



## **Ground-based measurements of methane, nitrous oxide, carbon monoxide and ozone over Toronto and comparisons with the GEOS-Chem model**

Cynthia Whaley, Kimberly Strong, and Dylan Jones

University of Toronto, Physics, Toronto, Canada (cwhaley@atmosph.physics.utoronto.ca)

We present an eight-year time series of tropospheric gases retrieved from spectra measured with a high-resolution ground-based Fourier Transform Infrared (FTIR) spectrometer at the University of Toronto Atmospheric Observatory (TAO). TAO is an urban site in the Network for Detection of Atmospheric Composition Change (NDACC) Infrared Working Group (IRWG). The trace gas retrievals are performed using the optimal estimation method implemented with the SFIT2 algorithm. The retrieval parameters used conform with the NDACC-IRWG harmonization initiative, which aims to achieve globally consistent and optimal retrievals for its sites.

The time series of the total and tropospheric columns from May 2002 to December 2010 are presented for methane, nitrous oxide, carbon monoxide and ozone. These are important species for air quality and global warming and we examine their seasonal and inter-annual variability at an urban site. Comparisons between TAO methane and the Greenhouse gas Observing Satellite (GOSAT) measurements will be presented. The tropospheric carbon monoxide and ozone time series are compared to the GEOS-Chem model, which is a global 3-D chemical transport model of atmospheric composition driven by assimilated meteorological fields from the Goddard Earth Observing System (GEOS). We validate the GEOS-Chem carbon monoxide and ozone simulations, and use the model to interpret the variability in our observed time series.