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Tropical atmospheric chemistry in Amazonia: The LBA atmospheric chemistry research program.

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A better understanding of tropical atmospheric chemistry is important for several global change questions. The LBA "Large Scale Biosphere-Atmosphere Experiment in Amazonia – LBA" experiment will adress key questions reagrding the role of Amazonia in regional and global climate. The LBA experiment is structured in five components: 1) Physical climate; 2) Carbon cycle and biogeochemistry; 3) Chemistry and physics of the atmosphere; 4) Hydrology and water chemistry; 5) Numerical Modeling.

On the chemistry and physics of the atmosphere component, we are installing and operating continuously for four years three atmospheric monitoring stations at different locations in Amazonia. These sites will have CO_2 flux towers from the LBA experiment. At these sampling stations we will measure continuosly several trace gases, including CO_2, CH_4, N_2O, CO, VOCs (Volatile Organic Compounds), hydrocarbons, NO_x, NO_y and Ozone. Aerosol particles will be studied in detail, with measurements of aerosol composition and ionic content, size distribution and optical properties, as well as organic and elemental carbon. In addition, precipitation composition in terms of trace elements, ionic content, dissolved and total carbon will be measured, in order to obtain the wet deposition fluxes of essential nutrients. Continuos measurements of aerosol optical thickness with sun-photometers will allow a detailed study of the influence of aerosol particles on the atmospheric radiation budget.

Intensive field studies will be performed twice a year, in the dry and wet seasons. At these intensive campaigns, gaseous compounds and aerosol properties that are difficult to measure continuously will be determined. Large-scale experiments using aircraft will allow basin-wide studies on the atmospheric composition and properties. The atmospheric chemistry of VOCs, NO_x O_3 and several oxidants will be studied from the point of view of photochemistry processes, heterogeneous chemistry and atmospheric carbon cycling. Radiative transfer models will study the relationship between aerosols and the radiative balance in the dry and wet seasons. Biogeochemical models will work with nutrient pools and fluxes, and will study the dry and wet deposition fluxes of essential nutrients. Chemical-dynamic transport models will be developed to integrate the atmospheric chemistry measurements with the large-scale transport.