

Georeferencing in ArcGIS Pro

Historic maps contain a wealth of information that can be used in research. You can use the scanned historic map as a background to your own data or you can digitize the information that's contained on the map such as exploration trails, military troop positions or fire perimeters to use for display or analysis.

"Raster data is obtained from many sources, such as satellite images, aerial cameras, and scanned maps. Modern satellite images and aerial cameras tend to have relatively accurate location information, but might need slight adjustments to line up all your GIS data. Scanned maps and historical data usually do not contain spatial reference information. In these cases you will need to use accurate location data to align or georeference your raster data to a map coordinate system. A map coordinate system is defined using a map projection—a method by which the curved surface of the earth is portrayed on a flat surface." <http://pro.arcgis.com/en/pro-app/help/data/imagery/overview-of-georeferencing.htm>

You will need to georeference your map or image (raster data) to an existing feature class or basemap that has a spatial reference. You identify and link a series of control points on the raster dataset with locations in the spatially referenced data. Many different types of features can be used as control points, such as road intersections or stream confluences, the mouth of a stream, or street corners. Once the control points are linked a transformation to shift and warp the raster dataset from its existing location to the spatially correct location is applied. If possible, you should spread the links over the entire raster dataset rather than concentrating them in one area. Typically, having at least one link near each corner of the raster dataset and a few throughout the interior produces the best results.

Overview of the Esri Georeferencing tools

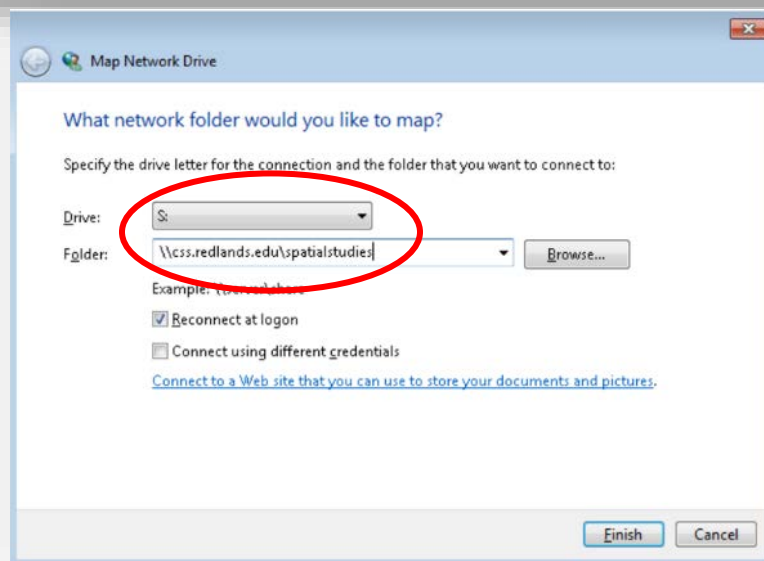
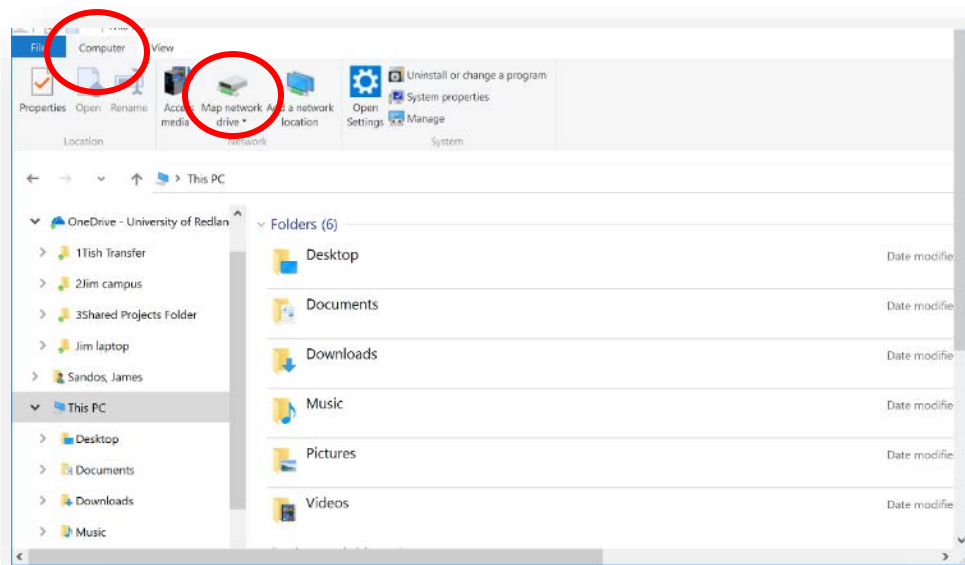
<http://pro.arcgis.com/en/pro-app/help/data/imagery/georeferencing-tools.htm>

Exercise

Map the 'S' drive (Spatial drive) <http://www.redlands.edu/study/schools-and-centers/CSS/resources/spatial-drive/>

You will map the Center for Spatial Studies network drive where you will access the data. Please note that you must be connected to the University of Redlands network via a wired ethernet connection to access these resources. Because university lab computers are refreshed nightly, you will have to perform these steps every time you want to access the CSS drive.

- In the search box, enter 'PC' and select
- Under the 'Computer' tab, click 'Map network drive' button in the menu bar
- Select S: from the Drive dropdown
- Enter \\css.redlands.edu\spatialstudies into the folder box



- Click Finish

The maps for this workshop are in
S:\Workshops\Georeferencing_Workshop\2018\WorkshopGeoreferencing_S18_Benvenuti\SharedResources\Images to Georeference

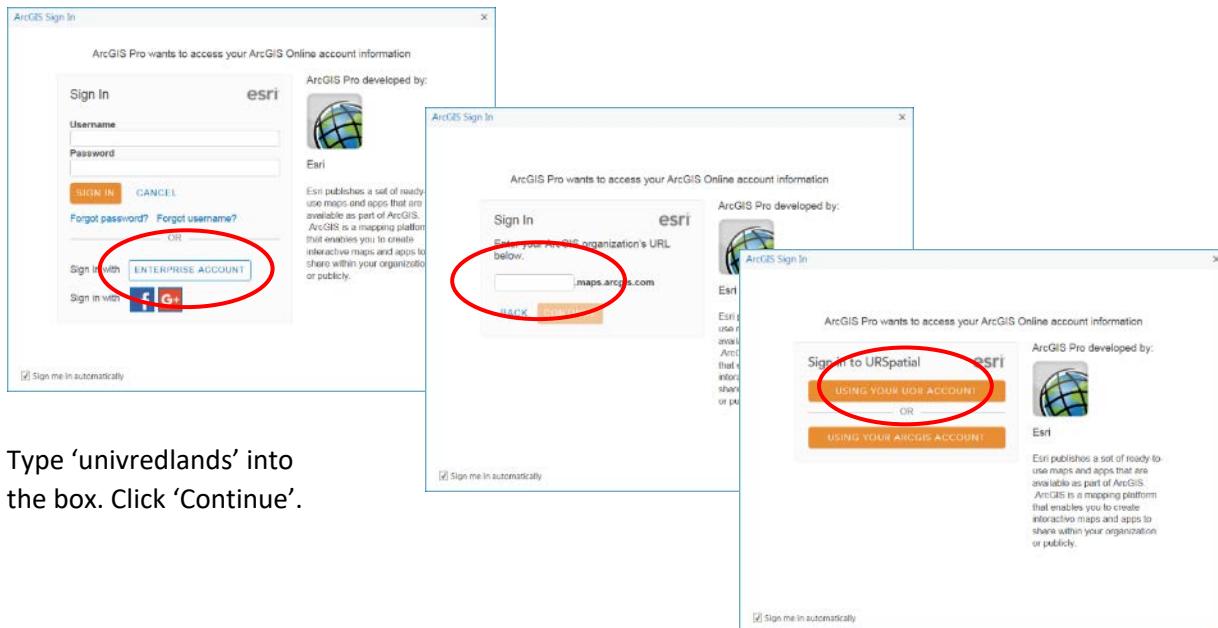
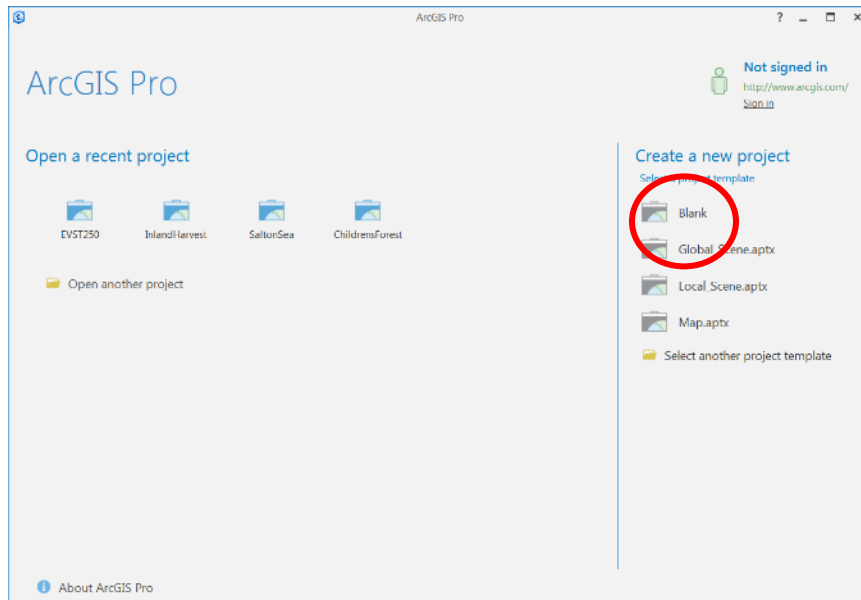
You can also search the internet to find a map image that is related to your own research. If you are going to use the historic map for any type of public presentation or publication, please be aware of any copy write restrictions and be sure to cite the source properly.

Copy one of the maps from the 'Shared Resources' folder to your own network folder or hard drive.

Start ArcGIS Pro

Open the search box and enter 'ArcGIS Pro' and select it.

To use ArcGIS Pro, you must sign in to ArcGIS Online using an *Organizational Account* (or "Org"). Signing in to ArcGIS Online authenticates your ArcGIS Pro license and allows you to access and share GIS content with users at the University of Redlands as well as publicly with users around the world.



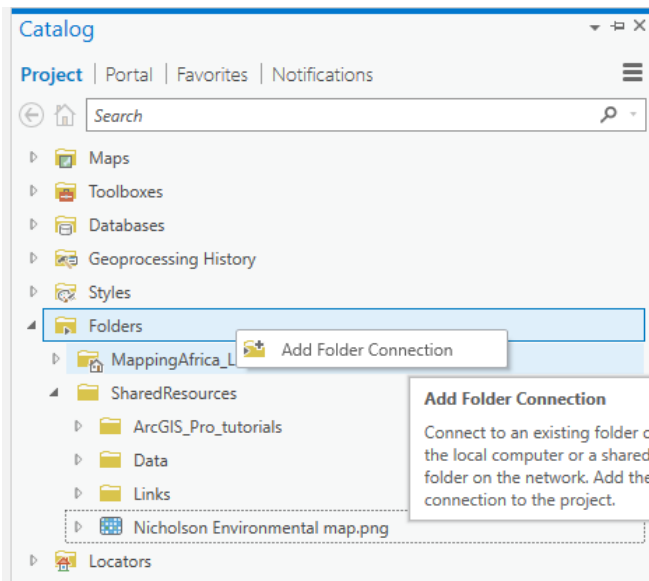
Type 'univredlands' into the box. Click 'Continue'.

Sign in 'Using your UOR Account'.
Use your normal university email and password.

Insert a 'New Map'.

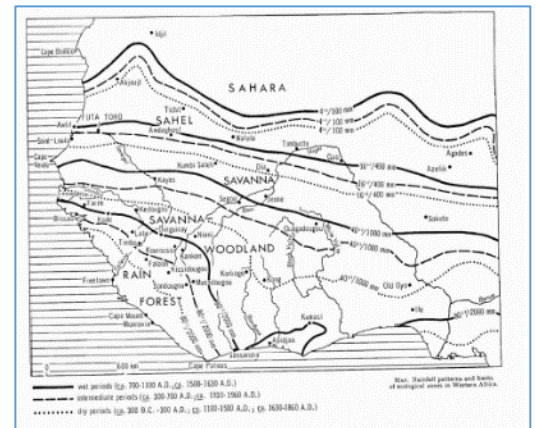
Open the Catalog tab on the right. If it is not there, go to the top ribbon bar and click on 'View'. Click on 'Catalog'.

In the Catalog pane, right click on 'Folders' and 'Add Folder Connection' to the folder where you saved the map image. Navigate to the folder where you saved the map image and click ok. Add the image to your map.



Zoom to the extent of your historic map image by right-clicking on it in the Contents pane, then 'Zoom to Layer'.

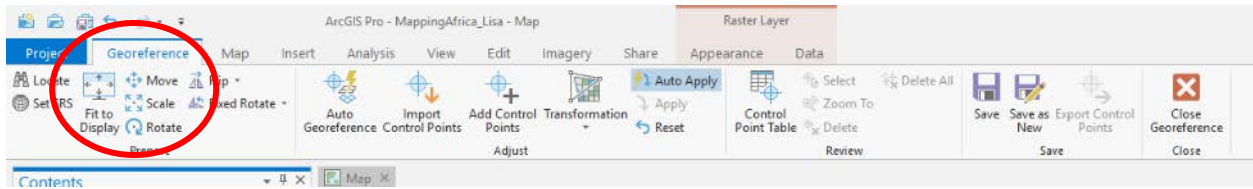
Carefully examine the image and then zoom to the proper location in the ArcPro map. Pan and zoom to match the map to the image extent as best as possible.



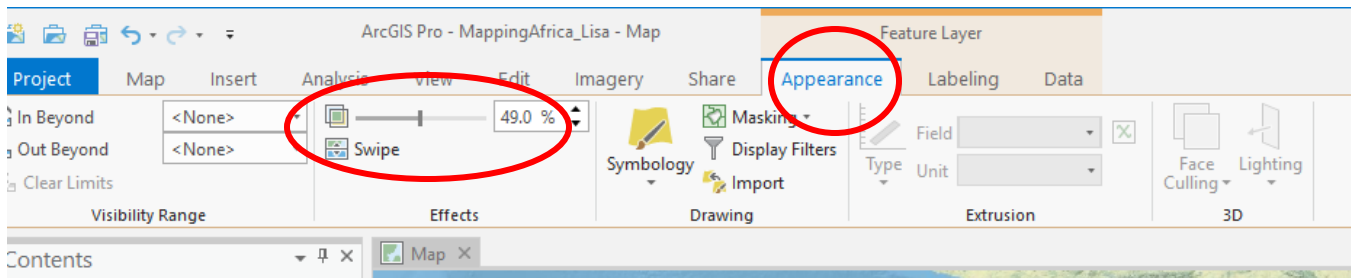
Click on the 'Imagery' tab at the top and select 'Georeference'. This will open a new Georeference ribbon. Click on 'Fit to display'.

Make sure that the historic image is active in the Table of Contents pane. It will be highlighted in light blue.



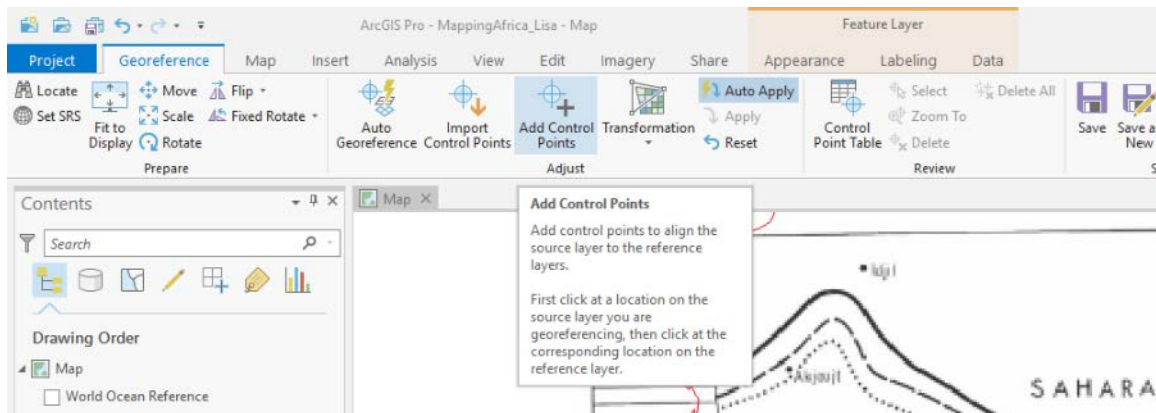


You can adjust the transparency of the image so you can see the base map underneath.

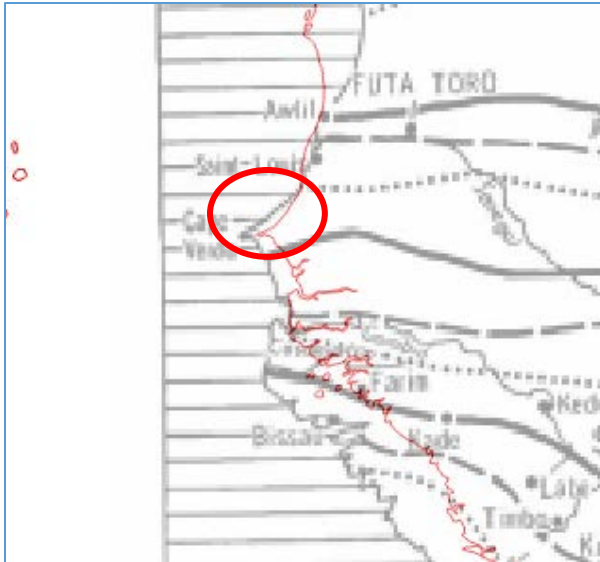


Use the 'Move' and 'Scale' buttons on the Georeference ribbon to adjust the historic map fit it to your area. It won't be perfect but get it close.

Adding Control Points



Click on the 'Add Control Points' button on the Georeference ribbon. Click on a recognizable point *on the historic map first*, then click on the same point on the basemap.



Add more points along the edges and in the middle where you can find corresponding features. For points in the interior you might have to turn off the image after selecting a control point to find it on the basemap. The idea is to add your points across the entire image. Don't bunch them in one area.

If your map becomes extremely skewed, open the 'Control Points Table' and turn off the bad one or delete them all and start over.

ID	Source X	Source Y	X Map	Y Map	Residual X	Residual Y
1	3167135	11611300	1750827	4177117	0.71760	0.33164
2	27810490	-17647519	3354938	4432943	0.38285	-0.15939
3	5436115	-38807018	-1704550	20323329	0.00000	0.00000
4	20175833	-15339493	1578172	4756031	-0.24551	0.16639
5	23728411	-10333839	1767738	4081893	0.00000	0.00000
6	25033007	-13453940	-2022292	4342100	-0.26401	0.24929

Click the 'Save' button on the 'Georeference' ribbon. Repeat the process to get a better fit if you need to. Save each time. When done, click the 'Close' button on the 'Georeference' ribbon.

You can also 'Save as New'. This will make a new image file that is georeferenced while leaving the original as is.

Save you ArcPro project

