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Interactive comment on "Bottom-up and top-down controls on picoplankton in the East China Sea" *by* C. Guo et al.

Anonymous Referee #3

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General Comments: This paper concerns the patterns of picoplankton abundance and growth rates and microzooplankton grazing in the East China Sea (ECS) during 2 cruises: one in summer 2009 and one in winter 2010. The authors also measured various physical and chemical parameters to correlate with the abundance and growth/grazing estimates (temperature, salinity, nutrients, chl a). They found that different regions of the ECS were dominated by different components of the microbial community during the 2 cruises. They also found that growth and grazing rates varied seasonally, regionally, and between groups. Using correlation analyses, they tried to estimate the relative impacts of top-down and bottom-up factors on phytoplankton growth rates in this region.

Much of the discussion/conclusions/interpretation of the data hinges on the correla-

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tion analyses and their interpretations. Of course, correlation is not causation, so discussing these data as if they imply causation without clear justification is a mistake that should be avoided. For instance, for young school children, shoe size strongly correlates with the ability to read, but there is no causal connection here. The missing causal variable is the age of the child. When reading the first section of the discussion, and the abstract, I get the impression that the authors think that there is a causal relationship between the variables they tested: I doubt that this is the case. If it is the case, they need to make it very clear in their discussion of the data their reasoning.

For instance, the strong positive correlation between salinity and all picophytoplankton abundances is not because these phytoplankton need more salt to accumulate. Salinity is a proxy for something: make it clear what that "something" is. The strong negative correlations between the picophytoplankton populations and nutrients in winter also does not mean that high nutrients kill off the phytoplankton: it is more likely this is a proxy for mixing and hence light levels experienced by the phytoplankton. And so on.

Another clarification to make in the text is that the "microzooplankton" grazers include "nanozooplankton" – since PRO and SYN are probably being consumed mainly by these smaller grazers (as is mentioned twice in the discussion). Seawater dilution experiments would of course include nanozooplankton, too. Perhaps the introduction, p. 8206, could state, "As the major consumer of phytoplankton, microzooplankton undertake the most important role in trophic carbon transfer between picoplankton and higher trophic levels. We define microzooplankton here as <200 μm grazers, which therefore include nanozooplankton (2-20 μm grazers)."

In summary, this paper needs significant editing of its content to streamline it and make its arguments crystal clear. It will be a valuable addition to the literature once these edits are made. As it is currently written, the data suggesting that bottom-up and top-down factors are important controllers on phytoplankton populations is not convincing, even if such statements are intuitively obvious.

Specific Comments: Figure 2k: is the blob of red indicating high chlorophyll just south of 32°N and east of 124°E an artifact of the ODV contour plotting routine used? It doesn't look like there are any stations at that location to account for the high values. If VG gridding was used in ODV, it is better to use a low number for X & Y scale-length and have a white area on the plot where no data is, than pick a high number to fill in the x-y space where no data occurs. Please check and modify as appropriate.

Figure 2L and 3L: is the high chlorophyll at the second to last station on the PN transect (to the east) real? Is this the transition zone or the Kuroshio region?

The PN transect data for chlorophyll is hard to see in the figures provided: the description in the text (p. 8212) doesn't really match what we can see in Figure 3.

There is no description in the methods for how microzooplankton abundance was obtained: please add (first mention is on page 8215 in the results section).

Table 1: Please add more explanatory details to the table. I have to assume that the values reported here are averages, with the range of the values in parentheses. Also, it should be mentioned in the legend that total C refers to total phytoplankton carbon. Please confirm and add to table legend. What jumps out at me in this table is that in the summer the plume area is highly variable for all parameters, suggesting that more than one region is encompassed here. This makes me wonder if using a single value (50) for converting Chl to C is really valid for this area. In general, there should be a discussion of the use of this single value and how it might over or under-estimate the total carbon, and therefore the percent of the total community represented by picoplankton. Also, is there ancillary data suggesting that a diatom bloom, for instance, was going on in the coastal area? With such high chlorophyll values that is what I would expect. Perhaps the light scatter data of the PEUKs indicate that they were larger there? If so, please mention in the text.

Table 2: The lack of correlation between SYN and the nutrients in the summer is potentially a very interesting result. I don't see it specifically mentioned in the discussion

section. It suggests that there is another control on this population; perhaps grazing.

Figure 4: these surface plots are averages over the top 150 m: it would be better to use integrals over that depth interval. Similarly, Figure 2 is just surface distributions: this makes sense for temperature/salinity, but integrals over the upper 150 m (assuming the data are available) of nutrients would be better to compare to integrals of phytoplankton concentration over the same depth range.

Figure 6: Are the panels labeled with their letters A-L? I can't read which are growth and which are mortality (quality of figure too bad). They are too small to see. This figure should be made bigger, perhaps making a Figure 6A for summer and Figure 6B for winter. It is too hard to see if any real trends are present. It is an interesting way to present the data, however, so it would be worth making it legible!

Figure 7, 8,9: Needs better quality graphics, so it is easy to read axes and notes on plots.

Lines 13-15: Diverse hydrographical conditions as the "driving force" for structuring phytoplankton distributions: I am uncomfortable with this phrasing. If the statement was that the communities were different spatially (in the different water masses) and seasonally within the same areas, then that would be fine, but the "cause" of those changes is likely due to the light, nutrient (hydrographic) and grazing (ecological) dynamics as they change over time and space. So, perhaps the sentence could be re-phrased.

How does temperature directly affect phytoplankton species distributions? Is it temperature directly, or is temperature a proxy for light or nutrients?

How is grazing affected by salinity? I see no reason why salinity should directly affect it, so what is the indirect cause of grazing changes? To say that the Yangtze River affects microzooplankton grazing needs more justification than this.

Technical Corrections: Page 8205: line 13: insert the words "to have" between "them"

and "a" Line 15: change "are" to "have been" Line 26: change "them" to "their carbon" and change "packed" to "consumed" Line 27: insert "the" between "via" and "microbial"

Page 8206: Line 2: change "previous" to "previously" Line 4: change "feeders" to "grazers"; change "rate" to "rates", change "of" to "and" Line 9: insert "of their" between "rest" and "mortality" Line 10: change "of" to "by" Line 14: change "change" to "changes" Line 16 & 17: omit the word "the" in both lines Line 19: change "situates" to "is situated" Line 21: insert "the" before "ECS" Line 23: insert "The" before "physical" Line 24: change "mid-latitude" to "mid-latitudes" and "landmass" to "landmasses" Line 26: change "amount" to "amounts" Line 29: change "Besides" to "Additionally"

Page 8207 Line 23: change "setting on" to "along"

Figure 1 legend: change "line" to "lines"; Change last sentence to: "The PN transect is labeled by a black line."

Page 8208 Line 3: insert "the" before "transitional" and change "station" to "zone" Line 4: put in actual model and manufacturer. Line 5: change "membrane" to "membranes" Line 19: change "according to" to "delineated by"

Page 8209 Line 2: insert "the" before "depth" and before "chlorophyll"; insert "note that" before "at" Line 3: insert "the" before "experiment"and before "surface" Line 9-11: re-write as "Duplicate sets of 1.2 L bottles were used to establish a nutrient-enriched dilution series, consisting of 15%, 27%, 50%, 73% and 100% natural seawater (10 bottles total)." Line 14: add "pre-screened through a 200 μm nitex mesh" after "seawater" Line 15: Change "All five bottles..." to "Inorganic nutrients were added to all ten bottles (final concentrations of ....)..."

Page 8210 Line 5: insert "the" before "formulas"

Page 8211 Line 10: insert "E" after "125°"

Page 8212 Line 12: omit "up-" and insert "the" after "located in" Line 16: insert "order of" before "magnitude" Line 17: insert "cells ml-1" after 10^3. Line 22: change "were" to

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"was" Line 24: insert "A" before "Negative" Line 26: omit "existence" Line 27: change "controlled" to "correlated with" (just because it is correlated, doesn't mean it directly controls abundance – it is probably a proxy for nutrients or another parameter)

Page 8213 Line 2: add "the" before "PN" Line 4: add in "were" before "distributed" Line 8: omit "that of" and insert "the trend found for" Line 11: replace "for" with "by about" Line 12: change "folds" to "fold"

Page 8214 Line 6: change "Flow cytometry-based" to "Seawater dilution experiment-based" Line 8: add in "d-1" after "0.1" Line 14: add in "the" after "at" (both times)

Table 4: need the units for microzooplankton abundance on the table (assume cells per mL).

Page 8216 Line 11: omit "sometimes" and put in "always" before "significant" (also there is an extra period on this line that needs to be removed) Line 26: omit "rest" and replace with "remaining", replace "contribution" with "consumption"

Page 8217 Line 4-5: omit the end of the sentence, i.e.,"the composition".

These are not the only grammatical errors, but should give an idea of what needs to improve in the manuscript. I do not list the changes necessary in the discussion/conclusion sections: a native English-speaker should be enlisted to help edit the paper.

Interactive comment on Biogeosciences Discuss., 10, 8203, 2013.