

The manuscript describes an experiment on metabolic enhancement in sediments and nutrient efflux to the water column by temperature increase and organic enrichment. The experiment involved a blank set of cores (no addition) and a set of enriched cores, that were incubated at 3 different temperatures. As can be expected, mineralization rates and nutrient efflux were enhanced by temperature and organic addition.

The manuscript is written in correct English. I did not like the large amount of numbers in the text. Generally, data should be in figures or tables, or in the text, but not in both. Of course it is the best to have the data in figures. The text should then guide the reader through the data, by pointing to trends and remarkable data.

The Figures could use improvement. Figure 1 is not needed, the data in the text indicate clearly that Fe(III) pools are variable and so large (ca 30 mmol/L sediment) that they cannot be influenced by the treatments. Instead, I would have liked to see the mineralization rates, which are now hidden in a line in the method section (171-173). Figures 2 should be larger. In Figure 3 we see two trends: a linear increase of the P efflux with T, N efflux seems to increase faster than linear. The exponential trajectory in Fig. 3b is an overinterpretation. Just connect the points and state in the text that it increases non-linearly.

The fate of the worms is not mentioned, yet is important. Did they survive the whole incubation? Did you see them pump? Frequency? The experiments where fishfood was added will have had much more active and well fed worms. Addition of organics enhances the activity of worms, hence the aeration of the sediments.

The introduction is excellent, be it that it does not lead to a hypothesis, nor an explicit statement on why these measurements needed to be done. Yet this is implicit in there. It is a very good overview of the complexity of the matter. A very complicated set of processes is influencing nutrient release, and the outcome cannot be easily predicted, so must be measured. A text along these lines would be enough to explain why this study needed to be done.

The complexity of the sediment processes is not reflected in the experimental set up. As both phosphate and inorganic N are divided over several pools, and DIN is further subjected to various process steps, it is hard to link production rates to efflux. Phosphate is partially bound to different fractions of iron-oxides and organics and for a small part dissolved. Phosphate release is stimulated by Fe(III) reduction and inhibited by Fe oxidation and both take place. In the enrichment experiment, Fe reduction will be stimulated due to higher e-donor supply, and Fe oxidation will be stimulated due to higher worm activity, which process wins is not a priori clear. Therefore good that this is measured, from the data it appears that Fe reduction and P release is stimulated but that most P remains stuck. It should be mentioned that the P binding capacity is not easily exhausted, as there is tens of mmoles of Fe(III) per liter of sediment. It is thus not surprising that only a fraction of the phosphate is released. Mineralization produces ammonium, which is also strongly bound to sediments, and is converted to NO_x and finally N₂. Also nitrification will be stimulated by worm activity, which is again stimulated by feeding.

The efflux of the measured nutrients is therefore determined by too many processes (both enhancing and inhibiting effluxes) to make a mechanistic interpretation. Also, the efflux rates cannot be directly, so

linearly, linked to mineralization rates. Efflux of DIN in whatever form is ecologically relevant, therefore, beside ammonium also NO_x should have been measured.

The manuscript can thus be much shorter. Most of the numbers should be removed from the text and left in tables and figures. Also the discussion should be focused. Higher T and sediment enrichment significantly increase mineralization rates and much less stimulate nutrient efflux. The processes stimulating and inhibiting the effluxes of the different nutrients can shortly be reviewed. Much more cannot be said.

Finally, the title should be changed. The authors did not study climate change. Climate change involves storm frequencies, precipitation patterns, sealevel rise, a bit of temperature (much less than the current yearly variation). They only studied the effect of temperature and nutrients, so suggested: *Effects of temperature and organic pollution on nutrient cycling in marine sediments*