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Calibration and Validation of SMOS Data at the Valencia Anchor Station

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L-band (1 - 2 GHz) microwave radiometry is a remote sensing technique to monitor soil moisture, which is being deployed in the *Soil Moisture and Ocean Salinity* (SMOS) Mission of the *European Space Agency* (ESA). Performing ground-based radiometer campaigns before launch, during the commissioning phase and during the operative SMOS mission was and is important for the validation of the satellite data and for the further improvement of the radiative transfer models used in the soil-moisture retrieval algorithms.

One of the selected validation sites is the *Valencia Anchor Station* (VAS) which is located about 80 km west of the city of Valencia on the *Utiel-Requena Plateau*. This region is a reasonable homogeneous area of about 50 x 50 km^2, mainly featuring vineyards (75%) and other Mediterranean ecosystem species (shrubs, olive and almond trees and pine forests). The topography is generally plain (slope angle $<2\%$) with slightly undulated regions (8%-15%). The temperatures range from -15ºC in winter to 45ºC in summer, with an annual mean temperature of 14ºC. The annual precipitation is about 450 mm with peaks in spring and autumn.

In September 2009 the ESA L-band radiometer ELBARAII-3 was mounted on a 15 m tower at the VAS site. Since then, the instrument has been measuring brightness temperatures at horizontal and vertical polarization of thermal radiation from the vineyards observed and representative for the VAS.

Measurements are performed automatically at nadir angles between 30° and 70° in steps of 5° every 30 minutes. At 45°, brightness temperatures are recorded every 5 minutes. Additional calibration of the radiometer is performed every day around midnight by means of sky brightness measurements at 150° (60° above the horizon). Simultaneously with the passive radiometer measurements, in-situ soil moisture and temperature are measured at representative locations within the observed footprints.

On the one hand, this approach allows retrieving surface soil moisture from the tower-based measurements. On the other hand, the field-scale data can be upscaled to the VAS scale for calibrating and validating the radiance measured with the overflying MIRAS radiometer on board the SMOS satellite.

The setup of the VAS site and the characteristics of the deployed ELBARAII-3 radiometer are outlined in this presentation. First, exemplary data of the long-term campaign are shown. Furthermore, preliminary results from short term experiments performed to estimate the vegetation transmissivity at different development stages are shown. This information is relevant for the SMOS Level 2 processor (L-MEB) that is used for the retrieval of soil moisture from the satellite data. Vegetation transmissivities are estimated from ground-based L-band measurements performed with a reflective foil placed on the ground to shield the soil emission. The resulting signatures measured are therefore dominated by the emission of the vine. This instance allows the estimation of vegetation transmissivities at different observation angles from the brightness temperatures measured. Finally, these results are compared to retrievals derived from L-MEB applied to corresponding ELBARAII-3 data. This investigation allows to rate the reliability of the transmissivities derived with L-MEB, and hence the quality of the retrieved soil moisture for the different vegetation stages.