BIOGEOCHEMICAL CYCLE IN A COCCOLITHOPHORID BLOOM

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The biogeochemical properties of an extensive bloom of the coccolithophore, *Emiliania huxleyi*, at the shelf break in the northern Gulf of Biscay was investigated in June 2006. Total Alkalinity (TA) values in the water column showed strong non-conservative behaviour indicative of the impact of calcification, with the highest TA anomalies (up to 26μmol.kg^{-1}) in the high reflectance coccolith patch. Partial pressure of CO_2 (pCO_2) values ranged from 250 to 338μatm and the area was found to act as a sink for atmospheric CO_2.Overall, pCO_2@13°C (pCO_2 normalized at a constant temperature of 13°C) in the water column was negatively related to TA anomalies in agreement with an overall production of CO_2 related to calcification. Hence, the calcifying phase of the *E. huxleyi* bloom decreased the sink of atmospheric pCO_2, but did not reverse the direction of the flux. Rates of pelagic respiration up to 5.5mmol O_2.m^{-3}.d^{-1} suggested a close coupling between primary production and respiration and/or between organic carbon content and respiration. Benthic respiration rates were quite low and varied between 2 and 9mmol O_2.m^{-3}.d^{-1}, in agreement with the fact that the study area consists of sandy sediments with low organic matter content. Benthic respiration was well correlated to the chlorophyll a content of the top 1cm of the sediment cores. Evidence was found for dissolution of $CaCO_3$ due to the acidification of superficial sediments in relation to the production of CO_2 and the oxidation of H_2S in the oxic layers.