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A Round Robin evaluation of AMSR-E soil moisture retrievals

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Large-scale and long-term soil moisture observations based on remote sensing are promising data sets to investigate and understand various processes of the climate system including the water and biochemical cycles. Currently, the ESA Climate Change Initiative for soil moisture develops and evaluates a consistent global long-term soil moisture data set, which is based on merging passive and active remotely sensed soil moisture. Within this project an inter-comparison of algorithms for AMSR-E and ASCAT Level 2 products was conducted separately to assess the performance of different retrieval algorithms.

Here we present the inter-comparison of AMSR-E Level 2 soil moisture products. These include the public data sets from University of Montana (UMT), Japan Aerospace and Space Exploration Agency (JAXA), VU University of Amsterdam (VUA; two algorithms) and National Aeronautics and Space Administration (NASA). All participating algorithms are applied to the same AMSR-E Level 1 data set. Ascending and descending paths of scaled surface soil moisture are considered and evaluated separately in daily and monthly resolution over the 2007-2011 time period. Absolute values of soil moisture as well as their long-term anomalies (i.e. removing the mean seasonal cycle) and short-term anomalies (i.e. removing a five weeks moving average) are evaluated. The evaluation is based on conventional measures like correlation and unbiased root-mean-square differences as well as on the application of the triple collocation method. As reference data set, surface soil moisture of 75 quality controlled soil moisture sites from the International Soil Moisture Network (ISMN) are used, which cover a wide range of vegetation density and climate conditions. For the application of the triple collocation method, surface soil moisture estimates from the Global Land Data Assimilation System are used as third independent data set. We find that the participating algorithms generally display a better performance for the descending compared to the ascending paths. A first classification of the sites defined by geographical locations show that the algorithms have a very similar average performance. Further classifications of the sites by land cover types and climate regions will be conducted which might result in a more diverse performance of the algorithms.