

Interactive comment on “Seasonal Variability in In-situ Supraglacial Streamflow and Drivers in Southwest Greenland in 2016” by Rohi Muthyala et al.

Anonymous Referee #1

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This manuscript describes the 46 discharge measurements and continuous water level measurements for 62 days during the summer of 2016, which is a long record for in-situ supraglacial stream measurements. The manuscript touches on several topics including surface energy budget, the timing of daily maximum discharge, and hydraulic parameterization. The writing is clear and concise. The overall flow is reasonable and easy to follow. However, this manuscript would benefit greatly from more in-depth analyses. Please see my detailed comments below.

1, What's new? I do not mean there is no new information here. However, the take-home messages do not strike me as new knowledge. For example, the conclusion of

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the surface energy balance that shortwave radiation dominates the seasonal and diurnal variabilities of surface melt (and thus runoffs) while longwave radiation and sensible heat contribute more than usual to peak melt events has already been made clear by several previous studies cited by this manuscript. The conclusion of the hydraulic parameter analysis concurs with that of Gleason et al. (2016): hydraulic geometry parameters cannot be generalized. The analysis of the timing of daily maximum discharge was left without a firm explanation. A lack of a clear statement of your novelty would make a reader wonder: what questions can your measurements answer but others cannot? Or what are the questions you intend to answer before starting the measurements? What new knowledge did you gain from presenting these measurements?

2, Broader impacts From reading this manuscript, I can tell what you measured and how but it is not clear why. I know these new measurements have merits on their own. I bet they are essential for certain questions. But without explicitly stating these questions and broader impacts, it is hard for readers to connect. For example, the potential impacts of the timing of peak discharges on the subglacial system and ice dynamics should be within the scope of this manuscript not in future work. This is the very reason you measured and analyzed it. Another example is from the introduction (Line 35-38): "...only a handful of studies using in situ supraglacial stream discharge to characterize current conditions". A few more words here to state the caveats of not using in-situ supraglacial stream discharge to study surface mass loss would emphasize the significance of this manuscript.

3, Title A study on "seasonal variability" usually includes more than one season of data. The seasonal variability in this manuscript is more like daily or inter-diurnal variability.

4, Introduction It would be more beneficial for readers if some of the statements are more specific. For example, in Line 32-34, how does increased surface melt influence ice sheet basal properties and ice dynamics: does surface melt increase or decrease basal melt? Line 49-50, how does timing influence ice sheet velocities?

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- 5, Section 2 Study Area How about moving this section to Section 3 as a sub-section?
- 6, Surface energy balance Surface energy balance largely determines surface melt, which in turn dominates the runoffs. On this daily timescale and without analysis on refreezing, how does your study differ from those using surface melt instead of runoffs, especially when your conclusions are the same as those studies using surface melt?
- 7, Line 272-273: “As the season progresses, the time to daily maximum discharge will reflect changes in network storage and transport efficiency.” I like this sentence. It helps me understand why the timing of peak discharges is important.
- 8, Section 4.3: this rapid shift in timing is a new discovery. A solid explanation is warranted. How does the temperature change explain this shift?
- 9, As for all significance tests, are the p values always = 0.00001 or ≤ 0.00001 ?
- 10, Line 295, what does it mean when the sum of exponent and the product of coefficients does not equal 1? Are they still valid? If the authors do not interpret their results, the readers may take it the wrong way.
- 11, Line 24-27, I do not think this is a fair comparison considering the large differences in the temporal and spatial scales.
- 12, Line 373, should the most accurate way be in-situ measurements? Or the next best, reanalysis?
- 13, Line 375, “lengthy” → “long-term”: Using “lengthy” suggests it is too long.

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