

Interactive comment on “A review of the theoretical basis for bulk mass flux convective parameterization” by R. S. Plant

R. Plant

r.s.plant@rdg.ac.uk

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General Comments

I thank both referees for the very positive tenor of their comments and for what were clearly very detailed readings of the article. It was very flattering to read some of the remarks from referee 2. A revised article has been submitted to ACP that has benefited from addressing the comments of both referees.

Below I respond to the specific suggestions from the referees for changes to the article. The numbering in this reply is my own.

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Specific Comments from Referee #1

1. The referee felt that the article was not easy to read in places because of the number of different sub and superscripts required. I have now included a table of nomenclature that I believe will be helpful for the reader.
2. The referee suggested to include a figure, or specific result. I have constructed an example which illustrates the practical consequences of the Yanai ansatz, and this is included as Figure 1 in the revised text. It is clear from the example that the ansatz will produce a systematic overestimate of condensate detrainment, and this I believe to be a useful result emerging from the theoretical considerations in the article.
3. The referee suggested that there may be scope to shorten the manuscript. Although I have looked for opportunities to do so, that has largely consisted of removing a few words here and there, or perhaps the odd sentence, rather than any significant surgery on the text. It was not clear to me that any section could be considerably reduced in length without unduly damaging the presentation.

Specific Comments from Referee #2

1. The referee makes some very good points about vertical velocities and the treatment of microphysics, and I have taken the opportunity to add some remarks along those lines to the revised article.
2. The referee suggests that a schematic on condensate detrainment would be a useful addition, and a good way to respond to referee #1. The suggestion was a good one, although ultimately I preferred to provide a specific example for the reasons stated above.

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3. Some rewording in the Introduction has been performed, along the lines suggested.
4. The referee's suggestion for rewording on p. 24962 has been adopted.
5. The referee is quite correct that there a subtle distinction can be drawn between the bulk cloud work function and the dilute CAPE. I thank the referee for drawing my attention to this, and agree that the distinction should be maintained (or, at least, that my failure to make that distinction in the original article might have caused some confusion).
6. The reference to Donner 1993 has been corrected.
7. The statements about cloud-base and the LCL have been qualified, as suggested.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 24945, 2009.