



Temporal stability of soil moisture and radar backscatter in different climatic environments

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The high spatio-temporal variability of soil moisture is the result of atmospheric forcing and redistribution processes connected to terrain, soil, and vegetation characteristics. Despite this high variability, many field studies have shown that spatial soil moisture patterns exhibit a high degree of temporal stability. Because the measurements taken by Synthetic Aperture Radar (SAR) instruments are very sensitive to soil moisture temporally stable soil moisture patterns are reflected in the radar backscatter measurements. As a result a time invariant linear model can be used to relate local scale (pixel) and regional scale (25 km) backscatter dynamics. This is demonstrated based on Wide Swath (WS) and Global Monitoring (GM) mode acquisitions taken by the Advanced Synthetic Aperture Radar (ASAR) on board of ENVISAT. Results are shown for study areas in Spain, Africa and United States. The temporal stability concept is of relevance for interpreting and downscaling coarse resolution soil moisture data retrieved from active (METOP ASCAT) and passive (SMOS, AMSR-E) microwave instruments.