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Tracing dissolved inorganic nitrogen in contrasting forest ecosystems

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Knowledge of factors that determine nitrogen (N) retention by terrestrial ecosystems is crucial to assess the impact of changes in anthropogenic N emissions and climatic conditions on future N cycling and losses. Retention of N has been demonstrated for a wide range of forest ecosystems, including forests in Europe and NE America that are exposed to chronically enhanced N deposition. Soils have been reported to be the main N sink in forests, but it is still unclear which factors determine this N retention capacity. Therefore, we examined the possible effects of forest type and tree species on N retention using ¹⁵N as a tracer.

The study was carried out in two adjacent forest stands of pedunculate oak (*Quercus robur* L.) and Scots pine (*Pinus sylvestris* L.) on a well-drained soil type and with a similar stand history, which are located in a region with high N deposition (Belgium). The fate of dissolved inorganic N within these temperate forest ecosystems was studied by spraying three pulses of dissolved ¹⁵N onto the forest floor, either as ammonium or as nitrate. Results are presented of the ¹⁵N recovery in the organic and mineral soil layers, fine tree roots, soil water percolate, ferns, and tree foliage at two time steps, i.e. four months and one year one year after the first application. The recovery of ¹⁵N is compared between the two forest stands and the two N treatments. The observed meaningful differences in ¹⁵N retention confirm that the forest type affects the N balance of ecosystems exposed to high anthropogenic N inputs.

