Geophysical Research Abstracts
Vol. 12, EGU2010-4635, 2010
EGU General Assembly 2010


# Lag time determination in DEC measurements with PTR-MS

Risto Taipale (1), Taina M. Ruuskanen (1,2), and Janne Rinne (1)

(1) University of Helsinki, Department of Physics, Helsinki, Finland (risto.taipale@helsinki.fi), (2) University of Innsbruck, Institute of Ion Physics and Applied Physics, Innsbruck, Austria

The disjunct eddy covariance (DEC) method has emerged as a popular technique for micrometeorological flux measurements of volatile organic compounds (VOCs). It has usually been combined with proton transfer reaction mass spectrometry (PTR-MS), an online technique for VOC concentration measurements. However, the determination of the lag time between wind and concentration measurements has remained an important challenge. To address this conundrum, we studied the effect of different lag time methods on DEC fluxes. The analysis was based on both actual DEC measurements with PTR-MS and simulated DEC data derived from high frequency $H_2O$ measurements with an infrared gas analyzer. Conventional eddy covariance fluxes of $H_2O$ served as a reference in the DEC simulation. The individual flux measurements with PTR-MS were rather sensitive to the lag time methods, but typically this effect averaged out when the median fluxes were considered. The DEC simulation revealed that the maximum covariance method was prone to overestimation of the absolute values of fluxes. The constant lag time methods, one resting on a value calculated from the sampling flow and the sampling line dimensions and the other on a typical daytime value, had a tendency to underestimate. The visual assessment method and our new averaging approach based on running averaged covariance functions did not yield statistically significant errors and thus fared better than the habitual choice, the maximum covariance method. Given this feature and the potential for automatic flux calculation, we recommend using the averaging approach in DEC measurements with PTR-MS.