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Comment

## ***Interactive comment on “Indications of nitrogen-limited methane uptake in tropical forest soils” by E. Veldkamp et al.***

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General comments: The authors explored the impact of chronic N addition on soil CH<sub>4</sub> fluxes from two old-growth forests in Panama. There so far is little information available in the scientific literature dealing with response of soil CH<sub>4</sub> fluxes to N addition in tropical forests. The results from this study will improve our knowledge on the response of CH<sub>4</sub> to elevated N deposition in various tropical ecosystems and will be interested by the readers of this journal. Generally, this work is well written and presented. I don't have major concerns, but several issues need to be well addressed before it is published.

Specific comments: 1 There are some inconsistencies in this manuscript. The authors found that there was a negative correlation between soil CH<sub>4</sub> fluxes and soil mineral

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N (NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup> or total available N) in these two forests, which suggest that soil CH<sub>4</sub> uptake was limited by N availability in both forests. However, results from this study showed that nine to twelve years of N addition to this lowland forest and one to four years of N addition to this montane forest did not affect soil CH<sub>4</sub> fluxes, although N addition significantly increased soil N availability (Fig. 2).<sup>2</sup> Since significant effect of N addition on soil CH<sub>4</sub> fluxes was not detected in this study, I would suggest that the title of this paper change from “Indications of nitrogen-limited methane uptake in tropical forest soils” to “Effect of N addition on soil CH<sub>4</sub> fluxes in two old-growth tropical forests in Panama”<sup>3</sup> Page 6014, Line 6, 2.2 Site description and experimental design “At both sites, four replicates of N-addition plots and four controls were established.” I wonder how these treatments arranged. Was a paired-plot design used in this experiment? What is the average slope for these sites? The large spatial variation in CH<sub>4</sub> fluxes maybe related to “high slope” in these sites.<sup>4</sup> Page 6018, Line21, “CH<sub>4</sub> fluxes from the lowland forest control plots ( $-21.47 \pm 1.57 \mu\text{gCH}_4\text{-Cm}^{-2} \text{h}^{-1}$ ) did not differ from the fluxes of the montane forest control plots ( $-3.99 \pm 3.40 \mu\text{gCH}_4\text{-Cm}^{-2} \text{h}^{-1}$ ; Fig. 3, Table 1).” Here, the difference between these two forests is about 5 times ( $21.47/3.99 = 5.38$ ), very large! However, the difference from Table 1 between these two forests is much smaller. For example, in 2006,  $-1.69 \pm 0.36$  for montane forest V.S.  $-1.93 \pm 0.24$  for Lowland forest. Difference for this is  $1.93/1.69 = 1.1$ .<sup>5</sup> Page 6018 Line15. “These opposing correlations of CH<sub>4</sub> fluxes with NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> were because the temporal patterns of NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> showed the opposite trend.” Why the temporal patterns of NH<sub>4</sub><sup>+</sup> and NO<sub>3</sub><sup>-</sup> showed the opposite trend? Do you have any data to support it? <sup>6</sup> Page 6009, page 3 “Based on these findings, it is unlikely that elevated N deposition on tropical forests will lead to widespread inhibition of CH<sub>4</sub> uptake.” This conclusion especially “widespread” is not supported by this study and the studies from other tropical forests. There are so far only two researches including this research dealing with response of soil CH<sub>4</sub> fluxes to N addition in tropical forests.

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