

Interactive comment on “Worldwide version-controlled database of glacier thickness observations” by Ethan Welty et al.

Anonymous Referee #3

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General comments

This article describes data set of global glacier thickness observations, the manuscript describes version 3, so it is not a new dataset, but extensively enlarged with IceBridge and other data (number of datapoints from v2 to v3 increased from 820 370 to 3 854 279). This database contains data that has been collected with tremendous effort, and gathering the data into this database is also a very big task, a truly community effort. Description of database is clear and care is taken to explain reasoning behind the selection of the methods and the structure for the database. Glacier thickness data is very useful for both assessment of total volume of glaciers in the world (sea level rise potential) and for the development and application of models to project the future evolution of the glacier volume. The database is very important for facilitating the use of

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these observations. The article is well structured and well written with clear objectives, the goals and design of database are clearly described, adhering to modern requirements for continued development, maintenance and accessibility of data. It is not clear to me what use the TT level of the data will have, I think the point measurements the TTT file contains the data that the user will make use of, rather than of elevation bands that are not clearly or uniformly defined.

Specific comments

The text needs thorough editing in some places, see suggestions below.

In the comments below suggestions are made to delete two unnecessary figures (Figures 8, and 11), the information on these figures can be expressed in the text and would shorten and sharpen the article if authors agree to delete these figures.

The titles of all the subsections in sections 2 and 3 need editing, some are too short and misleading, probably relics from the drafting of the article.

Technical comments

Abstract, line 8, not clear what “this description” is referring to. The sentence is not clear, is the data validated, or the format of it?

Abstract, line 9 something missing before GlaThiDa, insert “of” here?.

Page 2, line 6. I find “anticipating” a strange selection of word here, do you mean assessing, or modelling

Page 3, line 7-8, This sentence is not clear and needs editing. What does “intersecting” here mean, is the location of the data points inside a RGI glacier outline?

Page 4, Table 1, what data is the last line, 17 surveys, 0 points and no thickness measurement, why is this included in the table?

Page 4, line 10, add “to” before “achieve”? something missing in sentence

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Page 5, line 21, “n” missing in “unnecessary”

Page 9, line 13-14, something missing in sentence, it is strange

Page 13, line 5, not clear what “it” refer to. The sentence is not clear, why is it important to compare glaciers with different survey dates? Do you mean the same glacier that has been measured several times?

Page 13, line 6-7, not clear how ice thicknesses are coincident with glacier outlines, do you mean within glacier outlines?

Page 13, line 7, suggest to add “measurements” after surface elevation (and delete plural s). what other time-varying data are used? Suggest to specify here

Page 13, line 8, what does “large-scale analysis” mean here? Global? It is not clear to what “this” refers to

Page 13, line 10, sentence is not clear, it reads like surveys correspond to outlines, but isn't the thickness measurements that are within RGI outlines, suggest to edit to clarify

Page 13, line 10, suggest to replace “surface elevations” with “surface elevation measurements” everywhere in text.

Page 14, line 2-4 “synchronous surface elevations” is not clear, suggest “surface elevation measurement from the same time as thickness measurements”. The remainder of sentence is also not clear, suggest to edit to something like “with bed elevation measurement any surface elevation measurement at later time will provide a thickness measurement”

Page 14, line 5, suggest to edit section title, it is not clear what “growth” is referring to here, probably the database, but this can be clarified.

Page 14, line 9, suggest to replace “from” with “in”

Page 14, line 9, it is not clear what “This” is referring to, suggest to clarify

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Page 15, Figure 8, This figure is not very clear and I am not sure if it useful, suggest to delete this figure, text conveying the information in the main text would save space in paper. The figure caption needs editing if figure remains in paper.

Page 15, lines 5-12, this section needs editing, it appears that operation IceBridge is (not “are” as in line 5) ending, this has provided large amount of data to this database, the speculative sentence “future updates of GlaThiDa may not include as many new measurements as the latest version” should be deleted. Suggest to edit whole paragraph to emphasize the great gain of thickness measurements due to operation IceBridge, but not possible future development

Page 15, line 13, suggest to edit title, the uncertainty is in thickness measurements

Page 16, line 2, it is not clear what is failing, suggest to edit sentence

Page 16, line 5, “larger issue” suggest to edit and replace with “bigger uncertainty”

Page 16, line 7, sentence not clear “adequacy of the interpolation” does not make sense here, it is about the method of interpolation, right? Suggest to edit and turn sentence around, the spatial coverage is most important for the accuracy of spatially-averaged thickness estimate

Page 16, line 10, “approximate dense grid blanketing” is not clear, suggest to replace or delete sentence

Page 16, line 10-11, sentence is not clear, suggest editing

Page 17, Figure 10 Caption, suggest to replace “survey years since 1975” with “surveys after 1975”

Page 17, line 3, suggest to add “measurement” after thickness (and delete plural “es”)

Page 17, line 4, “based on listed references” is not clear, edit the sentence to clarify

Page 17, line 6, “thickness type” probably refers to the three different categories in the

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data base, but this is not clear in the text, suggest to clarify

Page 17, line 6, suggest to replace “thicknesses” with “thickness measurements”

Page 17, line 6-8 This sentence needs editing, “glacier and elevation band thicknesses” is not clear, probably refers to database categories?

Page 17, line 8-11, This sentence also needs editing, uncertainties are not “correct” but possible “realistic”, “deemed to outweigh any benefit gained from averaging out random errors” also not clear and needs clarification

Page 17, line 10-11, this sentence is not clear, not clear how a distribution on Figure provides estimate of uncertainty. “thickness type” is also not a good term, refer to database categories

Page 18, figure 11 is not very useful and needs better explanation and editing of figure caption, suggest to delete figure and convey information of the figure in text and save space

Page 18, line 5, suggest to edit section title

Page 19, line 5, “number of changes” what is meant here, corrections in the database or additional input?

Page 19, line 5, suggest to add “will” before “grow”

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