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Land use effects on gaseous nitrogen emissions and gross nitrogen transformations in Amazonian Dark Earth

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Amazonian Dark Earth (ADE) in the Brazilian Amazon provide a strong indication that soils lacking in nutrients can be converted into highly fertile land. These soils have been considered as a model soil when compared to the surrounding soil due to the high concentrations of P, Ca, Mg, Zn, Mn, stable organic matter and soil organic C (SOC). Soils with high SOC contents can lead to extensive emissions of the greenhouse gas N2O. In this context, we measured the fluxes of CO_2, N2O and CH4 in ADE and adjacent (ADJ) soils under secondary forest and manioc plantation. Moreover, we added 15N-NH4+ and -NO_3- and measured N2O emissions and gross-N transformations of the different N species for two weeks (15N signal, N concentrations; work on-going), to quantify the simultaneousyl operating N transformation rates (method see: Müller et al. (2004; 2007). We observed higher amounts of NO_3- in both ADE and ADJ soils under forest. High consumption rates for NH4+ were shown by both ADE soils under forest followed by manioc plantation. CO_2 effluxes from ADJ were higher than from ADE soils, and higher from the forest compared to the manioc plantation. N2O fluxes were much lower in ADE under forest and higher in the other soils. The results of the gross N transformations are distinctively different among ADE and Adjacent sites, providing a strong indication how the dynamics of the individual N transformation rates have been affected by the long-term management.

References cited

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