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Biogeosciences Discussions

Interactive comment on "Seasonal calcium carbonate undersaturation in shelf waters of the Western Arctic Ocean; how biological processes exacerbate the impact of ocean acidification" *by* N. R. Bates et al.

Anonymous Referee #2

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Due to low temperature and global circulation pattern, the Arctic Ocean has naturally low pH and carbonate saturation state (Omega) and thus it is and will be the first to be impacted by the ocean acidification (OA) process. The authors added their new data from 2010 and 2011 to their earlier data to show the omega distributions in surface and bottom waters in the Arctic Ocean. They also analyzed possible control mechanisms. While there is no major new point brought by the new data, I feel this is a useful contribution to the current literature.

However, the process analysis lacks rigorousness and even with some wrong state-

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ments. The conclusions on the contribution to omega by biological process vs OA should be built on a more stringent analysis (currently, text in p.14269-14270 is rather confusing and it is not clear how various terms, in particular that one caused by NCP, were derived). Also the entire base on that OA has decreased omega by 0.3 is based on the sentence (p. 14267, line 22-23) without any reference on where/how it was derived and how reliable it is, making the rest of comparison less convince.

The statement that calcification and dissolution of CaCO3 would have little impact on Omega is clearly wrong (the relative change of TA to DIC should be 2:1 in Fig. 7) though it may be right in the arctic that these processes are of minor importance. Also, in Fig. 7, it is not clear why ice-sea melt increases DIC, and it is even more confusing why in addition to that there is another surface freshening arrow. The text around line 15 in p. 14269 is perplexing.

Interactive comment on Biogeosciences Discuss., 9, 14255, 2012.