

Interactive comment on “The polar amplification asymmetry: Role of antarctic surface height” by Marc Salzmann

Anonymous Referee #1

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The paper examines the role of Antarctic surface height for the asymmetry of polar amplification using dedicated model runs with a standard continental setup and with a flat Antarctic continent and ice sheet. The question is very relevant and the results are interesting, so I recommend the paper for publication after the following issues have been addressed:

Major issues: 1) differences between RAD and ctrl runs and temporal evolution Going back and forth between results from both types of runs at times becomes confusing for the reader. I suggest a more explicit discussion of the use of both runs and why one of them would be more reliable for a certain analysis than the other in the methods section. Are results that are not robust between these two sets of runs robust enough to be mentioned at all? To the extent that the RAD re-run mostly triggers a new realisation, I would doubt that. Especially for the temporal evolution section, the robustness of

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the results has to be demonstrated. 2) Discussion of the role of sfc vs. atmospheric temperatures The author convincingly shows that the change in sfc temperature and its relationship to atmospheric warming is causing changes in the lapse rate feedback, rather than the warming profile within the atmosphere. However, it is not clear to me that the temperature feedback should therefore be regarded as a single mechanism. This point might benefit from either rethinking or more detailed discussion.

Minor issues:

l. 5 if->when (If + past tense triggers would in main clause, and indicates a hypothetical case) This issue reappears in the manuscript. l.6 (and elsewhere): please reserve “significant” for its statistical meaning, and specify the statistical test. p.2 l1 ff: What is the baseline for warming? p.2 l.23 Arctic or Antarctic? p. 2 l.32, general issue: I would suggest to consistently speak of either polar amplification symmetry or asymmetry to avoid confusion. p. 6 l.27 explained by what? p. 11 l. 15 Arctic or Antarctic?

Figure 1 and 2: I suggest combining these into one Figure, or at least using the same axes to facilitate comparisons.

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