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The Atmospheric Chemistry Experiment (ACE): MLT Results

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ACE (also known as SCISAT) is making a comprehensive set of simultaneous measurements of numerous 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-latitudes and polar regions. The primary instrument is a high-resolution (0.02 cm-1) infrared Fourier Transform Spectrometer (FTS) operating from 2 to 13 microns (750-4400 cm-1). ACE was launched by NASA on 12 August 2003 for a nominal 2-year mission; after 6 years on orbit the ACE-FTS performance is still excellent.

The first results of ACE have been presented in a special issue of Geophysics Research Letters (http://www.agu.org/journals/ss/ACECHEM1/) in 2005 and recently a special issue on ACE validation has been prepared for Atmospheric Chemistry and Physics (http://www.atmos-chem-phys.net/special_issue114.html) by K. Walker and K. Strong; more information can be found at http://www.ace.uwaterloo.ca. The ACE mission goals were initially focussed mainly on polar ozone chemistry, and more recently have shifted more to the troposphere where organic pollutants such as methanol and formaldehyde have been detected.

ACE makes limb observations from about 5 km (cloud free scenes) up to nearly 150 km in the lower thermosphere, where CO2 absorption is still weakly detectable. This talk will review ACE-FTS results in the mesosphere and lower thermosphere. Topics covered will include the mesospheric descent of NOx in the polar winter, spectra of polar mesospheric clouds, concentration profiles of CO2 (which do not match model predictions), and combined Odin-Osiris/ACE-FTS observations.