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Comment on esurf-2021-78

Hemanti Sharma et al.

Author comment on "The effects of late Cenozoic climate change on the global distribution of frost cracking" by Hemanti Sharma et al., Earth Surf. Dynam. Discuss.,
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Response to Reviews – Esurf Manuscript

The Effects of Late Cenozoic Climate Change on the Global Distribution of Frost Cracking

By: Sharma et al.

Response to Associate Editor: Michael Krautblatter

Dear Prof. Krautblatter,

We would like to thank you for agreeing to be the associate editor of our manuscript. We also thank our two anonymous referees for their valuable comments and suggestions. We addressed each comment and suggestion by the reviewers and think it improved the quality of our manuscript and made it more useful to the prospective readers. We hope the revised manuscript also meets the referees' expectations and high standard of Esurf. The most important changes are summarized below

In response to RC1 regarding the unavailability of paleoclimate data to validate the model results (and regarding the scale issues), we revised our data comparison (Section 5.3) to emphasize on comparison of global (and general) trends of our FCI estimates with results from previous studies and provide suggestions for future regional studies (Section 5.5). We clarified the source of land surface paleo-temperature data and revised the methods section (Section 3.1) to explain and justify the use of sinusoidal daily temperatures. We revised the limitations section (Section 5.5) to highlight the problems of direct application of our model results in alpine studies due to coarse spatial resolution. We also clarified the source of glacier mask and modified our model results and Fig. 6-10 (and supplement Fig. 1-2), where FCI is masked with ice-sheet cover.

In response to RC2 we updated our model results and Fig. 6-10 (and supplement Fig. 1-2) to include 'maximum glacier mask during Pleistocene' in FCI estimates derived from the Pliocene simulations. We revised the model limitations (Section 5.5) to discuss uncertainties arising due to the coarse spatial resolution of soil data on modeled FCI. We also revised the discussion section (Section 5.1) to evaluate the influence of penalty function on FCI and elaborate on the importance of paleoclimate time-slices (for surface processes) based on globally summed FCI estimates.

We have provided the details of manuscript revision in the point-by-point response to the referees' comments. We deeply appreciate your and all referees' efforts to help us improve our manuscript.

The submission file consists of our cover letter, followed by point-by-point response to referees' comments, and the revised manuscript (with tracked-changes) specifying all the modifications made in accordance with the referees' comments.

Please contact us if further clarifications are required. Sincerely, Hemanti Sharma, Sebastian Mutz, and Todd Ehlers (corresponding author).

Please also note the supplement to this comment:
<https://esurf.copernicus.org/preprints/esurf-2021-78/esurf-2021-78-AC3-supplement.pdf>