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## ***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<sub>4</sub><sup>+</sup> and NO<sub>2</sub><sup>-</sup> pools." The N<sub>2</sub>O yield calculations for the NO<sub>2</sub><sup>-</sup> addition experiments were based on the disappearance of NH<sub>4</sub><sup>+</sup> (decrease in NH<sub>4</sub><sup>+</sup> concentration from the starting concentration to the ending concentration). Although there was no loss of dissolved N above the precision of the NH<sub>4</sub><sup>+</sup> + NO<sub>2</sub><sup>-</sup> measurements, the standard deviations of replicate

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NO<sub>2</sub>- concentration measurements were large (10's of uM) for the 1 mM and 0.2 mM NO<sub>2</sub>- concentration measurements because of the dilution correction.

**BGD**

7, C2107–C2109, 2010

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page 3040 line 12-15 (page 16 lines 513-524): I have now included an estimate of what a 20% contribution of H<sub>2</sub>O to the d<sup>18</sup>O-N<sub>2</sub>O from NH<sub>2</sub>OH decomposition would do to the estimate of Epsilon\_NH<sub>2</sub>OH in both labeled and unlabeled water. There was an error as written ("If a fraction of this oxygen actually comes from H<sub>2</sub>O, then the model value of Enh<sub>2</sub>oh should be too low for data from experiments in unlabeled H<sub>2</sub>O and too high for data from labeled H<sub>2</sub>O"). This was a carry-over mistake from when we changed the signs of epsilon-nh<sub>2</sub>oh 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-NH<sub>2</sub>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 d<sup>18</sup>O values that are much higher and much lower than the d<sup>18</sup>O of the O<sub>2</sub> 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<sub>2</sub>O 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 H<sub>2</sub>O and NH<sub>2</sub>OH may not be a significant process, or it might be resolvable with more data from experiments with differently labeled H<sub>2</sub>O or O<sub>2</sub>. So the sentence has been changed but remains open-ended: "Furthermore, when a parameter for oxygen exchange between H<sub>2</sub>O and NH<sub>2</sub>OH 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 R<sup>2</sup> value

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

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