# The International Soil Moisture Network: an open-source data hosting facility in support of meteorology and climate science

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The International Soil Moisture Network (ISMN, https://ismn.earth) is international cooperation to establish and maintain a unique centralized global data hosting facility, making in-situ soil moisture data easily and freely accessible (Dorigo et al., 2021). Initiated in 2009 as a community effort through international cooperation (ESA, GEWEX, GTN-H, GCOS, TOPC, HSAF, QA4SM, C3S, etc.), the ISMN is an essential means for validating and improving global satellite soil moisture products, land surface-, climate-, and hydrological models.

The ISMN is a widely used, reliable, and consistent in-situ data source (surface and sub-surface) collected by a myriad of data organizations on a voluntary basis. The in-situ soil moisture measurements 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. Currently, 71 networks are participating with more than 2800 stations distributed on a global scale and a steadily increasing number of user communities. Long term time series with mainly hourly timestamps from 1952 – up to near-real-time are stored in the database, including daily near-real-time updates. Besides soil moisture in our database are stored other meteorological variables as well (air temperature, soil temperature, precipitation, snow depth, etc.).

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. ISMN data is widely used in a variety of scientific fields (e.g., climate, water, agriculture, disasters, ecosystems, weather, biodiversity, etc).

To validate the land surface representations of meteorological forecasting models soil moisture from the ISMN has often been used. The development of various generations of TESSEL models used both in the Integrated Forecasting Systems and reanalysis products of ECMWF, greatly profited from soil moisture and temperature data from the ISMN. Using ISMN data several studies assessed the soil moisture skill of the Weather Research and Forecasting Model (WRF) and assessed the forecast skill or new implementations of numerical weather prediction models.

To ensure a long-term funding for the ISMN operations, several ideas were perused together with

ESA. A partner for this task could be found within the International Center for Water Resources and Global Change (ICWRGC) hosted by the German Federal Institute of Hydrology (BfG).

In this session, we want to give an overview and future outlook of the ISMN, highlighting its unique features and discuss challenges in supporting the hydrological research community in need of freely available, standardized, and quality-controlled datasets.