

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.

Anonymous Referee #2

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General comments

This work presents the results of primary production, new production, regenerated production and related community structure in the Ulleung Basin in a period of one year. It improve our understanding of ocean ecosystem processes in this regional area. The methods to measure PP, NP and RP are suitable under our current knowledge. But it's necessary to always be careful on the calculation and make sure if the data are "reasonable". Here, PP in the winter and the calculation of new carbon production should be checked again. This paper could be published, but only after major revision.

Specific comments

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1. Figure 1. Apparently, the primary production are compared among the different regions in the East/Japan Sea. It's an important part in this paper to represent the role of UB as a "hot spot". What I suggest is you should plot the whole EJS in your Fig. 1 and give the borders of those different regions. You could also add some important physical processes like TWC or fronts which is described in the discussion.
2. Page 2142, Line 21-24, The assimilated C/N ratio is used to estimate the new carbon production. Is the value 3.4 a depth-integrated value? If so, it is a wrong way to calculate the new carbon production in this paper. In general, primary production is significant lower in the bottom of euphotic zone than in the surface, and it's reverse on the new production. Meanwhile, the assimilated C:N ratios are also different among layers. So you must calculate the new carbon production layer by layer with the accurate assimilated C:N ratios, then integrate the values by depth. I believe that the recalculated export ratio of primary production will be lower than your current prediction (78.0%).
3. Figure 8. In summer, PP decline from a spring bloom is normal in a temperate water. But it seems PP didn't change a lot from summer to winter. It is unusual because there was a great decrease on temperature and also on irradiance in theory. It seems not "reasonable".
4. Approximately estimated normalised optimal production rates (P_{opt}^B) in June 2010 and September 2010 in UB1 from figures in the paper are $>14 \text{ mgC mgChl}a \text{ m}^{-3} \text{ h}^{-1}$ and $<3 \text{ mgC mgChl}a \text{ m}^{-3} \text{ h}^{-1}$, respectively. These values are above or below one σ range of P_{opt}^B at 20 degree which was reported on Behrenfeld and Falkowski's paper in 1997. That's a great change between these two values. From June to September, the chlorophyll *a* biomass didn't decrease, temperature didn't become lower as well, and even more nitrate and silicate. You should give some explanation to this decline that could support the higher production rates

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you measured compared to other studies in the same area.

5. Page 2138, Line 18, the detail of statistics test used here should be described, and the P value
6. Page 2139, Line 21, "rather similar" and "but still lower" are in contradiction.
7. Page 2140, Line 26, please specify the definition of the words "oceanic regions".

Technical corrections

Page 2129, Abstract, Line 4, "and in biological properties", the "in" should be removed.

Page 2136, Line 6, the first word "was" should be moved to the position after "water column".

Page 2136, Line 21, the "were" after "summer" should be moved to the position in the next line before "depleted".

Page 2142, Line 12, "He found the highest ratio (0.47) in Winter." It is accurately "She" here.

Page 2143, Line 1, "thus high biological pump", the sentence is not complete, it should be "biological pump efficiency" or something else.

Table 1, in the table content, you should always list reference after each data to show clear information to the readers although they maybe the same one.

Fig. 2, Fig. 4, Fig.5 and Fig. 7, The words "one steep slope station, UB1 and two deep basin stations, UB2 and UB3" in the texts, should be moved to the text of Fig. 1. Those are replicated descriptions.

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