



Emission of atmospheric pollutants out of Africa – Analysis of CARIBIC aircraft air samples

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Africa is the single largest continental source of biomass burning (BB) emissions. The burning African savannas and tropical forests are a source for a wide range of chemical species, which are important for global atmospheric chemistry, especially for the pristine Southern Hemisphere. Emitted compounds include carbon monoxide (CO), nitrogen oxides (NO_x), hydrocarbons, oxygenated hydrocarbons and particles. Deep convection over Central Africa transports boundary layer emissions to the free troposphere making aircraft-based observations useful for investigation of surface emissions and examination of transport and chemistry processes over Africa

The CARIBIC project (Civil Aircraft for the Regular Investigation of the Atmosphere Based on an Instrument Container, www.caribic-atmosphere.com part of IAGOS www.iagos.org) is a long term atmospheric measurement program using an instrument container deployed aboard a Lufthansa Airbus A340-600 for a monthly sequence of long-distance passenger flights. Besides the online measurements mixing ratios of greenhouse gases and a suite of C₂-C₈ non methane hydrocarbons (NMHCs) are measured from flask samples collected at cruise altitude.

During northern hemispheric winter 2010/2011 CARIBIC flights took place from Frankfurt to Cape Town and Johannesburg in South Africa. Several BB tracers like methane, CO and various NMHCs were found to be elevated over tropical Africa. Using tracer-CO- and tracer-NO_y-correlations emissions were characterized. The NMHC-CO correlations show monthly changing slopes, indicating a change in burned biomass, major fire stage, source region and/or other factors influencing NMHC emissions. To expand our analysis of emission sources a source region data filter was used, based on backward trajectories calculated along the flight tracks. Taking all CARIBIC samples into account having backward trajectories to the African boundary layer the dataset was enlarged from 77 to 168 samples. For both datasets tracer-tracer correlations are used to investigate sources and the correlations between NMHCs are used to analyze photochemical processing and transport.