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Interactive comment on "Springtime phytoplankton dynamics in the Arctic Krossfjorden and Kongsfjorden (Spitsbergen) as a function of glacier proximity" *by* A. M.-T. Piquet et al.

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Dear reviewer,

We thank you for the constructive comments on our manuscript. Here below, we respond to your comments on the following issues: cyanobacterial abundance, near glacier zooplankton mortality, and seasonal differences between the two consecutive sampling years.

Cyanobacterial abundance: Regarding the relative high abundance of cyanobacterial

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pigments in our sample set. We speculated that these might indeed be of marine origin and might form a new marker species. Yet, we omitted to include the possibility that the cyanobacteria could have originated from freshwater (glacier and snow field melt water). Indeed, Arctic cyanobacteria are known to be well adapted to the cold and freshwater environment (Vincent 2007, Jungblut et al. 2010, Harding et al. 2011). We had a closer look at our data, in particular pigment composition profiles for surface and 20 m depth samples. The relative cyanobacterial pigment abundance was highly similar in surface and 20 m depth samples throughout the entire sampling period and at the different locations. We would expect small freshwater cyanobacteria to stay confined within the surface melt water layer of the fjord. The high buoyancy of cyanobacterial cells would most likely prevent rapid sinking to 20 m. Therefore, our data do not provide support for a freshwater origin of the cyanobacteria. On the other hand, it is true that the Middle and Glacier stations of the Kongsfjorden, which were most influenced by glaciers, had the highest cyanobacterial pigment abundances. At the middle station cyanobacterial pigment abundances averaged 4.8 and 6.7% at 0 and 20 m depth respectively, and at the glacier station: 9.6 and 8.8%. While the Ocean station had the lowest cyanobacterial pigment contributions: average 3.6 and 1.9% at 0 and 20m, respectively. Overall our data based on the spatial and depth distribution of cyanobacterial pigments and our inability to get cyanobacterial sequences do not enable us to confirm or reject the freshwater origin of the cyanobacteria. We will therefore elaborate on this matter in the discussion section attributed to the cyanoabacteria.

Zooplankton mortality: In the present study we did not look into the effects of zooplankton mortality and the associated egestion/excretion by upper trophic levels. Despite the interesting link to enhanced bacterial abundance and productivity, this is a matter we will not discuss in the current paper. It mostly would concern activation of the heterotrophic fraction of the prokaryotic community. We will discuss this issue in the prokaryotic manuscript of the same dataset that currently is under preparation.

Seasonal plankton development: We agree with your comment that an ideal sam-

BGD
10, C7724–C7726, 2014

pling situation would have been to have a long continuous sampling period, rather than comparing two successive years. Unfortunately this wasn't logistically feasible. In the figures, we clearly indicated a break between the 2008 and 2007 seasons, in order not to suggest that we were constructing a single phytoplanktonic seasonal development based on two different years. Thanks to work done by Hegseth and Tverberg (2013) we could confirm and compare our findings. We think that this comparison provides a robust support for the data set as we presented and discussed it. Furthermore, both years, were characterized by Altantic influence and therefore were reasonably legitimate to compare. Future research plans due for 2014 and upcoming years will include continuous (weekly) sampling, through a long term monitoring station. This will enable us to generate data on the true springtime phytoplankton development.

Specific comments: Yes. References in text will be changed to chronological order. Yes. Italic will be limited to genus and species Latin names throughout the text.

On behalf of my co-authors, Anouk Piquet

Interactive comment on Biogeosciences Discuss., 10, 15519, 2013.