Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

MIS023-P08 Room:Convention Hall Time:May 22 16:15-18:45

Conversion of nitrate to dissolved organic nitrogen in stream water through serpentinite bedrock in a forested watershed

Masaaki Chiwa[1*], Jun'ichiro Ide[2], Naoko Higashi[1], Ryoko Maruno[1], Kyoichi Otsuki[1]

[1]Kyushu University Forest, [2]International Research Center for River

The concentration of NO_3^- in stream water has been elevated in forested watersheds due to chronic atmospheric nitrogen (N) deposition over the last few decades. N saturation in forested ecosystems, defined as an excess of N deposition supply over biotic demand, results in significant N leaching from forested watersheds. Recent studies, however, indicated that chronic high N deposition has had variable effects on stream water NO_3^- concentrations across the northeastern United States. This is because many factors affect NO_3^- leaching from forested watershed.

In this study, to test the hypothesis that passing groundwater though different bedrock causes a marked difference in the nitrate (NO_3^-) concentration in baseflow stream water, two nearly adjacent watersheds, site O (serpentinite and chlorite schist: NO_3^- 55 micro mol L^{-1}) and site S (amphibolite: NO_3^- 113 micro mol L^{-1}), were investigated and the underlying mechanism affecting NO_3^- concentration as groundwater passes though bedrock was identified. The conversion of NO_3^- to dissolved organic nitrogen (DON) in groundwater as it through bedrock could be the primary reason for the lowered NO_3^- concentration at site O. Plausible mechanisms could be NO_3^- reduction to nitrite (NO_2^-) by reduced metals, such as iron, chromium, and nickel found in serpentinite bedrock and the subsequent reaction of NO_2^- with dissolved organic matter to produce DON. The results from this initial study showed that certain bedrocks can reduce NO_3^- concentrations in stream water by converting groundwater NO_3^- to DON.

Keywords: Nitrogen saturation, Nitrogen leaching, Conversion, Forested watershed, Serpentinite