Geophysical Research Abstracts
Vol. 12, EGU2010-2618, 2010
EGU General Assembly 2010

Mid-Burdigalian cooling of Central Europe – Impact of local tectonics and global climate

Patrick Grunert (1), Mathias Harzhauser (2), and Werner E. Piller (3)

(1) Institute for Earth Sciences, University of Graz, Austria (patrick.grunert@uni-graz.at), (2) Geological-Paleontological Department, Natural History Museum Vienna (mathias.harzhauser@nhm-wien.ac.at), (3) Institute for Earth Sciences, University of Graz, Austria (werner.piller@uni-graz.at)

Epicontinental seas with their vast climate-sensitive shelf areas comprise a valuable high-resolution archive for paleoclimatology. In many cases, their sedimentary records document the impact of global climate patterns as well as regional aberrations thereof with higher accuracy than deep-sea records of the open ocean.
Based on more than 170 localities, a review of the paleoclimatic record of the mid-Burdigalian (c. 17.2-19.2 Ma) Central Paratethys Sea and its adjacent continental hinterland reveals a quick deterioration of climate from subtropical to temperate conditions around 18.1 Ma. The signal is present in marine and terrestrial proxies: a temperature drop of c. 2-3°C is estimated for surface and bottom waters of the Central Paratethys and a less pronounced drop of c. 1.5 °C for terrestrial climate. Temperate conditions lasted for approximately 300ka. Climate amelioration towards subtropical conditions started not before c. 17.8 Ma heralding the Miocene Climatic Optimum.
Synchronous tectonic and paleogeographic events suggest a two-step model to explain this pattern: (1) The closure of the Tethyan Seaway towards the Indo-Pacific Ocean and a renewed connection of the westernmost branch of the Western Tethys with the Central Paratethys via the North Alpine Foreland Basin resulted in a major change of circulation patterns. The inflow of warm surface waters from the Indo-Pacific ceased resulting in cooling of the Mediterranean and Paratethys seas. (2) Subsequently, the development was amplified by an Antarctic glaciation (isotopic event Mi1b, c. 17.8-17.9 Ma) resulting in a short-term drop in global temperatures causing subsequent cooling of the marine water and the terrestrial climate.
More studies on continuous sedimentary records from drill sites are in progress and will further help to document and understand the mid-Burdigalian cooling. The present study shows exemplary the importance of epicontinental seas as high-resolution recorders of past climate on a local and global scale.