

Interactive comment on “Photosynthetic production in the Central Arctic during the record sea-ice minimum in 2012” by M. Fernández-Méndez et al.

Anonymous Referee #1

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Review of “Photosynthetic production in the Central Arctic” by M. Fernández-Méndez et al. BGD 12, 2897–2945, 2015

General Comment: I request that all figures and tables placed in the SI be included in the manuscript as they are very frequently referred to in the main text. Then the figures are necessary, not supplementary. SI is thus NOT the place for them! It is annoying to have to go to the SI to find these figures.

2898 L16 ‘light limitation in which season? Growth season? summer? 2899 L4 ass “as a proxy for nutrient stocks” after winter mixing 2900 L2-4 that’s a single snapshot! one station! Anything in Olli et al 2007? Any russian pubs? 2900 L11 add Miller et al.

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2015 Elementa 2902 L4 define Atlantic inflow, maybe in station cartoon? please add the water column stations in fig 1 2902 L15 what size filter was used? Where did the FSW come from? were the cores shaved of their outerlayer to minimize contamination or any other such measure? what diameter corer was used? 2902 L24 were any tests done to determine any cell loss due to pump action? such as a comparison with a bucket or similar? or, bottle attached to ice-CTD? 2903 L8 add ' ; ship's 2904 L19 please add (Table S1) after sea ice concentration 2905 L5 how is the lateral upscaling from single point to 10km done? 2906 L22 the community composition after 6d and 4d under melted conditions may not have been the same one as at To. Was any species composition or size fraction frequency or other descriptor done at To and Tf? 2907 L19 Ah! but not measured at the beginning; too bad 2911 L23 a "measurable" increase? 2911 L23 Interesting that this was not due to micrograzers but microalgae composition as sea ice diatoms!! 2913 L9 please add as many figures from supplement into full ms! If cited (and they are cited multiple times), then the figures are necessary, not supplementary. 2913 L15 please use INPP and NPP consistently throughout the manuscript; ie, always INPP if the value represents an integration 2913 L28 The value could also decrease if you take into account that bacteria also may use nutrients. But it could also be underestimated if there is nutrient replenishment by physical or biological processes 2915 L25 almost two decades earlier! Much could have changed, there is much interannual variability, and then there are so few data available for that region. 2916 L18 "and other Arctic ice-covered regions (Matrai & Apollonio [or the other way around] 2013)" 2917 L22 replace 'double' with 'twice' as much 2918 L16 fix ref formatting 2918 L19 due to *the large seasonal* riverine input. But you have used LeFouest to support a minimal influence of river nutrients. Which one is it: min or max influence? And the river freshet will have occurred long before the summer sampling time; was there much flow still then? 2919 L21 reword 'some nutrients left' to 'reduced nutrient concentrations' or similar 2919 L22-27 I believe an Apollonio reference and a Mundy reference have already expressed this notion; please acknowledge them 2920 L1 replace 'able' by 'capable' I would be very cautious of deriving too much from a single experiment!!!

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2920 L5 replace 'is' with 'are' 2920 L6 these the wrong references for zooplankton grazing on ice algae and phytoplankton. Both references are modeling studies simulating this system! 2920 L18 how was algal C determined in the sed traps? 2920 L23 not 'indicate' but 'suggest' 2921 L10 NO!! it has been **predicted**! Not observed. These are PP-chl models. There are many issues affecting the derivation of NPP from ocean color models and more complex models as well. Pabi et al 2008 is also an ocean color model and the Kara Sea estimates have no ground truth data to validate them with, sadly. 2921 L15 replace 'A' with 'Another' modeling study 2922 L5-10 These seas are not part of the central Arctic which is the main topic of this paper. These results don't fit well in here, as attractive or controversial as they may be. What happened in the central Arctic? If you insist in keeping this one sentence, it is necessary to have another sentence that indicates how much of the seasonal NPP is represented by this change in an ice free sept in each of these seas, according to your model. Something like "These increases still represent only x or as much as x% of the seasonal NPP in these regions, according to our model." Especially since most of the Greenland Sea is already ice free in Sept except for the E Greenland current and the mixed layer depths become very deep very soon once the fall storms begin. 2922 L15 could be 'reduced'. 2922 L18-21 All the processes listed will lead to a negative change in nutrient concentration. In other words, it may result in a decrease in NPP for the month of September. 2924 L7 replace ITPs with 'automated, autonomous systems' since floats, gliders and other buoys may also provide such information. Just making this sentence broader than ITPs 2924 Section 5 Conclusions: I would make your conclusions specific to your 2012 results and modeling. Exclude grazing, nutrients. No speculation or discussion here. 2924 L17 replace 'can contribute' with 'contributed' 2924 L19 specify if these are 'measured' estimates or 'model-derived' estimates 2928 L30 RUBAO JI, MEIBING JIN and ØYSTEIN VARPE. Sea ice phenology and timing of primary production pulses in the Arctic Ocean. Global Change Biology (2013) 19, 734–741, doi: 10.1111/gcb.12074 2940 will the volumetric values of NPP and chl a also be available in Pangea? Please! 2941 Fig 1: please indicate all stations sampled. Fig 2 has many more symbols than

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the 8 ice stations shown here 2942 Fig 2: can you please circle which symbols correspond to the INPP of fig 4? Simply display a line around the symbol 2945 Fig 5: Any melt ponds or sea ice in the coastal beaufort left in sept 2012? please add the line of min sea ice extent in aug and sept or for a specific day in each month.

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