We thank the reviewer for the thoughtful comments and suggestions for the manuscript. Below, we outline our changes for revision based on the comments. The reviewer comments are shown in **blue** and our responses are shown in **black** for clarity.

In this paper, Aman KC and colleagues describe the seasonal advance and retreat of 49 marine terminating glaciers around Greenland. The paper is well written, and the language and figures are polished to perfection. The technical approach employed here is strong and the methods are well described. I know from experience that the task of combining multiple terminus datasets is not an easy one, yet the authors have done an excellent job of making it seem easy, due to the well-reasoned logic they employ and clarity with which they describe it. Overall, the manuscript is of high quality and I believe it will be ready for publication if the results can be framed with a little more context.

The greatest room for improvement lies in the presentation of the current results in relation to previous studies that have conducted similar types of analysis. I would like to see clear and direct statements in the abstract and discussion/conclusion sections that offer insight into how the present results confirm, upends, or reshape our understanding of previous studies. Many previous studies have presented observations of terminus advance and retreat in Greenland, so what makes this one different? How do the current results change the narrative, what's different about this study, what's the big takeaway, and what guidance might the authors give to IMBIE, the IPCC, ice sheet modelers, or whomever might want to build on this work? Do these results support/strengthen our understanding of something that was already known, or introduce something new?

Although the discussion section includes a review of previous studies of physical processes that can cause seasonal advance and retreat, what's missing is a direct comparison of the present results to previous results. Several previous assessments of terminus variability are even cited in this paper, but they are constrained to the Introduction section as a means of providing motivation for the present study. I'd like to see the authors circle back at the end to place the new results in context of previous studies by Black, Joughin, Moon, Kochtitzky, Catania, Fried, Wood, Schild, Cassotto, Howat, Greene, etc. I don't mean to be too prescriptive here, so adjust that list according to taste. Direct quantitative comparisons to all those previous papers may be impossible due to differences in observation periods, but the authors have the intuition and expertise here to guide readers to find key similarities or difference between the present study and previous ones.

Thank you for pointing out that the big take-aways from our analysis are not necessarily clear as is. The main objective of our research is to demonstrate that dynamic mass loss rates on seasonal scales are strongly influenced by terminus position change even if direct mass loss from terminus retreat is small over decadal time scales. We did not include a discussion of the terminus position change record in the original submission because the focus of the study is on mass loss whereas the majority of the previous studies of terminus position focused on length or area, not mass, so an intercomparison is somewhat difficult. However, based on the reviewer's suggestion, we plan to include an additional figure that highlights seasonal terminus position changes at the study glaciers and the following text in the discussion on line 305:

…which in turn influence terminus stability. *“Different calving styles influence glacier mass balance in distinct ways, with some glaciers experiencing episodic large-scale calving events while others exhibit more gradual, continuous retreat (Cassotto et al., 2019; Catania et al., 2020). While previous analyses of terminus position at seasonal time scales have largely focused on the relationship between terminus change and glacier speed (King et al., 2020; Black et al., 2022, 2023; Moon et al., 2008), we focus on the direct influence of terminus position change on mass loss. Using terminus position data from a number of previous studies, supplemented by more recent manual delineations created following the approach recommended by Goliber et al. (2022), we highlight the contribution of seasonal terminus retreat to ice mass loss. For example, as illustrated in the Fig. R1 and R2 and, Fig. 10, these seasonal terminus position changes on the order of 2500 m to 1500 m are associated with approximately ~80-100 Gt of mass loss per year in the central west.”*

We will also include the following plots for each region in the supplement, that shows the seasonal retreat as a direct contributor to mass loss.

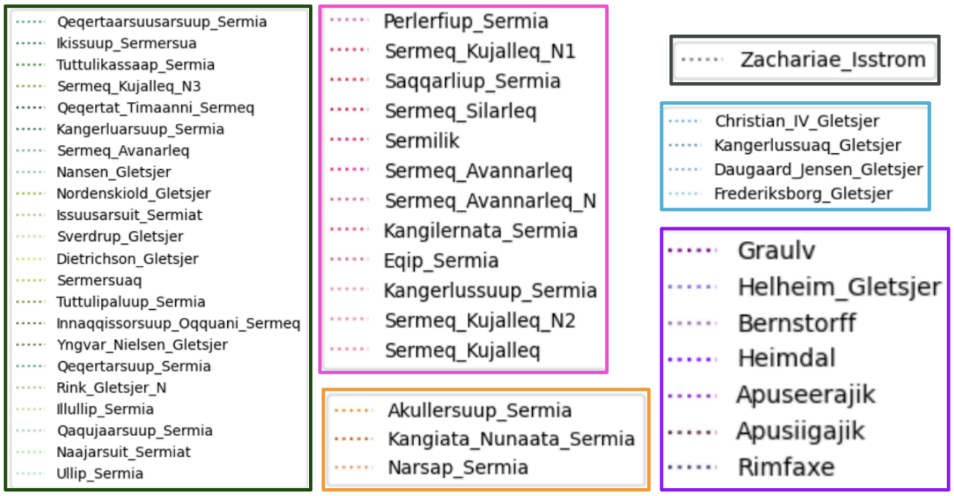
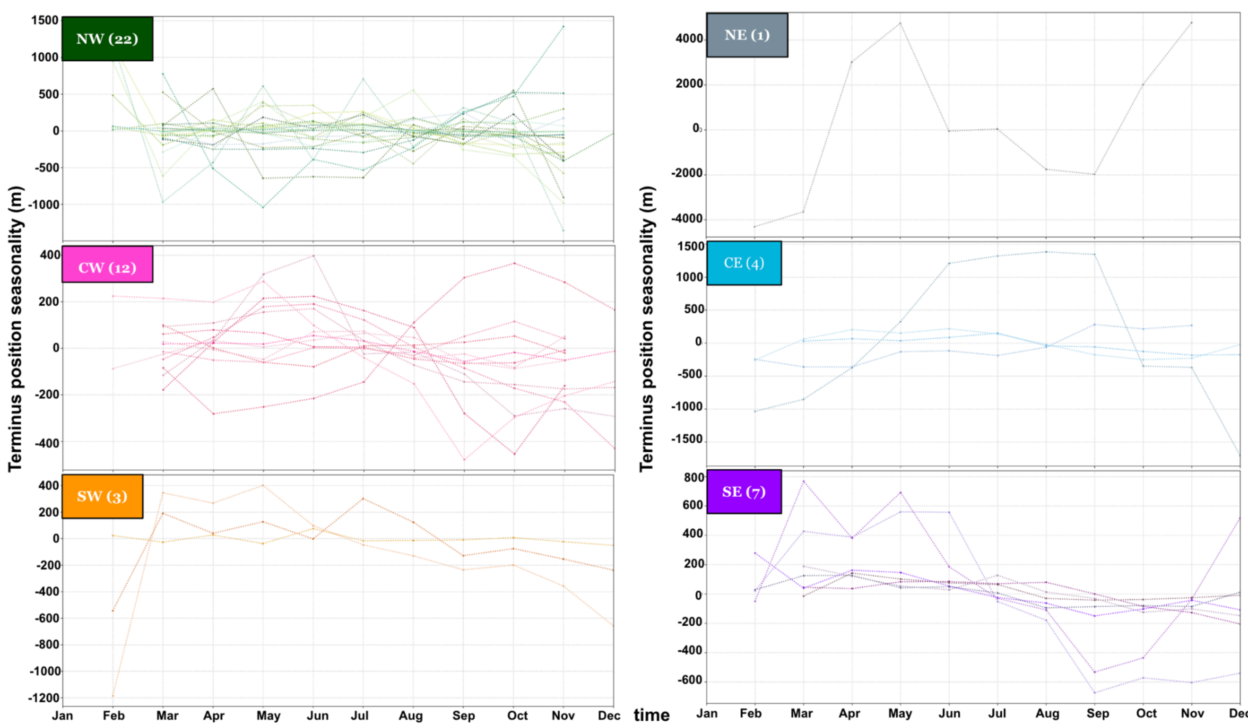


Fig R1: Terminus position time series for each region, with colors corresponding to the regions in Figure 1. Each line indicates an individual glacier corresponding to the names in the lower panel highlighted by the respective region. The numbers in parentheses indicate the number of study glaciers in the region.



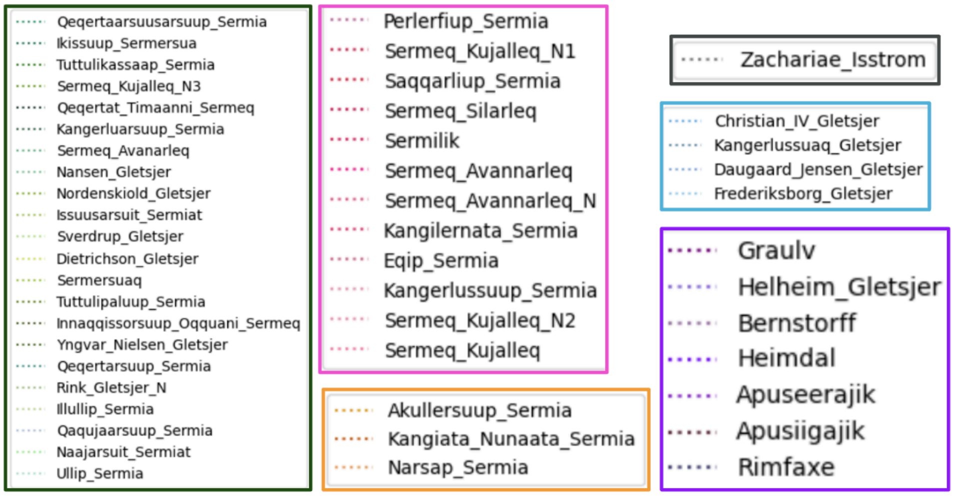


Fig R2: Seasonality of terminus position time series for each region, with colors corresponding to the regions in Figure 1. Each line indicates an individual glacier corresponding to the names in the lower panel highlighted by the respective region. The numbers in parentheses indicate the number of study glaciers in the region.

We will add the following text in the discussion on line 387, where we compare our glacier-specific terminus ablation estimates with the decadal-scale values reported by Kochtitzky et al. (2023) for glaciers included in both studies.
…in the northwest (Fig. 10). *"Greenland wide decadal terminus ablation analysis was performed by Kochtitzky et al. (2023). On comparing those estimates for the glaciers included in both studies, we found most of our estimates were in general agreement with the values reported in Kochtitzky et al. (2023). The differences could be a result of varying temporal resolution (monthly vs decadal), discharge data source (Mankoff et al. 2020 and Kochtitzky et al. 2023), and frequency of terminus delineations."*

References:

Black, T. E. and Joughin, I.: Multi-decadal retreat of marine-terminating outlet glaciers in northwest and central-west Greenland, Cryosphere, 16, 807–824, https://doi.org/10.5194/TC-16-807-2022, 2022.

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Cassotto, R., Fahnestock, M., Amundson, J. M., Truffer, M., Boettcher, M. S., De La Peña, S., & Howat, I. (2019). Non-linear glacier response to calving events, Jakobshavn Isbræ, Greenland. Journal of Glaciology, 65(249), 39–54. doi:10.1017/jog.2018.90

King, M. D., Howat, I. M., Candela, S. G., Noh, M. J., Jeong, S., Noël, B. P., van den Broeke, M. R., Wouters, B., and Negrete, A.: Dynamic ice loss from the Greenland Ice Sheet driven by sustained glacier retreat, Communications Earth & Environment 2020 1:1, 1, 1–7, https://doi.org/10.1038/s43247-020-0001-2, 2020

Kochtitzky, W., Copland, L., King, M., Hugonnet, R., Jiskoot, H., Morlighem, M., Millan, R., Khan, S. A., and Noël, B.: Closing Greenland's Mass Balance: Frontal Ablation of Every Greenlandic Glacier From 2000 to 2020, Geophysical Research Letters, 50, e2023GL104 095, https://doi.org/10.1029/2023GL104095, 2023

Mankoff, K. D., Fettweis, X., Langen, P. L., Stendel, M., Kjeldsen, K. K., Karlsson, N. B., Noël, B., Van Den Broeke, M. R., Solgaard, A., Colgan, W., Box, J. E., Simonsen, S. B., King, M. D., Ahlstrøm, A. P., Andersen, S. B., and Fausto, R. S.: Greenland ice sheet mass balance from 1840 through next week, Earth System Science Data, 13, 5001–5025, https://doi.org/10.5194/ESSD-13-5001-2021, 2021.

Moon, T. and Joughin, I.: Changes in ice front position on Greenland's outlet glaciers from 1992 to 2007, Journal of Geophysical Research: Earth Surface, 113, 2022, https://doi.org/10.1029/2007JF000927, 2008

Note: The data and code availability statements in this paper point to links that do not currently exist. Accordingly, this review does not apply to the data or code, and I'm taking it on blind faith that the data is of adequate quality and will be made available as promised.

The correct links have been updated.

Minor comments:
Line 11 Regarding this sentence in the abstract:
"for the northwest and central west sectors, where the fraction of outlet glaciers included in our estimates is greatest, the average difference between the annual maximum and minimum in terminus ablation are ~51Gt/yr and ~25Gt/yr, respectively, compared to only ~5Gt/yr for discharge."

That's really hard to parse, especially for someone who has not yet read the paper. I recommend rewording to reduce the number of comma-bound clauses, because they tend to break the flow and force the reader to mentally keep track of too many little concepts and their relationships to each other.

The sentence also requires the reader to have a prior understanding of what is meant by the somewhat ambiguous phrase "annual maximum and minimum terminus ablation", which I can try to guess the meaning of, but not confidently enough to understand the significance of its quantified rates of 51 Gt/yr vs 25 Gt/yr.

Thank you for the helpful feedback. We will reword the sentence for clarity as:
"At regional scales, seasonal variations in terminus ablation are much larger than those in discharge. We focus our intercomparison of discharge and terminus ablation on the northwest and central west sectors, where the highest fraction of outlet glaciers is included in our terminus ablation dataset. For these sectors, terminus ablation varies by approximately 51 Gt/yr and 25 Gt/yr, respectively, over each year. In contrast, the corresponding variation in discharge is only ~5 Gt/yr."

Line 115 and elsewhere I think AERODEM should be written in all caps?
https://www.nodc.noaa.gov/archive/arc0088/0145405/1.1/data/0-data/G150AERODEM/

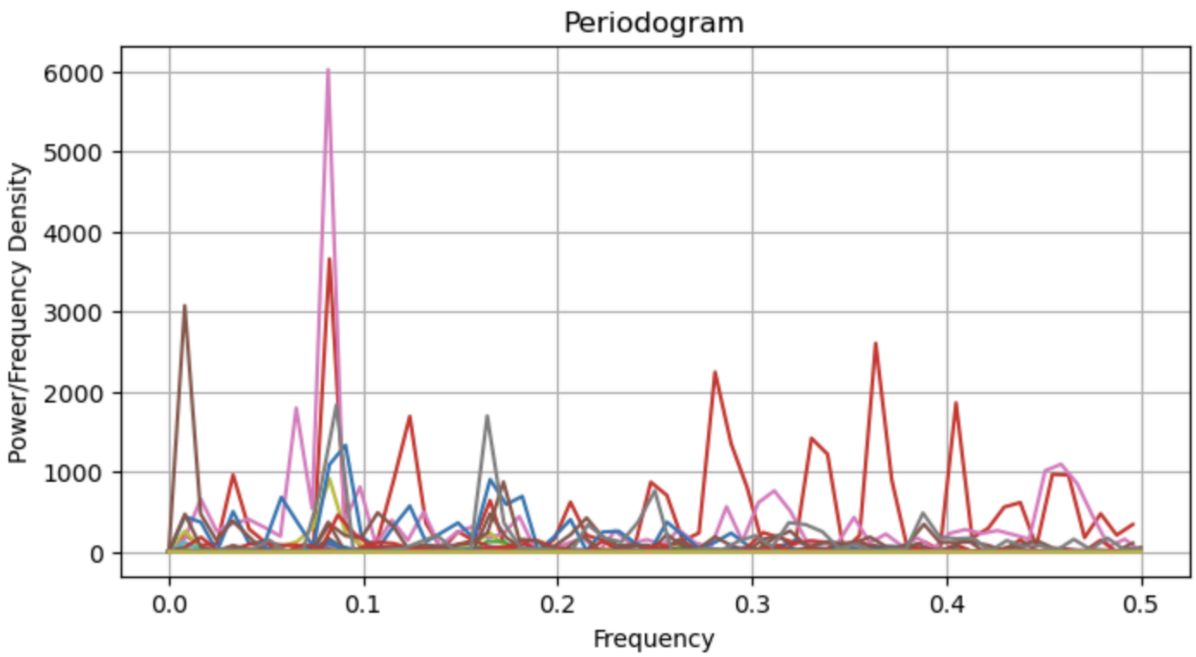
Thank you for the suggestion. We have changed "AeroDEM" to "AERODEM".

Figure 4 is very nice. I appreciate how the simplicity of the diagram focuses attention on the issues that can cause anomalous terminus position picks, so the figure will be useful to anyone who has not encountered these issues firsthand.

We are glad that you found the simplicity of Figure 4 effective in highlighting the key issues.

Line 157-168 The equations in Sec 2.2.1 are relatively innocuous, but I think they're relatively standard mathematical formulations, right? If there's something nonstandard going on here, be sure to mention it explicitly, otherwise I think it would be sufficient to say you plot the power spectral density of the terminus ablation time series and remove the equations. Rather than reading equations, in this section I would like to see PSD plot(s) that illustrate seasonal vs erratic glaciers because a major conclusion of the paper depends entirely on how the PSD is interpreted. Showing those PSD plots will help readers gain an intuition for how the results are obtained and how sensitive the overall findings might be to subjective differences in interpretation.

We agree that the equations presented are standard mathematical formulations for calculating the power spectral density of the terminus ablation time series and we will remove them. Regarding your suggestion to include PSD plots, we initially explored this approach. However, the periodogram values exhibit considerable variability across different glaciers, making it challenging to present a clear visual distinction between seasonal and erratic behaviors through plots alone (shown below).



This variability can obscure meaningful patterns and increase the likelihood of subjective interpretation. Given these challenges, we chose to present the classification in tabular form, as it more concisely and objectively conveys the primary results without relying on interpretative nuances from the PSD plots.

We will include the following table in the supplement after formatting it to meet the journal's requirements:

	glacier	region	frequency	lat	lon	seasonality	long-term interannuual
0	Sermeq_Avannarleq	CW	12.100000	70.0853	-50.2468	C	N
1	Innaqqissorsuup_Oqquani_Sermeq	NW	4.518519	76.3833	-62.7665	E	N
2	Sermeq_Avanarleq	NW	12.100000	73.9410	-55.7679	C	N
3	Helheim_Gletsjer	SE	12.100000	66.3735	-38.3067	C	N
4	Tuttulipaluup_Sermia	NW	12.100000	77.7000	-66.2330	C	N
5	Kangerlussuup_Sermia	CW	12.100000	71.4588	-51.3101	C	N
6	Kangerlussuaq_Gletsjer	CE	12.200000	68.6746	-33.0760	C	N
7	Qaqujaarsuup_Sermia	NW	5.761905	77.5167	-65.6664	C	N
8	Apuseerajik	SE	12.100000	66.3820	-37.5439	C	N
9	Nordenskiold_Gletsjer	NW	60.500000	75.8248	-59.0399	C	Y
10	Zachariae_Isstrom	NE	11.000000	78.9333	-21.0000	C	N
11	Sermeq_Kujalleq_N1	CW	12.200000	69.9960	-50.1596	C	N
12	Sermeq_Silarleq	CW	12.200000	70.8268	-50.7627	C	N
13	Sermersuaq	NW	3.270270	79.4462	-63.3957	E	N
14	Tuttulikassaap_Sermia	NW	12.100000	74.9618	-57.0355	C	N
15	Nansen_Gletsjer	NW	6.050000	75.7759	-58.8283	E	Y
16	Sermeq_Kujalleq_N3	NW	12.100000	73.8317	-55.5825	C	N
17	Sermilik	CW	12.100000	70.6333	-50.6167	C	N
18	Ikissuup_Sermersua	NW	12.777778	74.2307	-55.8275	C	N
19	Christian_IV_Gletsjer	CE	12.200000	68.7000	-30.6167	C	N
20	Qeqertaarsuusarsuup_Sermia	NW	12.200000	77.6564	-65.9679	C	N
21	Sermeq_Avannarleq_N	CW	4.461538	70.5454	-50.4896	E	N
22	Kangilernata_Sermia	CW	12.100000	69.9009	-50.3420	C	N
23	Qeqertarsuup_Sermia	NW	6.052632	73.5932	-55.5306	C	N
24	Rimfaxe	SE	12.200000	63.3050	-42.3669	C	N
25	Kangerluarsuup_Sermia	NW	12.600000	77.6934	-68.5829	C	N
26	Narsap_Sermia	SW	12.100000	64.6672	-49.8576	C	N
27	Perlerfiup_Sermia	CW	12.888889	70.9909	-50.9227	C	N
28	Bernstorff	SE	12.100000	63.8846	-41.7654	C	N
29	Saqqarliup_Sermia	CW	11.000000	68.8667	-50.2833	C	N

30	Akullersuup_Sermia	SW	12.200000	64.3833	-49.4779	C	N
31	Apusiigajik	SE	12.200000	63.2926	-41.9168	C	N
32	Qeqertat_Timaanni_Sermeq	NW	8.642857	76.3000	-61.7666	E	N
33	Yngvar_Nielsen_Gletsjer	NW	11.000000	76.3334	-64.0831	C	N
34	Ullip_Sermia	NW	12.200000	76.5797	-67.6260	C	N
35	Sermeq_Kujalleq	CW	5.809524	69.1833	-49.8000	E	Y
36	Naajarsuit_Sermiat	NW	12.100000	73.2500	-55.0833	C	N
37	Heimdal	SE	12.200000	62.9052	-42.6851	C	N
38	Graulv	SE	12.100000	64.3500	-41.5667	C	N
39	Frederiksborg_Gletsjer	CE	11.600000	68.4557	-31.6620	C	N
40	Illullip_Sermia	NW	12.100000	74.4167	-55.9666	C	N
41	Rink_Gletsjer_N	NW	5.761905	76.2167	-60.9999	C	N
42	Issuusarsuit_Sermiat	NW	12.200000	76.0667	-60.6333	C	Y
43	Daugaard_Jensen_Gletsjer	CE	11.500000	71.7500	-29.0000	C	N
44	Sermeq_Kujalleq_N2	CW	2.520833	70.4054	-50.5364	E	N
45	Dietrichson_Gletsjer	NW	12.300000	75.4582	-58.0637	C	N
46	Kangiata_Nunaata_Sermia	SW	4.066667	64.2966	-49.6102	E	N
47	Sverdrup_Gletsjer	NW	11.600000	75.6195	-57.9704	C	N
48	Eqip_Sermia	CW	12.200000	69.8080	-50.1851	C	N

Figures 5-7 I think I'm missing something here, because panel c is presented at monthly resolution, whereas the observations in panel b are presented in irregular intervals. I would expect the overall Mass time series to be the integral of the Ice Flux time series, but that's not what these panels look like. Please explain how they're related to each other.

In Figures 5-7, the relationship between panels b and c lies in how terminus mass change and ice flux are derived and processed.
Panel c presents ice flux components in a standardized monthly time series. Because these mass fluxes are from different datasets with varying temporal resolutions, they are either linearly interpolated or weighted to ensure comparability at a monthly scale.

Panel b represents near-terminus mass changes, which are based on observed terminus position data and are often irregular in time. This panel highlights the uncertainty in total mass estimates, which are primarily from terminus position records. The terminus polygons used for mass estimation are constructed using each available terminus trace, a fixed upstream boundary, and fjord outlines on both sides. Since the other three boundaries remain constant, changes in polygon mass serve as a proxy for terminus position change. By comparing these panels, we can visually assess how changes at the terminus influence both discharge and terminus ablation.

For example, we can see a multi-year variability in terminus ablation and discharge for Ullip Sermia (Fig. 7). While the terminus ablation almost matched ice discharge (Fig. 7b), the terminus slightly advanced during 2013–2017 (~1.1 km), indicated by the increase in terminus mass (Fig. 7c).