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Publication Date

2011

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Analysis of formaldehyde fluxes above a Ponderosa Pine forest measured via eddy-covariance



Citation: Keutsch, F., J. Digangi, S. Henry (more) , 2011: Analysis of formaldehyde fluxes above a Ponderosa Pine forest measured via eddy-covariance. *242nd ACS National Meeting*, Denver, CO, American Chemical Society.

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Abstract:

The OH radical is the most important tropospheric oxidant. An important question surrounds missing OH sink terms observed in biogenically influenced regions, which have been proposed to be caused by unmeasured biogenic volatile organic compounds (BVOCs). Formaldehyde (HCHO) is formed during oxidation of virtually all BVOCs. Observation of the HCHO efflux from the forest provides a direct measure of HCHO sources and serves as constraint on the in-canopy oxidation of unmeasured, reactive BVOCs. We present the first reported measurements of HCHO flux via eddy covariance observed with the Madison Fiber Laser-Induced Fluorescence instrument in a rural forest northwest of Colorado Springs, CO. Upward HCHO fluxes up to 200 $\mu\text{g m}^{-2} \text{hr}^{-1}$ were observed. We investigate the contribution of fast VOC oxidation chemistry and other HCHO emission sources, such as soil, leaf litter and plants, to assess whether the observed fluxes can be explained with known in-canopy sources and sinks of HCHO.

Classification: Non-refereed

Resource Type: Presentation/webcast

Date Presented August 28, 2011

Relations:

- [http://www.envirofacs.org/symposia/ENVR_ProgramD2011\(2\).pdf](http://www.envirofacs.org/symposia/ENVR_ProgramD2011(2).pdf)

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