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Biogeosciences Discussions

Interactive comment on "Monthly measured primary and new productivities in the Ulleung Basin as a biological "hot spot" in the East/Japan Sea" *by* J. H. Kwak et al.

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Dear Editor and Reviewer, Thank you very much for reviewing our manuscript. We have tried to revise the manuscript in line with the suggestions made by the reviewers. Our response to each point suggested by the third reviewer is as follows:

Reviewer #3

General comments

I have some concerns on methodology.

→ The general comments are indicated as specific comments below. Accordingly, we

have tried to revise carefully all the points suggested by the reviewer.

Specific comments

1. It is not clear that authors paid attention to so-called clean-technique for water sampling. It becomes a standard method after Fitzwater et al. (1982).

→ We tried to block off contamination factor of metal and other nutritional materials. All experimental instruments were acid-washed and rinsed by Milli-Q water. We used plastic (i.e. polycarbonate and polyethylene) bottles and Eppendorf dispenser with plastic tips. All experiments were conducted within one week from beginning of cruises. As indicated by the reviewer, we have inserted a sentence about clean-technique in the "Materials and Methods" section as follows:

"Trace clean technique was used for collecting and processing samples (Fitzwater et al., 1982)."

2. The authors mentioned that 15N tracers were added to attain about 10% of the ambient concentrations. However, it seems difficult to know the ambient concentration of substrate at the time of addition except the concentration was measured on board. It may happen to alter the ambient concentration especially when substrate was very low concentration, resulting in over-estimation of uptake rate. The authors mentioned that summertime nitrate was depleted at surface (NO info for NH4). The authors should mention this possibility or the range of actual 15N tracer amendment.

→ According to the reviewer's indication, we have inserted the explanation for the ambient concentration of substrate of the time of addition in the "Materials and Methods" section as follows:

"The ambient concentration of substrate at the time of isotope additions was estimated from the long-term monitoring nutrient data provided by Annual Report of Oceanographic Observations of National Fisheries Research and Development Institute of Republic of Korea and also our own previous data obtained from the same area during

several years. However, the concentrations of isotope additions were sometimes over 10% of the ambient nitrate and ammonium concentrations as some productivity stations had low ambient nutrient concentrations (<0.1 μM). Although inoculating with nitrate or ammonium stable isotopes into incubation bottles might have elevated the in situ uptake rates of phytoplankton (MacIsaac and Dugdale, 1972), adding nutrient isotopes would not cause serious elevations in phytoplankton uptake rates because of the relatively short incubation time (3–5 h) used in this study (Dugdale and Wilkerson, 1986)."

3. I guess that each incubation bottle was spiked either 15NO3 or 15NH4 as well as NaH13CO3. The authors should mention this and how many replicates were conducted for each settling.

→ According to the reviewer's suggestion, we have inserted the explanation of experimental replicates in the "Material and Methods" section as follows:

"For experiments of primary, new, and regenerated productivities, six bottles were prepared for each sampling depth. Labeled reagents were injected separately into each bottle. Duplicate experiments for measurements of carbon, nitrate, and ammonium uptake rates were performed and the values were averaged."

4. No data were presented for NH4. This paper deals new and regenerated production. So it is necessary to present the information for NH4.

→ Annual variation of ammonium concentration did not show any pattern and also the concentrations were very low compared to nitrate concentrations. Accordingly, as suggested by reviewer, we have inserted two sentences for the explanation of ammonium concentration in the "Results" section as follows:

"Ammonium concentrations (data not shown) ranged from 0.01 to 0.91 (average $\pm$ S.D. = 0.24 $\pm$ 0.19) between surface and 200 m depth. Ammonium concentrations showed no significant temporal variation with depth among sampling sites."

Interactive comment on Biogeosciences Discuss., 10, 2127, 2013.