

**Journal: Biogeosciences**

**Title: “Biogeochemistry and ecosystems of continental margins in the western North Pacific Ocean and their interactions and responses to external forcing – an overview and synthesis” by K.-K. Liu et al.**

**Ms. Ref. No.: bg-2014-323**

### **Rebuttals and responses to reviews**

We appreciate the three reviewers’ constructive comments on the manuscript. Their thoughtful suggestions prompted us to refine the manuscript. Detailed point by point responses follow. The texts referred to by the reviewer are indicated, in the responses, by page and line numbers of the revised version. Important changes are highlighted in the revised text.

### **Responses to Referee #1’s *Interactive comment***

#### ***General Comments***

This is a well-written review paper by a group of well-respected scientists, highlighting some key findings from a special issue on the biogeochemical condition and marine ecosystems in the major marginal seas of the western North Pacific Ocean. The authors have clearly laid out the connections, commonality and differences among those marginal seas. The key contributions from the individual papers in the special issue are well summarized with a reasonable amount of details (e.g. strength and weakness) presented in this review. I don’t have any major concerns about this paper.

RESPONSE: We are grateful for the referee’s appreciation of our work and for the specific comments, which are carefully heeded.

### *Specific Comments*

Below are some minor comments; most of them are about small reorganization of the text.

1. Figure 1: There is a typo for “South China Sea” on the map. It is currently labeled as “South Chia Sea”. Also, the authors mentioned ‘Sulu Sea’ and other places in the text, but not labeled on the map. I would suggest the authors to add labels for places that are mentioned in the text. This is important for readers who are not familiar with the region.

RESPONSE: Thanks for pointing out the typo. The suggestions concerning map labeling are good. We have corrected the typo and put the West Philippine Sea and Sulu Sea on the map.

2. P11296, L20, please add a reference for the residence time of 50 yrs.

RESPONSE: The residence time of the South China Sea basin water of ca 50 years is from the synthesis of Liu et al. (2010b), who drew evidence from previous observations and modeling results. The reference has been provided.

3. P11296, L23, what is Fig. 1a?

RESPONSE: It should be Fig. 1. The error has been corrected.

4. P11304, Section 3.2. The last paragraph regarding ocean color data doesn't fit the overall theme of that section. It would probably be better to move it to section 3.5, where chlorophyll distribution is discussed.

RESPONSE: This is a good suggestion. The paragraph has been moved to 3.5. (p. 17, Lines 500-512)

5. P11309, L3-15. This paragraph is about phytoplankton variability. I think it should also be moved to Section 3.5.

RESPONSE: This is a good suggestion. The paragraph has been moved to Sec. 3.5. (p. 17, Lines 489--499)

6. The title of Section 3.4 should be 'Physical forcing and nutrient transport' because the whole section discussed mostly the nutrient transport and budget.

RESPONSE: Agree. The heading of Section 3.2 has been modified accordingly. (p. 12, Line 347)

7. Section 3.5 discussed mostly the phytoplankton dynamics. Therefore, I would suggest changing the title to 'Phytoplankton responses to external forcing'. I understand that the last paragraph of Section 3.5 is about fish distribution, but this paragraph should be moved to Section 3.3, where the biota and their ecological characteristics along the continental margins are discussed.

RESPONSE: These are excellent suggestions and we have made the changes accordingly. (p. 14, Line 403)

8. I found the Section 4 'Summary and concluding remarks' is a bit too long. I would suggest it to be shortened. The authors should just highlight (briefly) the key points being presented in the paper.

RESPONSE: Agree. We have modified the summary to make it more concise.

Responding to another reviewer's demand, we have added more conceptual details in the summary for Figure 4, which summarizes many findings presented in this issue, but still manage to reduce the total word count of the last section by 16%.

## **Responses to Anonymous Referee #2's *Interactive comment***

### ***General Comments***

This paper is an overview and synthesis of the papers to be published in a special volume in Biogeosciences. The authors seem to have done a good job in summarizing the findings of the papers. One suggestion to the authors is to beef up the introduction section a bit more to stress the importance of the studied region in the global context. Also, it will be good if the authors can find a better way to present Figure 4. The figure summarizes the essential findings of many papers in the special issue yet it seems to lack the necessary conceptual detail. In addition, careful perusal paying attention to minor editorial details will improve the quality of the paper.

RESPONSE: We are grateful to the referee's positive appraisal of our work and for the constructive comments, which are carefully heeded. We have strengthened the Introduction by emphasizing the importance of the study area, which presents the best example of interaction between huge freshwater discharges from large rivers and in the interface zone between the land and the ocean. It also bears witness to the strong impacts of Anthropogenic stressors from the dense human populations on the marine ecosystems. The complicated topography as well as the pronounced climate oscillations/changes makes the study area exhibit a wide range of physical and biogeochemical conditions that control the ecosystem structures and functions. (p. 2 Lines 40-55 – highlighted.) We have paid special attention to Figure 4 making it conceptually more robust and comprehensive (p. 18, Lines 548-565) and also to all details of the presentation.

### ***Specific Comments***

Followings are some suggested editorial comments.

P11296: be consistent in presenting values. For example, both million km<sup>2</sup> (line 9 and 26) and 10<sup>6</sup> km<sup>2</sup> (P11297, Line 9) are used.

RESPONSE: We have unified the format of the presentations.

Figure 1: the map as is too small. Some texts are almost illegible. All geographic names need to be indicated clearly in the map (for example, the Sulu Sea is not indicated). In the text, also “Fig. 1a” can be found at a few places although there is only one map in Figure 1.

RESPONSE: The original figure is much larger. We will plea to the copy editor to enlarge the figure. We have added the missing geographic names mentioned in the text to the map, i.e., the West Philippine Sea and Sulu Sea. Figure 1a have been changed to Figure 1.

P11296 Line 29: Tsushima/Korean Strait -> Tsushima/Korea Strait

RESPONSE: The spelling has been corrected accordingly. (p. 4 Line 97)

P11297 Line 22: Secondary -> Second

RESPONSE: We have madethe change accordingly. (p. 4 Line 117)

P11299 Line 2: define KBC here, and use KBC in Line 7

RESPONSE: We have made the change accordingly. (p. 6 Line 150)

P11302 Line 19: lower values -> lower Omega a values

RESPONSE: We have made the change accordingly. (p. 8 Line 239)

P11305 Line 2: Sheng et al -> Shang et al. (?)

RESPONSE: We have changed all Shang et al. (2013) to Shang et al. (2014).

P11306 Line 22: are connecting -> connect

RESPONSE: We have made the change accordingly. (p. 11 Line 330)

P11311 Line 5: please pay attention to the number of significant figures. 307.3 should be presented with few number of significant figures (for example  $3.1 \times 10^2$  or 307) depending on the uncertainty of the estimate.

RESPONSE: We have made changes to the number of significant figures. (p. 15 Line 437)

P11312 Line 4: He et al. (2013) are -> He et al. (2013) is (or be consistent in treating et al., as singular or plural)

RESPONSE: We have unified the usage throughout the text. (e.g., p. 16 Line 463)

P11314 Line 5: bottom water of the -> bottom water

RESPONSE: We have deleted the redundant words.

P11315 Line 28: observations reveals -> observations reveal

RESPONSE: We have made the correction.

P11315 Line 26-P11316 Line 7: The introduction of the CARIACO study may be removed from this section

RESPONSE: We have kept the CARIACO study as an example for ecological observation, which is lacking or insufficient in the study areas reported in this special issue. However, we have revised the CARIACO example making it more succinct yet exemplifying how sustained ecosystem observations can reveal major changes. (p. 19 Line 565-574)

Figure 4 caption (6th line from bottom): supply from mar ine -> supply from marine

RESPONSE: We have made the correction.

P11325 Table 1: BS (Bohai Sea?) is missing

RESPONSE: We will add Bohai Sea to the list. (Table 1)

## **Responses to Referee Dr. D.-J. Kang's *Interactive comment***

### ***General Comments***

This is a fairly well-written review/overview paper. The authors summarized highlights of key findings of the special issue on biogeochemistry and ecosystems of continental margins in the western North Pacific Ocean and their interactions and responses to external forcing. I don't have any major concerns on this manuscript. This manuscript is good enough to publish in *Biogeosciences*.

RESPONSE: We are grateful for the referee's positive appraisal of our work and for the constructive comments, which are carefully heeded.

### ***Specific Comments***

There are some of minor comments as below.

1. P4 L23 Figure 1 has only one picture. But there are several Fig. 1a in the text.

RESPONSE: Figure 1a should be Figure 1. We have corrected it.

2. P5 L8 Most numbers in Introduction were expressed as x.xx million. But the area of JES was in 106 km<sup>2</sup>. Please write in same format.

RESPONSE: We have unified the format of the presentations.

3. P7 L7-11 Please use abbreviations in a list of abbreviation (Table 1)

RESPONSE: We have made the change accordingly.

4. P20 L18 chlorophyll a : In some places, the authors write as chlorophyll-a. Please unify the expression.

RESPONSE: We have unified the usage throughout the text. (e.g., p. 14 Line 423)

5. P24 L9 EAST : The times series program for the JES is EAST-I. Please change EAST to EAST-I.

RESPONSE: We have made the change accordingly. (p. 19 Line 575)

6. P35 Caption of Fig. 1: There are some typos in the caption. Some of unit of depth is mm, not m.

RESPONSE: We have made the corrections.

7. P38 Caption of Fig. 4: lox oxygen ->! low oxygen ???

RESPONSE: We have made the correction.

8. There are some missing or errors of references

1) P7 L3 Ichikawa and Beardsley, 2002 : Not listed in the reference list

2) P9 L16 C. M. Tseng et al., 2014 :!C.M Tseng et al., 2013 ????

3) P10 L26 Y.-F. Tseng et al., 2011 : Not listed in the reference list

4) P12 L21 Shang et al., 2013 : Shang et al., 2014 ????

5) P16 L8 Wiliams et al, 2011 : Not listed in the reference list

6) P29 L7 Lin et al., 2009 : Not referred in the text.

7) P36 Fig.2 caption Tseng et al., 2014a : Tseng et al., 2014 ????

8) P38 Fig.4 caption Tseng et al., 2014b : Tseng et al., 2014 ????

RESPONSE: We have updated all references.