

GIS-E5050

Unit 5: GNSS positioning practice

Real-time hands-on



Recall Unit 3: Next session

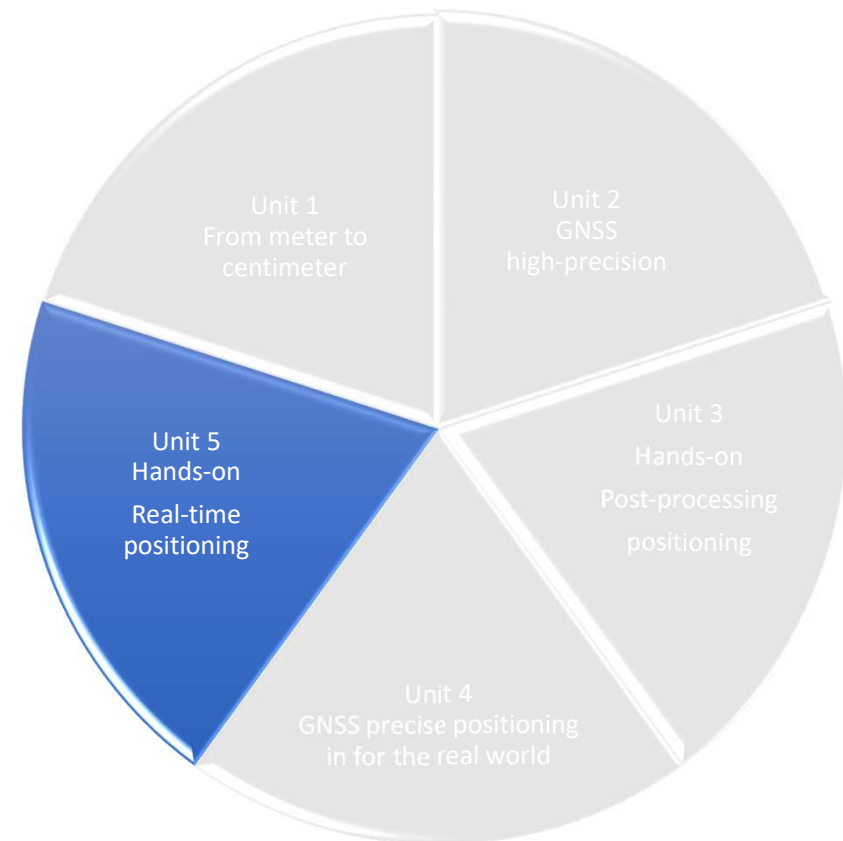
- We are going to do some of these things in **real-time!**
 - RTK
 - NRTK (VRS)
 - More PPP (perhaps ... we shall see how we manage time)

Internet
connection
is needed!

- **NOTE:** To try RT-PPP one needs access to the necessary correction data streams. IGS RTS streams require additional user registration at <https://register.rtcn-ntrip.org/cgi-bin/registration.cgi>

Module structure

- Hands on with
- RTK
- NRTK (VRS)
- PPP (?)

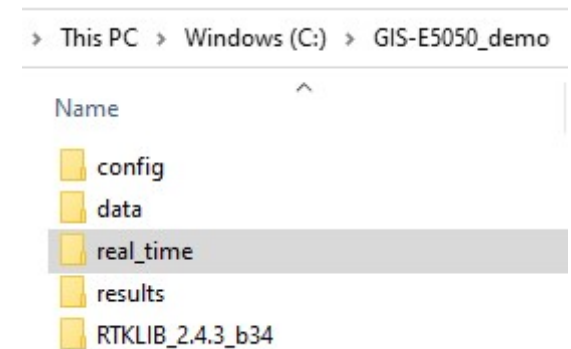


Real-Time Point

Preparation & simple example

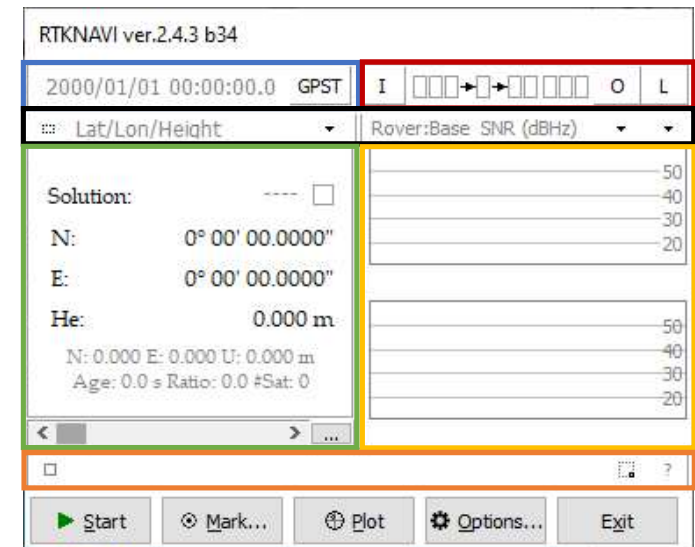
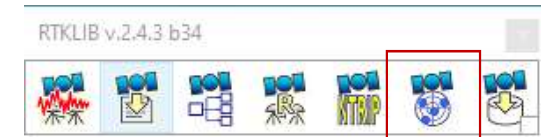
Preparation

- Fetch the real-time.zip from MyCouses
- Unzip
- Move the real-time directory to **X:\GIS-5050**



RTKNAVI

- Time display
- Input/Output/Log settings
- Display switch
 - Layout, Solution, Plot
- Solution
- Information
 - Signal level
 - Satellite visibility
- Monitor & message



More details in the manual, section 3.2!

Quick demo

- **Rover stream (observation)**

- Type: **NTRIP Client**

- Click Options
- Caster: opencaster.nls.fi
- Port: **2103**
- Mountpoint: **RAW_MET3**
- UserID: *by email*
- Password: *by email*

- Format: **RTCM3**

- **Correction stream (navigation)**

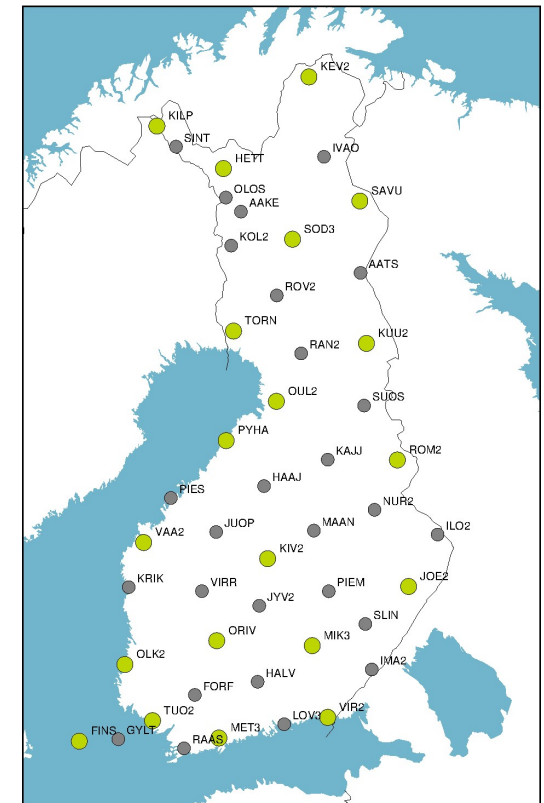
- Type: **NTRIP Client**

- Click Options
- Caster: ntrip.use-snip.com
- Port: **2101**
- Mountpoint: **RTCM3EPH**
- UserID:
- Password:

- Format: **RTCM3**

Try different data stream

- Replace **MET3** with your favourite pick
- Go to Plot and change the Coordinate Origin
 - **Manually**, or
 - Use **e1_finnref.pos**
-
- How accurate is the solution?
- Could you improve the accuracy?

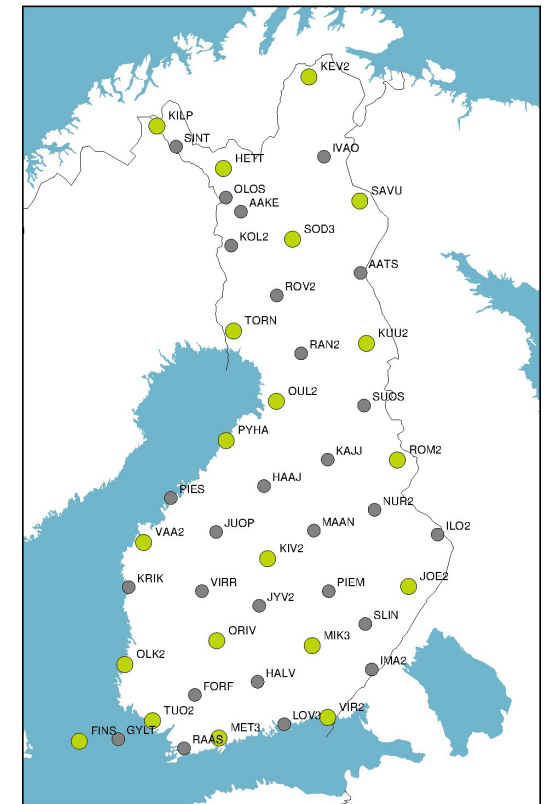


Further exploration

- **Congratulations!** Now, you are able to carry out positioning in real-time at your favorite FINNREF site.
- Explore further things based on your curiosity.
- Remember you can always come back to me at any time.

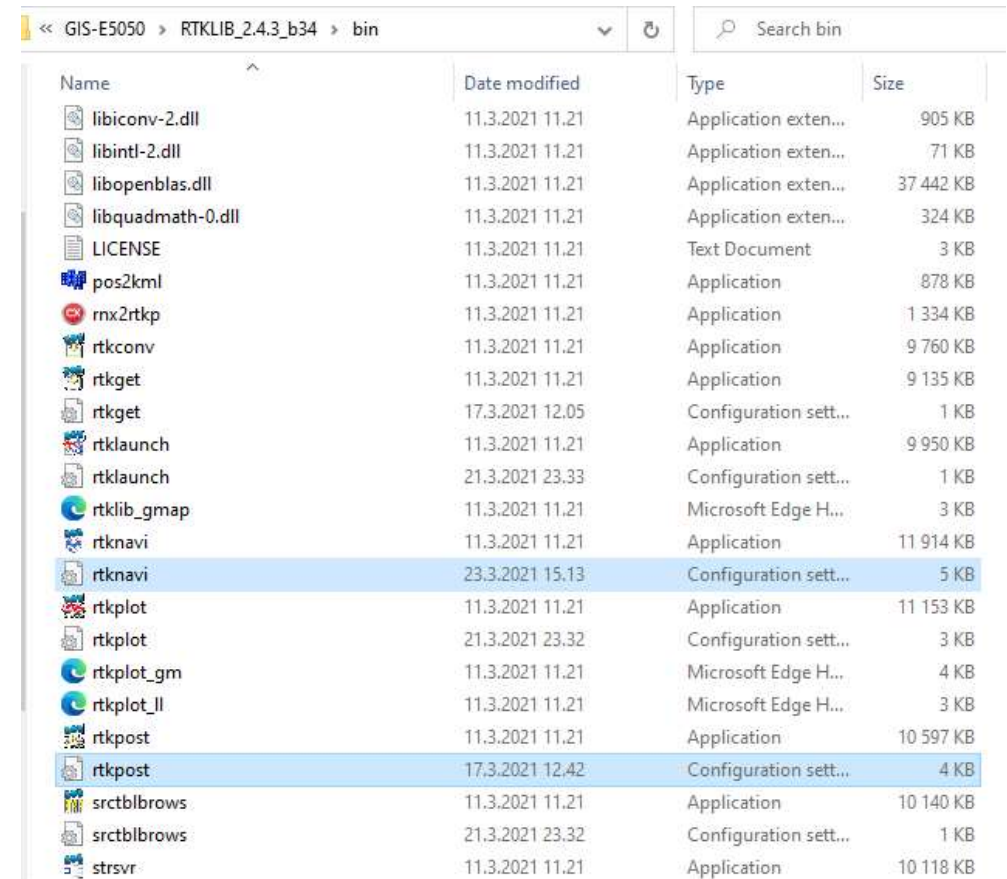
Real-Time Differential

DGPS in real-time with your favorite streams



Remember: Close-Remove-Restart

- If in trouble or loose track of the settings.
 - **Close** the app
 - **Remove** its *.ini file
 - **Restart** the app
- This is a fresh start, so ...
- **Be patient** if the restart is slow. The receiver has no other a priori information.

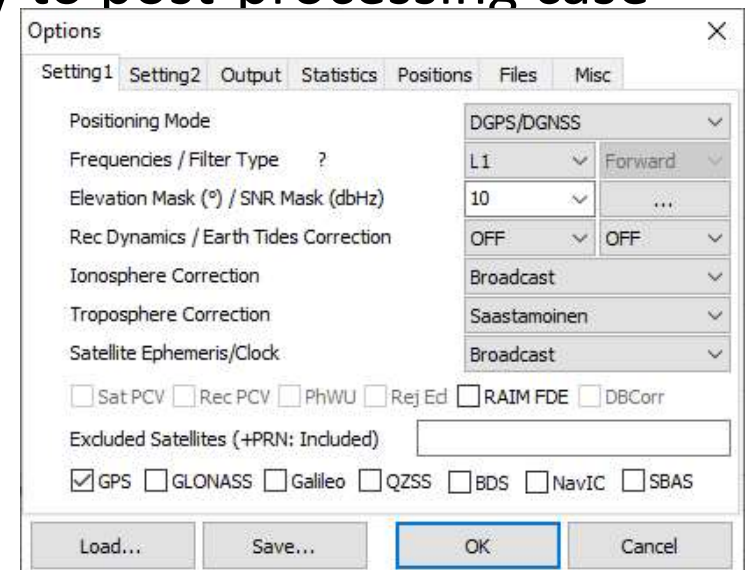


Name	Date modified	Type	Size
libconv-2.dll	11.3.2021 11.21	Application exten...	905 KB
libintl-2.dll	11.3.2021 11.21	Application exten...	71 KB
libopenblas.dll	11.3.2021 11.21	Application exten...	37 442 KB
libquadmath-0.dll	11.3.2021 11.21	Application exten...	324 KB
LICENSE	11.3.2021 11.21	Text Document	3 KB
pos2kml	11.3.2021 11.21	Application	878 KB
rnx2rtkp	11.3.2021 11.21	Application	1 334 KB
rtkconv	11.3.2021 11.21	Application	9 760 KB
rtkget	11.3.2021 11.21	Application	9 135 KB
rtkget	17.3.2021 12.05	Configuration sett...	1 KB
rtklaunch	11.3.2021 11.21	Application	9 950 KB
rtklaunch	21.3.2021 23.33	Configuration sett...	1 KB
rtklib_gmap	11.3.2021 11.21	Microsoft Edge H...	3 KB
rtknavi	11.3.2021 11.21	Application	11 914 KB
rtknavi	23.3.2021 15.13	Configuration sett...	5 KB
rtkplot	11.3.2021 11.21	Application	11 153 KB
rtkplot	21.3.2021 23.32	Configuration sett...	3 KB
rtkplot_gm	11.3.2021 11.21	Microsoft Edge H...	4 KB
rtkplot_ll	11.3.2021 11.21	Microsoft Edge H...	3 KB
rtkpost	11.3.2021 11.21	Application	10 597 KB
rtkpost	17.3.2021 12.42	Configuration sett...	4 KB
srctblbrows	11.3.2021 11.21	Application	10 140 KB
srctblbrows	21.3.2021 23.32	Configuration sett...	1 KB
strsvr	11.3.2021 11.21	Application	10 118 KB

Differential GPS

- Set the **Base** data stream in similar fashion you did for the **Rover**
- Pick the base location of your own
- Adjust the processing engine settings similarly to post-processing case (unit 3)

- Any challenges? Did we miss something?
- Does the solution type change?
- Is the solution more accurate?
- What is the distance between rover & base?

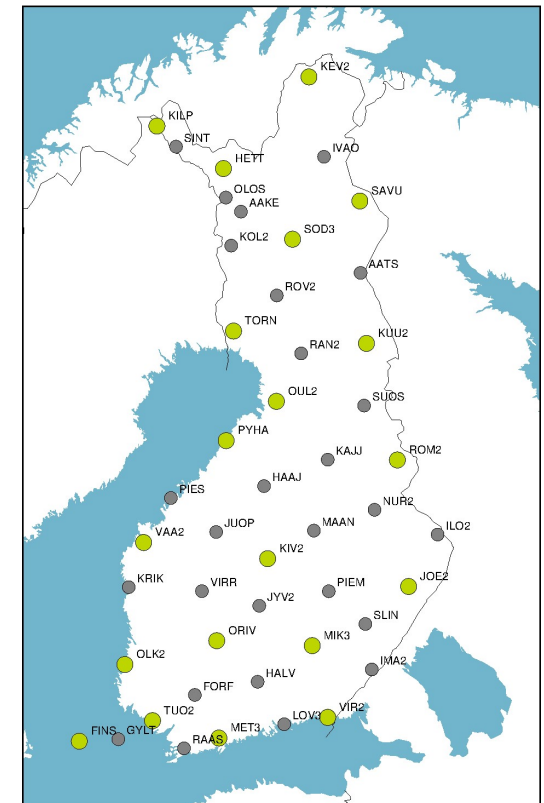


Show-and-Share

- Quick Share screen round (?)

Real-Time Relative

RTK positioning @MET3 using MPAS



Remember: Close-Remove-Restart

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 - **Close** the app
 - **Remove** its *.ini file
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- **Be patient** if the restart is slow. The receiver has no other a priori information.

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strsvr	11.3.2021 11.21	Application	10 118 KB

Set the RTK processing engine

- Load the **rtk.config** from
`X:\GIS-E5050\real-time\rtk`
- Check the *Positions* & *Files* windows
- These windows set:
 - the type of antenna at base & rover
 - the PCOs & PCVs associated with these types
 - The base station coordinates
 - FINNREF streams carry base station coordinates in the EUREF-FIN coordinate frame
- Set them according to your app/case/scenario!

The image displays two screenshots of a software application's 'Options' dialog box, specifically the 'Positions' and 'Files' tabs.

Top Screenshot (Positions Tab):

- Rover:**
 - Lat/Lon/Height (deg/m): 90.000000000, 0.000000000, -6335367.6285
 - Antenna Type (*: Auto): *
 - Delta-E/N/U (m): 0.0000, 0.0000, 0.0000
- Base Station:**
 - RTCM/Raw Antenna Posi: RTCM/Raw Antenna Posi
 - Lat/Lon/Height (deg/m): 90.000000000, 0.000000000, -6335367.6285
 - Antenna Type (*: Auto): *
 - Delta-E/N/U (m): 0.0000, 0.0000, 0.0000
- Station Position File:** (Empty field)
- Buttons:** Load..., Save..., OK, Cancel

Bottom Screenshot (Files Tab):

- Satellite/Receiver Antenna PCV File ANTEX/NGS PCV:** C:\GIS-E5050\data\atx\igs14.atx
- Geoid Data File:** (Empty field)
- DCB Data File:** (Empty field)
- EOP Data File:** (Empty field)
- Ocean Loading BLQ Format:** (Empty field)
- FTP/HTTP Local Directory:** C:\Temp
- Buttons:** Load..., Save..., OK, Cancel

Set-or-Check data streams (1/2)

- **Rover stream (observation)**

- Type: **NTRIP Client**

- Click Options
- Caster: opencaster.nls.fi
- Port: **2103**
- Mountpoint: **RAW_MET3**
- UserID: *by email*
- Password: *by email*

- Format: **RTCM3**

- **Correction stream (navigation)**

- Type: **NTRIP Client**

- Click Options
- Caster: ntrip.use-snip.com
- Port: **2101**
- Mountpoint: **RTCM3EPH**
- UserID:
- Password:

- Format: **RTCM3**

Set-or-Check data streams (2/2)

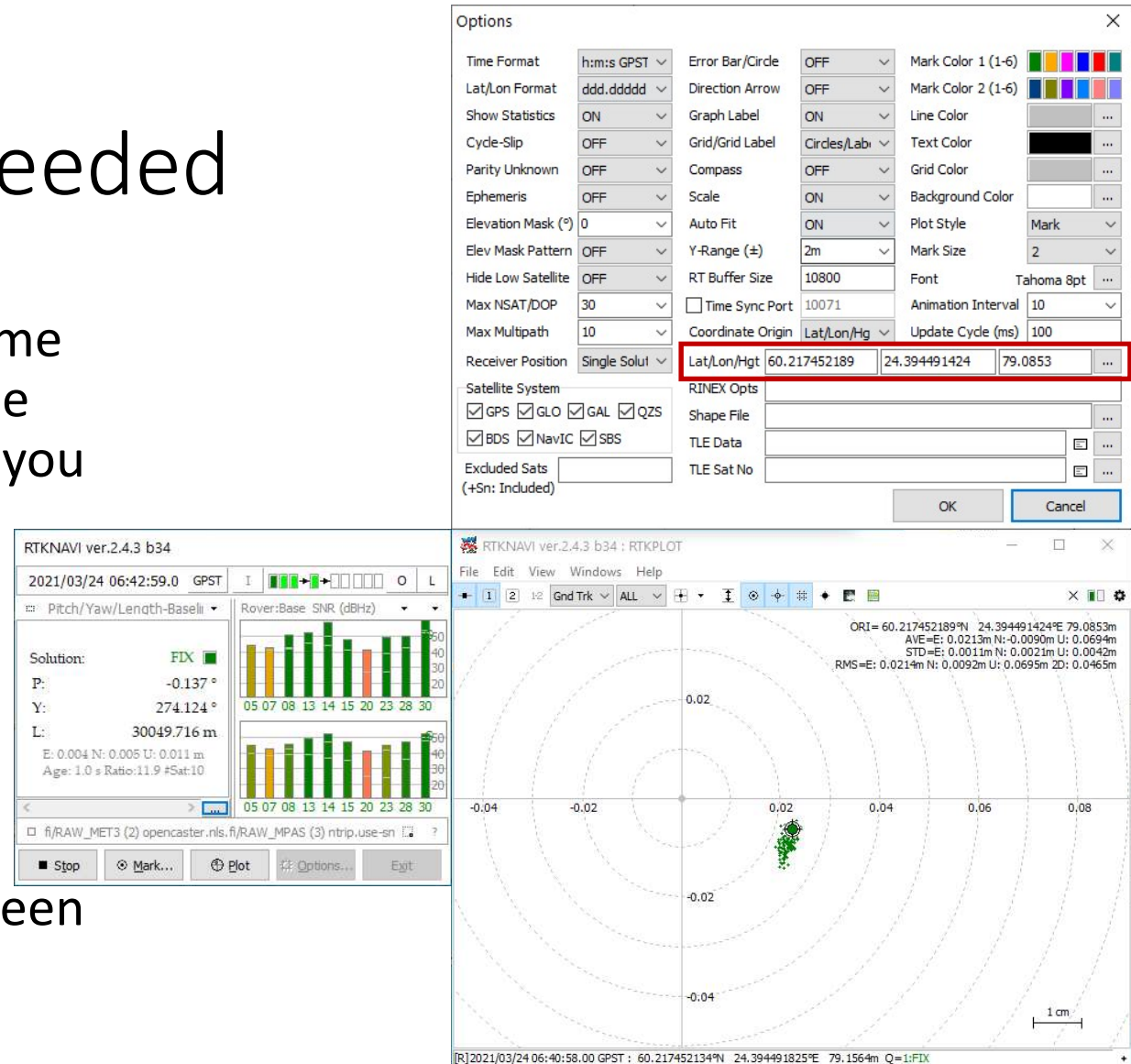
- **Base stream (observation)**
- Type: **NTRIP Client**
 - Click Options
 - Caster: **opencaster.nls.fi**
 - Port: **2103**
 - Mountpoint: **RAW_MPAS**
 - UserID: *by email*
 - Password: *by email*
- Format: **RTCM3**

Ajust the origin if needed

- According to the reference frame used by the base station (or the point(s) with respect to which you compute your position)

- EUREF-FIN
- ITRF2014
- WGS84
- Etc.

- Use coordinate conversion or transformation to switch between different representations



Show-and-Share

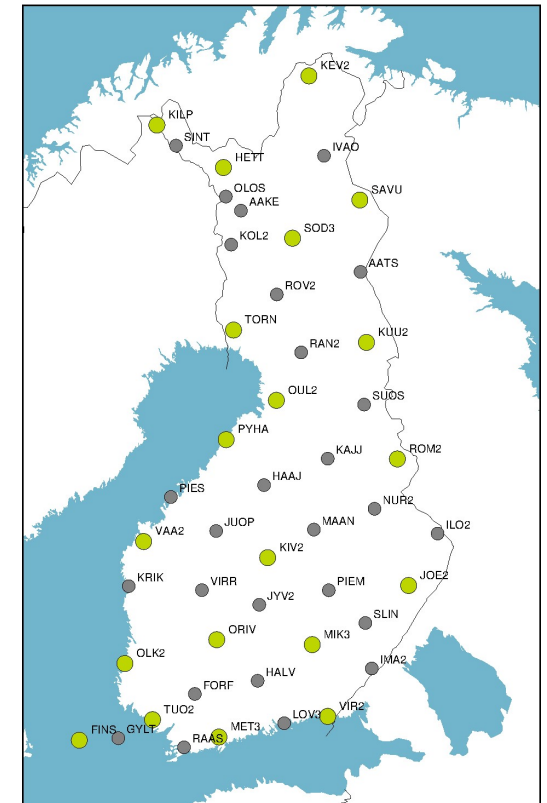
- Quick Share screen round (?)

Further exploration

- **Congratulations!** Now, you are able to carry out real-time relative positioning using RTK method.
 - Try a different baseline, such as OLOS – AAKE (~30 km)
 - Check the impact of other constellations.
 - Explore further things based on your own curiosity.
-
- Remember you can always come back to me at any time.

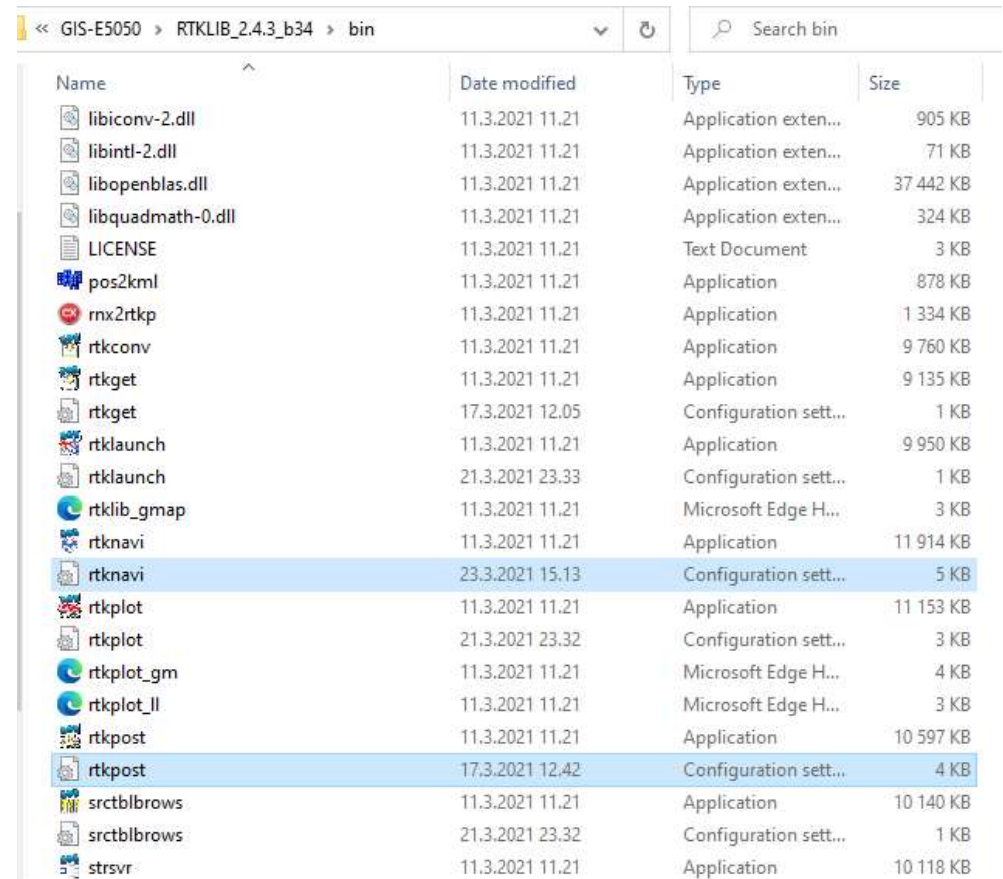
Network Real-Time

VRS-based positioning



Close-Remove-Restart

- If in trouble or loose track of the settings.
 - **Close** the app
 - **Remove** its *.ini file
 - **Restart** the app
- This is a fresh start, so ...
- **Be patient** if the restart is slow. The receiver has no other a priori information.



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Set the VRS processing engine

- Load the **vrs.config** from
[X:\GIS-E5050\real-time\nrtk](#)
- Check the *Positions & Files* windows (as previously)

Set/Check the data streams

- **Rover stream (observation)**

- Type: **NTRIP Client**

- Click Options
- Caster: opencaster.nls.fi
- Port: **2103**
- Mountpoint: **RAW_MET3**
- UserID: *by email*
- Password: *by email*

- Format: **RTCM3**

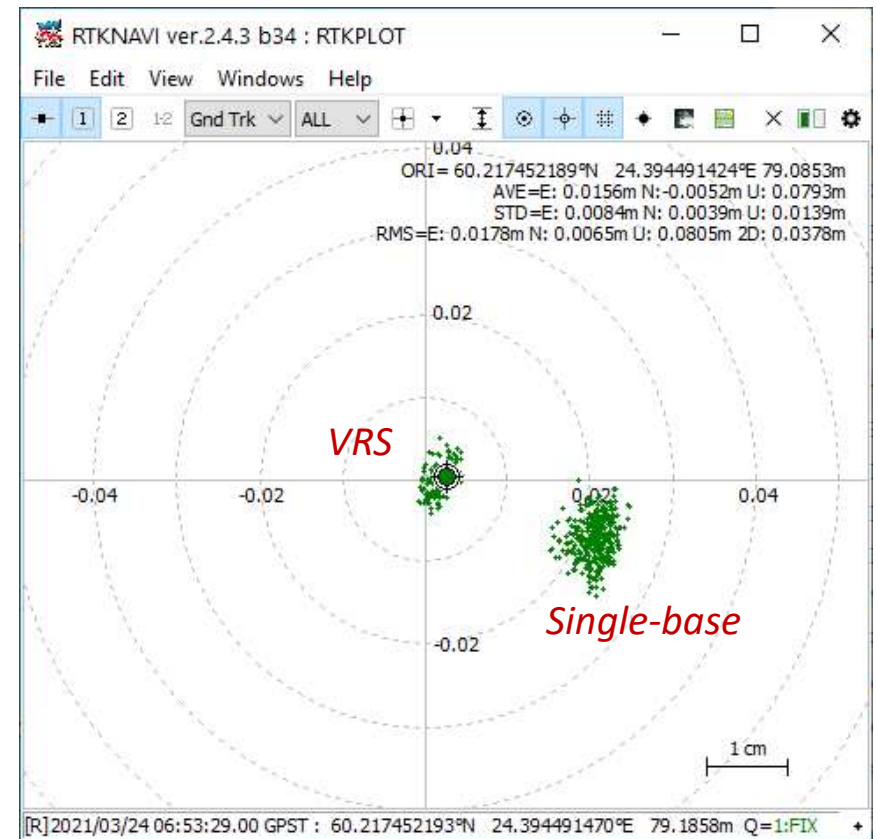
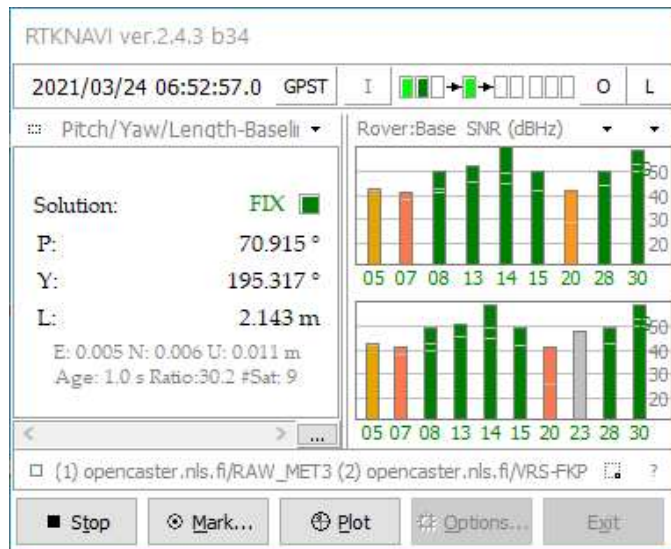
- **Base stream (correction data)**

- Type: **NTRIP Client**

- Click Options
- Caster: opencaster.nls.fi
- Port: **2101**
- Mountpoint: **VRS-FKP**
- UserID: *by email*
- Password: *by email*

- Format: **RTCM3**

Start & Plot



Further exploration

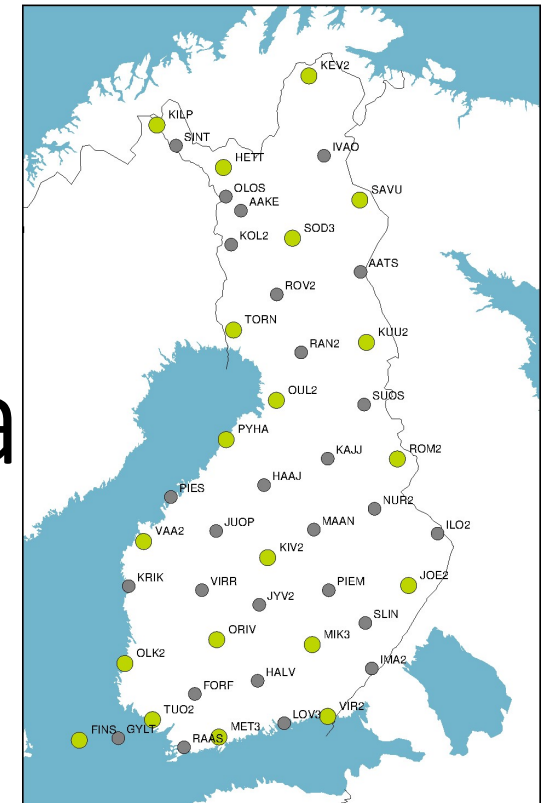
- **Congratulations!** Now, you are able to carry out Network-based RTK positioning using VRS correction data.
- Try and pick up a different data stream.
- Recall you may need to change the coordinate origin in RTKPLOT.
- Test the decorrelation error. Simulate you move further from the initial position (i.e., manually give the Latitude/Longitude values in the NMEA GGA message)
- Explore further things based on your own curiosity.
- Remember you can always come back to me at any time.

Show-and-Share

- Quick Share screen round (?)

RT-PPP with IGS (optional)

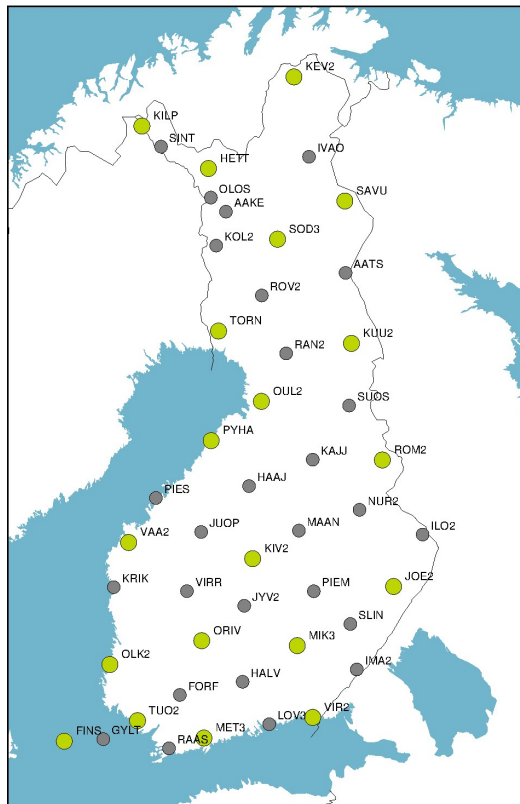
Separate access to the IGS streams is needed



Obtain access to IGS RTS data streams

- To try RT-PPP one needs access to the necessary correction data streams. IGS RTS streams require additional user registration at <https://register.rtcn-ntrip.org/cgi-bin/registration.cgi>

Rover + correction data



GIS-E5050: Advanced Geodesy
24.03.2021

Input Streams

Input Stream	Type	Opt	Cmd	Format	Opt
<input checked="" type="checkbox"/> (1) Rover	NTRIP Client	RTCM 3	...
<input type="checkbox"/> (2) Base Station	Serial	RTCM 2	...
<input checked="" type="checkbox"/> (3) Correction	NTRIP Client	RTCM 3	...

Transmit NMEA GGA to Base Station
OFF 0.000000000 0.000000000 0.000

Reset Cmd Max Baseline 10 km

Input File Paths

☐ Time x1 + 0 s ☐ 64bit

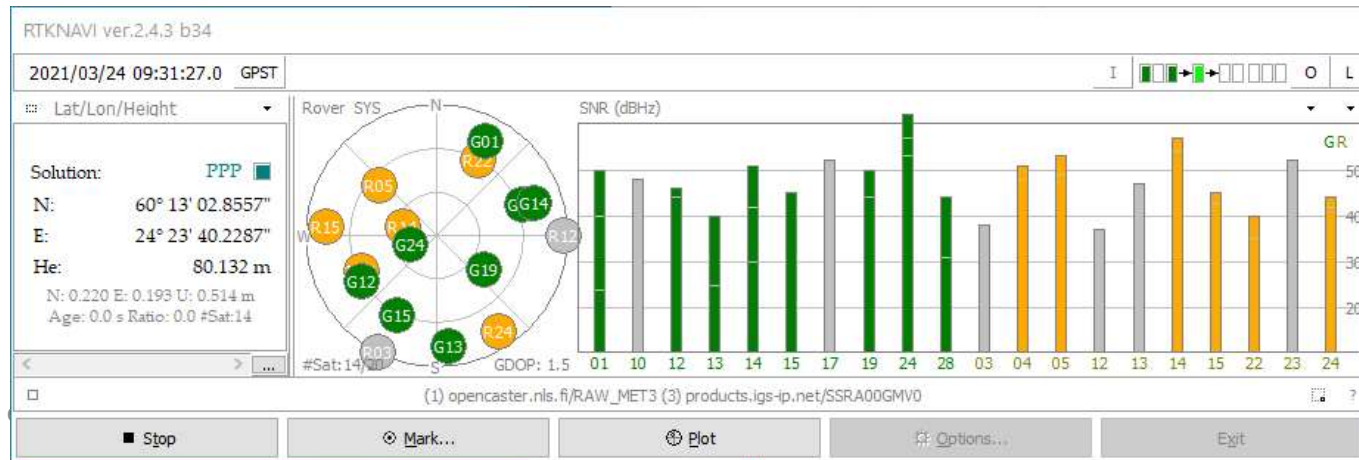
OK Cancel

NTRIP Client Options

NTRIP Caster Address products.igs-ip.net Port 2101

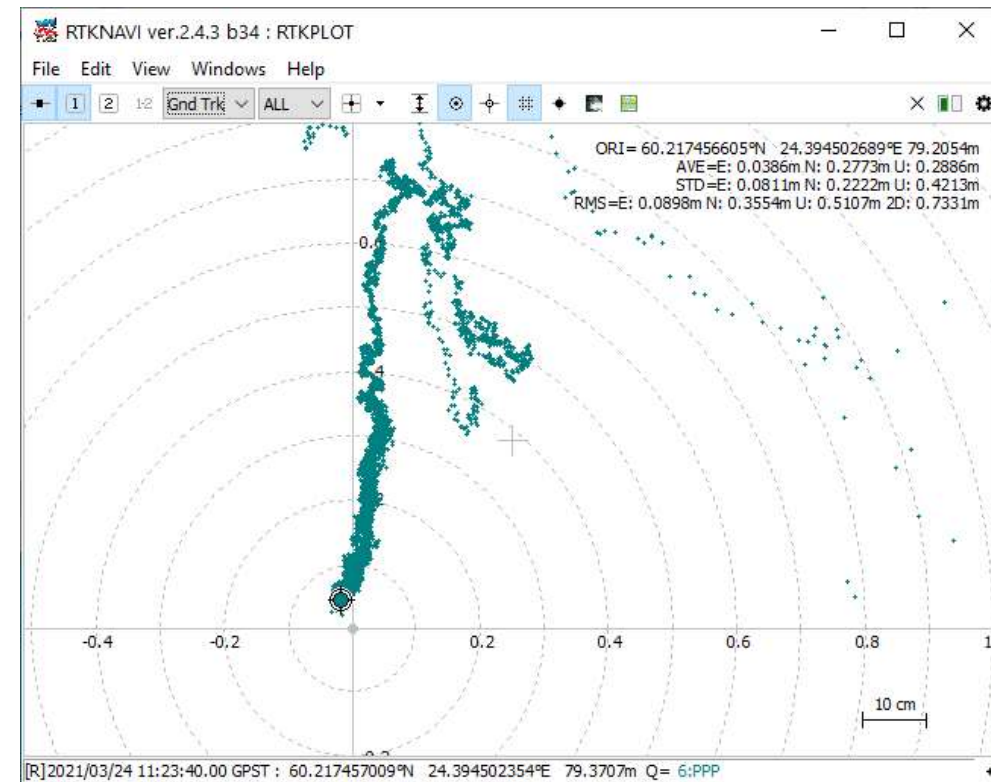
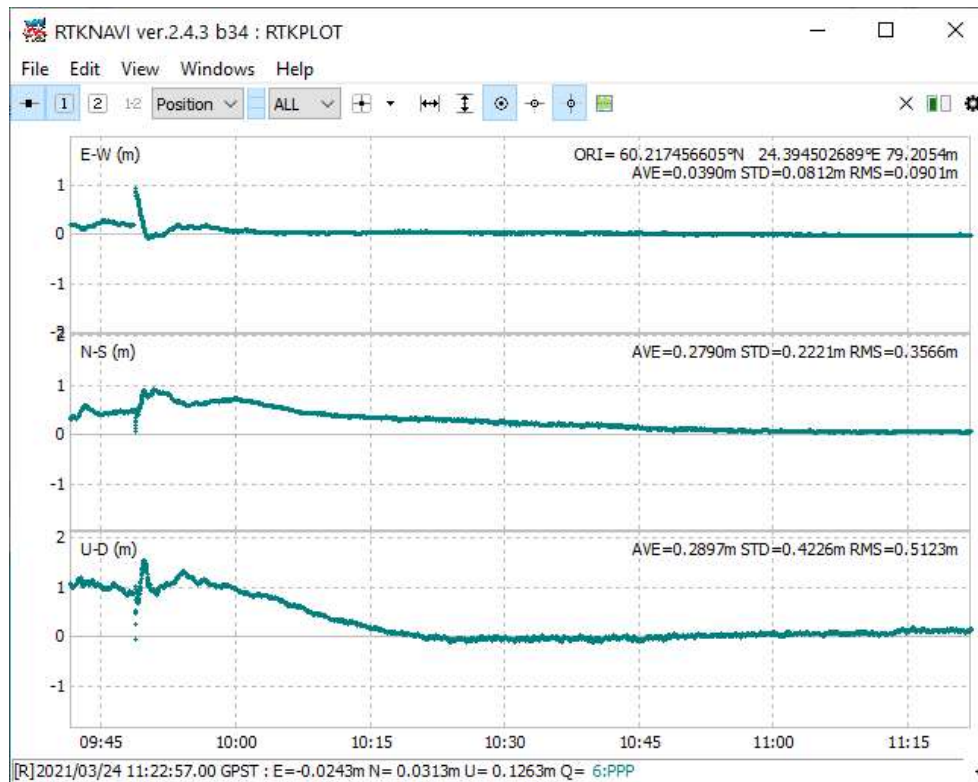
Mountpoint SSRA00GMV0 User ID rtsataalto Password

Browse... Get Mountp OK Cancel



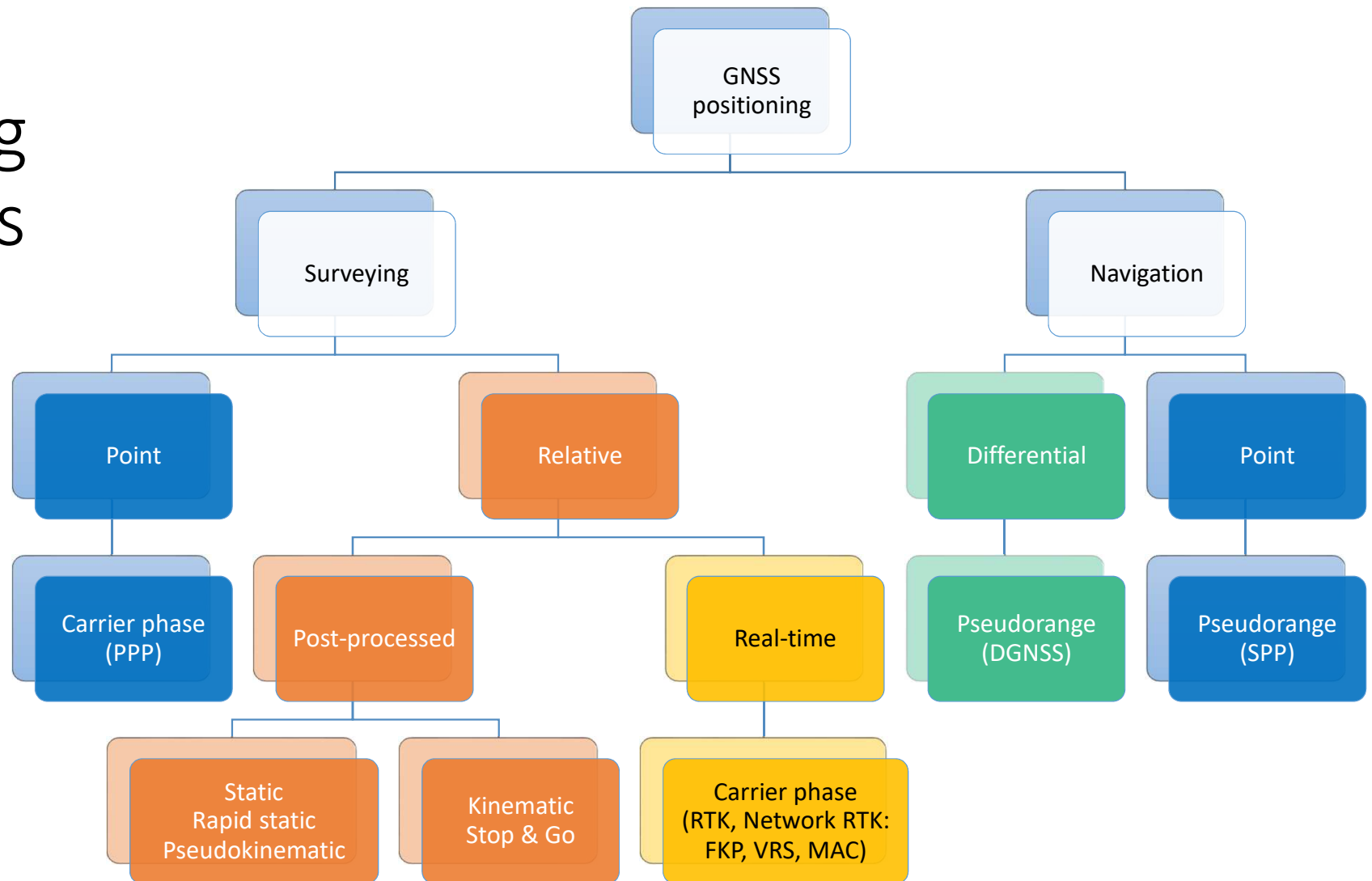
Email:

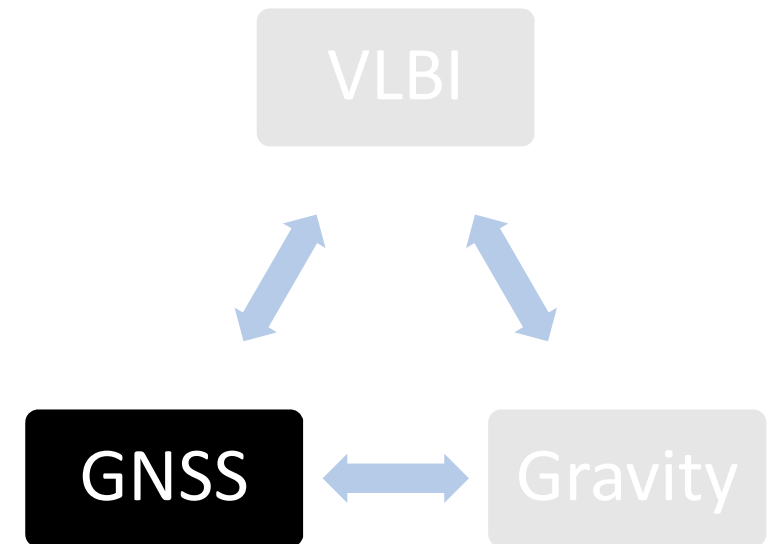
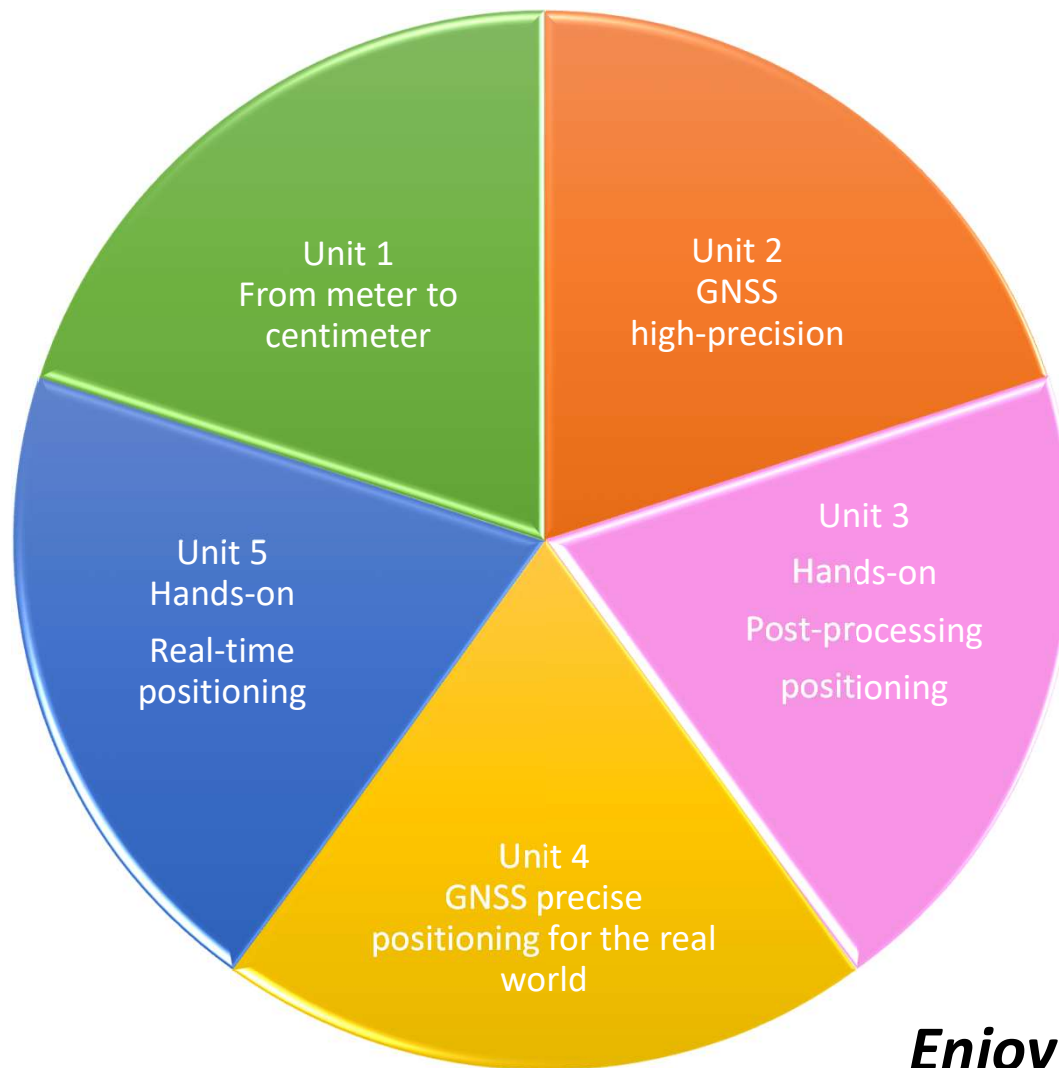
Convergence time



Time to wrap-up

GNSS positioning techniques





Enjoy the rest of the course. Thank you!