

Continuous underway data series for cruise AMT6 (15th May – 16th June, 1998)

Chief Scientist

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Content of data series

Parameter	Column heading	Units	Comments
Latitude	LAT+VEN	Degrees +ve N	
Longitude	LON+VEE	Degrees +ve E	
Salinity	RPSAL	PSU	Suspect data
Sea temperature	RTEMP	Degrees C	
Bathymetric depth	DEPTH	m	
Raw Turner Designs fluorometer output	TFLUOR	Nominal units	Not yet available
Atmospheric pressure	APRES	mbar	
Dry bulb air temperature (Masthead starboard)	SMDBT	Degrees C	
Wind speed	Speed	knots	
Wind direction	Direction	Degrees	
Photosynthetically available radiation	IRRAD	W m ⁻²	
Solar radiation	SOLR	W m ⁻²	Noisy data
Ship's velocity North-South	VN	Knots +ve N	
Ship's velocity East-West	VE	Knots +ve E	

Instrumentation and data processing by originator

Underway instruments and methodology

Navigation was recorded using a 3D-GPS Trimble Surveyor system using Marine Star differential corrections. Bathymetry was measured using a Simrad EA-500 echo sounder.

The ship was equipped with a pumped "non-toxic" seawater supply system. Water was pumped through a Sea-Bird Electronics (SBE) thermosalinograph system, and a fluorometer.

The fluorometer was a linear response Turner Designs model 10 instrument in flow-through mode. This was placed in line with the SBE thermosalinograph and a flow meter.

The ship also had a scientific meteorological package including the following:

- Wind vane and anemometer
- A photosynthetically available radiation (350 – 700 nm) sensor
- A total irradiance sensor,
- A dry bulb thermometer

It is assumed that the position of the pyranometer was the same as for AMT5 and suffered from the same problem of shading by the foremast.

Data acquisition and on-board data processing

Raw data were logged as ADC counts on the ship's computers. They were converted into engineering units using initial manufacturers' calibrations. Conductivity and two temperature channels were produced from the thermosalinograph counts.

The data from the fluorometer was logged into the JCR Ocean Logger system using the internal A/D converter and range output.

The data were submitted to BODC in RVS internal format for post-cruise processing and data banking.

BODC post-cruise processing and screening

Reformatting

Underway data files were merged into a single binary merge file using time as the primary linking key. The time span of the file was from 15/05/1998 12:00:30 to 16/06/1998 08:41:30, with a sampling interval of 30 seconds.

Salinity was computed from housing temperature and conductivity using the UNESCO 1978 Practical Salinity Scale (Fofonoff and Millard, 1982).

Screening

Each data channel was inspected on a graphics workstation and any spikes or periods of dubious data were flagged. The power of the workstation software was used to carry out comparative screening checks between channels by overlaying data channels. A map of the cruise track was simultaneously displayed in order to take account of the oceanographic context.

Data processing, correction and calibration

- **Navigation**

A program was run which located any null values in the latitude and longitude channels and checked to ensure that the ship's speed did not exceed 15 knots. *The program identified 3 gaps which were filled using linear interpolation.*

- **Meteorology**

Relative wind speed and direction were logged from the meteorological package during the cruise. The ship's speed and heading channels were used with the relative wind data to produce absolute wind speed and direction.

- **Temperature**

The underway sea temperature channel was compared with averaged surface values extracted from CTD profiles up to 7 metres. The 49 samples gave a very small offset of -0.017°C between CTD and surface underway data with a standard deviation of 0.046. As the offset was smaller than the standard deviation, no correction has been applied to the underway data.

- **Salinity**

The salinity channel was calculated from conductivity and housing temperature. During screening, it was obvious that there was a problem with the salinity channel as it showed disturbance whenever there was a change in temperature. The housing temperature and conductivity channels were compared and a lag was found between the two. The response of conductivity lagged the housing temperature by 3 datacycles (or 90 seconds). To improve the quality of the salinity data, the conductivity and housing temperature channels were realigned by moving the conductivity back 3 datacycles. The salinity channel was then recomputed.

Surface CTD data were also extracted to calibrate the underway salinity. This indicated a problem with the underway data set that needs further examination. The salinity data should be used with caution until further notice.

- **Fluorometer**

The Turner Designs fluorometer operated on different range settings throughout the cruise. The points at which the range setting changed were identified during screening by looking for abrupt jumps in the signal with a magnitude of approximately 3. This was difficult to do during AMT6 and the data are currently under review. The fluorometer data have been excluded from the data set.

Comments on data quality:

Users should be cautious when using ship-borne wind measurements. Although the relative wind data have been corrected for ship's heading and speed, they are still sensitive to shielding effects. Users can consult the ship's E-W and N-S speed alongside the wind speed and direction.

The salinity values are suspect, particularly between 16/07 to 25/07. Further investigation will be carried out. Users should use surface salinity data from CTD casts if possible.

Reference

Fofonoff N.P. and Millard Jr., R.C. 1982. Algorithms for Computation of Fundamental Properties of Seawater. ***UNESCO Technical Papers in Marine Science*** 44.