

Clim. Past Discuss., referee comment RC2  
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## Comment on cp-2021-106

Anonymous Referee #2

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Referee comment on "Late Pleistocene glacial chronologies and paleoclimate in the northern Rocky Mountains" by Brendon J. Quirk et al., Clim. Past Discuss., <https://doi.org/10.5194/cp-2021-106-RC2>, 2021

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This is an interesting study, that combines glacial geology and glacial modelling to infer past glacial conditions in the Northwestern USA. This combined approach (not common in the literature) is always welcome and can provide significant insights regarding the climate evolution of the planet. The scope and structure of the paper is sound, and the outcome could eventually be of major interest for the scientific community. However, the manuscript, in its present form, needs some revision in order to improve some aspects. I would like to invite the authors to consider the comments below, which I hope will help improve the manuscript. Finally, I would like to mention that this manuscript would benefit significantly from a review by a glacial modeler.

General comments:

- I am not a native English speaker; however, I can recognize the need for some tidying up of the wording of some sentences throughout the manuscript.
- When introducing new areas or sites, please provide coordinates (at least latitudes). People outside the US are not necessarily familiar with the locations discussed in the text.
- I am a little concerned with the way that the authors treated outliers (see specifics below). I don't know if this has a major impact on the main conclusions, but it needs to be addressed consistently.
- I don't agree with the discussion in the section "The pace of ice retreat in the Rocky Mountain". If you put all the ages together (e.g., figure 7), it is clear that the ages from upstream and downstream are statistically indistinguishable (even at 1 sigma). As such, all the associated analysis falls apart. The good news is that this manuscript (and all the main conclusions) do not depend on this section. I suggest removing this section.

Comments line by line:

INTRODUCTION:

56-58: why is this important? Maybe add 1-2 sentences

84-85 Awkward wording

89-91: this should be in the result section (justified by evidence) or cited from previous publications.

96: what do you mean that they generally flowed down to elevations of 1.6 km? When?

98-101: are we talking during the last glacial cycle?

92-101: I am missing citations.... How do you know all this information? (e.g., ice thickness). I couldn't find a single reference in the Site Description section. Has anyone else worked in the area?

104: "and relatively little work has been done inferring past climate in the region from paleoglacier characteristics". You should include some examples (cites) at the end of the sentence.

128: Did you recalibrate these ages with the latest curves?

133-135: are these phases progressively less extensive?

138-141: very awkward wording. Please, rephrase.

146-149: you need to discuss the meaning of the  $^{10}\text{Be}$  ages (how do you interpret them?) before presenting this statement. Are they minimum ages of stabilization? Close-minimum ages for the retreat? Maximum ages?

152 define late Pleistocene

164-170: the wording makes it difficult to understand the point of this long sentence.

## METHODS

181-183: move to results

Figure 2: for clarity, please choose a different color for the outline of recessional positions

206: delete "."

255: why did you choose standard error of the mean instead of standard deviation?

269-271: To do that, you need to assume that the moraines in both valleys are coeval, correct? If so, you should mention it in the text. Or am I missing something?

339: A detailed description of the geomorphology of the area is presented; however, it is very difficult to visualize /assess it, given that no detailed geomorphological map is presented (except figure 2 where the authors only depict the moraines)

356-359: it is unclear to me what the authors want to say here... outer and inner moraines?

355-367: why do you focus your description only on glacier width? What about glacier extent? Area?

Fig 4: it would be ideal to see the rest of the samples in this plot as well

Fig. 4: I don't see the logic behind considering CB12 as an outlier and not doing the same with sample DC1204. Neither of those overlap at 1 sigma. On the other hand, if you use 2 std, none of these samples would be considered outliers.

425: is that even possible? 3x precipitation? Hard to assess since the authors didn't provide present day values in the site description... 3x the precipitation would be equivalent to 1std? 2std? 10 std? Maybe, such analysis could help to refine the results.

Fig 5: (This comment may be out of ignorance since I am not a modeler) I understand that it is almost impossible to exactly match the modelling results to field evidence, however in panel A I see plenty of room for a bigger drop in temperature, at both the glacier front and headwalls. Can you explain?

## DISCUSSION

461-464: Actually,  $17.5 \pm 0.6$  ka and  $18.2 \pm 0.5$  ka are statistically indistinguishable. Furthermore, you never discuss if SF Deep Creek and Cascade Creek are coeval or not.

541: of the for the.... Review this sentence

668-670: citations for CO2 increase?