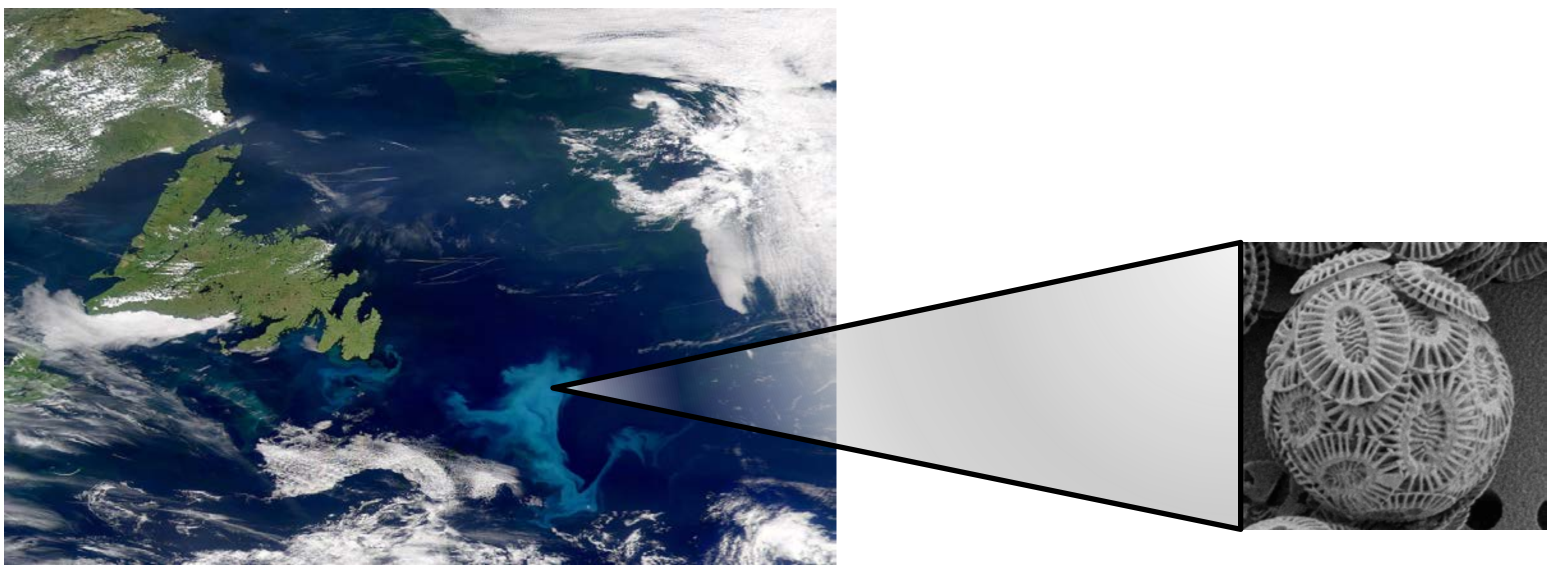
IAEA
International Atomic Energy Agency

CNPq
Conselho Nacional de Desenvolvimento Científico e Tecnológico

“Ocean acidification” experiments on coccolithophores under controlled laboratory conditions

Marius N. Müller



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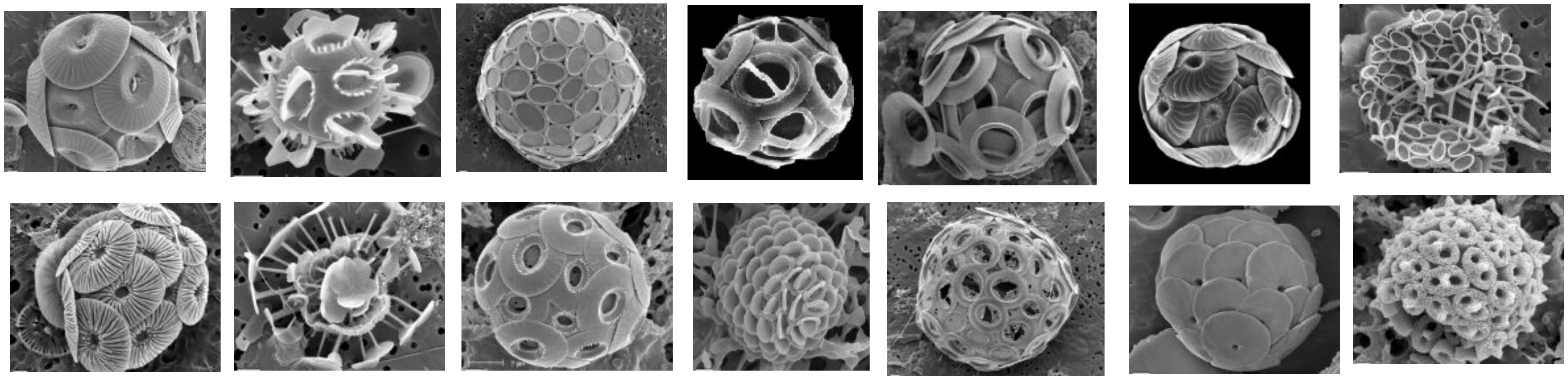
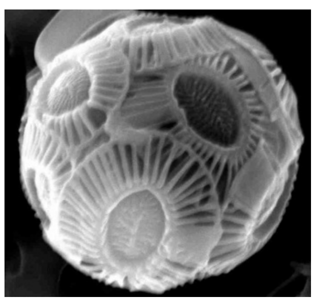


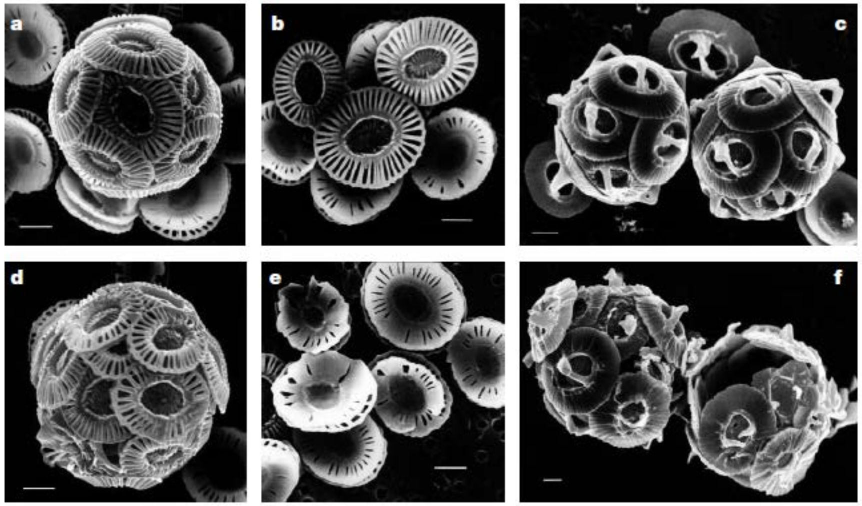


Emiliania huxleyi

>40 studies in regard to OA

Reduced calcification of marine plankton in response to increased atmospheric CO_2

Ulf Riebesell*, Ingrid Zondervan*, Björn Rost*, Philippe D. Tortell†, Richard E. Zeebe*‡ & François M. M. Morel†



Reduced PIC production

Increased POC production

Geochemistry Geophysics Geosystems G3
AN ELECTRONIC JOURNAL OF THE EARTH SCIENCES
Published by AGU and the Geochemical Society

Research Letter
Volume 7, Number 9
20 September 2006
Q09006, doi:10.1029/2005GC001227
ISSN: 1525-2027

Langer et al. 2006

Click Here for Full Article

Species-specific responses of calcifying algae to changing seawater carbonate chemistry

Biogeosciences, 6, 2637–2646, 2009
www.biogeosciences.net/6/2637/2009/

Biogeosciences

Strain-specific responses of *Emiliania huxleyi* to changing seawater carbonate chemistry

G. Langer[1,2], G. Nehrke[2], I. Probert[3], J. Ly[1,2], and P. Ziveri[1,4]

- Species and even strain specific effects of OA

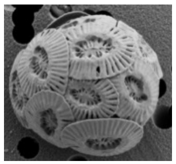
- Combined effects of OA and other environmental factors "multiple stressors"

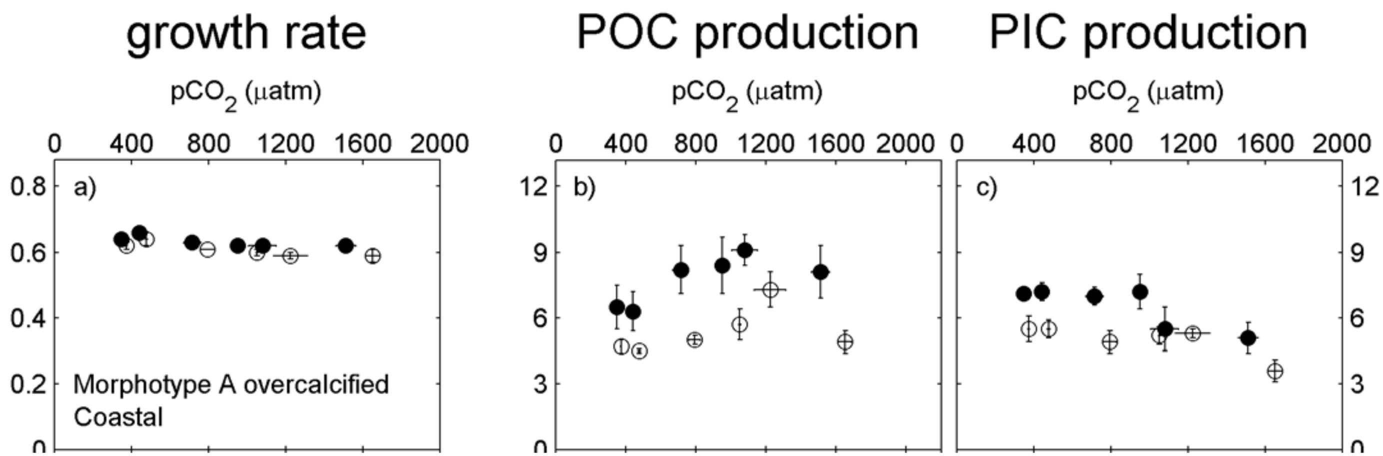
- Community interactions
- Evolution and adaptation

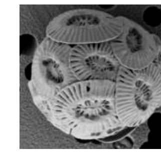
- Additive, synergistic and antagonistic effects

Where do you want to go with your experiments?

Real World Simulation	Mechanistic Understanding




growth rate
POC production
PIC production
pCO2 (μatm)
pCO2 (μatm)
pCO2 (μatm)
0 400 800 1200 1600 2000
a)
b)
c)
0.8 0.6 0.4 0.2 0
12 9 6 3 0
Morphotype A overcalcified
Coastal

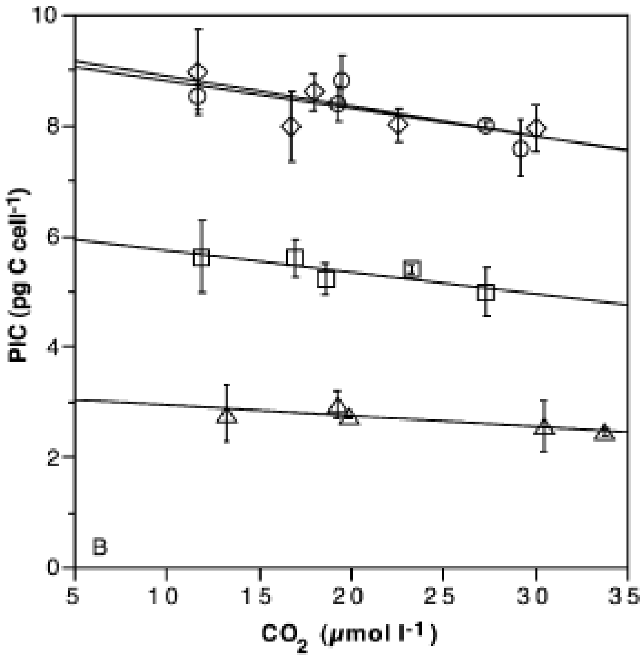


ELSEVIER
Journal of Experimental Marine Biology and Ecology
272 (2002) 55–70
Journal of EXPERIMENTAL MARINE BIOLOGY AND ECOLOGY
www.elsevier.com/locate/jembe

Effect of CO_2 concentration on the PIC/POC ratio in the coccolithophore *Emiliania huxleyi* grown under light-limiting conditions and different daylengths

Ingrid Zondervan *, Björn Rost, Ulf Riebesell

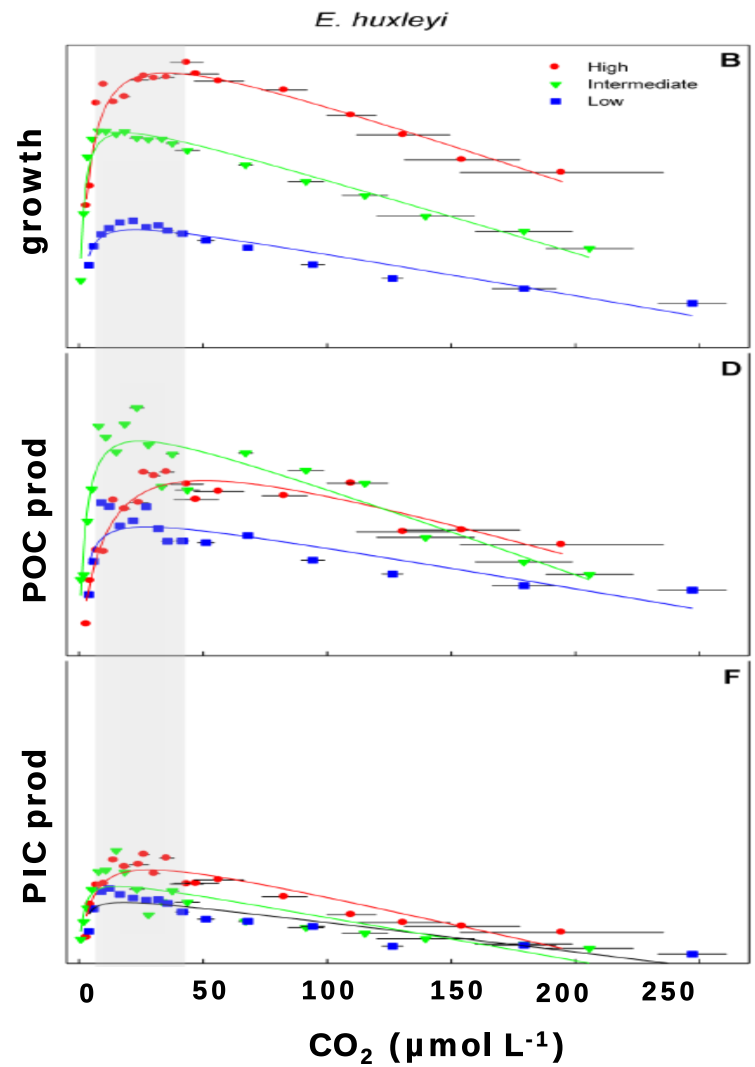
Light supply



OPEN ACCESS Freely available online
PLOS ONE

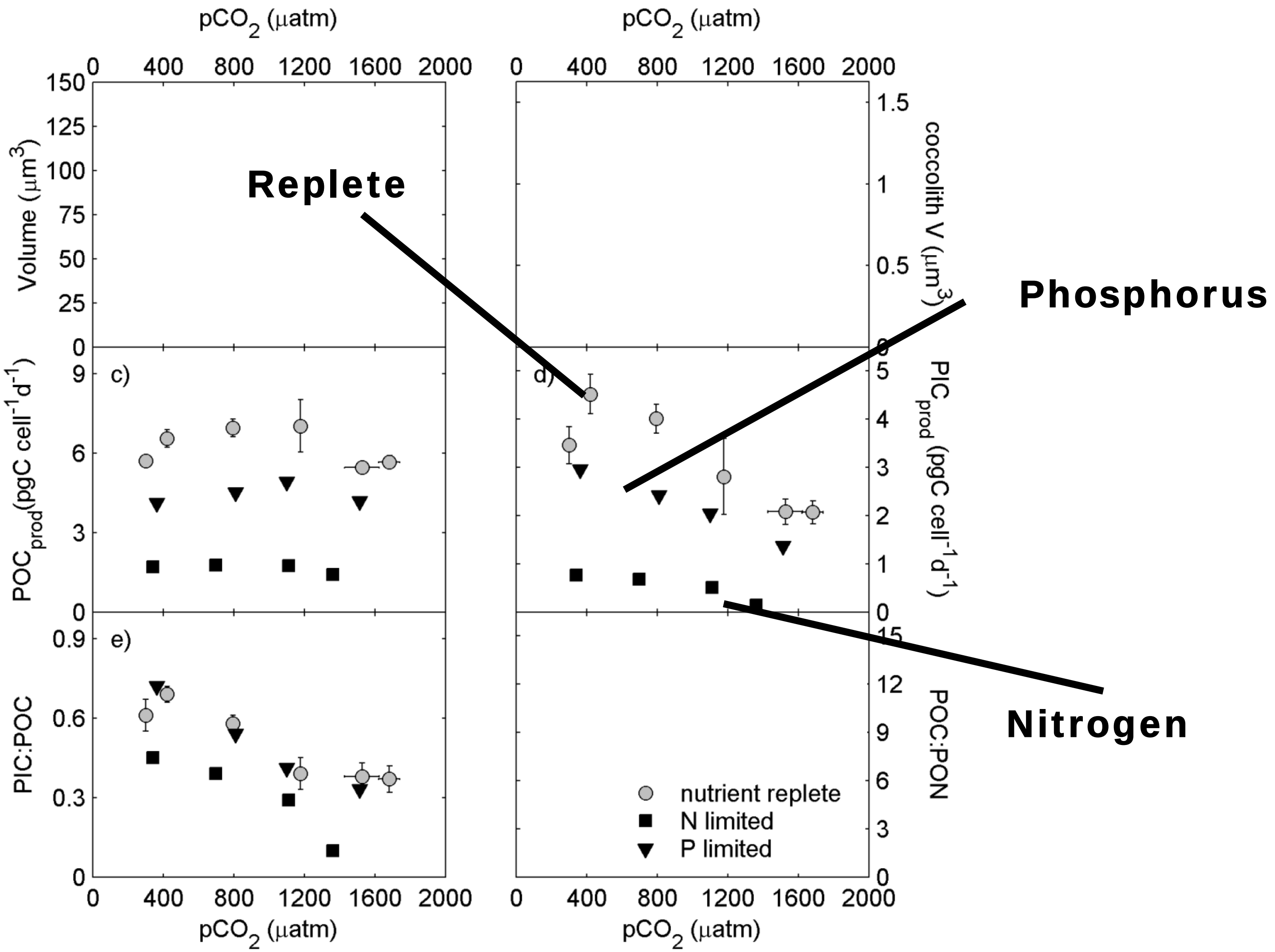
Temperature Modulates Coccolithophorid Sensitivity of Growth, Photosynthesis and Calcification to Increasing Seawater pCO_2

Scarlett Sett[1]*, Lennart T. Bach[1], Kai G. Schulz[1,2], Signe Koch-Klavsen[1], Mario Lebrato[1], Ulf Riebesell[1]



Temp.

Nutrient limitation



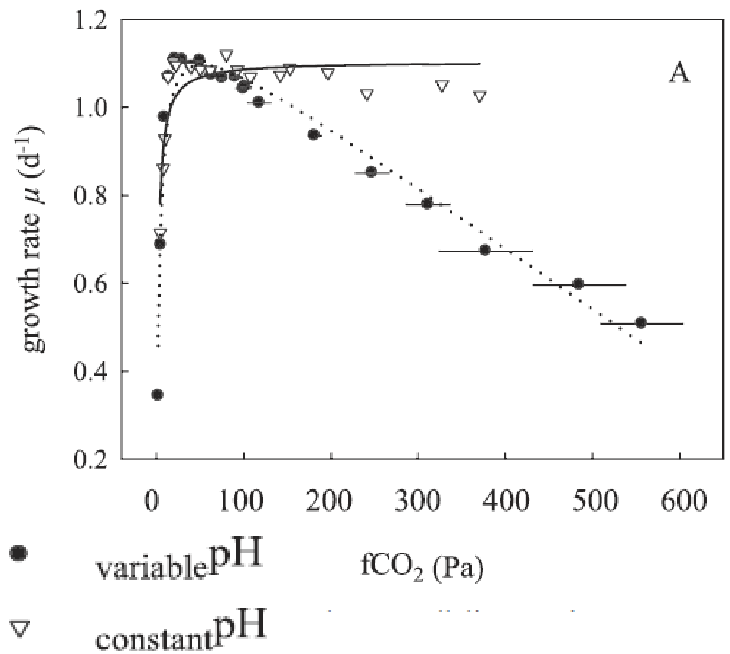
Muller et al. *in prep.*

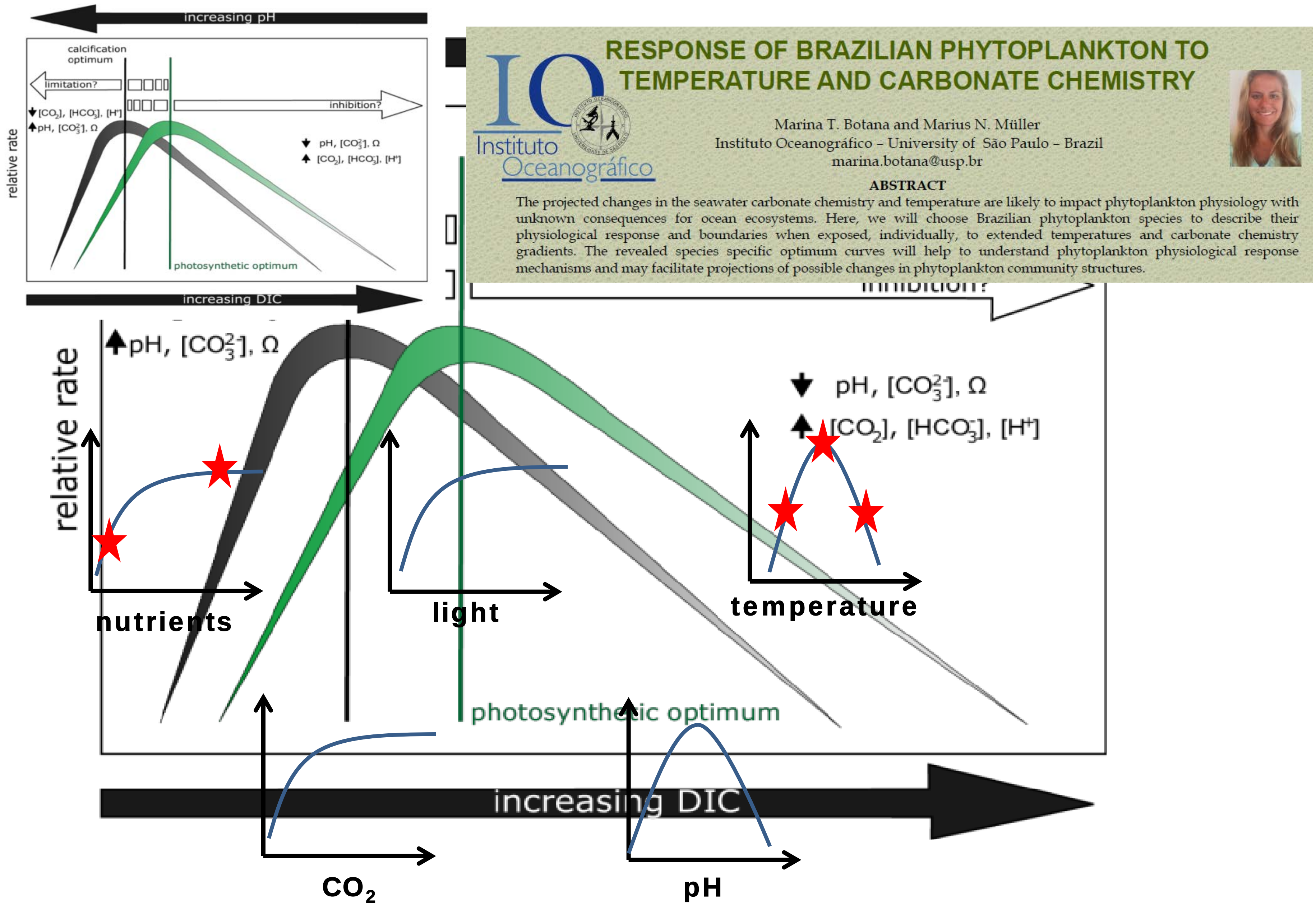
Limnol. Oceanogr., 56(6), 2011, 2040–2050

doi:10.4319/lo.2011.56.6.2040

Distinguishing between the effects of ocean acidification and ocean carbonation in the coccolithophore *Emiliania huxleyi*

Lennart Thomas Bach,* Ulf Riebesell, and Kai Georg Schulz





RESPONSE OF BRAZILIAN PHYTOPLANKTON TO TEMPERATURE AND CARBONATE CHEMISTRY

IO Instituto Oceanográfico

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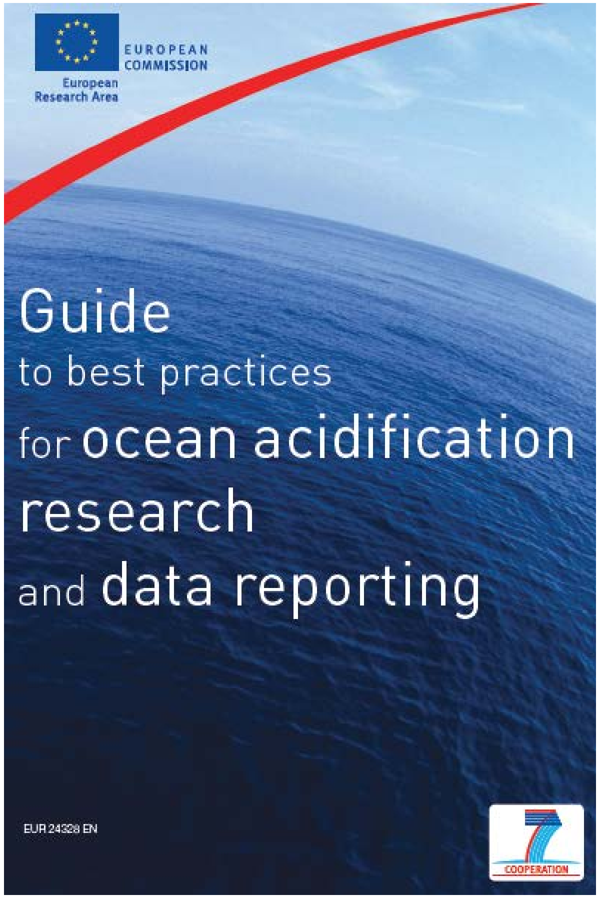
ABSTRACT

The projected changes in the seawater carbonate chemistry and temperature are likely to impact phytoplankton physiology with unknown consequences for ocean ecosystems. Here, we will choose Brazilian phytoplankton species to describe their physiological response and boundaries when exposed, individually, to extended temperatures and carbonate chemistry gradients. The revealed species specific optimum curves will help to understand phytoplankton physiological response mechanisms and may facilitate projections of possible changes in phytoplankton community structures.



COMMENTARY:

Lessons learned from ocean acidification research

Ulf Riebesell and Jean-Pierre Gattuso

Reflection on the rapidly growing field of ocean acidification research highlights priorities for future research on the changing ocean.

Research on ocean acidification has gone through a remarkable surge over the past decade. Known to only a small number of researchers ten years ago, the issue of ocean acidification has developed into one of the fastest growing fields of research in marine sciences, and is among the top three global ocean research priorities[1]. Notably, 50% of the papers have been published in the last three and half years, two-thirds of which deal with biological responses (Fig. 1). The development of this field has greatly benefitted from close collaboration, both within and between national and international projects, from an early community-driven agreement on best practices in ocean acidification research and data reporting[2], from concerted communication spear-headed by a Reference User Group (http://go.nature.com/guz4EE), and from international coordination (www.iaea.org/ocean-acidification). A large number of high-profile reports, targeting the science community and the general public as well as stakeholders and decision makers, have summarized the state of knowledge in this field as concisely and accurately as possible[3,4]. Ocean acidification and its consequences have received growing recognition at intergovernmental levels[5], and more recently also at the governmental level, as reflected by the US State Department's *Our Ocean Conference*, where ocean acidification was one of three topics addressed. In view of its fast and striking development, it is timely to reflect on the successes and deficiencies of ocean acidification research and take