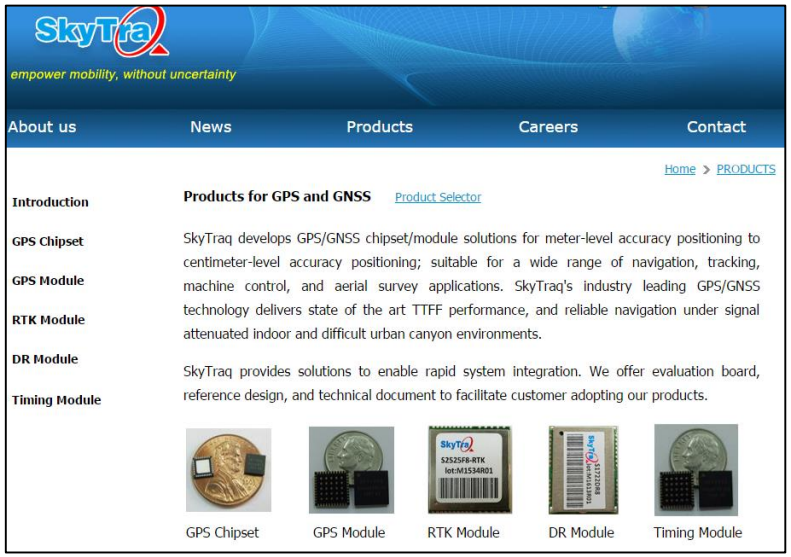
Skytraq Manual (Single frequency receiver)

Procedure to logging skytraq data with RTKNAVI

TUMSAT

Skytraq Receiver



http://www.skytraq.com.tw/products/products.html

S1216F8-BD-RAW

✓Datasheet

http://www.skytraq.com.tw/datasheet/S1216V8_v0.9.pdf

S1216

High-Performance Low-Cost 167 Channel SMD Global Positioning Receiver Module

Features

- 167 Acquisition/Tracking Channels
- Support QZSS, WAAS, MSAS, EGNOS, GAGAN
- 16 million time-frequency hypothesis testing per sec
- -148dBm cold start sensitivity
- -165dBm tracking sensitivity
- 29 second cold start TTFF
- 3.5 second TTFF with AGPS
- 1 second hot start
- 2.5m CEP accuracy
- Multipath detection and suppression
- Jamming detection and mitigation
- 7-day extended ephemeris AGPS
- Contains LNA, SAW Filter, TCXO, RTC Xtal, Regulator
- Works with active and passive antenna
- On board active antenna short protection
- On board active antenna detection
- Complete receiver in 12.2mm x 16.0mm size
- Operating temperature -40 ~ +85ºC
- Pb-free RoHS compliant

Applications

- Navigation and asset tracking
- Timing reference

The S1216 family is state-of-the-art global navigation satellite system receivers capable of using GPS, GPS/Beidou, or GPS/GLONASS signal under the same footprint. User can upgrade from GPS navigation system to GPS/Beidou or GPS/GLONASS dual-satellite navigation systems by choosing appropriate model type without hardware redesign.

The –BD12 and –GL12 entry level models offer dual-satellite navigation capability, tracking up to 12 GPS/Beidou or 12 GPS/GLONASS signals combined respectively. Its NMEA output is the same format as GPS receivers, thus users can effortlessly upgrade GPS product to GPS/Beidou or GPS/GLONASS product without needing modification on the application software.

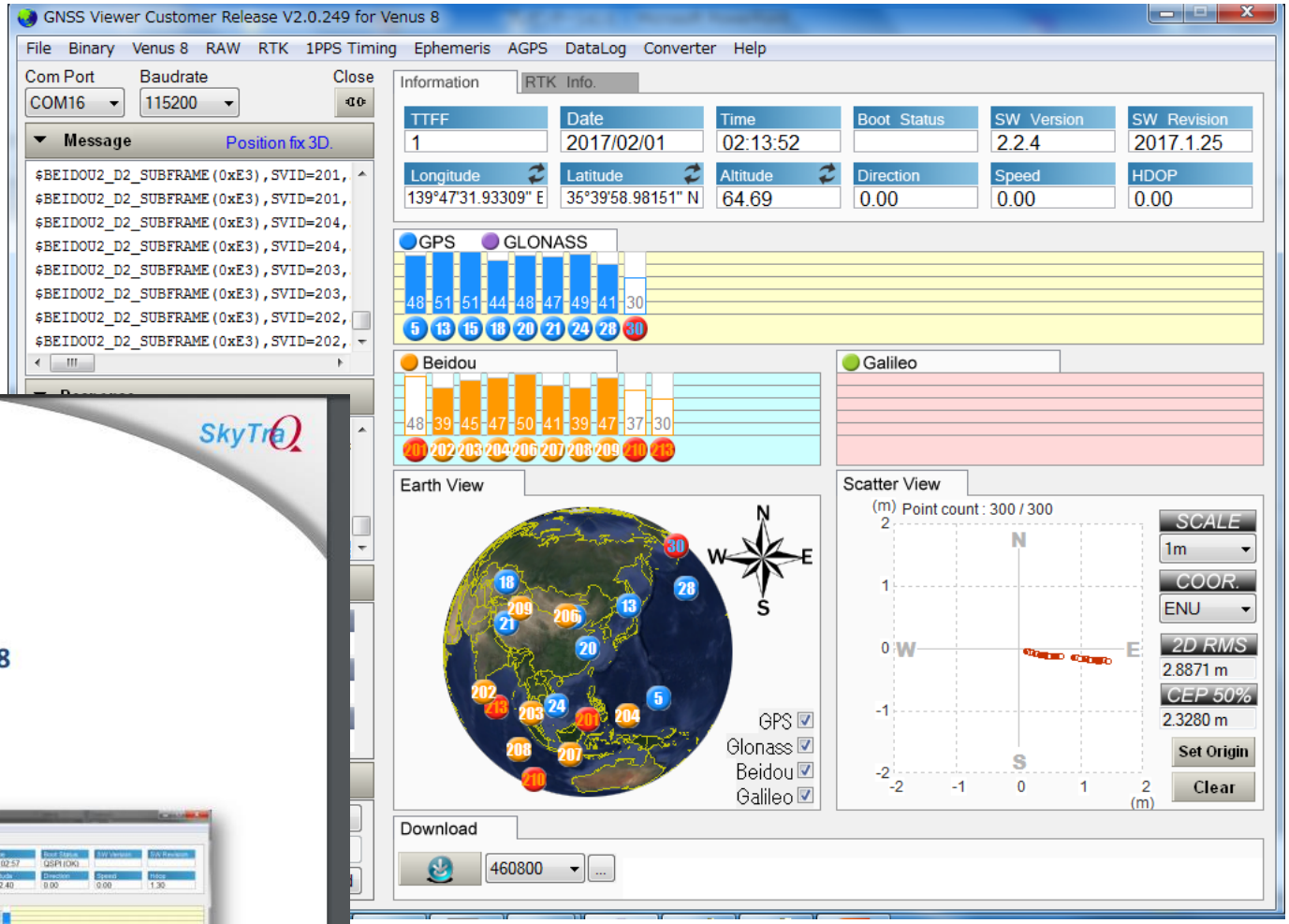
The –BD and –GL standard models tracks up to 24 GPS/Beidou or 24 GPS/GLONASS satellite signals combined respectively.

Dual-satellite navigation receiver module receives greater number of satellites than available for GPS-only receivers. The increased satellite number offers superior performance in challenging urban canyon and multipath environments.

The S1216 module contains SkyTraq Venus 8 positioning engine inside, featuring high sensitivity for indoor fix, low power consumption, and fast TTFF. The superior -148dBm cold start sensitivity allows it to acquire, track, and get position fix autonomously in difficult weak signal environment. The receiver's -165dBm tracking sensitivity allows continuous position coverage in nearly all application environments. The high performance signal parameter search engine is capable of testing 16 million time-frequency hypotheses per second, offering industry-leading signal acquisition and TTFF speed.

The S1216 module contains LNA for easy integration with passive antenna and a SAW filter for increased jamming immunity. It works with both passive and active antenna; the self-contained antenna detection and short circuit protection feature enables lowest integration cost for system integrators using active antenna

Skytraq Receiver



http://www.smokingresistor.com/wp-content/uploads/2015/07/GNSSViewerUserGuide.pdf

Objective

① ✓ Procedure to logging Skytraq data

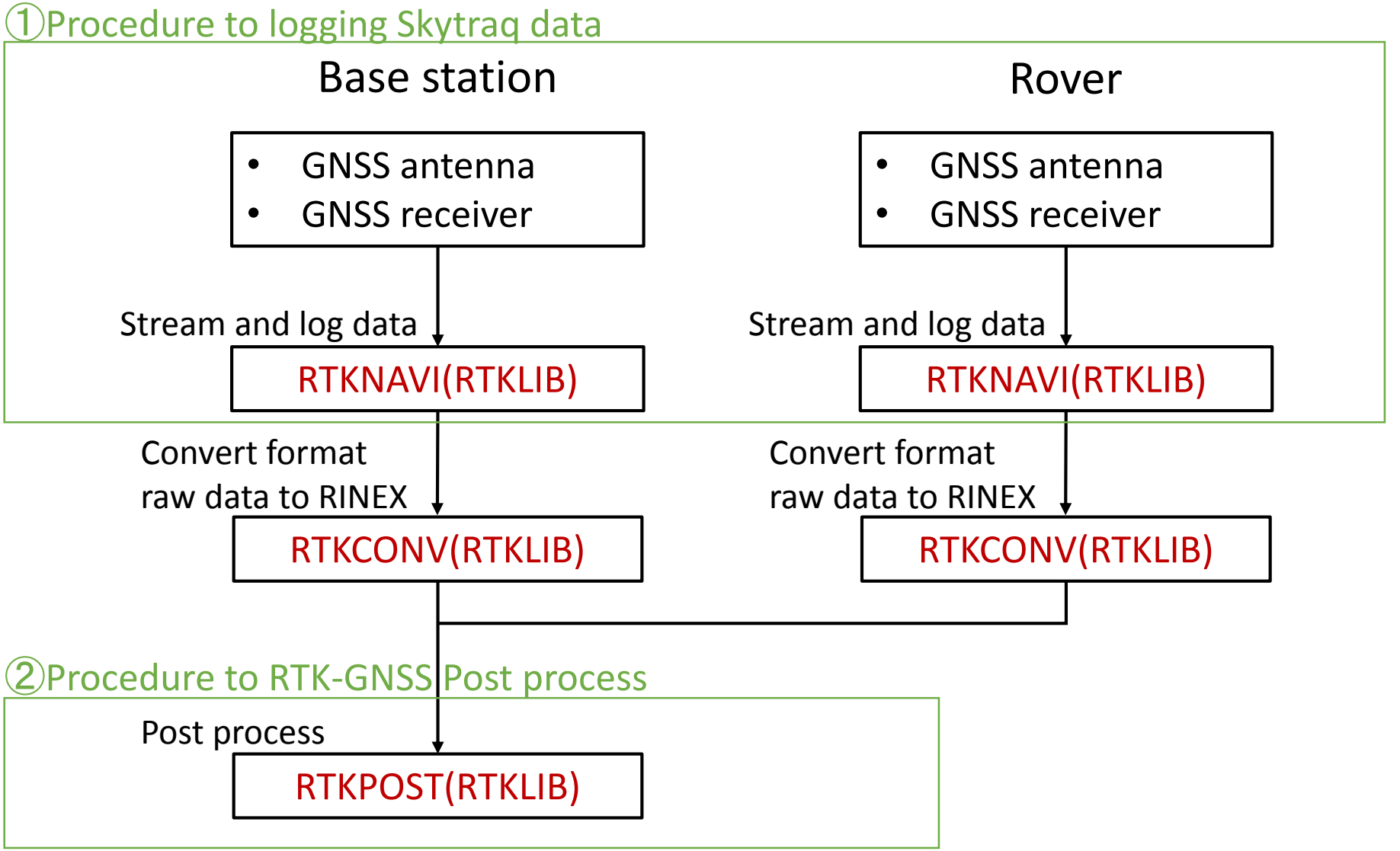
1. Connection step
2. Checking the observation data by RTKNAVI(RKTLIB)
3. Logging data by RTKNAVI(RTKNAVI)

✓ Procedure to RTK-GNSS by two Skytraq receivers

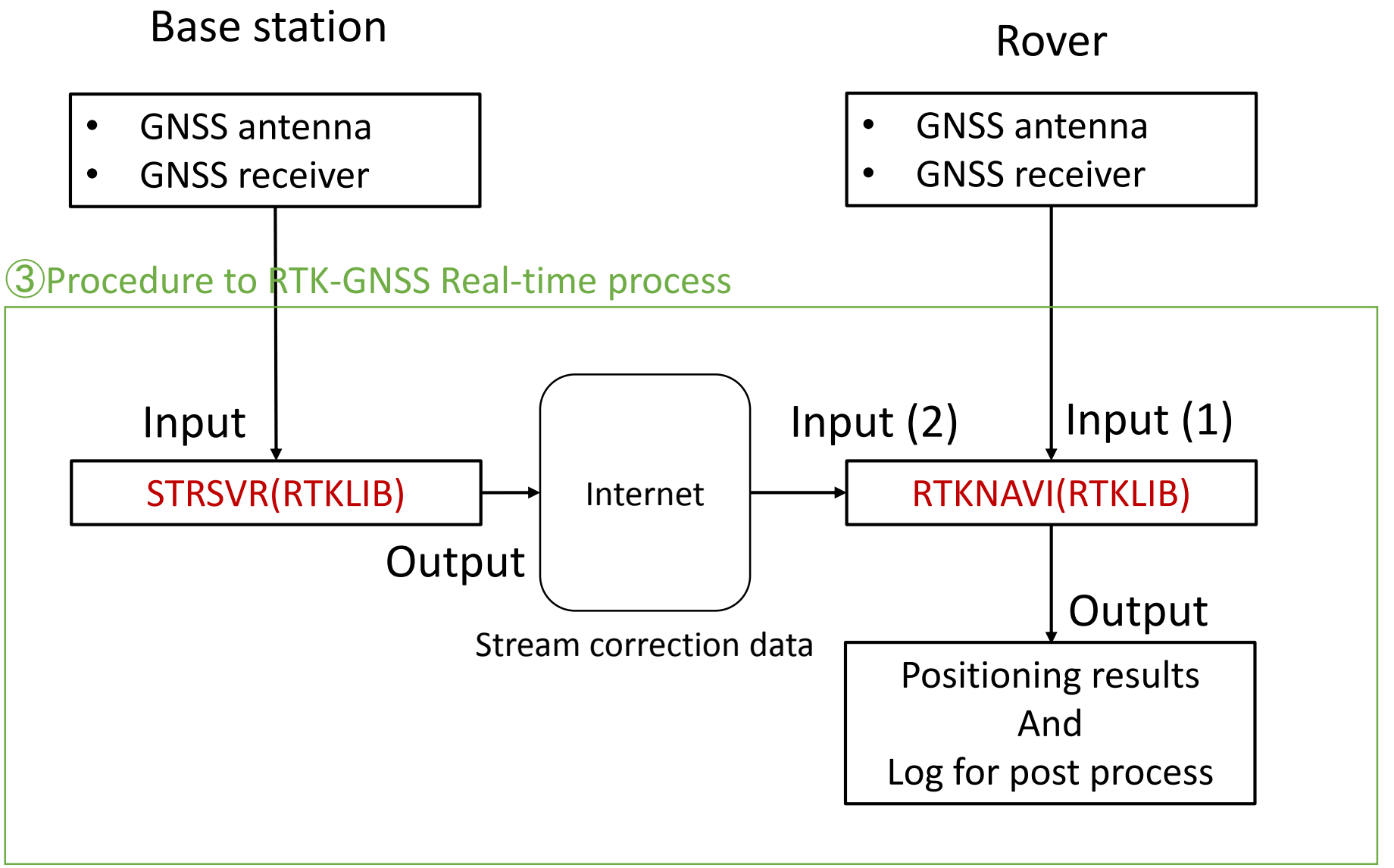
② ✓ Post process

③ ✓ Real-time process using Ntrip caster

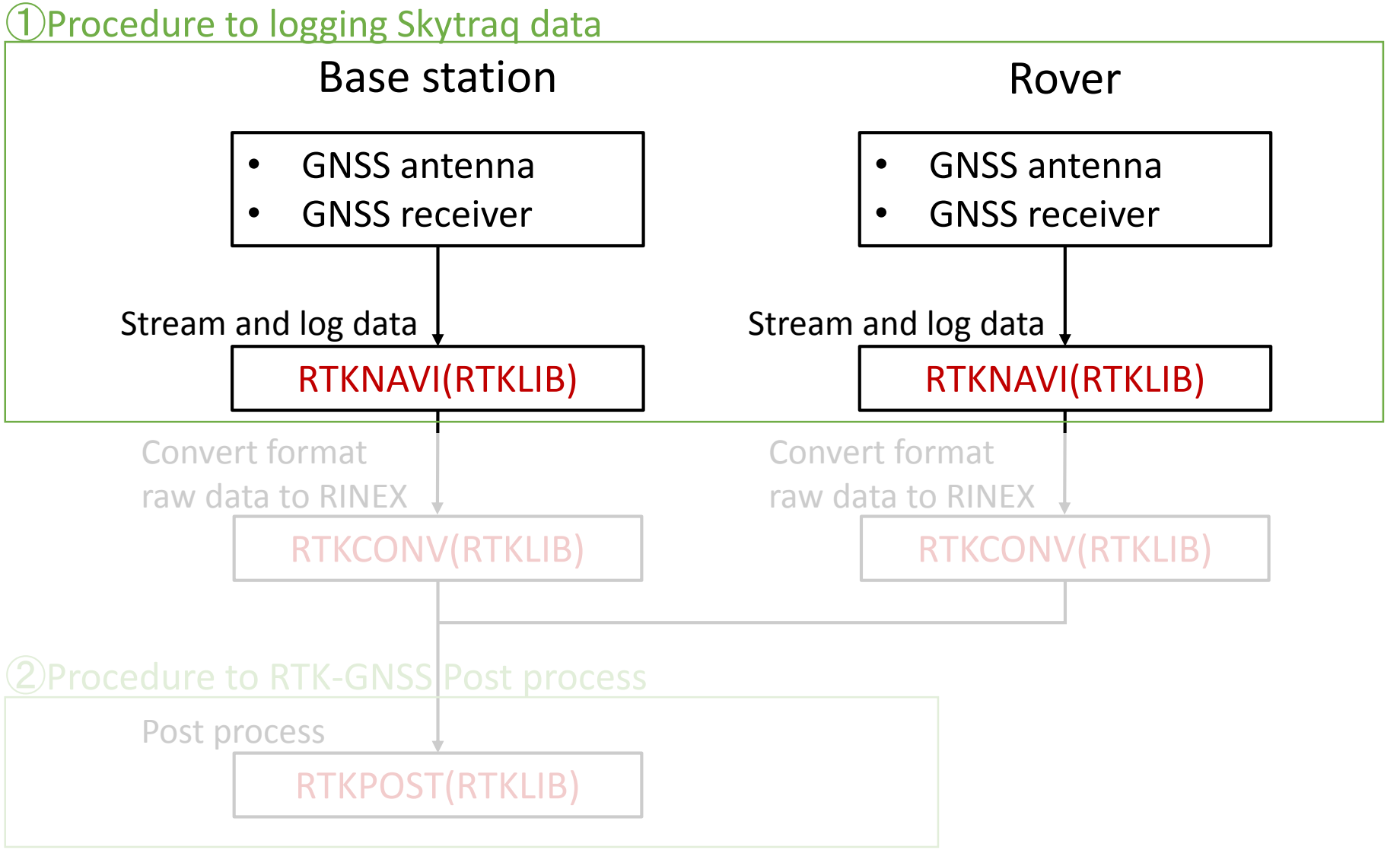
Post process by RTKPOST



Real-time process using Ntrip caster



Post process by RTKPOST



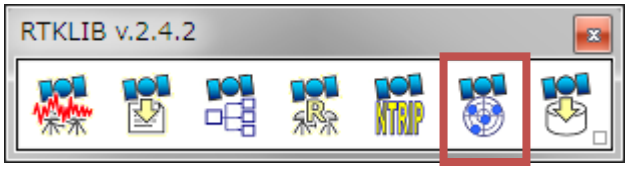
1.Connection step

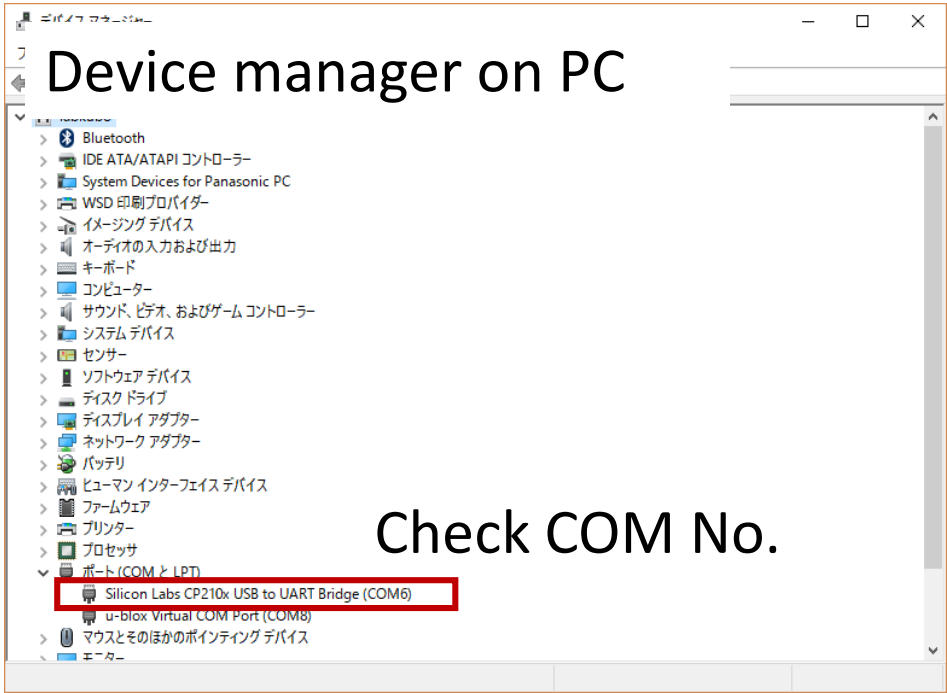
GNSS antenna

PC : USB

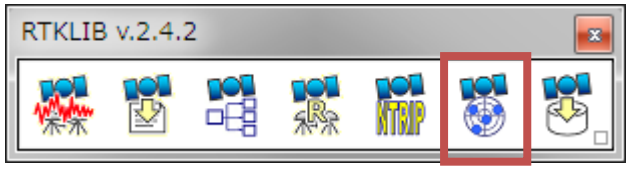
RTKNAVI(RKTLIB)

RTKLIB v.2.4.2 p12



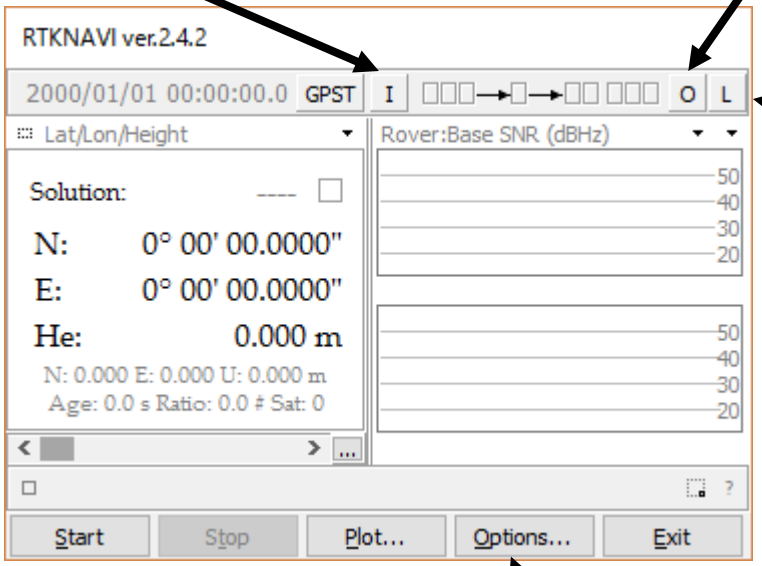


1.Connection step



①Input stream setting

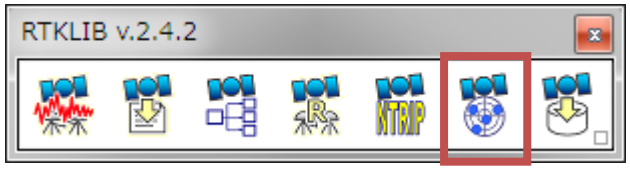
Output stream setting



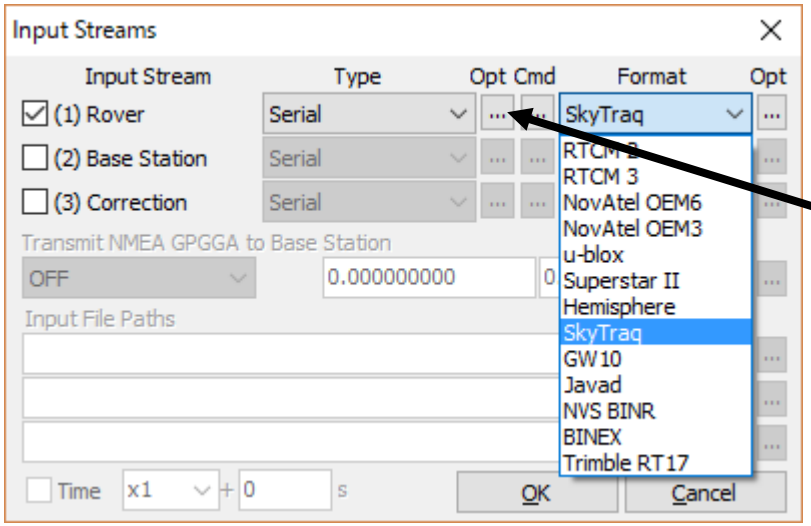
③Log stream setting

②RTKNAVI options

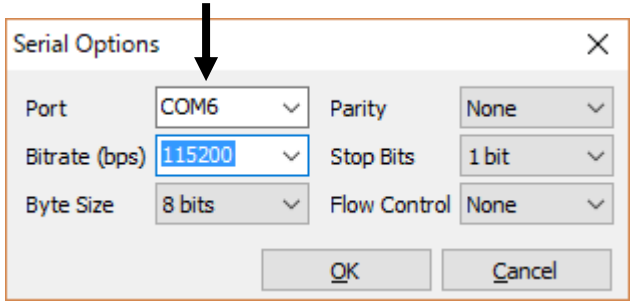
1.Connection step



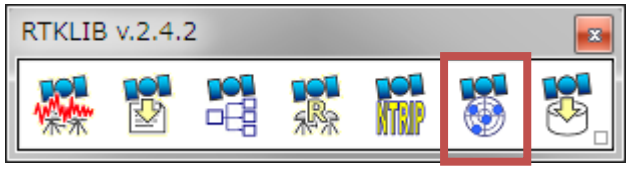
①Input stream setting



Select Port No. by device manager

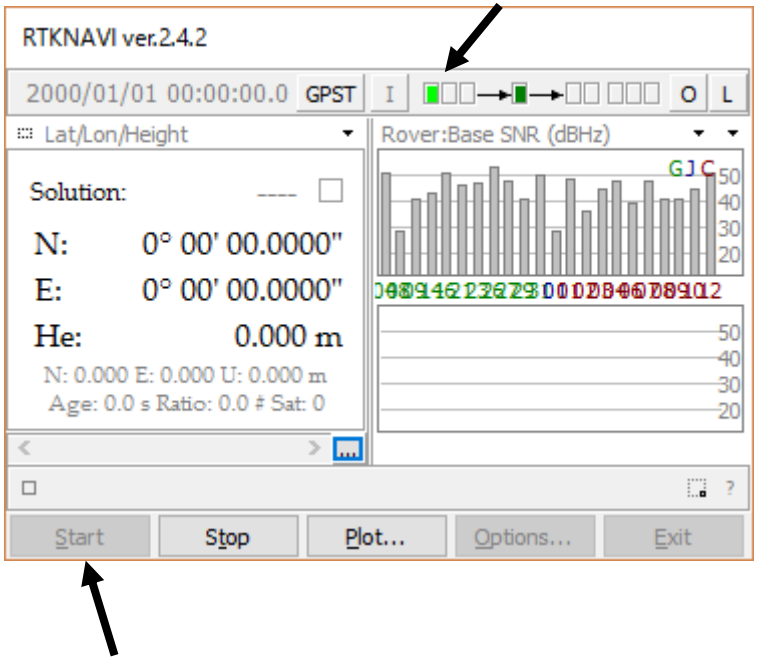


1.Connection step



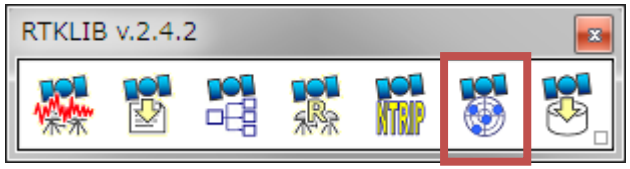
①Input stream setting

Green light is blinking (success to connect)



Start to connect

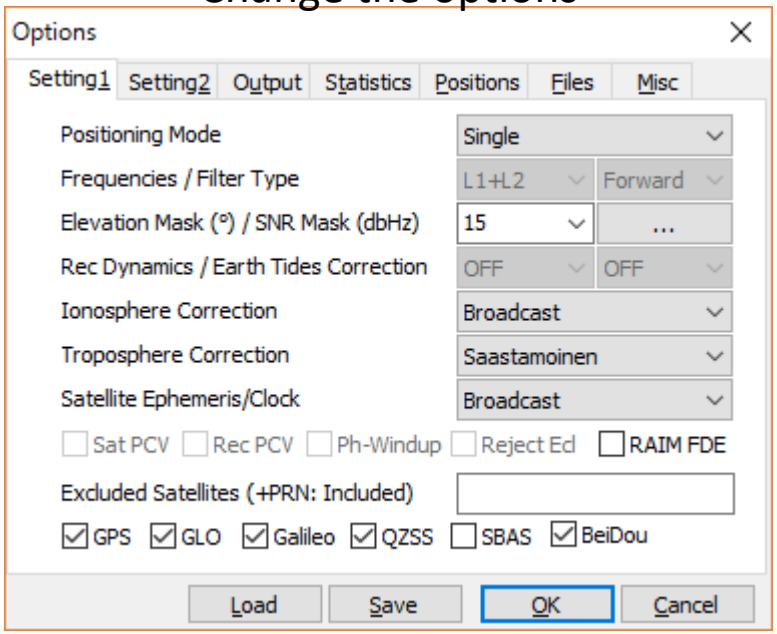
2.Checking the observation data



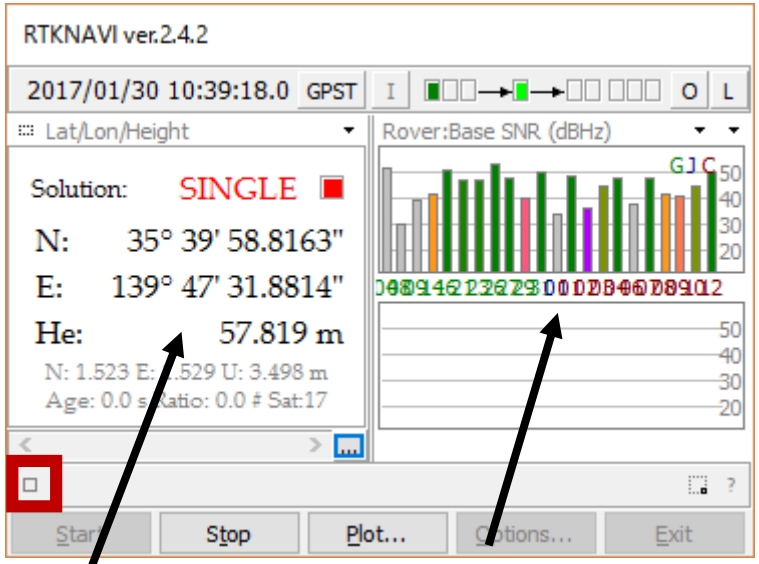
②RTKNAVI options

First stop connection to change the options to do the Single point positioning

Change the options



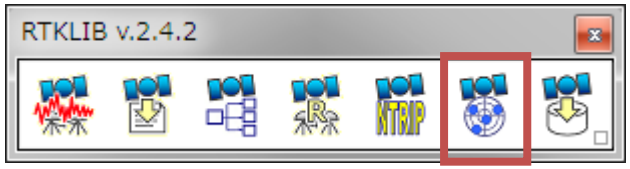
Start connection

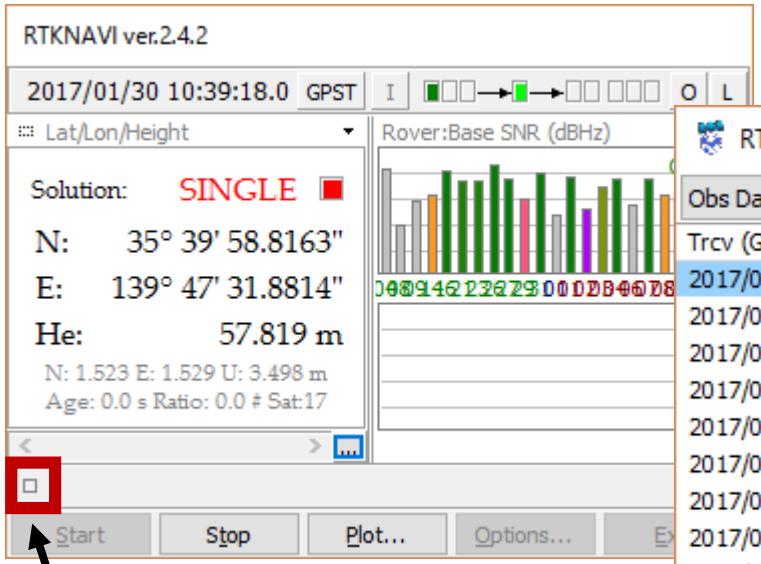


RTKNAVI execute the real-time single point positioning and solution

- Check the strength of SNR
  Strong one around the 50dBHz is enough to do RTK
- If these bars are still gray for over few minutes, receiver do not stream the navigation data(Ephemeris)

2.Checking the observation data





Select obs data

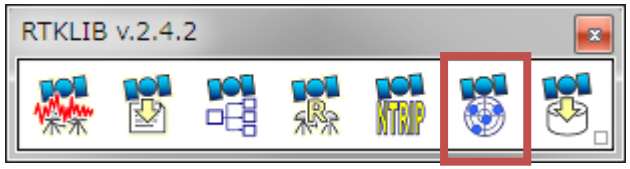
Check details of the stream data

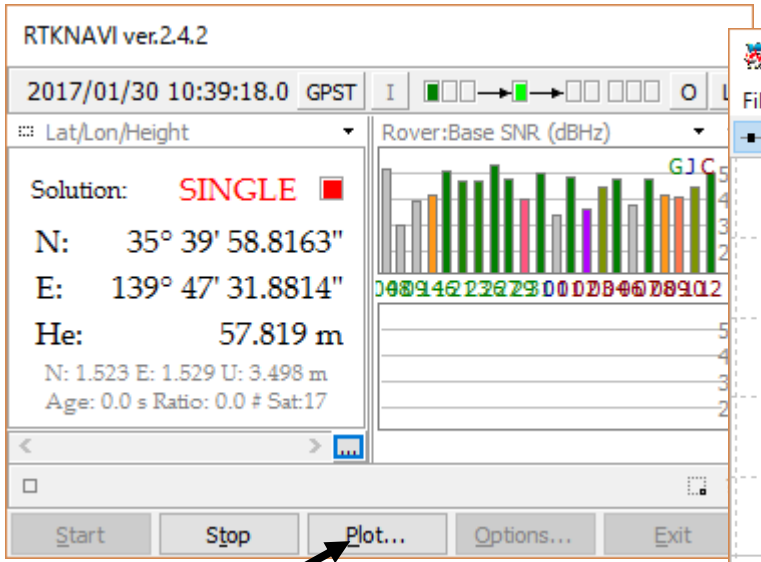
RTKNAVI ver.2.4.2: RTK Monitor

Obs Data | Normal

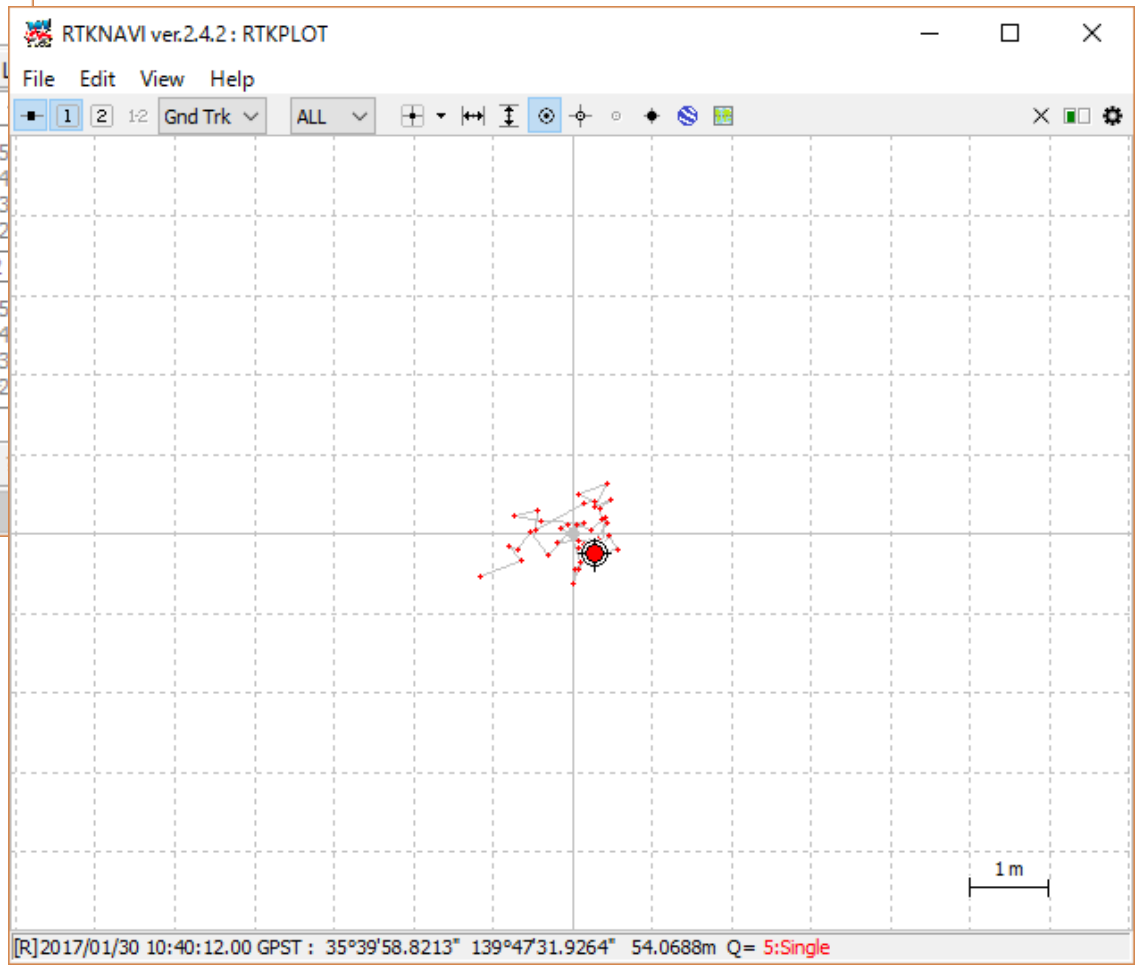
Trcv (GPST)	SAT	RCV	P1 (m)	P2 (m)	P5 (m)	L1 (cycle)	L2 (cyc
2017/01/30 10:38:57.997	G04	1	20387391.683	0.000	0.000	642430.017	0.000
2017/01/30 10:38:57.997	G08	1	24751047.667	0.000	0.000	-677601.329	0.000
2017/01/30 10:38:57.997	G09	1	24613971.330	0.000	0.000	-1783764.335	0.000
2017/01/30 10:38:57.997	G14	1	23104735.541	0.000	0.000	2957378.778	0.000
2017/01/30 10:38:57.997	G16	1	20446458.886	0.000	0.000	-1262329.692	0.000
2017/01/30 10:38:57.997	G21	1	22588886.945	0.000	0.000	-1231811.356	0.000
2017/01/30 10:38:57.997	G23	1	22348318.588	0.000	0.000	-1639446.735	0.000
2017/01/30 10:38:57.997	G26	1	20313997.834	0.000	0.000	-131866.455	0.000
2017/01/30 10:38:57.997	G27	1	21288894.262	0.000	0.000	-3169847.438	0.000
2017/01/30 10:38:57.997	G29	1	23385406.196	0.000	0.000	2826637.696	0.000
2017/01/30 10:38:57.997	G31	1	20649777.018	0.000	0.000	1059991.467	0.000
2017/01/30 10:38:57.997	J01	1	37523272.713	0.000	0.000	-66217.846	0.000
2017/01/30 10:38:57.997	C01	1	36583737.919	0.000	0.000	-336007.043	0.000
2017/01/30 10:38:57.997	C02	1	39281322.281	0.000	0.000	-317065.139	0.000
2017/01/30 10:38:57.997	C03	1	37481850.566	0.000	0.000	-342550.906	0.000
2017/01/30 10:38:57.997	C04	1	37034063.299	0.000	0.000	-336328.257	0.000
2017/01/30 10:38:57.997	C06	1	39888648.329	0.000	0.000	1437194.237	0.000
2017/01/30 10:38:57.997	C07	1	35877181.814	0.000	0.000	-707796.520	0.000

2.Checking the observation data

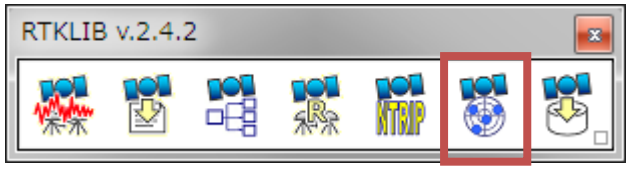




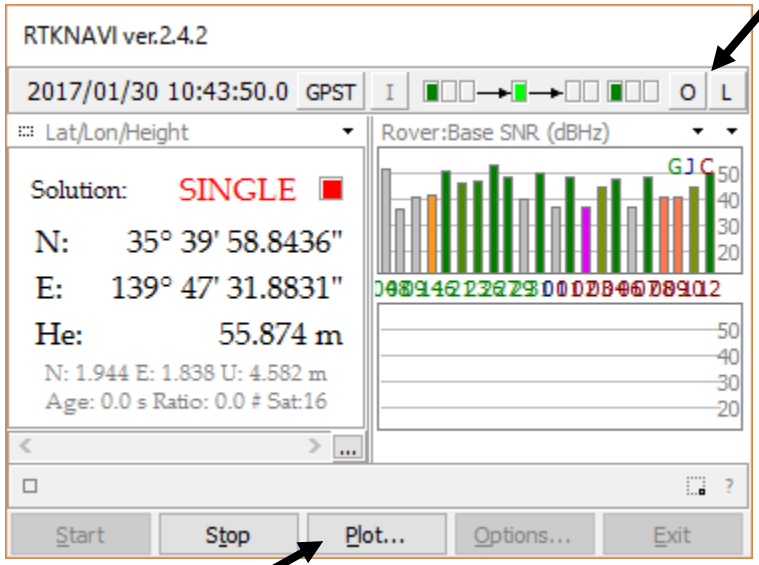
Plot for results



3.Logging data by RTKNAVI(RTKNAVI)

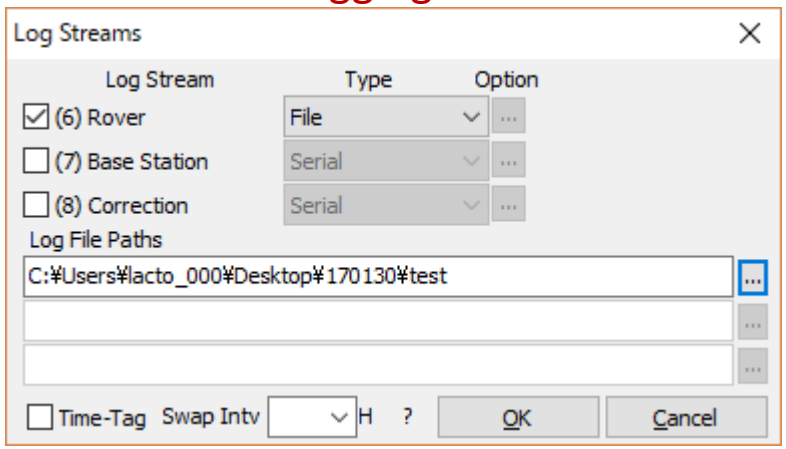


③Log stream setting



Plot for results

Logging file



Post process by RTKPOST

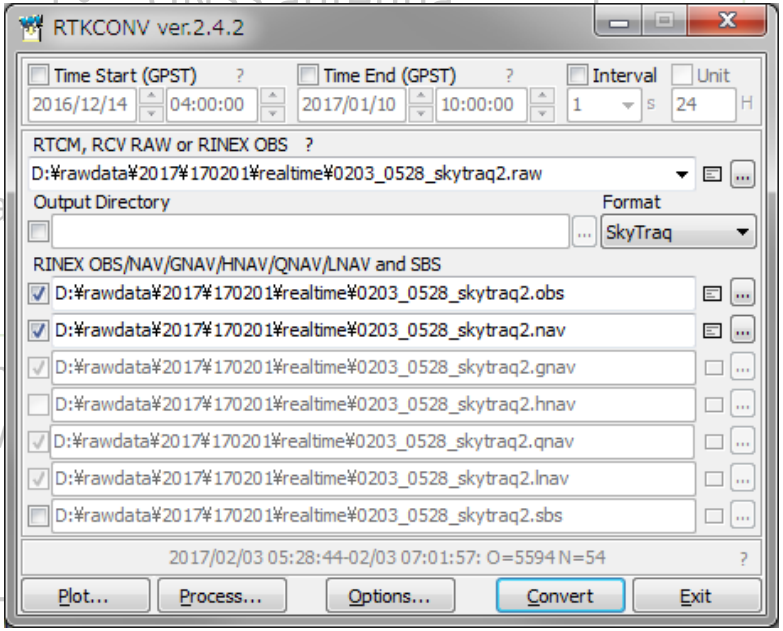
①Procedure to logging Skytraq data

Convert log file to RINEX by RTKCONV

＊Please check other manuals

“Post process by RTKLIB (vol.2)/ Convert raw data to RINEX by RTKCONV”

“How to convert BINEX to RINEX using RTKLIB”



Base station

GNSS antenna

GNSS receiver

Rover

GNSS antenna

Stream and log data

RTKNAVI(RTKLIB)

Convert format raw data to RINEX

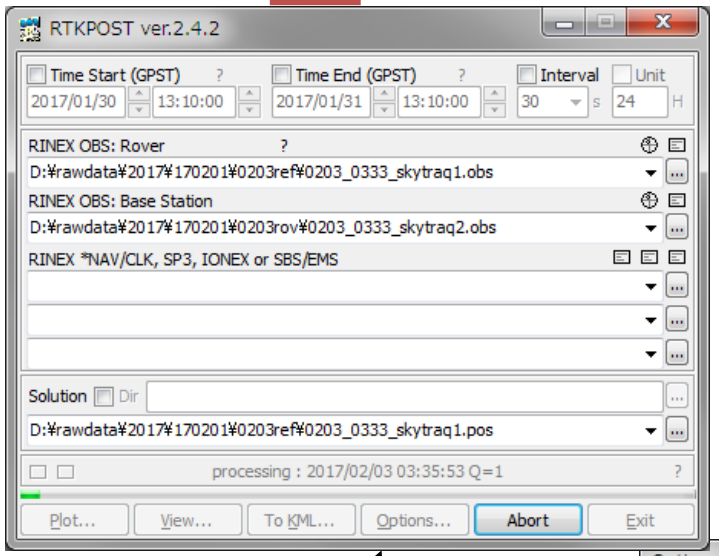
RTKCONV(RTKLIB)

②Procedure to RTK-GNSS Post process

Post process

RTKPOST(RTKLIB)

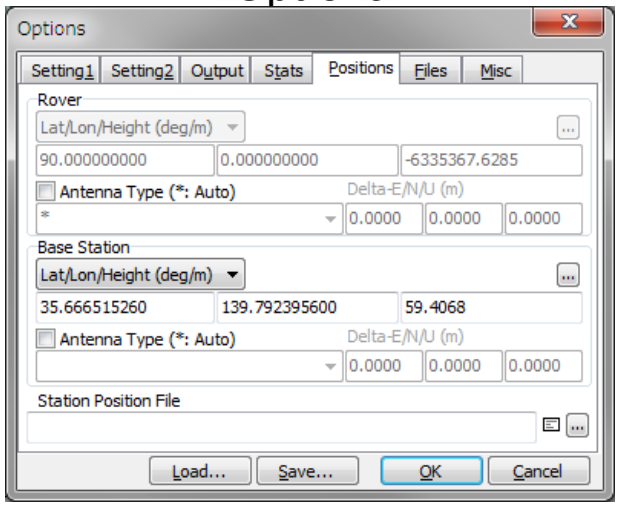
Post process RTK-GNSS by RTKPOST

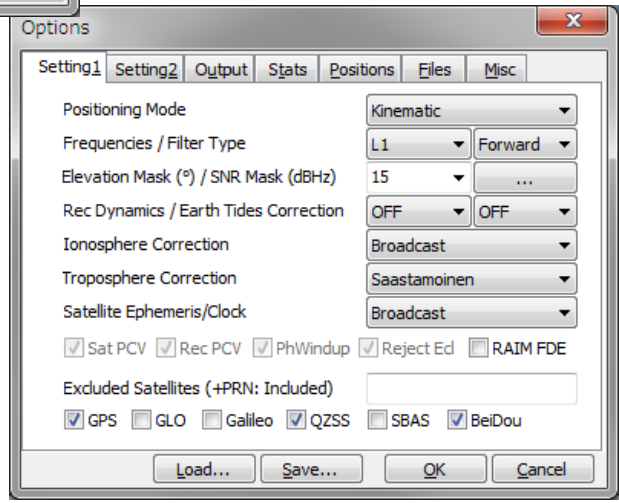


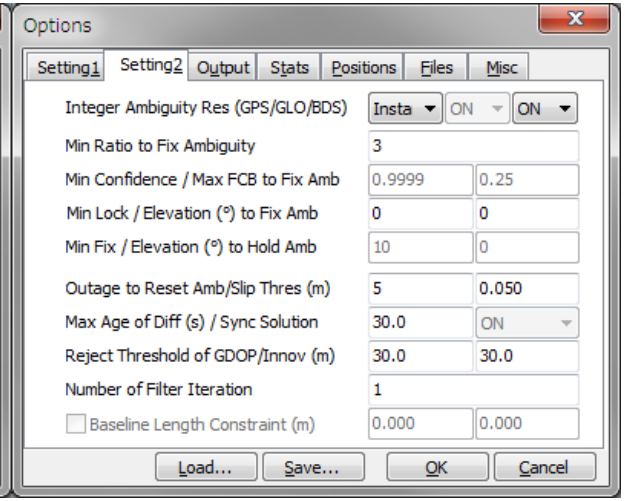
Setting options

Both rover and base station data (zero-baseline)
1.5hours by 1Hz at the roof top of the building

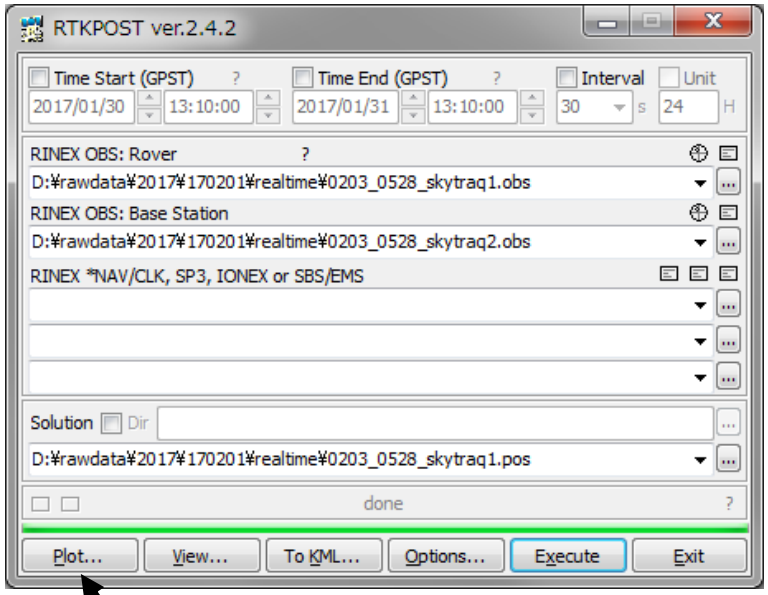
Options



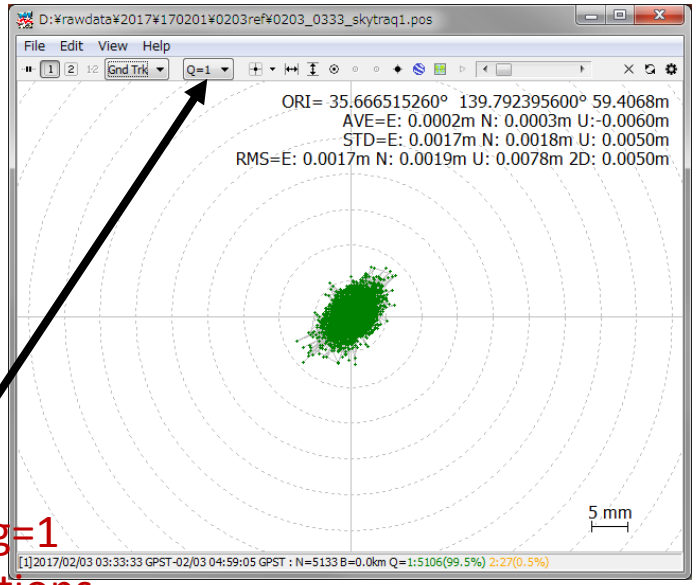




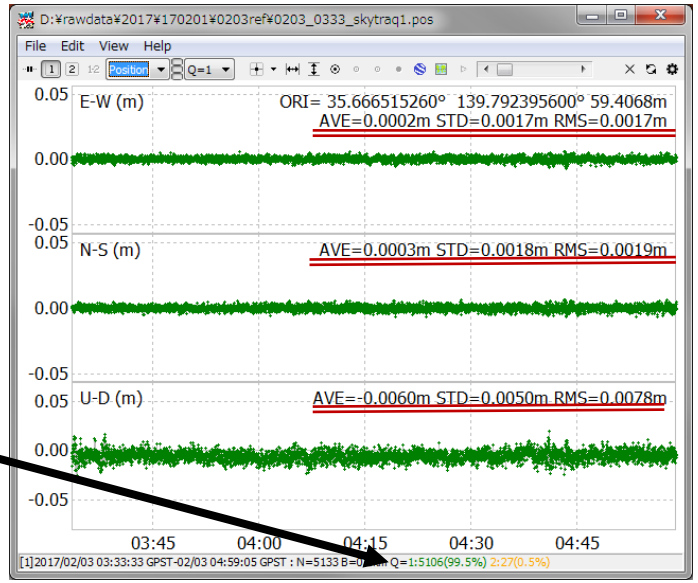
Post process RTK-GNSS by RTKPOST



Plot results



Quality flag=1
for RTK solutions



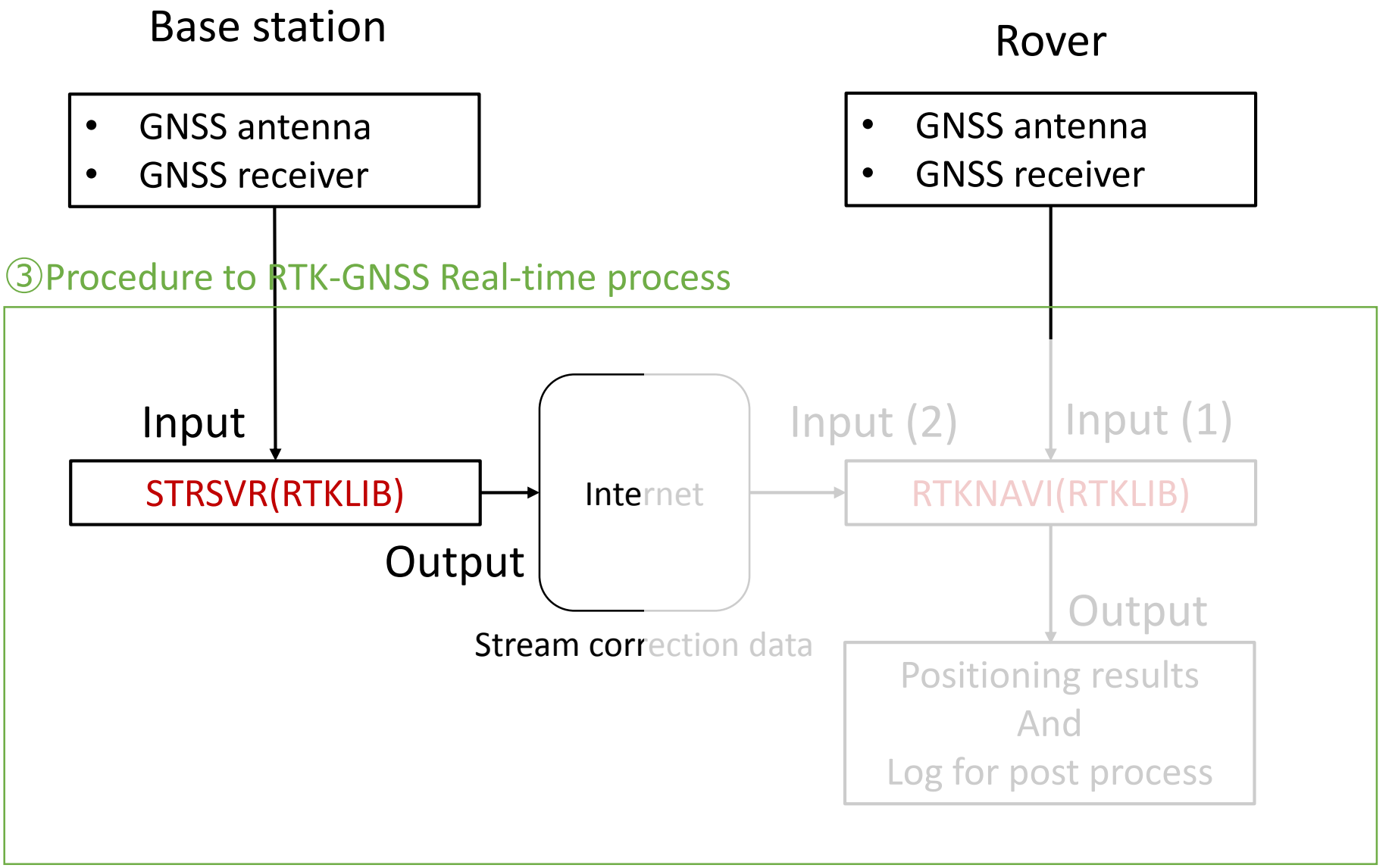
Number of RTK solutions

Fix rate = 5106/5133 = 99.5%

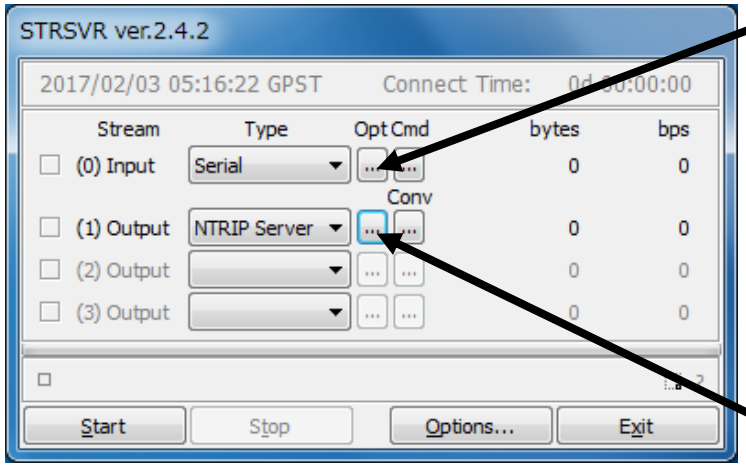
FIx solutions = 5106

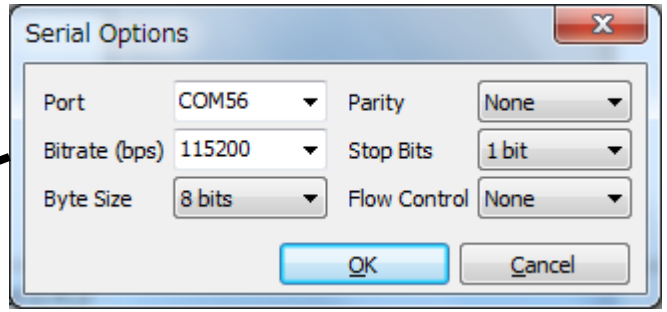
Total epoch = 5133sec×1Hz

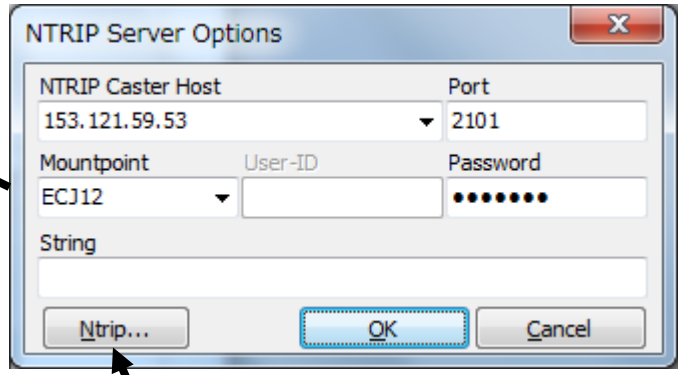
Real-time process using Ntrip caster



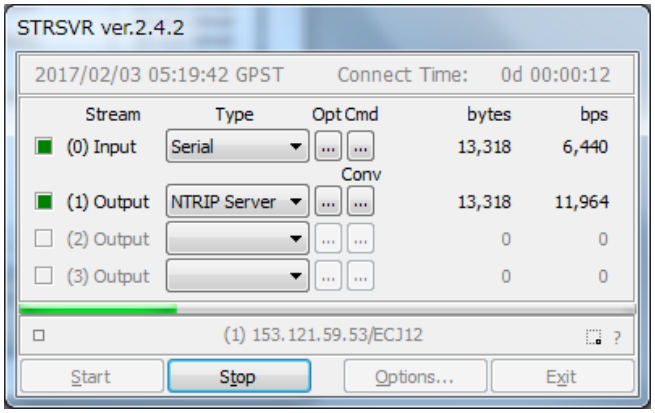
Base station setting (STRSVR)

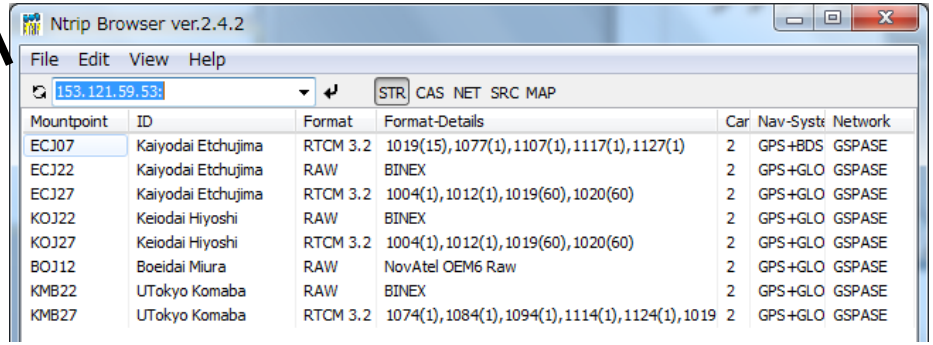




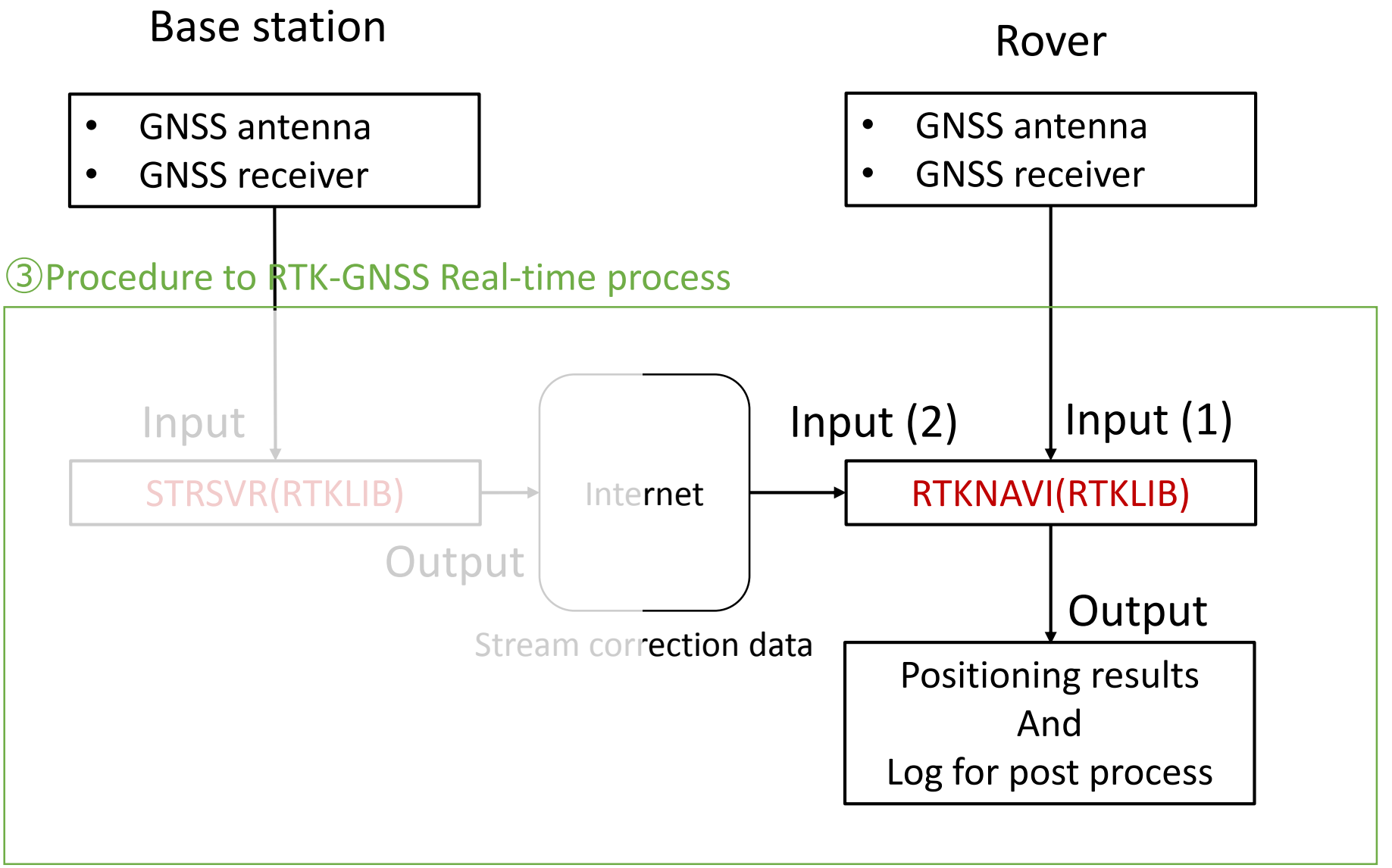


Start to stream

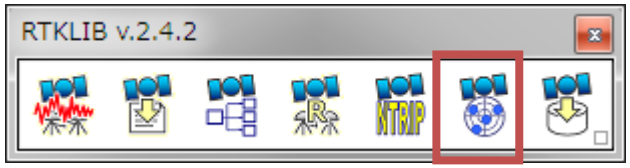


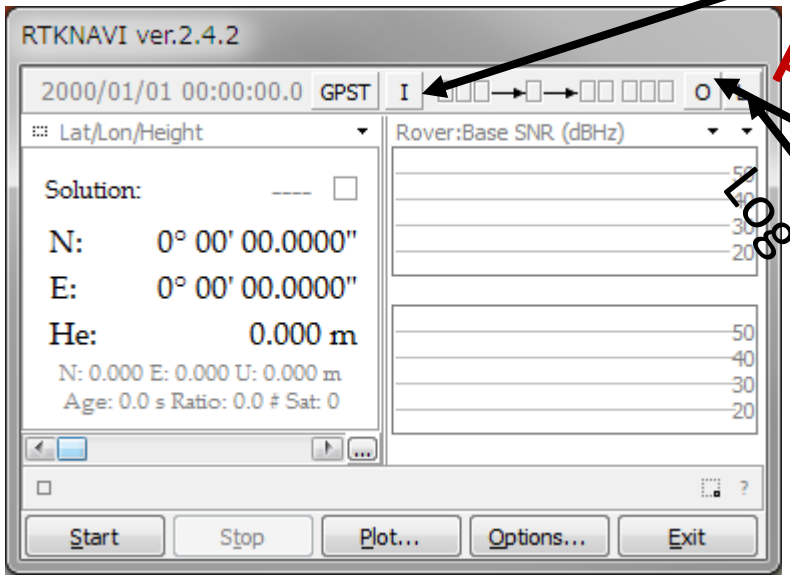


Real-time process using Ntrip caster



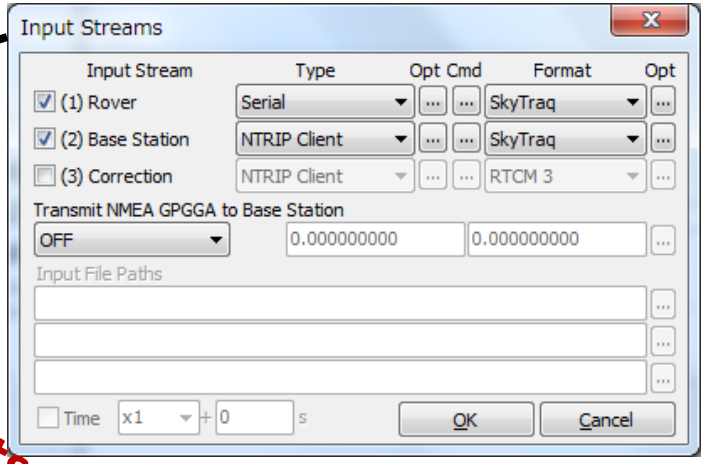
Rover setting (RTKNAVI)

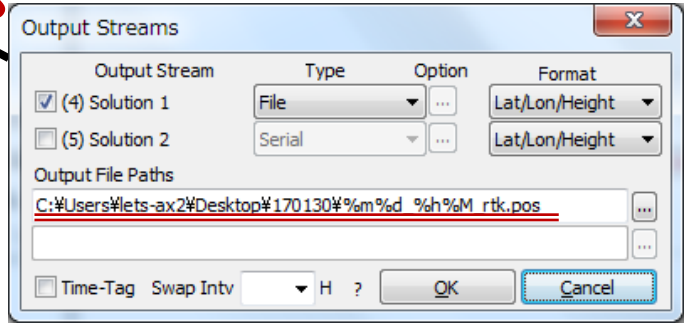


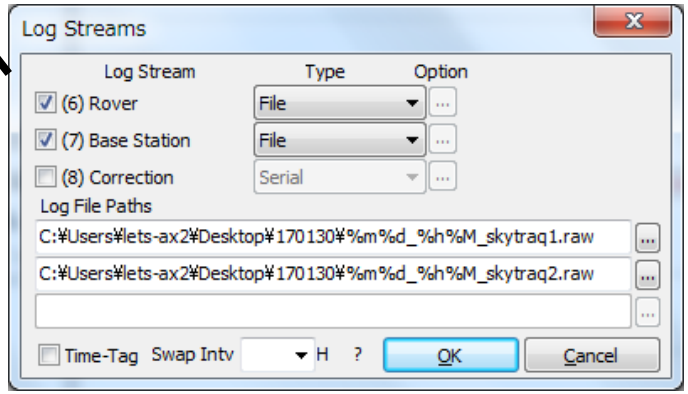


Positioning results

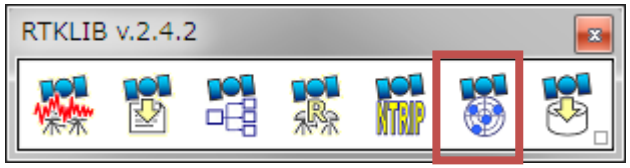
Log data for post process

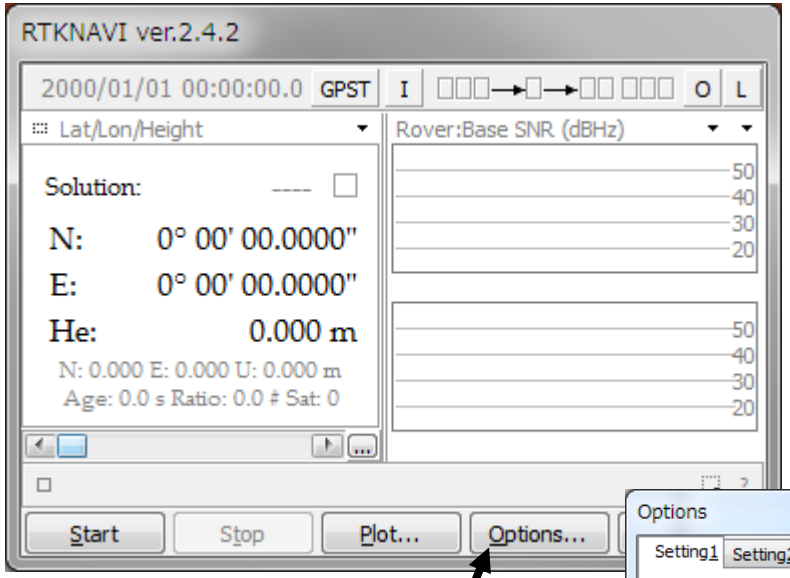




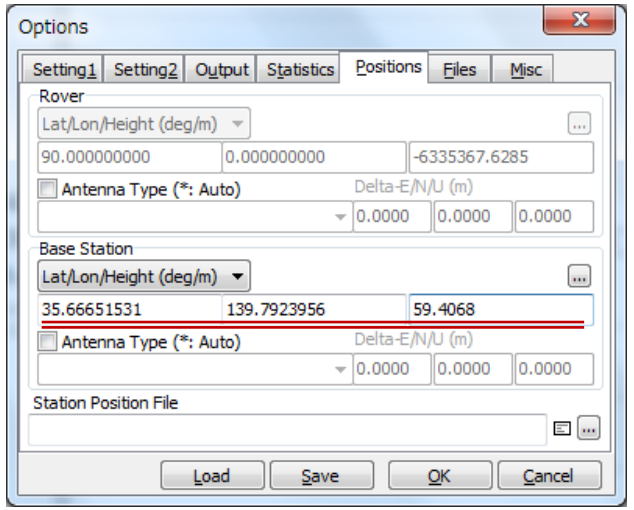


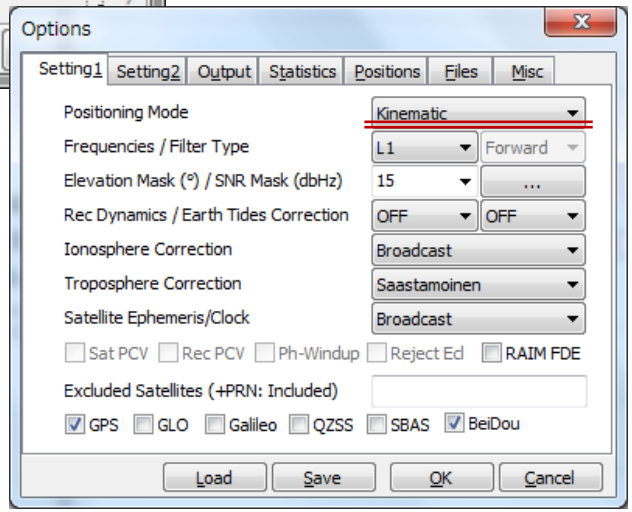
Rover setting (RTKNAVI)

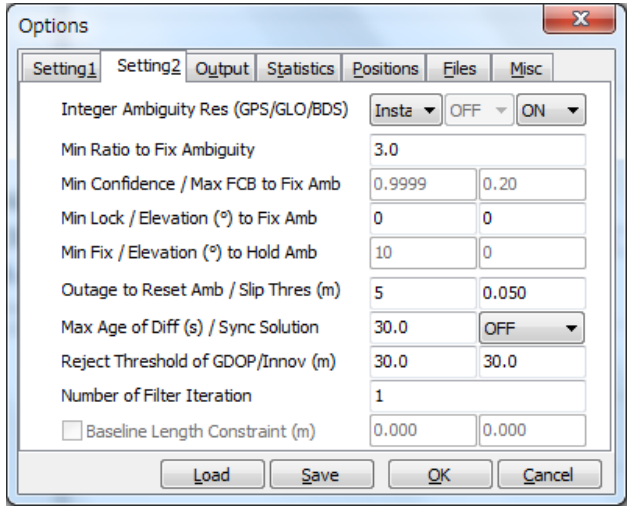




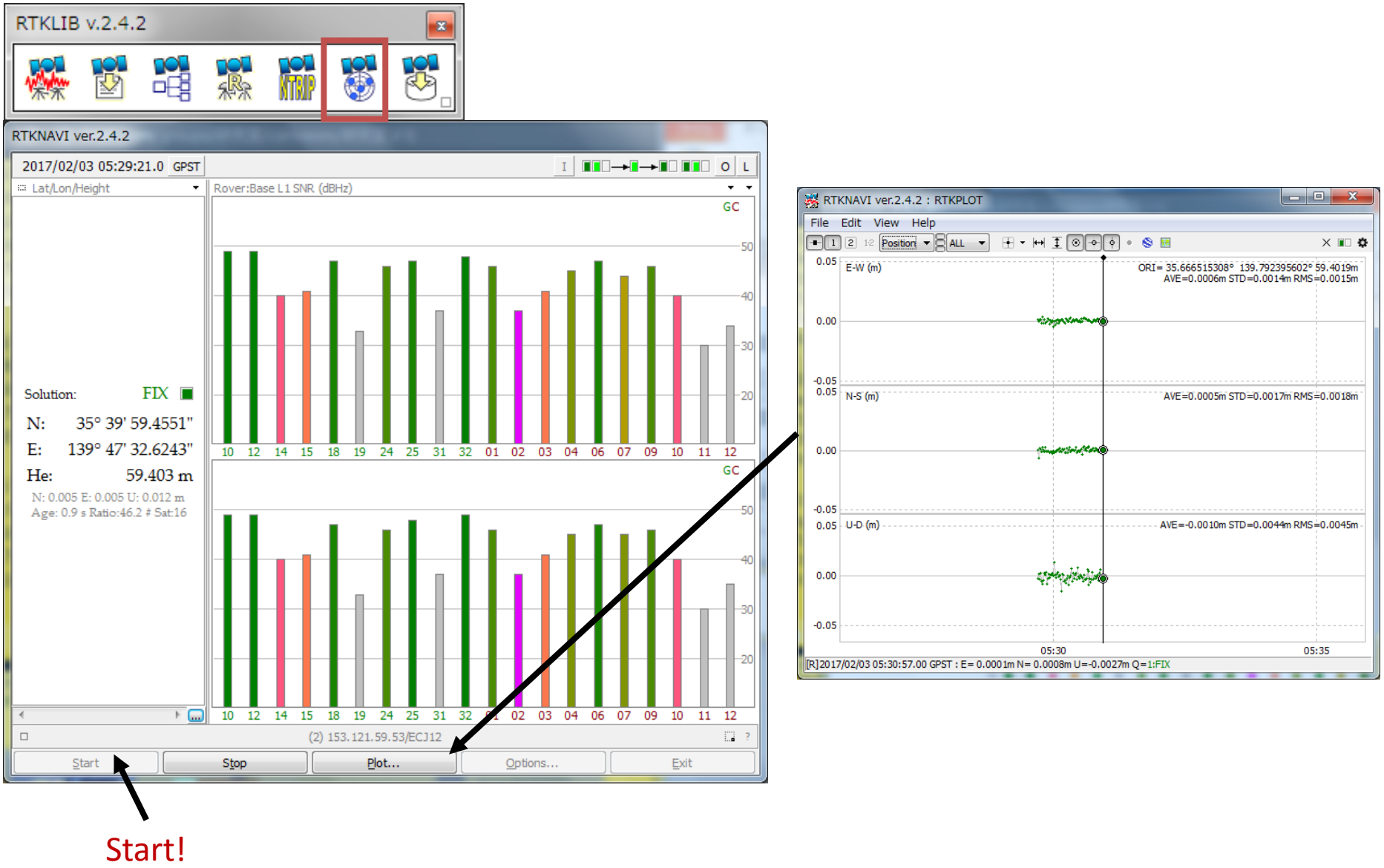
Setting options





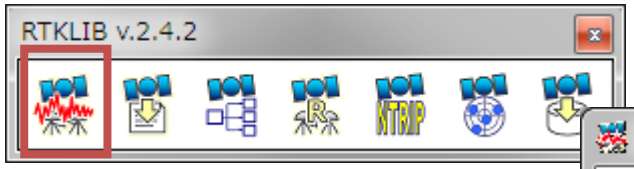


Rover setting (RTKNAVI)

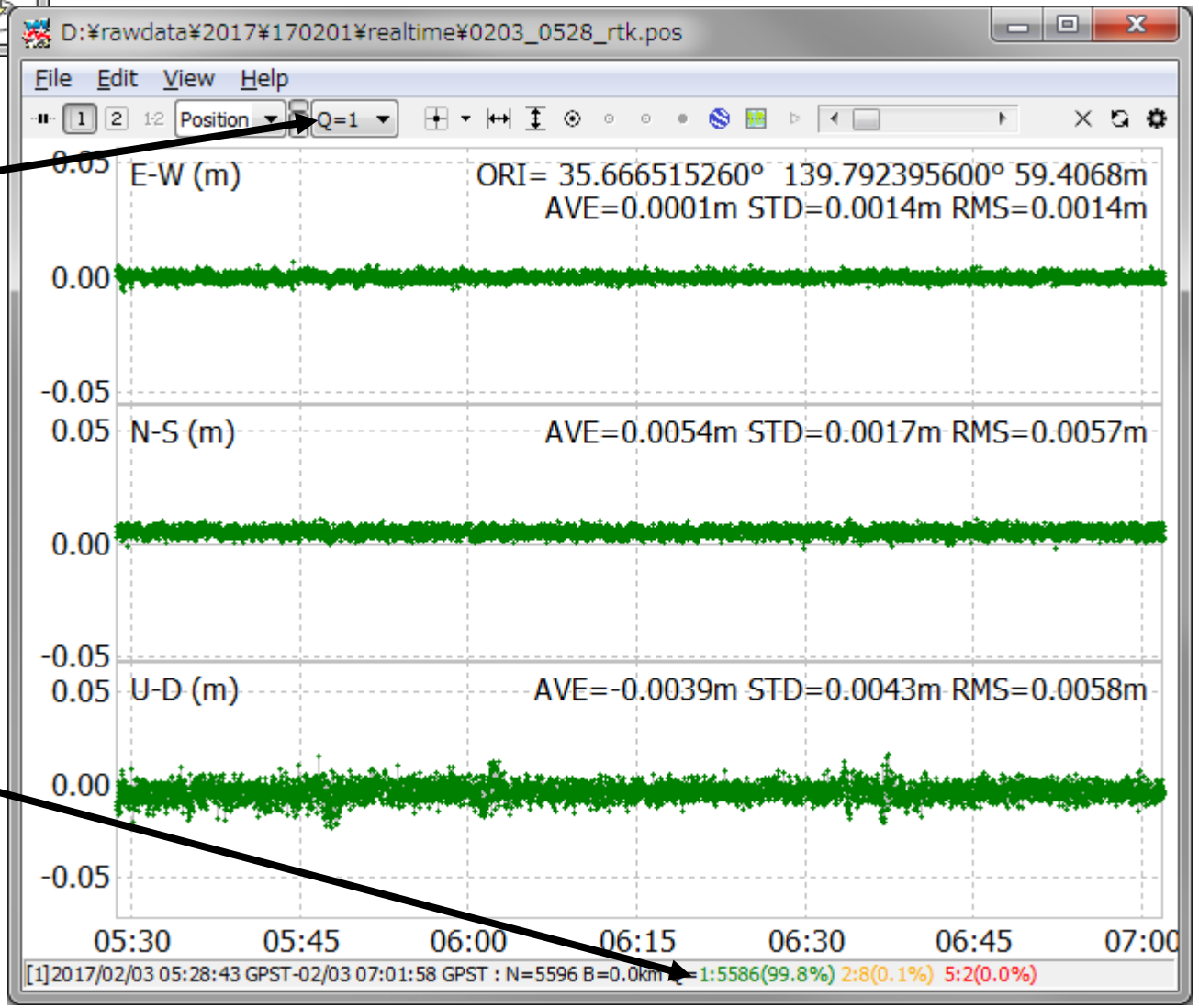


Start!

Show results (RTKPLOT)



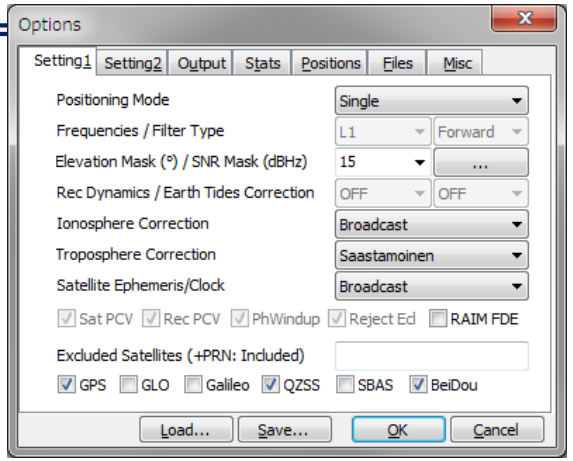
Quality flag=1
for RTK solutions



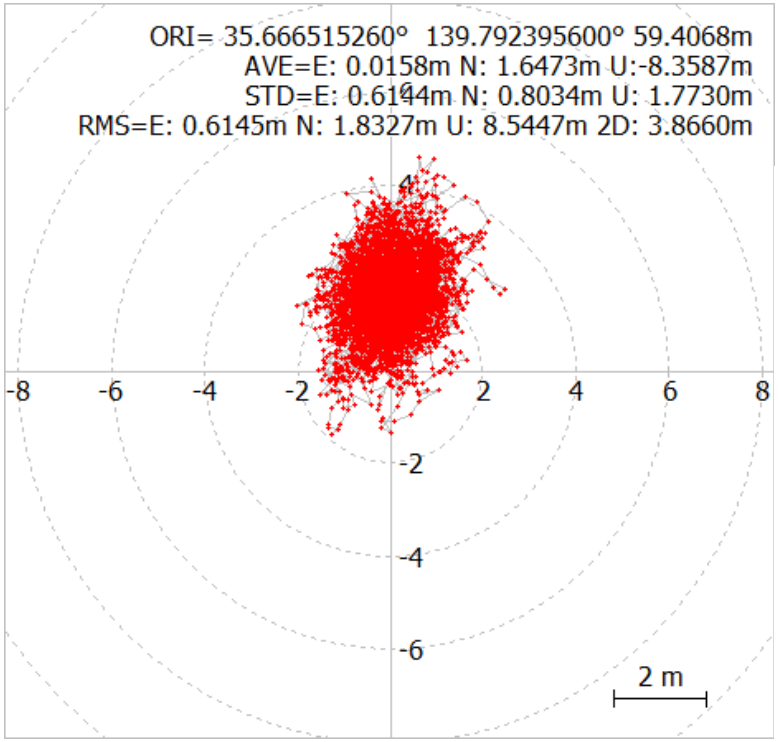
Number of RTK solutions
Fix rate=5586/5595=99.8%
FIx solutions = 5586
Total epoch= 5595sec×1Hz

Appendix Post process Single point positioning

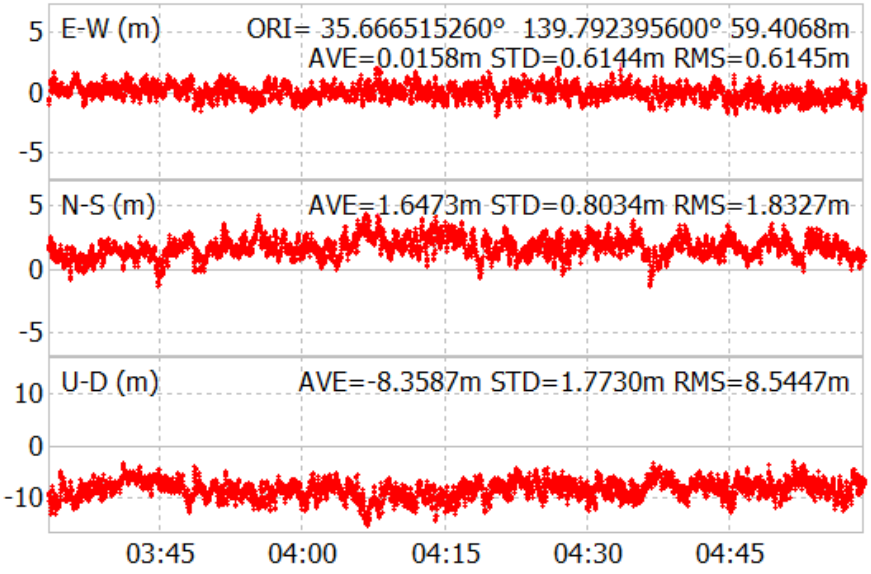
2017/2/3 Base station data



2D plot

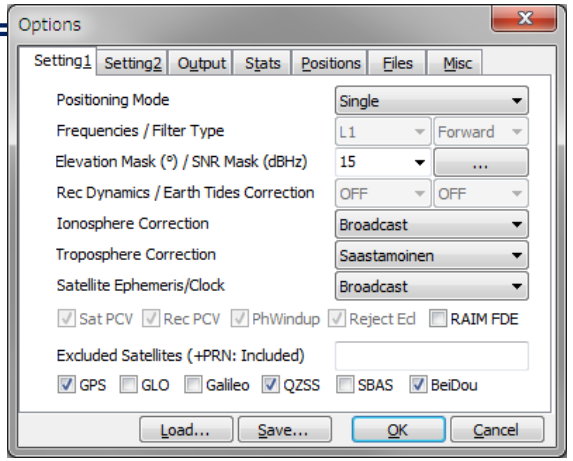


Time series of solution



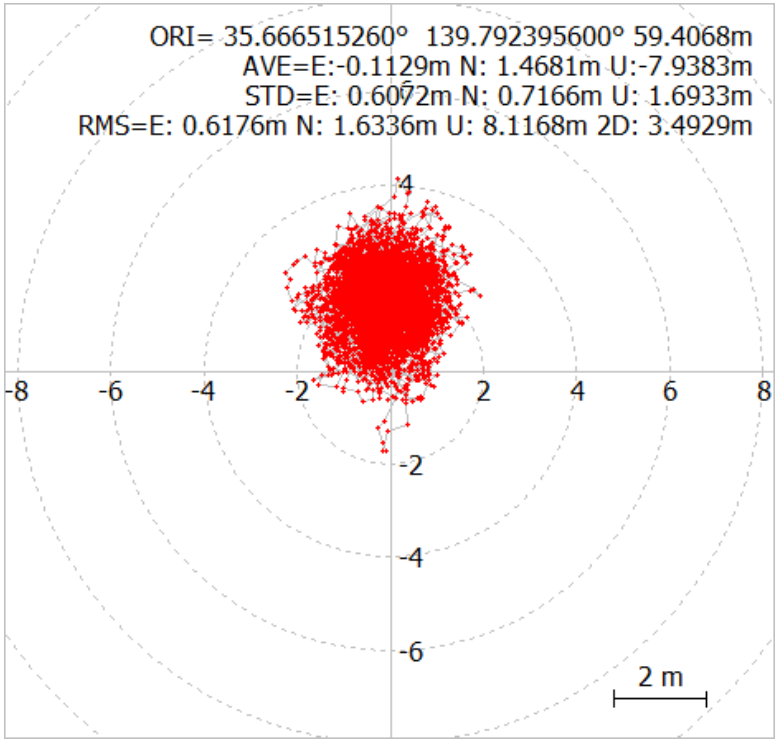
Appendix Post process Single point positioning

2017/2/3 Rover data

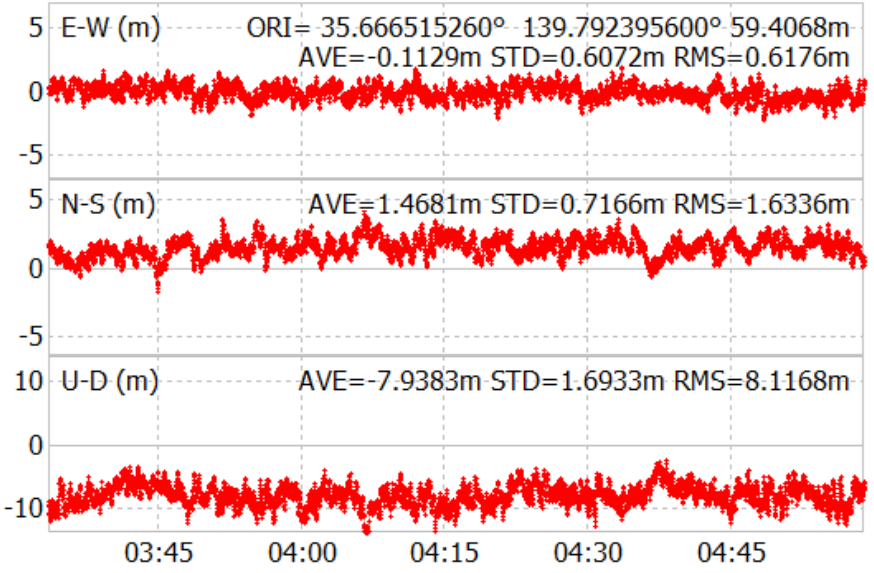


2017/2/3

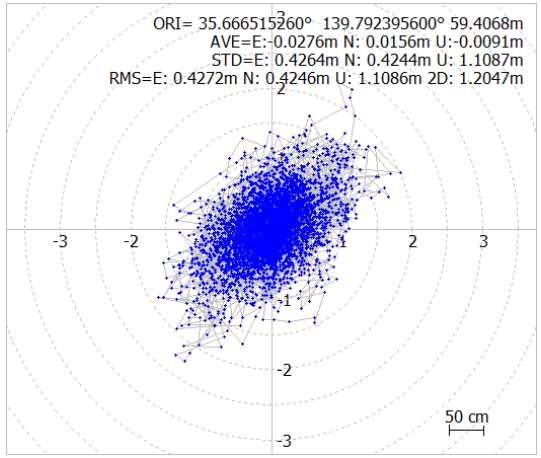
2D plot

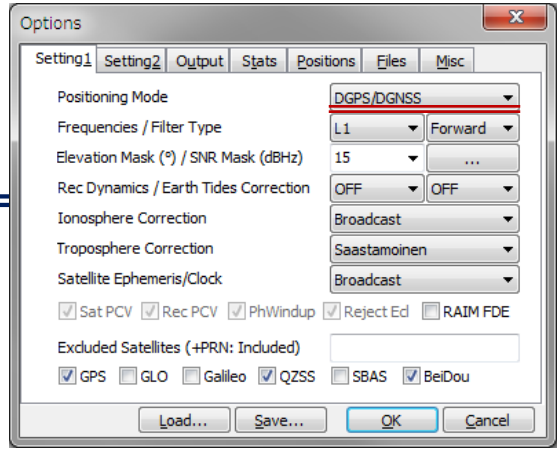


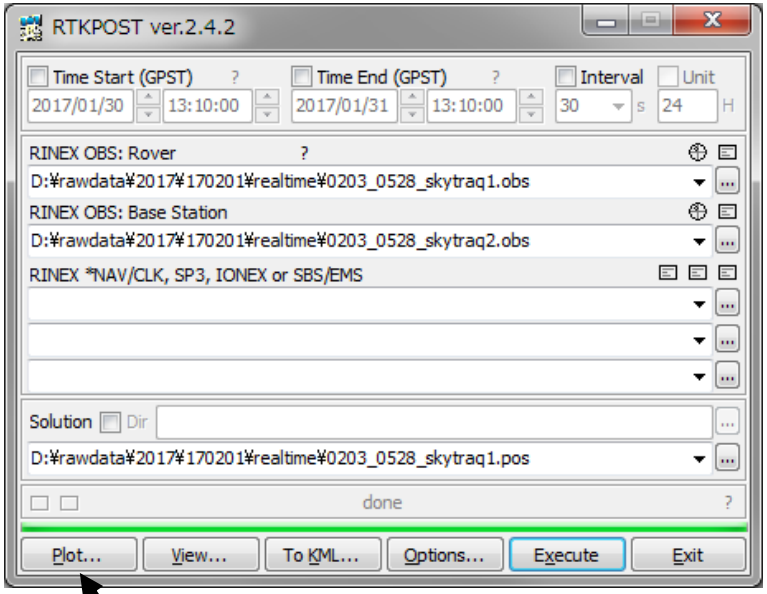
Time series of solution



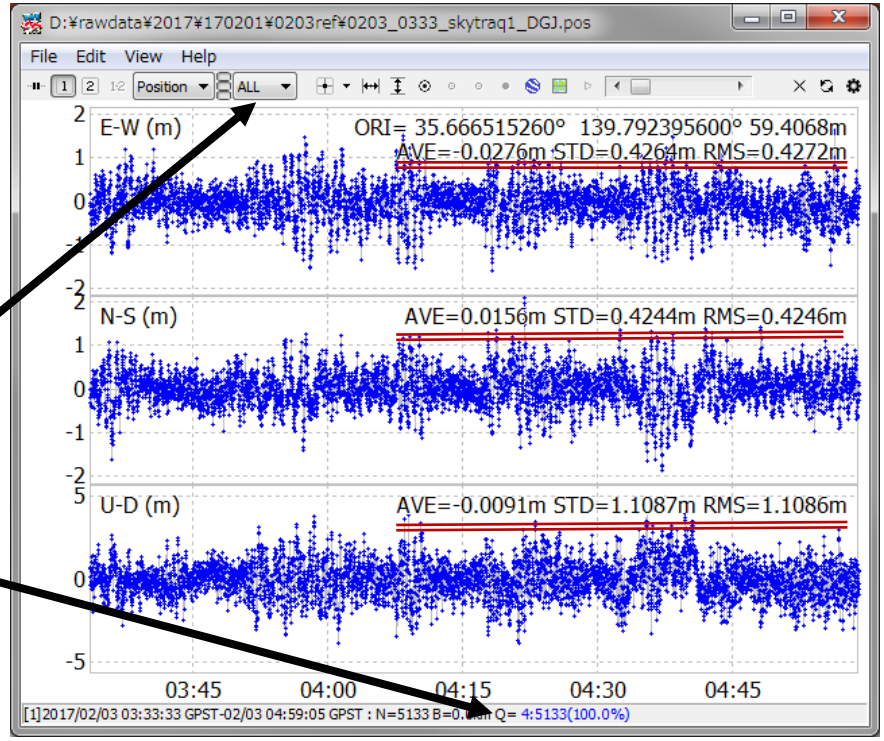
Appendix Post process DGNSS







2017/2/3



Plot results

Quality flag=4
for DGNSS solutions

Number of solutions

Fix rate = 5133/5133 = 100.%

FIx solutions = 5106

Total epoch = 5133sec×1Hzx

Appendix Post process DGNSS UBLOX

Both rover and base station data (zero-baseline)
3hours by 1Hz at the roof top of the building
2016/6/10