

Interactive comment on “Responses of CH₄ uptake to the experimental N and P additions in an old-growth tropical forest, Southern China” by T. Zhang et al.

Anonymous Referee #1

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General Comments

The manuscript by Zhang et al., showed responses of CH₄ uptake to the experimental N and P additions in an old-growth tropical forest, southern China. The authors found that soil CH₄ uptake rate was significantly reduced in the N-addition plots, and was not changed in the NP-addition plots, but was significantly increased in the P-addition. Thus the authors concluded that increased P availability may enhance soil methanotrophic activity and potentially mitigate the inhibitive effect of N deposition on CH₄ uptake in the studied tropical forests. I think this work is very interesting, original and novel. The new results from this study can improve our understanding on the relation-

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ship between soil C and nutrient (N and P) availability. In general, this work is well written, well presented, but there are still some comments to be addressed.

1. The authors found that response of CH₄ uptake to the experimental P additions in the studied tropical forest was significantly increased. It is apparently low P soils and P is likely limiting plant growth. Thus, this effect could be resulted from direct P deficiency to microbial growth and indirect P deficiency to plant growth. The authors need to discuss about the possible mechanisms for the responses of CH₄ uptake to P additions.
2. The authors' observations would provide an understanding of atmospheric CH₄ consumption in the tropical forests in this area. However, the difference in the soil CH₄ consumption in the three tropical forests was reported by Tang et al. (2006) and Zhang et al. (2008). To focus on the new findings in this report, in my opinion, the following title is more informative than the current one: Increased phosphorus availability mitigates the inhibition of N deposition on CH₄ uptake in an old-growth tropical forest, southern China. And the abbreviation of the element such as “P” and “N” should be avoided in the title.
3. It could be concluded that under high nitrogen deposition condition, CH₄ uptake rate would decrease and N₂O emission rate would increase significantly compared with controlled plots, which means that the concentration of CH₄ and N₂O will increase continuously for the high nitrogen deposition in this region, is that true?
4. In page 4954, line 26, the author indicate the global average concentration of CH₄ is 1.7 ppm, but it changed to 1.803 in page 4955, line 5. What is true? 1.7 or 1.803?
5. How much is the volume of the closed static chambers? Whether may the gas sampling method in this study affect the variation of volume within each chamber? These problems are associated with the precise of the CH₄ flux measurement in the field.

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6. Page 4959, Line 3-4. The author indicated that GHG concentration increased or decreased linear with the times after the closure chamber within 100 min. But as I know, gas with low concentration such as carbonyl sulfide (COS) and dimethyl sulfide (DMS) changed exponentially, and high concentration gas such as CO₂ increased linearly with 30 min. I am not sure whether GHG such as CH₄ and N₂O changed linearly within 100 min. Would the author provided the change curve?

7. Soil WFPS were changed by some treatments in this results. Is soil diffusivity an important regulator of the CH₄ flux if it is limiting factor in the transport?

8. Is soil water filled pore space (WFPS) better than soil moisture? Any explanation why WFPS is affected by the P/NP treatment?

9. It was not part of this study but still worth addressing. Had the fertilization any effect on tree growth and litter production and subsequently on GHG fluxes? Change in soil moisture due to higher water uptake?

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