Team evaluates new data collection method after age-related issue

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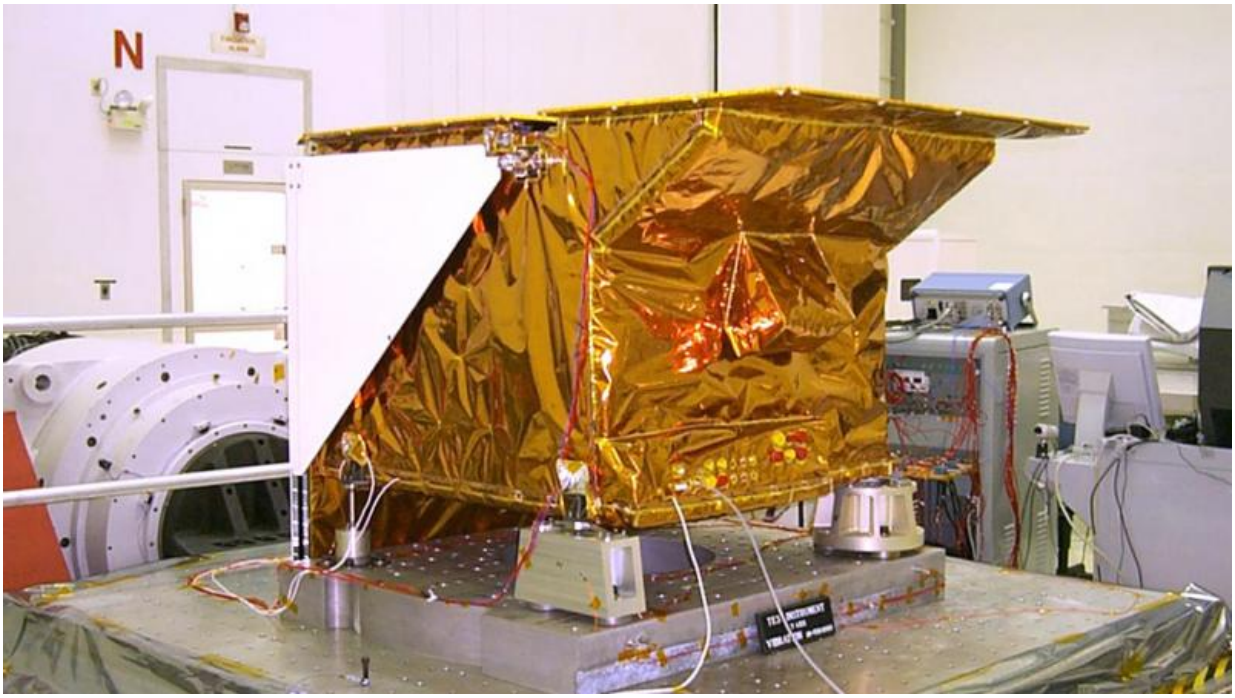

NASA's Tropospheric Emission Spectrometer (TES) instrument, one of four instruments on NASA's Aura spacecraft. Credit: Northrop Grumman

Mission managers at NASA's Jet Propulsion Laboratory, Pasadena, California, are evaluating an alternate way to collect and process science data from the Tropospheric Emission Spectrometer (TES) instrument on NASA's Aura spacecraft following the age-related failure of a critical instrument component. TES is an infrared sensor designed to study

Earth's troposphere, the lowermost layer of Earth's atmosphere, which is where we live. Launched in July 2004 and designed to fly for two years, the TES mission is currently in an extended operations phase. The remainder of the TES instrument, and the Aura spacecraft itself, are operating as expected, and TES continues to collect science data. TES is one of four instruments on Aura, three of which are still operating.

In August, following a gradual decline in power output, a reference laser within TES was unable to produce sufficient power to generate detectable interferograms. The TES interferograms record patterns of electromagnetic wave interference in Earth's atmosphere, similar to ripples on a pond. The reference laser functions like a yard stick, measuring the lengths between the troughs in the interferogram. With this knowledge, scientists can determine how much infrared radiation is entering the instrument. Because each gas in Earth's atmosphere has its own unique thermal infrared signature, or "fingerprint," these measurements can be used to detect and quantify the composition of gases in the atmosphere.

The TES science team has identified an alternate way to collect and process these laser measurements that uses an internal clock within TES to produce interferograms based upon measurements of time, rather than of space. The team is currently developing and testing algorithms to evaluate the ability of these clock-generated interferograms to substitute for the laser-generated ones.

Development and testing of the algorithms is expected to take at least several months. In the meantime, TES continues to collect and transmit raw measurement data to the TES ground data system, but delivery of science data products to users will be delayed.

TES measures the distribution of gases in Earth's lower atmosphere. These data advance understanding of the chemistry of the lower

atmosphere, interactions between the lower atmosphere and biosphere, and the exchange of gases between Earth's troposphere and stratosphere.

While TES can detect and measure many chemicals in Earth's troposphere, its primary mission is to measure ozone. Low levels of ozone are a natural component of the troposphere, but higher levels, usually associated with polluted environments, are dangerous to plants and animals, including humans. The instrument is providing important data on where ozone in the troposphere comes from and how it interacts with other chemicals in the atmosphere. TES data have been used to study the impact of ozone on Earth's climate, as well as changes in background levels of ozone over the Western United States due to non-local sources of pollution.

Other TES mission research highlights to date include:

- Studies that validate how pollutants are transported globally from continent to continent
- Differentiation of "heavy" water vapor from normal vapor, which can be used to track evaporation and precipitation cycles in the atmosphere
- The first quantification of the greenhouse gas effect of ozone
- Demonstration of ozone measurements near Earth's surface, in conjunction with Aura's ultraviolet Ozone Monitoring Instrument (OMI)
- Measuring ammonia, a significant source of aerosols, in the lower atmosphere

More information: For more information on TES, visit tes.jpl.nasa.gov/

Provided by NASA