

ENVI Tutorial: Working with ENVI Zoom

Table of Contents

OVERVIEW OF THIS TUTORIAL	2
<i>Files Used in This Tutorial</i>	2
STARTING ENVI ZOOM.....	2
SETTING PREFERENCES.....	2
OPENING AND DISPLAYING AN IMAGE	2
WORKING WITH THE DATA MANAGER	3
WORKING WITH LAYERS.....	3
<i>Reordering Layers</i>	3
<i>Hiding Layers</i>	4
EXPLORING THE ENVI ZOOM INTERFACE	4
USING DISPLAY TOOLS	5
WORKING WITH THE OVERVIEW WINDOW	5
PERFORMING RX ANOMALY DETECTION.....	6
WORKING WITH A PORTAL.....	7
<i>Pinning the Portal to the Image</i>	7
<i>Working with Blend, Flicker, and Swipe</i>	8
Blending	8
Flickering	8
Swiping.....	8
CHIPPING AND SAVING	9
RESETTING PREFERENCES AND CLOSING ENVI ZOOM.....	9

Overview of This Tutorial

In this tutorial, you will use ENVI Zoom to display a hyperspectral image of Jasper Ridge, California, and enhance, zoom, pan, and rotate the image. You will perform RX anomaly detection on the scene to identify anomalous spectral targets. You will create a Portal over a target of interest and compare it to the original scene using blend, flicker, and swipe tools. Finally, you will use **Chip from Display** to take a screen capture of the image and save it to JPEG format.

Files Used in This Tutorial

ENVI Tutorial Data DVD: `envidata\jsp99hym`

File	Description
<code>jsp99hym.eff</code>	HyMap apparent reflectance data, Jasper Ridge, California, USA

1999 HyMap data of Jasper Ridge, California, used for the tutorial are copyright 1999 Analytical Imaging and Geophysics (AIG) and HyVista Corporation (All Rights Reserved), and may not be redistributed without explicit permission from AIG (info@aigllc.com).

Starting ENVI Zoom


- Windows: Select **Start** → **Programs** → **ENVI x.x** → **ENVI Zoom**.
- UNIX: Type `envizoom` at the UNIX command line.

Setting Preferences

By default when you open a file, ENVI Zoom attempts to automatically display a true color or gray scale image based on your file type. For this tutorial, you will change this preference and display the Data Manager.

1. From the menu bar, select **File** → **Preferences**. The ENVI Zoom Preferences dialog appears.
2. On the left side of the dialog, select **Data Manager**.
3. On the right side of the dialog, double click the **Auto Display Method for Multispectral Files** field and select **CIR** (color infrared). This will cause image files to be displayed as color infrared by default.
4. Double-click the **Launch Data Manager After File/Open** field, and select **Always**. This will change the preference and allow the Data Manager to be viewed every time a file is opened.
5. Ensure the following settings are selected:
 - **Auto Display Files On Open = True**
 - **Clear Display When Loading New Data = False**
 - **Close Data Manager After Loading New Data = False**.
6. Click **OK** in the ENVI Zoom Preferences dialog to save these preferences.

Opening and Displaying an Image

1. Click the **Open** button  on the toolbar. The Open dialog appears.
2. Navigate to `envidata\jsp99hym` and open `jsp99hym.eff`. Because of the preferences you set in the previous step, the image is automatically displayed as color-infrared (CIR) and the Data Manager is displayed.

Working with the Data Manager

The Data Manager lists the files that you have opened and makes them accessible to load into your display. When you open a file in ENVI Zoom, a new item is added to the top of the Data Manager tree. You can open multiple files in one ENVI Zoom session, and you can choose which of those files to display and how to display them using the Data Manager.

1. When you click on band names in the Data Manager, color gun assignments automatically cycle through red, green, then blue (in that order). Experiment with selecting different band combinations. Click the band name you want to assign to red. A red box appears next to the band name.

2. Repeat for the green and blue bands.

If one band is assigned multiple colors, a split box appears next to the band name, showing the colors.

You must click **Load Data** each time to see the new band combination.

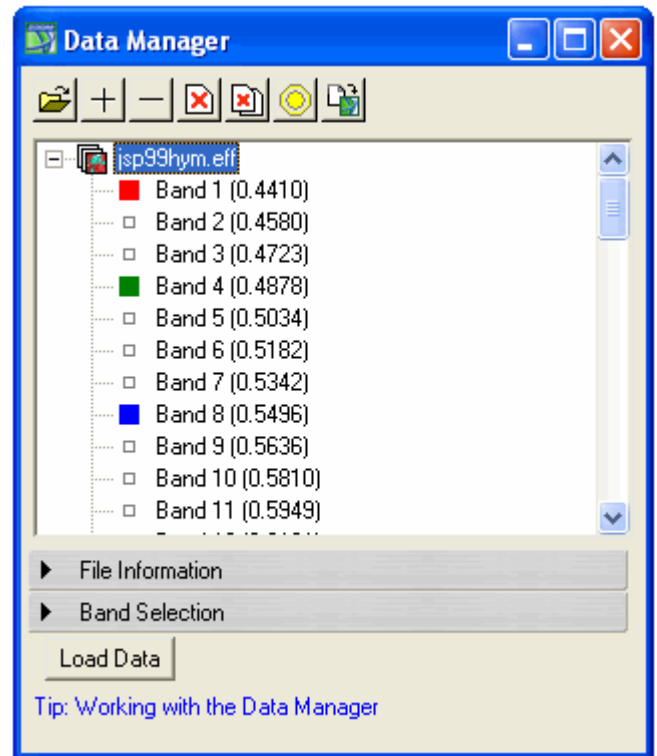
3. You originally had a CIR image loaded into the Image window. In the Data Manager, right-click on the filename (**jsp99hym.eff**) and select **Load True Color**. ENVI Zoom determines the proper bands to load a true-color image into the Image window.

4. Click the **Tip: Working with the Data Manager** link at the bottom of the Data Manager. You will find quick access to helpful tips throughout ENVI Zoom. These tips provide links to the ENVI Zoom Help, which is also accessible via the **Help** toolbar button or **Help** menu.

5. Close the ENVI Zoom Help (use the **X** at the top right of the dialog window).

6. Explore the toolbar buttons on the Data Manager. From the Data Manager toolbar, you can open new files, expand and collapse files, close files, and “pin” the Data Manager to keep it on the screen or “unpin” it to have it automatically close when you load a file into the display.

7. Close the Data Manager (use the **X** on the top right of the dialog window).



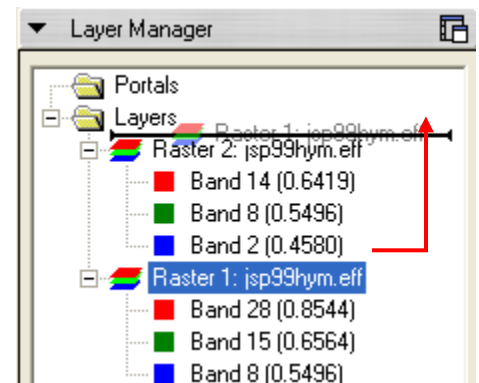
Working with Layers

You can load multiple layers into ENVI Zoom at one time and manage those layers using the Layer Manager. In the last exercise, you created separate true color and color infrared layers for the same file. Both are displayed in the Layer Manager.

Reordering Layers

You can control the order of layers in the Image and Overview windows by dragging and dropping layers in the Layer Manager tree or by using menu options (which you will use in a later exercise).

1. Click and drag **Raster1: jsp99hym.eff** in the Layer Manager above **Raster 2: jsp99hym.eff**.



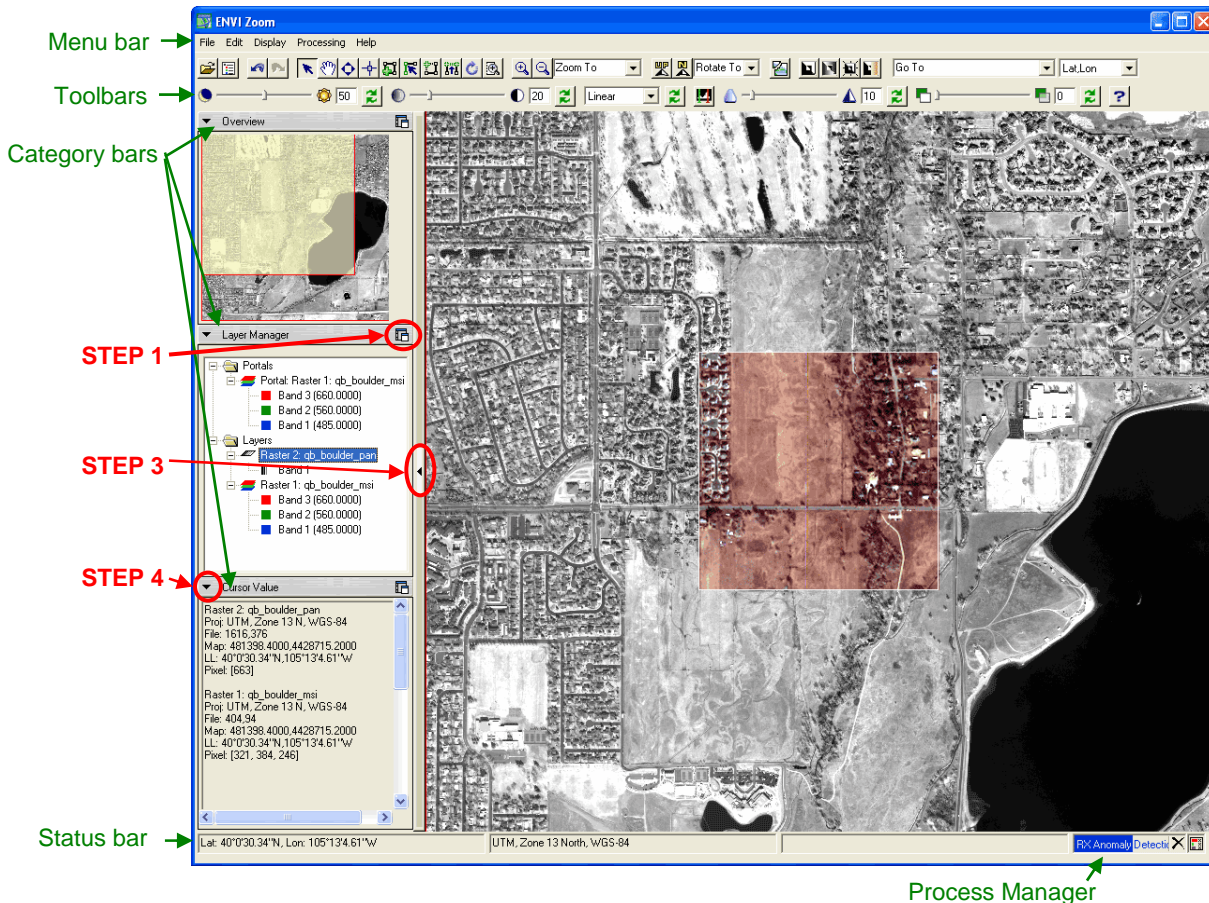
Hiding Layers

By default, all layers in the Layer Manager are displayed in the Image window. You can temporarily hide the display of a layer so that you can work with other layers in the Image window.

1. Right-click on **Raster1: jsp99hym.eff** in the Layer Manager, and disable the **Show** option to turn the display of that layer off in the Image window.
2. Right-click on a **Raster1: jsp99hym.eff** again and enable the **Show** option to turn the display of that layer back on.








Exploring the ENVI Zoom Interface

The ENVI Zoom interface includes a menu bar, toolbars, category bars, and a Status bar. Much of the ENVI Zoom interface is customizable and provides options to make use of multiple monitors.



1. Detach the Layer Manager category by clicking the **Detach** button to the right of the Layer Manager category bar (see image above).
2. Reattach the Layer Manager category by clicking the **X** on the top right of the Layer Manager dialog window.
3. Collapse the entire category panel by clicking on the collapse bar to the right of the categories (see image above). This allows you to view a larger Image window. Now, expand the categories by clicking again on the same bar (to the left of the Image window).
4. Collapse the Cursor Value category by clicking the arrow to the left of the Cursor Value category bar (see image above). Now, expand the Cursor Value category by clicking again on the same arrow.

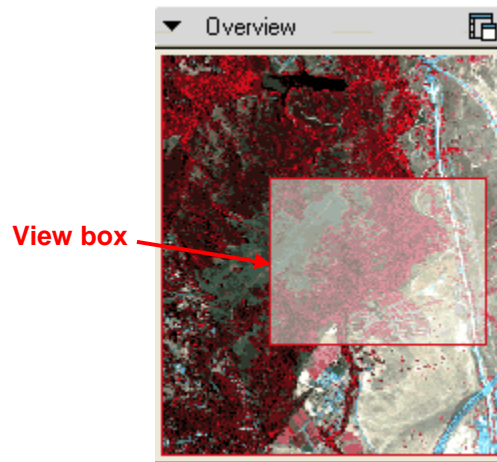
Using Display Tools

1. Click the **Zoom** button  then click and drag your cursor to draw a rubber-band box around a vegetated area near the center of the image. This will zoom to that area in the Image window.
2. Click the **Pan** button  then click and drag your cursor in the Image window to pan in the direction of the mouse. You can also use the middle mouse button to perform a pan.
3. Click the **Fly** button  then click and hold to continuously drift in the direction of the cursor. Moving further from the center (closer to any side) causes the drift to increase in speed.
4. Click the **Crosshairs** button . A set of red crosshairs appears in the Image window. You can click-and-drag the crosshairs to move them anywhere in the image. The Cursor Value category lists the pixel coordinates of the pixel directly underneath the center of the crosshairs. (You may want to use the Zoom tools to zoom in to individual pixels.)
5. In the field labeled **Go To**, type the pixel coordinates **240,500** and press the **Enter** key. The crosshairs jump to that location in the image, and the Image window centers over that location. If you were working with a georeferenced file, you could enter map coordinates or latitude/longitude coordinates in the Go To field.
6. Click the **Rotate** button  then click and drag the cursor in a clockwise or counter-clockwise direction to rotate the image. The **Rotate To** drop-down list on the toolbar interactively reports the current degree of rotation.
7. Click the **Select** button  to exit the Rotate tool.
8. Click the **Rotate To** drop-down list on the toolbar and select **0°**. 
9. Experiment with the **Brightness**, **Contrast**, **Sharpen**, and **Transparency** sliders.
 - Click on the slider bar to the right or left of the indicator or click the slider then use the **Page Up** or **Page Down** keys to move the slider up or down incrementally by ten percent.
 - Click on the icons to the right or left of the slider bar or click the slider then use the arrow keys on the keyboard to move the slider up or down incrementally by one unit.
 - Click the slider then use the **Home** key on the keyboard to move the slider to 100 and the **End** key to move the slider to 0.
10. Click the **Reset** button on each slider to return them to their default values.
11. Experiment with different stretch types by selecting options from the **Stretch Types** drop-down list (**Linear** is selected by default).

Working with the Overview Window

The Overview window provides a view of the full extent of the layers loaded into the Image window. Each time you display a new layer, the Overview window is resized to encompass the extents of all layers in the Image window. The Overview window is not populated until pyramids are built for the image, therefore it may appear blank for several seconds when you first load an image while pyramids are being built.

The View box is a small, partially transparent window inside the Overview window that shows the extent of the imagery visible in the Image window.

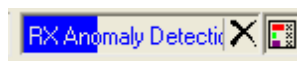
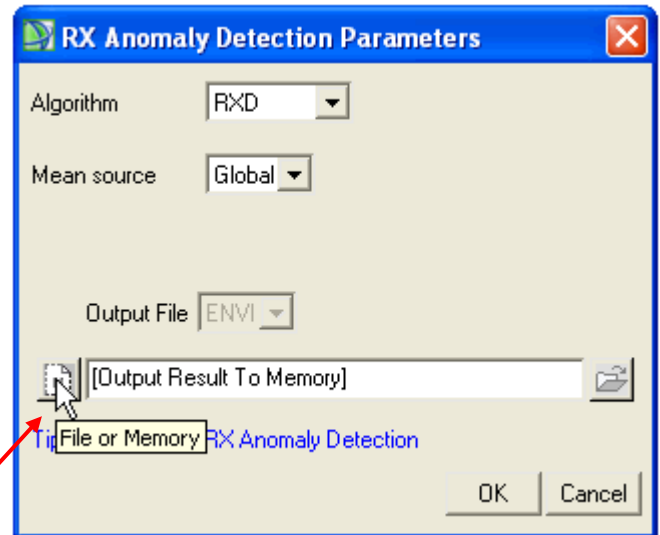


1. Increase or decrease the size of the View box by clicking and dragging a corner of that box. This will zoom in or out on the image displayed in the Image window. As you click and drag a side, the View box adjusts shape to maintain the proper aspect ratio of the Image window.
2. Click inside of the View box and drag it to any location within the Overview window to dynamically update the Image window.
3. Click outside of the View box in the Overview window to recenter the View box on the spot where you clicked.


Performing RX Anomaly Detection

RX Anomaly Detection processing uses the Reed-Xiaoli Detector algorithm to detect the spectral or color differences between a region to test and its neighboring pixels or the entire dataset. This algorithm extracts targets that are spectrally distinct from the image background. Results from RXD analysis are unambiguous and have proven very effective in detecting subtle spectral features.

1. From the menu bar, select **Processing** → **RX Anomaly Detection**. The Select Input File dialog appears.
2. RX Anomaly Detection works with all bands of a multispectral file, so you will not need to perform any spectral subsetting. The filename `jsp99hym.eff` is already highlighted in the Select Input File dialog. Click **OK**. The RX Anomaly Detection Parameters dialog appears.
3. In the **Algorithm** drop-down list, use the default **RXD** algorithm.
4. For this tutorial, the mean spectrum will be derived from the entire dataset. In the **Mean source** drop-down list, use the default value of **Global**.
5. Click the **File or Memory** button to select **Output Result To Memory**.
6. Click **OK**. The Process Manager in the lower-right corner of the ENVI Zoom window shows the processing status of the RX Anomaly Detection algorithm.






7. When processing is complete, the resulting image appears in the Layer Manager as "Raster 3: {Memory} RXD Result," and it is automatically displayed in the Image window.

8. Explore this image, when you are finished looking at it, right-click on the **Raster 3: {Memory}** RXD Result in the Layer Manager and select **Remove Selected Layer** to remove it from the display.
9. Click the **Data Manager** button  on the toolbar. Notice that the RXD result is still available (it has not been deleted; it is at the bottom of the list). You have just removed it from the display.
10. Close the Data Manager.

Working with a Portal

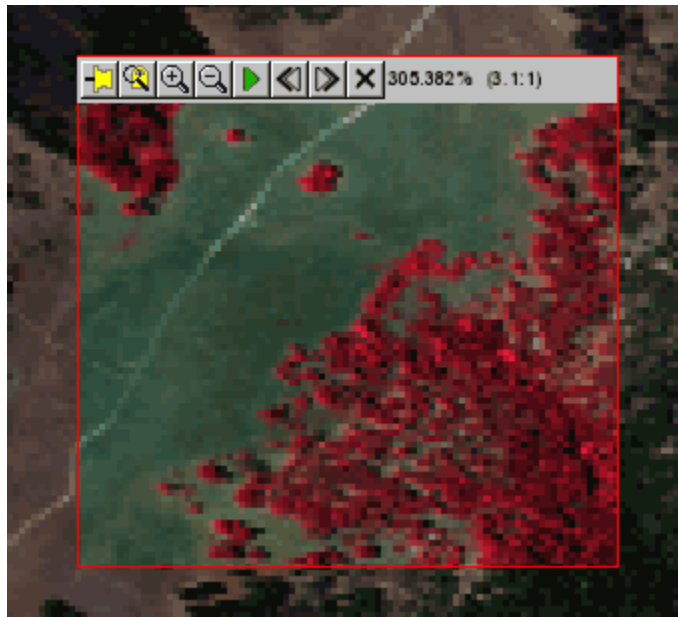
A Portal is a window inside the Image window that allows you to view multiple layers in the Layer Manager simultaneously. A Portal works as a separate layer (inside the Portals folder) in the Layer Manager. In this step, you will compare the true-color and CIR Jasper Ridge layers.

1. In the Layer Manager, right-click on the **Raster 2: jsp99hym.eff** (the true-color image) and select **Order Layer → Bring to Front**. This will place the Raster 2 image at the top of the layer list.
2. Click the **Portal** button  on the toolbar. ENVI Zoom creates a new Portal from the second layer in the Layer Manager, which is the Raster 1 CIR image. ENVI Zoom adds the new Portal to the Portals folder in the Layer Manager.
3. Click and drag inside the Portal to move it around the Image window.
4. Click and drag on a corner or side of the portal to resize it.
5. Click the **Pan** button  on the ENVI Zoom toolbar. Grab the true-color image (click outside of the Portal) and drag it around in the Image window. Notice how the Portal stays in one location while the image moves behind it.
6. Click the **Select** button  to exit the Pan tool.




Pinning the Portal to the Image

You can attach (or pin) the Portal to the image so that the Portal moves with the data (vice moving and panning with the image as you did in the last exercise). This way, when you pan the image, the Portal stays fixed to its original position relative to the data.

1. Click once inside the Portal to select it, then place your cursor at the top inside of the Portal to display the Portal toolbar.



2. Click the **Pin** button . The button changes to **Unpin**.




3. Click the **Pan** button  on the ENVI Zoom toolbar. Grab the true-color image (click outside of the Portal) and drag it around in the Image window. Notice how the Portal stays fixed to the image.
4. Click the **Select** button  on the ENVI Zoom toolbar to exit the Pan tool.
5. Click once inside the Portal to select it, then place your cursor at the top inside of the Portal to display the Portal toolbar.
6. Click the **Unpin** button  on the Portal toolbar.

Working with Blend, Flicker, and Swipe

ENVI Zoom provides tools that help you compare two different layers. You can use these tools for comparing entire images or you can use them inside of a Portal, as you will do in this tutorial. These tools are enabled only when you have two or more layers open in the Layer Manager, and when you display at least one layer in the Image window. For optimal viewing when using these tools, it is recommended that you not use the transparency enhancement slider.




Blending

Blending allows you to gradually transition from one image to another, by increasing the transparency of one image.

1. Right-click inside of the Portal and select **Blend**. Blending automatically begins between the true color and CIR layers.
2. Experiment with the speed of the blend, using the  and  buttons available on the Portal toolbar.
3. Click the **Pause** button  on the Portal toolbar to stop the blend.




Flickering

Flickering allows you to toggle between two images at a desired speed.

1. Right-click inside of the Portal and select **Flicker**. Flickering automatically begins between the true color and CIR layers.
2. Experiment with the speed of the flicker, using the  and  buttons available on the Portal toolbar.
3. Click the **Pause** button  on the Portal toolbar to stop the flicker.
4. If you paused the flicker action while the true color image was displayed, your Portal will appear transparent. Right-click in the Portal and select **Load New Layer → Raster 1: jsp99hym.eff**.

Swiping



Swiping allows you to spatially transition from one image to another using a vertical dividing line that moves between two images.

1. Right-click inside of the Portal and select **Swipe**. Swiping automatically begins between the between the true color and CIR layers.
2. Experiment with the speed of the swipe, using the  and  buttons available on the Portal toolbar.
3. Click the **Pause** button  on the Portal toolbar to stop the swipe.

To exit blend, flicker, or swipe, you must close the Portal, unless you want the Portal to appear in the screen capture you will create in the next step.

Chipping and Saving

In this step, you will use **Chip from Display** to take a screen capture of the contents of the Image window, and save the image. Any enhancements, zooming, rotating, or Portals that are displayed in the Image window are burned into the output image. ENVI Zoom creates an 8-bit, three-band image at screen resolution.

1. Click the **Chip from Display** button  on the ENVI Zoom toolbar. The Chip From Display Parameters dialog appears.
2. From the **Output File** drop-down list, select **JPEG**.
3. Click the **File Select** button . The Select Output Filename dialog appears.
4. Browse to a preferred location on your hard drive, type **zoomtutorial1** as the file name, and click **Open**.
5. Click **OK** on the Chip From Display Parameters dialog. ENVI Zoom adds the output file to the Data Manager, where you can open and view the new JPEG image.

Resetting Preferences and Closing ENVI Zoom

1. From the menu bar, select **File** → **Preferences**. The ENVI Zoom Preferences dialog appears.
2. Click the **Restore Defaults** button at the bottom of the dialog.
3. Click **OK** to save these preferences.
4. From the menu bar, select **File** → **Exit** and click **OK** to exit ENVI Zoom.