

**Sea Surface fCO₂ measurements in the Indian and Southern Oceans
obtained during MINERVE-33 associated to JGOFS/ANTARES-3 cruise
onboard the R.V. Marion-Dufresne (IPEV), 28/9-7/11/95
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Method

The sea surface fugacity of CO₂ (fCO₂) was measured onboard the research vessel Marion-Dufresne (IPEV) during the French JGOFS/ANTARES-3 by C. Brunet and C. Grosbois (LBCM, Paris) in the frame of the project MINERVE-33. The fCO₂ measurements technique has been described for other MINERVE cruises conducted during years 1990-1995 in the Indian and Southern Ocean (Poisson *et al.*, 1993; Metzl *et al.* 1995, 1999). This instrumentation was also used by our group during the international at-sea intercomparison of fCO₂ systems conducted in 1996 in the North-Atlantic (Kortzinger *et al.*, 2000).

In short, sea surface water is continuously equilibrated using a "thin film" type equilibrator thermostated with surface seawater. The CO₂ in the dried gas is measured with a non-dispersive infrared analyser (NDIR, Siemens Ultramat 5F). Standard gases for calibration (269.9, 349.7, 489.6 ppm) and atmospheric CO₂ are measured every 7 hours. To correct measurements to in situ data, we used polynomials given by Weiss and Price (1980) for vapour pressure and by Copin-Montégut (1988, 1989) for temperature. On average, the temperature in the thermostated equilibrium cell was 1.00°C warmer than SST during MINERVE-33 cruise. Based on different cruises analysis, the oceanic fCO₂ data are accurate to about ± 0.7 µatm. All parameters presented in this data-set correspond to the average of about 60 records made during 10 minutes.

During this cruise, problems have been identified for salinity on thermosalinographer records; therefore, when salinity is needed for calculating polynomials (for fCO₂ corrections), the sea surface salinity has been reconstructed based on well-known T/S relations-ship in the

investigated region. This does not introduce significant errors on fCO₂ corrections; however, salinity itself being subject to low accuracy, it has not been included in the data-file.

The fCO₂ data obtained during MINERVE cruise have been included in synthesis studies of air-sea CO₂ fluxes at regional scale in the SubAntarctic zone (Metzl et al., 1999), for constructing global scale pCO₂ climatologies (Takahashi et al., 2002) and for comparing and/or validating ocean models (e.g. Louanchi et al., 1996; Metzl et al., 1998).

File description

The file **MIN33CO2W.xls** contains all the results of sea surface fCO₂ measurements (and associated properties) made onboard during the cruise MINERVE-33. The columns of the file include: Date (dd/mm/yy, hh:mn), Latitude (degre.degre), Longitude (degree.degree), atmospheric pressure (mb), sea surface water fCO₂ fugacity (µatm) normalized at 1atm, FCO₂ (1013) and at local pressure, FCO₂ (Patm), fluorescence (in relative units), temperature in the equilibrium cell (°C), sea surface temperature (°C). The first date, first line of the data set, is 28/09/95 at 04:04.

For more information or if you have questions concerning these data, please contact N.Metzl (metzl@ccr.jussieu.fr) or C.Brunet (brunet@ccr.jussieu.fr)

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