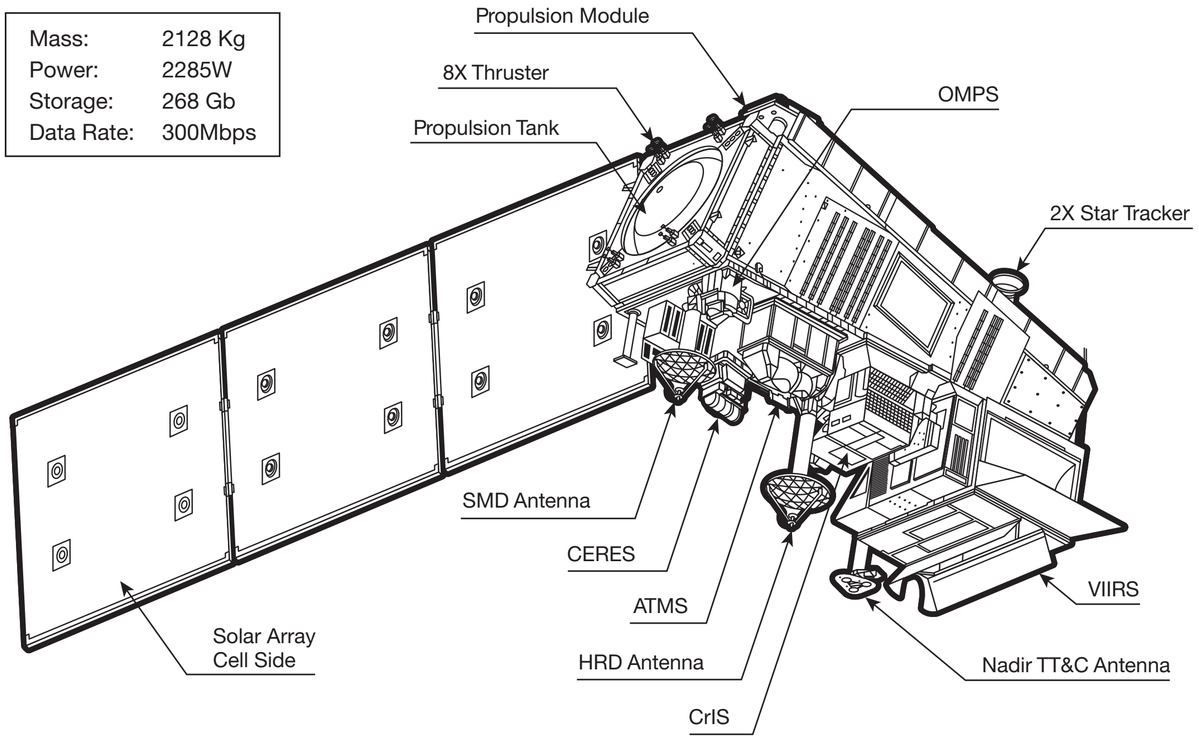
National Aeronautics and Space Administration

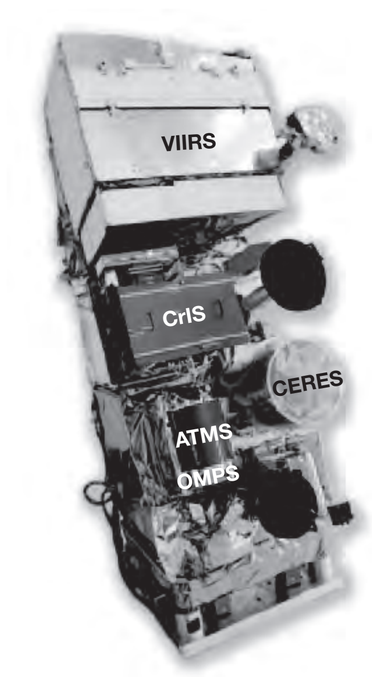
NPP Building a Bridge to a New Era of Earth Observations

NPP Spacecraft and Instruments

NPP is a NASA satellite that carries five very different instruments to monitor the Earth's environment, weather, and climate. It contains five instruments that provide critical insights into the dynamics of the entire Earth system including clouds, oceans, vegetation, ice and the atmosphere. Roughly the size of a minibus, NPP orbits the Earth from pole to pole about 14 times a day, flying 512 miles (824 kilometers) above the Earth's surface. NPP sends data to the Tracking and Data Relay Satellite System (TDRSS), direct broadcast users, and the Svalbard, Norway ground station.

Mass:	2128 Kg
Power:	2285W
Storage:	268 Gb
Data Rate:	300Mbps





VIIRS – Visible Infrared Imaging Radiometer Suite

The largest instrument aboard NPP is the Visible Infrared Imaging Radiometer Suite (VIIRS). It collects visible and infrared imagery as well as radiometric measurements of the land, atmosphere, ice and ocean. Data from this instrument, collected from 22 channels of the electromagnetic spectrum, is used to observe active fires, vegetation health, ocean color, sea surface temperature, and a variety of other surface features. Atmospheric scientists use certain electromagnetic bands to observe clouds and small airborne particles called aerosols. Oceanographers use VIIRS to monitor phytoplankton and sediment in the seas. Biologists monitor vegetation health and forest cover with the data and ice experts use it to record changes in the distribution of sea ice at the poles. Much of the data from VIIRS is useful for monitoring the pace of climate change.

CERES – Cloud and Earth Radiant Energy System

The Cloud and Earth Radiant Energy System (CERES) measures solar energy reflected by the Earth and the heat the Earth emits. This solar and thermal energy are key parts of what's called Earth's Radiation Budget. As sunlight hits the Earth and its atmosphere, they warm up. But clouds can both reflect the Sun's heat and light and insulate the Earth like a blanket. CERES will provide measurements to continue the monitoring of any changes in this delicate balance of Earth's radiation budget.

CrIS – Cross-track Infrared Sounder

The Cross-track Infrared Sounder (CrIS) and the Advanced Technology Microwave Sounder (ATMS) work as a single unit to provide high-resolution profiles of temperature and moisture, creating cross-sections of storms and other weather conditions. CrIS operates in clear conditions, producing daily global sets of high-resolution temperature and moisture profiles in areas with less than 50 percent cloud cover. With over 1,000 spectral channels of information in the infrared region and the ability to measure temperature profiles with improved accuracy, CrIS helps meteorologists create increasingly sophisticated forecast models.

ATMS – Advanced Technology Microwave Sounder

The Advanced Technology Microwave Sounder (ATMS) works in both clear and cloudy conditions, providing high-spatial-resolution microwave measurements of temperature and moisture. ATMS has better sampling and three more microwave bands than previous instruments like the Advanced Microwave Sounding Units (AMSU), and it combines all of their abilities into one instrument. Working in concert, CrIS and ATMS together comprise the Cross-track Infrared Microwave Sounding Suite (CrIMSS).

OMPS – Ozone Mapping and Profiler Suite

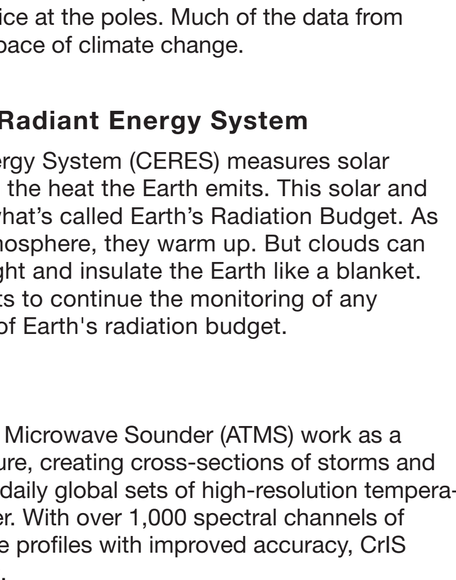
The Ozone Mapping and Profiler Suite measures the ozone layer in our upper atmosphere—tracking the status of global ozone distributions, including the 'ozone hole.' It also monitors ozone pollution near Earth's troposphere, the lowest layer of our atmosphere. OMPS extends our 40-year-long record of the health of the ozone layer while also supplying improved vertical resolution compared to previous operational instruments. Closer to Earth, OMPS's measurements of harmful ozone improve air quality monitoring and when combined with cloud predictions; help to create the Ultraviolet Index, a guide to safe levels of sunlight exposure. OMPS has two sensors, both new designs, and three advanced hyperspectral-imaging spectrometers.

NPP Launch Vehicle

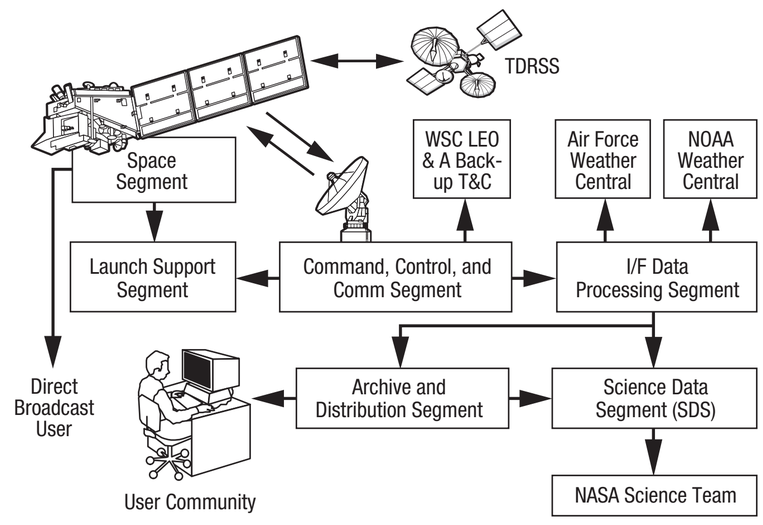
The NPP satellite will be launched from Vandenberg Air Force Base, California, on a Delta II-7920-10 launch vehicle.

The NPP mission will be launched into a 824 km circular, sun-synchronous polar orbit with a 1:30 p.m. local-time ascending node crossing.

KSC Range Services at Vandenberg AFB provides the integration facilities, launch pad services, electrical power, communication links, and range commanding required to process, erect, fuel, and launch the NPP spacecraft and its associated launch vehicle.

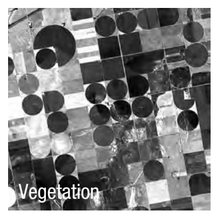


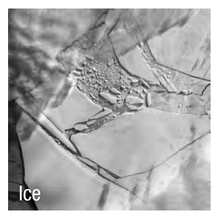
Mission System Architecture



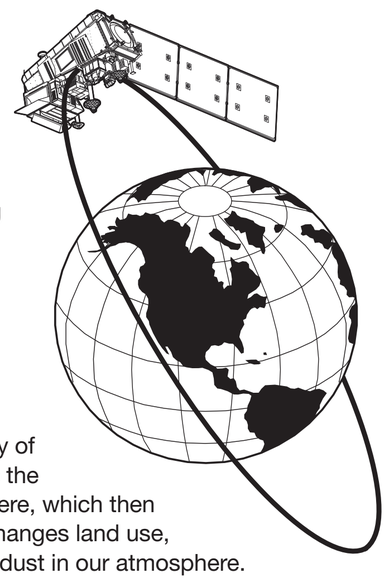
Environmental Data Records and Science Data Products

- VIIRS
  - Imagery
  - Sea Surface Temperature
  - Aerosol Optical Thickness
  - Aerosol Particle Size
  - Suspended Matter
  - Cloud Base Height
  - Cloud Cover/Layers
  - Cloud Effective Particle Size
  - Cloud Optical Thickness
  - Cloud Top Height
  - Cloud Top Pressure
  - Cloud Top Temperature
  - Albedo (Surface)
  - Land Surface Temperature
  - Vegetation Index
  - Snow Cover/Depth
  - Surface Type
  - Ice Surface Temperature
  - Ocean Color/Chlorophyll
  - Sea Ice Characterization
  - Active Fire Products
- CrIS/ATMS
  - Atmospheric Temperature Profile
  - Atmospheric Humidity Profile
  - Pressure
- OMPS
  - Total Column Ozone
  - Ozone Profile
- CERES
  - Net Solar Radiation (TOA)
  - Outgoing Longwave Radiation (TOA)
  - Downward Longwave Radiation (Sfc)
  - Downward Shortwave Radiation (Sfc)





NPP Orbit Path



NPP's polar orbit, combined with the Earth's rotation, allows it to view the entire Earth's surface daily and takes measurements that span the entire spectrum of observations required for observing environmental events, short-term weather forecasting and long-term data records. The study of Earth science can be seen as a system—a series of interconnected events. Because NPP surveys a variety of data, it helps us get a sense of the bigger picture. For example, a study of sea surface temperatures relates to the amount of moisture in the atmosphere, which then changes the weather, which then changes land use, which then changes the amount of dust in our atmosphere.

NPP serves as a bridge between NASA's Earth Observing System of satellites and the forthcoming Joint Polar Satellite System (JPSS); a system that will be developed by NASA for the National Oceanic and Atmospheric Administration (NOAA). NPP data will also be used by NOAA and the Department of Defense (DoD) for operational weather monitoring.

For more information, please visit our web site at:
http://npp.gsfc.nasa.gov/
or www.nasa.gov/npp

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