Investigation of the photochemical activity in different European MPC outflows during EMeRGe

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Since peroxy radicals are closely involved in a number of tropospheric chemical processes which e.g control the O_3 budget, hydrocarbon oxidation and acid formation, the accurate measurement of these radicals can provide essential information to improve our understanding of processing and transformation of polluted outflows from megacities and Major Population Centres (MPCs).

Airborne measurements of the total sum of peroxy radicals, $RO_2^* = HO_2 + \Sigma RO_2$, where R is an organic group, were conducted in Europe in summer 2017 and in East Asia in spring 2018 within the EMeRGe (Effect of Megacities on the Transport and Transformation of Pollutants on the Regional to Global Scales) project by using the PeRCEAS instrument (Peroxy Radical Chemical Enhancement and Absorption Spectrometer), on board of the HALO research aircraft (www.halo.dlr.de).

Over the course of both measurement campaigns different MPC outflows were investigated including among others, London, Rome, Manila and Taipei. Polluted air masses of different origin and composition were probed. The variations in the photochemical activity were studied by taking into account simultaneous observations of radical precursors and photolysis rates, while applying known oxidation mechanisms. This presentation will focus on the comparison of the measured RO_2^* values to those estimated from a pseudo stationary steady state assumption for radicals. With this the photochemical processing in the probed air masses is further analysed.