Geophysical Research Abstracts
Vol. 13, EGU2011-11565, 2011
EGU General Assembly 2011

Variability of CO_2 in an urban environment: from street canyon to neighbourhood scale

Björn Lietzke and Roland Vogt

University of Basel, Institute of Meteorology, Climatology and Remote Sensing, Department of Environmental Sciences, Switzerland (bjoern.lietzke@unibas.ch)

Quantifying the role of cities in the global carbon cycle is a crucial part in modeling work. Input to models is derived from emission inventories or from direct measurements. Uncertainties of urban measurements of CO_2-concentrations and fluxes arise from limitations of single-point measurements in the complex urban environment, which is characterized by the rough and heterogeneous surface and spatio-temporally variable anthropogenic sources, i.e. traffic emissions.

In order to investigate this local to neighborhood-scale variability of CO_2 concentrations and fluxes in a dense urban environment, an extensive field campaign has been conducted in the city of Basel, Switzerland from June 2009 to February 2011. With a focus on micro to local-scale CO_2-exchange processes, a 19m-tower has been set up in the middle of a street-canyon next to a long-term CO_2-concentration and flux monitoring rooftop-tower (40m above street level, since 2003). Vertical CO_2-profiles have been sampled here and at a canyon wall using a closed-path gas analyzer and CO_2 efflux from the street canyon has been measured at the top of the canyon with an open path Eddy-Covariance system. A second urban flux station (40m above street level) with comparable surroundings has been set up for the current project approximately 1.6 km apart.

In the present contribution a project overview is given and first results are presented. CO_2-distributions in the street canyon and exchange processes with the layers above show a strong dependence on the wind direction, apart from expected diurnal patterns due to stability effects and mixing layer heights. Fluxes at the top of the canyon have been compared to the measurements from above the rooftop and to data from the second station. The evaluation of diurnal traffic data provides good explanations for the spatial CO_2-distribution in the canyon and the fluxes at the canyon top, yet indicates only minor influence on the fluxes measured above.