Carbon dioxide estimations from Cenozoic North Atlantic sediments.

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The carbon dioxide (CO_2) decline during the Cenozoic is hypothesized to have played an important role in the climate system, driving global temperature variations and conditioning polar ice sheets. Coccolithophores, unicellular calcifying phytoplankton, are especially sensitive to changing CO_2 concentrations. Therefore, the carbon isotopic composition ($\delta^{13}C$) of organic compounds (long-chain unsaturated alkenones) produced by a specific family of coccolithophores (*Reticulofenestra spp.*) has been widely used to reconstruct those atmospheric CO_2 estimations. However, $\delta^{13}C$ of alkenones is not only affected by CO_2 availability in seawater, but also by changes in cell size, growth rate and active bicarbonate transport for photosynthesis. Consequently, reliable CO_2 reconstructions require an independent constrain of those factors. The magnitude of the CO_2 decrease during the Cenozoic is not clear yet, due to the high uncerteinities linked to the interpretation of this marine geochemical proxy.

With this work produce a new record of the phytoplanktonic carbon isotopic fractionation (ε_p) from North Atlantic marine sediments (IODP 342) to study the CO_2 evolution along Oligocene-Miocene time interval. Besides, we quantify the effect of changes in coccolithophore cell size and changes in the carbon isotopic fractionation in coccolith calcite so as to acquire a better understanding of cellular carbon allocation strategies. The pCO_2 estimated show a significant declining trend over the studied time period that correlates with some previously published works, but with differing amplitude.