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## Comment on esurf-2022-8

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Community 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-CC1>, 2022

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In their study, Lehmann et al. shed light on paleoenvironmental conditions in the westernmost Alps by investigating the rock glacier system in Vallon de la Route (Écrins-Pelvoux massif). The authors compare their newly acquired cosmic-ray exposure (CRE) ages with previously published and unpublished  $^{10}\text{Be}$  CRE ages for moraines at different sites in the Écrins massif. In Sect. 2, Lehmann et al. mention that Younger Dryas stadial re-advances (I personally prefer Egesen stadial instead of the Scandinavian terminology) are documented at different sites in the Écrins-Pelvoux massif and that few glacial advances during the Holocene and more precisely during the Neoglacial (from ca. 4.3 ka) have been reconstructed.  $^{10}\text{Be}$  CRE ages for moraines at several sites in the Écrins massif (Prelles Valley, Rougnoux valley, Font Turbat, Romanche Valley, forefield of Arsine glacier), however, suggest that glacial re-advances and/or standstills may have also occurred during the Early Holocene (Hofmann et al., 2019; Schoeneich et al., 2019; Schimmelpfennig et al., 2019). One of the innermost pre-Little Ice Age (LIA) moraines of Arsine glacier, for example, was dated to  $10.7\pm 0.5$  ka (Schimmelpfennig et al., 2019).

In Sect. 5.4, Lehmann et al. propose that the first phase of rock glacier activity coincides with final glacier retreat. I guess that they mean the time after the Egesen stadial maximum glacier advance. If so, this should be clarified. They mention previously published CRE ages for moraines at Plan de l'Alpe, downvalley of their study site ( $13.0\pm 1.1$  and  $12.4\pm 1.5$  ka). I would rather refer to the CRE age of the Egesen stadial maximum moraine at this site ( $11.9\pm 0.2$  ka; RO outer stadial in Schoeneich et al., 2019), since the CRE ages reported by Chenet et al. were obtained for moraines inside the Egesen stadial maximum glacier extent. Furthermore, I would mention CRE ages of Egesen stadial maximum moraines at Pré de la Chaumette (downvalley from Rougnoux Valley;  $12.5\pm 0.6$  ka; Hofmann et al., 2019) or at Font Turbat ( $12.7\pm 1.0$  ka; Schoeneich et al., 2019), since these ages further support your conclusion that the first phase of rock glacier activity coincides with glacier retreat in the Écrins massif after the Egesen stadial maximum advance. Lehmann et al. state that several advance episodes lasting  $\sim 1$  ka were identified (in the Ecrins massif), before the retreat starts again at  $\sim 10.4$  ka. They refer to a study on moraines of Argentière glacier in the Mont Blanc massif. Instead, I would mention that there was a pronounced glacial re-advance in the final part of the Lateglacial and that the subsequent phase of glacial re-advances and/or standstills may have potentially extended into the Early Holocene. Regarding the onset of final glacier retreat, I would not refer to the study on moraines of Argentière glacier in the Mont Blanc massif, since CRE ages for the innermost pre-LIA moraines at different sites in the Écrins massif have already been reported. They indicate that the onset of final glacier retreat

occurred no later than  $11.2 \pm 0.6$  –  $10.7 \pm 0.5$  ka depending on the site (Hofmann et al., 2019; Schimmelpfennig et al., 2019; Schoeneich et al., 2019).

## References

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