



## **Overdeepened valleys in the Eastern Alps: Why are they still interesting?**

**J.M. Reitner** (1) and D. van Husen (2)

(1) Geological Survey of Austria, Vienna

(2) Institute of Engineering Geology, Technical University of Vienna

(juergen.reitner@geologie.ac.at; dirk.van-husen@telering.at)

Overdeepened valleys and basins are a common phenomenon in the formerly glaciated mountains and forelands of the Eastern Alps. Intensified hydrogeological explorations by drilling and geophysics have increased our knowledge on structure and sedimentary infill of these valleys.

Generally such valleys are formed in areas where the ice discharge was high, such as near the equilibrium line, at valley junctions, or at narrowings of the valley profile. The long known overdeepened tongue basins in the Eastern Alps are regarded as typical examples of the impact of high ice velocities combined with increased debris load and running water under hydrostatic pressure around the former (LGM, and older glaciations) equilibrium lines. According to VAN HUSEN (2000) the maximum depth of these tongue basins in the eastern parts of the Austrian Alps seems to be around 400 m.

A second group of overdeepened valleys comprises longitudinal valleys trending parallel to the strike of the Alpine mountain belt like the valleys of the rivers Inn, Drau, Salzach and Enns. They follow major tectonic structures of Miocene age which are partly regarded as active. Tectonically forced subsidence is discussed as another possible reason for the overdeepening in addition to the formation by glacial erosion. For most of these valleys our knowledge of the thickness of the infill is based on few geophysical investigations. In the Inn Valley a high amount of overdeepening (up to 1000 m) was reported from seismic surveys. This is supported by a 900 m deep rotary drilling, which did not reach the bedrock. However, considering the high seismic

velocities of the deep horizons as well as the sonic velocities measured in the borehole, such a large depth of the pre-Quaternary basement in the Inn Valley is still under discussion.

Regarding the infill of these inneralpine valleys we have quite a good knowledge on what happened since Termination I in terms of chronology and sedimentary processes. There also exists a chronological framework for the last Interglacial-Glacial cycle based on isolated sediment outcrops on the valley flanks. However, for the earlier period our knowledge of the stratigraphy of the Eastern Alps is very fragmentary. It has to be emphasised, that the overdeepened valleys functioned as sediment traps since the onset of glaciations in the Alps or even before, depending on the assumed tectonic models of their formation since the Miocene. Hence, they have the potential to reveal the climatic record as well as the tectonic development of the Quaternary and maybe before in the Eastern Alps. It is evident that we need focussed research to unravel this great unsolved problem of the geology of the Eastern Alps – the age, formation, depth and infilling of the overdeepened Alpine valleys.

HUSEN, D. van (2000a): Geological Processes during the Quaternary.- *Mitteilungen der Österreichischen Geologischen Gesellschaft*, 92 (1999), 135-156, Wien