Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09603, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09603
EGU General Assembly 2008

The Forest Floor - Trunk Space Interface: Measurements of Trace Gas Exchange by Chamber and Gradient Techniques

F.X. Meixner (1,2), K. Hens (1), G.T. Feig (1), A. Moravek (1), A. Bargsten (1), M. Scheibe (1,3), Z. Zhu (1,4), M.O. Andreae (1)

(1) Max Planck Institute for Chemistry, Biogeochemistry Department, P.O. Box 3060, D-55020 Mainz, Germany, (2) Department of Physics, University of Zimbabwe, Harare, Zimbabwe, (3) German Aerospace Center (DLR), Institute for Atmospheric Physics, D-82234 Wessling, Germany, (4) Key Laboratory of Ecosystem Network Observation and Modelling, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China (meixner@mpch-mainz.mpg.de / fax: +49-6131-305-579)

At the forest floor – trunk space interface, there have already been several successful attempts to obtain trace gas fluxes from vertical concentration differences and the bulk (turbulent) transfer velocity (v_{tr}). While vertical concentration gradients can be measured quite easily in the first meter above the forest floor, the determination of v_{tr} may require unconventional approaches: one delivers v_{tr} from measurements of the vertical distribution and the decay constant (0.0125 s^{-1}) of the short-lived trace gas ^{220}Rn, another approach requires the combination of vertical concentration difference and soil surface flux measurements of non-reactive trace gases, such as ^{222}Rn and CO_2 (surface fluxes by static or dynamic chambers). Once the bulk transfer velocity within the first meter of the trunk space has been determined, it may be also applied to vertical concentration differences of reactive trace gases (NO, NO_2, O_3) in order to infer corresponding surface fluxes.

We will present results from these approaches obtained during field experiments in two Bavarian spruce forests, Hohenpeissenberg (47,801˚N, 11,009˚E, 943 m a.s.l.) and Weidenbrunnen/Fichtelgebirge (50.142˚N, 11.867˚E, 780 m a.s.l.) in September-October 2005 and August-October 2007, respectively. Mean bulk transfer velocities

in the first meter of the trunk space was determined from both the abovementioned approaches, ranged between 0.005 and 0.016 m s^{-1} (equivalent to a bulk turbulent exchange coefficient of 0.45 – 1.55 x 10^{-2} m^2 s^{-1}). Corresponding fluxes of NO, NO_2, and O_3 (corrected for the influence of fast chemical interconversions) will be compared to simultaneously performed direct surface flux measurements by dynamic soil chamber and eddy covariance techniques.