



Application of SMOS and ASCAT soil moisture estimations to hydrological modelling in Serbia

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This study explores the performance of satellite-based soil moisture products from satellites SMOS (Soil Moisture and Ocean Salinity, measuring brightness temperatures in the L-Band at 1.4 GHz) and ASCAT (Advanced Scatterometer, measuring surface backscattering coefficients in the C-band at 5.255 GHz) for hydrological application. Firstly, SMOS and ASCAT Level 2 soil moisture data were compared to in situ data over Serbia at available sites. All available in situ ground-based point measurements of soil moisture, from the Republic Hydrometeorological Service of Serbia and other independent stations, were collected for the overlapping period with satellite observations and compared against remotely sensed satellite-based soil moisture products.

Two approaches are presented in this study to evaluate the applicability of satellite-based SMOS and ASCAT soil moisture products to basin-scale hydrological modelling in a case study catchment in Serbia. The first approach was based on a continuous conceptual forecast-based rainfall-runoff model (using distributed HBV model), where satellite-based soil moisture data helped perform corrections to calculated model soil moisture. The second approach analysed individual event-based rainfall-runoff modelling (using HEC-HMS), where initial (pre-event) model parameters were estimated using satellite-based soil moisture data. Both approaches involved calibration of the hydrological models with and without satellite-based soil moisture data on a case study in Serbia.