

ANTARES-4 METADATA

1. PROJECT TITLE: Iron Distribution and Iron/Nutrient-Addition Experiments in the Indian Sector of the Southern Ocean
2. NAME OF PRINCIPAL INVESTIGATOR: Peter Sedwick

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3. BRIEF DESCRIPTION OF PROJECT

This investigation was carried out during the Antares-4 expedition in the region between 42-47°S latitude and 60-66°E longitude. It forms part of the French Joint Global Ocean Flux Study (JGOFS) research, and a broader Franco-Australian collaboration within the Southern Ocean JGOFS program. The project has two parts:

(i) measurement of dissolved and total iron in the upper water column of the study region, including an intercomparison of sampling and analytical methods, performed in collaboration with Stéphane Blain and Eva Bucciarelli (Université de Bretagne Occidentale); and

(ii) shipboard iron- and nutrient-addition bottle-incubation experiments designed to examine the sufficiency of ambient iron, silicic acid and nitrate concentrations for phytoplankton growth within the study region, performed in collaboration with Stéphane Blain (Université de Bretagne Occidentale), Brian Griffiths (CSIRO), Bernard Quéguiner (Université de Marseille), Michel Fiala (OSU Banyuls), Michel Denis (Université de Marseille), Richard Sempéré (Université de Marseille) and others.

4. TITLES OF ANTICIPATED PUBLICATIONS

Distribution of Iron Across the Polar Frontal Region in the Indian Sector of the Southern Ocean

Iron, Silicate and Nitrate limitation of Phytoplankton Growth in the Indian Sector of the Southern Ocean

Algal Iron Uptake Experiments in the Indian Sector of the Southern Ocean

5. DESCRIPTION OF DATA

5.4 What did you measure and how did you do it (include references for analytical methods)? Sedwick made no iron measurements at sea; these will be performed in Hobart following Sedwick et al. (1997). A diverse suite of chemical and biological measurements were made as part of the incubation experiments by collaborators following analytical protocols detailed in their individual cruise reports (e.g., nutrients, chlorophyll, primary production). The experiments were similar in design to those described in Sedwick and DiTullio (1997).

5.5 Sampling strategy. Where time allowed, water column samples for iron measurements were collected using trace-metal clean techniques using CSIRO-Helmond bottles on a Superbraid line (5 stations) or Go-Flo bottles on a Kevlar line (1 station), taken at depths of 15, 30, 45, 75, 150 and 300 m. Clean water for the incubation experiments was collected from ca. 20 m depth using a teflon-diaphragm pump and polyethylene tubing lowered on a Superbraid line.

5.3 Post-cruise data analysis/treatment required, and the time frame for this. Iron measurements and data analysis should be completed by late 1999, whereas the experimental results and data analysis from the incubation experiments should be completed by early 2000.

5.4 Error estimates, precision and accuracy of the data? The iron analyses described in Sedwick et al. (1997) have an estimated uncertainty of less than $\pm 20\%$. No certified reference materials are currently available for seawater within the expected concentration range for iron (~ 0.05 - 0.5 nM), and the accuracy of the iron measurements will be evaluated largely from the consistency of the data with hydrographic measurements and existing Southern Ocean iron data, and via the intercomparison with Blain and Bucciarelli.

6. DATA DESCRIPTION

6.1 Data file name. Please use a sensible name including your name or the parameter measured, not "antares4" or such obvious non specific name. PSedwick.xls

6.2 Explanation of headings, units used, and abbreviations in data file. Abbreviations of sample types are foot-noted in the data base; other abbreviations for measured parameters are dFe (dissolved iron, in nM), TDFe (total-dissolvable iron, in nM), S (salinity, in psu), NO₃ (nitrate, in μ M) and Si (silicate, in μ M).

6.3 *Describe what data is required to allow you to complete your own data set for submission to the data base, and estimate when your data will be submitted to the data base.* Salinity measurements for the water-column samples and CTD data (T, S, D, F) for stations where iron was sampled (CTD numbers ANT4002, ANT4003, ANT4034, ANT4040, ANT4043, ANT4050, ANT4075 and ANT4082). Water-column iron data and key data from the incubation experiments (if desired in the data base) should be ready for inclusion in the data base in late 1999.

7. REFERENCES

Sedwick, P. N., and G. R. DiTullio, Regulation of algal blooms in Antarctic shelf waters by the release of iron from melting sea ice, *Geophys. Res. Lett.*, 24, 2515-2518, 1997.

Sedwick, P. N., P. R. Edwards, D. J. Mackey, F. B. Griffiths, and J. S. Parslow, Iron and manganese in surface waters of the Australian subantarctic region, *Deep-Sea Res. I*, 44, 1239-1253, 1997.