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A paleoclimate record with tephrochronological age control for the last climatic cycle from Lake Ohrid, Albania and Macedonia

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Lake Ohrid, a transboundary lake situated on the border of Macedonia and Albania in the central-northern Mediterranean with an age of approximately 3-5 Ma, is considered to be the oldest lake in Europe. With a sediment fill of more than 600 m it provides a unique record in a region responding sensitively to climate change.

Here we present first results from a sediment record (Co1202) recovered from Lake Ohrid in autumn 2007. The c. 15m long sediment sequence was taken from 145 m water depth in the north-eastern part of the lake, where the sediment succession is widely undisturbed according to a shallow seismic pre-site survey. The identification of ten tephra and cryptotephra layers and their geochemical correlation to well dated eruptions of Italian volcanoes as well as seven additional radiocarbon dates allowed the establishment of a relatively reliable chronology for core Co1202. According to our age-depth model core Co1202 covers the last-glacial interglacial cycle and reaches back to marine isotope stage (MIS) 6. The sediment succession is, however, not continuous and comprises a hiatus of approximately 16,000 yrs. between c. 82,000 and 98,000 yrs. BP.

The sediment composition of core Co1202 varies strongly showing two clearly distinguishable lithofacies. Massive sediments with high amounts of CaCO3, TOC, and low amounts of detrital clastic material as indicated by low Ti and low magnetic susceptibility values correlate well with interglacial stages MIS 5 and the Holocene. Partly laminated sediments, dominated by high amounts of detrital clastic material as indicated by high Ti and magnetic susceptibility values, frequent occurrences of dropstones, and low CaCO3 concentrations, correlate well with glacial stages MIS 6, 4, 3 and 2.

Despite these general sedimentation patterns reflecting glacial and interglacial climate conditions, short termed climatic fluctuations probably representing Dansgaard/Oeschger, Heinrich, and Mediterranean sapropel events are recorded by proxies sensitive to hydrological changes. Initial results on changes in past lake surface temperature, obtained by application of the recently proposed TEX86 paleothermometer, indicate temperature differences of c. 5-6°C between the Last Glacial Maximum and the Holocene, as well as 2°C warmer temperatures during the Eemian if compared to the Holocene.