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Chironomids as indicator for the Holocene climatic and environmental history of Store Koldewey, NE-Greenland

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A 290 cm long sediment record from a high arctic lake on Store Koldewey, an island off North East Greenland was investigated for fossil chironomid assemblages, chronology and biochemistry. A total of 18 chironomid taxa were identified throughout the Holocene. The fossil chironomid assemblages in the lake on Store Koldewey differ markedly from lakes on Svalbard and from recent chironomid assemblages in lakes of West Greenland. First chironomids appear at ca. 9,000 cal. yr BP, when a significant warming is supposed for East Greenland. However, the abundance and diversity of chironomids remained low during the early Holocene. At 6000 cal. yr BP a distinct maximum of organic matter accumulation can be observed in the lake on Store Koldewey. The onset of distinct organic matter accumulation correlates with an increase of chironomid abundance and diversity, which remain on a relatively high level during the middle Holocene until ca. 3000 cal. yr BP. Distinctly lower chironomid abundances in the late Holocene are presumably the a result of palaeoenvironmental deterioration and cooler conditions. The differences between the abundances and diversity of the fossil chironomid assemblages in the lake on Store Koldewey and the known Holocene climate history of East Greenland implies that chironomid abundances and diversity is more controlled by nutrient availability and oxygen conditions in the water column than by temperature changes. The chironomid record from Store Koldewey is the first detailed record form Northeast Greenland and thus is a first step to evaluate the use of chironomids as climate proxies for such high arctic environments.