

Interactive comment on “Seasonal speed-up of two outlet glaciers of Austfonna, Svalbard, inferred from continuous GPS measurements” by T. Dunse et al.

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This manuscript presents 5 GPS time series from a profile on each of two glaciers draining Austfonna, Svalbard. Seasonal and higher frequency speed-ups are evident and they are compared to a remote AWS record of temperature from which a positive-degree-day record is constructed. The subsequent correlation is used as a basis to infer properties of the sub-glacial hydrological system. Comparison to velocities from the 1990s reveals substantial change in speed between the two periods.

The paper is well written and clearly describes the work. The description of the GPS datasets is complete and makes an important attempt to establish the uncertainties of

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the measurements which is not always easy to do for GPS. The conclusions appear robust and substantial and should be of interest to the community.

My only modest concern with the analysis at present surrounds the uncertainties of the measurements. This relates to the resolving power the smoothed data allows in determining the commencement of events relative to other GPS stations. Given 7-day smoothing, I would like the authors to more carefully demonstrate that they can resolve changes in velocity, apparently showing propagation upstream, at the time sampling they interpret (about 1 day; P343L7). It is probably robust, but I would like them to simulate an event and see to what precision they can recover truth. If the coordinate time series noise properties during the winter are similar to the summer (maybe not?), then they could insert a known signal into the otherwise event-less winter and see how confidently they can recover the start-time of the event. This would then allow them to insert a $\pm N$ days into the manuscript. This is more critical than some dual-frequency geodetic GPS time series since the noise is orders of magnitude higher with these measurements.

Minor comments: P3425L28: "and basal lubrication does not occur" - I didn't understand this phrase in the context of the sentence and suggest a reword

P3426L8: the work of Bartholomew et al, Joughin et al, and Sole et al should be considered here L24: "Also" didn't quite flow from the previous sentences L25: "rely -> relies Figure 1: it would be really nice to have the Dowdeswell et al. InSAR velocities plotted on here - it would save some text. Hopefully this has been, or could be, made available

P3430L19: "of" -> "to"

P3431: this analysis of error (in taking standard deviations) ignores temporal correlations in the time series. that is, when you assume white noise (uncorrelated) std. dev. assumes too many uncorrelated obs and hence is too optimistic. Is there evidence of temporal correlation? If not in the raw (the hourly sampling may decorrelate it) the

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moving average obviously does introduce temporal correlations. recall the $2\sigma_{xy}$ value when propagating variances (the correlation that is normally ignored) P3431: I have often found a Gaussian averaging kernel does a better job than a boxcar

P3433L10: express as a %? L11: #1 does not go higher than in June 2008 Figure 4 & 5: the period over which these velocities were computed is not clear. L15: it is ambiguous if it is meant that the speed increases over the entire period, or just between May 2009 and May 2010. Table 2 seems to contain text which may belong here.

P3434L5: "speed-ups were" L12: significance of 0.1m/yr quoted precision is no doubt questionable? L14: sentence beginning "At Duvebreen" seems to belong to the next paragraph

P3437L19: "considered their"

P3440L9: do the authors care to widen their discussion and conclusions out to consider the other glaciers draining the ice cap?

Interactive comment on The Cryosphere Discuss., 5, 3423, 2011.