

New insights on the Danian/Selandian boundary in the Basque Basin, Western Pyrenees: implications for (inter)regional correlation

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The early Paleogene is well recorded in numerous land-based sections of the Western Pyrenees, representing a wide range of sedimentary environments, from continental to deep marine. (Hemi)pelagic sediments are mainly exposed in outcrops along the coastline facing the Bay of Biscay, such as at the Zumaia reference section, which was recently selected as the Global Stratotype Section and Point (GSSP) for the bases of the Selandian and Thanetian Stages. The Sopelana section, located some 100 km west of Zumaia, near the city of Bilbao, is another reference section of the area, and is well-known for the quality of its Cretaceous/Paleogene boundary transition. This section also encompasses an almost complete Danian/Selandian (D/S) boundary transition, which can be correlated bed-by-bed with the GSSP at Zumaia, thus allowing the establishment of intrabasinal correlations of the main events and evolutionary processes affecting open-marine microfossils across this chronostratigraphic boundary.

Here we present an integrated sedimentological, micropaleontological (foraminifera) and geochemical study of the Sopelana and Zumaia sections in order to decipher the extent of the paleoenvironmental changes recorded across the D/S boundary and its implications for global climate and interregional correlation. The D/S boundary coincides with a prominent lithological change between the Danian limestone-dominated succession and the lower Selandian red to grey marly member. No distinct first or last occurrences of foraminiferal genera/species have been observed at the D/S boundary of Sopelana and Zumaia, although it is remarkable that both benthic and planktic foraminifera experience a significant decrease in test size at the lowermost Selandian. Another important event detected in this study is a progressive but systematic change in the coiling direction of the planktic species *Morozovella occlusa*, which evolved from an assemblage with proportionate coiling in the uppermost Danian to populations clearly dominated by a dextral coiling in the lowermost meters of the Selandian. These variations in test size and coiling direction might be related to changes in environmental parameters such as temperature, salinity and nutrient availability. In addition, benthic foraminifera show an increase in opportunistic taxa across the lowermost Selandian and a progressive decrease in calcareous-cemented agglutinated foraminifera, the later probably being related to a higher detrital supply to the basin floor during the marked sea level drop recorded in the Pyrenees across the D/S boundary. These microfossil events may be also related to climatic and paleoceanographic changes of global scale. Therefore, our understanding of these events and of their temporal sequence may shed light into the D/S boundary interval.