Geophysical Research Abstracts
Vol. 14, EGU2012-7609-1, 2012
EGU General Assembly 2012

Geothermal evidences of pre-industrial ground temperature changes in the Urals and Eastern Europe

D. Demezhko, A. Kotlovanova, and Yu. Khachay
Institute of Geophysics, Russian Academy of Sciences, Ural Branch, Ekaterinburg, Russian Federation (ddem54@inbox.ru)

To characterize pre-industrial (17-19th centuries) climate changes we reconstructed ground surface temperature histories from temperature-depth profiles measured in boreholes at 83 sites in the Urals and Eastern Europe (Finland, Ukraine, and Belarus). Only upper 300-meters interval and constant value of thermal diffusivity of rocks = 10-6 m2/sec were used in all cases. Parts of temperature histories for the 20th century were excluded from further analysis. Our investigation shows high degree of spatial-temporal variability of climatic changes in the 17-19th centuries. Nevertheless, most of the histories have a minimum within the investigated period corresponding to the Little Ice Age and subsequent temperature rise. Cluster analysis reveals at least two types of histories: with early (1720-1760 years) and late (1820-1900 years) warming start date. Early start of warming appears in the north and northwest Urals as well as north and south area of Eastern Europe. Late start appears along the lines southwest – northeast along the Urals as well as in central part of Eastern European territory. Higher positive amplitude of temperature changes in the 17-19 centuries are typical for the regions of early start, while for the regions of the late start there are low or even negative amplitude. In the report we discuss possible reasons of such ground temperature change pattern including: i) a role of atmospheric circulation, ii) air/ground surface temperature interaction and precipitation, iii) influence of non-climatic factors such as deforestation and geological features.