

**Data are from the France-JGFOS ANTARES II cruise on the R/V "Marion-Dufresne" (February-March 1994) and have been published in Sarthou et al. (1997).**

### **Sampling and methods**

Samples were collected at sunrise in the upper 250 meters of the water column in the Indian sector of the Southern Ocean. The cruise track followed a transect along the 62°E parallel. The particulate Fe sampling was made at the depth of the chlorophyll-a (Chla) maximum and/or the depth of the base of the mixed layer (about 200 m). Seawater was collected using acid-cleaned 8-liter Go-Flo bottles mounted on a 300-m-long Kevlar line. Particulate samples were collected using *in-situ* large volume filtration pumps (Challenger Oceanic) equipped with 142-mm-diameter Durapore membranes (acid-washed, 0.6- $\mu$ m-porosity). On board, all the trace metal work was carried out in a clean-room container equipped with laminar-flow hoods.

Seawater samples dedicated to the determination of **total dissolvable Fe (TDFe)** concentrations were transferred into acid-cleaned polyethylene bottles, acidified to pH 2 with double quartz distilled HNO<sub>3</sub>. After wrapping in three layers of plastic, they were stored in plastic containers until they were analysed. Back in the Toulouse clean-laboratory, 500 ml of the stored seawater was preconcentrated following the APDC/DDDC-chloroform organic extraction procedure adapted from Bruland et al. (1979). Extracted solutions were then analysed using a graphite furnace atomic absorption spectrometer (GFAAS Perkin Elmer Zeeman 5000, with an HGA graphite furnace). The total dissolvable iron represents the dissolved iron plus the fraction of particulate material that dissolves during the storage at pH 2 (the refractory components are excluded from the analysis (Löscher et al., 1997)). The average total blank measured on 12 quartz-distilled water samples was equal to 3 $\pm$ 1 ng. Thus, the detection limit (3 times the standard deviation of the average blank) is equal to 0.13 nmol/kg. The precision of the TDFe concentration analysis was determined in two different ways:

1) we measured four aliquots of certified NASS-4 seawater (NRC-CNRC, Canada) and obtained a value of 0.107 $\pm$ 0.013  $\mu$ g/l (that is an error of  $\pm$ 12%), which compared well to the certified value (0.105 $\pm$ 0.016  $\mu$ g/l);

2) we duplicated ten of our samples and the results were all reproducible within 12% (Table 1). Thus, we established that our TDFe concentration measurements are accurate within  $\pm$ 12%.

Filters of particles collected *in-situ* were leached with a strong acid mix (HCl/HNO<sub>3</sub>/HF, (Landing and Lewis, 1991). The leachate was then analysed for iron with the GFAAS. The

analytical blank was equal to  $247 \pm 87$  ng. Considering that we filtered an average volume of seawater of 250 liters, this blank corresponds to a detection limit of 0.02 nmol/kg for **particulate Fe (PFe)**. **Particulate aluminium (PAI)** concentrations were also measured on the same leachates using an Inductively Coupled Plasma Mass Spectrometer (ICP/MS, Perkin Elmer ELAN 5000). The detection limit of Al determination was 2.5 pmol/kg and the accuracy is equal to 2%.

Seawater samples collected for **hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>)** measurements were filtered on pre-combusted GF/F filters and analysed on board with a Scopoletin-Peroxidase quenching fluorescence method (Amouroux and Donard, 1995). The detection limit was equal to 3 nmol/kg. The analytical precision (calculated as the mean value of relative standard deviations of the 70 duplicated samples analysed during the cruise) was equal to 5%.

### **References:**

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