



The Randeck Maar: Facies development and habitat differentiation of a Miocene lacustrine system

Michael W. Rasser (1) and Andrea K. Kern (2)

(1) Staatliches Museum für Naturkunde Stuttgart, Germany (michael.rasser@smns-bw.de), (2) Department of Sedimentary and Environmental Geology, University of São Paulo, Brazil (annkern@usp.br)

The Randeck Maar in S Germany is a well-known fossil lagerstätte (Early/Middle Miocene, MN5) with exceptionally preserved fossils. Although it is a locally restricted succession of lake sediments with a diameter of only 1200 m and less than 60 m of preserved sediments, it appears to comprise a complex structure with a high scientific potential on a global scale, because the lake sediments and their fossils can provide evidence for the impact of the Mid-Miocene Climatic Optimum (MMCO) on the environment and its organisms as well as the ecological interactions between animals and/or plants during that interval. No other European locality provides such a rich insight into an ecosystem that existed during the MMCO.

Excavations of Staatliches Museum für Naturkunde Stuttgart provided new insights into the facies types of this maar lake. They showed that a high variety of facies types existed beside the traditional separation into a basal tuffitic development, followed by calcareous and bituminous ('dysodil') laminates, and terminal massive freshwater limestones.

Palaeoenvironmental reconstructions are based on the mentioned excavations and re-evaluations of collection material. They show that the Randeck Maar was a typical maar lake with a rich flora and fauna. Based on all plant remains, the IPR vegetational analysis points towards subhumid sclerophyllous forests, suggesting seasonal drought. 380 taxa in all are known thus far, which are dominated by plants (168) and insects (79). The taxonomic re-evaluation combined with palaeoecological considerations allows for the reconstruction of a palaeoenvironmental model. In brief, three main sections can be differentiated for the habitats of the Randeck Maar lake system: (1) Deep- and open-water lake habitats with local and short-termed mass occurrences of insect larvae, amphibians, and/or gastropods, while fish are particularly scarce. The interpretation of the water chemistry is problematic because palaeoenvironmental indicators for both brackish and freshwater conditions exist. (2) Shallow parts of the lake comprise a narrow reed-belt with insects and gastropods living on the exposed plant stems as well as turtles. (3) Crater slopes and surrounding plateaus were mainly covered by subhumid sclerophyllous to mixed mesophytic forests depending on sun exposition and soil conditions. Horses and other forest-dwellers preferably lived in forested habitats while proboscideans and rhinocerotids occupied more open habitats.