Geophysical Research Abstracts
Vol. 17, EGU2015-2597, 2015
EGU General Assembly 2015


# Validation of OMI Total Ozone Retrievals from the SAO Ozone Profile Algorithm and Three Operational Algorithms 3 with Brewer Measurements

Juseon Bak (1), Jae H. Kim (1), Xiong Liu (2), and Kelly Chaance (2)

(1) Pusan National University, Atmospheric Science, Pusan, (jaekim@pusan.ac.kr), (2) Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, United States.

The optimal estimation (OE) based ozone profile algorithm developed at Smithsonian 3 Astrophysical Observatory (SAO) is assessed as to its accuracy to extract total ozone amount from 4 Ozone Monitoring Instrument (OMI) measurements through the validation using Brewer ground 5 based measurements between January 2005 and December 2008. We compare it against the quality of 6 three OMI operational ozone products, derived from NASA TOMS, KNMI DOAS, and KNMI OE 7 algorithms, respectively. The validation demonstrates that the SAO ozone profile algorithm generally 8 has the best total ozone retrieval performance compared to the three OMI operational ozone products. 9 The individual station comparisons show an agreement between SAO and Brewer within $\pm$ 1% except 10 at polar stations ($\sim$ -2 %), with a high correlation coefficient of $\sim$ 0.99 at most stations. The KNMI OE 11 algorithm systematically overestimates the true total ozone value at all stations with a bias from 2 % 12 at low/mid latitude stations to 5 % at high latitude stations. On the other hand, TOMS/DOAS 13 algorithm underestimates total ozone by $\sim$ -1.7 % on average. The standard deviations of differences 14 are $\sim$ 1.8 % for SAO and TOMS while DOAS and KNMI show the standard deviation values of 2.2 15 and 2.5 %, respectively. The remarkable stability of SAO OE algorithm is found with no significant 16 dependency on algorithmic variables such as viewing geometries, cloud parameters, and time. In 17 comparison, the severe dependency on both solar and viewing zenith angles is found in KNMI OE 18 algorithm, which is characterized with a negative (positive) correlation with smaller (larger) solar 19 zenith angles and the strong cross-track dependent biases ranging from 4% at nadir and 1% at off-20 nadir positions. The dependence of DOAS and TOMS algorithms on the algorithmic variables is 21 marginal compared to KNMI OE algorithm, but distinct compared to SAO OE algorithm. Relative 22 differences between SAO/DOAS and Brewer show a similar seasonal dependence and variability, 23 which is lower than TOMS and KOE. The significant differences in total ozone retrieval performance 24 between the KOE/SOE algorithms cannot be sufficiently explained by the use of soft calibration (in 25 SOE) and the use of different a priori error covariance matrix, but other different algorithm details 26 causes significantly larger fitting residuals by a factor of 2-3.