Geophysical Research Abstracts,
Vol. 11, EGU2009-9446, 2009
EGU General Assembly 2009

Eddy covariance fluxes of the NO-NO2-O3 triad above a spruce forest canopy in south-eastern Germany.

A. Tsokankunku (1,2), Z. Zhu (1), F.X. Meixner (1,2), T. Foken (3), and M.O. Andreae (1)

(1) Max Planck Institute for Chemistry, Biogeochemistry, Mainz, Germany (anywhere@mpch-mainz.mpg.de), (2) Department of Physics, University of Zimbabwe, Harare, Zimbabwe, (3) Micrometeorology Department, University of Bayreuth, Bayreuth, Germany

We investigated the diel variability of the eddy covariance fluxes of the NO-NO_2-O_3 triad above a spruce forest canopy at the "Weidenbrunnen" research site (Fichtelgebirge, Germany). Measurements were part of the EGER project (ExchanGE processes in mountainous Regions), which focuses on the role of process interactions among the different scales of soil, in-canopy and atmospheric exchange processes of reactive and non-reactive trace gases and energy.

The eddy covariance platform was at the top of a 32 m high tower (50° 08'31" N, 11° 52'1"E, elevation 755 m.a.s.l). The eddy covariance system consisted of a CSAT3 sonic anemometer and a high speed, high resolution NO-NO_2two channel chemiluminescence analyzer (Ecophysics CLD 790 SR2). A solid-state blue-light photolytic converter was connected to the NO_2 channel of the analyzer just behind the sample inlet. Ambient NO and NO_2 mixing ratios were sampled via 52 m long tubes with the instrument itself located in a temperature-controlled container at the ground. The NO-NO_2 analyzer was operated at 5 Hz. Additionally we measured eddy covariance fluxes of CO_2 and H_2O. An infrared absorption-based analyzer (LI-7000) was used to sample CO_2 and H_2O mixing ratios, and a fast solid-phase chemiluminescence ozone analyzer (GFAS) was deployed to measure O_3 mixing ratios. All trace gas inlets were situated at 32.5 m, 20 cm below the path of the sonic anemometer. The 32m inlet of an independent NO, NO_2, and O_3 concentration profile measuring system was used as the calibration source for the fast ozone analyzer and the two channel NO-NO_2chemiluminescence analyzer.

Preliminary results show that NO and NO_2advection plays a big role in the magnitude and direction of the fluxes at the site. The main source of the advection is a busy country road situated about 2 km west of the site. CO_2 fluxes were also influenced by advection. Extended periods of stationarity usually occurred on Sundays when the amount of traffic was significantly lower. During the "golden days period" (29 June – 3 July 2008), there was mainly downward directed NO fluxes (within the margin of error). However there is also evidence of NO leaving the canopy in some instances. NO and NO_2 fluxes ranged between +1.5 and -1.5 nmol m^{-2} s^{-1} ($\pm$45 ngNO m^{-2} s^{-1} and $\pm$70 ngNO_2 m^{-2} s^{-1}).