

Interactive
Comment

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.

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I appreciate the interesting research questions that the authors try to answer. However, I have some reservations about the small size of the plots that were used for the manipulations, which in my opinion has affected the results. The size of the plots manipulated by Zhang et al. is 5 x 5 m (25 m², see p. 4958, l. 12) surrounded by a 'buffer strip' of 5m. It is not clear from the explanation whether this 'buffer strip' receives the same treatment or is just an untreated strip. If it is the latter (i.e. untreated 5-m 'buffer' strip), it is of course likely that in this old-growth forest, trees that did not receive treatment had roots that extended all the way to the core of the small 5mx5m treated plots.

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In my opinion this has affected the results: Zhang et al. report a higher CH₄ uptake from P treated plots. They interpret this as evidence for P limitation of the methanotrophic bacteria. There is however, a much simpler explanation for these observed treatment effects: Zhang et al. report also higher CO₂ fluxes from the P and NP treated plots (p 4963, l. 25) and they found that WFPS was lower in the P and NP treated plots (p. 4961, l. 20). I interpret these results as evidence that the P and NP treatment stimulated root growth into the treated plots from adjacent trees outside the plots. This stimulated root growth led to higher water uptake and consequently lower WFPS which in turn led to higher gas diffusion and thus higher CH₄ uptake.

Had the manipulated plots been bigger, these results would probably have been very different. The results are probably the result of an 'edge' effect. It is not by chance that good nutrient manipulation plots in old-growth tropical forests have a size of 40 x 40 m (see e.g. Kaspari et al, 2008; Koehler et al. 2009) where measurements are concentrated in the core 20 x 20m.

References:

Kaspari et al. 2008. Multiple nutrients limit litterfall and decomposition in a tropical forest. *Ecology Letters* 11: 35-43

Koehler et al., 2009. Chronic nitrogen additions causes a reduction in soil carbon dioxide efflux during..... *Biogeosciences* 6: 2973-2983

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