

Title: Comparison and integration of soil moisture estimation at different spatial and temporal scales

Research project

Soil moisture plays a key role in the hydrological cycle controlling water and energy fluxes at the land surface. For this reason, a correct monitoring of this variable is crucial in many applications, ranging from agricultural water management, runoff generations and floods, and landslide prediction. The main challenges in monitoring this variable are related to its strong spatial and temporal variability driven by the different hydrological processes at the land surface and further aggravated by human activities like irrigation and drainage.

Several instruments for monitoring soil moisture are nowadays available ranging from invasive point-scale soil moisture sensors to remote sensing methods. More recently, non-invasive near-ground detectors have been developed to estimate soil moisture over an intermediate scale (10 - 200 m radius) and at sub-daily resolutions providing a new perspective for hydrological observations. Several initiatives have been conducted to integrate all these observations. Despite that, nowadays soil moisture measurements remain poorly standardized, traceable, and integrated limiting their use in practical applications.

SoMMet project has been established by different partners at the European level to address this gap. Specifically, an interdisciplinary consortium ranging from Metrology institute, soil hydrological experts and remote sensing groups will work together to better define the specific characteristics of the different soil moisture sensors and their observations and to develop a new integrated product that will merge together the advantages of point-scale, intermediate scale and large scale soil moisture observations. The data will be provided by high level experimental sites over Europe supported by specific field activities planned within the project, by additional sites where data are available and eventually by model simulations.

Activities plan

The specific activities thought within the project for the research unit in this first phase are:

- To review methods to characterize spatial and temporal soil moisture from point-scale, intermediate-scale, and large scale remote sensing observations
- To review a existing soil moisture harmonisation methods that can be suited for these different soil moisture observations
- to compare and harmonise soil moisture observation based on synthetic data and collected data