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One important contributor to uncertainties in precipitation and drought S2S predictions is snowpack-precipitation-soil moisture feedback, which affects precipitation and other weather characteristics over timescales of days to months. As a land component of NOAA Unified Forecast System (UFS), the Noah-MP land surface model (LSM) suffers from some systematic biases in snowpack modeling. Thus, in this study, we try to enhance the model parameterizations for several key snowpack-related processes in Noah-MP with the ultimate goal of improving UFS S2S predictions of precipitation and droughts over the western US. Specifically, we enhance the canopy-snow interactions with a roughness sublayer turbulence scheme, and improves the Noah-MP snow albedo, snow cover, and snow compaction schemes with new observation-constrained parameterizations. These process-level snowpack enhancements substantially reduce the Noah-MP systematical snow biases.
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