

THE FOURIER TRANSFORM SPECTROMETER (FTS) ON THE ATMOSPHERIC CHEMISTRY EXPERIMENT (ACE) MISSION

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The ACE mission goals are: (1) to measure and understand the chemical and dynamical processes that control the distribution of ozone in the upper troposphere and stratosphere, with a particular emphasis on the Arctic region; (2) to explore the relationship between atmospheric chemistry and climate change; (3) to study the effects of biomass burning in the free troposphere; (4) to measure aerosol number density, size distribution and composition in order to reduce the uncertainties in their effects on the global energy balance.

ACE is making a comprehensive set of simultaneous measurements of trace gases, thin clouds, aerosols, and temperature by solar occultation from a satellite in low earth orbit. A high-inclination (74 degrees), low-earth orbit (650 km) gives ACE coverage of tropical, mid-latitude and polar regions.

A high-resolution (0.02 cm⁻¹) infrared Fourier Transform Spectrometer (FTS) operating from 2 to 13 microns (750-4400 cm⁻¹) is measuring the vertical distribution of trace gases, and the meteorological variables of temperature and pressure. The ACE concept is derived from the now-retired ATMOS FTS instrument, which flew on the Space Shuttle in 1985, 1992, 1993, and 1994.

Aerosols and clouds are being monitored using the extinction of solar radiation at 0.525 and 1.02 microns as measured by two filtered imagers as well as by their infrared spectra.

The FTS and imagers were built by ABB-Bomem in Quebec City, while the satellite bus was made by Bristol Aerospace in Winnipeg. ACE was selected in the Canadian Space Agency's SCISAT program, and was successfully launched by NASA on August 12, 2003 for a nominal 2 year mission. Selected results for ACE-FTS will be presented.