Surface Underway Data for Challenger 36 (16 Sep - 30 Sep 1988)

Instrumentation

A suite of parameters were logged from the non-toxic supply, the intake for which was located on the ship's hull, about 2m below the surface.

Navigation was predominantly based on Decca and is hence prone to the inherent weaknesses in this system, particularly at dawn and dusk.

The bathymetric depth was measured using a Simrad echo sounder with the transducer mounted on an overside pole.

Temperature and salinity were measured using an autoranging TSG103 thermosalinograph. Temperature was measured by a thermistor in the non-toxic supply inlet manifold. Conductivity was measured by a unit in the ship's wet laboratory, which included a second thermistor to provide temperature for the computation of salinity.

Optical transmittance was measured using a SeaTech red light (661nm) transmissometer with a 25cm optical path length mounted in a light-tight box on the starboard deck.

Operational procedure and data logging

Data were logged by the Research Vessels Services ABC data logging system. The data output units were sampled every 30 seconds by a microprocessor interface (the Level A) which passed time stamped data cycles to a Sun workstation (the Level C) via a buffering system (the Level B). Navigation was updated every two minutes and infilled by linear interpolation.

Data Processing

The raw data comprised ADC counts. These were converted into engineering units (degrees for latitude/longitude, volts for transmissometer, mmho/cm for conductivity, degC for temperature, metres for bathymetry) by the application of laboratory determined calibrations and salinity was calculated using the algorithm in Fofonoff and Millard (1983). The data were submitted to BODC in this form.

Within BODC the data were reformatted on an IBM main-frame. At this stage transmissometer air readings recorded during the cruise were used to correct the transmissometer voltage to the manufacturer's specified voltage by ratio. The voltages were then converted to attenuance to eliminate the influence of instrument path length using the equation:

$$\text{Attenuance} = -4.0 * \log_e (\text{voltage}/5.0)$$

Next the data were loaded onto a Silicon Graphics workstation. A sophisticated interactive screening program was used to examine the data and flag any spikes on all of the data channels. The data were then returned to the IBM.

Calibrations

The thermosalinograph was intercalibrated against surface values taken from the calibrated CTD. The corrections applied to the thermosalinograph and the time period for which they are valid are shown below:

Start time	End time	Salinity Correction (PSU)	Temperature Correction (degC)
16/09/1988 12:31	19/09/1988 02:37	0.13	0.02
19/09/1988 02:37	23/09/1988 07:43	0.02	0.02
23/09/1988 07:43	23/09/1988 12:52	0.19	0.02
23/09/1988 12:52	29/09/1988 11:25	0.09	0.02
29/09/1988 11:25	29/09/1988 15:13	0.19	0.02

Data quality comments

Gaps when the Decca system was down or radio reception was too poor were infilled using SatNav fixes plus dead reckoning, based on an em-log below the ship's hull.

The cruise track was validated against digital coastline data and generally shows good agreement, even where the ship passed into the higher reaches of estuaries.

In addition to the true position, tidally corrected navigation is also included. This is the position that the water sampled at a given instant would have been when logging commenced (i.e. the time of the first data cycle). The correction was determined using a numerical model and gives good results in the open sea but is less reliable near the coast where topography dominates the tidal displacement.

Many spikes and bad values have been flagged in the bathymetry.

Some noisy patches in the salinity data have been flagged.

Warnings

No dissolved oxygen data available.

No chlorophyll data available.

No PAR (photosynthetically active radiation) data due to a problem with the logging system at medium to high light intensities.

References

Fofonoff, N.P. and Millard, R.C. Jr. (1983). Algorithms for the computation of fundamental properties of sea water.