

**Sea Surface and atmospheric fCO₂ measurements in the South Indian
and Southern Oceans obtained during OISO-2 cruise
onboard the R.V. Marion Dufresne (IPEV),
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Method

The sea surface fugacity of CO₂ (fCO₂) was measured continuously onboard the R.S.S. Marion-Dufresne (IPEV/TAAF) during the OISO-2 cruise. The fCO₂ measurements technique has been described previously in details for other 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; report available online at http://cdiac.ornl.gov/oceans/ndp_067/ndp067.html).

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 (270.1, 350.0, 489.9 ppm during OISO-2) 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 0.2 to 1.0°C warmer than SST during OISO-2 cruise. Sea surface temperature and salinity recorded with the thermosalinographer were compared (and eventually corrected) to temperature and salinity recorded in surface water during CTD casts. Recorded surface salinity data were also compared (and eventually corrected) to sea surface samples measured back to laboratory (Guildline Autosol 8400B). Based on different cruises analysis, the oceanic fCO₂ data are accurate to about ± 0.7 µatm to ± 1.2 µatm (this depends mainly on the precision of temperature probes). All parameters presented in this data-set correspond to the average of about 60 records made during 10 minutes.

The data obtained during OISO-2 cruise have been included in several reports and publications for regional scale analysis (e.g. Jabaud-Jan et al., 2003; Metzl et al., 1999; Metzl, 2000; 2001); such data-set can be used for constructing global scale pCO₂ climatologies (Takahashi et al., 2002), and for comparing and/or validating ocean models (e.g. international OCMIP/IGBP and european NOCES projects).

Files descriptions

The file **oiso2CO2WAT** contains all the results of sea surface fCO₂ measurements (and associated properties) made onboard during the cruise OISO-2. The columns of the file include: Date (dd/mm/yy hh:mn), Latitude (degree.degree), 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), sea surface salinity (PSU), ship speed (knts) and ship cap (degree). Note that during this cruise, we identified problems in salinity records (until 31/08/1998 11:56); the salinity was added to the original file, taken from the companion listing (but only one digit was printed). The first date (first line) of the dataset, is 19/08/1998 at 15:03 TU. The last line of the dataset is 07/09/1998 at 07:08 TU.

The file **oiso2CO2AIR** contains all the results of atmospheric CO₂ concentrations (and associated properties) made onboard during the cruise OISO-2. The average xCO₂ measured during OISO-2 cruise was 365.4 (± 0.4) ppm. The columns of the file include: Date (dd/mm/yy hh:mn), Latitude (degree.degree), Longitude (degree.degree), atmospheric molar fraction xCO₂ (ppm), atmospheric pressure (mb), sea surface temperature (°C) and sea surface salinity (psu). The first date (first line) of the dataset, is 19/08/1998 at 16:10 TU. The last line of the dataset is 06/09/1998 at 23:09 TU.

More informations concerning the OISO program can be found on the web site <http://ipsl.jussieu.fr/> (see Services d'Observations page). If you have questions concerning these data sets, please contact N.Metzl (metzl@ccr.jussieu.fr)

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