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Interactive comment on "The relative importance of phytoplankton aggregates and zooplankton fecal pellets to carbon export: insights from free-drifting sediment trap deployments in naturally iron-fertilised waters near the Kerguelen plateau" *by* E. C. Laurenceau et al.

Anonymous Referee #2

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Comments on the Ms "The relative importance of phytoplankton aggregates and zooplankton fecal pellets to carbon export: insights from free-drifting sediment trap deployments in naturally iron-fertilised waters near the Kerguelen plateau"

This Ms shows very interesting information on the contribution of mainly fecal material, and phytodetritus plus fecal pellets, during the onset and decline of the spring bloom, respectively. In general is well written, clear and concise, so it is easy to follows the

arguments and points. I would agree in the fact that this Ms contribute with relevant issues related to carbon export around the Kerguelen plateau. I rated it as good (2) because I am convinced that this MS has the relevance to merit publication in BG after some medium changes. I hope that the following comments will improve the quality of the paper.

Some comments:

1) PPS3/3 and gel-cups were not simultaneously deployed. This situation might be a problem because the authors made comparisons based on similar nutrient and plankton scenarios, which is not necessarily true.

2) The authors mention that the average trap drift speed was 8.5 cm s-1 and I wonder whether the authors can provide with consistent evidence and information that this situation did not affect significantly the trap collection efficiency. In the study area the current speed along the slope and shelf break can be significantly higher.

3) Fecal and phytodetrital aggregates were distinguished because fecal matter was more dense and compact and phytodetritus loose and green, which seems to be a rather subjective criteria. Some observations using both light and electron microscopy probably would help to dissipate doubts?. The authors isolated fecal aggregates manually to conduct some tests, but from the text it is not clear enough which kind of test you did to be sure that fecal- and phytodetritus-aggregates were correctly classed.

4) The high phytodetritus coincide with high abundance of diatoms (as indicate by the biogenic-silica concentration), but no comments on the physiological state of the diatoms we included in the text. Did you notice that diatoms or the other functional groups of the phytoplankton were in relatively bad physiological condition? It would be interesting to have some comments on this situation that have been also reported for upwelling areas (Progress in Oceanography 83: 217-227; 2009). Laurenceau et al. suggest that high export efficiency could be mediated by fast-sinking aggregates of heavy silicified, grazing-resistant diatoms. It would be interesting whether the authors

make some statements on the relevance of diatoms as triggers of high export efficiency. In other words the relationship between chain-forming diatoms and the efficiency of the biological pump in marine systems.

5) The authors speculate that the increase of phytodetrital and fecal aggregates observed at depth in some stations (E-3) could reflect an earlier production event. An analysis of the phytoplankton composition would give insight on this aspect. Whether the composition did not change significantly I did not see reasons to exclude E-3 from Fig. 6.

6) Large-size, rare fecal pellets or phyto-aggregates may have a disproportionate high impact in the results and final conclusions. For example, one large pellet could contribute with a large fraction of the total carbon exported and are sometime considered outlier and usually not included in the analysis. How was your criterion on this issue?

7) During KEOPS2 a negative relationship between primary productivity and carbon export efficiency was found. So, where did the photosynthetically produced organic matter go in sites with high primary production?. Even though the processes that control export efficiency are beyond the scope of this contribution, this issue is highly relevant and I would ask the authors to provide more antecedents and insights on the possible effect of grazing or other biological/physical processes on the export mode and controls. Could you speculate on the reasons why microzooplankton did not show high numbers in trap samples nor in the water column?

Interactive comment on Biogeosciences Discuss., 11, 13623, 2014.