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Biogeosciences Discussions

Interactive comment on "Carbon and nutrient mixed layer dynamics in the Norwegian Sea" *by* H. S. Findlay et al.

H. S. Findlay et al.

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Please find our comments to the Review-Addendum from Anonymous Referee#1.

a) We would like to clarify the information on the alkalinity issues. First, data were collected every month, as stated in the Findlay et al. paper, however, analyses for alkalinity was not performed every month due to instrumental problems, and so there exist less alkalinity data compared to total carbon. Second, alkalinity data are not published in Skjelvan et al. (2007), and we do apologize this misunderstanding and will refer to the data in a different way.

Further the anonymous referee#1 refers to an interactive comment and response concerning Skjelvan et al. (2007). We would like to point out that presentation of new data is an important part of the Skjelvan et al. paper, and in this respect Skjelvan et

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al. did not consider it correct to include data which were not finally corrected. In Skjelvans comment she points out that they had problems with the correction procedure. Recently, Skjelvan have come to a revised conclusion on the quality of the data and it turns out that the not-performed correction represents less than 2 microEq/kg change in the alkalinity value. Therefore, in a context where the alkalinity data are used for rough quantitative comparison with a model, as in Findlay et al., the fact that the data are not finally corrected does not represent such a problem.

Finally, when it comes to the anonymous referees comment on eMLR analysis, where Skjelvan et al. have used salinity and not alkalinity to calculate anthropogenic carbon (Friis et al, 2005), the reason for this is simply that the amount of alkalinity data was not sufficient to perform a proper eMLR but the amount of salinity data was. So this decision was not based upon the quality of data.

b) We agree that it is reasonable to assume that half of the alkalinity change is due to salinity reductions however we disagree that the other part represents a small and uncertain contribution from calcification. The referee has overlooked that summer time alkalinity includes a contribution of nitrate alkalinity which translates as an extra 12 micomol alkalinity change which is due to calcification. If calcification were inactive, the consumption of nitrate by phytoplankton would increase alkalinity. We will emphasise these results more in the discussion.

With respect to the scatter of the data, additional data from other cruises taken over the summer period (June/July 2002) demonstrates that in the surface 30 m there is a large range of alkalinity (2280-2330 microEq/kg), which suggests that the model summer range is very reasonable. However, quantitative mechanisms described in the response to anonymous referee#1 will provide addition clarification of the model fit to data.

Lastly, we choose not to use salinity-normalised alkalinity because we want to know what conditions the phytoplankton experience; they don’t experience salinity-

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normalised saturation states.

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Interactive comment on Biogeosciences Discuss., 4, 3229, 2007.