Poster abstract - NitroEurope IP Open Science Conference
Reactive Nitrogen and the European Greenhouse Gas Balance

Title: *(max. 250 characters)* Nitrogen dynamics in coniferous and deciduous forest soils determined using a N-15 tracing model

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Select the **topical area** your poster addresses:

- ☒ Flux measurements of reactive nitrogen, pools and processes
- ☐ Impacts of changes in external drivers (global change, N deposition, management, land use change etc.) on fluxes and exchange of N, C and GHG in terrestrial ecosystems
- ☐ Plot scale modelling of processes controlling the biosphere-atmosphere exchange of trace gases to predict effects of changes in climate, land use and land management on gas exchange of C and N compounds
- ☐ Up-scaling from plot to regional scales – analysing interactions on different spatial scales
- ☐ Assessment of present and future nitrogen and green house gas fluxes at large regional scales in response to human influence
- ☐ Verification and uncertainty assessment of N and GHG management across disciplines

Abstract: *(max. 2000 characters)*

Despite chronically enhanced nitrogen (N) input to forest ecosystems in Europe and NE America, considerable N retention by forests has been observed. Organic and mineral soil layers typically immobilize more N than the aboveground biomass, but it is unclear which factors determine N retention in forest soils, even though this knowledge is crucial for assessing the impact of changes in anthropogenic N emissions on N losses.

Forest type and tree species potentially affect N retention and loss because of differences in N deposition, organic and mineral soil characteristics, soil microbial activity, and N uptake by plant roots. Therefore, N dynamics were examined in contrasting forest stands in a region exposed to enhanced atmospheric N deposition. The aim of this study was (i) to determine in situ N transformation rates in undisturbed mineral forest soils using N-15 isotope dilution and a N-15 tracing model, and (ii) to compare these rates between adjacent deciduous (pedunculate oak) and coniferous (Scots pine) forest stands with a similar stand history and soil type.

Using five spatial replicates per stand, three N-15 treatments were applied in the field to six ‘virtual’ soil cores that were disturbed only at sampling. Each treatment solution contained ammonium, nitrate, and nitrite, with one of the N forms labelled with N-15 at 99% at. excess. Intact soil cores were sampled at six time intervals over a 12-day period, and analysed for the N and N-15 content in different mineral and organic pools. Although the optimization of the N-15 tracing model is still in progress, the first results indicate meaningful differences in N transformation rates between the two forest stands. As root activity in the sampled soil cores was possible throughout this field experiment, N uptake by plant roots can be taken into account in the tracing model.