

## ***Interactive comment on “Effects of nitrogen and phosphorus additions on nitrous oxide emission in a nitrogen-rich and two nitrogen-limited tropical forests” by M. H. Zheng et al.***

### **Anonymous Referee #4**

Received and published: 17 February 2016

This is a very well written paper on the impact of N and P on N<sub>2</sub>O emissions from young and old tropical forest soils. The authors carried out a statistically designed plot experiments and applied either N, P or N+P to just water to the plots and measured the N<sub>2</sub>O fluxes, soil DIN, P, SOC and microbial biomass. Their general findings, that P addition reduced the N induced N<sub>2</sub>O emissions is interesting and as the authors suggested will warrant further investigation. This paper is certainly suitable for publication in BG. There are a few mainly technical points the authors should address (see below). My only main concern is the large rates of N & P application (150 kg N / ha / y and 150 kg P / ha / y). The N applied is ~5 times larger than the atmospheric N deposition rate at the site. The authors need to justify these unrealistic large rates. Would the results

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of the paper be different if slightly more realistic rates of N and P would have been applied? Technical comments: P7 line 1-5: you need to include a bit more detail on the chamber design: dimensions of the baseframe and lid (or chamber). Did you use a stirring fan, pressure valve? How did you seal the chamber to the lid?

P7 Line 5: Change sentence to: '...and analyzed within 12 h on the gas chromatograph (Agilent 4890D) fitted...' (replaced 'in' with 'on')

P7 line 10: 'The calculation of N<sub>2</sub>O fluxes followed the method of Holland et al. (1999), based on linear regression of' chamber gas concentration across time (changed 'across' to 'with')

P7 Line 11: was the soil temperature measured inside the chamber?

P7: line 16: I am not certain that the very general particle density value of 2.65 g/cm<sup>3</sup> is appropriate to be used for your forest soils? Would you not expect a different particle density in the OG forest compared to the mixed/pine forests?

P8 line 3: How was NH<sub>4</sub> extracted from the soil?

P8: line 8 & 10: NO<sub>3</sub><sup>-</sup>- N. '-' should not be a superscript

P10 line 3: change to: 'mixed, and pine forests, respectively (Fig. 4), with being significantly higher (P = 0.001) in the old-growth forest

Page 9 line 16 delete 'were' and line 21: delete 'was'

Page 10: line 3: change to 'mixed, and pine forests, respectively (Fig. 4), with being significantly higher (P = 0.001) in the old-growth forest'

P 11 section 4.1 first paragraph: you may like to add that the variability of the data available could be due to soil type and also variability in climate

P11 line 23-24: is this the same forest as in your study? If this is the case, replace with: ...in this old-growth forest, investigated previously by Fang et al (2008)

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P13 line 12 'In spring, forest soil was enriched with inorganic N (accumulated during non-growing seasons)' you need to say that the non growing season is due to the lack of rainfall. Also comment on the pulsing effect (wetting dry soil triggers N<sub>2</sub>O emissions and other gases).

p14 line 22: change to 'allowing us to reject the hypothesis that P addition causes greater decrease in N<sub>2</sub>O emission'

P15 line 1-2: Under laboratory conditions, Sundareshwar et al. (2003) found a negative response of sediment N<sub>2</sub>O emission to nitrate addition. This sentence should be moved to the nitrogen section 4.3

Fig 3 & 4 legend line 3: delete 'before analysis' Fig 5 legend change to: ... "in the three control plots of the study forest. . . ;

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