



Airborne DOAS observations of tropospheric NO₂ using an UltraLight Trike and flux calculation

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In this paper we present airborne DOAS observations of tropospheric NO₂ using an Ultralight Trike (ULT) and associated flux calculation. The instrument onboard the ULT was developed for measuring the tropospheric NO₂ Vertical Column Density (VCD). Measurements were performed for several days during 2011-2014, in a region SE of Romania, over the cities of Galati (45.43°N, 28.03°E) and Braila (45.26°N, 27.95°E). Measurements of the NO₂ column in the same area were performed using car-DOAS observations. The correlation between the tropospheric NO₂ VCD from airborne and mobile ground-based DOAS observations was used to validate the airborne observations. A specific AMF for each case was calculated using the radiative transfer model (RTM) UVspec/DISORT. We present also a comparison between SCDstrato derived from DOMINO (Dutch OMI NO₂) and the SCDstrato obtained from ground and airborne measurements.

Due to the mobility and flexibility of the ULT flights, this aerial platform provides a promising tool for satellite validation, especially for space observations by high resolution sensors such as the future TROPOMI instrument. A key added value of the ULT-DOAS, illustrated in this work, is the capacity to investigate the spatial variability of NO₂ inside the horizontal extent of satellite pixels, e.g. above plant exhaust plumes.