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## Modelling the water budget and the riverflows of the Maritsa basin in Bulgaria

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**Abstract.** A soil-vegetation-atmosphere transfer model coupled with a macroscale distributed hydrological model was used to simulate the water cycle for a large region in Bulgaria. To do so, an atmospheric forcing was built for two hydrological years (1 October 1995 to 30 September 1997), at an eight km resolution. The impact of the human activities on the rivers (especially hydropower or irrigation) was taken into account. An improvement of the hydrometeorological model was made: for better simulation of summer riverflow, two additional reservoirs were added to simulate the slow component of the runoff. Those reservoirs were calibrated using the observed data of the 1st year, while the 2nd year was used for validation. 56 hydrologic stations and 12 dams were used for the model calibration while 41 river gauges were used for the validation of the model. The results compare well with the daily-observed discharges, with good results obtained over more than 25% of the river gauges. The simulated snow depth was compared to daily measurements at 174 stations and the evolution of the snow water equivalent was validated at 5 sites. The process of melting and refreezing of snow was found to be important in this region. The comparison of the normalized values of simulated versus measured soil moisture showed good correlation. The surface water budget shows large spatial variations due to the elevation influence on the precipitation, soil properties and vegetation variability. An inter-annual difference was observed in the water cycle as the first year was more influenced by Mediterranean climate, while the second year was characterised by continental influence. The energy budget shows a dominating sensible heat component in summer, due to the fact that the water stress limits the evaporation. This study is a first step for the implementation of an operational hydrometeorological model that could be used for real time monitoring and forecasting of water budget components and river flow in Bulgaria.

[Final Revised Paper](#) (PDF, 1737 KB) [Discussion Paper](#) (HESSD)

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