

Interactive comment on “Decreased calcification affects photosynthetic responses of *Emiliana huxleyi* exposed to UV radiation and elevated temperature” by K. Xu et al.

Anonymous Referee #1

Received and published: 5 April 2011

General comments This manuscript reports on the coupling between calcification and photosynthesis in *Emiliana huxleyi* with respect to UV radiation and elevated temperatures. The authors showed that photosynthesis response to changes in UV radiation and temperature was dependent on the presence of coccoliths on the algae's surface. This work provides new interesting data and although this is a purely physiological study, this subject remains central within the context of climate change and global warming, and the ongoing debate about the fate of calcifying organisms.

Specific comments – Title: I think that it is more appropriate to change the title to “lack of coccolith on cell surface affects photosynthesis responses of *Emiliana hux-*

C455

leyi exposed to UV radiation and elevated temperatures” because experiments have been conducted with coccolith-bearing and coccolith-less cells. – I think that the experimental design used need much clarification because I could not reconsolidate the number of treatment and replicate done with the final number of tube used (36). I am obviously missing something. As I see it, for each calcium concentrations, you used 6 filters (280, 295, 305, 320, 350 and 395nm), and with 2 temperatures (20 and 25 oC), with 6 tubes for each (triplicates for measuring photosynthesis and calcification and triplicates for Pam measurements). That makes 72 tubes per calcium concentrations not 36. Plus, I am further confused concerning the PAR, UV-A and UV-B irradiance mentioned on p.861 l.8-10 and where they come into play in this experimental design. – P.864 l.24: “increase exposure time” - clarify, exposure time of what? – P.865 l.11-12: “HCa had lower inhibition than LCa treatment” but this does not look statistically different, in which case it is not different. – P.865 l.10-19: I think that it is important to state in that paragraph that inhibition increase with exposure to UVR wavelengths. – P.867 l.14-16: point 2 needs to be rephrased to become clearer. For example using the term “performance” on its own is not precise enough. Performance in terms of what? – P.867 l.20: similarly, “also a negative. . .calcification” this statement need to be clarified. – P.868 l.15-16. The authors should mention that this is a classical shade adaptation behavior. – P.868 l. 18: again “performance” in terms of what. Clarify – P.869 l.6-9: That's true for cells grown and incubated at high [Ca] but for those grown and incubated at low [ca] calcification rates remained constant while NPQ decreased with increasing wavelength. The authors should discuss this point in terms of coccolith-bearing and coccolith-less cells. – P.869 l.10-11: “reasonably. . .energy” I do not see what is the direct link between this sentence and the previous paragraph. The authors need to expend this point a bit more to clarify their thoughts. – P.871 l.15-25: I am surprised of the lack of mention of the Inglesias-Rodriguez et al 2009 Science paper, which is important within the context of *E. huxleyi* response to ocean acidification.

Technical corrections – p.858 l.20: add “producing” between “as well as” and “cal-

C456

cium” – p.859 l.25: remove “and” before “considering a context” – p.864 l.22: remove “and” before “at 20” – p.867 l.16: after “as compared to” remove one of the first “the” – Fig 2 panel C: use “Y25/20” for the right vertical axis, which would then agree with what you used in the text. – For all figures that report wavelength in horizontal axis, add PAR, UVB, UVA and UVR in addition to the actual wavelength on the horizontal axis, because this is how the data is discussed in the main text and it would make life easier to match text and figure. – Fig. 2 legend: exposure to what? Clarify – Fig 7 panel C: add “BWf of “ before “fixation”

Interactive comment on Biogeosciences Discuss., 8, 857, 2011.