

Low-Cost MADOCA PPP Receiver Systems

Dinesh Manandhar
CSIS, The University of Tokyo
dinesh@csis.u-tokyo.ac.jp
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Low-Cost MADOCA PPP Receiver Systems

MAD MAD MADROID

• Type – A

- **Product: MAD-PI**
- Based on RaspberryPi
- Receiver : Dual Frequency Receiver
 - UBX, SBF or RTCM3 data format
- MADOCA Decoding Receiver or Online Correction Data
- Correction Data Format
 - UBX, RTCM3 or JAXA online
- Under debugging and test

• Type – B

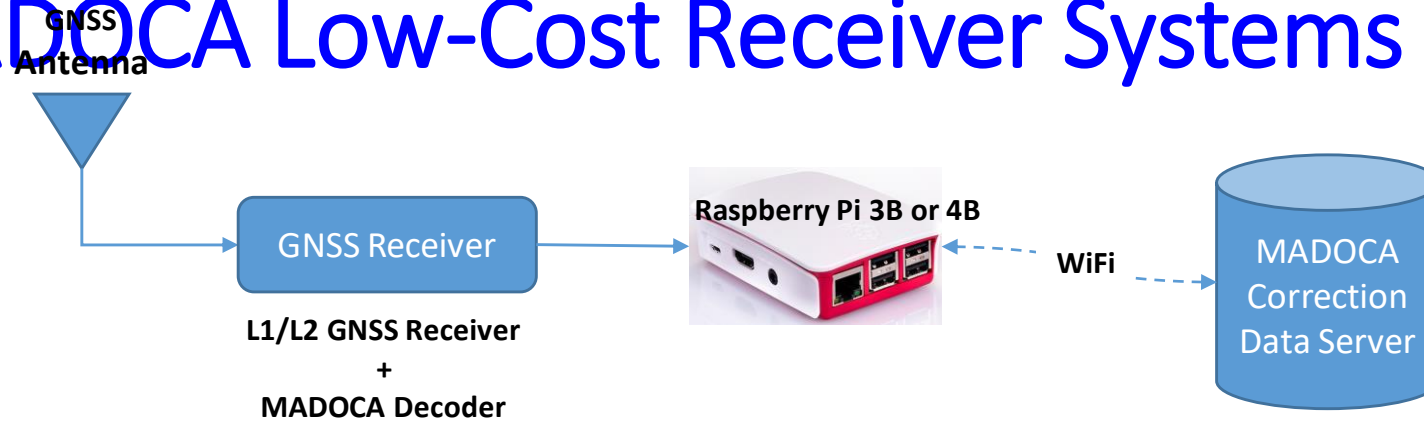
- **Product: MAD-WIN**
- Based on Windows
- Receiver : Dual Frequency Receiver
 - UBX, SBF or RTCM3 data format
- MADOCA Decoding Receiver or Online Correction Data
- Correction Data Format
 - UBX, RTCM3 or JAXA online
- Under debugging and test

• Type – C

- **Product: MADROID**
- Based on Android Device
- Receiver : Dual Frequency Receiver
 - UBX, SBF or RTCM3 data format
- Correction Data Format
 - JAXA online only
- Under debugging and test

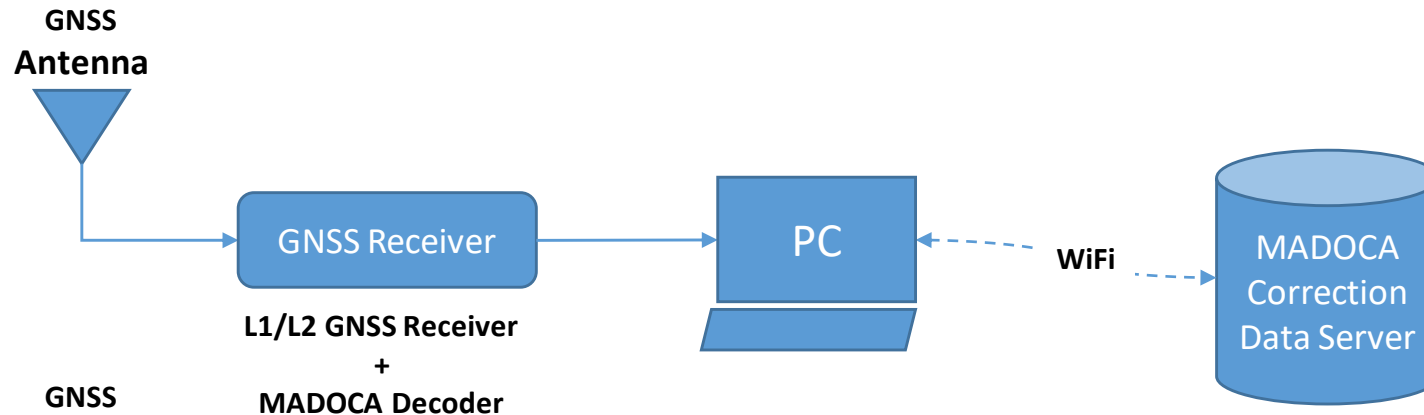
MADOCA Low-Cost Receiver Systems

Type – A : MAD-PI



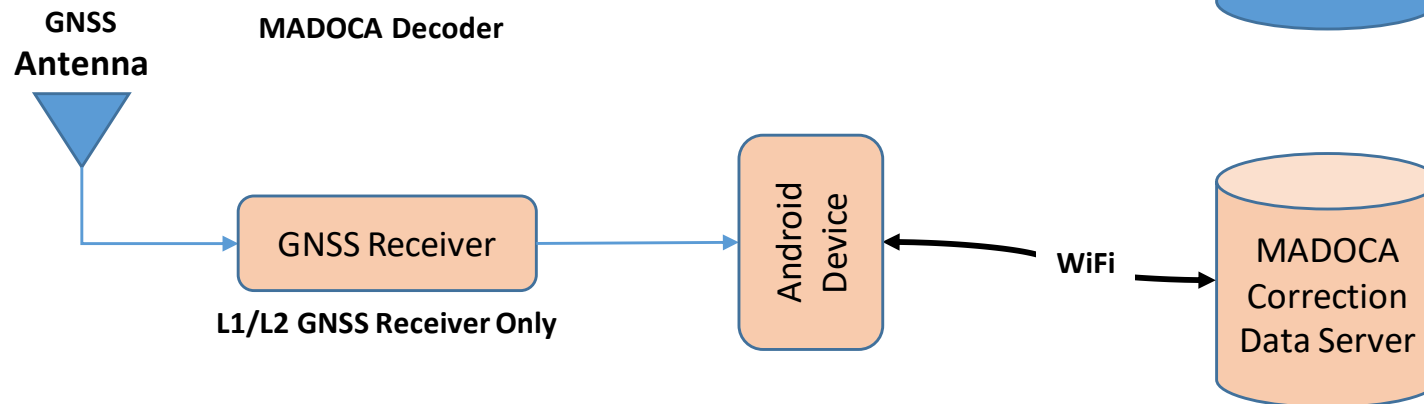
Use MADOCA correction data from server if GNSS receiver does not have MADOCA decoder

Type – B : MAD-WIN



Use MADOCA correction data from server if GNSS receiver does not have MADOCA decoder

Type – C : MADROID



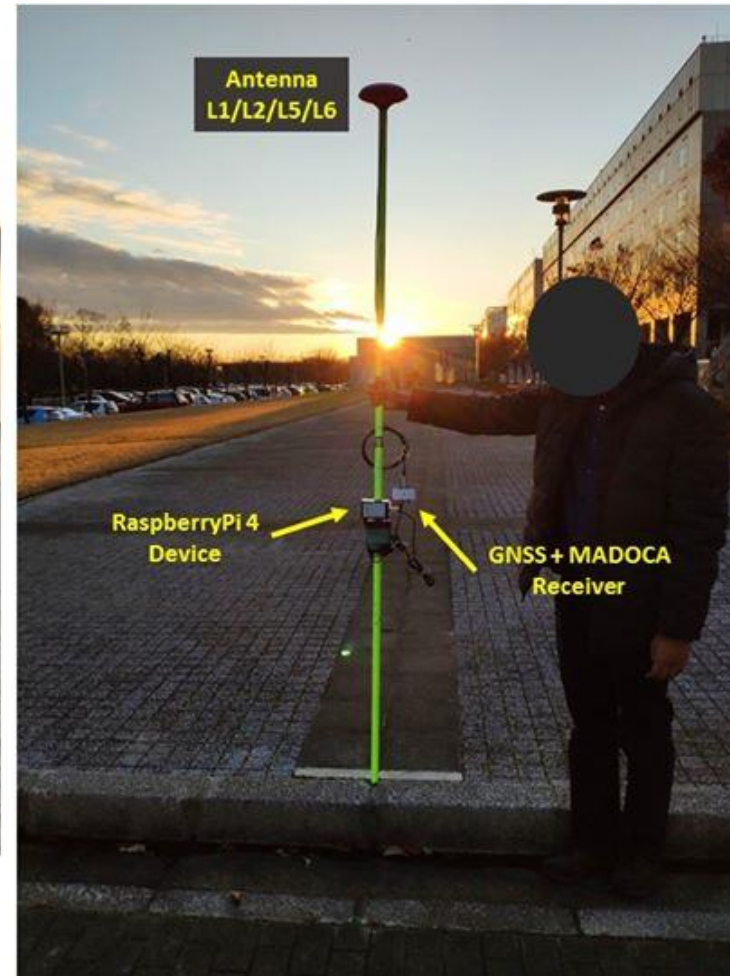
Use MADOCA correction data from server

Type A: MAD-PI

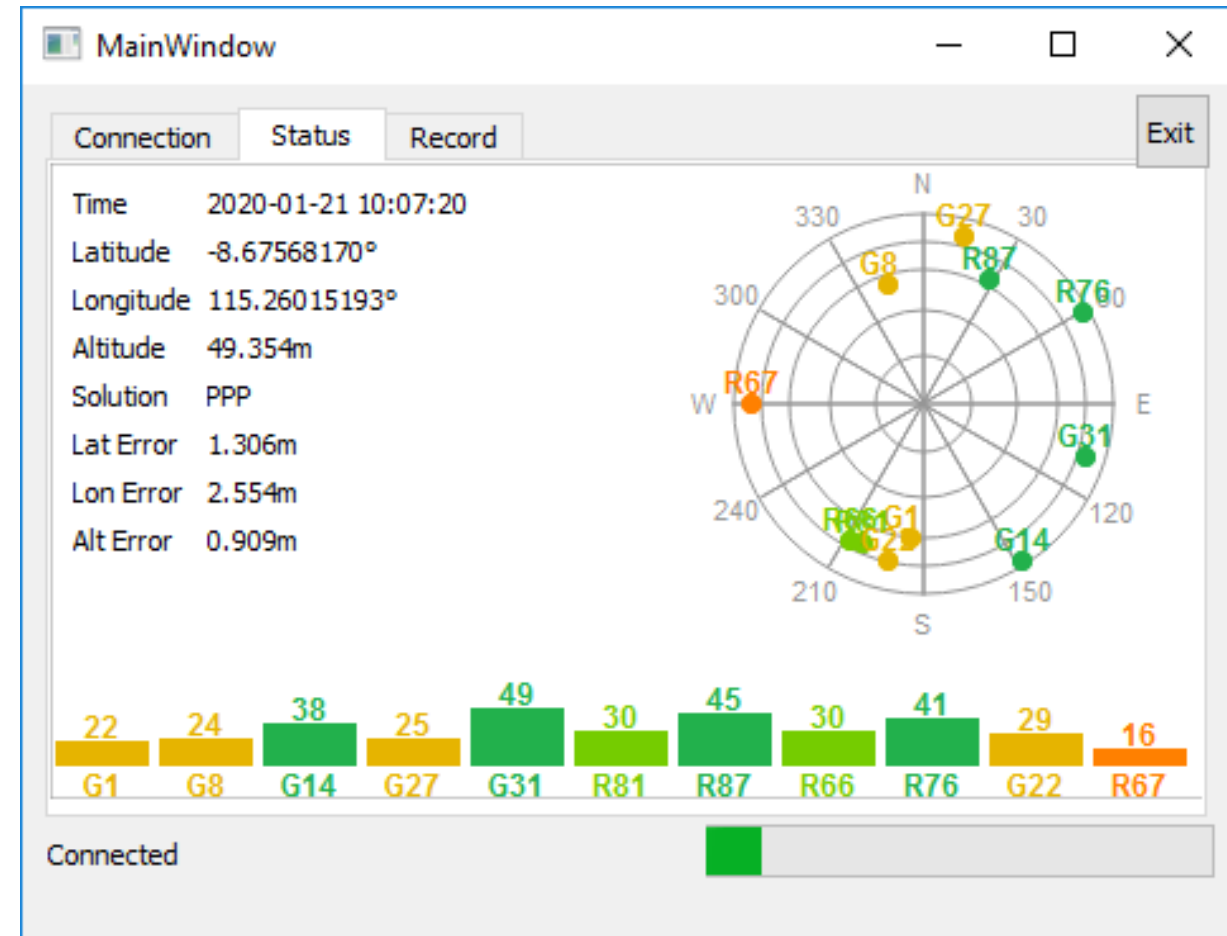
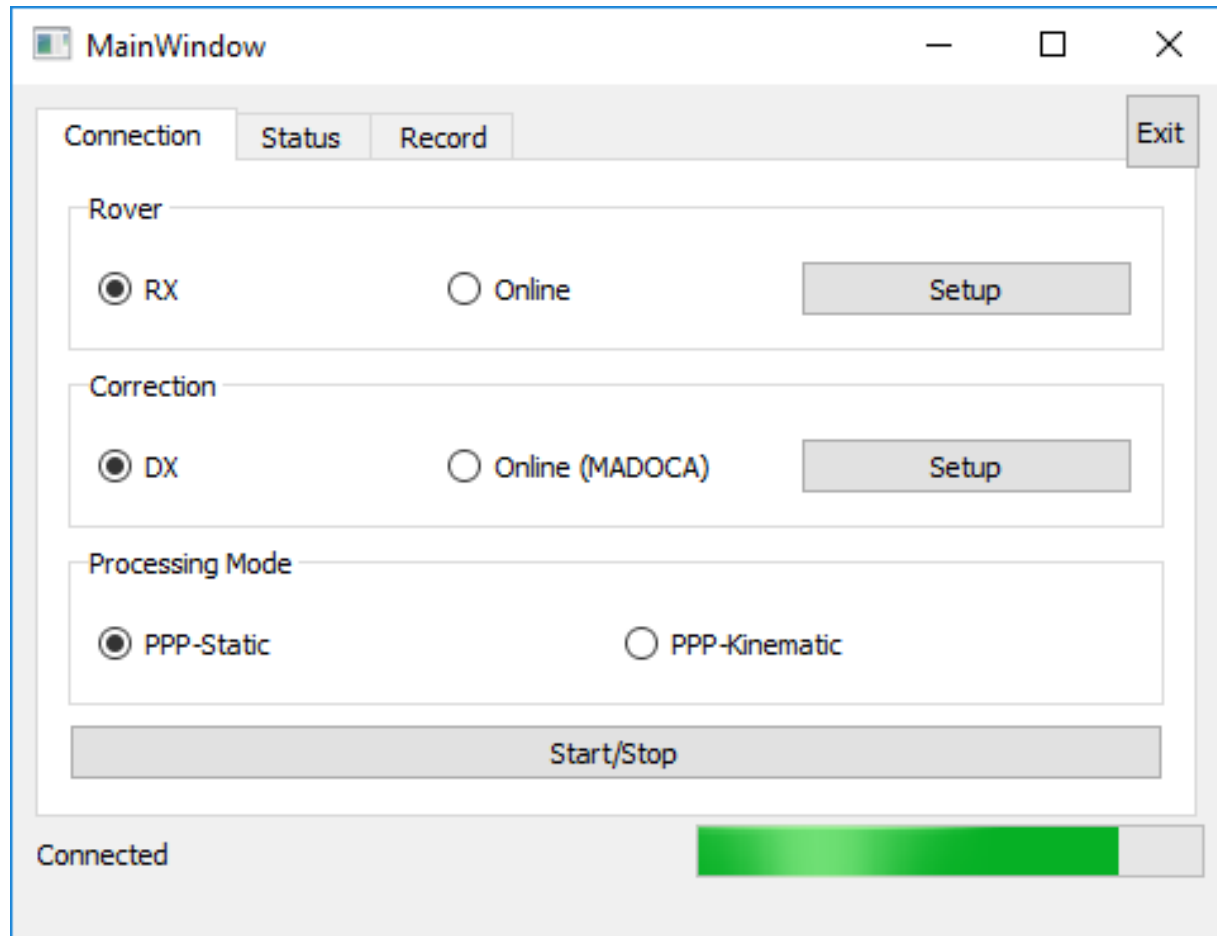
MADOCA PPP based on RaspberryPi

Dual Frequency Receiver + MADOCA Decoding Receiver

MADOCA PPP Receiver System based on RaspberryPi-4 Device



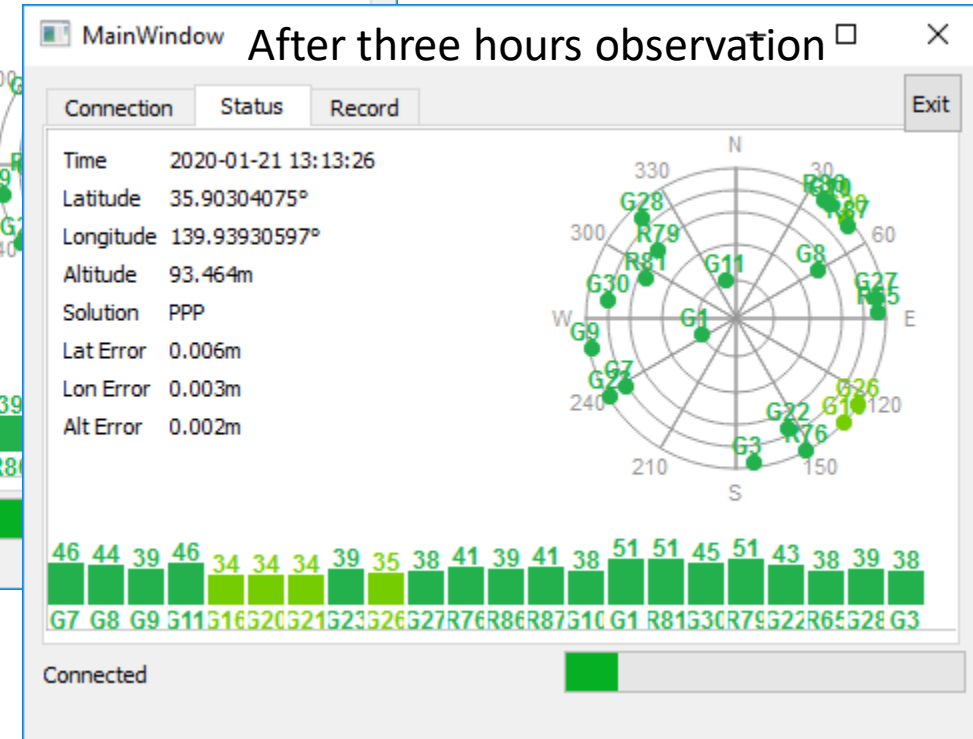
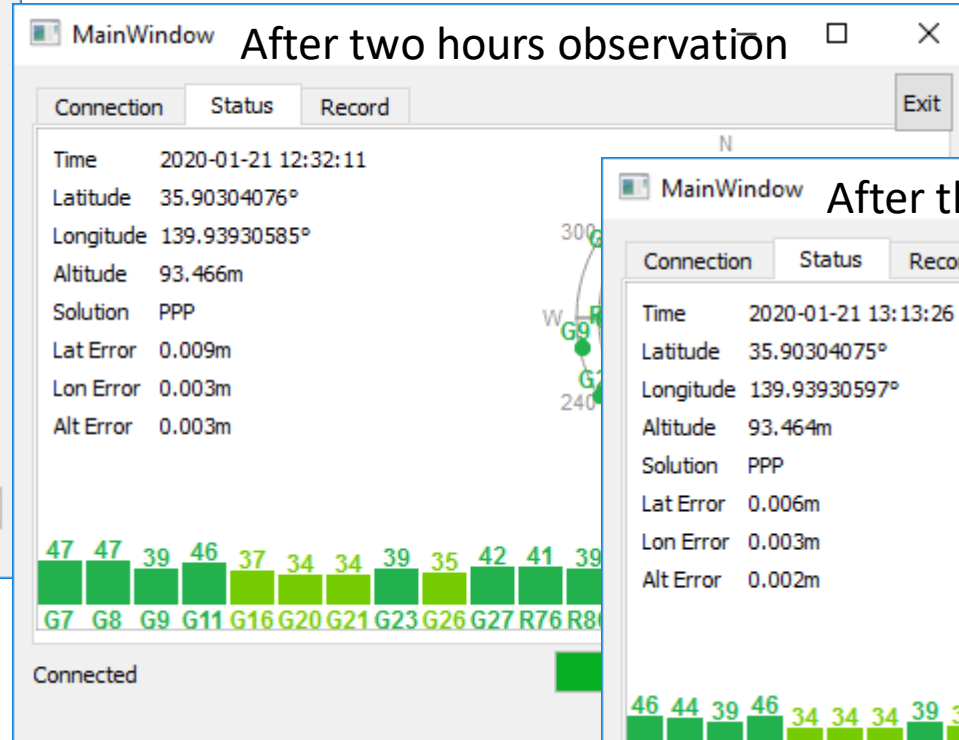
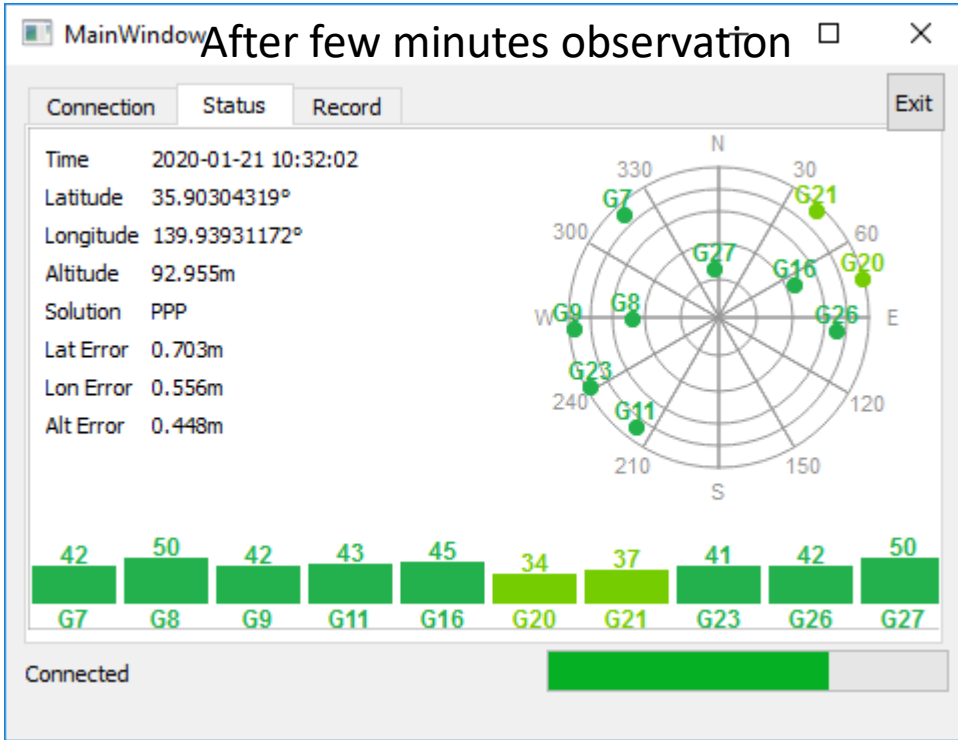
Type B: MAD-WIN



The position accuracy improves to cm (10 – 30 cm) level after initialization time of about 15min.

Type B: MAD-WIN

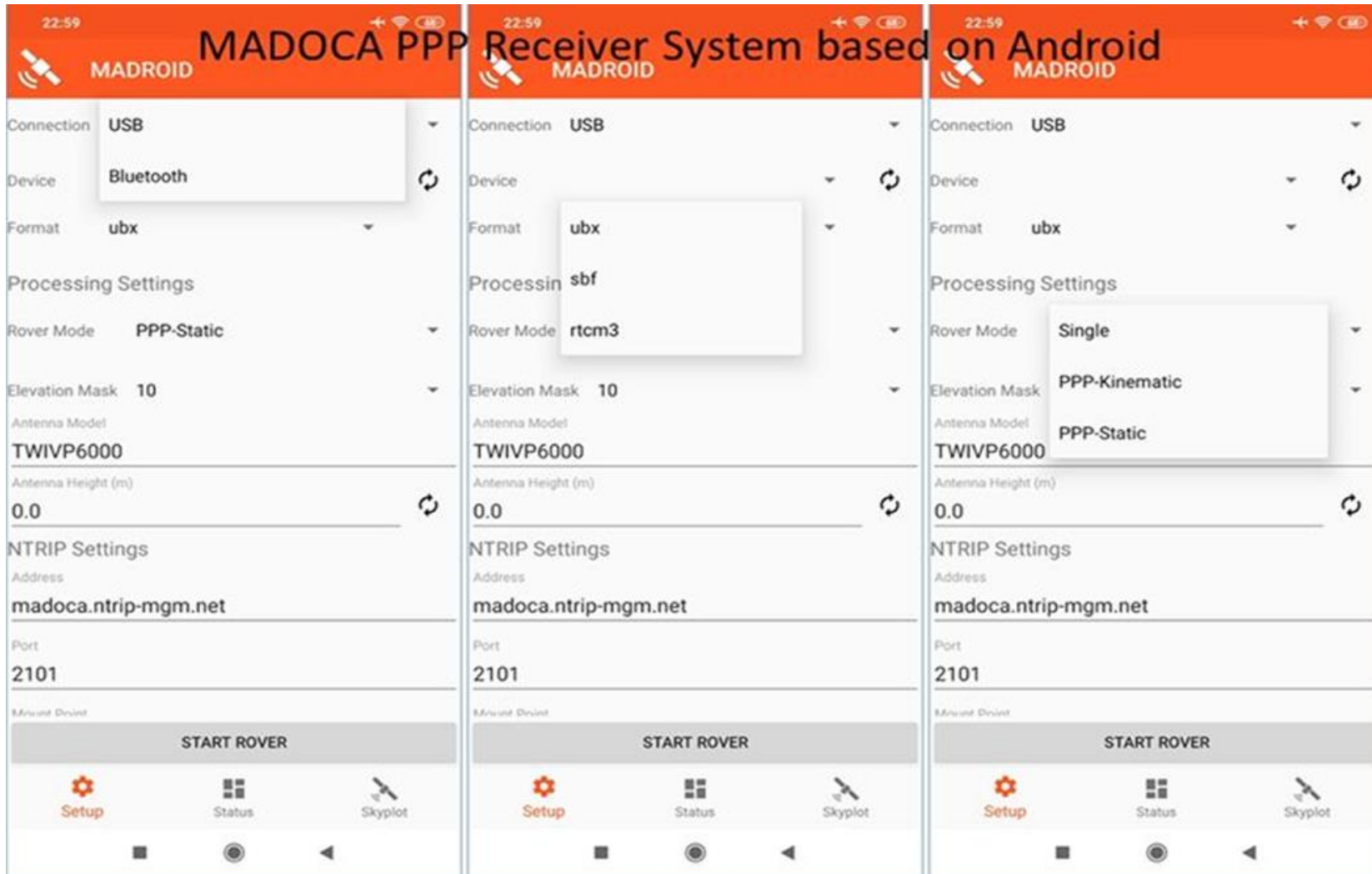
Receiver: Online receiver access in Kashiwa / Correction Data: MADOCA Receiver in Bali



Type C: MADROID

MADOCA PPP based on Android

Dual Frequency Receiver + Online MADOCA Correction Data



Contact : dinesh@csis.u-tokyo.ac.jp

Type C: MADROID

MADOCA PPP based on Android

Dual Frequency Receiver + Online MADOCA Correction Data

The image displays three screenshots of the MADROID application interface on an Android device. The interface is divided into three main sections: Setup, Status, and Skyplot.

Left Screenshot (Setup): Shows configuration options for the receiver. The title is "MADOCA PPP Receiver System based on Android".

- Connection: USB
- Device: u-blox GNSS receiver
- Format: ubx
- Processing Settings:
 - Rover Mode: PPP-Static
 - Elevation Mask: 10
 - Antenna Model: TWIVP6000
- NTRIP Settings:
 - Address: madoca.ntrip-mgm.net
 - Port: 2101
 - Mount Point: MDC0

A "START ROVER" button is visible at the bottom of the setup screen.

Middle Screenshot (Status): Shows real-time data and a skyplot.

- UTC Time: 05:27:17
- Latitude: 35.90202657° N
- Longitude: 139.93857286° E
- Ellipsoidal Height: 59.349m
- Orthometric Height: 21.385m
- Speed: 0.15 km/hr
- Fix type: PPP
- Satellites in view: 13
- Satellites in use: 13
- PDOP: 3.4
- HDOP: 1.8
- VDOP: 3.0

The skyplot shows 13 satellites in view, with their elevation angles represented by a bar chart at the bottom. The chart shows elevation angles ranging from approximately 15 to 75 degrees.

Right Screenshot (Recording): Shows recording options and real-time data.

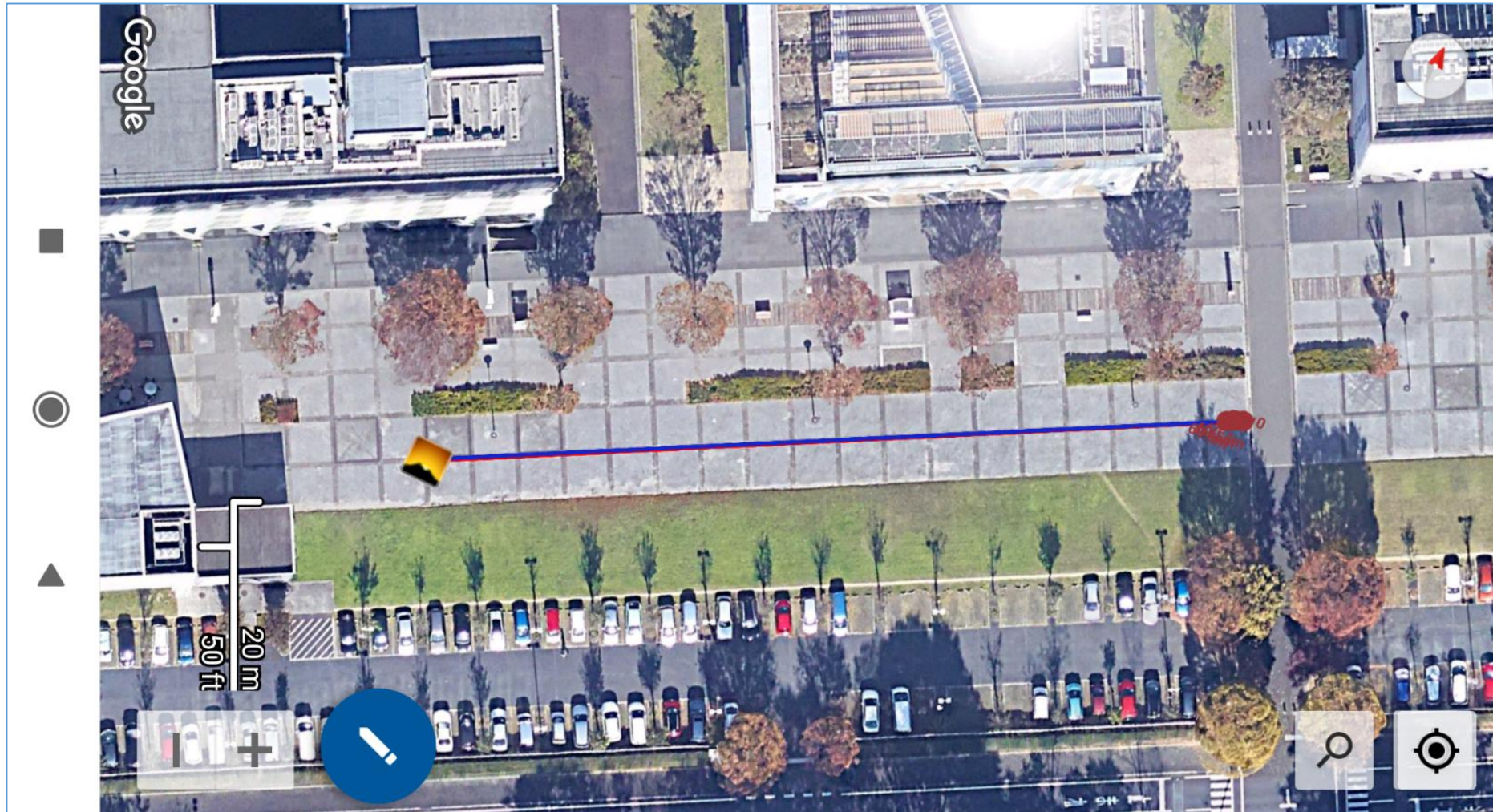
- Date: Dec 25, 2019
- Time: 05:34:17
- Latitude: 35.90202310°
- Longitude: 139.93857932°
- X: 54N 404216.762m E
- Y: 54N 3973601.765m N
- Ellipsoidal Height: 59.848m
- Orthometric Height: 21.884m
- Fix Type: PPP
- Speed: 0.11 km/hr
- HDOP: 1.9
- VDOP: 3.0
- PDOP: 3.5
- Satellites in View: 13
- Satellites in Use: 13
- Latitude Error: 0.191m
- Longitude Error: 0.171m
- Altitude Error: 0.104m

Recording options are shown at the bottom: "NMEA: 2019_12_25_14_28_19.txt(201KB)" and "UBX: 2019_12_25_14_28_19.ubx(1MB)". A "STOP RECORDING" button is visible.

Position Data from MADOCA PPP

We walked straight along the concrete tiles (30cmx30cm) and PPP results showed perfect straight line. Accuracy is about 15cm.

Receiver : F9 + Online MADOCA Correction Data



Output from MADOCA PPP Device: RaspberryPi

MainWindow

Connection Status Record Exit

Rover

RX Online

Correction

DX Online (MADOCA)

Processing Mode

PPP-Static PPP-Kinematic

Connected

MainWindow

Connection Status Record Exit

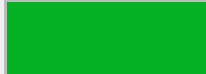
Device OS

Solution 2019-12-27_125516.nmea(482304)

Rover 2019-12-27_125516.ubx(3896320)

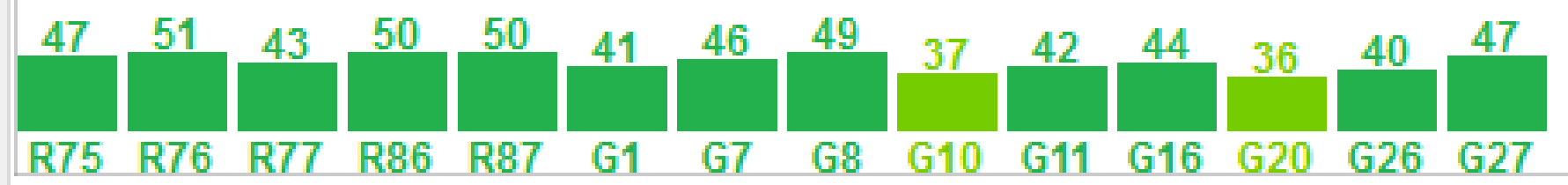
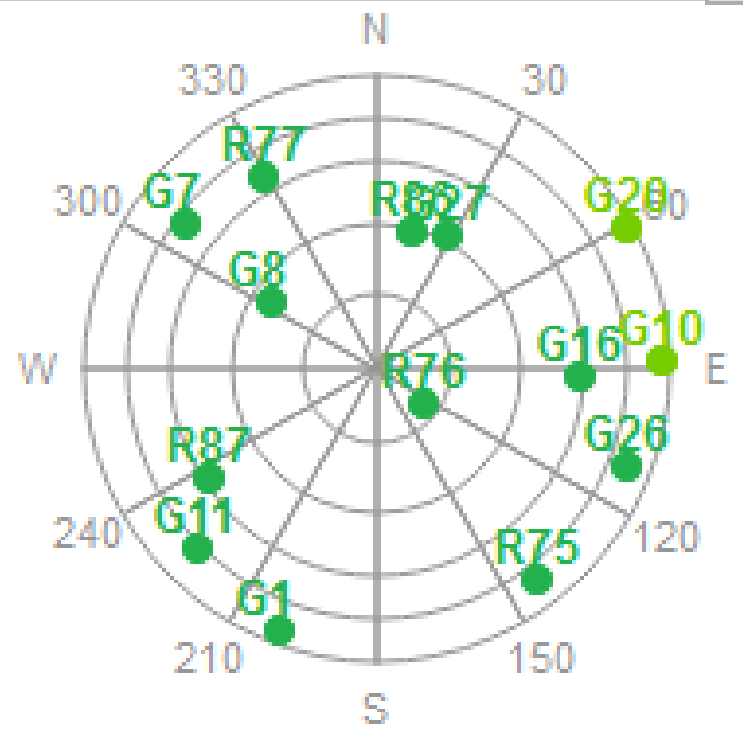
Correction 2019-12-27_125516.rtc3(1553408)

Record On/Off

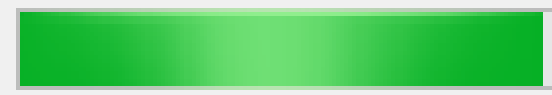
Connected 

Connection Status Record Exit

Time 2019-12-27 12:52:43
 Latitude 35.90305269°
 Longitude 139.93930937°
 Altitude 94.914m
 Solution PPP
 Lat Error 5.095m
 Lon Error 4.413m
 Alt Error 3.702m



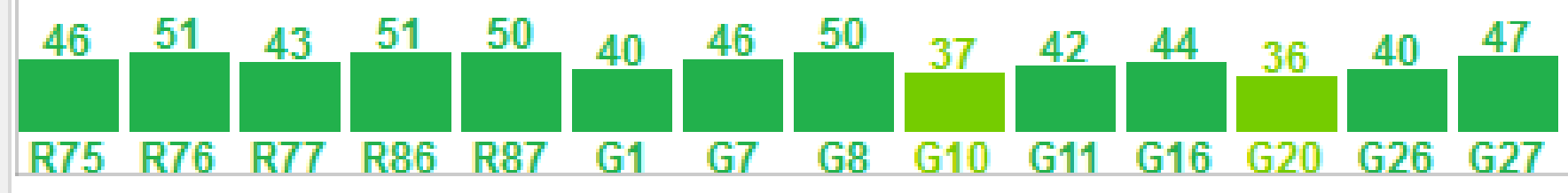
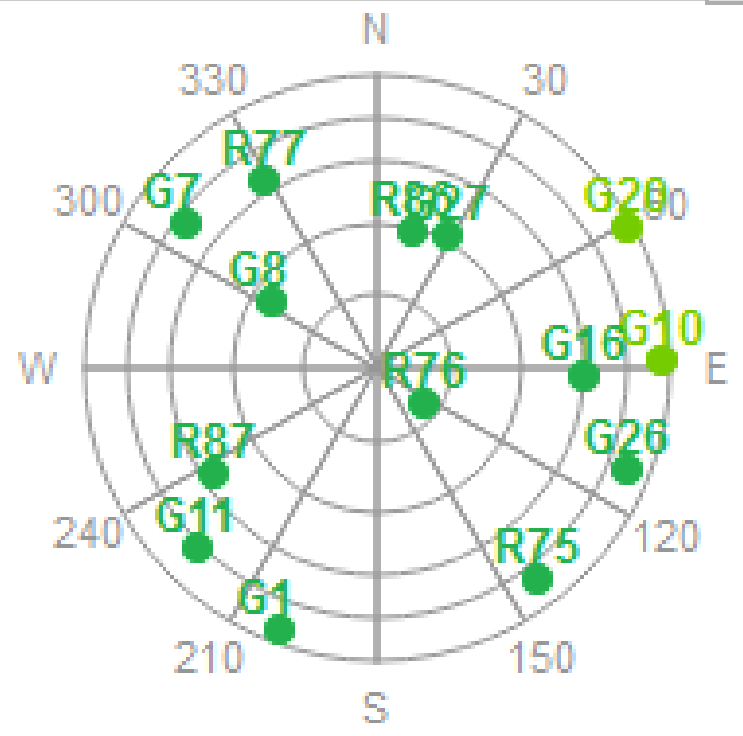
Connected



Connection Status Record

Exit

Time 2019-12-27 12:52:51
 Latitude 35.90305439°
 Longitude 139.93930858°
 Altitude 92.701m
 Solution PPP
 Lat Error 3.121m
 Lon Error 2.647m
 Alt Error 2.307m

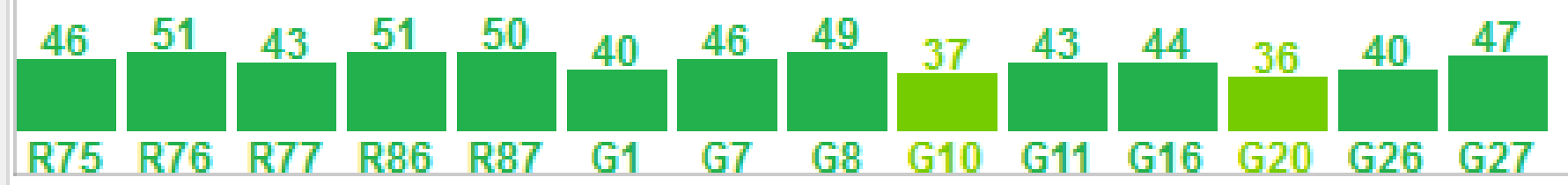
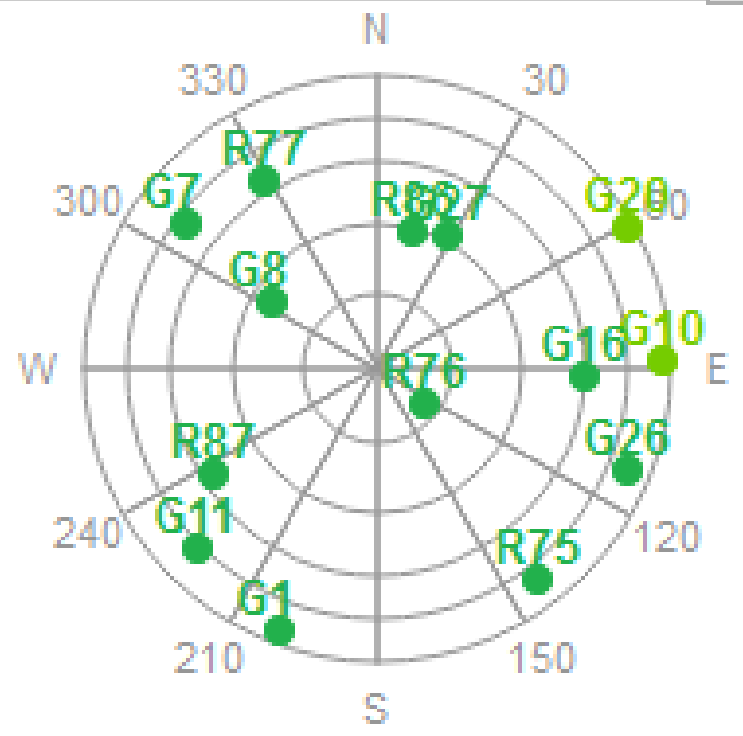


Connected

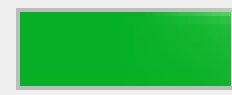


Connection Status Record Exit

Time 2019-12-27 12:52:59
 Latitude 35.90304378°
 Longitude 139.93930210°
 Altitude 93.777m
 Solution PPP
 Lat Error 2.328m
 Lon Error 1.949m
 Alt Error 1.722m

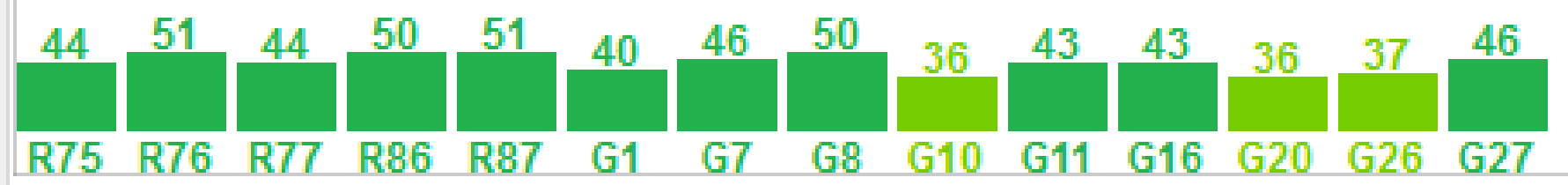
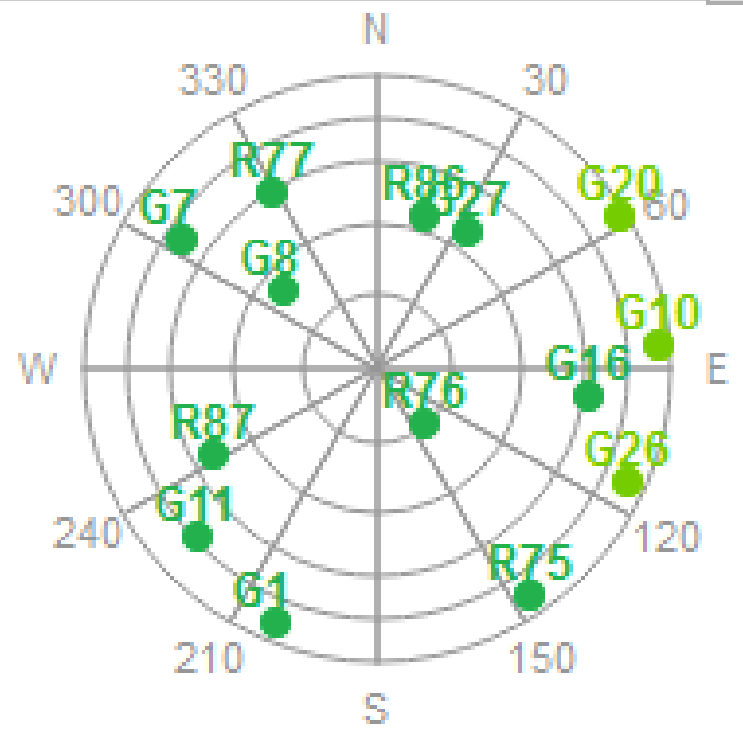


Connected



Connection Status Record Exit

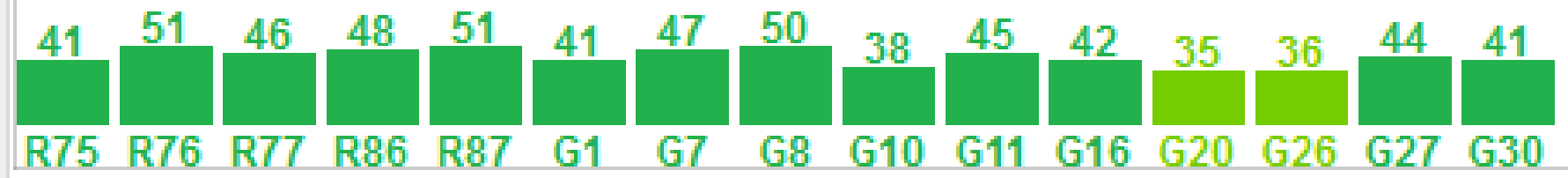
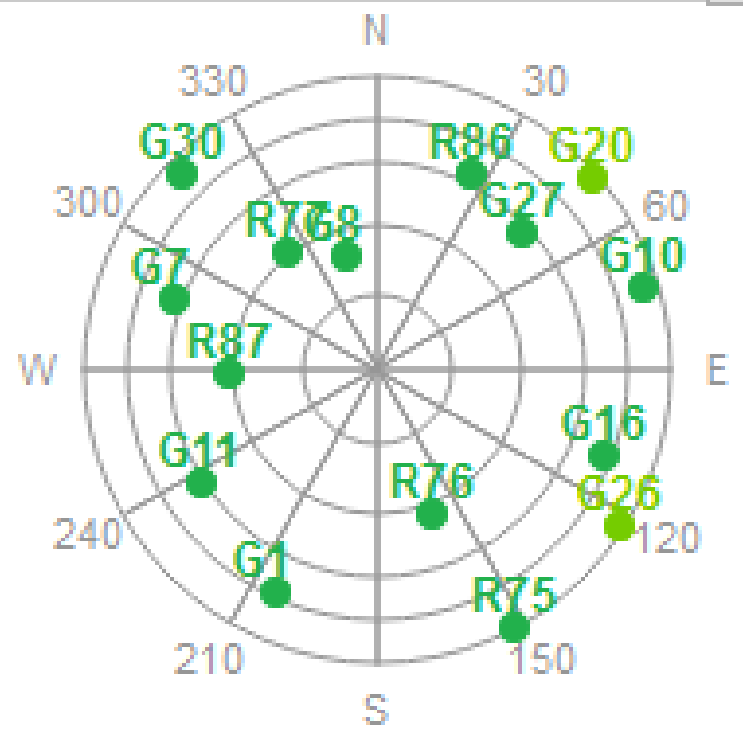
Time 2019-12-27 13:00:39
 Latitude 35.90304101°
 Longitude 139.93930435°
 Altitude 93.589m
 Solution PPP
 Lat Error 0.131m
 Lon Error 0.086m
 Alt Error 0.070m



Connected [Progress Bar]

Connection Status Record Exit

Time 2019-12-27 13:29:13
 Latitude 35.90304023°
 Longitude 139.93930615°
 Altitude 93.494m
 Solution PPP
 Lat Error 0.017m
 Lon Error 0.010m
 Alt Error 0.009m



Connected [Progress Bar]

MADOCA Observation Results, Kashiwa

	Measured Values	True Values	Difference meter
LAT	35.90304079	35.90304065	-0.02
LON	139.93930587	139.93930614	0.03
Ht	93.446	93.463	0.02

MADOCA Observation in Cairo, Egypt

Device used: MAD-PI, Receiver F9P, MADOCA Correction Data : Online

	Measured Values	True Values	Difference meter
LAT	30.08165408	30.08165819	0.4521
LON	31.24501952	31.24502203	0.2651
Ht	52.537	51.216	0.279*



MADOCA PPP measurement display on RaspberryPi device.

Difference = (True – Measured) / 1 deg about 110Km

*Antenna Height is 1.6m, GCP Height is 52.537-1.6 = 50.937m



Setting MADOCA low-cost receiver system in RaspberryPi device.