

GY301 Geomorphology

Lab 6: GPS Surveying

Introduction

In this lab you will use hand-held Garmin Rhino GPS receiver units to map a running trail on campus. In addition, you will take position data waypoints for the benchmarks used for the Total Station project (ST01-ST25). You will then download the data using the “Basecamp” or similar application, and generate a hard copy map using GIS. Simply add the data to your GIS project using methods covered in the Total Station project. Create separate GIS maps for:

1. The Garmin GPS track tracing the running trail around 3 mile creek.
2. The Garmin GPS waypoints for benchmarks 1-25 (points ST01 - ST25) along with the original total station RTK benchmark positions (points ST01 - ST25) used for the Campus Topo project (Lab 6). Color code the RTK versus Garmin GPS positions differently.
3. A spreadsheet of the RTK versus the Garmin data including UTM_X, UTM_Y, Elev_m, and point I.D. for both sets of data.

You may turn in either hard copy or electronic versions for the assignment.

To accomplish this task you will need to know how to:

1. Set the GPS to a specific map datum and coordinate system. For this project we are using NAD83 datum, UTM coordinates in zone 16. To set the map datum and coordinate system follow the below steps:
 - a. Go to the main menu page (the page that contains many icons) and select the “setup” option.
 - b. Select “position format” option.
 - c. For position format select “UTM UPS”. By selecting UTM coordinates you are configuring the GPS to output coordinates that correspond to the UTM grid marked on all modern USGS topographic maps. Units for the coordinates are meters.
 - d. Set the “map datum” to “NAD83” (North American 1983 datum). This datum matches the RTK data used for lab 6.
2. Store waypoints on the GPS. Name the waypoints “ST01” for benchmark 1, “ST02” for benchmark 2, etc. You can store a waypoint from the “Waypoint Averaging” procedure in the main menu page. Before storing a waypoint bring up the “satellite view” by pointing to the strength of reception bars on the main menu page. You should see that the receiver generating UTM coordinates. When ready move to the “Main menu” and select “Waypoint Averaging”. Use the cursor to move down and highlight the number (ex. 001), and then press down on the cursor to bring up the keyboard. Type in the benchmark ID (e.g. ST01), and then select “OK”. Cursor down to the “OK” button to store the waypoint. Wait about 25 seconds to collect 25 position positions for averaging.

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To verify the waypoint is stored page to the “Main Menu” and use the cursor to activate the “Waypoint Manager” button. Cursor through the list until the waypoint name is highlighted. Press down to select the waypoint, and then a screen will display the info for the waypoint. You can see the coordinates by selecting “change location”.

3. You will next document the position of the running trail that circles 3-mile creek with a GPS “track”. A track is simply the saved position of the GPS as you move overland. After some trigger distance a position point is saved when you move away from the last point more than the trigger distance:

a. Move to a starting position on the running trail. Start at the sign for the Life Science Building on the trail. Make sure the GPS is receiving UTM coordinates by viewing the satellite plot.

b. Find the “Track Manager” menu on the GPS main screen. Using the touch screen find and select the “current track”. “Clear” the current track to zero it out. A new track “line” will appear on the GPS map as you move. A point will be automatically taken as you move about 5 meters from the last point so try not to wander off the path.

c. When you complete the circuit around 3 Mile creek and return to the starting point stop and find the tracks menu on the GPS. Save the current track using the default name (a date/time combination). You are now ready to download tracks and waypoints at the computer.

3. Navigate to the ST01-ST25 waypoints on campus. Use waypoint averaging to store the position for each one, labelling the point as “ST01, ST02, etc.”. Download the stored waypoints and track to the base map of the campus. We will be using Garmin “BaseCamp” application to download the waypoints. A GPX file for track and waypoints saved from “BaseCamp” may be directly loaded into QGIS.

4. The GIS application QGIS or ArcMap (10.x) will be used to generate the waypoint position map overlain on top of the campus aerial at a scale of 1:5,000. The map will have a title, graphical scale, North arrow and UTM grid. Use the base map ZIP file link in the assignment web page.

Download Waypoints from Receiver using BaseCamp GPS Tool

This application can be downloaded freely from the Garmin web site and works with all garmin receivers. Once activated you should see a list of stored waypoints and tracks under the device name. Simply highlight either desired waypoints or tracks and then select “Export” to GPX format. QGIS will be able to display GPX points. You must connect the USB data cable to the receiver and PC for this procedure to work.

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Create Final Map with QGIS

In QGIS you should be able to add .GPX data files as vector data. Use the Print Composer to build a final map formatted like **Figure 1**.

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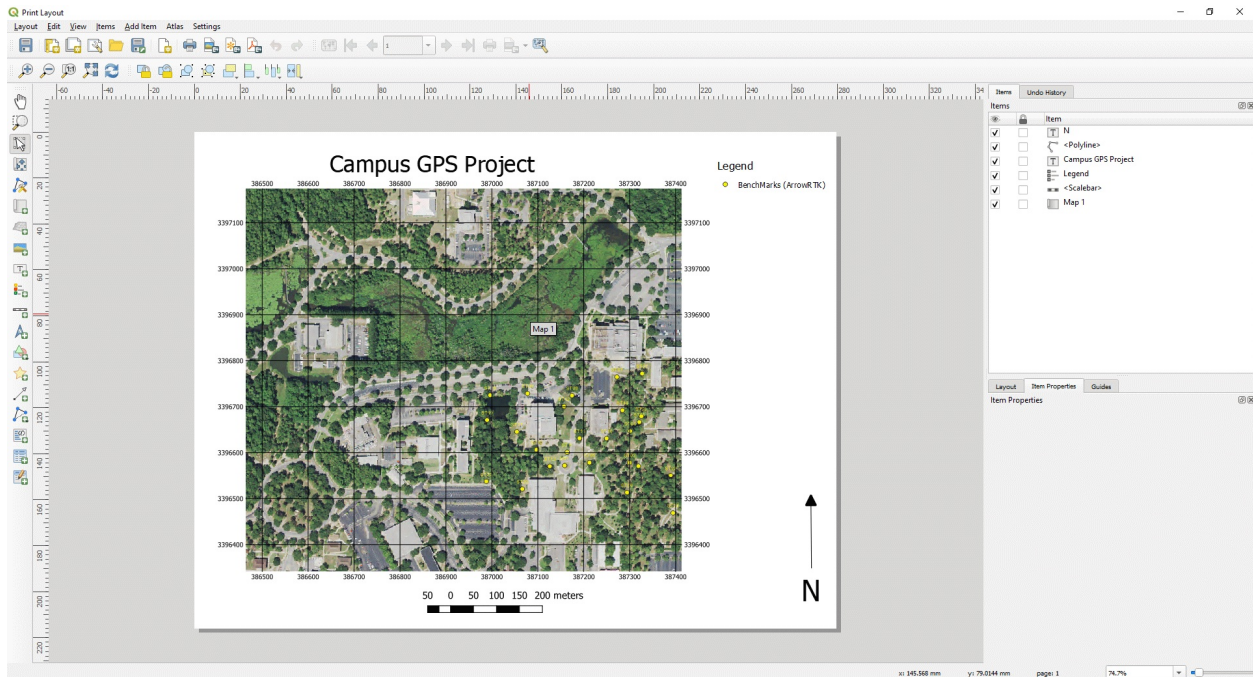


Figure 1: Layout of final map.