

Below we outline our response in blue to the comments of Reviewer #1 and #2

Response to Reviewer #1

The paper has improved considerably. I appreciate the authors' detail in their response and their caution to interpreting the dipole pattern seen in the ice core data to the SAM. I think the addition of the observations add a lot to the paper. I'm happy to have the paper accepted for publication, with only small technical / grammatical fixes as indicated below.

Page 3, Line 27: Remove the word 'along'

Done

Page 13, Lines 6-7: It isn't clear how a weakening of the ASL is related to fewer blocking events, which are typically done by higher pressure. A weakening of the ASL would seem to suggest more regional blocking in the ASL area. Perhaps you're talking about some other area of blocking connected to the ASL (like SE of NZ or in the S. Atlantic) that tends to be opposite-sign of the ASL due to the PSA-type wavetrains? Please rephrase this sentence to improve clarity.

The ridging relevant for RICE precipitation occurs west of the region of the ASL because of the location of the ASL. When the ASL weakens, the region of ridging either shifts or occurs less frequently. We have clarified the sentence: "The reduction in snow accumulation might be linked to a negative SAM-induced weakening of the ASL, perhaps leading to the development of fewer blocking events in the eastern Ross Sea."

Page 14, line 21: insert word 'time' before dependent

Done

Page 14, line 35: change 'experiencing' to 'all experience'

Done

Response to Reviewer #2

The revised version of the manuscript is much improved and I would only suggest some minor/technical modifications as summarized below:

One comment regard the Taylor Dome data: I agree that using the st9810 age scale makes no sense but why not using the updated age scale as reconstructed by by Michael Sigl (Sigl et al., 2017 Nature Clim Change, see their figure 6 in the SOM) using the volcanic matches with the WDC06A-7 chronology

of the WAIS ice core? These data are available in the PAGES2k Consortium 2017 paper: A global multiproxy database for temperature reconstructions of the Common Era. *Scientific Data*, 4, 170088. doi: 10.1038/sdata.2017.88. The data are available at: <https://www.ncdc.noaa.gov/paleo-search/study/21171>. In case this data set is used in the figure 6, please also update the text lines 34-36 at page 12 of the revised manuscript.

We thank the reviewer and have changed the age scale of the Taylor Dome data to the WDC06A-7 age scale as developed by Sigl et al. 2014 and published by PAGES2k Consortium 2017. We updated Figure 6 and Table 1 to reflect these changes.

2) For Talos Dome firn core: the dating is from Stenni et al. 2002 and not Severi et al., 2012, which is dating that can be used for the TALDICE deep ice core for the recent period. Please, update the Table 1.

Done

Other minor/technical issues:

Page 6, line10: the citation Keller et al., is lacking in the References list.

Done

Page 7, line 17: a value is lacking before +/- 0.51

We removed this value which had been replaced with a new value in the revision.

Page 12, lines 34-36: update this sentence if using the Taylor Dome data on the Sigl age scale (see above).

We replaced the following sentence: "We do not interpret the Taylor Dome record for this time period because its age scale uncertainties in this part of the record (0-3ka BP is based on a flow model which assumes constant snow accumulation and lacks independent age benchmarks, Steig et al. (1998), Steig et al. (2000)) prohibits a precise alignment of events. " with: "The Taylor Dome record also shows prolonged cold isotope temperature anomalies during this time period."

Page 15: in data availability update the data citation for the ice core data used in the manuscript and figures (Talos, TALDICE, Taylor Dome, Siple Dome WDC).

Done

Figure 6 caption: add Taylor Dome in part a).

Done