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The SCOPSCO deep drilling program in ancient Lake Ohrid: Unravelling the driving forces of speciation in Europe's oldest and most biodiverse lake

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Ancient Lake Ohrid on the Balkan Peninsula constitutes the oldest and most biodiverse lake in Europe. The processes generating this extraordinary species richness with a high share of endemic taxa, however, are poorly understood.
In order to unravel the geological and biological history of the lake and to study, among others, the influence of major geological and environmental events on the evolution of endemic taxa, an international research initiative – the SCOPSCO project – was launched. The project combines sedimentological, tephro-stratigraphical, seismic and paleontological (diatoms, mollusks, ostracods) studies of lake sediment cores with molecular-dating and empirical modelling approaches applied to extant taxa.
Preliminary analyses of sediment core and borehole logging data from drill sites with a maximum penetration depth of 569 m below lake floor and an overall recovery of > 95 % indicate that Lake Ohrid is roughly 1.3 to 1.5 My old. Intriguingly, these data fully reinforce the results of molecular clock analyses conducted prior to the drilling operation. Moreover, the combined geological and biological studies suggest that the extraordinary biodiversity in Lake Ohrid is largely driven by 1) the long and continuous existence of the lake, 2) the lack of catastrophic events (e.g., desiccation, full glaciation or salinization) during its lifetime potentially causing massive extinctions, 3) the high buffer capacity of the lake to environmental change and/or the high resilience of its taxa, and 4) distinct turnovers in species composition over time promoting frequency dependent selection. The cumulative effect of these factors, in turn, resulted in overall low extinction rates and continuous speciation and radiation events.
These findings not only shed new light on patterns and processes of evolution in Europe's oldest lake, they also show that data from sediment cores can contribute to a better understanding of the driving forces of biotic evolution. Moreover, Lake Ohrid appears to be a first class example for studying the link between geological and biological evolution in highly isolated ecosystems over comparatively long time scales.