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Interactive comment on "Winter speed-up of quiescent surge-type glaciers in Yukon, Canada" *by* T. Abe and M. Furuya

Anonymous Referee #1

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This paper discusses an assemblage of flow velocity data on a number of glaciers in the St. Elias Mountains over a 5 year period. The data is spatially and temporally extensive and demonstrates a wide range of interesting changes in flow speed. The authors discuss the timing of three surge events. However, the focus of the paper is on surge-type glaciers not in surge phase. The authors highlight that they observe speedup on these glaciers in winter that propagates down glacier. The authors speculate as to a cause. My primary concern is that most of the observed variations in flow speed, while interesting, aren't of great surprise and appear to be, at least as shown here, as examples of already published dynamics. As such, I think what this paper contributes, is not the mechanics, but an example of how variable velocities are in the St. Elias because of these mechanics. For example, it appears mini surges are common throughout the range.

I think perhaps some of the confusion here is that the seasonal minimum in flow velocity is actually in fall, and through winter gradual acceleration occurs as cavities close and water pressure increases. (Iken and Truffer,J.Glacio.1997; Truffer et al., J.Glacio., 2005; Sundal et al.,Nature, 2012; Sole et al., GRL, 2013; Burgess et al., GRL, 2013). Your observations of "summer" velocities are actually late summer to fall thus I don't see it surprising that velocities are lower in Aug-Oct than mid winter. Also, as you say, many surges begin in winter, and such is likely the case for mini-surges as well. Thus the downstream propagation on Anderson for example appears to be as a excellent picture of annually recurring mini-surges. Burgess et al., GRL 2013, also identified wintertime seasonal acceleration in Alaska; it would be worth seeing how these changes compare. I encourage the authors to consider their results again considering previous knowledge more carefully. If done well, I think these results would be a substantial contribution. Writing clarity in this version was also an issue, but given the substantial changes needed, I will mostly comment on more substantive points.

Update intro with proper literature review.

P2614 L8 How did you correct for the stereoscopic effect?

L11 How does your elevation-dependent correction work?

What are your uncertainties in flow velocity?

Section 3.1.3 This tributary actually has a name: Ottawa Glacier

P2617 L15 This is typical of surging glaciers in quiescent phase (Burgess et al., NatCom 2013)

L25 I have never heard any reason why winter speed up would be dependent on glacier size, it occurs on ice sheets as well (Zwally et al., Science 2002)

L28 Looks to me to be late winter to early spring, could this be the spring acceleration?

P2618 L2 Don't really see this downstream propagation here. More just an accelera-

tion.

L11 These variations are clearly not due to snow accumulation. This test is unnecessary.

Discussion should be rewritten considering previous knowledge.

P2620 L9-21 This all seems tangential and too speculative given your results.

Figure 6 Unclear it dates are by column or row, or how these maps progress in time? Is there temporal overlap here?

Fig 10 State what the box is in the caption.

Interactive comment on The Cryosphere Discuss., 8, 2611, 2014.