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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Recent Changes to the Hydrological Cycle of an Arctic basin at the Tundra-Taiga Transition" *by* Sebastian A. Krogh and John W. Pomeroy

Anonymous Referee #2

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I think this is a generally well-written and important paper that attempts to separate the drivers of climate change and vegetation change on hydrology over a historic period. My biggest concern is the observational data used to drive the model, particularly precipitation and snow. I understand that the experiment compares three scenarios (changing climate, changing vegetation, and both) so I would like to see how each of these is impacted by uncertainty in the quality of the precipitation estimates. If the cold season precipitation is most biased, it could be that changes in the length of the cold season cause changes in this bias with time. I think the springtime precipitation trend is suspicious and I'd like to know how uncertainty in those data impacts the robustness of the results. The description of the precip data is useful, but I'd have

more confidence if a more thorough comparison of different precip data sources (and nearest other stations) were performed. There are a lot of discontinuities in these datasets, as described. Have the authors considered doing a scenario that separates temperature and precipitation change? In the discussion, I'd like to hear more about impacts of the uncertainty in the precipitation data on the larger results of the study. Same for snow measurements and to a lesser degree, streamflow.

Minor comments: like the other reviewer, I don't care for the use of the term 'hydrologically resilient' without a technical definition provided. This is too vague. I would also like a little more information on this basin. Is this a well-instrumented research basin? It doesn't really seem like it, based on the description of the single station observations. Why was it chosen? Are there no research basins that fit the description (tundra-taiga boundary with permafrost)? In your introduction, it might be worth mentioning the NASA ABoVE (Arctic-Boreal) campaign, focused on exactly these eco-zones because it has a hydrology component. Finally, while most of the paper is readable, the abstract could use some work. Go for shorter, simpler sentences that really convey what is interesting and exciting about this paper.

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