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Scientists to Validate Satellite-Based Ozone Measurements

Aura, the third and final satellite in the National Aeronautics and Space Administration (NASA) Earth Observing System (EOS), was launched into orbit on July 15, 2004. Aura was designed to collect data from Earth's atmosphere, thus complementing EOS satellites Terra, which monitors land, and Aqua, which observes Earth's water cycle. Data collected by Aura will help scientists (1) understand the causes behind declining global air quality and changing climate and (2) track the predicted recovery of Earth's ozone layer.

Aura carries a number of specialized instruments that take measurements of atmospheric chemistry. One of Aura's instruments, the Tropospheric Emission Spectrometer (TES), takes global measurements of chemical compounds and temperature. The TES will make the first direct measurements of ozone in the lower atmosphere and will also measure compounds including nitrates, water vapor, and tropospheric ozone precursors such as carbon monoxide. Data collected by the TES will be used in atmospheric chemistry prediction models to help researchers distinguish between human and natural influences on air quality.

Figure 1. Artist's rendering of the Aura satellite in orbit (NASA image).

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In January and February 2006, the SGP facility is hosting an experiment headed by NASA researcher Francis Schmidlin. The objective is to validate and verify the ozone measurements the TES is taking. Researchers will be on-site to launch specialized ozone sondes that resemble the familiar weather balloons launched daily at the SGP, but instead measure vertical profiles of ozone in the atmosphere. The sondes' *in situ* ozone measurements will be compared with the satellite-based ozone measurements taken by the TES. Verification of satellite measurements is a critical step in assuring the accuracy and dependability of research results.

Another part of the Aura validation effort is an SGP experiment that will begin this spring. A team headed by Frank Murcray of the University of Denver will be operating the Solar Radiance Transmission Interferometer (SORTI). This ground-based optical radiometer produces ultra-high-resolution infrared spectra of the solar radiation transmitted through the atmosphere.

The SORTI is mounted on a solar tracker that directs solar radiation into the instrument. The high-resolution SORTI measurements allow verification of line-by-line model calculations of radiation reaching Earth's surface. Once the measurements are calibrated, the SORTI data can also be used to quantify total integrated column amounts of many atmospheric chemical species, including ozone, methane, ammonia, and carbon monoxide, for comparison with satellite measurements.