

Evolution of N cycling in regrowing Amazonian rainforest

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Resumo: Extensive regions of tropical forests are subjected to high rates of deforestation and forest regrowth and both processes strongly affect soil nutrient cycling^{1,2,3}. Nitrogen (N) dynamics changes during forest regrowth⁴ and the recovery of forest and functioning to pristine conditions depends on sufficient N availability^{5,6}. We show that, in a chronosequence of Amazonian forests, gross nitrification and, as a result, nitrate-to-ammonium ($\text{NO}_3^- : \text{NH}_4^+$) ratio were lower in all stages of regrowing forests (10 to 40 years) than in pristine forest. This is an indication of an evolution of a more conservative and closed N cycle, reducing the risk for N leaking out of the ecosystem. Furthermore, our results indicate that young regrowing forests (10 years) show a decoupling of mineralization and nitrification, such as that high gross mineralization is accompanied by low gross nitrification, indicating a closed N cycle at the same time maintaining N supply for forest regrowth. We conclude that the status of gross nitrification in disturbed soil is a key process to understand the mechanisms of and time needed for tropical forest recovery.

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