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The Heidelberg Basin Drilling Project – Characteristics of an outstanding archive of Quaternary sediments

Gerald Gabriel (1), Dietrich Ellwanger (2), Christian Hoselmann (3), Michael Weidenfeller (4), and the "Heidelberg Basin Drilling Project" Team

(1) Leibniz Institute for Applied Geophysics, Hannover, Germany (gerald.gabriel@liag-hannover.de), (2) Landesamt für Geologie, Rohstoffe und Bergbau im Regierungspräsidium Freiburg, Freiburg i.Br., Germany, (3) Hessisches Landesamt für Umwelt und Geologie, Wiesbaden, Germany, (4) Landesamt für Geologie und Bergbau Rheinland-Pfalz, Mainz-Hechtsheim, Germany

The Heidelberg Basin, located in the northern part of the Upper Rhine Graben (Germany), hosts one of the thickest and most complete successions of Plio-/Pleistocene sediments in continental Mid-Europe, as revealed by new cored boreholes at three different locations. These boreholes expose different types of the basin facies: (a) three 300 m deep, cored boreholes in Ludwigshafen represent the western margin of the basin; (b) the 350 m deep, cored borehole close to Viernheim reveals information about the central basin facies, and (c) the 500 m deep borehole Heidelberg UniNord is located above the depocentre of the basin on the eastern margin of the Rhine Graben.

The main goal of this drilling project is to establish a reference profile for Quaternary stratigraphy for the region north of the Alps. As suggested by the first pollen data, the succession is complete in the sense of climate stratigraphy – a unique situation in Western Europe. In this context special emphasize is on the definition of Base Quaternary as revealed by different datasets. During the last decades a petrographical marker has been used to identify “Base Quaternary” in the context of Quaternary research in the Upper Rhine Graben, e.g. the first deposition of alpine sediments imaged by a significant change in the heavy mineral spectrum. First data from the new boreholes suggests that this definition must be re-evaluated. For the Ludwigshafen borehole correlation between the heavy mineral data indicating the transition between sediments of alpine and local origin, the biostratigraphic boundary between Plio-/Pleistocene, and a significant change in magnetomineralogy that is interpreted to have been caused by environmental change, is observed at 177 m depth. In contrast, for the Heidelberg UniNord drilling, the palynological data suggests that the borehole did not even reach Base Quaternary, whereas the base of the sediments of alpine character is found at 300 m depth. From the combination of lithostratigraphy and chronostratigraphy it becomes clear that the sedimentation in the Heidelberg Basin is controlled by both tectonics and climate. Lithostratigraphic boundaries, which mainly result from tectonic impulses, do not always correlate with chronostratigraphic boundaries that image climate changes.

Reference

Gabriel, G., Ellwanger, D., Hoselmann, C., Weidenfeller, M. (guest editors). Special Issue ’The Heidelberg Basin Drilling Project’. – Quaternary Science Journal (Eiszeitalter und Gegenwart), 57(3/4), 2008.