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Interactive comment on "Repeat UAV photogrammetry to assess calving front dynamics at a large outlet glacier draining the Greenland Ice Sheet" *by* J. C. Ryan et al.

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Ryan et al (2014) provide a unique study of Greenland outlet glacier dynamics using an UAV. The level of detail for crevasse mapping and velocity tracking is impressive. This paper will be an important contribution in what I am sure will be a rapid increase in the use of UAV's. This paper represents best practices at this time for UAV use. The paper has just one significant issue.

Not referencing Ahlstrom et al (2013), who have an excellent nearly continual velocity record from Store Glacier 2010-2012. This record indicates that there is a significant deceleration each year in July toward a minimum flow in late summer. This charac-

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teristic is robust year to year and even on many Greenland outlet glaciers, which has implications for the suggestion in this paper that late season thinning is a result of acceleration.

2246-19: Should note that the tidal flexure is not unique reference another glacier such as Jakobshavn where this has been observed, first by Lingle et al (1981).

2257-12 to18: Ahlstrom et al (2013) Figure 6 provide detailed 2010-2012 nearly continual Store Glacier velocity data. This data indicates a steady increase during the spring with a peak before July 1 and a sharp deceleration to a minimum in August-September. You need to reference this article but also utilize the more detailed information.

2260-2: This is not likely due to acceleration as noted here. Again Ahlstrom et al (2013) indicate that this is a period of lower velocity on Store Glacier. What about a combination of ablation and reduced flotation.

2260-5: The ablation rate cited here is not compatible with temperatures indicated from any degree day model. You would have ablation of 0.001 m/day. If we use data from Hock (2005) the degree day factors for Greenland range from 6 to 10 mm per degree per day. A few warm days were noted. For example at an average daily temperature of 8 C, this would yield ablation rates of 0.048-0.10 m/day and for 3 C 0.018-0.03 m/day. How does this affect your conclusion about the potential role of ablation.

2260-12: True, but look at the timining, this acceleration is earlier in the summer, with deceleration during July into August. This is not just the case on Store, Ahlstsrom et al (2013) noted this on Kangiata Nuniata Sermia, Sermilik Brae and Sermeq Avanagardleq all show reduced flow in July and August.

Table 2: List the number of crevasses observed in each zone.

Figure 3: Increase most fonts

Ahlstrøm, A. P., Andersen, S. B., Andersen, M. L., Machguth, H., Nick, F. M., Joughin, I., Reijmer, C. H., van de Wal, R. S. W., Merryman Boncori, J. P., Box, J. E., Citterio,

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M., van As, D., Fausto, R. S., and Hubbard, A.: Seasonal velocities of eight major marine-terminating outlet glaciers of the Greenland ice sheet from continuous in situ GPS instruments, Earth Syst. Sci. Data, 5, 277-287, doi:10.5194/essd-5-277-2013, 2013.

Hock, R.: Glacier melt: a review on processes and their modelling. Progr. Phys. Geogr., 29(3), 362–391, 2005.

Lingle, C. S., Hughes, R., and Kollmeyer, C.: Tidal flexure of Jakobshavns Glacier, West Greenland, Journal of Geophysical Research, 86, 3960–3968, 1981.

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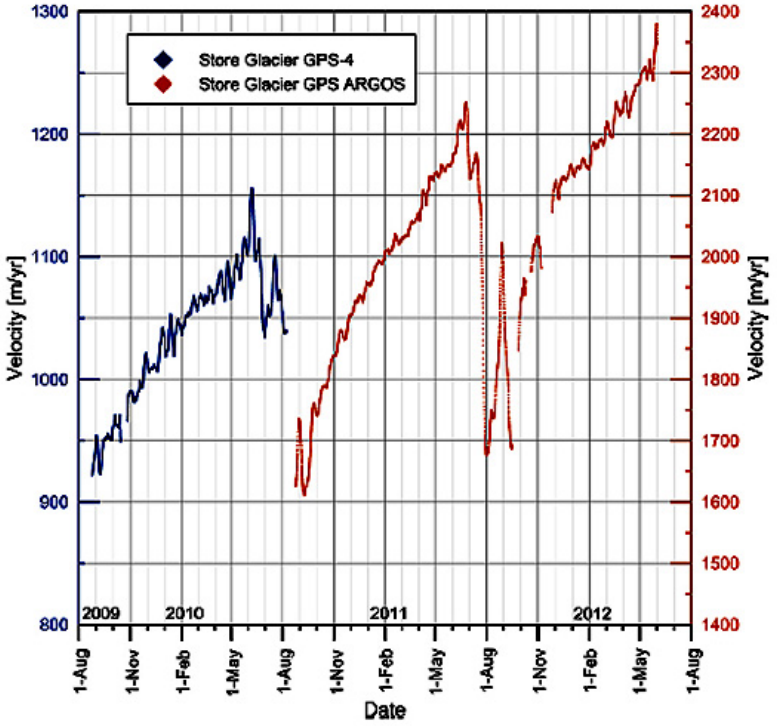

Figure 6. Store Glacier 7-day averaged GPS velocities (see Fig. 1 and Table 1 for instrument position and operational period). Note the different scales for the two GPS velocity records.

Fig. 1. From Ahlstrom et al (2013) indicating velocity of Store Glacier.

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