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July 8, 2017

Dear Dr. Van Dijk,

With this letter, we submitted the revised version of our manuscript “Toward improved parameterization of a macro-scale hydrologic model in a discontinuous permafrost boreal forest ecosystem” by Abraham Endalamaw, W. Robert Bolton, Jessica M. Young-Robertson, Don Morton, Larry Hinzman, Bart Nijssen (doi.org/10.5194/hess-2017-25)

We thank the reviewers for their detailed comments and we made many of the suggested changes. When appropriate, we provided detailed descriptions of the changes or our decision to retain our original text or figures; otherwise, we were brief in our response when the suggestions required a simple change.

Both reviewers suggested we test our model in a larger basin. We agreed with the suggestions. However, in order to use our model at a larger or different watershed in the current setup, we need small-scale permafrost distribution and vegetation cover data. Caribou Poker Creek Research Watershed (CPCRW) is the only watershed that has observed permafrost distribution and vegetation cover data to perform such experimentation. Nevertheless, the next step is to model the permafrost and vegetation cover over a larger catchment using the method developed in this study. Therefore, with the current experimentation and parameterization setup, testing the model at a larger basin where observations do not exist would be out of the scope of the current study detailed in this manuscript. As indicated in each reviewer’s responses, testing of the small-scale parameterization study in a larger catchment will be conducted in the next phase of the research project.

Reviewer #2 suggested we put the evapotranspiration (ET) and soil moisture simulations (Figures 7 – 11) as appendices. The reviewer indicated that these simulation results would have strengthened our modeling if field observations were available. We agreed with the reviewer’s remark that if basin scale field observation existed, we would have an opportunity to compare our simulations with observations. Unfortunately, there are no relevant field observations to compare each simulation with observation. However, our basin-scale ET and soil moisture simulations would help to inform readers how each process is impacted when different parameterizations are applied. Thus, it is with the readers and future researchers in mind that we retained the figures within the main body of the text.

Our detailed responses to reviewers are attached to the author’s response section under each reviewer. The revised manuscript is attached here as separate author’s comment.

We look forward to hearing from you,

Regards,
Abraham Endalamaw