

Interactive comment on “Short-term fate of phytodetritus across the Arabian Sea Oxygen Minimum Zone” by J. H. Andersson et al.

J. H. Andersson et al.

Received and published: 1 November 2007

Referee #2 lacks quantitative statements in the conclusions and abstract. We will therefore add some summarising data to the abstract and conclusions sections. In the abstract:

Phytodetritus sedimentation events were simulated by adding 44 mmol ¹³C-labelled algal material per m² to surface sediments in retrieved cores

The majority of the label (20 to 100 %) was left unprocessed in the sediment at the surface. The largest pool of processed carbon was found to be respiration (0 to 25 %), recovered as dissolved inorganic carbon. Both temperature and oxygen were found to influence the rate of respiration. Macrofaunal influence was most pronounced at the lower part of the oxygen minimum zone where it contributed 11 % to processing of

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

phytodetritus.

In the conclusions:

Between 20 and 100 % of the added algal carbon was left unprocessed in the sediment, mainly at the surface. Respiration accounted for the largest fraction of processed carbon, between 0 and 25 %, and was governed by both temperature and bottom-water oxygen levels. The decrease in temperature from shallow to deeper situated sediments caused a progressively longer lag period in the respiration of the algal carbon. Macrofaunal influence was most pronounced at the lower part of the oxygen minimum zone (940 m), where high amounts of food overlaps with a sufficient concentration of oxygen. At this station macrofaunal uptake accounted for 11 % of total phytodetritus processing.

Referee # 2 points to Figure 8 as nicely showing the percentage algal ^{13}C respired vs. depth but is curious what a similar plot vs. temperature would look like. We have made such plots for 44 h and 86 h of incubation. A positive correlation is apparent after 44 h but no such correlation after 86 h. This result is consistent with the results from Figure 2 and 3, where the length of a lag phase is increasing with increasing water depth, which we believe is primarily an effect of temperature. So even though the plot of percentage respiration versus temperature looks interesting, it is not possible to disentangle the effect of the decrease in oxygen and the concurrent decrease in temperature, in general nor at station 140 between the pre- and post-monsoon cruise.

There are always both advantages and disadvantages related to mimicking the natural environment as close as possible. One obvious disadvantage is of course that factors can not always be varied independently of each other.

The referee also raised potential pressure artefacts. It is true that we did not control pressure in the shipboard incubation. This might have affected the results from the deepest station 1850 m as effects of pressure have been shown for abyssal sediments. Lander incubations were planned to be performed at all stations to verify the shipboard results and it is unfortunate that technology not always behaved as planned. We still

BGD

4, S1765–S1767, 2007

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

believe that these results are important, while keeping in mind potentially altered conditions.

We will change the title to “**Short-term fate of phytodetritus in sediments across the Arabian Sea Oxygen Minimum Zone**” to avoid confusion about pelagic processes.

We will rectify our mistake stating that coastal upwelling is responsible in both monsoon seasons, and clarify that is in fact open ocean divergence during the northeast monsoon.

We appreciate all the technical corrections given and will implement them in the revised manuscript.

Interactive comment on Biogeosciences Discuss., 4, 2493, 2007.

BGD

4, S1765–S1767, 2007

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper