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Measuring ozone and related species from space with the Atmospheric Chemistry Experiment (ACE)

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The Canadian-led Atmospheric Chemistry Experiment (ACE) is a Canadian-led scientific satellite that uses infrared and UV-visible spectroscopy to investigate the chemistry and dynamics of the Earth's atmosphere. The primary instrument on-board, the ACE Fourier Transform Spectrometer (ACE-FTS) is a high-resolution (0.02 cm^{-1}) FTS operating between 750 and 4400 cm^{-1} . It also contains two filtered imagers (0.525 and 1.02 microns) to measure atmospheric extinction due to clouds and aerosols. The second instrument is a dual UV-visible-NIR spectrophotometer called ACE-MAESTRO (Measurements of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation), which extends the ACE wavelength coverage to the 280 - 1030 nm spectral region. Launched in August 2003, the ACE instruments have been making regular solar occultation measurements for over 12 years and, from these measurements, altitude profiles of atmospheric trace gas species, temperature and pressure are obtained. These profiles include ozone, ozone-depleting species, greenhouse gases and atmospheric tracers. The 650 km altitude, 74 degree circular orbit provides global measurement coverage with a focus on the Arctic and Antarctic regions. The long lifetime of ACE has provided a valuable time series of composition measurements that contribute to our understanding of ozone recovery. In addition to the instrument and mission status, a review of ACE science results relating to ozone will be presented in this paper.