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Use of Physio-Hydrological Units for SMOS Validation at the Valencia Anchor Station Study Area

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The SMOS space mission will soil moisture over the continents and ocean surface salinity with the sufficient resolution to be used in global climate change studies.

With the aim of validating SMOS land data and products at the *Valencia Anchor Station* site (VAS) in a Mediterranean Ecosystem area of Spain, we have designed a sample methodology using a subdivision of the landscape in environmental units related to the spatial variability of soil moisture (Millán-Scheiding, 2006; Lopez-Baeza, et al. 2008). These physio-hydrological units are heterogeneously structured entities which present a certain degree of internal uniformity of hydrological parameters. The units are delimited by integrating areas with the same physiomorphology, soil type, vegetation, geology and topography (Flugel, et al 2003; Millán-Scheiding et al, 2007). Each of these units presented over the same pedological characteristics, vegetation cover, and landscape position should have a certain degree of internal uniformity in its hydrological parameters and therefore similar soil moisture (SM). The main assumption for each unit is that the dynamical variation of the hydrological parameters within one unit should be minimum compared to the dynamics of another unit.

This methodology will hopefully provide an effective sampling design consisting of a reduced number of measuring points, sparsely distributed over the area, or alternatively, using SM validation networks where each sampling point is located where it is representative of the mean soil moisture of a complete unit area.

The *Experimental Plan for the SMOS Validation Rehearsal Campaign at the VAS area* of April-May 2008 used this environmental subdivision in the selection and sampling of over 21.000 soil moisture points in a control area of 10 x 10 km^2. The ground measurements were carried out during 4 nights corresponding to a drying out period of the soil. The sampling consisted of 700 plots with 4 volumetric SM cylinders and 7 Delta-T Theta Probe measurements (with 3 repetitions each), covering the whole area.

This experimental campaign permits the characterization of the soil moisture distribution within each physio-hydrological unit and results in a soil moisture map of the VAS site. All of it used for the validation of the aircraft observations done throughout the campaign.

The ground measurement results obtained indicate that soil properties and vegetation cover are the parameters of the physio-hydrological units that most influence the moisture of the soil. This relationship will permit a more simple delimitation of the physio-hydrological Units and a reduction of the number of sample points for the calibration/validation of SMOS products.

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