One Year of AOD, Halogen Radicals, OVOCs, H_2O and NO_2 Measurements at Mauna Loa Observatory

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The University of Colorado is conducting long-term observations of reactive trace gases, humidity, and aerosol optical depth at Mauna Loa Observatory. In particular, our measurements separate tropospheric and stratospheric bromine oxide, and nitrogen dioxide (NO_2), along with tropospheric iodine oxide, formaldehyde, glyoxal, water vapor, and other gases by means of a remote controlled state-of-the-art Multi-AXis Differential Optical Absorption Spectroscopy (MAX-DOAS) instrument. The instrument has been continuously operational since March 2017, providing a full year of measurements to investigate seasonal cycles. The instrument collects scattered light from multiple angles between zenith and horizon from two hemispheres. Using the Ring effect, i.e. the filling-in of Fraunhofer lines due to inelastic Raman scattering on air molecules, we can retrieve information on the aerosol optical density (AOD) above with high sensitivity particularly at low AOD. This is a prerequisite to quantify total trace gas columns from DOAS observations. Here we present our AOD retrieval and comparison with Aeronet data. We further discuss the seasonal cycle of the observed trace gases.

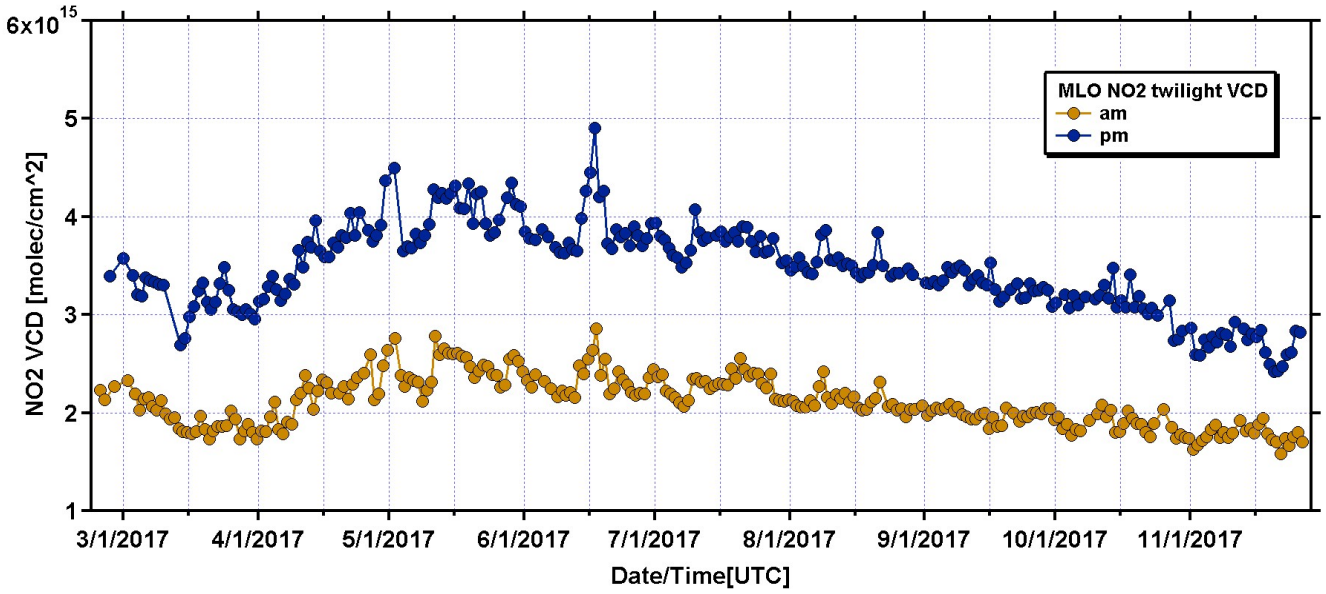

Figure 1. Stratospheric NO_2 observation.