Geophysical Research Abstracts
Vol. 19, EGU2017-5339, 2017
EGU General Assembly 2017

Aircraft-borne aerosol chemical composition measurements in the lower to middle troposphere over southern West Africa: Biomass burning, urban outflow plumes, and long-range transport.

Anneke Batenburg (1), Christiane Schulz (1), Johannes Schneider (1), Daniel Sauer (2), Hans Schlager (2), and Stephan Borrmann (1)

(1) Particle Chemistry Department, Max Planck Institute for Chemistry / Johannes Gutenberg University of Mainz, Mainz, Germany, (2) Institute of Atmospheric Physics, German Aerospace Center (DLR), Oberpfaffenhofen-Wessling, Germany

During the DACCIWA field campaign in June and July 2016, aircraft-borne in-situ aerosol chemical composition measurements were performed over southern West Africa (SWA). This presentation will focus on the submicron particle measurements done with a Compact Time-of-Flight Aerosol Mass Spectrometer (C-ToF-AMS) on board of the DLR Falcon aircraft during twelve research flights from Lomé, Togo, covering the altitude range from the boundary layer (BL) to the middle troposphere (12 km).

A preliminary analysis of the results shows typical baseline total non-refractory aerosol mass loadings of 1.5 to 2.8 μg m^{-3} in the BL, and 0.4 to 1.1 μg m^{-3}above. Up to half of the baseline aerosol mass in the BL appears to consist of sulphate, compared to only 10 to 35 % above the BL; organic matter dominates in the middle troposphere.

During several flights, the DLR Falcon crossed a pronounced and seemingly widespread aerosol layer at 2—4.5 km altitude, partly in or slightly above the BL. The AMS data indicate that about half of the non-refractory aerosol mass in the middle of this layer consisted of organic matter. We consider it likely that these aerosol particles were produced by biomass burning in Central Africa.

Emissions from cities and industrial areas were also intercepted, as well as enhancements in some species at higher altitudes. Trajectory analysis suggests that an increase of the organics to more than 2.5 μg m^{-3} observed at 8 km during one flight came from the Arabian Peninsula. Several ammonium peaks during the same flight at higher altitudes were traced back to the Asian Summer Monsoon Anticyclone (ASMA).