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Stable isotopic study of effects of N deposition on ammonium cycling in a boreal forest in Northern China

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There is still lacking of study on the effect of N deposition on microbial N cycling in boreal forests. Here we present results from a N deposition stimulation experiment to show that relatively low rate of N deposition (40 kg NH4Cl-N hm-2 a^{-1}) caused a decoupling of ammonium cycling in mineral soil of a boreal coniferous forest in the Great Xing' an Mountain region of China. The uncoupled microbial NH4+ cycling is likely due to reduced NH4+ immobilization possibly as a result of a change in soil N status. Soil autotrophic nitrification rates decreased as NH4+ immobilization decreased. However, the abundance of ammonia-oxidizing archaea (AOA) also presented a decreasing trend as NH4+ immobilization decreased, which explains the reduction in autotrophic nitrification. In addition, gross NO_3- production and NO_3- retention processes (NO_3- immobilization, and dissimilatory nitrate reduction to ammonium DNRA) in the soil did not change with enhanced N deposition. These results demonstrate that soil microbial NH4+ consumption processes are more prone to be affected by enhanced N deposition.