Geophysical Research Abstracts
Vol. 13, EGU2011-3644, 2011
EGU General Assembly 2011

Formaldehyde Flux Measurements via Eddy Covariance Above a Ponderosa Pine Forest: First results from BEACHON-ROCS 2010 and Analysis of Source Terms

Josh DiGangi, Erin Boyle, Frank Keutsch, and the BEACHON-ROCS Team
University of Wisconsin-Madison, Department of Chemistry, Madison, United States (keutsch@wisc.edu)

Models of HO_X chemistry in regions with high biogenic volatile organic compound (BVOC) emissions can drastically under-predict OH concentrations while simultaneously failing to account for a significant fraction of the observed OH reactivity. The combination of these facts implies a significant misunderstanding of HO_X chemistry in BVOC dominated regions. Highly reactive, unmeasured BVOCs, which are rapidly oxidized within the forest canopy, have been proposed as potential contributors to the missing OH reactivity. Formaldehyde (HCHO) is formed during the photochemical degradation of virtually all BVOCs and serves as a key tracer of oxidative chemistry. Direct observation of the efflux of HCHO from the forest provides a sensitive and direct measure of HCHO production and can serve as an additional constraint on the oxidation of unmeasured, highly reactive BVOCs within the forest canopy. To investigate this we have developed a high sensitivity, fast HCHO sensor, the Madison FIber Laser-Induced Fluorescence (FILIF) Instrument. We present the first reported measurements of HCHO flux via eddy covariance, as well as HCHO concentrations and gradients as observed with the FILIF instrument during the BEACHON-ROCS 2010 campaign in a rural coniferous forest northwest of Colorado Springs, CO. Midday upward HCHO fluxes as high as 150 $\mu g/m^2/hr$ were observed. These results will be discussed in the context of a model of rapid in-canopy BVOC oxidation to assess whether the observed fluxes can be explained with known in-canopy sources and sinks of HCHO.