Moderate Resolution Imaging Spectroradiometer (MODIS) Overview

The Moderate Resolution Imaging Spectroradiometer (MODIS) is an instrument that collects remotely sensed data used by scientists for monitoring, modeling, and assessing the effects of natural processes and human actions on the Earth's surface. The continual calibration of the MODIS instruments, the refinement of algorithms used to create higher-level products, and the ongoing product validation make MODIS images a valuable time series (2000-present) of geophysical and biophysical land-surface measurements. Carried on two National Aeronautics and Space Administration (NASA) Earth Observing System (EOS) satellites, MODIS acquires morning (EOS-Terra) and afternoon (EOS-Aqua) views almost daily. Terra data acquisitions began in February 2000 and Aqua data acquisitions began in July 2002. Land data are generated only as higher-level products, removing the burden of common types of data processing from the user community. MODIS-based products describing ecological dynamics, radiation budget, and land cover are projected onto a sinusoidal mapping grid and distributed as 10- by 10-degree tiles at 250-, 500-, or 1,000-meter spatial resolution. Some products are also created on a 0.05-degree geographic grid to support climate modeling studies. All MODIS products are distributed in the Hierarchical Data Format-Earth Observing System (HDF–EOS) file format and are available through file transfer protocol (FTP) or on digital video disc (DVD) media.

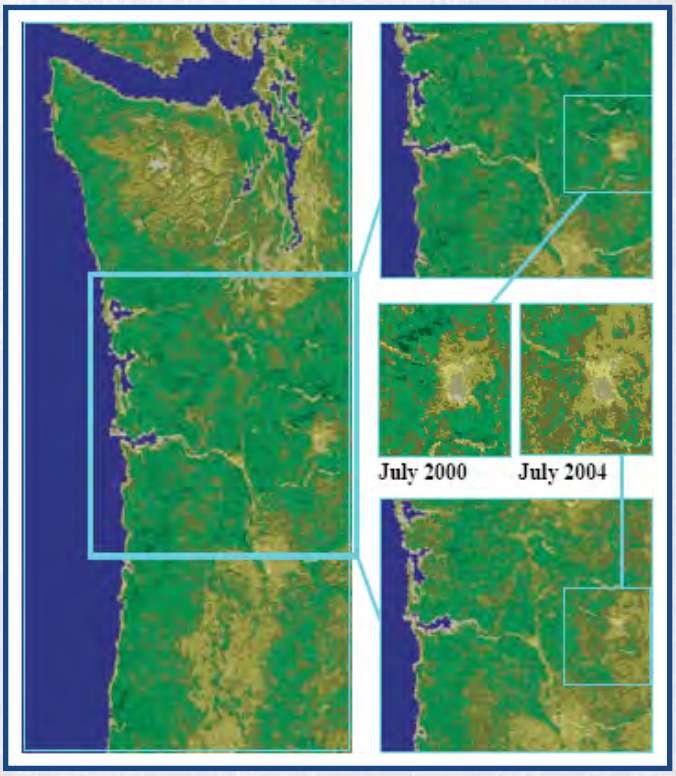
Versions 4 and 5 of MODIS land data products are currently available and represent "validated" collections defined in stages of accuracy that are based on the number of field sites and time periods for which the products have been validated. Version 5 collections incorporate the longest time series of both Terra and Aqua MODIS data products.

Product Description—Surface Reflectance

The 8-day 500-meter Surface Reflectance product is an estimate of spectral reflectance for the first seven wavelength bands, in which the effects of atmospheric gases, aerosols, and thin cirrus clouds are counteracted by a detailed correction scheme applied to lower-level radiance and geolocation input data. The result is the apparent removal from the imagery of the effects of atmospheric scattering and absorption. MODIS Surface Reflectance is the source for many higher-level land products and is used in global and regional climate models, surface energy balance models, and land characterization research.

MODIS 500-meter Surface Reflectance over Europe, centered on Italy in May 2004. This image was created using the MODIS Reprojection Tool to mosaic and convert two sinusoidal tiles into a Universal Transverse Mercator (UTM) map projection and coordinate system.

Granule shortname = MOD09A1
Area = approximately 10- x 10-degree latitude/longitude
Image dimensions = 2 (2,400 x 2,400 row/column)
Average file size = varies
Resolution = 500 meters
Projection = sinusoidal
Data format = HDF–EOS
Science data sets (SDSs) = 13



On the left is an image of the MODIS 500-meter Enhanced Vegetation Index (EVI) over the coast of the northwestern United States, from the mouth of the Columbia River in Washington in the north to the city of Eugene, Oregon, in the south. The central part of this image is expanded in the upper right (July 2000) and the lower right (July 2004). The two images in the middle right highlight the condition of vegetation around Mount St. Helens, which appears drier in 2004 than in 2000.

Granule shortname = MOD13A1
Area = approximately 10- x 10-degrees latitude/longitude
Image dimensions = 2 (2,400 x 2,400 row/column)
Average file size = varies
Resolution = 500 meters
Projection = sinusoidal
Data format = HDF–EOS
Science data sets (SDSs) = 11 or 12

Product Description—Vegetation Indices

MODIS Vegetation Index (VI) data are spectral measures of the amount and condition of vegetation present on the ground. The VI products involve transformations of the red, near-infrared, and blue image bands into indices that are designed to enhance MODIS's "vegetation signal" and support studies of changes in vegetation over time. The VI products contain two indices: the Normalized Difference Vegetation Index (NDVI) and a new Enhanced Vegetation Index (EVI). Each product consists of index values, VI quality information, and the composited surface reflectance bands used as inputs to calculation of the index. MODIS NDVI is produced to maintain continuity with existing Advanced Very High Resolution Radiometer (AVHRR)-derived NDVI products, which have been produced since 1989. The EVI is MODIS-specific and is more sensitive than NDVI in high biomass regions. MODIS EVI improves vegetation monitoring by decoupling the canopy background signal and reducing atmospheric influences. The two indices complement each other in vegetation studies and aid the extraction of canopy biophysical parameters. MODIS VI products have a wide range of uses, including global biogeochemical modeling, agricultural monitoring and forecasting, land use planning, land-cover change detection, and habitat preservation.

Resources for MODIS Land Data

Warehouse Inventory Search Tool URL:
https://wist.echo.nasa.gov/~wist/api/imswelcome/index.html
Land Processes Distributed Active Archive Center (LP DAAC) Data Pool
https://lpdaac.usgs.gov/lpdaac/get_data/data_pool
U.S. Geological Survey Global Visualization Viewer
http://glovis.usgs.gov
MODIS Land Products
https://lpdaac.usgs.gov/lpdaac/products/modis_products_table
LP DAAC Data Tools
https://lpdaac.usgs.gov/lpdaac/tools
MODIS Web Site
http://modis.gsfc.nasa.gov

Contact Information

LP DAAC User Services
U.S. Geological Survey
Earth Resources Observation and Science (EROS) Center
47914 252nd Street
Sioux Falls, SD 57198–0001
Voice: 605–594–6116
Toll Free: 866–573–3222
866–LPE–DAAC
Fax: 605–594–6963
E-mail: LPDAAC@eos.nasa.gov
Web: *https://LPDAAC.usgs.gov*
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