**Ziel**

The objective is to investigate the effects of nitrogen deposition in European ecosystems and to evaluate the degree of nitrogen saturation in these ecosystems. NITREX (nitrogen saturation experiments) is a research project focused on the impact of nitrogen on forest ecosystems. The project addresses the role of nitrate and ammonium in acidification of soil and water by addition or removal of nitrogen to precipitation falling on headwater catchments and forest stands.

The sites comprise nearly pristine areas with no appreciable output of inorganic nitrogen, intermediate areas, and highly impacted areas with nitrogen outputs nearly equal to inputs and segregate between those which receive less than 150 meq m\(^{-2}\) y\(^{-1}\) total nitrogen and leach little or no nitrogen and those which receive greater than 200 meq m\(^{-2}\) y\(^{-1}\) and leach significant amounts of nitrogen. By increasing nitrogen inputs at the low deposition sites, and decreasing them at the high deposition sites, the experiments are designed to move all the ecosystems across the threshold of nitrogen saturation, either forward or backward.

It is assumed that different ecosystem compartments will react to the treatments at different rates. Differences in soil and vegetation characteristics should already be present among the sites, however, due to the existing differences in nitrogen deposition.

The soils data from the sites indicate differences that could be partly due to the pollution gradient. Soil pH and % base saturation, both indicators of soil acidification, show a gradient from high to low along the input pollution gradient. There is no cation exchange capacity (CEC) gradient. The vegetation data also show differences that may reflect nitrogen inputs. Changes in pools of soil and vegetation nitrogen will be difficult to detect directly because of the large pool sizes relative to the annual fluxes. The nitrogen-15 tracer experiments, however, by showing the allocation of the added nitrogen, will provide direct evidence of even small changes in the pools.

Nitrogen will be added at an enrichment of 1500, 6000 and 120000 parts per thousand delta nitrogen -15 (isotopic composition is expressed in terms of delta values or parts per thousand differences from a standard).

The levels of enrichment used are for the total inputs to the forest floor (ie both the throughfall and fertilizer inputs). Additional nitrogen-15 will be added to the fertilizer to compensate for the (predicted) throughfall nitrogen inputs. The nitrogen-15 will be applied for 1 year and its fate followed in tree, soil and leachate pools.

NITREX (nitrogen saturation experiments) is a research project focused on the impact of nitrogen on forest ecosystems. The project addresses the role of nitrate and ammonium in acidification of soil and water by addition or removal of nitrogen to precipitation falling on headwater catchments and forest stands.
Within the NITREX programme a process oriented, deterministic simulation model for heat, water, nitrogen and carbon cycling has been developed. The model (NIICCE; nitrogen isotopes and carbon cycling in coniferous ecosystems) is intended as a tool for interpretation of results of experiments on atmospheric input of nitrogen to coniferous forest ecosystems.

NIICCE is developed to interpret results of tracer experiments with nitrogen-15, and has been provisionally used to predict amounts of the tracer needed in experimentally enriched throughfall to reach levels of nitrogen-15 in various pools high enough to discriminate between variation in the isotope's natural abundance and increased levels after experimental addition. It also simulates turnover of stable isotopes of carbon. NIICCE simulates processes such as primary production, mineralization, decomposition, root uptake, transport of solutes, and isotope fractionation of nitrogen for a coniferous forest in a 1-dimensional, multicompartment soil profile. The model is intended to be used for forests with a closed canopy, older than about 20 years. Fluxes of atmospheric and/or experimental input of nitrogen compounds (throughfall and canopy exchange) are inputs to the model, together with data on global short wave radiation, precipitation and temperature. NIICCE is implemented as Quick Basic (version 4.5) multimodule compiler code. The execution time of the model running on a 80386SX 16MHz personal computer with numeric coprocessor is 5 to 10 minutes for a 1-year simulation period. NIICCE has been used for simulation of nitrogen cycling in 2 NITREX sites, Speuld in the Netherlands and Klosterhede in Denmark but the results of simulations should be considered provisional. Sensitivity and uncertainty analysis will be performed using a MonteCarlo procedure and the model will calibrated using data form the Speuld and Klosterhede site collected before the start of the NITREX experiments. Validation will be performed using data collected during the NITREX programme and the model will be extended with a module simulating gas transport.

The project aims to answer the questions of continued or increased nitrogen deposition leading to nitrogen saturation in sensitive areas in Europe and planned future decreases in nitrogen deposition reversing nitrogen saturation in impacted areas of central Europe by experimentally changing nitrogen deposition to entire ecosystems, either catchments (Norway and Sweden) or large forest stands (Denmark, West Germany, the Netherlands, and United Kingdom).

NIITREX is an international, interdisciplinary research project encompassing ecosystem scale experiments with nitrogen in Norway, Sweden, Denmark, West Germany, the Netherlands, and the United Kingdom. These nitrogen experiments comprise a European network spanning the gradient in nitrogen deposition from high deposition in the Netherlands to low deposition in Norway. The same team of investigators and the same techniques will be used at all sites. The network will be at the catchment scale where feasible, and nitrogen will be added or removed to simulate natural precipitation.

Together, these experimental data will form the basis for extensive cross European comparisons and for the development and refinement of process oriented models for nitrogen in coniferous ecosystems. These comparisons and the modelling work are aimed at evaluating the potential for nitrogen saturation, the reversibility of nitrogen saturation, critical loads for nitrogen in coniferous forests, and the potential combined effects of forest use, atmospheric pollution and climate change.

NIITREX will include a total of 9 large scale experiments at 7 sites in 6 European countries as follows.
Nitrogen addition at a small catchment (G2) with Norway spruce at Gaardsjoen in western Sweden.
Nitrogen removal (by roof) at a small catchment (G1) with Norway spruce at Gaardsjoen in western Sweden.
Nitrogen addition at a small catchment with thin soils and sparse vegetation in southernmost Norway.
Nitrogen addition at a Norway spruce stand at western Jutland, Denmark.
Nitrogen removal (by roof) at a Norway spruce stand at Klosterhede, western Jutland, Denmark.
Nitrogen removal (by roof) at a Douglas fir stand at Speuld, The Netherlands.
Nitrogen removal (by roof) at a Scots pine stand at Ysselsteyn, The Netherlands.
Nitrogen removal (by roof) at a Norway spruce stand at Solling, Germany.
Nitrogen addition at a Sitka spruce stand in Wales, United Kingdom.

**Koordinator**

Landbouwuniversiteit Wageningen
10,Duivendaal
6701 AR Wageningen
Netherlands
See on map

**Administrative Kontaktangaben:** VAN BREEMEN

**Teilnehmer**
Danmarks Tekniske Universitet
2800 Lyngby
Denmark

Administrative Kontaktangaben: RASMUSSEN

GEORG-AUGUST-UNIVERSITY GOETTINGEN
Buesgenweg 2
37077 GOETTINGEN
Germany
See on map

Administrative Kontaktangaben: HAUHS

Institutet för Vatten- och Luftvårdsforskning
1,Dagjämningsgaten
402 58 Göteborg
Sweden
See on map

Administrative Kontaktangaben: HULTBERG

Katholieke Universiteit Nijmegen - Stichting Katholieke Universiteit
Toernooiveld
6500 HC Nijmegen
Netherlands
See on map

Administrative Kontaktangaben: ROELOFS

NERC Institute of Terrestrial Ecology
Deiniol Road
LL57 2UW Bangor
United Kingdom
See on map

Administrative Kontaktangaben: STEVENS

E-Mail-Adresse

NORWEGIAN FOREST RESEARCH INSTITUTE
Hoegskoleveien, 12
1432 AAS
Norway

Administrative Kontaktangaben: O. STUANES
NORWEGIAN INSTITUTE FOR WATER RESEARCH
19, Brekkeveien 19
0411 Oslo
Norway
See on map

Administrative Kontaktangaben: RICHARD F. WRIGHT

THE SWEDISH UNIVERSITY OF AGRICULTURAL SCIENCES
Ulvs v. 33
750 07 UPPSALA
Sweden
See on map

Administrative Kontaktangaben: PERSSON

Universiteit van Amsterdam
130, Nieuwe Prinsengracht
1018 VZ Amsterdam
Netherlands
See on map

Administrative Kontaktangaben: TIETEMA

Vrije Universiteit Amsterdam
1087, De Boelelaan
1081 HV Amsterdam
Netherlands
See on map

Administrative Kontaktangaben: VERHOEF

Zuletzt geändert am 1991-12-04
Abgerufen am 2019-04-28

© European Union, 2019