

GNSS Data Processing for High-Accuracy Single, DPGS and Kinematic

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Objectives

- Learn how to post-process GNSS data using RTKLIB software
 - Data Conversion Methods
 - Data Check and Data Plots
 - Data Post-Processing Methods: Single, DGPS and Kinematic
- Learn data processing methods
 - Single Method
 - Standard GNSS Accuracy: Few meters to 10m
 - DGPS Method
 - Differential Correction, Code-phase Observation
 - Meter level accuracy
 - Kinematic method
 - Differential Correction with Code and Carrier phase observation
 - Centimeter level accuracy
- Compare accuracy levels
 - Compare accuracy between Single, DPGS and Kinematic methods

Data Files

- Two data sets “STATIC” and “DYNAMIC” are provided.
- “STATIC” contains data for a fixed point, no antenna movement.
- “DYNAMIC” contains data logged by mounting GPS antenna on a vehicle.
- Unzip the files to STATIC and DYNAMIC folders.

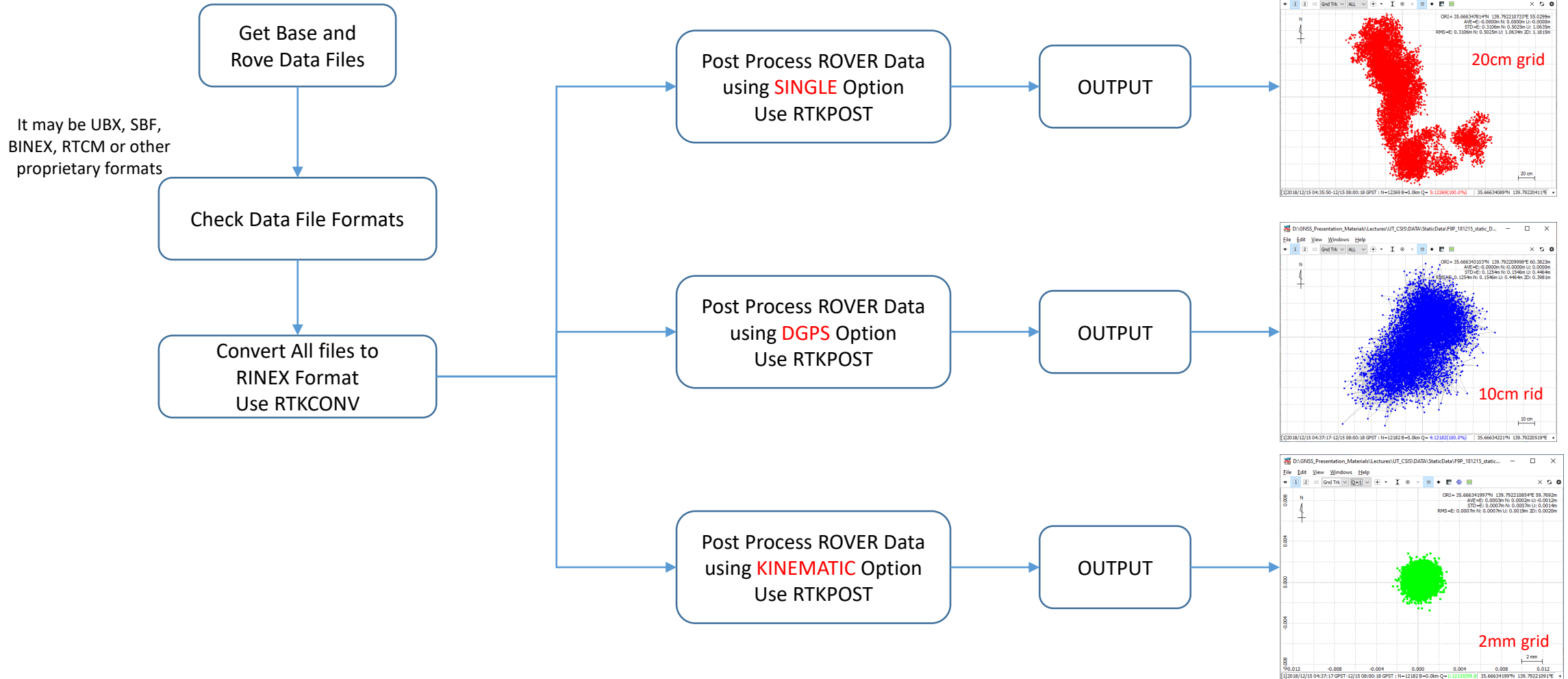
Data ID	Purpose	Type	File Name	File Type	Receiver Model	Receiver Type	Frequency and Satellites	Observation Mode	Purpose
KDB 001	Static Observation	Base-Station	NetR9_181215_static.binex	BINEX	Trimble NetR9	High-End Survey Grade	Multi-Frequency Multi-System	Static	Use as Base-Station
KDR 001		Rover	F9P_181215_static.ubx	UBX	U-blox F9P	Low-Cost	Dual-Frequency Multi-System	Static	Static Data Analysis
KDB 002	Dynamic Observation	Base-Station	ECJ02_base	UBX	U-blox F9P			Static	Use as Base-Station or Static Rover
KDR002		Rover	F9P_dynamic_rover_RTKsample	UBX	U-blox F9P			Dynamic	Dynamic Data Analysis

Base-Station Position Data

- For DPGS, KINEMATIC or other data processing methods where a Base-station data are used, it is necessary to provide Base-Station's coordinates.

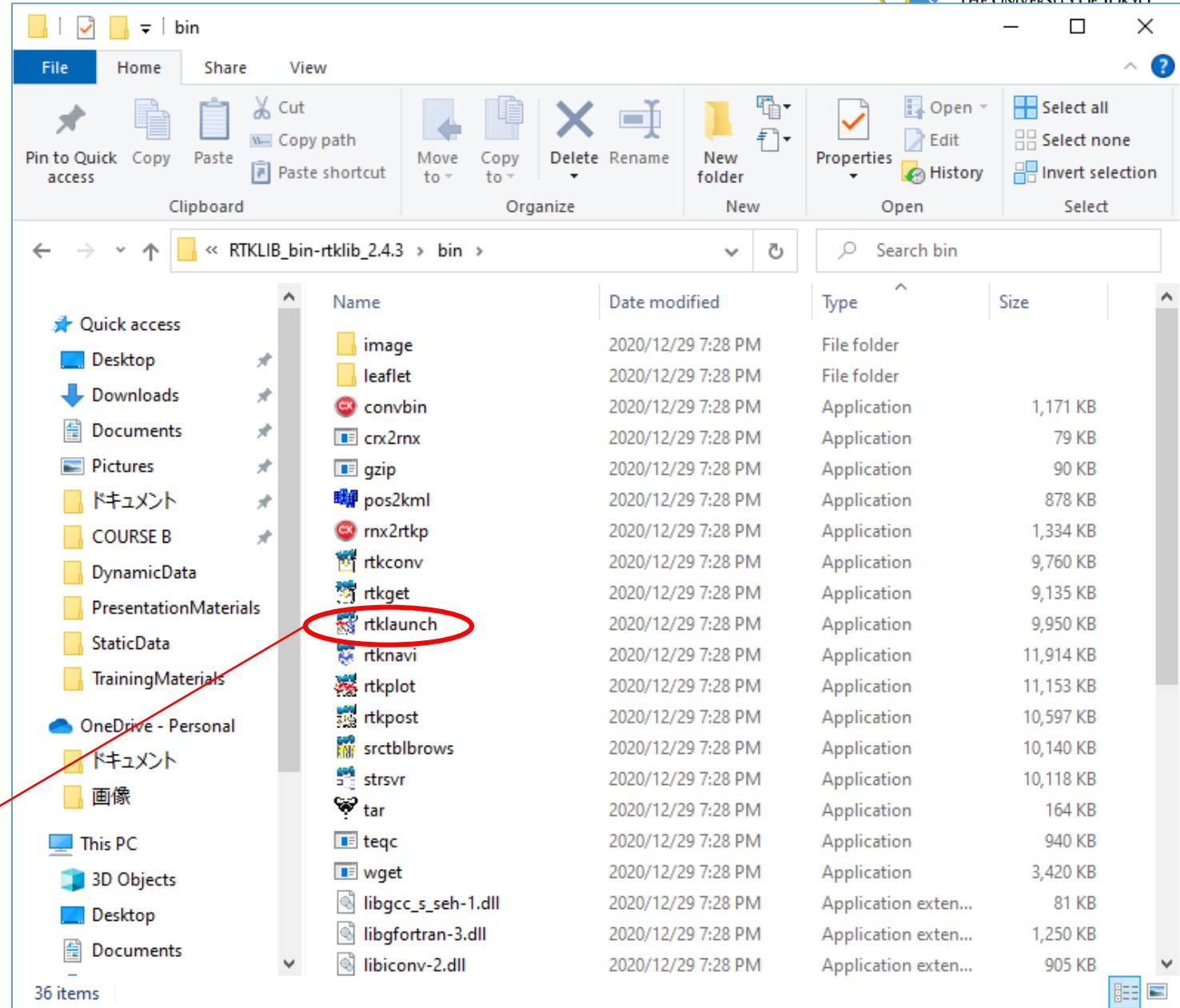
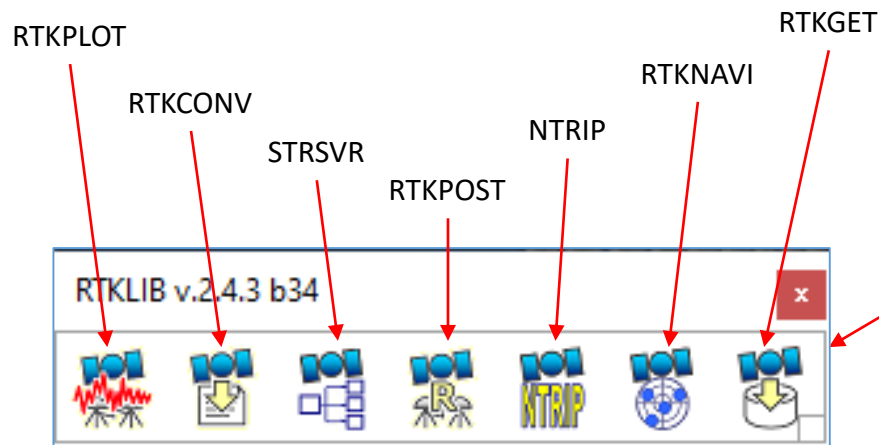
Data ID	LAT	LON	HT	Location	Receiver Model	Antenna Type	Remarks
KDB 001	35.66634207	139.79221086	59.771	Tokyo	Trimble NetR9		High-End Survey Grade Receiver
KDB 002	35.66633434	139.79220132	59.746	Tokyo	U-blox F9P		Low-Cost Receiver

Data Processing Flow



Launch RTKLIB Menu

- Go to RTKLIB Folder
- Go to BIN Folder
- Double Click RTKLAUNCH.exe file
- Or create a shortcut to RTKLAUNCH.exe file and copy this shortcut to Desktop for easy access



Convert GNSS Data File to RINEX Format for Post-Processing

Select RTKCONV → 1

Select File to be converted
Repeat this process for both BASE and ROVER files → 2

Select File Type or use AUTO → 3

Select OPTIONS → 4

Select RINEX Version, 3.02 is OK
Select higher version if NAVIC data is available → 5

Use Default selections
You may change if necessary → 6

7

Options

RINEX Ver: 3.02

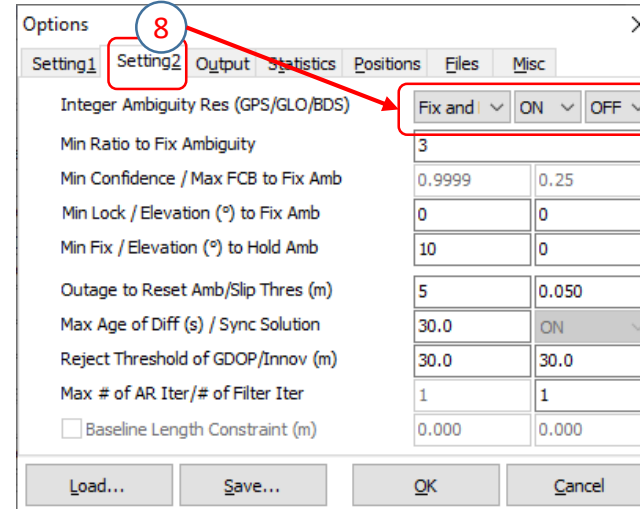
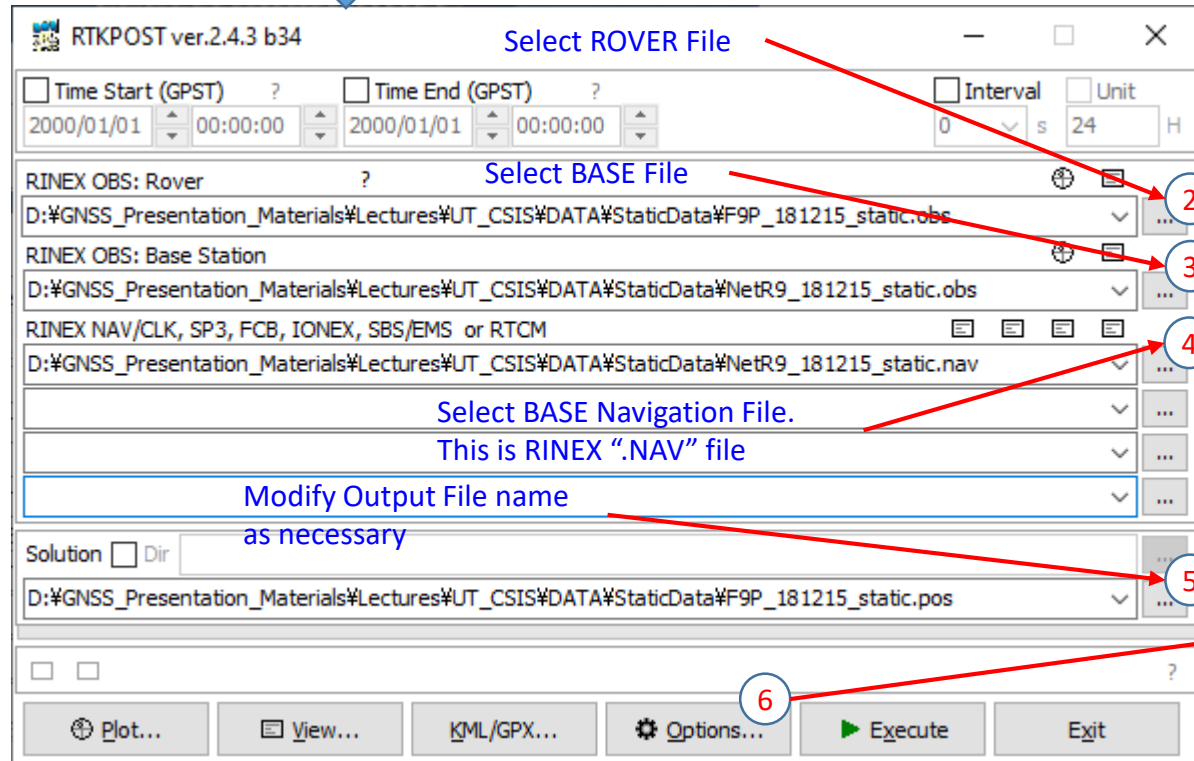
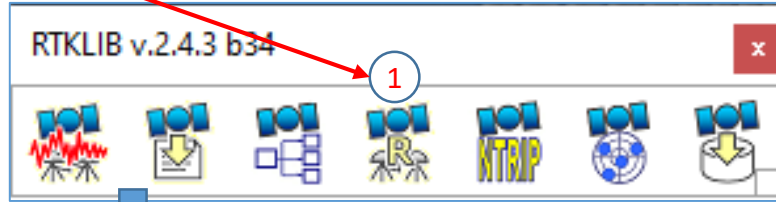
Satellite Systems: GPS GLO GAL QZS BDS NavIC SBAS

Observation Types: C L D S

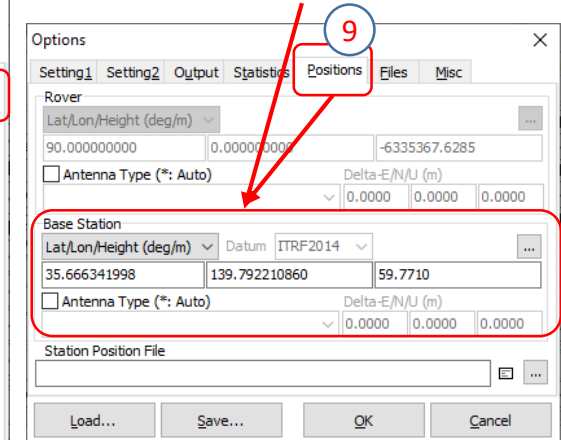
GNSS Signals: L1 L2 L3 L4 L5

GNSS Data Post-Processing

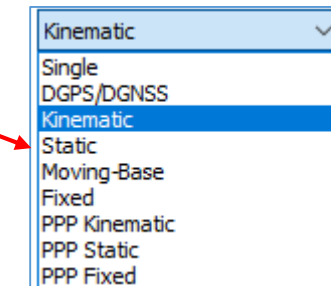
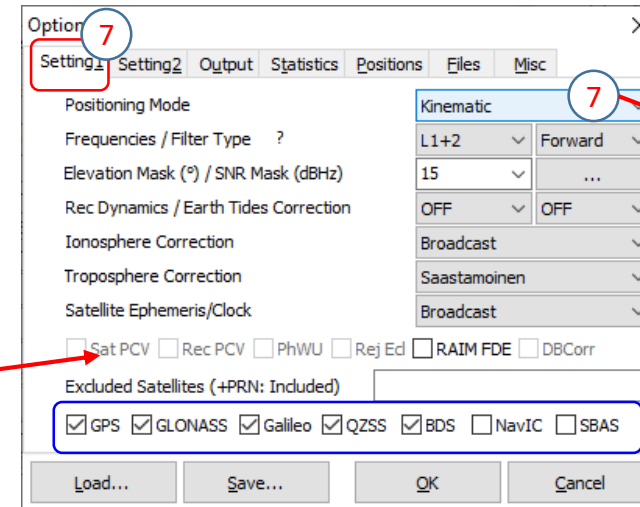
Select RTKPOST



Input Base-station Coordinates or select Coordinate File



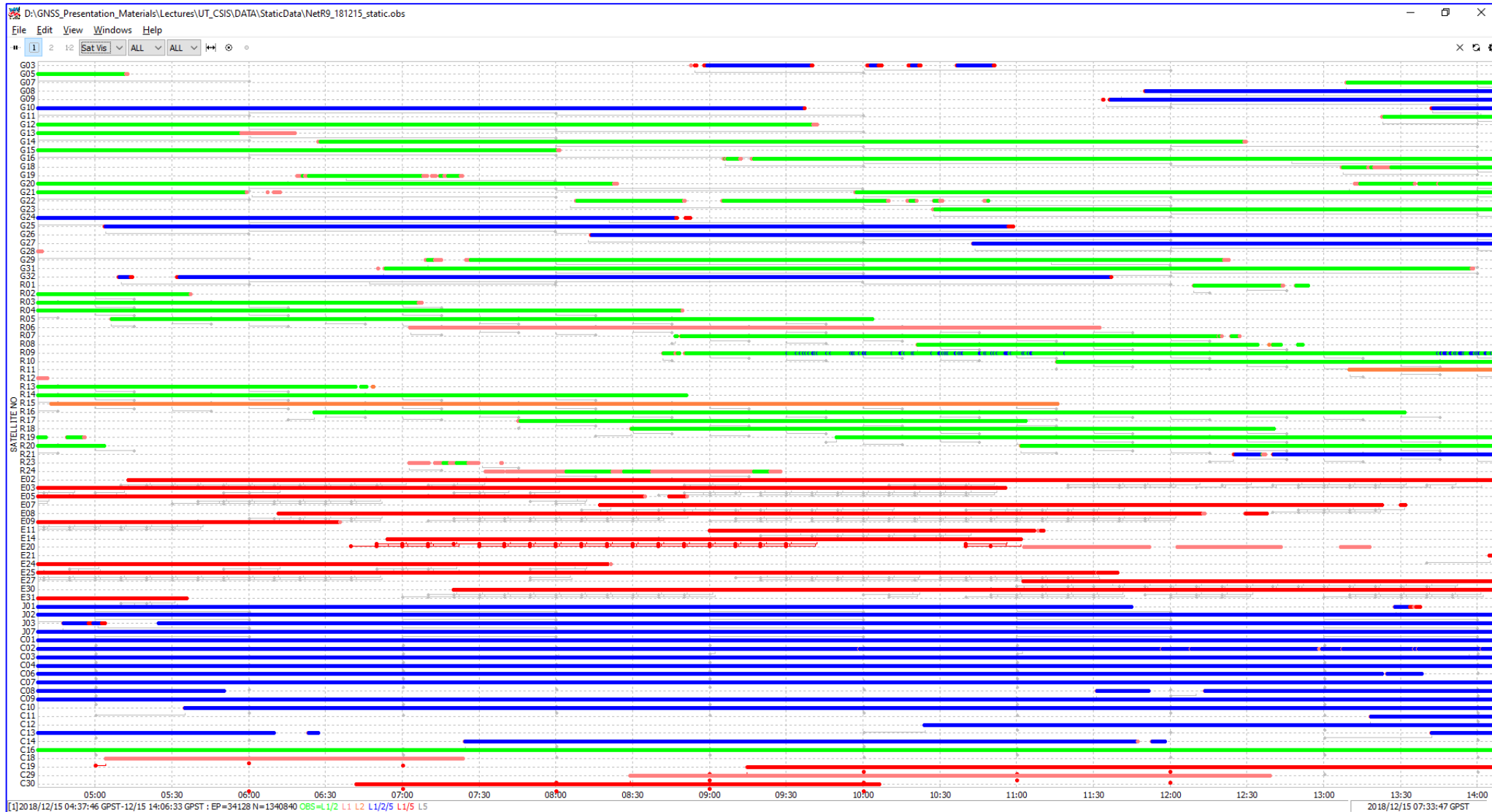
Select Processing Mode
Try with different modes



- Single: Standard Position Computation
 - (only Rover Data is necessary)
 - Few Meters accuracy: 3- 30m
- DGPS: DGPS Correction (code-Phase)
 - (Base and Rover Data necessary)
 - Meter level accuracy, 1 – 3m
- Kinematic: RTK
 - (Base and Rover Data necessary)
 - Centimeter level accuracy

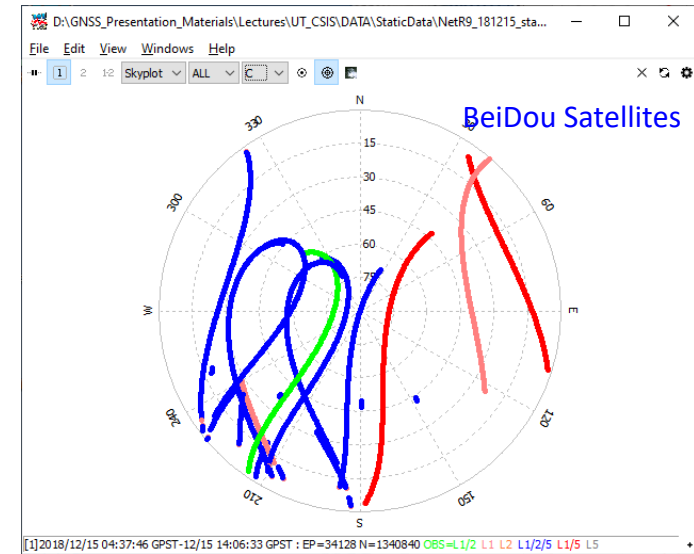
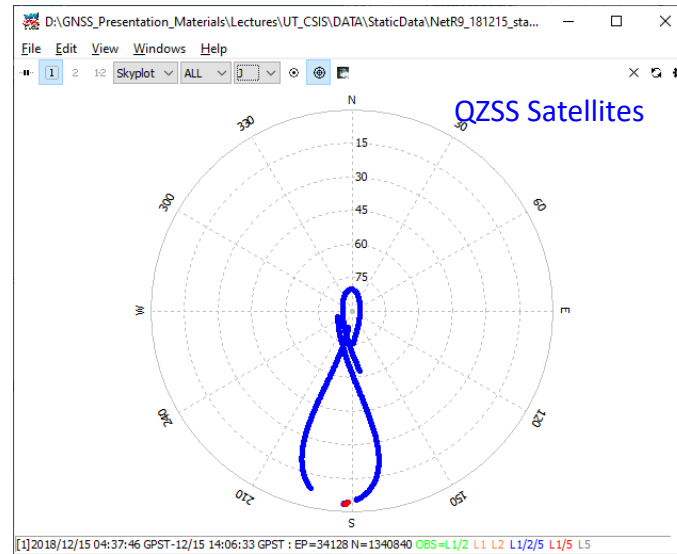
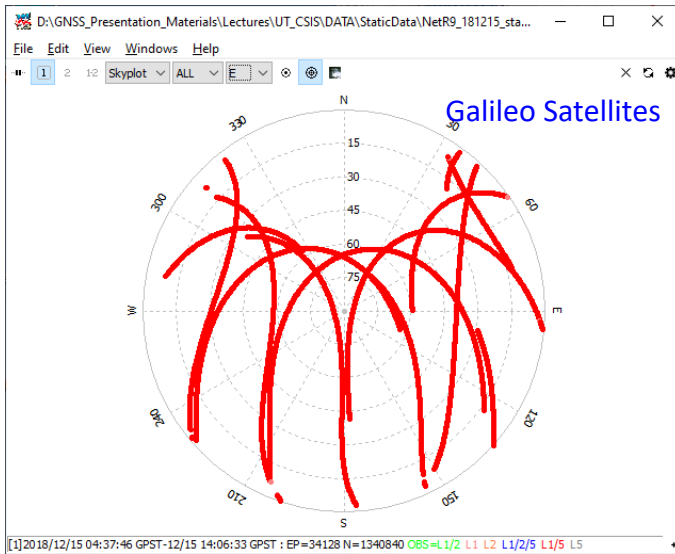
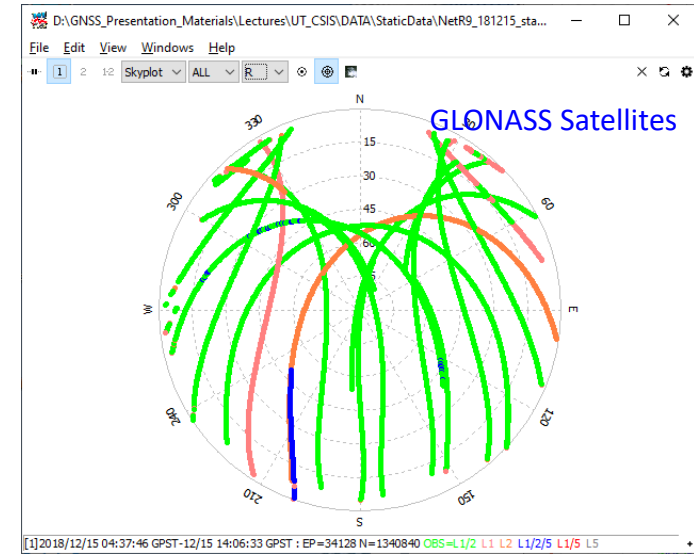
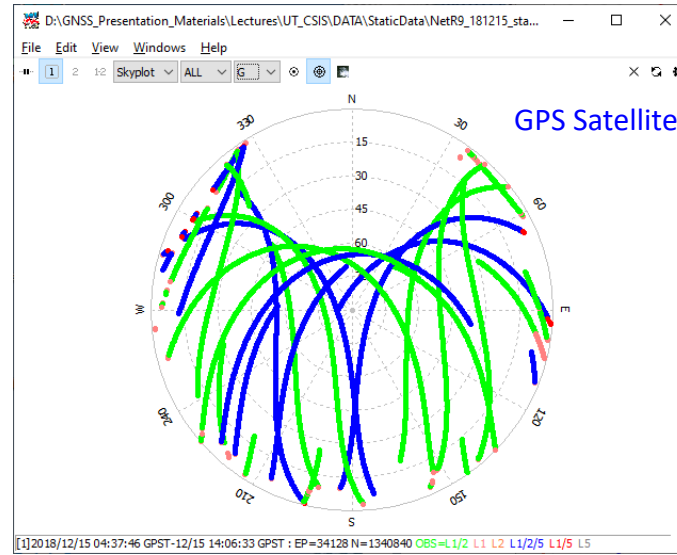
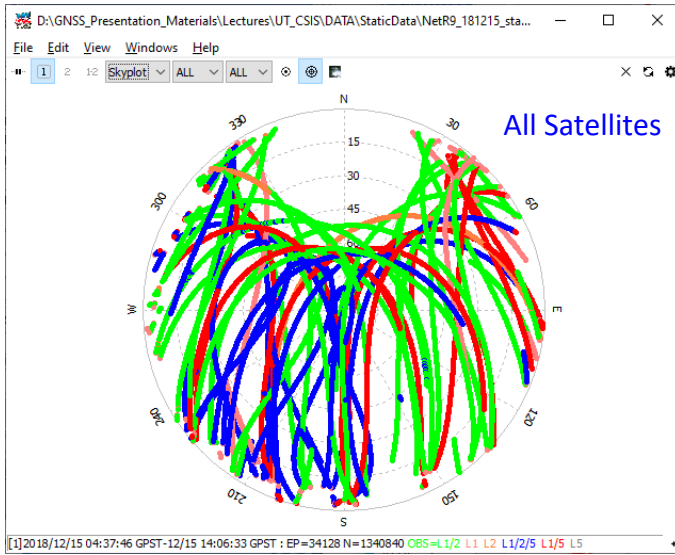
Base-Station: Satellite Visibility Plot

Visible Satellites



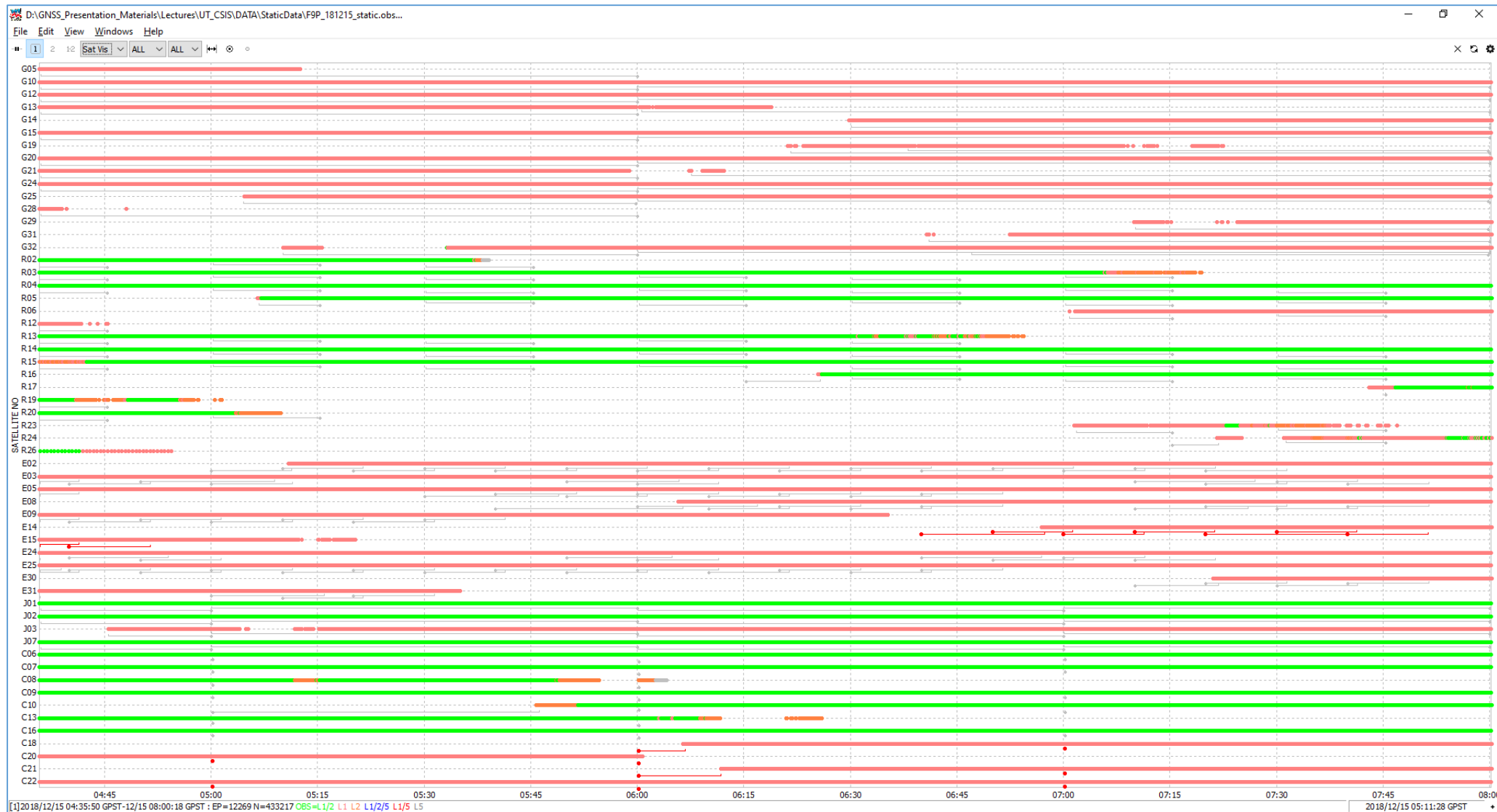
TIME, UTC

Base-Station: Skyplot



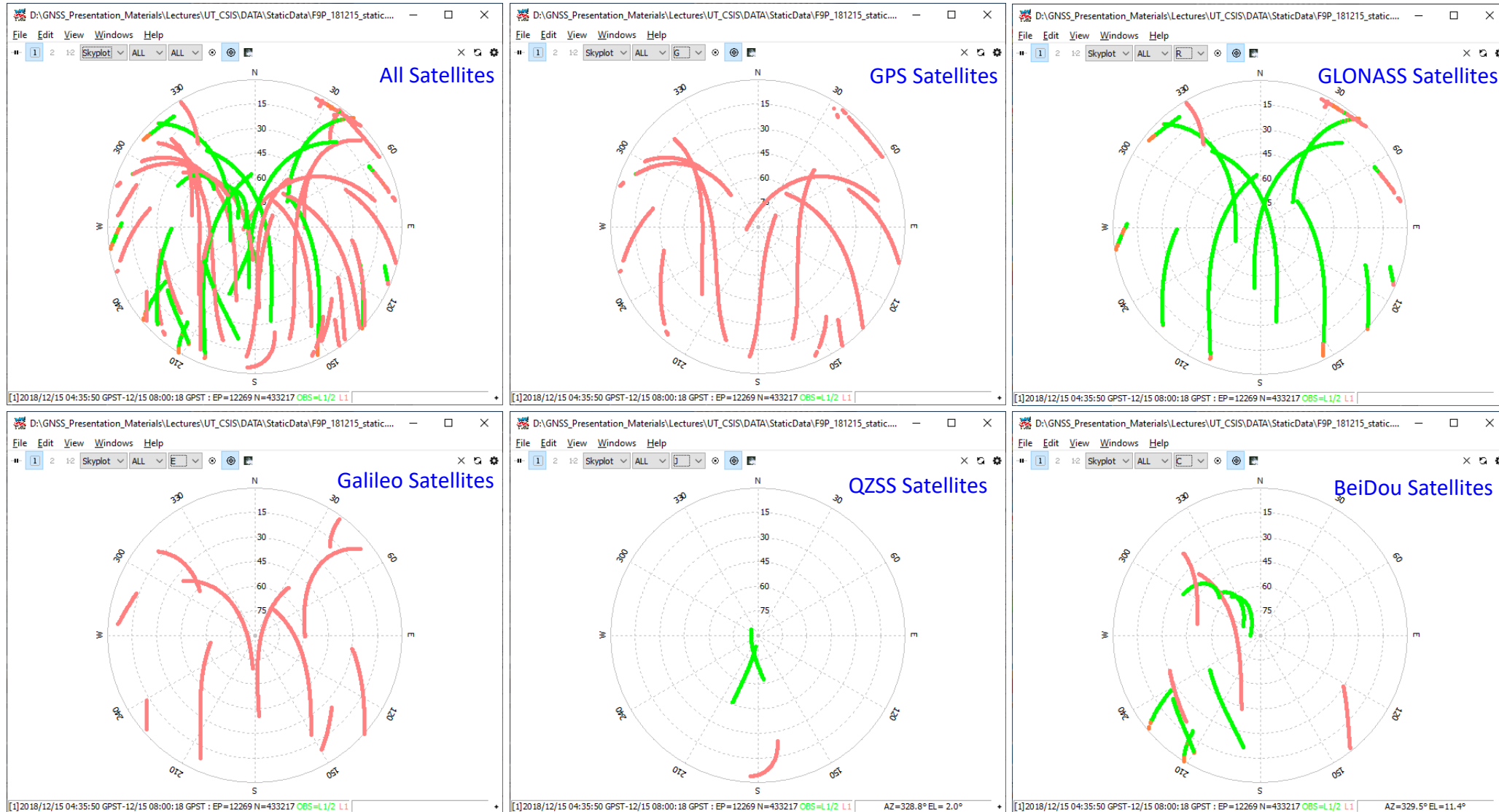
Rover: Satellite Visibility Plot

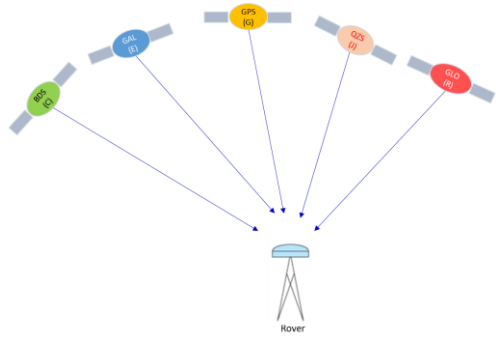
Visible Satellites



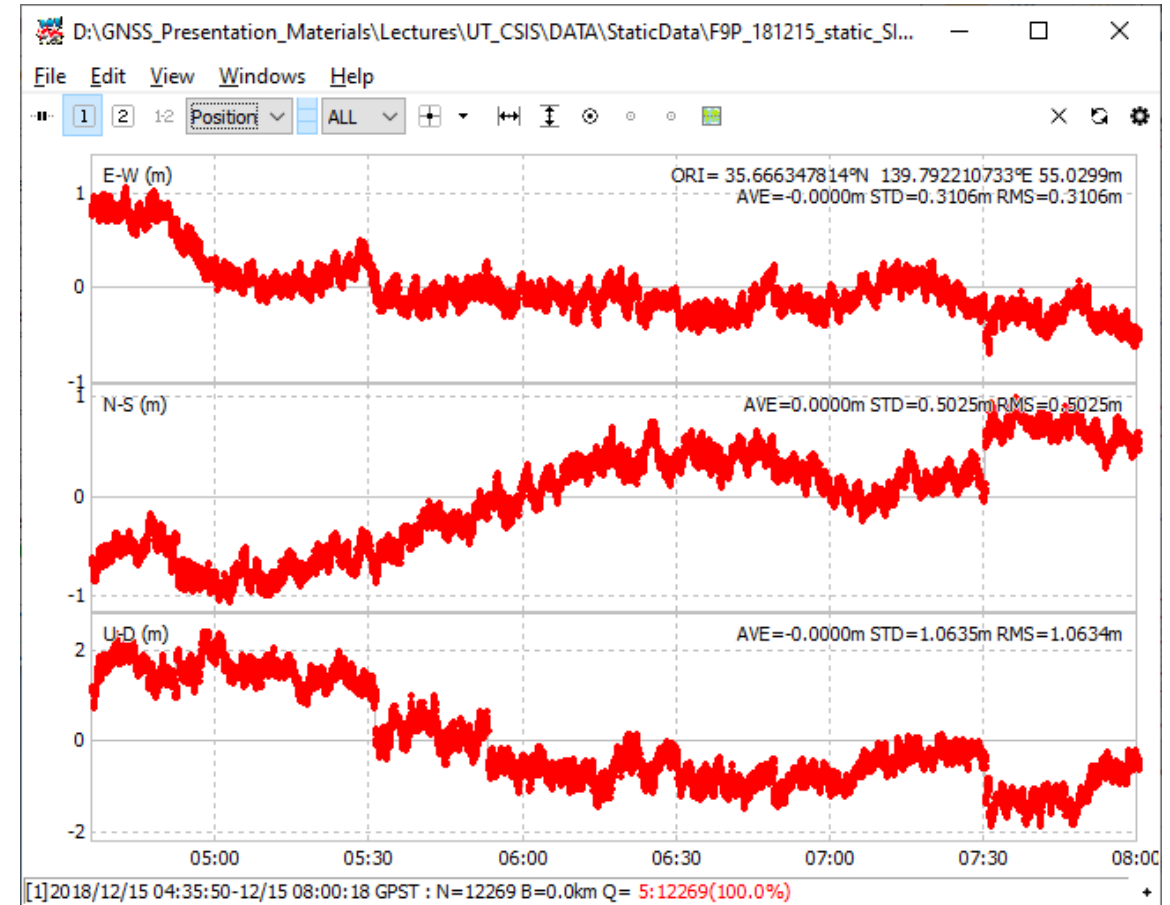
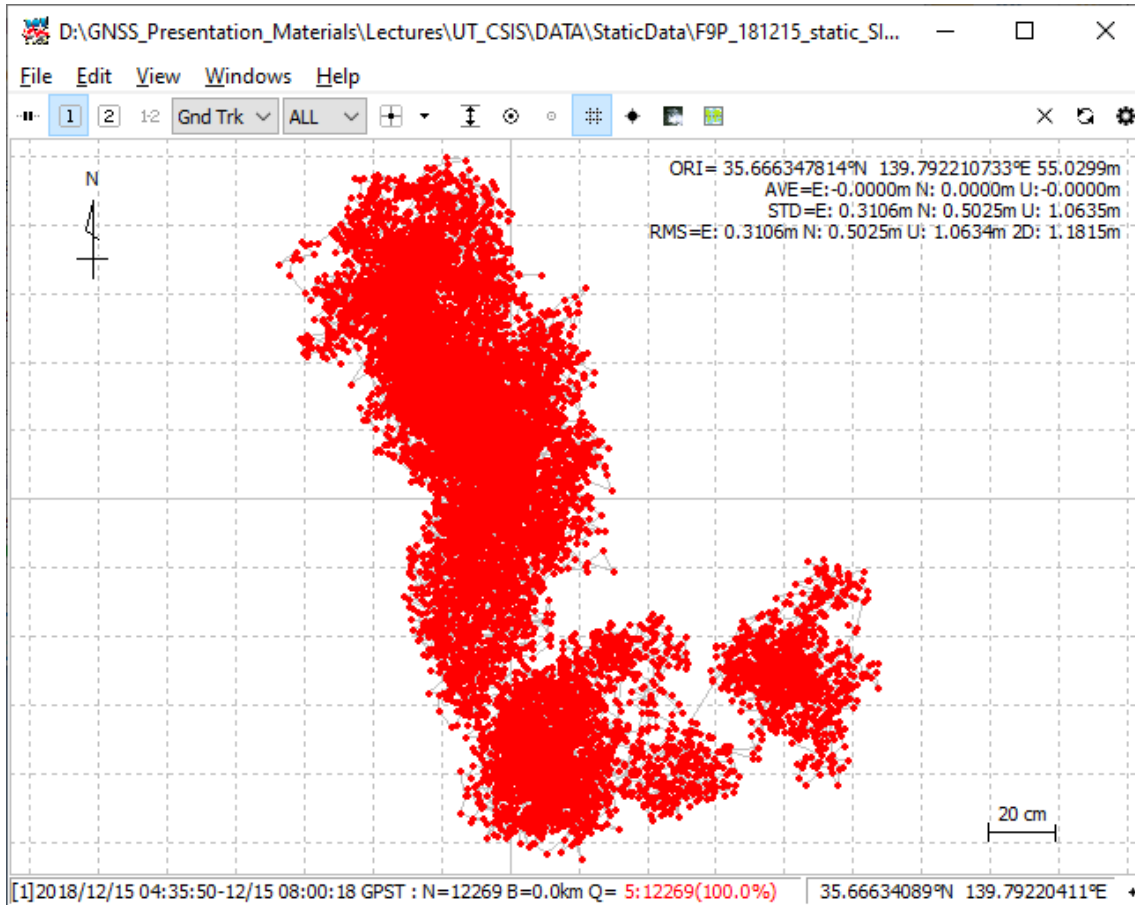
TIME, UTC

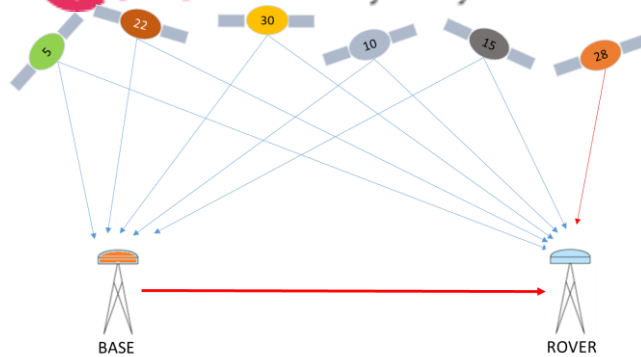
Rover: Skyplot



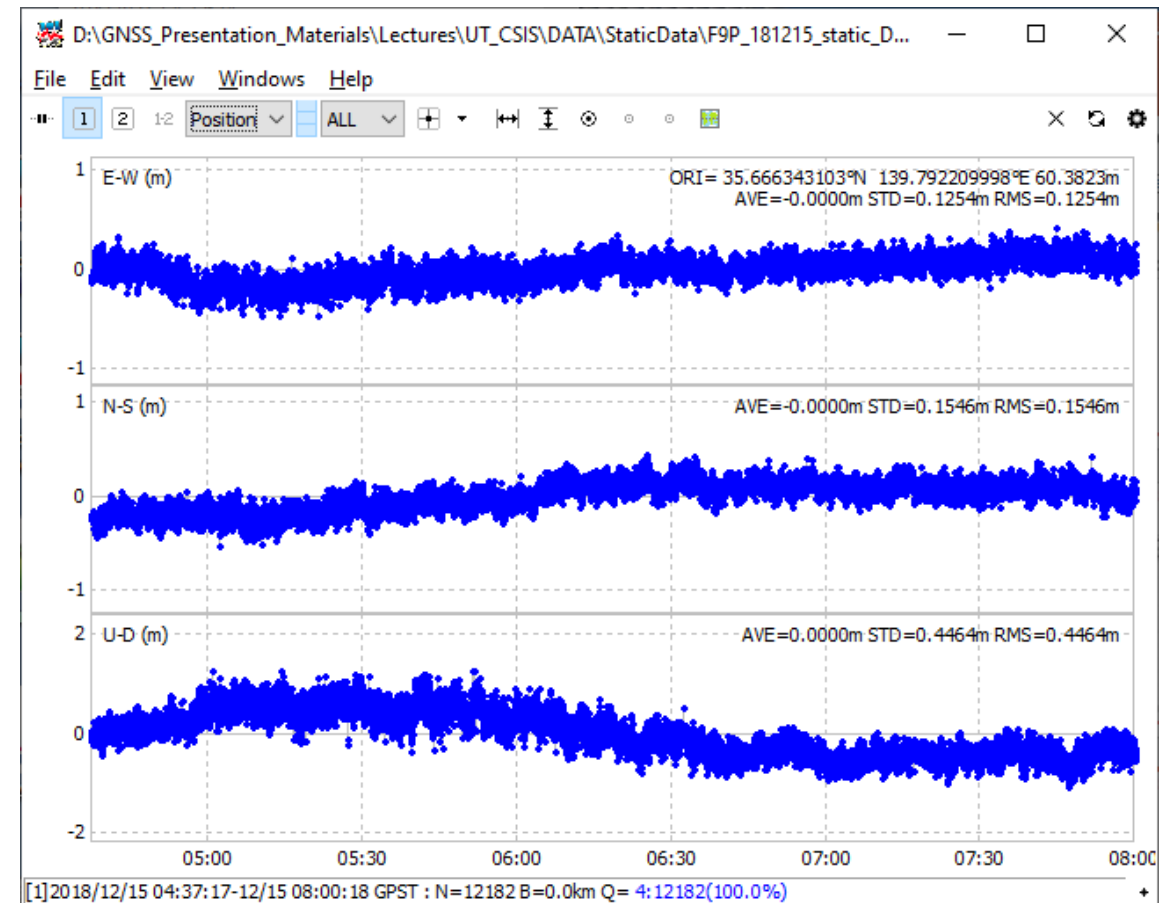
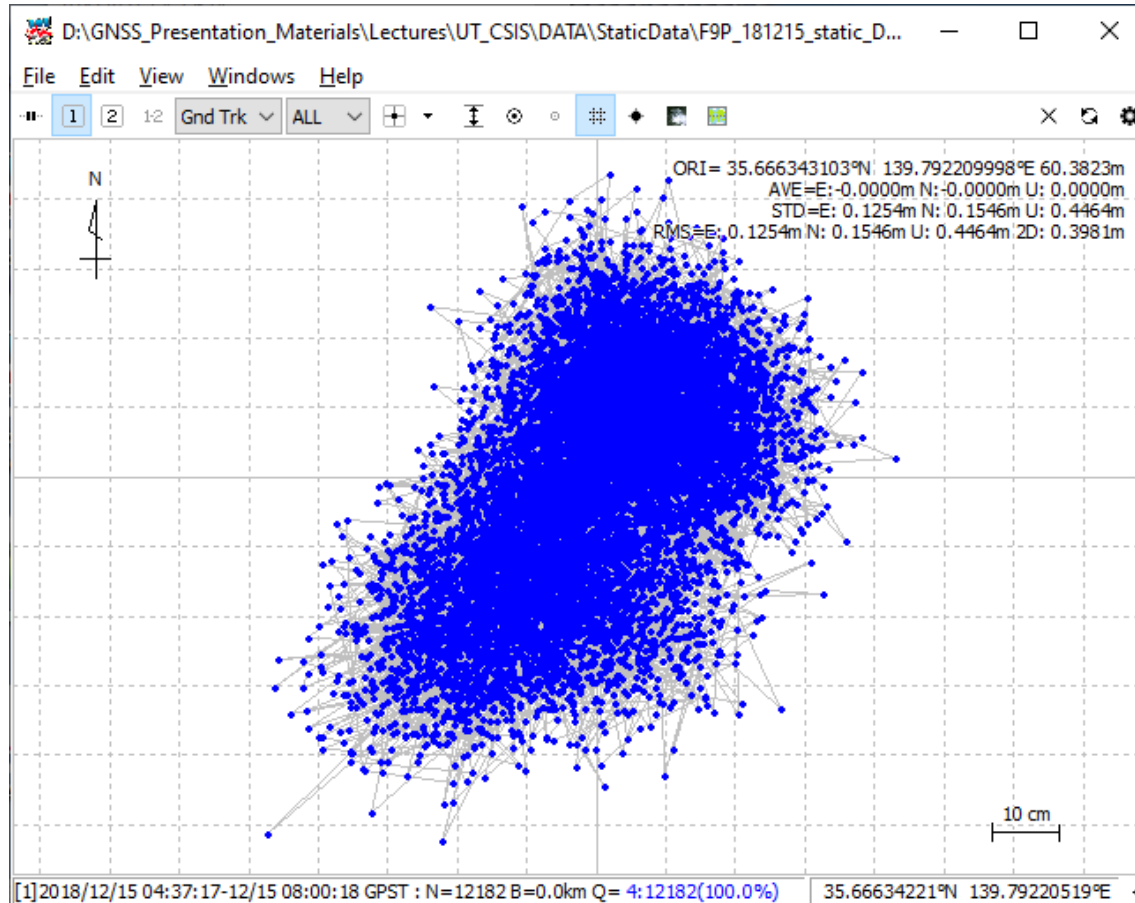


GNSS Data Processing: Single

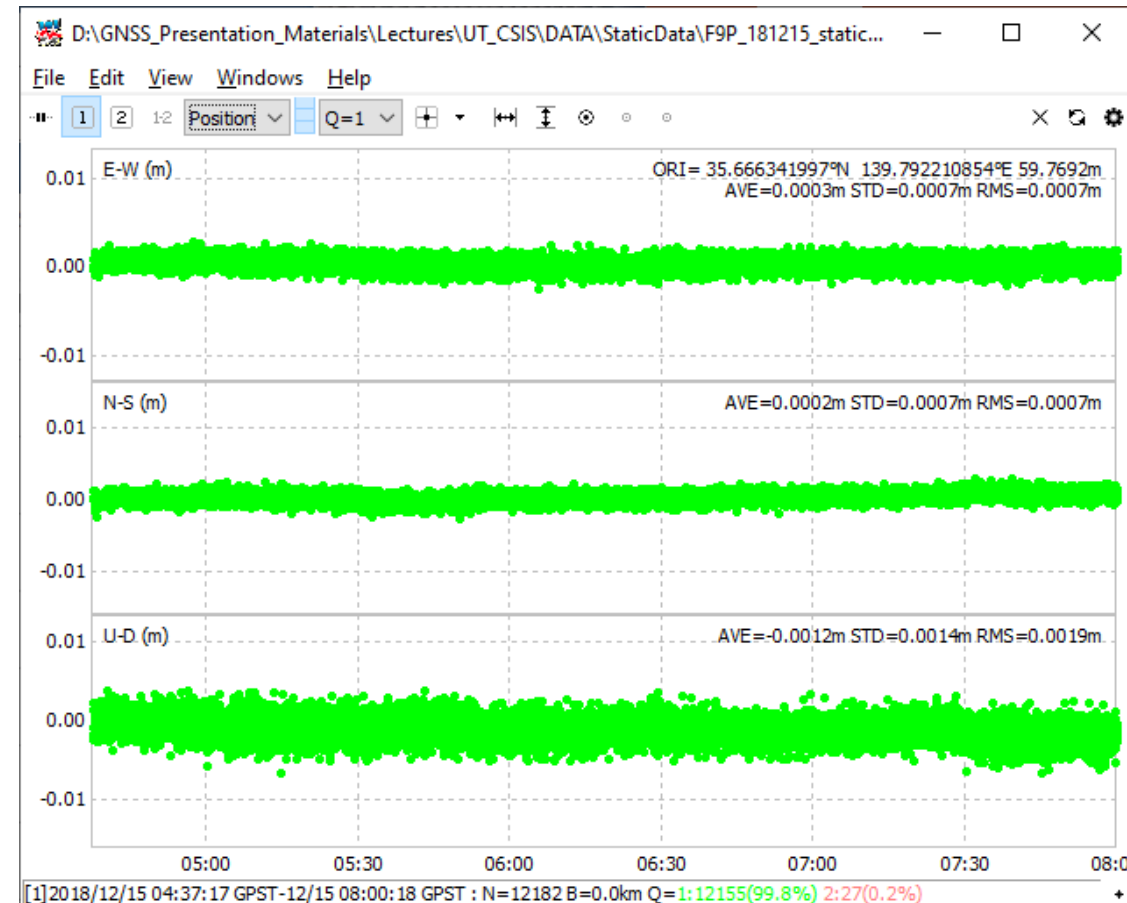
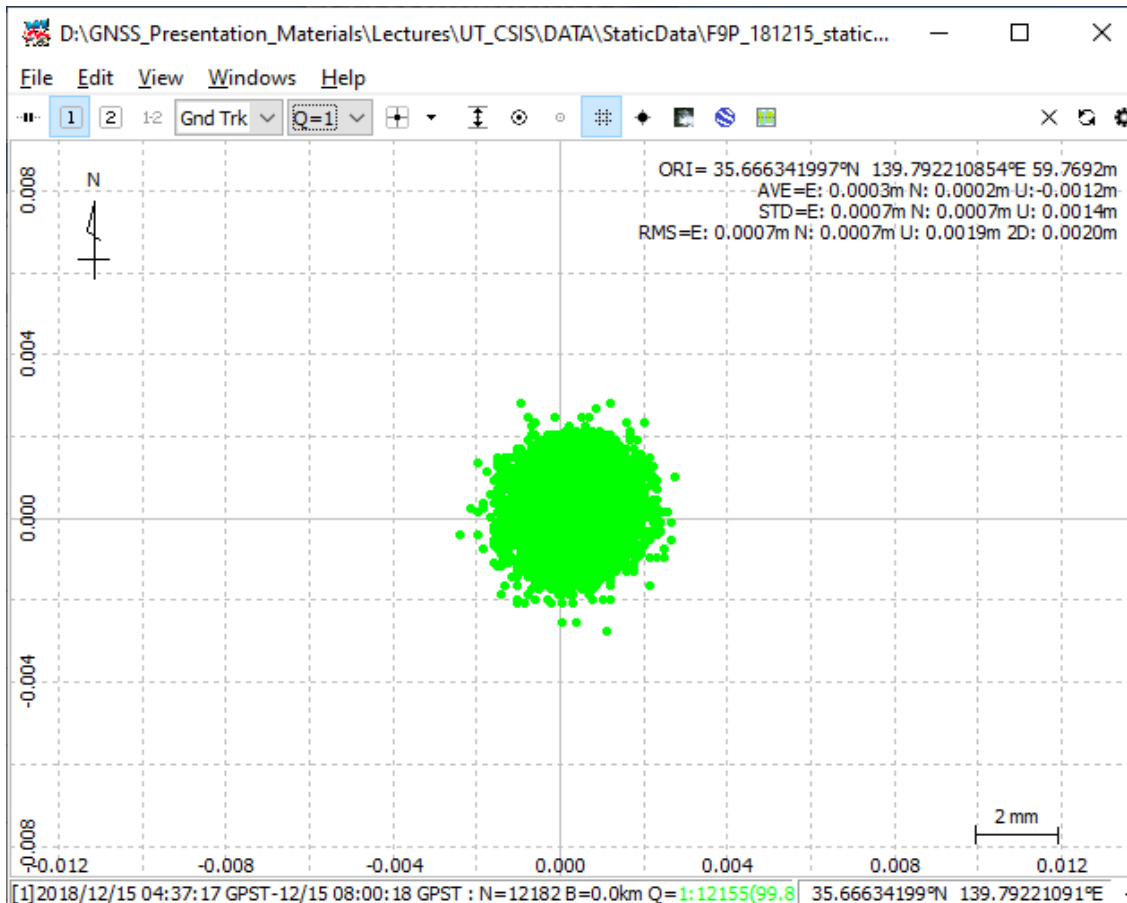
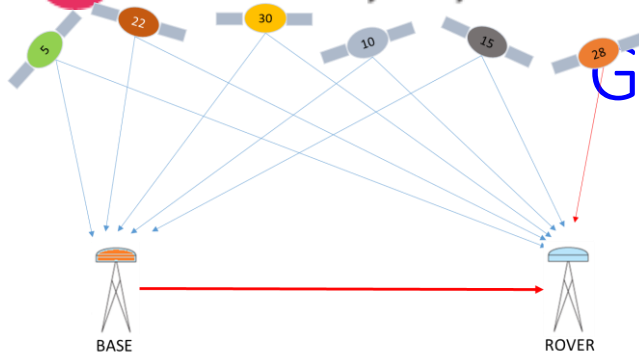




GNSS Data Processing: DGPS



GNSS Data Processing: Kinematic



GNSS Data Processing: Single, DGPS, Kinematic

