Comparative analysis of atmosphere temperature variability for Northern Eurasia based on the Reanalysis and in-situ observed data

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At present numerous data archives which include meteorological observations as well as climate processes modeling data are available for Earth Science specialists. Methods of mathematical statistics are widely used for their processing and analysis. In many cases they represent the only way of quantitative assessment of the meteorological and climatic information. Unified set of analysis methods allows us to compare climatic characteristics calculated on the basis of different datasets with the purpose of performing more detailed analysis of climate dynamics for both regional and global levels.

The report presents the results of comparative analysis of atmosphere temperature behavior for the Northern Eurasia territory for the period from 1979 to 2004 based on the NCEP/NCAR Reanalysis, NCEP/DOE Reanalysis AMIP II, JMA/CRIEPI JRA-25 Reanalysis, ECMWF ERA-40 Reanalysis data and observation data obtained from meteorological stations of the former Soviet Union.

Statistical processing of atmosphere temperature data included analysis of time series homogeneity of climate indices approved by WMO, such as "Number of frost days", "Number of summer days", "Number of icing days", "Number of tropical nights", etc. by means of parametric methods of mathematical statistics (Fisher and Student tests). That allowed conducting comprehensive research of spatio-temporal features of the atmosphere temperature. Analysis of the atmosphere temperature dynamics revealed inhomogeneity of the data obtained for large observation intervals. Particularly, analysis performed for the period 1979 – 2004 showed the significant increase of the number of frost and icing days approximately by 1 day for every 2 years and decrease roughly by 1 day for 2 years for the number of summer days. Also it should be mentioned that the growth period mean temperature have increased by 1.5 - 2° C for the time period being considered.

The usage of different Reanalysis datasets in conjunction with in-situ observed data allowed comparing of climate indices values calculated on the basis of different datasets that improves the reliability of the results obtained.