Biogeosciences Discuss., 7, C2102–C2104, 2010
www.biogeosciences-discuss.net/7/C2102/2010/

Biogeosciences Discussions

Interactive comment on "Biogeochemical controls and isotopic signatures of nitrous oxide production by a marine ammonia-oxidizing bacterium" *by* C. H. Frame and K. L. Casciotti

C. H. Frame and K. L. Casciotti

cframe@whoi.edu

Received and published: 30 July 2010

Specific Comment Responses: We have now included an illustration of oxygen atom incorporation and removal during ammonia oxidation and N2O production (Figure 1). We appreciate the referee's desire to have the results and discussion broken up into two sections and we have rearranged the order of information in some of the results and discussion paragraphs to put our results first and the discussion sentences afterwards. However, we found that merging the sections facilitated discussion of our model output. The isotope effects and site preferences that are the output of the isotopic models are results of this research but in constructing the models, we had to integrate information

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

that we felt fit best in with the discussion section.

page 3025 line 3 (page 4, line 128): The references to Sutka et al have been inserted

Methods section (page 5 lines 160-161): A sentence about the setup of 18O-enriched water experiments has been included.

page 3028 (page 7 lines 218): A nanomole conversion of mV-s was included.

page 3031 lines 12-15 (page 9 lines 282-286): I've reworded the sentence to make it clearer. The sentence is complicated by the fact that it refers to the combined work of two different researchers. Beaumont et al 2002 and 2004 identified the transcription factor while Rodionov et al 2005 did the genetic comparisons that include it in the family of NO sensitive transcription factors. I moved the positions of the citations to reflect this.

page 3031 line 20-page 3032 line 2 (page 9 lines 289-298): I've simplified the discussion and tried to reduce the amount of speculation about why we see this effect. The main point is that the lower density cultures may have been growing differently from the high density cultures.

page 3033 lines 15-16 (page 10 lines 340-341): Hydroxylamine was suggested as the source of the extra N2O production by Beaumont et al.

page 3035 line 6 (page 12 lines 378-379): M is now defined as mass. Mnh2oh was assumed to be a constant but like the other parameters in the model, it was allowed to vary during the regression analysis until the model had converged on the best fit to the data. Since the model couldn't resolve both d15N-NH2OH and M_NH2OH, I left them convolved as a single term in equation (3b). By leaving them as a single term in the model, I was able to extract d15N_ND.

page 3039 lines 24-25: Figures 3 and 4 (now Figures 4 and 5) include the cell densities represented as different colors. The data in Figure 1 (now Figure 2) is also included in the isotopic signatures in Figures 3 & 4 (now 4&5). Some of the isotopic data from high density 20% and 2% O2 data is not included in Figures 3 and 4 because there was

BGD

7, C2102–C2104, 2010

less than 1 nanomole of N2O produced in those experiments and the measurement precision drops off below this mass (the blank for these measurements is about 0.1 nanomole).

page 3042 (page 17 lines 570. . . moved to page 17 line 557): the reference to archaea was removed from the Conclusions and put at the end of the discussion section (in a briefer form).

Supplementary Material: In section 3 I've included a more detailed explanation of how the sensitivity analysis was done and of what the impact errors in our estimated values of End, Enh2oh, and SPnh2oh are on the estimated value of SPnd.

Appendix A: MS was replaced by mass spectrometer

Figure 1 (now Figure 2): the y axis label was change to yield per N-NH3

Figure 3 and 4 (now figure 4 and 5): symbols and labels have all been enlarged

page 3034 line 4 (page 11 line 354): This is okay as NO2-. Sutka et al did their work in culture, where measurable quantities of NO2- accumulated. However, NO2- concentrations are much lower in the ocean.

page 3035 line 22 (page 12 line 398): This is a minimum.

page 3040 lines 17-19 (page 16 lines 512-515): The sentence was corrected.

Interactive comment on Biogeosciences Discuss., 7, 3019, 2010.