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A late Holocene Record of sediment dynamics obtained from Lake Altaussee (Salzkammergut, Austria).

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Sedimentary records in inner-Alpine lakes typically show a rich history of changes in sediment dynamics and the occurrence of various geohazards. Lake Altaussee (712 m asl; 2.4 x 1.0 km; max. 72 m deep) is a dimictic, moderately-sized glacigenic lake located in the Northern Calcareous Alps. Currently, it has no major river inflow and most water input comes from several subaqueous springs, forming large and deep craters (max. 60 m diameter and 22 m deep) on the lake bottom. Since 2019, a wide suite of investigations (hydrogeology, microplastics, hydroacoustics, geomorphology, sedimentology) started under the framework of the Walter Munk Foundation for the Oceans (WMFO) and the University of Natural Resources and Life Sciences (BOKU) Vienna. In 2020, the University of Innsbruck (UIBK) became a project partner to undertake joint research on its sedimentary infill.

We present preliminary results from lacustrine morphological mapping of high-resolution multibeam bathymetry (Kongsberg EM2040), seismic-stratigraphic analysis of subbottom profiling data (Innomar SES-2000 and Kongsberg GEOPULSE), and sedimentological/geochemical analysis on 22 short cores (60-170 cm long). Stratigraphic correlation between the 22 cores is based on visual detection of marker layers in Multi-Sensor Core Logging (MSCL), X-Ray CT and X-ray fluorescence (XRF) core scanning data.

The sediment cores mainly exhibit slowly-accumulating organic-rich sediments, typical for lake systems that lack significant fluvial sediment input. One unit of finely-laminated clastic carbonate-rich sedimentation can be traced back to an episode in which a major creek −draining an area of active salt mining− was flowing into the western part of the lake. In medieval times, this creek was artificially diverted and depositional conditions in the lake returned to organic-rich sedimentation.

The hydroacoustic data show a scattered pattern of large-scale blocks up to 50-70 m diameter in the eastern half of the lake basin. This suggests the occurrence of one or more large gravitational mass movements, which potentially originated at the steep rock slopes at the northern and eastern end of the lake. A megaturbidite (>1-2 m thick) can be traced over the entire basin floor in both subbottom profiling data and sediment cores, and directly overlies the blocks in the deep

basin. Isopach mapping of this megaturbidite hints at sediment transport from both the eastern and western slopes, which we interpret to have occurred as the results of a mass-movement induced impulse wave that eroded coastal sediments at the opposite side of the lake and transported these to the deeper basin. On the shallower western plateau, the presence of an outstanding coarse-grained stratigraphic unit with an erosive base further supports this hypothesis, as it is stratigraphically coeval to the megaturbidite. Biogenic gas accumulation at the base of the megaturbidite prevents further penetration on the subbottom profiles, but some acoustic windows visualize up to 15 m of infill.

Upcoming research involves the establishment of ^{14}C-based age-depth models, the acquisition of single-channel airgun seismics to visualize the entire infill of the lake through the gas blanket, and long piston coring to investigate the sediment dynamics and geohazards recorded in the Holocene sedimentary infill.