The Cryosphere

Discussions

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# Interactive comment on "A new automatic approach for extracting glacier centerlines" by Dahong Zhang et al.

**Anonymous Referee #1**

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This is a valuable paper to attempt to get more accurate centerlines in glaciers. The major motivation is to automatically generate high-quality glacier centerlines in a wide range. Authors present and implement a novel automatic algorithm deriving glacier centerlines basing on the feature lines of glacier surface rather than the unit of raster pixel. This method is tested in the second Chinese glacier inventory, and the assessment criteria are built. And the results have been excellent. China has a wide variety of glaciers, so this method should be universal and has a potential application for glacier change.

Overall Quality

Overall, the part of the explanation of the algorithm (Section 3) describes the method in detail, and the flow chart is easy to understand. The research results are convincing,

and some deficiencies, worries and expectations are also reflected in the discussion section. I appreciate that the authors were transparent about the limitations of the method, but have still published what is an interesting study. This study is of great importance to further improve the quality of global glacier centerlines. I recommend it to be published with minor changes.

Specific Comments

Title: I think the title should point out that the author's approach is different from other studies, for example "base on . . ..."

*(P1L20) "the largest length" -> "the longest length" or "the maximum length".

*(P2L30) "Alternatively" might be "Therefore".

*(P2L31) Please add a sentence to explain the role of the two concepts of glacier axis and glacier centerline and their relationship with glacier flowline.

*(P2L45) Delete "automatic". It is too early to mention the importance of automatic extraction algorithm because it cannot be illustrated above.

*(P2L46- P3L60) This section seems not make clear the challenge of current glacier centerlines extraction.

*(P4L80) The provincial boundary is not obvious to see in Figure 1, and the number of map's scale is best such as 100, 200, 500, 1000 km.

*(P5L85) "arcpy" -> "ArcPy"

*(P5L95) Make some parameters clear, for example, PG, A, P, AG.

*(P5L101) Author should explain where the formula 1-3 comes from?

*(P7L124) Some word's fonts in Figure 2 are not uniform. Please check. In addition, I have a question, did DEM need preprocessing? Such as filling.

*(P8L134) median elevation Zmin -> median elevation Zmed. Please check the full

text.

*(P9L144) "the material flow" -> "the mass flow"

*(P9L147) As for post-processing, please introduce in more detail.

*(P12L198) How exactly did the authors get the final glacier centerlines?

*(P14L234) How exactly did the authors visual inspection? Some glacier centerlines may be visually indistinguishable.

*(P19L280) Is the DEM used for maximum length calculation in RGI6.0 same with the author's?

(P24L364) Maybe I missed some details. How did the authors get ELA through Zmin? Maybe the author meant Zmed?

(P26L409) When the article was accepted, I requested the authors to consider making the source code or tool available on Github or some elsewhere.