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QA4SM – An online tool for satellite soil moisture data validation

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To validate satellite soil moisture products and compare their quality with other products, standardized, fully traceable validation methods are required. The QA4SM (Quality Assurance for Soil Moisture;) free online validation tool provides an easy-to-use implementation of community best practices and requirements set by the Global Climate Observing System and the Committee on Earth Observation Satellites. It sets the basis for a community wide standard for validation studies.

QA4SM can be used to preprocess, intercompare, store, and visualise validation results. It uses state-of-the-art open-access soil moisture data records such as the European Space Agency's Climate Change Initiative (ESA CCI) and the Copernicus Climate Change Services (C3S) soil moisture datasets, as well as single-sensor products, e.g. H-SAF Metop-A/B ASCAT surface soil moisture, SMOS-IC, and SMAP L3 soil moisture. Non-satellite data include in-situ data from the International Soil Moisture Network (ISMN:), as well as land surface model or reanalysis products, e.g. ERA5 soil moisture.

Users can interactively choose temporal or spatial subsets of the data and apply filters on quality flags. Additionally, validation of anomalies and application of different scaling methods are possible. The tool provides traditional validation metrics for dataset pairs (e.g. correlation, RMSD) as well as triple collocation metrics for dataset triples. All results can be visualised on the webpage, downloaded as figures, or downloaded in NetCDF format for further use. Archiving and publishing features allow users to easily store and share validation results. Published validation results can be cited in reports and publications via DOIs.

The new version of the service provides support for high-resolution soil moisture products (from Sentinel-1), additional datasets, and improved usability.

We present an overview and examples of the online tool, new features, and give an outlook on future developments.

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