



Fate of increased nitrogen deposition in humid sub-tropical forests in Southern China

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Increased nitrogen (N) emissions from anthropogenic activities have dramatically increased N deposition to forest ecosystems particularly in the warm and humid south-east of China. Elevated N input may lead to eutrophication, nutrient imbalances, N leaching and soil acidification. The effects of deposited N depend greatly on the initial status of the forest and the fate of deposited N. However, the fate of increased N deposition is not well understood.

In this study the objective was to quantify the retention of atmospheric N deposition in different ecosystem compartments as well as the leaching loss from a N-rich subtropical forest ecosystem. To this end, we investigate the fate of simulated increased N-deposition in an old growth forest using isotopic labelling (^{15}N). We used an ongoing long-term N-addition experiment in Dinghushan Biosphere Reserve in South China. Stable ^{15}N -tracer in the form of $^{15}\text{NH}_4^{15}\text{NO}_3$ was mixed with fertilizer (NH_4NO_3) and sprayed to the forest floor under two different N deposition levels over one year. Following application, the recovery of added ^{15}N in major ecosystem pools (trees, ground vegetation, forest floor and mineral soil) and in water fluxes was determined. Samples were collected in June-July 2014 about three months after the last monthly addition.

We hypothesize less recovery of ^{15}N and lower N assimilation by trees in this N-rich subtropical forest compared to the high recovery and retention usually observed in such experiments performed in N-limited boreal and temperate forests. Due to the high N status we expect the N cycle to be relatively open in this forest and that most of the deposited N to be lost from the forest ecosystem.