CHARACTERIZATION OF OZONE PROFILES DERIVED FROM AURA TES AND OMI RADIANCES

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We present satellite based ozone profile estimates derived by combining radiances measured at thermal infrared (TIR) wavelengths from the Aura Tropospheric Emission Spectrometer (TES) and ultraviolet (UV) wavelengths measured by the Aura Ozone Monitoring Instrument (OMI). The advantage of using these combined wavelengths and instruments for sounding ozone over either instrument alone is improved sensitivity near the surface as well as the capability to consistently resolve the lower troposphere, upper troposphere, and lower stratosphere for scenes with varying geophysical states. For example, the vertical resolution for ozone estimates from either TES or OMI vary strongly by surface albedo and temperature and typically provide 1.6 degrees-of-freedom for signal (DOFS) for TES or less than 1 DOFS for OMI in the troposphere. The combination typically provides 2 DOFS in the troposphere with approximately 0.4 DOFS for near surface ozone (surface to 700 hPa). We evaluate these new ozone profile estimates with ozonesonde measurements and find that calculated errors for the joint TES and OMI ozone profile estimates are in approximate agreement with actual errors as derived by the root-mean-square difference between the ozonesondes and the joint TES/OMI ozone estimates. We find that the vertical resolution of the joint TES/OMI ozone profile estimate is sufficient for quantifying variations in near-surface ozone with a precision of 26 % (15.6 ppb) and a bias of 9.6 % (5.7 ppb).To further improve the quality of ozone measurements using multiple spectral regions, next generation of ozone spectroscopic parameters should mitigate the existing discrepancy among different spectral regions (microwave, thermal infrared, visible and ultraviolet).