Geophysical Research Abstracts
Vol. 21, EGU2019-17892-2, 2019
EGU General Assembly 2019

Hydroperoxyl radical measurements at the canopy-atmosphere interface in the Amazon rainforest

Chinmay Mallik (1), Otávio C. Acevedo (2), Alessandro Araùjo (3), Martina Berger (4), Efstratios Bourtsoukidis (1), Ralph Dlugi (4), Jürgen Kesselmeier (5), Jos Lelieveld (1), Antonio Ocimar Manzi (6), Daniel Marno (1), Monica Martinez (1), Pablo E. S. Oliveira (2), Eva Pfannerstill (1), Matthias Sörgel (1), Sebastian Tauer (1), Anywhere Tsokankunku (1), Marta Sá (6), Ana-Maria Yáñez-Serrano (5), Jonathan Williams (1), Stefan Wolff (1), Michael Zelger (4), and Hartwig Harder (1)

(1) Max Planck Institute for Chemistry, Atmospheric Chemistry, Mainz, Germany (chinmay.mallik@mpic.de), (2) Universidade Federal Santa Maria, Dept. Fisica, 97119900 Santa Maria, RS, Brazil, (3) Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), Belém-PA, Brasil, (4) Arbeitsgruppe Atmosphärische Prozesse (AGAP), Munich, Germany, (5) Biogeochemistry Department, Max Planck Institute for Chemistry, Mainz, Germany, (6) Instituto Nacional de Pesquisas da Amazônia/ INPA, Manaus-AM, Brazil

Hydroperoxyl radicals (HO_2) account for bulk of the HO_x number density and together with the hydroxyl radicals (OH) maintain the self-cleaning capacity of the atmosphere. The reaction of HO_2 with NO forming NO_2 is an important chemical source of tropospheric O_3, which is a greenhouse gas detrimental to the health of humans and plants. The oxidation of CO and hydrocarbons emitted from various anthropogenic and biogenic processes lead to the formation of HO_2. The chemical lifetime of HO_2 is about a few hundred seconds, sufficient to feed oxidation processes and interact with turbulences in the microscale e.g. HO_2 formed due to oxidation of biogenic hydrocarbons above forest canopies can be transported down into the canopies and react with NO and O_3 to recycle OH.

The vast green stretches of Amazon are not only a storehouse of carbon but also the source of copious biogenic hydrocarbons, which impact the regional and global atmospheric chemistry. The export of primary hydrocarbons and their oxidized products from the Amazon to the global troposphere depends on the oxidation capacity at the canopy-atmosphere interface. To understand the chemical processes influencing the oxidation capacity over the Amazons, measurements of OH, HO_2 along with related chemical, meteorological and photochemical parameters were carried out during an intensive field campaign SEGAM (SEGregation experiment in the AMazon) in November 2015. Fast 5 Hz measurements of OH and HO_2 using laser induced fluorescence were conducted on a tower at 40 m altitude at the canopy-atmosphere interface to understand the sources, sinks and chemistry of atmospheric oxidants in relation to the variation in NO and isoprene fluxes down in the forest. This presentation deals with the measured variability of HO_2 during SEGAM and its chemical sources and sinks estimated with a photochemical box model.