

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

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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 $\text{NH}_4^+ + \text{NO}_2^-$ measurements, the standard deviations of replicate

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NO_2^- concentration measurements were large (10's of μM) for the 1 mM and 0.2 mM NO_2^- 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 H_2O to the $\text{d}18\text{O}-\text{N}_2\text{O}$ from NH_2OH decomposition would do to the estimate of $\text{Epsilon}_{\text{NH}_2\text{OH}}$ in both labeled and unlabeled water. There was an error as written ("If a fraction of this oxygen actually comes from H_2O , then the model value of Enh_2oh should be too low for data from experiments in unlabeled H_2O and too high for data from labeled H_2O "). This was a carry-over mistake from when we changed the signs of $\text{epsilon}_{\text{nh}_2\text{oh}}$ and $\text{epsilon}_{\text{ND}}$ 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 $\text{Epsilon}_{\text{NH}_2\text{OH}}$ 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 $\text{d}18\text{O}$ values that are much higher and much lower than the $\text{d}18\text{O}$ of the O_2 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 N_2O 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.

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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.

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