



The International Soil Moisture Network in support of satellite soil moisture product validation

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The International Soil Moisture Network (ISMN, <https://ismn.geo.tuwien.ac.at/en/>) is a unique centralized data hosting facility, making in situ soil moisture easily and freely accessible.

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 was created to address the above-mentioned issues. 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.

Since its establishment in 2009 and with continuous financial support through the formerly SMOS and the recent IDEAS+ project of the European Space Agency (ESA), the ISMN evolved into the largest international platform for in situ soil moisture data and is growing continuously (in terms of data volume and users). Historic measurements starting in 1952 up to near-real time observations are available through the ISMN web portal. Currently, the ISMN consists of 59 networks with almost 2500 stations spread all over the globe, thus providing a unique basis for evaluating satellite-derived soil moisture data. With over 2600 users the value of the ISMN as a well-established and rich source of in situ soil moisture observations is widely recognized. In fact, the ISMN provides benchmark data for several operational services such as ESA CCI Soil Moisture, the Copernicus Climate Change (C3S) and Global Land Service (CGLS) and the online validation tool QA4SM.

About 10⁷000 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.

ISMN data is widely used in a variety of scientific fields (e.g. climate, water, agriculture, disasters, ecosystems, weather, biodiversity, etc.). In this session we especially give an overview of the ISMN, its unique features and its benefits for validating satellite soil moisture products.