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Lacustrine oxygen isotope records from biogenic silica ($\delta^{18}O_{BSi}$) – a global compilation and review

Philip Meister[1] and the Project team: "Lacustrine oxygen isotope records from biogenic silica (δ18OBSi) – a global compilation and review"*
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Isotope records are crucial for proxy-model comparison in paleoclimatology because of their advantage of being directly comparable with isotope-enabled paleoclimate model outputs. Oxygen isotopes ($\delta^{18}O$) are commonly measured on carbonates (i.e. ostracods, authigenic carbonates) and biogenic silica (mainly diatoms). Oxygen isotopes in lacustrine carbonates ($\delta^{18}O_{CaCO3}$) have been studied extensively for several decades, yet they are subject to complex species-dependent fractionation processes and not available globally. Lacustrine oxygen isotope records from biogenic silica ($\delta^{18}O_{BSi}$), on the other hand, likely do not display species-dependent fractionation effects (or only very minor) and offer insight even in data-sparse regions devoid of carbonates, such as the Arctic. To date, more than 70 lacustrine $\delta^{18}O_{BSi}$ records have been published. These case studies have been complemented with additional efforts addressing climatic and hydrological backgrounds, laboratory techniques and possible species-dependent fractionation as well as deposition and dissolution effects.

Here, we present the first comprehensive review and global compilation of lacustrine $\delta^{18}O_{BSi}$ records, with explicit regard to their individual lake basin parameters. With this work, we aim at contributing to bridging the gap between modelling and isotope geochemistry approaches regarding terrestrial archives in paleoclimatology. Departing from hitherto prevalent case studies, we assess what we can learn from lacustrine $\delta^{18}O_{BSi}$ records globally, considering lake basin characteristics, spatial and temporal coverage as well as hydrological background information. This improves both the usability of $\delta^{18}O_{BSi}$ for proxy-model comparison and our understanding of the general constraints for interpreting lacustrine $\delta^{18}O_{BSi}$ records.

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