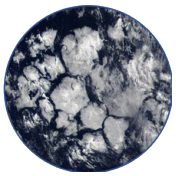
National Aeronautics and Space Administration

CLARREO Pathfinder

CLARREO Pathfinder's data will help us better understand Earth's changing climate.

CLARREO Pathfinder (CPF) data will do this by taking highly accurate measurements of sunlight reflected by Earth and the Moon. These measurements, which will be anchored to international standards, will be five to ten times more accurate than those from existing sensors. CPF will have the unique ability to maintain its high accuracy throughout its lifetime. CPF will also showcase novel techniques in transferring its high accuracy to other sensors monitoring Earth. Higher accuracy means greater certainty in our measurements, which makes it possible to detect Earth's subtle climate change trends decades sooner than otherwise possible, and provides the knowledge needed to make informed decisions in response. The CLARREO Pathfinder mission is led by NASA's Langley Research Center. The payload will be installed on the International Space Station with launch planned in 2023.

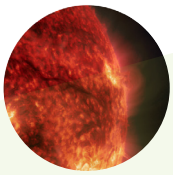


Earth's climate is complex and dynamic.

CPF will take high accuracy measurements of reflected sunlight needed to help us better understand Earth's climate system.

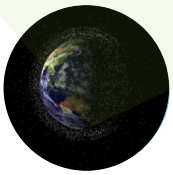
The spectral content of reflected sunlight carries climate information back to space.

CPF measurements will be sensitive to changes in reflected sunlight, which are representative of changes in several vital climate variables. This is essential to detect and understand changes in Earth's climate.



CPF will measure reflected sunlight better than current Earth-viewing sensors.

CPF will use scans of the Sun and other detailed calibration measurements to achieve unprecedented accuracy that will be 5-10 times better than existing sensors.



Other instruments need a high accuracy reference to more confidently monitor climate.

CPF will demonstrate how to transfer its high accuracy, which will be tied to international standards, to other Earth-viewing sensors.

CPF will improve the Moon as a calibration standard.

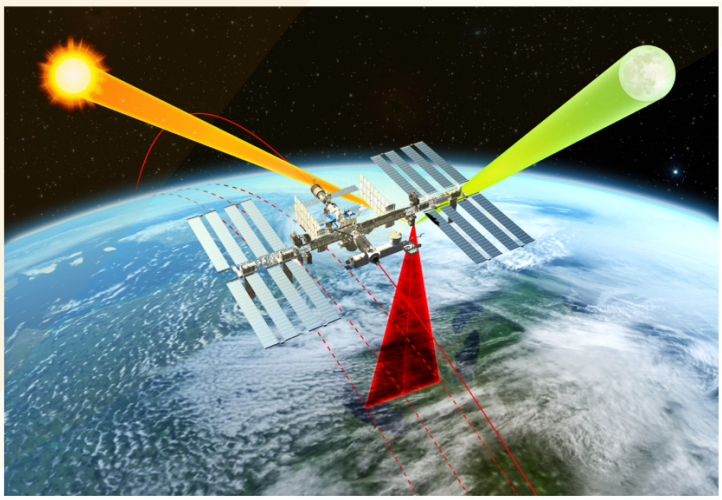
CPF's measurements will improve the calibration accuracy of the Moon, a stable calibration target, which will also help other in-orbit instruments.

For more information, go to: https://clarreo-pathfinder.larc.nasa.gov

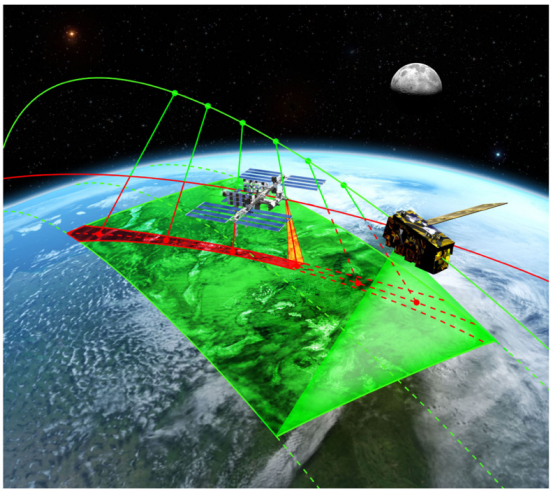
What Will CLARREO Pathfinder Do?

CPF has two main mission objectives:

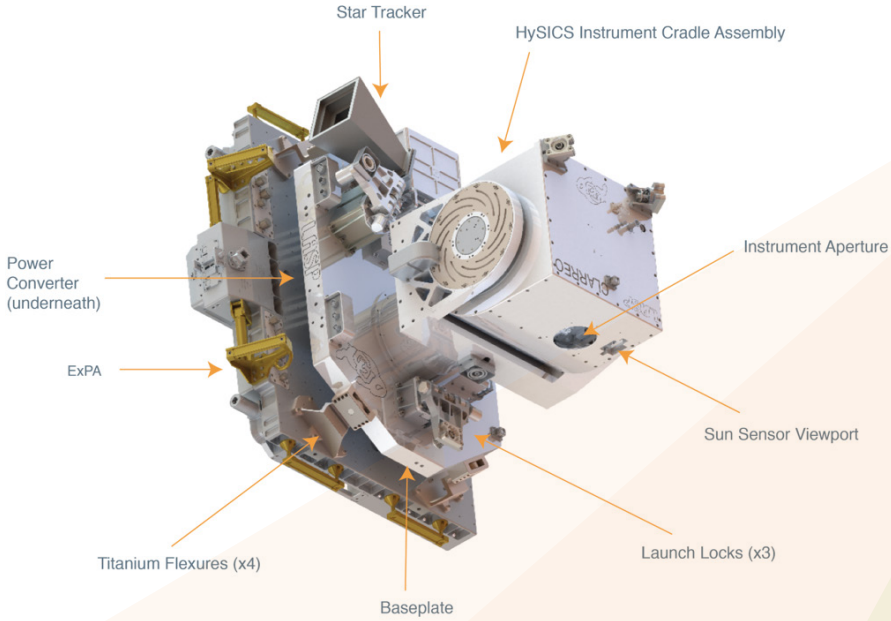
Demonstrate ability to take highly accurate measurements of Earth with on-ordit calibration using the Sun and the Moon.



Demonstrate ability to transfer high accuracy to other Earth-viewing instruments that cross its path in orbit.



The Hyperspectral Imager for Climate Science (HySICS) is the imaging spectrometer that is the heart of the CPF payload. HySICS will take spectral measurements of sunlight reflected by Earth and the Moon. The instrument is being developed and built by the University of Colorado at Boulder's Laboratory for Atmospheric and Space Physics (LASP). Its design builds on over 10 years of LASP-led science research and technology development.



CLARREO Pathfinder will establish unprecedented boundaries in accuracy (0.3%,1-sigma) of reflected sunlight measurements of Earth.