Geophysical Research Abstracts,
Vol. 11, EGU2009-858-1, 2009
EGU General Assembly 2009


# Large-scale modelling with fine spatial-temporal representation of runoff formation processes: application to the arctic basins of Eastern Siberia

O. Semenova and I.N. Beldiman

State Hydrological Institute, Department of Experimental Hydrology and Modelling of Hydrological Processes, St. Petersburg, Russian Federation (omakarieva@gmail.com)

Usually large scale hydrological models integrated into climate modelling systems have rather crude spatial and temporal description of runoff formation processes which effects in averaged by large territories output values for runoff and variable states. From the other hand the land surface models which are tuned to very detailed representation of water and heat fluxes are not applicable for global scale mainly because of requirement of specific data for calibration which objectively can not be obtained for large basins.

In this presentation we will show the results of numerous simulations of runoff processes implemented across the East Siberia within Lena, Yana, Indigirka and Kolyma river basins. The distributed hydrologic model "Hydrograph" developed by Prof. Yu.B. Vinogradov at the State Hydrological Institute (Saint-Petersburg, Russia) was applied.

The objective of the research was to evaluate the model's representation of hydrological cycle in the Arctic land region and to show its applicability for large-scale modelling combined with fine time and space step representation of individual hydrological processes. For this runoff modelling for basins of different sizes ranging from less than 100 km2 to greater than 2.4 millions km2 and representing different landscape characteristics (tundra, forested tundra, plain and mountain taigas) was performed.

Modelling results for the period 1966–1984 with daily time interval included streamflow hydrographs at basins outlets, basin water balance components (averages for precipitation, evaporation, and runoff discharge including that of surface, soil and ground water) and variable states, e.g., soil temperature and moisture for different soil depths, water capacity, density and saturation of snow cover.

For model verification such data as streamflow observations at basins outlets, monitored snow cover extent characteristics, soil temperature and moisture were used.

The runoff calculations for the Lena river basin (2.4 millions km2) were also conducted using recent forcing data for the period 2000–2005 in conditions of the intensification of thawing processes. The observed and simulated values of soil variable states based on the same set of physical parameters showed good correlation.

The results indicate that the used model performs well the large watersheds as dynamical system in whole succeeding at the same time to fit to the observations of particular hydrological processes at local scale.