Interactive precipitation feedbacks in a single-column model

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Feedbacks between soil moisture and precipitation are a common research topic, but few studies capture in an idealized framework the full interactive nature of this relationship. The partitioning between latent and sensible heat fluxes varies with soil moisture and influences boundary layer properties. The boundary layer is the linchpin of this feedback, since the mixed-layer thermodynamic properties dictate the timing and magnitude of convective rainfall. Any precipitation that does occur replenishes soil moisture, completing the feedback loop. The Weather Research and Forecasting (WRF ARW) model is run in single-column mode in order to study the local nature of this interaction. When run in SCM-mode, the governing dynamics in WRF are those of the NOAA land-surface model, an eddy-diffusivity treatment of the boundary layer, and parameterized deep convection. The computational economy of the SCM permits long time integrations and a multitude of parameter sensitivity experiments. The degree of influence from regional or large-scale contributions such as horizontal moisture advection is tested in this approach.