

Overall comments:

The authors compile a 50+ year dataset of kinematic changes of Abramov glacier, filling in gaps in the *in situ* observational record using a variety of remote sensing datasets. Overall, the manuscript is well-written and demonstrates how more detailed datasets of glacier kinematics can reveal novel dynamic behavior that may complicate mass balance studies. I applaud the authors for the thoroughness of their data processing and presentation of the methodology. I recommend a minor revision of the manuscript with the specific comments listed point by point below.

Specific comments:

Abstract:

- L9: It would be helpful to mention which “archives” are used in this study, especially since your results show a newly-discovered pulsation not resolved from certain products (mentioned L11).
- L12: What do you mean by “active phase” here? This terminology is specific to active/quiescent phases of surges. I recommend using “velocity pulsation” given the framing in the introduction.
- L15: The results you present throughout the rest of the abstract suggest that the dynamics are quite active. I recommend adding a sentence prior to this with some results related to the transition to stable dynamics.

Introduction:

- L29, L34-35: State specific years instead of “recent years”. 2011 is not that recent and “recent” will be even less applicable if this paper is read years from now.
- L39: Change “to hinder” to “that hinder”.
- L88 and 93: State specific years rather than “present-day”.

Methods:

- L99-100: Change “surface ice velocities” to “ice surface velocities” and state here what techniques are used to derive them. Feature-tracking? InSAR?
- L103: How many 30 m DEMs in the set?
- L106-107: How much lower is the error compared to NASADEM? Were the reference measurements made *in situ*? In what time frame?
- L195: Recommend changing to “Ice surface velocity” or just “Surface velocity” here and elsewhere throughout the paper. The latter is consistent with the Section 3.2 heading in the results.
- L207: Please clarify units for the 11 x 11 window (pixels or meters).
- L223: Please justify the time separations of 5-100 and 300-430 days. Why were 100-300 day separations removed?
- L228: What was the typical variance in velocity values across the four bands? It would be convincing to report the value here.
- L292-295: Clarify what you mean by “consistency” of remote sensing data here. From looking through your Appendix D, it seems as if you are assessing both the accuracy (by confirming that velocity ratios are within physically reasonable values) and the temporal

variation in velocity / volume changes. Should these values be temporally consistent considering the dynamic pulsation just prior to those years (2000-2003)?

Results:

- L299: A length change uncertainty of 4 m (0.03%) seems unrealistically small. User error uncertainty in manual delineations is typically at least one pixel (Paul et al., 2013). For the all images other than the 0.5 m resolution images, the uncertainty should be the GSD at minimum.
- L303: Was the wave of active ice observed through velocity datasets? If so, I recommend moving this down to that section.
- L306: Oscillation in glacier length of what magnitude? It would be helpful to list a typical range here.
- L314, 315 and elsewhere: Replace “/” with dashes for the year range.
- L314: Rephrase “a gradual (but faster) slowdown” to “a faster—yet gradual—slowdown is visible”.
- L342: Rephrase “abovementioned pulsations” to “pulsations mentioned above”.
- L344: Add commas before and after “albiet widespread”.
- L345-346: You have not yet defined what a “reservoir region” is to your readers. Similarly, you have not defined active versus quiescent phases. Please define these terms to readers in the introduction.

Discussion:

- L372: Ice redistribution due to the pulsation is a relationship of note between ice thickness and velocity. Perhaps you mean “no positively-correlated relationship” rather than “no direct relationship”
- L384-385: Would like to see the 2022-23 velocities plotted alongside the older SPOT- and IRS-derived velocities where they overlap on the glacier to better show the attainment of a new velocity peak.
- L426-427: List the value, error range, and uncertainty in this sentence.

Conclusions:

- L550: Where will the DEMs and ortho images be made available? A data repository?

Figures and Tables:

- Table 1: Recommend converting all spatial resolutions into meters for ease of comparison.
- Table 2: For the mono scene GSDs, replace the slashed entries (e.g., 5/10) with “and” or “or” (e.g., 5 or 10) for clarity.
- On all figures: Recommend adding bounding bars or a patch over regions of time series plots that correspond to the observed pulsations.
- Figure 2: The cyclic colormap makes the most recent (e.g., 2023) traces and the oldest traces (e.g., 1968) difficult to distinguish. Please change to a sequential colormap, keeping in mind what color schemes are colorblind friendly.
- Figure 5: Your panel ordering (vertical, as two columns) is different from in Figure 4 (horizontal, as two rows). Keep them consistent.
- Figure 6: Consider moving this figure to the Appendix or supplement since it is not critical to the main story.

Appendices:

- Appendix D, L636: Are there existing data to compare with to comment on whether these ice influx values are reasonable?
- Appendix E: The text in this appendix section would be appropriate to include in the main text in Section 4.4. The figures could remain in the Appendix for readability purposes.

References:

Paul F and 19 others (2013) On the accuracy of glacier outlines derived from remote-sensing data. *Annals of Glaciology* 54(63), 171–182.