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Ground Sampling Strategy and Measurements during the CNES CAROLS Campaign at the Valencia Anchor Station

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Knowledge of the distribution of soil moisture (SM) in semi-arid Mediterranean ecosystems, and of the environmental factors influencing it, will enable the acquisition of *in situ* data simultaneous to the observations from SMOS in the area of the *Valencia Anchor Station* (VAS). The variability of SM depends on intrinsic and extrinsic soil factors. It is necessary to define a sampling strategy that integrates the relationships between the hydrological variables, particularly SM, and the parameters of the landscape at different spatial scales

SM data acquisition for the CAROLS (*Combined Airborne Radio - instruments for Ocean and Land Studies*) Campaign extended over an area of 27 x 35 km^2, within the VAS site, demands a selection of sampling points which are representative of larger areas. The total area was sub-divided in *Environmental Units* which were homogeneous with respect to landscape, geological material, land use (or vegetation cover) and soil type (mainly soil texture and geomorphologic aspects).

The most representative units of the area correspond to (i) vineyards over stony-sandy soil, (ii) vineyard over clayey soil, (iii) cereal with partly fallow land, (iv) forest areas with sub-arbustive and dense shrub-land divided into Northern and Southern exposure, and (v) mixed vineyards and forest vegetation. The sampling strategy during the CNES CAROLS campaign was designed with the following threefold criteria:

(i) Within each Environmental Unit, an area of 1 x 1 km^2 was selected where a simple random sampling of about 35 plots/km^2 was defined and where volumetric SM samples were obtained with small cylinders, together with *ThetaProbe* and surface temperature measurements. Soil samples were processed to obtain volumetric soil moisture, texture, bulk density and organic material for each measurement plot

(ii) A selection of 10 stationary points, each one respectively and nearly close to 10 thermopluviometric stations, representative of the different units of the area, was also made with the aim to reflecting all of the variability of vegetation types and of the different roughness parameters

(iii) A transect sample strategy in the 10 x 10 km^2 ESA SVRC (*SMOS Validation Rehearsal Campaign*) control area of 2008 was kept in the CNES CAROLS campaign but at a less dense point sampling

The analysis of the data gathered show that the water content variation at any given point of the soil depends partially on the degree of variability of the intrinsic edaphic properties that most influence water retention capacity. Soil moisture (m^3/m^3) throughout the three days of the campaign was significantly different, being 0.10 for the first day, 0.081 for the second and 0.048 for the third in average. With respect to vegetation cover, units with natural vegetation presented significant differences with those with agricultural use, stratified by density cover and plot orientation. Plots with fallow land and cereal showed heterogeneous soil moisture content throughout the campaign due to their irrigation state. No differences were found between SM of the stationary plots and SM of the respective units in which these plots were located; therefore, these points should be representative of the average SM of the unit where they are found. A clear negative correlation was also seen between the probe *mV* and surface temperature. SM data from the transects of the 10 x 10km^2 control area corroborate their similarity to the units where they are located, and the stationary measurements are representative of the situations they typify.

In the CAROLS campaign, SM data corresponding to each km^2, representative of the environmental units present certain homogeneity in relation to the interior variability of each unit. In order to be able to extrapolate the SM value to the whole area and draw the SM map corresponding to each campaign day, it is necessary to lean on other meteorological parameters such as antecedent precipitation fields, for example, which is the forthcoming task in this work.