

## ***Interactive comment on “Coccolithophores on the north-west European shelf: calcification rates and environmental controls” by A. J. Poulton et al.***

### **Anonymous Referee #3**

Received and published: 8 April 2014

The authors of the manuscript entitled "Coccolithophores on the north-west European shelf: calcification rates and environmental controls" address coccolithophore abundance, primary production and calcification rates at several locations on the north-west European shelf, under the less studied non-bloom conditions. In addition to in situ measurements it also presents data from short-term experiments in which the response of coccolithophores to nutrient availability and carbonate chemistry was evaluated. The text is in general well written, but the main conclusions and the connection between the two approaches should be more clear. I recommend this manuscript for publication in Biogeosciences after minor revisions.

General comments:

1) The manuscript presents an interesting data set and considers a timely subject. The

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dual approach provides interesting data. However, the story should be more evident and the main results and complementary information from the two approaches made more clear.

2) Detailed information concerning the in situ manipulations is not available (or I did not find it) since Richier et al (2014) is still in preparation (Page 2696, line 19 to 22). If I understood correctly, the sodium bicarbonate and the chloridric acid were added directly into the incubation bottles. The acid addition might have stressed the cells under high CO<sub>2</sub> concentrations, prolonging the lag phase and, as a result, masking the results of this short experiment (48h). Authors should elaborate on that. Perhaps the 96h experiments provide information about the duration of the stress-related lag phase.

3) It would be relevant to provide information about initial cell abundances, growth rates and nutrient drawdown for the incubation experiments.

4) Finally, there is not a lot of information on relative abundances of coccolithophores for the in situ samplings and the experiments. This would be especially relevant to understand whether the coccolithophore starting communities in the short-term experiments influenced the response to the nutrients and carbonate chemistry, and for the determination of cellular calcification rates.

Specific comments:

Introduction Page 2688, line 9 – Add reference to the chosen interval in the statement “nanoflagellate (<10 $\mu$ m) community”.

Page 2688, line 10 – Add the used abbreviation (*E. huxleyi*) close to *Emiliana huxleyi*.

Page 2689, lines 3 to 10 – Improve phrasing.

Methods: Page 2691, line 5 – In the text “... macronutrients (nitrate + nitrate, phosphate...)” should read “... macronutrients (nitrate + nitrite, phosphate...)”.

Page 2691, line 15 – The labeling of the sites sampled twice, should be made clearer,

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perhaps add information on the legend of Table 1.

Page 2694, lines 5 and 14 – Explain the size interval chosen for micro-phytoplankton and nanoplankton, and add reference to support it.

Page 2694, line 23 - In the text "... macronutrients (nitrate + nitrate..." should read "... macronutrients (nitrate + nitrite..."

Results Page 2697, lines 16 to 18 - Improve writing.

Page 2699, line 20 - Information on how the pH values were obtained should be added in the Methods. If calculated, it should read "Surface water pH values calculated from..."

Page 2702, line 9 - Gephyrocapsa muelleriae is incorrectly written. It should read "G. muelleriae" instead of "G. melleriae".

Page 2703, line 5 and 6 - the reasoning behind choosing a 16h period for the coccolith calcite content calculations is not clear.

Discussion Page 2705, line 24 - The table does not show the concentrations in the text. The text should read "... NO<sub>x</sub> was reduced by 1.3  $\mu$ M and PO<sub>4</sub> by 0.1  $\mu$ M..".

Page 2710, line 21 - Elaborate on the coccolithophore responses. Potentially, add information about community composition.

Page 2712, line 4 - Carbonate chemistry parameters vary with each other. Thus, in situ measurements cannot exclude correlations of more than one parameter.

Page 2713, lines 9 to 11 - Elaborate on potential direct effect of the acid addition.

Page 2714, lines 7 to 11 - The sentence is too long.

Page 2714, line 19 - The statement would benefit from additional references.

Figures

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The graphs are in general simple and easy to understand. Table 1 could show pCO<sub>2</sub>, since it is a variable in the bioassays. Moreover, the meaning of repeated locations should be made clear in the corresponding legend. On Table 4 initial nutrient concentrations or nutrient drawdown should be added and meaning of "2B, 4B and 5B" should be introduced in the corresponding legend.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/11/C873/2014/bgd-11-C873-2014-supplement.pdf>

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Interactive comment on Biogeosciences Discuss., 11, 2685, 2014.

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