A review on a paper
"First Pan-Arctic Assessment of Dissolved Organic Carbon
in Lakes of the Permafrost Region"
by Stolpmann et al.
submitted to *Biogeochemistry*

General remarks

The paper presents so far the largest available database on the DOC concentration in Northern permafrost lakes. It will be important contribution to further research of Pan-Arctic carbon budget, which still suffers from significant uncertainties, among which the freshwater ecosystems role is not the least. The manuscript is in a good shape and should be published after a number of comments listed below are addressed. I have two major methodological concerns:

- a potentially important and still poorly quantified source of errors for such global or regional estimates is that the samples from individual sites are taken at different seasons of a year, thus representative of different phases of annual cycle; this makes a month of sampling to be one more factor of DOC concentration in addition to a list of factors studied in the paper; this factor is addressed in Section 4.1 (and it is shown, that for some lakes DOC difference between seasons attains an order of magnitude), but no implications are formulated for analysis carried out in subsequent Sections; in fact, neglecting the difference in season of sampling between lakes imposes uncertainty which is additional to the factors either omitted in this study like climate parameters and local hydrological conditions; I suggest to add analysis of this factor in Discussion;
- in the study, the individual correlations of DOC with different factors are estimated, whereas the *joint* effect of these factors and predictive skill of a *set* of respective parameters on lake DOC content may be estimated as well, concomitantly quantifying the remaining uncertainty imposed by not taking into account the other factors; multiple correlation analysis could be a natural extension of the method used in the paper to achieve such estimates. I suggest that the authors elaborate on this topic in the paper.

Specific comments

- Page 2, Line 10: better to specify which is the part of Siberia, where individual boreholes demonstrate significant positive temperature trend
- Page 2, Line 25: is there direct chemical pathway from DOC to CH_4? Anyway, this is not mineralization. If you mean that DOC is stored in sediments after flocculation, and then decomposed to CH_4, please rephrase the sentence to make it clear.
- Page 2, Lines 26-29: "The mineralization of DOC in a lake is a major component of the global C cycle..." is too strong statement. "one third to one-half" – does this contribution include river C fluxes? Please rephrase to make understandable.
- From which lacustrine layer DOC has been sampled in lakes? I guess, epilimnion. Please provide the info.
- Section 3.3: I would expect, that in order to isolate the influence of a single factor on lake DOC, you should compute correlation coefficient for a series of DOCs from all lakes, for which the other factors are fixed. Or you computed each correlation coefficient for the total number of lakes? Please precise.
- Table 4: not clear, how the rank correlation coefficient have been computed for qualitative predictors: permafrost region, ecoregion, ground ice content, deposit type. Please provide details.
- What is the reason for ultrahigh DOC concentrations in some Alaskan lakes?
- Page 16, Lines 30-31: an unfinished sentence
- Page 17, Line 22: I guess you meant "occupied **by** wetlands"