



Fully coupled high-resolution atmospheric-hydrological modeling: Development, application and analysis of WRF-VIC

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A high-resolution regional model is proposed by coupling Weather Research and Forecasting (WRF) atmospheric model and Variable Infiltration Capacity (VIC) hydrology model. The regional coupled model provides advantages of regional focus, which permits significantly higher spatial resolution to explicitly represent and evaluate the role of important fine-scale hydro-climate processes and feedbacks, such as evaporation flux, freshwater runoff, clouds as well as land-atmosphere-ice-ocean interactions. Our regional coupled model also allows for simulation of a larger number of ensemble members, using different initial conditions and space-dependent sub-grid parameterization, to generate probabilistic predictions that would be more useful to national and local decision makers than global model forecasts alone. We applied this regional coupled model on 10-year simulation of land-atmospheric system over extend Yangtze River basin and thus presented a more realistic and detailed picture of the climate patterns, which are emerging in the region, as well as to provide a greater insight into what processes and feedbacks future Global Climate and Earth System Models should improve upon.