



Soil moisture estimates from the SMOS Validation Rehearsal Campaign in Valencia using EMIRAD airborne measurements

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The European Space Agency conducted a series of flights in 2008 over the main SMOS Validation sites in Europe, amongst them at the Valencia site. The scope of these campaigns was to help in the preparation of operational soil moisture outputs to be generated by the validation teams during the SMOS commissioning phase and beyond. For that purpose, several activities were scheduled at the Valencia site as part of the SMOS Validation Rehearsal campaign. These included:

- i) Airborne measurements at L-band to improve the parameterisation of the microwave model L-MEB (L-band Microwave Emission model of the Biosphere) in the area, in order to improve the match between measured brightness temperatures by SMOS, and simulations using ground-truth soil moisture.
- ii) Intensive soil moisture sampling in a 10 km x 10 km area to support both current studies on soil moisture spatialisation based on SVAT modelling, and the definition of homogeneous land units for the future characterisation of soil moisture at the scale of a SMOS pixel (~ 50 km).

The Valencia Site is located in SE Spain, about 80 km inland to the west of Valencia. Within the Valencia validation site, an area of 10 km x 10 km was selected for the experiment. The land use in this area is dominated by vineyards and bare soil (>70%), and orchards (~18 %). Flights over this area were conducted on four different days between April 22nd and May 2nd 2008. During that period, soil moisture near the surface (0-6 cm) slowly decreased with the last rainfall having occurred on April 20. Radiometric measurements were acquired by EMIRAD (L-band, 1.4 GHz) onboard the Skyvan aircraft. The flight plan, repeated across the four days, included 4 parallel lines crossing the 10 km x 10 km area at ~2300 m above the ground level. One diagonal flight was also performed at ~900 m above the ground level on each day. EMIRAD measured the L-band radiation emitted by the surface using two horns, one close to nadir, and the other one at 43 deg towards the back of the aircraft. These horns produced footprints of 600 m at low altitude (diagonal flight) and 1600 m at high altitude (parallel flights), both dimensions given for -3dB antenna aperture.

This communication will focus on the radiometric data set and will present results of soil moisture retrievals in the 10 km x 10 km area with the aim of addressing the following questions:

- What do soil moisture retrievals from EMIRAD indicate in terms of performance of L-MEB, and regarding the selection of a reference soil moisture?
- What conclusions can be drawn regarding the level of the microwave signal, as it has been found to be underestimated by the model in recent experiments?
- What activities should be planned in the future at the Valencia site to optimise the upcoming campaigns in the area (ground-based and airborne-based) both before the SMOS launch and during the commissioning phase?