

In this document, we respond to the comments of reviewer 1 one by one. Whenever some entirely new text has been added to the manuscript, it has been added in italics and in red.

The proposed revised with and without track changes is added as a supplementary .pdf file.

### **Reviewer 1**

This brief communication presents new ground penetrating radar (GPR) ice thickness measurements for the Grigoriev Ice Cap in Kyrgyzstan. The manuscript describes the field campaign, the GPR measurements, and the interpolation method used to obtain a complete ice thickness map. Finally, the authors compare their results with global ice thickness datasets and highlight the discrepancies. The figures are nice and the paper clear and well organized but the content of the paper is weak at this stage, even for a brief communication. Major revisions are required before it can be considered for publication.

We thank the reviewer for his useful comments and suggestions. We agree that the manuscript missed some in-depth analysis on the global ice thickness products, and we have significantly expanded this analysis in the revised version (section 4.2).

### **General comments**

**[RGC1.1]** Just saying that field measurements are needed because global thickness products are not accurate in this particular case is not very remarkable in itself. Global products do not attempt to be accurate everywhere, but rather give a volume estimate on a regional to global scale. The specific case of a polythermal, small ice cap is exactly where one would expect global scale estimates to be wrong. In my opinion, what would make this communication publishable would be to highlight the reason why the different global estimates do not reproduce the observations. This would allow to identify which assumption done in those estimates can be improved and how. In the current version of the manuscript, this work is poorly done, as the authors have not really looked in detail at how these global estimates are made. This is shown by their assumption that these estimates are done for the year 2002 due to the SRTM DEM, which is wrong. This leads to a wrong correction of their thickness field and to irrelevant comparisons. For example, Milan et al. uses surface velocity from 2017/2018 combined to the shallow ice approximation to provide thickness estimate. The SRTM DEM from 2002 is only used to compute the surface slope. The method and assumptions of each estimate presented should be reviewed and analyzed in the light of what is known about the Grigoriev Ice Cap. This would allow to identify the origin of the errors in the reconstructed thickness (mass balance, ice viscosity, sliding, surface velocity .....).

We agree with the reviewer, and we have substantially expanded section 4.2 where we compare our reconstruction with the ice thickness of the global datasets. Given that we have performed several new analyses and substantially expanded the text, we refer to the added sections for further information.

### **Specific comments**

The specific comments provided in the manuscript were directly incorporated and can be consulted through the track changes.