

# **Towards an optimised use of SMOS data in the ECMWF Land Data Assimilation System**

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The European Centre for Medium-Range Weather Forecasts (ECMWF) is consolidating a Land Data Assimilation System (LDAS) able to assimilate, for the first time, soil moisture information from passive microwave brightness temperatures. Weather forecasts can benefit from this update through a better initialisation of soil moisture prior to a forecast run.

This study shows the main results obtained from different experiments combining screen level variables (SLV) and SMOS brightness temperatures in the ECMWF LDAS. Firstly, three global scale assimilation experiments conducted during the summer month in the North Hemisphere (where evapotranspiration rates are higher, and therefore expecting a larger impact of SMOS data) quantify the added value of integrating SMOS data in the LDAS for the estimation of the soil water content. To this end, the soil moisture analyses are compared to all available in-situ observations belonging to the International Soil Moisture Network (ISMN). Both, the seasonal dynamic and the short term variability of the analysed soil moisture field are evaluated. Then, the impact in atmospheric variables, such as air temperature and air humidity, is also evaluated. Special emphasis is put in those areas where the assimilation of SMOS data is more promising. Secondly, short term experiments investigate the sensitivity of soil moisture forecasts and analysis to different model and SMOS brightness temperatures scenarios in the LDAS, with the objective of optimizing the use of SMOS data in the assimilation system. A range of data assimilation experiments using different configurations of the observation and model error representation are investigated and the results presented in this study.