National Park Service

National Park Service
U.S. Department of the Interior

Northeast Coastal and Barrier Network
Inventory and Monitoring Program

Standard Operating Procedure (SOP)

GPS Data Collection Workflow for Using the Trimble GeoXT 2008 GPS Receiver with ESRI ArcPad 7.1 and the Trimble GPS Analyst Extension

Version 1.0 (September, 2009)

DRAFT

The following table lists all changes that have been made to this Standard Operating Procedure since the original publication date. Any recommended or required changes added to the log must be complete and concise and promptly brought to the attention of the Data Manager. The Data Manager will review and incorporate all changes, officially complete the revision history log, and change the date and version number on the title page.

Revision History Log:

New Version #	Previous Version #	Revision Date	Author (full name, title, affiliation)	Location in Document and Description of Change	Reason for Change

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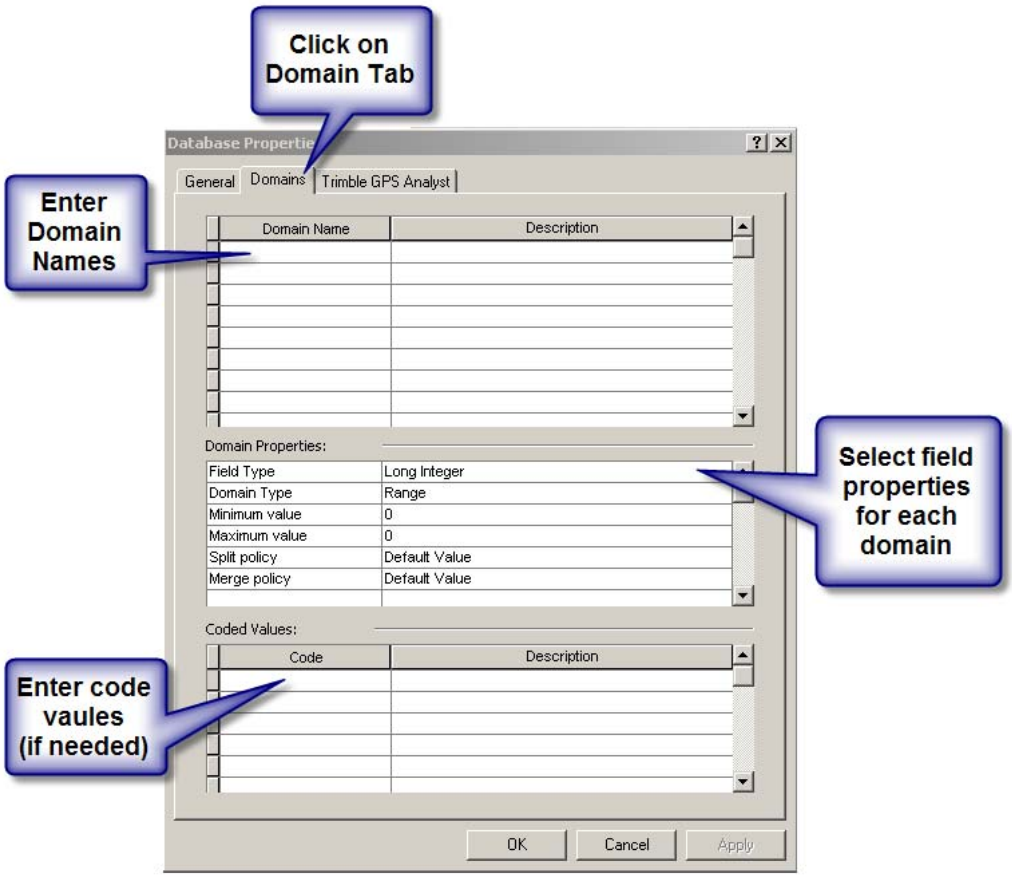
I. Preparing Data for ArcPad 7.1 Using the GPS Analyst Extension

A. Create a personal geo-database

Note: Personal geo-database is the only geodatabase format that will work with the Trimble GPS Analyst extension. File base geo-databases are not supported.

B. Code any domains to be used for the geo-database

1. Right click on the personal geo-database, and select *Properties*.
2. Select the *Domain* tab.
3. Enter Domain Name & Description.
4. Enter properties for domain and select a field type (Short Integer, Long Integer, Float, Double, Text, or Date).
5. For numbers enter a range. For text enter the possible text selections under coded values. You must also enter descriptions for all coded values.
6. Repeat steps 3 and 4 until your entire data dictionary has been created.

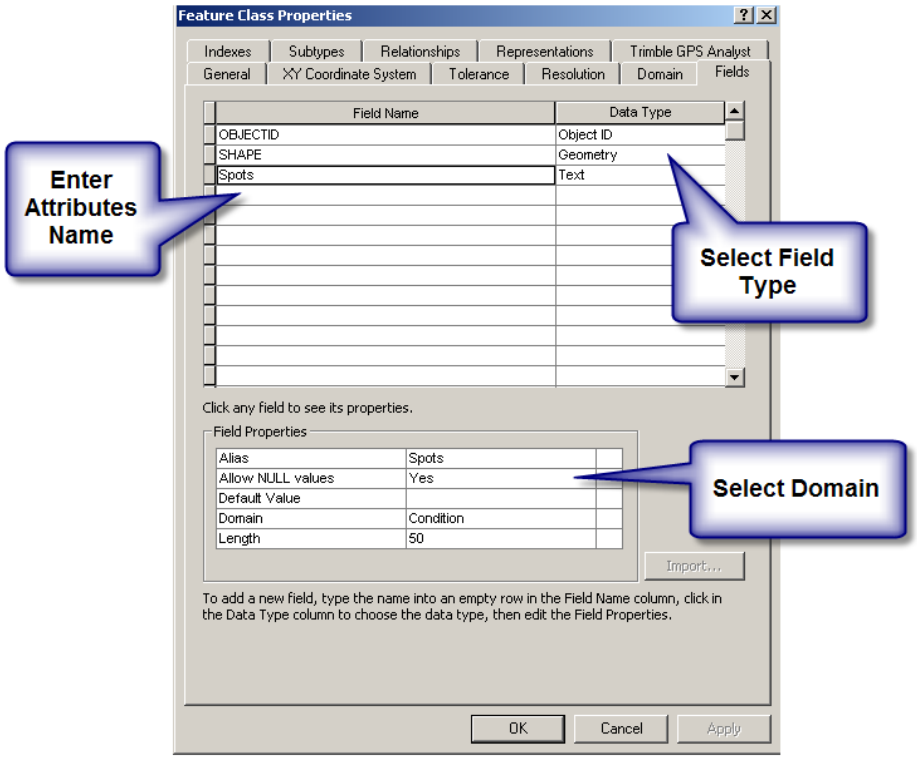


C. Create a feature dataset

Be sure to define the coordinate system.

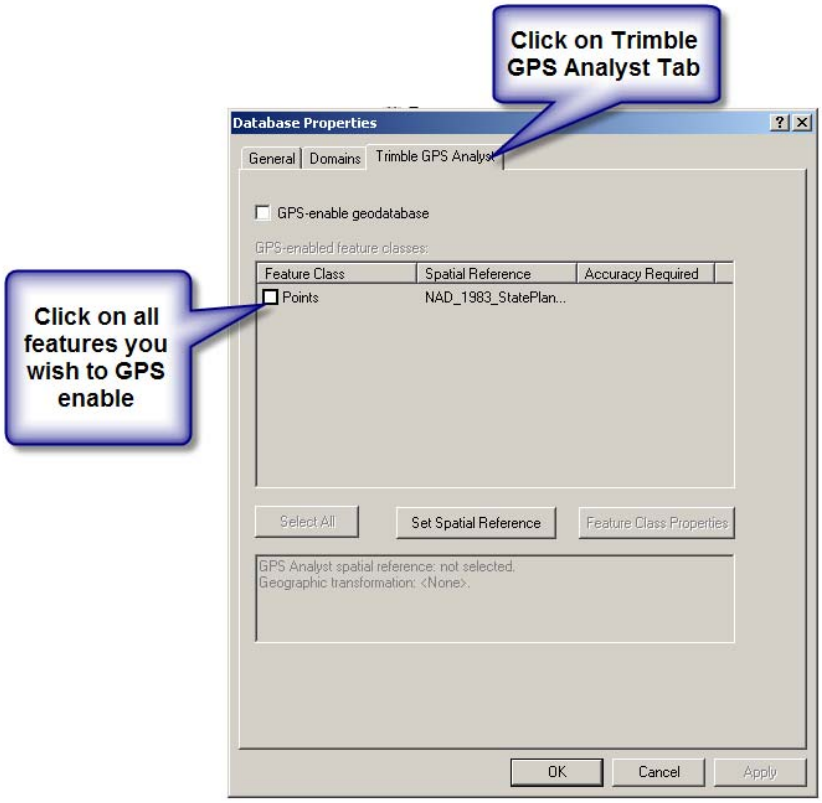
D. Create the Point, Line, or Polygon feature class inside the feature dataset

1. Define your attributes using the domains created above.
2. Select the field type that matches the domain.
3. Select the domain.

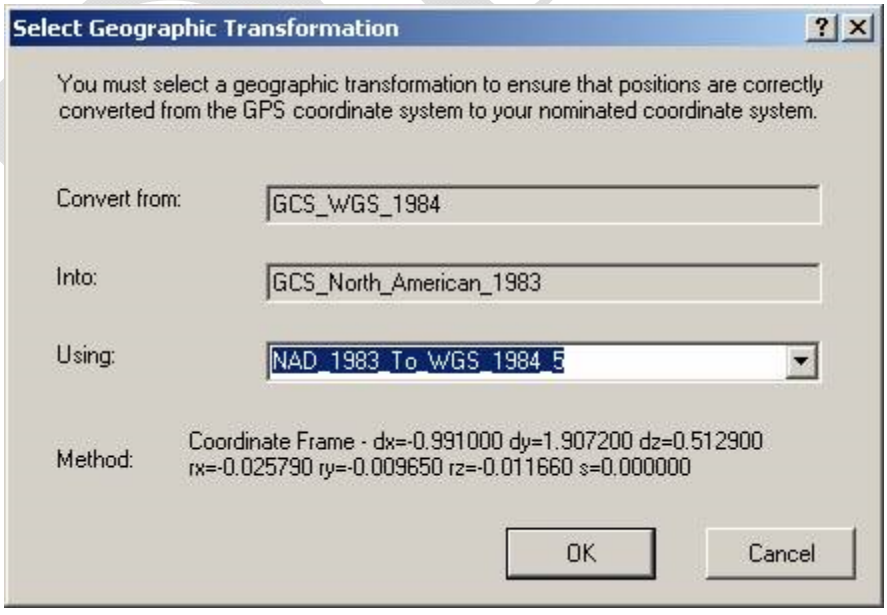


E. Enable the GPS Geodatabase

1. Right click on the geodatabase.
2. Select *Properties.*
3. Click the *Trimble GPS Analyst* tab.
4. Click on all the features you wish to enable.
5. Click *Apply*.



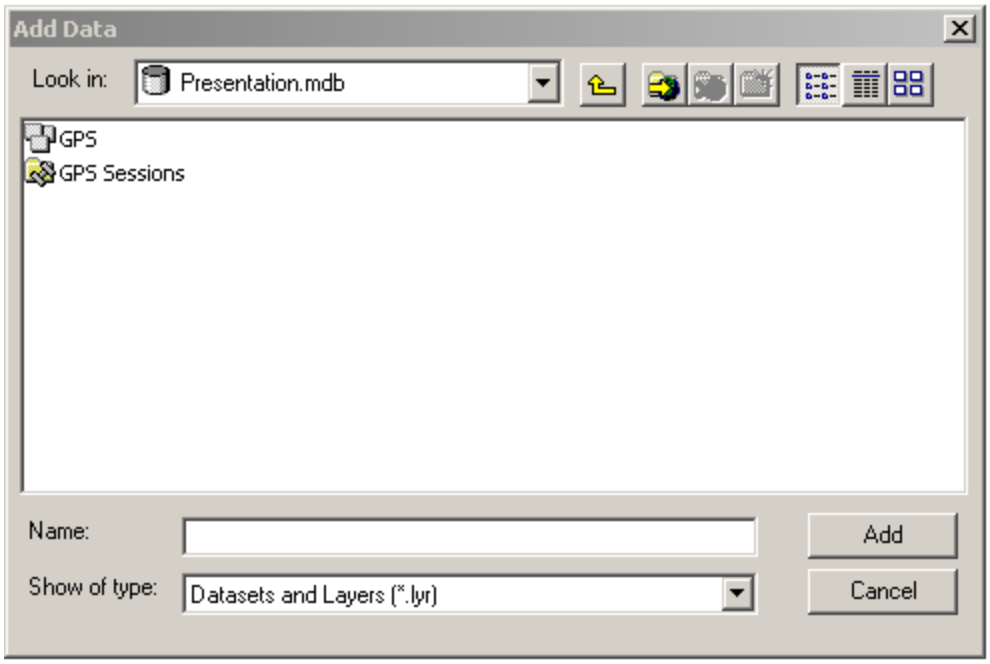
6. You must then select a geographic transformation to convert the data from WGS 1984 to North American 1983. Select NAD_1983 to WSG 1984_**5.**



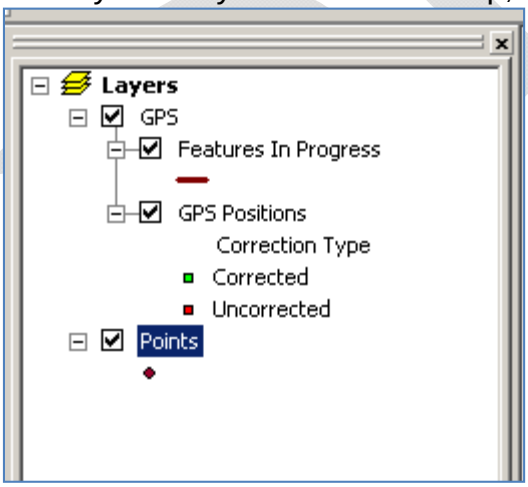
7. Click *OK*.

F. Create an ArcMap document with the features you wish to map.

There is now a new folder in the geo-database called “GPS Sessions.” There is where the .ssf file will be stored.



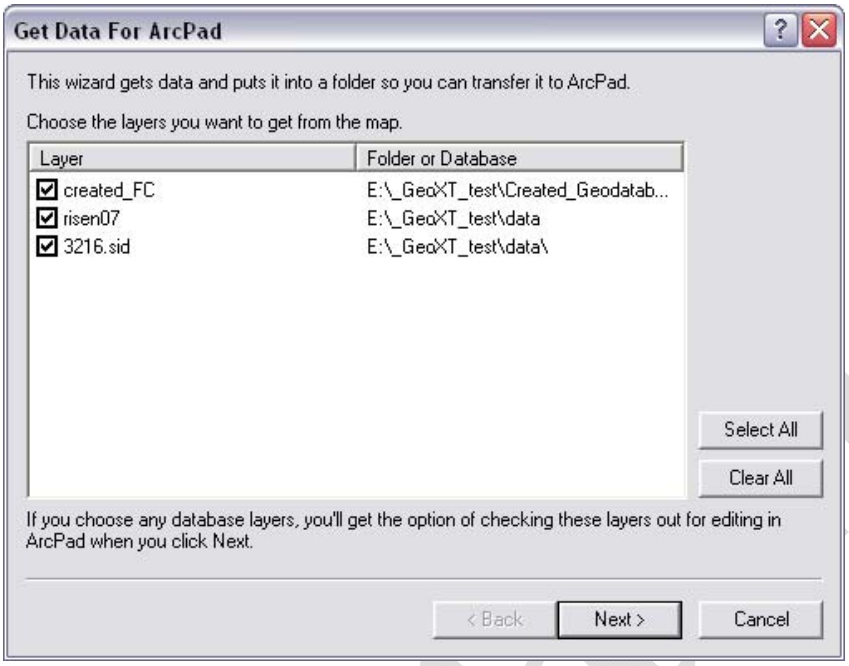
When you add your data to ArcMap, the GPS layer will also be added.



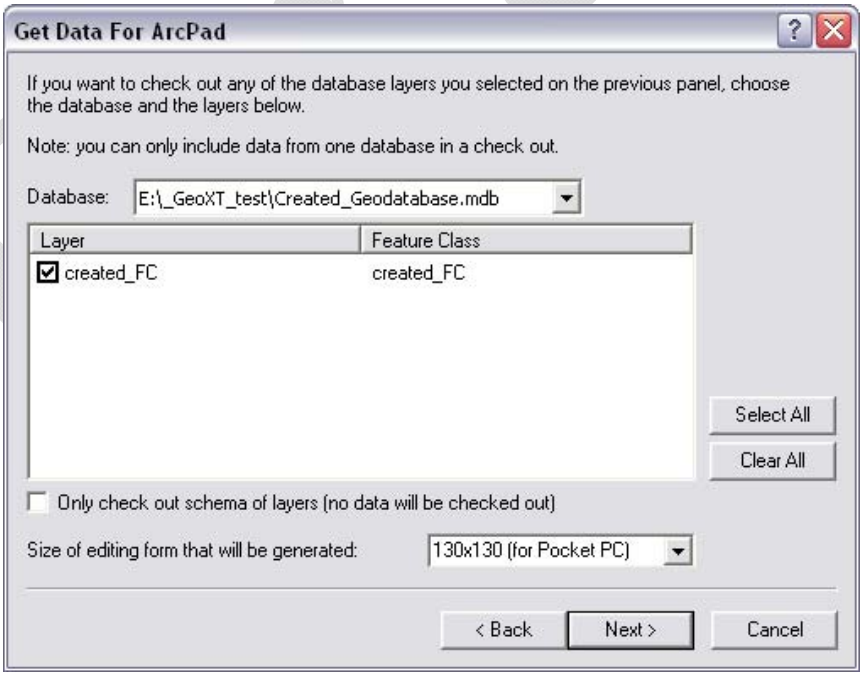
G. Check out the features you wish to map.

1. Using Windows Explorer, create a folder where the exported ArcPad packet will be stored on the desktop computer.

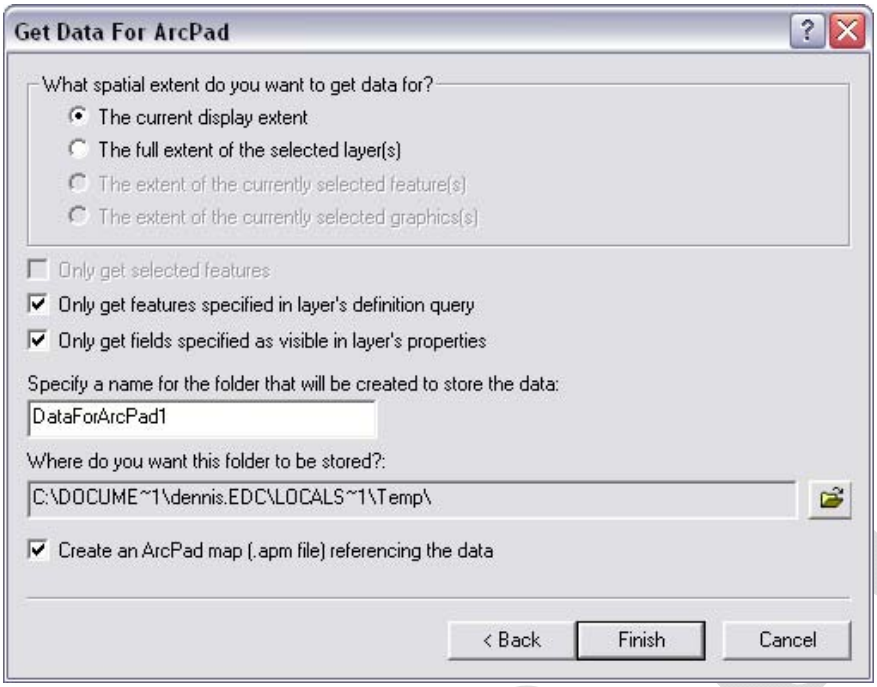
2. Click the *Get Data for ArcPad 7* button  on the Trimble GPS Analyst toolbar. The first page of the *Get Data for ArcPad* wizard appears:



3. Select all desired feature classes and click *Next*. The second page of the *Get Data for ArcPad* wizard appears:



4. Select all layers that you wish to be editable in ArcPad, and then click *Next*. The third page of the *Get Data for ArcPad* wizard appears:



5. In the spatial extent options group, select either *The current display extent* or *Full extent* option.

6. Type a name for the folder that will store the data.

7. Navigate to the folder created in #1 above.

8. Click *Finish*; the check out process starts.

9. When the check out process is complete, the *Get Data for ArcPad* summary dialog appears. Click *OK* to close the dialog. The feature classes you selected are now checked out as shapefiles.

10. Usually, you would now use Microsoft software such as ActiveSync to transfer the shapefiles to a GPS unit that is running ESRI ArcPad software and the Trimble GPScorrect extension.

II. ArcPad 7.1 Settings

It is important that each of the following settings is configured. Other settings not elaborated upon here are not used or are not required.

A. GPScorrect settings

1. Accessing GPScontroller menus:
   a. Power on the GeoXT GPS unit and open the ArcPad program

b. Access the GPScorrect extension by clicking the drop-down arrow to the right of the *GPS Position Window*  button on the main toolbar and selecting the *Trimble GPSCorrect* icon  .
c. Click the down arrow on the main menu and choose *Setup*.

2. Logging settings:
   a. Click on *Logging Settings*
   b. *Log GPS to SSF* = On
   c. *Log H-Star Data* = Auto
   d. You can set the antenna type by clicking the wrench icon.
   e. Click *OK*

3. GPS settings:
   a. Click on *GPS Settings*.
   b. Make sure checkbox next to the slider bar is un-checked.
   c. *DOP type* = PDOP
   d. *Max PDOP* = 6.0
   e. *Min SNR* = 39.0
   f. *Min Elevation* = 15°
   g. *Velocity Filter* = Off
   h. Click *OK*.

4. Real-time settings
   a. Click on *Real-time Settings*.
   b. Choice 1 = Use Uncorrected GPS
   c. Real-time Age Limit = 25 s

B. ArcPad settings

1. Accessing the settings menus
   a. Power on the GeoXT GPS unit and open the ArcPad program.
   b. Access the GPS settings dialog box by clicking the drop-down arrow to the right of the *GPS Position Window*  button on the main toolbar.
   c. Select *GPS Preferences*.

2. Protocol settings (GPS tab):
   a. Click on the *GPS* tab.
   b. Protocol: TrimbleGPS Correct
   c. Port: COM3:TSIP Serial Port
   d. Baud: 9600
   e. Uncheck *Automatically Activate.*

3. Capture settings:
   a. Click on the *Capture* tab.
   b. Check *Enable Averaging.*
   c. Points = 12
   d. Vertices = 12
   e. Streaming Vertices Interval = 1
   f. Distance Interval = 2 m

4. Quality settings:
   a. Click on the *Quality* tab.
   b. Check *Non-compulsory Warnings.*
   c. Check Maximum PDOP = 6.
   d. Check Minimum EPE = 12.
   e. Leave remaining boxes unchecked.

5. GPS Height settings:
   a. Click on the *GPS Height* tab.
   b. Enter height of GPS (or antenna).
   c. Check *Use Height in Datum Transform*.

6. Datum:
   a. Click on the *Datum* tab.
   b. GPS Datum = D_WGS_1984

7. Alerts settings:
   a. Click on the *Alerts* tab.
   b. Check all boxes.

8. Location:
   a. Leave last known fix locations for *Latitude*, *Longitude*, and *Elevation*.
   b. Uncheck *Restore Location.*

Any remaining settings generally apply to display preferences and may be changed as the user sees fit.

III. Data Collection with ArcPad 7.1

1. On the GPS unit, open the ArcPad map document exported in section II. above.
2. Activate the GPS by clicking the *GPS Position Window*  button on the main toolbar.
3. Click the *Layers*  button on the main toolbar, and make sure the pencil is checked for editing the desired shapefile.
4. Tap the arrow to the right of the *Feature* tool  to display the drop-down list. Choose the *Polyline* feature tool. The *Add GPS Vertex* and *Add GPS Vertices Continuously* buttons are enabled.
5. Tap the *Add GPS Vertices Continuously* button  to begin capturing streaming vertices.
6. To pause data collection, tap the *Add GPS Vertices Continuously*  button. Tap the button again to resume capturing vertices.
7. Tap the *Proceed* button  to complete the new line feature. The *Feature Properties* dialog box, or a custom edit form, is automatically displayed after

the new line feature has been created.

8. Enter any appropriate attribute data.

9. Tap *OK*.

IV. Checking in Field Data Using the GPS Analyst Extension

Using ActiveSync, copy the ArcPad shapefiles and the GPScorrect SSF files to their original folder on the desktop computer (i.e., overwrite the same files that were originally exported to the GPS unit). The next step is to check the modified field data into the geodatabase.

1. Open your original ArcMap document.

2. From the *Trimble GPS Analyst* drop-down menu, select *Start GPS Editing*. This starts a GPS edit session and enables most of the buttons on the *Trimble GPS Analyst* toolbar. Because you have already checked out feature classes from this map document, the *Check In ArcPad shapefiles and GPScorrect SSF* button  is also enabled.

3. Click the *Check In ArcPad shapefiles and GPScorrect SSF button*  on the *Trimble GPS Analyst toolbar*. The *Check In Shapefiles* list displays all of the layers in the field data folder.

4. Select the shapefile to check in and click *OK*. When check-in is complete, the *Check In ArcPad shapefiles and GPScorrect SSF* summary dialog appears.

5. Click *Close* to close the dialog. The updated field data is now checked in. The corresponding SSF file is imported into the geodatabase as an imported GPS session, and the GPS data is linked to the GIS features. You can now see the new features on the map.

6. From the *Trimble GPS Analyst* drop-down menu, select *Save Edits*. The modified features, and the GPS-derived geometries to which they are linked, are saved in the geodatabase.

7. From the *Trimble GPS Analyst* drop-down menu, select *Stop GPSEditing*.

8. Select *File* / *Save* to save the map document.

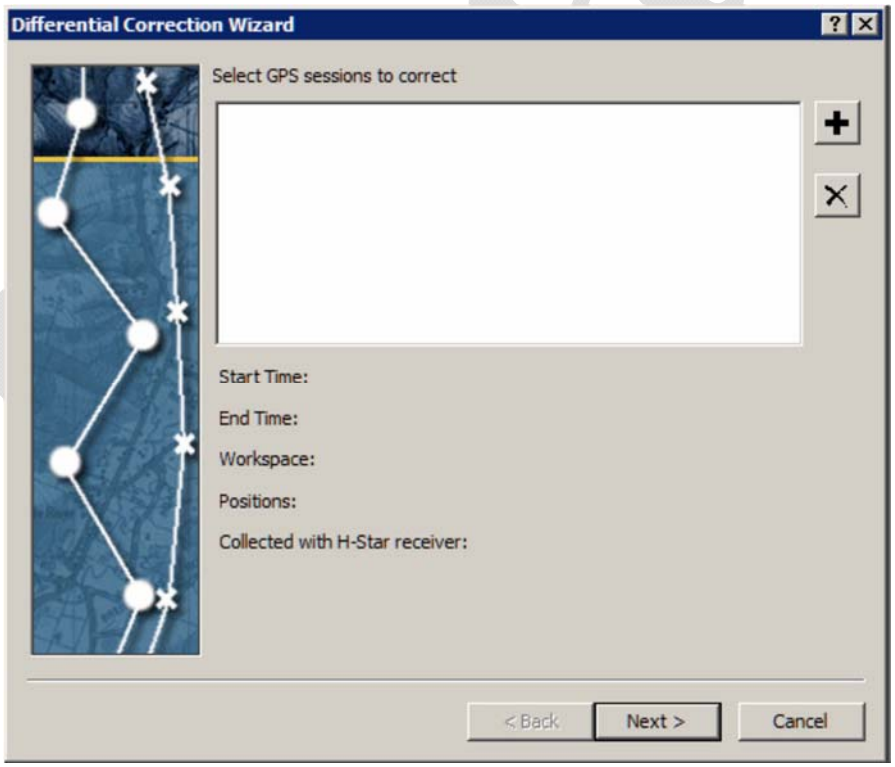
V. Checking in ArcPad Shapefiles not Exported with GPS Analyst Extension

Note *– You must enable the* Trimble GPS Analyst *extension in ArcCatalog and GPS-enable a geodatabase before you can view the* GPS Analyst extension *interface.*

1. Create a GPS-enabled geodatabase. (See section I., above.)
2. In ArcCatalog, right-click on the geodatabase.
3. Select the *Import* / *From ArcPad shapefiles and GPScorrect SSF*  tool.

VI. Differentially Correcting Field Data

1. In ArcMap, open the *Trimble GPS Analyst* drop-down menu, and select *Start GPS Editing*. This starts a GPS edit session, and enables most of the buttons on the *Trimble GPS Analyst* toolbar.
2. Click the *Differential Correction* button  on the *Trimble GPS Analyst* toolbar.
3. The first page of the *Differential Correction* wizard appears:



The *Select GPS sessions to correct* list is either empty, or it displays the imported GPS session(s) that were created the last time you imported GPS data into the geodatabase.

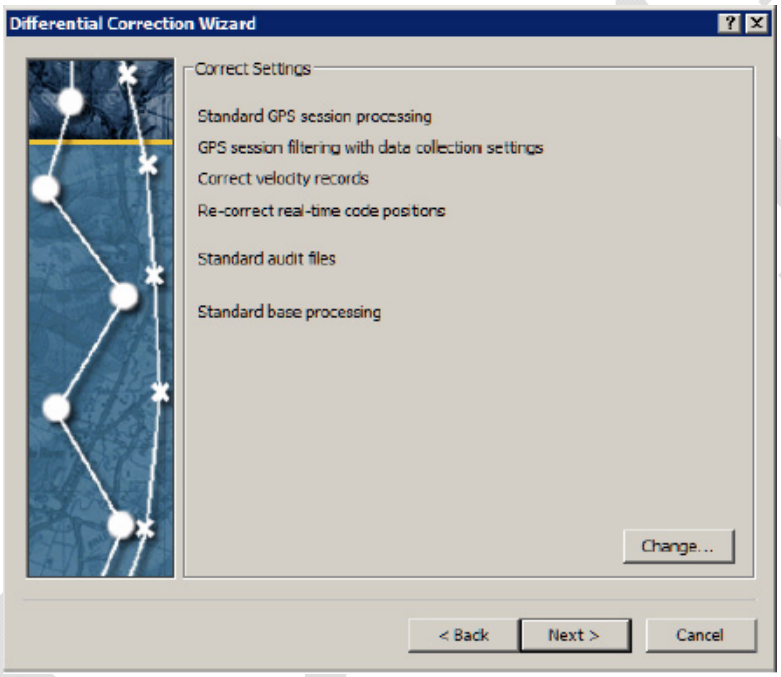
4. Remove any sessions that are listed by selecting them and clicking the *Remove Sessions* button  .

5. Click the *Add GPS Sessions* button  and browse to the imported GPS session that was created when the GPScorrect SSF file was checked into the geodatabase.

6. Select the session, and Click *Add*.

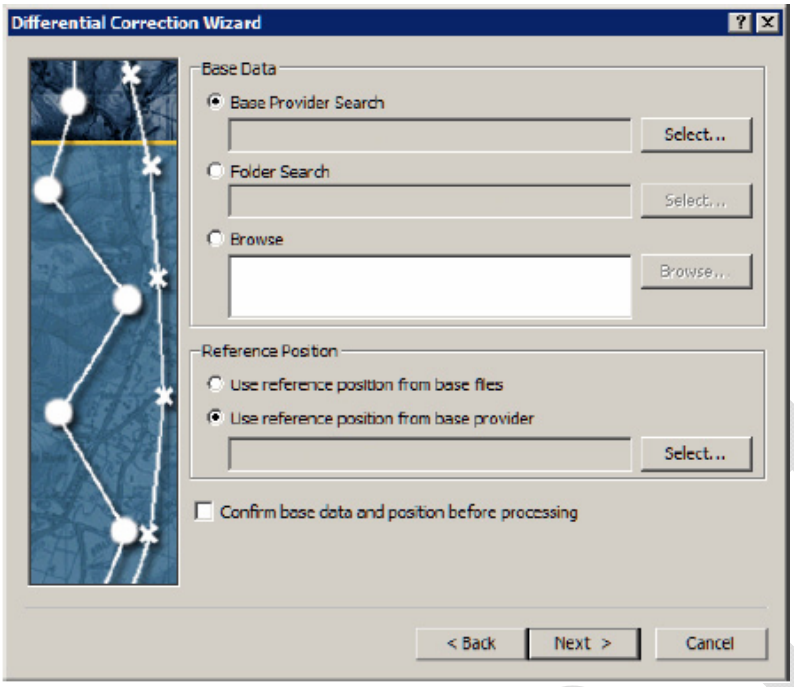
7. Click *Next* twice to navigate through the *Processing Type* page.

8. Make any changes necessary in the *Correction Setting* page.

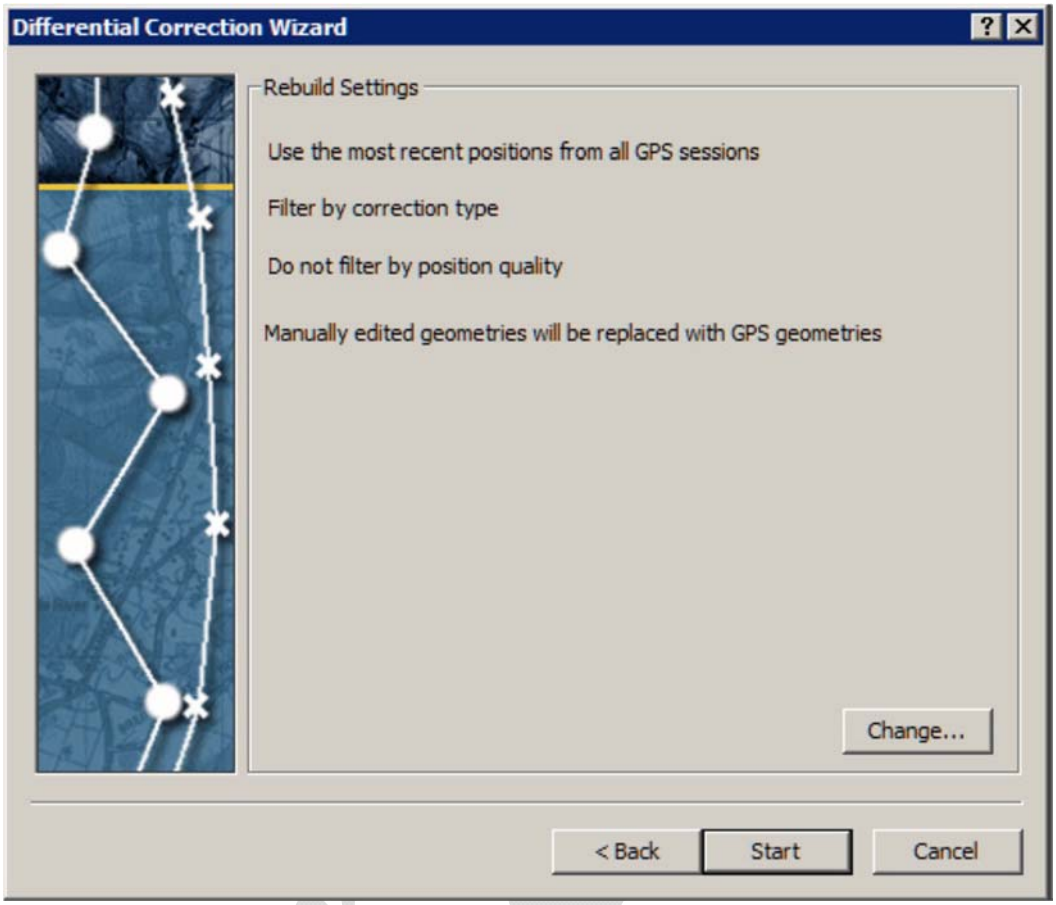


9. Click *Next*

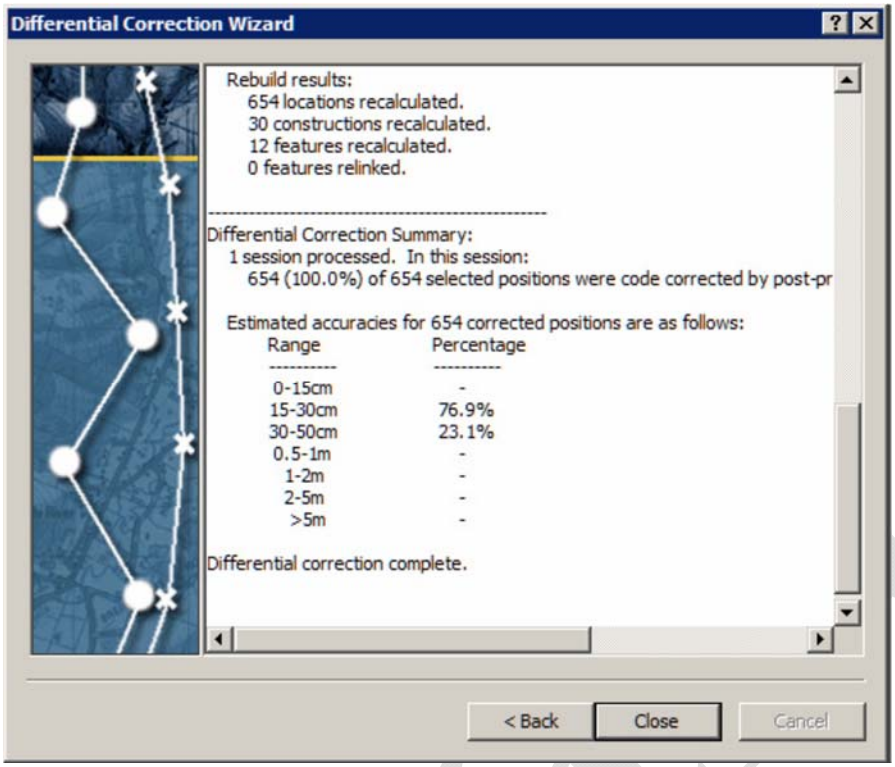
10. In the *Base Data* group, select *Base Provider Search.*



11. Click *Select* and select the most appropriate base station. Click *OK*.
12. In the *Reference Position* group, select *Use reference position from base provider*.
13. Check the *Confirm base data and position before processing* box.
14. Click *Next*.
15. Make any necessary changes to the *Rebuild Settings* page.



16. Click *Start*.
17. Review the *Correct Processing* page, and click *Close*.



VII. Displaying Corrected and Uncorrected GPS Positions in ArcMap

A. Displaying GPS positions for all selected features.

1. Check that a GPS edit session is active in the *Trimble GPS Analyst* drop-down menu.
2. Check that the *GPS Positions* layer is turned on in the table of contents (select the check box next to the layer).
3. Right-click the *GPS Positions* layer in the table of contents and select *Properties*. The *Layer Properties* dialog appears.
4. Select the *Display* tab.
5. Select the check box next to the type of GPS positions to display.
6. Click *OK*. The GPS positions appear on the map (if there are a large number of GPS positions stored in the geodatabase, this may take some time).

B. Displaying GPS positions for selected features.

1. Check that a GPS edit session is active in the *Trimble GPS Analyst* drop-down menu.

2. On the ArcMap *Tools* toolbar, click the *Select Features* button  . The mouse cursor changes to the *Select Features* tool  .

3. Use the *Select Features* tool to select the features for which you want to view GPS positions.

4. Return to the *Trimble GPS Analyst* toolbar and click one of the *Select GPS Positions* buttons:

   - To select the GPS positions that are used in the selected features, click the *Select GPS Positions for Selected Features* button  .
   - To select all of the GPS positions recorded for the selected features, click the *Select All GPS Positions for Selected Features* button  .

5. The GPS positions for the selected features appear on the map.