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Biogeosciences Discussions

Interactive comment on "The role of termite CH_4 emissions on ecosystem scale: a case study in the Amazon rain forest" *by* Hella van Asperen et al.

Anonymous Referee #2

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This manuscript presents a well thought out study to quantify methane emissions by termite in the Amazon rain forest. The authors reviewed the literature extensively and compared/discussed with their findings. I have some comments that I think will make the study more valuable. 1. Please provide the estimate of CH4 emissions by termite and put in context with the overall CH4 budget globally or in the Amazon. This manuscript presents CH4 emission factors only. Without knowing how many termite mounds in Amazon, it's difficult to imagine the scale of the global CH4 budget. I think this is one of a key messages for readers. 2. The first sentence in the Introduction section, it says "Methane (CH4) is the second most important long-lived anthropogenic greenhouse gas." I think CH4 has been recognized to be "short-lived" climate pollutant. 3. In the Introduction section, Line 35, it says "Recently, it was shown that termites

have a mitigating effect during droughts in tropical rain forests". Please elaborate what mitigating effect. 4. In the Introduction and in Appendix, the authors touched on N2O emissions from termite but didn't give conclusive results. 5. Section 2.3, Line 129, LGR GHG analyzer was mentioned to be the instrument deployed to quantify CH4 emissions in flux chambers. I think authors should add brief instrument performance specifications and details of what calibration and drift evaluation have been done in Amazon. While the absolute CH4 concentrations in flux chamber measurements are not very critical, since it's to measure the CH4 concentration increase, but the manuscript does not provide the measured concentrations and jumped directly to the emission factor estimates. For example, LGR UGGA precision is about 2 ppb. Does it perform the same in Amazon? Also, what CH4 concentration increments measured in the flux chambers? If it was only 2 ppb, then that data would not be useful. I think it should be many times more than the instrument precision and drift. 6. Well-designed flux chambers should have a small mixing fan or internal distribution tubing to quantify fluxes. Section 2.5, describes how LGR sampling tubes were connected on top of a 220 L chamber, if the air inside is not well mixed, the two fittings on top of the chamber may not detect CH4 at the bottom of the chamber. 7. Appendix A1 and A2 talk about N2O calibrations and measured concentrations. The measured N2O concentrations are outside of the calibration range. While the lower range (333.7 ppb) is similar to NOAA's measurements in Brazil, the manuscript does not provide the FTIR instrument precision and therefore, it's difficult to determine whether the detected range (333.7-342.4 ppb) is within instrument drift or it's actually an increment of N2O. I don't think the authors can conclude there isn't N2O emissions.

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