Atmos. Chem. Phys. Discuss., 11, C6062–C6063, 2011
www.atmos-chem-phys-discuss.net/11/C6062/2011/


Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Characterization of gas station emissions during the CAREBeijing 2008 field study" *by* J. Zheng et al.

**Anonymous Referee #1**

Received and published: 7 July 2011

The paper reports VOC emission rates for 8 gas stations in Beijing sampled over the course of 2 days in August 2008. The measurements were made by a PTR-MS instrument housed in a mobile van. The van was located 15 to 20 m downwind from gas pumps at the various stations and measurements made for several hours at each location. A Gaussian plume dispersion model, using Pasquill stability classifications to estimate dispersion parameters was used to convert measured VOC concentrations observed in "plumes" or "spikes" in the time series to an emission rate (kg / s). The application of the analytical Gaussian plume model analysis is very crude tool and I'm not convinced that emission rates determined by this approach are meaningful. In my opinion the local turbulence in an inhomogeneous urban environment can't be reliably captured by the generalized Pasquill stability classifications. Gaussian plume dispersion modeling is a useful approach to model average downwind concentrations from a



continuous point source. In this paper the authors appear to be modeling a single data point and not an average concentration. How do they know if this single data point (the plume) represents the centerline or the edge? The spatial dimension of the gas station and its multiple sources of gasoline vapor from individual pumps is approximately the same as the downwind measurement distance so I have trouble imagining the emissions as being a continuous point source. There is a conceptual problem with applying the Gaussian dispersion model under these environmental conditions and in using it to interpret a single data point of 1 or 2 second duration. A puff model might be a more realistic description of the dispersion physics. In my view the analysis is too crude and conceptually flawed and for this reason I can't recommend this paper for publication.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 14719, 2011.