

Publication

The Little Ice Age signature in a 700-year high-resolution chironomid record of summer temperatures in the Central Eastern Alps

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Despite the fact that the Little Ice Age (LIA) is well documented for the European Alps, substantial uncertainties concerning the regional spatio-temporal patterns of temperature changes associated with the LIA still exist, especially for their eastern sector. Here we present a high-resolution (4-10 years) 700-year long mean July air temperature reconstruction based on subfossil chironomid assemblages from a remote lake in the Austrian Eastern Alps to gain further insights into the LIA climatic deterioration in the region. The record provides evidence for a prolonged period of predominantly cooler conditions during AD 1530-1920, broadly equivalent to the climatically defined LIA in Europe. The main LIA phase appears to have consisted of two cold time intervals divided by slightly warmer episodes in the second half of the 1600s. The most severe cooling occurred during the eighteenth century. The LIA temperature minimum about 1.5 °C below the long-term mean recorded in the mid-1780s coincides with the strongest volcanic signal found in the Greenland ice cores over the past 700 years and may be, at least in part, a manifestation of cooling that followed the long-lasting AD 1783-1784 Laki eruption. A continuous warming trend is evident since ca AD 1890 (1.1 °C in 120 years). The chironomid-inferred temperatures show a clear correlation with the instrumental data and reveal a close agreement with paleotemperature evidence from regional high-elevation tree-ring chronologies. A considerable amount of the variability in the temperature record may be linked to changes in the North Atlantic Oscillation.

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