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Postglacial evolution and recent siltation of the protected lake "Taferlklaussee" (Austria)

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Nature conservation and human interaction with the environment often provide a multifaceted area of conflict, exemplified here by an intensively used but also protected small alpine lake.

The study area is located in the Salzkammergut region (Upper Austria), which is known for its major salt deposits and especially popular for its numerous lakes. The focus is on the "Taferlklaussee" (TKS), a small freshwater body filling a basin originating from glacial erosion during the last glacial maximum (LGM) and early late glacial stadials (between 16 and 20 ka). The responsible valley glacier (Aurach) was isolated from the major alpine ice flow network during the LGM and not connected to the large adjacent Salzach and Traun outlet glaciers. In historical times the area was deforested and the lake level artificially raised in AD 1716, to allow log rafting on the river Aurach that originates from the TKS. Today, the TKS is under nature conservation but highly frequented as recreational area for summer and winter sports (e.g. hiking, biking, ice-skating and curling - the regional curling club is situated directly at the lakeside). As a consequence of the multiple uses, views on future management of the study area are diverging: On the one hand, nature is meant to be left alone and any negative impacts on the environment should be avoided and on the other hand, natural siltation should be stopped as it reduces the lake area, and provokes lots of controversy.

Our research is intended to create information to support the current debate about the future of the TKS by providing first-hand data on short and long-term lake evolution. We focus on two timescales of lake development: The postglacial evolution and infill history of the lake basin (origin, structure, volume and chronology of stored sediment) as well as decadal-scale and recent trends of lake siltation.

We are using a bundle of direct and indirect field surveys to generate complementary data. To investigate thickness and structure of the sedimentary basin fill, we use DC-resistivity and ground-penetrating radar. Additionally, drill cores deliver stratigraphic information to validate geophysical data and to establish sedimentation rates (14C dating of organic remains). The recent siltation is analysed using historical maps, multi-temporal aerial photographs (from 1953 onwards), and short-term sedimentation rates based on 210PB analyses of the sediment core.

Preliminary results indicate that the basin is rather shallow with a hard rock-base below the basin fill in 4-5 m depth. Sediment coring revealed a peat deposit overlaying basal till that is capped by lacustrine sediments; clearly indicating a two-stage development of the TKS from an initial peat basin to an artificial lake since water level has been risen. The most recent lake development as reconstructed from multi-temporal aerial photographs shows that two zones of siltation have strongly expanded since 1953 on the cost of a diminishing lake area.