



Century-scale climate-driven vegetation and environmental dynamics in southern Siberia during the last 47 kyr

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Radiocarbon-dated pollen and diatom records from Lake Kotokel in southern Siberia are used to reconstruct the environmental history of the area since ~47 kyr BP. Pollen data and reconstructed biome scores suggest predominance of a tundra-steppe vegetation and variable woody cover (5-20%) between ~47-30 kyr BP, indicating generally a harsh and unstable climate during this interval, conventionally regarded as the MIS3 interstadial. The short-term climate amelioration episodes in the glacial part of the records are marked by the peaks in taiga and corresponding minima in steppe biome scores and appear synchronously with the hemispheric temperature and precipitation changes recorded in the Greenland ice cores and Chinese stalagmites. The interval ~30-24 kyr BP was probably the driest and coldest of the whole record, as indicated by highest scores for steppe biome, woody coverage <5%, absence of diatoms and reduced size of the lake. A slight amelioration of the regional climate ~24-22 kyr BP was followed by a shorter than the previous and less pronounced deterioration phase. After 14.7 kyr BP the climate became warmer and wetter than ever during ~47-14.7 kyr BP, resulting in the deepening of the lake and increase in the woody coverage to 20-30% ~14.5-14 kyr and ~13.3-12.8 kyr BP. These two intervals correspond to the Meiendorf and Allerød interstadials, which until now were interpreted as part of the undifferentiated Bølling/Allerød interstadial complex in the Lake Baikal region. The increase in tundra biome scores and pronounced change in the diatom composition allow (for the first time) the unambiguous identification of the Younger Dryas (YD) in the region ~12.7-11.65 kyr BP, suggesting the synchronous onset of the YD and the Holocene interglacial across Eurasia. The maximal spread of the taiga communities in the region is associated with a warmer and wetter climate than the present prior to ~7 kyr BP. This was followed by a wide spread of Scots pine, indicating the onset of modern environments.

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