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UNCERTAINTIES OF RADAR-DERIVED VERTICAL VELOCITIES IN DEEP CONVECTIVE CLOUDS USING ARM PRECIPITATION RADARS

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ABSTRACT

Vertical air motions have a direct effect on convective cloud life cycles and microphysical processes. Measurements of updrafts and downdrafts on scales comparable to cloud-resolving models are required to evaluate and improve convective parameterization. Despite their importance, the availability of these measurements in deep convective clouds is still rather sparse. One of the primary goals of the new ARRA enhanced radar networks is to provide such measurements routinely. The retrieval approach utilizes multi-Doppler analysis techniques. However, the accuracy of these retrievals is not well characterized, particularly the sensitivities associated with radar configuration. In order to address this issue we have developed a forward model radar simulator, known as the McGill Multi-parameter Radar Simulator (MMRS). Coupling MMRS with WRF model output, synthetic radar volumes associated with a particular scanning strategy are generated. Vertical air motions are then extracted from these synthetic volumes using the retrieval algorithms to be tested: for example, an OTS Cartesian mapping system combined with a three-dimensional variational wind retrieval scheme. A comparison between the model field and the retrieved field can be performed allowing for a study on the impact undersampling storm features has on vertical velocity retrievals.