Climate of the Past Discussions

Clim. Past Discuss., referee comment RC1
https://doi.org/10.5194/cp-2022-68-RC1, 2022


# Comment on cp-2022-68

Anonymous Referee #1

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Referee comment on "Temporal variations of surface mass balance over the last 5000 years around Dome Fuji, Dronning Maud Land, East Antarctica" by Ikumi Oyabu et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2022-68-RC1, 2022

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Review of Oyabu et al., "Temporal variations of surface mass balance over the last 5000 years around Dome Fuji, Dronning Maud land, East Antarctica."

This study adds a significant dataset to surface mass balance estimations for East Antarctica. As the authors suggest, it is primarily aimed at adding a new stacked dataset to a region with only minimal information currently. It is not an indepth analysis of the mechanisms causing variability in the record/s described. So I have read the manuscript in this spirit assuming further analysis of the dataset is underway. I have primarily minor comments as follows.

The introduction is a good assessment of current knowledge and knowledge gaps.

Line 91 – there is also a first order issue here – that most of the EAIS is difficult to access in a spatially coherent way – so any addition to the dataset such as this is valuable.

Line 113 – what does 'continentality' mean?

Lines 170-175 – could do with a bit of editing for readability.

Section starting at line 259 – there is not enough detail here about these analyses. At what resolution were they measured? Continuous or at interval's and in what cores? What were mean concentrations and were these ok for detection limits?

Section starting at line 275 – this needs an introductory sentence. Explain why you were measuring tritium, and why this is essential to this particular study.

Line 283 – depending on resolution…

Line 284 – this is dependent on site resolution/annual accumulation, so this statement is not correct for some sites in Antarctica, e.g. high resolution coastal sites, where the lag can be as low as 6 months. Be more specific.

Fig. 3. Is it possible to use some colour banding or other visual way to illustrate the common ties in this figure? In shallower cores it is relatively easy to visually pick out the common groups of ties, but in deeper areas this is close to impossible, so the point of the figure is lost. The figure is a promising one, but currently risks losing the readers faith that the figure is designed to clearly allow the reader to discern common ties. It is not possible with just the figure alone (regardless of what is in the supp info). The figure should stand alone in being able to communicate the ties.

Fig. 4. Other double Pinatubo peaks have been detected elsewhere in east antarctica. E.g. see Plummer et al., 2012 or Crockart et al., 2021 (both in Climate of the Past). There is also always a chance that this relatively small eruption is confused with another unidentified regional eruption.

Line 362 – any age errors?

Line 383 – rephrase, this is confusing prose. E.g. "longer to the north and smaller to the south"

Line 387 – or larger variability in orographic deposition

Section starting at line 398 – you need to explain why you chose these periods. Presumbaly for dating/volcanic tie reasons, but to do a good good analysis of climatologically why there are differences, you also need good climatological reasonbs for the separation of your different time periods.

Figure 7 and Table 3. As best I can tell, these two elements display the same information. Remove one or the other, probably the table to supp info.

Section around line 505. This has also been reported at Dome C, with the shifting Dome position related to small variations in wind direction, which have further been related to the frequency and position of mid-latitude atmospheric blocking in the southern ocean. See papers by Frezzotti and Scarchilli, and also Masson, Pook et al. Also recent work by Jonathan Wille, John Turner and Danielle Udy on the influence of meridional mid-latitude atmospheric variability and events on east Antarctic SMB and ice cores.

The discussion is well written for what is predominantly data focussed paper. I think a bit more discussion is required in the section at lines 675-680 around why GHG and ozone depletion might increase moisture content over the Southern Ocean. Readers may be aware of the theories, but they should still be elaborated on here, as this increase in SMB is one of the primary findings surely? Also – I'm not sure whether GHG and Ozone depeletion can be easily related to interior east Antarctica yet. Are there any papers you can cite specifically about interior SMB changes and GHG/ozone?