How calcareous nannoplankton responded to paleoenvironmental factor changes at low and high latitudes across the late Aptian-early Albian interval?

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The geological record is characterized by case histories marked by profound changes in the ocean-atmosphere system, such as injection of a large amount of CO_2, super-greenhouse conditions, ocean anoxia, increased surface-water fertility, and changes in the bio-limiting metal content. To better understanding the ecosystem variations, we study calcareous nannoplankton which are good palaeoecological tracers being one of the most important calcifying groups in marine phytoplankton. Several studies on living coccolithophores species demonstrate that they are very sensitive to environmental changes (i.e. temperature, nutrient content, CO_2 and trace metal concentration) which could affect their shape, dimension, and abundance. However, it is still not clear which factors can alter the nannofossil size on the long-term and if there is a different response of average size of selected species depending on the paleolatitude.

We studied a 14 My-long time interval from the late Aptian to the early Albian, which includes a cooling event and two Oceanic Anoxic Events, namely OAE1a and OAE1b. We analysed the variations in abundance and size of selected nannofossil species with affinities to temperature and fertility such as *Watznaueria barnesiae* (oligotrophic species), *Rhagodiscus asper* (warm waters), *Zeugrhabdotus erectus* and *Biscutum constans* (mesotrophic species). Samples were collected from two low latitude core sites, ODP Site 1049 (proto-North Atlantic Ocean) and the Piobbico core (Umbria-Marche western Tethys Basin, central italian Appennines) and a from high latitude site, namely DSDP Site 511 (Falkland Plateau, Southern America).

Morphometric results show significant dimensional and abundance variations which follow similar patterns in the three studied sites although with different mean size. The DSDP Site 511 results show that *W. barnesiae* and *B. constans* are larger than specimens at low latitudes. *B. constans* and *Z. erectus* display similar trends in all studied with size reduction during OAE 1a and small average size from the end of OAE1a up to the end of OAE1b. Also, the resistant and cosmopolitan species *W. barnesiae*, which commonly does not evidence coccolith size change, show size variations but they differ from *B. constans* and *Z. erectus* possibly suggesting that were controlled by different paleoenvironmental factors: whilst *W. barnesiae* seems to depend on temperature, *B. constans* and *Z. erectus* follow surface water fertility. The only exception is the size drop across OAE1a which affected all studied species including *R. asper* probably in response to surface water acidification.