Geophysical Research Abstracts
Vol. 16, EGU2014-15150, 2014
EGU General Assembly 2014

Evaluation of the spatial variability of soil water content at the spatial resolution of SMAP data products : case studies in Italy and Morocco

Massimo Menenti (1,3), Nadia Akdim (2,1), Silvia Maria Alfieri (3,1), Kamal Labbassi (2), Francesca De Lorenzi (3), Antonello Bonfante (3), and Angelo Basile (3)

(1) Delft University of Technology, GRS, OLRS, Delft, Netherlands (m.menenti@tudelft.nl), (2) Chouaib Doukkali University, Morocco (labbassi@ucd.ac.ma), (3) Institute for Mediterranean Agricultural and Forest Systems, Italy (silvia_alfieri@tiscali.it)

Frequent and contiguous observations of soil water content such as the ones to be provided by SMAP are potentially useful to improve distributed models of soil water balance. This requires matching of observations and model estimates provided both sample spatial patterns consistently. The spatial resolution of SMAP soil water content data products ranges from 3 km X 3 km to 40 km X 40 km. Even the highest spatial resolution may not be sufficient to capture the spatial variability due to terrain, soil properties and precipitation.
We have evaluated the SMAP spatial resolution against spatial variability of soil water content in two Mediterranean landscapes: a hilly area dominated by vineyards and olive orchards in Central Italy and a large irrigation schemes (Doukkala) in Morocco.
The "Valle Telesina" is a 20,000 ha complex landscape located in South Italy in the Campania region, which has a complex geology and geomorphology and it is characterised by an E–W elongated graben where the Calore river flows. The main crops are grapevine (6,448 ha) and olive (3,390 ha). Soil information was mainly derived from an existing soil map at 1:50 000 scale (Terribile et al., 1996). The area includes 47 SMUs (Soil Mapping Units) and about 60 soil typological units (STUs). (Bonfante et al., 2011).
In Doukkala, the soil water retention and unsaturated capillary conductivity were estimated from grain size distribution of a number of samples (22 pilot points, each one sampled in 3 horizons of 20cm), and combined with a soil map. The land use classification was carried out using a NDVI time series at high spatial resolution (Landsat TM and SPOT HRV).
We have calculated soil water content for each soil unit in each area in response to several climate cases generating daily maps of soil water content at different depths.
To reproduce spatial sampling by SMAP we have filtered these spatial patterns by calculating box averages with grid sizes of 1 km X 1 km and 5 km X 5 km. We have repeated this procedure for soil water content in the 0 to 5 cm and 0 to 10 cm depths. For each case we have compared the variance of filtered soil water content with the expected accuracy of SMAP soil water content.
The two areas are very different as regards morphology and soil formation. The Valle Telesina is characterized by a very significant variability of soil hydrological properties leading to complex patterns in soil water content. Contrariwise, the soil properties estimated for all soil mapping units in the Dhoukkala collapse into just two pairs of water retention and hydraulic conductivity characteristics, leading to smoother patterns of soil water content.