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Analysis of potential climate change impact on mean flow in Someș river basin, Romania

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This paper presents the results obtained by the National Institute of Hydrology and Water Management (NIHWM) in collaboration with the Swedish Meteorological and Hydrological Institute (SMHI) within the ECLISE project ("Enabling CLimate Information Services for Europe").
In order to estimate the modifications due by the climate change on the mean flow of the Somes river basin in the time horizon 2021 – 2050 the hydrological model WATBAL was used, a water balance model with monthly time step, using as input data series of monthly precipitation and mean monthly temperature. These series resulted from data processing of climate projections obtained by four regional climate models: CNRM_RM5.1_ARPEGE (A), HC_HadRM3Q0_HadCM3Q0 (B), SMHI_RCA3_BCM (C) and SMHI_RCA3_ECHAM5 (D).
WATBAL model parameters were calibrated by the flow simulation in 33 analysed cross-sections from Somes river basin using as input data the monthly precipitation and mean monthly temperatures recorded at weather stations located into the area, during 1971-2000, considered as reference period.
Hydrological simulation was performed taking into account two scenarios: Scenario 0, in which mean monthly discharge was computed for the reference period, considering the meteorological inputs simulated with climate models, and Scenario 1, which suppose the simulation of mean monthly discharge for the next period 2021-2050, with the same hydrological model, considering as inputs the climate change projections.
Comparative analysis of water flow simulations in Somes river basin, regarding the regime of multi-annual mean monthly, seasonal and annual discharges, for the reference period and for the next period have been carried out. From the analysis performed in this study resulted that the variation of the multi-annual monthly mean discharges based on the 4 climate models considered in the assumption of climate change (period 2021-2050) compared to the current flowing regime (period 1971-2000) is often contradictory being relatively few situations where all climate models obtained the same trend of flow. Thus, in general, for all climate models, has been achieved an increase of multi-annual mean discharge in March and a decrease in July and August.
Regarding the variation with altitude of the multi-annual monthly mean discharges it has been found a smaller variation of their in the river basins with small reception area and high average altitude and a greater variation for those with large reception area and small medium altitude.
By seasons was obtained, generally, an increase of multi-annual mean discharge in winter, spring and autumn and a decrease in summer.
Generally, for the time horizon considered, in the Somes river basin, for climate models B and C was obtained for multi-annual mean discharge an increase trend while for climate models A and D this trend is decreasing.