



NH₄⁺ rather than NO₃⁻ production and retention processes are susceptible to enhanced NH₄⁺ deposition in a subtropical plantation

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It remains largely unknown how increasing N depositions may alter soil N cycling and N retention capacity of subtropical/tropical forest ecosystem functions. Here we report results from a ¹⁵N tracing study on soil from a subtropical forest plantation in China. Nitrogen fertilizer was applied monthly for more than 2.5 years at a rate of 40 (low) and 120 (high) kg NH₄Cl-N hm⁻² yr⁻¹, respectively. High NH₄⁺ input significantly retarded gross N mineralization, with a greater inhibition on mineralization of recalcitrant organic N than labile organic N which can possibly be related to a decreased fungal biomass. With increasing NH₄⁺ inputs, rates of NH₄⁺ immobilization into recalcitrant organic-N showed a trend of rise first and then fall. Interestingly, microbial NH₄⁺ cycling moved toward to be a more open N cycling under low NH₄⁺ input conditions, but was driven to be a tightly coupled N cycling under high NH₄⁺ input conditions. On the contrary, microbial NO₃⁻ production (heterotrophic nitrification and autotrophic nitrification) and retention (NO₃⁻ immobilization and DNRA) processes showed insensitivity to elevated NH₄⁺ input. Our results highlight that in acid subtropical/tropical forest soil, NH₄⁺ rather than NO₃⁻ production and retention processes are susceptible to enhanced NH₄⁺ deposition.