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The land states and fluxes greatly influence land-atmosphere coupling in many regions. As Noah-MP will become the land surface model in next generation UFS applications, it is essential to ensure that the model can simulate high-fidelity land states and fluxes in the coupled modeling system. In this study, we specifically focus on optimizing the parameters in Noah-MP to better simulate hydrometeorology as well as terrestrial hydrology in the coupled system, with an emphasis on precipitation, snow, soil moisture, and streamflow. Typically, uncoupled land model optimization is performed using data atmospheres, which ignores the coupled land-atmosphere feedbacks and therefore compromises the usability of optimized land parameters in coupled systems. To address this challenge, we propose to use the single column model (SCM) in selecting sensitive parameters and model optimization because the SCM allows rapid iteration of test configurations with at least 1-D land-atmosphere interactions. In addition, we aim to reveal the differences in sensitive parameter selection by conducting sensitivity experiments using both standalone Noah-MP and in the SCM. We present an initial testbed where we have configured the UFS land model to over 90 Ameriflux sites to perform model experiments. We diagnose initial results quantifying the biases in energy and hydrologic fluxes using the default parameter sets using an information theoretic approach, which provides novel insight into process-level biases which can be improved via optimization.
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