



Toward quality-controlled soil moisture products for climate studies using data assimilation of multiple satellite datasets

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Satellite observations provide information on soil moisture spatio-temporal variability, which is key to understanding processes linking the land surface and the atmosphere, and their impact on, e.g., climate change. This is a key motivation behind the setting up by the European Space Agency (ESA) of the climate change initiative (CCI) project for soil moisture. The ESA CCI for soil moisture will produce a multi-year soil moisture dataset from various satellite datasets: ASCAT, AMSR-E, SSMR, SSM/I, TMI and the ERS Scatterometer. Other satellite datasets of interest to the ESA CCI for soil moisture include Windsat, AMSR-E-2, Feng Yun and SMOS.

To add value to the ESA CCI soil moisture dataset, we perform data assimilation experiments using multiple satellite datasets with a variant of the Ensemble Kalman Filter (EnKF), in the first instance over the European domain. Initially, the satellite datasets are from the ASCAT, AMSR-E and SMOS platforms; later, these will include ESA CCI soil moisture datasets. Tests of the data assimilation set-up involve runs that are 1-month long; we then present results for a longer period (c. 1 year). We evaluate the data assimilation results by comparison against independent in situ soil moisture data from the International Soil Moisture Network. We show that the data assimilation method provides the following. (i) Information on the observational error. (ii) Information on the quality of the ESA CCI product and the land surface model used in the assimilation. (iii) Extension of the ESA CCI product in the horizontal (by gridding the data) and the vertical (by providing root zone soil moisture). And (iv) Information on the relative impact of the satellite observations, as well as the relative impact of the elements comprising the ESA CCI soil moisture product (active, passive and merged radiometer datasets).

In this presentation, we first show and evaluate preliminary results from these assimilation experiments. We then discuss the way forward toward quality-controlled soil moisture products that validate, extend and complement the ESA CCI soil moisture product, and how they contribute to the provision of an evaluated long-term time series for climate studies.