

## ***Interactive comment on “Ocean acidification mediates photosynthetic response to UV radiation and temperature increase in the diatom *Phaeodactylum tricornerutum*” by Y. Li et al.***

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Received and published: 6 July 2012

The authors analyzed the interactive effects of increasing pCO<sub>2</sub>, temperature and irradiance (P, UVA, UVB) on photoinactivation and repair in the cosmopolitan diatom *Phaeodactylum*.

They find that warm temperatures and high pCO<sub>2</sub> confer increased capacity to repair the damage caused by UVB.

Abstract: "The ratio of repair to UV-induced damage showed inverse relationship with increased NPQ, showing higher values under the ocean acidification condition against UV-B, reflecting that the increased pCO<sub>2</sub> and lowered pH counteracted UV-B induced  
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harm."

This sentence is confusing and from the abstract, I am not sure the meaning.

General query: *Phaeodactylum* has multiple cell morphologies. Did the authors track the morphological state of the cultures they studied? +/- frustules?

Abstract: "The ratio of repair to UV-induced damage showed inverse relationship with increased NPQ, showing higher values under the ocean acidification condition against UV-B, reflecting that the increased pCO<sub>2</sub> and lowered pH counteracted UV-B induced harm."

I found this sentence confusing, and I did not understand it in the abstract alone. Perhaps: "The ratio of repair to UV-induced damage decreased as the induction of NPQ increased, so the cells induced NPQ as repair fell behind damage. The ratio of repair to UV-induced damage was higher under the ocean acidification condition in cells exposed to UV-B, showing that the increased pCO<sub>2</sub> and lowered pH counteracted UV-B induced harm."

Intro - fine. Materials & Methods: Growth light of 70 μmol photons m<sup>-2</sup> s<sup>-1</sup>; was this measured with a 4π integrating sphere sensor or a flat sensor?

PAR:UVA:UVB ratio: How was this chosen? Is it based upon values from a particular location?

Results: "In order to determine the potential “protecting” role of excess energy dissipation via non-photochemical quenching (NPQ), the variations of the ratio of repair (r) to damage (k) – r/k –,"

I think better to write: "In order to determine the potential “protecting” role of excess energy dissipation via non-photochemical quenching (NPQ), the variations of the ratio of repair (r) to damage (k), (r/k),

P. 7206 & 7207; Very similar equations are used to describe loss of photochemistry un-

der excess irradiance and recovery after the stress, but in one case the equation a,b,c are described as 'adjustment parameters' and in the second case they are described as rate constants. In the second case, I do not think that a,b,c are all rate constants; I think c is a rate constant, a is an intercept and b is scaling factor? Also, I think the authors should spell out how a,b,c relate to r & k, which are the rate constants from the underlying model. I think that during the recovery period, 'k' falls to near zero?

P.7211 'stimulative' effects of UVA, not 'simulative' (typo)

Figure 1: How many times were the treatments replicated? Also, on my screen there is a problem with the triangle symbols - the bottom of the triangle is a white stripe.

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Interactive comment on Biogeosciences Discuss., 9, 7197, 2012.