

The effect of two-way dynamical coupling in a climate-hydrological model setup

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This study is a part of the Danish HYACINTS project (<http://hyacints.dk/index.shtml>). As part of the HYACINTS project a fully coupled dynamic climate-hydrological model is developed consisting of the HIRHAM regional climate model (Danish Meteorological Institute) and the MIKE SHE hydrological model (DHI / Geological Survey of Denmark and Greenland) also incorporating the SWET land-surface model. The objective of instigating the coupled setup was to provide improved hydrological predictions of the impact of climate change. This study focuses mainly on possible improvements in the coupled model setup as opposed to traditional one-way hydrological modeling with all climatic inputs provided beforehand. The HIRHAM domain is covering an area of 4000x2800 km in 11km resolution over northern Europe forced by ERA-Interim reanalysis data at the boundaries and the coupled catchments is located at the approximate HIRHAM domain center in the Western part of Denmark covering an area of app. 2500 km². The effect of the coupling is tested for a 2 year period by running the model in two setups; a fully coupled setup and a setup where the climatic inputs to the MIKE SHE hydrological model are taken after running the HIRHAM with the exact same forcings and characteristics. Validation variables include evapotranspiration, sensible heat flux and soil moisture.