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The diatom flora of Lake Kinneret (Israel) - Paleolimnological evidence for Holocene climate change and human impact in the southeastern Mediterranean

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The Mediterranean basin is a region of highly complex topography and climatic variability, such that our understanding of the past environmental variability is still limited. Diatoms (single-celled siliceous algae, Bacillariophyceae) are abundant, diverse and sensitive to a wide range of environmental parameters. They are often well preserved in lake sediment records, and have well-recognised potential to generate high-quality paleolimnological data. Diatoms remain one of the least-exploited proxies in Mediterranean palaeoclimate research. Here, we present results of diatom analysis of an 18 m sediment core from Lake Kinneret (Israel) as part of a multi-proxy study of Holocene climate change and human impact in the Levant (http://www.sfb806.uni-koeln.de). Results are compared with other proxy data including pollen, and with output data from regional climate modelling, to strengthen interpretation of environmental change in the southeastern Mediterranean.

The results show remarkable shifts in the diatom flora over the last ca. 8,000 years. Preliminary investigations show that 98% of the diatom taxa can be classified as oligohalobous-indifferent and as alkaliphilous, as is typical of freshwater, alkaline lakes of open hydrology in limestone, karst-dominated catchments.

Changes in the diatom data over time can be interpreted mainly in terms of productivity shifts, with a clear trend from oligotrophic at the base to hypereutrophic in the modern lake. The eutrophication trend accelerates after ca. 3,000 cal. yrs. BP, indicating the influence of increased human activity in the catchment, identified previously by analysis of the vegetational history (Schiebel, 2013).

The analysis of the composition of the diatom flora also provides some evidence for lake-level fluctuations, as a proxy for shifts in moisture availability. Low lake-level stands are characterized by low diatom concentration and increased relative abundance of littoral taxa. High lake-level stands are marked by the clear dominance of planktonic species, such as *Cyclotella ocellata* PANTOCSEK and *Cyclotella paleo-ocellata* VOSSEL & VAN DE VIJVER (a newly described centric diatom which may be endemic (Vossel et al., 2015), in phases of high diatom concentration. Such inferred lake-level oscillations correlate well with the output from the climatic models from the Levant region, representing changes in moisture availability (Litt et al., 2012), although the signal is obscured in the last 3,000 years by the effects of anthropogenic eutrophication.

References

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