

Earth Surf. Dynam. Discuss., referee comment RC1
<https://doi.org/10.5194/esurf-2022-8-RC1>, 2022
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Comment on esurf-2022-8

Marcelo Fernandes (Referee)

Referee comment on "Alpine rock glacier activity over Holocene to modern timescales (western French Alps)" by Benjamin Lehmann et al., Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2022-8-RC1>, 2022

Dear Editor Dr. Susan Conway,

General comment:

The paper shows a reconstruction of the surface displacement in the Combeynot rock glacier, western European Alps. The authors present a very interesting ^{10}Be Cosmic Ray Exposure dating dataset from ca. 13 to 2 ka from stable boulders across the five different units of the rock glacier. Besides that, they reconstruct the rock glacier displacement from 1960 to 2018 based on orthorectified imagery with motion above 2600 m and with an average of 0.14 m^{-1} . Based on the chronology and distance from the headwall, two ancient phases of rock glacier motion were reconstructed across the Holocene (12-6 and 3-recent). It has scientific quality and I propose to be published in the journal as it contains important data and an "out of the box" thinking to understand better the evolution of rock glacier velocities in long-term series however I have several major concerns:

The introduction is well constructed and I only propose that the long-term rock glaciers state of the art starts first and then remote sensing studies finish the section. This sequence must be applied to the rest of the manuscript and will give a stratigraphical comprehension to the paper, according to the timescale adopted in the work. Besides that, a clear idea of the goals of the paper should be added at the end of the introduction.

In the results, the causality relation made between the chronological evolution across the rock glacier and the geomorphological process needs to be improved with the morphological criteria, especially with boulders characteristics. Here, explanations should be avoided, and I propose to describe only the paper's results. Besides that, it is necessary to state that values of rock glacier surface displacements are presented in gross values, as we don't know how debris supplied the rock glacier over the Holocene.

Some information must be better organized. A substantial part of the discussion should be part of the results, and there is information that was not explained in the methods. Besides that, the three first subsections of the discussion contain only three citations and must be improved. Finally, the discussion about the recent velocities is neglected and must be reinforced.

Specific comments are included in the manuscript.

I hope you find this revision helpful.

Bert regards,

Marcelo Fernandes

Please also note the supplement to this comment:

<https://esurf.copernicus.org/preprints/esurf-2022-8/esurf-2022-8-RC1-supplement.pdf>