



**NOAA Satellite and Information Service
Deep Space Climate Observatory (DSCOVR)
ENHANCED POLYCHROMATIC IMAGING CAMERA (EPIC)**

Background

The Earth Polychromatic Imaging Camera (EPIC) is an imager that provides global spectral images of the entire sunlit face of Earth, as viewed from an orbit around Lagrangian point 1 (L1)—the neutral gravity point between Earth and the sun.

EPIC is able to view the entire sunlit Earth from sunrise to sunset at an almost constant scattering angle between 165–178°. This scattering angle has minimal overlap with other satellites’ scattering angles. EPIC’s observations from the L1 position will provide a unique angular perspective and can be combined with other measurements to obtain particle shape, phase selection, optical depth, 3-D effects and stereo heights.

Benefits

Imagery from EPIC will be used in science applications to measure ozone amounts, aerosol amounts, cloud height and phase, vegetation properties, hotspot land properties (a view of the land from angles where shadows are a minimum) and UV radiation estimates at Earth’s surface.

Expected data products include: total ozone column, aerosol index, aerosol optical thickness, aerosol height, cloud fraction, cloud height, surface albedo, vegetation index, Leaf Area Index and RGB colored image of the Earth’s sunlit surface.

These data products are of interest to climate science, as well as hydrology, biogeochemistry and ecology. Data will also provide insight into Earth’s energy balance.

Key Measurements

EPIC is a 10-channel spectroradiometer that uses a Cassegrain type telescope, built by SSG Inc., comprised two filterwheels with six positions each (the open hole plus five spectral filters). It is a reflecting Ritchey-Chretien design with an aperture diameter of 30.5 cm, f 9.38, a FOV of 0.61° and an angular sampling resolution of 1.07 arcsec. (Once at L1, Earth varies from 0.45° to 0.53° full width.)

It images the irradiance from the sunlit face of Earth on a 2048x2048 pixel CCD (charge-coupled device) in 10 narrowband channels: 317, 325, 340, 388, 443, 552, 680, 688, 764 and 779 nm. The wavelength spans ultraviolet and near infrared, and the exposure time for each channel is about 40 ms. This combination of UV and visible channels is unique to DSCOVR, and they were selected, in part, to match with other satellite imaging instruments so data products can be directly compared. These comparisons will validate both calibration and data reduction algorithms.

EPIC Instrument-at-a-Glance

Purpose: Provides global spectral images of the entire sunlit face of Earth.

Instrument Contractor: Lockheed Martin’s Advanced Technology Center, Palo Alto, Calif.

Key Specs:

Spectral coverage:
10 channels from 317–779 nm
Resolution:
varies based on the channel
FOV: 0.61°
Mass: 63.2 kg

Website:

<http://www.nesdis.noaa.gov/DSCOVR/spacecraft.html>

To increase the downlink cadence of retrieved 10-channel image sets, the resolution will be averaged on board to 1024x1024 pixels resulting in spatial sampling at 17 km from pixel to pixel with a resolvable size of 25 km. The time cadence will be no faster than 10 spectral band images every hour.