

## **TITLE : Georeferencing Historic Images Using ArcGIS**

### **WHAT IS GEOREFERENCING?**

Aligning geographic data to a known coordinate system so it can be viewed, queried, and analysed with other geographic data. Georeferencing may involve shifting, rotating, scaling, skewing, and in some areas warping, rubber sheeting, or orthorectifying the data. (GIS, A to Z, p89)

### **FINDING & CREATING HISTORIC MAP IMAGES**

**Finding Historic Map Images.** There are numerous collections of online maps that have been scanned and archived by libraries and organizations. Make sure you read their use and reproduction policies. Several suggested sites are:

- The Perry- Costeñeda Library Map collection at the University of Texas  
<http://www.lib.utexas.edu/maps/historical/index.html>
- The David Rumsey Collection <http://www.davidrumsey.com>
- The FCIT Maps ETC Project <http://etc.usf.edu/maps>
- The Library of Congress Map Collection <http://www.loc.gov/maps>
- A great list of other historical map websites can be found at:  
[http://www.lib.utexas.edu/maps/map\\_sites/hist\\_sites.html](http://www.lib.utexas.edu/maps/map_sites/hist_sites.html)
- Check with your local public and university libraries, historic societies, and GIS offices. They may have resources that you had not even thought of for your project.

**Creating Historic Map Images.** Any raster image from a digital camera or scanner can be used for georeferencing. They should be either JPG or TIF images. The raster image produced from scanning or taking a photo has no spatial reference to the earth's surface. It may have "units" assigned to it but that would be from the settings of the scanner or camera. This is why georeferencing is necessary in order to use the image.

**I don't have a scanner or my map is too big, What do I do?** You may find the map you want to scan is larger than your classroom or home scanner or you may want to scan the document at a larger resolution than your current equipment can provide. Many libraries have digitizing departments or equipment and will either assist you by scanning the document for you or by lending you use of their equipment. I always suggest a trade for such services, if possible provide them with the digitized files for their collection or acknowledge their participation in your project in some other way. If your local community or university library doesn't have this capability check with local museums and GIS offices. If you want more information about digital images one of the best informational sites is Tech-Ease (<http://etc.usf.edu/te/>), all of your images questions will be answered at: [http://etc.usf.edu/te\\_win/images/index.html](http://etc.usf.edu/te_win/images/index.html).

## **TITLE : Georeferencing Historic Images Using ArcGIS**

### **Creating Historic Map Images**

If you have a paper map and are interested in creating your own images for your student's use you will want to scan it at several resolutions. It is a good idea to scan anything you may want to use in the future at a high resolution to archive (you can always change the resolution at a later point in time). If you want the images to load more quickly in ArcGIS or ArcExplorer Java Edition for Education (AEJEE) you will want to scan the document at a target file size of less than 250mb. This is very important when you are working with georeferenced images in AEJEE.

### **HELPFUL POINTERS AND TIPS BEFORE GETTING STARTED**

**Control Layers.** The spatial reference information (coordinate system, datum, etc) will automatically be set in the data frame to the first data layer you import into your blank map document. This data layer is also known as your *control layer*. In order to change your spatial reference you will have to double click on the Layers frame (or right click) on the Layers frame to open the Data Frame Properties.

Control layers are not absolutely necessary. You can use GPS coordinates to establish the earthly location of the historic image.

**Creating pyramids.** Pyramids are also called "reduced resolution datasets." Pyramids help the software and computer draw and display the layers more quickly when there is a large raster. Basically it draws smaller resolution versions of the original file. The redrawing of the image at faster processing speeds is especially true when you are zooming in and out of the raster. An important note, if you create a pyramid file for an image named picture.jpg, you will now have a secondary file picture.rrd. The .rrd file is the reduced resolution dataset. There is also an auxiliary file, or .aux, that will be created. The .aux helps to create a bridge of information between the original dataset and the .rrd file, which is necessary when/if you want to perform any type of analysis.

*Important to Note:* AEJEE does not read .aux files and therefore pyramids are irrelevant for use with AEJEE. You must begin with a smaller image file for use in AEJEE.

## **TITLE : Georeferencing Historic Images Using ArcGIS**

### **USING THE GEOREFERENCING TOOL BAR**

#### **Turning on the Georeferencing Tools**

Tools >> Customize>>> Toolbars>> Check/Select Georeferencing

OR

Right click on the top toolbar in an area where there is no button. Select georeferencing.

The Georeferencing Toolbar will now appear.

Once you import your image into your project, if your map does not show up click on Georeferencing drop-down arrow and select Fit to Display

The

#### **Other selections and georeferencing terms**

1st Polynomial at least 3 control points

2nd Polynomial at least 6 control points

3rd Polynomial at least 10 control points

Adjust - Minimum of 10 control points

Spline - Minimum of 3 control points

#### **RMS (Root Mean Square) error**

This should be as low as possible but it is suggested that it is equal or lower than the pixel size of your data set. It will not appear until you have created the minimum control points and will not calculate RMS error until you have added 1 more control point pair than the minimum.

#### **Update Georeferencing (from Georeferencing Toolbar)**

This will create an .aux and a world file to match what you have created. *Please note:* AEJEE ignores the .aux file but needs a .prj (projection file) to match your project data files. This can be easily created in the ArcGIS toolbox.

#### **Rectify (from Georeferencing Toolbar)**

This option *permanently* sets the raster to the current coordinate system being used.

## About viewing in stereo mode

Stereo viewing provides added depth and realism to your 3D views. You can visualize your 3D view in stereo by using red and blue stereo viewing glasses, a polarized stereo shutter for your monitor in combination with specialized eyeglasses, or by projecting the images in a scene and viewing the images with specialized eyeglasses.

Red and Blue Anaglyph mode displays the 3D view in overlapping red and blue views. When you view these scenes with red and blue stereo viewing glasses, you'll benefit from an enhanced 3D effect.

You can also use a polarizing shutter glass for your computer monitor and accessory glasses that you wear to view in stereo with true color.

Finally, if you'd like to display your 3D views in stereo projected to an audience, you can use Free mode stereo viewing to send left and right images to independent projectors and view the images with specialized glasses. Shutter Glass mode requires a quad-buffer graphics card to accommodate the shutter. Free mode requires a quad-buffer graphics card with dual output in order to project images in stereo.

## Stereo view is only available in ArcScene. How to view in stereo mode

### Viewing the display in stereo using red and blue anaglyphs

Click **View** and click **View Settings**.

In the **Applies to** dropdown menu, click the viewer you want to view in stereo.

Click **Stereo View**.

Click the **Method** dropdown arrow and click **Red/Blue Anaglyph**. The view mode changes so that a red anaglyph of the scene is drawn superimposed and to the right of a blue anaglyph. Use red and blue stereo viewing glasses to add more of a 3D feel to your scene.

Optionally, move the Eye Separation slider to the right to increase the distance between the anaglyphs, or to the left to decrease the separation. You may need to adjust this to accommodate the distance between your eyes or the distance between you and the computer screen.

Optionally, move the Parallax slider to the right to increase the movements of scene objects relative to the observer, or to the left to decrease the relative movements. Increasing the parallax accentuates the movements of objects in the scene as you look at them.

Optionally, click Reverse left and right views to switch the red and blue sides of the view.

Click Cancel.