

## BIOGEOCHEMICAL CYCLE IN A COCCOLITHOPHORID BLOOM

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The biogeochemical properties of an extensive bloom of the coccolithophore, *Emiliana 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  $26\mu\text{mol.kg}^{-1}$ ) in the high reflectance coccolith patch. Partial pressure of  $\text{CO}_2$  ( $\text{pCO}_2$ ) values ranged from 250 to  $338\mu\text{atm}$  and the area was found to act as a sink for atmospheric  $\text{CO}_2$ . Overall,  $\text{pCO}_2@13^\circ\text{C}$  ( $\text{pCO}_2$  normalized at a constant temperature of  $13^\circ\text{C}$ ) in the water column was negatively related to TA anomalies in agreement with an overall production of  $\text{CO}_2$  related to calcification. Hence, the calcifying phase of the *E. huxleyi* bloom decreased the sink of atmospheric  $\text{pCO}_2$ , but did not reverse the direction of the flux. Rates of pelagic respiration up to  $5.5\text{mmol O}_2.\text{m}^{-3}.\text{d}^{-1}$  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  $9\text{mmol O}_2.\text{m}^{-3}.\text{d}^{-1}$ , 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  $\text{CaCO}_3$  due to the acidification of superficial sediments in relation to the production of  $\text{CO}_2$  and the oxidation of  $\text{H}_2\text{S}$  in the oxic layers.