



Biogeochemistry and carbon budget during a coccolithophorid bloom in the northern Bay of Biscay (June 2006)

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A biogeochemical multidisciplinary survey was carried out in the northern Bay of Biscay, in early June 2006, during which were determined carbon metabolic rates (14C-based primary production and calcification, O₂-based pelagic and benthic community respiration, bacterial production) and several variables (partial pressure of CO₂ (pCO₂), total alkalinity (TA), inorganic nutrients, chlorophyll-a (Chl-a), phaeopignments (Phaeo), particulate inorganic carbon (PIC), particulate organic carbon (POC) and particulate nitrogen (PN)). Remote sensing images contemporary to the cruise showed several patches of high reflectance (HR) in the investigated area. Based on remote sensing data and in situ determination of biogeochemical parameters, different development stages of the coccolithophorid bloom (early development to declining bloom conditions) were identified and characterized. The major HR patch corresponded to declining bloom conditions, was located over the shelf, along the continental margin that was sampled at 3 stations, was characterized by moderate Chl-a concentrations, never exceeding 1.0 µg/L, dissolved phosphorus (PO₄) and silica (DSi) depletion, low primary production and calcification rates, yet surface waters were undersaturated in CO₂ with respect to atmospheric equilibrium. The metabolic community fluxes CO₂ associated to primary production, calcification and respiration were integrated in order to provide a comprehensive C budget in the area. Our analysis of the C budget highlights the importance of taking into account C extracellular production to sustain the biological demand in the twilight zone, which has also several implications in the fate of C organic and inorganic production in the photic zone at the different bloom stages described in the investigated area.