Geophysical Research Abstracts, Vol. 7, 02379, 2005
SRef-ID: 1607-7962/gra/EGU05-A-02379

Magnitude and relative importance of particulate and dissolved organic carbon fluxes in the world ocean

R. Schlitzer (1) and D. Hansell (2)

(1) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, (2) University of Miami, Miami

Biological activity in the surface layer of the ocean results in the production of particulate and dissolved organic carbon (POC and DOC). Both, POC and DOC are transported to greater depths, either through particle sinking or physical processes, such as subduction, convection or diapycnal mixing. Both components are slowly remineralized along their downward path, and the relative rates of recycling versus downward transport set the depth scale to which POC and DOC are effectively transported. This in turn determines the efficiency of the downward carbon pump. The competition between downward transport and remineralization also sets the depth range of strongest oxygen utilization and inorganic nutrient release. Regional or global estimates of carbon fluxes and remineralization rates are difficult to obtain by direct measurements, and numerical models are required for large scale budgets.

Here we use a coupled circulation, biogeochemical model to infer production, downward flux and remineralization of POC and DOC. The model is fitted to global ocean distributions of T, S, oxygen, nutrients, carbon and transient tracers by means of an automatic optimization procedure (adjoint method), thereby constraining the model physics (circulation, ventilation, mixing) and biogechemical parameters (POC export and downward flux, DOC production and decay). Integrated fluxes of POC and DOC, as well as DOC/POC flux ratios for the global ocean and for various sub-regions will be presented in the talk. DOC/POC flux ratios vary geographically, with the highest relative contribution of DOC found in oligotrophic region, whereas in high productivity regions the POC flux strongly dominates. On a global average the DOC/POC flux ratio in the upper 400 m of the water column amounts to about 15%. This ratio decreases with depth.