

Interactive comment on “Influence of entrainment of CCN on microphysical properties of warm cumulus” by J. W. B. Derksen et al.

Anonymous Referee #2

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This paper is well written, and the figures in particular are nicely done.

My main criticism stems from use of the entraining 1D model. Even when including entrainment, this very simple experimental framework has basically run its useful course for fundamental cloud physics investigations. Of course, it remains relevant for convective and cloud microphysical parameterizations. Most researchers have moved on from the 1D framework for two main reasons. First, particularly for turbulent boundary layer flows, representing the complexity of lateral and cloud-top entrainment by a single bulk parameter (α) is a drastic oversimplification. Second, the 1D framework makes the assumption that all turbulent entrainment processes are characterized by homogeneous mixing, whereas both mixing regimes exist in nature. The authors acknowledge that both homogeneous and inhomogeneous mixing regimes have been observed in

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clouds, so at the very least they should discuss the impact of assuming all the mixing is homogeneous. Furthermore, they should speculate on the anticipated differences between their 1D and 2D/3D (CRM and LES) frameworks.

A more modern choice of model framework that still preserves some simplicity of the 1D model is the trajectory ensemble model approach, which is based on 3D LES dynamics. This technique would be preferable for future studies.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8791, 2009.

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