

Publication

A chironomid-based Holocene summer air temperature reconstruction from the Swiss Alps

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We developed a quantitative chironomid-July air temperature inference model based on surface sediments from 81 Swiss lakes and applied it to the Holocene subfossil chironomid record of Hinterburgsee, a small subalpine lake in the northern Swiss Alps (present-day mean July air temperature of 11.3degreesC). After smoothing to reduce the high between-sample variability of inferred temperatures, the reconstruction indicates July air temperatures of 10.4-10.9degreesC at the end of the Younger Dryas, of 11.9-12.8degreesC during the early and mid-Holocene (11500-4000 cal. BP), and slightly lower temperatures of 11.5-12.0degreesC during the late Holocene (3500-1000 cal. BP). A warming trend inferred for the past millennium is most likely an artifact of human impact on Hinterburgsee's chironomid fauna, rather than a genuine temperature signal. The most prominent climatological events during the Holocene were two periods of lower temperatures at c. 10700-10500 cal. BP and 8200-7700 cal. BP and an abrupt shift to a cooler late-Holocene climate around 4000-3700 cal. BP. Although the chironomid-inferred climate signals were within the prediction error of the model (1.51degreesC), major inferred temperature changes agree well with other northern and central European climate reconstructions and underline the potential of subfossil chironomid analysis to reconstruct even the moderate climatic changes within the Holocene.

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