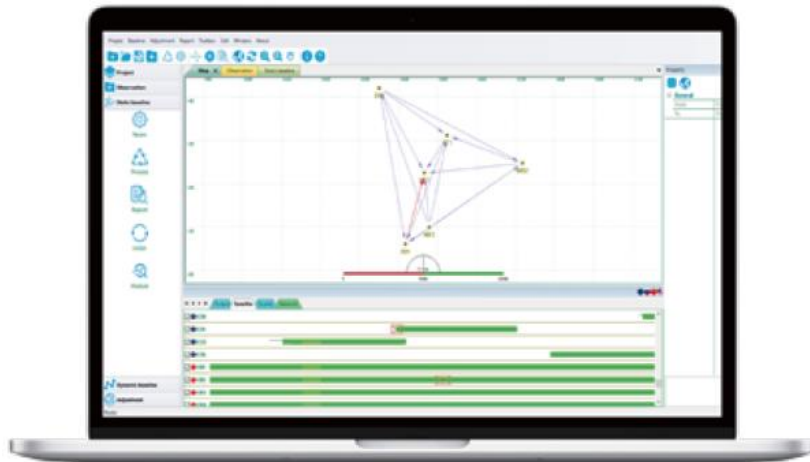


SingularXYZ



PProcessing Software

Quick Guide

V1.0, modified on 2021.12.27

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Corporate Office

SingularXYZ Intelligent Technology Ltd.

Address: Floor 2, Building A, No. 599 Gaojing Road, 201702 Shanghai, China

Tel: +86-21-60835489

Fax: +86-21-60835497

Website: <https://www.singularxyz.com>

E-mail: singularxyz@singularxyz.com

Technical Assistant

If you have any questions that can't be solved in this manual, please contact your local SingularXYZ distribution partner. Alternatively, request technical support from SingularXYZ Intelligent Technology Ltd.

Support Email: support@singularxyz.com

Support Skype: [Support.SingularXYZ](https://www.skype.com/join/Support.SingularXYZ)

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Table of Content

Chapter 1 Create A New Project

1.1	Project File.....	3
1.2	Import raw observation files	5
1.3	Constraint known points.....	6

Chapter 2 Baseline Processing

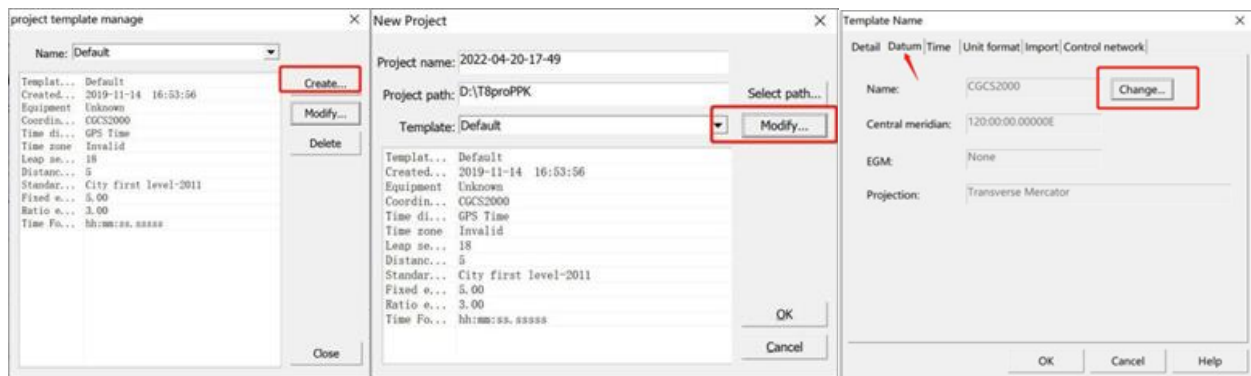
2.1	Static baseline processing.....	7
2.1.1	View	7
2.1.2	Baseline Process Settings	7
2.1.3	Static Baseline process	8
2.1.4	Network Adjustment	10
2.2	PPK (Post-Processing Kinematic).....	11
2.2.1	Dynamic baseline processing	11
2.2.2	Map View	12

Chapter 3 Report Export

3.1	Static Report.....	14
3.2	PPK Report.....	14

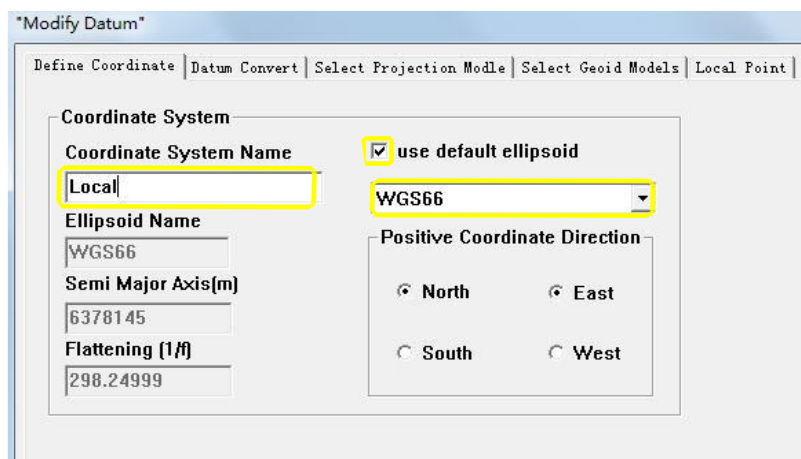
1.1 Project File

- 1) Choose the folder path
- 2) Enter a project name
- 3) Select Modify>>Create>>Datum>>Change.



Click Add to define new datum, you can set proper parameters (ellipsoid and projection) for your new coordinate system; Also Click Modify to edit the currently coordinate parameters.

Firstly check “use default ellipsoid”, select the proper ellipsoid from the list, and then enter the Coordinate System Name.



Enter 3 or 7 parameters if needed.

"Modify Datum"

Define Coordinate | Datum Convert | Select Projection Model | Select Geoid Models | Local Point

The 7-transfer-parameters from WGS-84

Translation X: 0 Rotation X: 0

Translation Y: 0 Rotation Y: 0

Translation Z: 0 Rotation Z: 0

Scale Factor: 0

From **WGS-84** To **Local**

$$\begin{pmatrix} X \\ Y \\ Z \end{pmatrix} = \begin{pmatrix} \Delta x \\ \Delta y \\ \Delta z \end{pmatrix} + (1+k) \begin{pmatrix} X \\ Y \\ Z \end{pmatrix}_{WGS-84} + \begin{pmatrix} 0 & \varepsilon_z & -\varepsilon_y \\ -\varepsilon_z & 0 & \varepsilon_x \\ \varepsilon_y & -\varepsilon_x & 0 \end{pmatrix} \begin{pmatrix} X \\ Y \\ Z \end{pmatrix}_{WGS-84}$$

Select the proper projection model, and enter parameters according to the Project location.

"Modify Datum"

Define Coordinate | Datum Convert | Select Projection Model | Select Geoid Models | Local Point

Projection Model

Transverse Mercator

Transverse Mercator

Scale Factor: 1 False Northing (m): 0

Origin Latitude: 0 False Easting (m): 500000

Origin Longitude: 120

In Geoid Models, check **Add Geoid Modules**, click **Add Geoid File** to input a Geoid module. Then click **OK** to finish datum modify.

"Modify Datum"

Define Coordinate | Datum Convert | Select Projection Model | Select Geoid Models | Local Point

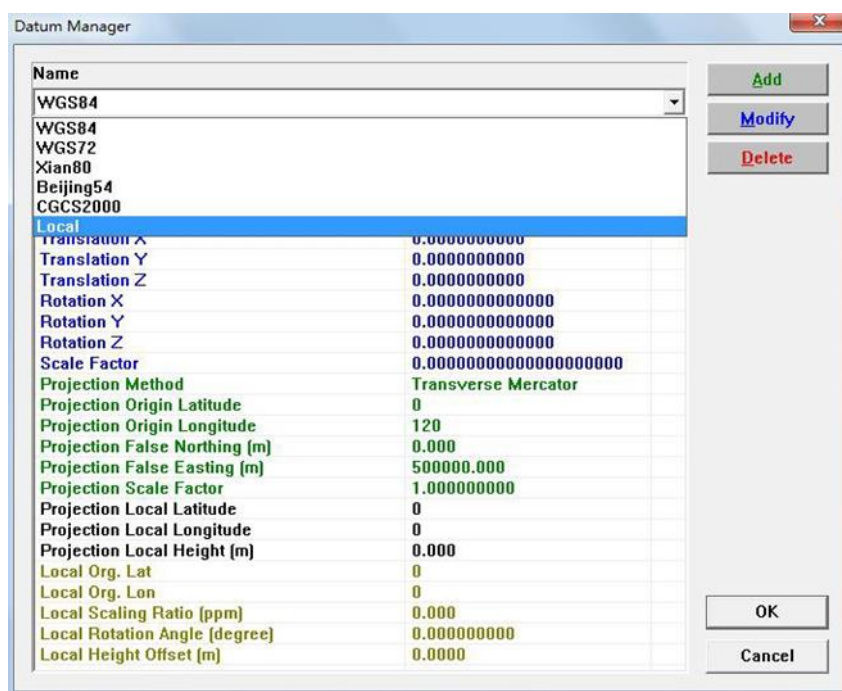
☒ Add Geoid Modules

Add Geoid File

Max Latitude: 0 Max Longitude: 0

Min Latitude: 0 Min Longitude: 0

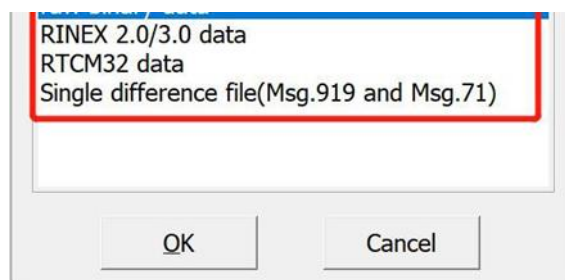
Then you can select the coordinate system you built, click **OK** to active this datum in the current project.



Tip: the coordinate system and its parameters also can be edited in **Tools** -> **datum manager**.

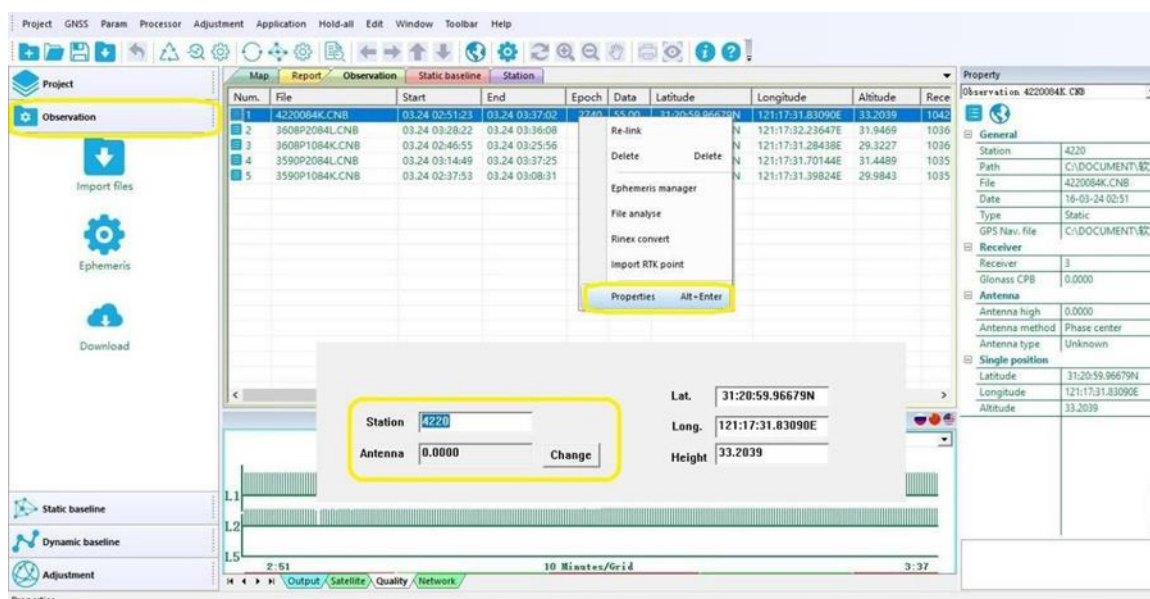
1.2 Import raw observation files

To import GNSS raw data, click **File** -> **Import** in the menu bar. The static observation file can be imported directly; For PPK and dynamic data, please check "Import Dynamic files".



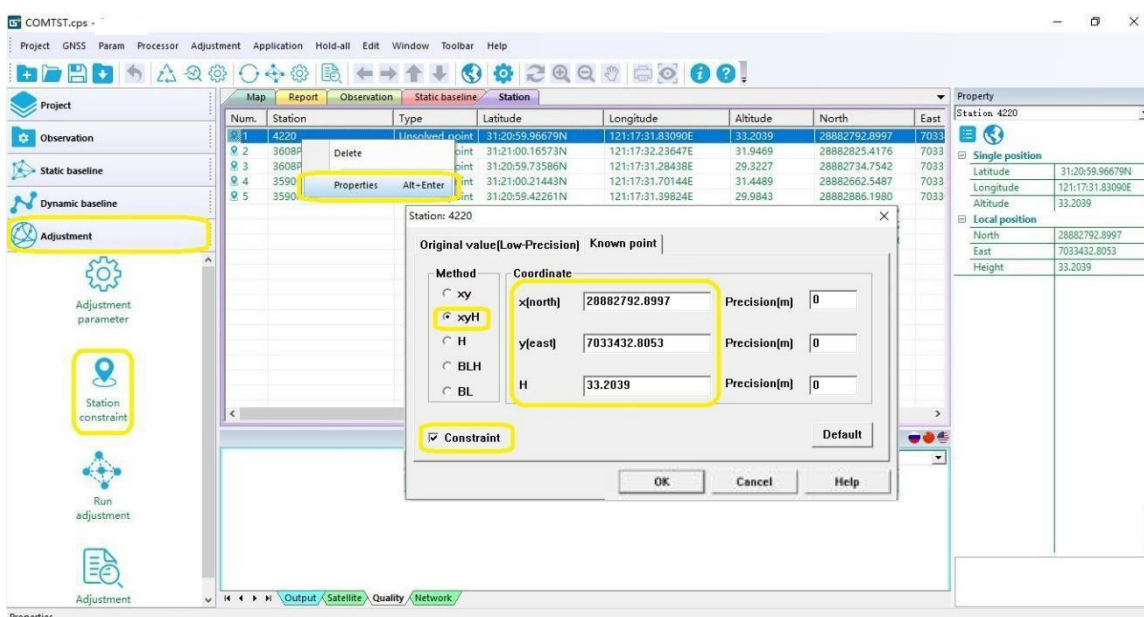
Tip: PProceesing only can support dynamic raw data in SingularXYZ **CNB** format.

After importing the raw data, click **Observation** -> **select the observation file** in the navigation pane, then right-click on the file name to edit properties, including station name and antenna information.



1.3 Constraint known points

To ensure all stations within your local grid coordinate system, at least 1 station should be fixed on a known point. Click **station** -> **properties** -> **Known Point** to enter coordinate values (check the **Constraint**).



Tip: You can get the default coordinate value under current coordinate system by clicking **Default**. It should not be a big difference between the default value and the **known** value; otherwise, check the coordinate system parameters.

Chapter 2

Baseline Processing

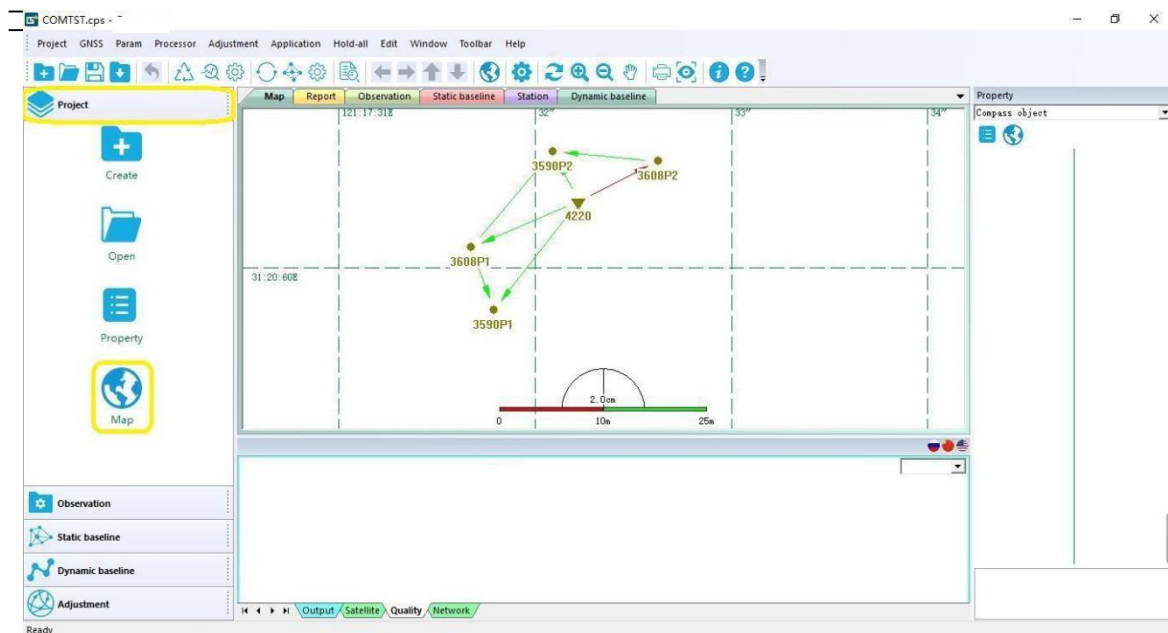
This chapter will introduce how to process GNSS raw data in static and PPK mode respectively, which helps you to learn about the basic settings in the software.

2.1 Static baseline processing

In static mode, PP Software Solution can directly process baseline vectors of different sites with simultaneously recorded GNSS raw data. We recommended that at least 3 receivers observe at the same time to form the simultaneously loop of baselines.

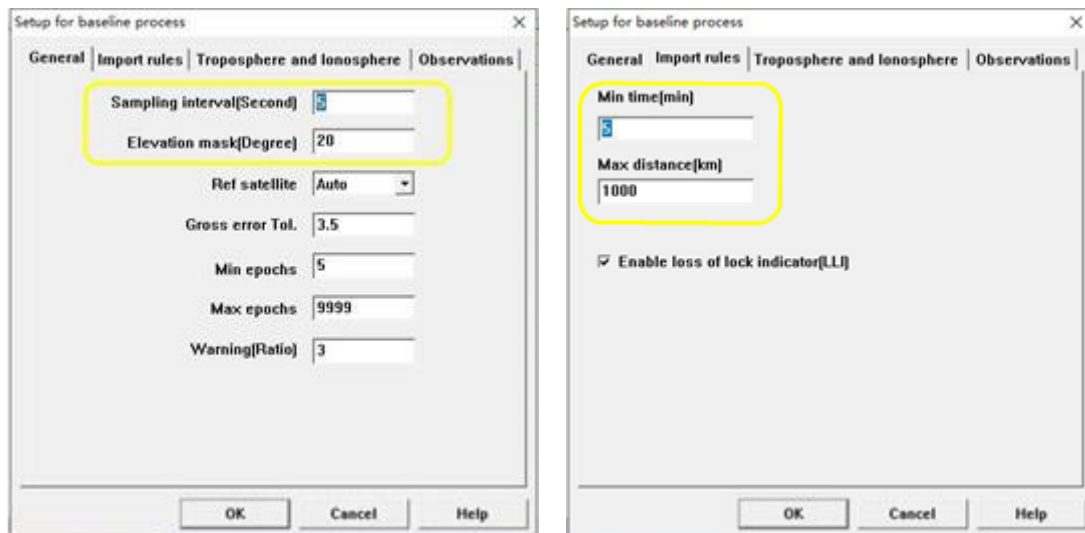
2.1.1 View

The static baseline vector will be automatically formed after importing GNSS raw data. Go to **Project** -> **Map** to check the baseline vectors.

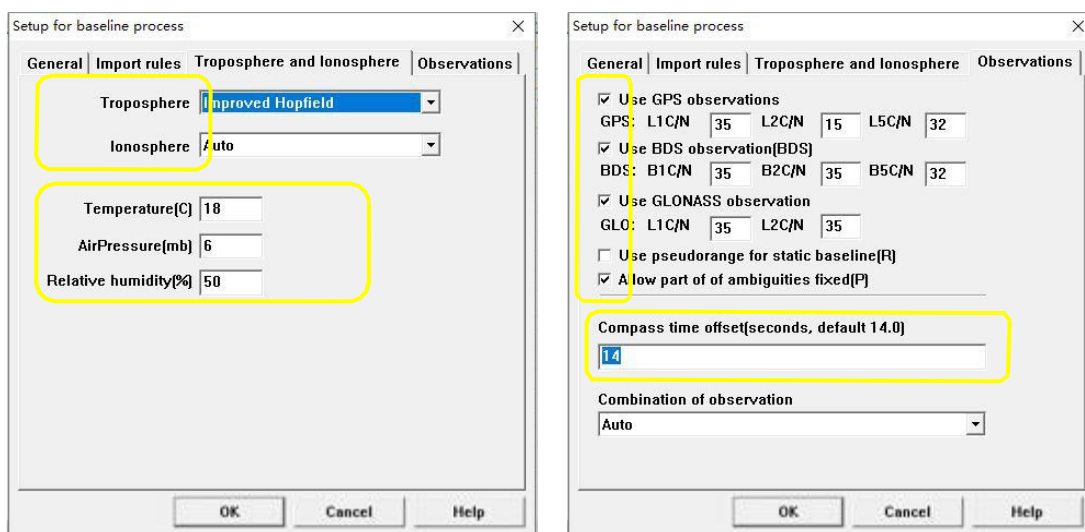


2.1.2 Baseline Process Settings

Before starting static baseline processing, click **Processor** -> **Baseline setting** in the menu bar to set proper processing parameters. The settings are related to data import rules, observations, troposphere and ionosphere.



- Sampling Interval: the data processing interval, the value should be greater than the interval used during recording of the data.
- Elevation Mask: the minimum mask angle to be used. When the data is a good quality the mask should be between 10 and 15 degrees.
- Min Time (Min.): the minimum observation period of GNSS raw data to form the baseline.
- Max Distance (km): the maximum observation distance of GNSS raw data to form the baseline.



- Select proper correction model for Troposphere and Ionosphere.
- Weather parameters: Temperature, Air pressure and Relative.
- Allow you to disable satellites individually so that data from these satellites will not be part of the solution.
- PP Software time offset: default value is 14.

2.1.3 Static Baseline process

After setting the baseline process parameters, click **Processor** -> **Process Static Baselines**.

Num.	Start	End	Sys. time	Status	Solution	Ratio	RMS	Check	dx
1	4220084K.CNB	3608P2084L.CNB	00:07:46	Using	Fix	43.5	0.0109	Valid	-7.2741
2	4220084K.CNB	3608P1084K.CNB	00:34:33	Using	Fix	2.2	0.0046	Valid	11.1407
3	4220084K.CNB	3590P2084L.CNB	00:22:13	Using	Fix	5.7	0.0051	Valid	5.3411
4	4220084K.CNB	3590P1084K.CNB	00:17:08	Using	Fix	10.1	0.0048	Valid	7.2014
5	3608P2084L.CNB	3590P2084L.CNB	00:07:46	Using	Fix	39.6	0.0138	Valid	12.5971
6	3608P1084K.CNB	3590P2084L.CNB	00:11:07	Using	Fix	6.6	0.0053	Valid	-5.7999
7	3608P1084K.CNB	3590P1084K.CNB	00:21:36	Using	Fix	5.2	0.0052	Valid	-3.9402

After all baseline processed, check the quality value (Solution type, Ratio and RMS) and baseline information (dx,dy,dz,ds) shown in the view area. To acquire a high- accuracy result, also check:

- Solution value from Unsolved to Fix
- Ratio should be smaller than warning value you set (default as 3)
- RMS value < 0.00X (millimeter accuracy)
- Check: valid

Alternatively, click **Adjustment** -> **Search Loop's Errors** to check PPM value of loop and detailed baseline processing information.

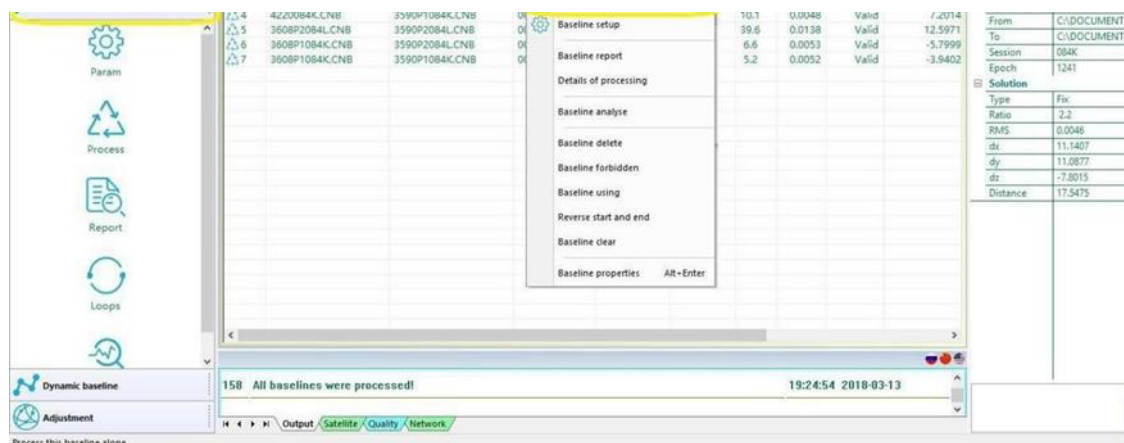
If the baseline RMS and Ratio values cannot meet standard requirements, edit the baseline manually and process it again.

Delete bad observation data in the **Timeline window** based on the **Quality window**. As the below example shown, observation data with a bad quality should be deleted from Timeline window.



Tip: In the Time Line window, selecting the observation means delete the observation data, double choose left checkbox to clear the selecting to restore the deleted observations.

1. Process this baseline again to acquire a better result.

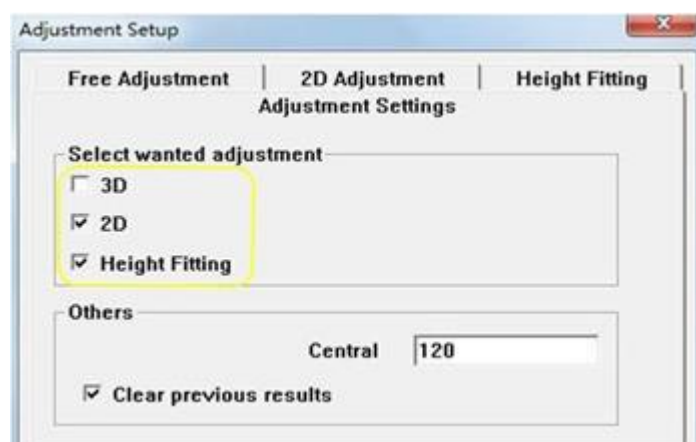


You can also edit baselines, including:

- Baseline setup: shortcut to baseline processing setting.
- Baseline report: create report for baseline processing result.
- Details of processing: show details of calculation procedure parameter.
- Baseline delete: delete this baseline from your project, which is not recommended.
- Baseline forbidden: forbid this baseline to be part of the solution, used only when the baseline without good accuracy.
- Baseline using: allow this baseline to be part of the network adjustment.
- Reverse start and end: reverse the direction of baseline vector.
- Baseline properties: include general information, fix solution and float solution.

2.1.4 Network Adjustment

In this section, you will carry out a least squares adjustment using the processed baselines above. First go to **Adjustment** -> **Adjustment setup** in the menu bar.

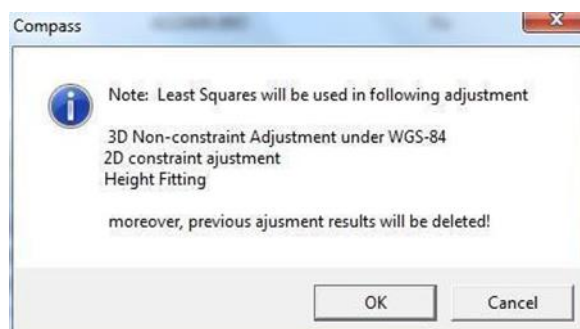


- 3D: WGS84 coordinate as control points
- 2D: Horizontal adjustment, use local grid coordinates as control points

- Height Fitting: Height adjustment

Tip: we recommend that you apply 2D & Height to adjust baselines.

Then click **Adjustment**->**Run Adjustment**, click **OK** to complete adjustment.

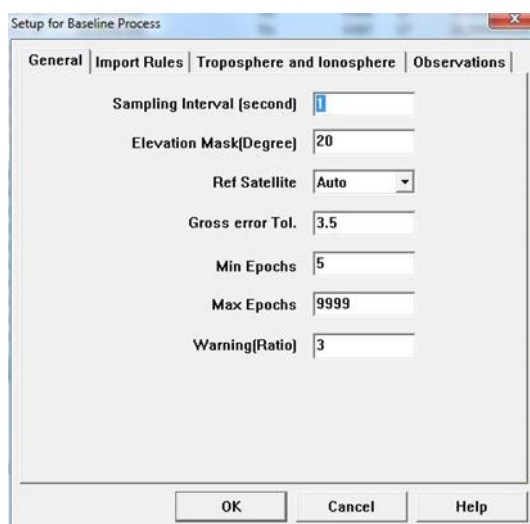


2.2 PPK (Post-Processing Kinematic)

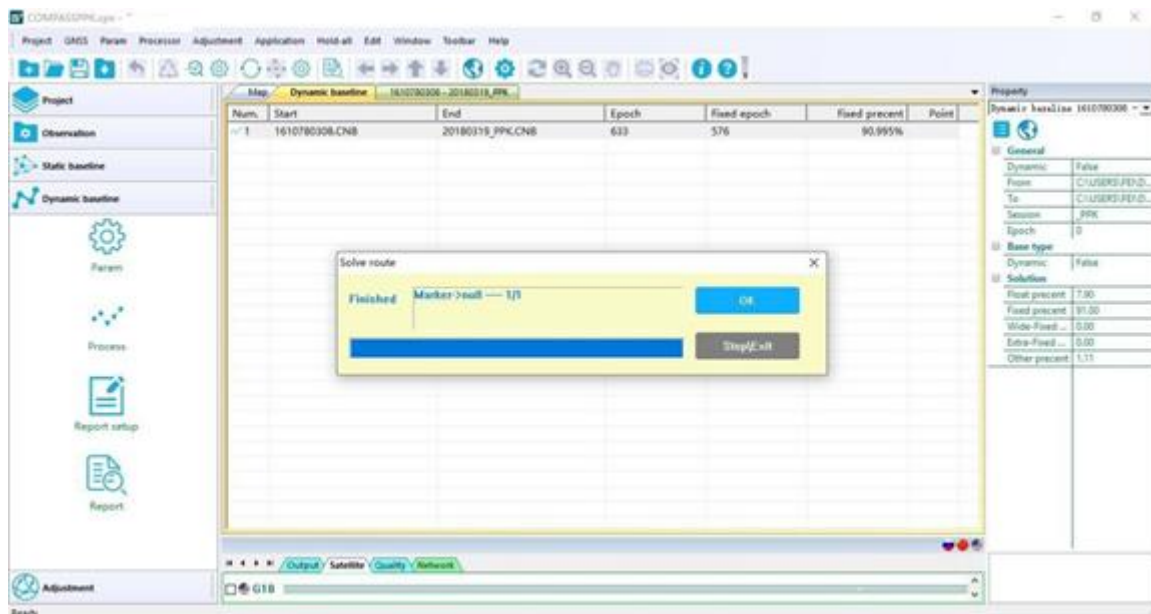
For PPK (Post processed Kinematic) mode, it can process trajectories of rover combined with base station static data. Commonly, set the sampling interval of base station as 1/s and fix it on the known point

2.2.1 Dynamic baseline processing

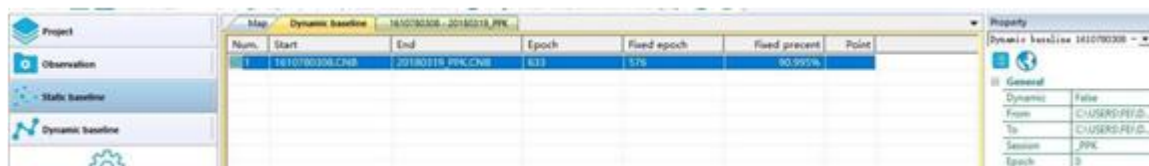
Setting up process parameters for the dynamics baseline, which should be the same as static baseline processing setting (the sampling interval is 1/s).



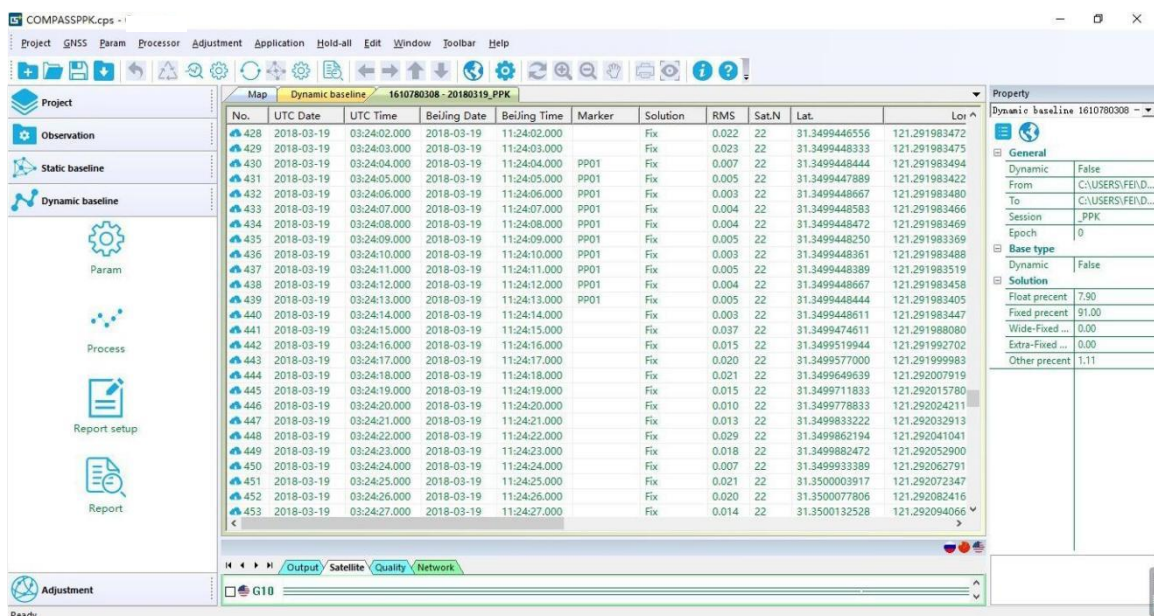
Right-click on the file's name to process this baseline alone. The figure is shown below:



Click **Next** to finish dynamic baseline processing, you will see the baseline information, i.e. Epoch Num, Fixed Epoch and Fixed percentage.

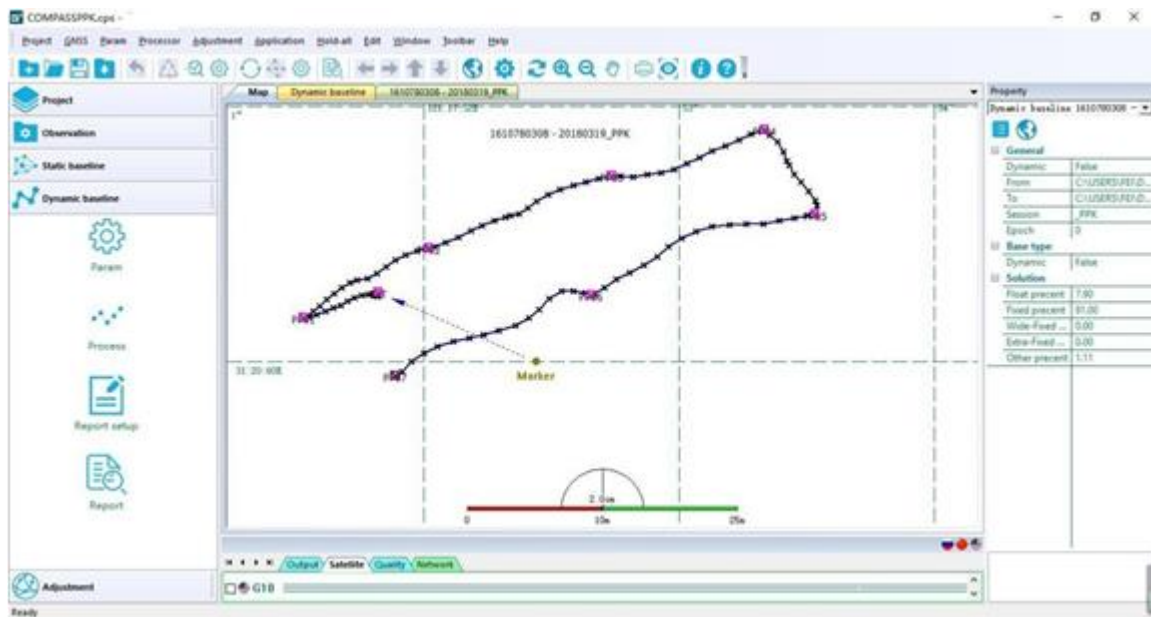


Double right click on the Dynamic baseline to check detailed information of each point.



2.2.2 Map View

After dynamic baseline processing, you can go to **Project -> Map** to have a look at trajectories of your rover.

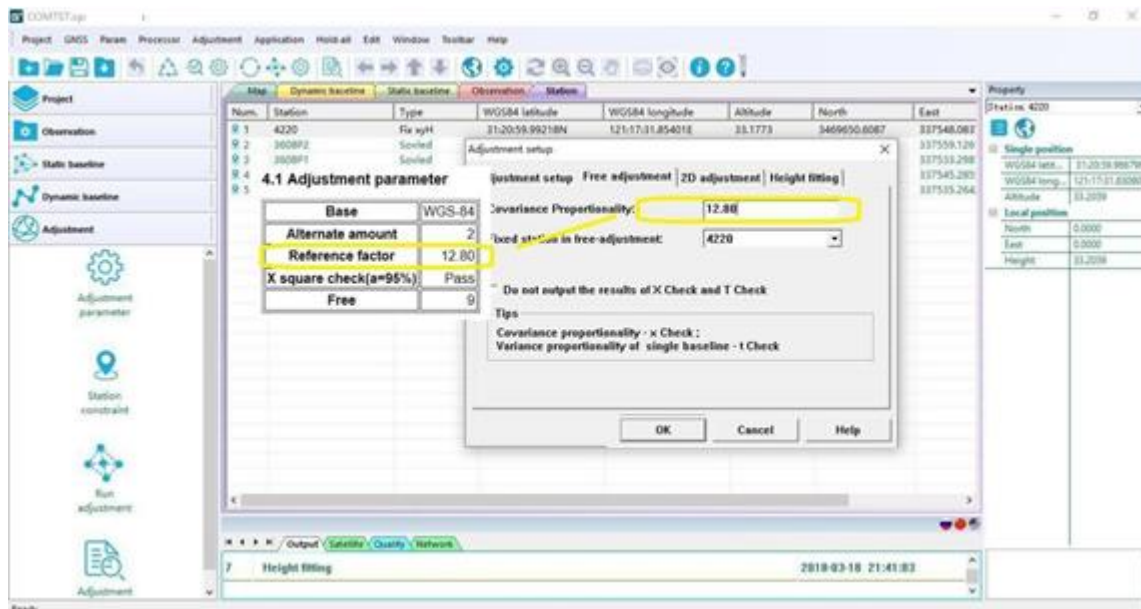


This chapter will introduce how to export processing reports

3.1 Static Report

Go to **Report** in the main menu bar, you can output a network adjustment report in web format. It contains five parts: project property, coordinate system, baseline, 3D non-constraint adjustment and 3D constraint adjustment, which help you to check the result of baselines and adjustments.

The most important parameter you should check is **X square check**, if it shows fail, copy the value of reference factor to **Adjustment** -> **Adjustment Setup** -> **Free adjustment**, then run adjustment again.

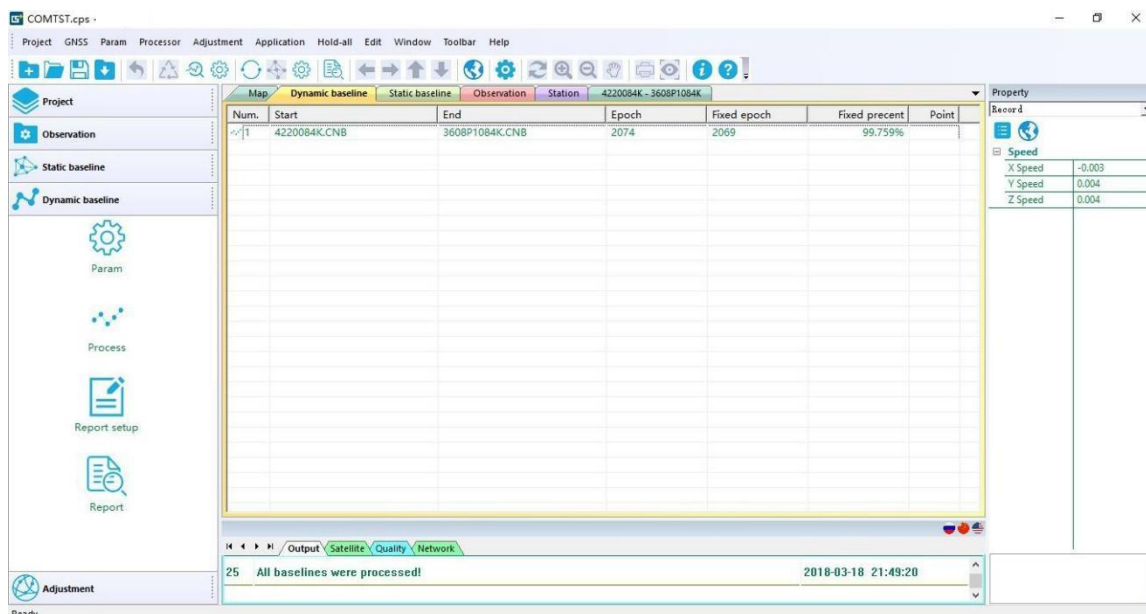


Tip: The **X square check** parameter is meaningful for triangle network adjustment. For single baseline processing, you only need to check parameters, i.e. Solution, Ratio and RMS.

Other report formats can be exported, including brief report, DXF and KML. In the end, click **File** -> **Save** to save your project.

3.2 PPK Report

Double-click on this baseline to check the detailed information.

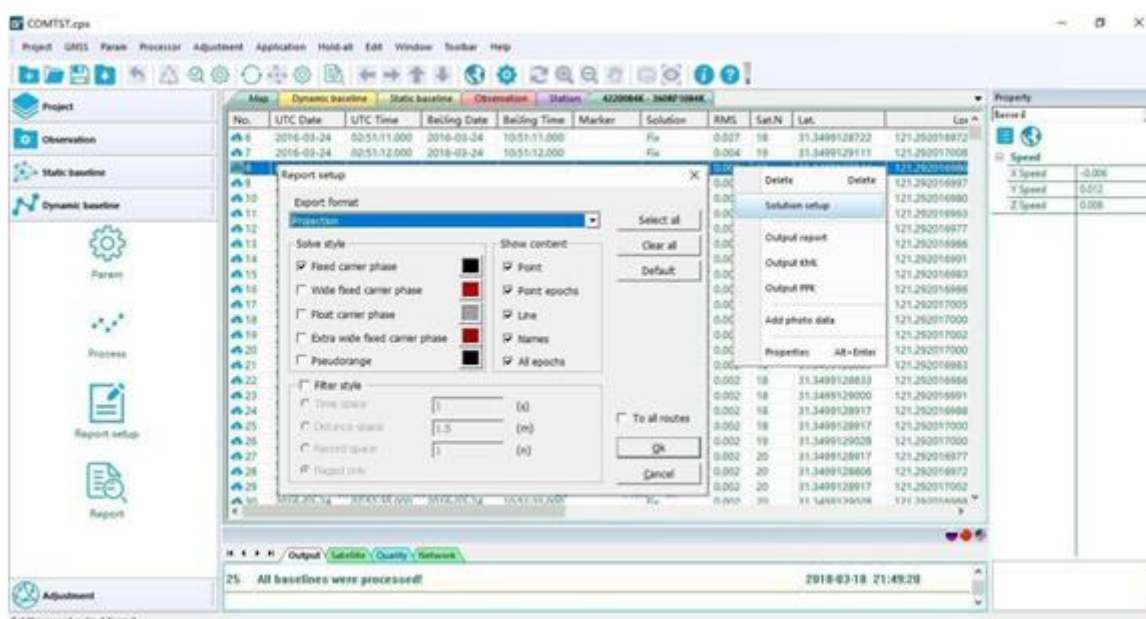


In the detailed information page, right click to select **Filter** -> **Export format**, **Solution Setup** -> **OK** to set the report format.

Export format:

- Latitude/longitude: export the report in WGS84 coordinate system
- Projection: export the report in local grid coordinate system.
- Relative 2D: Horizontal distance relative to base station
- Relative distance: 3D distance relative to base station

Solve style: Filter the processing results, commonly choose Fixed carrier phase (centimeter accuracy).



a) Output report, PPK report or KML format, we recommend to save the report in *.csv format, which makes it easier to analyze post-processing result. And the KML allows you to save files in the format

accepted by Google Earth

b) After exporting the report, go to the main menu bar -> **File** -> **Save**, save the project.