



***Clouds and the
Earth's Radiant
Energy System
(CERES)***

*Continuous measurement
of the Earth's radiation balance*

THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

Clouds and the Earth's Radiant Energy System (CERES)

Continuous measurement of the Earth's radiation balance

Data for the record books

Widely acknowledged as the most accurate broadband climate sensor ever flown in space, the Northrop Grumman-built Clouds and the Earth's Radiant Energy System (CERES) continues to return valuable data on Earth's clouds and climate after more than a decade in orbit.

CERES is a scanning broadband radiometer designed to measure the emitted thermal and reflected solar radiative energy at the top of the Earth's atmosphere. The radiometer is made up of three sensors, each with its own telescope, mounted on a gimbaled platform that continuously scans across the Earth in a 6.6-second cycle.

The CERES shortwave, longwave, and total sensor channels are calibrated to an accuracy that is 5 to 10 times better than other typical Earth remote sensors. This is accomplished using an elaborate Radiometric Calibration Facility at Northrop Grumman that was designed specifically to support CERES calibration. Accuracies of these levels are required to allow climate scientists to determine if the Earth is in a warming or cooling trend and to measure the effect of clouds on this warming or cooling.

The CERES sensors have been delivering measurements of reflected solar and Earth-emitted thermal energy since 1998, beginning with the first CERES sensor flown on the joint NASA, JAXA Tropical Rainfall Measurement Mission. Four CERES instruments are currently operating on NASA's Earth Observing System Terra and Aqua satellites, well past their design lives.

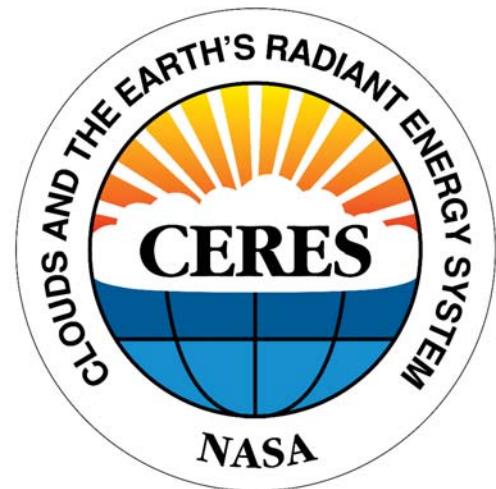
CERES and its predecessor, the Northrop Grumman-built Earth Radiation Budget Experiment, collectively have provided a continuous record of reflected solar and emitted thermal radiation since 1984. This long data record helps explain the role of clouds and the energy cycle in global climate change.

Next in the series

Northrop Grumman has built a sixth CERES sensor to fly onboard NASA's weather and climate risk reduction mission, the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project, or NPP, that was launched in October 2011. The instrument suite flying on NPP will collect land, ocean, and atmospheric data for distribution to the meteorological and climate science communities.

Next in this ongoing series is a CERES sensor being built by Northrop Grumman slated to launch on a future Joint Polar Satellite System mission managed by the National Oceanic and Atmospheric Administration (NOAA).

The continuous, precise, calibrated parameters critical to the understanding of Earth's radiation balance provided by current and future CERES sensors will extend and preserve this vital piece of the climate data record.



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