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Aircraft imaging DOAS measurements of anthropogenic nitrogen dioxide

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Aircraft based observations of NO_2 columns have been conducted using an imaging spectrometer. NO_2 column amounts below the aircraft are retrieved from scattered light measurements by Differential Optical Absorption Spectroscopy (DOAS). These imaging DOAS observations provide information about abundances and emissions of trace gases on a fine spatial scale of around 100m, which is suitable for investigations of anthropogenic point sources. With its wide angle entrance optics, the instrument is designed to yield simultaneous observations for all viewing angles within a broad swath below the aircraft across flight direction. In addition, the specific detector design allows gap free measurements along flight direction. These instrument characteristics provide best conditions for trace gas mapping. Source strengths and source distributions can be derived from the measurements. In addition, such NO_2 observational data is useful for model input, model comparisons, satellite validation, and the investigation of sub-pixel variability.
Instrumental performance has been analysed as well as the influences of aircraft positioning angles, viewing geometry and ground surface albedo on the retrieval results. Results and investigations from aircraft measurements above several anthropogenic source regions are presented.