Paleoceanographic history of the Paratethys: a multidisciplinary study to understand their isolation progress and continental climate change during the Late Paleogene

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The terminal Eocene massive global cooling was one of the most pronounced events in the climatic evolution during the Cenozoic era. Due to the vast amount of DSDP and ODP cores, the open oceanic record of this greenhouse-icehouse transition has been extensively studied. However, significantly fewer studies have concentrated on isolated marginal seas or on terrestrial paleoclimatic changes at the time. Marginal seas, such as the Paratethys in East-Central-Europe are particularly interesting because they reflect global signals in a different intensity. Evidence for ocean water cooling near the Eocene/Oligocene (E/O) boundary at about ~34 Ma years is provided by a sudden rise in benthic $\delta^{18}O$ values and Circum-Atlantic ice-rafted debris sediment and the fossil record of Antarctic vegetation. The thermal isolation of Antarctica and the sudden growth of the Antarctic ice sheet might have caused changes in insolation and surface ocean density, which in turn are known to contribute to abrupt shifts in deep-ocean circulation with significant consequences for regional and global climate changes. Moreover, the northward drift and rotation of the African continent and a related microcontinent (i.e. Apulia) and their collision with the European foreland had a strong impact on the Cenozoic paleoceanography. This stratification was triggered by cold boreal deep water and warm Tethyan surface water leading to initial bottom currents. Surface water salinities increased and dysoxic bottom water conditions developed, periodically interrupted by supply of oxygen-bearing water. These drastic oceanographic changes are responsible for the repeated deposition of laminated organic-rich sediments considered as hydrocarbon source rocks from the Alpine Molasse Basins through the Central Paratethys. Therefore, the Central Paratethys represents a key area for studying isolation progress of the Paratethys and their paleogeographic, paleoceanographic and paleoclimatic changes. For this project, four continuous Eocene-Oligocene boundary sections of marine sediments from the Central Paratethys area has been investigated for their foraminiferal contents and for stable isotope geochemical properties of their tests. The benthic foraminiferal analysis for the estimating of bathymetry, water temperature, salinity, organic matter fluxes and bottom water oxygenation have been performed by multivariate statistical analysis (Q-mode PCA, BFOI) and by stable isotopes measuring. The stable isotopes ($\delta^{18}O$ and $\delta^{13}C$) have been measured on both monospecific (or monogeneric) planktonic and benthic foraminiferal tests. Proxy records for the reconstruction of past continental climate change constructed form stable oxygen ($\delta^{18}O$) and carbon ($\delta^{13}C$) isotope compositions of terrestrial vertebrate tooth (i.e. rhinocerotids, anthracotherids, equids). The main goal of this project is to reconstruct the evolution history of the paleoenvironmental conditions and paleoceanography of the Central Paratethys during the Late Paleogene in comparison with continental paleoclimatic changes.