Biogeosciences Discuss., 10, C3482–C3483, 2013
www.biogeosciences-discuss.net/10/C3482/2013/

Biogeosciences Discussions
Open Access

Interactive comment on "Catchment-scale carbon exports across a subarctic landscape gradient" *by* R. Giesler et al.

Anonymous Referee #2

Received and published: 15 July 2013

The paper by Giesler et al. summarizes DOC, DIC and flows from 6 catchments in a relatively close geographical area. The strengths of this manuscript are the data set as collecting water quality and flows in northern catchments is a challenges. Weaknesses of the manuscript are in its clarity of interpretation. While I believe that there is value in this manuscript, I believe it needs to be recast to sufficiently highlight its strengths.

Major Comments:

∼ there are no description of soils or parent geology and how this varies across the landscape. This is a glaring omission and goes to the heart of the DIC question. How interpretable are the results without this information?

∼ I am unsure of the space-for-time argument. These sites have a very limited spatial

extent and I see no clear argument as to how their spatial arrangement can be used as an argument for changing temporal patterns. Perhaps I am missing something here? The catchments do appear to have some trends with time, but that is not a space-for-time argument. Without information on the disposition of permafrost / soils among these catchments, I do not see how this is possible. I would suggest the authors recast the manuscript to provide a more clear and convincing rationale.

∼ The comparison of total flows (in m3) is meaningless, particularly when using this to compare with mass fluxes which are not independent from total flows. I think the authors can work to address and eliminate the large differences in area that clearly influence mass loads and attempt to focus on changes in patterns of normalized C fluxes.

∼ There is insufficient information about the hydrology of this 'water year'. I note the large differences in total runoff (in mm) in Table 1. What is the cause of such large normalized variability? Does this go to the quality of the discharge data, which is not addressed particularly. I am quite nervous about the interpretation of the results based on the uncertainty in the flows.

∼ This work builds on considerable past research, but I am uncertain as to its unique contribution. Exploration of terrain characteristics and simple regression analysis with regressions really only particularly strong with the (not independent) mass fluxes and total runoff provides little new insight. The paper re-states ideas of flow paths, and there is some evidence based on the DIC-flow path length relationship, but again, if the authors are looking to provide improved insight into what causes the spatial variability among the catchments, it is not clear to me.

Overall, while this data is of interest, I believe the authors should rework the manuscript to focus on the unique contributions of this work and how it informs our understanding of carbon and hydrology in discontinuous permafrost environments.

Interactive comment on Biogeosciences Discuss., 10, 7953, 2013.