MINX Document 4
MINX - Basic Features

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January, 2013

MINX Software Overview

- Interactive, IDL visualization tool with GUI interface
- Runs on Mac OS X, MS Windows and Linux
- Very memory and CPU intensive
- Downloadable from Open Channel Foundation website:

  https://www.openchannelsoftware.com/projects/MINX
- Distributed as an IDL virtual machine (VM) application – you can download the IDL VM at no charge from the Exelis company:

  http://www.exelisvis.com/Downloads/ProductDownloads.aspx
- Used to digitize > 12,000 smoke plumes for EPA/NASA project
- Plume height project and software support:

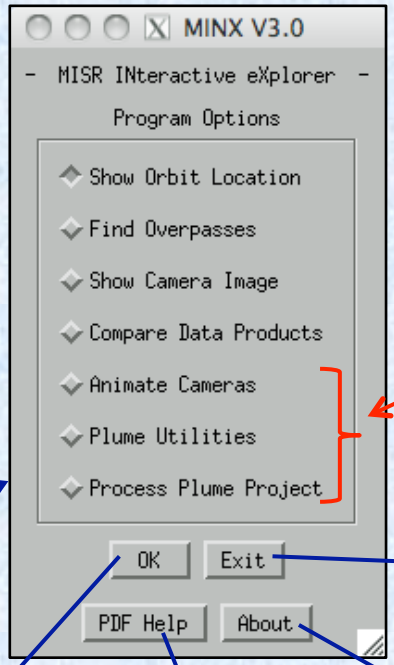
  Stacey Boland, Eric Danielson, David Diner (MISR PI), Michael Garay, Jeff Hall, Earl Hansen (MISR project manager), Ralph Kahn, Cecelia Lawshe (Raytheon), Jason Matthews, Susan Paradise, Brian Rheingans, Charles Thompson, > 10 summer students
- Won a NASA Space Act award in 2008
- NOTE – Most of the contents of this file are also available as internal documentation in MINX. Look for the "PDF Help" buttons.

Running MINX

(all MINX images were captured on a Mac computer)

On the following slides, colored annotations mean:

- **Blue** : user's actions and the resulting behavior of MINX
- **Red** : descriptions of dialog box and data window features



Plume height analysis

Exit MINX

Proceed to selected option

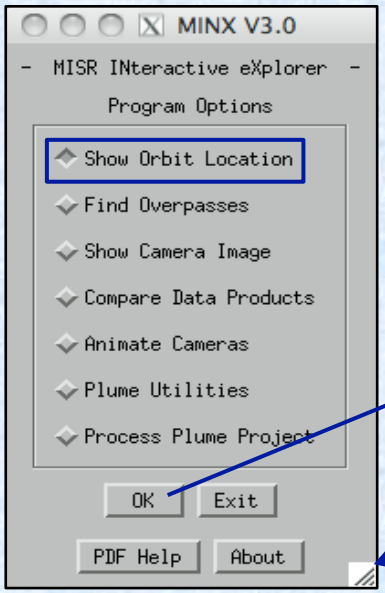
Display PDF file summarizing each item on main menu

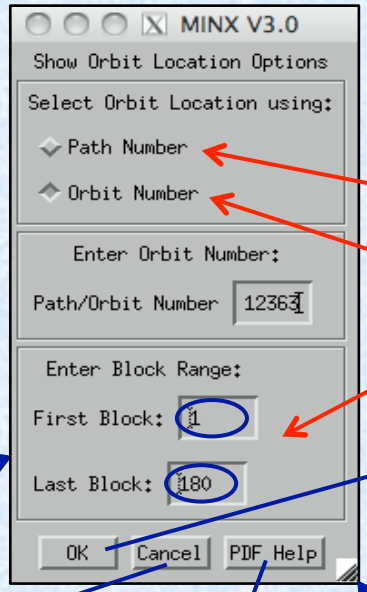
Display system information and MINX copyright information

Show Orbit Location

Show Orbit Location - 1

Objective: To illustrate in map view where MISR paths, orbits and blocks are without external inputs.





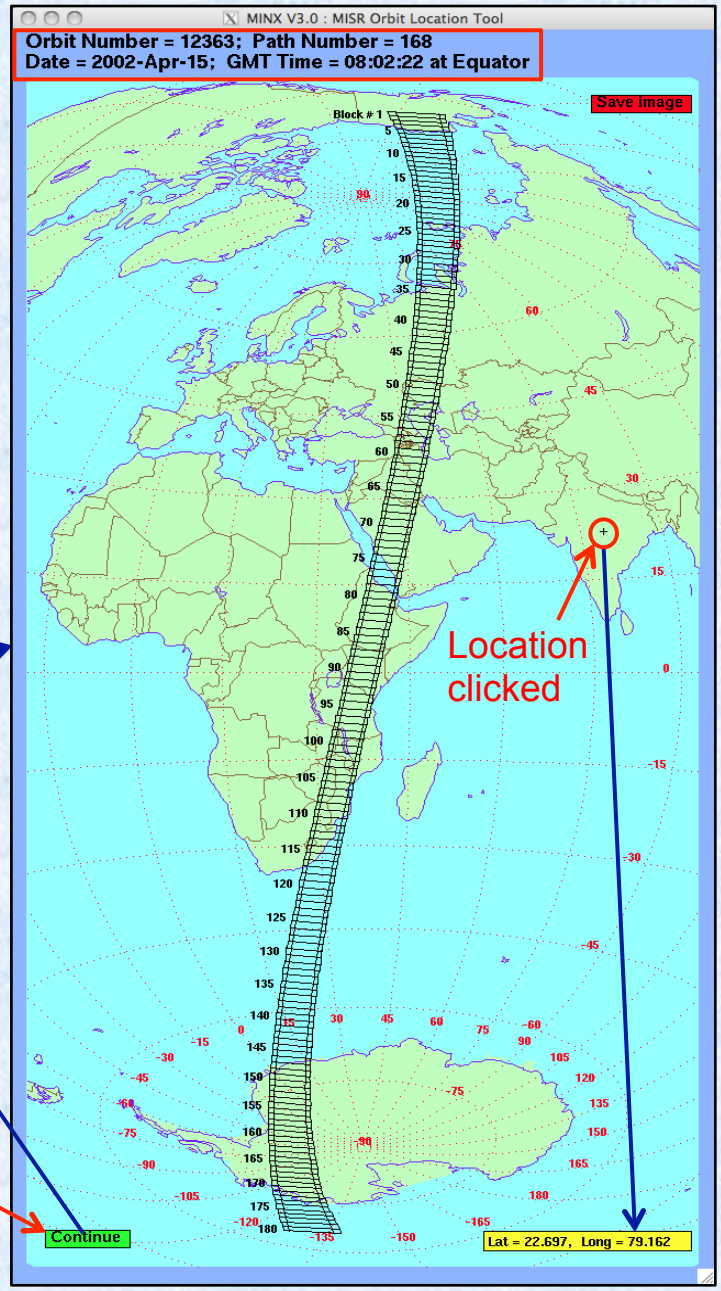
Valid Ranges:

[1 – 233]

[1 – 99999]

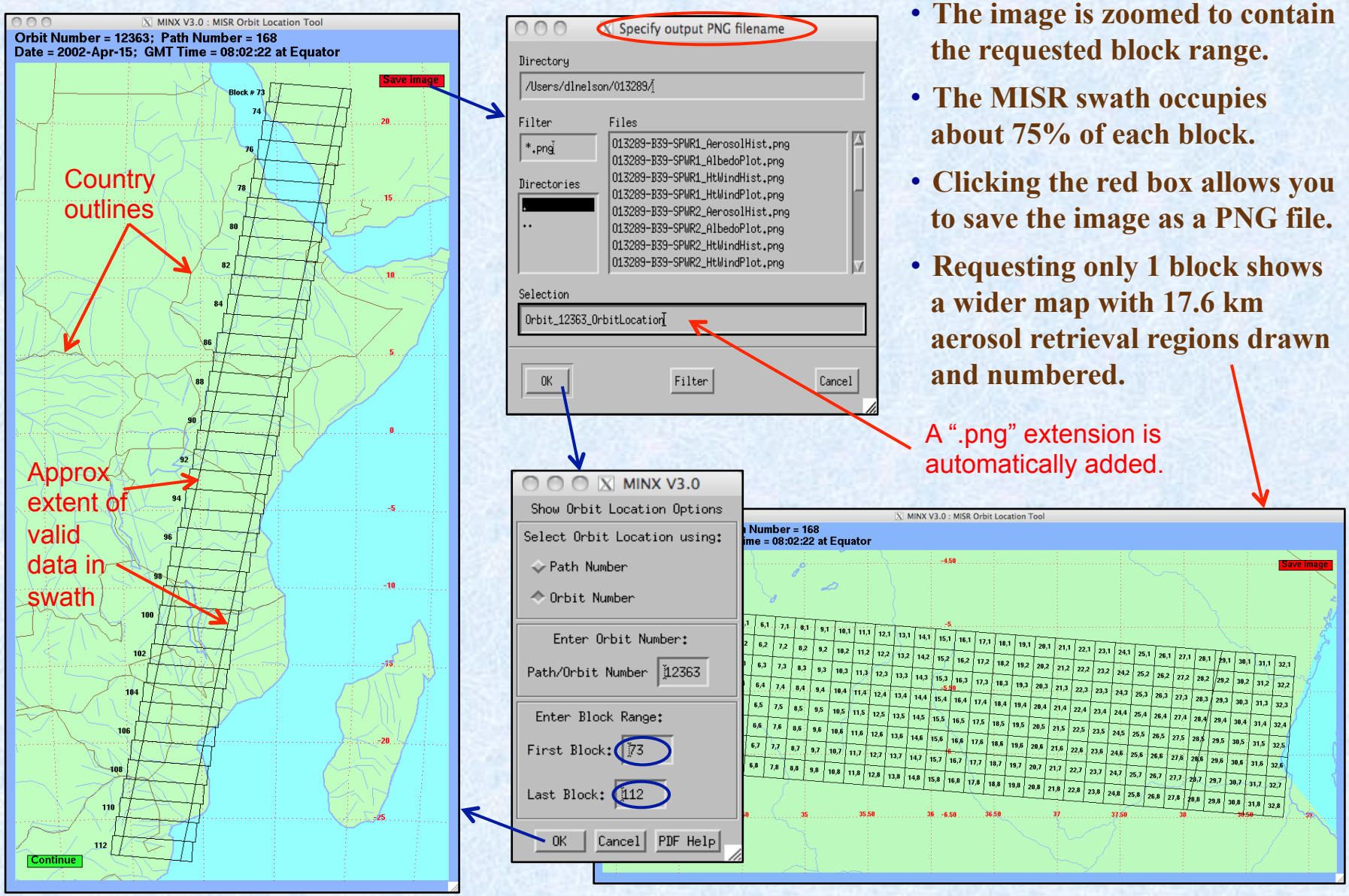
[1 – 180]

Display these instructions



- **This is a good way to find the Path number and acquisition Date and Time for any Orbit Number.**
- **Clicking the green "Continue" button OR right-clicking on the map deletes the map and returns control to "Show Orbit Location Options" dialog.**
- **Clicking in the map window displays geographic coordinates in the yellow box at the bottom.**

Show Orbit Location - 2



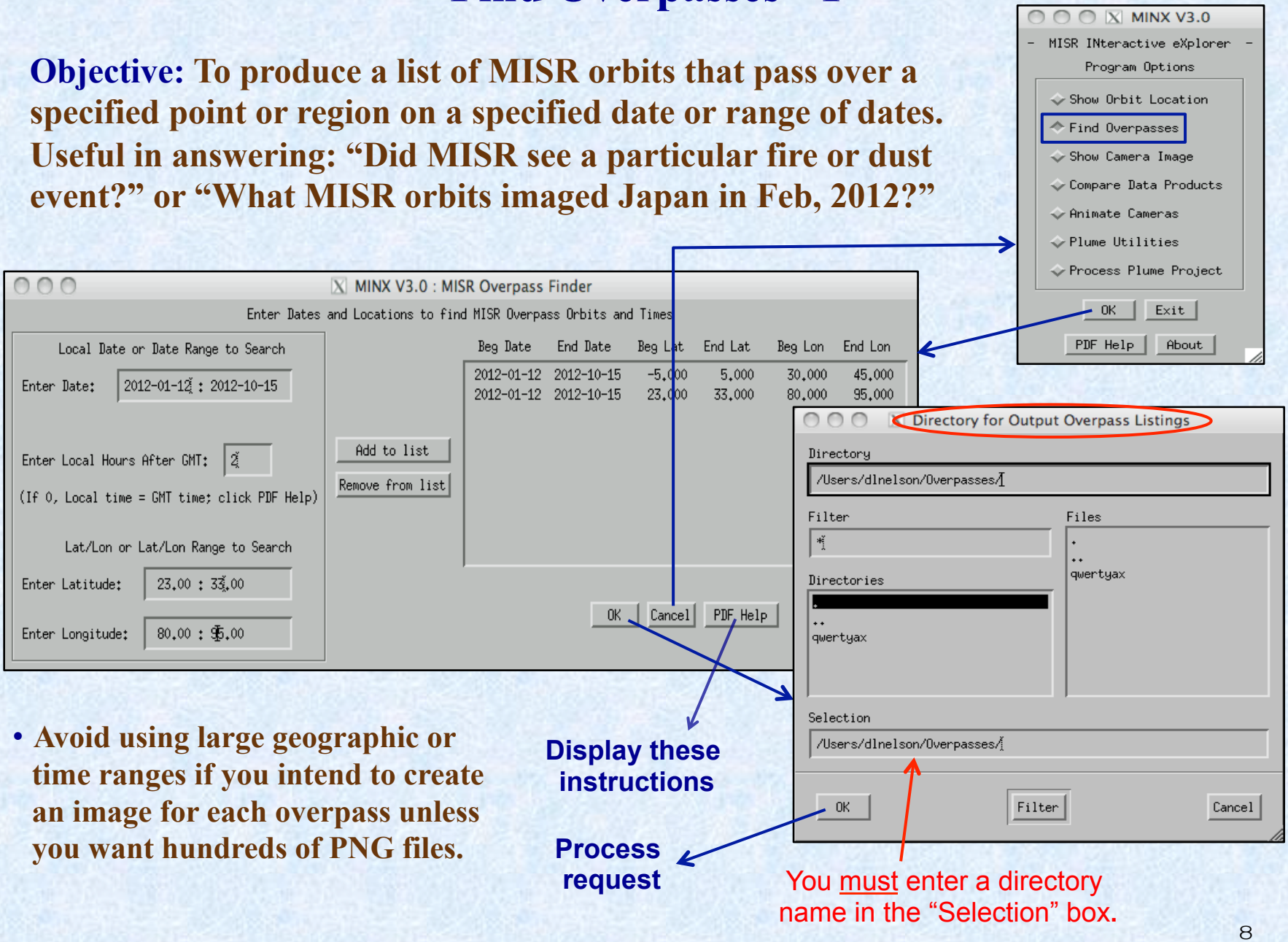
- The image is zoomed to contain the requested block range.
- The MISR swath occupies about 75% of each block.
- Clicking the red box allows you to save the image as a PNG file.
- Requesting only 1 block shows a wider map with 17.6 km aerosol retrieval regions drawn and numbered.

A ".png" extension is automatically added.

Find Overpasses

Find Overpasses - 1

Objective: To produce a list of MISR orbits that pass over a specified point or region on a specified date or range of dates. Useful in answering: "Did MISR see a particular fire or dust event?" or "What MISR orbits imaged Japan in Feb, 2012?"

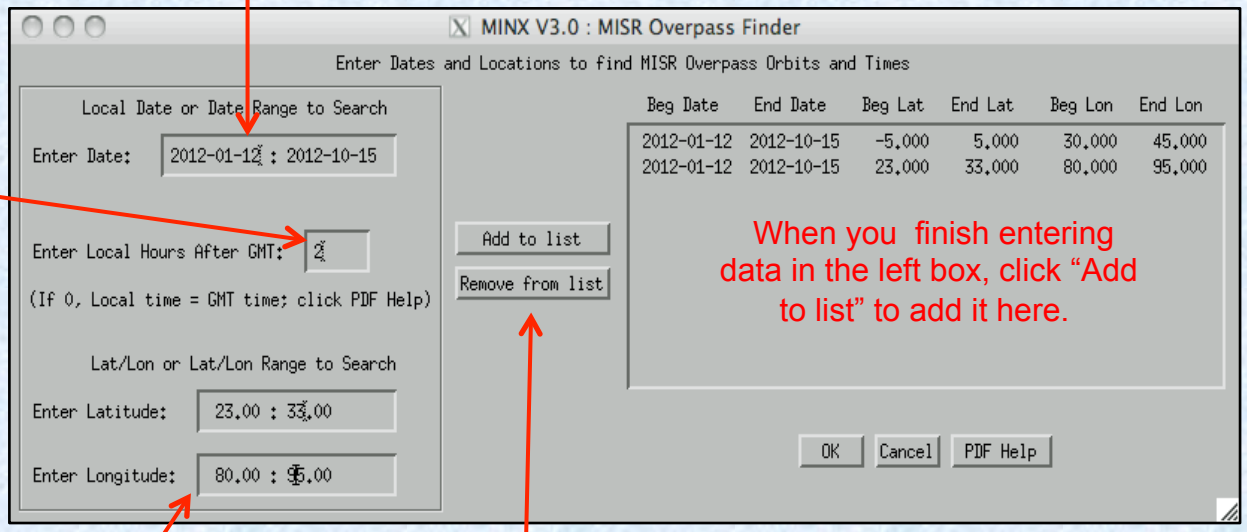


- **Avoid using large geographic or time ranges if you intend to create an image for each overpass unless you want hundreds of PNG files.**

Find Overpasses - 2

Enter either a single date or a date range here. The format must be either "YYYY-MM-DD" for a single date or, for a date range, "YYYY-MM-DD : YYYY-MM-DD". The search will begin at midnight local time at the beginning of the first date and will continue through midnight local time at the end of the second date.

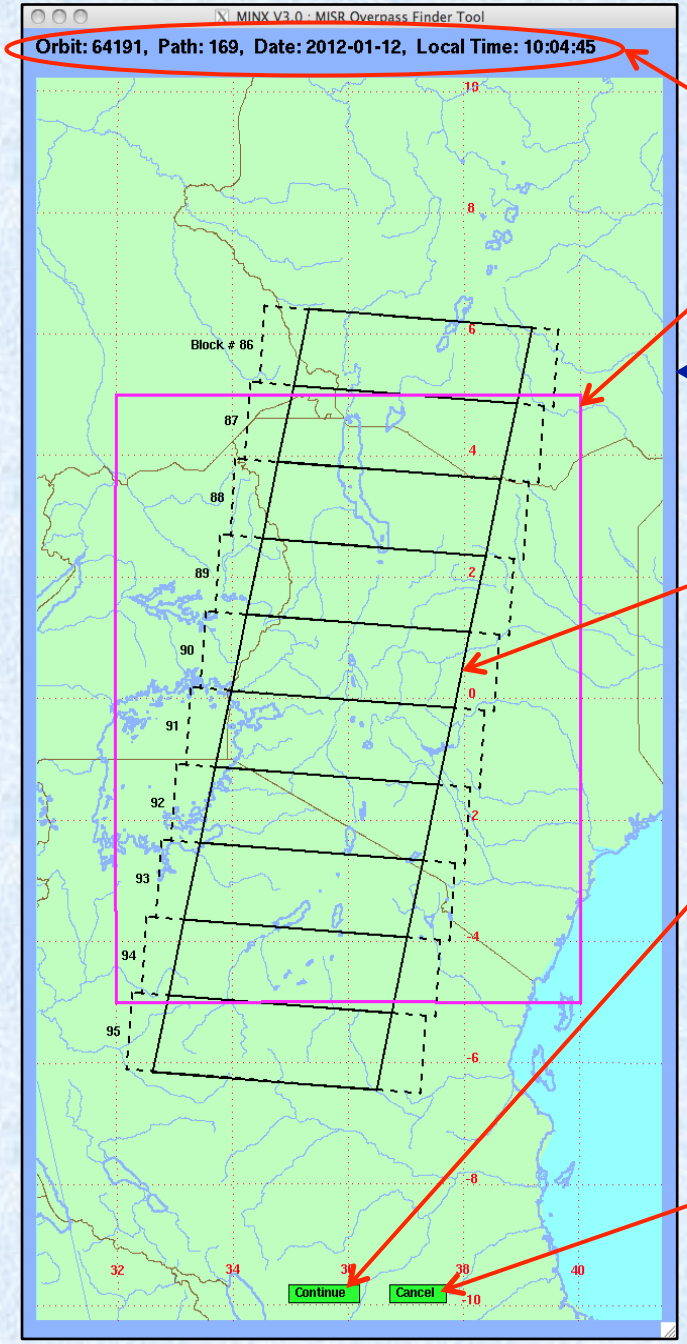
Enter the number of hours between GMT and local time at the location(s) you enter. This number should be negative for time zones west of Greenwich and positive for time zones east. The number of hours you enter will be applied to the search process for ALL the entries in the list you construct. You may also want to adjust for Daylight Saving Time. Note: GMT or Greenwich Mean Time is nearly identical to UTC or Coordinated Universal Time.



Once you have completed the date and location entry, click "Add to list" to copy the information to the list box on the right. Then you can enter more date and location values, each time adding them to the list. If you are not satisfied with an entry in the list, click on the entry to highlight it, and then click "Remove from list" to remove it.

Enter a latitude or latitude range and a longitude or longitude range in decimal degrees. For single points use format "sDD.DDD"; for a region the format is: "sDD.DDD : sDD.DDD". The "s" stands in for "+" or "-". The absolute value of latitudes must not exceed 84 deg, and the absolute value of longitudes must not exceed 180 deg. Decimal points are optional.

Find Overpasses - 3



Overpass details for this orbit.

Region specified for finding MISR overpasses.

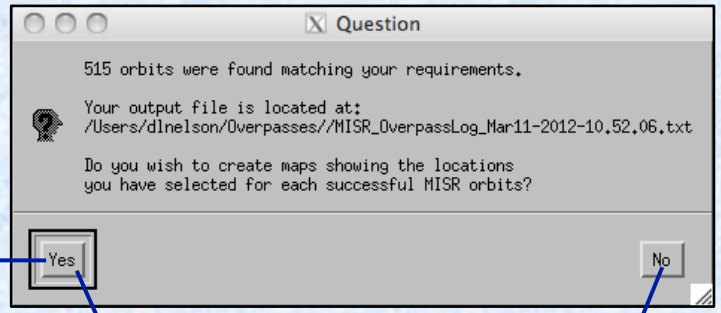
Orbits are returned only if the specified overpass region intersects the solid black lines of the orbits' swaths.

Click here to show the next overpass image.

Text data and images are saved to file.

Click here to stop showing images.

Text data will still be written to file, but not images.




```
Search number     : 1
Input date range : 2012-01-12 to 2012-10-15
Input lat range  :    -5.000  to     5.000
Input lon range  :    30.000 to    45.000

List of Orbits satisfying search criteria :
64191,64220,64235,64249,64264,64278,64293,64322,64351,64366,64380,
64395,64409,64424,64453,64468,64482,64497,64511,64526,64555,64584,
etc.
67948,67963,67977,67992,68006,68021,68050,68079,68094,68108,68123,
68137,68152,68181,68196,68210,68225
```

Orbit	Path	Blk	GMT Date	GMT Time	Local Date	Local Time
64191	169	86	2012-01-12	08:04:45	2012-01-12	10:04:45
		95	2012-01-12	08:07:53	2012-01-12	10:07:53
64220	167	86	2012-01-14	07:52:23	2012-01-14	09:52:23
		95	2012-01-14	07:55:31	2012-01-14	09:55:31
64235	174	86	2012-01-15	08:35:39	2012-01-15	10:35:39
		91	2012-01-15	08:37:23	2012-01-15	10:37:23
64249	165	86	2012-01-16	07:40:02	2012-01-16	09:40:02
		95	2012-01-16	07:43:10	2012-01-16	09:43:10
64264	172	86	2012-01-17	08:23:17	2012-01-17	10:23:17
		94	2012-01-17	08:26:04	2012-01-17	10:26:04
64278	163	87	2012-01-18	07:28:01	2012-01-18	09:28:01
		95	2012-01-18	07:30:48	2012-01-18	09:30:48
64293	170	86	2012-01-19	08:10:56	2012-01-19	10:10:56
		95	2012-01-19	08:14:04	2012-01-19	10:14:04
64322	168	86	2012-01-21	07:58:34	2012-01-21	09:58:34
etc.		95	2012-01-21	08:01:42	2012-01-21	10:01:42

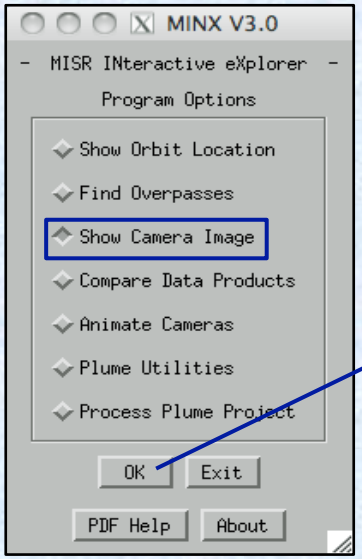
Report file shows a comma-separated list of orbits at the top for convenience in ordering MISR products. Block and time details are in the table below. GMT and local times are shown for the first and last blocks intersected.

Show Camera Image

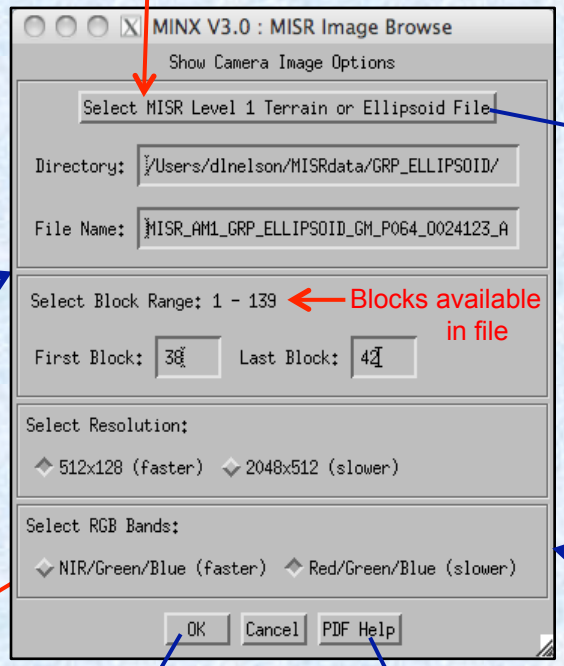
Show Camera Image - 1

Objective: To display a static, color image of all or part of a swath for a single MISR camera. Useful for rapidly browsing orbit imagery at higher resolution than the online Browse Tool, but requires L1 radiance data.

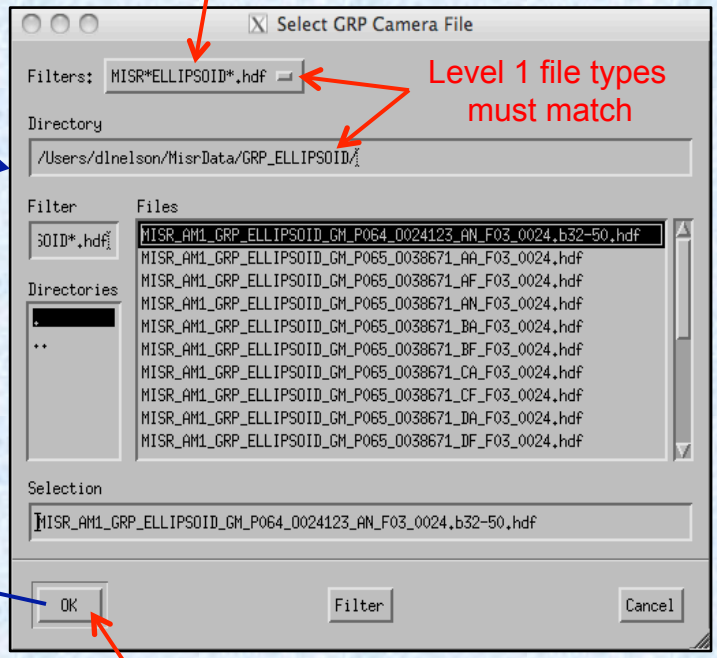
- 512x128 resolution (1100 m pixels) may allow displaying an entire orbit for any camera; blocks are not "assembled" to correct for between-block offsets.
- 2048x512 resolution (275 m pixels) may allow displaying as many as 10 to 40 + blocks before you run out of memory. Blocks are "assembled".



Click this button first.



Select Ellipsoid-referenced or Terrain-referenced L1 file



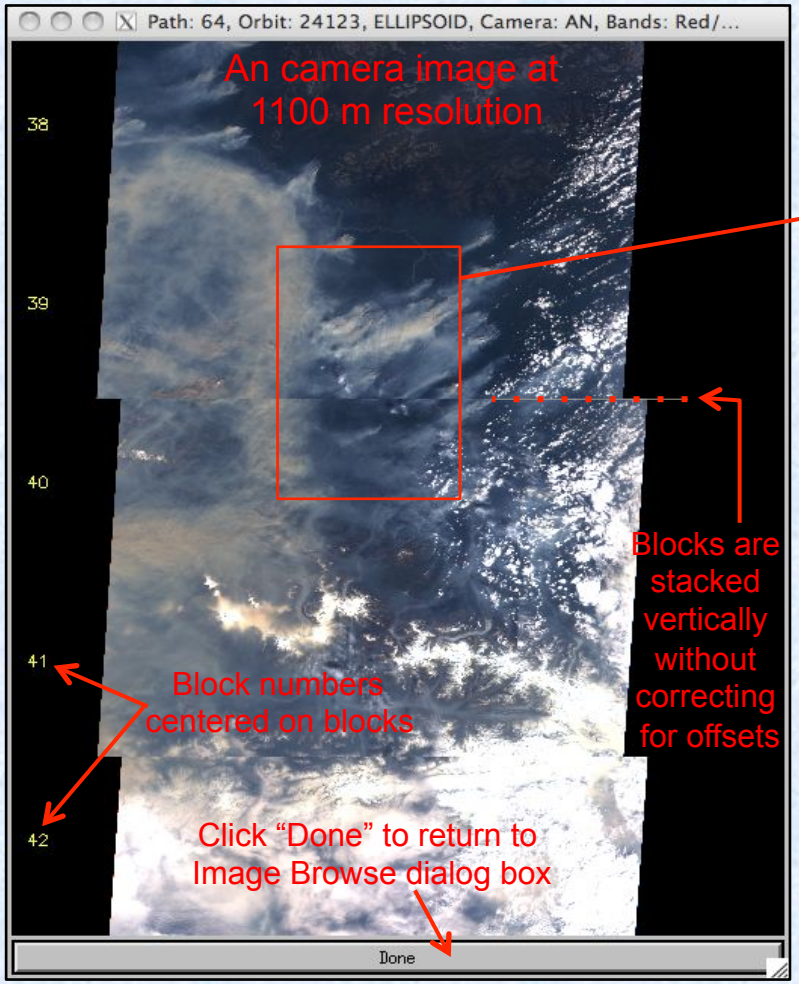
Clicking "NIR/Green/Blue" substitutes the NIR band for Red which is smaller and faster for cameras other than An.

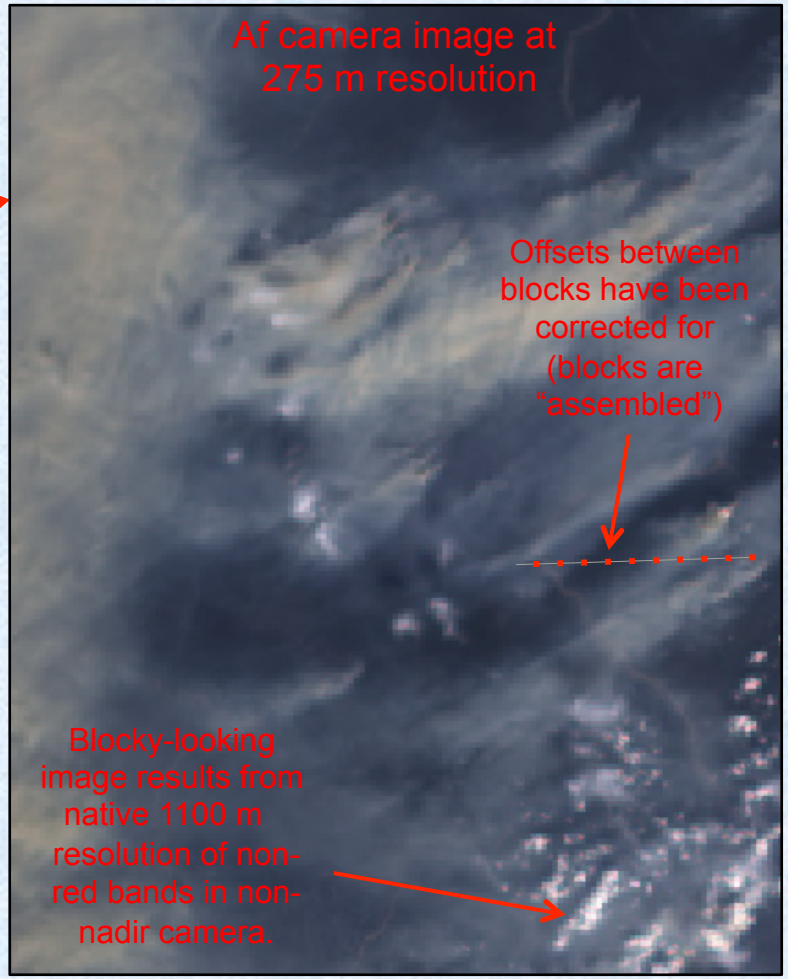
Display image

Display these instructions

Clicking "OK" populates the "MISR Image Browse" dialog box with file name and block range information.

Show Camera Image - 2





- In An product file, all bands are stored at 275 m resolution.
- In image above, RGB is displayed at 1100 m.
- MISR blocks are not "assembled" (offsets are not applied).

- In Af product file, Red band is stored at 275 m resolution, Green and Blue at 1100 m.
- In image above, RGB is displayed at 275 m.
- MISR blocks are "assembled" smoothly.

Compare Data Products

Compare Data Products - 1

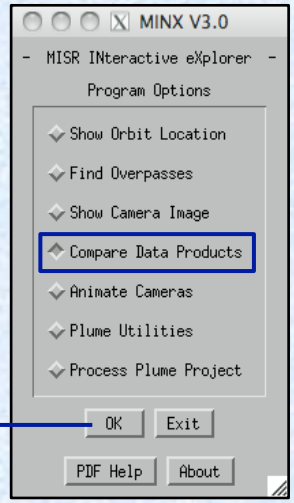
Objective: To display several MISR data products, chosen by the user, side-by-side in separate panes of a larger window, all at the same 1100 m/pixel resolution. Also to query all these data products for their values with a single mouse click. Useful for studying the spatial variation of MISR data and relating them to each other.

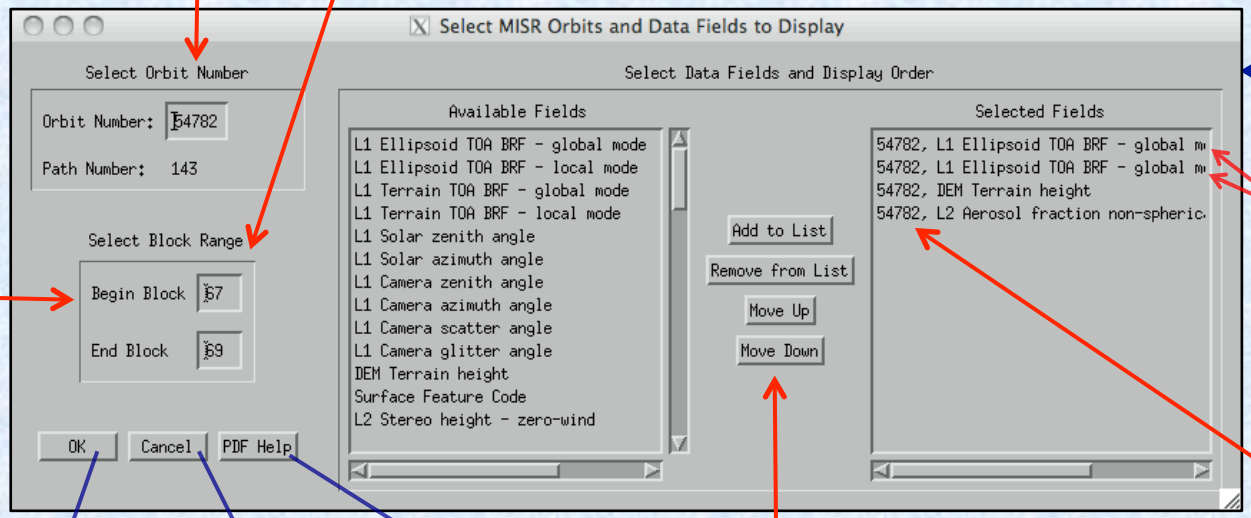
MISR data fields that can be selected for display in the "Available Fields" list include:

- Global and local mode radiance data (level 1 GRP_TERRAIN or GRP_ELLIPSOID products)
- Radiometric cloud and glitter masks (level 1 RCCM product)
- Sun and camera angles (level 1 GP_GMP geometric parameters product)
- DEM terrain heights and surface feature codes (AGP ancillary geographic product)
- Cloud heights, winds and cloud masks (level 2 TC_STEREO and TC_CLOUD stereoscopic products)
- Aerosol optical depths, single scatter albedos, angstrom exponents and mixture sizes and shapes (level 2 AS_AEROSOL product)
- Surface BRF, DHR, NDVI and RPV parameters (level 2 AS_LAND aerosol surface product)
- Local, restrictive and expansive top-of-atmosphere albedos, both spectral and broadband (level 2 TC_ALBEDO albedo product)
- Cloud, smoke and dust masks (level 2 TC_CLASSIFIERS product)

Compare Data Products - 2

First enter an orbit number to display. Its path number is automatically updated as you type. Then select the beginning and ending MISR block numbers to display for all the data fields. 4 to 9 blocks may fit on your screen; others will be accessible by vertical scrolling. Dialog controls at the bottom of each pane scroll with the data, so it's convenient to limit the number of blocks you display.





2 different cameras can be displayed by entering the same field twice – the cameras will be selected in the next step.

The orbit number is added to the field name so different orbits can be displayed and compared. It's wise to select orbits from the same path.

Continue processing

Return to Main Menu

Display these instructions

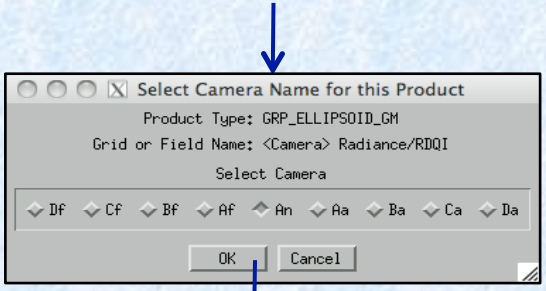
After the first field has been added to the "Selected Fields" list, editing of block numbers is disabled. To re-enable block numbers, you must first remove all entries in the "Selected Fields" list.

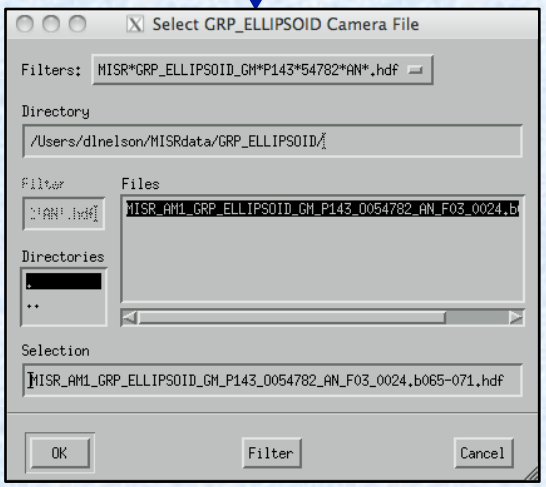
Select a data field to display from "Available Fields", then click "Add to List" to copy the name to the "Selected Fields" list. Add more fields to the list as needed. You can select several fields at once. 3 to 5 fields may fit on your screen – others you have loaded will be accessible by horizontal scrolling. You can remove a field by highlighting it in "Selected Fields" and clicking "Remove from List". Or rearrange the order in which data fields will be displayed by highlighting a field and clicking the "Move Up" and "Move Down" buttons.

Compare Data Products - 3

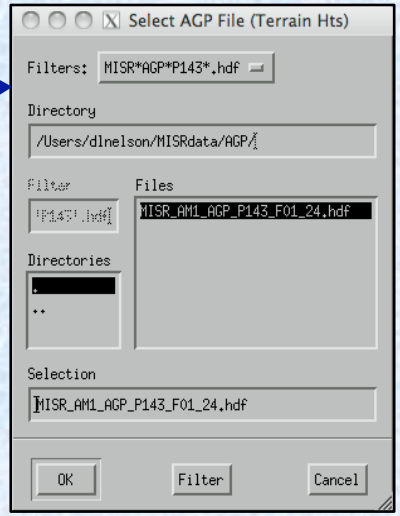
Next a series of dialog boxes is presented in two passes over the selected products. In the first pass, select the MISR product files to load. File names are requested in the order they appeared in the “Selected Fields” list.

For level 1 product files that are divided into 9 camera files per orbit, a camera-name dialog is presented before the camera-file dialog. The first product to be loaded in the example on the preceding slide is a GRP_ELLIPSOID product composed of 9 camera files. You must first specify camera name followed by file name. MINX will filter out file names in the camera-file dialog when orbits and cameras don’t match. Read the dialog title and text carefully to ensure you’re selecting parameters for the correct product. In the example, the second product is also GRP_ELLIPSOID. The same pair of camera-name and camera-file dialogs will be repeated, allowing a different camera to be selected.

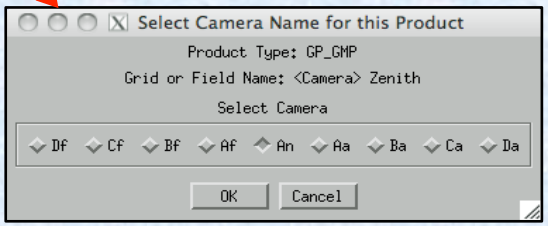




For most other product types, e.g. the AGP file containing DEM Terrain height on the preceding slide, only the file name is requested in pass 1.



In the second pass, select extra dimensions for each product. If a product has camera or band dimensions inside the file, dialogs will be shown where appropriate, in the same order as the products appeared in the “Selected Fields” list. Many products have no extra dimensions, and no dialog box will be shown for them, so read dialog box text carefully. Dialog boxes for extra bands or cameras look like this:

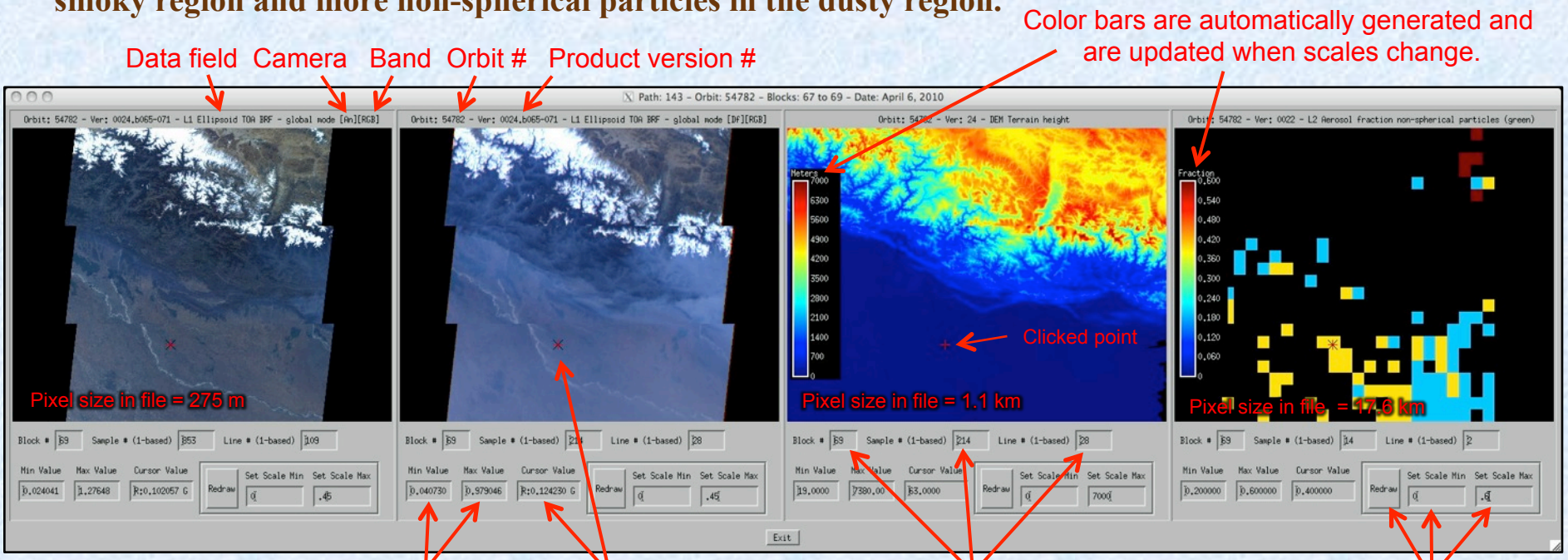


Proceed to the next slide for displayed results

Compare Data Products - 4

Main "Compare Data Products" window and 4 product panes for 3 blocks of orbit 54782 over the Himalayas and Ganges Basin. Panes 1 and 2: radiance data for An and Df cameras respectively; pane 3: terrain heights; and pane 4: fraction of aerosol particles that are non-spherical.

Smoke is more evident at right center on pane 2 in the oblique Df image than in the vertical An image of pane 1. Dust streaming SE off the river channel near the clicked point is visible only in the Df image. The "Aerosol fraction non-spherical" product detects the dust: it shows more spherical particles in the smoky region and more non-spherical particles in the dusty region.



All products are converted to 1100 m/pixel resolution for display purposes.

Minimum and maximum values in each pane are displayed.

Clicking in any pane displays a cursor symbol and a data value in all panes at the clicked point.

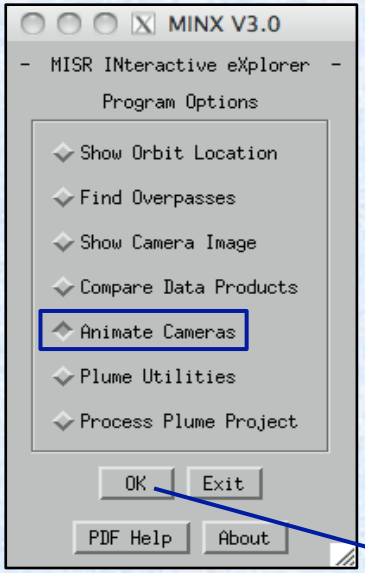
Clicking also shows the MISR block/sample/line coordinates appropriate to the native resolution of the pane's data.

The minimum and/or maximum of the color scale for each pane can be changed and the pane redrawn.

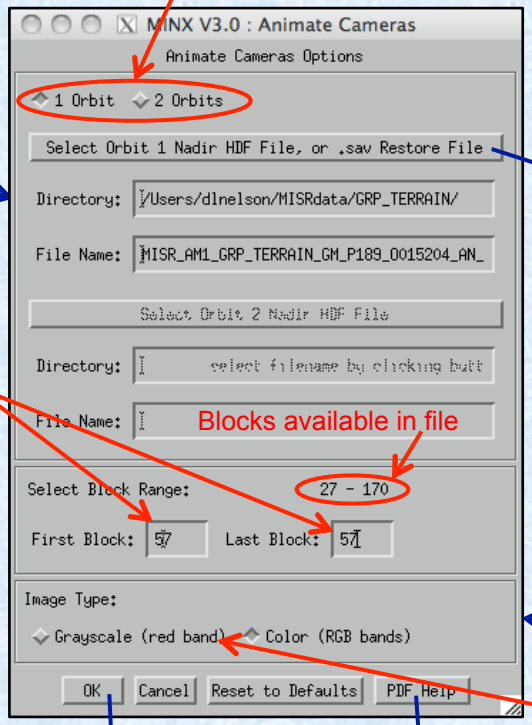
Animate Cameras

Select MISR Orbit to Load

Objective: To display selected blocks of MISR radiance imagery at 275 m resolution in all channels; to view 9 cameras as an animation; and to perform analyses on data including determining aerosol heights and motion.

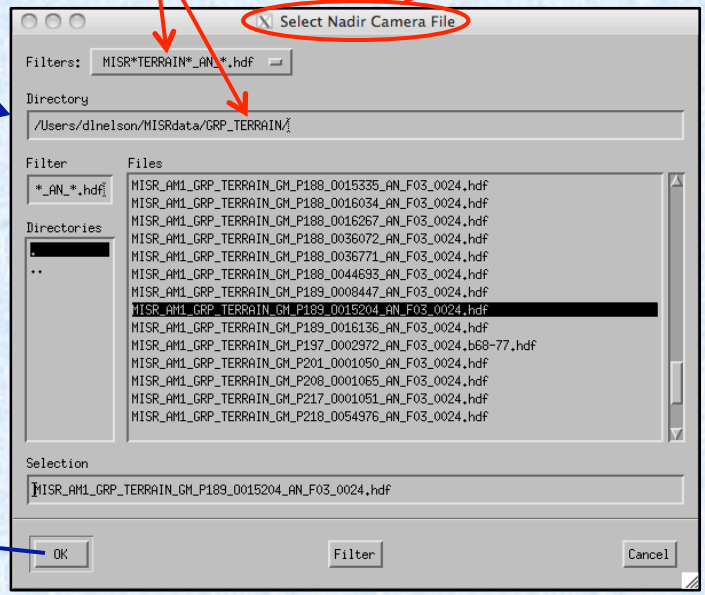


2 orbits from the same path can be loaded at once and compared. Then orbit 2 must also be selected below.

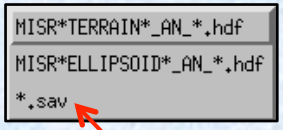


The L1B2 data type selected in "Filters:" must match the file type found in the directory you enter in "Directory" edit box.

Select only the An camera; the other 8 cameras are read automatically if they're in the same directory.



Depending on your computer's resources, you may be able to load from 2 to 10 or more blocks of MISR data.



The "Filters" dropdown list provides one way to load a previously saved MINX session.

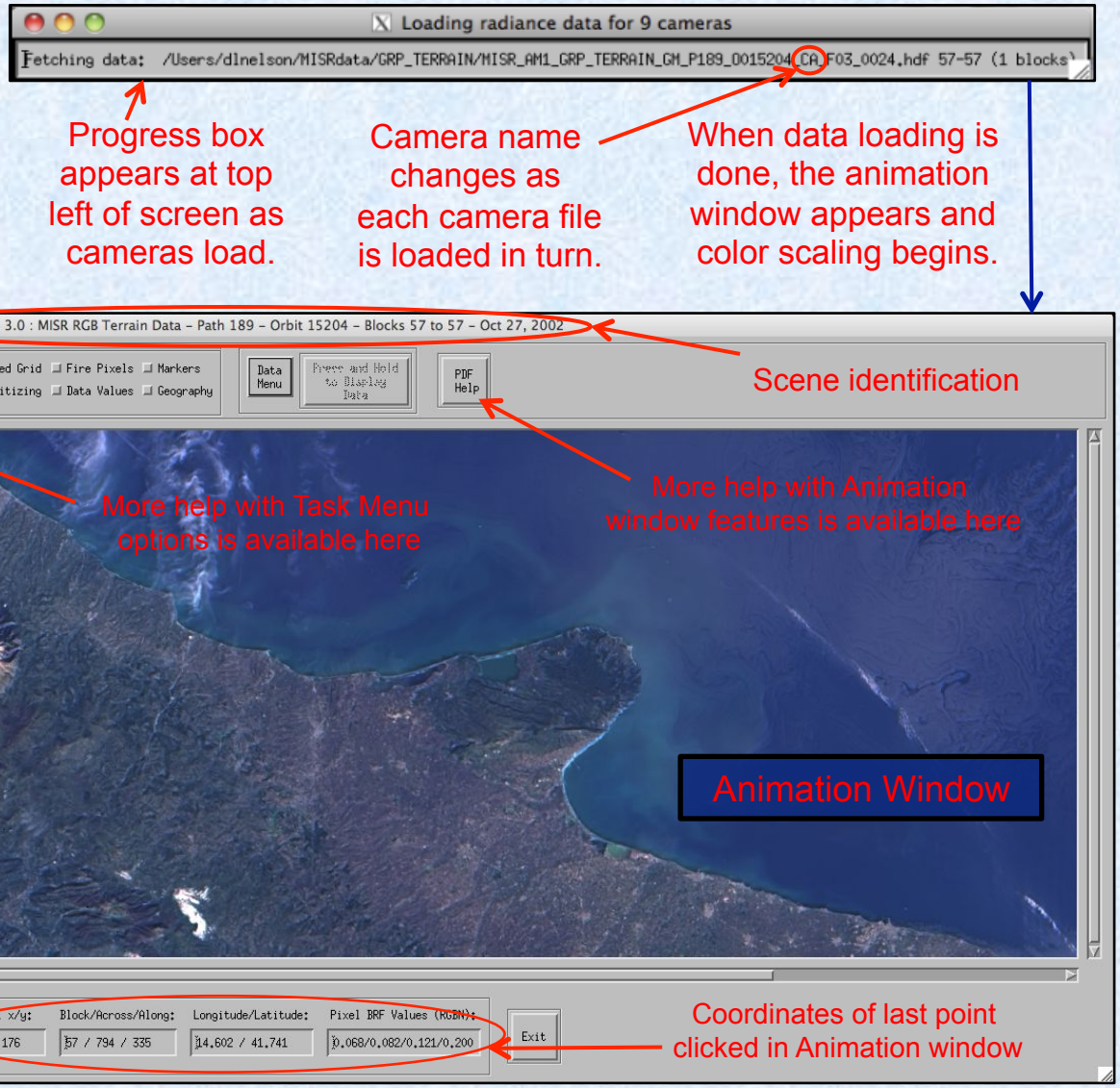
Automatically load camera imagery for selected orbit.

Display these instructions.

Loading only the high resolution red band reduces memory requirements significantly, but images are in grayscale.

Load Camera Images

- **MISR radiance data are converted to Top-Of-Atmosphere (TOA) BRFs before data are displayed.**
- **MISR's 9 camera images occupy the same virtual screen space and alternate in an animation sequence.**



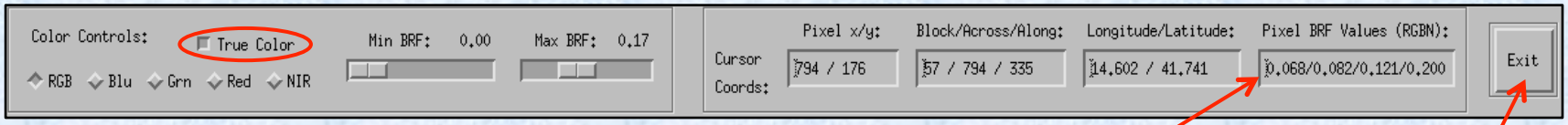
Peninsula with lagoon on Adriatic coast of Italy – Af camera showing sediment and sun glint in water

Animation Window

Lower Task Bar

Color controls

Coordinate display is updated whenever user clicks in the Animation window.



Besides the default RGB display, any band can be displayed alone in gray scale.

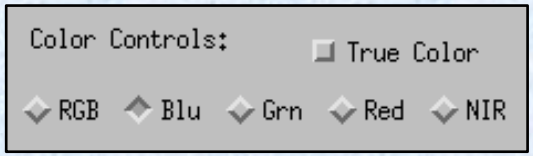
BRF values are shown for 4 bands (red, green, blue, NIR).

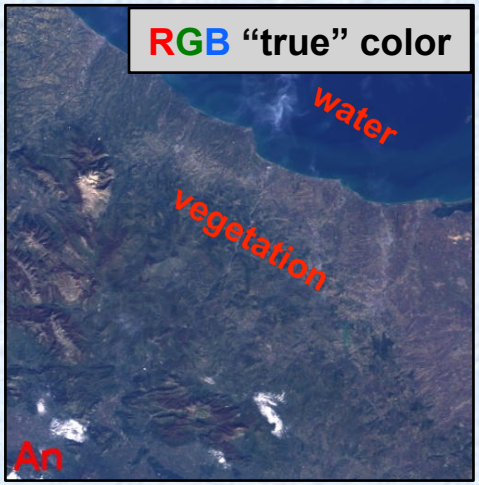
Clicking here returns user to the Animate cameras dialog to select another orbit.

- **"True color" = OFF maps data to a unique color scale for the 4 bands of each camera.**
- **"True color" = ON maps radiance (BRF) data to a single color scale for all 36 channels.**
- **The "NIR in Green" slider allows NIR band data to be added to green so dense, dark forest scenes appear brighter. This is only available when <u>not</u> in True Color mode.**
- **When "True Color" is selected, sliders change to "Min BRF" and "Max BRF" for brightness control.**

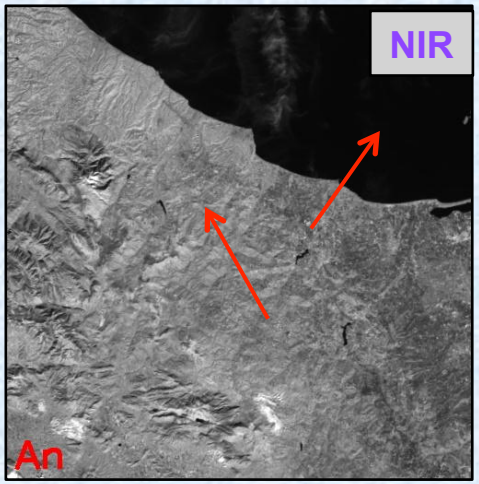
- **"Pixel x/y:" uses a single coordinate system for the entire animation window based on 275 m pixels with origin [0,0] at the <u>lower left</u> corner of the window. Use these coordinates to specify an image rectangle when saving images to file.**
- **"Block/Across/Along:" uses a separate coordinate system for each MISR block based on 275 m pixels with origin [0,0] at the <u>upper left</u> corner of each block. These coordinates are uncorrected for offsets.**

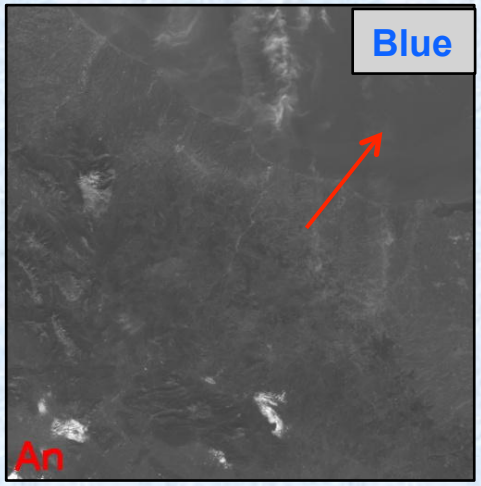
Display Single Bands

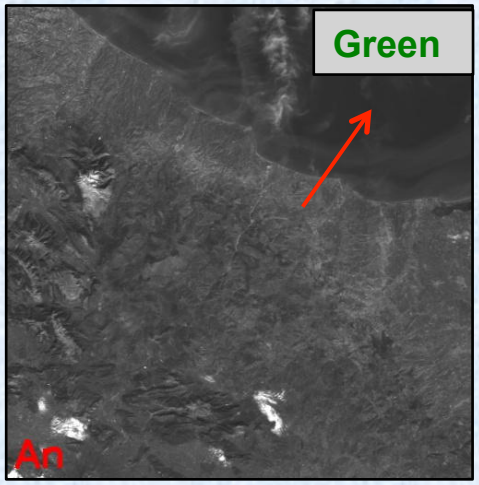


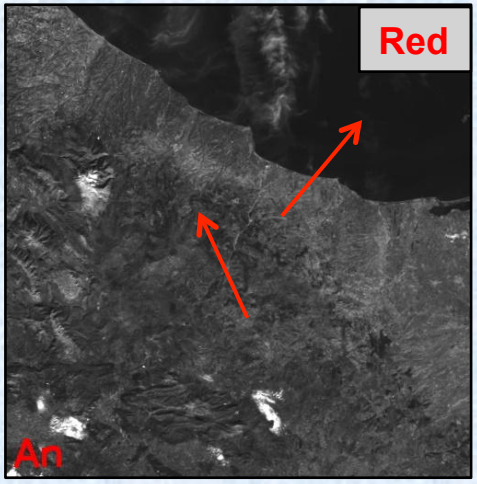


- Water absorbs NIR and Red light and reflects Blue and green.
- Vegetation absorbs Red light and reflects NIR and Green.
- Blue light is most strongly scattered by many aerosols.
- White features (clouds, snow, …) scatter all wavelengths equally.

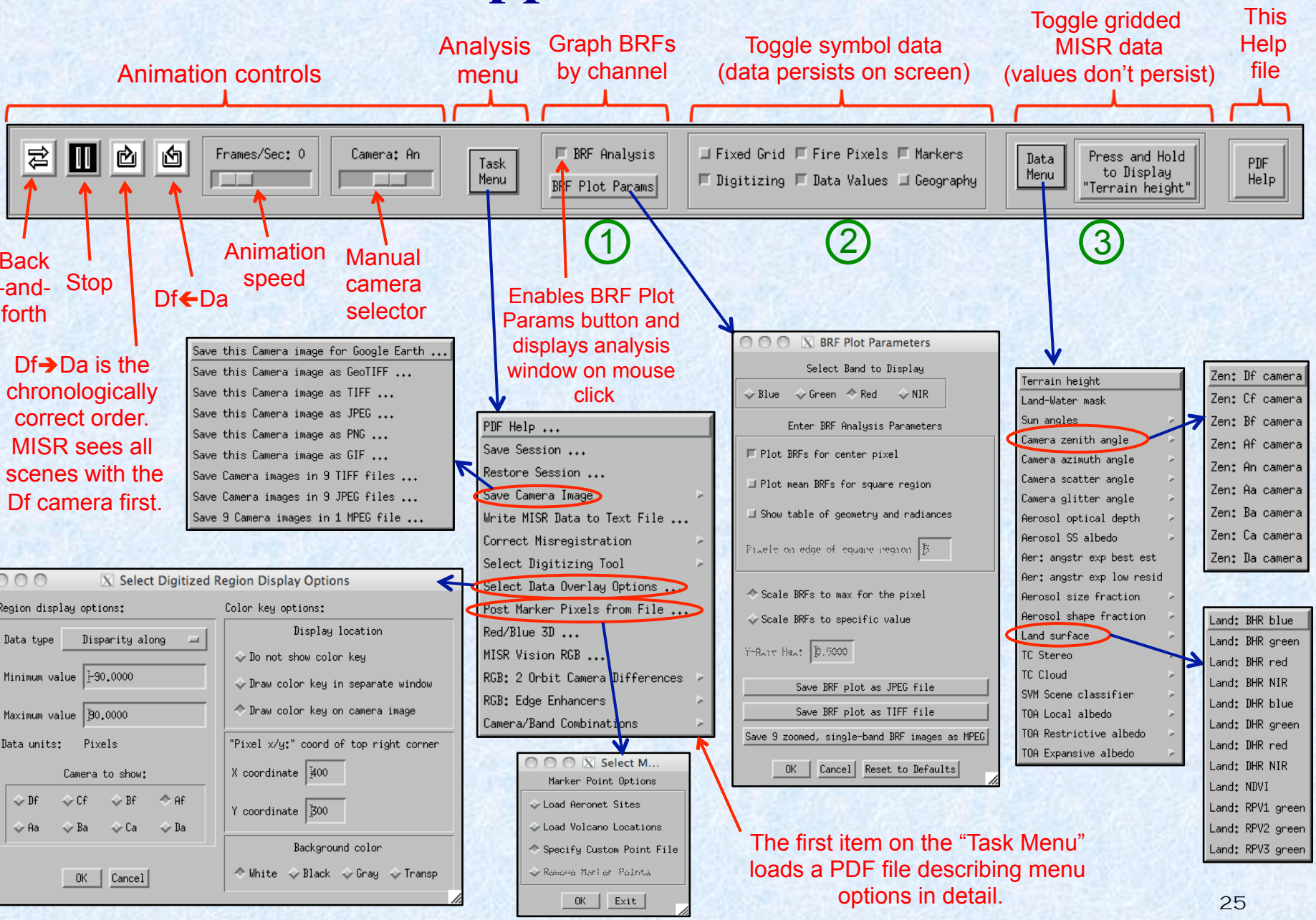






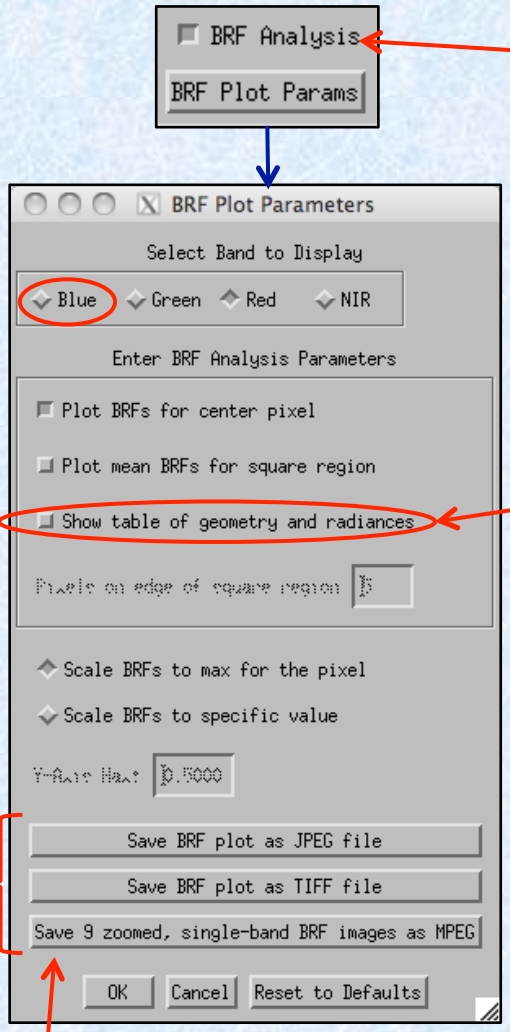


Upper Task Bar



1

BRF Analysis
(Bidirectional Reflectance Factor)



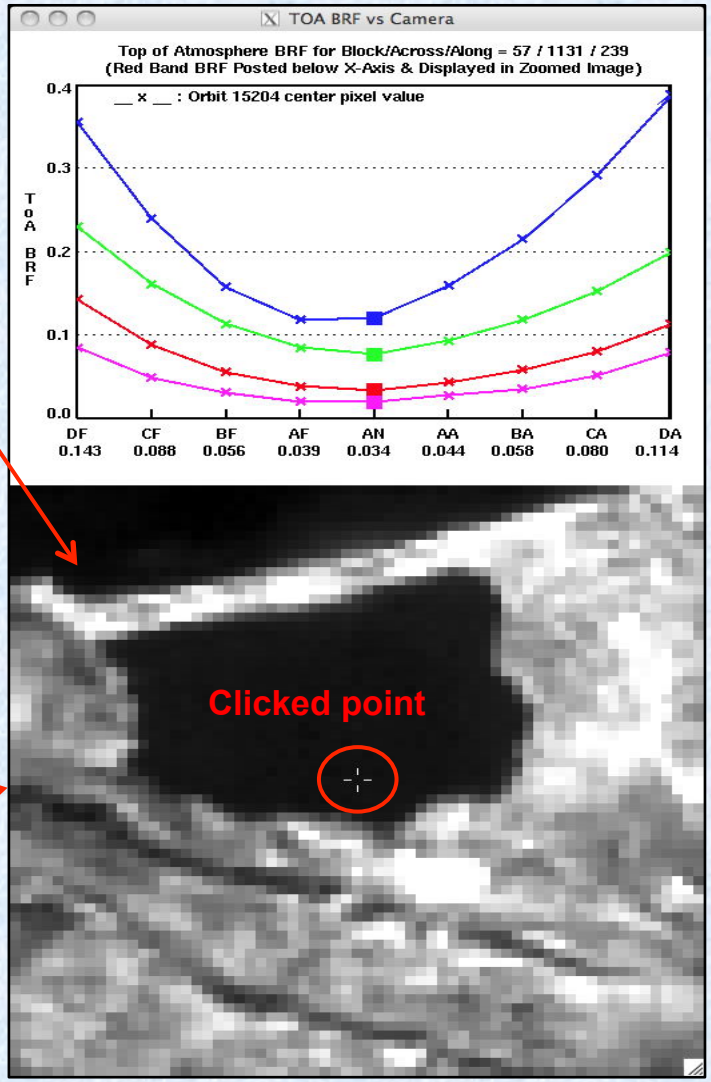
When BRF Analysis button is checked and user clicks in the animation window, the plot and zoomed image are updated.

Zoomed image is scaled to data ranges in zoom window allowing subtle features to be seen.

ASCII table of sun and camera angles and radiances, equivalent reflectances and BRFs for clicked point can be saved to file.

Image of graph and zoomed window can be saved to file. IDL license is required for MPG.

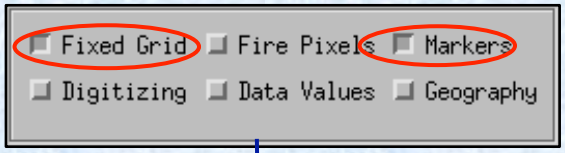
Top-of-Atmosphere BRF .vs. camera for clicked point (or mean for region)



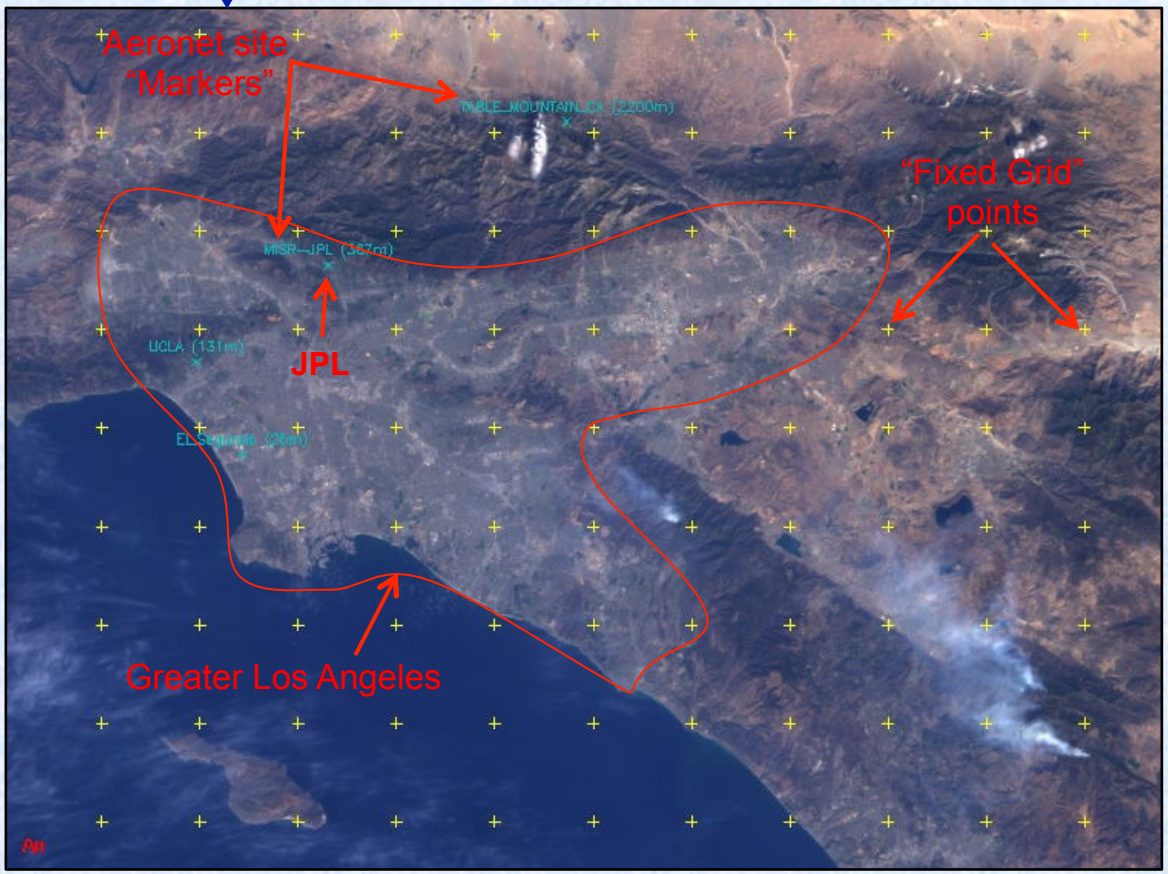
Scene showing 64x64 pixel square centered on point clicked by user

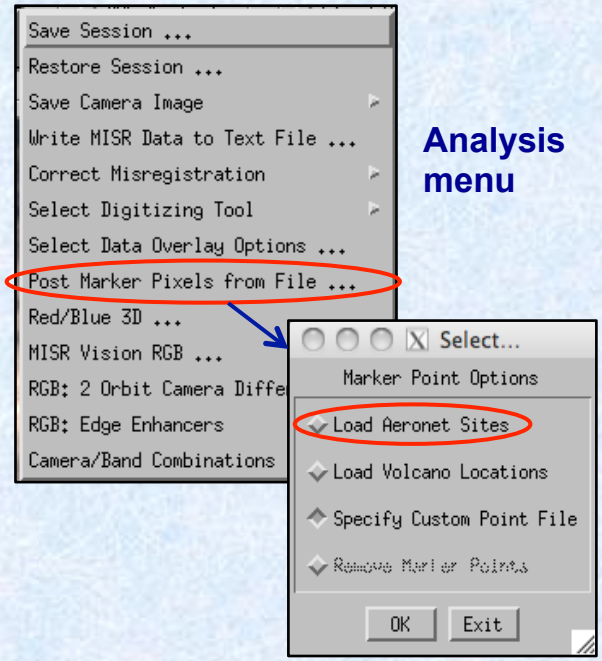
8x zoomed image of white square is displayed in band selected in dialog box

Toggle Symbol Data - 1



Portion of animation window showing yellow "Fixed Grid" plus symbols and cyan "Markers" showing Aeronet sites for fire scene SE of Los Angeles in 2007.



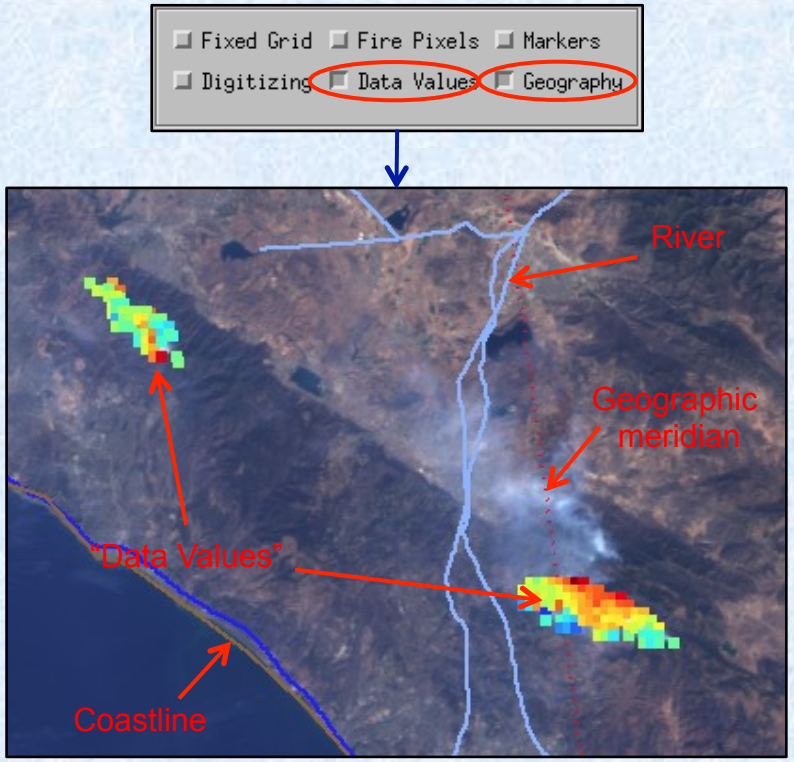


Analysis menu

- **Symbols remain on screen until toggled off – they persist.**
- **"Fixed grid" points are computed on the fly and are useful for judging relative motion during animation.**
- **"Markers" are read from files and include 3 options: 794 Aeronet sites or 1543 volcanos or a user-defined list of points.**

Toggle Symbol Data - 2

"Fire Pixels" and "Digitizing" symbols for LA fires

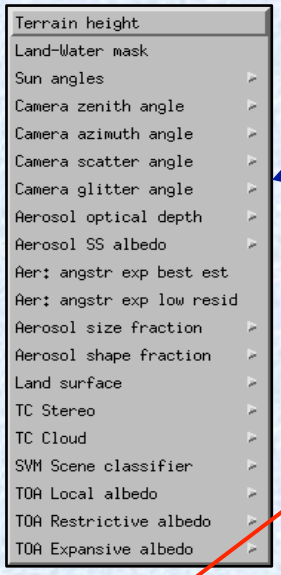


"Data Values" symbols for Los Angeles fires

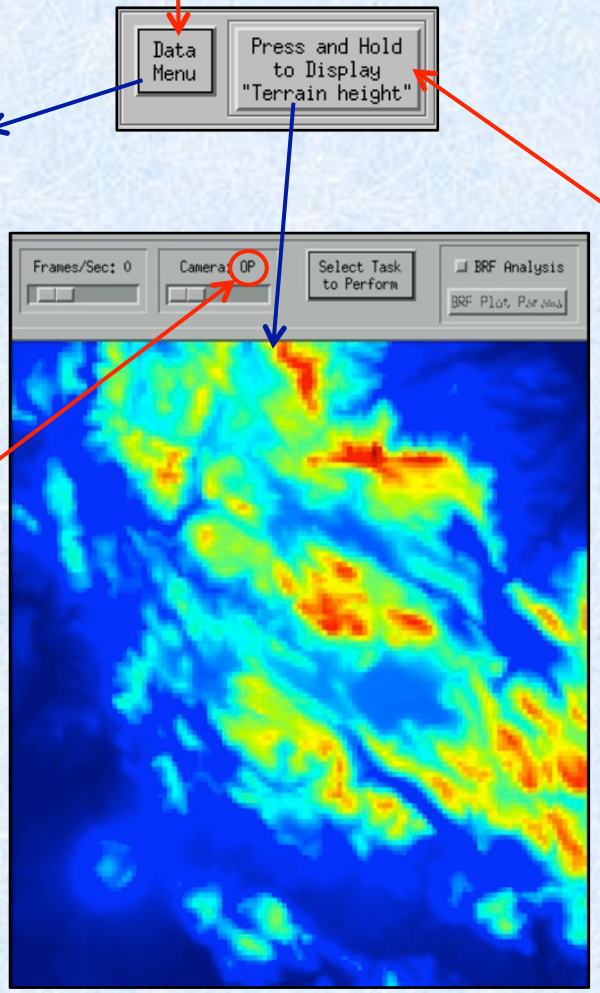
- "Fire Pixels" are generated from MODIS data using "Plume Utilities" option on the MINX Main Menu.
- "Markers" (volcanos, Aeronet sites or custom markers) are loaded from the Task Menu.
- "Digitizing" symbols created by user include outline of polygon, direction arrow and plume name.
- "Data Values" are posted after retrieval of heights inside the polygon digitized by user. Other data types and options can be selected in the "Select Data Overlay Options…" dialog box in the Task Menu.
- "Countries" includes a latitude-longitude grid plus IDL's database of coastlines, country and state boundaries, rivers, lakes etc.

Data menu - Toggle Gridded Data

2-level dropdown list box



- Gridded data refers to MISR pixelated data products that cover much of the area of the animation window.
- Gridded data are shown in an "extra", zeroth camera window called OP (for OPerations) located on the far left end of the "Camera:" slider control.
- By rapidly pressing and releasing the "Press and Hold" button, a visual correlation between gridded data and MISR BRF data can be made.



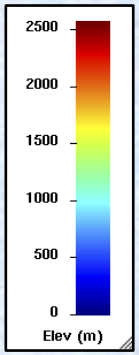
Portion of animation window showing color-coded terrain heights displayed while "Press and Hold…" button is depressed

When a data product is selected from the Data Menu list, the user is asked to select the file containing the chosen MISR gridded data if it's not already loaded.

Toggle button for displaying data. Text changes to reflect the data type selected in the dropdown list.

When "Press and Hold" is pressed:

- Data are copied into the OP window.
- The view switches to the OP window.
- A color bar is displayed in a separate window or is updated if not already present and current.



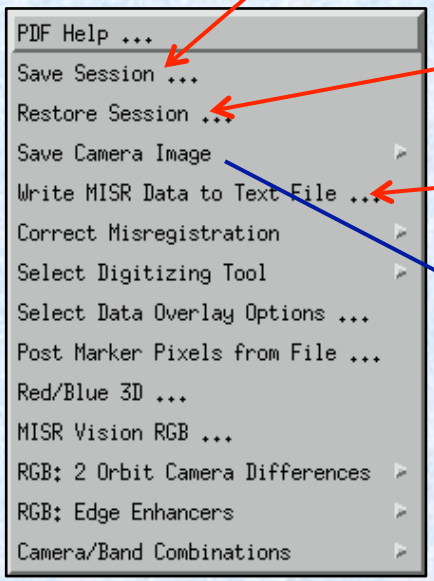
When "Press and Hold" is released:

- The view switches back to the original window.
- Data remain in the OP window and are manually accessible with the "Camera:" slider .
- The color bar window remains until another operation is selected.

Task Menu

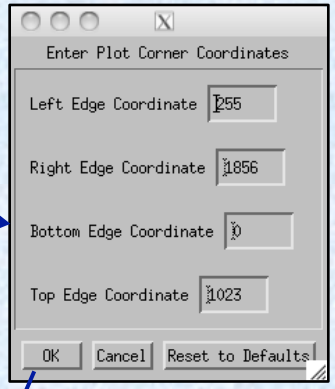
Save/Restore Session & Save Image to File

Option prompts for a file name into which a complete MINX animation session (images, digitizing, markers, etc.) is saved. Saved session files must have an extension of .sav. Saving and restoring a session can take minutes.



Option prompts for a file from which a complete MINX animation session is restored. The current session is removed and replaced. Restoring a session can also be accomplished in the "Select Nadir Camera File" dialog during initial orbit loading by selecting ".sav" in the "Filters" dropdown list.

Option has not been implemented.



- **Specify the edge pixel coordinates of a region in the animation window that you want to capture and save in a graphics file format.**

Select 1 of 9 image formats into which the selected region of the image window is to be saved (saving to MPG requires an IDL license).

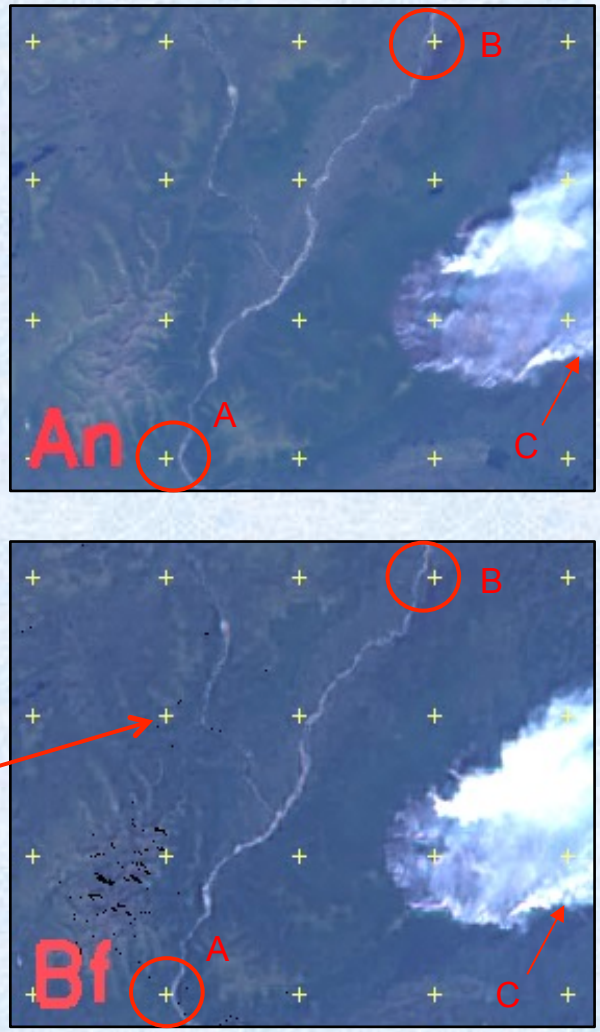
Dashed outline of region to save is drawn on the image. User is given a chance to change the region before being asked for a file name into which the image will be saved.

- **To find edge coordinates, click in the animation window, read values from the "Pixel x/y:" box at the bottom of animation window, and test until desired values are found.**
- **All PNG images have transparent edges.**
- **Google Earth images are projected into a geographic coordinate system.**
- **GeoTiff images are projected into the UTM map coordinate system.**

Camera Registration Correction - 1

The purpose of correcting camera registration is to improve stereo height retrieval accuracy by reducing errors in camera-to-camera geometric registration before image matching is performed.

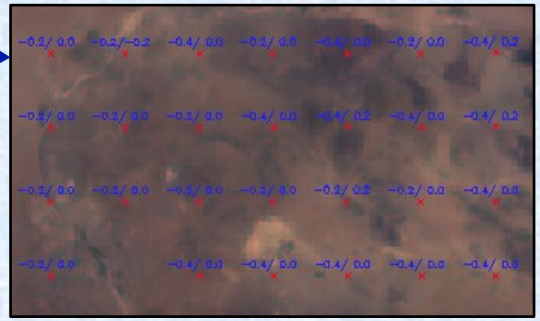
- 1 pixel registration error can lead to a height error of ~ 550 m for Af/Aa cams and ~ 150 m for Cf/Ca
- Mean co-registration error of MISR data < 1 pixel
- Some orbits are misregistered by more than 2 pixels
- Co-registration errors are evaluated on a regular grid of control points using image-matching with An as reference camera
- To <u>assess</u> misregistration:
  - ① Turn on MINX "Fixed Grid" (yellow + symbols)
  - ② Animate cameras
  - ③ Study distinctive terrain features near yellow grid points (circles A and B) – Bf image is displaced left relative to An by 3 pixels
  - ④ Do not compare features in clouds or plumes (C) which are <u>expected</u> to "misregister"

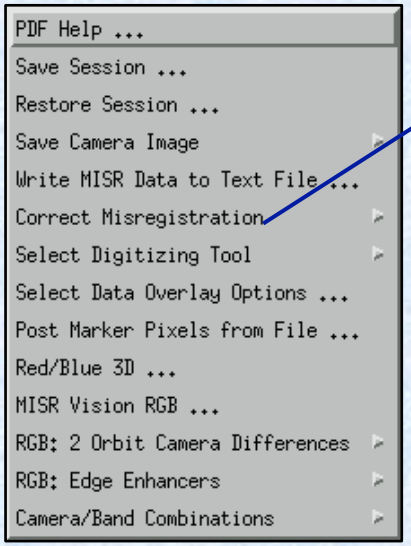


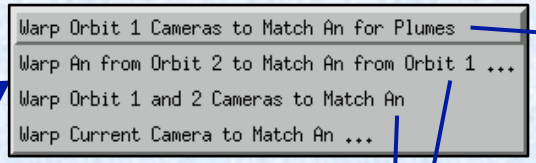
Bf camera is mis-registered by -3 across-track pixels relative to An

Camera Registration Correction - 2

- To visually determine if cameras are misregistered, click the "Fixed Grid" button to show yellow plus symbols, then animate the cameras. Carefully observe whether features on the terrain are stable from camera-to-camera. If not, you should perform a misregistration correction.
- Correcting misregistration involves an automatic assessment of the position of terrain features on off-nadir cameras relative to the An camera. The assessment is performed on a grid of points over the entire image. The off-nadir camera image is then warped to match the An camera. Warping corrections at grid points are shown as fractional 275 m pixels across/along over camera image.
- You will be asked to select a MISR AGP file (DEM terrain heights) before correction begins.
- Warping corrections are conservative and do not correct for rapid variations caused by DEM inaccuracies.

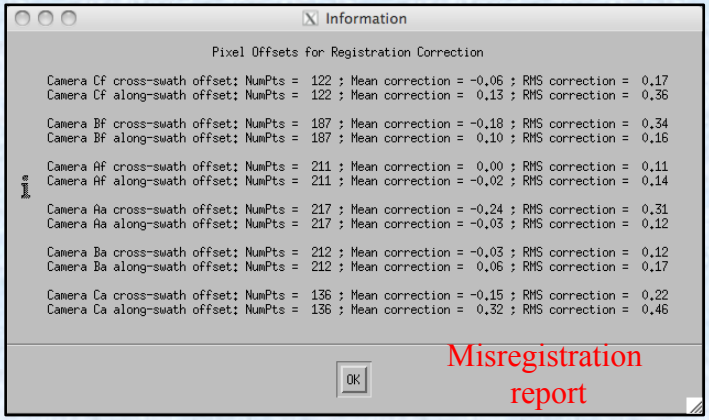






Use this for routine misregistration correction during plume height analysis.

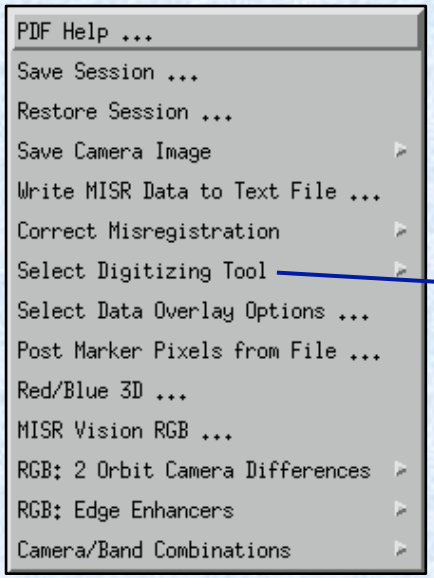
If you loaded 2 orbits and wish to correct the 2nd orbit to match the 1st, first correct the orbit 2 An camera relative to the orbit 1 An camera, then correct the non-nadir cameras to match their respective An cameras.



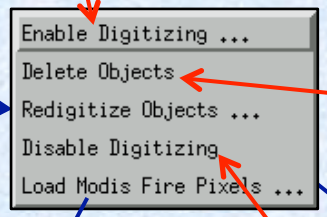
Misregistration report

Digitizing Tools

- **This option contains most of the features required for digitizing aerosol plumes and determining their height and motion.**

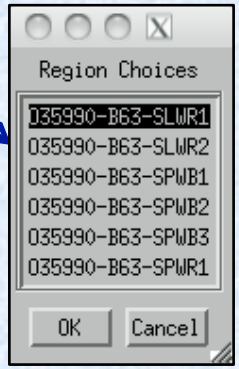


"Enable Digitizing", opens a dialog box containing numerous options and is the subject of an entire PDF Help file accessed from that dialog box. It also puts MINX in a state where mouse clicks are interpreted as elements of the digitizing process until a different state is selected.



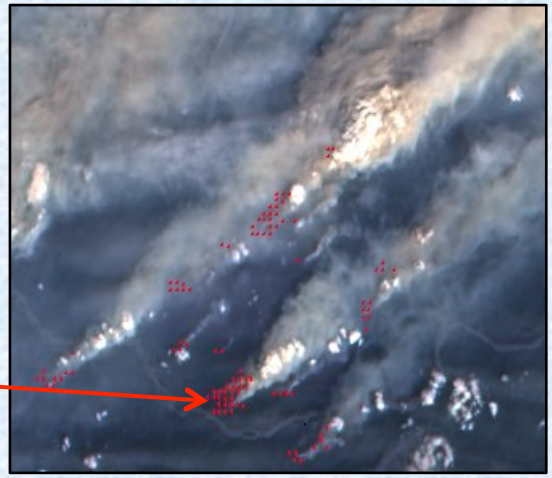
Selecting this option puts MINX in a state where clicking the mouse on a digitized feature identifies it for deletion. After clicking, you are given an opportunity to cancel. But if you accept, the digitized feature is deleted from the screen, from MINX memory and from files on disk.

"Disable Digitizing" cancels the "Enable Digitizing" or "Delete Objects" states.

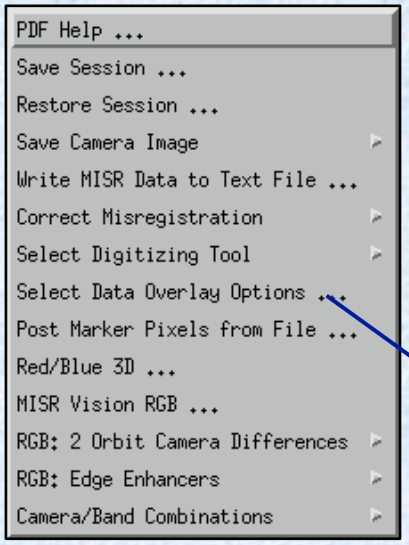


- **If you exit MINX after digitizing plumes but later want to redigitize them, choose the plume name from this list of files. This prevents MINX from over-writing the incorrect file on disk.**
- **File names contain plume names which are numbered by block and from 1 to N within each block.**

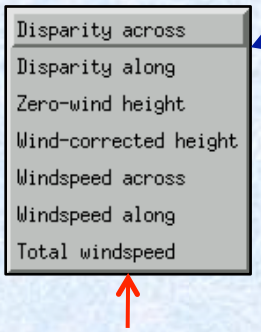
- **MODIS thermal anomalies or fire pixels can be collected in a MINX format file using option "Plume Utilities" on the MINX Main Menu.**
- **This option prompts you for the fire pixel file to load.**
- **Fire pixels are displayed as red dots over MISR imagery and store radiative power.**



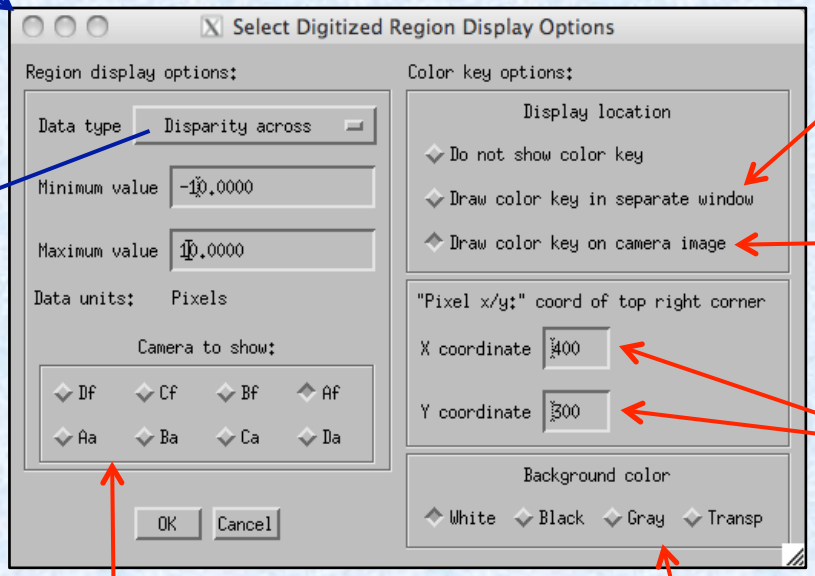
Data Overlay Options



- **This option allows you to select the type of colored pixel data to show inside digitized polygons (e.g. plumes), to select their color scaling and to display a color key.**
- **If several digitized plumes are present in the animation window, all are rescaled using the same minimum and maximum scale values you specify.**
- **When a new plume polygon or line is digitized, MINX automatically sets the "Data Type" to "Zero-wind height" or "Wind-corrected height" and rescales the colors so they are appropriate for that plume. This is so the automatically captured screen images of the current plume are presentable. This may be disconcerting at first.**



The type of data chosen determines what appears in digitized polygons as well as the units shown at the bottom of the scale bar.



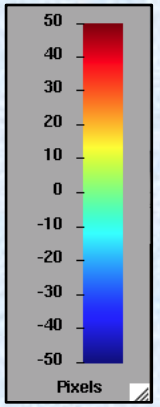
Choosing "Disparity across" or "Disparity along" enables the camera buttons. Disparity is the offset in pixels between a feature in the chosen camera and the An camera.

The background color can be chosen for the color bar. Gray is shown at right.

For routine use, drawing the color key in a separate window is more convenient.

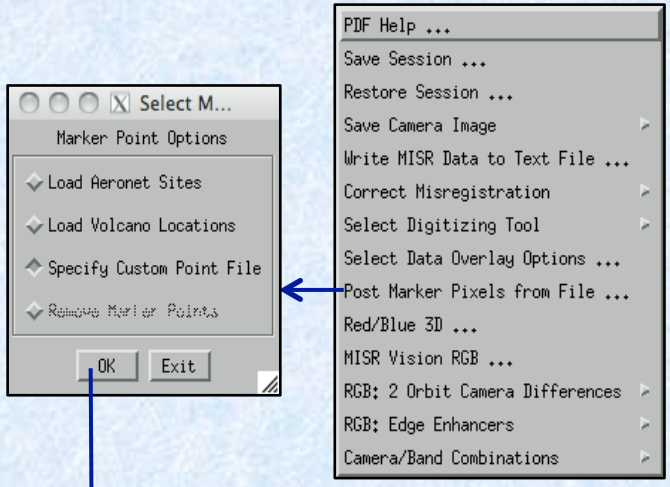
If you're saving an image for presentation, you can overlay the color bar on the image so it will be captured. This button enables the X/Y coordinate text boxes below it.

Use Pixel x/y: coordinates at the bottom of animation window to specify the location for upper right corner of the color bar.



Post Marker Pixels

- **Marker points form symbols and lines that can be drawn over an image at precise geographic locations. They can be assigned symbol types, colors and names.**
- **Two classes of marker points are hard-wired into MINX: volcanos are displayed in green with a "+" symbol, the volcano name and its summit elevation; Aeronet sun photometer sites are shown in cyan with an "x" symbol, the site name and its elevation.**
- **A third class of marker point is user-defined and can be displayed as lines as well as points. These markers are read from a user-created text file whose format is described below, and for which you are prompted.**
- **Any one of these types of markers can be displayed at a time. To display another type, you must first remove any existing marker points using the final option.**



File Format

1) Line 1 – an arbitrary, descriptive text string.
2) Line 2 – the number of points and/or lines in the file to follow.
3) Line 3 – four items describing this marker in this order: number of points; symbol name; color name; and marker name (spaces OK).
4) Line 4 to N – decimal longitude and latitude, one point per line.
5) Repeat 3) and 4) as required by line 2.

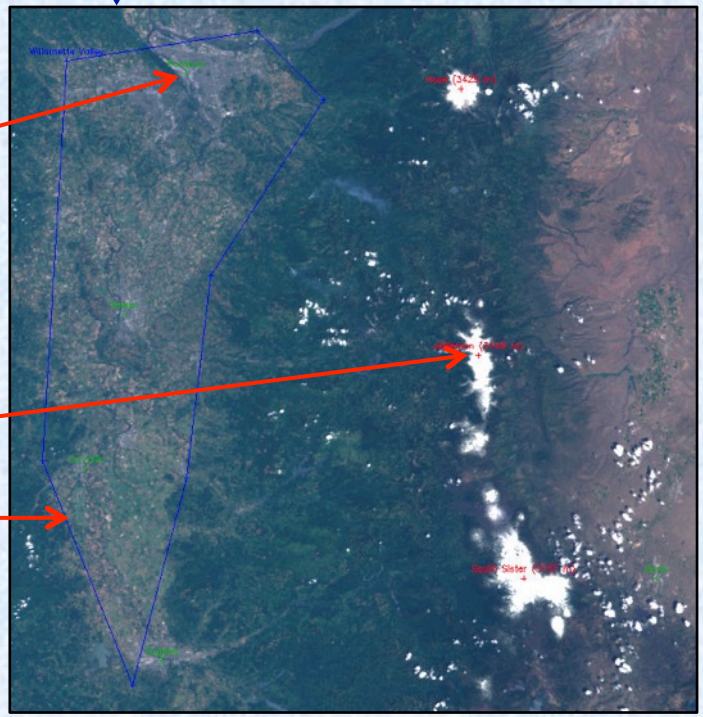
Valid Names

Symbols: +, ×, *, square, triangle, diamond

Colors: red, green, magenta, blue, yellow, aqua, white, pink, lt_blue, lt_green, gray, blue2, purple, brown, black

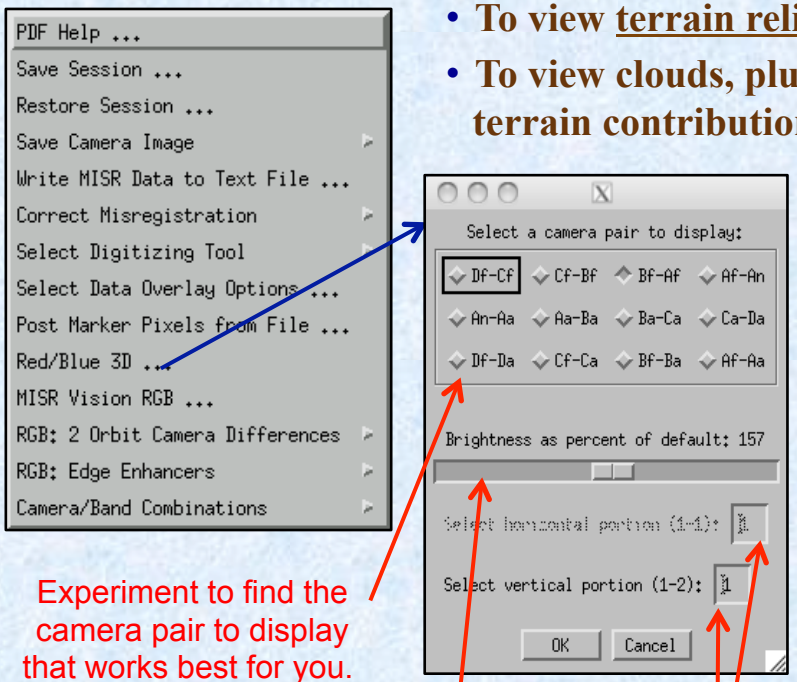
File that created markers on image of NW Oregon, USA

```
Example of custom marker file.
9
1 + green Portland
   -122.677    45.522
1 X green Salem
   -123.033    44.938
1 + green Corvalis
   -123.254    44.563
1 + green Eugene
   -123.085    44.050
1 + green Bend
   -121.310    44.052
1 + red Hood (3425 m)
   -121.70     45.37
1 + red Jefferson (3199 m)
   -121.80     44.69
1 + red South Sister (3157 m)
   -121.77     44.11
8 + blue Willamette Valley
  -123.1       45.6
  -123.4       44.6
  -123.2       44.0
  -122.9       44.5
  -122.7       45.0
  -122.2       45.4
  -122.4       45.6
  -123.1       45.6
```



Red/Blue 3D Images

- **MISR images can be displayed in the OP window and viewed in true 3D with special red/blue glasses.**
- **Images are rotated 90 degrees counterclockwise so they can be viewed on the screen.**

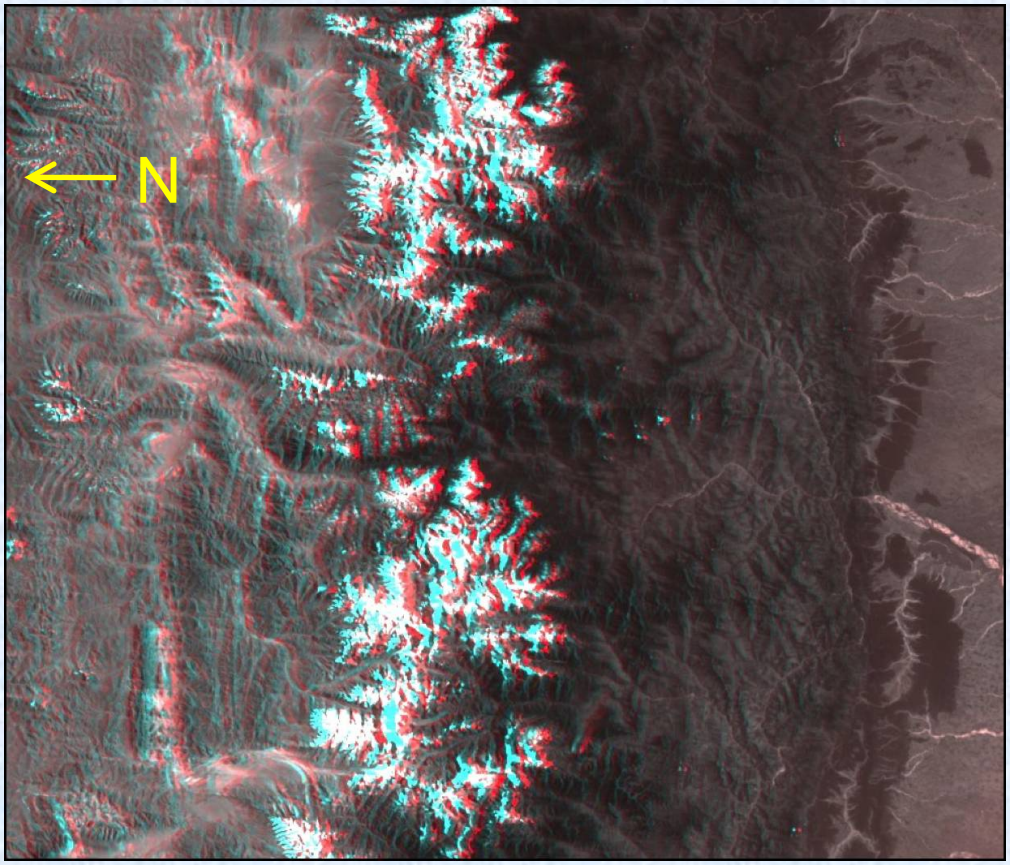


- **To view <u>terrain relief</u> in 3D, you must load MISR GRP_ELLIPSOID products.**
- **To view clouds, plumes and other above-terrain features in 3D without any 3D terrain contributions, use MISR GRP_TERRAIN products.**

Experiment to find the camera pair to display that works best for you.

Adjust image brightness with this slider.

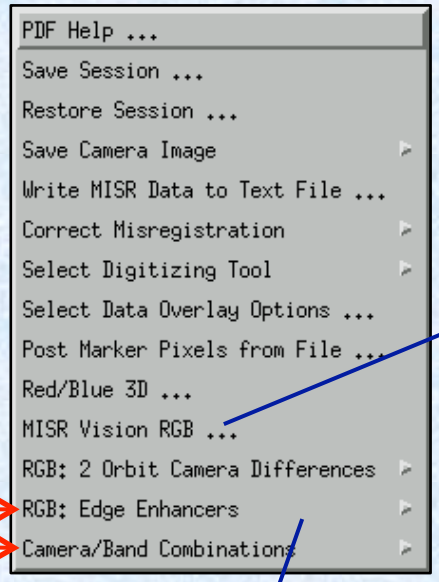
Because the image must be rotated 90 degrees, it may not fit in the OP window. If there are fewer than 4 blocks loaded, it will be too wide for the available vertical window size. If there are more than 4 blocks loaded, it will be too long for the available horizontal window size. Use these edit boxes to specify which portion of the image to display. Or simply load 4 blocks.

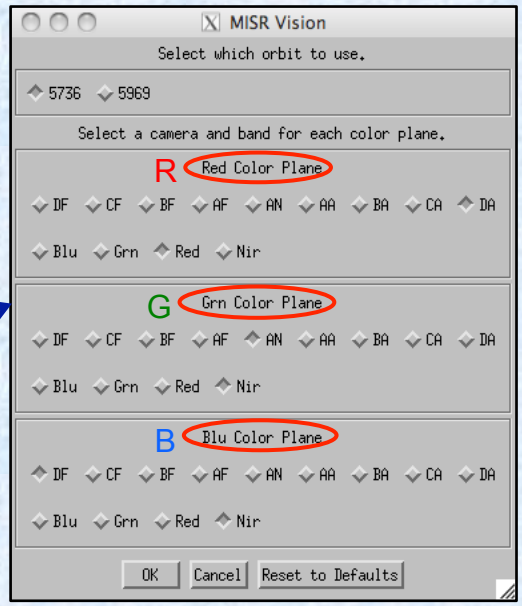


Nepalese Himalayas and Tibetan Plateau (reduced ~ 1.5X)

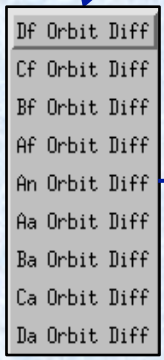
MISR Vision & 2 Orbit Camera Differences

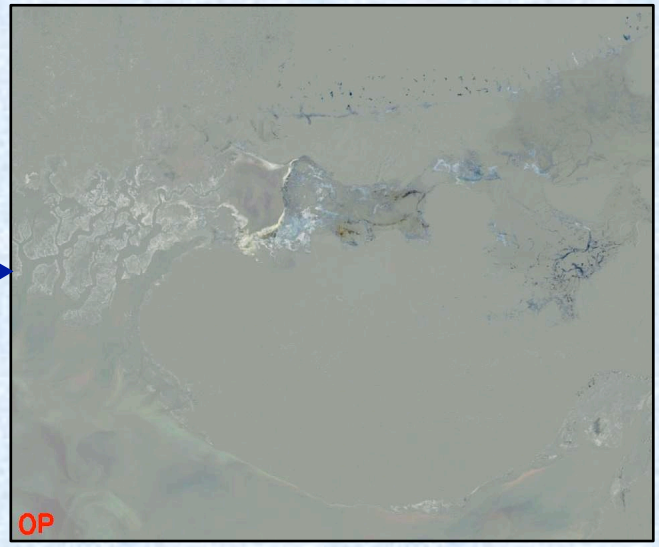
These create new images in the OP window and are not discussed further. Experiment freely.





- **This option differences the images for 2 orbits from the <u>same path</u> using the selected cameras and displays the results in the OP window.**
- **Subtle temporal differences in surface conditions often stand out.**

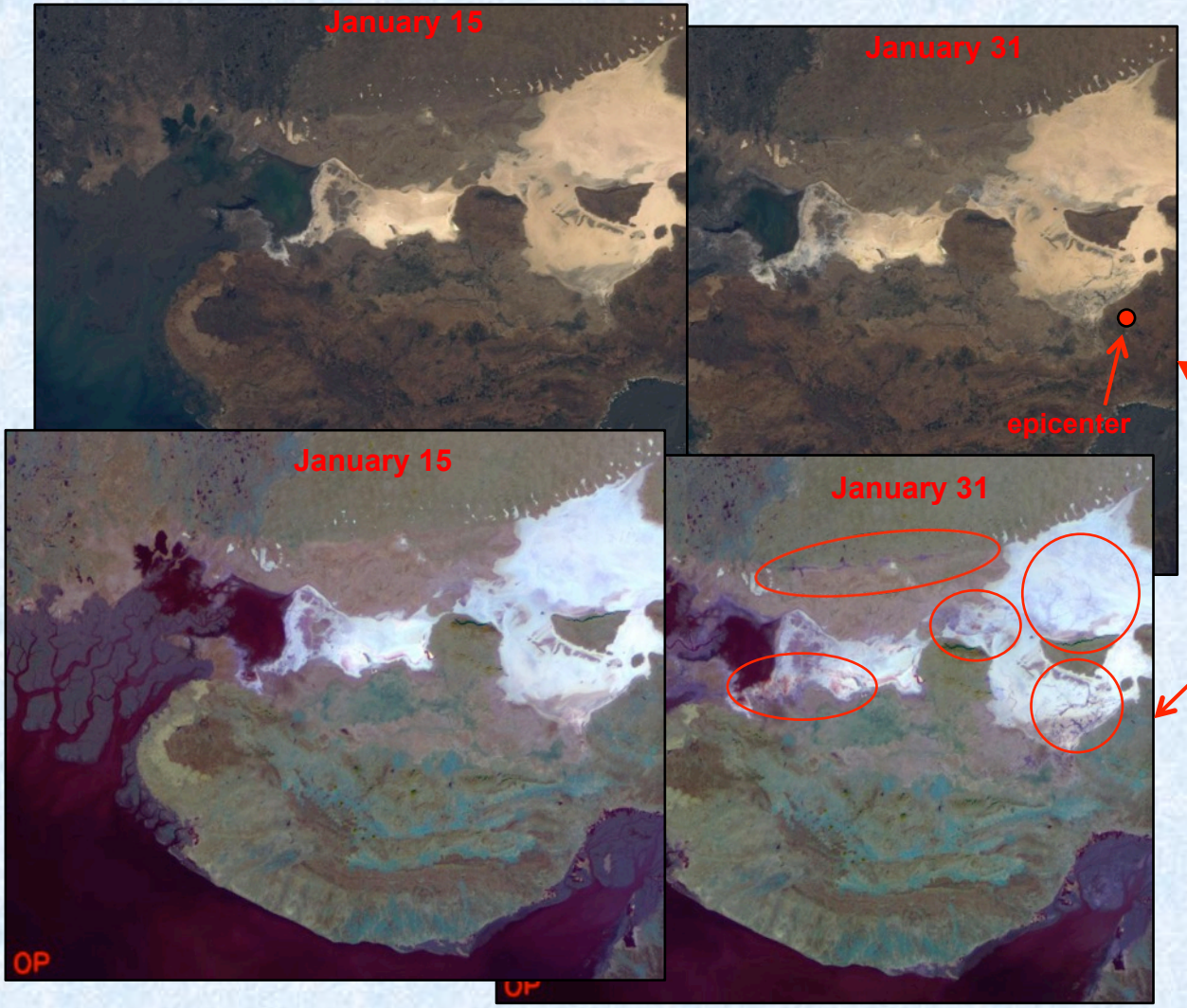




- **MISR Vision creates a new camera image in the OP window whose RGB components represent the selected MISR channels.**
- **This permits MINX to perform <u>multi-angle</u> compositing as well as <u>multi-spectral</u> compositing.**
- **The capability highlights features that are sensitive to view angle, such as rough ice vs. smooth ice or shallow surface water present before and after an earthquake (see next slide).**

This is the result of subtracting the Jan. 15 An camera image from the Jan. 31 An image for the same 2 Bhuj, India orbits shown in the next slide. It illustrates a 2nd method for highlighting the areas where water was expelled by the Bhuj earthquake.

MISR Vision and Bhuj Earthquake Effects



- Before and after images of the area where, on January 26, 2001, a magnitude 7.7 earthquake struck in Gujarat Province of northwestern India.
- 20,000 people were killed and extensive damage was incurred.
- **Upper images**: Standard MISR RGB image (An camera) before (Jan 15) and after (Jan 31) the earthquake.
- **Lower images**: Shows same data but in **false color** with Df NIR in red color plane, An NIR in green plane and Da red in blue plane.
- Pink/purple areas show new areas of water and dendritic drainages where liquefaction forced water to the surface.

Based on B. Pinty et al, EOS, February, 2003

Digitizing Options

Digitizing Options Dialog Box - 1

Your selection of aerosol type contributes a code letter to the name of the plume (see final slide), and it determines the color of the digitized polygon boundary. There are no other effects.

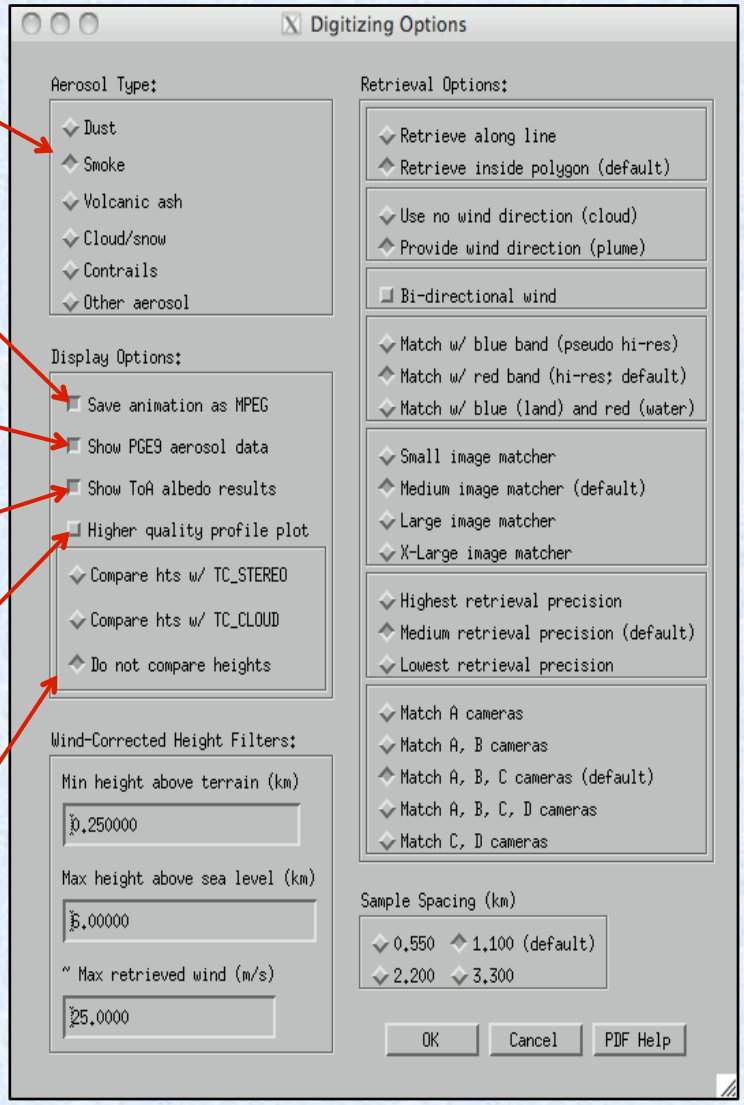
If this is checked and you have an MPG license from Exelis, a 9-camera MPEG or MP4 animation is saved. If it is not checked or you have no MPG license, 9 JPEG images are saved. If you have an IDL license, you can request MPG licenses from Exelis at no charge.

If you have a MISR AS_AEROSOL standard product file for the current orbit, then by checking this button you are notifying MINX to load the file and read it. Whenever you digitize a new region, aerosol data for the points in that region are collected and summarized in a set of histograms which are saved to file.

If this is checked, top-of-atmosphere (TOA) albedos are computed and saved to file for the points in each digitized region.

Images, profile plots and histograms are always automatically saved for each region digitized. When this button is checked, each height/wind profile will be drawn larger and with fewer annotations than normal to make it more presentable for publication. Also any images that are saved, either automatically or manually from the "Save Camera Image" option on the "Task Menu", have the 2-character camera name removed from the lower left corner.

MISR has two standard products that contain global stereoscopic cloud height and wind retrievals: TC_Stereo and TC_Cloud. If one of these options is selected, you will be prompted to select the appropriate product file after each retrieval is finished. MINX will read the file and add corresponding standard product heights and winds to the MINX results on the height and wind profiles and histograms.



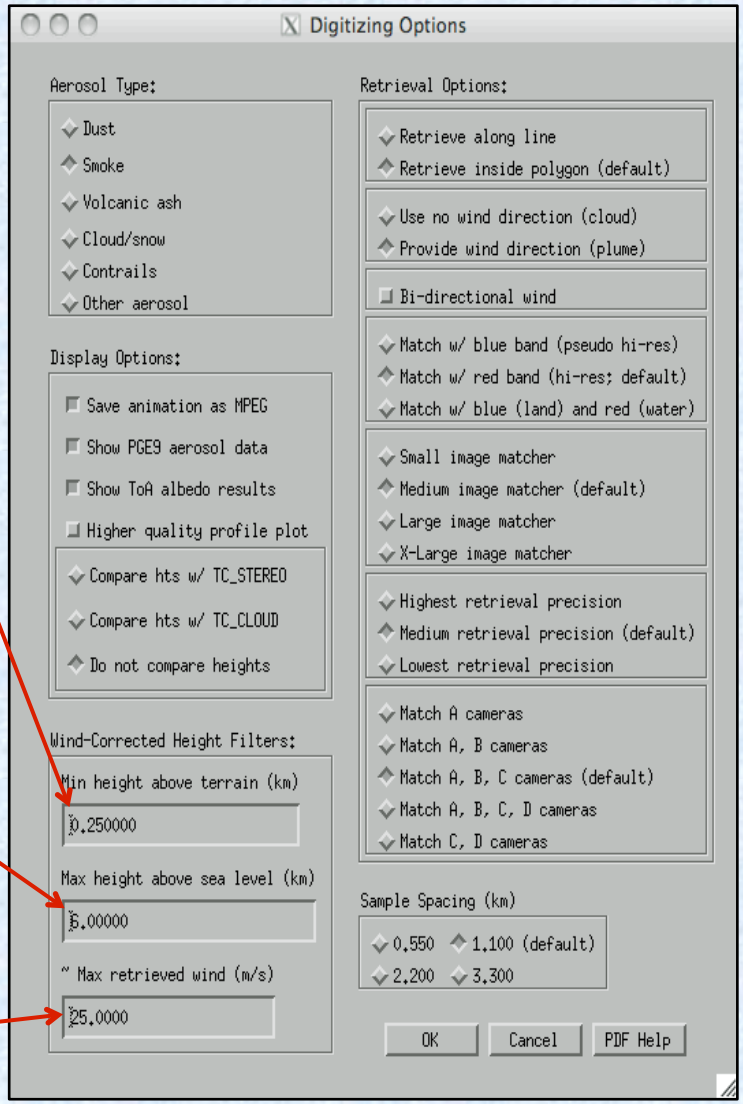
If the cursor hovers over a button, context-sensitive help is shown.

Digitizing Options Dialog Box - 2

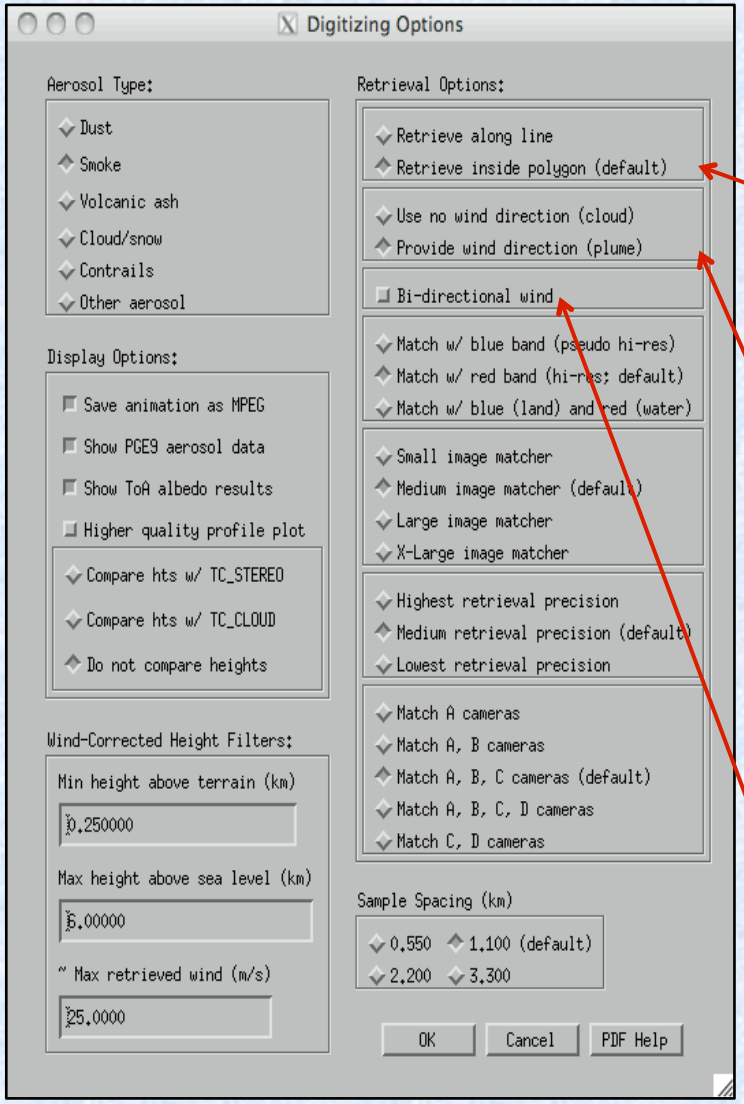
This filter establishes the lower-limit of retrieved wind-corrected heights relative to ground level.
The retrieval algorithm cannot distinguish between aerosols above the terrain and the terrain itself. So if the cameras aren't adequately co-registered, or if the terrain model (DEM) is not accurate enough at your location of interest, MINX may retrieve heights from the terrain tens or hundreds of meters above ground level. Set the value of this parameter to suppress invalid terrain retrievals from wind-corrected height records. The default value is generally good, but especially for dust plumes that may be close to the ground and when camera co-registration is good, the value may need to be set to 0.1 km above terrain or less. This value does not affect zero-wind heights.

This filter establishes the upper-limit of retrieved wind-corrected heights relative to sea level.
It is not uncommon for aerosol plumes to be partially exposed beneath patchy clouds. It is tedious to digitize around clouds to exclude them and thus avoid contaminating valid aerosol heights and winds with cloud heights and winds. This parameter makes it easier to exclude unwanted heights by suppressing those that are higher than the indicated height above sea level. In order to determine what value to assign, it is necessary to digitize a feature several times. In the first pass, assign a large enough value to determine (from the height profile) whether there is a clean separation between the heights of clouds and aerosol. For the second pass, set the filter to a value between the plume heights and cloud heights.

This filter establishes the upper-limit of retrieved absolute wind-speed in either the across-track or along-track direction.
This filter and the upper-limit height filter above affect the computation time for height/wind retrievals. Use the smallest reasonable values in these fields to minimize run time. The value assigned to this parameter can also be used to exclude height/wind retrievals for fast-moving aerosols.



Digitizing Options Dialog Box - 3



You can retrieve heights and winds either along a digitized line or inside a digitized polygon.

If you choose "Retrieve along line", then the digitized line serves both as the wind direction line and as the line along which height/wind retrievals will be made. The digitized line will be splined and resampled at a uniform interval set by the "Sample Spacing" parameter. This is useful for generating a narrow height profile and for reducing computation time. "Retrieve along line" is available only when "Provide wind direction" is chosen.

If you choose "Retrieve inside polygon", then you must digitize a closed polygon. Height retrievals will be performed on a regular grid of points inside the polygon whose interval is set by the "Sample Spacing" parameter. You can provide a wind direction or not, depending on the checked item in the next box.

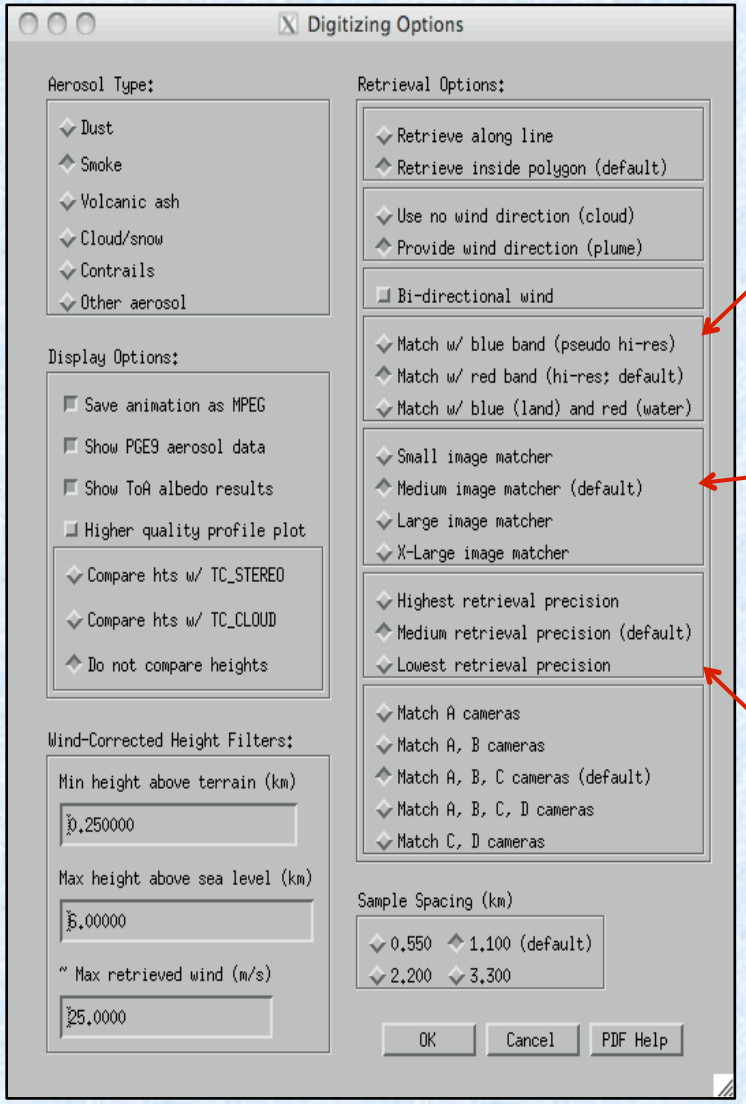
"Use no wind direction" computes only zero-wind heights which assumes that the entire disparity or offset between camera images is due to parallax (wind is discounted). This may be all you can do to determine cloud or aerosol heights if you lack wind direction information, though there may be a significant error in the results. You will need to digitize a closed polygon surrounding the aerosol or cloud of interest, but no wind vector is needed.

"Provide wind direction" computes both zero-wind heights plus winds and wind-corrected heights. This is the appropriate option whenever you have knowledge of wind direction from any source that you can use to establish a wind vector. You must digitize a closed polygon as well as a direction line.

Checking the "Bi-directional wind" box instructs MINX to use the wind direction you provide plus its 180 degree opposite in determining heights. This can be useful in a transect across the eye of a hurricane, for example, where wind directions reverse.

If the cursor hovers over a button, context-sensitive help is shown.

Digitizing Options Dialog Box - 4



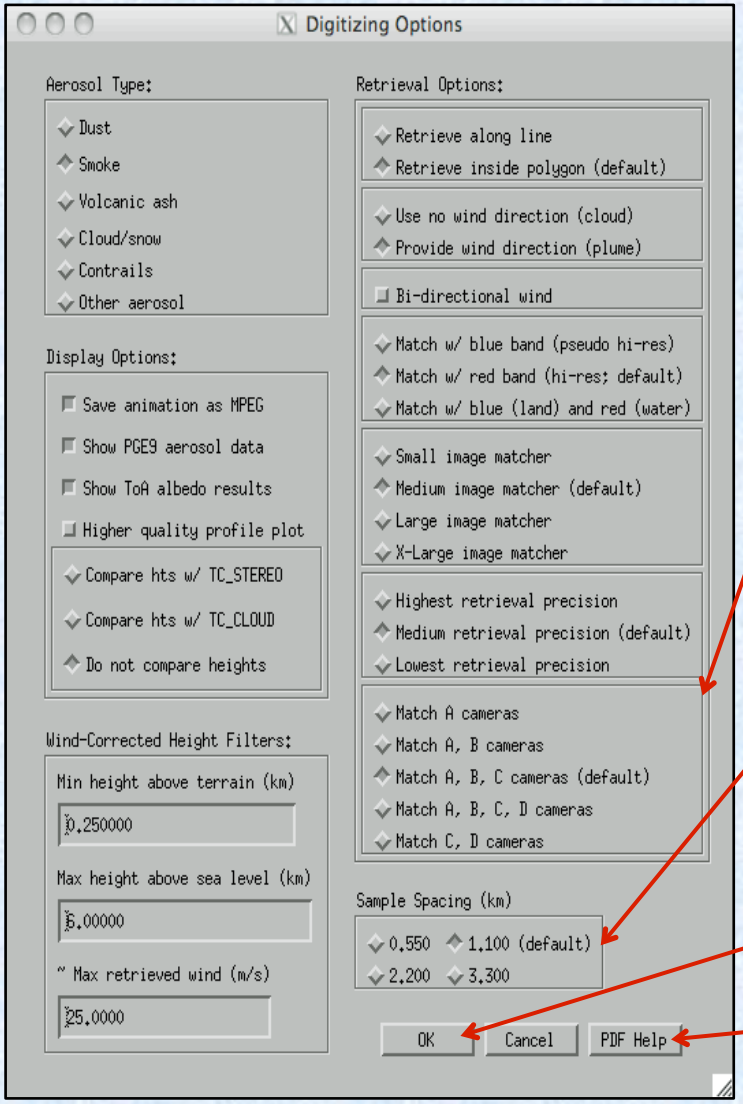
Select which MISR band(s) to use in the image matching step of the height retrieval.
The red band has the highest native resolution and should be used whenever it provides acceptable results, especially over water and for retrieving heights of clouds and other optically dense aerosols. If an aerosol is not optically dense and lies over a bright surface, then the blue band will often produce better results. If a plume extends across a coastline to lie over both land and water, “Match w/ Blue and Red” often produces superior results.

Select the size of the image matcher.
This affects both the quality of the retrieval and the speed of the operation. The default matcher is appropriate for most purposes. Larger matchers run much more slowly, generate smoother retrieval results and often increase the number of successful retrievals. The matchers vary in size from 7 pixels square to 15 pixels square for “Small”, “Medium” and “Large” matchers. The “X-Large” matcher is 25 pixels square, is extremely slow and smooths out much of the spatially-variable detail in retrieved heights.

Select the “precision” or quality of the retrieval.
The default precision is appropriate for most purposes. Higher precision provides greater confidence in the results but reduces the number of retrievals. The algorithm is based on the number of camera pairs that return similar results and on a threshold of similarity. “Highest retrieval precision” and “Medium retrieval precision” require that 3 cameras paired with An retrieve similar heights; “Lowest retrieval precision” requires only 2 camera pairs. The threshold for assessing similarity is tighter the greater the retrieval precision. It is often advantageous to use the “Lowest retrieval precision” option when the number of successful retrievals in an aerosol region is small.

If the cursor hovers over a button, context-sensitive help is shown.

Digitizing Options Dialog Box - 5



Select which cameras to image-match against the An reference camera.
The default option uses the 6 cameras nearest nadir (Cf, Bf, Af, Aa, Ba and Ca) and is almost always the best choice. Adding the D cameras (Df and Da) slows retrievals and is useful only if an aerosol otherwise produces poor retrievals and is relatively stratiform. If you choose to use only the 2 A cameras or the 4 A and B cameras, you should also use the "Lowest retrieval precision" option, because fewer cameras are available to pass the "precision" test.

Select the spatial frequency for retrieval attempts.
This parameter determines the spacing between grid points in a plume polygon or between sample points on a splined direction line where height/wind retrievals are attempted.
The permissible values are multiples of MISR's high-resolution pixel size (275 m). Closer spacing significantly increases computation time (e.g., using 0.550 km spacing requires 16 times as long to run as using 2.2 km spacing).
The amount of spatial detail you can extract from a scene is affected not only by the sample spacing, but also by the size of the image matcher. Smaller values of both increase the spatial detail but also increase noise and reduce the number of successful retrievals.

Clicking OK puts MINX into digitizing mode.

Shows this PDF file.

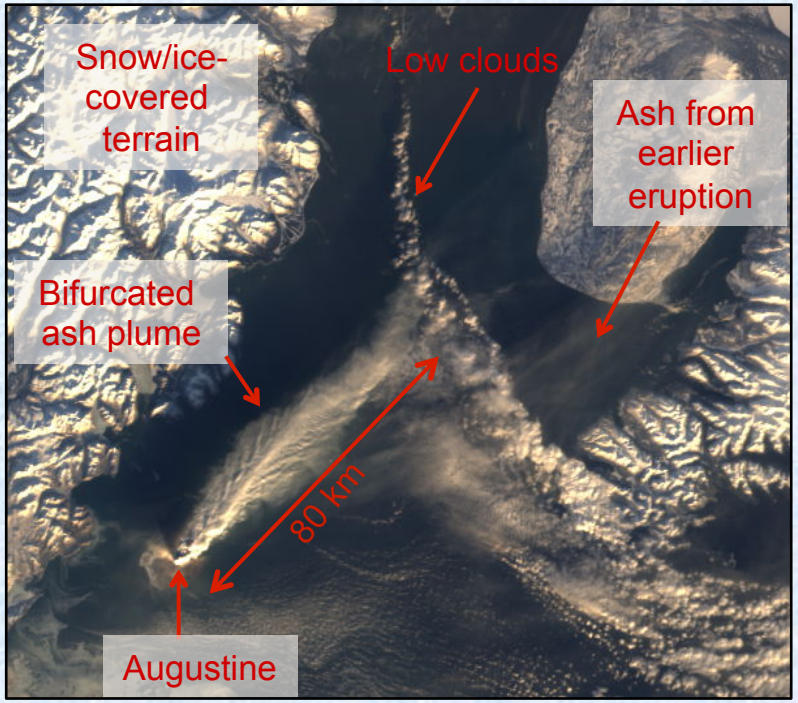
If the cursor hovers over a button, context-sensitive help is shown.

Digitizing Procedure Overview

1) **Load Level 1 radiance images:**
   - If no land is present in scene, use GRP_ELLIPSOID (GRP_TERRAIN will be empty).
   - In all other cases, use GRP_TERRAIN. Using GRP_ELLIPSOID images over land will produce invalid results, more so the greater the terrain elevation.
2) **Adjust image color and brightness.**
3) **Assess and correct camera co-registration errors.**
4) **Load MODIS fire pixels if available.**
5) **For each feature (plume or cloud or geometric region) in the scene:**
   1) **It is critically important to carefully study feature geometry and context during camera animation to understand the scene and to determine:**
      - Outline of feature to digitize.
      - Wind direction to digitize.
      - Retrieval parameters to use (select from "Digitizing Options" dialog box).
   2) **Digitize feature:**
      - Digitize outline and wind direction.
      - Select AGP and GP_GMP product files to load when prompted (required - only once).
      - Select other MISR product files when prompted (optional - only once).
   3) **Evaluate digitizing results:**
      - Study height/wind plots and color overlays.
      - Delete digitized feature if not satisfactory.
      - Redigitize with new parameters if necessary.

Digitizing Procedure – 1

- After clicking "OK" on the "Digitizing Options" dialog box, you are in 'Digitizing mode'. You can continue digitizing plumes until you select a different digitizing option from the "Task Menu".
- You need to load MISR data products (AGP, GP_GMP, etc.) only once per orbit.



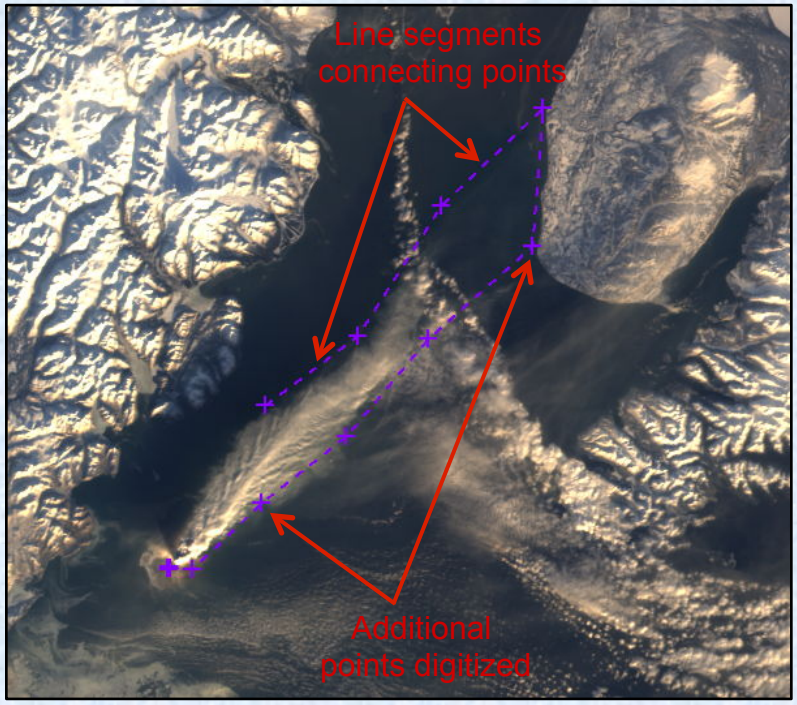
Eruption of Augustine volcano, Alaska

① Using the mouse, left-click a point you believe to be near the origin or source of the plume but a few pixels outside it.

- If you loaded MODIS fire pixels, they provide an excellent indicator of the source of smoke.
- Be sure to enclose fire pixels within your digitized polygon to capture the fire radiative power for the output text file.

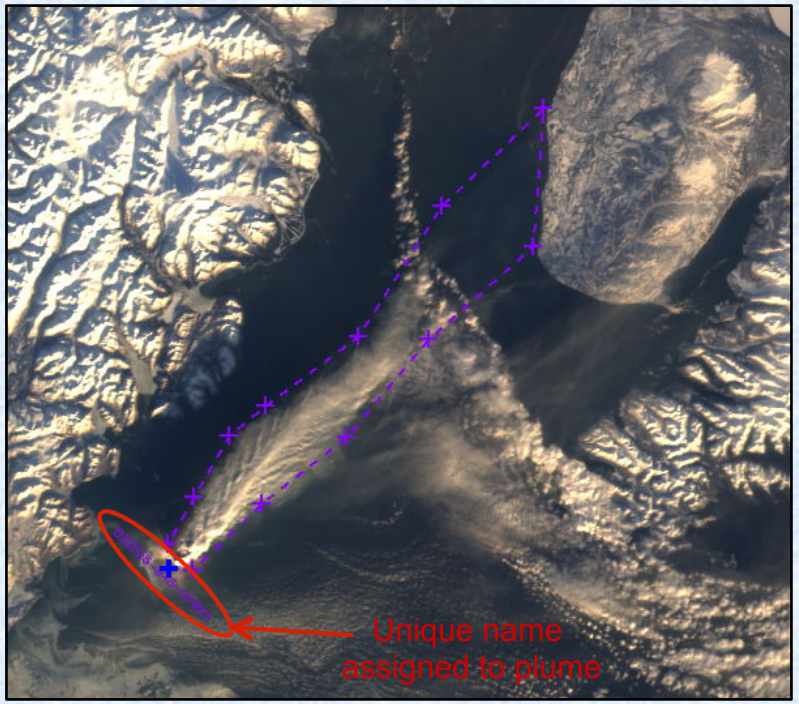
Digitizing Procedure – 2

② Left-click as many additional points as needed to define the boundary of the plume. A dashed line segment is drawn to connect each successive pair of points.



- Keep your digitized points a few pixels outside the aerosol region where you want to retrieve heights.
- Don't capture an excessive number of points.

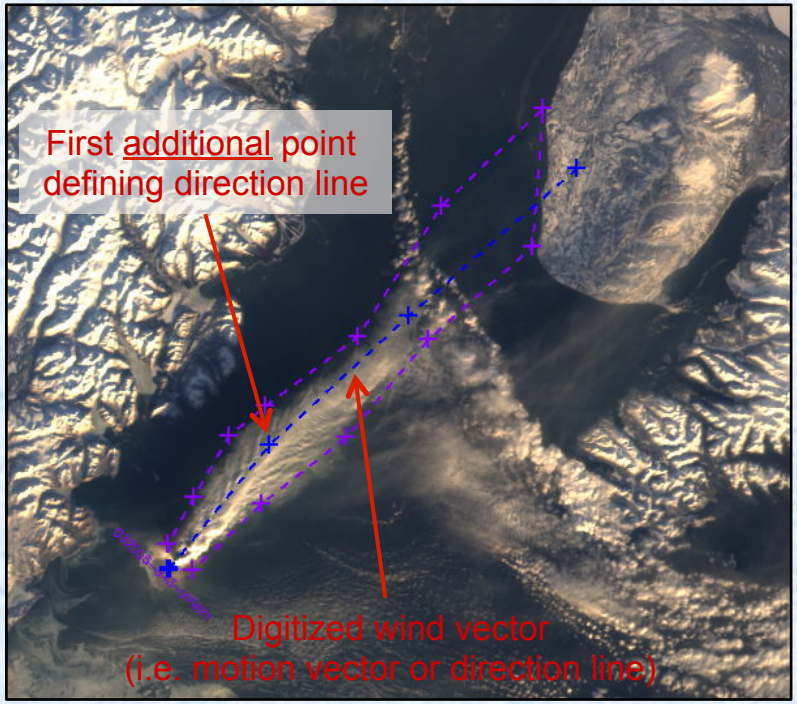
③ Left-click the final point to coincide (to within a few pixels) with the origin point. This automatically closes the polygon and assigns it a unique name.



- If you selected "Use no wind direction" in the "Digitizing Options" dialog box, you are done digitizing and MINX will automatically begin computing zero-wind heights.

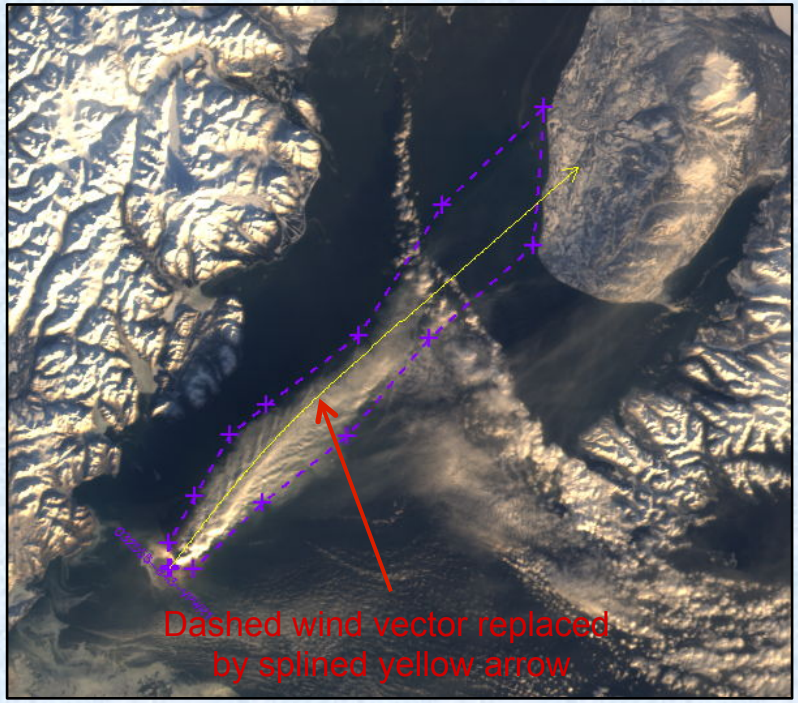
Digitizing Procedure – 3

④ If you chose "Provide wind direction" in the "Digitizing Options" dialog box, then left-click one or more additional points to define a straight or curved motion vector. The points are connected with dashed line segments.



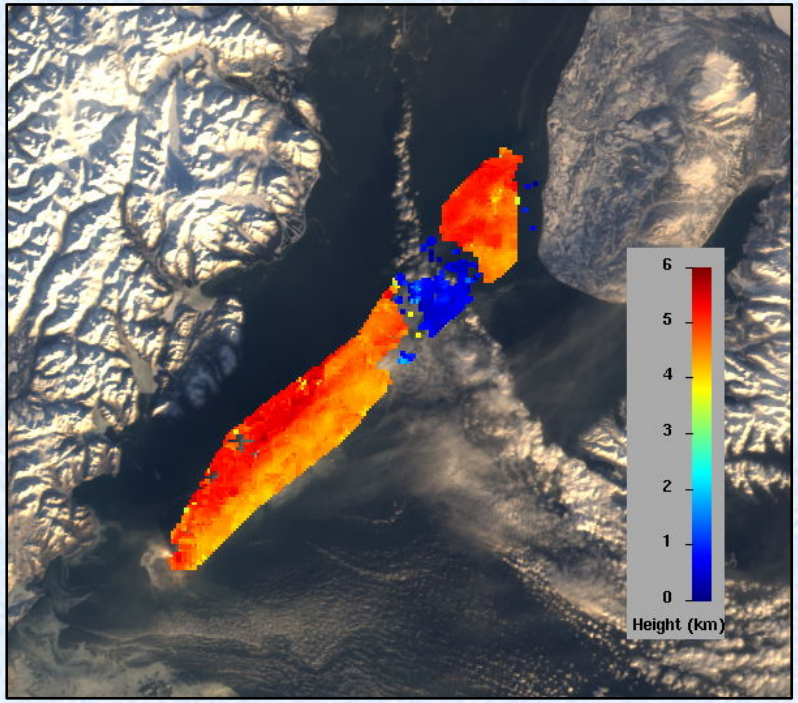
- At any time before you click to create the first point on the direction line, you can right-click anywhere in the animation window to delete the current polygon and start over.

⑤ Right-click anywhere in the animation window to signify you are done entering points on the direction line. Select the AGP and GP_GMP product files to load when the dialog boxes prompt for them. When they are loaded, the direction line will change to solid yellow and will describe a splined curve. This signals that image matching and height retrieval have begun.

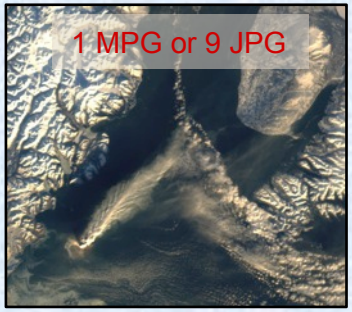


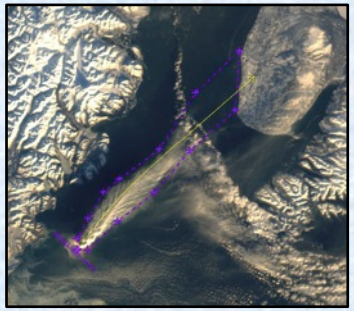
Digitizing Procedure – 4

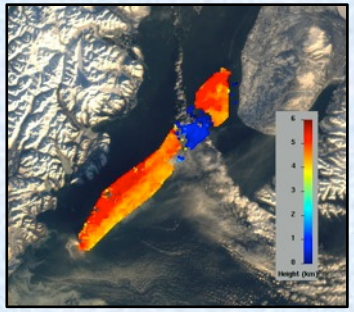
⑥ When height/wind calculations finish, color-coded, retrieved heights are displayed on the screen at those points inside the digitized polygon where retrievals were successful.



- For each aerosol feature digitized, MINX saves 3 map-view images (see below), 2 data profiles, 2 histograms and 1 text file containing raw data point information.
- All 8 files can be found in a sub-directory in the user's home directory named: "0<orbit number>" e.g. "/Users/dnelson/032555/".
- The MPG camera animation file is saved only if you have an IDL license. Otherwise MINX will create 1 JPEG image for each camera.







- It is important to evaluate the retrieved results for every digitized region to determine whether it should be deleted and redone. In unique or complex cases, it is useful to experiment by digitizing multiple times using variations on wind direction, digitizing options, etc.

Evaluate Retrieval Results - 1

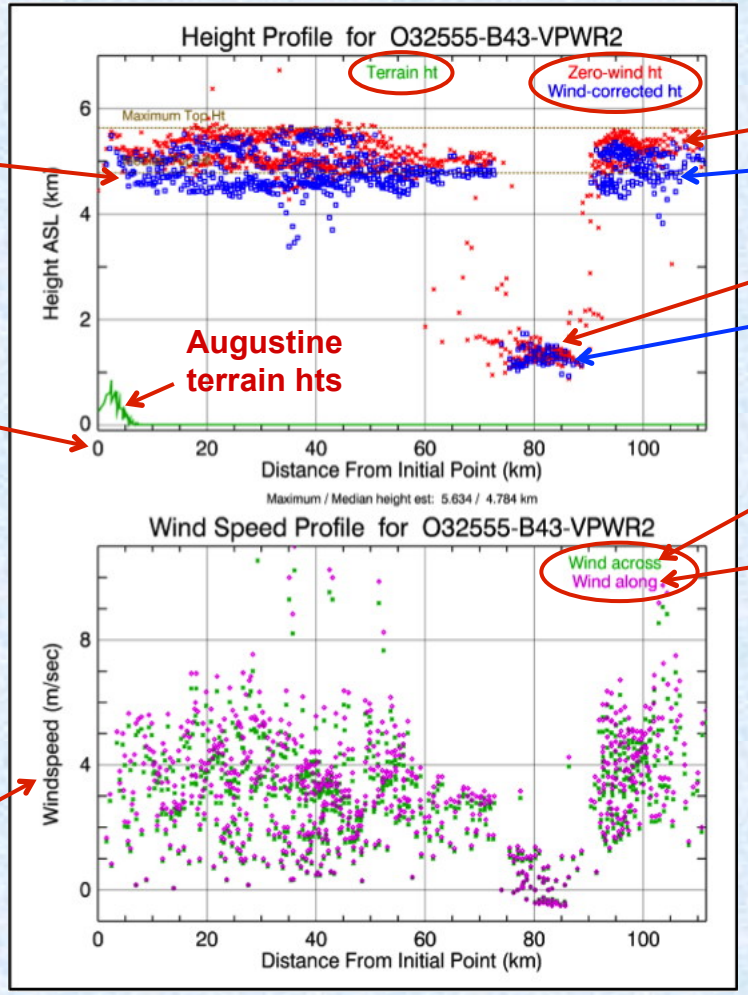
Some of the apparent scatter in heights is due to multiple data points at the same distance from the origin of the region.

Distance = 0 on the profiles corresponds to the first point digitized, so profiles may appear reversed from map view.

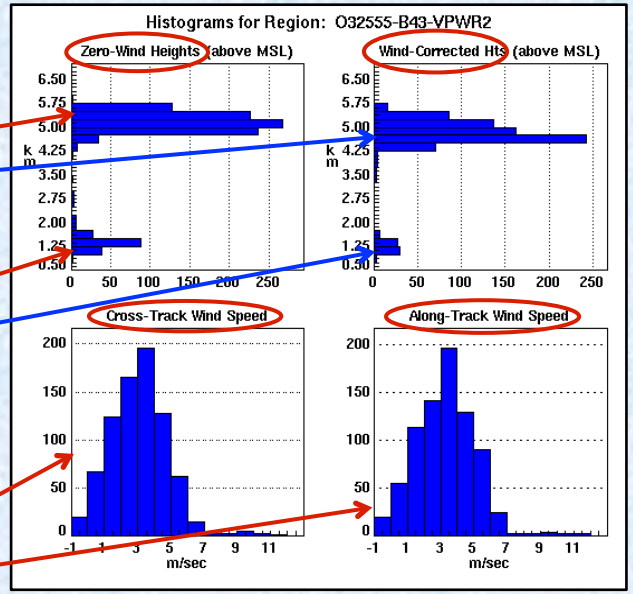
Total wind speed is :

$\sqrt{(wind\_across^2 + wind\_along^2)}$

Wind speed along-track is positive toward the top of MISR orbits. Wind speed across-track is positive toward the right on MISR orbits.



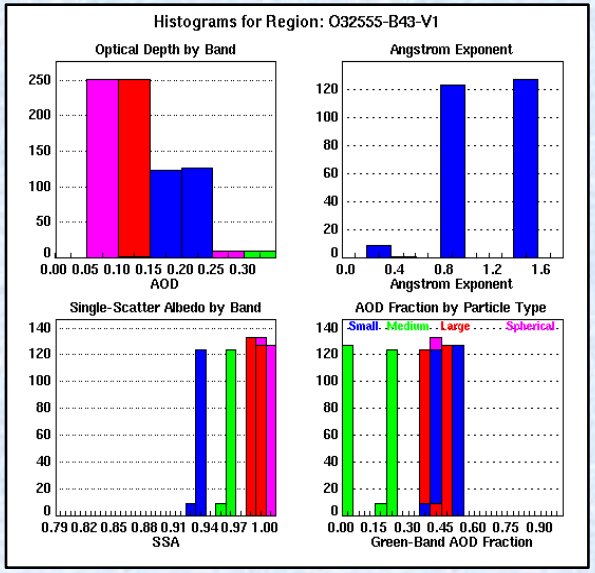
Height and wind profiles



Height and wind histograms

- **The Height Profile is the most important graphic for evaluating the success and validity of the retrieval.**
- **If "Use no wind direction" was selected in the "Digitizing Options" dialog, then only the Height Profile and the Zero-Wind Heights histogram will be populated.**

Evaluate Retrieval Results - 2



Header records in raw data file

Aerosol parameter histograms (optionally retrieved from MISR standard aerosol product)

Data-point table in raw data file (file is truncated across and down)

```
Orbit number    : 32555
Path number     : 69
Block number    : 43
Date acquired   : 2006-01-30
UTC time        : 21:30:35
MINX version    : V2.0
User name       : dlnelson
Date digitized  : 2012-04-10

Region name             : O32555-B43-VPWR2
Region aerosol type     : Volcanic ash
Region geometry type    : Polygon
Region wind dir type    : Direction provided
Retrieved with band     : Red
Match blue in An only?  : No
Match with blue-bandx?  : No
Retrieved with matcher  : Medium
Retrieved with cameras  : A B C D
Retrieval precision     : Medium
Images in "true color"  : No

First point longitude   :  -153.47194
First point latitude    :    59.35468
Perimeter length (km)   :   243
Area (sq km)            :  1453
Area per point (sq km)  :     1.210
Wind-corrected points   :   787
Percent area covered    :    66
Best median ht (m ASL)  :  4784
Best top ht (m ASL)     :  5634
StdDev metric, corrht   :   227
|WndDir-AlongDir|(deg)  :    43
Power of fire in MW     :    NA
Retrieval quality       :  GOOD

Level 1 radiance file   : MISR_AM1_GRP_TERRAIN_GM_P069_O032555_AN_F03_0024.hdf
Terrain elevation file  : MISR_AM1_AGP_P069_F01_24.hdf
Cam/Sun Geometry file   : MISR_AM1_GP_GMP_P069_O032555_F03_0013.hdf
SVM Classifiers file    : Not Loaded
Aerosol product file    : MISR_AM1_AS_AEROSOL_P069_O032555_F12_0022.hdf
```

New naming convention in MINX V2.0 +

New in MINX V2.0 +

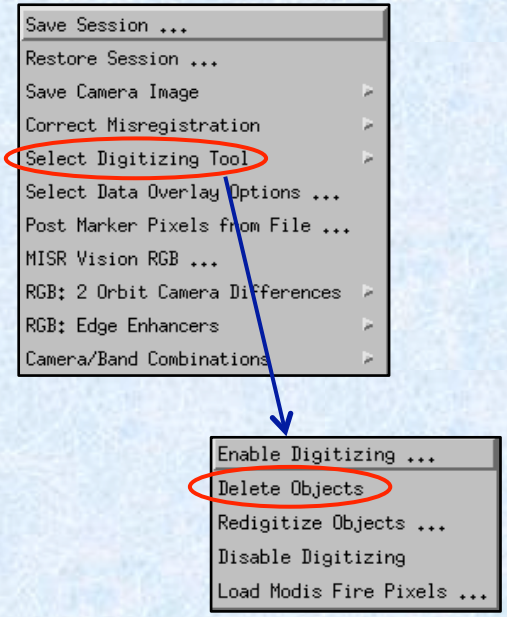
V2.0 + also records coordinates of points defining the digitized polygon and the wind direction (not shown)

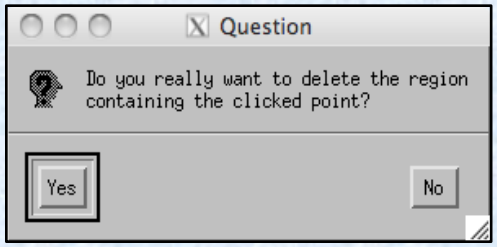
RESULTS: 1199 points in this table are samples where NoWnd heights or fire power were retrieved.

Pt#	Long-itude	Lat-itude	Blk	Samp	Line	Km to Pt 1	Dg Cw Rel N	Terr Elev	Feature Ht (m) NoWnd	Feature Ht (m) W/Wnd	Feature Ht (m) Fltrd	Windspeed (m/s) Across	Windspeed (m/s) Along	Windspeed (m/s) Total	Albedo by Band Blue	Albedo by Band Green	Albedo by Band Red	Albedo by Band NIR	BB TOA Albedo	Optical Depth by Band Blue	Optical Depth by Band Green	Optical Depth by Band Red	Optical Depth by Band NIR
1	-153.471	59.357	43	555	201	0.0	55	250	4768	-99	-99	-99.9	-99.9	-99.9	0.53	0.35	0.35	0.38	0.30	-9.999	-9.999	-9.999	-9.999
2	-153.433	59.398	43	558	182	5.1	55	27	5074	5187	-99	4.4	4.9	6.6	0.52	0.33	0.36	0.37	0.29	-9.999	-9.999	-9.999	-9.999
3	-153.437	59.389	43	558	186	4.0	55	101	4694	-99	-99	-99.9	-99.9	-99.9	0.52	0.34	0.35	0.40	0.30	-9.999	-9.999	-9.999	-9.999
4	-153.441	59.379	43	558	190	3.0	55	244	4864	-99	-99	-99.9	-99.9	-99.9	0.54	0.38	0.35	0.43	0.33	-9.999	-9.999	-9.999	-9.999
5	-153.446	59.369	43	558	194	2.0	55	447	5403	-99	-99	-99.9	-99.9	-99.9	0.51	0.32	0.34	0.33	0.27	-9.999	-9.999	-9.999	-9.999
6	-153.450	59.360	43	558	198	1.2	55	579	5083	5121	-99	1.8	2.0	2.7	0.54	0.36	0.41	0.44	0.32	-9.999	-9.999	-9.999	-9.999
7	-153.401	59.425	43	563	170	8.5	55	12	1033	-99	-99	-99.9	-99.9	-99.9	-99.99	-99.99	-99.99	-99.99	-99.99	-9.999	-9.999	-9.999	-9.999
8	-153.406	59.415	43	563	174	7.5	55	11	5324	5174	-99	1.0	1.2	1.6	0.42	0.26	0.41	0.26	0.19	-9.999	-9.999	-9.999	-9.999
9	-153.410	59.406	43	563	178	6.4	55	12	5064	-99	-99	-99.9	-99.9	-99.9	0.59	0.43	0.55	0.56	0.36	-9.999	-9.999	-9.999	-9.999
10	-153.414	59.396	43	563	182	5.4	55	40	5041	4578	-99	2.7	3.0	4.0	0.58	0.43	0.59	0.53	0.35	-9.999	-9.999	-9.999	-9.999
11	-153.418	59.387	43	563	186	4.4	55	137	5062	5050	-99	2.2	2.5	3.4	0.63	0.48	0.65	0.62	0.39	-9.999	-9.999	-9.999	-9.999
12	-153.423	59.377	43	563	190	3.5	55	320	5345	4870	-99	4.9	5.4	7.3	0.53	0.36	0.40	0.40	0.30	-9.999	-9.999	-9.999	-9.999
13	-153.427	59.367	43	563	194	2.8	55	618	5469	5456	-99	1.4	1.6	2.1	0.57	0.39	0.43	0.44	0.33	-9.999	-9.999	-9.999	-9.999
14	-153.431	59.358	43	563	198	2.3	55	860	5531	5568	-99	1.5	1.6	2.2	0.65	0.49	0.54	0.59	0.41	-9.999	-9.999	-9.999	-9.999
15	-153.374	59.442	43	566	162	11.0	55	12	4356	4556	-99	3.0	3.4	4.5	0.55	0.37	0.56	0.42	0.28	-9.999	-9.999	-9.999	-9.999
16	-153.378	59.432	43	566	166	9.9	55	12	1484	-99	-99	-99.9	-99.9	-99.9	0.57	0.44	0.44	0.48	0.35	-9.999	-9.999	-9.999	-9.999
17	-153.382	59.423	43	566	170	8.9	55	12	5144	4775	-99	4.0	4.5	6.1	0.61	0.47	0.56	0.61	0.40	-9.999	-9.999	-9.999	-9.999
18	-153.387	59.413	43	566	174	7.9	55	11	5115	4565	-99	9.7	10.8	14.5	0.57	0.40	0.47	0.50	0.34	-9.999	-9.999	-9.999	-9.999
19	-153.391	59.404	43	566	178	6.9	55	11	5021	4496	-99	2.5	2.8	3.7	0.59	0.43	0.60	0.54	0.35	-9.999	-9.999	-9.999	-9.999

Evaluate Retrieval Results – Delete Plume

- To delete a region (plume, cloud or line):
  - ① Select “Delete Objects” from “Select Digitizing Tool” submenu
  - ② Left-click in or on any region
  - ③ Click “Yes” in the dialog box to confirm the operation
  - ④ You remain in “Delete” mode until you select a different menu option
- Deleting removes the image and text files from disk, from the animation window and from memory
- The deleted region name is reused by the next region you digitize in the same block
- If several regions overlap and you click in their intersection, the earliest region digitized will be deleted
- MINX makes it possible to experiment: you may want to digitize, delete and redigitize a region numerous times to determine the best bounding polygon, wind direction and digitizing parameters





Digitized Region Naming Convention

O49787-B68-SPNB3 - typical region name in MINX V3.0

O49787 - MISR Orbit number

B68 - MISR Block number where initial point was digitized

SPNB - region identifiers assigned by MINX based on user's selections in Digitizing Options dialog box (see table below)

3 - unique region identifier incremented for each new region in each block

Key to Region Identifier Letters

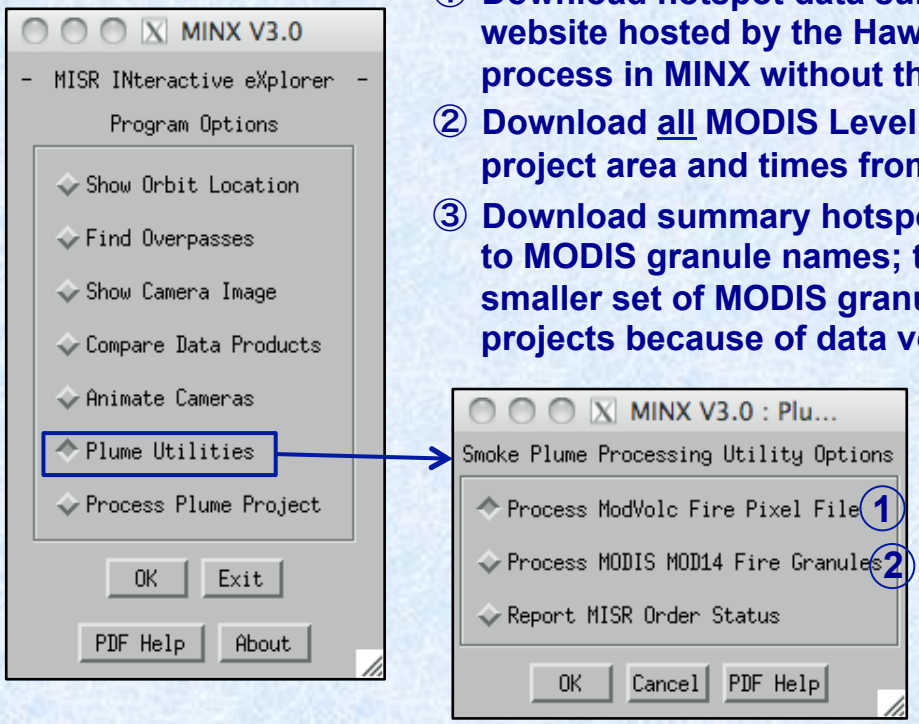
Letter 1: region aerosol type	Letter 2: region geometry type	Letter 3: wind direction specified by user?	Letter 4: band used in height retrieval
D = Dust	L = Line	N = No wind provided ("cloud")	R = Red
S = Smoke	P = Polygon	W = Wind provided ("plume")	B = Blue
V = Volcanic ash			C = Red/Blue combination
W = Water			

Plume Utilities

Plume Utilities

Objective: To facilitate processing large smoke plume projects by using MODIS hotspot detections to select MISR orbits and blocks that contain fires. Also to capture MODIS fire radiative power and report it with other smoke plume data.

- It's too costly to download all MISR orbits in a project area and manually search for smoke plumes.
- Using fire detections from MODIS (on Terra only) can reduce MISR downloads by 100x or more.
- MINX Plume Utilities options produce a list of MISR orbits and blocks to order and a collection of files, one per orbit, containing hotspot data and their MISR coordinates for use in digitizing plumes with MINX.
- Before using MINX Plume Utilities options, MODIS fire pixel data must be downloaded.
- There are 3 alternatives for acquiring and processing MODIS "fire pixel" or "hotspot" data. They are:



① Download hotspot data summarizing MODIS detections from the ModVolc website hosted by the Hawaii Institute of Geophysics and Planetology, then process in MINX without the need for MODIS granules.

② Download all MODIS Level 2 MOD14 thermal anomaly granules for your project area and times from the USGS ftp site, then process in MINX.

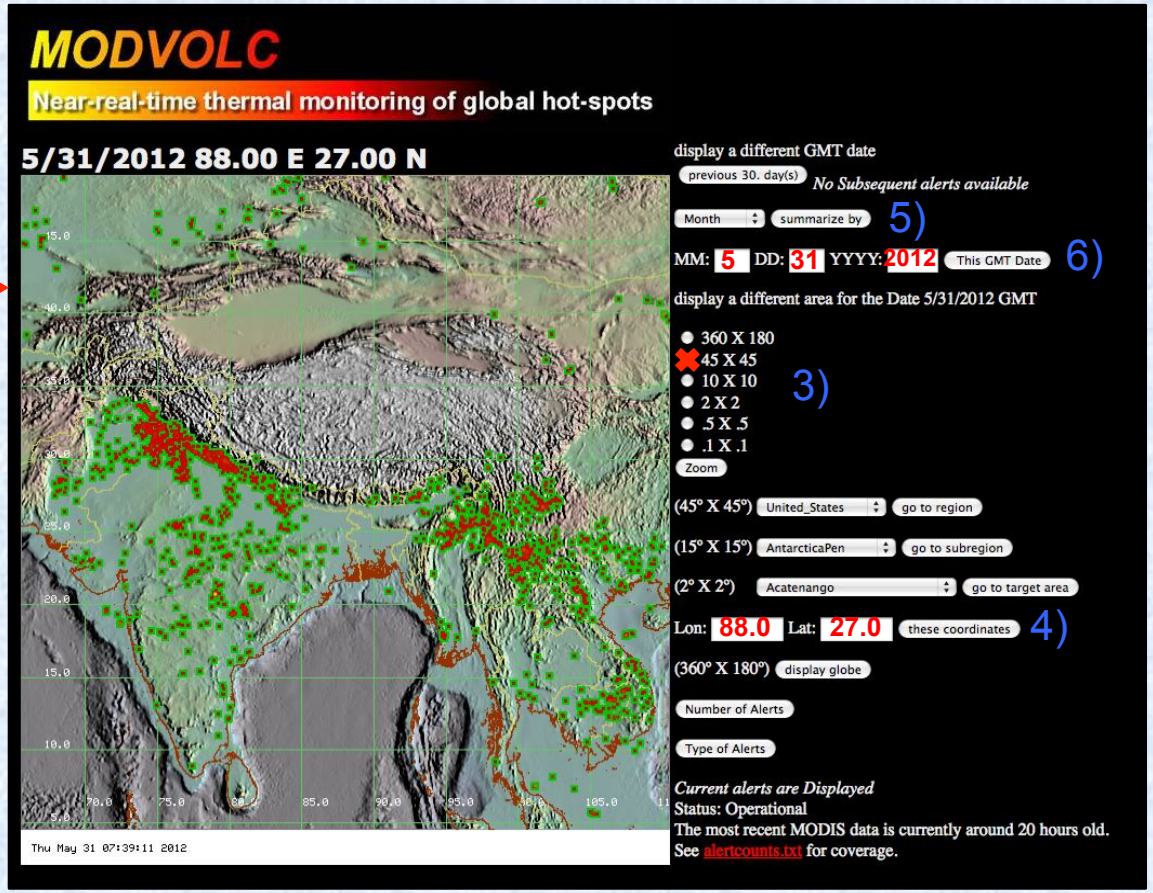
③ Download summary hotspot data from ModVolc; next use ① to convert data to MODIS granule names; then use MINX to download and process a much smaller set of MODIS granules than in ②. This is often preferred for large projects because of data volume considerations.

ModVolc fire pixel files:

- Contain no fire radiative power.
- Are downloadable as an ASCII text file with one fire pixel per line of text.
- Can replace thousands of MODIS granule files at ~300 K bytes per file.
- May not be as comprehensive or reliable as MODIS thermal anomaly granule data.

① Process ModVolc Fire Pixel File – Download Data

If you chose the "Process ModVolc Fire Pixel File" option, you can download MODIS hotspot data for your project by following these steps:



1) Determine your project's geographic and date ranges.
2) Go to http://modis.higp.hawaii.edu/.
3) Decide which of the six geographic size ranges is best for your project. Select it, press "Zoom" and wait for the map to update (you may need to repeat the remaining steps with more regions to fit your data).
4) In the boxes labeled "Lon:" and "Lat:" enter the center longitude and latitude for your region of interest, press the "these coordinates" button and wait for the map to update.

Note - If appropriate for your project, you can select a specific region from the list boxes below "Zoom" rather than using steps 3) and 4).

5) In the dropdown listbox with default value of "Day", select the period of time, e.g. "month", for which you wish to retrieve data, press "summarize by" and wait for the map to update.
6) In the "MM:", "DD:", and "YYYY:" boxes, enter the ending date for the period you want to retrieve, press "This GMT Date" and wait for the map to update.
7) Click on red link at the bottom labeled "Text Alert File" (not shown here) to go to the page containing ASCII results.
8) On your browser's "File" menu, select "Save Page As…" and save data to a file named "ModVolc_<project>.txt", where <project> is the name of the project that you will use consistently in all the MINX utilities - if you selected and downloaded data from multiple region squares, concatenate the files into one file with this name.

① Process ModVolc Fire Pixel File – Sample Downloaded File

Sample ModVolc fire pixel file – 1 fire pixel per row

(first header row added for clarity)

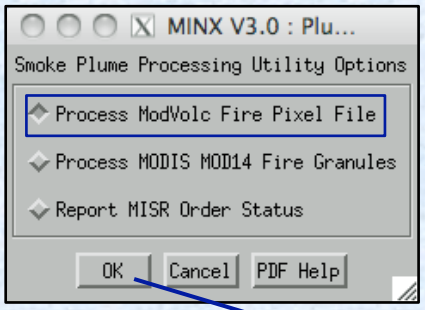
UNIX_Time	Sat	Year	Mo	Dy	Hr	Mn	Longitude	Latitude	B21	B22	B6	B31	B32	SatZen	SatAzi	SunZen	SunAzi	Line	Samp	Ratio	Glint
1199115300	T	2007	12	31	05	35	84.432106	28.454927	3.733	-10.000	9.770	7.378	6.996	46.11	-77.86	52.88	165.57	473	1177	-0.357	47.557
1199115300	T	2007	12	31	05	35	85.997452	28.160923	2.304	-10.000	8.387	7.205	6.877	53.27	-76.49	52.31	167.28	468	1247	-0.559	49.777
1199081400	A	2007	12	30	20	10	86.095711	23.684803	1.187	1.145	177.141	7.547	7.210	15.11	-81.76	154.01	94.49	602	844	-0.726	139.289
1199037600	A	2007	12	30	08	00	84.415016	28.459906	9.990	-10.000	14.834	8.953	8.345	44.99	-96.49	56.95	-153.54	1704	188	0.057	86.020
1199026200	T	2007	12	30	04	50	84.778687	28.446533	6.048	-10.000	15.171	10.130	9.543	30.66	97.98	55.98	154.11	1354	340	-0.277	76.064
1198982700	T	2007	12	29	16	45	85.148216	28.227318	0.653	0.691	169.026	6.329	6.171	31.11	-97.40	158.25	-82.51	873	334	-0.799	168.947
1198721700	T	2007	12	26	16	15	86.088821	23.680870	0.855	0.888	169.026	8.061	7.627	32.45	79.70	152.35	-95.52	115	1033	-0.791	119.890
1198549500	T	2007	12	24	16	25	86.392899	23.772381	0.905	0.906	169.026	8.351	7.909	5.09	83.48	155.67	-94.74	1016	734	-0.794	149.991
1198116300	T	2007	12	19	16	05	87.241096	23.560938	0.874	0.875	169.026	7.388	7.082	35.14	79.70	152.75	-95.97	1636	1063	-0.780	116.753
1197870900	A	2007	12	16	19	55	86.090881	23.680214	0.948	0.925	177.143	7.683	7.310	12.20	97.57	155.27	94.41	1728	542	-0.775	168.408
1197339300	T	2007	12	10	16	15	87.243050	23.557714	0.902	0.852	168.883	7.766	7.403	24.40	80.67	155.04	-94.01	37	947	-0.794	130.711
1196994900	T	2007	12	06	16	35	82.755440	24.144701	0.930	0.969	168.883	7.556	7.153	9.23	80.96	156.99	-91.44	1974	780	-0.761	146.717
1196921700	A	2007	12	05	20	15	86.102715	23.686962	0.962	0.956	177.145	7.816	7.394	27.42	-79.53	149.83	94.02	1057	979	-0.771	123.085
1196261400	T	2007	11	28	04	50	87.001198	26.642347	4.124	-10.000	13.424	9.455	8.680	10.46	97.98	50.48	158.87	1418	561	-0.419	56.391
1195917300	T	2007	11	24	05	15	81.619591	29.902927	3.302	-10.000	16.158	8.813	8.410	10.58	97.75	52.60	160.76	919	560	-0.526	58.079
1195784700	T	2007	11	22	16	25	86.392342	23.772024	0.924	0.932	168.883	8.623	8.129	5.48	86.12	158.08	-85.36	899	738	-0.794	152.154
1195711500	A	2007	11	21	20	05	86.097397	23.681507	0.875	0.880	177.014	8.070	7.639	1.60	-94.08	151.09	88.66	122	694	-0.793	149.550
1195539300	A	2007	11	19	20	15	86.103180	23.686689	0.927	0.937	177.016	8.209	7.753	27.31	-80.16	148.05	88.92	1024	978	-0.784	121.628
1194835500	T	2007	11	11	16	45	82.753380	24.148623	0.905	0.924	168.793	8.484	8.018	4.06	-97.12	158.54	-76.12	272	632	-0.793	162.133
1194663300	T	2007	11	09	16	55	82.755974	24.144241	0.968	0.938	168.793	8.520	8.041	29.32	-98.38	161.06	-71.92	1168	354	-0.791	165.558
1194574200	T	2007	11	08	16	10	87.235504	23.556698	0.801	0.918	168.867	8.568	7.987	24.95	79.13	155.56	-79.04	1910	952	-0.794	130.494
1194501000	A	2007	11	07	19	50	86.095741	23.680073	1.052	1.275	177.023	8.452	7.875	24.95	99.06	152.35	79.37	1210	401	-0.721	171.188
1194329100	A	2007	11	05	20	05	86.399284	23.771706	0.979	1.004	177.025	8.763	8.120	4.00	-84.86	149.08	80.86	93	721	-0.780	145.247
1194230100	T	2007	11	04	16	35	82.750717	24.146837	0.990	1.054	168.793	8.514	8.023	9.57	80.90	156.47	-73.63	1864	783	-0.768	146.609
1194230100	T	2007	11	04	16	35	86.391319	23.769669	0.978	0.971	168.793	8.817	8.180	21.37	-99.12	159.68	-70.58	1768	441	-0.788	169.724
1194156900	A	2007	11	03	20	15	82.761208	24.149549	0.969	1.003	177.026	8.410	7.951	1.71	101.93	149.31	78.32	1035	658	-0.776	151.425
1194156900	A	2007	11	03	20	15	86.102310	23.687292	0.924	0.964	177.026	8.520	7.933	27.31	-79.35	146.39	81.30	1028	978	-0.783	120.569
1194058200	T	2007	11	02	16	50	82.754509	24.145805	0.965	1.001	168.793	8.618	8.071	17.68	-98.95	158.82	-68.04	756	481	-0.779	169.071

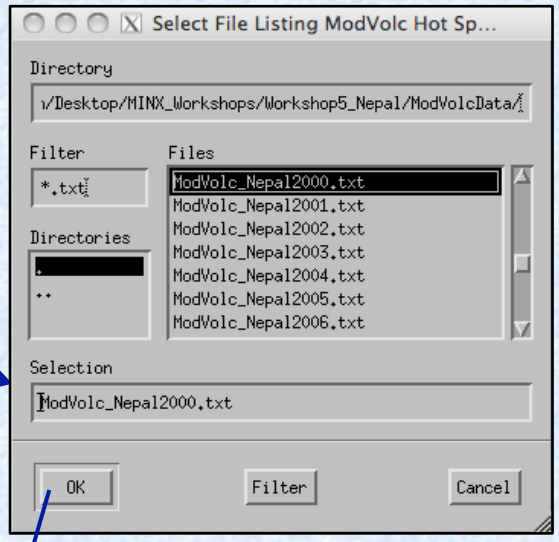
"Sat" column refers to satellite name, where T = Terra and A = Aqua.

Columns enclosed in red are used by MINX.

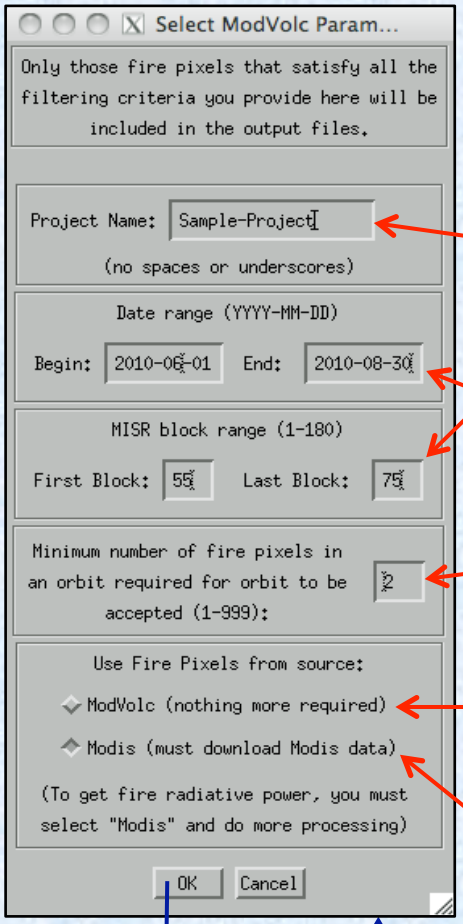
① Process ModVolc Fire Pixel File – MINX Processing - 1

Select "Process ModVolc Fire Pixel File" from the Plume Utilities dialog box to show another dialog box requesting the name of the file that contains fire pixel data downloaded from the ModVolc website.





Select your ModVolc fire pixel file and click "OK" to show a dialog box requesting the name of the directory where all output files will be written.



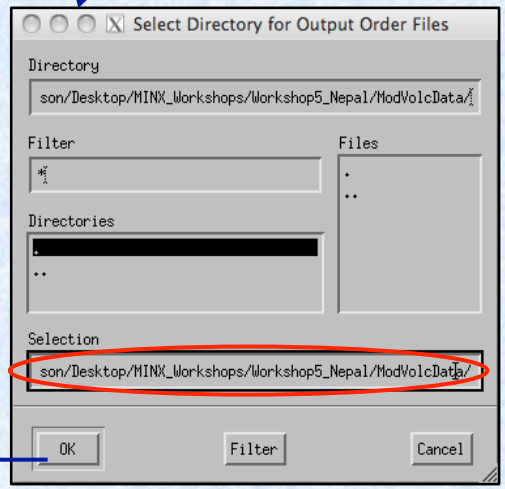
Use a consistent project name throughout. MINX will replace space and underscore characters with a dash (-).

Enter date range and MISR block range for project. These will be used to filter out input fire pixels that don't qualify. Block number is an effective proxy for latitude.

To exclude MISR orbits with a very small number of fire pixels, enter a number larger than 1.

To show fire pixel locations on MISR images but not have access to fire power, then choose "ModVolc". This is processing alternative ①.

To retrieve MODIS fire power when you digitize plumes, choose "MODIS". This is processing alternative ③.



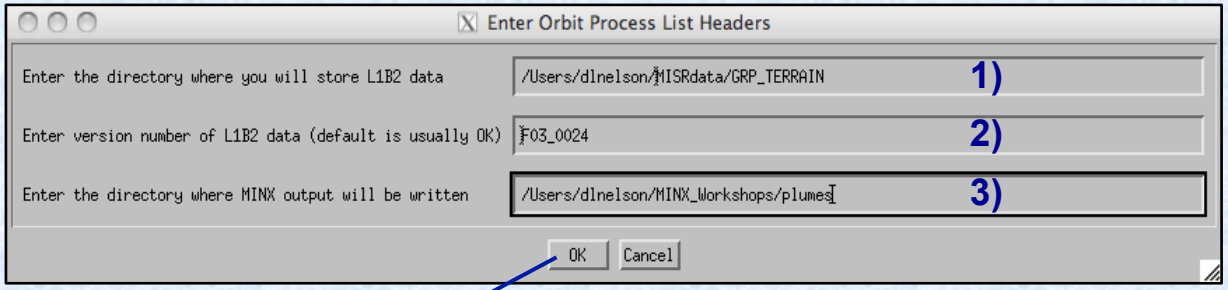
Enter your output directory and click "OK" to show a dialog box requesting ModVolc project parameters.

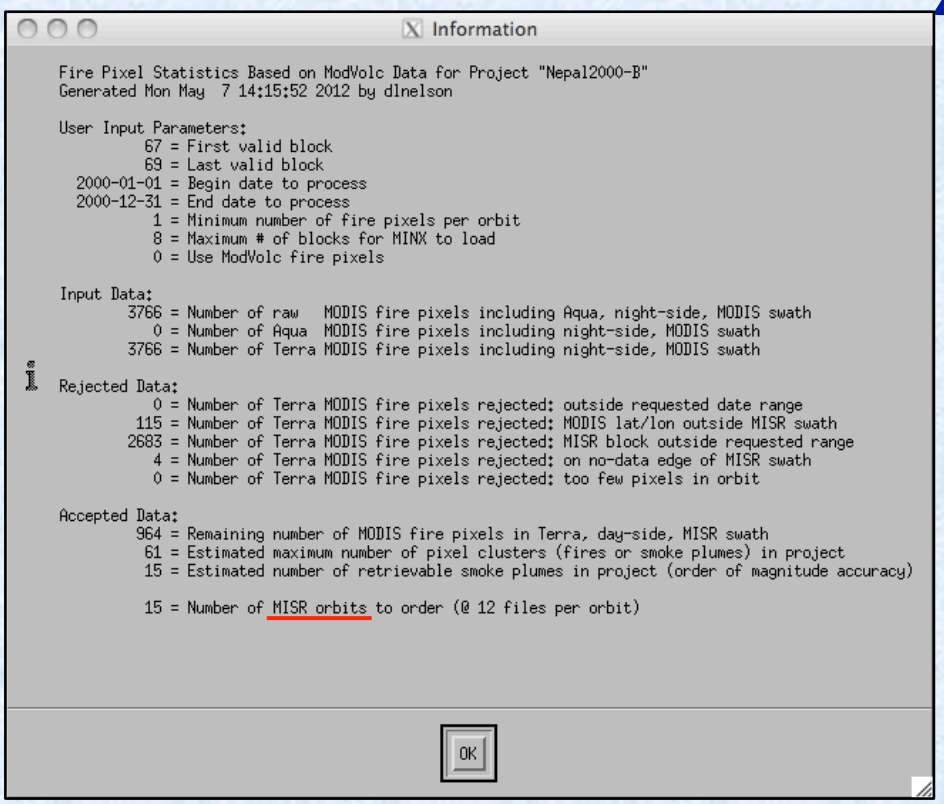
Next slide

① Process ModVolc Fire Pixel File - MINX Processing - 2

If you selected “ModVolc” in the previous dialog box, “Select ModVolc Parameters”, you will see these dialog boxes next.

If you selected “MODIS”, skip to the section describing alternative ③.





The above parameters are written into the top of the “MisrProcessList-ByModvolc_<project>.txt” file(you can edit these values later):

1) **The full directory name where you expect to store downloaded MISR GRP_TERRAIN or GRP_ELLIPSOID files for input to digitizing.**
2) **Version number of GRP_.... Files. Use the default version unless MISR reprocesses level 1 data.**
3) **Directory name where MINX images, graphs and raw data files from plume digitizing will be saved.**

After clicking OK in these dialog boxes, wait for processing to complete. Then look for your output files in the directory specified in the “Select Directory for Output Order Files” dialog (see previous slide):

- **MisrOrderList-ByModvolc_<project>.txt**
- **MisrProcessList-ByModvolc_<project>.txt**
- **FirePixReport-ByModvolc_<project>.log**
- **FirePixels-ByModvolc (directory)**

① Process ModVolc Fire Pixel File – Output Files

Sample orbit order list file:
MisrOrderList-ByModvolc_<project>.txt

```
49117,49219,49554,49627,49656,49685,49758,
49787,50384,50457,50486,50559,50588,50661,
50792,50821,50952
```

List of comma-separated MISR orbits that can be cut-and-pasted into the MISR "Order and Customization Tool" on the Langley DAAC website.

Sample project process list file:
MisrProcessList-ByModvolc_<project>.txt

```
/Users/dlnelson/MISRdata/GRP_TERRAIN
F03_0024
/Users/dlnelson/MINX_Workshops/plumes
 1658    67   69    2000-04-10     05:30:00
 1687    67   69    2000-04-12     05:20:00
 2095    66   69    2000-05-10     05:45:00
 2517    68   70    2000-06-08     05:15:00
 2561    68   70    2000-06-11     05:45:00
 2590    68   70    2000-06-13     05:30:00
 2692    68   70    2000-06-20     05:35:00
 2721    66   68    2000-06-22     05:25:00
 2750    68   70    2000-06-24     05:15:00
 2794    68   70    2000-06-27     05:45:00
 2823    67   70    2000-06-29     05:30:00
 2852    68   70    2000-07-01     05:20:00
 2954    66   70    2000-07-08     05:25:00
 5313    67   69    2000-12-17     05:10:00
 5386    66   68    2000-12-22     05:30:00
```

Rename this file to "PlumeProjOrbitList.txt" and copy it into your home directory. The file is automatically read when "Process Plume Project" is selected from the main MINX menu, and you can point-and-click to choose which MISR orbit to process.

These 3 file types are produced by fire pixel alternative ①. They are all that is required for MISR orbit selection and fire pixel detection.

Sample fire pixel file – one is produced per orbit:
FirePixels_02852_<project>.txt

```
Fire pixels from ModVolc project : Nepal2000
2852 / 141 / 2000-07-01   : orbit/path/date
 Longitude  Latitude Blk Samp Line
  degrees    degrees       0-based
  86.63058  26.82733  69 1534  249
  86.64109  26.82565  69 1538  249
  86.45438  26.72519  69 1475  297
  86.46477  26.72354  69 1479  297
  86.47516  26.72189  69 1483  297
  86.49596  26.71858  69 1491  298
  86.51679  26.71527  69 1498  298
  86.52721  26.71361  69 1502  299
  86.46581  26.70623  69 1480  304
  86.51787  26.69807  69 1499  305
  86.52831  26.69643  69 1503  305
  86.46407  26.69711  69 1480  308
  86.47447  26.69547  69 1484  308
  86.51611  26.68893  69 1499  309
  86.52654  26.68729  69 1503  309
  86.45192  26.68962  69 1476  311
  86.47271  26.68635  69 1484  312
  86.48312  26.68472  69 1487  312
  86.50394  26.68144  69 1495  312
  86.51437  26.67980  69 1499  313
```

During processing of plume heights by MINX, this file can be loaded, and each fire pixel location will automatically be posted on the MISR image as a red dot. Because ModVolc data include no fire radiative power, those values cannot be collected and archived during plume processing.

② Process MODIS MOD14 Fire Granules – Download Data - 1

If you intend to use the "Process MODIS MOD14 Fire Granules" option in MINX, you must first download MODIS hotspot data for your project by following these steps:

1) Determine your project's geographic and date ranges.
2) Go to website: http://reverb.echo.nasa.gov/reverb.
3) Register to download data if you haven't and "Sign In".
4) Pan and zoom the map to center your project area.
5) Select "Bounding Box", "Polygon" or other method and outline your project area using the mouse.
6) Enter MODIS MOD14 in the "Search Terms" box.
7) Check the box by "MODIS/Terra Thermal Anomalies/Fire 5-Min L2 Swath 1km V005".
8) Specify your starting and ending dates and times.
9) Click the "Search for Granules" button at the bottom and wait for the search to finish.

You can download a maximum of 2000 granules at a time. If you exceed this, you can break the project into several smaller time periods.

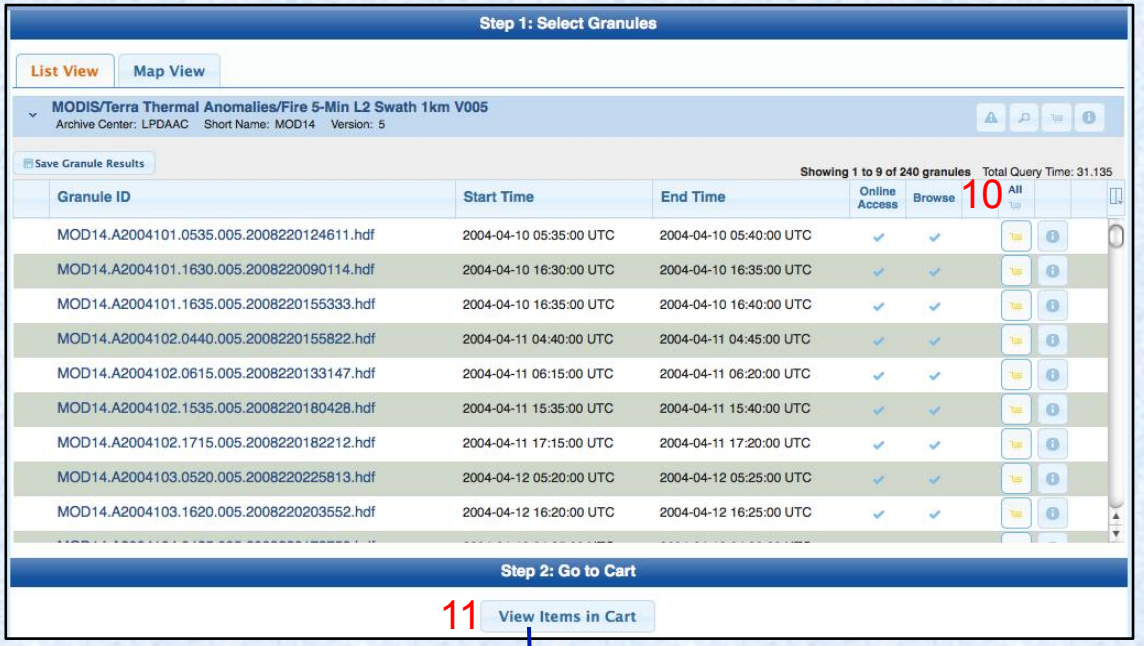
② Process MODIS MOD14 Fire Granules – Download Data - 2

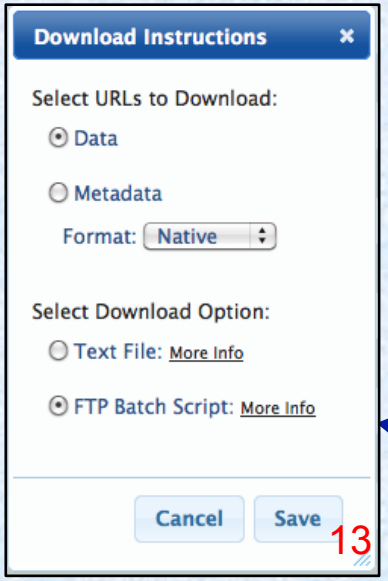
10) Click “All” above the cart symbol column to select all granules, and wait for the search to complete.

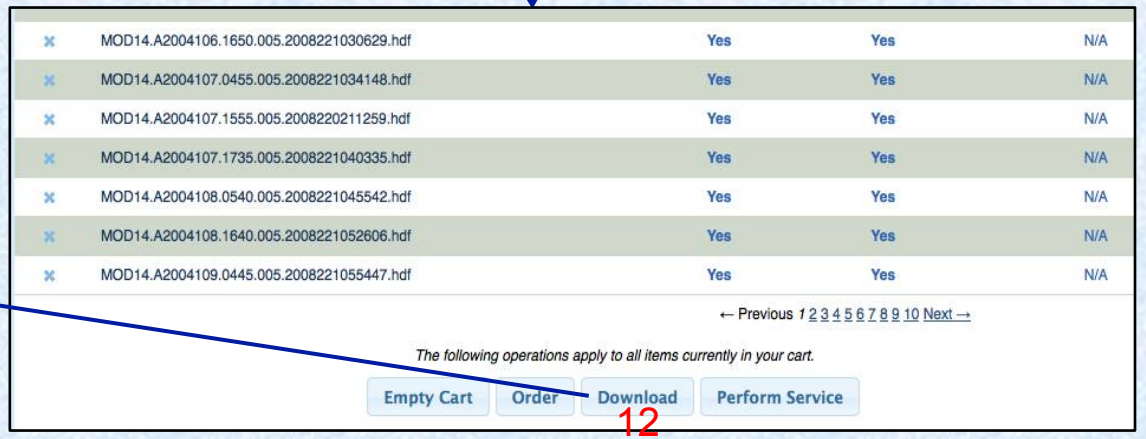
11) Click the “View Items in Cart” button when ready.

12) When the cart list appears, click the “Download” button, not the “Order” button.

13) On the “Download Instructions” dialog box, select “Data”, “Native” format and “FTP Batch Script” and click “Save”. Accept file download.







The Reverb website may, in the near future, convert from ftp to http downloads. It is not known at this time how the procedure documented here will be affected. Check the Open Channel Foundation website periodically for MINX updates should this occur.

② Process MODIS MOD14 Fire Granules – Download Data - 3

The MODIS file you downloaded from the Reverb site should contain text that looks like the sample below. Only the files with extension .hdf are required. You may delete the .jpg and .xml files before downloading to save download time. On Windows, use WordPad, not TextEdit, to view or edit the file.

```
open e4ftl01.cr.usgs.gov
user anonymous user@example.com
bin
get MODIS_Dailies_C/MOLT/MOD14.005/2008.10.01/MOD14.A2008275.0120.005.2009125054635.hdf MOD14.A2008275.0120.005.2009125054635.hdf
get WORKING/BRWS/Browse.001/2009.05.05/BROWSE.MOD14.A2008275.0120.005.2009125054635.1.jpg BROWSE.MOD14.A2008275.0120.005.2009125054635.1.jpg
get MODIS_Dailies_C/MOLT/MOD14.005/2008.10.01/MOD14.A2008275.0120.005.2009125054635.hdf.xml MOD14.A2008275.0120.005.2009125054635.hdf.xml
get MODIS_Dailies_C/MOLT/MOD14.005/2008.10.01/MOD14.A2008275.0125.005.2009125053601.hdf MOD14.A2008275.0125.005.2009125053601.hdf
get WORKING/BRWS/Browse.001/2009.05.05/BROWSE.MOD14.A2008275.0125.005.2009125053601.1.jpg BROWSE.MOD14.A2008275.0125.005.2009125053601.1.jpg
get MODIS_Dailies_C/MOLT/MOD14.005/2008.10.01/MOD14.A2008275.0125.005.2009125053601.hdf.xml MOD14.A2008275.0125.005.2009125053601.hdf.xml
……..
```

- **Before you pull your order using ftp, create a directory to contain the MODIS granules.**
- **Move the file you downloaded from the Reverb website into the new directory.**
- **Change your current working directory to the new directory.**
- **Edit the file to change "user@example.com" in line 2 to your email address.**
- **When you are ready to pick up your order:**

On a MAC or Linux

- **Open a terminal window.**
- **Enter this command on a Mac:**
  ftp –a < <download_filename>
- **Enter this command on Linux:**
  ftp –n < <download_filename>

On Windows Vista and 7

- **Click the "Start" button.**
- **Type "cmd" in the search bar and hit "Return".**
- **Enter this command:**
  ftp –n –s:<download_filename>

On Windows XP

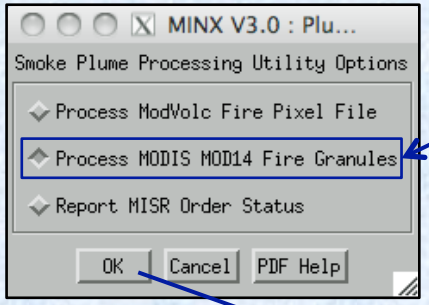
- **Click "Start", then "Run…".**
- **Type "cmd" and press OK to create a command window.**
- **Enter this command:**
  ftp –n –s:<download_filename>

(If this fails, see the final slide.)

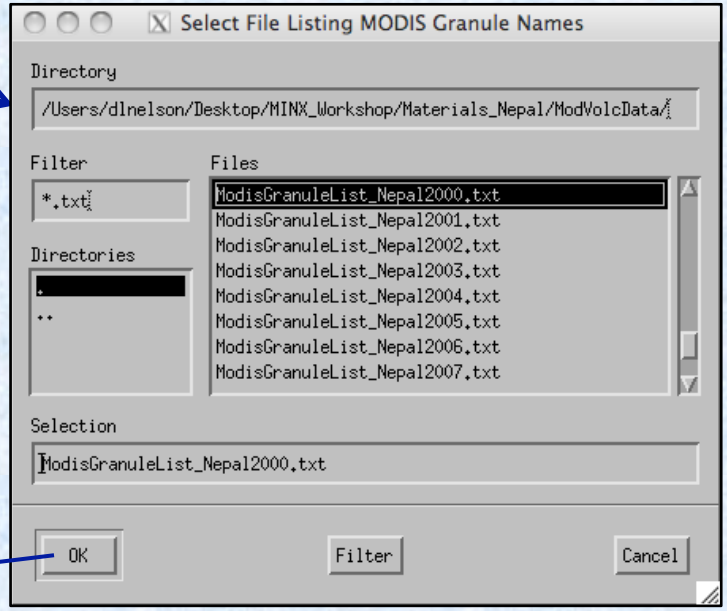
- **When all your MODIS granules have been received, proceed to the next slide.**
- **Notes – Depending on your particular ftp client program, you may need to modify the ftp command. If there are space characters in your <download_filename>, enclose it in double quotes.**

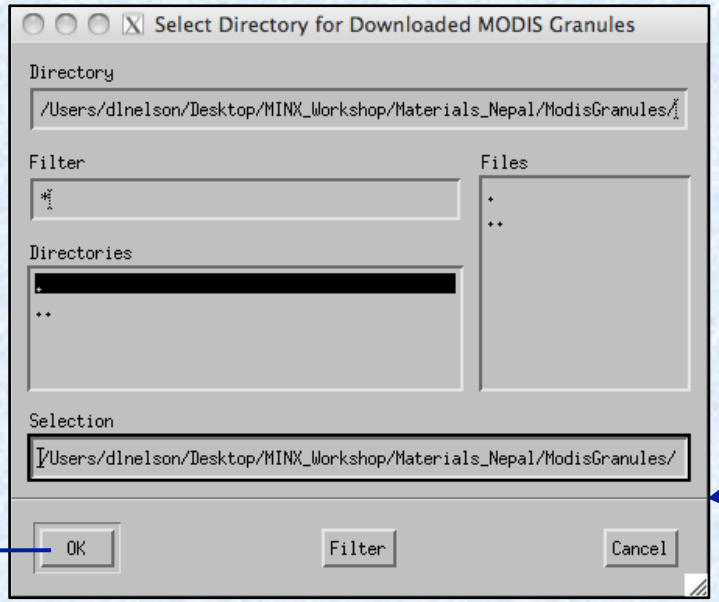
② Process MODIS MOD14 Fire Granules – MINX Processing - 1

Select "Process MODIS MOD14 Fire Granules" from the Plume Utilities dialog box to show another dialog box requesting the name of the file containing the names of MODIS granules downloaded from the Reverb website.



Also select this option from the MINX "Plume Utilities" menu after you have downloaded MODIS granules using processing alternative ③.





Next slide

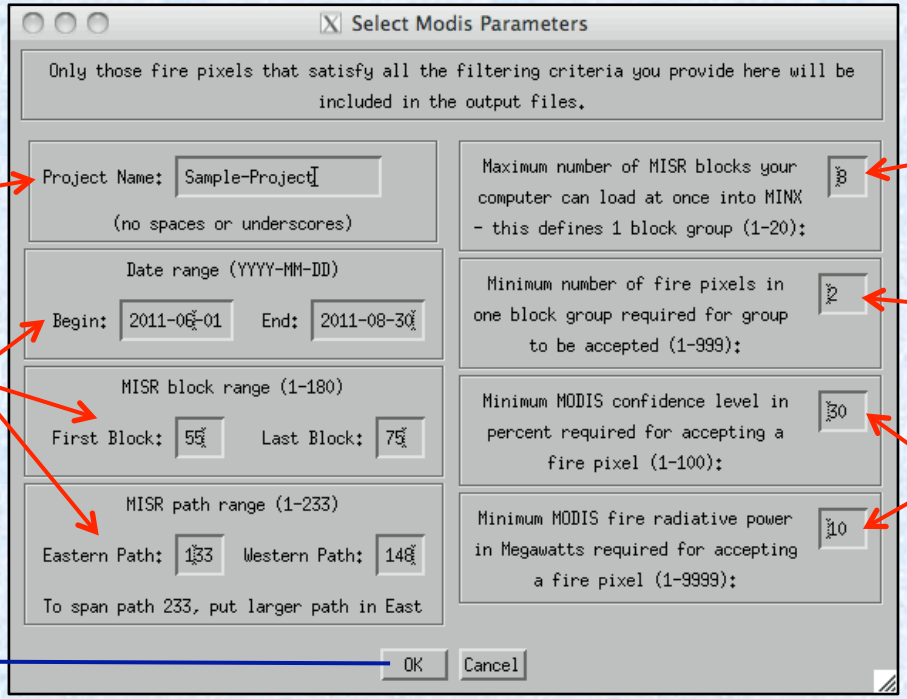
Enter the name of the directory where you stored your downloaded MODIS granules, and click "OK" to show a dialog box requesting MODIS project parameters.

Select your MODIS granule name file and click "OK" to show a dialog box requesting the name of the directory where your MODIS granules were written.

② Process MODIS MOD14 Fire Granules – MINX Processing - 2

Use a consistent project name throughout. MINX will replace space and underscore characters with a dash (-).

Enter the date range, MISR block range and MISR path range for the project. Fire pixels that don't fall within these ranges will be filtered out.



Each block group will contain no more blocks than the number you specify here. See explanation below.

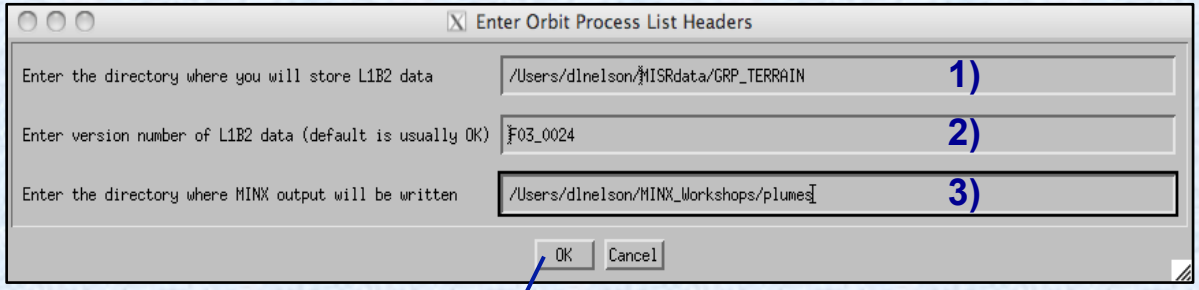
To filter out block groups with a small number of fire pixels, enter a number larger than 1.

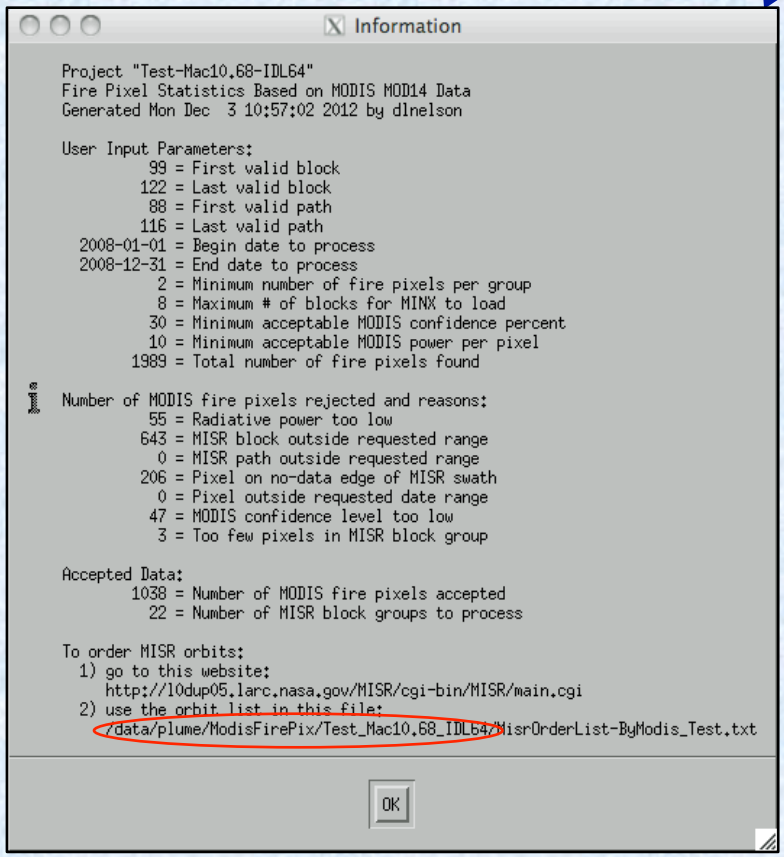
MODIS confidence level and fire power can be used to filter out fire pixels. Fire pixels with values less than those entered here will be excluded.

Next slide

- **Block number is a proxy for latitude and path is a proxy for longitude. You can determine the best values for these by testing different paths in the "Show Orbit Location" option on the MINX main menu.**
- **Path numbers increase from east to west as a consequence of Terra's sun-synchronous orbit. Paths 1 and 233 (the largest path number) meet over the western Atlantic.**
- **For projects that include MISR paths 1 and 233, path numbers should be entered with the larger path number in the east.**
- **Because MISR data sets are very large, a limited number of blocks can be loaded into MINX at once, depending on your computer. If there are fire pixels on a large range of blocks in one orbit, MINX will break the orbit into separate block groups. These block groups appear, one to a line, in the output file named : MisrProcessList-ByModis_<project>.txt.**

② Process MODIS MOD14 Fire Granules – MINX Processing - 3





The parameters you enter here are written into the top of the file named MisrProcessList-ByModis_<project>.txt (you can edit these values later):

1) **The full directory name where you expect to store downloaded MISR GRP_TERRAIN or GRP_ELLIPSOID files for input to digitizing.**
2) **Version number of GRP_.... Files. Use the default version unless MISR reprocesses level 1 data at a later time.**
3) **Name of the directory where MINX images, graphs and raw data files from plume digitizing will be saved.**

After clicking OK, wait for processing to complete. Then look for your output files in the directory at the bottom of the Information window:

- **MisrOrderList-ByModis_<project>.txt**
- **MisrProcessList-ByModis_<project>.txt**
- **FirePixReport-ByModis_<project>.log**
- **FirePixels-ByModis (directory containing fire pixel files)**

② Process Modis Fire Pixel File – Output Files

Sample orbit order list file:
MisrOrderList-ByModis_<project>.txt

```
44324,45853,46056,46478,46580,46595,46682,
46785,46887,46916,47046,47120,47149,47177,
47789,47819,47848,47876,47978
```

List of comma-separated MISR orbits that can be cut-and-pasted into the MISR "Order and Customization Tool" on the Langley DAAC website.

Sample project process list file:
MisrProcessList-ByModis_<project>.txt

```
/Users/dlnelson/MISRdata/GRP_TERRAIN
F03_0024
/Users/dlnelson/MINX_Workshops/plumes
 44324    103   106      2008-04-18      01:55:36
 44324    116   118      2008-04-18      01:55:36
 45853    102   106      2008-08-01      01:49:40
 46056    109   115      2008-08-15      00:23:12
 46478    110   113      2008-09-12      23:52:20
 46580    110   115      2008-09-19      23:58:31
 46595    100   106      2008-09-21      00:41:46
 46595    106   109      2008-09-21      00:41:46
 46682    107   114      2008-09-27      00:04:40
 46682    113   118      2008-09-27      00:04:40
 46785    101   106      2008-10-04      01:49:43
 46887    102   105      2008-10-11      01:55:51
 46916    100   107      2008-10-13      01:43:29
 47046    109   115      2008-10-21      23:58:22
 47120    102   109      2008-10-27      01:55:45
 47149    102   107      2008-10-29      01:43:23
...
```

Block groups

Rename this file to "PlumeProjOrbitList.txt" and copy it into your home directory. The file is automatically read when "Process Plume Project" is selected from the main MINX menu, and you can point-and-click to choose which orbit to process.

These 3 file types are produced by fire pixel alternative ②. They are all that is required for MISR orbit selection and fire pixel detection.

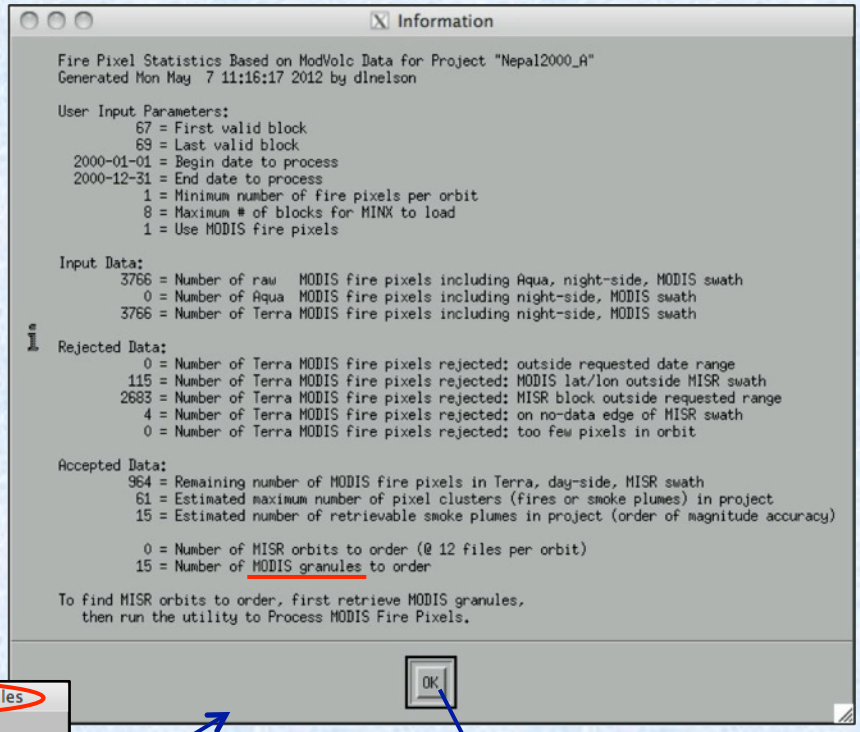
Sample fire pixel file - one is produced per MISR orbit:
FirePixels_02852_<project>.txt

```
Fire pixels from MODIS granules on 275m MISR SOM grid for project : Test-Mac10.68-IDL64
44324 / 109 / 2008-04-18   : orbitnum / pathnum / date
 Longitude   Latitude Blk Samp Line   Power  BTmpR2 BTmpT21 BTmpT31 BBTmpT21 BBTmpT31 Conf
  degrees     degrees      0-based    MWatt  reflec fire(k) fire(k) bkgnd(k) bkgnd(k)   %
 126.12141 -16.46974 104 1469   19    32.7   0.176  336.2   308.4    312.5    307.6    87
 126.14466 -16.98726 104 1495  226    17.0   0.182  325.1   308.3    311.1    307.2    74
 126.17412 -17.45087 104 1521  411    11.1   0.172  322.2   310.7    313.1    309.4    55
 124.78822 -17.26045 104  981  378    13.2   0.137  326.4   313.6    315.5    311.2    71
 124.77747 -17.26805 104  977  382    21.8   0.165  333.7   312.1    317.7    312.0    86
 124.75736 -17.27426 104  969  385    11.4   0.160  324.1   311.7    314.4    310.2    51
 124.79194 -17.29778 104  983  393    15.2   0.164  326.0   312.3    313.2    309.3    70
 126.12694 -17.50045 104 1504  432    28.3   0.121  335.0   314.1    315.2    310.2    87
 126.14648 -17.50322 104 1512  433    11.1   0.181  322.8   310.0    313.8    309.8    44
 126.12560 -17.50963 104 1504  436    36.3   0.173  339.0   310.2    314.6    309.9    89
 124.41653 -17.57336 105  912    4    34.3   0.180  338.5   311.9    313.6    309.6    89
 124.41510 -17.58236 105  912    8    21.9   0.221  332.0   311.5    315.2    310.8    77
 124.50326 -17.63237 105  948   25    12.4   0.123  325.3   313.3    314.9    310.9    59
 124.51264 -17.63377 105  952   25    13.9   0.160  326.8   312.0    315.6    311.1    59
 125.53361 -17.92106 105 1354  107    16.2   0.164  330.6   315.5    318.7    314.5    83
 126.65521 -18.30927 105 1796  229    18.6   0.153  329.4   313.9    316.8    312.7    75
 126.66620 -18.33519 105 1801  239    17.8   0.132  327.6   315.9    315.1    310.6    59
 126.67660 -18.33659 105 1805  240    18.2   0.166  327.7   314.1    314.9    310.6    63
 126.64391 -18.34180 105 1793  243   160.3   0.165  377.8   312.4    314.3    310.3   100
 126.65424 -18.34320 105 1797  243   124.9   0.168  369.5   313.8    315.6    310.6   100
 126.66479 -18.34462 105 1801  243    43.3   0.166  341.2   314.5    315.2    310.7    90
 126.67519 -18.34603 105 1805  243    19.7   0.182  328.5   312.1    314.8    310.6    70
...
```

When you later use either the "Process Plume Project" or "Animate Cameras" option on the MINX main menu to retrieve plume heights, this file can be loaded from the "Select Digitizing Tool" option on the "Task Menu", and each fire pixel location will be posted automatically on the MISR image as a red dot. Because fire pixel data from MODIS granules include fire radiative power, power values at locations inside a digitized plume will be collected and archived during plume processing.

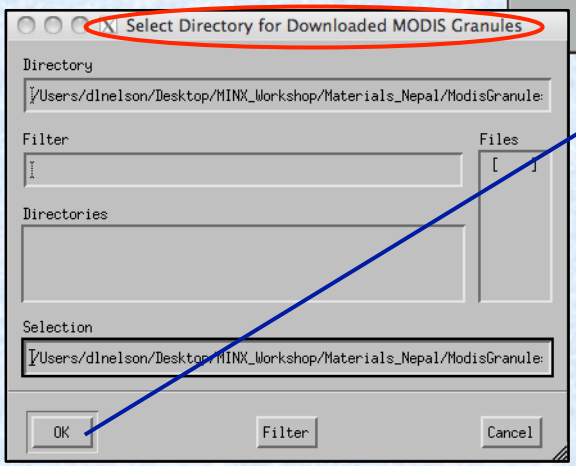
③ Process ModVolc Fire Pixel File/ Process MODIS MOD14 Fire Granules - MINX Processing

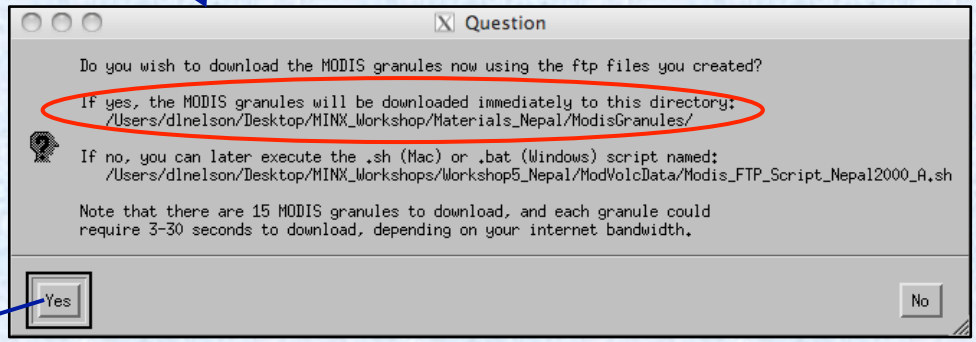
If you selected "MODIS" in the "Select ModVolc Parameters" dialog box from processing alternative ①, you will see these dialog boxes next.



The "Information" message box tells you how many fire pixels were filtered out and why. It also tells how many MODIS granules need to be ordered.

Select the directory where MODIS granules will be downloaded and click "OK" to show results of filtering.





The "Question" message box allows you to automatically download MODIS granules now - or use the saved ftp script file to download later.

Next slide

③ Process ModVolc Fire Pixel File/ Process MODIS MOD14 Fire Granules - Output Files - 1

- Files MisrOrderList-ByModvolcModis_<project>.txt and MisrProcessList-ByModvolcModis_<project>.txt are created just as they were for "Process ModVolc Fire Pixel Files" (see ① Output Files).
- Two additional files are created to assist in downloading MODIS granules: a ftp script file and a file containing a list of MODIS granules to be downloaded.

Sample of ftp script file created on Mac: Modis_FTPscript-ByModvolcModis_<project>.sh

```
cd "/Users/dlnelson/Modvolc_Australia/MINX_OSX/MOD14/"
ftp -a < "/Users/dlnelson/ModVolcData/ModisGranuleList-ByModvolcModis_Nepal2000.txt"
```

Sample of ftp script file created on PC: Modis_FTPscript-ByModvolcModis_<project>.bat

```
cd /d "\Host\Users\dlnelson\ModVolc_Australia\MINX_Windows\MOD14\"
ftp -n -s:"/Users/dlnelson/ModVolcData/ModisGranuleList-ByModvolcModis_Nepal2000.txt"
```

- Executing the ftp script file from the MODIS granule directory will download the files listed in the MODIS granule file to that directory.
- MINX will complete the download automatically if you answer "Yes" in the "Question" message box on the preceding slide.
- If you answer "No" you must later open a command window and enter "source <script file> on a Mac or Unix system or simply "<script file>" on a Windows machine.
- When all your MODIS granules have been received, go back to slide 11 entitled "Process MODIS MOD14 Fire Granules – MINX Processing – 1" and follow those instructions to finish.

```
open e4ftl01.cr.usgs.gov
user anonymous user@example.com
bin
prompt
cd MOLT/MOD14.005/
cd 2000.04.10/
mget MOD14.A2000101.0530.005.*.hdf
cd ../2000.04.12/
mget MOD14.A2000103.0520.005.*.hdf
cd ../2000.05.10/
mget MOD14.A2000131.0545.005.*.hdf
cd ../2000.06.08/
mget MOD14.A2000160.0515.005.*.hdf
……......
bye
```

Sample of MODIS granule list file: ModisGranuleList-ByModvolcModis_<project>.txt

Using Fire Pixel Data in MINX Height Retrievals and FTP Notes.

When you later use either the "Process Plume Project" or "Animate Cameras" option on the MINX main menu to retrieve plume heights, this file can be loaded from the "Select Digitizing Tool" option on the "Task Menu", and each fire pixel location will be posted automatically on the MISR image as a red dot. Because fire pixel data from MODIS granules include fire radiative power, power values at locations inside a digitized plume will be collected and archived during plume processing.

Sample fire pixel file for one orbit: FirePixels_01658_<project>.txt

Fire pixels from MODIS granules on 275m MISR SOM grid for project : Nepal2000
1658 / 143 / 2000-04-10 : orbit / path / date

Longitude degrees	Latitude degrees	Blk	Samp 0-based	Line 0-based	Power MWatt	BTmpR2 reflec	BTmpT21 fire(k)	BTmpT31 fire(k)	BBTmpT21 bkgnd(k)	BBTmpT31 bkgnd(k)	Conf %
81.68207	29.00411	67	653	470	17.2	0.236	320.5	297.8	303.8	297.7	60
80.44640	28.95329	68	282	19	15.4	0.225	323.3	306.6	311.4	305.6	76
80.57449	28.90775	68	329	33	11.8	0.216	320.3	305.3	310.5	304.9	72
80.70905	28.85212	68	379	51	8.2	0.203	317.5	306.4	310.3	305.3	59
80.57658	28.86023	68	332	52	10.0	0.219	321.2	307.2	313.3	307.2	72
84.46432	28.28295	68	1732	140	16.5	0.188	314.8	295.7	298.6	293.9	41
80.91257	28.79835	68	453	66	16.4	0.222	324.9	305.8	311.8	305.6	47
80.85776	28.79649	68	433	69	8.9	0.205	320.1	308.3	312.7	306.9	44
80.45261	28.83216	68	289	67	8.8	0.241	321.8	308.3	315.1	308.5	74
84.24374	28.18143	68	1658	190	11.2	0.192	318.8	301.4	309.3	302.5	62
84.26181	28.15952	68	1666	198	9.6	0.199	316.6	303.5	308.1	301.9	42
84.35287	28.11608	68	1700	211	13.3	0.211	321.7	303.0	311.1	304.4	56
81.34144	28.49936	68	616	172	16.3	0.197	327.5	309.1	314.7	308.5	65

Unlike ModVolc files, fire pixel files derived from MODIS granules contain fire radiative power, brightness temperatures and a confidence metric.

Notes on using ftp:

If you use Windows and your version is newer than XP, you should be able to use Windows built-in command line ftp program. If you have problems, ensure your internet connection uses passive mode.

If you use Windows XP and your command line ftp does not work, it may be because it does not allow for passive mode. Instead:

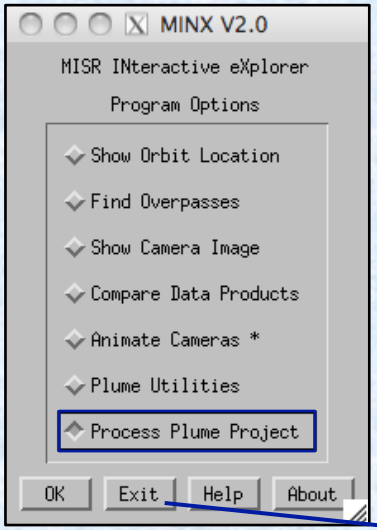
- Download and unzip this file ftp://ftp.gnu.org/old-gnu/emacs/windows/contrib/ftp-for-win32.zip.
- Copy extracted file "ftp.exe" from the Release subdirectory into your MODIS download directory.
- Change directory to the MODIS download directory, and enter this on the DOS command line to download:
  ftp –n < <download_filename>.

There are many variations on ftp programs. If the instructions in this document don't work for you, you need to determine how best to download MODIS data with your OS and installed ftp version.

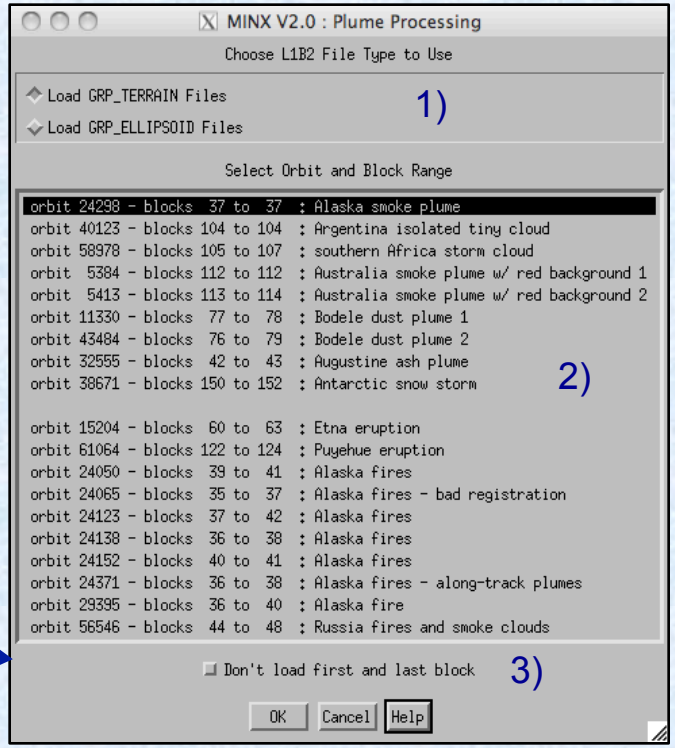
Process Plume Project

Process Plume Project - 1

Objective: To enable a plume digitizing project comprising many orbits to be processed more rapidly by allowing a user to select orbits from a list and bypass multiple MINX dialog boxes.



- Click "OK" and MINX searches for and reads a file with mandatory name "PlumeProjOrbitList.txt" and mandatory location: home directory.
- The file can be created automatically (refer to the documentation for "Plume Utilities") or it can be hand-coded to contain a list of frequently used orbits/blocks.
- If the file is not present or cannot be read, MINX will prompt the user with the format to use to create file.



1) Select the type of level 1 radiance imagery you want to load. Always use Terrain data if the plume is over land – if over water, then it's OK to use Ellipsoid data.
2) Highlight an entry from this list - when you click "OK", nine MISR camera images for the selected orbit and block range will be loaded and displayed without showing any other file selection dialogs.
3) Checking "Don't load first and last block" instructs MINX to load the block range for the selected orbit minus the first and last blocks. This is useful for reducing load time when you want to quickly inspect a scene.

Process Plume Project - 2

- File PlumeProjOrbitList.txt can be created automatically by Plume Utilities, or you can create the file with a text editor.
- The file must contain 3 lines of header plus a list of orbits to choose for processing. Do not create this file with an editor that inserts invisible formatting characters.
- The header lines must be:
  1. One or two directory names where GRP_TERRAIN and GRP_ELLIPSOID files are located. Use two names in the order above if you need to use both files types AND if they are stored in different locations. Separate the names by at least one space character or tab.
  2. Version string for GRP_TERRAIN and/or GRP_ELLIPSOID files (F03_0024 is latest as of 12/2012).
  3. Directory where MINX output data and images will be written.
- Each successive line contains information for one orbit in the following order in free format with items separated by space characters or tabs:

  OrbitNumber BeginBlockNumber EndBlockNumber Comments
- The comments field may contain spaces and is optional. Blank lines may be included in orbit list.

```
/Users/dlnelson/MISRdata/GRP_TERRAIN  /Users/dlnelson/MISRdata/GRP_ELLIPSOID
F03_0024
/Users/dlnelson/MINX_output
 58978 105 107  southern Argentina isolated tiny cloud
 24298  37  37  Alaska smoke plume
 40123 104 104  Africa storm cloud
  5384 112 112  Australia smoke plume w/ red background
 43484  76  79  Bodele dust plume 2
 38671 150 152  Antarctic snow storm

 15204  60  63  Etna eruption over Mediterranean – use ellipsoid
 32555  42  43  Augustine ash plume
 61064 122 124  Puyehue eruption
```

Sample hand-coded PlumeProjOrbitList.txt file