

Interactive comment on “Biogeochemical characteristics of suspended particulates at deep chlorophyll maximum layers in the East China Sea” by Qianqian Liu et al.

Qianqian Liu et al.

selvaraj@xmu.edu.cn

Received and published: 2 October 2017

Anonymous Referee #3

General Comment: This manuscript characterized the bulk and isotopic composition of organic matter collected in DCM layer of the south East China Sea in summer time. The study is well designed and neatly presented. It observed the marine derived material is the dominant organic matter in DCM layer. The influence of the Yangtze River is very limited. Additionally, the nitrogen isotopes elucidated the potential role of N₂ fixing in middle shelf where TWCW is dominated and remineralized nutrients plays an important role. However, in this point, the depth profile will be very helpful to strengthen

C1

the discussion but it is lack in the manuscript. Furthermore, the influence of lateral transport (cross shelf) better to be considered when the authors estimate the nutrients contributions from different sources and POC inventory.

Reply: Thank you for your positive opinions on the overall work presented here. At present, we don't have depth profiles of nitrate or ammonia or nitrogen isotopic composition of nitrate to strengthen the PN/ $\delta^{15}\text{N}$ data and related interpretations. However, we reiterate that there is no much information related to $\delta^{15}\text{N}$ data, especially from the biota-dominated DCM layers, in the southern East China Sea. Since we proved that the POM is dominated by phytoplankton, publishing $\delta^{15}\text{N}$ data of this study may create more interests among readers to conduct such investigation in the marginal seas of the western Pacific. Given this, we request anonymous reviewers and Associate Editor to allow this section for publication because we interpreted PN/ $\delta^{15}\text{N}$ data based on the published information from the southern East China Sea.

Specific comments:

Referee 3: 1) The title better be more specific in study region, such as southern East China Sea

Reply: The title of the manuscript has been modified as follows: Biogeochemical characteristics of suspended particulates at deep chlorophyll maximum layers in the southern East China Sea

Referee 3: 2) Abstract: OK

Reply: Thank you.

Referee 3: 3) Introduction: Better to emphasize the status of DCM in ECS and the potential role in POC inventory estimation and hypothesis

Reply: The text related to the POC inventory has been deleted in the revised version, as suggested by the Referee 2.

C2

Referee 3: 4) Methods P5, the filtration volume was in the range of 0.5-2L, the author used half filter for POC or PN analysis, Did they have enough material for reliable analysis, especially for nitrogen?

Reply: We have mistakenly mentioned the filtration volume in the original manuscript. Our apologies! We filtered 4.1-19.1 L of water samples for the collection of SPM. The volume of filtration has been changed accordingly in the revised version.

In our study, the amount of measured C and N ranged from 68.24-322.18 μg and 14.46-64.69 μg , respectively. Precision for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ decreases for samples containing less than 100 μgC and 20 μgN , respectively. Among thirty-six filters analyzed for the present study, only five (three) filters contain less than 100 μgC (20 μgN).

Referee 3: 5) Result and interpretations: The order of hydrographic characteristics can be adjusted as salinity, turbidity and chl a

Reply: As suggested, we rearranged the order of hydrographic characteristics in the revised version.

6) Discussion: In general, the authors gave proper credit to related work and clearly indicate their own new contribution to the biogeochemical cycles in the study area.

Reply: Thank you.

Some minor suggestions:

Referee 3: a. P13-14, How to use C/P ratio to estimate the Yangtze-sourced nutrients for marine primary productivity, how does the lateral cross shelf transport contribute to the POC inventory?

Reply: The text related to the C/P ratio and POC inventory have been deleted in the revised version, as suggested by the Referee 2.

Referee 3: b. P15, L20, this paragraph is a bit speculative and need more straightforward data to support itself, the depth profile data could be bit helpful to elucidate.

C3

Reply: Please refer to our reply to the general comment of Referee 3.

Referee 3: c. Comments on 5.5, why the Yangtze River will play an important role in DCM OM in south ECS, the paragraph of TGD can be moved which seems less related to this topic, also I am confused about how the author summarized in the abstract" SPM investigated here seems not to be influenced by the terrestrial organic matter supplied by the Yangtze River (Changjiang) in summer 2013, a finding that is contrary to a number of previous studies' conclusion.", which is not convinced in this part.

Reply: The transport pathway of Yangtze River debouched sediments to the Okinawa Trough is one of the unsettled issues in the oceanographic studies of the East China Sea. Recently, Chen et al. (2017) suggested that the Changjiang river plume flows southward when sediments are resuspended along the China coast by cyclonic storms. Most previous studies also had shown that cross-shelf transport of Yangtze-derived sediments to the Okinawa Trough. So, one would expect the influence of Yangtze-derived sediments in the southern ECS during summer.

The part of the sentence "a finding that is contrary to a number of previous studies' conclusion" in the abstract has been deleted in the revised version.

Referee 3: d. The quality of Figure 4 and 5 should be improved. Figure 8b, there is 35 samples summarized but all the other plotted based on 36 samples, why?

Reply: The quality of Figures 4 and 5 has been improved. There is no fluorescence/Chl a data for station DH6-1 (see Table S1 in the appendix) and therefore plots with Chl a data contain only 35 data points, including Fig. 8b.

Thank you very much.

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2017-290>, 2017.

C4

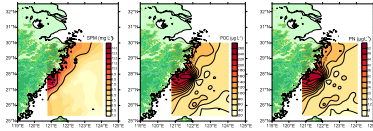


Figure 4. Spatial distributions of suspended particulate matters (SPM, mg L⁻¹), particulate organic carbon (POC, μg L⁻¹) and nitrogen (PN, μg L⁻¹) around the deep chlorophyll maximum layer in the southern East China Sea during summer 2013.

Fig. 1. Revised Figure 4

C5

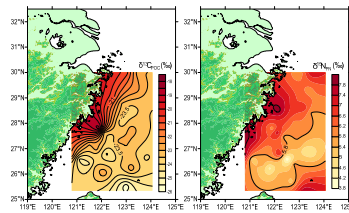


Figure 5. Spatial distributions of stable isotopic values of particulate organic carbon and nitrogen (δ¹³C_{POC} and δ¹⁵N_{PN}) around the deep chlorophyll maximum layers in the East China Sea during summer 2013.

Fig. 2. Revised Figure 5

C6