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Miocene oceanographic changes of the western equatorial Atlantic (Ceara Rise) based on calcareous dinoflagellate cysts

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The middle- and upper Miocene represent a time-interval of major changes in palaeoclimate leading to global cooling forming the precursor of the onset of Northern Hemisphere Glaciations (NHG). These climate changes are thought to be strongly controlled by oceanographic modifications although the nature of the relationship between ocean and climate change is far from clear. It has for instance been observed that in this time interval the modern deepwater circulation system; the thermohaline circulation was established. It is thought that tectonic events, such as the narrowing of the Panama gateway, played a key role in the progressing of these Miocene oceanographic changes (e.g. Duque-Caro 1990; Lear et al. 2003). However, the complex interaction between the closing of the Panama Gateway, the development of NADW, and thus the oceanographic progression towards our present day circulation is far from being fully understood.
A key region to study these interactions is the Caribbean region, notably the Ceara Rise since it is an area of highest sensitivity to global deep water circulation changes.
Here we intent to improve the understanding of these processes by establishing a detailed palaeoceanographic reconstruction of the western equatorial Atlantic Ocean on the basis of calcareous dinoflagellate cyst (dinocyst) associations. For this, we investigated sediment samples from ODP Site 926A by defining the calcareous dinocyst assemblage. Site 926A is located at the southwestern flank of the Ceara Rise, an area of highest sensitivity to global deep water circulation changes. At about 11 Ma, we see a distinct increase in the absolute abundances of the calcareous dinocysts suggesting enhanced productivity and better carbonate preservation that can be related to the intensification of NADW formation (Woodruff & Savin 1989). At 11.3 Ma, Leonella granifera, a species known to be strongly related to terrestrial input increases. This could be a signal for the initiation of the Amazon River as a transcontinental river (11.8 – 11.3 Ma; Figueiredo et al. 2009) in relation to Andean tectonism.

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