

Total Column Carbon Observing Network: Variability in Total Column CO₂ and CO

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The Total Column Carbon Observing Network (TCCON) is a growing network of ground-based high resolution Fourier Transform Spectrometers optimized to observe gases, including CO₂, CO, CH₄, N₂O, HF, H₂O, and O₂, with transitions in the near-infrared (details at tcon.caltech.edu). In this presentation we focus on two sources of variability to the total column CO₂ record: synoptic-scale weather and biomass burning. First, we present 3.5 years of total column carbon dioxide data from the first dedicated TCCON site at Park Falls, Wisconsin. This represents the longest time series of measured total column CO₂ and provides new information on the variability of mid-latitude CO₂. We find that synoptic scale variability dominates the CO₂ column variability, particularly during summer. We regress CO₂ anomaly against potential temperature anomaly, a dynamical signal, to find that synoptic activity contributes +/- 2 ppm to the total column signal on top of the seasonal cycle. The observed range of synoptic-scale variability is not captured in transport models such as MATCH, or reanalysis products such as CarbonTracker. Second, we demonstrate the influence of burning on CO₂ observations at three sites in the TCCON network: Park Falls, Wisconsin; Darwin, Australia; and Pasadena, California. Simultaneous observations of total column CO enable us to better understand the influence of biomass burning on CO₂ variability.

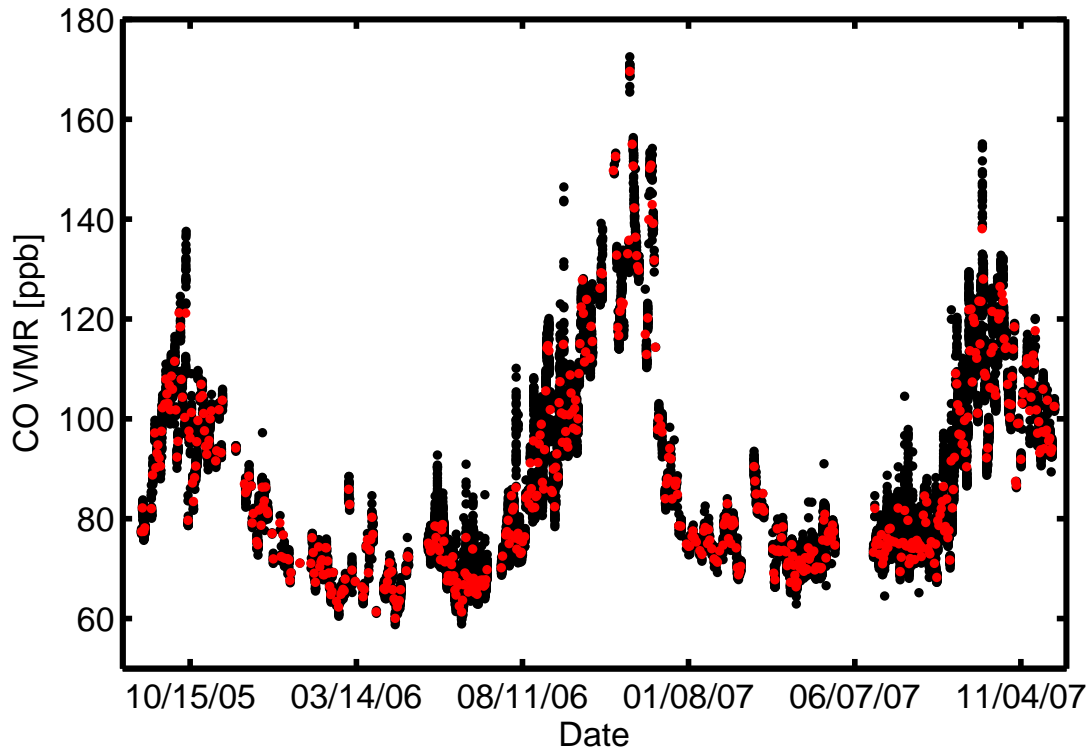


Figure 1. Total column carbon monoxide retrieved from ground-based FTS spectra obtained at Darwin, Australia.