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Interactive comment on “Synoptic evaluation of carbon cycling in Beaufort Sea during summer: contrasting river inputs, ecosystem metabolism and air–sea CO₂ fluxes” by A. Forest et al.

A. Forest et al.

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Reply to anonymous referee #1

Referee: The data set and results discussed in this manuscript are of high scientific significance. They also have been extensively and deeply interpreted, which makes this paper suitable for publication in Biogeosciences. In order to understand the numerous parameters and processes affected by climate change in polar region, it is fundamental to obtain exhaustive comprehension of the biogeochemical cycles and general ecosystem functioning. Dealing with such large data set and difficult-to-measure processes can often result in unclear studies and methodological inaccuracies. But the study pre-

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sented in this paper is successful with the dataset analysis and it will be of high value for future comparison work with other sites/seasons/years. The only issue the authors should either amend or justify is to do with the interpretation of the processes happening beyond the shelf, in the Canada basin, i.e. under the ice cover. From the methods and the maps showing the sampling stations, it is my understanding that there was no station sampled for any of the parameters in this area. Moreover, it is said in section 3.1 that during the analysis of the remote sensing estimates of primary production (PP), pixels with more than 10% of ice cover have been discarded. As a result of those two points, it seems that there should be a lack of data in the Canada basin area under the ice cover. So I am wondering how did the authors get the data presented on the different gridded composite maps and even more how did they compiled the secondary data set of net community production (NCP – Figures 10 and 12). Wouldn't it be more accurate to leave out of the analysis and interpretation (and maps) this area with ice cover which has not been sampled and which cannot reveal any remote sensing value of PP? I may have missed one methodological point here, but then, it would be worth developing it a bit more in the text to help the reader's understanding. I am happy to support the publication of this paper in BGD as soon as the authors justify or amend this issue.

Reply: We would like to thank Referee #1 for his/her support regarding our study and its findings. The issue raised by the Referee is a very important one and the manuscript has been revised accordingly. In brief, the remote sensing maps of primary production were masked for the areas where sea ice was present. This is true that we had the impression that there was no production in the Canada Basin when the remote sensing data were gridded, whereas we simply did not have the data for most of this region. However, we need to underscore that the NCP estimates were not built using the remote sensing PP data, but were constructed upon actual measurements of PP at sea (see section 2.5), which included tens of stations in the offshore region (beyond the 1000 m isobath). Hence, we corrected the section on NCP methodology to better reflect this fact.

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Interactive comment on Biogeosciences Discuss., 10, 15641, 2013.

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