

Validation and downscaling of Advanced Scatterometer (ASCAT) soil moisture using ground measurements in the Western Cape, South Africa

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ABSTRACT:

Satellite-based remote sensing of soil water content (SWC) is a promising technology for hydrological applications to overcome large spatiotemporal variabilities of SWC. This study investigated the performance of the Advanced Scatterometer (ASCAT) soil moisture product on METOP satellite (12.5 km and downscaled to 1 km resolution), against ground measurements of SWC taken with a Hydrosense II probe along transects of 360–820 m on agricultural and natural land at locations in the Western Cape. The ASCAT products estimated fairly accurately seasonal trends of SWC; performance was better on lower slopes ($R^2 = 0.66$) and uniform vegetation. ASCAT 12.5 km performed better in estimating SWC than the downscaled product (average concordance coefficient = 0.60 and 0.39, and $R^2 = 0.84$ and 0.74, respectively). ASCAT 12.5 km was more responsive to rainfall events, whilst the downscaled product was more sensitive to vegetation characteristics (normalised difference vegetation index and land surface temperature). In situations with ground measurement networks and data availability constraints, remote sensing could be a feasible alternative to monitor SWC for hydrological applications at the meso-scale (regional scale).