



Merge Landsat TM and DOQ Imagery



Remote Sensing For Ranger Districts Using Image Analysis For ArcGIS

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Landsat TM and DOQ Merge Assumptions:

- 1) **Landsat TM** image is terrain corrected.
- 2) The **Landsat TM** and **DOQ** imagery are co-registered.
- 3) **DOQ** spatial resolution should be 1- 5 meters.

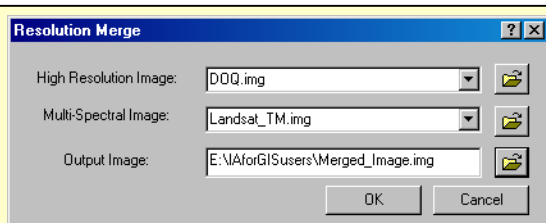


Landsat TM and DOQ Merge Considerations:

- 1) Increases processing time.
- 2) Increases file space.
- 3) Does not maintain spectral integrity (**DO NOT use a Merged Image for subsequent analysis**—only for visual interpretation and visualization).



Ensure the Image Analysis extension and toolbar are enabled: 1) Select **Tools | Extension** from **ArcMap's** Main Menu and check **Image Analysis**, 2) select **View | Toolbars** from **ArcMap's** Main Menu and check **Image Analysis**, and 3) dock the **Image Analysis** toolbar if necessary.



This graphic illustrates the Resolution Merge dialog and its appropriate set-up.

Objective

- To merge Landsat TM (Thematic Mapper) and DOQ (Digital Orthophoto Quadrangles) Imagery (**also known as a Resolution Merge**).

Required Data

- A **Landsat TM** and a **DOQ** image.

Introduction and Overview of Procedure Steps

A resolution merge combines high resolution panchromatic imagery with less spatially resolute multispectral imagery to create a merged high resolution multispectral image—a technique used for improving visual interpretation. The focus of this tutorial is to describe how to perform a resolution merge using high resolution (1-5 meter) panchromatic DOQ imagery with multispectral, but less spatially resolute (30 meter) Landsat TM imagery. The major topics are:

1. Merge Landsat TM and DOQ Imagery
2. Inspect the Results

I. Merge Landsat TM and DOQ Imagery

1. Launch **ArcMap** from the **Start** menu (**Start | Programs | ArcGIS | ArcMap**).
2. Select the **Add Data** button from **ArcMap's** **Standard** toolbar.
3. Navigate to and select a **Landsat TM Image**.
4. Select **Add** to load the **Landsat TM Image** into **ArcMap's** **Table of Contents**.
5. Select the **Add Data** button from **ArcMap's** **Standard** toolbar.
6. Navigate to and select a your **DOQ Image**.
7. Select **Add** to load the **Landsat TM Image** into **ArcMap's** **Table of Contents**.
8. Ensure the **Image Analysis** toolbar and extension are enabled (see note to left).
9. Select **Image Analysis | Spatial Enhancement | Resolution Merge** from the **Image Analysis** toolbar to open the **Resolution Merge** dialog. Set the following parameters in the **Resolution Merge** dialog:

- **High Resolution Image:** *your DOQ*
- **Multi-spectral Image:** *your Landsat TM Image*
- **Output Image:** *select the yellow folder button, navigate to an appropriate output directory, ensure the **Save As Type** is ERDAS IMAGINE, type in the Output File **Name**, and select **Save**.*
- Select **OK** to run the process. The image will automatically display in the **Data View** once finished.



The **Resolution Merge** uses the **Brovey Transformation** method to resample the Landsat TM image. This method resamples the Landsat TM image to a higher spatial resolution while retaining its original spectral information. However, the Brovey Transformation retains limited spectral information—only three bands from the Landsat TM image will be available for display in the Merged Image. The retained bands are determined by:

- 1) If your Landsat TM image is open in ArcMap, it will retain the displayed bands, or
- 2) If your Landsat TM image is not displayed in ArcMap, it will retain the default bands set in the **Raster Options** tab found by selecting **Tools | Options** from ArcMap's main menu.



The default band combination of your Merged Image **will always be 1, 2, 3 despite what input bands of your Landsat TM image are used in the Resolution Merge**. For example, if the input band combination of your Landsat TM image is 4, 3, 2 (near-infrared, red, green), the Merged Image band combination will be 1, 2, 3 (still near-infrared, red, green; the numbers are only different). The bands essentially display the same information.

II. Inspect the Results

1. Select the **Zoom-In** button from **ArcMap's Tools** toolbar, and left-click (hold down the click) and drag the cursor (creating a box) around an area of interest in the **Data View**. Zoom-In close enough so you can start to see the individual pixel extents.
2. Toggle the **Merged Image** by clicking its associated checkbox in the **Table of Contents** and compare with the **Landsat TM** and **DOQ Image**. *How does the Merged Image compare with the Landsat TM and DOQ images?*
3. Double-click on the **Merged Image** in the **Table of Contents**, and select the **Source** tab from the **Layer Properties** dialog.
 - The **Cell Size** (X and Y cellsize) should equal the spatial resolution of your **DOQ Image** (1-5 meters)
 - Select **OK** to close the **Layer Properties** dialog
4. Notice that the **Merged Image** is also multispectral. Feel free to experiment by displaying different band combinations.