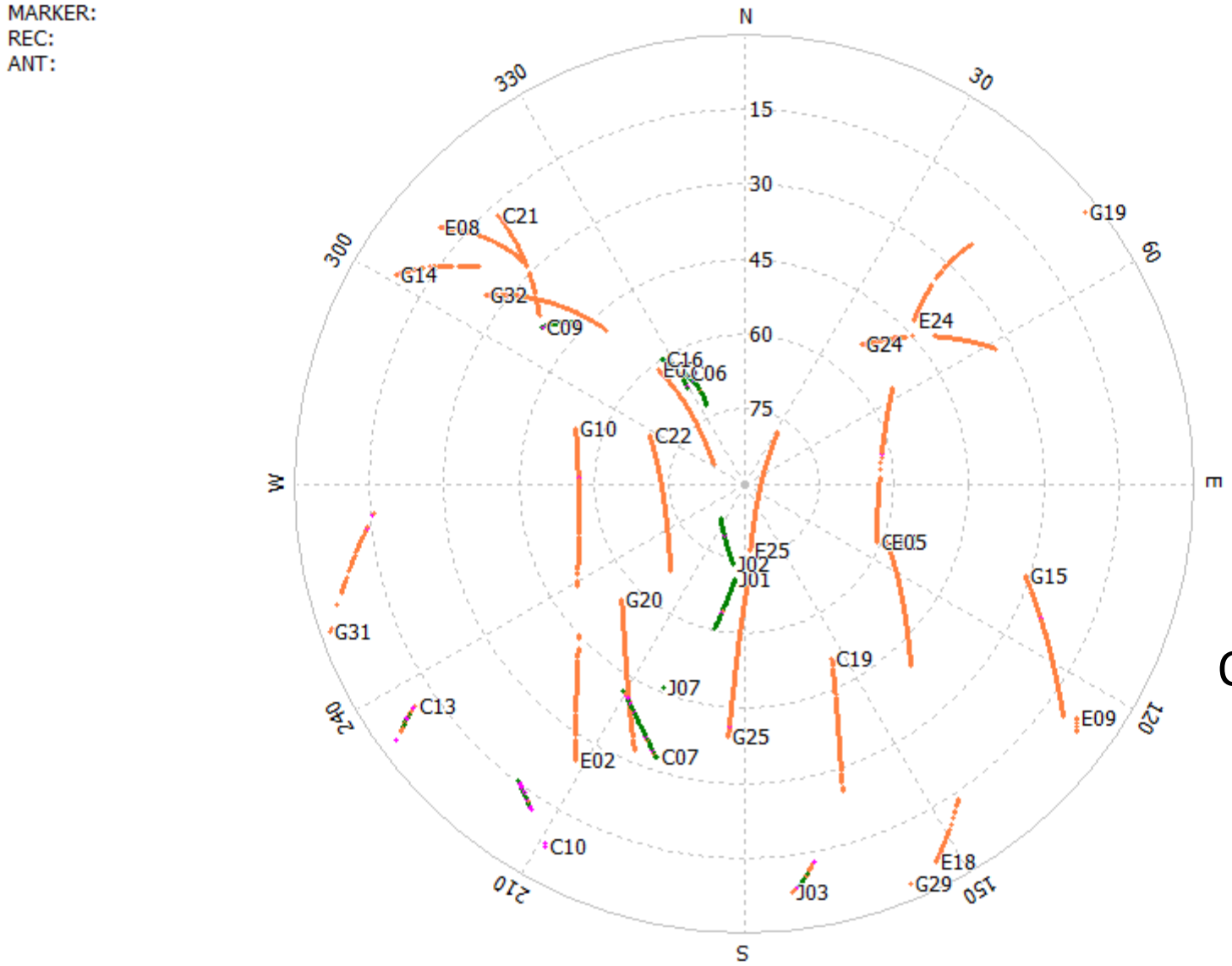
RTK performance with/without QZSS

Test configuration

- 2019/11/29　60 min.
- TUMSAT(Etchujima)-ODAIBA
- Rover receiver : F9P (u-blox) and Chronosphere L6S (Core)
- Base receiver : F9P (u-blox)
- Post-process : GPS,QZSS,GALILEO,BDS (dual-frequency)
- Instantaneous RTK (RTK core)

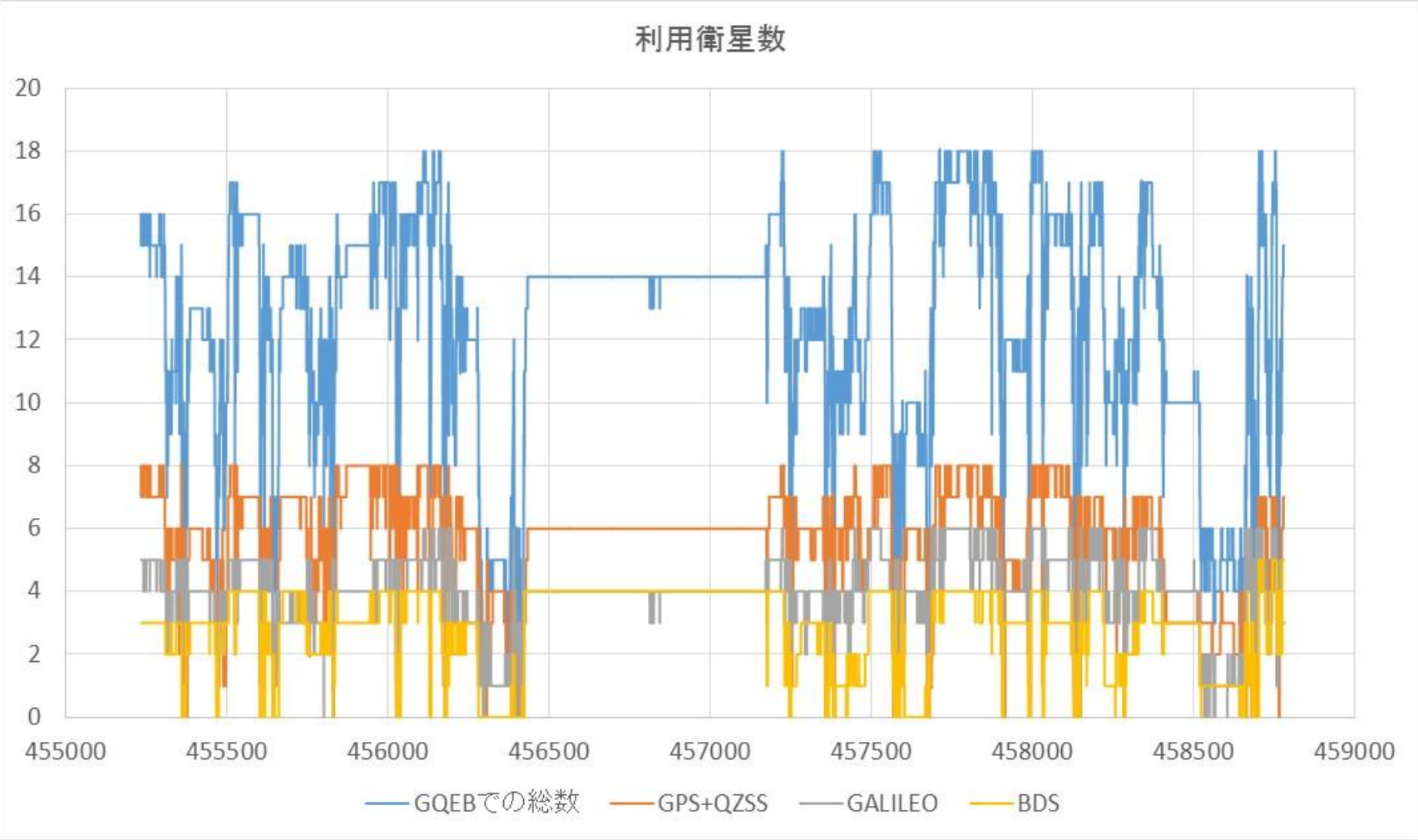
Post-process performance is similar to real-time performance.

SkyPlot during test



QZSS : J01, J02 and J07

Temporal Number of used Satellites (valid carrier-phase tracking)

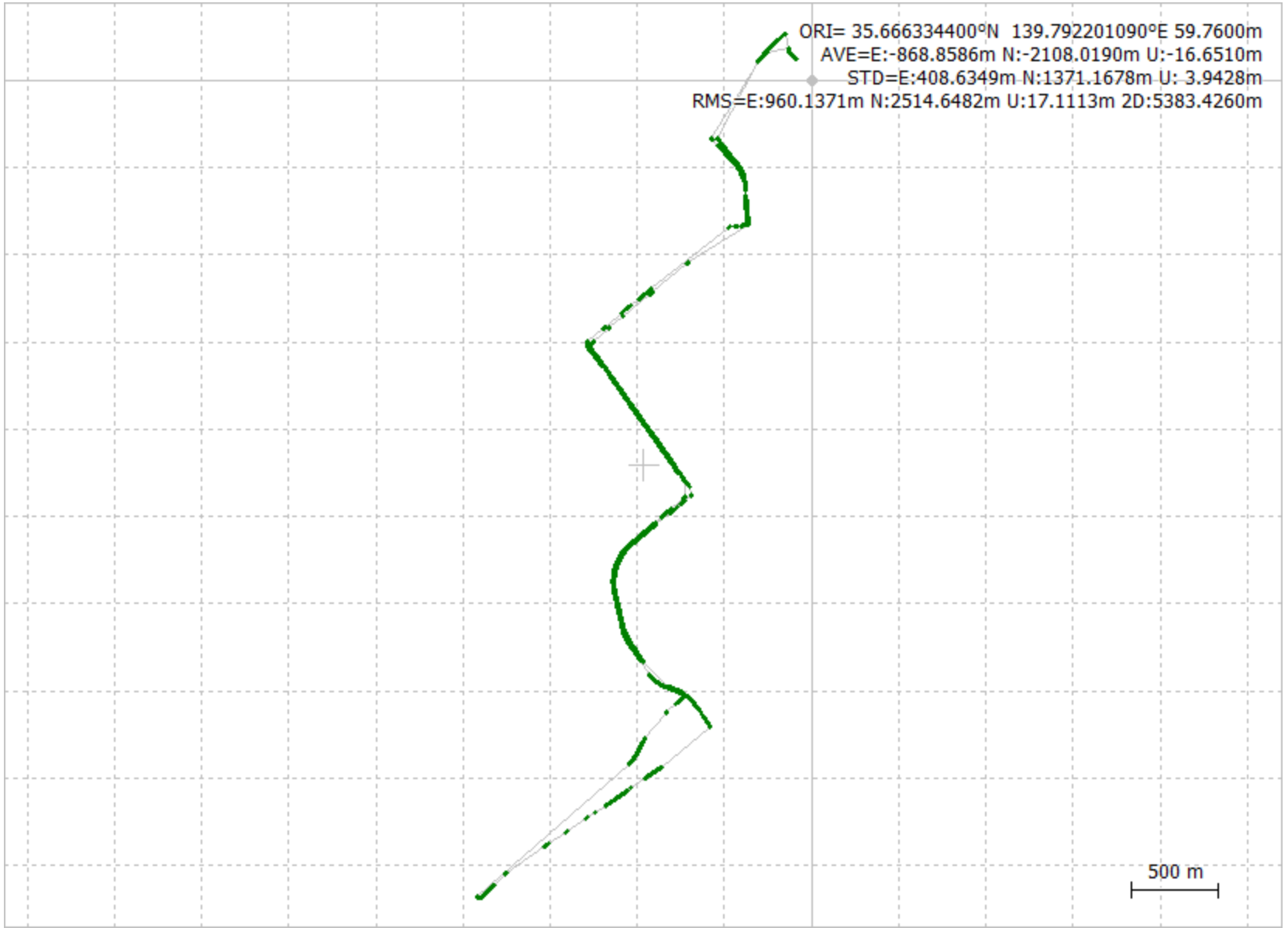


Average SVn

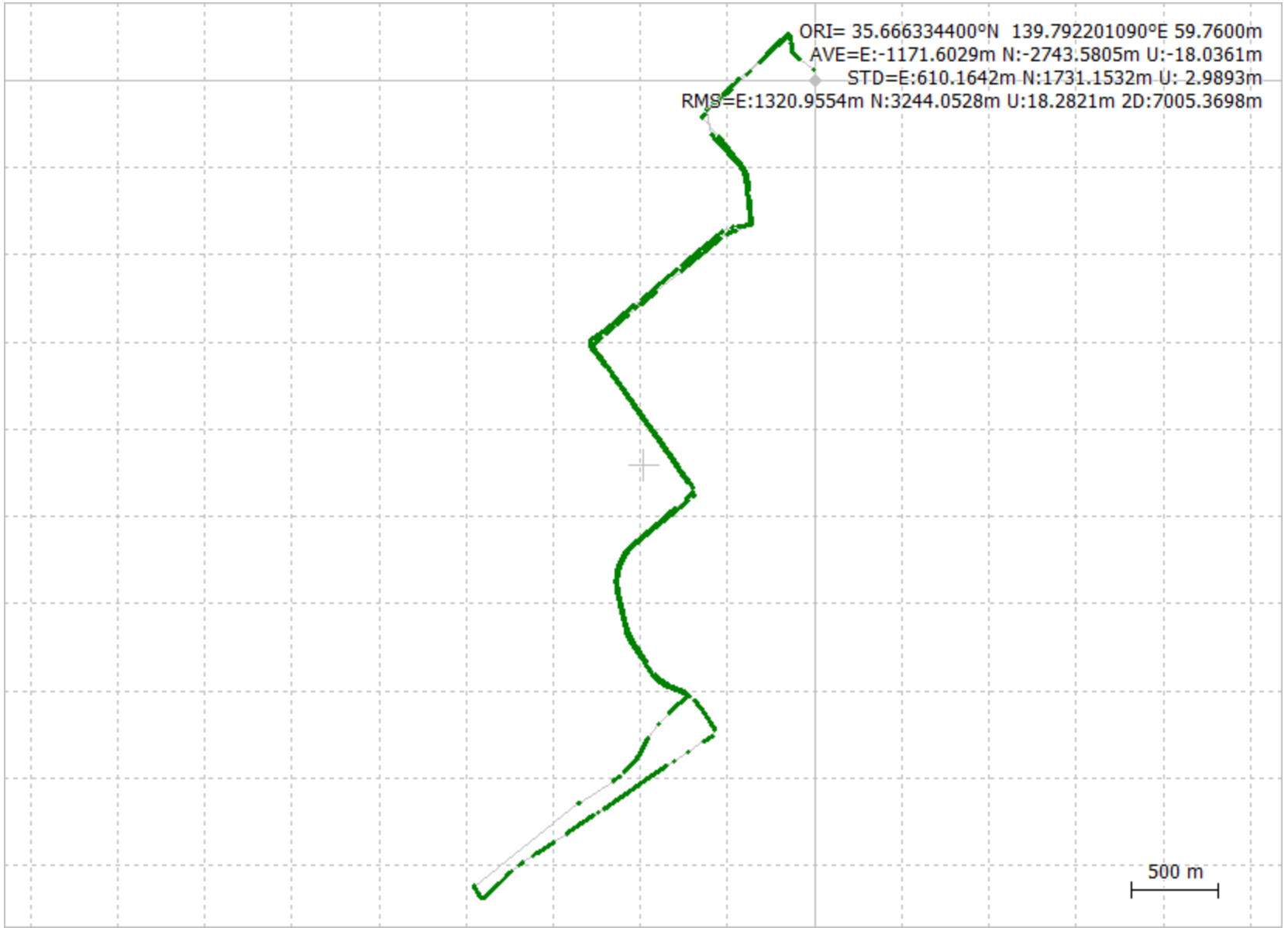
GPS 3.8
QZSS 1.8
GALILEO 4.0
BDS 2.9

TOTAL 12.5

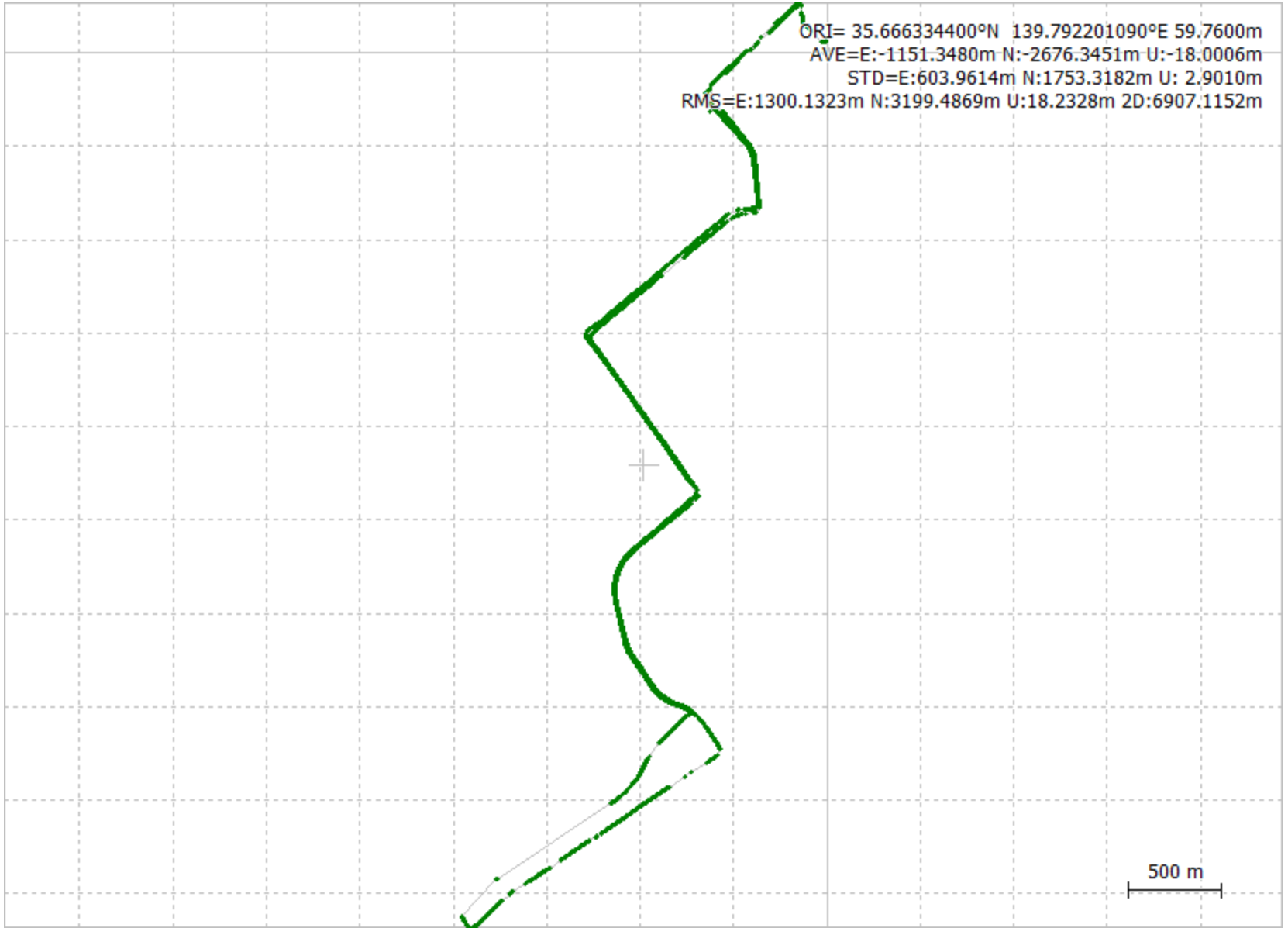
GPS（FIX 4828/17739）



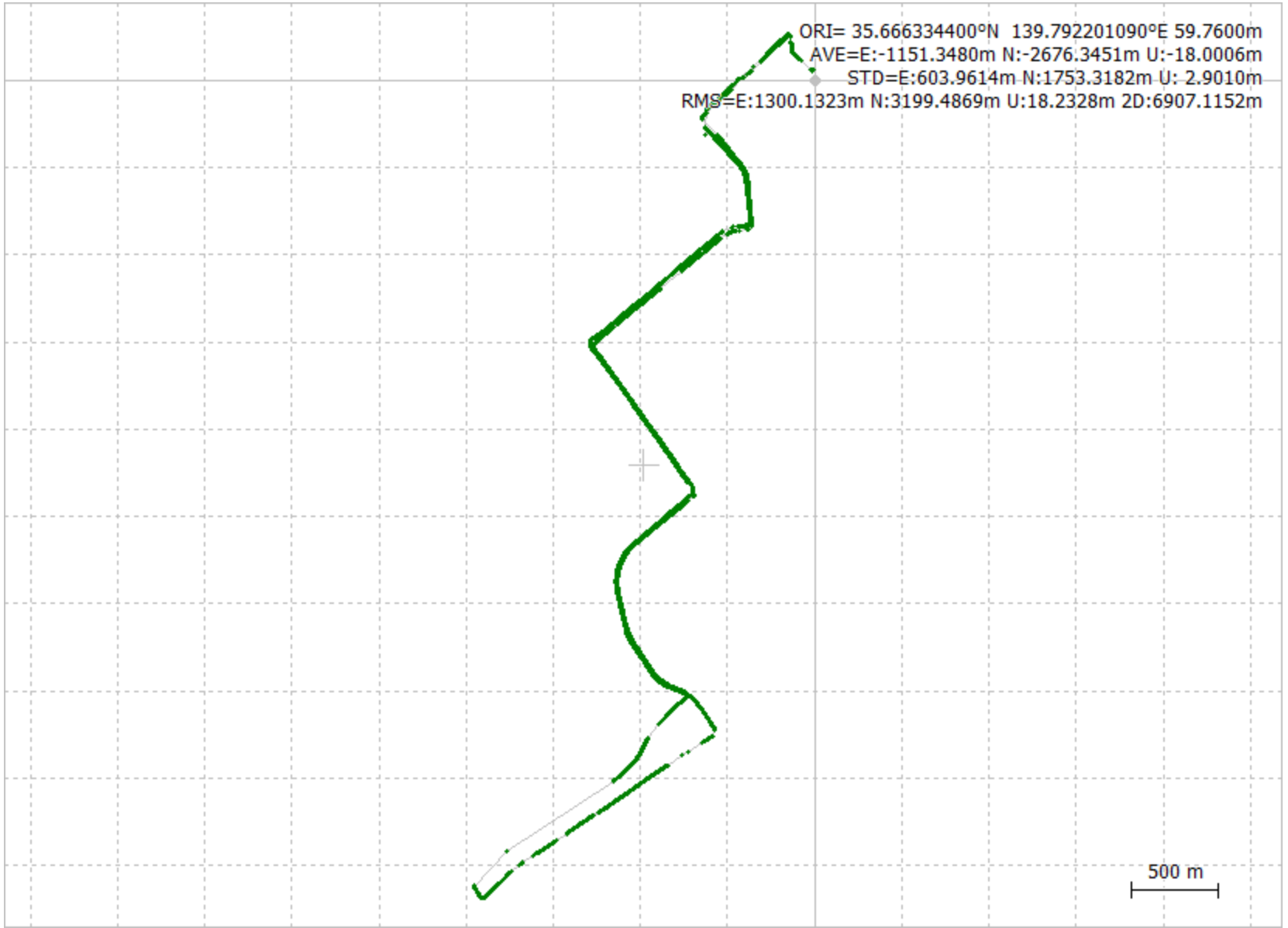
GPS+QZSS（FIX 12138/17739 ）



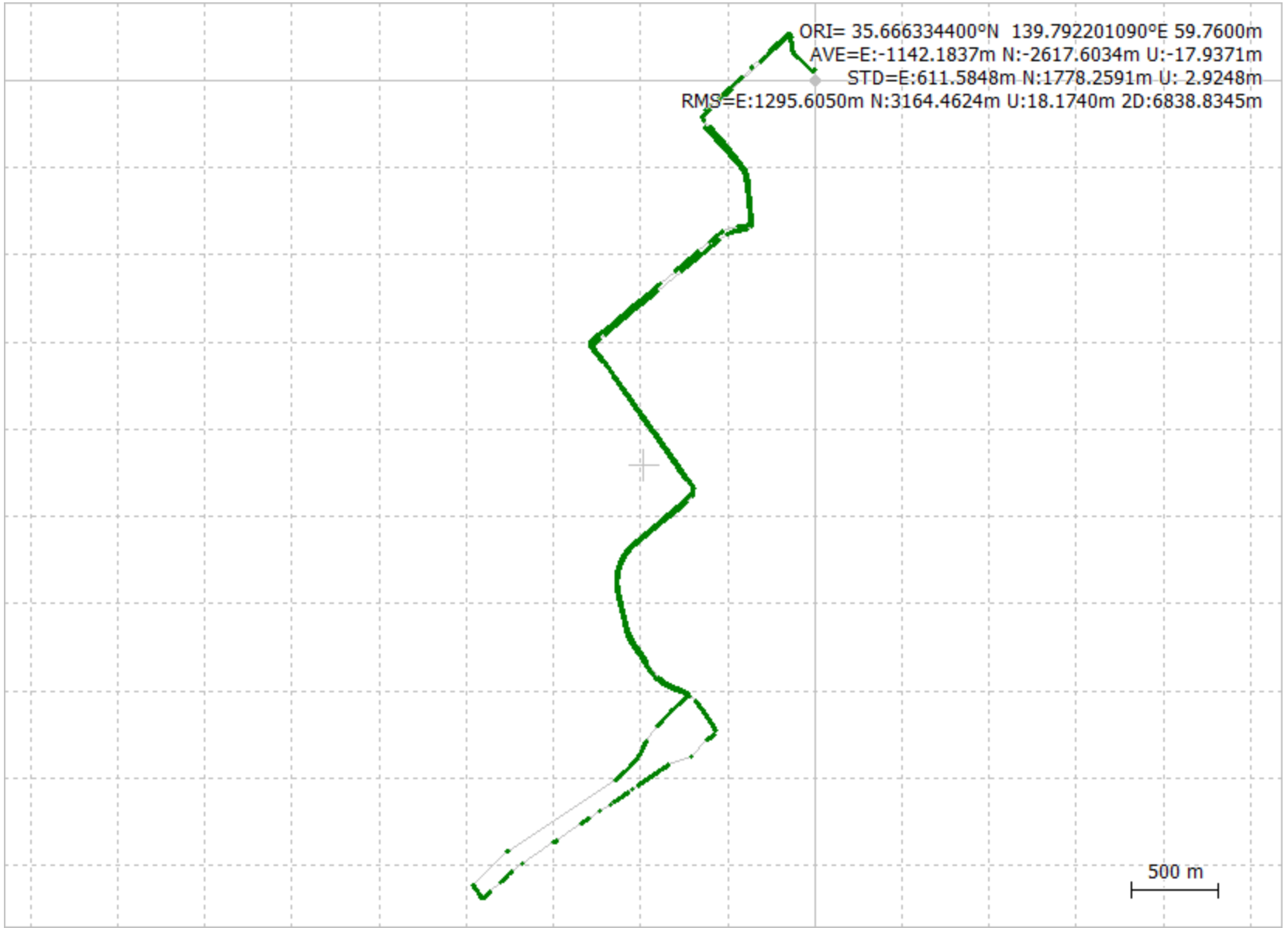
GPS+GALILEO（FIX 13267/17739 ）



GPS+QZSS+GALILEO（FIX 14833/17739 ）



GPS+QZSS+GALILEO+BDS（FIX 13698/17739 ）



Summary (RTK core)

Combination	FIX	FIX rate
GPS	4828	27.2%
GPS+QZSS	12138	68.4%
GPS+GALILEO	13267	74.8%
GPS+QZSS+GALILEO	14833	85.3%
GPS+QZSS+GALILEO+BDS	13698	78.7%

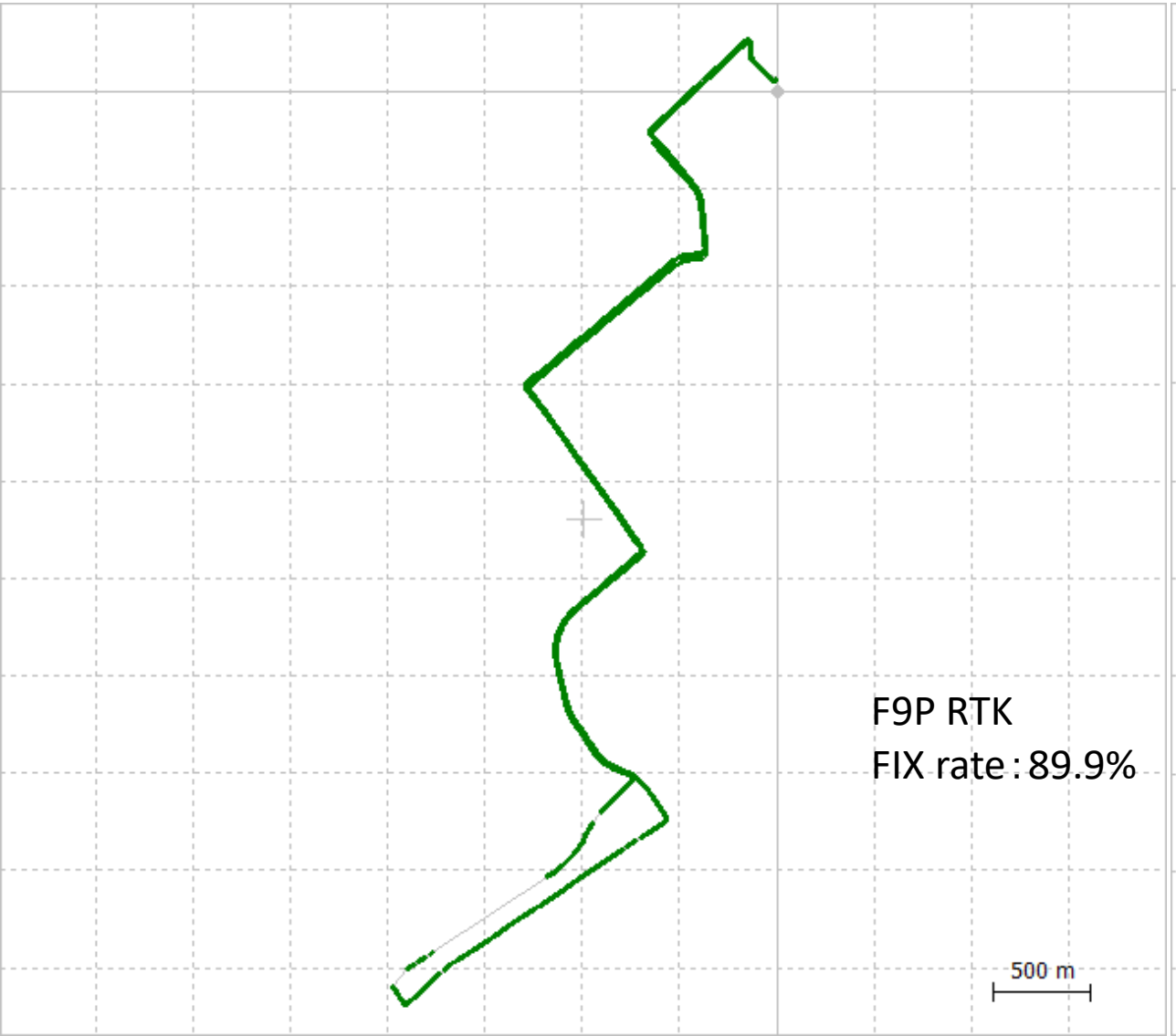
Average SVn

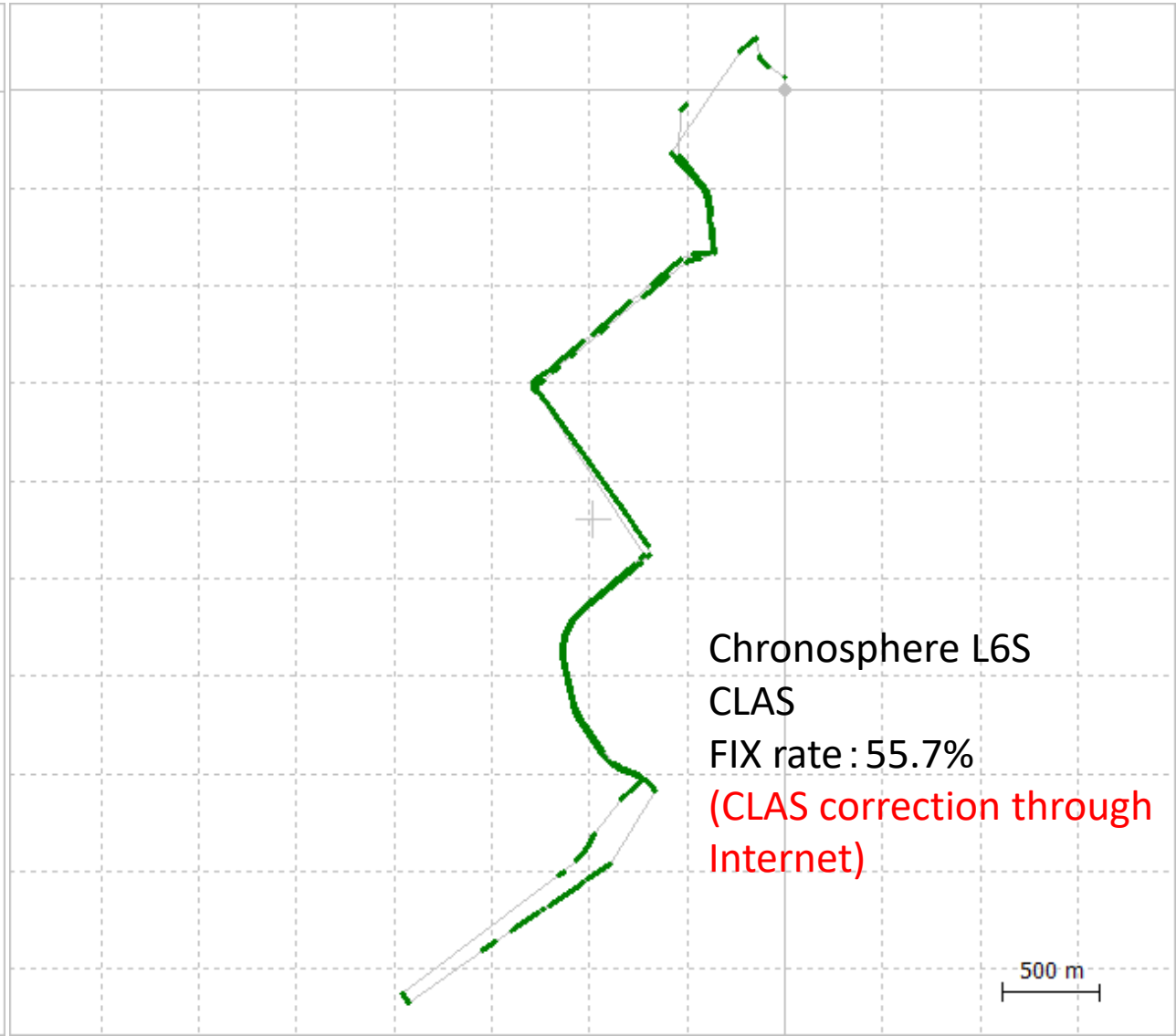
GPS 3.8
QZSS 1.8
GALILEO 4.0
BDS 2.9

TOTAL 12.5

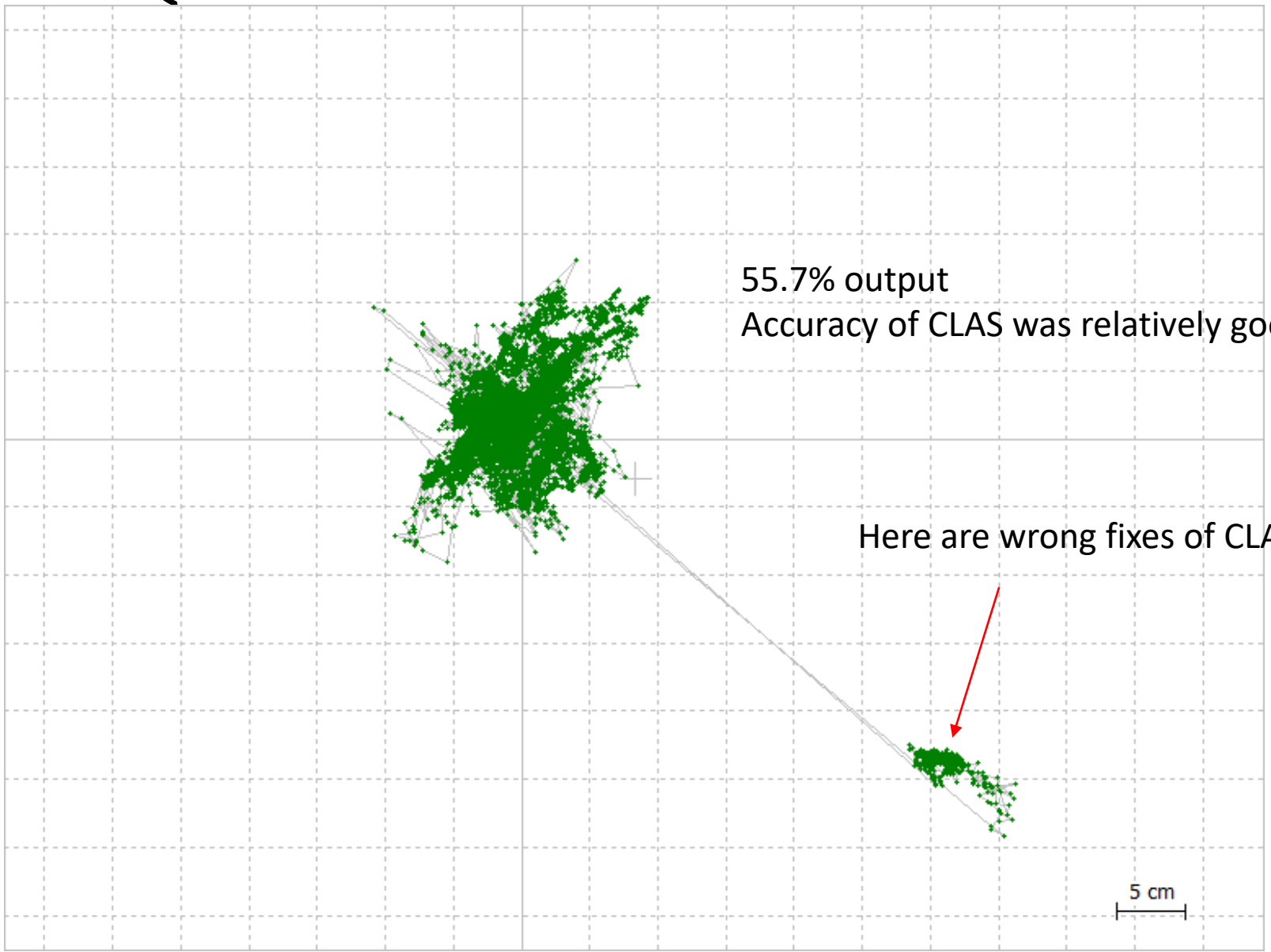
The reason for the performance degradation using GPS/QZSS/GAL/BDS is simple. If we check dual-frequency BDS, we often see the cases that number of valid BDS is only 1 or 0. In those cases, we give up the epoch to fix ambiguities. If we combine the above functions(combinations) in RTK, the fix rate will definitely increase. However, here is the equal comparison results between each combinations. During this test, GAL 25 was highest satellite (over 75 degrees). Therefore, adding GALILEO was effective in RTK. L2P satellites in GPS were not included. Therefore, the RTK performance using only GPS is quite low.

F9P RTK engine and Chronosphere L6S CLAS

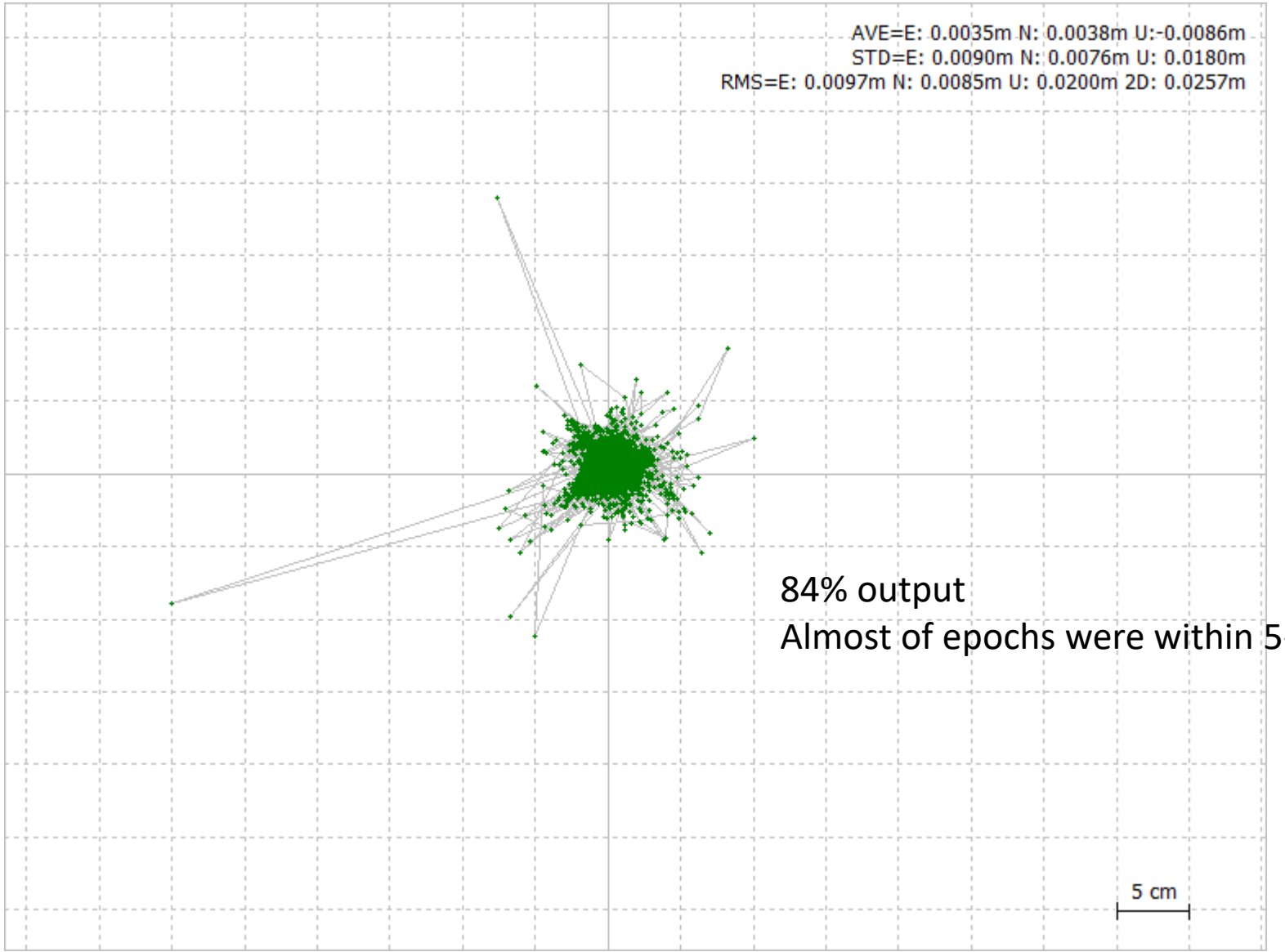




Differences between F9P RTK engine and post-processed GQE



Differences between F9P RTK engine and post-processed GQE



84% output

Almost of epochs were within 5-10cm.