

# Researchers help NASA measure carbon dioxide in the atmosphere

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Colorado State University scientists are involved in the launch of a \$467 million NASA satellite that will provide researchers with the clearest picture to date of the amount of carbon dioxide accumulating in the atmosphere and in natural "sinks" such as plants and oceans.

Researchers in the Department of Atmospheric Science and CIRA, the Cooperative Institute for Research in the Atmosphere, at CSU have helped develop the sophisticated algorithms that will crunch data collected by NASA's Orbiting Carbon Observatory-2 satellite.

The OCO-2 satellite is scheduled to launch at 2:56 a.m. local time on July 1 from Vandenberg Air Force Base in California. Once it is in orbit, the CSU team will work with NASA to analyze the information OCO-2 collects.

"We at CSU have been working hard on this mission for many years now," said Professor Chris O'Dell, who is leading the Colorado State team. "We've been involved with OCO-2 from the original concept design process, through the implementation of the algorithms used to actually produce the measurements."

The seven-foot-long OCO-2 spacecraft weighs 999 pounds and will circle Earth from pole-to-pole in approximately 98 minutes.

The satellite is expected to orbit the Earth for at least two years and will collect data at a higher resolution and with greater accuracy than has

been previously possible. Currently, only the Greenhouse Gases Observing Satellite (GOSAT), launched by the Japanese space agency in 2009, is dedicated to collecting carbon dioxide data.

OCO-2 is equipped with an advanced sensor that can quantify the amount of [atmospheric carbon dioxide](#) down to about 1 part per million. It also will measure the faint "glow" emitted by plants during photosynthesis, providing further information about the carbon cycle process.

The new satellite will provide much-needed information about CO<sub>2</sub> sources and sinks, which will help scientists worldwide develop better climate models.

Roughly 36 billion tons of carbon dioxide are emitted into the atmosphere every year (the equivalent of every U.S. household putting out 40 bags of trash every week for a year). About half of that stays in the atmosphere and the other half is absorbed by Earth's oceans and plants.

What scientists want to understand – and what the data collected by OCO-2 will help inform – is where those sources and sinks of atmospheric CO<sub>2</sub> are located on the planet. Determining where [carbon dioxide](#) is emitted and where it is taken up by Earth's natural ecosystem is a key "missing piece" of the climate story.

"This information plays a huge role in our ability to predict how our climate is changing," he said.

OCO-2 is a near replica (as some on the mission say, a "carbon copy") of a previous NASA mission to measure atmospheric CO<sub>2</sub>.

A nearly-identical satellite, dubbed OCO, lifted off from Vandenberg in

February 2009. That mission ended roughly eleven minutes after launch when the nose cone of the rocket carrying the OCO satellite into orbit failed to separate as planned, plunging the [satellite](#) back into the atmosphere, where it burned up over the Antarctic ocean.

"Many of us on that original team were very heartbroken but this successor to the OCO mission is in many ways superior to the original, and we're extremely excited to put years of theory into practice and push the envelope of scientific understanding," O'Dell said.

Provided by Colorado State University

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