



VIRTUAL RINEX & LOCALIZATION

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FRUSTRATED WITH LONG GNSS OBSERVATIONS?



Besides myself, who else is frustrated by long observation times to establish primary control?



Virtual Rinex may be your solution.

Lets look at a sample scenario.



You have a client that is intending to develop a large tract of land in Southeast Orange County.

You will be working as the primary Surveyor from the beginning of the project until completion of construction.

The site is comprised mostly of cow pastures and is an ideal candidate for GNSS RTK observations.

You research the project area for NGS control, Certified Corner Records, FPRN base stations, platting, Right-of-Way map, etc.

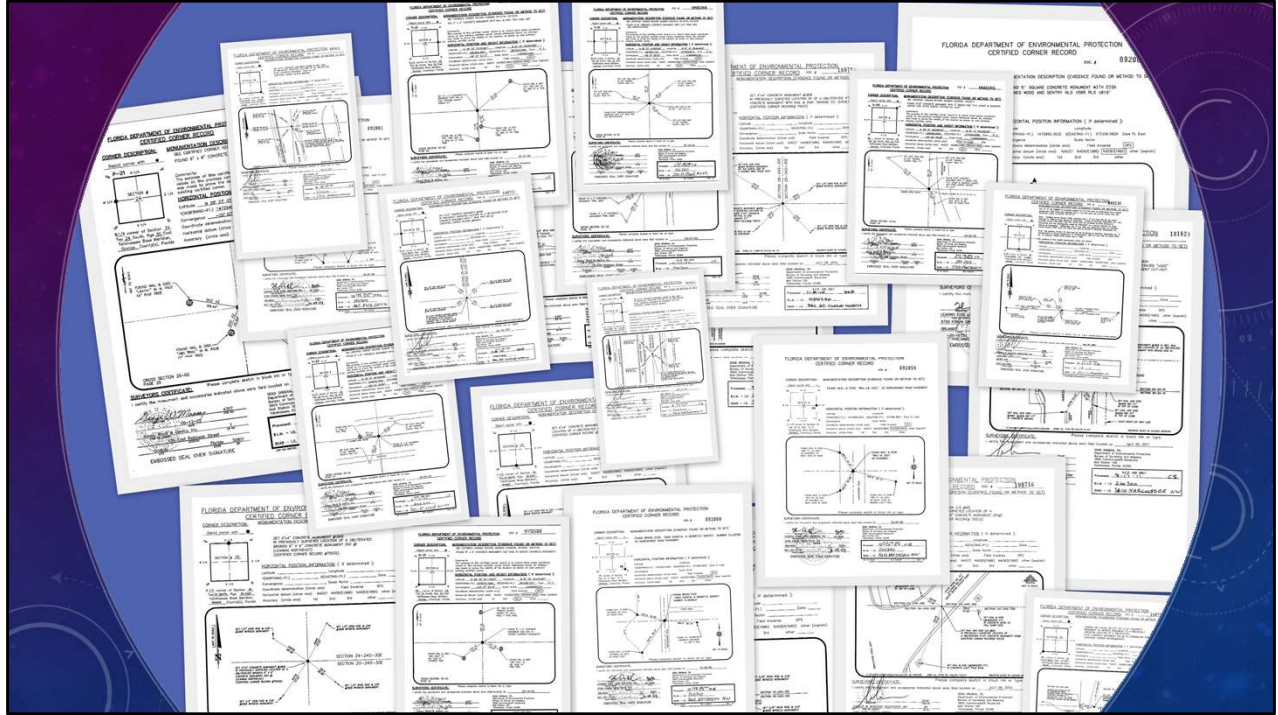


During the course of your planning you determine that the closest FPRN station is 14km away from the site.

With a 14 km baseline you determine that your static observation times should be 2 hours per occupation and with a set of redundant measurements, total observation time would be 4 hours per point.

In order to cut cost , you decide to use Virtual Rinx to establish the primary control and VRS-RTK to perform the boundary survey.

You go on to recover the NGS control and the section corners.







You send field crews out to obtain 2 sets (separated by at least two hours) of 15 minute, 5 second epoch observations on each recovered point.



After the Field crews return all the data, you pick a location to act as your Virtual Reference Station.

Virtual RINEX Request

Date: * 12/12/2018

Local start time: * 07 : 0

Duration: * 14 : 0 h.min

Output files: * ☒ Observation ☒ Navigation

Observation rate: * 5.00 sec

Latitude: * 28 ° 22 ' 55.59 " ☒ N ☐ S

Longitude: * 81 ° 15 ' 37.72 " ☒ W ☐ E

Height: * -0.04 m

Virtual station site code: * VRS1

Virtual station site name: * Virtual Rinex

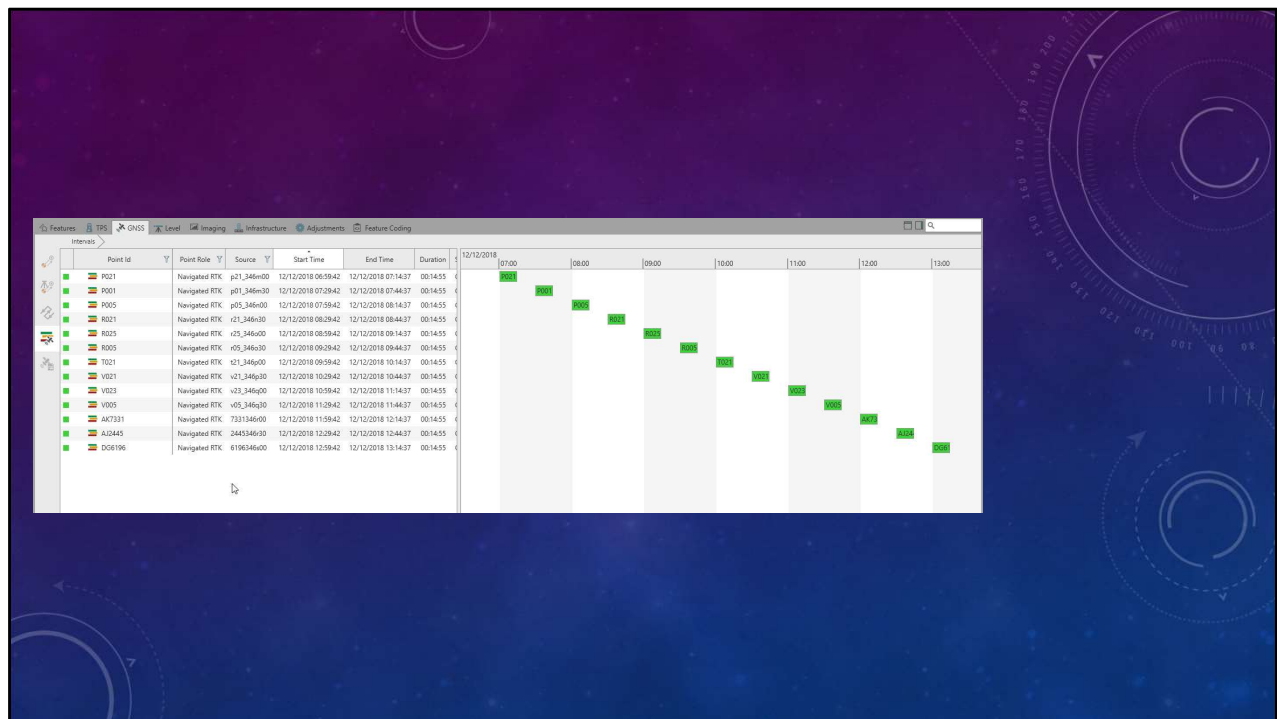
Use data from satellite system: * GPS and GLONASS

Select position of site in map: [Google Map](#)

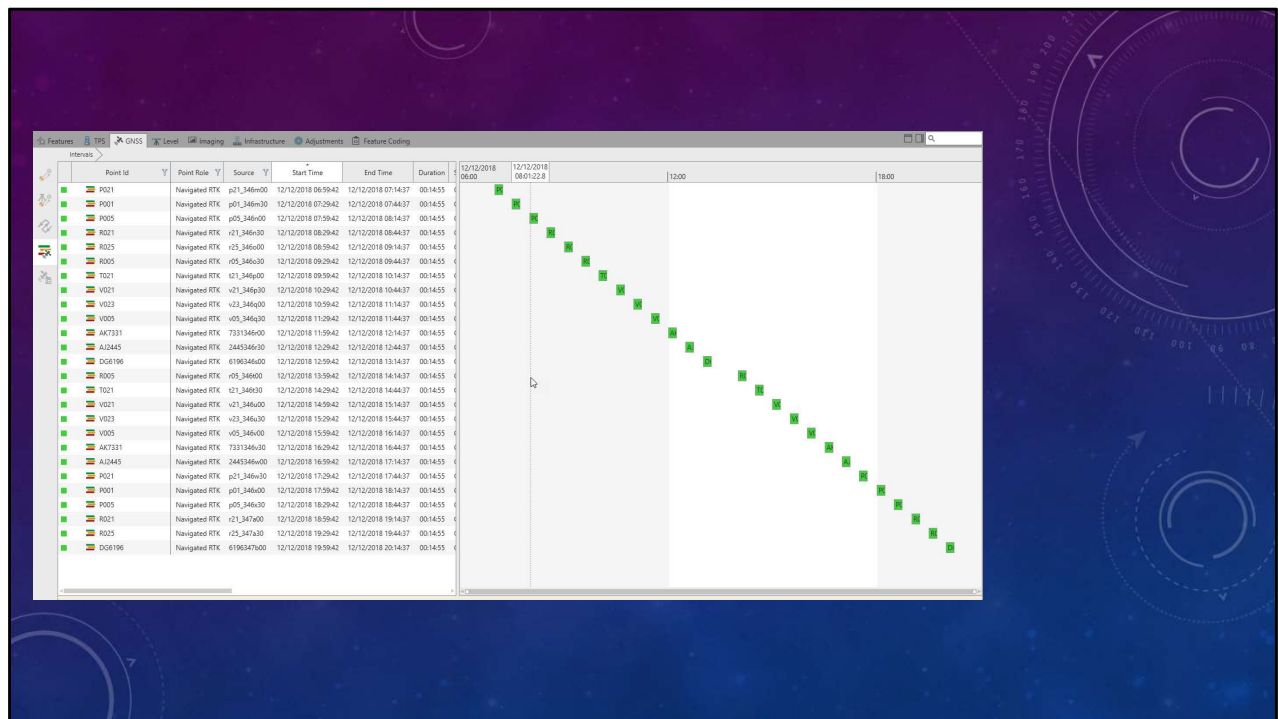
* Required field

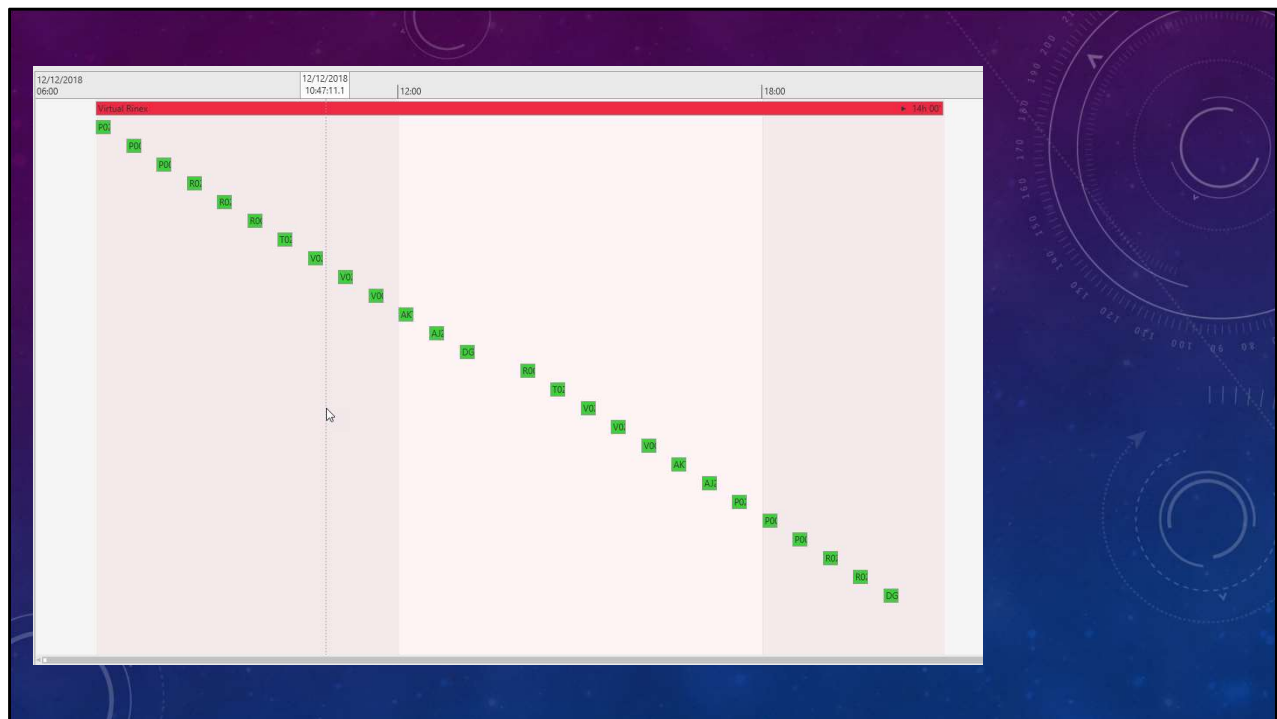
[Submit](#)

You log onto the FPRN webpage and request a Virtual Rinex file, that covers the entire field time, for the station.



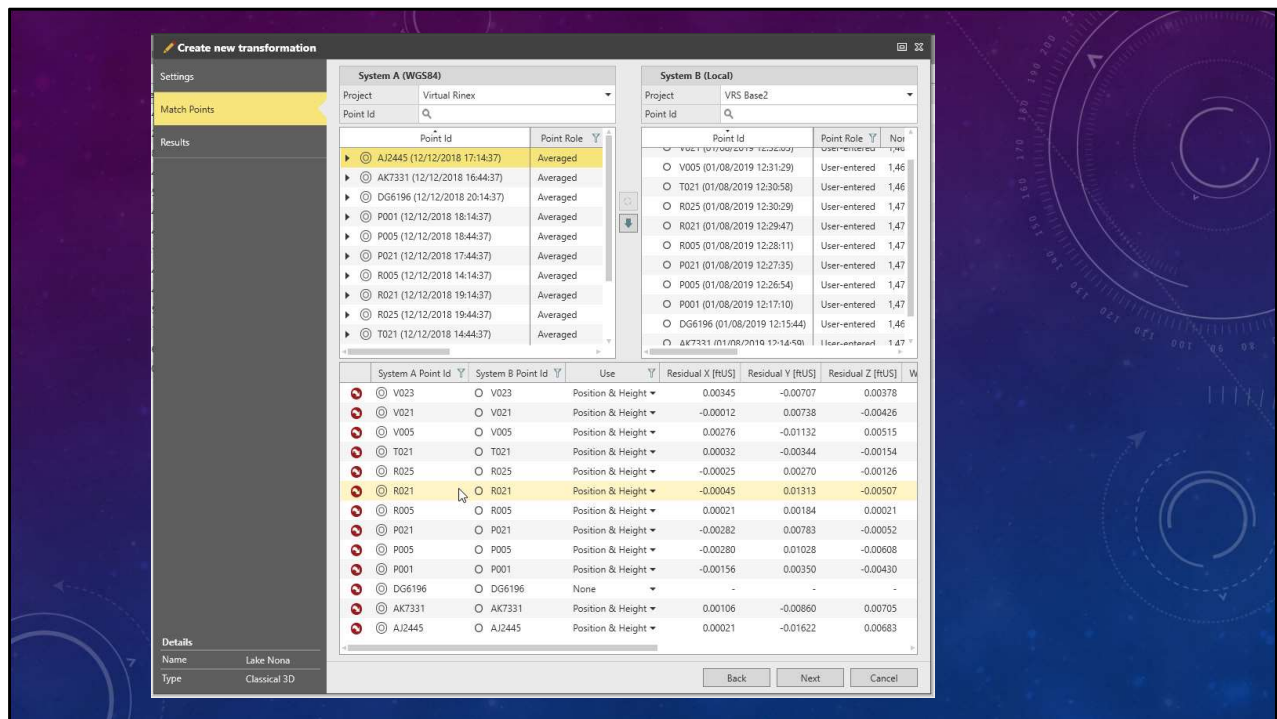
After receiving the VR file you proceed to import the field and reference data into your post processing software.





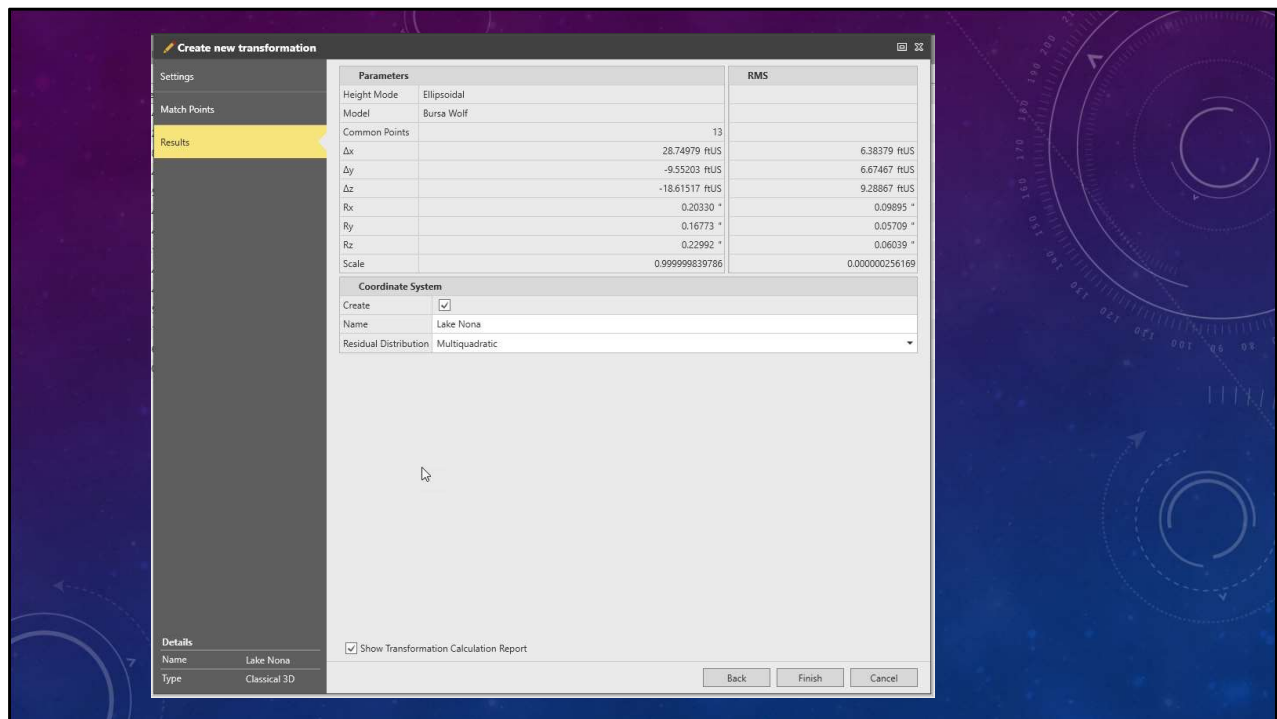
After processing your GNSS data. You create a separate coordinate file containing the published control for your project.

If the published datum for your control points (NGS, CCR's, etc.) is out of date, do not match, or not on the datum required by contract, you may choose to convert them to the desired datum prior to creating the new coordinate file.

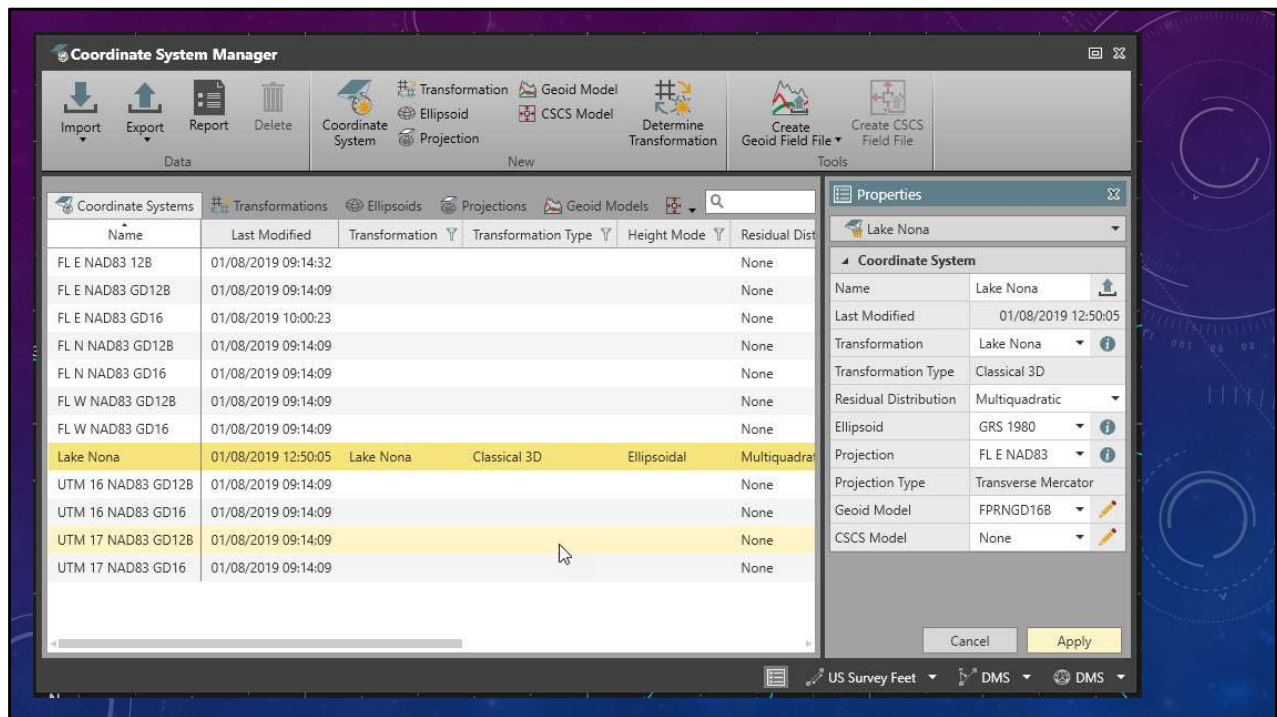


You begin to create a localization file (custom transformation) for the project site by matching the field observed points to the published value points.

Review the residuals for each point and discard any points that have a negative affect on the solution.



Finish creating your localization file (custom transformation).



Apply your Localization file to your project.

Make sure to upload the file to your GNSS rovers and apply the transformation to any field file being used for the project.

By applying the localization file to the your field files will cause the coordinates to be transformed, in real time, to the datum being used on the project.

No matter if it is NAD83 (CORS 96) or NAD83 (2011).



Don't own post-processing software?

So, you don't own a post-processing software?

Why not use the FPRN Computation Service.

SpiderWeb

Site overview | RINEX Job Service | Virtual RINEX | Computations | Configuration | Results | Statistics | About | Logout

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Computation Service

Static Mode: Upload up to 3 observation files for the position to be calculated in static computation mode. Please make sure that you only upload static observations. The files can be from different days but have to be for the same position. If uploading files with several positions in one file, the coordinate result will be calculated incorrectly.

Make sure your observation file contains a valid antenna type which complies with the IGS naming conventions ([See here for reference](#)).

Please, choose 3 reference sites to be used for calculation. In case "Use virtual reference" or "Choose sites automatically" option is selected, sites will be chosen automatically.

Choose sites automatically: ☒

Use virtual reference: ☒

Select site(s) from list:

Select site(s) in map:

Note: turn off pop-up blockers

Computation mode:

Choose Coordinate System

Coordinate System:

Please note that the maximum allowed distance from the reference sites to the rover (in meters) is 70000

Upload observation file 1:

Upload observation file 2:

Upload observation file 3:

Choose computation precision:

Computation precision:

Or enter computation precision values manually:

Enter mm here:

Enter ppm here:

Login to the FPRN webpage and select Computation Service

Let the program choose sites automatically and Use a Virtual Reference

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Upload observation file 1:

Upload observation file 2:

Upload observation file 3:

Choose computation precision:

Computation precision:

Or enter computation precision values manually:

Enter mm here:

Enter ppm here:

Select the Computation Mode

The screenshot displays the SpiderWeb RINEX Job Service interface. The top navigation bar includes links for Site overview, RINEX Job Service, Virtual, Computations, Configuration, Results, Statistics, About, and Logout. The left sidebar lists various services and support links, with 'Computation Service' highlighted. The main content area is titled 'Computation Service' and contains instructions for static mode, a 'Reset form' button, and options to choose sites automatically or manually. The 'Coordinate System' dropdown menu is highlighted with a red arrow, showing 'FL E NAD83' as the selected option. Below this, there are fields for uploading observation files and a section for choosing computation precision.

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Computation Service

Static Mode: Upload up to 3 observation files for the position to be calculated in static computation mode. Please make sure that you only upload static observations. The files can be from different days but have to be for the same position. If uploading files with several positions in one file, the coordinate result will be calculated incorrectly.

Make sure your observation file contains a valid antenna type which complies with the IGS naming conventions ([See here for reference](#)).

[Reset form](#)

Please, choose 3 reference sites to be used for calculation. In case "Use virtual reference" or "Choose sites automatically" option is selected, sites will be chosen automatically.

Choose sites automatically: ☒

Use virtual reference: ☒

Select site(s) from list: [Show list](#)

Select site(s) in map: [Show map](#)

Note: turn off pop-up blockers

Computation mode:

Choose Coordinate System

Coordinate System:

Please note that the maximum allowed distance from the reference sites to the rover (in meters) is 70000

Upload observation file 1: [Browse...](#)

Upload observation file 2: [Browse...](#)

Upload observation file 3: [Browse...](#)

Choose computation precision:

Computation precision:

Or enter computation precision values manually:

Enter mm here:

Enter ppm here:

Select the Coordinate System

The screenshot shows the SpiderWeb RINEX Job Service interface. The main content area is titled "Computation Service". It includes a "Static Mode" section with instructions on uploading observation files. Below this, there are checkboxes for "Choose sites automatically" and "Use virtual reference", both of which are checked. There are also buttons for "Select site(s) from list" and "Select site(s) in map". A "Reset form" button is located at the top of the form. The "Computation mode" is set to "Static" and the "Coordinate System" is set to "FL E NAD83". A note states that the maximum allowed distance from the reference sites to the rover is 70000 meters. There are three "Upload observation file" fields, each with a "Browse..." button. A red arrow points to the "Upload observation file 2" field. The "Computation precision" is set to "10mm+3ppm". There are also fields for "Enter mm here:" and "Enter ppm here:".

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Computation Service

Static Mode: Upload up to 3 observation files for the position to be calculated in static computation mode. Please make sure that you only upload static observations. The files can be from different days but have to be for the same position. If uploading files with several positions in one file, the coordinate result will be calculated incorrectly.

Make sure your observation file contains a valid antenna type which complies with the IGS naming conventions ([See here for reference](#)).

[Reset form](#)

Please, choose 3 reference sites to be used for calculation. In case "Use virtual reference" or "Choose sites automatically" option is selected, sites will be chosen automatically.

Choose sites automatically: ☒

Use virtual reference: ☒

Select site(s) from list: [Show list](#)

Select site(s) in map: [Show map](#)

Note: turn off pop-up blockers

Computation mode:

Choose Coordinate System

Coordinate System:

Please note that the maximum allowed distance from the reference sites to the rover (in meters) is 70000

Upload observation file 1: [Browse...](#)

Upload observation file 2: [Browse...](#)

Upload observation file 3: [Browse...](#)

Choose computation precision:

Computation precision:

Or enter computation precision values manually:

Enter mm here:

Enter ppm here:

Upload up to 3 Rinx 2.11 files per point

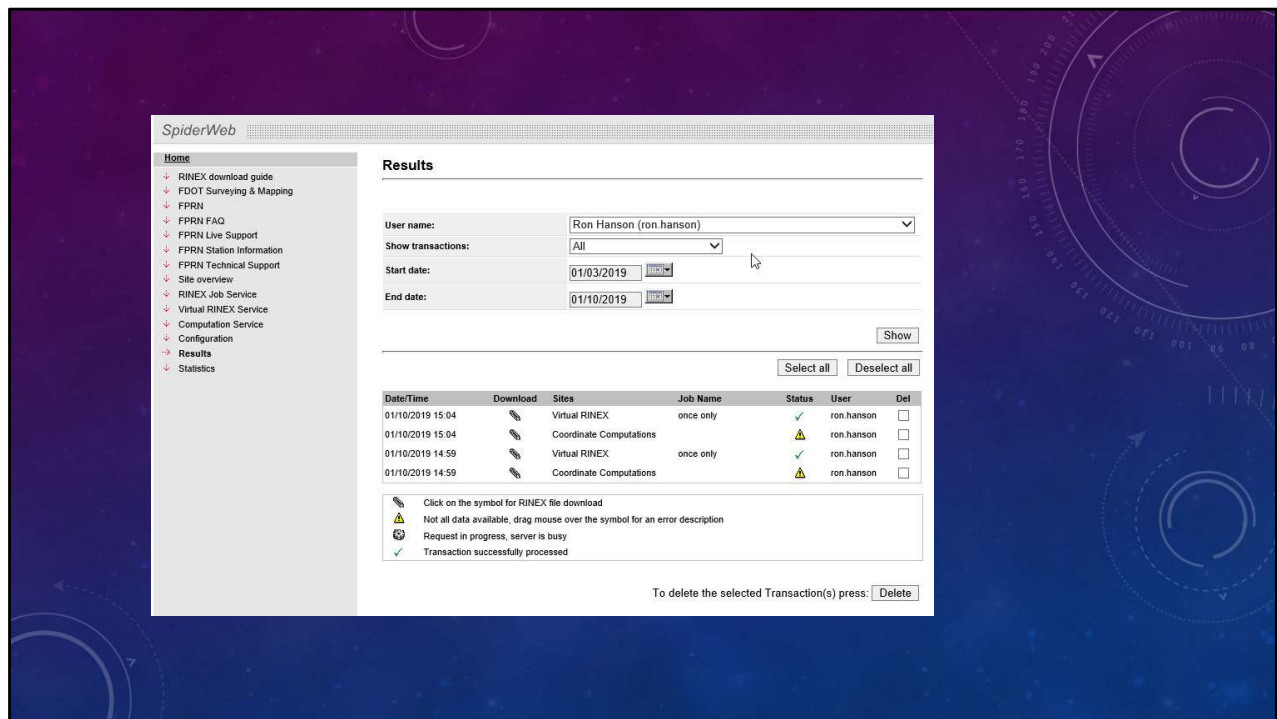
The screenshot shows the SpiderWeb RINEX Job Service interface. The main content area is titled "Computation Service". It includes a "Static Mode" section with instructions on uploading observation files. Below this is a "Reset form" button and a note about selecting 3 reference sites. The "Choose sites automatically" checkbox is checked. The "Use virtual reference" checkbox is also checked. There are buttons for "Show list" and "Show map". A note about turning off pop-up blockers is present. The "Computation mode" is set to "Static". The "Coordinate System" is set to "FL E NAD83". A note states the maximum allowed distance from reference sites to the rover is 70000 meters. There are three "Upload observation file" buttons, each with a file name and a "Browse..." button. The "Choose computation precision" section has a dropdown menu set to "10mm+3ppm", which is highlighted by a red arrow. Below this are fields for "Enter mm here:" and "Enter ppm here:".

Select the computation precision or enter manually.

I suggest selecting 10mm+3ppm

The screenshot shows a web application interface for RINEX Job Service. On the left is a sidebar menu with the following items: **Site overview**, **RINEX Job Service**, **Virtual RINEX Service**, **Computation Service**, **Configuration**, **Results**, and **Statistics**. The main content area contains a form for setting up a computation. At the top, there is a **Reset form** button and a note: "Please, choose 3 reference sites to be used for calculation. In case 'Use virtual reference' or 'Choose sites automatically' option is selected, sites will be chosen automatically." The form includes several options: **Choose sites automatically:** (checkbox), **Use virtual reference:** (checkbox), **Select site(s) from list:** (with a **Show list** button), and **Select site(s) in map:** (with a **Show map** button). A note below these options says: "Note: turn off pop-up blockers". The **Computation mode** is set to **Static**. The **Coordinate System** is set to **FL E NAD83**. A note states: "Please note that the maximum allowed distance from the reference sites to the rover (in meters) is 70000". There are three **Upload observation file** sections, each with a text input and a **Browse...** button. The first two are filled with the path **sktop\Labins\VRS\Fieldp21_346m00.18o** and **sktop\Labins\VRS\Fieldp21_346w30.18o** respectively. The third is empty. Below these is a **Choose computation precision:** section with a dropdown menu set to **10mm+3ppm**. There is also a section for manual entry: **Or enter computation precision values manually:**, with **Enter mm here:** and **Enter ppm here:** input fields. At the bottom, there is a disclaimer: "The automatically computed results are only to be used for reference purposes. Your data provider and Leica Geosystems AG provide no guarantee regarding the correctness of this automatic computation (both its methodology and result) and shall not be liable for any loss, damage or injury (including but not limited to consequential loss, damage or injury) however caused, which may arise directly or indirectly from the use or application of this automatic computation result. Please verify the automatic computation result before use." A red arrow points from the **10mm+3ppm** dropdown menu down to the **Submit** button at the bottom right of the form.

Finally, click on the submit button.



The program will generate a report containing the averaged WGS84 Cartesian, WGS84 Geodetic, and, in this case, the NAD83 (2011) Florida State Plane Coordinates (East Zone) coordinates.

The program will also create a Rinex file of the Virtual Rinex Station used to compute the Least Square adjusted coordinates supplied in the report.

You can use the Rinex file to import into a post processing software.


```
Results of Crew 1
-----
Total number of GPS baselines computed = 1
Total number of GPS baselines used for final computation (after baseline rejection) = 1

WGS 84 Cartesian Coordinates
-----
X      = 854801.515 m      Standard error = 0.048 mm
Y      = -5550100.685 m    Standard error = 0.126 mm
Z      = 3019144.058 m      Standard error = 0.078 mm

Max. residual of GPS baseline in X component = --
Max. residual of GPS baseline in Y component = --
Max. residual of GPS baseline in Z component = --

WGS 84 Geodetic Coordinates
-----
Latitude      = 29° 23' 7.30058 N      Standard error = 0.043 mm
Longitude     = 81° 14' 39.69482 W      Standard error = 0.042 mm
Ellipsoidal Height = -2.756 m          Standard error = 0.143 mm

Max. residual of GPS baseline in latitude component = --
Max. residual of GPS baseline in longitude component = --
Max. residual of GPS baseline in ellipsoidal height component = --

Local Grid Coordinates ( FL E NAD83 )
-----
Northing      = 448937.477 m
Easting       = 176051.744 m
Ellipsoidal Height = -2.756 m
Orthometric Height = -

Dilution Of Precision
-----
GDOP 2.3 - 3, HDOP 1.1 - 1.4, PDOP 2 - 2.5, VDOP 1.7 - 2.1
```



Most of the modern Data Collectors will allow for the creation of a Localization file (custom transformation).

Just use the published coordinates as one of the files and the coordinates from the FPRN as the field observations and follow the steps previously outlined.



Questions ?

