# Georeferencing Historic Maps with **Google Earth**

## What is georeferencing?

Imagine that the map (left) has dots representing locations of 18th century villages. You want to go to these locations and see if there are any archaeological remains. Of course, you could go to this region and perform a survey, but that takes time. There's a faster option: georeferencing the map onto Google Earth satellite imagery (right); finding the GPS coordinates for where the villages would be; inspecting the imagery and/or visiting these places in person.

In other words, georeferencing matches up features on a paper map with digital spatial data (in this case, Google Earth:

Once georeferenced, you can create digital files recording the locations of the archaeological features.

## Georeferencing in archaeology:

Consider these scenarios:

- Archaeologists often want to revisit old archaeological data: maps that were hand drawn, maps that were made with geospatial software but it's really old and imprecise
- A recent archaeological project might publish an article/book with a map of sites, and even though they have spatial data recording these locations, they won't distribute it.

For any of these scenarios, there's a method for finding the precise locations:

1) create a digital version of the paper map (e.g. scan it)

2) add it to Google Earth as a layer

3) georeference the map (*note: Google Earth call this process "image overlay")*

4) find the archaeological sites and mark their locations

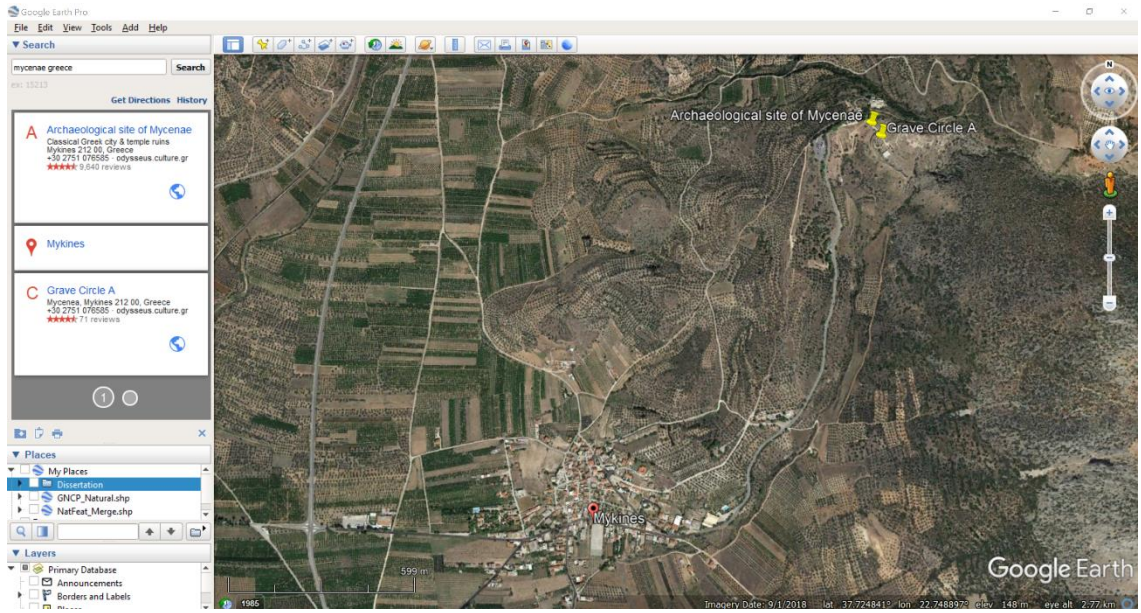
## How to georeference/image overlay:

1. Open Google Earth

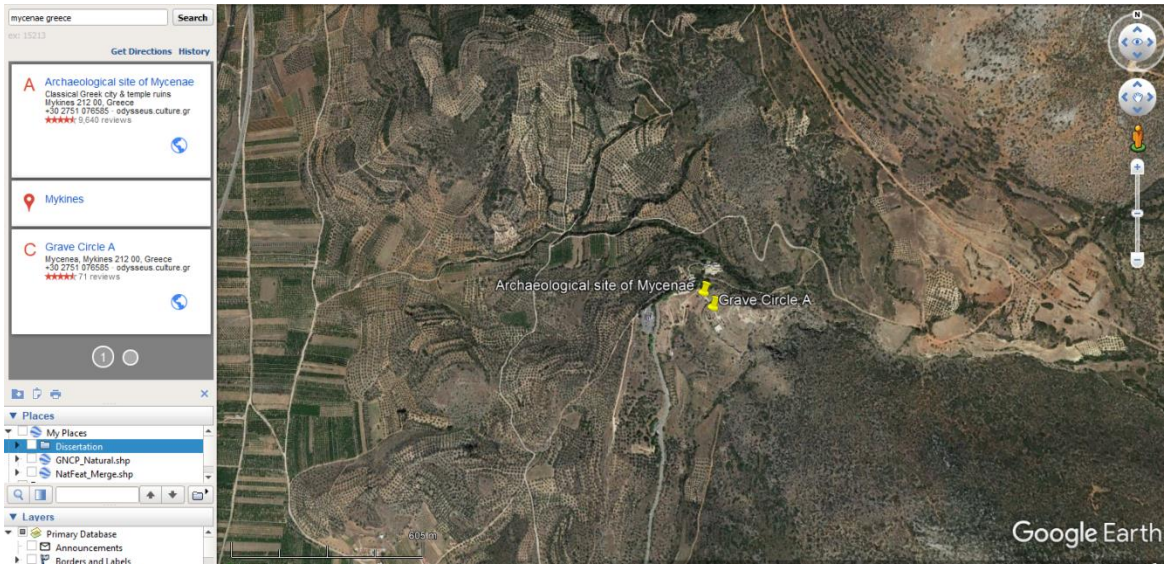
2. If you've never used this software before, click here to review some basic moves.

3. In the search bar, type "Mycenae, Greece" and click search/hit Enter.

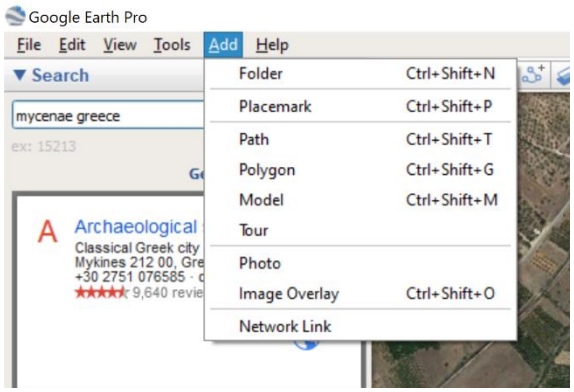
4. The satellite imagery will look similar to below. It's zoomed into an area including both the modern city of Mycenae (i.e. Mykines) as well as the ancient site of Mycenae.




5. Click closer to the archaeological site so that it is closer to the center of your screen.



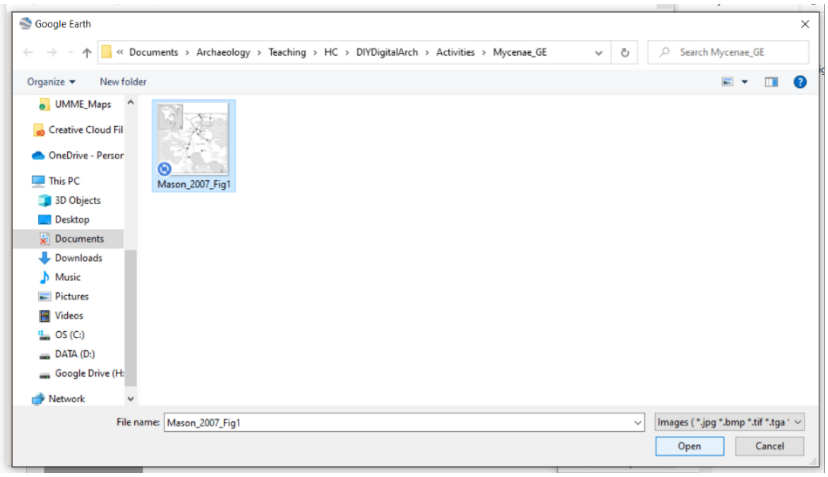
6. Navigate to **Add → Image Overlay**




7. A small box will appear (note: if you're using dual screens, it will likely appear on the second one). In the **Name** field, title this ***Mason_2007*.**

8. Click **Browse.** You need to find the location where you saved the **Mycenae_GE** folder.

9. Once there, select ***Mycenae_2007_Fig1*** and click **Open.**

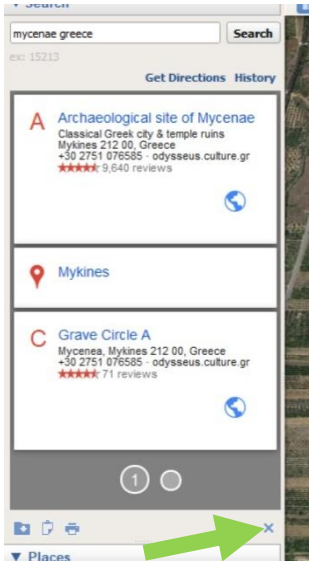



10. You will see a map appear on Google Earth.

11. Close the **Image Overlay** window.

12. Drag the **transparency slider** so that the image is 50 – 60% transparent.

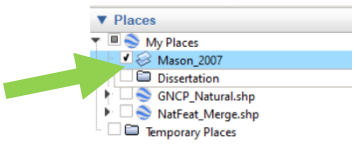
13. On the side of your Google Earth screen, click the **x button** underneath the search results. We're just doing this to declutter your screen.




14. Look under **Places.** This is where Google Earth will store preloaded layers as well as any data you add. Everyone's **Places** folder will look a bit different and you might need to expand some sub folders, but you will eventually find ***Mason_2007*** listed. Hint: check under **Temporary Places** first.

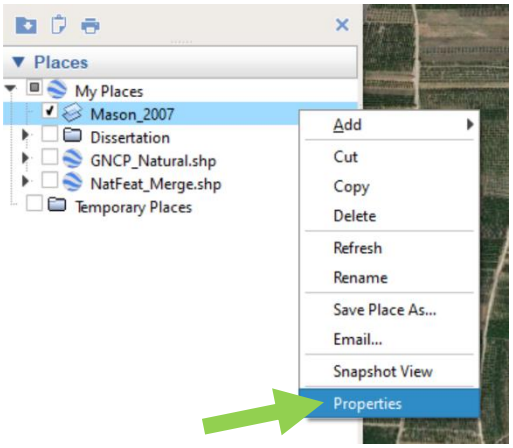
15. To remind you: this is the map image appearing on the screen. If you click the check mark, the map will disappear. It's still added to Google Earth but just not visible.

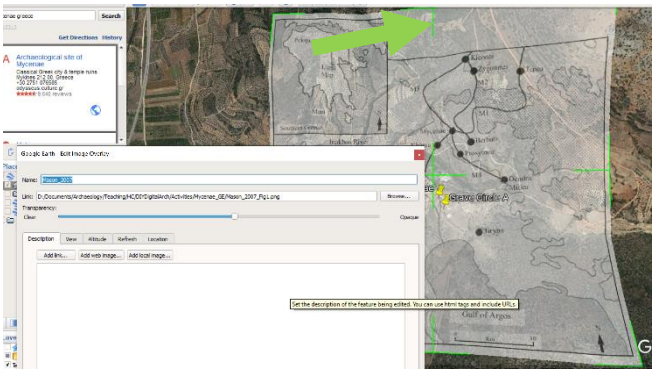
16. Click and hold down ***Mason_2007*** and drag it up. Drag it until your mouse hovers over **My Places** and let go. This makes sure the map is saved under **My Places.** If you're working on your own computer, it will be there next time you open Google Earth.



17. Our goal is to move and warp the map so that its features line up with the Google Earth satellite. Because we closed the **Image Overlay** box, we can't move the image. We need to reopen it.

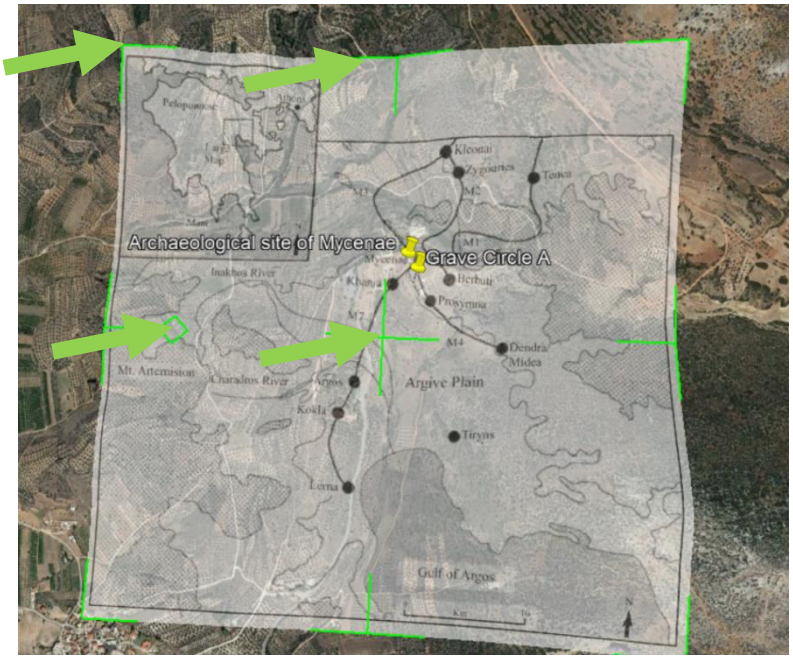
18. In the **Places Menu**, right click on **Mason_2007** (Mac: this should be a ctrl + click). Click on **Properties** and you will see the **Overlay box** reappear. Green lines will also appear on the image. So, remember: if you want to move the image, keep the **Image Overlay** box open.



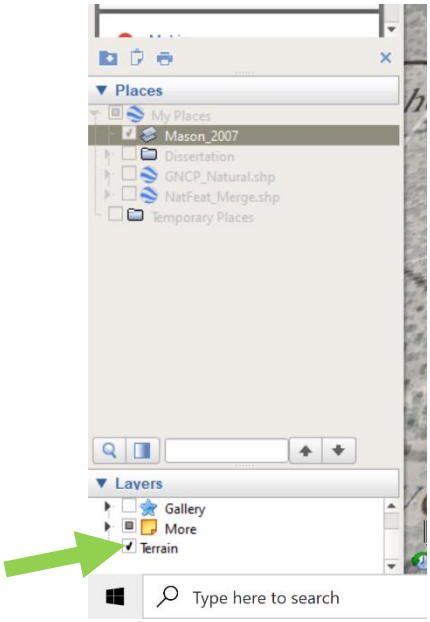



19. Even though it needs to stay open, feel free to reposition/resize the Image Overlay box so it's not in your way. You will need to see the map screen.

20. A few moves:
    a. Click on the center green X and hold down. This allows you to move the image left to right, up to down, etc. *Note: your cursor will change from a hand to a pointy finger.*
    b. Click in the middle of the green diamond. Hold down and drag. The image should rotate.
    c. Click and drag from the corner green lines. This resizes the image.

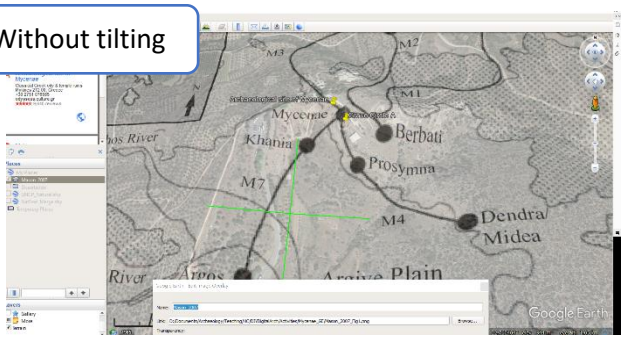


21. Start to position the map. Here are some helpful navigational points:
    a. Experiment with the transparency slide as you work.
    b. You can turn on/off the terrain. Terrain makes Google Earth look 3D. Terrain is located on the bottom of the screen under **Layers.**

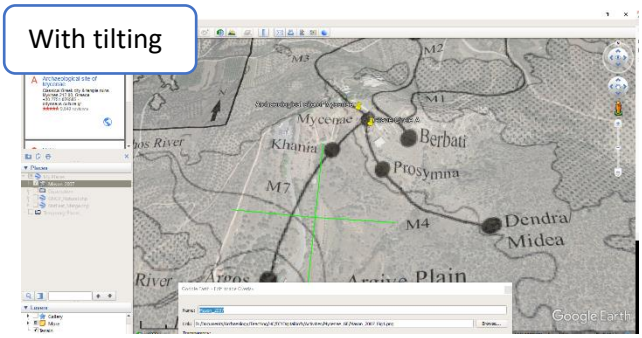



    c. Google Earth is automatically set to zoom on a tilt; you're not traveling to a location from directly above. If you want to switch to a top-down perspective, type **r.** Next time you zoom in/out, you'll be back to tilting:

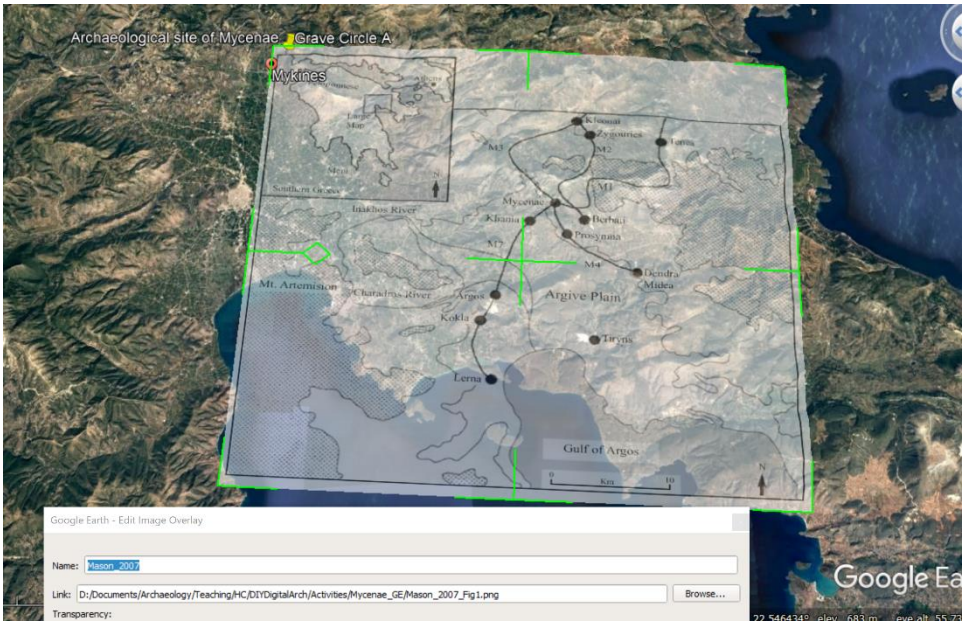
Without tilting



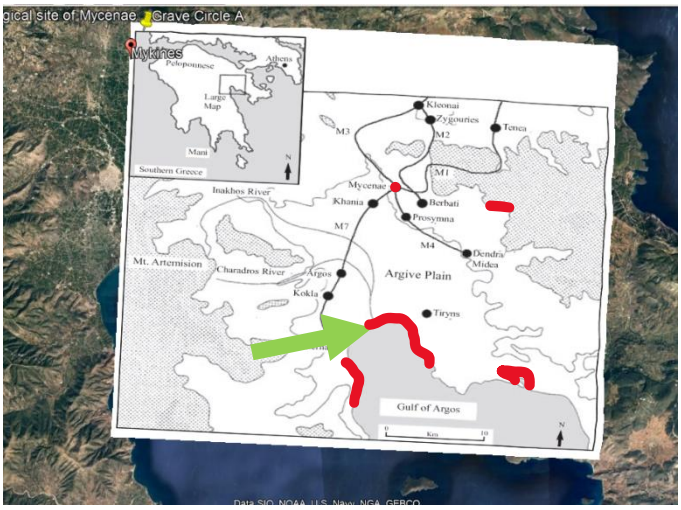

With tilting



22. Time to move the image. You're free to try this on your own, but here are some hints:
    a. Drag the lower righthand corner of the image and make it bigger; next, zoom out. Repeat this process until you can see a fair amount of the southern bay:



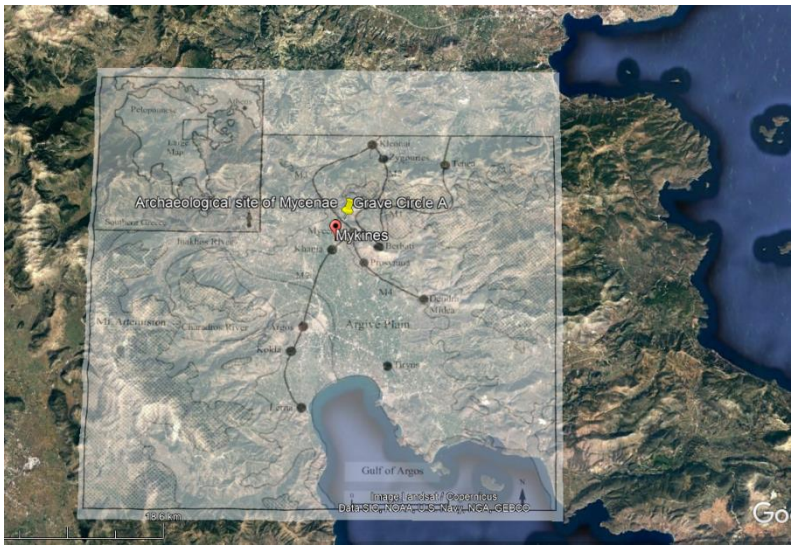

    b. I've marked some areas where the map matches with the coastline:



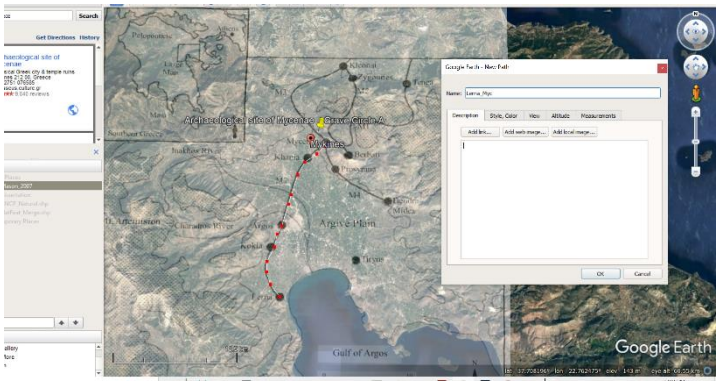


    c. Remember all of the options: stretch the map in different directions; rotate it. Keep an eye on the coastline and line that up; then, make sure image's Mycenae lines up with Google Earth's archaeological site of Mycenae.
    d. **FYI:** Don't kill yourself. You're trying to line up an old map with satellite imagery. Go for the best possible fit and don't spend too much time on it. The goal is to understand the method, not perfect it.

e. Your screen should look something like this when you're finished:

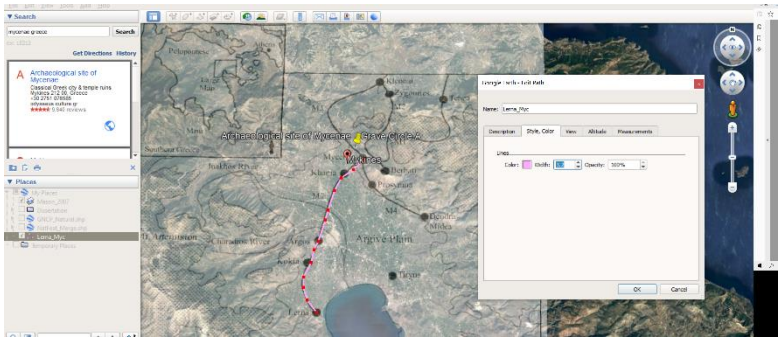



23. Now we're going to trace the ancient roadways. Go to **Add → Path.**
24. The **Edit Path** box looks similar to what you used before. Name the path ***Lerna_Myc*.**
25. While the box is open, click your mouse at the beginning of the road going from Lerna (SW corner of the map) to Mycenae. Following the road, keep clicking. Nodes will appear and this will create a line.
    a. Notice that the more you click, the more detailed you can make your curvature.
    b. You can also zoom in and out as you work.

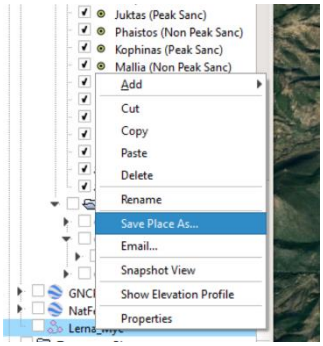



26. Click **OK** once you've gotten that road finished. Don't worry about the rest of the segments – I will be supplying those for you at a later date.

27. Your road will appear. It's probably going to look pretty thin. If you want to change how it looks on screen, find ***Lerna_Myc*** under your Places list. **Right click** (Mac: ctrl + click) → **Properties**. In the **Edit Path** box, click on the **Style, Color** tab and you can change the color/width of the line.



28. Right click on ***Lerna_Myc*** (in your Places list). Go to Save Place As → name the file **Lerna_Myc** and store it in the **Mycenae_GE folder.**




## Recap:

- You took a digital version of an old paper map and added it to Google Earth. The paper map records ancient roadways.
- You warped and stretched that map so it matches up with Google Earth satellite imagery
- You traced the ancient roadways from the map. This created a digital line file.
- Using that file, you could:
    - Direct your GPS to bring you to the road
    - Do different geospatial analyses (coming soon!)
    - Share the file with someone elses