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CLIMATE OF WEST SIBERIA DURING THE SLOWING PHASE OF WARMING (1986–2015) AND PREDICTION OF HYDRO-CLIMATIC RESOURCES FOR 2021–2030

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The relevance of the study. The most visible affect of the present climate change is the rise of surface air temperature. Regional and local indicators of climate change differ from the global characteristics. Transformation of the hydrological cycle, water balance, river runoff in its turn affects climate processes. In order to predict the response of geosystems and their hydro-climatic resources to climate change it is necessary to have a clear vision of contemporary climate change and its projections for the coming decades in specific geographical localities.

The aim of the study is (1) to assess the climate change over West Siberia on the basis of statistical analysis of monthly air temperature and precipitation time series up to 2015, (2) predict the average air temperature and precipitation fields for the 2021–2030, and (3) determine the climate-driven changes in water balance and water flow regime over the study area.

The methods used in the study. Analysis and forecasting of spatial and temporal variability of surface air temperature and precipitation rates at meteorological stations in the region are made by statistical methods in the StatSoft STATISTICA package (regression analysis, trend analysis, cluster analysis to classify objects, exponential smoothing and forecasting). The averaged monthly land water balance constituents are determined for the base (1966–1985), current (1986–2015) and forecast (2021–2030) using the method of hydrological and climatological calculations developed by V.S. Mezentsev.

The results. It is shown that the modern 30yrs climatic period differs from the previous one in higher energy level (air temperature). Against this background, not only upward but downward temperature trends in some months are observed. The authors have predicted the average temperatures and precipitation rates in a cold season and monthly temperatures and precipitation in a warm season of the year at 31 meteorological stations for 2021–2030. The estimates for the current and forecast periods made it possible to compute the average regime parameters of precipitation, evapotranspiration, runoff and moisture of soil active layer at the meteorological stations located in different landscape zones and regions of West Siberian plain. The projected increase in temperature and evapotranspiration does not lead to the expected decrease in flow even in the southern dry regions. At the same time, soil moisture in summer will decrease everywhere.

Key words:

Hydro-climatic resources of geosystems, water balance, Western Siberia, method of hydrological and climatological computations, air temperature, atmospheric precipitation, time series analysis and forecasting

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