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Interactive comment on "Particulate organic matter composition and organic carbon flux in Arctic valley glaciers: examples from the Bayelva River and adjacent Kongsfjorden" *by* Z.-Y. Zhu et al.

Z.-Y. Zhu et al.

zyzhu@sklec.ecnu.edu.cn

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Thanks for the interest in our work.

It is expected that the in situ production contribution to organic matter in glacier meltwater may be less when compared to that in surface fjord waters, but direct evidence is lack. In this work we presented quantitative evidence. Based on amino acids yields, the AA nitrogen proportion in PN showed a clear increasing trend from 0 salinity in glacier meltwater to over 30 salinity in the fjord. Also, D-form of amino acids give

signal of bacteria activity in glacier basin, while the different abiotic racemization rate further confirmed the bacteria contribution. This result echos previous hydrochemical (Hodson et al., 2002) or microbial (Irvine-Fynn et al., 2012) studies. More important, though glacier meltwater runoff and sediment transport flux have been well studied/estimated previously (Bogen and Bønsnes, 2003; Hagen et al., 2003), bulk organic carbon flux for Svalbard remains largely unknown (Kuliński et al., 2014), especially the dissolved form. In the meantime, almost all the rest arctic river basins (e.g., Siberian/Alaskan/Canadian river basins) has been studied (Dittmar and Kattner, 2003; Holmes et al., 2012). Though the flux for whole Svalbard is preliminary and tentative, So far as we know, it is the first report for whole Svalbard organic carbon flux.

A comparison with different month would certainly be better, but in this study it was not available. We chose August in this study as it is in the middle of ablation season. Another reason is that July-August is the best time to exam the glacier meltwater influence to the fjord. Previous study has indicated that in July and August the glacier meltwater causes oligotrophic condition in the fjord and accordingly a shift from diatom-based to pico-phytoplankton based fjord ecosystem is reported (Piquet et al., 2014).

To remove the inorganic carbon before measure POC, we use HCl vapor and the method has been used before and described elsewhere (Wu et al., 2013).

About the 'great contribution of POC to the study area', it is the area-weighted OC flux. Basically, we first estimated the total OC flux, and then divided it by the total glacier area, then we got the area-weighted OC flux. The Greenland ice sheet is great both in total OC flux and area, but its area-weighted OC flux is very low, compared with Svalbard. In the revised version, we further add discharge-weighted OC flux, which is calculated as total OC flux divided by discharge. Svalbard is very low in total OC flux, but in both calibrated fluxes (i.e., the area-weighted OC flux and discharge-weighted OC flux), it is very important and cannot be neglected when compared to Greenland ice sheet and other valley glaciers (like glaciers in Gulf of Alaska). In fact, the discharge-weighted DOC flux is highest for Svalbard, when compared with other arctic glacier systems (Greenland ice sheet and glaciers in Gulf of Alaska), and this indicates its important potential in carbon cycle/budgets as DOC usually travels much further than POC.

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