Daily cycles in CO

The diel cycle of trace gases such as CO impacts air quality and measurements of such patterns can help evaluate AQ models such as CAMx and CMAQ. Measurement in the PBL is essential to track these patterns. The diel cycle of CO is weak in the lower free troposphere over rural areas, as evidenced by the relatively constant mixing ratios observed at Pinnacles State Park, NY, a site about 500 m altitude (Figure). Urban areas, in contrast, show strong daily cycles resulting from PBL dynamics and traffic patterns; see observations from Pittsburgh, PA. High concentrations of CO are observed in urban areas in the cooler months for cloud-free conditions when the mixing height is relatively low. The daily cycles in the column content and PBL column content remain unknown, and GRIPS can address this uncertainty.The temporal continuity and sensitivity of GRIPS to near surface trace gases will be invaluable in improving our understanding of tropospheric chemistry and air quality.







**Figure Caption.** Observed average surface mixing ratios of CO expressed as climatology plots where the X-axis is month and the Y-axis is time of day. The dashed black lines indicate sunrise and sunset – GRIPS will determine PBL concentrations for solar zenith angles less than about 70**°**. The horizontal gray line indicates the approximate overpass time of MOPITT. CLR represents data collected for clear sky conditions; OVC overcast. The difference indicates the maximum expected bias due to sampling in cloud-free conditions.