# Reconstruction of the ocean surface dynamics of the Iberian margin in the Miocene–Pliocene using calcareous nannofossil assemblages


## Laura Martín-García

Universidad de Salamanca, Departamento de Geología, Salamanca, Spain; lauramaga@usal.es

## Francisco J. Jiménez-Espejo

Instituto Andaluz de Ciencias de la Tierra CSIC, Granada, Spain; fjjspejo@ugr.es

## William Clark

University of Alabama, Department of Geological Sciences, Tuscaloosa, AL 35487, USA; wclark15@crimson.ua.edu

## Barbara Balestra

American University, Department of Environmental Science, Washington DC, 20016, USA; balestra@american.edu

## José-Abel Flores

Universidad de Salamanca, Departamento de Geología, Salamanca, Spain; flores@usal.es



https://doi.org/10.58998/jnr3259



The Iberian margin is a unique location on our planet. It has a shallow continental shelf that is delimited by deep submarine canyons. Portugal's continental shelf rapidly transports sediments through rivers to the ocean floor of the Iberian margin where it records continental climate signals and changes in ocean dynamics. Previous studies of marine sediments in the region have shown that sedimentary records, which can be correlated with terrestrial and ice volume global records from Greenland and Antarctica, are related to astronomical (orbital) cyclicity.

Using Miocene–Pliocene sedimentary material recovered from the International Ocean Discovery Program (IODP) Site U1587, located in the southwest of the Iberian margin, calcareous nannofossil assemblages were analyzed to reconstruct changes in surface-water masses and environmental parameters, such as temperature and surface-water productivity. Calcareous nannofossils were used to illustrate the effect of astronomical dynamics on the marine-continental relationship at the Miocene/Pliocene boundary.

The studied sedimentary sequence contains alternations of dark and lighter materials, reflecting a cyclicity linked to the astronomical response. The calcareous nannofossil assemblages also respond to these patterns, as evidenced by the abundance of *Coccolithus pelagicus* (cold water species) with respect to *Discoaster* (warm water taxa). Moreover, the abundance of total nannoliths per gram of sediment is also affected by this trend. In addition, intervals have been identified that contain an increase in the number of *Reticulofenestra* morphotypes with a closed central area. This has been observed in all sizes of Noelaerhabdaceae: smallest sizes (<5 μm), medium sizes (between 5 and 7 μm), and larger sizes (>7 μm). This observation could be related to high calcification intervals in the surface water of the ocean. In this succession, darker colored sediment intervals are consistent with a scenario of maximum insolation: wet intervals with increased continental rainfall and a resulting increased supply of detrital material being deposited in the basin. Lighter colored sediment levels are consistent with a scenario of minimum insolation: less rainfall, higher planktonic production, and more continental aridity. However, other global or regional processes, particularly some related to dynamics of the subtropical gyre, could interfere and modify the pattern.