Five decades of Abramov glacier dynamics reconstructed with multi-sensor optical remote sensing

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Reply to reviewer 2

In this paper, the authors have utilized an impressive array of remote sensing datasets and applied a range of techniques to produce a 50+ year record of surface ice velocity, elevation change, and terminus position change for Abramov glacier. I found this paper very easy to read and follow, with both the data processing and characterization of uncertainty well-explained. The results are well-demonstrated, and provide good support for (almost) all of the conclusions. As such, I have only relatively minor comments on the manuscript that should be easy to address.

We would like to thank the reviewer for the positive and constructive review of our manuscript. Below, we provide point-by-point answers to the comments. Any comments which are not mentioned here are considered accepted and fully implemented in the revised manuscript. The review text is reported in *black italic,* while our responses are in blue.

- *l. 11: "unobserved" pulsation. In the comparison with Mandychev et al. (2017), you show that those authors observed an advance of the glacier, reported as beginning in 2000 (rather than 2002, as you have shown). This seems to be a contradiction with the claim here (and in the conclusions), that this pulsation is "unobserved". The claim that this is better captured by your data/observations than in previous global datasets or other studies is not quite the same thing, so I feel that this claim should be softened somewhat.*

We agree with the reviewer on this point. In the revised manuscript, we are rephrasing the sentence as follows: "We describe at subseasonal scale a second pulsation over 2000–2005, not observed *in situ* and poorly resolved by Landsat and ASTER products"

- *l. 38-39: suggest "... found that data inconsitencies and regional simplifications hinder interpretation ..."*

In the revised manuscript, the entire sentence is being slightly reworded following comments by all reviewers.

- *l. 258: "within bins": what size are the bins used here?*

We used a constant N = 500 bins for the along-/across-track corrections. As such, the actual dimension of each bin in m depends on the along-/across-track angles of the correction, and the number of samples in each bin additionally depends on the amount of missing data within each grid. During preliminary analysis, we found very little sensitivity of our results to the size of these bins, as long as they were small enough to resolve the targeted biases and large enough to hold enough samples. In the revised manuscript, we provide this information.

- *Fig. 4: would it be possible to include different symbols/patterns to help differentiate the*

colors here?

In the revised manuscript, we are adding an alternating pattern of solid line / dashed line to improve differentiation.

- *Fig. 5: same comment for panels (c, d) and (g, h) as for Fig. 4*

We are not sure about the possibility to further differentiate the data points here. The plots already use a colorblind-friendly color scale and the plotted dots are geometrically separate (no overlap in panels c and d, unambiguous overlap of only SPOT and ASTER data in panels g and h, since NASADEM corresponds to a single data point). Moreover, in order to be geometrically separate, the plotted dots are not large enough to benefit from the use of multiple symbols beyond simple circles. For panels c and d, we note that the exact acquisition date of all declassified scenes is reported in Table A2.