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Biogeosciences Discussions

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

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This is a very well written paper on the impact of N and P on N2O 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 N2O fluxes, soil DIN, P, SOC and microbial biomass. Their general findings, that P addition reduced the N induced N2O 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

of the paper be different if slightly more realistic rates of N and P would be 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 stiring fan, pressure valve? How did you seal the chamber to the lid?

P 7Line 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 N2O 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/cm3 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 NH4 extracted from the soil?

P8: line 8 & 10: NO3ÂňÂň- 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)

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 N2O emissions and other gases.

p14 line 22: change to ‘allowing us to reject the hypothesis that P addition causes greater decrease in N2O emission’

P15 line 1-2: Under laboratory conditions, Sundareshwar et al. (2003) found a negative response of sediment N2O 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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