Comment on tc-2022-33

Jeremie Mouginot (Referee)

Referee comment on "Empirical correction of systematic orthorectification error in Sentinel-2 velocity fields for Greenlandic outlet glaciers" by Thomas R. Chudley et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2022-33-RC1, 2022

Chudley et al. presents a study on the correction of the orthorectification error in surface ice velocity generated from Sentinel-2 acquisitions in Greenland. The results are sounds, clear and well described in the manuscript. Having a methodology to use the potential of Sentinel-2 images to track the dynamic evolution of Greenland's glaciers is a significant advance and will be useful for many other studies. The paper focuses mainly on the methodological aspects of remote sensing and as such could have its place in a journal more related to this type of subject. Nevertheless I believe that the topic will be of interest to the glaciological community and so could be published in The Cryosphere. Therefore, I recommend publication and have only minor comments below.

Comments:

An important point of the study to justify the processing Sentinel-2 images from different orbits (cross-track pairs) is the increase in the number of measurements that are useful for capturing rapid changes in velocity and producing dense time series. I think that the advantage of such an approach over considering only observations of similar orbits (repeat-track pairs) should be reinforced. In short, I think showing time series with and without the cross-track pairs could be useful to highlight the advantage over using repeat-track pairs. Similarly, the processing of Sentinel-2 data does not seem to provide additional information to that obtained by Sentinel-1 (Fig. 7). Would it be possible to find an example where S2 would fill a gap with respect to the already published time series in Sentinel-1 MEaSUREs (or Landsat-8 ITS_LIVE) ?

Gaussian process regression could be further described. Although a short description of the kernels used is given, it seems difficult with the details provided to reproduce the results obtained in Figure 7.

In Fig.6 : The name "Jacobshavn" is not consistent with the text (Jakobshvan)