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Surprising changes in the diel cycle of OH Reactivity in an El Niño year

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The hydroxyl (OH) radical is the most important oxidant in the troposphere, reacting with primary pollutants (e.g. CO), greenhouse gases (e.g. CH4), and with volatile organic compounds (VOCs) which sequentially influence ambient ozone and particle concentrations. Recently it has become possible to directly measure the total OH loss rate (OH reactivity), allowing atmospheric oxidation processes to be better constrained and the relative contributions of the individual trace gases to be determined.
The balance between ambient air reactivity and OH concentration is particularly important over tropical forests such as the Amazon rainforest. In this pristine environment, strong fluxes of reactive trace gases such as isoprene meet high concentrations of OH radicals generated by reaction of O1D with water. Environmental changes influencing this balance between emission of reactive species and oxidant generation can in turn affect tropospheric ozone chemistry, methane lifetime, and even the carbon cycle.
For two weeks in November 2015, during a strong El Niño period, OH reactivity and isoprene were measured at canopy height in the Amazon rainforest using the comparative reactivity method (CRM) and a PTRMS. El Niño associated changes caused the Amazon rainforest to undergo extreme drought conditions, with average relative air humidity reduced by 10% and soil humidity reduced by 20-25% compared to an ENSO-neutral November. OH reactivity and isoprene data had been acquired at the same location using the same techniques in ENSO-neutral November 2012, allowing to compare these contrasting regimes. Remarkably, under El Niño conditions highest OH reactivities were observed around sunset instead of at noon. Here we present investigations of possible reasons for this change in behavior, including turbulence and ecological responses in the plants.