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Interactive comment on "Field-obtained carbon and nitrogen uptake rates of phytoplankton in the Laptev and East Siberian seas" *by* Sang Heon Lee et al.

Anonymous Referee #1

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The authors investigated the carbon and nitrogen (nitrate and ammonia) assimilation rates of phytoplankton in the Laptev and East Siberian Seas in late summer of 2013. Overall, I agree that the data obtained from this study are precious to better understand the biogeochemical and ecosystem processes of the less studied regions in the Arctic. However, in my view, the present manuscript is too descriptive, and it contains a number of ambiguous or uncertain issues. For example, below are a few severe weaknesses in this paper. As a result, I am sorry that I cannot recommend this paper for publication in the journal Biogeosicences at the present form.

1) Lack of optical data during observation. Even for the determination of optical depths,

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the authors used a legacy Secchi disk technique. Please clarify the accuracy of the optical depths determined in this study. If not, the primary production data may not be reliable – an underwater PAR sensor or spectroradiometer should be used for determining the euphotic layers. In this study, the authors incubated the seawater samples for 4 to 6 hours on deck. However, no information is available for the surface PAR during incubation. Were these irradiance levels constant among stations? Also, the authors assumed 24-h daylight conditions in the summer period (L186–187). Were the light levels also constant at every station throughout the day? Please clarify these optical measurement issues. As an explanation for the lower f-ratio values observed in this study, the authors suggested potential light-limited conditions for phytoplankton growth in the study period (L220–222). Unfortunately, the authors did not show any optical or bio-optical data such as photosynthesis-irradiance parameters.

2) For a comparison between in situ and satellite remotely sensed primary production in the study area, the authors solely used the mean value in the study area during 1998–2008 reported by Arrigo and Dijken (2011) with a few assumptions. As a conclusion of this study, the authors noted that further careful validation would be required for the use of satellite data (L285–288 and L322–325). It is a shame that the authors did not make any effort to match up their in situ data with satellite-based estimates in the observation period more precisely.

Minor comments: L22: $p > 0.01$. Is this level statistically significant? L22: Remove "Unexpectedly" from the sentence. It could be common that the data obtained were within the previous reported values. L52: Delete "of primary producers" from the sentence. The words are redundant. L58–59: Cite a reference at least for the sentence that the Laptev and East Siberian seas are situated on the wildest and shallowest continental shelf in the world. L65–66: List the references chronologically. L72: marine ecosystems L97: Lee et al., 2007; 2012; Yun et al., 2015). L98: How did the authors convert Secchi disc depth to light intensity? L101: NaH13CO3? L108–109; Did the authors remove particulate inorganic nitrogen? If not, particulate nitrogen (PN) would

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be a better expression. L115: How about the discrimination factor for 13C/12C? L129: Insert “values” between “salinity” and “ranged”. L133: from the surface L139–140: I was a bit confused with the sentence that they were relatively higher in the Laptev Sea than in the East Siberian Sea. How did the authors separate the former from the latter? Where is the boundary between the two seas? Also, in Table 1, please classify the stations into the two seas. L141: the patter of silicate concentration showed opposite . . .. The verb “appear” is an intransitive verb, so it cannot be used for the passive. L148: phosphate and nitrate were so low . . .. L152: concentrations L155: Again, $p > 0.01$. Is this statistically significant? L169: at the surface L172: rates were L266: these production levels L267: mean production estimates L344: The “2” in CO2 should be subscript. L381: The “13” should also be subscript. L427: at the productivity measurement stations L452: Use subscript for the number of NO2+NO3, NH4, PO4, and SiO4. L439, 441, 453, and 454: The unit of chl-a concentration would be mg m-2. Fig. 4: Insert a space between “20” and “μm”.

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