Trace gas profiles and anthropogenic plumes from metropolitan areas in West Africa during DACCIWA - Airborne measurements on board the DLR Falcon 20

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The DACCIWA (Dynamics-Aerosol-Chemistry-Cloud Interactions over West Africa) airborne field campaign was conducted in Southern West Africa in June/July 2016. The atmosphere in South West Africa is exposed to numerous influences like the Monsoon, biomass burning and oil rigs. Its chemical composition is modified by urbanisation, a growing population, complex meteorological influences and air pollution. During DACCIWA, three European research aircraft (DLR - Falcon 20, SAFIRE - ATR 42 and BAS - Twin Otter) were deployed from Lomé/Togo and conducted research flights across Ivory Coast, Ghana, Togo and Benin. On board the DLR Falcon O_3, SO_2, CO, NO_2 and aerosol fine mode particle number concentration and size distribution were measured during a total of 12 scientific flights.

Distinct trace gas layers were found during vertical soundings. An O_3 layer at $\sim$ 3000 m altitude was observed during 6 flights with concentrations up to 85 ppb compared to background concentrations of about 35 ppb due to southern hemispheric biomass burning products which were transported to the DACCIWA study area. Furthermore, enhanced trace gas and particle number concentrations were detected in city pollution plumes of Lomé/Togo, Accra/Ghana and Kumasi/Ghana. O_3 enhancements of 5 – 10 ppb were measured downstream of the cities relative to the upstream observations. Measured SO_2 pollution plumes with concentrations up to 0.9 ppb near Lomé are combined with HYPSLIT dispersion simulations and are compared to emission databases.