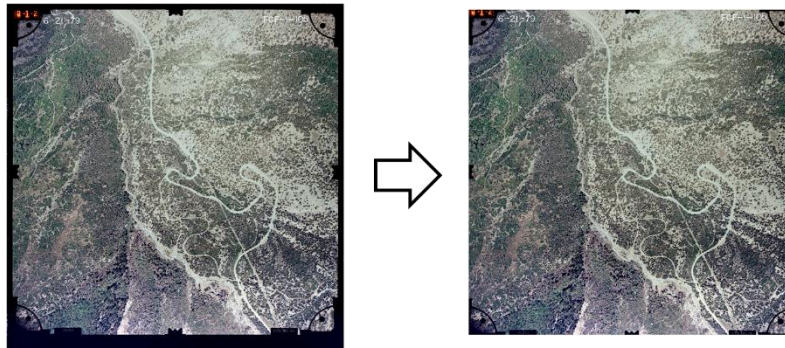


Processing Scanned Aerial Imagery: Preparing images with Esri ArcMap (part 1)



Introduction

Before processing the scanned images in Agisoft Metashape, we need to clip the scanned images to the same dimensions (number of rows and columns). Doing so allows Metashape to more effectively remove distortions and also improves image alignment since much of the black border will be removed during the clipping process. Image clipping can be done using various software applications, including ERDAS Imagine and Esri ArcMap. If you only have a handful of images (up to a hundred or so), this ArcMap workflow should meet your needs. However, for larger datasets, you may want to consider using ERDAS Imagine.

In this exercise, we will use Esri ArcMap to create a polygon for the clipping extent. We will then use the batch clip tool to create new images that are all the same dimensions and without the black borders. Once you complete this exercise, the images will be ready for processing in Metashape. If you are using your own scanned images for this exercise, it is helpful if the fiducials are visible on the scanned images and that the scanning extent was similar for each scan. *Special thanks to Mark Riley from the Pacific Northwest Region for assembling this workflow.*

Objectives

- Learn how to batch clip scanned images using ArcMap to later process in Metashape.

Required Data

- Metashape_scanned_aerial.zip – this zip file contains 22 images taken in 1979 of Manti-La Sal National Forest. It also contains other files for this exercise and the part 2 exercise.

Prerequisites

- The following software applications are needed to complete this exercise: Esri ArcMap (version 10.2 or newer).

Table of Contents

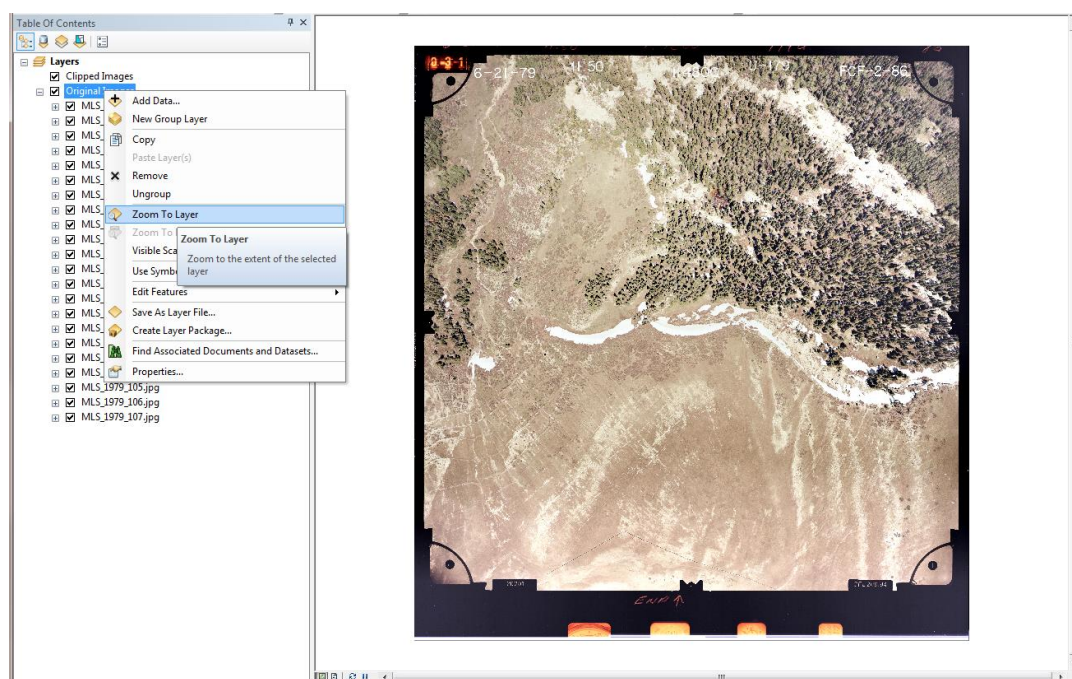
Part 1: Loading images and preparing ArcMap	2
Part 2: Create the shapefile polygon for clipping	2
Part 3: Batch clip the images	4

Part 1: Loading images and preparing ArcMap

We first need to load the images and organize them in ArcMap to more easily process them.

1. Launch Esri ArcMap (click on **Start, All Programs, ArcGIS**, and select **ArcMap 10.2** (or newer).
2. In the table of contents (TOC), make a new group layer by right clicking on **Layers** and selecting **New Group Layer**. Name the new layer **Original Images**.
3. Repeat the previous steps to create one more new group layer and name it **Clipped Images**.
4. Add all scanned images to the Original Images group (either use the **Add Data** button or navigate to the exercise data using the File Explorer, select all scanned images, and drag and drop the images into the Original Images group in ArcMap).
5. Right click on the **Original Images** group and select **Zoom to Layer** to insure that all images are within the data frame. This is a simple way to check that the coordinates and rows/columns are in general agreement.
6. Turn on and off some of the images to make sure that the fiducials generally align from one image to the next (see following note and figure).

NOTE: To turn off all of the images in the TOC, hold down the CTRL button and click on the checkmark box next to one of the images. You can also hold down the CTRL button and click on the plus or minus symbol to the left of one of the images to collapse or expand the band information for all the images.



Part 2: Create the shapefile polygon for clipping

In this section, we will create a new shapefile and draw a polygon that will represent our clipping extent.

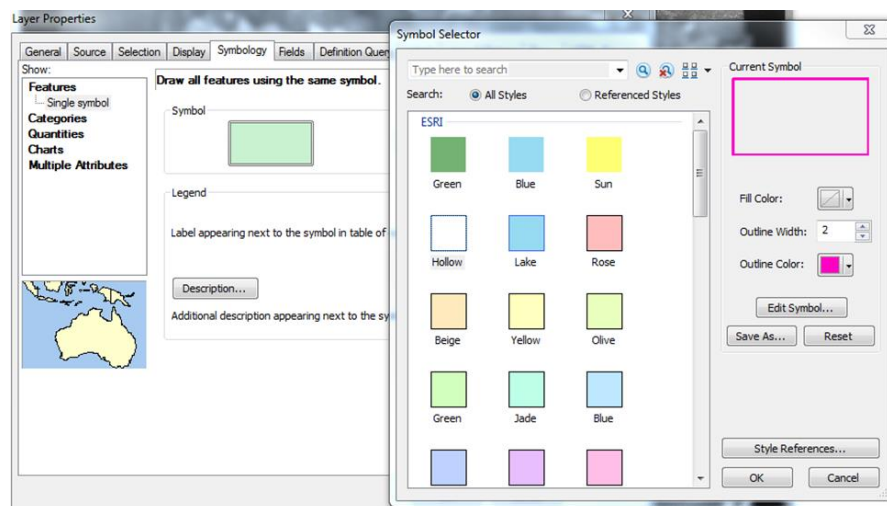
1. Open the ArcCatalog window in ArcMap by clicking on either the ArcCatalog button or tab (see following figure).



2. Navigate to the Metashape_scanned_aerial exercise folder, right click it, and select Shapefile.
 - i. Give the new shapefile a name (such as ImageMask).
 - ii. Select **Polygon** as the Feature Type.
 - iii. Leave the Spatial Reference set to Unknown Coordinate System and the bottom options unchecked (see following note).
 - iv. Click **OK** to finish making the empty shapefile. The shapefile should automatically be added to your TOC.

NOTE: You may get a warning message upon clicking OK regarding an Unknown Spatial Reference. Go ahead and disregard it since we are currently working with the file coordinate system.

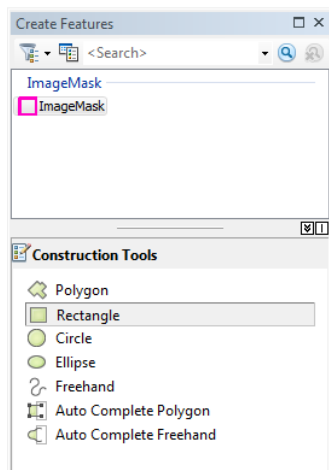
3. Open up the layer properties for the newly created shapefile (either double click on it in the TOC or right click it and select Properties).
 - i. Click on the **Symbology** tab.
 - ii. Change the symbology to something visually easier to work with, such as a classic Ginger Pink outline color and no fill color (see following figure).
 - iii. Click **OK** to accept changes.



4. Start editing the new shapefile (right click the layer in the TOC and go to **Edit Features** and then select on **Start Editing**).
5. In the editor tool bar, click on the **Create Features** button (see following figure).



6. In the **Create Features** window, select the ImageMask shapefile and then click on the Rectangle construction tool.



- i. Now we are ready to draw the shapefile rectangle that will be used for clipping the images. Click on one of the corners, just within the black border, to begin drawing the rectangle.
 - ii. Press the **TAB** button to orient the rectangle perfectly straight.
 - iii. Go to the opposite corner of the image and click one more time to place the rectangle.
- If you need to make adjustments to the rectangle, it is possible to use the Edit Vertices tool found in the Editor toolbar. However, this may make the polygon nonrectangular, so it may be easier to delete the initial polygon and redraw a new one (see following note).

NOTE: There is no hard and fast rule to this, but try to select as much image area as possible while eliminating most of the outer black frame. It is also good to retain the title block and fiducials if possible, as shown in the following example.



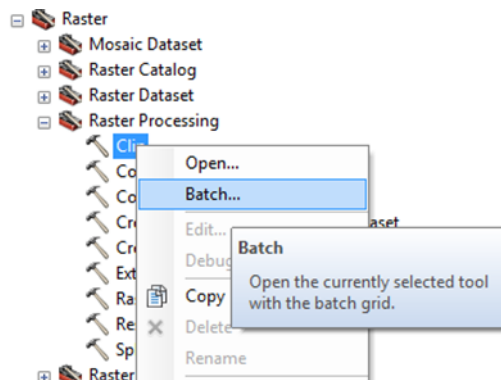
7. Once you have a polygon that you like, go to **Editor** and click **Save Edits** and **Stop Editing**.

Part 3: Batch clip the images

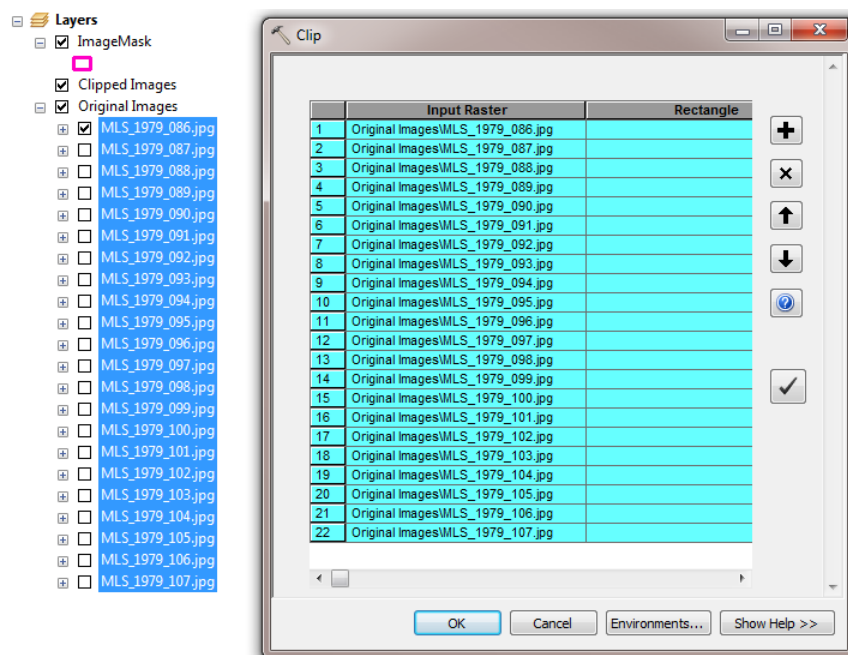
1. Open **ArcToolbox** (click on the ArcToolbox button if necessary, as shown in following figure).



- i. Expand the **Data Management Tools, Raster, Raster Processing**
- ii. Right click on **Clip** and select **Batch** (see following figure).



- iii. Before we add any fields, click on the **Environments** button in the lower right corner.
- iv. Click on **Workspace** to expand the options and
- v. Load all of the original images into the Input Raster field. A quick way to do this is to select all rasters in the ArcMap TOC and simply drag and drop into the first open cell in the **Input Raster** column (see following figure).



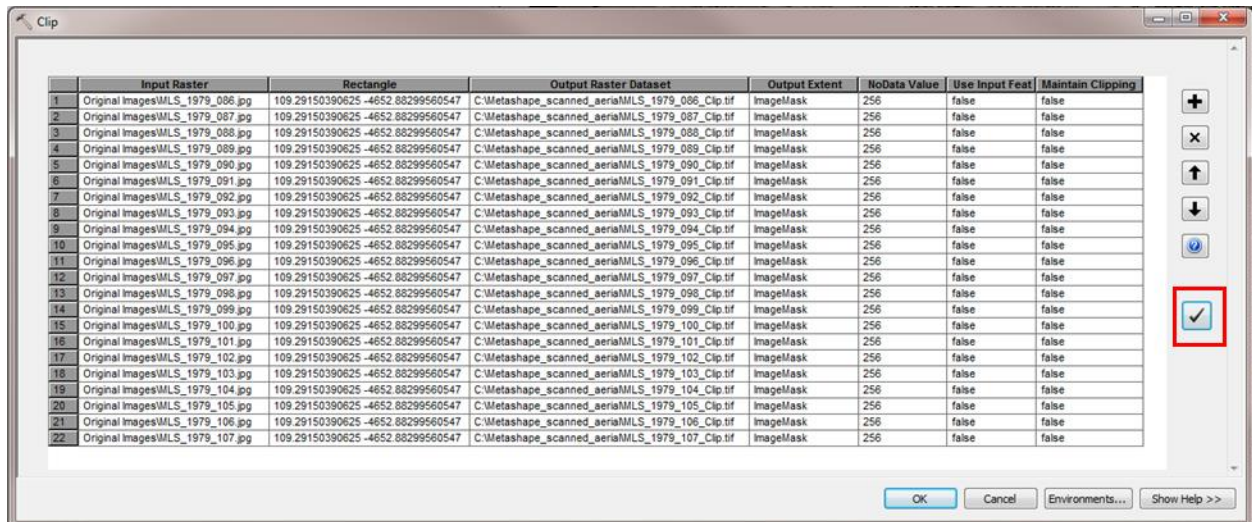
- vi. Right click on the open cell under **Output Extent** and select **Open**.
- vii. From the dropdown, select the newly created **ImageMask** shapefile and click **OK**.
- viii. Right click on the **ImageMask** cell and select **Fill**. This will populate all the Output Extent fields with ImageMask as well as populate the first row for Rectangle and Output Raster Dataset fields.
- ix. Click on the **Environments** button in the lower right corner and select **Workspace** to expand the options.

- x. Change the **Scratch Workspace** to the exercise folder directory (see following note).

NOTE: By default, ArcMap saves the clipped images in a geodatabase. This is fine for working viewing the clipped images in ArcMap, but in order to use the images in Metashape, we need to save them as either JPEGs or TIFFs. By changing the scratch workspace to a standard folder, we are telling ArcMap to save the images as TIFFs.

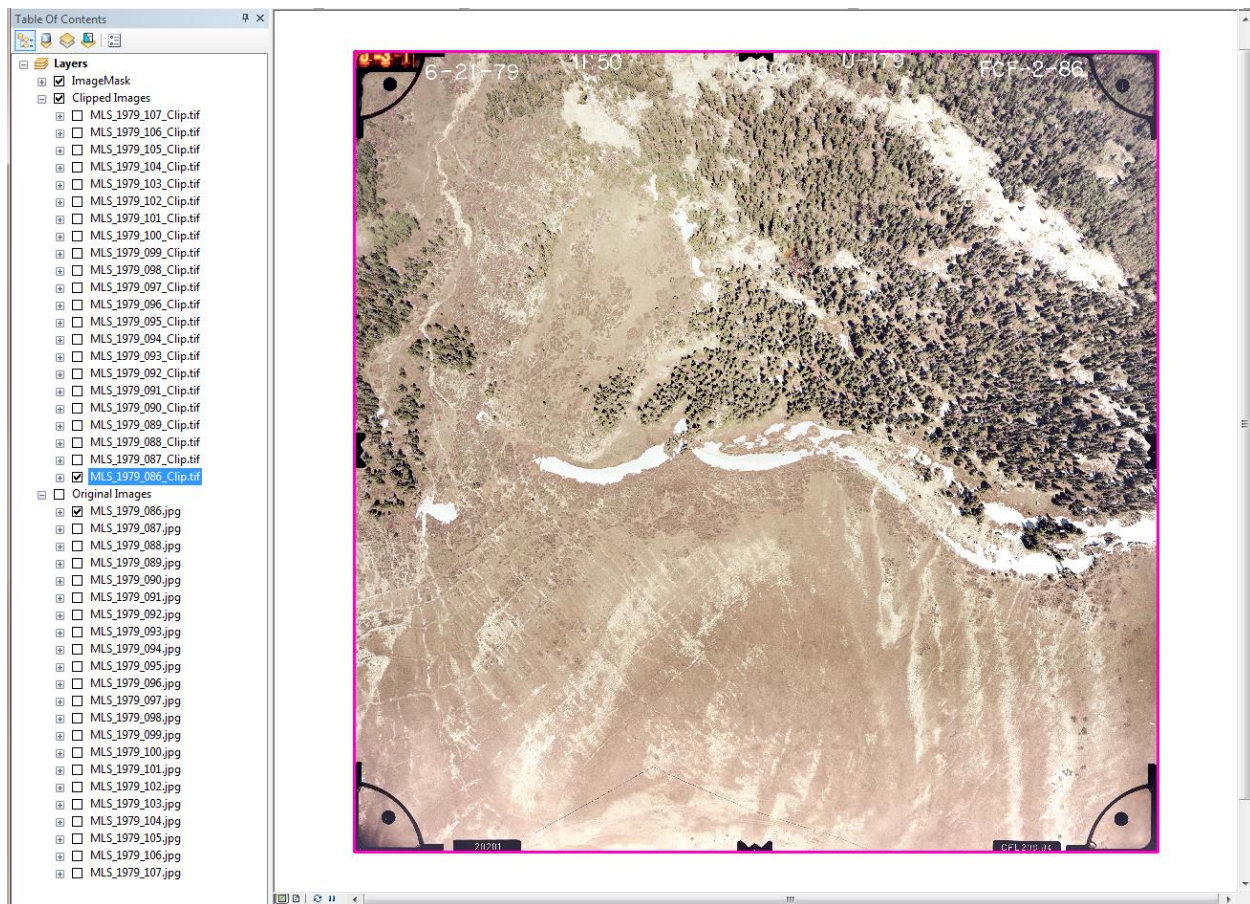
- xi. Scroll down and click on **Raster Storage** to expand the options. Uncheck the **Build Pyramids** and **Calculate statistics** boxes and select the LZ77 as the compression type.
- xii. Click **OK** to accept the Environment settings. The Rectangle fields should all have the same coordinates specified and the Output Raster Dataset fields should be named the same as the input rasters except with the Clip.tif suffix (see following note and figure).

NOTE: For this exercise, we chose to start with JPEGs instead of TIFFs due to their much smaller file size, which makes it easier to distribute and download them. However, if your scanned images are delivered as TIFFs, the workflow would be exactly the same as is explained in this exercise.



- xiii. Click on the Check Values button, which is highlighted in the previous figure, to make sure all of the fields are populated correctly.
- xiv. Click **OK** to start the batch clipping process. It will take a few minutes to clip out all of the images. Once complete, the clipped images will automatically be added to your ArcMap session. Select all of the clipped images and drag them to the Clipped Images folder in your TOC.

2. Review a few of the clipped images to make sure the clipping was done correctly. Your final TOC and viewer should look similar to the following figure.



3. Save your ArcMap project file (click on **File** in the main menu and **Save**) and continue onto the part 2 exercise.

Congratulations! You have successfully completed this exercise and the images are now ready to process in Metashape. Since all of the images are now the same dimensions (number of rows and columns), Metashape will be able to more effectively calibrate the camera to remove distortions and create products from the images. In this exercise, you also learned how to create and run a batch command in ArcMap. This can be a useful utility for efficiently running the same process on multiple images. You are now ready to work on the second part of this scanned imagery exercise.