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Interactive comment on “High nitrate to phosphorus ratio attenuates negative effects of rising $p\vec{CO}_2$ on net population carbon accumulation” by S. A. Krug et al.

Anonymous Referee #2

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The manuscript by Krug et al. represents an interesting piece of original research, which is moreover timely and of great value for the growing ocean acidification community. The experiments on which the manuscript is based were well done and clearly presented in terms of tables and figures. My criticism concerns the interpretation of the data and the conclusions drawn. Although I have the feeling that the latter are not essentially wrong, they are phrased in a way that makes them appear wrong. In the following I'll explain in detail what I mean. Page 6834, lines 15-17: What do you mean by “cellular nutrient accumulation”? The reason for the higher cell densities is simply that there was initially more phosphate. Moreover, I cannot follow the argument. It is actually the other way round; the Redfield treatment features the weaker cellular re-

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sponse. Page 6834, lines 18-21: I don't understand that conclusion. See comments on chapter 4.2 Page 6834, lines 24-26: How is that possible? I understand that you showed that this is impossible. Page 6843, line 6: POP was not measured. How do you know about POP then? Page 6843, lines 7-10: The final N-conc in the Redfield is close to the detection limit. So there's the possibility of N-limitation here. The latter is supported by Fig 2b showing higher C/N ratio in the Redfield. Page 6843, line 11: The "limiting resource" can only be named with confidence for the "high N/P" (see comment on lines 7-10). The "reason for higher cell abundance" is the higher initial conc of phosphate in the Redfield. Page 6843, line 19: You might as well cite Hoppe et al. (2011, JEMBE) here for a comprehensive analysis. Page 6843, line 20: How do you know about the "cellular response to P-limitation"? You haven't got a control, have you? Plus there are no references for the "previous studies". If you look at the literature you see that there is no uniform response. So what does it coincide with? Page 6843, line 24: This is a contradiction to lines 7-10. Page 6843, lines 25/26: That's rather a more severe P-limitation than an "over-supply of N" (cells tend to get fatter under N-limitation as well). Page 6843, lines 26-28: What does that sentence mean? Page 6844, lines 7-12: It is not necessarily the nutrient ratio, because there's an N/P co-limitation in the Redfield only and the limitation is much stronger in the "high N/P". I suggest calling it "nutrient regime" instead of "nutrient ratio". Chapter 4.2: page 6844, line 24: what is a "TPC ratio"? On the chapter in general: I'm unable to follow the argument, because the consumption of DIC does tell you nothing about the shift in the system, ie pH. The latter is determined by the ratio of DIC and TA consumption which in turn is determined by the PIC/POC ratio. On the whole, I believe by clarifying the above issues it should be possible to make the interpretation as good as the data.

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