

Dear Leif Anderson
Dear Andreas Vieli, editor of The Cryosphere

We thank you for the very positive reception of our substantially revised manuscript. We hope we have addressed the few minor corrections raised by the referee and the editor by breaking up paragraphs or longer sentences and by ensuring consistent wording and spelling (e.g. “middle Holocene” instead of “mid Holocene”). Please see our point-by-point responses below.

We thank you very much again for your careful review of our manuscript.
Dominik Amschwand, Susan Ivy-Ochs and Olivia Steinemann, on behalf of all the co-authors

List of minor suggestions by Referee Leif Anderson

Line 32-50. Consider breaking this into two paragraphs for easier reading and communication of the main points here.

We broke the paragraph at “In the literature, ...” and at “Another concept is the synchronous...”.

Line 33. Suggest a rewrite from "as diagnostic for" to "to be diagnostic of".

We modified the text accordingly.

Line 37. Consider 'in a delayed fashion' instead of 'attenuated and delayed'.

We modified the text accordingly.

Line 66. Perhaps consider reword of 'Holocene-long development' to 'development through the entire Holocene'.

We modified the text accordingly.

Line 98. This sentence would be more effective if the list came second and the use of the methods came first.

We modified the text accordingly.

Line 118-19. Very slick!

Thank you!

Line 196. Consider breaking this paragraph up into a couple.

We broke the paragraph at “Over-steepened terrain steps, ...” to separate general rock-glacier stratigraphy from Bleis Marscha observations and model implementation.

Line 209. 'evidence' does not seem to be the right word here. Maybe 'to confirm the presence of a shear layer'? Also a citation to other work where a shear layers are present would be good here.

We modified the text accordingly and added Arenson et al. (2002).

Figure 2. I think a figure title is needed here. Plus unbolded text I believe for figure captions.

We modified all figure captions accordingly. Yes, text is unbolded except for the “Figure X.”

Figure 3. Very nice figure. Thank you!

Figure 4. the UTM distances on the x and y are hard to read as are the contour labels. I would suggest removing the UTM labels as there is a scale bar in the figure already. Photo views are really well done here.

We removed all UTM labels except of two for each axis for reference, and those in a slightly larger font size.

Line 359. 'looking at' is a bit casual, perhaps 'interpreting'?
We modified the text accordingly.

Table 1. If there is space adding a column for the unit number would be helpful. But not necessary.
No, unfortunately, there is not enough space. We hope that the units are gleaned from Figs. 7 and 11.

Line 390. Consider a more technical term for 'matched' here
We changed the wording to “correlated” and rewrote the text as follows:
“By correlating two orthophotos from late summer 2003 and 2012, we obtain a noise-filtered horizontal surface creep-rate field for the Bleis Marscha rock glacier and its immediate surroundings.”

Table 4 is very helpful for the reader.
Thank you!

Line 548. All the info is good here but it I wonder if the take homes can be simplified a bit here. It is not totally clear after going through the paragraph.
We added a sentence “It is within this framework that we interpret the exposure ages” to clarify the purpose and reformulated the statement more concretely:
The cumulative effect of material loss and small under-exposure from boulder instabilities and rotation added up over centuries–millennia likely is the primary contributor to the ‘geologic scatter’.

Line 685. Need an 'a' between 'as' and 'stress'
We modified the text accordingly.

Line 757. Anderson, L.S. should be inserted as the second author here
We apologize for the omission. We completed the citation.

Minor comments by editor Andreas Vieli

Line 46-47: Just a suggestion, liquid water input (besides temp and snow) seems also important for seasonal variations, maybe integrate this here (see Cicoira et al 2019, Earth Planet Sc Lett).
Yes, thank you for this suggestion. We include the citation and modified the text accordingly.

Line 99: you could use the abbreviation FE here as you already introduced it above on line 70.
We modified the text accordingly.

Line 121: average error of 1-3m. is this the vertical or horizontal position error?
This is the position error for all three dimensions (Kartenblatt 1236, Ausgabe 2017). We modified the text accordingly.

Line 195: '... in two dimensions along a central flowline with...'
We modified the text accordingly with this clarifying apposition.

Line 282: I would delete 'apparently'
No, we would like to emphasize that the lower part only looks inactive, but is actually slowly moving as revealed by the kinematic analysis (comparison with older aerial image from 1988, cf. caption to Fig. 8).

Fig. 4 caption: add age unit of exposure ages: '...exposure ages in ka BP'.

We added the units (ka, not ka BP), modified the caption accordingly and clarified that the uncertainties are 1σ external errors. 'BP' is only used for calibrated radiocarbon dates.

Fig. 6 caption: similar add a sentence what the numbers are on the foto: exposure ages in ka BP.
We modified the caption accordingly.

Fig. 7 caption: add age unit of exposure ages: '...exposure ages in ka BP' (yes it is on the right axes already, but the labels in the figures have no units!).
We modified the caption accordingly.

Line 523ff: relatively small wobble is also the case of relatively fast flowing rockglaciers in the Mattertal (see Wirz et al 2016 Earth Surf. Dynam., 4, 103-123, 2016 www.earth-surf-dynam.net/4/103/2016/ (based on continuous inclinometer data and GPS)
Thank you for this literature suggestion! We added this citation and modified the text accordingly.

Line 569: 'most upstream'
We modified the text accordingly.

Line 663: style, '...to earlier research...'
We modified the text accordingly.

Acknowledgments: please also acknowledge the input by the two referees.

We sincerely thank both reviewers and the editor for their work. Of course, we added:

An earlier draft greatly benefitted from the critical reviews by Jakob Heyman and Leif Anderson. We appreciate as well the numerous insightful suggestions given by handling editor Andreas Vieli.