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CMIP5 multi-model ensemble results applied to hydro-climatic change in the Sava River Basin

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Growing concerns about and needs to plan for water availability, quality and sustainable use require relevant climate-model projections for water on land. The scope of this study is to examine the implications of multi-model ensemble results of the Coupled Model Intercomparison Project, Phase 5 (CMIP5) for the land water system of the Sava River Basin (SRB) and its subcatchments. The SRB and one of its subcatchments, Kozluk, have been recognized as dominantly influenced by human water-use activity during most of the 20th century. A main question is how well climate models can project water conditions and changes in such areas, where human activity may be a dominant driver of hydro-climatic change. To answer that question, we investigate here CMIP5 results for the SRB and its subcatchments, compare the climate model results with observed data for temperature (T), and the water balance components of precipitation (P), runoff (R) and evapotranspiration (ET) and their implied net annual water balance. Individual model results exhibit a very wide range for all the variables. We find consistent increase in projected temperature and evapotranspiration, particularly high inter-model variability of runoff, and major differences between model results and observations in runoff and precipitation in most SRB subcatchments. The long-term average annual net water balance (P-R-ET) result of climate models implies unrealistic continuous decrease of water levels in most of the SRB catchments, with an extreme result of an implied 10.3 meters decrease for the Kozluk catchment over the whole 30-year investigation period of 1961-1990. In general, such results call for improved representation of the land water system in climate modeling.