Geophysical Research Abstracts, Vol. 8, 02944, 2006
SRef-ID: 1607-7962/gra/EGU06-A-02944

Multidecadal evolution of oceanic surface pCO2 in the southern hemisphere : a view from long-term observations in the Southern Indian Ocean (20˚S-60˚S).

N. Metzl, C. Brunet, C. Lo Monaco and A. Poisson.

LOCEAN/IPSL, CNRS, Université Pierre et Marie Curie, Case 100, 4 Place Jussieu, 75252 Paris Cedex 05, France.

(metzl@ccr.jussieu.fr / Fax: 33.1.44.27.49.93 / Phone 33.1.44.27.33.94)

The multidecadal evolution of sea surface carbon dioxide concentrations and partial pressure (e.g. rising of DIC and pCO2) has not been clearly detected in temperate and cold waters of the southern hemisphere because (i) very few repeated observations are available in the Southern Ocean and (ii) when observations are available, mostly during austral summer, the long-term oceanic pCO2 trend is often masked by large spatio-temporal variability related to biological activity. The study of the decadal changes of oceanic CO2 and air-sea CO2 fluxes requires long-term observations both in summer and winter. To reach this goal, we have conducted several cruises in the Southern Indian Ocean at different seasons and years over the period 1991-2005 (MINERVE and OISO cruises). This dataset reveals that the oceanic pCO2 growth rate was higher than 1 μatm/yr both in the subtropical warm waters (20-35˚S) and in the circumpolar Southern Ocean (35-60˚S). A comparison with historical data (back to 1962) also suggests that, as in the atmosphere, the ocean pCO2 increased more rapidly during the recent period, with perceptible differences in warm and cold waters. The multidecadal rising of ocean pCO2 in the Southern Indian Ocean certainly results from regional anthropogenic carbon ocean uptake, and is probably modulated by decadal variations of vertical mixing (e.g. through external forcing such as the Southern Annular Mode), primary production and sea surface warming. Maintening long-term observations and studying in more details the decadal variability of all these ocean processes and associated forcing are a prerequisite to better estimate and understand the evolution of the air-sea CO2 fluxes.