HOME: A Modeling Framework for Integrating Eco-hydrological Models in the Heihe River Basin, China

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This study develops a modeling environment that can integrate a large number of eco-hydrological models and modules. The need to integrate the multiple eco-hydrological coupling models used in the Heihe River Basin (HRB) led to the development of the Heihe river basin Open Modeling Environment (HOME). The HOME enables us to answer questions about ecological and hydrological processes and about the water resources in the HRB. The HOME can also be used to integrate the models generated by other projects in the Heihe Major Research Plan of the Natural Science Foundation of China, and will provide researchers with user-friendly pre-process, simulation, post-process, and other convenient software tools. The HOME software has ten components: Module Builder, Context, Model Builder, Data Exchange, Runtime, Module Library, Database, Parameter Library, Toolkit, and GUI. A researcher can use the HOME GUI to construct a series of models; the software allows researchers to exchange variables between modules, and to place modules with different spatial and temporal scales in different contexts. Once the variables are selected, the organizational model can be run in the command line interface and the GUI environment of HOME. In our case study, HOME was used to integrate surface and underground water models and to optimize the models' parameters.

Keywords: Integration platform, Modeling framework, Heihe river basin, Eco-hydrology model, Heihe Plan