PRODUCTION, TRANSPORT AND SINKS OF ORGANIC MATTER AND ASSOCIATED ELEMENTS IN MARINE SYSTEMS : AIR-SEA INTERACTIONS

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The goal of this project is to quantify the most important fluxes and processes affecting the behaviour of components of the carbon cycle in the coastal zone and at the ocean margins in order to assess the role of this environment in terms of sources and sinks of critical elements and components associated with Global Change.

The processes directly related to the carbon cycle considered are exchange of CO_2 at the air-sea interface, primary production of organic matter, grazing of phytoplankton by zooplankton, deposition of detrital organic carbon to the sediments or its export to the open ocean from the coastal area and respiration of dissolved or particulate organic matter in the water column.

The aim of this part of the project is to determine CO_2 chemistry and its distribution above the North-Western European continental shelf. Some related parameters (dissolved oxygen, chlorophyll, suspended particulate matter concentration, $\delta^{13}C$) are also determined in order to correlate observations to the major oceanic processes liable to modify the carbon content (biological production, hydrodynamics, air-sea exchanges, ...) Air-sea CO_2 exchanges are also measured and examined in terms of both chemical and physical constraints.

A theoretical approach has also been carried out to modelize the thermodynamics of CO_2 equilibria in seawater. Analytical expressions have been derived and allow to compute changes of pCO_2 and pH resulting from any input/output carbonate, bicarbonate and proton. These equations have allowed to get a better understanding of some important geochemical features, such as marine calcification.

References

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