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Operational Monitoring of Soil Moisture at 1 km Scale: from ENVISAT to Sentinel-1

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With support from ESA, over the last three years a 1km soil moisture product based on the ENVISAT ASAR Global Mode (GM) data has been disseminated as an operational service for Southern Africa and Australia. Validation studies have confirmed the quality of the product. Currently, extension of the operational services and further validation, retrieval algorithm development and development of practical uses are pursued.

Soil moisture has been identified as a land surface parameter of great importance in various fields of application. In 2006 the first medium resolution soil moisture dataset has been developed as part of the ESA project SHARE. The algorithm used a change detection approach that scales the normalized backscatter between historical minimum and maximum backscatter values. Besides its simplicity, an attractive feature of the method is that it works without the need for auxiliary data. Data from the Global Mode of the Advanced Synthetic Aperture Radar (ASAR) on board ENVISAT were utilized mainly because of the high temporal resolution (up to three acquisitions weekly) – a characteristic important for soil moisture monitoring.

Over the last three years the soil moisture product developed at the Vienna University of Technology (TU Wien) has been used for regular monitoring of large parts of Africa and entire Australia. The validation studies performed over Oklahoma, USA and Australia showed a good correspondence with in-situ measurements and other remotely sensed soil moisture products and modeled datasets. Current research aims at the qualitative and quantitative analysis of the ASAR GM model parameters with geophysical land parameters (soil types, soil texture, vegetation indices) over the Murrumbidgee field experimental region in southeastern Australia. In this presentation, the first results will be discussed. In addition, the work done towards transforming the existing algorithm from the ENVISAT to the Sentinel-1 sensor will be presented.

The improved understanding of the physical behavior of the model parameters may not only improve the soil moisture retrieval process but may also assist to retrieve additional variables such as biomass or physical soil properties. These might be subsequently derived at global scale from operational SAR sensors such as Sentinel-1.