Relationship between topographic characteristics and forest N dynamics in the Tanzawa Mountains

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The Japanese archipelago is characterized by the high rate of orogenic uplift, and local topography is undulating and dissected with steep hillslope. The Tanzawa Mountains, locating in northwestern of Kanagawa Prefecture, was formed by the collision of the Honshu-Arc and the Izu-Arc, where higher rate of orogenic uplift and denudation is observed. Surface slope failures on steep slopes, created by the 7.9-magnitude Kanto Earthquake in 1923 and subsequent strong storms (Ishikawa et al., 2006), are frequently observed in this area. Such topographic characteristics are likely to affect nutrient dynamics and streamwater quality in the forest ecosystem through the influence on vegetation development and soil chemical processes.

Nitrogen (N) is one of the important elements that regulate biological productivity in terrestrial ecosystems. Recently, anthropogenic activity have increased the reactive N in global scale, which can cause nitrogen saturation in forest ecosystems, stream water pollution and eutrophication of lakes and estuaries. Here I report results of soil N mineralization and N concentrations in stream water in the Tanzawa Mountains. Using GIS technique, the relationship to catchment topography is discussed.

Soils in steep slope or slope failure sites exhibited higher N mineralization per unit soil N content, compared to moderate slope sites. Inorganic N leaching from topsoil, measured by buried ion exchange resin, indicated that the rate of nitrate leaching in the slope failure site were several fold higher than the moderate slope site. These results imply the lower retention of soil N in slope failure sites.

The N concentration in the streams tended to increase in the catchiments with higher proportion of steep slope area and south-facing slope. Using the multiple regression analysis for topographic characteristics and water quality, we established the model that predict the N concentration in streams in each catchment