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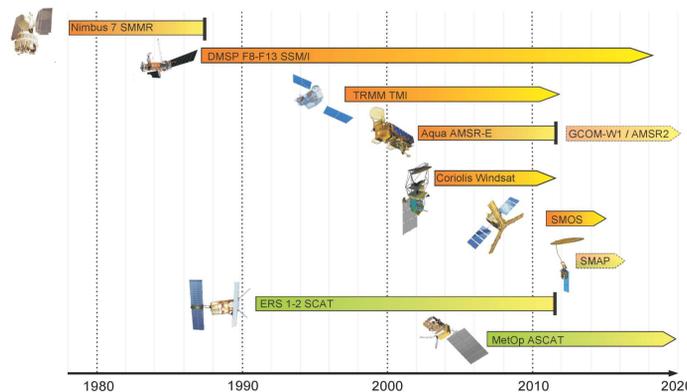
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Background and scope

The importance of soil moisture in the global climate system has recently been underlined by the Global Climate Observing System (GCOS) by endorsing soil moisture as an Essential Climate Variable. Several microwave missions, dating back as far as the late 1970s, provide information on soil moisture on a global scale. Their number is increasing over time and continuation of the record is ascertained at least until 2020. At the same time, soil moisture records measured in-situ at the local scale go back as far as the 1950s. Also their number is rapidly increasing.

Past, present, and scheduled coarse resolution satellite microwave missions suited for generation of a soil moisture climate data record. In orange the passive missions (radiometers), in green the active ones (scatterometers).



To study the interaction between climate and soil moisture both satellite-based and in-situ datasets need to be harmonized. Thus, GCOS outlined two core actions in the 2010 update of the Implementation Plan for Global Observing System for Climate in Support of the UNFCCC [1]:

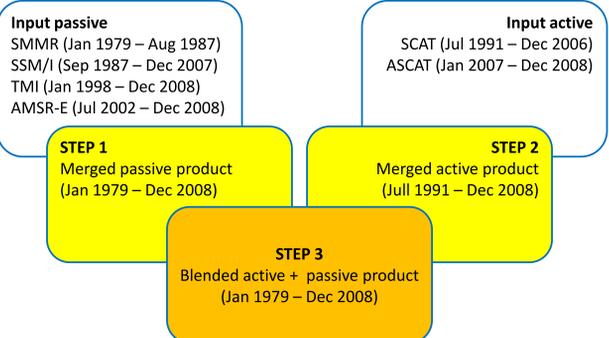
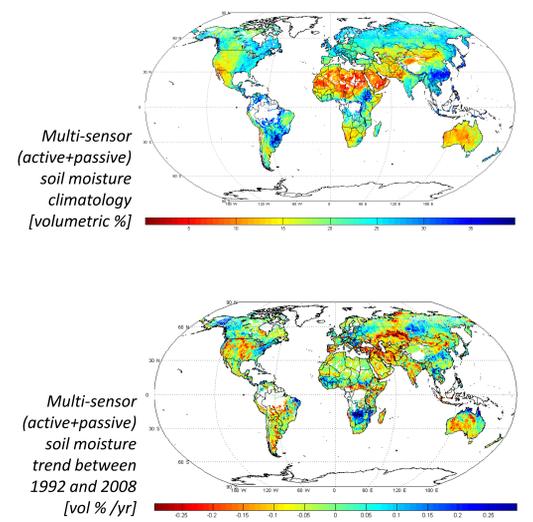
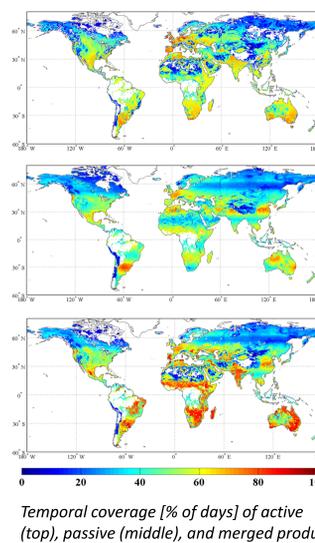
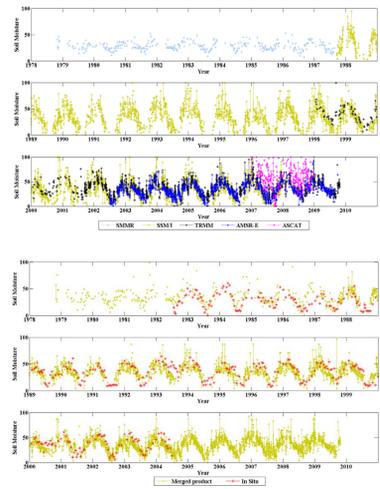
1. Develop a record of validated globally-gridded near-surface soil moisture from several satellites
2. Develop a Global Terrestrial Network on in-situ Soil Moisture.

This poster shows recent progress that has been made with respect to these two actions.

The WACMOS multi-mission satellite soil moisture product

The WACMOS product [2, 3] combines 4 radiometer products (based on VUA-NASA algorithm) and 2 scatterometer products (based on TU Wien method) into a single multi-mission product. Errors of individual datasets are carefully characterized (through error propagation and triple collocation) and used to rank and weight the input data sources in the end product. The final product, which is expressed in the dynamic range of GLDAS-Noah, has a spatial resolution of 0.25°.

Original (top) and merged (bottom) time series for grid cell in Illinois, USA



The International Soil Moisture Network

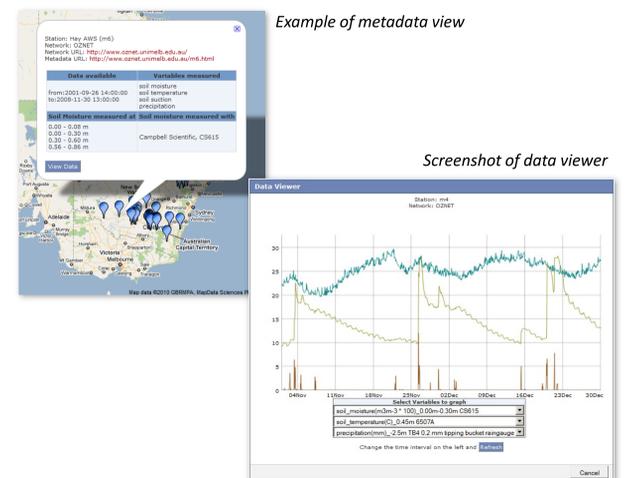


Data portal ISMN

A large number of in-situ soil moisture datasets is available from a wide variety of networks and sources. Nevertheless, they differ strongly in their characteristics, e.g. with respect to the sensor used, installation depths and deployment of the sensors, data formatting and accessibility. Therefore, an in-depth characterization and harmonization of each dataset is required to be able to make global comparisons, e.g. with satellite-based or land surface model estimates.

The International Soil Moisture Network (ISMN) is a new data-hosting center where globally available ground-based soil moisture measurements are collected, harmonized, and made available to users through a web interface (<http://www.ipf.tuwien.ac.at/insitu>) [4]. Main focus is on quality control, metadata provision, and user friendliness.

The ISMN is fully operational and currently hosts soil moisture data of more than 600 stations from 23 different networks while this number is still steadily expanding. For scientific use, access to the data is free of charge.



Outlook

The WACMOS product shows the potential of a multi-mission satellite soil moisture product. But it is just a start: Now it is time to thoroughly validate the product and compare the signals in the data set with other key variables of the water cycle. The Climate Change Initiative funded by the European Space Agency (start December 2011) provides an opportunity to address more in-depth the intercalibration between different sensors and products and to design a platform where additional current and future missions (e.g. SMOS, SMAP, AMSR2) can be integrated.

The ISMN appears to be a big success and fill an important gap in the access to in-situ soil moisture data. Apart from integrating additional networks future efforts will focus on enhanced quality control and characterization of stations. The goal is to strive for the highest degree of automation.

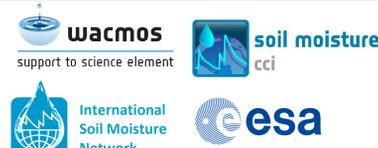
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