



## **Rapid summer temperature changes during Termination 1: multi-proxy reconstructions from Gerzensee (Switzerland)**

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Climate warming at the end of the last glaciation had significant impacts on plants and animals. The response of these biota to climatic change allows reconstructing past climate based on organism-specific transfer functions. Quantitative July temperature reconstructions using fossil chironomid and pollen assemblages from Gerzensee (Switzerland) have been carried out for the period between 15,000 and 13,000 cal. years BP. The excellent correlation between the Gerzensee bulk sediment oxygen isotopes and the NGRIP core allowed the development of a precise, high-resolution chronology for the record. The July temperature reconstructions show rapid warming at Termination 1, i.e. the onset of the late-glacial Interstadial at ca. 14,700 cal. BP, of 4°C (pollen) and 1.5°C (chironomids). These temperature changes go parallel with a shift of more than 3% in a high-resolution stable oxygen isotope record measured on bulk carbonates from the same core, indicating also a substantial and rapid warming.

Pollen-inferred summer temperatures run parallel with the oxygen-isotope record with a generally decreasing trend of ca. 2°C throughout the Interstadial, showing even minor cold oscillations (e.g. GI-1d, and 1b) of 0.5-1°C during the Greenland Interstadial 1. Chironomid-inferred July temperatures, however, show a gradual increase of ca. 3°C throughout the Interstadial, interrupted by some cold oscillations (e.g. GI-1b) of

0.5-1°C.

The reconstructions of both proxies are in agreement with comparable studies in the Jura Mountains and the Alps. Given the close correlation between the oxygen isotope record and the pollen-inferred temperatures, the discrepancies between the biota-specific summer temperature inferences may be explained by a threshold response in vegetation dynamics because of a higher sensitivity of the Interstadial pioneer vegetation to changes in seasonality and precipitation.