

Interactive comment on “Influence of hydrodynamic mixing on the distribution of dissolved organic carbon in the East China Sea and the northwest Pacific” by Ling Ding et al.

Anonymous Referee #1

Received and published: 18 October 2018

Ding et al look at the dissolved organic carbon (DOC), dissolved inorganic carbon (DIC), delta-14C-DIC and hydrographic (sigma/T/S) values to assess whether DOC distributions at the shelf-edge and shelf-slope regions of the East China Sea (ECS) are more affected by hydrodynamic processes (mixing of Kuroshio and Oyashio currents) or biological processes. They find that DOC in the ECS largely reflects mixing as opposed to biological processes, and that DOC oxidation only accounted for 18% of the oxygen consumption, thus implying that POC plays an important role in maintaining the biological pump as opposed to DOC. While I find the study to be simple and straightforward and potentially suitable for publication, it requires some substantial revisions.

C1

First of all, the authors suggest that since DOC and temperature correlate, that mixing must play a major role in the DOC distributions. While I find their reasoning to be completely valid here, they don't counter their argument by showing that DOC does not correlate with microbial processes. Are there bacterial abundance (BA) data from those seven stations? Do the BA correlate with DOC? If they don't, that will strengthen their argument that POC would be what sustains the microbial communities in that region.

Secondly, the authors discuss the DIC and delta-14C-DIC values from that region, but never report their values in the Results. The Results section only includes hydrographic data and DOC. If the authors are reporting these original data to support that DOC is distinct in water masses, these data should be reported in the results and discussed in greater detail. AOU should be reported in the results as well.

Thirdly, the data reported here are limited, and these data are from either the shelf-edge, or near the KE (as seen in Fig. 1); there are no data in between these two extremes. As the authors show that DOC correlates with temperature, even though there are no DOC data, perhaps there are some publicly available temperature data along the Kuroshio current that the authors can use to support their claims.

In addition, Figures 5 and 8 look nice initially, but at a closer look, they are a bit misleading, as the data are quite spread out (and the data in the figures don't include all of the seven shelf stations and eight deep stations shown in Figure 1). Also, why is density listed as the conserved variable in figure 5, yet salinity is in figure 8? These two figures should be consistent. With those variables in mind, if the authors were to find more hydrographic data in the region to support the figures, that would be helpful (at least to show that the spreading of the data in the figures is a valid assumption). In addition, the x-axis on both of these figures is latitude, but the stations that are reported in each of these figures are not linearly spaced. I suggest at the very least putting a map with the section outlined in each figure to orient the reader.

C2

Finally, there are some writing and style aspects of the paper that need to be improved. Several figure axes are miniscule and impossible to make out (see specific comments). In addition, the written English for the manuscript should be improved. There are quite a few grammar and wording issues that should be addressed. I pointed out some of them, but the authors would do well to send their manuscript to a proofreading service.

Line 32: Suggest rephrasing sentence for clarification: “carried by the Kuroshio and Oyashio western boundary currents. . .”

Line 41: “compounds” is not entirely correct because that is not taking into account the structural isomers. . .there could be more actual compounds than 20,000. Please replace “compounds” with “molecular formulae”.

Line 43: English: “plays”, not “play”

Line 65: English: replace “about a” with “there is a” and remove “was seen”.

Line 71: replace “such as” with “from”

Line 75: add “the” before “Kuroshio”. Lines 92-94: English: Consider correcting to: “DOC observations on WOCE (World Ocean Circulation Experiment) and CLIVAR cruises were collected at Line P02 stations along a 30° N latitudinal transect, yet the distribution of DOC near the KE was not investigated during these cruises.” Line 110: Needs clarification: “it is affected”: What is affected? The DOC? The currents? Please clarify. Line 117: Remove “which”. Line 152: replace “Dr. Hansell” with “Hansell Biogeochemistry Laboratory” Line 185: Replace “were” with “are”

Line 188: spell out the number 7

Line 222: Significantly? Are they statistically lower? Otherwise please avoid using that word.

Line 226: Where are the results for the DIC and delta-14C-DIC data?

Line 233: yes DOC has a good relationship with temperature, but does it also have a

C3

relationship with bacterial abundance? This seems like a pretty definitive statement, so at least provide some evidence that DOC does not correlate with a microbial parameter.

Line 290: Remove “apparent”.

Line 292: “statistically significant”, not “significantly statistical”

Line 293: Of course AOU and temperature have a high correlation; the temperature of water plays a role in the solubility of dissolved oxygen. Please advise and adjust this statement.

Line 374: How is delta-DOC calculated? There is no mention of how the authors determine a conserved DOC? Please clarify.

Line 404: Again, use of “significant”.

Figures:

Figure 1: The font on the z-axis is especially tiny and unreadable. The fonts on the x and y axis should probably be larger as well.

Figure 2: Have the authors considered putting these figures in T/S space, as opposed to vs. depth? What is their reasoning behind using depth? With T/S space, they can distinguish the different water masses that are present in the system (and they would need less subplots).

Figure 7: The font is tiny and impossible to see.

Figure 8: This intrusion is interesting and the data look nice, but it appears to be only five stations spread out across 8 degrees of latitude. I understand that sampling is limited here, but the colors are really spread out over a large range, which can be misleading. How do we know that this is truly what the hydrography looks like there? As salinity is shown there, there must be some other datasets around with more salinity in the region. I suggest that the authors expand their data for salinity at least, to show a more complete picture of the currents in the region. The same general idea goes for

C4

Figure 5.

Figure 9: The x-axis range is odd. Why not zoom in to better reflect the regression?

Please also note the supplement to this comment:

<https://www.ocean-sci-discuss.net/os-2018-78/os-2018-78-RC1-supplement.pdf>

Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2018-78>, 2018.