

Interactive comment on “Importance of basal processes in simulations of a surging Svalbard outlet glacier” by R. Gladstone et al.

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Gladstone et al (2013) provide an interesting and detailed analysis of the surge behavior of an outlet glacier of Austfonna Ice Cap in Svalbard. This paper is a pleasure to read. The model aids in providing an exceptional discussion that probes the potential aspects of surging, in this instance so well displayed in Figure 8. Field data alone cannot provide such insight. The most important point that needs more attention is the location of the ELA and various facies derived from various melt levels, versus the initiation of the main zone of speedup spatially. This could be displayed on Figure 3.

5826-6: A better Figure 1 identifying characteristics of Austfonna and B3 is needed this might be the place to refer to it.

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5827-7: Seems worth directly noting that the lower increase in velocity during a surge should necessitate a longer surge phase.

5827-10: Is this not always the case that surge speeds are much greater not just in Svalbard.

5831-18: How do results here and methods compare to Bevan et al (2007) Figure 3?

5837-6: Where is the fast flow initiated compared to the ELA or the facies noted by Dunse et al (2009) in their Figure 6. It is worth correlating the observed melt regions with the observed region of speedup.

5837-18: Does the limited degree of winter deceleration indicate anything about the residence time of water in the till?

5838-2: Worth pointing out the ELA in a few years such as 2003, 2004, 2005 and 2011. The AAR for the Basin 3 was certainly very low in a few of those years, which would be quite a change for the hydrologic system. Moholdt et al, (2010) note low AAR for Austfonna 2003-2005.

5839-11: It appears to me that the velocities do not indicate a slow down near the coast, resulting from thinning induced heat advection in B3, if so this suggests this mechanism is limited in the face of higher water delivery to the bed and higher velocities.

Figure 1: Not a good base map for the setting of B3 including elevations.

Figure 8: Brilliant, just refer to it earlier during the discussion.

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