

Einladung zum Vortrag
im Rahmen des gemeinsamen Kolloquiums des Instituts für Biologie und
Umweltwissenschaften und des Departments für Neurowissenschaften

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Insights into plant nitrogen nutrition and terrestrial nitrogen cycling by stable isotope analysis

Virtually all chemical elements of biological importance occur naturally in the form of multiple stable isotopes, including light elements such as nitrogen (^{14}N , ^{15}N). The ratios of these stable isotopes show natural variability, and offer a vast potential for new research approaches on a wide range of biological and ecological processes. Natural differences in the stable isotope composition of biotic and abiotic compounds of ecological interest are the result of differences in a variety of predictable factors that affect isotope fractionation. These factors include source effects, enzyme selectivity for isotopically different molecules, diffusional constraints and interactions between processes. Stable isotope investigations can therefore provide new insights into fluxes of matter among organisms, between organisms and their abiotic environment, and between compartments of the environment. Natural abundance stable isotopes can thereby be used as (i) natural integrators of biological/ecological processes and (ii) as tracers of biological/ecological processes. As integrators, stable isotopes allow to non-invasively assess the net outcome of a complex array of input, transformation and output processes that vary temporally and spatially, without altering the natural activity or the behaviour of the element in the system. As tracers, stable isotopes enable to follow the fates and transformations of compounds and resources and to partition multiple sources in a sink organism. The latter requires that the different potential sources have reproducible and distinct isotopic signatures, and that isotope discrimination is low or negligible. In this lecture I will present examples of nitrogen isotope research allowing to trace plant nitrogen metabolism, including biological nitrogen fixation, nitrogen nutrition of epiphytes, reconstructions of tree nitrogen nutrition and effects of plant N:P limitation. Other examples will focus on ecosystem nitrogen cycle processes, how they affect the isotopic composition of organic and inorganic nitrogen and allow to trace losses from ecosystem-based nitrogen cycles.

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Gastgeber: Prof. Dr. Gerhard Zotz

Gäste aller Institute sind herzlich willkommen