MADOCA PPP PERFORMANCE EVALUATION IN ASIA AND OCEANIA

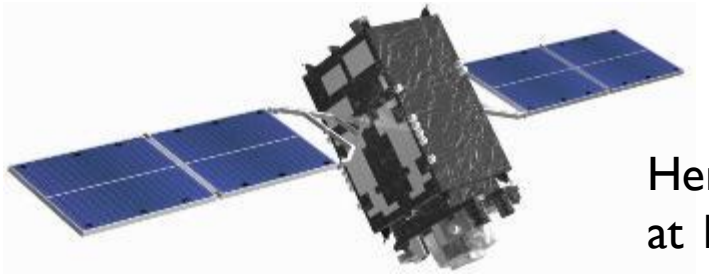
TOKYO UNIVERSITY OF MARINE SCIENCE AND TECHNOLOGY

GPS/GNSS LABORATORY

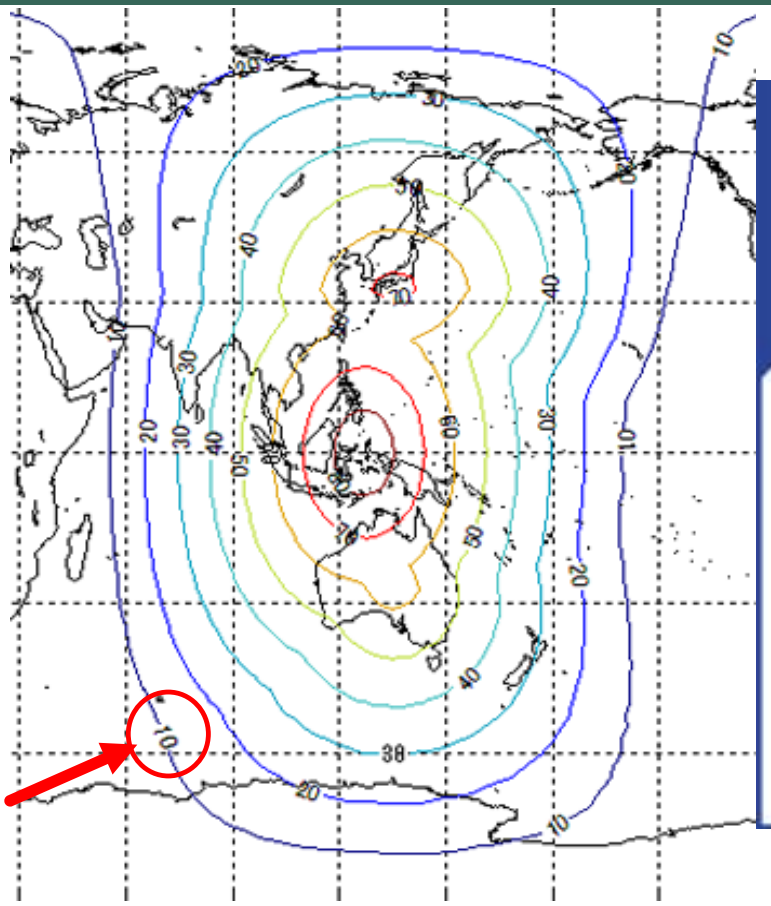
NOBUAKI KUBO

PURPOSE

- The first objective is to evaluate real MADOCA PPP performance in several countries in Asia and Oceania.
- **The second objective is to find the potential users of PPP in these countries.**



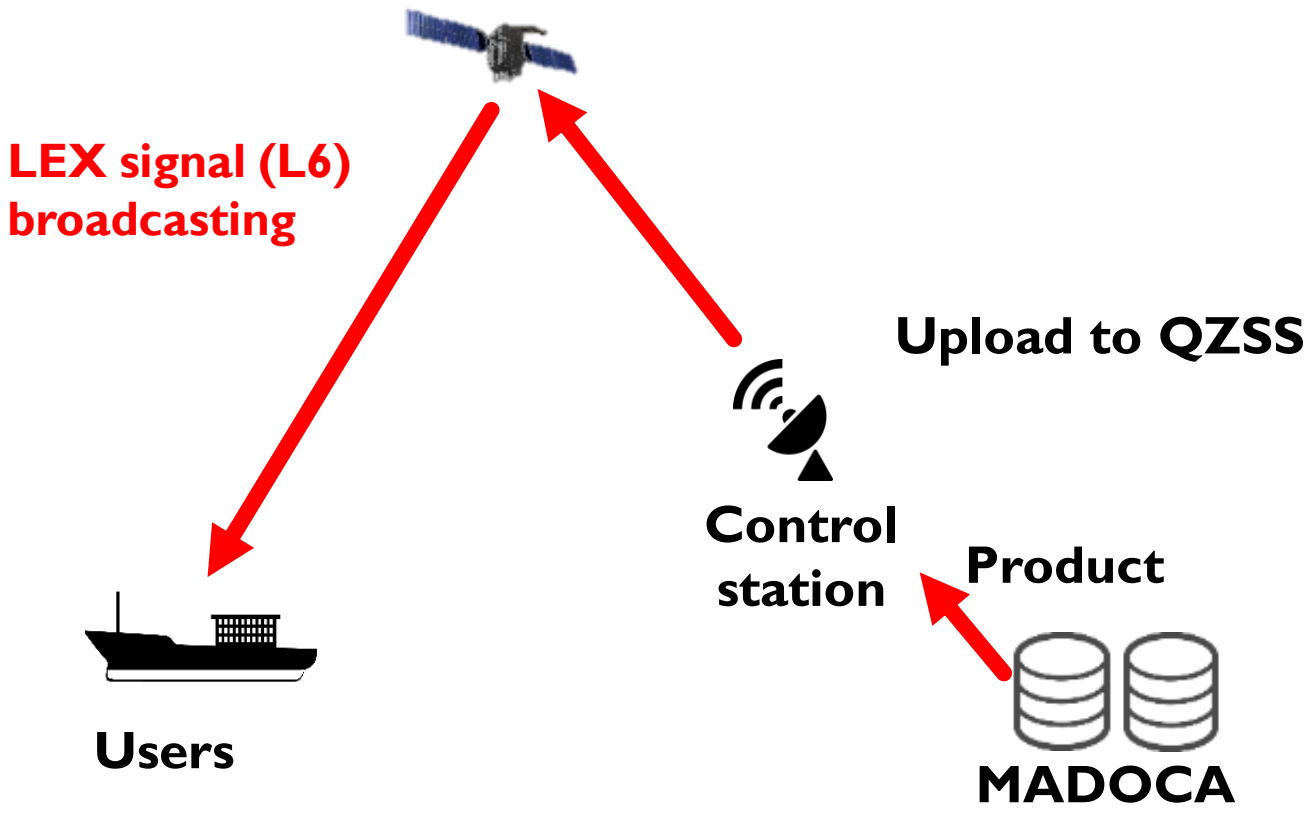
Here, we can see QZSS at 10 degrees



Freely available in Asia and Oceania

MADOCA-PPP（no base station）

PPP correction service（operation in the near future）



MADOCA

After 15 min., we can get 10 cm accuracy. With new method, we can shorten the time and PPP-AR is possible

Product (LEX signal)

GPS・GLONASS・QZSS

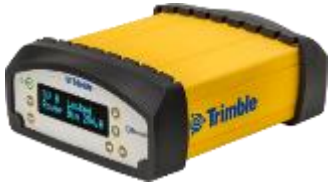
Precise orbit and clock

CONVENTIONAL → NOW

Conventional

decode

LEX



PPP

Software receiver

High-end receiver

Now

PPP

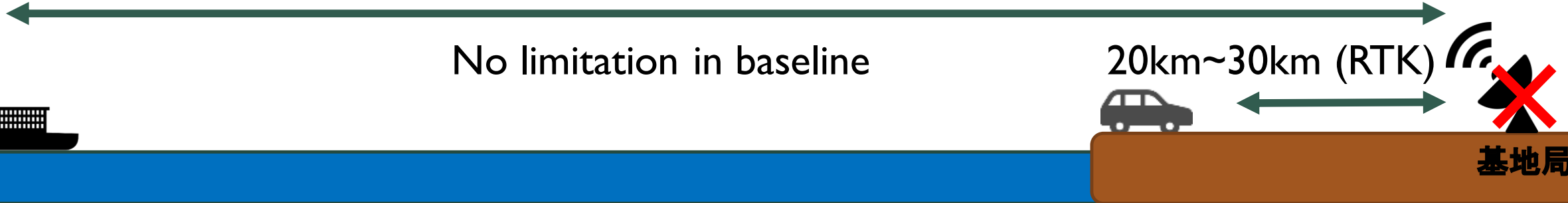
Low-cost small receiver is available for PPP.
Dr. Dinesh demonstrates it.

All you need is to connect antenna.

ISSUES IN SEA AND UNDEVELOPED AREA

It is difficult to use cm-level accuracy on the sea and undeveloped areas without controlled base stations.

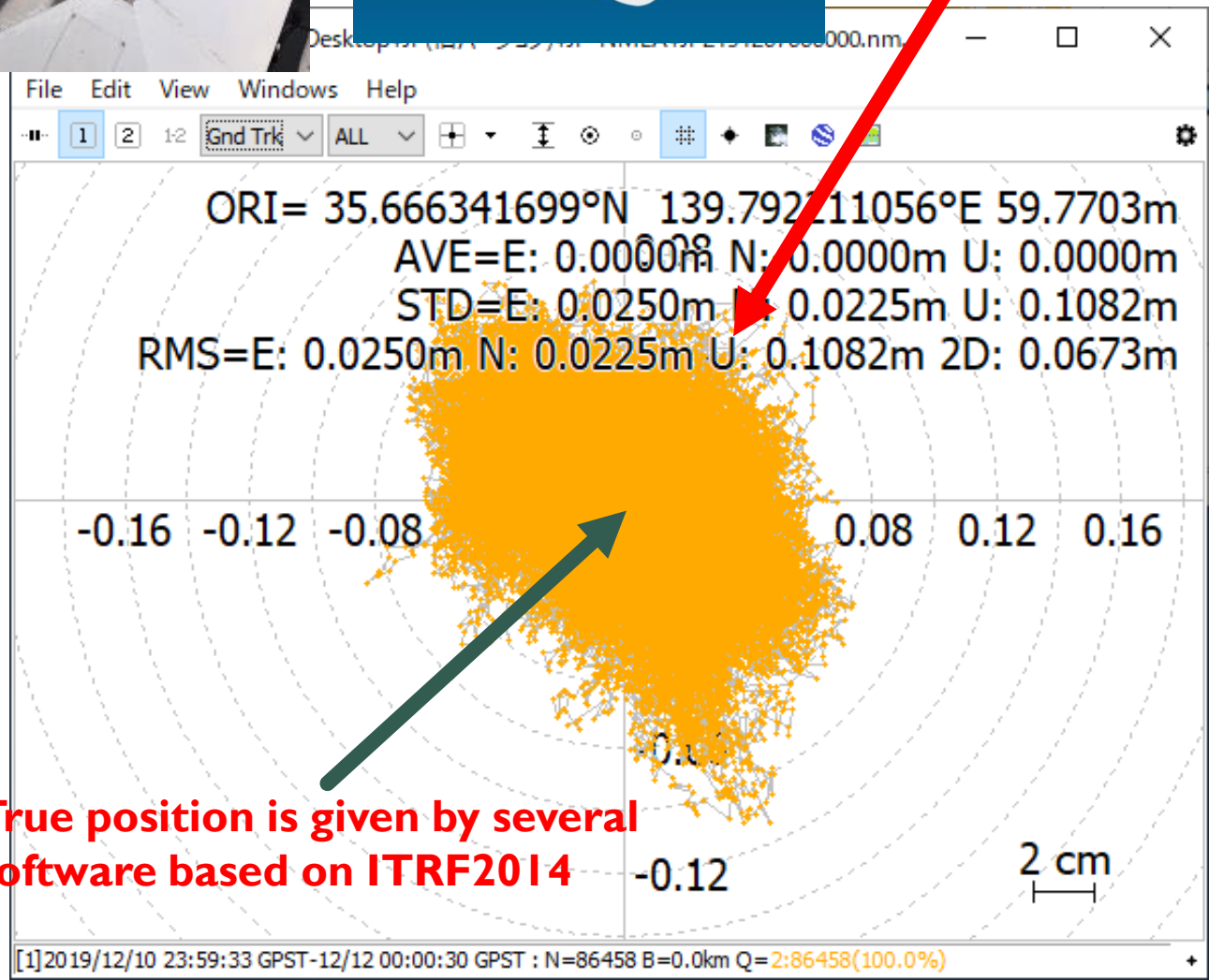
PPP is possible through the satellite



EVALUATION

NMEA (PPP)

- Receiver is multi-GNSS receiver manufactured by Magellan Systems Japan.
- Locations are 1 in Japan and 7 in foreign countries including Singapore.
- Errors in each station are evaluated based on true position (ITRF2014)→**suitable for moving platform in global (ship and airplane)**

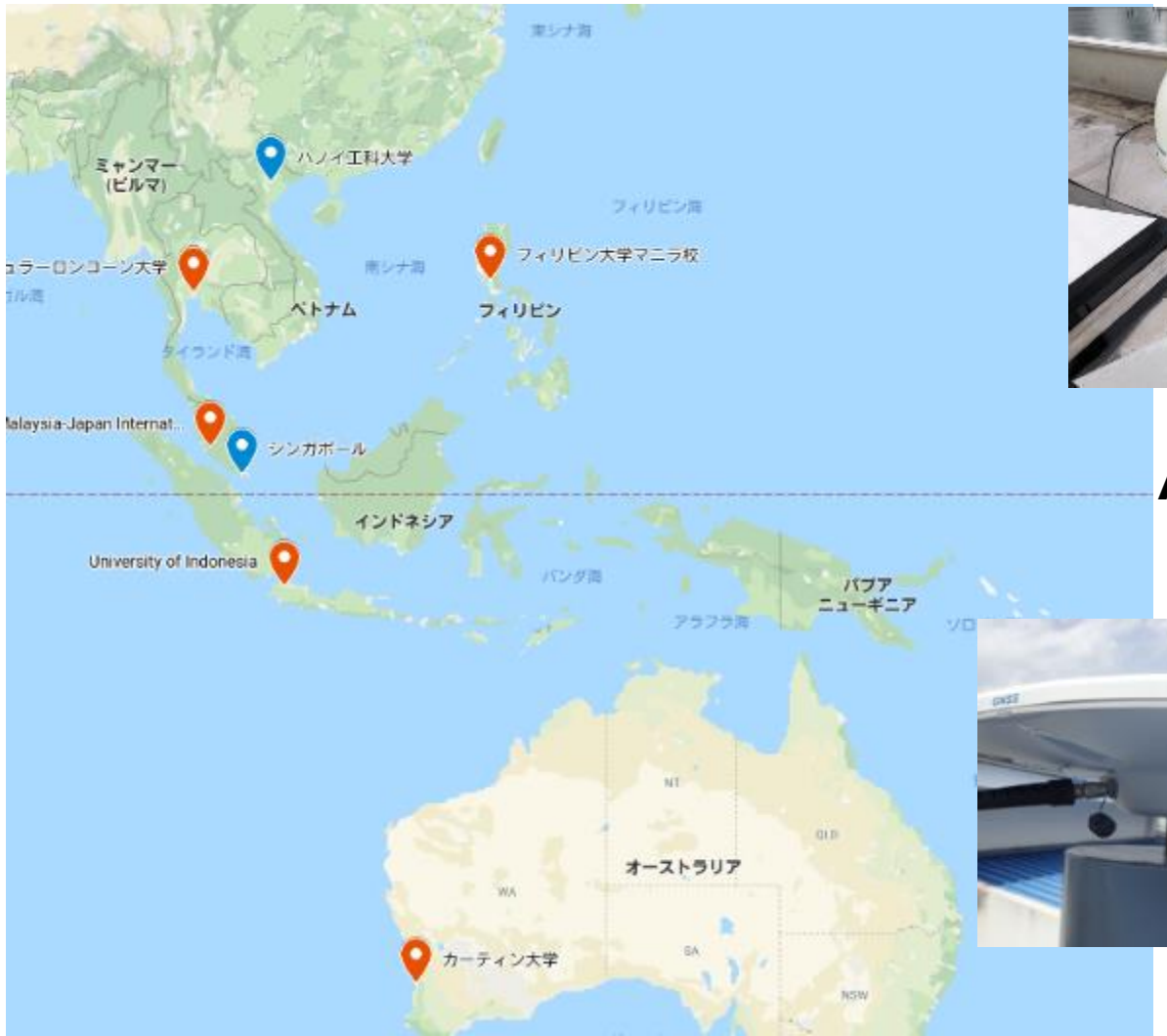


True position is given by several software based on ITRF2014

OUTLINE OF LOCATIONS

Locations (Time)

TUMSAT JAPAN（August）
Chula Thailand（August）
UOP Philippine（August）
MJIIT Malaysia（Nov.）
Curtin Australia（Nov.）
UOI Indonesia（Dec.）
Singapore：（Feb.）
Vietnam：（Feb.）



Thailand
Tokyo

Australia→

←Malaysia

DATA ACQUISITION IN APRIL 2020

- JP ▪ ▪ ▪ no data from 18 to 23 due to PC reboot (no one came to lab.)
- UP ▪ ▪ ▪ OK
- Thailand ▪ ▪ ▪ OK
- MJIIT ▪ ▪ ▪ impossible to upload sue to COVID19
- Indonesia ▪ ▪ ▪ waiting for 28,29,30
- Curtin ▪ ▪ ▪ OK

Place：UP

Time：April

App used：GPASLIB

True position：

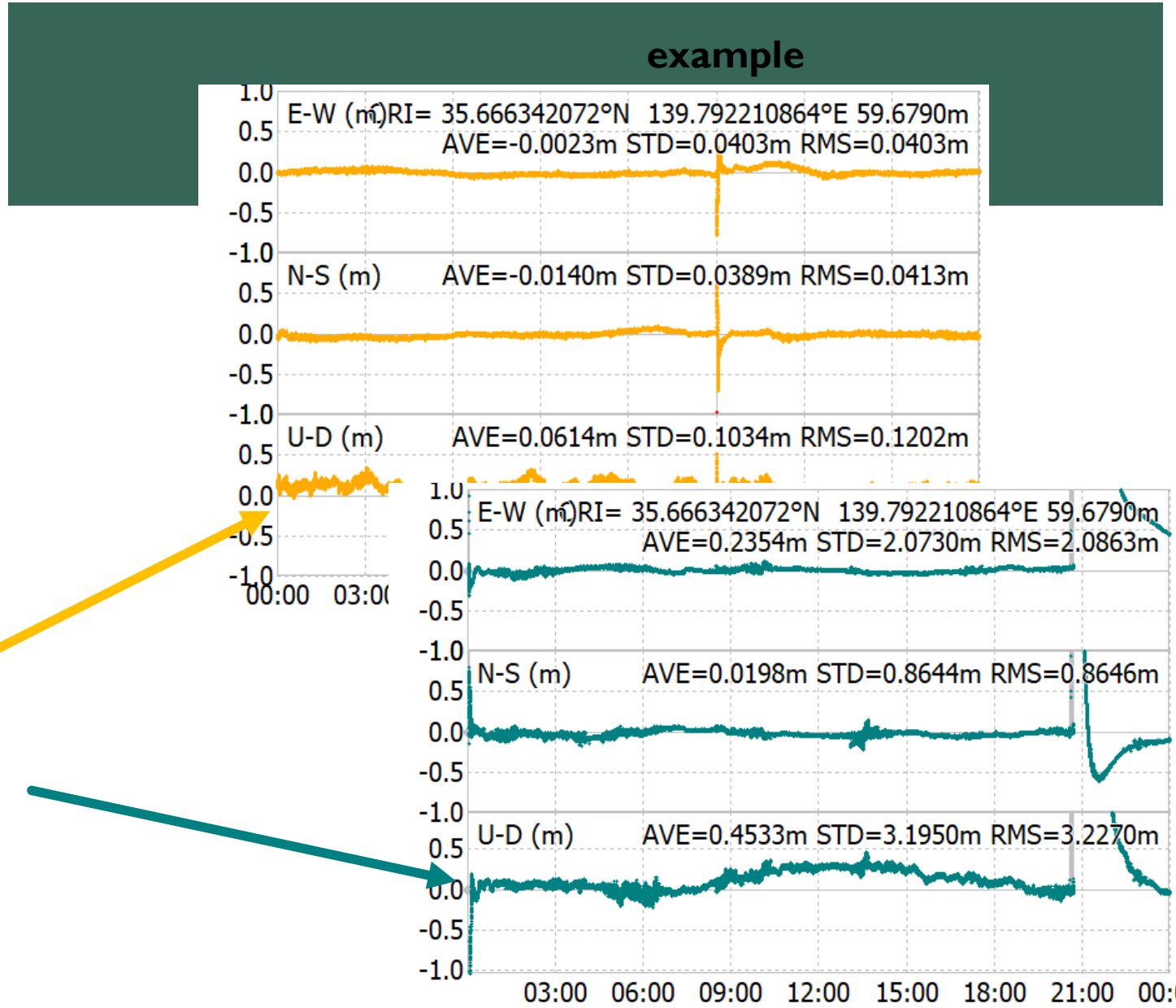
Latitude 14° 39' 23.13498" N

Longitude 121° 04' 11.11668" E

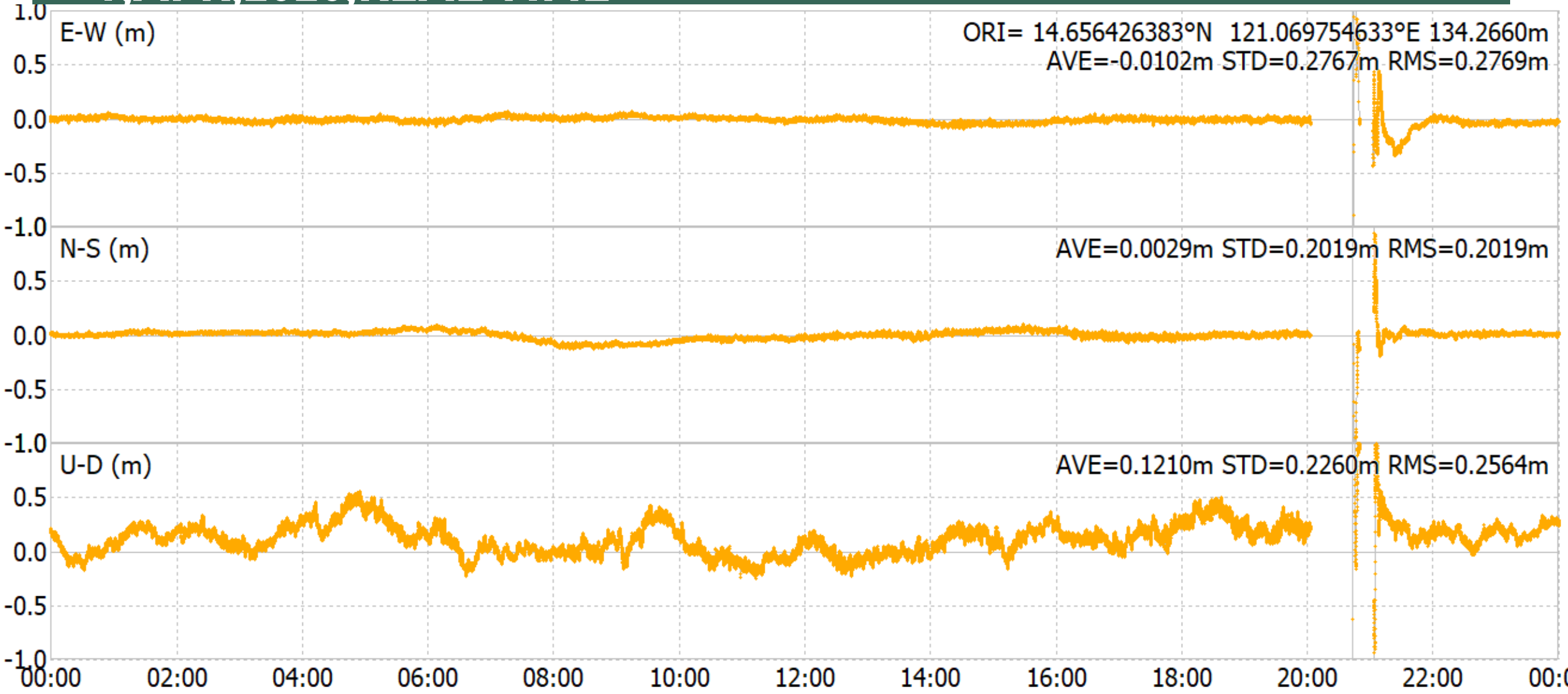
El. Height 134.266 m

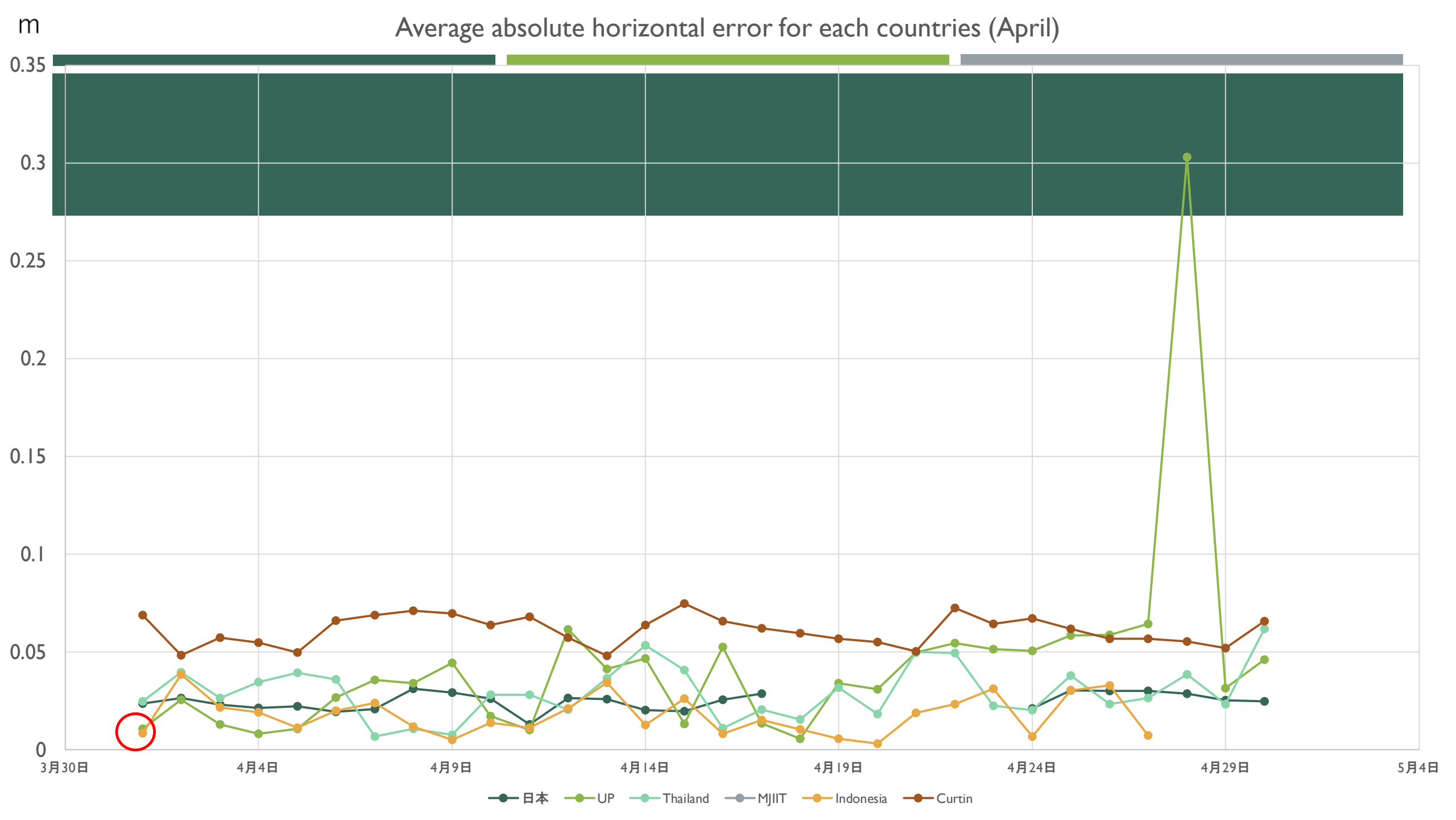
Yellow line：real time

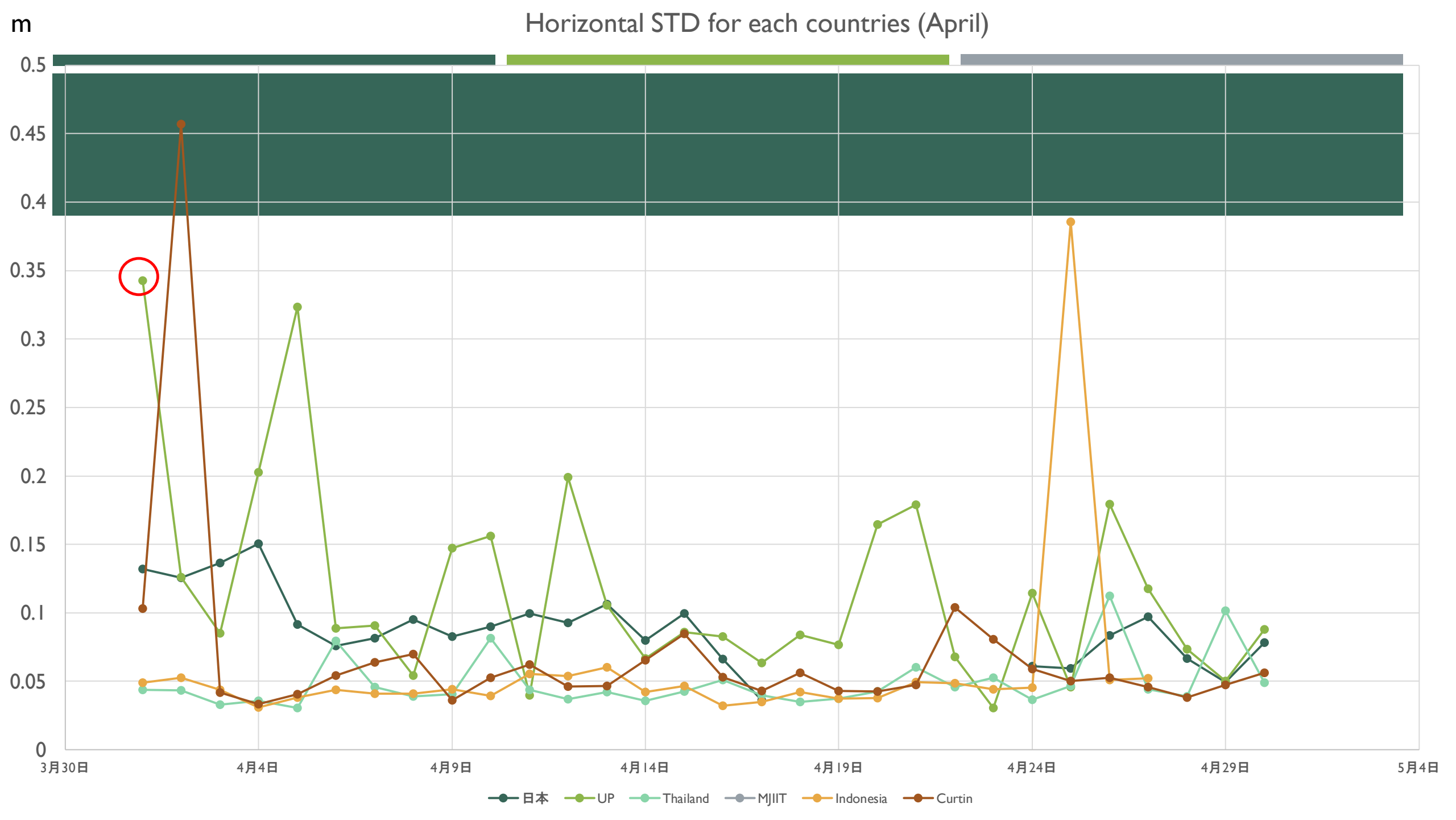
Blue line：post-processing



1,APR,2020,REAL TIME




m
Average absolute horizontal error for each countries (April)
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
3月30日
4月4日
4月9日
4月14日
4月19日
4月24日
4月29日
5月4日
日本
UP
Thailand
MJIIT
Indonesia
Curtin


m
Horizontal STD for each countries (April)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
3月30日
4月4日
4月9日
4月14日
4月19日
4月24日
4月29日
5月4日
日本
UP
Thailand
MJIIT
Indonesia
Curtin

LONG TERM EVALUATION

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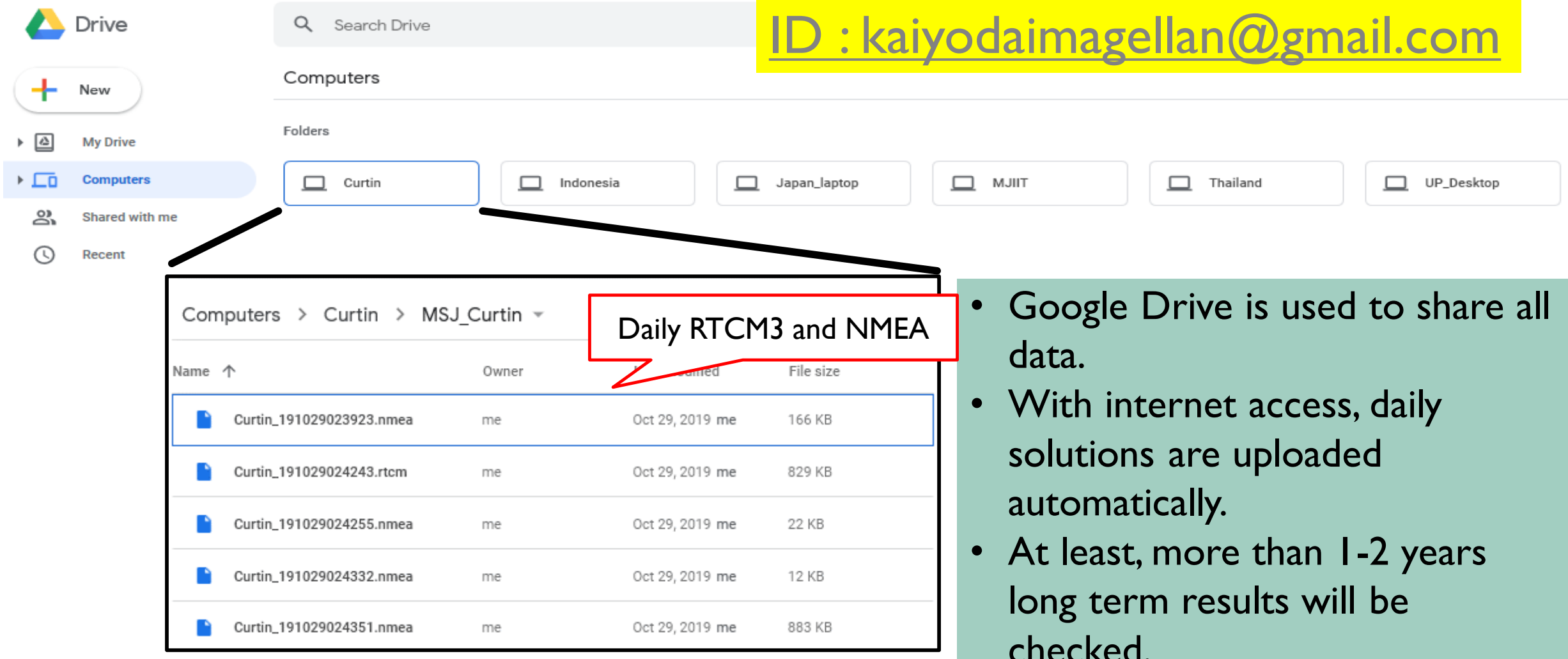
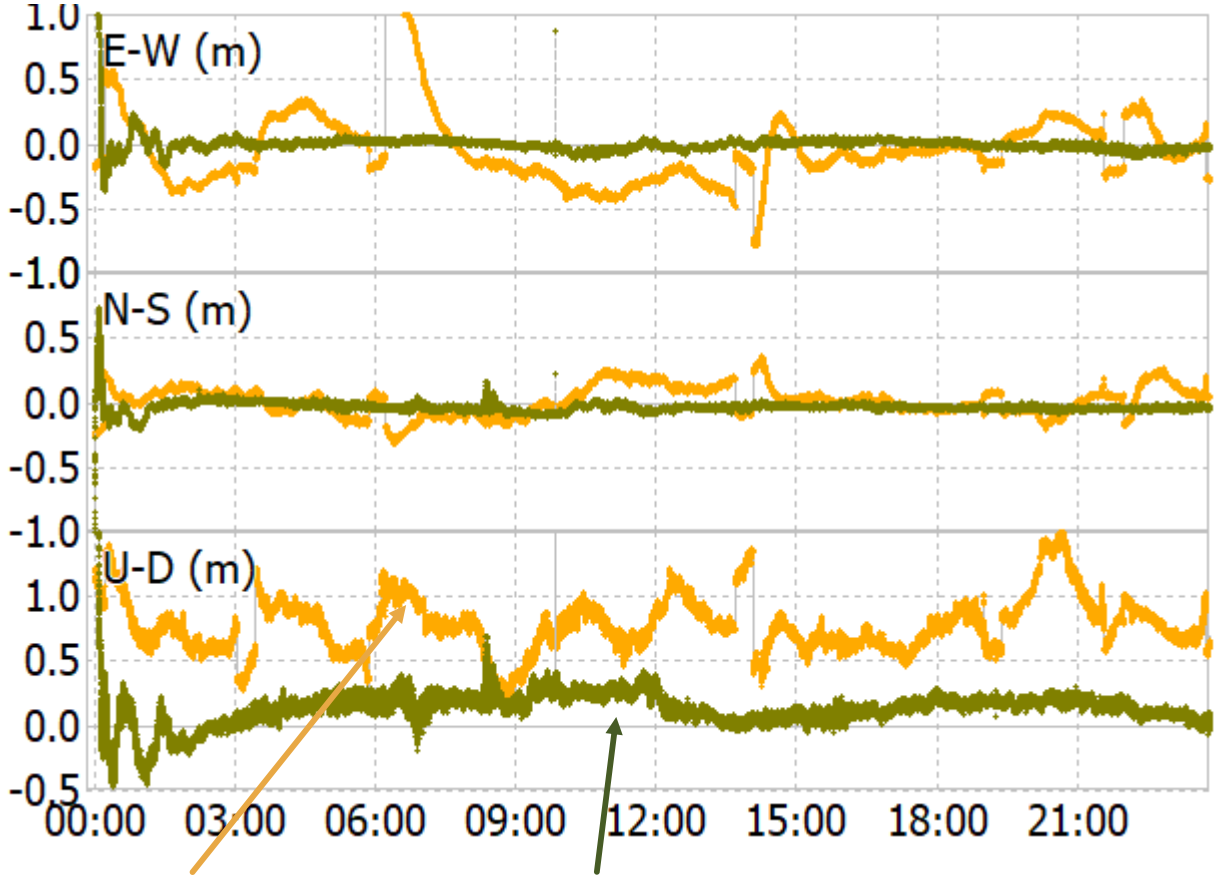


- Google Drive is used to share all data.
- With internet access, daily solutions are uploaded automatically.
- At least, more than 1-2 years long term results will be checked.

POST PROCESSING EVALUATION

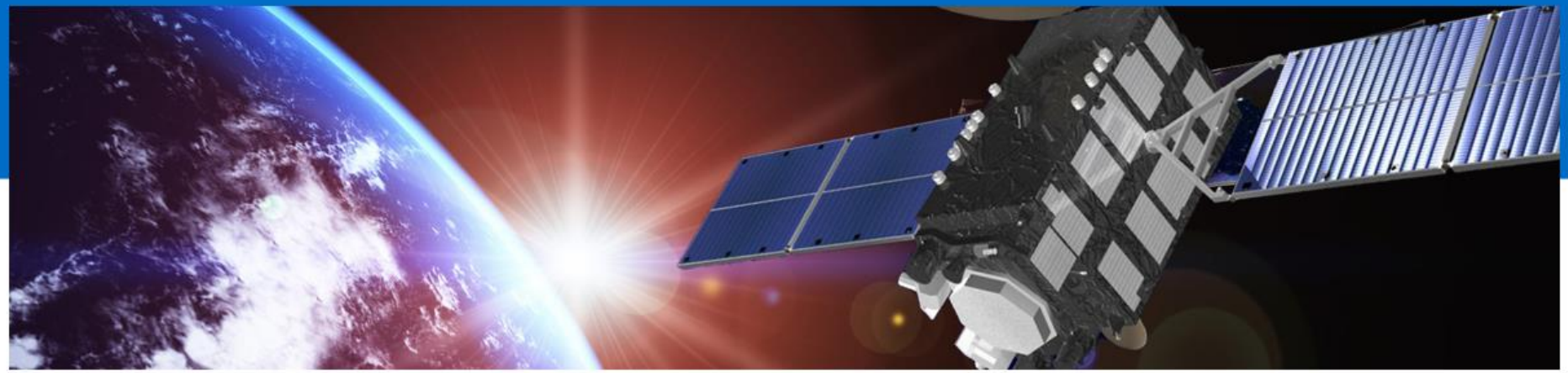


Orange：MSJ receiver　Green：Post-processing

At the beginning of evaluation, we see some large errors of MSJ receiver output. **It is very important to distinguish the causes from receiver PPP engine ? or MADOCA correction ?**

Double checking by post-processing is very important. We just post-processed "raw data + Madoca correction" by using GPASLIB/RTKLIB. These results are also shared with other countries.

GNSS TUTOR



About this site

This site is mainly for students/beginners who learn basic of GNSS including precise positioning. We will update the experiments at least once a month in "Report". If it is difficult to modify RTKLIB by yourselves, please check "RTKcore". In addition, performance of MADOCA PPP in several countries are updated in "MADOCA PPP".

TopPage
RTKcore
Report
MADOCA PPP

News

GNSS TUTOR is updated (1/14/2020).

国立大学法人 東京海洋大学 Tokyo University of Marine Science and Technology
東京海洋大学 海洋工学部
海事システム工学科 GPS/GNSS研究室

SUMMARY

- We will continue to monitor the real MADOCA-PPP performance.
- Let's find out potential applications using PPP each other.
- PPP might be more suitable than RTK for some applications.