



Late Glacial to Holocene abrupt temperature changes recorded by Crenarchaeota in Lake Lucerne (Vierwaldstättersee, Switzerland)

Cornelia I. Blaga (1), Gert-Jan Reichart (1,2), André F. Lotter (3), Flavio Anselmetti (4), Jaap S. Sinninghe Damsté (1,5)

(1) Utrecht University, Earth Sciences, Utrecht, The Netherlands (blaga@geo.uu.nl), (2) Alfred Wegener Institut for Polar and Marine Research, Biogeosciences, Bremerhaven, Germany, (3) Institute of Environmental Biology, Section Palaeoecology, Utrecht, The Netherlands, (4) Geological Institute, Swiss Federal Institute of Technology, Zürich, Switzerland, (5) Royal Netherlands Institute for Sea Research (NIOZ), Den Burg, The Netherlands

In this study we applied the TEX86 (TetraEther Index of 86 carbon atoms) temperature proxy to a sediment core from Lake Lucerne (Vierwaldstättersee) to reconstruct, in almost decadal resolution, temperature changes during the Younger Dryas and the Early Holocene (ca. 14600 to 10600 cal. BP). The TEX86 proxy suggests a sequence of shifts during the late glacial period that strongly resemble the shifts in $\delta^{18}\text{O}$ values from the Greenland ice core record. The TEX86-reconstructed lake temperature record indicates a step-wise pattern of climate changes across the studied interval with a shift from colder to warmer temperatures at the onset of the late-glacial interstadial, followed by an abrupt cooling at the onset of Younger Dryas and a rapid warming from 5.5 to 9°C at the Younger Dryas/Holocene transition in less than 200 years. The temperature change associated with the Interstadial-Younger Dryas alternation is ca. 4 °C and is in line with previous temperature reconstructions based on different proxies. The rapid changes in temperature associated with the last deglaciation are reflected in the highest possible detail in the TEX86 record. It is thus clear that our proxy, based on the isoprenoidal GDGTs (Glycerol Dialkyl Glycerol Tetraethers), is capable to reflect high resolution records of rapid (decadal to century scale oscillations) environmental fluctuations comparable with those obtained from ice cores.