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Biogeosciences Discussions



# *Interactive comment on* "Coccolithophore response to climate and surface hydrography in Santa Barbara Basin, California, AD 1917–2004" *by* M. Grelaud et al.

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I would like to make a short comment to this interesting study.

Page 4143 line 24: (The authors wrote: When the pH is controlled by CO2 injection, rather than by acid addition, the production of dissolved inorganic carbon (DIC) is greater and the production of bicarbonate which is the source of DIC for calcification in coccolithophores is enhanced.)

$Ca^{2+} + 2\ HCO_3^- = CaCO_3(s) + CO_2 + H_2O$

Increasing $pCO_2$ shifts the above equilibrium to the left side, leading to higher DIC and



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Ca2+ concentrations, provided that solid CaCO3 is present (e.g. colloidal particles) which can act as a reaction partner. However, with no suspended CaCO3 particles in the water column, addition of CO2 will shift the pH as well as the carbonate concentration to lower values, creating less favourable conditions for calcification, since carbonate rather than bicarbonate is needed for the precipitation of CaCO3.

On the other hand, coccolithophores need CO2 to carry out photosynthesis, and their productivity may be controlled by the availability of CO2. Increasing pCO2 in seawater could therefore be compatible with an increase in coccolith weight.

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Interactive comment on Biogeosciences Discuss., 5, 4129, 2008.