

Oxygen and nitrogen isotope systematics during soil nitrification

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Nitrification is the main natural way of producing nitrate, a key nutrient in biogeochemistry. In a world where the N cycle has been perturbed by human activity through the addition of N from fertilizers and atmospheric deposition, it is important to be able to distinguish between natural and anthropogenic N in a system. Stable isotopes offer the opportunity to delineate between natural and anthropogenic sources of nitrate. One limitation is the uncertainty in the $\delta^{18}\text{O}$ and $\delta^{15}\text{N}$ of nitrate produced by nitrification. To reduce this uncertainty we have conducted a series of soil incubation experiments to assess the $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ values that arise during the nitrification process. Nitrification incubations using waters with unique $\delta^{18}\text{O}$ values were carried out. Also, nitrification potentials were carried out using sealed incubation chambers that had O_2 with unique $\delta^{18}\text{O}$ values. The shift in $\delta^{15}\text{N}$ from the starting NH_4^+ reagent was also measured. The results help constrain the $\delta^{15}\text{N}$ and $\delta^{18}\text{O}$ values that should arise during soil nitrification.