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OMI NO_2 compared with NO_2-sonde and aircraft data during DISCOVER-AQ: column comparison and assumed profile shape analysis

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Based on the NO_2-sonde dataset measured during the DISCOVER-AQ campaign from four deployments covering the period of 2011 to 2014, new analyses comparing OMI QA4ECV NO_2 columns and assumed profile shapes to aircraft, sonde, and model data have been carried out. The KNMI NO_2-sonde was used on a Millersville University tethered balloon to make semi-continuous, lower boundary layer profiles of NO_2 concentrations from the ground up to 500 m AGL. The 1-Hz sampling of both NO_2 and meteorological variables makes it possible to combine the NO_2-sonde data with aircraft measurements of NO_2 from the NCAR NO_xyO_3 instrument onboard the NASA P3-B which spiraled over the NO_2-sonde site up to 3 times per day on key measurement days. The combined sonde-aircraft profiles are compared to the DOMINO averaging kernel and a priori TM4 model profile shape. The combined sonde-aircraft data are also used to create a pseudo-column to compare with the tropospheric column amount from the DOMINO data product. The relationship of the wind direction and how it varies with NO_2 concentration versus height is also presented.