

**Interactive comment on “Insignificant enhancement of export flux in the highly productive Subtropical Front, east of New Zealand: a high resolution study of particle export fluxes based on  $^{234}\text{Th}$ : $^{238}\text{U}$  disequilibria” by K. Zhou et al.**

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Response to C. Jeandel (Referee)

This work presents numerous data of good quality allowing an estimate of the POC export flux within different water masses across the Chatham rise, east of New Zealand. Despite a significant natural fertilization of the area, the results evidence a low export. The paper is clearly written, well argued and illustrated and surely deserves to be published in Biogeoscience, after minor corrections listed below.

Response: We appreciate the positive comments from the reviewer.

- Because of the paradoxical low export in this area, I suggest to the authors to change the title in order to underline the contrast between the natural fertilization and the weak export.

Response: Respectfully, we would prefer to retain the present title since our study is focused on the decoupling between Primary productivity (PP) and export rather than the effect of natural Fe fertilization on export fluxes.

- I would explicitly represent the Chatham rise on the figure, and improve the symbols representing the station within their different contexts.

Response: The Chatham Rise has been identified on the figure, and the station names have been enlarged and marked in different colours.

- In the abstract, please specify what "low" and "high" salinity means.

Response: We have specified “low salinity water” as  $S < 34.5$  where macronutrient concentrations were high and dissolved iron is inferred to be low, and “high salinity water” as  $S > 34.8$  where macronutrient concentrations were low.

-methodology: Did the authors participate to any analytical intercalibration as the recent Geotraces one? What is the reproducibility of their data? How were the error bars determined? Should be more explicit.

Response: Yes, we participated to the recent Geotraces intercalibration. The precision of our  $^{234}\text{Th}$  were better than 5%. The error bars were derived from propagation from the initial and final counting of  $^{234}\text{Th}$ , as well as the uncertainty on the  $^{230}\text{Th}$  recovery correction.

- Figures: there are many figures and all are not always explicit. For example, in order to visualize the Th and POC export fluxes in the different contexts, I prefer to see histograms instead of interpolated coloured maps...

Response: Thanks for the advice. We have changed Figure 9 into histograms.

- Are there other ancillary parameters as dissolved Si in order to assess the argument on the activities of diatoms in the area, at this season?

Response: We have included discussion on the dissolved Si as suggested by the reviewer.

- mesozooplanktonic activity is considered as the most likely actor limiting the export here; what about macro-nutrient (ex: Si) limitation?

Response: See previous comments to Reviewer #2. It does seem that at the time of our sampling diatoms were likely to be under dissolved Si stress by judging from the dissolved Si data. However, we tended to believe that Si was not yet limiting the primary production (PP) because PP was significantly high at mid-salinity water while the Si level was similar in both the mid-salinity and high salinity waters.

-the authors should check thoroughly the references (or change of software!) because there are many small errors in the reference list.

Response: Yes, the references have been cross-checked and corrected.