

Field and Laboratory Exercise PIXEL DELINEATIONS¹ IMPORTING GPS DATA TO IMAGE BACKGROUND

Objectives:

1. Demonstrate the differences in spatial resolution of selected remote sensing instruments.
2. Use a GPS receiver to record waypoints and tracks, import the waypoints into an image background to display a path/outline in its correct geographic location.

Equipment needed: Garmin Etrex GPS units, with USB cables, spare batteries; several surveyor's measuring tapes (at least 50 meters); notebook & pen; camera.

Part 1. Tracing the Dimensions of Some Common Pixel Sizes using a GPS Receiver

Students participating in this exercise will form groups (recommended at least 6 members to a group). Each group will use a GPS receiver to record pixel corners and trace the outline of a pixel characteristic for different remote sensing systems, as described below. The instructor will designate a nearby area large enough to mark out boundaries of pixels as indicated below.

For each group, four of the members define the outline of a pixel from the list below, measuring the correct dimensions using the surveyors' tape.



Assume each pixel to be square in shape and one team member will stand to mark each corner of the pixel. The final two group members use the GPS receiver to record the corners of the pixels (using waypoints) and trace the outlines of the pixel shape (using tracking), i.e., with the GPS receiver active, walk the outline of the pixel shape, stopping at each corner to record a waypoint. Be sure to **turn off** the tracking option when the last corner of each pixel is marked, otherwise the GPS will track **all movement** of the GPS unit.

<u>Pixel Sizes:</u>	Landsat TM: bands 1, 2,3,4,5, and 7:	30 × 30 meters
	Landsat TM, band 6:	60 × 60 meters
	SPOT HRV XS:	20 × 20 meters
	ASTER	15 × 15 meters
	SPOT HRV PN:	10 × 10 meters
	GeoEye	0.5 × 0.5 meters

¹ This exercise adapted from Alison Goforth of Montgomery County Virginia Public Schools

Part 2: Projecting GPS data onto Imagery

When all groups have collected their results, return to your classroom or laboratory where you have access to a desktop computer. Use on-line image maps, such as GoogleEarth or ArcGIS On-Line to plot the outlines of each pixel into image. **See Part 3 on how to download the GPS data.**

When the download is complete, make a screen shot of the Google Earth image showing the outdoor area and the pixel outlines and identify the different pixel sizes and sensors. The following question should be addressed: Why does the variation in pixel size make a difference?



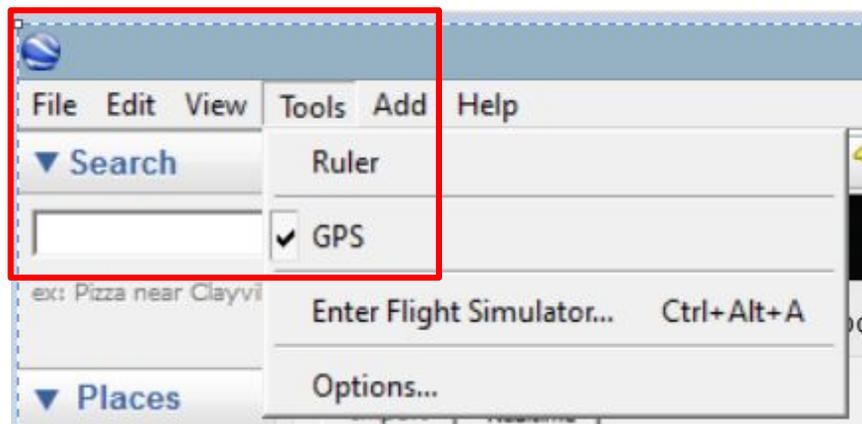
Part 3: Integrating Waypoints and Tracking with Imagery

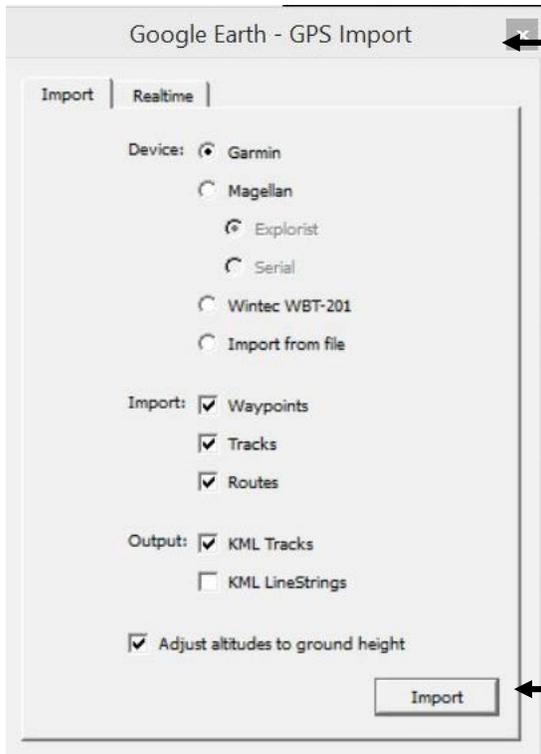
There are two ways to integrate your GPS data onto imagery, either through direct download from the GPS unit onto the image or downloading the data into software which will convert the data to a file usable within mapping software.

Method 1: Directly downloading GPS points into Google Earth

Turn on the computer and open GoogleEarth.

On the GoogleEarth Toolbar, go to **Tools** and click on **GPS**





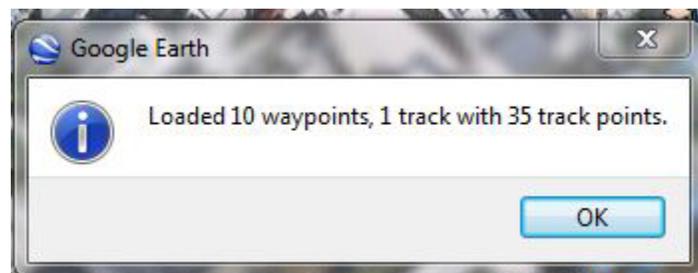
The GPS Import window will open.

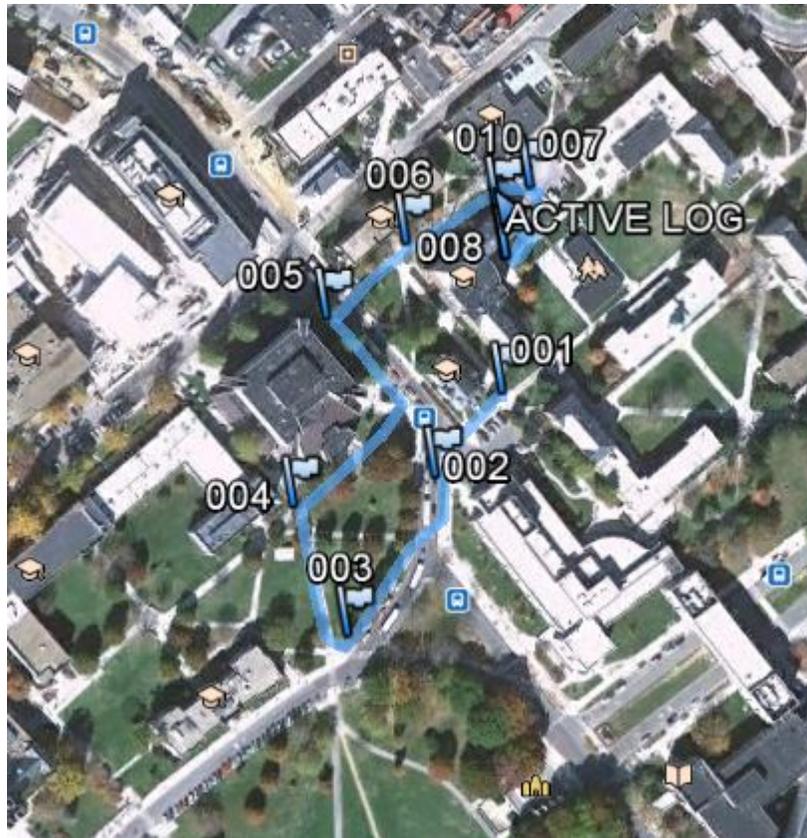
Under **Device**, select the correct manufacturer type for your GPS device. Under **Import**, select the types of data you want to import. We recommend using the default option to have all three types selected. This will allow for all types of GPS data to be transferred. Under **Output**, select KML Tracks. Check the **Adjust altitude to ground height** option to adjust all recorded points to ground level.

Plug the USB cord into the GPS unit and into a USB port on the computer. Turn on the GPS unit. Once the unit has turned on, click on the **Import** button.

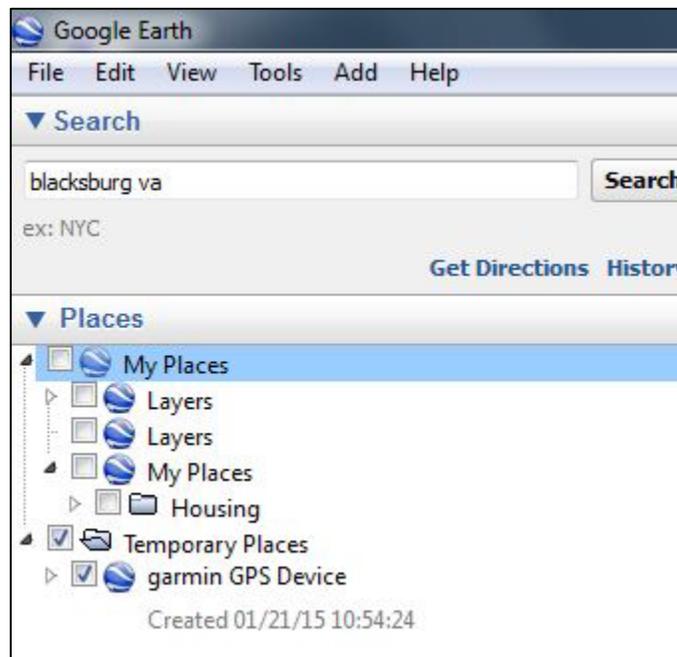
Note: the GPS unit does not need to be connected to satellites to download the data. If you receive a message that no GPS unit is found, turn off the GPS unit, wait for a few seconds and turn it back on. Then try the import again.

When the GPS data has been successfully imported, you will get the following message and your tracks and waypoints will display on GoogleEarth, exactly in place on your outdoor location.





Your data appears in *My Places > Temporary Places* with the label GPS Device. If you expand the GPS Device folder, you can see your GPS data. You can expand those folders to explore the information further, in addition to organizing, editing, sharing, and saving the data.



Method 2: Downloading GPS data to computer in different formats

If you do not have access to GoogleEarth or wish to download your data and use in GIS desktop programs or ArcGIS On-Line, you will need to download the data into GPS Conversion software. In many cases, GPS units come with software (i.e. many of the Garmin etrex models come with Map Source software). If your GPS unit did not come with software, freeware is available for download on-line. One source of software is the Minnesota Department of Natural Resources and this software is called DNRGPS (<http://www.dnr.state.mn.us/mis/gis/DNRGPS/DNRGPS.html>). The DNRGPS website has all the instructions on download and use of the software.