OBSERVATIONAL CONSTRAINTS ON TERPENE OXIDATION DURING THE
GOAMAZON 2014/5 FIELD CAMPAIGN USING SPECIATED MEASUREMENTS
FROM SV-TAG

Lindsay D. Yee1, Gabriel Isaacman-VanWertz1*, Rebecca A. Wernis2, Nathan M. Kreisberg3,
Yingjun Liu4, Karena A. McKinney4, Suzane de Sá4, Scot T. Martin4, M. Lizabeth Alexander5,
Brett B. Palm6, Weiwei Hu6, Pedro Campuzano-Jost6, Douglas A. Day6, Jose L. Jimenez6, Juarez
Viegas7, Stephen R. Springston8, Florian Wurm9, Joel F. Brito9, Paulo Artaxo9, Antonio Manzi10,
Luiz A. T. Machado10, Karla Longo11, Maria B. Oliveira12, Rodrigo de Souza12, Susanne V.
Hering3, Allen H. Goldstein1,2

1 Dept. of Environmental Science, Policy, and Management, University of California, Berkeley, CA, USA
2 Dept. of Civil and Environmental Engineering, University of California, Berkeley, CA, USA
3 Aerosol Dynamics Inc., Berkeley, CA, USA
4 School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA
5 Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory, Richland, WA, USA
6 Dept. of Chemistry & Biochemistry and Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO, USA
7 Instituto Nacional de Pesquisas da Amazonia, Manaus, AM, Brazil
8 Environmental Sciences Department, Brookhaven National Laboratory, Upton, NY, USA
9 Department of Applied Physics, University of São Paulo, SP, Brazil
10 Instituto Nacional de Pesquisas Espaciais, São José dos Campos, SP, Brazil
11 Instituto Nacional de Pesquisas Espaciais, Cachoeira Paulista, SP, Brazil
12 Universidade do Estado do Amazonas, Manaus, AM, Brazil

Biogenic volatile organic compounds (BVOCs) from the Amazon forest represent the largest regional source of organic carbon emissions to the atmosphere. These BVOC emissions dominantly consist of volatile and semi-volatile terpenoid compounds that undergo chemical transformations in the atmosphere to form oxygenated condensable gases and secondary organic aerosol (SOA). We have deployed the Semi-Volatile Thermal desorption Aerosol Gas Chromatograph (SV-TAG) at the rural T3 site located west of the urban center of Manaus, Brazil as part of the Green Ocean Amazon (GoAmazon) 2014/5 field campaign to measure hourly concentrations of semi-volatile BVOCs and their oxidation products during the wet and dry seasons. Primary BVOC concentrations measured by the SV-TAG include sesquiterpenes and diterpenes, which have rarely been speciated with high time-resolution. Several sesquiterpenes present in ambient data were found to overlap with the sesquiterpene composition in essential oils from the Copaiba tree (*Copaifera officinalis* Jacq. L.), commonly known as the “diesel tree” in the Amazon, suggesting that it and related vegetation may be potential sources of BVOC emissions in the Amazon. We observe sesquiterpenes at levels of tens of pptv, and they are anti-correlated with ozone. We estimate that from the observed sesquiterpene and monoterpene concentrations, sesquiterpenes would account for more olefin-channel ozone sink (loss). We also observe periods of enhanced organic aerosol formation (as measured by an oxidation flow reactor) accompanied with higher sesquiterpene concentrations and anthropogenic influence. We further discuss the relative lifetimes of identified sesquiterpenes, chemical mechanisms, and their potential to contribute to ambient SOA formation.