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Dissolved inorganic carbon dynamics and air-sea carbon dioxide fluxes during coccolithophorid blooms in the Northeast European continental margin (northern Bay of Biscay)

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We present a data-set of dissolved inorganic carbon (DIC) obtained during three cruises in the northern Bay of Biscay carried out in June 2006, May 2007, and May 2008. During these cruises, blooms of coccolithophores occurred, as indicated by patches of high reflectance on remote sensing images, phytoplankton pigment signatures, and microscopic examinations. Total alkalinity (TA) showed a non-conservative behaviour as a function of salinity due to the cumulated effect of net community calcification (NCC) during bloom development on seawater carbonate chemistry. The cumulated impact of NCC and net community production (NCP) on DIC and the partial pressure of CO2 (pCO2) were evaluated. The decrease of DIC (and increase of pCO2) due to NCC was overwhelmingly lower than the decrease of DIC (and decrease of pCO2) due to NCP (NCC:NCP « 1). During the cruises, the northern Bay of Biscay acted as a sink of atmospheric CO2 (on average ∼-9.7 mmol C m-2 d-1 for the 3 cruises). The overall effect of NCC in decreasing the CO2 sink during the cruises was low (on average ∼12% of total air-sea CO2 flux). If this is a general feature in naturally occurring phytoplankton blooms in the northern North Atlantic Ocean (where coccolithophorid blooms are the most intense and recurrent), and in the global ocean, then the potential feed-back on increasing atmospheric CO2 of the projected decrease of pelagic calcification due to thermodynamic CO2 "production" from calcification is probably minor compared to feed-backs related to changes of NCP.