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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Tropical Continental Downdraft Characteristics: Mesoscale Systems versus Unorganized Convection" *by* Kathleen A. Schiro and J. David Neelin

Anonymous Referee #3

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This paper uses GOAmazon data to compare characteristics of downdrafts in unorganized convection and those of Mesoscale Convective Systems (MCSs). Using composites of meteorological variables, the paper provides a quantification of the changes in surface thermodynamic fields associated to the passage of the observed convective events and their relative cold pools. The paper then focuses on the properties of downdrafts using surface values of equivalent potential temperature and composites of radar reflectivity and vertical velocity. It is shown that downdrafts have similar intensity and originate in the lower troposphere, with MCSs' downdrafts having a slightly higher origin height. Finally, a strong relationship is shown between drops in equivalent potential temperature at the surface and precipitation rate.

The paper is overall well written and presents interesting results from observations. I only have few comments that I list below, but otherwise I recommend its publication in this journal.

Comments:

Line 40: I believe the surname is actually Böing. Line 41-42: The boundary between the cold pool and the environment is not, strictly speaking, a mechanism. Please rephrase this. Line 149 and following: I find the use of Celsius and Kelvin at the same time confusing. Please use Kelvin throughout the manuscript. Line 149: Please specify units of measurements for 8.9. Line 164: Could the greater recovery of the temperature be simply due to the diurnal cycle (i.e., the fact that some of the systems you are observing are in the late part of the day)? Line 187: I think "corresponding" would be a better term here. Line 219-220: Judging from Figure 4, the minimum of theta_e for the isolated case seems much higher than what you indicated, more like 5 km. Line 224-229: Could you speculate whether a higher mixing rate for isolated convection would actually make sense? Line 248-250: You say that retrieval near freezing level has large errors, so how confident are you about the high probability you mention? Line 286: Betts 1976 should have parentheses? Line 292: The altitude of 1.5 km is cited only as a reference point. The mode of the distribution seems to actually be at 1 km. Line 318: The relationship in Figure 8 seems non-linear with a plateau/decrease towards lower dtheta_e. Why is that? Line 356: "The maximum dtheta_e [. . .]". Do you mean the minimum? Line 379: Please check the number you are providing here as they don't seem in agreement with what you reported earlier on. Line 381-383: Why is moisture recovering faster? Line 395-396: Again, it would be very nice if you could suggest reasons why this could happen. Line 419: Do you mean "composing"?

Figure 1: Please specify unites of measurement on top of the color bar. Figure 2-3: As they are, these figures make it hard to appreciate details of the curves. First, I would recommend including a grid in each single panel; second, I would also suggest using a lower aspect ratio so that panels are less squeezed.

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