



XXVII FIG CONGRESS

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A comparison of survey-grade GNSS receivers by means of observation and coordinate domain approaches; traditional vs low-budget

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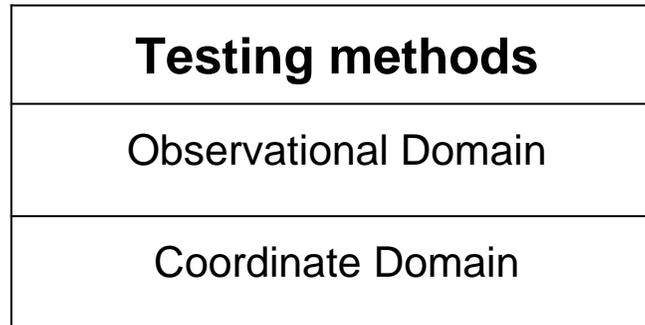
Introduction and overview



“Traditional vs low-budget”



Traditional



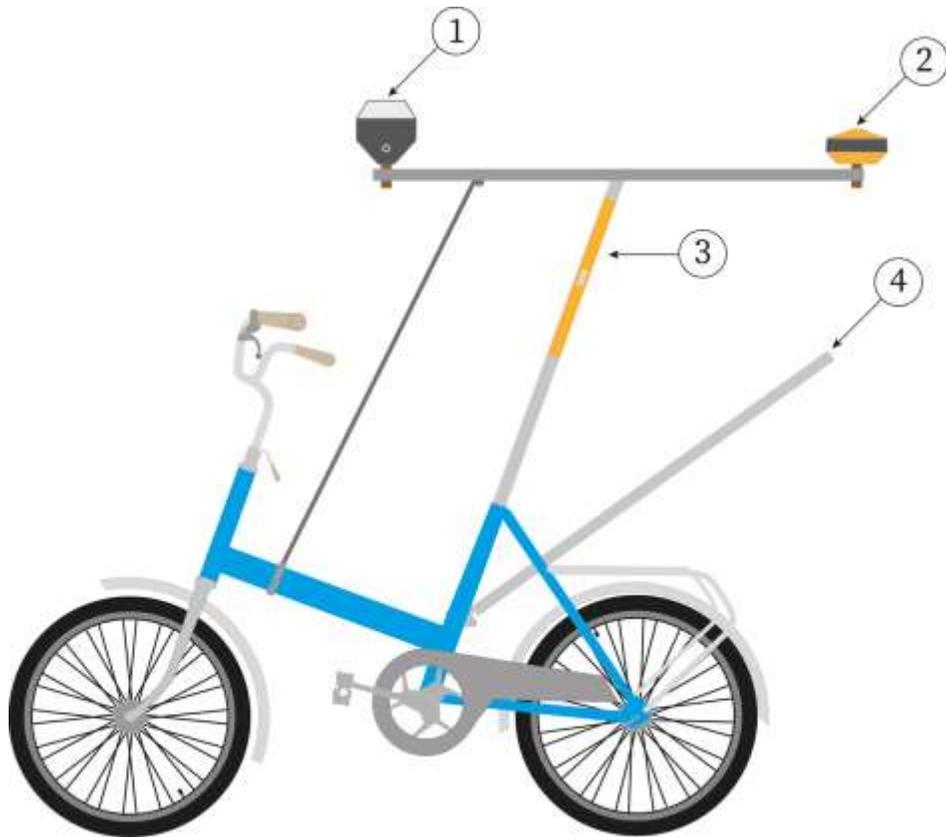
Low-Budget

Test-setup for the observation and coordinate domain

- **Static**
 - Two hours data collection
 - Observation domain analysis
- **Kinematic**
 - 22 control points
 - Real world scenario
 - Varied visibility
 - Observation and coordinate domain analysis



Kinematic platform and processing methods



Kinematic platform:

1. Emlid receiver
2. Topcon receiver
3. Tube level
4. Support rod

Processing methods:

- Canadian Spatial Reference System Precise Point Positioning
- CPOS - Real Time Kinematic

Results

Observation domain (Static observation)

The static observation domain analyses were done in GPS, GLONASS, Galileo and BeiDou. Only results from GPS are shown here.

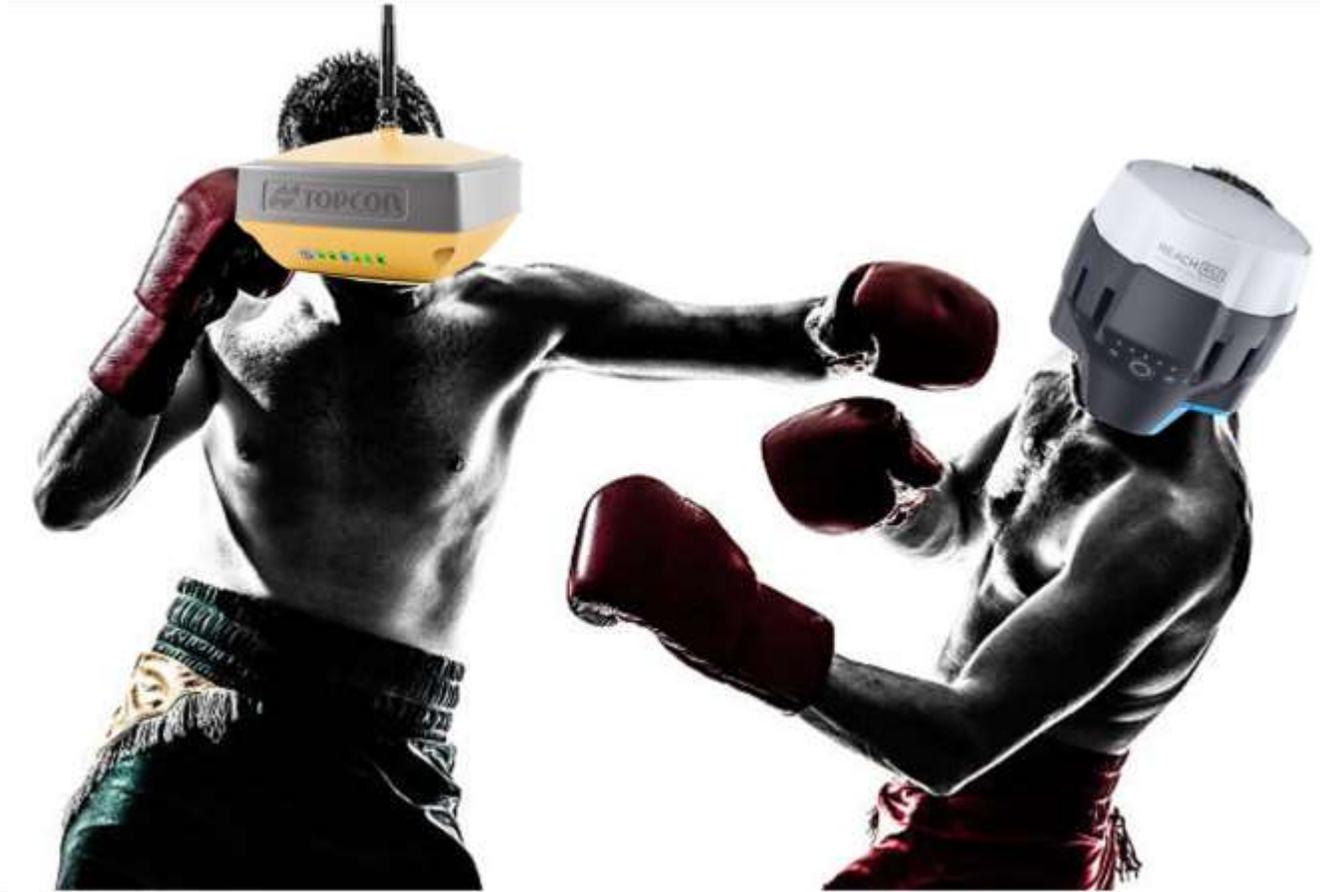
	EMLID [GPS]	TOPCON [GPS]
Number of satellites	10	15
Total number of observations	44149	63361
Overall standard deviation for code multipath on the first frequency [m]	0.294	0.202
Overall standard deviation for code multipath on the second frequency [m]	0.369	0.298
Number of cycle-slips	720	6
Relative number of cycle-slips [%]	1.412	0.009

Results

Coordinate Domain (Kinematic observations)

	EMLID	TOPCON
RTK Standard deviation	0.049 m	0.051 m
PPP Standard deviation	0.551 m	0.031 m

- Canadian Spatial Reference System-PPP solutions only support GPS and GLONASS.
- The Emlid receiver does not support the anti-spoofing technology to track the encrypted P(Y)-code broadcasted by GPS satellites. Therefore, the Emlid has fewer dual frequency observations than the Topcon in the PPP solutions.



Traditional

Low-budget



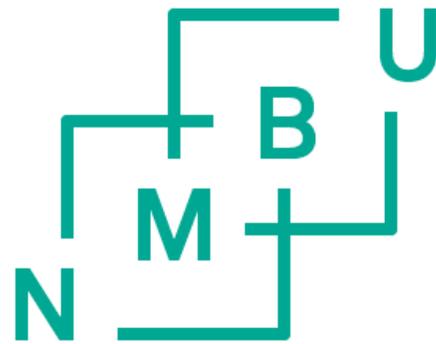
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Our paper

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