



Hydrological projections of climate change scenarios in the Lena and the Mackenzie basins: modeling and uncertainty issues

Alexander Gelfan (1,4), David Gustafsson (2), Yury Motovilov (1,4), Berit Arheimer (2), Andrei Kalugin (1), Inna Krylenko (1,3), Alexander Lavrenov (1,3)

(1) Water Problems Institute, Russian Academy of Sciences, Moscow, Russian Federation (hydrowpi@aqua.laser.ru), (2) Swedish Meteorological and Hydrological Institute, Norrköping, Sweden, (3) Lomonosov Moscow State University, Faculty of Geography, Moscow, Russian Federation, (4) P. P. Shirshov Institute of Oceanology of RAS, Moscow, Russian Federation

The ECOMAG and the HYPE regional hydrological models were setup to assess possible impacts of climate change on the hydrological regime of two pan-Arctic great drainage basins: the Lena and the Mackenzie rivers. We firstly assessed the reliability of the hydrological models to reproduce the historical streamflow series and analyse the hydrological projections from the climate change scenarios. The impacts were assessed in three 30-year periods: early- (2006-2035), mid- (2036-2065) and end-century (2070-2099) using an ensemble of five GCMs and four Representative Concentration Pathways (RCP) scenarios. Results show, particularly, that the basins react with multi-year delay to changes in the RCP2.6 mitigation (peak-and-decline) scenario, and consequently to the potential mitigation measures. Then we assessed the hydrological projections' uncertainty, which is caused by the GCM's and RCP's variabilities, and indicated that the uncertainty rises with the time horizon of the projection and, generally, the uncertainty interval is wider for Mackenzie than for Lena. We finally compare the potential future hydrological impacts predicted based on the GCM-scenario ensemble approach and the delta-change transformation method of the historical observations. We found that the latter method can produce useful information about the climate change impact in the great Arctic rivers, at least for the nearest decades.