



Paleoclimatic reconstructions for the south Valdai Hills as paleo-analogues of possible regional vegetation changes under global warming.

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An assessment of reaction of south taiga forest ecosystems on global climatic changes, appearing mainly as temperature growth and changes in precipitation regime, is one of very important scientific problems demanding multy-proxy paleoenvironmental investigations. Reconstructions of climatic changes in the Holocene and past Interglacial will allow us to find paleo-analogues for possible landscape dynamics at the regional level of the south of Valdai Hills (Central European Russia). The Central Forest State Natural Biosphere Reserve (CFSNBR) in the south Valdai Hills has been chosen as a key region for this study. The landscape of CFSNBR is most typical for south taiga zone and represented mainly by original spruce forests. It is situated in area between continental area of central Russia and maritime areas of Western Europe. Mean annual air temperature of the area is close to the south limit of taiga zone; therefore flora and vegetation of CFSNBR should be very sensitive even to relatively small climatic and environmental changes.

The quantitative characteristics of the Holocene climate (temperature of warmest and coldest months, mean annual temperature and precipitation) were calculated using the information-statistical method developed by Klimanov (1984). The summer and winter temperatures of the last Interglacial were reconstructed on the base of V.P. Grichuk's method of climagrams (Grichuk, 1985). Information about future climatic conditions for period to 2100 on the study area has been obtained using modeling results provided by the global climatic model ECHAM5 (Hamburg, Germany) and climatic scenario A1B (IPCC 2007).

The results of the study have show that the optimum of the Holocene (the late Atlantic period, 5100-4500 yr. BP) can be considered as a possible analogue for climatic conditions in 2040-2050 in the area. Global warming in 2100 will reach the level of the optimal phases of the last Interglacial (Mikulino, Eemian, 130-115 kyr. BP).

In the territory of the CFSNBR the Holocene climatic optimum has appeared mainly by increasing in winter temperature (up to -6.5° , 3° higher than at present). The mean annual and July temperatures exceeded their present values by 1° . Precipitations were 600-800 mm per year. Vegetation was mixed coniferous broad-leaved forest with high proportion of oak, elm, lime and alder.

In the warmest phases of the last interglacial the January temperature rose to -1 , -4° , that was $5-8^{\circ}$ higher than modern conditions. The deviation of July temperature was about $2-4^{\circ}$. Vegetation cover was represented by mixed broad-leaved and hornbeam forests, plants demanding to the relatively high heat supply penetrated to the territory of CFSNBR.

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