Measurements of CO$_2$-fluxes over urban surfaces are rare, even though cities are an important source of CO$_2$. However, the morphologically complex surfaces and the non-homogeneous distribution of CO$_2$-sources form methodological difficulties (Grimmond et al., 2002).

It is the aim of BUBBLE (Basel Urban Boundary Layer Experiment, a COST 715 action) to increase the knowledge of mass, momentum and energy exchange over urban surfaces (Rotach, 2001). Results from profile measurements of mean CO$_2$-concentrations should help explaining the exchange processes rather than quantifying urban emissions. The presented results focus on diurnal mean courses combined with traffic data and selected turbulence parameters.

**Site**

The instrumented canyon (“Basel-Sperrstrasse”) is located in a densely built-up part of the city of Basel. The surface has a high plane area density $A_p$ of 0.57 and an average building height $h$ of 14.6 m.

A triangular lattice tower was installed 3 m off the northern building wall and operated over nearly one year. It supported measurements of mean CO$_2$-fluxes and mean CO$_2$-concentration profiles are available.

**Observations of CO$_2$ gradients derived from profiles fit with eddy covariance flux measurements (open path).**

**Maximums of CO$_2$-concentrations are observed during morning hours with relatively high traffic and low mixing.**

**Concentrations are always decreasing with height. This results in positive fluxes of CO$_2$ away from the urban surface all the time. This is in agreement with other urban CO$_2$-studies (Nemitz et al., 2002) and in contrast to suburban surfaces, where a daytime CO$_2$-uptake was measured (Offerle et al., 2001). Smallest gradients are observed during early morning hours with low traffic.**

**Instrumentation**

A CO$_2$/H$_2$O gas-multiplexer system sampled sequentially air from 10 tower levels. Air is sucked from each inlet at the tower through a 40 m tube down into a van, where a gas multiplexer and a LICOR 6262 gas-analyzer were operated. Each channel is sampled 30 s, the first 10 s after switching are discarded. Mean values over the remaining 20 s are stored. This results in mean profiles (10 levels) with a resolution of 5 minutes. The gas-analyzer was operated from December 2002 until July 2003 in differential mode, i.e. measuring continuously a zero gas in the reference cell. During the IOP in Summer 2002 additional instrumentation was deployed including two LICOR 7500 open path analyzers at $z/h=1.0$ (14m) and $z/h=2.2$ (31m).

**Surface plot illustrating the mean value of the vertical CO$_2$ gradient in ppm m$^{-1}$ for given $u$, and traffic load on 1h blocks for March 1 to July 15 2002.**

**References**


**Additional Information**

http://www.unibas.ch/geo/mcrProjects/BUBBLE/
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