**Hydrology and
Earth System
Sciences
Discussions**

Interactive comment on "Subsurface release and transport of dissolved carbon in a discontinuous permafrost region" *by* E. J. Jantze et al.

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This manuscript reports on novel data from a high-latitude catchment that adds to the important body of knowledge on catchment solute export. Further the paper couples these interesting data with a simple but elegant model framework to gain conceptual understanding. The paper is also very well written. I recommend publication subject to the comments and suggestions below.

1. I found the use of a uniform distribution for g(tau) not very well defended (p. 10). As the authors note, other distributions are more realistic. I suggest either including a more realistic function or more strongly defend why the improvement in results would not be enough to warrant the added complexity of a 'more realistic' distribution. 2. In at least three parts of the paper (pp. 11, 14, and 15) the authors discuss the relative temporal

variability of concentration, flow, and load. I have used the ratio of the variances of ln_c and ln_q to describe and understand the relative dominance of of c and q variability in relation to chemostasis. As shown in the paper cited below, the mass flux correlation to discharge, such as the authors found in Fig. 6, can be shown to be analytically explained by this variance ratio. However, the authors have used range rather than variance when discussing the effect of "fluctuation around temporal mean" (p.15). As the author of the paper below, I naturally encourage these authors to consider the benefits of ln-variance ratio. At a minimum, they might find it instructive to review: Jawitz, J.W., and Mitchell, J., 2011. Temporal inequality of catchment discharge and solute export. Water Resources Research, 47, W00J14, doi:10.1029/2010WR010197.

Other comments 1) Abstract: Consider reporting the solute dissolution/release rates here 2) P. 2, line 11: Include the country here 3) P. 2, line 13: Check this again. Concentration may have been flow-independent but not load. 4) P. 2, line 16: Again, consider rephrasing since probably all loads are 'high flow-dependent' 5) P. 3, line 26: I suggest modifying "described" with "qualitatively", "conceptually", or similar 6) P. 4, lines 5-12: It is not necessary to cite every paper on the subject. Two or three of these will suffice. 7) p. 6, lines 15-18: The point being made is that the regression slope is very close to one. Thus reporting a good r2 is not enough here, the slope is also important. The text says "1:1" but the slope is really 0.935. Was this used as a correction factor, then? I suggest being more explicit here. 8) p. 6, lines 23-27: The load estimation method described is appropriate when daily flow and daily concentration data are available. Concentration data were available on a limited temporal frequency, so more consideration is suggested for the appropriate interpolation of concentrations and loads. Cohn and collaborators argue for regression methods (see the USGS software LOADEST). There is a rich discussion on this topic in the literature. 9) pp. 6-7: I was surprised that an annual value for DOC was dismissed as an outlier so casually. This value presumably arose from many independent measurements. I think more examination and/or discussion about this is warranted. 10) P. 7, line 20: Should the numerator be dc* ? 11) P. 8, line 7: Remove "first" here (it is repeated on the next line).

12) P. 8, "flown" is not the correct usage here. Some might use "flowed" but that's not very good either. I suggest a different sentence construction in these cases. 13) P. 8, line 11: It is not necessary to add the clause that begins "i.e.,..." It is definitely not necessary to add such clauses for each equation. 14) P. 9, line 1: Neither "c" nor "s" are in the following equations. Further, equation 4a appears to be exactly equation 3a and thus does not need to be repeated. Also equation 4c seems to be exactly equation 3c. 15) P. 9, line 18: should be "flux-average" (or "flux-averaged") 16) P. 10, lines 22-24: Consider specifying what method was used to determine this 17) P. 11, lines 6-7: Remove the clause that starts "even if..." as this is repeated from the previous line. 18) P. 11, line 9: I think the "catchment-average" formula here is only correct if the two variables are uncorrelated. 19) P. 14, lines 23-26: I was unclear if these statements were intended as conjecture or if there were data to support them. 20) P. 16, Consider moving section 5.3 up ahead of the current 5.2 21) Figure 2b: I was not clear why this was labeled concentration or mass flux. 22) Figures 2 and 3: Nothing new happens in these 4 graphs after 2 to 4 years, so it is not clear why they are extended for 10 years.