Geophysical Research Abstracts, Vol. 9, 10771, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10771

Gradient measurements of O_3, NO, NO_2, CO_2, H_2O and meteorological quantities at a steep floor of a mountainous spruce forest (Hohenpeissenberg, Germany)

F.X. Meixner, M. Scheibe, V. Wolff, L Klanner

Max Planck Institute for Chemistry, Biogeochemistry Department, Mainz, Germany (meixner@mpch-mainz.mpg.de)

On the steep (52%) southfacing slope of the spruce forest around Hohenpeissenberg/Germany (47.8010˚N, 11.0088˚E, 943 m a.s.l.) measurements of reactive (O_3, NO, NO_2) and non-reactive (CO_2, H_2O, ^{222}Rn) trace gases have been performed at 0.05 and 1.06 m above the forest floor. Wind speed and wind direction have been measured with a 3-cup and a 2D sonic anemometer at the same levels, while the vertical temperature gradient (9 levels) has been obtained from fine thermocouple measurements between 0.02 and 2 m. Air temperature and relative humidity (both aspirated), as well as global radiation were monitored at 1 m. The experiment was conducted from 05-21 September 2005 as part of the SALSA 2005 field campaign.

At 1.06 m above the forest floor mixing ratios of O_3, NO, NO_2, CO_2, and H_2O ranged between 15-60 ppb, 0.05-0.3 ppb, 0.6-3.5 ppb, 375-430 ppm, and 560-1100 ppth, respectively, while at 0.05 m above the forest floor mixing ratios were between 8-40 ppb, 0.05-2 ppb, 0.8-4 ppb, 390-630 ppm, and 580-1300 ppth. Gradients of mixing ratios were always positive (i.e., from the forest floor to the trunk space) for NO, NO_2, CO_2, and H_2O, while always negative for O_3. For all trace gases, the magnitude of trace gas gradients was highest under calm (< 1 m/s), warm (10-20˚C), dry ($< 60\%$), and thermodynamically very stable (1K/m) conditions, while very small gradients have been observed for high wind speeds (2-4 m/s), cold (5-10˚C), wet ($> 80\%$), and neutral conditions.

We will report on relationships between trace gas gradients and parameters of stability

in the trunk space. An attempt will be made to quantify fluxes of the trace gases on the basis of soil emission (chamber technique) and the gradient measurements of ^{222}Rn. All data of trace gases and meteorological quantities obtained at the forest floor will be compared to those which have been simultaneously measured well above the forest at the observatory of the German Meteorological Service Hohenpeissenberg (47.8014˚N, 11.0091˚E, 990 m a.s.l.). From that, we aim to quantify (a) occasional local advection of NO (NO_2) from a nearby national road, and (b) the canopy reduction effect on the biogenic NO emission from the forest floor.