



Airborne MAX-DOAS measurements over California: testing the NASA OMI tropospheric NO₂ product

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Airborne Multi-AXis Differential Optical Absorption Spectroscopy (AMAX-DOAS) measurements of NO₂ tropospheric vertical columns were performed over California for two months in summer 2010. The observations are compared to the NASA Ozone Monitoring Instrument (OMI) tropospheric vertical columns (data product v2.1) in two ways: (1) Median data was compared for the whole time period for selected boxes and the agreement was found to be fair ($R = 0.97$, slope = 1.4 ± 0.1 , $N = 10$). (2) A comparison was performed on the mean of coincident AMAX-DOAS measurements within the area of the corresponding OMI pixels with the tropospheric NASA OMI NO₂ assigned to that pixel. The effects of different data filters were assessed. Excellent agreement and a strong correlation ($R = 0.85$, slope = 1.05 ± 0.09 , $N = 56$) was found for (2) when the data was filtered to eliminate large pixels near the edge of the OMI orbit, the cloud radiance fraction was < 50 %, the OMI overpass occurred within 2 hr of the AMAX-DOAS measurements, the flight altitude was > 2 km, and a representative sample of the footprint was taken by the AMAX-DOAS instrument. The AMAX-DOAS and OMI data sets both show a reduction of NO₂ tropospheric columns on weekends by 38 ± 24 % and 33 ± 11 %, respectively. The assumptions in the tropospheric satellite air mass factor simulations were tested using independent measurements of surface albedo, aerosol extinction and NO₂ profiles for Los Angeles for July 2010 indicating an uncertainty of 12 %.