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Biogeosciences Discussions

Interactive comment on "Distribution of calcifying and silicifying phytoplankton in relation to environmental and biogeochemical parameters during the late stages of the 2005 North East Atlantic Spring Bloom" *by* K. Leblanc et al.

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Please find below our response to reviewer 3 and attached revised paper as supplement file "bg-2009-138-supplement.pdf".

Anonymous Referee #3

This manuscript discusses various stages of the spring bloom in the NE Atlantic over the latitudes 45-66°N, primarily the alternation between diatom and prymnesiophyte/ cocolithophore dominance in relation to changing silicate, nitrogen and phosphate nu-

trients. The paper is well written and interesting to read and I support publication, but some details need to be considered before final acceptance.

The authors proportion the Chla into the 3 size fractions according to Uitz (2006). This method uses both Zea and Chlb in the pico fraction. In the southern part of the study area, Chlb probably indicates pico-eukaryotes, but is this the case in the northern sector where the waters are colder? Do the authors have any other information that might indicate that Chlb should perhaps be included in the nano fraction for the north? Is the elevated pico Chla in the IS in Fig 8b really picoplankton?

We agree that there is no easy way of determining size-classes from pigments alone, and as this was pointed by all three reviewers as a potential weakness, we decided to withdraw Figure 8 and 9 computing size class fractions. These were much less discussed in the Discussion section than the actual FUCO and HEX distributions, hence their withdrawal should not bear consequences on our conclusions. We kept the Tchla, FUCO, HEX and FUCO:HEX ratios data but combined them in one figure (Fig 8) and renumbered all the following figures consequently. Regarding the Zea/Chlb data, we have no other information to support their contribution to either pico or nanophytoplankton and yes, it is likely that the Chlb is not entirely from picophytoplankton but that nanophytoplankton also constitutes a large part of the biomass.

Most of the discussion in the paper revolves around the diatoms and the prymnesiophyte/ cocolithophore and the authors use Fuc and Hex as the main pigment signatures. In this context, using both the diagnostic indices and pigment concentrations seems rather a luxury with 3 pigment figures (Figs 8, 9, 10). I suggest the authors' use either the straight pigment concentrations for the key indicator pigments or use pigment/Chla ratios. Fig 10 shows quite clearly the distribution of diatom and prymnesiophyte indicator pigments and other phytoplankton types could be similarly displayed. Pigment/Chla ratios may be even more useful for displaying the patterns, or some mathematical or statistical approach could be used to specifically estimate the diatom and prymnesiophyte fractions from the pigment data set.

See answer above. Figures 8,9,10 were combined into one. The aim of this paper was to focus on biomineralizing algae, and not to give a full statistical pigment analysis of the NASB cruise, which will be the focus of another paper in preparation by DiTullio et al. We kept the presentation of the main pigments generally used as indicators of diatoms and prymnesiophytes (FUCO, and HEX) and discuss their potential bias in the discussion section.

The satellite images in Fig 14 are a useful indication of the phytoplankton distribution during the study period, but one month composites don't really fit the more variable daily or weekly conditions encountered during the cruise. Weekly composites for the month of June 2005 would be a more useful comparison with the in situ data.

Weekly SeaWifs images were obtained, but were much obscured by cloud cover and could not be useful in our context. The intention in this paragraph was to give a general overview of the bloom on a monthly basis and not to discuss day to day or week to week variability, which we cannot infer from our data, as none of the stations were sampled twice in time. Hence, as we stated at the end of section 4.1, our transect is a composite of both spatial and temporal bloom stages, and a weekly progress cannot be detailed from our data as we were cruising to the North over the month of the cruise.

Information on pre-bloom conditions might be useful for placing the bloom development in a larger seasonal context. What were the nitrate and silicate concentrations/ratios before the onset of the bloom? Maybe this information can be gleaned from the literature for previous investigations in the NE Atlantic in both the winter and spring.

The following has been added to page 5821 l22 : "Since then, several other programs such as BIOTRANS, BOFS, PRIME and POMME conducted in the NEA during the productive season have reported Si depletion prior to N exhaustion later in the season, as well as consistently low Si:N ratios in the surface layer (Lochte et al., 1993; Sieracki et al., 1993; Passow and Peinert, 1993; Taylor et al., 1993; Savidge et al., 1995; Bury et al., 2001) that are well below the usual 1:1 requirement for diatoms (Brzezinski,

1985). From earlier work during the POMME program, it was shown that winter surface silicic acid availability between 40 and 45°N was already 2–3 μM lower than nitrate and that this deficit increased with depth, with a 5–7 μM difference between DSi and DIN concentrations at 1000 m (Leblanc et al., 2005)."

Table 2 is a difficult table to read and understand. The data needs to be presented in a much simpler table, or in another form of presentation.

This table has been redrawn according to suggestions.

Please also note the Supplement to this comment.

Interactive comment on Biogeosciences Discuss., 6, 5789, 2009.