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Palaeoecology of larger foraminifera during the late Palaeocene-earliest Eocene transition in the northern Tethys (SW Slovenia): tropical foraminiferal carbonate production under humid mesotrophic conditions?

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The warmest climatic episode of the Cenozoic occurred at the Palaeocene-Eocene transition (Paleocene-Eocene Thermal Maximum, PETM). The response of shallow marine biota of the northern Tethys to these environmental changes is investigated in this study. Palaeoecological and sedimentological analysis of two sections on the NW Adriatic Carbonate Platform (SW Slovenia) has been used to reconstruct palaeoenvironmental conditions and foraminiferal community evolution during the late Palaeocene-earliest Eocene, a time of reorganisation of the larger benthic foraminifera (LBF) group.

Biostratigraphic and chemostratigraphic data have been integrated to test the correlation between a major step in the evolution of Palaeogene LBF and the PETM.

Three facies units (1-3) and six foraminiferal assemblages (a-f) have been recognised, representing different sub-environments: (1) early Thanetian facies dominated by thick bedded wackstones, muddy packstones and, rarely, grainstones corresponding to protected and partly restricted innermost ramp with (a) miliolids-dominated assemblage and (b) benthic foraminifera-dominated assemblages thriving on partly vegetated, soft substrates; (2) late Thanetian facies with massive boundstones/floatstones, poorly stratified bioclastic packstones and wackstones representing mid-ramp settings sporadically influenced by storms/currents with (c) *Assilina*-dominated assemblage occurring on soft sandy substrate in the upper mid-ramp; deeper mid-ramp with

(d) ‘bioconstructors’ and (e) orthophragminids-dominated assemblages characterising coral-microbialite mud mounds and the surrounding environment; (3) Ilerdian facies unit dominated by poorly stratified, nodular packstones of inner ramp with (f) alveolinids-nummulitids assemblage occurring on muddy sandy substrate, partly covered or close to seagrass beds.

In both studied sections, a prevalence of muddy lithologies and a lack of wave-related fabric indicate that deposition took place along a protected carbonate ramp. Intensive microbial activity, shown by strong micritisation of bioclasts and growth of microbial mud mounds, is interpreted to be the consequence of an eutrophication event, indirectly linked to the climatic changes and to a complex palaeogeography along the northern Tethyan margin. Nutrient supply into the basin was probably strongly controlled by intensified erosion of higher-relief orogen areas under a humid tropical climate during the late Palaeocene-early Eocene. In fact, the high temperature could have determined feedback mechanisms, such as enhanced tropical cyclone/storm activity and/or intensifying the weathering processes as response to enhanced atmospheric humidity and high rainfall intensity. Moreover, the inferred confined nature of the adjacent foreland basin could have increased the concentration of nutrients. In the studied carbonate platform, the main effect exerted by these conditions was promoting development of low-light dependant, non-framework building communities. LBF are common sediment contributors, with *Alveolina*, *Nummulites*, *Assilina* and orthophragminids showing tolerance to enhanced nutrients levels.

Isotopic analyses performed on bulk rock samples have led to the identification of three major zones which roughly correspond to the facies units. The first zone shows a large variability of δ^{13}C, spanning from -3 to +2.5‰. The second zone has δ^{13}C values ranging between +1 and +2‰. The third zone is characterised by initial negative values (-0.5‰) rapidly rising to +2‰ and then fluctuating around +2‰ for the remaining part of the sections. This negative shift could be interpreted as an indication of a global δ^{13}C decrease at the P-E boundary, supporting the biostratigraphic data.