Session title: M08 - Posters - Air Quality in the Changing Anthropocene

Session type: Poster Session

Symposium: M08

Presentation number: M08p-191

★ Abstract title:

Aircraft Measurements of SO2 in Pollution Plumes of Major Population Centers in Europe and East-Asia during EMeRGe

L. Eirenschmalz[1], H. Schlager[1], J. Ly[1], H. Huntrieser[1], R. Baumann[1], H. Ziereis[1], P. Stock[1], M. Lichtenstern[1], G.A. Stratmann[1], T. Klausner[1], A. Fiehn[1], D. Sauer[1], C. Heckl[1], M.D. Andrés Hernández[2], J.P. Burrows[2].
[1]DLR e.V., Atmospheric Physics, Weßling, Germany.
[2]University of Bremen, Institute of Environmental Physics, Bremen, Germany.

We present in-situ measurements of SO_2 in pollution plumes of Major Population Centers (MPCs) performed during the EMeRGe (*Effect of Megacities on the Transport and Transformation of Pollutants on the Regional to Global Scales)* campaigns in Europe (July 2017) and Asia (March/April 2018) using the German research aircraft HALO operated out of Oberpfaffenhofen, Germany and Tainan, Taiwan, respectively. The SO_2 measurement techniques used include a Chemical Ionization Mass Spectrometer (CI-ITMS) with an in-flight on-line calibration and a Pulsed Fluorescence Detector. We discuss the SO_2 observations together with additional trace gases and aerosol parameters measured from HALO (e.g. CO, NO, NO_y, O_3, PAN, CO_2, CH_4, ultrafine and fine aerosol). We relate the sampled MPC pollution plumes to emission sources using air mass back-trajectory analysis. In Europe, the highest SO_2 mixing ratios were observed in the boundary layer downwind of the Po Valley, Greater London and the Benelux-MPC with peak values of 6 ppb. In East-Asia, enhanced SO_2 mixing ratios were measured downwind of MPCs of China, Taiwan, and the Philippines with mixing ratios of up to 10 ppb. Whereas the majority of the European MPCs were probed within a distance of ~10 km, the emissions of East-Asian MPCs (especially China) were measured at a much larger distance from the sources (>100 km downwind). We determine the age of the various sampled SO_2 pollution plumes using simulations with a dispersion model and estimate the chemical loss of SO_2 during transport.