

NewsRelease



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Langley Research Center
Hampton, Virginia 23681-0001

Chris Rink
(757) 864-6786
c.p.rink@larc.nasa.gov

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Julia Cole
(757) 864-4052
j.h.cole@larc.nasa.gov

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NASA Satellite Instrument Warms Up Global Cooling Theory

Measurements from a NASA Langley Research Center satellite instrument dispute a recent theory that proposes that clouds in the Tropics might cool the Earth and counteract predictions of global warming. The Langley instrument indicates these clouds would instead slightly strengthen the greenhouse effect to warm the Earth.

Scientists at NASA Langley in Hampton, Va., used observations from an instrument called CERES (Clouds and the Earth's Radiant Energy System) on the Tropical Rainfall Measuring Mission (TRMM) satellite to test the Iris effect—the proposed cooling mechanism.

“The Iris effect is a very interesting but controversial idea for how clouds might act to stabilize the climate system. If correct, it would be welcome news for concerns over future climate change,” said Bruce Wielicki, CERES principal investigator at NASA Langley. “We tested the Iris hypothesis by looking down at these clouds using the latest generation of satellite data in the Tropics and found the opposite answer. If anything, these clouds appear to slightly destabilize climate.”

According to the Iris effect, the climatically important canopy of clouds in the Tropics decreases as climate warms. As its size shrinks, so does the area of ocean and land covered by the canopy. With more of the Earth's surface and atmosphere free from heat-trapping clouds, more emitted thermal energy (or heat) can escape to space and, according to the theory, cool the Earth.

While a smaller cloud canopy could allow more heat to leave the Earth, it also means more sunlight could reach the surface. In the battle between the cooling of escaping heat and the warming of incoming sunlight, cloud properties determine which one will have a stronger effect on climate. CERES provides the most accurate measurements ever of how much heat clouds trap and how much sunlight they reflect.

“We used the cloud observations from CERES, placed them inside the Iris climate model and found a slightly destabilizing effect of these clouds,” said Wielicki. “The result is that the Iris effect slightly warms the Earth instead of strongly cooling it.”

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“A recent study by Dennis Hartmann at the University of Washington has seriously challenged whether the Iris decrease in cloud canopy would occur in a warmer climate,” Wielicki adds. “Our study takes the next step and shows that, even if the Iris effect decreases the cloud canopy, the resulting change in the planetary energy balance would not act to stabilize the climate system.”

Bing Lin, a NASA Langley researcher and CERES team member, will present the paper on this research during Session 10 of the 13th Symposium on Global Change and Climate Variations at the American Meteorological Society annual meeting on Wednesday, Jan. 16, at 1:45 p.m. The Journal of Climate published this paper in the January 1, 2002, issue.

Designed and managed by NASA Langley, there are CERES instruments aboard the TRMM and Terra satellites. The CERES instruments were built by the TRW Corp., Redondo Beach, Calif.

The Iris hypothesis was published by Richard Lindzen and co-authors in the March 2001 issue of Bulletin of the American Meteorological Society.

Images and additional information about CERES are available on the Internet at:

<http://asd-www.larc.nasa.gov/ceres/ASDceres.html>
<http://visibleearth.nasa.gov/Sensors/Terra/CERES.html>