

Note: this document contains co-editor and reviewer comments in black text and our responses in blue. Line numbers in our responses refer to the tracked-changes version of the manuscript.

Co-editor

Dear Dr. Abbott

Many thanks for your revisions and for addressing the points raised by the reviewers. Both reviewers are agree that the paper has further improved and is almost ready for publication. I therefore accept your paper for publication in WCD subject to a few minor corrections:

Reviewer 2 recommends adding “in the pseudoadiabatic limit” to the title, and I think this is a good idea. It makes the title more technical but also more specific about an important assumption of the study.

See response to Reviewer 2 below.

Reviewer 2 thinks that Appendices B and D are not required. However, I appreciated these details; please re-consider whether you like to keep them or not. And have a look at the consistency of notation: in L241 and L775 v is the horizontal velocity, why then not also use v in eq. (A4, A5, B3)?

See response to Reviewer 2 below. We’ve modified notation in Equations A4-A7 and B3 and on lines 628 and 631 so that v is consistently used for horizontal velocity.

Reviewer 1 has several recommendations concerning the clarity of the figures.

See response to Reviewer 1 below.

References: Copernicus journals use journal abbreviations and include a DOI. Please check in published WCD papers and adapt your list of references accordingly.

We have modified our list of references to match the style of Copernicus journals.

I am looking forward to receiving the final version of your manuscript.

With best regards,

Heini Wernli

Reviewer 1

The authors have addressed all of my earlier concerns. This will be a useful contribution, and I find the results both interesting and somewhat surprising. I do have a minor suggestion regarding the graphics. Several of the figures (1, 4, 5, and 10, for example) would benefit from grid lines.

We agree that grid lines would help readers estimate the coordinates of points shown in figures 1, 4, 5, and 10, but are concerned that they would add visual clutter to plots that already contain several different lines. As a compromise, we have added tick marks to the right and top panel edges in Figures 1, 4, 5, 10, A1, and E1, which will make it easier to estimate the coordinates of points that lie far from labeled axes.

In Figure 10, the lines are thick, and of similar color, making comparison difficult. Also, some of the ordinate labels (e.g., Panel c) seem missing or irregular.

We decreased the line thickness in Figures 10 and E1, and replaced dark blue curves with a lighter blue throughout the manuscript. The ordinate labels differ between panels in Figure 10 because the y-axis range changes; we modified ordinate labels so that they're identical in panels a, c, and e.

Reviewer 2

The authors considered all of my comments in their revised manuscript. Therefore, the paper has improved in my view. However, I am still not sure that the presented results describe the true impact of precipitation mass sinks on midlatitude storms. This study suggests that the magnitude of this impact is rather small. Therefore, it is not obvious why condensate loading has not an impact of similar magnitude and that the superposition of both impacts lead to a different result. Consequently, I recommend adding "in the pseudoadiabatic limit" to the title. Then the reader sees that the results may not describe the true impact and further work may be needed.

We agree that it's worthwhile to highlight the idealized nature of our simulations in the title, but worry that the meaning of "in the pseudoadiabatic limit" will be unclear without accompanying text clarifying that this refers to a limit where condensate immediately falls out of the atmosphere. Instead, we have changed the title to "Impact of Precipitation Mass Sinks on Midlatitude Storms in Idealized GCM Simulations over a Wide Range of Climates", and modified a sentence in the abstract to highlight that one of the assumptions made by this GCM is that condensate immediately falls out of the atmosphere (lines 7-8).

Appendix B and appendix D: In my view it is not necessary to show that the pseudoadiabatic model results from the limit of an infinitely fast fallout as it is obviously consistent with the statement of an immediate liquid water annihilation.

After some consideration we decided to keep these two appendices. Because they're appendices they shouldn't be distracting to readers who find them unnecessary or obvious, and some readers may find them useful.