Geophysical Research Abstracts
Vol. 19, EGU2017-18200, 2017
EGU General Assembly 2017

On the soil moisture estimate at basin scale in Mediterranean basins with the ASAR sensor: the Mulargia basin case study

Laura Fois and Nicola Montaldo
Dipartimento di Ingegneria Civile, Ambientale ed Architettura, Università di Cagliari,Italy

Soil moisture plays a key role in water and energy exchanges between soil, vegetation and atmosphere. For water resources planning and managementthesoil moistureneeds to be accurately and spatially monitored, specially where the risk of desertification is high, such as Mediterranean basins. In this sense active remote sensors are very attractive for soil moisture monitoring. But Mediterranean basinsaretypicallycharacterized by strong topography and high spatial variability of physiographic properties, and only high spatial resolution sensorsare potentially able to monitor the strong soil moisture spatial variability.In this regard the Envisat ASAR (Advanced Synthetic Aperture Radar) sensor offers the attractive opportunity ofsoil moisture mapping at fine spatial and temporal resolutions(up to 30 m, every 30 days).
We test the ASAR sensor for soil moisture estimate in an interesting Sardinian case study, the Mulargia basin withan area of about 70 sq.km. The position of the Sardinia island in the center of the western Mediterranean Sea basin, its low urbanization and human activity make Sardinia a perfect reference laboratory for Mediterranean hydrologic studies. The Mulargia basin is a typical Mediterranean basinin water-limited conditions, and is an experimental basin from 2003. For soil moisture mapping23 satellite ASAR imagery at single and dual polarization were acquired for the 2003-2004period.Satellite observationsmay bevalidated through spatially distributed soil moisture ground-truth data, collected over the whole basin using the TDR technique and the gravimetric method, in days with available radar images.
The results show that ASAR sensor observations can be successfully used for soil moisture mapping at different seasons, both wet and dry, but an accurate calibration with field data is necessary. We detect a strong relationship between the soil moisture spatial variability and the physiographic properties of the basin, such as soil water storage capacity, deep and texture of soils, type and density of vegetation, and topographic parameters. Finally we demonstrate that the high resolution ASAR imagery are an attractive tool for estimating surface soil moisture at basin scale, offering a unique opportunity for monitoring the soil moisture spatial variability in typical Mediterranean basins.