

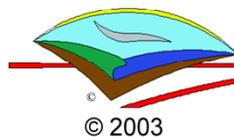
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# Satellite and Aerial Imagery Demonstration Project

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## ***USGS Topographic Digital Raster Graphics (DRG)***

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## Introduction

Locating and ordering satellite imagery for a particular area and time can be a time consuming and daunting task. USGS and NASA maintain vast archive of historic of satellite imagery, some of it dating back 30 years or more. Until recently, searching for relatively cloud-free Landsat imagery for a given location required a good understanding of the various imagery archives and Internet distribution interfaces. Fortunately, USGS has greatly assisted users by the creation of the Global Visualization Viewer for Landsat and ASTER imagery. This tutorial demonstrates use of the viewer to locate current Landsat 7 ETM+, ASTER and historic Landsat 5 imagery. The Global Visualization Viewer allows searches to be conducted in a manner of minutes that previously consumed hours. Beginning users should find the point-and-click map style interface familiar and easy to use. Use of the viewer by itself can help an environmental analyst gain a better understanding of landcover characteristics and changes over time.

Ordering functions in the Global Visualization Viewer were not yet functional at the time of the development of this tutorial, but the user may browse candidate imagery and record image identification numbers and other metadata. The identification numbers and metadata can later be used with other archive interfaces to procure the imagery.

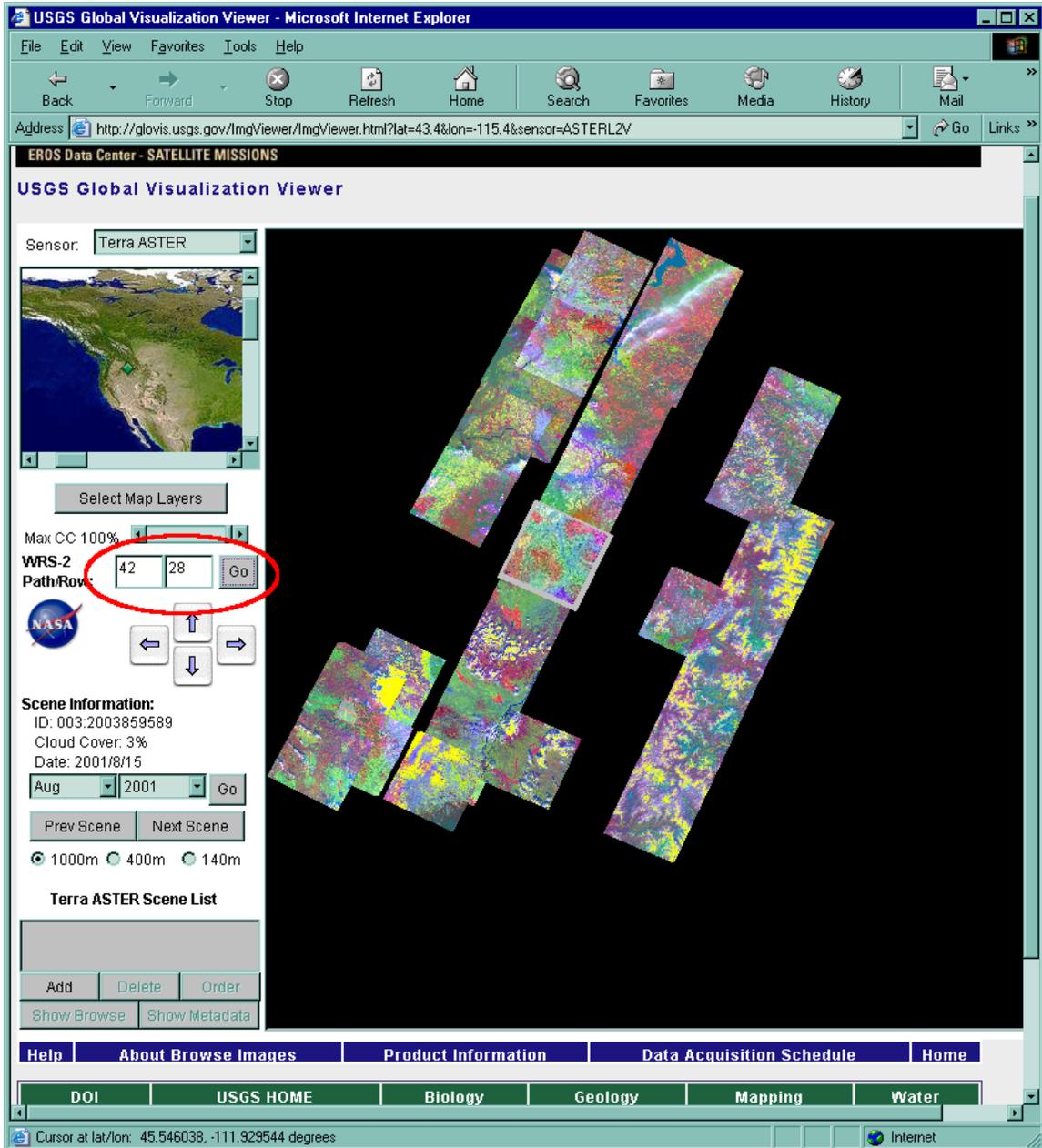
**Step 1.** Start the Internet browser and navigate to the USGS Global Visualization Viewer at:

<http://edcdaac.usgs.gov/landdaac/aster/glovis.html>

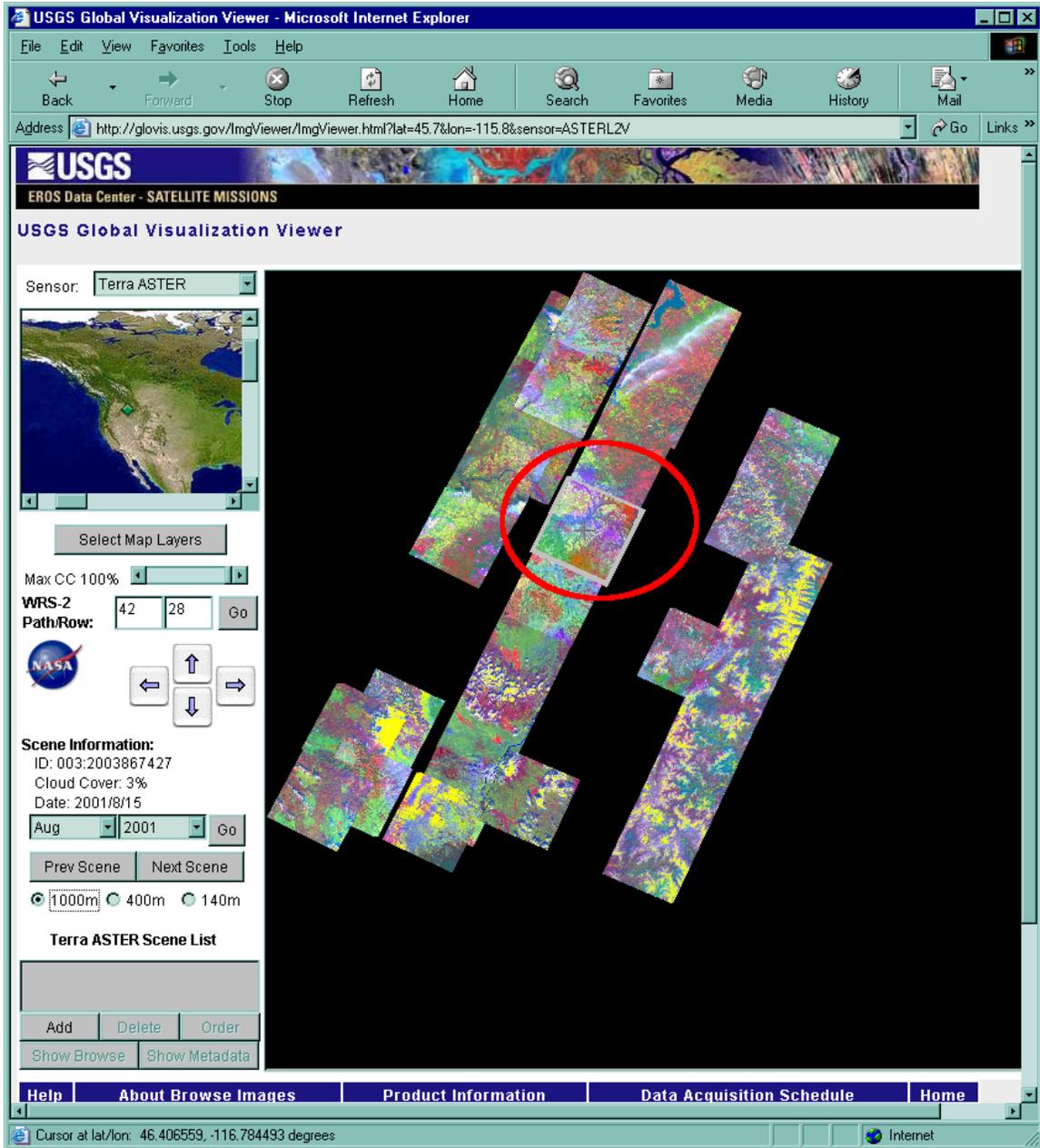
**Step 2.** Move the hand pointer to north central Idaho and left click. No need to be too exact, since the search area can be narrowed after zooming. Make sure that Terra ASTER is entered in the **Select Sensor** list window at the top of the map.



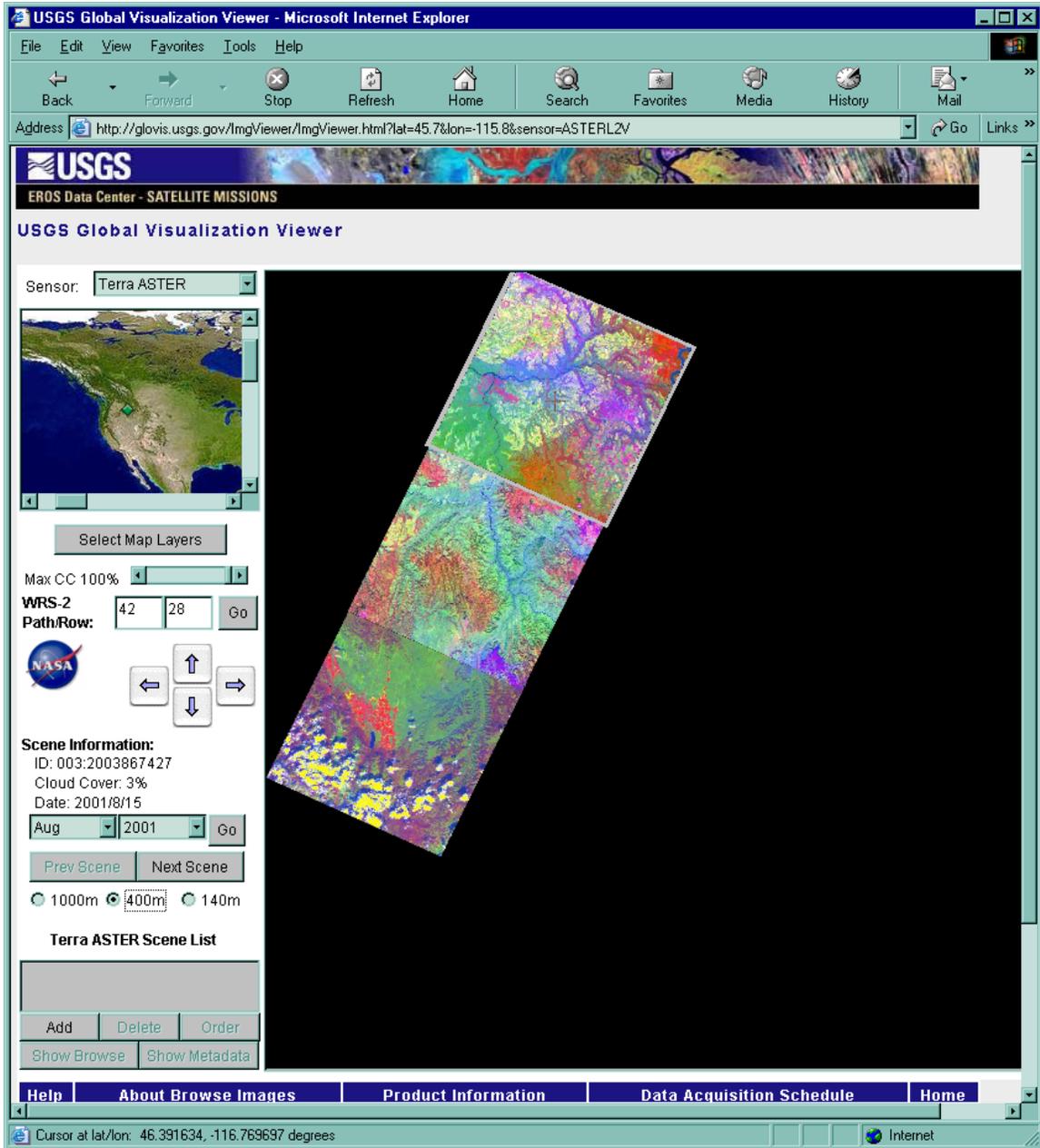
**Step 3.** Enter the Path 42 and Row 28 in the WRS coordinate box. This will display the ASTER images in the archive for this WRS location. Notice that the default zoom is set to 1000 m.



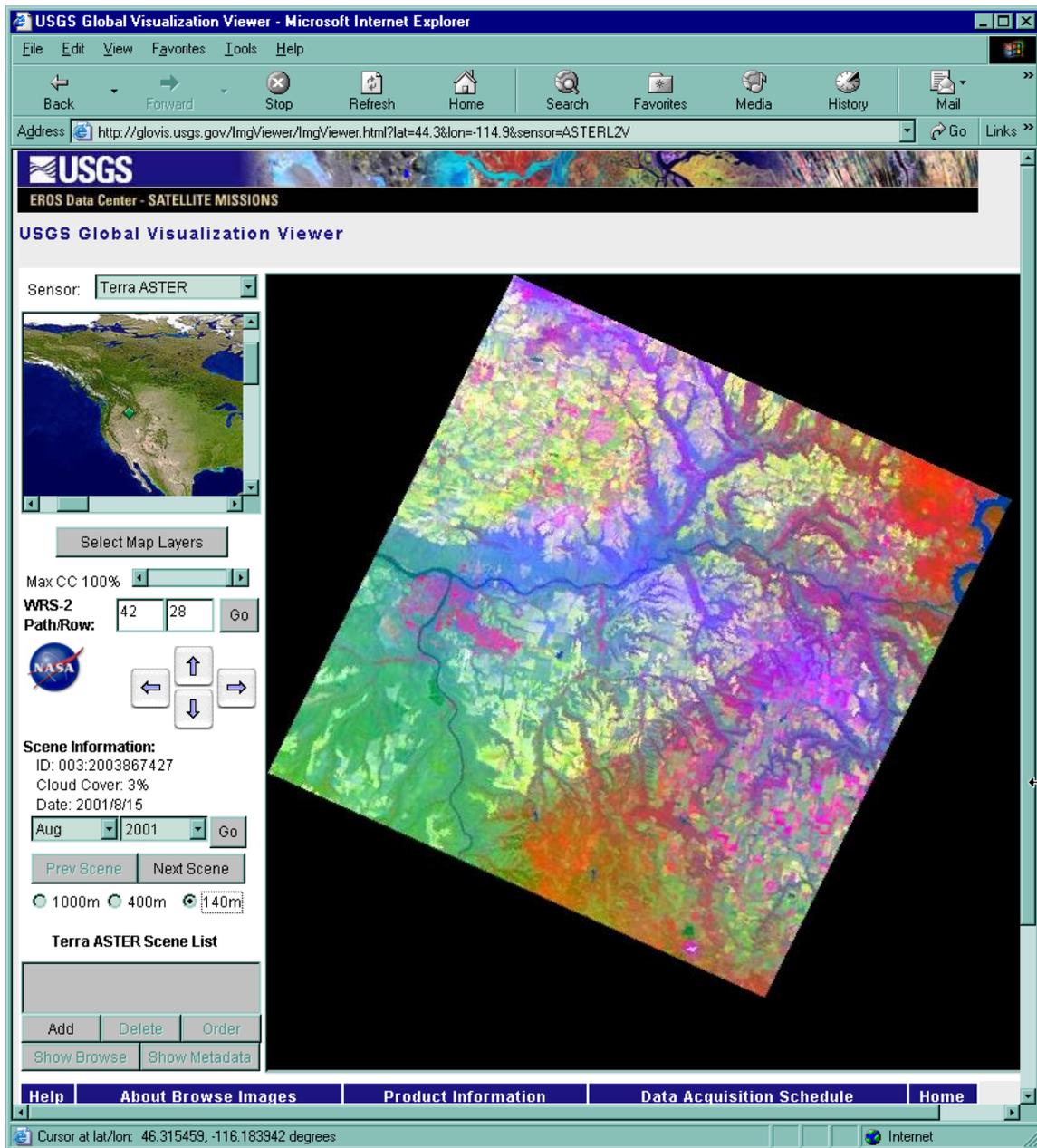
**Step 4.** Position the cross hair pointer over the ASTER that covers the confluence of the Clearwater and Snake Rivers and left click. This repositions the selection border to this image.



**Step 5.** Click the 400 m radio button and the browser zooms to larger view of the selected image and nearby images.

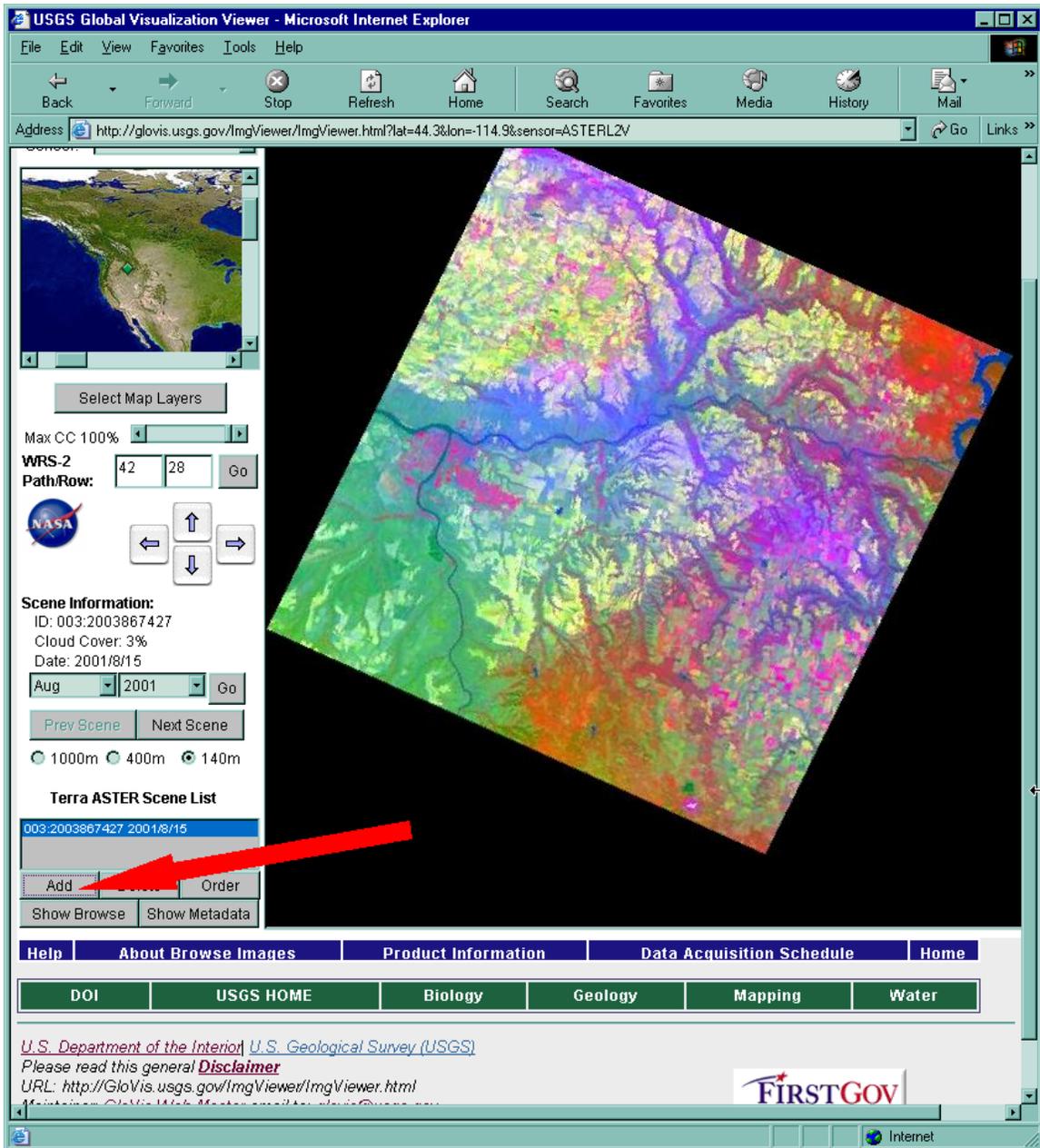


**Step 6.** Click the 140 m radio button and the browser zooms to the largest view of the selected image.

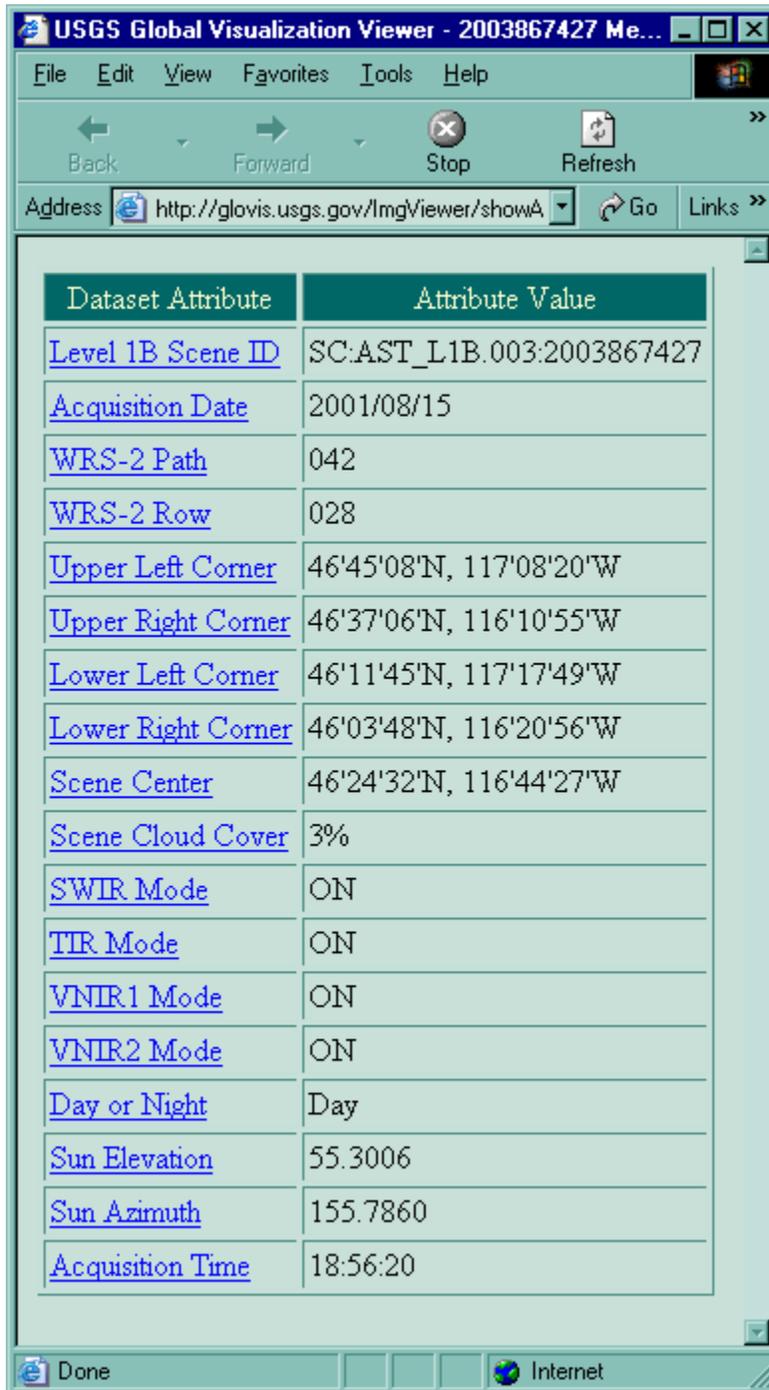


The colors in the image are not particularly meaningful in a physical sense. The image was produced using a process called **decorrelation stretch**. It is meant to show the maximum variability of features in the image. This gives a user an idea of the amount of information that might be extracted from the full version.

**Step 7.** Click the **Add** button to transfer the identification number of the selected image into the order buffer. The order link is not functional yet, but should make ordering ASTER imagery easier in the future. Note that the identification number, percent cloudiness and image date are given in the **Scene Information** box. This image was acquired on August 15, 2001.



**Step 8.** Click the [Show Metadata](#) button to open a separate window that gives more details about the image including the time of day the image was acquired. The time is in Universal Time Coordinate (UTC). Pacific Northwest Standard time (PST) is 8.0 hours behind UTC, so the image was acquired at 10:56:20 PST or 11:56:20 Pacific Daylight Savings Time.



Dataset Attribute	Attribute Value
<a href="#">Level 1B Scene ID</a>	SC:AST_L1B.003:2003867427
<a href="#">Acquisition Date</a>	2001/08/15
<a href="#">WRS-2 Path</a>	042
<a href="#">WRS-2 Row</a>	028
<a href="#">Upper Left Corner</a>	46°45'08"N, 117°08'20"W
<a href="#">Upper Right Corner</a>	46°37'06"N, 116°10'55"W
<a href="#">Lower Left Corner</a>	46°11'45"N, 117°17'49"W
<a href="#">Lower Right Corner</a>	46°03'48"N, 116°20'56"W
<a href="#">Scene Center</a>	46°24'32"N, 116°44'27"W
<a href="#">Scene Cloud Cover</a>	3%
<a href="#">SWIR Mode</a>	ON
<a href="#">TIR Mode</a>	ON
<a href="#">VNIR1 Mode</a>	ON
<a href="#">VNIR2 Mode</a>	ON
<a href="#">Day or Night</a>	Day
<a href="#">Sun Elevation</a>	55.3006
<a href="#">Sun Azimuth</a>	155.7860
<a href="#">Acquisition Time</a>	18:56:20

**Step 9.** Change the **Sensor** to Landsat 7 ETM+. The image browser removes the ASTER image and displays a Landsat 7 ETM+ image for the same Path and Row.



The View automatically selected an image date of September 19, 2002.

**Step 10.** Change the month and year to August 2001 to view a Landsat 7 ETM+ image acquired around the same time as the ASTER image.

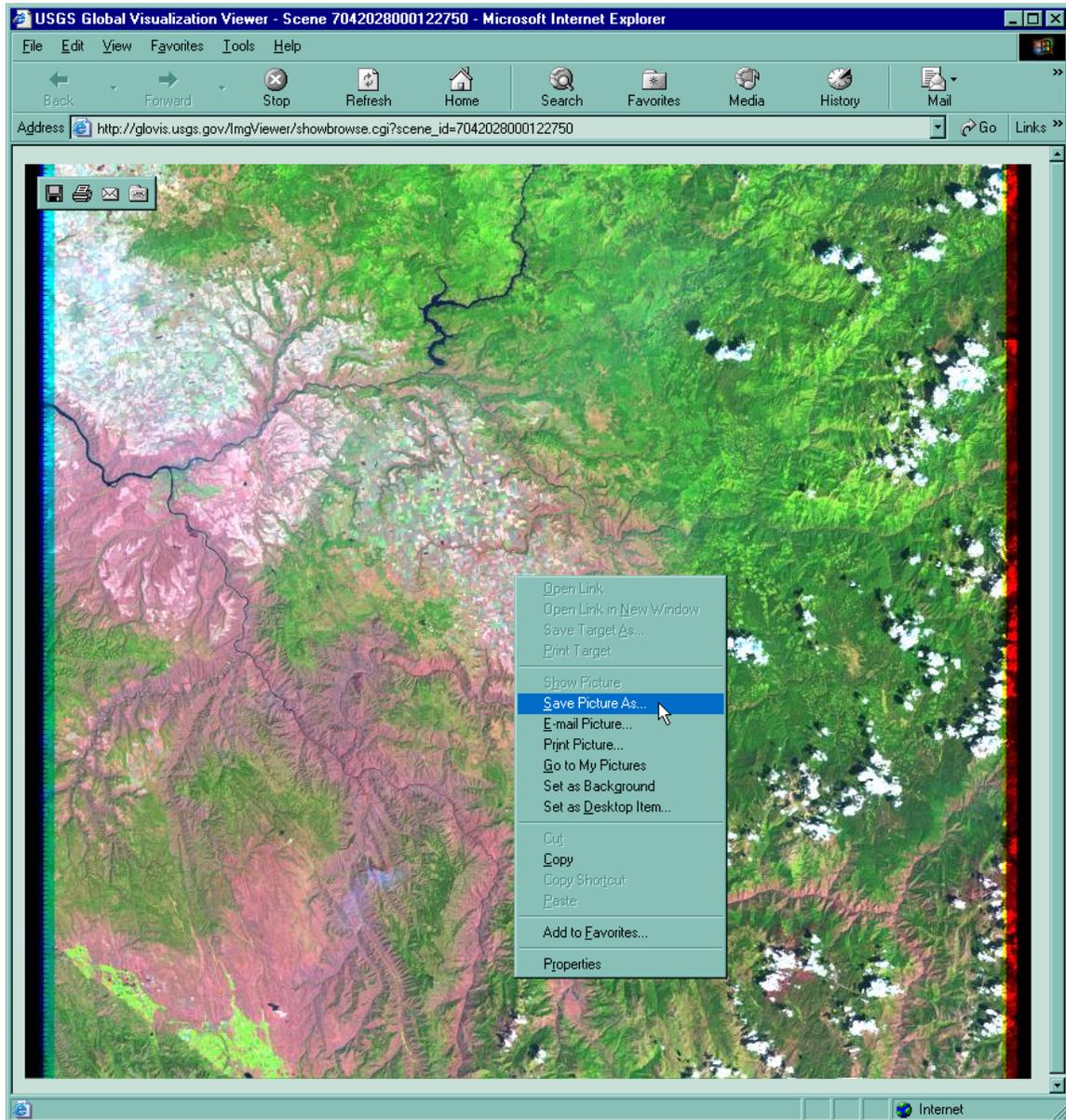
The screenshot shows the USGS Global Visualization Viewer interface. The browser window title is "USGS Global Visualization Viewer - Microsoft Internet Explorer". The address bar contains the URL: <http://glovis.usgs.gov/lmgViewer/lmgViewer.html?lat=44.3&lon=-114.9&sensor=ASTERL2V>. The page header includes the USGS logo and "EROS Data Center - SATELLITE MISSIONS". The main content area displays a satellite image of a mountainous region. The interface includes a "Sensor" dropdown menu set to "Landsat 7 ETM+", a "Select Map Layers" button, a "Max CC 100%" slider, and "WRS-2 Path/Row" fields set to 42 and 28. The "Scene Information" section shows "Date: 2001/8/15" and a "Date" dropdown menu set to "Aug" for the year "2001". There are also "Prev Scene" and "Next Scene" buttons, and a "Landsat 7 ETM+ Scene Lis" table with one entry: "7042028000122750 2001/8/15". The bottom navigation bar includes links for "Help", "About Browse Images", "Product Information", "Data Acquisition Schedule", and "Home".

Note the smoke from a wildfire in Hells Canyon of the Snake River in the lower left quadrant of the image.

**Step 11.** Click the 1000 m button to zoom out and view the surrounding Landsat 7 images. The selected image is highlighted by a shaded border. Add an image to the order buffer to view its metadata. The selected image was acquired on August 15, 2001, the same day as the ASTER image. The simultaneous collection is often planned to allow direct comparison of ASTER and Landsat 7 imagery.



**Step 12.** Click the **Show Browse** button to open a view of the selected image that may be saved with the Internet Explorer. Place the pointer anywhere on the image and right click and select the Save Picture As menu choice. Save the image in a convenient directory. The image is saved in jpeg format.



**Step 13.** Change the **Sensor** to Landsat 4/5 TM. Landsat 4 and Landsat 5 have been in orbit since \_\_\_\_\_, so they offer an opportunity to examine changes over time. Landsat 5 is still providing imagery, so direct comparisons can be made with Landsat 7. The image selected by the viewer was acquired on July 9, 2002.

USGS Global Visualization Viewer - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media History Mail

Address <http://glovis.usgs.gov/ImgViewer/ImgViewer.html?lat=44.3&lon=-114.9&sensor=ASTERL2V> Go Links

**USGS**  
EROS Data Center - SATELLITE MISSIONS

USGS Global Visualization Viewer

Sensor: Landsat 4/5 TM

Select Map Layers

Max CC 100%

WRS-2 Path/Row: 42 28 Go

USGS

Scene Information:  
ID: 5042028000219010  
Cloud Cover: 0%  
Date: 2002/7/9  
Jul 2002 Go

Prev Scene Next Scene

1000m 480m

Landsat 4/5 TM Scene List

Add Delete Order

Show Browse Show Metadata

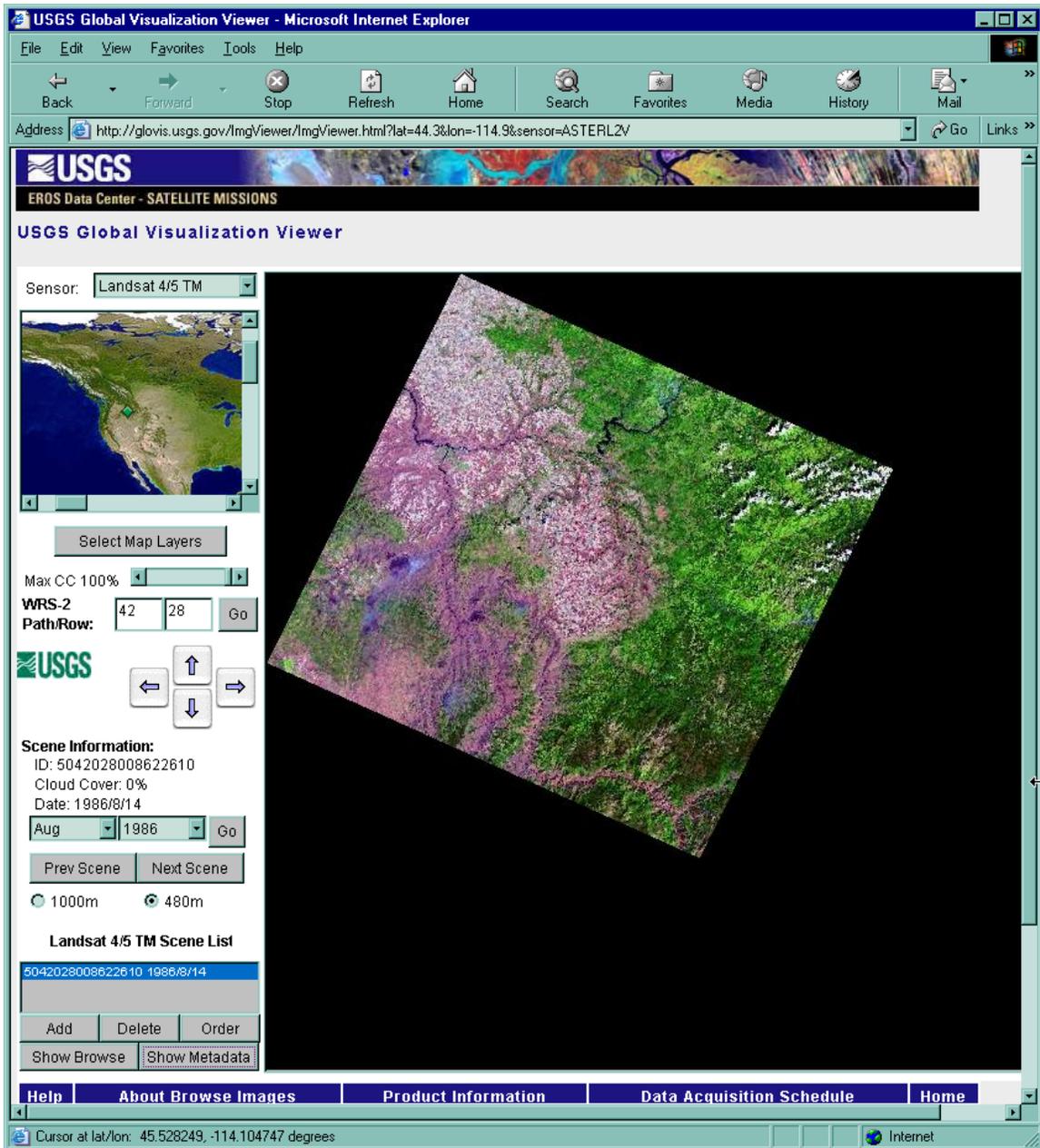
Help About Browse Images Product Information Data Acquisition Schedule Home

Cursor at lat/lon: 44.933223, -112.694326 degrees

Internet

The sensors onboard Landsat 4, 5, and 7 are slightly different, but differences are well known and techniques are available to minimize uncertainties because of radiometric characteristics.

**Step 14.** Click the 480 m button to zoom into the selected scene. Set the month to August and work back through the years to find the earliest Landsat 4 or Landsat 5 image for Path 42 Row 28. The earliest cloud free image found by the browser is a Landsat 5 image acquired on August 14, 1986. Wildfires were again burning in Hells Canyon.



It is interesting to observe the changes in forest and crop patterns when browsing back through the years. This simple technique gives

the observer a factual impression of significant landcover changes within the scene area. It may be helpful to transfer the image information into the order buffer, select the [Show Browse](#) button, and copy the browse image to an image directory. Later replay and comparison of the image sequence with other image viewer software will reinforce the perception of landcover change.

## **Summary**

The USGS Global Visualization Viewer is a well-designed and highly functional browser for ASTER and Landsat imagery. It allows quick searches of imagery for specified time periods and geographic areas. It conveniently provides image identification data and metadata to facilitate ordering through other online archive interfaces.

The USGS Global Visualization View saves a tremendous amount of time in locating ASTER imagery compared to alternative search methods. The author was able to conduct searches in a few minutes that previously required hours, sometimes days, with other online browsers.