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Comparison of measured and satellite-derived ASCAT surface soil moisture data in a small mountain catchment

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Soil moisture plays an important role in the transformation of precipitation into flow and affects the severity of droughts, floods and other hydrological processes such as transpiration and evaporation. Estimation of spatio-temporal dynamics of soil moisture is therefore crucial for all water sectors. The main objective of this study is to compare satellite-derived ASCAT soil moisture data and field soil moisture measurements in an experimental, well-documented catchment (the Jalovecký Creek catchment, Western Tatra mountains, Slovakia). For the comparison, we used data from the period of 2012 – 2019. Measured data are represented by point measurements at two localities: (a) Červenec – open area (1500 m a.s.l., measurements at a depth of 5 cm) and (b) Červenec – forest (1420 m a.s.l., measurements at a depth of 10 cm). The new, experimental version of the ASCAT product provides data with higher spatial and temporal resolutions and improved soil moisture mapping under vegetation. Satellite-derived soil moisture data represented by the Soil Water Index are determined by an exponential filter with characteristic time delays (T in days). T value represents the reduction of the infiltration of the soil moisture dynamics, and therefore, it must be carefully chosen. The suitability of the satellite data in terms of different T values (i.e., $T = 1, 2, 5, 10$) is assessed by the visual inspection (measurements vs satellite) and correlation coefficient. The agreement between observed ASCAT data and the field soil moisture measurements will be further evaluated using observations of snow accumulation and melt, precipitation, air temperature and global radiation. The study will discuss the factors controlling this agreement.

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