Atmospheric pseudo-retrievals for averaging kernel and total uncertainty characterization for ACE-FTS level 2 (PRAKTICAL) data

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For over the past decade, the ACE-FTS (Atmospheric Chemistry Experiment – Fourier Transform Spectrometer) instrument on the Canadian SciSat satellite has been observing the Earth's limb via solar occultation in the 750-4400 cm-1 spectral region with 0.02 cm-1 spectral resolution. The most recent version of the level 2 data, version 3.5 (v3.5), which starts in February of 2004 and is currently ongoing, is comprised of volume mixing ratio profiles of over 30 atmospheric trace species and over 20 subsidiary isotopologues. This study will use ACE-FTS level 1 spectra and the v3.5 forward model in pseudo-retrievals that use a Levenberg-Marquardt optimal estimation technique in order to produce representative ACE-FTS averaging kernels and to characterize the systematic and random uncertainties inherent in the level 2 profiles. In order to ensure that the derived error statistics are consistent with the v3.5 data, the results will be compared to random and systematic uncertainties propagated through the standard v3.5 retrieval algorithm. The ACE-FTS uncertainties will also be compared to the reported uncertainties of data sets from other atmospheric limb sounders.