Interactive comment on "The effects of different environmental factors on biochemical composition of particulate organic matters in Gwangyang Bay, South Korea" *by* Jang Han Lee et al.

Jang Han Lee et al.

n2357n@pusan.ac.kr

Received and published: 20 October 2016

Interactive comment on "The effects of different environmental factors on biochemical composition of particulate organic matters in Gwangyang Bay, South Korea" by Jang Han Lee et al. Dr. Yun (misunyun@pusan.ac.kr) Received and published: 27 September 2016

General Comments The manuscript presents the seasonal variation of biochemical composition of POM in Bay. The author shows the major controlling factor for them based on statistical analysis. Overall, I found the paper to be sound and believe that

it contains valuable data in understanding the characteristics of POM and their contribution to coastal ecosystem as basic food source. I think that the paper is worthy of publication for BGS after minor revisions are made, while there are a few areas that need improvement.

Major comment and corrections 1. Page 12, Line 258-278: The author showed _13C value and carbon to nitrogen ratio in surface, in order to find the origin of POM. I think that the contribution of benthic microalgae to POM could be large and significant, since the study area is located in coastal area and extremely turbid condition related to freshwater input or tidal cycles or wind. Therefore, many amounts of benthic microalgae could be included to POM through the resuspension, especially during high river input. Indeed, Table 3 shows the lower 13C value in August. =>We discussed on potential contributions of benthic microalgae on POM in line 300-302, page 13.

2. Pages 13-14, Line 301-304: For the criteria of their moral ratios among dissolved inorganic nutrients, I wonder could it be applied in coastal area. I think that the status of nutrient limitation in phytoplankton could be different between open oceans and coastal area. =>Actually, the criteria of the moral ratios can be applied in coastal area based on several papers as we referred in our discussion (e.g., Roelke et al., 1999).

3. Page 15, Line 335-344: As the author discussed, I think that the composition of phytoplankton assemblages and species could be closely related to seasonal variation of biochemical composition. High nitrogen supply during river-input increased season could lead to different phytoplankton composition. For example, the large sized phytoplankton (such as diatom) could be thrived in that condition, since the large phytoplankton could grow best and dominate under eutrophic condition. According to Fernandez et al. (1994), the carbon allocation into different biochemical pools were different depending on dominant phytoplankton group. For example, the carbon allocation into lipids was higher under the dominance of flagellates, whereas the lower lipid synthesis was observed in the dominance of diatoms. Therefore, the seasonally different phytoplankton composition related to nutrient input could affect to the different biochemical

composition in the region. =>Yes, the seasonal compositions of phytoplankton could lead different biochemical compositions. We discussed on that issues in line 380-389, page 15-16.

4. In figure 3, the author shows positive relationship between river input and protein composition. However, I didn't find the positive relationship between them, based on comparison with table 2 and figure 2. For example, the protein composition in August was lowest, although the rive input was considerably high. In addition, the protein composition from October in 2012 to April in 2013 was higher than that in August, even though the lower river inputs were recorded. =>Actually, the river input data in Table 2 are monthly integrated river inputs to show monthly patterns of river input and rainfall. In Figure 3, river-inputs were integrated from 20 days prior to our sampling dates since phytoplankton productivity is recovered after 20 days after rainfall in Gwangyang Bay according to Min et al. (2011). We added this explanation in line 100-102, page 5 to make it clear.

Minor corrections 1. Pages 8-9, Line 175-186: The position of some sentences needs to be corrected. For example, the results about irradiance and chl-a are shown in Table 1 (it is explained in line 178-186). The results for rainfall and river-input are indicated in former position (in line 175-178), although they are shown in Table 2. =>We rearranged the sentences in line 190-194, page 9. 2. Page 9, Line 195-197: The author found that there were no significant differences in spatial distribution of POM. However, the protein composition in station 2A (is closest to the River) might be higher than in station 4 and 5, since there is the large effect of river-input on the biochemical composition in this study. =>We did ANOVA test for each depth from 3 stations based on an assumption of no spatial difference and another ANOVA test for a spatial difference by pooling of 3 light depths at one station and comparing each station based on an assumption of no difference in light depths. But, we found to realize that there are statistical errors by doing that. So, we deleted no significant differences between vertical and spatial distributions in our text. The station 2A (is

closest to the River) might be the largest effect of river-input but different effects of river-input could be different depending on water circulation, tidal currents, winds, and etc as well as distance from the river in Gwangyang Bay. At this point, we can not determine how much effect at each station from river inputs but the station 2A could have more proteins than others if they have more influence from river inputs based on Table 1 and Fig. 3.

Please also note the supplement to this comment: http://www.biogeosciences-discuss.net/bg-2016-347/bg-2016-347-AC2-supplement.pdf