

Analysis of the soil moisture distribution over the Valencia Anchor Station using SURFEX model simulations, SMOS products and in situ measurements.

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Soil moisture is an important variable in agriculture, hydrology, meteorology and related disciplines. Despite its importance, it is complicated to obtain an appropriate representation of soil moisture, mainly because of its high temporal and spatial variability. SVAT (Soil-Vegetation-Atmosphere-Transfer) models can be used to simulate the temporal behaviour and spatial distribution of soil moisture in a given area.

SURFEX (Surface Externalisée) model developed at the Centre National de Recherches Météorologiques (CNRM) at Météo-France is used to simulate soil moisture at the Valencia Anchor Station. The Valencia Anchor Station was chosen as a validation site for the ESA (European Space Agency) SMOS (Soil Moisture and Ocean Salinity) mission and as one of the hydrometeorological sites for the HyMeX (HYdrological cycle in Mediterranean EXperiment) programme. It is located east of the Iberian Peninsula. This site represents a reasonably homogeneous and mostly flat area of about 50x50 km². Several soil types and land covers are distinguished in the area. The main cover type is vineyards (65%), followed by fruit trees, shrubs, and pine forests, and a reduced number of small industrial and urban areas. To assess areal characteristics in relation to land conditions physio-hydrological units are defined. Annual mean temperatures are between 12 °C and 14.5 °C, and annual precipitation is about 400-450 mm. The duration of frost free periods is from May to November, with maximum precipitation in spring and autumn.

The first part of this investigation consists in simulating soil moisture for selected sites, MELBEX-I and MELBEX-II, where long time observations, as well as an L-band radiometer from ESA ELBARA-II, are available. Additionally, the representation of the variability of the soil moisture fields is investigated by comparing SURFEX model simulations and observations with level-3 (~ 25km) and level-2 (~15 km) soil moisture maps generated from SMOS and high resolution SMOS pixel-disaggregated soil moisture products, ~ 1 km, obtained combining SMOS with MODIS (Moderate Resolution Imaging Spectroradiometer) NDVI (Normalized Difference Vegetation Index) and LST (Land-surface Temperature) data at the SMOS Barcelona Expert Centre on Radiometric Calibration and Ocean Salinity (SMOS-BEC) over the Valencia Anchor Station (Piles et al, 2011). Furthermore, the impact of soil moisture initialization on model simulations of soil moisture and precipitation is assessed making use of high-resolution SMOS-derived soil moisture fields. The period of investigation covers the complete 2012 period and we will particularly focus on selected periods from 2012.

References

Piles, María, Camps Adriano, Vall-Ilossera Mercè, Corbella Ignasi, Panciera Rocco, Rüdiger Christoph, Kerr Y., and Walker J. Downscaling SMOS-derived Soil Moisture Using MODIS Visible/Infrared Data. IEEE Transactions on Geoscience and Remote Sensing, March, (2011).