

ATMOSPHERIC CHEMISTRY EXPERIMENT (ACE): SPECTROSCOPY FROM ORBIT

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The ACE (<http://www.ace.uwaterloo.ca/>) [1,2] satellite has been measuring atmospheric composition by solar occultation from low Earth orbit since 2004. The primary ACE instrument is a high-resolution (0.02 cm^{-1}) infrared Fourier transform spectrometer (ACE-FTS). ACE-FTS version 5.2 processing yields altitude profiles for the concentrations of 46 molecules as well as spectra of clouds and aerosols. After 20 years on orbit, ACE data are useful for climate change observations. Topics covered will include measurements of greenhouse gases, gases associated with the Montreal Protocol on Substances that Deplete the Ozone Layer, fire emissions [3] and volcanic eruptions. ACE-FTS measures infrared spectra of aerosols and clouds by removing gas phase features to leave “residual” spectra. ACE retrievals depend on laboratory measurements and the presentation will highlight desirable improvements to spectroscopic data.

[1] P. F. Bernath, The Atmospheric Chemistry Experiment (ACE), *J. Quant. Spectrosc. Rad. Transfer* 186, 3-16 (2017).

[2] P. F. Bernath, The Atmospheric Chemistry Experiment (ACE): Aerosol and Gas Analysis from Orbit, *Trends in Analytical Chemistry* 166, 117207 (2023).

[3] P. Bernath, C. Boone and J. Crouse, Wildfire smoke destroys stratospheric ozone, *Science* 375, 1292-1295 (2022).