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Variations climate of East-European Plain and Caspian sea level during last 20000 years (on the basis of numercial simulations within the Paleoclimate Modeling Intercomparison Project)

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In this paper results of climate simulation in East-European Plain (EEP) by coupled climate models (which take part in project PMIP II (Paleoclimate Modeling Intercomparison Project)) are tested for different climatic periods (pre-industrial, mid-Holocene, Last Glacial Maximum (LGM)). The main parameters for comparison were: temperature, precipitation, evaporation and the Volga runoff. As a result, the model CNRM (Centre National de Recherches Meteorologie, France) was chosen as the best for this territory for pre-industrial climate. Its results were used to calculate runoff of the Volga river during the LGM and modern climate. “Climatic” component of the Volga runoff was calculated as the difference between precipitation and evaporation in the watershed. The “climatic” part of the Volga runoff 21 kyr decreased by 60% compared with the modern (according to model CNRM). The main reason for the low values of “climatic” runoff was the reduction of precipitation on the territory of Volga watershed. The decrease of evaporation could not compensate the deficit of precipitation.

However, according to paleoreconstructions and the results of PMIP II simulation, a significant change to the hydrological regime of the Volga River (21 kyr BP) could be due to the contribution of meltwater (about 384 km^3/year). This means that within the territory of Volga watershed to "climatic" component of runoff (about 78 km^3/year), one has to add volume of the meltwater of the Scandinavian ice sheet (PMIP provides information about the configuration of the ice sheet in the LGM). For the first time the contribution of melted glacier in the river runoff has been taken into account.

The results were used to assess the level of the Caspian Sea during this period (changes in the Caspian sea level compared with modern was about 48 meters). Also, level of the Caspian Sea was calculated after the complete degradation of Scandinavian ice sheet.