Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06685, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06685
EGU General Assembly 2008

Estimating interannual variability of oceanic biogeochemistry from atmospheric O_2/N_2 and CO_2 measurements

C. Rödenbeck (1), C. Le Quéré (1,2), N. Cassar (3), Y. Tohjima (4), M. Heimann (1), R. Keeling (5)

(1) Max Planck Institute for Biogeochemistry Jena (Germany), (2) now at the Univ. of East Anglia and British Antarctic Survey (UK), (3) Princeton University (USA) (4) National Institute for Environmental Studies, Tsukuba (Japan), (5) Scripps Institution of Oceanography, University of California (USA)

Atmospheric measurements of O_2/N_2 and CO_2 at up to 16 sites have been used to infer the interannual variations in ocean-atmosphere O2 exchange with an inverse method. The method distinguishes the regional contributions of at least 3 latitudinal bands, with increasing spatial resolution the more sites are used. The interannual variations of the inferred O_2 fluxes in the tropical band correlate significantly with the El Niño/Southern Oscillation. Tropical O_2 variations appear to be dominated by the ventilation of the O_2 minimum zone from variations in Pacific equatorial upwelling. The interannual variations of the northern and southern extratropical bands are of similar amplitude, though the attribution to mechanisms is less clear. The interannual variations estimated by the inverse method are larger than those estimated by the current generation of global ocean biogeochemistry models, especially in the North Atlantic, suggesting that the representation of biological processes plays a role. The comparison further suggests that O_2 variability is a more stringent test to validate models than CO_2 variability because the processes driving O_2 variability combine in the same direction and amplify the underlying climatic signal.