

Interactive comment on “Distinguishing the impacts of ozone and ozone depleting substances on the recent increase in Antarctic surface mass balance” by Rei Chemke et al.

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Review of ‘Distinguishing the impacts of ozone and ozone depleting substances on the recent increase in Antarctic surface mass balance’ by Chemke et al.

Overview: This paper used specialized climate model simulations from CESM to analyze the relative contribution of ozone depleting substances, and stratospheric and tropospheric ozone (separately) on changes in Antarctic mass balance. The study clearly demonstrates and cleanly separates that the largest contributions come from stratospheric ozone in austral summer. This is accomplished through changes in the meridional moisture flux, strongly tied to barotropic instability (rather than baroclinicity)

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bringing more moisture to the Antarctic continent and increasing SMB.

The paper is well-written, the figures are clear, and the results are fully justified by the analysis. I only offer one small potential minor revision to help place the paper in a broader context of the model reliability, which never really was addressed or referenced. It would be helpful to know that the values and changes of SMB are well within the known bounds of SMB from satellite observations (surface height estimates etc.) and other detailed models of SMB.

Minor revision suggestion: 1. There is never really a discussion on how well the models employed do at simulating observed Antarctic SMB from satellite measurements or in comparison to more sophisticated models of SMB. At the very least, the LENS simulations could be compared to this over a period of overlap.

Specific technical edits: 2. Throughout: east Antarctica, west Antarctica, and Antarctic peninsula can all be capitalized since they refer to specific proper nouns / geographic regions: East Antarctica, West Antarctica, Antarctic Peninsula 3. Line 175 – change 'show' to 'shown' 4. Some of the nomenclature is a bit awkward, particularly in Fig. 8, why not just use derivatives instead of subscripts?

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