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Ocean Science Discussions

Interactive comment on "Adding nitrate and phosphate separately or together in the Central Indian Ocean: a nutrient enrichment experiment" *by* S. Tang et al.

Anonymous Referee #1

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In this short paper, the authors measure Chlorophyll a concentration (phytoplankton growth rates is derived from it) after the addition of N, P, N+P and no addition in water samples from the central Indian Ocean. The authors find that phytoplankton response is greater when N and N+P are added, whereas they see little change when P only is added. They also deduce from their experiment that temperature and the N:P ratio play no noticeable role in controlling primary productivity (Chla).

I have no major problem with the manuscript apart from the fact that there is nothing very new or far reaching about the authors' findings. I do not know every papers that present analyses of phytoplankton growth response to N and P enrichment but I am

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pretty sure that similar experiments have already been conducted in the Central Indian Ocean.

The main findings of the authors, i.e. phytoplankton response is greater after N and N+P addition rather than P addition, is very much in agreement with previous findings in marine systems and notably with the compilation made by Elser et al.[1] for marine ecosystems.

The evident conclusion from the present work is that primary productivity in the area is N limited rather than P limited. However the authors do not reach this conclusion. There is also very little discussion of the relevance of their results in the context of previous works, for example in the debate about the relative importance of P and N for phytoplankton growth. Some important references seem to be missing, for instance Tyrell et al.[2] or Elser et al.[1]. Initial N:P ratio is low in B1 (ambient waters) and below the Redfield ratio: what does that mean? Could it be the effect of denitrification in the Arabian sea?

I am a bit surprised that the author find no relationship between N:P ratios and growth rate as it seems that N addition promotes phytoplankton growth while P does not. It means that initial high N:P ratios should promote primary productivity. I am not convinced that the last figure (Fig. 4) shows adequately the absence of relationship between total growth and N:P ratio. I would rather draw a plot showing the average N:P or initial N:P ratio in each experiment compared to the average or cumulated phytoplankton growth.

I found the method for Chlorophyll a measurements not adequately described. The paper is not always clearly written.

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[1]Elser, J. J. *et al.* Global analysis of nitrogen and phosphorus limitation of primary producers in freshwater, marine and terrestrial ecosystems. *Ecology Letters* **10**, 1135-1142 (2007).

[2]Tyrrell, T. The relative influences of nitrogen and phosphorus on oceanic primary production. *Nature* **400**, 525-531 (1999).

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Interactive comment on Ocean Sci. Discuss., 6, 2649, 2009.