

Controls over biogenic volatile organic compounds from Amazon forests as part of GoAmazon

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Emissions of biogenic volatile organic compounds (BVOCs) from Amazon forests affect key atmospheric processes including aerosol and cloud lifecycles, which in turn influence terrestrial physiological processes through changes in precipitation, temperature, and the quality of incoming light for photosynthesis. As a part of the DOE GoAmazon ARM campaign in central Amazon, we are conducting controlled laboratory studies and a multi-year field campaign to investigate the identities, amounts, and biological and environmental controls over tropical BVOC emissions using advanced analytics (TD-GC-MS, PTR-MS, CRDS). In lab studies, connections between BVOC emissions and plant central carbon and energy metabolism is being carried out at the leaf and branch level using dynamic ¹³C-pulse chase experiments. In the field, we are collecting spatial and temporal atmospheric BVOC concentration patterns at the TT34, K14, K34, and ATTO towers and ZF2 canopy walkways. In addition, tree surveys have been initiated to evaluate potential phylogenetic relationships with BVOC emissions. By improving the representation of BVOC emissions within the CESM model with field observations in the Amazon, we will evaluate the impacts of tropical BVOC emissions on aerosol and cloud lifecycles and their associated climate feedbacks to the biosphere.