



Ecosystemic postglacial succession of Nettilling Lake (Baffin Island, Canada) inferred by the oxygen isotope composition and the assemblage of lacustrine diatoms

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In 2012, a 82 cm long sediment core (Ni2B) was drilled at Nettilling Lake. We use a multi-proxy paleolimnological approach to study the sedimentary records preserved in Nettilling Lake (Baffin Island, Canada) in order to reconstruct the postglacial environmental history of the lake watershed. 31 samples of biogenic silica were purified, their contamination assessed and corrected for and subsequently analysed for the oxygen isotope composition ($\delta^{18}\text{O}_{\text{diatom}}$). Additionally, the diatom assemblage from 35 samples was quantified under the light microscope with $\times 1000$ magnification. Our chronology extends to \sim BC 1200 yrs based on ^{14}C from bulk sediment.

Downcore variations in $\delta^{18}\text{O}_{\text{diatom}}$ values show a marine-lacustrine transition. The samples from the marine-brackish zone show a higher isotopic composition (27.5‰ 58.5cm depth, "middle Holocene") than the samples from the lacustrine section (21.7‰ 1.5cm, 2002 AD). The transition zone can be distinguished by values between these extremes, too (23.4‰ 33cm, \sim 1240 BC). This likely reflects changes in the water source, from more isotopically enriched marine water in the past to more depleted and cold lacustrine water. The diatom assemblage reflects the same transition. The marine-brackish zone contains polyhalobous-mesohalobous benthic species (e.g. *Trachyneis aspera*, *Gomphonemopsis aestuarii*, *G. pseudexigua*, *Cocconeis scutellum*) which have a salinity preference between 35‰ to 5‰ indicating a shallow, littoral environment. The transition zone is characterized by a sharp rise of alkaliphilous freshwater benthic taxa (e.g. *Staurosirella pinnata*, *Staurosira construens*, *Staurosira brevistriata*). The diatom flora of the upper zone is characterized by halophobous planktonic and benthic species (e.g. *Cyclotella rossii*, *Cyclotella pseudostelligera*, *Tabelaria flocculosa*, *Encyonema silesiacum*, *Nitzschia perminuta*).

The $\delta^{18}\text{O}_{\text{diatom}}$ and the diatom assemblage record from Nettilling Lake register changes in the oxygen isotope composition of the lake water. This is the first $\delta^{18}\text{O}_{\text{diatom}}$ record documenting a marine-lacustrine transition. Records from Nettilling Lake will provide further evidence for the usefulness of $\delta^{18}\text{O}_{\text{diatom}}$ as an important parameter in multi-proxy paleoclimatic reconstruction.