Geophysical Research Abstracts
Vol. 12, EGU2010-8947, 2010
EGU General Assembly 2010

Statistical peculiarities of air temperature behavior on Siberian territory in the second half of XX century revealed from reanalysis and observational data

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As well known now, climate changes on Siberian territory are spatially inhomogeneous, there are areas, called "hot spots," where accelerated warming is occurred. Detailed studying of climate dynamics peculiarities in this region is required. To do this, it is necessary to enlarge a set of climate characteristics under study and to use meteorological information obtained from both weather stations and meteorological models. The report presents results of investigation of air temperature behavior on Siberian territory over the period from 1958 to 2000 based on ECMWF ERA-40 2.5°×2.5° data and observations of weather stations located in Siberia. We analyzed spatial distribution of trends for the following temperature characteristics: annual mean, seasonal mean, monthly mean temperatures, beginning and duration of warm and vegetation periods (daily mean temperature exceeds 0° C and 5° C, respectively), number of thaw days during winter.

Analysis of temperature dynamics has shown significant increase of annual mean air temperature on West Siberia territory, which reaches 0.2 – 0.3° C/10 years. It was found that temperature changes in winter and spring seasons make the largest contribution into temperature behavior, while contribution of temperature changes in summer and autumn are much less. Temperatures averaged over shorter periods of time (month) present more varied behavior which is smoothed in season averaging. Analysis of duration of warm and vegetation periods has shown an increase in number of days with daily mean temperature exceeding 0° C and 5° C, respectively, by 2-3 days/10 years in average. An increase of 2-4 days/10 years in number of thaw days on the West Siberia territory was revealed as well.

Recently, using WRF mesoscale model, we obtained archives of meteorological fields with spatial resolution of 10 km, taking into account influence of surface layer on climate forming and allowing detailed analysis of local climate dynamics. In particular, the results obtained reveal local inhomogeneities with sizes up to 20 km, within which variations of monthly mean temperature are about 1° C.

The work has been partially supported by SB RAS Program 4.5.2 and integration projects Nos. 4, 50 and 66.