USE OF SATELLITE DATA FOR SOIL MOISTURE ANALYSIS AT ECMWF

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Land surface processes and their initialization are of crucial importance to address the challenge of seamless (from weather to seasonal) Numerical Weather Prediction (NWP). In particular it has been found that soil moisture influences the land-atmosphere exchange processes on all relevant time scales. It is therefore expected to be of high interest for NWP applications to assimilate new satellite based soil moisture observations from METOP/ASCAT (Advanced SCATerometer) [4] or from SMOS (Soil Moisture and Ocean Salinity) [5].

A number of current operational soil moisture analysis systems used for NWP are based on analysed or observed screen level variables (2-meter air temperature and air humidity). At Météo France [1] and at Environment Canada [2] as well as in the High Resolution Limited Area Model [3] Optimal Interpolation (OI) algorithm is used operationally. The OI scheme was also used at ECMWF for soil moisture analysis for more than a decade . The OI presents several weaknesses, including the fact that it is not flexible enough to cope with the current increase in model complexity and data availability. The German Weather Service (Deutsche Wetter Dienst) was the first NWP centre to adopt a 'simplified' Extended Kalman Filter (EKF) [6]. Météo-France recently developed an offline EKF soil analysis scheme [7] within the SURFace EXternalized system. ECMWF [8] recently developed an EKF system for the soil moisture analysis.

This presentation shows the ECMWF soil moisture analysis system and its recent developments related to its operational implementation. The ECMWF soil moisture analysis has been developed to account for satellite data in the surface analysis. Data assimilation results are presented based on METOP/ASCAT (Advanced SCATerometer) soil moisture data assimilation. Preliminary results based on SMOS (Soil Moisture and Ocean Salinity) brightness temperature data assimilation are also presented. Synergy between active and passive microwave data is investigated through a multivariate data assimilation system.

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