PARTIAL AND TOTAL COLUMN SFIT2 RETRIEVALS FROM DA8 AND PARIS-IR FOURIER TRANSFORM INFRARED SPECTRA RECORDED OVER CANADIAN ARCTIC IN THE SPRING OF 2004-5, INCLUDING COMPARISONS WITH ACE SATELLITE MEASUREMENTS

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In the springs of 2004 and 2005, two Fourier transform spectrometers (FTSs) were operated at Eureka, Nunavut, Canada (80.05°N, 86.42°W) as part of Arctic validation campaigns for the Atmospheric Chemistry Experiment (ACE). Using the SFIT2 profile retrieval program, we h ave retrieved total and partial column densities from the resulting solar absorption spectra for seven stratospheric species (O_3, HF, HCl, NO, NO_2, HNO_3, $ClONO_2$) and two tropospheric species (CH_4, N_2O) out of the 14 ACE baseline molecules. A complete set of a priori trace gas volume mixing ratio (VMR) profiles and their covariances has been constructed by using zonal mean profiles for latitudes higher than 65°N from HALOE (v.19, 1992-2005), SPARC 2000, MIPAS (v.3, 2002-2004), and the Eureka ozonesonde archive (1993-2005), and relative humidity from daily radiosonde measurements. Through investigation of column averaging kernels and degrees of freedom for signal, the ground-based retrievals have been well characterized for total and partial columns. For ozone and HCl, total error budgets for the partial and total column retrievals have been made. The DA8 measurements show good agreement with those from PARIS-IR, ACE-FTS, and ozonesondes, except those of NO_2. In addition, the DA8 measurements fall on the time series of PARIS-IR measurements for a given day for the total columns of ozone, HCl, and HNO_3. Differences in the chemical composition between the two consecutive years have also been analyzed using column ratios of O_3/HF, HNO_3/HF, HCl/HF, and $ClONO_2$/HF from the three Fourier transform spectrometers.