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H41G-0960**Expanding integrated modelling capabilities using OpenMI***** Butts, M B***mib@dhigroup.com**DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark***Overgaard, J***DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark***Styczen, M***DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark***Gudbjerg, J***DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark***Loenborg, M J***DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark***Loerup, J K***DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark***Graham, D***DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark***Sinding, P***DHI, Agern Alle 5, Hoersholm, DK 2970, Denmark*

Hydrological modelling continues to evolve towards higher resolution and integrating more complex phenomena, such as ecological conditions, land use change and climate effects. Fortunately, this is supported by parallel trends in computational resources (e.g. parallel processing, distributed computing) and software capabilities (e.g. OpenMI for linking models). Linking existing models provides a cost-effective and powerful method for expanding integrated modelling capabilities. This paper demonstrates how this approach is being used to enhance the process modelling capabilities within the integrated hydrological modelling framework, MIKE SHE. There are a number of important challenges in successfully integrating different process descriptions into a modelling framework. These include matching the temporal and spatial scales of the different processes, modelling subgrid processes, ensuring fast, accurate and stable numerical solutions and properly accounting for the effects of coupling between the processes. In this paper, two examples of how OpenMI can be used to expand the current capabilities of an existing integrated modelling framework, MIKE SHE, are presented. In the first case, OpenMI is used to couple MIKE SHE with the agro-hydrological model, DAISY that simulates water, nutrient and plant processes in the unsaturated zone. Initial results that compare the OpenMI coupling of the models with results from the two individual models show good performance and accuracy. This coupling is based on a one-dimensional description of the unsaturated zone which is now being extended to two-dimensions. In the second example, OpenMI coupling is used as an exploratory tool to investigate the impacts of coupling between atmosphere models and hydrological models and explore issues such as scale effects and feedbacks. Results are shown where MIKE SHE is coupled to a limited area weather model and validated against field data. Current developments include the coupling to a regional climate model

HIRHAM use OpenMI to address coupling with different spatial and temporal representations and across different platforms.

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