

Underway navigation, meteorology and surface hydrography data series for cruise Pelagia PE136 (29 March to 9 April 1999)

Cruise Principal Scientist and Data Originator

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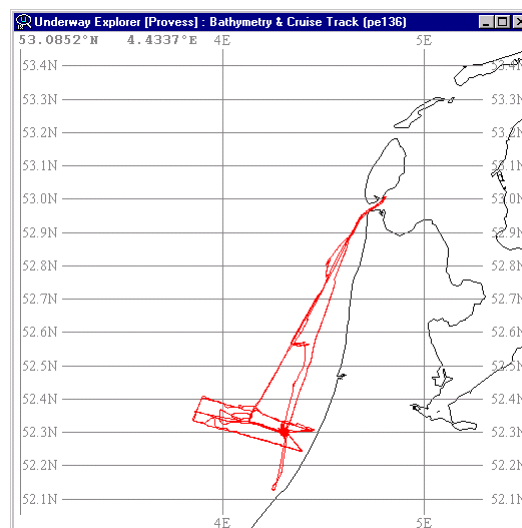
Content of data series

Parameter	Unit	Parameter code	Comments
Latitude	deg. N	A	none
Longitude	deg. E	B	none
Ship's Heading	deg.	u	none
Ship's EW velocity	knot	6	computed from lat/lon
Ship's NS velocity	knot	7	computed from lat/lon
Water depth	m	J	none
Sea temperature	deg. C	C	none
Salinity	PSU	F	none
Chlorophyll <i>a</i>	$\mu\text{g l}^{-1}$	G	calibrated from fluorescence
Atmospheric pressure	mbar	z	none
Relative humidity	percent	{	none
Relative wind speed	knots	l	none
Relative wind direction	deg.	m	none
Absolute wind speed	knots	Y	computed
Absolute wind direction	deg.	V	computed

Sampling strategy

Navigation and meteorological data were recorded for the duration of the cruise from 29 March 1999 07:30 GMT, shortly after the ship left NIOZ harbour in Texel (Netherlands) until 9 April 1999 06:41 shortly before arriving back in Texel where the cruise ended (Fig. 1). The record for the surface underway data was usually shorter because the pump of the non-toxic sampling system is typically switched off close to coastal area. The cruise was divided into two legs with a mid-cruise port-call back at Texel on 31 March 1999. The non-toxic surface water supply was switched off before reaching the harbour and restarted shortly after leaving Texel on 01/04/99. As a result there are no valid underway sea-surface measurements (temperature, salinity and chlorophyll) between 31/3/99 06:15 and 01/04/99 09:05.

Fig. 1. Cruise track of cruise Pelagia PE136.



Instrumentation and data processing by originator

The underway data acquisition system was an ABC-system (NERC, Research Vessel Services, UK). It handled the logging and initial data processing from the following instruments:

- Simrad EK 500 scientific echosounder (depth),
- Chelsea Instruments Aqua flow system (surface seawater fluorescence, temperature and salinity),
- NIOZ PAR system (wind speed and direction from a cup anemometer and windvane both located at a height of 27 metres above sea level, air temperature, relative humidity and barometric pressure),
- Global Positioning System, Gyro compass and EM. Speedlog for navigation data.

The ship's non-toxic intake was at a depth of 3.5 metres.

Data were supplied to BODC with the manufacturer's calibrations applied and merged into daily spreadsheets with a 60 second sampling interval from 26/03/1999 14:50:29 to 09/04/1999 06:41:32.

BODC post-cruise processing and screening

Reformatting:

The data were converted to a binary format and merged into one single file for the whole cruise (the 'Binary Merge File') with time as the primary linking key. The time channel of the binary merge file spans from 29 March 1999 07:30 to 9 April 1999 06:41 with a sampling interval of 60 seconds. In addition the following transformations were made:

- wind speed was converted from m/s to knots by multiplying the original values by 1.943845.
- ship's EW and NS velocities were calculated from changes in ship's latitude and longitude with time.
- absolute wind speed and direction were calculated from relative wind speed and direction and ship's EW and NS velocities. They represent the wind at the height of the instrument.

Calibrations:

- Temperature: underway sea surface temperature was checked against surface values extracted from the CTD profiles and averaged between 0 and 5 m. CTD stations exhibiting excessive variability in the surface layer (SD > 0.09 deg. C) were excluded. The difference between the surface temperature from the TSG system and the CTD values was significant with TSG values being lower than CTD values. The offset was consistent throughout the cruise and averaged -0.22 ± 0.07 deg. C. The TSG temperature was therefore corrected by adding 0.22 deg. C to the original values.

- Salinity: A drop in salinity of 0.3 PSU occurred on 01/04/1999 00:00. Before this, the TSG recorded salinity values up to 35.29 PSU which seem to be high for this area. As a result records from the beginning of the second leg until 31/03/99 23:59 were corrected by subtracting 0.3 PSU to the original value. Further comparison between the TSG salinity and surface salinity values from good CTD casts and from the moored TCP logger at site A (rig 541730) on 6 and 7 April 1999 indicated that the TSG salinity values were low compared with both CTD and moored instrument by about 0.1 PSU. Based on surface values from CTD casts 098 to 133 a correction factor of 0.07 (SD ± 0.06 , median: 0.06 PSU) was derived based on 18 casts where surface gradients were small (SD in upper 5 m < 0.01 PSU). In summary, the following corrections were therefore applied to the data:

First leg: no correction applied for lack of comparable data from CTD cast or moored instruments.

Second leg, from 01/04/1999 09:06:22 to 01/04/1999 23:59:22:

$$\text{corrected SAL} = \text{SAL} - 0.3 + 0.07 = \text{SAL} - 0.23$$

Second leg, from 02/04/1999 00:00:22 to 09/04/1999 06:41:22 (end of record):

$$\text{corrected SAL} = \text{SAL} + 0.07$$

- Chlorophyll: a total of 14 extracted chlorophyll measurements were made on seawater collected from the ship's non-toxic supply (data from K. Wild Allen, Napier University). A regression analysis was carried out between these values and the corresponding values from the fluorometer record. The regression was significant and unbiased. The calibration equation obtained was as follow:

$$\text{Chl } a = 7.29 (\pm 1.40) \text{ Fluor} + 2.31 (\pm 1.30), \quad R^2=0.695, \quad n=14$$

where Chl *a* ($\mu\text{g l}^{-1}$) 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 ($\mu\text{g l}^{-1}$) calculated from the fluorometer voltages and the manufacturer's calibration coefficients.

There was a good correlation between surface chlorophyll concentrations from the CTD fluorometer and from the Aquaflow fluorometer ($R^2= 0.841$). However, users should be aware that surface chlorophyll concentrations derived from the CTD fluorometer tended to be higher than those estimated from the Aquaflow fluorometer. Based on average chlorophyll concentrations in upper 5 m from 16 CTD casts for

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which variability was small in the upper 5 m ($SD < 0.5 \mu\text{g l}^{-1}$) the difference between the two fluorometers averaged $2.17 \pm 0.66 \mu\text{g l}^{-1}$ (median = $2.19 \mu\text{g l}^{-1}$).

Comments on data quality

None to report.