Dear reviewer,

We deeply appreciate your comments and efforts towards improving our manuscript. We have revised the manuscript seriously according to your valuable criticisms and suggestions. For the revision, please kindly refer to the point-to-point responses and the revised manuscript.

Responses to Referee #1

This paper intended to investigate the influence of fresh water on phytoplankton absorption properties, using in situ measured phytoplankton absorption coefficients and HPLC pigment data at the surface and SCM. The authors used samples collected in waters influenced by the Changjiang discharge in the East China Sea (ECS), and also introduced samples beyond the influence of that discharge in the Tsushima Strait (TS) as comparison.

However, I do not think the interpretation of the results are convincing and using the TS samples as comparison is a good idea. It is not surprised that the absorption properties in the TS are different from those in the ECS. It could be just resulted from different size structures of phytoplankton in those two water bodies. But what leads to the difference in structure? Isn't it a combination of various factors?

Response: Thank you for your valuable comments. The intention of comparison between ECS and TS was to emphasize the distinct absorption properties in ECS. Phytoplankton absorption properties and size structure in TS were similar to those in the global ocean, while those in ECS were different. We agree with you that the difference just comes from different size structure. Indeed, this is the first study to show that the size structure in ECS where is strongly influenced by the Chiangjiang freshwater was different from most of the global ocean using absorption and HPLC data. What special is the size structure in ECS as followings; 1) relatively low micro-phytoplankton fraction and high nano- and/or pico-phytoplankton fractions at high total chlorophyll *a* (Tchl *a*) levels, and 2) no correlations between size-fraction and Tchl *a*. These no correlations further induced the poor relationships between Tchl *a*-specific absorption coefficient ($a_{ph}^*(\lambda)$) and Tchl *a*, and the relatively low micro-phytoplankton fraction and high nano- and/or pico-phytoplankton fractions at high Tchl *a* levels caused higher $a_{ph}^*(\lambda)$ in ECS than values from the global regressions between $a_{ph}^*(\lambda)$ and Tchl *a*. We found the "outliers" in ECS were generally distributed in the low salinity waters and

SCM waters under them.

The main focus of the current study was to investigate the characteristics of phytoplankton light absorption in the Changjiang influenced region, and attempted to explain these properties by size structure. How does the Changjiang influence size structure in ECS is not quite clear at this stage and it is beyond the scope of this study. Considering high concentrations of nitrogen discharged from the Changjiang during summer, we speculated nutrient structure (high N/P ratio) might be one of possible factors leading to distinct size structure in ECS (see detailed explanations in discussion of the revised manuscript). As you suggested, it may be a combination of various factors. The influences of Changjiang discharge on phytoplankton community should be further investigated in future.

We have clarified the focus of this study in introduction, added some discussions about potential influences of the Changjiang discharge on phytoplankton community, and revised the statements in abstract and conclusions accordingly.

How to justify the contribution from the Changjiang? One puzzling issue is that similar absorption properties and phytoplankton size structures were observed at the surface and the SCM beneath it, and the authors attributed all these to the Changjiang diluted water (CDW). I am wondering how thick the CDW is.

Response: Thanks for these comments. We used salinity to identify areas of the Changjiang influences. We found distinct phytoplankton size structure and corresponding absorption properties in the surface low salinity waters and SCM waters just below them, while it is difficult to quantify the contribution from the Changjiang to phytoplankton size structure at this stage.

The CDW usually has a thickness of about 10–20 m in the mid-shelf area. The SCM samples were collected from waters at depths of 10–30 m. In order to make clear the influence of the Changjiang on SCM, we added the thickness of CDW, the range of SCM depth and some descriptions of local salinity at SCM in the revised manuscript. Local salinity of some of the SCM samples showed freshwater influences (28.8–32), and salinity of some samples were higher (>32) as you expected. However, most of the high salinity samples were also collected just beneath the low salinity CDW, and we believe SCM waters were also influenced by the Changjiang to some extent. But as you suggested it is not just influenced by low salinity but also by more complex factors. We

added this explanation in discussion.

If the water under observation was used as an example to demonstrate river impact, it should retain most features of the river water. Was considerable fraction of pico-plankton in the samples one of the features of the Changjiang water? The authors at least should provide some references relevant to the phytoplankton community structures in the Changjiang estuary and its vicinity. I believe there should be some.

Response: Thanks for these comments. We agree with you that "if the water under observation was used as an example to demonstrate river impact, it should retain most features of the river water". The salinity indicated that most of surface samples and some SCM samples were collected from the Changjiang influenced region.

Jiao et al. (2002; 2005) reported that *Synechococcus* were abundant in the Changjiang estuary and adjacent area in summer, while the contributions to the high biomass (Tchl *a*) were mainly contributed by diatoms (Zhou et al., 2008; Li et al., 2009; Zhu et al., 2009). Therefore, we do not think considerable pico-phytoplankton in the samples is directly from the Changjiang and Changjiang estuary waters. (We speculated that considerable fractions of pico-phytoplankton were possibly related to changes in nutrient structure as explained above.)

We have added some references relevant to the phytoplankton community structures in the Changjiang estuary and its adjacent area in discussion.

In a word, there seems no solid evidence to support the conclusion: "The majority of ECS surface samples taken from the low-salinity Changjiang diluted water (CDW), and even most of SCM samples taken from waters beneath the CDW, displayed significant fresh water influences." I would like to suggest the authors change the title accordingly.

Response: Thanks for this comment and suggestion. We admit our wording is too strict. We have revised abstract, discussion and conclusions to make reasonable statements. Also, the title was changed to "Phytoplankton absorption properties in river-influenced region: a case study in the East China Sea".

Those in situ data are certainly of value. However, improvement in the interpretation of

the data is advocated. The flow of the paper is not good. It reads like a lengthy data report, particularly the result section. Some details are not required, for example, Table 1 could be removed, and there is no need to use different symbols in Figure 1.

Response: Thanks for these comments. We have simplified the results and improved interpretation of the data in discussion. Table 1 has been removed, and Fig.1 has been revised as suggested.

Reference

Jiao, N., Yang, Y., Hong, N., Ma, Y., Harada, S., Koshikawa, H., and Watanabe, M.: Dynamics of autotrophic picoplankton and heterotrophic bacteria in the East China Sea, Cont. Shelf Res., 25, 1265–1279, 2005.

Jiao, N., Yang, Y., Koshikawa, H., Watanabe, M.: Influence of hydrographic conditions on picoplankton distribution in the East China Sea, Aquat. Microb. Ecol., 30, 37–48, 2002.

Li, J., Glibert, P. M., Zhou, M., Lu, S., and Lu, D.: Relationships between nitrogen and phosphorus forms and ratios and the development of dinoflagellate blooms in the East China Sea, Mar. Ecol.-Prog. Ser., 383, 11–26, 2009.

Zhou, M., Shen, Z., and Yu, R.: Responses of a coastal phytoplankton community to increased nutrient input from the Changjiang (Yangtze) River, Cont. Shelf Res., 28, 1483–1489, 2008.

Zhu, Z. Y., Ng, W. M., Liu, S. M., Zhang, J., Chen, J. C., and Wu Y.: Estuarine phytoplankton dynamics and shift of limiting factors: A study in the Changjiang (Yangtze River) Estuary and adjacent area, Est. Coast. Shelf Sci., 84, 393–401, 2009.