After having read the revised manuscript, I must say its quality and readability have drastically improved. Combined with the revisions, having access to the model description pre-print was very helpful in addressing the main questions related to technical aspects of the model and was sufficient for appropriately conducting this review process. Whereas I am not a reviewer of the modelling description paper, nor will I make any comments on the manuscript content itself, I could not help but get stuck on the author's statement *"Depending on community interest and involvement, a github for the model may eventually be setup."*. I rather believe that, if the model is not available in a standard way like GitHub, with some documentation, it will be much harder to get traction in the community. This is of course just an encouragement from my end for the authors to seek to expand the group of users of their glacial systems model, which this paper highlights to be extremely useful for the paleo ice sheet modelling community.

My only remaining concern about this manuscript is regarding some of the citations. As per TC's manuscript submission guidelines, citing a pre-print posted on a personal webpage is not allowed for publication (i.e., no "in prep", "in review", or "submitted" references are allowed, only those that were given a DOI). Thus, the pre-print should be available in GMD Discussions with a citeable DOI before I can recommend this manuscript to be published. I have been checking GMD's website daily to make sure I did not miss it being out until the last day I could delay sending my review, but so far it has not appeared. If the manuscript has already been submitted and is waiting on an Editor to open the discussion, I would suggest liaising with GMD so its process can be expedited and a citable GMDD version of the model description can be made available. Similarly, it would be highly beneficial if the accompanying "Part 2" paper would be available for the reader as a pre-print, so its citation can be kept. On a similar note, I could not find the reference "Tarasov & Goldstein (2019)" as per the author's rebuttal letter. Assuming it was meant to be "Tarasov & Goldstein (2021)", in GMDD, I am unsure what TC's policy is regarding citing pre-prints that did not have their revised version accepted. This is beyond my role as a reviewer, but I found it to me my job to highlight this to the Editor and the authors.

Citation problems apart, I am happy that the introduction is much improved and the reading flows really well throughout the entire manuscript despite its considerable length. I think this manuscript is a good contribution, showcasing the power of data constraints in paleo ice sheet models. My remaining points are rather minor, mostly editorial.

L10: Are citations in the abstract allowed? It should not be necessary, and the mention of AntICE2 (including its full name) should be sufficient

L90: I think there's an "If" missing at the beginning of the sentence

L132: "can quantify" reads better and is more appropriate for the middle of an introduction than "will quantify"

L168-171: not quite framed as "research questions". It might be worth rewording or calling them "research problems/goals".

L240: the reference Morlighem et al. (2024; SciAdv, doi:10.1126/sciadv.ado7794) would be good to support your approach to treat ice-cliff failure in a more conservative way

L251: "temperoral" -> temporal

L253-255: Does the first scheme then just adds an uniform anomaly based on the glacial index, which is further modified by the lapse rate? Please clarify

L255: just "van Wessem et al."

L372: Please define that this sum is the quadrature, so you can appropriately use the term in L378

L385: It might be worth reiterating that the evaluation of the mentioned consequences is presented in the "part II" paper

L438: the proper way of writing isotopes is ^{14}C and ^{10}Be

L500-505: It is not clear what the criteria were for picking those 18 runs for the HVSS, neither how exactly RefSims 1 to 3 were deemed to "collectively represent the best-fitting simulation (or simulations?)". Do you just mean the top 3 performing simulations when evaluating their score against the data? Please clarify

L508: "necessarely" -> necessarily

L523-524: Whereas I think I understand this sentence after reading it 3 times, it could be rewritten for better readability

L526: It might be worth saying "larger spread" or something similar instead since, as far as I understand, you are not showing their variance, nor testing whether it is statistically significant. Whereas I do not personally think this is a problem, I can see some readers getting stuck in this sentence because they expected something different to be shown/discussed

L538: either "on a magnetic and a seismic inference" or "on magnetic and seismic inferences" would read better

L544: I would start the sentence with "Particularly" to avoid repetition (two instances of "especially" are four words apart), and change "are" for "is", unless "overlap" was meant to be plural

L589: I believe an "and" is missing before "open"

L677: This sentence feels odd, as it implies that this is not the norm. It could be rephrased as "Cosmogenic exposure ages taken from PD ice free regions scattered across Antarctica (can) constrain past ice thickness"

L820: "across West Antarctica", without "the"

L839: "data constraints", no need for hyphenation

L869: I'd emphasise that you are still talking about the "continental shelf" here, even if it is not strictly necessary

Table 1: Is it correct that the first two EOFs are used for temperature, but only the first for precipitation?

Figure 2: please explain in the caption to what the lighter blue shading refers

Figure 3: should it be "full ensemble statistics" or "full ensemble spread" in the caption?

Figures 4 and 6: There is no explanation why some sites have their ID in grey or black. Please add it to their caption.

Figure S9: Is there any particular reason why the HVSS markers are grey in the plot, but black in the legend?