

Interactive comment on “Self-regulation of ice flow varies across the ablation area in South-West Greenland” by R. S. W. van de Wal et al.

Anonymous Referee #1

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This paper presents some really nice, comprehensive data sets showing seasonal speedup over an extended period. Although there have been several recent papers showing such speedup, the results presented here are accompanied by borehole pressure observations. Although boreholes can provide vastly different results, this one seems to have been well connected to the basal hydrological system.

General Points In several places the word feedback is used incorrectly, or at least ambiguously. Its fine on 4620L21–24, where melt speeds up flow, which moves ice to lower elevations, causing more melt. Elsewhere it simple refers to summer melt speeding flow. In this case text such as “suggesting a positive feedback between melt and velocity” on 4620L26 that simply refer to melt induced seasonal speedup should replace “feedback” with a better work like “relation” or correlation”, including the abstract.

C1811

Most of the analysis is sound, except the part about the acceleration by a factor of 2 in the last sentence of the abstract and the three paragraphs starting at 4629L26. The fact that that the speed increases from 50 to 100 m/yr from S10 to S9 is no evidence of any speedup related to warming because a) this area is above the ELA, so the flow should be extending and some speedup expected b) the ice overall is thinning as elevation drops so the ice should speedup further c) speed can vary substantially over short distances. The S9 and S10 speeds up have not changed substantially relative to each other over the period of observation, indicating no overall transition. If cryo-hydrologic warming had occurred over the period prior to this, there should be a substantial thinning signal between these two sites if the flux at S9 had increased substantially (50% or more) relative to S10. There is no such evidence of such thinning (e.g., Pritchard). Furthermore this is not evidence the bed is wet in one location and frozen in the other. Several studies suggest the bed is melted at both sites, though sliding could be more at S9 since the faster speed would lead to more basal melt production. Thus, while there could be some small amount of cyro-logic warming in this region, the data and analysis presented here don't support any finding of such warming. Its important to note that prior evidence of cryologic warming in this region (Phillips et al., 2013) was an incorrect interpretation of processing artifacts in the data they used, which is obvious from a quick glance at the figure showing speedup in that paper. The data presented in van de Wal Figure 2 shows little or no trend in winter velocity over the last 7 years, which is completely and correctly at odds with the findings of Phillips et al. Essentially this paper would be greatly improved by simply removing these 3 paragraphs and the reference to them in the abstract.

While the data have good temporal resolution, they provide sparse spatial sampling and even along a flow line the response to melt can vary significantly. To put this in context, it would be worth adding a couple of sentences and references to Palmer et al. 2011 and Joughin et al., 2013, both of which show the high degree of spatial variability. This type of variability explains why, for example, the response of S8 is less than S7 below it and S9 above it.

C1812

Specific points.

Page 4621L25 Change 168 h to “weekly (168 h)”

Page 462L26 Change “168 h spaced” to “weekly”

Page 4621L27 The velocity data in Figure 2 appear not be “hourly” but “weekly”

Page 4622L14 “argue” I am not sure you are arguing so much as observing. Such “observe” rather than “argue”

Figure 5 caption “infers” should be “implies” Figure 9 caption “divided” should be “divide”

Interactive comment on The Cryosphere Discuss., 8, 4619, 2014.