Review of “Insights in a remote cryosphere: A multi method approach to assess permafrost occurrence at the Qugaqie basin, western Nyainqêntanglha Range, Tibetan Plateau” by Johannes Buckel et al..

In this interesting work, the authors combined three distinct methods: (i) geomorphological mapping to identify periglacial landforms, (ii) geophysical (ERT) survey to evaluate the presence of ice, and (iii) satellite Synthetic Aperture Radar Interferometry to investigate surface displacements of periglacial landforms that can be used as a proxy of ice occurrence. These methods were applied in the remote Qugaqie basin in Tibet. Despite the logistical problems due to high altitude and extreme climatic conditions, field campaigns were conducted in this area for ERT survey. This study increases the knowledge of poorly studied periglacial geomorphology in Tibet, including the permafrost occurrence within a basin where no borehole measurements are available.

Here some general comments about the manuscript, followed by some detailed comments. A careful proofread is needed.

General comments.

The study area and the three methods used in this work are well described in their respective sections. However, further information on the approaches and criteria used to outline the identified landforms should be added, including some examples with their associated uncertainties.

About the method that describes the Synthetic Aperture Radar Interferometry, different geometries (i.e. ascending and descending) are used. However, the Authors should explain how they used these different geometries (combination of both, choosing the most appropriate, etc.).

In the results section, velocity values are showed in the text, tables and figures. However, disagreements are apparently visible, probably due to the different “observation periods” in which the velocities were computed (e.g. velocity computed in annual periods vs velocity computed in summer periods?) not specified in the text. The Authors should clarify how the velocity are computed and in which observation periods, in order to avoid misunderstandings. Furthermore, measurements are often shown with different units, but the same unit should be used (mm/yr and mm or cm/yr and cm).

In the discussions there is not a paragraph or section that discusses the mapping of landforms. The same landform can be outlined following different approaches. As suggested by Brardinoni et al. 2019 (https://doi.org/10.1002/esp.4674) the uncertainty on mapping rock glacier is very high. IPA Action Group is now working on baseline concepts and practical guidelines to produce uniform rock glacier inventories (https://www3.unifr.ch/geo/geomorphology/en/research/ipa-action-group-rock-glacier/).

Detailed comments

L 56: unclear sentence.

L 78: this sentence seems to be a “general research question”. As you already mention, Barsch, 1996; Schrott, 1996, Scapozza, 2015 say this. Specify that this sentence is related to TB landforms.

L 97: specify what the ISM acronym is (now it is in the L 106).

L 114, Figure 1A: wind systems are not visible in the figure A. Add the position of Nyainqêntanglha in figure A.

L 152 – 154: unclear sentence.

L 168: here you say “excluding glacially-conditioned environments”, but in the following parts you mapped also glaciers. Be clearer.

L 171: the meaning of "manually" is unclear (after the field campaign?). Be clearer.

L 173: add the parameters used to derive the hillshade (azimuth and inclination of light source).

L 175: IPA Action Group is working on Baselines and Practical Guidelines for mapping rock glaciers.

L 176: unclear sentence.

L 181: Location of the photos at Figure 6 and 9.

L 236: specify that displacements higher than half of the SAR wavelength are undetectable (e.g. rockfall) and coherence also decreases.

L 237: How do you choose the threshold of 0.3? Motivate your choice.

L 254: Describe how you used the ascending and descending dataset (do you combine them? Or do you select one depending on the landform orientation?).

L 262: coefficient lower than 0.2 is possible, but it is not used in order to avoid an excessive amplification of displacements and associated errors (from Notti et al. 2014).

L 274: a table containing the parameters used during the processing (or the reference) can be useful here.

L 277: provide the locations and outlines of these stable areas (e.g. in figure 6 or 9).

L 300, figure 6: Inside the figure 6 replace Figure 10 with 9.

L 312: talus slope and protalus rampart also provide sediments in the rooting zone of rock glaciers (visible in figure 6).

L 346, figure 8: use the “k ohm m” unit in the figure 8 (as in the text). Add the cartesian coordinates on each profile (e.g. West and East for A A').

L 365: specify how you compute the mean velocity of the landforms, not only in the caption of table 3 (do you selected some points inside the landforms? Or do you use all the points inside the delineated landforms?), and add the observation periods (e.g. velocity computed in annual periods or velocity computed summer periods?).

L 371: use always the same units in the text (mm/yr and mm or cm/yr and cm).

L 376, table 3:

- the computation of "downslope velocity precision" is not clear.
- the "interpolated time periods" is not defined.
- there are apparent disagreements between this table and the text below. For example, from this table the maximum downslope velocity expected for rock glacier is 47.2 mm/yr (26.8±20.4), but velocities up to 153 mm/yr are visible in figure 9 and 10. This is probably due to different points investigated or different “observation periods” where the mean velocities were computed (e.g. annual periods vs summer periods?). please specify how these values are obtained.

L 386, Figure 9: Specify if the "creeping rates" are along LOS or slope direction. Indicate the observation period of the velocities showed in the figure.

L 390: these values (“from 10 mm/yr to 80 mm/yr”) are apparently in disagreement with those in table 3 (the mean downslope velocity is 12.7±9.2 mm/yr). Explain why (different observation periods?).

L 397 – 398: this sentence is not supported by results and data. Time series of temperature and precipitation are not shown. Provide data (or references) to support, or remove this sentence.

L 401, figure 10: indicate the observation periods of the velocities showed in the maps B and C.

L 433: specifies whether the layer refers to the ice layer.

L 466 – 469: rephrase these two sentences (it is not clear that these two sentences are not related to your work).

L 483: Sentinel 1 is not a high-resolution satellite.