Histogram Example

Histogram Matching with DOQs

Version 1.0 Mark Lucas 20 May 2005

Overview

Histogram Matching

This example will take four Digital Ortho Quads that have different levels of brightness and contrast and mosaic them together into a tonally balanced mosaic using histogram matching. The images in this demonstration have already been prepared by creating reduced resolution overview (*img2rr*) and histogram files (*create_histo*) with the command line applications.

So start up ImageLinker and follow the following steps:

Open the files

The demodata directory contains four raw digital ortho quads of the North Carolina area. Open each of the files and tile the displays using the Window->Tile command.
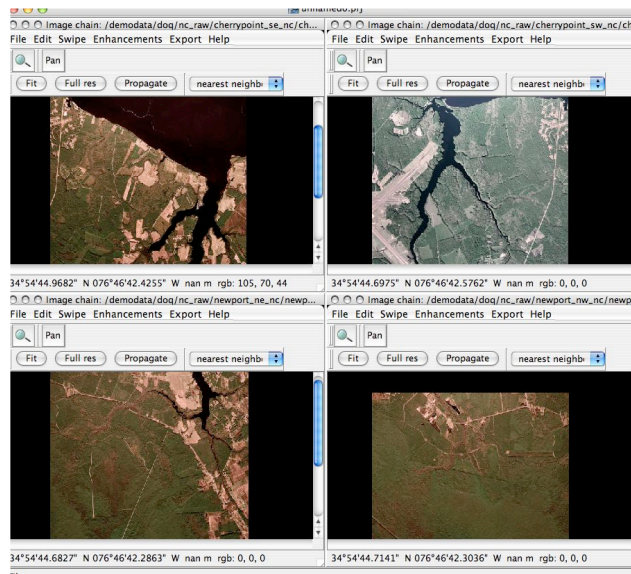
File->Open /demodata/doq/nc_raw/cherrypoint_se_nc/cherrypoint_se_nc.tif

File->Open /demodata/doq/nc_raw/cherrypoint_sw_nc/cherrypoint_sw_nc.tif

File->Open /demodata/doq/nc_raw/newport_ne_nc/newport_ne_nc.tif

File->Open /demodata/doq/nc_raw/newport_nw_nc/newport_nw_nc.tif
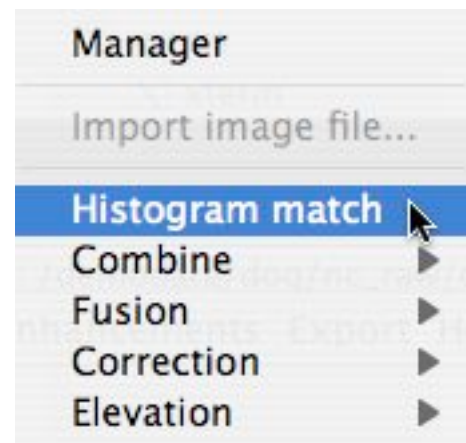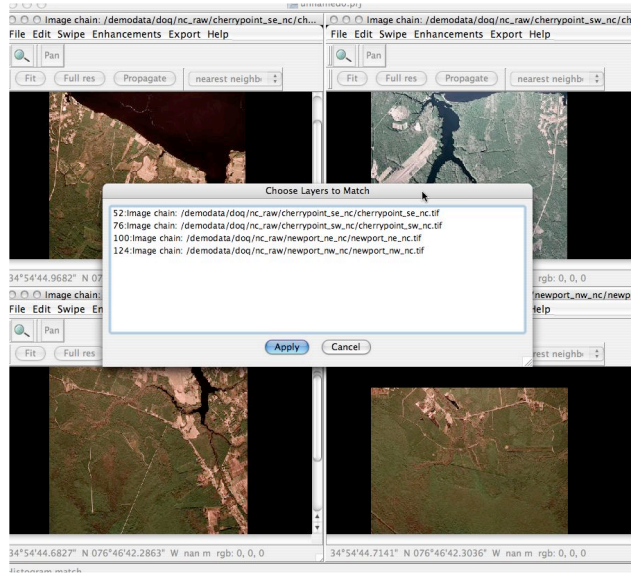
Window->Tile

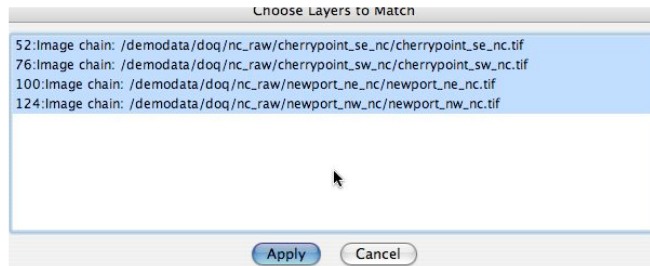## Perform the Histogram Match

Tile the Windows

Organize the images side by side by using the Tile menu command. Select **Window->Tile**

Layer->Histogram match, will call up a dialog for selecting images to be combined in a histogram matched mosaic. The histogram of the first selected image will be used as the target histogram. the image.
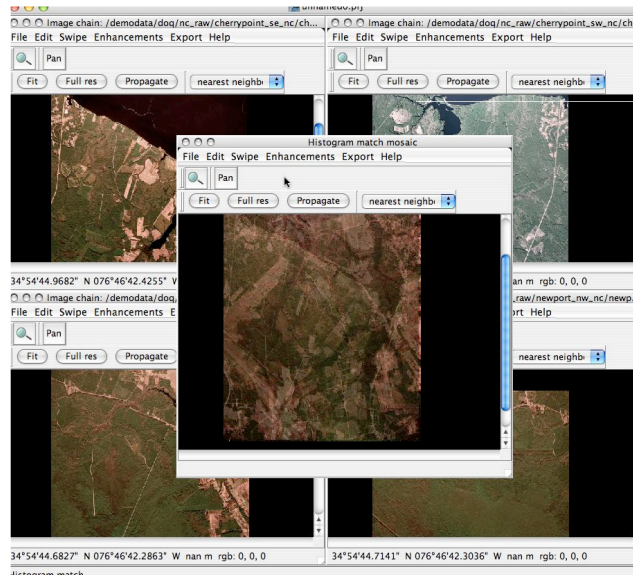
Select all four of the image chains that are displayed in the histogram match dialog.

Press the **Apply** button

A Histogram matched mosaic window will be displayed. Note that the color, brightness and contrast is now consistent across the entire mosaic.

Minimize each of the four source DOQ windows leaving only the histogram matched mosaic display open within the canvas.

Minimize the source windows

Now we are just going to put together a raw feathered mosaic so that we can compare the differences with the histogram matched mosaic.

Create a Feathered Mosaic from the four original DOQs

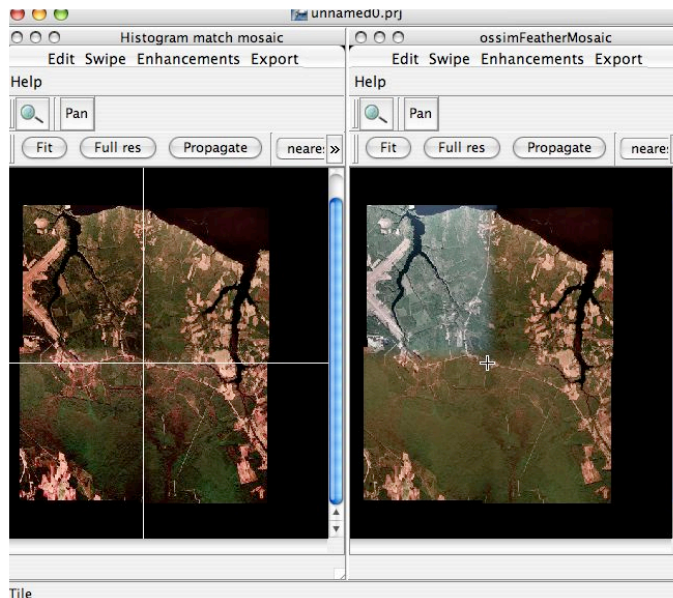Under the Layer menu we are going to select the Combine sub-menu and pick the Feather menu item.
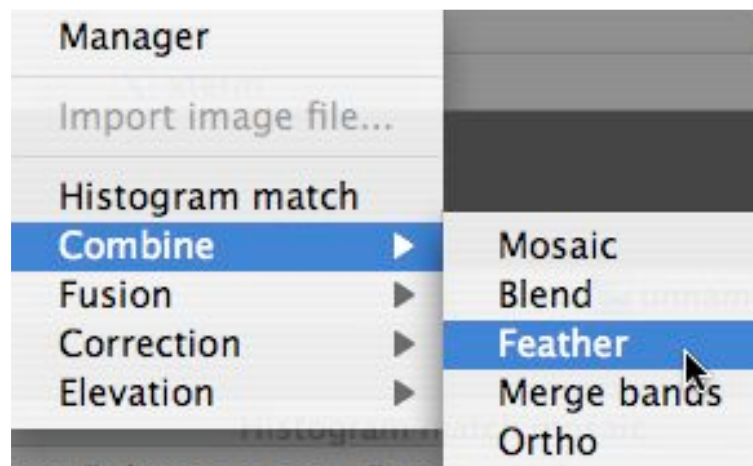
Layer->Combine->Feather.

A list of all the loaded image chains will be displayed in a Choose Layers to Feather dialog box. The first four items in the list are the source DOQ image chains. Select all four by shift clicking the lines.
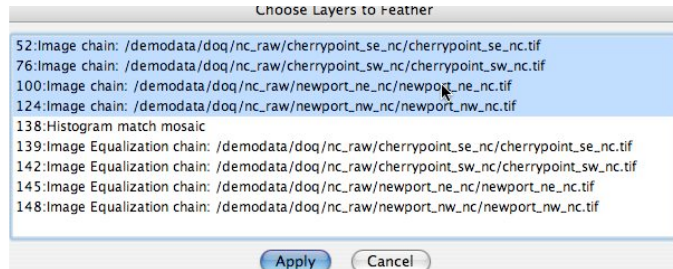

Press the **Apply** button

Press the **Fit** and **Propagate** buttons to get both displays correctly generated in the same geographic views. Select **Windows->Tile** to organize them side by side. This shows the difference between histogram matching and simple feathering. Since any window can also be layered into a Swipe window we can interactively display both views on top of each other.

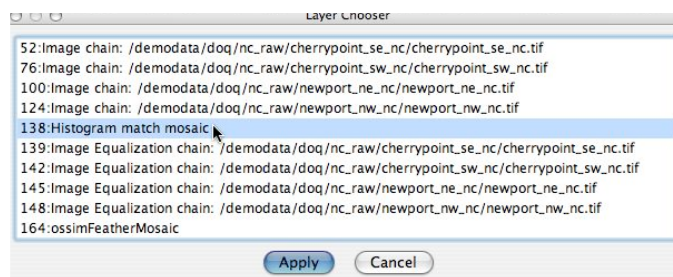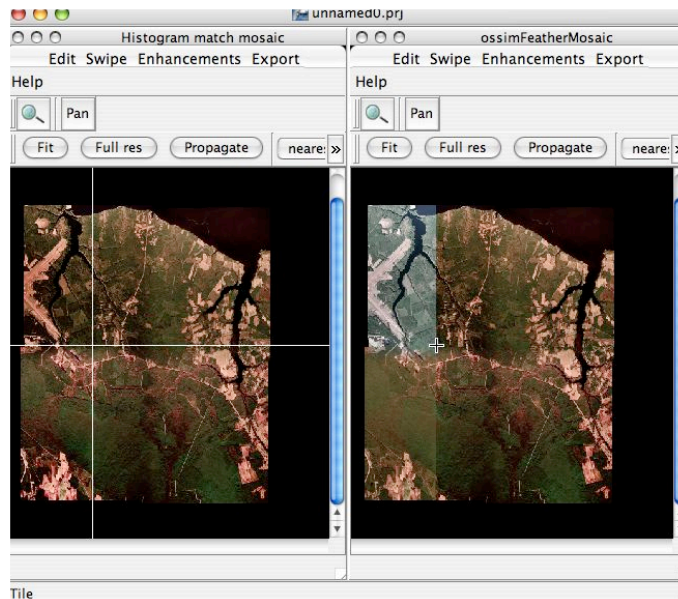In the ossimFeatherMosaic display window select **Swipe->Add Layer**
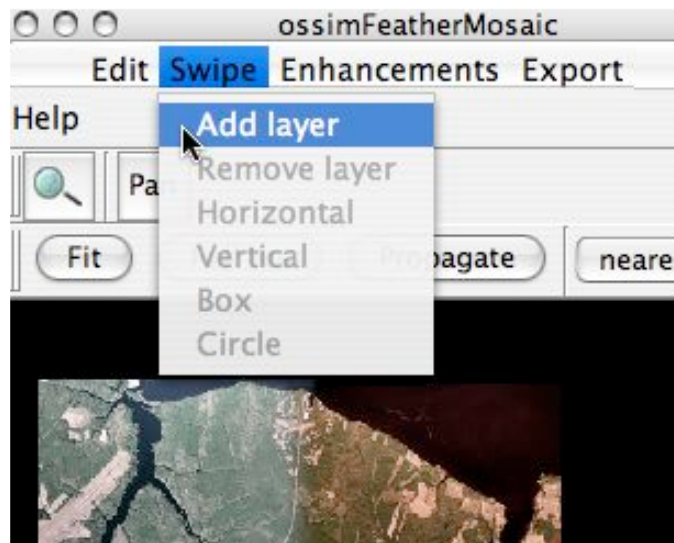
Swipe Displays

Swipe displays are very handy for comparing results. Vertical and Horizontal swipe modes are available in ImageLinker, Box and Circle modes are implemented in the library but haven't be instantiated in this version of the GUI.

After Selecting the Add Layer menu item select the Histogram match mosaic from the image chain list. This specifies which layer you want to add to your display.
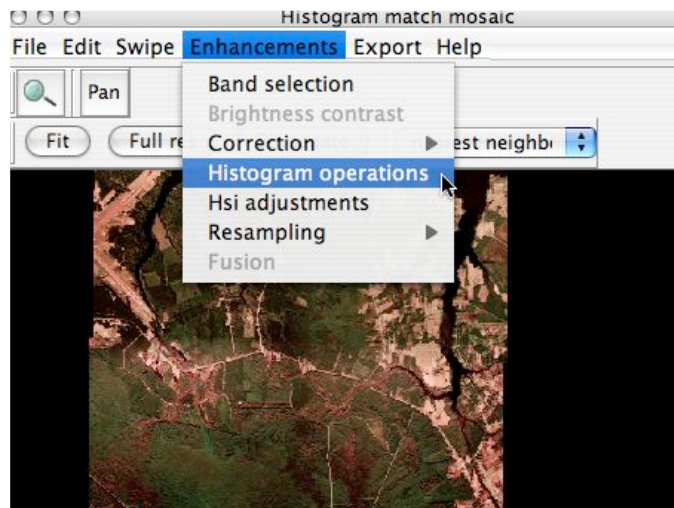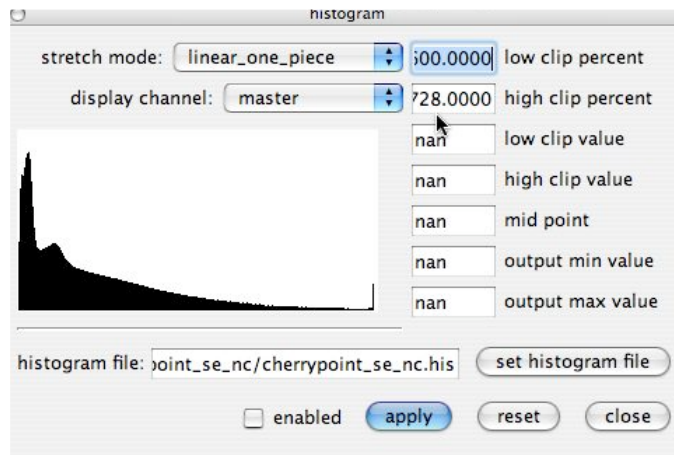
press **Apply**

Moving the cursor back and forth in the ossimFeathermosaic display window will obscure and reveal the layer you just added to the display. For more information or control with Histograms select the Histogram operations menu item in the enhancements menu.

**Enhancements->Histogram operations**

The histogram dialog will appear as shown below:

The histogram is displayed and you can optionally apply different stretch modes, clip points or set the histogram to point to a previously saved histogram file.

Finally, save the project as histogram.prj. Later you can open histogram.prj with the **File->Open Project** menu item to restore your session.
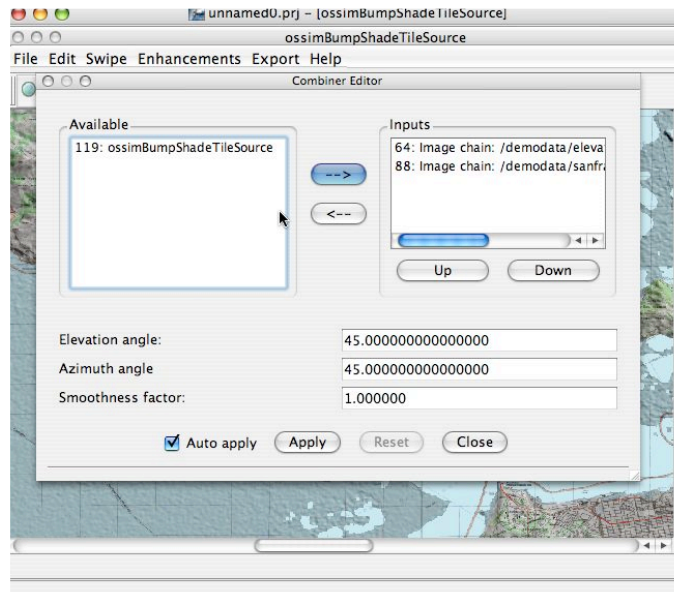
Summary

Histogram matching is a simple way to tonally balance mosaics. This tutorial provided a simple demonstration of histogram matching and mosaicing four digital ortho quads. Other types of input can mixed and mosaiced as well. Note: for non-tiled image sets such as Landsat where the footprint is not rectangular, you will want to run the command line tool **extract_vertices** to define the bounds of the valid imagery. Another command line utility, **cmm**, is used calculate maximum and minimum pixel values within the valid imagery.