REVIEW 1

Thank you for your comments and time spent assessing this work. All of your specific comments and suggestions are addressed in the following text.

Specific comments:

Methods: The vertical and horizontal resolution of the DEMs used as the basis for bedform mapping needs to be added.

This information was added in line 56 of the manuscript: "Digital elevation models with horizontal resolution of 1.83 x 1.83 meters and coarsest vertical resolution of 2 meters from across the Puget Lowland [...]". Because many of the DEMs used to ensure full coverage of these sites had varying resolution, only the coarsest resolution was explicitly stated.

Figure 1: The colour choices in this figure for both the background elevation data and the mapping mean that there is little contrast between the two, and the mapping is hard to see (especially the green bedforms appearing on the lowest topography. I suggest modifying the colour schemes to improve this. The elevation scale for each of the panels in A) also varies. In order to compare across sites it would be preferable to use a single colour scale for elevation in each panel. There should also be a space between the value and the unit in the labels. The study area panel is very dark. For those unfamiliar with the region there should be inclusion of a small inset to show the wider context of the location within the area covered by the Cordilleran Ice Sheet. The area comparisons in (B) is a very useful figure, but would be easier to follow if the lines connecting the labels to the graduated circles were thinner, and the colours of the text boxes were the same as the circles, especially as this same colour scheme is continued throughout the other figures to identify each site. It is unclear what the volume values are pertaining to in the labels. Is this of the area, the bump, or the bedforms?

The color of the upstream bedforms was modified to gray. All bedforms were highlighted with a white outline to make them more visible.

Due to the large scale elevation differences between the bump sites themselves, one elevation scale was not utilized, but rather the same color range was kept constant between sites. In order to see variability in elevation across each site, the individual elevation ranges were needed.

A space was added between the elevation values and units in all labels.

The study area panel was updated to be brighter and more visible. In this panel, I also added an inset map of the Cordilleran Ice Sheet glaciation with an outline of the Puget Lowland.

Fig 1B was updated by reducing the size of the lines connecting the labels to the circles and the color of the text boxes was changed to match the circles. A bar graph was created to visually represent the bump volume. Additional text clarification of size references for each bump was added to text boxes in Figure 1B.

All relevant changes to the figure were changed accordingly in the Figure 1 caption.

Figure 2: Include in the legend the site codes as used in Fig 1 as well as the names, or add site names to the labelling in Figure 1A.

The site codes used in Fig 1 were added to the legend in Fig 2 and also added to the legend.

I would recommend acceptance of the paper with corrections as specified under specific comments.

REVIEW 2

Thank you for these comments. Your consideration of our logic in downstream ice-flow velocity is very helpful and will strengthen this work. All of your comments have been addressed in the following text.

The manuscript is exceptionally well written, and I do not have many suggestions for changes. I suggest publication after the following points have been considered:

1. L27-29: *"Conversely, ice flow over topographic highs can increase strain heating and basal meltwater production, thereby increasing ice-flow velocity downstream of the obstacle."*

I agree with the logic that increased strain heating leads to bed weakening downstream

of the bump through elevated basal water pressure and decreased effective stress. However, despite the basal weakening, the bump may not cause faster ice flow, as friction from the bump is transferred through the ice column by longitudinal stresses. The listed references, Payne and Dongelmans (1997) and Cuffey and Paterson (2010), are too general to support that specific hypothesis. I am unaware of recent observations of faster-than-usual ice flow downstream of sticky spots or bumps. Do you have observations or modeling references that could support the ice speed increase? Otherwise, I suggest that the hypothesis is reframed so that the observed changes in bedforms downstream of bumps are due to elevated basal water pressure and reduced basal friction, not basal ice speed.

The consideration for basal water pressure and reduced basal friction in synthesizing longer bedforms was added to the revised manuscript in line 27: "[…] topographic highs can increase strain heating and basal meltwater production, elevating basal meltwater pressure and reducing basal friction in the downstream environment (Payne and Dongelmans, 1997; Cuffey and Paterson, 2010)." Your comment was also referenced in lines 31- 32: "However, identifying which forms and scales of "bumps" across a glaciated landscape may increase, decrease, or not affect ice-flow velocity, basal water pressure, and basal friction is not well understood." "Ice-flow velocity" was kept in these lines due to the decrease in ice-flow velocity between the upstream and on-top of bump ice-bed interactions.

The only other reference to increased ice-flow velocity downstream of bumps was in the Results and Discussion section in line 119. This was removed to now read "Increased sediment availability and basal meltwater that results from the strain heating on top of the bump (Payne and Dongelmans, 1997), increases downstream sediment transport efficiency (McIntyre, 1985; Pohjola and Hedfors, 2003; Winsborrow et al., 2010b), resulting in the greatest number and most elongate bedforms, as well as the greatest proportion of bedforms with low surface relief downstream of bumps (Fig. 1A; Fig 2; Fig 4A, 4B)."

2. Figure 1B: The concentric circles in panel B are hard for me to tie to the statistics listed in the accompanying boxes. I would much prefer 2D plots containing the same information, which in my opinion, would make it easier to spot trends and variability.

A box plot representing bump volume was added to Fig. 1B to address this comment. The text providing numerical values for these volumes was made more clear in the text boxes of this same figure.

3. Figure 4AB: Is it possible to remove the gray background in panels A and B? It makes it hard for me to discern the color differences between lines on my monitor.

This adjustment was made to the final version of Fig 4.