

Spatial variations in larch and soil nitrogen isotope ratio along forest-grassland gradient in northern Mongolia

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The underlying processes that affect the Nitrogen isotope ratio of plant and soil, which is known as a good indicator of N dynamics and shows dependency on climate, is not yet clearly understood.

In this study, we compare the nitrogen isotope ratio of single plant species (*Larix sibirica* Ledeb.) and soils along the forest-grassland gradient of a forest-steppe ecotone in Mongolia. Larch needles and soils were sampled during the growing season (May- August) from 2004-2012 at several sites in seven study areas.

The results showed the clear spatial pattern in needle, soil nitrogen isotope ratios, and its difference ($\Delta\delta^{15}\text{N}$) along forest-grassland gradient and the pattern corresponded to humus type (mor/mull). $\Delta\delta^{15}\text{N}$ also had significant correlations with needle $\delta^{13}\text{C}$ and C/N ratio of bulk soil, suggesting the $\Delta\delta^{15}\text{N}$ change relates to water, light conditions and soil N availability. Isotope mass-balance model was applied to investigate the processes affecting the spatial pattern of $\Delta\delta^{15}\text{N}$.

Keywords: ecotone, Mongolia, nitrogen isotope ratio, plant and soil