

Interactive comment on “Constraints on global oceanic emissions of N₂O from observations and models” by Erik T. Buitenhuis et al.

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Thanks for this contribution to global marine N₂O modeling. May I ask some questions regarding the model formulation and applied parameter sampling:

Line 148: Is there nitrification at 1 umolO₂/l?

Line 156: How is N₂O consumption modeled? As a first order consumption term as applied in other studies? How large is gross consumption? What O₂ threshold do you use to separate nitrification, production from denitrification and consumption from denitrification? How large are aerobic and anaerobic remineralization fluxes in the model?

Line 166: Are modeled N₂O concentrations not drifting substantially after such a spin
C1

up procedure?

Line 199: How many parameter perturbation simulations did you run? Which sampling technique is applied to vary parameters? Over which range are parameters varied? What does the legend in Fig 8/10 stand for? Could you illustrate the sampled slopes and resulting optimal slope? Are fluxes tied stoichiometrically to remineralization fluxes? Why is N₂O consumption slope given as N₂O/NO₃⁻? Does this make sense stoichiometrically?

Figure 6: Many global N₂O modeling studies present N₂O versus O₂ scatter plots for evaluation. What does this relationship look like in the model?

The N₂O flux estimate of 2.4+/-0.8 Tg N yr⁻¹ is much lower than what was reported in Suntharalingam et al. 2000/2012, on which the model builds ('4.6 Tg N yr⁻¹ (comprised of 3.0 Tg N yr⁻¹ from the 'nitrification' pathway, and 1.6 Tg N yr⁻¹ from the low-oxygen pathway', Suntharalingam et al. 2012). How come? Does your prior include these previous fluxes? Your N₂O production at low O₂ is now ~10 times smaller compared to this previous model.

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