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Partitioning of Ozone deposition fluxes at a rainforest site (ATTO) in the central Amazon basin

Matthias Sörgel (1), Anywhere Tsokankunku (1), Stefan Wolff (2), Alessandro Araùjo (3), Pedro Assis (4), Hartwig Harder (1), Giordane Martins (4), Marta Sá (4), Rodrigo Souza (5), Jonathan Williams (1), and Nora Zannoni (1)

(1) Max Planck Institute for Chemistry, Air Chemistry Department, Mainz, Germany, (2) Max Planck Institute for Chemistry, Multiphase Chemistry Department, Mainz, Germany, (3) Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), Belém-PA, Brazil, (4) Instituto Nacional de Pesquisas da Amazônia/ INPA, Manaus-AM, Brazil, (5) Universidade do Estado do Amazonas (UEA), Manaus- AM, Brazil

Few direct eddy covariance flux measurements of O_3 in tropical forests exist and deposition velocities of O_3 for tropical forest have large uncertainties in models. Therefore, we measured O_3 fluxes by dry chemiluminescence at different heights (4 m, 12 m, 46 m and 81 m), which is 2 levels within canopy (below crown layer) and two levels above. At the same levels heat and CO_2 fluxes were measured by eddy covariance to infer differences in footprint and the stomatal conductance which was calculated based on the inverted Penman-Monteith equation. Further measurements include the profiles of O_3, NO_x, CO_2 and H_2O which are used to calculate storage fluxes and reactions of O_3 with NO_x within the air volume. Additionally, leaf surface temperature and leaf wetness were measured in the upper canopy to infer their influence on the non-stomatal deposition. The measurements were conducted at the ATTO (Amazon Tall Tower Observatory) site that is located about 150 km northeast of the city of Manaus in the Amazon rainforest. (02°08'38.8"S, 58°59'59.5"W). The climate is characterized by a rainy (350 mm around March) and a dry season (ca. 80 mm in September). During the wet months, the air quality is close to pristine, while strong pollution from biomass burning is evident in the dry season. Therefore, we will present results from two intensive campaigns (3- 4 flux levels) for the rainy season (March to May) and the dry season (September to December) 2018.

The focus of the analysis is the partitioning between a) the crown layer and understory and b) stomatal and non-stomatal deposition with a further analysis of the non-stomatal pathways. Non-stomatal deposition is analyzed by quantifying gas-phase reactions of O_3 with NO_x and an estimate of O_3 reactivity by VOCs. Furthermore, the remaining (surface) deposition is analyzed according to its relations with leaf surface temperature and leaf wetness.