Point by point reply to the comments

Dear Editor,

We thank you and the referees for their thorough reviews and for the suggestions.

Please find below, point by point, our answers to all the suggestions. Your suggestions are in red, suggestions from Referee #2 are in blue.

Yours sincerely,

On behalf of the co-authors

Erwan Le Roux

My concern is your conclusions and outlook section. In principle, the first paragraph summarizes the applied method, whereas the second one gives some outlook. Could you please add some information on the major results or achievements?

In the conclusion, at the end of the first paragraph, we added our main result: "To sum up, on average, mean annual maxima is projected to decrease below 3000 m and increase above 3600 m, while 100-year return level of snowfall is projected to decrease below 2400 m and increase above 3300 m. At elevations in between, an increase is projected until +3°C of global warming, and then a decrease."

L75: Since you partition snowfall with a temperature threshold, I guess you also need to downscale temperature with ADAMONT, and not only precip?

Yes, we added a sentence to clarify this point in the Data Section. "The ADAMONT method relies on the S2M reanalysis as a reference and is applied separately for the four seasons, four weather regimes, and several meteorological variables including temperature and precipitation."

L80: Please explain why you don't use directly the daily RCM data and instead you first disaggregate daily to hourly, and then calculate daily from hourly. I can imagine a few reasons (e.g., related to the daily cycle, etc.). But then disaggregating precip is not a trivial task (compared to temperature, where you go fairly well with sine-cosine functions). Have you tested uncertainty or sensitivity to this methodological step in some previous study? If not, please at least mention and/or discuss it.

Yes, as mentioned in the Data Section, "daily precipitation is disaggregated at the hourly time step using analogues and partitioned between rain and snow with the threshold 1°C and an additional quantile-mapping correction is applied". The reason for this disaggregation is that hourly-data is needed to force energy balance land surface model. The ADAMONT method has been analyzed in the original publication, see Verfaillie et al., 2017. Moreover, the ADAMONT method has already been used at the European-scale, mainly in mountainous areas, using UERRA as reference (Morin et al., 2021, Climate Services).

References:

Verfaillie et al. 2017, The method ADAMONT v1.0 for statistical adjustment of climate projections applicable to energy balance land surface models, https://doi.org/10.5194/gmd-10-4257-2017

Morin et al. 2021, Pan-European meteorological and snow indicators of climate change impact on ski tourism, https://doi.org/10.1016/j.cliser.2021.100215