

Interactive
Comment

Interactive comment on “Coccolithophores and calcite saturation state in the Baltic and Black Seas” by T. Tyrrell et al.

Anonymous Referee #1

Received and published: 15 November 2007

Review of the manuscript Biogeoscience Ms. Ref. No.: bgd-2007-0133

Title: Coccolithophores and Calcite Saturation State in the Baltic and Black Seas Author: T. Tyrrell, B. Schneider, A. Charalampopoulou, and U. Riebesell

Decision: This manuscript is acceptable for publication after minor revisions

General comment:

Studying two or more contrasting objects, like planets, vegetation, lakes, oceans, volcanoes, earthquakes,... always leads to interesting results and questions. In this paper, Tyrrell et al analyse contrasting observations in the Baltic and Black seas in order to understand what controls the absence of a phytoplanktonic calcifier group, Coccolithophores, in the Baltic sea. As many processes could explain this intriguing situation,

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

authors review many of them (salinity, temperature, light, silicate). The main hypothesis is related to low carbonate undersaturation during winter.

The paper is very well written and organized. At the end of the first reading I was convinced authors have selected the best scenario, i.e. low state of carbonate saturation during winter. Same feeling after second reading. In addition, authors did not exclude other possibilities, like low salinity and high silicate. This opens new questions to be addressed in the future to better understand the functioning and the limitations of planktonic calcifiers now and in a "high CO₂ ocean". If salinity is an alternative scenario to explain why "cocco" are absent, this could have significant implications (not only in a high CO₂ ocean), but in a fresher ocean due to climate changes and ice melting. These two effects added in the context of anthropogenic CO₂ emissions.... Could this be simulated in a future control mesocosm experiment ? Would that lead to positive or negative feedback ?

This study is exactly in the line of topics addressed in Biogeosciences and I therefore recommend its publication after minor corrections. I would like to add few comments, rather technical that should be taken into account in the revised version.

Specific comments:

1 A map of the investigated region (Baltic sea and around) would be useful for readers not familiar with this region. The text refers to many sites, bight, rivers, etc... not very well known by many of us.

2 Page 3583, line 16: specify emissions (of what ?)

3 Page 3585: to calculate the saturation states, authors use dissociation constants from Roy et al. As other constants might be used, authors should explain why they use Roy et al. and recall if this (or almost) correct for very low salinity. Using different constants, results near or just below saturation might be different, especially for low salinity and temperature. Although this may not change dramatically the seasonality

BGD

4, S1932–S1934, 2007

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

(low in winter/high in summer), other constants would change the absolute values of "Omega". Testing this with other constants (e.g. Merbach refitted by Dickson and Millero 1987 ?) would also permit to include error bars in the seasonal Omega plots in Figure 2 (this figure needs also error bars relative to the uncertainties of pCO₂ and Ct measurements and/or STD relative to average of the 26 data used).

4 Page 3591, line 8: as you define total dissolved inorganic carbon as Ct do not change the expression DIC.

5 Figure 2: add error bars (STD); add points calculated with other dissociations constant ?

6 Figure 2: Ct and pCO₂ values in the Baltic sea are used to calculate Omega but never given in the manuscript. It should be interesting to plot the seasonal Ct et pCO₂ on top of figure 2. Or add one figure with seasonality of SST, salinity, Ct and pCO₂. This figure would be referred page 3585 when quoting Schneider et al 2003. Another option would be a table including Date-Period and average SST, SSS, pCO₂, Ct, and Omega (calcite and aragonite).

Interactive comment on Biogeosciences Discuss., 4, 3581, 2007.

BGD

4, S1932–S1934, 2007

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper