

# **MRTWeb**

## **User Guide**

**Release 2.0**  
**February 25, 2009**

*Land Processes DAAC*  
*USGS Earth Resource Observation and Science (EROS) Center*

## Introduction

The Land Processes Distributed Active Archive Center (LP DAAC) stores a variety of MODIS land products in standard  $10^\circ \times 10^\circ$  tiles (Figure 1) in Sinusoidal projection and HDF-EOS format. User feedback-based requirements helped define the MODIS reprojection tool web (MRTWeb) interface, which was developed to provide enhanced, web-based discovery and delivery services for MODIS land product tiles archived at the LP DAAC. This guide describes the basic functions of the MRTWeb 2.0, which is slated for release on February 25, 2009.

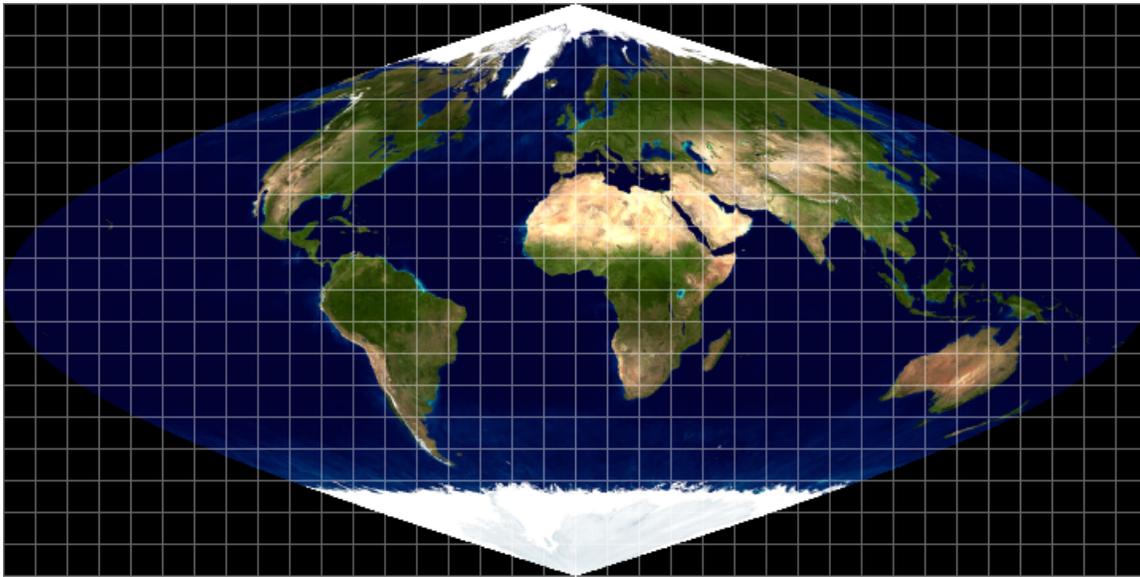


Figure 1. A global representation of standard MODIS land product tiles.

MRTWeb 2.0 combines familiar capabilities of the USGS Global Visualization Viewer (GloVis) and the downloadable MODIS Reprojection Tool (MRT). The MRTWeb interface combines and modifies the pre-existing GloVis and MRT layouts into three main tabs: Selection, Process, and Download, which allow the user to perform the following functions:

- Find / Visualize / Select tiles of interest
- Choose bands or layers (Science Data Sets in HDF terminology) of interest
- Mosaic multiple adjacent tiles from same date (and subset to an area of interest if desired)
- Subset an area of interest from multiple dates of the same tile (time series extraction)
- Set projection (currently limited to Albers Equal Area, Geographic, Lambert Azimuthal, Polar Stereographic, Sinusoidal, and UTM)
- Set resampling (currently limited to Nearest Neighbor, with native, 250-, 500-, and 1000-meter griddings)
- Choose output format (currently limited to HDF-EOS, GeoTiff, and Raw Binary)
- Submit processing job(s) to LP DAAC
- Monitor progress of processing job(s)
- Download customized MODIS data sets and processing logs
- Exit the interface, and login later to check job status and/or download data sets

Submitted jobs are run with MRT 4.0 processing software across multiple servers at the LP DAAC. Output datasets are staged on a job-specific FTP directory for user download. No media options are available with MRTWeb.

The MRTWeb target audience includes intermediate to expert users of MODIS land data. Knowledge of MODIS land product characteristics and general image processing techniques is assumed. MRTWeb is not intended as a method for acquiring very large volumes of data from the archive.

The scope of this document does not include detailed explanations of file formats, projection considerations, or any of the underlying image processing concepts and code used to develop the MRT 4.0 processing software. For additional details, users are referred to existing documentation on the LP DAAC web site: [https://lpdaac.usgs.gov/lpdaac/tools/modis\\_reprojection\\_tool](https://lpdaac.usgs.gov/lpdaac/tools/modis_reprojection_tool)

## Available Data

The following MODIS Land products (table 1) are available for use in MRTWeb 2.0. The LP DAAC anticipates expanding this list in the future.

Shortname	MODIS Product	Platform	Level	Spatial Resolution (m)	Temporal Granularity
<b>MCD43B1</b>	BRDF / Albedo - Model Parameters	Combined	3	1000	16-day Composite
<b>MCD43B3</b>	Albedo	Combined	3	1000	16-day Composite
<b>MCD43B4</b>	Nadir BRDF- Adjusted Reflectance	Combined	3	1000	16-day Composite
<b>MOD09A1</b>	Surface Reflectance Bands 1-7	Terra	3	500	8-day Composite
<b>MOD13A1</b>	Vegetation Indices	Terra	3	500	16-day Composite
<b>MOD13A2</b>	Vegetation Indices	Terra	3	1000	16-day Composite
<b>MOD14A2</b>	Thermal Anomalies / Fire	Terra	3	1000	8-day Composite
<b>MOD15A2</b>	Leaf Area Index / fPAR	Terra	4	1000	8-day Composite
<b>MYD09A1</b>	Surface Reflectance Bands 1-7	Aqua	3	500	8-day Composite
<b>MYD13A1</b>	Vegetation Indices	Aqua	3	500	16-day Composite
<b>MYD13A2</b>	Vegetation Indices	Aqua	3	1000	16-day Composite
<b>MYD14A2</b>	Thermal Anomalies / Fire	Aqua	3	1000	8-day Composite
<b>MYD15A2</b>	Leaf Area Index / Fraction of Photosynthetically Active Radiation	Aqua	4	1000	8-day Composite

Table 1. MODIS products available in MRTWeb 2.0.

## Getting Started Create Account

You can find the access point to MRTWeb 2.0 from the LP DAAC web site at the following location: [https://lpdaac.usgs.gov/lpdaac/get\\_data/mrtweb](https://lpdaac.usgs.gov/lpdaac/get_data/mrtweb). You can also go directly to MRTWeb using the following link: <http://mrtweb.cr.usgs.gov>. **Make sure your Internet browser pop-ups are not blocked** before using the tool.



Use the MRTWeb entry point ([glovis.usgs.gov/mrtweb](http://glovis.usgs.gov/mrtweb)) to **select a product** (e.g. MODIS Aqua MYD09A1) and **click the map** (e.g., on Florida) to bring up the login dialog box.

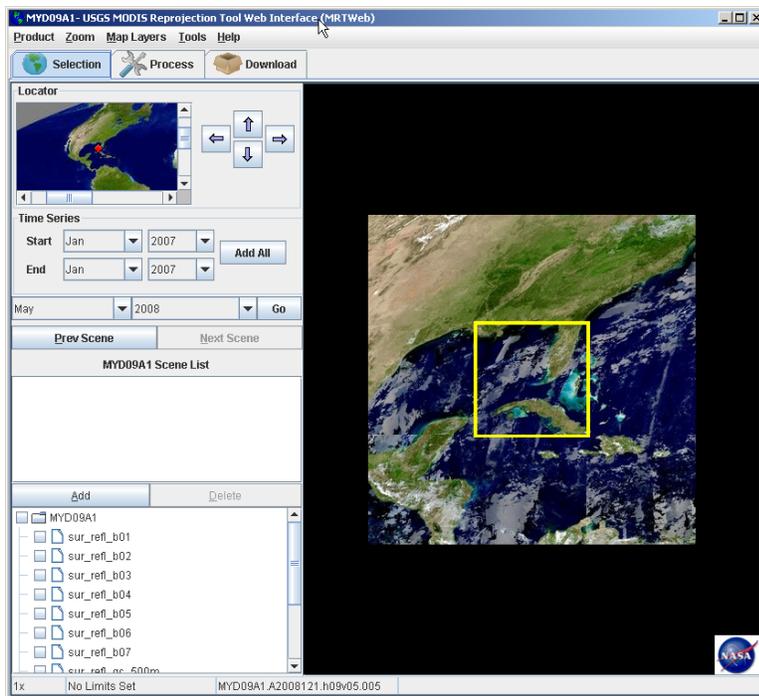
?

Login

Password

Login Cancel Create Account Change Password

**Submit your login and password** when prompted. If you do not have one, please click on “Create Account”.



The MRTWeb 2.0 graphical user interface will appear in a new window.

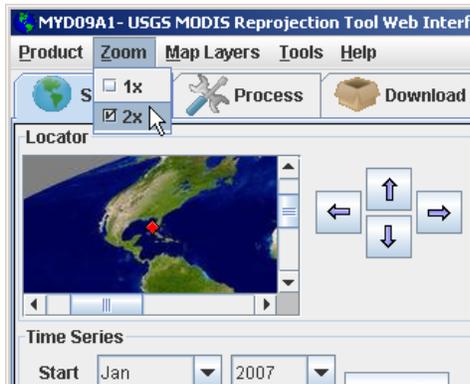
**You are now ready to begin with the Use Cases.**

## Use Cases

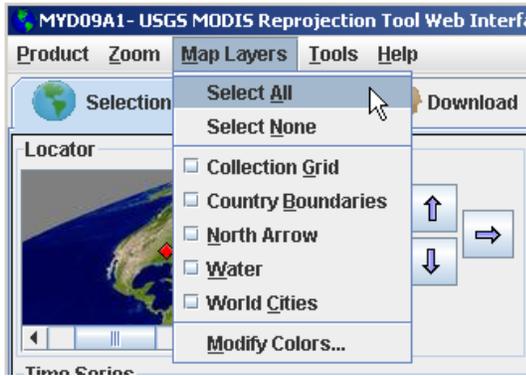
Three use cases are provided to give users experience with important functions and components of MRTWeb 2.0. Users are encouraged to follow the use cases in sequence, and then apply the knowledge gained to create their own customized processing jobs. Those already very familiar with GloVis and MRT can skip the Use Cases, but should read the *Troubleshooting* section at the end of this document before proceeding.

### Use Case 1: Select a cloud-free tile and change its format

The first use case assumes that the user is looking at the MODIS Aqua MYD09A1 product for Florida (as above).

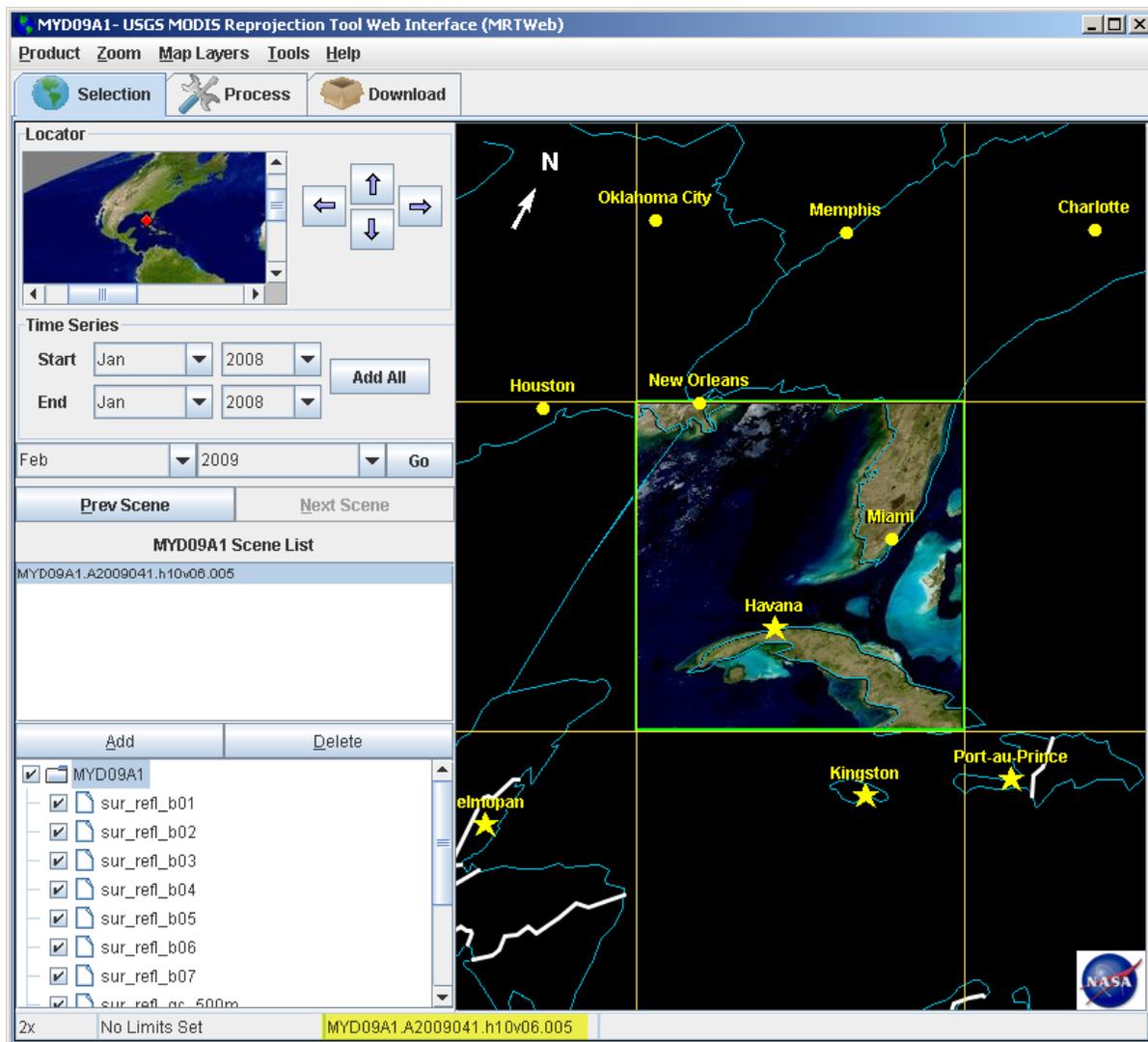


- 1.1 Use the Zoom drop-down on the main toolbar to zoom in closer (2x).** This gives a closer look at the browse image for the product of interest. MRTWeb always displays the most recent available browse at the time of use.

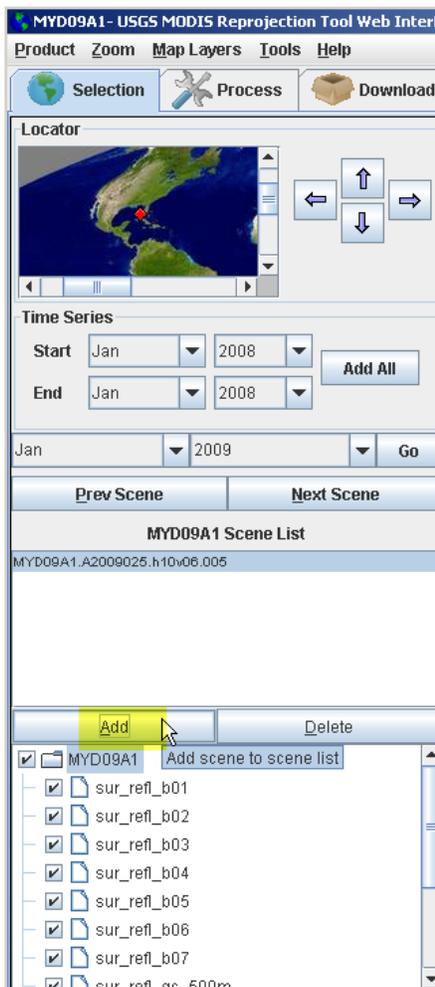
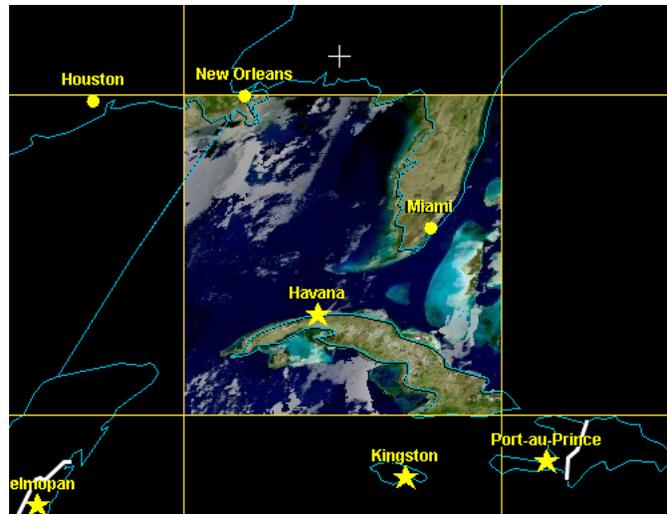
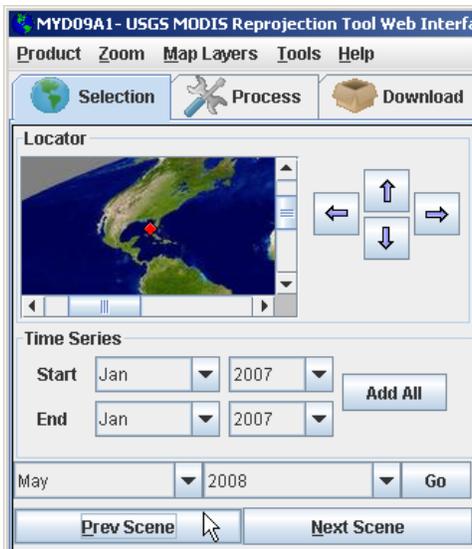


**1.2 Use the Map Layers drop-down on the main toolbar to select all map layers.** Map layers give spatial context to the MODIS land product browse images.

**1.3 The MRTWeb GUI at Zoom Level 2x and all Map Layers selected.** Notice that the product (MYD09A1), year (2009), Julian day (041), tile coordinate (h10v06), and version (005) of the most recent browse image are displayed in the status bar at the bottom of the MRTWeb GUI. The status bar also provides the geographic coordinates of your cursor as you scan across the browse image (e.g., over Miami).

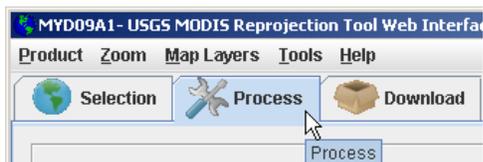
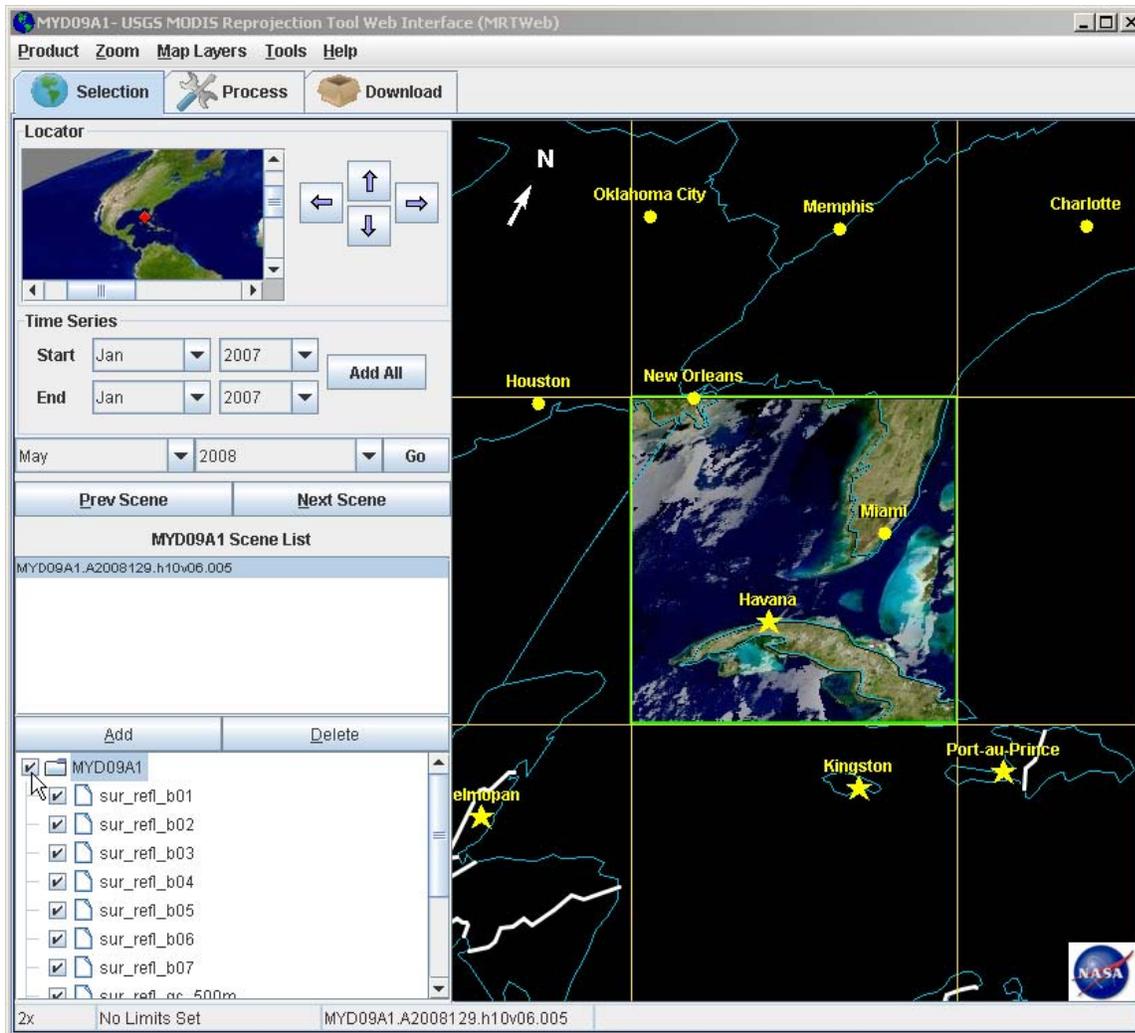


**1.4 Click the Prev Scene button** to browse back through time. Click the Next Scene button to browse forward in time. Browse until you find a relatively cloud-free MODIS land product tile (e.g., MYD09A1.A2009025.h10v06.005).



**1.5 Click on the Add button** underneath the MYD09A1 Scene List to add the tile to the scene list. This is the only tile selected for this processing job, as indicated by the single entry in the **MYD09A1 Scene List**.

**1.6 Click the MYD09A1 check box in the band list to select all MYD09A1 layers from this tile to include in the processing job. A check mark next to each layer indicates that all bands and/or layers are selected for processing.**



**1.7 Click the Process Tab to change from the selection screen to the processing options screen in the MRTWeb 1.0 GUI.**

The screenshot shows the MYD09A1-USGS MODIS Reprojection Tool Web Interface (MRTWeb) window. The title bar reads "MYD09A1-USGS MODIS Reprojection Tool Web Interface (MRTWeb)". The menu bar includes "Product", "Zoom", "Map Layers", "Tools", and "Help". Below the menu bar are three buttons: "Selection" (with a globe icon), "Process" (with a wrench icon), and "Download" (with a box icon). The main interface is divided into several sections:

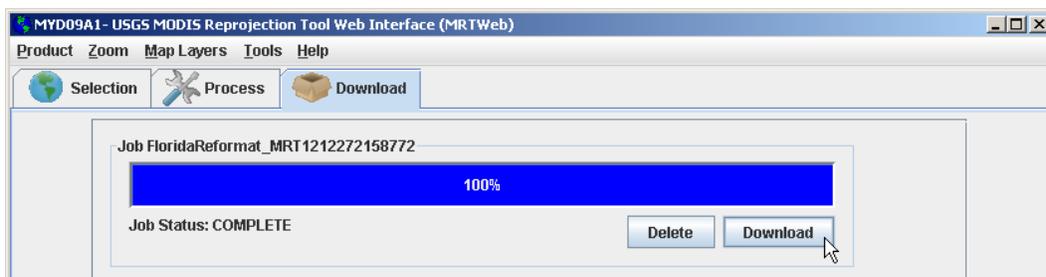
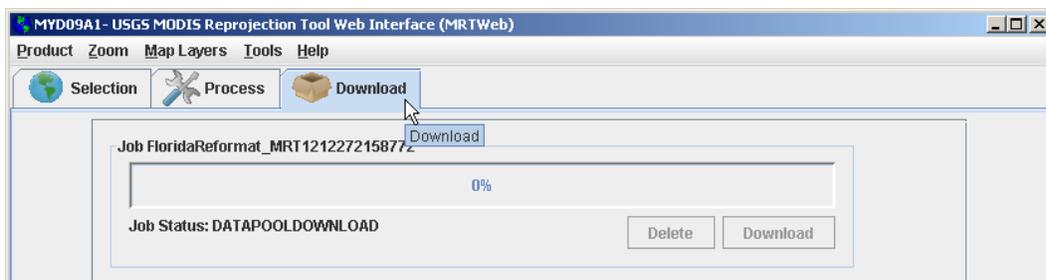
- Processing Type:** A dropdown menu set to "Convert Format".
- Job Name:** A text input field containing "FloridaReformat" with a note "(use only alphanumeric characters)".
- Spatial Subset:** A dropdown menu (empty) and four input fields for "Upper Left", "Latitude", "Longitude", and "Lower Right", all of which are empty.
- Output:** A dropdown menu for "File Type" set to "GEOTIFF" and a "Process" button.

**1.8 Set the processing options as follows (shown above):**

- Set the processing type to Convert Format
- Enter a name in the Job Name field (e.g., FloridaReformat).
- Leave the Spatial Subsetting parameters empty to process the full tile extent
- Set the Output File Type to GEOTIFF.

**1.9 Click the Process button to initiate the reformatting job on LP DAAC servers. Click the OK button on the job notification pop-up message to acknowledge that the processing job has been submitted.**





**1.10 Click the Download Tab** to change from the processing options screen to the job monitoring and download screen. The job status message will initially indicate that the tile is moving from the Data Pool to the staging area. As soon as the tile is staged and reformatting begins, the status bar will indicate the progress of your job. When the job completes, **click the Download button** to spawn an FTP directory viewer.



**1.11 Download the individual .tif files from the FTP directory to your local file system.**

The standard HDF file used to process your job is available as well, should you choose to download it. The MRT 4.0 log and parameter files are also available for download. You can download these text files to capture a record of your processing job.

A grayscale image of *MYD09A1.A2008129\_1.sur\_refl\_b01.tif* (an output band file from this use case) is shown in figure 2 below. The native tile extent and projection are not altered, and only the file format is changed.

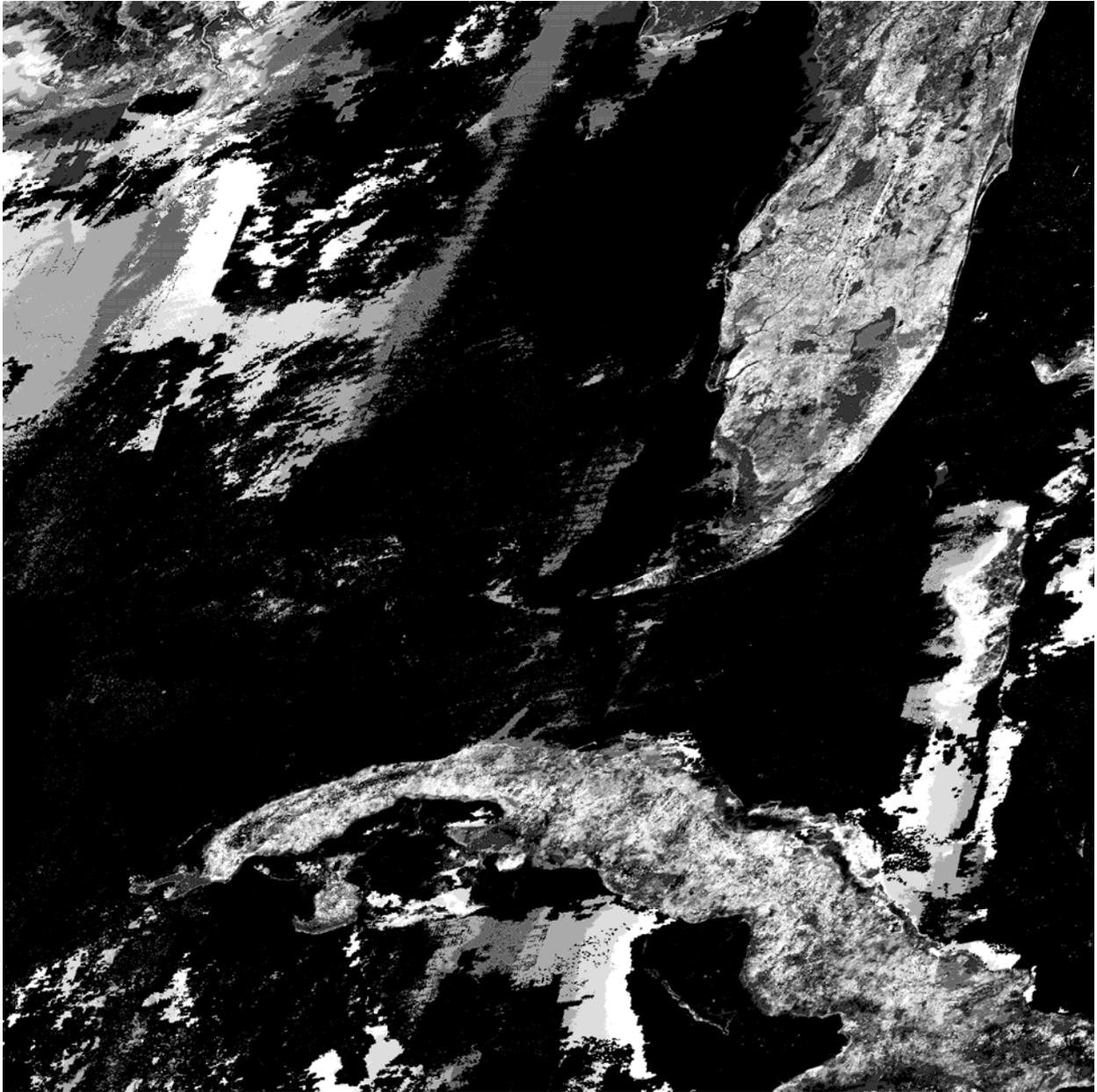
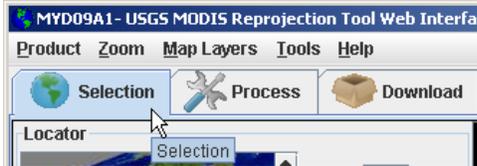
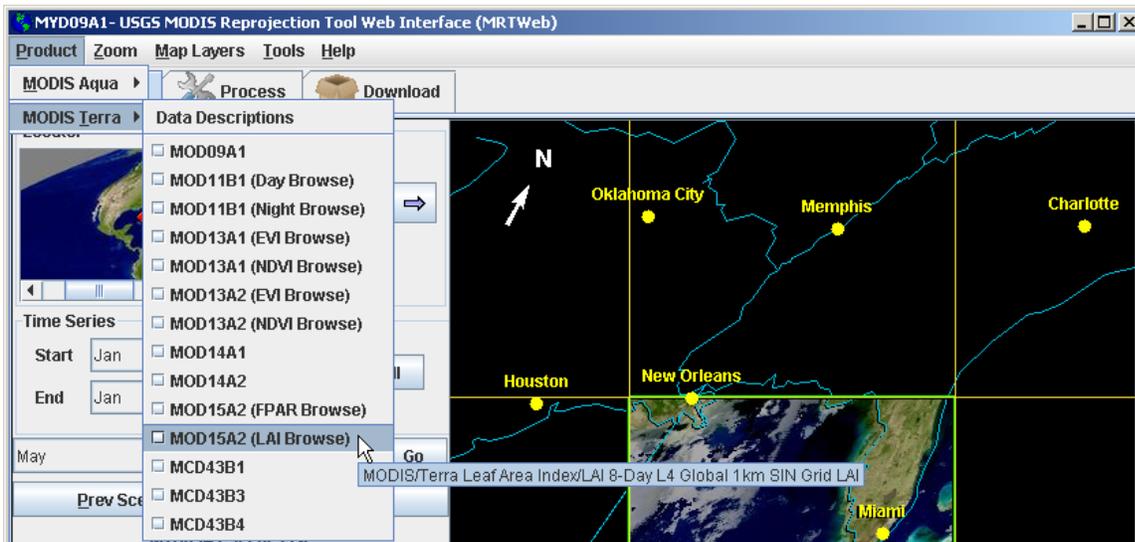


Figure 2. A grayscale image of *MYD09A1.A2008129\_1.sur\_refl\_b01.tif*.

**Use Case 2: Extract a one-year time series, which includes elimination of unwanted layers, reprojection, spatial subsetting, and reformatting.**



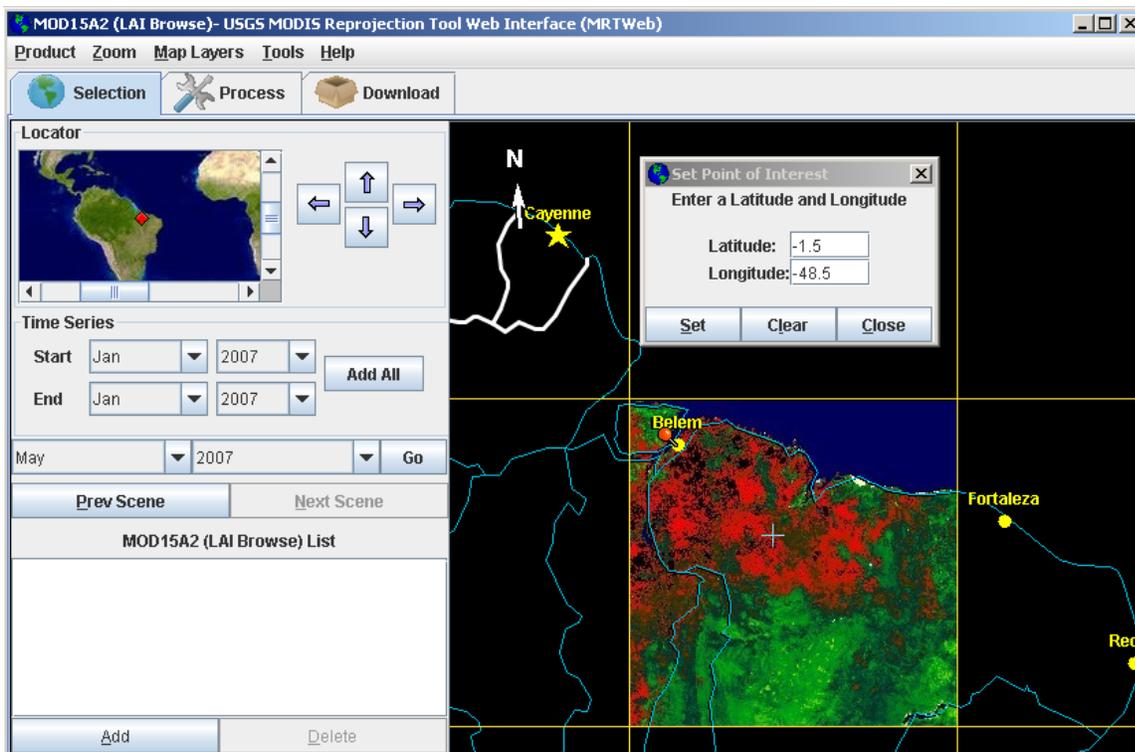
**2.1 Click the Selection Tab** to change from the download screen back to the selection screen.



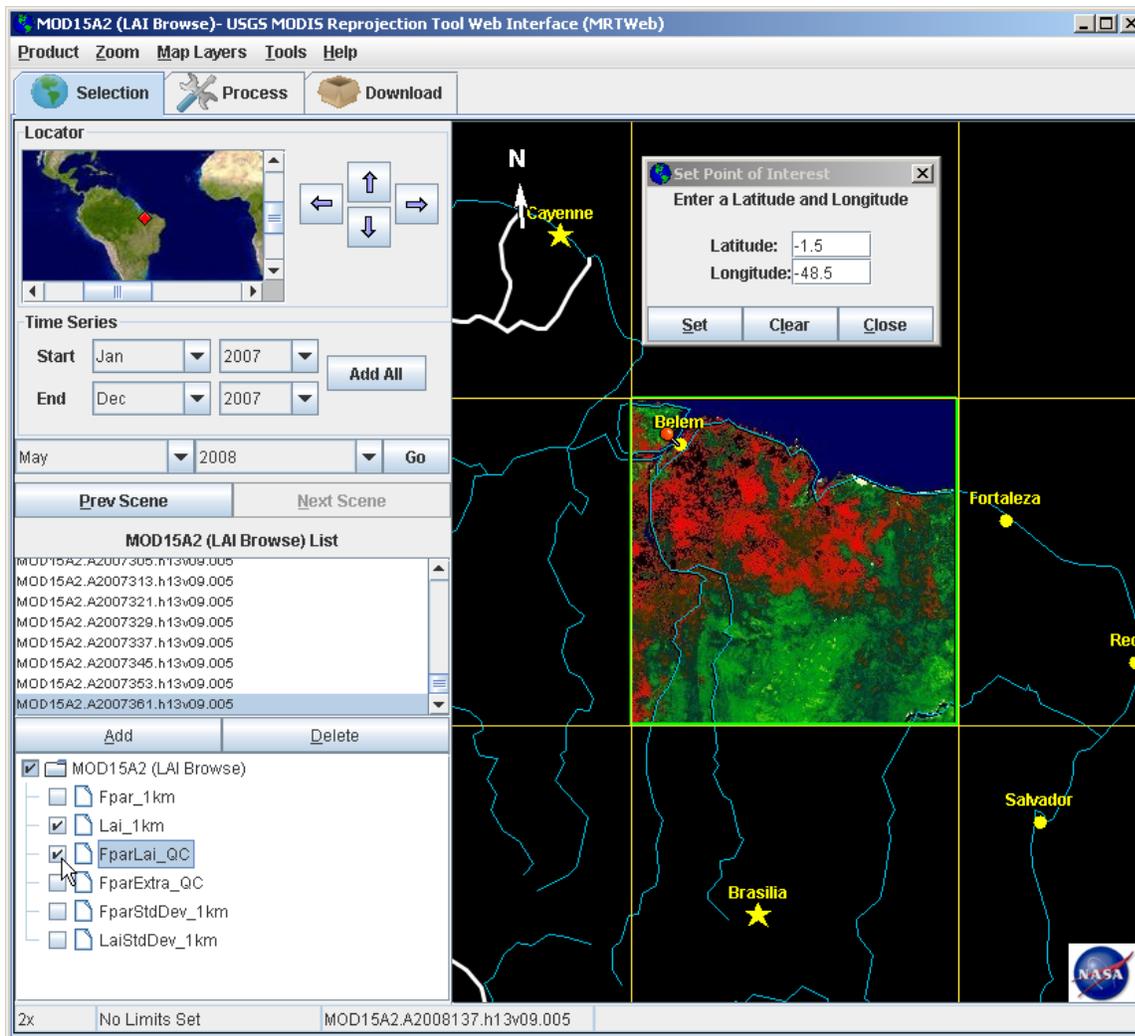
**2.2 Use the Product drop-down menu on the main toolbar to select the MOD15A2 product. Click Yes on the confirmation pop-up to clear your scene list, and display the MOD15A2 browse. The scene list is cleared anytime you switch products.**

**2.3 Use the Tools drop-down menu on the main toolbar to select Set Point of Interest.** A small dialog box will pop up. Enter **-1.5 for Latitude and -48.5 for Longitude, and click Set.** The point of interest appears as a pin in the MRTWeb browser window (in this case, corresponding to Belem, Brazil).

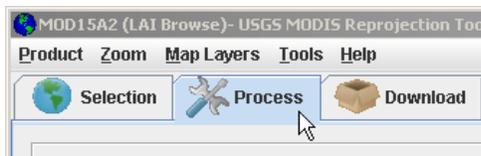




2.4 Use the Time Series controls to select and add one year of MOD15A2 tiles to the scene list. **Set time series Start month/year to Jan/2007 and End month/year to Dec/2007. Click Add All**, and all the 2007 tiles are added to the scene list.



**2.5** Click the check box for *Lai\_1km* and *FparLai\_QC* in the band list to select only the Leaf Area Index and main Quality Control layers for this product. A check mark indicates which layers of interest are selected for processing.



**2.6** Click the **Process Tab** to change from the selection screen to the processing options screen in the MRTWeb 2.0 GUI.

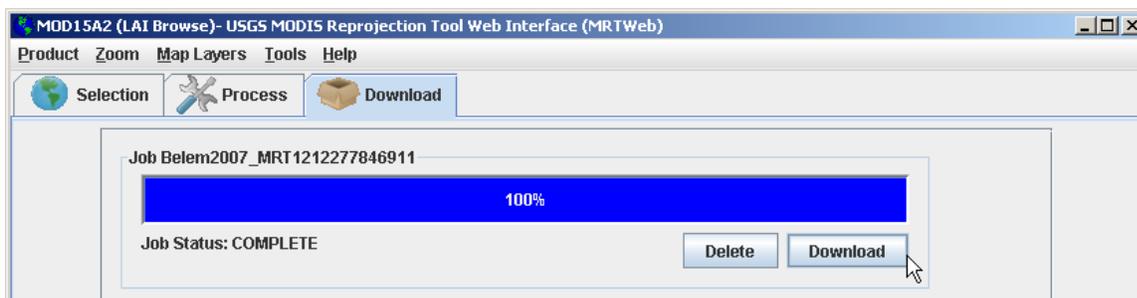
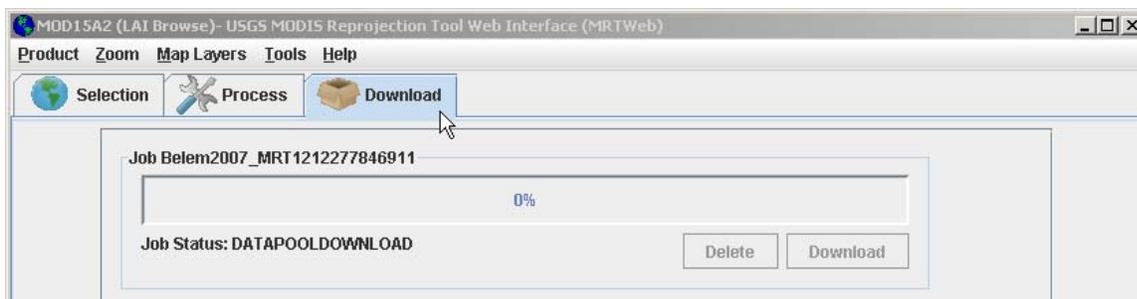
The screenshot shows the 'MOD15A2 (LAI Browse)- USGS MODIS Reprojection Tool Web Interface (MRTWeb)'. The interface includes a menu bar with 'Product', 'Zoom', 'Map Layers', 'Tools', and 'Help'. Below the menu are three tabs: 'Selection', 'Process', and 'Download'. The main content area is divided into several sections:

- Processing Type:** A dropdown menu set to 'Reproject'.
- Job Name:** A text input field containing 'Belem2007' with a note '(use only alphanumeric characters)'.
- Spatial Subset:** A dropdown menu set to 'Input Lat/Long'. Below it are four input fields: 'Upper Left' (with values -0.5 and -49.5), 'Latitude' (with value -2.5), 'Longitude' (with value -47.5), and 'Lower Right'.
- Resampling:** A section with two dropdown menus: 'Type' set to 'Nearest Neighbor' and 'Pixel Size' set to 'Native' pixels.
- Projection:** A dropdown menu set to 'Geographic' and a 'Datum' dropdown set to 'WGS84'.
- Output:** A dropdown menu for 'File Type' set to 'GEOTIFF' and a 'Process' button.

## 2.7 Set the processing options as follows (shown above):

- Set the Processing Type to Reproject.
- Enter a name in the Job Name field (e.g., Belem2007).
- Set the Spatial Subset Input Lat/Long
- Enter -0.5, -49.5 (Lat/Long) for the Upper Left and -2.5, -47.5 (Lat/Long) for the Lower Right spatial subset to define a 2 degree by 2 degree area of interest.
- Set the Resampling options to Nearest Neighbor and Native Pixel Size
- Leave output file type set to GEOTIFF.
- Click the Process button to initiate the processing job on LP DAAC servers. Click the OK button on the job notification pop-up message to acknowledge that the processing job has been submitted.

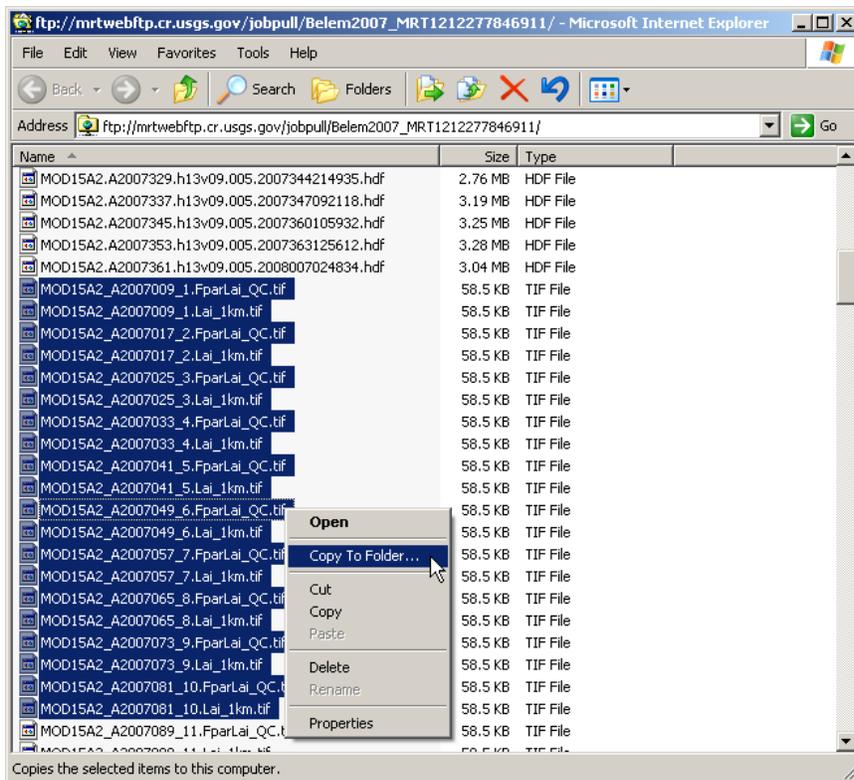




**2.8 Click the Download Tab** to change from the processing options screen to the job monitoring and download screen. The job status message will initially indicate that the tiles are moving from the Data Pool to the staging area. As soon as the tiles are staged and processing begins, the status bar will indicate the progress of your job. When the job has completed, **click the Download button** to spawn an FTP directory viewer.



**2.9 Download the individual .tif files from the FTP directory to your local file system.** Using the browser controls to open the directory as an FTP Site makes it easy to download multiple files through a drag-and-drop capability (as seen below). The standard HDF files used to process your job are also staged, should you wish to download them. The MRT 4.0 log and parameter files provide a record of your processing job, and are also downloadable.



A grayscale image of *MOD015A2.A2007\_1.Lai\_1km.tif* (the first time series date subsetted from the LAI layer in this use case) is shown in figure 3. The subset corresponds to the two by two degree extent specified, and is reprojected to geographic.

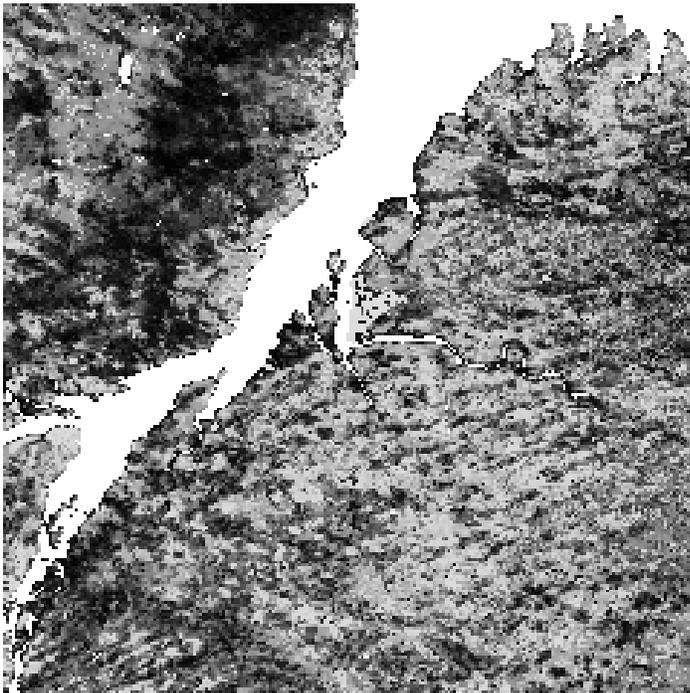
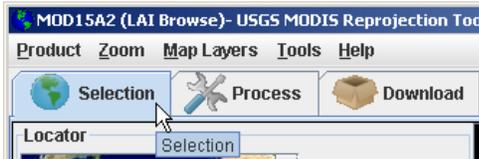
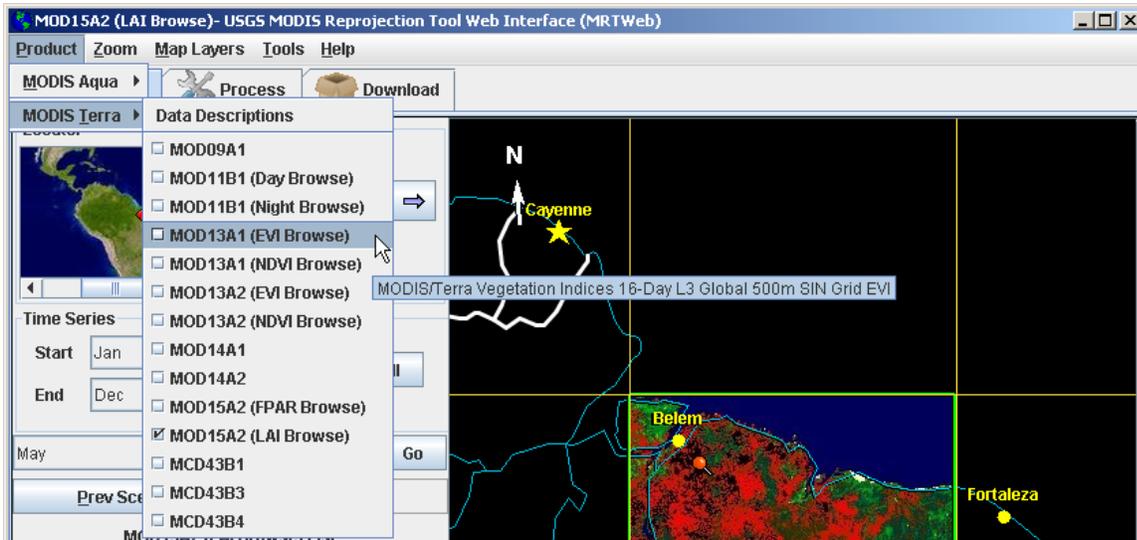


Figure 3. A grayscale image of *MOD015A2.A2007\_1.Lai\_1km.tif*.

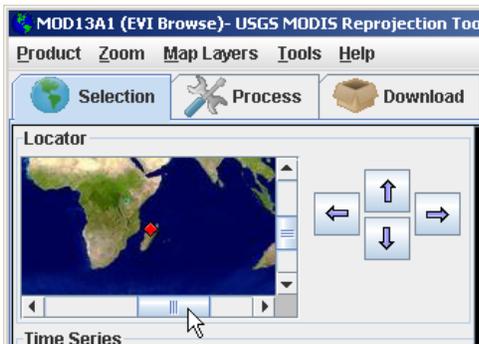
### Use Case 3: Create a multi-tile mosaic, which includes elimination of unwanted layers, reprojection, spatial subsetting, and reformatting



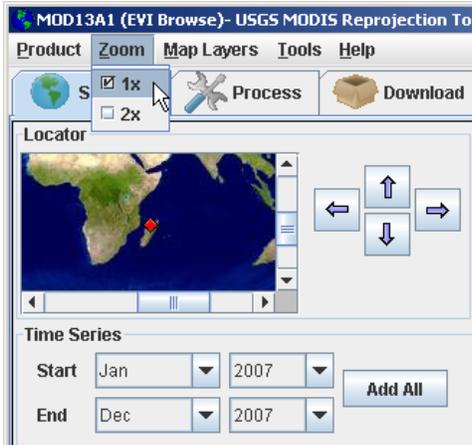
3.1 Click the Selection Tab to change from the download screen back to the selection screen.



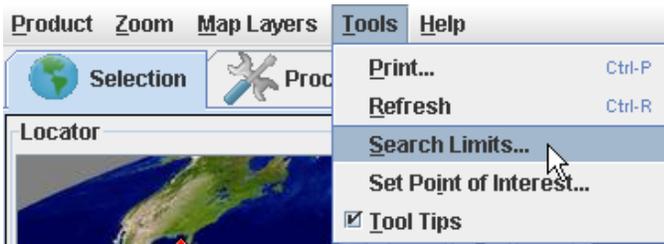
3.2 Use the Product drop-down menu on the main toolbar to select the MOD13A1 product (EVI browse). Click Yes on the confirmation pop-up to clear your scene list and display the MOD15A2 browse. The scene list is cleared anytime you switch products.



3.3 Use the Locator Controls to navigate to Madagascar. The slider bars reorient the locator map. Click a location on Madagascar to point the browse viewer there.



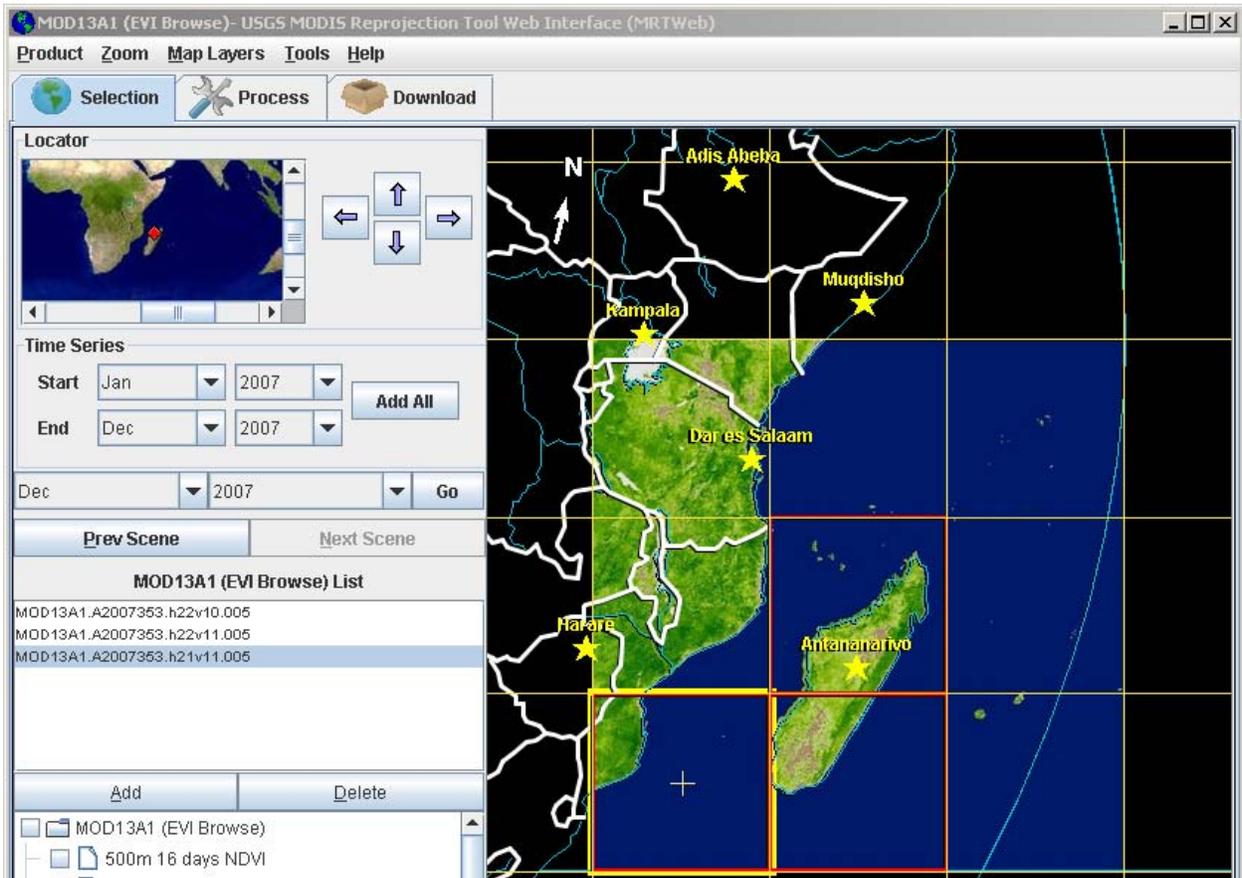
**3.4 Use the Zoom drop-down on the main toolbar to zoom out (1x).** This will show a group of nine browse images for the product of interest.



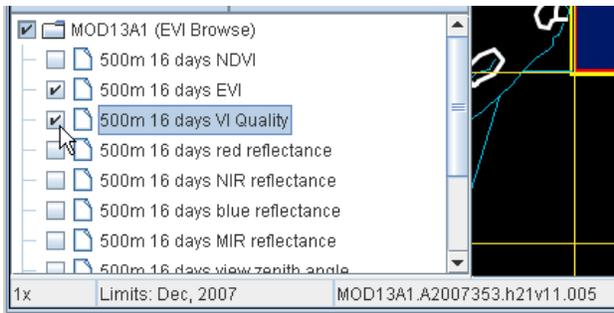
**3.5 Use the Tools drop-down on the main toolbar to bring up the Search Limits dialog box.**



**3.6 Set and Apply Search Limits.** This function constrains viewable browse images to the limits set by the user. In this case, set Start and End year to 2007, and Start and End Month to December.



**3.7 Double-click one of the tiles** covering Madagascar. The tile is added to the scene list. Repeat until the three tiles shown above are added to the scene list. Confirm that all three tiles are from the same date. MRTWeb will automatically mosaic multiple tiles in the scene list as long as they are from the same date.



**3.8 Click the check box for 500m 16 days EVI and 500m 16 days VI Quality in the band list** to select only the Enhanced Vegetation Index and main Quality layer for this product. A check mark indicates which layers of interest are selected for processing.

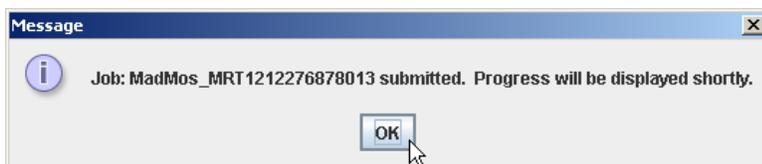
The screenshot shows the MRTWeb interface with the following settings:

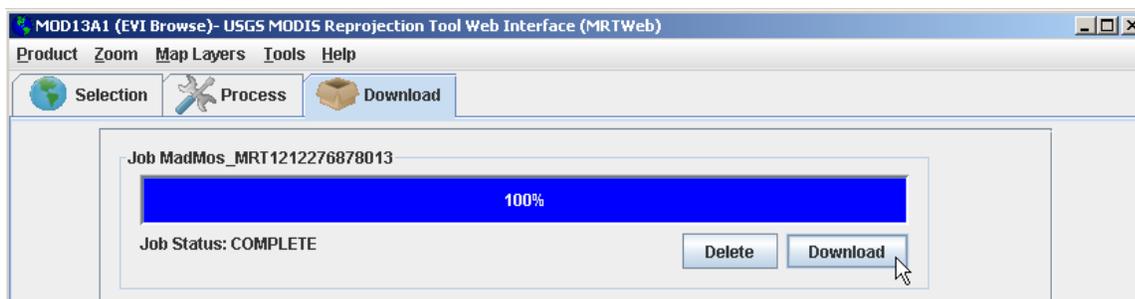
- Processing Type:** Reproject
- Job Name:** MadMos (with a note: use only alphanumeric characters)
- Spatial Subset:** Input Lat/Long
 

Upper Left	-11.5	42	
Latitude	-26.5	Longitude	51
Lower Right			
- Resampling:** Type: Nearest Neighbor; Pixel Size: Native pixels
- Projection:** Geographic; Datum: WGS84
- Output:** File Type: GEOTIFF
- Process:** A button is visible with a mouse cursor over it.

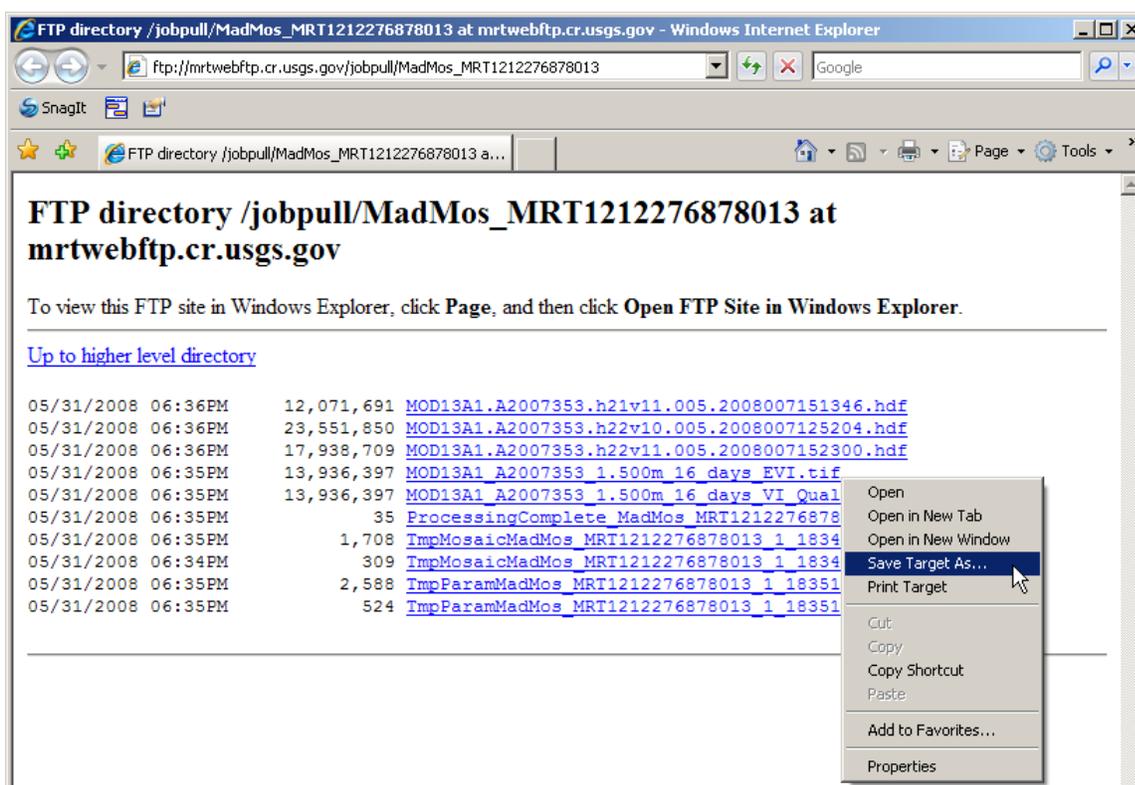
### 3.9 Set the processing options as follows (shown above):

- Set the Processing Type to Reproject
- Enter a name in the Job Name field (e.g., MadMos)
- Set the Spatial Subset Input Lat/Long
- Enter -11.5, 42 (Lat/Long) for the Upper Left and -26.5, 51 (Lat/Long) for the Lower Right spatial subset to define a 15 degree by 11 degree area of interest.
- Set the Resampling options to Nearest Neighbor and Native Pixel Size
- Leave output file type set to GEOTIFF
- Click the Process button to initiate the processing job on LP DAAC servers. Click the OK button on the job notification pop-up message to acknowledge that the processing job has been submitted





**3.10 Click the Download Tab** to change from the processing options screen to the job monitoring and download screen. The job status message will initially indicate that the tiles are moving from the Data Pool to the staging area. As soon as the tiles are staged and processing begins, the status bar will indicate the progress of your job. When the job completes, **click the Download button** to spawn an FTP directory viewer.



**3.11 Download the individual .tif files from the FTP directory to your local file system.**

The standard HDF files used to process your job are available as well, should you wish to download them. The MRT 4.0 log and parameter files provide a record of your processing job, and are also downloadable.

**A grayscale image of MOD13A1\_A2007353\_1.500m\_16\_days\_EVI.tif**

(an output EVI file from this use case) is shown in figure 4 below. The mosaic corresponds to the 15 by 11 degree extent specified, and is reprojected to geographic.

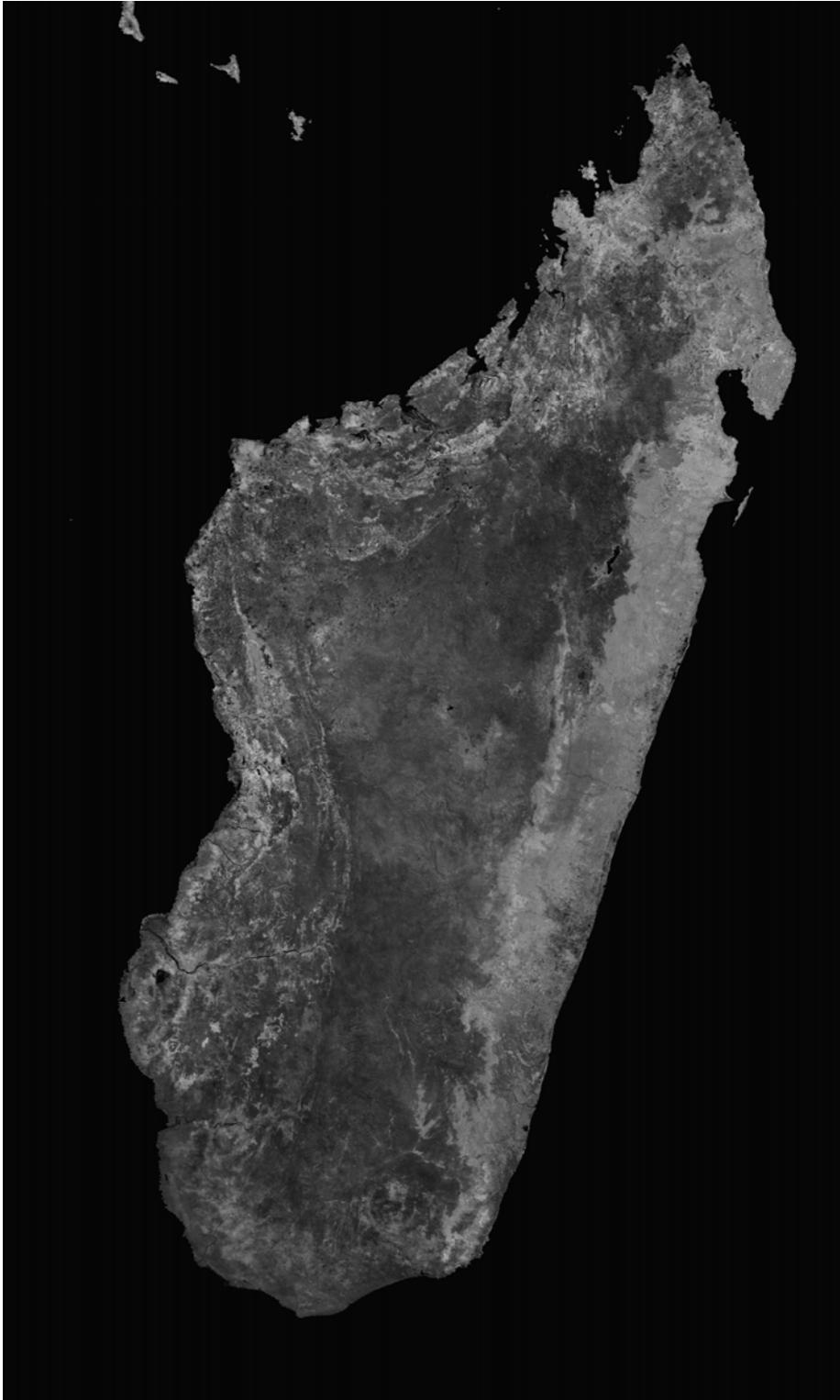
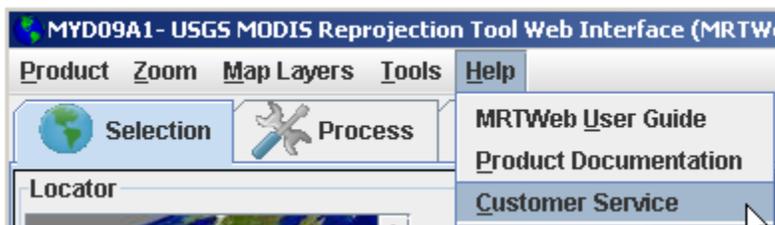


Figure 3. A grayscale image of *MOD13A1\_A2007353\_1.500m\_16\_days\_EVI.tif*.

## Help Menu Options



Use the **Help drop-down menu** to access this User Guide, Product Documentation, and Customer Service.

## MODIS Product Table

These links will direct you to specific information and access points for each of the MODIS Land Products distributed from LP DAAC.

Shortname	Platform	MODIS Product	Raster Type	Res (m)	Temporal Granularity
<a href="#">MCD12Q1</a>	Combined	Land Cover Type	Tile	500m	Yearly
<a href="#">MCD43A1</a>	Combined	BRDF-Albedo Model Parameters	Tile	500m	16 Day
<a href="#">MCD43A2</a>	Combined	BRDF-Albedo Quality	Tile	500m	16 Day
<a href="#">MCD43A3</a>	Combined	Albedo	Tile	500m	16 Day
<a href="#">MCD43A4</a>	Combined	Nadir BRDF-Adjusted Reflectance	Tile	500m	16 Day
<a href="#">MCD43B1</a>	Combined	BRDF-Albedo Model Parameters	Tile	1000m	16 Day
<a href="#">MCD43B2</a>	Combined	BRDF-Albedo Quality	Tile	1000m	16 Day
<a href="#">MCD43B3</a>	Combined	Albedo	Tile	1000m	16 Day
<a href="#">MCD43B4</a>	Combined	Nadir BRDF- Adjusted Reflectance	Tile	1000m	16 Day
<a href="#">MCD43C1</a>	Combined	BRDF-Albedo Model Parameters	CMG	5600m	16 Day
<a href="#">MCD43C2</a>	Combined	BRDF-Albedo Snow-free Quality	CMG	5600m	16 Day

Click the **Product Documentation** link to open a new window with the list of MODIS products described on the LP DAAC website. Make sure that you look at version 5 (V5) documentation, the only version available via MRTWeb.

## Customer Service

Our User Services staff are the primary point of contact for users of LP DAAC products and services. Please contact us with any questions you may have about LP DAAC data products, access, tools, or policies.

Voice: 605-594-6116

Toll Free: 866-573-3222 (866-LPE-DAAC)

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Web: <http://LPDAAC.usgs.gov>

Have a comment about the website?

[We want to hear from you.](#)

Click the **Customer Service** link to open a new window with the contact information for LP DAAC User Services.

## Troubleshooting



Make sure pop-ups are not blocked by your Internet browser before using MRTWeb.



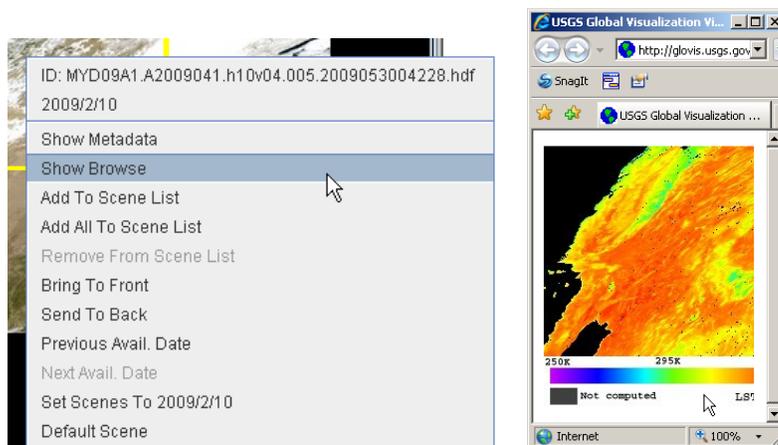
- Selecting a very large number of tiles per job may slow processing performance, and create very large output files for download. A maximum of 50 tiles can be selected for processing at one time.



The scene list and layer selection check boxes are the main controls on what data sets are submitted for processing. Multiple tiles of the same date are mosaicked automatically, so ensure that all input tiles are from the same date for mosaicking jobs. The layer selections are universally applied to all tiles in the scene list.



Navigation and selection are controlled in various ways using the interface. Experiment with different ways to navigate (e.g., using the locator map, dragging within the browse window, using the point of interest dialog box). Experiment with different ways to select (e.g., using the Add button, double-clicking on a tile of interest, using the Add All button for time series, or using right-click options on the tile of interest).



Right-click drop-down options on the tile of interest include Show Browse, which gives the color scale for the product.



You can estimate the geographic coordinates of the area of interest (i.e., the upper left and lower right corners of the desired Spatial Subset) from MRTWeb. Place the cursor over the location of interest on the browse image and read the coordinates off the status bar at the bottom of the interface. It is best, however, to have your particular study area coordinates available beforehand.



Users should fully understand their desired Projection Parameters before setting these options in MRTWeb. You may wish to enter your projection parameters to match pre-existing data sets for your study area.



MRTWeb provides the user a high degree of control over processing jobs. Inaccurate or nonsensical parameterizations of processing options may yield spurious results or cause submitted jobs to fail.



Correct use of the MRTWeb tool will produce results identical to the use of the stand-alone MRT 4.0 tool. The difference is that MRTWeb lets you act on HDF tiles remotely without downloading them first. You need only to download your finally processed files.