DOI: https://doi.org/10.37162/2618-9631-2026-1-159-170

Adaptation of the runoff formation model for several southern rivers of Russia / Semenova N.K., Simonov Yu.A., Shatokhin M.V. // Hydrometeorological research and forecasts. 2026, no. 1 (399), pp. 159-170.

To assess river water availability in the south of European Russia over the next 5-year period, it is proposed to use a modified runoff formation model and a long-term meteorological forecast of the INM-CM5 model with a lead time of 1–5 years for several basins of the Don, Kuban, and Kuma rivers. These river basins are characterized by high loads on water management systems, which determines their sensitivity to both interannual and intraannual variability of river runoff and its main characteristics. To estimate such variability, the HBV hydrological runoff formation model was modified using an algorithm for describing the dynamics of snow density and snow depth, as well as a module for calculating the freezing depth. The modified version of the hydrological model was adapted for the studied rivers. The adaptation included the calculation of model coefficients, parameter optimization, and verification of calculations of the main river characteristics. A validation of the model results on an independent sample demonstrated a good performance of the model and its applicability for producing long-term forecasts of runoff characteristics. An optimum algorithm for correcting hydrological model calculations and forecasts taking into account autocorrelation of their errors was developed, which increased the modeling accuracy by 15–20 % for the study watersheds.

Keywords: river runoff, long-term forecast, hydrological model, verification

Tab. 2. Fig. 3. Ref. 24.