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Interactive comment on "Impacts of prescribed burning on soil greenhouse gas fluxes in a suburban native forest of south-eastern Queensland, Australia" *by* Y. Zhao et al.

Anonymous Referee #2

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Prescribed burning has been increasingly recognized as an important tool for reducing fire hazard and managing forest in many parts of the world. Although prescribed burns are generally less intensive than wildfires, their influences on vegetation, soil, and biogeochemical processes can still be quite conspicuous. As the authors rightfully pointed out, there are very limited studies examined how prescribed burning affects soil greenhouse emission and the associated driving mechanisms. The data reported in this study, although not impeccable, can further our understanding about the influences of prescribed burning on soil greenhouse gas fluxes.

The study employed a before-after/control-treatment experiment design to evaluate prescribed burning effects. The authors firstly collected gas flux data before the burn-

ing (Aug. 2013) and then on two post-burning dates (Aug. 2014 vs. Nov. 2014). This dataset was compared with a one-way ANOVA to assess burning effects on CH4, CO2, and N2O exchange rates. To account for the confounding effects from the inherent temporal dynamics of those fluxes, the authors collected a second suite of dataset on four unburned replicates and conducted a second-round ANOVA. However, after carefully examining Table 1, one could draw a conclusion that the inherent temporal dynamics of those fluxes exerted much greater influences than prescribed burning. The more accurate depiction of burning effect size and magnitude can only be derived from the second-round ANOVA. For example, although CO2 emission rate in the burning site was reduced on Aug. 2014. However, this reduction cannot be attributed to the prescribed burning because Aug. 2014 CO2 rates measured in the burned plots were not significantly different from that in the unburned plots. The authors did make such distinctions in their abstract and conclusion, but they did a poor job in the results section (especially section 3.1).

I am not very concerned about the pseudo-replicate issue as long as the authors can state clearly in the manuscript that the results only reflect the effects of this particular prescribed burning. However, the presentation of their ANOVA interpretations should be carefully revised to avoid inflicting any unwanted confusions.

English presentation is problematic. Some paragraphs read smoothly, but a number of paragraphs are still rough. Please see below for an incomplete list of language suggestions.

P4L7, the reference of Zhao et al. 2013 is mainly about greenhouse gas emissions from Three Gorges Reservoir of China. It doesn't seem to be a global climate change study. Suggest to delete this citation from the list

P4L18, change altering to alter

P4L18, change "decomposition of organic matters" to "organic matter decomposition"

P4L22, to reduce the repetitive usage of the same words over and over, suggest to change “soil CO2, CH4 and N2O fluxes” into “those soil greenhouse gas fluxes”

P4L27, change “wildfires of” to “wildfires in”

P5L9-L10, What do you mean “As temperature and moisture reflect the seasonal variations in CO2 emissions”? It has been documented that wildfire can change soil temperature and moisture over a relatively long time period. Please clarify

P5L24-25, change to “but there are only few published studies and their results are inconsistent”

P10L15, change to “significantly”

P10L17, change to “CH4 uptake rate became similar to that before the burning”

P10L18, change to “relatively stable”

P10L19, delete “in uptake rate”

P13L7, change “moderate” to “affect”

P13L9, “at an insignificant level”

P19L14, delete “to manipulate fires”

P19L22-L23, change “it was a combination of burning introduced variation and natural seasonal variations” to “it was largely caused by natural annual variations”

Interactive comment on Biogeosciences Discuss., 12, 10679, 2015.