

ArcGIS Pro: Georeferencing a Raster Dataset

ArcGIS Pro 3.0.1

Welcome to the Essential GIS Task Sheet Series. This series supplements the Iowa State University Extension and Outreach Geospatial Technology Training Program's workshops and short courses by providing quick and easy instructions for performing a variety of mapping, data science, analysis and data visualization tasks.

Raster datasets represent geographic features by dividing the world into square or rectangular cells laid out in a grid. Each cell has a value that is used to represent a characteristic of the location. Raster data is commonly obtained from aerial photography, satellite imagery or historical maps. Scanned maps don't typically contain spatial reference information until they are georeferenced. Georeferencing is the process of assigning spatial coordinates to data that is spatial in nature but has no explicit geographic coordinate system (GCS). This task sheet will take you through the steps of georeferencing using the georeferencing toolbar in ArcGIS Pro.

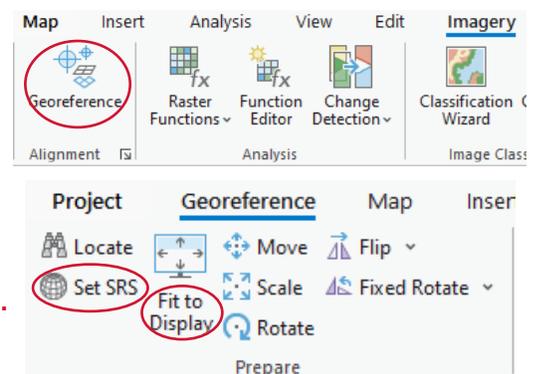
1. Getting Started & Downloading the Data

- To download the data used in this task sheet, navigate to: <https://isueogtp.github.io/GISTaskSheets/TaskSheetData/GISTP0017.zip>.
- When the download is complete, you will need to unzip the **GISTP0017** folder in order to access the files in ArcGIS Pro. The folder contains a **GISTP 0017.aprx** and **ISU_1949.jpg**.
- Open **GISTP 0017.aprx** to begin working in ArcGIS Pro. The project will open to 2016-2018 aerial imagery of Iowa State University's campus from the [ISU Orthoserver](#).
- Next, click the **Map** tab on the ribbon and select **Add Data**. Navigate to the unzipped **GISTP0017** folder in the dialog window that opens, select **ISU_1949.jpg** and press **OK**. If prompted to **Calculate Statistics**, click **OK**.



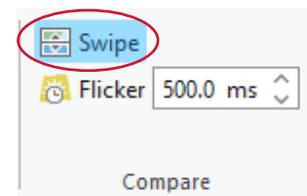
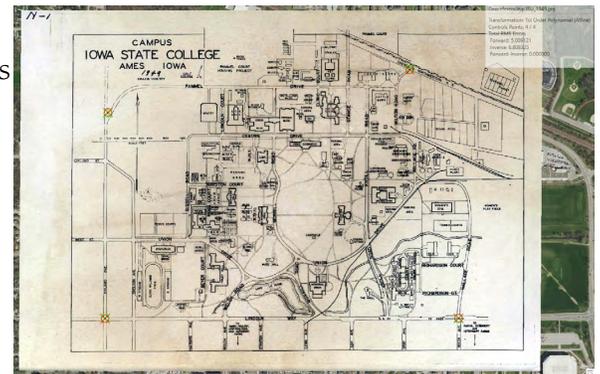
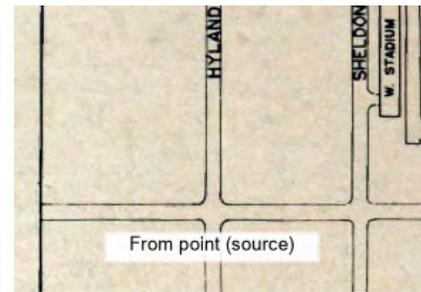
2. Georeferencing a Historic Map

- ISU_1949.jpg** will be added to the **Contents** pane but not the map. ArcGIS Pro may warn you that this file has an **Unknown Coordinate System**. Completing this tutorial will fix that!
- Click the **Imagery** tab in the ribbon, then click **Georeference**. This opens a new **Georeference** tab on the ribbon.
- Click **Set SRS**. Choose **WGS 1984 Web Mercator (auxiliary sphere)**, and click **OK**.
- Now, click **Fit to Display** from the **Georeference** tab. **ISU_1949.jpg** should now overlay the map.



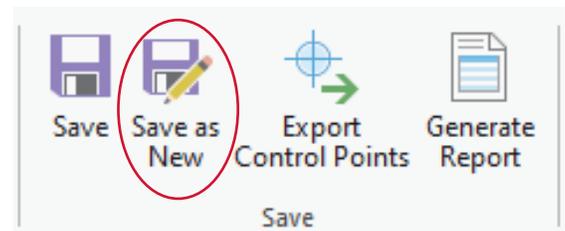
3. Adding Control Points

- To georeference a map, ArcGIS Pro relies on matching common points between the dataset to be georeferenced—the source layer, **ISU_1949.jpg**—and a dataset already in in the correct, position, the target layer (**ortho_2016_2018_nc**).
- Toggle the **Move** and **Scale** options in the **Prepare** group of the **Georeference** tab until **ISU_1949.jpg** roughly overlays the modern aerial imagery.
- Georeferencing works best with using stationary objects as referents. These could be roads, buildings, or other landmarks. It is also helpful to try to place control points in each of the four corners being georeferenced. Click **Add Control Points**. The cursor turns into a cross.
- Start by placing a control point (simply click the cursor) at the center of the intersection of Hyland and Lincoln Way on the source layer. Type the letter **i** to reveal the target layer (aerial imagery) underneath. Find the center of the same intersection and click again. Your first control point is set. Because **Auto Apply** is on by default, the source layer will shift with each control point set.
- Type **i** again to view the 1949 map. Then, repeat the previous step by making control points in the other three corners of the map. Your map will look something like the image to the right.
- Click the **Raster Layer** tab, then click **Swipe**. Use **Swipe** by clicking and dragging your cursor across the map to reveal the layer beneath. You can see the map is georeferenced! If you want more precise georeferencing, continue adding control points and using **Swipe** to check progress. Georeferencing is complete; now on to saving the results.



4. Exporting a Georeferenced Raster

- Click the **Georeference** tab. Click **Save as New**, and save to your desired location as your desired file type. All done!



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