Biogeosciences
Discussions

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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.

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Van Asperen and co-authors studied methane and CO2 emissions by a termite species at an upland site in the amazon basin. They report individual and mound-bsed emission factors compareable to previous studies, and suggest that methane emissions can be employed as as rapid and non-invasive method to estimate mount populations.

Strength: The manuscript addresses a timely and important research question (methane emissions by termites) and provides a much needed data point in a previously understudied areas (termites in the neotropics). The authors followed state of the art measurements at a surely logistically challanging field location. As a bonus, the authors present both a comprehensive literature review and some very rare data on

C1

emissions of other trace gases (N2O, CO) in the appendix. The manuscript is generally well written and surely of great interest for the Biogeosciences readership.

Limitations: Some of the measurements were poorly replicated: Only one control collar was placed at distance from termite mounts, and for termite weight estimates, only one measurement is presented.

Possible improvement: - While the manuscript is generally very well written, I would encourage the authors to focus on editing the discussion section, which reads less easily than the rest of the manuscript. Some of this could be done by shortening and streamlining this section, which is rather long and at times meandering. - The authors could also improve the quality figures and tables (see below), most importantly remove the grid lines from the figures for easier readability.

Overall, this is a very nice contribution and it was a pleasure to review it!

L48: 'which is around' - aprroximately instead of around, also better state the range in % as well given that 2-15 Tg is quite a wide range. L60: 'termite CO2 measurements' - measurements of termite CO2 emissions L64: to avoid mixing weight units (gramm and tons), Pg instead of Gt L119: what material was your chamber built out of? L130: when were your measurements conducted (date, in what season?) L134: 'molar density': concentration L142: 'increase': concentration change, as you could see uptake L176-181: The section could be improved. L195: can you state an uncertainty of this weight per individual? L217: no need to state the original unit here, just state the values converted to the unit used in your study. L223-235: I recommend streamlining/shortening this segment. Acknowledging mount uptake is important, but it's not the focus of your study and comes out of left field here. Focus on why this is important to understanding your results. L237-241: I would move this comparison with literature data up to L215-219. L243 ff: To be honest, these variations among individual measurements look pretty trivial to me and may not need such extensive discussion (which ends up questioning your measurements.). L249-254: This can be tested by looking at

the concentration curves wihtin individual closures. If a relevant air exchange between chamber and ambient air occurred, concentrations should be non-linear (d[CH4]/dt decreasing over time, following a y=a + b*eˆ(-c*t) function). If this is the case, fluxes should be calculated by fitting such an exponential function and calculating the slope as d[CH4/dt] at t=0. L280ff: it would be good to add an uncertainty range to your population estimates L288: 'contemplated': considered? L291-292: 'hypothesize': don't use hypothesize that for claims you do not test. 'It is therefore likely that ..' L303: 'drawback': disadvantage L304-305: 'is proposed': by whom? The authors? If that's that's the case, say so (ok, sorry for the snarky tone. Use active voice here - 'We propose a follow-up study to directly compare') L311: 'it was decided': same here, use active voice: 'we decided .. to avoid overestimating ..'

L418-419: 'indicating no or very low N2O emissions': Can you provide an uncertainty range for that estimate (e.g., limit of detection for fluxes?)

Figures: remove grid lines (counterintuitively, this makes figures easier to read), place ticks inwards Fig 1: remove 'per mount' on the y axis, it's redundant with the unit on that axis. Fig 4: A broken axis might work better than the inserts here (if you keep the inserts, state the y axis scale). The figure could also be simplified by showing the means + SD of the four mounts instead of values for individual mounts. Also, I think the direction in which you placed the soil collars from the mount wasn't chosen deliberately, so your x axis could be just 'distance from the center of the mount', combining your flux measurements at the same distance at either side of the mount. Fig 5: number instead of amount

Tables 2-3: I recommend combining Table 2 and 3 after removing reported value and reported unit (these can be placed in a supplement) to keep the table easier to read. State the unit of the converted values in the table header. This leaves the following columns: [Study] [Study area] [CH4 emission (state units)] [CO2 emission (state units)] [CH4:CO2 ratio (state units)] [Species]. Such a table would give a much better overview.

Place footnotes as footnotes and not in the table caption.