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CARBOOCEAN –marine carbon sources and sinks assessment

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CARBOOCEAN is the European contribution to the global observation and modelling network on marine carbon. It is an FP6 Integrated Project funded over a five year period (2005-2009) with 14.5 million € and combines the key European experts of 35 contracting partners from 14 countries, including the USA. The project provides a description and quantification of the CO2 air-sea exchange ranging from a seasonal to interannual time scale up to a decadal to centennial time scale for the Atlantic Ocean and the Southern Ocean, involving also the sub-surface and deep waters. Special focus is given to the quantification of carbon sources and sinks at a regional scale and the identification and understanding of biogeochemical feedback mechanisms which control marine carbon uptake and release. The new data and knowledge is integrated into the prognostic modeling framework.

One of the project highlights is the North Atlantic Observing Network which employs voluntary observing ships (VOS). The Air-sea fluxes of CO2 show a high temporal and spatial variation as a result of variability in climate, biological activity and ocean circulation. Latest data indicate that the North Atlantic and Southern Ocean both show at least transient decrease in uptake strength for CO2.

The anthropogenic carbon uptake by the oceans is dominated by physical-chemical buffering but biological and biogeochemical effects cannot be neglected. Findings from data analysis, forward and inverse modeling indicate that the oceanic water column burden of anthropogenic carbon has a maximum in the northern North Atlantic close to the areas of deep convection but also the Southern Ocean carries significant amounts of anthropogenic carbon. These carbon sink areas of vertical water mass transfer are vulnerable to climate change.