

Biogeosciences Discuss., referee comment RC2  
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## Comment on bg-2022-9

Anonymous Referee #2

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Referee comment on "Observing intermittent biological productivity and vertical carbon transports during the spring transition with BGC Argo floats in the western North Pacific" by Chiho Sukigara et al., Biogeosciences Discuss.,  
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### Review of Sukigara et al.'s manuscript

Sukigara and co-authors investigate the effect of passing storms on the production of organic matter and its fate once exported into the mesopelagic, using 2 BGC-Argo floats deployed in the western North Pacific. I reviewed the first version of this manuscript (first submission to BG few months ago) and I think most of the issues I highlighted in my last review have not been addressed. I appreciate the effort done to better describe atmospheric (wind and heat fluxes) and hydrologic conditions but I am not convinced by the heat content analysis. Figure 4f shows differences between delta heat content and heat flux of several orders of magnitude. How can you assume a 1D system? In section 3.1 (lines 274-275), it seems that you conclude that only case 4 is 1D but then, in the discussion, you state that case 1 and 2 are also 1D. You argue that "changes of heat content occurred mainly below the 200-dbar level" but figure 4f only shows 0-400m integrated values. Besides, temperature and salinity profiles also present large differences in case 3. By the way, why salinity profiles are not shown for the other cases?

My previous comments about Redfield and C:Chla ratio still stand. Deviation from Redfield ratio or changes in C:Chla can be due to a lot of different processes. And you actually use these two ratios to explain different mechanisms between your 4 cases. I think it is hard to be conclusive with these ratios. This is why you are using extensively the words "may", "might", "likely" which make the discussion very speculative.

The results section is very descriptive with very few new results. I think this section could be better structured, potentially according to your 4 cases (as you have done for the discussion), focusing on new results. Sentences like "The DO concentration in the water column was high in the euphotic zone and gradually decreased with depth" are not necessary.

**Specific comments:**

lines 33-35: The phrasing is not correct. Plus, "to observe"

lines 82-85: Reformulate with 2 sentences.

line 134: You should mention that you assume a constant euphotic depth throughout the timeseries. Or estimate it based on satellite PAR and/or Chla (see for example Morel et al. 2007).

lines 171-174: What about Non-Photochemical Quenching? Did you apply a correction for NPQ?

equation 4: Describe the terms of the equation. What is  $C_p$  and  $\rho$ ?

lines 259-262: The two sentences are redundant.

line 266: "Because the density changed significantly before the end of events 3 and 4". Which part of the density profile, how deep?

line 267: "the end date was determined from the change in the density profile". How much density change? Which threshold did you use?

line 274: Only case 4?

line 305: "We examine below the physical oceanographic conditions". Below is section 3.2 about biogeochemical parameters, not physical conditions??

lines 312-312: Pretty obvious. Go straight to the main results.

line 334: "the depth of the euphotic zone (~200 m)". You mentioned 70m earlier in the text.

line 339: "Chl a concentration.s increased slightly in the euphotic zone after the mixed layer deepened". Not exactly true. The increase occurs after deep mixing stopped.

lines 347-349: Pretty obvious.

line 369: You mentioned the POC to Chla ratio earlier in the text. Here and later in the text, you used the notation C/Chla. In the Behrenfeld paper, C is phytoplankton carbon not POC. It is a bit confusing. Make sure to distinguish between POC/Chla and C/Chla.

lines 378-379: I don't understand this sentence.

line 401: exceeded 19m? or 190m? You could plot a horizontal line for the MLD.

line 428: All other cases? Be more specific.

line 440-442: The Redfield ratio is not the TRUE value.

line 471: "(Fig. 14)". Which panel?

line 480: POC/Chla

figure 2: line 869, remove "red"

figure 4f: You should mention that it is daily integrated heat flux.

figure 5: dashed lines

figure 8: no g panel

figure 10: This figure is not useful. You should consider moving some figures to the supplementary information. "A fixed time (the start of profiling) was used to generate the figure.". I don't understand this sentence.