CTD data series for cruise Pelagia PE125 (19 to 30 October 1998)

Cruise Principal Scientist and Data Originator

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Content of data series

Parameter	Unit	Parameter code	Number of casts (*)	Comments
Pressure	db	PRESPR01	73	none
Temperature (ITS-90)	deg. C	TEMPST01	73	none
Potential Temperature	deg. C	POTMCV01	73	none
Salinity	PSU-78	PSALST01	73	none
Sigma-theta	kg m^{-3}	SIGTEQ01	73	none
Chlorophyll *a*	µg l^{-1}	CPHLPR01	73	calibrated from fluorescence
Optical attenuance	m^{-1}	ATTNMR01	73	correction factor applied
Dissolved oxygen	µmol l^{-1}	DOXYPR01	41	calibrated
Oxygen saturation	percent	OXYSBB01	41	none
Downwelling irradiance	µE m^{-2} s^{-1}	IRRDUV01	41	none

(*) the total number of 73 casts include 31 yoyo profiles between 30 and 80 m carried out during 1.5 hours on 23 Oct. 1998 (for all parameters but oxygen and irradiance).

Instrumentation and data processing by originator

CTD unit and auxiliary sensors:
Sea-Bird Electronics 911 Plus system fitted with the following additional sensors: 25 cm pathlength transmissometer (SeaTech SN160), Aquatracka III fluorometer (Chelsea Instrument SN 88/725/042), oxygen sensor and PAR sensor (K-meter SN4410) for downwelling irradiance.

Changes of sensors during the cruise: none reported.

Data were logged on a PC running Seabird Seasave data acquisition software v. 4.224 and manufacturer's calibration coefficients were applied to the raw data.

Data were supplied to BODC as downcasts only, binned to 0.5 db.

Sampling device:
Rosette sampling system equipped with 24 x 12L NOEX sampling bottles. The pressure sensor was located close to the base of the bottles, at a distance of 1m from the top aperture of the bottles. The calculation of bottle sampling depth by BODC takes into account the geometry of the CTD frame.

No reversible thermometer was used.

BODC post-cruise processing and screening

Reformatting:
The data were converted into BODC internal format (PXF) to allow use of in-house software tools notably the workstation graphics editor SERPLO. In addition to reformatting, the transfer program applied the following modifications to the data:

- transmissometer readings were converted from percent transmission to attenuance using the algorithm:

$$\text{attenuance } (m^{-1}) = -1 / PL * \log_e (\% \text{ transmission} / 100)$$

where PL is the transmissometer pathlength in m (0.25 m).

- oxygen was converted from µmol kg^{-1} to µmol l^{-1} as follows:

oxygen (µmol l^{-1}) = oxygen * (sigma-t + 1000) / 1000

Screening:
Reformatted CTD data were transferred onto a high-speed graphics workstation. Downcast channels were screened graphically using custom in-house graphics editors. If present, spikes and suspicious values were manually flagged. No data values were edited or deleted; flagging was achieved by modification of the associated quality control flag to 'M' for suspicious data and 'N' for null.

Banking:
Once screened on the workstation, the CTD downcasts were loaded into a database under the ORACLE Relational Database Management System.

Calibration and correction:

- Attenuance: on-board conversion from volts to percent transmission was carried out using a calibration coefficient of 20 instead of 22.55. The resulting error on attenuance (calculated as: offset = -1 / 0.25 * $\log_e$ (22.55 / 20) = -0.48 per m) was significant. The offset correction was applied to the data directly in the database at BODC according to the following formula:

ATTN = ATTN - 0.48

It was later noted that the attenuance values during this cruise were consistently higher than those measured during the two other concomitant PROVESS NNS cruises Dana D1198 and Challenger CH140. A correction was attempted based on comparison of attenuance values in the upper 40 m (<mixed layer depth) between CTD casts from these three cruises. Only casts that had been made within 0.5 hours and within 0.1 degree of latitude and longitude of each other were selected for the intercomparison. Difference between CH140 and D1198 CTD attenuance values were not significant so the two were merged for comparison with PE125. The offset was very consistent between depths and stations (n=13) and averaged 0.36 ±0.03 m^{-1} . The following correction was applied to the attenuance channel:

offset corrected attenuance = ATTN – 0.36

- Fluorescence: chlorophyll fluorescence (µg Chl *a* l^{-1}) was calibrated against extracted chlorophyll concentrations measured on samples collected during the cruise using the following equation determined by K. Wild-Allen (Napier University, Edinburgh, UK):

Chl *a* = 6.299 Fluor – 10.411, R^2=0.758, n=92

where Chl *a* (µg l^{-1}) is the chlorophyll concentration of samples filtered through GF/F filters, extracted in 90% acetone and determined by spectrophotometry using the trichromatic method and Fluor is the chlorophyll concentration (µg l^{-1}) calculated from the CTD fluorometer output and the manufacturer's calibration coefficients.

This calibration equation resulted in a number of negative chlorophyll concentration values (up to -0.24 µg l^{-1}) being observed occasionally.

- With the exception of the oxygen channel, data from the other channels had already been calibrated by the data originator and no further calibration/correction was applied.

Comments on data quality

Oxygen analyses were not performed during this cruise. The oxygen channel is therefore uncalibrated and absolute values should be used with caution.