



## **Coccolithophore morphological sensitivity and adaptation to selective pressures during the Oligocene - Early Miocene high CO<sub>2</sub> world**

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Coccolithophores, marine calcifying organisms, are primary producers of calcite in the ocean. It is generated as coccosphere, an exoskeleton formed by coccoliths, which span micrometer scale in size and thickness. It was hypothesized that atmospheric changes in carbon dioxide have a direct impact in the ocean carbon budget, and therefore, coccolithophore physiology appear to be especially sensitive to this changes. Such variations include for instance changes in growth rate, degree cellular calcification and coccolith size.

Here we conduct a morphological study of coccolith size for the *Reticulofenestra* lineage over the Oligocene-Miocene time interval using circular polarization microscopy methodology. IODP sediments selected for this study represent a latitudinal gradient over the Atlantic Ocean: mid-latitude IODP 1406 (40°N) and tropical ODP 925 (2.5°N). Results are compared with published data from the South Atlantic DSDP 516 (30°S). Our mid-latitude site exhibits two steps decreasing in average size from 30 to 28 M.yr. and from 25 to 23 M.yr., however coccoliths larger than 8 microns are always present. Site 925 shows a constant trend while large coccoliths are rare.

We propose, firstly, that the lack of large coccoliths shown in DSDP 516 may be related with a decrease in nutrient supply which appear to be scarce after 24 M.yr.; and secondly, the two reducing size steps at mid-latitudes would be consequence of a global selective pressure, possibly including CO<sub>2</sub>. Further research will resolve if the tropical site, with much lower solubility, remain unaffected as a potential consequence of a carbon dioxide limiting factor.