Geophysical Research Abstracts
Vol. 20, EGU2018-15410, 2018
EGU General Assembly 2018

The impact of biomass burning onto the chemical composition of the upper troposphere as observed with IAGOS – CARIBIC

Marco Neumaier (1), Eric Förster (1), Harald Bönisch (1), Markus Hermann (2), Denise Assmann (2), Jeannine Ditas (3), Helmut Ziereis (4), Greta Stratmann Stratmann (4), and Andreas Zahn (1)

(1) Karlsruhe Institute of Technology, IMK, Eggenstein-Leopoldshafen, Germany (marco.neumaier@kit.edu), (2) TROPOS, Leibniz-Institut für Troposphärenforschung, Leipzig, Germany , (3) Max Planck Institute for Chemistry, Mainz, Germany , (4) German Aerospace Center, Institute of Atmospheric Physics Atmospheric trace gases, Oberpfaffenhofen-Wessling, Germany

Since 2005 the IAGOS-CARIBIC passenger aircraft (In-service Aircraft for a Global Observing System -Civil Aircraft for the Regular Investigation of the atmosphere Based on an Instrument Container, Lufthansa, Airbus 340-600) measures ∼100 trace gases and aerosol components in the UTLS (9-12 km altitude) on 4 consecutive long-distance flights per month. VOCs (Volatile Organic Compounds) are measured with a Proton-Transfer-Reaction Mass Spectrometer (PTR-MS).
The VOC Acetonitrile is an important tracer for biomass burning (BB) as it is almost exclusively emitted from wildfires and other BB sources. Based on the signal of acetonitrile we analyzed the unique IAGOS-CARIBIC data set in order to quantify (i) the sampling frequency of BB and (ii) the impact of BB onto the abundance of other trace gases (e.g. Ozone, NO_y, acetone) and aerosol particles. The most prominent regions over which persistent BB signatures were sampled with a frequency of ∼50-80% in boreal winter and autumn are Africa and South America (SA). In boreal summer, the strongest BB signals were sampled over North America and Greenland up to ∼3 km above the thermal tropopause, but with smaller frequency. The impact of BB onto other trace gases was estimated by comparing the whole data set with a subset of data without BB influence diagnosed by acetonitrile. We show that upper tropospheric ozone and NO_y mixing ratios are enhanced by up to ∼20% due to BB over Africa and South America in winter. Further the transport pathways of BB affected air masses into the upper troposphere and lowermost stratosphere are discussed.