

# Pre-Phase A

## Official Beginning of CLARREO Pathfinder

The NASA Headquarters Earth Science Division gave approval to NASA Langley Research Center to formally begin CPF. The approval states CPF includes a Reflected Solar Spectrometer likely to be built by the Laboratory for Atmospheric and Space Physics (LASP) in Boulder, Colorado.

## CPF Begins Concept Studies (Pre-Phase A)

During this phase, the mission investigates alternatives for initial mission concepts, architectures, potential launch vehicles, and concepts of operations. These alternatives are evaluated to determine the most feasible mission concepts that would enable mission success.

## Evaluation of CPF Mission Concept (Mission Concept Review)

A review panel evaluates the feasibility of executing the proposed mission concept and ability to meet mission goals and objectives.

## CPF Receives Approval to Proceed to Next Phase: Concept and Technology Development (Key Decision Point – A)

The mission demonstrates that it addresses critical NASA objectives and that project planning is mature enough to begin the Concept and Technology Development Phase (Phase A).

# Phase A

## CPF Begins Concept & Technology Development

The project further advances mission and operational concepts and establishes an initial project plan. It also refines its requirements and continues to assess technology maturity and the need for additional technology development.

## Evaluation of the CPF System Requirements and Proposed Architecture (System Requirements Review/Mission Definition Review)

A review panel evaluates the preliminary project plan, system requirements, and proposed architecture to ensure mission requirements will be met.

## NASA Awards CPF Prime Contract to Laboratory for Atmosphere and Space Physics (LASP)

LASP designs, builds, integrates, and operates the main elements of the CPF payload, the core of which is based upon the HyperSpectral Imager for Climate Science (HySICS) instrument. The contract also includes other aspects of LASP's role on CPF including designing and providing the pointing system.

## Re-evaluation of CPF System Requirements and Proposed Architecture (delta-System Requirements Review/Mission Definition Review)

A review panel evaluates advancements in mission and system requirements and architecture design after programmatic uncertainty incurs delays in the CPF lifecycle. This delta review ensures any new design elements still satisfy mission requirements.

# Phase B

## CPF Begins Preliminary Design and Technology Completion

The project further matures the mission concept, architecture, and operations plans. It also matures preliminary instrument and mission design and initiates development of engineering prototypes of key payload subsystems.

## Evaluation of Preliminary Mission Design (Preliminary Design Review)

A review panel evaluates the preliminary mission design to assess its compliance with requirements. This includes payload and instrument components, science data processing, and the various mission interfaces.

## CPF Receives Approval to Proceed to Next Phase: Implementation (Key Decision Point – C)

The project demonstrates that it is ready to enter the Implementation Phase by illustrating that the project planning, technical, cost, and schedule baselines are adequate to enable mission success. Passing this gate review establishes Center (Langley) and Agency (NASA) commitments.

# Phase C

## CPF Enters Final Design and Fabrication Phase

The project completes testing of engineering prototypes of key payload subsystems and develops final detailed payload and ground system designs. Following a Critical Design Review, the project initiates fabrication, characterization, and testing of the flight payload components and subsystems.

## Evaluation of Matured CPF Design Ability to Meet Mission Requirements (Critical Design Review)

A review panel evaluates the matured payload and mission design for its ability to meet requirements and the project's readiness to continue with payload fabrication and assembly.

## Main Element of CPF Payload, HySICS Instrument, Complete

HySICS Instrument assembly, testing, and characterization is complete at LASP. Preparation for payload-level integration begins.

## Independent Calibration Performed

This independent calibration activity will be used as an informal validation of the official on-orbit calibration. It combines a pre-flight absolute radiometric calibration of HySICS and an instrument numerical model to transfer the pre-launch calibration to orbit.

# Phase D

## CPF Begins System Assembly, Integration, and Test

The project assembles and integrates all payload hardware and software for payload-level testing and requirements verifications. The payload is prepared for launch and operations.

## Evaluation of Readiness to Proceed with Payload Environmental Testing (Pre-Environmental Review)

A review panel evaluates the payload status, the project's readiness to proceed with environmental testing of the integrated payload, and that the project is on track to complete payload development.

## Assembly, Integration, and Testing (AI&T) Complete

AI&T of the CPF Payload is complete. Environmental testing has demonstrated that the payload can withstand launch conditions and operate in the space environment while hosted on the ISS.

## Evaluation of Payload Readiness for Delivery for Launch (Pre-Ship Review)

A review panel evaluates whether the payload has been verified to meet all functional, performance, and interface requirements, and if the project is ready to ship the payload to the ISS Payload Processing Facility at Kennedy Space Center (KSC) for final processing prior to launch.

## Evaluation of Readiness-to-Proceed with Prime Operations (Operational Readiness Review)

A review panel evaluates the readiness of the flight systems and associated ground systems for operations. This review ensures that all systems will comply with defined project requirements and constraints during the operations phase.

# CLARREO Pathfinder Project Timeline

## Phase E

### CPF Receives Approval to Launch (Key Decision Point-E)

This review marks approval to launch and the approval to transition from development activities to operations after completion of on-orbit check-out and commissioning period.

### CPF Begins Launch, Operations, and Sustainment

The mission conducts its prime operations. The payload will be launched to ISS and prime operations will begin after a period of commissioning.

### CPF Payload Launched to ISS & Commissioning Begins

After launch and installation on the ISS, a two-month commissioning period begins. During this time, functional tests are performed for payload checkout and in preparation for prime operations.

### CPF Begins Prime Operations

Payload commissioning activities have been completed and the project initiates regular payload operations for science data collection.

### Beta Level 1 and Level 4 Data Products Available

The Atmospheric Science Data Center distributes beta versions of publicly available data products.

## Phase F

### CPF Begins Closeout

The mission is complete and performs close-out activities. The payload is decommissioned and the science working groups continue refining data analysis.

### Reprocessed Level 1 and Level 4 Data Products Available

After additional data analysis and validation, the data products will be reprocessed from the one year of prime mission operations and released to the public.

## Key

Pre-Phase A  
Phase A  
Phase B  
Phase C  
Phase D  
Phase E  
Phase F

