Geophysical Research Abstracts
Vol. 17, EGU2015-14176, 2015
EGU General Assembly 2015

Age depth-model based on cyclostratigraphic analysis of gamma ray data for the past 675 ka in Lake Ohrid (Macedonia/Albania)

Henrike Baumgarten (1), Thomas Wonik (1), Alexander Francke (2), Bernd Wagner (2), and Giovanni Zanchetta (3)

(1) Leibniz Institute for Applied Geophysics, Hannover, Germany (henrike.baumgarten@liag-hannover.de), (2) Institute of Geology and Mineralogy, University of Cologne, Zülpicher Str. 49a, 50674 Köln, Germany, (3) Dipartimento di Scienze della Terra, Universita Di Pisa, Lungarno Pacinotti, 43 56126 Pisa PI, Italy.

Lake Ohrid is located at the border between Macedonia and Albania (40°70′ N, 20°42 E) and is assumed as the oldest lake in Europe. The lake with a surface area of 360 km^2 has trapped sediments and volcanic ashes over more than 1.5 Ma and hence, contains essential information of major climatic and environmental change of the central northern Mediterranean region. Seismic investigations indicate a sediment fill of the lake basin up to a thickness of 700 m. In the frame of the ICDP project SCOPSCO (Scientific Collaboration on Past Speciation Conditions in Lake Ohrid), several scientific questions are addressed: age and origin of the lake, paleoclimatic change during the Quaternary, tephrostratigraphy, and driving forces for the outstanding biodiversity.
The "Deep site" is located in the central deep basin of Lake Ohrid and was targeted for drilling operation to a depth of 569 m below lake floor (mblf) in spring 2013. First results revealed that the bottom part (below 430 mblf) is characterized by coarser grained deposits while the upper part yields fine grained pelagic sediments. High-quality continuous downhole logging data have been achieved by the use of the following tools: spectral gamma ray, magnetic susceptibility, resistivity, dipmeter, borehole televiewer and sonic. The borehole logging data shows strong contrasts in all physical properties, in particular in spectral gamma ray, magnetic susceptibility, resistivity and seismic velocity (vp). Strong cyclicity is evident in Lake Ohrid's pelagic sediment facies, whereas the signal is most pronounced in the total gamma ray and potassium content. The data shows high correlation (R^2 = 0.75) with the global climate reference curve from benthic foraminifera (LRO4 stack) and undisturbed and continuous sedimentation was preserved. Low potassium (and gamma ray) correlates with interglacial periods and therefore glacial-interglacial dynamics can be read from these data easily. To further investigate the cyclic characteristics of the data, spectral analysis was applied (sliding window method) and a temporal evolution of several emphasized wavelength was observed. These high amplitudes were linked with orbital cycles to calculate sedimentation rates which range from 45 cm/ka to 30 cm/ka. The effect of compaction was determined and corrected sedimentation rates (average increase of 14 %) after decompaction of the sediment layers were estimated. An age depth-model was generated, which is supported by several age control points from dating of tephra (40Ar/39Ar) in the cores and thereafter the sediments from 0 mblf to 240 mblf span 675 ka.