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The Cryosphere Discussions

Interactive comment on "Dissolved and particulate organic carbon in Icelandic proglacial streams" *by* Peter Chifflard et al.

Anonymous Referee #2

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The authors reported an organic carbon study in Iceland glaciers meltwaters, based on a field work in July of 2016. They reported important information for this island, especially for its POC and DOC concentration, as well as its DOC composition information. I think this is the most interesting key point for this study. However, I think the flaw is also obvious. I am writing the following suggestions for the authors to improve their manuscript. I think the major suggestions are the key problems that the current manuscript should overcome.

Major: 1. The POC measurement method. I think the authors did a very good job in DOC measurement. But for POC measurement, the method seems too old. As stated in the manuscript, there should be some interference (sometimes it may be very big) due to this old method. I think an elemental analyzer should be used, with

inorganic carbon being removed (e.g., via HCl) first. As POC data is widely presented and discussed in this manuscript, so I think this becomes a very clear flaw of the work. In addition, authors reported that POC flux in Iceland is very large in this work and take this as one of the key findings. Given the POC method problem, I think their suggestions (about the big POC flux) are not that convincing.

2. OC flux. In this ms, organic carbon flux is presented in the conclusion part, which is very strange. I think the flux estimate should be in a separate section, and with all the uncertainties presented and discussed.

3. Organic matter process in the glacier meltwaters. I got confused by the authors. At line 5 of page 7, authors suggest that the DOC concentration decrease is likely due to influence of seawater, as indicated by higher electrical conductivity. I went to Table 2, and check for the data of HV (ie. HV01-HV11). When I plot the conductivity against DOC concentration for all the HV station (ie. HV01-HV11), I found no such supporting relationship between conductivity and DOC concentration. Instead, DOC concentration seems slightly increase with increasing conductivity. This is in contrast with the authors words in line 5 of page 7. I have no idea if this is due to my mistake as I am not that familiar with the data as the authors are, but I think anyway the authors explanation here needs more attention.

4. POC decrease at line 7 page 8. I think authors should present stronger evidence to support their idea that the POC decrease may be due to direct use and reworking by benthic organisms, instead of citing a literature. Did they have evidence of benthic organisms in the sampling site? We indeed observed mosquito-like winged insect in some of the glacier meltwaters in the field. Sometimes there can be some other insects in some of the glacier meltwaters (benthic like). Is that the case in this current work? Are these insects being removed in the membranes before the sample was measured? On another aspect, authors would need evidence to prove that how significantly these author-mentioned microbial can contribute to modifying POC, given the short distance (and hence short time) and low temperature (and hence low rate) environment. I see

that DOC in glacier meltwater may be highly labile, but for POC, the condition can be quite different. I suggest the authors check if the POC variation is partly due to increasing conductivity or not. In addition, to present and discuss POC% data (POC in mg/L divided by TSM in mg/L) may be helpful too.

Minor: 1. about the length of the streams. In line 34 page 3 authors suggest that the streams are long. But later in line 20 page6, authors suggest that the streams is short. I got confused.

2. from line 10-20, page 3. The result from model predictions come with uncertainties. And so I suggest authors shorten the discussion and comparison for the glacier future changes.

3. the OC flux should be discussed with care. For example, OC may vary in both concentration and composition among different months within a melting season.

4. Figure 1. Please indicate the north direction.

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