Biogeosciences Discuss., 10, C244–C246, 2013
www.biogeosciences-discuss.net/10/C244/2013/

Biogeosciences
Discussions

Interactive comment on "Enhanced rates of particulate organic matter remineralization by microzooplankton are diminished by added ballast minerals" *by* F. A. C. Le Moigne et al.

Anonymous Referee #1

Received and published: 7 March 2013

This very interesting paper by Le Moigne et al. focuses on the processes responsible for the lower rates of organic matter mineralization in aggregates that were noticed in previous experiments. Because of the importance of OM remineralization in the global carbon cycle, this topic is completely within the scope of BG. The paper investigates the effects of zooplankton feeding and presence of ballast minerals on OM remineralization, both singly and together. I have not seen previous work where the two are treated together, and of course they co-occur in nature, so this is a valuable exercise. The authors conclude that both zooplankton and mineral ballast decrease OM remineralization, and that furthermore they increase the initial rate of particle aggregation so that export would be greater in their presence. These findings are important when

considering ocean carbon transport.

The paper is extremely well written, the experiments well thought out, and the methods carefully described. It would be entirely possible to repeat these experiments from the descriptions given. The title and abstract are appropriate for the paper. The results of the work are clearly presented.

There are two issues that should be mentioned, however. 1) BiSi is not regenerated during organic matter decomposition. As the authors point out several times, it is chemically dissolved. The authors sometimes treat Si in the same way as N and P, and seem to be surprised when it behaves differently. One example: "In this case, the presence of rotifers resulted in enhanced remineralization [production is meant here] of NH4+ and phosphate, but not of DSi, during the 8 days of the experiment." (p. 3611, line 7-8).

2) The authors point out that their experiments are simple (I hope not simplistic as they say), but they should still be related to the real world. How do the rotifer and calcite concentrations added compare to what might be seen in the ocean? There was an analysis of rotifer nutrient regeneration rates on p. 3607. How do these compare with natural waters? Would the concentrations of calcite added be similar to a coccolithophorid bloom? The experiments are very straightforward, ad the results are clear, but what they possibly mean needs to be discussed further.

Minor editorial things:

page 3598, line 19 Delete "as they were". I think "as they are" was meant, but it is not needed in any case.

p. 3600, l. 4 Add r to Experimental

p. 3603, l. 4 "as described in Poulton et al. (2006).

p. 3604, l. 2 no differences sounds better than not differences

p. 3611, l. 4 simple, not simplistic l. 14 . . .increased the initial rate, not the kinetics of

aggregation. . .

Interactive comment on Biogeosciences Discuss., 10, 3597, 2013.