# Aurora Australis JGOFS Cruises in the Southern Ocean DATA DOCUMENTATION

Cruises AU 9101, AU9303, AU 9404, AU9407, AU9501, AU 9604, and AU 9706

# [1] General:

Parameter: Phytoplankton pigments determined by HPLC: Cruises AU 9101,

AU9303, AU 9404, AU9407, AU9501, AU 9604, and AU 9706

Level 1 Yes

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List of Parameters: Phytoplankton pigments:

Pigment abbreviation	Pigment
Chla ug/L	Chlorophyll-a
chlc3	Chlorophyll c <sub>3</sub>
chl c	Chlorophyll C <sub>1</sub> + C <sub>2</sub> +MgDVP
peri	Peridinin
but	19'-Butanoyloxyfucoxanthin
fuc	Fucoxanthin
hex	19'-Hexanoyloxyfucoxanthin
pras	Prasinoxanthin
violax	Violaxanthin
ddx	Diadinoxanthin
allox	Alloxanthin
lutein	Lutein
zea	Zeaxanthin
chlb	Chlorophyll-b
undeg	Unknown chla degrad product
zea	Zeaxanthin

**List of Units**: mg m<sup>-3</sup>

### [2] Sampling:

Gear (e.g. CTD, pump, etc.): CTD; 10 litre niskin bottles

Standard Depths: Hydrochemistry depths: see Hydrochemistry data

Chemicals used: -

Special Procedures: 0.1 - 2.0 L of seawater was filtered using Whatman

GF/F filter (cut to 13mm dia). The filter was folded, blotted 3x and frozen in liquid nitrogen for return to

the lab up to 3 months later.

Comments and Notes: Normally in vivo fluorescence was measured

simultaneously for data quality control.

# [3] Analysis:

Instrument: HPLC

Waters 626 pump, Gilson 231 Autoinjector, Alltech Alltima C18 column (250 x 4.6mm, 5um packing), Waters 996 diode array detector, Hitachi F1000 fluorescence detector,

Waters Millenium software

Precision: Coefficient of variation estimated as being between 5 and

15% for major pigments based on analyses of replicate

samples.

Comments -

# [4] Results:

Quality of Data Good.

Known Problems: Chlorophyll c1& c2 & MgDVP not resolved.

19'-hexanoyloxyfucoxanthin & 4-keto-19'-hexanoyloxyfucoxanthin not resolved.

Chl a and divinyl Chl a not resolved, but the latter is not present to our knowledge (tested using another method)

#### [5] Brief description of analytical methods

**Method:** Pigments were extracted by sonication for 1 min in 1.5ml

methanol using a 4mm dia probe at 50W power in semi-darkness. Extracts were filtered using Milcrofiltration Systems MFS Nylon, 3mm dia, 0.45 um filters and analysed by the method of Wright *et al* (1991) using a Waters 626 pump, Gilson 231 autoinjector (with the sample stage refrigerated at -10°C), Alltech Alltima C18 column (at 30.0°C) and a Waters 996 diode array detector. Pigments were identified by comparison of their retention times and spectra with those of mixed standards obtained from known cultures (Jeffrey and Wright, 1997) that were

injected with each batch of samples. Peaks were integrated using Waters Millennium software.

**Pigment calibration** Pigments were isolated from well-characterised sources

(Jeffrey and Wright, 1997) and calibrated using the internal standard procedures of Mantoura and Repeta (1997) by adding approximately 130 ng  $\beta$ -apo-8'-carotenal (Fluka) to

each sample before extraction.

#### References:

- Jeffrey, S.W., Wright, S.W. (1997) Qualitative and quantitative analysis of SCOR reference algal cultures *in* Jeffrey, S.W., Mantoura, R.F.C., Wright, S.W. (eds.) (1997) Phytoplankton pigments in oceanography: Guidelines to modern methods. ISBN 92-3-103275-5. UNESCO, Paris, p. 343–360
- Mantoura, R.F.C., Repeta, D.J. (1997) Calibration methods for HPLC *in* Jeffrey, S.W., Mantoura, R.F.C., Wright, S.W. (eds.) (1997) Phytoplankton pigments in oceanography: Guidelines to modern methods. ISBN 92-3-103275-5. UNESCO, Paris, p. 407–428
- Wright, S.W., Jeffrey, S.W., Mantoura, R.F.C., Llewellyn, C.A., Bjornland, T., Repeta, D., Welschmeyer, N. (1991) Improved HPLC mehtod for the analysis of chlorophylls and carotenoids from marine phytoplankton. *Marine Ecology Progress Series* **77**, 183-196.

#### [6] Comments:

HPLC Chlorophyll-a is the only pigment currently available for cruises AU 9101AU9303, AU 9404, AU9407, and AU 9501. Chlorophyll-a and other Pigments listed above are available from cruises AU 9604 and AU 9706.

There were no significant method changes in the methodology between 1991 and 1998.