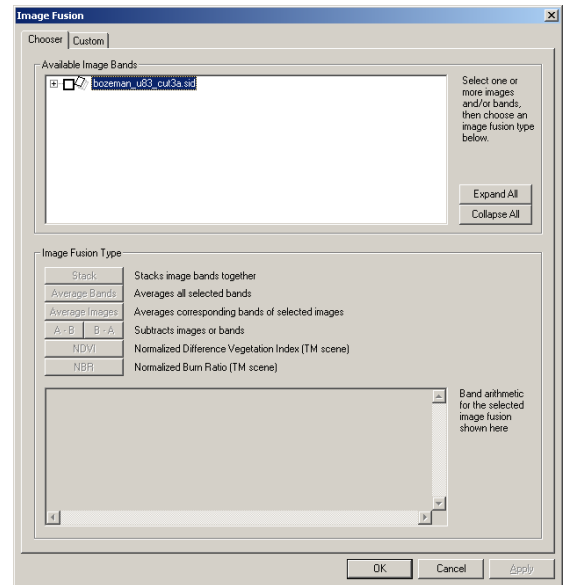


IMAGE FUSION

Image Fusion allows you to combine bands from one or multiple images in a variety of ways. Fusing images can be especially helpful when you are trying to use elevation data in your extraction problem. If you are using Ikonos or Quickbird images, use Image Fusion to “pan sharpen” the images, providing better resolution for your extractions.



- 1 Select **Image Fusion** on the Image Tools menu.

The Image Fusion dialog box opens. The system combines individual bands or entire images. There are two methods of selecting bands to combine, represented by the tabs at the top of the dialog box.

- 2 Choose one of the following options:

METHOD	FUNCTION
Chooser	<p>The Chooser mode contains 5 options:</p> <ul style="list-style-type: none"> • Stack: Adds the selected bands to the output image • Average: Creates new bands in the output image by averaging the band values together • Subtraction: Creates new bands in the output image by calculating the difference between corresponding selected bands • NDVI (Normalized Difference Vegetation Index): Utilizes the red and infrared bands in TM imagery to portray vegetation “greenness” (chlorophyll content) and wet plant biomass • NBR (Normalized Burn Ratio): Enhances fire-damaged land cover using bands 4 and 7 of a TM scene
Custom	<p>Custom mode allows you to specify band arithmetic. Double click on an image band in the upper pane to add it as a value in a band expression. The data type of the resulting image appears in a drop down menu near the bottom of the window. The system either promotes or demotes each band to the selected data type.</p>

- 3 When you made your option selection, choose **OK** to close the dialog box.

The Save Feature As dialog box opens.

- 4 Enter a **name and path** for the new image layer and choose **Save**.

The fused image appears in the Table of Contents.

FUSING PANCHROMATIC REFLECTANCE AND DEM IMAGES

Fusing DEMs with a reflectance image that's matched to it can help extract features that are best identified using elevation data. This may include a river in a deep ravine or a road in a canyon that surrounded by other roads at high elevations.

- 1 With your images in a data frame in ArcGIS, choose **Feature Analyst** on the toolbar.

- 2 Select **Image Tools** on the drop menu and select **Image Fusion**.

The Image Fusion dialog box opens.

- 3 Choose the **Custom tab**. The goal is to create an image that includes both the DEM data and the reflectance data, but still retains the visualization of both. This is done by creating a three-band RGB image with one empty band.

- 4 To create the first band, expand the **first image listing** by clicking on the plus sign in the text box.

- 5 Double-click on **Band 1**.

The band appears in the text box at the bottom of the dialog box as Band 1 of the output image.

- 6 Next, click the **New Band** button located on the right side of the text box to create Band 2 of the output image.

- 7 Double-click on **Band 1** (the only band) of the image DEM image.

The first two band of the output image have been prepared. A third empty band is necessary in order to view both the DEM and the reflectance data in one image.

- 8 To create the third (empty) band, select **New Band** again and enter **127** into the equation field. This value is a neutral value and will not affect the image.

Before choosing OK, make sure that the DEM image is the base image (three asterisks appear next to it). If not, highlight it and click Set Base Image.

- 9 Choose **OK**.

The dialog box closes and Feature Analyst asks you to enter a name for the new image that will be created from this process. The new image appears in the data frame with the two images used to create the fused image.

PAN SHARPENING

Use Image Fusion to fuse multi-spectral images with registered Ikonos or Quickbird panchromatic images. Ikonos and Quickbird images often have a higher resolution. This allows you to sharpen the view by combining bands from each image.

- 1 With your images in a data frame in ArcGIS, choose **Feature Analyst** on the toolbar.

- 2 Select **Image Tools** on the drop menu and select **Image Fusion**.

The Image Fusion dialog box opens.

- 3** Choose the **Custom tab**.
- 4** Expand both the images in the Available Image Bands box by clicking on **Expand All**.
- 5** Choose **New Band**.

A new band appears in the scrolled list box at the bottom of the dialog box.

- 6** In the Band Arithmetic Expressions field, enter an expression such as the following:

```
(Image One Band [1] * Image Two Band [1])/255
```

The equation will look similar to this:

```
(Evaro_fused2.tif[1] * Evaro_cut1_dem.tif[1])/255
```

You can double-click on the image band in the Available Image Bands box to place them in the field. Use the buttons below the field to enter the other elements of equation such as the parenthesis and modifiers. The square brackets are part of the band title.

This Band 1 of the fused image.

- 7** Choose **New Band**.

A new band appears in the scrolled list box at the bottom of the dialog box.

- 8** In the Band Arithmetic Expressions field, enter the following:

```
(Image One Band [2] * Image Two Band [1])/255
```

This is Band 2 of the fused image.

- 9** Choose **New Band**.

A new band appears in the scrolled list box at the bottom of the dialog box.

- 10** In the Band Arithmetic Expressions field, enter the following:

```
(Image One Band [3] * Image Two Band [1])/255
```

This is Band 3 of the fused image.

- 11** Choose **OK**.

Feature Analyst asks you to enter a name for the new image. Once processing completes, the fused image appears in the data frame with the two base images.

Note: Image One is the Multi-spectral image while Image Two is the pan image.