Biogeosciences Discuss.,
doi:10.5194/bg-2016-216-AC1, 2016

Biogeosciences Discussions
Open Access
EGU

Interactive comment on "Land use change associated with urbanization modifies soil nitrogen cycling and increases N_2O emissions" *by* Lona van Delden et al.

Lona van Delden et al.

lona.vandelden@qut.edu.au

Received and published: 1 September 2016

The authors would like to thank reviewer 1 for the great feedback. We agree on all of the mentioned suggestions and would prepare the revised manuscript accordingly. The detailed response is as follows:

1. Changing or deleting the correlation plot to avoid generalization of data on establishment phase and the rest of the year.

This recommended modification of correlating the parameters within the establishment phase separately to the rest of the year and changing the data to log transformed values greatly improved the R2 value and results in a valuable partial relationship pre-

Printer-friendly version

Discussion paper

sentation. Therefore, we would like to keep but change Figure 4 into the attached figure.

2. Statements about leaching will be reduced and modified to clarify that this is a possibility and not a result of the study.

3. Additional information will be included into the Materials and Method section:

a. Buffer zones of 0.5 m pasture strips between plots

b. Pneumatically operated, clear acrylic glass chambers

c. Fluxes from the two pseudo-replicate frames were analysed continuously as one replicate

4. The bibliography will be updated to make sure the Copernicus output style matches the authors reference list

5. Conclusion section will be modified to clarify the focus of the study: “This study provides evidence that land use change associated with urbanization accelerates N turnover and increase N2O emissions from soils by presenting the first high temporal frequency dataset on peri-urban soils in the subtropics for a full year after land use change. These findings demonstrate that GHG emissions from peri-urban areas should be included into future IPCC climate change scenarios and rural to urban land development guidelines need to be established for GHG emission mitigation. Three main factors need to be considered to target N2O losses from soils during land use change associated with urbanization: (i) previous land use, (ii) duration of development process, and (iii) new land use purpose that it is being changed into, i.e. public or private. This dry sclerophyll forest in this study supports the general hypothesis that forest soils are low N2O emitters, contrary to expectation that the humid subtropical summer conditions would increase emissions compared to temperate forest soils. The accumulation of NO3- in fallow soil increases the potential for N2O emissions and may amplify considering future predictions of rising temperatures and more frequent heavy

rain events worldwide. Increased fertilizer application may be required to compensate for these N losses after land use change to keep peri-urban land, such as turf grass, highly productive, which consequently increases GHG emissions furthermore. The outcomes of this study emphasize the potential to reduce NO3- accumulation which increases N2O emissions through altered management during urbanization processes and turf grass establishment."

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-216, 2016.

Printer-friendly version

Discussion paper

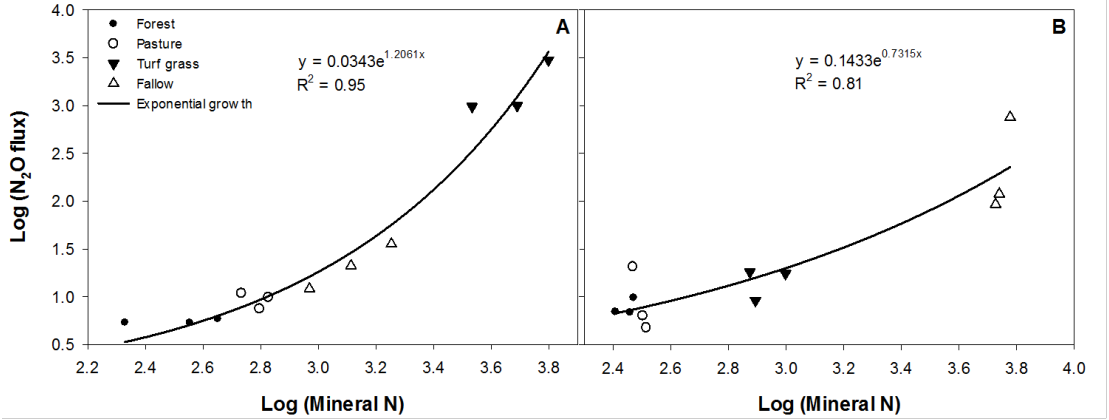

Fig. 1. Figure 4: Exponential increase of N2O emissions with increasing mineral N content

Printer-friendly version

Discussion paper