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Cross-evaluation of modelled and remotely sensed surface soil moisture with in situ data in southwestern France

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Abstract. The SMOSMANIA soil moisture network in Southwestern France is used to evaluate modelled and remotely sensed soil moisture products. The surface soil moisture (SSM) measured in situ at 5 cm permits to evaluate SSM from the SIM operational hydrometeorological model of Météo-France and to perform a cross-evaluation of the normalised SSM estimates derived from coarse-resolution (25 km) active microwave observations from the ASCAT scatterometer instrument (C-band, on board of METOP), issued by EUMETSAT and resampled to the Discrete Global Grid (DGG, 12.5 km gridspacing) by TU-Wien (Vienna University of Technology) over a two year period (2007–2008). A downscaled ASCAT product at the 1-kilometre scale is evaluated as well, together with operational soil moisture products of two meteorological services, namely the ALADIN numerical weather prediction model (NWP) and the Integrated Forecasting System (IFS) analysis of Météo-France and ECMWF, respectively. In addition to the operational SSM analysis of ECMWF, a second analysis using a simplified extended Kalman filter and assimilating the ASCAT SSM estimates is tested. The ECMWF SSM estimates correlate better with in situ observations than the Météo-France products. This may be due to the higher ability of the multi-layer land surface model used at ECMWF to represent the soil moisture profile. However, the SSM derived from the IFS corresponds to a thin soil surface layer and presents good correlation with ASCAT SSM estimates for the very first centimetres of soil. At the end of the study, the use of a new data assimilation technique, which is able to use the ASCAT SSM, improves the SSM and the root-zone soil moisture analysis.

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