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The International Soil Moisture Network in assistance of EO soil moisture validation products, services and models

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The International Soil Moisture Network (ISMN, <https://ismn.geo.tuwien.ac.at/>) is an international cooperation to establish and maintain a unique centralized global data hosting facility, making in situ soil moisture data easily and freely accessible. This database is an essential means for validating and improving global satellite soil moisture products, land surface -, climate- , and hydrological models.

In situ measurements are crucial to calibrate and validate satellite soil moisture products. For a meaningful comparison with remotely sensed data and reliable validation results, the quality of the reference data is essential. The various independent local and regional in situ networks often do not follow standardized measurement techniques or protocols, collecting their data in different units, at different depths and at various sampling rates. Besides, quality control is rarely applied and accessing the data is often not easy or feasible.

The ISMN has been created to address the above-mentioned issues and is building a stable base to assist EO products, services and models. Within the ISMN, in situ soil moisture measurements (surface and sub-surface) are collected, harmonized in terms of units and sampling rates, advanced quality control is applied and the data is then stored in a database and made available online, where users can download it for free.

Founded in 2009, the ISMN has grown to a widely used in situ data source including 61 networks with more than 2600 stations distributed on a global scale and a steadily growing user community > 3200 registered users strong. Time series with hourly timestamps from 1952 – up to near real time are stored in the database and are available through the ISMN web portal, including daily near-real time updates from 6 networks (> 900 stations). With continuous financial support through the European Space Agency (formerly SMOS and IDEAS+ programs, currently QA4EO program), the ISMN evolved into a platform of benchmark data for several operational services such as ESA CCI Soil Moisture, the Copernicus Climate Change (C3S), the Copernicus Global Land Service (CGLS) and the online validation service Quality Assurance for Soil Moisture (QA4SM). In general, ISMN data is widely used in a variety of scientific fields (e.g. climate, water, agriculture, disasters, ecosystems, weather, biodiversity, etc.).

About 10'000 datasets are available through the web portal. However, the spatial coverage of in situ observations still needs to be improved. For example, in Africa and South America only sparse data are available. Innovative ideas, such as the inclusion of soil moisture data from low cost sensors (eventually) collected by citizen scientists, holds the potential of closing this gap, thus providing new information and knowledge.

In this session, we give an overview of the ISMN, its unique features and its benefits for validating satellite soil moisture products.