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ASCAT data assimilation at ECMWF

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Soil moisture initialisation is crucial for Numerical Weather Prediction (NWP). New generation of satellites, such as ASCAT (Advanced Scatterometer) and SMOS (Soil Moisture and Ocean Salinity) provide highly suitable data from active and passive microwave sensors for surface soil moisture remote sensing. For NWP applications, satellite data monitoring provides a continuous evaluation of observations and first guess departures (observation minus model) values at global and regional scales.

The EUMETSAT operational ASCAT surface soil moisture product is used at ECMWF for soil moisture analysis developments as well as for the H-SAF (Satellite Application Facility on support to operational hydrology and water management) activities. Within the H-SAF project ECMWF developed a retrieval algorithm of root zone soil moisture profile based on ASCAT data assimilation in the ECMWF Land Data Assimilation System. The derived soil moisture product, the so-called SM-DAS-2 product, is a level-4 type soil moisture product, providing soil moisture in the root zone (0-3m) with a global daily coverage. ASCAT surface soil moisture data assimilation relies on a simplified Extended Kalman Filter approach. A Cumulative Distribution Function (CDF) matching is used a bias correction to rescale, for each model grid point, the scatterometer surface soil moisture index to fit the model surface soil moisture climatology. The ASCAT CDF matching was recently revised, allowing to account for a seasonal correction, improving thereby the efficiency of ASCAT data assimilation in both the root zone retrieval algorithm and for NWP applications.

In this presentation ASCAT data assimilation activities at ECMWF are presented. First monitoring and data assimilation in the ECMWF NWP system are presented and the impact of ASCAT data assimilation on NWP performance is addressed. Second, the separate root zone retrieval data assimilation system is described and the SM-DAS-2 product is presented.