# Evaluating a priori ozone profile information used in TEMPO tropospheric ozone retrievals

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Ozone ($O_3$) is a greenhouse gas and toxic pollutant which plays a major role in air quality. Typically, monitoring of surface air quality and $O_3$ mixing ratios is primarily conducted using in situ measurement networks. This is partially due to high-quality information related to air quality being limited from space-borne platforms due to coarse spatial resolution, limited temporal frequency, and minimal sensitivity to lower tropospheric and surface-level $O_3$. The Tropospheric Emissions: Monitoring of Pollution (TEMPO) satellite is designed to address these limitations of current space-based platforms and to improve our ability to monitor North American air quality. TEMPO will provide hourly data of total column and vertical profiles of $O_3$ with high spatial resolution to be used as a near-real-time air quality product.

TEMPO $O_3$ retrievals will apply the Smithsonian Astrophysical Observatory profile algorithm developed based on work from GOME, GOME-2, and OMI. This algorithm uses a priori $O_3$ profile information from a climatological data-base developed from long-term ozone-sonde measurements (tropopause-based (TB) $O_3$ climatology). It has been shown that satellite $O_3$ retrievals are sensitive to a priori $O_3$ profiles and covariance matrices. During this work we investigate the climatological data to be used in TEMPO algorithms (TB $O_3$) and simulated data from the NASA GMAO Goddard Earth Observing System (GEOS-5) Forward Processing (FP) near-real-time (NRT) model products. These two data products will be evaluated with ground-based lidar data from the Tropospheric Ozone Lidar Network (TOLNet) at various locations of the US. This study evaluates the TB climatology, GEOS-5 climatology, and 3-hourly GEOS-5 data compared to lower tropospheric observations to demonstrate the accuracy of a priori information to potentially be used in TEMPO $O_3$

algorithms. Here we present our initial analysis and the theoretical impact on TEMPO retrievals in the lower troposphere.