Calcareous nannofossils as tracers of *paleo*CO_2

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The Cretaceous has been characterized by intervals of super-greenhouse climate and profound environmental perturbations, including the early Aptian Oceanic Anoxic Event (OAE 1) a and the latest Cenomanian OAE 2 being episodes of widespread organic matter burial in oxygen-depleted oceans. The OAE 1a and OAE 2 are thought to be related to the emplacement of the Ontong Java Plateau and the Caribbean Plateau, respectively. The volcanic acrivity of these Large Igneous Provinces (LIPs) introduced in the atmosphere a large amount of CO_2 with consequent impact on biota, climate and ocean chemistry. The perturbations of the C cycle are traced in the C isotopic record which shows a negative shift at the beginning of OAE 1a followed by a positive excursion, and a large positive anomaly marking the OAE 2. In this study, we intended to detected if and how these changes in pCO_2 affected the biogenic carbonate production of calcareous nannoplankton. Coccolithophore algae are in fact extremely sensitive to changes in physical and chemical conditions of the oceans and laboratory experiments on living forms indicate that coccolith type, abundance and degree of mineralization depend on chemical-physical-trophic conditions of water as well as on pCO_2. Our data revealed the presence of dwarf/malformed coccoliths during OAE 1a and OAE 2 interpreted to be the response of some coccolithophore species to increased surface-water acidification, thus providing indication of intervals of excess CO_2. Following these observations, that suggest that past calcareous nannoplankton probably responded similarly to extant coccolithophores under fluctuating CO_2, we reconstructed nannofossil calcite paleofluxes during the Aptian and used them to calculate *paleo*CO_2. Calcite production resulted to be severly affected during OAE 1a, when the highest CO_2 concetrations of the Aptian were reached under the most intense phase of Ontong Java. During the middle-late Aptian, paleofluxes were then characterized by fluctuations, suggestive for variable *paleo*CO_2 depending on the interplay between CO_2 emissions and uptake.