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Lake level fluctuations and catchment dynamics at Lake Ohrid (Macedonia, Albania) during MIS6 and MIS5

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Lake Ohrid, presumably the oldest lake of Europe located at the border of Macedonia and Albania, is about 30 km long, 15 km wide, and up to 290 m deep. In 2013, an ICDP deep drilling campaign was carried out under the umbrella of the Scientific Collaboration on Past Speciation Conditions in Lake Ohrid (SCOPSCO) project. At the main drill site (DEEP) in the central part of Lake Ohrid, the uppermost 568 m from a total sediment fill of ca. 700 m were recovered. Initial data from core catcher material indicate that the sediment sequence covers more than 1.2 million years. An age model, which is based on 11 tephrostratigragphic tie points and on tuning of biogeochemical proxy data versus orbital parameters reveals that that the upper 247 m of the DEEP site sequence cover the time period between 637 ka (MIS16) and the present.

Inhere, we present sedimentological, (bio-)geochemical, environmental magnetic, and pollen data for the time period between MIS6 (191 ka) and MIS5 (71 ka). The data imply that MIS6 was one of the most severe glacial periods, while MIS5 was likely one of the more pronounced interglacial during the past 637 kyrs. The repercussions of these high amplitude climatic and environmental variations during this period are recorded in the sedimentological archive of Lake Ohrid.

Previous studies based on hydro-acoustic and sediment core data from the northeastern part of the lake basin have shown that the lake level of Lake Ohrid was likely 60 m lower during MIS6. The ~60 m lower lake level at Lake Ohrid during MIS6 can at least partly be explained by the ongoing subsidence, which persists in the basin until today. However, in the DEEP site sediments, the MIS6/MIS5 transition occurs at ca. 50 m sediment depth. This implies that climate-induced lake level fluctuation at Lake Ohrid are less severe compared for example to Lake Van (Turkey), were a 260 m lower lake level has been reported for the Younger Dryas.

The imprint of the environmental variations between 191 ka and 71 ka can also be seen in the catchment dynamics around the lake. Extraordinary high sedimentation rates, high clastic and negligible authigenic matter concentrations in DEEP site sediments during MIS6 imply enhanced erosion in the catchment. Thereby, elemental ratios (Zr/K) and environmental magnetic data (S-ratio) suggest that predominantly the products of chemical weathered, K-depleted old soils were transported into the lake. In contrast, a low sedimentation rate despite high authigenic matter concentrations during MIS5 implies less erosion in the catchment.

In order to obtain more information about the catchment dynamics at Lake Ohrid, future studies will encompass the analyses of uranium and lithium isotopes. U isotopes (^{234}U and ^{238}U) can be used to assess the balance between deep and shallow erosion, while Li isotopes (^{7}Li and ^{6}Li) can inform on the extent of chemical weathering in the sediment source area. The application of these tools on a Late Glacial to Holocene record from Lake Dojran (Macedonia, Greece) has recently shown that climatic perturbations (8.2 and 4.2 cooling event) and anthropogenic land use have a direct impact on the catchment dynamics.