

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on **essd-2022-49**

Anonymous Referee #1

Referee comment on "British Antarctic Survey's aerogeophysical data: releasing 25 years of airborne gravity, magnetic, and radar datasets over Antarctica" by Alice C. Frémand et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-49-RC1>, 2022

General comments

This article summarises the main findings of 28 years of aerogeophysical data surveys over Antarctica. It also describes the data acquisition and instrumentation for each of the 24 airborne geophysical surveys, and the data processing applied to the 64 datasets accompanying this article. The authors of the paper also outline the format of the data and the publishing strategy they adopted following the FAIR data principles. They also present a new data portal to download the aerogeophysical data and interactive open access tutorials for displaying and checking the quality of the data. In addition, the authors also discuss the potential for extracting englacial stratigraphy from radar data, and the potential re-use of the BAS aerogeophysical data.

The dataset provided in this compilation is a valuable contribution to the Antarctic scientific community and should prove an extremely useful resource for further exploring the Antarctic Ice Sheet and the underlying geology, for example mapping the internal stratigraphy of the Antarctic Ice sheet (e.g., AntArchitecture). The dataset provided is freely available in a friendly, and easy to use interface aiming to reach a wider community of specialists and non-specialists.

Thanks to the authors for their hard work and all the great job they have done in compiling and publishing the aerogeophysical data from BAS surveys. These data are very valuable to any ice sheet/shelf modeller, and therefore should be published.

There are a few minor comments and suggestions that might help improve the manuscript and the accompanying user guide, such as: citing references in chronological order, shortening long sentences, and being consistent with the proper use of "reflectors" and "reflections".

In addition, I suggest double check the tutorial provided in Matlab and Python as some minor errors were found in Matlab.

Specific comments

■ Introduction

L73: I think it should be "subglacial geology" or "geology underlying the ice", not both

L75-76: References in chronological order. Please cite references in chronological order throughout the manuscript as well

L84-88: Personally, I think 47 words is a bit too long. Please consider shortening the length of this sentence and other sentences throughout the manuscript (more than 50 words in some sentences). Longer sentences make it harder to follow the main idea

L95: I think it should read "... (hereafter abbreviated to WAIS and EAIS, respectively) ..." include a comma after EAIS

L116-117: maybe it would read better "(...) data have been relatively inaccessible to the wider scientific communities (...)"

■ Background

L142: I'm not sure if the "Figures 2-3 demonstrate (...)" the data have been used progressively; I think the figures show products derived from the aerogeophysical surveys instead

L268: Weddell Sea Rift "System" (include System)

L270: I think the sentence "(...) a new digital elevation model of the bed underlying the ice streams of the (...)" would read better as "(...) a new digital elevation model of the subglacial topography around the (...)"

L277: Delete "(...), the product of (...)"

L284-289: It is a bit hard to follow this sentence. Please consider shortening or improving punctuation

L293: please consider enumerating the examples after "...such as", I think it would help the reader to follow the examples

L326: it reads "(...) and ed picks respectively." I think a comma is missing "(...) and ed picks, respectively."

■ Data acquisition and processing

L347: In this case, maybe the word "Usually" is more suitable than the word "Generally"

L377-378: "When in standard swath mode, all 378 antennae are configured in H orientation with the starboard and belly antennae also in H orientation" is there any reference you could cite maybe?

L381-383: reference?

L436: I think adding commas to the sentence "...ADC cards rather than a digitising scope allowed phase..." so it would read as "...ADC cards, rather than a digitising scope, allowed phase..."

L440-447: It would be useful if you could provide a reference for PASIN1 and PASIN2

L457: in the sentence "...mixed antenna gain path for areas where ice is heavily disrupted where the starboard signal can be..." is the second "where" the word you wanted to use? Maybe the word "and" is more suitable (?)

L459: please consider enumerating the "minor modifications", so the sentence would read "...reduce noise and improve system operations, including: (1) low-pass filters in the RF switches, (2)..."

L467-471: are there any references you could cite?

L523: is there any key reference for the definition?

L532: I think it reads better as "Additional processing may include the use of masks..."

L568-569: Maybe change "see Table 3" to "see hyperlinks provided in Table 3"
L579: the PASIN system was(?) designed to retain...
L584: I think it reads better "The second step included..." instead of "Following on from this first step,..."
L589: Maybe including a semicolon and a comma, make the sentence easier to follow (?) "...a moving-average window filter used; however, no Synthetic..."
L596: include a comma after "however"
L603: I think is easy to follow as "over West Antarctica. Figure 6a shows..."
L607-608: Maybe use ". In contrast" instead of "however" (?)
L622: delete "Note that"
L625: is there a missing word after "...such as..."?
L626: maybe "Additional techniques, to prevent misinterpretation of the ice thickness, have also..." reads better (?)
L627: delete "and thus may affect ice thickness estimates". Also, consider adding "it has been" after "..., as..." so it reads ", as it has been previously..."
L631-632: Is "reflector" the word you want to use, or maybe "reflection"? Also, please consider deleting "...on from the processing the..." and "the last step was to "pick" the", so it reads "Following radar data processing, bed and ice surface reflections were picked"
L632: delete "It is worth stating that"
L638: delete ". This was"
L639: "reflector" or "reflection"?
L641: "reflector" or "reflection"?
L643-650: please consider rephrasing this paragraph
L661-664: Please consider rephrasing this paragraph, it's hard to follow
L666: "reflector" or "reflection"?
FAIR data publishing
L788: the link does not work when clicking from the document
L799: maybe "aim" is more suitable than "end goal"

■

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Discussion

L852-853: add "lateral" to "... (laterally) continuous...". How a well-preserved and lateral continuous englacial layer suggests changes in past ice-flow conditions?
L857: include "lateral" to "...quantifying the (lateral) continuity of englacial..."
L858: include "it" to "...conditions, and (it) can also be used..."
L860: include "new" to "... (new) acquisition strategies."
L861: include "lateral" to "...for mapping the (lateral) continuity..."
L867: include "lateral" to "...in assessing layer (lateral) continuity."
L870: include "lateral" to "...indicate high (lateral) continuity."
L887-888: maybe you could be a little more specific about "surface noise"
L889: Consider including some references about the echo-free zone (?). For example: Drews et al., 2009 (doi: 10.5194/tc-3-195-2009) or Drewry and Meldrum, 1978 (doi: 10.1017/S0032247400018271).
L895: Which version of BedMachine (Antarctica?) did you use?

L907: Add "lateral" before "continuity"
L925: I think the region is called Ellsworth Subglacial Highlands (not "Mountains")
L942: Please cite references in chronological order
L943-946: Please consider rephrasing this sentence, it is hard to follow as it is.
L953: "...these data..." instead of "...this data"
L957: Change "...this data..." to "...these data..."
L958: Delete "such"
L1010: Delete "Lastly, and"
L1016: Consider change from "Combined, these will likely..." to "These data combined..."

■

Conclusion

L1035: Change the word "can" to "could"
L1039: Add the word "and" before "thus"

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Figures and tables

Figure 1: I think it would be better to use the International System of Units and derived units for the scale bar, i.e. m or km. It would also keep consistency with other figures on the manuscript (e.g., distance axis). I would also suggest removing the blue background of the figure (and keeping consistency with other figures in the manuscript), and to consider including a graphic legend next to the figure.

Figure 3: to keep consistency with other figures of Antarctica in the text, I would suggest removing the blue background to the Antarctic image. Perhaps, it would be useful to include a vertical scale in the echograms.

Figure 4: It is hard to read what is written inside each box. Could you please increase the font size?

Figure 6: Please consider labelling all the panels (outside the echogram) and refer to the labels instead of "the top panels. Also, consider including the time in one of the y-axis to keep consistency (i.e., Figure 7).

Figure 8. Please label the polygons. Also, consider having two separate figures showing the ice surface velocity and the ILCI. I think it would also be useful to include an ice

thickness map in this figure.

Figure 9: there are no labels for the rectangles in Figure 8. I can't really distinguish the ice surface velocity below the ILCI.

Table 2: great table, very useful. Are there any key references for each radar system you could cite maybe?

Table 3: The hyperlinks (<http://data.bas.ac.uk...>) as they are written at the moment are broken.

Technical comments

Please check the Matlab code for reading the radar netcdf file

It reads

```
xlabel('Fast Time Sample Number', fontSize = 10) % set axis title
```

```
ylabel('Amplitude (dB)', fontSize = 10) % set axis title
```

it should read

```
xlabel('Fast Time Sample Number', 'FontSize', 10) % set axis title
```

```
ylabel('Amplitude (dB)', 'FontSize', 10) % set axis title
```

Please check the Python codes are ok.

Regarding the new platform for downloading data. The only potential complication I can think about at this point is the interface to select and download the data. Is not super easy to download a segment of interest. I had to navigate through several segments before I could actually select the segment I was intending to download. Some additional difficulties happened when more than one dataset was activated in the visualisation of the data. For example, there is a pop-up window that does not show what is selected with the cursor, it shows random segments of the dataset. Additionally, I think it would be useful if you could include an option to download a complete line by selecting the segments manually and then clicking a "download" button maybe (?)– if there is already an option like this I missed it, in which case it would be great to make it a bit more evident. It would save some time for the users.