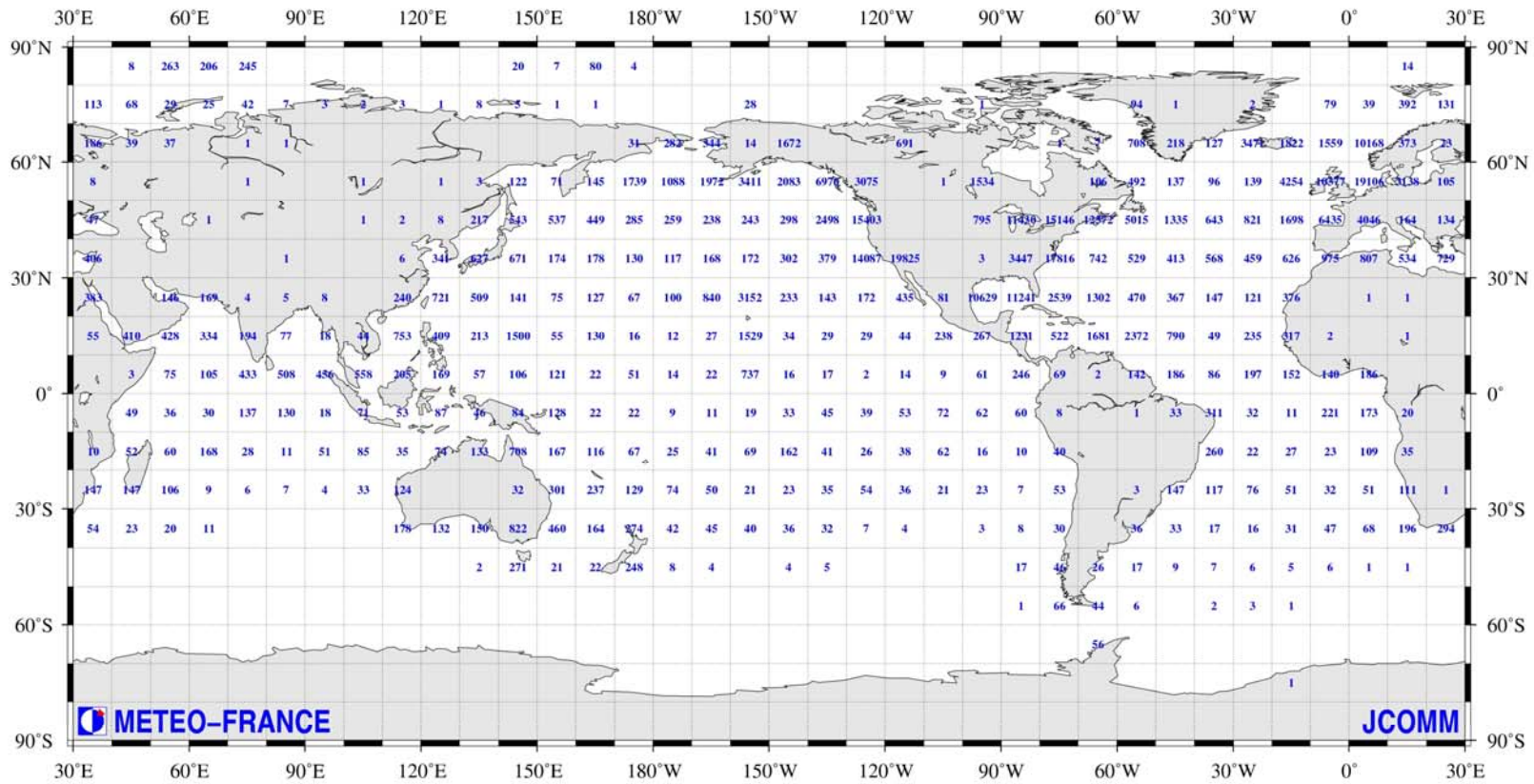


FIGURE 8b

Carte de pointage des observations reçues en juin 2007

Mapping position plot chart of data received during June 2007

Messages : BUOY

Total : 899665

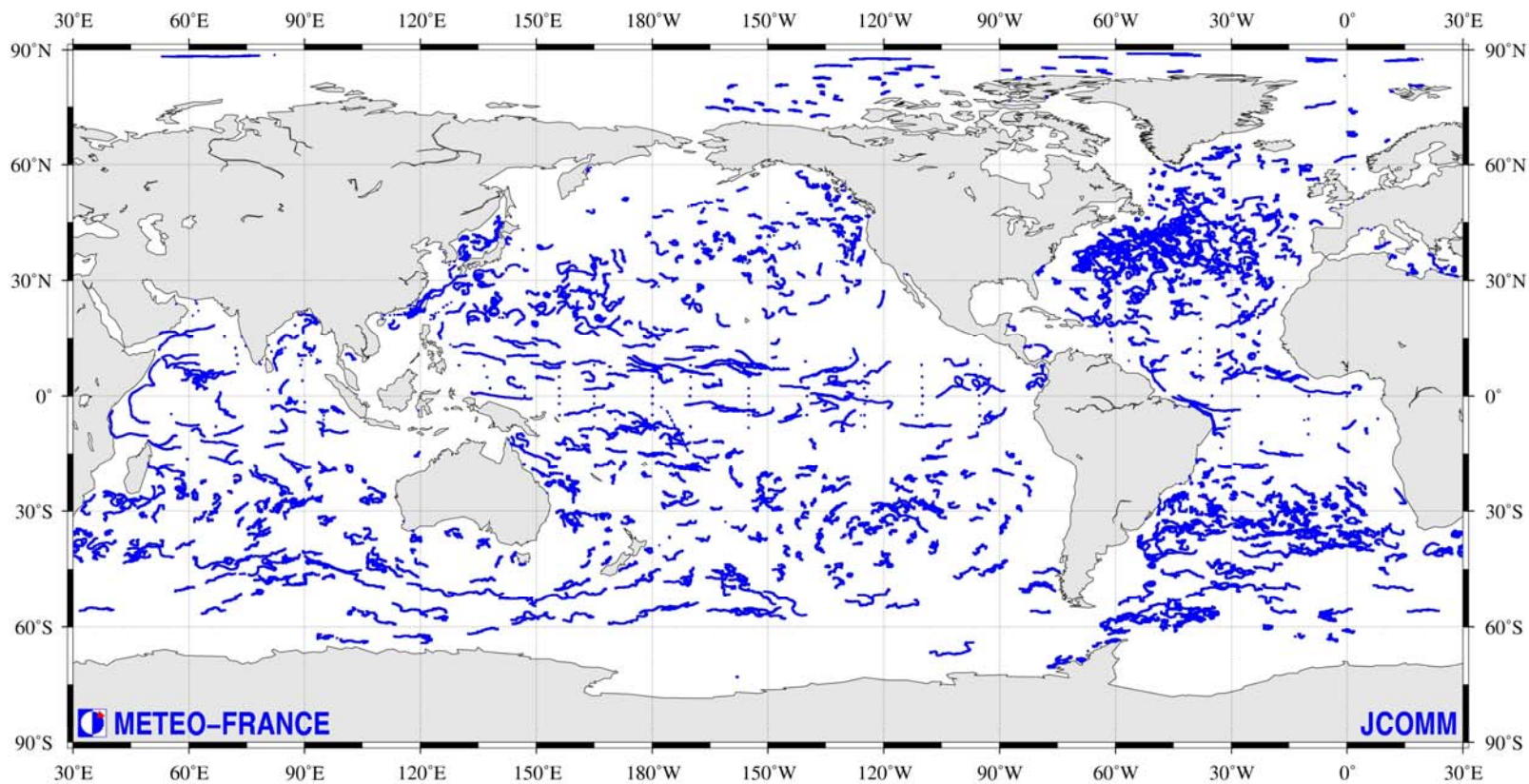


FIGURE 9a

Répartition par carré Marsden des observations reçues en juin 2007
Marsden square distribution chart of data received during June 2007

Messages : BUOY

Total : 899665

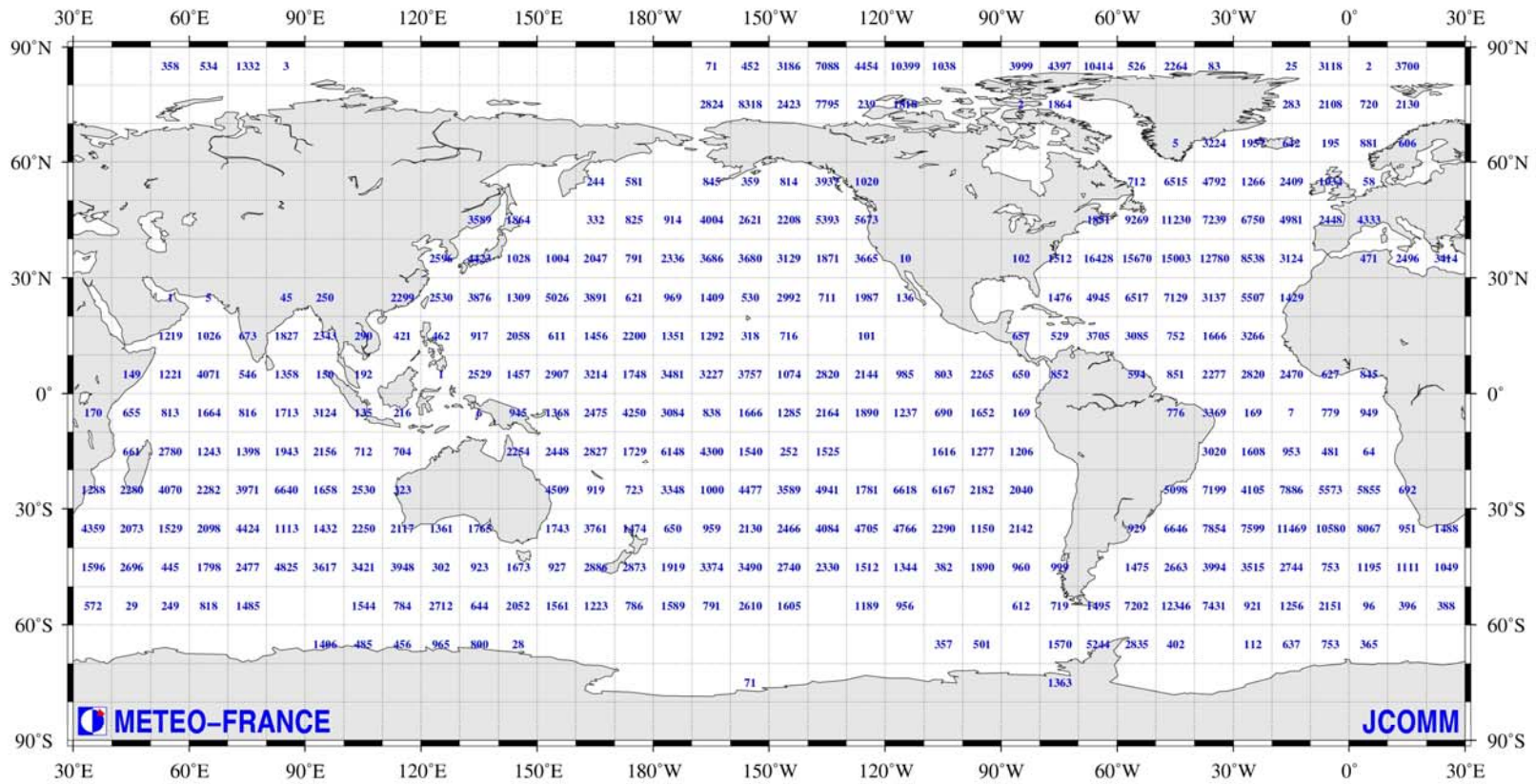


FIGURE 9b

Carte de pointage des observations reçues en juin 2007

Mapping position plot chart of data received during June 2007

Messages : TRACKOB

Total : 9774

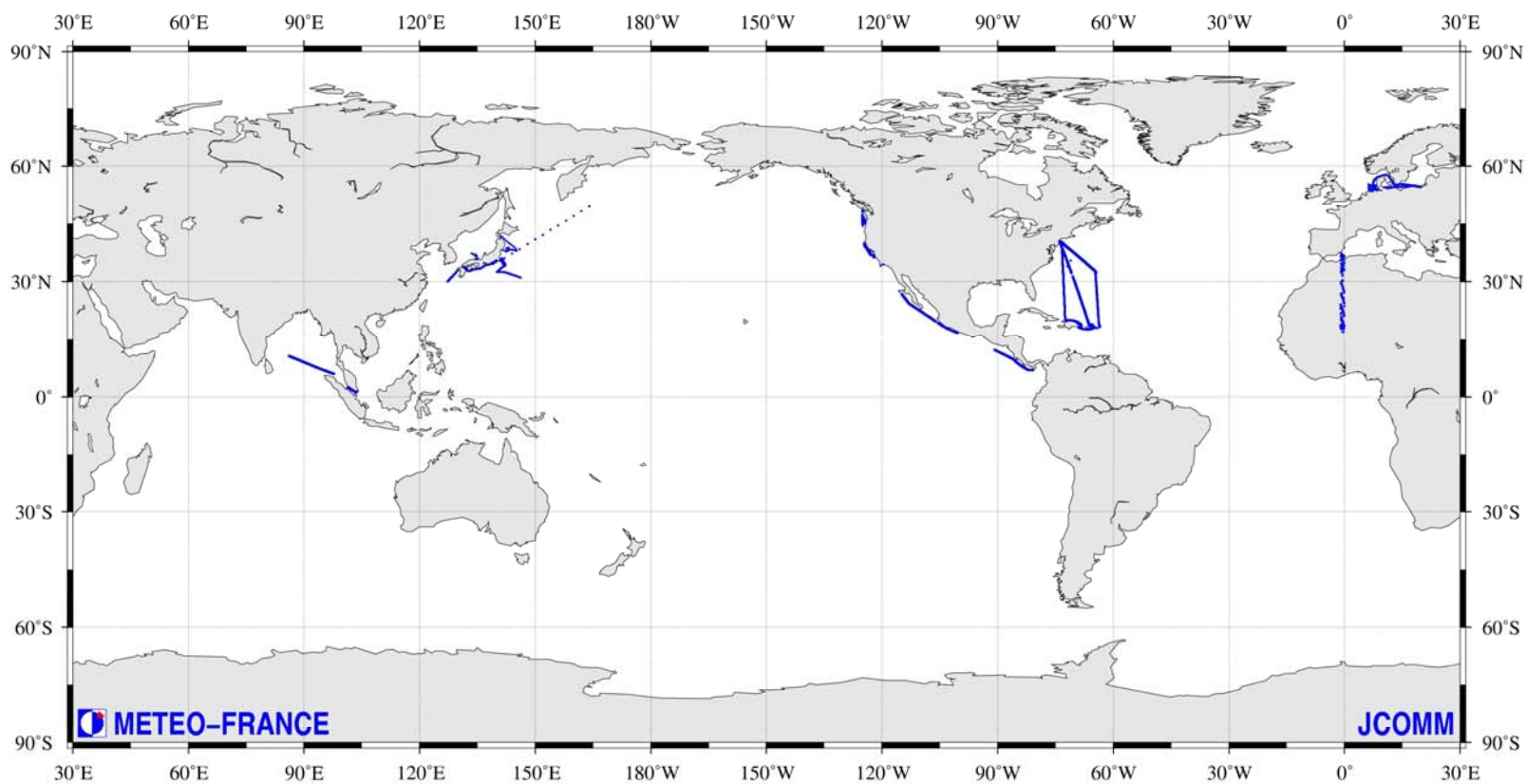


FIGURE 10a

Répartition par carré Marsden des observations reçues en juin 2007
Marsden square distribution chart of data received during June 2007

Messages : TRACKOB

Total : 9774

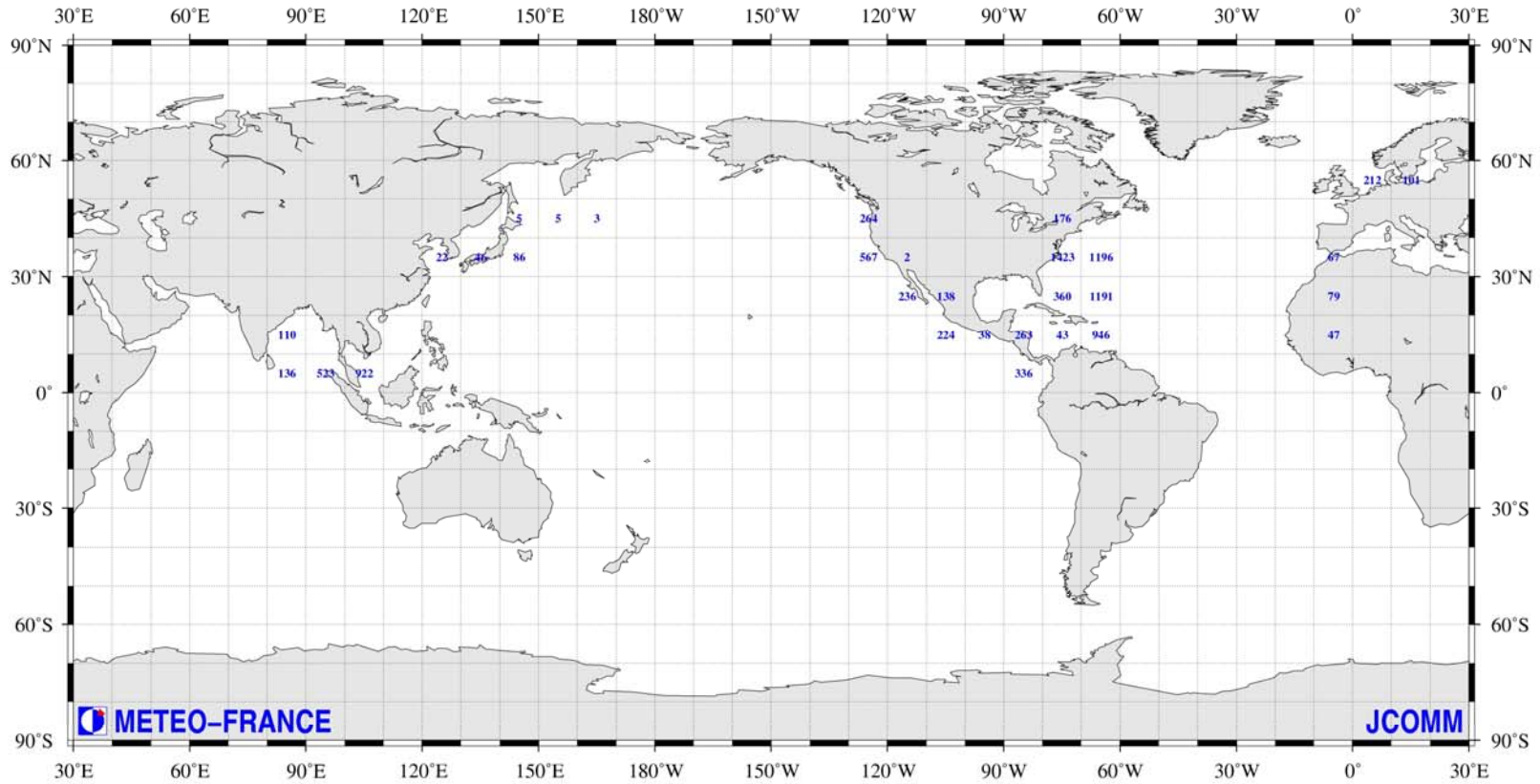


FIGURE 10b

METEO-FRANCE

WIND

JUNE 2007

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)

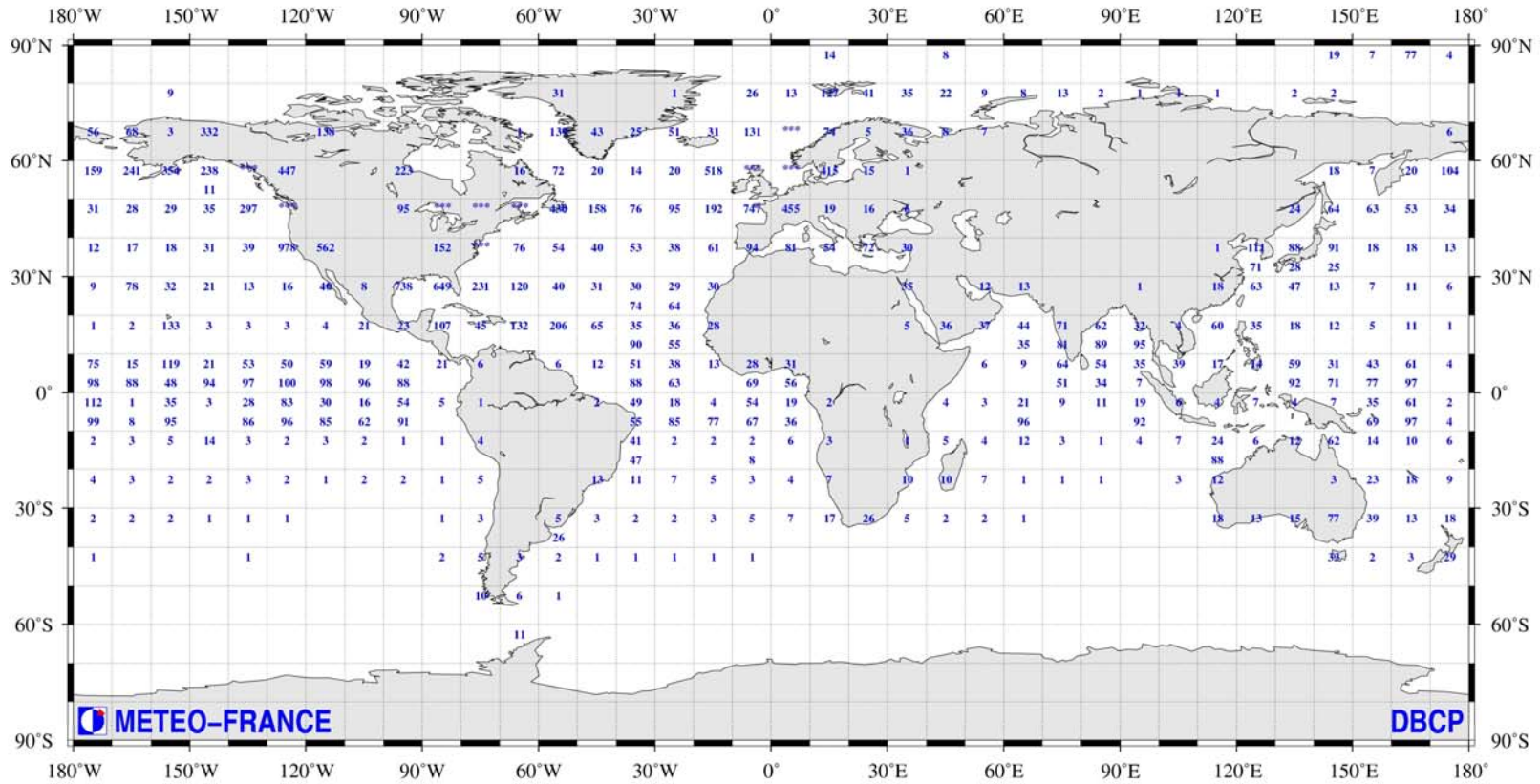


FIGURE 11

METEO-FRANCE

PRESSURE

JUNE 2007

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)

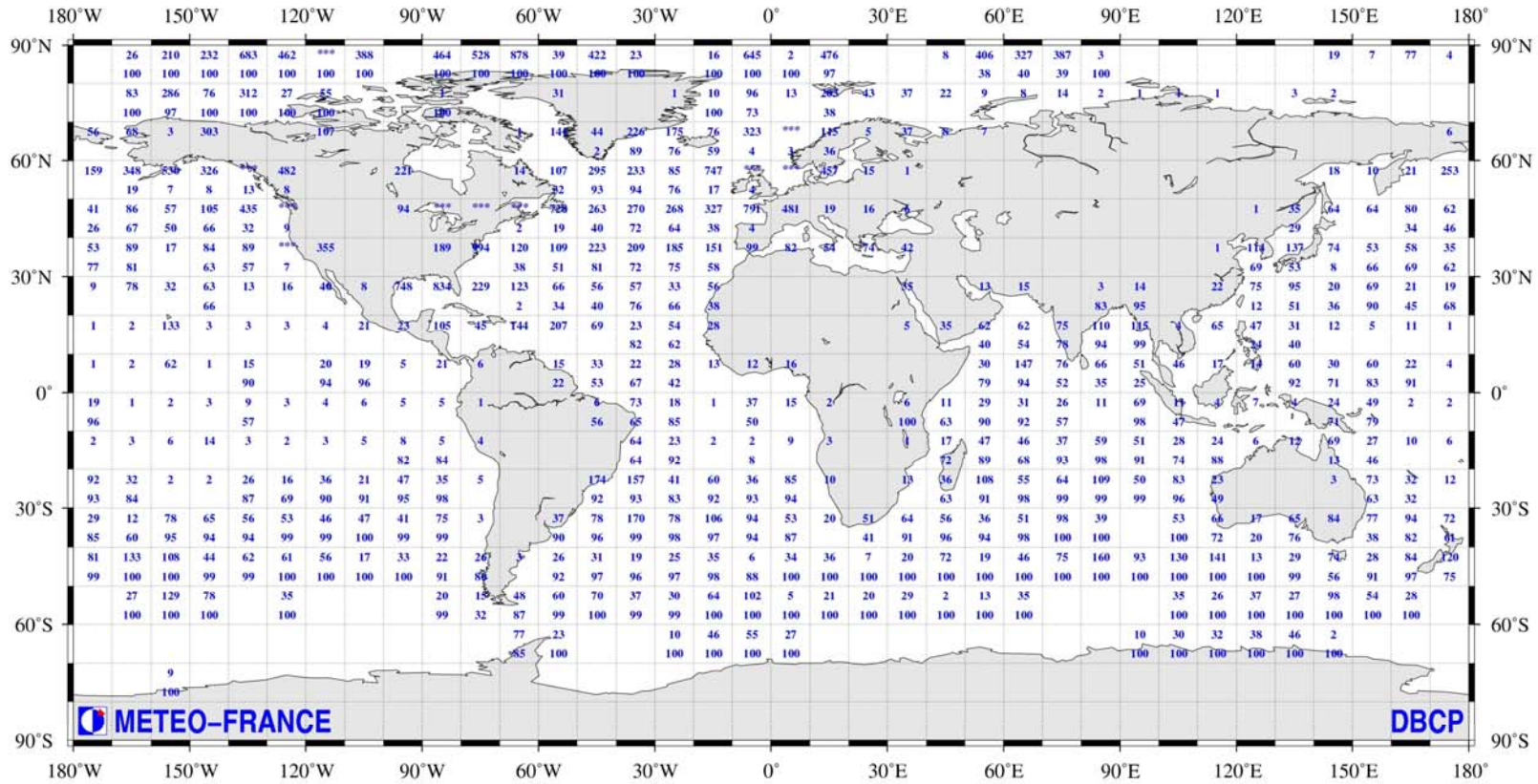


FIGURE 12

METEO-FRANCE

TEMPERATURE

JUNE 2007

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)

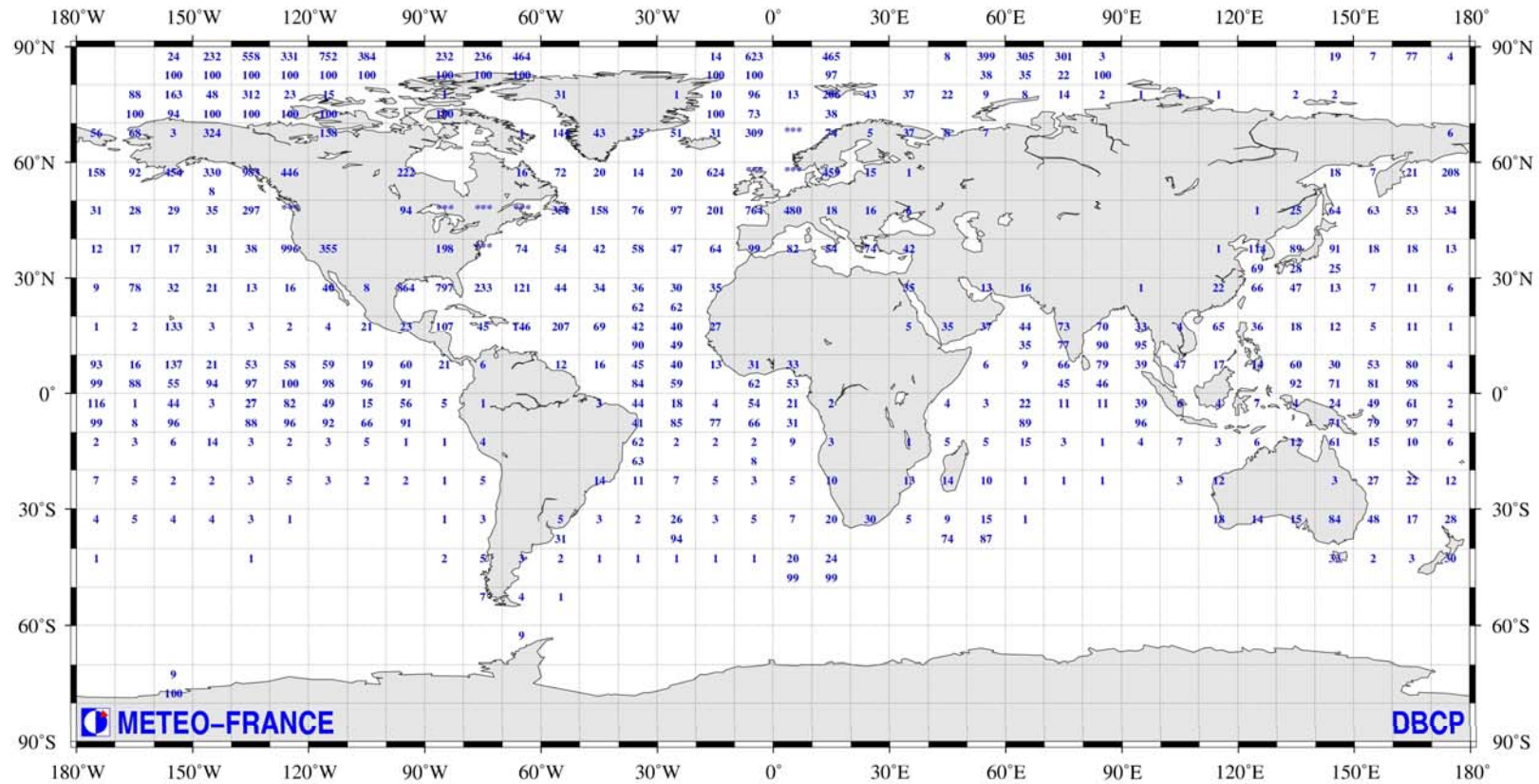


FIGURE 13

METEO-FRANCE

SEA SURFACE TEMPERATURE

JUNE 2007

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)

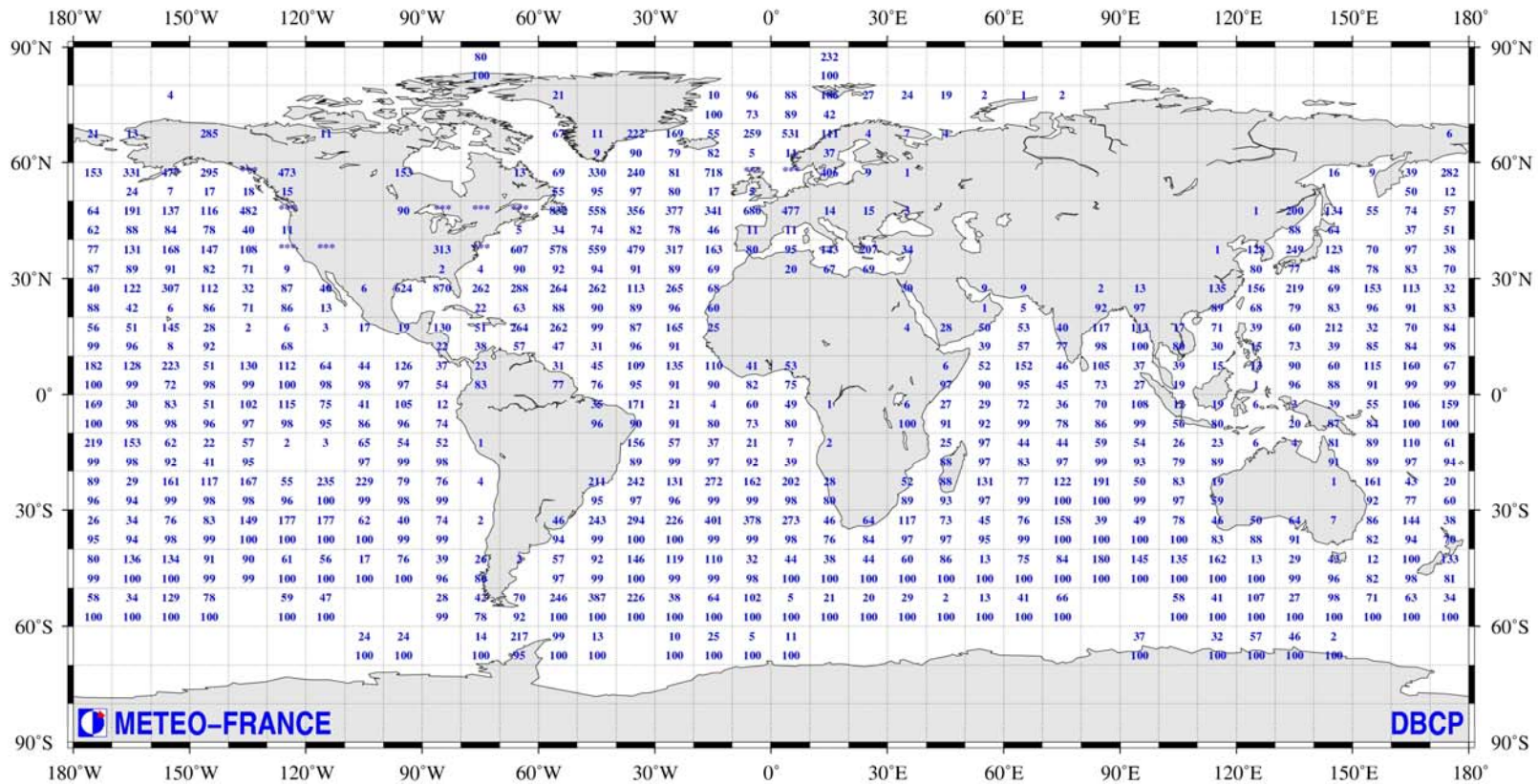


FIGURE 14
