

Interactive comment on “Phospholipid synthesis rates in the eastern subtropical South Pacific Ocean” by B. A. S. Van Mooy et al.

Anonymous Referee #1

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The phosphorus cycle is a major process of the biogeochemical cycling of elements in the marine environment; the contribution of the microbial community to this cycle is still under question. In their paper, Van Mooy and co-authors measured the flux of phosphorus processed through the build up of membrane phospholipids in microbial picoplankton cells, along a west-east transect between Easter Island and Conception in Chile. Phospholipids synthesis rates were compared to additional parameters (Chl_a fluorescence, the PP/BP ratio) with the aim to discriminate the respective contribution of heterotrophic bacteria and phytoplankton to this flux.

The authors give evidences that phospholipids synthesis account for a significant part of phosphorus incorporation in the ocean, and that heterotrophic bacteria are the primary agents of phosphorus incorporation into phospholipids synthesis in the eastern

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South Pacific. There is no doubt that this is a major original result that will affect future researches on the cycling of phosphorus in the ocean.

Phospholipids synthesis rates were measured by using a new protocol previously set up by the first author; It involves a standard phosphorus radiotracer incubated over 8 hours in presence of the whole plankton community, followed by phospholipids extraction of suspended matter retained on 0.2 μ m aluminium filter, and measurement of radioactivity incorporated in the whole phospholipids fraction. The need for developing again protocols, coupling analytical chemistry, biochemistry and microbiology, in order to better evaluate the cycling of elements in the oceans, is clearly shown here. I wonder whether such result might have been expected from what we know about the respective importance of carbon to phospholipids ratios in bacterial and phytoplankton cells?

The manuscript is nicely written and easy to follow with a well constructed discussion. I greatly recommend it for publication in BGS.

However, I suggest adding more environmental data in the result section, given to their importance in phospholipids synthesis rates, and for comparison with further environmental situations and spatial scale of investigations. The characteristics of the ultra oligotrophic environment must be clearly stated even though these data are certainly available in some of the other manuscripts of the special BGS volume. These data include sea water temperature (“incubations were done at sea surface temperature”), depth of 0.3% light attenuation along the transect, PO₄ and NO₃ concentration ranges (“phosphorus was not limiting”), and the range of PP and BP. To what extent these variables might affect the measured PL synthesis rates should be discussed in the discussion section.

Detailed comments:

P2794: Abstract line 5 replace The synthesis of one class of membrane lipids, the phospholipids, also creates...by The synthesis of cell membrane phospholipids creates

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a demand..

P2796: 2.2 Incubations line 4: add a reference for the protocol afterwas less than 1% of ambient concentrations of PO₄ at all stations (add a reference).

P2798: 2.5 Additional measurements line 3 & 5 add the units for BP and PP.

P2798: 3 Results:

I suggest two paragraphs

3.1. Environmental parameters: a table with at least T°, PAR (depth of 0.3% attenuation), PO₄, NO₃, PP, BP

3.2. Phospholipids patterns

P 2799:4 Discussion

Line 1 during the second leg of the BIOSOPE cruise we encountered a broad range of oceanographic conditions. Please briefly say which one. Move here sentence p2802 line3 starting by Furthermore, PO₄ was present in abundanceuntil (Bonnet, 2007; Van Wambeke3). P 2802 replaces line 3 shortly by (Van Mooy et al. 2006). As PO₄ was never limiting, it is reasonable to expect that phytoplankton....

Line 4-5: with increasing rates of bacterial biomass production (?) or microbial biomass production?

P2799 end of the first paragraph: briefly discuss to what extent environmental variables such as temperature, PO₄ concentrations, PP might (or might not) affect the measured PL synthesis rates.

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