

# ***Interactive comment on “Spatial and temporal variability of water-filled crevasse hydrologic states along the shear margins of Jakobshavn Isbrae, Greenland” by Casey A. Joseph and Derrick J. Lampkin***

## **Anonymous Referee #2**

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This paper looks at the hydrology of the shear margins of Jakobshavn Isbrae, and attempts to link the filling and drainage of water-filled crevasses with the dynamics of the glacier both in cause and effect. This is a fascinating area of study; there are extensive regions of water-filled crevasses in Greenland yet they have received far less attention than supraglacial lakes in the literature, and their potential influence on the glacier’s shear margins is intriguing and I can only commend the author’s for seeking out an interesting topic of study. However, this paper falls short of its stated objectives and reading it left me no wiser as to the causes or effects of water-filled crevasse

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drainage.

My major issues with it are as follows:

1) The authors make much of increases in drainage over the study period, yet don't take into account a similar trend in observation frequency. Any potential bias needs to be accounted for before any such conclusions can be reached.

2) I can't actually work out what the main conclusions of this paper are, let alone if they are supportable. Perhaps a separate conclusion section might have helped me understand what the point is? The discussion is based heavily on the existing literature and the conclusions hinted at appear to result from reviewing the literature rather than insight from the presented results. I don't believe that the results presented in the paper actually add anything to the discussion.

3) The paper is badly written with little evidence of care or proof reading. Some sections have incomplete sentences. Others are overly verbose. This does not help the reader fathom what conclusions they are expected to take home.

Unfortunately, I cannot recommend publication in its current state.

Line by line comments:

Page 1. 14: May has the fewest filled days? Not, for example, December?

15: "Inter-seasonal drain frequencies over this system...". I've read this several times and I'm not sure what it means.

17 (and throughout the paper): Do you mean averaged between -1 and 2? Or averaged from -1 to 2?

Page 2: 4: See Joughin et al. (1996) and Everett et al. (2016)

19: Is there a citation for these crevasse systems being responsible for hydrological weakening of the shear margin?

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20-21: This is not a sentence.

26: "satellite derived measured velocity data". Redundant word

27: Again, it feels like the authors never finished this sentence.

Page 4: 18: Presumably you know how many crevasse groups were filled, making inferences from the number of drainages rather pointless?

Page 7 onwards: This whole section is very hard to read. Some paragraphs might help!

Figure 4a: No matter how much I read the description of this figure I cannot work out what it actually presents. I also don't see how it fits into the paper as a whole.

Everett, A., Murray, T., Selmes, N., Rutt, I., Luckman, A., James, T., Clason, C., O'Leary, M., Karunarathna, H., Moloney, V. & Reeve, D. (2016). Annual down-glacier drainage of lakes and water-filled crevasses at Helheim Glacier, southeast Greenland. *J. Geophys. Res. Earth Surf.*, 121, 1819–1833, doi:10.1002/2016JF003831.

Joughin, Ian and Tulaczyk, Slawek and Fahnestock, Mark and Kwok, Ron (1996) A Mini-Surge on the Ryder Glacier, Greenland, Observed by Satellite Radar Interferometry. *Science*, 274 (5285). pp. 228-230.

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