Geophysical Research Abstracts
Vol. 20, EGU2018-6875, 2018
EGU General Assembly 2018

Large-Scale Plumes of NO_x Observed in the UTLS Region Using Passenger Aircraft by IAGOS

Florian Berkes (1), Norbert Houben (1), Domenico Taraborrelli (1), Sabine Schröder (1), Bastien Sauvage (2), Philippe Nedelec (2), Andreas Wahner (1), and Andreas Petzold (1)

(1) Forschungszentrum Juelich, Institute of Energy and Climate Research - Troposphere, Juelich, Germany, (2) Laboratoire d'Aérologie, Université de Toulouse, CNRS, UPS, France

NO_x (sum of NO and NO_2) play a central role in atmospheric chemistry related to ozone and therefore climate forcing. The most important sources of NO_x in the upper troposphere are lightning, and transport from the boundary layer (combustion processes, from biomass burning, agriculture, and industry, transport, and aircraft emissions). Continuous long-term measurements of NO_x in the upper troposphere and lowermost stratosphere (UTLS) are rare and the contribution of the different sources is highly uncertain.

Here, we present a statistical analysis of the occurrence and chemical characteristics of large-scale plumes (LSPs) of NO_x observed in the UTLS region over the North Atlantic from Jun. to Oct. in 2015. The data was collected from the European Research Infrastructure IAGOS (In-service Aircraft for a Global Observing System, www.iagos.org) which operates a global-scale monitoring system for atmospheric temperature, trace gases, aerosols and clouds at high spatial resolution by passenger aircraft. The measurement of nitrogen oxides are performed with a self-build instrument based on the well-established chemiluminescence technique.

LSPs extended from 50 km to several hundred kilometers which were observed in the UTLS region along the flight track. For this study we consider only LSPs larger than 300 km. Most of these LSPs were observed downwind of the east coast of the USA and over Western Europe. The polluted air masses with large NO_x show in average larger ozone and CO mixing ratios compared to background air suggesting the impact of convective transport from the boundary layer. This is further discussed based on FLEXPART and EMAC simulations.