

Response to Referee #1 comments on:

EGUSPHERE-2024-2593 Review Article: Antarctica's internal architecture: Towards a radiostratigraphically-informed age-depth model of the Antarctic ice sheets

14 February 2025

The paper has a clear structure, as it includes an introduction, a detailed review of relevant datasets, a discussion of methodologies, and a forward-looking conclusions. Each section logically follows from the previous one. Motivations are well stated, even though I would expect a dedicated sub-section named "motivation" inside the introduction. The abstract is concise, but it could be more engaging to summarize key findings and implications, as well as invite the readers to continue the reading. The clarity of the manuscript is adequate, however, in larger sections the readability is a bit lacking. The main point is in section 3: I suggest shortening the description of each subsection and consider summarizing with a table encompassing e.g. data provider, system name/type, key regions surveyed and/or coverage and relevant notes regarding each dataset or a table to collect the dataset grouped by key regions areas. This would allow readers to quickly grasp key distinctions between datasets.

The advice given here regarding the presentation of the abstract and Section 3 is consistent with suggestions also made by Referee #2, and we take the point that the presentation in both cases can be made more engaging and efficient. We will revise both these sections accordingly.

Regarding section 4, I assume it is related to figure 4. I suggest adding the reference to figure subsection at the beginning of each text subsection, e.g. 4.1 Pulse compression, filtering, and image focussing for optimising IRH tracing – fig.4b. So, in sections like the introduction and dataset descriptions, sentence structures are sometimes complex. I advise shortening some sentences to enhance readability.

Line 483 had indeed clarified upfront in Section 4 that the section is supported by Figure 4. However, we had not added further references to sections of Figure 4 at the outset of each text subsection, and agree this is a helpful addition.

Considering the scientific quality, the purpose of the work is clearly articulated, reflected in an adequate methodology, and its achievement compellingly underpinned by the evidence presented with the methods and techniques valid and suitable. In addition, the paper encompasses a robust range of references, except for some minor exceptions described below, the bibliography is sufficient and good.

We appreciate this overall assessment. Thank you.

Technical comments:

Figure2a: maybe consider adding an arrow to highlight the bedrock reflection

We will add this.

Figure4c: typo "differentiation"

We will correct this.

Figure7: it is hard to distinguish light green and yellow colors in panel b and c

We will amend this.

Figure8: I really like this figure, but may I suggest removing arrows and place the letters close to the area where they are referring to? e.g. put a small (f) close to “layer folding”

Within the team of authors opinion is split between this suggestion and retaining the arrows; we will consider the suggestion.

Figure9: Even though I appreciate 3D views, this one is difficult to read. I suggest rethinking this figure in 2D, using colours for the third dimension.

We agree that 3D depictions as attempted here can be confusing. We will try to improve this visualisation to make it more accessible or alternatively will switch to a 2D representation.

L195: typo “form”

We will correct this.

L.232-243: just to stay coherent with the writing style, you could add some references here, as it seems the only paragraph without references.

Section 3 will be reworked and shortened in line with advice above and also from Referee #2. Should a form of this paragraph remain, we take the point, although the intention with all paragraphs from Lines 207 to 243 was simply to set the context that we will proceed through presenting airborne and ground-based RES surveys in the section. We only referred to Drewry/Frémand et al. in Section 3 Paragraph 1 to direct readers to broad overviews of Antarctic RES history and Medley et al. (2014) in Section 3 Paragraph 2 to direct readers to a single example of shallow RES data (that we do not revisit in the paper). We consider that the paper gives adequate reference to multiple papers on airborne and ground-based RES data throughout the rest of Section 3.

L.244-264: I suggest shortening this subsection, sticking only to the difference between analogue-digital and coherent-incoherent.

This section will be revised in line with both referees' suggestions.

L.413: delete as it is a repetition of the line above

This will be deleted if the subsection remains as part of the overall revision of Section 3.

L.457-470: how about to replace the lines with a dotted list of the other institutions? Or another table just for them?

This section will be revised in line with both referees' suggestions.

L.488: I think this explanation could be placed in paragraph L244-264.

Referee #2 has also made a similar point, and in response we propose to rework the previous Section 4.1 into a revised and shortened Section 3.

L.580: I understand that focusing on processing details is not the focus, but when you talk about migration, it is straightforward to ask about velocity estimation, I think that a few lines should be added.

This refers to Line 508. We take the point and will add some extra lines here.

L.588-563: you speak about two approaches, but approach (a) has just one reference, could you provide more references? Otherwise, I would not define it as a “main approach”, just a different one from the commonly used.

This refers to Lines 558-563. We will remove “main” from Line 558.

L1043: can you say that this is also a priority list?

It is not necessarily a priority list so we prefer to leave this unchanged.

Final comment: I recommend this manuscript to be published after some minor technical corrections, which are related to editing and enhancing readability, since the scientific quality of this work is clearly evident.

We are grateful to the referee for their time spent reading the manuscript and formulating this considered advice.