

## ***Interactive comment on “Stoichiometries of remineralisation and denitrification in global biogeochemical ocean models” by A. Paulmier et al.***

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Reply to Referee 3:

We thank the reviewer for her/his very careful reading of the manuscript and the resulting constructive corrections and comments to clarify the discussion! All reviewer comments are in italics, whereas our response/action is described in roman font.

MAIN COMMENTS:

C199

*Paulmier et al. present an interesting study with the aim of highlighting the inconsistencies among ocean biogeochemistry models (OBMs) in the implicit assumptions made on the hydrogen content of organic matter. These differences lead to variations in remineralization and denitrification stoichiometries among the models, with implications for simulated tracer distributions. The study derives algebraic relationships linking the stoichiometric ratios for different biogeochemical processes in varying marine environments. The authors use these relationships to examine the parameterization of stoichiometries in four different OBMs.*

*The paper has a useful message, and the algebraic analysis of stoichiometries provides interesting insights. However, for some cases, while the algebraic formulations are presented in detail, the ensuing analysis and discussion (particularly in the latter half of the paper) would benefit from clarification and expansion. Examples are given in the ‘Specific Comments’ section below. I recommend publication of the paper following revisions to expand the interpretive discussion, particularly in sections 3.2 and 3.3.*

Following the suggestions of the referee, we have made important changes to expand the interpretive discussion, and have especially corrected the spelling mistakes.

SPECIFIC COMMENTS and TEXT CORRECTIONS:

*Section 1, pg. 2541, Line 1. Add ‘the’ before ‘chemical’.*

In the revised version, we removed this part of the sentence.

*Section 2, pg 2545, Line 6, Correct spelling to ‘implicitly’.*

We corrected ‘implicately’ into ‘implicitly’. Cf. also the last reply concerning the same correction for the whole text.

*Section 1, pg 2543, Lines 4-6, If dissolved organic matter is not considered in*

C200

*this analysis, additional discussion in this section (or in section 4) would be useful to discuss the implications of this. Many OBMs do include varying contributions to the organic matter cycle from DOM.*

As suggested by Referee 3, we added some additional discussion in this section.

*Section 3.1.3, pg. 2548,: Lines 14-19 appear to compare Equation 11 and Equation 12, before Equation 12 has been defined. This section should be reorganized.*

We thank Referee 3 for this comment, also suggested by the other Referees, and we corrected this, reorganizing this section.

*Section 3, pg 2551, Line 23, Correct spelling to 'oxic'.*

We corrected "oxix" into "oxic", as also mentioned by the other Referees.

*Section 3.3.1 : pg 2552, Lines 8-25. This discussion on nitrate vs. oxygen demand is not clear.*

Following the suggestion of Referee 3, we re-wrote a part of this paragraph, to clarify this issue.

*Section 3.3.2. pg. 2553. The authors use the ratio of fixed N to organic N denitrified to identify this. However the accompanying discussion does not sufficiently discuss the rationale for their analysis. Further clarification is needed.*

Following the suggestion of Referee 3, we also re-wrote a part of this paragraph, to clarify this issue.

*Pg. 2556, Line 5, Correct spelling to 'implicitly'*

*Pg. 2557, Line 7, Correct spelling to 'implicitly'*

We thanks Referee 3 for pointing out this spelling mistake, and corrected it. We corrected the spelling of 'implicly' in section 4.4 (p2559, Line 6 of the previous version of the submitted Discussion), and in the caption of Figure 1, now moved into the

C201

text (Section 4.1). We corrected also the spelling of 'explicitely' into 'explicitly' in sections 3.2.2 (p2551, Line 10 of the previous version of the submitted Discussion) and 4.1 (p2555, Line 18 and p 2556, Line 4 of the previous version of the submitted Discussion).

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Interactive comment on Biogeosciences Discuss., 6, 2539, 2009.

C202