

The Cryosphere Discuss., author comment AC1
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Reply on RC1

Jonathan R. Adams et al.

Author comment on "New ^{10}Be exposure ages improve Holocene ice sheet thinning history near the grounding line of Pope Glacier, Antarctica" by Jonathan R. Adams et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-82-AC1>, 2022

We would like to thank Anonymous Reviewer 1 for a thorough, constructive, and thought-provoking review of our manuscript. We are happy with the positive nature of this review and pleased that the Reviewer deems the manuscript a good addition to the existing knowledge of the Holocene ice thinning history of West Antarctica. The reviewer has provided many helpful comments and suggestions, which we will fully address if we are invited to submit a revised manuscript.

Firstly, the reviewer is correct that the local topography could affect the linear regression to some unknown extent. In our original manuscript, we selected the most representative nearest point on Pope Glacier a few hundred metres away that is at a consistent elevation (80 m asl) along the ice stream adjacent to scoria cone. In the revised manuscript, we would address the reviewer's comment and include topographic profiles, including across outcrop A and outcrop B as well as the position of scoria cone relative to our reference modern ice surface height of 80 m asl. The topographic profiles would then be utilised to inform the selection of the proximal ice heights used for Outcrop A and Outcrop B. We would then perform a sensitivity analysis using these distinct ice height for Outcrop A and another for Outcrop B, respectively, to determine what effect the choice of reference ice heights as inputs to the linear regression analysis has on our interpretation of the rate and timing of the thinning history. We would then quantify if the results of the sensitivity analysis fall within the uncertainty boundaries of our original preferred thinning history, and directly address whether our choice of ice height changes our primary conclusions or not.

Secondly, we acknowledge the reviewer's comment that there is insufficient information of how we obtained the altitude of the samples, these elevations are corrected to the EGM08 Geoid, and we would provide a more detailed description in the revised paper methods.

Thirdly, the reviewer raised the question of what caused the rapid Holocene ice sheet thinning in this region. The answer to this question is presently unknown, although it was discussed in association with the wider Holocene paleoclimatic context of the region by Johnson et al. (2020). Since that paper provides a detailed discussion of the topic, we have decided not to repeat that work here, but to instead include specific reference to Johnson et al. (2020) in our revised discussion section.

Finally, we also thank the reviewer for their attention to minor issues regarding the manuscript and will also address these within the author's response and manuscript revisions.

