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Daily and Monthly Cycles of Terrestrial Water Storage in an Eastern Asia Monsoon Region

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A coupled land surface-hydrology model (CLHM) has been developed by coupling a land surface model (LSX) and a distributed hydrologic model (HMS) to better simulate regional scale land surface water and energy fluxes. The main modules of the CLHM include vegetation, snow, river/lake, soil, deep unsaturated zone and groundwater. The coupling of the land surface model and the hydrologic model is achieved by specifying the drainage from the unsaturated soil layer and the exchanges between the unsaturated layer and the water reservoirs. The CLHM is implemented to the Huaihe River Basin in eastern Asia monsoon region with a 20 km resolution to study the terrestrial water storage in extremely wet and dry years. The CLHM model, forced with observed precipitation, is first calibrated with the simulated and observed streamflows, and then applied to assess the available water with a temporal resolution of a day during extreme climate episodes. Results show that the CLHM has considerable capability to represent the different water masses in snow, surface soil, river/lake and deep unsaturated and saturated zones. The characteristics of available water during different climate episodes in the Huaihe River Basin are examined in detail both on daily and monthly time scales.