

# New space sensor as a hosted payload to track air pollution across North America

November 9 2012, by Steve Cole

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NASA has selected a proposal from the Smithsonian Astrophysical Observatory in Cambridge, Mass., to build the first space-based instrument to monitor major air pollutants across the North American continent hourly during daytime. The instrument, to be completed in 2017 at a cost of not more than \$90 million, will share a ride on a commercial satellite as a hosted payload to an orbit about 22,000 miles above Earth's equator.

The competitively selected proposal, Tropospheric Emissions: Monitoring of Pollution (TEMPO), is led by principal investigator Kelly Chance of the Smithsonian Astrophysical Observatory. The investigation will for the first time make accurate observations of tropospheric pollution concentrations of ozone, [nitrogen dioxide](#), sulfur dioxide, formaldehyde, and aerosols with high resolution and frequency over North America.

"NASA is excited to make this initial step into using commercially available space on geostationary communication satellites to engage in [cutting edge science](#)," said John Grunsfeld, astronaut and associate administrator of NASA's Science Mission Directorate in Washington. "We expect to see significant advances in air quality research with TEMPO. The vantage point of geostationary orbit offers the potential for many new opportunities in other areas of [Earth system science](#)."

The TEMPO team has extensive experience in measuring the components of air quality from [low-Earth orbit](#). Chance is on the science

teams of the Ozone Monitoring Instrument now in orbit on NASA's Aura satellite and two European air quality space sensors. The team includes partnerships with Ball Aerospace and Technologies Corp., in Boulder, Colo.; NASA's Langley Research Center in Hampton, Va.; NASA's Goddard Space Flight Center in Greenbelt, Md.; the U.S. Environmental Protection Agency in Research Triangle Park, N.C.; and several U.S. universities and research organizations.

TEMPO was chosen from 14 proposals submitted to NASA's Earth Venture Instrument program. Earth Venture missions, part of the Earth System Science Pathfinder program, are small, targeted science investigations that complement NASA's larger research missions. In 2007, the National Research Council recommended NASA undertake this type of regularly solicited, quick-turnaround project. The first Earth Venture selection was awarded in 2010 for five airborne investigations. The second was for a full satellite mission, the Cyclone Global Navigation Satellite System, announced earlier this year. Today's announcement is the first Earth Venture Instruments award.

The TEMPO investigation will provide an instrument by September 2017 that NASA will seek to deploy on an appropriate satellite in geostationary orbit. Investigation costs will be capped at \$90 million, excluding the launch vehicle and integration to the selected satellite platform. Numerous commercial [communication satellites](#) are expected to be suitable for the TEMPO instrument in the 2017 time frame.

After being deployed on a geostationary satellite, TEMPO will observe Earth's atmosphere in ultraviolet and visible wavelengths to determine concentrations of many key atmospheric pollutants. From geostationary orbit, these observations can be made several times each day when North America is facing the sun instead of once per day, which is the case with current satellites orbiting a few hundred miles above the surface. Other space agencies are planning similar observations over Europe and Asia

after TEMPO is in orbit, allowing for the formation of a constellation of geostationary air quality satellites.

NASA is planning to announce two new Earth Venture calls for proposals in 2013 and make awards at regular intervals for investigations using cutting-edge instrumentation carried on airborne platforms, on small space missions, or as secondary instruments or hosted payloads on larger platforms. Langley manages the Earth System Science Pathfinder program for NASA's Science Mission Directorate. The missions in this program provide an innovative approach to address Earth science research with periodic windows of opportunity to accommodate new scientific priorities.

For more information about the Earth System Science Pathfinder program, visit: [go.nasa.gov/MKvgJO](http://go.nasa.gov/MKvgJO)

Provided by NASA

Citation: New space sensor as a hosted payload to track air pollution across North America (2012, November 9) retrieved 26 April 2024 from <https://phys.org/news/2012-11-space-sensor-hosted-payload-track.html>

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