

Interactive comment on “The potential effects of fresh water content on the primary production in the Chukchi Sea” by M. S. Yun et al.

Anonymous Referee #4

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General comments: This paper investigated the in situ primary production rates and their relation to various environmental variables in the Chukchi Sea including the Russian waters of the Arctic, where only the limited data are available. The authors pointed out that the primary production in the Chukchi Sea is mainly affected by nutrient concentrations and phytoplankton biomass, and the nutrient concentrations, and thus the primary production, are influenced by the freshwater content (FWC). This concept may be not new but seems to be verified from the present data and statistical analyses. In addition, the authors indicated a recent decrease in primary production from decades ago, although the primary production has large temporal and spatial variabilities. The authors suggested that a plausible reason for the recent low primary production could be due to the decreased concentrations of nutrients and chlorophyll. If possible, the

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authors should show the nutrient and chlorophyll data that are associated with the recent decrease in primary production. This point could be a new finding. This is an interesting paper that is in general clearly written and well-laid out. I recommend the paper for publication in Biogeosciences after some revisions.

Specific comments: P. 13516, L. 11: The authors should explain why the reference salinity was selected as 34.8.

P. 13518, L. 18: The authors should explain why the upper 30m was selected to show the nutrient distribution.

P. 13519, L. 5: The authors should explain why the upper 30m was selected to show the chlorophyll distribution.

P. 13519, L. 23 – P. 13520, L. 10: The authors should explain why the nitrate and ammonium production rates were measured. This explanation should be described in “Introduction”. In addition, some discussion might be necessary. In the basin area, the nitrate (ammonium) production rates may be recognized as new (regenerated) production rates. But, in the shelf area, both the nitrate and ammonium are partly or mainly supplied from the sediments. In this case, what does the each rate mean?

P. 13519, L. 5: Siberian Coastal Water might result in the accumulation of freshwater in the western side of the southern Chukchi Sea (Fig. 7a). But, the sea ice meltwater is also a source of freshwater. Why did the authors discard the latter possibility?

P. 13526, L. 25 – 26: Even if the measurements of primary production were performed in the same season (the mid-July and early August) both in the previous studies and Hill et al. (2005) or Lee et al. (2012, 2013), the sea ice condition might be different. For example, in the previous studies, the mid-July and early August might be just after the sea ice melt. In that case, the productivity would be large. The authors might be better to confirm the difference in the sea ice condition.

P. 13526, L. 28 – P. 13527, L. 2: If possible, the authors should show the nutrient and

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chlorophyll data. This point could be a new finding.

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