



## **A small-scale geostatistical analysis of the variability of soil properties driving the biogenic emission of nitric oxide from soil**

T. Behrendt (1,2), A. Bargsten (2), B. Mamtimin (2), M. O. Andreae (2), M. Bruse (1), F. X. Meixner (2,3)

(1) Institut of Geography, Johannes Gutenberg University, Mainz, Germany (thomabeh@students.uni-mainz.de), (2) Max Planck Institute for Chemistry, Biogeochemistry, Mainz, Germany, (3) Physics Department, University of Zimbabwe, Harare, Zimbabwe

It is well known that the main steering parameters for the biogenic emission of nitrogen oxide (NO) from the soil are soil moisture, soil temperature, soil organic matter (SOM), soil nutrients, as well as soil texture and the vegetation cover. Following controlled incubation and fumigation experiments on soil samples, laboratory derived parameterization of the net NO release rate in terms of soil moisture, soil temperature and the loss in ignition (as a raw estimate of SOM) enable the calculation of net potential NO fluxes from soil.

At the experimental-site „Weidenbrunnen“, a mountainous spruce forest located in the Fichtelgebirge (Germany), 142 samples of organic matter and topsoil were collected. The study area (120 x 140 m) was sub-divided into three units according to differences in vegetation and insolation, as well as the position of tracks. For the sampling procedure a nested sampling design with grid intervals of 20 m, 5 m and 1.25 m was chosen. The soil properties that were analysed included the variability of the organic matter thickness, pH, C/N-ratio, loss in ignition, texture, soil temperature and top soil moisture, as well as bulk density. The relief and the understorey were included as external factors.

Furthermore, the terrain elevation was measured with a TruePulse360° Laser along a geostatistical grid using supporting points in 8 different directions. Of 4 supporting points into 8 different directions, one data point was placed every 5 m. We used this grid structure to interpolate the contour lines and identified southern exposition and a micro hilly relief (DEM).

The understorey mapping was calculated by the triangulation-method while the area between the trees was divided into triangles. First of all, an experimental variogram of the appropriate grid intervals was constructed. Through the development of a model function it is possible to assign a variogram value to every distance. Across that theoretical function a spatial interpolation of the parameters was conducted by the use of the Krigging method.

The result will be maps showing the small-scale distribution of main soil properties, which will be used to estimate the small-scale variability of biogenic NO fluxes from the study area.