COUPLING THE MIKE SHE HYDROLOGICAL MODELLING TOOL WITH THE HIRHAM REGIONAL CLIMATE MODEL USING OPENMI

Martin Drews, Danish Meteorological Institute, +45 39 15 74 98, mad@dmi.dk

1. Martin Drews, Danish Meteorological Institute
2. Michael Butts, Department of Water Resources, DHI
3. Søren Højmark Rasmussen, Danish Meteorological Institute
4. Sara Lerer, Department of Water Resources, DHI
5. Jesper Grooss, Department of Water Resources, DHI

It is important to understand and represent the interaction between the atmosphere and land surface hydrology to assess the impacts of climate change on surface water and groundwater resources. This interaction is complicated by the feedback between the two systems, the spatially variability of parameters and water processes on t he land surface. Linking existing models provides a cost-effective and powerful method for expanding integrated modelling capabilities to investigate coupled systems. Within the hydrological modelling community the Open Modelling Interface (OpenMI) has been developed to facilitate such coupling. However, there are a number of challenges that need to be addressed, including, matching the temporal and spatial scales of the different processes, ensuring fast, accurate and stable numerical solutions and properly accounting for the effects of coupling between the processes.

In this study, we present the development of a coupled climate-hydrological modelling tool using OpenMI. This fully coupled dynamic climate-hydrological model consists of the MIKE SHE hydrological model and the HIRHAM regional climate model. The models are linked through an energy-based land surface model based on S huttleworth-Wallace. The coupling developed via OpenMI is described, in particular how it allows exchange between the two models at different scales and on different computing platforms. The coupling expands the capabilities of both models and can be used as an exploratory tool to investigate scale and feedback effects. We will present results of a set of numerical experiments to explore the impact of hydrological processes on the sub-grid scales of regional climate model. An important strength of the coupled model is that more detailed hydrological processes can be represented at a finer scale, and catchment management processes can be represented.