

Ion-Exchange-Resin Technique to Measure Nitrogen Deposition and Its Isotopic Composition in Alpine Region

Yoko Kitazawa[1]; Rumiko Nakashita[2]; Muneoki Yoh[2]

[1] Environ.Sci.,Tokyo Univ.Agri.Tech.; [2] Tokyo Univ. Agri. Tech.

1. INTRODUCTION

Information for atmospheric deposition in high mountains is quite limited because of difficulty of sampling. However, it is essential to figure out nitrogen cycling and acidification in alpine ecosystems. Here, a technique using an ion exchange resin is presented, which enable collection of atmospheric deposition and measurement their stable nitrogen isotope ratio ($d^{15}N$) in remote areas. Results of analytical examination and preliminary research are presented.

2. METHOD

The analytical procedure with an ion exchange resin (Amberlite MB-1) to analyze $d^{15}N$ of inorganic nitrogen in wet deposition involved four steps: (1) sorption of NH_4^+ and NO_3^- onto the resins, (2) elution of the ions from the resin, (3) steam distillation to separate the ions from the eluate. The recovery and the $d^{15}N$ stability of the ions through this procedure were examined.

Preliminary research was performed in order to examine the feasibility of the resin in a field. Deposition and isotope composition of NH_4^+ and NO_3^- in throughfall were compared between the resin technique and a conventional one from July 2005 to January 2006 in an experimental forest in Hachiohji, Tokyo.

Collection of nitrogen deposition with this resin technique was also started from September 2006 around Mt. Tsubakuro.

3. RESULTS AND DISCUSSION

The efficiency of sorption and elution of NH_4^+ and NO_3^- of the resin were almost 100%. The recovery of N ions decreased a little after steam distillation. As to $d^{15}N$, fractionation caused by the resin was not found, but steam distillation led to fractionation about 1 permillage. At the present stage, we are able to analyze $d^{15}N$ using this resin technique with an uncertainty of only about 1 permillage. Reducing the loss of N through steam distillation improve reliability of this technique.

The resin technique showed different result from conventional one for deposition and $d^{15}N$ of NH_4^+ and NO_3^- . Microbial activity might occur in rainwater reserved in conventional collector. That hinted at the possibility of the resin technique in practical use for long-term monitoring in remote areas.

Analytical data of precipitation collected around Mt. Tsubakuro and further data of throughfall in Hachiohji will be also reported.