Collecting Data Using a Trimble GeoExplorer Tutorial

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Introduction

This is an introductory guide that explains how a Trimble GeoExplorer user can set up and take gps ground data within the parameters that the user decides to use. In this tutorial we used Trimble's TerraSync software. Through the following steps you will learn how to choose the optimal settings that will give you the best accuracy on the day that you are collecting, how to create a point, line, or area data, downloading the data to a computer and more. This is not a comprehensive guide to all of the GeoExplorer's capabilities but is designed to get you on the right track and to collect quality datasets.

1) **Before you head out into the field to collect data**
   a) Make sure the batteries are charged
   b) Make sure the field computer and GPS receiver are communicating
   c) After testing the system, turn off the field computer to save battery life *(any receiver that is connected to it is automatically turned off as well)*

2) **Configure settings with TerraSync software before data collection**
   You will configure these settings to suit your needs, and you may do this before you are out in the field. In step 3, I am configuring the device to collect data in Fort Collins, Colorado, USA. Therefore I am in UTM Zone 13 North. **If you already have your device configured to suit your needs for collecting data, skip to step (3).**
   a) Turn on the Trimble device to configure
   b) Release the pen that is attached to the device *(you will use this pen to make all selections)*
   c) Tap the windows icon 🪟 , then **Programs/TerraSync**
   d) You should see a Skyplot screen (Figure 1), with a Status Box and a Skyplot Box in the left corner
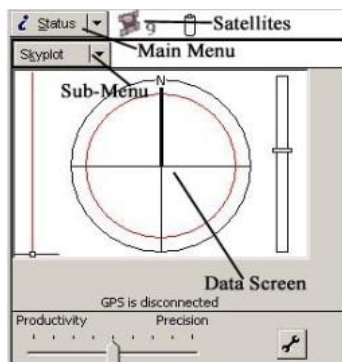   e) Click on **Status/Setup** *(you should see a screen similar to Figure 2)*

Figure 1: Skyplot screen
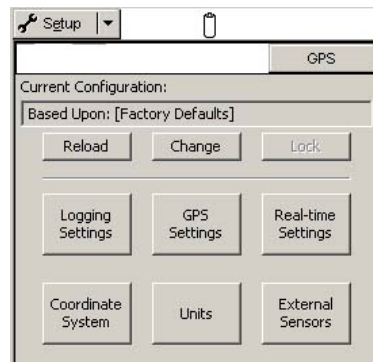

Figure 2: Status/Setup screen

   f) Click on **Logging Settings**:
      i) Accuracy Settings: Accuracy Value for display/logging:
         (1) horizontal, in the field
         (2) use accuracy-based logging- NO

      ii)   Point/Vertex auto-pause count: NONE

      iii) Antenna Height : 1.3 meters *(set to the distance from the ground to the antenna if you are using one)*

      iv) Allow position update: CONFIRM

      v)   Confirm end feature: YES

      vi) Filename Prefix: *(put your initials or other prefix you want files saved under here)*

      vii) Waypoint Filename Prefix: *(W, or other waypoint filename prefix you choose)*

      viii) Between Feature Logging:
- (1) Style-Time
- (2) Interval-OFF

      ix) Click *DONE*

g) Click on **GPS Settings** *(note: may also be set via Status bar or GNSS settings)*:

      i)   GPS Receiver Port: COM3 *(or another port you will be using)*

      ii)   If you want to set the parameters for the GPS slide bar manually, uncheck the box next to it, then follow steps iii-vii. Otherwise, click *DONE*

      iii) Max PDOP : 12 *(may also use 8-11 depending on preference)*

      iv) MinSNR: 35-37 *(excludes satellites with low quality signals)*

      v)   Min Elevation: 10-12° *(the lower you set this, the more satellites you make available to the GPS receiver)*

      vi) NMEA Output: OFF

      vii) Click *DONE*

h) Click on **Real –time Settings**:

      i)   Choice 1: Use uncorrected GPS or Integrated WAAS

      ii)   Click *DONE*

i) Click **Coordinate System** *(the following selections are for the Fort Collins, Colorado example):*

      i)   System: UTM

      ii)   Zone: 13 North

      iii) Datum: WGS 1984

      iv) Altitude Reference: Mean Sea Level

      v)   Altitude Units: Meters

      vi) Display USNG: OFF

      vii) Geoid: DMA 10x10 (Global)

      viii) Coordinate Units: Meters

      ix) Coordinate Order: North/East

      x)   Click *DONE*

    j)   Click **Units**:

        i)   Distance Units: Meters

        ii)   Area Units: Square Meters

        iii) Velocity Units: Kilometers per hour

        iv) Angle Units: Degrees

        v)   Lat/Long Format: DD$^\circ$MM'SS.ss"

        vi) Offset Format: Horizontal/Vertical

        vii) North Ref: True

        viii) Magnetic Declination: Auto (8.8° E)

        ix) Click *DONE*

    k)   **External Sensor Settings** (if available): Use default

    l)   When you have finished the configuration, turn off the Trimble device to save battery power

3) When you are at the data collection site

    a) Turn on the Trimble Device

    b) Tap the windows icon 🏁 , then **Programs/TerraSync**; the GPS receiver should start automatically

    c) You should see a Skyplot screen like Figure 3, with a Status Box and a Skyplot Box in the left corner

Figure 1: Skyplot screen

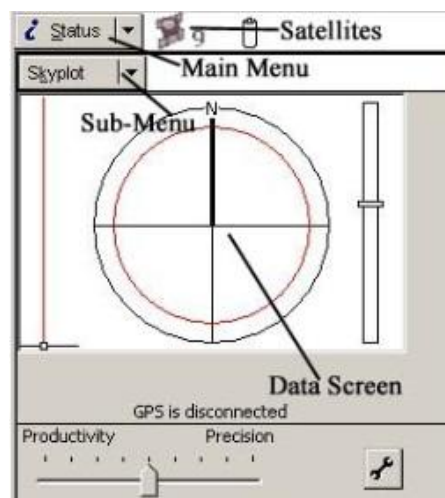**Move to a location where you have a clear, unobstructed view of the sky:** Your Skyplot screen should look similar to Figure 4. You can see the North (N) indicator. Filled, black boxes represent satellites that the GPS receiver is using to compute your current position. White, unfilled boxes represent satellites the GPS receiver is getting signals from but is not using *(likely weak signals).*
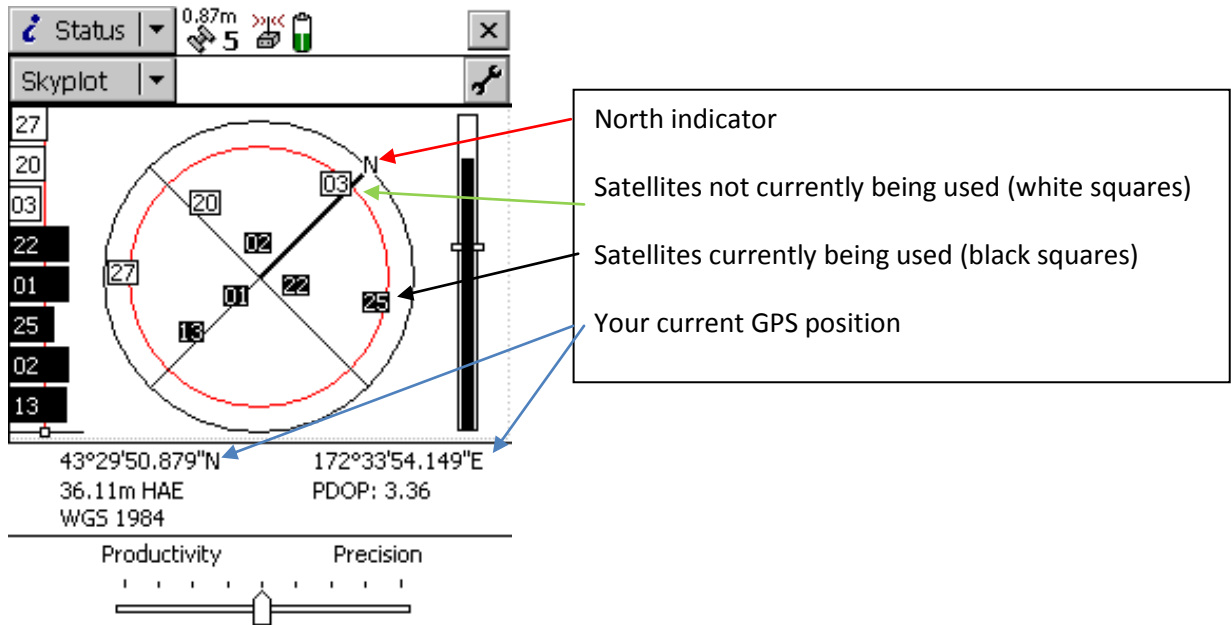
Figure 2: Skyplot screen with satellites

4) **Computing GPS positions**

If the receiver is computing GPS positions the satellite icon in the Status bar and the number beside this (number of satellites being used) are solid (Figure 5). If the satellite or the number beside it is flashing, the device has not yet acquired enough satellites with good geometry *(to compute a 3D GPS position, you will need a minimum of 4 satellites with good geometry).* You may slide the GPS slider bar (Figure 5) to the left to obtain satellites in less than favorable conditions *(i.e. under a tree canopy),* but note that this decreases precision. You would slide the GPS slider to the right to gain precision *(i.e. in an open field).* **Generally, you want a PDOP value < 4 (Figure 5).**
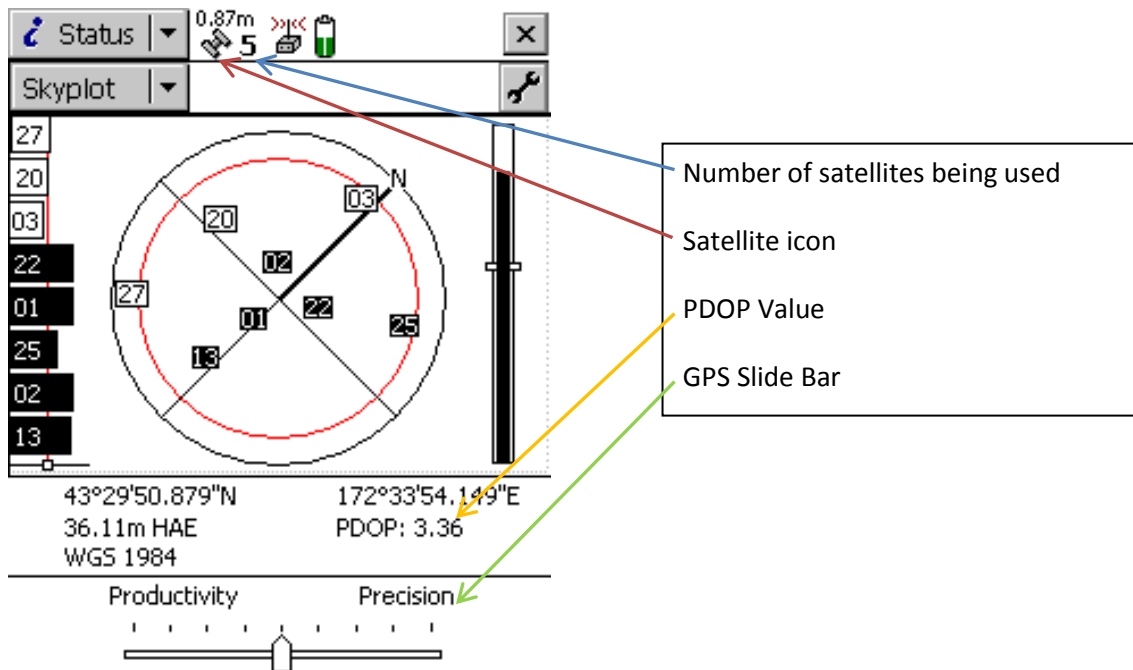

Figure 3: Skyplot data

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5) **OPTIONAL INFORMATION** (*If you click the arrow next to the Skyplot box, you will find the following)*
   a) Skyplot: Location of satellites and PDOP
   b) Satellite Info: satellite number, SNR, elevation, Br(T), almanac date
   c) Receiver: position status, carrier time, connectivity of GPS and antenna
   d) Real-time: integrated WAAS info and SNR
   e) Plan: future satellite availability
   f) Comms: ports
   g) Time: displays Universal Time Coordinated (UTC) time; Greenwich, England
   h) About: system info and system report access

6) **To Create a New File** *(note: When using the Trimble device, data are collected in files made up of features. There are three types of features: POINTS, LINES, and POLYGONS. A single file may contain one or more of these features)*
   a) Tap the **Data** Icon *(note: this is the icon directly below the windows icon . Depending on the last usage of the device, this icon may say something else-tap it regardless and select Data)*
   b) Tap the icon below the Data icon: select New File *(the new file screen appears; Figure 6)*
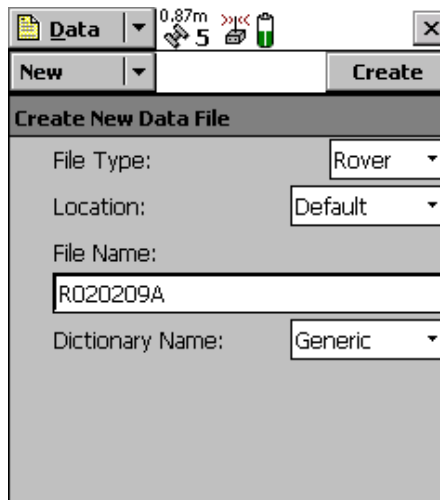

Figure 4: New file screen

   c) There is a default name give in the File Name field. You may change this to the file name desired (Figure 6).
   d) Tap **Create**
   e) The Confirm Antenna Height form appears; if necessary, change this; otherwise ignore
   f) Type: GeoXT Internal (default)
   g) Tap **OK**
   h) The Collect Features screen appears; you can now begin collecting features

7) Collecting a Point Feature

a) Begin with steps 4,5,6, and 8 above

b) Make sure the Collect Features Screen is open; if not, tap the **Status Icon**- *(note: this is the icon directly below the windows icon . Depending on the last usage of the device, this icon may say something else-tap it regardless and select **Data**)*

c) Tap the icon below Data- select Existing File and select the data file you want to use

d) Tap **Open** at the bottom of the screen

e) The Confirm Antenna Height form appears; if necessary, change this; otherwise ignore

f) Type: GeoXT Internal (default)- Tap **OK**

g) Tap the **Collect Icon/Collect Features**

h) Select **Point_generic icon** *(you may enter a comment here if desired: tap the keyboard icon at the bottom of the screen)*; tap *DONE (note: by default, the Trimble device will begin logging GPS positions as soon as you open a new feature; to delay logging positions until you log attributes of the feature and/or reach the beginning point for the feature, tap the Options Icon/Log Later- you will know the TerraSync software is not logging GPS positions when the pause icon is flashing in the status bar)*

i) The Trimble Device should begin collecting data *(if it is paused, tap Log at the bottom of the screen)*

j) When you are ready to collect the point, tap *DONE* to save the point

k) A message, "feature stored" should appear; the point has been saved to the data file you created

8) Collecting a Line Feature

a) Begin with steps 4,5,6, and 8 above

b) Make sure the Collect Features Screen is open; if not, tap the **Status Icon**- *(note: this is the icon directly below the windows icon . Depending on the last usage of the device, this icon may say something else-tap it regardless and select **Data**)*

c) Tap the icon below Data- select **Existing File** and select the data file you want to use

d) Tap **Open** at the bottom of the screen

e) The Confirm Antenna Height form appears; if necessary, change this; otherwise ignore

f) Type: GeoXT Internal (default)- Tap **OK**

g) Tap the **Collect Icon/Collect Features**

h) **Select Line_generic icon** *(you may enter a comment here if desired: tap the keyboard icon at the bottom of the screen)*; tap *DONE (note: by default, the Trimble device will begin logging GPS positions as soon as you open a new feature; to delay logging positions until you log attributes of the feature and/or reach the beginning point for the feature, tap the Options Icon/Log Later- you will know the TerraSync software is not logging GPS positions if the pause icon is flashing in the status bar)*

i) Move to the beginning of the line you will be walking and tap **Log** if the device is paused; begin walking

j) When you have reached the end of the line, tap *DONE*

k) A message, "feature stored**"** should appear; the line has been saved to the data file you created

9) **Collecting an Area Feature** *(note: the first and last GPS positions logged will close the area, therefore it is optional to return to the starting point):*

a) Begin with steps 4,5,6, and 8 above

b) Make sure the Collect Features Screen is open; if not, tap the **Status** Icon- *(note: this is the icon directly below the windows icon* *. Depending on the last usage of the device, this icon may say something else-tap it regardless and select* **Data***)*

c) Tap the icon below Data- select **Existing File** and select the data file you want to use

d) Tap **Open** at the bottom of the screen

e) The Confirm Antenna Height form appears; if necessary, change this; otherwise ignore

f) Type: GeoXT Internal (default)- tap **OK**

g) Tap the **Collect Icon/Collect Features**

h) Select **Area_generic icon** *(you may enter a comment here if desired: tap the keyboard icon at the bottom of the screen)*; tap *DONE (note: by default, the Trimble device will begin logging GPS positions as soon as you open a new feature; to delay logging positions until you log attributes of the feature and/or reach the beginning point for the feature, tap the Options Icon/Log Later- you will know the TerraSync software is not logging GPS positions if the pause icon is flashing in the status bar)*

i) Move to the beginning point, and tap **Log** if the device is paused; begin walking the perimeter of the area you want to record *(note: you can pause logging at any time while walking the perimeter and enter attribute values by tapping Pause; tap Resume to continue logging)*

j) To view the map while collecting features, tap the **Status Icon**; select **Map**- *(note: this should be the icon directly below the windows icon* *. Depending on the last usage of the device, this icon may say something else-tap it regardless and select* **Map***. You can zoom in or out to look at the map at different scales. To return to the Data screen, tap the Map Icon/Data)*

k) When you have completed the perimeter of the area you want to record, tap *DONE*

l) A message, "feature stored" should appear; the line has been saved to the data file you created

10) **Vertex Averaging** *(note: when you are mapping an object, for example a building, you can stand at points along the perimeter, i.e. building corners, and get average positions)*

a) Stand at the first point or corner; ***follow steps (11: a-h) above***

b) Tap the **Options** icon/New Vertex

c) Tap *DONE* at the bottom of the screen to collect that vertex point

d) Move to the next point or corner

e) Tap the **Options icon/New Vertex**

f) Follow this process until the last Vertex is recorded: tap **OK** to close the area feature

11) Ending Data Collection
   a) Tap *DONE* in the Collect Features screen
   b) Tap **YES** to close the current data file; you will return to the Create a New File screen
   c) Tap the **Data** Icon/Exit *(note: this should be the icon directly below the windows icon* . *Depending on the last usage of the device, this icon may say something else-tap it regardless and select **Data**)*

12) Navigation *(once you have created a data file containing point features, you can navigate back to them)*
   a) Tap the **Data** Icon *(note: this should be the icon directly below the windows icon* . *Depending on the last usage of the device, this icon may say something else-tap it regardless and select **Data**)*
   b) Tap the icon below the Data Icon- select **Existing file**-tap the file you want to select
   c) Tap **Open** at the bottom of the screen
   d) The **Confirm Antenna Height** form appears; if necessary, change this; otherwise ignore
   e) Type: **GeoXT Internal (default)**- Tap **OK**
   f) A list of the features in the data file selected will appear *(the comments attached to the feature highlighted may be seen at the bottom of the screen)*
   g) Tap the feature you want to navigate to; will be highlighted
   h) Tap **Options Icon/Set Nav Target** and select the feature you have highlighted
   i) Tap the **Data** Icon *(note: this should be the icon directly below the windows icon* . *Depending on the last usage of the device, this icon may say something else-tap it regardless and select **Navigation**)*
   j) Start moving toward the target; there will be an arrow to follow. You will also see a distance indicating the remaining distance from your point to the target. The bearing and heading values should be the same value when you are following the correct path.
   k) Tap the **Navigation** icon; select **Map** if you want to view your destination
   l) When you reach the destination, the distance should ≈ 0. Tap the **Options Icon/ Clear Nav Targets**

13) Connecting the Trimble Device to the Computer
   a) Place the Trimble device in the receiver and turn it on
   b) Connect the Trimble to the computer you are using with the USB cable *(you may also use Bluetooth wireless)*
   c) A Windows Mobile Screen Appears; select **continue without setting up your device** (*Note: You also have the option to follow the Windows Mobile instructions to set up the connections to your specifications, although this is unnecessary for data transfer)*

14) GPS Pathfinder Office Software v. 4.20-File Settings and Options
   This section (steps 16-20) will be edited when the new Pathfinder Software Arrives
   a) Open GPS Pathfinder software
   b) Select **File/Projects/New** *(creates a new project)*

c) Type in a project name *(today's date will appear automatically in comments; you may edit this if desired)*

d) Select a project folder location *(under the destination drive)*

e) This folder will be where the Trimble device stores the .ssf data files *(from the selected project)* when you connect it to the computer

f) Backup folder: location for backup copies of your data files

g) Export folder: exported GIS files will later be stored here

h) Base folder: base station files will be stored here

i) Select **OK**- If you need to set options, continue through **steps (j-l)** below; if you have done this previously, continue to **step (m)** below:

j) Select **Options/ Units**… *(review all default units and make changes if necessary)*

k) Select **Options/Coordinate System**… *(select coordinate system for display- for this example, we are using: System: UTM, Zone: 13 North, and Datum: WGS84)* also select altitude measured from mean sea level (MSL), default Geoid model, and coordinate and altitude units in meters.

l) Select **Options/Time Zone**… *(in this example, we are using Mountain Standard Time)*

15) **Transferring Data from the Trimble to a Computer using GPS Pathfinder Office Software** *(note: If the TerraSync software and the GPS Pathfinder Office software are installed on the same computer (i.e. a laptop), then you can skip this step)*

a) In the GPS Pathfinder software, Select **Utilities/Data Transfer**…

b) The Data Transfer Screen should appear; if the device is connected, you will see green circles with check marks at the top of the window (Figure 7):
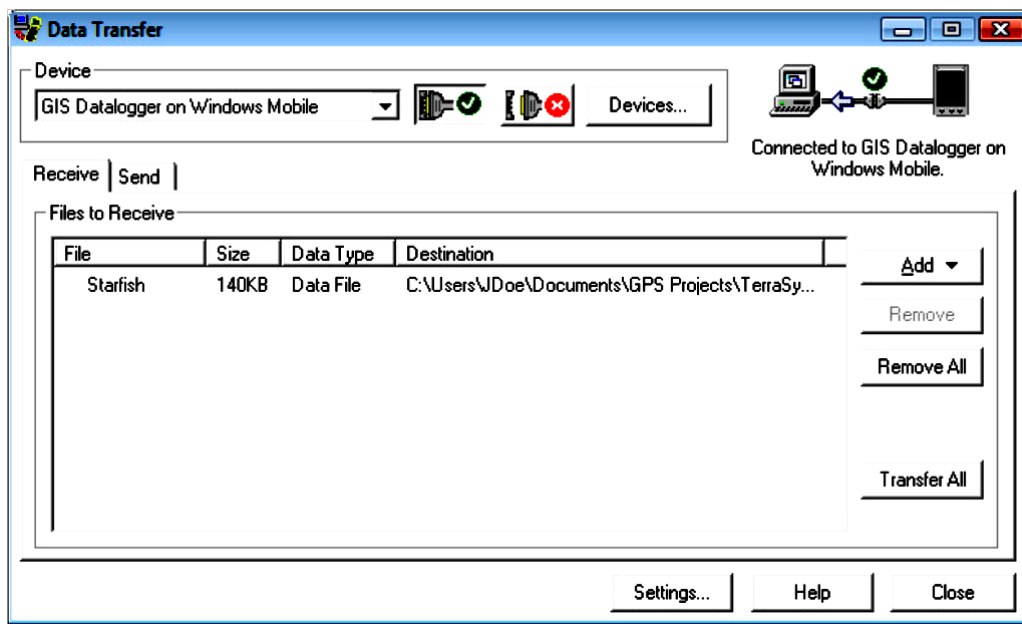

Figure 5: GPS Pathfinder Office's data transfer screen

c)   With the Receive Tab selected, select **Add icon/Data File**

d)   The available files will appear; select all files to be transferred into the project

e)   Select **Open**- the files will move to the "files to receive" window

f)   Select **Transfer All** icon- the files will be downloaded to the main project directory from **step 15** above

g)   Select **Close** when you are finished transferring files

16) Viewing your Files in GPS Pathfinder Office

h)   In the GPS Pathfinder software, select **File/Open** (will be a .ssf file)

i)   There are various tools to use: zoom, ruler, etc.

j)   To change symbols for features, select View/Layers/Features

17) Plotting the Map in GPS Pathfinder Office

a)   In the GPS Pathfinder software, select **File/Plot Map**

18) Differential Correction of Data in GPS Pathfinder Office

 (OPTIONAL- may improve the accuracy of GPS positions if you suspect any errors such as atmospheric noise)

a)   In the GPS Pathfinder software, open the project containing the data you want to correct

b)   Select **Utilites/Differential Correction**

c)   The Differential Correction Wizard will begin

d)   Select the .ssf file(s) to correct

e)   Select Processing Type: Automatic Standard Carrier and Code Processing

f)   Select Base Data Provider- Search for the closest Trimble Station (the closest one to you should appear when you search)

g)   Continue through the wizard (leaving default options)

h)   A new file (s) will be created (.cor) that is the corrected file(s)

Additional References

http://www.trimble.com/geoxt3000_ts.asp?Nav=Collection-76246

http://www.geoplane.com/downloads/Datalogger_Manuals/Mapping/GeoExplorer%202003%20XT%20Getting%20Started%20Guide.pdf

http://www.geoplane.com/downloads/Receiver_Manuals/Mapping/Geo%20Explorer%20III%20Operation%20Guide.pdf