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Climate changes in East Siberia (Russia) in the Holocene based on diatom, chironomid and pollen records from the sediments of Lake Kotokel

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Abstract

We analysed a 620-cm-long sediment record from Lake Kotokel located in East Siberia (Russia) for subfossil diatoms, chironomids and pollen to provide a reconstruction of the climate history of the area for the last 12.2 kyr. The subfossil records show differing time lags in their responses to climate change; diatoms and chironomids were more sensitive to climate change than the pollen record. Changes in the biogenic proxies seem related with changes in insolation, the temperature of the North Atlantic and solar activity. The chironomids *Chironomus plumosus*-type and *Einfeldia carbonaria*-type and the diatom *Aulacoseira granulata* were interpreted as markers of warm climate condition. The proxy records were divided into four periods (A, B, C and D) suggesting differing climate in East Siberia during the Holocene. Period D (12.2-9.5 kyr BP) at the beginning of the Holocene, according to chironomid and diatom records, was characterized by warm climate with summer temperatures close to modern. However, forest vegetation had not become fully established yet. During Period C (9.5-5.8 kyr BP), the climate seemed to gradually become colder and wetter from the beginning of Period C to 7 kyr BP. From 7 to 5.8 kyr BP, the climate seemed to remain cold, but aridity increased. Period B (5.8-1.7 kyr BP) was characterised by frequent and sharp alternations between warm and cold conditions. Unstable conditions during this time are also registered in records from Lakes Baikal, Khubsugul and various other shallow lakes of the region. Optimal warm and wet conditions seemed to occur ca. 4 kyr BP. During Period A (the last 1.5 kyr) the diatom and chironomid records show evidence of cold conditions at 1.5-1 kyr BP, but the forest vegetation did not change significantly. © 2012 Springer Science+Business Media B.V.

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Keywords

Bottom sediments, Chironomids, Climate changes, Diatoms, Lake Kotokel, Pollen, The Holocene