General remarks

Lander Van Tricht and colleagues present the ice thickness estimations of the Grigoriev ice cap (Kyrgyzstan) collected in several field campaigns during August 2021 (summer) by using GPR technique. Then, the radar data was processed by applying the yield stress method and interpolated to produce an ice thickness layer. Finally, the authors evaluate if the global outputs resulting from 6 different experiments are able to capture the spatial patterns of the ice thickness at the local scale in the Grigoriev ice cap.

The manuscript is well structured, clear, and concise, making it easy to understand. I congratulate the authors because they have compiled a large amount of data with potential for scientific applications, however, they do not give enough detail on the statistical approach demonstrating the unreliability of the global datasets, and it seems they remain in a visual description of the discrepancies.

The global ice thickness products were conceived as an approximation of the total volume of ice available on the Earth's surface, with its associated uncertainty. It is therefore logical to expect that their site-specific net representation will vary from site to site, depending on morpho-topographic conditions. In addition, several of the world's ice masses are inaccessible for logistical or risk reasons, in which case in-situ observations are simply not feasible. This does not seem to be the case with Grigoriev. Therefore, numerical modelling products can provide valuable complementary data to field measurements.

There is a methodological gap in this study and the authors need to work on major corrections before this manuscript can be published in TC.

Detailed remarks

L11. I am not sure how the under-representation of ice thickness in the global dataset demonstrates the importance of in-situ measurements. Please provide more evidence of the specific factors that may render the thickness data obtained by global models deficient, e.g. the role of basal topography. For example, it would be interesting to suggest methodological considerations that would improve model outputs.

L38. Grigoriev Ice Cap has a gentle topography, which allows most of the ice cap area to be covered by radar, but not so for other glaciers. Since data are available, please shed some light on the role of mass balance, dynamics and morphology in explaining such discrepancies. Also give the area covered by the ice cap.

L45. I don't think 'range' is the right word, but if it is, then provide a range of mass balance or thermal profile max/min values.

L74. The error estimate is not clear. Is it 8m or 5%? In the location, in the profile or in the interpolated area? Provide a detailed description of how do you arrive at these values or a reference.

L77. Give a description of the photogrammetric process. Did you perform a geodetic adjustment? If so, give the mean error in the horizontal and vertical residuals. How many ground control points did you use? Are GCPs located in the off-glacier areas?

L78. 0.2 m is the nominal uncertainty of the GPS or has the adjustment error been reached, please clarify

L90. Please show some radar profiles.

L111. Instead to interpolate τ_y why not only compute a bedrock surface model taking advantage of the high resolution data you have.

L128 and L133. Text is repeated

L136. I do not understand why you stick to visual inspection when you can make a robust statistical comparison of the two spatial datasets. This involves checking the spatial distribution, patterns, and correlations between spatial locations of ice thickness once the data are standardized.

Section 4.2. In view of the comment made by referee 1 about the misunderstanding of the approach used by Milan et al. and Farinotti et al., this comparison should be reviewed and adjusted to obtain a reliable interpretation.

Conclusions. If data are available, please shed some light on the role of mass balance, dynamics, and morphology in explaining such discrepancies. It could be interesting to identify the reasons for such discrepancies between datasets and to suggest approaches to resolve such discrepancies. For example, I would like to see the authors propose some alternatives for adjusting global products based on local observations or evaluate the representativeness of the global products in terms of their applications for estimating the future evolution of ice masses or runoff in the context of a changing climate.