Geophysical Research Abstracts
Vol. 13, EGU2011-11289, 2011
EGU General Assembly 2011

The project "Desert encroachment in central Asia – Quantification of soil biogenic nitric oxide emissions by ground- and satellite-based methodologies (DEQNO)" – An overview

Buhalqem Mamtimin and the DEQNO* Team

The north-western Chinese province Xinjiang, part of the great deserts of Central Asia, currently experiences fast economic growth. This is intrinsically tied to large (and rapid) changes of land use, namely from desert/grassland to irrigation and fertilizer fed oasis agriculture. Substantial biogenic emissions of nitric oxide (NO; an indirect greenhouse gas) from Xinjiang's oases are supposed and expected to increase in near future. However, any measured data of soil biogenic NO emissions are entirely lacking from this remote region.

The DEQNO project, funded by German Science Foundation (DFG) and Max Planck Society (MPG), aims to provide quantification of NO fluxes (and evapotranspiration) on plot, oasis, and regional scales. It is planned to achieve this by (1) laboratory incubation measurements on representative soil samples, surface vegetation-atmosphere-transport (SVAT) modelling, and GIS based up-scaling, (2) differential optical absorption spectroscopy based determination of vertical column densities of NO2 and H2O from satellite retrievals, and (3) ground based micrometeorological in-situ measurements, as well as Lagrangian dispersion and Weather Research Forecast modelling of concentrations and fluxes.

The DEQNO Project is organized along three columns to realize innovative aspects: firstly, extensive validation (by a suite of suitable in-situ field measurements) of both estimates of biogenic NO emission that which will be obtained by the "laboratory/ SVAT/GIS upscaling" approach, as well as that derived from satellite observations. This will be explicitly performed as on plot and oasis scales. Secondly, in-situ field measurements will be also used to verify 3D concentrations of non-reactive (CO2, H2O) and reactive trace gases (NO, NO2, O3) simulated by a Lagrangian dispersion and Weather Research Forecast models on the oasis scale; the validated model will then serve as the desired link between satellite NO2 (and H2O) observations and soil biogenic NO (and evapotranspiration) fluxes.

We will present outlines of the DEQNO project and highlight the results of two orienttation field experiments (2009, 2010), exploratory laboratory investigations, and first dispersion modelling exercises for strategic planning; details will be presented on corresponding (poster) presentations during the session.

>>>>>>>>>>>>>>_
>>>>>>>>>>>>>>_

*Buhalqem Mamtimin (1,2), Thomas Behrendt (1), Nils Hempelmann (1), Yue Qi (1,3), Guozheng Song (1), Thomas Wagner (1), Steffen Beirle (1), Michael Bruse (4), Eva Falge (1), Zhaopeng Wu (2), Yanhong Li (2), Jiao Li (2), Hailong Jin (2), Xinzheng Chu (2), Yunshe Dong (3), Zhilin Zhu (3), Junbao Yu (5), Franz X. Meixner (1,6).
Affiliations: (1) Max Planck Institute for Chemistry Biogeochemistry Department, Germany; (2) Institute of Geography Science and Tourism Xinjiang Normal University; (3) Institute of Geographical Sciences and Natural Resources Research Chinese Academy of Sciences (CAS); (4) Institute of Geography, Johannes Gutenberg University Mainz Germany; (5) Yantai Institute of Coastal Zone Research for Sustainable Development Chinese Academy of Sciences (CAS); (6) Department of Physics, University of Zimbabwe.