INTERACTIVE WEB-BASED INTERFACE FOR MISR DATA VISUALIZATION

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1. INTRODUCTION

The Multi-angle Imaging SpectroRadiometer (MISR) instrument provides a unique view of Earth, obtaining radiance, aerosol, cloud and land surface data from nine cameras at different angles and four wavelengths. MISR was launched on December 18, 1999 on the NASA Earth Observing System (EOS) Terra satellite.

MISR data are processed, archived and distributed by the NASA Langley Atmospheric Sciences Data Center (ASDC). Data, information and tools are available at the ASDC web site, http://eosweb.larc.nasa.gov.

A new web-based tool is being developed to allow interactive creation of images from MISR radiance data files.

2. MISR DATA

MISR uses nine cameras pointed at fixed angles, one viewing the nadir direction and four each viewing the forward and aftward directions along the spacecraft ground track. The off-nadir cameras image Earth at 26.1, 45.6, 60.0, and 70.5 degrees forward and aftward of nadir. Each of the nine MISR cameras obtains images in four spectral bands: blue, green, red and near-infrared. The center wavelengths of these bands are 446, 558, 672, and 886 nm, respectively.

The Level 1B2 Georectified Radiance product consists of the sets of imagery from the nine cameras, calibrated and registered to one another and to the ground. This product is mapped into a standard projection called Space Oblique Mercator(SOM). There are separate files for each of the nine cameras which contain the red, green, blue and NIR radiances for one orbit. The nadir camera data and the red bands of the off-nadir cameras have a pixel resolution of 275 m. The other three bands of the off-nadir cameras have a resolution of 1.1 km. MISR's swath width is 360 km.

3. TOOL OVERVIEW

The MISR imaging tool is designed to provide a web-based interface which can be used to determine MISR files of interest and create high resolution images of areas of interest from those files. A web-based

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interface makes the tool available to users without needing specialized software and hardware on their local computer.

There are two parts to the tool. The first is used to view MISR browse image files to choose a particular orbit for a region of interest. The second is used to work with the actual radiance data to generate a high resolution scene. Final image processing occurs off-line and an e-mail is sent with instructions for downloading the resulting high resolution image file.

4. MISR BROWSE TOOL

The MISR Browse Tool allows users to specify the orbit, area, and camera angle of interest and then view browse images matching those criteria. Browse images are lower resolution (2.2 km) renderings of MISR Level 1B2 georectified radiance data that use the red, green and blue wavelengths to create a true color image. These images have had an automated stretching algorithm applied during their production to provide the best overall visibility for land, ocean and cloud features. The browse tool is accessible at http://eosweb.larc.nasa.gov/MISRBR/.

The browse tool begins with an overview page describing general information about the MISR instrument and its orbital coverage as it relates to the browse image files. There are 233 distinct MISR orbit paths that repeat every 16 days, called data days. Each orbit is broken into 180 blocks. The tool then brings up a page for data day 1. A map [Figure 1] shows the orbital coverage (14 or 15 orbits in a given day) for that data day and a user may choose an orbit to view.
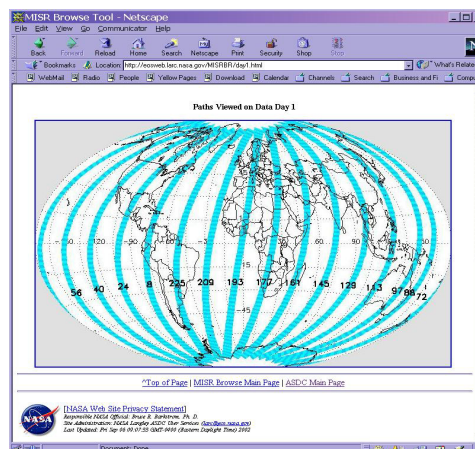

Figure 1. Data day map

The block clicked in the orbit will be the centering point for the image displayed. A table of data days and path numbers [Figure 2] is also provided for browsers that don't support clickable image maps.

Figure 2. Data day table

Tools in the data day window provide the capability to calculate the date and data day for a particular orbit or the orbits that occurred on a given date. In addition, the paths and blocks that intersect a box with specified latitude and longitude bounds can be determined.

Clicking on a different data day will bring up a page for that data day with its own map; clicking on a path will select that path for image display, centered on block 90.

Once the path is selected, a new window appears for choosing a specific orbit (orbits are numbered consecutively beginning with orbit 1 at launch) and refining other choices [Figure 3]. The most recent available orbit is displayed first.

Figure 3. Selection window

The camera may also be selected in this window; the default is the nadir camera but the drop down list may be used to select a forward or aftward looking camera. The block at which the browse image is centered may be changed. Even the path may be modified in this window to go to an entirely different area of the globe.

Once the selections are made, pressing the "View Image" button brings up a window [Figure 4] to display the selected browse image file, centered at the specified block.
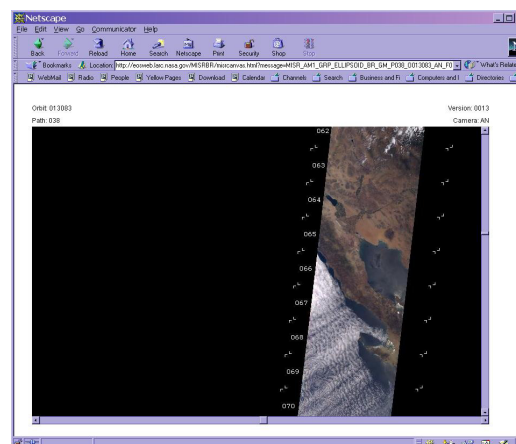

Figure 4. Browse Image Display

The display area has scroll bars for panning through the entire image. This image is centered on Baja California, showing cloud formations abutting the coast line.

The browse tool uses Research Systems, Inc.(RSI) Interactive Data Language (IDL) to generate the data day web pages; both the html and the day map jpegs are created with IDL code. The selection window and image display window are Java applets that use AWT to provide the lowest common denominator for cross platform compatibility. Initial development was done under the auspices of the MISR team at NASA's Jet Propulsion Lab. Currently there are plans to redo this application in RSI's IDL on the Net (ION) product for even more platform and browser independence.

5. MISR HIGH RESOLUTION IMAGING TOOL

At the time of this writing, the tool used to generate high resolution MISR images is still under development. When work is complete and the tool becomes available, it can be accessed via the MISR data access tools and information page, http://eosweb.larc.nasa.gov/PRODOCS/misr/misr_tools.html.

For a sampling of high resolution MISR imagery along with descriptive text, visit the MISR Image Gallery, http://www-misr.jpl.nasa.gov/gallery/gallery.html.