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Interactive comment on "Carbon and nitrogen turnover in the Arctic deep sea: in situ benthic community response to diatom and coccolithophorid phytodetritus" *by* Ulrike Braeckman et al.

Anonymous Referee #2

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Reviewer's comments for bg-2018-264

It is a series of comments for the manuscript, entitled "Carbon and nitrogen turnover in the Arctic deep sea: in situ benthic community response to diatom and coccolithophorid phytodetritus" that has appeared on BG Discussion. I am pleased to read this article with a great interest. Because, this article tries to measure states of both carbon and nitrogen turnover at deep-sea floor through in situ feeding experiments. Even though numbers of experimental trials were a few, it gives an important data for benthic ecosystems research.

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I would like to make a couple of comments in terms of this worthy experiments.

1) Why did you select both Thalassiosina and Emiliania sp. for food materials ? Chaetocelos and Gephylocapsa spp. are also common species of primary production both at middle to high latitude seas. Please ask to add some additional explanation why you use Emiliania and Thalassiosina sp. 2) You have gotten subsamples with syringe tubes. You are better to evaluate statistically how subsamples represent sea floor states. Because, phytodetritus deposition is heterogeneous at sea floor. This introduce patchy distribution of environments as discussed by Glud and others 2009. This may be the same in experimental chamber. 3) You described that diatom frustules are easily decomposed by bacteria according to Bidle and Azam (1999) paper. I suppose that diatom frustules compose of the mixture of organic materials and amorphous silicate. Bacteria may be decomposed organic material. Then silicates dissolve in seawater. Seawater silicates may be undersaturate at Arctic. Do you have any silicate concentration data at the experimental site ? 4) I understand that bacteria do not play a big role for dissolution of calcific tests. However, calcite concentration at Arctic is undersaturate in the Arctic deep-sea, coccolith may dissolve quickly at the site. Can you discuss about dissolution procedures of calcareous tests in laboratory condition? It is also required to discuss about Calcite Compensation Depth in Arctic. Normally, dissolution of calcareous tests at sea floor is much faster at polar seas than temperate oceans. 5) P17, lines 576 $\sim$ 584. This paragraph mainly discuss about foraminiferal assimilation at sea floor. You described that Pyrgo may play a big role for assimilation of organic materials at Hausgarten site. In situ experiments at middle latitude show opportunistic species such as Uvigerina sp. Fursenkoina fusiformis or Epistominella exigua play more big role for assimilating organic materials at sediment water interface (for instance, Nomaki et al., 2005, 2008). These species are all size of meiofauna. Main players may not remain on your sieve. Please evaluate more details about roles of foraminifera at sediment-water interface. Series of Nomaki's in situ experimental works at Sagami Bay floor should be helpful to discuss about this topic. 6) One of chamber experiments could only get top cm layer. This means that you are difficult to evaluate

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roles of infaunal species at sediment-water interface. It may be helpful to discuss how organisms from deep in sediments assimilate organic materials. You may evaluate thin layer chamber results. Please discuss more details about roles of infaunal species for both carbon and nitrogen turnover through your experimental work.

I am very much appreciated the you are able to respond all the comments properly.

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