Analysis of hydrological components of the Siberian region for the XXI century

Kuzin V.I., Lapteva N.A.

Institute of Computational Mathematic and Mathematical Geophysics SD RAS, Novosibirsk,

e-*mail*: kuzin@sscc.ru

enviromis 2016

INTERNATIONAL CONFERENCE

and Early Career Scientists School
on Environmental Observations, Modeling and Information Systems

July 11–16, 2016,
Tomsk, Russia

ABSTRACT

Climatic model of the river runoff with 1/3 degree resolution is presented in the paper. The model is the linear reservoir model i.e., each cell in the model is the reservoir or the cascade of the reservoirs. The speed of the output from the cell is depended linearly of the input to the cell and the slope of the cell and verse proportional to distance between the cells. The flow is separated to the surface flow, river runoff and ground flow which is determined in accordance with the ground surface model. In the model the influence of the wetland and lakes is included.

Siberian region in the model is divided to twelve watersheds which include Ob– Irtysh, Yenisei, Lena, Pur, Taz, Khatanga, Anabar, Olenyok, Yana, Indigirka, Kolyma. The paper discusses the results of calculations by the linear reservoir model of the climatic river runoff for the subarctic Eastern Siberia region. For the verification of the model the measurements data as well as the MERRA reanalysis data for the XX century were used. For the XXI century calculations by the data of the INM, CRNM, GFDL, HadGEM, MIROC5, MPI models of the scenario RCP 8.5 of the Project CMIP5 IPCC were done.
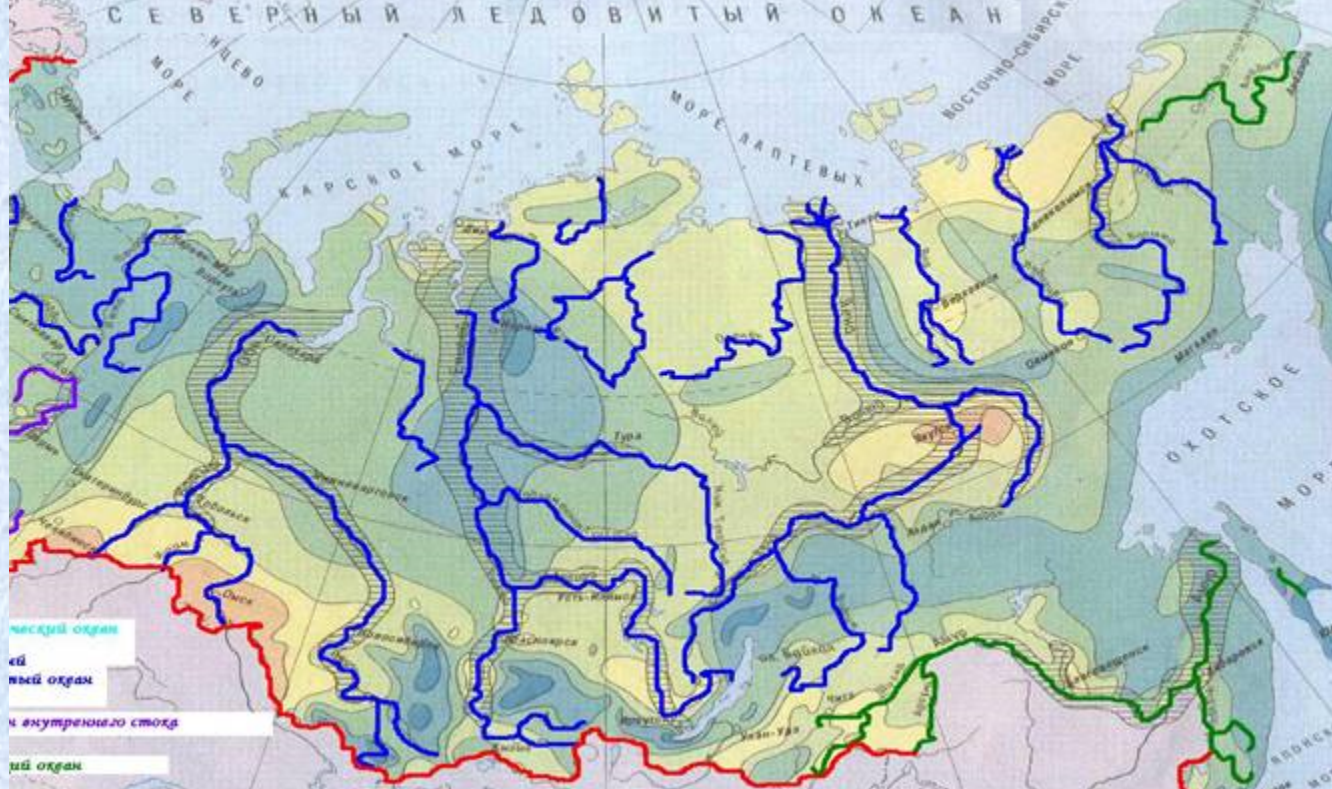
Model river flow covers the Siberian region in longitude from the Ural Mount to Chukotka and latitude from Mongolia to the Arctic Ocean.
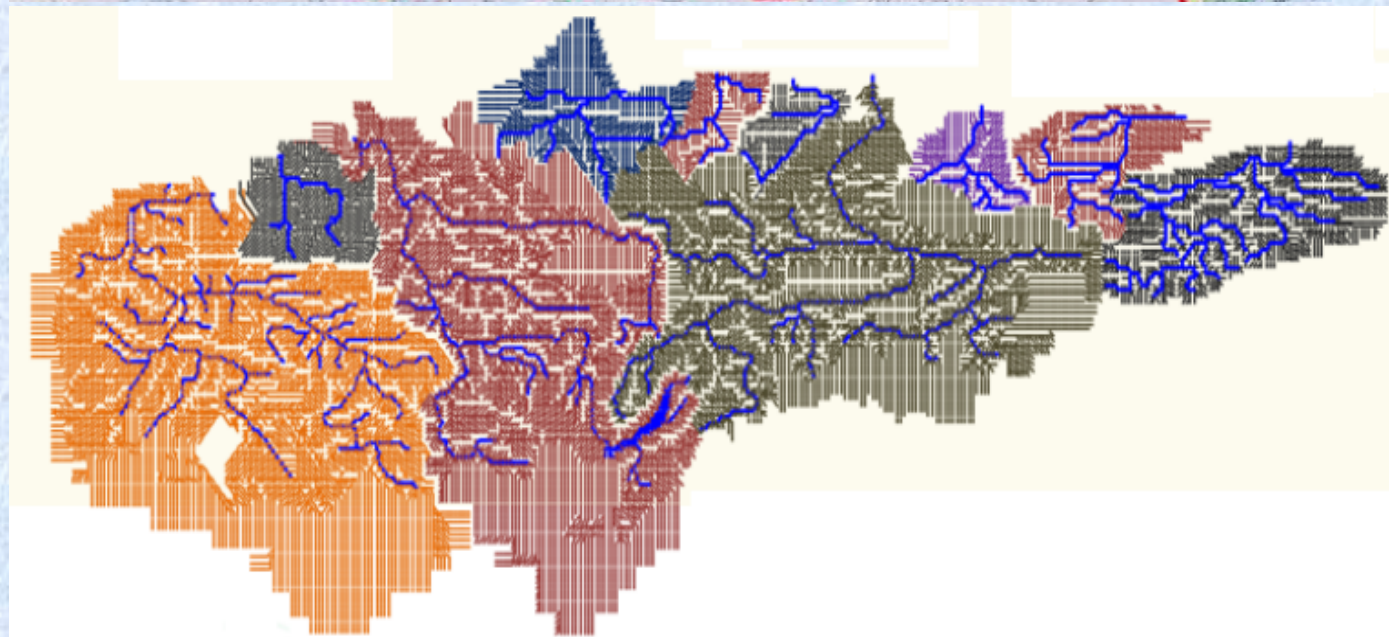

Trases of rivers and areas of surface and groundwater flow (resolution of 1/3 °)
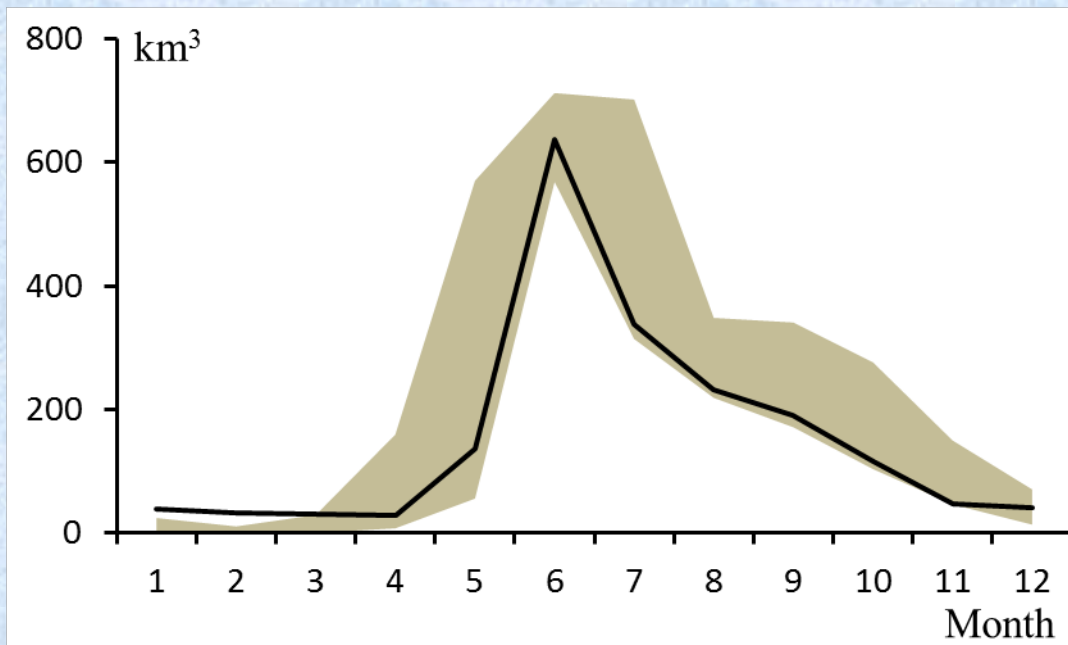
Hydrographs of the multimodel calculations in comparison with the measurements data in the XXth century (for the river watersheds giving the inflow to the Arctic Ocean).
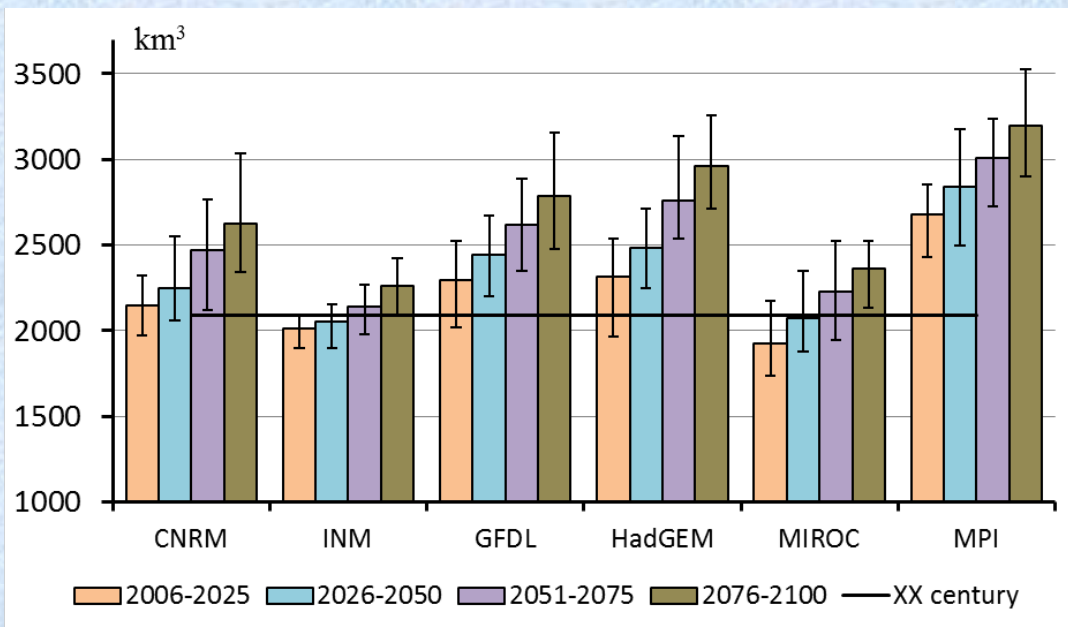
Changes in the river flows averaged over a quarter of century for the IPCC models. Vertical lines indicate the amplitude of the interannual variability in the given period. The horizontal line represents the climatic value of the flow for the XXst century.
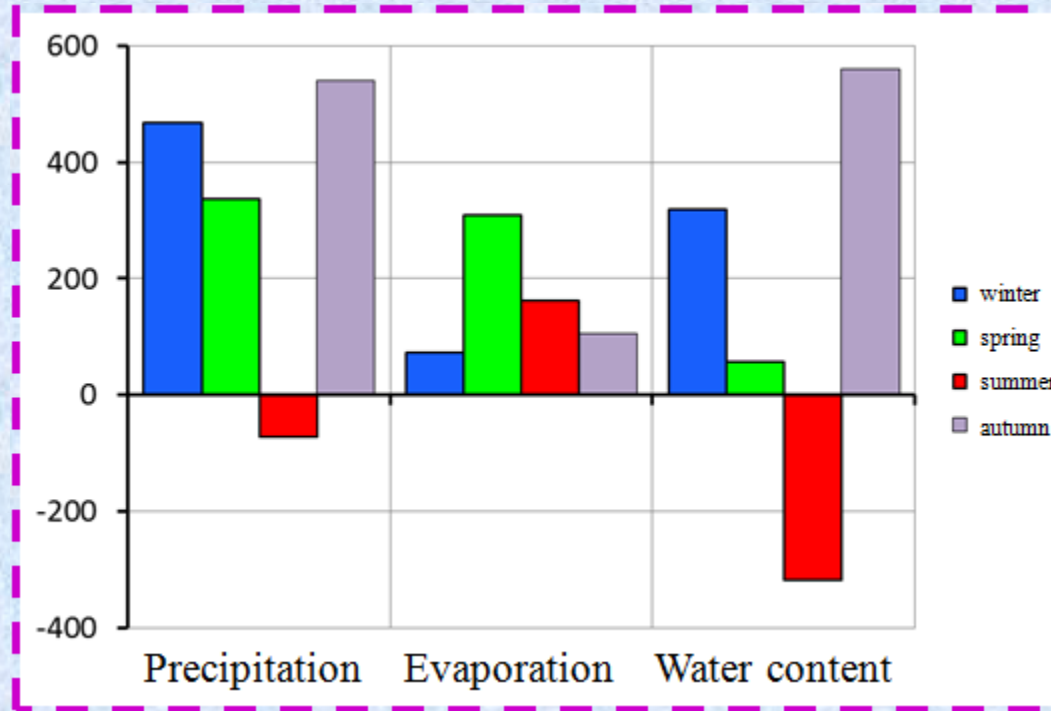
The analysis has shown that the largest contribution to an increase in hydrological characteristics that form the runoff, is provided by the winter and autumn seasons with a moderate growth in the spring. The summer period is characterized by a negative trend. These characteristics determine the overall positive trend in the river flow in the XXIst century.

Thank you for attention!