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Biogenic Emissions of Nitric Oxide from Continental Steppe and Desert Soils of Mongolia

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One of the most important sources of atmospheric NO are soils, which contribute approx. 30% ($\pm$ 20%) to the total global NO_X source. It is an ubiquitous soil characteristic that they (microbiologically driven) produce or consume NO, macroscopically controlled by soil moisture, soil temperature and soil nutrient content. One of the global unknowns in this respect is the contribution of arid and semi-arid soils.

We will present, net potential NO emission rates, which are derived from Mongolian soil samples through a laboratory incubation technique. Mongolian soils have been sampled along a south west to north east transect from the Gobi desert (south of Dalandzadgad) to the southern edge of the forest steppe (north of Ulan Bator) in April 2008. The transect ranges from 43˚N to 48˚N latitude and from 104˚E to 107˚E longitude. It is characterized by a highly continental climate.

Sieved (2mm) sub-samples of original composite soil samples (each consisting of at least 15 core samples taken from the top 5cm of the soil) were incubated in a 1 L cuvette for 48 hours in the laboratory. The soil containing cuvette was then used as a dynamic chamber to measure the net release rate of NO at 10˚C and 30˚C, covering the entire soil moisture range (0-100%) and two different headspace NO concentrations (approx. 0 and 166 ppb NO). From these laboratory studies, parameterization of the net NO release rate in terms of soil temperature and soil moisture are derived. Applying an operational Galbally&Johansson type soil diffusion/production/consumption model, the net potential NO flux could then be calculated as a function of (field measured) soil moisture and the temperature. Accompanying field data (pedological surveys and soil profiles) have been obtained during the field campaign to establish further relationships of the net potential NO flux.

A dark *Castanozem* soil under pasture land use sampled in Zunmod, south of Ulan Bator, showed the highest NO emission rate (3 ng $m^{-2}s^{-1}$), while soils in the southbound direction exhibit much smaller NO emission rates.

To our knowledge, this is the first study on biogenic emission of NO from Mongolian soils. The effects of soil type, climate gradient, and land use on the NO flux will be discussed.