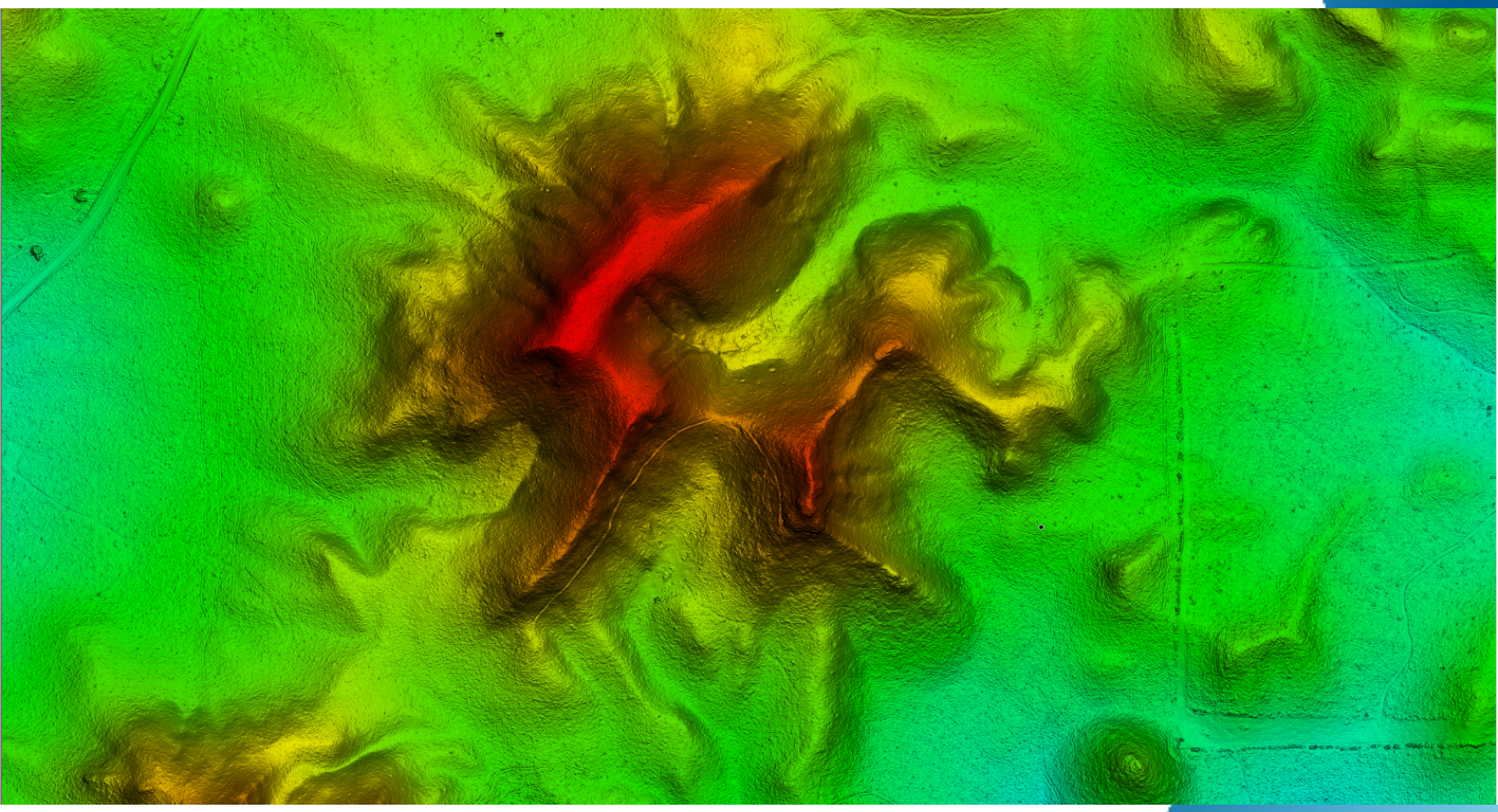
NV5 GEOSPATIAL



WI 12County 12 B22 Bayfield LIDAR PROCESSING REPORT

2023

Project ID: 230110
Work Unit: 300215

Submitted: August 31, 2023

Prepared for:

USGS
science for a changing world

Prepared by:

NV5 GEOSPATIAL

National Map Help Desk: tnm_help@usgs.gov

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1. Summary / Scope

1.1. Summary

This report contains a summary of the Wisconsin 12 County - Bayfield, Work Unit 300215 lidar acquisition task order, issued by USGS under their Contract 140G0221D0012 on 3/25/2022. The task order yielded a work unit area covering 1,527 square miles over Wisconsin at Quality Level 1. The intent of this document is only to provide specific validation information for the data acquisition/collection, processing, and production of deliverables completed as specified in the task order.

1.2. Scope

Aerial topographic lidar was acquired using state of the art technology along with the necessary surveyed ground control points (GCPs) and airborne GPS and inertial navigation systems. The aerial data collection was designed with the following specifications listed in Table 1 below.

Table 1. Originally Planned Lidar Specifications

Average Point Density	Flight Altitude (AGL)	Field of View	Minimum Side Overlap	RMSEz
8 pts / m2	1600 m	58.5°	20%	≤ 10 cm

1.3. Coverage

The work unit boundary covers 1,527 square miles over Bayfield County, Wisconsin. Work unit extents are shown in Figure 1.

1.4. Duration

Lidar data was acquired from 5/14/2022 to 5/27/2022 in 67 total lifts. See “Section: 2.4. Time Period” for more details.

1.5. Issues

There are 7 tiles that are empty due to water. These tiles are 662523, 833532, 833613, 833617, 842550, 842595, and 842599.

WI_12County_12_B22_Bayfield Work Unit 300215 Projected Coordinate System: Wisconsin Coordinate Reference System - Bayfield Horizontal Datum: NAD83 (2011) Vertical Datum: NAVD88 (GEOID 18) Units: Survey Feet	
Lidar Point Cloud	Classified Point Cloud in .LAS 1.4 format
Rasters	• 1-foot Hydro-flattened Bare Earth Digital Elevation Model (DEM) in GeoTIFF format • 1-foot Intensity images in GeoTIFF format • 2-foot Maximum Surface Height Raster in GeoTIFF format • 2-foot Swath Seperation Images in GeoTIFF format
Vectors	Shapefiles (*.shp) • Project Boundary • Lidar Tile Index Geodatabase (*.gdb) • Continuous Hydro-flattened Breaklines • Flightlines Swath
Reports	Reports in PDF format • Focus on Delivery • Focus on Accuracy • Survey Report • Processing Report
Metadata	XML Files (*.xml) • Breaklines • Classified Point Cloud • DEM • Intensity Imagery

Wisconsin 12 County - Bayfield
Work Unit 300215 Boundary

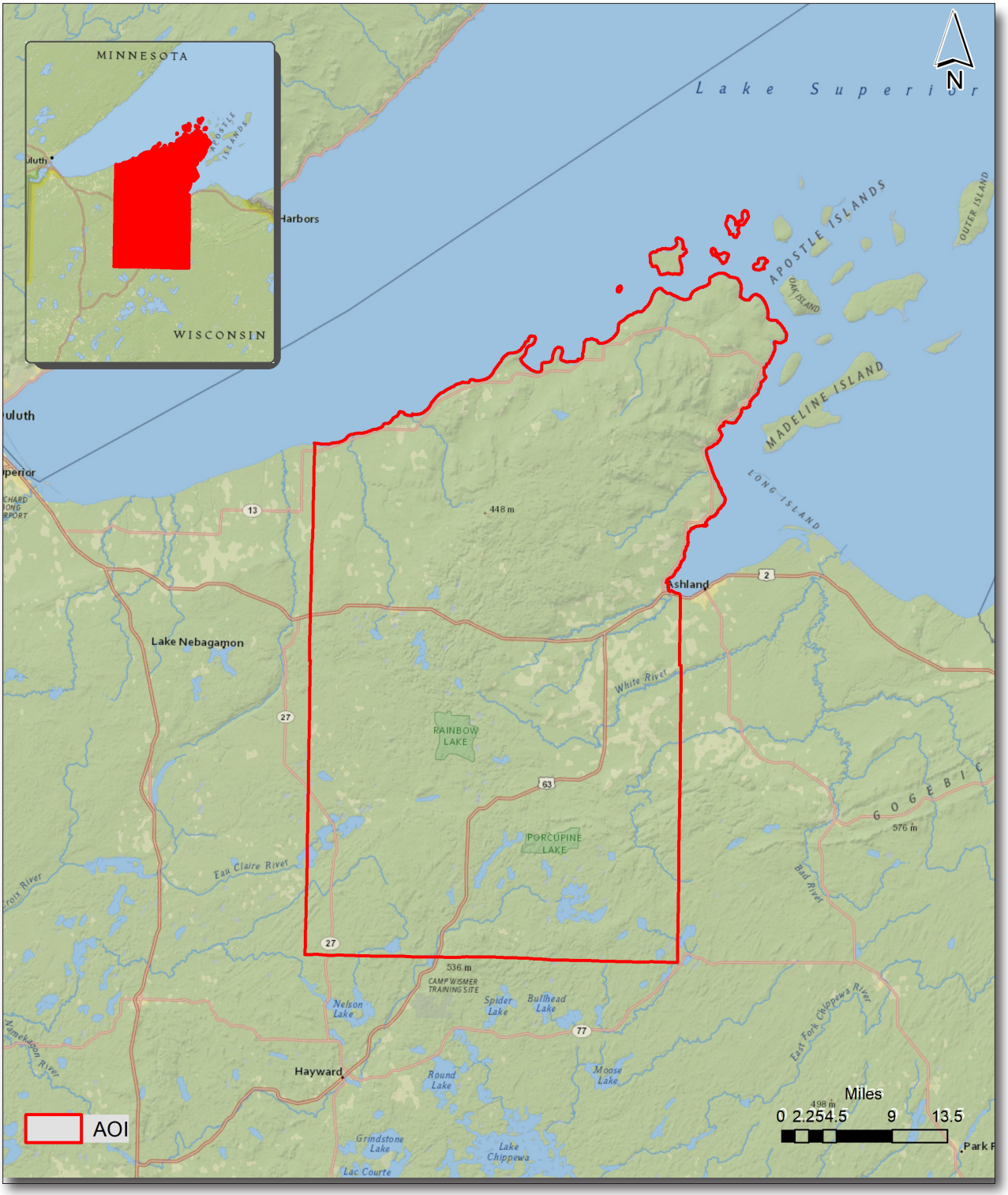


Figure 1. Work Unit Boundary

2. Planning / Equipment

2.1. Flight Planning

Flight planning was based on the unique project requirements and characteristics of the project site. The basis of planning included: required accuracies, type of development, amount / type of vegetation within project area, required data posting, and potential altitude restrictions for flights in project vicinity.

Detailed project flight planning calculations were performed for the project using RiPARAMETER planning software.

2.2. Lidar Sensor

NV5 Geospatial utilized Riegl VQ-1560ii lidar sensors (Figure 2), serial numbers 3062 and 3543 , for data acquisition.

The Riegl 1560ii system is a dual channel waveform processing airborne scanning system. It has a laser pulse repetition rate of up to 4 MHz resulting in up to 2.66 million measurements per second. The system utilizes a Multi-Pulse in the Air option (MPIA) and an integrated IMU/GNSS unit.

A brief summary of the aerial acquisition parameters for the project are shown in the lidar System Specifications in Table 2.

Table 2. Lidar System Specifications

		Riegl VQ1560ii (SN3543)	Riegl VQ1560ii (SN3062)
Terrain and Aircraft Scanner	Flying Height	1690 m	1690 m
	Recommended Ground Speed	160 kts	160 kts
Scanner	Field of View	60°	60°
	Scan Rate Setting Used	178 Hz	191 Hz
Laser	Laser Pulse Rate Used	1100 kHz	1200 kHz
	Multi Pulse in Air Mode	YES	YES
Coverage	Full Swath Width	1951 m	1951 m
	Line Spacing	1561 m	1561 m
Point Spacing and Density	Average Point Spacing	0.35 m	0.35 m
	Average Point Density	8 pts / m^2	8 pts / m^2

Figure 2. Riegl VQ-1560ii Lidar Sensor

2.3. Aircraft

All flights for the project were accomplished through the use of customized aircraft. Plane type and tail numbers are listed below.

Lidar Collection Planes

- Piper PA-31, Tail Number(s): C-FFRY
- Piper PA-31, Tail Number(s): C-GAYY

These aircraft provided an ideal, stable aerial base for lidar acquisition. These aerial platforms have relatively fast cruise speeds, which are beneficial for project mobilization / demobilization while maintaining relatively slow stall speeds, proving ideal for collection of high-density, consistent data posting using a state-of-the-art lidar system. NV5 Geospatial's operating aircraft can be seen in Figure 3 below.

Figure 3. NV5 Geospatial's Aircraft

2.4. Time Period

Project specific flights were conducted between 5/14/2022 and 5/27/2022. Seven aircraft lifts were completed. Accomplished lifts are listed below.

Lift	Start UTC	End UTC
05142022A (SN3062,C-GAYY)	5/14/2022 1:16:40 PM	5/14/2022 5:54:28 PM
05152022A (SN3062,C-GAYY)	5/15/2022 12:41:44 PM	5/15/2022 5:36:40 PM
05162022A (SN3062,C-GAYY)	5/16/2022 12:39:56 PM	5/16/2022 2:02:25 PM
05172022A (SN3062,C-GAYY)	5/17/2022 2:47:16 PM	5/17/2022 7:45:44 PM
05222022A (SN3543,C-FFRY)	5/23/2022 1:45:34 AM	5/23/2022 4:20:35 AM
05232022A (SN3543,C-FFRY)	5/23/2022 11:32:40 AM	5/23/2022 4:12:00 PM
05272022A (SN3543,C-FFRY)	5/27/2022 4:45:12 PM	5/27/2022 8:05:12 PM

3. Processing Summary

3.1. Flight Logs

Flight logs were completed by Lidar sensor technicians for each mission during acquisition. These logs depict a variety of information, including:

- Job / Project #
- Flight Date / Lift Number
- FOV (Field of View)
- Scan Rate (HZ)
- Pulse Rate Frequency (Hz)
- Ground Speed
- Altitude
- Base Station
- PDOP avoidance times
- Flight Line #
- Flight Line Start and Stop Times
- Flight Line Altitude (AMSL)
- Heading
- Speed
- Returns
- Crab

Notes: (Visibility, winds, ride, weather, temperature, dew point, pressure, etc). Project specific flight logs for each sortie are available in Appendix A.

3.2. Lidar Processing

Applanix + POSPac software was used for post-processing of airborne GPS and inertial data (IMU), which is critical to the positioning and orientation of the lidar sensor during all flights. Applanix POSPac combines aircraft raw trajectory data with stationary GPS base station data yielding a “Smoothed Best Estimate Trajectory” (SBET) necessary for additional post processing software to develop the resulting geo-referenced point cloud from the lidar missions.

Each sensor is initially factory calibrated. Further adjustment is performed on each sensor by periodically flying boresight locations and using this data to update boresight values used in data processing. Various proprietary tools and methodologies are used during this process. Once all data has been processed with updated boresight values, FL to FL match is performed by using strip align and other proprietary tools/processes.

Point clouds were created using the RiPROCESS software. The generated point cloud is the mathematical three-dimensional composite of all returns from all laser pulses as determined from the aerial mission. The flight line strips are calibrated using Strip Align software. This process involves correcting for systematic errors remaining in the dataset after the boresight values are applied to the dataset. Corrections are made from line to line as well as from lift to lift in order improve the relative accuracy of the dataset and exceed specifications. Each adjusted flight line channel is merged using proprietary software to form the final flight line strips. The point cloud data is then imported into GeoCue, where they are then cut into a tiled dataset. Automated ground macros are run, and the vertical accuracy of the calibrated point cloud is tested against the surveyed ground control and any bias is validated, and the remaining bias is removed from the data using a TerraScan macro that is run through the GeoCue distributive process.

DEMs and Intensity Images are then generated using proprietary software. In the bare earth surface model, above-ground features are excluded from the data set. Global Mapper is used as a final check of the bare earth dataset.

Finally, proprietary software is used to perform statistical analysis of the LAS files.

Software	Version
Applanix + POSPac	8.6
RiPROCESS	1.8.6
GeoCue	2020.1.22.1
Global Mapper	19.1;20.1
Microstation Connect	10.16.02.34
TerraModeler	21.008
TerraScan	21.016
StripAlign	2.21

3.3. LAS Classification Scheme

The classification classes are determined by Lidar Base Specifications 2021, Revision A and are an industry standard for the classification of lidar point clouds. All data starts the process as Class 1 (Unclassified), and then through automated classification routines, the classifications are determined using TerraScan macro processing.

The classes used in the dataset are as follows and have the following descriptions:

Table 3. LAS Classifications

	Classification Name	Description
1	Processed, but Unclassified	Laser returns that are not included in the bare earth class, or any other project classification
2	Bare earth	Laser returns that are determined to be bare earth using automated and manual cleaning algorithms
7	Low Noise	Laser returns that are often associated with scattering from reflective surfaces, or artificial points below the bare earth surface
9	Water	Laser returns that are found inside of hydro features
17	Bridge Deck	Laser returns falling on bridge decks
18	High Noise	Laser returns that are often associated with birds or artificial points above the bare earth surface
20	Ignored Ground	Bare earth points that fall within the given threshold of a collected hydro feature.

3.4. Classified LAS Processing

The bare earth surface is then manually reviewed to ensure correct classification on the Class 2 (Ground) points. After the bare- earth surface is finalized, it is then used to generate all hydro-breaklines through heads-up digitization.

All ground (ASPRS Class 2) lidar data inside of the Lake Pond and Double Line Drain hydro flattening breaklines were then classified to water (ASPRS Class 9) using proprietary tools. A buffer of 1.5 feet/0.5 meter was also used around each hydro flattened feature to classify these ground (ASPRS Class 2) points to Ignored ground (ASPRS Class 20). All Lake Pond Island and Double Line Drain Island features were checked to ensure that the ground (ASPRS Class 2) points were reclassified to the correct classification after the automated classification was completed.

Any noise that was identified either through manual review or automated routines was classified to the appropriate class (ASPRS Class 7 and/or ASPRS Class 18) followed by flagging with the withheld bit.

All data was manually reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler. Global Mapper is used as a final check of the bare earth dataset. NV5 Geospatial's proprietary software was then used to create the deliverable industry-standard LAS files for all point cloud data and to perform final statistical analysis of the classes in the LAS files, on a per tile level to verify final classification metrics and full LAS header information.

3.5. Hydro-Flattened Breakline Processing

Using heads-up digitization, all Lake-Ponds, Double Line Drains, and Islands are manually collected that are within the project size specification. This includes Lake-Ponds greater than 2 acres in size, Double Line Drains with greater than a 100 foot nominal width, and Islands greater than 1 acre in size within a collected hydro feature. Lidar intensity imagery and bare-earth surface models are used to ensure appropriate and complete collection of these features.

Elevation values are assigned to all collected hydro features via NV5 Geospatial's proprietary software. This software sets Lake-Ponds to an appropriate, single elevation to allow for the generation of hydro-flattened digital elevation models (DEM). Double Line Drain elevations are assigned based on lidar elevations and surrounding terrain feature to ensure all breaklines match the lidar within acceptable tolerances. Some deviation is expected between breakline and lidar elevations due to monotonicity, connectivity, and flattening rules that are enforced on the breaklines. Once complete, horizontal placement, and vertical variances are reviewed, all breaklines are evaluated for topological consistency and data integrity using a combination of proprietary tools and manual review of hydro-flattened DEMs.

Breaklines are combined into one seamless shapefile, clipped to the project boundary, and imported into an Esri file geodatabase for delivery.

3.6. Hydro-Flattened Raster DEM Processing

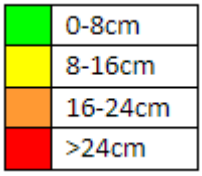
Hydro-Flattened DEMs (topographic) represent a lidar-derived product illustrating the grounded terrain and associated breaklines (as described above) in raster form. NV5 Geospatial's proprietary software was used to take all input sources (bare earth lidar points, bridge and hydro breaklines, etc.) and create a Triangulated Irregular Network (TIN) on a tile-by-tile basis. Data extending past the tile edge is incorporated in this process so that proper triangulation can occur. From the TIN, linear interpolation is used to calculate the cell values for the raster product. The raster product is then clipped back to the tile edge so that no overlapping cells remain across the project area. A 32-bit floating point GeoTIFF DEM was generated for each tile with a pixel size of 1-foot cells. NV5 Geospatial's proprietary software was used to write appropriate horizontal and vertical projection information as well as applicable header values into the file during product generation. Each DEM is reviewed in Global Mapper to check for any surface anomalies and to ensure a seamless dataset. NV5 Geospatial ensures there are no void or no-data values (-999999) in each derived DEM. This is achieved by using propriety software checking all cell values that fall within the project boundary. NV5 Geospatial uses a proprietary tool called FOCUS on Delivery to check all formatting requirements of the DEMs against what is required before final delivery.

3.7. Intensity Image Processing

Intensity images represent reflectivity values collected by the lidar sensor during acquisition. Proprietary software generates intensity images using first returns and excluding those flagged with a withheld bit. Intensity images are linearly scaled to a value range specific to the project area to standardize the images and reduce differences between individual tiles. Appropriate horizontal projection information as well as applicable header values are written during product generation.

3.8. Swath Separation Raster Processing

Swath Separation Images are rasters that represent the interswath alignment between flight lines and provide a qualitative evaluation of the positional quality of the point cloud. NV5 Geospatial proprietary software generated 2-foot cell size raster images in GeoTIFF format using last returns, excluding points flagged with the withheld bit, and using a point-in-cell algorithm. Images are generated with a 75% intensity opacity and (4) absolute 8-cm intervals, see below for interval coloring. Intensity images are linearly scaled to a value range specific to the project area to standardize the images and reduce differences between individual tiles. Appropriate horizontal projection information as well as applicable header values are written to the file during product generation. NV5 Geospatial uses a proprietary tool called FOCUS on Delivery to check all formatting requirements of the images against what is required before final delivery.



3.9. Maximum Surface Height Raster Processing

Maximum Surface Height rasters (topographic) represent a lidar-derived product illustrating natural and built-up features. NV5 Geospatial's proprietary software was used to take all classified lidar points, excluding those flagged with a withheld bit, and create a raster on a tile-by-tile basis. Data extending past the tile edge is incorporated in this process so that proper gridding can occur. The raster is created by laying a 2-foot DEM cell size over the area and assigning the values to cells by using the maximum lidar point that intersects that grid cell. The raster product is then clipped back to the tile edge so that no overlapping cells remain across the project area. A 32-bit floating point GeoTIFF was then generated for each tile with a pixel size of 2-foot. There is no interpolation type being used in creating the raster product. NV5 Geospatial's proprietary software was used to write appropriate horizontal and vertical projection information as well as applicable header values into the file during product generation. Each maximum surface height raster is reviewed in Global Mapper to check for any anomalies and to ensure a seamless dataset. NV5 Geospatial uses a proprietary tool called FOCUS on Delivery to check all formatting requirements of the DEMs against what is required before final delivery.

3.10. Point Density

The acquisition parameters were designed to acquire an average first-return density of 8 points/m2. First return density describes the density of pulses emitted from the laser that return at least one echo to the system. Multiple returns greater than 1 from a single pulse were not considered in first return density analysis. Some types of surfaces (e.g., breaks in terrain, water, and steep slopes) may have returned fewer pulses than originally emitted by the laser. First returns typically reflect off the highest feature on the landscape within the footprint of the pulse. In forested or urban areas, the highest feature could be a tree, building or power line, while in areas of unobstructed ground, the first return will be the only echo and represents the bare earth surface.

The density of ground-classified lidar returns was also analyzed for this project. Terrain character, land cover, and ground surface reflectivity all influenced the density of ground surface returns. In vegetated areas, fewer pulses may penetrate the canopy, resulting in lower ground density.

The average first-return density of lidar data for the project was 17.69 points/m2 while the average ground classified density was 13.7 points/m2. The statistical and spatial distributions of first return densities and classified ground return densities per 100 m x 100 m cell are portrayed in Figures 4 and 5.

WI 12 County B22 Bayfield County
Work Unit 300215 First Return Density

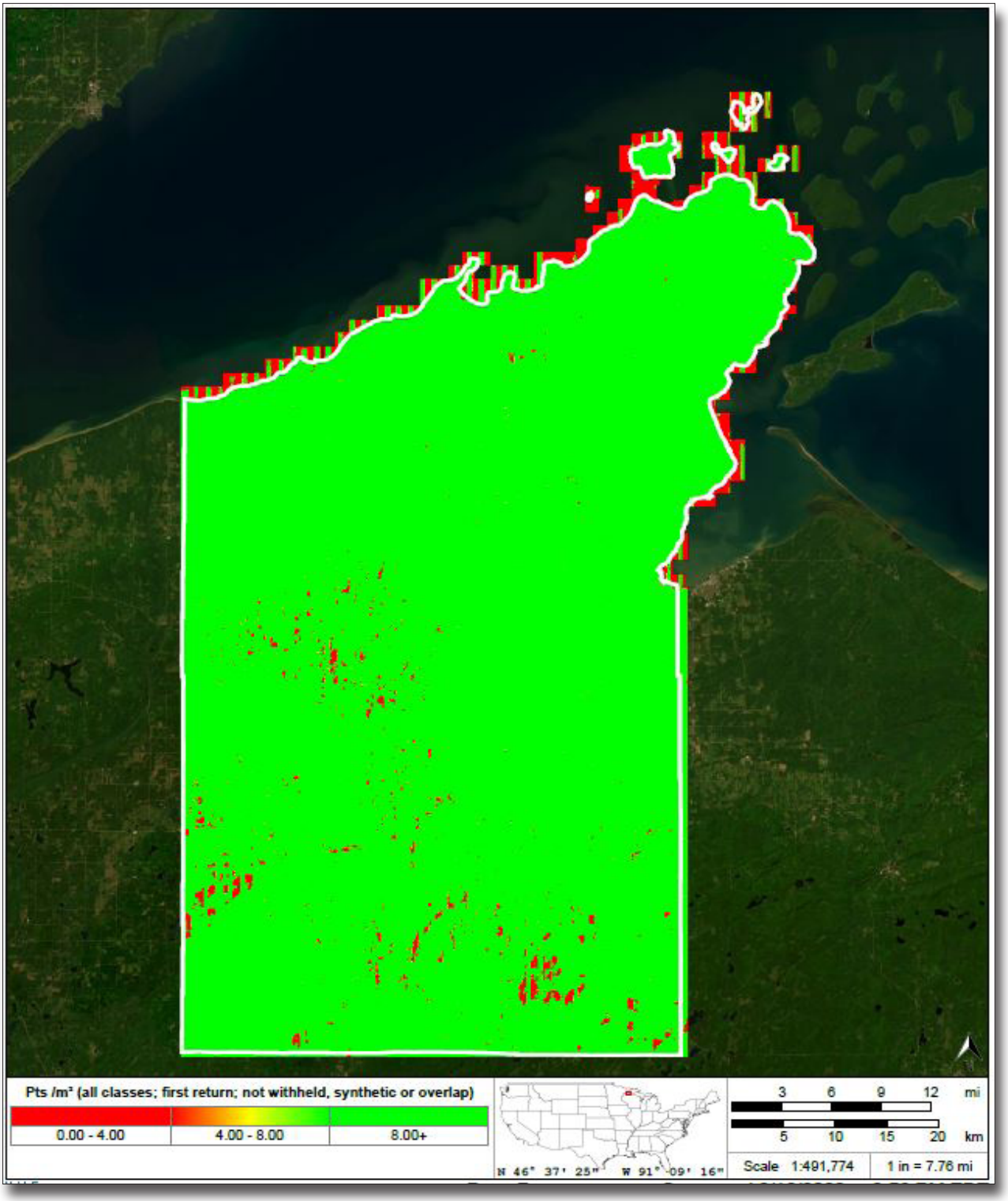


Figure 4. First Return Point Density

WI 12 County B22 Bayfield County
Work Unit 300215 Ground Density

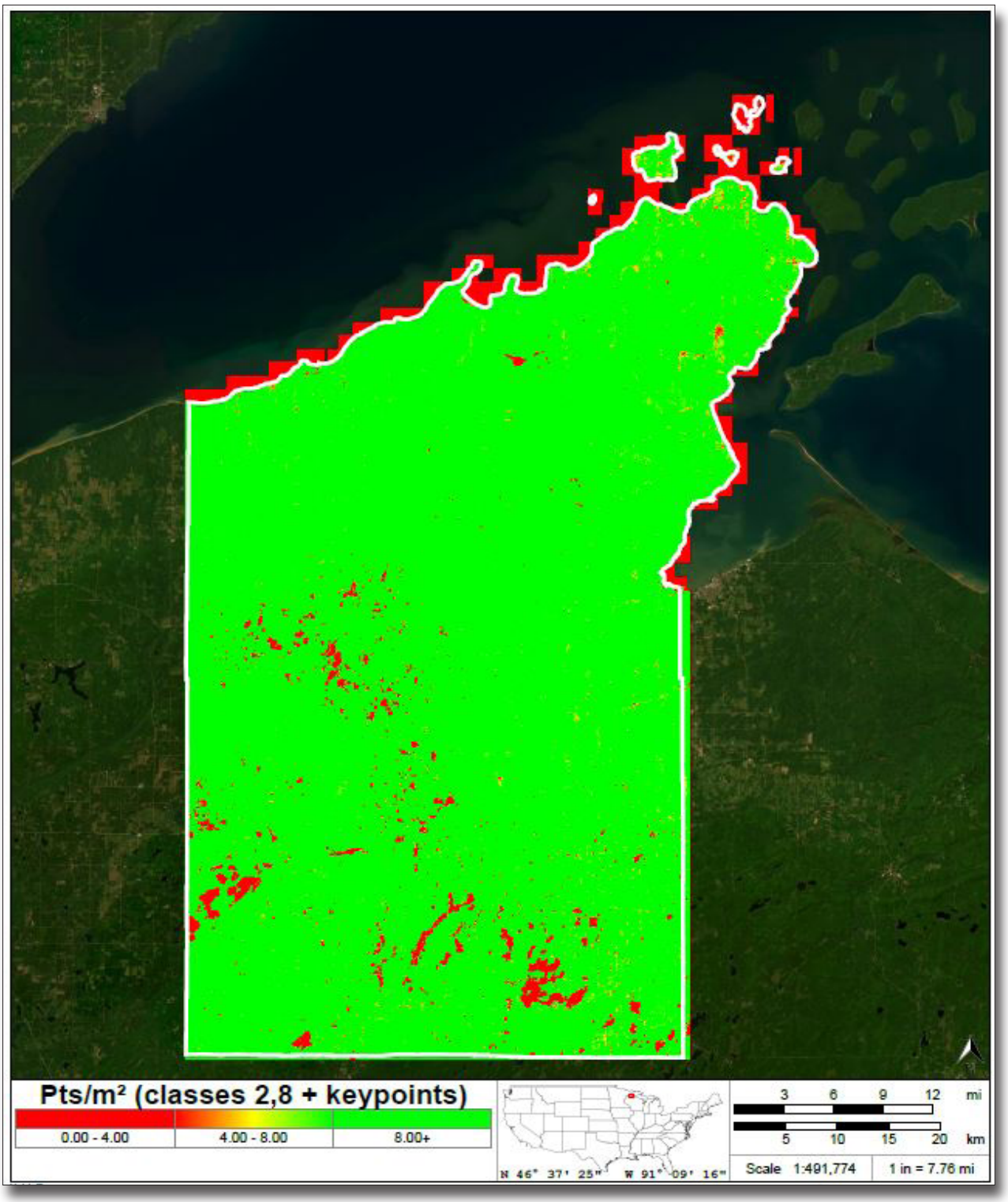


Figure 5. Ground Density

Wisconsin 12 County - Bayfield
Work Unit 300215 Tile Layout

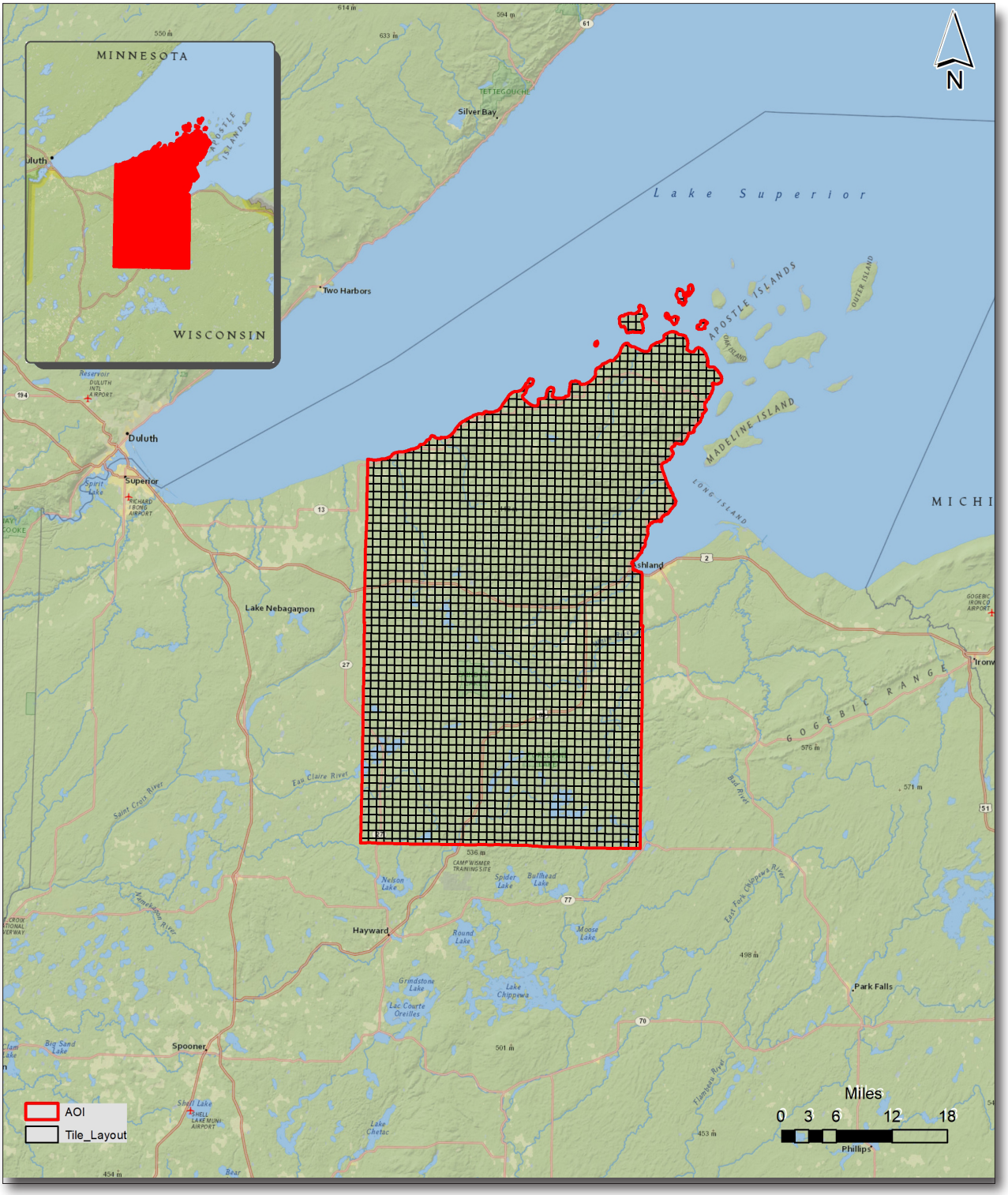


Figure 6. Lidar Tile Layout

4. Project Coverage Verification

A proprietary tool (FOCUS on Flight) produces grid-based polygons of each flightline, depicting exactly where lidar points exist. These swath polygons are reviewed against the project boundary to verify adequate project coverage. Please refer to Figure 5.

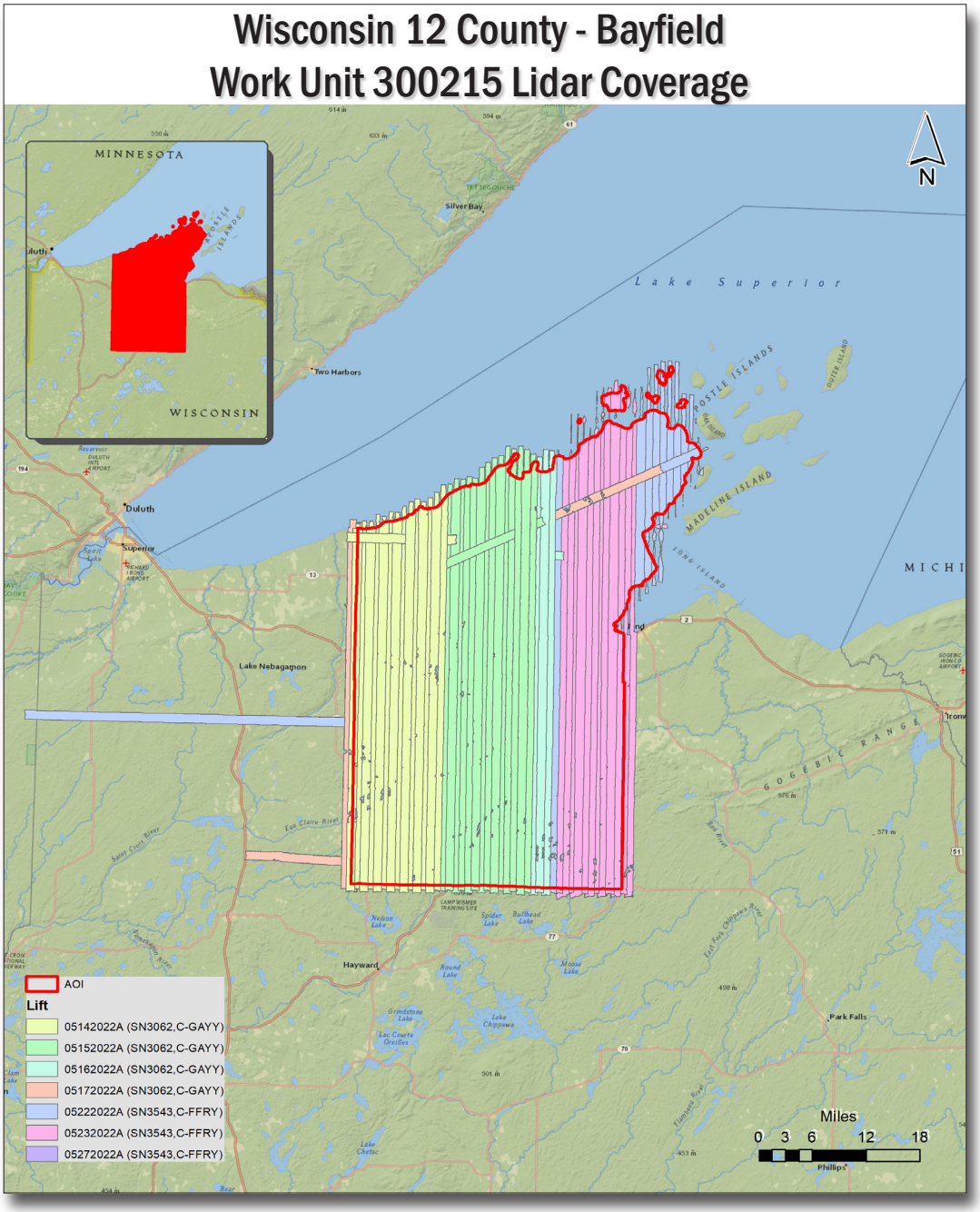


Figure 7. Lidar Coverage

5. Geometric Accuracy

5.1. Horizontal Accuracy

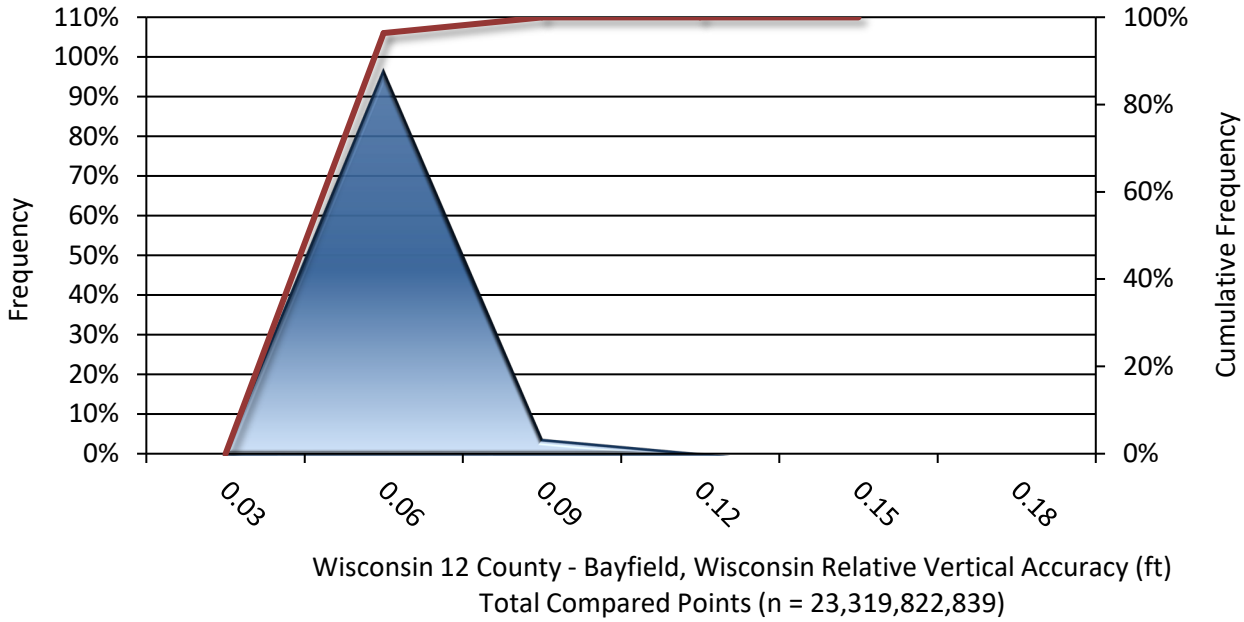
Lidar horizontal accuracy is a function of Global Navigation Satellite System (GNSS) derived positional error, flying altitude, and INS derived attitude error. The obtained $RMSE_r$ value is multiplied by a conversion factor of 1.7308 to yield the horizontal component of the National Standards for Spatial Data Accuracy (NSSDA) reporting standard where a theoretical point will fall within the obtained radius 95% of the time. Based on a flying altitude of 1690 meters, an IMU error of 0.002 decimal degrees, and a GNSS positional error of 0.015 meters, this project was compiled to meet 0.18 meter horizontal accuracy at the 95% confidence level. A summary is shown below.

Horizontal Accuracy	
$RMSE_r$	0.35 ft
	0.11 m
ACC_r	0.61 ft
	0.18 m

5.2. Relative Vertical Accuracy (Interswath Precision)

Relative vertical accuracy refers to the internal consistency of the data set as a whole: the ability to place an object in the same location given multiple flight lines, GPS conditions, and aircraft attitudes. When the lidar system is well calibrated, the swath-to-swath vertical divergence is low (<0.10 meters). The relative vertical accuracy was computed by comparing the ground surface model of each individual flight line with its neighbors in overlapping regions. The average (mean) line to line relative vertical accuracy for the Wisconsin 12 County - Bayfield project was 0.050 feet (0.015 meters). A summary is shown below.

Relative Vertical Accuracy	
Sample	55 flight line surfaces
Average	.050 ft
	.015 m
Median	.050 ft
	.015 m
RMSE	.050 ft
	.015 m
Standard Deviation (1σ)	.003 ft
	.001 m
1.96σ	.005 ft
	.002 m



5.3. Intraswath Precision (Smooth Surface Precision)

Intraswath Precision (smooth surface precision) is the measure of reliability of the lidar point cloud elevations along a planar surface. This measurement is performed on hard surfaces against a single flightline. NV5 digitized several large parking lots as polygons across the project area. These polygons were then used to calculate precision on a single FL basis using the below formula:

Precision = Range – (Slope x Cellsize x 1.414)

Range – Is the difference between the highest and lowest lidar points in each cell
Slope – is the maximum slope of the cell to its 8 neighbors
Cellsize – is set to the ANPS, rounded up to the next integer, and then doubled

NV5 calculated the RMSDz to be 2.9 cm, minimum slope-corrected range to be 0 cm, and the maximum slope-corrected range to be 10 cm.

Project Report Appendices

The following section contains the appendices as listed in the Wisconsin 12 County - Bayfield Lidar Project Report.

Appendix A

Flight Logs

Julian Day	142	Flight	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date	May 22, 2022	**Aircraft**	C-FFRY
Project	3237_NV5_QL1_2022	**Pilot**	Kane G
Location	Duluth MN	**Operator**	Daniel. A
Mission Objective			

System	Riegl VQ-1560ii
Unit	43
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

T- 12C
H- 44%
AMLS-435m
Hpa-1025

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	22:31	**Takeoff**	22:48		
Engine Off	04:53	**Landing**	04:44		
Total	6.4 hrs	**Total**	5.9 hrs		

Mission Plan					
AGL Height	1600	m	**Pulse Rate**	1100 khz/ch	
Target Speed	160	kts	**Scan Rate**	178hz/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	2235	2240
Post Mission	0446	0451

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp _____	
F8			2254	2259				
1024	432214201		2303	2315			230321	
1025	432214202		2319	2332			231920	
1026	432214203		2336	2348			233605	
1027	432214204		2352	0005			235234	
1028	432214205		0009	0021			000915	
1029	432214206		0025	0038			002512	
1030	432214207		0042	0054			004200	
1031	432214208		0058	0111			005807	
1032	432214209		0114	0127			011449	
F8			0137	0142				
3098	432214210		0145	0203			014533	3238_NV5_QL1_2022
3120	432214211		0210	0210			021008	
3119	432214212		0213	0215			021333	
3118	432214213		0219	0223			021939	

Julian Day	142	Flight	A

LIDAR Flight Log

Date	May 22, 2022	**Aircraft**	C-FFRY
Project	3237_NV5_QL1_2022	**Pilot**	Kane G
Location	Duluth MN	**Operator**	Daniel. A
Mission Objective			

System	Riegl VQ-1560ii
Unit	43
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

T- 12C
H- 44%
AMLS-435m
Hpa-1025

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	22:31	**Takeoff**	22:48		
Engine Off	04:53	**Landing**	04:44		
Total	6.4 hrs	**Total**	5.9 hrs		

Mission Plan					
AGL Height	1600	m	**Pulse Rate**	1100 khz/ch	
Target Speed	160	kts	**Scan Rate**	178hz/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	2235	2240
Post Mission	0446	0451

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp _____	
3117	432214214		0227	0232			022753	
3116	432214215		0236	0242			023636	
3115	432214216		0245	0250			024555	
3114	432214217		0252	0303			025228	
3113	432214218		0307	0316			030726	
3112	432214219		0319	0327			031920	
3111	432214220		0331	0339			033124	
3121	432214221		0344	0359			034454	
F8			0400	0403				
1049	432214222		0407	0420			040742	3237_NV5_QL1_20222
1007	432214223		0425	0431			042511	Refly 16nm FNE
F8			0432	0437				

Julian Day	142	Flight	A

LIDAR Flight Log

Date	May 22, 2022	**Aircraft**	C-FFRY
Project	3237_NV5_QL1_2022	**Pilot**	Kane G
Location	Duluth MN	**Operator**	Daniel. A
Mission Objective			

System	Riegl VQ-1560ii
Unit	43
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

T- 12C
H- 44%
AMLS-435m
Hpa-1025

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	22:31	**Takeoff**	22:48		
Engine Off	04:53	**Landing**	04:44		
Total	6.4 hrs	**Total**	5.9 hrs		

Mission Plan					
AGL Height	1600	m	**Pulse Rate**	1100 khz/ch	
Target Speed	160	kts	**Scan Rate**	178hz/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	2235	2240
Post Mission	0446	0451

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp _____	

Julian Day	142	Flight	A

LIDAR Flight Log

Date	May 22, 2022	**Aircraft**	C-FFRY
Project	3237_NV5_QL1_2022	**Pilot**	Kane G
Location	Duluth MN	**Operator**	Daniel. A
Mission Objective			

System	Riegl VQ-1560ii
Unit	43
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

T- 12C
H- 44%
AMLS-435m
Hpa-1025

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	22:31	**Takeoff**	22:48		
Engine Off	04:53	**Landing**	04:44		
Total	6.4 hrs	**Total**	5.9 hrs		

Mission Plan					
AGL Height	1600	**m**	**Pulse Rate**	1100 khz/ch	
Target Speed	160	**kts**	**Scan Rate**	178hz/ch	
Laser Current	100	**%**	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	2235	2240
Post Mission	0446	0451

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp _____	

Julian Day	142	Flight	A

LIDAR Flight Log

Date	May 22, 2022	**Aircraft**	C-FFRY
Project	3237_NV5_QL1_2022	**Pilot**	Kane G
Location	Duluth MN	**Operator**	Daniel. A
Mission Objective			

System	Riegl VQ-1560ii
Unit	43
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

T- 12C
H- 44%
AMLS-435m
Hpa-1025

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	22:31	**Takeoff**	22:48		
Engine Off	04:53	**Landing**	04:44		
Total	6.4 hrs	**Total**	5.9 hrs		

Mission Plan					
AGL Height	1600	m	**Pulse Rate**	1100 khz/ch	
Target Speed	160	kts	**Scan Rate**	178hz/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	2235	2240
Post Mission	0446	0451

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp _____	

Julian Day	143	Flight	A

LIDAR Flight Log

Date	May 23, 2022	**Aircraft**	C-FFRY
Project	3238_NV5_QL1_2022	**Pilot**	Kane G
Location	Duluth MN	**Operator**	Daniel. A
Mission Objective			

System	Riegl VQ-1560ii
Unit	43
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

T- 7C
H- 66%
AMLS-435m
Hpa-1027

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time				
Engine On	10:56	**Takeoff**	11:11	
Engine Off	16:47	**Landing**	16:38	
Total	5.9 hrs	**Total**	5.5 hrs	

Mission Plan					
AGL Height	1584	m	**Pulse Rate**	1200 khz/ch	
Target Speed	160	kts	**Scan Rate**	186 hz/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	1100	1105
Post Mission	1640	1645

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp _____	
F8			1126	1129				
Xtie	432214301		1132	1136			113239	
3110	432214302		1147	1206			114704	
3109	432214303		1210	1230			121023	
3108	432214304		1232	1253			123226	
3107	432214305		1257	1316			125700	
3106	432214306		1320	1339			132006	
3105	432214307		1343	1402			134312	
3104	432214308		1405	1425			140542	
3103	432214309		1431	1448			143103	
3102	432214310		1452	1511			145225	
3101	432214311		1513	1531			151347	
3100	432214312		1534	1552			153413	
3099	432214313		1555	1612			155503	
F8			1613	1618				

Julian Day	147	Flight	B

LIDAR Flight Log

Date	May 27th, 2022	**Aircraft**	G-FFRY
Project	3237_NV5_WI3DEP_QL1	**Pilot**	K.B, P.B
Location	CYQT	**Operator**	RMG

Mission Objective

Reflight lines 1041-1048

System	VQ-1560 II
Unit	S2223543
IMU	Applanix AP50
GPS Rx	Trimble GNSS17
Scanner 1 Drive	C1
Scanner 2 Drive	C2

Additional Notes

GPS files: N62756178.107-173
Extremely rough
Peter in training. Pretty green.
Descending slightly for cloud if needed.

Time to next maintenance: 33.5 ○ 50 hr ◉ 100 hr

Aircraft Block Time				
Engine On	15:24	**Takeoff**	15:49	
Engine Off	21:23	**Landing**	21:06	
Total	6.0 hrs	**Total**	5.3 hrs	

Mission Plan			
AGL Height	1600 m	**Pulse Rate**	1100 kHz
Target Speed	160 kts	**Scan Rate**	177 (178plane)
Laser Current	100 %	**FOV**	60 degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	15:34	15:39
Post Mission	21:16	21:21

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220527	Comments
			Start	End	Time	nmi to End		
							220527_153451	
Figure 8		8	16:38	16:43				6600 ft +/-
1048	432214712	182.4	16:45	16:59			220527_164511	5698 ft, refly cloud & IP issue
1041	432214713	002.2	17:03	17:18			170324	5698 ft south 25 NM
1042	432214714	182.2	17:21	17:35			172147	5698 ft
1043	432214715	002.2	17:38	17:52			173800	5698 ft
1044	432214716	182.2	17:55	18:09			175508	5698 ft
1045	432214717	002.2	18:13	18:29			181342	5698 ft
1046	432214718	182.3	18:32	18:46			183204	5698 ft, pilot sick, may have to refly
1047	432214719	002.2	18:48	19:03			184837	5698 ft Kane flying rest of mission
1048	432214720	182.3	19:05	19:19			190507	5698 ft REFLOWN
1046	432214721	002.2	19:23	19.37			192304	5698 ft REFLOWN density concerns
1041	432214722	182.3	19:44	19:54			194411	5698 ft REFLOWN cloud south 25 NM
X-Tie_41-48	432214723	092.3	20:02	20:05			200224	6099 ft east 7 NM +/-
Figure 8		20:06	20:06	20:09				Delayed on parking

Julian Day	134	Flight	A

LIDAR Flight Log

Date	May 14, 2022	**Aircraft**	C-GAYY
Project	3238_NV5_QL1	**Pilot**	A. Hering
Location	Eau Claire, Wisconsin	**Operator**	B.Eisenbart
Mission Objective			

System	VQ-1560II
Unit	S2223062
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

moderate turbulence

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	12:42	**Takeoff**	12:59		
Engine Off	18:23	**Landing**	18:14		
Total	5.7 hrs	**Total**	5.3 hrs		

Mission Plan					
AGL Height	1584	m	**Pulse Rate**	1200 khz/ch	
Target Speed	160	kts	**Scan Rate**	191 lps/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	12:46	12:51
Post Mission	18:16	18:21

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220514	Comments
			Start	End	Time	nmi to End		
figure 8		-	13:08	13:13			-	
3067	622213012	182°	13:16	13:33			131640	
3068	622213013	002°	13:35	13:49			133548	
3069	622213014	182°	13:53	14:09			135312	
3070	622213015	002°	14:12	14:26			141208	
3071	622213016	182°	14:30	14:46			143007	
3072	622213017	002°	14:49	15:03			144914	
3073	622213018	182°	15:07	15:24			150736	
3074	622213019	002°	15:27	15:42			152740	
3075	622213010	182°	15:46	16:03			154628	
3076	622213011	002°	16:06	16:21			160654	
3077	622213012	182°	16:25	16:43			162554	
3078	622213013	002°	16:46	17:01			164641	
3079	622213014	182°	17:05	17:23			170550	
3080	622213015	002°		17:42			172627	

Julian Day	134	Flight	A

LIDAR Flight Log

Date	May 14, 2022	**Aircraft**	C-GAYY
Project	3238_NV5_QL1	**Pilot**	A. Hering
Location	Eau Claire, Wisconsin	**Operator**	B.Eisenbart
Mission Objective			

System	VQ-1560II
Unit	S2223062
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

moderate turbulence

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	12:42	**Takeoff**	12:59		
Engine Off	18:23	**Landing**	18:14		
Total	5.7 hrs	**Total**	5.3 hrs		

Mission Plan					
AGL Height	1584	m	**Pulse Rate**	1200 khz/ch	
Target Speed	160	kts	**Scan Rate**	191 lps/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	12:46	12:51
Post Mission	18:16	18:21

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220514	Comments
			Start	End	Time	nmi to End		
X-Tie	622213016	272°	17:49	17:54			174953	Rain moving into the block
Figure 8		-	17:55	17:59			-	

Julian Day	135	Flight	A

LIDAR Flight Log

Date	May 15, 2022	**Aircraft**	C-GAYY
Project	3238_NV5_QL1	**Pilot**	A. Hering
Location	Eau Claire, Wisconsin	**Operator**	B.Eisenbart
Mission Objective			

System	VQ-1560II
Unit	S2223062
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

moderate to heavy turbulence and wind shear all day

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	12:05	**Takeoff**	12:17		
Engine Off	18:09	**Landing**	17:59		
Total	6.1 hrs	**Total**	5.7 hrs		

Mission Plan					
AGL Height	1584	m	**Pulse Rate**	1200 khz/ch	
Target Speed	160	kts	**Scan Rate**	191 lps/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	12:09	12:14
Post Mission	18:02	18:07

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220515	Comments
			Start	End	Time	nmi to End		
Figure 8		-	12:28	12:33			-	
3081	622213514	182°	12:41	12:58			124143	
3082	622213515	002°	13:02	13:18			130204	
3083	622213516	182°	13:22	13:38			132211	
3084	622213517	002°	13:42	13:59			134220	
3085	622213518	182°	14:02	14:18			140229	
3086	622213519	002°	14:22	14:39			142229	
3087	622213520	182°	14:43	14:49			144305	
3088	622213521	002°	15:03	15:21			150337	
3089	622213522	182°	15:24	15:41			152433	
3090	622213523	002°	15:45	16:02			154527	
3091	622213524	182°	16:06	16:23			160608	
3092	622213525	002°	16:27	16:44			162728	
3093	622213526	182°	16:48	17:05			164800	
3094	622213527	002°	17:09	17:26			170914	

Julian Day	135	Flight	A

LIDAR Flight Log

Date	May 15, 2022	**Aircraft**	C-GAYY
Project	3238_NV5_QL1	**Pilot**	A. Hering
Location	Eau Claire, Wisconsin	**Operator**	B.Eisenbart
Mission Objective			

System	VQ-1560II
Unit	S2223062
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

moderate to heavy turbulence and wind shear all day

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time					
Engine On	12:05	**Takeoff**	12:17		
Engine Off	18:09	**Landing**	17:59		
Total	6.1 hrs	**Total**	5.7 hrs		

Mission Plan					
AGL Height	1584	m	**Pulse Rate**	1200 khz/ch	
Target Speed	160	kts	**Scan Rate**	191 lps/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	12:09	12:14
Post Mission	18:02	18:07

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220515	Comments
			Start	End	Time	nmi to End		
X-TIE	622213528	247°	17:31	17:36			173126	
Figure 8		-	17:36	17:41			-	

Julian Day	136	Flight	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date	May 16, 2022	**Aircraft**	C-GAYY
Project	3238_NV5_QL1	**Pilot**	A. Hering
Location	Eau Claire, Wisconsin	**Operator**	B.Eisenbart
Mission Objective			

System	VQ-1560II
Unit	S2223062
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time				
Engine On	11:59	**Takeoff**	12:13	
Engine Off	14:40	**Landing**	14:30	
Total	2.7 hrs	**Total**	2.3 hrs	

Mission Plan					
AGL Height	1584	m	**Pulse Rate**	1200 khz/ch	
Target Speed	160	kts	**Scan Rate**	191 lps/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	12:04	12:09
Post Mission	14:33	14:38

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220516	Comments
			Start	End	Time	nmi to End		
Figure 8		-	12:32	12:37			-	
3095	622213601	182°	12:39	12:56			123956	
3096	622213602	002°	13:00	13:20			130024	
3097	622213603	182°	13:23	13:40			132310	
X-TIE	622213604	272°	14:00	14:02			140055	clouds forming in the block
Figure 8		-	14:03	14:07			-	

Julian Day	137	Flight	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date	May 17, 2022	**Aircraft**	C-GAYY
Project	3237_NV5_QL1	**Pilot**	A. Hering
Location	Eau Claire, Wisconsin	**Operator**	B.Eisenbart
Mission Objective			

System	VQ-1560II
Unit	S2223062
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time				
Engine On	14:11	**Takeoff**	14:28	
Engine Off	20:28	**Landing**	20:18	
Total	6.3 hrs	**Total**	5.8 hrs	

Mission Plan					
AGL Height	2300	m	**Pulse Rate**	500 khz/ch	
Target Speed	160	kts	**Scan Rate**	102 lps/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	14:14	14:19
Post Mission	20:21	20:26

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220517	Comments
			Start	End	Time	nmi to End		
Figure 8		-	14:39	14:43			-	
3121		67°	14:47	15:00			144715	Aborted line, clouds over 3238 block
Figure 8		-	15:16	15:20			-	moved to 3237 block
1034	622213720	182°	15:23	15:37			152359	
1035	622213721	002°	15:40	15:54			154028	
1036	622213722	182°	15:57	16:10			155739	
1037	622213723	002°	16:14	16:28			161426	
1038	622213724	182°	16:31	16:45			163136	
1039	622213725	002°	16:48	17:02			164827	
1040	622213726	182°	17:05	17:19			170538	
1041	622213727	002°	17:22	17:36			172235	
1042	622213728	182°	17:39	17:53			173929	
1043	622213729	002°	17:56	18:10			175643	
1044	622213730	182°	18:13	18:28			181352	
1045	622213731	002°	18:31	18:45			183144	

Julian Day	137	Flight	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date	May 17, 2022	**Aircraft**	C-GAYY
Project	3237_NV5_QL1	**Pilot**	A. Hering
Location	Eau Claire, Wisconsin	**Operator**	B.Eisenbart
Mission Objective			

System	VQ-1560II
Unit	S2223062
IMU	Applanix AP60
GPS Rx	Trimble GNSS17
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes

Time to next maintenance: _____ ◉ 50 hr ○ 100 hr

Aircraft Block Time				
Engine On	14:11	**Takeoff**	14:28	
Engine Off	20:28	**Landing**	20:18	
Total	6.3 hrs	**Total**	5.8 hrs	

Mission Plan					
AGL Height	2300	m	**Pulse Rate**	500 khz/ch	
Target Speed	160	kts	**Scan Rate**	102 lps/ch	
Laser Current	100	%	**FOV**	60	degs

Static Alignment	GPS Time	
	Start	**End**
Pre Mission	14:14	14:19
Post Mission	20:21	20:26

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID Time Stamp 220517	Comments
			Start	End	Time	nmi to End		
1046	622213732	182°	18:48	19:03			184852	
1047	622213733	002°	19:06	19:20			190642	
1048	622213734	182°	19:24	19:38			192402	
X-TIE	622213735	272°	19:41	19:45			194131	
1033	622213736	002°	19:50	20:03			195017	
Figure 8		-	20:03	20:07			-	

Appendix B

SBET and POSPAC Reports

General Information

Mission Information

Project name	05142022A_3062
Processing date	2022-05-17 18:52:52
Mission date	2022-05-14 12:46:08
Mission duration	05:34:14.831
Processing mode	IN-Fusion PP-RTX

Rover Hardware Information

Product	POS AV 610 VER6 HW2.5-12
Serial number	S/N8708
IMU type	57
Receiver type	BD982
Antenna type	AV59

Project File List

Rover Data Files

File name	File type
6222134.000	POS Data
6222134.001	POS Data
6222134.002	POS Data
6222134.003	POS Data
6222134.004	POS Data
6222134.005	POS Data
6222134.006	POS Data
6222134.007	POS Data
6222134.008	POS Data
6222134.009	POS Data
6222134.010	POS Data
6222134.011	POS Data
6222134.012	POS Data
6222134.013	POS Data
6222134.014	POS Data
6222134.015	POS Data
6222134.016	POS Data
6222134.017	POS Data
6222134.018	POS Data
6222134.019	POS Data
6222134.020	POS Data
6222134.021	POS Data
6222134.022	POS Data
6222134.023	POS Data
6222134.024	POS Data
6222134.025	POS Data
6222134.026	POS Data
6222134.027	POS Data
6222134.028	POS Data
6222134.029	POS Data
6222134.030	POS Data
6222134.031	POS Data
6222134.032	POS Data
6222134.033	POS Data
6222134.034	POS Data
6222134.035	POS Data
6222134.036	POS Data
6222134.037	POS Data
6222134.038	POS Data
6222134.039	POS Data
6222134.040	POS Data
6222134.041	POS Data
6222134.042	POS Data
6222134.043	POS Data
6222134.044	POS Data

Input Files

File Name	File Type
Ephm1340.22g	GLONASS Broadcast Ephemeris
Ephm1340.22n	GPS Broadcast Ephemeris

Output Files

Filename	File type
sbet_05142022A_3062.out	SBET Trajectory File

Rover Data Summary

First raw data file	6222134.000		
Last raw data file	6222134.044		
Start GPS week	2209		
Start time	564349.249 (5/14/2022 12:45:49 PM)		
End time	584404.080 (5/14/2022 6:20:04 PM)		
Start of fine alignment	564778.986 (5/14/2022 12:52:58 PM)		
Available subsystems	Primary GNSS, Gimbal, IMU		
POS Event Input	None		
Correction data	None		
IMU Installation Lever Arms & Mounting Angles			
Gimbal to IMU lever arm (m)	0.000	0.000	0.000
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.142	-0.236	-1.269
Gimbal to Primary GNSS lever arm std dev (m)	-1.000		
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

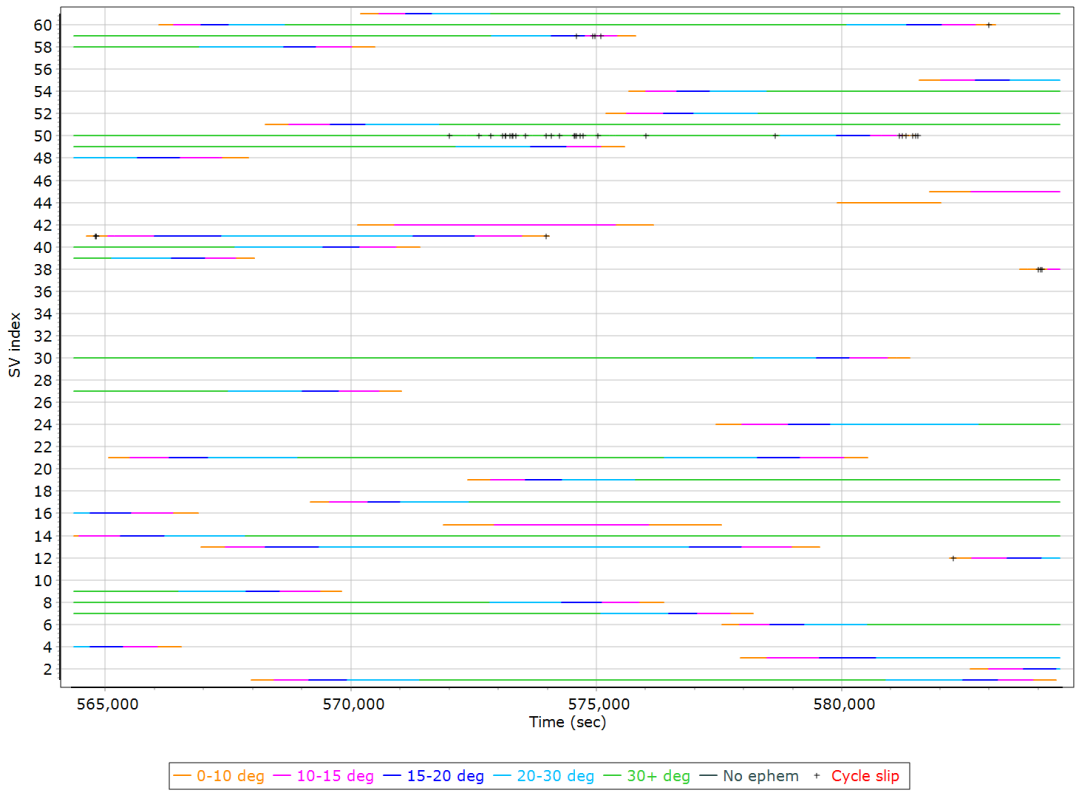
Rover Data QC

Raw IMU Import QC Summary

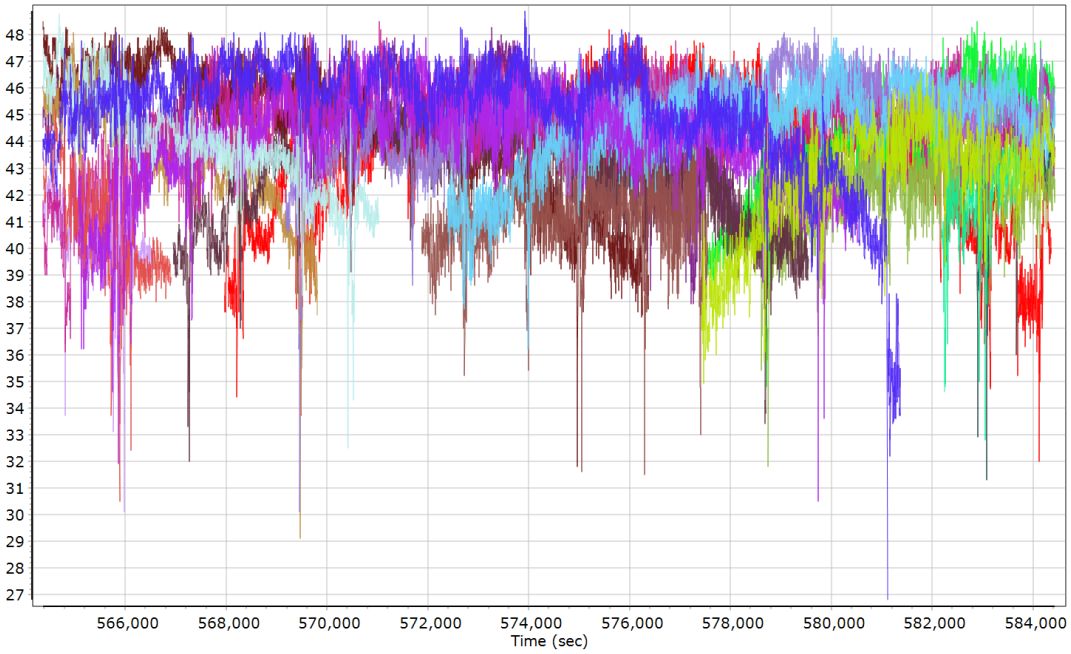
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05142022A_3062.log
IMU Records Processed	4011930
Termination Status	Normal
IMU Anomalies	0

Primary Observables & Satellite Data

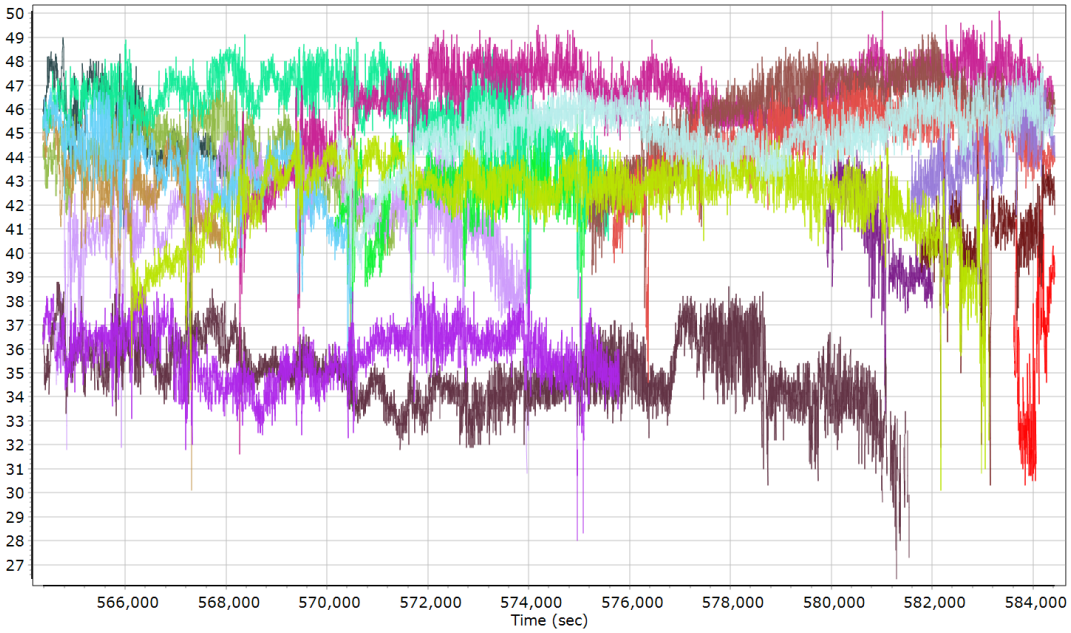
GPS/GLONASS L1 Satellite Lock/Elevation

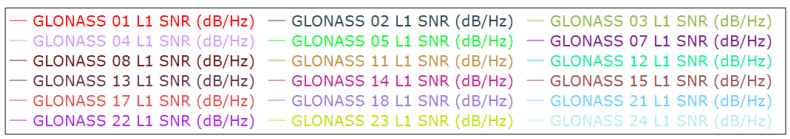


GPS L1 SNR

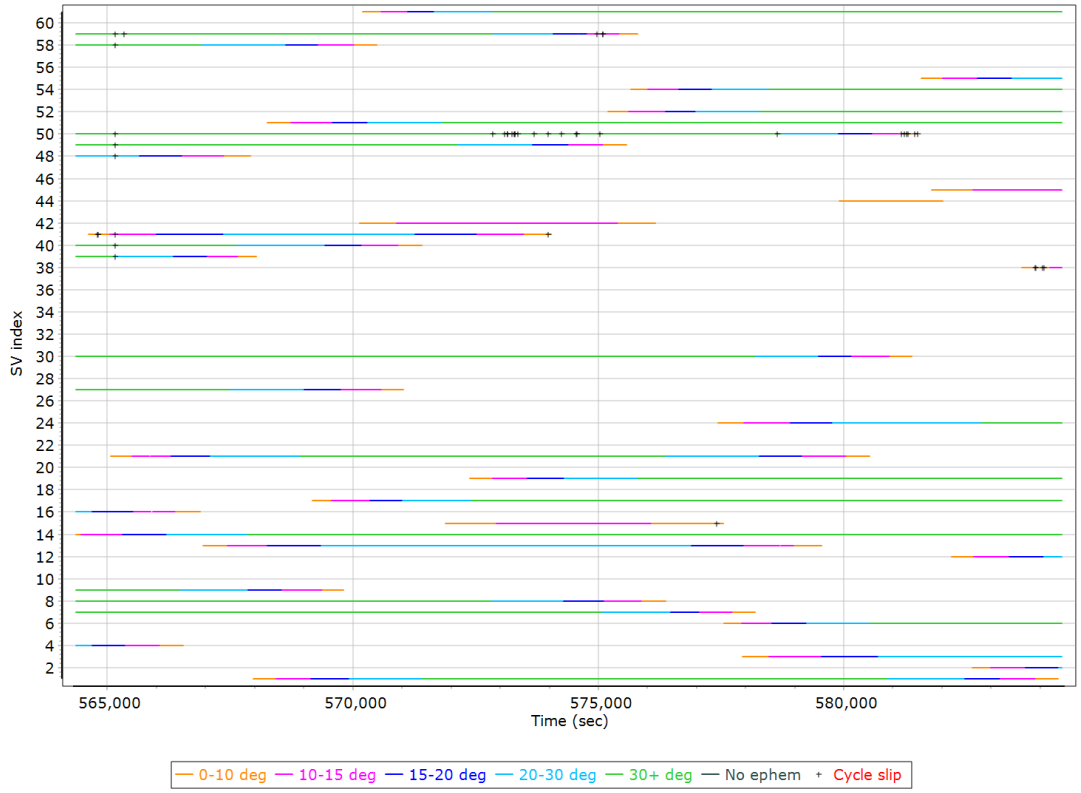


GLONASS L1 SNR

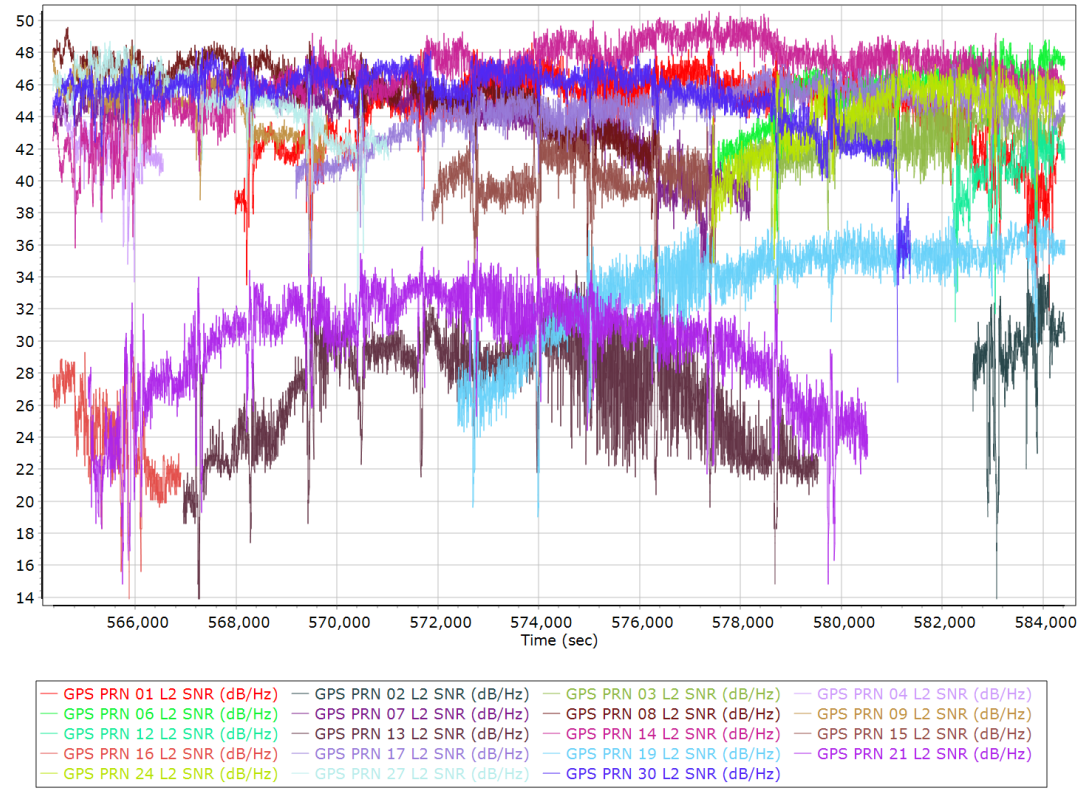




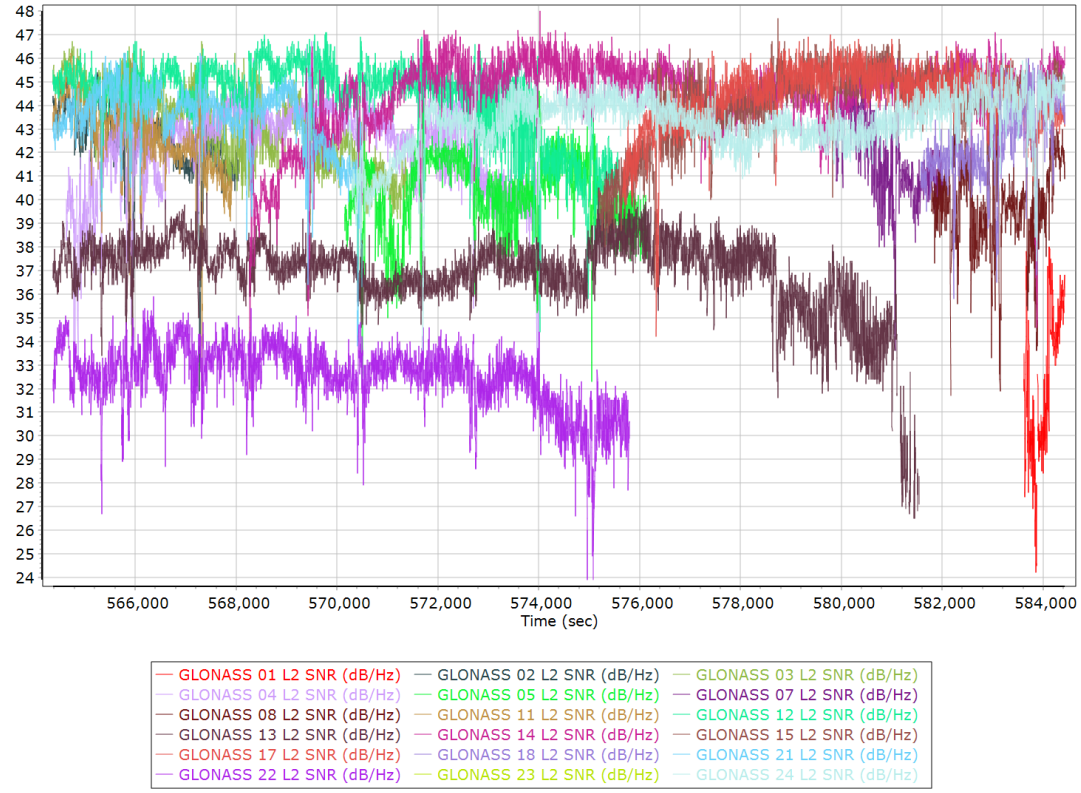
GPS/GLONASS L2 Satellite Lock/Elevation



GPS L2 SNR

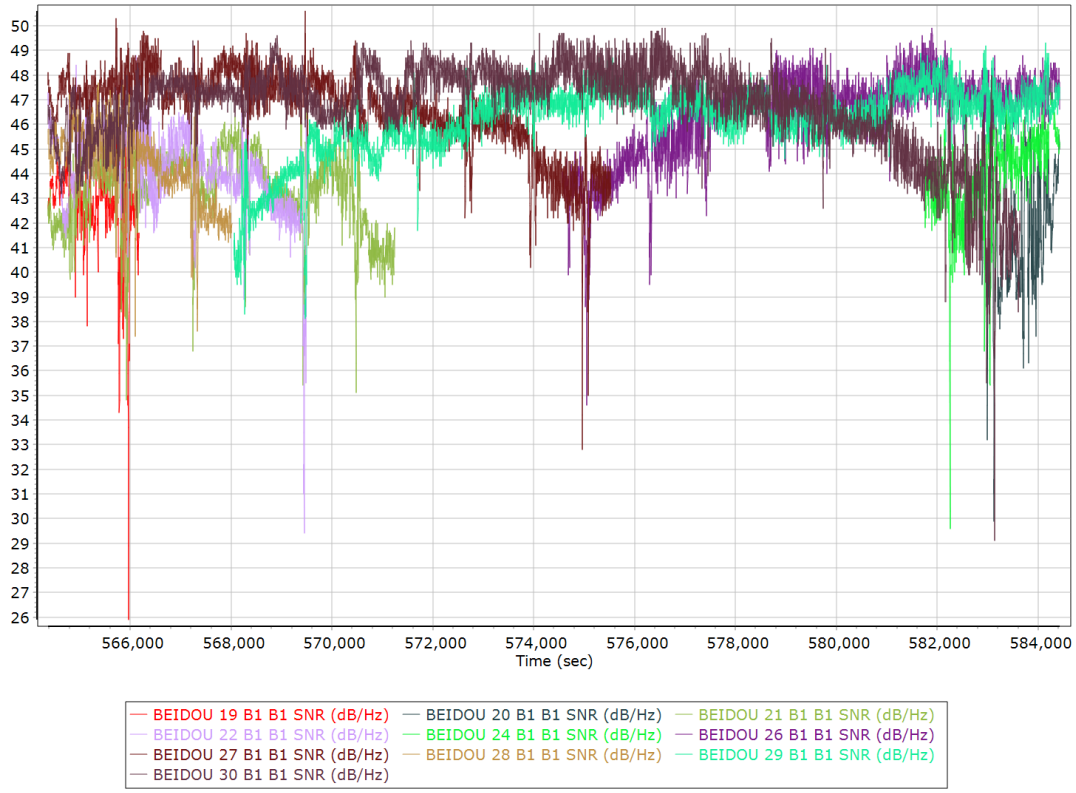


GLONASS L2 SNR

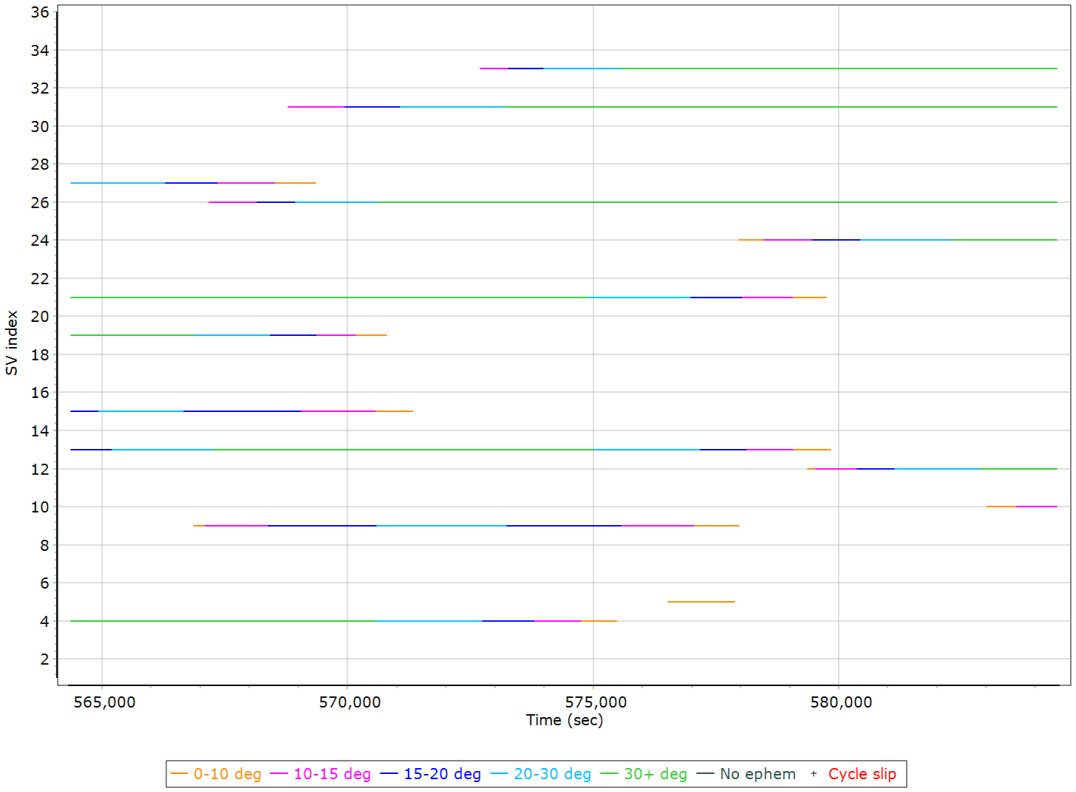


BEIDOU Satellite Lock/Elevation

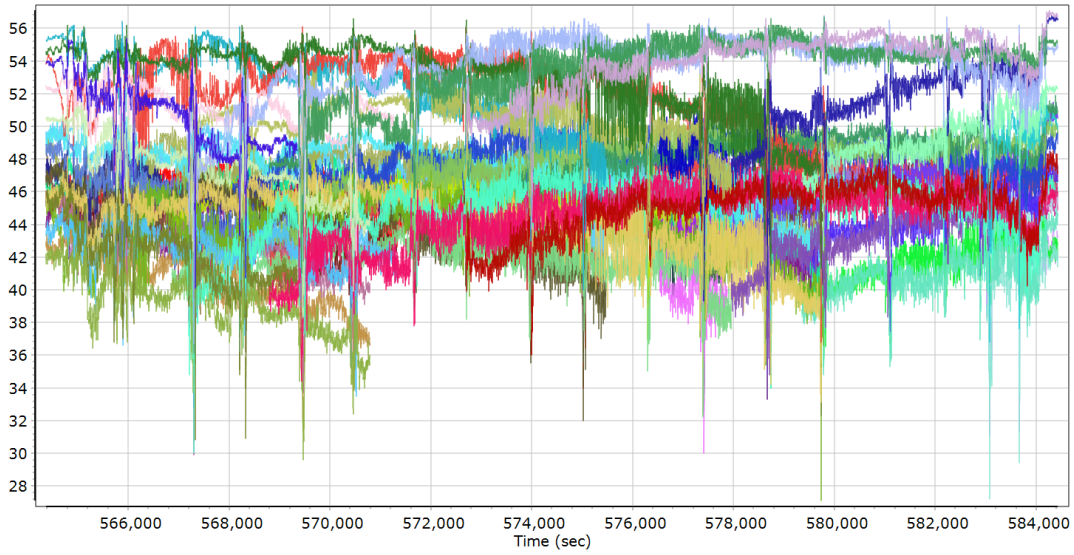
BEIDOU SNR



GALILEO Satellite Lock/Elevation



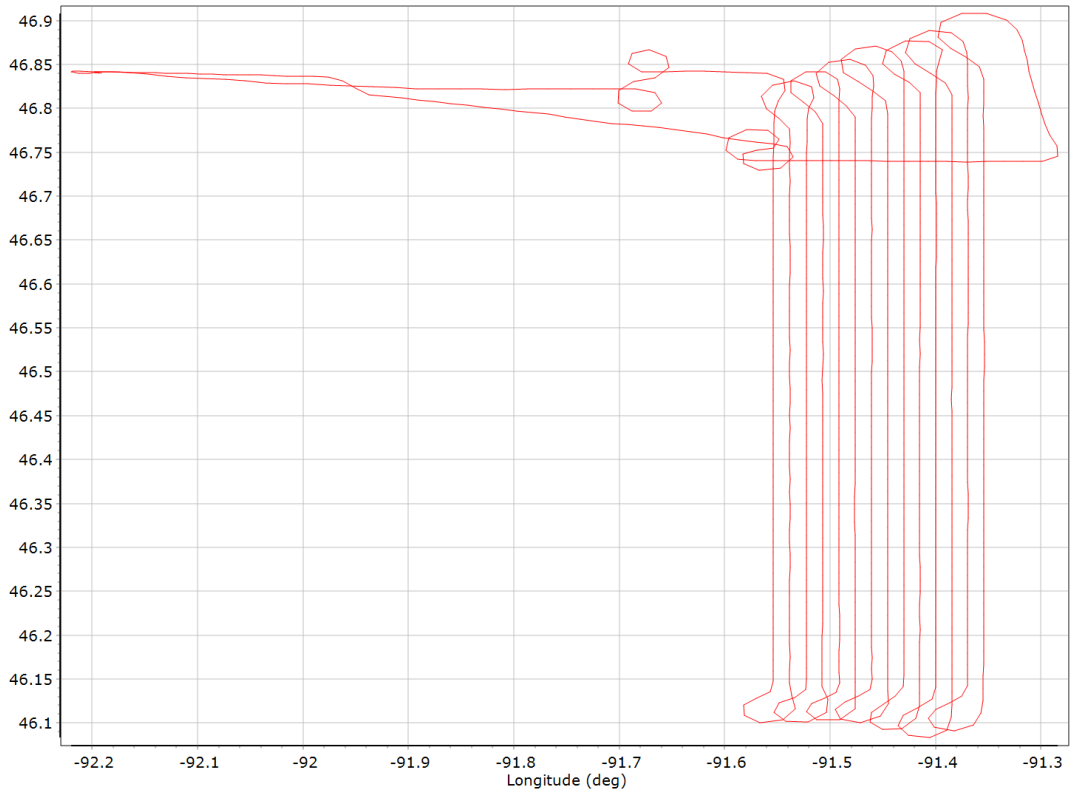
GALILEO SNR



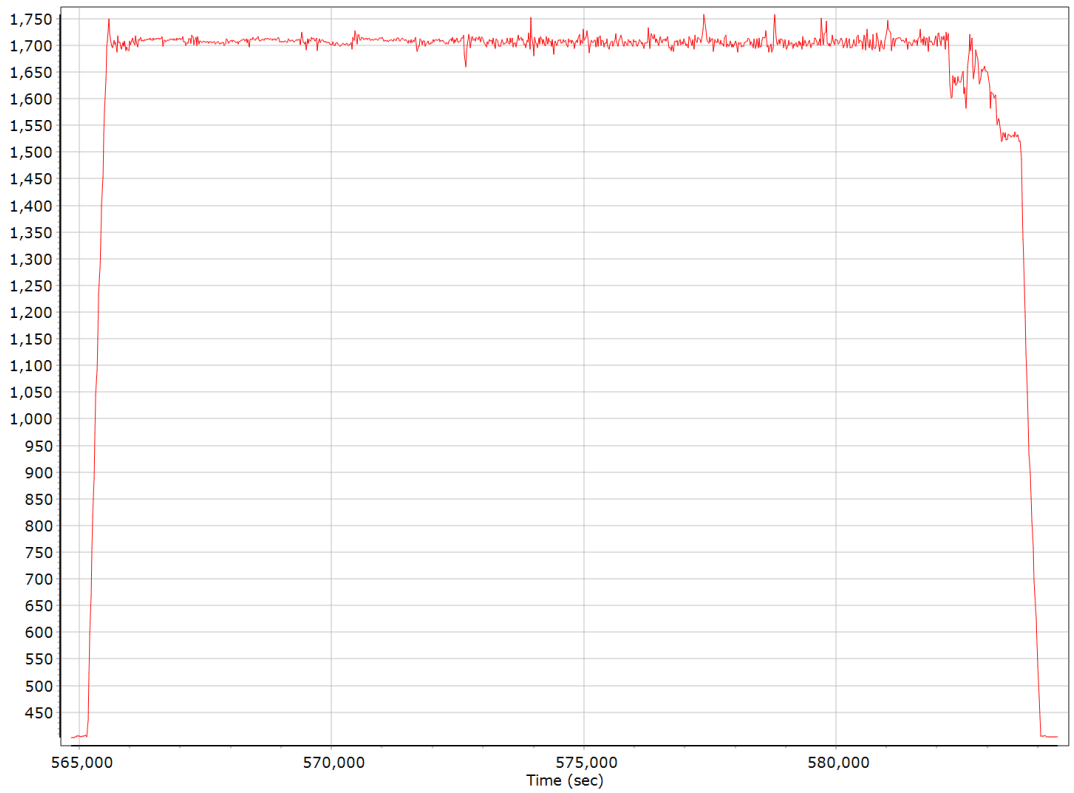
GALILEO 04 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 05 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 09 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 10 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 13 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 15 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 19 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 21 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 24 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 26 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 27 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 31 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 33 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 04 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 05 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 09 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 10 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 12 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 13 L5E5A BPSK10_PD SNR (dB/Hz)

Smoothed Trajectory Information

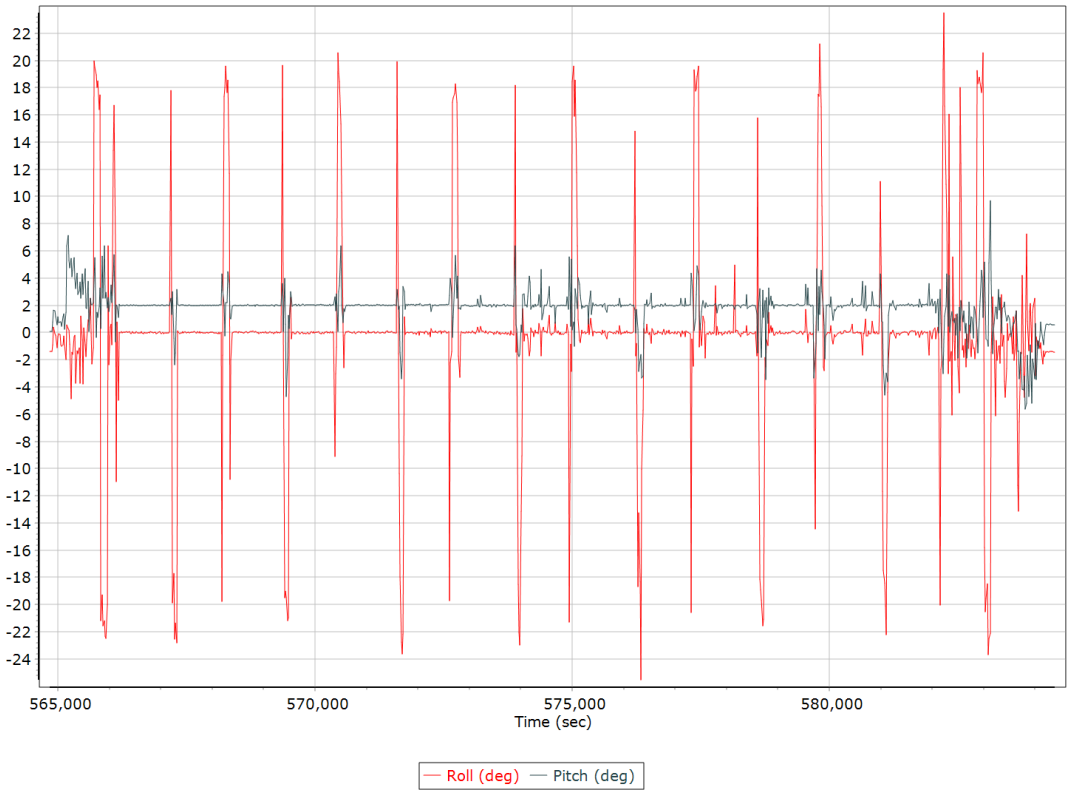
Top View



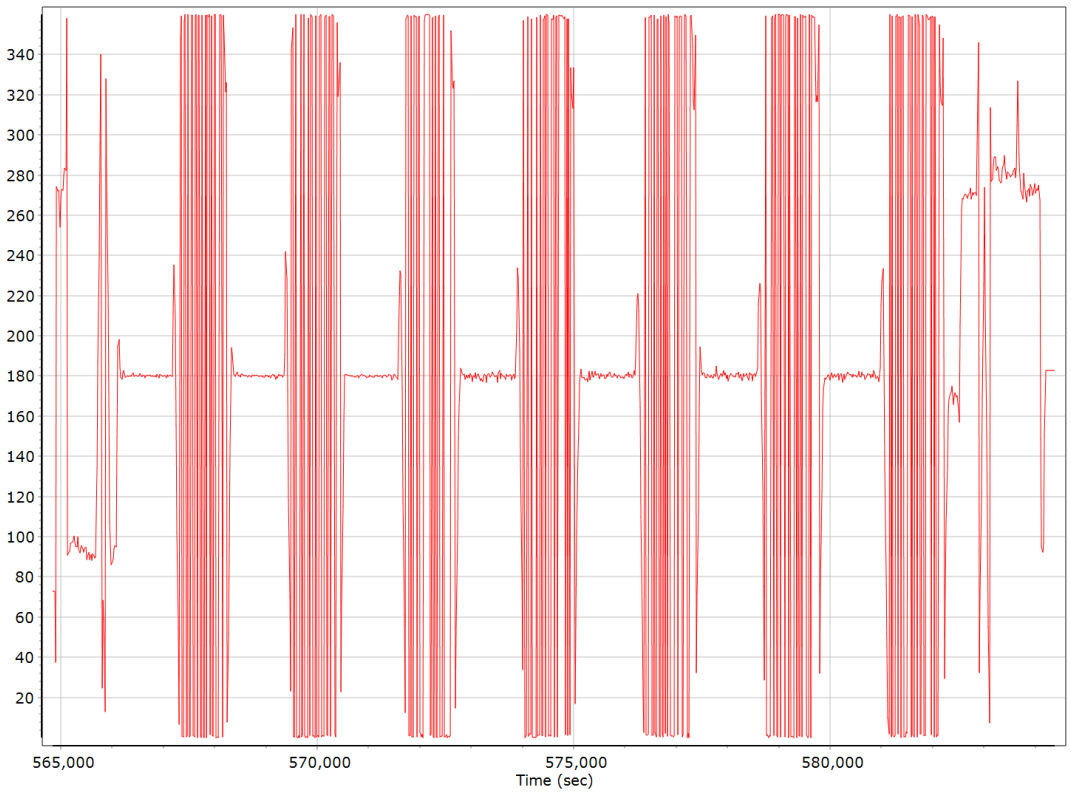
Altitude



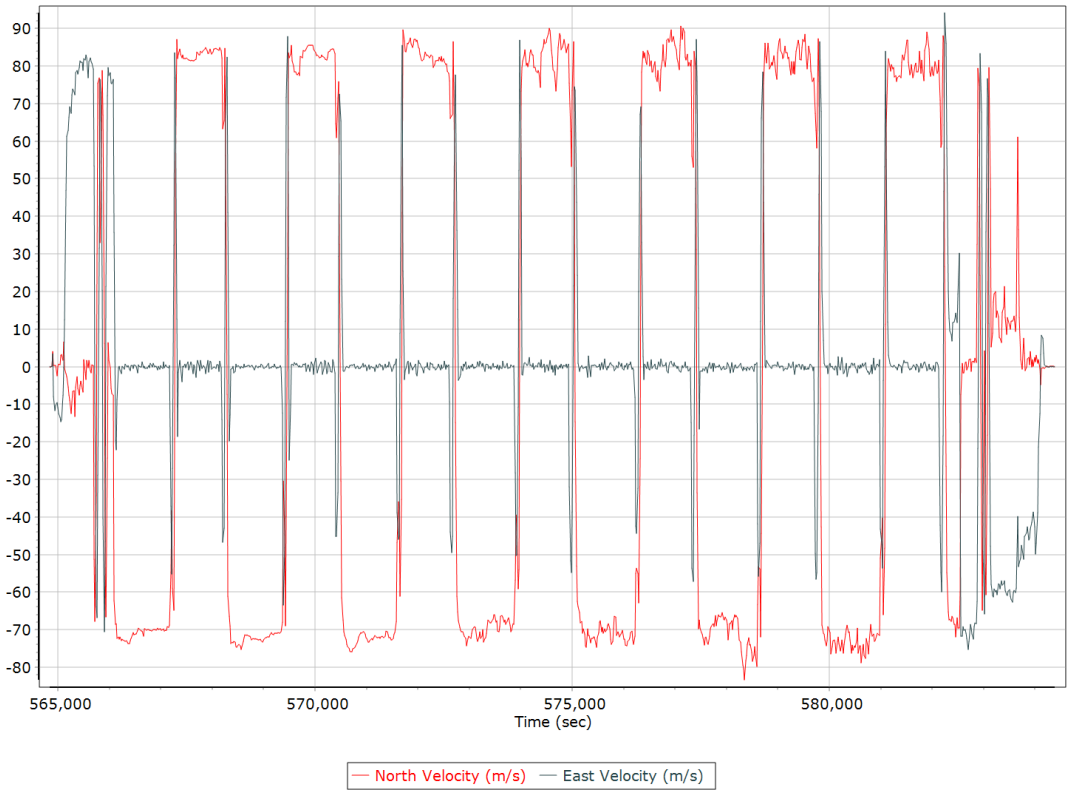
Roll/Pitch



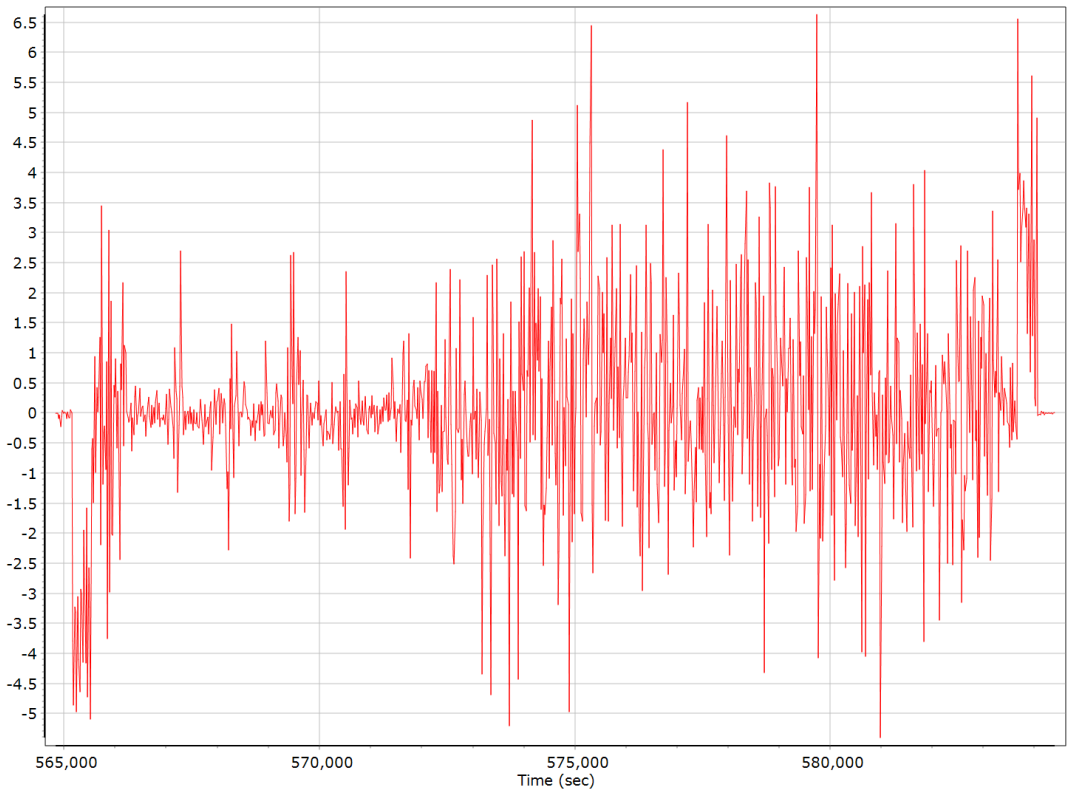
Heading



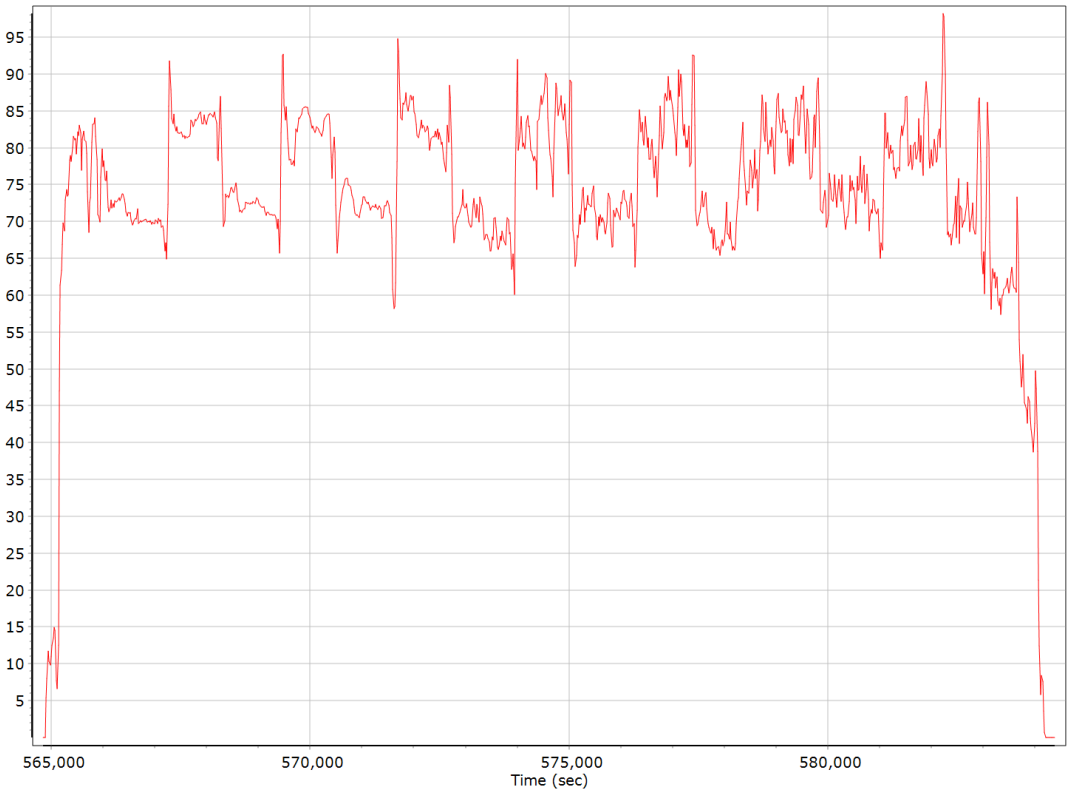
North/East Velocity



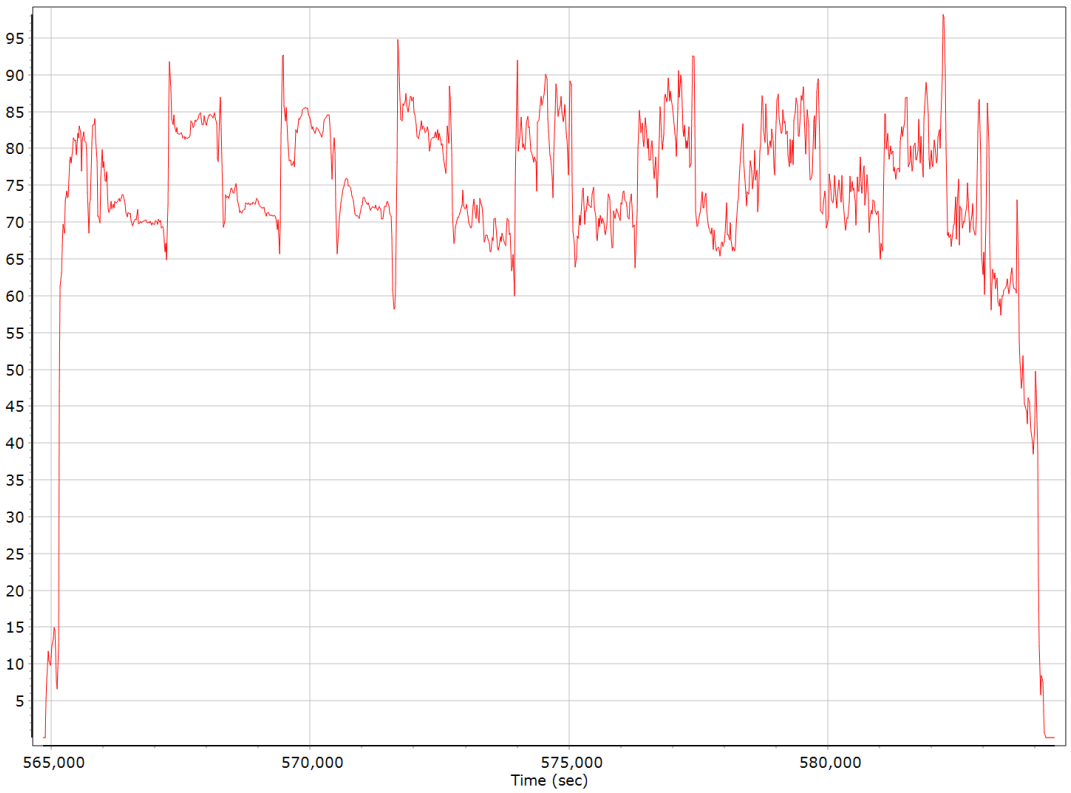
Down Velocity



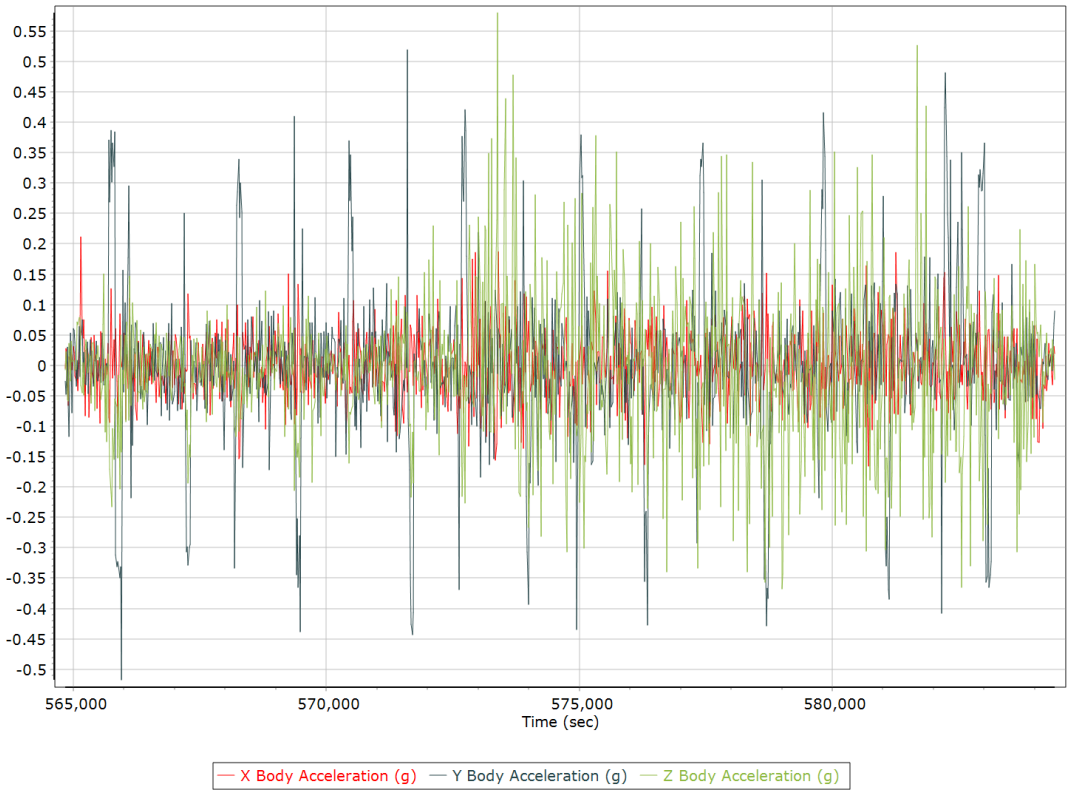
Total Speed



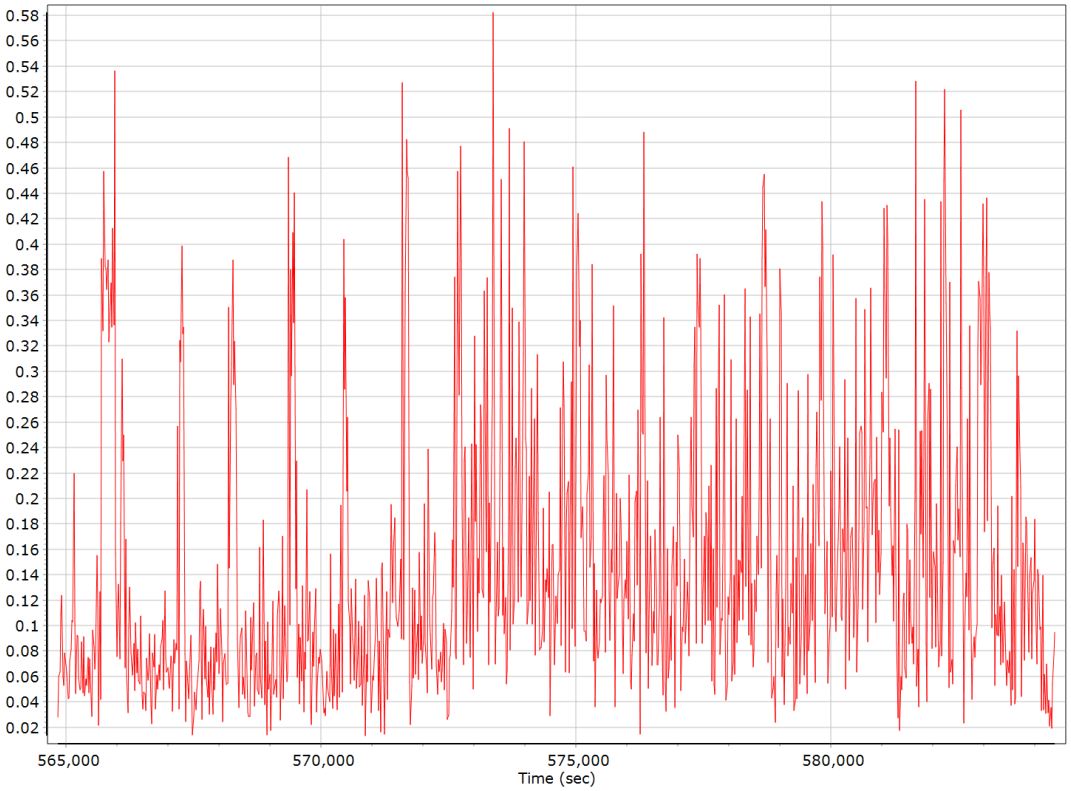
Ground Speed



Body Acceleration



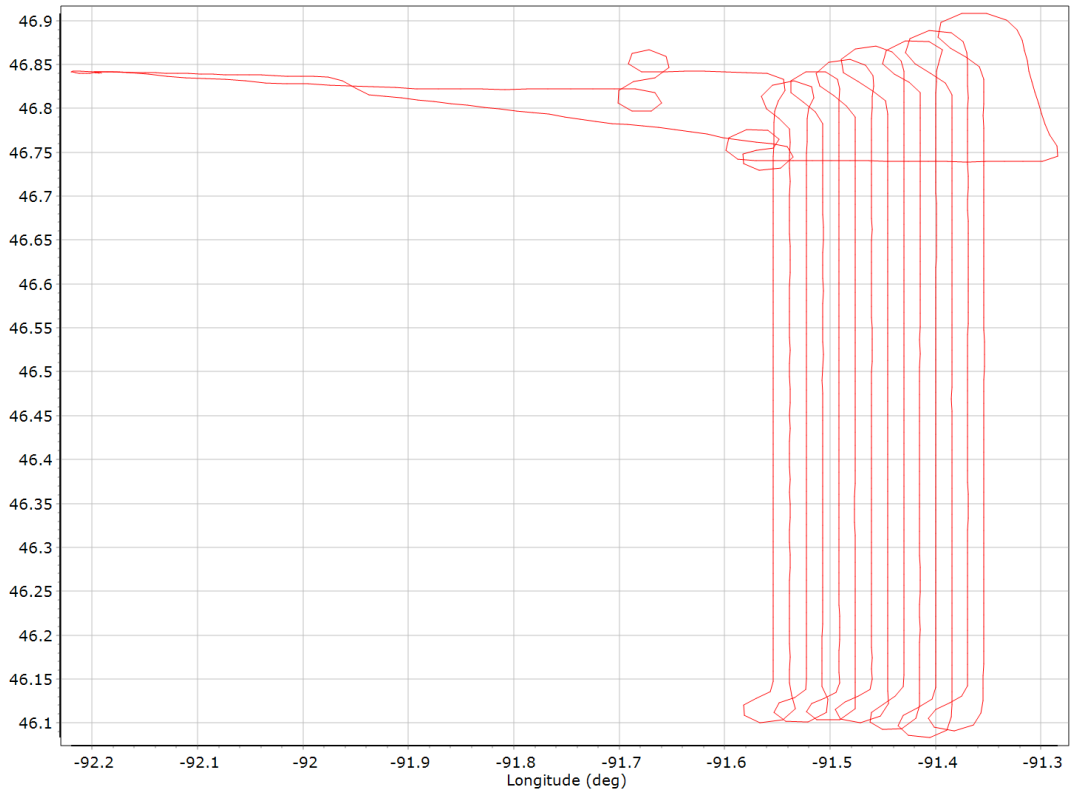
Total Body Acceleration



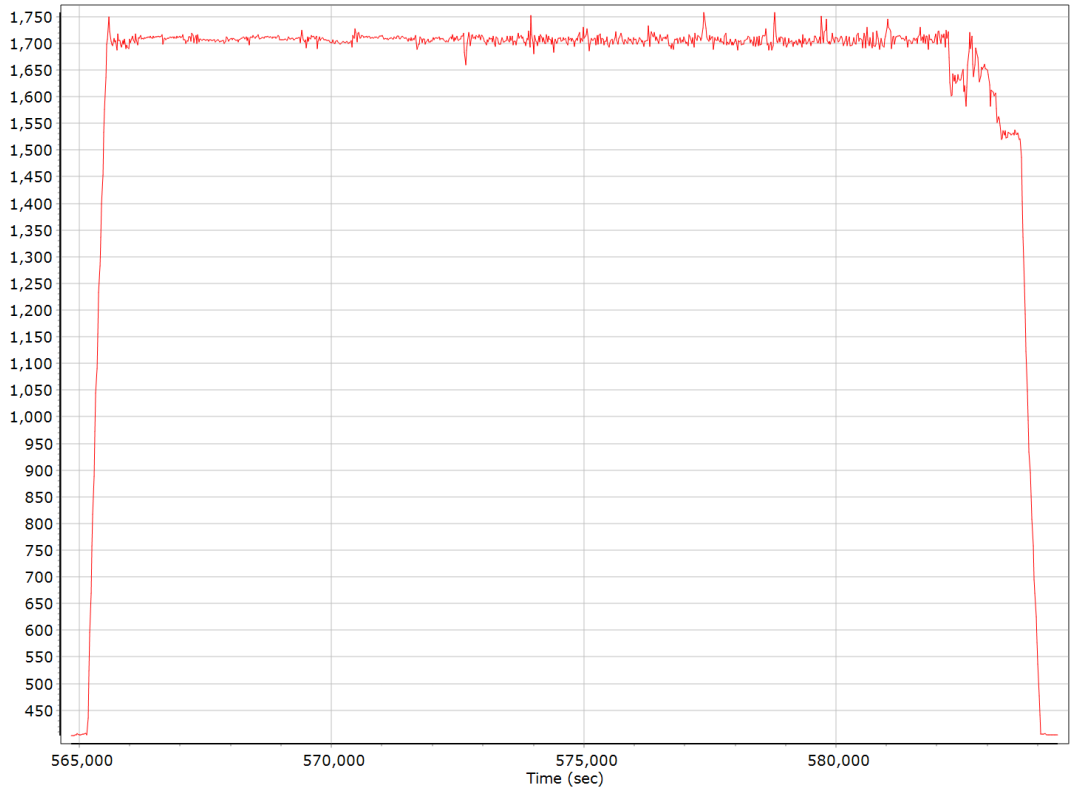
Body Angular Rate

Forward Processed Trajectory Information

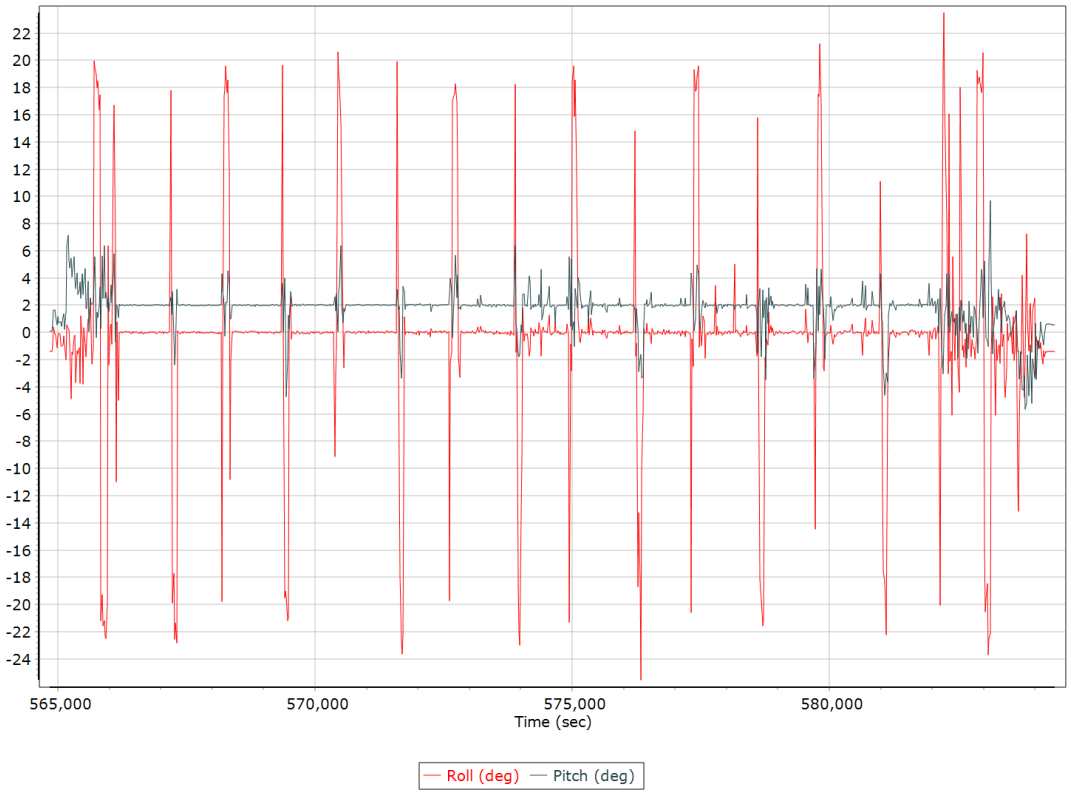
Top View



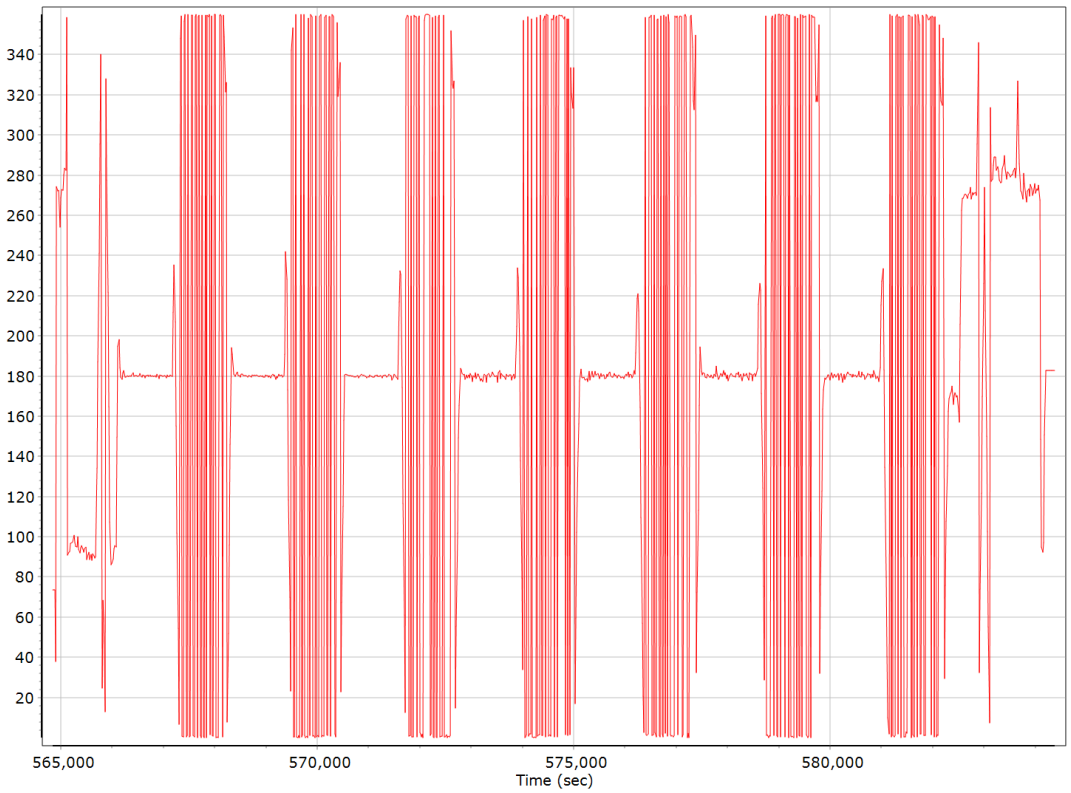
Altitude



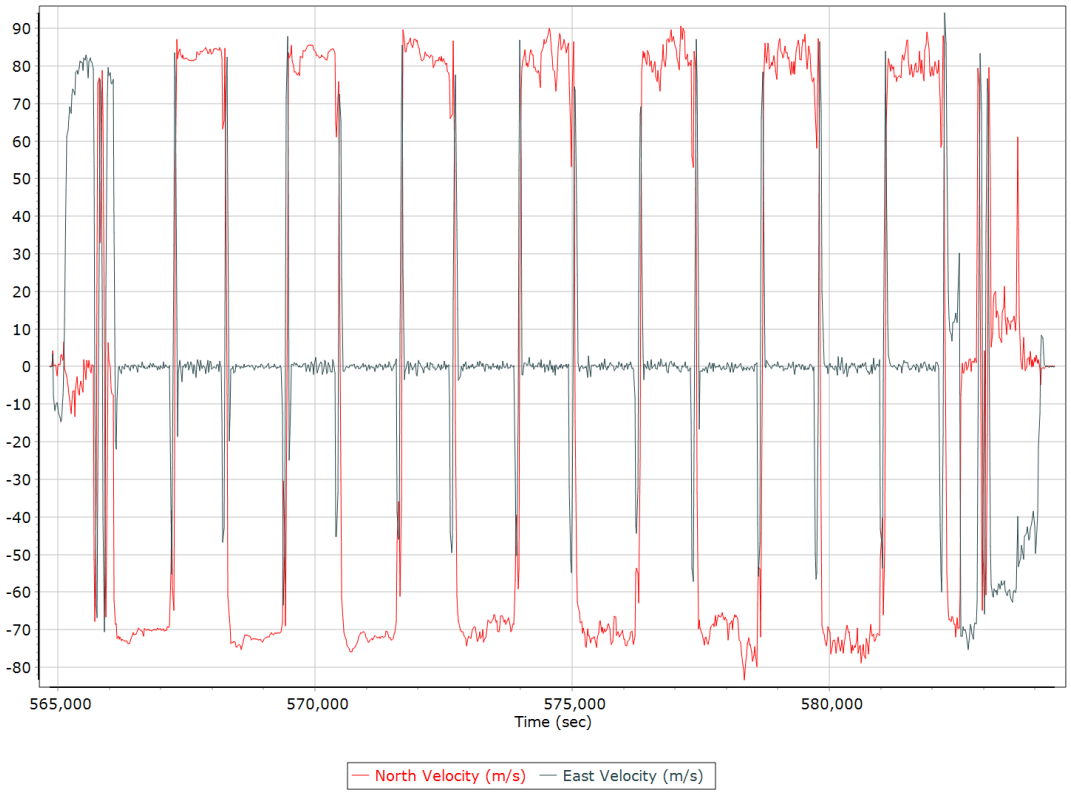
Roll/Pitch



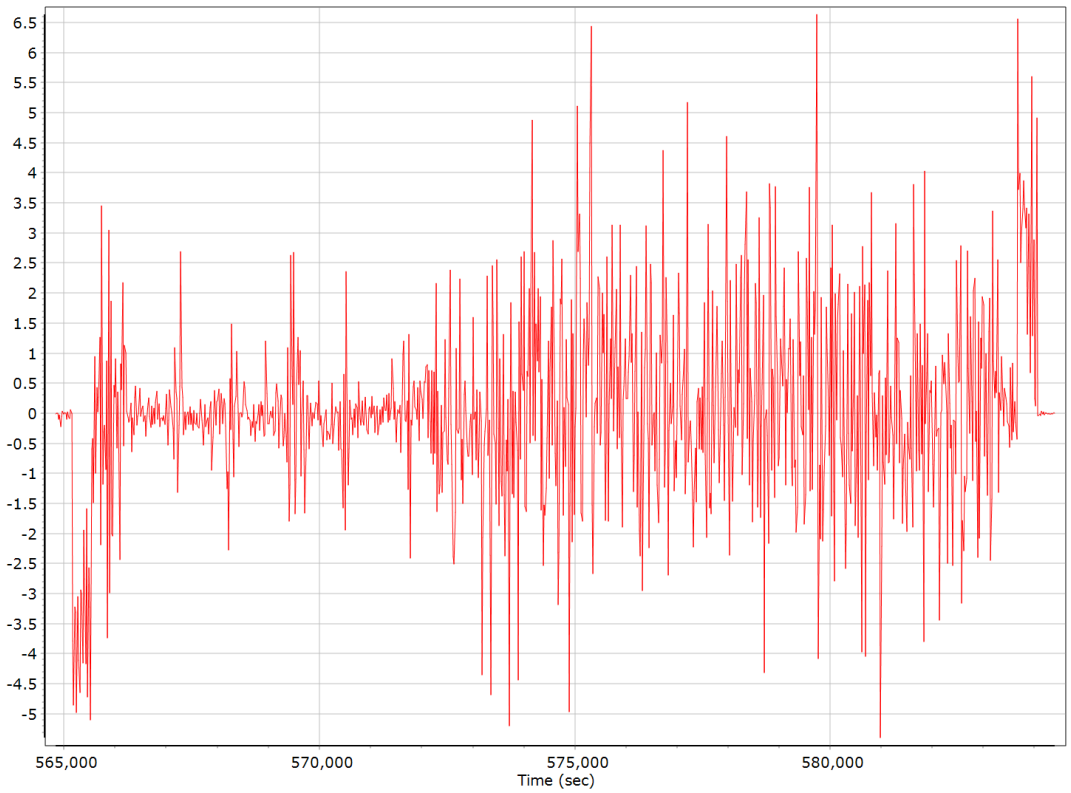
Heading



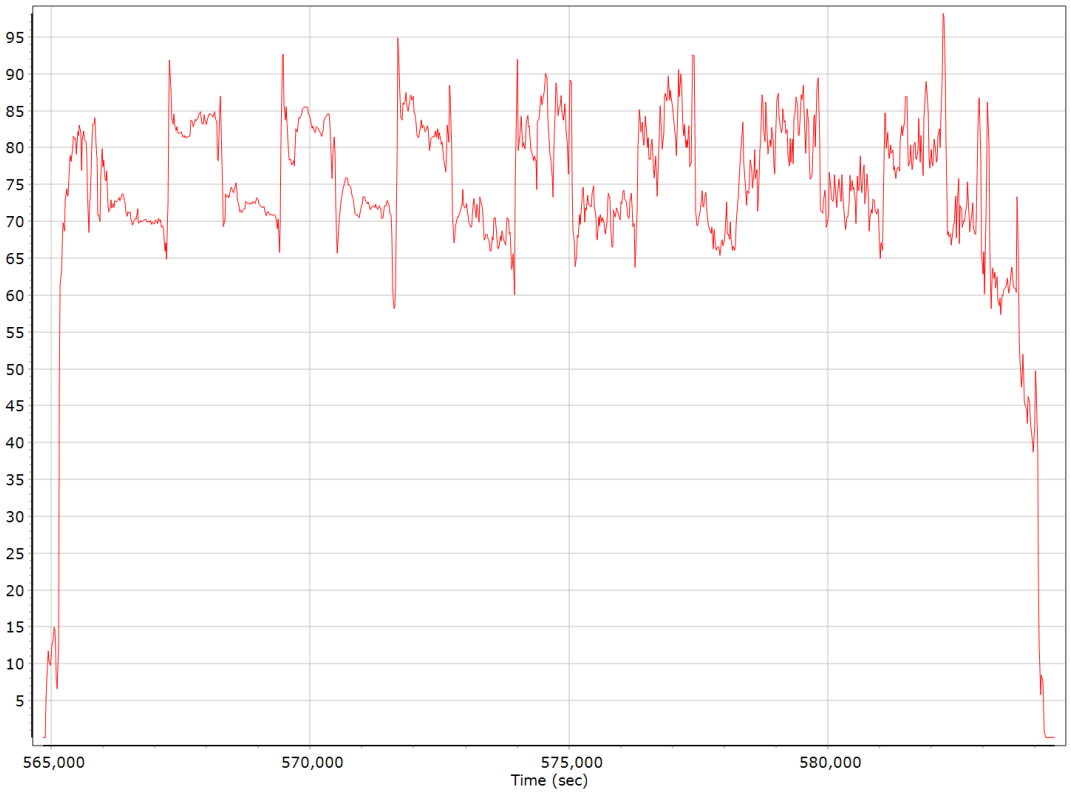
North/East Velocity



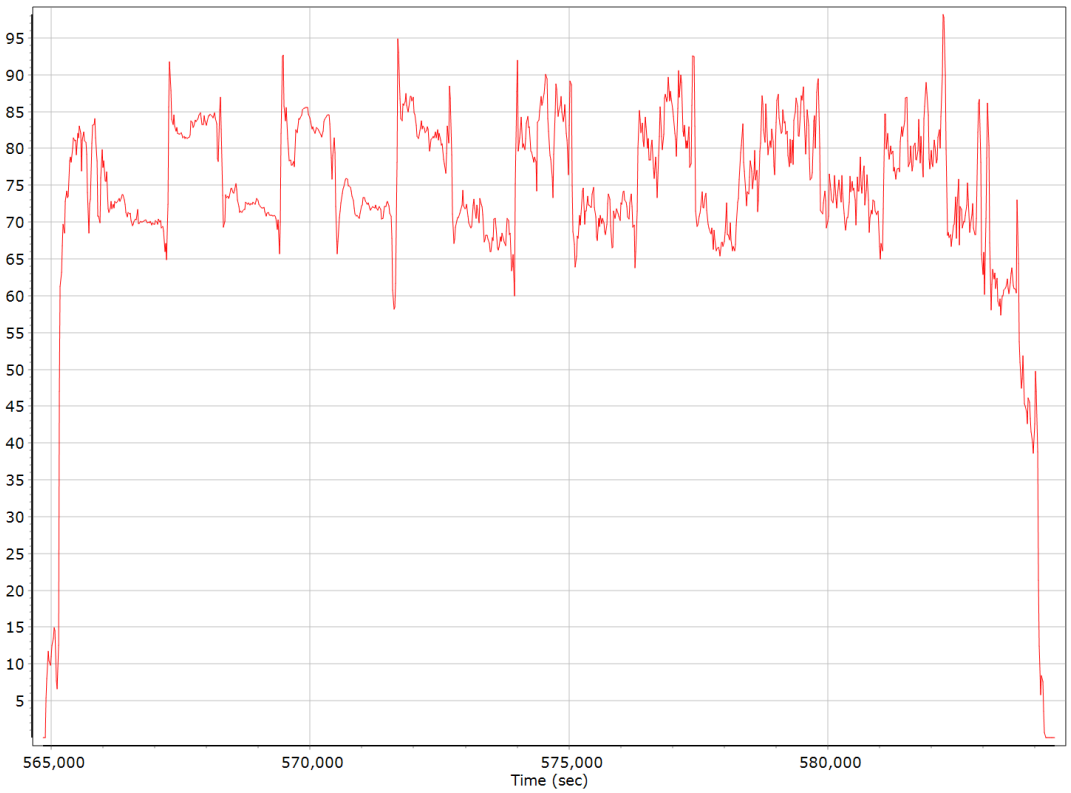
Down Velocity



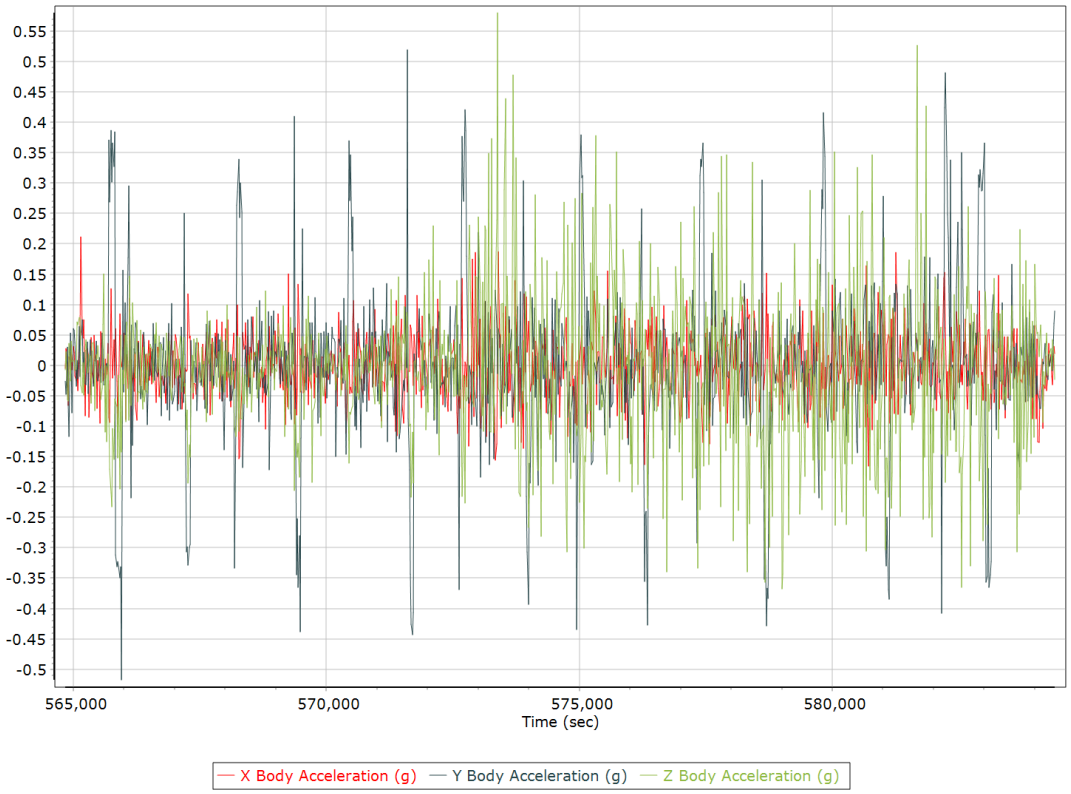
Total Speed



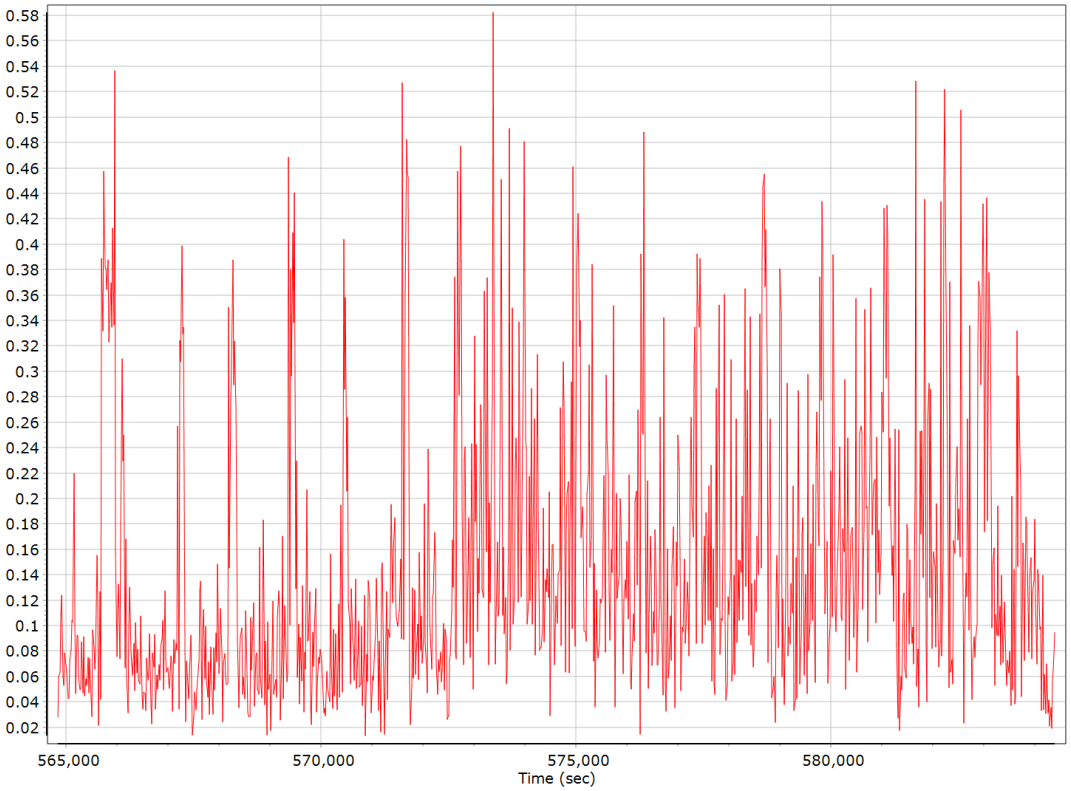
Ground Speed



Body Acceleration



Total Body Acceleration



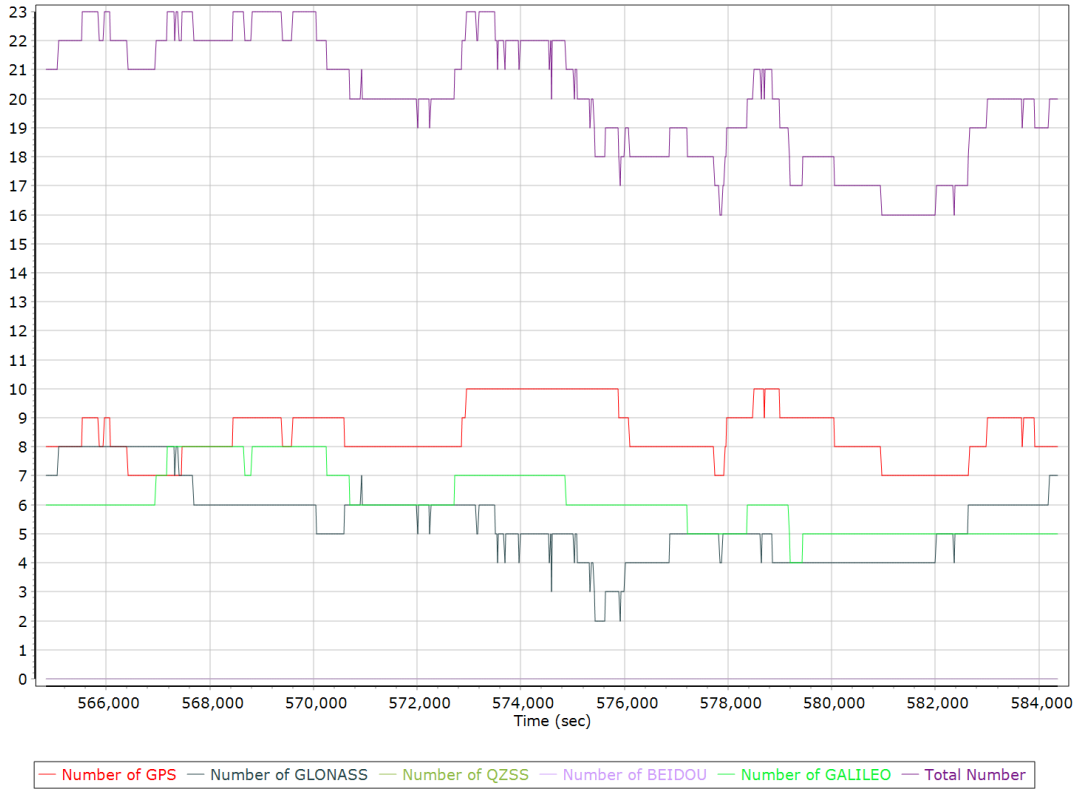
Body Angular Rate

GNSS QC

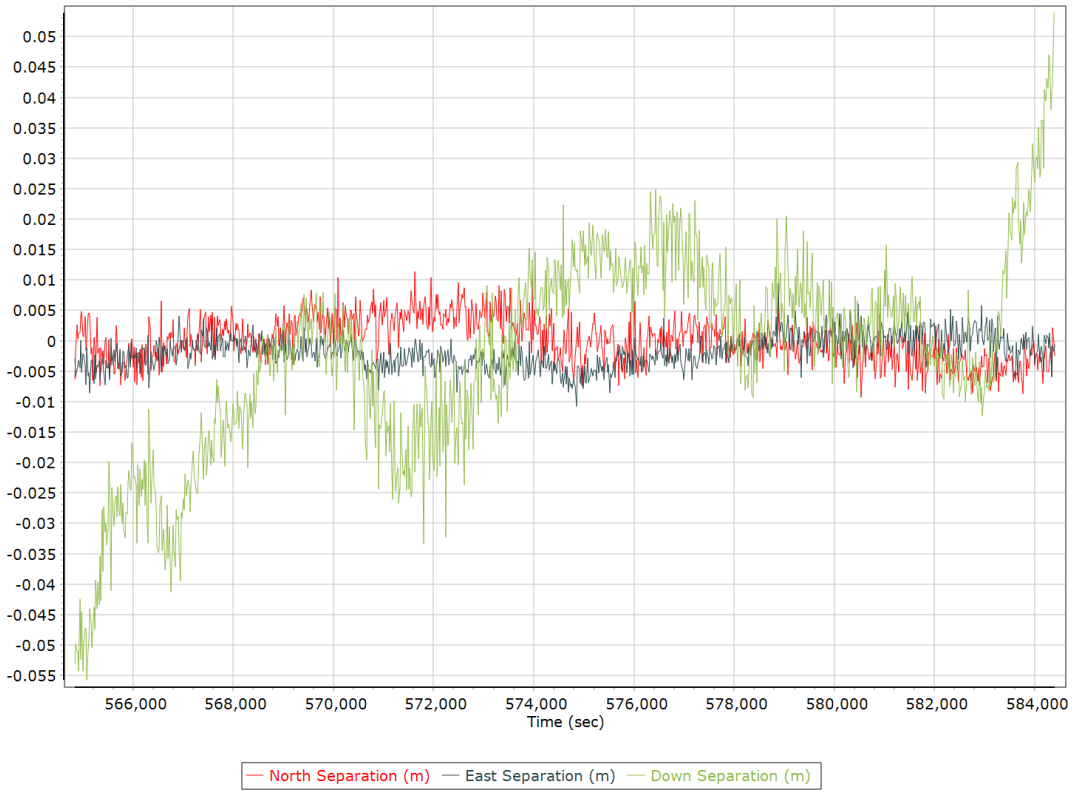
GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	7	10	8
Number of GLONASS SV	0	8	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	0	0
Number of GALILEO SV	4	8	6
Total number of SV	14	23	20
PDOP	0.95	1.98	1.19
QC Solution Gaps	1.00	1.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	19963.00	0.00	41.00
Percentage	99.80	0.00	0.20

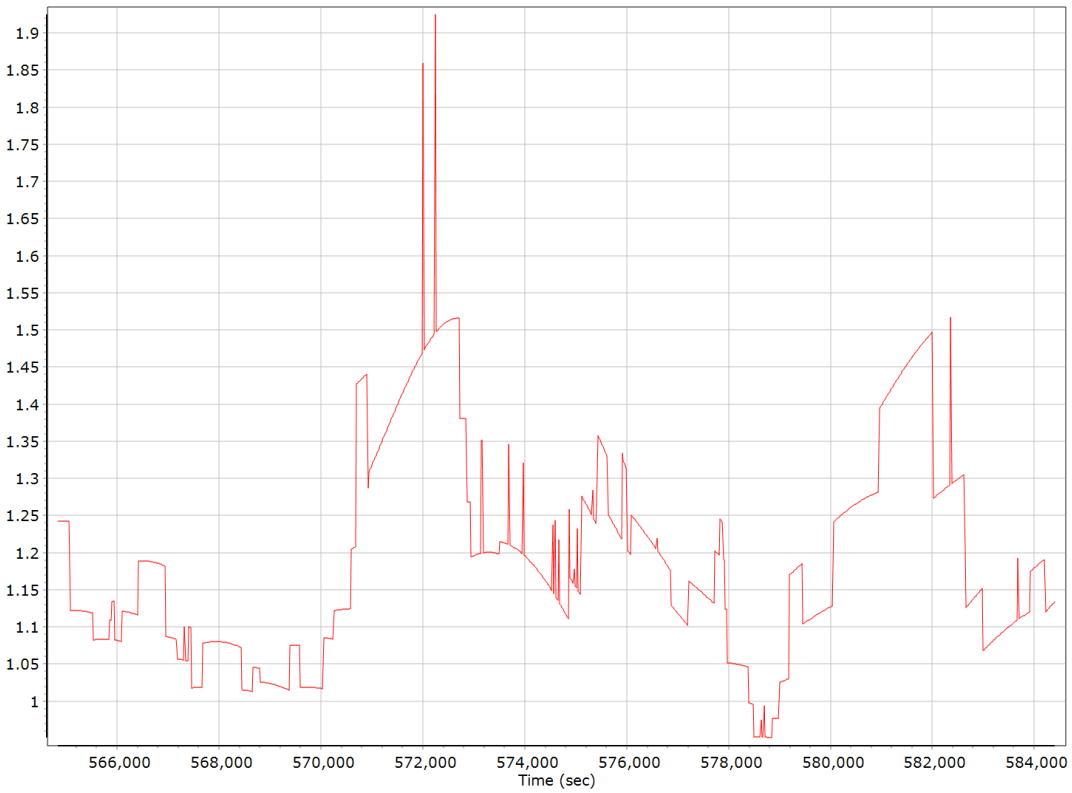
Num SVs in solution



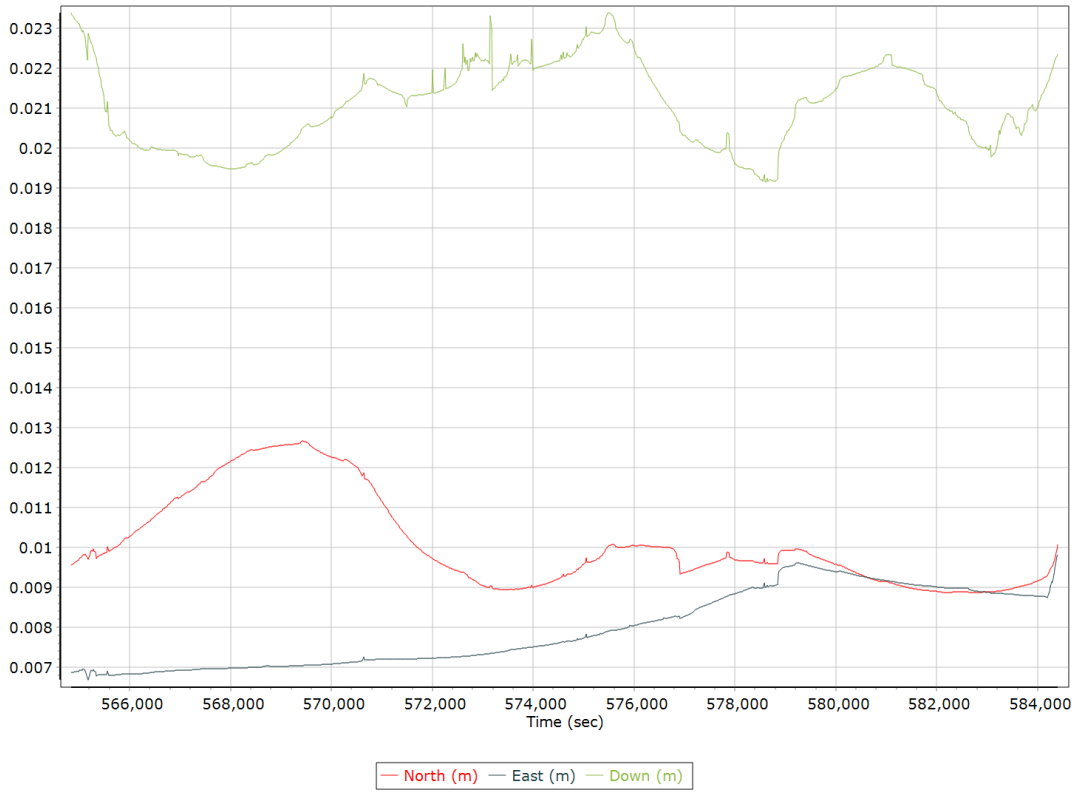
Forward/Reverse Separation



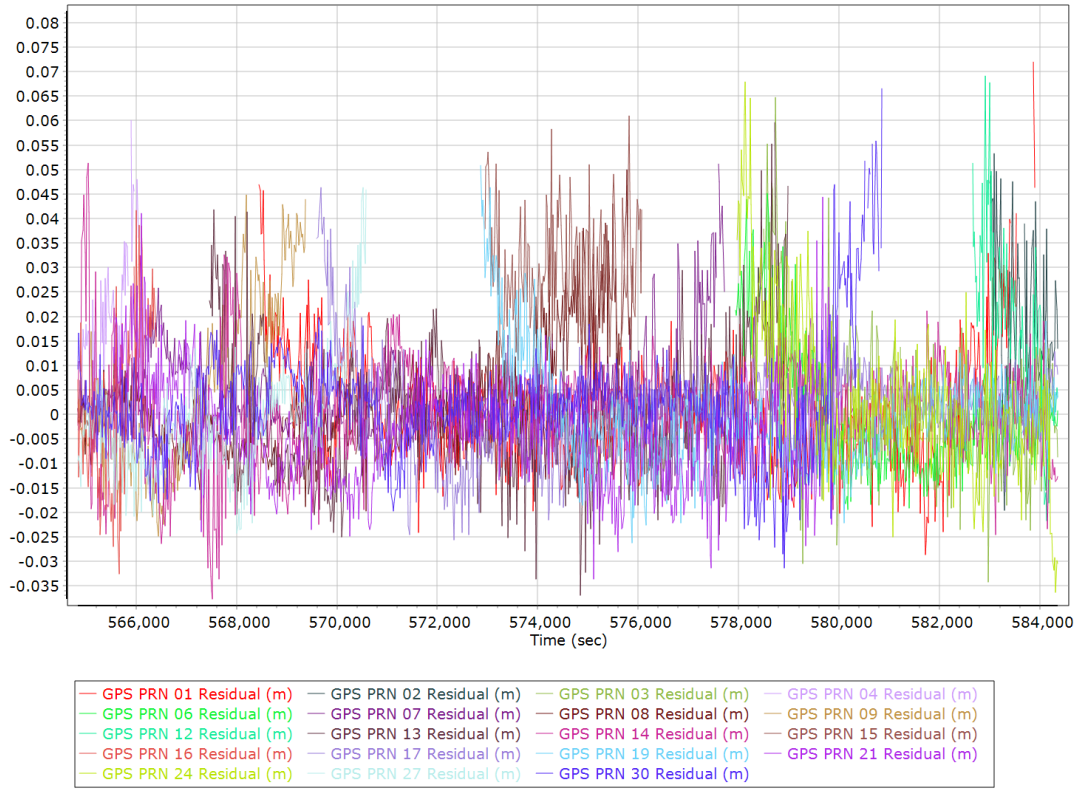
PDOP



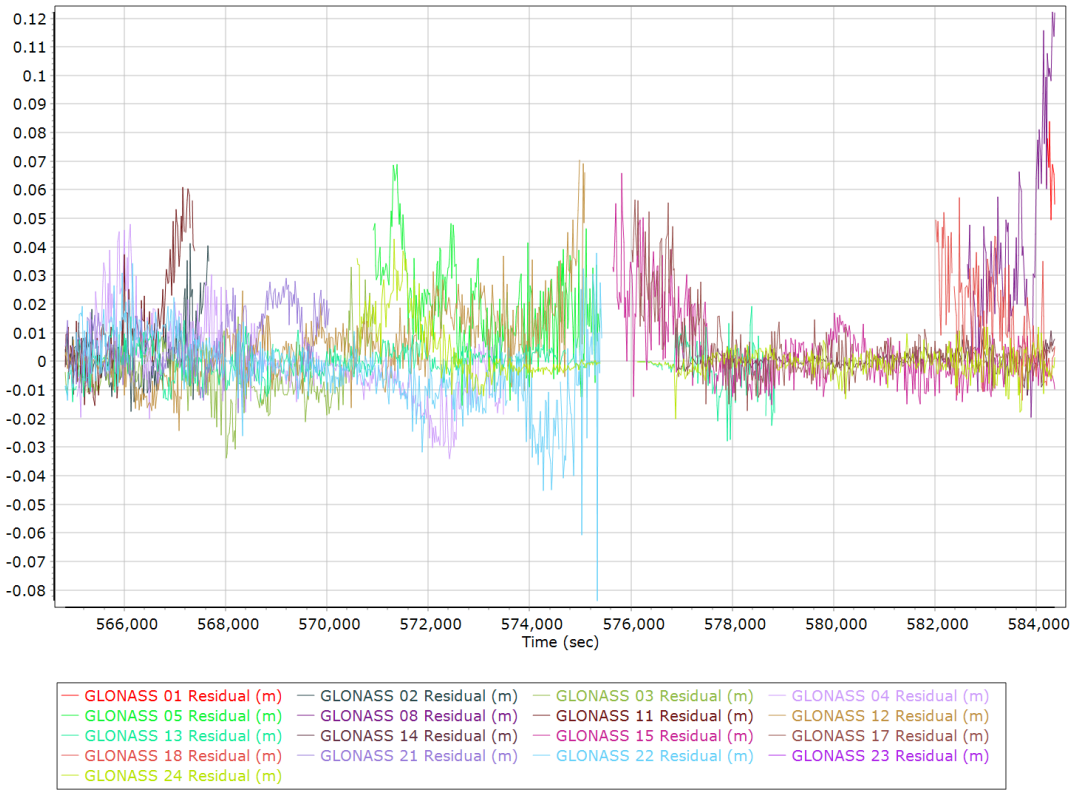
Estimated Position Accuracy



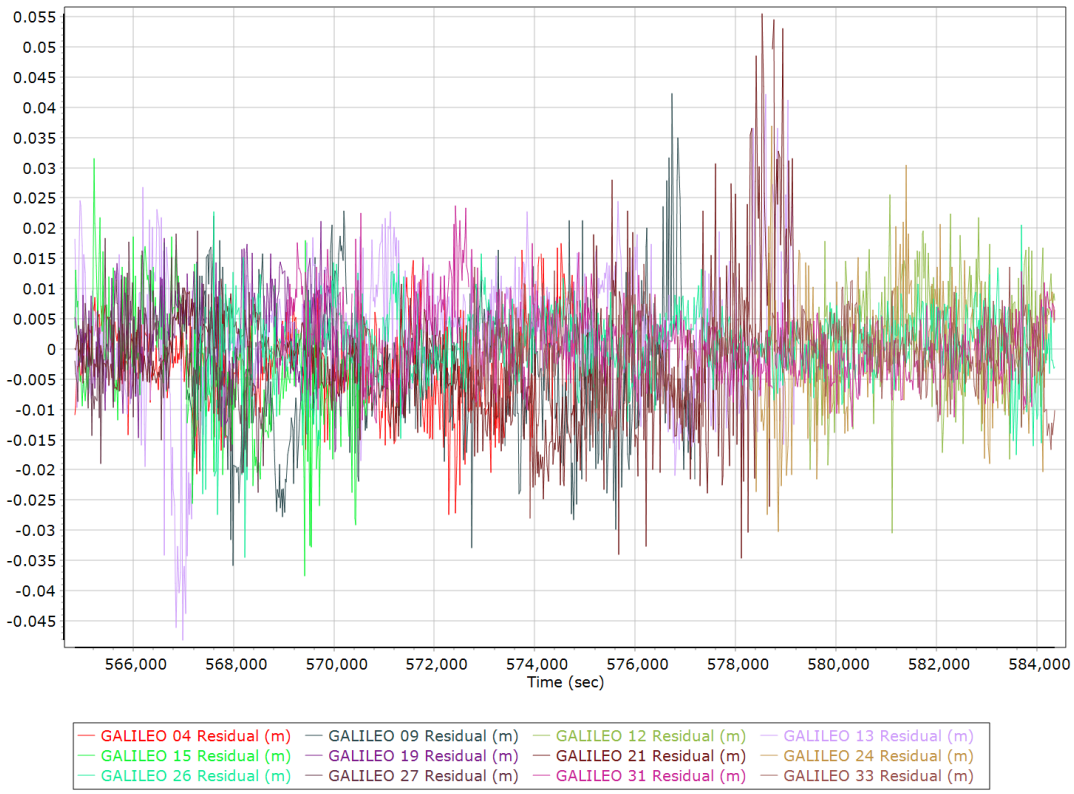
GPS Residuals



GLONASS Residuals



GALILEO Residuals



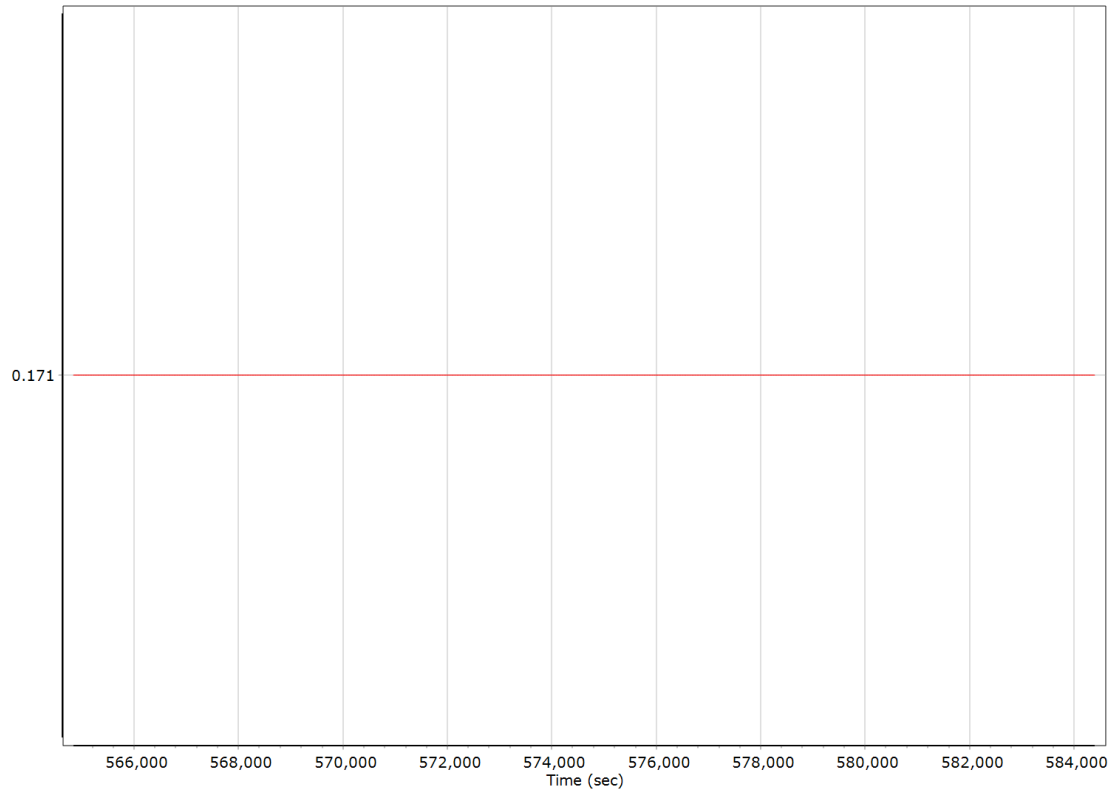
GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	564350.000 (5/14/2022 12:45:50 PM)		
Processing end time	584413.000 (5/14/2022 6:20:13 PM)		
Initial attitude source	Real-Time VNAV/RNAV Attitude		
IMU Sensor Context	Processing with Onboard IMU		
Gimbal to IMU lever arm (m)	0.000	0.000	0.000
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.171	-0.238	-1.273
Gimbal to Primary GNSS lever arm std dev (m)	0.030	0.030	0.030
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

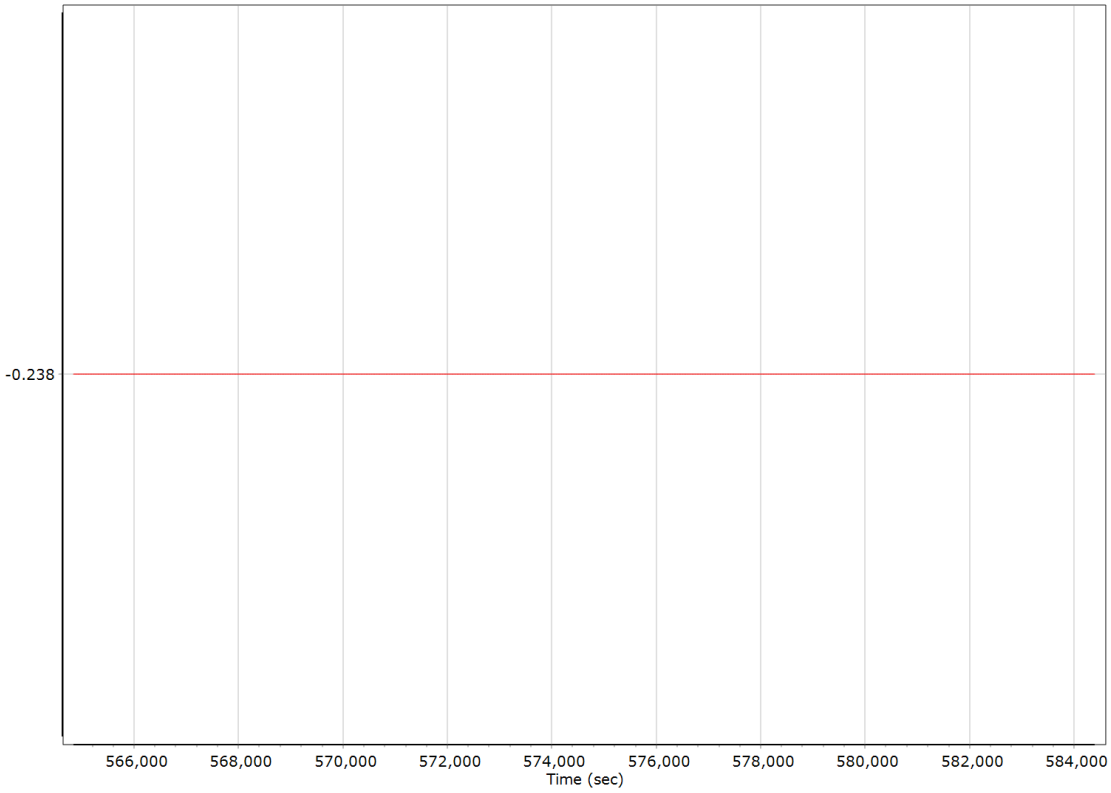
Calibrated Installation Parameters

Reference-Primary GNSS Lever Arm (m)

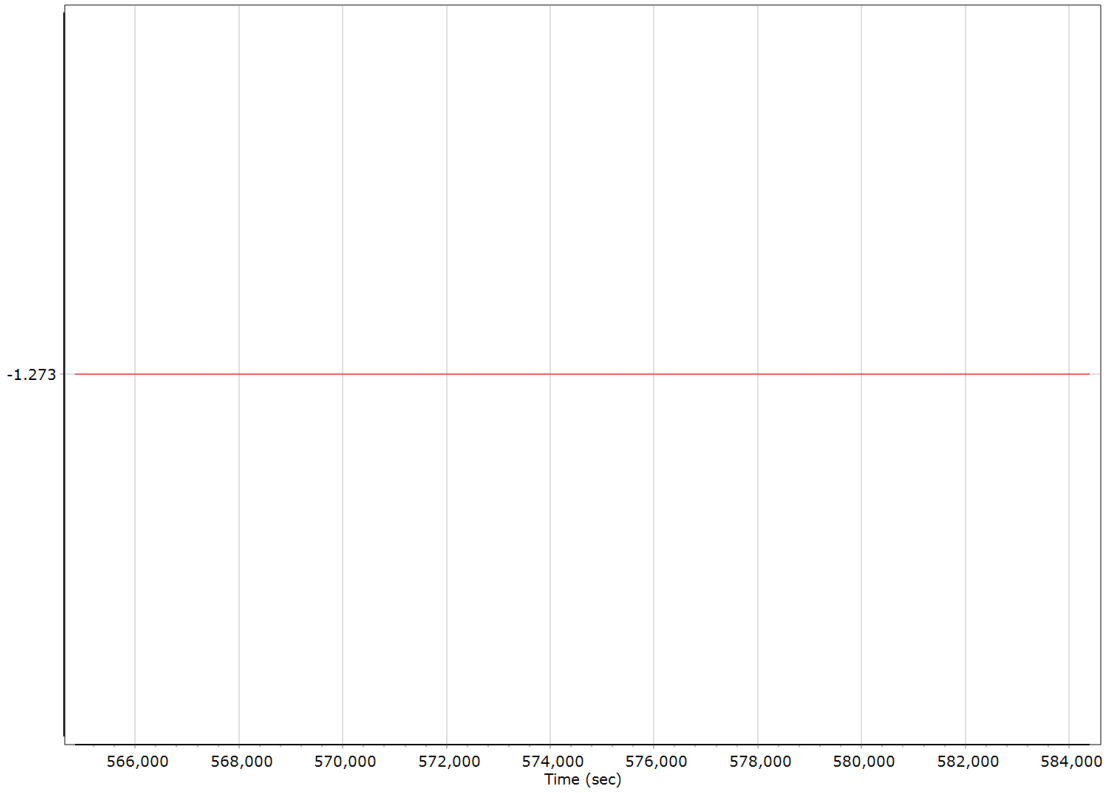
X Reference-Primary GNSS Lever Arm (m)



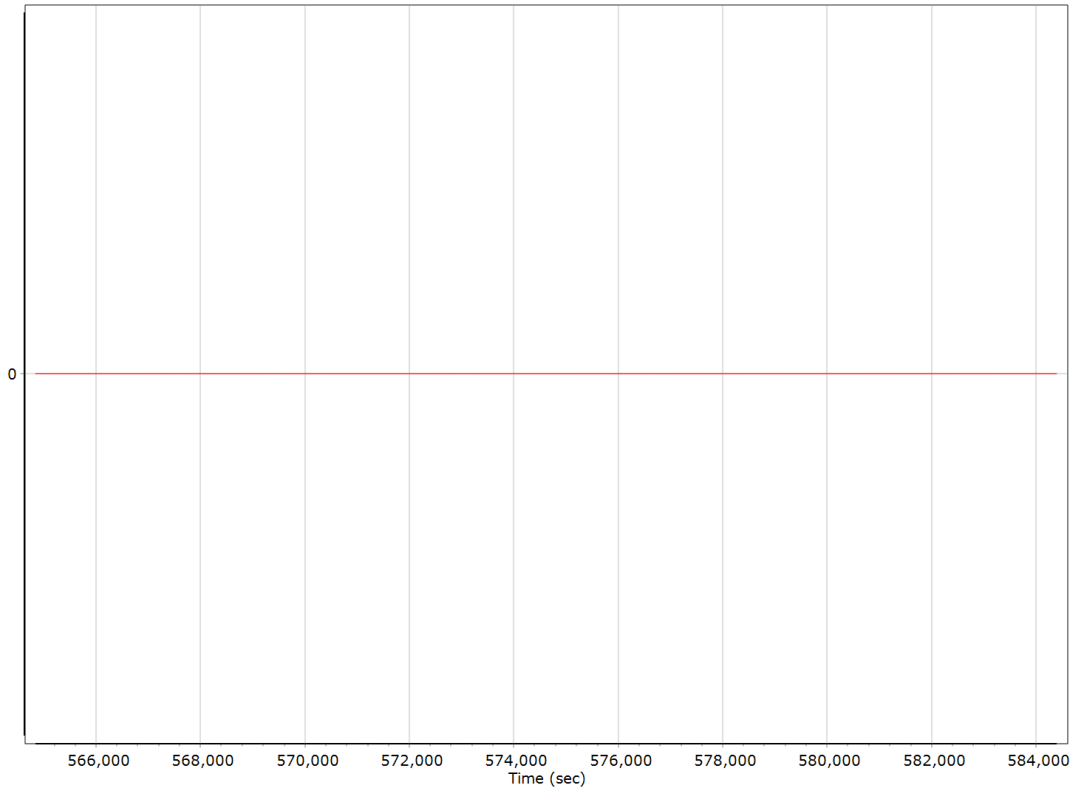
Y Reference-Primary GNSS Lever Arm (m)



Z Reference-Primary GNSS Lever Arm (m)



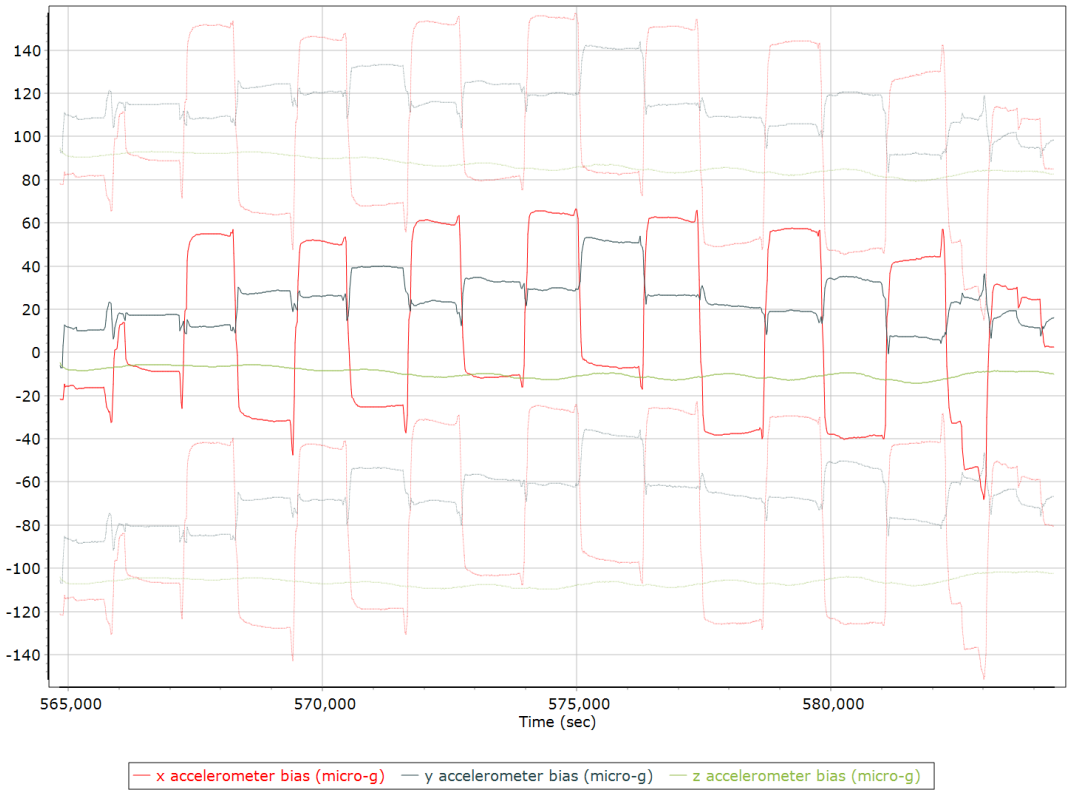
Reference-Primary GNSS Lever Arm Figure of Merit



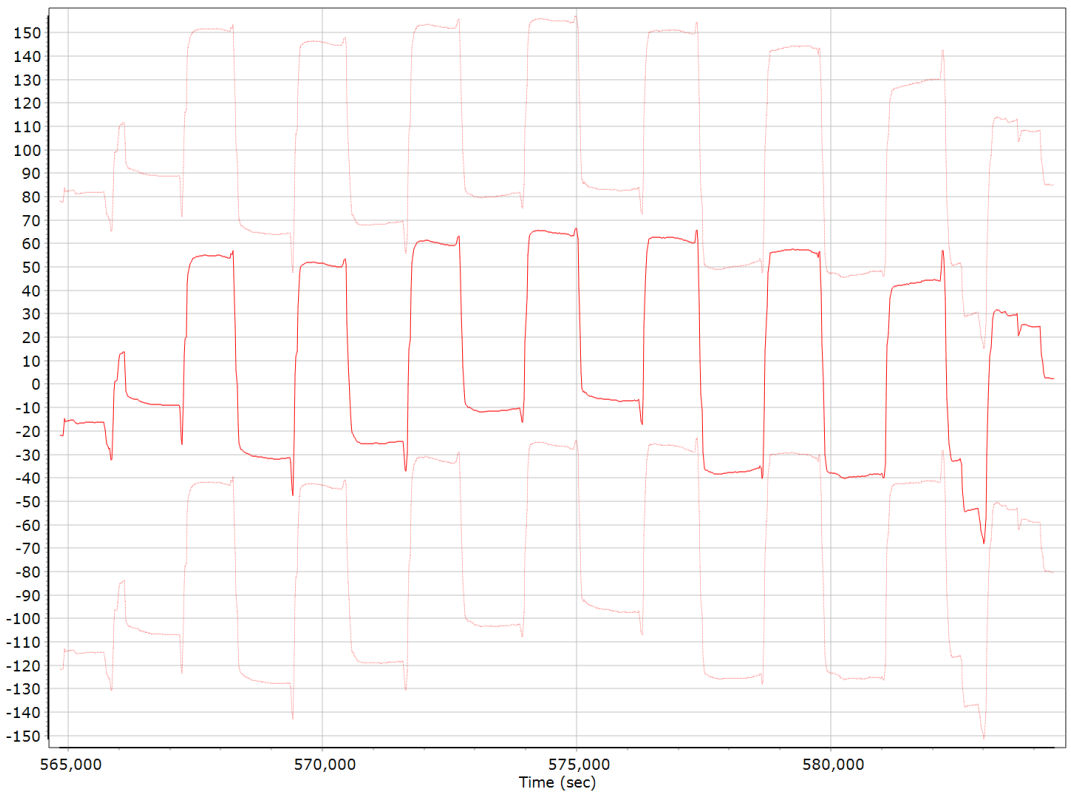
IN-Fusion QC

Forward Processed Estimated Errors, Reference Frame

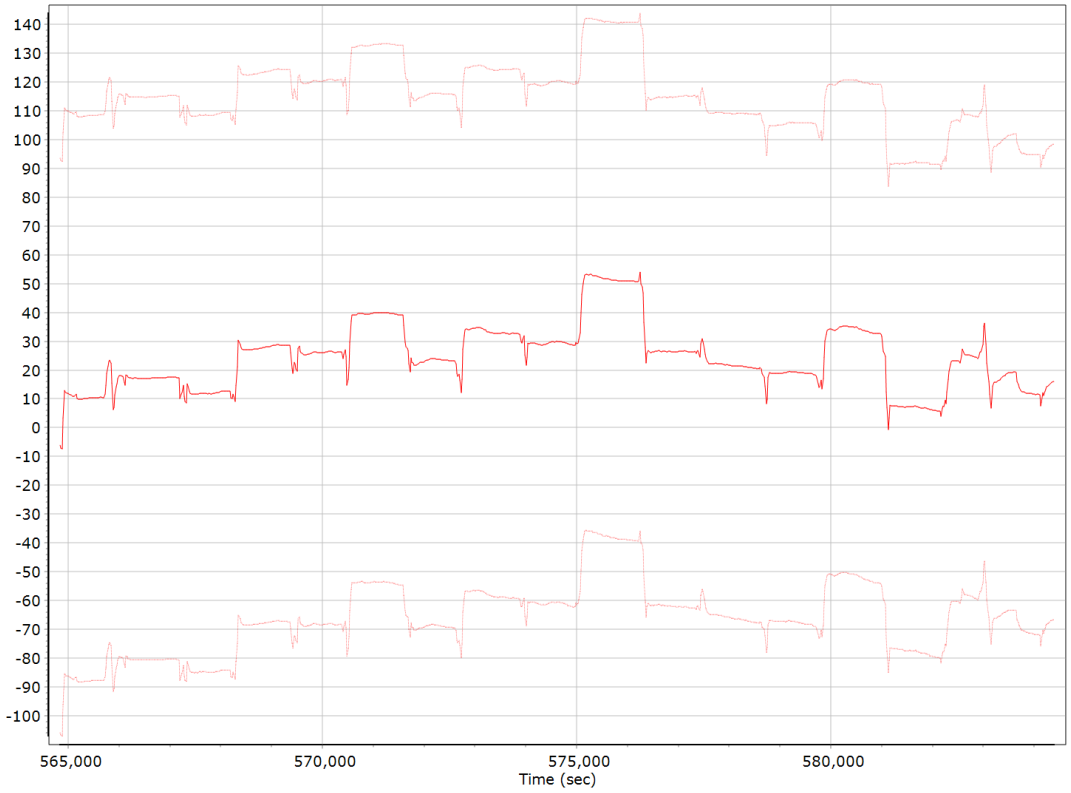
Accelerometer Bias (micro-g)



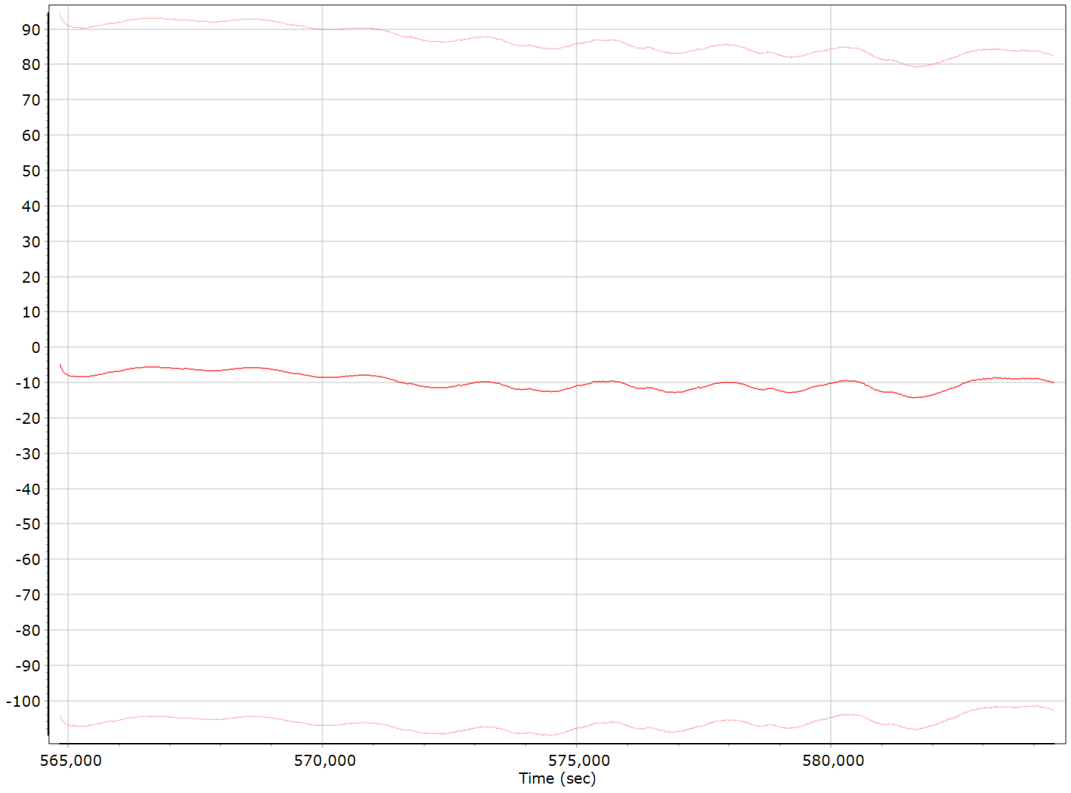
X Accelerometer Bias (micro-g)



Y Accelerometer Bias (micro-g)



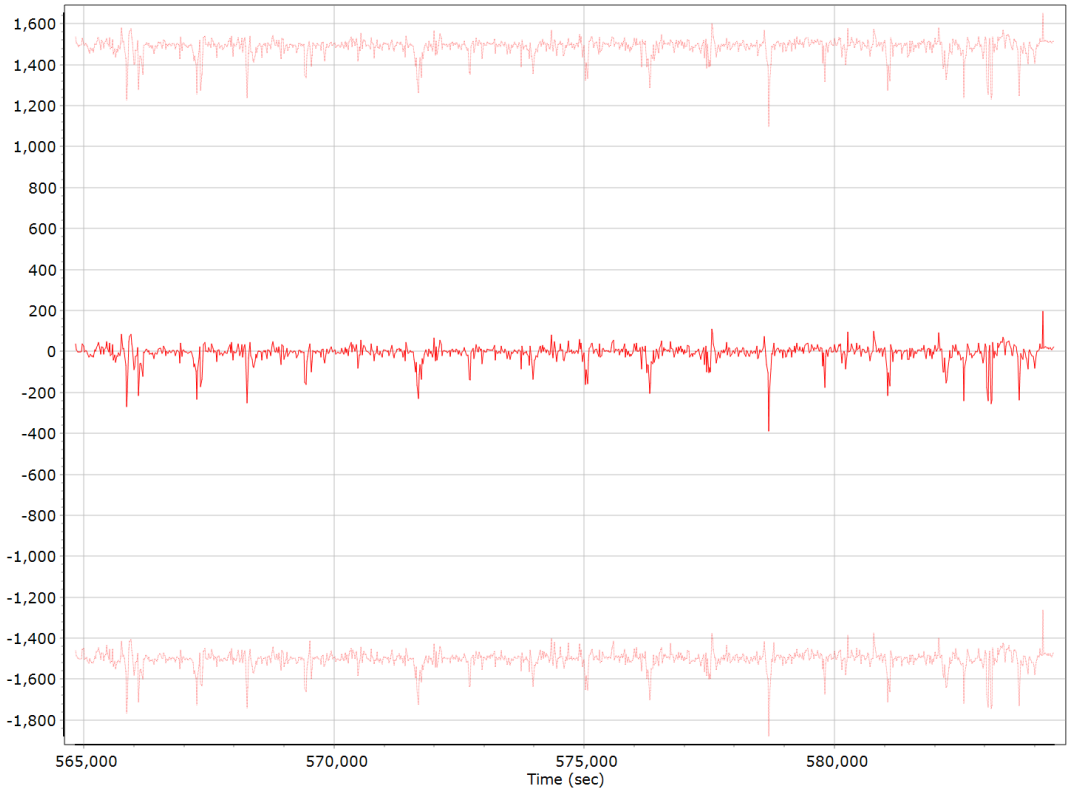
Z Accelerometer Bias (micro-g)



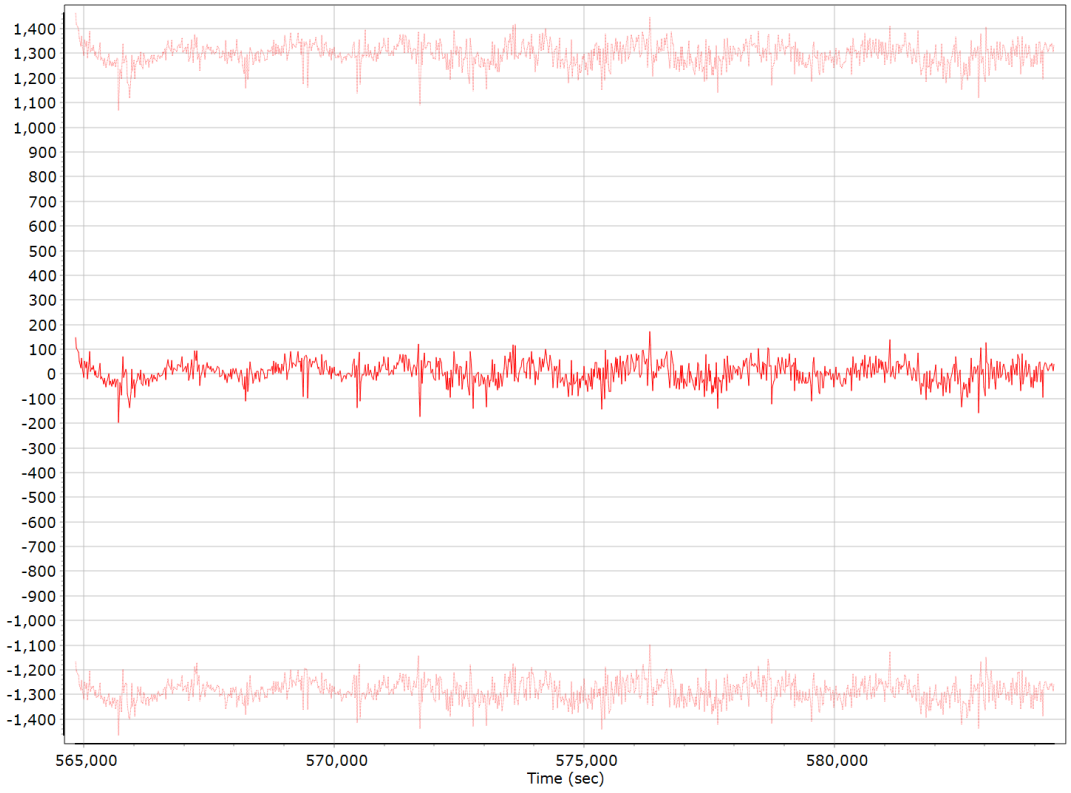
Accelerometer Scale Error (ppm)

X Accelerometer Scale Error (ppm)

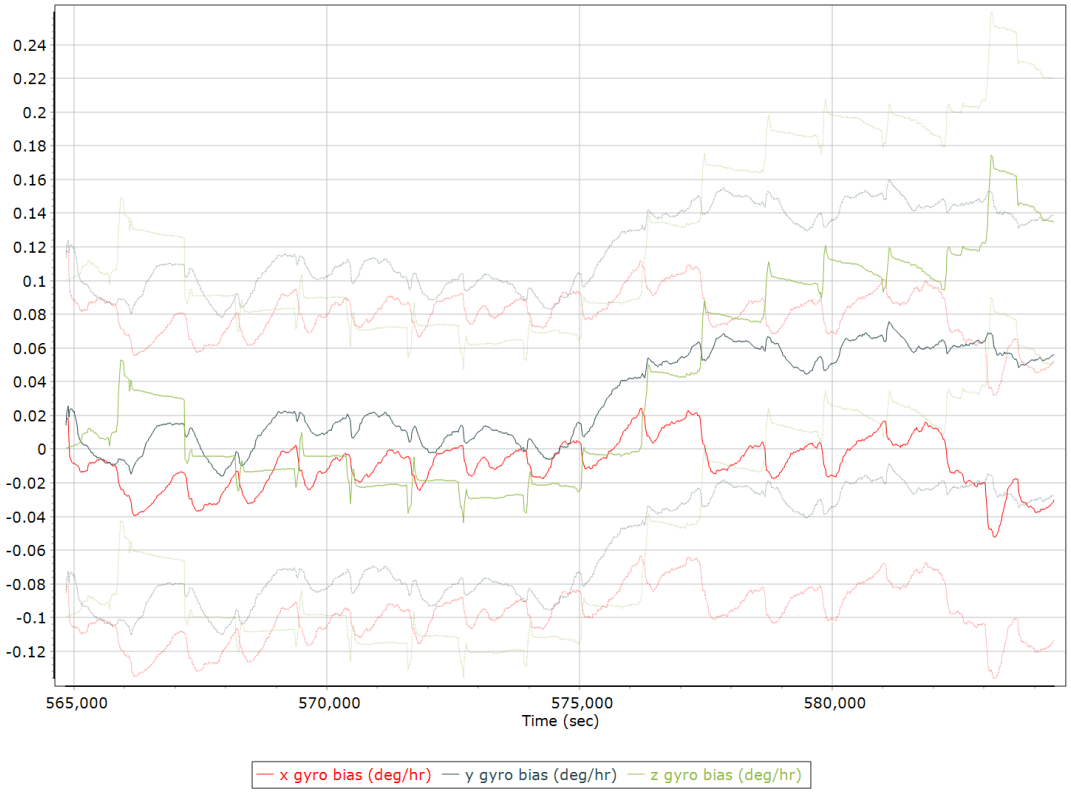
Y Accelerometer Scale Error (ppm)



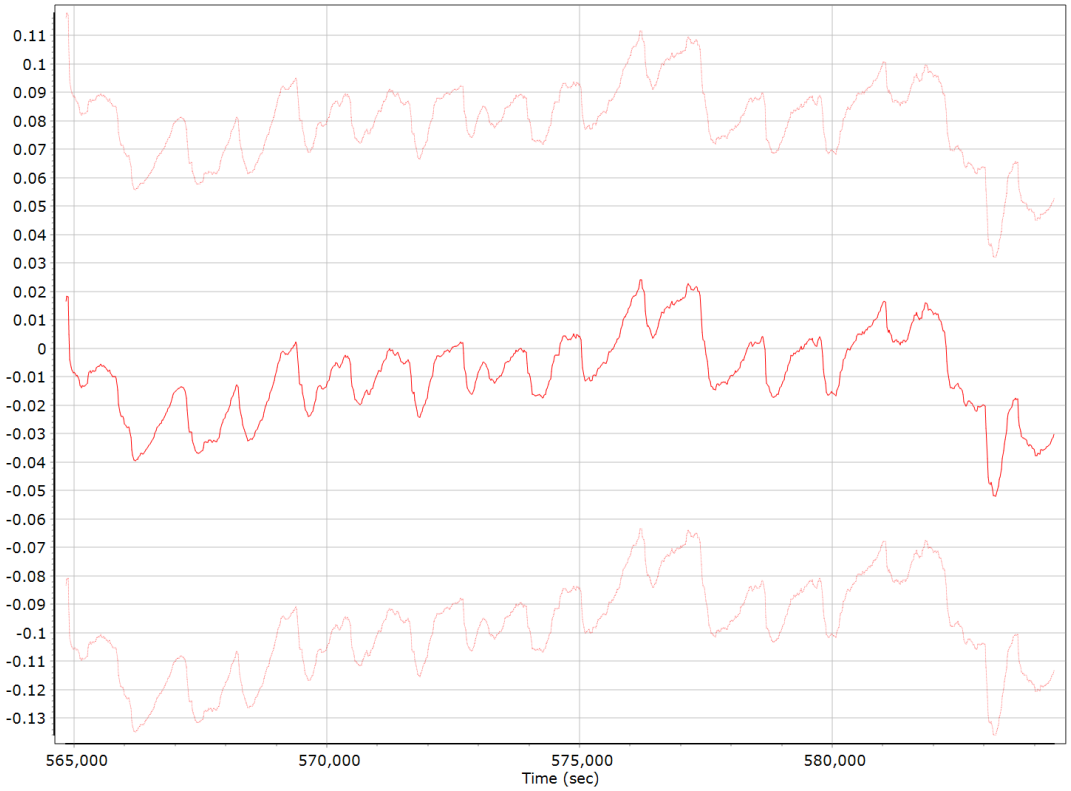
Z Accelerometer Scale Error (ppm)



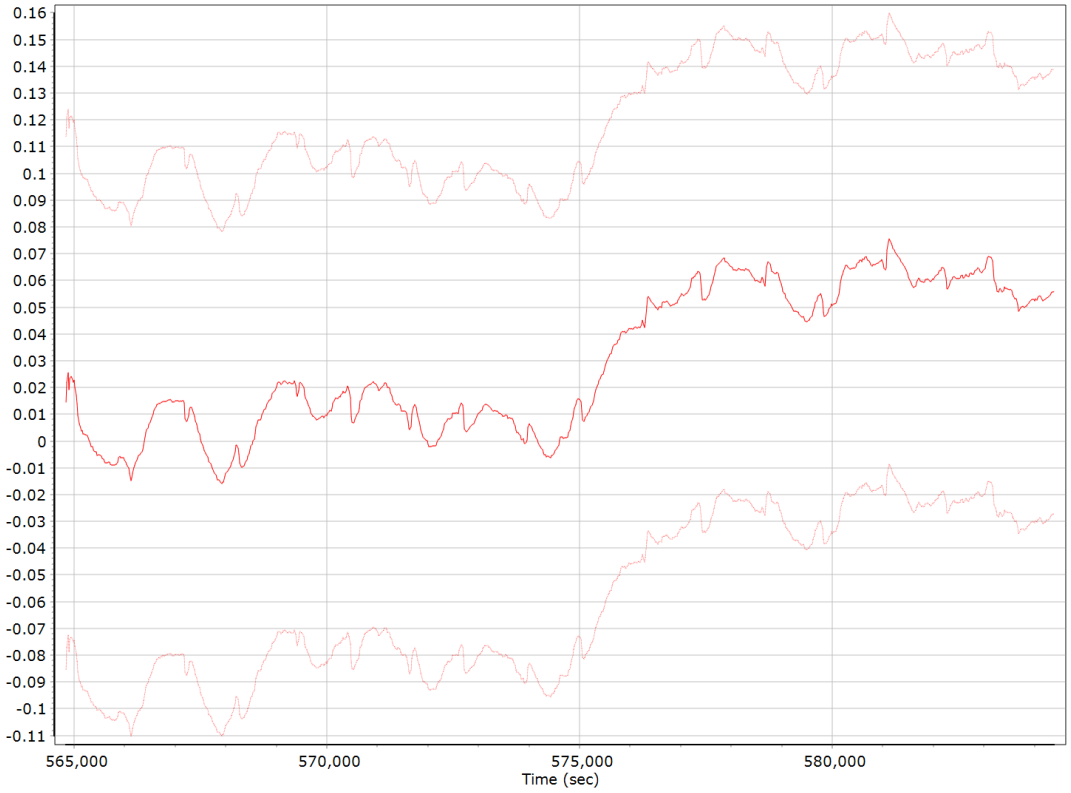
Gyro Bias (deg/h)



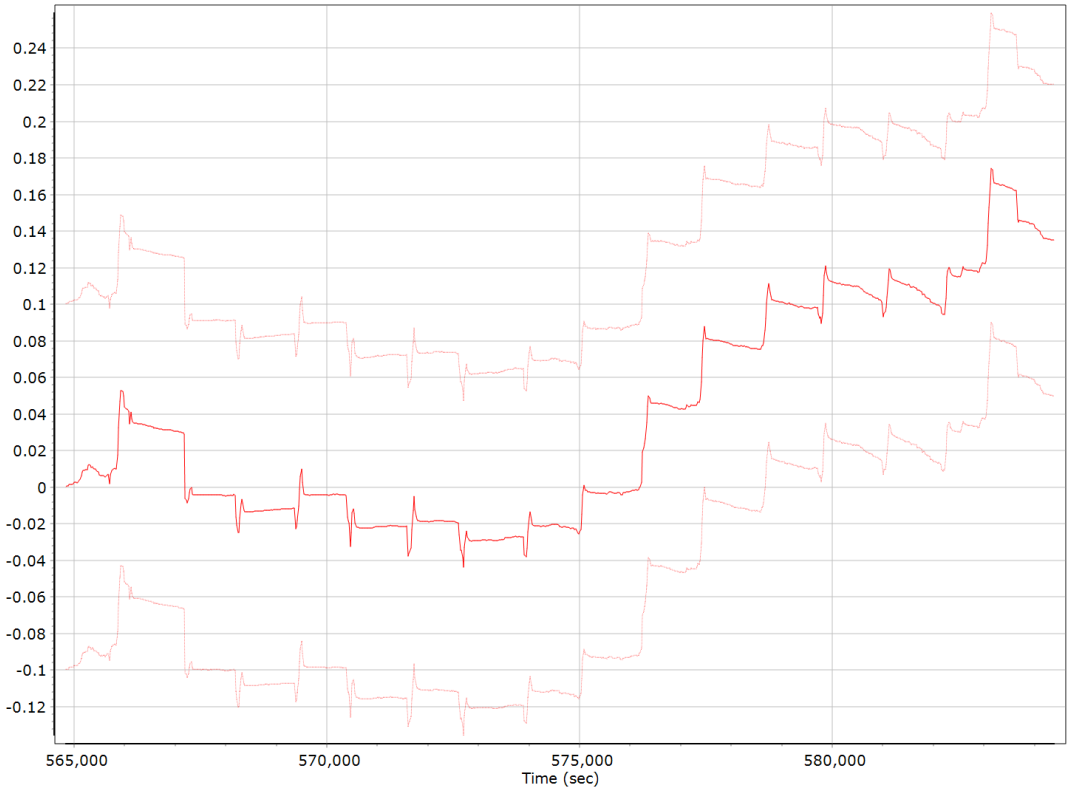
X Gyro Bias (deg/h)



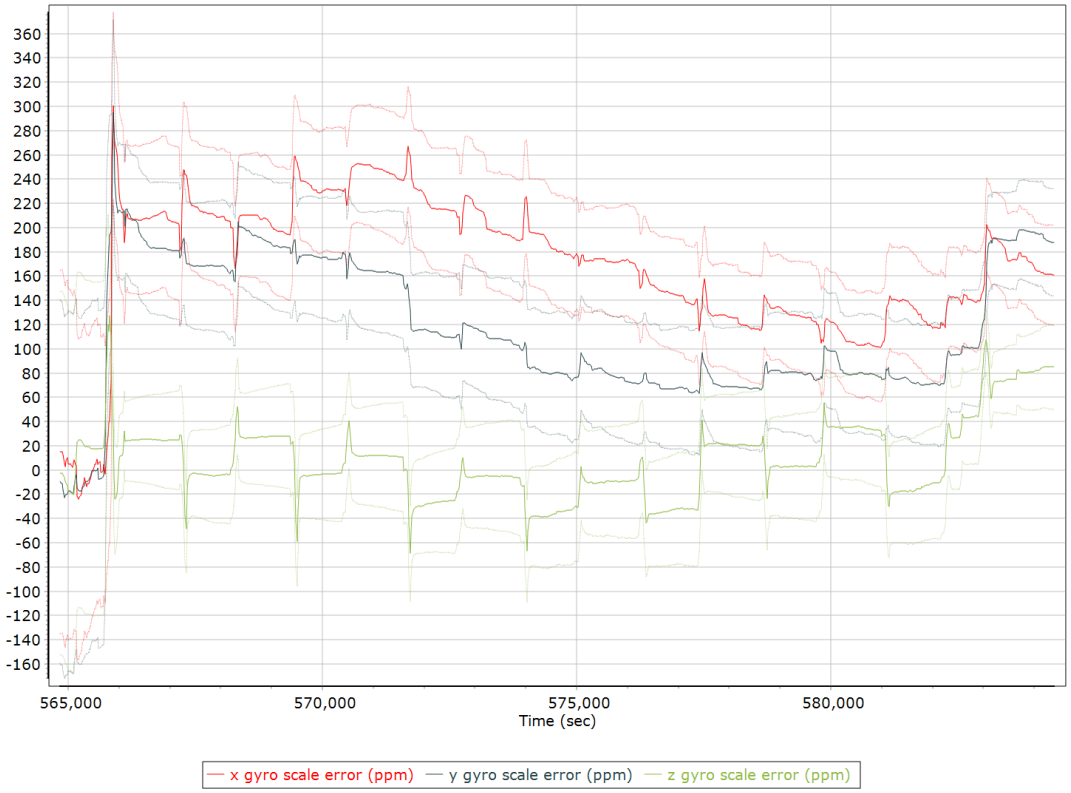
Y Gyro Bias (deg/h)



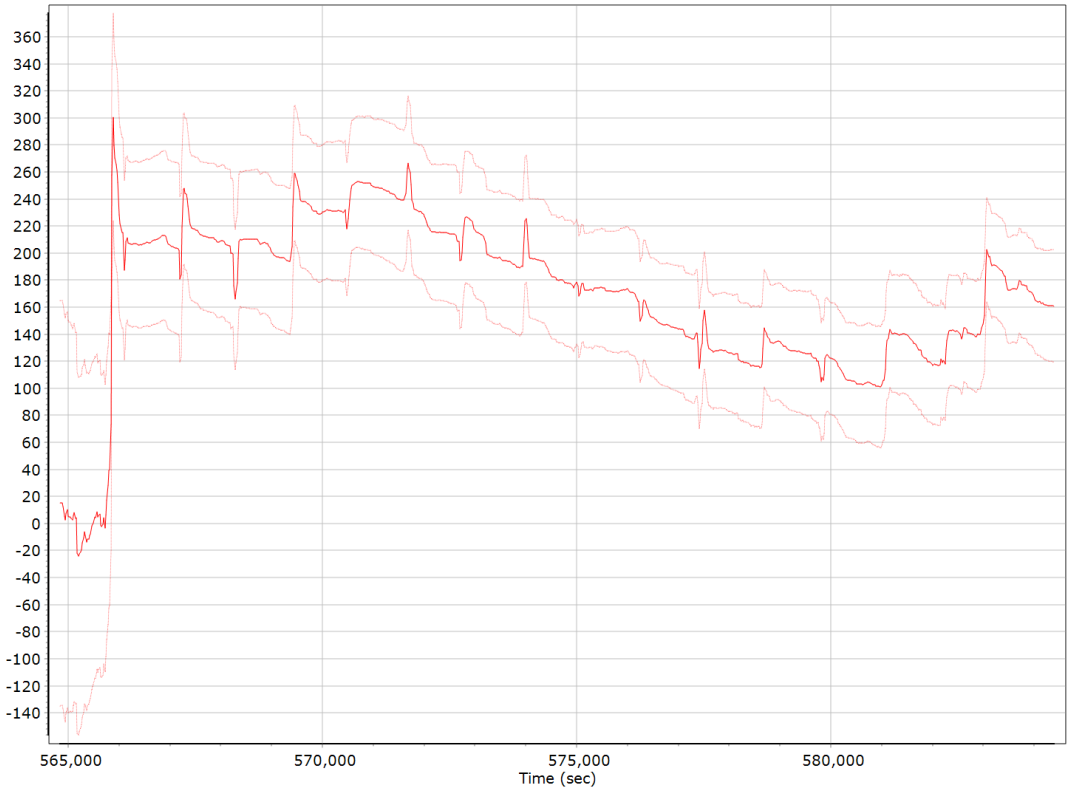
Z Gyro Bias (deg/h)



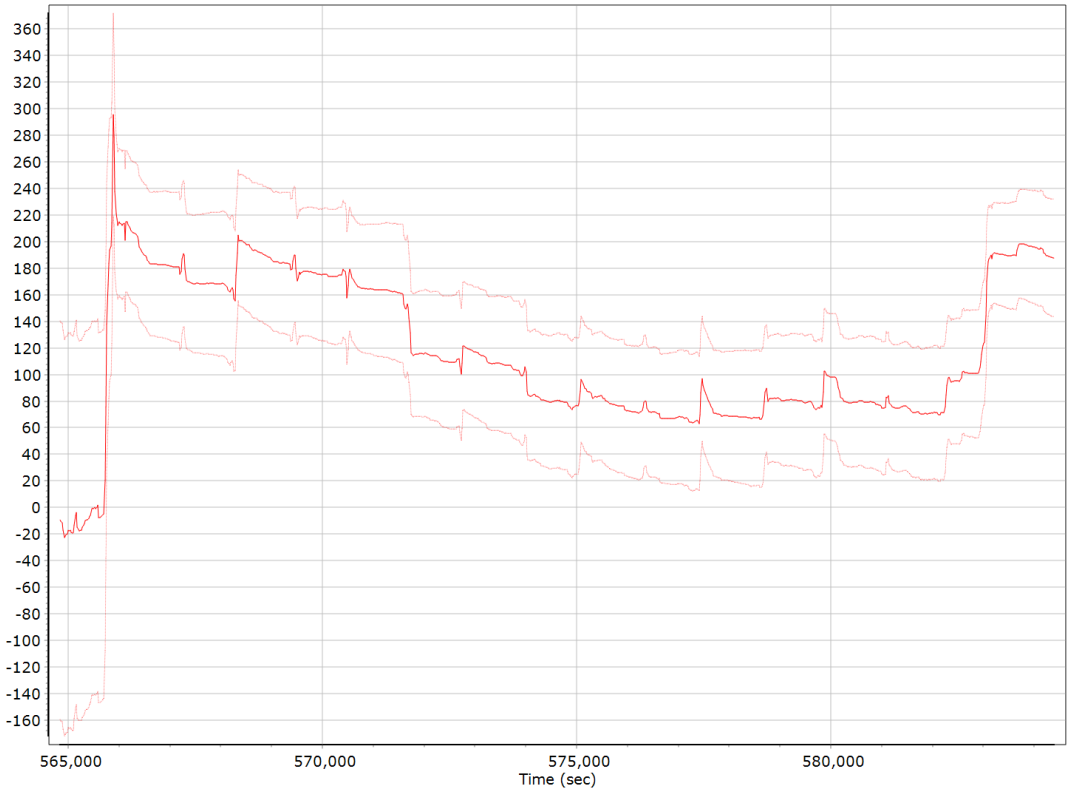
Gyro Scale Error (ppm)



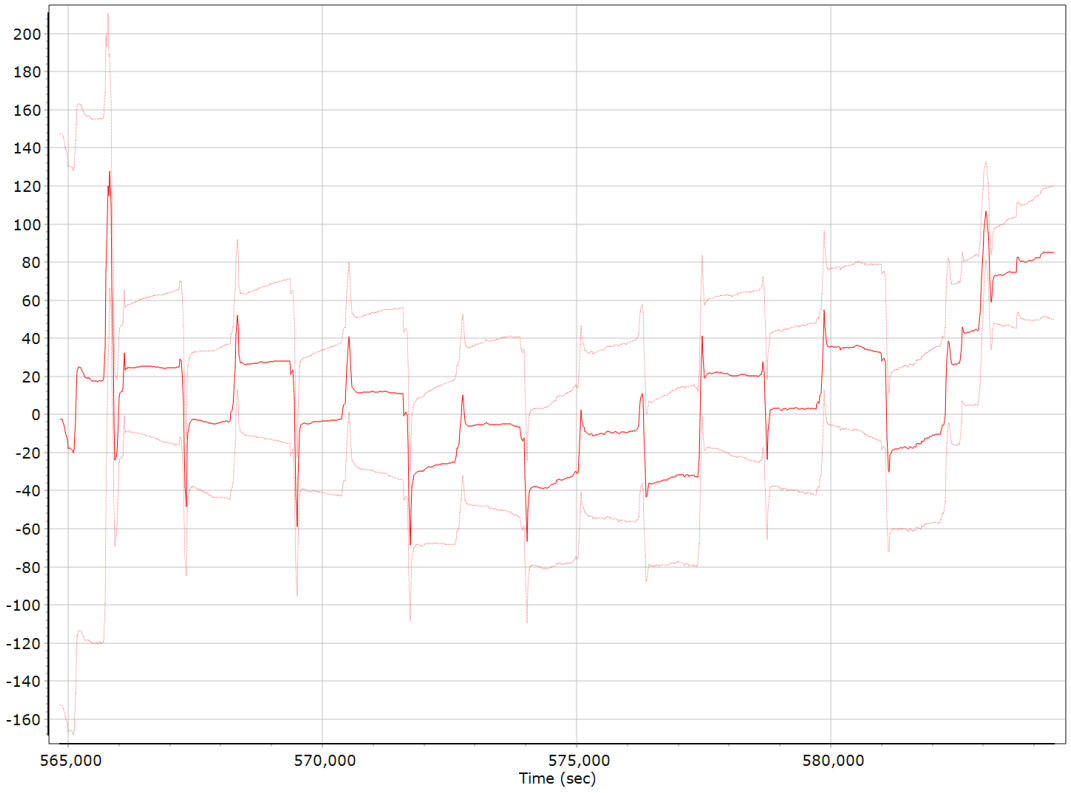
X Gyro Scale Error (ppm)



Y Gyro Scale Error (ppm)



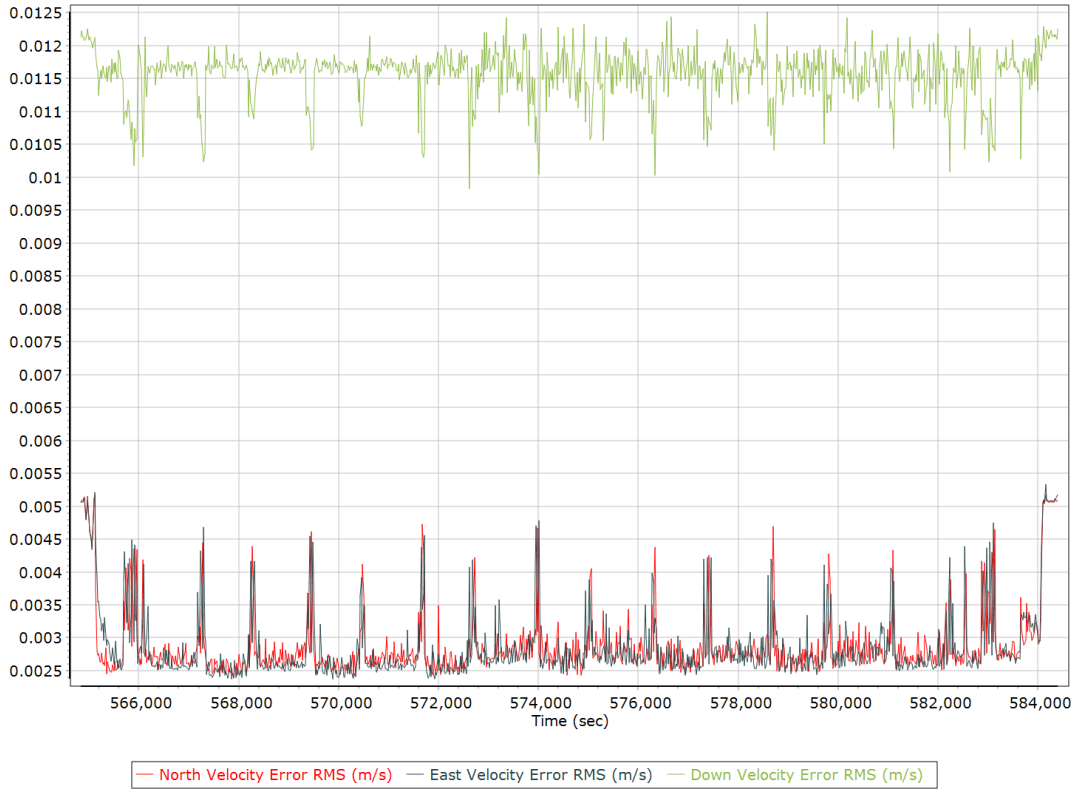
Z Gyro Scale Error (ppm)



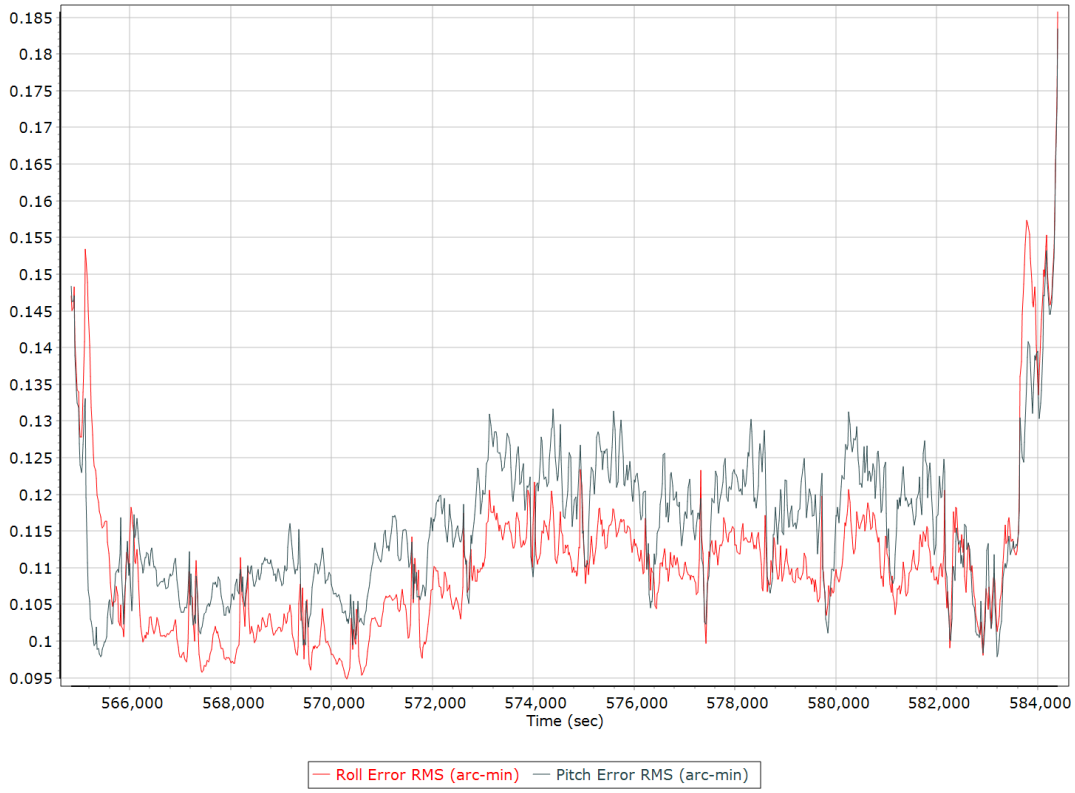
Smoothed Performance Metrics

Position Error RMS (m)

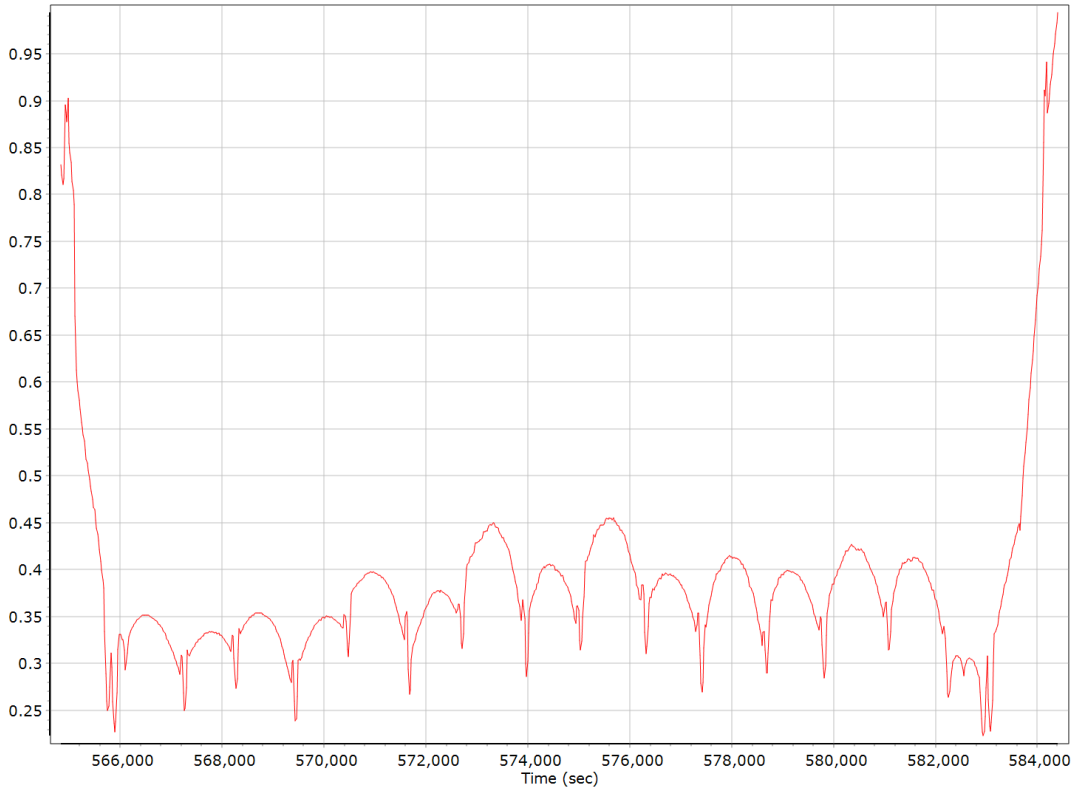
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)



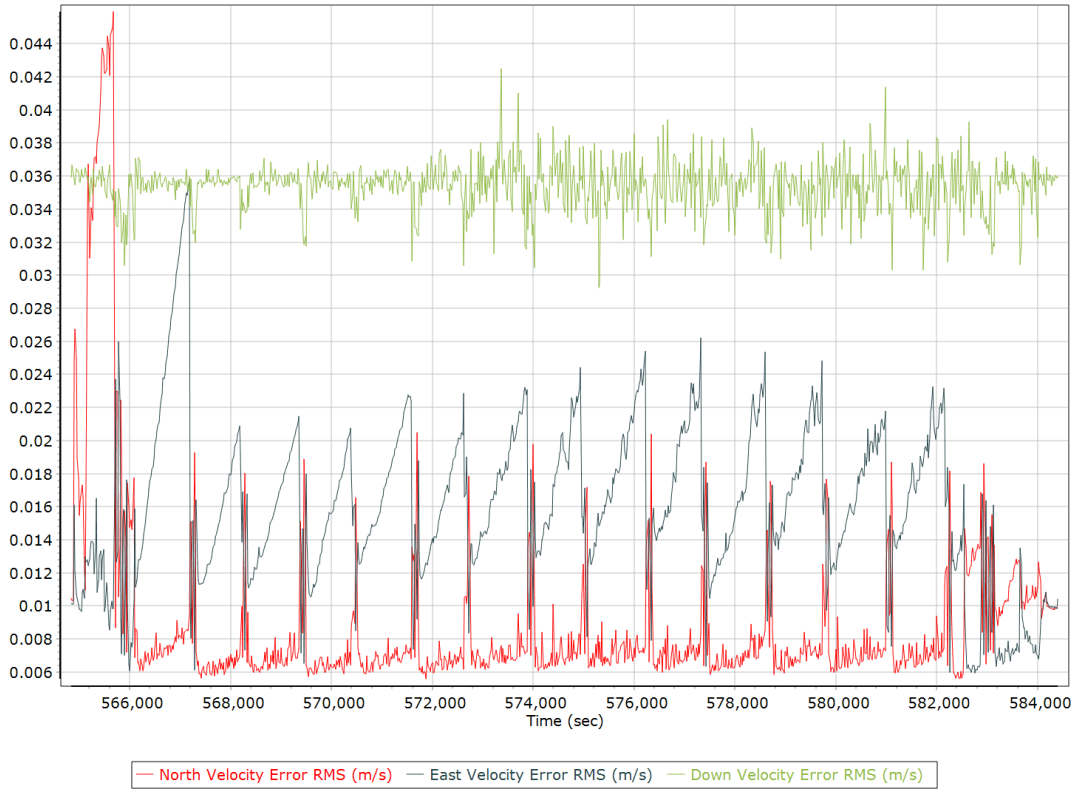
Heading Error RMS (arc-min)



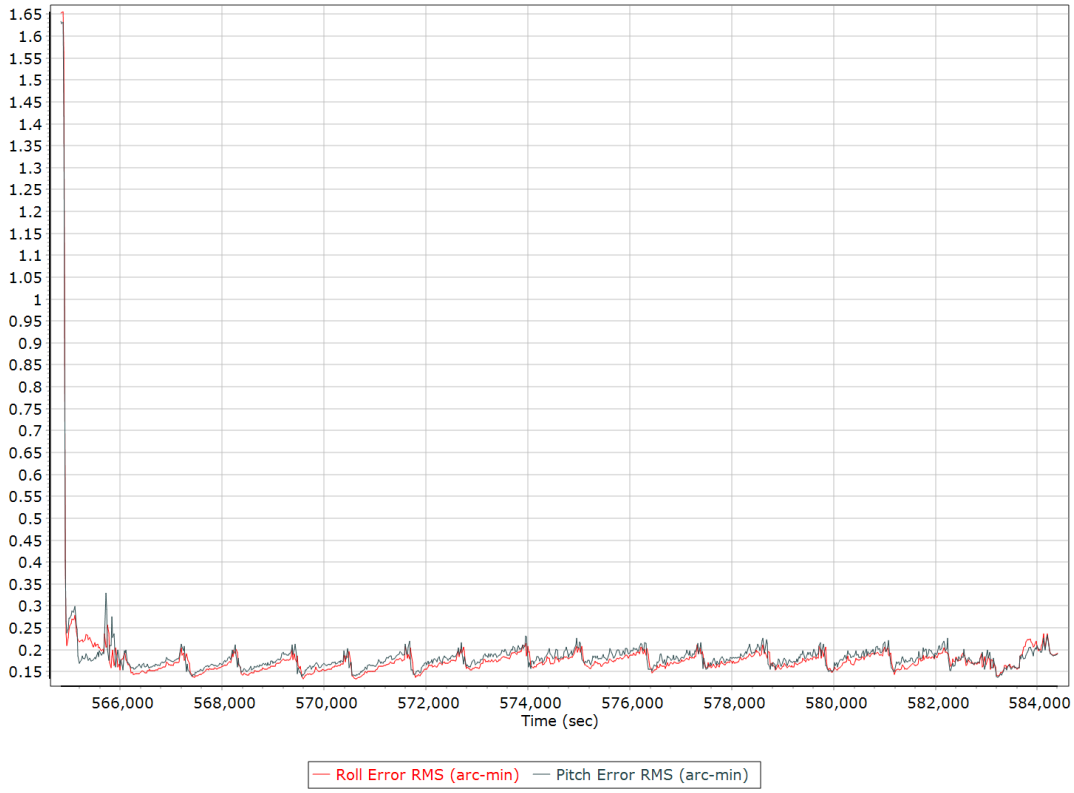
Forward Processed Performance Metrics

Position Error RMS (m)

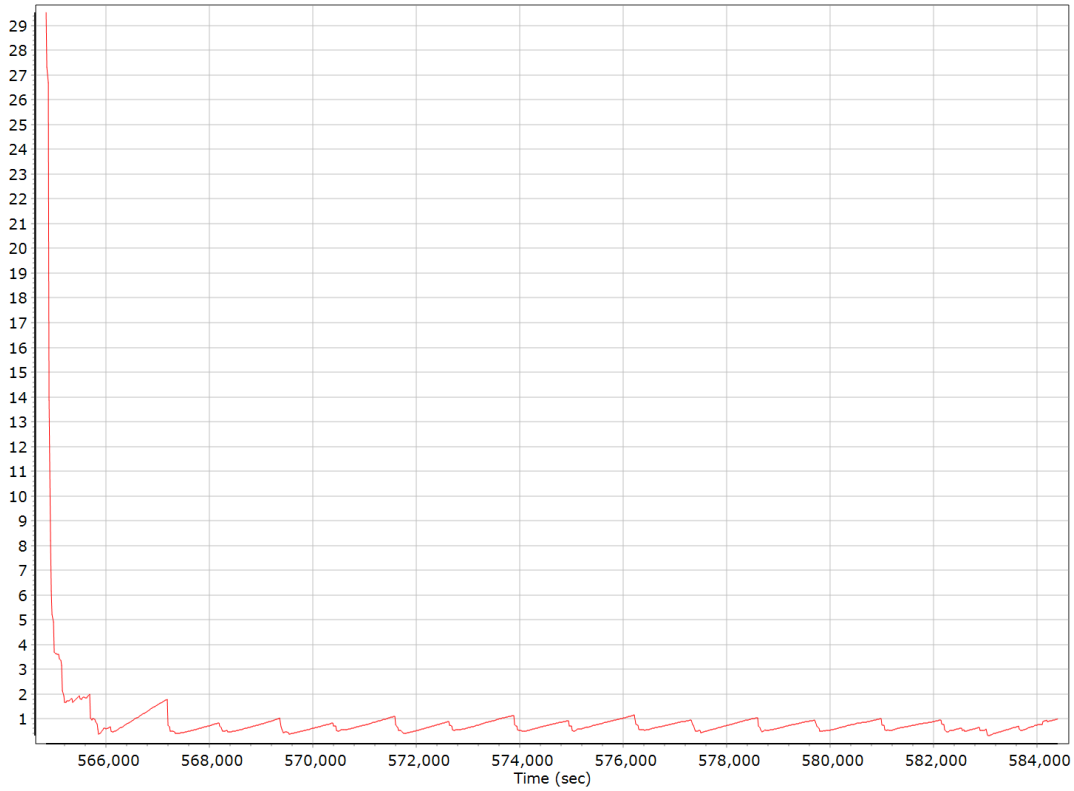
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

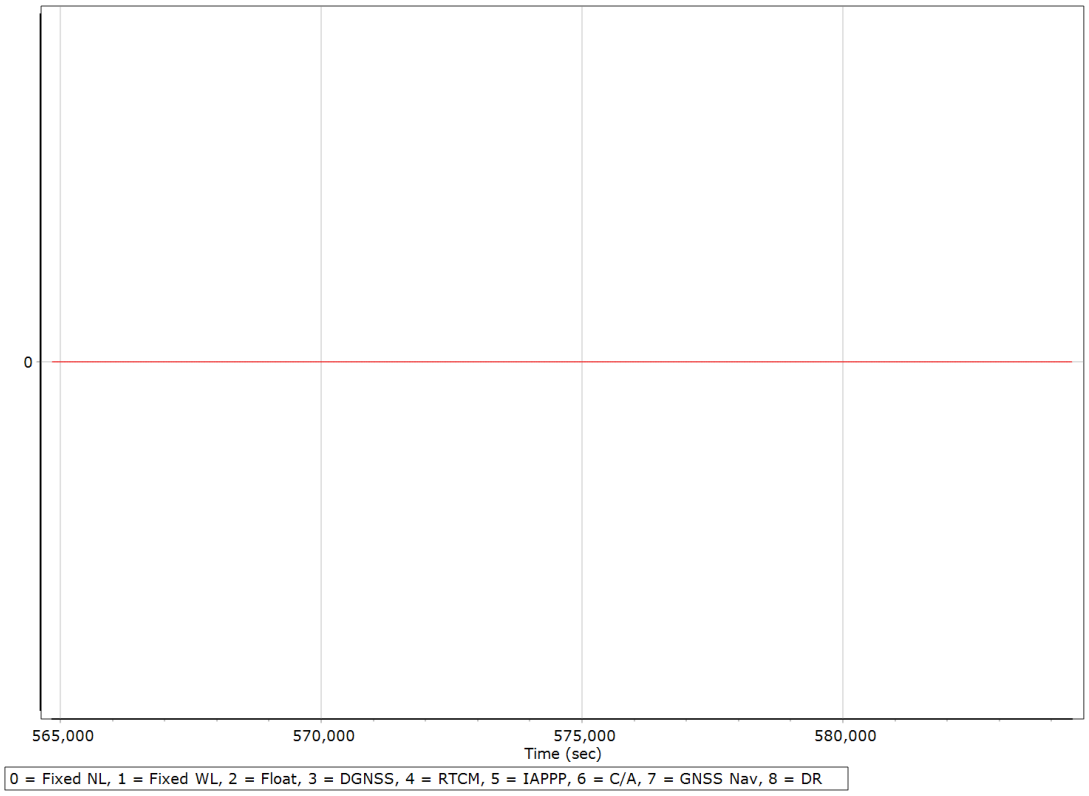


Heading Error RMS (arc-min)

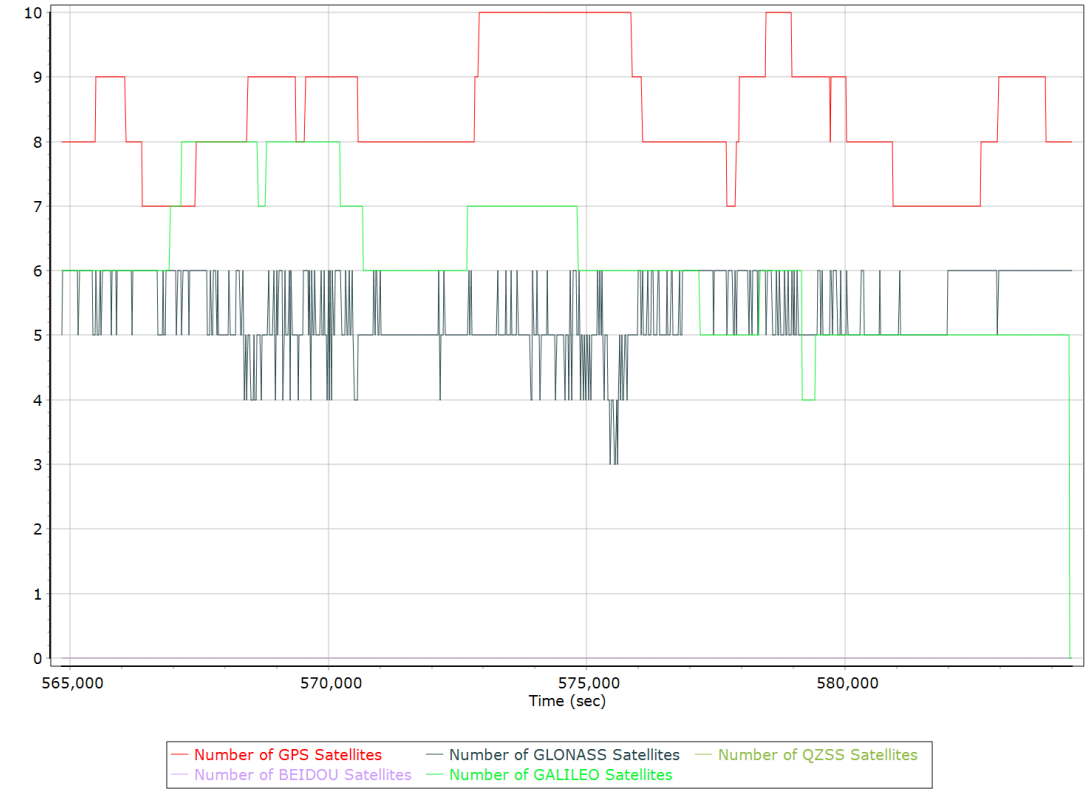


Forward Processed Solution Status

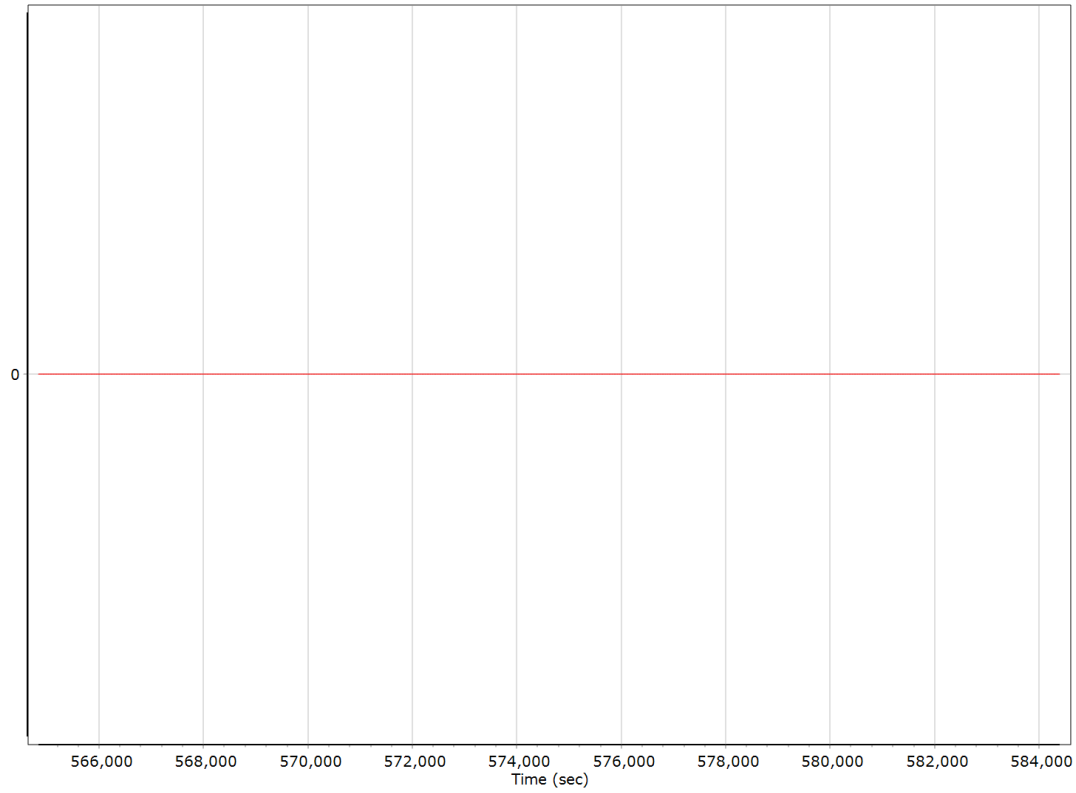
Processing Mode



Number of Satellites



Baseline Length



General Information

Mission Information

Project name	05152022A_3062
Processing date	2022-05-17 19:20:40
Mission date	2022-05-15 12:08:49
Mission duration	05:58:15.131
Processing mode	IN-Fusion PP-RTX

Rover Hardware Information

Product	POS AV 610 VER6 HW2.5-12
Serial number	S/N8708
IMU type	57
Receiver type	BD982
Antenna type	AV59

Project File List

Rover Data Files

File name	File type
6222135.000	POS Data
6222135.001	POS Data
6222135.002	POS Data
6222135.003	POS Data
6222135.004	POS Data
6222135.005	POS Data
6222135.006	POS Data
6222135.007	POS Data
6222135.008	POS Data
6222135.009	POS Data
6222135.010	POS Data
6222135.011	POS Data
6222135.012	POS Data
6222135.013	POS Data
6222135.014	POS Data
6222135.015	POS Data
6222135.016	POS Data
6222135.017	POS Data
6222135.018	POS Data
6222135.019	POS Data
6222135.020	POS Data
6222135.021	POS Data
6222135.022	POS Data
6222135.023	POS Data
6222135.024	POS Data
6222135.025	POS Data
6222135.026	POS Data
6222135.027	POS Data
6222135.028	POS Data
6222135.029	POS Data
6222135.030	POS Data
6222135.031	POS Data
6222135.032	POS Data
6222135.033	POS Data
6222135.034	POS Data
6222135.035	POS Data
6222135.036	POS Data
6222135.037	POS Data
6222135.038	POS Data
6222135.039	POS Data
6222135.040	POS Data
6222135.041	POS Data
6222135.042	POS Data
6222135.043	POS Data
6222135.044	POS Data
6222135.045	POS Data
6222135.046	POS Data
6222135.047	POS Data

Input Files

File Name	File Type
Ephm1350.22g	GLONASS Broadcast Ephemeris
Ephm1350.22n	GPS Broadcast Ephemeris

Output Files

Filename	File type
sbet_05152022A_3062.out	SBET Trajectory File

Rover Data Summary

First raw data file	6222135.000		
Last raw data file	6222135.047		
Start GPS week	2210		
Start time	43710.640 (5/15/2022 12:08:30 PM)		
End time	65205.771 (5/15/2022 6:06:45 PM)		
Start of fine alignment	44072.887 (5/15/2022 12:14:32 PM)		
Available subsystems	Primary GNSS, Gimbal, IMU		
POS Event Input	None		
Correction data	None		
IMU Installation Lever Arms & Mounting Angles			
Gimbal to IMU lever arm (m)	0.000	0.000	0.000
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.142	-0.236	-1.269
Gimbal to Primary GNSS lever arm std dev (m)	-1.000		
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

Rover Data QC

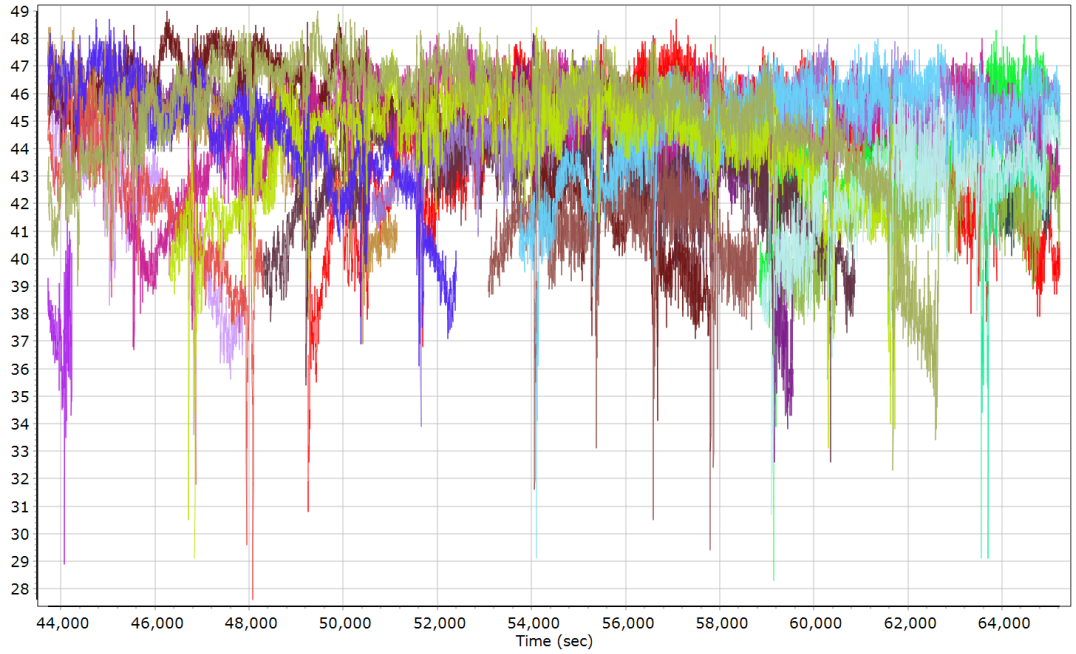
Raw IMU Import QC Summary

IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05152022A_3062.log
IMU Records Processed	4298668
Termination Status	Normal
IMU Anomalies	0

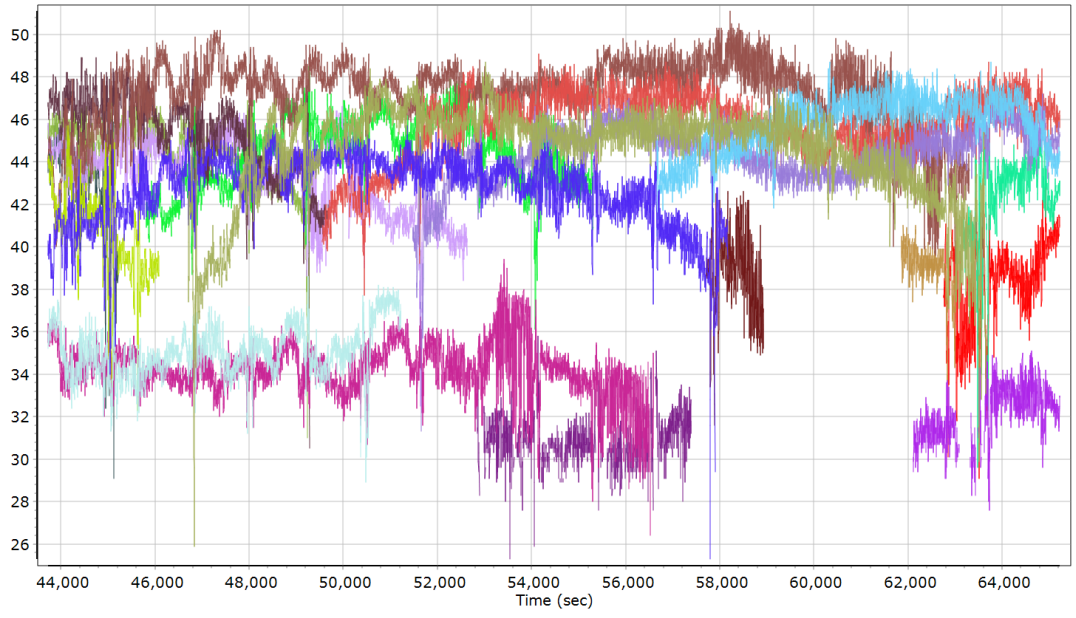
Primary Observables & Satellite Data

GPS/GLONASS L1 Satellite Lock/Elevation

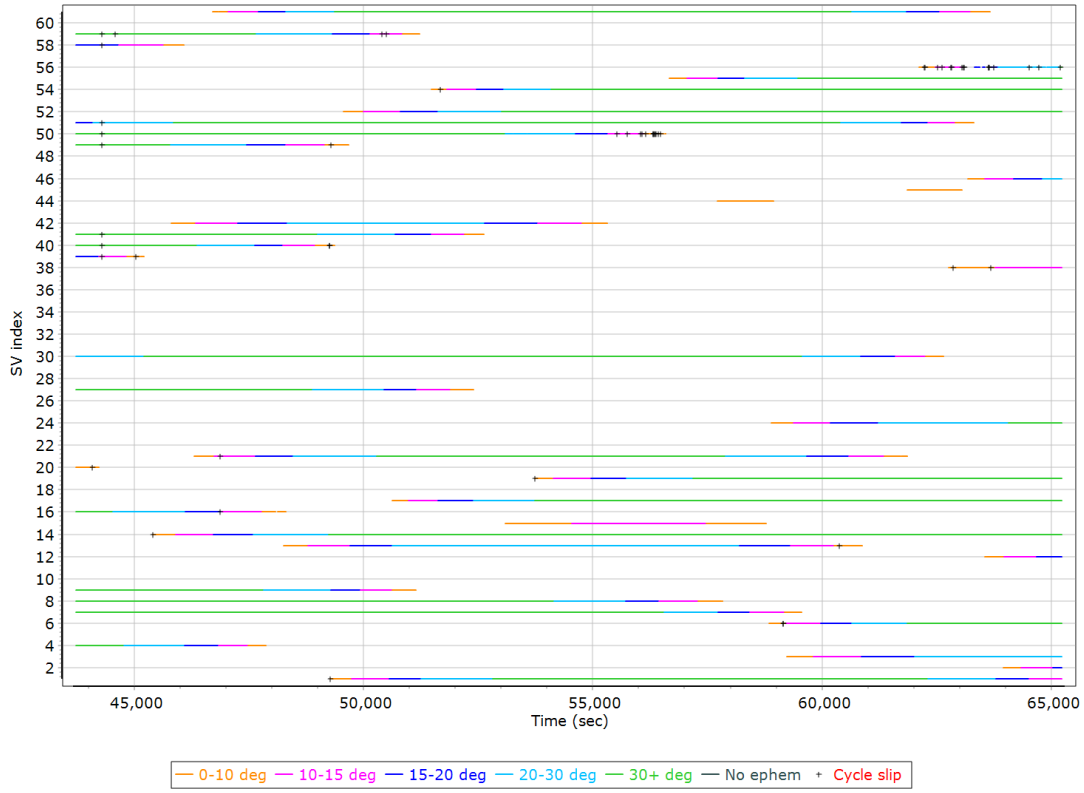
GPS L1 SNR



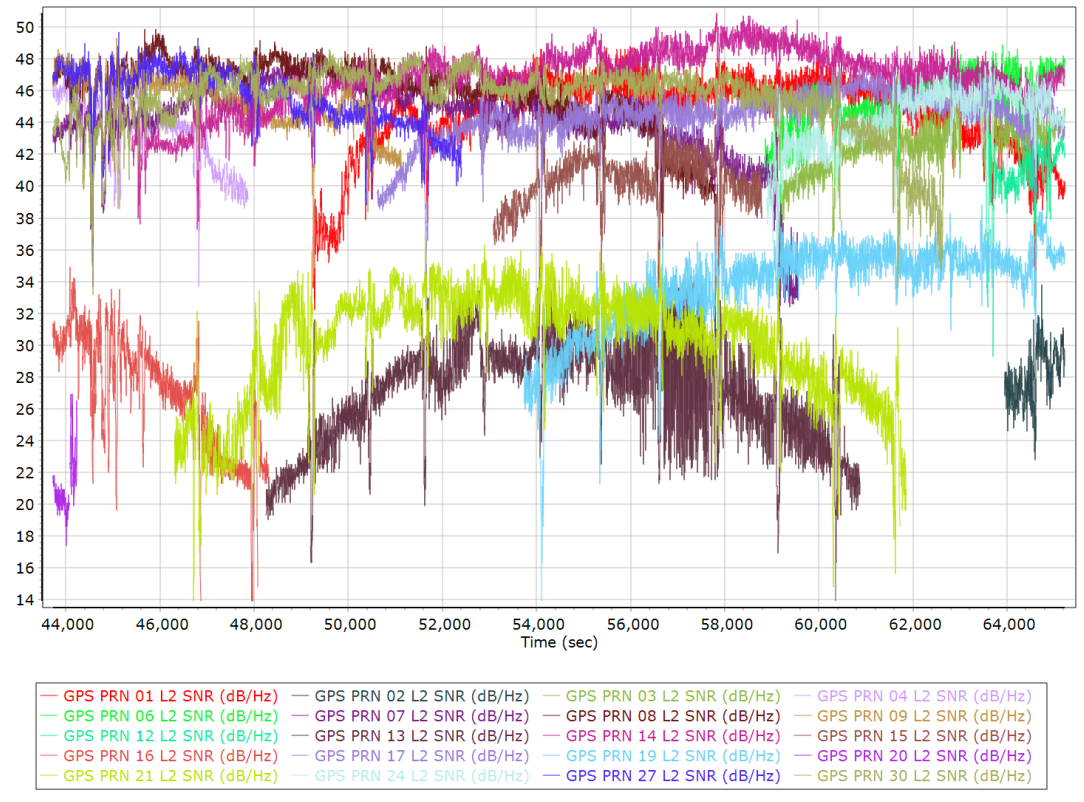
GLONASS L1 SNR



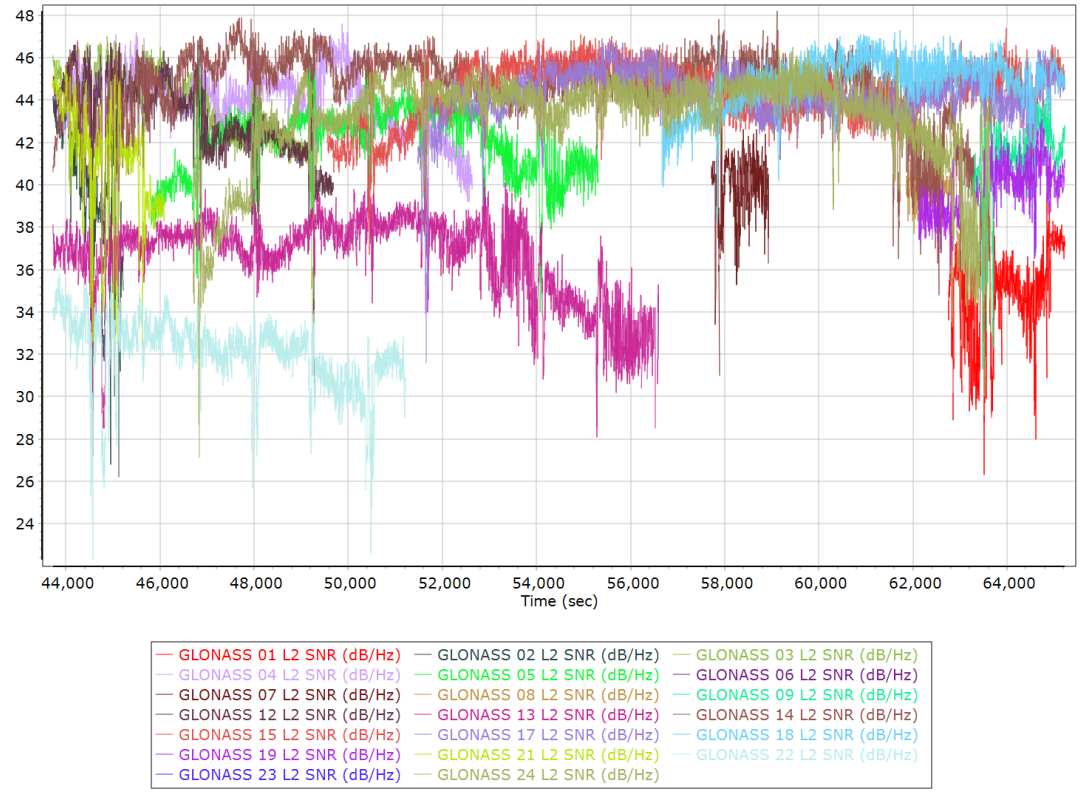
GPS/GLONASS L2 Satellite Lock/Elevation



GPS L2 SNR

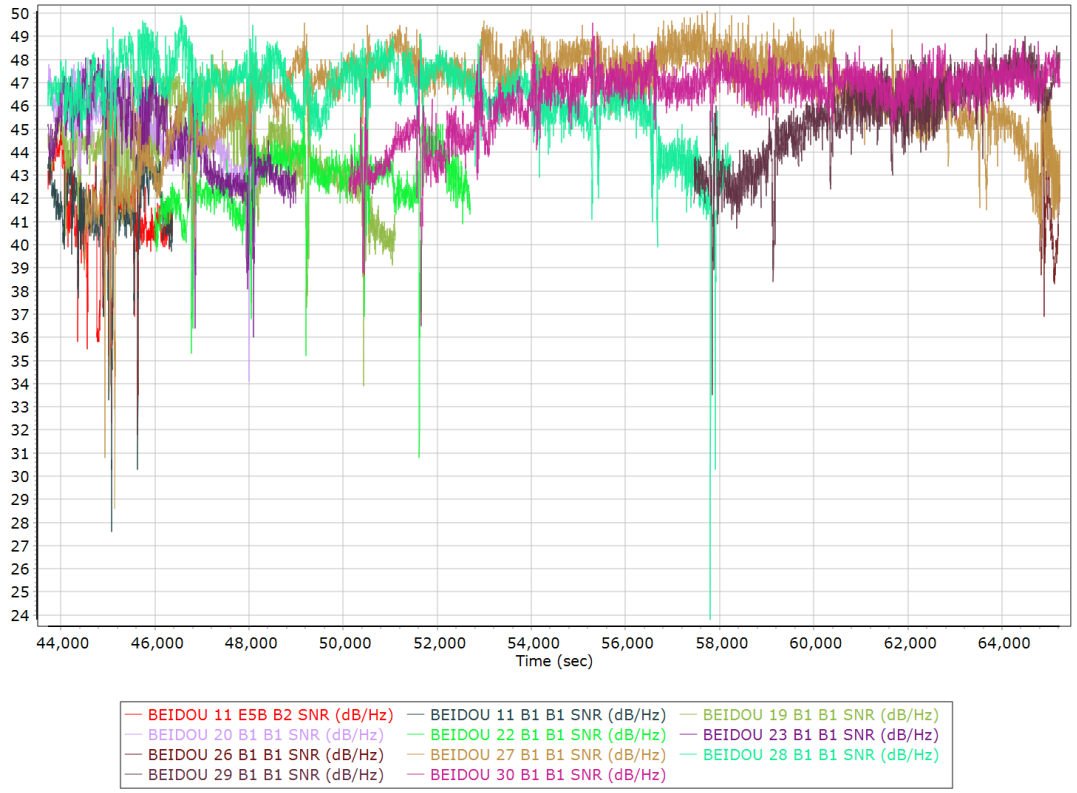


GLONASS L2 SNR

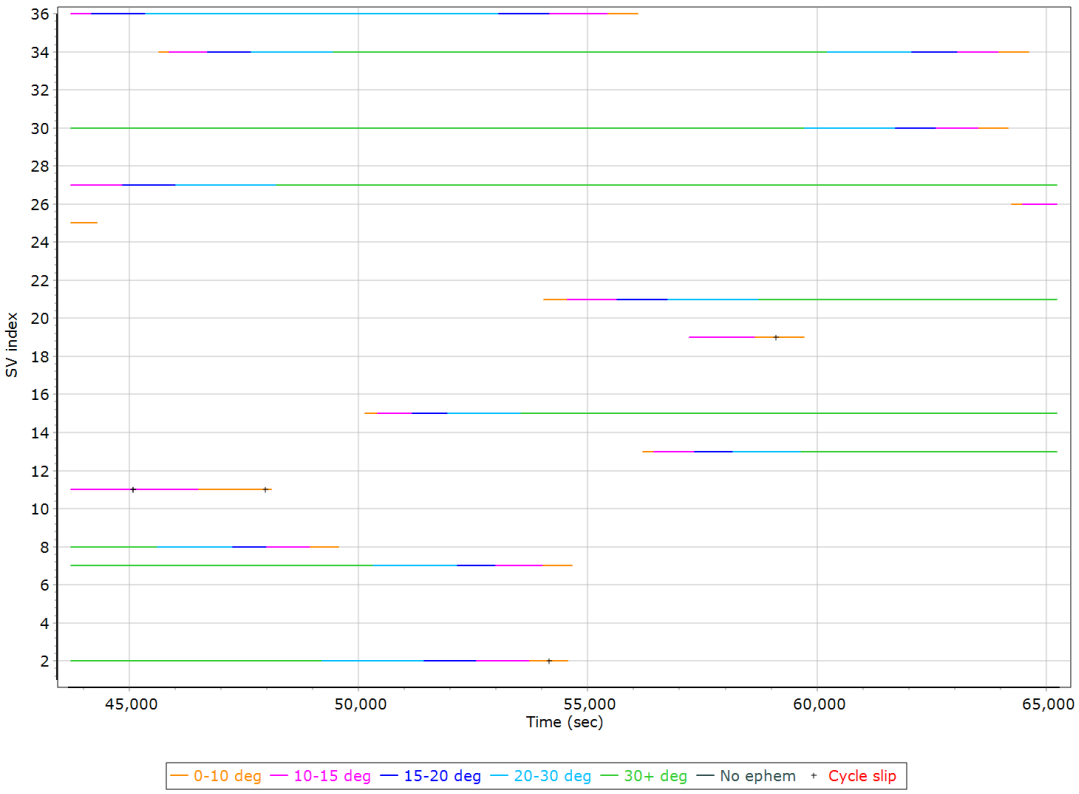


BEIDOU Satellite Lock/Elevation

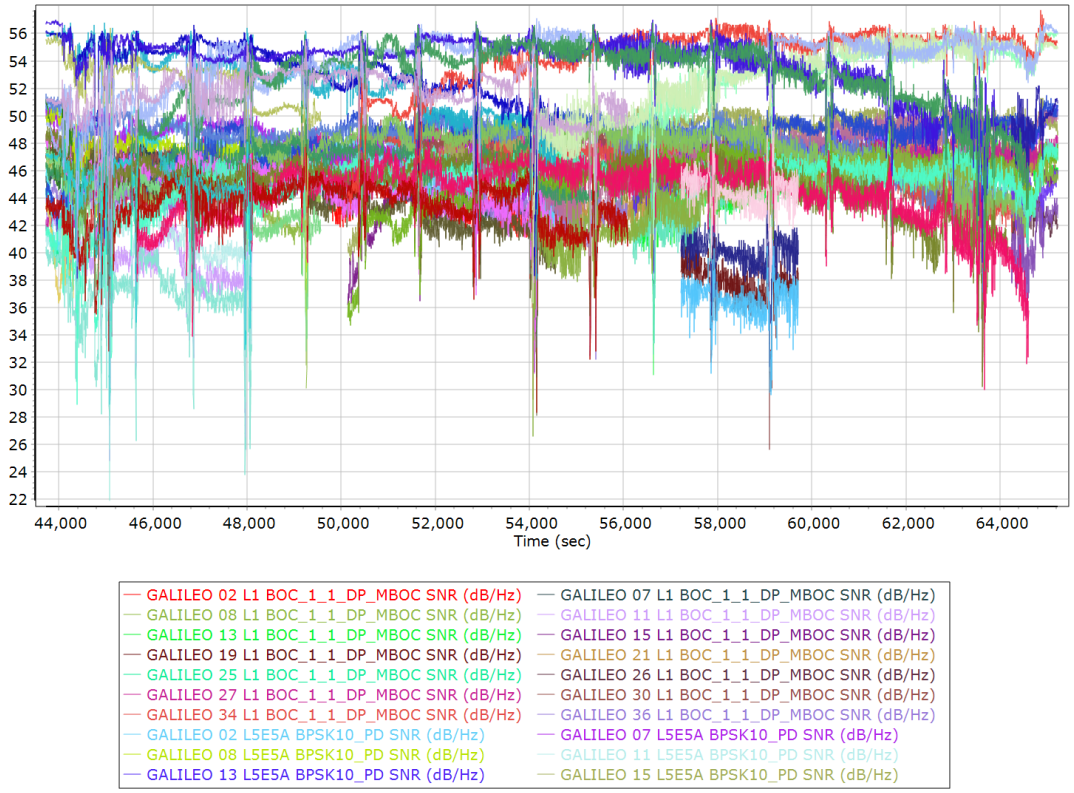
BEIDOU SNR



GALILEO Satellite Lock/Elevation

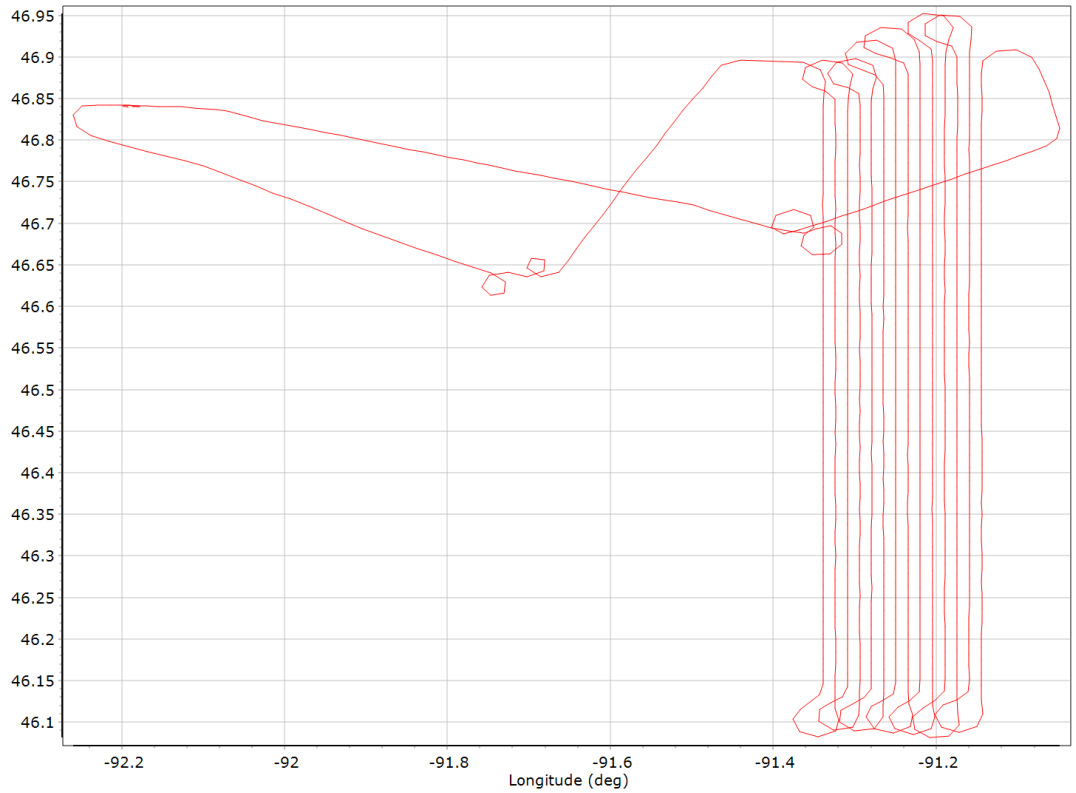


GALILEO SNR

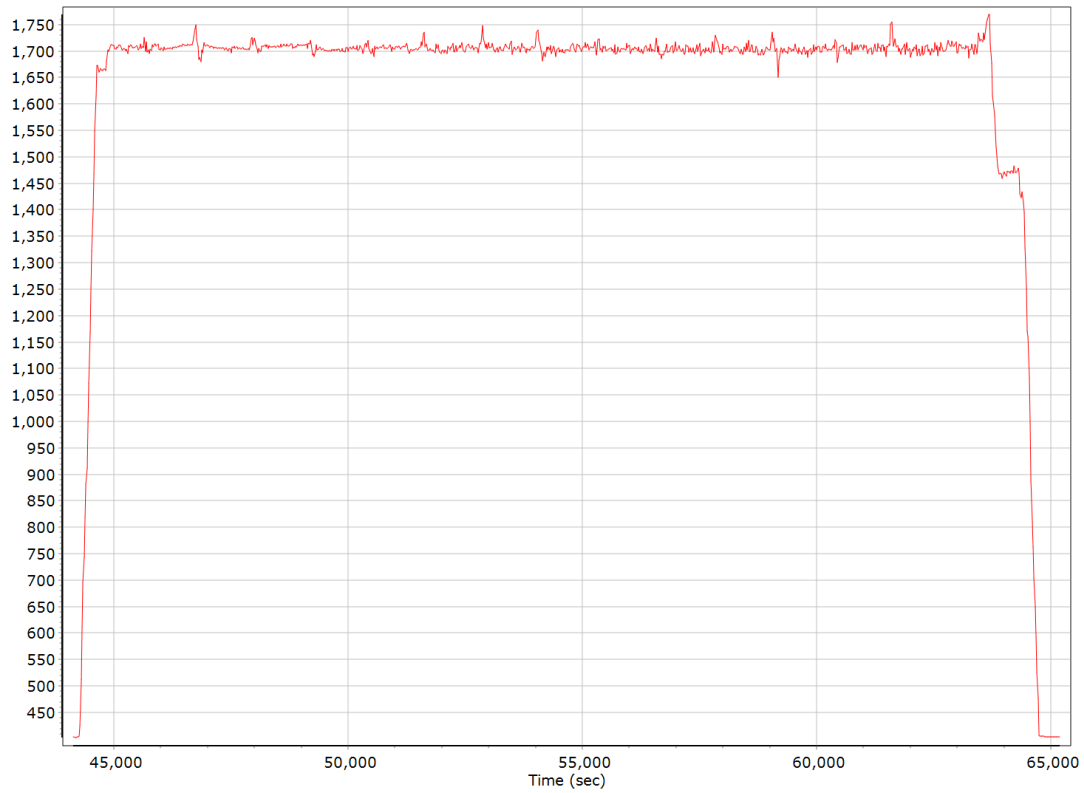

56
54
52
50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
44,000
46,000
48,000
50,000
52,000
54,000
56,000
58,000
60,000
62,000
64,000
Time (sec)
GALILEO 02 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 07 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 08 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 11 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 13 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 15 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 19 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 21 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 25 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 26 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 27 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 30 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 34 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 36 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 02 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 07 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 08 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 11 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 13 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 15 L5E5A BPSK10_PD SNR (dB/Hz)

Smoothed Trajectory Information

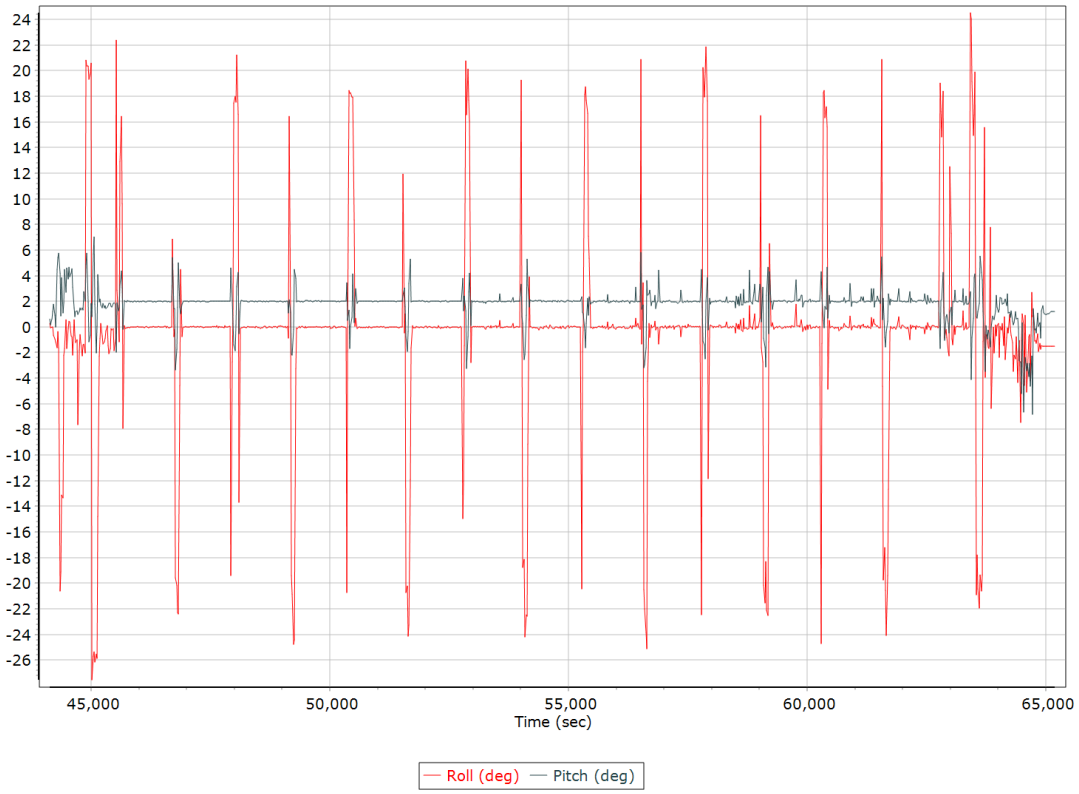
Top View



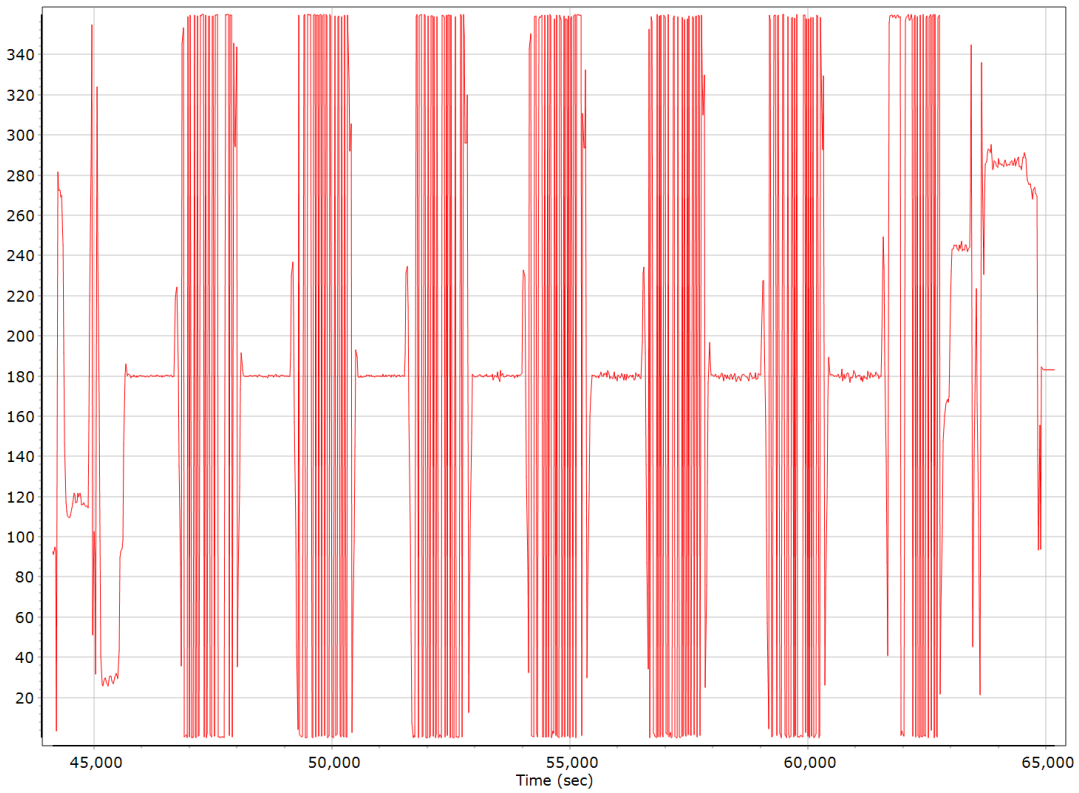
Altitude



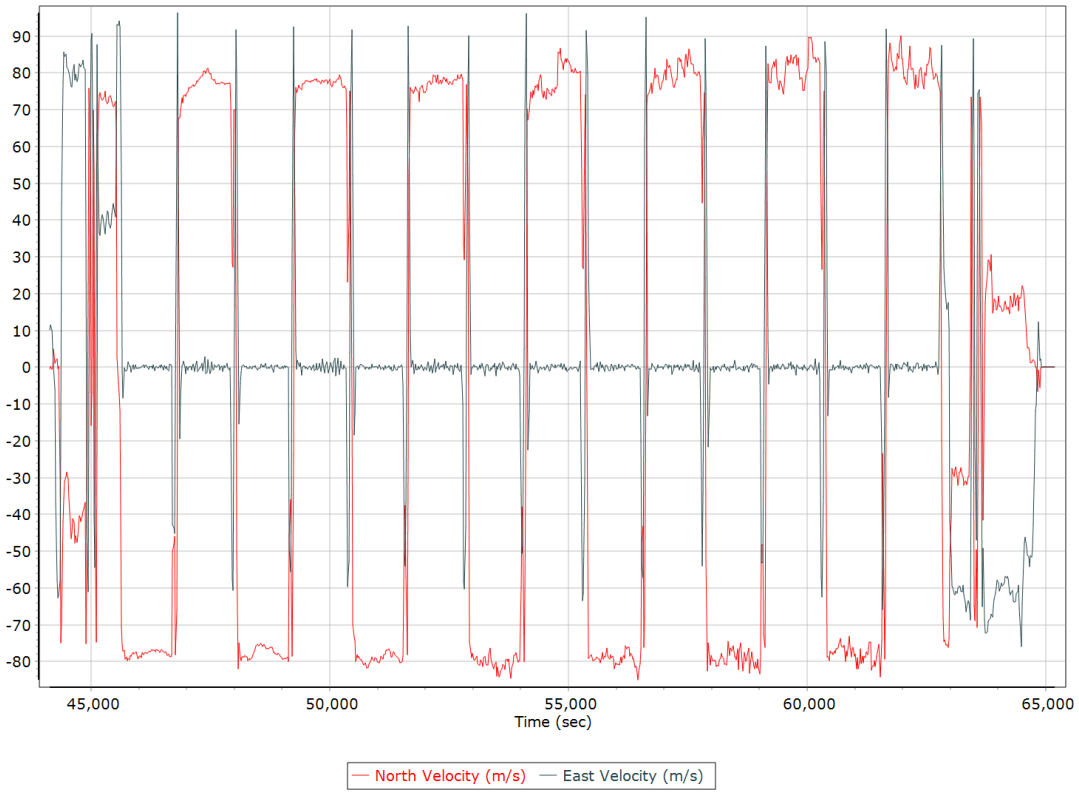
Roll/Pitch



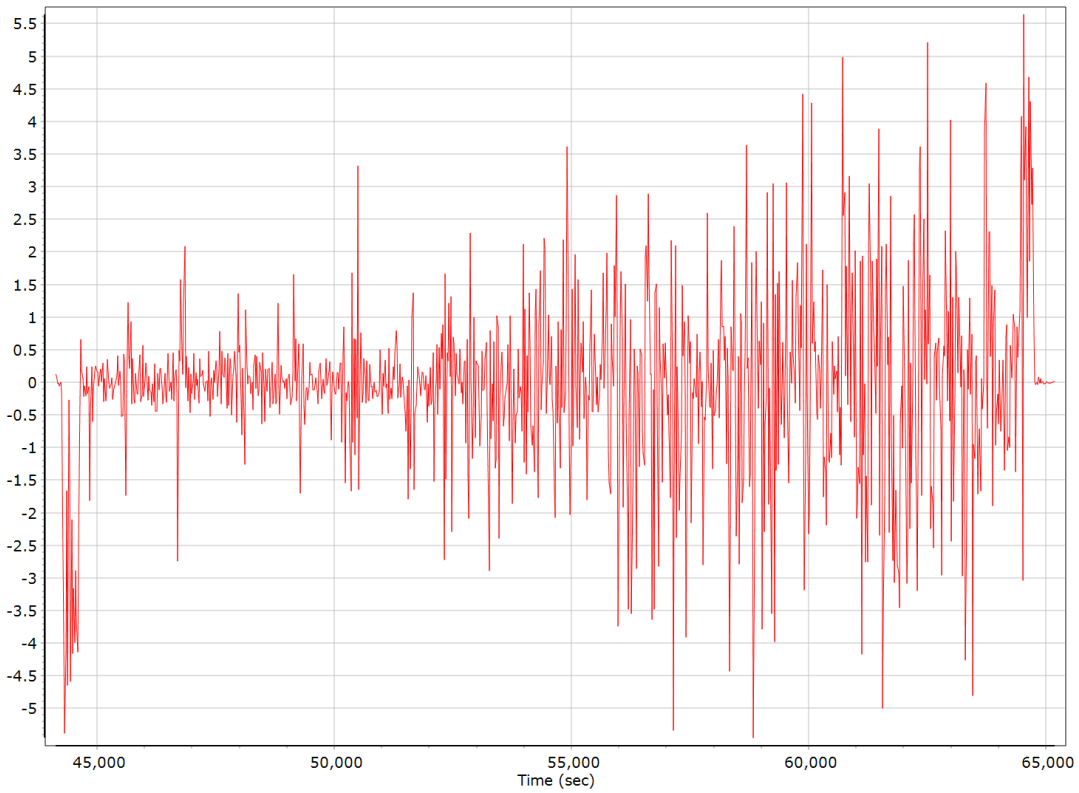
Heading



North/East Velocity

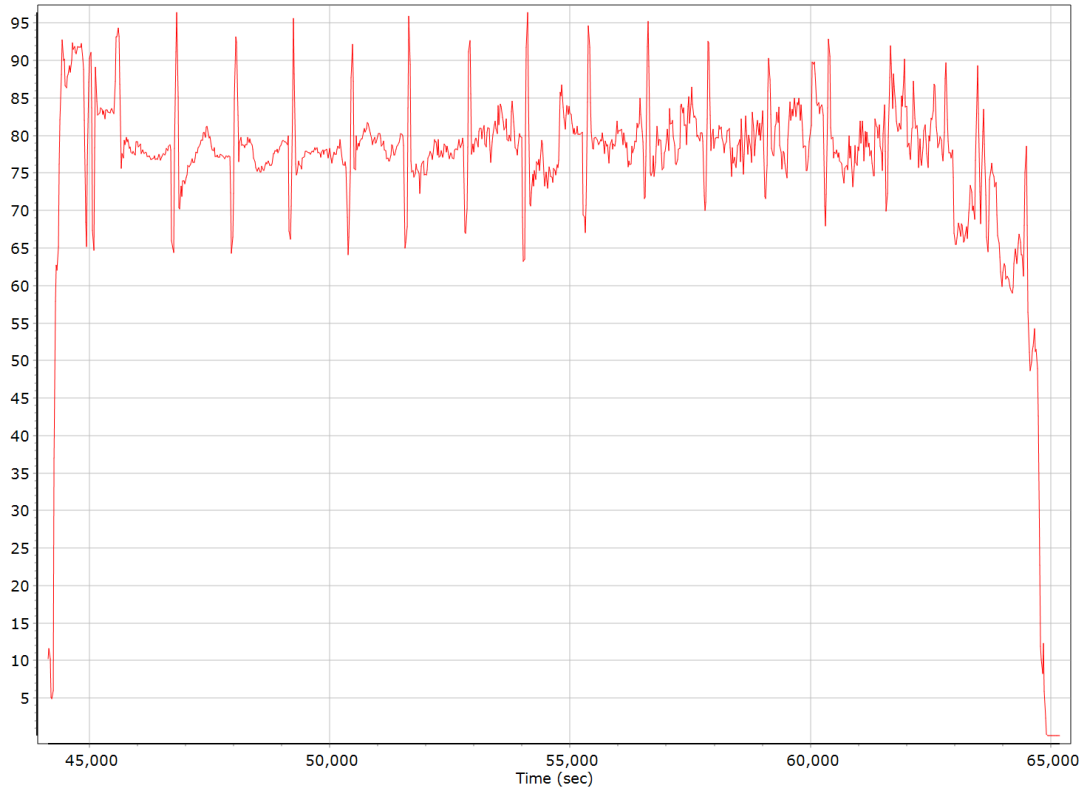


Down Velocity

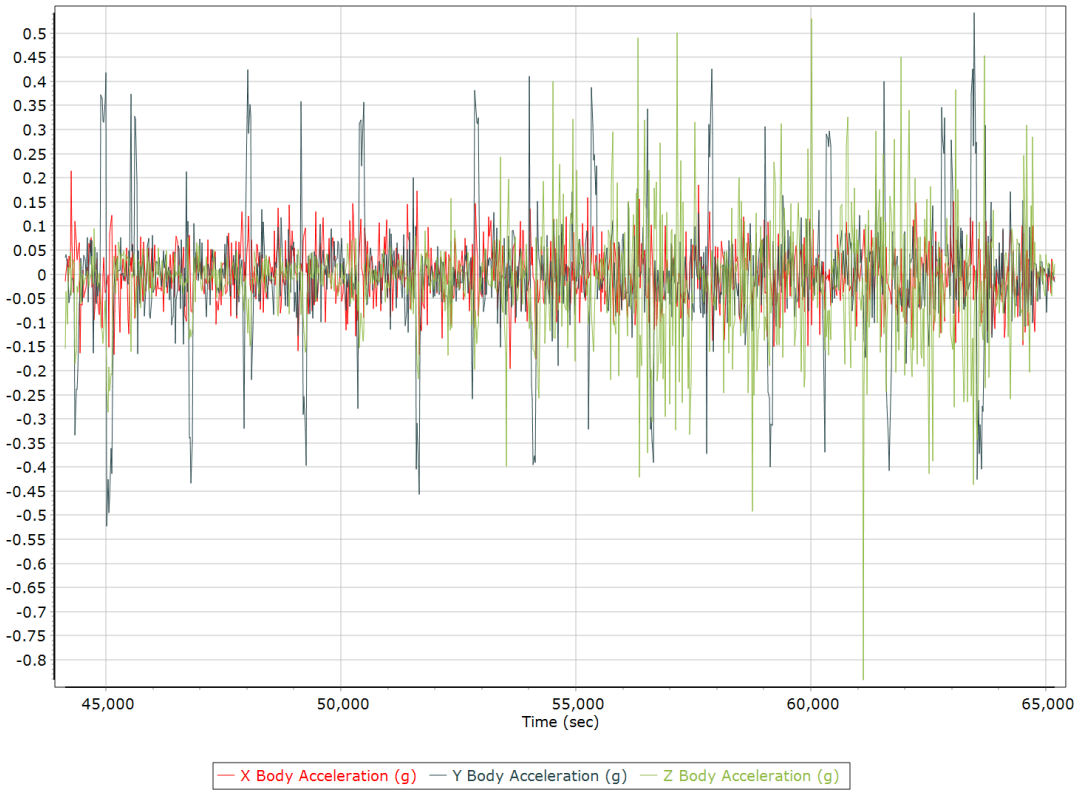


Total Speed

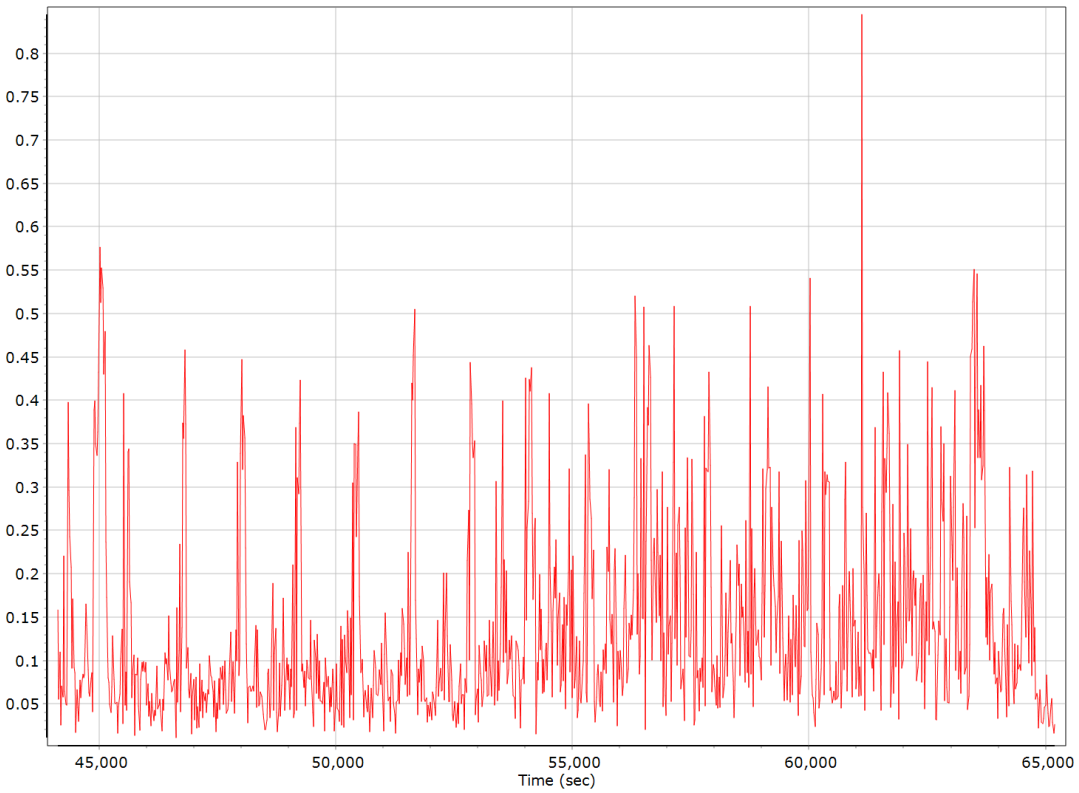
Ground Speed



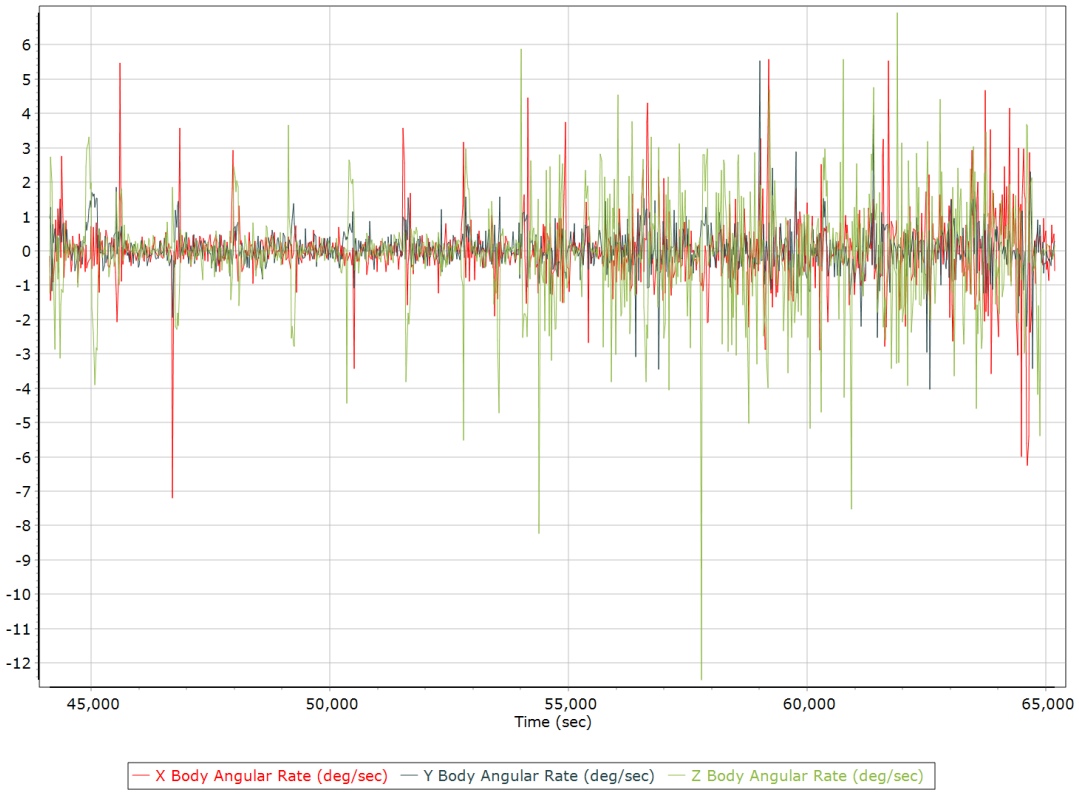
Body Acceleration



Total Body Acceleration

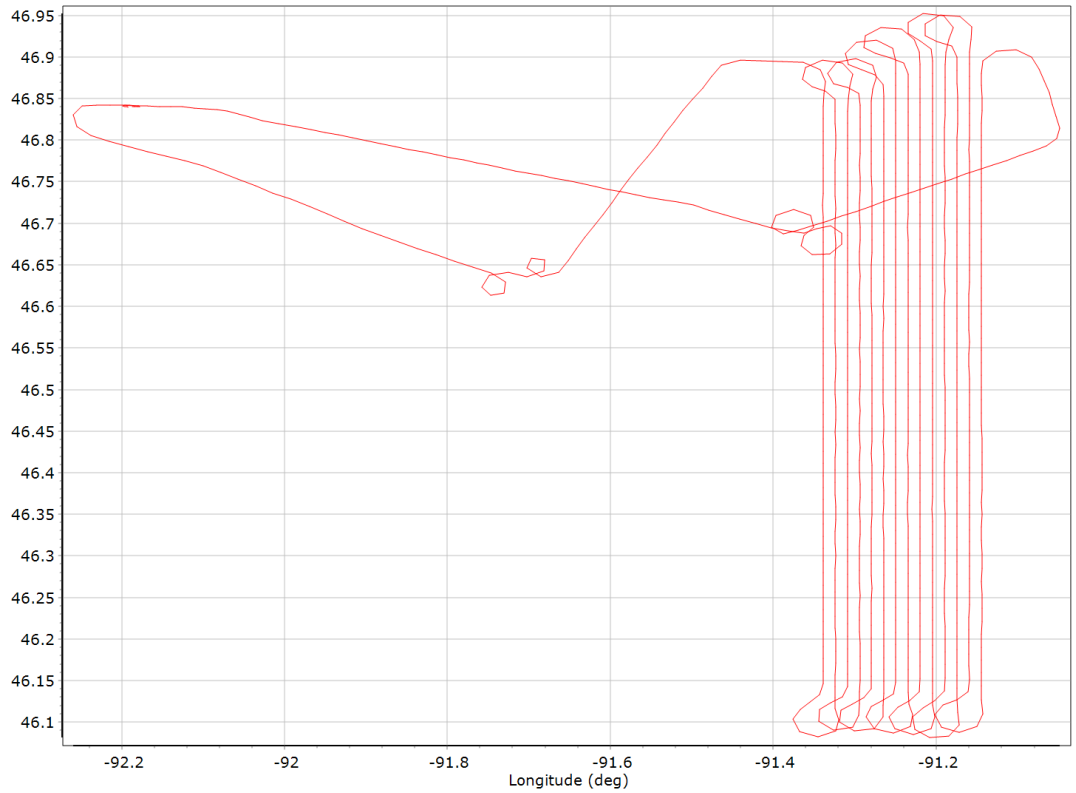


Body Angular Rate

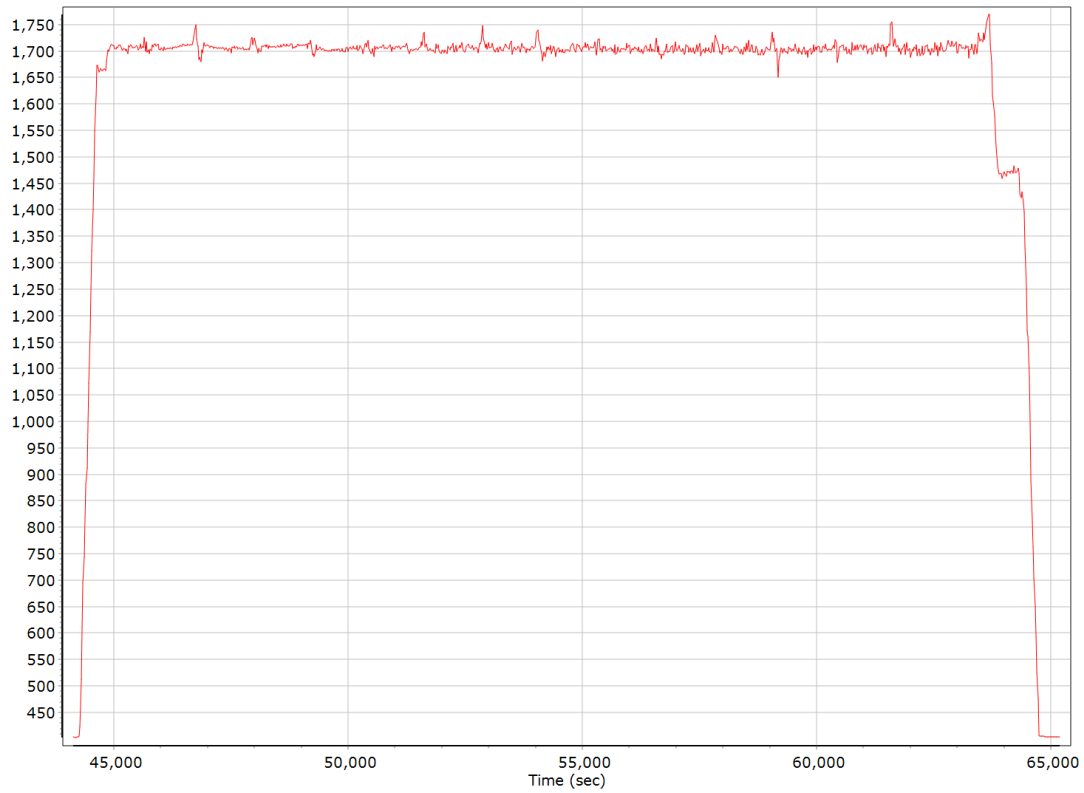


Forward Processed Trajectory Information

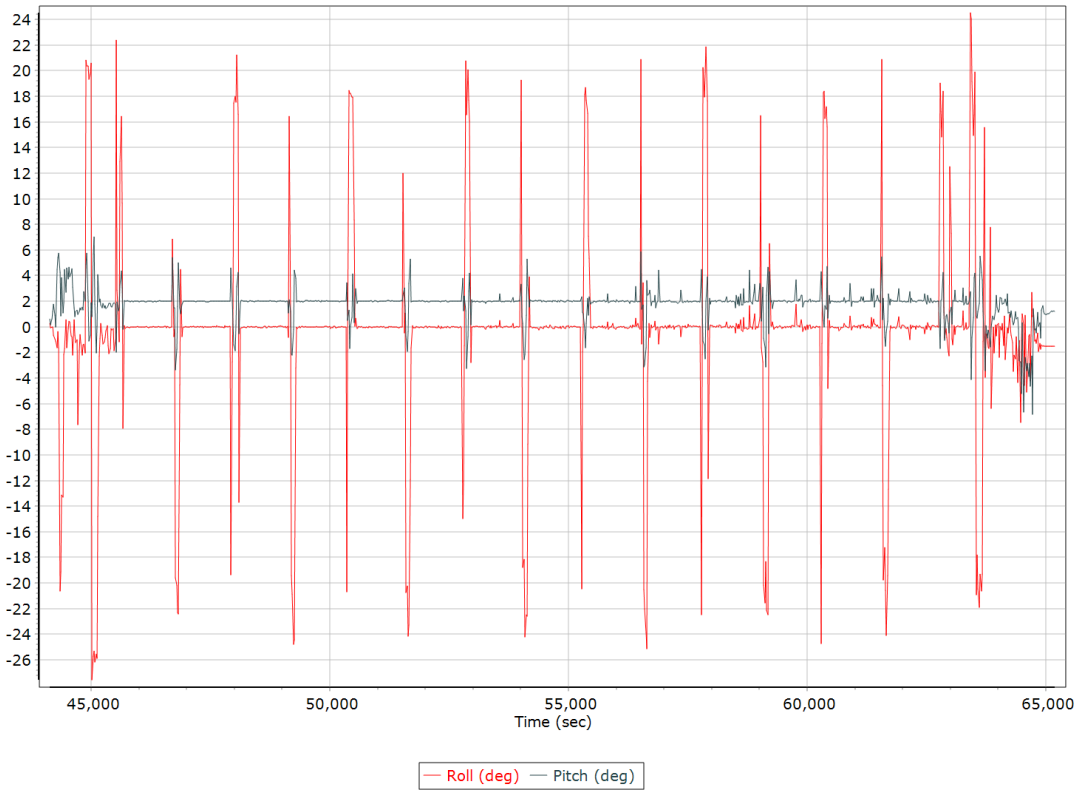
Top View



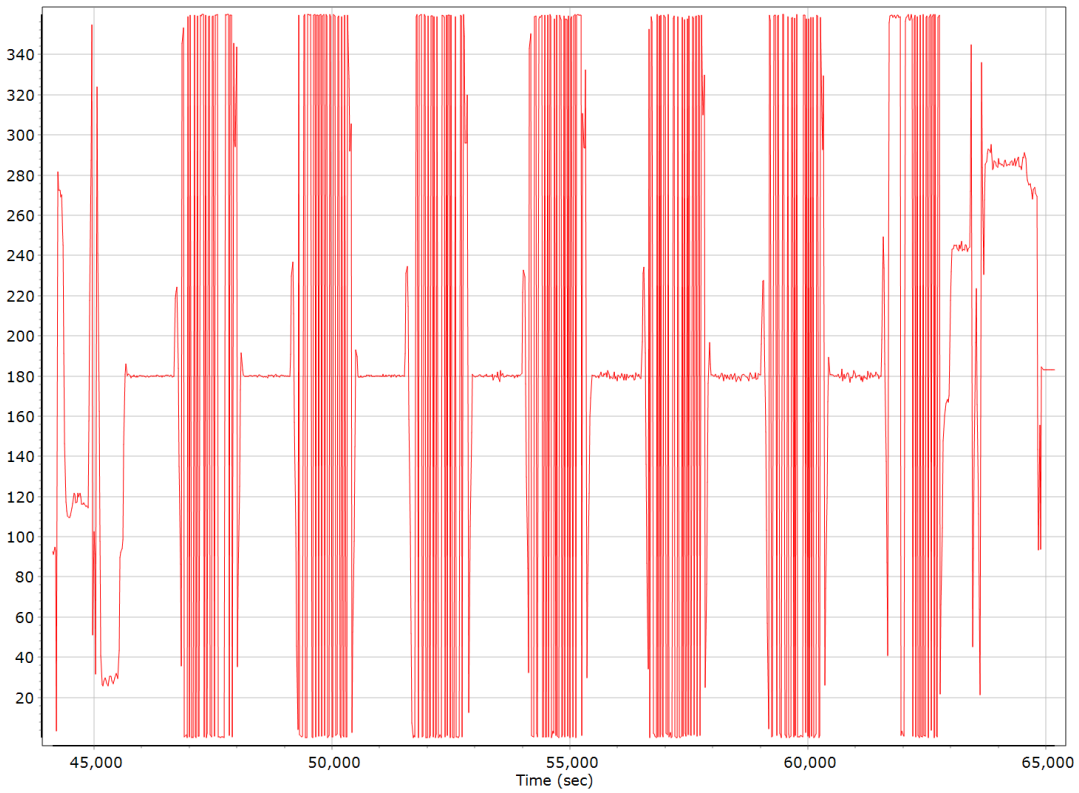
Altitude



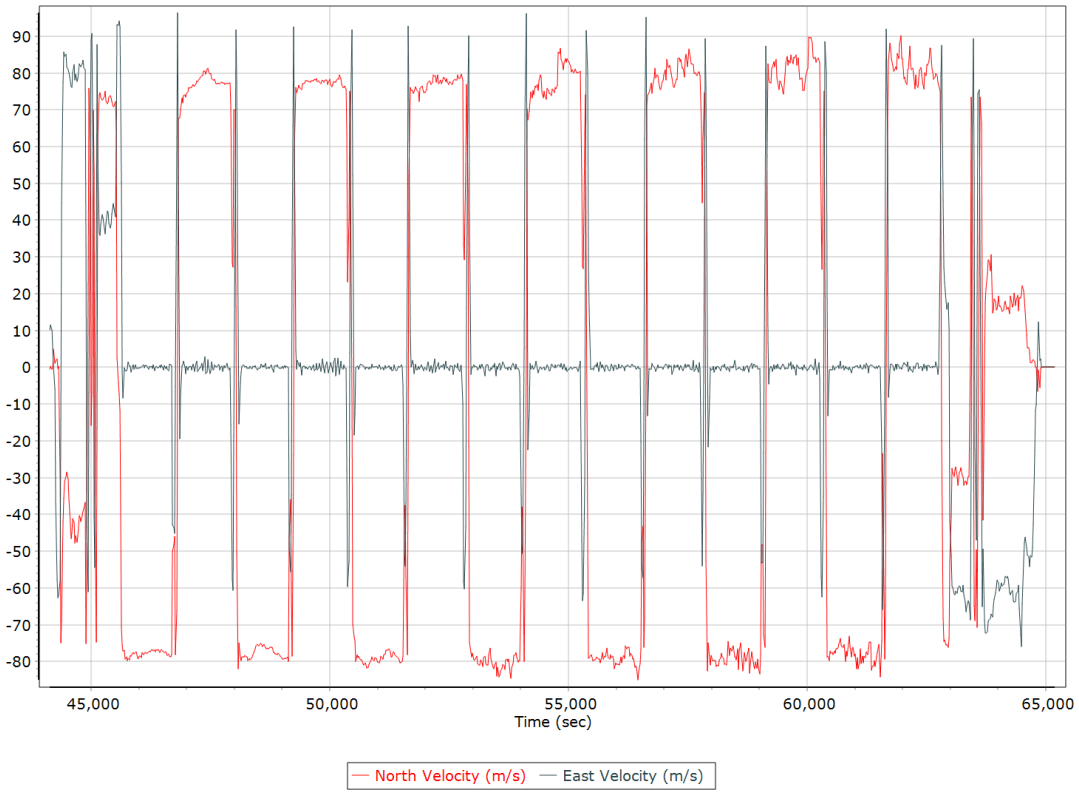
Roll/Pitch



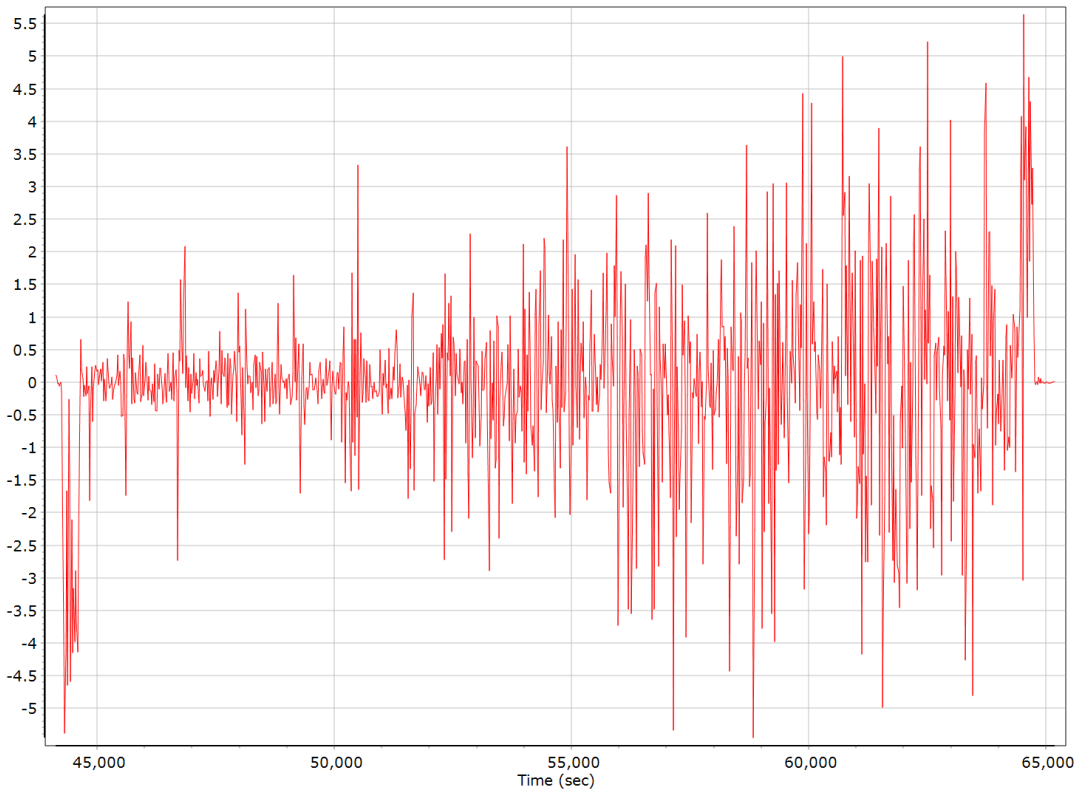
Heading



North/East Velocity

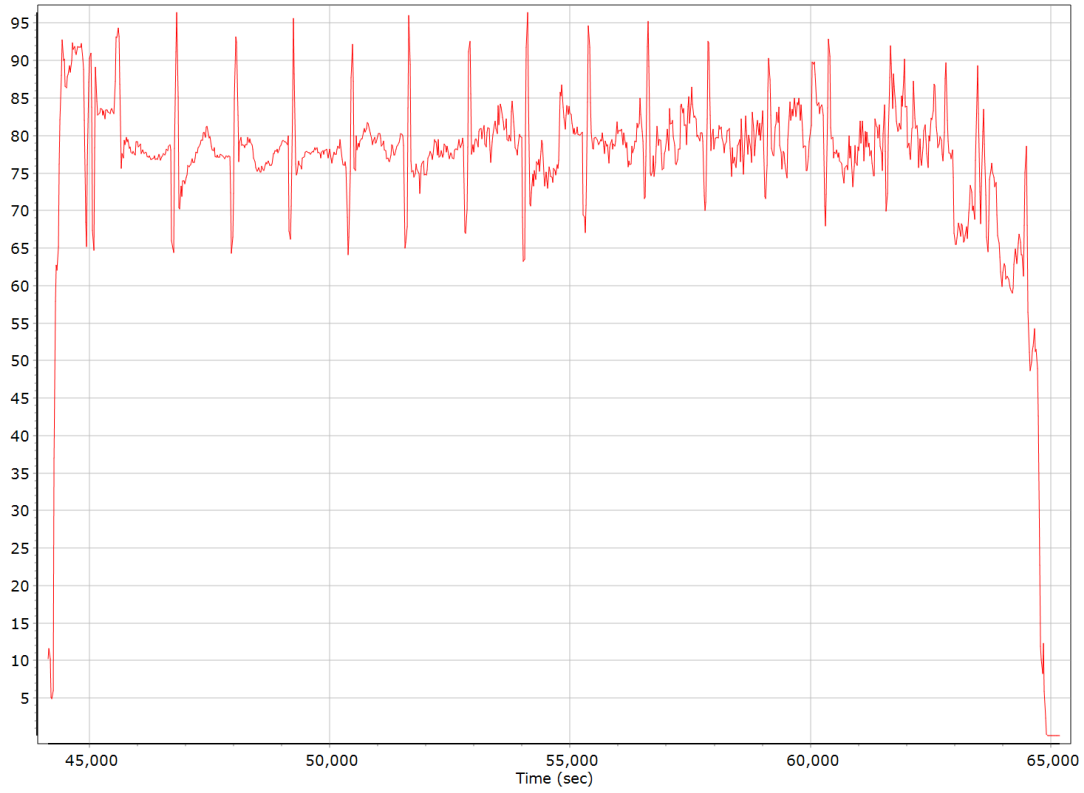


Down Velocity

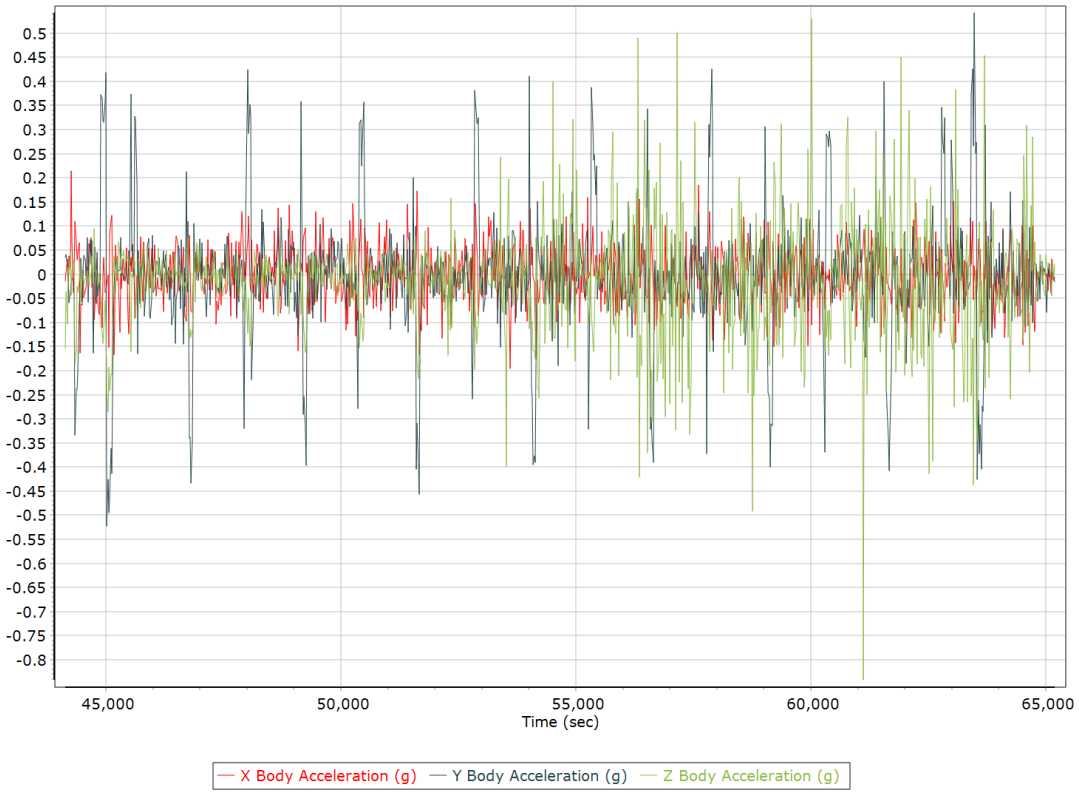


Total Speed

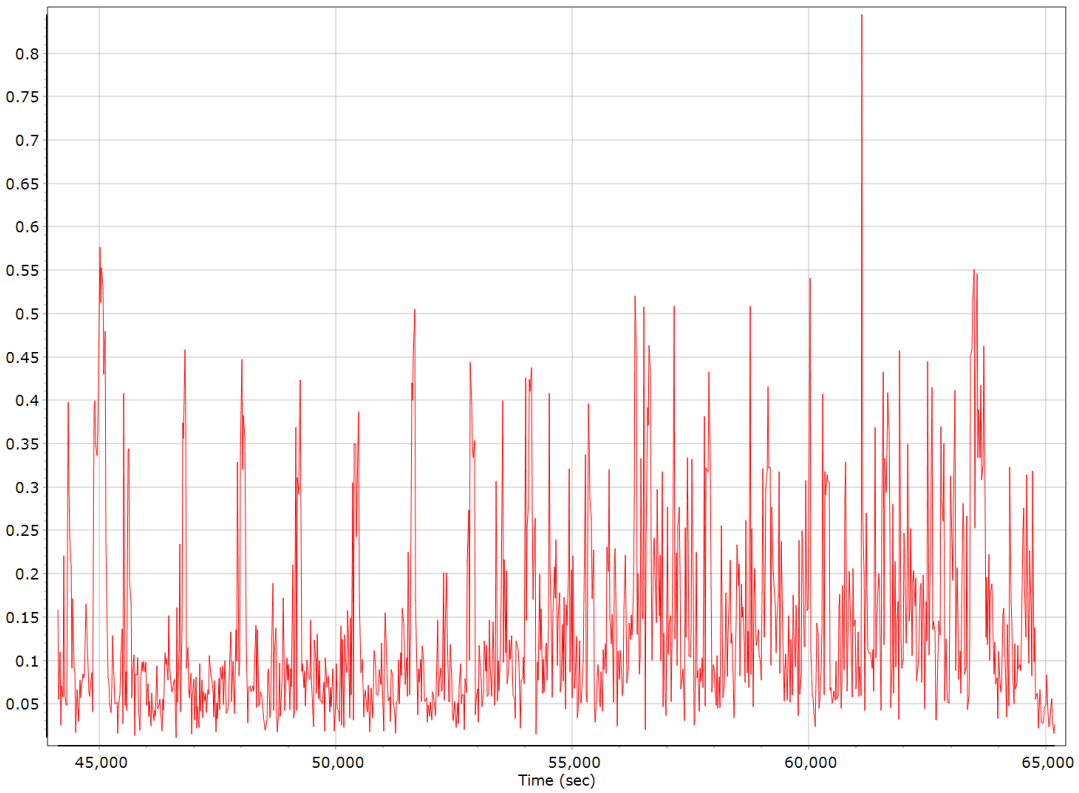
Ground Speed



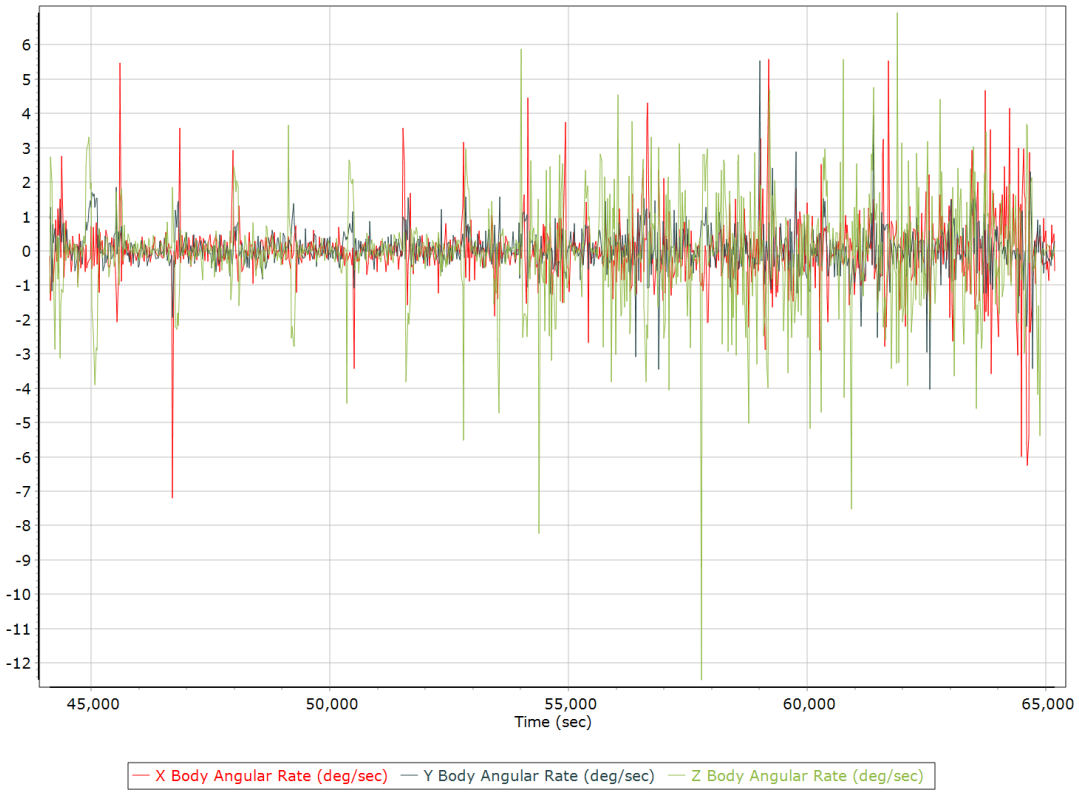
Body Acceleration



Total Body Acceleration



Body Angular Rate

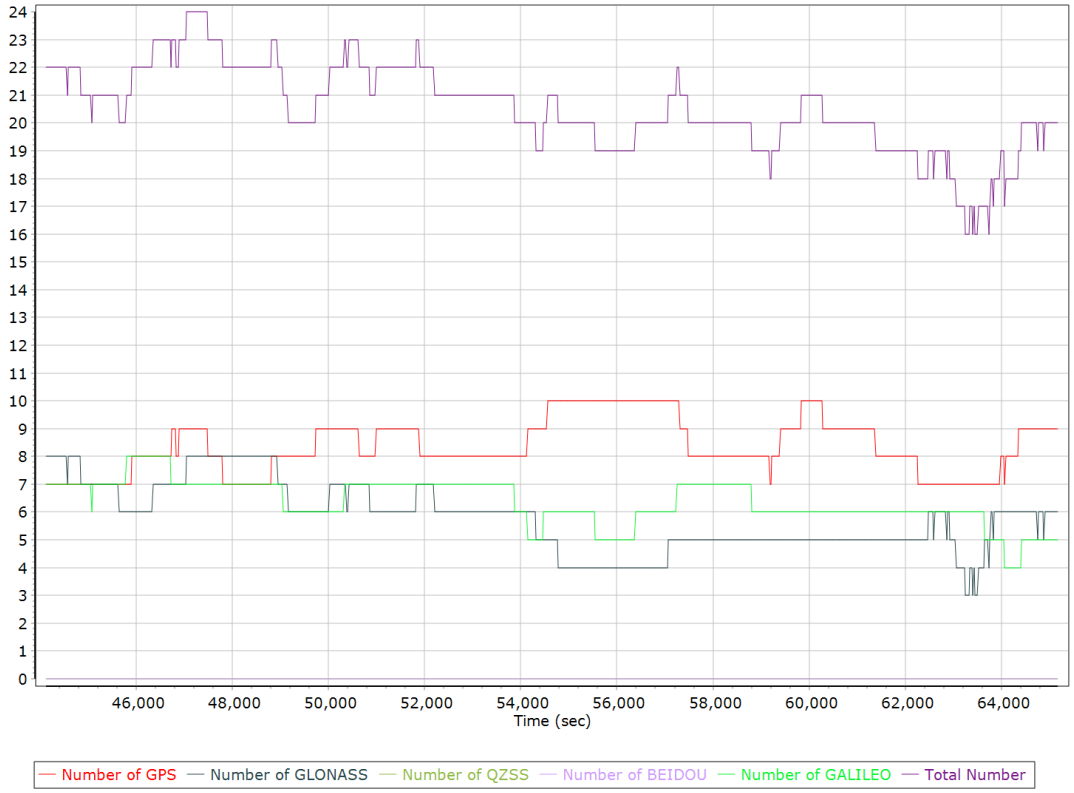


GNSS QC

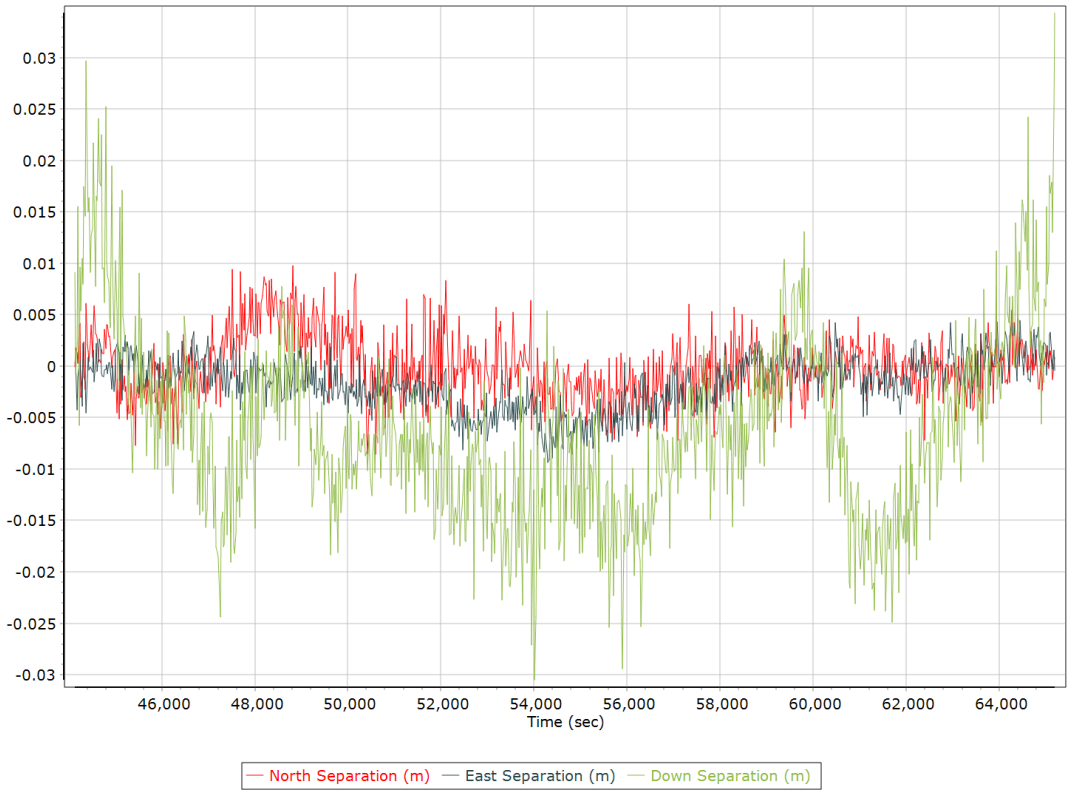
GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	7	10	8
Number of GLONASS SV	0	8	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	0	0
Number of GALILEO SV	4	8	6
Total number of SV	14	24	21
PDOP	1.00	1.51	1.17
QC Solution Gaps	1.00	1.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	21442.00	0.00	1.00
Percentage	100.00	0.00	0.00

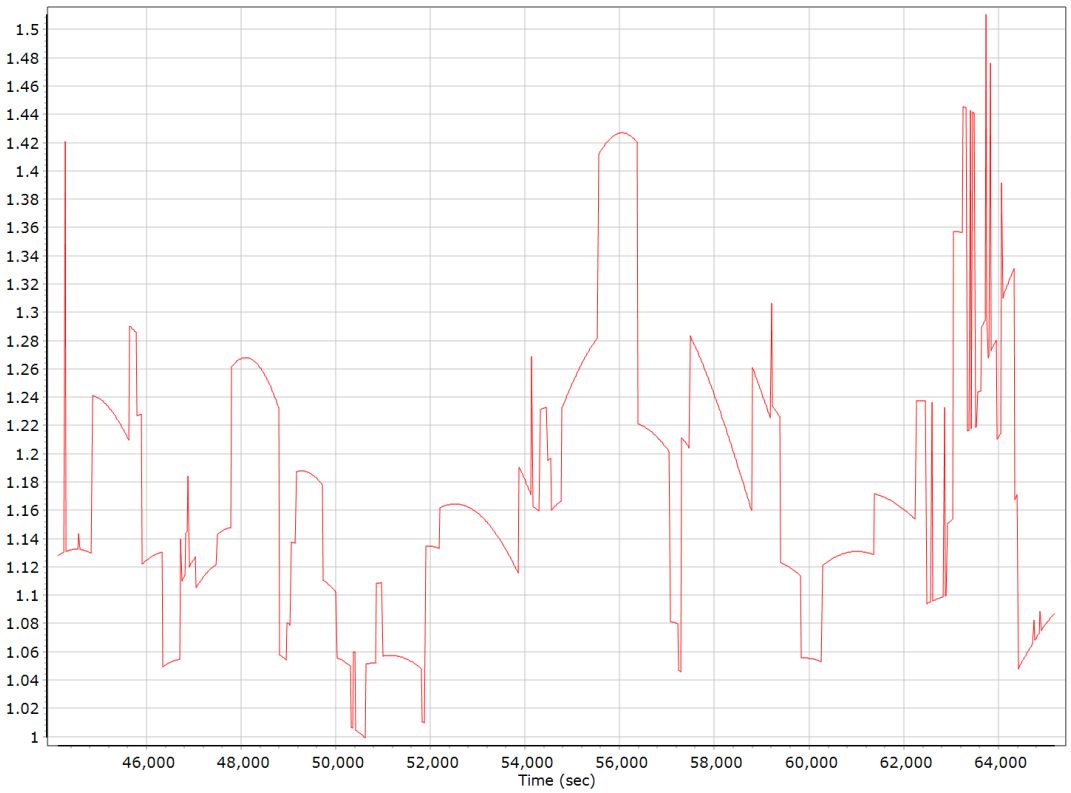
Num SVs in solution



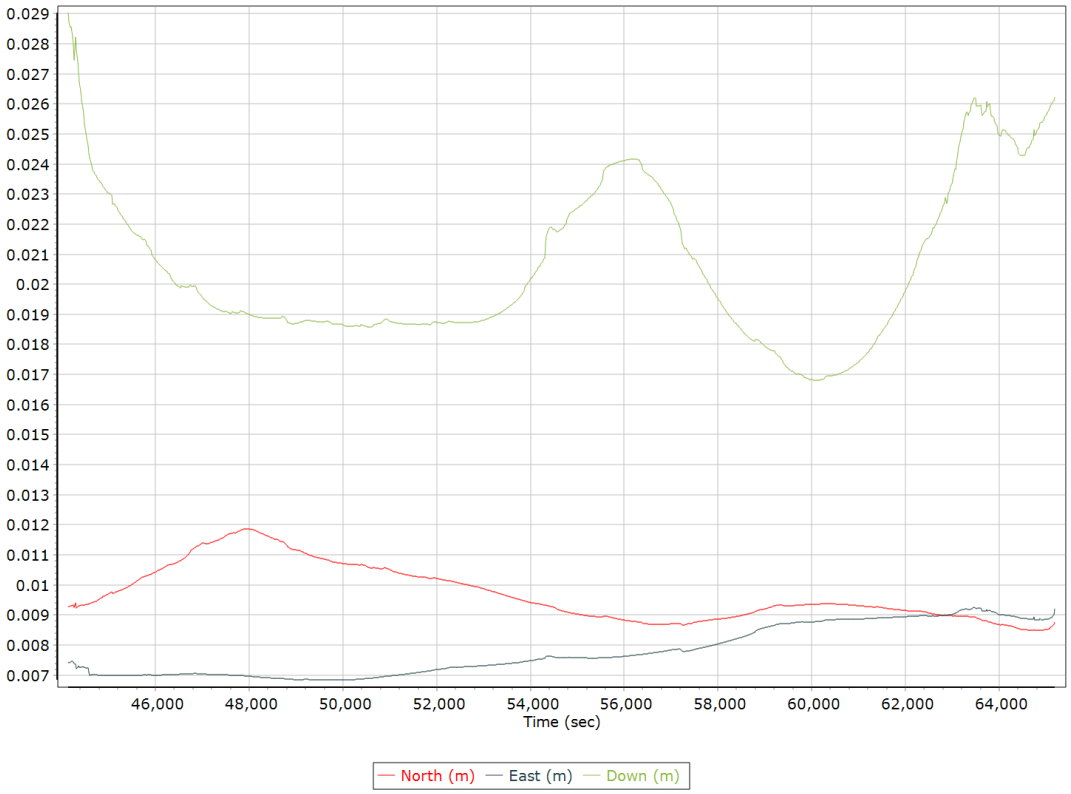
Forward/Reverse Separation



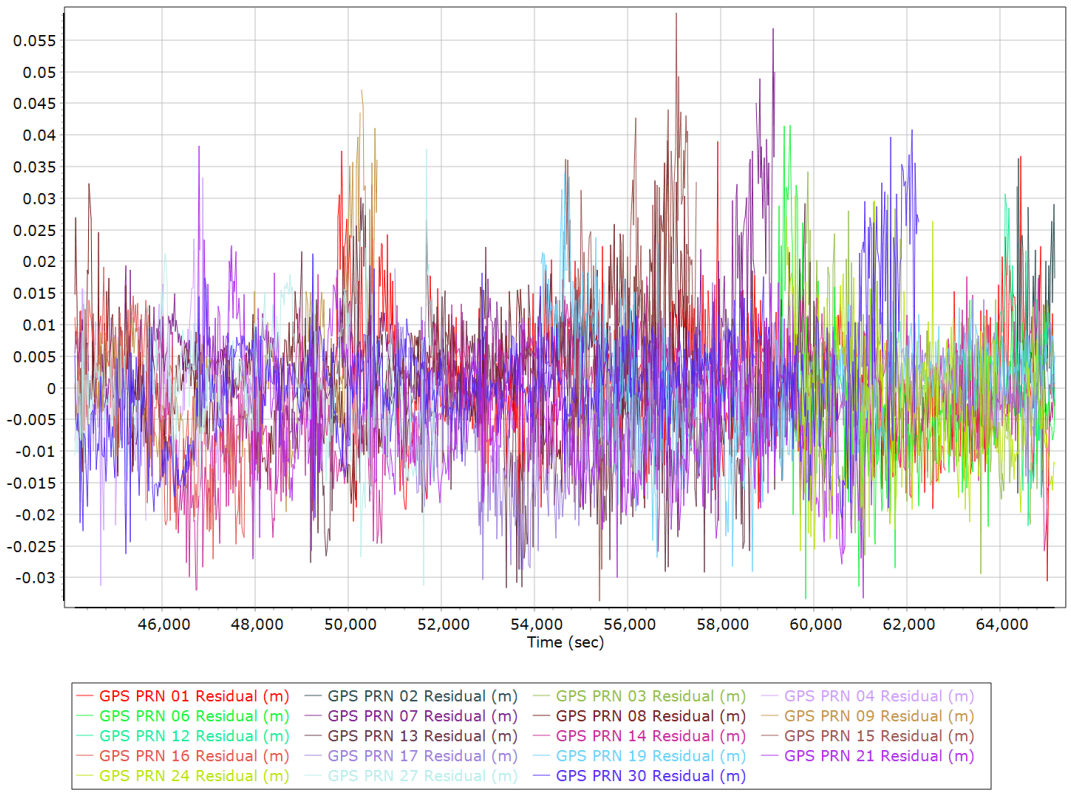
PDOP



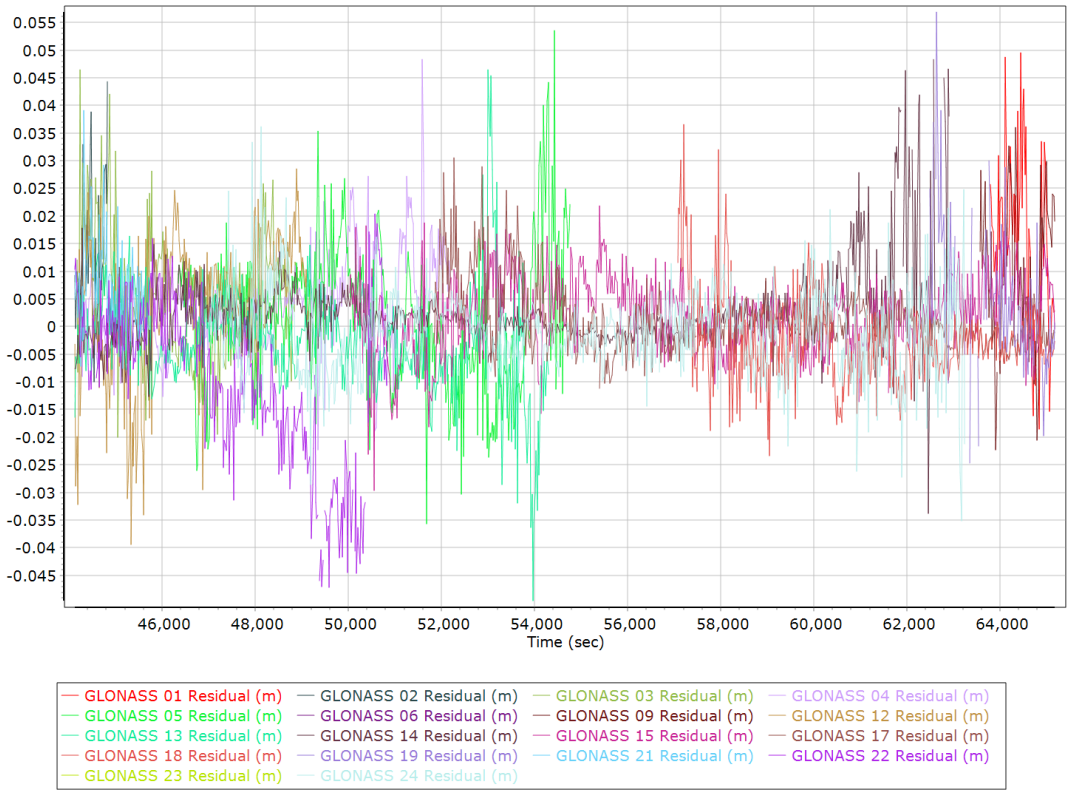
Estimated Position Accuracy



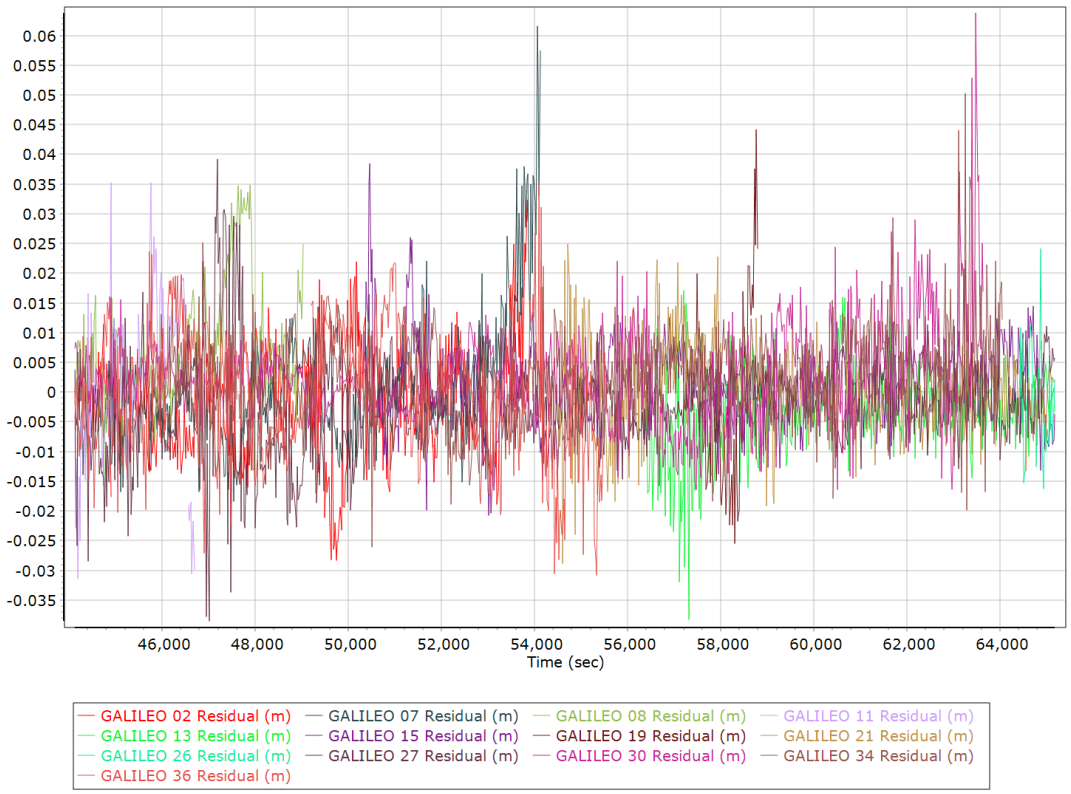
GPS Residuals



GLONASS Residuals



GALILEO Residuals



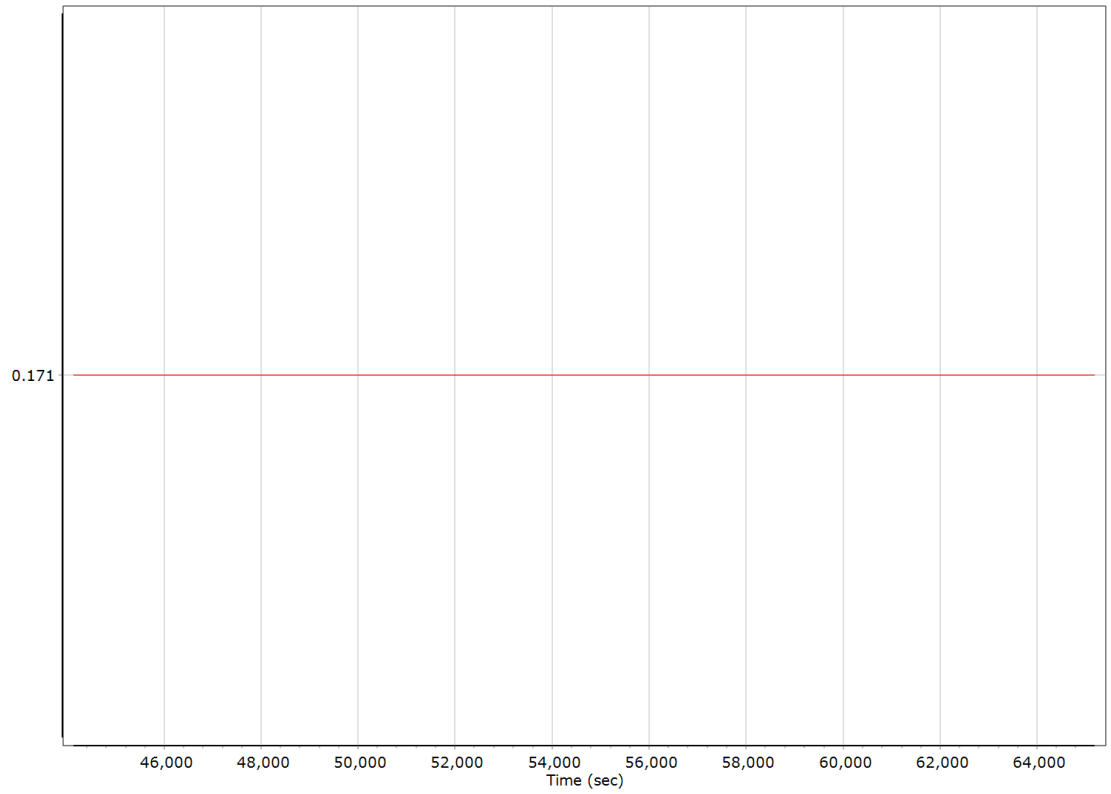
GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	43711.000 (5/15/2022 12:08:31 PM)		
Processing end time	65208.000 (5/15/2022 6:06:48 PM)		
Initial attitude source	Primary GNSS Track		
IMU Sensor Context	Processing with Onboard IMU		
Gimbal to IMU lever arm (m)	0.000	0.000	0.000
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.171	-0.238	-1.273
Gimbal to Primary GNSS lever arm std dev (m)	0.030	0.030	0.030
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

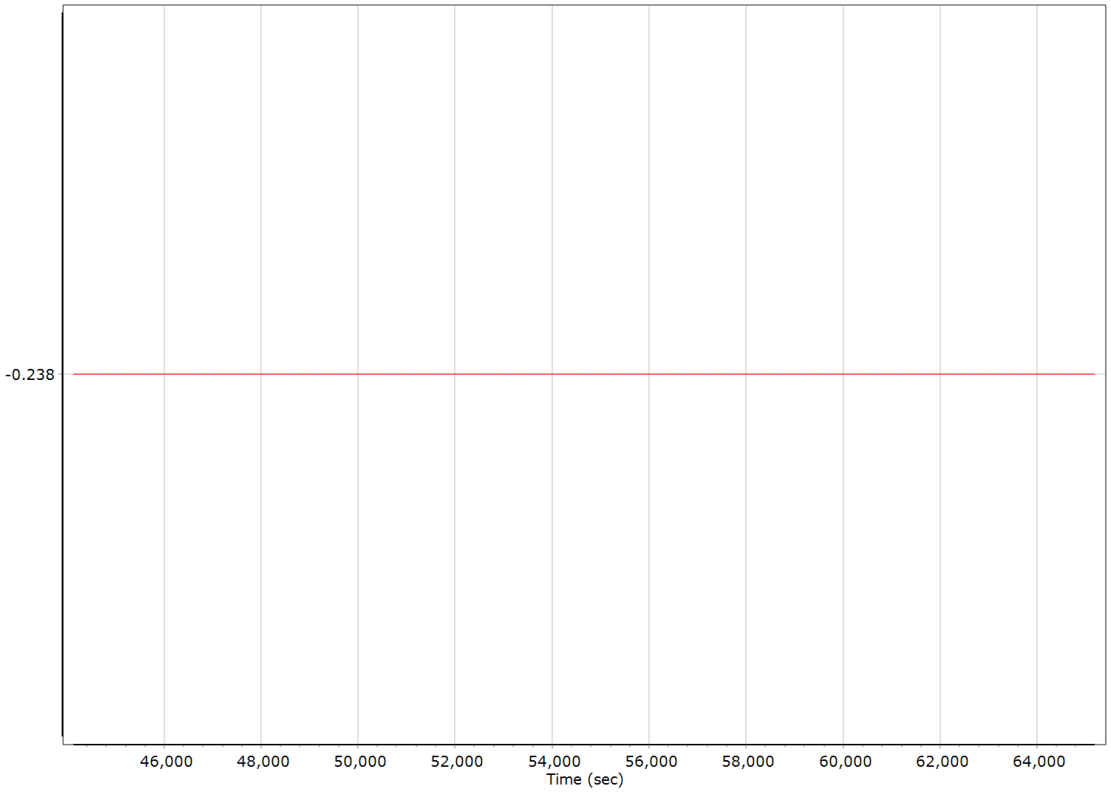
Calibrated Installation Parameters

Reference-Primary GNSS Lever Arm (m)

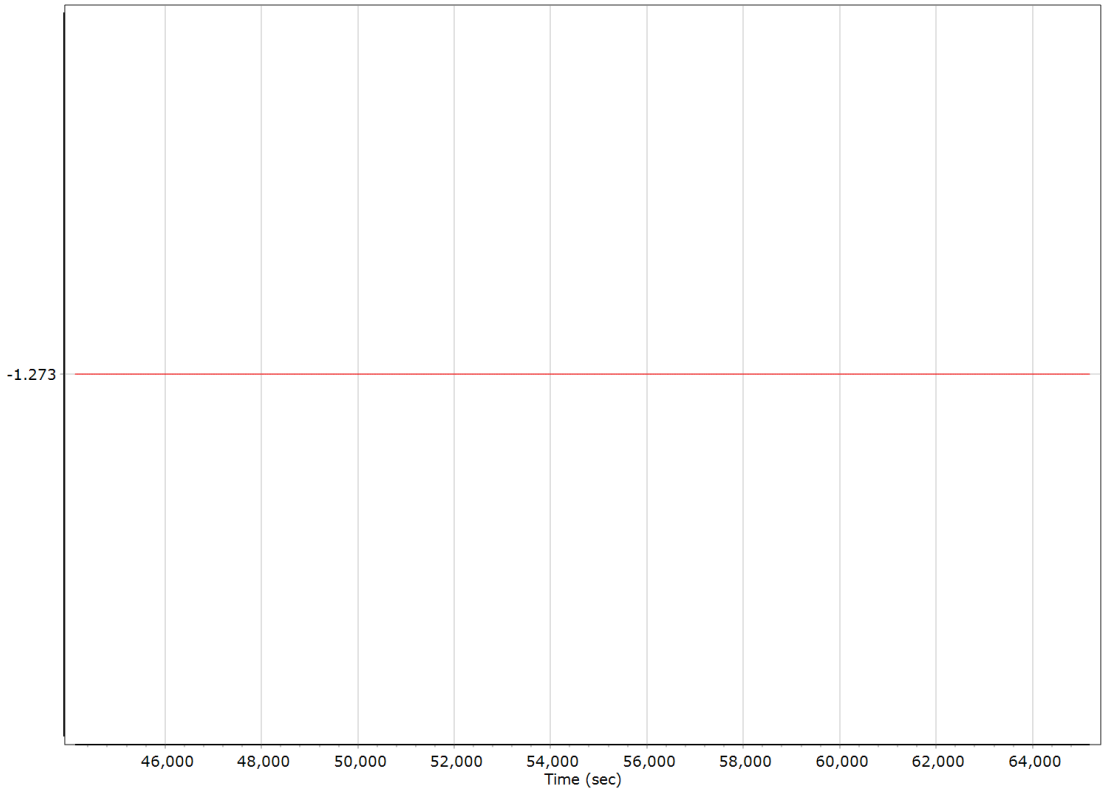
X Reference-Primary GNSS Lever Arm (m)



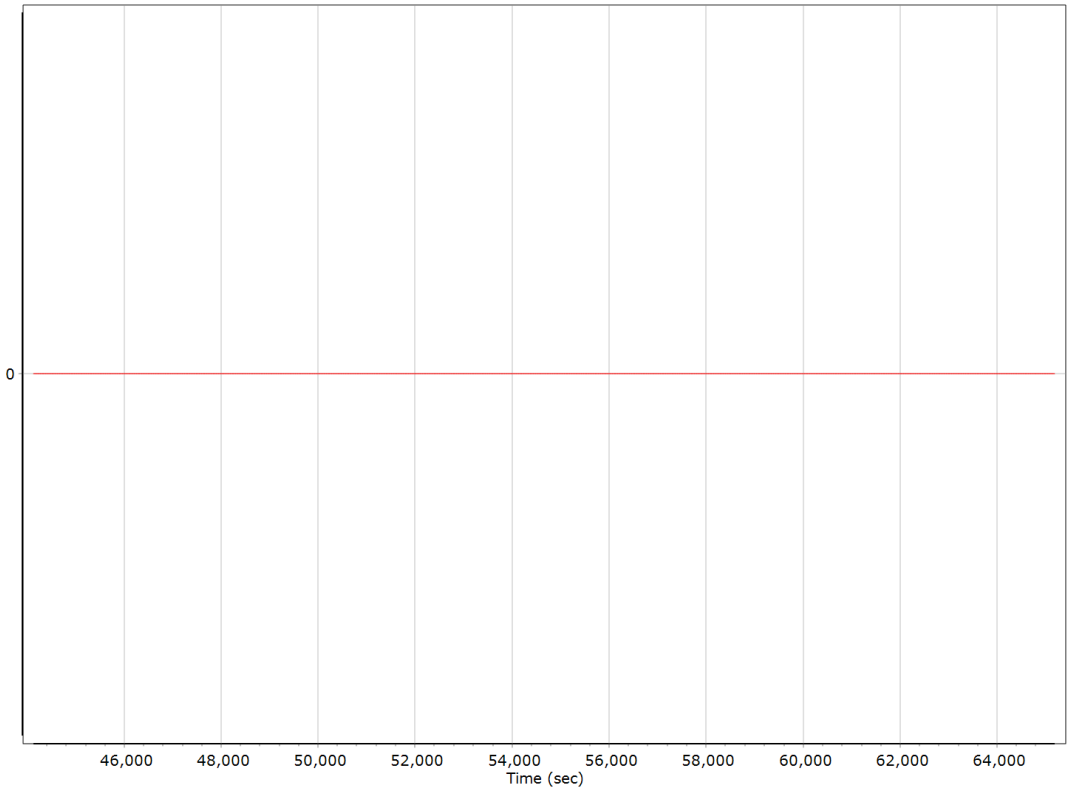
Y Reference-Primary GNSS Lever Arm (m)



Z Reference-Primary GNSS Lever Arm (m)



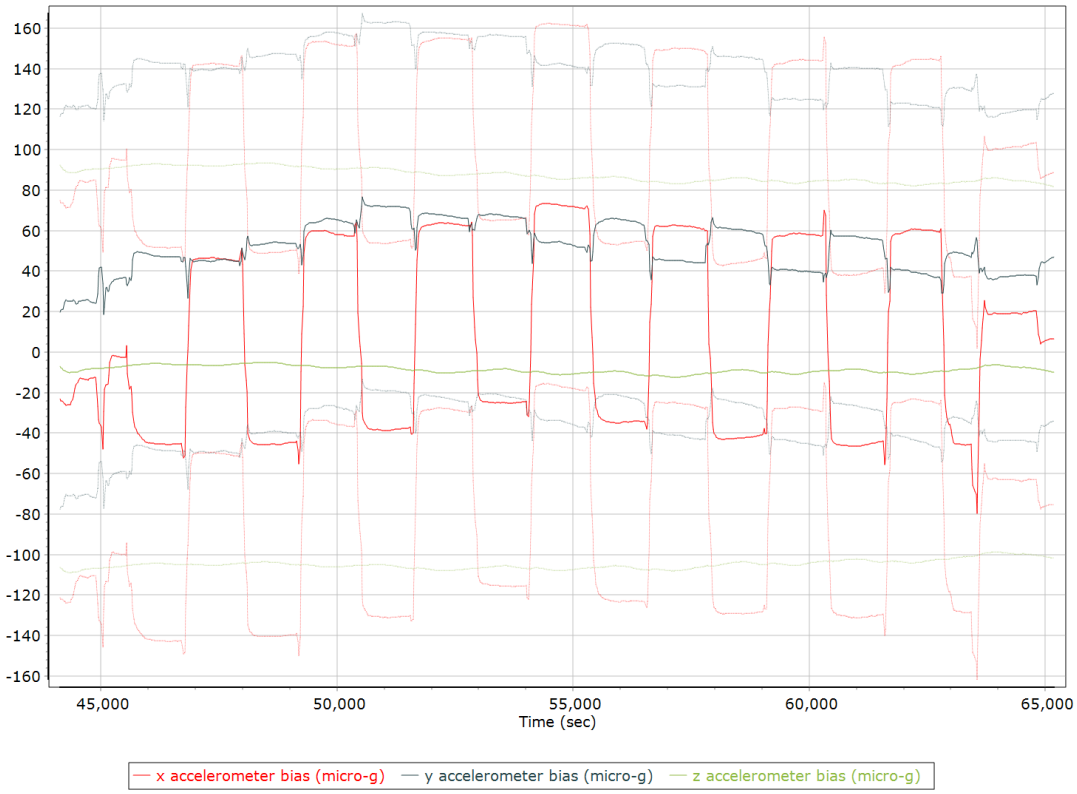
Reference-Primary GNSS Lever Arm Figure of Merit



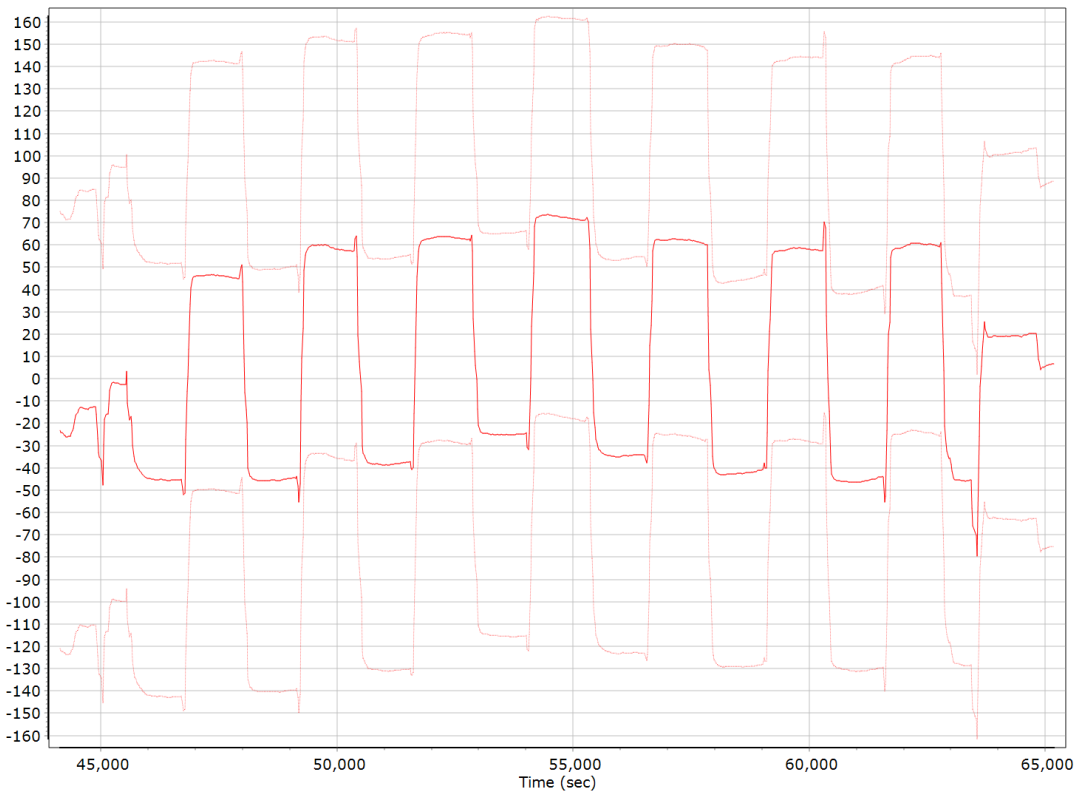
IN-Fusion QC

Forward Processed Estimated Errors, Reference Frame

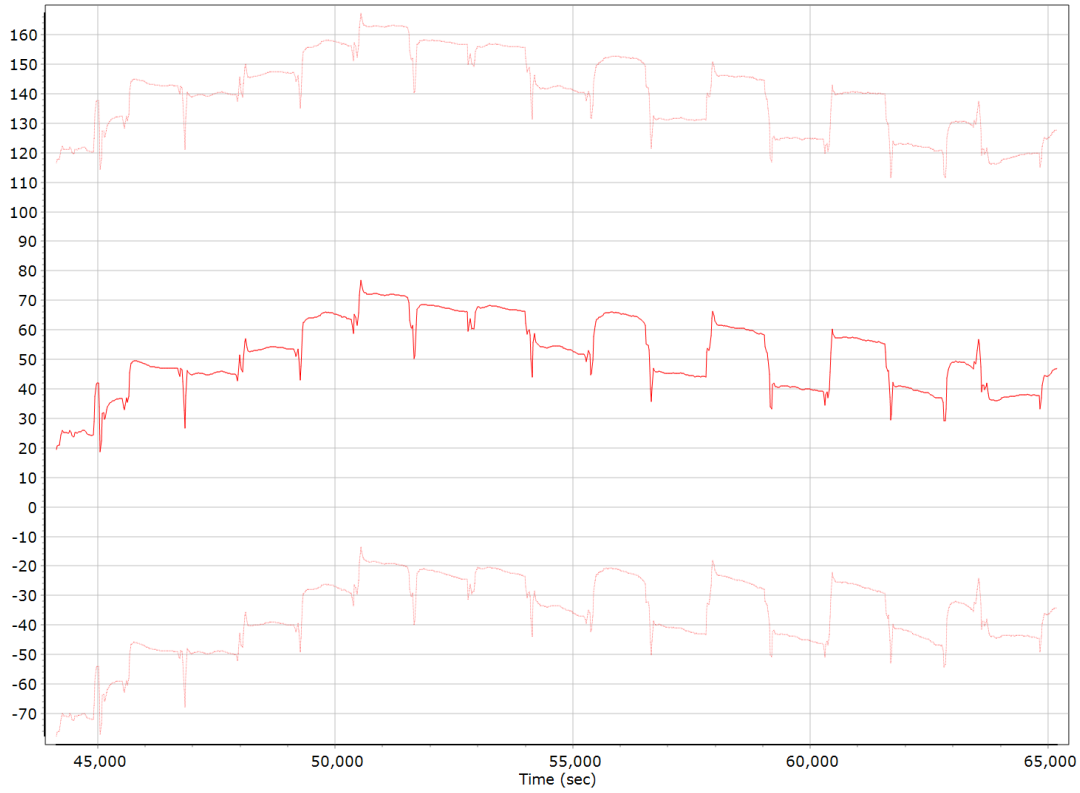
Accelerometer Bias (micro-g)



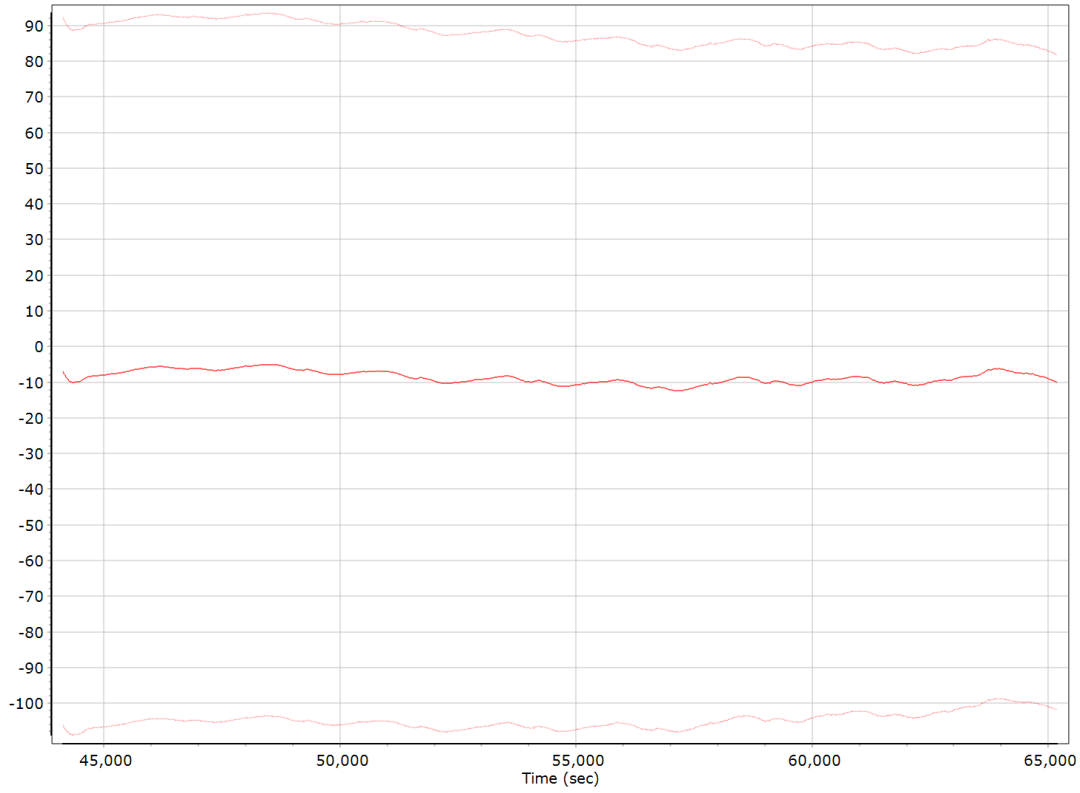
X Accelerometer Bias (micro-g)



Y Accelerometer Bias (micro-g)



Z Accelerometer Bias (micro-g)

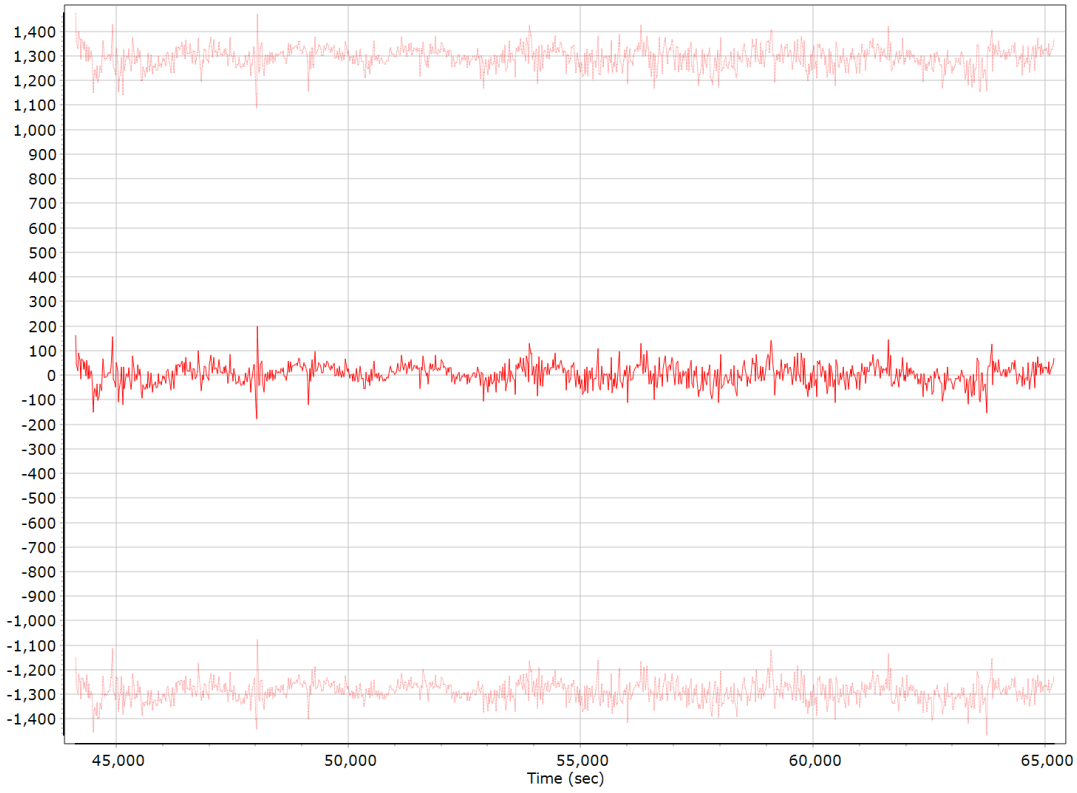


Accelerometer Scale Error (ppm)

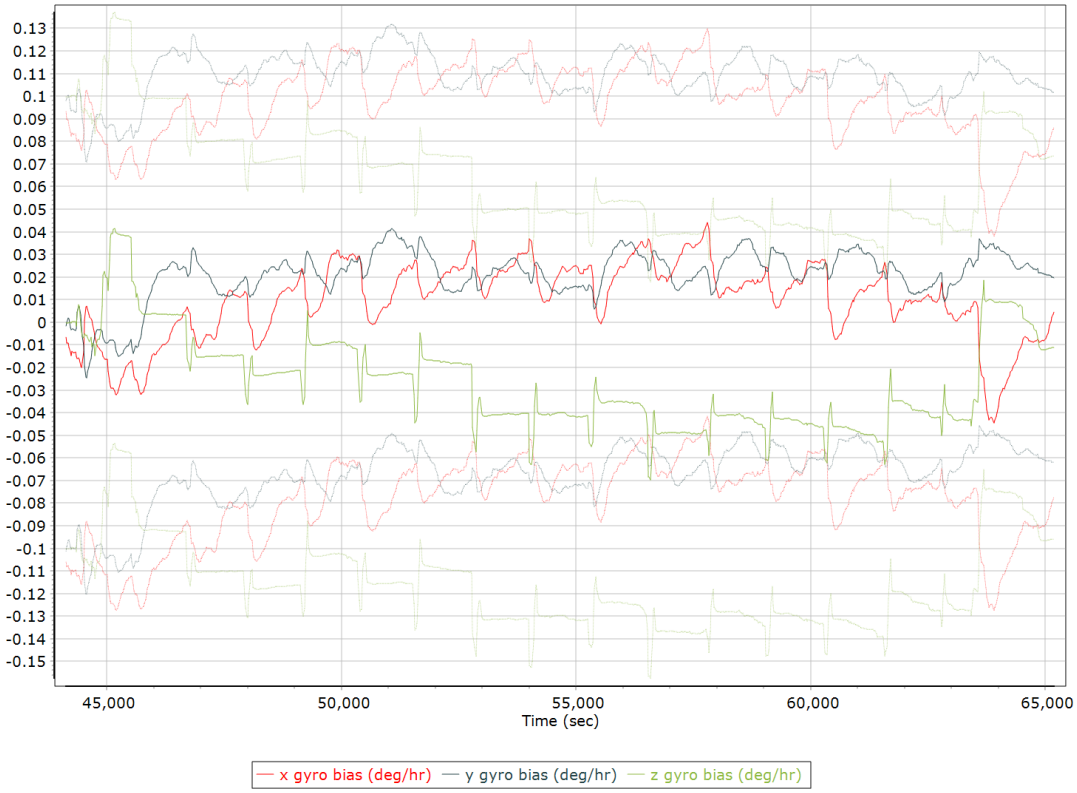
X Accelerometer Scale Error (ppm)

Y Accelerometer Scale Error (ppm)

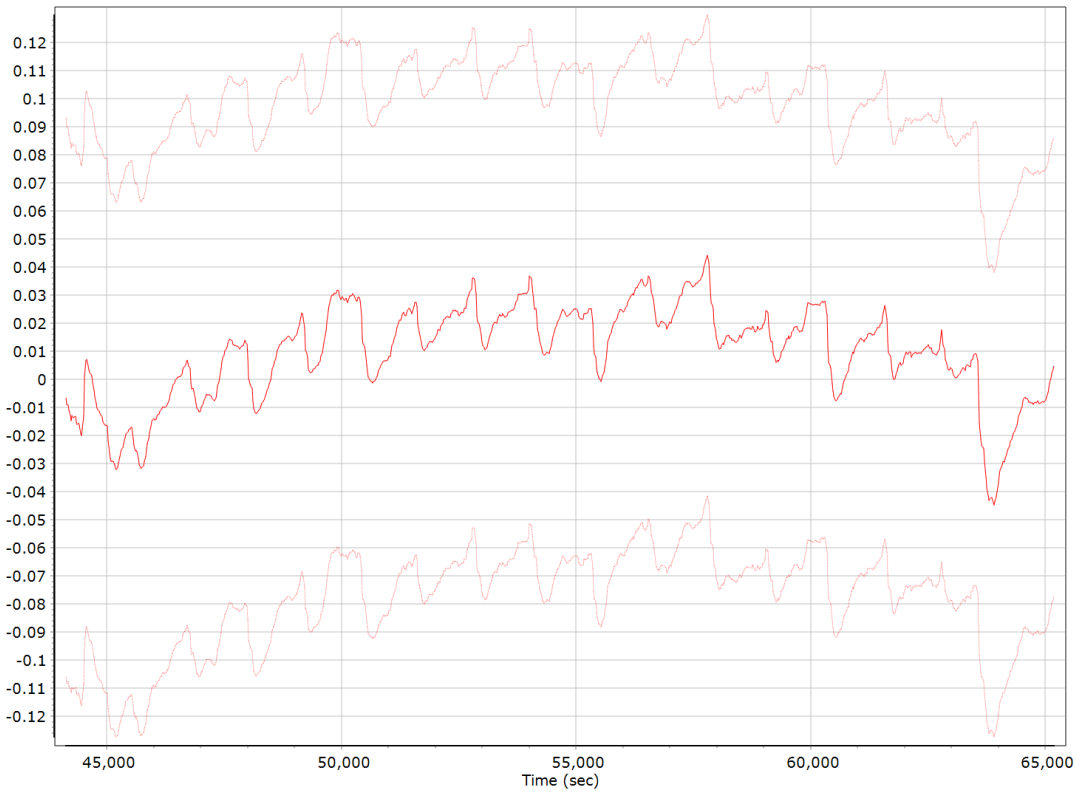
Z Accelerometer Scale Error (ppm)



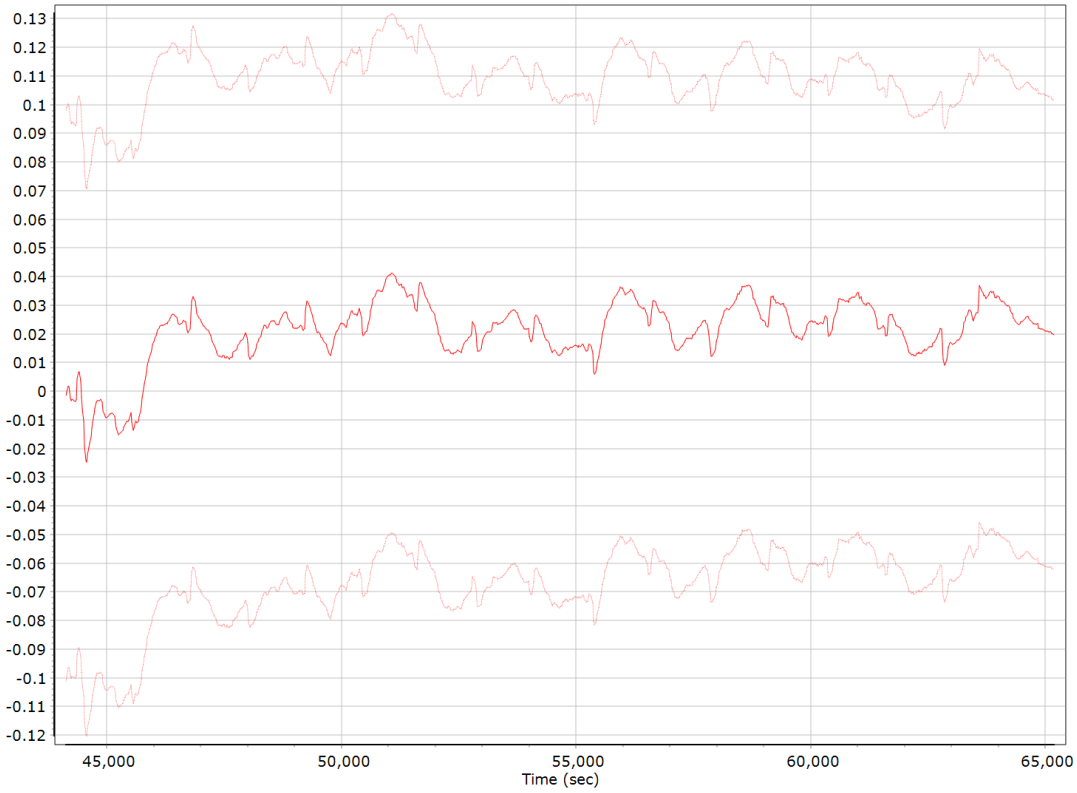
Gyro Bias (deg/h)



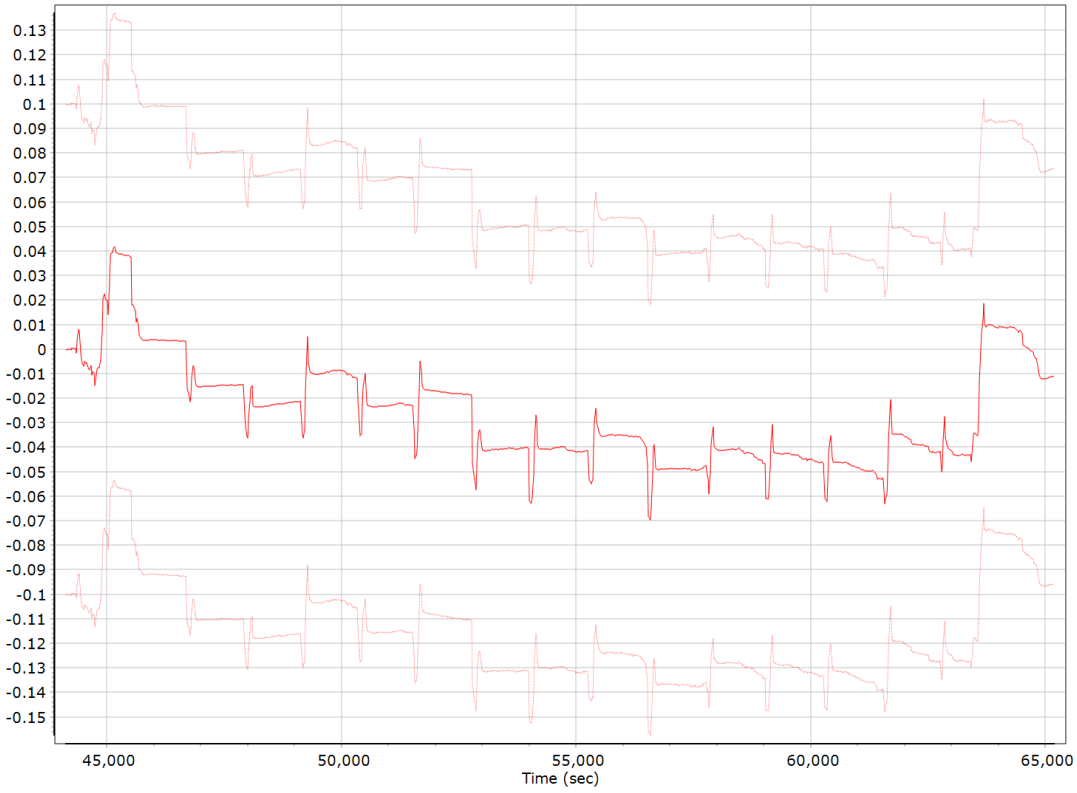
X Gyro Bias (deg/h)



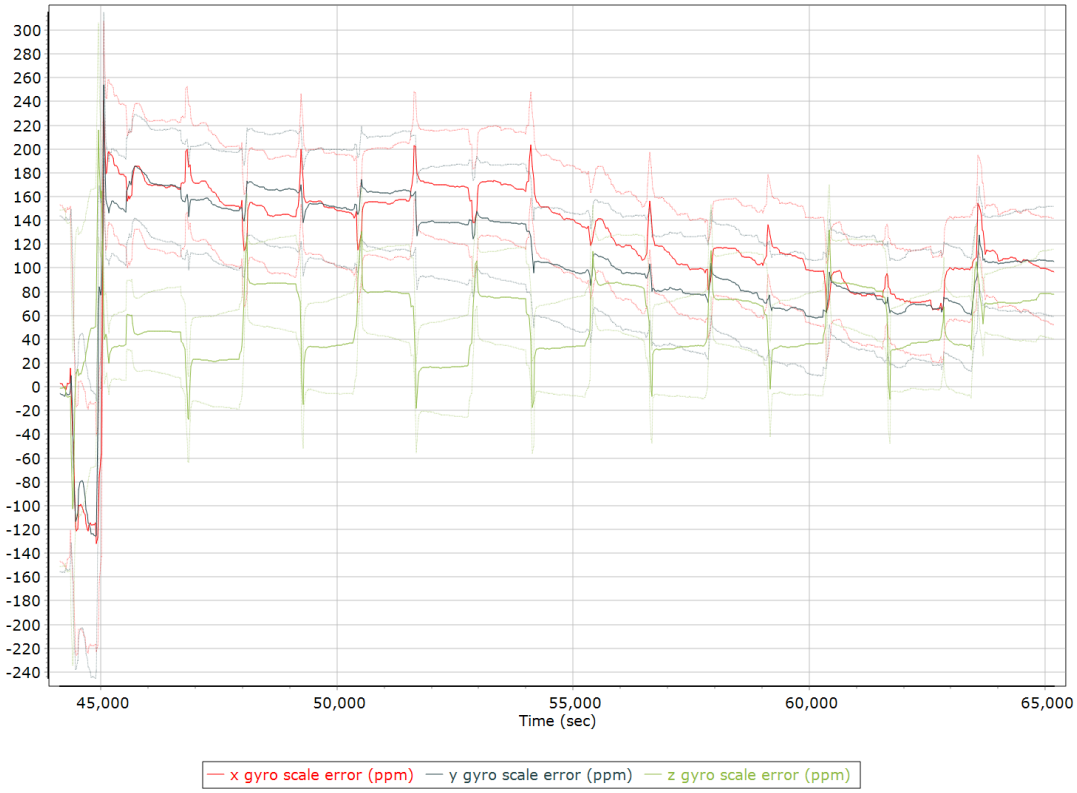
Y Gyro Bias (deg/h)



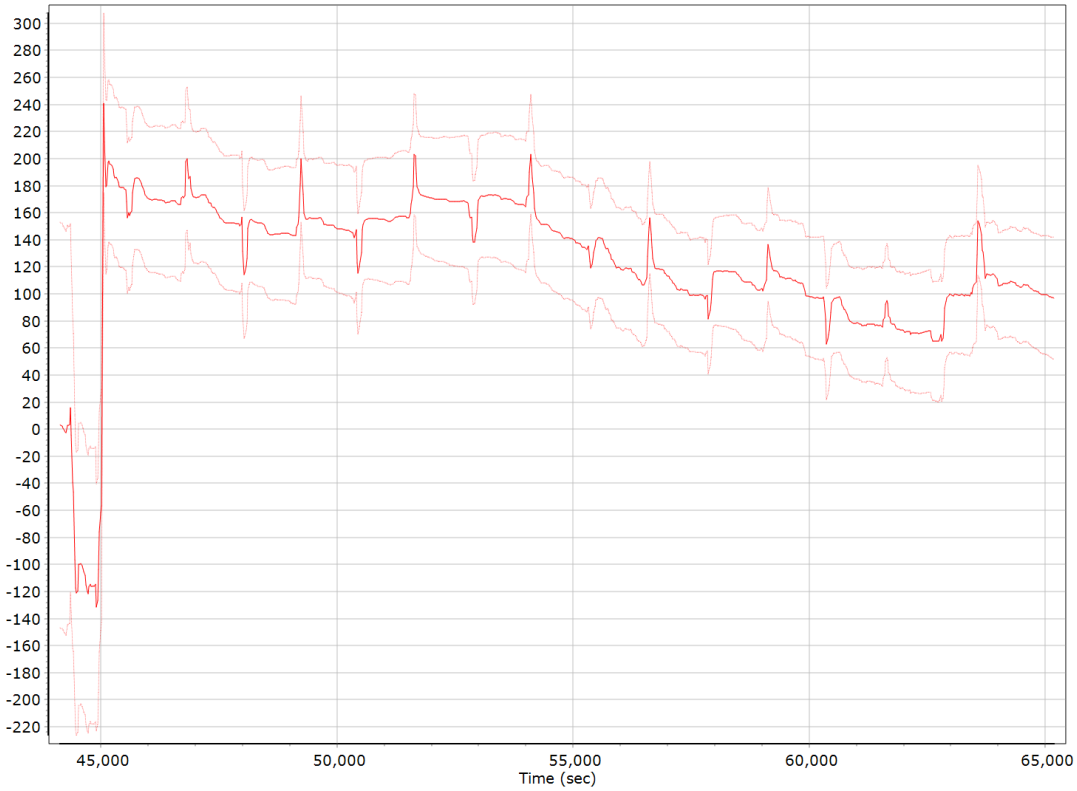
Z Gyro Bias (deg/h)



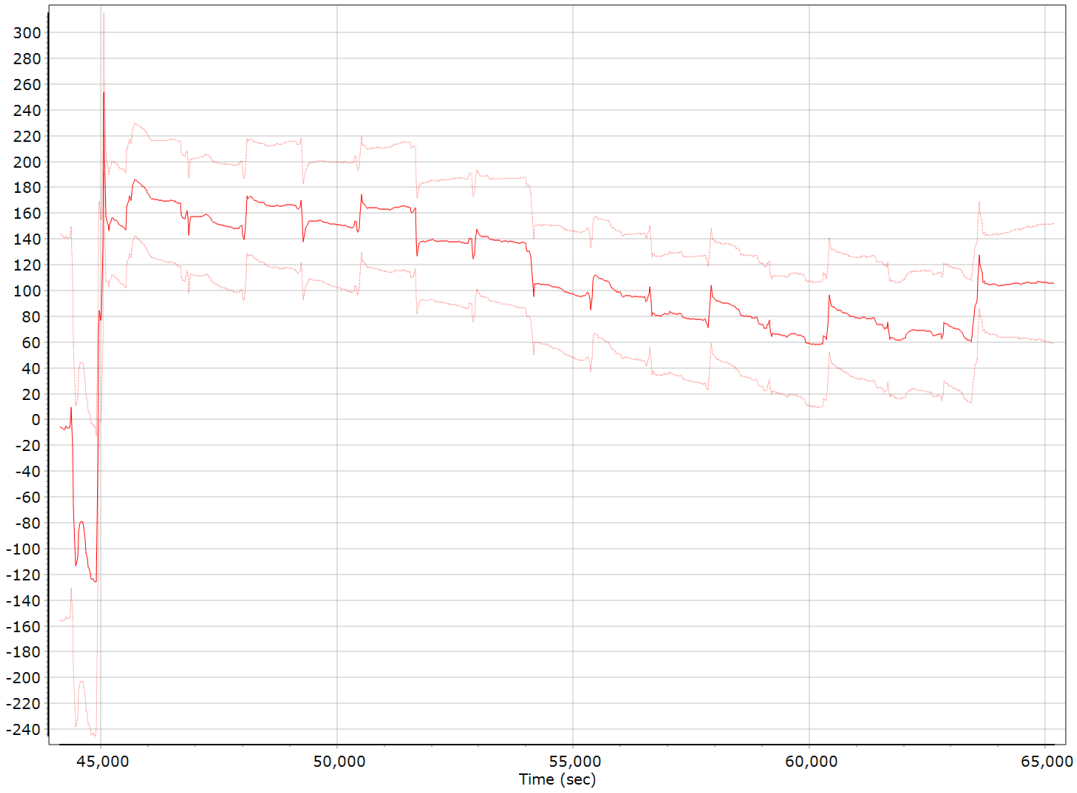
Gyro Scale Error (ppm)



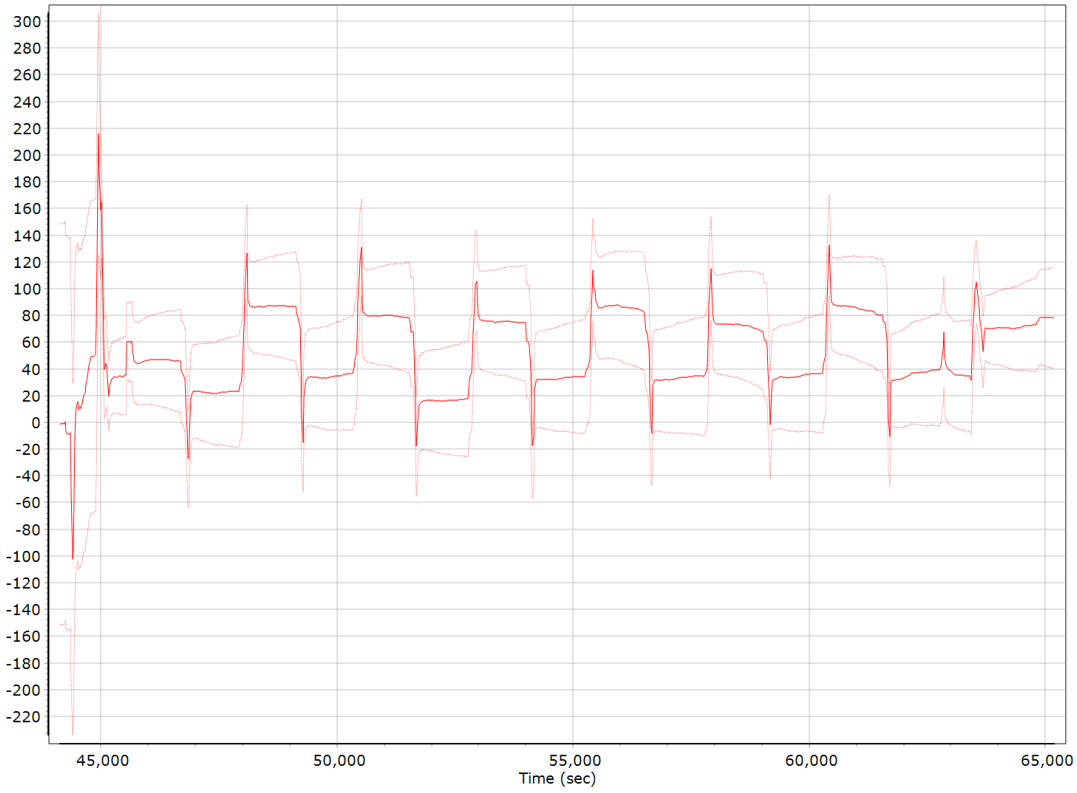
X Gyro Scale Error (ppm)



Y Gyro Scale Error (ppm)

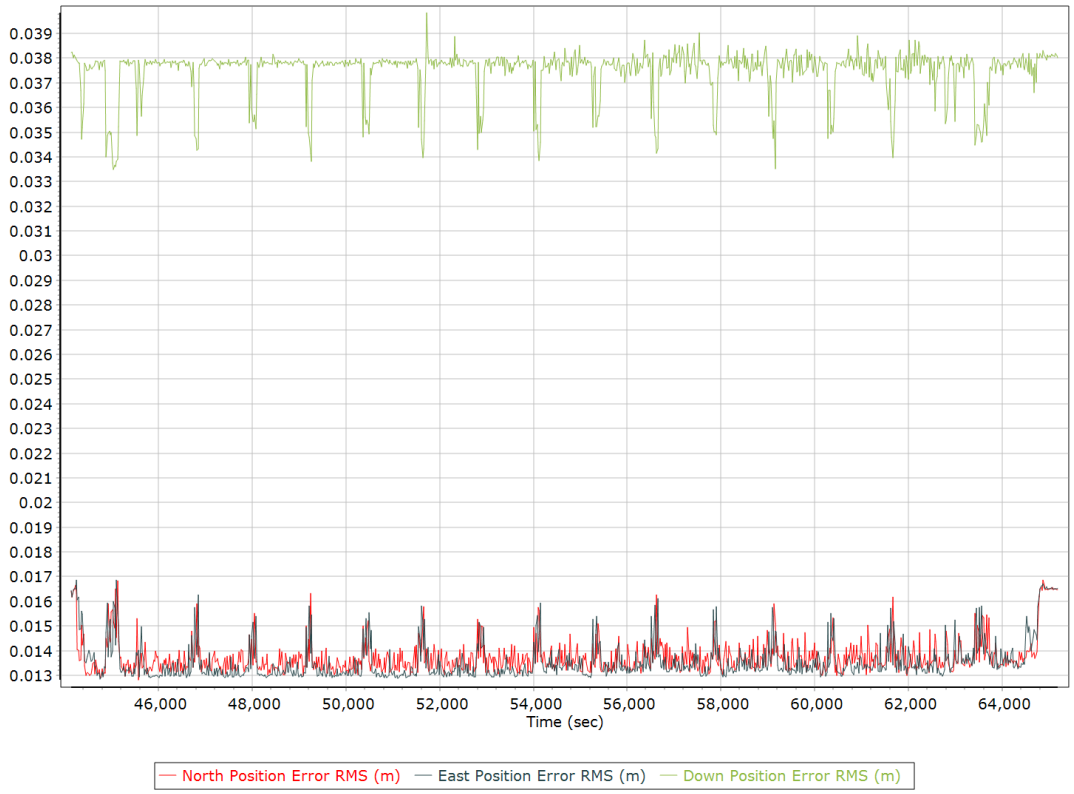


Z Gyro Scale Error (ppm)

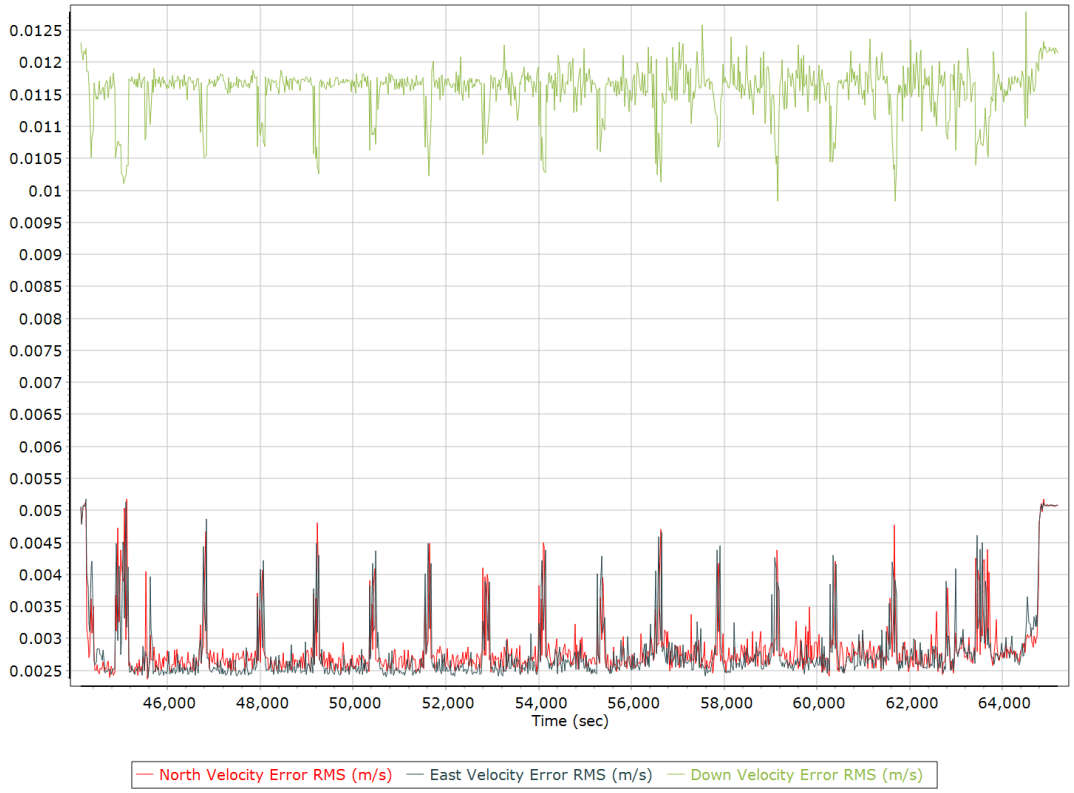


Smoothed Performance Metrics

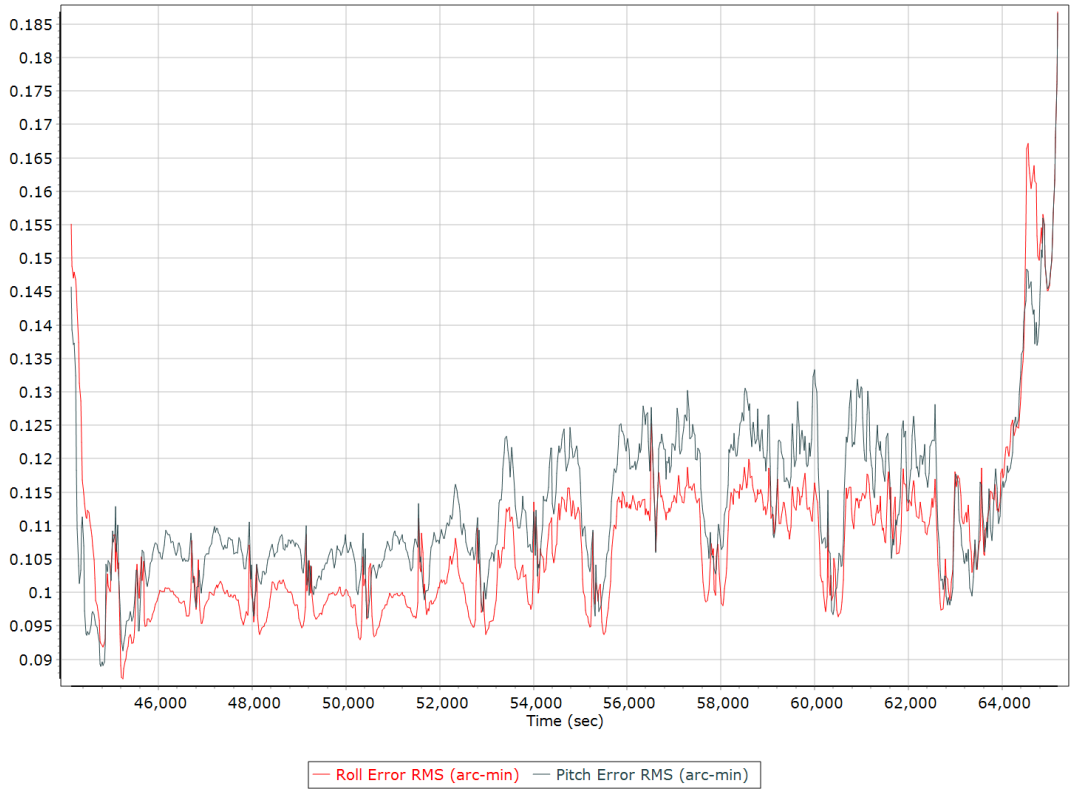
Position Error RMS (m)



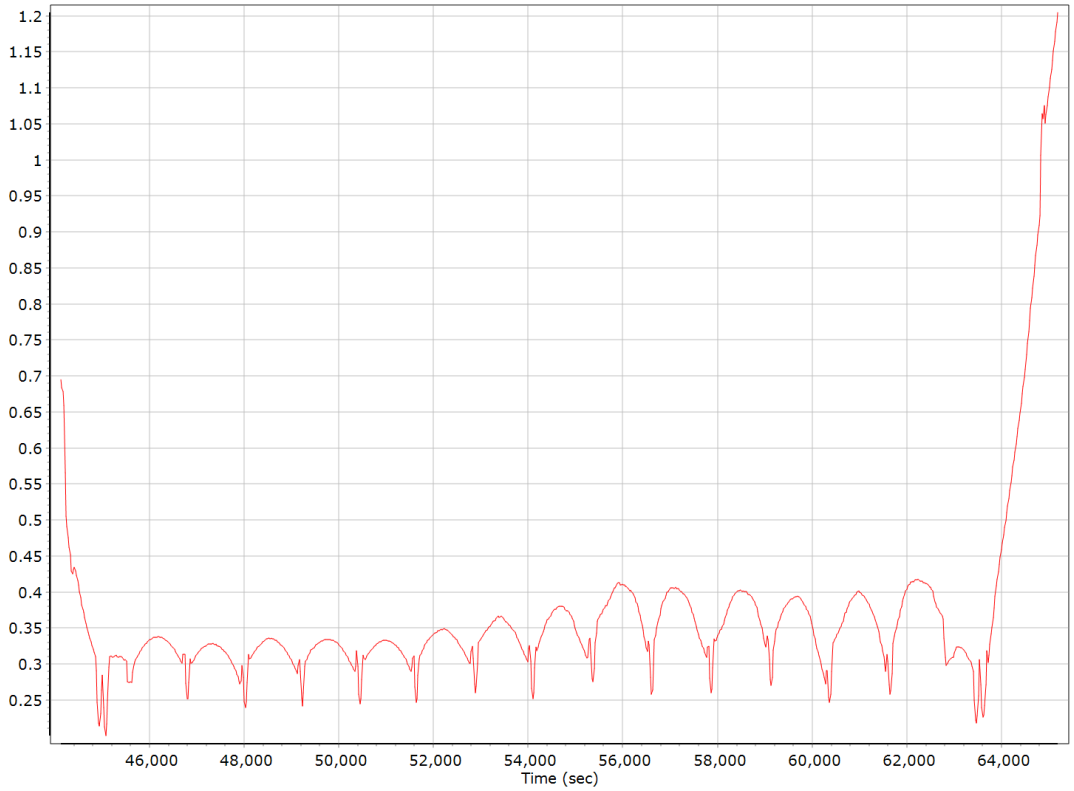
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

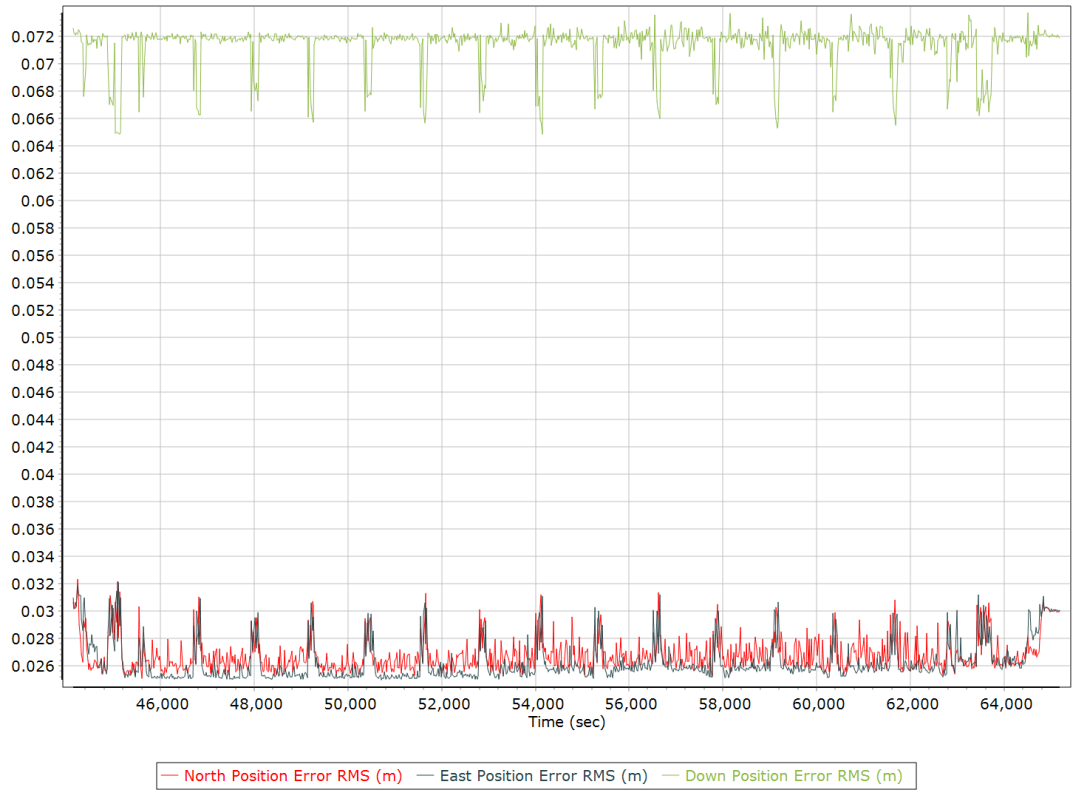


Heading Error RMS (arc-min)



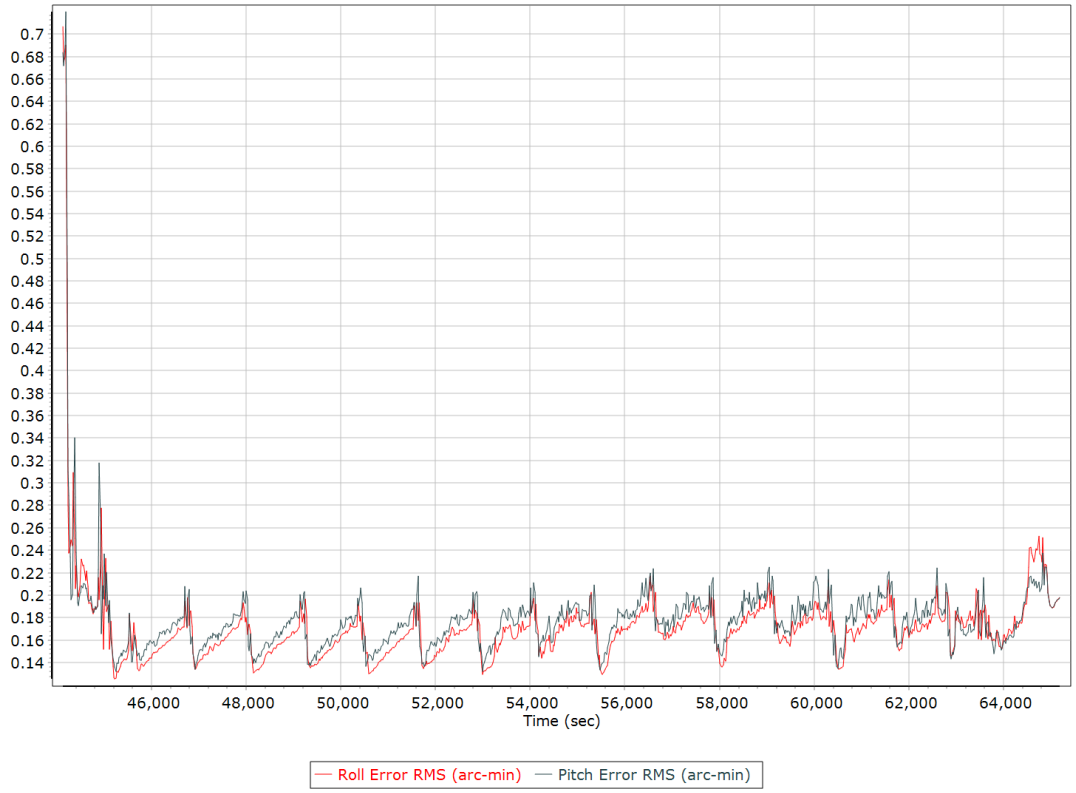
Forward Processed Performance Metrics

Position Error RMS (m)

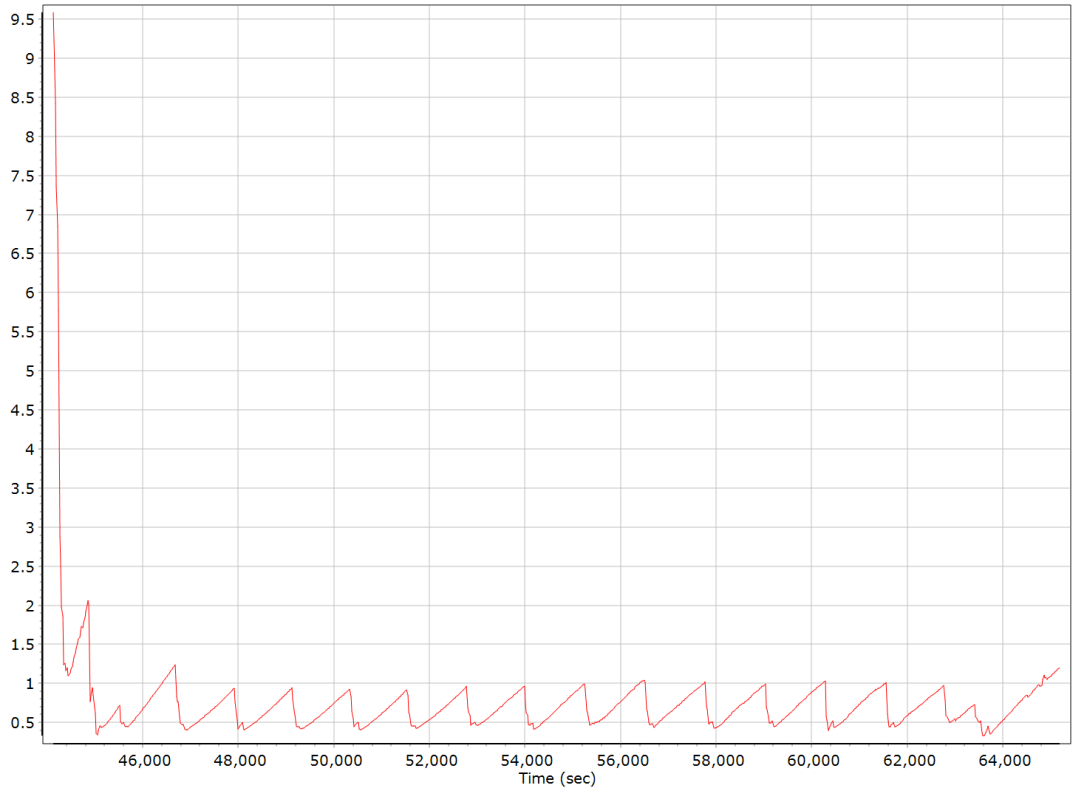


Velocity Error RMS (m/s)

Roll/Pitch Error RMS (arc-min)

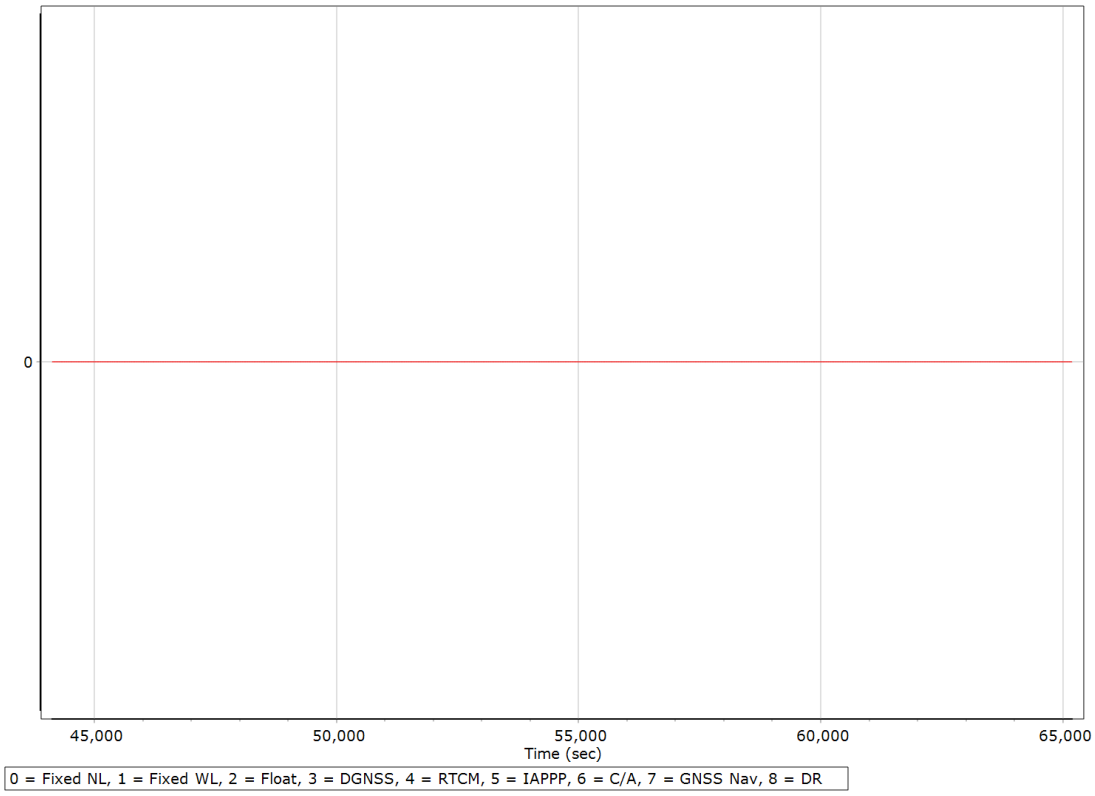


Heading Error RMS (arc-min)

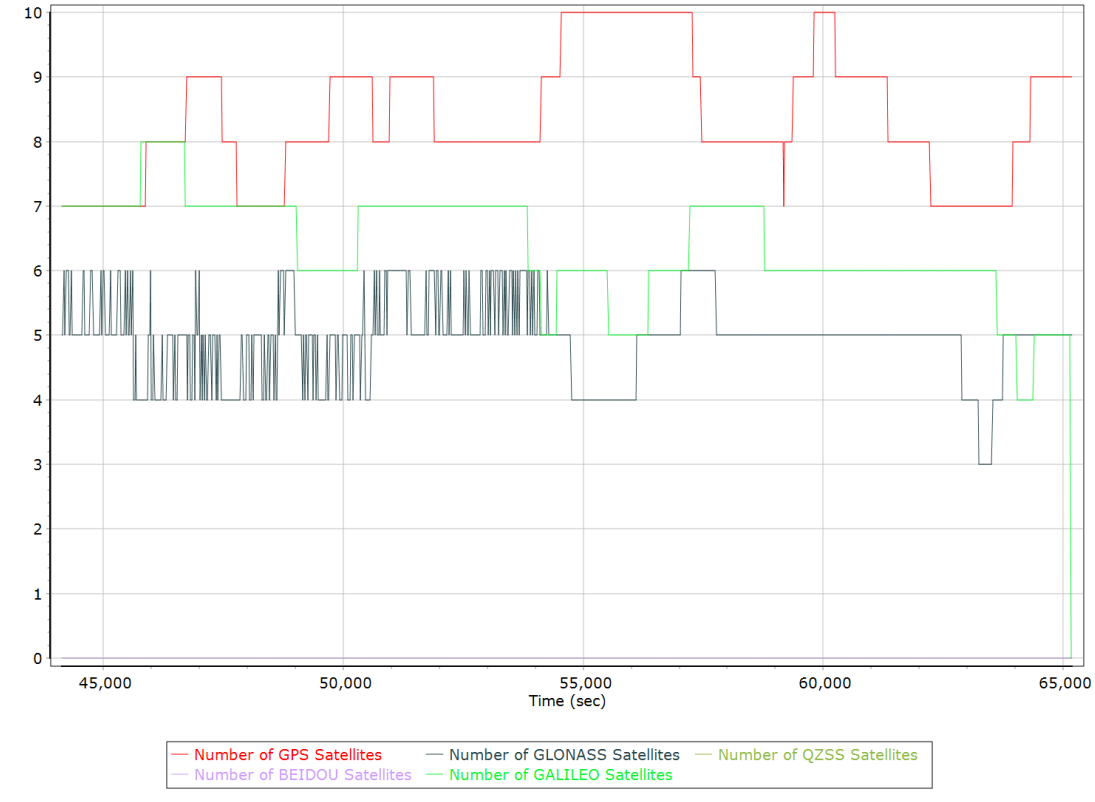


Forward Processed Solution Status

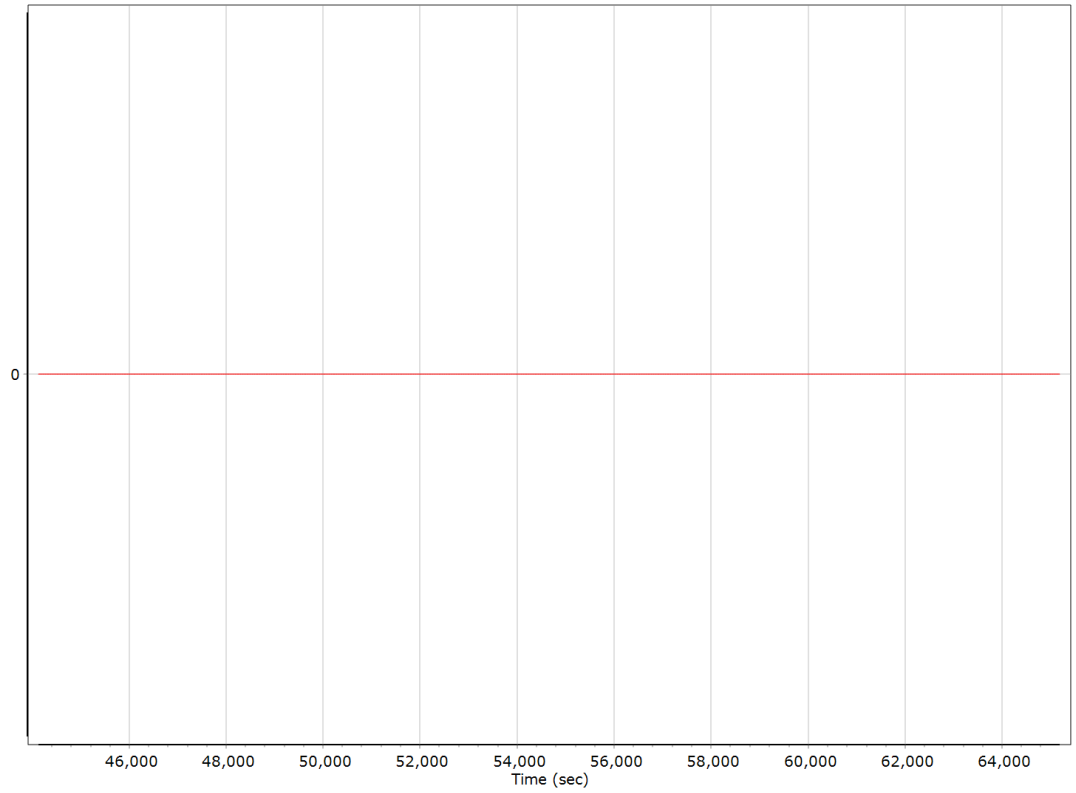
Processing Mode



Number of Satellites



Baseline Length



General Information

Mission Information

Project name	05222022A_3543
Processing date	2022-05-25 15:00:54
Mission date	2022-05-22 22:39:22
Mission duration	06:11:25.363
Processing mode	IN-Fusion PP-RTX

Rover Hardware Information

Product	POS AV 610 VER6 HW2.5-12
Serial number	S/N9683
IMU type	57
Receiver type	BD982
Antenna type	AV59

Project File List

Rover Data Files

File name	File type
N62756178.094	POS Data
N62756178.095	POS Data
N62756178.096	POS Data
N62756178.097	POS Data
N62756178.098	POS Data
N62756178.099	POS Data
N62756178.100	POS Data
N62756178.101	POS Data
N62756178.102	POS Data
N62756178.103	POS Data
N62756178.104	POS Data
N62756178.105	POS Data
N62756178.106	POS Data
N62756178.107	POS Data
N62756178.108	POS Data
N62756178.109	POS Data
N62756178.110	POS Data
N62756178.111	POS Data
N62756178.112	POS Data
N62756178.113	POS Data
N62756178.114	POS Data
N62756178.115	POS Data
N62756178.116	POS Data
N62756178.117	POS Data
N62756178.118	POS Data
N62756178.119	POS Data
N62756178.120	POS Data
N62756178.121	POS Data
N62756178.122	POS Data
N62756178.123	POS Data
N62756178.124	POS Data
N62756178.125	POS Data
N62756178.126	POS Data
N62756178.127	POS Data
N62756178.128	POS Data
N62756178.129	POS Data
N62756178.130	POS Data
N62756178.131	POS Data
N62756178.132	POS Data
N62756178.133	POS Data
N62756178.134	POS Data
N62756178.135	POS Data
N62756178.136	POS Data
N62756178.137	POS Data
N62756178.138	POS Data
N62756178.139	POS Data
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N62756178.141	POS Data
N62756178.142	POS Data
N62756178.143	POS Data
N62756178.144	POS Data
N62756178.145	POS Data
N62756178.146	POS Data
N62756178.147	POS Data
N62756178.148	POS Data
N62756178.149	POS Data
N62756178.150	POS Data
N62756178.151	POS Data
N62756178.152	POS Data

File name	File type
N62756178.153	POS Data
N62756178.154	POS Data
N62756178.155	POS Data
N62756178.156	POS Data
N62756178.157	POS Data
N62756178.158	POS Data
N62756178.159	POS Data
N62756178.160	POS Data
N62756178.161	POS Data
N62756178.162	POS Data

Input Files

File Name	File Type
Ephm1420.22g	GLONASS Broadcast Ephemeris
Ephm1420.22n	GPS Broadcast Ephemeris
Ephm1430.22g	GLONASS Broadcast Ephemeris
Ephm1430.22n	GPS Broadcast Ephemeris

Output Files

Filename	File type
sbet_05222022A_3543.out	SBET Trajectory File

Rover Data Summary

First raw data file	N62756178.094		
Last raw data file	N62756178.162		
Start GPS week	2211		
Start time	81543.155 (5/22/2022 10:39:03 PM)		
End time	103828.518 (5/23/2022 4:50:28 AM)		
Start of fine alignment	81826.865 (5/22/2022 10:43:46 PM)		
Available subsystems	Primary GNSS, Gimbal, IMU		
POS Event Input	None		
Correction data	None		
IMU Installation Lever Arms & Mounting Angles			
Gimbal to IMU lever arm (m)	-0.034	-0.010	-0.374
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.717	-0.178	-1.265
Gimbal to Primary GNSS lever arm std dev (m)	-1.000		
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

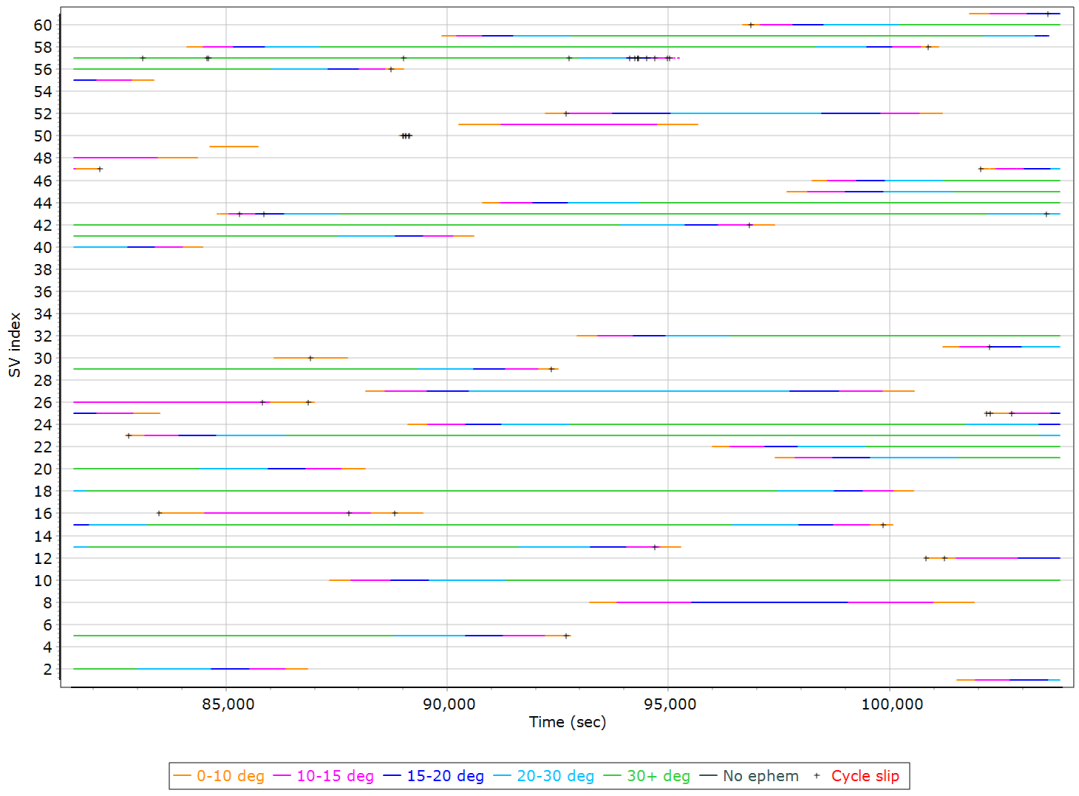
Rover Data QC

Raw IMU Import QC Summary

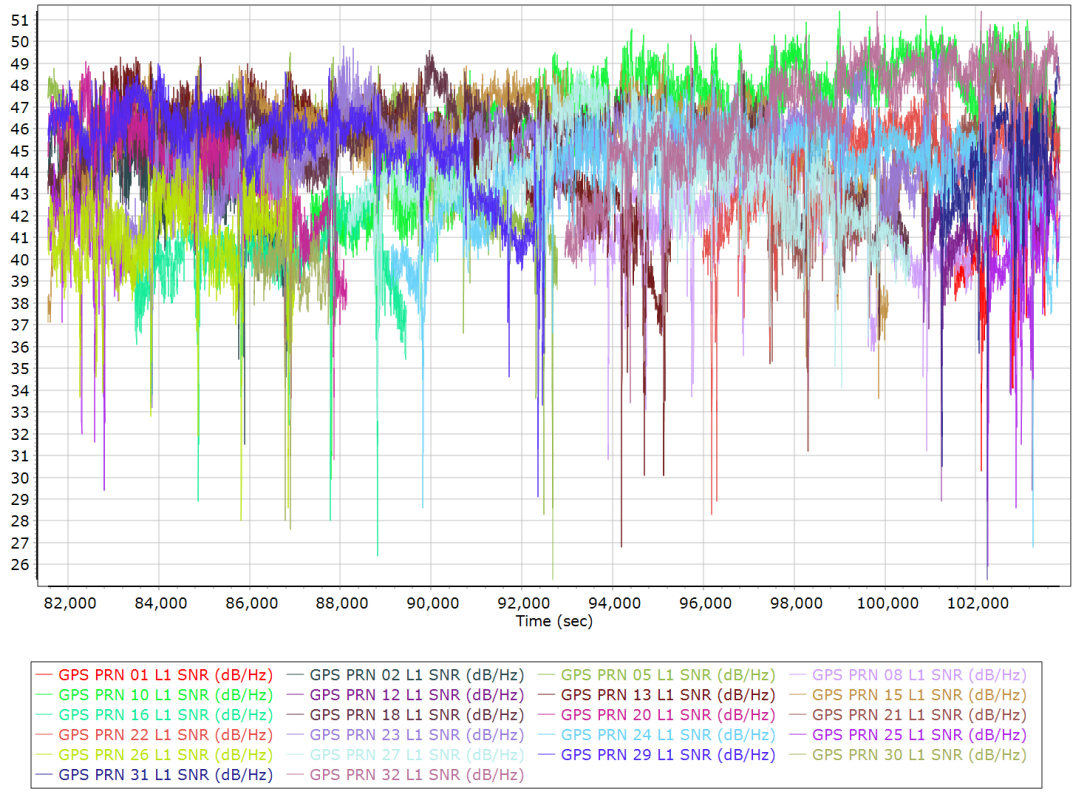
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05222022A_3543.log
IMU Records Processed	4456624
Termination Status	Normal
IMU Anomalies	0

Primary Observables & Satellite Data

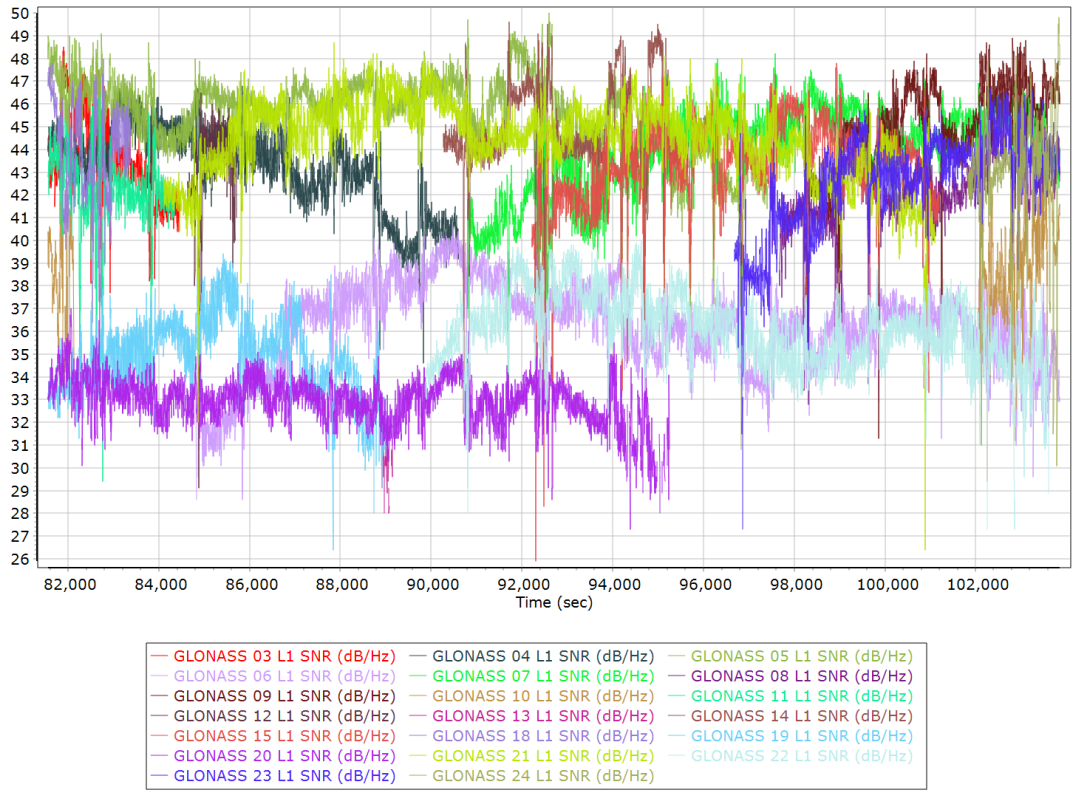
GPS/GLONASS L1 Satellite Lock/Elevation



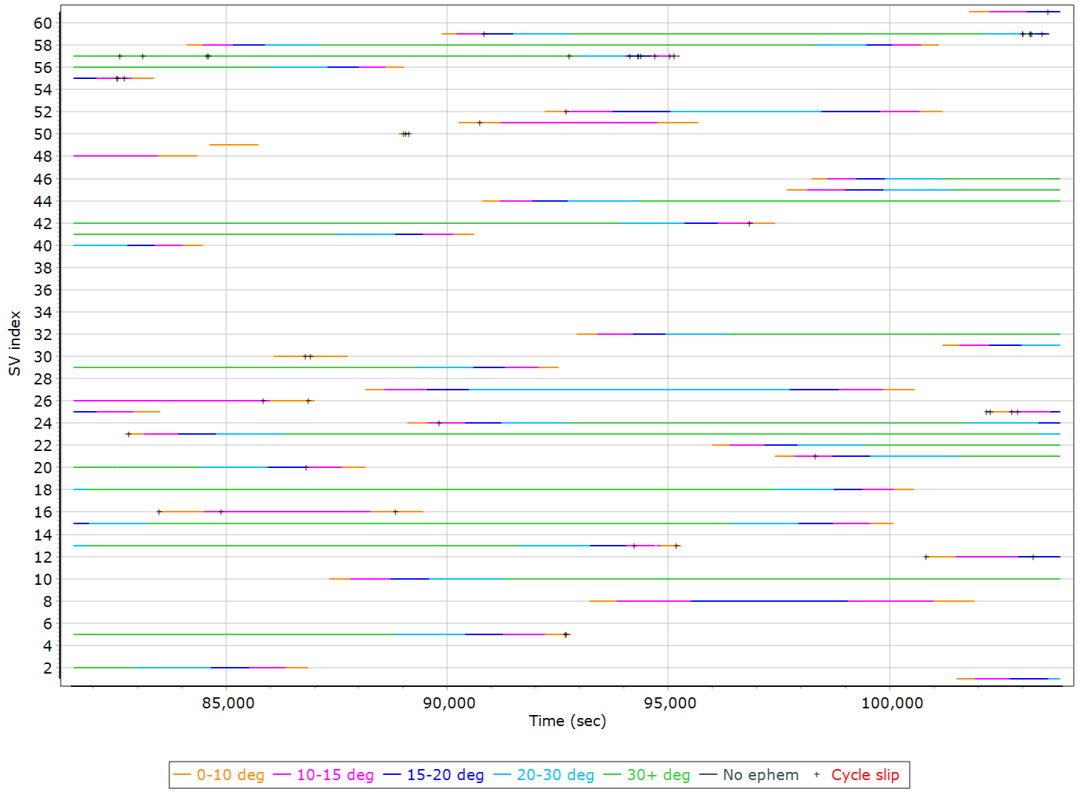
GPS L1 SNR



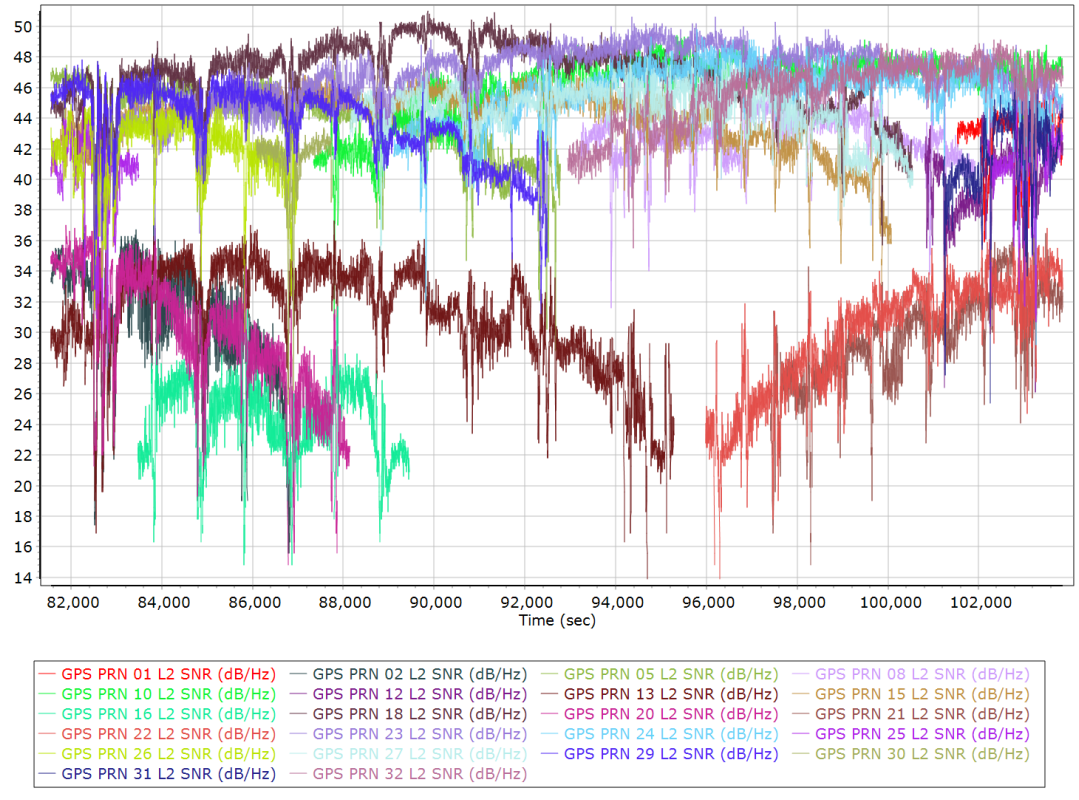
GLONASS L1 SNR



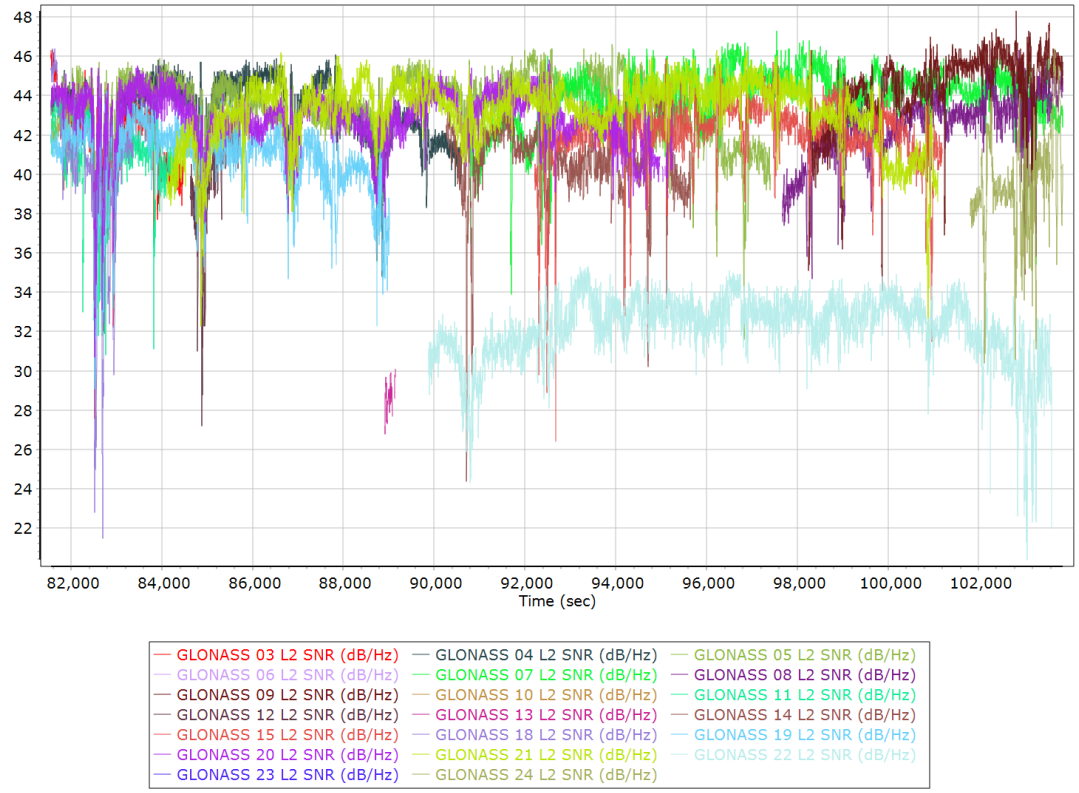
GPS/GLONASS L2 Satellite Lock/Elevation



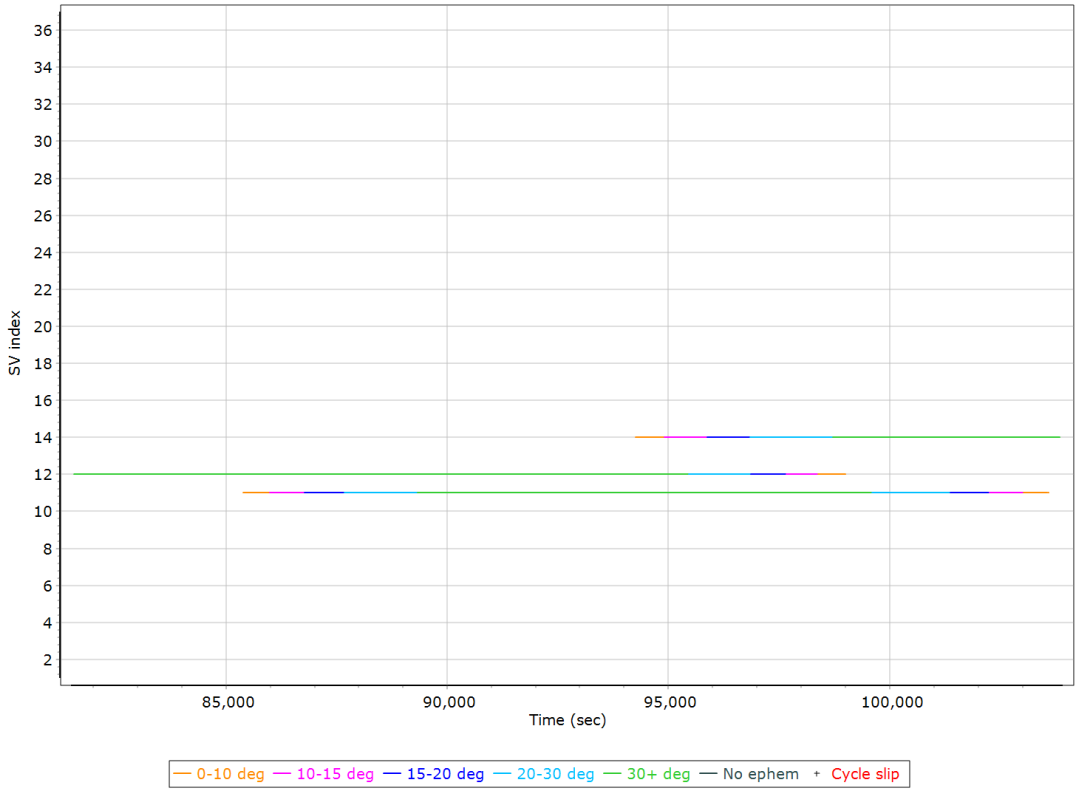
GPS L2 SNR



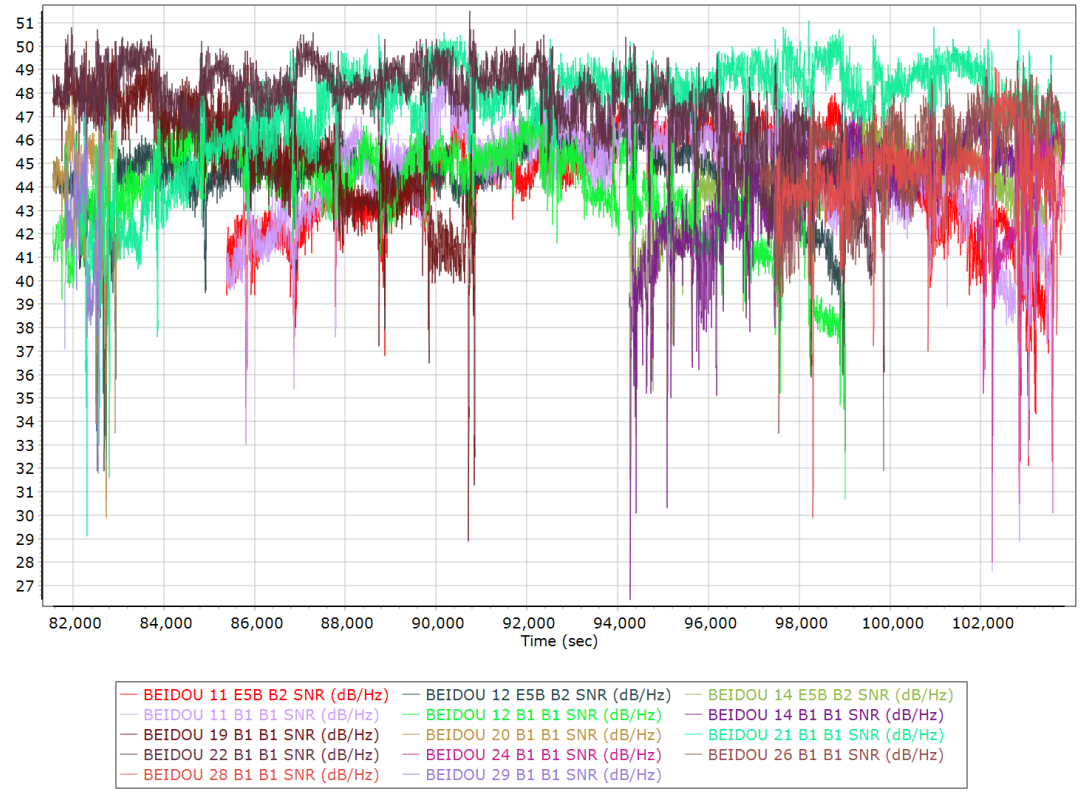
GLONASS L2 SNR



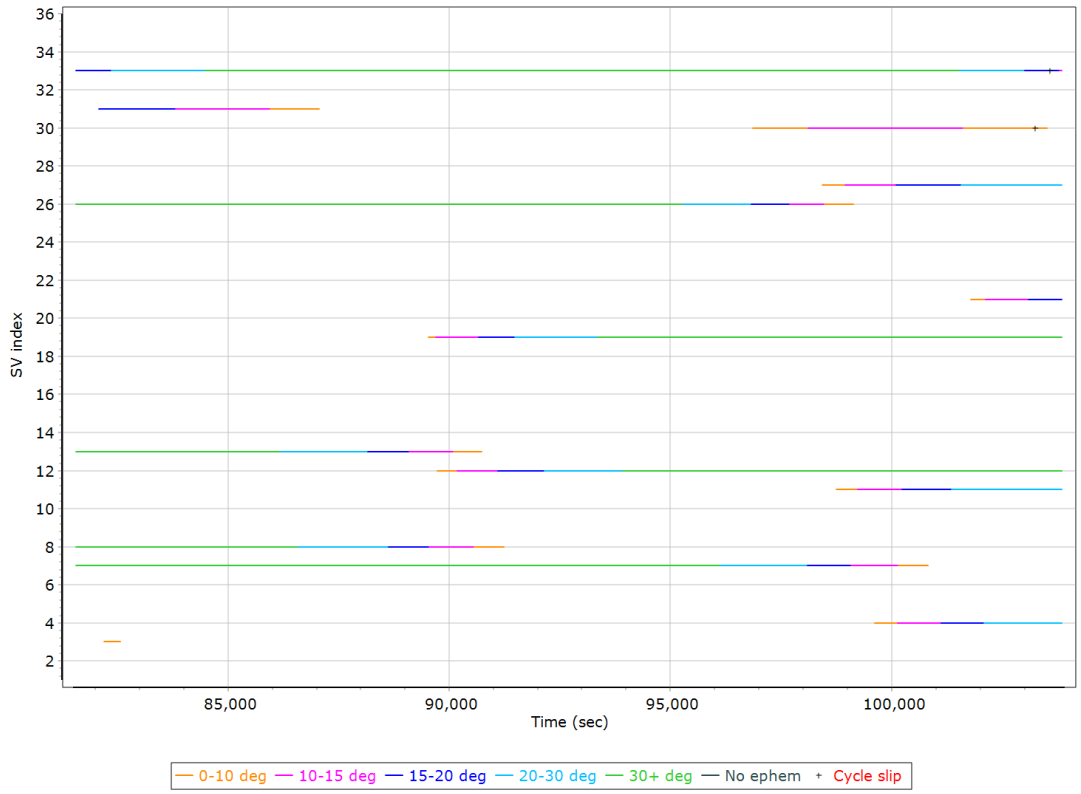
BEIDOU Satellite Lock/Elevation



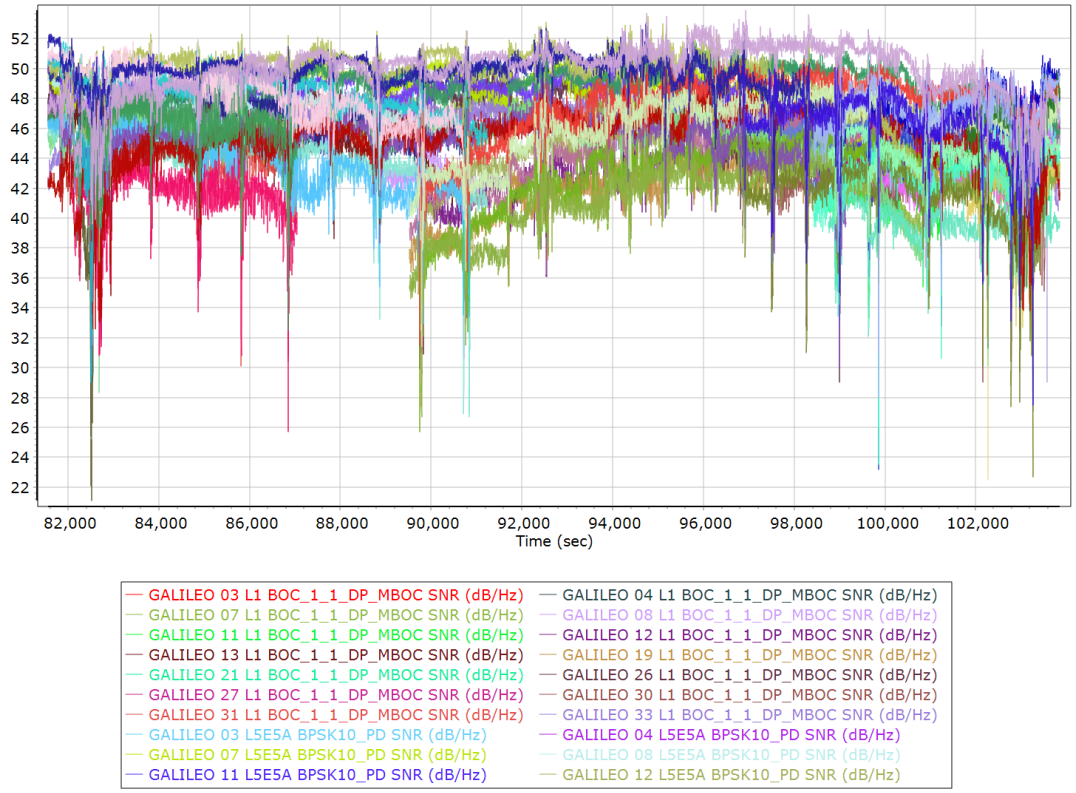
BEIDOU SNR



GALILEO Satellite Lock/Elevation

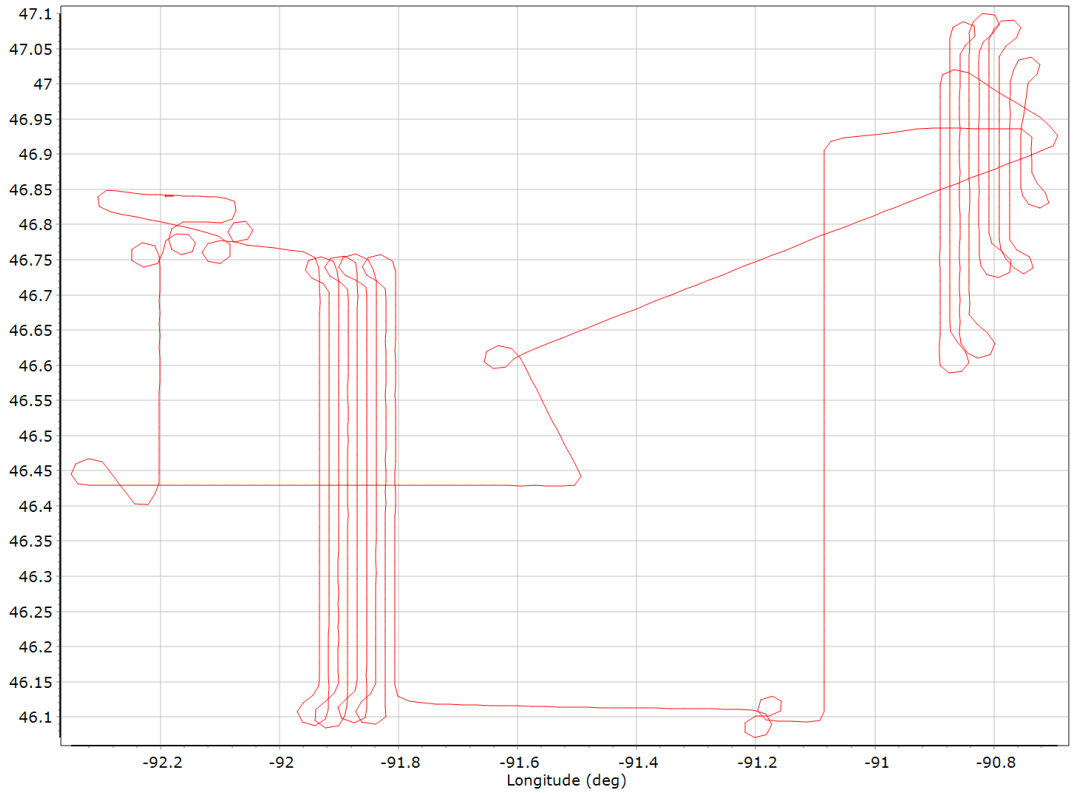


GALILEO SNR


52
50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
82,000
84,000
86,000
88,000
90,000
92,000
94,000
96,000
98,000
100,000
102,000
Time (sec)
GALILEO 03 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 04 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 07 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 08 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 11 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 13 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 19 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 21 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 26 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 27 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 30 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 31 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 33 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 03 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 04 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 07 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 08 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 11 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 12 L5E5A BPSK10_PD SNR (dB/Hz)

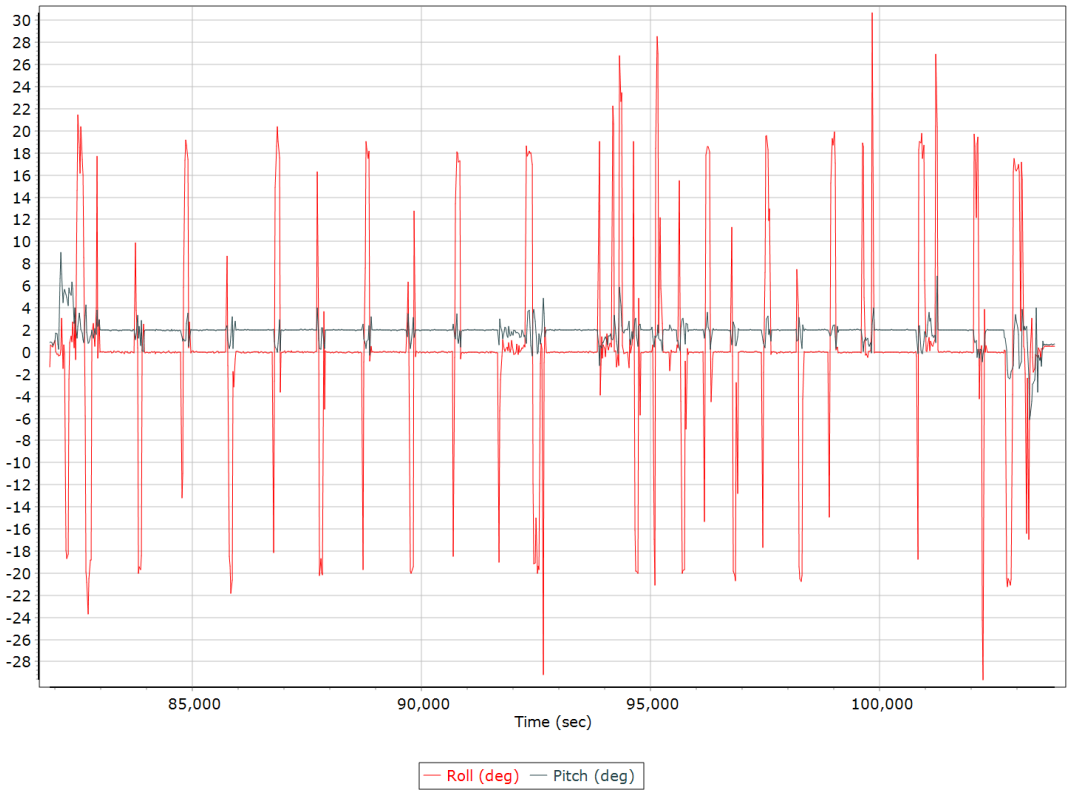
Smoothed Trajectory Information

Top View

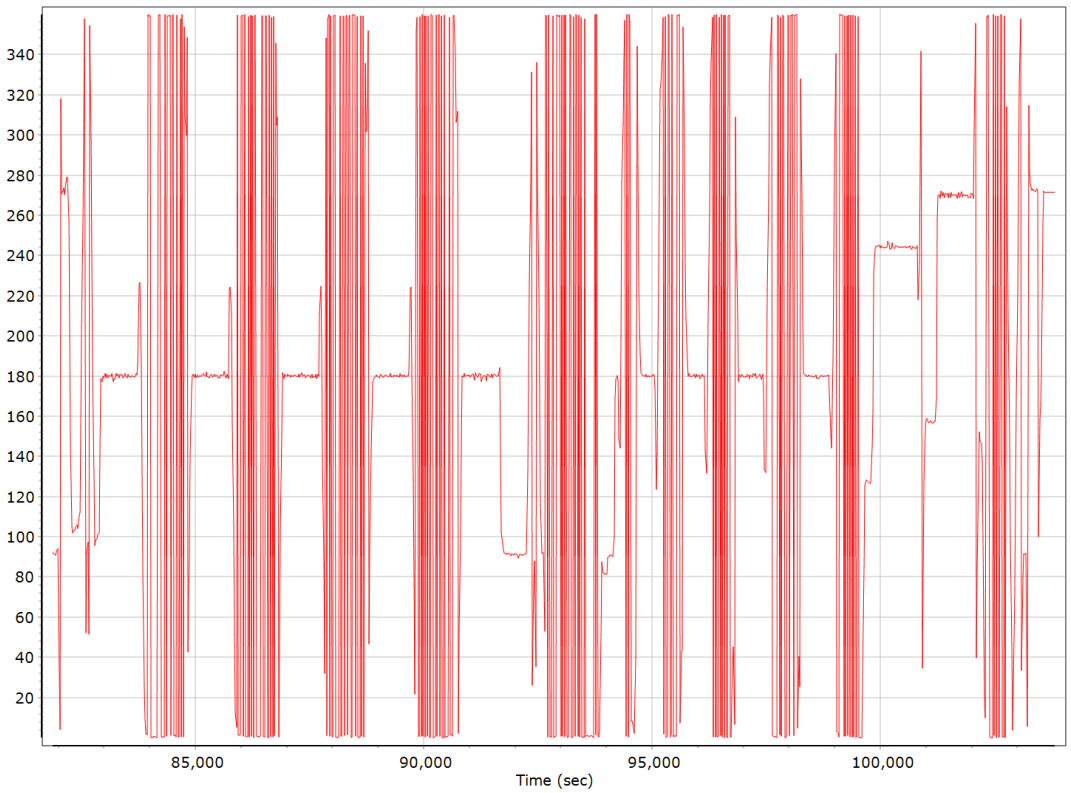


Altitude

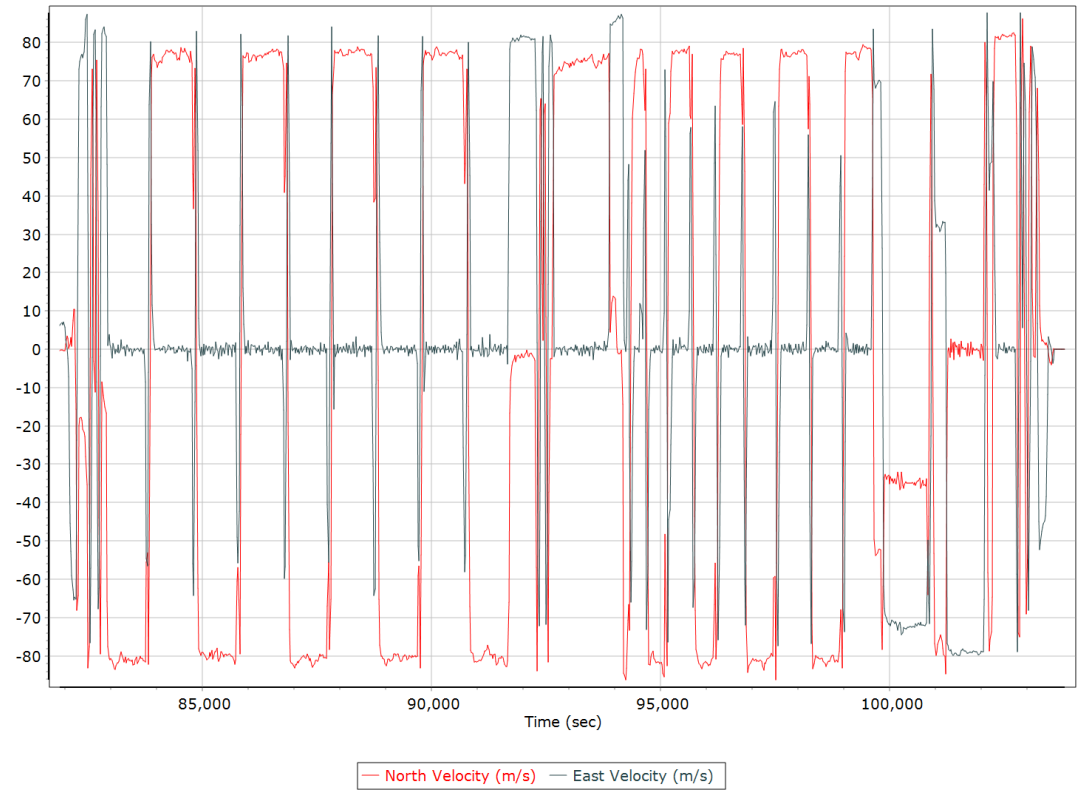
Roll/Pitch



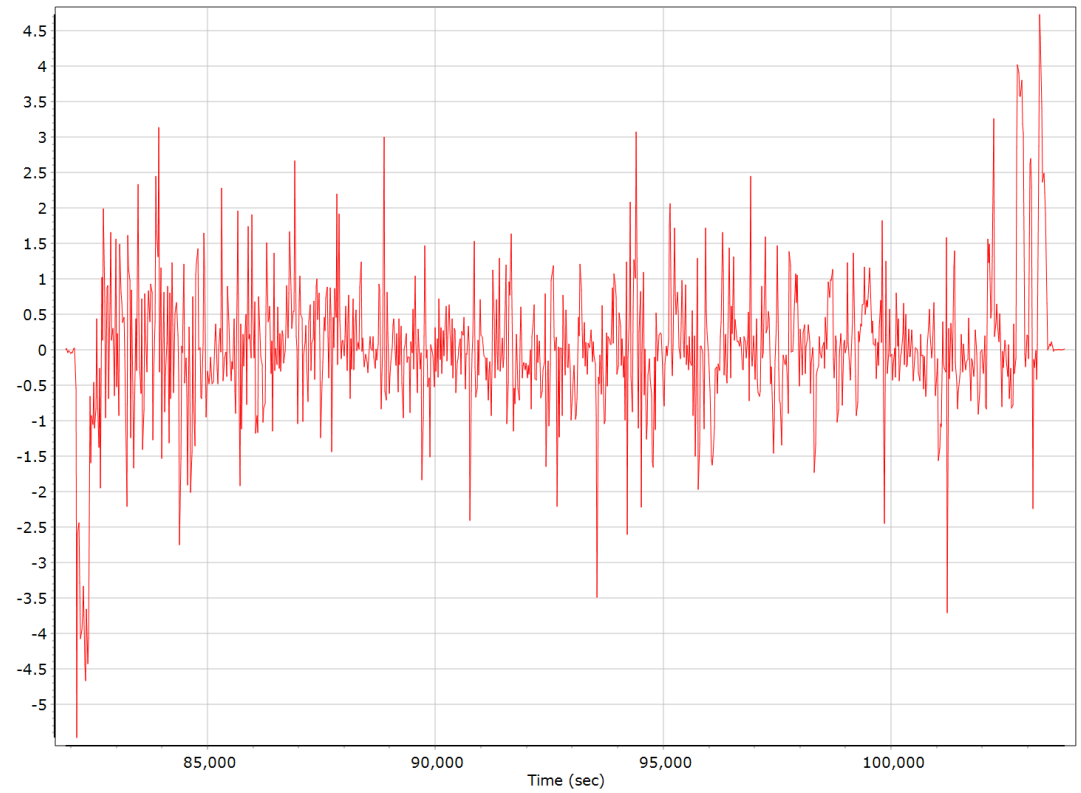
Heading



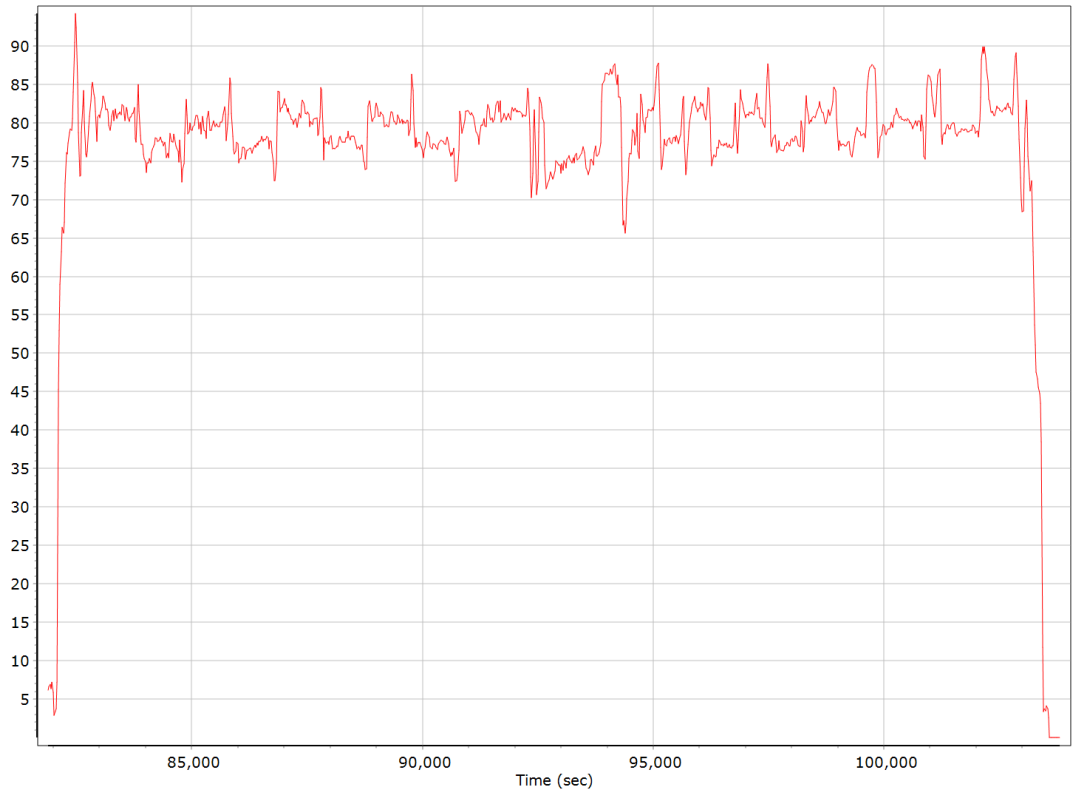
North/East Velocity



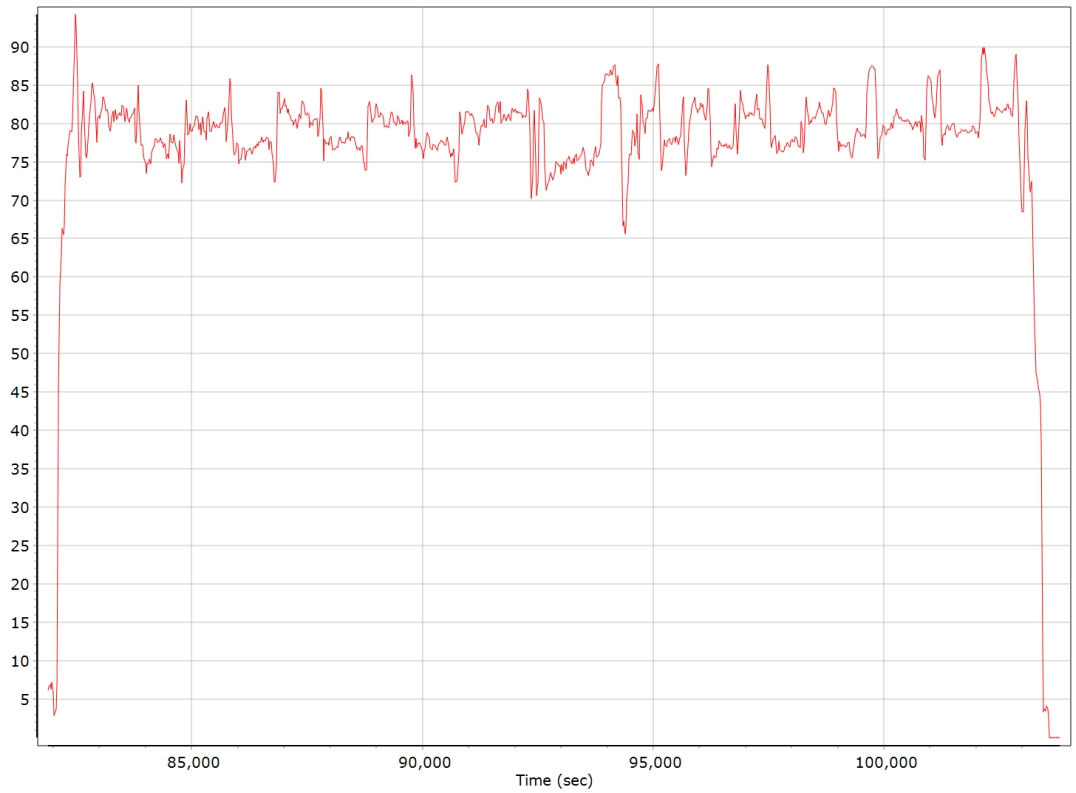
Down Velocity



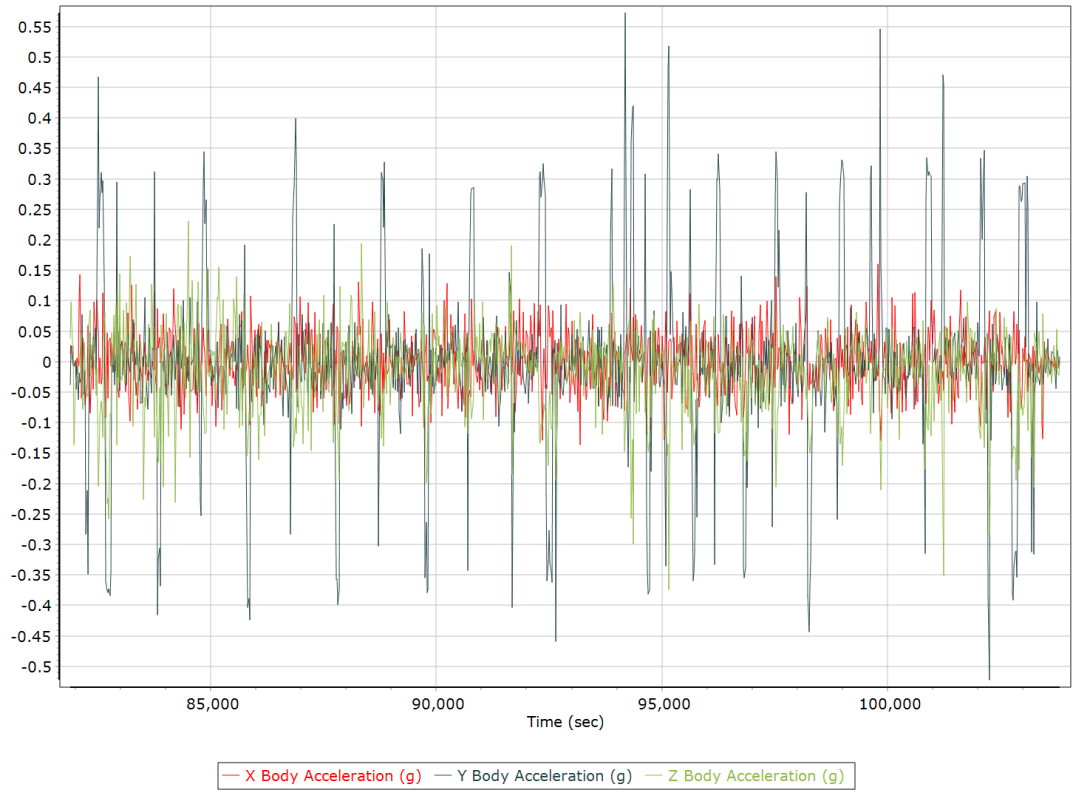
Total Speed



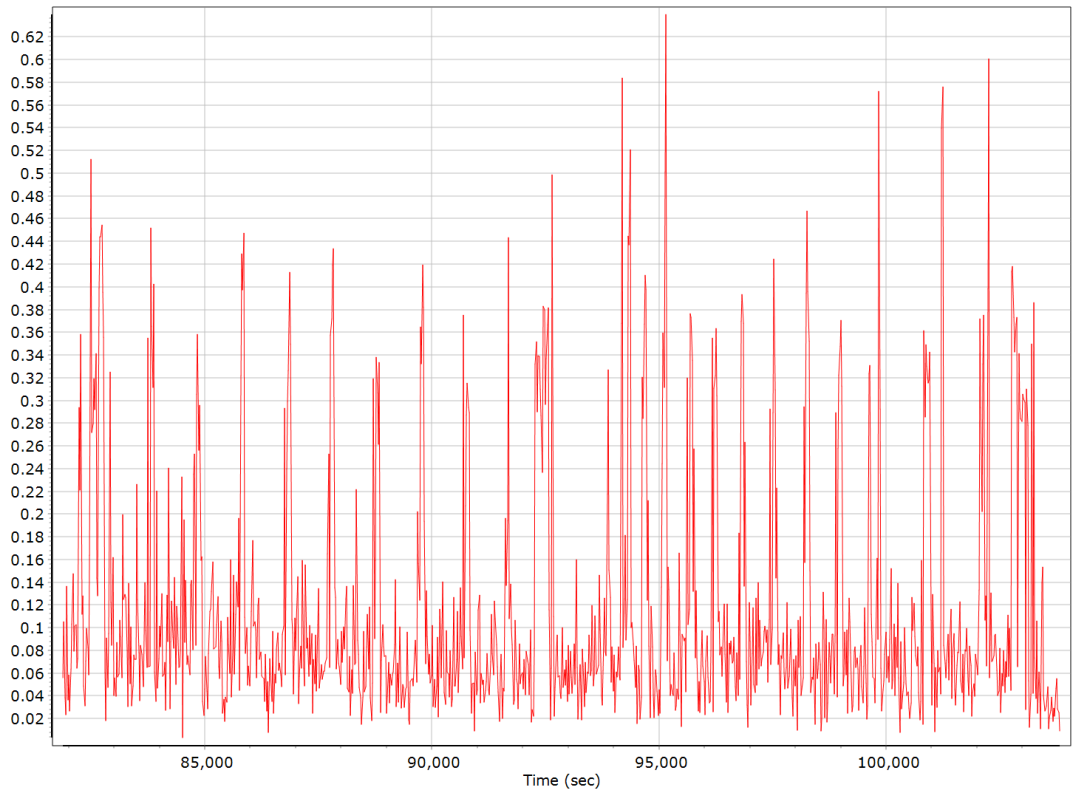
Ground Speed



Body Acceleration



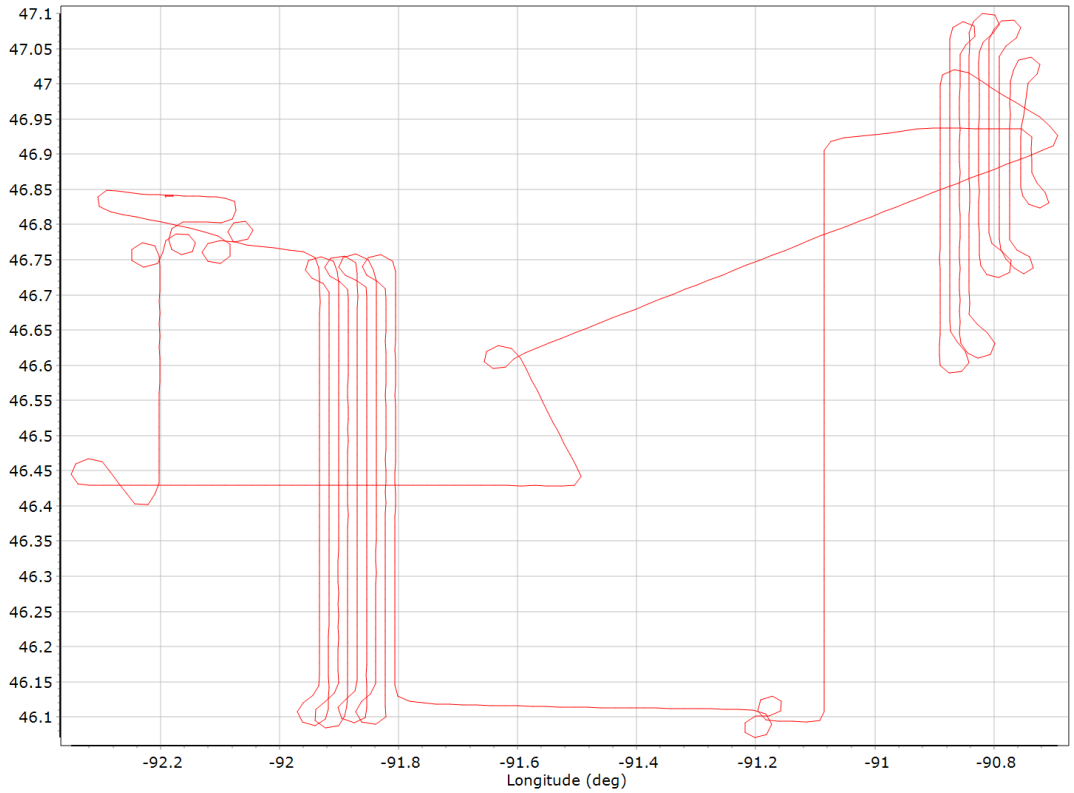
Total Body Acceleration



Body Angular Rate

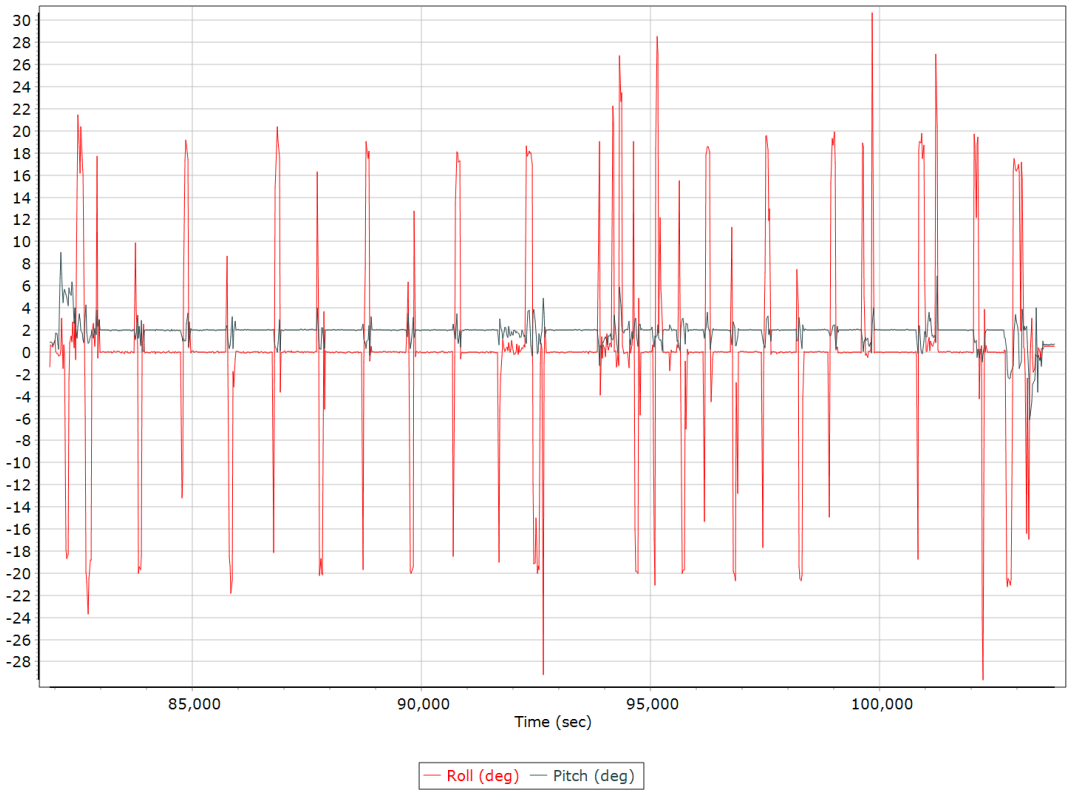
Forward Processed Trajectory Information

Top View

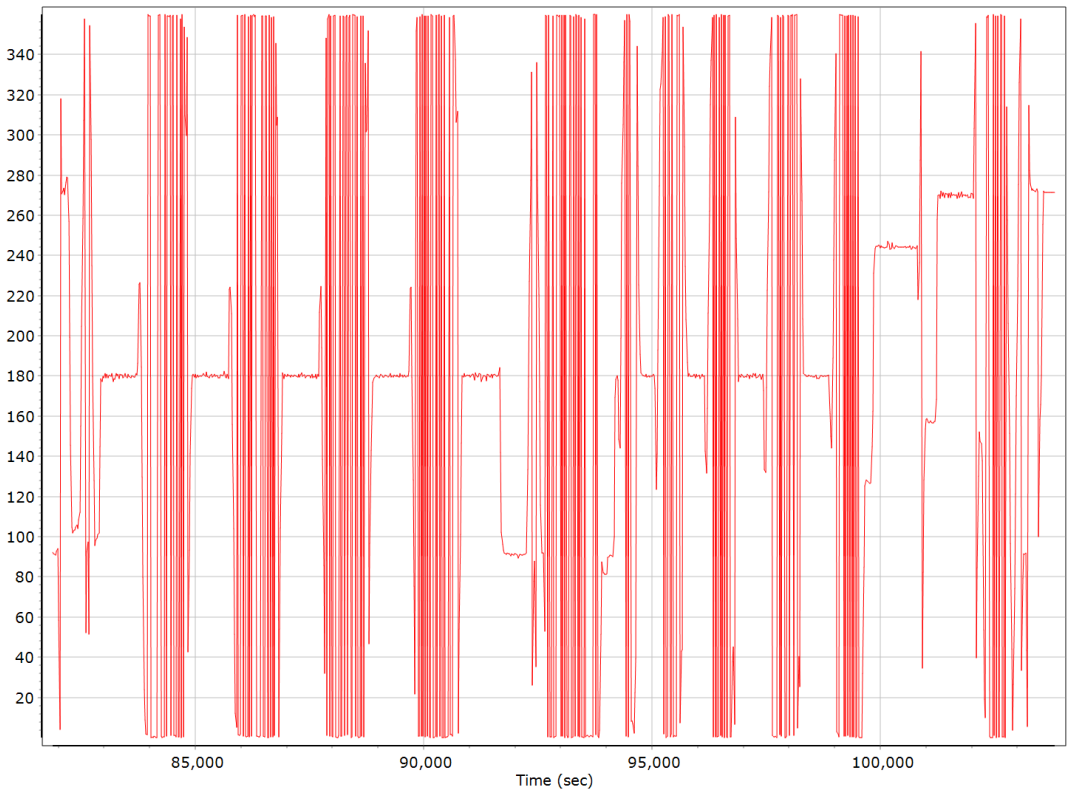


Altitude

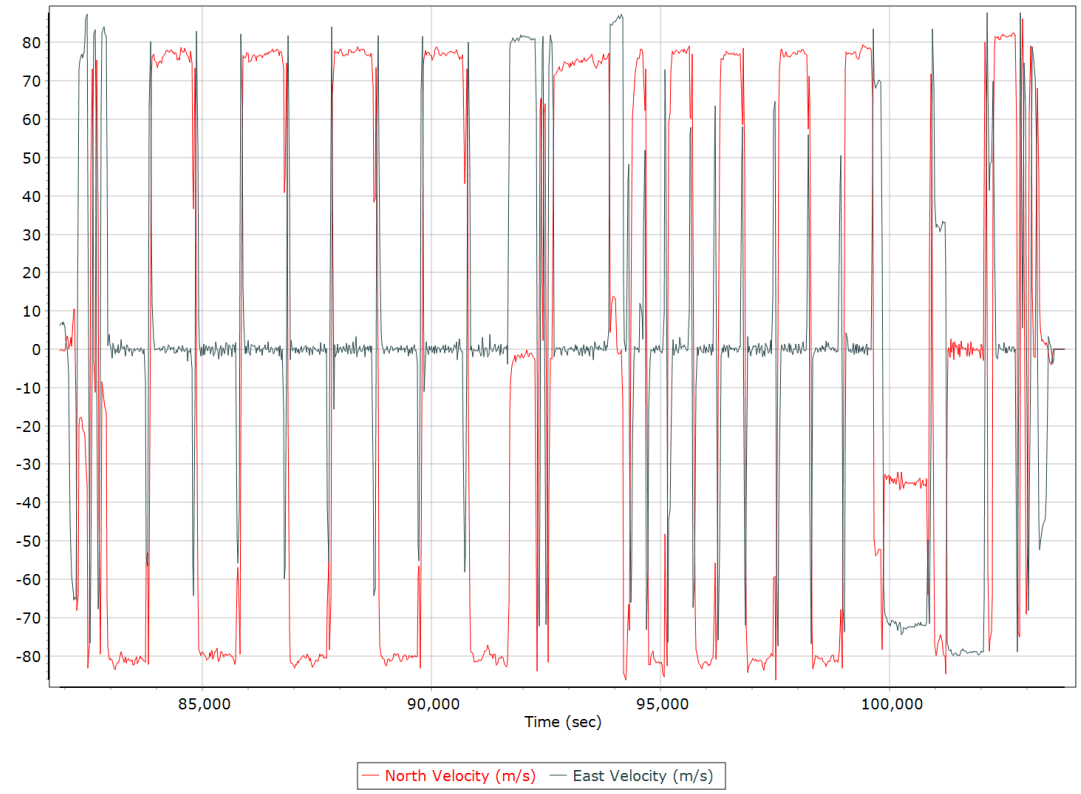
Roll/Pitch



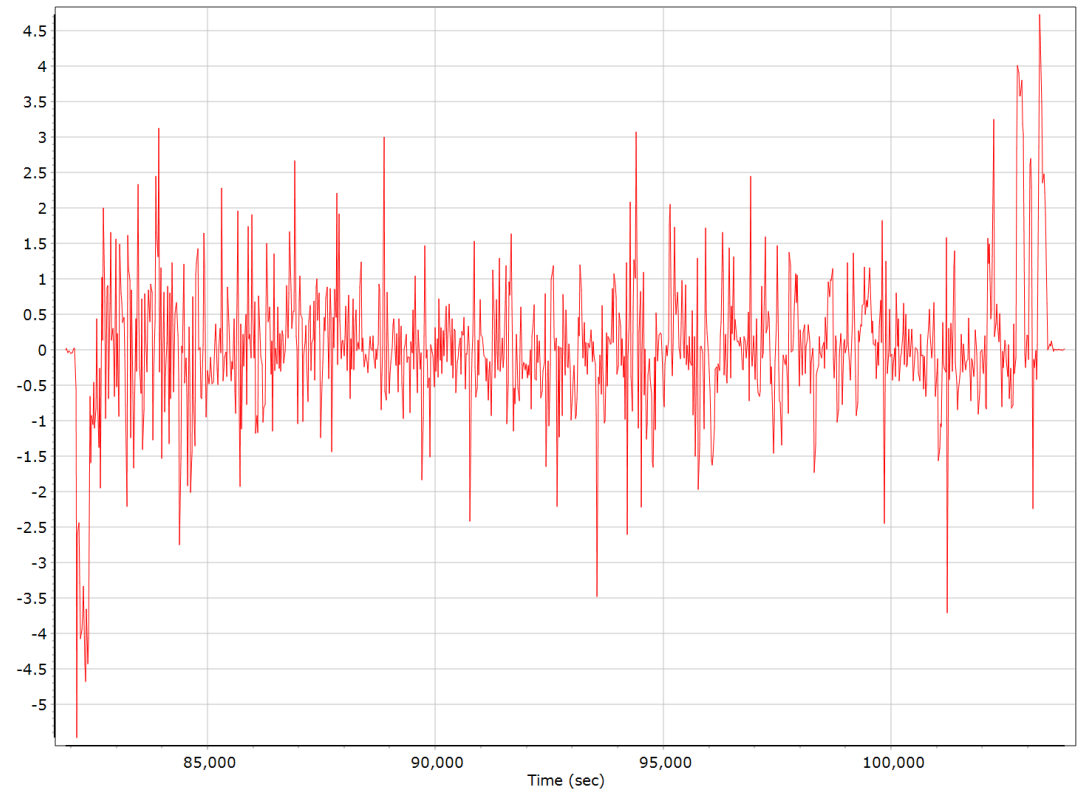
Heading



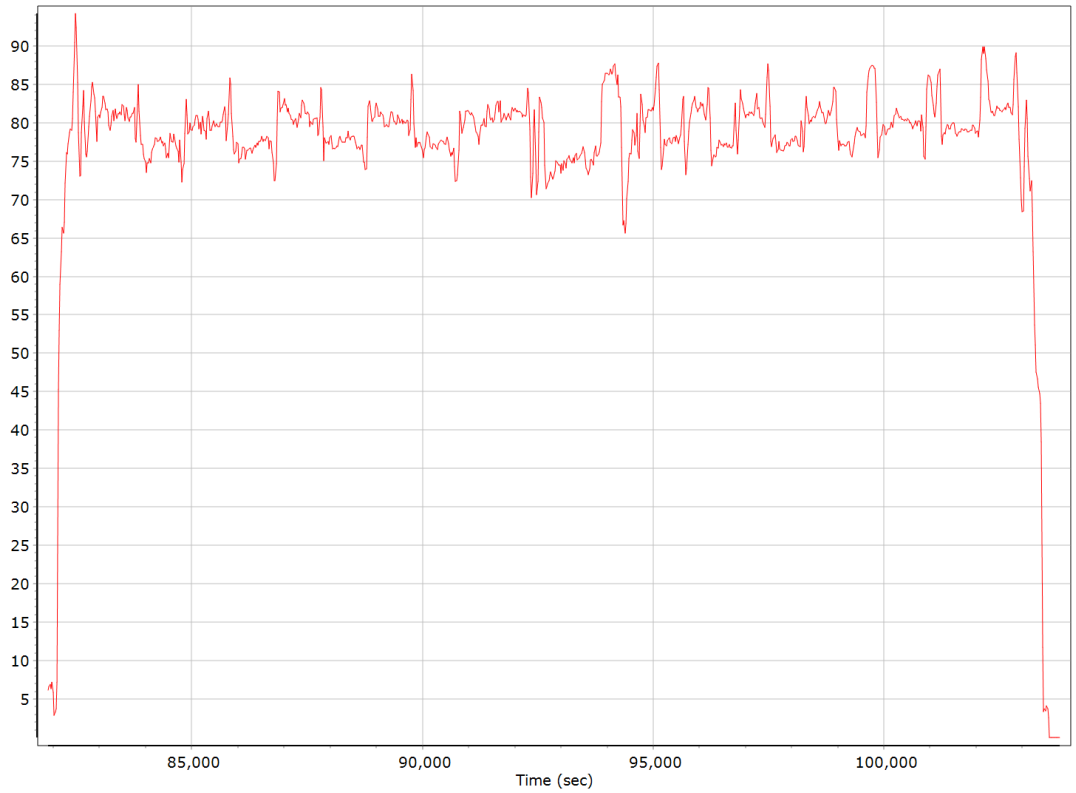
North/East Velocity



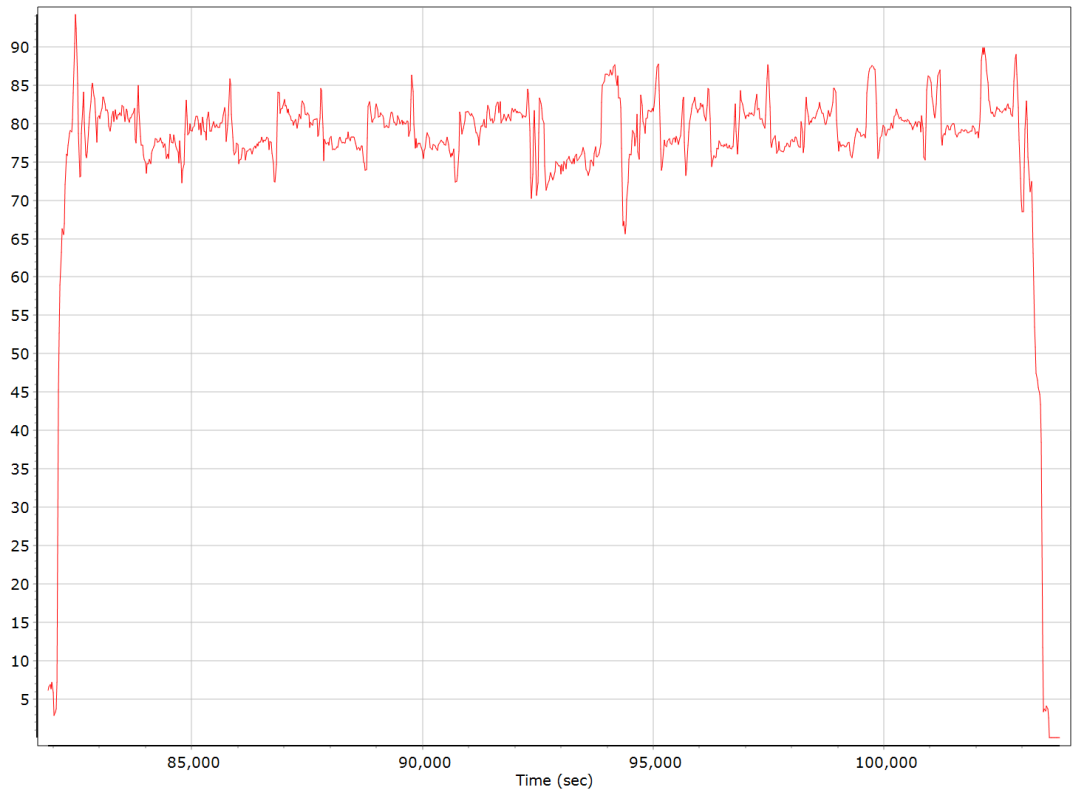
Down Velocity



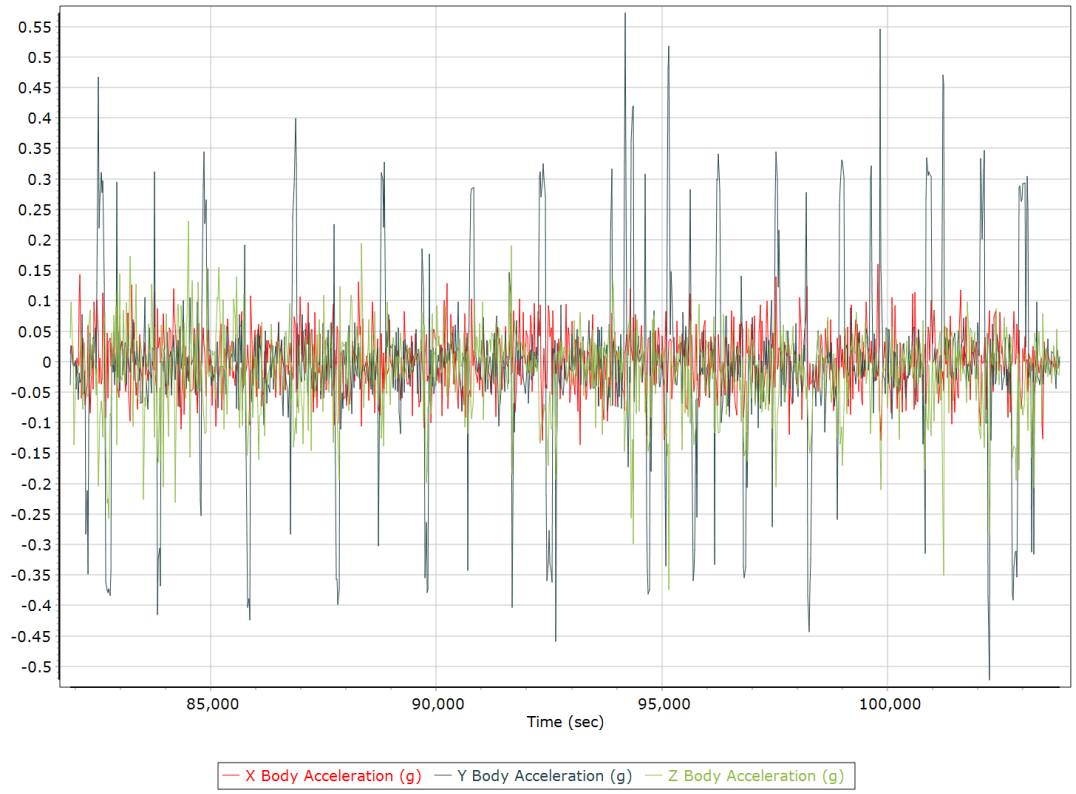
Total Speed



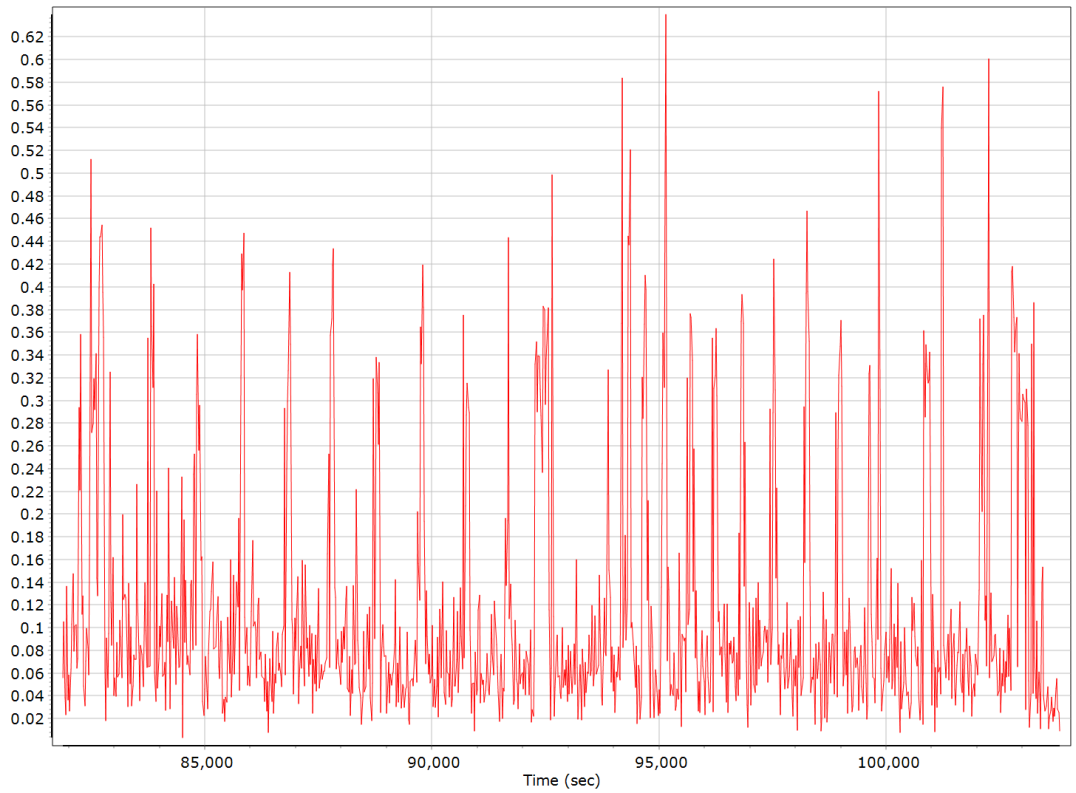
Ground Speed



Body Acceleration



Total Body Acceleration



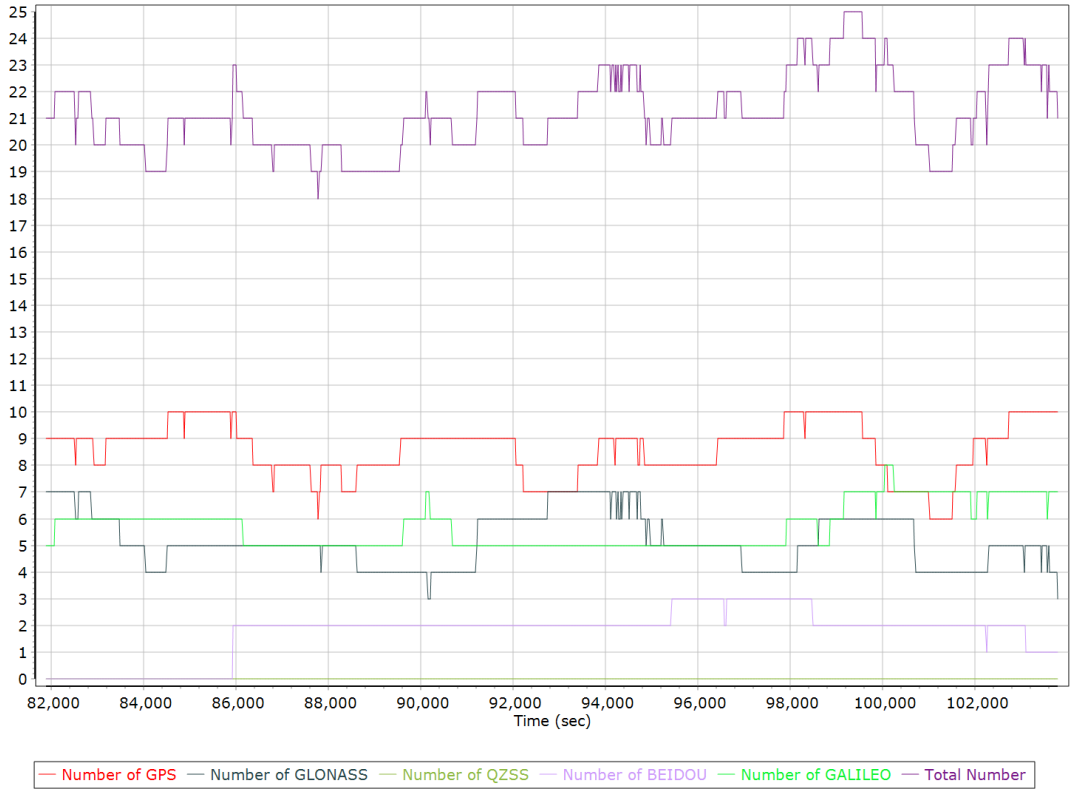
Body Angular Rate

GNSS QC

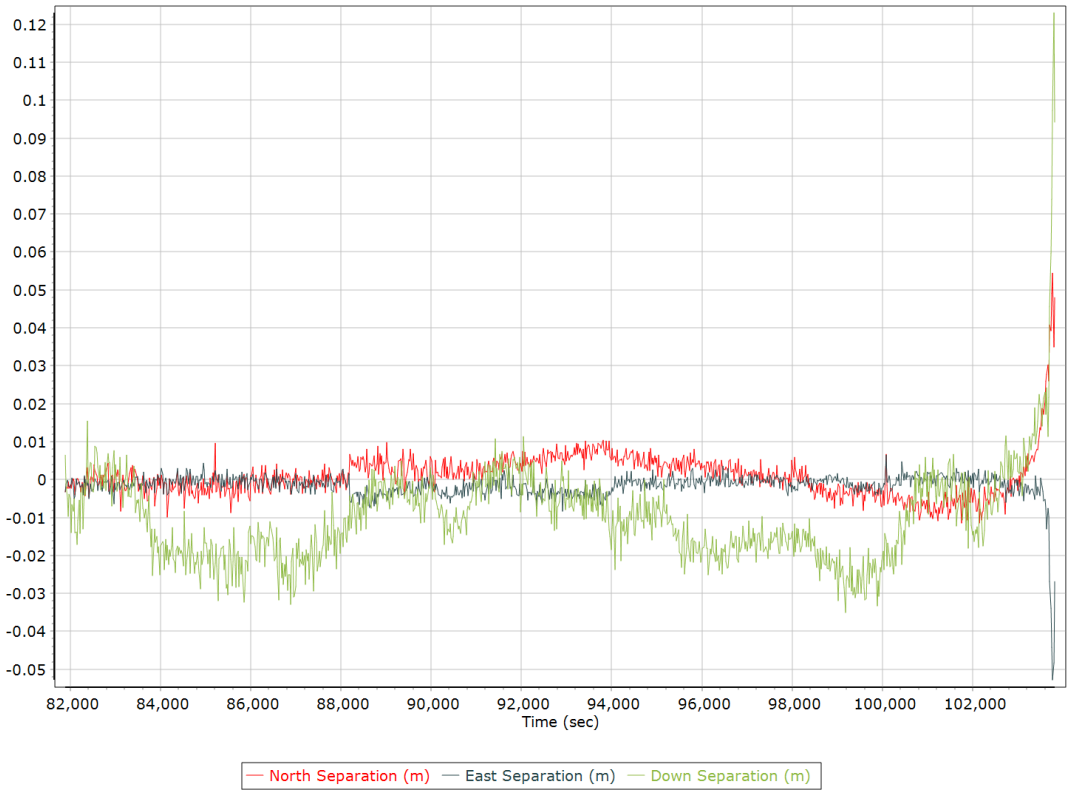
GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	6	10	9
Number of GLONASS SV	3	7	5
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	3	2
Number of GALILEO SV	5	8	6
Total number of SV	18	25	21
PDOP	0.94	1.41	1.14
QC Solution Gaps	0.00	0.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	22238.00	0.00	0.00
Percentage	100.00	0.00	0.00

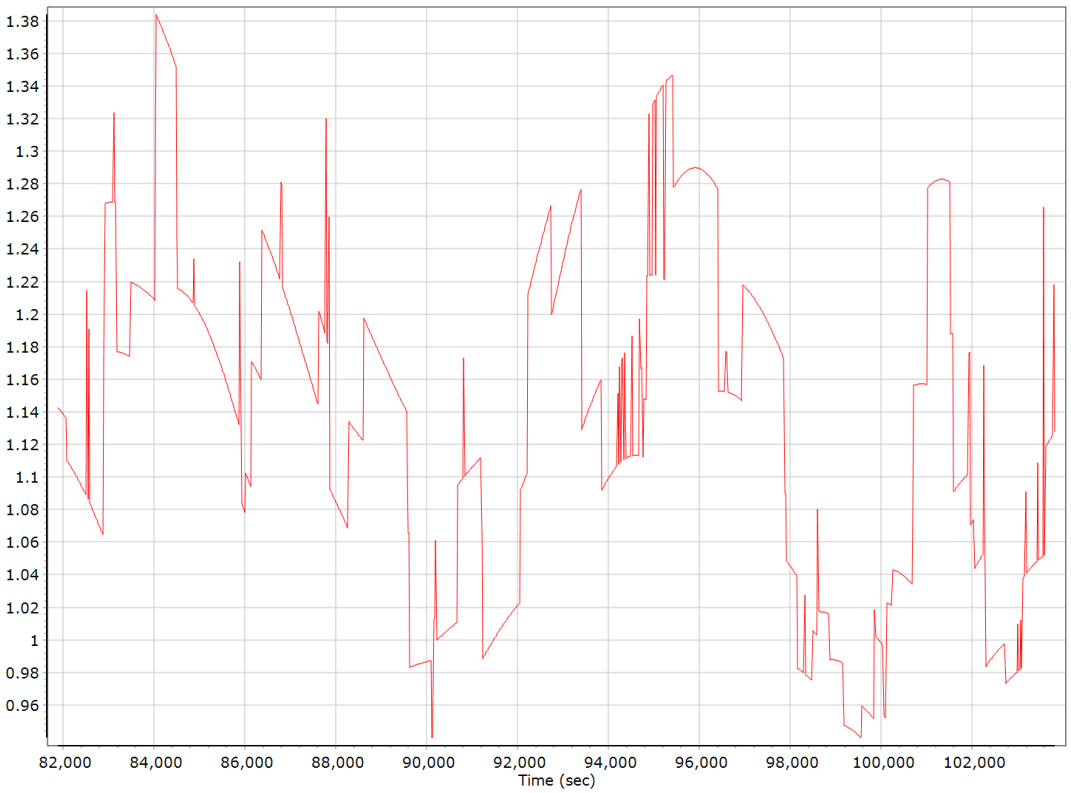
Num SVs in solution



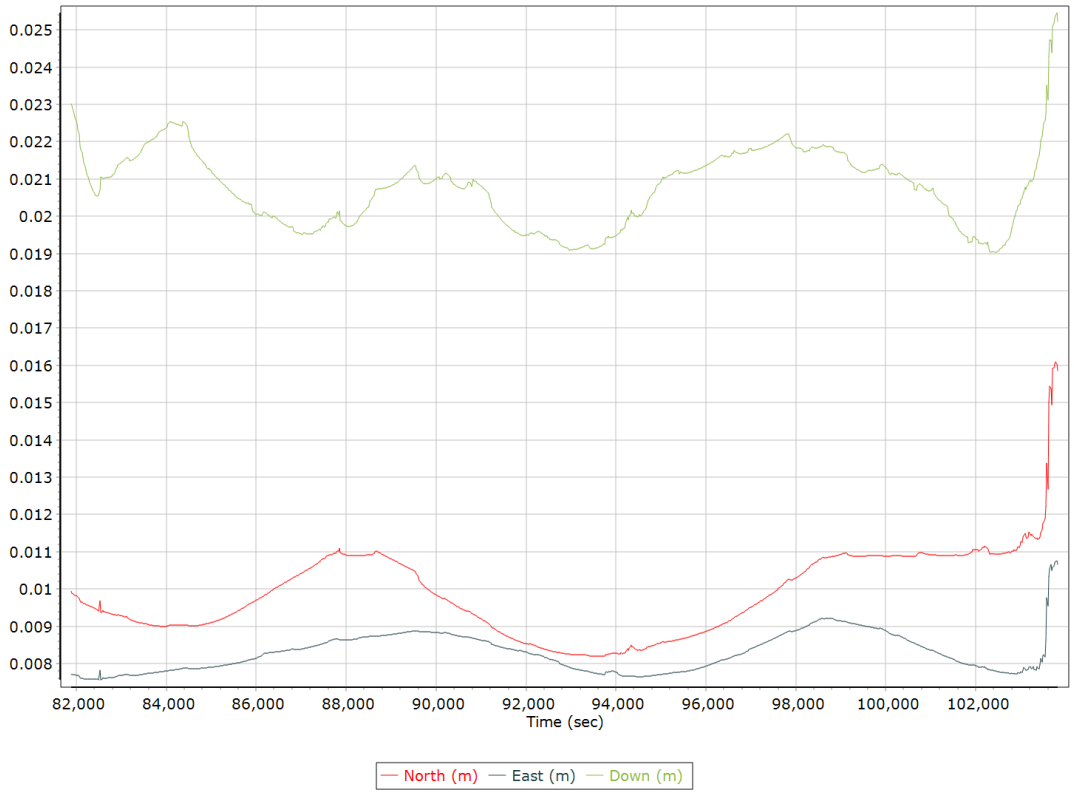
Forward/Reverse Separation



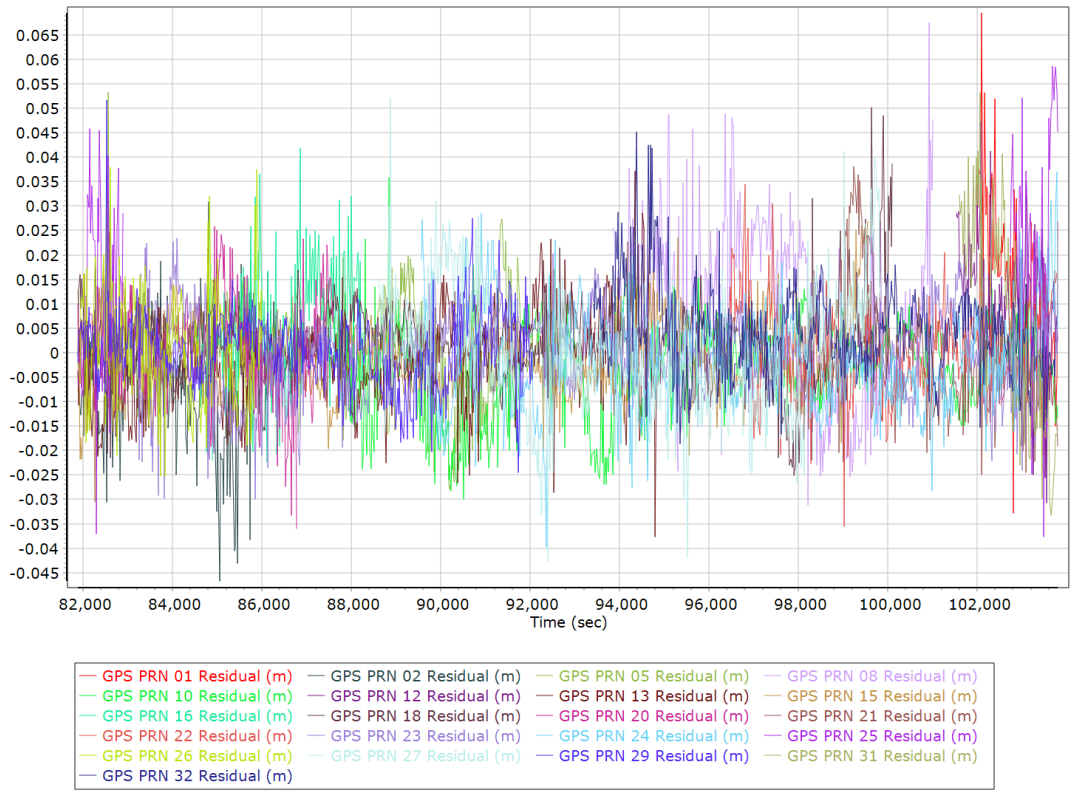
PDOP



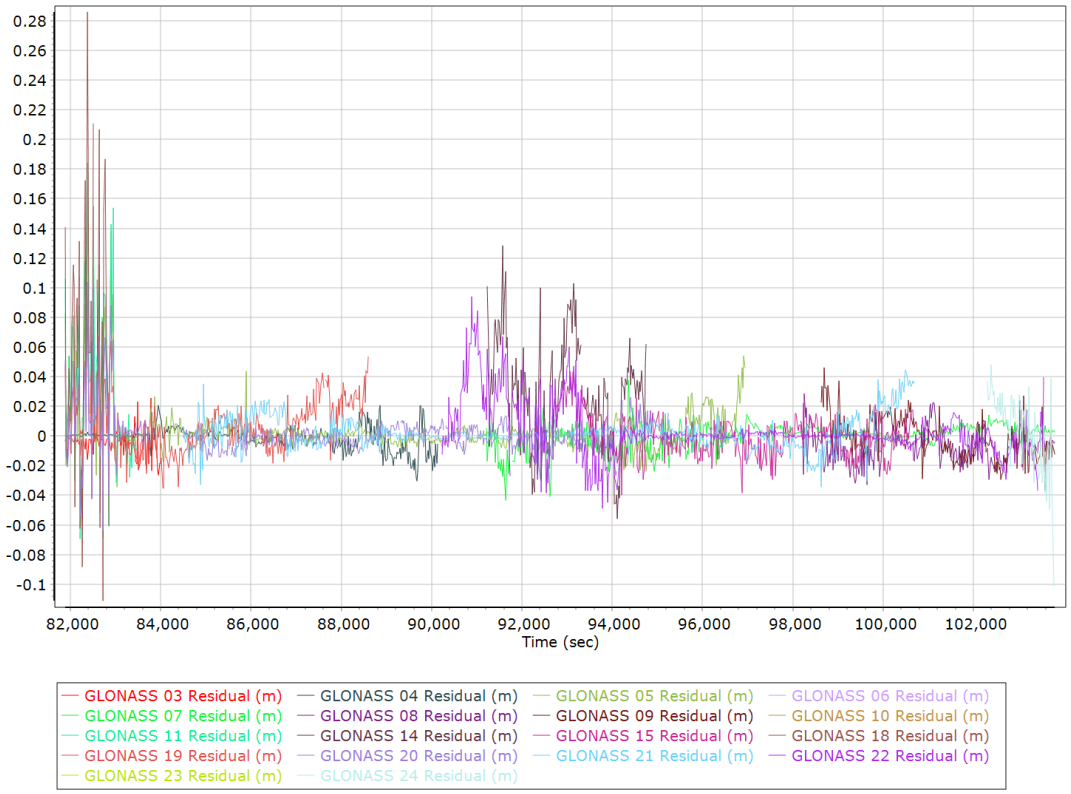
Estimated Position Accuracy



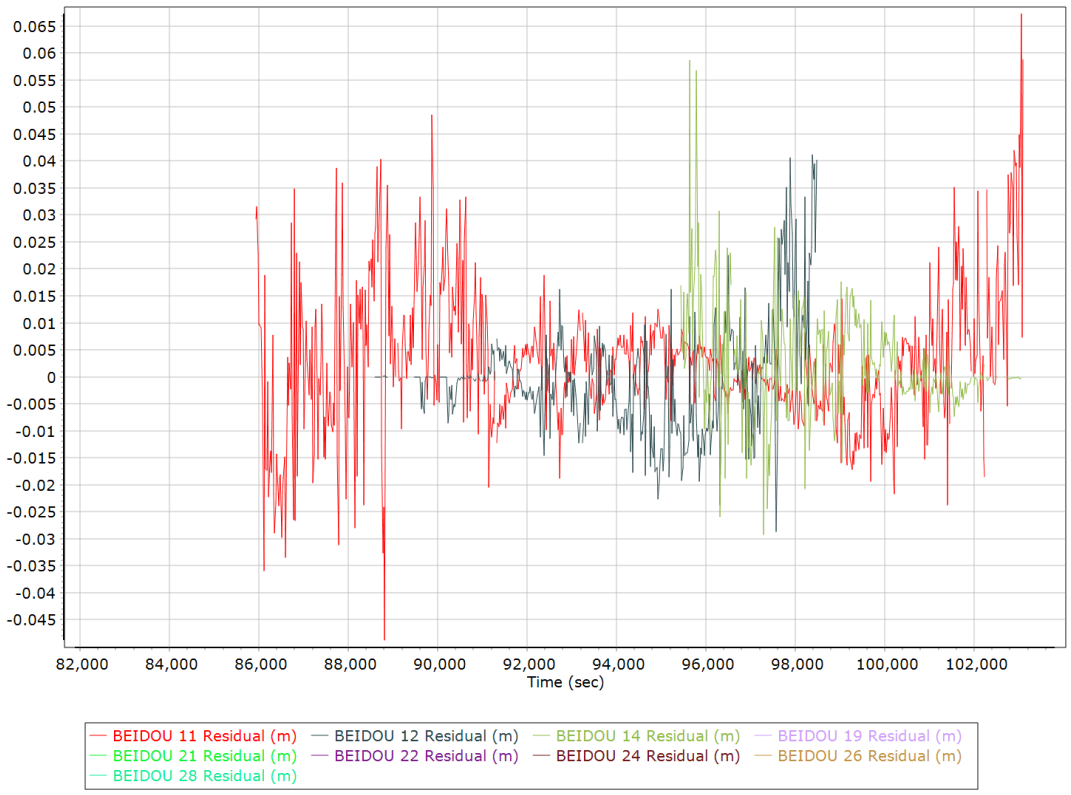
GPS Residuals



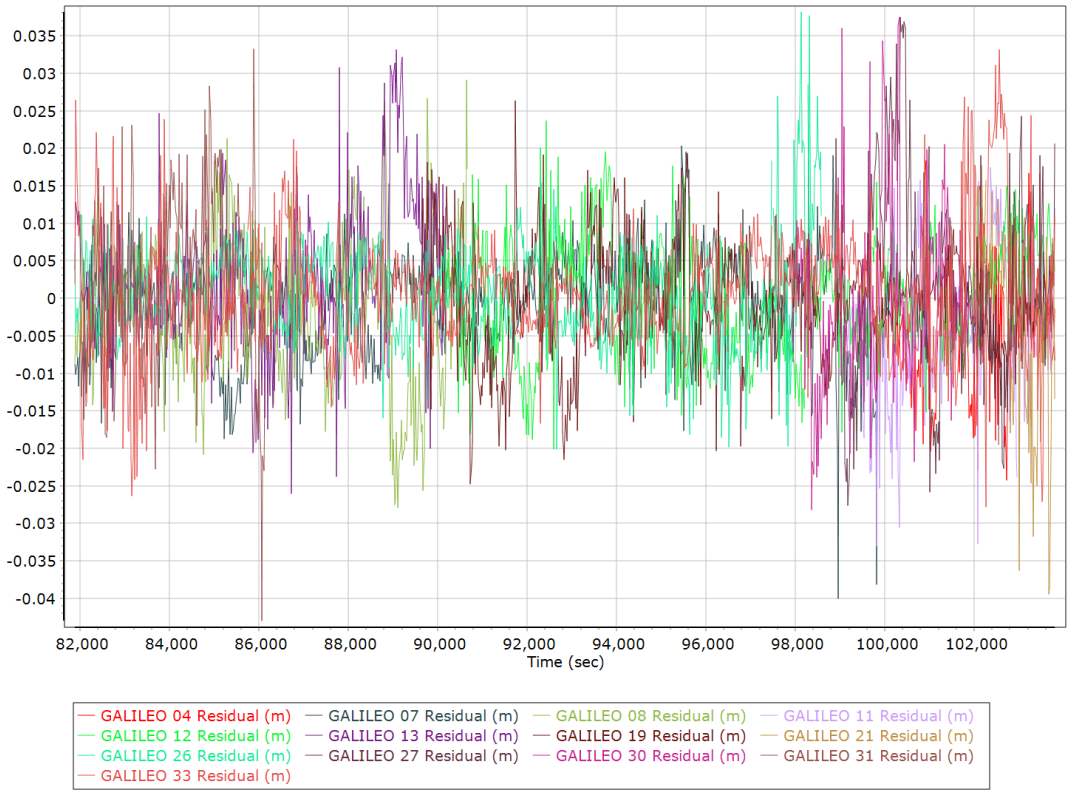
GLONASS Residuals



BEIDOU Residuals



GALILEO Residuals



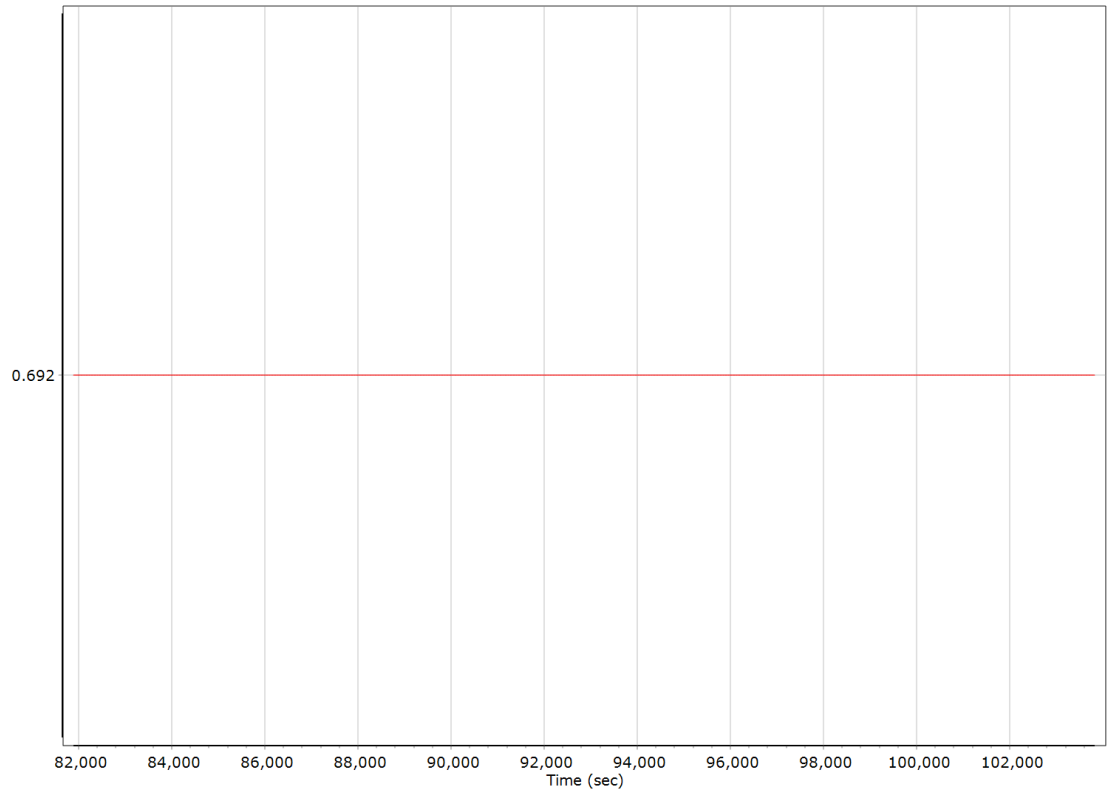
GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	81544.000 (5/22/2022 10:39:04 PM)		
Processing end time	103831.000 (5/23/2022 4:50:31 AM)		
Initial attitude source	Real-Time VNAV/RNAV Attitude		
IMU Sensor Context	Processing with Onboard IMU		
Gimbal to IMU lever arm (m)	-0.034	-0.010	-0.374
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.692	-0.181	-1.276
Gimbal to Primary GNSS lever arm std dev (m)	0.030	0.030	0.030
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

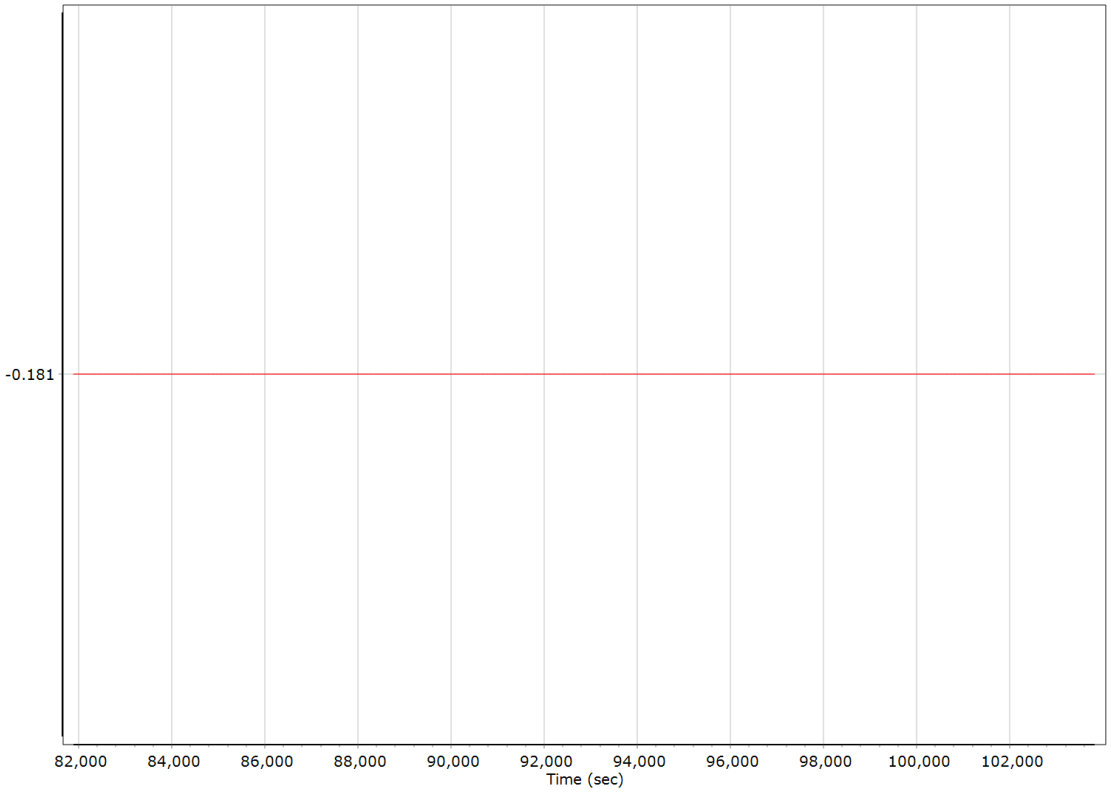
Calibrated Installation Parameters

Reference-Primary GNSS Lever Arm (m)

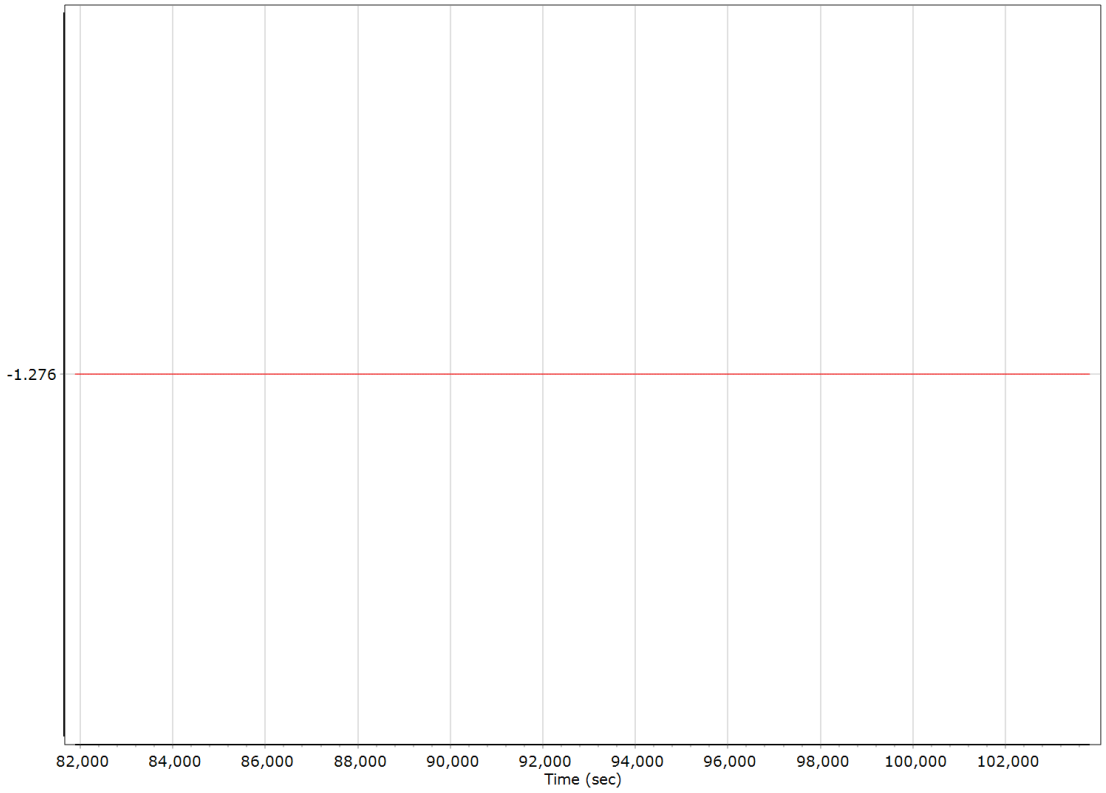
X Reference-Primary GNSS Lever Arm (m)



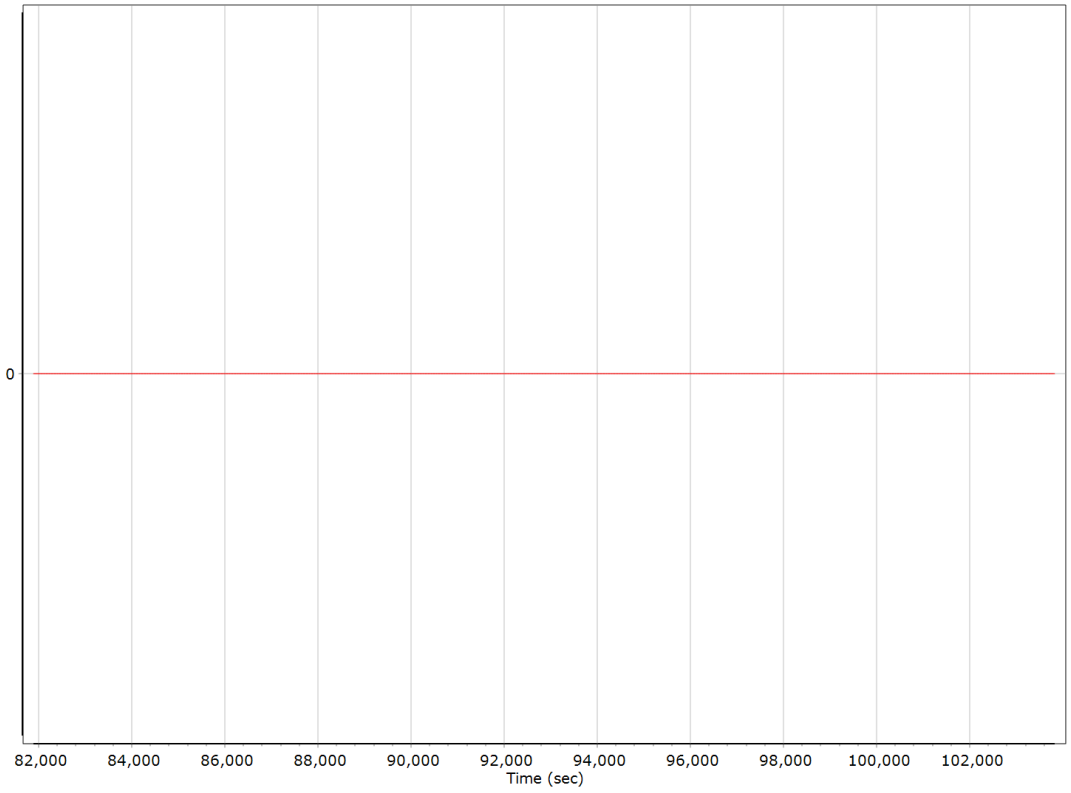
Y Reference-Primary GNSS Lever Arm (m)



Z Reference-Primary GNSS Lever Arm (m)



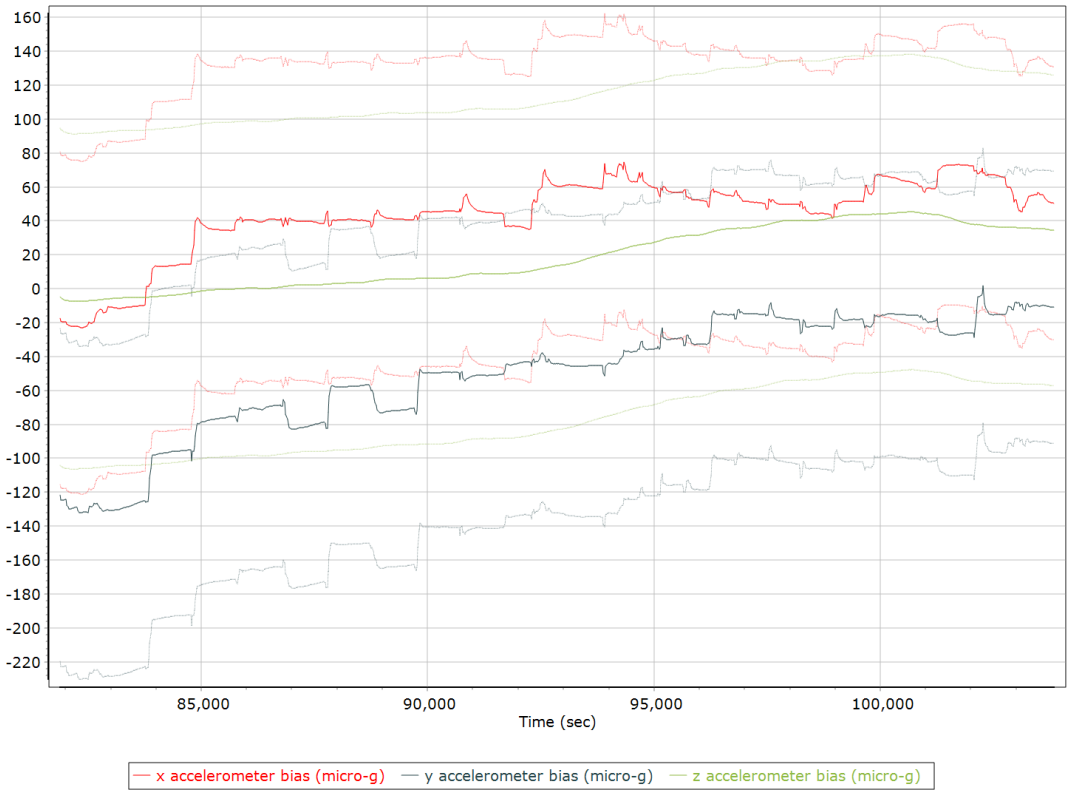
Reference-Primary GNSS Lever Arm Figure of Merit



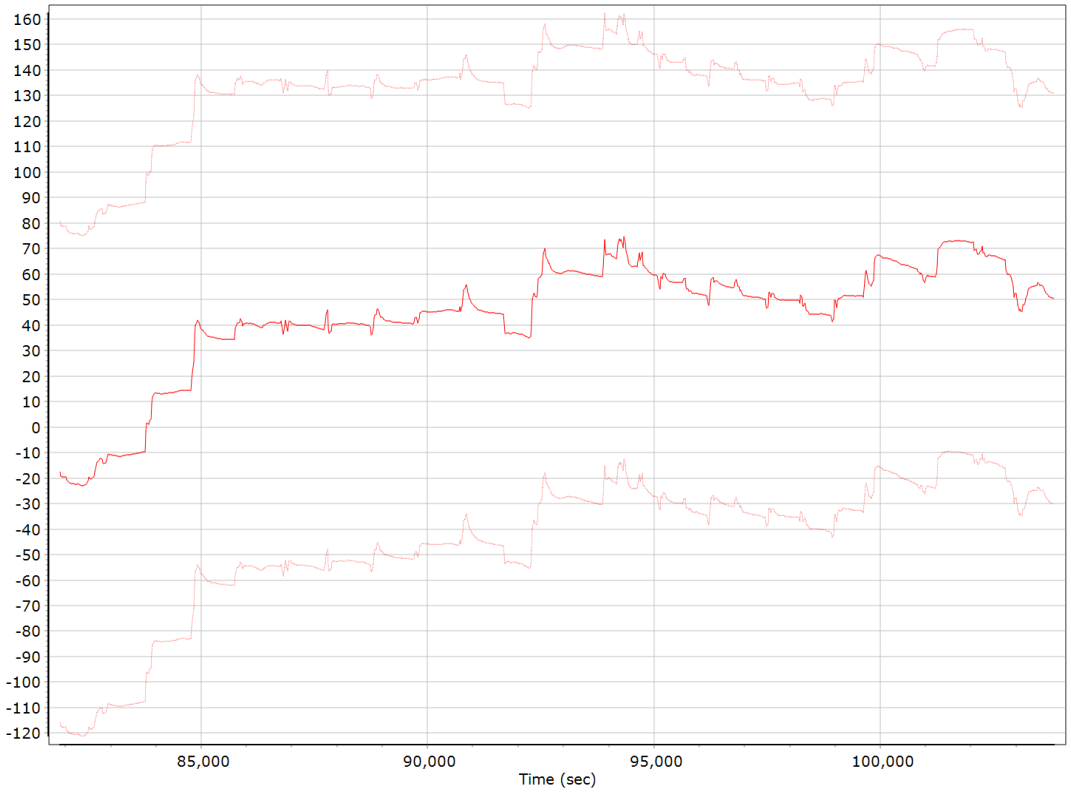
IN-Fusion QC

Forward Processed Estimated Errors, Reference Frame

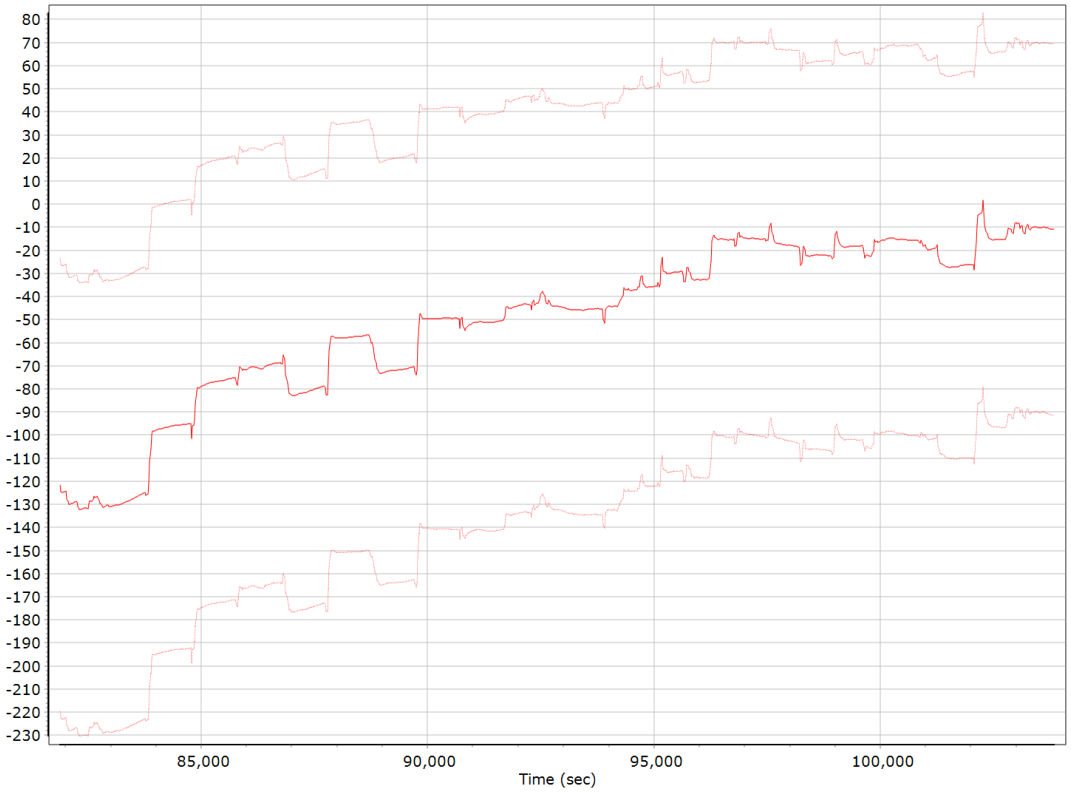
Accelerometer Bias (micro-g)



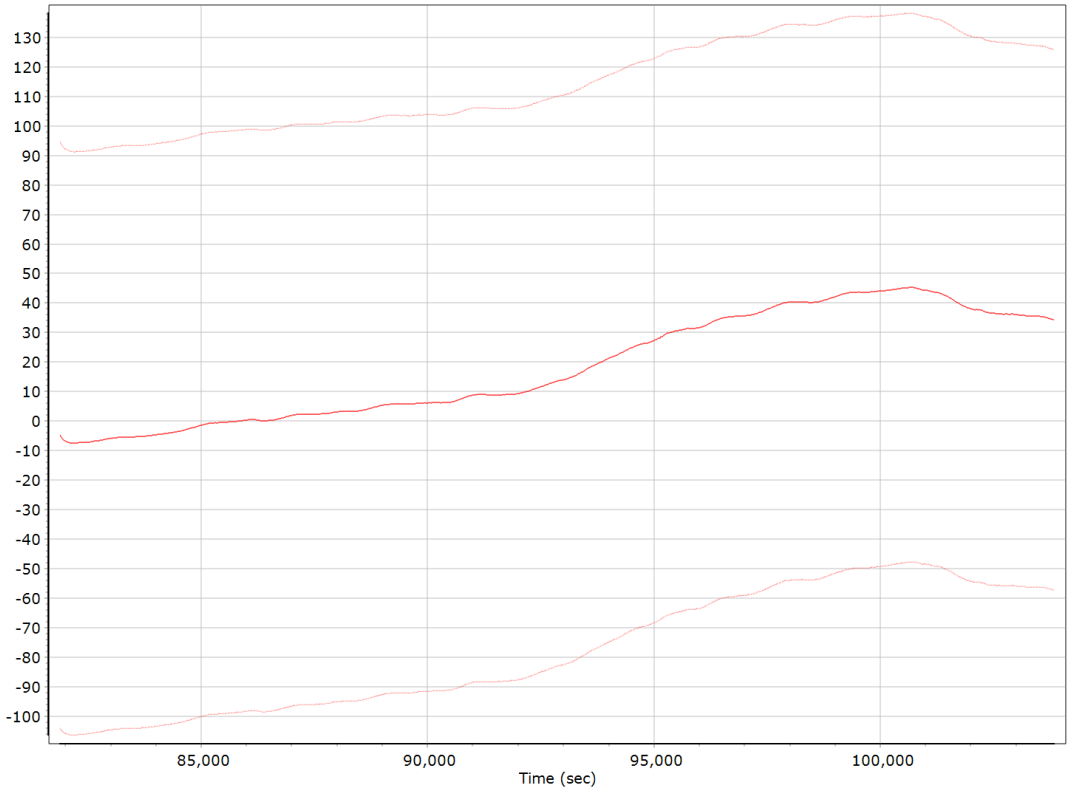
X Accelerometer Bias (micro-g)



Y Accelerometer Bias (micro-g)



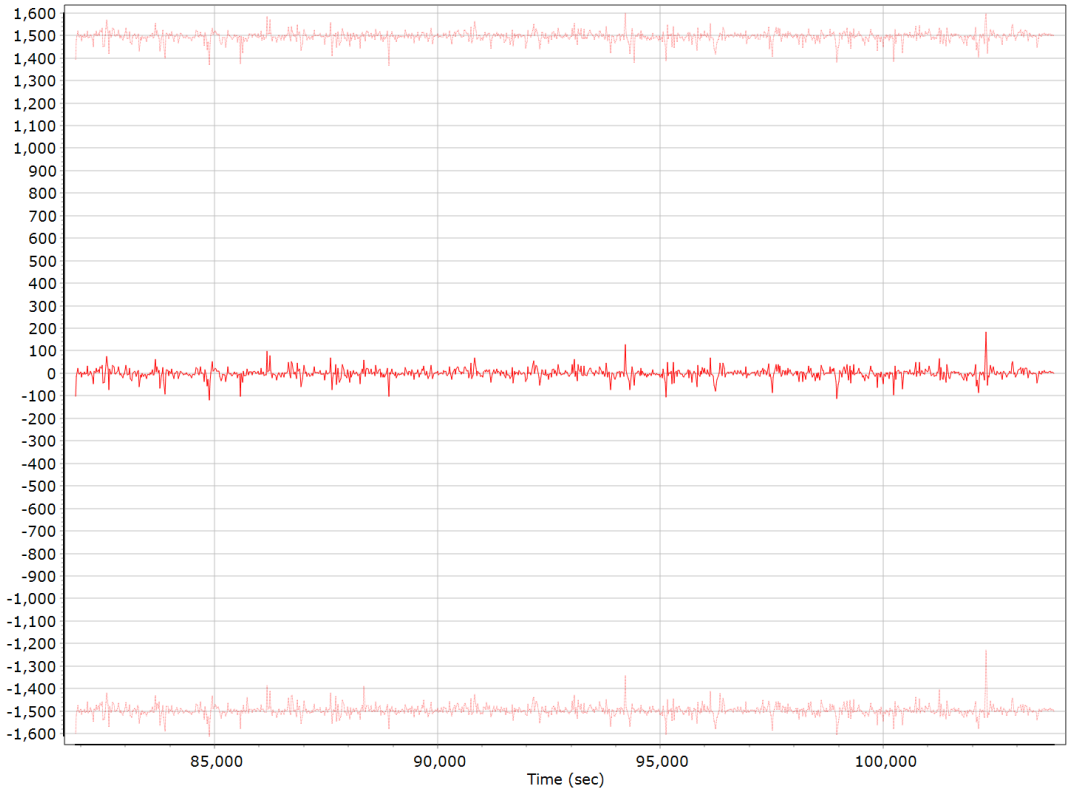
Z Accelerometer Bias (micro-g)



Accelerometer Scale Error (ppm)

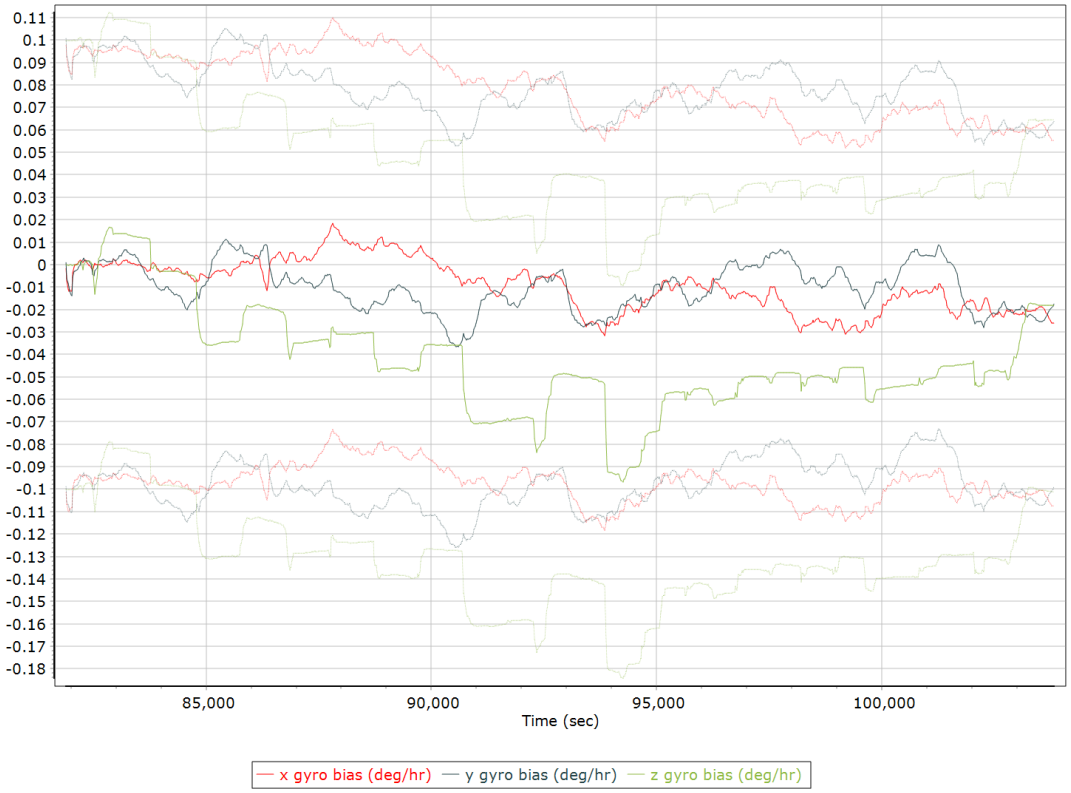
X Accelerometer Scale Error (ppm)

Y Accelerometer Scale Error (ppm)

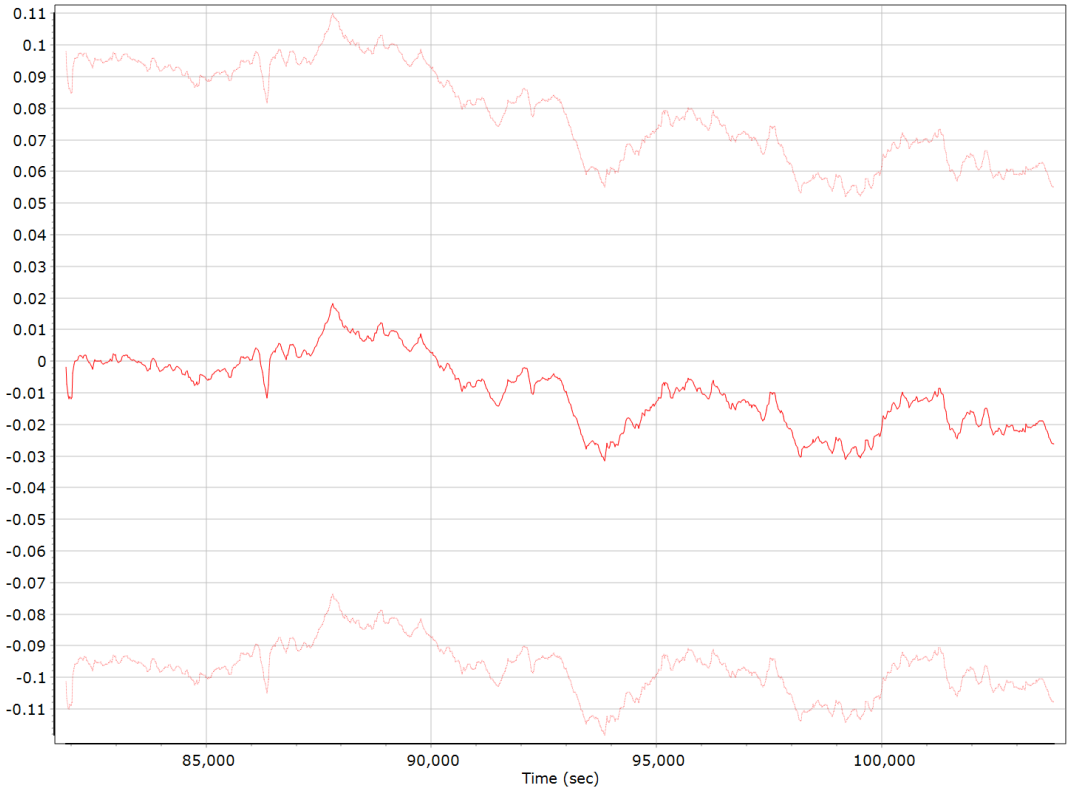


Z Accelerometer Scale Error (ppm)

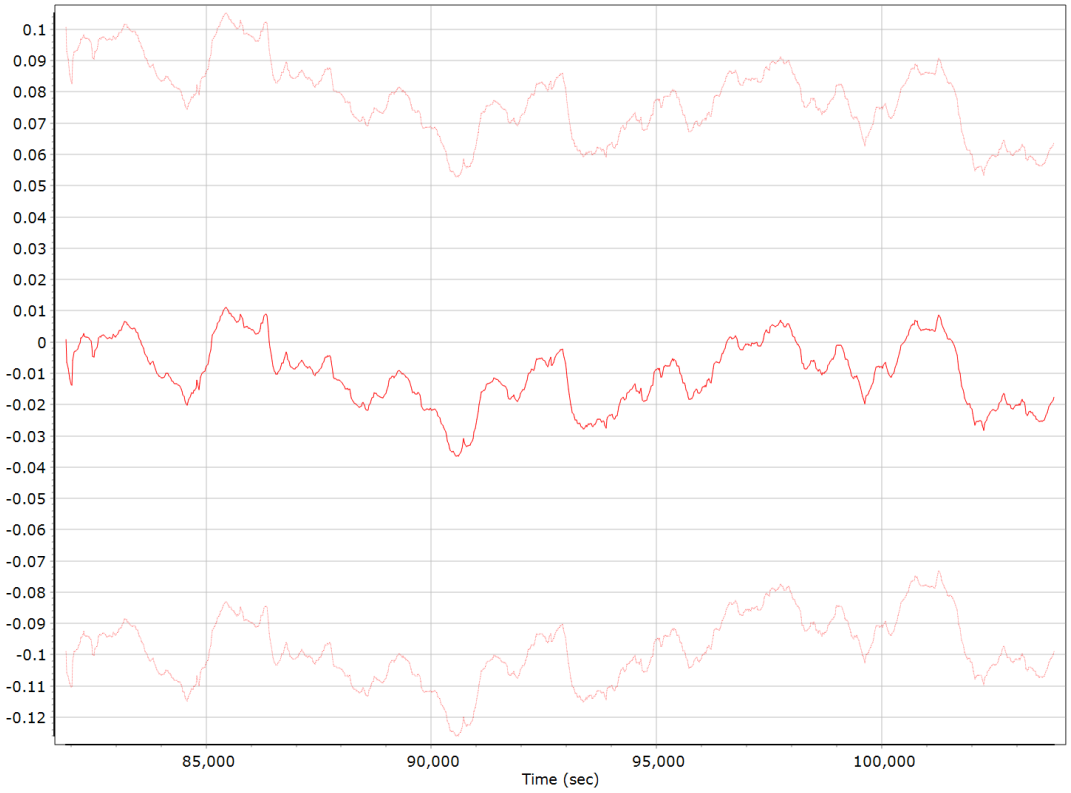
Gyro Bias (deg/h)



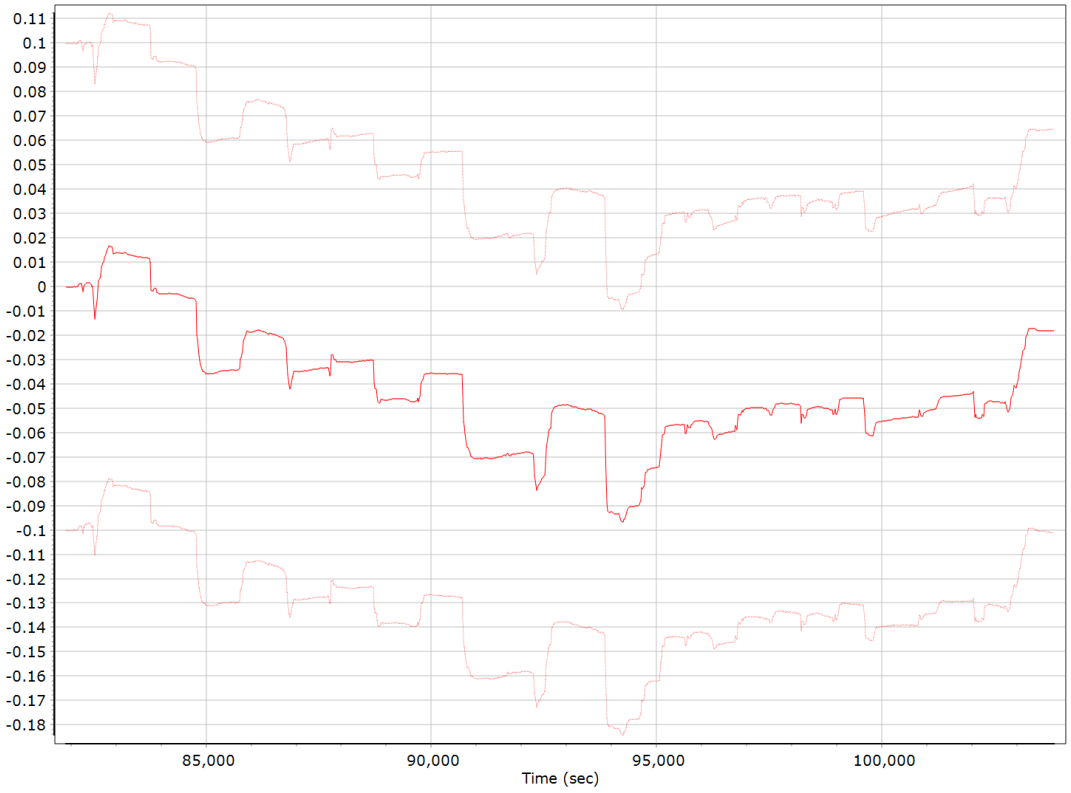
X Gyro Bias (deg/h)



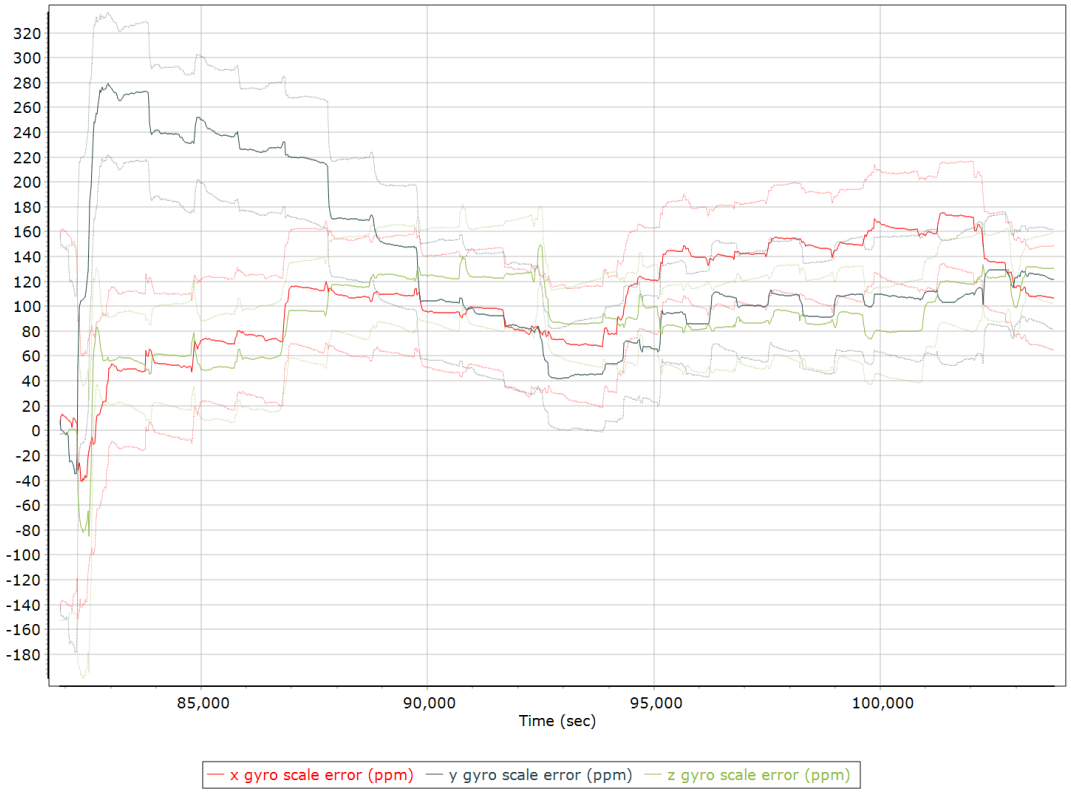
Y Gyro Bias (deg/h)



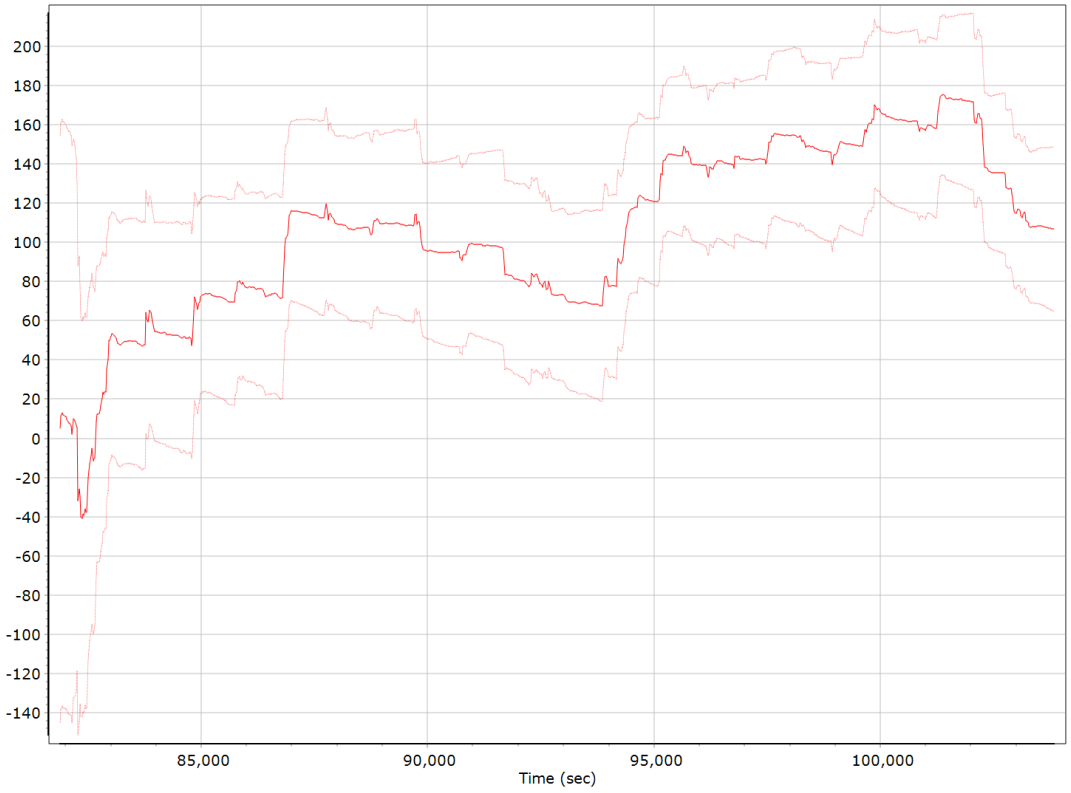
Z Gyro Bias (deg/h)



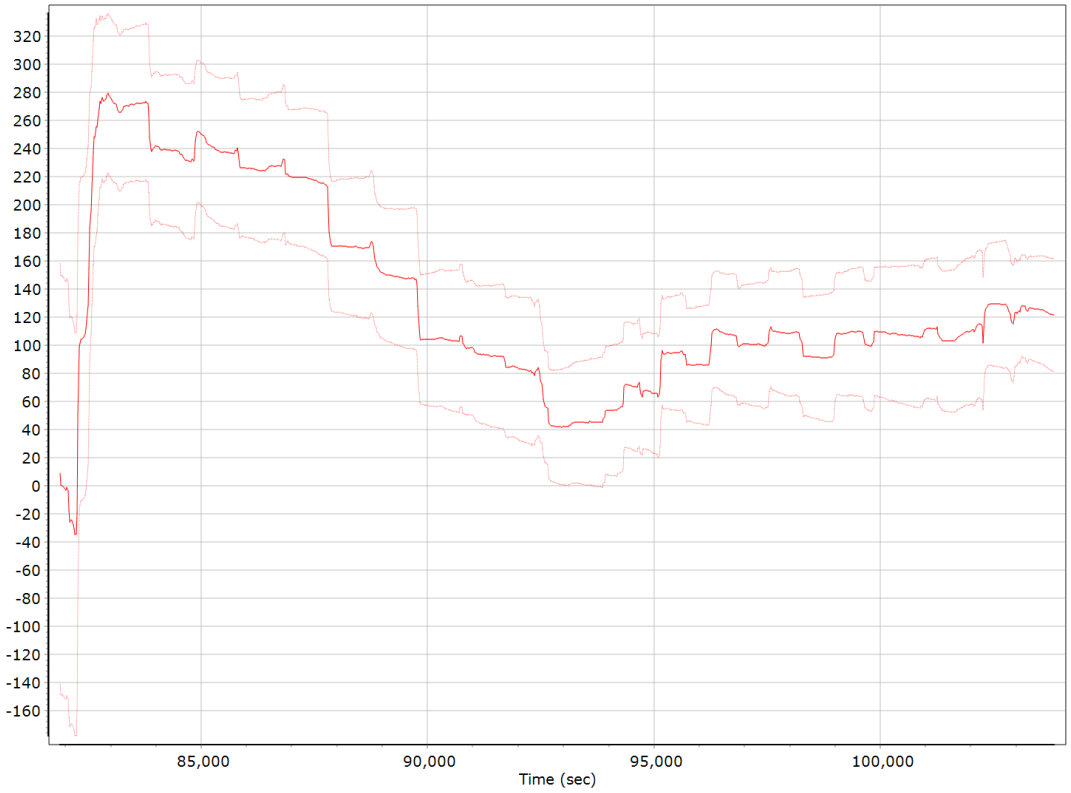
Gyro Scale Error (ppm)



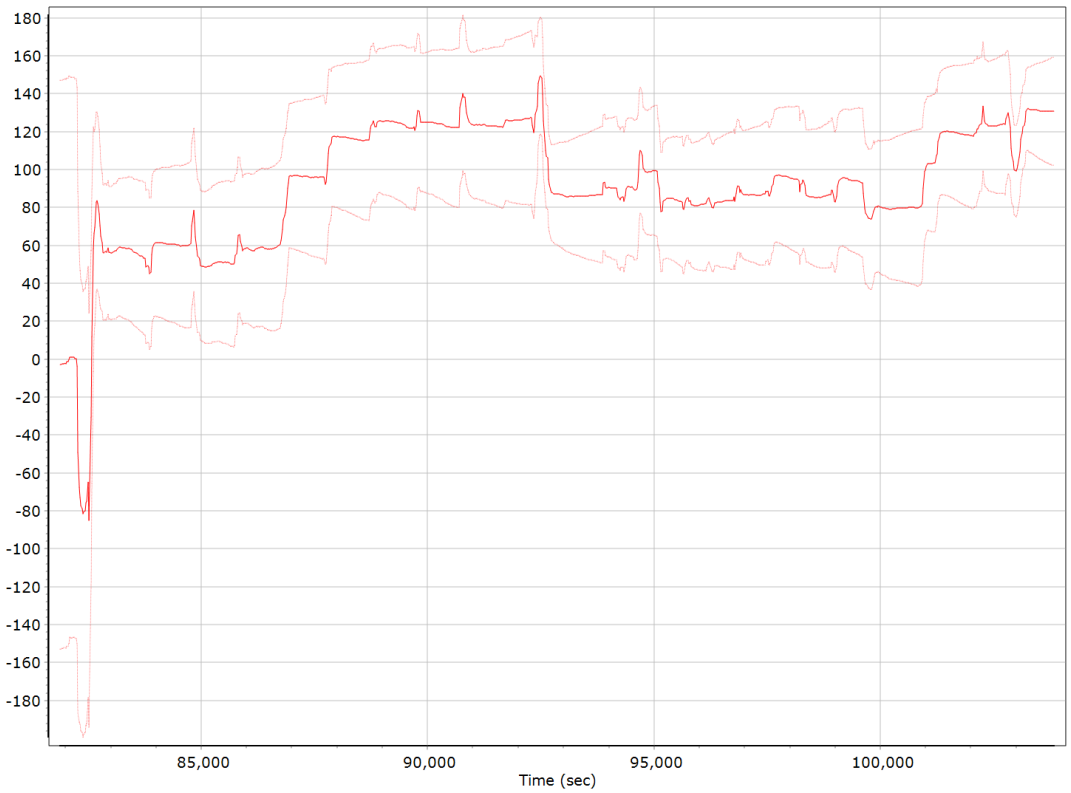
X Gyro Scale Error (ppm)



Y Gyro Scale Error (ppm)

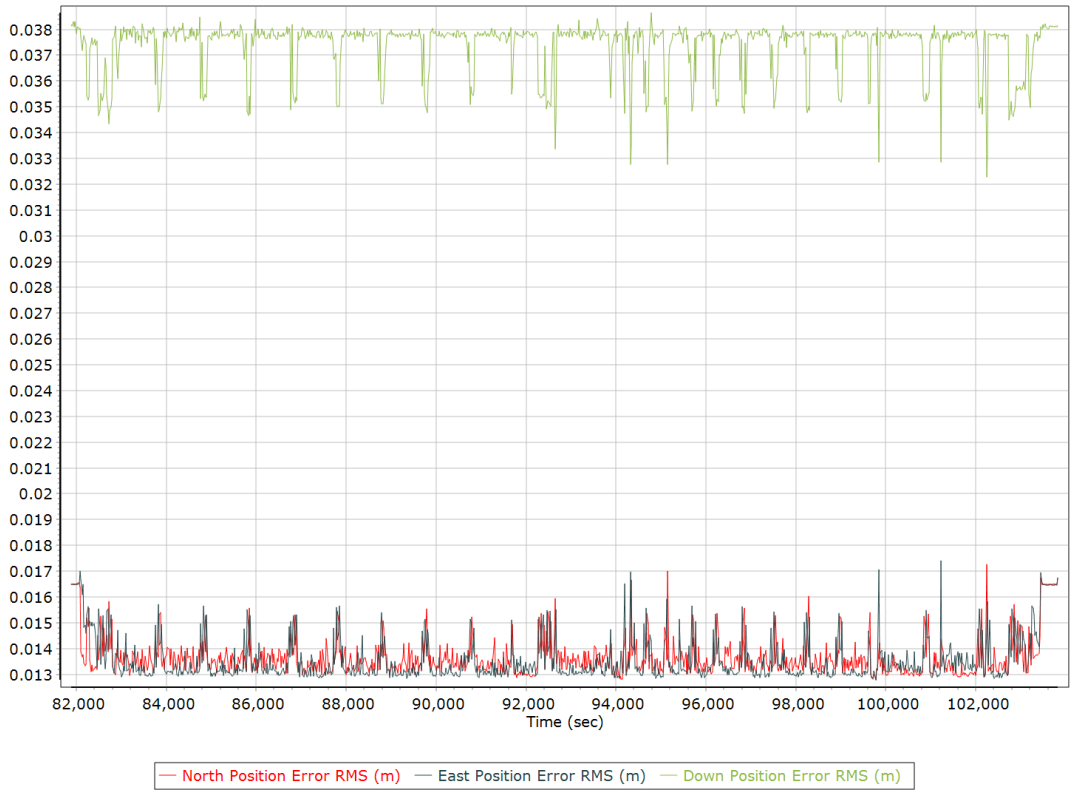


Z Gyro Scale Error (ppm)

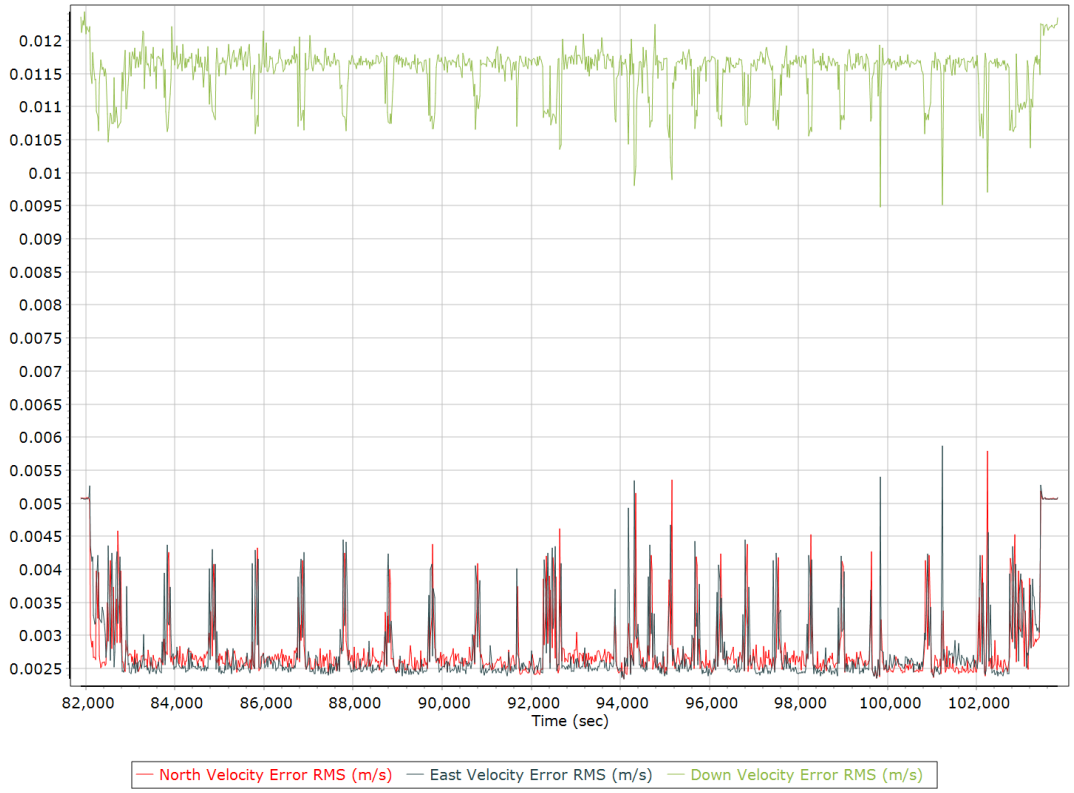


Smoothed Performance Metrics

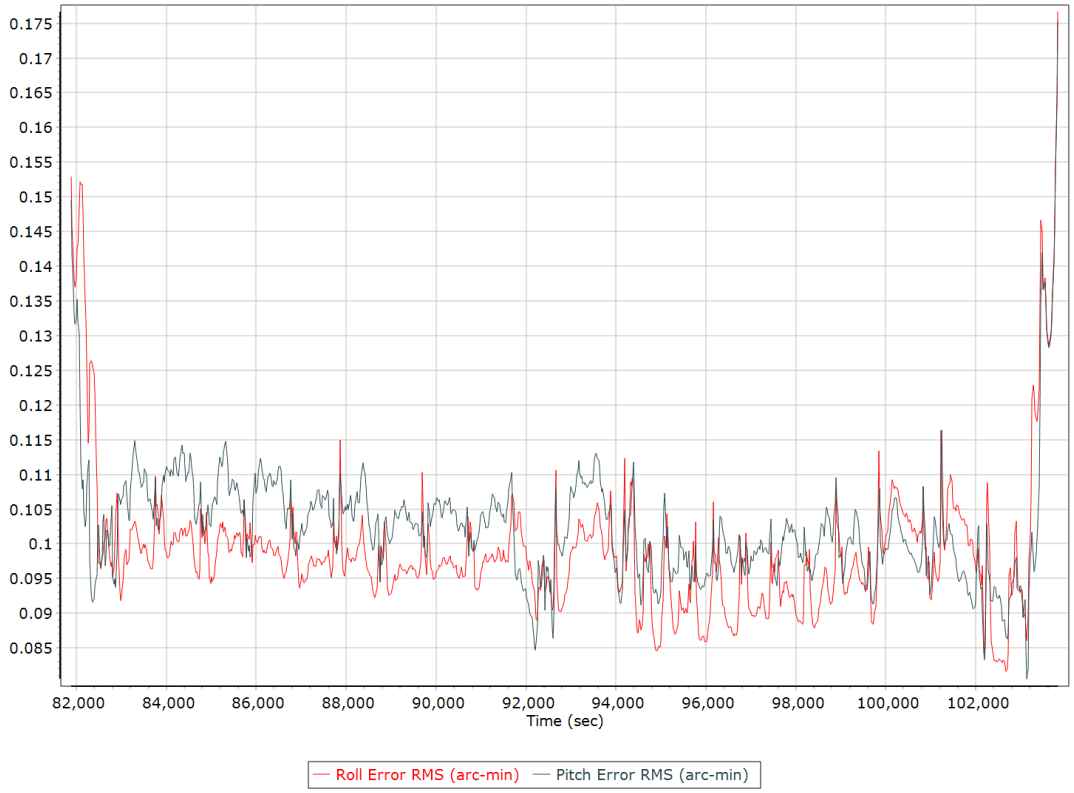
Position Error RMS (m)



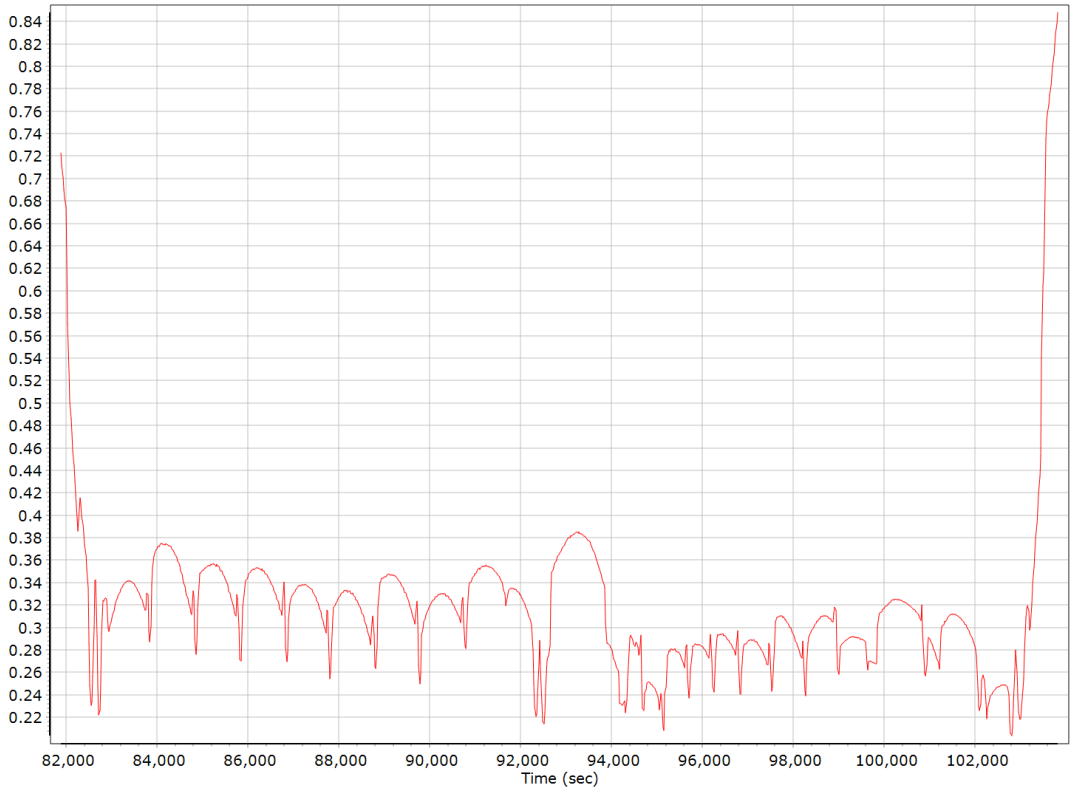
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

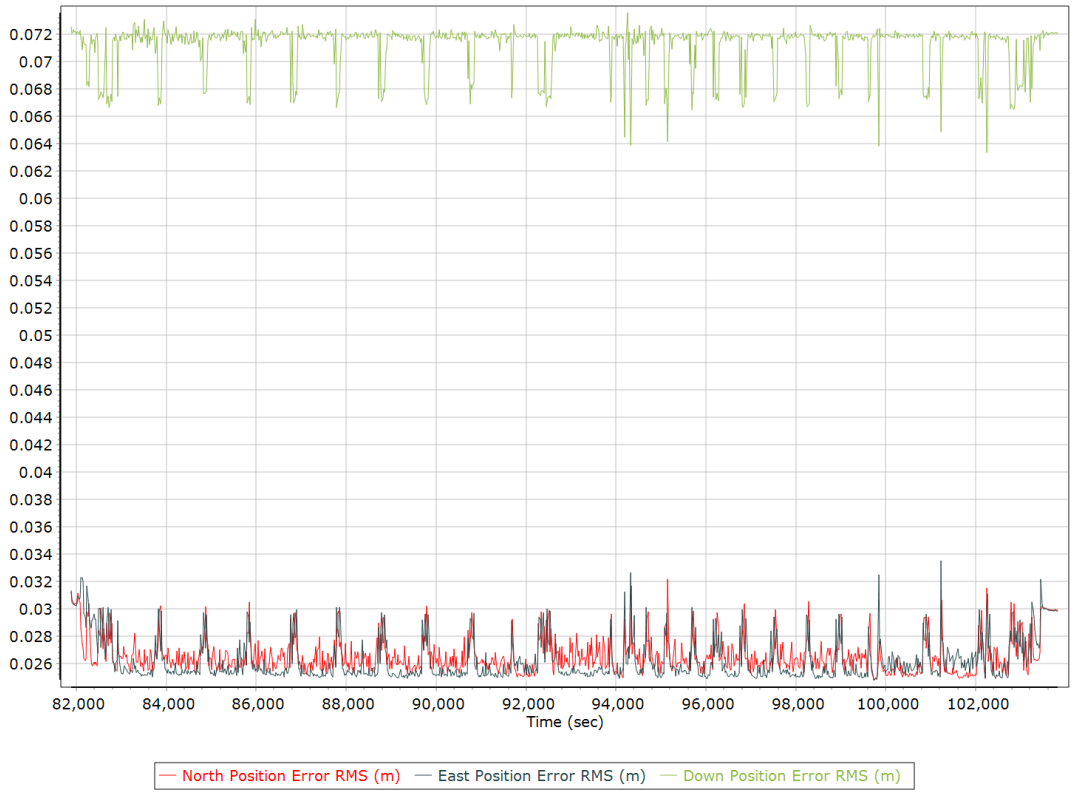


Heading Error RMS (arc-min)

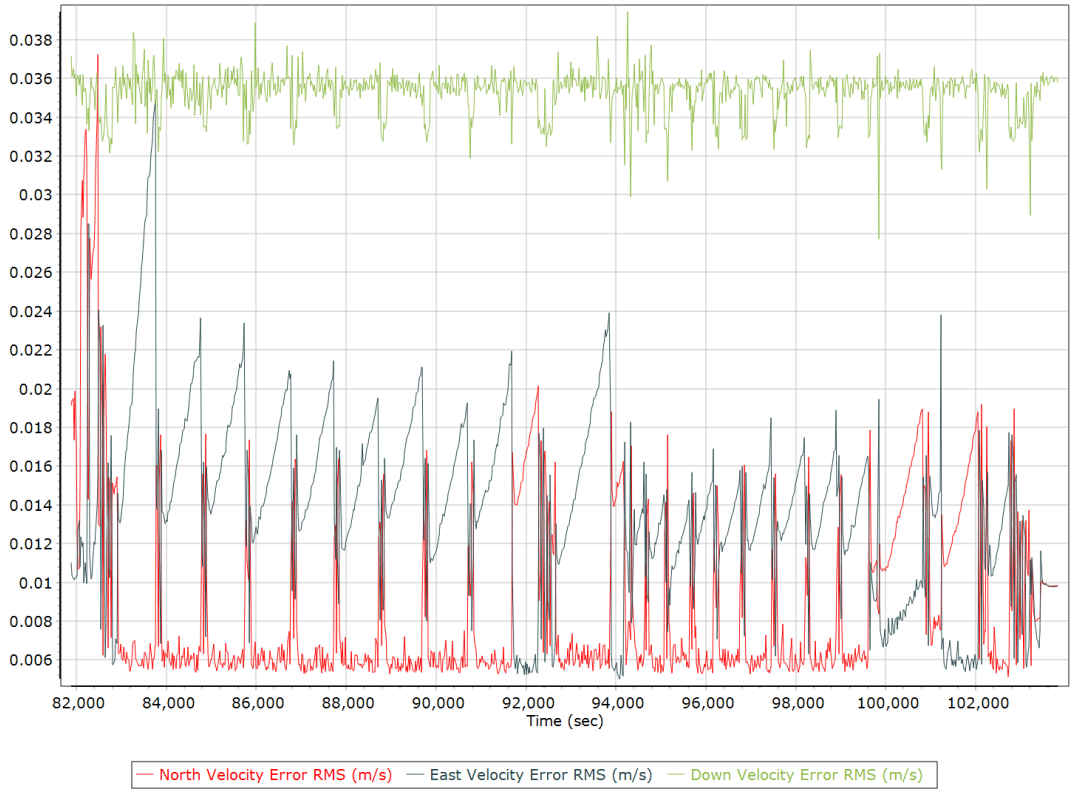


Forward Processed Performance Metrics

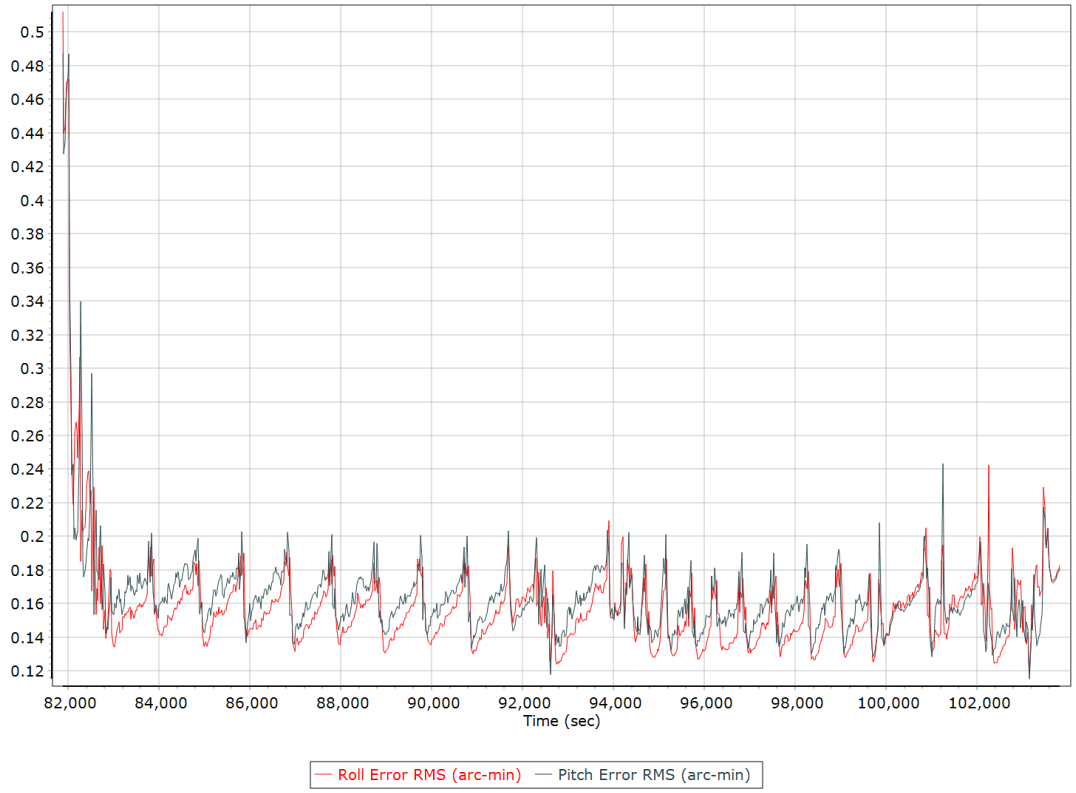
Position Error RMS (m)



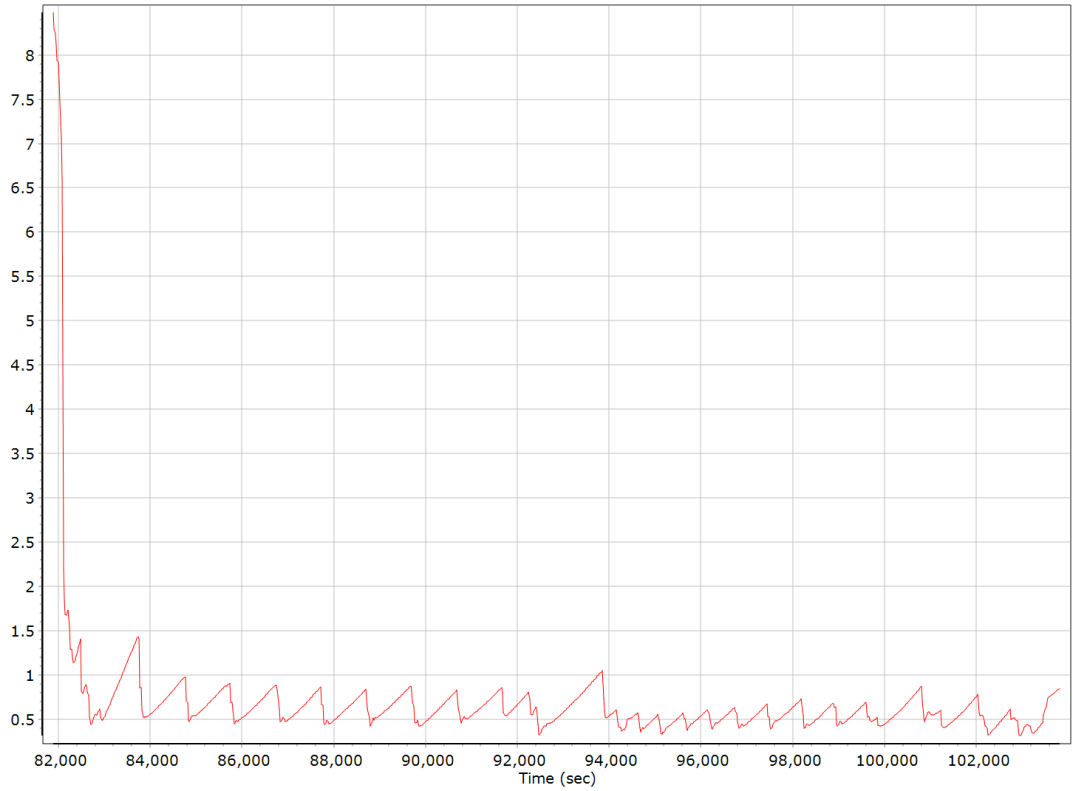
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

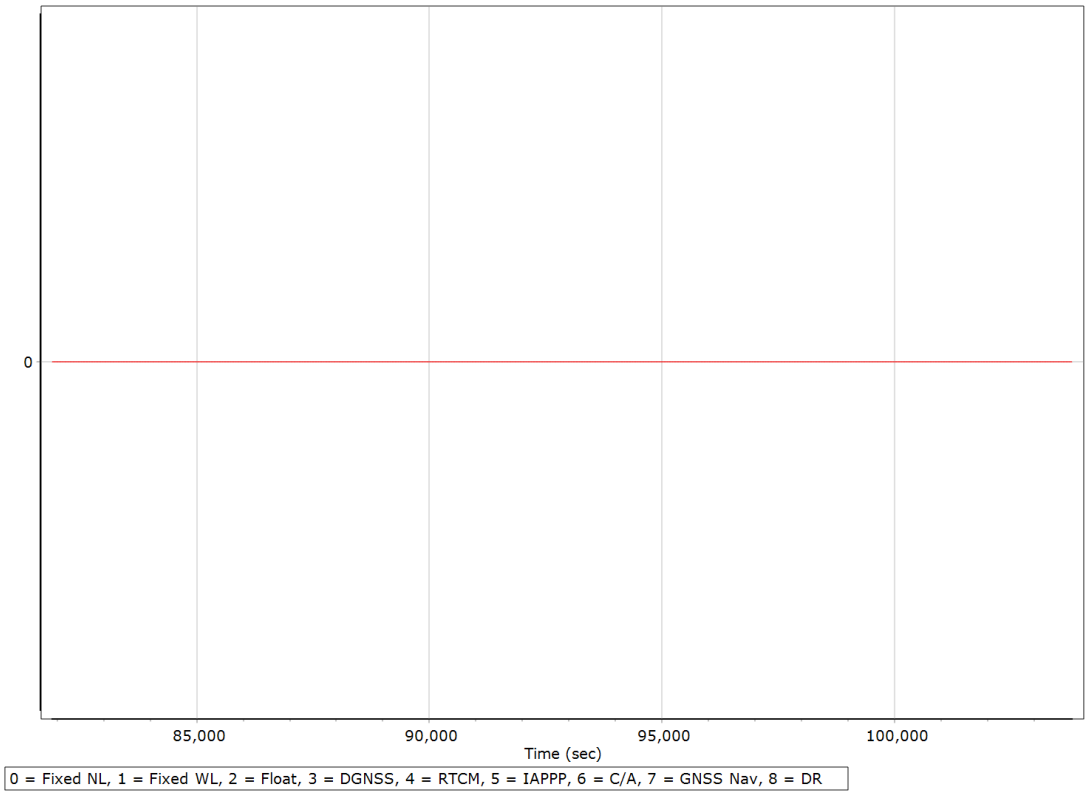


Heading Error RMS (arc-min)

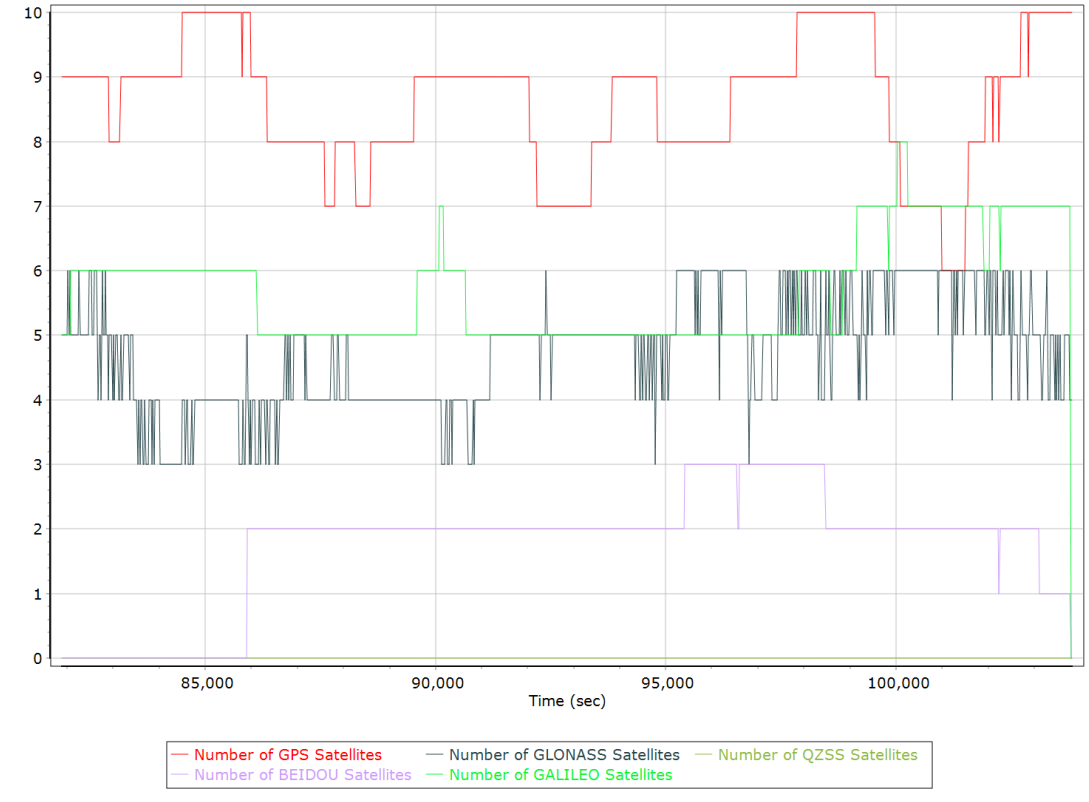


Forward Processed Solution Status

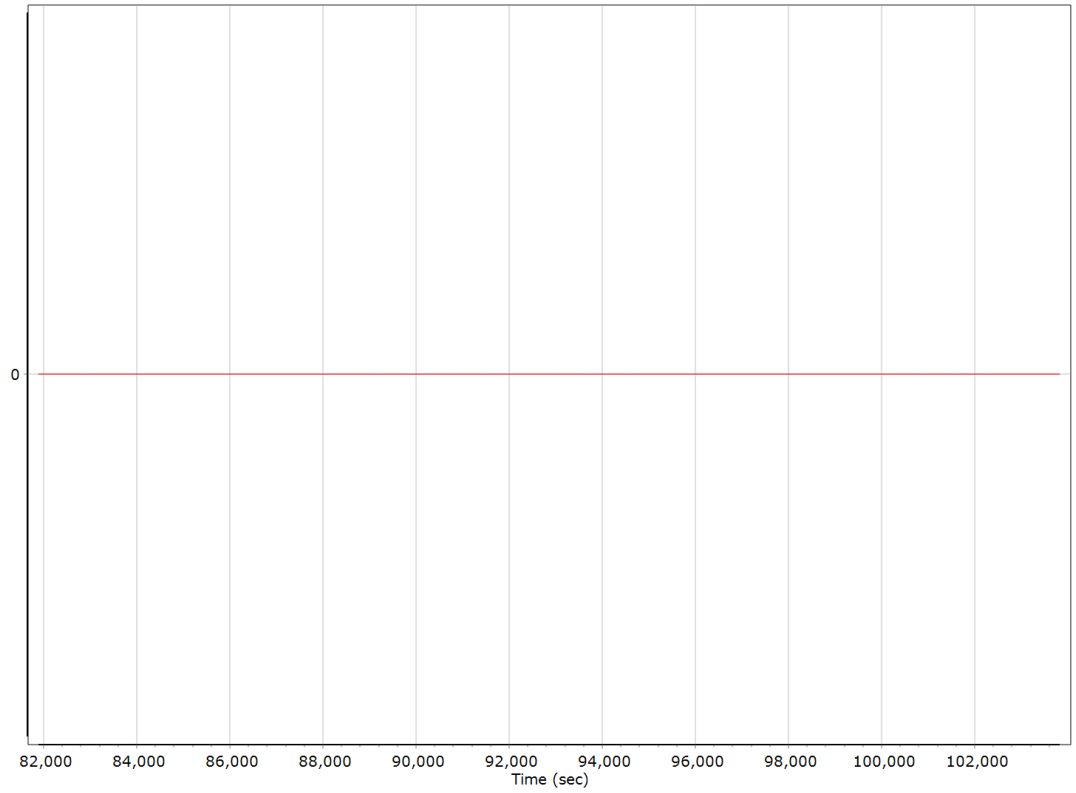
Processing Mode



Number of Satellites



Baseline Length



General Information

Mission Information

Project name	05232022A_3543
Processing date	2022-05-25 15:06:45
Mission date	2022-05-23 11:03:41
Mission duration	05:41:24.942
Processing mode	IN-Fusion PP-RTX

Rover Hardware Information

Product	POS AV 610 VER6 HW2.5-12
Serial number	S/N9683
IMU type	57
Receiver type	BD982
Antenna type	AV59

Project File List

Rover Data Files

File name	File type
4322143a.001	POS Data
4322143a.002	POS Data
4322143a.003	POS Data
4322143a.004	POS Data
4322143a.005	POS Data
4322143a.006	POS Data
4322143a.007	POS Data
4322143a.008	POS Data
4322143a.009	POS Data
4322143a.010	POS Data
4322143a.011	POS Data
4322143a.012	POS Data
4322143a.013	POS Data
4322143a.014	POS Data
4322143a.015	POS Data
4322143a.016	POS Data
4322143a.017	POS Data
4322143a.018	POS Data
4322143a.019	POS Data
4322143a.020	POS Data
4322143a.021	POS Data
4322143a.022	POS Data
4322143a.023	POS Data
4322143a.024	POS Data
4322143a.025	POS Data
4322143a.026	POS Data
4322143a.027	POS Data
4322143a.028	POS Data
4322143a.029	POS Data
4322143a.030	POS Data
4322143a.031	POS Data
4322143a.032	POS Data
4322143a.033	POS Data
4322143a.034	POS Data
4322143a.035	POS Data
4322143a.036	POS Data
4322143a.037	POS Data
4322143a.038	POS Data
4322143a.039	POS Data
4322143a.040	POS Data
4322143a.041	POS Data
4322143a.042	POS Data
4322143a.043	POS Data
4322143a.044	POS Data
4322143a.045	POS Data
4322143a.046	POS Data
4322143a.047	POS Data
4322143a.048	POS Data
4322143a.049	POS Data
4322143a.050	POS Data
4322143a.051	POS Data
4322143a.052	POS Data
4322143a.053	POS Data
4322143a.054	POS Data
4322143a.055	POS Data
4322143a.056	POS Data
4322143a.057	POS Data
4322143a.058	POS Data
4322143a.059	POS Data

File name	File type
4322143a.060	POS Data
4322143a.061	POS Data
4322143a.062	POS Data
4322143a.063	POS Data
4322143a.064	POS Data
4322143a.065	POS Data

Input Files

File Name	File Type
Ephm1430.22g	GLONASS Broadcast Ephemeris
Ephm1430.22n	GPS Broadcast Ephemeris

Output Files

Filename	File type
sbet_05232022A_3543.out	SBET Trajectory File

Rover Data Summary

First raw data file	4322143a.001		
Last raw data file	4322143a.065		
Start GPS week	2211		
Start time	126202.833 (5/23/2022 11:03:22 AM)		
End time	146687.775 (5/23/2022 4:44:47 PM)		
Start of fine alignment	126387.680 (5/23/2022 11:06:27 AM)		
Available subsystems	Primary GNSS, Gimbal, IMU		
POS Event Input	None		
Correction data	None		
IMU Installation Lever Arms & Mounting Angles			
Gimbal to IMU lever arm (m)	-0.034	-0.010	-0.374
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.717	-0.178	-1.265
Gimbal to Primary GNSS lever arm std dev (m)	-1.000		
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

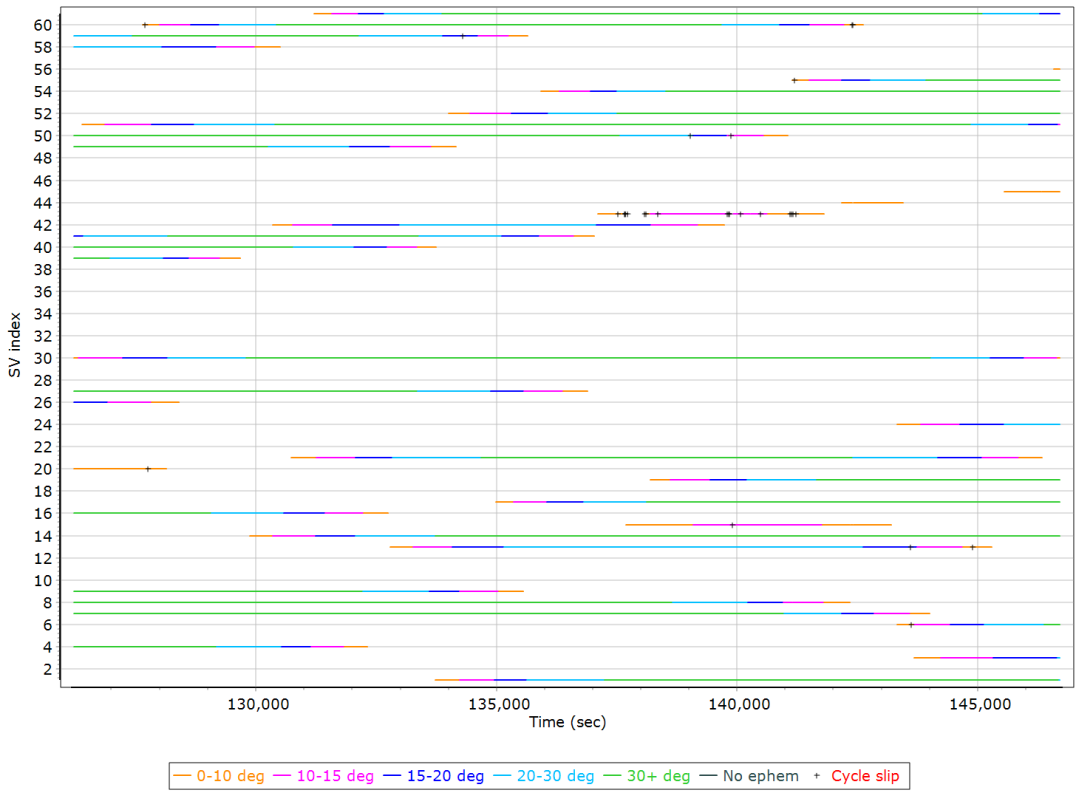
Rover Data QC

Raw IMU Import QC Summary

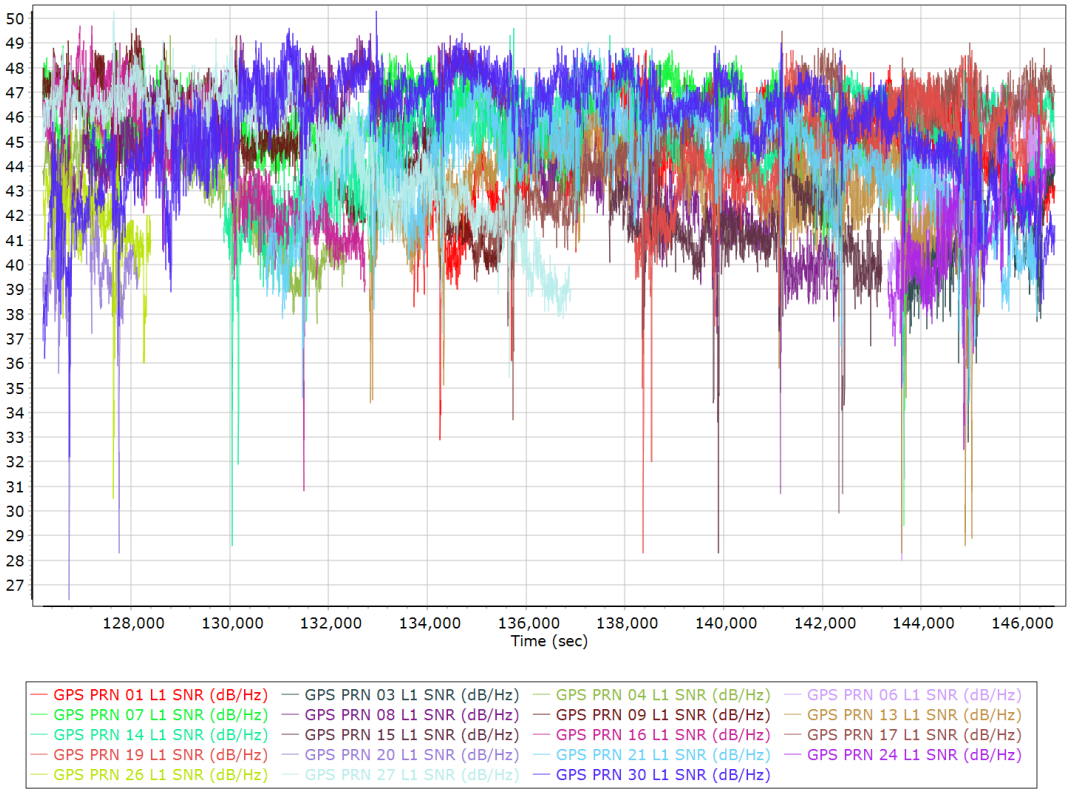
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05232022A_3543.log
IMU Records Processed	4096211
Termination Status	Normal
IMU Anomalies	0

Primary Observables & Satellite Data

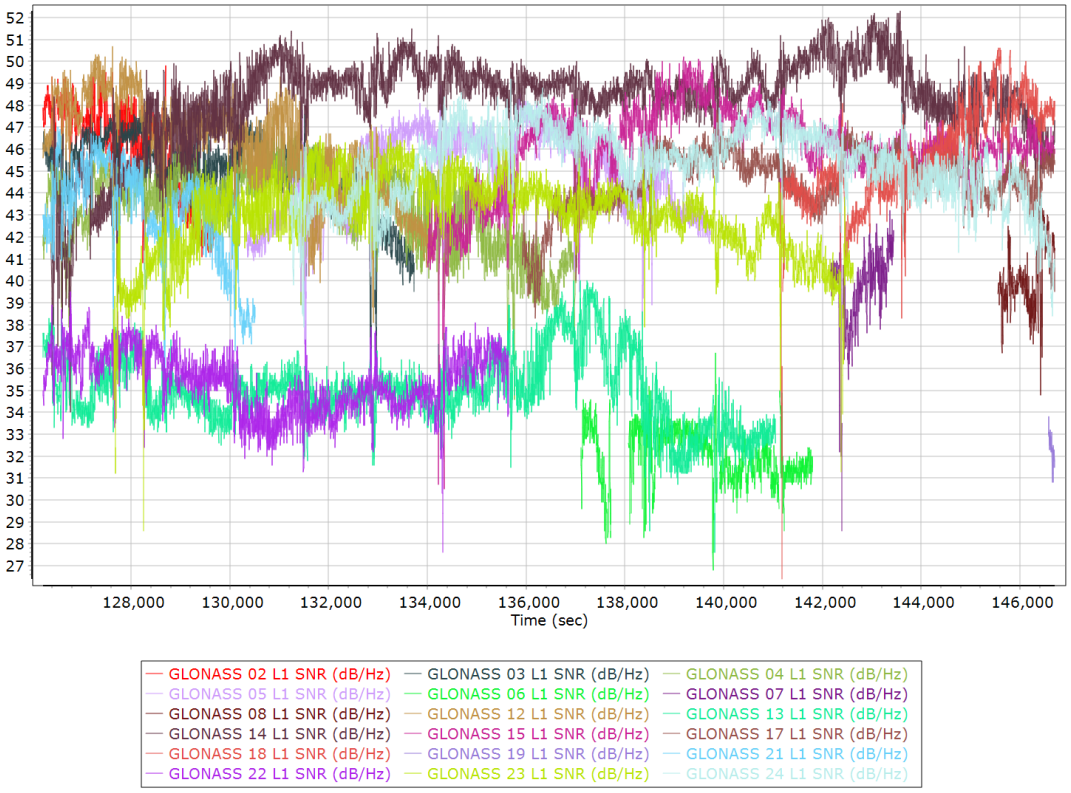
GPS/GLONASS L1 Satellite Lock/Elevation



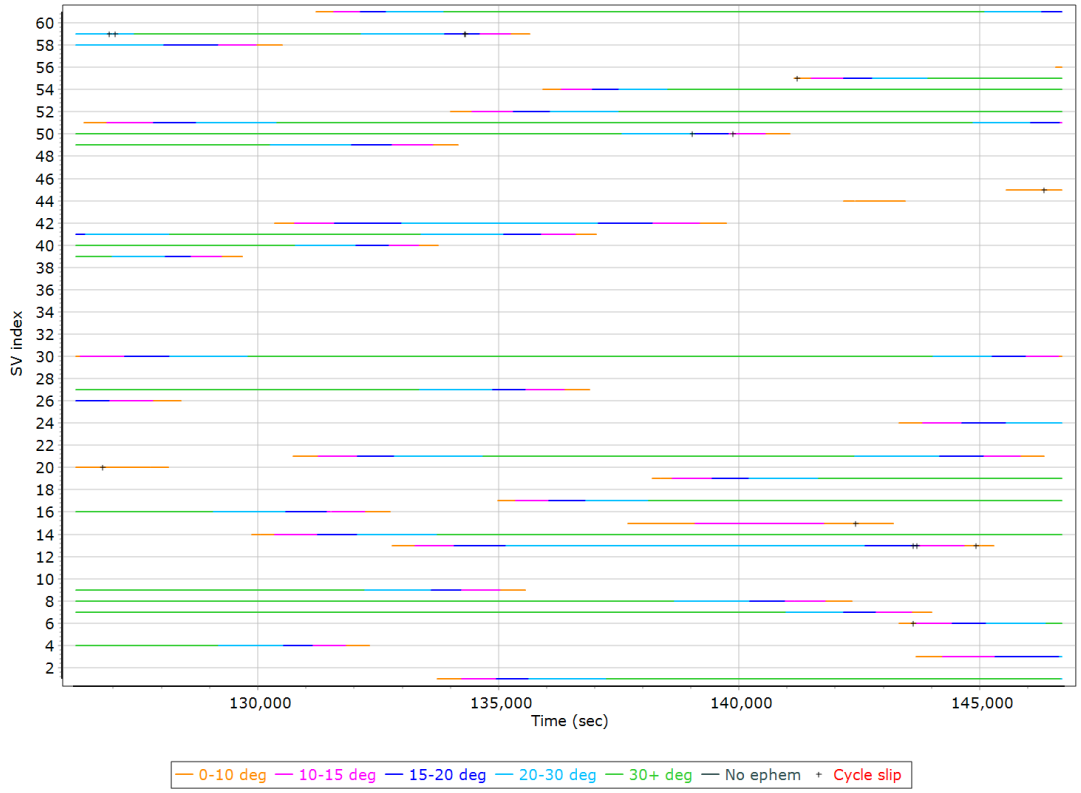
GPS L1 SNR



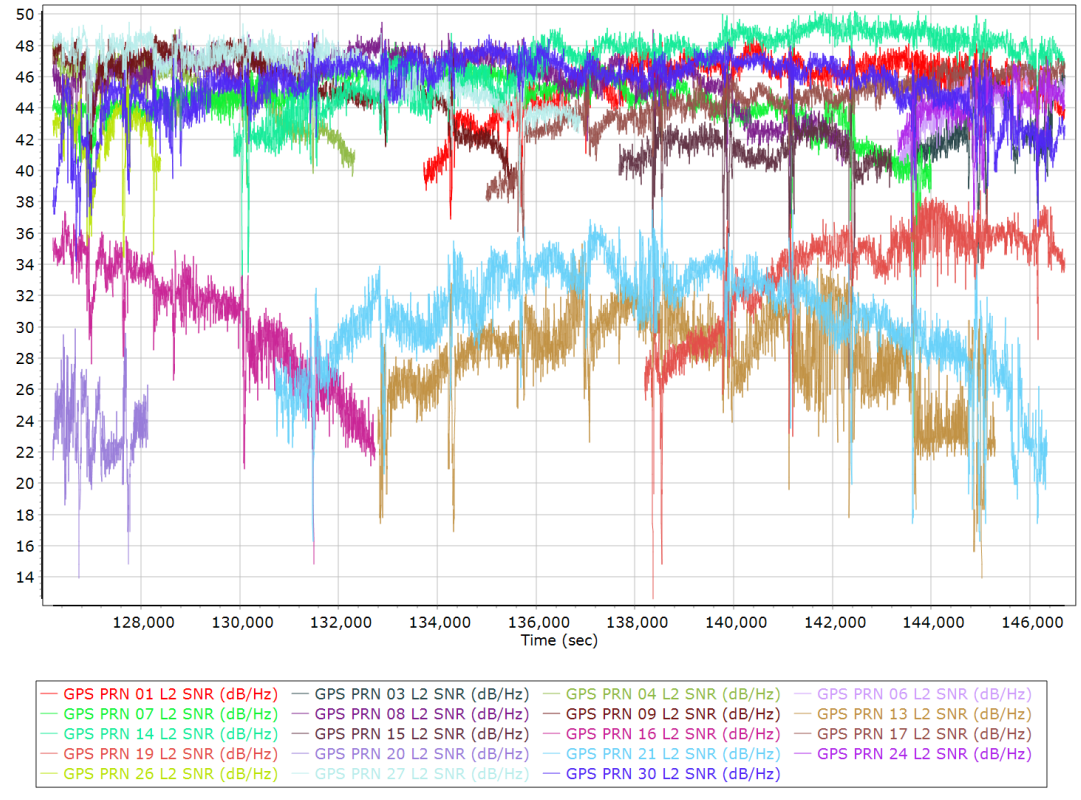
GLONASS L1 SNR



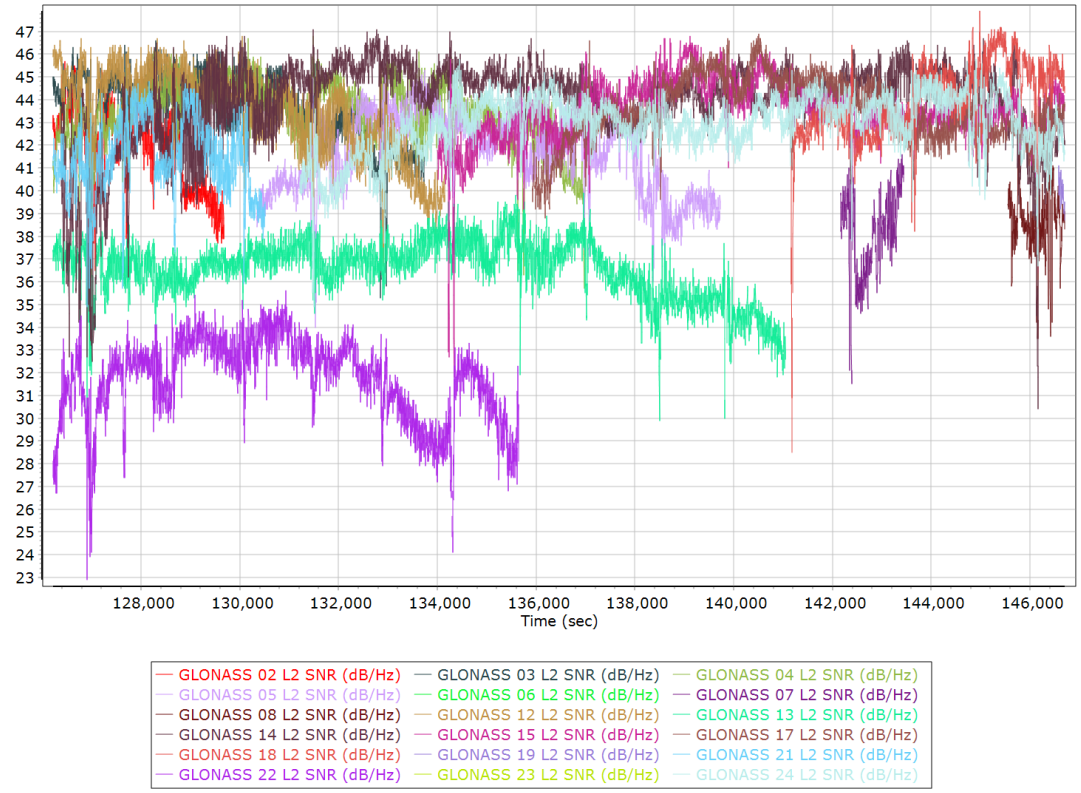
GPS/GLONASS L2 Satellite Lock/Elevation



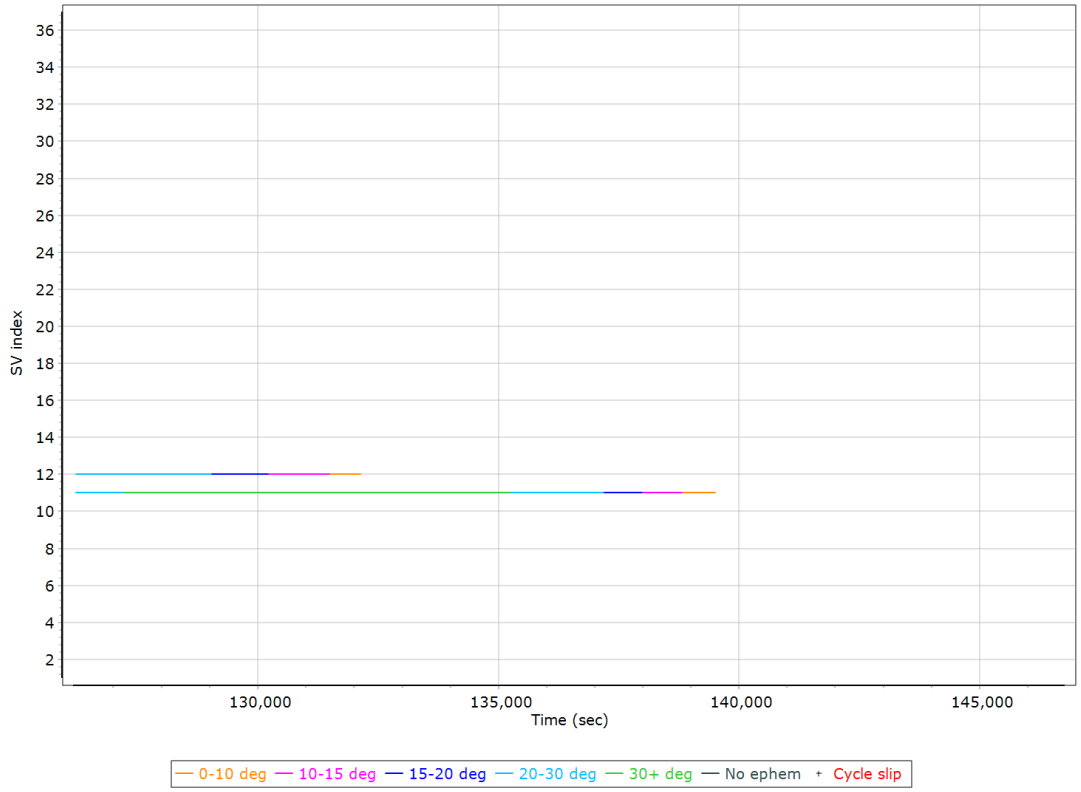
GPS L2 SNR



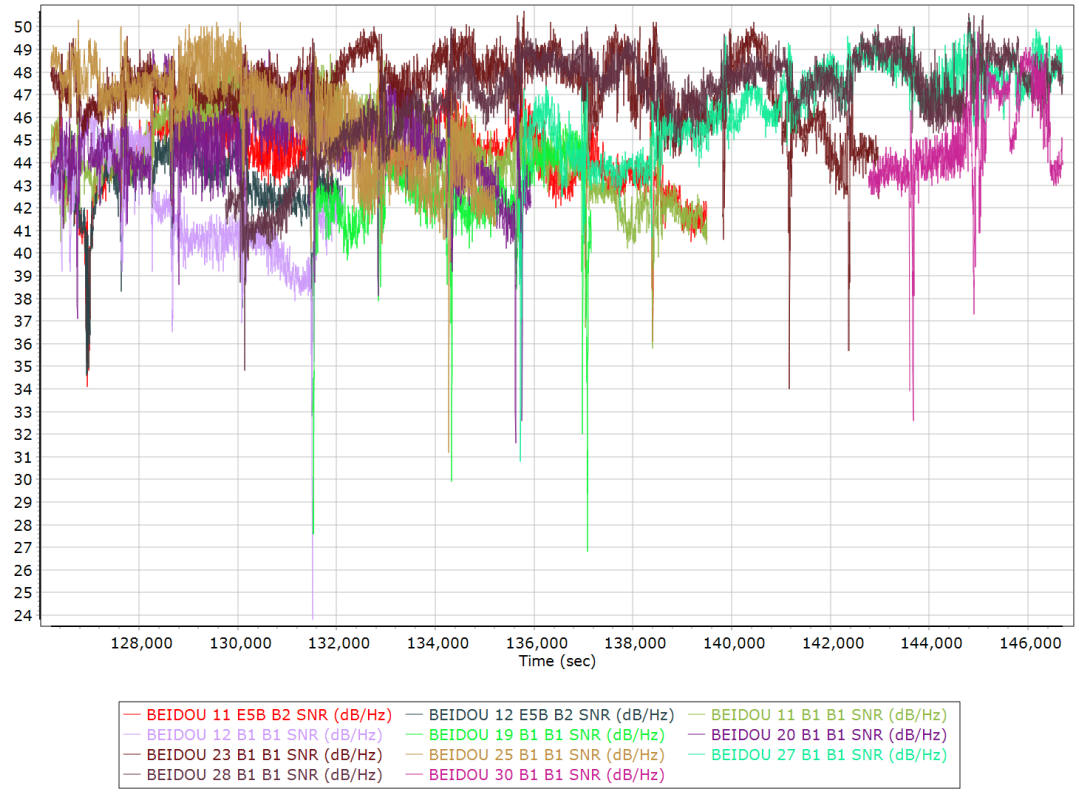
GLONASS L2 SNR



BEIDOU Satellite Lock/Elevation

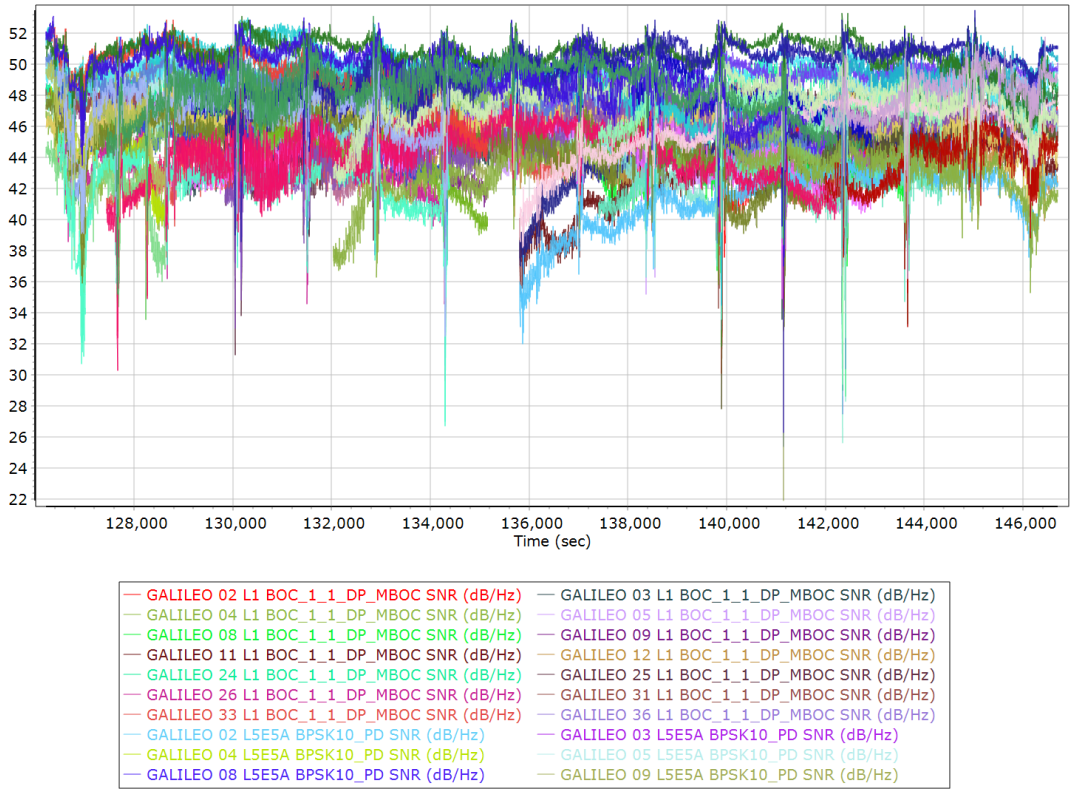


BEIDOU SNR



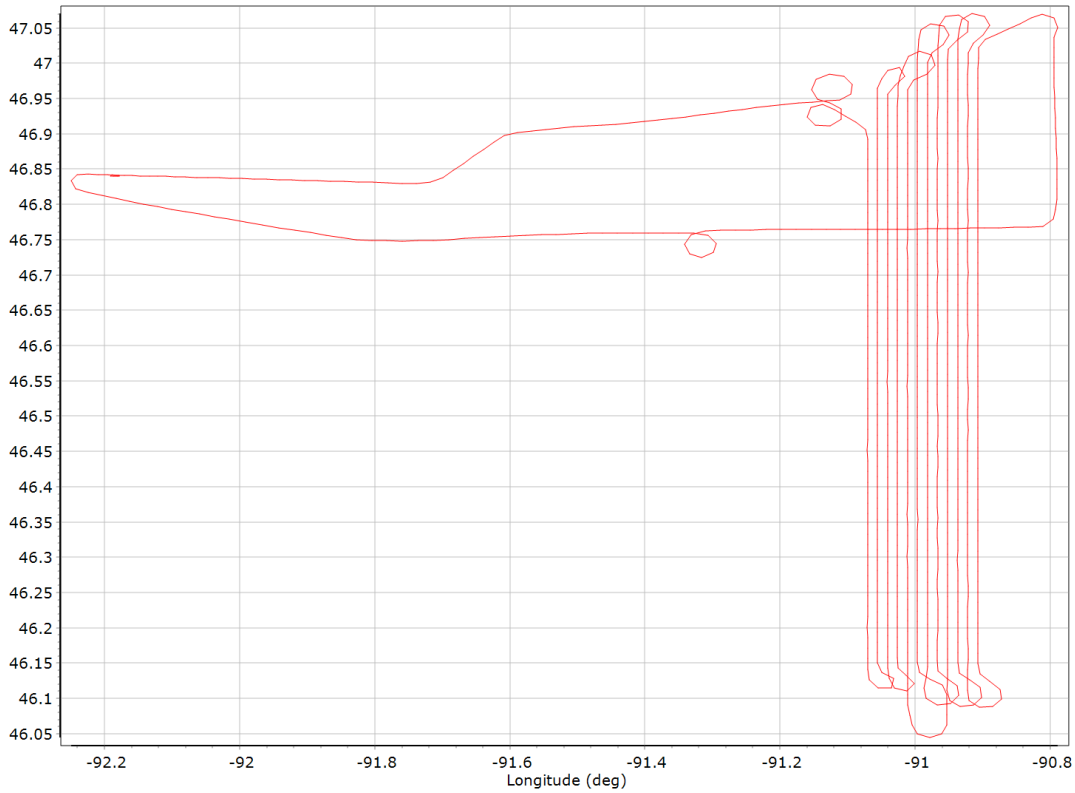
GALILEO Satellite Lock/Elevation

GALILEO SNR

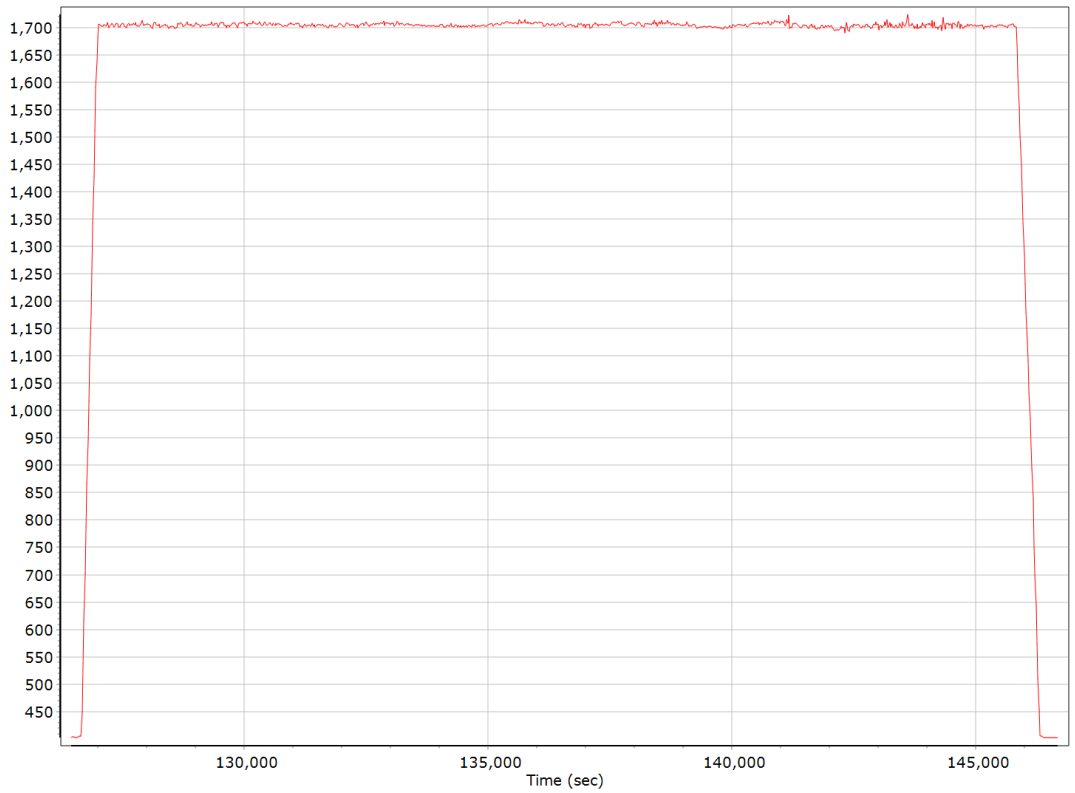

52
50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
128,000
130,000
132,000
134,000
136,000
138,000
140,000
142,000
144,000
146,000
Time (sec)
GALILEO 02 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 03 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 04 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 05 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 08 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 09 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 11 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 24 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 25 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 26 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 31 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 33 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 36 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 02 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 03 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 04 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 05 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 08 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 09 L5E5A BPSK10_PD SNR (dB/Hz)

Smoothed Trajectory Information

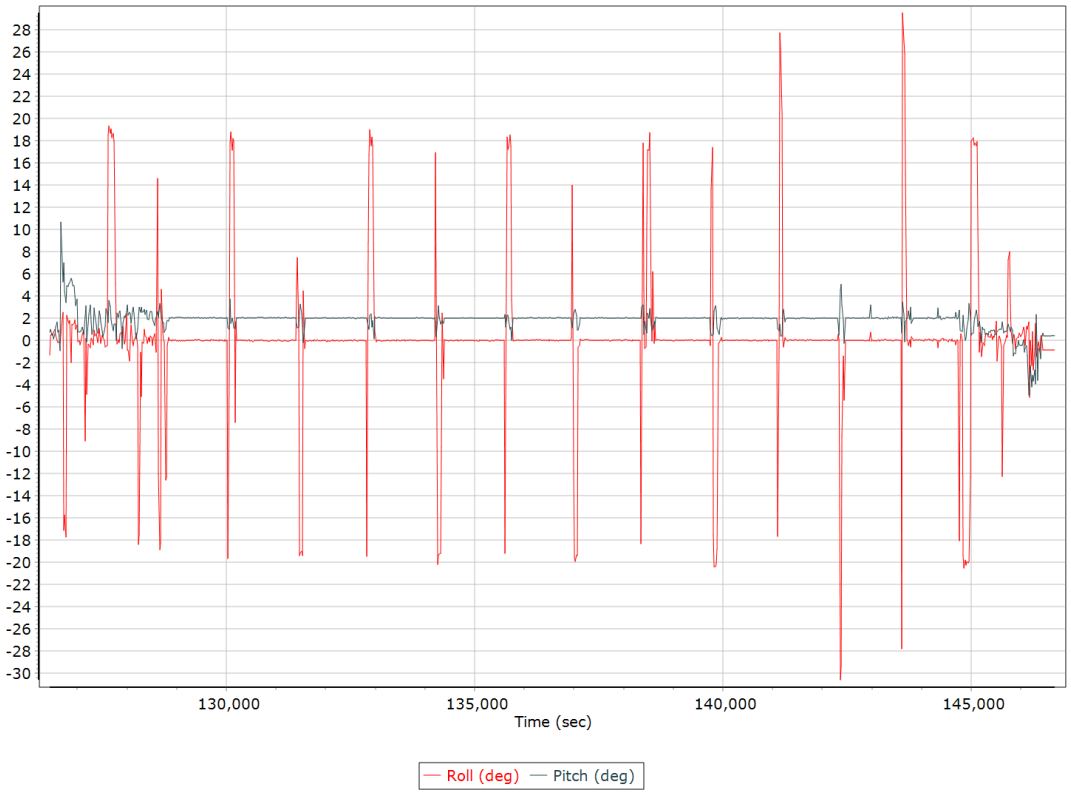
Top View



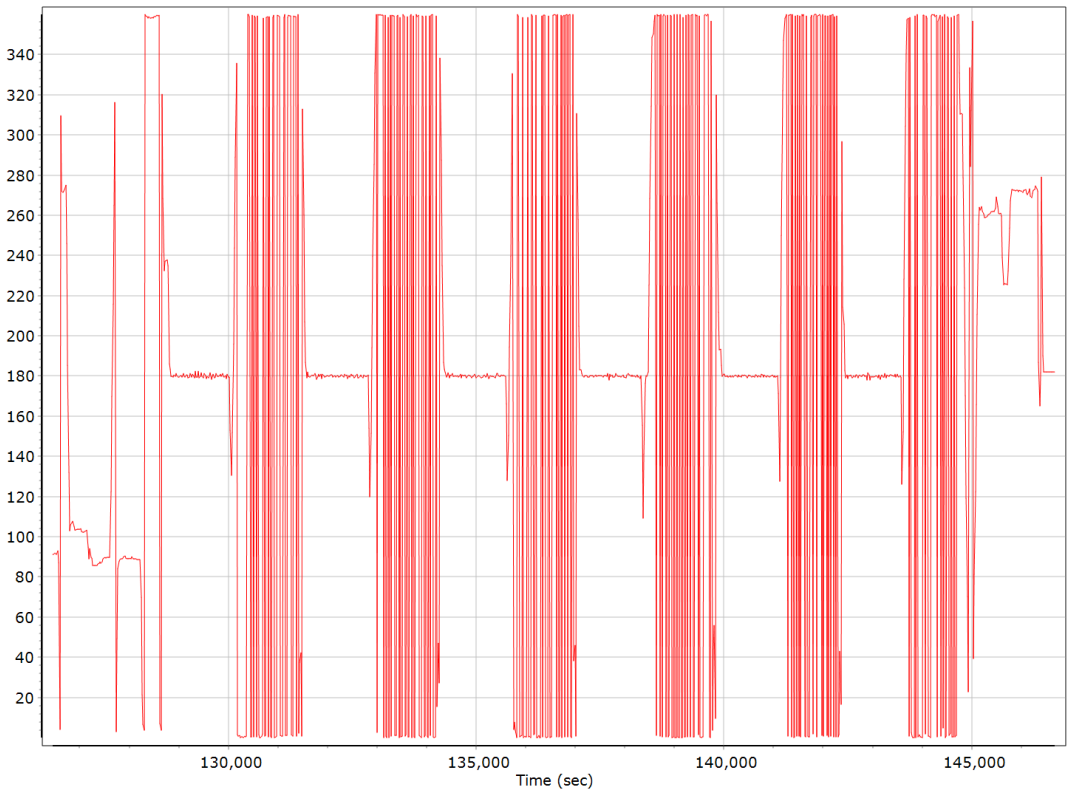
Altitude



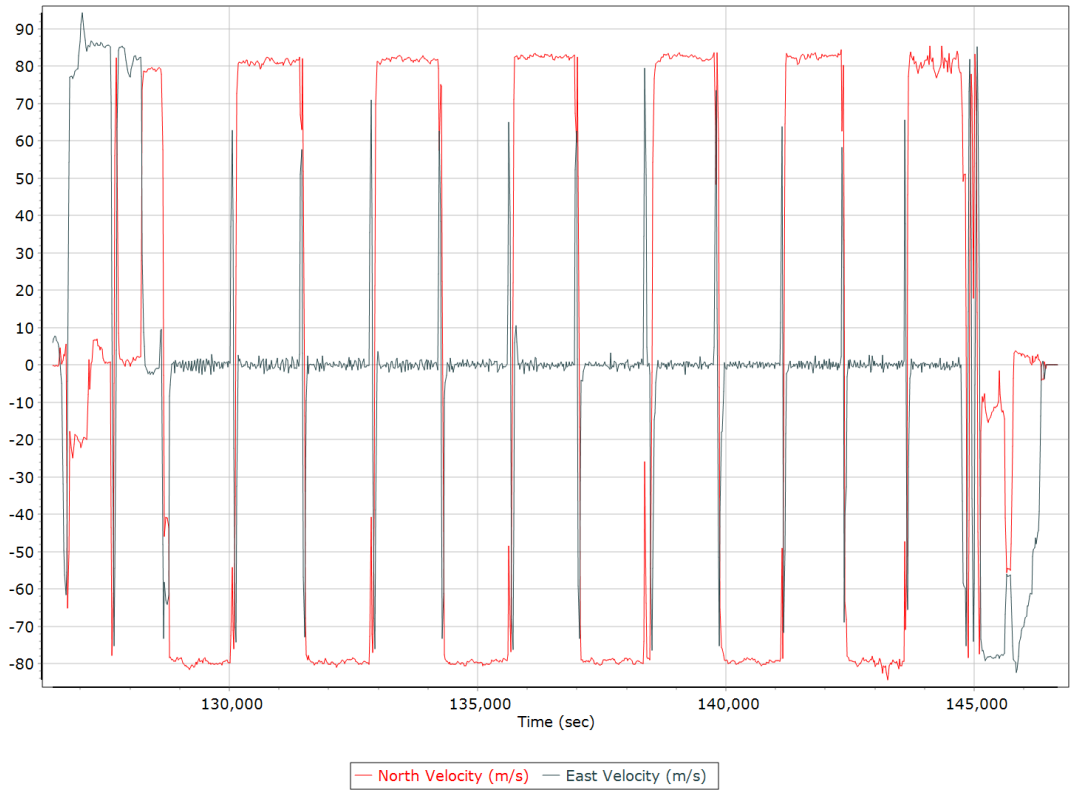
Roll/Pitch



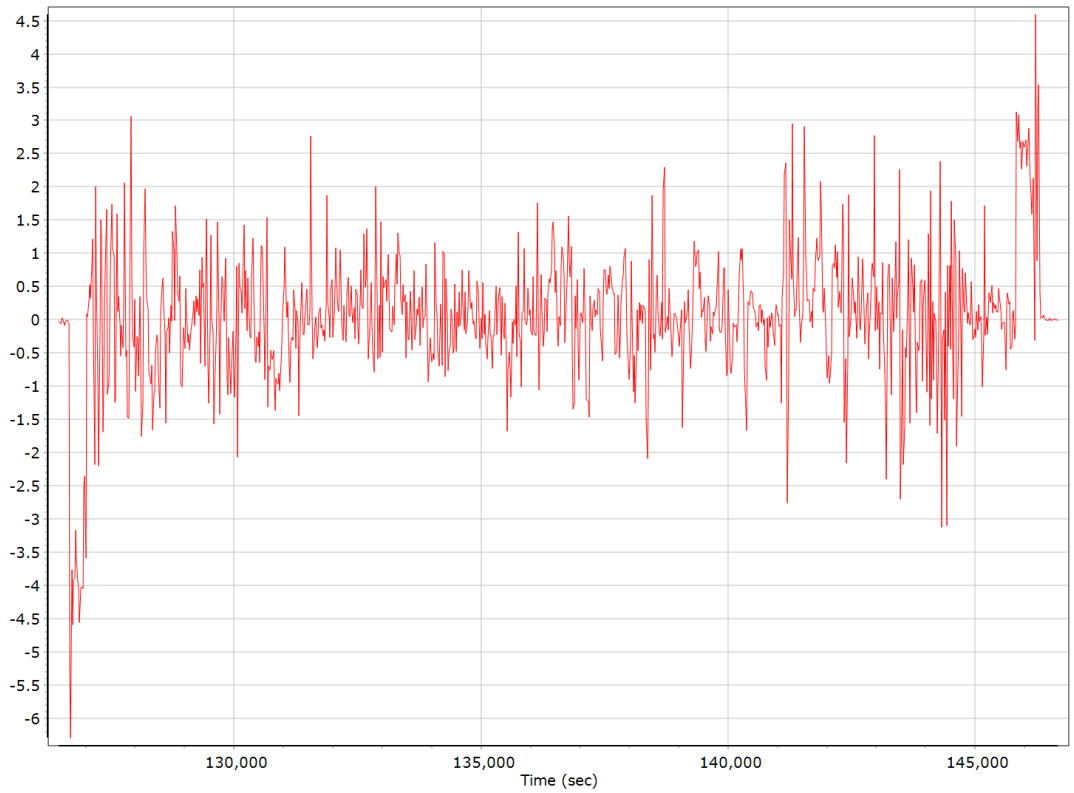
Heading



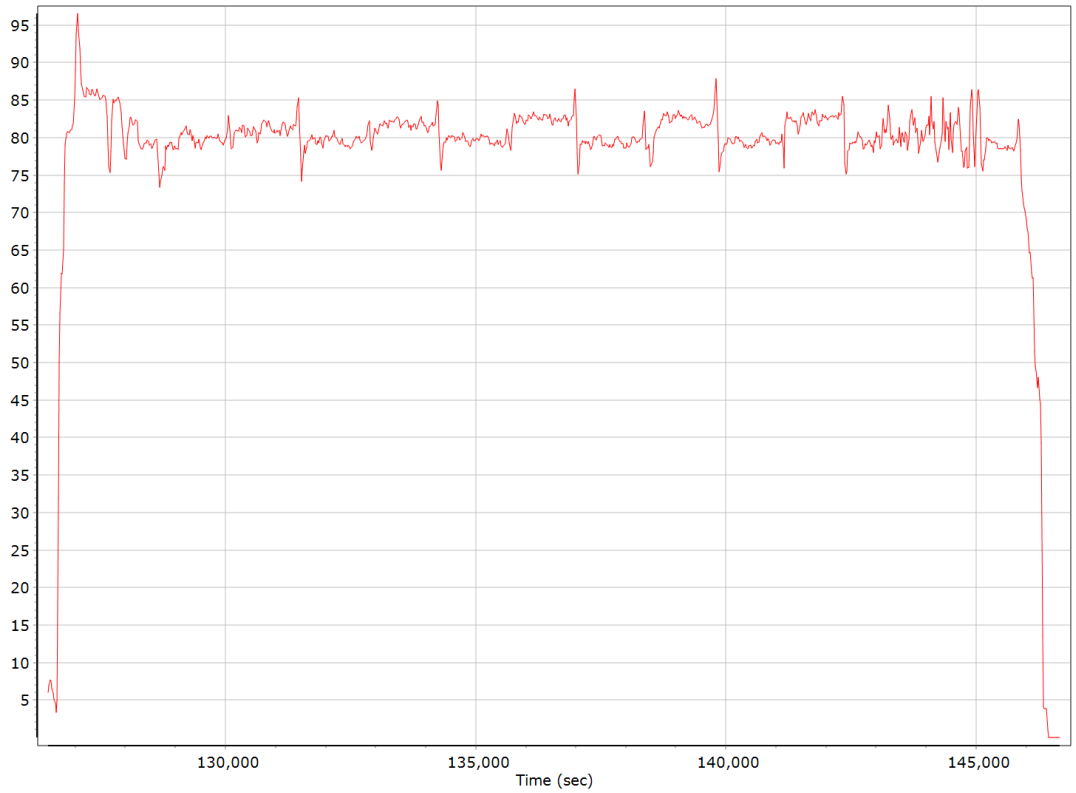
North/East Velocity



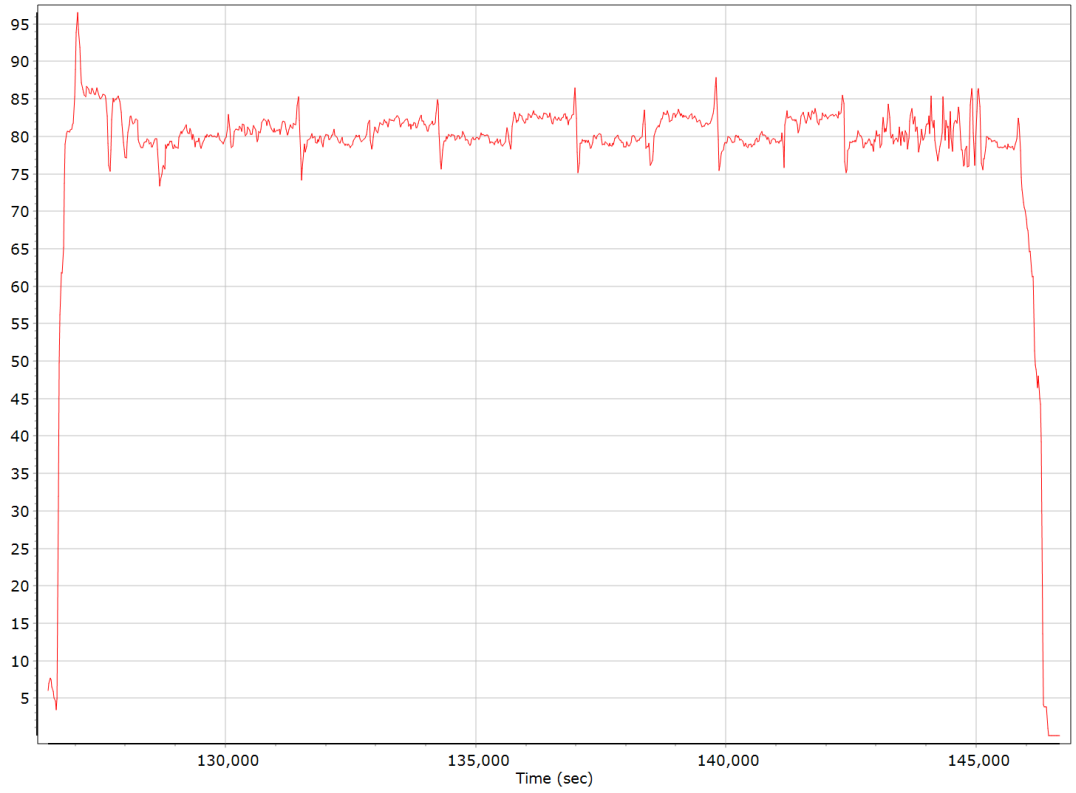
Down Velocity



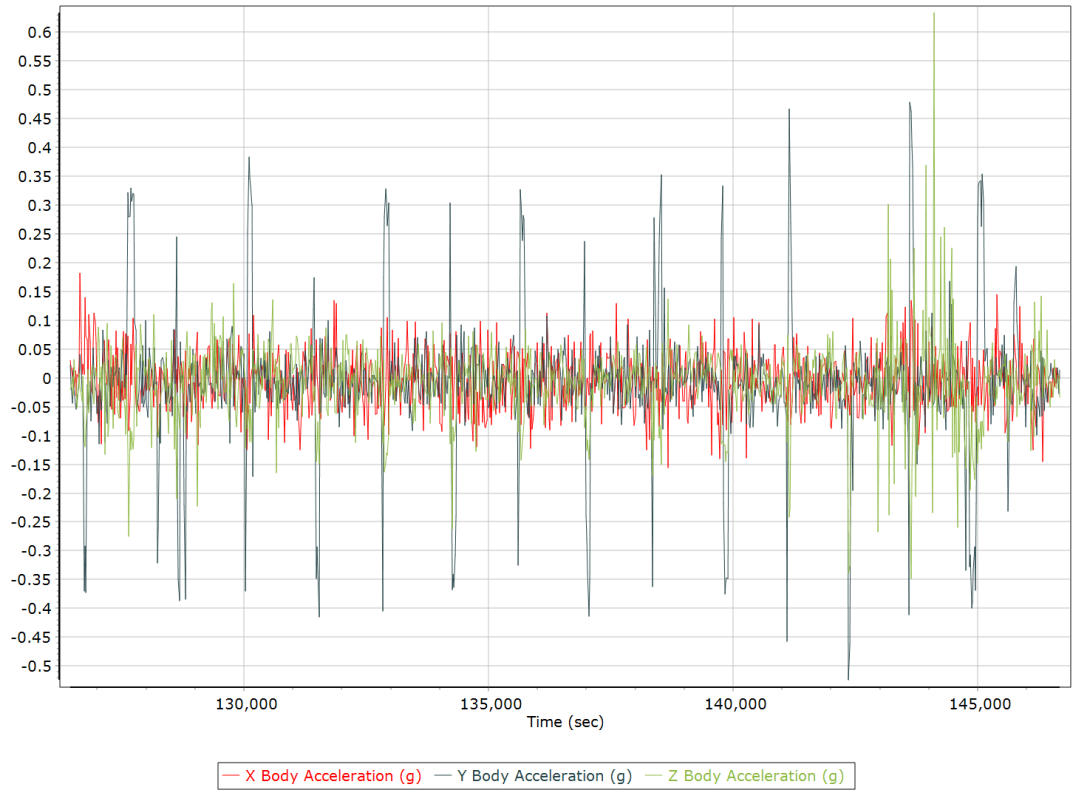
Total Speed



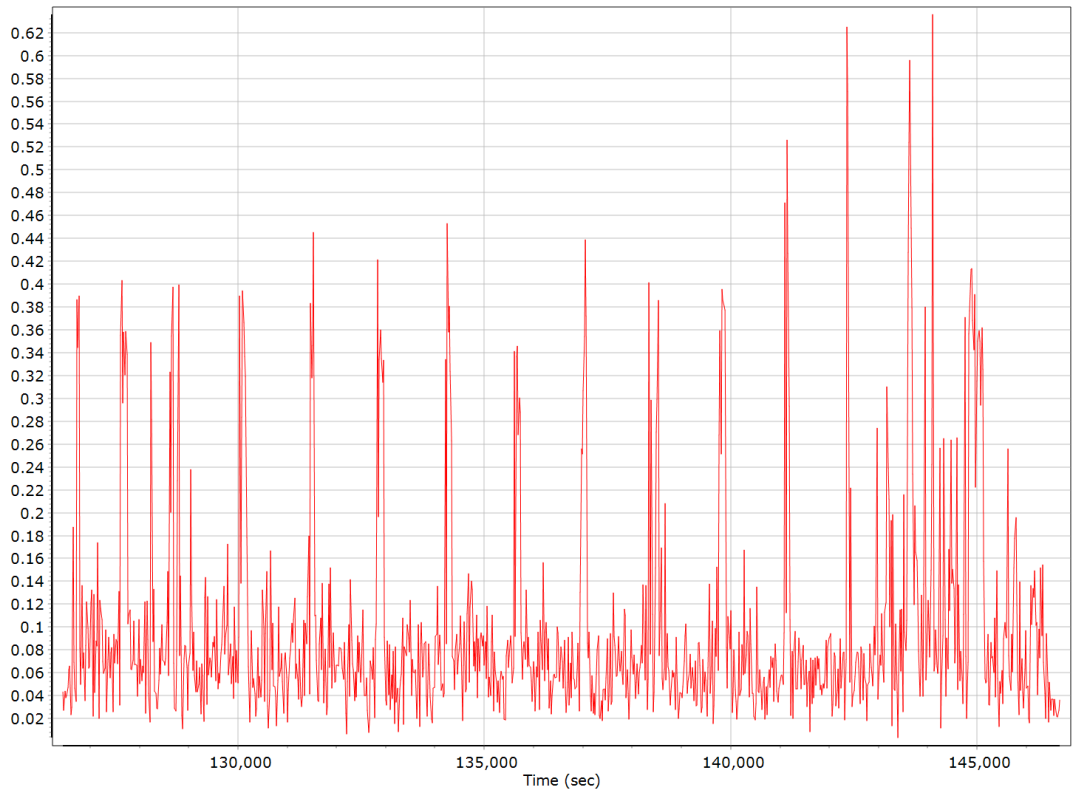
Ground Speed



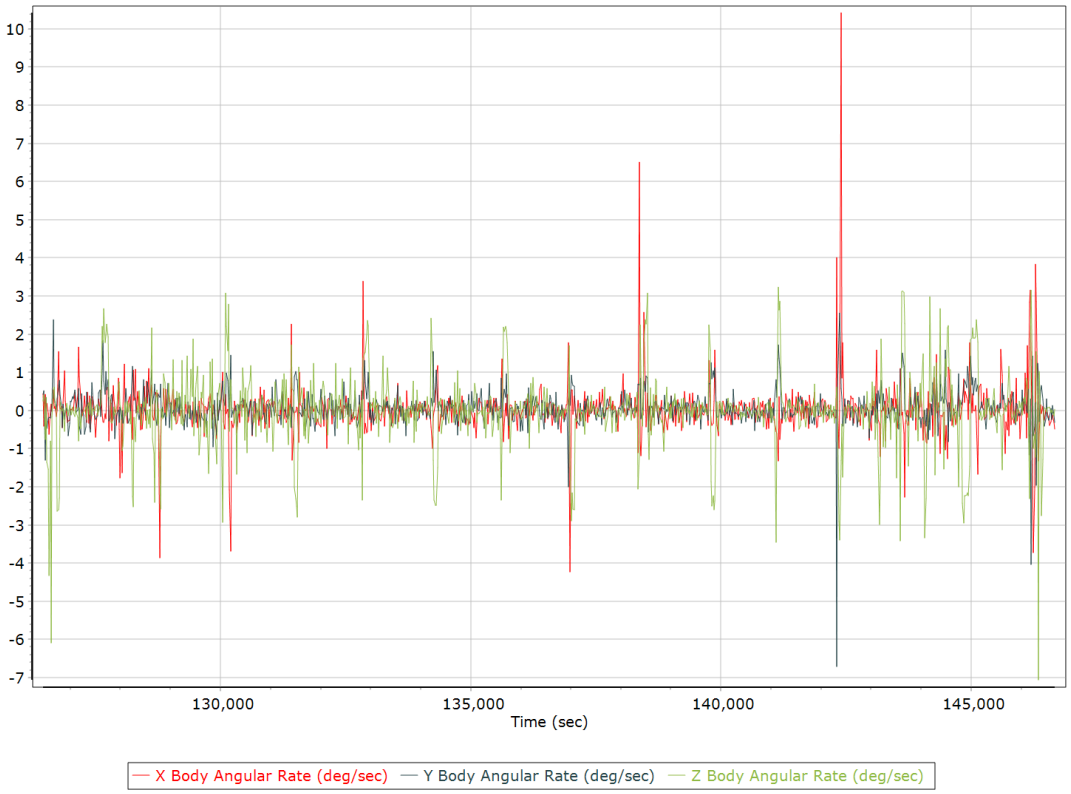
Body Acceleration



Total Body Acceleration

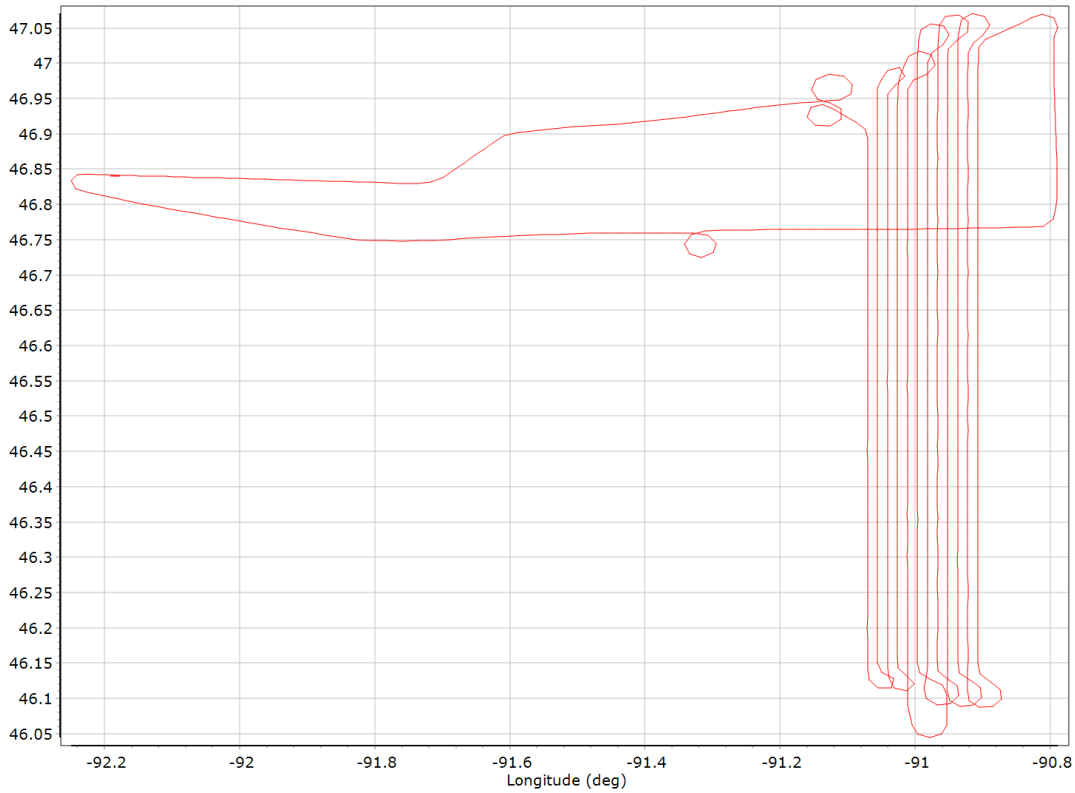


Body Angular Rate

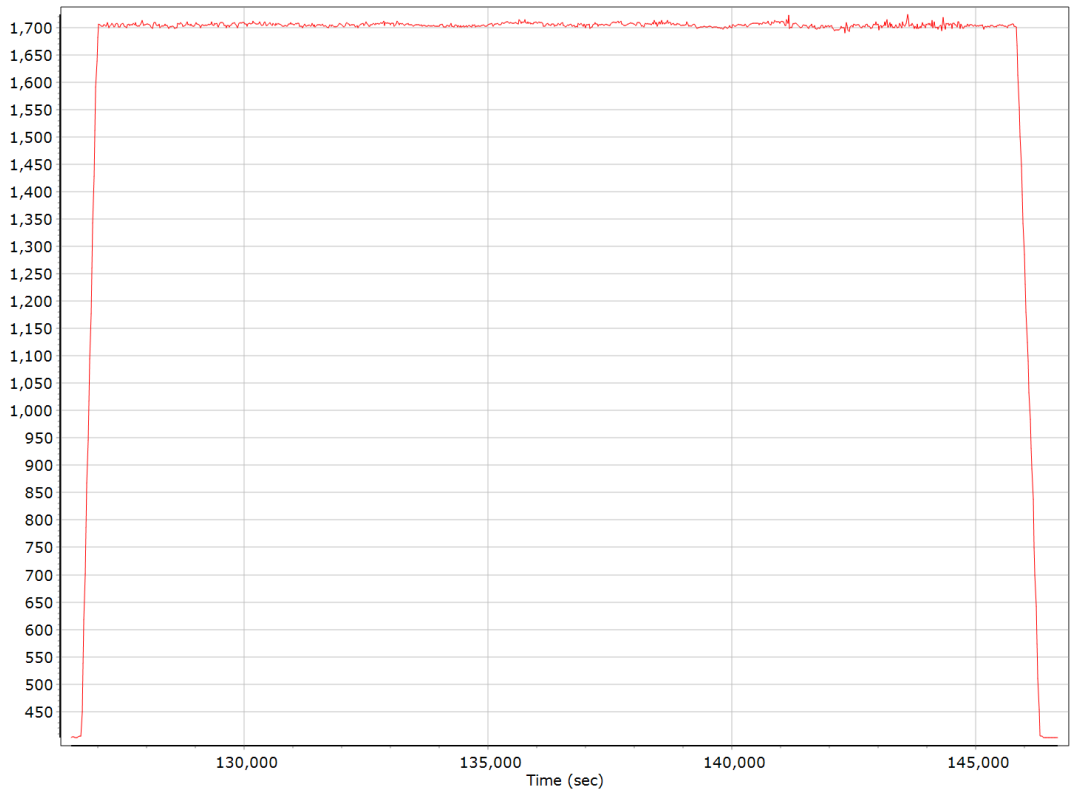


Forward Processed Trajectory Information

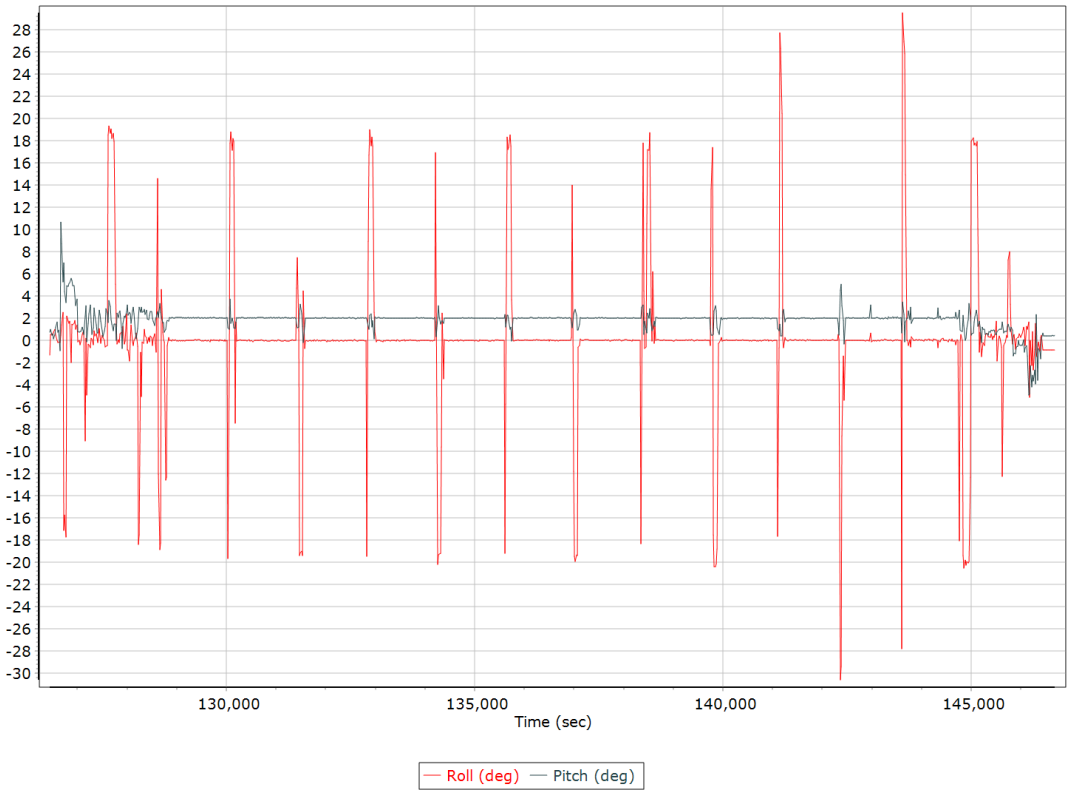
Top View



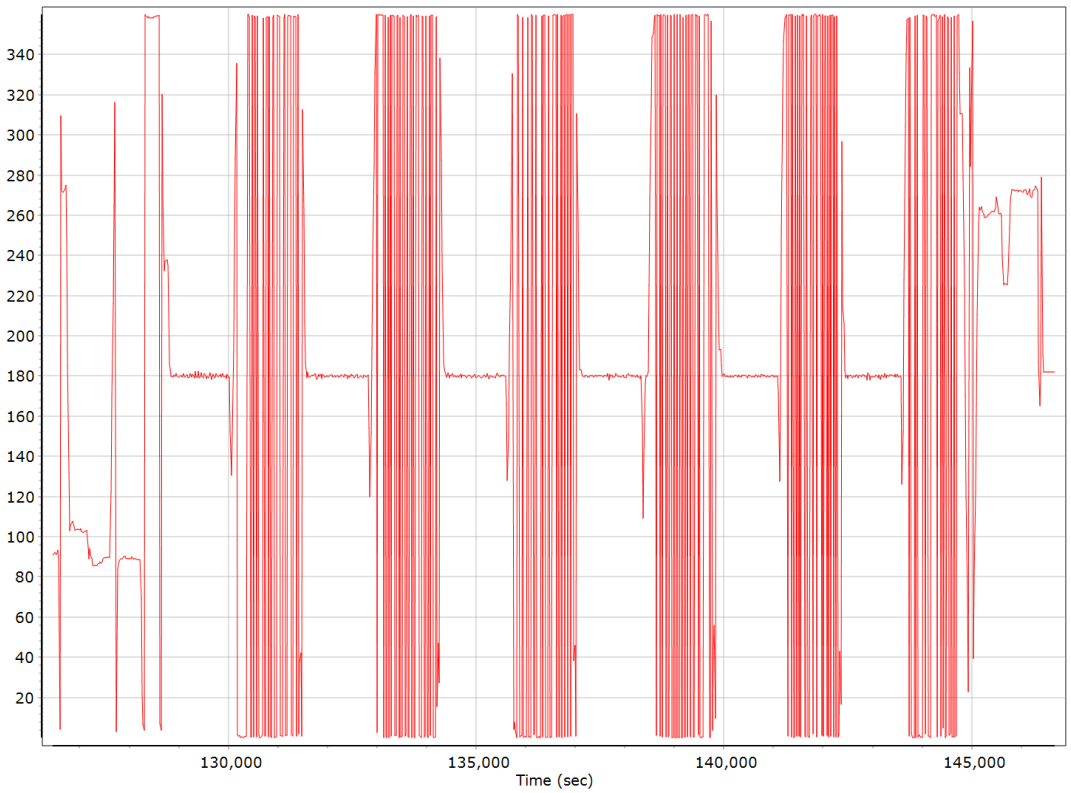
Altitude



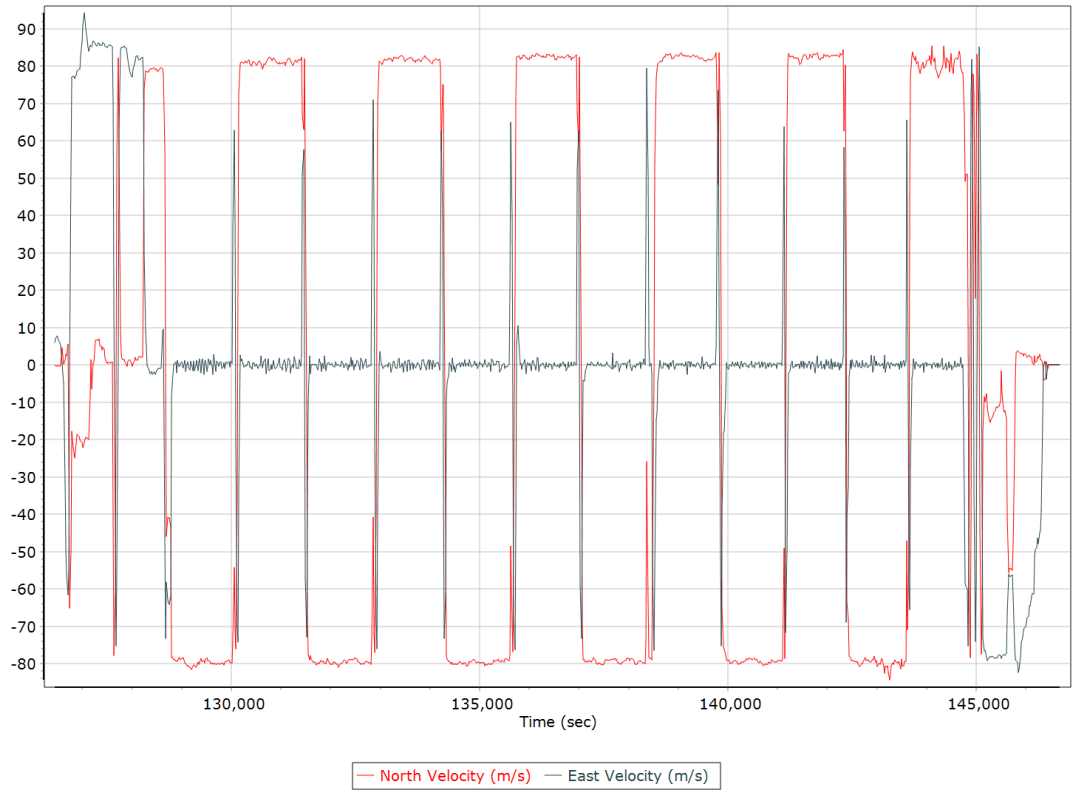
Roll/Pitch



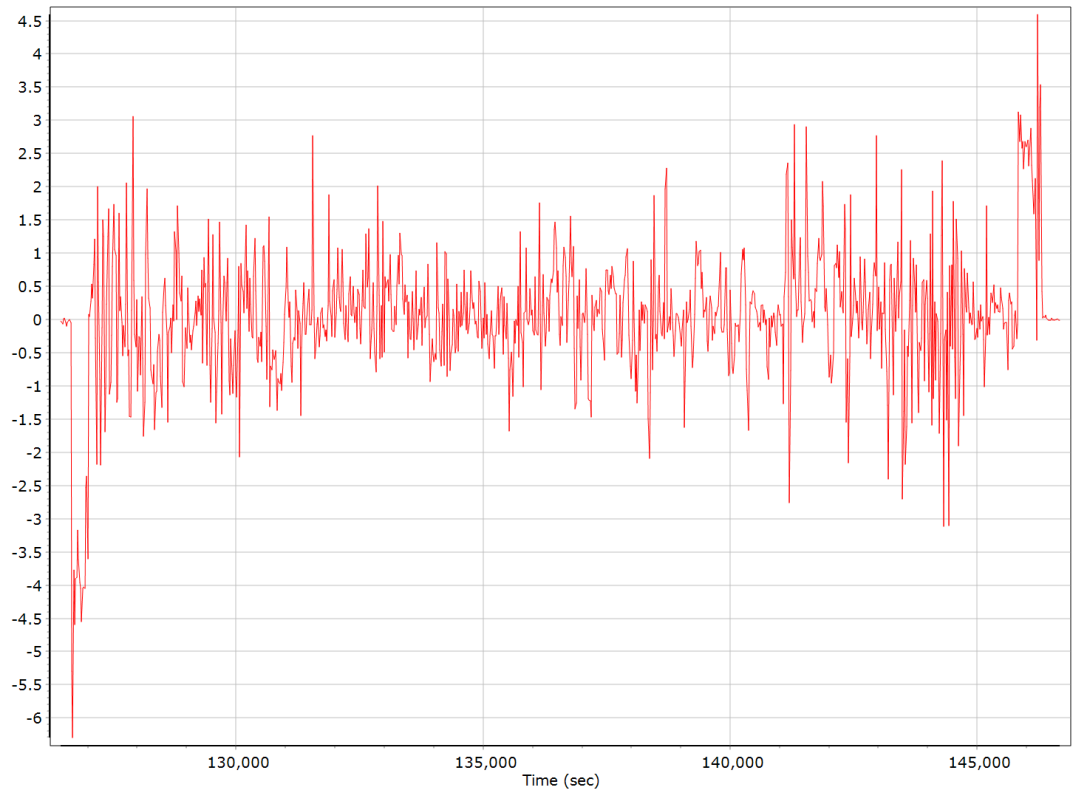
Heading



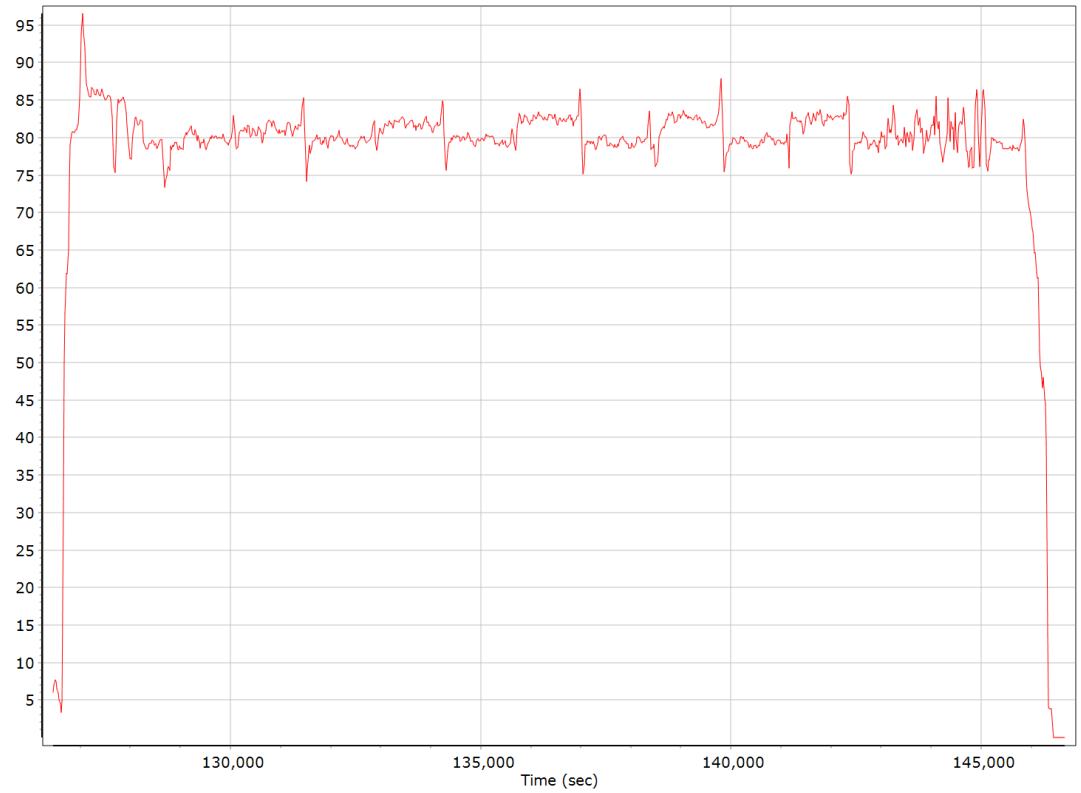
North/East Velocity



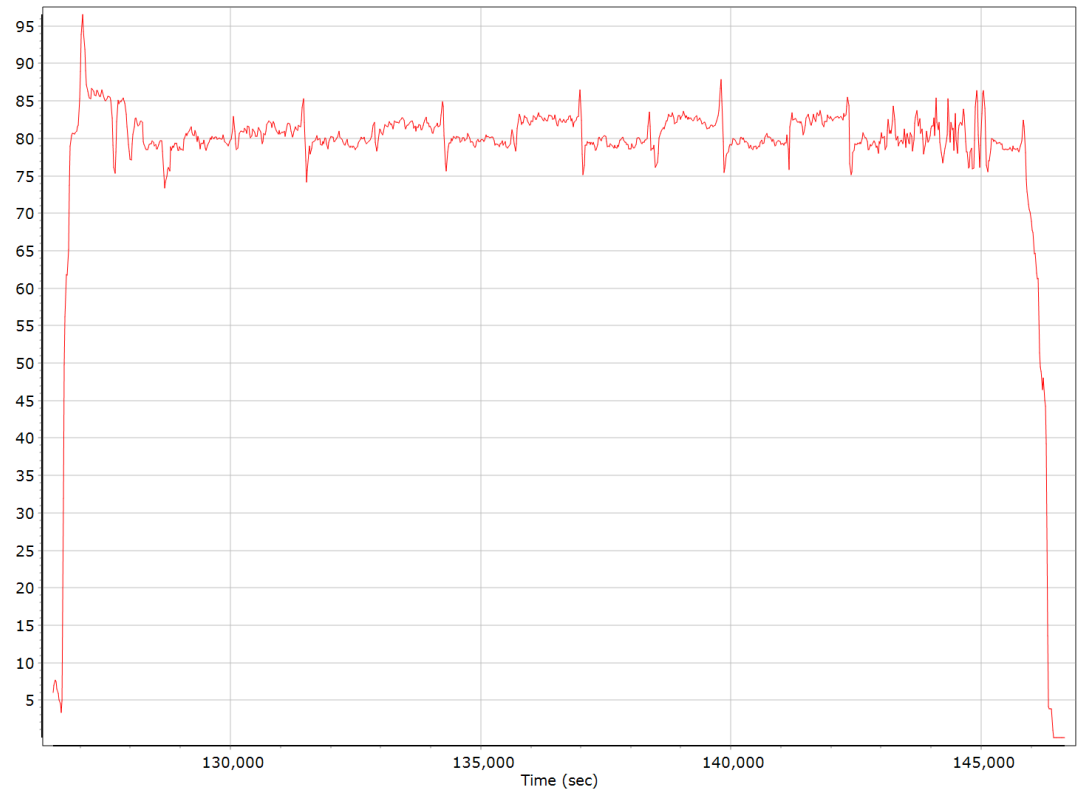
Down Velocity



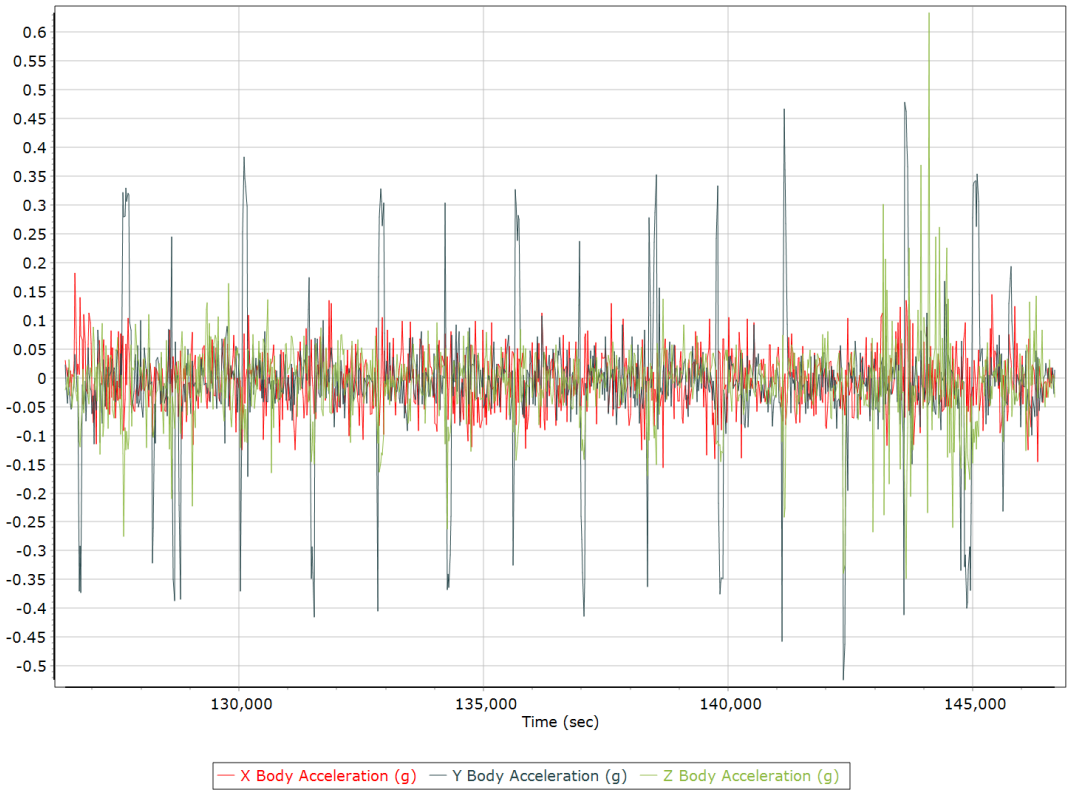
Total Speed



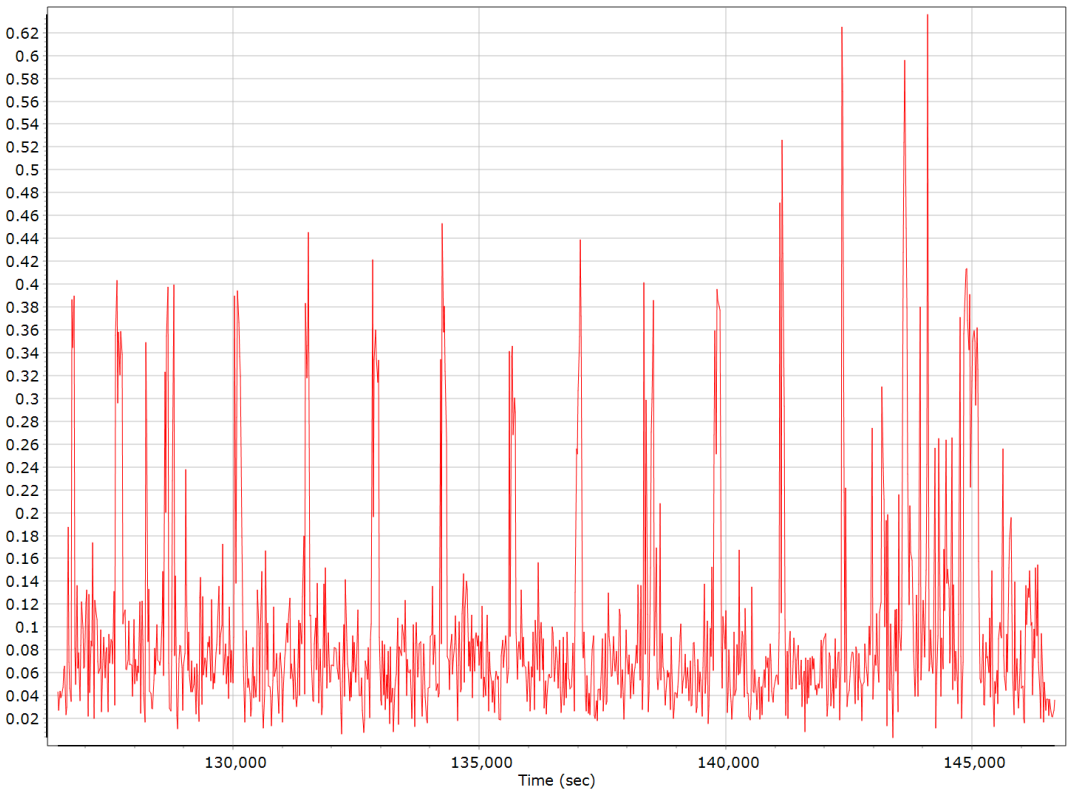
Ground Speed



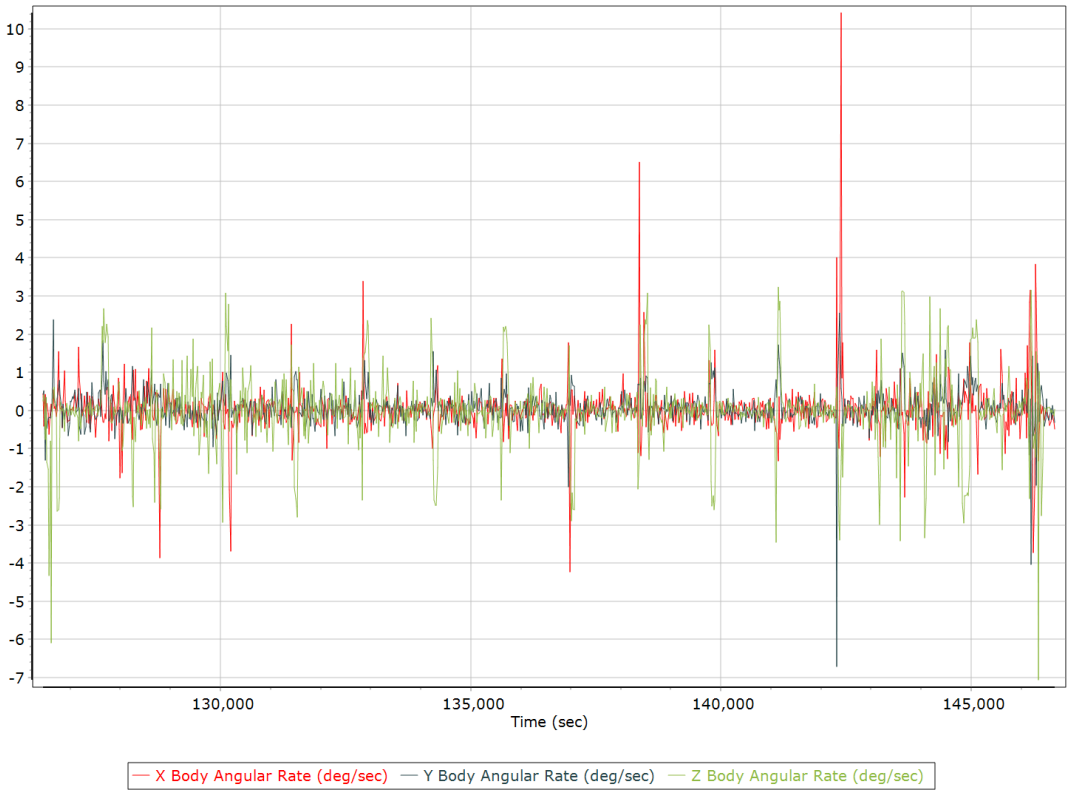
Body Acceleration



Total Body Acceleration



Body Angular Rate

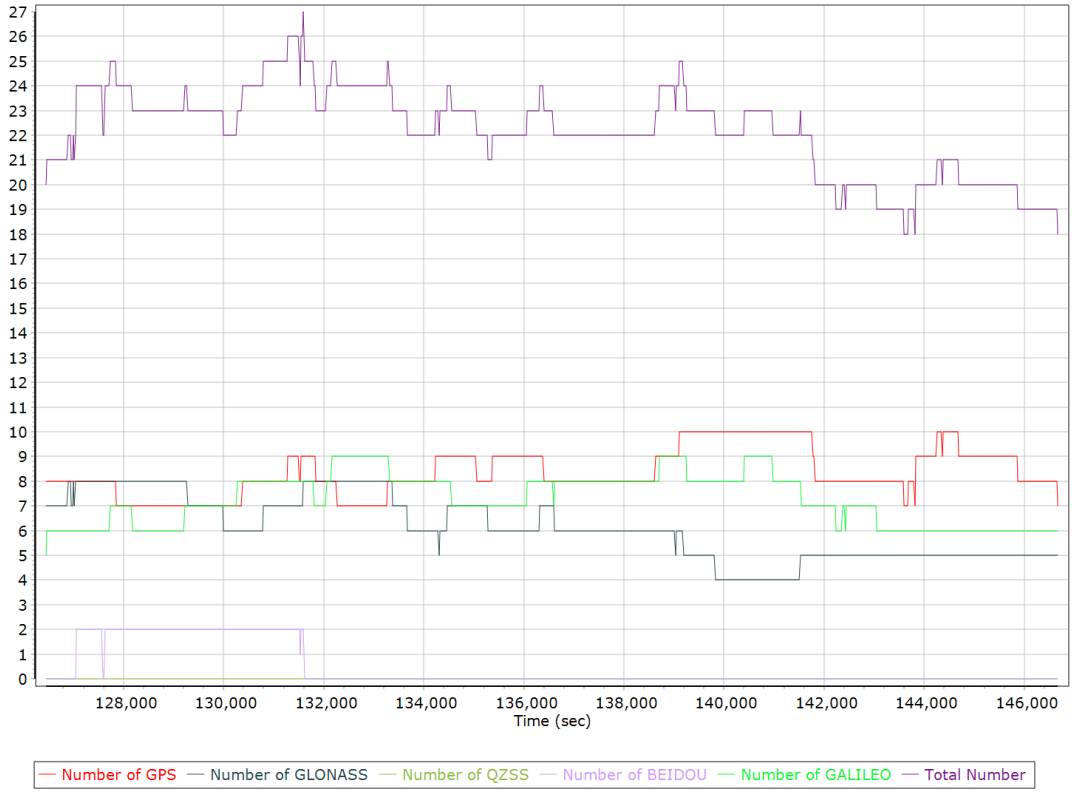


GNSS QC

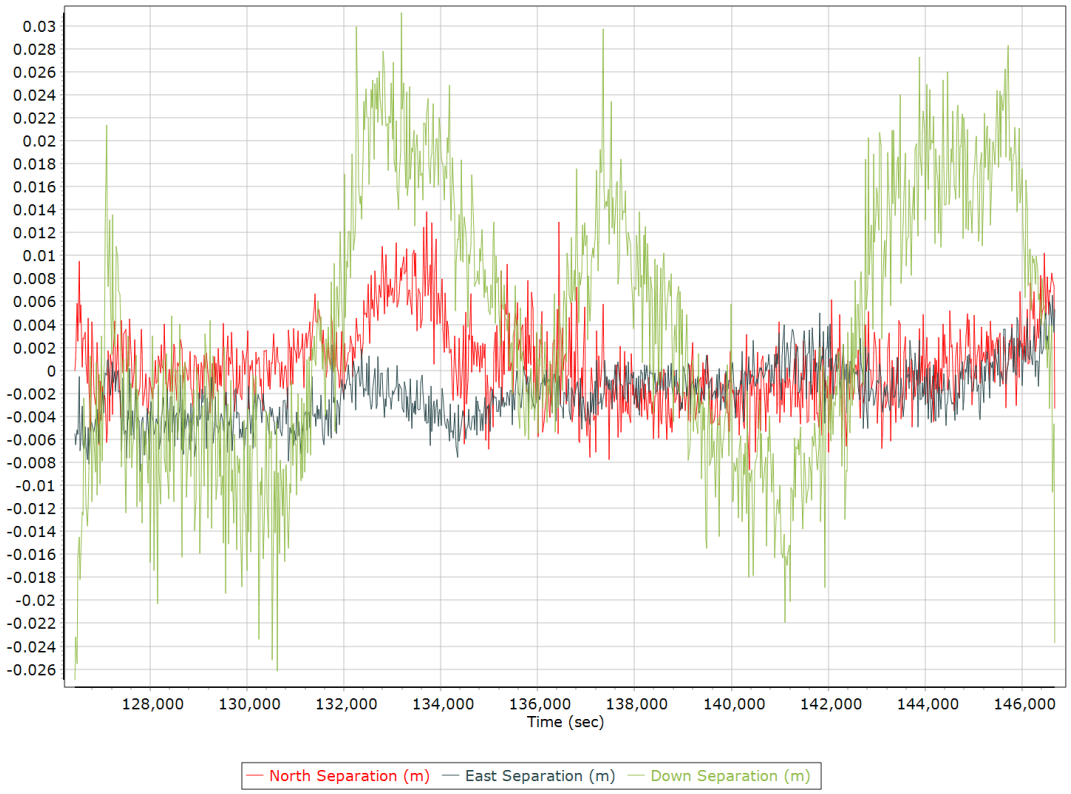
GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	6	10	8
Number of GLONASS SV	4	8	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	2	0
Number of GALILEO SV	4	9	7
Total number of SV	17	27	22
PDOP	0.94	1.42	1.13
QC Solution Gaps	0.00	0.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	20475.00	0.00	0.00
Percentage	100.00	0.00	0.00

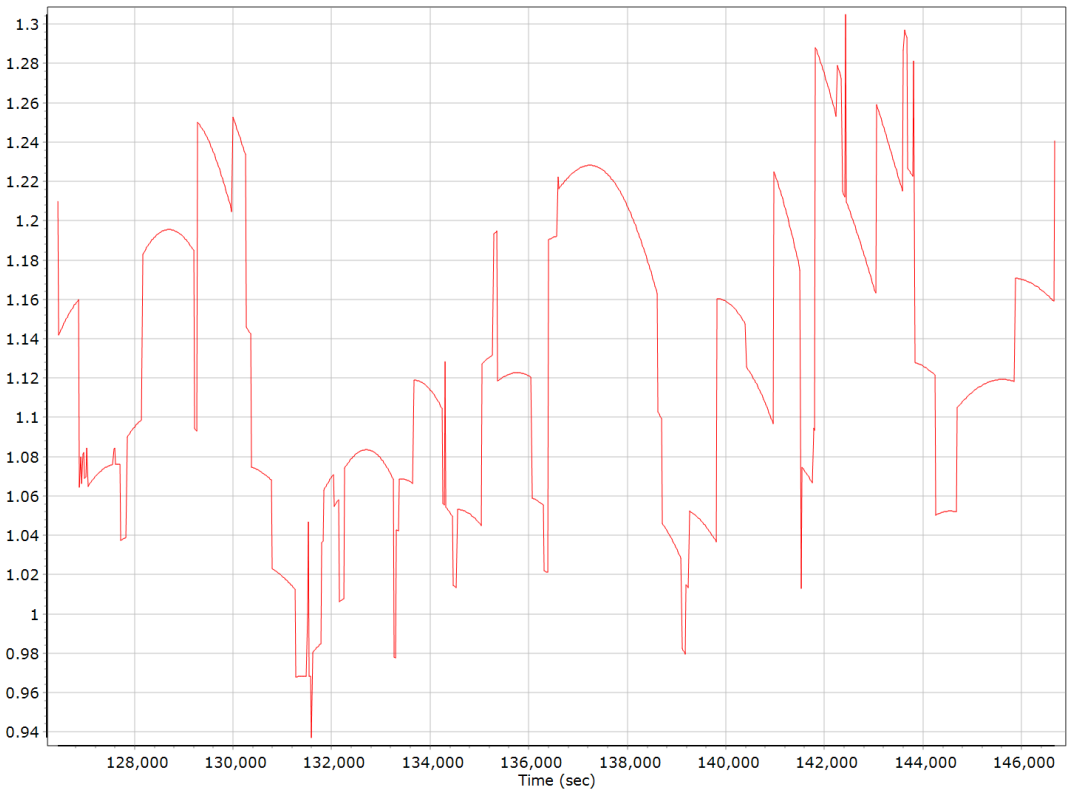
Num SVs in solution



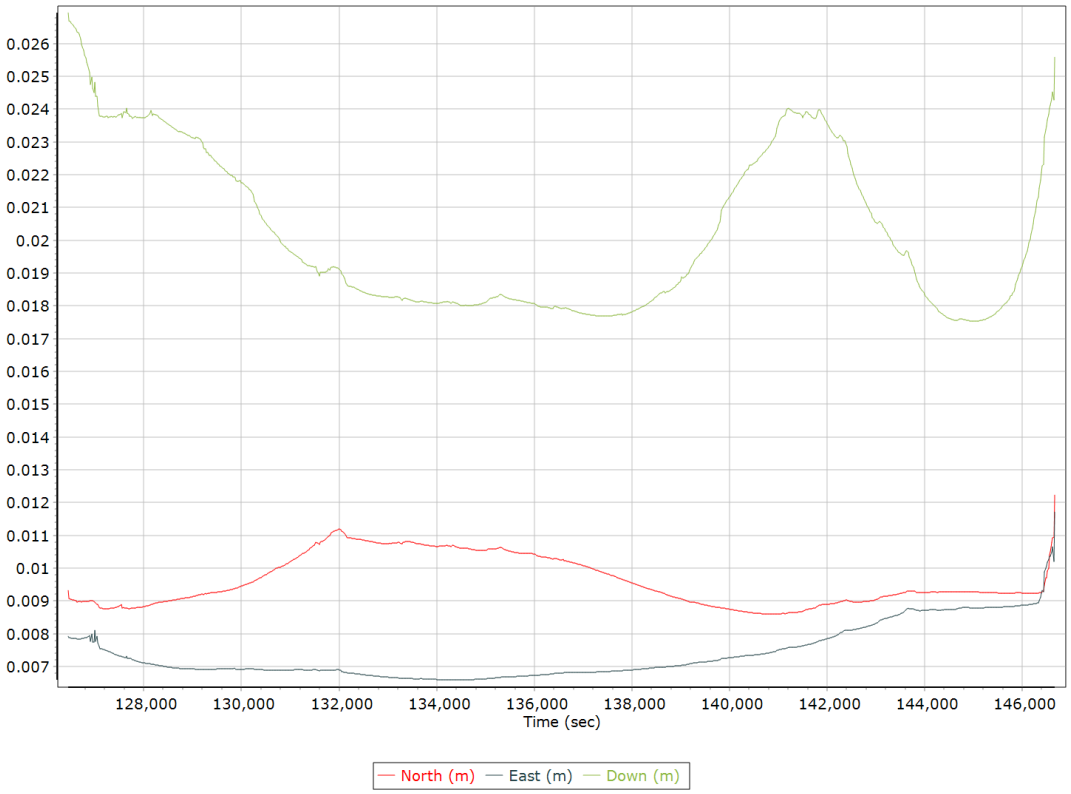
Forward/Reverse Separation



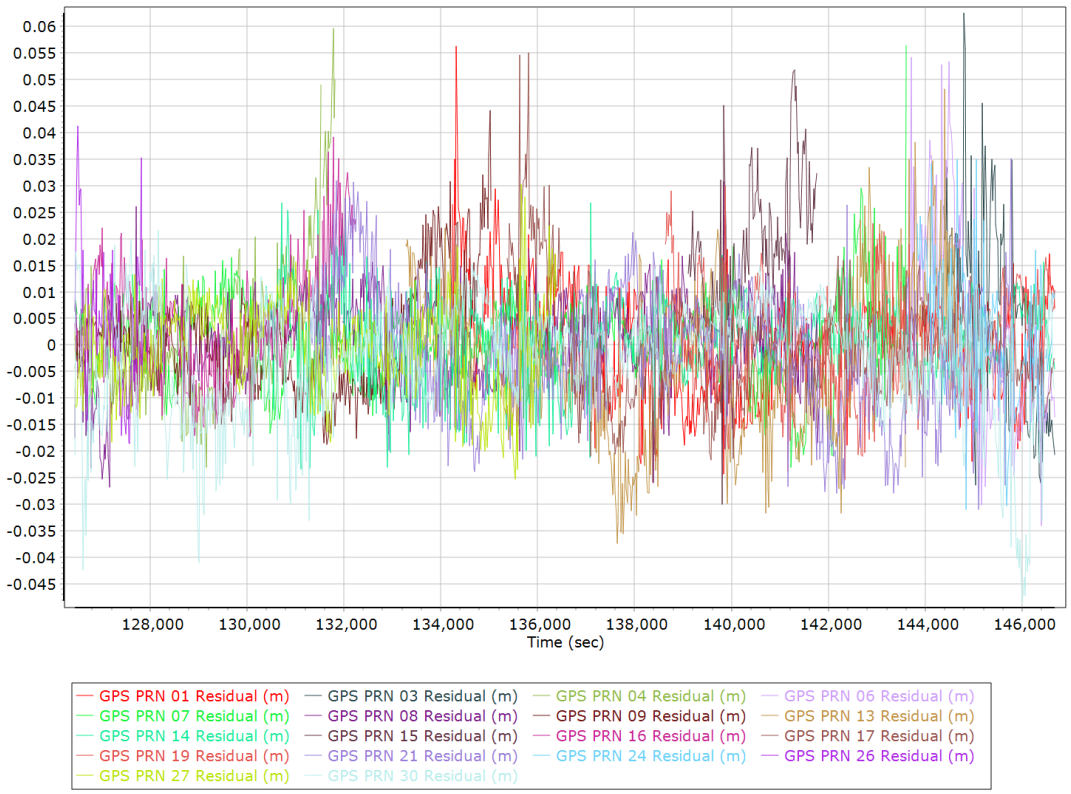
PDOP



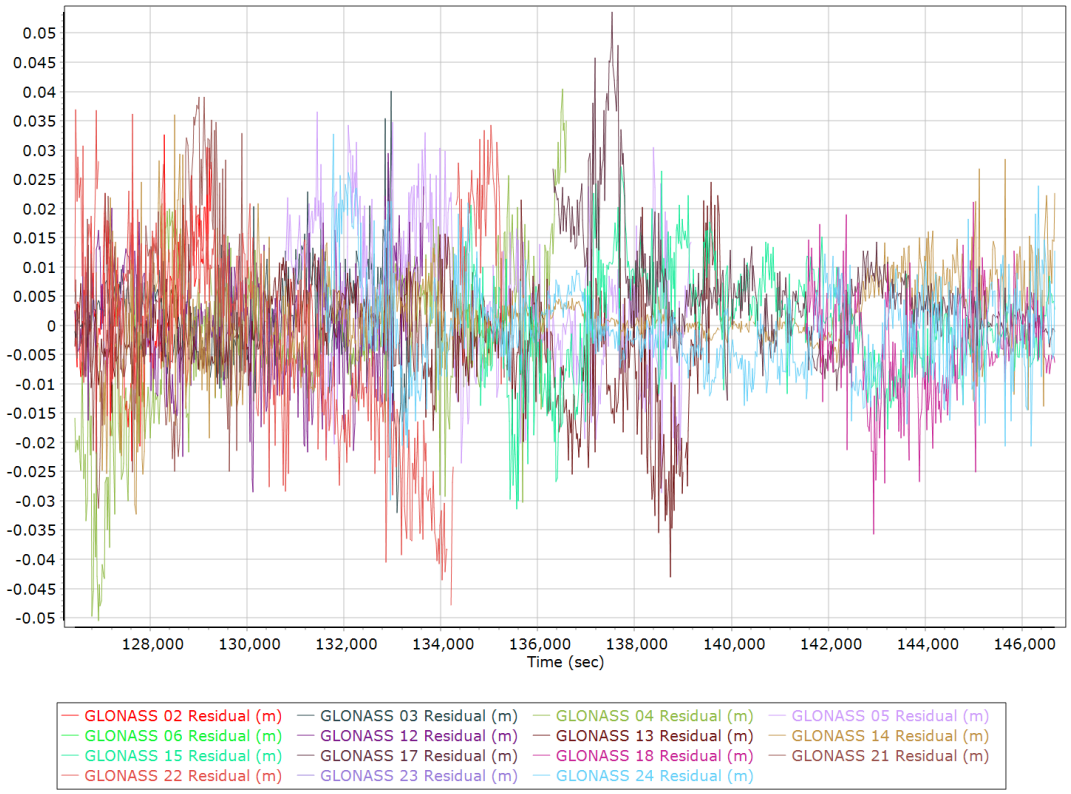
Estimated Position Accuracy



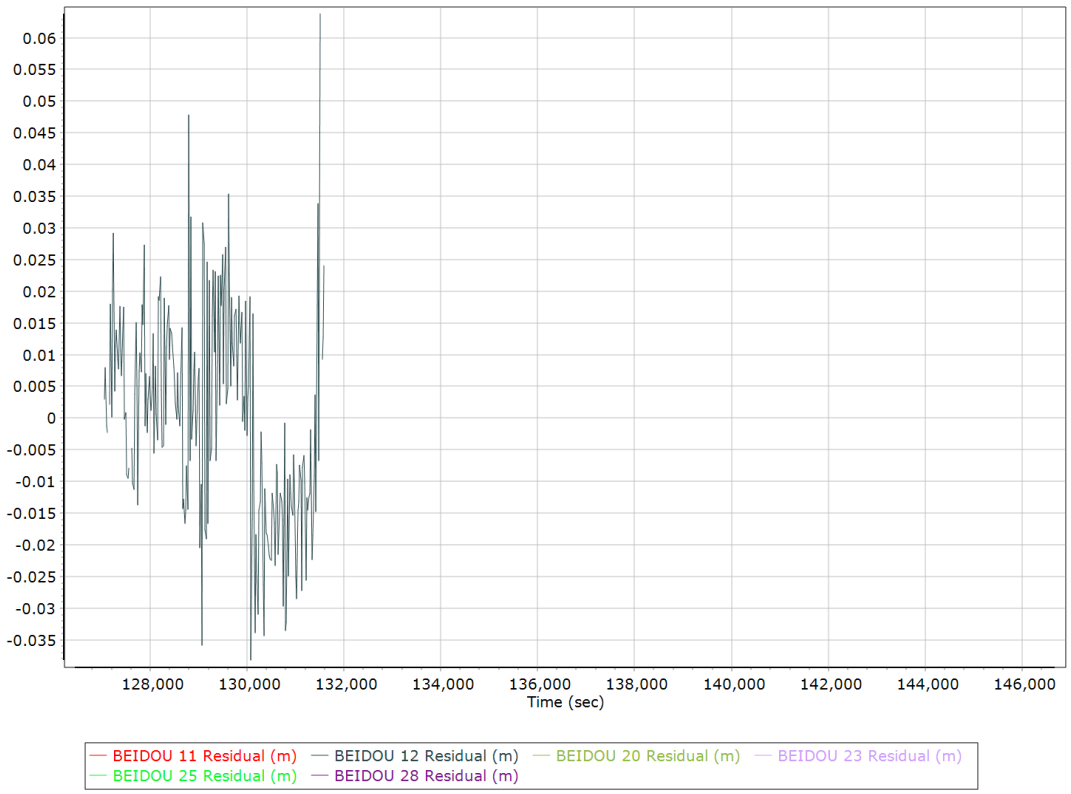
GPS Residuals



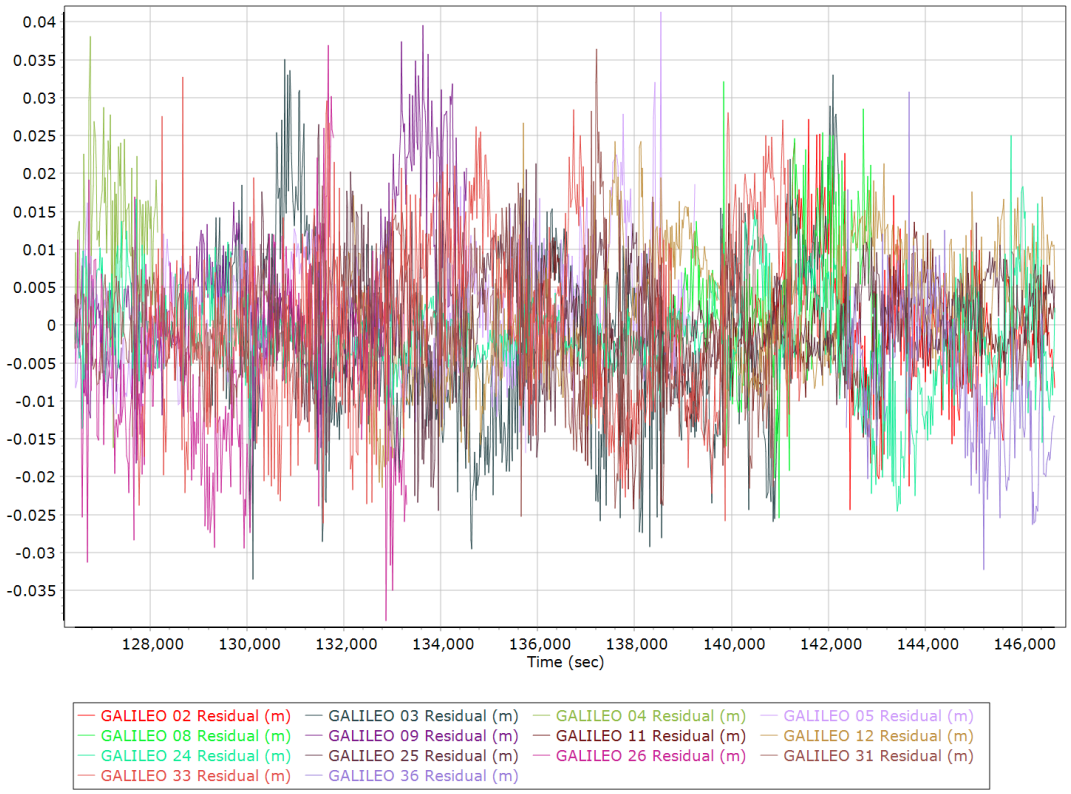
GLONASS Residuals



BEIDOU Residuals



GALILEO Residuals



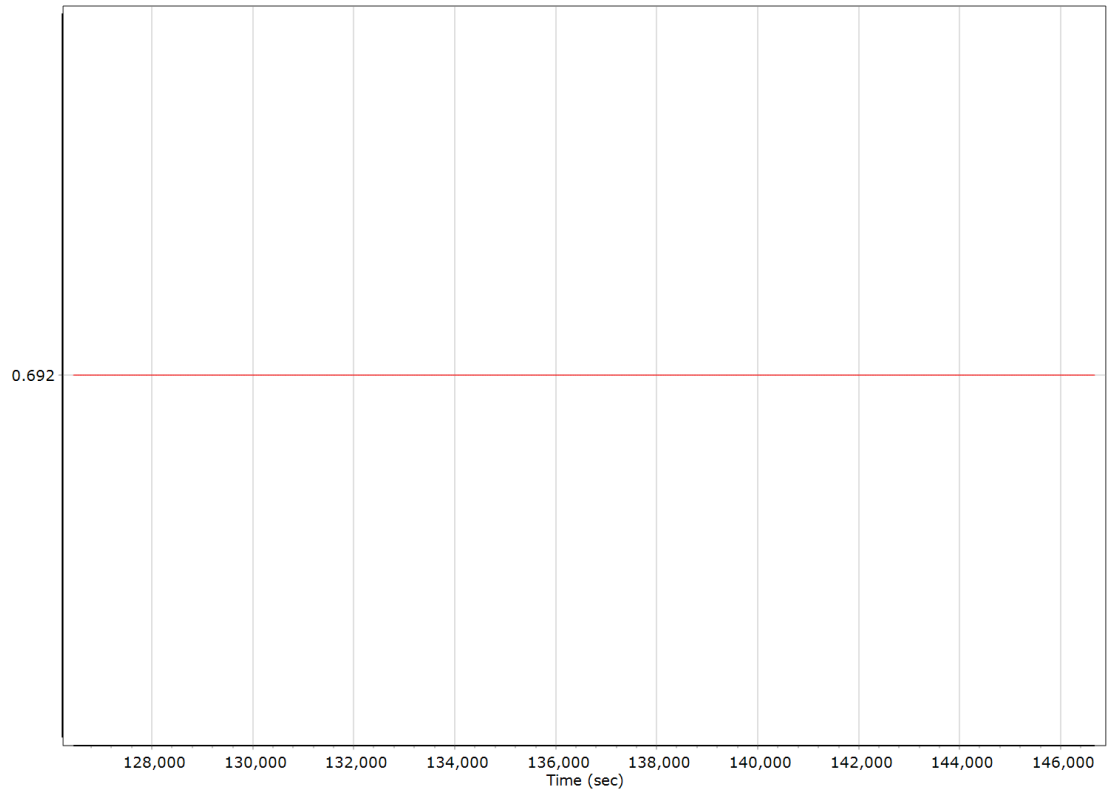
GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	126203.000 (5/23/2022 11:03:23 AM)		
Processing end time	146688.000 (5/23/2022 4:44:48 PM)		
Initial attitude source	Real-Time VNAV/RNAV Attitude		
IMU Sensor Context	Processing with Onboard IMU		
Gimbal to IMU lever arm (m)	-0.034	-0.010	-0.374
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.692	-0.181	-1.276
Gimbal to Primary GNSS lever arm std dev (m)	0.030	0.030	0.030
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

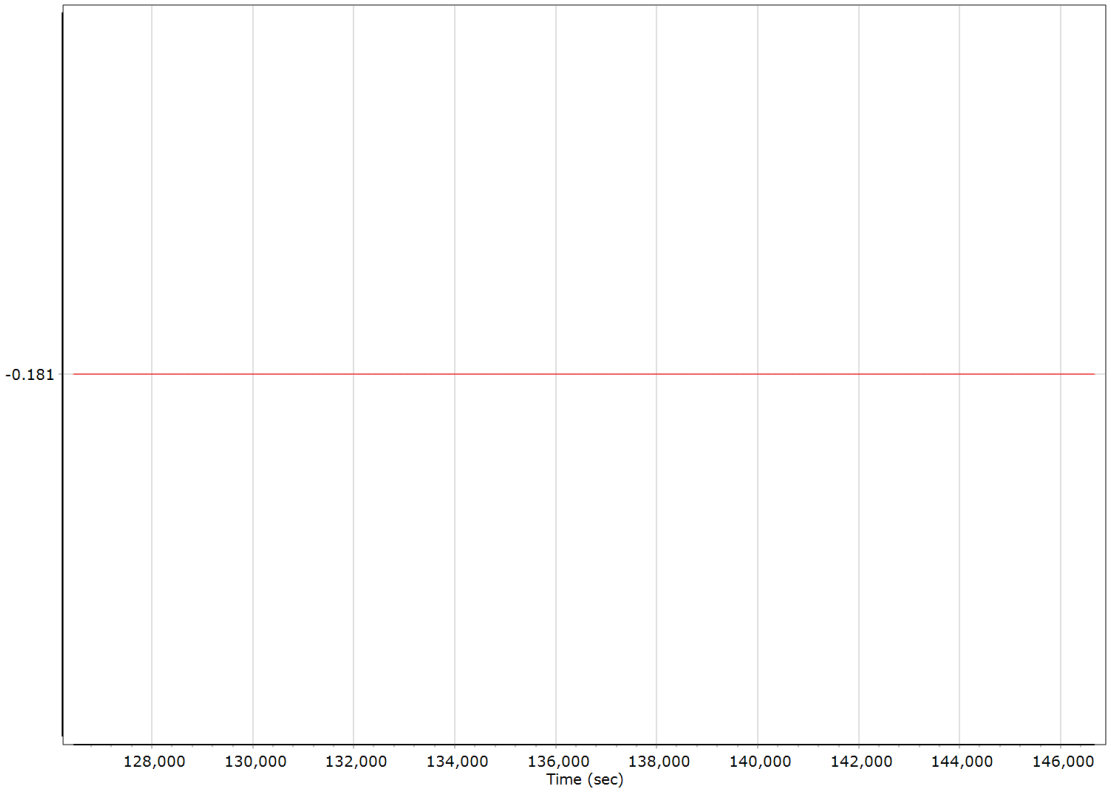
Calibrated Installation Parameters

Reference-Primary GNSS Lever Arm (m)

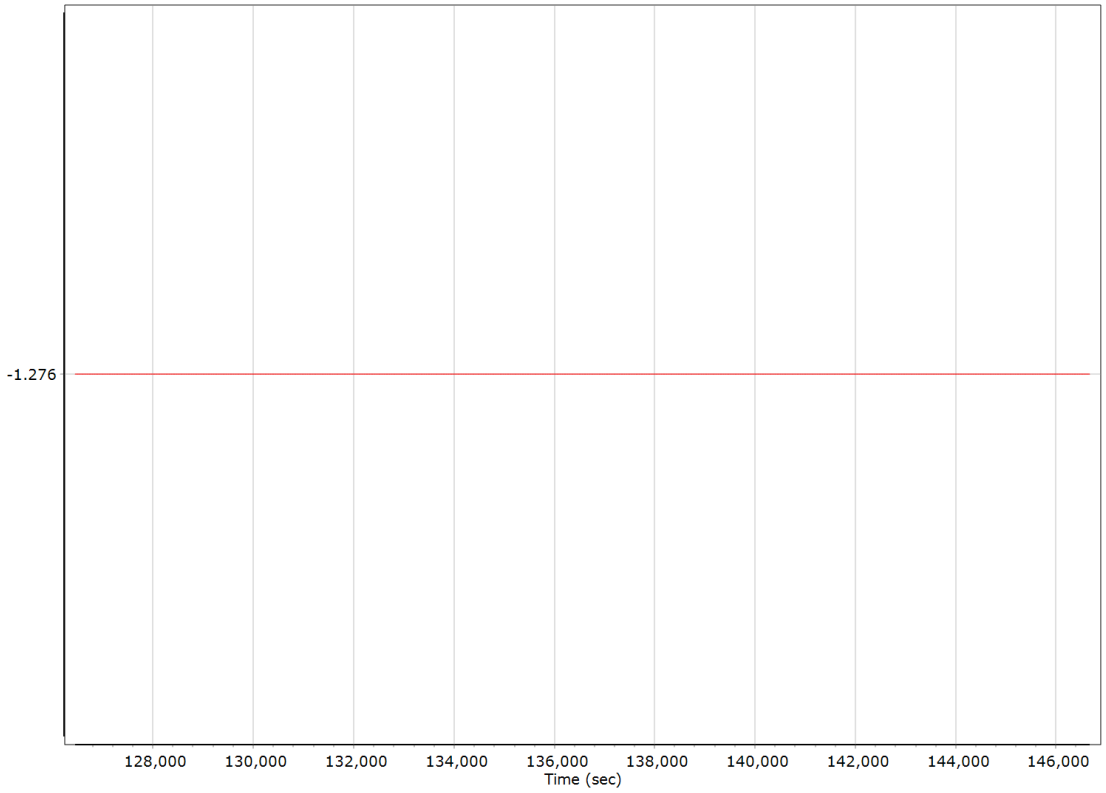
X Reference-Primary GNSS Lever Arm (m)



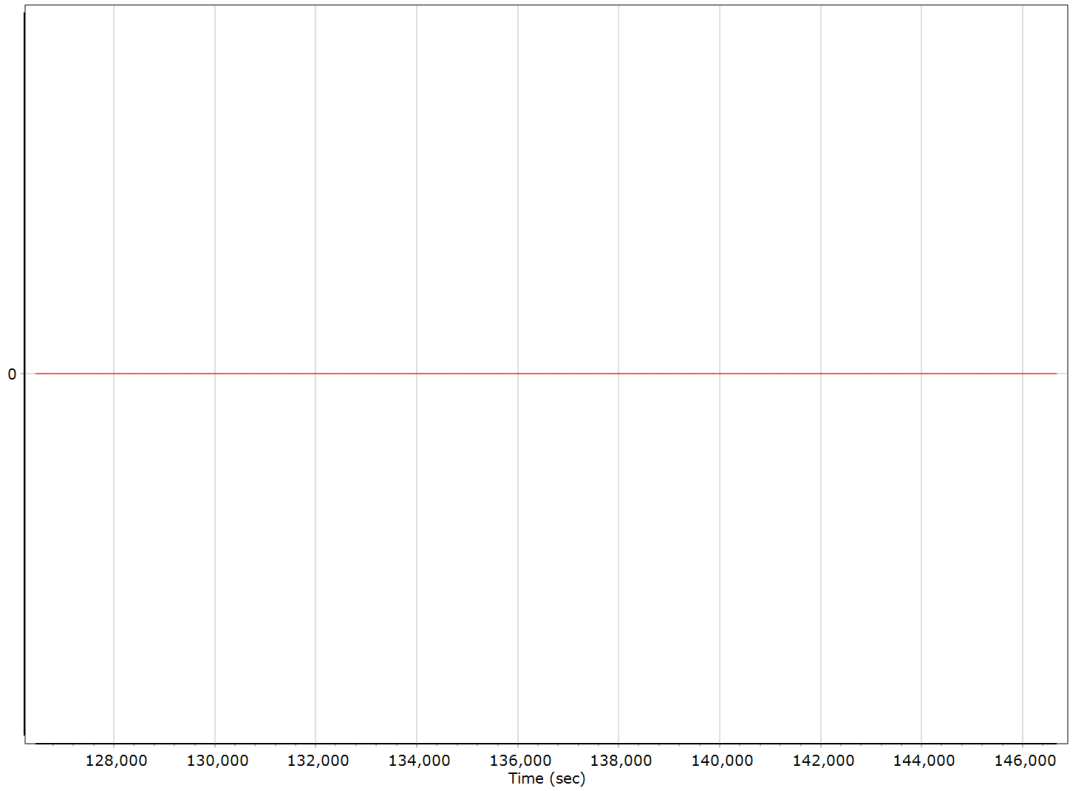
Y Reference-Primary GNSS Lever Arm (m)



Z Reference-Primary GNSS Lever Arm (m)



Reference-Primary GNSS Lever Arm Figure of Merit



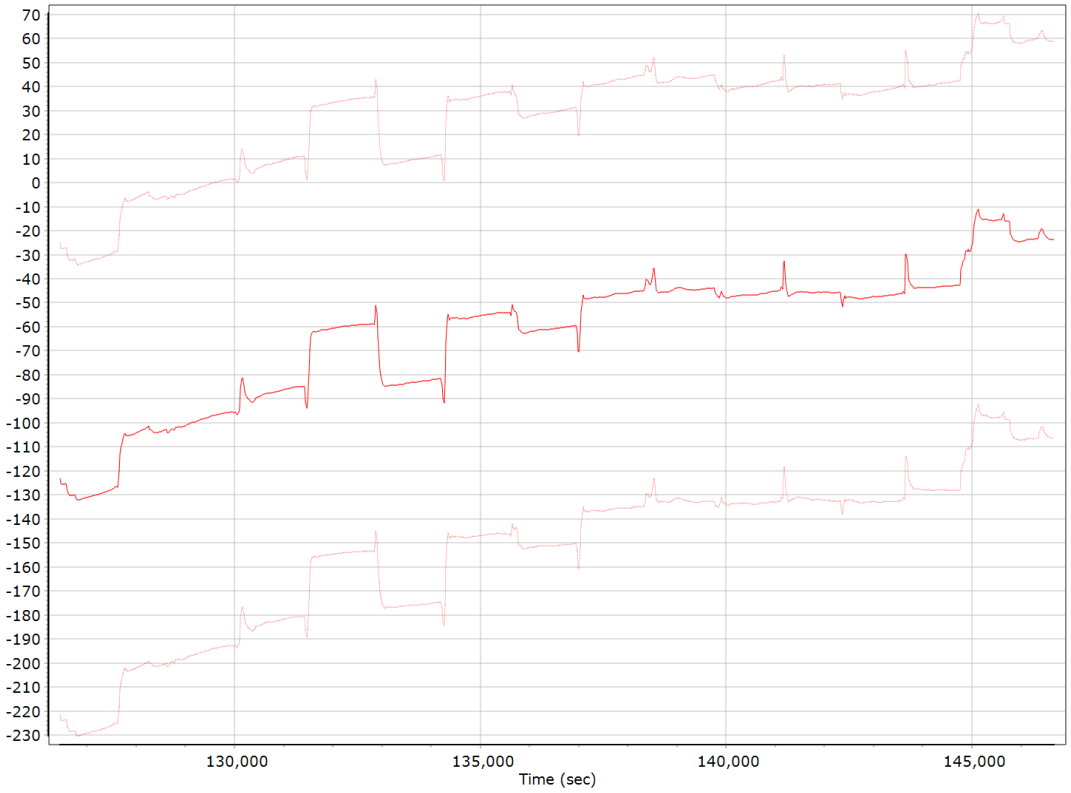
IN-Fusion QC

Forward Processed Estimated Errors, Reference Frame

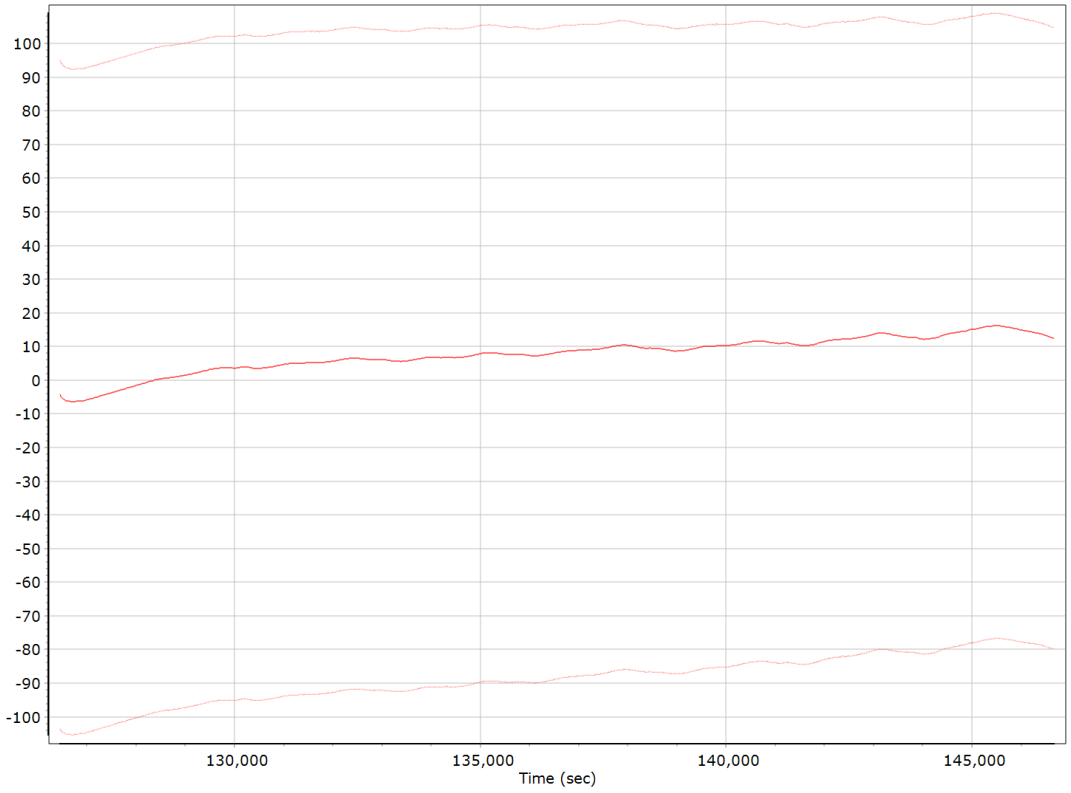
Accelerometer Bias (micro-g)

X Accelerometer Bias (micro-g)

Y Accelerometer Bias (micro-g)



Z Accelerometer Bias (micro-g)



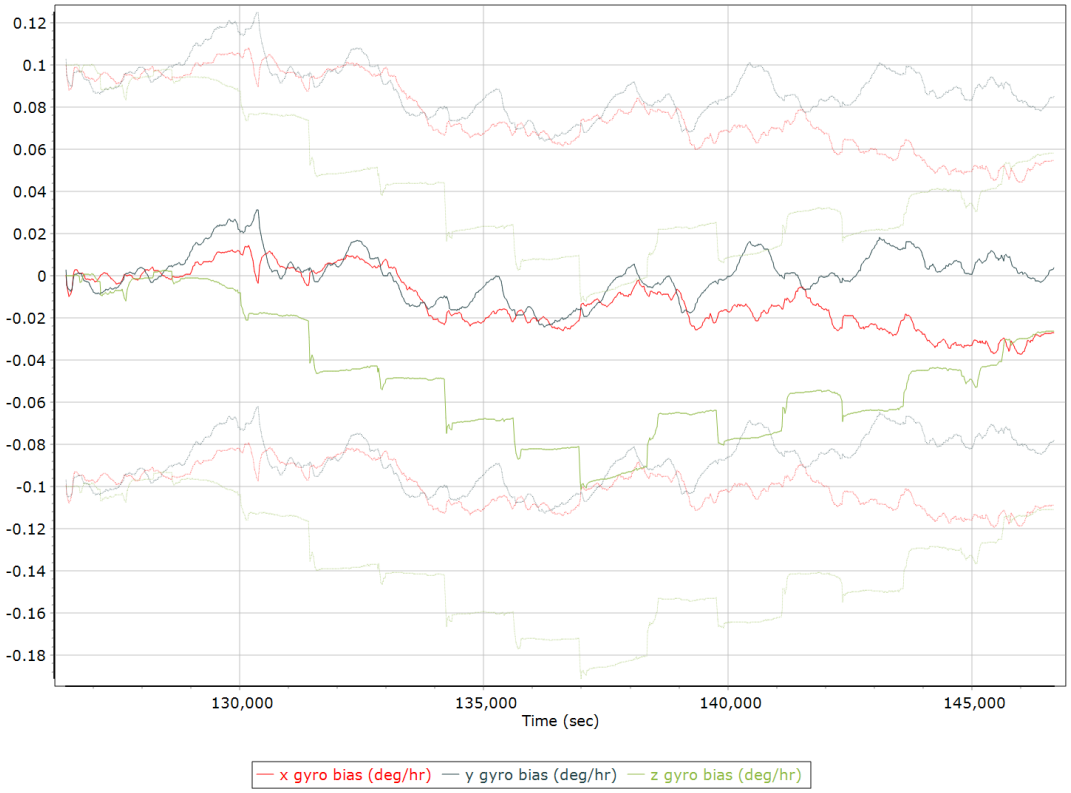
Accelerometer Scale Error (ppm)

X Accelerometer Scale Error (ppm)

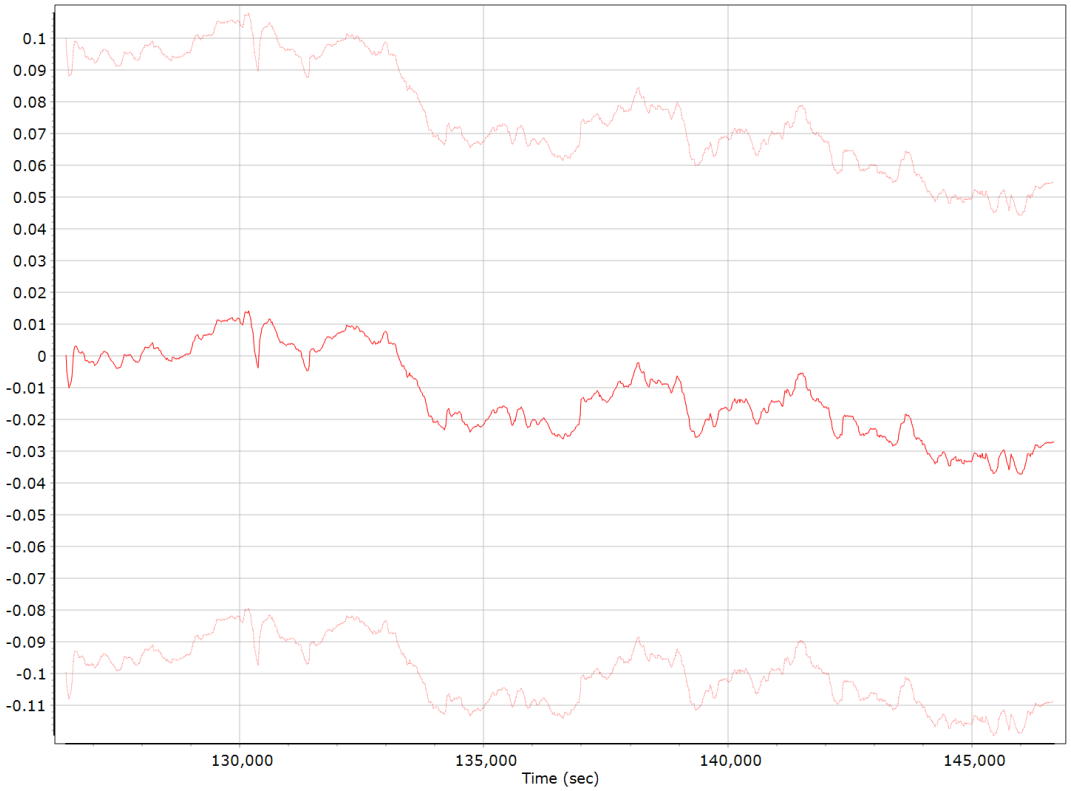
Y Accelerometer Scale Error (ppm)

Z Accelerometer Scale Error (ppm)

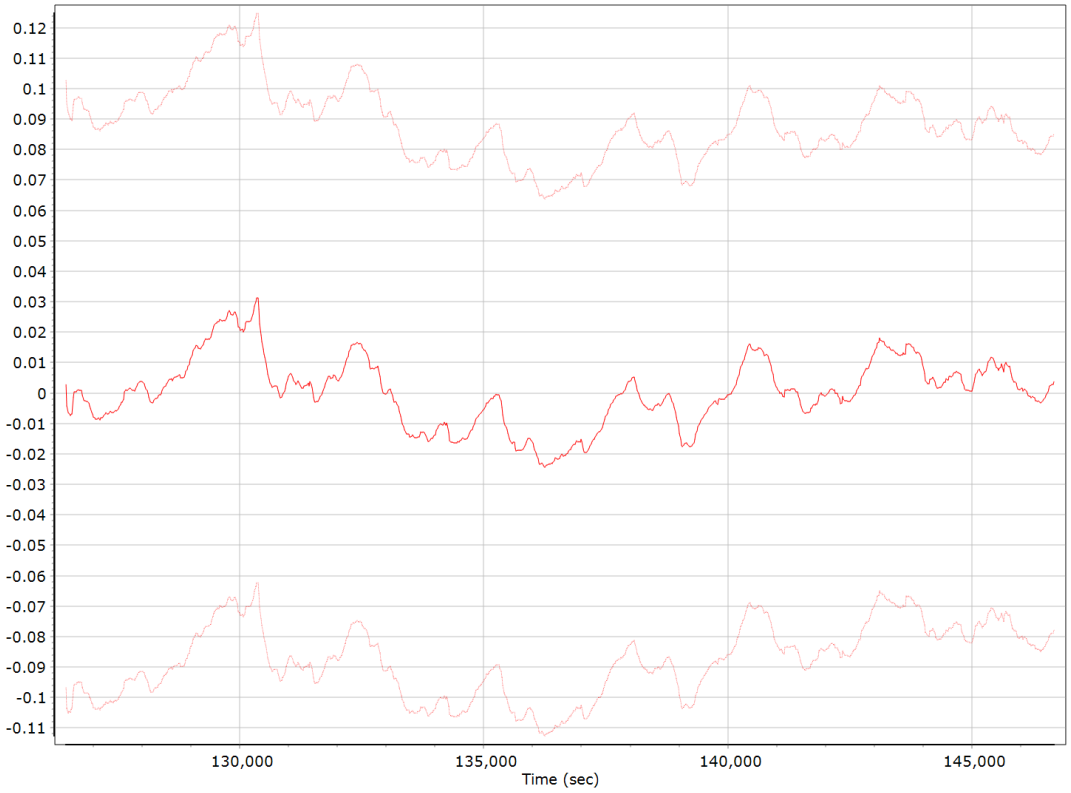
Gyro Bias (deg/h)



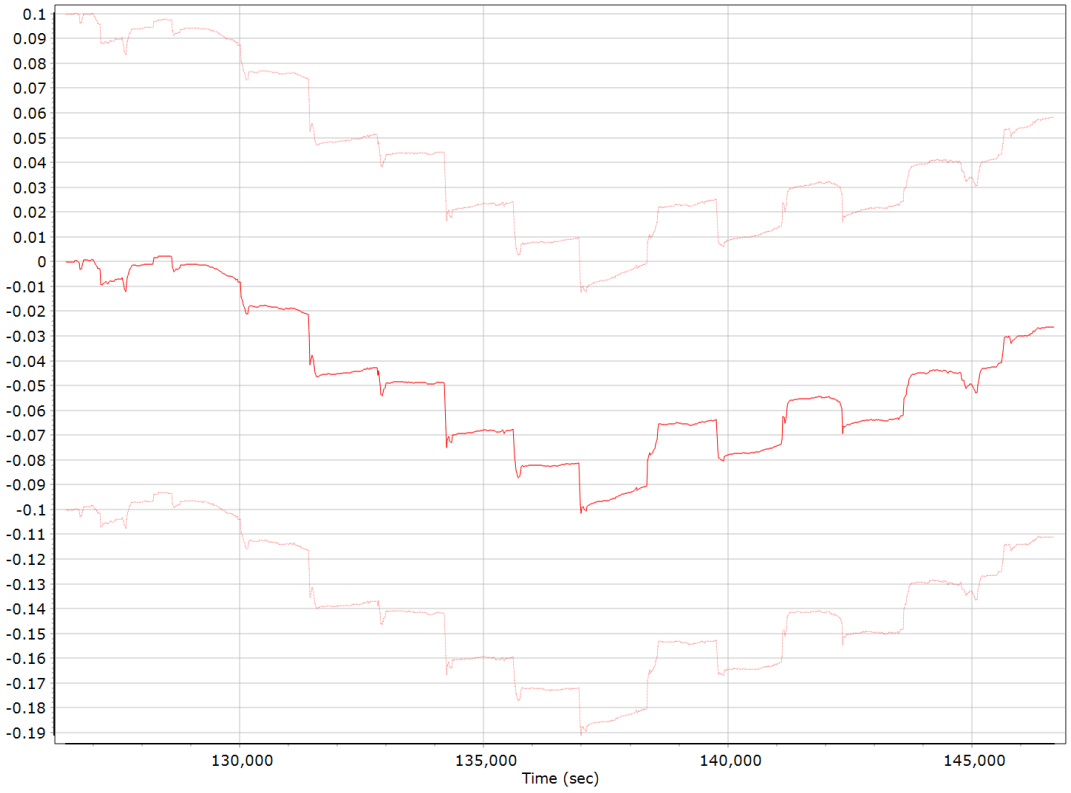
X Gyro Bias (deg/h)



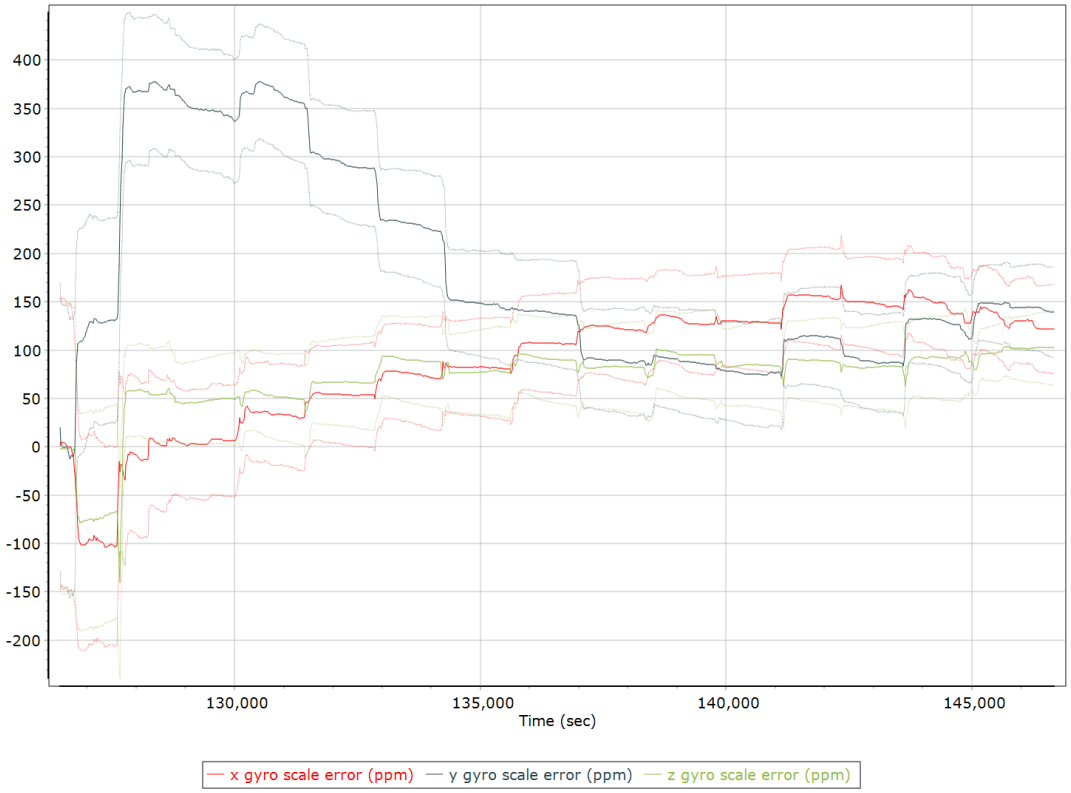
Y Gyro Bias (deg/h)



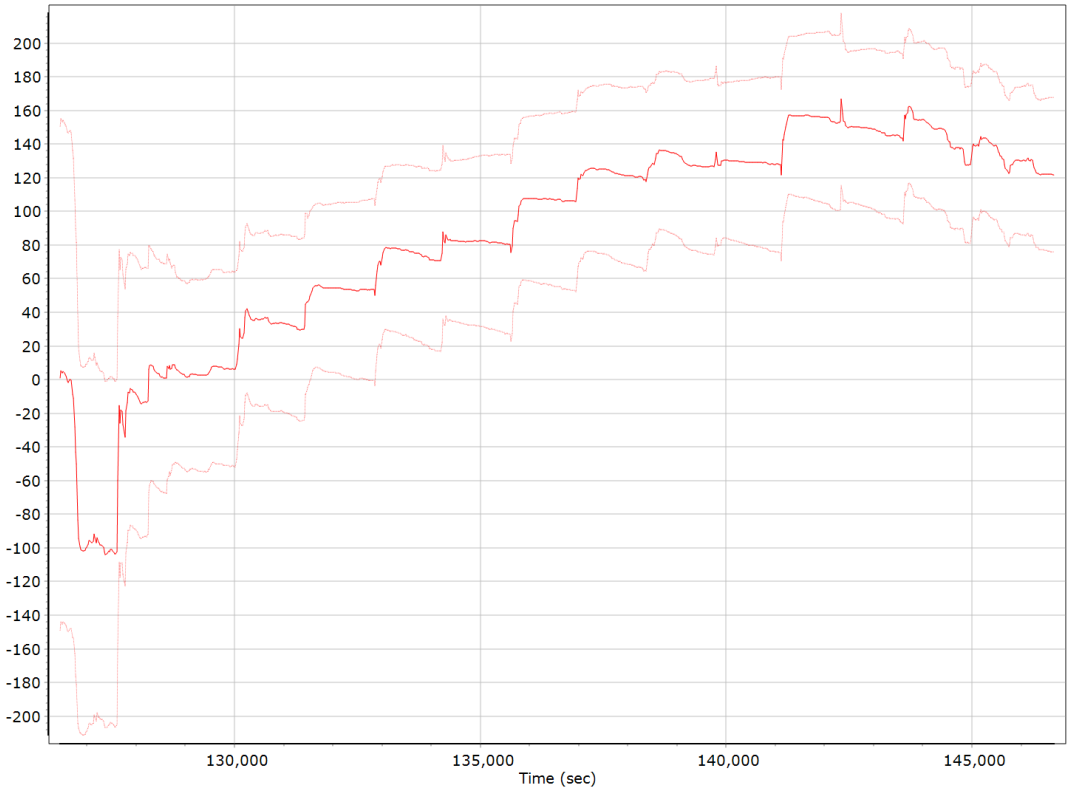
Z Gyro Bias (deg/h)



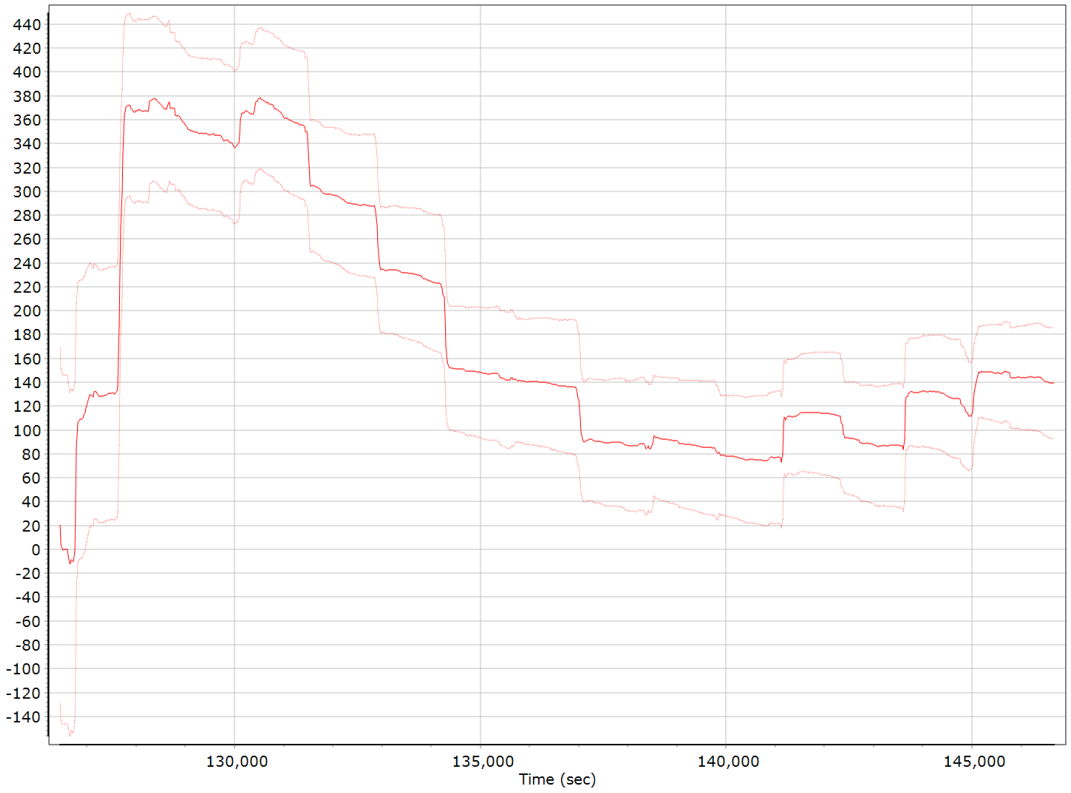
Gyro Scale Error (ppm)



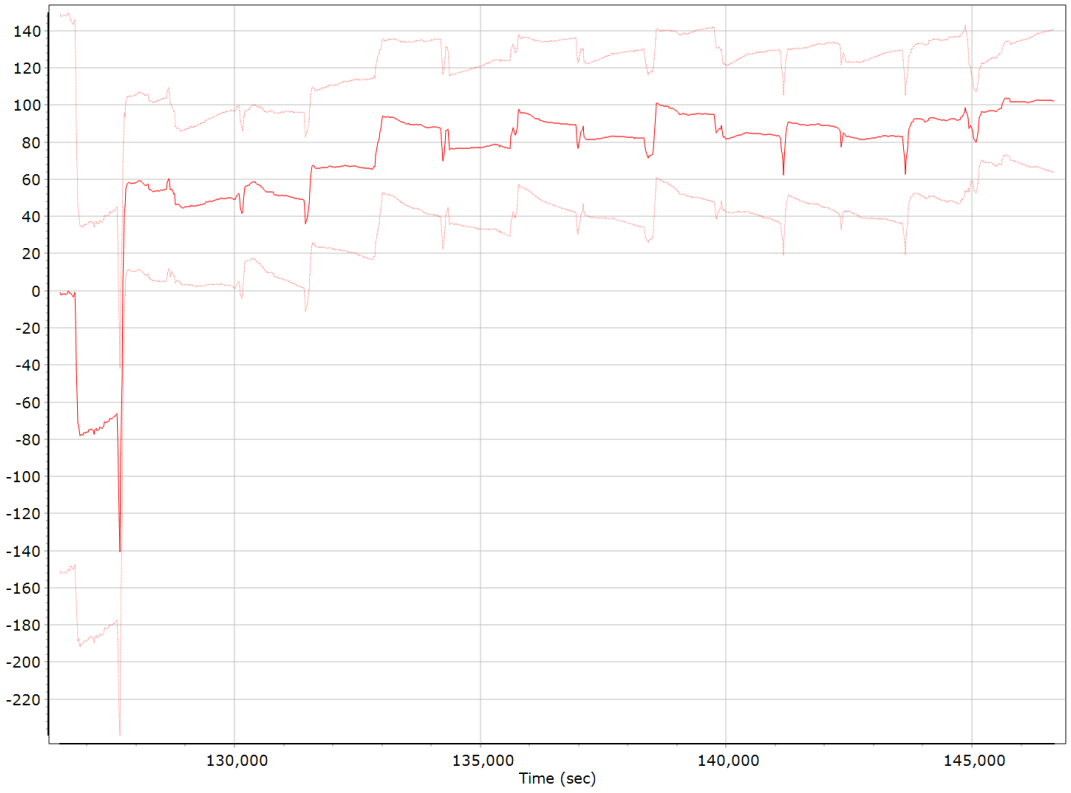
X Gyro Scale Error (ppm)



Y Gyro Scale Error (ppm)

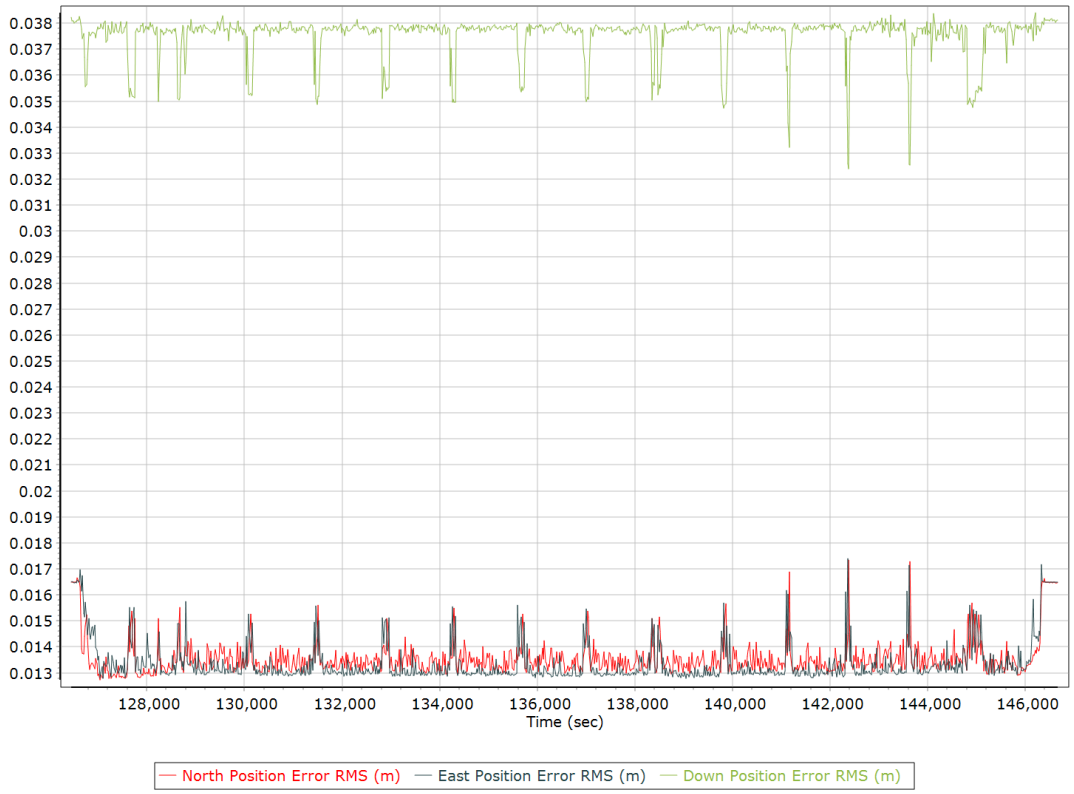


Z Gyro Scale Error (ppm)

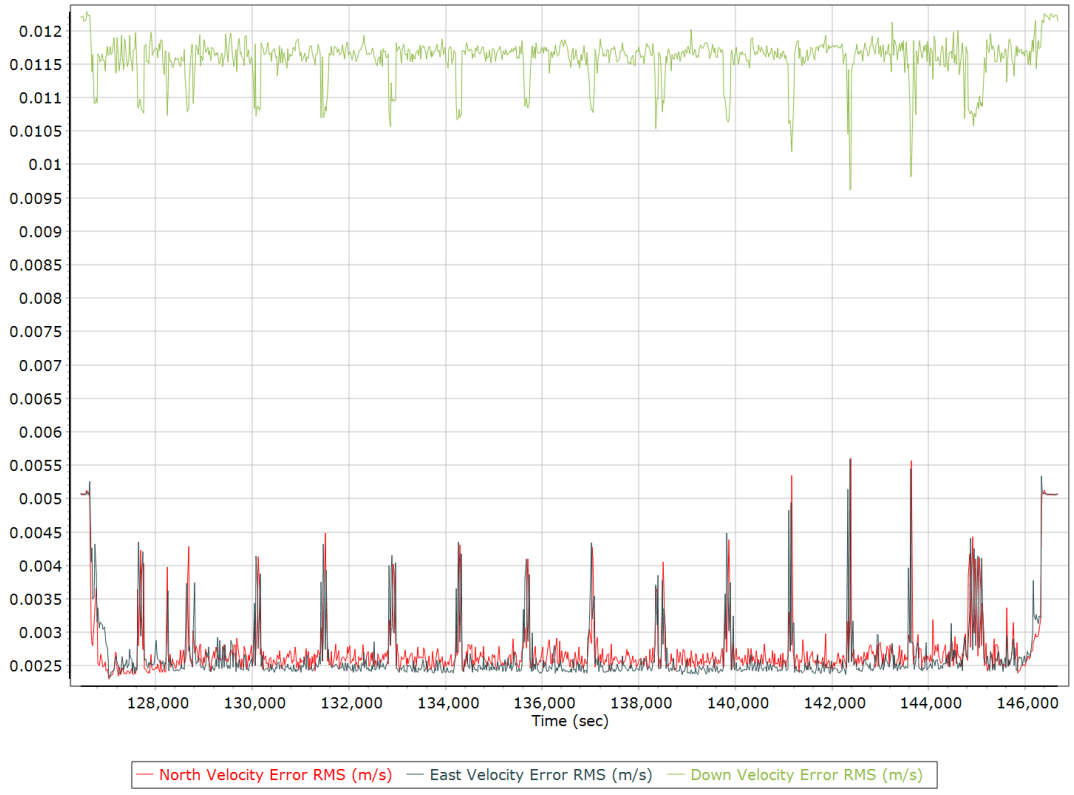


Smoothed Performance Metrics

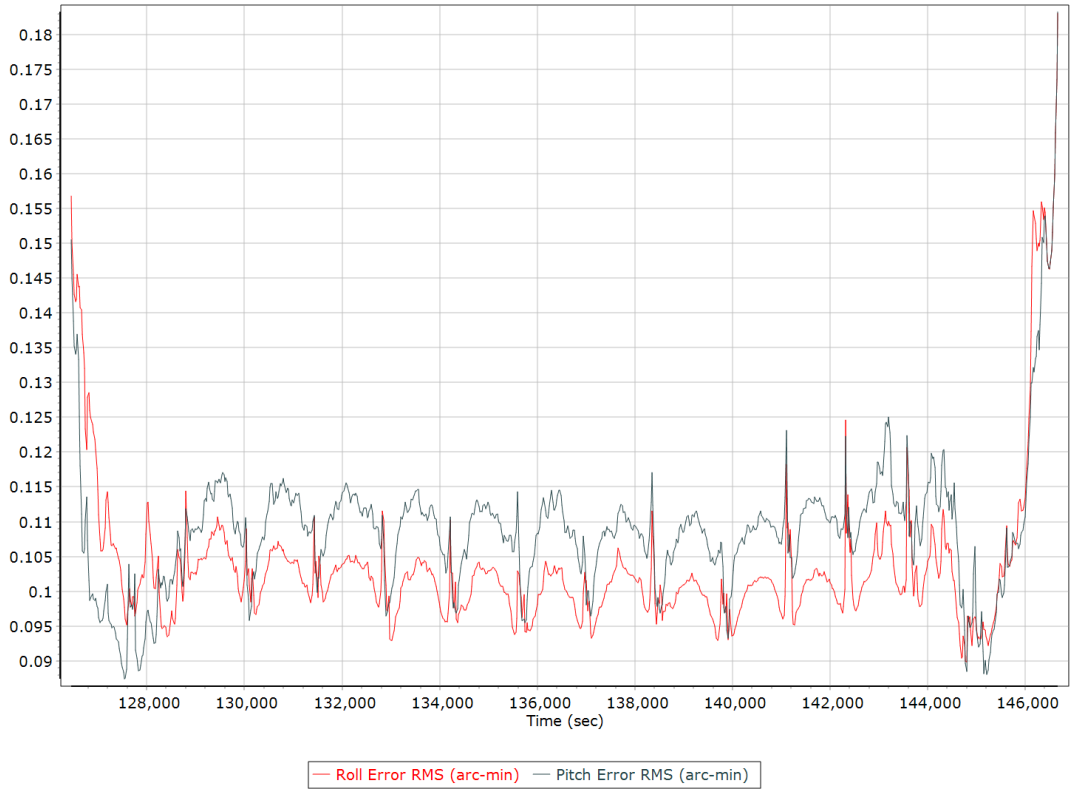
Position Error RMS (m)



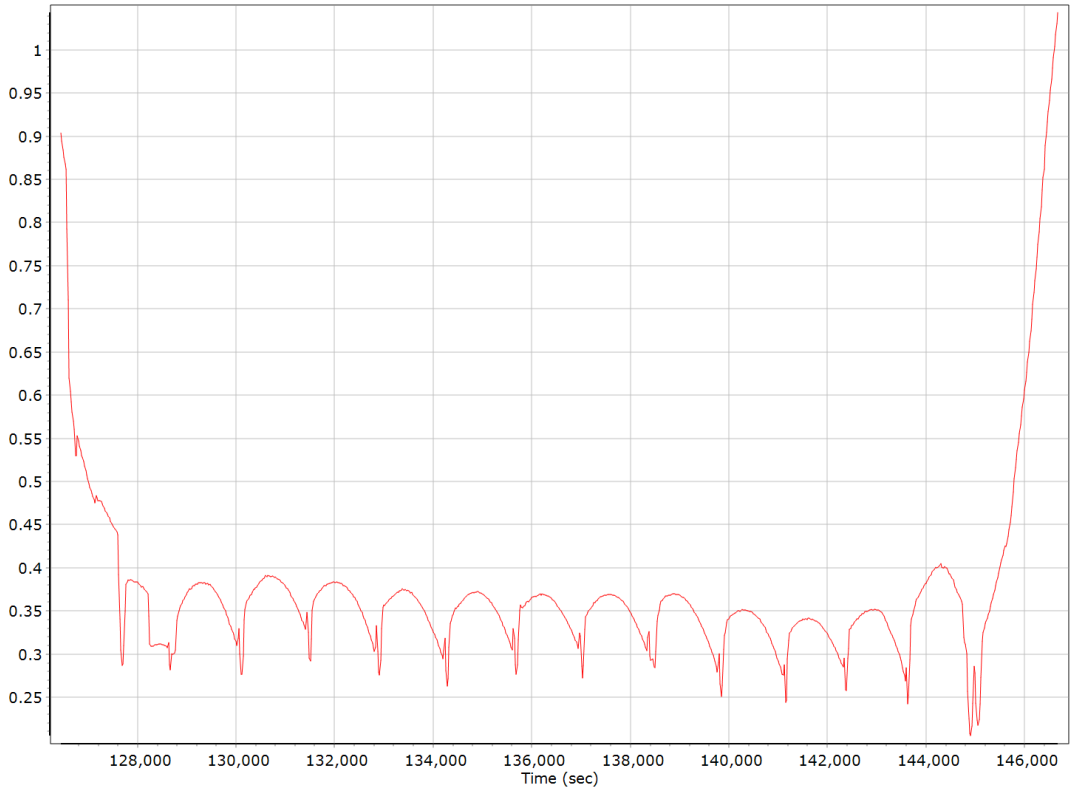
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

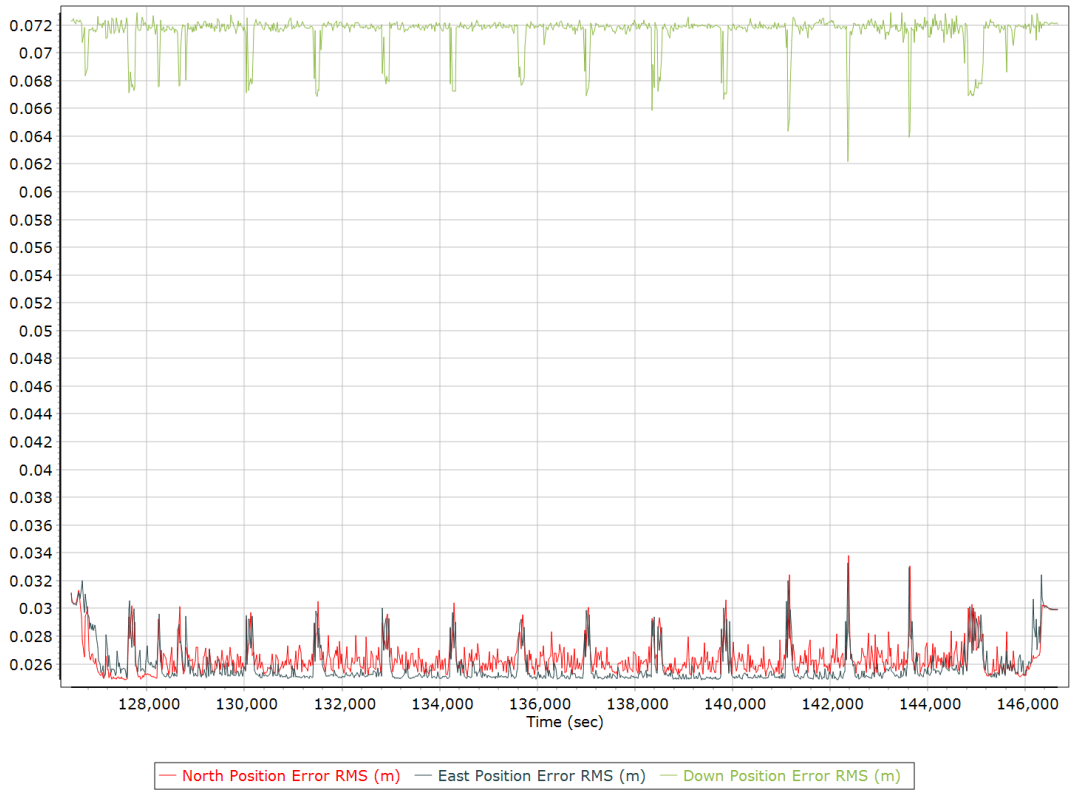


Heading Error RMS (arc-min)

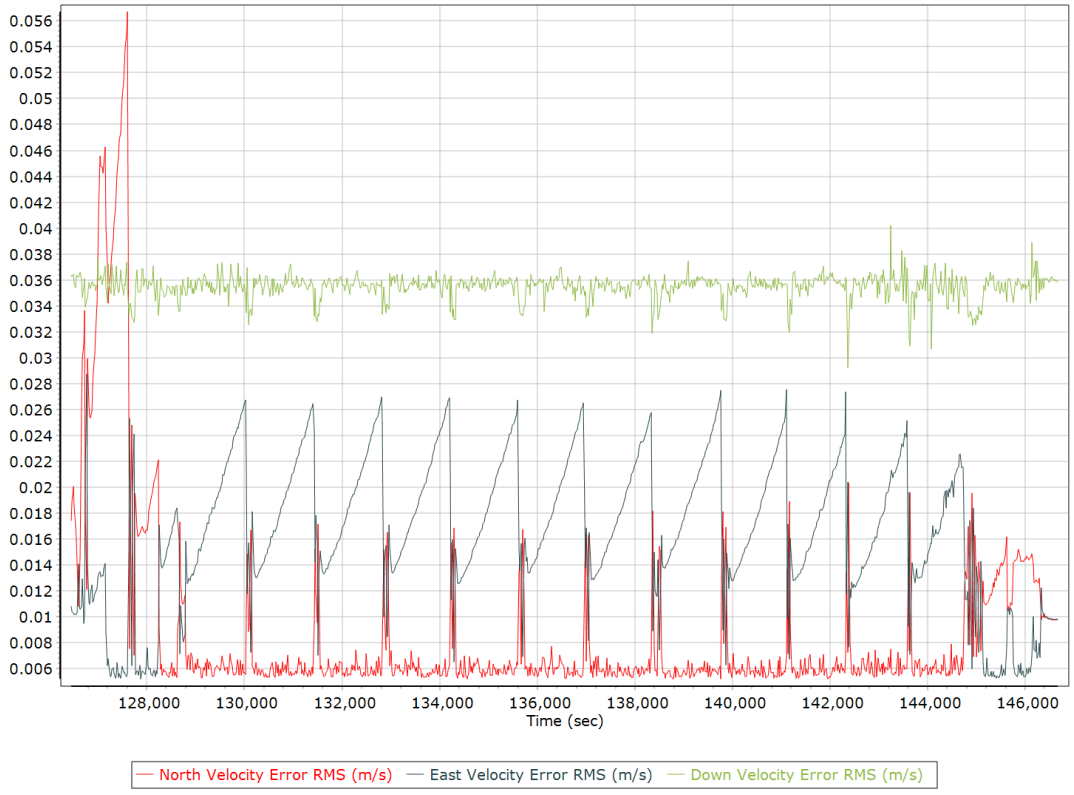


Forward Processed Performance Metrics

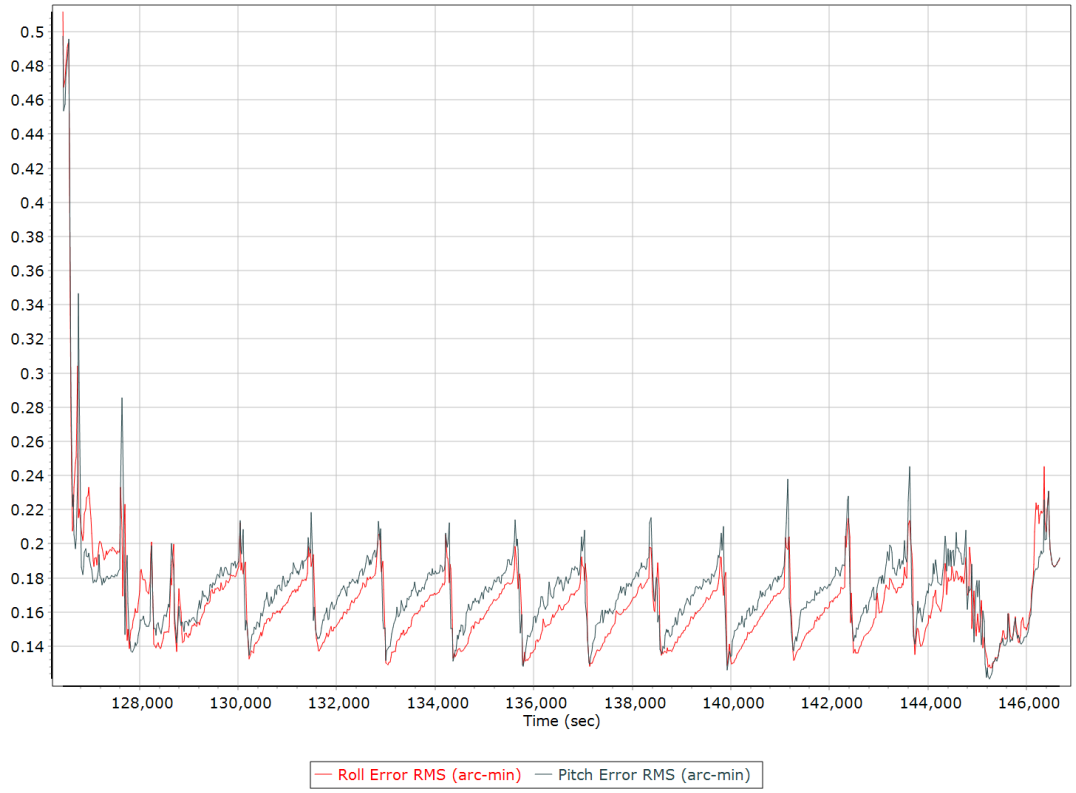
Position Error RMS (m)



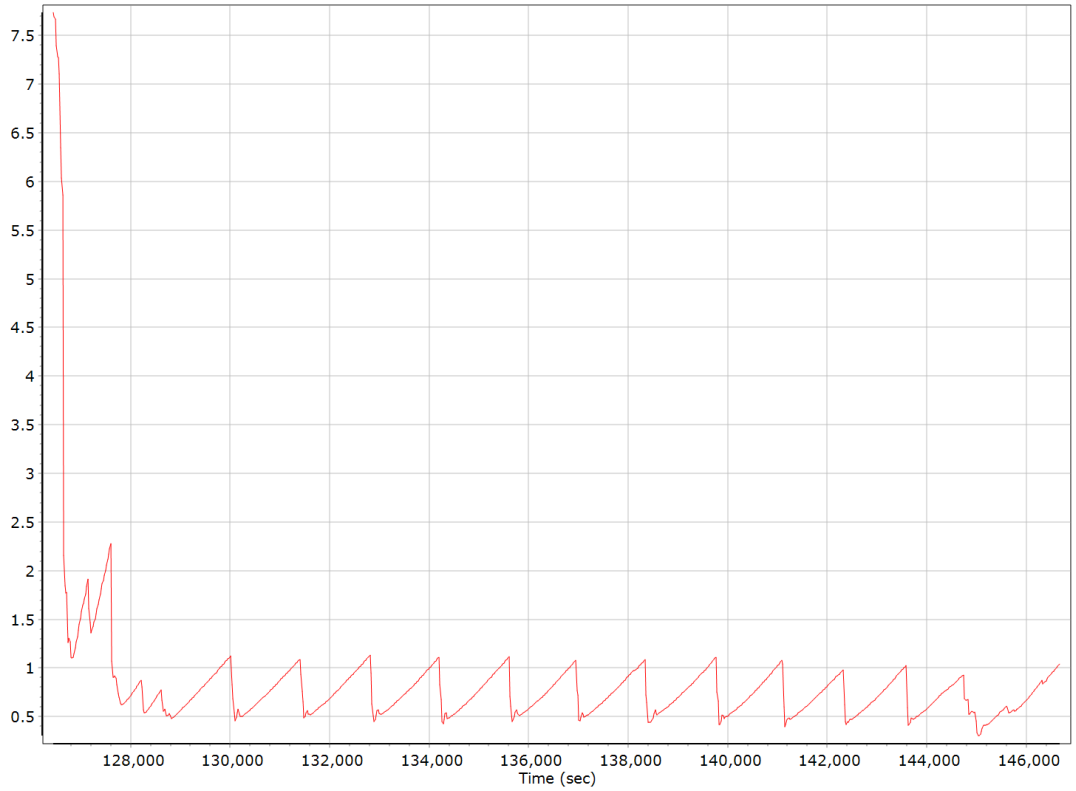
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

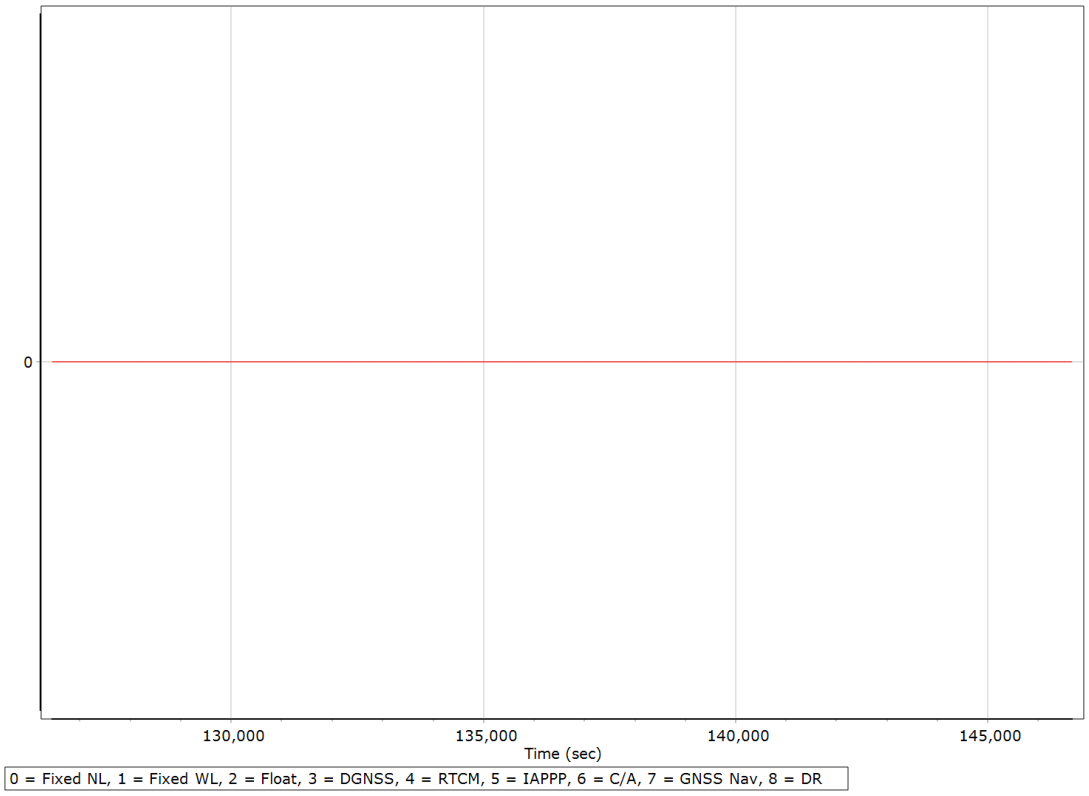


Heading Error RMS (arc-min)

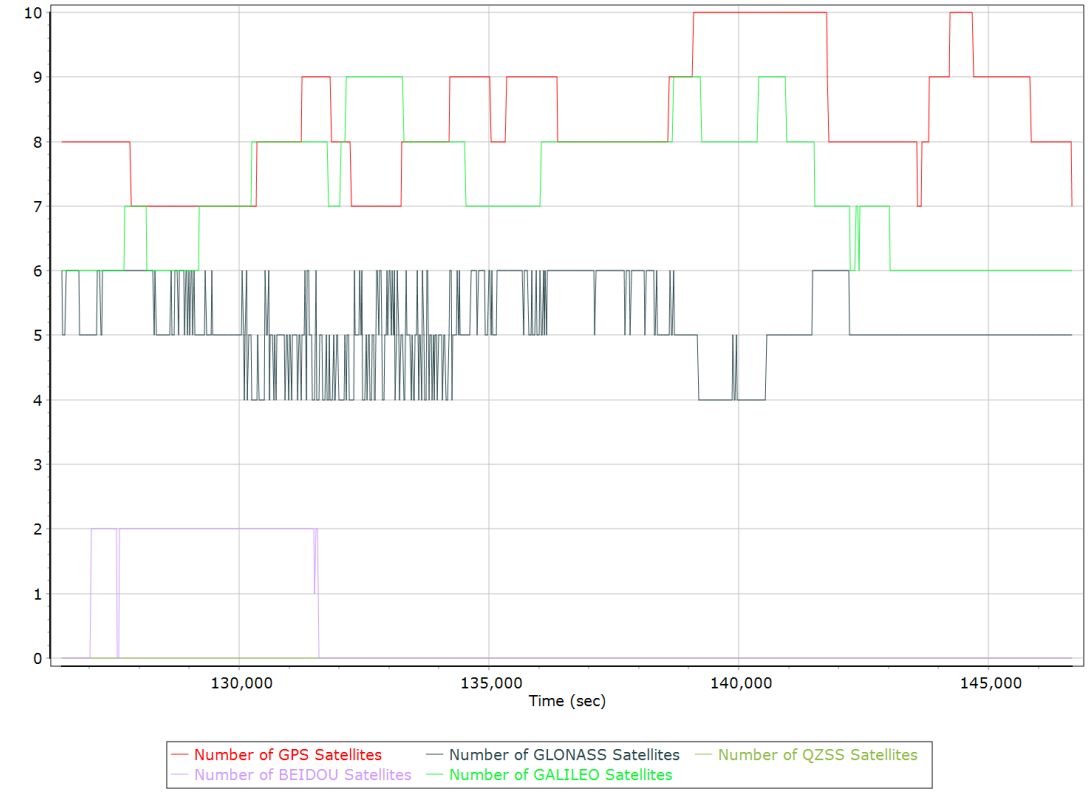


Forward Processed Solution Status

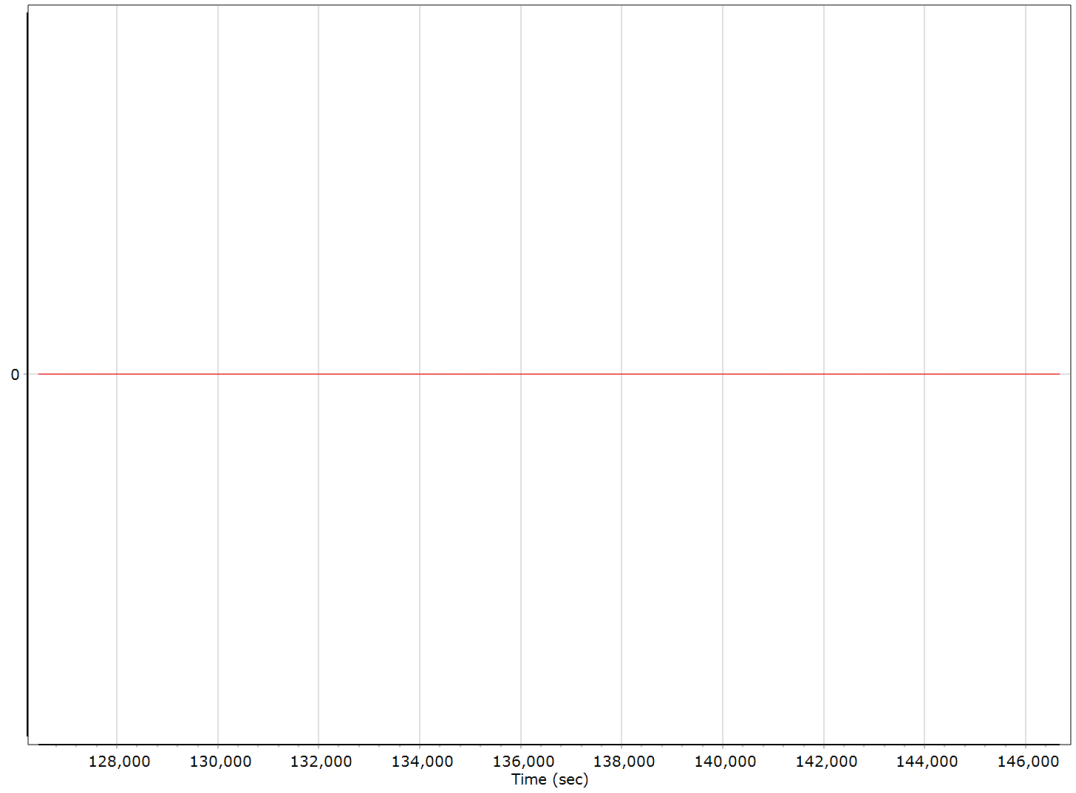
Processing Mode



Number of Satellites



Baseline Length



General Information

Mission Information

Project name	05272022A_3543
Processing date	2022-06-01 15:13:16
Mission date	2022-05-27 15:27:50
Mission duration	05:54:15.142
Processing mode	IN-Fusion PP-RTX

Rover Hardware Information

Product	POS AV 610 VER6 HW2.5-12
Serial number	S/N9683
IMU type	57
Receiver type	BD982
Antenna type	AV59

Project File List

Rover Data Files

File name	File type
N62756178.107	POS Data
N62756178.108	POS Data
N62756178.109	POS Data
N62756178.110	POS Data
N62756178.111	POS Data
N62756178.112	POS Data
N62756178.113	POS Data
N62756178.114	POS Data
N62756178.115	POS Data
N62756178.116	POS Data
N62756178.117	POS Data
N62756178.118	POS Data
N62756178.119	POS Data
N62756178.120	POS Data
N62756178.121	POS Data
N62756178.122	POS Data
N62756178.123	POS Data
N62756178.124	POS Data
N62756178.125	POS Data
N62756178.126	POS Data
N62756178.127	POS Data
N62756178.128	POS Data
N62756178.129	POS Data
N62756178.130	POS Data
N62756178.131	POS Data
N62756178.132	POS Data
N62756178.133	POS Data
N62756178.134	POS Data
N62756178.135	POS Data
N62756178.136	POS Data
N62756178.137	POS Data
N62756178.138	POS Data
N62756178.139	POS Data
N62756178.140	POS Data
N62756178.141	POS Data
N62756178.142	POS Data
N62756178.143	POS Data
N62756178.144	POS Data
N62756178.145	POS Data
N62756178.146	POS Data
N62756178.147	POS Data
N62756178.148	POS Data
N62756178.149	POS Data
N62756178.150	POS Data
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N62756178.155	POS Data
N62756178.156	POS Data
N62756178.157	POS Data
N62756178.158	POS Data
N62756178.159	POS Data
N62756178.160	POS Data
N62756178.161	POS Data
N62756178.162	POS Data
N62756178.163	POS Data
N62756178.164	POS Data
N62756178.165	POS Data

File name	File type
N62756178.166	POS Data
N62756178.167	POS Data
N62756178.168	POS Data
N62756178.169	POS Data
N62756178.170	POS Data
N62756178.171	POS Data
N62756178.172	POS Data
N62756178.173	POS Data

Input Files

File Name	File Type
Ephm1470.22g	GLONASS Broadcast Ephemeris
Ephm1470.22n	GPS Broadcast Ephemeris

Output Files

Filename	File type
sbet_05272022B_3543.out	SBET Trajectory File

Rover Data Summary

First raw data file	N62756178.107		
Last raw data file	N62756178.173		
Start GPS week	2211		
Start time	487663.776 (5/27/2022 3:27:43 PM)		
End time	508918.918 (5/27/2022 9:21:58 PM)		
Start of fine alignment	488586.874 (5/27/2022 3:43:06 PM)		
Available subsystems	Primary GNSS, Gimbal, IMU		
POS Event Input	Event 1 Input, Event 2 Input, Event 3 Input		
Correction data	None		
IMU Installation Lever Arms & Mounting Angles			
Gimbal to IMU lever arm (m)	-0.034	-0.010	-0.374
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.717	-0.178	-1.265
Gimbal to Primary GNSS lever arm std dev (m)	-1.000		
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

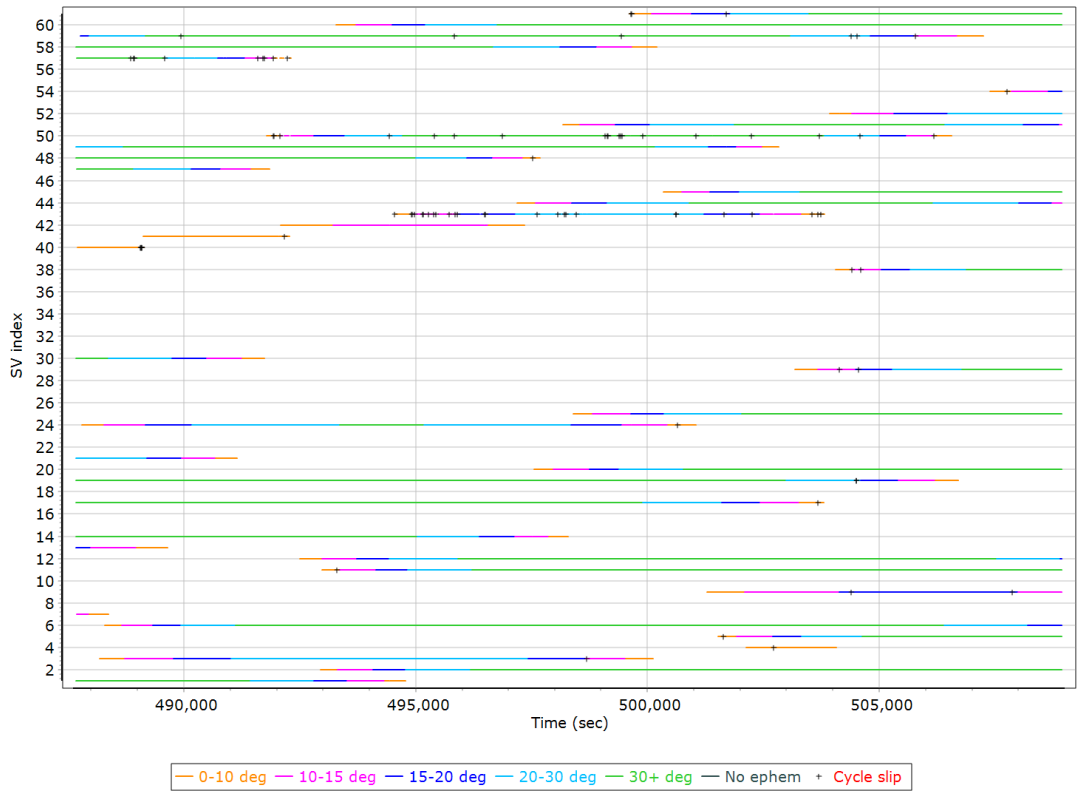
Rover Data QC

Raw IMU Import QC Summary

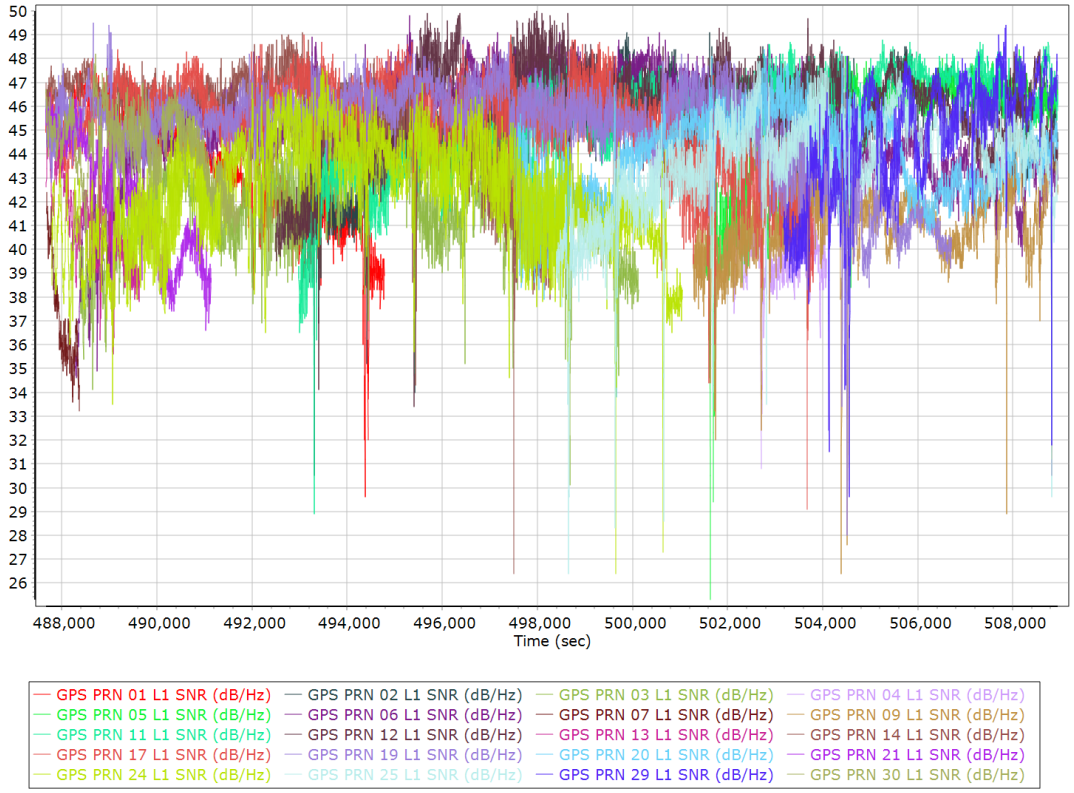
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05272022B_3543.log
IMU Records Processed	4253128
Termination Status	Warnings
IMU Anomalies	1
IMU Failure Messages	
487663.616 : WARNING : Gap of 487651.6547 seconds in CHECKDT input data	

Primary Observables & Satellite Data

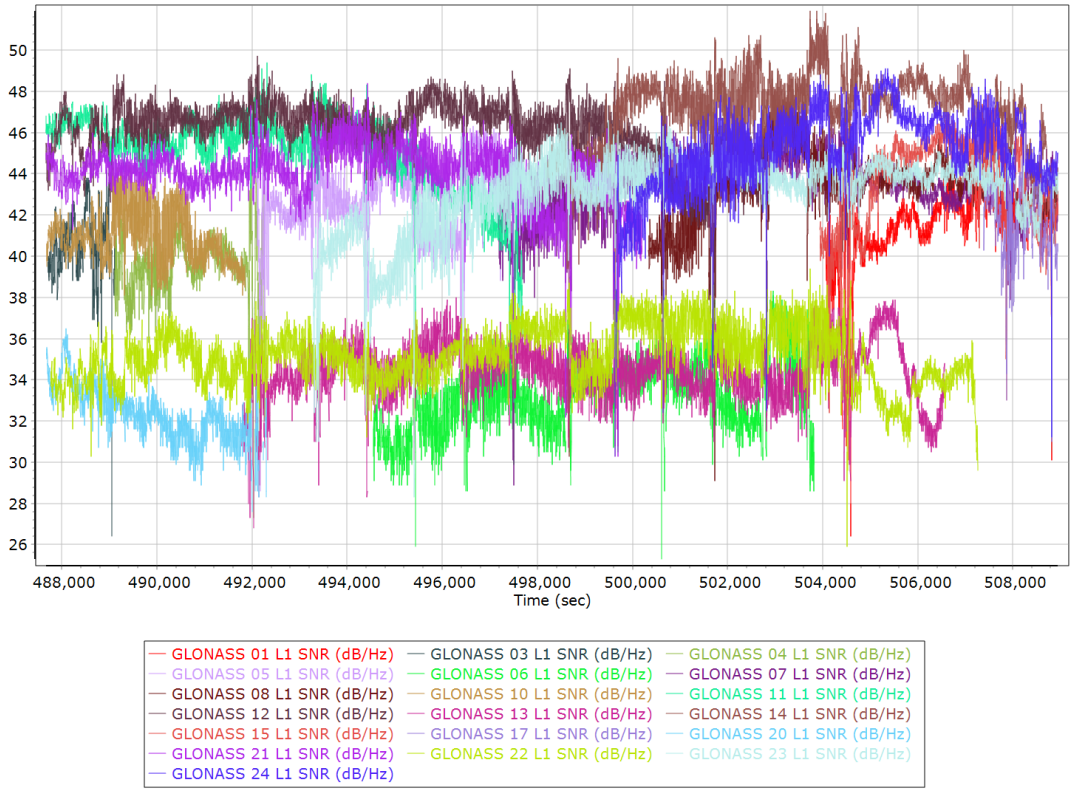
GPS/GLONASS L1 Satellite Lock/Elevation



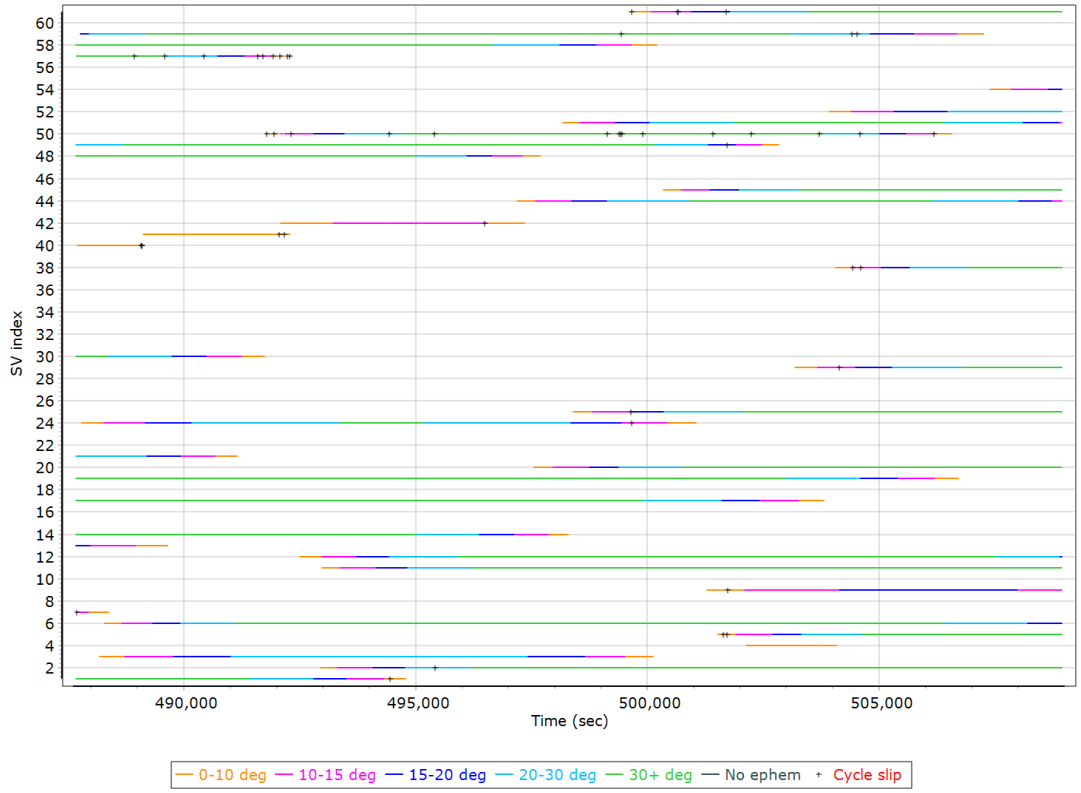
GPS L1 SNR



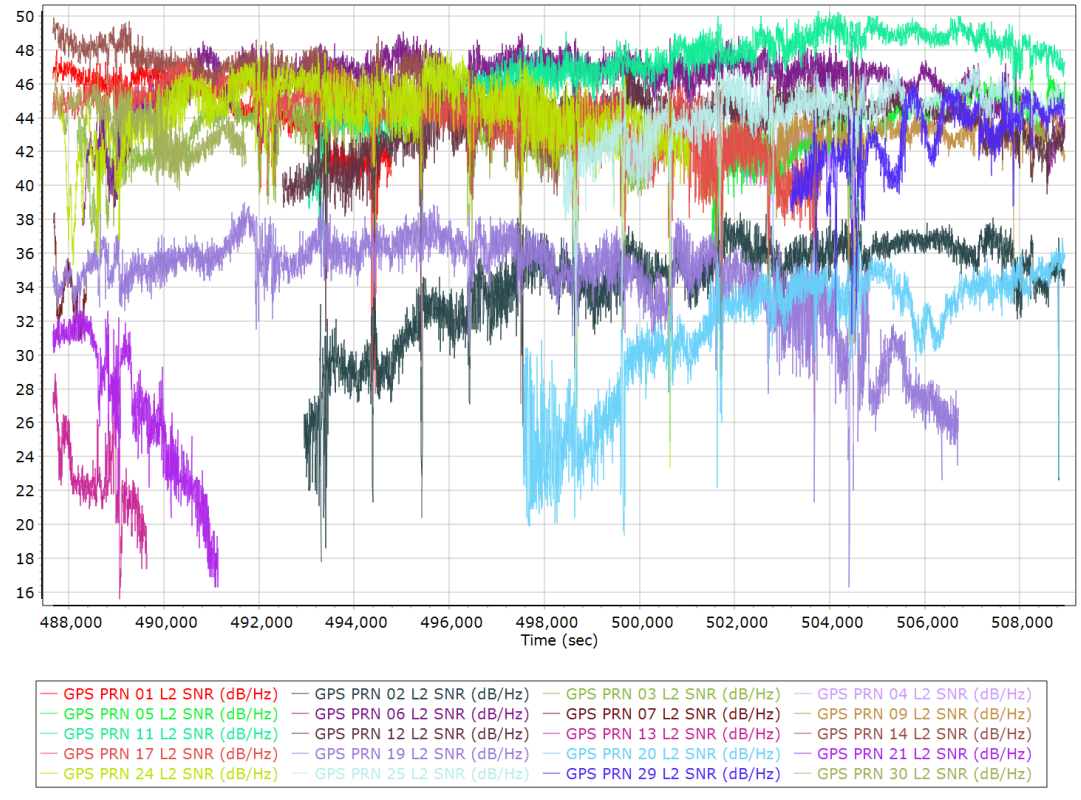
GLONASS L1 SNR



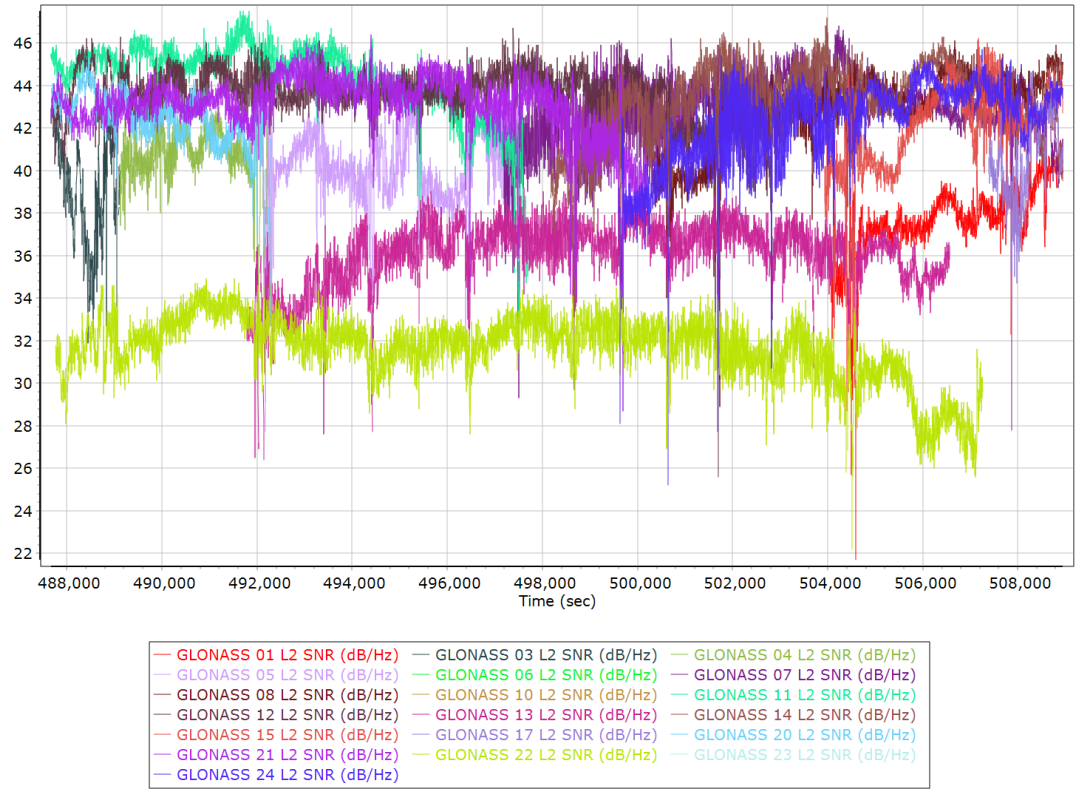
GPS/GLONASS L2 Satellite Lock/Elevation



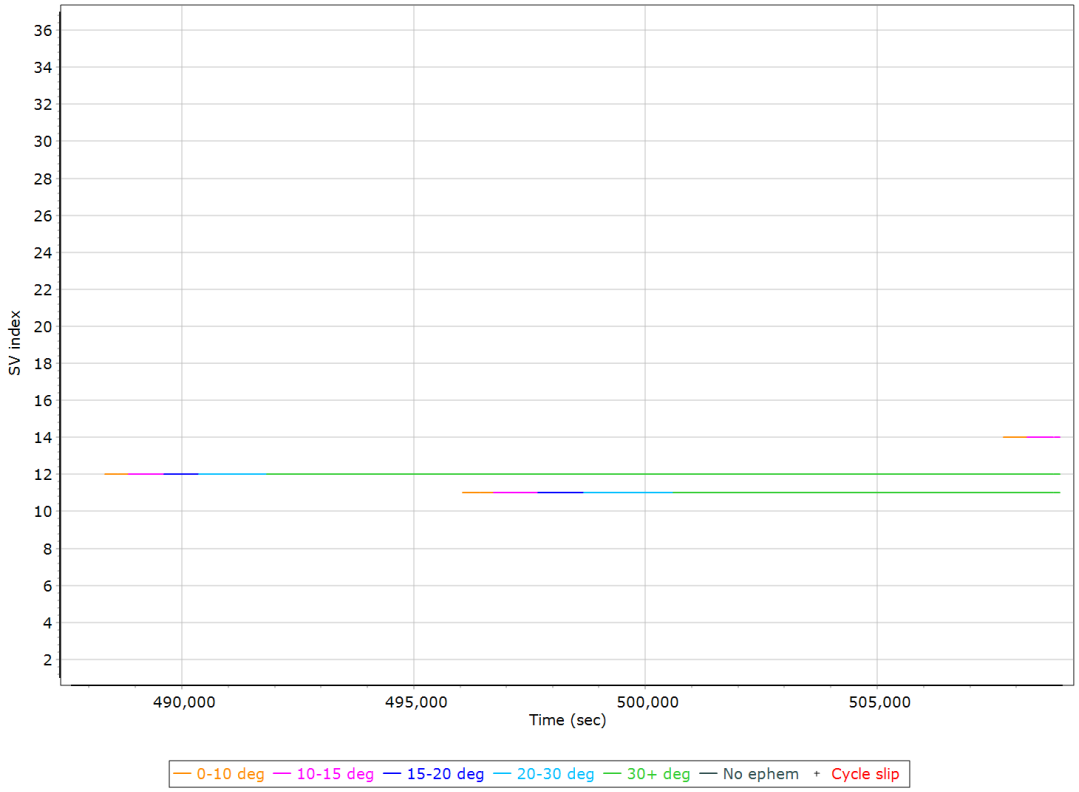
GPS L2 SNR



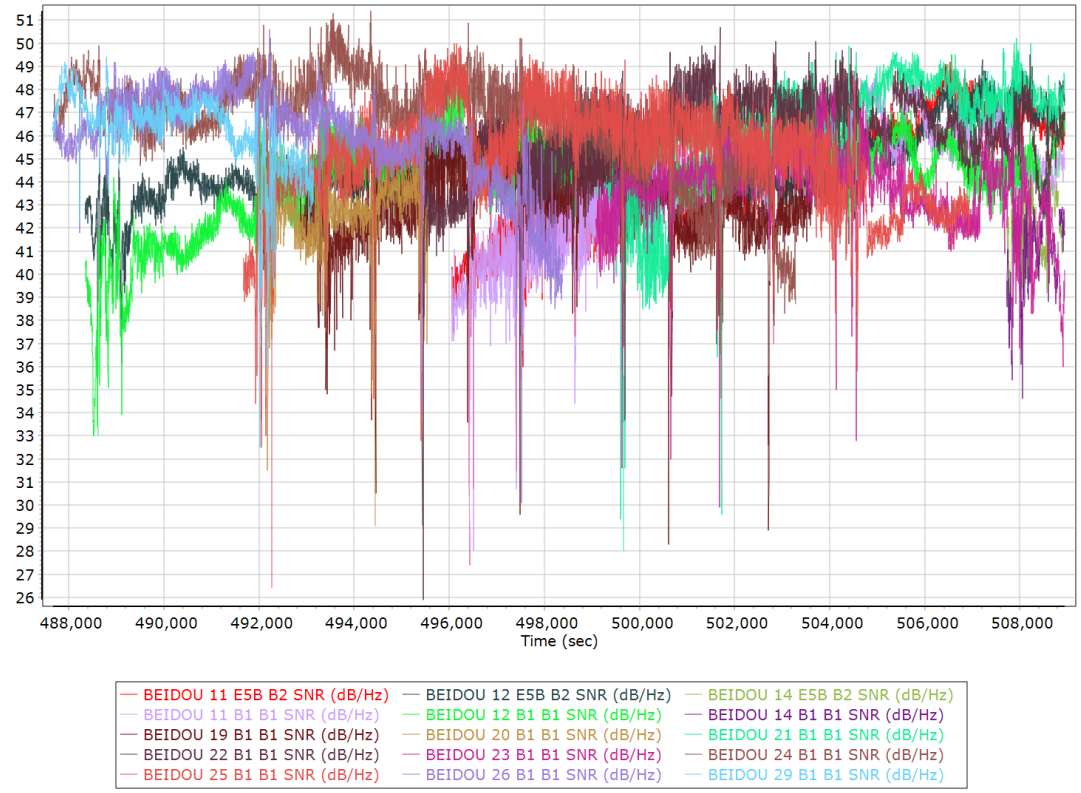
GLONASS L2 SNR



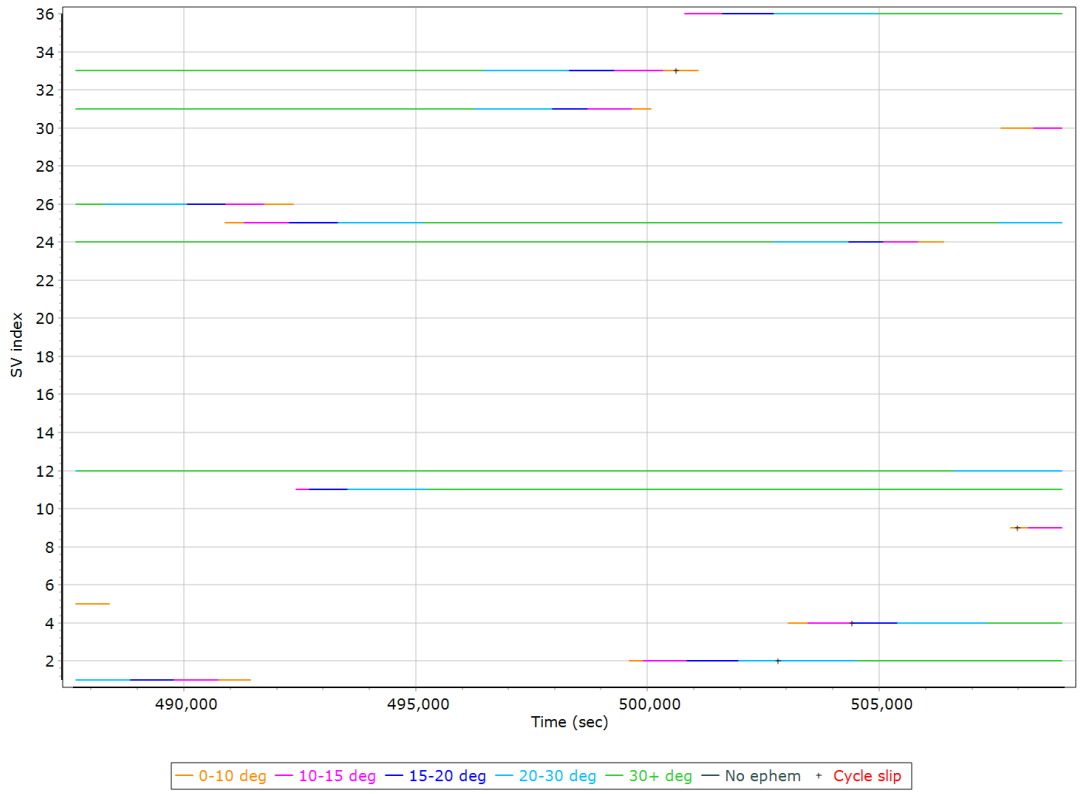
BEIDOU Satellite Lock/Elevation



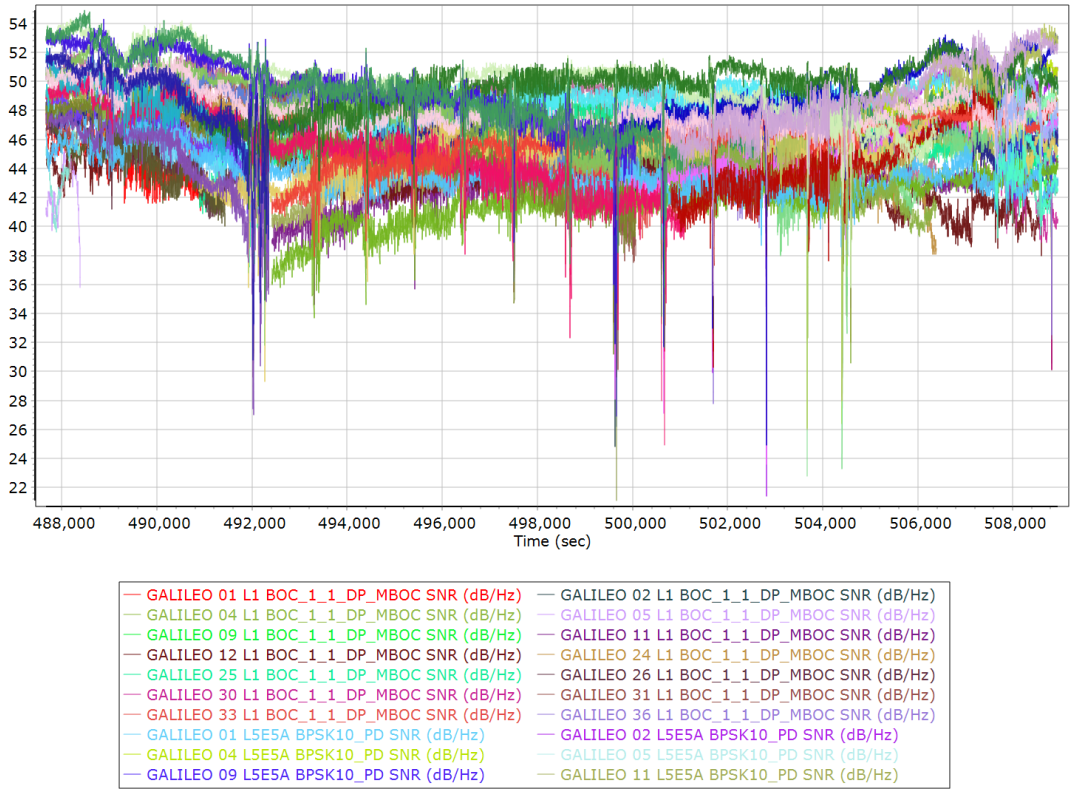
BEIDOU SNR



GALILEO Satellite Lock/Elevation

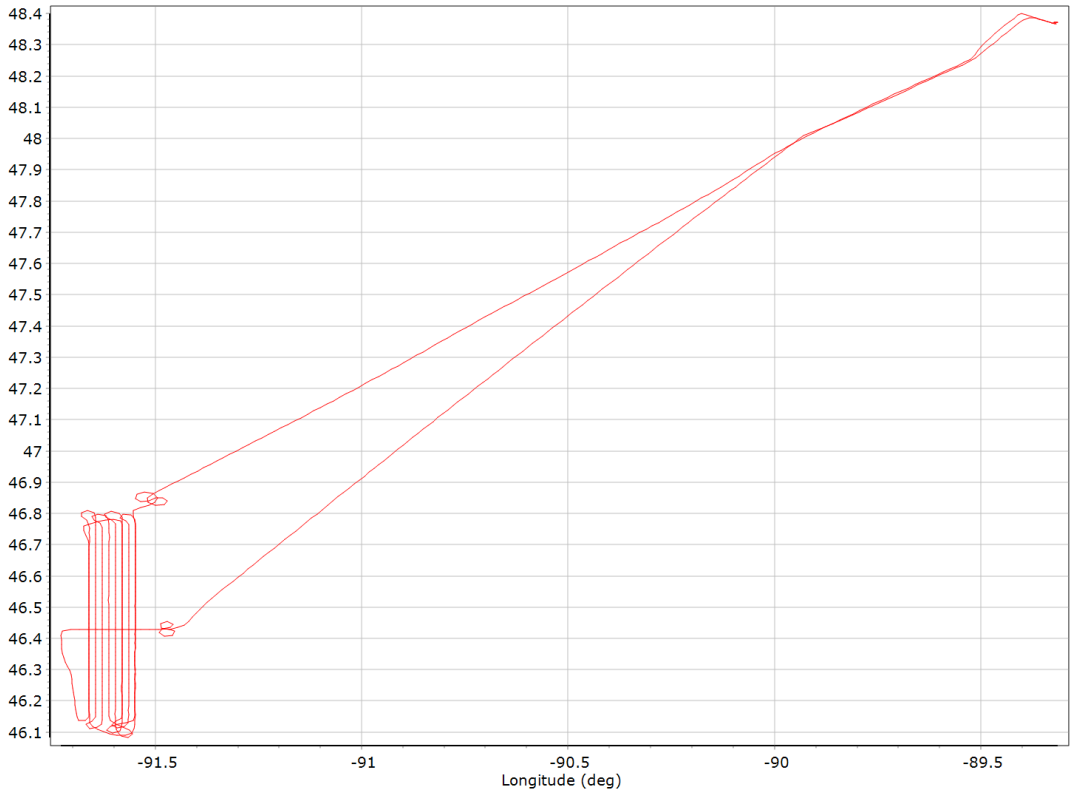


GALILEO SNR

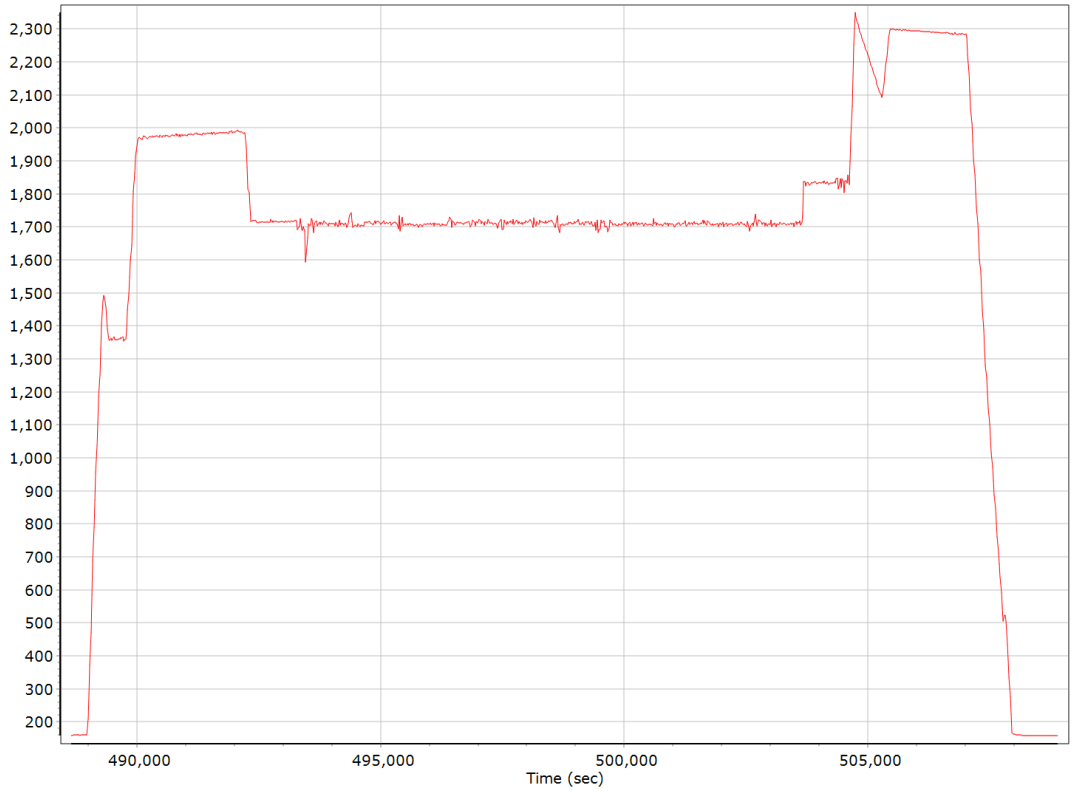

54
52
50
48
46
44
42
40
38
36
34
32
30
28
26
24
22
488,000
490,000
492,000
494,000
496,000
498,000
500,000
502,000
504,000
506,000
508,000
Time (sec)
GALILEO 01 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 02 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 04 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 05 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 09 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 11 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 24 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 25 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 26 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 30 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 31 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 33 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 36 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
GALILEO 01 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 02 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 04 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 05 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 09 L5E5A BPSK10_PD SNR (dB/Hz)
GALILEO 11 L5E5A BPSK10_PD SNR (dB/Hz)

Smoothed Trajectory Information

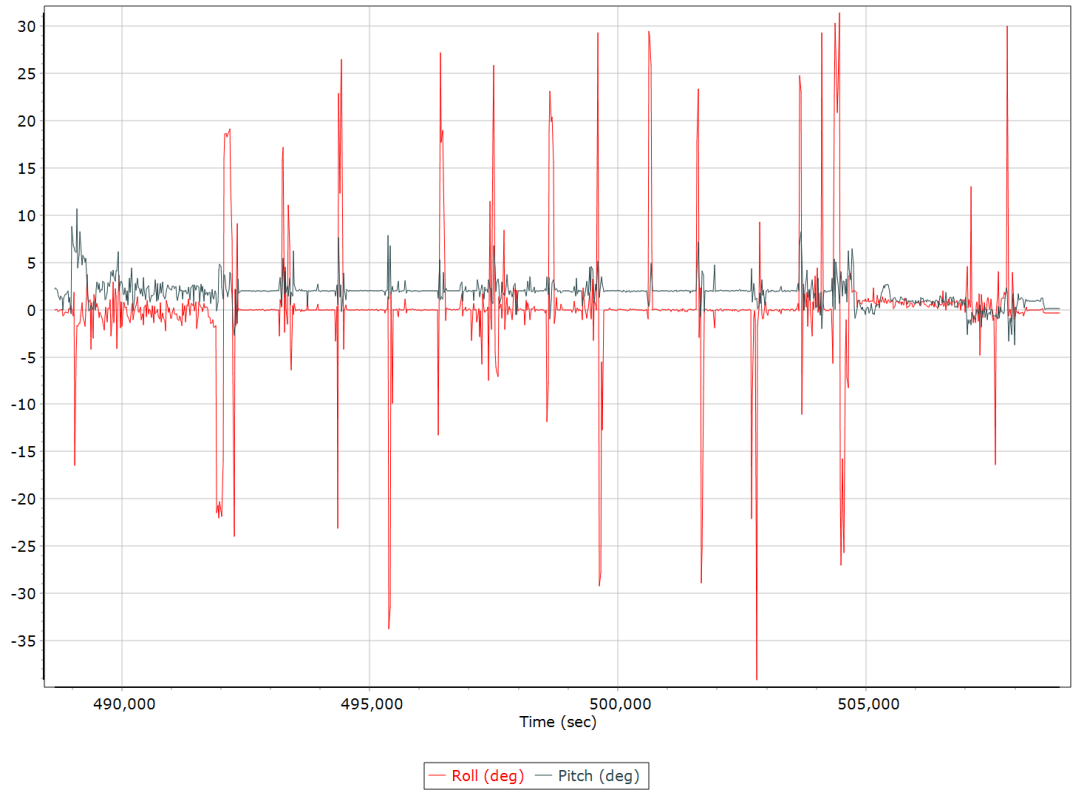
Top View



Altitude



Roll/Pitch



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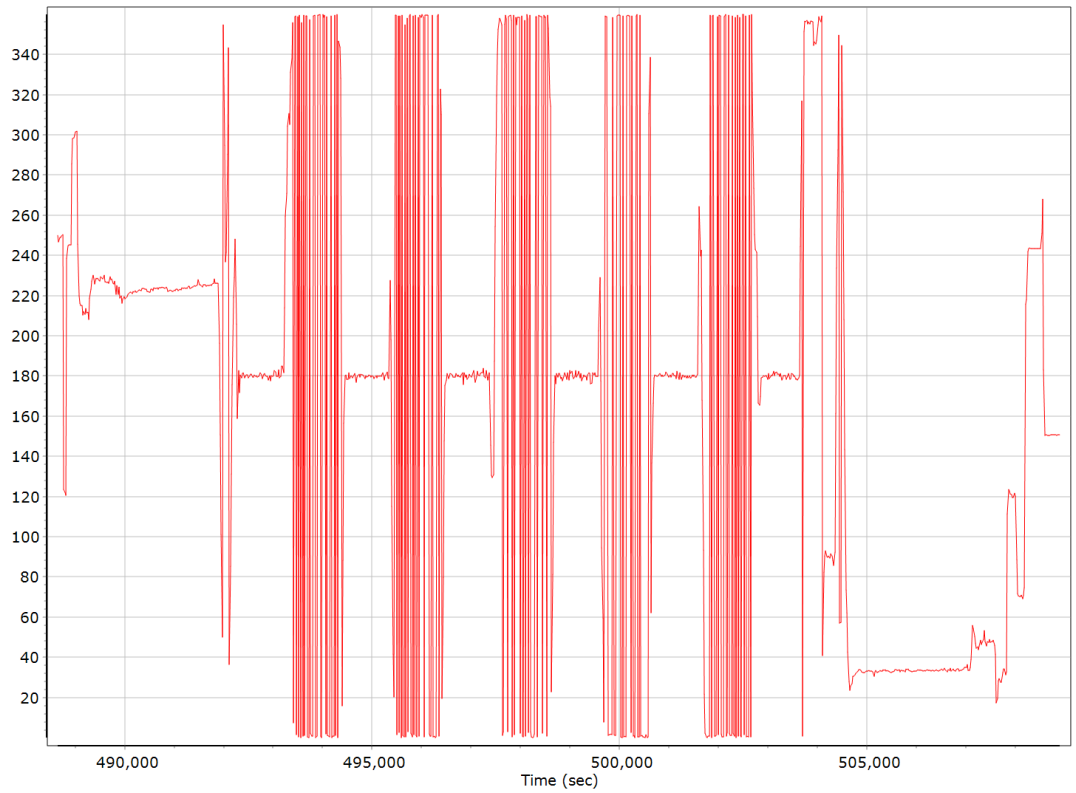
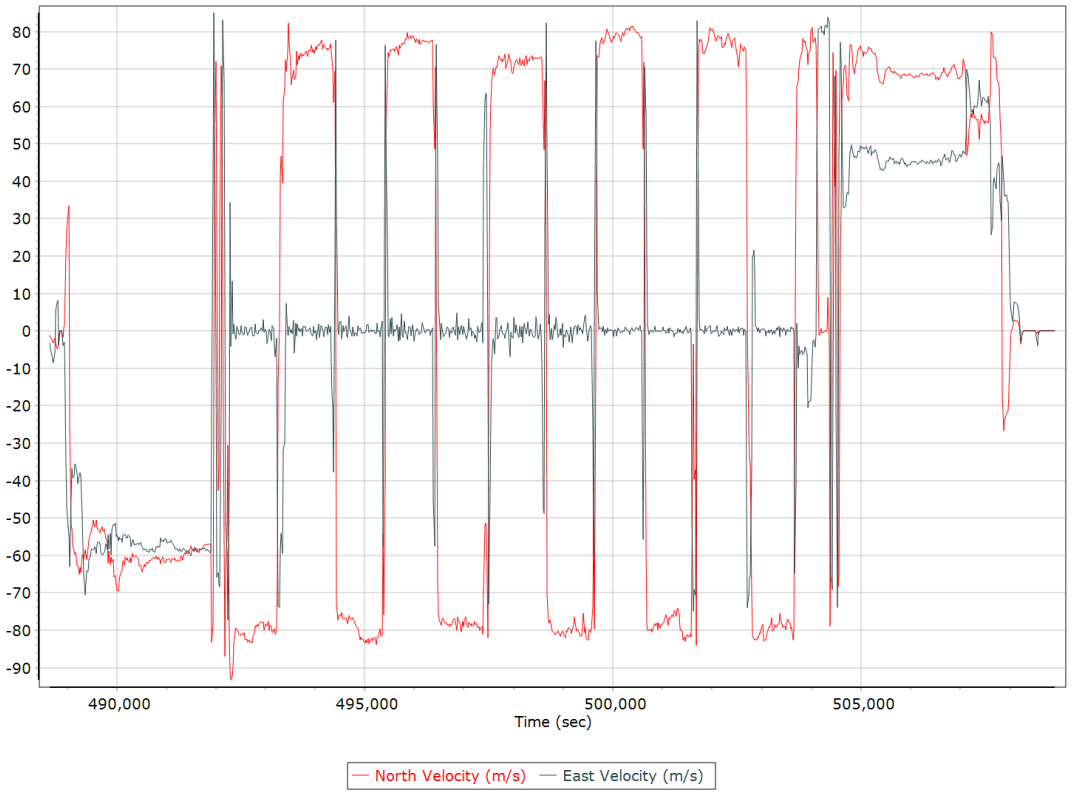
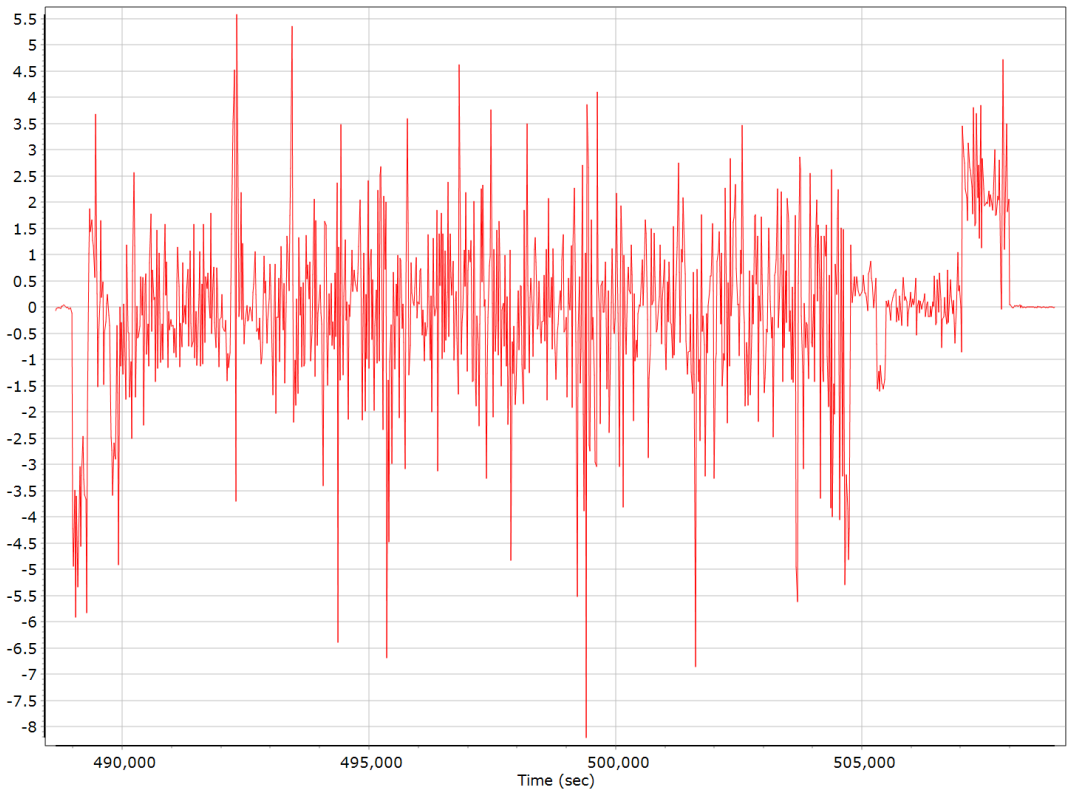


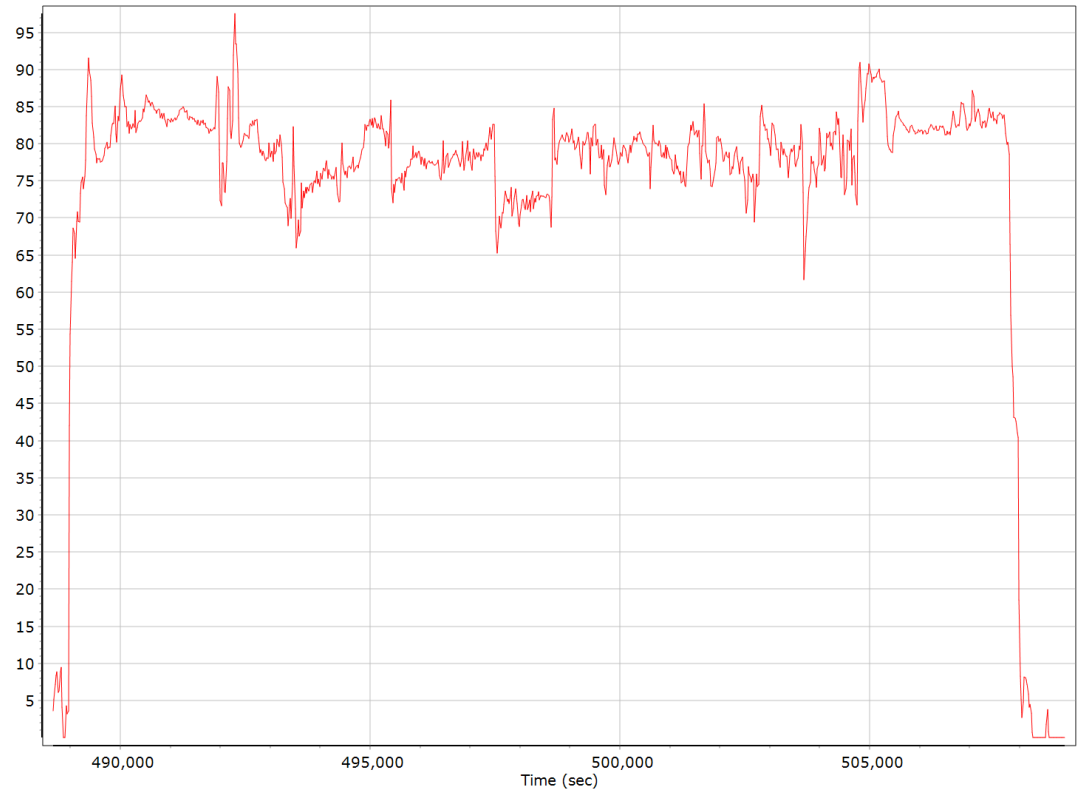
North/East Velocity



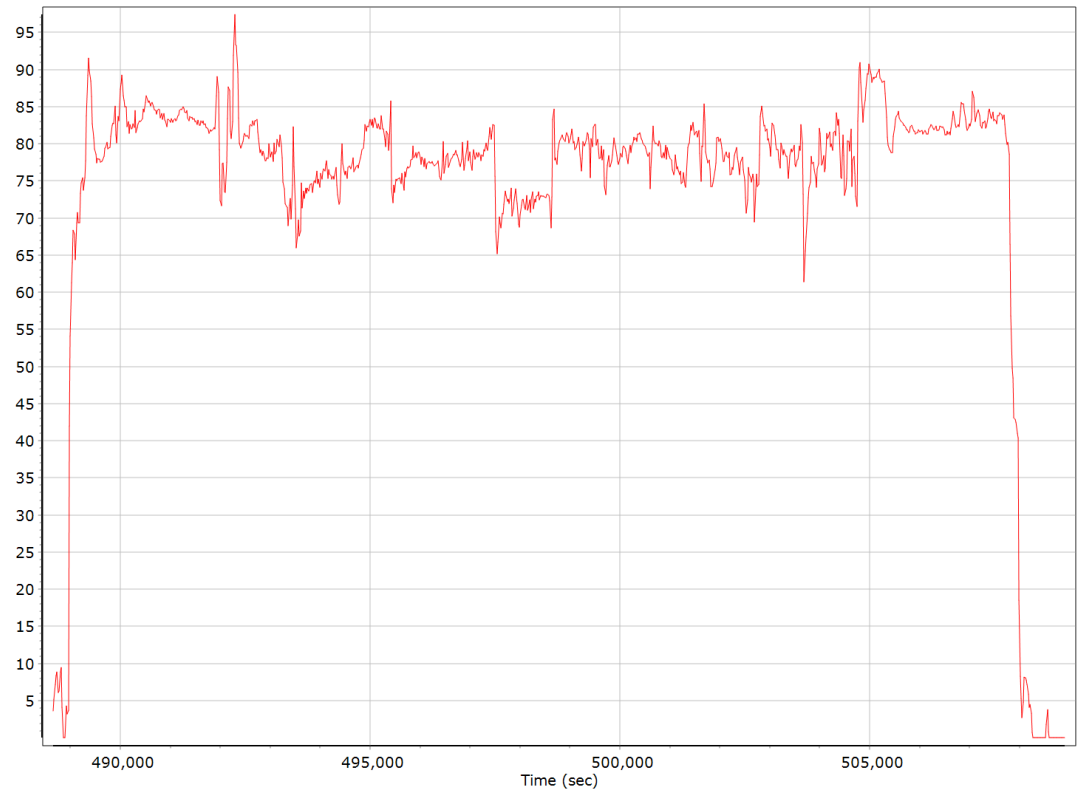
Down Velocity



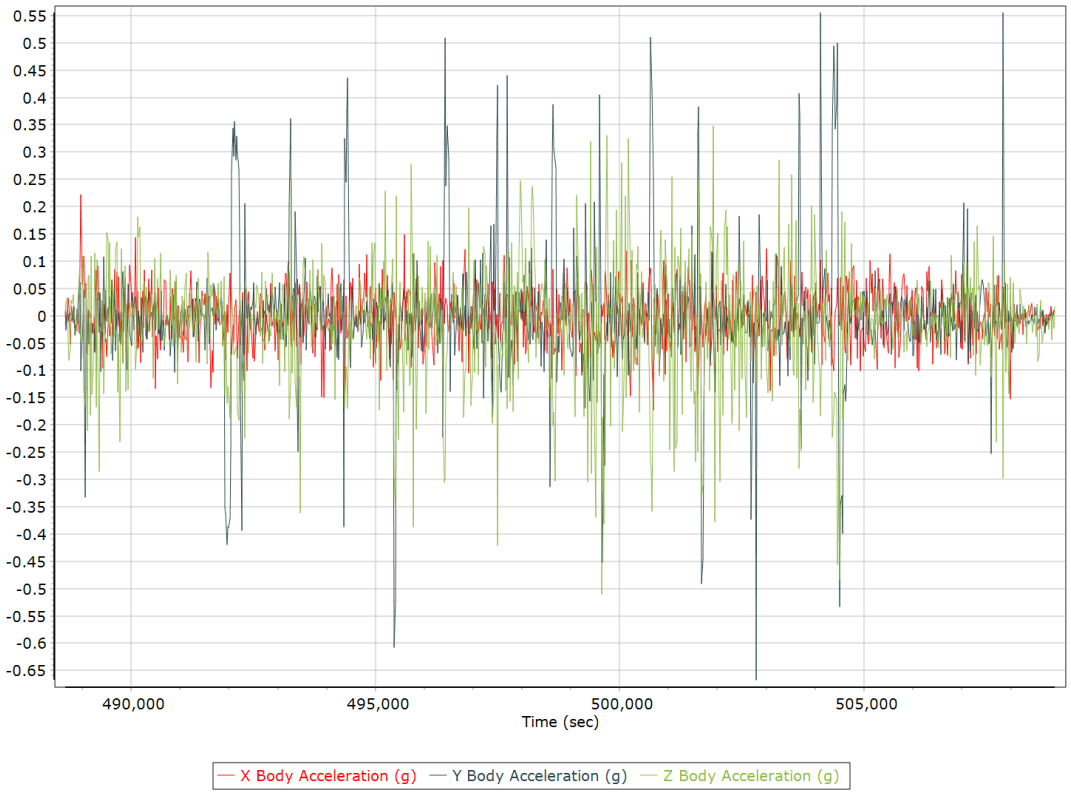
Total Speed



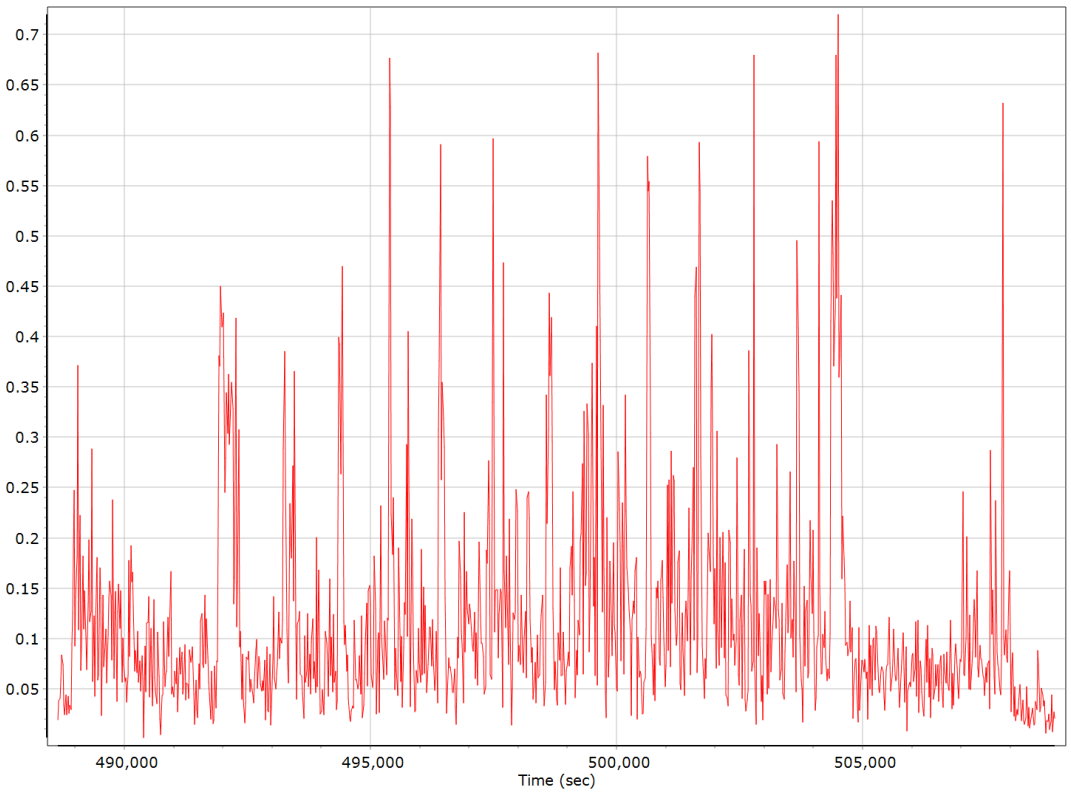
Ground Speed



Body Acceleration



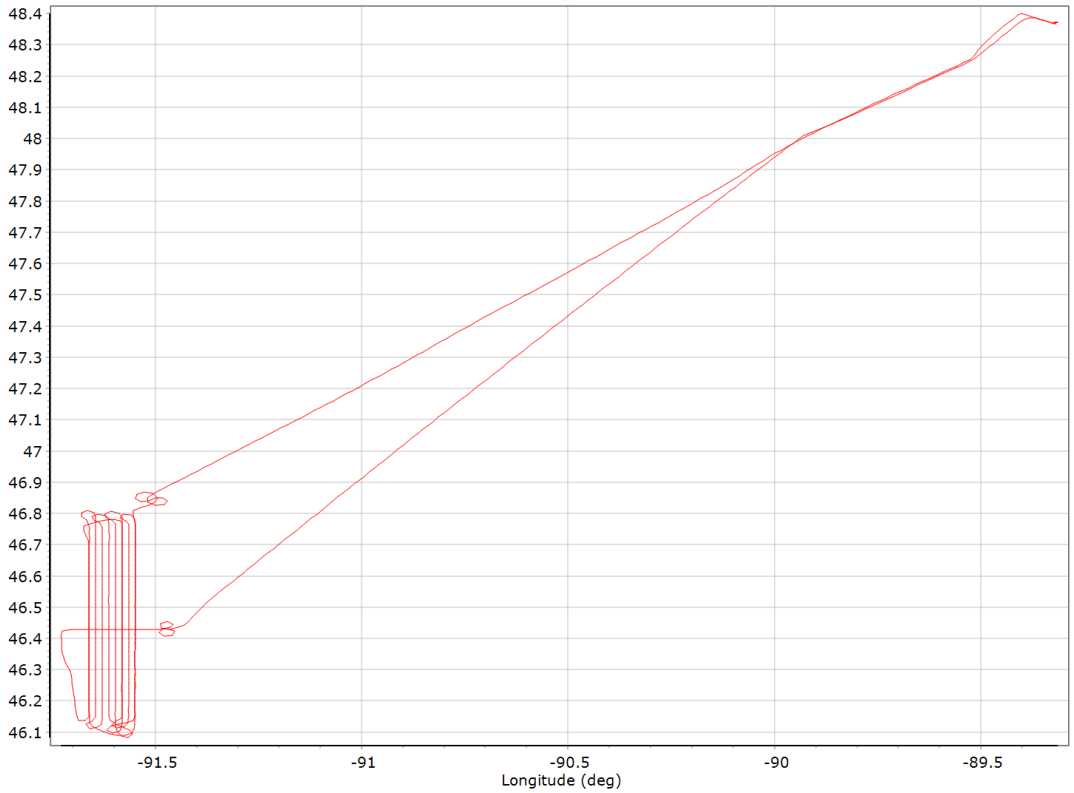
Total Body Acceleration



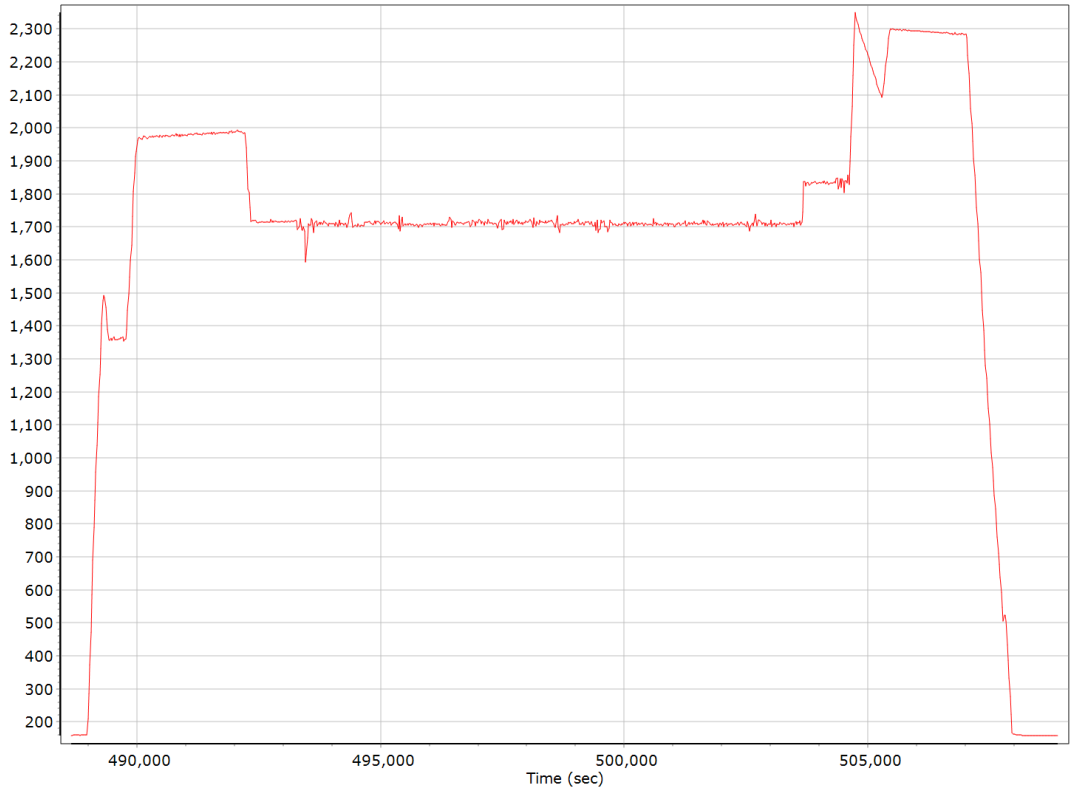
Body Angular Rate

Forward Processed Trajectory Information

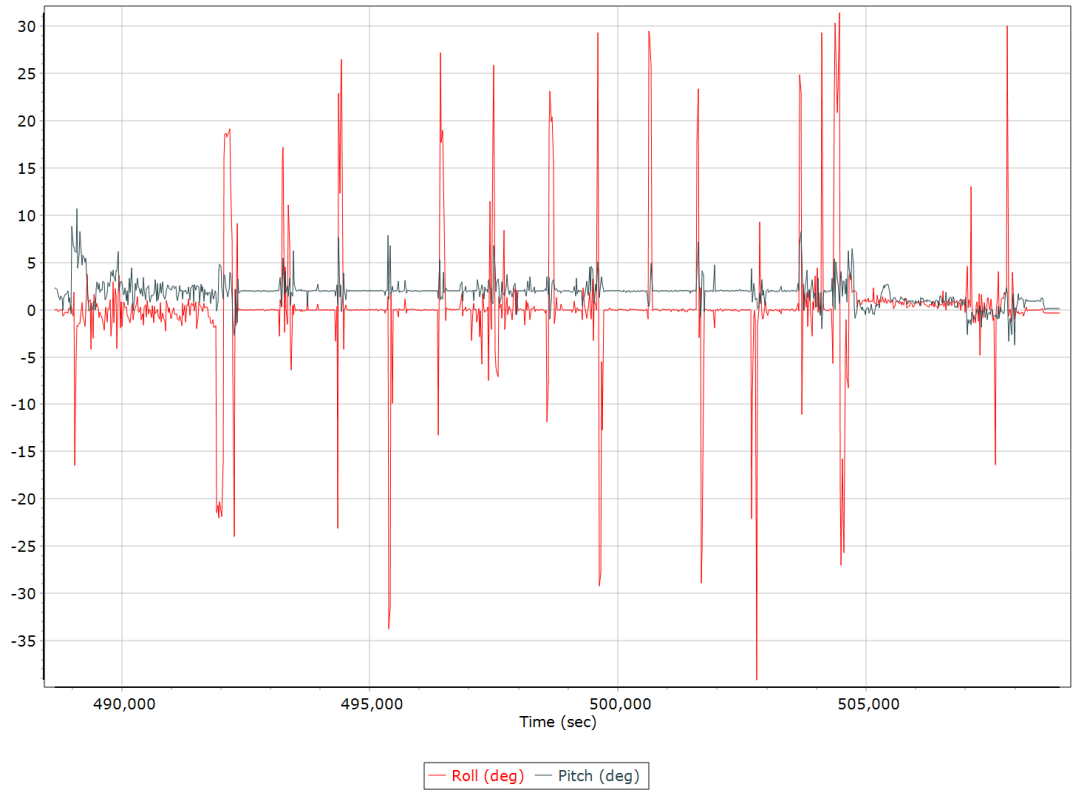
Top View



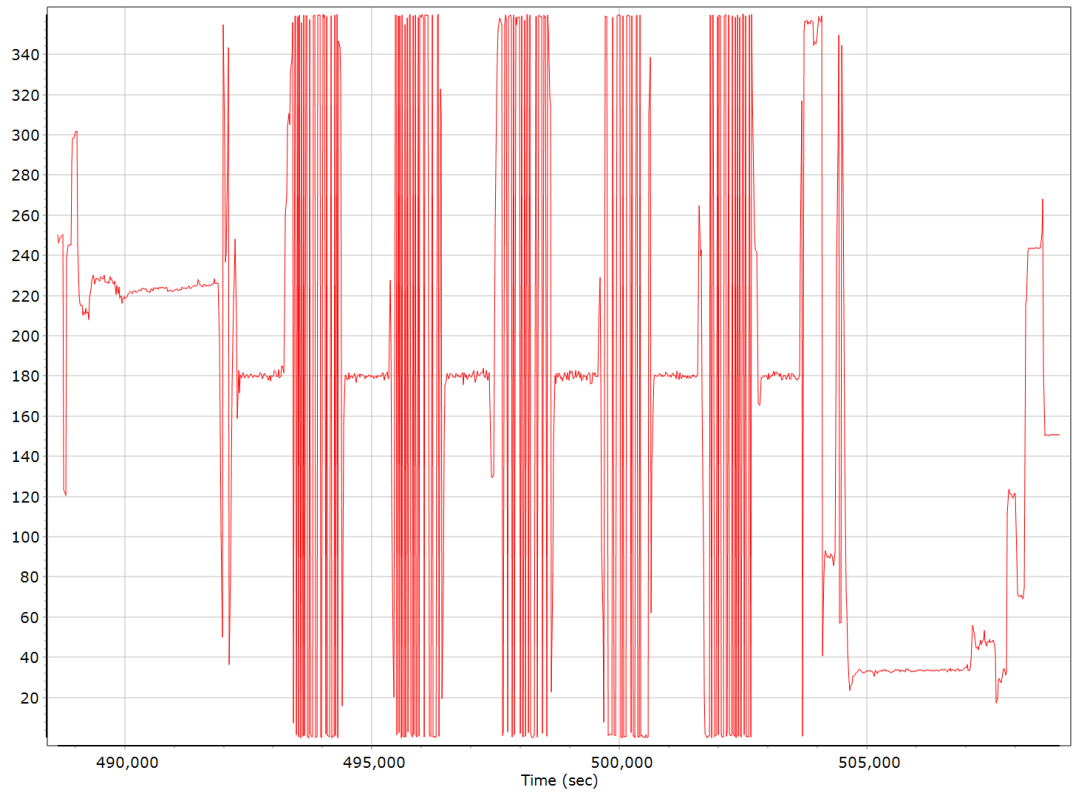
Altitude



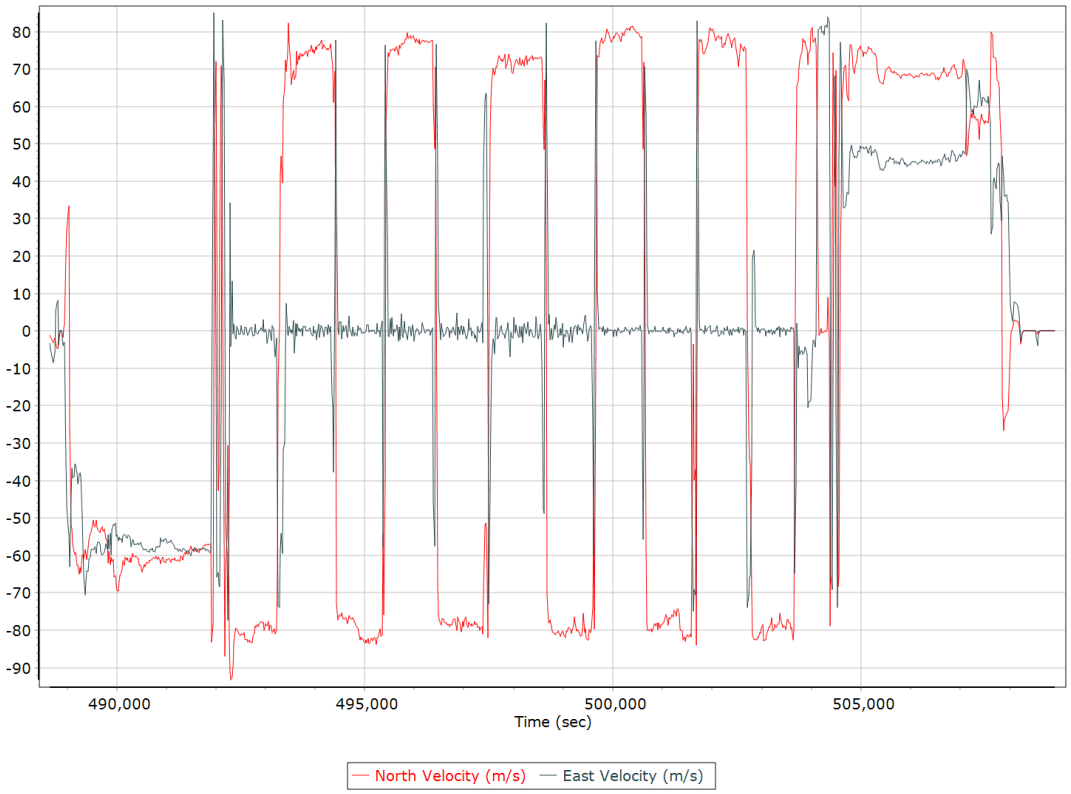
Roll/Pitch



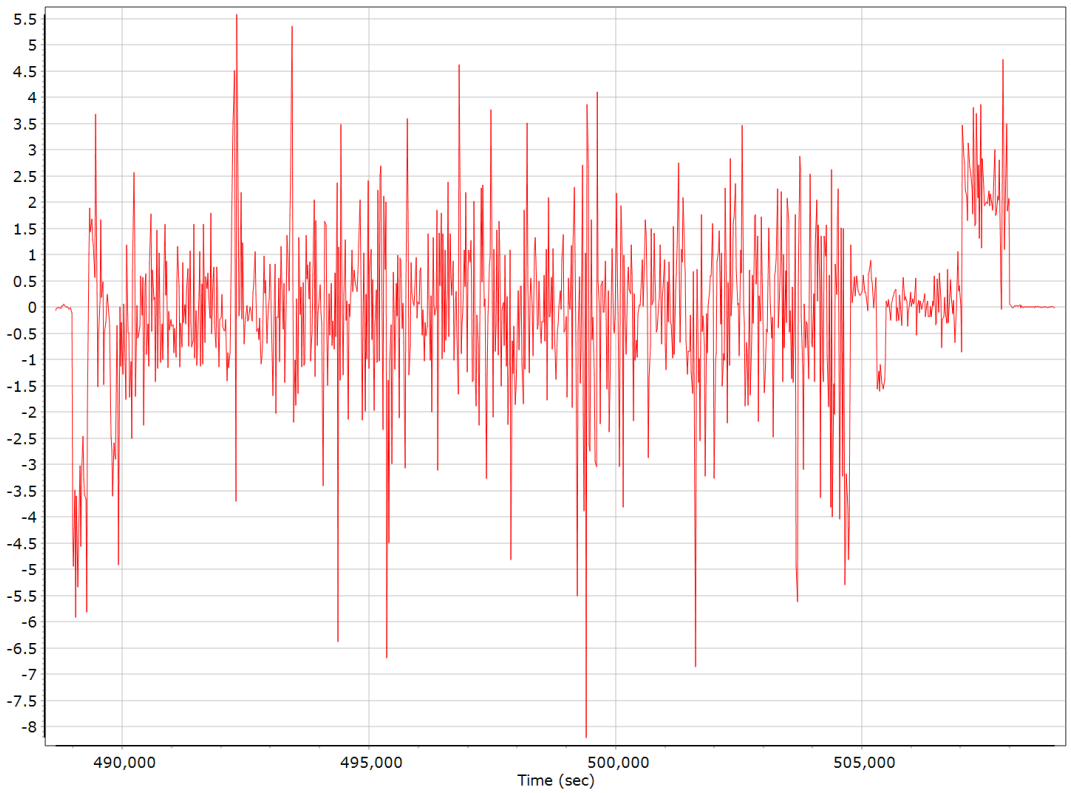
Heading



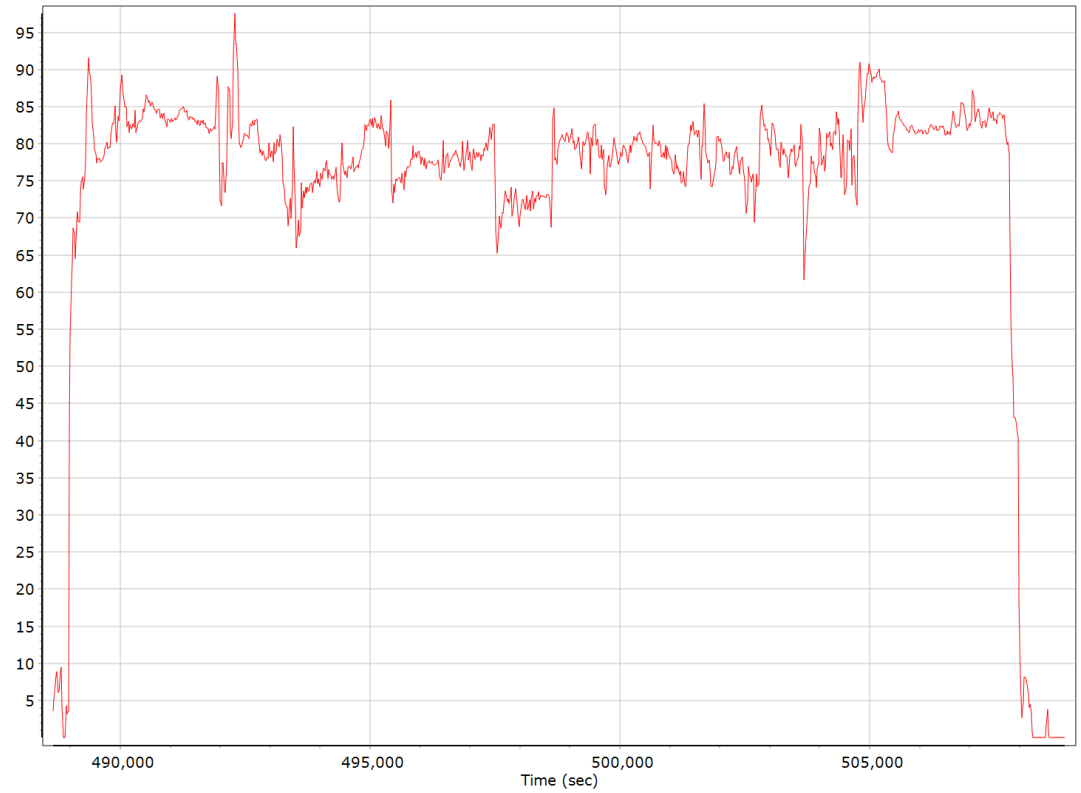
North/East Velocity



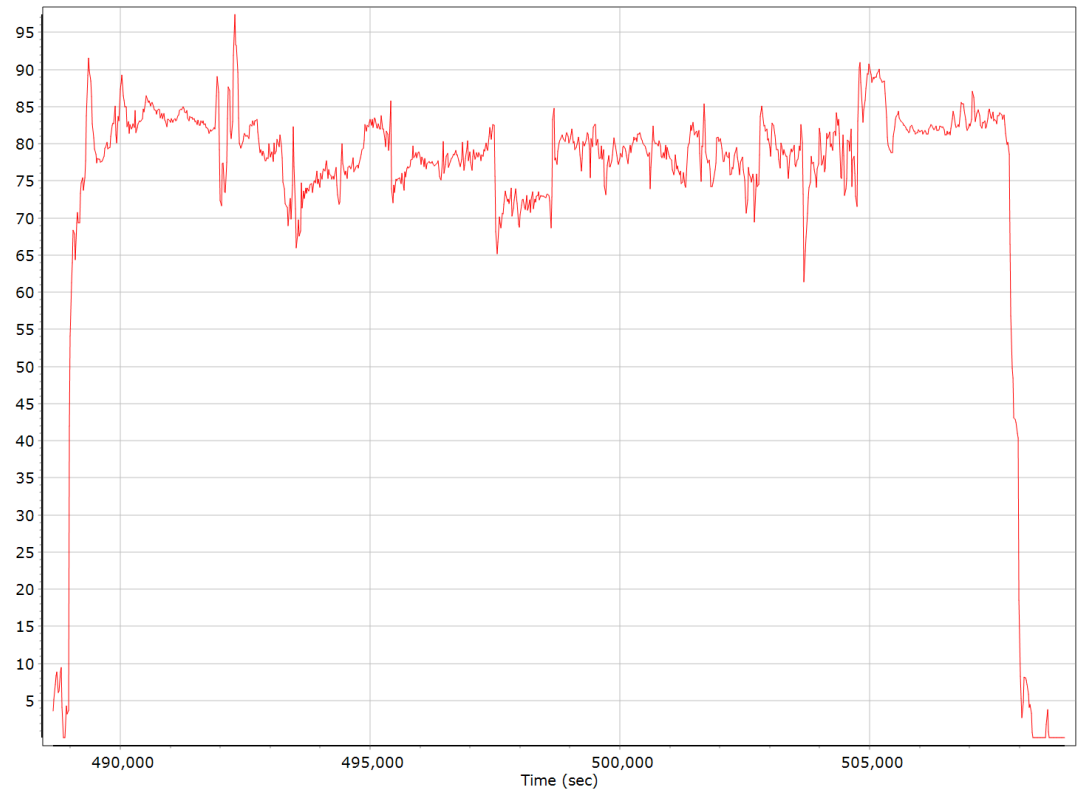
Down Velocity



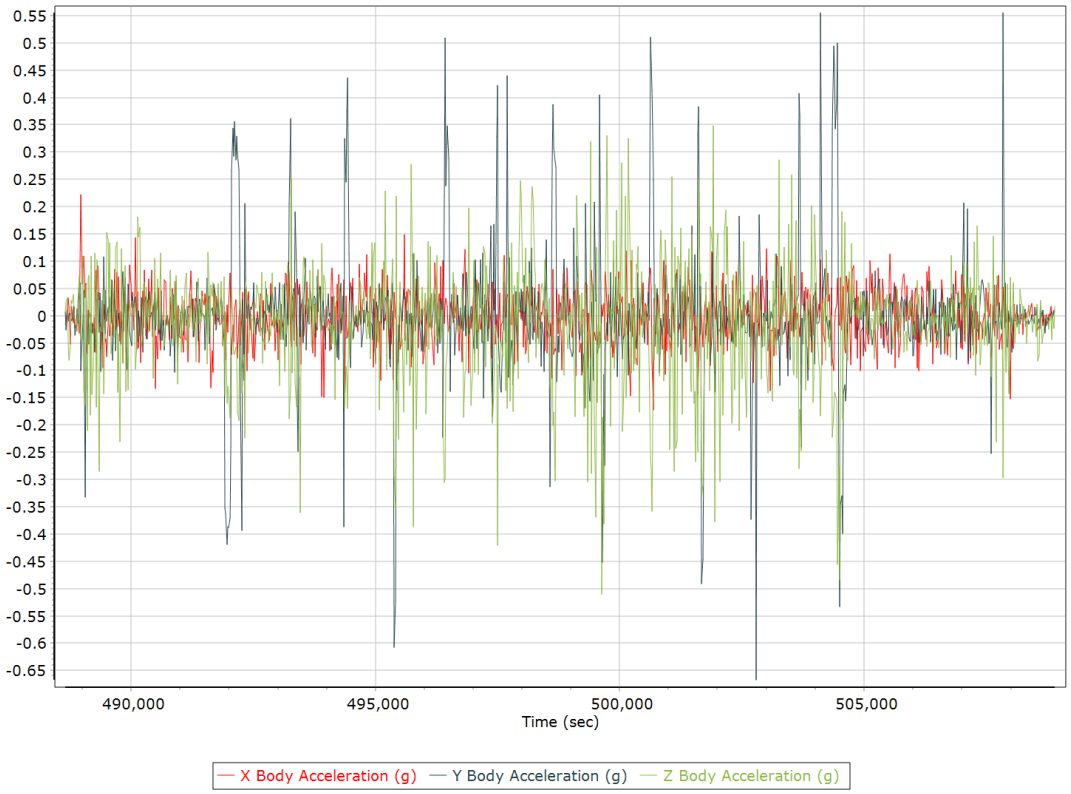
Total Speed



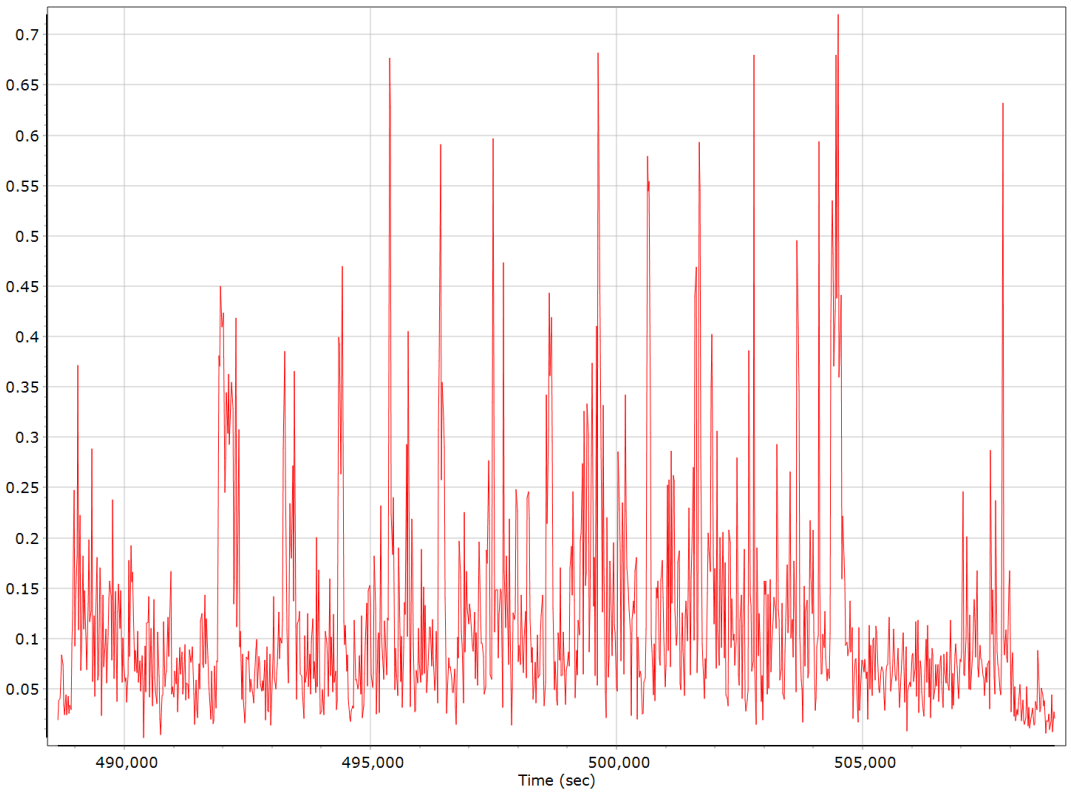
Ground Speed



Body Acceleration



Total Body Acceleration



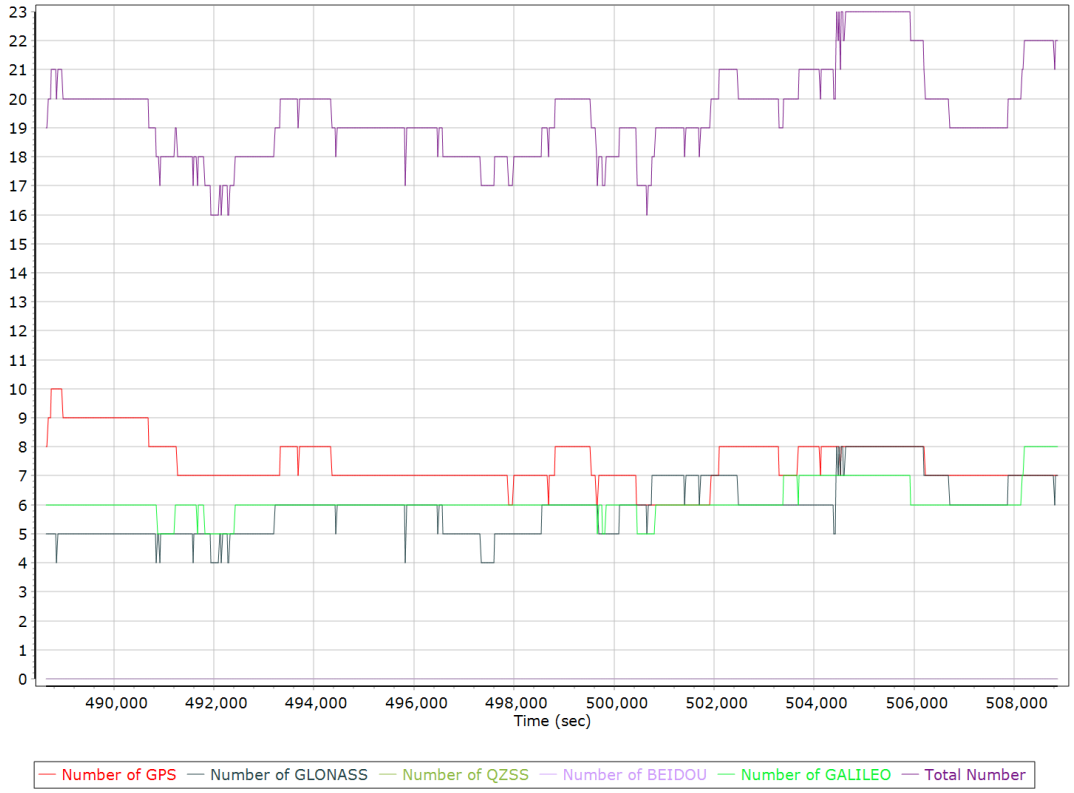
Body Angular Rate

GNSS QC

GNSS QC Statistics

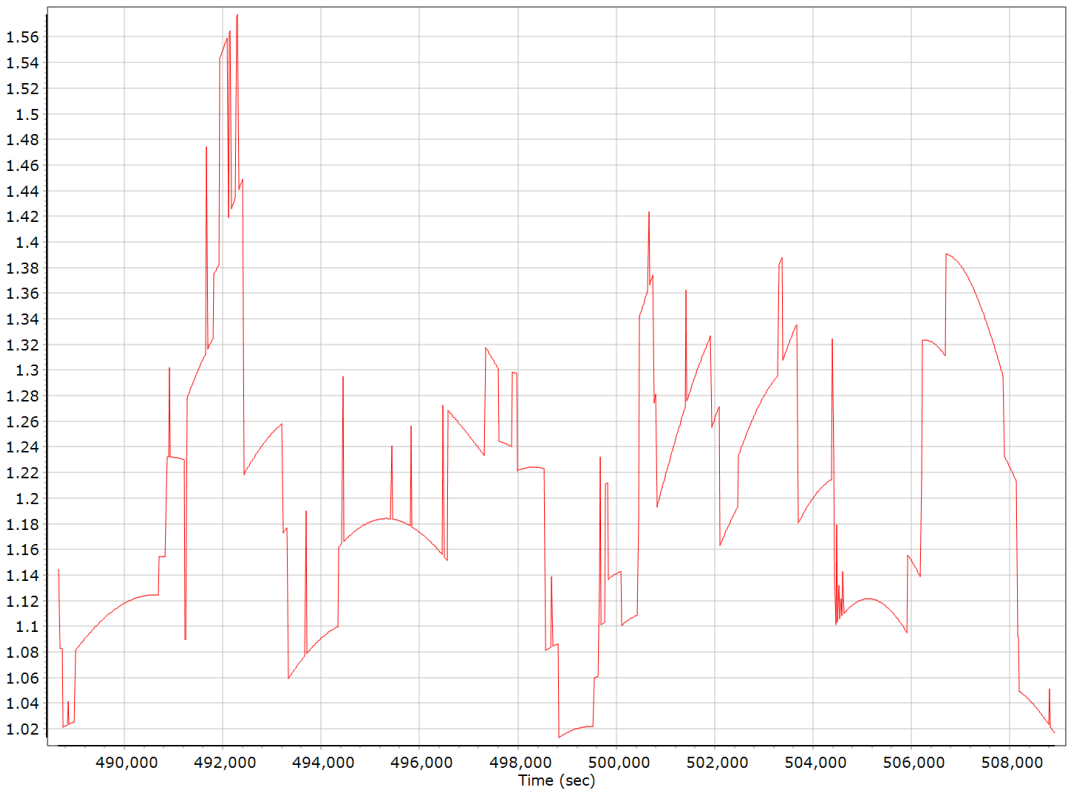
Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	5	10	7
Number of GLONASS SV	3	8	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	0	0
Number of GALILEO SV	5	8	6
Total number of SV	15	23	19
PDOP	1.01	1.58	1.20
QC Solution Gaps	0.00	0.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	21214.00	0.00	0.00
Percentage	100.00	0.00	0.00

Num SVs in solution

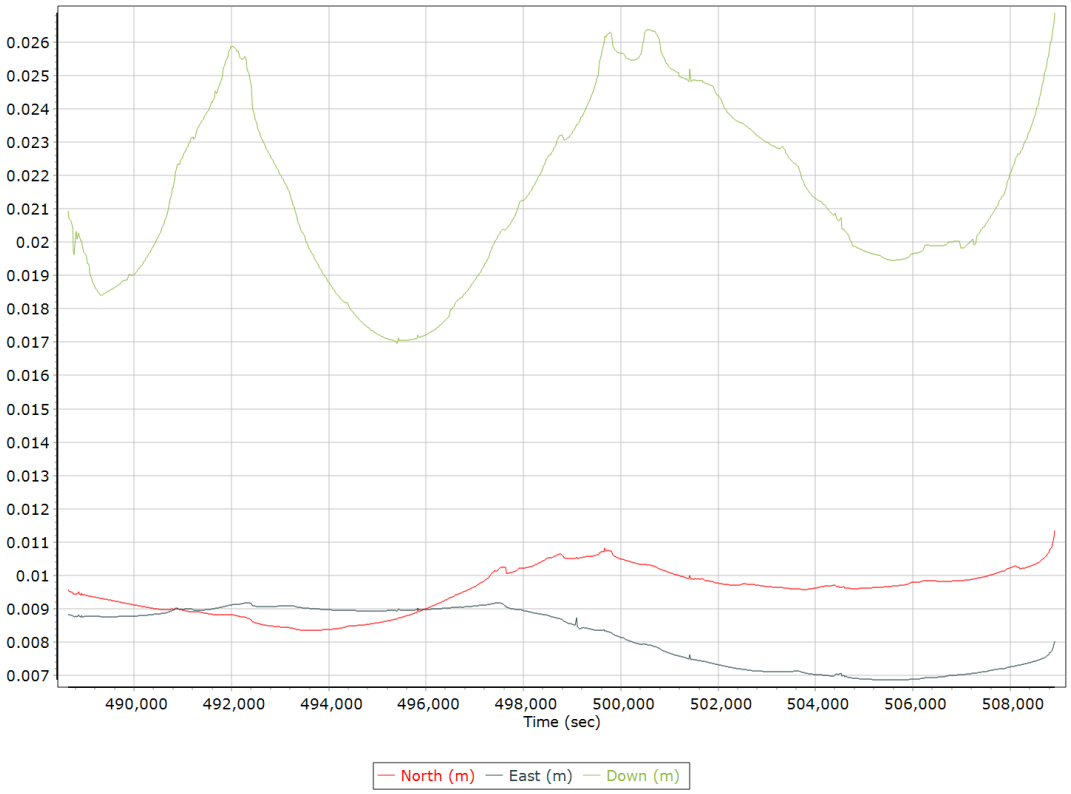


Forward/Reverse Separation

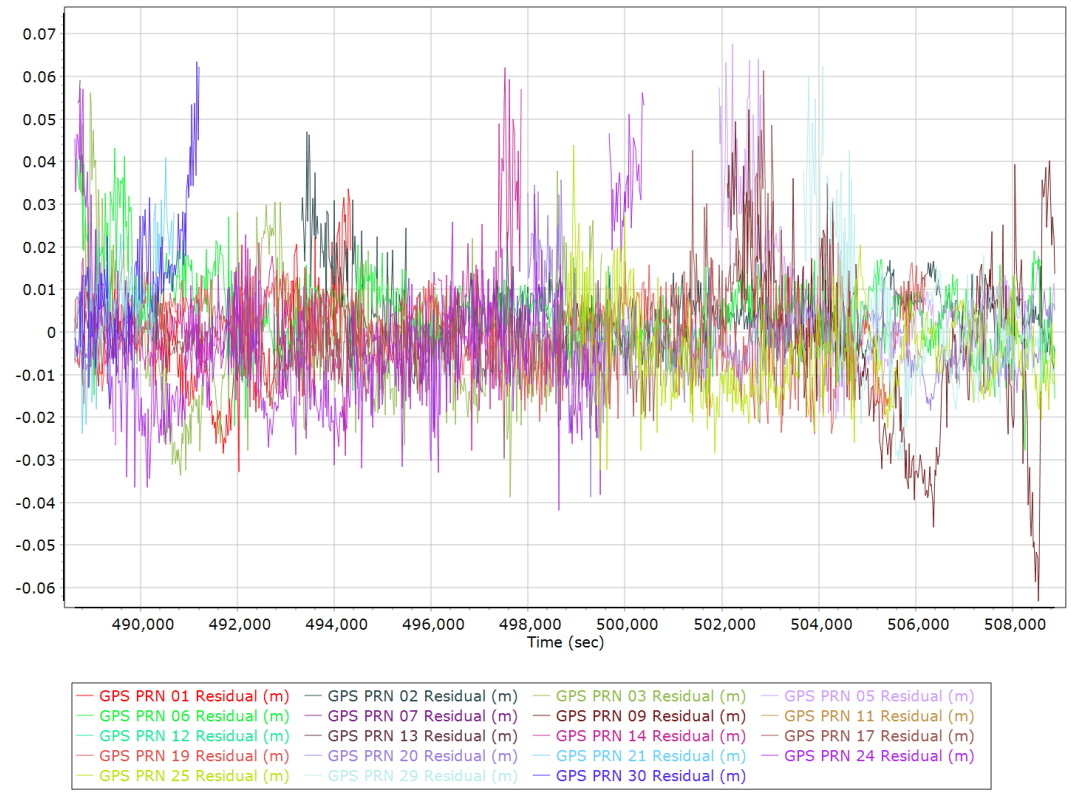
PDOP



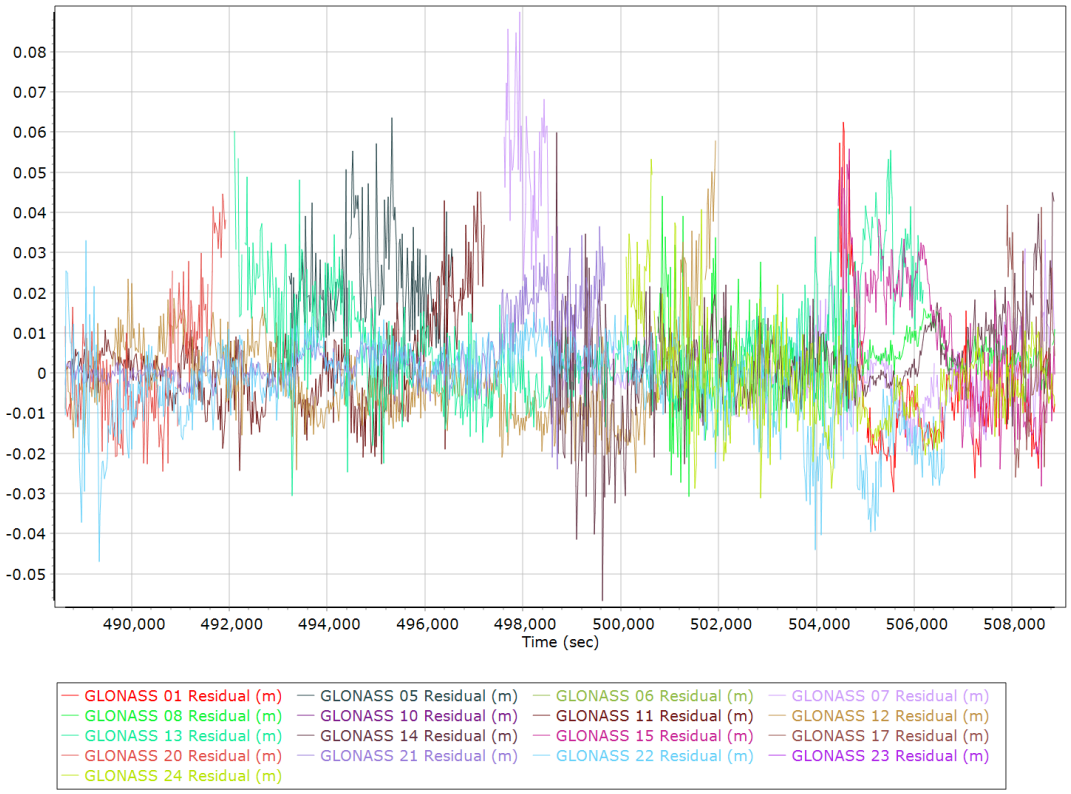
Estimated Position Accuracy



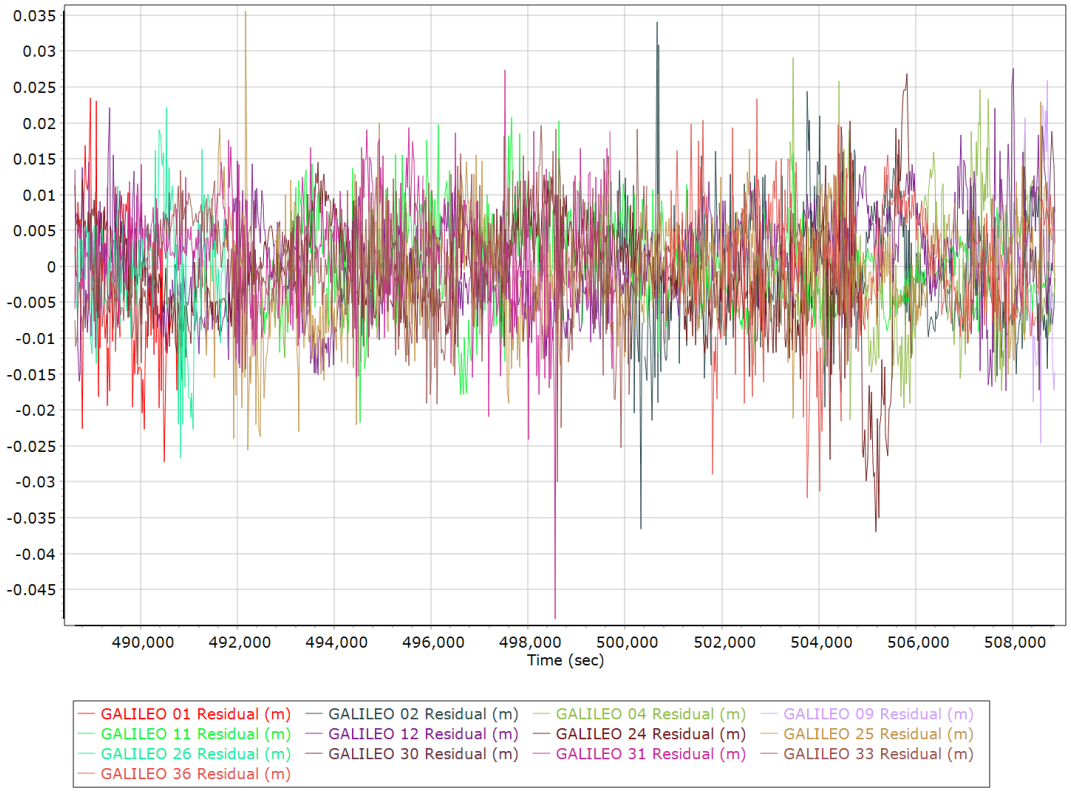
GPS Residuals



GLONASS Residuals



GALILEO Residuals



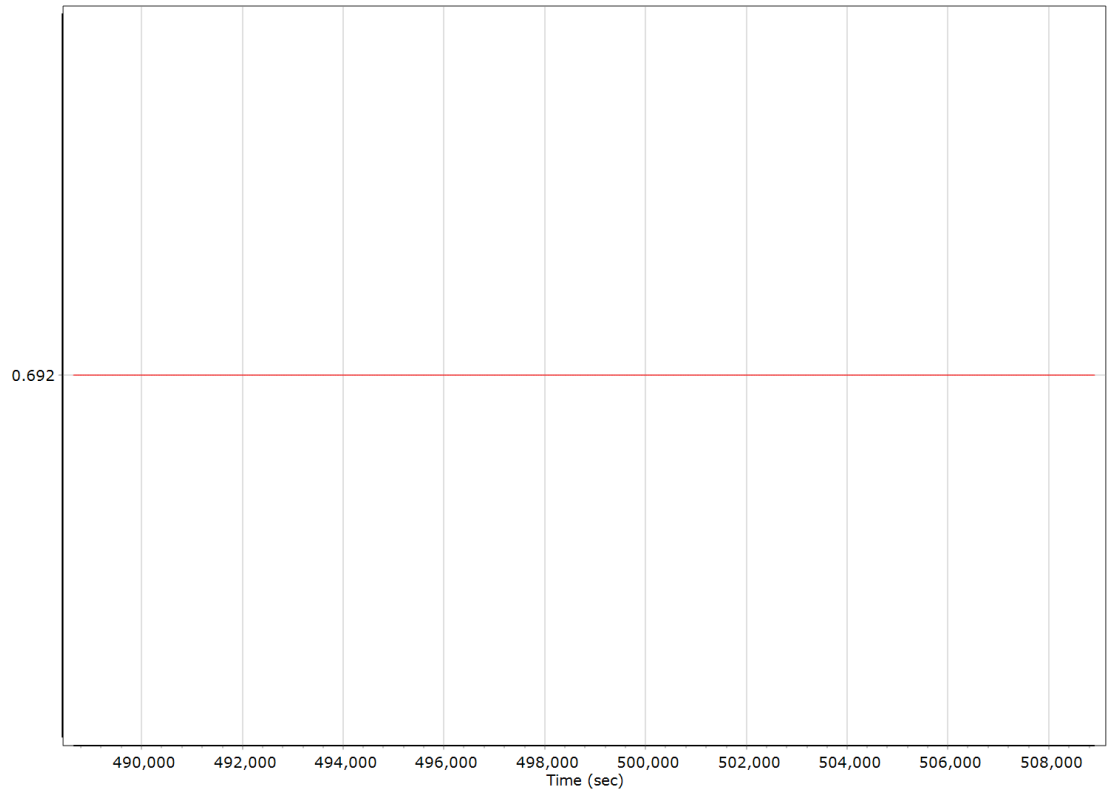
GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	487652.000 (5/27/2022 3:27:32 PM)		
Processing end time	508922.000 (5/27/2022 9:22:02 PM)		
Initial attitude source	Real-Time VNAV/RNAV Attitude		
IMU Sensor Context	Processing with Onboard IMU		
Gimbal to IMU lever arm (m)	-0.034	-0.010	-0.374
Gimbal to IMU mounting angles (deg)	0.000	0.000	0.000
Gimbal to Primary GNSS lever arm (m)	0.692	-0.181	-1.276
Gimbal to Primary GNSS lever arm std dev (m)	0.030	0.030	0.030
Aircraft to Reference mounting angles (deg)	0.000	0.000	0.000

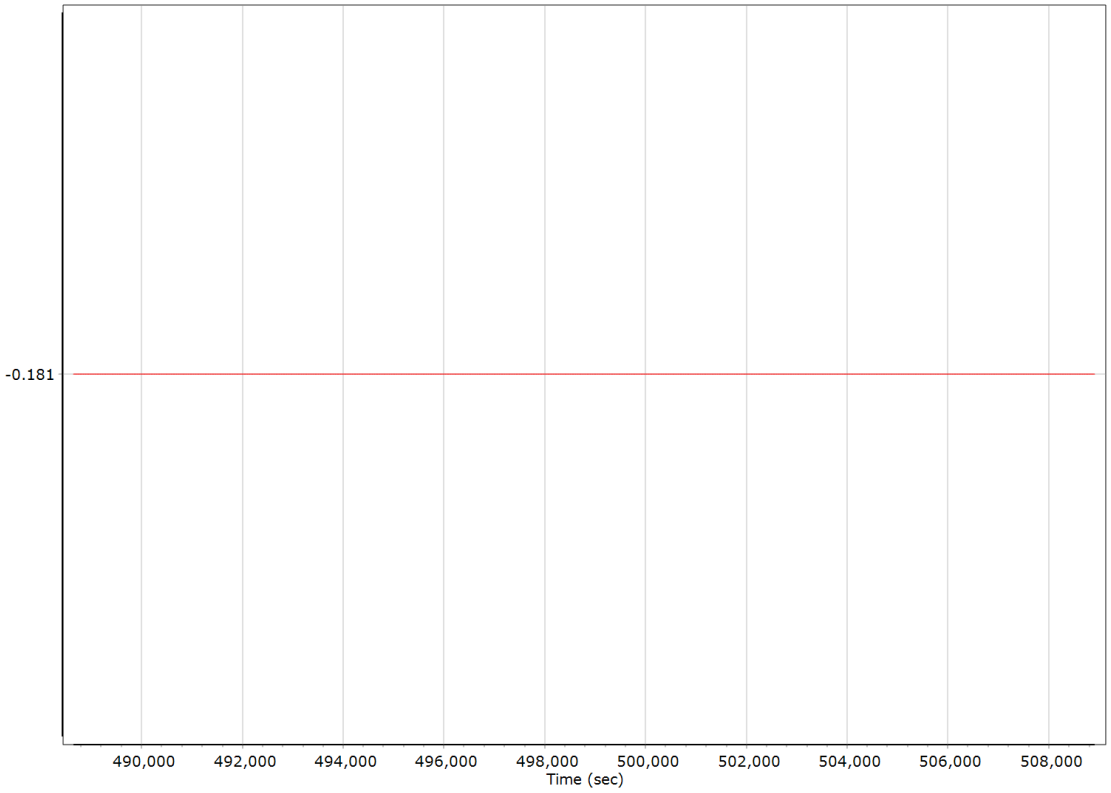
Calibrated Installation Parameters

Reference-Primary GNSS Lever Arm (m)

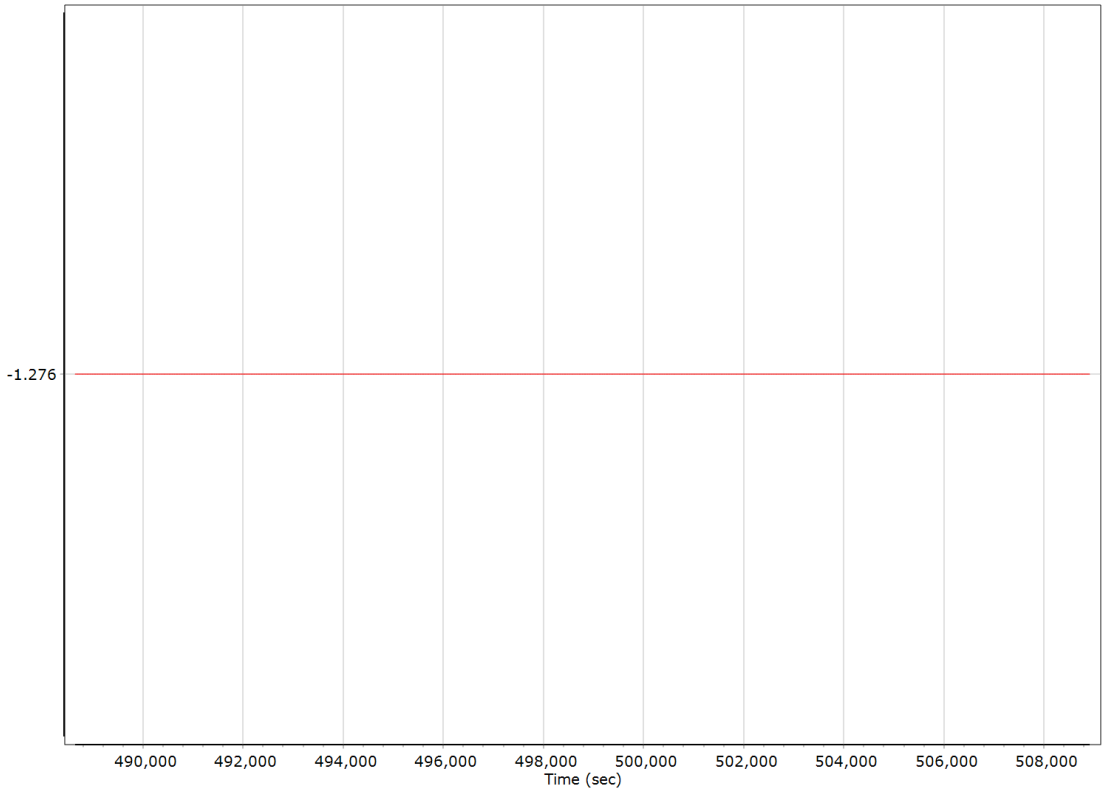
X Reference-Primary GNSS Lever Arm (m)



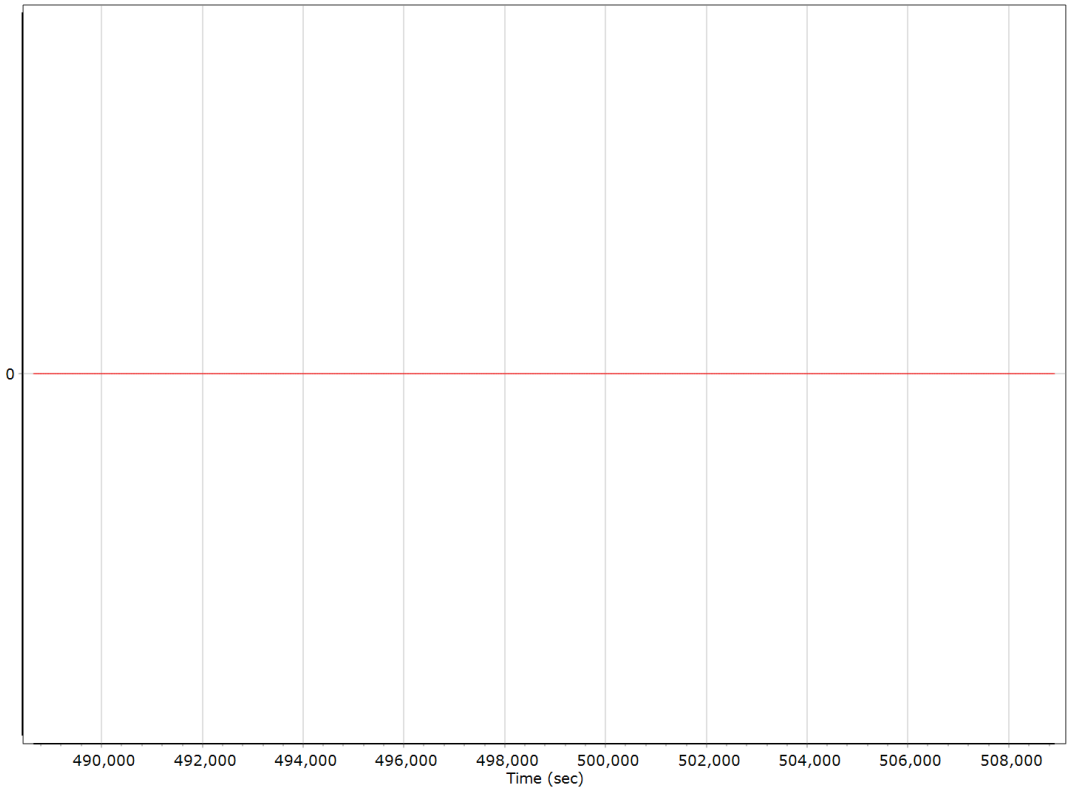
Y Reference-Primary GNSS Lever Arm (m)



Z Reference-Primary GNSS Lever Arm (m)



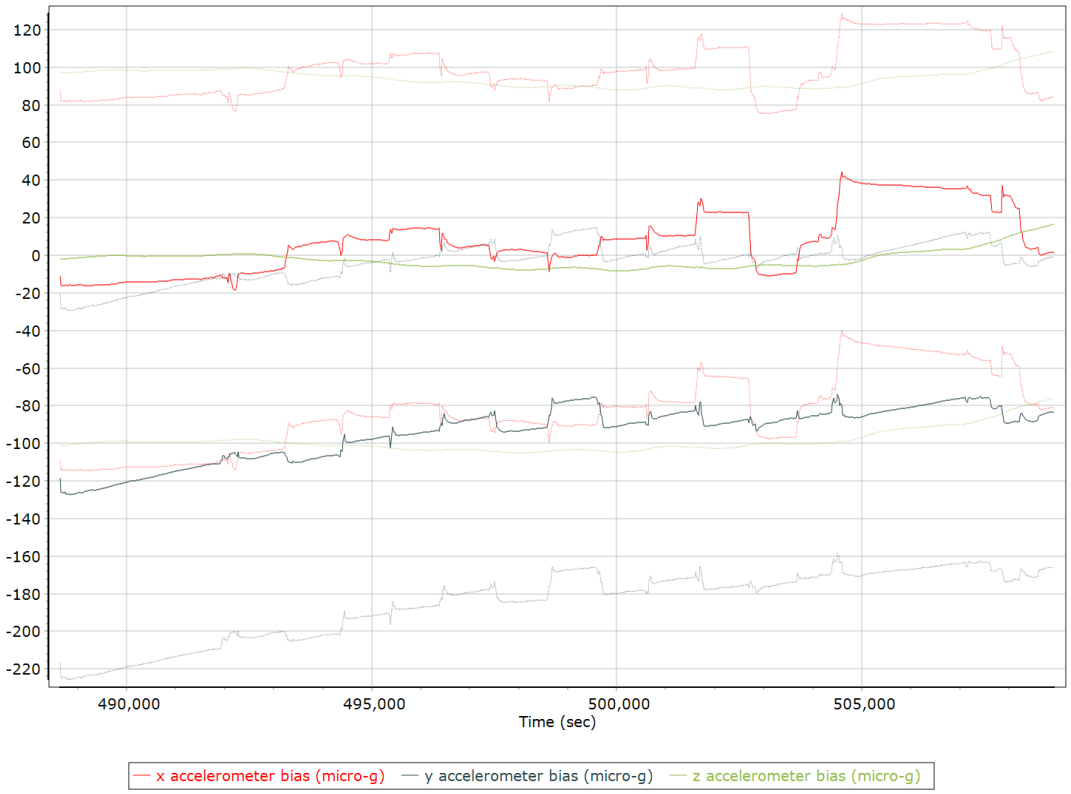
Reference-Primary GNSS Lever Arm Figure of Merit



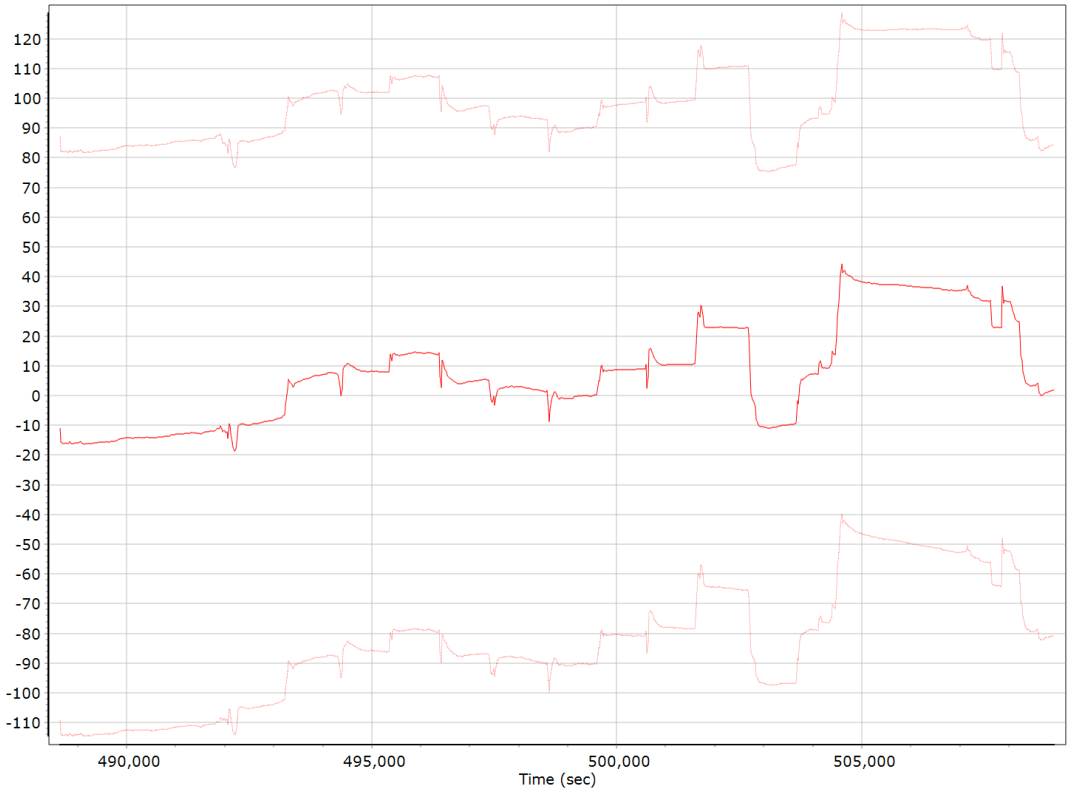
IN-Fusion QC

Forward Processed Estimated Errors, Reference Frame

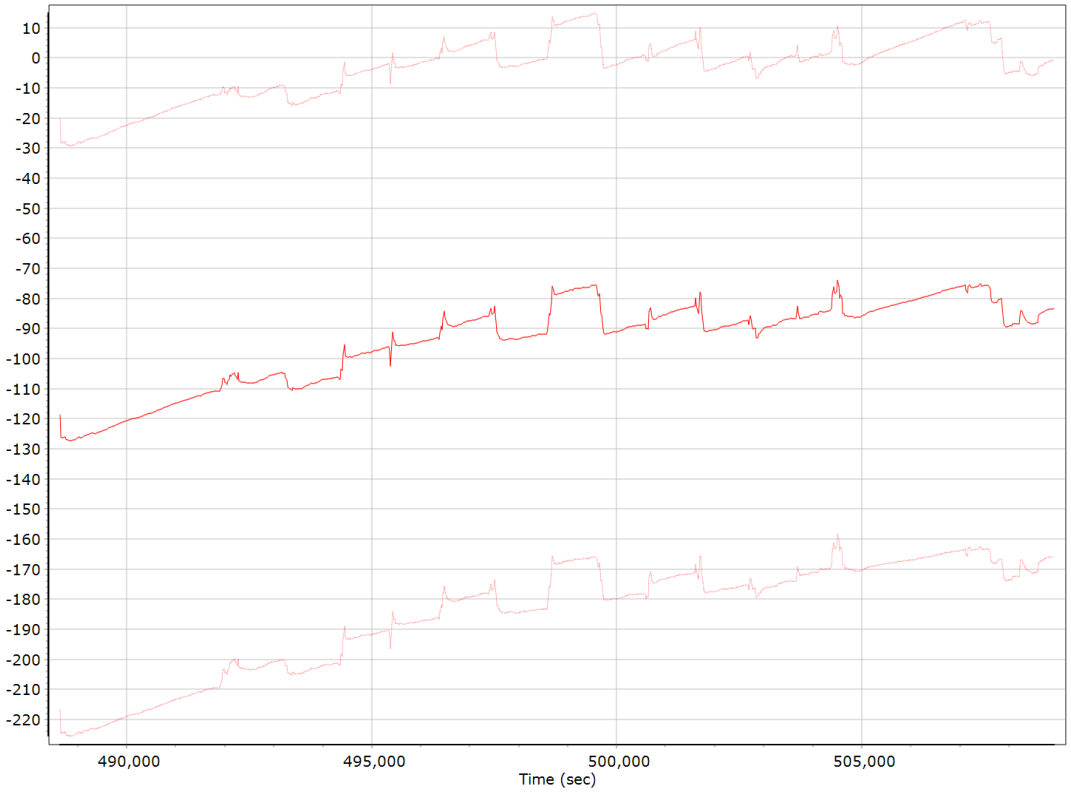
Accelerometer Bias (micro-g)



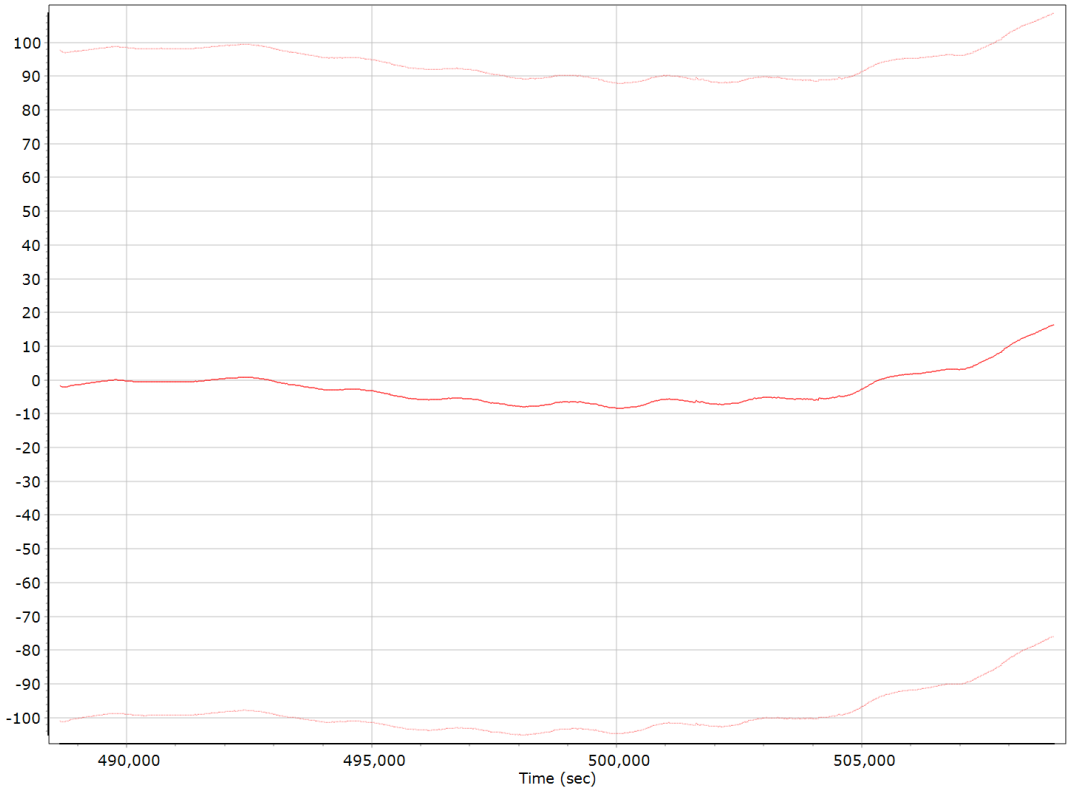
X Accelerometer Bias (micro-g)



Y Accelerometer Bias (micro-g)



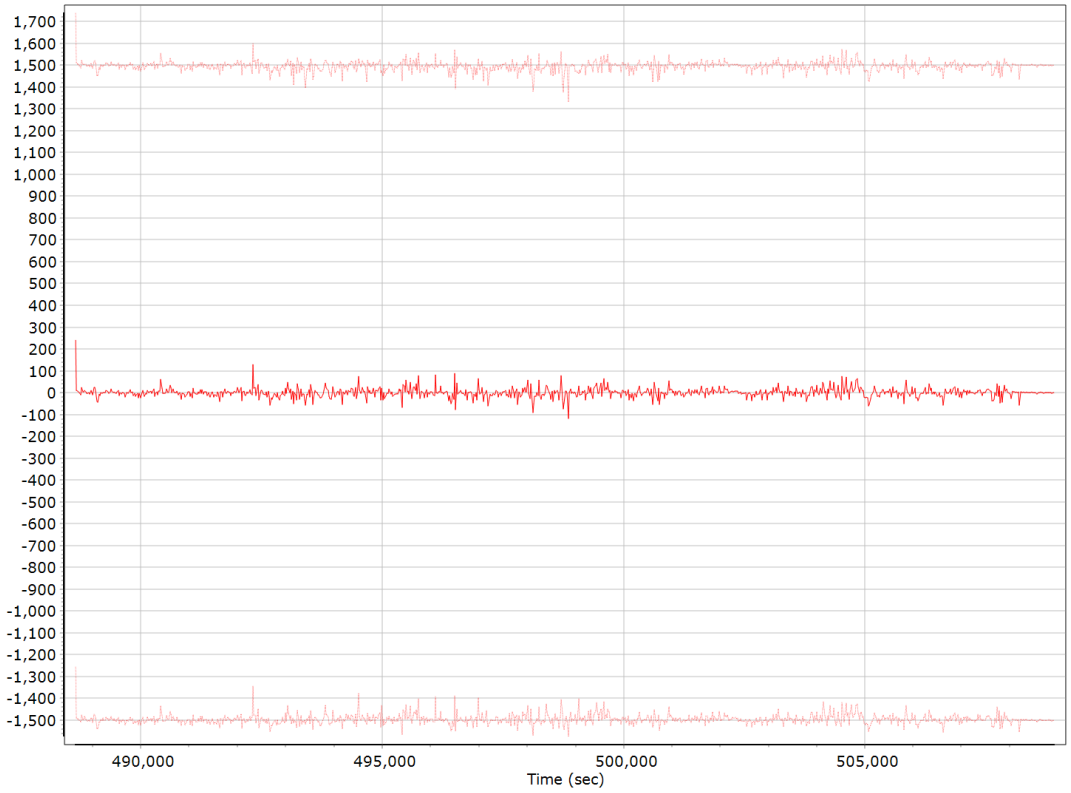
Z Accelerometer Bias (micro-g)



Accelerometer Scale Error (ppm)

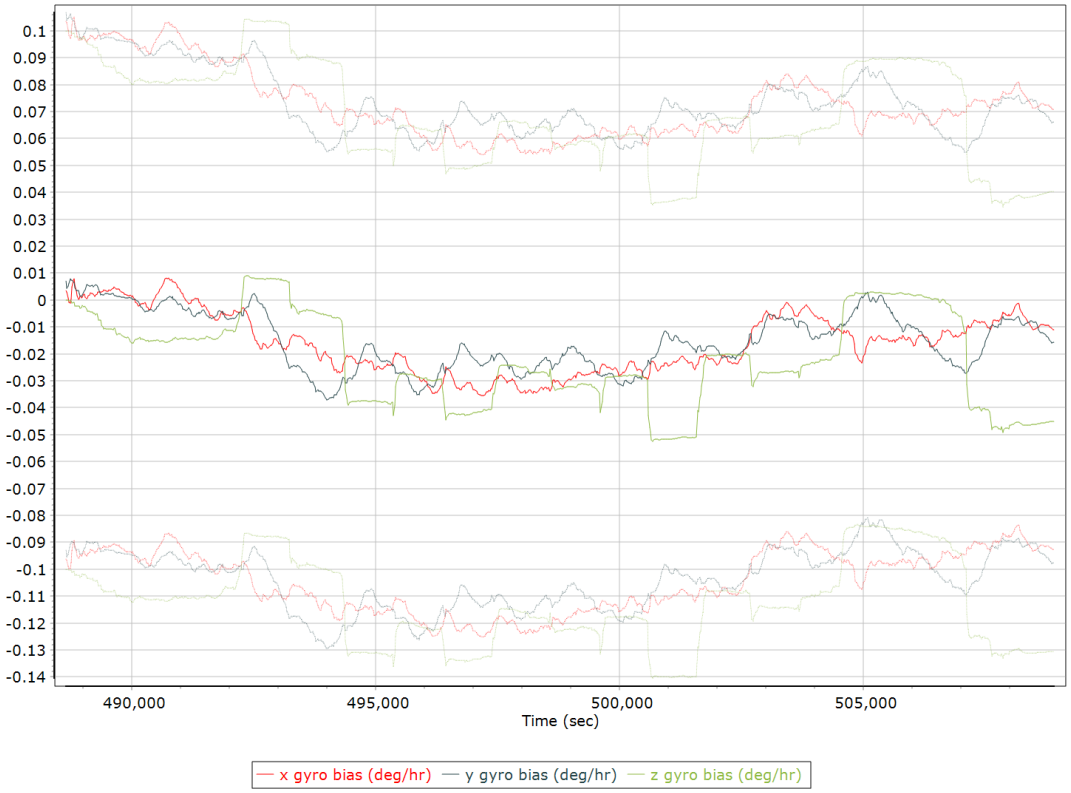
X Accelerometer Scale Error (ppm)

Y Accelerometer Scale Error (ppm)

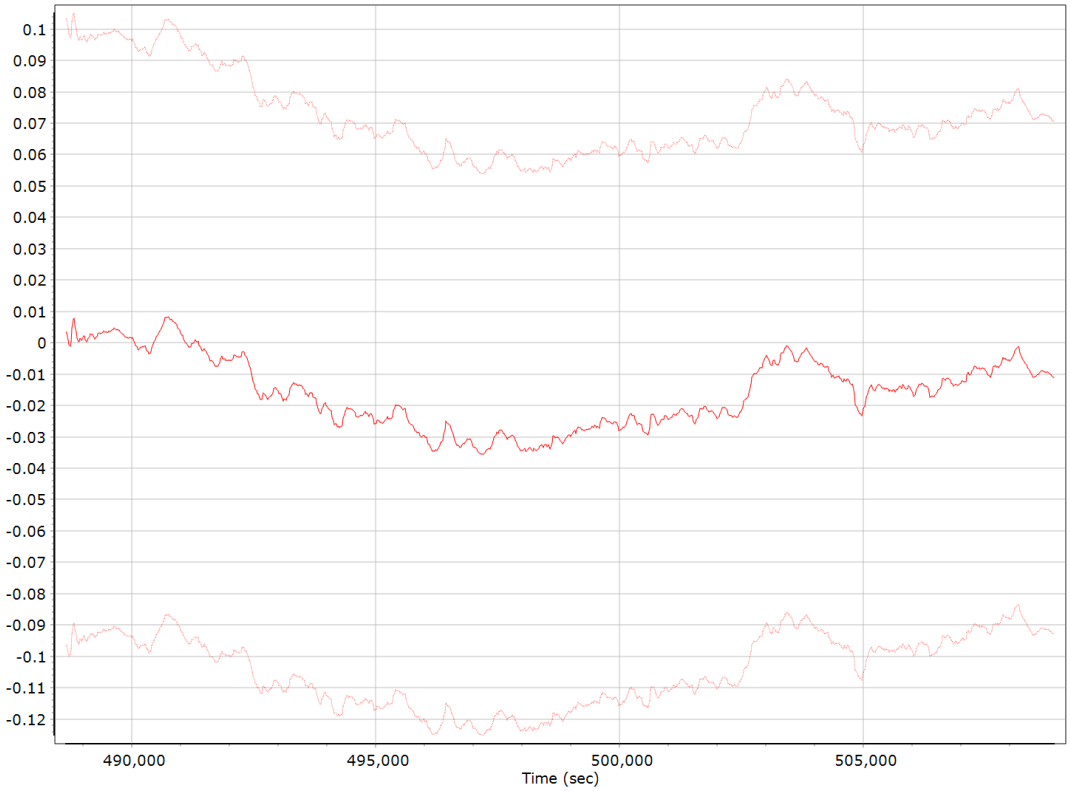


Z Accelerometer Scale Error (ppm)

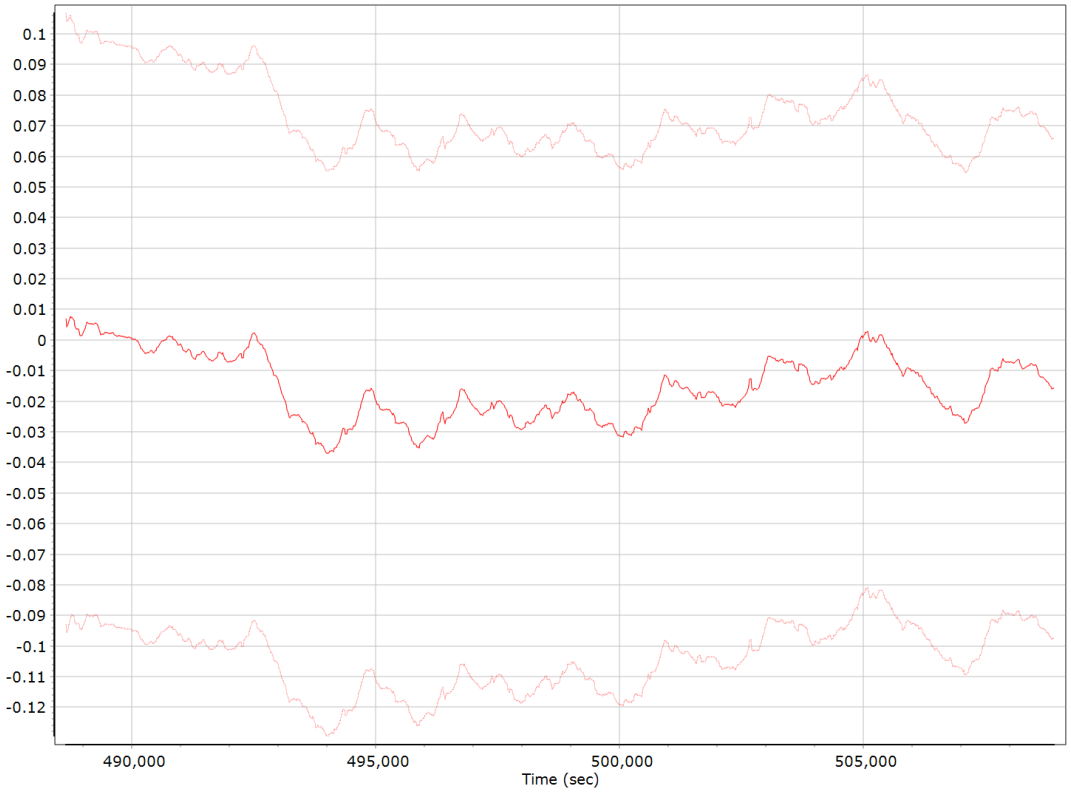
Gyro Bias (deg/h)



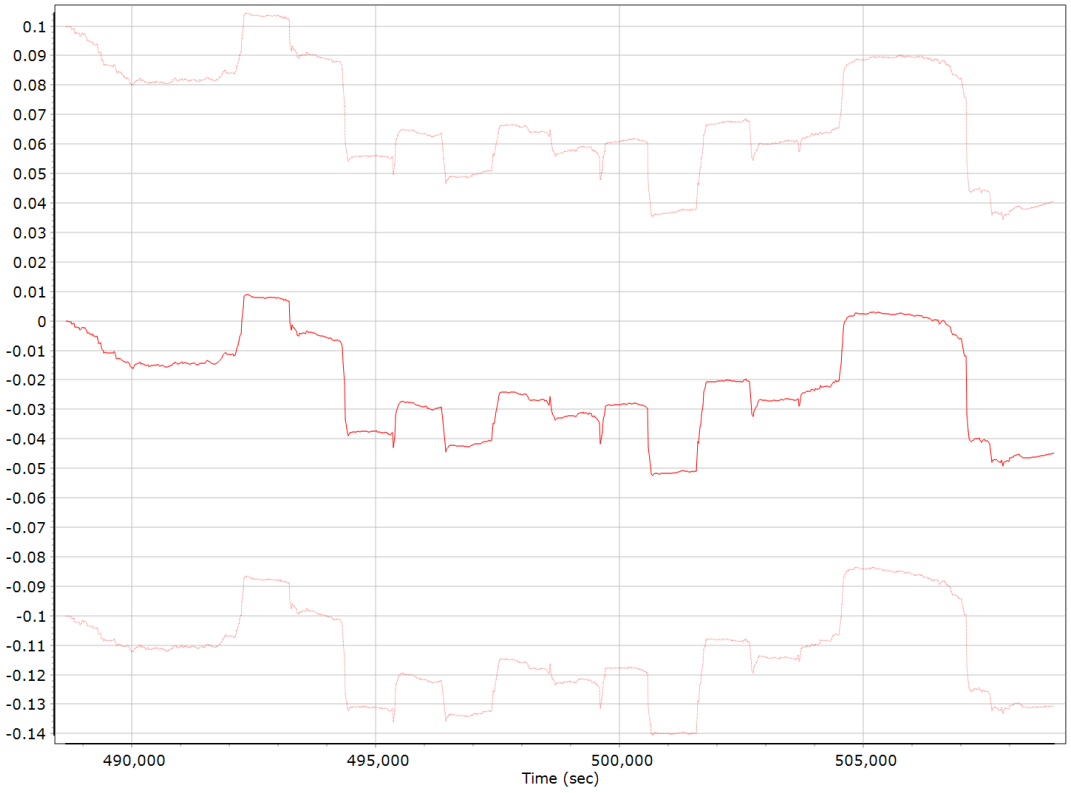
X Gyro Bias (deg/h)



Y Gyro Bias (deg/h)

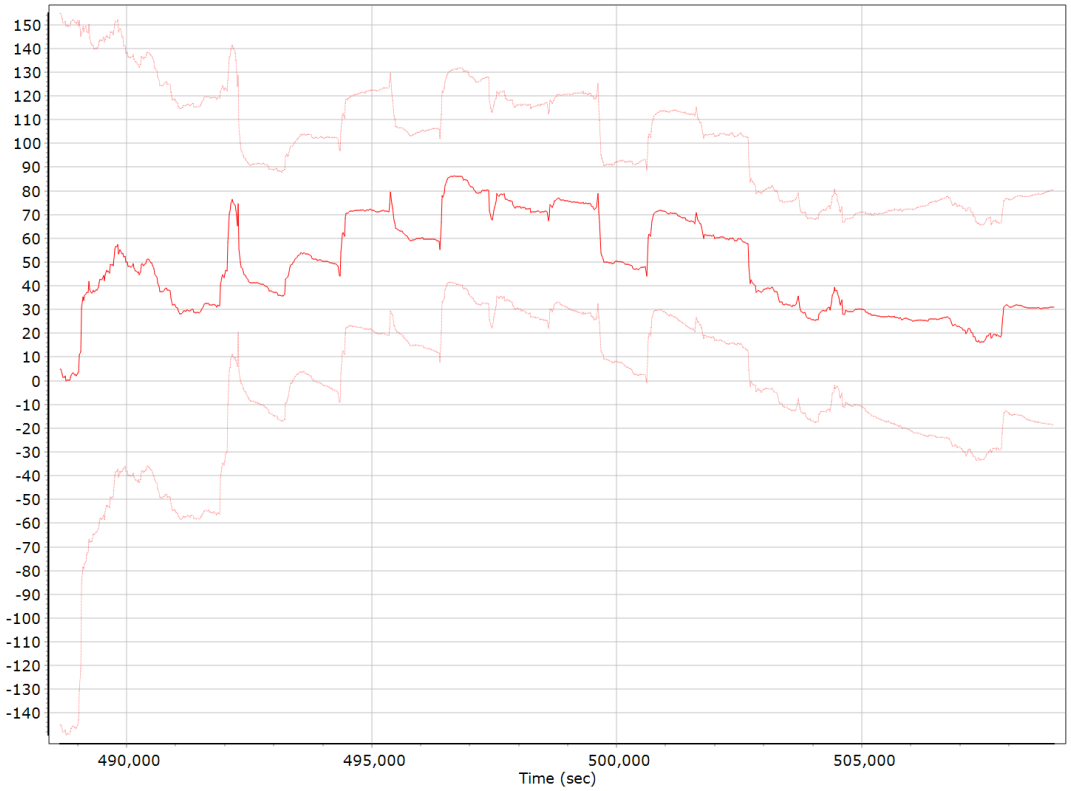


Z Gyro Bias (deg/h)

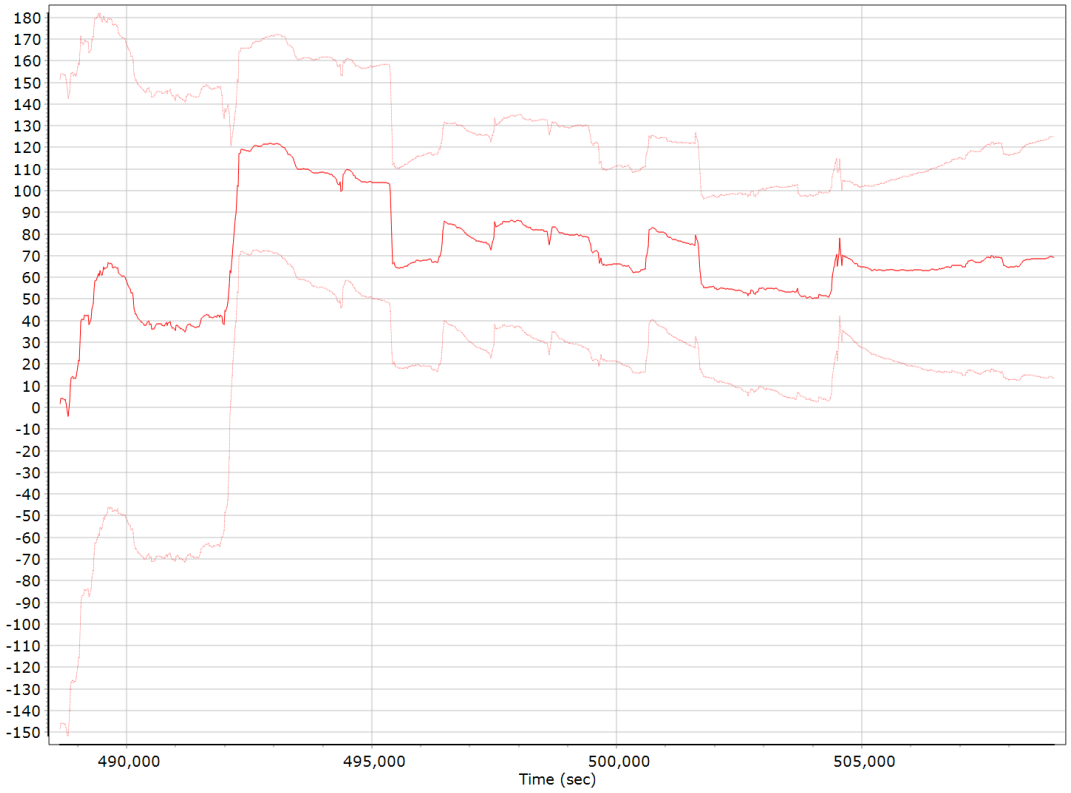


Gyro Scale Error (ppm)

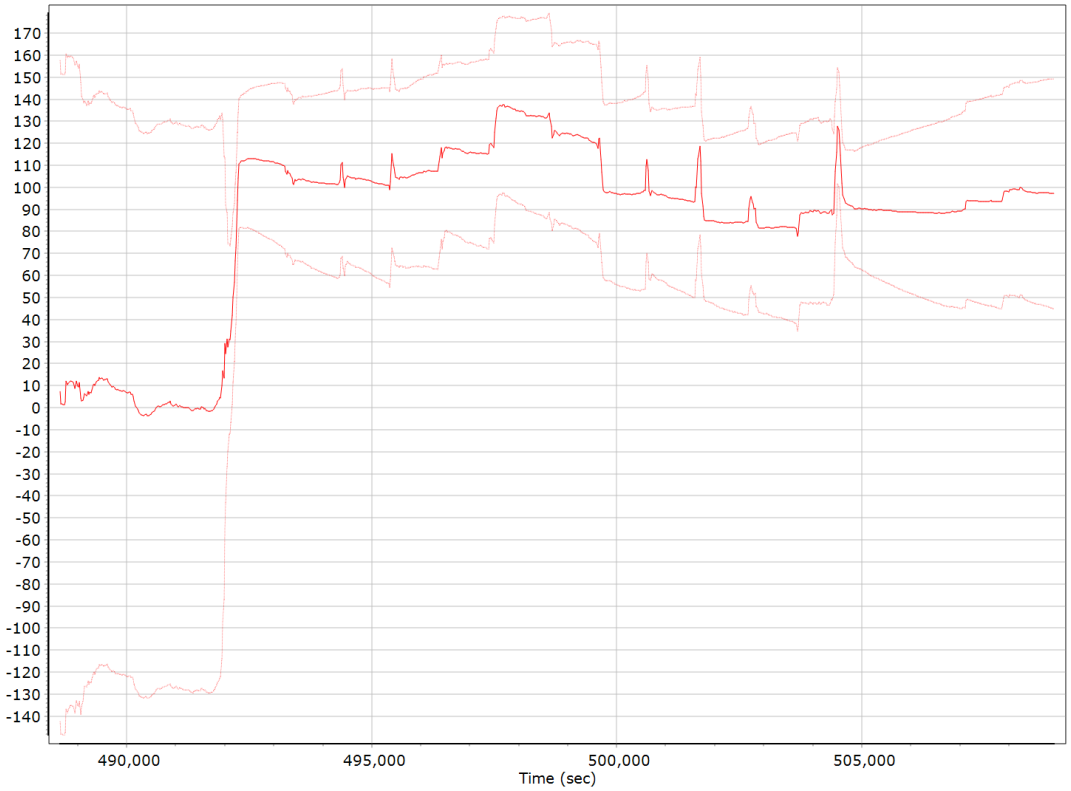
X Gyro Scale Error (ppm)



Y Gyro Scale Error (ppm)

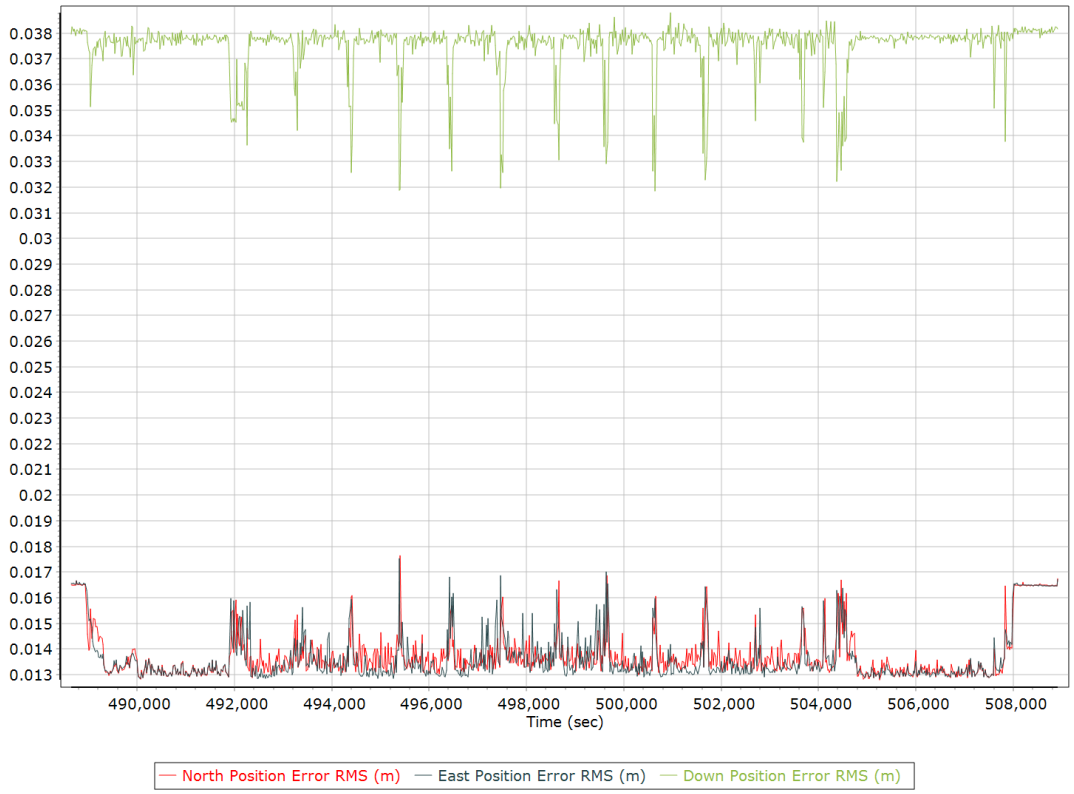


Z Gyro Scale Error (ppm)

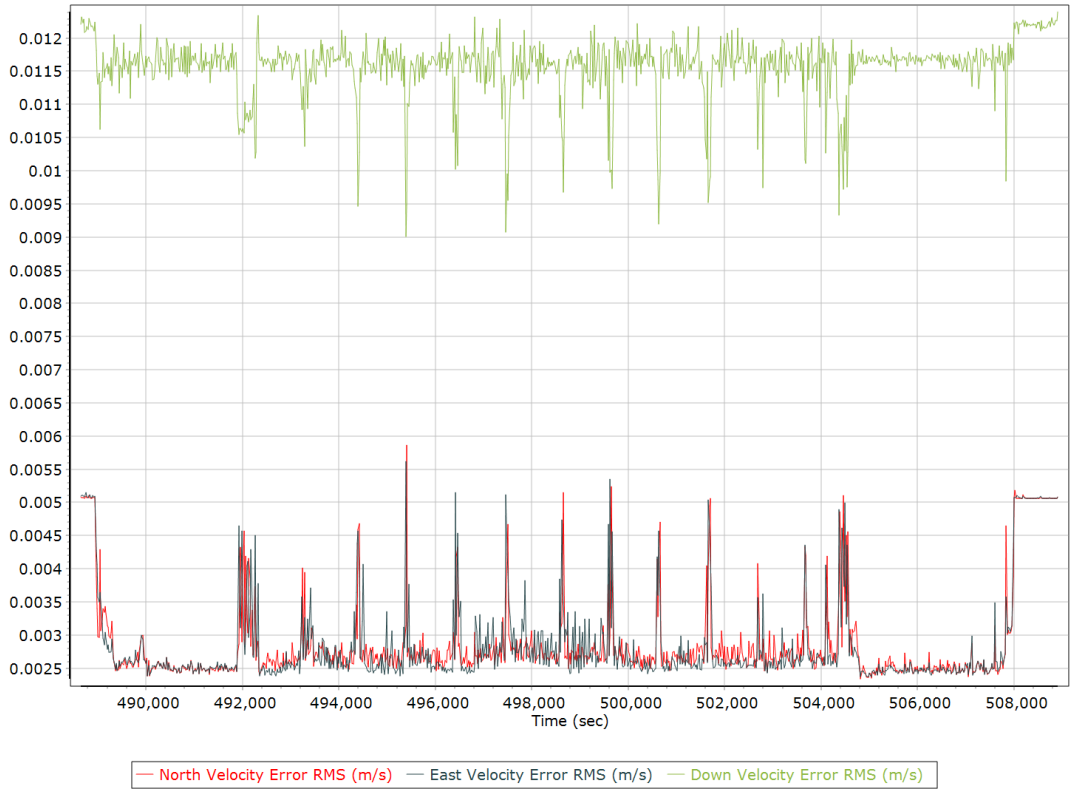


Smoothed Performance Metrics

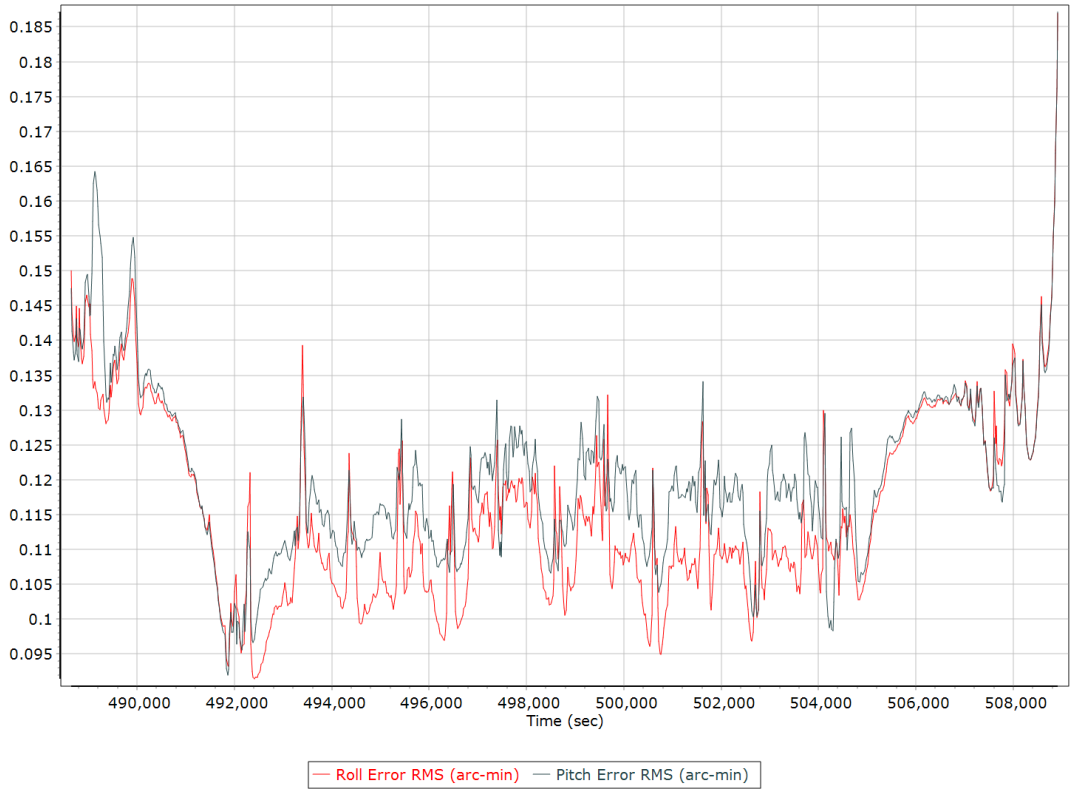
Position Error RMS (m)



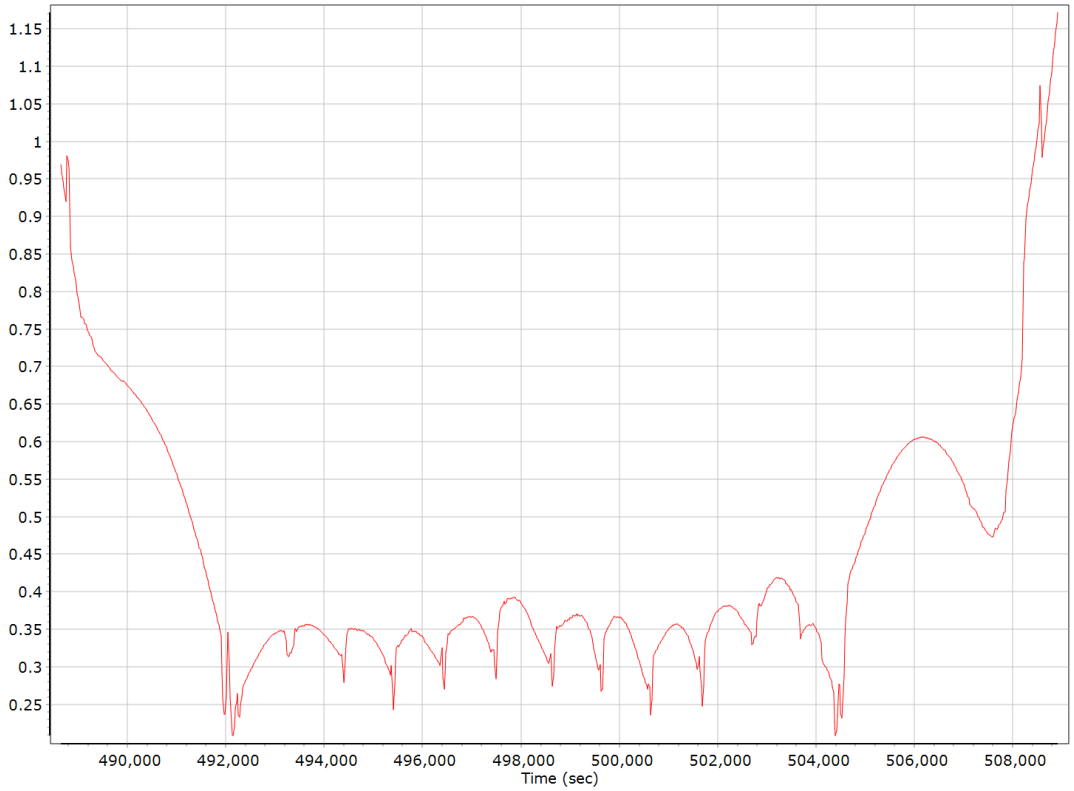
Velocity Error RMS (m/s)



Roll/Pitch Error RMS (arc-min)

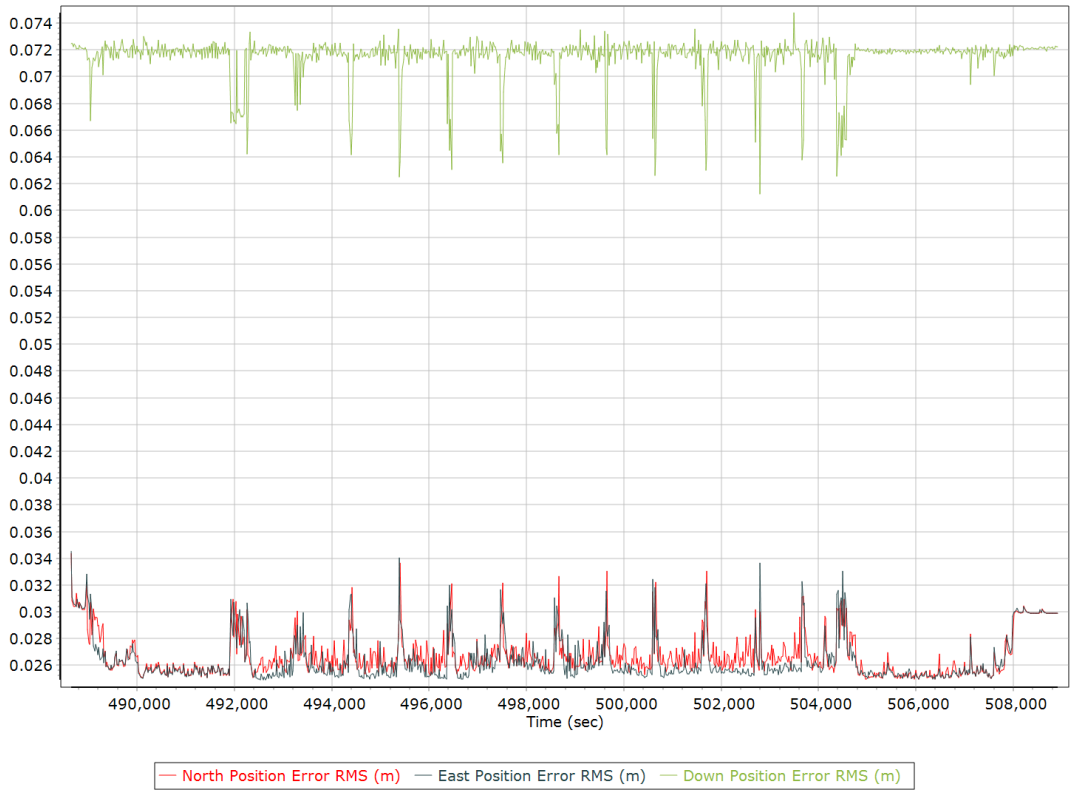


Heading Error RMS (arc-min)



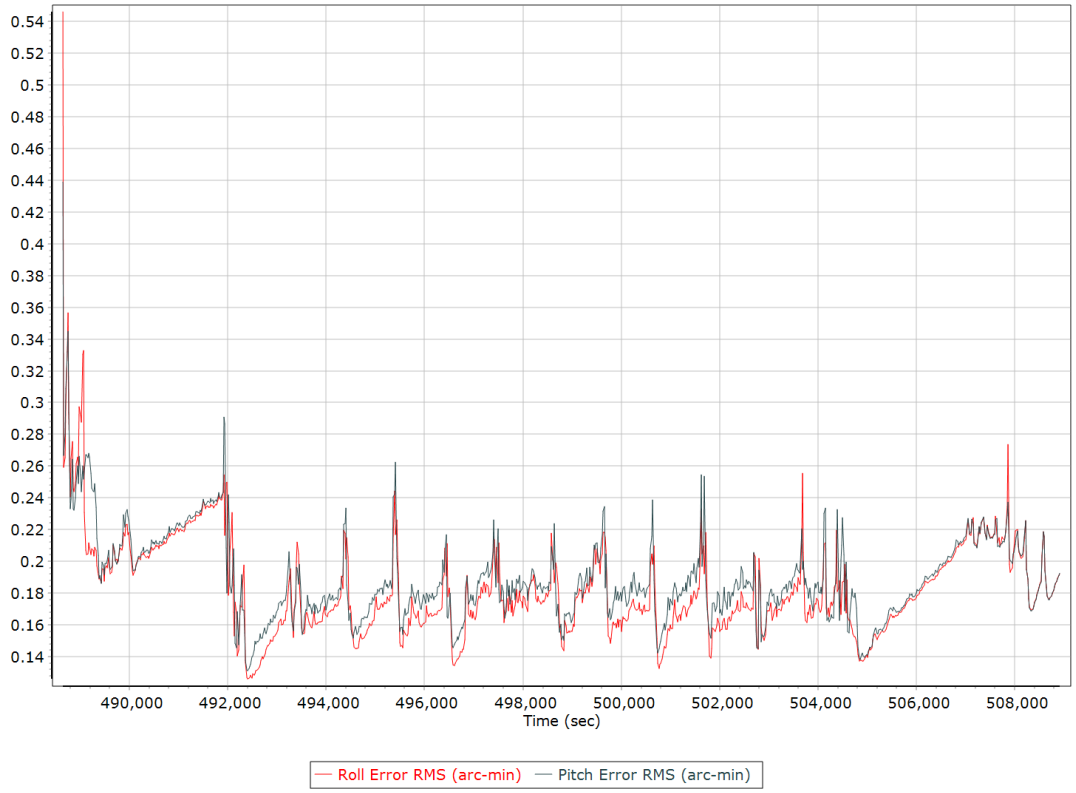
Forward Processed Performance Metrics

Position Error RMS (m)

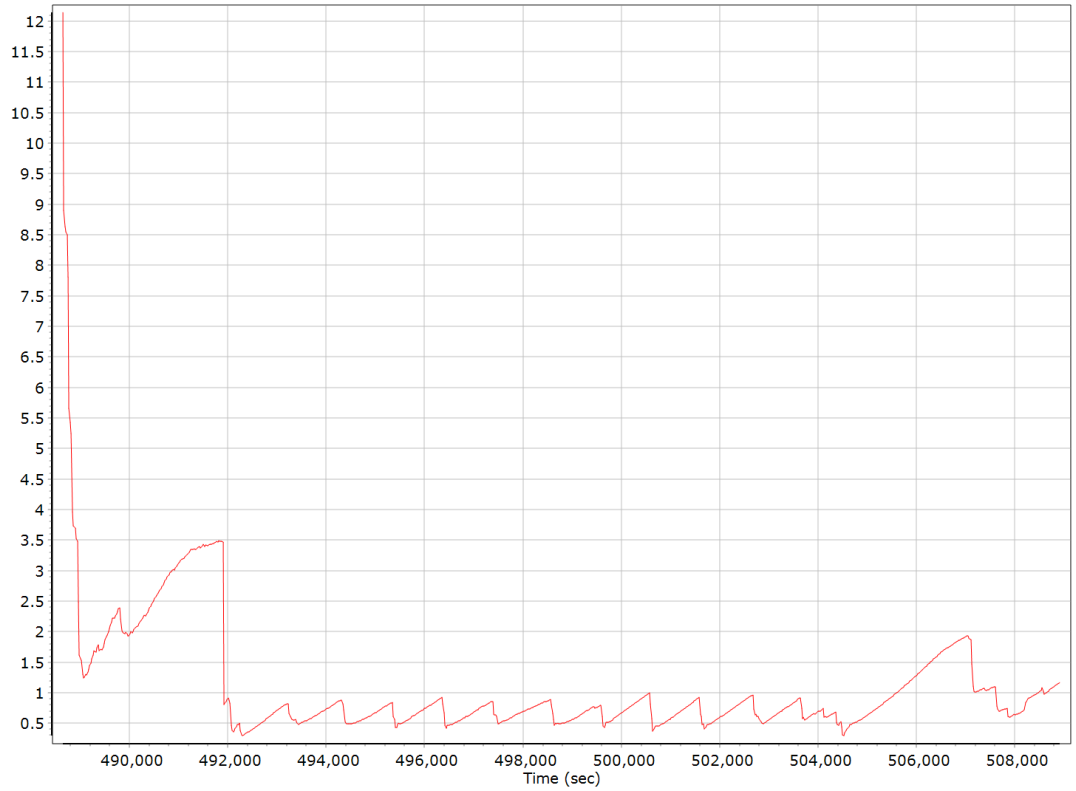


Velocity Error RMS (m/s)

Roll/Pitch Error RMS (arc-min)

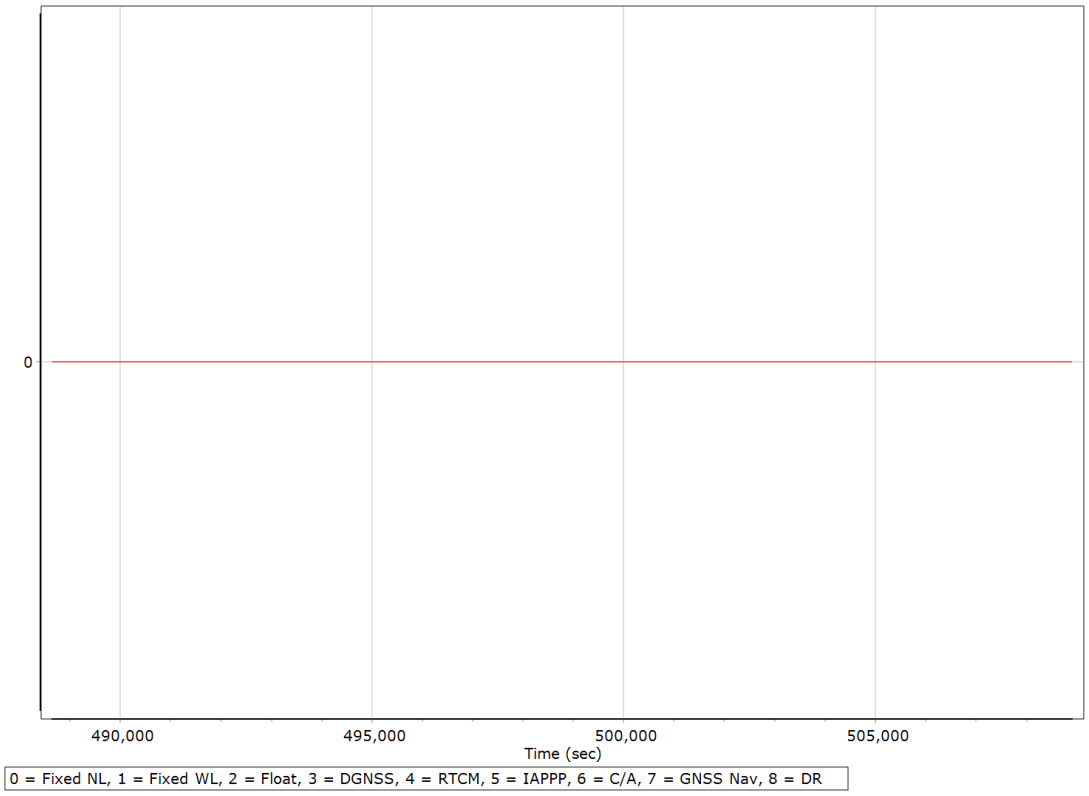


Heading Error RMS (arc-min)

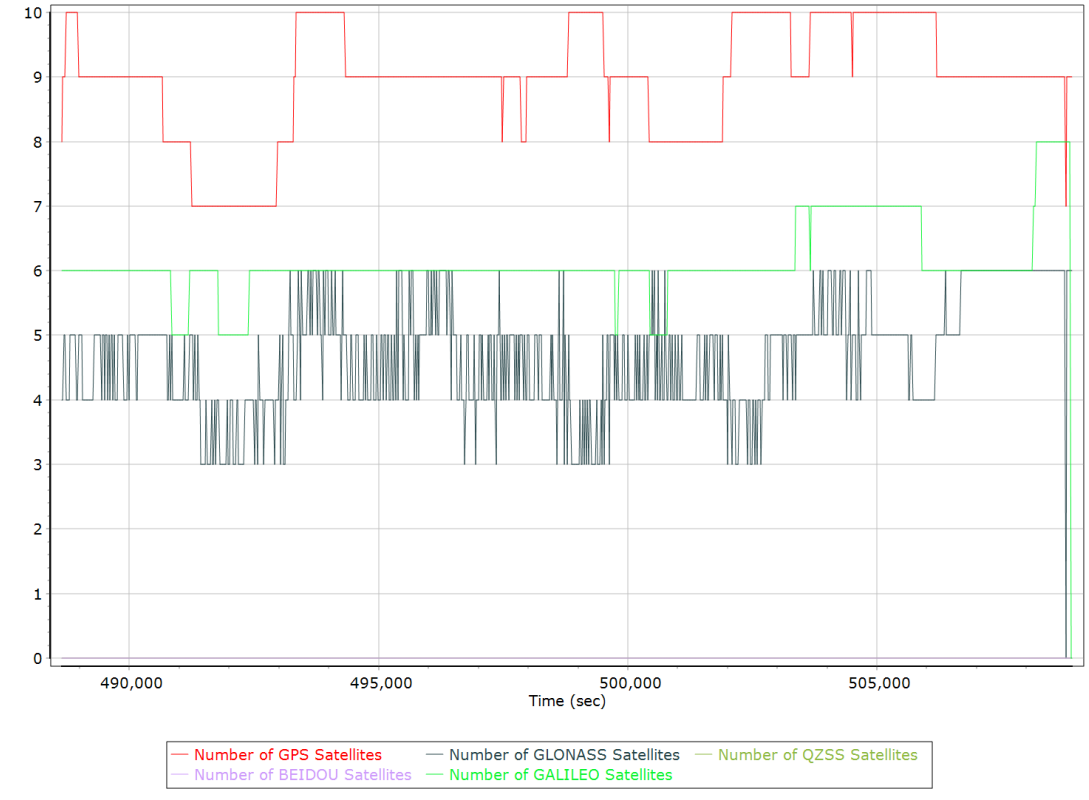


Forward Processed Solution Status

Processing Mode



Number of Satellites



Baseline Length