

## 酸素同位体異常を用いた森林生態系における大気沈着由来硝酸イオンの解析

## Tracing Atmospherically Deposited Nitrate in Forest Ecosystem Using Triple Nitrate Isotopes

\*角 和暁<sup>1</sup>、勝山 正則<sup>1</sup>、矢野 翠<sup>2</sup>、木庭 啓介<sup>2</sup>\*Kazuaki Sumi<sup>1</sup>, Masanori Katsuyama<sup>1</sup>, Midori Yano<sup>2</sup>, Keisuke Koba<sup>2</sup>

1.京都大学大学院農学研究科、2.京都大学生態学研究センター

1.Kyoto University, Graduate School of Agriculture, 2.Kyoto University, Center for Ecological Research

Nitrogen saturation is one of the forest environmental issues as a result of increasing anthropogenic emission of reactive nitrogen. Forest which reached nitrogen saturation exports residual nitrogen as dissolved inorganic nitrogen (mainly nitrate:  $\text{NO}_3^-$ ) and the amount of  $\text{NO}_3^-$  leaching is one of the signal of nitrogen saturation. However, the mechanism of nitrate export from forest ecosystem is not well understood because of complexity of forest internal nitrogen cycle. In fact,  $\text{NO}_3^-$  has two sources, atmospherically deposited nitrate ( $\text{NO}_3^-_{\text{atm}}$ ) and microbial nitrate ( $\text{NO}_3^-_{\text{microb}}$ ) in forest ecosystem. These two sources could not be separated so far, but triple nitrate isotope analysis techniques enabled distinguishing  $\text{NO}_3^-_{\text{atm}}$  from  $\text{NO}_3^-_{\text{microb}}$ , and revealed that the fraction of  $\text{NO}_3^-_{\text{atm}}$  ( $f_{\text{atm}}$ ) in stream water is about 10% worldwide. To clarify the mechanism of export of atmospherically deposited nitrate ( $\text{NO}_3^-_{\text{atm}}$ ) to stream from forest catchment, we explored which factors of forest ecosystem influence  $f_{\text{atm}}$  in stream water.

We measured  $\delta^{15}\text{N}-\text{NO}_3^-$ ,  $\delta^{18}\text{O}-\text{NO}_3^-$ ,  $\Delta^{17}\text{O}-\text{NO}_3^-$ , and  $\text{NO}_3^-$  concentration along with forest hydrological pathways, through fall, soil water, ground water and stream water at Kiryu Experimental Watersheds (KEW) in central Japan.

We calculated the value of  $f_{\text{atm}}$  of four stream water, and mean value was about 10% except for one of the stream water which flows steep slope catchment. These results are consistent with the reports for stream. In soil, the concentration of  $\text{NO}_3^-$  and the values of  $f_{\text{atm}}$  were decreased along with the soil depth suggesting that  $\text{NO}_3^-_{\text{atm}}$  was consumed immediately at surface soil. In contrast, the values of  $f_{\text{atm}}$  were not fluctuated in ground water which suggests that the value of  $f_{\text{atm}}$  in stream water is almost determined at soil.

キーワード：森林生態系、硝酸イオン安定同位体、酸素同位体異常

Keywords: forest ecosystem, nitrate isotopes, oxygen isotope anomaly