Coupling of N_2O emission and mineralization-nitrification in Amazon pristine forest

V. FIGUEIREDO[1*],T. RÜTTING[2], K. TÔSTO[3], A. ENRICH-PRAST[4]

[1]Federal University of Rio de Janeiro, Department of Botany, Rio de Janeiro, Brazil, vivi.bioufrj@hotmail.com
[2]University of Gothenburg, Department of Earth Science, Gotheburg, Sweden, tobias.rutting@gvc.gu.se
[3]National Institute for Space Research, Post-Grad. Program in Science of Terrestrial System, tosto.karina@gmail.com
[4]Department of Environmental Change, Linköping University, Linköping, Sweden, alex.enrich.prast@liu.se

Tropical forests are the terrestrial ecosystems with the highest productivity [1] and emissions of nitrous oxide (N_2O), a potent greenhouse gas [2]. Nitrous oxide is a product from microbial metabolism that is mainly regulated by nitrogen (N) availability linked to soil N cycling. Previous studies correlated N_2O emissions with soil N mineralization and nitrification [3]. The present study aims to investigate the relation of gross soil N mineralization and nitrification, with N_2O emission in a pristine Amazonian forest (Ecological Station of Cuniã, Rondônia, Brazil), using the ^{15}N pool dilution technique associated with intact soil chambers. The ^{15}N samples were analyzed using Mass Spectrometry (SPINMAS), and gas samples by gas chromatograph (Thermo).

Nitrous oxide emissions from tropical soils were large, averaging 10.8 ± 4.8 mg $N\text{-}N_2O$ m^{-2} d^{-1} (N=25; mean ± SD), and the rates of gross N mineralization and nitrification were 30.1 ± 18.1 and 12.5 ± 4.3 mg N m^{-2} d^{-1} (N=5; mean ± SD). There is an association between nutrient availability in soils and N_2O flux [3], which can be seen in the present study. Mineralization supports nitrification through ammonium production, and nitrification produce directly N_2O from ammonium oxidation. The soil texture has predominance of sandy, but the high amount of litter and superficial roots releasing organic compounds that estimulate the coupling mineralization-nitrification-N_2O emission [4]. This study suggest that gross N transformations might be valuable to determine N_2O formation and emission in tropical forest soils.

[1] Vicca et al. (2012) *Ecol. Let*. **15**, 520-526. [2] Davidson et al. (2000) *BioScience*. **50**(8), 667-680. [3] Matson and Vitousek (1987) *Global Biogeochem. Cycl.* 1, 163-170. [4] Dijkstra et al. (2013) *Front. Microbiol*. **4**(216).