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Assimilation of scatterometer derived soil moisture in the ECMWF land surface scheme

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Land surface processes have a dramatic effect on near surface atmospheric variables and are such an important component of Numerical Weather Prediction (NWP). Specifically soil moisture initial conditions are a crucial element in the forecast performance in mid-latitudes spring/summer and might extend predictability over land in the monthly to seasonal range. Despite the important role of soil moisture, most NWP centres use very simplified ways for initialising the land surface, ranging from nudging to climatology to optimal interpolation of proxy data. Consequently soil moisture drifts are ubiquitous in most NWP models.

In recent years considerable effort has therefore been devoted to the implementation of advanced assimilation techniques. Data assimilation is necessary to constrain model drift, bringing the model state closer to observations. This is particularly important given the large sensitivity of model integrations to the initial conditions of surface variables, e.g., root zone soil moisture. These activities have additionally been stimulated by the availability of new soil moisture observations form coarse resolution microwave sensors such as the scatterometers onboard the ERS and METOP satellites or the upcoming SMOS radiometer.

The European Centre of Medium Range Weather Forecast (ECMWF) actively contributes to these activities. Currently the ECMWF extends its surface analysis scheme TESSEL to explore the assimilation of several types of satellite products using a Kalman filter approach. As part of the H-SAF project the assimilation of soil moisture information derived from ERS and METOP scatterometer data is implemented and tested. Results of this work will be presented including a discussion of the importance of soil moisture for numerical weather prediction and the basic outline of the assimilation scheme, i.e. the TESSEL model and the Kalman Filter. Further the practical

implications of soil moisture assimilation will be discussed. Based on first results we will show the importance of strict quality control and a robust bias correction to handle differences in the climatology of the modelled and observed soil moisture fields.