



Impact of biomass burning and anthropogenic emissions on the composition of the summertime Arctic troposphere - aircraft observations during POLARCAT-GRACE

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We report on detailed chemical aircraft measurements performed in July 2008 in the European sector of the Arctic based from Kangerlussuaq during the POLARCAT Greenland Aerosol and Chemistry Experiment (GRACE). The DLR research aircraft FALCON was used instrumented with a large set of in-situ trace gas (CO, CO₂, O₃, NO, PAN, NO_y) aerosol and meteorological measurement systems. Data were sampled during 16 flights covering altitudes up to 12 km in order to study the pathways, dispersion and chemical processing of forest fire and urban pollution during long-range transport into the Arctic.

We found that the entire free troposphere above 4 km was strongly polluted by emissions from forest fires and fossil fuel combustion during the campaign period. More than 40 distinct pollution plumes were detected with large enhancements in the mixing ratios of CO and reactive nitrogen species. The pollution plumes originated mainly from sources in North America, Siberia and East Asia according to FLEXPART analysis. Interestingly, many of the plumes measured were influenced by a mix of both, biomass burning as well as anthropogenic pollution. We discuss the chemical composition measured in the pollution plumes and highlight differences observed between pollution plumes of different origin and transport history.