Geoscientific
Model Development
Discussions

Interactive comment on "ORCHIDEE MICT-LEAK (r5459), a global model for the production, transport and transformation of dissolved organic carbon from Arctic permafrost regions, Part 2: Model evaluation over the Lena River basin" *by* Simon P. K. Bowring et al.

Anonymous Referee #1

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This portion of the study present the results of the model evaluation in the Lena River Delta. The first result that one notices is that there are some fairly significant problems with the simulated discharge, both in the timing and the magnitude. As the authors note, there is too much spring flow and the timing is a bit off, not enough growing season/fall baseflow. Plus it seems as though the model underestimates discharge by 50-100%. This is addressed in the manuscript directly, but little analysis is given about it. The failure of the model to accurately model the annual discharge results

in really substantial uncertainties in the budget for DOC exports. However, this is not at all quantified in the current analysis, which undermines any substantial conclusions on DOC export from the study. Until the issues with discharged are corrected, these numbers on DOC export and processing are most likely inaccurate. As an absolute minimum, the uncertainties resulting from the discrepancies with discharge need to be quantified.

The manuscript text in this model evaluation section is quite long and a bit disorganized. It could really use a major re-working to streamline and refine the points.

Throughout the main text & supplement: Maps all require lat/long labels (grid labels). lat/long grids necessary. Really hard to read with blue background; can't tell the watershed outline, can't differentiate terrestrial vs. Arctic Ocean.

Specific comments:

33: continuing the numbered list doesn't seem to make sense

91: check figure order

125: does is make sense to call the transient model the control?

813: I don't think Svalbard has forests

834-843: doesn't fit in this section

Figure 2: what do the CO_2 numbers at the top mean?

Fig. 3: too much snowmelt, too little baseflow.

Fig 4a: legend order confusing, figure isn't super useful.

Fig 4d: extra dotted lines are confusing

Fig 5. Doesn't contain much new info, what does p-1 mean?

Fig 8: units of per pixel make not much sense.

Table S1: is it Tootchi et al., 2018 or Tootchi et al., 2019? Text says one, Table says another.

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