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Interactive use of ecological and hydrological model in ecohydrological study, Mongolian semi arid region

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Here we present, as a proof concept, a simple integrated modeling framework for simulating ecohydrological components in upper part of Kherlen river basin of Mongolian semi-arid region. The prototype-coupled model consists of the Century ecosystem model (version 4) and the TOPLATS hydrological model. The two models are directly coupled through a one-way data transfer method, which is used to simulate the carbon cycle, hydrological cycle, and energy fluxes. On one side of the interface, Century ecosystem model simulates mainly the ecological components and some of hydrological components. On the other side, TOPLATS hydrological model predicts hydrological components together with energy fluxes. We initialized these models with field measurement datasets and general distribution of vegetation cover, soil type, as well as grazing pressure for spatial scale. As an initial test and validation of this modeling framework, we performed a 4 years simulation for each model at point scale using field measurement datasets of the study areas. Also we run the Century ecosystem model and TOPLATS hydrological model at spatial scale with 1 km mesh in this exploratory study. The models correctly simulate the ecohydrological components. These preliminary results demonstrate the feasibility of coupling ecosystem-hydrological models, which will facilitate the exploration of a broad range of environmental change issues.

Keywords: Mongolia, semiarid, ecohydrological components, Century and TOPLATS model