Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

AHW26-P17 Room:Convention Hall Time:May 24 17:15-18:30

Sources and processes of nitrate in forest soils: a case study at sites with heavy nitrogen deposition using nitrogen an

SHI, Jun[1*], Nobuhito Ohte[1], Naoko Tokuchi[2], Naohiro Imamura[1], Tomoki Oda[1], Miyuki Nagayama[1]

[1]Graduate School of Agr. & Life Sci., Univ. Tokyo, [2]FSERC, Kyoto Univercity

Nitrogen is one of the indispensable nutrients for plant growth and microbial activities. The nitrogen cycle is an important part of the forest ecosystems. Atmospheric nitrogen deposition remains elevated in industrial regions of the world and is accelerating in many developing regions. Chronically elevated atmospheric N inputs to forest can lead to changes in tree growth, mortality, and species composition and to possible declines in soil fertility and drainage water quality. Combined oxygen (O) and nitrogen (N) stable isotope analyses are recently used in the source determination of NO3-. The source of NO3- can be determined based on distinct O and N isotopic signatures (d18O and d15N) of various sources and isotopic effects during NO3- transformation processes. There two major sources in forest soil nitrate (NO3-): atmospheric deposition and microbial production. In Tanashi where have a high amount of nitrogen deposition, we analyzed d18O and d15N of NO3- in the samples consisted of the rainfall, though fall, stew fall , litter layer water and the soil water.

The results were: 1) the d18O of NO3- had a decreasing trend from rainfall, though fall, stem flow to soil water. It indicates that NO3- derived from the atmosphere is absorbed by plants and/or microbes when the rain through forest vegetation. 2) the d18O of NO3- values was 0˜20 permil while d15N of NO3- values was -5˜5 permil in the soil water. This suggests that the major potion of NO3- of the soil water is comes from the nitrification in soil by microbes, meaning that most of atmospheric NO3- was replaced by NO3- produced by microbes. 3) A large range of d18O values 12˜95 permil and d15N values -9.2˜6.6 permil in the litter layer water what shows that nitrate in the litter layer water has complex sources including nitrification and atmosphere , and those change temporarily.

Keywords: nitrate, oxygen and nitrogen stable isotope, Tanashi, temperate forest

Keywords: nitrate, oxygen and nitrogen stable isotope, Tanashi, temperate forest