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satellite synthetic observations heterogenety variability as studied from virtual catchment

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The FOR2131 research unit is currently developing and improving data assimilation schemes for coupled subsurface-land surface-atmosphere models, namely the TerrSysMP comprised by ParFlow-CLM-COSMO models. That framework is used to test how different kinds of observations and networks of observations can improve system state estimation with a focus on in and inter-compartment fluxes of matter and heat energy.

The focus of the present contribution is to analyze satellite observations (focus on SMOS and SMAP missions) which provide information on spatial and temporal scales that are hardly supported by in-situ observation networks. In that context, a satellite virtual observation operator has been developed in order to provide synthetic observation for the high spatial-resolution TerrSysMP model applied to the Neckar catchment in the south-west of Germany.

Therefore, SMOS real and synthetic observations are used in order to understand the the effects on the microwave signature from the inclusion of sub-pixel land-surface heterogeneity which incorporates comparatively large-scale satellite observations in the data assimilation framework developed by the FOR2131 research unit. Preliminary results performed in a multi incident angle approach it is shown that SMOS real observations shows larger dynamic range as compared to the synthetic observations, while the temporal variability (daily bases) is good represented after a estimation of proper MW radiative transfer parameter specifically adjusted for the TerrSysMP Neckar catchment.

This results focused on satellite observations, among other data sources, are mean to support and to confine the system states needed for the development of data assimilation framework by FOR2131.