

## ***Interactive comment on “Biotic stoichiometric controls on the deep ocean N:P ratio” by T. M. Lenton and C. A. Klausmeier***

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We thank the referee for their supportive remarks. In response to their specific comments:

(1) I chose to use the default version of the LW model (M1 in Lenton and Watson, 2000), which excludes a direct effect of anoxia on the organic C:P burial ratio, for the sake of clarity, because: (i) it is the simplest to back refer to in the literature, (ii) there are others who have questioned the strength of the effect, (iii) including the effect makes the analytical solution of the model more complex. I personally think the effect is important hence I originally created another version of the LW model (M5) with it included. Then the equation for deep ocean N:P assuming  $r_{N:P,Fix} = r_{N:P}$  (replacing Eq.39) becomes:

$$\frac{NO_3}{PO_4} = r_{N:P} \left( 1 + \frac{r_{C:P} k_P}{C_0 W^{\frac{1}{2}}} \left( 4.025 + 0.011W - \frac{3.036W^{\frac{1}{2}}}{0.7W^{\frac{1}{2}} + 0.3W^{-\frac{1}{2}}} \right) \right)^{-1} \quad (1)$$

I have produced an alternative Fig.8 for version M5 of the LW model but unfortunately the Author Comment system doesn't allow me to upload it. Compare Figures 6 and 10 of Lenton and Watson (2000) to get an idea of the changes, which are to  $PO_4$ ,  $O_2$  and the upper limit of  $W$  allowing steady state (the solution for  $NO_3$  is unchanged). The resulting change in  $NO_3/PO_4$  (from using the equation above instead of Eq.39 in the paper) is modest and does not qualitatively affect the main points of the present paper. Hence I am hesitant to include it in the revisions.

(2) I agree with the referee that the putative link between phosphorite formation and denitrification may not be of great quantitative importance. It was actually a suggestion of an earlier referee - hence its inclusion. This process may be only a small part of the global fixed nitrogen sink as well as being a small sink for phosphorus. I will add a sentence to this effect in the revisions.

Tim Lenton

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