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Biogeosciences Discussions

Interactive comment on "Iron biogeochemistry across marine systems at changing times – conclusions from the workshop held in Gothenburg, Sweden (14–16 May 2008)" *by* E. Breitbarth et al.

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We are very grateful for the positive and very helpful comments of both reviewers. We incorporated most of the reviewers' requests, which further improved our manuscript.

Both reviewers commented on the linking of the 2008 Gothenburg workshop and this manuscript to the 1998 Amsterdam workshop. We now reworded the preface to this article accordingly.

Replies to Reviewer 1:

- Section 1.1, pg 6639 – "Recent campaigns in some of these regions. . ...do provide some confidence in the models, but the uncertainties are substantial" – This is a vague statement. What are "the models" referred to here? What are the uncertainties?

Authors reply: We agree and now clarified the statement.

- Section 1.1, pg 6641 – in introducing the Ye et al. study, I would say something like this: "In their contribution to this special issue, Ye et al. (2009) aim to improve. . .. . ." See my comment above about making it clear which references are part of the special issue. Similar introductory text should be adopted whenever an article in this special issue is being discussed.

Authors reply: We changed this accordingly.

- Section 2, pg. 6647, lines 11-14 – "Over all, our knowledge about. . .. . .has greatly advanced (eg. Rue and Bruland 1995; Croot et al. 2001)." First, it should be overall, not over all (see below for my comment on the need for some English corrections). More importantly, what is the context for this very broad statement? Knowledge of iron solubility, organic iron complexation, and iron redox states in the ocean in general? in HNLC areas? during or as a result of mesoscale iron fertilization experiments? I assume the latter, but in that case shouldn't you reference Rue and Bruland 1997, not 1995?

Authors reply: We changed this sentence and added the Rue and Bruland (1997) reference (also keeping Rue and Bruland (1995)).

- Section 2, pg 6648 – I think an appropriate reference here would be the recent Science Policy Forum article by Buesseler et al. on the potential use of ocean iron fer-

tilization for carbon credits (Buesseler et al 2008, “Ocean Iron Fertilization – Moving Forward in a Sea of Uncertainty”, Science 319:162)

Authors reply: We now included this reference along with an earlier discussion of the topic by Chisholm et al. (2001).

- Section 3 – This section really needs to be re-organized. Rather than starting out with the extensive discussion of the Baltic Sea work, the section should instead begin with an overview of recent findings on iron in coastal/estuarine systems and conclude with a discussion of the Baltic Sea papers as contributions to this special issue.

Authors reply: We re-organized this section, but incorporated the Baltic Sea work into the flow of the text.

- Sections 4, 5 and 6 – In general, I think these sections are well written. One could quibble about what is included, but keeping in mind that this is not meant to be an exhaustive review, I think these sections are OK pretty much as is. Again, please take care to introduce the special issue contributions as such.

Authors reply: We introduced/marked the special issue contributions as such in the new version.

- Technical corrections: Pg 6640, first paragraph – is “deposition velocity” really the term to use here? It seems like “deposition flux” might be more appropriate, or some measurement of deposition amount, rather than the speed of deposition.

Authors reply: We changed this accordingly.

- References – the reference for Rose et al. 2009 is incomplete.

Authors reply: We now updated this reference

Replies to Reviewer 2:

- General comments: ... I also found the “at changing times” part of the title to be somewhat misleading/confusing. After reading the paper, I feel that it would be more appropriate to replace “at changing times” with something along the lines of “: progress from the past decade.”

Authors reply: We agree. Initially the second part of the title was intended to point towards climate change, but clearly was misleading. However the title suggested by the reviewer seems more appropriate and we changed it accordingly and cut the subtitle about the Gothenburg workshop as this is referred to in the abstract.

- Authors replies to comments on Section 2: We restructured section 2 and shortened its introduction according to the reviewer’s suggestions.

We feel that the brief summary of the relevant data on which our concerns about geo-engineering are based on, which are not the main focus of this review, is sufficient. The section is composed of +450 words and lists the main concerns and limitations of purposeful iron fertilization in HNLC regions. We now added two further citations that critically discuss the issue: Chisholm et al. (2001) and Buessler et al. (2008).

- Authors replies to comments on Section 5: In section 5 we modified the discussion about analytical improvements. We also now included short statements about autonomous methods and sensor technology as well as the suggested citations. However, we felt it would lead to far to summarize the results gained from all new technology mentioned here. We see it as appropriate to briefly mention general achievements and refer the reader to the listed original citations. We now incorporate a statement that method development and specific design of experiments to link Fe

chemistry to biological processes are needed.

References:

Buesseler, K. O., et al: Ocean Iron Fertilization - Moving Forward in a Sea of Uncertainty, Science, 319, 162, 2008.

Chisholm, S. W., Falkowski, P. G., and Cullen, J. J.: Oceans - Dis-crediting ocean fertilization, Science, 294, 309-310, 2001.

Rue, E. L., and Bruland, K. W.: Complexation of iron(III) by natural organic ligands in the Central North Pacific as determined by a new competitive ligand equilibration/adsorptive cathodic stripping voltammetric method, Marine Chemistry, 50, 117-138, 1995.

Rue, E. L., and Bruland, K. W.: The role of organic complexation on ambient iron chemistry in the equatorial Pacific Ocean and the response of a mesoscale iron addition experiment, Limnology and Oceanography, 42, 901-910, 1997.

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