XBT Data Documentation

Introduction

XBT probes were deployed to provide temperature profile data between stations on a total of the BOFS/Sterna cruises. These cruises have been subdivided into the following groups on the basis of different processing protocols and/or availability of processing information:

BOFS 1989 NABE cruises (Discovery 182, 183 and 184)

BOFS 1990 Lagrangian Experiment cruises (Discovery 190 and 191)

BOFS 1991 Coccolithophore cruise (Charles Darwin 61)

Sterna 1992 survey cruise (Discovery 198)

The XBT data for each group of cruise are documented below in separate sections.

BOFS 1989 North Atlantic Bloom Experiment Cruises (Discovery 182, 183 and 184)

The UK Hydrographic Office provided the XBT probes used, which were either type T7 (760m) or T5 (1800m) probes. The cruise reports and log sheets from these cruises provide no indication of the type of probe used. However, examination of the maximum depths indicates that the profiles were most likely collected using T7 probes.

The raw data were logged directly onto Hewlett-Packard tape cartridges, which were sent to the Hydrographic Office at Taunton for processing and quality control. The data were returned as calibrated ASCII temperature-depth files, reduced to the minimum number of points needed to define the shape of the profile.

On arrival at BODC, the data were converted into an internal format and inspected on a graphics workstation, which revealed that the data were of good quality and free from spikes. The data were loaded into the relational database. The procedure included verification of launch times against available log sheets (cruises 182 and 183) and assignment of positions based on these times and the automatically logged master navigation file.

Significant errors (up to 3 days!) were detected by the checks of launch times against the log sheets for cruises 182 and 183. No log sheets were available for Discovery 184. As the positions have been assigned on the basis of the launch times there is a real risk for this cruise of undetected launch time errors resulting in incorrect positions for some of the profiles.

The maximum profile depths require some comment. For Discovery 184 the median of the maximum profile depths was 761.5 metres, which is exactly as one would expect for a T7 probe. However, for Discovery 182 it was 817m and for Discovery 183 it was 833m, with maximum profile depths from both cruises of over 895m. Inspection of the profiles shows that the temperatures labelled with depths >760m are credible, which shows that these were not excess data logged after ‘snap off’. Therefore, the conclusion must be drawn that a different depth computation algorithm was used for the first two cruises. It cannot be said with any certainty, which is correct (although the DI184 depths seem more credible) and **users are asked to take this uncertainty about the depths into consideration when using the data.**

BOFS 1990 Lagrangian Experiment Cruises (Discovery 190 and 191)

The UK Hydrographic Office provided the XBT probes used, which were either type T7 (760m) or T5 (1800m) probes. The cruise reports and log sheets from these cruises provide no indication of the type of probe used. However, examination of the maximum depths indicates that the profiles were most likely collected using T7 probes, with the exception of one profile from Discovery 191 (XBT191#14) that includes temperatures down to 5.2, which are typical of N Atlantic waters at depths greater than 1000m. It is therefore most likely that a T5 was used for this cast.

The data were processed on the ABC system and arrived at BODC as part of the Level C GF3 archive as files of date/time, depth and temperature.

On arrival at BODC, the data were converted into an internal format, inspected on a graphics workstation and temperature spikes in the data were flagged as suspect. The data were loaded into the relational database. Positions were assigned from the master navigation file on the basis of the time channel included in the data file. No external verification of these times was possible as no log sheets could be obtained.

The maximum profile depths require some comment. The median of the maximum profile depth (excluding the T5 profile) was 867m for Discovery 190 and 887m for Discovery 191, with maximum profile depths from both cruises of over 895m. Inspection of the profiles shows that the temperatures labelled with depths >760m are credible, which shows that these were not excess data logged after ‘snap off’. These maximum profile depths were very similar to those obtained on two of the three NABE cruises (see above) and it seems likely that the same depth computation algorithm was used. It cannot be said with any certainty that this was the correct algorithm and consequently **users are asked to take this uncertainty about the depths into consideration when using the data.**

BOFS 1991 Coccolithophore Cruise (Charles Darwin 61)

The UK Hydrographic Office provided the XBT probes used, which were either type T7 (760m) or T5 (1800m) probes. According to the cruise log, T7 probes were used from 12/7/91 to 23/7/91 inclusive with the exception of one cast (BODC event number 28929: cast at 16:57 on 21/7/91). On all other casts, T5 probes were used. Notes in the log indicated that the XBT system was set up for T7 probes but T5 probes were launched for the following casts:

29082 (XBT61#089)	09:30	25/07/1991	(762m profile)
29212 (XBT61#101)	07:31	26/07/1991	(1220m profile)
29220 (XBT61#102)	09:32	26/07/1991	(762m profile)
29239 (XBT61#103)	11:29	26/07/1991	(63m profile)

However, examination of the maximum profile depths casts serious doubts on the accuracy of these records. It looks far more credible to assume that T7 probes were used for all casts except the following:

XBT61#074-078
XBT61#082-085
XBT61#088
XBT61#099-101
XBT61#103-108

The raw data from the cruise were supplied to BODC on floppy disk, which was sent to the Hydrographic Office at Taunton for processing and quality control. The data were returned as calibrated ASCII temperature-depth files, reduced to the minimum number of points needed to define the shape of the profile.

On arrival at BODC, the data were converted into an internal format and inspected on a graphics workstation, which revealed that the data were of good quality and free from spikes. The data were loaded into the relational database. The procedure included verification of launch times against available log sheets and assignment of positions based on these times and the automatically logged master navigation file.

Checks on the maximum profile depths did not reveal any cause for concern.

Sterna 1992 Survey Cruise (Discovery 198)

The Bathy Systems Incorporated program version 1.1 was used on a SESU (Hydrographic Department) supplied deck unit to record XBT launches. The probes were launched using a Sippican Corporation hand launcher from the stern quarter in the lee of the wind. T7 (760m) probes were used for all launches except xp198016, xp198017 and xp198019 for which T5 (1800m) probes were used. A number of profiles were lost or curtailed due to short-circuiting of the wire in high winds, thermal shock or wire stretch due to snagging.

Temperature was computed from the voltage drop across the probe using the manufacturer's algorithm. The 10 Hz temperature data were transferred from the deck unit to the ABC system by floppy disk 'walknet'. Depth was computed from flight time (t) using the equations:

T7 $\quad \text{Depth} = 6.472\ t - 0.00216\ t^2$

T5 $\quad \text{Depth} = 6.828\ t - 0.00182\ t^2$

Comparison with coincident CTD data indicated that these equations worked well.

The data were transferred to P* format and quality controlled using the P-EXEC software suite. Data were archived in GF3 format and transferred to BODC.

On arrival at BODC, the data were converted into an internal format, inspected on a graphics workstation and any remaining temperature spikes in the data were flagged as suspect. The data were loaded into the relational database. Positions were assigned from the master navigation file on the basis of the launch times included in the cruise log.

Checks on the maximum profile depths did not reveal any cause for concern.