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# Environmental Drivers and Dynamics of Downdrafts in Simulations of Convection

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Downdrafts play an essential role in the feedback between deep convective clouds and their surrounding environment, and they must be properly accounted for in climate model parameterization schemes. Such downdrafts found near and in-cloud, such as subsiding shells and hydrometeor-loaded downdrafts, significantly contribute to downward mass flux in the lower and middle troposphere. However, environmental links to driving mechanisms and characteristics of downdrafts must be understood for proper implementation in parameterization schemes. Using CM1, simulations modeling convection were performed utilizing weakly-sheared dry and wet season composite soundings compiled during the Green Ocean Amazon Campaign, as well as similar thermodynamic soundings with a prescribed increase of vertical wind shear. The soundings in this study were adapted to isolate relative humidity and shear effects on convective downdrafts. All deep convective updrafts in the simulations that met a required vertical velocity threshold were analyzed, along with their near-cloud environments and associated downdrafts. Magnitude differences of subsidence in the matrix of environments encouraged a parcel trajectory analysis, which showed that downward accelerations were primarily driven by negative buoyancy accelerations and were aided by cloud-top pressure perturbations. Compared to other near-cloud downdrafts, subsiding shell accelerations relied heavily on strongly negative thermal buoyancy for downward accelerations but were also moderated by upward vertical perturbation pressure gradient accelerations away from cloud top, ultimately making them weaker than all other downdrafts. Future work aims to increase understanding of and improve mass transport processes found in near-cloud downdrafts and apply such understanding to climate model cumulus and convective parameterization schemes.