

## ***Interactive comment on “How accurate are estimates of glacier ice thickness? Results from ITMIX, the Ice Thickness Models Intercomparison eXperiment” by D. Farinotti et al.***

**Anonymous Referee #2**

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Inventory of glaciers on Earth has been recently achieved, however ice thickness distribution remains largely unknown at a global scale for obvious reasons of tremendous geophysical survey it would require to be completed. A comprehensive knowledge of glaciers thickness is however of primary importance for a number of glaciological studies: estimating the volume of ice stored (water availability, sea-level change) and a prerequisite before any ice flow-modeling attempt. This work presents the results of the first intercomparison of the currently used methodologies to estimate thickness of a glacier from surface measurements. This community effort is highly relevant for at least two reasons. First, as mentioned, improving our knowledge of the thickness of glaciers would open to significant progresses in fields of high societal impacts. Sec-

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ond, the amount of surface data available will most likely significantly increase in the forthcoming years and appropriate methodologies to infer ice thickness distribution will have to be developed. The paper is well structured and written; I therefore recommend its publication in the best delay.

I must confess that I had one slight frustration reading the manuscript: there is not that many recommendations on further direction of developments. I clearly have in mind how difficult this could be in such a large community effort with a lot of variety in the approaches used and the incomplete realization of the whole set of experiments by most of the models participating. I have one suggestion to circumvent this difficulty, which I believe would also improve the readability of the paper and facilitate its impact on non-specialists. 17 different models have been used, and according to the authors, they could be classified in 4 categories. In the manuscript the description and discussion are only viewed from a single model point of view or from the entire set of models. I think that approaching also the manuscript using these 4 categories would strengthen the paper. Some suggestions regarding that point:

- Section 4, is rather technical and probably gives not enough details for specialists and too many for non-specialists. I would recommend arranging section 4 in order to present the philosophy of each type/category of method and to add in the supplementary materials required details for each model. Regarding that latter aspect, I would strongly encouraged unpublished approaches to give more details as information are today to my opinion very limited.

- In more or less all figures and tables (and particularly in table 1, table 2, table 4, Figure 3, Figure 7) the 17 models are presented in alphabetic order. I would recommend grouping them along the 4 categories. Color code of figures 4, 5 might also be rearranged to try to give the opportunity to the reader of disentangling the approach used behind the models.

- Are they pattern emerging regarding these categories? Systematic bias for a given

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category for some specific configuration (glaciers, ice caps, synthetic)? In other words is there a family of approach that is more suited for a given configuration or not? I think this should be discussed. My guess is that if there were some obvious ones it would have been already discussed. However, mentioning that today we are not able to discriminate whether one family of approach seems more appropriate than another is also a result that I think deserve to be mentioned.

I would further encourage having a perennial repository of all the datasets required for people to confront future approaches with the results already computed (i.e. set up and results). This is mentioned as an intention in the conclusion, but a clear link to an already established database would be much better. Ideally, this database should be reviewed with the manuscript.

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Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2016-250, 2016.