We thank the anonymous reviewer for their thorough and helpful review of the manuscript. Their comments have provided valuable input to improve the manuscript, the processing chain and the data product. We have made significant changes to the manuscript, processing chain and data product, with detailed responses to the reviewer comments below. Reviewer comments are shown in black, our responses in blue. All line numbers in our responses refer to the revised manuscript.

Specific comments
Dataset: The currently published dataset contains too many separate folders - one geopackage for one data type of one glacier, this makes it difficult to visualize/use this dataset. The advantage of geopackage over shapefiles is that it can have multiple layers with each layer having a different data type. Please consider merging different layers of different glaciers in one geopackage.

- We changed the format of the dataset so that the complete dataset is available as a single geopackage, shapefile or NetCDF.

I see that frontal ablation plots for all the studied glaciers are presented in the supplementary file, will it be possible for the authors to provide these figures in the data product as well?

- We have uploaded the supplementary figures for each glacier to the repository.

Product Description: this section is not a description of the data product generated in this study, it is purely about the frontal ablation calculation methods, therefore it should be better placed in the Methods section. Here please give an overview of all the relevant information that we need to know about the dataset itself. What kind of data product you have produced? What is the spatial coverage and temporal resolution of this data product? What data files are included in the data product?

- We thank the reviewer for this point and have revised the section accordingly, now providing the salient product information.
- We moved the description of the frontal ablation calculation method to the methods section under the subsection “1. Background”.
- We added a paragraph to describe the available temporal coverage, available file formats of the dataset as well as the variables that the dataset contains [Lines 83-92].

Data Sources and Methods:

In the Data Sources section, many places mention “see Methods”, this is not helpful. Please label each subsection in Methods, so you can easily cross-reference different data sources and the corresponding processing steps.

- Thank you. We have introduced labelled subheadings in the Methods section to make it easier to refer to the relevant paragraph and amended the manuscript accordingly.

Please move Table S1 to the main text, this table is important for readers to know about the spatiotemporal resolution and quality of each input data source. Also in this table, note that temporal resolution is different from temporal coverage and please clarify accordingly. Please include the Khan (2017) data, which is an important data source for adjusting ice thickness according to the manuscript. The data type of ArcticDEM used in the study, and the time periods of both ArcticDEM and AeroDEM, should also be provided in this table.

- We have moved Table S1 to the main text (now Table 1), included the Khan (2017,2023) dataset, and clarified the temporal coverage / resolution.
- We included the temporal coverage of Arctic- and AeroDEM in Table 1. The exact timestamp for each DEM can be derived from the image itself, which is included in the processing chain repository.

Methodology needs to be restructured. First, please provide a flowchart to give an overview of all the major processing steps outlined in this section. This can help readers understand the general processing workflow. Second, there are many nice sketch figures presented in the method section, while they are helpful for readers to visualize each processing step, most of them can be easily merged into one single integrated figure, such as Figures 2/3/5/7. For Figure 5 and Figures 7B-E, I not even sure whether they are necessary in the main text as these details are trivial concepts that are easy to understand from the text description alone, perhaps it's better to put them in the supplementary material.

- Thank you for this helpful feedback. We have included a flowchart of the processing chain (Figure 2)
- We combined Figures 2 and 3 into a single figure (now Figure 3), moved Figure 7 to the supplementary (now Figure S2), and removed Figure 5 from the manuscript.

Khan (2017) dataset: in line 128 it says the time period of Khan dataset is 1995-2015. However, from the data link you provided in the manuscript (https://dataverse.geus.dk/dataset.xhtml?persistentId=doi:10.22008/FK2/GQJJEA), the Khan data covers the period from 2011 to 2020, which is correct? The more urgent issue is why not use the latest Khan (2023) dhdt dataset? Won't this latest dhdt improve the ice thickness calculation in this study? Again, there is no introduction of Khan dhdt dataset in the Data Sources section. Why did you choose to use Khan dhdt instead of other dhdt products? What is the advantage of this data product and how it was generated? Please also cite the associated publication for the Khan dataset.

- We now refer only to the Khan (2023) dataset in the manuscript, which contains 2 datasets: one covering 1995-2015, and one covering 2011-2020. We have merged these two datasets into a single dataset covering 1995-2020. This is now clarified in the text.
- We note that part of the confusion here was due to data migration to the GEUS server and the extension of the product: Khan (2017) only had 1995-2015, but the new version adds a dataset covering 2011-2020.

In Figure 6, if Khan dhdt is already available for the date of the terminus change, doesn't this mean that TOD has already been included in the K-SCR time range? Why there is still an additional step of checking whether TOD is in K-SCR time range?

- We amended and simplified the figure to make the processing steps easier to follow (now Figure 4).

ArcticDEM and AeroDEM: what type of ArcticDEM is used in the methods? Are they mosaics or strips? If using the strip and it covers the selected terminus trace, is it still necessary to adjust elevation based on dhdt?

- We use ArcticDEM strips, downloaded via GoogleEarthEngine from the University of Minnesota Polar Geospatial Center. We have added further information on this to the manuscript, including the spatial resolution and acquisition type to the description of the DEMs [Lines 118-121] and to Table 1.

- We calculate surface elevation for each individual terminus position i.e. timestep. Unless the acquisition date of the ArcticDEM coincides exactly with the date of the terminus position, we then adjust for surface elevation change using dhdt (when available).

Figure 9 gives an overview of the frontal ablation rates produced in this study. The choices of different number scales of the annual mean frontal ablation look a bit random, why not use integers here or a colorbar that can clearly show the value variations? Can you also compare the frontal ablation rates with the Mankoff ice discharge data statistically, ideally in a histogram? This can show the impact and necessity of including terminus changes in the frontal ablation calculation.

- We simplified the former Figure 9 (now Figure 6) to make the varying frontal ablation estimates between individual glaciers clearer.
- We have included a comparison plot between the frontal ablation estimates shown in this study and Kochtitzky et al (2023) in Figure 6 B, as well as a comparison figure of the ice discharge from Mankoff et al. (2020) and Kochtitzky et al. (2023) in Figure 6 C.
- We have added a chart of how ablation compares to discharge for each glacier in Figure S3.

Figure 10 and Line 380-383. Authors claimed that “agreement is reduced for the period 2010-2020”, this is not obvious from Figure 10, although Table S3 provides a comparison. I recommend calculating the difference in frontal ablation for each glacier between this study and Kochtitzky et al. (2023) dataset, then plotting these differences in a map similar to Figure 9, or in a histogram.

- Upon further detailed analysis the two periods appear to have comparable agreement and we have removed this statement from the main text.

Line 398-400, it briefly touched on the issue of ice discharge but only gave one example. Can you compare the discharge data used in Kochtitzky et al. (2023) and the Mankoff ice discharge data for all the studied glaciers? This should help clarify if the discrepancy in frontal ablation rates is from terminus change or ice discharge.

- Thank you for this suggestion. We have included a comparison of ice discharge between the two studies which hopefully clarifies this point (Figure 6 C).
- It remains difficult, though, to determine which discharge product is more accurate without further analysis, which would go beyond the scope of this paper.

Line 346: This sharp increase in frontal ablation (Figure 8A) started in 2005/2006, not 2004/2005. There is significant interannual variability in frontal ablation and given there is no errorbar provided in the plot, it is difficult to claim that this increase in frontal ablation is from changes in velocity and terminus, especially since there is also a sharp change in 2010/2011 according to Figure 8A.

- We appreciate this comment and have substantially revised this paragraph. We now focus on the increase in frontal ablation variability and how it coincides with changes in velocity and terminus position. We use this example to validate our approach, since Helheim glacier has been studied extensively and the 2005/6 retreat is well documented in the literature. We are now careful to avoid discussing causal relations.

Line 348-351: can you fit linear regression before and after 2004/2005 to see if there is actually an increase in frontal ablation before and after the velocity/terminus changes?

- We appreciate this suggestion – there is a small increase in linear slope but it's unlikely statistically significant, due to the high variability in the time series. As per the comment above, we are now no more suggesting an increase in frontal ablation but rather focus on the increase in frontal ablation variability.

In Figure 8 and Figures S2-S48, the temporal intervals in the x-axis are not regular – it contains both two-year and three-year intervals but they have the same width, is this a plotting error?

- We have amended this oversight and the intervals between dates are now consistently 5 years.

Technical comments
Abstract needs rewrite. For example, BedMachine has been mentioned twice and please be clear in Line 34 this is consecutive *calving front* observations.

- We have rewritten the abstract to avoid duplicate mentions of datasets and to make it clearer that this manuscript describes a data product rather than a software product.

Line 38-39: "any tidewater glacier". Is it only for the Greenland Ice Sheet? Or globally?

- We clarified that the processing chain can be adapted for all tidewater glaciers globally [Lines 38-40 and Lines 473-475].

1. Line 69-73: this paragraph reads like a separate statement and feels very sudden here. Since this is a dataset paper for a dataset journal, the focus be the data product itself instead of the methodology, please recheck the journal submission guideline.

   - We removed the paragraph and added a more extensive description of the data product [Lines 83-106].

2. Line 105-106: could you please provide a figure on the spatial coverage of the Bedmachine v4 bathymetry data sources in the supplementary file?

   - We appreciate this suggestion. The BedMachine v4 dataset is widely used in in the field, openly accessible, and linked in the data sources section. While we agree that this article should be largely self-contained, we'd argue that the ubiquity of the BedMachine v4 product alleviates the need for a figure.

3. Line 127: as mentioned in the major comments, please provide detailed information about the Khan dhdt dataset here.

   - Please see our response to the major comment above. We added further details on the Khan (2023) surface elevation change datasets to the paragraph [Lines 122-125 and Lines 312-317] and Table 1.

4. Line 142: "5 km upstream of the terminus" is this the most retreated terminus location?

   - The distance of the flux gate from the terminus was chosen by Mankoff et al. (2020). We manually measured the distance of each flux gate to the most retreated position to determine whether we need to adjust surface elevation as there might be a time lag between the gate and the terminus.

- The flux gates are, on average, 5 kilometres upstream from the most retreated terminus position.

5. Line 173: please be clear that the individual terminus positions are compared to each other to get area changes.

   - Thank you. We rephrased the sentence to [Lines 287-288]: "*A reference boundary needs to be defined so that area change can be calculated by comparing individual terminus positions to each other".*

6. Line 182 **Terminus Positions**: I suggest introducing terminus positions first before talking about fjord boundary, because in fjord boundary section there are lots of descriptions on how to change the terminus direction without knowing what terminus data were used.

   - We agree that the fjord geometry section does refer to the terminus position data at times. However, we would like to keep the section on fjord boundaries at its current location in the manuscript, as this is relevant for the subsequent section on processing terminus delineations.
   - We moved the section on defining the upstream boundary below the section on terminus positions (now section 2c)

7. Line 188-191: this sentence is difficult to understand, please rephrase. Can you give a number on the maximum level of uncertainty involved?

   - We rephrased the sentence to clarify the meaning. It now reads [Lines 205-209]: "*We found that using terminus positions spaced at closer than 1 month gives unreliable frontal ablation estimates (the error increases as the time interval decreases – see discussion of errors below). We also found that delineations that are only several days apart and created by different authors can differ significantly and thereby introduce large uncertainties (cf. Goliber et al., 2022).*"
   - Errors for delineations between different authors can be found in Goliber et al. (2022), Figure 12, so that we do not include these uncertainties here but rather refer to the original TermPicks study.

8. Line 191: what is the threshold for time difference?

   - We take the observation that is closest to the 1st of each month. We have aimed to clarify this in the text (Methods section 2b).

9. Line 212: where is this centerline from?

   - The centerlines are manually drawn but are available in the repository for reproducibility of the study. We've included a statement in the sentence, which now reads [Lines 238-241]: "*Ice flow velocities are successively extracted along a centerline, which has been drawn manually for each glacier (available in the repository), between the most retreated and most advanced terminus position for each glacier.* "

10. Line 217: change "mean value velocity" to mean velocity

    - Changed as suggested.

11. Line 229-232: please move this information to Line 103-110 when first mentioning how these 49 glaciers were selected.

- We have added a sentence to the product description to clarify that some glaciers were excluded [Lines 1041068].

12. Line 269: please be clear about “the SCR”, is this “AA-SCR”?

    - Changed to AA-SCR as suggested.

13. Line 357-359: please be more explicit about the importance of having this higher variability in frontal ablation. Or why does it matter to have this variability compared to ice discharge that doesn’t have it?

    - We included two sentences to discuss why having a higher variability is important [Lines 433-440].

14. Figure 2: please label the upper and lower fjord walls in the figure.

    - We labelled the fjord boundaries in what is now Figure 3 and have amended the text to use fjord boundaries 1 and 2 (rather than upper/lower).

15. Figure 3 and Line 204-205: Can you explain a bit about how these delineations can skew the mass changes? It is not clear from Figure 3 at all.

    - We added clarification on how shorter delineations could skew the mass change calculations to the sentence. The sentence now reads [Lines 231-233]:
      “[…] as extrapolation of these delineations to the fjord boundaries would create an arbitrary terminus geometry which could subsequently skew mass change calculations (Fig. 3D).”

16. Figure 8: In Line 351-355, the figure labels are all wrong here, and there is no Figure 8E, please carefully check the figure labels throughout the manuscript. It is hard to distinguish between TMC and F in Figure 8A given the current choices of linewidth and line color. In Figure 8C, which direction is terminus retreat or advance?

    - We thank the reviewer for spotting these issues and have changed the labels in the text to correspond with the panels in the figure.

We changed the colors and linewidths in the Figure 8 (now Figure 5) and all supplementary figures (S4-S54) to make them more distinguishable