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Scientific Collaboration of Past Speciation conditions in Lake Ohrid (SCOPSCO): A high-resolution record of northern Mediterranean climate history back to 1.4 Ma

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The SCOPSCO ("Scientific Collaboration on Past Speciation Conditions in Lake Ohrid") deep drilling project aimed at a better understanding of (i) the age and origin of Lake Ohrid (Former Yugoslav Republic of Macedonia/Republic of Albania), (ii) its regional seismotectonic history, (iii) the volcanic activity and climate change in the central northern Mediterranean region, and (iv) the drivers of biodiversity and endemism. The Ohrid basin formed by transtension during the Miocene, opened during the Pliocene and Pleistocene, and the lake established de novo in the still relatively narrow valley. The lake history is recorded in a 584 m long sediment sequence, which was recovered within the framework of the International Continental Scientific Drilling Program (ICDP) from the central part (DEEP site) of the lake in spring 2013. Previous chronological analyses of the upper 248 m of the sediment sequence (i.e. the last 640 ka) based on tephrostratigraphy and tuning biogeochemical proxy data to orbital parameters. We now extended the age model down to 456 m of the sediment sequence. This part of the sequence comprises hemi-pelagic sediments and thus records the history of Lake Ohrid since the establishment of full lacustrine conditions continuously. Below 456 m, shallow lacustrine and fluviatile sediments prevail. With support of magnetostratigraphic data, showing the Matuyama-Bruhnes boundary and the base of the Jaramillo subchron, the onset of full lacustrine conditions in Lake Ohrid can now be defined to almost 1.4 Ma ago. A multi-disciplinary study, including biogeochemical, granulometric and micropaleontological proxies, was applied for the reconstruction of the northern Mediterranean climate and environmental history. Deep-water conditions in Lake Ohrid were fully established at 1.2 Ma, when there is also a significant change in catchment vegetation. The existing data show that Lake Ohrid and its catchment reflect long-term variability in temperature, in tune with global scale glacial/interglacial changes, and millennial-scale climate fluctuations, such as Dansgaard/Oeschger events. Moreover, biogeochemical and pollen data from our site indicate changes in precipitation amount that closely follow changes in Northern Hemisphere summer insolation and monsoon-intensity as evidenced in the enigmatic Mediterranean Sea sapropel and Chinese speleothem records. This suggests a positive precipitation phase relationship for the Northern Hemisphere monsoon regions and the Mediterranean mid-latitudes.