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On the comparison between the LISFLOOD modelled and the ERS/SCAT derived soil moisture estimates

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In a large scale modelling framework it is common to encounter a series of problems related to the evaluation of the reliability of the produced spatial information due to the uncertainties inherited by the static spatial data (e.g. the soil maps) or by the spatial mapping of the point input data (e.g. the meteorological inputs).

In order to evaluate the spatial behavior of the modelled products it is possible to validate the model outputs by comparison with remotely sensed products.

Within the European Flood Alert System (EFAS) the LISFLOOD model performs continuous hydrological simulations producing a wide range of modeled variables throughout Europe.

The LISFLOOD model is a distributed hydrological model that is run within the EFAS on a 5 km spatial resolution. It comprises modules for the modelling of vegetation, soil, groundwater, snow cover, runoff generation, and stream routing in major European rivers. The soil compartment of LISFLOOD consists of a two-layer soil model. Infiltration of effective precipitation, soil evaporation and plant water uptake take place from the upper soil layer, while the lower soil layer represents essentially a storage term that produces a slow runoff component and recharges the groundwater compartment. Accordingly the soil moisture content of the upper soil layer mirrors well the balance of water between precipitation supply and climate and vegetation demand.

The observed meteorological input information is derived from measured and spatially interpolated meteorological point data provided by the MARS-STAT activity of IPSC-JRC (so called JRC-MARS).

The soil moisture data of the Global Soil Moisture Archive has been obtained by the scatterometer on board the ERS-1 and ERS-2 satellites, operated by the European Space Agency (ESA), whose data from the years 1992 to 2000 have been processed globally by means of a soil moisture retrieval technique based on a change detection approach. The information on the soil surface layer water content has been processed in a semi-empirical modelling approach to estimate the status of the profile soil moisture content, deriving the Soil Water Index (SWI). The method has been derived by considering a two-layer soil model: the first layer corresponds to the remotely sensed surface layer and the second layer to the 'reservoir' below. Assuming that the water flux between the two layers is proportional to the difference in soil moisture content between the two layers, a simple water balance equation is used to establish a link between the area-average soil moisture content in the reservoir, and the soil moisture content of the remotely sensed surface layer. It has been shown that SWI can be transformed into any other soil moisture measurement once determined the soil water retention features.

The results of the comparison between the LISFLOOD modelled and the ERS/SCAT derived soil moisture products are presented.