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Intercomparison of daily total column ozone data from the Pandora spectrophotometer with Dobson, Brewer, and OMI measurements over Seoul, Korea

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Daily total column ozone (TCO) measured using the Pandora spectrophotometer (#19) was intercompared with data from the Dobson (#124) and Brewer (#148) spectrophotometers, as well as from the Ozone Monitoring Instrument (OMI), over the 2-year period between March 2012 and March 2014 at Yonsei University, Seoul, Korea. The Pandora TCO measurements are closely correlated with those from the Dobson, Brewer, and OMI instruments with regression coefficients (slopes) of 0.95, 1.00, 0.98 (OMI-TOMS), and 0.97 (OMI-DOAS), respectively, and determination coefficients (R2) of 0.95, 0.97, 0.96 (OMI-TOMS), and 0.95 (OMI-DOAS), respectively. In particular, they show a close agreement with the Brewer TCO measurements, with slope and R2 values of 1.00 and 0.97, respectively. The difference between the Pandora and Dobson data can be explained by smaller amount of Dobson data available to calculate the daily averages, observation times, solar zenith angles, SO_2 effect, temperature, and humidity between the two datasets. The difference in the results obtained from the Pandora instrument and Ozone Monitoring Instrument-Differential Optical Absorption Spectroscopy (OMI-DOAS algorithm) can be explained by the dependence on seasonal variations of about $\pm 2\%$ and solar zenith angle leading to overestimation by 5% of OMI-DOAS measurements. For the Dobson measurements in particular, the difference caused by the inconsistency in observation times when compared with the Pandora measurements was up to 12.5% on 22 June 2013 because of diurnal variations in the TCO values. However, despite these various differences and discrepancies, the daily TCO values measured by the four instruments during the 2-year study period are accurate and closely correlated.