

## ***Interactive comment on “Phosphorus addition mitigates N<sub>2</sub>O and CH<sub>4</sub> emissions in N-saturated subtropical forest, SW China” by Longfei Yu et al.***

### **Anonymous Referee #2**

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General comments The authors reported an experiment of P addition (79 kg P ha<sup>-1</sup> yr<sup>-1</sup>, applied as NaH<sub>2</sub>PO<sub>4</sub> powder) to an N saturated, Masson pine-dominated forest at TieShanPing (TSP), Chongqing, SW China for a period of 18 months. In the experiment, they measured soil fluxes of N<sub>2</sub>O and CH<sub>4</sub>, soil chemistry and plant growth. They found that P addition significantly decreased soil N<sub>2</sub>O emissions and turned the soil from CH<sub>4</sub> emissions into a net sink. The experiment is appropriate. Data interpretation was logical and supported their conclusion. The study is for a type of ecosystem (subtropical, high ambient N deposition, N-saturated forest soil) for which such information is lacking. Their findings are interesting, can help us understand the interaction effect of N and P on greenhouse gas emission and also have implication for the forest management (such as P fertilization). In addition, the manuscript is also well organized and well written. I have only some minor concerns which I would like to discuss with

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the authors or maybe helpful for improving the manuscript, please see details below. Specific comments 1) P7, Line117. “annual N deposition at TSP measured in throughfall varies between 40-65 kg ha<sup>-1</sup>”. What is the N deposition in precipitation there? Because N deposition in throughfall may be affected by difference in species, structure etc. of the forest, N deposition in precipitation is better data for comparing different forests. 2) P9, L165. Please give the locations (in the center of the plot?) where you measured the gas emission in the plots. 3) P9, L165-167. “to investigate the immediate effect of P addition on . . . . . (7, 10 and 12 May) after the P application.” Did you show these results in the result or discussion section? If not, please delete it. 4) P11, Line 195 Statistical analyses. In the Experimental Design, the author showed that three blocks were established and two plots in each block in the study forest. In each block, plots were assigned randomly to a reference (Ref) and a P treatment. Did you try One-way Repeated-Measures ANOVA to exam the treatment effect for the emission of CH<sub>4</sub> and N<sub>2</sub>O, due to measuring the gas repeatedly. 5) P19, L362-363. “Overall, our study demonstrates that chronically high N deposition has transformed TSP soils to a regional hotspot for N<sub>2</sub>O and CH<sub>4</sub> emission. “ It is not clear for me. Could you explain it? 6) P25, L565-568, “Zhang et al., 2014. Responses of nitrous oxide emissions to nitrogen and phosphorus . . . . .” has been published in Biogeosciences, please replace Biogeosciences Discuss. 7) P27, L585, Table 1. How did you get n=6? Did you mixed samples in each plot? 8) P28, L591, Table 2. The yearly variation for some data is big. For example, PAL in the ref plots was 5.4 in Aug. 2013, but was 13.4 in Aug. 2015. Do you have any explanation for it?

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