

An integrated paleo-environmental analysis of a marine transgressive sequence from the northern Tethyan margin: The Lutetian to Priabonian beds of Adelholzen (Helvetic Unit, Bavaria, Germany)

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The northern Tethyan margin is a key region for the understanding of paleoceanographic processes during the collision of continental and oceanic tectonic plates. The here investigated Middle to Late Eocene sediments were deposited during a period instable climatic conditions. In order to quantify paleoenvironmental changes, we developed a detailed age model based on planktic foraminifera-, calcareous nannoplankton-, larger benthic foraminifera-biozonations, and stable oxygen and carbon isotope records. Foraminiferal, calcareous nannoplankton, and macrofossil assemblages were analyzed for changes in paleo-water depth, mixing and stratification, paleo-primary productivity (pPP), food supply, and bottom water oxygenation. The section at Adelholzen covers the almost complete Lutetian (biozones NP15a-16, E9-11, SBZ13-15) and Priabonian Stages (NP18-20, E14/15), while the intermediate Bartonian Stage (NP17) is largely missing. Paleo-water depth estimates range from 50 m (middle neritic, early Lutetian) to 530 m (upper bathyal, late Priabonian). Calculated pPP vary between 0.5 and 6.3 mgC/cm² Ky with highest values during the late Lutetian. The combination of assemblage composition (all investigated taxa), planktic and benthic foraminiferal accumulation rates, and derived parameters (C-flux to sea floor, pPP) enabled us to identify at least five distinct paleoceanographic events of at least regional significance. The changes affected nutrient availability, food supply, and bottom water oxygenation in different ways. However, pPP-values correspond to those of the centers of modern tropical-subtropical anticyclonic gyres, indicating highly oligotrophic conditions throughout.

The Antarctic viewpoint of the Middle Miocene Central Paratethys: cause, timing, and duration of deep valley incision in the Alpine-Carpathian foredeep and delta progradation in the Vienna Basin

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Global, glacio-eustatic sea level changes massively influenced the depositional history of the Central Paratethyan region. Here we correlate Middle Miocene global $\delta^{18}\text{O}$ -shifts with ice volume changes on Antarctica and sea level changes with corresponding phases of erosion (valley incision) and deposition in the Lower Austrian part of the Alpine-Carpathian Foredeep. This allows the exact dating of the valley formation. Two periods of positive $\delta^{18}\text{O}$ -shifts resulted in sea level falls of about 60 and 40 m respectively. The first drop at c. 13.9 Ma (Mi3b) was fast and caused severe erosion on the emerged foredeep. In a second, less pronounced step around 13.0 Ma (Mi4), the base level was further deepened after a period of alternating erosion and deposition. The combined sea level change (80-120 m) fits well with the maximum thickness of Sarmatian sediments drilled within incised valley (110 m). The global sea level falls affected not only the geological history of the foredeep. Intensive erosion (valley incision) is combined with delta progradation in the adjacent Vienna Basin. Interruption of marine connections resulted in vast salt deposits and faunal crises within the Central Paratethys.