

Discover MODIS Land at your Desk

January 17, 2007

Calli B. Jenkerson*
MODIS Science Data Specialist
LP DAAC

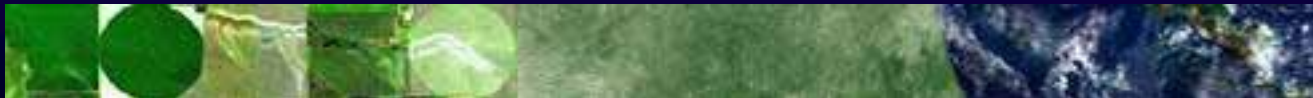
*SAIC, contractor to U.S. Geological Survey (USGS)
Center for Earth Resources Observation and Science, Sioux Falls
Work performed under USGS contract 03CRCN0001.



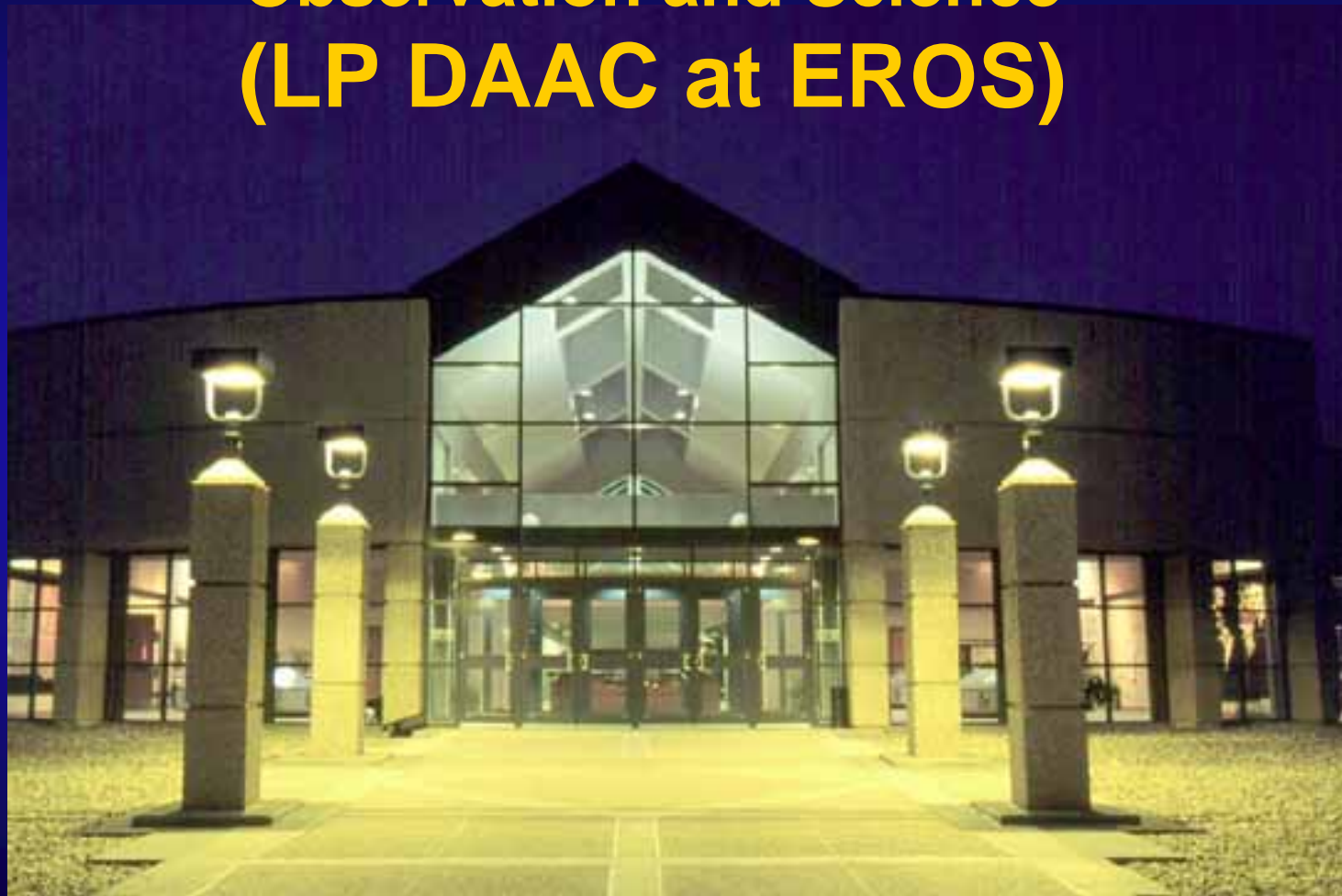
U.S. Department of the Interior
U.S. Geological Survey

Rumors

- Better resolution than AVHRR
 - Better repeat cycle than Landsat
 - Free data
 - Too many products
 - Weird map projection
 - Hard to find
-
- Can I use MODIS data in my application?



Land Processes Distributed Active Archive Center at USGS Center for Earth Resources Observation and Science (LP DAAC at EROS)



http://lpdaac.usgs.gov

Land Processes Distributed Active Archive Center

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The Land Processes Distributed Active Archive Center (LP DAAC) was established as part of NASA's Earth Observing System (EOS) Data and Information System (EOSDIS) initiative to process, archive, and distribute land-related data collected by EOS sensors, thereby promoting the inter-disciplinary study and understanding of the integrated Earth system. The role of the LP DAAC includes the higher-level processing and distribution of [ASTER](#) data, and the distribution of [MODIS](#) land products derived from data acquired by the Terra and Aqua satellites.



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ASTER



ASTER



MODIS



MODIS

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Scenes Available
October 11, 2004

[ASTER](#) Over 1,173,000
[MODIS](#) Over 10,243,000



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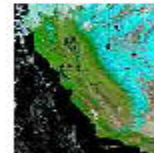
ASTER & MODIS Image Galleries



ASTER



ASTER



MODIS



MODIS



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[MODIS products on CD-ROM to discontinue](#)

Scenes Available

November 28, 2006

[ASTER](#) Over 1,130,000

[MODIS](#) Over 14,830,000



LP DAAC - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://lpdaac.usgs.gov/main.asp>

Land Processes Distributed Active Archive Center

About LP DAAC The Land Processes Distributed Active Archive Center (LP DAAC) is a NASA Earth Observing System (EOSDIS) initiative related data collected by inter-disciplinary study and system. The role of the LP DAAC is the archiving and distribution of EOSDIS land products from Terra and Aqua satellites.

Data Products

- Terra ASTER
- Routine Products
- On-Demand Products
- Terra & Aqua MODIS
 - Surface Reflectance
 - Land Surface Temperature and Emissivity
 - Land Cover/Change
 - Vegetation Indices
 - Thermal Anomalies/Fire
 - LAI/FPAR
 - Net Primary Vegetation Production
 - BRDF/Albedo
 - Vegetation Conversion/Continuous Fields
 - Geolocation Angles
 - Pointer Files

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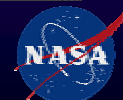
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ESIP
 FEDERATION


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javascript:{page_redirect('dataproducs', 'products', 'Default')}



MODIS Land Product Information

<http://lpdaac.usgs.gov/modis/dataproducts.asp>



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NEW [V005 REPLACES V004](#)

[V005 ALGORITHM CHANGES](#)

MODIS began processing Terra, Aqua, and Combined data acquisitions from January 1, 2007 onward as new V005 products. MODIS V004 production ended December 31, 2006.

The LP DAAC publicly released a number of MODIS V005 land data products on October 25, 2006. The current collection includes acquisitions from February 2000 forward and will grow as data are produced chronologically. MODIS V005 Terra and Combined data are available now, and Aqua data are expected to follow in the summer of 2007.

MODIS V003 data, otherwise known as the [Golden Month](#), are no longer available publicly through the EDG. Please contact [LP DAAC User Services](#) for special access to the collection.

As always, users are encouraged to examine the Science Quality Flag/Explanation metadata in each product's [.hdf](#) and [.met](#) files.

[V004 ALGORITHM CHANGES](#)

MODIS Overview	Known MODIS Product Issues
MODIS Science Quality Status	MODIS Land Quality Assessment
MODIS Browse Availability	MODIS Data Summary
MODIS Data Availability	MODIS Sinusoidal Grid
MODIS bands, spectral ranges	The Golden Month



AVAILABLE MODIS LAND PRODUCTS	Terra	Aqua	Combined*
<u>Surface Reflectance</u>			
Surface Reflectance Daily L2G Global 1km and 500m	MOD09GA V5	MYD09GA V5	
Surface Reflectance Daily L2G Global 250m	MOD09GO V5	MYD09GO V5	
Surface Reflectance Daily L3 Global 0.05Deg CMG	MOD09CMG V5	MYD09CMG V5	
Surface Reflectance 8-Day L3 Global 500m	MOD09A1 V4 V5 <u>EDG.</u>	MYD09A1 V4 V5 <u>EDG.</u>	
Surface Reflectance 8-Day L3 Global 250m	MOD09Q1 V4 V5 <u>EDG.</u>	MYD09Q1 V4 V5 <u>EDG.</u>	
Surface Reflectance Daily L2G Global 500m	MOD09GHK V4 <u>EDG.</u>	MYD09GHK V4 <u>EDG.</u>	
Surface Reflectance Daily L2G Global 250m	MOD09GQK V4 <u>EDG.</u>	MYD09GQK V4 <u>EDG.</u>	
Surface Reflectance Quality Daily L2G Global 1km	MOD09GST V4 <u>EDG.</u>	MYD09GST V4 <u>EDG.</u>	



AVAILABLE MODIS LAND PRODUCTS	Terra	Aqua	Combined*
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Surface Reflectance Daily L2G Global 1km and 500m	MOD09GA V5	MYD09GA V5	
Surface Reflectance Daily L2G Global 250m	MOD09GO V5	MYD09GO V5	
Surface Reflectance Daily L3 Global 0.05Deg CMG	MOD09CMG V5	MYD09CMG V5	
Surface Reflectance 8-Day L3 Global 500m	MOD09A1 V4 V5 <u>EDG</u>	MYD09A1 V4 V5 <u>EDG</u>	
Surface Reflectance 8-Day L3 Global 250m	MOD09Q1 V4 V5 <u>EDG</u>	MYD09Q1 V4 V5 <u>EDG</u>	
Surface Reflectance Daily L2G Global 500m	MOD09GHK V4 <u>EDG</u>	MYD09GHK V4 <u>EDG</u>	
Surface Reflectance Daily L2G Global 250m	MOD09GQK V4 <u>EDG</u>	MYD09GQK V4 <u>EDG</u>	
Surface Reflectance Quality Daily L2G Global 1km	MOD09GST V4 <u>EDG</u>	MYD09GST V4 <u>EDG</u>	



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Surface Reflectance Daily L2G Global 500m	MOD09GHK V4 <u>EDG.</u>	MYD09GHK V4 <u>EDG.</u>	
Surface Reflectance Daily L2G Global 250m	MOD09GQK V4 <u>EDG.</u>	MYD09GQK V4 <u>EDG.</u>	
Surface Reflectance Quality Daily L2G Global 1km	MOD09GST V4 <u>EDG.</u>	MYD09GST V4 <u>EDG.</u>	



MODIS Land Product One-Pagers

<http://lpdaac.usgs.gov/modis/mod09gav5.asp>



EDG Data Set Name	ShortName
MODIS/Terra Surface Reflectance Daily L2G Global 1km and 500m SIN Grid	MOD09GA

Version	Acquisition Range	Science Quality Status
003	August 29, 2002 – October 7, 2002	Provisional
004	February 24, 2000 - December 31, 2006	Validated Stage 1 from 01/01/2003
005	February 24, 2000 -	Validated Stage 1 from 02/24/2000

[V005 MOD09GA Changes](#) (abbreviated Points of Interest below)
[V005 MOD09GA Science Data Sets \(specifications for data layers\)](#)
[V005 MOD09GA Quality Control Bit Legend](#)



MODIS Land Product One-Pagers

<http://lpdaac.usgs.gov/modis/mod09gav5.asp>

Data Set Characteristics:

Area: ~10 degrees x 10 degrees

lat/long

File Size: ~85 MB

Projection: Sinusoidal

Data Format: HDF-EOS

Data Group 1 kilometer:

Dimensions: 1200 x 1200

rows/columns

Resolution: 1000 meters

Science Data Sets (SDS HDF Layers): 9

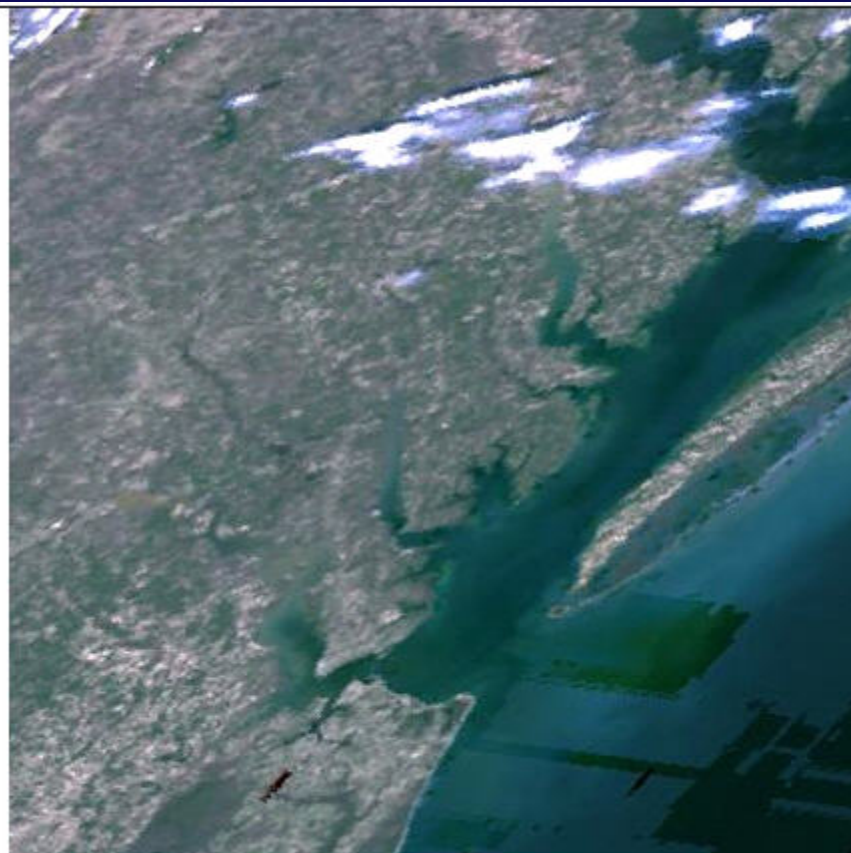
Data Group 500 meter:

Dimensions: 2400 x 2400

rows/columns

Resolution: 500 meters

Science Data Sets (SDS HDF Layers): 12



MODIS Land Product One-Pagers

V005 Change Points of Interest:

- Reduced number of data products: MOD09GST, MOD09GHK, MODMGGAD, MODPT1KD, MODPTHKM, MODPTQKM encapsulated within MOD09GA
- Reduced file volume: internal compression

Product Description

The MODIS Surface Reflectance products provide an estimate of the surface spectral reflectance as it would be measured at ground level in the absence of atmospheric scattering or absorption. Low-level data are corrected for atmospheric gases and aerosols, yielding a level-2 basis for several higher-order gridded level-2 (L2G) and level-3 products.

MOD09GA provides Bands 1-7 in a daily gridded L2G product in the Sinusoidal projection, including 500-meter reflectance values and 1-kilometer observation and geolocation statistics. 500-m Science Data Sets provided for this product include reflectance for Bands 1-7, a quality rating, observation coverage, observation number, and 250-m scan information. 1-kilometer Science Data Sets provided include number of observations, quality state, sensor angles, solar angles, geolocation flags, and orbit pointers.

Version-5 MODIS/Terra Surface Reflectance products are validated, meaning that product uncertainties are well defined over a range of representative conditions. Although there may be later improved versions, these data are ready for use in scientific publications.



MODIS Land Product One-Pagers

[View Printer Friendly Version](#)

Retrieve the MOD09GA.5 MODIS product through the [LP DAAC Data Pool](#)

Via Search Tool:

<http://e0dps01u.ecs.nasa.gov:22000/OPS/drill?attrib=esdt&esdt=MOD09GA.5&group=MOLT>

Via FTP Directory: <ftp://e0dps01u.ecs.nasa.gov/MOLT/MOD09GA.005/>

Order Data through the [EOS Data Gateway](#)

(<http://edcimswww.cr.usgs.gov/pub/imswelcome/>)

EOS Data Gateway Search Tips

Data Center:	LPDAAC
Sensor:	MODIS
Dataset:	MODIS/Terra Surface Reflectance Daily L2G Global 1km and 500m SIN Grid
Spatial:	HORIZONTALTILENUMBER Max/Min VERTICALTILENUMBER Max/Min
Geographic Extent:	Type Lat/Long Range or Draw on Map
Temporal Extent:	2000-02-24 to present



MODIS Land Product One-Pagers

Product Information

[Product Description](#)

(<http://modis-land.gsfc.nasa.gov/surfrad.htm>)

[User Guide](#)

(<http://modis-sr.ltdri.org/html/guide.htm>)

[Algorithm Theoretical Basis Document \(ATBD\)](#)

(http://modis.gsfc.nasa.gov/data/atbd/atbd_mod08.pdf)

[MODIS Standard Data Products Catalog](#)

(<http://modis.gsfc.nasa.gov/data/dataprod/index.php>)

[EOS Data Products Handbook Volume 1 \(2000\)](#)

(http://eosps0.gsfc.nasa.gov/eos_homepage/for_scientists/data_products/vol1.php)

Contact Information

[LP DAAC User Services](#)

National Center for
Earth Resources Observation and Science
U.S. Geological Survey
47914 252nd Street
Sioux Falls, SD 57198-0001

Phone: 605-594-6116

Toll Free: 866-573-3222

866-LPE-DAAC

Fax: 605-594-6963

Email: edc@eos.nasa.gov

Web: <http://lpdaac.usgs.gov/main.asp>

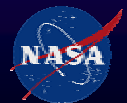


MODIS Land Product One-Pagers

<http://lpdaac.usgs.gov/modis/dataproducts.asp>

Terra, Aqua, and Combined
V004 and V005:

- Surface Reflectance
- Land Surface Temp/Emissivity
- Land Cover / Land Cover Dynamics
- Vegetation Indices
- Thermal Anomalies/Fire
- LAI/fPAR
- Gross Primary Production
- BRDF/Albedo



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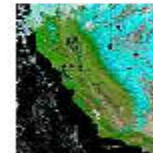
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ASTER



ASTER



MODIS



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EDG - Earth
Observing System
(EOS) Data Gateway

Data Pool - LP DAAC
On-Line Archive

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[Data Pool](#)

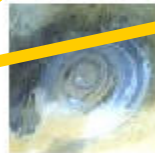
[GloVis](#)

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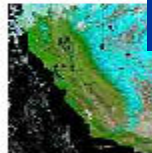
ASTER & MODIS Image Gallery



ASTER



ASTER



MODIS



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GloVis – USGS
Global Visualization
Viewer



Common Data Access Methods

Data Access	ADVANTAGE	CHALLENGE
EDG	-All available products -Most robust search criteria	Relatively slow (2000+ data sets)
<u>GloVis</u>	-Browse based access -Fast	Only browse based products
Data Pool	-Instant on-line access -Data conversion	Restricted temporal holdings



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ASTER & MODIS Image Galleries



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Less Common Data Access Methods

Data Access	FEATURES	BEST FOR
MTMGW Machine to Machine Gateway	-Non-EDG access -User-controlled -Script-based ordering -FTPPush	Retrieving large volume / large number of files from archive
Subscription	-Automated Delivery -FTPPush -Insert Notification -Forward Processing	Constant inflow of current production over specified areas
<u>MODExtract</u>	-Automated <u>FTPPull</u> -Data Pool -Expect Script	Retrieval of smaller volumes from Data Pool



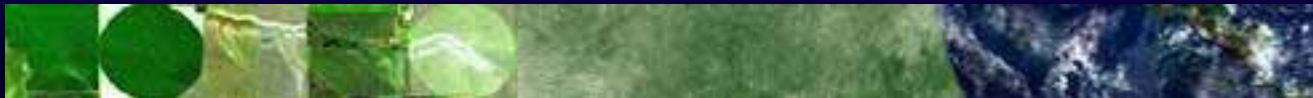
Summary: Data Access

- EDG
- GloVis
- Data Pool
- MTMGW
- Subscription
- MODExtract



Considerations for Use

- File Format (HDF-EOS)
- Map Projection (Sinusoidal)
- Bit-encoded Quality Information



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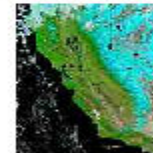
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Data Tools

These tools provide methods to obtain, transform and analyze LP DAAC data.

- [HDF-EOS Software Tools Table](#)
- [MODIS Reprojection Tool \(MRT\)](#)
- [MODIS Land Data Operational Product Evaluation \(LDOPE\)](#)
- [MODIS Swath Reprojection Tool \(MRT Swath\)](#)
- [MODIS Data Pool Extraction Tool \(MODextract\)](#)
- [ASTER Lat/Lon Adjustment Tool](#)



<http://lpdaac.usgs.gov/datatools.asp>



The screenshot shows the LP DAAC website interface. At the top, there is a banner with the text "Land Processes Distributed Active Archive Center" and a satellite image. Below the banner is a navigation menu with links: Home, About, Products, Data Tools (highlighted in red), Order Data, News, Help/Edu, Links, and Contact Us. On the left side, there are links for "HDF-EOS Introduction", "ASTER", "MODIS", and "Additional Information". On the right side, there is a "Data Tools" section with a blue header. Below the header, it says "These tools provide methods to obtain, transform and analyze LP DAAC data." and lists several tools with bullet points. A yellow arrow points to the first tool in the list: "HDF-EOS Software Tools Table".

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- [MODIS Data Pool Extraction Tool \(MODextract\)](#)
- [ASTER Lat/Lon Adjustment Tool](#)



HDF-EOS Software Tools Table (Last updated: March 31, 2006)

Tool/Utility	Description	Current URL
Commercial Tools		
RSI ENV/IDL	Geospatial Image Processing	http://www.rsinc.com/
ERDAS Imagine	Geospatial Image Processing	http://gis.leica-geosystems.com/
PCI Geomatics	Geospatial Image Processing	http://www.pcigeomatics.com/
Idrisi	Geospatial Image Processing	http://www.clarklabs.org/
ERMapper	Geospatial Image Processing	http://www.ermapper.com/
Matlab	Technical Computing & Image Processing	http://www.mathworks.com/
HDF Explorer Pro	Data Visualization	http://www.space-research.org/
Public Domain Tools		
HEG	HDF-EOS to GeoTIFF Conversion	http://newsroom.gsfc.nasa.gov/sdptoolkit/HEG/HEGHome.html
MultiSpec	Multispectral Image Data Analysis	http://dynamo.ecn.purdue.edu/~biehl/MultiSpec/
MSPHINX	Satellite Process Handling Images uNder Xwindow	http://www-loa.univ-lille1.fr/Msphinx/Msphinx_gb.html
MODIS Reprojection Tool	Projection/Format Conversion	http://lpdaac.usgs.gov/landdaac/tools/modis/index.asp
MRT - Swath	Swath-to-Grid Conversion	http://lpdaac.usgs.gov/landdaac/tools/mrtswath/index.asp
LDOPE Tools	MODLAND Quality Assessment	http://lpdaac.usgs.gov/landdaac/tools/ldope/index.asp
MODIS Swath-to-Grid	IDL-Based Conversion	http://nsidc.org/data/modis/ms2gt/
HDFView	Data Visualization	http://hdf.ncsa.uiuc.edu/hdf-java-html/hdfview/
Cube Visualization (CV)	Data Visualization	http://isis.astrogeology.usgs.gov/isis2/isis-bin/isis.cgi/
HDFLook	Data Visualization/Processing	http://www-loa.univ-lille1.fr/Hdflook/
WebWinds	Data Visualization/Processing	http://www.openchannelsoftware.com/projects/WebWinds/
WinVicar	Windows-Based Image Processing	http://www.openchannelsoftware.com/projects/WINVICAR/



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Data Tools

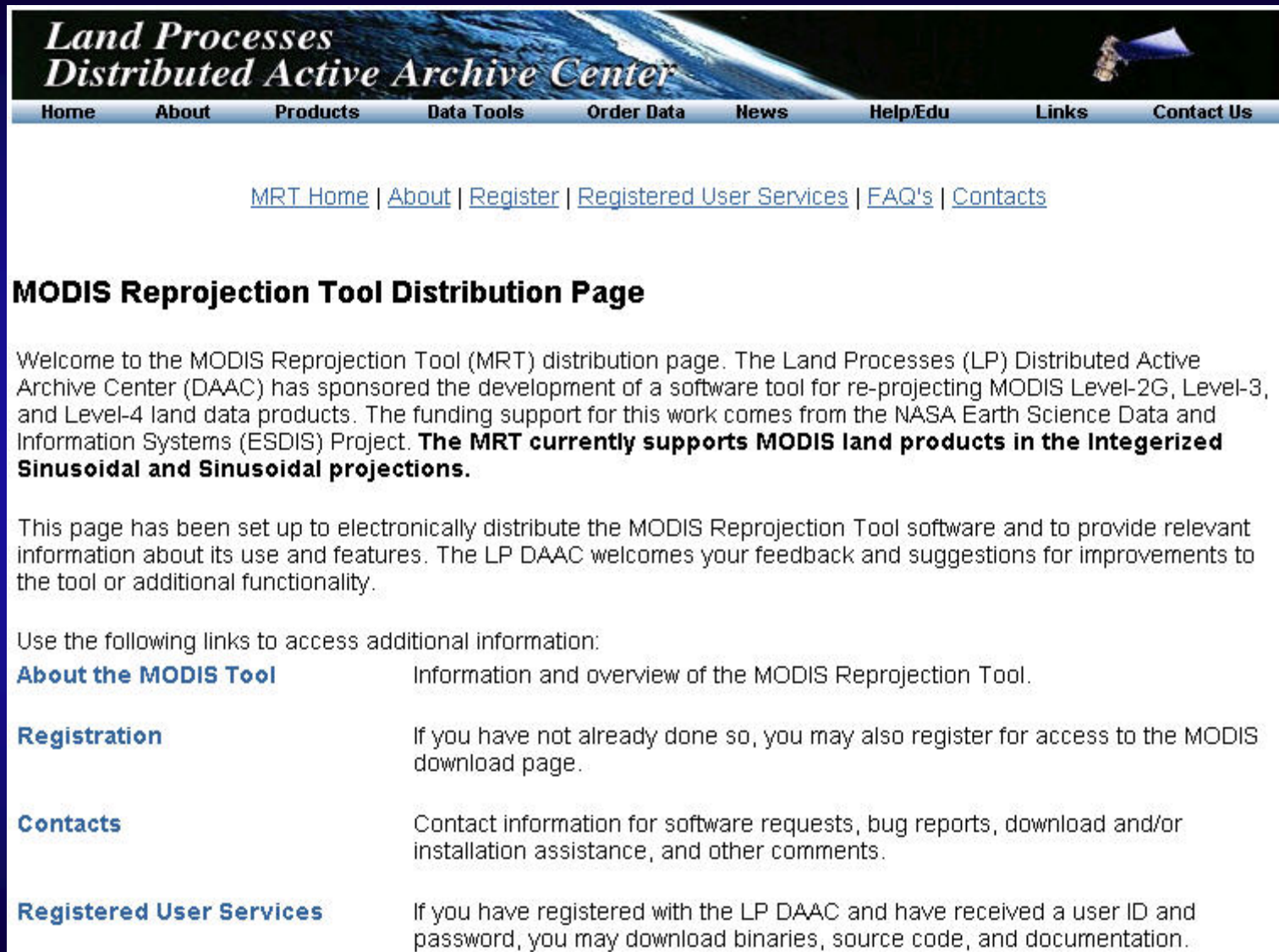
These tools provide methods to obtain, transform and analyze LP DAAC data.

- [HDF-EOS Software Tools Table](#)
- [MODIS Reprojection Tool \(MRT\)](#)
- [MODIS Land Data Operational Product Evaluation \(LDOPE\)](#)
- [MODIS Swath Reprojection Tool \(MRT Swath\)](#)
- [MODIS Data Pool Extraction Tool \(MODextract\)](#)
- [ASTER Lat/Lon Adjustment Tool](#)

MODIS Reprojection Tool (MRT)



<http://lpdaac.usgs.gov/landdaac/tools/modis/index.asp>



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[MRT Home](#) | [About](#) | [Register](#) | [Registered User Services](#) | [FAQ's](#) | [Contacts](#)

MODIS Reprojection Tool Distribution Page

Welcome to the MODIS Reprojection Tool (MRT) distribution page. The Land Processes (LP) Distributed Active Archive Center (DAAC) has sponsored the development of a software tool for re-projecting MODIS Level-2G, Level-3, and Level-4 land data products. The funding support for this work comes from the NASA Earth Science Data and Information Systems (ESDIS) Project. **The MRT currently supports MODIS land products in the Integerized Sinusoidal and Sinusoidal projections.**

This page has been set up to electronically distribute the MODIS Reprojection Tool software and to provide relevant information about its use and features. The LP DAAC welcomes your feedback and suggestions for improvements to the tool or additional functionality.

Use the following links to access additional information:

About the MODIS Tool	Information and overview of the MODIS Reprojection Tool.
Registration	If you have not already done so, you may also register for access to the MODIS download page.
Contacts	Contact information for software requests, bug reports, download and/or installation assistance, and other comments.
Registered User Services	If you have registered with the LP DAAC and have received a user ID and password, you may download binaries, source code, and documentation.



MRT Capabilities Overview

Reproject Sinusoidal to:

- Geographic
- Hammer
- Mollweide
- Sinusoidal
- UTM
- Transverse Mercator
- Integerized Sinusoidal
- Goode's Interrupted Homolosine
- Lambert Azimuthal
- Lambert Conformal Conic
- Polar Stereographic
- Albers Equal Area

-Spatial Subset

-Mosaic

-Spectral Subset
.bin, .tif

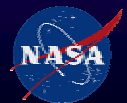
-Outputs .hdf,



Sampling

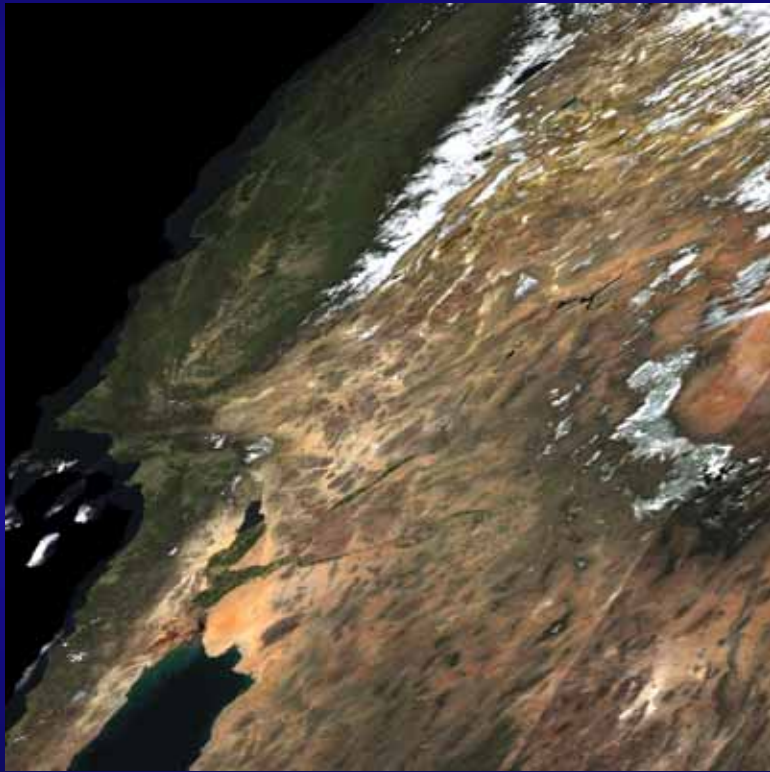


-Datum Conversion



MRT Capabilities Overview

Sinusoidal

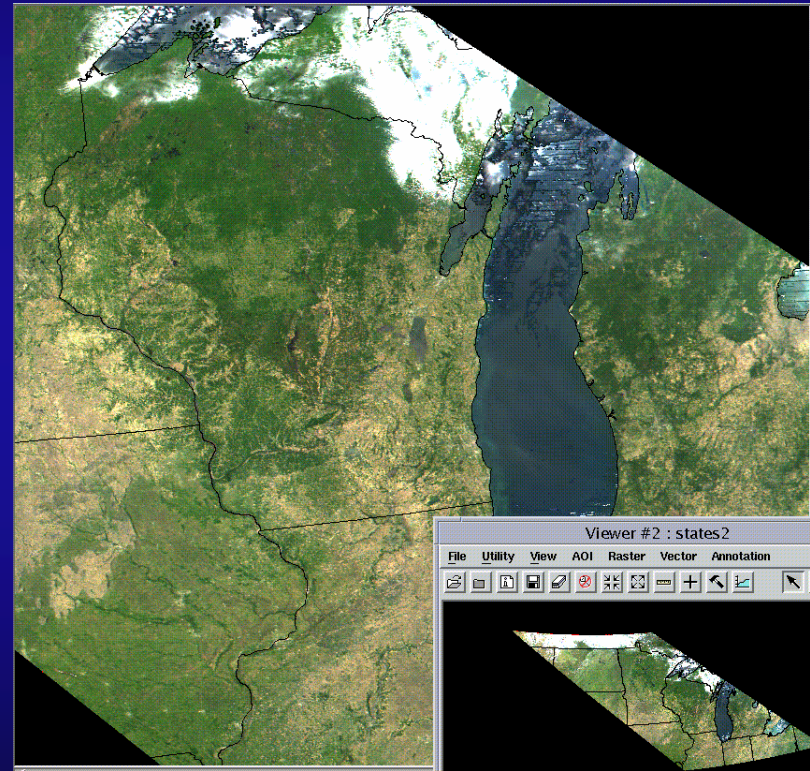
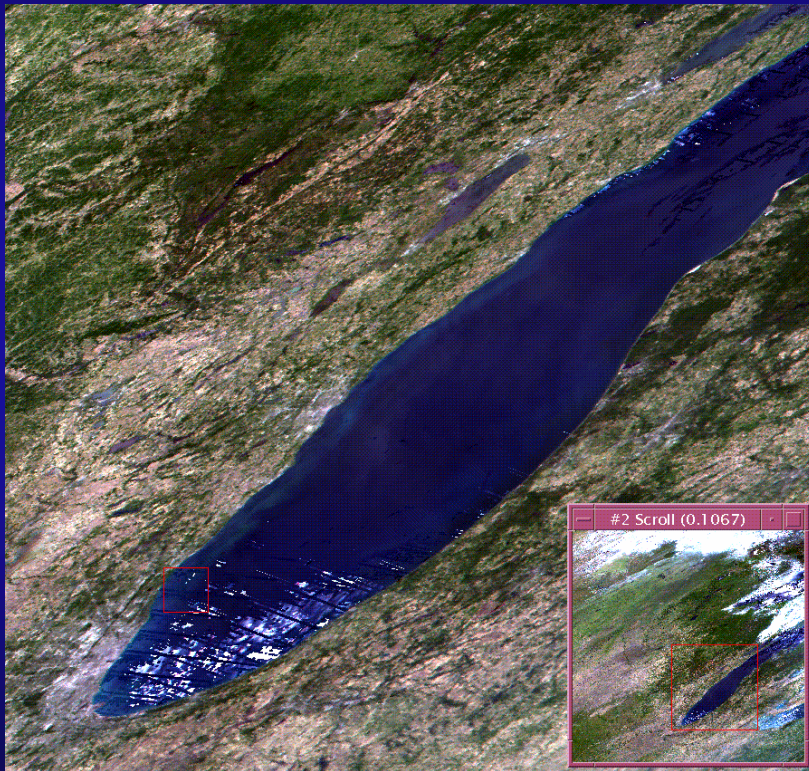


Lambert Azimuthal



MRT Capabilities Overview

MODIS Reprojection Tool (MRT) Utility

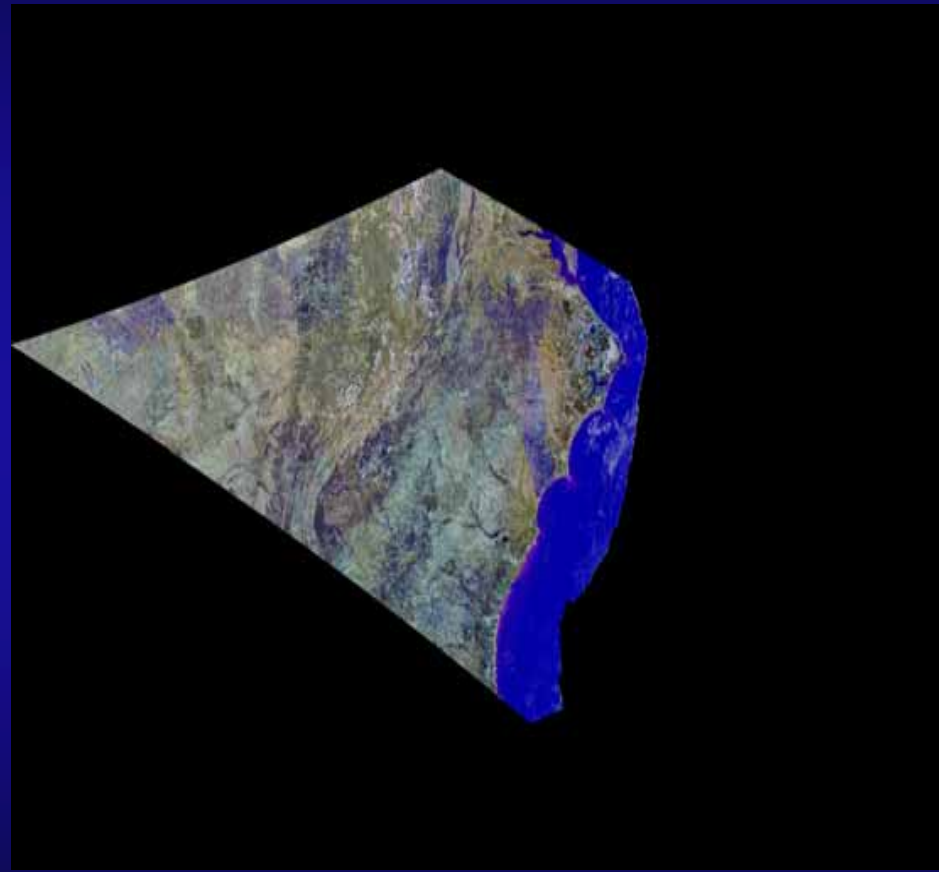


MRT Capabilities Overview

Integerized Sinusoidal



Lambert Azimuthal



<http://lpdaac.usgs.gov/datatools.asp>



The screenshot shows the LP DAAC website interface. At the top, there is a banner with the text "Land Processes Distributed Active Archive Center" and a satellite image. Below the banner is a navigation menu with links: Home, About, Products, Data Tools (highlighted in red), Order Data, News, Help/Edu, Links, and Contact Us. On the left side, there are links for "HDF-EOS Introduction", "ASTER", "MODIS", and "Additional Information". On the right side, there is a "Data Tools" section with a blue header. Below the header, it says "These tools provide methods to obtain, transform and analyze LP DAAC data." and lists six tools with blue underlined links. A yellow arrow points to the "MODIS Swath Reprojection Tool (MRT Swath)" link.

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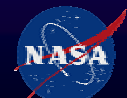
HDF-EOS Introduction
ASTER
MODIS
Additional Information

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MODIS Swath Reprojection Tool (MRTSwath)

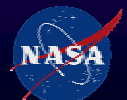


MRTSwath Overview

Developed for Level-2 MODIS Land Data

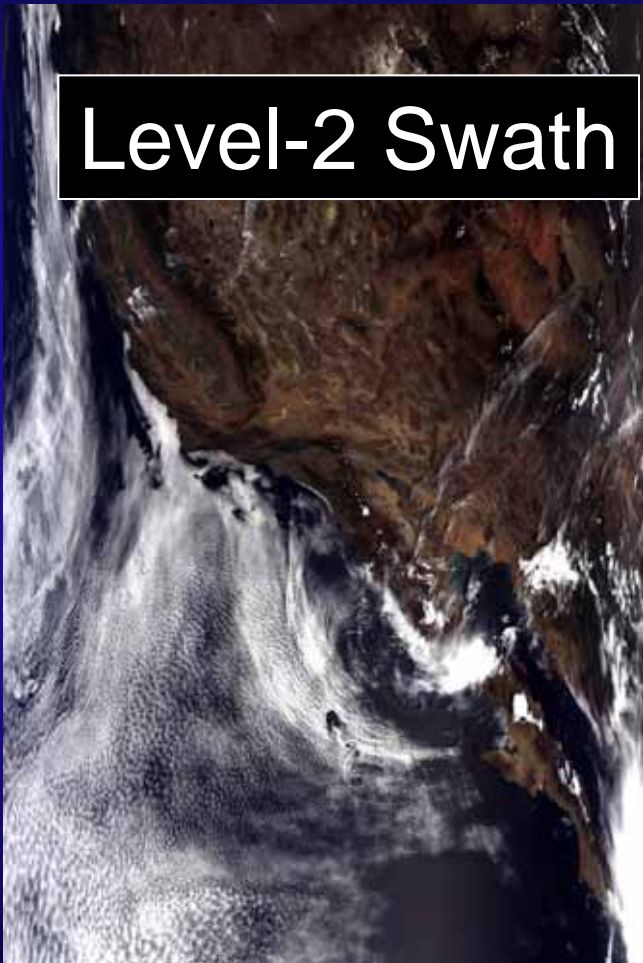
Provides same general capabilities as MRT except

- Requires Geolocation input (Level 1A MOD03)
- Does not include mosaic function

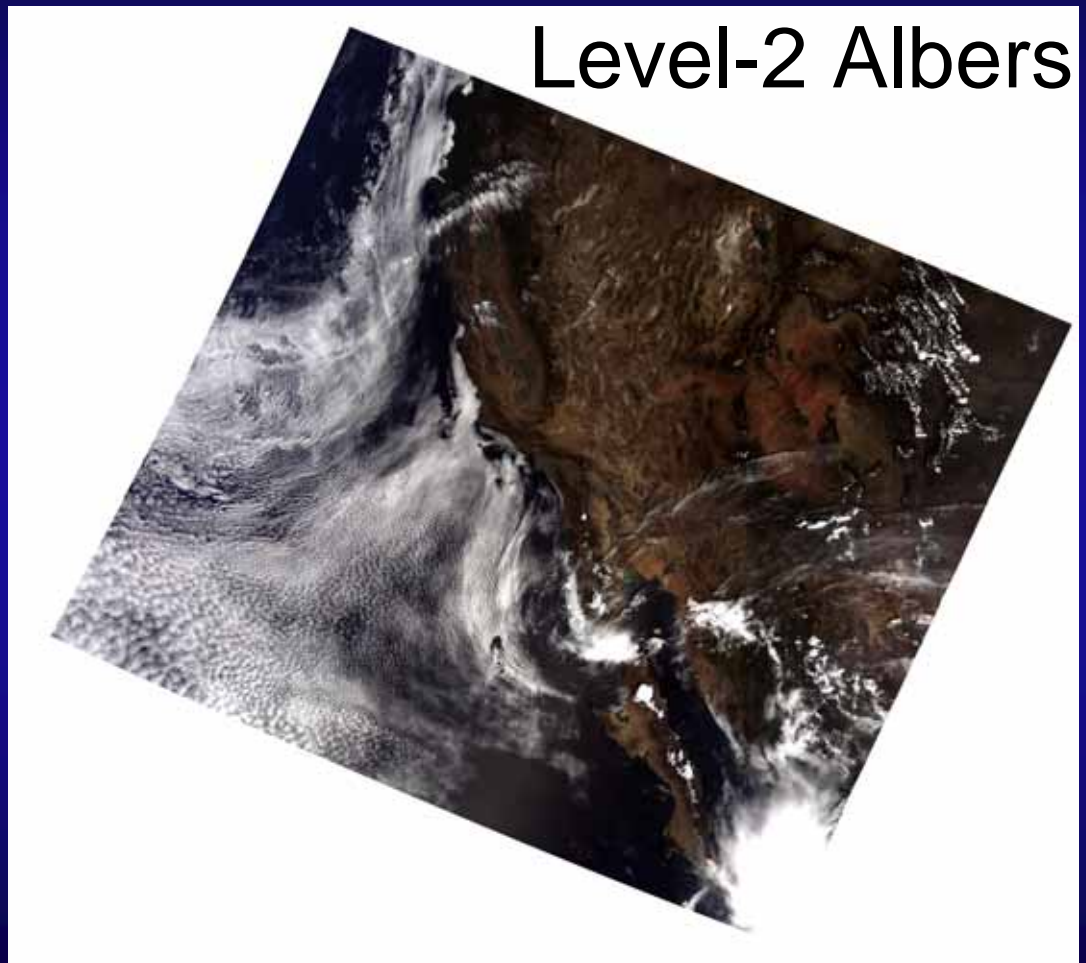


MRTSwath Overview

Level-2 Swath



Level-2 Albers



<http://lpdaac.usgs.gov/datatools.asp>



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- [ASTER Lat/Lon Adjustment Tool](#)

MODIS Land Data Operational Product Evaluation Tools (LDOPE)

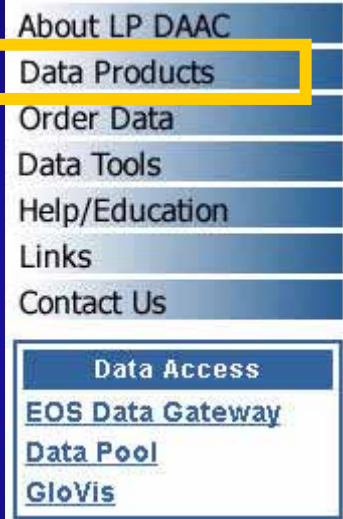


MODIS LDOPE Tools

- Perform any processing function necessary for manipulating MODIS Land data, except reprojection
- QABits, mosaicking, subsetting, format conversion, multidimensionality, etc.
- Stand-alone executables invoked from a command-line interface
- Supported on Irix, Solaris, Linux, and Windows operating systems

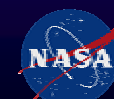


<http://lpdaac.usgs.gov>

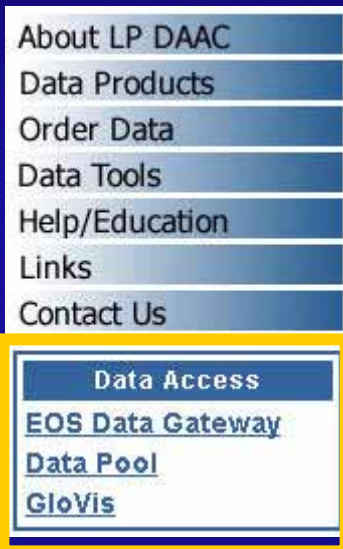


MODIS Land Product Information:

- Collection Updates
- Product Characteristics
 - QC-Bit Interpretation
 - SDS Specifications
- Search and Order Tips
- Additional Links

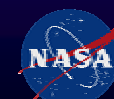


<http://lpdaac.usgs.gov>



MODIS Land Product Common Access:

EDG
Data Pool
GloVis



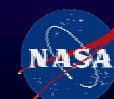
<http://lpdaac.usgs.gov>



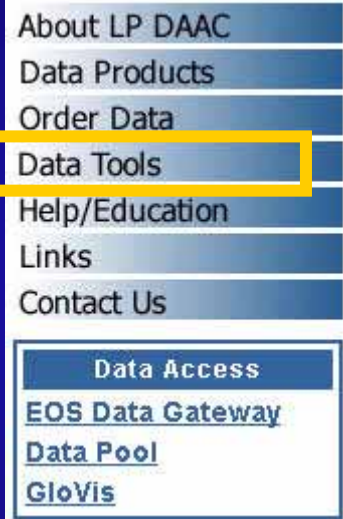
- About LP DAAC
 - Data Products
 - Order Data
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 - Help/Education
 - Links
 - Contact Us
-
- Data Access
 - [EOS Data Gateway](#)
 - [Data Pool](#)
 - [GloVis](#)

MODIS Land Product Alternative Access:

MTMGW
Subscription
MODExtract



<http://lpdaac.usgs.gov>



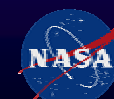
MODIS Land Product Tools:

HDF-EOS Tools

MRT

MRTSwath

MODIS LDOPE



Data Applications Model

Historical Approach

Search & Order MODIS tiles

**Download individual
tiles in standard format**

**Conduct user-specified,
local processing to create
application-ready
MODIS data**

Use MODIS data



Data Applications Model

Historical Approach

Search & Order MODIS tiles

Download individual
tiles in standard format

Conduct user-specified,
local processing to create
application-ready
MODIS data

Use MODIS data

Future Approach

Select MODIS tiles

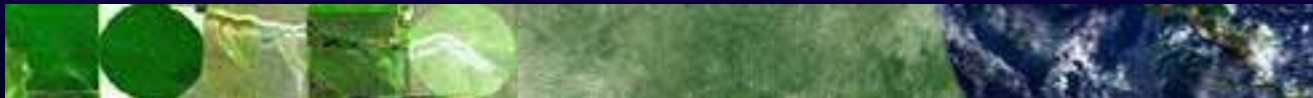
Specify processing options

Initiate and monitor remote
processing job

Download application –
ready MODIS data

Use MODIS data

Day 2 Thursday 9:00 – 9:30



Questions, Comments, or Concerns



Calli Jenkerson
MODIS Science Data
Specialist
LP DAAC

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(605) 594-2638

