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**Biogeosciences Discussions**

# *Interactive comment on* "Seasonal distribution of dissolved inorganic carbon and net community production on the Bering Sea shelf" *by* J. T. Mathis et al.

**Anonymous Referee #1**

Received and published: 2 March 2010

Review of "Seasonal distribution of dissolved inorganic carbon and net community production on the Bering Sea shelf" by J. T. Mathis, J.N. Cross, N.R. Bates, S.B. Moran, M.W. Lomas, and P.J. Stabeno for publication in Biogeosciences.

This manuscript presents a very interesting data set for the Bering Sea shelf, which is worthwhile to be published in Biogeosciences. I do have some problems with the structure of the manuscript, which shows some characteristics of a review paper. I also think that more information could be drawn from the present data set.

This is a relatively long paper, but I think the amount of information based on measured data is not that large to justify this. In particular the background section is much too



long. It contains a lot of info which is not relevant for the paper. I get the impression that it is part of a thesis. For a thesis, this level of detail is of course acceptable, but a scientific paper should be more concise. Also the number of references seems a bit too high.

I am surprised that NCP is only calculated using DIC. As shown by the authors in Section 5.3, using DIC has some serious drawbacks. NCP can also be estimated using nitrate. It also opens up the possibility to compute Redfield ratios of drawdown. Moreover, comparison with previous estimates may be more useful with nitrate.

As to the methods, in section 3.1 it is mentioned that a suite of measurements was carried out. Most of these data are discussed elsewhere in the paper. However, only DIC measurements are described in this section. Please add the other measurements including their precision and accuracy.

DIC measurements were performed using the VINDTA system. With such a system also alkalinity can be measured. Are there any alkalinity data available? Such data would be useful to estimate the importance of carbonate building organisms to the primary productivity (section 3.3). The way primary production is estimated in the manuscript neglects such a contribution. The authors should provide evidence on the importance of CaCO3 in the CO2 budget between the two cruises. This can be done with alkalinity, or biological data.

Similarly (section 3.3) the authors should justify the normalization procedure. If part of the salinity decrease is due to terrestrial runoff as they write, a simple normalization to a fixed salinity of 35 is not correct. The runoff has a non-zero concentration in DIC, which should be accounted for. I presume that the DIC concentration of the runoff is significant.

In section 4 Results, not a single figure is presented on the hydrography, nutrients and DO of the region. I think we definitely need those. The reader must be able to check the interpretation of the authors.

In the Discussion, section 5.1 the part on the use of normalization (2nd paragraph) is not useful, because the advantages of normalization is generic knowledge and must not be explained again.

Section 5.3 It is fine that several processes are discussed here, but please provide an overall assessment of the uncertainty, or better underestimation of NCP, and whether this is acceptable or not.

Conclusions I think there is a lot of discussion in this section. This should be better separated.

Almost all figures: The axis descriptions and texts in the figures are too small.

Minor comments

P252 line 1-7 I think this kind of info should not appear in the abstract

P262 Explain CTD, DIC line 18 was instead of: were

P267 line 12 discussed

P268 line 10-11 delete sentence beginning with: In Fig. 8b

P269 line 2-3 delete: (again . . .circle) line 11 I do not understand where the NCP value of 334 $\mu$mol/kg comes from. Please explain this.

P269-270 It would be interesting to compare the DIC increase in the bottom water with the DIC drawdown in the surface. This could give additional indications about the processes responsible for the bottom water enrichment.

P270 line 24 "due to" instead of: do to

P273 line 3 were instead of: was

Figure 1: Please add longitude and latitude

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Interactive comment on Biogeosciences Discuss., 7, 251, 2010.