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Aircraft-based 2- and 3D Trace Gas Measurements with HAIDI (Heidelberg Airborne Imaging DOAS Instrument) - Results of EMeRGe Mission Asia

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Due to their significant impact on atmospheric chemistry, it is important to locate and quantify trace gases in the atmosphere. Aircraft-based measurements fill the gap between satellite instruments with good coverage but low spatio-temporal resolution and ground based measurements with good temporal resolution but poor spatial coverage. The HAIDI instrument provides high temporal and spatial resolution (40m x 40m at 1.5 km flight altitude, 266m x 266m at 10 km flight altitude, at 10 ms temporal resolution) in 2D and 3D during overflight and can thus resolve small-scale chemical and dynamical processes in the Earth's atmosphere. Sources of trace gases can also be identified and quantified.

Within the EMerGe (Effect of Megacities on the Transport and transformation of Pollutants on the Regional to Global Scales) project HAIDI was installed on the research airplane HALO (High Altitude and LOng range research aircraft) of the DLR (German Aerospace Center). Two missions (July 2017 in Europe and March 2018 in Asia) were performed to investigate the chemical composition of the outflow of megacities and the atmospheric impact of urban pollution. Target areas included Paris, London and the Po area as well as Manila, Taiwan cities and China outflow.

HAIDI derived a number of trace gases such as NO_2, SO_2, O_3, BrO and HCHO. We will present results of the HAIDI measurements during the EMeRGe mission, including high-resolution data of megacity and ship plumes, where plume structures can be seen clearly.