

Underway navigation, meteorology and surface hydrography data series for cruise Belgica BG9912 (17 to 21 May 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
Water depth	m	J	none
Sea temperature	deg. C	C	none
Salinity	PSU	F	none
Chl. fluorescence	$\mu\text{g l}^{-1}$	D	calibrated from fluorescence
Atmospheric pressure	mbar	z	none
Relative humidity	percent	{	none
Air temperature	deg. C	n	none
Absolute wind speed	knots	Y	none
Absolute wind direction	degree	V	none
Solar radiation	W m^{-2}	O	none

Sampling strategy

Navigation and meteorological data were recorded for the duration of the cruise from 17 May to 21 May 1999. 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 started and ended at Zeebrugge, Belgium. The cruise track is illustrated in Figure 1.

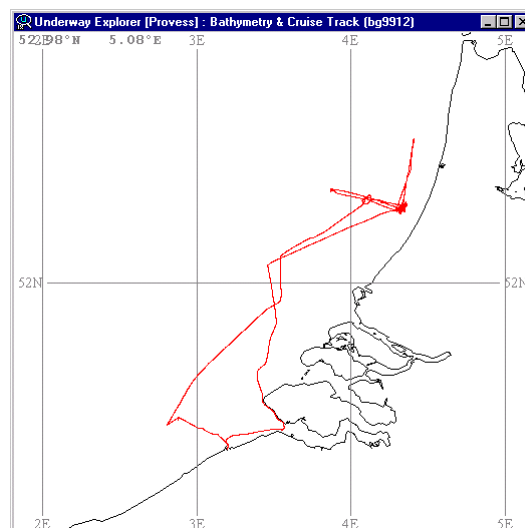


Fig. 1. Cruise track of cruise Belgica BG9912.

Instrumentation and data processing by originator

Data from navigational, oceanographic and meteorological instruments were logged continuously by the Oceanographic Data Acquisition Software system "ODASII". Details of the instruments were as follows:

- SERCEL NR103 DGPS positioning system with an accuracy of 3 to 5 m using the Sercel beacons for differential corrections (dgps lat, dgps lon).
- MAGNAVOX 200MX DGPS positioning system with an accuracy of ca. 5 m using IALA beacons for the differential correction.
- Anshutz STD12 Gyro Compass (ship heading).
- Raytheon DSN450 Doppler speed log and bathymetric depth (fo/af speed).
- Atlas Deso 22 Scientific Echosounder equipped with 2 transducers (33 kHz and 210 kHz). The 33 kHz transducer has a depth range of ca. 1500 m in good weather conditions.

- TSS 320B Heave Compensator. The data of the Atlas Deso 22 echosounder are corrected for heave by the TSS 320B. (tss depth-l, tss heave)
- Furuno Echosounder FCV381 equipped with 2 transducers (28 kHz and 88 kHz). Only the 28 kHz transducer with a depth range of ca. 2000 m in good weather conditions is used.
- Friedrichs meteorological station measuring wind speed (range: 0-41 m/s, precision: 0.2 m/s), wind direction (precision: 2 degrees), air temperature (range: -35 to +45 deg. C, precision: 0.2 deg. C), atmospheric pressure (range: 950 to 1050 mb, precision 1.5 mbar) and relative humidity (specifications not available).
- Kipp & Zonen solar radiation sensor (range: 0 to 1000 Watt/m², precision 10 Watt/m²).
- Remote Sea-Bird SBE21 thermosalinograph installed at the inlet of the non-toxic seawater circuit situated at the bow of the vessel. The salinity was measured continuously with a Sea-Bird software package. The processed data were transmitted every 6 sec. to the HP1000/A400 data acquisition computer. The specifications of the thermosalinograph were as follows:

Temperature (deg. C): range of -5 to +35 degree C, accuracy of 0.01 degree / 6 months
Conductivity (S/m): range of 0 to 7 S/m, accuracy of 0.001 S/m/month

- Sea-Bird SBE38 temperature sensor (sbe38 temp.) also installed at the inlet of the non-toxic seawater circuit.
- Turner Designs 10-AU-005 fluorometer also connected to the non-toxic sea water circuit.

The ODASII data acquisition system collected information from a Hewlett Packard HP1000/A400 real-time minicomputer system with RS-232 interfaces and a Hewlett Packard HP3852A data acquisition system. Data from the different sensors were collected by the data acquisition software and the raw data were converted to physical units and stored in an Informix relational database on a UNIX workstation. Data were acquired at a 10 seconds interval and all data were transmitted in real time to the ODASII system.

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

Data were supplied as two ASCII files containing meteorological and surface hydrography data respectively as well as associated navigation data. The timestamp in both files was identical and the sampling interval was 10 seconds.

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' or BMF) with time as the primary linking key. The sampling frequency was reduced from 10 to 30 seconds with a time channel spanning from 17/05/1999 09:55:00 to 21/05/1999 08:01:00. In addition the following transformation was applied to the data:

- wind speed was converted from m/s to knots by multiplying the original values by 1.9438.
- the difference between the two sea temperature sensors was small and only the temperature measured by the Sea-Bird SBE21 thermosalinograph was transferred into the Binary Merge File.

Calibration:

- Fluorescence: calibration coefficients for the Turner Design fluorometer were determined by MUMM after the cruise and were applied to the original data at BODC. The coefficients were derived from a linear regression of *in situ* chlorophyll *a* concentration against the underway fluorometer output. *In situ* chlorophyll concentration was measured on surface samples collected from the ship's non-toxic seawater supply and from near-surface seawater with the CTD-rosette sampler. Chlorophyll *a* concentration was determined by the Lorenzen spectrophotometric method. The calibration equation derived was:

$$\text{Chl} = 0.074 (\pm 0.008) \text{CHL_FL} - 0.72 (\pm 1.25), \quad R^2 = 0.789, \quad n = 24$$

where Chl ($\mu\text{g l}^{-1}$) is the *in situ* chlorophyll *a* concentration and CHL_FL is the surface underway fluorometer output ($\mu\text{g l}^{-1}$).

BODC Data Documentation
PROVESS Project MAS3-CT97-015

- Data from the other channels had already been calibrated by the data originator and no further modification was applied.

Comments on data quality

- Relative humidity: values exceeded 100% during most of the day on 20/05/1999 with maximum up to 107%.
- Air temperature: some rapid short-lived increases in air temperature were observed from time to time during the record. These, though suspect, were not flagged and the data should therefore be used with caution.
- Sea temperature: record appears very noisy from 19/05/1999 12:00 until 20/05/1999 00:00.