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CAFTON and PEARL: Using Ground-based FTIR Spectroscopy to Probe Atmospheric Composition over Canada

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Fourier transform infrared (FTIR) spectroscopy provides a powerful tool for probing the atmosphere. Solar absorption spectroscopy can be used to measure atmospheric abundances of tropospheric and stratospheric trace gases, while emission spectroscopy also provides information about clouds and the radiation budget. High-quality time series of composition measurements, along with critical analysis and evaluation, are essential as a means to improve our understanding of the changing atmosphere. In Canada, FTIR measurements have been made for more than a decade at the University of Toronto Atmospheric Observatory (TAO) and since 2006 at the Polar Environment Atmospheric Research Laboratory (PEARL) in the high Arctic. These instruments, in combination with several other FTIR spectrometers, comprise the Canadian FTIR Observing Network (CAFTON). This network involves: (i) coordination and enhancement of FTIR measurement capabilities, (ii) implementation of new and improved methods for measuring atmospheric constituents, and (iii) use of models to investigate processes related to the origin, concentration, and transport of airborne contaminants. This presentation will provide a brief overview of CAFTON, with a focus on measurements at TAO and PEARL. Several applications of these measurements will be discussed, including identification of the sources of air pollution over Toronto, detection of smoke plumes from biomass burning events in the Arctic, and quantification of Arctic stratospheric ozone depletion.

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