[O5B-3] A biodiversity indicator for the assessment of nitrogen deposition

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In Europe the assessment of critical loads for acidity and for nitrogen (N) has in the past mainly focused on abiotic parameters such as a critical Al/Bc ratio or critical nitrate concentration in the soil solution. Since it became clear that N deposition has a large impact on species composition, the need emerged for a critical load for N deposition based on vegetation composition as a proxy for biodiversity. The effect of N deposition on vegetation composition is indirect. The N input to the soil changes the C/N ratio and the competitional strength of species. Especially fast growing grasses profit, and species adapted to nutrient poor circumstances suffer.

To assess the effect of N deposition on plant species composition, several models have been developed, e.g. MADOC-GBMOVE in the UK, ForSAFE-VEG in Sweden and VSD+-PROPS in the Netherlands. The latter is now also being adapted for use in the USA. All these models contain a soil process model that calculates soil chemistry such as soil pH, nitrate concentration and C/N ratio based on e.g. deposition of S and N. Simulated soil chemistry is then used as input for model predicting plant species responses either in a process-oriented way (VEG) or by statistical relationships between climate and soil chemical indicators and plant species occurrence (GBMOVE, PROPS). The PROPS model is calibrated using a European data set with vegetation relevés with calculated pH and C/N ratio using a species indicator system, modelled nitrogen deposition, and temperature and precipitation obtained from meteorological databases. These environmental data are linked to the species in the relevés to obtain response curves per species. Changes in occurrences probability of wanted species in response to N and S deposition and climate change are then used as an indicator for changes in biodiversity.