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After the ice: post glacial evolution of small overdeepened basins in the NE Alps - Lake Taferlklaussee, Austria

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Glacially overdeepened basins are common features in formerly and currently glaciated regions. They are characteristic for glacial erosion and their formation process is subject of current debate. After deglaciation such basins form sedimentary sinks that represent excellent archives for reconstructing postglacial landscape evolution and establishing sediment budgets. In case of closed denudation-accumulation systems, sedimentary records are particularly useful to reconstruct environmental change. Detailed infill histories of overdeepened valleys are still relatively rare, especially quantitative information on their formation is missing.

Here we focus on a low elevated valley glacier system at the northern fringe of the Alps active at least until the Last Glacial Maximum (LGM). Only active during rather short periods within a glacial cycle, the role of such isolated valley glaciers for Quaternary landscape dynamics is largely unknown. Lake Taferlklaussee, a formerly glaciated basin has a catchment size of 3 km^2 only and an altitudinal range from c. 750 to 1700 m. We specifically focus on a heavily silted lake system in the terminal area of the former glacier, to infer processes of subglacial basin formation. Furthermore, we analyse the stratigraphic record of the lake basin in order to unravel the postglacial lake evolution, landscape dynamics and the role of human impact on lake aggradation. We use a multi-method approach, consisting of field surveying (mapping, DC-resistivity, core drilling), lab (grain size analyses, radiocarbon dating) and GIS analyses.

Our results indicate a typical glacial overdeepened basin framed by terminal moraines and talus slopes. Distal basin depths are rather shallow (5 - 7 m) but strongly increase down to 35 m towards the centre of the basin with a steep headwall at the southern basin margin. Coring shows a coherent picture of the basin fill consisting of five main stratigraphic units: at the base Flysch deposits, overlain by basal till, lake sediments, and peat and alluvial/debris flow deposits at the top. Radiocarbon ages of organic sediment and wood span the entire Holocene, from 11 ka to 500 a BP. During the early stages the lake was much larger than today and already existed during the Younger Dryas. Siltation history shows that initially siltation was rapid and propagated towards NE. While a peat bog in the proximal part had already been covered by large amounts of debris flow deposits, a lake still existed in the distal part. Open lake conditions disappeared around 3900 a BP and a peat basin existed until the beginning of the 18th century. A dam was built to create an artificial lake in AD 1716 to allow log rafting. Since then, siltation has reduced the lake area again and created a shallow pond with strong organic deposition and some fluvial input at the NE throughflow.