Geophysical Research Abstracts
Vol. 15, EGU2013-10201, 2013
EGU General Assembly 2013

A roundup of SMOS validation activities at the HOBE site in the Skjern River Catchment, Denmark

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The Soil Moisture and Ocean Salinity Mission (SMOS) delivers global surface soil moisture data at high temporal resolution which is of high relevance for water management, weather and climate predictions as well as hazard analysis. In order to estimate the quality and caveats of the SMOS data at different processing levels (e.g. L1C geolocated brightness temperatures TB, L2 soil moisture SM and optical thickness TAU, L3 spatio-temporal synthesis of TB, SM and TAU), product validation in various climatic regions is a crucial issue.
In the framework of the Danish Hydrological Observatory (HOBE) one such validation site has been established in the Skjern River Catchment, Denmark. The catchment is one of Europe's northernmost intensely cultivated region with environmental features related to this latitude such as very sandy soils with large organic deposits under natural vegetation and region-specific land cover such as heathland. The area is of pronounced flatness and located at a short distance to the coast line in two directions.
During fall 2009, a soil moisture and soil temperature network with 30 stations has been installed to provide continuous in-situ soil moisture data feasible for upscaling and comparison with SMOS data at large scale. One SMOS pixel (44x44 km2) to be validated was chosen by maximizing its coverage of the Skjern River Catchment and minimizing the open water fraction. Prevailing environmental conditions and their respective fractions were considered for the selection of suitable network locations.
To further support validation activities an airborne campaign with the passive L-band microwave radiometer EMIRAD-2, was carried out within the chosen SMOS pixel in spring 2010 to directly acquire soil moisture data at intermediate scale (few kilometers spatial resolution). Concurrent with ascending SMOS overpasses, four flights were conducted with simultaneous ground sampling of surface soil moisture and auxiliary parameters within three 2x2 km patches of the most representative land covers (agriculture, heath and forest).
This communication will give an overall insight into the validation carried out at the Danish test site by means of the collected in situ data, and present data comparisons at SMOS Levels 1C, 2 and 3. The shown results include data from different soil moisture processor versions as well as the investigation of main auxiliary parameters in the retrieval algorithm. Finally, an outlook on future planned SMOS activities in the higher northern latitudes will be given.