SURVEY OFFICE



Importing GNSS Data

Spectra Geospatial, 10368 Westmoor Drive, Westminster, CO 80021, USA Spectra Geospatial, Rue Thomas Edison, ZAC de la Fleuriaye – BP 60433, 44474 Carquefou (Nantes), FRANCE

© 2020, Trimble Inc. All rights reserved. Spectra Geospatial is a Division of Trimble Inc. Spectra Geospatial and the Spectra Geospatial logo are trademarks of Trimble Inc. or its subsidiaries. All other trademarks are the property of their respective owners.

About this tutorial

In this tutorial, you will import control and static GNSS data into a new project, merge points, and download reference and precise orbit data. You will also import a georeferenced image into the project.

Note: If you need additional help at any time you are using the software, press **F1** to display the online help.

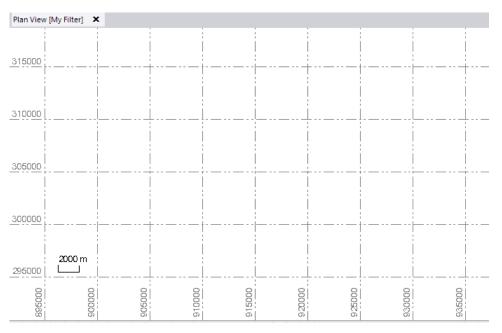
Step 1. Open the project

For this tutorial, you will use the project file *Importing GNSS Data.vce*. Project settings have been specified, but no data has been imported into the project.

Note: The downloaded *ImportingGNSSData* folder contains this PDF file, a *Data* folder, and the *Importing GNSS Data.vce* project file. You will import data from the *Data* folder later in this tutorial.

- 1. In SO, select File > Open.
- 2. In the **Open File** dialog, browse to ..*ImportingGNSSData**Importing GNSS Data.vce* and click **Open**.

The project opens in the **Survey Office** window. Since no data has been imported into the project, the **Plan View** is empty.



The project file is read-only. You can perform the tutorial steps without saving the project file. However, if you are interrupted while performing the tutorial, you can save it with a new name by selecting **File > Save Project As**. Then, you can re-open the project to continue the tutorial at a later time.

You are now ready to import GNSS control data into your project.

Step 2. Import GNSS control data

1. Select Home > Data Exchange > Import.

The Import pane opens in the right side of the Survey Office window.

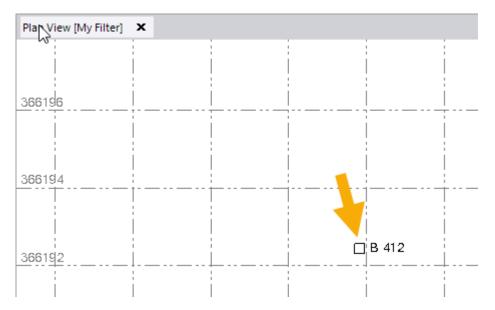
- 3. In the Browse for Folder dialog, browse to .. \ImportingGNSSData \Data and click OK.

The *Data* folder contains the NGS Data Sheet file that will be used in this project. It was previously downloaded from the NGS website. Access to this site is available using the **Survey > GNSS > Internet Download** menu option.

The content of the *Data* folder displays in the **Select File(s)** list in the **Import** pane.

4. In the **Select File(s)** list, select *B* 412 ds.txt and click the **Import** button.

The selected file is imported into your project and the computed point is displayed on the **Plan View**.



5. Click point *B* 412 in the **Plan View** to select it. Then right-click and select **Properties** to display the **Properties** pane for the selected point.

In the **Properties** pane, you can see that the horizontal values are set to *Unknown Control* quality **2**; the heights are set to *Survey Grade* quality (geoid derived) **3**; the elevation is set to *Control* quality **9**.

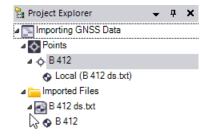
| 366192.447 | ? |
|------------------|--|
| 948971.815 | ? |
| 1636.164 | ۰ |
| | |
| N39°53'08.00000" | ? |
| W105°05'45.00000 | ? |
| 1619.421 | |
| e | |
| N39°53'08.00000" | ? |
| | 2 |
| | 948971.815 1636.164 N39°53'08.00000'' W105°05'45.00000 1619.421 e |

 If the Project Explorer is not already displayed, select Home > Data > Project Explorer.

The **Project Explorer** pane displays.

7. In the **Project Explorer** pane, right-click the **Points** icon and select **Expand** in the context menu. Then right-click the **Imported Files** icon and select **Expand**.

You can now view the newly imported file and the resulting point.



You are ready to import GNSS static data into your project.

Step 3. Import GNSS static data

1. Select Home > Data Exchange > Import.

The Import pane opens in the right side of the Survey Office window.

The GPS data file (ZIP format) contained in the *Data* folder is displayed in the **Select File(s**) list in the **Import** pane.

2. Select *Static Data.zip* in the **Select File(s)** list and click the **Import** button.

The **Receiver Raw Data Check In** dialog displays.

| | | | | Point View | | | |
|----|------|-------------|--------------|----------------------|----------------------|----------|-------|
| Im | port | Point ID | File Name | Start Time | End Time | Duration | Fe |
| ø | • | HANNA | 01241650.dat | 6/14/2006 2:57:25 PM | 6/14/2006 3:31:05 PM | 00:33:41 | SCP |
| I | • | 5 | 80341650.T01 | 6/14/2006 2:58:16 PM | 6/14/2006 3:32:21 PM | 00:34:06 | scp |
| ø | • | fsi 16406 a | 89911650.T01 | 6/14/2006 2:59:39 PM | 6/14/2006 3:31:22 PM | 00:31:44 | scp 🗄 |
| ø | • | frey | 15151651.T01 | 6/14/2006 3:09:52 PM | 6/14/2006 3:31:24 PM | 00:21:33 | scp |
| ø | • | 3 | 80341651.T01 | 6/14/2006 3:42:38 PM | 6/14/2006 4:21:09 PM | 00:38:32 | scp |
| ı | ✓ | filter | 89911651.T01 | 6/14/2006 3:43:03 PM | 6/14/2006 4:18:54 PM | 00:35:52 | scp |
| ø | ✓ | sixtwo | 15151653.T01 | 6/14/2006 3:43:04 PM | 6/14/2006 4:20:49 PM | 00:37:46 | scp |
| ı | ✓ | HANNA | 01241651.dat | 6/14/2006 3:49:16 PM | 6/14/2006 4:21:07 PM | 00:31:52 | SCP |
| ø | ~ | hanna | 89911652.T01 | 6/14/2006 4:27:22 PM | 6/14/2006 5:11:28 PM | 00:44:07 | scp |
| ø | • | filter | 15151656.T01 | 6/14/2006 4:34:36 PM | 6/14/2006 5:10:20 PM | 00:35:45 | scp |
| ø | • | 5 | 01241652.dat | 6/14/2006 4:37:50 PM | 6/14/2006 5:11:01 PM | 00:33:12 | SCP |
| Ø | ✓ | frey | 80341653.T01 | 6/14/2006 4:40:37 PM | 6/14/2006 5:13:58 PM | 00:33:22 | scp 🔻 |
| • | | | | 111 | | | • |

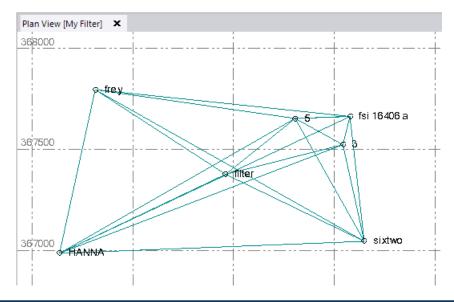
You can select any of the tabs in the lower-left corner of the dialog to verify information is correct, and make changes as necessary. For example, you could correct a point ID or feature code on the **Point** tab; or, change the antenna height or measurement method on the **Antenna** tab.

For instructions on editing antenna types, measurement methods, and measured values, press **F1** to display the "Check-In Raw GNSS Data" online Help topic. In step 4 of the topic, click the **Editing Multiple antenna heights** link.

For this tutorial, this information is correct and does not require changes.

3. In the Receiver Raw Data Check In dialog, click OK.

The GNSS static data is imported into your project and displayed on the Plan View.



For this project, you will need to merge some points, as explained in the next procedure.

Step 4. Merge points

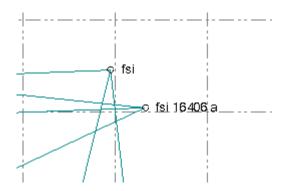
The points *fsi 16406 a* and *fsi* have been imported with slightly different name variations. Therefore, the points must be merged.

1. Select Survey > COGO > Merge Points.

The Merge Points pane displays.

| Merge Points | | • | ą |) |
|-------------------------|-------|--------|---|---|
| | | | | |
| Data | | | | ł |
| Selected: 0 | | Option | s | |
| Filter Points by ID | | | | l |
| Oldentical | | | | |
| Ignored | | | | |
| | | | | d |
| Filter Points by Distan | ce | | | |
| Within the following | dicta | ncer | | |

2. Because *fsi* is located close to *fsi 16406 a*, use your mouse wheel to enlarge the display on the **Plan View** to see both points.



- 3. In the **Merge Points** pane, click in the **Data** field and then select *fsi* and *fsi* 16406 *a* on the **Plan View** by drawing a box around them.
- 4. In the **Selected Points** list, ensure the **Final** option is selected for *fsi 16406 a* and the **Include** checkbox is selected for *fsi 16406 a* and *fsi*.

| Selected Points | | | | | | | |
|-----------------|------------------------|-----|---------|---------|-------|--------|-------|
| | Point ID 🗠 fsi 16406 a | | | Count | | | |
| . | | | | | 2 | | |
| | Horizont Vertic | | Point I | Final | Inclu | Distan | |
| | | ¢ | 3 | fsi 164 | ۲ | 1 | 0.000 |
| | ļ | 1 ? | 16 | fsi | 0 | • | 1.110 |

- 5. Click the **OK** button.
- 6. In the **Project Explorer** pane, note how the points have been merged.

fsi and fsi 16406 a before merge:

```
    ▷ ↔ trey
    △ ☆ fsi
    ◇ Global (15151658.T01)
    △ ☆ fsi 16406 a
    ◇ Global (89911650.T01)
    ▷ ↔ HANNA

fsi after merge:
```

```
    ▷ (15151658.T01)
    O Global (15151658.T01)
    O Global (89911650.T01)
    ▷ A HANNA
```

Since you have merged points, the red **Compute Project Needed** indicator (located in the status bar at the bottom of the **Survey Office** window) is lit to indicate you must re-compute the project.

| orado North 0501 | • | 0 | 367657.16 |
|------------------|---|---|-----------|
| | | | |

7. Click the red **Compute Project Needed** indicator or press **F4** to re-compute the project.

You are now ready to download data for reference stations.

Step 5. Download reference station data

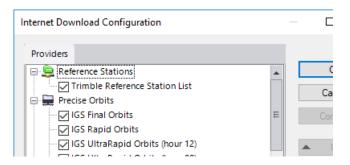
In this procedure, you will use the **Internet Download** command to download reference station data from a local CORS site.

1. Select Survey > GNSS > Internet Download.

The Internet Download pane displays.

| 😋 Inte | rnet Download 🗸 | ņ |
|---------|---------------------------------|-----|
| ▼ | | |
| Start | | |
| | Reference Stations | |
| | Trimble Reference Station List | - [|
| i i 📮 🚞 | Precise Orbits | |
| | IGS Final Orbits | |
| | IGS Rapid Orbits | |
| | IGS UltraRapid Orbits (hour 12) | |
| | ICS UltraBabid Orbits (baur 00) | |

2. Click the Internet Download Configuration icon located in the pane's toolbar.



3. In the Internet Download Configuration dialog, click the New Site button.

The **New Site** dialog displays. For this project, you will select from a provider list available from the Trimble website.

4. Select the **Select from the predefined list** option, and ensure the check box beneath it is selected. Then click **OK**.

| New Site | × | | | |
|---|-----|--|--|--|
| O Enter the details manually. | | | | |
| Select from the predefined list. | | | | |
| Download the most up-to-date list from Trimble's internet site | | | | |
| OK Can | cel | | | |

The **Add Predefined Reference Station Provider** dialog displays showing the current list of reference station data providers from the Trimble website. The providers are listed in sequence, starting with the one that is closest to the center location of the project.

Note that you can click any column heading to sort the rows based on the column.

| Ad | Add Predefined Reference Station Provider | | | | |
|----|--|------|------|--|--|
| S | Select one or more providers and press OK. | | | | |
| | Provider | Code | | | |
| Þ | GPS Pathfinder Office v4.20, tutorial | | West | | |
| | UNAVCO, Marshall Field East Daily | mfle | Mars | | |
| | SOPAC, Marshall Field Tri-pillar Sout | mfts | Boul | | |
| | UNAVCO Marshall Field Tri-pillar So | mfts | Boul | | |

5. In the **Add Predefined Reference Station Provider** dialog, select *CORS, MARSHALL FIELD (P041)* in the list. Then click **OK.**

The site properties for this reference station display in the **New Site Properties for Group Reference Stations** dialog. You do not need to make any changes.

| New Site Properties for group Reference Nations | | | | | |
|---|---|--|--|--|--|
| Providers Contact Security | Reference Station | | | | |
| Site Name | P041 - CORS, MARSHALL FIELD (P041), COL | | | | |
| Manual Connection | | | | | |
| Host URL/Address: | http://www.ngs.noaa.gov/CORS/ | | | | |

6. Click OK.

The selected provider displays in the Internet Download Configuration dialog.

| Internet Dow | nload Configuration |
|---------------------------------------|---|
| Providers | |
| · · · · · · · · · · · · · · · · · · · | ce Stations |
| | - CORS, MARSHALL FIELD (P041), COLORADO |
| Trim | ble Reference Station List |
| Precise | Orbits |
| | Final Orbits |
| | I |

7. Click OK.

The selected provider displays in the Internet Download pane.

| 😋 Internet Download | • | ņ |
|-----------------------------|------|----------|
| | | |
| Start | | |
| P041 - CORS, MARSHALL FIELD | (P0- | 41 |
| Precise Orbits | | |

8. Double-click *P041 – CORS, MARSHALL FIELD,* or select the station and click the **Automatic** button at the bottom of the pane.

The **Download Parameters** dialog displays. If the project included multiple time spans, you could select them in the drop-down list. But, since this project has only one time span, you do not need to make a selection.

| Download Parameters | | | | | | |
|--|---------------------------|--|--|--|--|--|
| Time Span - Expanded to 6 hours | | | | | | |
| Session: (start time - duration in hours) | Project time span - 4.1 🗸 | | | | | |
| Start time: | 6/14/2006 ∨ 2:57:25 PM 🜲 | | | | | |
| End time: | 6/14/2006 V 7:01:24 PM 🚖 | | | | | |
| | OK Cancel | | | | | |

9. Click OK.

A new tab **#1** displays in the **Internet Download** pane, showing the files that are being downloaded and the files ready for import. The action associated with each file is predefined and is displayed in the **Action** column. You can change any action by selecting it.

| Internet Download | ⊸ д Х | | | |
|---|------------------|--|--|--|
| | | | | |
| Start #1 (done) | | | | |
| P041 - CORS, MARSHALL FIELD (P041), COL | | | | |
| File Name | | | | |
| The Name | Action | | | |
| ▶ p0411650.060 (p041165.zip | Action Import | | | |
| | | | | |
| ▶ p0411650.060 (p041165.zip | Import | | | |

Note: The log and readme text (.txt) files cannot be imported but they can be saved with the project data. To do this, you would change the action from **Delete** to **Save**.

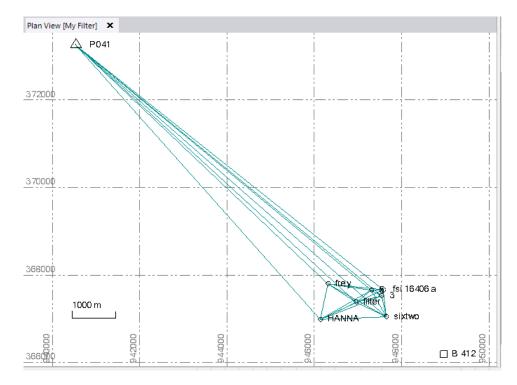
10. Click the Import button on tab #1 (done) to import the time frame.

The **Receiver Raw Data Check In** dialog displays. Typically, you would review the data on all tabs to ensure it is correct. For this tutorial, everything is correct so there is no need to perform this review.

| Im | port | Point ID | File Name | Start Time | |
|----|------|----------|--------------|----------------------|----|
| •0 | | P041 | p0411650.06o | 6/14/2006 2:00:00 PM | 6/ |

11. Click OK.

The newly imported reference station data is represented in the **Project Explorer** pane and on the **Plan View.**

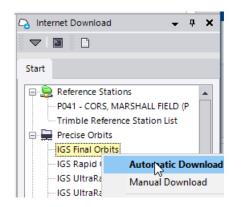


You are now ready to download precise orbit data into your project so that you can process baselines.

Step 6. Download precise orbit data

To process baselines in your project, you can download and import the precise orbits for the timeframe of the GNSS data. Because the data for this project was collected in the past, you can use the final orbit data when you process the baselines.

1. In the Internet Download pane, right-click *IGS Final Orbits* and select Automatic Download.



The **Download Parameters** dialog displays.

| Download Parameters | | × | | | |
|--|----------------------------------|---|--|--|--|
| Time Span - Expanded to | Time Span - Expanded to 48 hours | | | | |
| Session: (start time - duration in hours) | Project time span - 6 | | | | |
| Start time: | 6/14/2006 V 2:00:00 PM 🛓 | | | | |
| End time: | 6/14/2006 V 8:00:00 PM 🔹 | | | | |
| · | OK Cancel | | | | |

If the project included multiple time spans, you could select them in the drop-down list. But, since this project has only one time span, you do not need to make a selection.

2. Click **OK**.

The files are displayed for download on the **#2** tab.

| C | a Internet Download 🛛 🚽 🕈 🗸 | | | | | × |
|---|-----------------------------|-----------------|----------------|------|-----|---|
| | 7 | 7 🛯 🕴 | | | | |
| | Sta | art #2 (done) | | | | |
| | IGS Final Orbits | | | | | |
| | File Name Action | | | | | |
| | Þ | igs13793.sp3 | (igs13793.sp3. | Impo | ort | |
| | | igs13794.sp3 | (igs13794.sp3. | Impo | ort | |

- 3. Repeat this procedure for *IGS Final Glonass Orbits* on the **Start** tab in the **Internet Download** pane.
- 4. In the **Internet Download** pane, click the **Import** button on tabs **#2** and **#3** to import each timeframe.

Next, you will import an image that includes georeference data embedded in the image file itself. The image will display in the **Plan View** based on the global coordinates specified in the georeference data.

Note: You can also import an image file that does not include embedded georeference data, but instead uses an associated world georeference data file. The associated file must have the same file name as the georeferenced image, but with a different file extension (for a example, .wld or .ini).

Step 7. Import a georeferenced image

1. Select Home > Data Exchange > Import.

The Import pane opens in the right side of the Survey Office window.

2. In the Select File(s) list, select Westmoore2.tif and click Import.

Click **No** in the **Import Errors** message dialog. The photo image displays in the **Plan View**.



If the image does not display correctly (for example, the image displays as a black box), you may need to change the display resolution for the image to minimize the amount of memory required to display it. Changing to a lower display resolution will degrade the quality of the image, but it will not change its image size in **Plan View**. In many cases, you will not even notice the quality change.

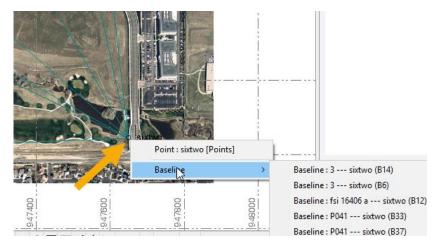
Since *Westmoore2.tif* is a very high resolution image, you could change to a lower resolution without losing appreciable quality by selecting **File > Options**. Then, in the **Options** dialog, you would select **Images** in the left navigation pane and select the **No tiles** option in the **Georeferenced Images** group. You could then select **512x512** in the **Size (pixels)** drop-down list.

| Options | |
|---|--|
| General Display Project Management File Locations Language Context Menu Internet Download External Services - Profiles External Services - Options Improvement Program Baseline Processor Photogrammetry Mobile Mapping Point Clouds | Images Station View Images Original resolution Down-sampled resolution (512 x 512 pixels) Georeferenced Images Tiling Tile with multi-resolutions Set pixel transparency on import Note: The import processing time will increase. Pixel color: Not iles Not iles Down-sample image Size (pixels): |
| Images Process Monitoring | 512 X 512 🗸 🗸 |
| Network Device Port | Smooth images |

However, for this tutorial, *do not make any changes* in the **Options** dialog.

3. Use your mouse wheel to zoom in on the image as shown here.

Note that you can select points and baselines, which are now superimposed on the image.



By default, the image itself is not selectable in the **Plan View**.

- 4. To make the image selectable in the **Plan View**:
 - a. Select Home > View > View Filter Manager.
 - b. In the **View Filter Manager** pane, click the **Advanced View Filter Settings** in the pane's toolbar.
 - c. In the **Advanced View Filter Settings** dialog, select the **Selectable** checkbox for *Westmoore2.tif*. Then click **OK**.

| ilter name: | | | |
|-------------------------------------|----------|------------|--|
| 1y Filter | | | |
| Include newly created layers and s | surfaces | | |
| Locked | | | |
| _ Looked | | | |
| Name | Visible | Selectable | |
| 0 | ✓ | • | |
| Points | | ✓ | |
| | | | |
| V Georeferenced Images | | | |
| V Georeterenced Images Name | Visible | Selectable | |
| | Visible | Selectable | |
| Name Westmoore2 | | v | |
| Name Westmoore2 | | v | |
| Name Westmoore2 | | | |
| Name Westmoore2 7 CAD Name | Visible | Selectable | |
| Westmoore2 CAD Name CAD Block | Visible | Selectable | |

5. To view properties for the georeferenced image, click in the upper right corner of the image in the **Plan View** to select it. Then, right-click and select **Properties** in the context menu.

There are several settings in the **Properties** pane you can use to modify the display of the image.

| Properties | ↓ ₽ : | | | | |
|---------------------------------------|--------------|--|--|--|--|
| ▼ _ | | | | | |
| Georeferenced Image Westmoore2.tif | | | | | |
| Georeferenced Image (1) | | | | | |
| Pixel size: | 0.305 m | | | | |
| Background Transparer | ıcy | | | | |
| Transparent background: | No | | | | |
| Transparent pixel color: | Black | | | | |
| Render Settings | | | | | |
| View priority: | 1 | | | | |
| Display style: | None | | | | |
| Transparency (%): | 0 | | | | |
| Smooth: | User Setting | | | | |
| - Upper Left Corpor | | | | | |

You are done importing GNSS data into your project.

6. Select File > Close.

The **Save Changes** dialog displays. If you saved the project to a new location or with a new name, you can click **Yes**. Otherwise, click **No**.

Now that you have imported GNSS data into your project, you are ready to process GNSS baselines. See the tutorial *Processing GNSS Baselines* for instructions.