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Soil nitrite transformation along a forest slope and controlling factors

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We conducted a tracer study to clarify the spatial heterogeneity of nitrite (NO_2^-) dynamics in forest soils. Because of its reactive nature, NO_2^- does not usually accumulate in forest soils. This low concentration and experimental difficulties of accurate quantification have hampered quantitative detailed analyses of gross NO_2^- production and consumption in terrestrial environments. However, NO_2^- is an intermediate in many N transformation processes including nitrification and denitrification. Furthermore NO_2^- can also be reduced to gaseous N and react with organic matter not only biologically but also chemically. Thus NO_2^- dynamics may control whole N retention/emission characteristics in forest soils.

We added $^{15}NO_2^-$ to mineral top soils derived from a slope of a Japanese cedar forest. Primary properties of soils such as concentration of inorganic N, pH and water content differed geographically; N concentration, pH and water content are lower in the upper soils. NO_2^- production and consumption rates gradually increased from upper slope to lower slope. Quite short mean residence time of NO_2^- implies that NO_2^- consumed very rapidly anywhere in slope. The dominant pathway of NO_2^- consumption change geographically. It is suggested that the conversion to DON and gaseous N is more important in upper soils. On the other hand, conversion to NO_3^- (nitrification) is dominant in lower soils.

At this presentation, we focus on geographical difference of NO_2^- dynamics and their regulation by environmental factors.

Keywords: Forest soil, Nitrite, 15N tracer, Dissolved organic nitrogen, Nitrification

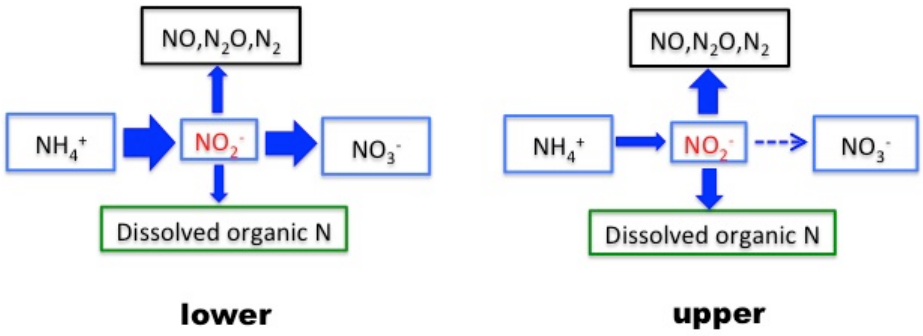

Fig.1 Schematic picture of nitrite dynamics along a forest slope.
Difference between upper and lower soils.