

Computer Tutorial on MISR Satellite Image Data Products



Multi-angle Imaging SpectroRadiometer

Brian E. Rheingans

Jet Propulsion Laboratory, California Institute of Technology

**Quantitative Research Methods in Human Dimensions
of Environmental Change within Eastern Europe**

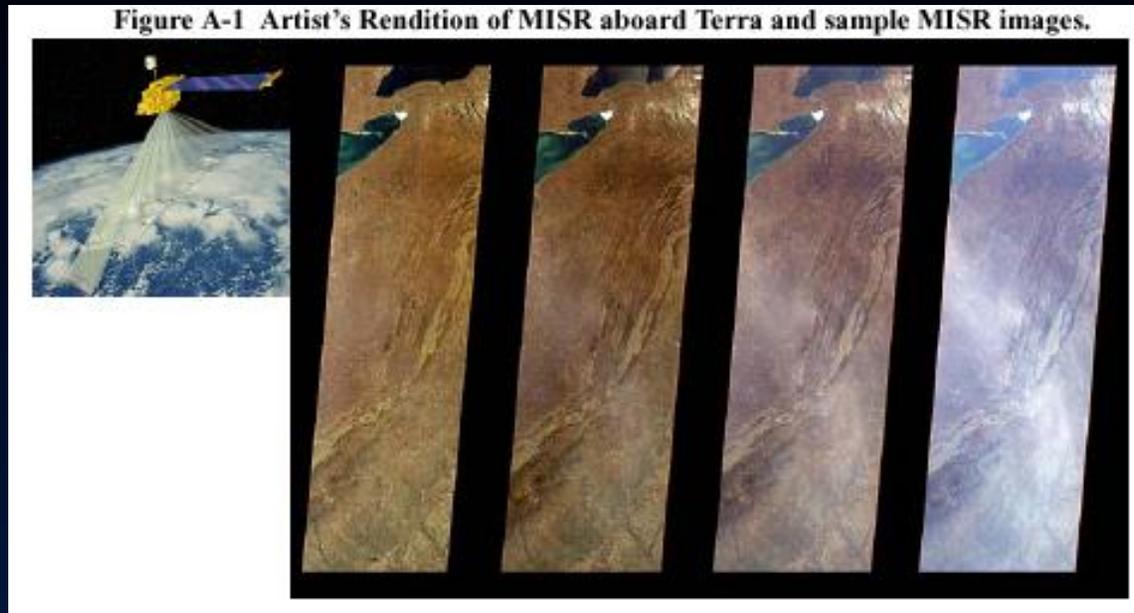
Valmiera, Latvia

August 2010

Agenda

- **Background and terminology**
- Obtaining data, MISR browse tool and subsetting procedures
- Data extraction and processing
- Solving problems discussed in handout
- Information about re-projection tools

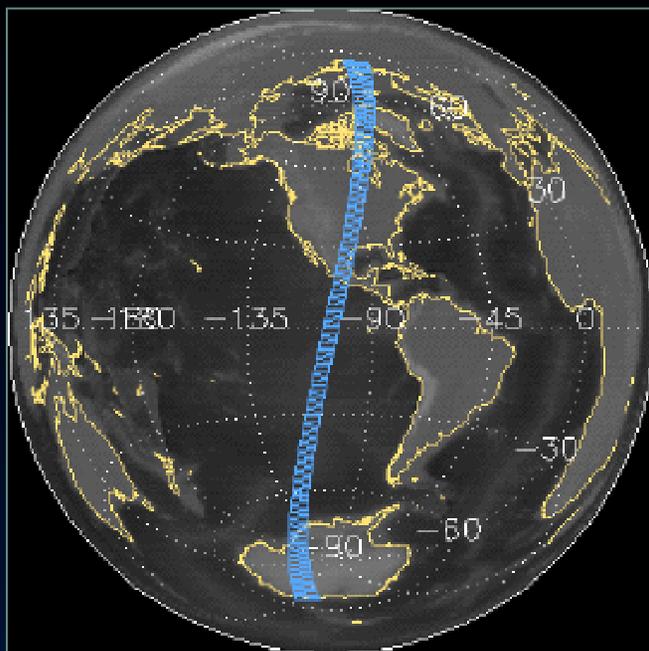
MISR Background



Four MISR images over Appalachian Mountains
Nadir, 45.6 deg, 60.0 deg, 70.5 deg forward viewing cameras

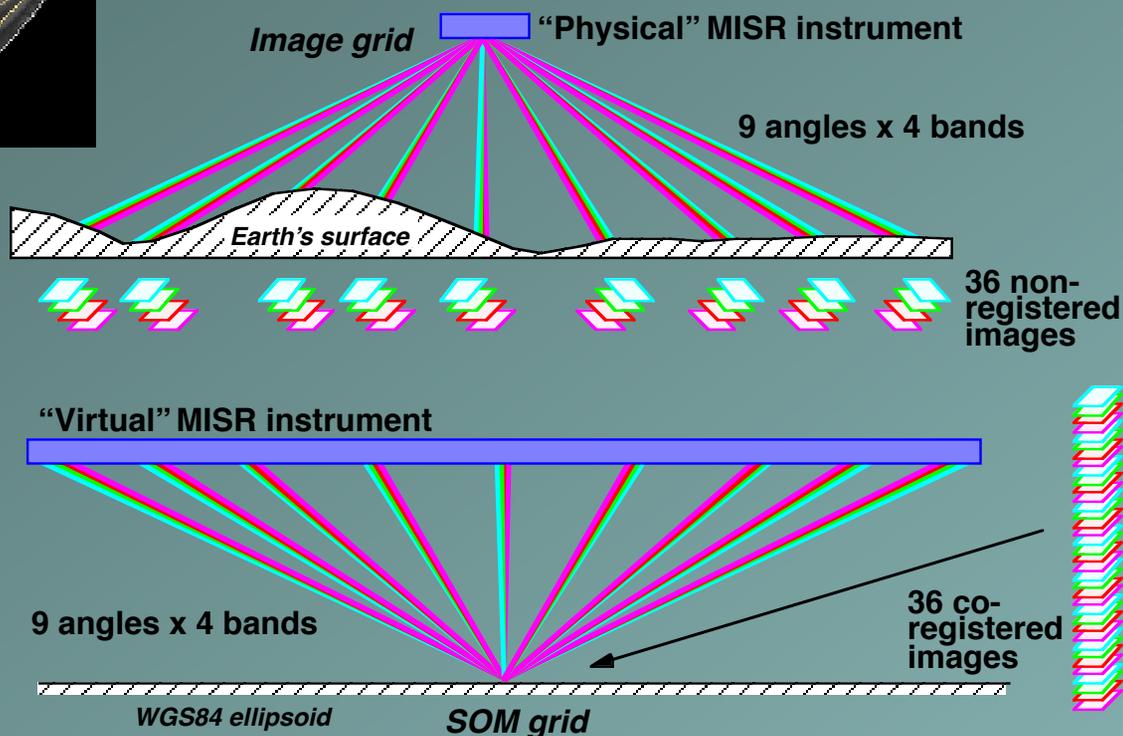
To make use of angular as well as spectral information all
(9 cameras X 4 bands = 36) pixels must be accurately co-registered

MISR Geolocation and Angle-to-Angle Coregistration



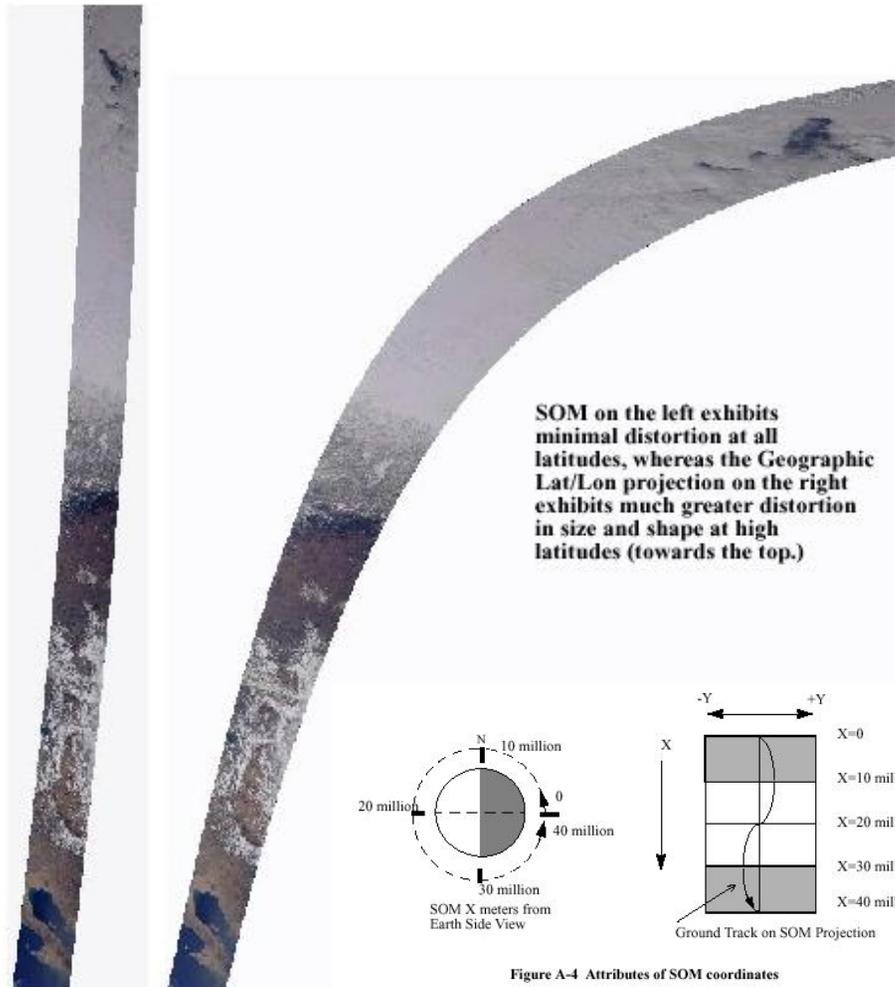
233 unique paths in
16-day repeat-cycle
of Terra orbit

- Each MISR camera eventually views one ground point at a slightly different time from a different angle as the spacecraft passes over that point
- Data is resampled from each channel into a common map projection, called Space Oblique Mercator (SOM).
- SOM projection minimizes resampling distortions



SOM Background

Figure A-3 Sample Partial MISR Swath in SOM vs. Distorted Geographic Lat/Lon



The Space Oblique Mercator (SOM) map projection was developed to support satellite which covers the same large geographic extent as MISR.

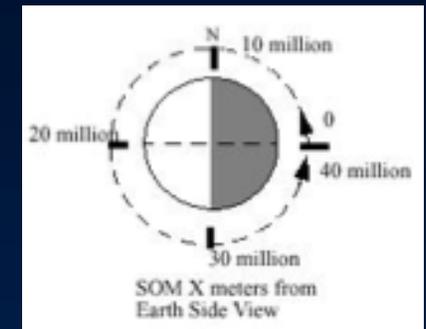
SOM was designed to minimize the shape distortion and scale errors throughout the length of the MISR swath near the satellite ground track.

SOM X is in the direction of the Spacecraft ground track and SOM Y is perpendicular X

SOM Projection

Path, Orbit and Block definitions

- Terra satellite / MISR instrument follows a pattern of orbital cycles which repeats after 233 unique orbits
- Each of the 233 possible orbital cycle is called a path
- Paths numbers are always fixed in geographic position
- SOM defines a separate projection for each of these paths
- For MISR, a path begins at a particular longitude as the satellite crosses the ascending node
- Each path implies a specific longitude of ascending node, which implies a specific SOM projection
- Orbit number implies overpass time
- Orbit number increases throughout the mission
- Path number repeats every 233 orbits, 16 day coverage
- Block number subdivides each path in the North/South direction



Primary Level 1 Standard Products

Ancillary products

Ancillary Geographic Product

MISR_AM1_AGP_P028_F01_24.hdf

Level 1 standard products

Level 1B2 browse (JPEG)

MISR_AM1_GRP_ELLIPSOID_BR_GM_P028_O002510_AN_F03_0024.jpg

Level 1B2 geometric parameters

MISR_AM1_GP_GMP_P028_O002510_F03_0013.hdf

Level 1B2 radiometric camera-by-camera cloud mask

MISR_AM1_GRP_RCCM_GM_P067_O023963_AN_F04_0025.hdf

Level 1B2 georectified radiance product, global and local modes,
organized by camera view angle (Df, Cf, Bf, Af, An, Aa, Ba, Ca, Da):

√ Ellipsoid projected

MISR_AM1_GRP_ELLIPSOID_GM_P028_O002510_AN_F03_0024.hdf

√ Terrain (blocks containing land only) projected

MISR_AM1_GRP_TERRAIN_GM_P028_O002510_AN_F03_0024.hdf

Level 1 processing operates on each camera individually

Primary Level 2 Standard Products

Level 2 standard products

Level 2AS aerosol

MISR_AM1_AS_AEROSOL_P028_O002510_F12_0022.hdf

Level 2AS land surface

MISR_AM1_AS_LAND_P028_O002510_F07_0022.hdf

Level 2TC stereo

MISR_AM1_TC_STEREO_P028_O002510_F07_0022.hdf

Level 2TC top-of-atmosphere albedo

MISR_AM1_TC_ALBEDO_P028_O002510_F07_0022.hdf

Level 2TC classifiers

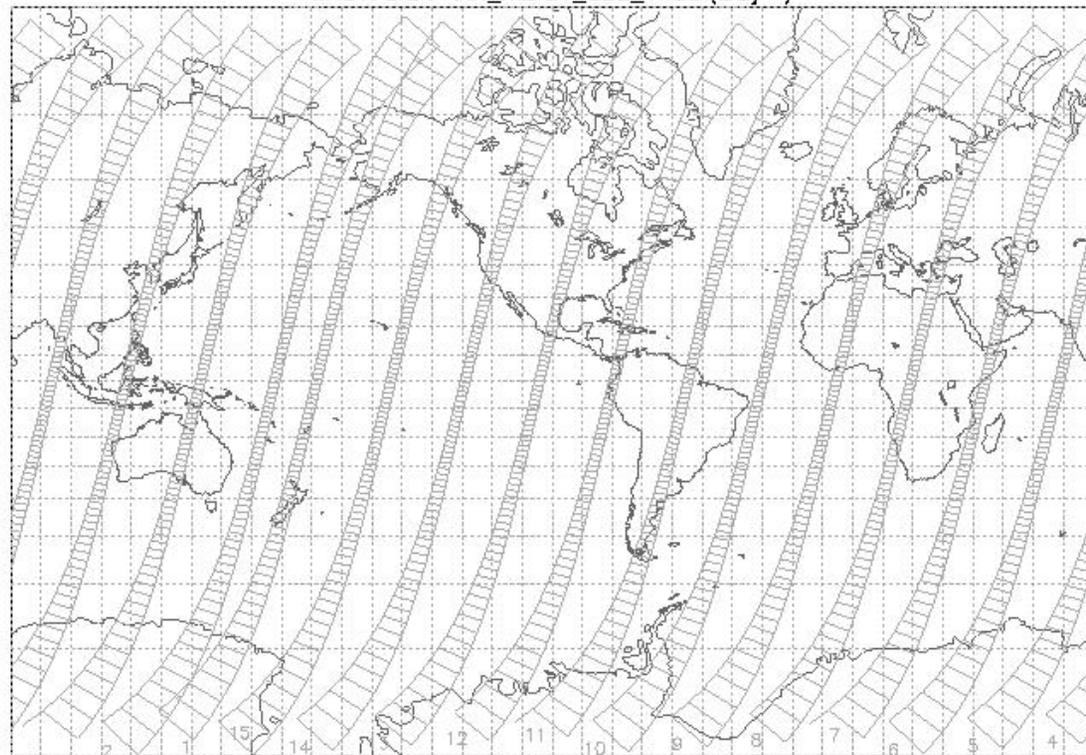
MISR_AM1_TC_CLASSIFIERS_P028_O002510_F07_0022.hdf

Level 3 Global Summaries

<http://eosweb.larc.nasa.gov/PRODOCS/misr/level3/overview.html>

MISR Orbital Paths/Blocks

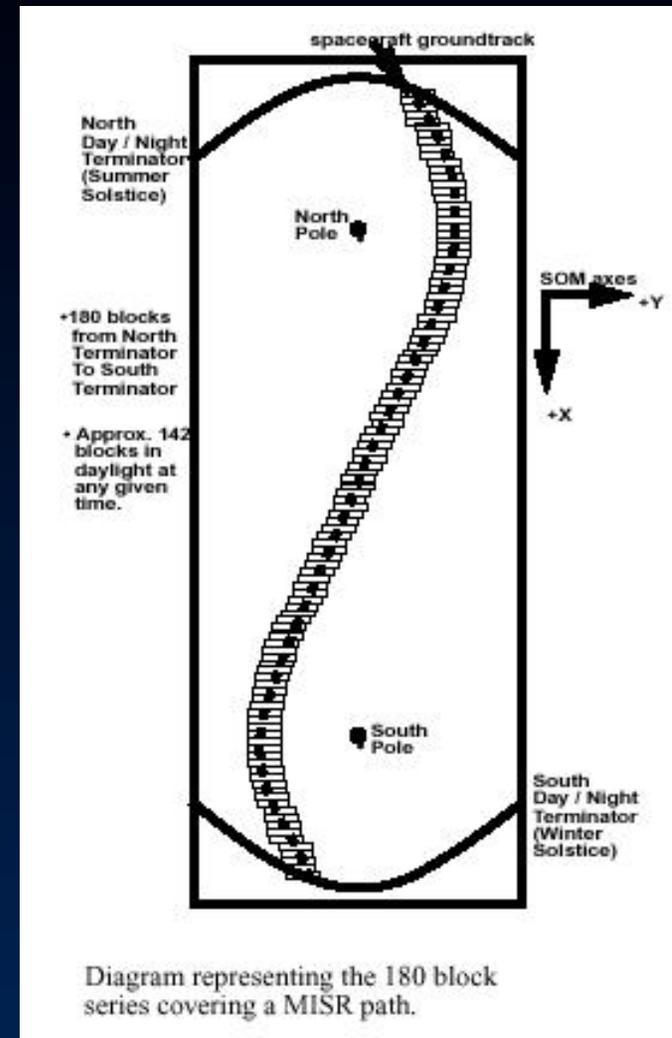
MISR orbit - An_mar21_233_1426 (Day 1)



MISR File format

HDF-EOS “Stacked Block”

- 180 blocks are defined for every MISR product to make block index absolute
- However, roughly 142 blocks have data for any given orbit. The extra blocks are to allow for seasonal variation
- Files are in HDF-EOS format and are stored as a “stack” of blocks
- HDF-EOS routines do NOT assemble the blocks. That is left for the application or the MISR Toolkit
- MISR data subsetting by block can be ordered using the MISR order tool to reduce data bulk

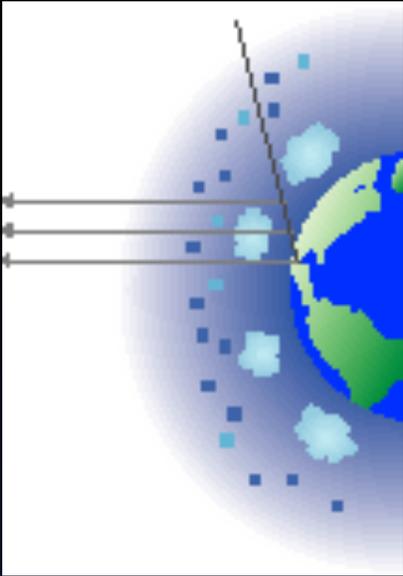


Agenda

- Background and terminology
- **Obtaining data, MISR browse tool and subsetting procedures**
- Data extraction and processing
- Solving problems discussed in handout
- Information about re-projection tools

Finding Information and Ordering MISR Data

- Obtaining MISR information
 - Documentation
 - Data Products
 - Data Processing
- Ordering, customizing and subsetting MISR data
- Tools available from the ASDC
- MISR Browse Tool



ATMOSPHERIC SCIENCE DATA CENTER



<http://eosweb.larc.nasa.gov>

larc@eos.nasa.gov

Where to Begin?

The screenshot shows the NASA Langley Atmospheric Science Data Center website. The browser address bar displays 'http://eosweb.larc.nasa.gov/'. The page header includes the title 'ATMOSPHERIC SCIENCE DATA CENTER' and a description: 'Processing, archiving, and distributing Earth science data at NASA Langley Research Center in the following disciplines: Radiation Budget • Clouds • Aerosols • Tropospheric Chemistry'. A search bar is located in the top right. The left sidebar contains 'Data & Documentation' and 'Navigation and Help' sections. The main content area features 'Data Center Highlights' and 'Featured Articles and Imagery'. The 'Imagery' section has a link to 'Imagery of ASDC Products'. The 'Featured Projects' section lists 'CALIPSO', 'CERES', 'MISR', 'MOPITT', 'SAGE III', and 'TES'. The 'MISR' link is circled in red. The 'MISR Order Tool' link in the 'Data & Documentation' sidebar is also circled in red. Red arrows point from the text labels on the right to these specific elements.

ASDC Web Site

MISR Imagery

MISR Data and Information

MISR Order Tool

How to obtain
MISR Data and Information



MISR Data and Information


 Search

The Multi-angle Imaging SpectroRadiometer (MISR) was successfully launched into sun-synchronous polar orbit aboard Terra, NASA's first Earth Observing System (EOS) spacecraft, on December 18, 1999. MISR measurements are designed to improve our understanding of the Earth's environment and climate. Viewing the sunlit Earth simultaneously at nine widely-spaced angles, MISR provides radiometrically and geometrically calibrated images in four spectral bands at each of the angles. Spatial sampling of 275 and 1100 meters is provided on a global basis. The [MISR FAQ](#) and [Observation Concept](#) have more details about the MISR instrument. All MISR data products are available in HDF-EOS format, and select products are available in netCDF format.

Notices, Features, and Latest News:

- [MISR Wildfire Plume Data](#) - additional data added for North America 2004
- Featured MISR Article: [Exploring links between atmospheric aerosols, climate change, and ultraviolet rays](#)
- Featured MISR Imagery: [Satellites Track Human Exposure to Fine Particle Pollution](#)

- [Join MISR News List](#)
- [MISR Home Page](#)
 - [MISR publications](#)

Obtaining Data and Tools	Documentation		Relevant Links
<ul style="list-style-type: none"> • Available Data Products • MISR Order and Customization Tool • Data Pool • WIST Order Tool <ul style="list-style-type: none"> ◦ User's Manual Order Tips <p>Tools:</p> <ul style="list-style-type: none"> • Software for working with the data • Orbit/Date Conversion • Lat/Lon to Path/Block Conversion 	<p>Introductory Material -</p> <p>New Users Start Here:</p> <ul style="list-style-type: none"> • Frequently Asked Questions <ul style="list-style-type: none"> ◦ FAQ - how to order • Project Handbook • Overview <ul style="list-style-type: none"> ◦ Observation Concept • How to obtain MISR data (PPT) • Workshop Presentations 	<p>Data Product Details:</p> <ul style="list-style-type: none"> • Data Product Content (DPS) • Data Product Quality • Data Product Versioning <p>Detailed Theory:</p> <ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents 	 <ul style="list-style-type: none"> • View All Imagery • View Level 3 Imagery • MISR Browse Tool • Tropical Cyclone Information • Terra Spacecraft Record

Continued ...

- [Software for working with the data](#)
- [Orbit/Date Conversion](#)
- [Lat/Lon to Path/Block Conversion](#)

- [How to obtain MISR data \(PPT\)](#)
- [Workshop Presentations](#)

[Documents](#)

Available Data Products

Product	Description	Processing Information	
Level 3 Products	Globally gridded statistical summaries (daily, monthly, quarterly, and yearly) of select Level 1 and Level 2 Radiances, Aerosol, Land/Surface, and TOA Albedo parameters. Special regional products for select areas.	Production Reports: <ul style="list-style-type: none"> • Level 1 • Local Mode • Level 2 • Level 3 Daily • Level 3 Monthly, Seasonal, Yearly 	Processing Status / Collections: <ul style="list-style-type: none"> • Level 1B2, LM, Geometric • Level 2 Products • Level 3 Radiance • Level 3 Aerosol/Land • Level 3 Albedo/Cloud
Level 2 Products	Aerosol, Land/Surface, Cloud Mask, and TOA Cloud Stereo, Albedo and Classifier Products		
Level 1 Products	Georectified Radiances, Browse, and Geometric Products		
Ancillary Products	Static Ancillary Products		
Special Products	<ul style="list-style-type: none"> • MISR Wildfire Plume Data - Plume Height Climatology Project • "Clim-Likely" Aerosols - Model-Derived Global Aerosol Climatology for MISR Analysis • EOS Validation Data - now available through the MISR order tool (help) • Field Campaigns - intensive research studies • CERES-MISR Radiances - CERES-MISR Fusion Data • AirMISR Data - airborne instrument 		

A Portable Document Format (PDF) reader (such as [Adobe Acrobat Reader](#)) is required to open and view PDF documents.

[MISR Site Map](#) | [ASDC Home Page](#) | [Access Data](#) | [Questions/Feedback](#)



Responsible NASA Official: John M. Kusterer
 Site Administration/Help: NASA Langley ASDC User Services (larc@eos.nasa.gov)
[\[Privacy Policy and Important Notices\]](#)
 Last Updated: Wed May 13 2009 14:10:30 GMT-0400 (Eastern Daylight Time)



MISR Data and Information


 Search

The Multi-angle Imaging SpectroRadiometer (MISR) was successfully launched into sun-synchronous polar orbit aboard Terra, NASA's first Earth Observing System (EOS) spacecraft, on December 18, 1999. MISR measurements are designed to improve our understanding of the Earth's environment and climate. Viewing the sunlit Earth simultaneously at nine widely-spaced angles, MISR provides radiometrically and geometrically calibrated images in four spectral bands at each of the angles. Spatial sampling of 275 and 1100 meters is provided on a global basis. The [MISR FAQ](#) and [Observation Concept](#) have more details about the MISR instrument. All MISR data products are available in HDF-EOS format, and select products are available in netCDF format.

Notices, Features, and Latest News:	<ul style="list-style-type: none"> • MISR Wildfire Plume Data - additional data added for North America 2004 • Featured MISR Article: Exploring links between atmospheric aerosols, climate change, and ultraviolet rays • Featured MISR Imagery: Satellites Track Human Exposure to Fine Particle Pollution 	<ul style="list-style-type: none"> • Join MISR News List • MISR Home Page <ul style="list-style-type: none"> ◦ MISR publications
-------------------------------------	---	--

Obtaining Data and Tools	Documentation	Relevant Links
<ul style="list-style-type: none"> • Available Data Products • MISR Order and Customization Tool • Data Pool • WIST Order Tool <ul style="list-style-type: none"> ◦ User's Manual Order Tips <p>Tools:</p> <ul style="list-style-type: none"> • Software for working with the data • Orbit/Date Conversion • Lat/Lon to Path/Block Conversion 	<p>Introductory Material - New Users Start Here:</p> <ul style="list-style-type: none"> • Frequently Asked Questions <ul style="list-style-type: none"> ◦ FAQ - how to order • Project Handbook • Overview <ul style="list-style-type: none"> ◦ Observation Concept • How to obtain MISR data (PPT) • Workshop Presentations 	<p>Data Product Details:</p> <ul style="list-style-type: none"> • Data Product Content (DPS) • Data Product Quality • Data Product Versioning <p>Detailed Theory:</p> <ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents  <ul style="list-style-type: none"> • View All Imagery • View Level 3 Imagery • MISR Browse Tool • Tropical Cyclone Information • Terra Spacecraft Record

MISR Information - FAQ

MISR Frequently Asked Questions - Netscape Browser

File Edit View Go Bookmarks Tools Help

MISR Frequently Asked Questio...

Illustrations of MISR instrument viewing the Earth:

- [MOV version](#) [13.9 mb]
- [MPEG version](#) [4.1 mb]
- [MISR's nine cameras](#) (MOV version [0.8 mb])

Views of the MISR instrument:



Where can I find information about the MISR instrument?

See the [MISR web site](#), and also Diner, D. J. et al. "Performance of the MISR Instrument During Its First 20 Months in Earth Orbit", *IEEE. Trans. Geosci. Rem. Sens.* 40 (7), 1449-1466 (July 2002).

MISR Instrument Description

Parameter	Value	Characteristics
Camera View Zenith Angles at Earth's Surface	0.0 ° (nadir), 26.1, 45.6, 60.0 and 70.5 ° (both fore and aft of nadir)	 <p>Global Mode:</p> <ul style="list-style-type: none"> • 275m sampling in all nadir bands • 275m sampling in red band of off-nadir cameras • 1.1km for other channels <p>Local Mode (targeted):</p> <ul style="list-style-type: none"> • 275m all channels all cameras
Swath Width	360 kilometers (224 miles) (9-day global coverage)	
Cross-Track x Along-Track Pixel Sampling	275 x 275 meters (902 x 902 feet) 550 x 550 meters (0.34 x 0.34 mile) 1.1 x 1.1 kilometers (0.68 x 0.68 mile) 275 meters x 1.1 kilometers (0.17 x 0.68 mile)	
Spectral Bands (Solar Spectrum Weighted)	446.4, 557.5, 671.7, 866.4 nanometers	
Spectral Bandwidths	41.9, 28.6, 21.9, 39.7 nanometers	

What are the benefits of having multiple camera angles?



Multi-angle Imaging SpectroRadiometer



Project Handbook

Summary:

MISR, the Multi-angle Imaging SpectroRadiometer, is an instrument unlike any that has flown in space before. Viewing the sunlit Earth simultaneously at nine widely spaced angles, MISR provides ongoing global coverage with high spatial detail. Its imagery is carefully calibrated to provide accurate measures of the brightness, contrast, and color of reflected sunlight.

MISR provides new types of information for scientists studying Earth's climate, such as the regional and global distribution of different types of atmospheric particles and clouds on climate. The change in reflection at different view angles combined with stereoscopic techniques enables construction of 3-D models and estimation of the total amount of sunlight reflected by Earth's diverse environments.

MISR was built for NASA by the Jet Propulsion Laboratory (JPL) in Pasadena, California. It is part of NASA's first Earth Observing System (EOS) spacecraft, the *Terra* spacecraft, which was launched into polar orbit from Vandenberg Air Force Base on December 18, 1999. MISR has been continuously providing data since February 24, 2000.

MISR Observing Concept

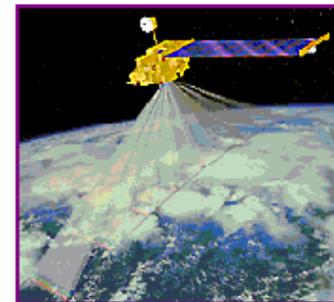


Table of Contents:

1. [Project Overview](#)
 - [1.1 Project Mission Objectives](#)
 - [1.2 Geographic Regions](#)
 - [1.3 Instrument Description](#)
2. [Data Products](#)
 - [2.1 Level 1 Products](#)
 - [2.1.1 Level 1A: Reformatted Annotated Product](#)
 - [2.1.2 Level 1B1: Radiometric Product](#)
 - [2.1.3 Level 1B2: Georectified Radiance Product](#)
 - [2.1.4 MISR Browse Product](#)
 - [2.1.5 Local Mode Products](#)
 - [2.2 Level 2 Products](#)
 - [2.2.1 Level 2TC: Top-of-Atmosphere/Cloud Product](#)



MISR Data and Information


 Search

The Multi-angle Imaging SpectroRadiometer (MISR) was successfully launched into sun-synchronous polar orbit aboard Terra, NASA's first Earth Observing System (EOS) spacecraft, on December 18, 1999. MISR measurements are designed to improve our understanding of the Earth's environment and climate. Viewing the sunlit Earth simultaneously at nine widely-spaced angles, MISR provides radiometrically and geometrically calibrated images in four spectral bands at each of the angles. Spatial sampling of 275 and 1100 meters is provided on a global basis. The [MISR FAQ](#) and [Observation Concept](#) have more details about the MISR instrument. All MISR data products are available in HDF-EOS format, and select products are available in netCDF format.

Notices, Features, and Latest News:	<ul style="list-style-type: none"> • MISR Wildfire Plume Data - additional data added for North America 2004 • Featured MISR Article: Exploring links between atmospheric aerosols, climate change, and ultraviolet rays • Featured MISR Imagery: Satellites Track Human Exposure to Fine Particle Pollution 	<ul style="list-style-type: none"> • Join MISR News List • MISR Home Page <ul style="list-style-type: none"> ◦ MISR publications
-------------------------------------	---	--

Obtaining Data and Tools	Documentation	Relevant Links
<ul style="list-style-type: none"> • Available Data Products • MISR Order and Customization Tool • Data Pool • WIST Order Tool <ul style="list-style-type: none"> ◦ User's Manual Order Tips <p>Tools:</p> <ul style="list-style-type: none"> • Software for working with the data • Orbit/Date Conversion • Lat/Lon to Path/Block Conversion 	<p>Introductory Material - New Users Start Here:</p> <ul style="list-style-type: none"> • Frequently Asked Questions <ul style="list-style-type: none"> ◦ FAQ - how to order • Project Handbook • Overview <ul style="list-style-type: none"> ◦ Observation Concept • How to obtain MISR data (PPT) • Workshop Presentations <p>Data Product Details:</p> <ul style="list-style-type: none"> • Data Product Content (DPS) • Data Product Quality • Data Product Versioning <p>Detailed Theory:</p> <ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents 	 <ul style="list-style-type: none"> • View All Imagery • View Level 3 Imagery • MISR Browse Tool • Tropical Cyclone Information • Terra Spacecraft Record

MISR Information – Data Product Specification

Adobe Reader - [DPS_v40_RevN[1].pdf]

File Edit View Document Tools Window Help

Save a Copy Select 85% Help Search Web Adobe Reader 7.0

Options

Bookmarks

- Document Change Log
- TBD List
- Which Product Versions Does this C
- Table of Contents
- Acronym List
- 1.0 MISR DATA PRODUCT SPECIF
- 2.0 MISR SCIENCE DATA PROCES
- 3.0 MISR PRODUCTS: FILE FORM
- 4.0 MISR LEVEL 1A REFORMATTE
- 5.0 MISR LEVEL 1B1 RADIOMETRI
- 6.0 MISR LEVEL 1B2 GEORECTIFI
- 7.0 MISR LEVEL 2 TOA/CLOUD PR
- 8.0 MISR LEVEL 2 AEROSOL/SUR
- 9.0 MISR ANCILLARY PRODUCTS
- 10.0 MISR LEVEL 3 COMPONENT
- 11.0 MISR LEVEL 3 JOINT PRODUC
- APPENDIX A: MISR GEOREGISTR

Pages

Attachments

Comments

JPL D-13963, Revision N

Earth Observing System

 Multi-angle
Imaging
Spectro-
Radiometer

Data Products Specifications

— Incorporating the Science Data Processing Interface Control Document

Mike Bull
Jason Matthews
Catherine Moroney
Mike Smyth

1 (1 of 380)

MISR Information - Data Product Versioning

Data Products

Detailed Product
History

MISR Level 3 Radiance Versioning - Windows Internet Explorer

http://eosweb.larc.nasa.gov/PRODDocs/misr/Version/pge12a.html

MISR Level 3 Radiance Versioning



MISR Level 3 Radiance Versioning

Component Global Georectified Radiance Product (CGGRP) - Daily, Monthly, Quarterly, Yearly products

Processing Status

ESDT	Product File Name Prefix	Current Quality Designations
MIL3DRD, MIL3MRD, MIL3QRD, and MIL3YRD	MISR_AM1_CGGRP	<ul style="list-style-type: none"> Stage 3 Validated: Component Global Georectified Radiance Product MISR maturity level definitions Quality Summary

Note: Level 3 is a summary of Level 1. This page covers changes to the Level 3 software itself for each product version, but you should also consult the [L1B2 Versioning statement](#) for changes to the Level 1 data being summarized.

Ver. #	Production Start Date	Software Configuration/ Product Impact	Quality Transition
Current F04_0025	12/01/2007	<p>The entire mission is being reprocessed at this level.</p> <p>Data Product Specification Rev Q.</p> <p>Product contains a new field "RCCM Category Count". This new field is a histogram summary of the Radiometric Camera-by-camera Cloud Mask (RCCM).</p>	
F02_0023	08/01/2007	<p>Data Product Specification Rev P.</p> <p>No user visible changes.</p>	
F02_0021	10/02/2006	<p>Data Product Specification Rev O.</p> <p>No user visible changes.</p>	
F02_0019	12/01/2005	<p>Data Product Specification Rev N.</p> <p>No user visible changes, other than changes in Level 1 data being summarized (see L1B2</p>	



MISR Data and Information


 Search

The Multi-angle Imaging SpectroRadiometer (MISR) was successfully launched into sun-synchronous polar orbit aboard Terra, NASA's first Earth Observing System (EOS) spacecraft, on December 18, 1999. MISR measurements are designed to improve our understanding of the Earth's environment and climate. Viewing the sunlit Earth simultaneously at nine widely-spaced angles, MISR provides radiometrically and geometrically calibrated images in four spectral bands at each of the angles. Spatial sampling of 275 and 1100 meters is provided on a global basis. The [MISR FAQ](#) and [Observation Concept](#) have more details about the MISR instrument. All MISR data products are available in HDF-EOS format, and select products are available in netCDF format.

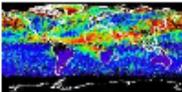
Notices, Features, and Latest News:	<ul style="list-style-type: none"> • MISR Wildfire Plume Data - additional data added for North America 2004 • Featured MISR Article: Exploring links between atmospheric aerosols, climate change, and ultraviolet rays • Featured MISR Imagery: Satellites Track Human Exposure to Fine Particle Pollution 	<ul style="list-style-type: none"> • Join MISR News List • MISR Home Page <ul style="list-style-type: none"> ◦ MISR publications
-------------------------------------	---	--

Obtaining Data and Tools	Documentation	Relevant Links
<ul style="list-style-type: none"> • Available Data Products • MISR Order and Customization Tool • Data Pool • WIST Order Tool <ul style="list-style-type: none"> ◦ User's Manual Order Tips <p>Tools:</p> <ul style="list-style-type: none"> • Software for working with the data • Orbit/Date Conversion • Lat/Lon to Path/Block Conversion 	<p>Introductory Material -</p> <p>New Users Start Here:</p> <ul style="list-style-type: none"> • Frequently Asked Questions <ul style="list-style-type: none"> ◦ FAQ - how to order • Project Handbook • Overview <ul style="list-style-type: none"> ◦ Observation Concept • How to obtain MISR data (PPT) • Workshop Presentations <p>Data Product Details:</p> <ul style="list-style-type: none"> • Data Product Content (DPS) • Data Product Quality • Data Product Versioning <p>Detailed Theory:</p> <ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents 	 <ul style="list-style-type: none"> • View All Imagery • View Level 3 Imagery • MISR Browse Tool • Tropical Cyclone Information • Terra Spacecraft Record



MISR Imagery and Articles



 	<p>Image Gallery</p> <p>View images by:</p> <ul style="list-style-type: none"> thumbnails index map 	<p>Illustrations of MISR instrument viewing the earth:</p> <ul style="list-style-type: none"> MOV version [13.9 mb] MPEG version [4.1 mb] MISR's nine cameras (MOV version [0.8 mb]) Plugins for viewing <p>3D glasses for viewing stereo images</p>
	<p>Level 3 Imagery</p>	<p>Visualization of select parameters available in the MISR Level 3 global data products</p>
	<p>Field Campaigns</p>	<p>Imagery supporting field campaigns, intensive research studies</p>
	<p>MISR Browse Tool</p>	<p>Easy access to ellipsoid projected true-color images for each camera reduced to 2.2 km resolution</p>
	<p>Browse Atlas</p>	<p>Time series of MISR browse images for the continental United States (January 2003 - February 2004) and for specific field experiments</p>
	<p>Featured Articles</p>	<ul style="list-style-type: none"> Measuring the health effects of the World Trade Center disaster Exploring links between atmospheric aerosols, climate change, and ultraviolet rays

[MISR Information](#) | [MISR Site Map](#) | [ASDC Home Page](#) | [Questions/Feedback](#)



Responsible NASA Official: John M. Kusterer
 Site Administration/Help: NASA Langley ASDC User Services (larc@eos.nasa.gov)
[\[Privacy Policy and Important Notices\]](#)
 Last Updated: Mon Mar 16 15:21:38 EDT 2009

MISR Level 3 Imagery – Views of Optical Depth example

Print Image or
Download Data



Image Selection &
Animation Control



Map Display



MISR Level 3 Aerosol - Netscape

MISR Level 3 Aerosol

ATMOSPHERIC SCIENCES DATA CENTER

MISR Level 3 Aerosol

MISR

MISR Level 3 Imagery: [Overview](#) | [Products](#) | [View Data](#) | [Download Data](#)

NEW: Select "View Type" of "Globe" to view data as a 3D globe. Select "Flat Map" to view as a traditional map. The 3D globe requires the free Java and Java 3D libraries, see [Help with Globe](#) for details.

Input version for data being viewed: F08_0016

Download Type

Print | HDF | Download | Help

Optical Depth

Optical depth April 2005 F02_0014
Summarizes L2 AS AEROSOL, RegMeanSpectralOptDepth field F08_0016, 0.5 deg res

Optical depth
0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

Animate | Stop | Pause | Slower | Default Speed | Faster | Advanced Options

Year 2005 | Month/Season April | Previous | Next

View Type Flat map | View Image Size Small

- Level 3 data contain a range of Level 1 and Level 2 versions.
- Before using MISR Data products, please read the documentation including [Data Quality](#) and [Versioning](#) statements available from the [MISR data table](#).

How to Order – MISR Order and Customization Tool



MISR Data and Information


 Search

The Multi-angle Imaging SpectroRadiometer (MISR) was successfully launched into sun-synchronous polar orbit aboard Terra, NASA's first Earth Observing System (EOS) spacecraft, on December 18, 1999. MISR measurements are designed to improve our understanding of the Earth's environment and climate. Viewing the sunlit Earth simultaneously at nine widely-spaced angles, MISR provides radiometrically and geometrically calibrated images in four spectral bands at each of the angles. Spatial sampling of 275 and 1100 meters is provided on a global basis. The [MISR FAQ](#) and [Observation Concept](#) have more details about the MISR instrument. All MISR data products are available in HDF-EOS format, and select products are available in netCDF format.

Notices, Features, and Latest News:	<ul style="list-style-type: none"> • MISR Wildfire Plume Data - additional data added for North America 2004 • Featured MISR Article: Exploring links between atmospheric aerosols, climate change, and ultraviolet rays • Featured MISR Imagery: Satellites Track Human Exposure to Fine Particle Pollution 	<ul style="list-style-type: none"> • Join MISR News List • MISR Home Page <ul style="list-style-type: none"> ◦ MISR publications
-------------------------------------	---	--

Obtaining Data and Tools	Documentation	Relevant Links
<ul style="list-style-type: none"> • Available Data Products • MISR Order and Customization Tool • Data Pool • WIST Order Tool <ul style="list-style-type: none"> ◦ User's Manual Order Tips <p>Tools:</p> <ul style="list-style-type: none"> • Software for working with the data • Orbit/Date Conversion • Lat/Lon to Path/Block Conversion 	<p>Introductory Material -</p> <p>New Users Start Here:</p> <ul style="list-style-type: none"> • Frequently Asked Questions <ul style="list-style-type: none"> ◦ FAQ - how to order • Project Handbook • Overview <ul style="list-style-type: none"> ◦ Observation Concept • How to obtain MISR data (PPT) • Workshop Presentations <p>Data Product Details:</p> <ul style="list-style-type: none"> • Data Product Content (DPS) • Data Product Quality • Data Product Versioning <p>Detailed Theory:</p> <ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents 	 <ul style="list-style-type: none"> • View All Imagery • View Level 3 Imagery • MISR Browse Tool • Tropical Cyclone Information • Terra Spacecraft Record

MISR Order and Customization Tool

Simple & Intuitive Order Interface

ATMOSPHERIC SCIENCE DATA CENTER

MISR Order and Customization Tool

MISR

Welcome to the MISR Order Tool
(Version 4.7.1)

Username:

Password:

Login

Note: If you do not have an account, please use the name 'guest'. Obtain [account](#). [Edit Profile](#). [Retrieve login and password](#).

This tool was tested on the following systems and browsers:

Operating System	Browsers Supported	Not Supported
Windows 2000, XP	Internet Explorer 6, Netscape 8 and 7.2, Firefox 1.5, Opera 8.5, Mozilla 1.7	
Mac OS X	Netscape 7.2	Safari
Linux	Mozilla, Firefox	

[MISR Information](#) | [MISR FAQ](#) | [ASDC Home Page](#) | [Questions/Feedback](#)

Responsible NASA Official: John M. Kusterer

Order Tool - Search

Refine Data Products
By Discipline



Select File Version



MISR Order and Customization Tool - Windows Internet Explorer
http://10dup05.larc.nasa.gov/MISR/cgi-bin/MISR/main.cgi

ATMOSPHERIC SCIENCE DATA CENTER MISR Product Selection and Search MISR

[New Search](#) | [View Cart/Submit Order](#)

Step 1: Select Data Products

Refine the Data Products list by selecting one or more of the following:

- Aerosol
- Cloud
- Land/Surface
- Radiance
- Top of Atmosphere Albedo
- Images
- Supporting Products
- Engineering
- All

Data Products (Full Name - ESDT Name) [MISR Browse Tool](#)

- MISR Level 1B2 Ellipsoid Data-MI1B2E
- MISR Level 1B2 Terrain Data-MI1B2T
- MISR Browse data-MISBR
- MISR Level 2 Aerosol parameters-MIL2ASAE
- MISR Level 2 FIRSTLOOK Aerosol parameters-MIL2ASAF
- MISR Level 2 Land Surface parameters-MIL2ASLS
- MISR Level 2 FIRSTLOOK Surface parameters-MIL2ASLF
- MISR Level 2 TOA/Cloud Albedo parameters-MIL2TCAL
- MISR Level 2 FIRSTLOOK TOA/Cloud Albedo parameters-MIL2TCAF
- MISR Level 2 TOA/Cloud Classifier parameters-MIL2TCCL
- MISR Level 2 FIRSTLOOK TOA/Cloud Classifier parameters-MIL2TCCF

- Return all file versions
- Return only latest file version

Step 2a: Select at least one of the following Search Criteria

Continued next slide

Order Tool - Search

Select Search Criteria
Temporal and/or Spatial

Optional Camera
Search

Search

MISR Order and Customization Tool - Windows Internet Explorer

http://10dup05.larc.nasa.gov/MISR/cgi-bin/MIS

MISR Order and Customization Tool

Step 2a: Select at least one of the following Search Criteria

Temporal Search

Search type: Date/Time Day of Year/Time Orbit

Valid for dates greater than February 23, 2000.

Start time: Feb 14 2009 00:00:00

End time: Feb 15 2009 23:59:59

Spatial Search

Search type: Map Geographic Bounds Path

EOS Validation Sites

90.0 N

180.0 W 180.0 E

90.0 S

Zoom In Zoom Out

Step 2b: Select Optional Search Criteria

Camera

AA
AF
AN
BA
BF
CA
CF
DA
DF

Arrangement of Cameras

Search Reset

Order Tool – Search Results

1 Data Product, for 1 day,
over Australia,
& latest File Version

Select Products to Display

The screenshot shows a web browser window titled "MISR Order and Customization Tool - Windows Internet Explorer". The address bar shows the URL "http://10dup05.larc.nasa.gov/MISR/cgi-bin/MISR/". The page content includes the "ATMOSPHERIC SCIENCE DATA CENTER" logo, the heading "MISR Search Results", and the MISR logo. Below the heading are links for "New Search" and "View Cart/Submit Order". A message states "Results contain 2 files." The main section is titled "Step 3: Select Data Products to Display" and contains a table of customizable data products. One product is listed: "MISR Level-1B2 Global Mode Terrain-projected Radiance - MI1B2T" with a file count of 2. A button below the table reads "Display Selected Customizable Data Products".

ATMOSPHERIC SCIENCE DATA CENTER

MISR Search Results

MISR

[New Search](#) | [View Cart/Submit Order](#)

Results contain 2 files.

Step 3: Select Data Products to Display

Customizable Data Products:

Data Product	File Count
<input type="checkbox"/> MISR Level-1B2 Global Mode Terrain-projected Radiance - MI1B2T	2

Display Selected Customizable Data Products

Order Tool – Search Results

Select Files to order &/or
customize

Save this search

Order selected files or
subset/customize

MISR Order and Customization Tool - Windows Internet Explorer

http://10dup05.larc.nasa.gov/MISR/cgi-bin/MISR/main.cgi?clearAllSelectionsRes=1&e.sdt=MI1B2T&MI1B2T_count=2&limitSu

MISR Order and Customization Tool

ATMOSPHERIC SCIENCE DATA CENTER

MISR Search Results

MISR

[New Search](#) | [Current Search](#) | [View Cart/Submit Order](#)

Found 2 files. This page (1) displays 1 to 2

Step 4: Select Files to Order

(Sort results by column heading)

Filename	Start Date	Stop Date	Size (MB)	Orbit	Path	Version ID	Camera	ESDT
<input type="checkbox"/> MISR_AM1_GRP_TERRAIN_GM_P102_O048736_AA_F03_0024.hdf	2009-02-15 00:51:00	2009-02-15 01:41:00	106.69	48736	102	24	AA	MI1B2T
<input type="checkbox"/> MISR_AM1_GRP_TERRAIN_GM_P093_O048750_AA_F03_0024.hdf	2009-02-15 23:56:00	2009-02-16 00:45:00	93.52	48750	93	24	AA	MI1B2T

"Select All Files" and "Clear All Selections" applies across the entire search results.)

Search Results Page: [1](#)

Save this search as:

Step 5: Add Files in Cart

[FAQ: What is customization?](#)

OR

Order Tool – Customization

Select files to customize →

MISR Order and Customization Tool - Windows Internet Explorer
http://10dup05.larc.nasa.gov/MISR/cgi-bin/MISR/main.cgi
Google
MISR Order and Customization Tool

ATMOSPHERIC SCIENCE DATA CENTER MISR Product Customization MISR

[New Search](#) | [Current Search](#) | [View Cart/Submit Order](#)

No Saved Customizations were found using the provided user login.

Step 6. Select Files to Customize

Files
MISR_AM1_GRP_TERRAIN_GM_P102_O048736_AA_F03_0024.hdf

Select Customization Options

Step 7a. Subset Files (decreases file size)

Parameter Subset

Continued next slide

Order Tool – Customization

Select Parameter →

Select Region →

Select Date(s) →

Add lat/lon layers →

Unpack/Unscale →

Step 7a. Subset Files (decreases file size)

Parameter Subset 

[Data Products Specifications](#)

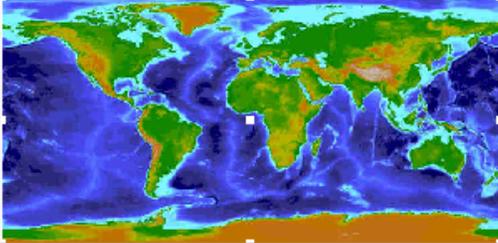
Select Grid(s) - (Available Resolutions)

NIRBand - (275 meters, 1.1 kilometers) ▲
RedBand - (275 meters) ▲
GreenBand - (275 meters, 1.1 kilometers) ▲
BlueBand - (275 meters, 1.1 kilometers) ▼

List Parameters for Grid(s)

Spatial Subset 

Subset type: Block Map Geographic Bounds



Temporal Subset 

Subset type: Time

Valid for dates greater than February 23, 2000.

Start time:
Hour: Min: Sec:

End time:
Hour: Min: Sec:

Step 7b. Add fields to output (increases file size)

Add Latitude Longitude Layers to output

Unpack and unscale all applicable fields

Some parameters are packed and scaled to reduce file size. This option expands

Continued next slide

Order Tool – Customization

Output format →

Save Customization ↘

Submit →

Temporal Subset 

Subset type: Time

Valid for dates greater than February 23, 2000.

Start time:
Hour: Min: Sec:

End time:
Hour: Min: Sec:

Step 7b. Add fields to output (increases file size)

Add Latitude Longitude Layers to output

Unpack and unscale all applicable fields

Some parameters are packed and scaled to reduce file size. This option expands packed data values and converts (unscales) them to floating point values.

Output Formats

HDF-EOS stacked-block grid (original)

HDF-EOS conventional grid

MODIS-like file names

[FAQ: What is the Space Oblique Mercator \(SOM\) projection?](#)

[FAQ: What is stacked-block format? What is conventional format?](#)

[FAQ: Latitude/longitude implications for reformatted data.](#)

Save customization as:

Clicking "Add Customized Files to Cart" returns you to this page for additional customization. To view your cart or perform a new search, use the links at the top of this page.

 Responsible NASA Official: John M. Kusterer

Order Tool – Review & Order

Review Orders →

Select Delivery
Method →

Submit Order →

The screenshot shows a web browser window with the title "MISR Order and Customization T...". The browser tabs include "NASA Langley Atmospheric Science Dat...", "MISR Order and Customization T...", and "NASA".

Step 1: Review Your Orders

Delete	Order Details	Customization Details
<input type="checkbox"/>	View	View <input type="checkbox"/> Remove Customization

Step 2: Select Your Delivery Method

Delivery method: (dropdown menu showing FTP Push, FTP Pull)

FTP Push Delivery

Hostname:

UserId:

Password:

Remote Directory:

Order Label (optional):

Once you have submitted your order, you will receive an email with further information

Done

Order Tool –

Request for Contact



Request for contact



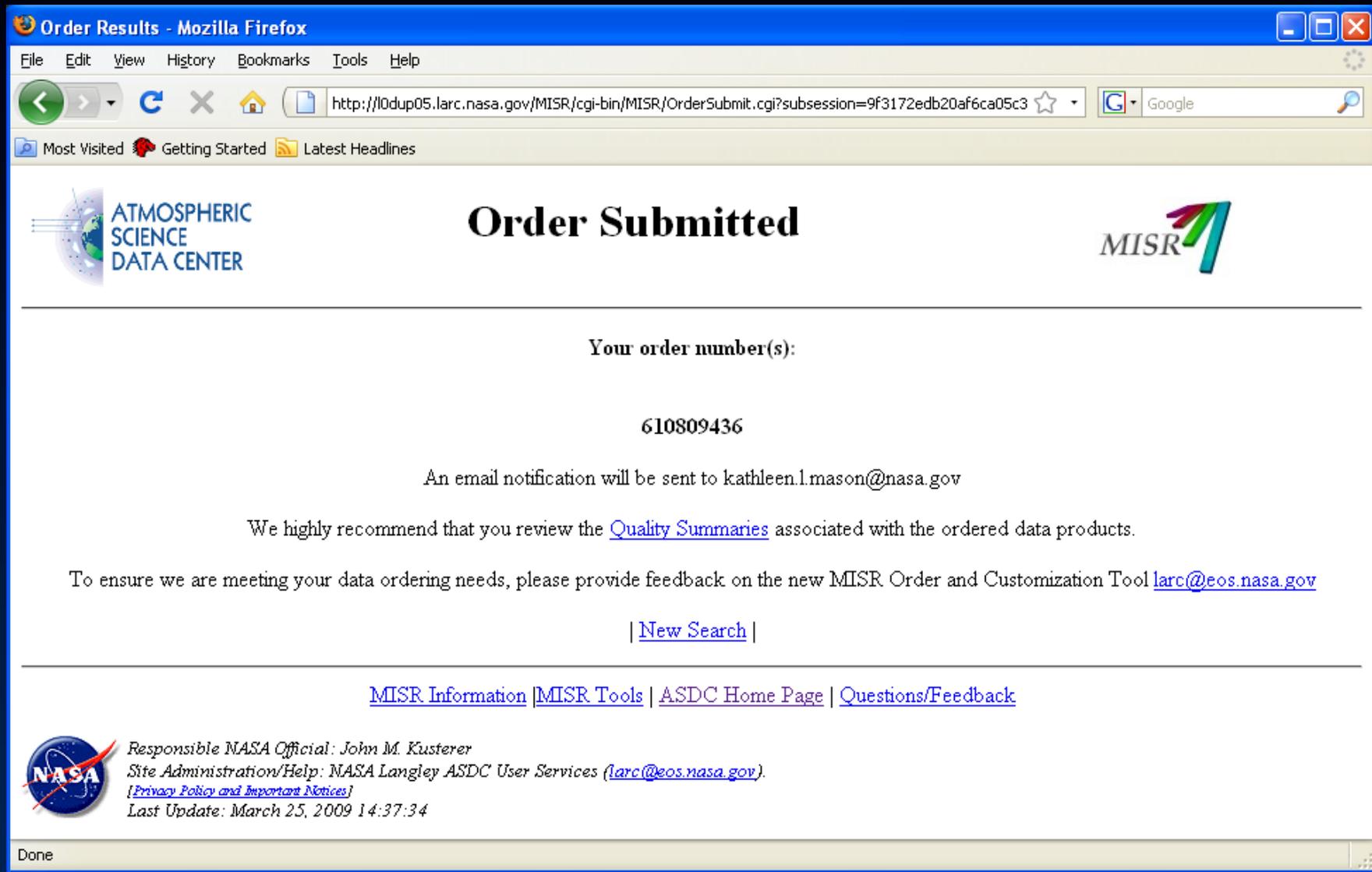
[New Search](#) | [View Cart/Submit Order](#)

The satisfaction of our customers with our services and the usefulness of our data holdings in a variety of applications are vital indicators to NASA of our effectiveness as a Data Center. We would like to receive permission for our User Services staff to occasionally contact you to discuss your experiences with our Data Center and to allow us to gain insight into the usability of our data holdings. If you are willing to have such contact, please select "OK" below.

[MISR Information](#) | [MISR Tools](#) | [ASDC Home Page](#) | [Questions/Feedback](#)

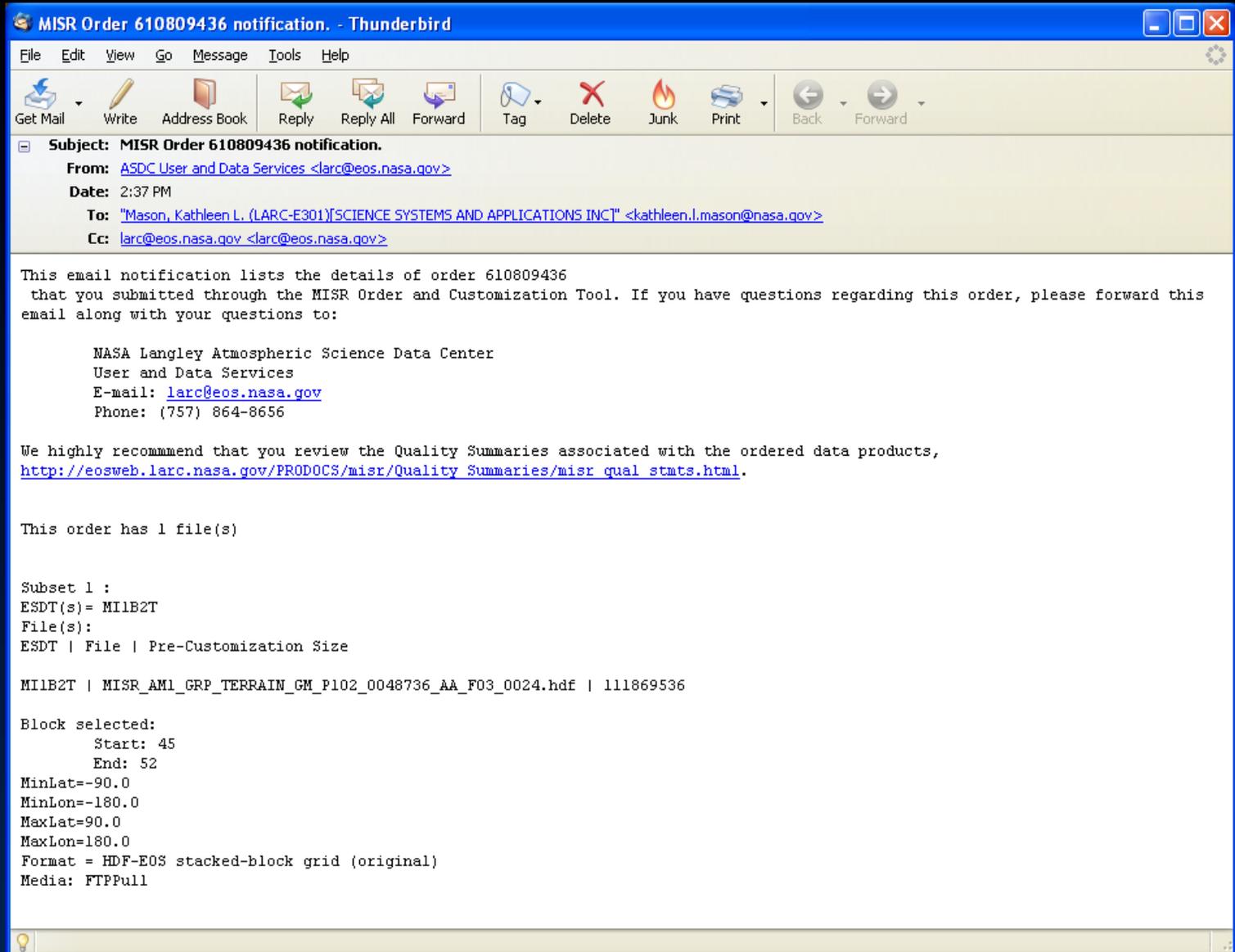
Order Tool –

Order Details



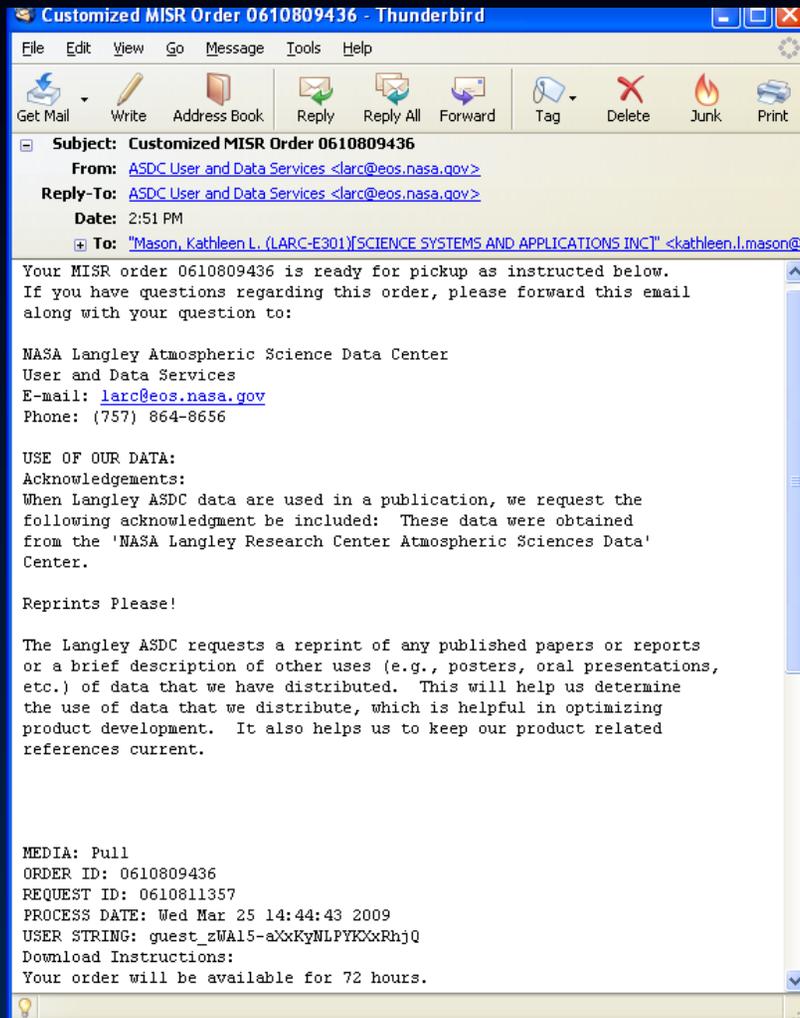
The screenshot shows a Mozilla Firefox browser window with the title "Order Results - Mozilla Firefox". The address bar contains the URL: <http://0dup05.larc.nasa.gov/MISR/cgi-bin/MISR/OrderSubmit.cgi?subsession=9f3172edb20af6ca05c3>. The page content includes the Atmospheric Science Data Center logo on the left and the MISR logo on the right. The main heading is "Order Submitted". Below this, it states "Your order number(s): 610809436". A message indicates that an email notification will be sent to kathleen.l.mason@nasa.gov. A recommendation is made to review the [Quality Summaries](#) associated with the ordered data products. A request is made for feedback on the new MISR Order and Customization Tool at larc@eos.nasa.gov. A link for "[New Search](#)" is provided. At the bottom, there are links for [MISR Information](#), [MISR Tools](#), [ASDC Home Page](#), and [Questions/Feedback](#). The footer includes the NASA logo, the responsible NASA official (John M. Kusterer), site administration information (NASA Langley ASDC User Services at larc@eos.nasa.gov), a link to [Privacy Policy and Important Notices](#), and the last update date: March 25, 2009 14:37:34. The browser status bar at the bottom left shows "Done".

Order Tool – Order Confirmation



Order Tool –

Order Pickup Notification



Customized MISR Order 0610809436 - Thunderbird

File Edit View Go Message Tools Help

Get Mail Write Address Book Reply Reply All Forward Tag Delete Junk Print

Subject: Customized MISR Order 0610809436
From: ASDC User and Data Services <larc@eos.nasa.gov>
Reply-To: ASDC User and Data Services <larc@eos.nasa.gov>
Date: 2:51 PM
To: "Mason, Kathleen L. (LARC-E301) [SCIENCE SYSTEMS AND APPLICATIONS INCT]" <kathleen.l.mason@eos.nasa.gov>

Your MISR order 0610809436 is ready for pickup as instructed below.
If you have questions regarding this order, please forward this email along with your question to:

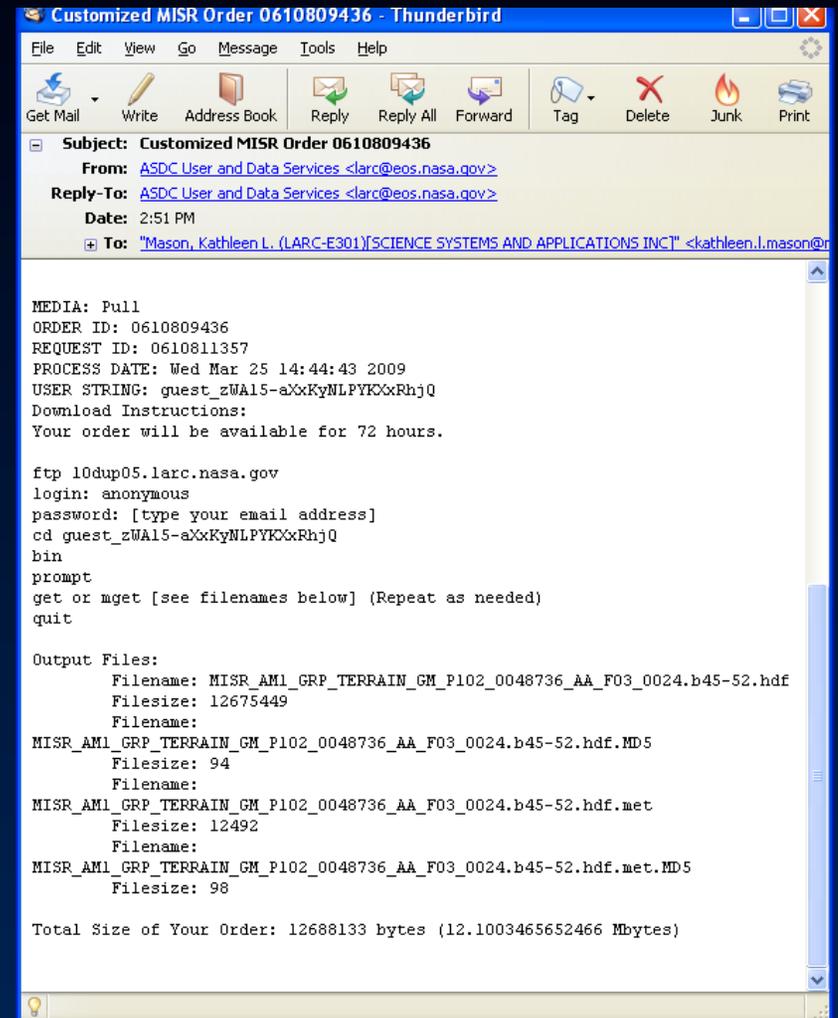
NASA Langley Atmospheric Science Data Center
User and Data Services
E-mail: larc@eos.nasa.gov
Phone: (757) 864-8656

USE OF OUR DATA:
Acknowledgements:
When Langley ASDC data are used in a publication, we request the following acknowledgment be included: These data were obtained from the 'NASA Langley Research Center Atmospheric Sciences Data' Center.

Reprints Please!

The Langley ASDC requests a reprint of any published papers or reports or a brief description of other uses (e.g., posters, oral presentations, etc.) of data that we have distributed. This will help us determine the use of data that we distribute, which is helpful in optimizing product development. It also helps us to keep our product related references current.

MEDIA: Pull
ORDER ID: 0610809436
REQUEST ID: 0610811357
PROCESS DATE: Wed Mar 25 14:44:43 2009
USER STRING: guest_zWA15-aXxKyNLPYKxRhjQ
Download Instructions:
Your order will be available for 72 hours.



Customized MISR Order 0610809436 - Thunderbird

File Edit View Go Message Tools Help

Get Mail Write Address Book Reply Reply All Forward Tag Delete Junk Print

Subject: Customized MISR Order 0610809436
From: ASDC User and Data Services <larc@eos.nasa.gov>
Reply-To: ASDC User and Data Services <larc@eos.nasa.gov>
Date: 2:51 PM
To: "Mason, Kathleen L. (LARC-E301) [SCIENCE SYSTEMS AND APPLICATIONS INCT]" <kathleen.l.mason@eos.nasa.gov>

MEDIA: Pull
ORDER ID: 0610809436
REQUEST ID: 0610811357
PROCESS DATE: Wed Mar 25 14:44:43 2009
USER STRING: guest_zWA15-aXxKyNLPYKxRhjQ
Download Instructions:
Your order will be available for 72 hours.

```
ftp 10dup05.larc.nasa.gov
login: anonymous
password: [type your email address]
cd guest_zWA15-aXxKyNLPYKxRhjQ
bin
prompt
get or mget [see filenames below] (Repeat as needed)
quit
```

Output Files:

Filename	Filesize
MISR_AM1_GRP_TERRAIN_GM_P102_0048736_AA_F03_0024.b45-52.hdf	12675449
MISR_AM1_GRP_TERRAIN_GM_P102_0048736_AA_F03_0024.b45-52.hdf.MD5	94
MISR_AM1_GRP_TERRAIN_GM_P102_0048736_AA_F03_0024.b45-52.hdf.met	12492
MISR_AM1_GRP_TERRAIN_GM_P102_0048736_AA_F03_0024.b45-52.hdf.met.MD5	98

Total Size of Your Order: 12688133 bytes (12.1003465652466 Mbytes)

Tools available from ASDC to work with MISR Data



MISR Data and Information


 Search

The Multi-angle Imaging SpectroRadiometer (MISR) was successfully launched into sun-synchronous polar orbit aboard Terra, NASA's first Earth Observing System (EOS) spacecraft, on December 18, 1999. MISR measurements are designed to improve our understanding of the Earth's environment and climate. Viewing the sunlit Earth simultaneously at nine widely-spaced angles, MISR provides radiometrically and geometrically calibrated images in four spectral bands at each of the angles. Spatial sampling of 275 and 1100 meters is provided on a global basis. The [MISR FAQ](#) and [Observation Concept](#) have more details about the MISR instrument. All MISR data products are available in HDF-EOS format, and select products are available in netCDF format.

Notices, Features, and Latest News:	<ul style="list-style-type: none"> • MISR Wildfire Plume Data - additional data added for North America 2004 • Featured MISR Article: Exploring links between atmospheric aerosols, climate change, and ultraviolet rays • Featured MISR Imagery: Satellites Track Human Exposure to Fine Particle Pollution 	<ul style="list-style-type: none"> • Join MISR News List • MISR Home Page <ul style="list-style-type: none"> ◦ MISR publications
-------------------------------------	---	--

Obtaining Data and Tools	Documentation	Relevant Links
<ul style="list-style-type: none"> • Available Data Products • MISR Order and Customization Tool • Data Pool • WIST Order Tool <ul style="list-style-type: none"> ◦ User's Manual Order Tips <p>Tools:</p> <ul style="list-style-type: none"> • Software for working with the data • Orbit/Date Conversion • Lat/Lon to Path/Block Conversion 	<p>Introductory Material - New Users Start Here:</p> <ul style="list-style-type: none"> • Frequently Asked Questions <ul style="list-style-type: none"> ◦ FAQ - how to order • Project Handbook • Overview <ul style="list-style-type: none"> ◦ Observation Concept • How to obtain MISR data (PPT) • workshop Presentations 	<p>Data Product Details:</p> <ul style="list-style-type: none"> • Data Product Content (DPS) • Data Product Quality • Data Product Versioning <p>Detailed Theory:</p> <ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents <p></p> <ul style="list-style-type: none"> • View All Imagery • View Level 3 Imagery • MISR Browse Tool • Tropical Cyclone Information • Terra Spacecraft Record



Tools for Working with MISR Data Products



Tool	Description	Data Products (definitions)	Data Format (definitions)	Software Language
Orbit/Date Conversion	Interactive interface for converting dates to MISR Orbit number and Orbit numbers to dates	N/A	N/A	N/A
Lat/Lon to Path/Block Conversion	Interactive interface for obtaining MISR paths based on latitude and longitude	L1, L2	N/A	N/A
MISR Browse Tool	Easy access to ellipsoid projected true-color images for each camera reduced to 2.2 km resolution	Browse	N/A	N/A
MISR INteractive eXplorer (MINX)	Interactive application for visualizing Level 1B2 data and for retrieving plume heights and wind velocities from wildfire smoke, volcanic and dust plumes	L1B2, GP_GMP and AGP required; TC_CLASSIFIERS and AS_AEROSOL recommended	Stacked-block	IDL, C
MISR Toolkit	Simplified programming interface for Level 1B2, Level 2, and Ancillary products	L1B2, L2, Ancillary	Stacked-block, Conventional	Various
misr view	Visualizes MISR TOA radiances, aerosol, surface, and cloud data products	L1B2, L2	Stacked-block	IDL, IDLVM
	Routines for extracting data and		Stacked-block	

MISR Browse Tool



MISR Data and Information


 Search

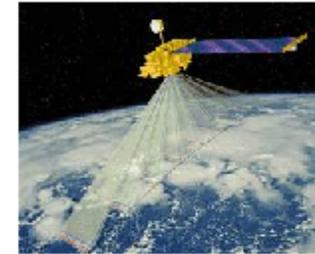
The Multi-angle Imaging SpectroRadiometer (MISR) was successfully launched into sun-synchronous polar orbit aboard Terra, NASA's first Earth Observing System (EOS) spacecraft, on December 18, 1999. MISR measurements are designed to improve our understanding of the Earth's environment and climate. Viewing the sunlit Earth simultaneously at nine widely-spaced angles, MISR provides radiometrically and geometrically calibrated images in four spectral bands at each of the angles. Spatial sampling of 275 and 1100 meters is provided on a global basis. The [MISR FAQ](#) and [Observation Concept](#) have more details about the MISR instrument. All MISR data products are available in HDF-EOS format, and select products are available in netCDF format.

Notices, Features, and Latest News:	<ul style="list-style-type: none"> • MISR Wildfire Plume Data - additional data added for North America 2004 • Featured MISR Article: Exploring links between atmospheric aerosols, climate change, and ultraviolet rays • Featured MISR Imagery: Satellites Track Human Exposure to Fine Particle Pollution 	<ul style="list-style-type: none"> • Join MISR News List • MISR Home Page <ul style="list-style-type: none"> ◦ MISR publications
-------------------------------------	---	--

Obtaining Data and Tools	Documentation	Relevant Links
<ul style="list-style-type: none"> • Available Data Products • MISR Order and Customization Tool • Data Pool • WIST Order Tool <ul style="list-style-type: none"> ◦ User's Manual Order Tips <p>Tools:</p> <ul style="list-style-type: none"> • Software for working with the data • Orbit/Date Conversion • Lat/Lon to Path/Block Conversion 	<p>Introductory Material - New Users Start Here:</p> <ul style="list-style-type: none"> • Frequently Asked Questions <ul style="list-style-type: none"> ◦ FAQ - how to order • Project Handbook • Overview <ul style="list-style-type: none"> ◦ Observation Concept • How to obtain MISR data (PPT) • Workshop Presentations <p>Data Product Details:</p> <ul style="list-style-type: none"> • Data Product Content (DPS) • Data Product Quality • Data Product Versioning <p>Detailed Theory:</p> <ul style="list-style-type: none"> • Algorithm Theoretical Basis Documents 	 <ul style="list-style-type: none"> • View All Imagery • View Level 3 Imagery • MISR Browse Tool • Tropical Cyclone Information • Terra Spacecraft Record



MISR Browse Tool



The Multi-angle Imaging SpectroRadiometer (MISR) views the Earth like no other instrument. It obtains calibrated images in four spectral bands at each of nine angles, providing new information for scientists studying the Earth.

The MISR instrument orbits the earth about 15 times each day recording data during the daylight portion of the orbit. The orbit number indicates the number of revolutions or orbits since launch. There are 233 distinct orbits which are repeated every 16 days. Each of these 16 days is referred to as a Data Day. The 233 repeating orbits are called paths. Each path is divided into 180 blocks. Since the paths overlap, near global coverage is obtained in 9 days.

The nine MISR cameras are pointed at fixed angles, one viewing vertically downward (nadir or An) and four each viewing the forward and aftward directions along the line of the orbit. The four cameras viewing forward are designated Af, Bf, Cf, and Df (the Af camera being closest to the vertical,) while those viewing aftward are designated Aa, Ba, Ca, and Da.

The MISR Browse Tool allows easy access to images from the MISR instrument. The browse images are ellipsoid color images for each camera and are available at two different resolutions. The default resolution is 4.4km. The image is enlarged to a 2.2km resolution by selecting "Full Size" on the controls menu in the upper left corner of the Browse Tool. The MISR red, green and blue bands are used to create the color image, which has been intentionally clipped and gamma-stretched to make cloud, ocean and land features visible.

- [Browse Tool](#) - **Javascript MUST be enabled in your browser.**
- [Known Issues](#)
- [MISR Path List and Maps by Data Day](#)
- Download browse images from the data pool: [via FTP access](#) | [via web interface](#)
- [MISR Level 3 Imagery](#)

MISR was built for NASA by the Jet Propulsion Laboratory in Pasadena, California. For more information on MISR and its mission, check out the [MISR Home Page](#). It is part of the Earth Observing System of NASA's [Earth Science Enterprise](#). MISR was launched into a polar orbit around Earth on 18 December 1999 onboard the [Terra spacecraft](#).

MISR Browse Tool

MISR Browse Tool
ATMOSPHERIC SCIENCES DATA CENTER

MISR
Multi-angle Imaging SpectroRadiometer

Region Time Range Path Orbit MISR Home

Step 1
MISR Region Selection Tool

Move rectangle and resize if needed, or enter Lat/Lon coordinates.

North: Lat:
West: East: Lon:
South: Height:

Select time range of interest.

Month Day Year Hour Min
Start Time: Mar 03 2000 00 00 UTC
End Time: Mar 27 2009 00 00 UTC

[MISR Information](#) | [MISR FAQ](#) | [ASDC Home Page](#) | [Questions/Feedback](#)

Responsible NASA Official: John M. Kusterer
Site Administration/Help: NASA Langley ASDC User Services (larc@eos.nasa.gov)
[Privacy Policy and Important Notices](#)
Last Update:

MISR Browse Tool
ATMOSPHERIC SCIENCES DATA CENTER

MISR
Multi-angle Imaging SpectroRadiometer

Region Time Range Path Orbit MISR Home

Step 1
MISR Path Tool

Enter a path number (1 - 233) and a time range to obtain a list of orbits within the time range that cover that path.

Path number:

Month Day Year Hour Min
Start Time: Mar 03 2000 00 00 UTC
End Time: Mar 27 2009 00 00 UTC

[MISR Information](#) | [MISR FAQ](#) | [ASDC Home Page](#) | [Questions/Feedback](#)

MISR Browse Tool
ATMOSPHERIC SCIENCES DATA CENTER

MISR
Multi-angle Imaging SpectroRadiometer

Region Time Range Path Orbit MISR Home

Step 1
MISR Orbit Tool

Enter orbit number to obtain date, path, and view browse image.

Orbit number:

[MISR Information](#) | [MISR FAQ](#) | [ASDC Home Page](#) | [Questions/Feedback](#)

Responsible NASA Official: John M. Kusterer
Site Administration/Help: NASA Langley ASDC User Services (larc@eos.nasa.gov)
[Privacy Policy and Important Notices](#)
Last Update:

MISR Browse Tool
ATMOSPHERIC SCIENCES DATA CENTER

MISR
Multi-angle Imaging SpectroRadiometer

Region Time Range Path Orbit MISR Home

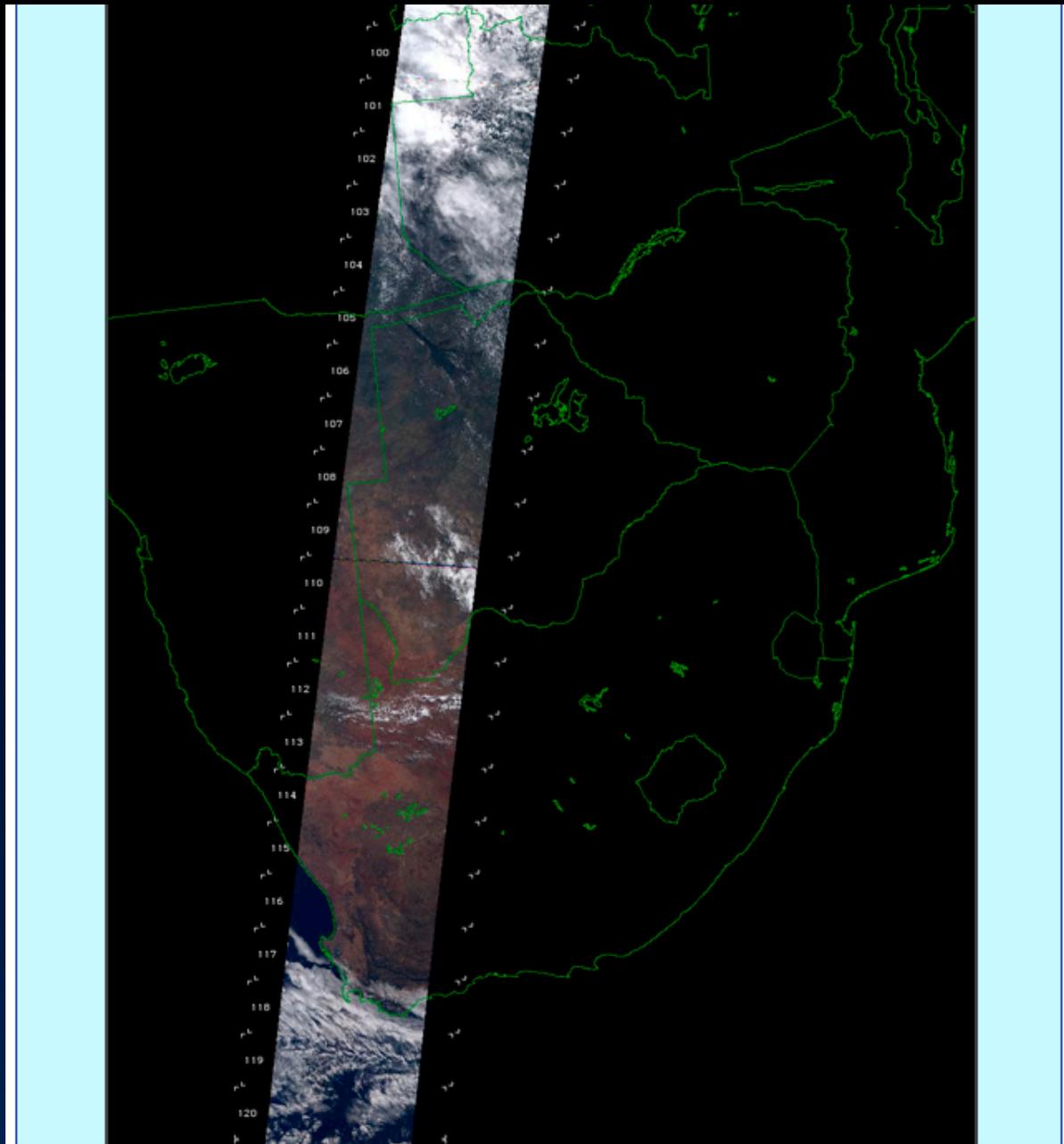
Step 1
MISR Time Range Tool

Enter time range to obtain orbits and paths.

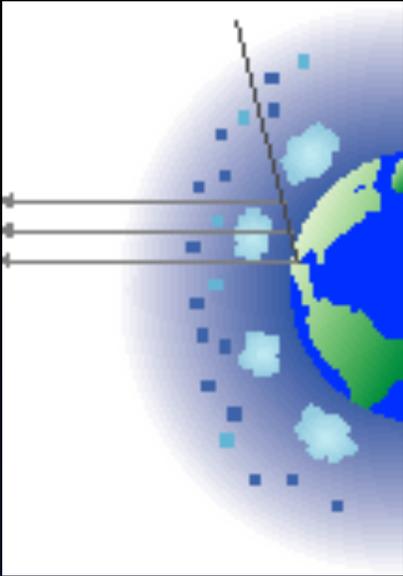
Month Day Year Hour Min
Start Time: Mar 03 2000 00 00 UTC
End Time: Mar 27 2009 00 00 UTC

[MISR Information](#) | [MISR FAQ](#) | [ASDC Home Page](#) | [Questions/Feedback](#)

Responsible NASA Official: John M. Kusterer
Site Administration/Help: NASA Langley ASDC User Services (larc@eos.nasa.gov)
[Privacy Policy and Important Notices](#)
Last Update:



MISR browse tool demo



ATMOSPHERIC SCIENCE DATA CENTER



<http://eosweb.larc.nasa.gov>

larc@eos.nasa.gov

Agenda

- Background and terminology
- Obtaining data, MISR browse tool and subsetting procedures
- **Data extraction and processing**
- Solving problems discussed in handout
- Information about re-projection tools

MISRView

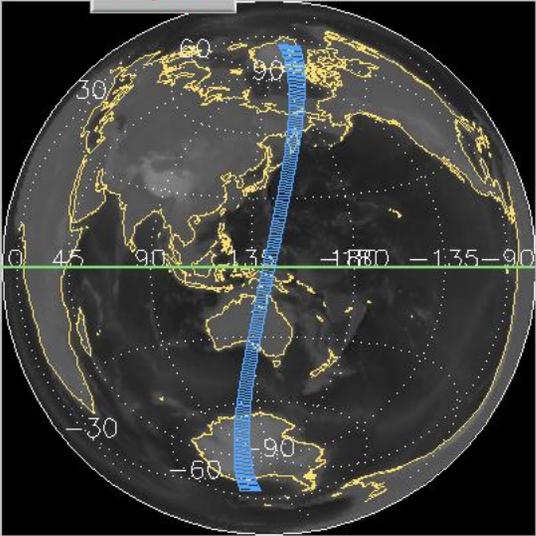


- Maps path/orbit to time and date
- Assembles MISR blocks
- Reports Lat/Lon using the AGP
- Displays true color MISR imagery
- Can reproject MISR imagery
- Requires IDL or IDL VM
- Perspective tool
- Band slider tool
- Scroll tool
- Vector overlay tool
- Reprojection tool
- Color / Contrast tools

MISRView – Main Menu

MISRView interface

snapshot



Source Data: MISR AirMISR

Choose MISR Orbit Choose MISR Blocks

Orbit Date: GMT:

Path: Orbit:

Start Block: Center lat,lon: 0.6, 142.3

End Block: Center lat,lon: 0.6, 142.3

Number of Blocks: Map Zoom: In Out

Cursor lat,lon: 58.3, 00.

Data < None Selected > 1100m 1100m

RED PLANE NOT SET	GREEN PLANE NOT SET	BLUE PLANE NOT SET
ANCILLARY 1 PLANE NOT SET	ANCILLARY 2 PLANE NOT SET	ANCILLARY 3 PLANE NOT SET

Data Selection Parameters: Rotate Deg.

MISRView – L1B2 imagery

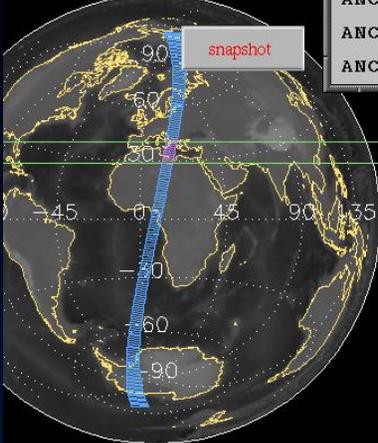
fjorgyn.jpl.nasa.gov/home/miassa1

fjorgyn.jpl.nasa.gov{ber}69:
fjorgyn.jpl.nasa.gov{ber}70:

MISR_VIEW 4.1

Controls Quit Help

Data Selection Interface



w=2

Longitude: 15.2170 degrees
Latitude: 34.4562 degrees

RED PLANE (block #, block-y, block-x, data value): 63, 173, 70, 2464
GREEN PLANE (block #, block-y, block-x, data value): 63, 173, 70, 3464
BLUE PLANE (block #, block-y, block-x, data value): 63, 173, 70, 7180
ANCILLARY PLANE #1 (block #, block-y, block-x, data value): 63, 173, 70, 36
ANCILLARY PLANE #2 (block #, block-y, block-x, data value): 63, 11, 5, 308.27800
ANCILLARY PLANE #3 (block #, block-y, block-x, data value): 63, 11, 5, 20.931710

Orbit Date: Jul 22 2001 GMT: 09 22 4

Path: 187 Orbit: 8476 Orbit List, Pat

Start Block: 58 Center lat,lon: 40.6,
End Block: 67 Center lat,lon: 29.4,
Number of Blocks: 10 Map Zoom: In Out

Cursor lat,lon: 1350.0, 23.0

w=2 p=187 o=8476 b=58.67 z=0.500000 m=

Utilities Tools Modes Kill

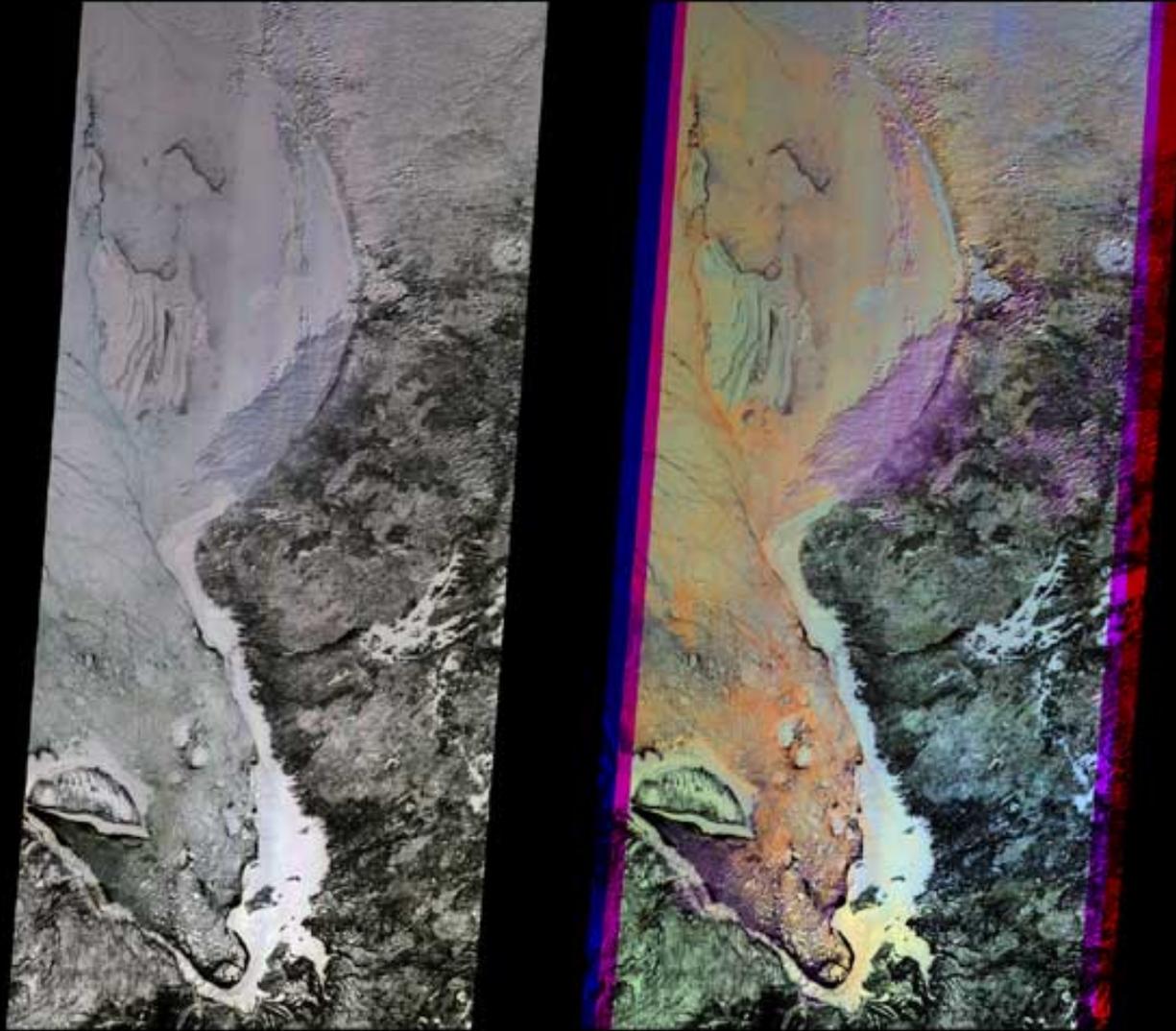


< GP, GMP, P187, 0008476___Geome > Cross-track 1100m Along-track

Set Active Plane	Clear Active Plane	Plane Display Options.
<p>RED PLANE ORBIT 8476 GRP, ELLIPSOID, AN, P187, 0008476 RedBand_Red Radlance/RDQI 1100m (cross-track) x 1100m (along-track)</p>	<p>GREEN PLANE ORBIT 8476 GRP, ELLIPSOID, AN, P187, 0008476 GreenBand_Green Radlance/RDQI 1100m (cross-track) x 1100m (along-track)</p>	<p>BLUE PLANE ORBIT 8476 GRP, ELLIPSOID, AN, P187, 0008476 BlueBand_Blue Radlance/RDQI 1100m (cross-track) x 1100m (along-track)</p>
<p>ANCILLARY 1 PLANE ORBIT 8476 AGP, P187 Standard_AveSceneElev 1100m (cross-track) x 1100m (along-track)</p>	<p>ANCILLARY 2 PLANE ORBIT 8476 GP, GMP, P187, 0008476 GeometricParameters_SolarAzimuth 1100m (cross-track) x 1100m (along-track)</p>	<p>ANCILLARY 3 PLANE ORBIT 8476 GP, GMP, P187, 0008476 GeometricParameters_SolarZenith 1100m (cross-track) x 1100m (along-track)</p>

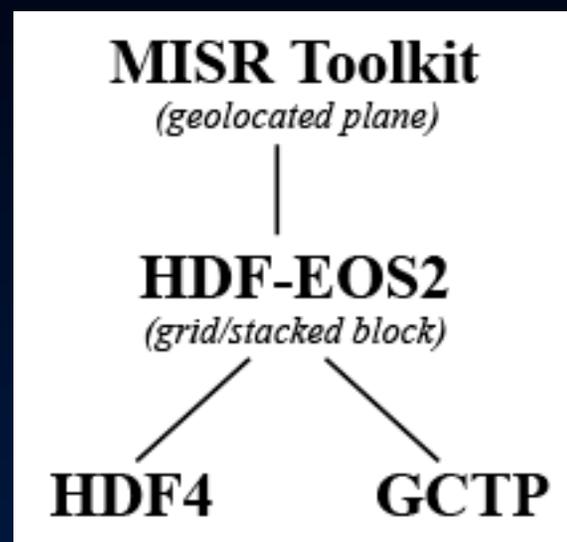
Data Selection Parameters: Store Recall Rotate 0.0 Deg. Create Viewer

MISRView – MISR Vision (R-Ba, G-An, B-Bf)



Introduction to the MISR Toolkit API

- The MISR Toolkit API provides simplified MISR data access and geolocation functionality utilizing the GCTP metadata, instead of an ancillary data set lookup
- Abstract MISR “stacked block HDF-EOS grid” to a geolocated SOM projected plane with blocks assembled and fields unpacked and unscaled
- Reads all MISR ancillary, L1B2 and L2 products
- There are no other tools available that simultaneously make use of the GCTP geolocation metadata and are aware of the MISR “stacked block” format for all of the MISR products



MISR Toolkit API Components (Partial List)

1.1) Region Selection

MtkSetRegionByUlcLrc()
MtkSetRegionByLatLonExtent()
MtkSetRegionByPathBlockRange()

1.2) Reading a Geolocated SOM plane

MtkReadData()
MtkReadRaw()
MtkReadBlockRange()

1.3) SOM Plane Coordinate Query

MtkLSToLatLon()
MtkLatLonToLS()
MtkLSToSomXY()
MtkSomXYToLS()

1.4) Map Reprojection

TBD

2.1) Orbit/Path Query

MtkLatLonToPathList()
MtkRegionToPathList()
MtkTimeToOrbitPath()
MtkTimeRangeToOrbitList()
MtkPathTimeRangeToOrbitList()
MtkOrbitToPath()

2.2) File/Grid/Field Query

MtkMakeFilename()
MtkFindFileList()
MtkFileToGridList()
MtkFileGridToFieldList()

2.3) Coordinated Conversion

MtkPathToProjParam()
MtkLatLonToBlS()
MtkBlSToLatLon()
MtkSomXYToBlS()
MtkBlSToSomXY()
MtkLatLonToSomXY()
MtkSomXYToLatLon()

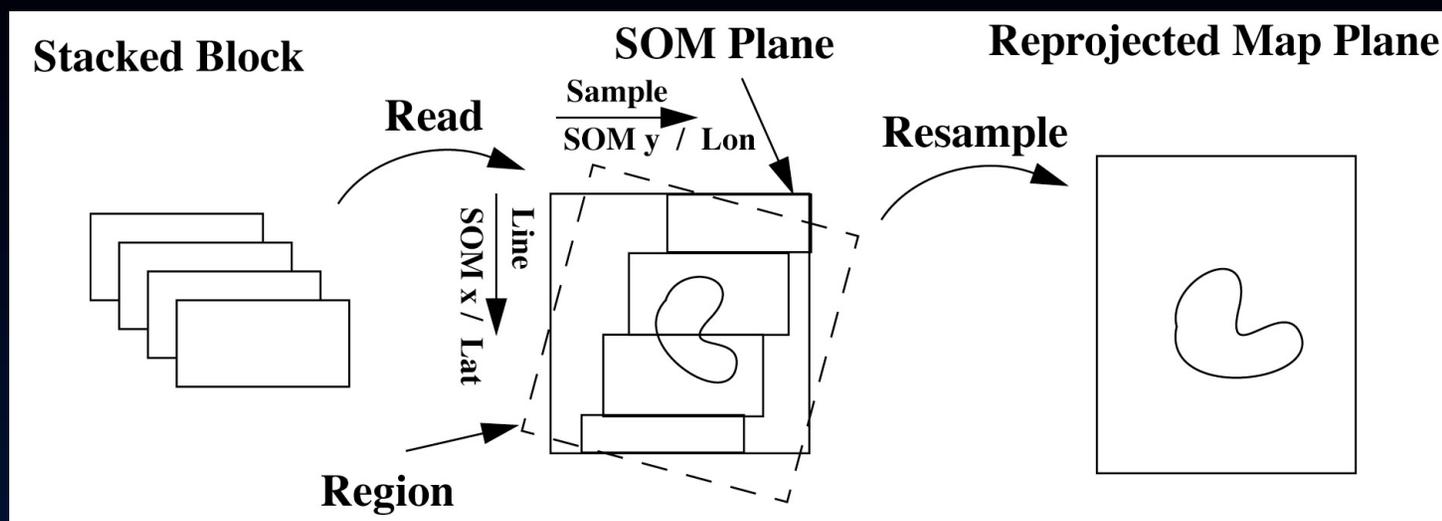
2.4) Unit Conversion

MtkDmsToDd()
MtkDdToDms()
MtkDdToRad()
MtkRadToDd()
MtkDmsToRad()
MtkRadToDms()

2.5) Memory Management

MtkDataBufferAllocate()
MtkDataBufferFree()

MISR Toolkit API Concept



- 1) Select a geographic region of interest
- 3) Read a geolocated SOM plane from any number of MISR product files using the selected region. The region will be “snapped” to the geolocated SOM grid determined by the path number of the product
- 4) Query the coordinates of the SOM plane, mapping between plane line/sample, SOM x/y, Latitude/Longitude and “stacked-block” block, line, sample

Note: Adjacent paths are actually separate SOM projections, so a map re-projection may be needed to compare between separate MISR paths

MISR Toolkit API Concept (cont.)

In addition to L1B2, L2 and Conventional MISR data access the MISR toolkit has the ability to

- Perform coordinate conversions between lat/lon <-> SOM x/y <-> line/sample <-> block/line/sample
- Inter-compare MISR data with other data sets geographically
- Query a MISR product file to retrieve such information as block range, file version, file type, grid list, field list (including unpacked/unscaled fields), dimension list, metadata, etc.
- Construct MISR filenames and search a directory tree for the file
- Convert between path, orbit and time range
- Determine which paths/orbits cross a particular geographic location or region within a given time range

MISR Toolkit Platform and Language Availability

Platforms and Languages Available (version 1.2.0)

- C library on Linux, Mac OS X and Windows XP
- IDL on all platforms via dynamically loadable library
- Python bindings for Linux, Mac OS X and Windows XP
- Command line utilities on Linux and Mac OS X (Useful for scripting or function usage examples)

Agenda

- Background and terminology
- Obtaining data, MISR browse tool and subsetting procedures
- Data extraction and processing
- **Solving problems discussed in handout**
- Information about re-projection tools

MISR problem solving demo

Agenda

- Obtaining data, MISR browse tool and subsetting procedures
- Data extraction and processing
- Solving problems discussed in handout
- **Information about re-projection tools**

What are the coordinates of a pixel within the MISR HDF-EOS “Stacked Block” File Format?

- Inside the HDF-EOS “stacked block grid” = (block, line, sample)
- Convert (block, line, sample) \leftrightarrow SOM (x,y)
 - Requires several metadata values and some arithmetic.
- Convert SOM (x,y) \leftrightarrow Lat/Lon
 - Requires use of GCTP map projection coordinate conversion library in HDF-EOS distribution.
- Units: Integral block, fractional line/sample; meters x/y; decimal degrees Lat/Lon.
- This process is described in the [MISR Data Product Specification](#), Appendix A. Also routines are provided in the MISR Toolkit.
- Or simply look up the Lat/Lon of the corresponding block, line, sample in the Ancillary Geographic Product (AGP) datasets (1.1km).

MISR Toolkit IDL example to convert to ENVI

```
pro convert2envi, filename, envifilename

  path = 0
  status = mtk_file_to_path(filename, path)
  if (status ne 0) then exit

  status = mtk_file_to_blockrange(filename, start_block, end_block)
  if (status ne 0) then exit

  status = mtk_file_to_gridlist(filename, ngrid, gridlist)
  if (status ne 0) then exit
  gridname = gridlist[0]

  status = mtk_file_grid_to_fieldlist(filename, gridlist[igrd], nfield, fieldlist)
  if (status ne 0) then exit
  fieldname = fieldlist[0]

  status = mtk_file_grid_field_to_dimlist(filename, gridname, fieldname, ndim, dimnames, dimsizes)
  if (status ne 0) then exit

  status = mtk_setregion_by_path_blockrange(path, start_block, end_block, region)
  if (status ne 0) then exit

  status = mtk_readdata(filename, gridname, fieldname, region, databuf, mapinfo)
  if (status ne 0) then exit

  status = mtk_write_envi_file(envifilename, databuf, mapinfo, filename, gridname, fieldname)
  if (status ne 0) then exit

end
```

MISR data loaded in ENVI preserving geolocation information

ENVI 4.6.1

File Basic Tools Classification Transform Filter Spectral Map Vector Topographic Radar Window Help

#1 (R:R (RedBand:Red Equivalent Reflectance:Red.img),G:G (GreenBand:Green Equivalent Reflectance:Green.img),B:B (BlueBand:Blue Equivalent Reflectance:Blue.img))

File Overlay Enhance Tools Window

Available Bands List

File Options

- RGB.img
 - R (RedBand:Red Equivalent Reflectance)
 - G (GreenBand:Green Equivalent Reflectance)
 - B (BlueBand:Blue Equivalent Reflectance)
 - Map Info

Gray Scale RGB Color

R R (RedBand:Red Equivalent Reflectance)

G G (GreenBand:Green Equivalent Reflectance)

B B (BlueBand:Blue Equivalent Reflectance)

Dims: 2688 x 10752 (Byte) [BSQ]

Load RGB Display #1

#1 Zoom [4x]

Cursor Location / Value

File Options

Disp #1 (1357,5152) Scrn: R:161 G:181 B:175

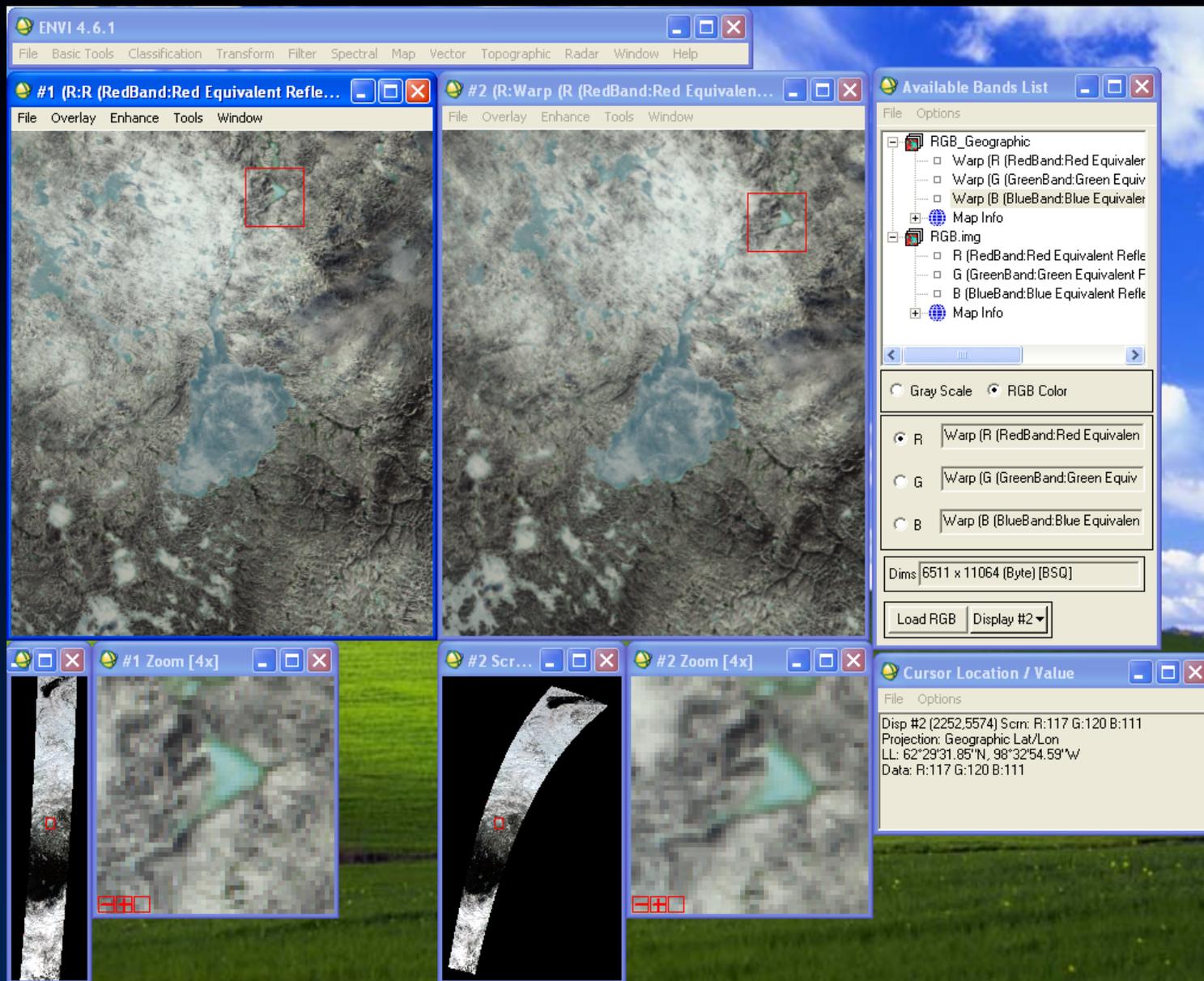
Projection: Space Oblique Mercator A (MISR Path 37)

Map: 12960887.50E,777562.48N Meters

LL: 63°7'50.40"N, 99°26'19.85"W

Data: R:161 G:181 B:175

MISR SOM data reprojected to Geographic Lat/Lon using ENVI





Jet Propulsion Laboratory
California Institute of Technology

+ View the NASA Portal

JPL HOME

EARTH

SOLAR SYSTEM

STARS & GALAXIES

SCIENCE & TECHNOLOGY

MISR

Multi-angle Imaging SpectroRadiometer

HOME

MISSION

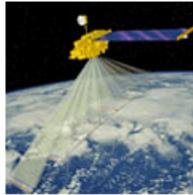
GALLERY

EDUCATION

NEWS

ABOUT US

INTERNAL



Publications

Get Data

Field Campaigns

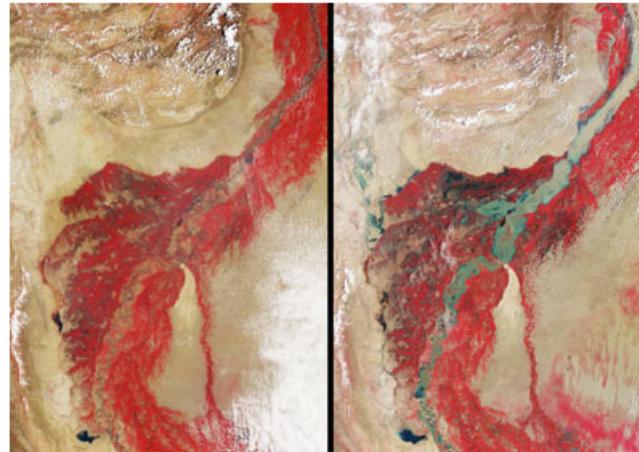
Terra Mission

Mystery Quiz

Ask a Question

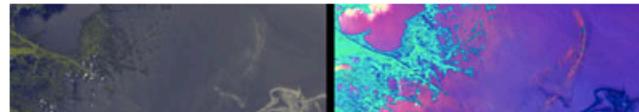
Suggest an Image

A collection of Iceland volcanic plume data has been added to the MISR Plume Height Project web site

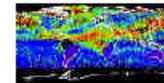


[NASA's MISR Tracks Massive Flooding in Pakistan](#)

In late July 2010, flooding caused by heavy monsoon rains began in several regions of Pakistan, including the Khyber Pakhtunkhwa, Sindh, Punjab and parts of Baluchistan. According to the Associated Press, the floods have affected about one-fifth of the country. Tens of thousands of villages have been flooded, more than 1,500 people have been killed, and millions have been left homeless. The floodwaters are not expected to fully recede before late August. >>



VISUALIZATIONS



World maps and animations

[Aerosols](#)

[Land surface](#)

[Top-of-atmosphere](#)

[Albedo](#)

[Radiance](#)



3D globe animations

(Requires [Java](#) & [Java 3D](#))

[Aerosols](#)

[Land Surface](#)

[Top-of-atmosphere](#)

[Albedo](#)

[Radiance](#)

Where on Earth...?



QUIZZES

[Click here](#)