MODIS Data Products at the Global Land Cover Facility

The Global Land Cover Facility – Mission and Goals

The Global Land Cover Facility (GLCF) develops and distributes remotely sensed data and products concerned with land cover from the local to the global scales.

- The mission of the GLCF is to encourage and expand the use of remotely sensed imagery, derived products and applications in a manner that improves comprehension of the nature and causes of land cover change.
- The goal of the GLCF is to provide free access to an integrated collection of critical land cover and Earth science data through systems that are designed to maximize user outreach and that promote development of novel tools for ordering, visualizing and manipulating spatial data.

Over 13 terabytes of primary data products are available at the GLCF free to anyone via FTP. Data and products available at the GLCF include:

Satellite Imagery and Composites
ASTER
Landsat
MODIS
QuickBird
OrbView
SRTM

Derived Products
AVHRR
- GIMMS
- GloPEM
- Land Cover Classification
- Tree Cover Continuous Fields
- Burned Areas in Russia

Landsat
- Forest Change Products
- Landsat Mosaics
- Landsat Subsets
- Coastal Marsh Health Index

GOES
- Radiative Fluxes

MODIS
- Vegetation Continuous Fields
- Vegetative Cover Conversion
- Vegetation Index (NDVI)
- Pyrogenic Emissions

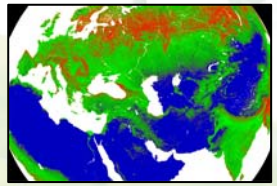
Online datasets may also be accessed electronically through the **Earth Science Data Interface** (ESDI) (below). ESDI is part of our on-going research into spatial data distribution and visualization technologies. This GUI is available on current web browsers and represents a distinct interface for users to access our data collections. Users can search our data archives using parameters such as product type, place, date, or coordinates to locate the desired dataset.

Currently, the MODIS collection at GLCF is offered through ESDI in GeoTIFF format for five continental tiles covering Africa, Eurasia, North America, Oceania and South America. MODIS datasets are also offered in continental US (CONUS) tiles for certain products.

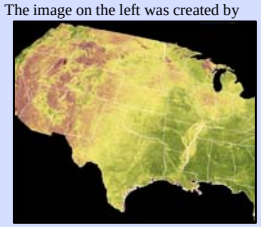
Global and Regional Products from MODIS Imagery

The MODIS sensor produces imagery that greatly enhances the ability of earth systems scientists to determine global processes, including global climate change and the global carbon cycle. MODIS images are collected from NASA's Terra and Aqua earth observing satellites, and are processed into 16-day and 32-day composites. These composites are then processed at the University of Maryland to derive a variety of products that are made available to the public through the Global Land Cover Facility.

32-day Composites: The 500m 32-day composites available from GLCF were derived from the MODIS L3 surface reflectance product MOD09A1. These monthly composites are a necessary precursor to MODIS Vegetation Continuous Fields product. Native MODIS HDF tiles are stitched together and reprojected using Nearest Neighbor sampling into the Goode's Homolosine projection with continental subsets. The image on the right was created by assigning MODIS bands 1, 4, and 3 to the red, green, and blue channels respectively. All datasets are available at www.landcover.org.

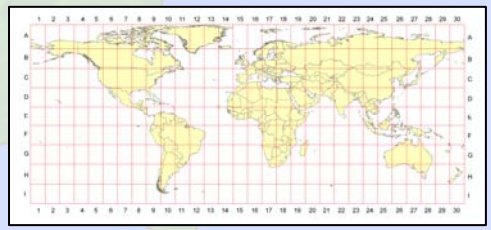


Vegetation Continuous Fields: Proportional estimates of cover are developed from global training data derived using high-resolution imagery. The training data and phenological metrics are used with a regression tree to derive percent cover globally. The model is then used to estimate aerial proportions of life form, leaf type, and leaf longevity. The current release of the MODIS VCF product contains only proportional estimates of life form (proportion of woody vegetation, herbaceous vegetation, or bare ground) with other layers to follow in later releases. The image on the left was created by assigning tree, herbaceous, and bare layers to the red, green, and blue channels respectively. The MODIS VCF dataset is available at www.landcover.org.



16-day Normalized Difference Vegetation Index: The GLCF U.S. VI product is produced every 16 days from daily 250m MODIS red and near infrared surface reflectance data for the continental United States. The compositing procedure at the University of Maryland has been designed to maximize the spatial resolution of the data product. The data is output with 250m pixels in Albers Equal-Area Conic projection. The image on the right was produced by draping a 16-day NDVI composite (Oct 16-31 2005) over SRTM, GTOPO30 mosaic. All datasets are available at www.landcover.org.

Forthcoming



New tile scheme for MODIS data: In an effort to further facilitate user accesses to satellite imagery and derived products the GLCF will introduce a new tile scheme for distribution of MODIS products through ESDI.

- The tile scheme is based on a modified UTM scheme (2 x 2 UTM zones).
- Resulting tiles are significantly smaller than a single Landsat ETM+ visible band file, potential reducing download and processing time significantly for the user.
- Tiles will be distributed in geographic coordinates to facilitate use in geographic information systems software.

New MODIS data products: The GLCF will hold over 4 terabytes of MODIS data products by Spring 2006. The products include VCF at 250m, a regionally tuned VCF product for the continental US and Alaska, and a 16-day TOA brightness temperature product.

- **Vegetation Continuous Fields at 250m:** The current Vegetation Continuous Fields product is comprised of three layers related to life form: production of woody vegetation, herbaceous vegetation, and bare ground. New layers to be hosted by GLCF will include leaf type (proportion of woody vegetation that is needleleaf or broadleaf) and leaf longevity (proportion of woody vegetation that is evergreen or deciduous). Additional layers will also include proportion woody shrub, crops, and water. All VCF layers will be available at 250m spatial resolution for the entire globe.
- **Regional VCF for CONUS and Alaska at 250m:** A Vegetation Continuous Fields product for the continental United States and Alaska that is regionally tuned using local training data will also be made available through the GLCF in Spring of 2006. The new VCF layers will quantify proportion of high risk fuels, fragmentation, and disturbance per pixel.
- **TOA Brightness Temperature:** The University of Maryland is currently producing a 16-day TOA brightness temperature data product from daily TOA brightness temperature observations. The product has a spatial resolution of 1km and will be made available to users through ESDI.

The image on the right is tile C9 from the new tile scheme above. At 500m spatial resolution, 16-bit, the tile is 3MB per band compressed.

Subset Tool: The GLCF is currently developing a subset tool for use with remotely sensed data to be hosted in ESDI. This tool will allow users to interactively specify a particular area of interest by drawing the boundaries or by using preset vector file boundaries. This tool will allow users more flexibility when downloading data from GLCF

Data Blender: The Data Blender is a tool developed at NASA Goddard Space Flight Center designed to take advantage of the high temporal resolution of the MODIS sensor and the high spatial resolution of the Landsat ETM+ sensor (including SLC-off data). MODIS daily 500m surface reflectance data and Landsat ETM+ 30m surface reflectance data (with a 16-day repeat cycle) are used to produce a synthetic "daily" surface reflectance product at ETM+ spatial resolution. The GLCF intends to offer users online access to this useful tool.

The Global Land Cover Facility is sponsored by NASA (contract NCC5300) and the University of Maryland. http://glcf.umiacs.umd.edu The GLCF is a founding member of the Federation of Earth Science Information Partners.