Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2017-565-RC1, 2018

Biogeosciences Discussions

Interactive comment on "Nutrient availability and the ultimate control of the biological carbon pump in the Western Tropical South Pacific Ocean" *by* Thierry Moutin et al.

Anonymous Referee #1

Received and published: 31 January 2018

On the one hand, this ms. deals with an impressive dataset, but in the end, the main conclusions (importance of iron, importance of zooplankton vertical migration for export) are conjectured from indirect evidence, not from processes/data studied by the authors on the cruise.

There are several grave deficiencies in the data treatment and interpretations.

1. Why should it be justified to obtain "winter values" of properties by taking the 70m values as representative? These are minimum estimates at best given that in almost all profiles the chl-a maximum is below 70m.

2. How can matter, recovered from sediment traps, be taken at face value and trap

biases be not considered? Or, even better, corrected for! This issue has been extensively discussed: Gardener 2000 in The changing ocean carbon cycle, Hanson, Ducklow, Field, eds., Cambridge Univ. Press, p 240-281; Buesseler et al. 2007, J.Mar.Res. 65, 345-416). Solubilization into collection cup supernatants is (almost) not considered at all but this is important especially in shallow traps, see Kähler and Bauerfeind (2001), Limnol. Oceanogr. 46, 719-723; Antia (2005) Biogeosci. Discussions 275-302. In the case of phosphorus, supernatants have been measured but assigned 100% to swimmers! What about P in the passive flux? DOC could obviously not be measured (formalin) and DON was not, or is not reported. Hence almost all P and much N and C "export" by particles is missed in the trap data. Also one of the traps is used in the balances of two regions (Fig. 7).

3. Zooplankton vertical migration is conjectured to be the one important export mechanism with only implied evidence (ADCP data not shown). But to present swimmers attracted to the sediment trap as evidence of vertical migration ("Zoo/Particulate mass flux ratio" in Tab.4) or "mean carbon export by swimmers" (p.13 line 23) is downright nonsense. Swimmers killed in the trap cannot move upward again. And of what should swimmers be representative? Certainly not of a vertical flux.

4. New production and primary production are not neatly distinguished in the text (e.g. p.13 line37; p13 line 19). Most PP is recycled in these environments thus PP cannot explain the drawdown of DIC.

5. The ms. was to me difficult to read because of abounding abreviations and numbers in the text, repeated checks were necessary whether the authors refer to their own data or speculate. No story is told convincingly. But my rejection of the ms. is mainly based on points 2 and 3 above.

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