Report 1

I think that the manuscript is for the most part ready for publication. I would still, however, recommend that the authors add in a table that summarizes all of their abbreviations. While the abbreviations are spelled out in the manuscript, the authors should consider that some readers still read manuscripts on paper, and on paper it is not always easy to find the first time that an abbreviation is explained.

*A table summarizing the abbreviations used in the paper has been added.*

I also still disagree with the authors' assertion that the fecal pellet pathway is likely to transport a higher proportion of picoplankton carbon than microplankton carbon (lines 455-457). In their response to reviewers, the authors cite Gifford (1993) – note that of the papers they cite, this is the only one that pertains to the relative contribution of protozoans and phytoplankton in North Pacific mesozooplankton. Gifford found (in a very nice study) that protozoans were cleared by copepods at the same rate that microphytoplankton were cleared. In their experiments, however, protozoans were much more numerous than microphytoplankton, and hence they concluded that (during their study) protozoans were the dominant prey source for copepods. For the authors' current study, microphytoplankton make up 31% of the phytoplankton standing stock (their results). If we start by assuming constant specific growth rates for all phytoplankton taxa (a naïve assumption, granted – diatoms often grow with higher specific growth rates than other taxa, though that might not be the case if Fe limitation is significant), then production of pico- and nanoplankton combined would be equal to 69% of total production. If we assume a protozoan gross growth efficiency of 30% (Straile et al. 1997), protozoan production will be ~21% of phytoplankton production (compared to 31% for microphytoplankton). It should be noted that this is an UPPER estimate of protozoan production, because picoplankton are primarily grazed by ~5-um flagellates, which in turn are grazed by ciliates and heterotrophic flagellates before being passed to mesozooplankton and hence the efficiency of the protozoan shunt as a whole is likely less than 30%. Thus it seems likely that mesozooplankton (which according to Gifford prey upon microzooplankton and microphytoplankton in proportion to their relative biomasses) have diets that contain >50% microphytoplankton. I thus think that it is misleading for the authors to suggest that potential fecal pellet export would invalidate their core findings. In reality, it is likely that sinking fecal pellets would support their results that microphytoplankton were preferentially exported.
Regardless, I would like to congratulate the authors on what I consider a fine study.

*While we feel grazing is likely an important pathway for small cell export, this study did not set out to compare the relative contributions of different phytoplankton size-classes to export by this pathway. Since we collected no evidence with which to support a claim that the grazing pathway would lead to an enhanced role for small cells, we have also noted that grazing could further enhance the role large phytoplankton play in export as suggested by the more traditional view of the biological pump. We thank the reviewer for the thoughtful, helpful, and supportive review.*

Report 2

Message of this paper is that small (nano- and pico-) phytoplankton also contributes to the biological pump although it has been thought that only large (micro-) phytoplankton play a crucial role in the biological pump. Authors reported that minor fraction of small phytoplankton in settling particle collected by sediment trap might be attributed to that small phytoplankton are grazed by zooplankton and involved into fecal pellet (FP) and thus small phytoplankton also play a role in biological pump. This hypothesis is very unique. In addition, authors responded to almost every comment correctly. Thus this article is publishable.

However I have one question.
Major premise of this paper is that small phytoplankton is incorporated into FP and FP is not collected by sediment trap. However I think that settling particle collected by sediment trap should include FP. How do author answer this question?

*Fecal pellets are indeed collected by the sediment traps, but they are not quantitatively collected by the* in situ *pumps due to an insufficient volume (~1000 L) of water being sampled.*

In addition, followings need minor revisions or considerations before acceptance.

L178 Why was preservative such as formalin and HgCl2 not used although three days drifting? How do authors thing quality of sample?

*While it is possible that the sample was degraded over the three-day deployment, we do not feel that this had a large effect.*

Numbers in text are not coincident with those in Table 2.
L198 Where does NPP of 91.8 come from? Average of 105.14 and 78.75?

*91.8 is an average of the two P26 samplings.*

L199 12.4 -> 23.41 (?)
L202 2.2 -> 3.58 (?)

*The numbers in the table are correct. The errors in the text have been fixed.*

L235, L240, L244, L247, L251 Fig.4 -> Fig.4a
L235 POC/234Th ratios can be easily understand with not only Fig. 4, but also Fig.9.

*L235 and L240 refer to Fig. 4a. L244, L247, and L251 refer to Fig 4b-d. Figure 9 only plots the POC/Th ratio for the >53-µm size-class (because this is the ratio used to convert from Th flux to POC flux) so it is not referred to during the comparison of the different size-fractions.*

Table 2 What are P26-D and P26R? Please explain these in caption.

*P26-D and P26-R are the stations for the deployment and recovery of the sediment traps respectively. A note to this effect has been added to the caption.*

Table S1, S2, S3 Season for observation period is unreadable. How about inserting the boundary line between different cruises?

*The cruise month, year, and station are shown before the data for each station. A blank row separates data from different stations.*

Table S1 How about showing integrated Chl-a for each fraction? Because integrated Chl-a are discussed in text (section 3.4). It is difficult to know fraction of chl-a (e.g. >5um is >30% and maximum is 50%) with current Table S1.

*Integrated chlorophyll* a *as determined by HPLC are reported in Table 3 (now Table 4). These data are the most frequently used for higher-level analysis in this study are therefore the ones reported. The supplemental tables contain only base measurements and no derived quantities.*

Do author think which is close to true value, Th-based POC or sediment trap-based POC?

*Reasons for the observed difference in Th-derived POC fluxes and the sediment trap fluxes are discussed in the paper. Because the two methods integrate over different time periods, the comparison between the two measurements is an imperfect one. Furthermore, the* in situ *pumps and the sediment traps sample a different fraction of the particulate matter, with the pumps sampling smaller, slower sinking particles, but missing large, fast-sinking, but rare particles like fecal pellets while the traps capture fecal pellets, but may miss the slower-sinking particles. It is likely the two methods bracket the "true" POC flux. We thank the reviewer for the helpful and supportive review.*