

# ***Interactive comment on “Persistent Tracers of Historic Ice Flow in Glacial Stratigraphy near Kamb Ice Stream, West Antarctica” by Nicholas Holschuh et al.***

**Nicholas Holschuh et al.**

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Dear Reviewer,

Thank you for your comments on the text of our manuscript. The changes we made in response have led to a substantially improved work, most notably a clearer set of descriptions for the unconformity formation mechanisms. We outline the specific changes below, and provide point-by-point responses to your technical comments.

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## 1) Appropriately emphasize conclusions regarding the Siple Coast Ice Streams

We are glad you find our results compelling, and we have restructured our conclusions to immediately discuss the long-term behavior of the Siple Coast Ice Streams. We drafted alternative structures of the results section, but found that the clearest one starts with the mechanistic break down of unconformity formation, and follows with discussion of paleo-flow behavior. Hopefully the new conclusion provides the emphasis you were seeking.

## 2) The text (most notably, the discussion of erosion formation mechanisms) is at times hard to follow.

We have overhauled the text related to unconformity formation, in an effort to respond to your technical comments and better leverage the figure. We took special care to explain mechanism 2 (now on P6, L1-8). Additional structural changes were made to improve clarity following your review and the comments of our other anonymous reviewer (see our response to review 1 for more details).

### Technical Comments:

- page 5, line 29: *what do the authors mean with "static flow fields"? Steady (no change in time), perhaps?*

[Now Page 4, Line 27] We have rephrased for clarity. "... temporally-stable ice-flow conditions ..."

- page 6, line 12: *Figure 3C is not the right figure*

Fixed

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- page 6, line 27-30: here you use the present-day configuration of the blue ice region to reject one formation mechanism, but it's unclear to me how/ under what assumptions this applies to the past. Can you expand on this?

We have made substantial changes to the text to make the distinction between mechanisms clear. For mechanisms 1 and 2, we are focused on formation processes that can explain the unconformity as a steady-state structure. In that sense, we are assuming that the configuration of the blue ice area is constant through time. Mechanism 3, our preferred mechanism, relies on changes to the configuration of the blue ice area through time to explain the unconformity. It is this distinction, steady-state versus transient, that makes mechanism 1 different from mechanism 3.

- page 7, lines 1-7: in my opinion, this paragraph is barely understandable. I recommend that the same description is rewritten with closer reference to the supporting figure, and disentangling interpretation from observations. Also, the notation "3x, 5x, .." is highly confusing.

This text has been rewritten to make the paragraph clearer, as well as eliminate the confusing nomenclature.

- page 7, line 17: "Steep slopes .." it might be obvious, but I would briefly explain why steep slopes over blue ice enhance the winds.

We clarified this to read katabatic winds, as the surface slope primarily affects gravity driven flows.

- figure 1d: what is the colour scale?

Color scale added.

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