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Development of a two-way coupled land surface-hydrology model: method and application

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Based on the initially coupled version of the coarse grid land surface model (LSX) and finer grid hydrologic model (HMS), a two-way coupled land surface-hydrology model (CLHM) is developed to better understand land surface water and energy cycles at regional scale under the changing environment. The CLHM model consists of major modules on vegetation, snow, river/lake, soil, deep unsaturated zone and groundwater. As the low boundary condition of the Richards' Equation and source term of groundwater dynamics, deep drainage flow through the bottom soil layer (D) is used to couple the groundwater module and the soil module. The CLHM model is calibrated with the simulated and observed streamflows in the Huaihe River Basin from 1980 to 1982. Results show that the two-way coupled model represents the interactions between soil moisture and groundwater, and has a better capability to simulate the surface water and groundwater dynamics.