

The Soil Moisture and Ocean Salinity (SMOS) near-real-time soil moisture product

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The European Space Agency (ESA) Soil Moisture and Ocean Salinity (SMOS) satellite is the first mission specifically designed to measure soil moisture (SM) from space. This paper discusses the new near-real-time (NRT) ESA SMOS SM product. This new product has been obtained by training a neural network using as input SMOS NRT brightness temperatures for incidence angles in the 30°-45° range and soil temperature from the European Centre for Medium Range Weather Forecast (ECMWF). The SM dataset used as reference to train the neural network is the L2 SM product from ESA. The SMOS NRT SM is produced at ECMWF, delivered to ESA, and distributed via EUMETCast and GTS. It is available in less than three hours after sensing.

The new product has been evaluated globally with respect to the standard L2 SMOS SM product showing a high correlation ($R > 0.7$) and a low standard deviation (STD) of $< 0.04 \text{ m}^3/\text{m}^3$ except in dense forest regions. The SMOS NRT SM product has also been evaluated against in situ measurements of SM from the SCAN and USCRN networks in North America. The mean correlation is 0.72 and the mean STD of the error is $0.56 \text{ m}^3/\text{m}^3$, similar, but somewhat higher and lower, respectively, than the correlation and STD obtained with the L2 SM product.

In summary, the SMOS NRT SM product is a new SM dataset with similar quality and properties to the standard L2 SM product, but available in less than three hours after sensing and it is devoted, in particular, to operational hydrology and numerical weather prediction applications.