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Validation of OMI and SCIAMACHY total and tropospheric NO_2 using DANDELIONS ground-based measurements

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Validation of daily total and tropospheric NO_2 satellite measurements revealing strong day to day variability is crucial for understanding the quality of these novel satellite data products and their use in air quality forecasting. We present comparisons among OMI, SCIAMACHY and ground based total and tropospheric NO_2 columns made during the Dutch Aerosol and Nitrogen Dioxide Experiments for vaLIdation of OMI and SCIAMACHY (DANDELIONS-2) September 2006 campaign at Cabauw, The Netherlands. We focus on days with clear skies and fair weather. An elaborate set of ground based measurements were made during the campaign including NO_2 profile observations by the RIVM lidar and NO2 columnn and profile observations by three MAXDOAS instruments (operated by the Belgian Institute for Space Aeronomy, the University of Bremen and the University of Heidelberg). Previous studies (Brinksma et al., 2008; Celarier et al., 2008; Volten et al., 2008) found good agreement among the various ground based instruments. Satellite measurements are taken for a snapshot in time for a spatial average over a given pixel size. The ground based measurements were made throughout the day, including the satellite overpass, thereby providing information on diurnal variability. Considering the large variability of NO_2on all time scales, the satellite measurements agreed reasonably well with the collocated ground based measurements. We relate this high level of agreement to meteorological and

chemical mechanisms including back trajectories and the development of the planetary boundary layer measured with a boundary layer lidar.

Brinksma, E.J. et al., 2008, The 2005 and 2006 Dandelions NO_2 and aerosol intercomparison campaigns, Journal of Geophysical Research, accepted.

Celarier, E.A. et al., 2008, Validation of Ozone Monitoring Instrument Nitrogen Dioxide columns, Journal of Geophysical Research, accepted.

Volten, H. et al., 2008, Using NO_2 lidar profile measurements for satellite validation and interpretation, Journal of Geophysical Research, manuscript in progress.