



Palaeolimnological Evidence for Recent Climate Change in Lakes from the Northern Urals, Arctic Russia

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General circulation models predict that warming in the Arctic will occur more rapidly than elsewhere, and there is growing evidence from palaeoclimatic studies that unprecedented climate warming has already taken place in many parts of the arctic during the twentieth century. Lake sediment records in these regions are especially useful in identifying the extent of warming. Here we examine results from the Bol'shezemel'skaya Tundra in the northern Ural region of the Russian Arctic and assess evidence for climate change and also evaluate the impact of atmospheric pollution from local sources.

The recent sediments from two deep arctic lakes, Mitrofanovskoe and Vanuk-ty, situ-

ated in the permafrost belt within the Bol'shezemel'skaya Tundra in the northern Ural region were studied for diatoms, chironomids, spheroidal carbonaceous particles and stable lead isotopes. The magnitudes and rates-of-change in diatom and chironomid assemblages were numerically estimated. Instrumental climate records were used to assess statistically the amount of variance in diatom and chironomid data explained by temperature. A combination of modern limnological and paleolimnological data was used to interpret the results. At Mitrofanovskoe Lake, major compositional changes in diatom and chironomid assemblages occurred at the turn of the 20th century and are likely to be related to the summer temperature increase. A chironomid-inferred air temperature also increased by approximately 1°C during the last 100 years at Mitrofanovskoe Lake. At both lakes diatom compositional changes coincident with the increase in June and September temperatures also occurred at the late 1960s. These compositional changes were correlated with the increase in diatom production, sediment organic content and diatom species richness N2 and are likely to be a diatom response to the lengthening of the growing season. Chironomid response to the late 1960s temperature increase is less pronounced in both lakes.