Geophysical Research Abstracts
Vol. 17, EGU2015-2590, 2015
EGU General Assembly 2015


# Arctic total ozone trend and variability during 2004 – 2012 based on Brewer revised data, Ozonesonde and satellite measurements

Omid Moeini (1,2), Zahra Vaziri (1), Tom McElroy (1), David Tarasick (1,2), Vladimir Savastiouk (3), and David Barton (1)

(1) York University, Toronto, Ontario, Canada (omidmns@yorku.ca), (2) Environment Canada, Toronto, Ontario, Canada, (3) Full Spectrum Science Inc., Toronto, Ontario, Canada

It is now known that Single-Monochromator Brewer Spectrophotometer ozone measurements suffer from non-linearity due to the presence of instrumental stray light caused by scattering from the optics within the instrument. Stray light is unwanted radiation from different wavelengths that arrives at the detector during the measurements. Since the gradient of ozone absorption is large in the ultraviolet spectral region, the stray light contribution becomes significant between 300 and 325 nm where the Brewer measures, especially when the amount of ozone in the light path becomes more than 1000 Dobson Units (D.U.). Stray light results in an underestimated ozone column at larger air masses. As the light path (air mass) increases, stray-light effects in the measurements also increase. An ozone column of 600 D.U. with at an air mass factor of 3 (1800 D.U.) can measure as much as 8% lower than the ozone actual amount. These are conditions commonly seen during the Arctic spring.

A new method to account for stray light effects is being developed for the Brewer ozone measurements. This method is based on a mathematical model of the instrument response and a non-linear retrieval which calculates the best values for the model parameters. The parameterization used is validated by an instrument physical model simulation. Using the mathematical model in reverse provides correct ozone values. This paper presents the method and the results of a trend analysis based of the re-evaluated data of three Brewers which are located in the Arctic (Alert Lat. 82.44, Lon. -62.55, Eureka Lat. 79.96, Lon. -86.45 and Resolute Lat. 74.69, and Lon. -95.01) from 2004 to 2012. Gaps in the Brewer data are filled with ozonesonde reanalysis data obtained from WOUDC (World Ozone and Ultraviolet radiation Data Centre) and the results will be compared with MLS (Microwave Limb Sounder) satellite data.