Influence of nitrogen deposition to mountain ecosystems: tracer experiment with ^{15}N isotope

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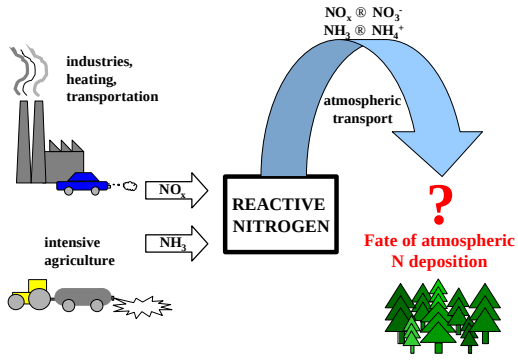
Introduction

In the last decades, human activities strongly altered the global nitrogen cycle.
Two main types of anthropogenic activities release reactive nitrogen to the atmosphere:

- combustion processes NO_x => NO_3^-
- intensive agriculture NH_3 => NH_4^+



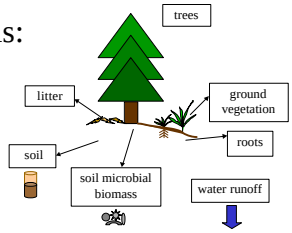
The increasing deposition rate of reactive nitrogen particularly affects mountain ecosystems and can lead to acidification and eutrophication.
To assess these effects, the flow and fate of inorganic nitrogen is followed by a ^{15}N tracer experiment.

Research site

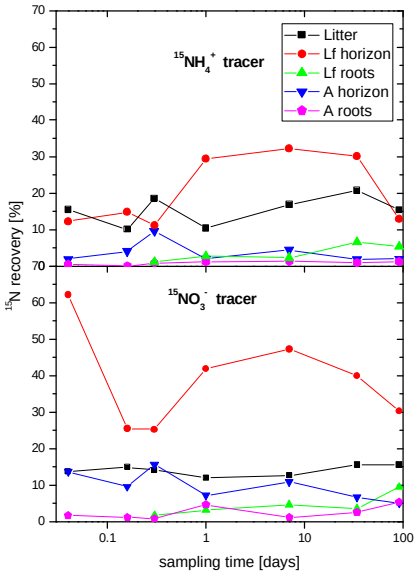
- Alptal: Prealps of central Switzerland
- *Picea abies* forest, 1200 m a.s.l.
- cool and wet climate (6°C, 2300 mm/year)
- bulk deposition of NO_3^- + NH_4^+ of 12 kg/year
- umbric Gleysol over Flysch

Materials and methods

- tracer experiment with two salt solutions: $K^{15}NO_3$ and $^{15}NH_4Cl$
- monitoring the tracer movement: in small catchments (1500 m^2) and in plots (10 m^2)
- different temporal scales (hours, days, weeks, etc.)
- sampled pools:



Results



- the litter layer and the Lf horizon are the largest sinks for both tracers and all sampling times
- a higher amount of $^{15}NO_3^-$ than $^{15}NH_4^+$ tracer was recovered in the soil layers
- vegetation analyses are not yet finished

Conclusion

- the recovery rates in the different pools shows few changes through time

Link: IRISALP Project http://www.wsl.ch/forest/wus/irisalp/iris-de.htm