#Reviewer 2

Summary

The study examines the influence of seasonal terminus change on glacier velocity changes at four marine-terminating glaciers in Central West Greenland using a novel 1D model. The results show that the glacier velocities are driven by a multitude of drivers with some being dominated by terminus change, and others being dominated by wintertime acceleration. The terminus-driven model introduced in the study provides a new and relatively simple way to investigate the influence of terminus change on near-terminus glacier velocities, which can be applied to most marine-terminating glaciers in Greenland. I commence the authors on a well-conceived and executed study. The manuscript is well written and presented, so I have few minor comments which are outlined below.

We thank the reviewer for the thoughtful and encouraging summary of our work. We appreciate the positive assessment of our study's conception, execution, and presentation, as well as the constructive minor comments. We have carefully addressed each of the detailed comments as indicated above, and we believe the revised manuscript has been strengthened as a result.

Detailed comments:

Line 78: Reference is in all caps – needs reformatting

Revised as suggested. Thank you.

Figure 1 caption: You say the terminus positions are coloured by data, but they are coloured by day of year. Consider rephrasing

Revised as suggested.

Line 92 – 94: I was wondering why you chose to use ITS_LIVE velocities given that earlier you say you selected the specific study period as Sentinel-1 data became available with a higher resolution. Would it then not make more sense to use PROMICE v5 data which solely relies on Sentinel-1 data and has a consistent 11-day temporal resolution from 2016 to 2025?

Thank you for the comment. We selected ITS_LIVE because it integrates Sentinel-1, Sentinel-2, and Landsat-8, offering higher effective temporal resolution than PROMICE v5's 11-day product. Moreover, our terminus positions derive from AutoTerm, which also uses the same multi-sensor suite; thus ITS_LIVE ensures better consistency between the velocity and terminus datasets.

Line 111 – 113: There are some standard methods to quantify terminus change (e.g. curvilinear box method) and I was wondering why you chose to not use them. Consider adding a sentence or two on how your method differs from those.

Thank you for the suggestion. Our area-based metrics account for both terminus shape and fjord geometry, and unlike the curvilinear box method, they do not require a predefined box to represent the fjord geometry. We have added this information in the main text.

Line 117 – 118: While it is a nice addition to use the novel DG-IS2_DEM, I am wondering why you don't include any elevation change prior to 2018. I am aware that this would mean using ArcticDEM prior to 2018, but it seems odd to only have elevation data for half of the study period.

The DG-IS2_DEM product is based on ICESat-2 data, which became available only after the satellite's launch in 2018. Our primary objective in incorporating this dataset was to examine seasonal elevation changes, and although it does not span the entire study period, it covers two full seasonal cycles, providing meaningful insight into seasonal variability.

Line 189: Why do you not include uncertainties from elevation data? Consider adding a sentence here to explain why.

The elevations uncertainties are not directly included as our model assumes invariant geometry. However, we analytically examine the impact of seasonal variations in surface elevation on velocity simulations, offering a complementary sensitivity test for elevation-related effects. We have revised the related sentences as: "*The elevation uncertainties are not directly included, as our model assumes invariant geometry (following Joughin et al. (2012)). Although the terminus-driven model assumes invariant geometry, we analytically examine the impact of seasonal variations in surface elevation on velocity simulations, offering a complementary sensitivity test for elevation-related effects.*"

Line 236: behaivor -> behaviour.

Revised as suggested.

Figure 2 caption: with light yellow shading shows uncertainty – change "shows" to "showing". Also, you state that the grey bars show when runoff is great 2m/yr – should runoff not be in cubic meters?

We have changed "shows" to "showing". The runoff represents per-unit-area values, so the unit is m/yr. We have added a brief clarification in the caption to avoid confusion.

Line 249: indicate -> indicates

Revised as suggested.

Figure 4 panel b: Total elevation change should be a black line to conform with previous figures.

Revised as suggested.

Line 274: increase -> increases

Revised as suggested.

Line 304 – 305: […] the ratio of velocity range between upstream and frontal region is 13% in summer […] - Insert “the” before “upstream”.

Revised as suggested.