Coccolith dynamic distribution in the western tropical Atlantic during the last 300,000 years: Toward a better understanding of oceanic current dynamics

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In tropical regions, trade winds related to the Intertropical Convergence Zone (ITCZ) shape ocean surface circulation with a significant impact on latitudinal heat transport. This is particularly the case in the western tropical Atlantic (WTA) that is characterized by several surface currents: the South Equatorial Current, the Brazil Current, and the North Brazil Current, which contribute to a unique northward, cross-equatorial transport of heat and salt. The dynamics of these currents in the geologic past remains unclear, preventing us from having a clear overview of how they may have affected cross-equatorial flow and the associated heat transport.

In this study based on coccolith assemblage analyses of marine sediment core GL-1180 retrieved in the WTA (8°27'18"S, 33°32'53"W, 1037 m water depth), we explore productivity patterns over the past 300,000 years to track variations in the expansion of the nutrient-rich South Atlantic Central Water (SACW) at orbital scales and try to understand how it may impact the Brazil Current system. In addition, based on total coccolith abundance (TCA) and proportions of lower photic zone (LPZ) species, such as *Florisphaera profunda* and *Gladiolithus flabellatus*, together with subsurface temperature data, we aim to trace nutricline dynamics and interpret them in terms of stratification versus mixing of the upper to intermediate water column.

Preliminary results show that ~90% of the coccolith assemblages were represented by *F. profunda*, *Gephyrocapsa* spp., *Emiliania huxleyi*, and *G. flabellatus*. Subtropical species, such as *Umbellosphaera* spp., *Syracosphaera* spp., *Discosphaera tubifera*, and *Umbilicosphaera* spp., were also observed, but altogether, they did not exceed 15% of the assemblage. The coccoliths had moderate to excellent preservation. The LPZ species *F. profunda* and *G. flabellatus* dominated the assemblages when precession was low, suggesting a relatively deep nutricline, stratified waters, and probable oligotrophic conditions in the upper photic zone. *Gephyrocapsa* spp. only dominated during the high precession periods of Marine Isotope Stages 8 and 9, which might indicate a shallower nutricline and higher paleoproductivity when meso-eutrophic conditions prevailed. Higher *Gephyrocapsa* spp. abundances were concomitant with higher TCA and lower subsurface temperatures, whereas higher LPZ species abundances were associated with lower TCA and higher subsurface temperatures. It is probable that heat accumulated in the study area during low precession periods, which are associated with a weakening of the North Brazil Current and a southward migration of the ITCZ prevented any influence of the SACW and, hence, hampered nutrient input into the photic zone. In contrast, we likely observed an influence of intermediate SACW for periods of high precession.