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# *Interactive comment on* "Impact of river discharge, upwelling and vertical mixing on the nutrient loading and productivity of the Canadian Beaufort Shelf" *by* J.-É. Tremblay et al.

**Anonymous Referee #1**

Received and published: 20 February 2014

The authors present a detailed data set of the particulate and dissolved constituents of the Mackenzie River plume in the shallow region of Mackenzie Bay and Kugmallit Bay and the adjacent southeast Beaufort Sea during summer. This region is interesting but also complicated due the various source waters as the riverine discharge, the Pacific water inflow, etc., all with very different compositions of nutrients and organic matter. This makes a general interpretation difficult. The authors make a lot of calculations some based on assumptions. These calculations are complex and should be presented more clearly. They describe conservative and non-conservative behavior of individual compounds but the explanations are sometimes vague and not really supported by their data. For example, silicate, DON and DOC declined in a conservative manner



from the river towards the open sea but there must be remineralization processes of DOM and utilization of the huge amount of silicate. The authors should avoid publishing their data in many small publications. They have already published quite a lot based on the MALINA project and will publish another one on $\delta$18O although these data are very important for the interpretation of the influence of sea ice meltwater and riverine water for this manuscript.

The manuscript is generally well-written but is sometimes not carefully worded (typos, missing references) and suffers from very long and complicated sentences. I recommend publication with minor to moderate revision.

Minor comments:

At the end of the introductions objectives or hypotheses are missing. The authors present just an outlook of the content of their manuscript.

Methods

The determination of the organic matter is quite inaccurate. There are much better methods than the wet oxidation. CN analyzers for particulate and dissolved organic C and N are much more precise. The calculation of dissolved organic matter by subtracting the particulate part from the total is also rather rough. This has to be considered for the interpretation of the data.

How were the acidified samples stored?

Page 16680, line 24: are filters pre-combusted?

Page 16682, line 23: It is ultra-pure water from a Milli-Q ion exchange unit and not distilled water. Distillation is a totally different method.

Page 16682, line 27: How were real-time measurements performed?

Discussion

There is no need to introduce the following discussion at the end of the first paragraph (page 16688). The calculations or better estimates of the new production are extremely difficult to follow. The authors are asked to improve this perhaps by adding a table.

Page 16690, line 3ff: It is hard to believe that sea ice meltwater has such a strong dilution effect although it is well known that sea ice has very low nutrient concentrations.

Sometimes silicic acid is used but also silicate. I propose to use generally silicate.

There is a mixture of the unit for nutrients and organic compounds using $\mu$M or $\mu$mole L-1, etc. Both are correct but it is better to be consistent.

Missing in References:

Bergeron and Tremblay, 2013

Granger et al., 2011

Kirkwood (1992)

Raimbault et al. (1990)

Aminot and Kerouel (2007)

There are several typos (some are listed here):

Page 16677, line 16: Correct Le Fouest

Page 16681, line 25: study not with capital

Page 16684, line 16: delete psu and wherever it is used as unit in the text (it occurs several times)

Page 16684, line 8: nitrate not with capital

Page 16687, line 7: ..in stark contrast the shark drop of TPP... This sounds very strange, please reword.



Page 16690, line 11: ...and N recycling....

Figures

Remove psu from the salinity figures and figure legends. As you write yourself it is no unit for salinity.

Fig. 1: Change phosphorous to phosphorus in the legend

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Interactive comment on Biogeosciences Discuss., 10, 16675, 2013.