

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 Comments: page 3021 lines 7-8 (page 2 line 31): The reference was updated to the IPCC estimated value.

page 3032 line 21-22 (page 10 lines 315-323): I have taken out the statement that "There was no detectable loss of dissolved N from the combined NH_4^+ and NO_2^- pools." The N_2O yield calculations for the NO_2^- addition experiments were based on the disappearance of NH_4^+ (decrease in NH_4^+ concentration from the starting concentration to the ending concentration). Although there was no loss of dissolved N above the precision of the NH_4^+ + NO_2^- measurements, the standard deviations of replicate

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NO₂- concentration measurements were large (10's of μM) for the 1 mM and 0.2 mM NO₂- concentration measurements because of the dilution correction.

page 3040 line 12-15 (page 16 lines 513-524): I have now included an estimate of what a 20% contribution of H₂O to the d18O-N₂O from NH₂OH decomposition would do to the estimate of Epsilon_NH₂OH in both labeled and unlabeled water. There was an error as written ("If a fraction of this oxygen actually comes from H₂O, then the model value of Enh₂oh should be too low for data from experiments in unlabeled H₂O and too high for data from labeled H₂O"). This was a carry-over mistake from when we changed the signs of epsilon-nh₂oh and epsilon-ND from positive to negative in equations 5 and 6. This has been corrected to match the equations as they are now written.

page 3040 line 16 (page 16 lines 515-516): The model couldn't resolve all of the parameters when I entered data from only labeled or only unlabeled water. But I didn't see a consistent positive or negative bias in the residuals of Epsilon-NH₂OH that depended on whether they were calculated from data in labeled experiments or data from unlabeled experiments. It's very possible that more data from experiments in waters with d18O values that are much higher and much lower than the d18O of the O₂ could increase our ability to resolve all these parameters.

Technical Corrections page 3020 line 2 (page 1 line 1): we changed the statement to "Nitrous oxide is a trace gas that contributes to the greenhouse effect and stratospheric ozone depletion." We did this because the reviewer's intention seemed to be that we include the influence of N₂O on global warming.

page 3021-3022 lines 20-21 (page 2 47-50): This paragraph and the ones preceding it have been reorganized. The reference to Goreau (1980) has also been removed from this line.

page 3022 line 20-27 (page 2-3 lines 57-58): Mixing is included as the fourth entry in the list of contributors now.

page 3022 lines 9-15 (page 2 lines 37-50): The structure of the paragraph has been reorganized to follow the reviewer's suggestion.

page 3038 equation 5 (page 12, 14, 17): The hyphens have been changed to distinguish them from minus signs

page 3040 line 17-19 (page 16 lines 517-518): It's unclear why we couldn't resolve an oxygen exchange term with this data. Oxygen exchange between H₂O and NH₂OH may not be a significant process, or it might be resolvable with more data from experiments with differently labeled H₂O or O₂. So the sentence has been changed but remains open-ended: "Furthermore, when a parameter for oxygen exchange between H₂O and NH₂OH was included in equation (6), we were unable to resolve it with the present data set."

page 3043 appendix A (lines 578, 623, 625): Mass numbers were given as superscripts

page 3043 line 8 (page 17 lines 575-576): Here we mean a ratio of the sample ion ratios to the standard ion ratios. The term 'ratios of ratios' was used instead to clarify this.

page 3055: fonts and symbols were enlarged

page 3057 (Figure 3b): NOB was added to the figure legend.

page 3058 (Figure 4): units were added to Figure 4

page 3059 (Figure 5): R was changed to R² value

page 3059 (Figure 5): the permil symbol was put in parentheses.

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

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