Biogeosciences
Discussions

Interactive comment on "Impact of trace metal concentrations on coccolithophore growth and morphology: laboratory simulations of Cretaceous stress" *by* Giulia Faucher et al.

Anonymous Referee #2

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General comments

In this paper, Faucher et al. investigate the effect of various trace metal concentrations on the growth and morphology of four different coccolithophore species. Using laboratory experiments, the authors simulate the environmental stress identified in Mesozoic geological records and use four coccolithophore species phylogenetically related to Mesozoic species, for comparison with the fossil record. Based on the results obtained, the authors emphasize that each coccolithophore species responds differently to metal availability and that such species-specific response should be taken in to account when coccolithophore morphological characteristics are used to reconstruct seawater chemistry in the geological past. I read the review posted by Dr. L. J. de Nooijer and I agree

with his assessment. The manuscript is well written and the results presented can be of interest to a broad audience. However, there are some changes that I recommend the authors to consider in order to improve their manuscript. Overall, I recommend this article for publication in "Biogeosciences" after a minor to moderate revision.

Specific comments:

I agree with the comments already provided by Dr. L. J. de Nooijer. Below are few additional suggestions.

Abstract.

Page 1, line 20. The authors do not really discuss the changes in coccolithophore algae production as consequence of elevated trace metal concentrations in their experiments. Please, delete.

Introduction.

Page 2, line 19. "During the latest Cenomanian OAE 2 (. . . .), increased by about 8-20 times the background level". Is this "seawater background level"? Please, specify.

Page 2, line 24. Which coccolithophore species?

Page 2, lines 26-28. It is likely that this paper will be read by scientists, who might not be familiar with morphological phylogeny. I recommend adding few sentences to explain what morphological phylogeny is, its implications, and its relevance in this study.

Page 3, line 4. It might be worth to explain why E. huxleyi is so widely studied compared to other coccolithophore species.

Page 3, line 9. The trace metals tested – which ones?

Material and Methods.

Page 4, line 8. Please, provide the range of duration of each experimental treatment.

Page 4, line 10. What is meant by "main experiment"?

Page 5, section 2.4.2. Please, specify why these analyses were done only on E. huxleyi.

Results.

Page 6, lines 7-8. "On the other hand, E. huxleyi, G. oceanica, C. pelagicus and P. carterae survived in L, M and H". I suggest adding the word "treatments" (or equivalent) at the end of the sentence.

Page 6, lines 28-29. "The coccosphere volume was significantly reduced under increased trace metal concentrations compared to control conditions (Fig 6b) with similar coccosphere volumes recorded in both L, M and H". Can the coccosphere volume be really defined "similar" in L, M, and H?

Discussion.

As a general comment, there is no discussion of E. huxleyi coccolith malformations (Figure 3).

Figure 1. The meaning of the grey line is a little bit foggy – what does it represent? Does it represent the coccosphere volume? Please, specify.

Figure 2. I would recommend moving the column "Control" prior the columns "Low", "Medium", and "High", for consistency with Tables 1-4 and the other Figures.

Table 2. Growth rate, coccosphere diameter, cell diameter, and coccosphere volume are reported either as (almost) fully spelled name or as symbol. Please, be consistent and revise the table caption accordingly.