

Interactive comment on “Soil N₂O and NO emissions from land use and land-use change in the tropics and subtropics: a meta-analysis” by J. van Lent et al.

J. van Lent et al.

j.lent@cgiar.org

Received and published: 6 November 2015

Thank you for providing a second review and your kind words. Below we provide answers to the six additional comments:

1. Thank you, we checked these pages for additional errors.
2. We have changed lines 16-20 into the following: “According to the meta-analysis LUC overall increased N₂O and NO emissions, albeit not significantly. Land-use change types or practices that induced significant changes in emissions all pointed towards increased rather than decreased emissions.”

C7439

3. Figure 4 shows that for croplands both non-fertilized and fertilized sites can emit substantial fluxes after conversion. So direct mineral N input alone is not the sole factor determining the increase for the first 5-10 years. Land-clearing and preparation effects are likely to play an important role. We added a sentence in lines 14-22 of page 12800. For pastures this is discussed in lines 5-11 on page 12800.

4. The spatial-temporal variation indeed is known to be large for N-oxide flux measurements, although spatial variability is often more important in the tropics than temporal variability. For example, several authors failed to find a diel cycle in chamber flux measurements because day and night temperature differences in the tropics are lower than in temperate and boreal zones. Our dataset contains yearly averages, derived from measurements throughout the year taken from several spatial replicates. The number of studies that monitored the fluxes during more than a year was very limited. Therefore we cannot – with the existing data – fully answer this question. True temporal variation needs to be addressed by analysing high-resolution multi-year measurements, similar to spatial variations that needs to be analysed within one temporal unit at varying positions. Although we agree with the reviewer that this is an important point, this is beyond the scope of this study. This is mentioned in the manuscript at page 12800 lines 11-13 and page 12804 lines 13-16.

5. Even though for the temperate zone large Q10 values have been reported, several studies showed that when other factors are limiting N-oxide fluxes, the relationship with (soil) temperature could be suppressed (e.g. Dobbie et al., 1999; Skiba and Smith, 2000). We added the following sentences into the discussion at page 12802 line 17: “In the temperate zone exponential increases in N₂O emissions with increasing temperature have been reported, whereas in the tropics the evidence is mixed (Skiba and Smith, 2000). Substrate (e.g. N, P) and moisture constraints of microbial processes influencing N-oxide fluxes may reduce the temperature effect. Werner et al. (2006), for instance, demonstrated that variations in N₂O emissions from tropical rainforest soils were mainly affected by soil moisture changes and that temperature changes were of

C7440

minor importance."

6. Thank you, this is added to the sentence (page 12803, line 18).

Additionally, we included a recently published study on tropical forest conversion to oil palm plantations, given the lack of research in these agro-ecosystems; as was also mentioned by the reviewer. This resulted in minor changes of the regressions and values in table 1, 2, 3 and throughout the text.

Interactive comment on Biogeosciences Discuss., 12, 12783, 2015.

C7441