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Using Alos PALSAR data for improved soil moisture retrieval and modelling in a semi arid watershed

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According to current climate projections, Mediterranean countries are at high risk for an even pronounced susceptibility to water stress and drought, which is expected to have severe direct impact on agricultural productivity. The synergistic use of field measurements, multi temporal and multi frequency space-borne remote sensing products as well as eco-hydrological models has shown great potential to assess this impact. Herein soil moisture plays a key role. However, the assessment of soil moisture on field scale is crucial and yet not appropriately solved.
The presented study is conducted in the Campidano plain, the agricultural heartland of Sardinia (Italy), at a well-equipped experimental farm near Ussana. The Azienda St. Michele is operated by the regional agricultural research agency AGRIS and disposes of an extensive data base of continuous field data and satellite imagery (e.g. ASAR, PALSAR, Radarsat II).
The poster is presenting the findings of an intense field campaign for soil physical and vegetation parameters, which has accompanied a series of PALSAR and ASAR image acquisitions from April to August 2007 as well as from March to August 2008.
In a first qualitative assessment, Level 1.1 polarimetry mode PALSAR data was used for further image analysis. Results of an E/A/alpha decomposition as well as the Freeman-Durden decomposition are shown to highlight the great potential of PALSAR data compared to ASAR imagery for land use separation between bare soils and vegetated fields.
In addition the study shows how to reduce the uncertainties in soil moisture retrieval by using spatially derived soil surface roughness from PALSAR data incorporated in an analytical solution of Oh's empirical soil moisture retrieval algorithm (Oh et al. 1992).
These retrieved soil moisture patterns are further used to parameterize and validate the spatially explicit hydrological model PROMET (Mauser & Bach 2009). The advantages of using remote sensing products in comparison to conventional parameterizations of a physically based eco-hydrological model are shown and discussed.