

## Responses to Reviewer 1

Authors are like to responses with cordial thanks for these details' scientific comments of reviewer 1. After considering all comments, authors changed the structure of whole manuscript for pursuing a constructive discussion about the main focus of this manuscript. Here are the responses to all creative comments accordingly.

### INTRODUCTION SECTION

In the introduction part a large discussion is introduced on the SML. However, the SML is beyond the Scopes of this study. I suggest that the simple reference introduced in lines 46-47 is fairly enough on this and all other related text is removed from the manuscript (lines 64-75 and elsewhere).

**Answer:** Authors rephrased lines 46-477 to 46-49 with necessary references and removed all lines associated with SML. SML only exists at result section 3.2, at line 289 for describing result.

- Line 38: between the

**Answer:** Changed in line 37.

- Line 38: organic carbon pools

**Answer:** Changed in line 37.

- Line 41: considered

**Answer:** Changed in line 40.

- Line 43: sourced? Please rephrase

**Answer:** Rephrased to “produced” at line 42.

- Line 47: organically? Please rephrase

**Answer:** Rephrased to “which can make organic sea surface microlayer” at line 46.

- Line 51: control

**Answer:** Changed in line 52.

- Line 54: Please rephrase

**Answer:** Rephrased by breaking into 2 lines from 52-56.

- Line 60: Please rephrase

**Answer:** Rephrased from 60-62.

- Line 62: at the sea surface

**Answer:** Changed in line 64.

- Line 63: Mari et al., 2017 review addresses this issue and should be added in the references herein

**Answer:** Authors cited in “Mari et al., 2017” lines 64-65.

- Line 78: in the water column

**Answer:** Changed in line 68.

- Line 84: at the upper water column

**Answer:** Changed in line 74.

- Line 85: in summer rather than spring

**Answer:** Changed in line 75.

- Line 86: on carbon export

**Answer:** Changed in line 76.

- Line 87: The present study

**Answer:** Changed in line 77.

- Line 92: East of the BS

**Answer:** Changed in line 82 by removing it while English language editing.

- Lines 95-96: Please rephrase

**Answer:** Rephrased to “Zonation of Yellow Sea i.e. North Yellow Sea (NYS) and South Yellow Sea (SYS); will help in visualization of better seasonal scenario.” in lines 85-86.

- Line 104: on TEP

**Answer:** Changed in line 93.

- Lines 108-110: Correct, but poor correlations amongst TEP and other environmental parameters has also be attributed to other biotic factors driving their distributions such as microbial breakdown of larger marine snow particles, sloppy feeding by meso- and macrozooplankton, abiotic TEP formation by bacteria and also consuming of TEP by bacteria. Please see review article of Mari et al., 2017 and references therein as an example for the relevant discussion.

**Answer:** Authors considered reviewer’s advice and added notable lines therein from Mari et al., 2017 with necessary references from lines 95 to 98 i.e. “microbial breakdown (Mari et al. 2017) and phytoplankton species composition (Passow 2002b). Changes in TEP assemblage may also influenced by bacterial secretions and feeding as well as zooplankton grazing locally (Passow and Alldredge, 1999, Surosz et al. 2006, Mari et al. 2017).”.

I suggest that a relevant part is being introduced in the introduction of the manuscript instead of the extended discussion on SML.

**Answer:** Authors removed all lines associated with SML. SML only exists at result section 3.2, at line 289 for describing result.

## MATERIALS AND METHODS SECTION

- It is unusual in a manuscript not to have a Table outline of the sampled stations, coordinates and corresponding sampling depths. Of course, this will be too long for the main body of the text and I suggest that the authors should considering adding this information as supplementary material.

**Answer:** Authors added suplimentary data as PDF format with necessary information according to reviewer's requirements.

- In my opinion the authors should consider merging sections 2.1 and 2.2 in one section outlining study area and conducted samplings.

**Answer:** Authors merged these sections; starting from line 120.

- Lines 122-127: This part should be moved to the results section. Please follow my other comment on this issue below.

**Answer:** Authors removed this part and added it in result section in short form at lines 197-204.

- Line 141: nutrients separately? Please rephrase

**Answer:** Rephrased and rearranged at line 123.

- Line 142: sampling bottles

**Answer:** Changed in line 125.

- Line 145: Please correct nomenclature to mL here and throughout the text. Also use L (capital) for litres throughout the text and figures/tables.

**Answer:** Rectified through whole manuscript at lines 126, 137, 149 and 154.

- Lines 149-152: Please rephrase. The same text is introduced twice and a part of it is also being repeated above in lines 143-144 regarding Chl-a

**Answer:** Authors removed previous lines 149-152 and regenerated in new lines 149-151.

- Lines 159-160: dissolved, in all cases

**Answer:** Changed in lines 144-145.

- Lines 162-164: Please rephrase

**Answer:** Rephrased in lines 147-149 as "Sextuplicate measurements of TEP were done by following colorimetric method of Passow and Alldredge (1995) for all samples after confirming calibration factor (fx) from xanthan gum curve."

- Line 169: were then soaked

**Answer:** Changed and rephrased in line 154

- Line 170: H2SO4 for sulphuric acid

**Answer:** Changed in line 155

- Line 170: were gently

**Answer:** Changed in line 155.

- Line 171: lied

**Answer:** Changed in line 156.

- Lines 183-184: Please rephrase

**Answer:** Rephrased and rearranged in lines 170—172 as “The Plexiglass columns were kept undisturbed on the vessel to settle for 2-3 hours. Temperature was maintained through a thermostatically controlled water bath with water jackets by pumping its water.”.

- Lines 195-201: I suggest that the authors should consider removing this text from this part.

**Answer:** Authors removed it to result section 3.1 at line 197-198.

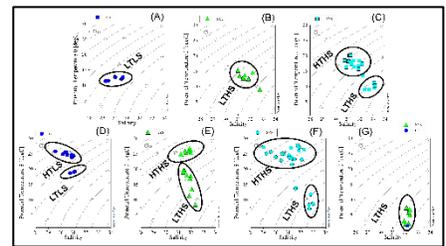
- Section 2.6: I suggest that the authors should consider moving the TEP-C calculations part above in sect. 2.4 and the phytoplankton species description part in the relevant sect 2.3 above

**Answer:** Thank you for your constructive suggestion. Authors removed lines 202-205 to 161-164 at section 2.3 as advised.

## RESULTS SECTION

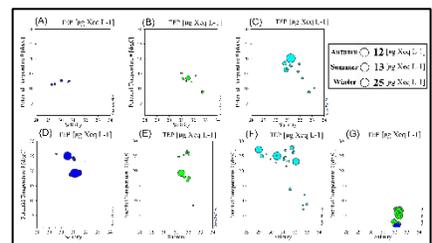
An interesting aspect of this study in my opinion is the highlighted connection between the TEP distributions patterns and water masses characteristics in some cases. I suggest that the authors should consider elaborating a little bit more on this issue maybe providing a figure highlighting this connection.

**Answer:** Authors considered your suggestion and deployed TS diagram for detecting different water masses along the seas through different seasons. They decorated and rearranged the data at lines 213-221 for marking high assembled according to respected water mass in Fig. 3.



Please see the study of Parinos et al., 2017. Cont Shelf Res., 149, 112-123 for an approach on this matter. Please also check if this connection is highlighted/displayed on the clustering of stations in figure 7.

**Answer:** Authors studied Parinos et al. 2017 thoroughly and visualized TEP assemblages according to density gradient in fig. 5 with necessary details in lines 274-278 and discussions at lines 366, 407-410.



- Section 3.3: I suggest that the authors should consider merging this section with the previous one, sect 3.2, since it is expected that TEP-C distributions will be the same ones as in the case of CTEP since  $TEP-C = CTEP \times 0.75$  in all cases.

**Answer:** Authors considered your relevant advice and merged 2.2 with 2.3 at lines 279-290.

- Section 3.6: please check corresponding figure numbers! Fig. 16 is Fig. 6?? Fig. 13 is Fig. 7? Also please follow my comment below "section 4.1" regarding lines 322-327

**Answer:** Authors checked and rechecked all numbering of figures in text with necessary correction. They expressed gratitude to the reviewer's humbleness and consideration while reading this manuscript with patience.

## DISCUSSION SECTION

- Line 337: EPS include also protein-containing Coomassie stainable particles so the term EPS is not equivalent to TEPs only. TEPs are a part of EPS.

**Answer:** Authors rectified the structure of the sentence as "Study of seasonal trends on EPS (exopolymeric substances i.e. TEP) confirmed the formation of EPS at earlier season in upper sea column with time" at line 331.

- Line 339: resource? Please rephrase

**Answer:** Rephrased to "phytoplankton cells were reported as precursors of TEP" in line 333.

-Section 4.1: In this section, see also my comment above on lines 322-327, I cannot see the connection between the various phytoplankton species and TEP distributions patterns on Fig.6. Therein the CCA analysis is nicely presented but focused on TEPChla relations and not individual species. I suggest that the authors should consider adding a table outlining TEP-phytoplankton species correlations in support to the discussion introduced in this section or re-phrase the paragraph.

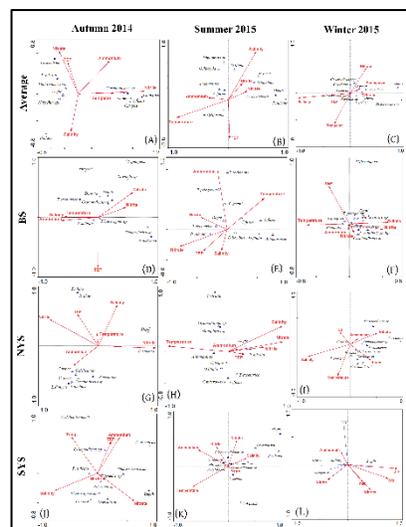
**Answer:** Authors reconstruct the CCA analysis of TEP with dominant species along all seasons of studied seas with average assemblages for better correspondences analysis in fig. 8. It will help to explain the relations of TEP with different species.

- Line 345: the linkage between TEP and Chl-a in Figs. 6d-3-f is not at all strong in my opinion.

**Answer:** Authors considered this opinion and rearranged the section 4.1 accordingly.

- Line 348: Same as above for figure 6g.

**Answer:** Authors changed the numbering with necessary details.



- Lines 374-376: but also, other than sources, to other factors consuming TEPs, i.e. consuming of TEP by bacteria, which is an aspect that cannot be addressed based on the presented dataset.

**Answer:** Authors tried to mention these factors with necessary references in lines 335-336.

- Section 4.3: My feeling is that in order to address the potential role of TEP-C in the overall carbon cycle in the study area an essential aspect that is missing from the dataset is considering TEP carbon in respect to POC values. Taking into account the low TEP concentrations recorded overall in the study area, up to  $23.2 \mu\text{g XG eq L}^{-1}$ , and the high chl-a values recorded in summer and moreover the very high chl-a values recorded during winter 2015, TEP-C seems that it probably contributes a very small fraction to POC.

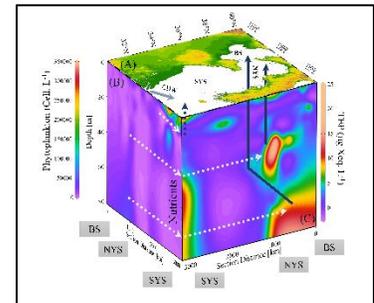
**Answer:** Authors reconstruct these lines with whole section by mentioning that POC was not measured.

Please see Ortega-Retuerta et al., 2010;2019, Bar-Zeev et al., 2011 and references therein, amongst others, as an example for the relevant discussion. If there are POC data available for the studied samples then they should be in my opinion included in the dataset and discussed in the manuscript.

**Answer:** Authors studied Ortega-Retuerta et al., 2010;2019 and Bar-Zeev et al., 2011 in detail. They were cited in discussion at 4.3 for relevant TEP-C influences on carbon cycle at lines 458-474.

Overall, I believe that the relevant discussion/ interpretations introduced in section 4.3 are not fully supported by the presented results other than the similarity of TEP distributions with chl-a or nutrients in some cases, which cannot fully support a discussion on TEP role in carbon cycling in the study area

**Answer:** Authors rearranged this section from TEP-Chl-*a* discussion to TEP-TEP-C relations by seasonal water mass influences at studied seas. Author reproduce a conceptual model as Fig. 10 for the study areas on basis of previous interactions in former researches. It may draw a probable source for TEP concentrations along these study areas.



- Line 426: of the carbon cycle

**Answer:** Changed in line 443.

- Line 428: the euphotic zone

**Answer:** Changed in line 446.

- Lines 441-442: zooplankton fecal pellets? This statement is not supported by the presented results.

**Answer:** Authors removed this part from manuscript.

## **TABLES**

Nine tables seem a lot for a manuscript. I suggest that the authors should consider some structural changes as i.e.:

- merging tables 2 and 3 in one major table presenting the concentrations and sinking rates of TEP reported in this study

**Answer:** Authors merged 2 and 3 with table 1 for seasonal TEP assemblages and TEPs in this study.

- merging tables 4-5-6 and 8 in one shorter major table presenting the concentrations of TEPs available from the literature, considering only the relevant data discussed in the text (lines 380-396)

**Answer:** Authors merged tables 4-5-6 and 8 in table 2, 3 and 4. Effect of water column on TEP was discussed according to these two tables after dividing into 0-50 m and 50-100 m layered concentration. Table 4 was useful for discussing seasonal TEP concentration at seas.

- incorporating the information provided in tables 7 and 9, especially table 9 were only data from Guo and Sun other than the ones reported in this study are provided, in the main body of the text (sect 4.2)

**Answer:** Authors merged tables 7 and 9 in table 5 according to this comment, on basis of seasons for having better discussion.

## **FIGURES**

Figure 3: Scales used for TEP concentrations should be uniform in all cases, both in min-max values and also scale stepping (step of color change).

**Answer:** Authors retained Fig. 3 to Fig. 4 by maintaining same colors pattern in scales and max-min values both in integrated and transection view in Fig. 4.

## **END OF REVIEW**