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Arctic rivers water runoff change

Y. Simonov (1) and A. Khristoforov (2)

(1) Lomonosov Moscow State University, Hydrology, Moscow, Russian Federation (yuri.simonov@mail.ru), (2) Lomonosov Moscow State University, Hydrology, Moscow, Russian Federation (masha@cabling.ru)

Northern rivers water runoff plays great role in hydrological regime of Arctic Ocean and also influences the life quality of population of the arctic region. Investigation of spatial and temporal variability of arctic rivers runoff and also estimation of its runoff change will help to forecast and minimize possible negative effect of climate change in the Arctic region in ecological and economical scale.
Statistical analysis of long-term fluctuations of runoff characteristics (annual runoff, spring flood, summer and winter runoff) and its major climate factors in general showed that climate change resulted in statistically significant increase of variances and autocorrelation in the second half of 20th century. In the same time statistically significant trends of mean annual runoff reflect the common influence of climate factors and manmade load on water recourses of the Arctic region.
Rather tight correlation dependencies between long-term fluctuation of runoff characteristics and its major climate factors were built for the parts of the Arctic watershed, where manmade load level is low. Such correlation dependencies were significantly improved by taking into account spatial variability of northern region environmental conditions. Gained equations were used to estimate possible future water runoff change under climate change. Multi-model climate projections under A2 emission scenario were used to estimate future change of climate characteristics. In the result of such estimation annual water runoff may increase on 5-30% in the second half of 21st century compared with baseline period from low water management parts of Arctic watershed.
Influence of major climate factors change on water runoff characteristics variability was more accurately checked by using conceptual hydrological model of Hydrometeorological scientific center of Russia and. This hydrological model was used on averaged size watersheds (around 20 000 km2) of Severnaya Dvina basin together with downscaled outputs of 8 Atmosphere Ocean General Circulation Models (AOGCM) on the second half of 21st century under A2 emission scenario. Such estimation showed that annual runoff of northern east European rivers may increase on 20-40%, spring flood increase may be around 25-45% and winter runoff can increase on 75% in the second half of 21st century under A2 emission scenario compared to baseline period.