We thank the reviewer for the constructive comments and the time spent on the manuscript! We will implement the suggestions to the best of our abilities. In the following, responses to specific comments are in blue text. Reviewer comments are black.

Structure: The paper is based on data and methods presented in previous studies of the authors. Without a knowledge of these studies, it is sometimes hard to follow.
We will revise the relevant sections to improve clarity. We aim for a balance between showing new work and combining it with data and results from previous studies, as this combination leads to new insights and a more comprehensive understanding of the rock glacier. We agree that enough information must be given for the reader to follow and will work to improve this issue.

The methods can be described in a more comprehensive way. Data acquisition and analyses methods are mixed in section 2. The methods (e.g. image correlation or accuracy assessment) are described in sentences which go very deep into the details but are not comprehensible and useful to understand the method. If you use such a deep level of description, you must explain much more of the method. As alternative, use a simple way to describe the method in a few sentences and give a overview.

We accept this criticism and will separate data and acquisition more clearly in the revised manuscript. We will also reconsider the level of detail and adjust the explanation appropriately. Thank you for pointing this out.

In the discussion, topics are discussed which are not described in the method and data section. Please adjust method and discussion section.

We will make sure all topics relevant to the discussion are included in the methods section.

Figures: The selection of the figures should be revised. It is confusing referring in the text to figures from the supplement. Figures in the manuscript are too small and it is hard to get the information from it.

We will revise the figure selection and increase the size to improve readability. In particular, we will add figures pertaining to the uncertainty analysis to the manuscript. These were in the supplementary material previously but can be incorporated in the main publication to improve clarity.

Language: The paper should be also revised in terms of sentence structure. In some parts sentences are very long and hard to follow.

We will revise the language and take care to shorten sentences where necessary.

Conclusion: How can you know that the onset of destabilization was in 2017 when you do have no data between 2011 and 2016?

We do have block displacement data for the 4 block profiles for this time period at annual resolution, as well as strain rates computed from the displacement data. We will rephrase the relevant sections to make this more clear. We acknowledge that the term “destabilization” requires careful explanation and clarity in terms of definitions and usage and will work to improve this in a revised version of the manuscript.

Specific comments - page and line numbers refer to the annotated pdf uploaded with the review.

P2: check sentence structure for this chapter. Very long sentences are hard to follow and not always correct

We will revise the language in this chapter to improve sentence structure.

P3: L58 Crystalline lithology: and in what else?

Marcer et al. (2019) find destabilizing rock glaciers in densely jointed lithologies (i.e. ophiolites and schists) as opposed to crystalline lithologies. We will add this information to the text.

P3, additional comments:

Will fix typo and adjust wording.

P4: sliding? - yes, we will change it.

P5: lidar in 1953?

No, DSMs are derived from aerial imagery for the early data sets. Will rephrase for clarity.

P8: new section=> this is no geodetic monitoring

Will change as suggested.

The data acquisition is described in a chaotic way. Information about data acquisition and methods are mixed and described at very different levels of detail. It is hard to follow which sensors and data where used. Revise this. Further a table with the datasets and ist accuracy is missing

We will rework this section to improve the issues mentioned here.

Using which software?

The ICP algorithm was used as a plug-in of the FOSS SAGA GIS (Conrad et al. 2015), which is implemented in c++. The implementation was done by the authors and is an adaptation of the original algorithm presented by Besl & McKay (1992). We will clarify this in the text.

DSM as abbreviation is already introduced

Yes, we will adjust the text and fix the typo/missing word in the previous sentence. We will also revise the sentence structure in the following lines.

P9: without a knowledge of the image correlation tool it is very hard to follow. You write about DSM, grids and now points. Revise this description

We will revise this section and the following paragraphs to improve clarity. We will add a conceptual figure to explain the employed correlation tool, together with a more comprehensive description.

P10: Why have you chosen this method for uncertainties assessment. Add references with a statistic legitimization for this method?

We will add a more detailed explanation and references for the chosen method.
the ULS campaign is described in detail while no information about the TLS campaign. Why?
The TLS campaigns have been described in previous publications (cited in Table 2), while the ULS campaigns have not. We will make this more clear in the text and add the citations for the TLS campaigns to this section. We will revise sentence structure and phrasing in the last paragraph on P10 as indicated by the reviewer in the pdf.

P11: you used orthoimages? First time you mention. I miss this information in the previous section
We will add this to the previous section. We mention the ortho images in table 2 but agree with the reviewer that this needs an explanation in the text.
L255 x y z?: We will rephrase for clarity. This led to a 3D translation vector (x,y,z)
L257: Implementation in FOSS SAGA GIS by the authors in c++ programming language, as above.
Table 2
We will adjust the table headings and content of the table as suggested.

P15 - we will revise the sentence structure where marked by the reviewer
L299 why is that?
Poor quality of the underlying data (aerial images) in the area of the terminus. We will add this explanation to the text.
L305 why?
There are no block profiles in the lowest part of the terminus, hence the block profiles do not capture the change of this section. Will clarify in the text.
geomorphological analyses should appear somewhere in the method section
Agreed. We will incorporate these analyses in the methods section.

P16: now you mention elevation differences. Describe the difference methods more clearly in the method section
Will add a better description in the methods section.
L320 ???geomorphological features?
Yes, we refer to geomorphological destabilization features such as crevasses, cracks, and scarps. We will add a clearer definition of the term “destabilization signs” and incorporate this in the updated methods section on the geomorphological analyses.
L334: why? these has to be mentioned in the methods section!
The data quality of the first five DSMs is not as good as later on due to the quality of the aerial imagery used to derive these DSMs. The DSMs computed from the available digitized analogue images do not include the same level of topographic detail as the DSMs derived from laser scanning, which is an active remote sensing technique. We will add an explanation to clarify this.
P18 - will fix typo
Figure 5 it is easier to mark geomorphological features by a line and not a letter!
We would like the features to remain visible to the reader in the images and would prefer not to mark them with lines, as this would obscure the complexity of the features. We also note that we

use the letters to refer to zones of the rock glacier, rather than individual geomorphological features. We will experiment with different options for this figure to try and improve clarity.
Figure 8: figure is too small and hard to read
Will increase size of the figure.
P22 L391 ff what do you mean?
We will rephrase to improve clarity. The image correlation technique is applied at regularly spaced nodes (raster cells) in a distance of 5m. Applying the technique at each node wouldn't be possible from a computational perspective. However, the nodes left out could provide slightly different results compared to the closest considered node. The image correlation method will be described in more detail in the methods section.

P23 why now named as profiles 0, .. and not P0 ?
Will change to P0 and check consistency.
P25: L439 when? Timespans I-V in summer 2019, as shown in Fig. 12. Will add this to the text.
The discussion about the uncertainties in the first part of the chapter is important but unfortunately are the methods and results not presented in the previous chapters.
I am missing a structure e.g. chronological order of the datasets
We will rewrite this section to improve clarity, structure, and completeness. We will also ensure that all relevant topics discussed in this section are mentioned in the methods section.

P26 L452 what does this mean?
Will add detail to improve clarity, see also the response to comment on P22, L391.
L454 but this is not presented in this study.
We will rework this section to improve clarity. The co-registration of the multi-temporal datasets as discussed here will be better described in the methods section. We agree with the comment about the presentation, the boxplots originally presented in the supplement will be presented in the text as an additional and revised figure.

L460 showing the uncertainties in m/a makes it difficult to compare the quality of the datasets. Using the absolute value is more suited when discussing the data quality
In the light of the scope of the analysis - an assessment of velocity changes - we respectfully disagree with this statement. The periods between subsequent epochs are irregular, which would make it more tricky to compare derived distances directly. After normalizing the distances by the time periods, the mean annual velocities and their velocities become directly comparable. We will add an explanation of our reasoning to the manuscript and more clearly include references to publications that go into greater detail on absolute uncertainty measures of the previously published data sets (these references are currently cited in Table 2).

L 464 if you discuss this you have to mention it in the method section!
This refers to work presented in previous studies. We will clarify this and add the relevant reference again here.

P28: a comprehensive table or figure would make it easier to follow the time series

We agree that such an overview would be helpful to the reader. We will add either a figure or revise table 2, depending on whether we can find a readable way to visualize the data sets throughout the time series.

P28 add the date: 1953-2006, will add this in the text.

P29 how can you know that the onset of destabilization was in 2017 when you do have no data between 2011 and 2016?

We do have the annual block displacement data from the 4 block profiles. The statement is based on destabilization signs visible in the 2017 DSM and these data. We will rephrase this section for clarity.

which region?

The majority is in the French and Swiss Alps, a smaller number from the Austrian and Italian Alps. Will add this in the text.

P31: Subsequent?? - yes, will adjust this.

in the supplement only summer precipitation is shown. What is with snow accumulation? 2017 was little in snow

We will adjust the figure to include winter precipitation / snow, and add a note on this in the text.

???

Typo, will adjust.

P32: since about?

Will change to: “annual since 1997 with the exception of 2005, when no measurement took place.”

hard to read

Will rephrase to improve clarity.

Thank you again for the detailed review and thoughtful comments!

References

Besl, P. J. and McKay, N. D.: Method for registration of 3-D shapes, in: Sensor fusion IV: control paradigms and data structures, vol. 1611, pp. 586–606, Spie, 1992.

Conrad, O., Bechtel, B., Bock, M., Dietrich, H., Fischer, E., Gerlitz, L., Wehberg, J., Wichmann, V., and Böhner, J.: System for automated geoscientific analyses (SAGA) v. 2.1. 4, Geoscientific Model Development, 8, 1991–2007, 2015.

Marcer, M., Serrano, C., Brenning, A., Bodin, X., Goetz, J., and Schoeneich, P.: Evaluating the destabilization susceptibility of active rock glaciers in the French Alps, The Cryosphere, 13, 141–155, 2019.