

## Phytoplankton pigment concentration data series for cruise Pelagia PE136

### Principal Investigator

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### Data Originator

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### Content of data series

Parameter	Unit	Parameter code	Number of samples	Number of stations	Comments
Chl.a (Lorenzen)	$\mu\text{g l}^{-1}$	CPHLSPP1	100	35 CTD + 14 NT + 1 BUCKET	none
Phaeop.a (Lorenzen)	$\mu\text{g l}^{-1}$	PHAESPP1	100	as above	none
Chl.a (SCOR)	$\mu\text{g l}^{-1}$	CPHLSPP1	100	as above	none
Chl.b (SCOR)	$\text{ng l}^{-1}$	CHLBSSP1	100	as above	none
Chl.c (SCOR)	$\text{ng l}^{-1}$	CHLCSSP1	100	as above	none
Carotenoids (SCOR)	$\mu\text{g l}^{-1}$	CAROSSP1	100	as above	none
Chl.a >5 $\mu\text{m}$ (Lorenzen)	$\mu\text{g l}^{-1}$	SCHLSPPA	23	7 CTD + 1 BUCKET	none
Phaeop.a >5 $\mu\text{m}$ (Lorenzen)	$\mu\text{g l}^{-1}$	SPHASPPA	23	as above	none
Chl.a >5 $\mu\text{m}$ (SCOR)	$\mu\text{g l}^{-1}$	SCHLSPPA	23	as above	none
Chl.b >5 $\mu\text{m}$ (SCOR)	$\text{ng l}^{-1}$	SCHBSSPA	23	as above	none
Chl.c >5 $\mu\text{m}$ (SCOR)	$\text{ng l}^{-1}$	SCHCSSPA	23	as above	none
Carotenoids >5 $\mu\text{m}$ (SCOR)	$\mu\text{g l}^{-1}$	SCARSSPA	23	as above	none
Chl.a <5 $\mu\text{m}$ (Lorenzen)	$\mu\text{g l}^{-1}$	SCHLSPPM	23	7 CTD + 1 BUCKET	none
Phaeop.a <5 $\mu\text{m}$ (Lorenzen)	$\mu\text{g l}^{-1}$	SPHASPPM	23	as above	none
Chl.a <5 $\mu\text{m}$ (SCOR)	$\mu\text{g l}^{-1}$	SCHLSPPM	23	as above	none
Chl.b <5 $\mu\text{m}$ (SCOR)	$\text{ng l}^{-1}$	SCHBSSPM	23	as above	none
Chl.c <5 $\mu\text{m}$ (SCOR)	$\text{ng l}^{-1}$	SCHCSSPM	23	as above	none
Carotenoids <5 $\mu\text{m}$ (SCOR)	$\mu\text{g l}^{-1}$	SCARSSPM	23	as above	none

CTD= CTD-Rosette water column sampling station.

NT= surface underway sampling from ship's non-toxic supply.

### Originator's protocol

Water samples were mainly collected using the CTD-rosette water sampler. Samples were typically taken from the near-surface for comparison with optical measurements and from 1 to 2 additional depths in the water column. Additional samples were occasionally taken at the surface with a bucket and from the ship's non-toxic sea water supply.

Samples were filtered under vacuum through Micropore membrane (5  $\mu\text{m}$ ) and/or Whatman glass fibre filters (GF/F 0.7 $\mu\text{m}$ ). Filters were then placed in labelled test-tubes and stored in a dark container with dessicant in the freezer. Following the cruise the samples were transferred to the laboratory freezer to await extraction and analysis (at the University of Wales, Bangor).

Pigments on the filters were extracted in 10 ml 90% analar acetone (10% miliQ water, buffered with sodium bicarbonate), stored in a dark container and refrigerated for 24 hours. Extracted samples were centrifuged at 10,000 rpm for 10 minutes and decanted into 1 cm pathlength micro-cuvettes. The

Shumidzu spectrophotometer holds 2 cuvettes and is initialised by measuring the optical density of 2 blanks (cuvettes filled with 90% acetone) in 0.5 nm bandwidths from 345 - 755 nm. This generates a 'baseline' against which samples are compared. Sample optical densities were measured (in 0.5 nm bandwidths from 345 - 755 nm) by replacing 1 blank with a sample-filled cuvette. To evaluate pheopigment concentration the samples were acidified with 3 drops of 2 molar hydrochloric acid and measured again.

Pigment concentrations can be calculated from spectra by comparing the ratios of absorption at various wavelengths. Equations for each pigment are given in  $\mu\text{g l}^{-1}$ .

Lorenzen method:

$$\text{Chlorophyll.a} = A \cdot \frac{R}{R-1} \cdot (OD_{665} - OD_{665A}) \cdot \frac{E}{V \cdot p}$$

$$\text{Pheopigment} = A \cdot \frac{R}{R-1} \cdot (R \cdot OD_{665A} - OD_{665}) \cdot \frac{E}{V \cdot p}$$

Trichromatic method with Jeffrey & Humphrey (1975) coefficients:

$$\text{Chlorophyll.a} = (11.85OD_{664} - 1.54OD_{647} - 0.08OD_{630}) \frac{E}{V \cdot p}$$

$$\text{Chlorophyll.b} = (-5.43OD_{664} + 21.03OD_{647} - 2.66OD_{630}) \frac{E}{V \cdot p}$$

$$\text{Chlorophyll.c1} + \text{c2} = (-1.67OD_{664} - 7.60OD_{647} + 24.52OD_{630}) \frac{E}{V \cdot p}$$

Carotenoids:

$$\text{Carotenoid} = (OD_{480} - 1.49OD_{510}) \frac{7.6E}{V \cdot p}$$

where: A is the pigment coefficient ( $11 \mu\text{g cm ml}^{-1}$ )

R is the ratio of chlorophyll.a to pheopigment absorbance at 665 nm (1.7)

$OD_{665}$  is the optical density at 665 nm relative to 750 nm

$OD_{665A}$  is the optical density of the acidified sample at 665 nm relative to 750 nm

E is the extract volume (ml)

V is the sample volume filtered (l)

p is the cuvette pathlength (cm).

### **BODC processing**

In order to standardise parameter units with that held in BODC's parameter dictionary, chlorophyll b and c concentrations were converted from  $\mu\text{g l}^{-1}$  to  $\text{ng l}^{-1}$  by multiplying their original values by 1000. The rest of the data were loaded into a database under the ORACLE Relational Database Management System without modification.

### **Comments on data quality**

None to report.

### **Reference**

Jeffrey SW, Humphrey SF (1975) New spectrophotometric equations for determining chlorophylls a, b, c1 and c2 in higher plants, algae and phytoplankton. *Biochem. Biophysiol. Pflanzen*, 167, 191-194.