

Interactive comment on “Summer microplankton community structure across the Scotia Sea: implications for biological carbon export” by R. E. Korb et al.

Anonymous Referee #1

Received and published: 13 November 2009

The manuscript by Korb et al. presents an interesting data set on the phytoplankton community structure in the Scotia Sea. Differences in the phytoplankton community composition together with physical features allow them to distinguish 5 different communities with implications for carbon and silica export estimations. This topic is of high importance in order to understand the mechanisms of natural bloom development and carbon export in high productivity areas of the Southern Ocean. These interrelations are complex and still poorly understood. I only have a few comments, mainly addressing the calculation of nutrient deficits. Apart from that I recommend publication of this manuscript.

C2998

General comments:

The authors calculate nutrient depletion from the difference between the surface water concentrations and the “winter water” concentrations in 60-140m depth according to Jennings et al. 1984. I question if the deep water can always give reliable information about the nutrient concentration in the surface water during winter. As mentioned by Jennings et al. these calculations can only give reliable information if for example little or no vertical and lateral mixing took place. This is not discussed by Korb et al. and I doubt that vertical and lateral mixing can be ruled out in this study. Strong vertical mixing due to storm events is common in the Southern Ocean and many sampling stations are close to fronts. I am therefore not convinced that the method used here to calculate nutrient depletion can give reliable information.

The only indicator for iron limitation of the different regions used in this manuscript is the Si:N deficit ratio. I think this approach is prone to error for several reasons. As mentioned above, I am not convinced that Si and N deficits can be calculated as done here. Further, especially the Si concentrations in the surface waters and the Si deficits of one and the same region often show a strong variability (e.g. MID-SCOT, SW-SG, and NW-SG 2008 and MID-SCOT and SW-SG 2003). This might be because the sampling stations within one region are partly separated by fronts (MID-SCOT 2003 station 5.3 and 6.4 north of SB and 5.4 and 6.1 south of SB; SW-SG 2003 6.6, 6.7, and 7.2 north of SACCF and 7.3 south of SACCF). As a result the Si:N deficit ratios also have high standard deviations making and interpretation difficult. Since Fe limitation is obviously an important factor influencing growth and species composition in the Southern Ocean more accurate data would be needed here to distinguish the role of iron limitation for the differences in phytoplankton composition between the different regions found by the authors. Without direct measurements of Fe concentrations I think this is to speculative and the authors should at least carefully discuss the multiple factors that could affect their calculation of the Si:N deficit ratios.

Page 9788 line 1: replace “dinaoflagellates” by “dinoflagellates” Page 9811 figure cap-

C2999

tion of figure 2: "... abundance for 2008 and (c) 2009..." should read "... abundance for 2008 and (c) 2003..." Page 9794 line 24: "(~6 mmol m-3)" instead of "(~6 mol m-3)"

Interactive comment on Biogeosciences Discuss., 6, 9781, 2009.

C3000