

Global Subsurface Data Centre (GSDC) for TOGA and WOCE

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The Upper Ocean Thermal Data Assembly Centre (UOT-DAC) in Brest collects subsurface temperatures both in real time and in delayed mode. The centre collates the data, eliminating duplicates and provides a standardized quality-controlled data set to the World Data Centres A and B for Oceanography. Selected data sets are provided to scientists on a routine basis.

Data set

Most of the observations are made routinely by the VOS (Voluntary Observing Ships) XBT network sampling along regular shipping lines recommended by TOGA and WOCE. Additional observations come from research vessels, navies, fishing vessels and moorings. The largest dataset is the collection of eXpendable BathyThermograph (XBT) data (Fig. 1).

Setting up a VOS line includes the training of the crew and the management of the XBT probes and the collected data. France is contributing to this network by setting up 6 lines in the Atlantic Ocean, 3 lines in the Indian Ocean and 15 lines in the Pacific Ocean with XBTs provided by NOAA up to 1995 (support is not yet decided for 1996).

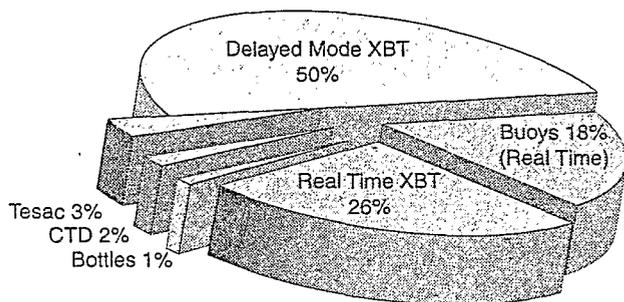


Figure 1. Composition of the data base per type of profile (February 1996).

Data flow

Real-time (RT) data (BATHY messages) are received electronically from the French IGOSS Centre, METEO FRANCE in Toulouse the first week of each month. They are replaced by the more complete delayed mode (DM) data when they are transferred to the data centre (see the time distribution on Fig. 2). The time lag between the receiving of RT data and the DM data is about three years due to the slowness of the data flow but also due to some technical problems like frequent changes in the exchange formats. Moreover about 24% of the RT profiles are never replaced by DM data.

Fig. 3 provides a comparison of the number of XBT data collected in each ocean for each year from 1985

onwards. The number of profiles available in each ocean seem to be linked to the ocean sizes. Sampling in the Indian Ocean seems to remain steady whereas it seems to decrease slightly from 1992 onwards in the other oceans.

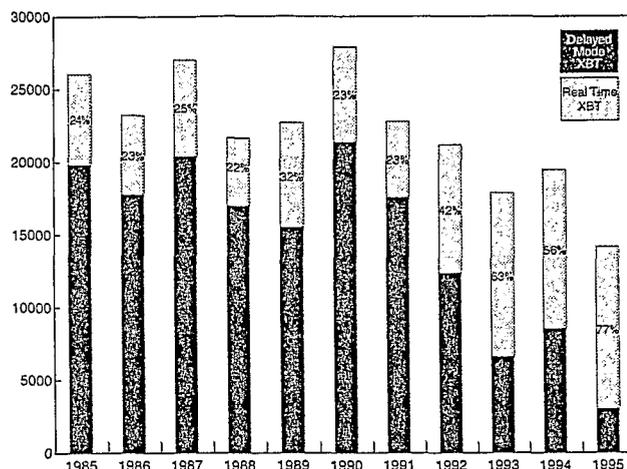


Figure 2. Composition of the data base in real time and delayed mode XBT (January 1996).

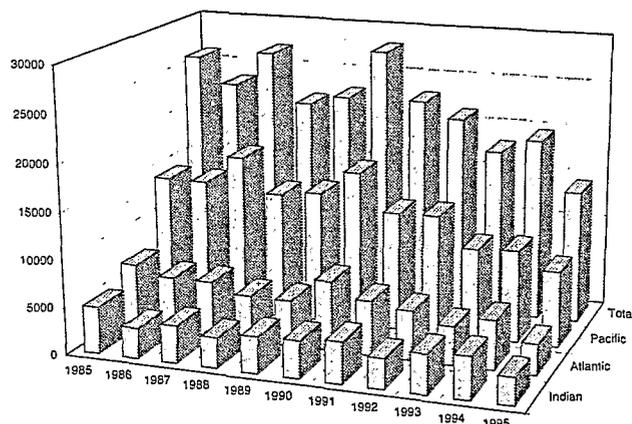


Figure 3. Data base per year and ocean (January 1996).

Quality control (QC)

The data base is continuously updated, using merging procedures to replace real-time data by the corresponding delayed-mode data. Emphasis is put on duplicate checks (automatic and visual). Every incoming set of profiles is examined objectively first (automatic checks) and then subjectively according to the IOC recommendations. Each profile is then visually checked on an interactive graphic display with the results of the automatic checks. Standard flags are applied to each temperature/depth pair as well as to header elements.



Data Quality flags are as follows:

- 0 : No Quality Control done
- 1 : Good data
- 2 : Probably good data
- 3 : Probably bad data
- 4 : Bad data
- 5 : Changed value

If data are already flagged by one of WOCE Regional Science Centres, the original flags are not modified and the profiles are archived in the data base in full resolution. For practical reasons the QC are performed in the following order:

- Automatic checks that follow international requirements (spikes, gradient tests, temperature inversions,...)
- Duplicate test: complex procedure checking for identical (irrespective of ship's name) and near-identical observations; best data is kept
- Data: consistency with neighbouring data
- Land test: visual inspection of dot plot for each data set (eliminate data on land)
- Speed test: if vessel exceeds 25 knots, position/date of observation reviewed
- Climatology: Temperature data quality control is based on data editing and visual comparison with the Levitus Climatology (*i.e.* five degree squares and seasonal climatology)

Access to data

The GDC provides data files in different formats and different kind of maps. All products can be generated on request with the following possible selection criteria: data type (XBT, CTD, Bathy,...); date of measurement; ocean (Atlantic, Pacific, Indian); geographical selection (latitude, longitude); vessel (radio code, name or NODC code); institution (name, NODC code).

Data products

1. Data files are available in several ASCII output formats (TSDC, Hydro, GTSP, Medatlas).
2. Four kinds of maps are available to show the space distribution of the profiles: Location of Profiles (Fig. 4a); Number of profiles by geographical squares (*e.g.*: 5° x 5°, Fig. 4b); Dots as a function of classes of

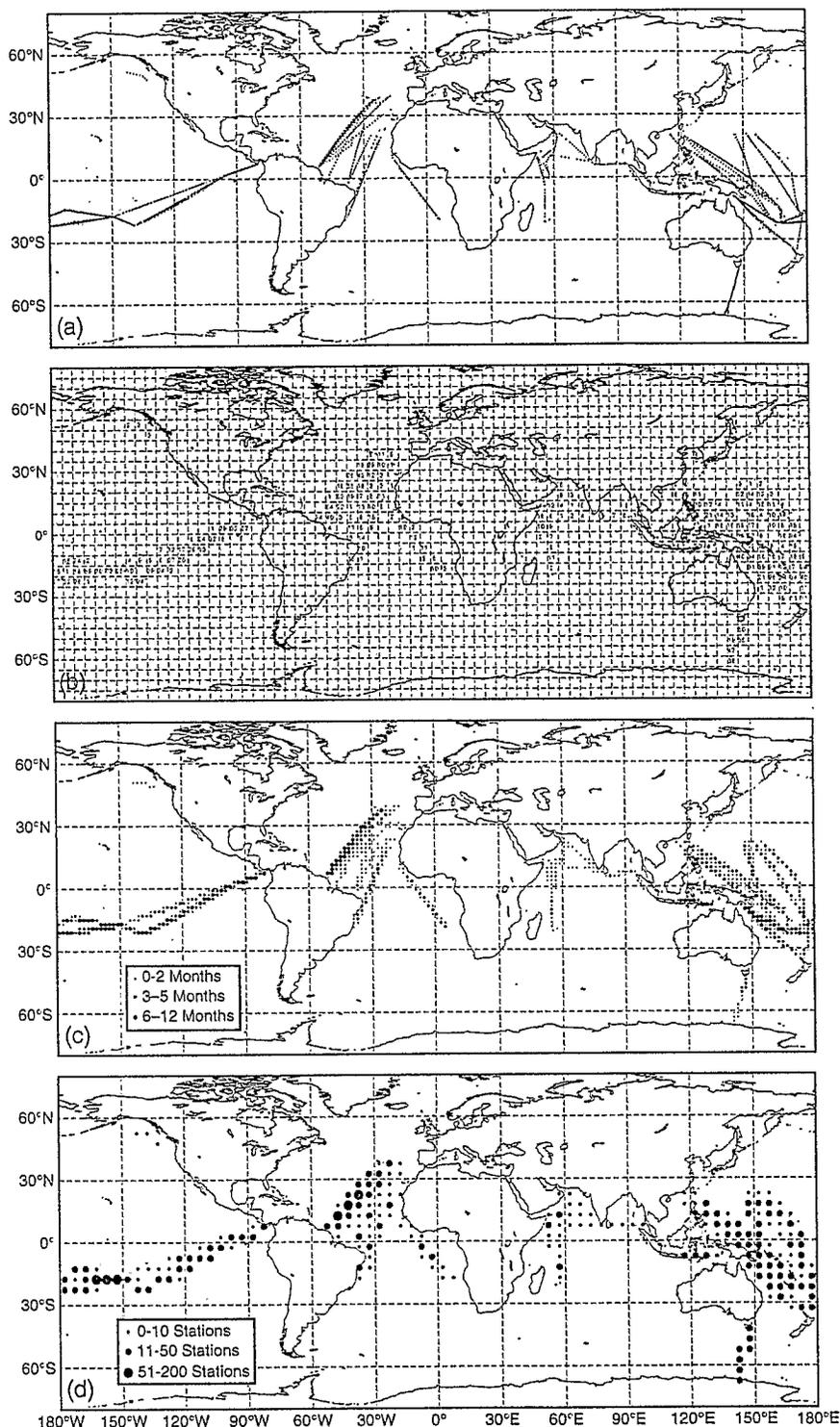


Figure 4. Maps available at GSDC: (a) Location of profiles; (b) Number of profiles by geographical squares; (c) Dots as a function of classes of profiles numbers by geographical squares; (d) Dots as a function of the number of months for which profiles were archived for each geographical square.

3. Statistics are available such as: Number of stations; Distribution of stations according to data types and oceans; Distribution of stations according to vessels,

years, months and oceans; Distribution of stations according to institutions and years.

4. A detailed 6 monthly report (in French) of the centre's activities is also issued.

Some data products are already available on the WWW, such as maps of station location for each year from 1985 to 1995. Newly-archived data are available on line as well. As soon as data files are archived, users can find a new map of station location, the number of stations, data file volume and the data file. A description of the format is also available on line.

Conclusion and perspective

This data set begins in 1985, when it was initiated for the tropical (30°N–30°S) region, and was extended worldwide for the WOCE experiment in 1990. Accordingly the present data set is more substantial in the tropical area. It must be pointed out that one of the important objectives of the TOGA experiment was to set up an operational observing system of the upper ocean, associating the available *in situ* observations with a realistic model. This has been done in the past, where monthly data sets from the Brest centre were assimilated in the LODYC numerical model in Paris (Morlière *et al.*, 1990). As a result, both the numerical

model and the quality control procedure of the data set were improved. Such kind of product could be prepared for the WOCE and also for the forthcoming programmes like CLIVAR and GOOS.

Reference

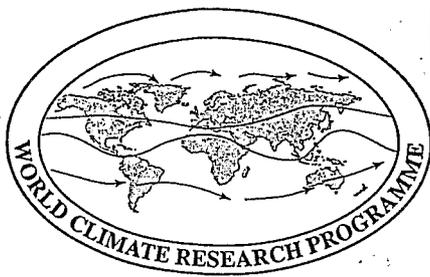
- Morlière, A., Rebert J.P., Servain, J., and Merle, J., 1990: An operational 3-dimensional simulation of the Tropical Atlantic Ocean with assimilation of the *in situ* observations. International TOGA Scientific Proceedings, Honolulu, WCRP-43/WMO/TD-No. 379, pp 19–27.

Data requests can be sent to GSDC by e-mail or regular mail. Data products can be provided on different digitalized supports *e.g.*: diskettes, tapes, ftp or WWW.

For data shipment and more information contact:

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WOCE is a component of the World Climate Research Programme (WCRP), which was established by WMO and ICSU, and is carried out in association with IOC and SCOR. The scientific planning and development of WOCE is under the guidance of the Scientific Steering Group for WOCE, assisted by the WOCE International Project Office.

The WOCE Newsletter is edited at the WOCE IPO at the Southampton Oceanography Centre, Empress Dock, Southampton SO14 3ZH (Tel: 44-1703-596789, Fax: 44-1703-596204, e-mail: woceipo@soc.soton.ac.uk).

We hope that colleagues will see this Newsletter as a means of reporting work in progress related to the Goals of WOCE as described in the Scientific Plan. The SSG will use it also to report progress of working groups, experiment design and models.

The editor will be pleased to send copies of the Newsletter to institutes and research scientists with an interest in WOCE or related research.

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