Eco-hydrological simulation and prediction in the Haihe River basin by coupling the BIOME-BGC model with the WEP-L model

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Abstract A distributed eco-hydrological model was developed to simulate and predict hydrological processes and vegetation production by coupling the vegetation model BIOME-BGC with the distributed hydrological model WEP-L. BIOME-BGC updates the vegetation parameters of WEP-L in a daily time step, and WEP-L provides hydro-meteorological data to BIOME-BGC. The coupled model was applied in the Haihe River basin of China, which is well known for its water scarcity. In the modelling validation, results show good agreement with the field observation data or literature values of LAI, Net Primary Production (NPP) and river discharge. Under future climate change scenarios in 2021–2050, meteorological data predicted by the global climate models after downscaling were used for eco-hydrological simulation to predict future eco-hydrological response in the Haihe River basin. Results show that under the global warming impact, river runoff may decrease, and NPP may increase. This means a big challenge to the water and land management in the basin and mitigation/adaption measures of climate change are desired.

Key words eco-hydrological model; climate change; Haihe River basin