Tropospheric ozone net production rate within the Manaus urban plume, in Central Amazonia Rizzo, L. V.

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Amazonia is a unique place to study the impact of anthropogenic emissions on atmospheric photochemistry, fueled by large inputs of solar radiation, water vapor, biogenic emissions and turbulent mixing. In the wet season, thousands of km<sup>2</sup> of Amazonian forest areas can be considered pristine, whereas in the dry season regional scale biomass burning emissions add to the picture. The Amazon region is also going through localized urban development, in particular, the Manaus city, with 2 million inhabitants. The GoAmazon2014/5 experiment seeks to understand the interactions between urban and biogenic emissions in Amazonia. The combination of biogenic volatile organic compounds and urban NOx emissions is expected to increase tropospheric O3 production, with impacts to ecosystem and human health. To investigate this issue, surface O3 measurements were taken between Feb and Dec 2014 at two sites in Amazonia: T2, located in the outflow of the Manaus urban plume, and T3, sitting 90 km downwind of the city. Additionally, airborne observations were taken under the ARM/G1 and DLR/HALO aircrafts. The influence of the urban plume at T3 site was detected by a combination of typical  $\Delta CN/\Delta CO$  ratios, Hysplit backtrajectories and threshold concentrations of tracers such as particle number and black carbon. The transport from T2 to T3 usually lasted 7 hours. In the absence of urban or biomass burning emissions, O3 diurnal cycle at T3 showed a peak of 15 ppb at 14 LT, similar to observations taken in pristine forest areas in Amazonia. When the Manaus plume reached the T3 site in the afternoon, the diurnal O3 peak reached 35±15 ppb on average. Estimated values for the net O<sub>3</sub> production rate along this diurnal transport typically ranged between 0.8 and 3.6 ppb/h (percentiles 25<sup>th</sup> and 75<sup>th</sup>). When the Manaus plume reached the T3 site before sunrise, i.e., a transport during the night, the diurnal peak anticipated to 11 LT and reached 23 ± 7 ppb. Observations aboard the ARM/G1 aircraft within the boundary layer confirmed the relatively low O<sub>3</sub> net production rates estimated at T3, with 25<sup>th</sup> and 75<sup>th</sup> percentiles of 1.3 and 5.4 ppb/h for measurements taken 80-90 km downwind of Manaus. The net production rate was higher near Manaus (<50 km downwind), with 25<sup>th</sup> and 75<sup>th</sup> percentiles of 2.1 and 13 ppb/h, suggesting that most of urban plume oxidation took place within 50 km from the emission source.