Use of in situ and modelled soil moisture estimates to evaluate microwave remotely sensed products in southwestern France

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A long term data acquisition effort of profile soil moisture is currently underway at 13 automatic weather stations located in southwestern France. This ground network was developed in order to validate remote sensing and model soil moisture estimates. As a first step, an exponential filter and its recursive formulation were used in order to estimate the Soil Water Index (SWI) from in-situ surface soil moisture measurements (SSM, at a depth of 5 cm) and comparing those to observations at 30cm. Most often than not, the estimated SWI correlates well with the in-situ measurements. The only parameter required is a characteristic time length T, where a single value of T=6 days allows to estimate soil moisture at a depth of 30cm from observations at 5cm for the whole group of station. A synthetic soil moisture data set covering continental France is also used. From this data set the added value of using the filter to estimate the SWI is demonstrated.

Also, soil moisture measured in-situ at 5 cm is used to evaluate the normalized SSM estimates derived from coarse-resolution (25 km) active microwave data of the ASCAT scatterometer instrument (onboard METOP), issued by EUMETSAT, for a period of 6 months (April-September) in 2007. In order to remove the seasonal trend, the satellite and the in-situ time series soil moisture observations are transformed into normalised anomalies. Nine stations present significant correlation levels. For two stations, a significant correlation is obtained when considering only part of the ASCAT data. The soil moisture measured in-situ at those stations, at 30 cm, is used to estimate the characteristic time length (T) of an exponential filter applied to the ASCAT product. The best correlation between a soil water index derived from ASCAT and the in-situ soil moisture observations at 30 cm is obtained with a T-value of 14 days.