

National Aeronautics and  
Space Administration



# CLARREO Pathfinder Inter-Calibration Workshop

## CPF Mission Requirements, Objectives, and Status

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<http://fpd.larc.nasa.gov/index.html>

[www.nasa.gov](http://www.nasa.gov)

- **CLARREO Pathfinder is a directed mission through the NASA Science Mission Directorate – Earth Science Division**
  - NASA Langley has overall project management responsibility
- **CLARREO Pathfinder is a risk reduction mission for a potential future full CLARREO Mission**
  - *Two primary mission objectives:*
    1. Demonstrate on orbit, high accuracy, SI-Traceable calibration
    2. Demonstrate ability to transfer this calibration to other on-orbit assets
- **Project scope consists of formulation, implementation, launch, operation, and analysis of measurements from a Reflected Solar (RS) Spectrometer, launched to the International Space Station (ISS)**
- **Category 3 (NPR 7120.5E) / Class D Mission (NPR 8705.4), nominal 1-year mission life + 1 year science data analysis**
- **Targeted for launch in late CY2020 – early CY2021**
- **Authority to Proceed received April 11, 2016**

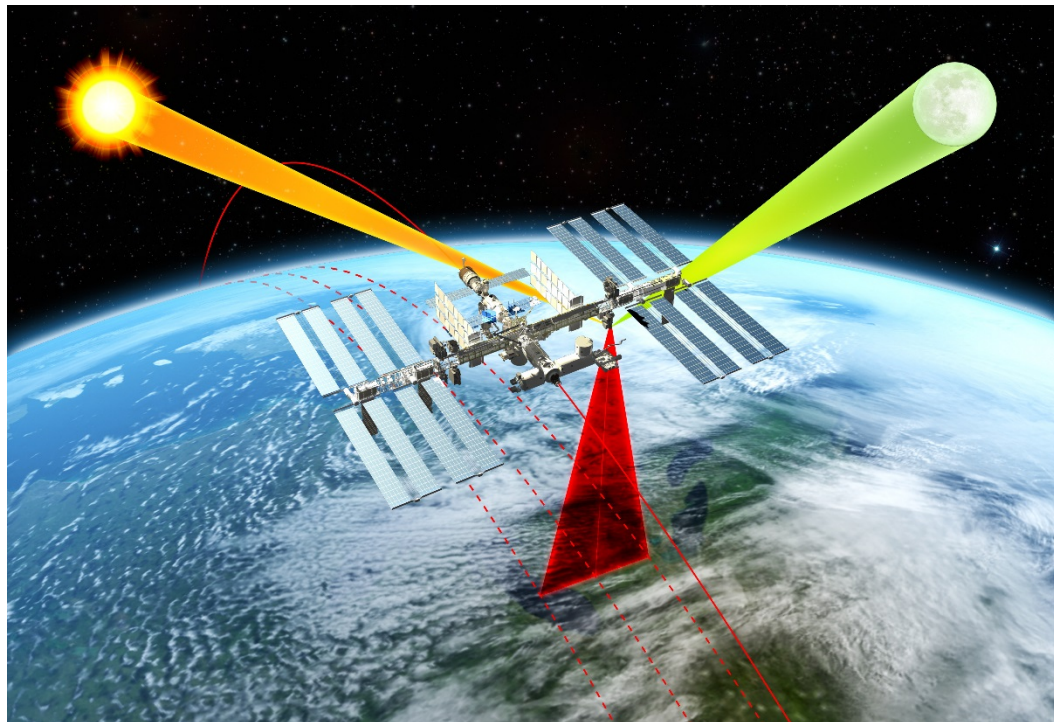
***CLARREO Pathfinder is not the end, it is a critical step along the way to a full CLARREO Mission.***



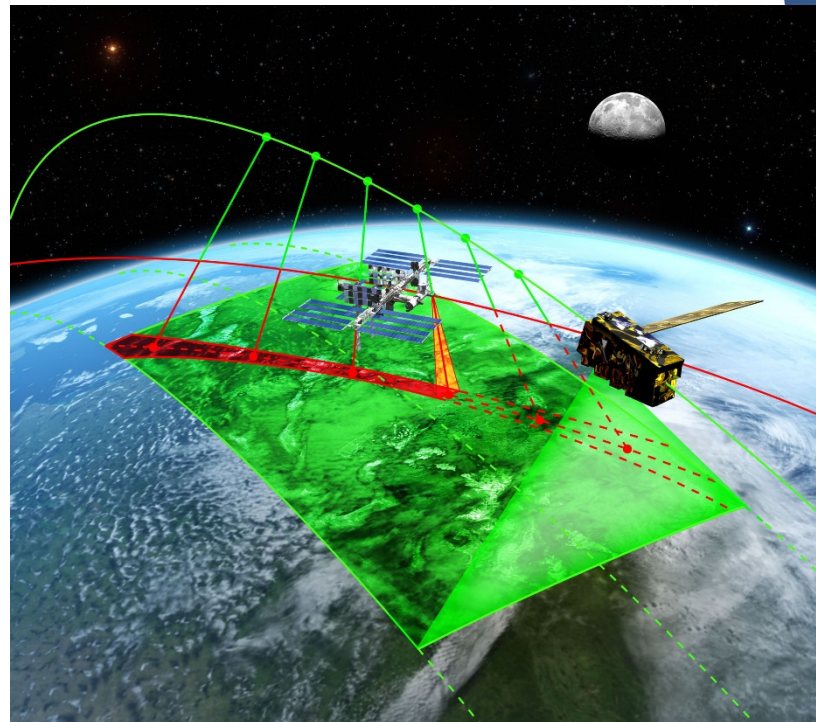
# CLARREO Pathfinder: Baseline Mission Objectives

## *Demonstrate high accuracy SI-Traceable Calibration*

## *Demonstrate Inter-Calibration Capabilities*



**Objective #1:** Demonstrate the ability to conduct, on orbit, SI-Traceable calibration of measured scene spectral reflectance in wavelength range from 350 - 2300 nm, with an advanced accuracy over current on-orbit sensors using a reflected solar spectrometer flying on the International Space Station.



**Objective #2:** Demonstrate the ability to use that improved accuracy to serve as an in orbit reference spectrometer for advanced inter-calibration of other key satellite sensors across the reflected solar spectrum (350-2300 nm).

Demonstration Parameter	Measurement Uncertainty	
	Baseline Objective*	Threshold Requirement**
<b>Spectrally-Resolved Earth Reflectance (350 – 2300 nm):</b> SI-Traceable, referenced to spectral solar irradiance	$\leq 0.3\%$ (k = 1)	$\leq 0.6\%$ (k = 1)
<b>Spectrally-Integrated Earth Reflectance (350 – 2300 nm):</b> SI-traceable broadband (350 - 2300 nm) spectrally-integrated Earth reflectance with spectral accuracy weighted using global average Earth spectrally reflected energy	$\leq 0.3\%$ (k = 1)	$\leq 0.6\%$ (k = 1)
<b>On-Orbit Inter-Calibration***:</b> Demonstrate the ability to Inter-Calibrate with CERES/RBI short wave channel and VIIRS reflectance bands	$\leq 0.3\%$ (k = 1)	$\leq 0.6\%$ (k = 1)

*\*Baseline Objective is within a factor of 2 of full CLARREO Tier-1 Decadal Survey Mission Requirements*

*\*\*Threshold requirement is a factor of 2 (CERES) to 4 (VIIRS) better than current capabilities.*

*\*\*\*Inter-calibration uncertainty are contributions from data matching noise.*

- The CLARREO Pathfinder mission shall demonstrate on orbit calibration accuracy improvement over existing reflected solar instrumentation, and use these data to demonstrate inter-calibration with these instruments.

- CERES / RBI and VIIRS are the required instruments for demonstrating inter-calibration capability
  - CERES / RBI Short Wave Channel
  - VIIRS Reflectance Bands
  - Inter-Calibration possibilities include CERES / VIIRS on Suomi NPP and JPSS-1, and RBI / VIIRS on JPSS-2
- CLARREO Pathfinder project objective is to have the capability to acquire the data necessary to demonstrate inter-calibration with other Earth-observing instruments
  - The objective is intended to get as much scientific value out of this risk reduction mission as possible within the available budget and schedule
  - **Acquisition of data** for demonstrating inter-calibration with instruments other than CERES/RBI and VIIRS will be as events of opportunity
  - **Processing the data** for demonstrating inter-calibration with instruments other than CERES/RBI and VIIRS is not within current CLARREO Pathfinder project scope / budget
    - We welcome the opportunity to work with other projects to arrange / advocate for the necessary funding

- **CLARREO Pathfinder is currently in pre-Formulation (pre-Phase A)**
  - Successful Mission Concept Review on August 24-26, 2016
  - Key Decision Point-A (KDP-A) gate review scheduled for January 12, 2017
- **CLARREO Pathfinder is a recognized International Space Station (ISS) payload and is listed on the MiPROM (MiPROM = ISS payload schedule planning tool)**
  - Instrument payload is planned to be accommodated on the ISS at Express Logistics Carrier #1 (ELC-1) Site #3
  - ISS has planned for an 18-month occupancy for the CLARREO Pathfinder payload (October 2020 through March 2022)
    - Includes 2-month commissioning period + 12 months prime mission operations
- **Project is currently performing the necessary work to establish contracts and partnerships during the Formulation phase of the project**



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***Thank you for attending the CLARREO Pathfinder  
Inter-Calibration Workshop!***

***We appreciate and value your input.***



