Geophysical Research Abstracts
Vol. 14, EGU2012-9526, 2012
EGU General Assembly 2012

Flux measurements of volatile organic compounds at SMEAR II using surface layer gradient method

P. Rantala (1), R. Taipale (1), T.M. Ruuskanen (1), J. Aalto (2), M.K. Kajos (1), J. Patokoski (1), S. Schallhart (1), and J. Rinne (1)

(1) University of Helsinki, Department of Physics, Helsinki, Finland (pekka.a.rantala@helsinki.fi), (2) University of Helsinki, Department of Forest Sciences, Helsinki, Finland

Volatile organic compounds (VOCs) are mostly emitted into atmosphere from natural sources. Some of the compounds, such as monoterpenes, are highly reactive and seem to have major contributions to aerosol particle formation and growth, thus these compounds are also connected to the global climate change. Approximately 50 % of the biogenic emissions is coming from the tropical rain forests, 15-20 % from the boreal forests and the rest from the other sources like fields and oceans.

In order to understand seasonal and interannual changes in VOC emissions long term emission measurements would be of great importance. However, long-term VOC emission measurements are extremely sparse. Our aim is to develop reliable and feasible method to measure ecosystem scale VOC emissions by micrometeorological methods. In the past decade the disjunct eddy covariance method with proton transfer reaction quadrupole mass spectrometry (DEC/PTR-QMS) has been the method of choise for VOC flux measurements. However, automatically data post-processing, crucial for long term measurement, remains a challenge, especially in low flux conditions.

To by-pass these problems we can apply a surface layer gradient technique with PTR-QMS (SLG/PTR-QMS) for long term VOC flux measurements. In this technique fluxes are obtained using measured vertical profiles on VOC concentrations with Monin-Obukhov similarity theory. Albeit more indirect method than DEC, this classical method holds promise for long term measurement.

The measurements wer conducted in Hyytiälä at SMEAR II station (61° 51' N, 24° 17' E, 180 m a.m.s.l.) since summer 2010. Hyytiälä represents a typical boreal region with clear snow covered winters and annual average temperature has been approximately 3.3°C. Clear cumulative positive flux of methanol, acetaldehyde, ethanol/formic acid, acetone, MBO-fragment/isoprene, and monoterpenes were observed.