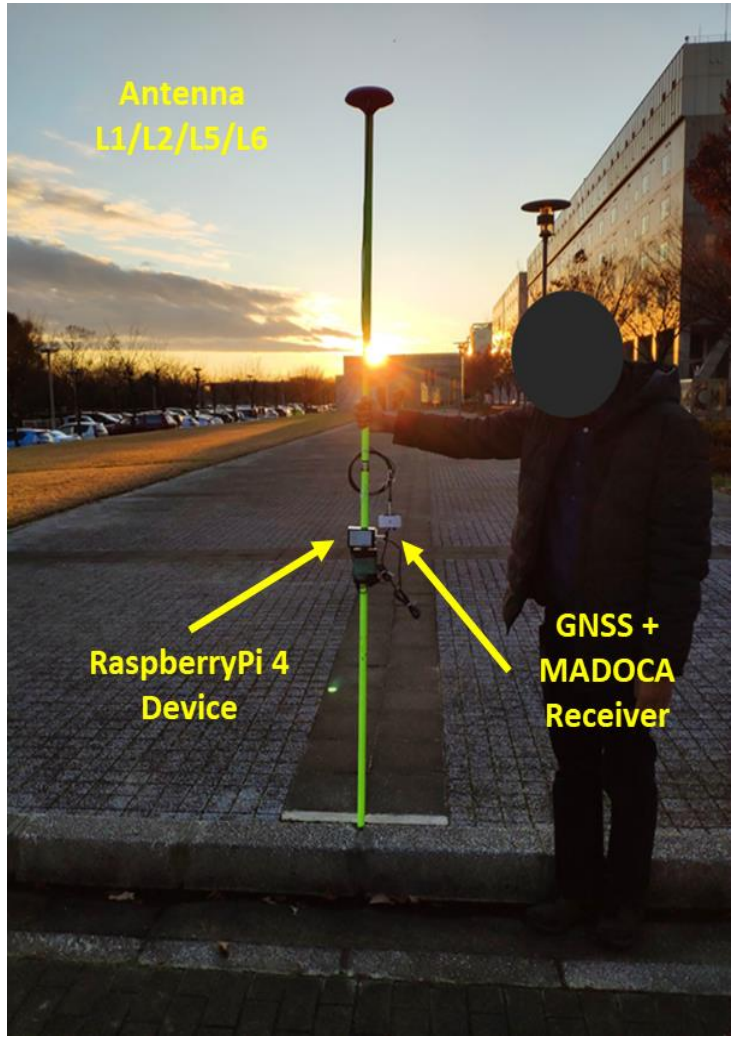
GNSS Data Processing for High-Accuracy MADOCA-PPP using MAD-WIN and MADROID



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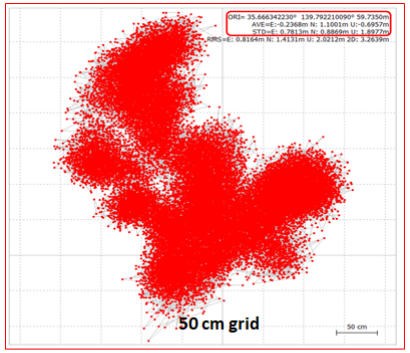
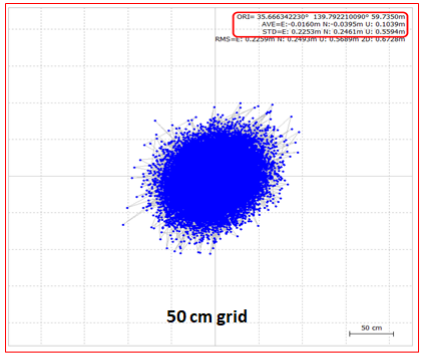
Objectives

- Learn how to process GNSS data for MADOCA-PPP using
  - MAD-WIN
    - MADOCA PPP for Windows OS
  - MADROID Software
    - MADDOCA PPP for Android Device

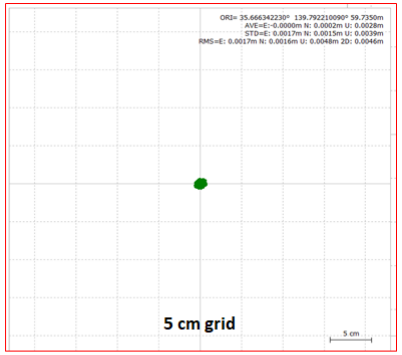
Position Accuracy and Errors



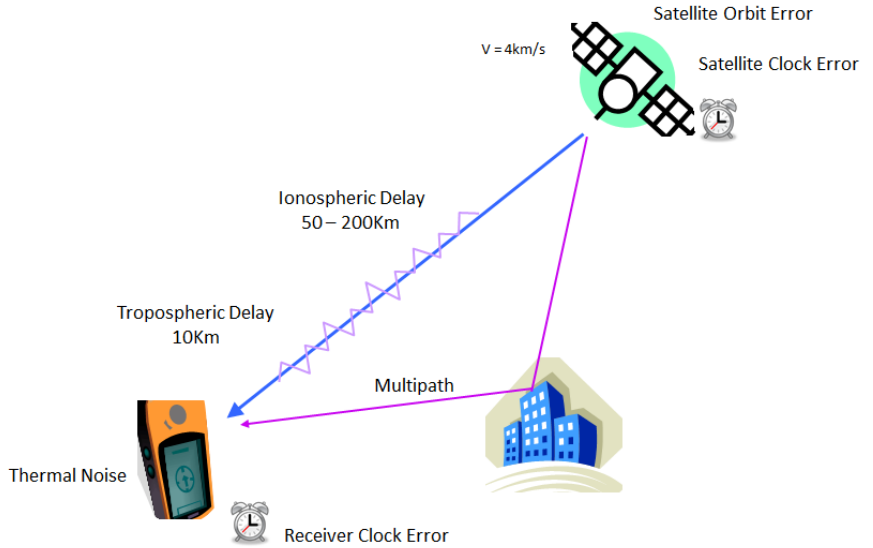
SPP (Single Point Position)



DGPS (Differential GPS)
Code-phase observation



RTK (Real Time Kinematic)
Carrier-phase observation

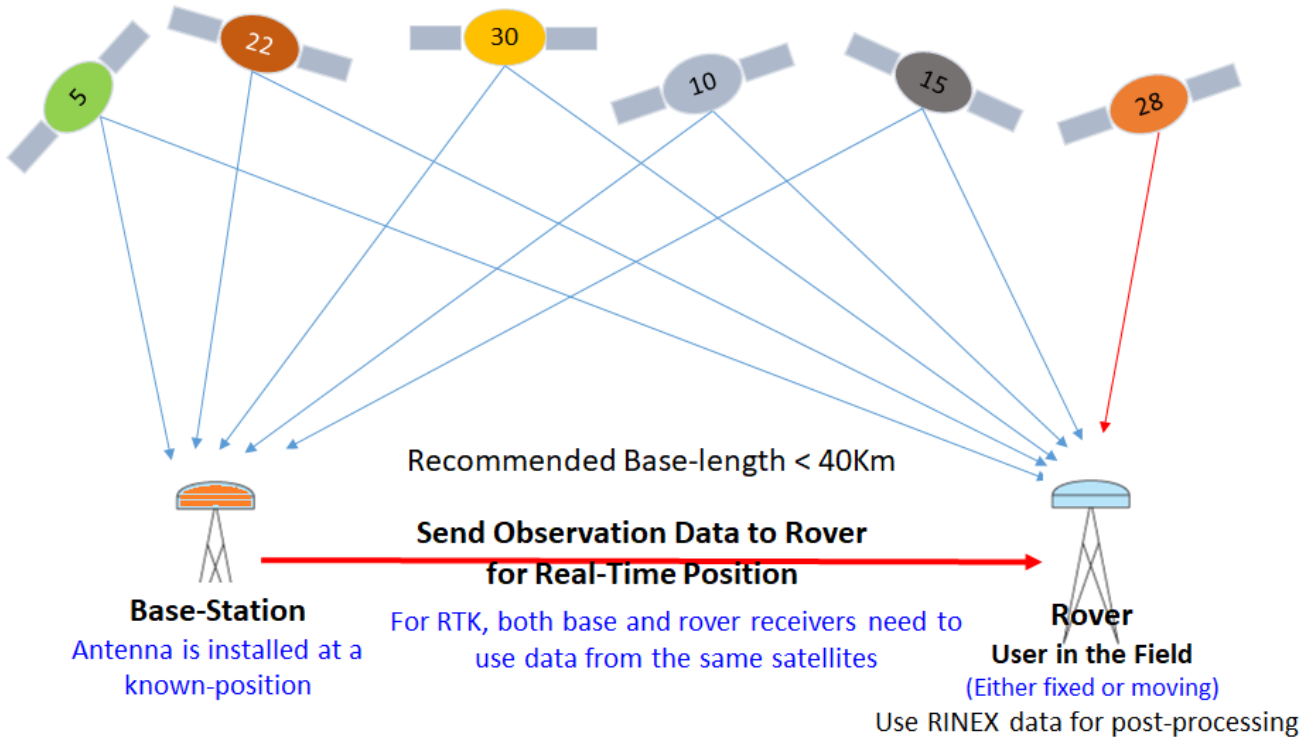


GNSS Position Accuracy:
- Red: Single Point Position
- Blue: DGPS, Code-Phase Observation
- Green: RTK, Carrier Phase Observation

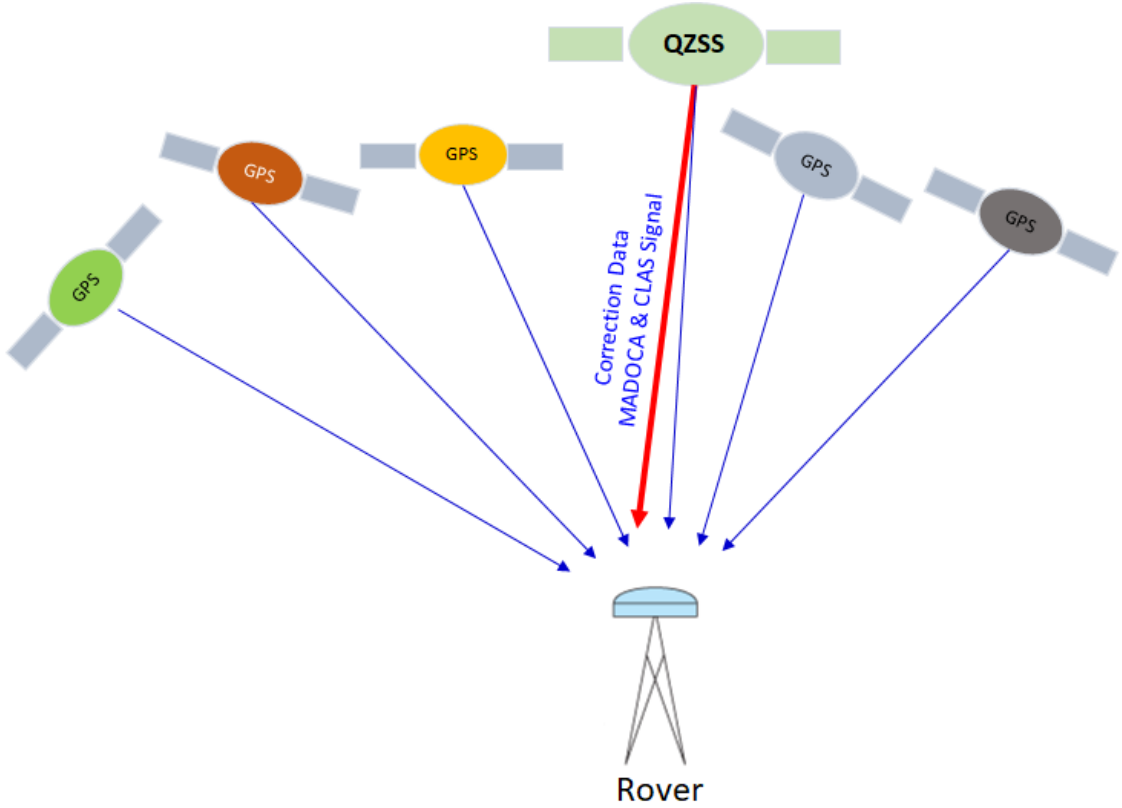
GNSS Errors:
- Satellite Orbit Error
- Satellite Clock Error
- Ionospheric Delay
- Tropospheric Delay
- Receiver Clock Error
- Thermal Noise
- Multipath

Data Observation Methods for High-Accuracy

Data Observation Method for DGPS / RTK / PPK



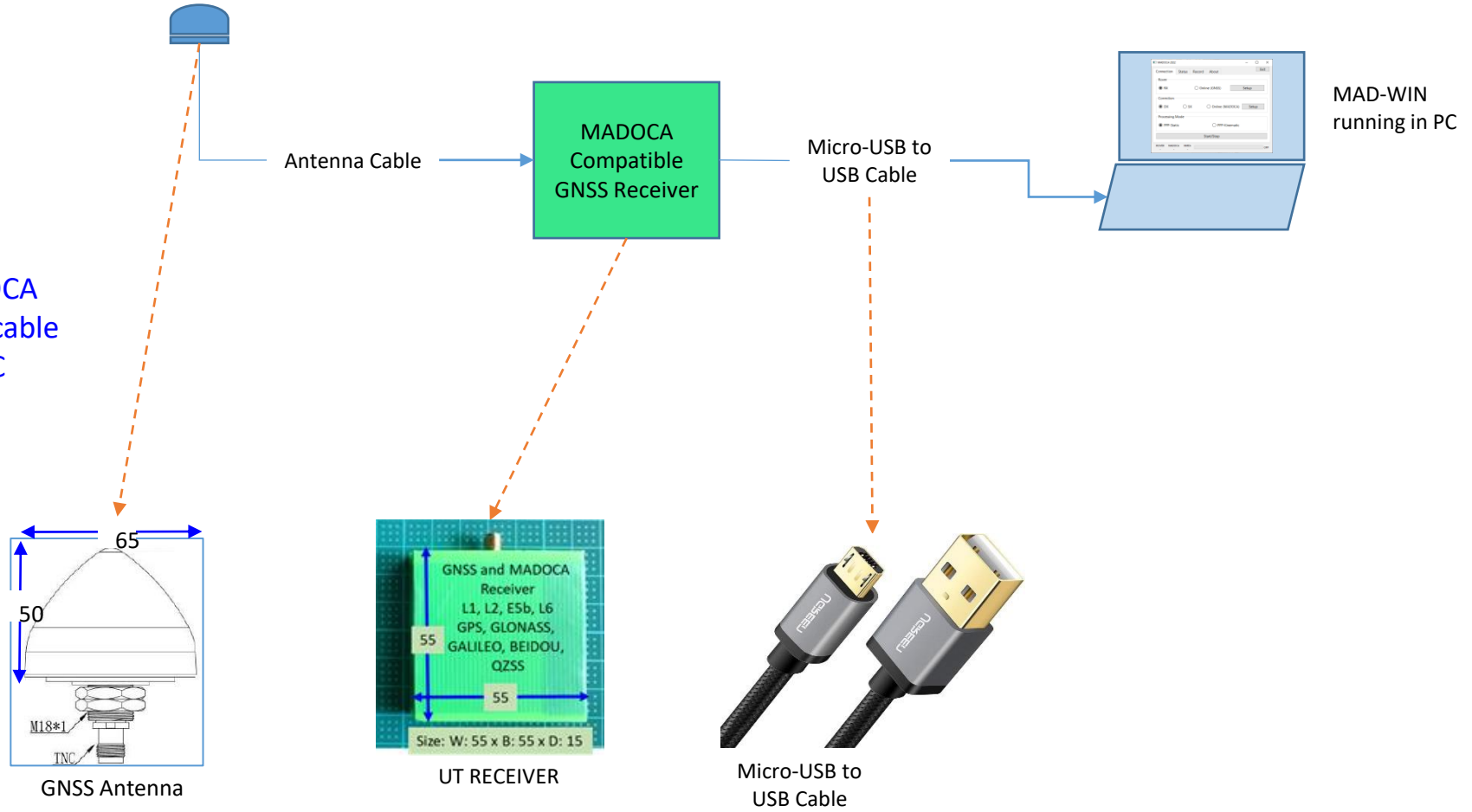
Data Observation Method for MADOCA PPP



MAD-WIN Setup

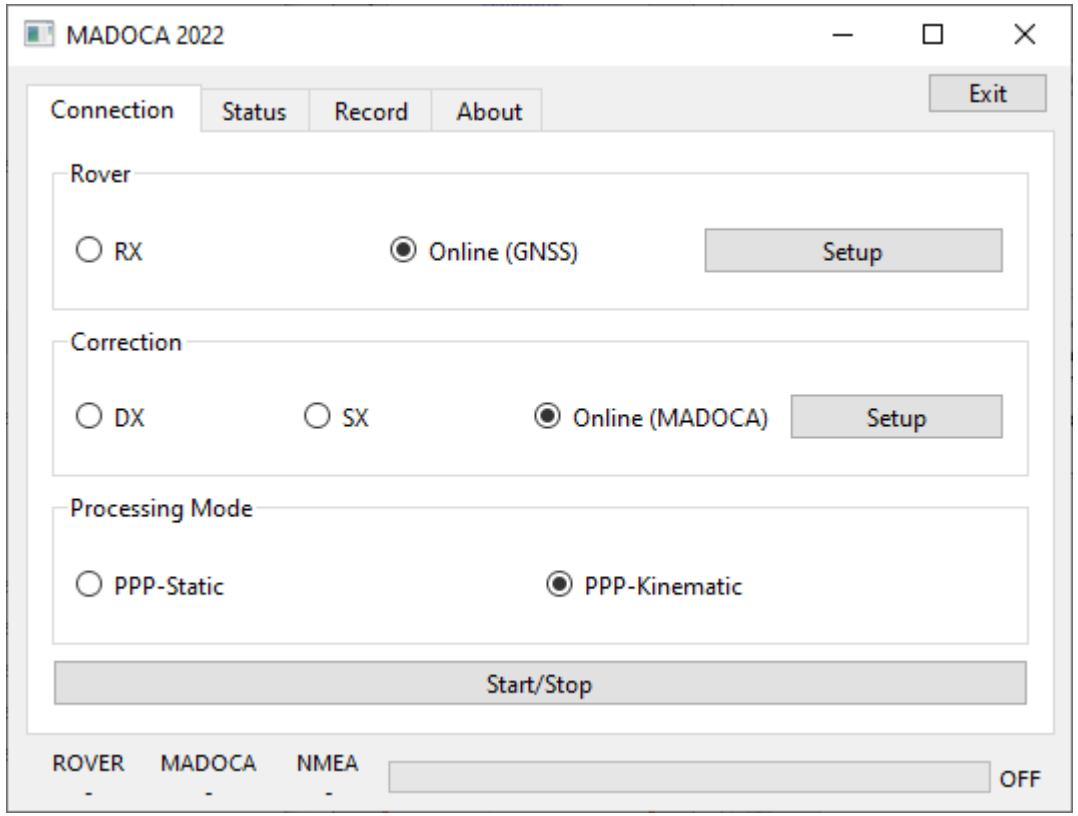
MAD-WIN Setup

- Connect Antenna to the GNSS/MADOCA receiver using the provided antenna cable
- Connect the receiver to a windows PC using a “micro-USB to USB” cable



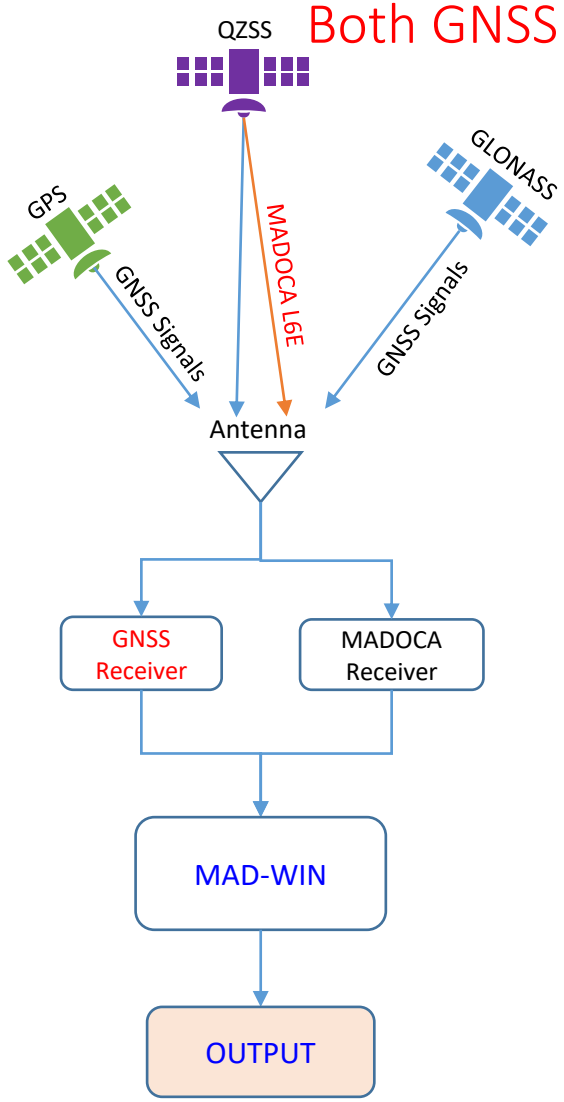
Install and Run MAD-WIN

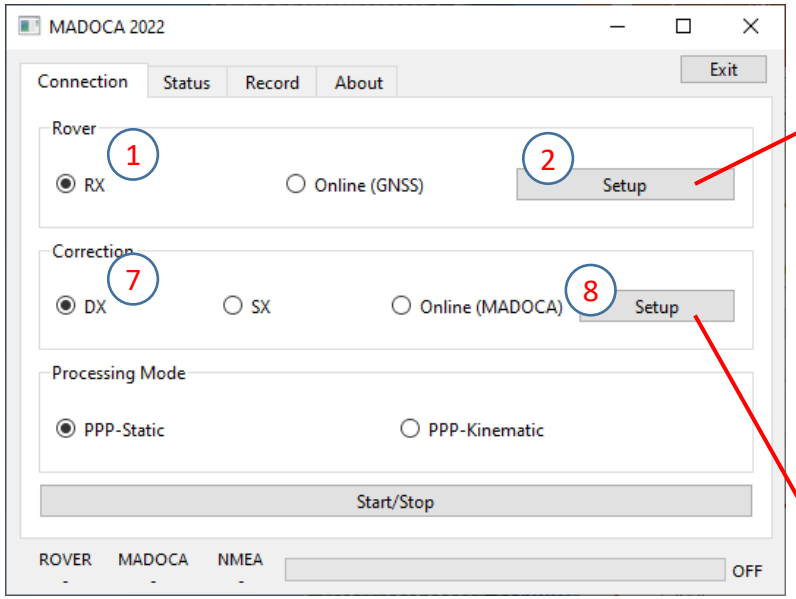
- Download MAD-WIN software from UT
- Unzip the software to a folder
- Run “Madoca_win.exe” by double click from the MAD-WIN folder
- For easy access, create a Shortcut such as “Madoca_Win - Shortcut”
- Copy this “Madoca_Win - Shortcut” to desktop for easy access.
- Double click the Shortcut to run the application.

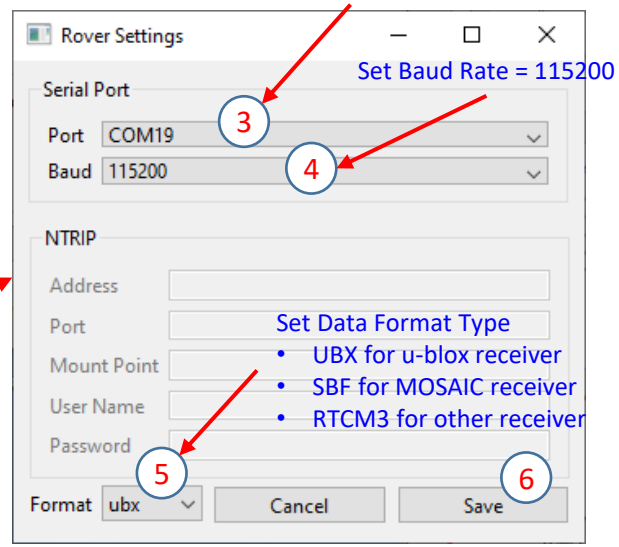


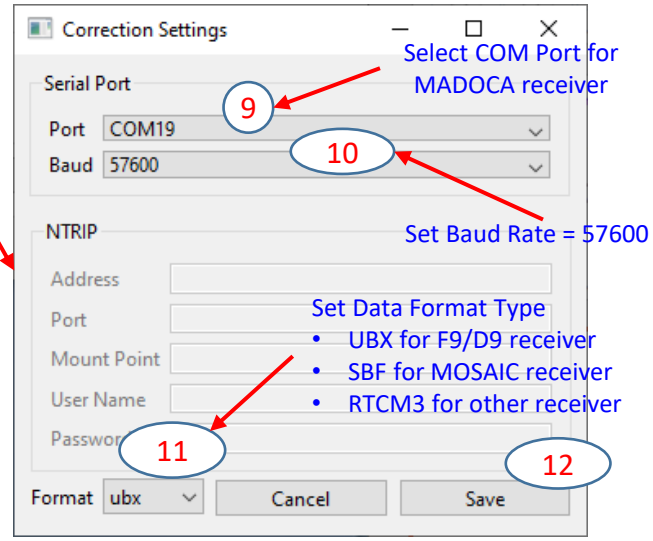
MAD-WIN Setup: Case A

Both GNSS and MADOCA Receivers are connected to your PC



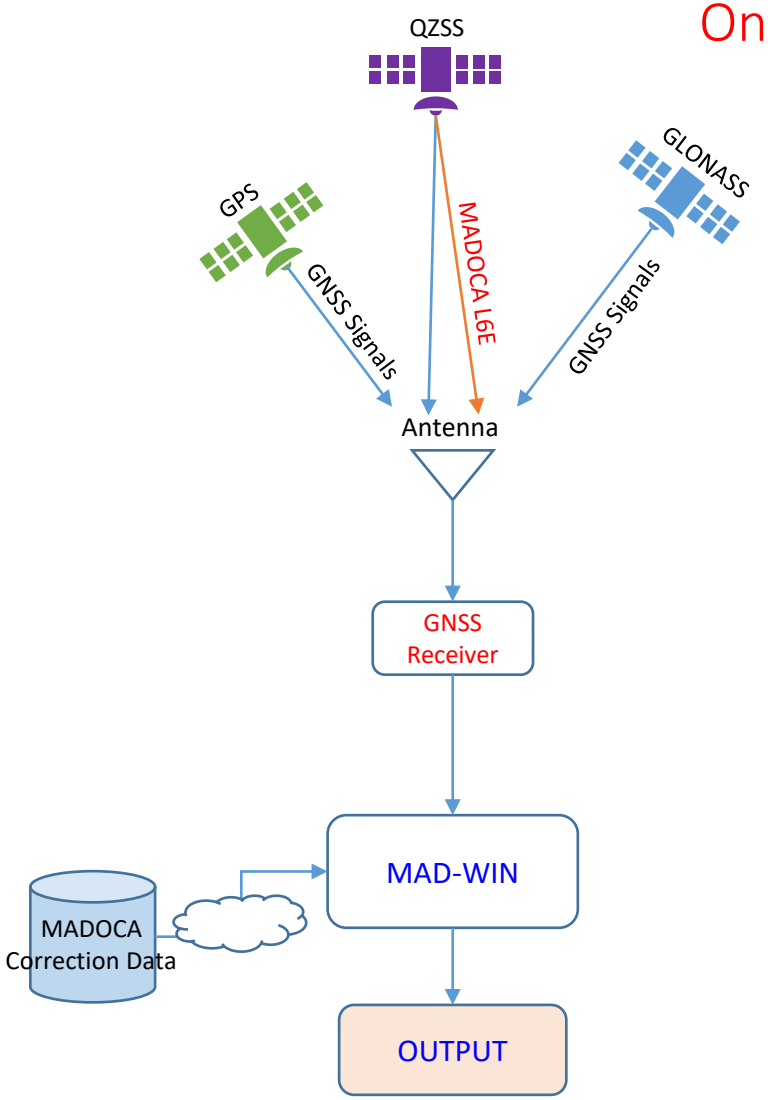


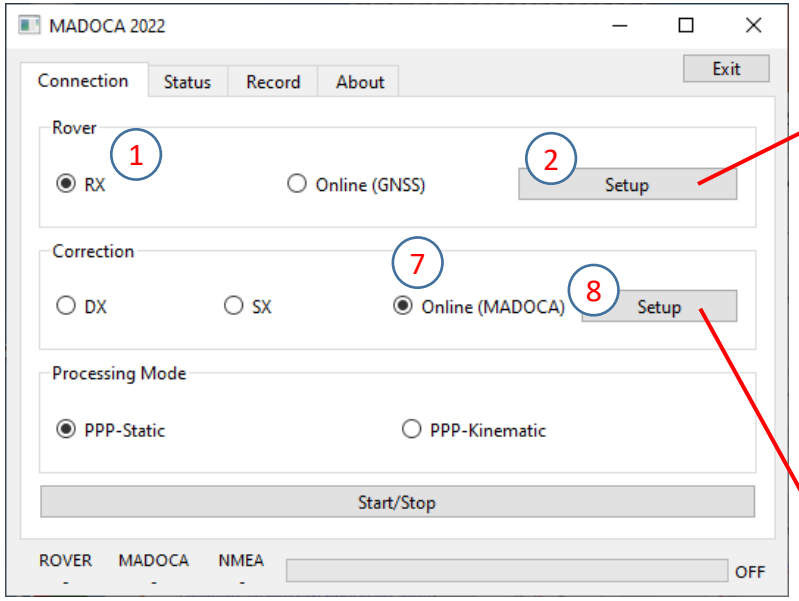




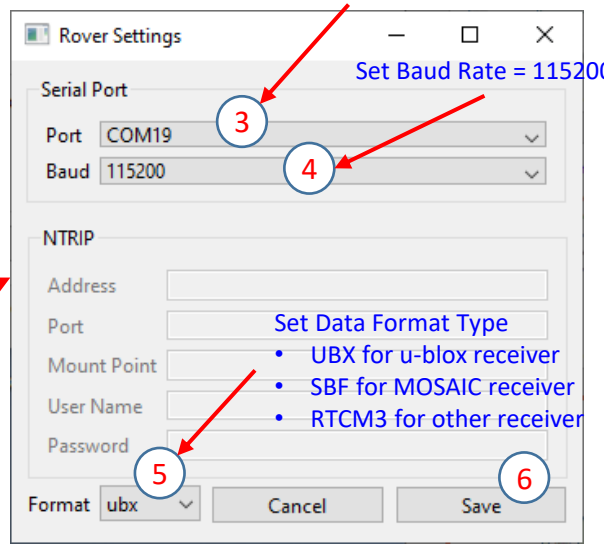
MAD-WIN Setup: Case B

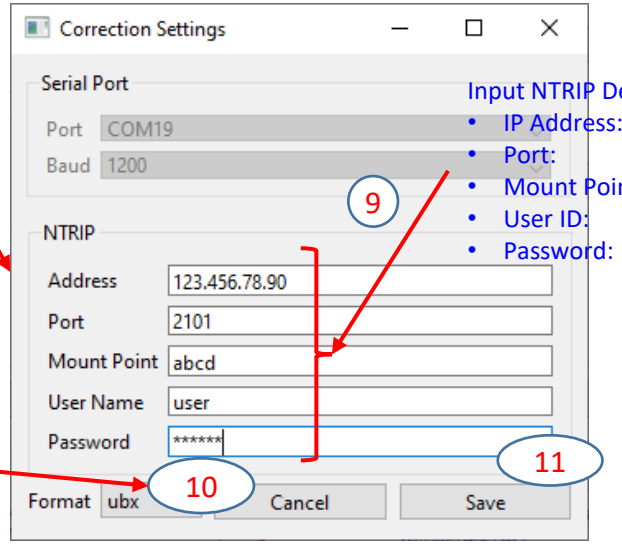
Only GNSS Receiver is connected to your PC





Select COM Port for GNSS Receiver

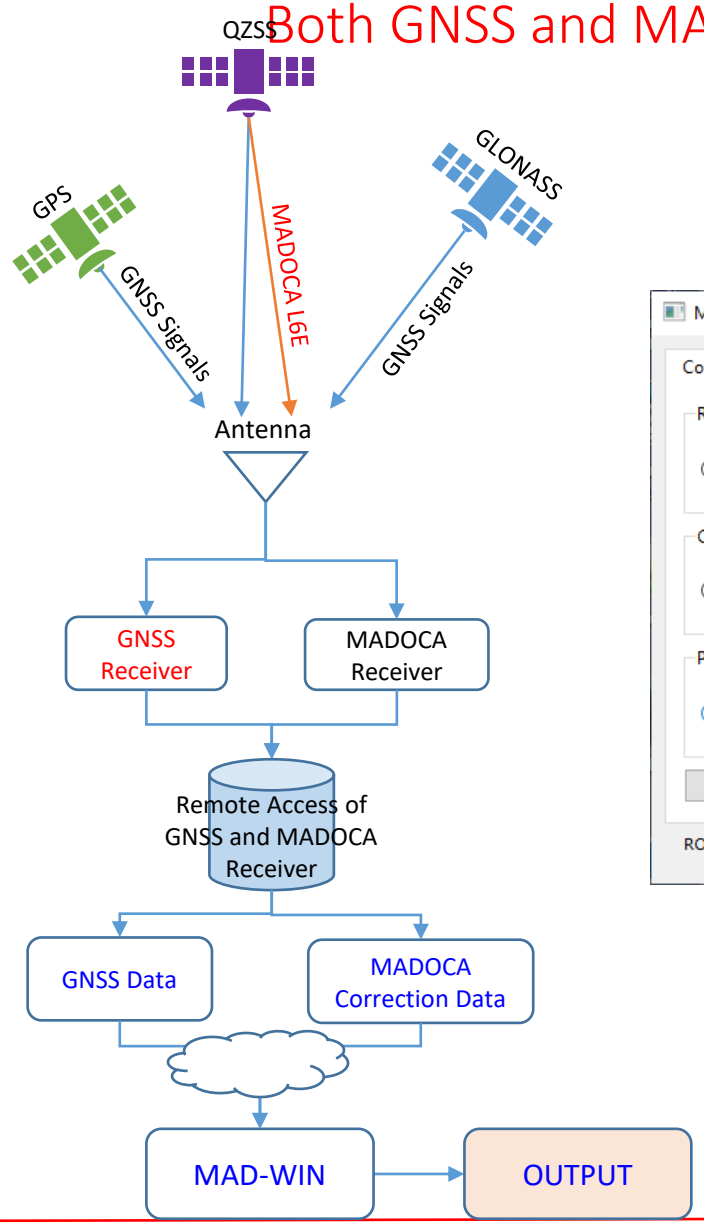


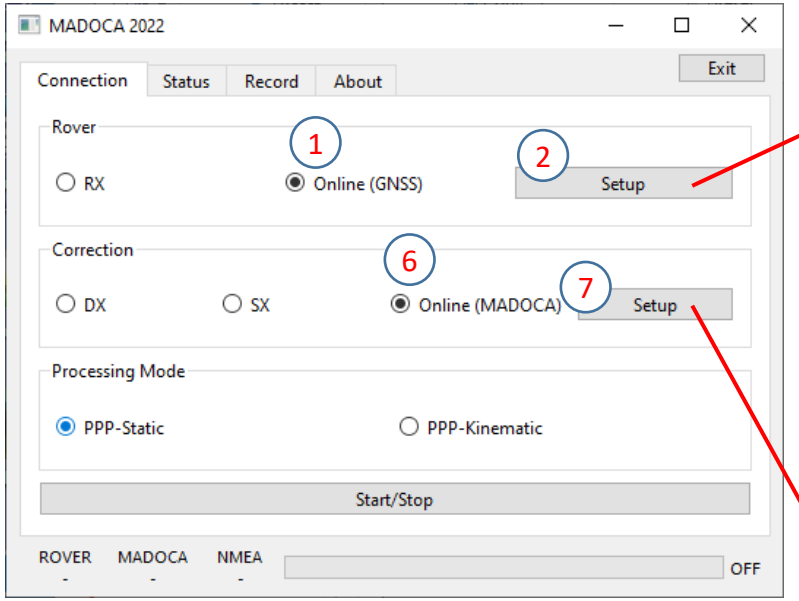


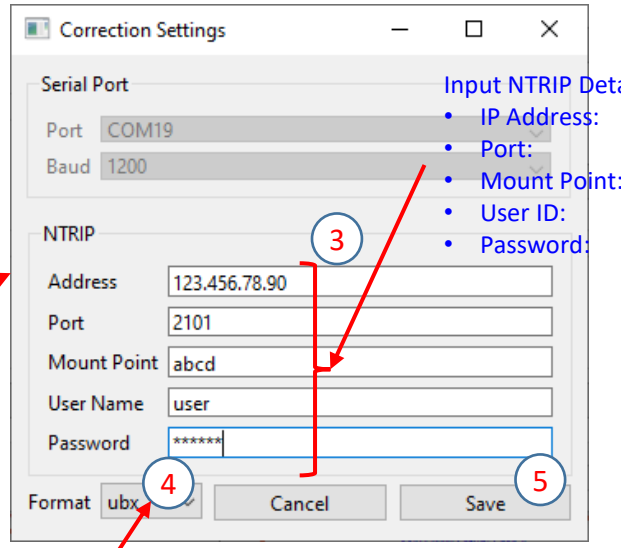
Set Data Format Type
- UBX for D9C Receiver
- SBF for MOSAIC Receiver
- RTCM3 for Other

MAD-WIN Setup: Case C

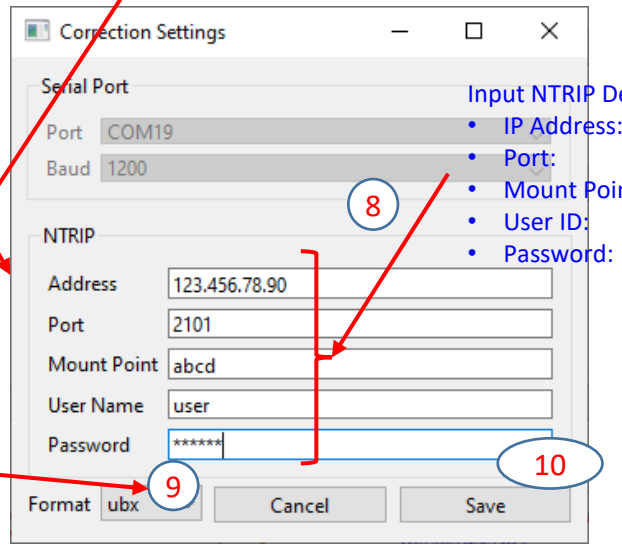
Both GNSS and MADOCA Receivers are located at a remote place







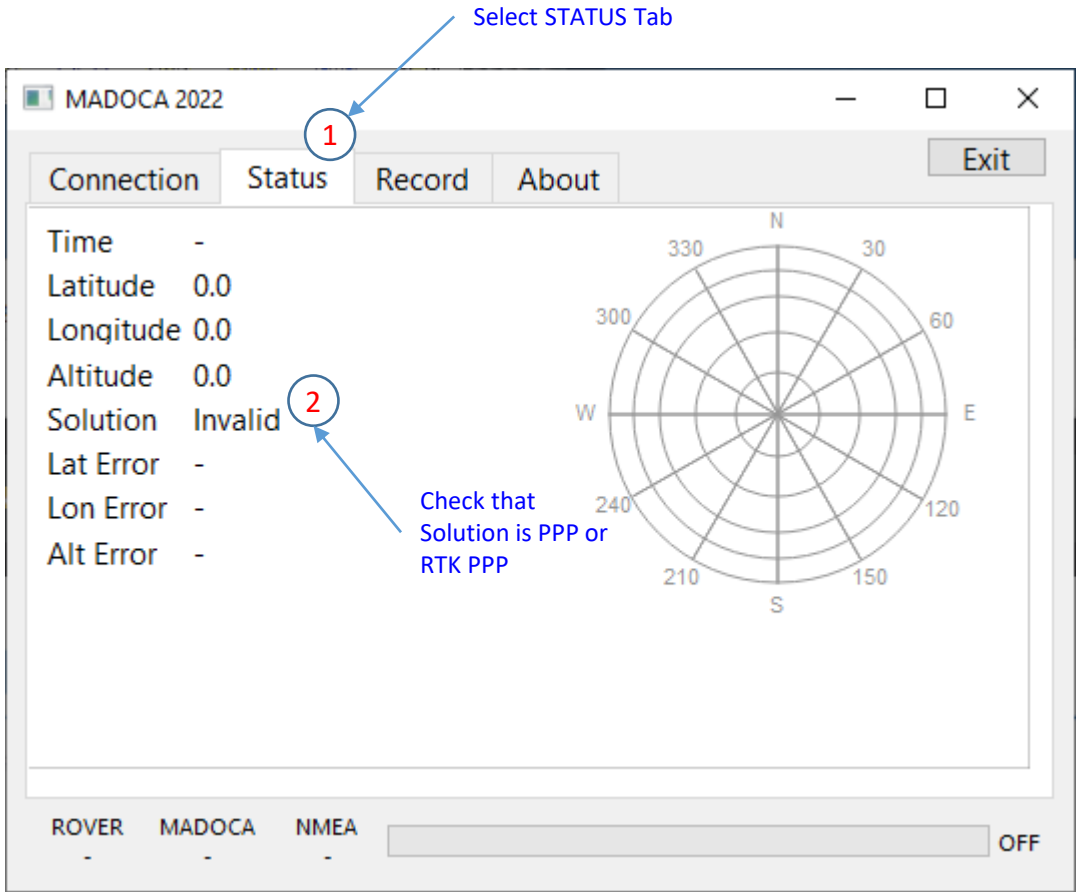
Input NTRIP Details
- IP Address:
- Port:
- Mount Point:
- User ID:
- Password:

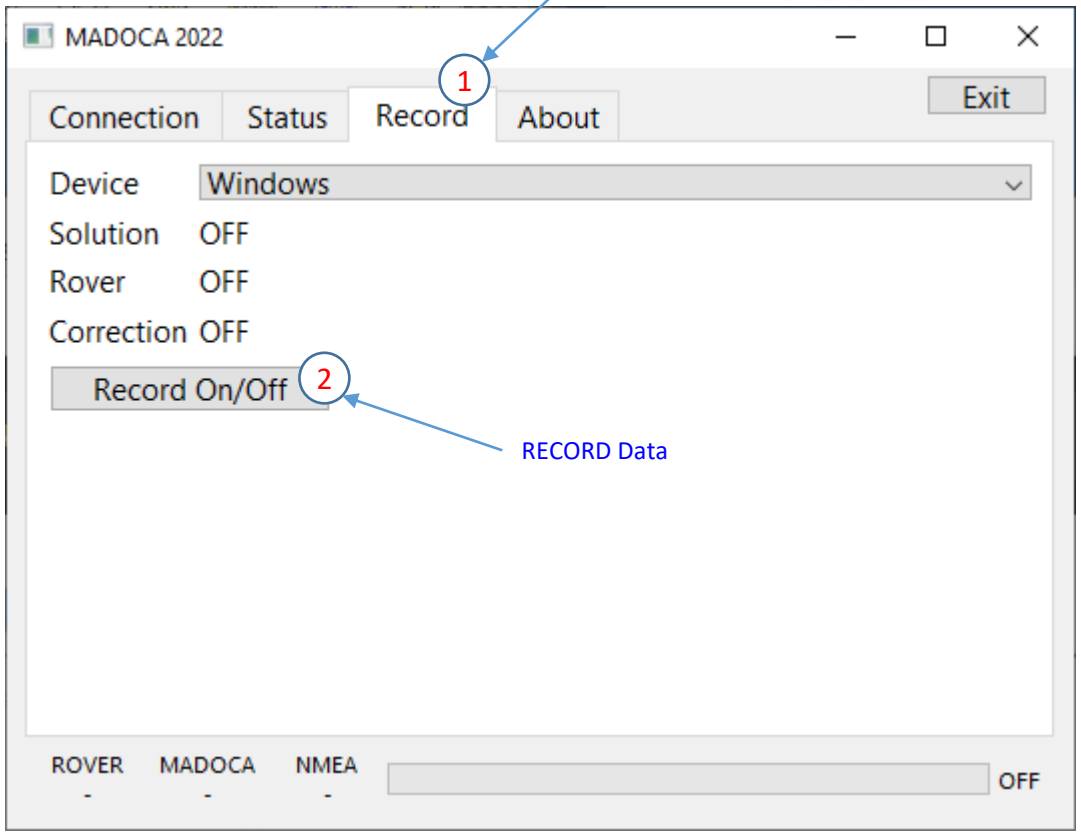


Input NTRIP Details
- IP Address:
- Port:
- Mount Point:
- User ID:
- Password:

Set Data Format Type
- UBX for D9C Receiver
- SBF for MOSAIC Receiver
- RTCM3 for Other

MAD-WIN Setup: All Cases





MADROID Setup

MADROID Setup: Receiver and Android Device

Antenna Cable

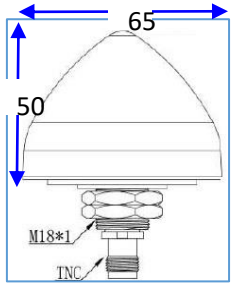
MADOCA Compatible GNSS Receiver

Micro-USB to USB Cable

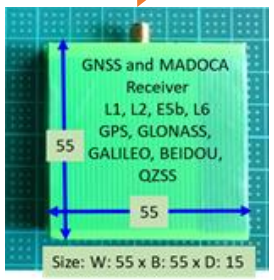
OTG Cable

- Connect Antenna to the GNSS/MADOCA receiver using the provided antenna cable.
- Connect the receiver to an Android device using a “micro-USB to USB” cable and an OTG cable.
- OTG (On-The-Go) cable may be either Type-C or Micro-USB Type depending upon android device’s connection port.

Select OTG Cable based on Android Device Connector Type



GNSS Antenna



UT RECEIVER

Micro-USB to USB Cable

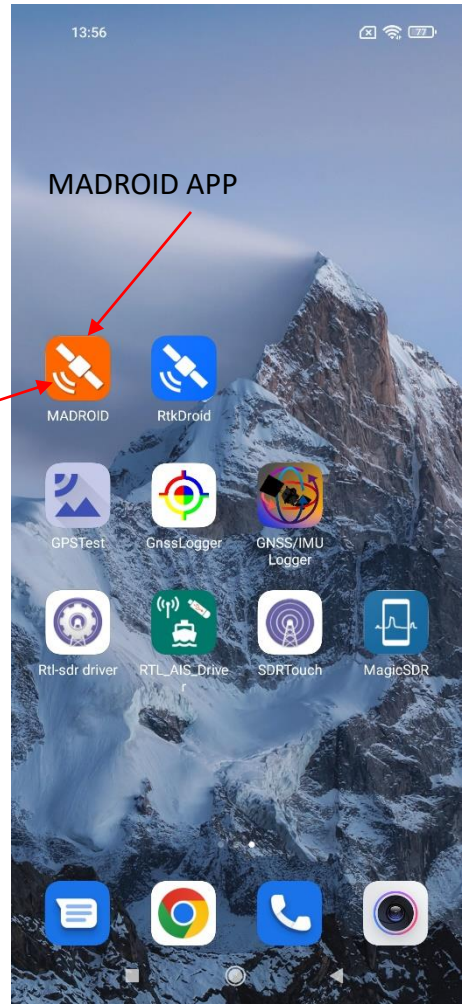
OTG Cable Type: C

OTG Cable Type: Micro USB

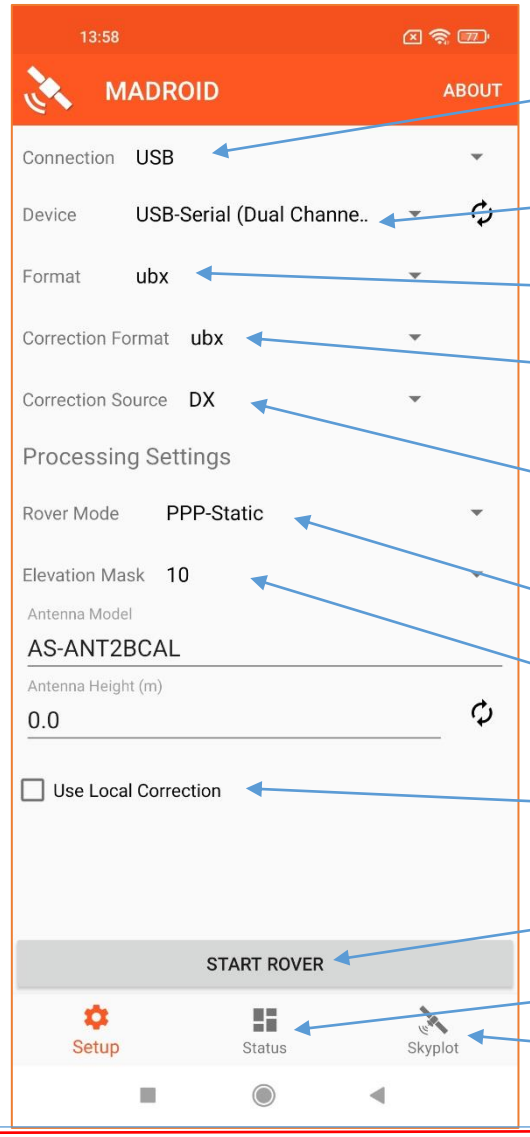
Install MADROID APP

Install MADROID APK in Android Device

- Get MADROID APK file from UT
- Connect Android device to the PC using an USB cable
- Set the device in Data Transfer mode
- Access Android device from PC
- Go to DOWNLOAD folder of Android device
- Copy MADROID file from PC to DOWNLOAD folder of Android device
- In the Android device, Go to File Manage APP
- Go to Download Folder. MADROID.apk file will be available here
- Tap the file, it will prompt for INSTALL access
- Say Yes and Install the APP
- After installation is done, go to device screens
- You will find the MADROID APP as shown here
- Run the APP and follow the instructions as shown in the next slide.
- Make sure that you have already connected Antenna, receiver etc. to the Android device before running the APP
- If ONLINE correction data will be used, make sure either WiFi or DATA is ON to access the NTRIP server via internet.



MADROID GUI: Use this setting for system test



CONNECTION
Select USB
(Options are 1. USB 2. Bluetooth)

DEVICE
In the Device the following must be visible if UT Receiver is connected:

- USB-Serial (Dual Channel) (Port 0)
- USB-Serial (Dual Channel) (Port 1)

FORMAT
Select UBX to use GNSS Signals from UT Receiver connected to Android Device

CORRECTION FORMAT
Select UBX if MADOCA Correction data from UT receiver to be used
Select other format such as RTCM or BINEX if correction data are provided in RTCM or BINEX format

CORRECTION SOURCE
Select DX if correction data from the receiver connected to the Android device to be used
Select ONLINE if correction data from an ONLINE NTRIP server to be used
When ONLINE is selected, It is necessary provide NTRIP related information such as
IP Address, Port, Mount Point, User ID and Password.

ROVER MODE
Select ROVER MODE either PPP STATIC or PPP KINEMATIC

ELEVATION MASK
Se ELEVATION MASK angle. Normally a mask angle of 10 - 15 degree is set.

LOCAL CORRECTION
Do not select Local Correction unless you are provided Local Correction NTRIP information.

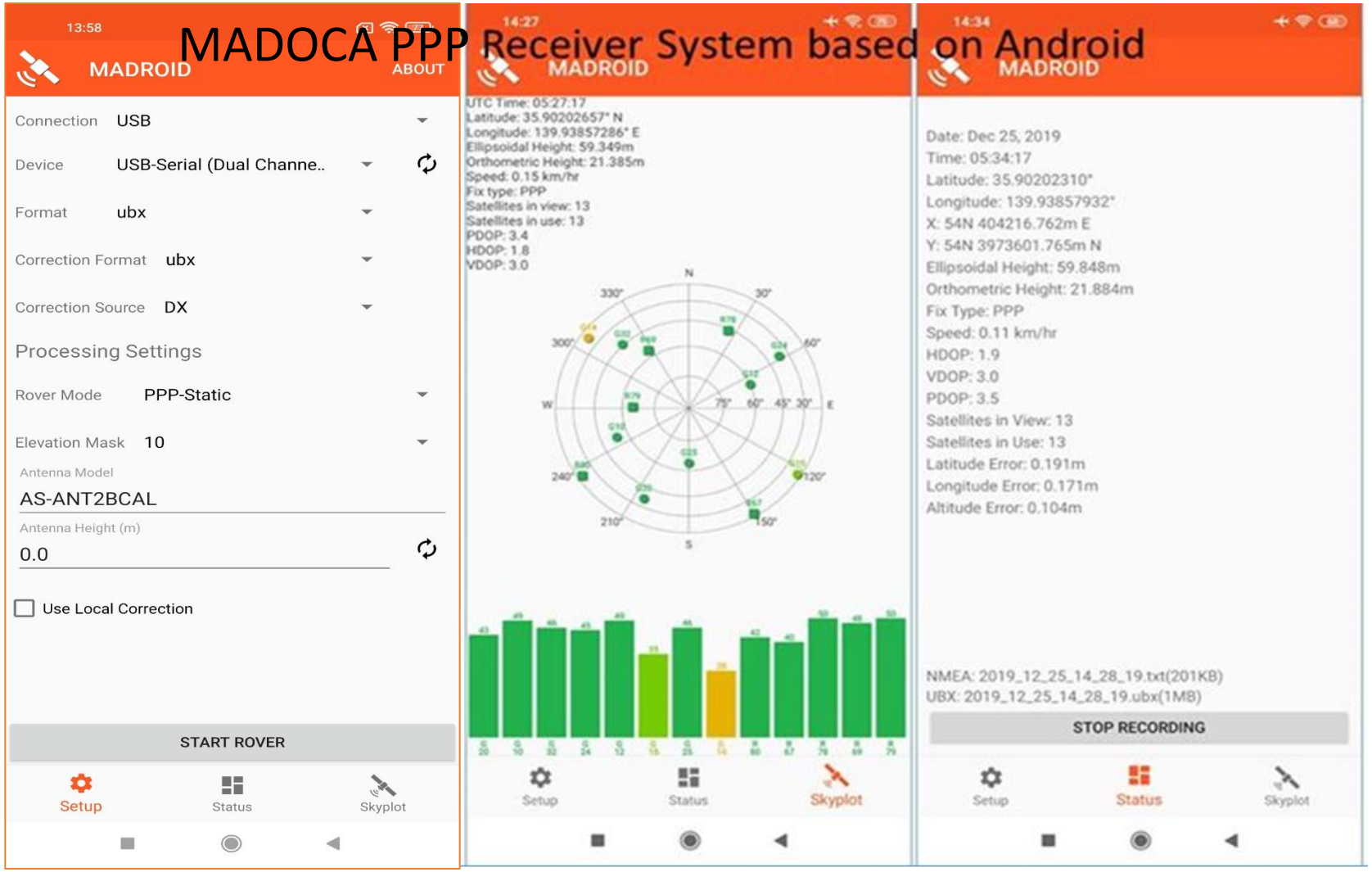
START ROVER
Once all the settings are completed, Select START ROVER. This will begin MADOCA PPP Observation.

STATUS
It shows current MADOCA PPP Status such as Position Data, Position Error etc.

SKYPLOT
SKYPLOT shows all visible satellites, C/No values and Position Data.

MADROID System Test Screen Shots

MADOCA PPP Receiver System based on Android



MADROID PPP with Local Correction Setup