

Interactive comment on “A Synthesis of Three Decades of Eco-Hydrological Research at Scotty Creek, NWT, Canada” by William Quinton et al.

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My main criticism is that this article could be alternatively titled ‘My life’s work’. There are 40 self-citations to the first author’s work alone, which is highly unusual. However, I can appreciate that there is no real way to circumvent this, as doubtless the authors of this paper (especially the first author) have led the work at this site for many years and produced many important papers. However, as a comment, I wonder if they could include a section (or at least some more text) relating the work at Scotty Creek to other long-term northern, discontinuous permafrost research catchments, even ones that may have different physical conditions. That might give this broader appeal.

â“ We thank the reviewer for these suggestions. However we feel that a title such

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as “My life’s work” for a research programme that has involved such a large number of research colleagues, local community members, and hundreds of students, would be grossly inaccurate. We do agree that it is unusual to see a large number of “self-citations”, however, it is also unusual for researcher to dedicate his entire career to a building a research station for long term (i.e. multi-decadal) studies. It is the study site that is the subject of this paper. We will follow the referee’s suggestion of adding text relating th work at Scotty to other long-term observatories.

2. I don’t find the first two paragraphs of the introduction particularly well written. In my opinion the first paragraph should talk about circum-polar subarctic cold regions/permafrost/hydrology work to begin with (at a large-scale) and then narrow to the region containing Scotty Creek. This paper starts with a rather abrupt introduction to the Liard River valley, and then expands in the second paragraph to the broader Mackenzie River basin. Restructuring and enhancing the circum-polar questions and implications would position this paper better in the broader literature. I think that is important, as it is certainly not standard to write a review paper in a hydrology journal that is focused on just one site, and it would be useful for the authors to really emphasize the critical nature of this work.

â“ We thank the reviewer for these comments. We will revise the first two paragraphs of the paper so that it starts off with a broader scope, rather than the other-way round.

3. Sections 2 and 3 are a bit of a laborious read and describe processes and concepts that could easily be visually represented. Why not have a figure in Section 2 that shows the landscape units and how they function and interact hydrologically? This would be useful when the authors refer to the ‘new conceptual framework for runoff generation’ (P5, L23). Some of this would be easier to see than read (although I recommend that the text be retained). Section 3 could have a figure that shows some active layer conditions or processes (e.g. data for K vs. depth or some freeze-thaw conditions).

â“ The need for a conceptual diagram was raised by other reviewers. This will be

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included in the revised Summary and Conclusions section.

4. I miss much discussion on biogeochemical processes or storage and lateral fluxes of nutrients etc. I understand that has not been the focus at Scotty Creek, but I am surprised there are so few studies to refer to. Related to this, there is very little discussion on vegetation changes at Scotty Creek except where the focus is the impacts on hydrologic processes. Surely some of the Baltzer work could be better highlighted. I would suggest giving more than a passing glance to the important Baltzer et al. 2014 GCB (P11, L26) study. Although Eco-Hydrological is included in the title, there surely isn't much eco content in the paper.

â€” It was decided at the outset to limit the scope of this paper to the 20+ years of hydrological research. The author is aware of the others studies at Scotty Creek (e.g. studies that focus on GHG, ecology, sedimentology, biogeochemistry, etc.), since he invited the researchers to pursue such studies. However, the scope of the paper would be far too broad, and the length too long. This would be better accomplished with a Scotty Creek book, with separate chapters detailing the advances of different areas of study. This has been done for other long term stations (e.g. Wolf Creek, Yukon).

5. Figure 3 on the active layer and talik etc. could also include an additional pane or two showing the 'dual layered system' of flow (P12, L14).

â€” This has been done.

6. How much longer will the increased hydrologic connectivity result in higher flows? If the wetlands are dewatering, when will the basin reach 'peak water'?? It seems to me that this concept related to glacier discharge could also be applied to Scotty Creek as the wetland storage decreases.

â€” Since this paper was submitted, we have advanced our understanding of the permanence of water storage changes in response to permafrost thaw. This will be included in the revised draft.

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7. The conclusion ends abruptly. It almost seems like text were deleted by accident. There is no vision, no path forward, no high-level statement explaining the importance of the work. Something needs to be rewritten here.

â€” This was also noted by other reviewers. This section will be changes with the help of sa new conceptual diagram.

P2, L5, should 'regions' be after 'warming'?

â€” This sentence has been reworded.

Figure 1, this is obvious to Canadians, but probably 'Canada' could be labeled in the inset

â€” Done.

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