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Multi-temporal angular correction of ASAR Wide Swath data and the influence of vegetation phenology

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The estimation of soil moisture variations using change detection algorithms and multitemporal SAR data is becoming increasingly popular, and will continue to do so with the upcoming launch of the first Sentinel satellite. Change detection algorithms are based on the assumption that soil moisture changes occur on much shorter time scales than changes in soil roughness and vegetation cover, so that changes in SAR backscatter can be attributed to changes in soil moisture content. This requires, however, that images acquired from different incidence angles are first normalized to a common incidence angle, which can be performed by an empirical multi-temporal angular correction. In this correction, the slope of linear regression between incidence angle and SAR backscatter is derived from the image time series for each pixel, and subsequently used to perform the normalization.

The multi-temporal angular correction can, however, be influenced by vegetation phenology when applied over longer time series covering multiple seasons. In this study, the effect of seasonally changing vegetation cover on the angular correction is assessed using a 3-year time series of ENVISAT ASAR Wide Swath images over Calabria, Italy.