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Interactive comment on “Linking catchment-scale subglacial discharge to subsurface glacially modified waters near the front of a marine terminating outlet glacier using an autonomous underwater vehicle” by L. A. Stevens et al.

Anonymous Referee #2

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This manuscript is well articulated and shows interesting, uniquely detailed ocean observation near a glacier ice front. In my view, the use of plume theory and model is slightly overstretched (i.e. plume theory can be made consistent with the observations, but hardly explains or quantifies much of it), but the comparative analysis remains interesting nonetheless. Overall, I only have minor comments (see below) that should be easily answered by the authors, so I recommend the manuscript for publication after minor corrections.

Specific comments

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4585, Line 8-10: confusing sentence, maybe reformulate?

4586, Line 22: needed → need

4586, Line 22: It is fair to say that observations help to develop theoretical approaches, but observations are not required for that specific reason. So the lack of theories is not directly imputable to the lack of observations.

4587, Line 27: I am just curious: were the operation 'high-risk' because of the potential for calving? Presumably, a probability density function of the calving frequency could help reducing that risk. Was such a pdf available to you?

4588, Line 12: Only CTD and turbidity? Did the ADCP not work properly?

4589, Line 24: 3m → 3.2-3.6m, or alternatively, change the vehicle speed to 1.5m/s

4590, Line 6: remove comma after CTD casts and change 'and RBR' → 'an RBR'

4590, Line 15: how can there be a 2.5m error in depth measurements between CTD cast and REMUS observations?? That is way beyond the accuracy of the pressure sensors.

4590, Line 20: 'a REMUS ADCP'. Why 'a'? How many ADCP units were mounted (the expression 'dual' in the description section is unclear)? If there were more than one ADCP, maybe replace 'a' with 'downward looking'.

4592, Line 20-24: Very hard to read, please rephrase.

4593, Line 15 and Figure 7, caption: bedmap → bed map?

4596, Line 16: I (think I) understand why GMW1 is likely coming from an area of higher runoff than GMW2 (larger subglacial flux>larger buoyancy forcing>shallower equilibrium depth), but I am not sure the sentence and the connection is clear enough for the average reader. I guess you could refer the reader to section 4.3 where this link is more clearly explained.

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4601, Line 3: why only 2 primary subglacial discharge? Aren't the observation potentially missing D3? I generally agree that a case can be made for D3 to be of minor contribution, but don't really see a need to dismiss it either.

4605, Line 24: similarly, unless otherwise explained, I would suggest stating: 'For this system, we observed AT LEAST two, ...'

4605, end of paragraph: I totally agree with the authors. I might add however that the time variability of the subglacial discharge might also lead to modifications in the nature of the discharge distribution at the ice front (say, from 2-3 distinct point discharge to a more distributed discharge?). Please feel free to add a sentence relaying this additional thought, or not...

Interactive comment on The Cryosphere Discuss., 9, 4583, 2015.

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