EGU21-5321, updated on 20 Apr 2021
https://doi.org/10.5194/egusphere-egu21-5321
EGU General Assembly 2021

Half-precession signals in Lake Ohrid and their spatial and temporal connection to proxy records in the European realm

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Lake Ohrid is located on the Balkan Peninsula between Albania and North Macedonia. It is considered Europe's oldest lake and thus is a valuable archive for studies that focus on the change of local (hydro-)climate during the last 1.36 million years (e.g., Francke et al. 2016; Wagner et al. 2019). During an International Continental Scientific Drilling Program (ICDP) campaign in 2013, geophysical downhole logging by the Leibniz Institute for Applied Geophysics acquired continuous datasets of physical properties. Additionally, 2100 m of sediment core was obtained from different sites, the deepest with a length of 570 m (Wagner et al. 2014).

Investigations of half-precession (HP) cycles (~9,000 – 12,000 years) have been given only a small role or have been completely neglected in previous cyclostratographic studies. In this study we focus on HP signals in Lake Ohrid and investigate the temporal variability of this signal over the last one million of years. Next to a connection of HP cycles to interglacials, we see a more pronounced correlation of the HP signal to natural gamma radiation logs in the younger part of the record.

We relate the results from Lake Ohrid to a variety of proxy records from the European mainland and marine sediment cores from the Atlantic and the Mediterranean. Certain patterns, such as the increased visibility of the HP signal in interglacials, occur in most records, but differences, like variations in the amplitude modulation of the filtered HP signal, need to be investiagted in more detail. Nevertheless, the HP cycles are contained in all of the investigated sites, although the records are influenced by different climatic systems. This illustrates that HP signals cannot be connected to a certain climatic system, but can occur simultaneously in records with different proxy signal origins.

HP cycles are a relevant part of natural climate variability - also in Europe - and allow a more detailed investiagtion of sedimentary systems.

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