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Still searching for the Holy Grail: on the use of effective soil parameters for Parflow-CLM.

Gabriele Baroni (1), Bernd Schalge (2), Jehan Rihani (2), and Sabine Attinger (1)

(1) Helmholtz Centre for Environmental Research - UFZ, Department Computational Hydrosystems - CHS, Leipzig, Germany (gabriele.baroni@ufz.de), (2) University of Bonn, Meteorological Institute (MIUB), Bonn, Germany

In the last decades the advances in computer science have led to a growing number of coupled and distributed hydrological models based on Richards' equation. Several studies were conducted for understanding hydrological processes at different spatial and temporal scales and they showed promising uses of these types of models also in practical applications. However, these models are generally applied to scales different from that at which the equation is deduced and validated. For this reason, the models are implemented with effective soil parameters that, in principle, should preserve the water fluxes that would have been estimated assuming the finer resolution scale. In this context, the reduction in spatial discretization becomes a trade-off between complexity and performance of the model. The aim of the present contribution is to assess the performance of Parflow-CLM implemented at different spatial scales. A virtual experiment based on data available for the Neckar catchment (Germany) is used as reference at 100x100m resolution. Different upscaling rules for the soil hydraulic parameters are used for coarsening the model up to 1x1km. The analysis is carried out based on different model output e.g., river discharge, evapotranspiration, soil moisture and groundwater recharge. The effects of soil variability, correlation length and spatial distribution over the water flow direction on the simulation results are discussed. Further researches aim to quantify the related uncertainty in model output and the possibility to fill in the model structure inadequacy with data assimilation techniques.