

Biogeosciences Discuss., referee comment RC1
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Comment on bg-2021-17

Anonymous Referee #1

Referee comment on "Biological pumps of carbon, nitrogen, and phosphorus in the northern South China Sea" by Jia-Jang Hung et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2021-17-RC1>, 2021

Overall assessment:

In this study by Hung et al., the biological pump of the North Southern China Sea (NSCS) is assessed through the passive and active fluxes of nitrogen, carbon and phosphorus. The study finds that passive fluxes were dominant for C, N and P (74-83% of total flux). These fluxes were seasonally variable and higher in the winter. Active fluxes varied with seasonality as well, yet with an opposite pattern to the passive fluxes. Both types of fluxes were driven by nutrient availability within the euphotic layer, but also internal waves and eddies played a clear role as well. The carbon flux of the NSCS into the ocean's interior is almost 2% of the global C flux, illustrating the potential importance of the NSCS on a global scale.

Overall, I found that the study is robust and this manuscript will be suitable for publication after some mild to moderate adjustments. For one, the use of the term "biological pumps", or "BPs" in the paper was confusing to me and I don't think it is the correct way to use that term. I think of the biological pump as a large-scale concept that is occurring in the water column; its strength can be assessed through fluxes of the C, N and P, as described in this study. Therefore, this study should use the correct terminology of what the study is really assessing (active and passive fluxes), instead of "biological pumps". I also noticed that multiple figures are distorted (i.e. stretched or compressed). Finally, the manuscript had numerous repeated grammatical errors and would thus benefit from an English proofreader.

Specific comments:

Line 75: A figure showing a map of the SCS would be helpful here, maybe refer to Fig. 1.

Lines 85-88: Goals of this study are confusing. Does the author mean there is limited data on the BP in the NSCS? And is the ultimate goal looking at multiple biological pumps, or the biological pump in the NSCS? Use of BP terminology is unclear.

Table 1: I am confused about the sampling dates for that cruise as well, please put it in the same format as the other dates.

Line 129: Please provide the actual depth (i.e., pressure in water column) along with the light penetration depths here.

Fig. 2: Please put the season and sampling year somewhere in each subplot; I don't remember which one is which with just numbering 1-11.

Fig 3: In TS plot, you could label (or put box around) the different waters (subsurface, winter vs. summer waters, etc)

Line 300: Why is the figure not shown? Maybe just remove that text.

Figure 5 caption: "data in various expeditions"- are these the expeditions that are described here (i.e. Table 1), or are they different?

Line 383: Term "regular summer" is unclear.

Line 390: "an overall value" – is that the mean of both the 50 m and 100 m ratios?

Table 3: Replace "predicted" with "estimated"

Line 575-579: "This may imply..."; what is being said here? That the NCSC has more effective C fluxes than previous data from the open Atlantic and Pacific oceans? That was not stated and it is unclear what the sentence is saying in its current form.

Line 583: This statement about 1.89% of the global flux could be strengthened by also mentioning the area / volume of the NCSC relative to the global ocean (I am guessing it is <2%).