Soil moisture estimation from multitemporal ENVISAT ASAR Wide Swath images in mountainous terrain

Jasper Van doninck (1), Jan Peters (2), Bernard De Baets (2), Eva M. De Clercq (3), Els Ducheyne (3), and Niko E.C. Verhoest (1)

(1) Ghent University, Laboratory of Hydrology and Water Management, Ghent, Belgium (Jasper.Vandoninck@UGent.be), (2) Ghent University, Research Unit Knowledge-based Systems, Ghent, Belgium, (3) Avia-GIS, Zoersel, Belgium

Global coarse spatial resolution topsoil moisture products are being derived routinely using a multitemporal change detection approach, developed at TU Wien, based on the multi-incidence observation capabilities of ERS and METOP scatterometers. Application of this method on higher resolution SAR data is problematic due to the lack of multi-incidence abilities of most of these sensors and due to the increased influence of soil roughness on radar backscatter at higher resolution.

This paper reports on the analysis of a time series of approximately 100 Envisat ASAR Wide Swath images, acquired over Calabria, Italy, from 2007 to 2010. Because of the strong topography in Calabria, the ASAR WS images are first geometrically and radiometrically corrected, followed by a correction for the different viewing geometries of the different images. Subsequently, a pixel-wise change detection –based on the TU Wien method– is applied on the time series. Soil moisture estimates are validated using a simple hydrological model which uses data from a large number of meteorological stations and soil texture maps.