Climate of the Past Discussions

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Comment on cp-2021-110

Heinz Wanner

Community comment on "Glacier response to Holocene warmth inferred from in situ ^{10}Be and ^{14}C bedrock analyses in Steingletscher's forefield (central Swiss Alps)" by Irene Schimmelpfennig et al., Clim. Past Discuss., https://doi.org/10.5194/cp-2021-110-CC1, 2021

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The paper by Schimmelpfennig et al. provides an impressive overview of glacier fluctuations during the Holocene by analysing cosmogenic ^{10}Be in moraines and ^{10}Be-^{14}C bedrock dating in the forefield of the Steingletscher in the central Swiss Alps. I recommend to add a small section, which explains the influence of the driving forcing factors. Basically, three different periods can be distinguished:

First, the early Holocene glacier retreats were strongly influenced by orbital forcing (Wanner et al. 2008, Solomina et al. 2015). Second, the advances and retreats of the last 4000 years were significantly influenced by groups of volcanic eruptions and solar irradiance changes (Bradley et al. 2016). During cooler periods with groups of volcanic eruptions as well as Grand Solar Minima, the glaciers often advanced. When the solar irradiance remained at medium levels and there were hardly any volcanic eruptions, it was likely warmer and the glaciers retreated. Typical cool periods with glacier advances are the Late Antique Little Ice Age (Büntgen et al. 2016) and the classical Little Ice Age (Grove 1988, Brönnimann et al. 2019). Thirdly, the massive glacier retreats of the present are clearly determined by anthropogenic forcing, which far exceeds the influence of solar irradiance.

References

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