

Interactive comment on “Carbon export in the naturally iron-fertilized Kerguelen area of the Southern Ocean based on the ^{234}Th approach” by F. Planchon et al.

Anonymous Referee #1

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The manuscript aims to describe the ^{234}Th and derived POC export variability in the Kerguelen plateau submitted to natural iron fertilization. The idea here is to estimate how iron fertilization could affect the carbon export in high productivity sites over and off plateau in early stages of the bloom. It appears that higher export was observed in the permanent PF meander and lower over and off the plateau. In the same way, higher export efficiency has been found in PF meander and lower in others stations. This indicates, as we expected, that phytoplankton biomass stage is crucial to determine the carbon export and that export efficiency is balanced between phytoplankton species, grazing pressure and bacterial degradation. The relation between iron fertilization and carbon export is less obvious as export is firstly and mainly linked to biomass structure

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and particle settling velocity.

The manuscript presents new results regarding POC export in the Southern Ocean in early bloom stage period using the ^{234}Th approach. The results and protocols are well described. The discussion is consistent. However, in this section, some explanations appear unclear and have to be more detailed. Consequently, I recommend the paper for publication with minor corrections.

Details comments The overall manuscript is clear but some clarifications/explanations are required in the discussion section.

Paragraph 4.1: The station R2 is dominated by small phytoplankton and slow grazing. The reasons to explain a high ThE ratio is not clear. In line 453: What is the relation between iron limitation and a high ThE ? Explain more.

Paragraph 4.2: The stations F-L are characterized by a massive bloom with diatoms in fast growing phase. In lines 496/497, authors suggest that the phytoplankton community was composed by a broad spectrum of size and taxa (mix between small and large species). What is exactly the structure of the biomass community ? How diatoms can be associated to an accumulation scenario as they are usually associated to higher export efficiency (ballast effect) ? Perhaps authors should consider the new production as directly linked to carbon export instead of primary production ?

Paragraph 4.4: In this site (E1 and E3), the export was high in the beginning while the production was low. Both are going in opposite trend explaining the decoupling between production and export. In this case again, authors should consider maybe the new production instead of the primary production ?

Conclusion: There is a misunderstanding in line 696. The highest carbon export was observed in station E (PF meander) and not in station A3 (see figure 6). Do authors consider the average of carbon export (100m, 200m and trap@200m) or just the maxima ? This should be clarified.

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Please also note the supplement to this comment:
<http://www.biogeosciences-discuss.net/11/C7849/2015/bgd-11-C7849-2015-supplement.pdf>

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