

## WI 12 County - Douglas LIDAR PROCESSING REPORT

Project ID: 230110

Work Unit: 300213

Prepared for:



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# 1. Summary / Scope

## 1.1. Summary

This report contains a summary of the WI 12 County - Douglas, Work Unit 300213 lidar acquisition task order, issued by USGS under their Contract 140G0221D0012 on March 28, 2022. The task order yielded a work unit area covering 1,352 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	2,083 m	58.5°	20%	≤ 10 cm

## 1.3. Coverage

The work unit boundary covers 1,352 square miles over Douglas County, Wisconsin. Work unit extents are shown in Figure 1.

## 1.4. Duration

Lidar data was acquired from May 14, 2022 to May 27, 2022 in 10 total lifts. See “Section: 2.4. Time Period” for more details.

## 1.5. Issues

There were no issues to report.



<b>WI 12 County - Douglas Work Unit 300213</b> <b>Projected Coordinate System: Wisconsin Coordinate Reference System - Douglas</b> <b>Horizontal Datum: NAD83 (2011)</b> <b>Vertical Datum: NAVD88 (GEOID 18)</b> <b>Units: Survey Feet</b>	
Lidar Point Cloud	Classified Point Cloud in .LAS 1.4 format
Rasters	<ul style="list-style-type: none"> <li>• 1-foot Hydro-flattened Bare Earth Digital Elevation Model (DEM) in GeoTIFF format</li> <li>• 1-foot Intensity images in GeoTIFF format</li> <li>• 2-foot Maximum Surface Height Raster in GeoTIFF format</li> <li>• 2-foot Swath Separation Images in GeoTIFF format</li> </ul>
Vectors	Shapefiles (*.shp) <ul style="list-style-type: none"> <li>• Project Boundary</li> <li>• Lidar Tile Index</li> </ul> Geodatabase (*.gdb) <ul style="list-style-type: none"> <li>• Continuous Hydro-flattened Breaklines</li> <li>• Flightlines Swath</li> </ul>
Reports	Reports in PDF format <ul style="list-style-type: none"> <li>• Focus on Delivery</li> <li>• Survey Report</li> <li>• Processing Report</li> </ul>
Metadata	XML Files (*.xml) <ul style="list-style-type: none"> <li>• Breaklines</li> <li>• Classified Point Cloud</li> <li>• DEM</li> <li>• Intensity Imagery</li> </ul>



## WI 12 County - Douglas Work Unit 300213 Boundary

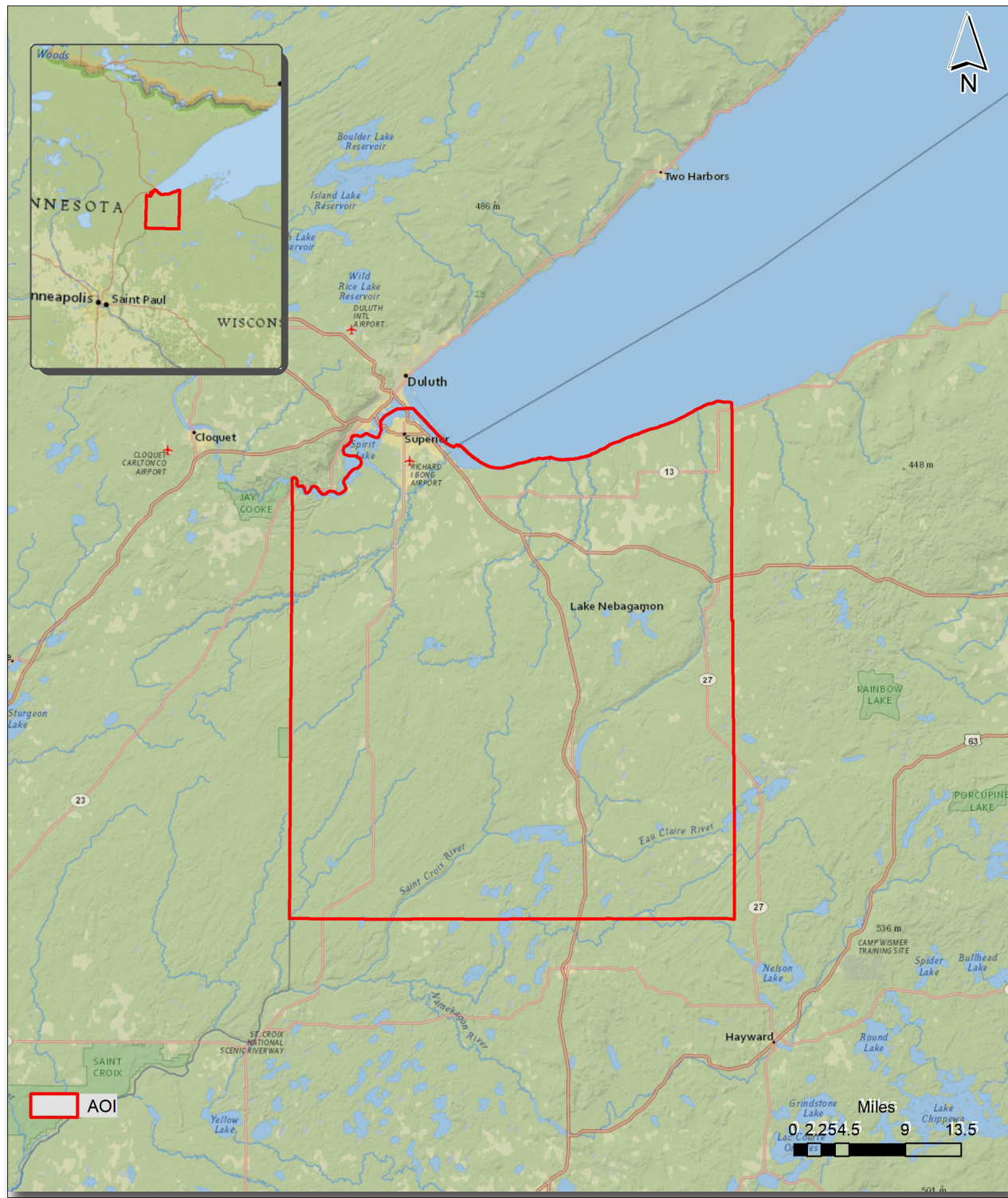


Figure 1. Work Unit Boundary

## 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 VQ1560ii lidar sensors (Figure 2), serial number(s) SN3543 and SN3062, 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 (SN3062)	Riegl VQ1560ii (SN3543)
<b>Terrain and Aircraft Scanner</b>	Flying Height	1584 m	1600 m
	Recommended Ground Speed	160 kts	160 kts
<b>Scanner</b>	Field of View	60°	60°
	Scan Rate Setting Used	191 Hz	177 Hz
<b>Laser</b>	Laser Pulse Rate Used	1200 kHz	1100 kHz
	Multi Pulse in Air Mode	yes	yes
<b>Coverage</b>	Full Swath Width	1827 m	1846 m
	Line Spacing	1462 m	1477 m
<b>Point Spacing and Density</b>	Average Point Spacing	0.35 m	0.35 m
	Average Point Density	8 pts / m <sup>2</sup>	8 pts / m <sup>2</sup>

**Figure 2. Riegl VQ1560ii 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-GAYY, C-FFRY
- Piper Navajo (twin-piston), Tail Number(s): N44RL

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 May 14, 2022 and May 27, 2022. Nine 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
05142022A (SN3543,C-FFRY)	5/14/2022 5:30:24 PM	5/14/2022 5:31:26 PM
05152022A (SN3543,C-FFRY)	5/15/2022 4:44:16 PM	5/15/2022 5:30:17 PM
05162022A (SN3543,C-FFRY)	5/16/2022 12:13:33 PM	5/16/2022 1:33:38 PM
05172022A (SN3062,C-GAYY)	5/17/2022 2:47:16 PM	5/17/2022 8:03:06 PM
05172022A (SN3543,C-FFRY)	5/17/2022 11:17:46 AM	5/17/2022 3:57:40 PM
05222022A (SN3543,C-FFRY)	5/22/2022 11:03:22 PM	5/23/2022 4:31:38 AM
05272022A (SN3062,N44RL)	5/27/2022 3:53:59 PM	5/27/2022 6:59:55 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.

During the sensor trajectory processing (combining GPS & IMU datasets) certain statistical graphs and tables are generated within the Applanix POSPac processing environment which are commonly used as indicators of processing stability and accuracy. This data for analysis include: max horizontal / vertical GPS variance, separation plot, altitude plot, PDOP plot, base station baseline length, processing mode, number of satellite vehicles, and mission trajectory.

Point clouds in flightline swath format 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. Each flightline swath point cloud was calibrated using Strip Align software that corrects systematic geometric errors and improves the relative and absolute accuracy of the flightline swath point cloud. The calibrated point cloud swaths were imported into GeoCue distributive processing software and the imported data was then tiled so further processing could take place in TerraScan software. Using TerraScan, the vertical accuracy of the surveyed ground control was tested and any vertical bias was removed from the data. TerraScan and TerraModeler software packages were then used for automated data classification and manual cleanup. The data were manually reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler.

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.
21	Snow	Bare earth points that fall on snow, where identifiable
22	Temporal Exclusion	Points that are excluded due to differences in collection dates

### 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. 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 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.

	0-8cm
	8-16cm
	16-24cm
	>24cm

### 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/m<sup>2</sup>. 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 16.05 points/m<sup>2</sup> while the average ground classified density was 12.3 points/m<sup>2</sup>. 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 Douglas County Work Unit 300213 First Return Density

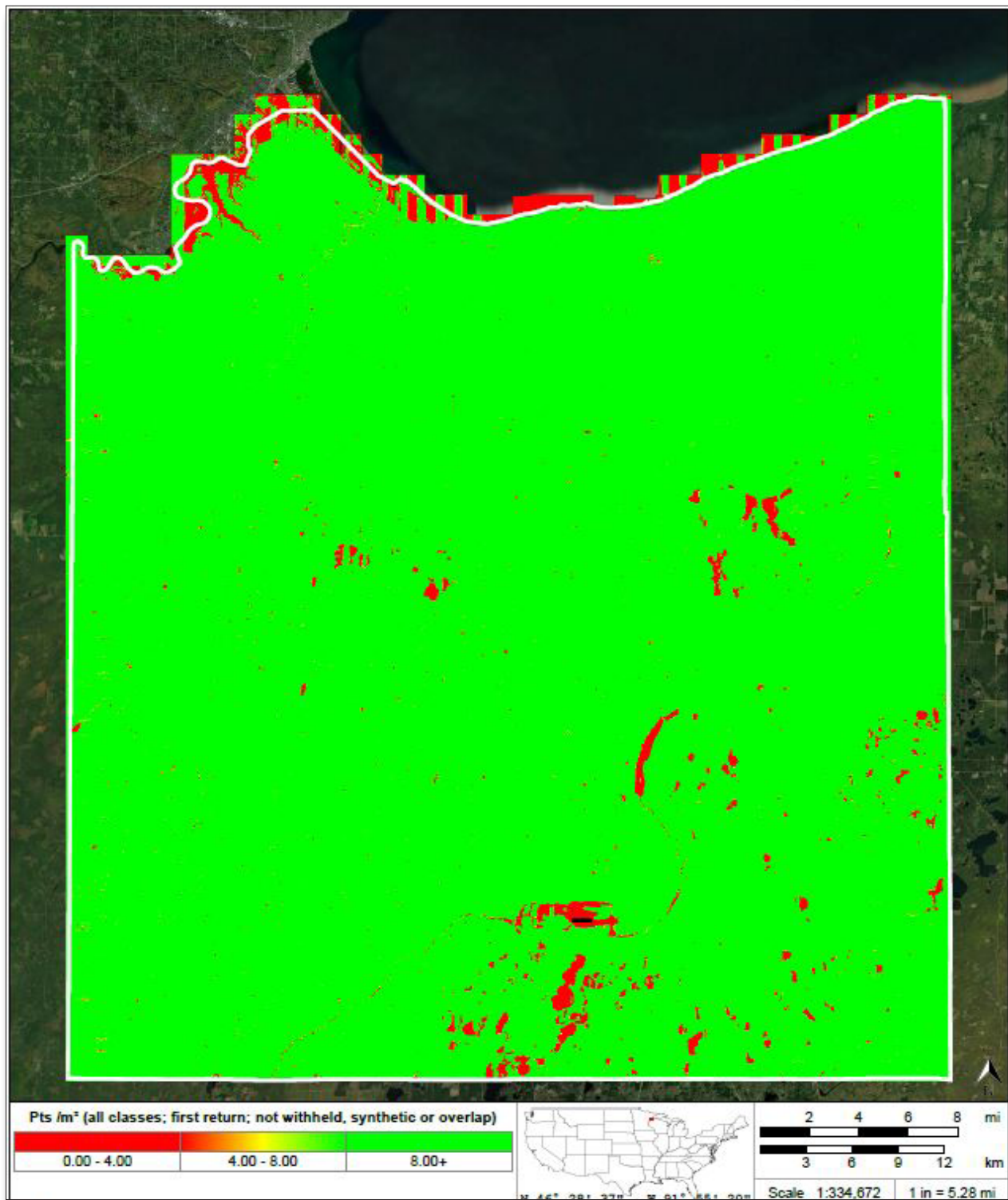


Figure 4. First Return Point Density

## WI 12 County B22 Douglas County Work Unit 300213 Ground Density

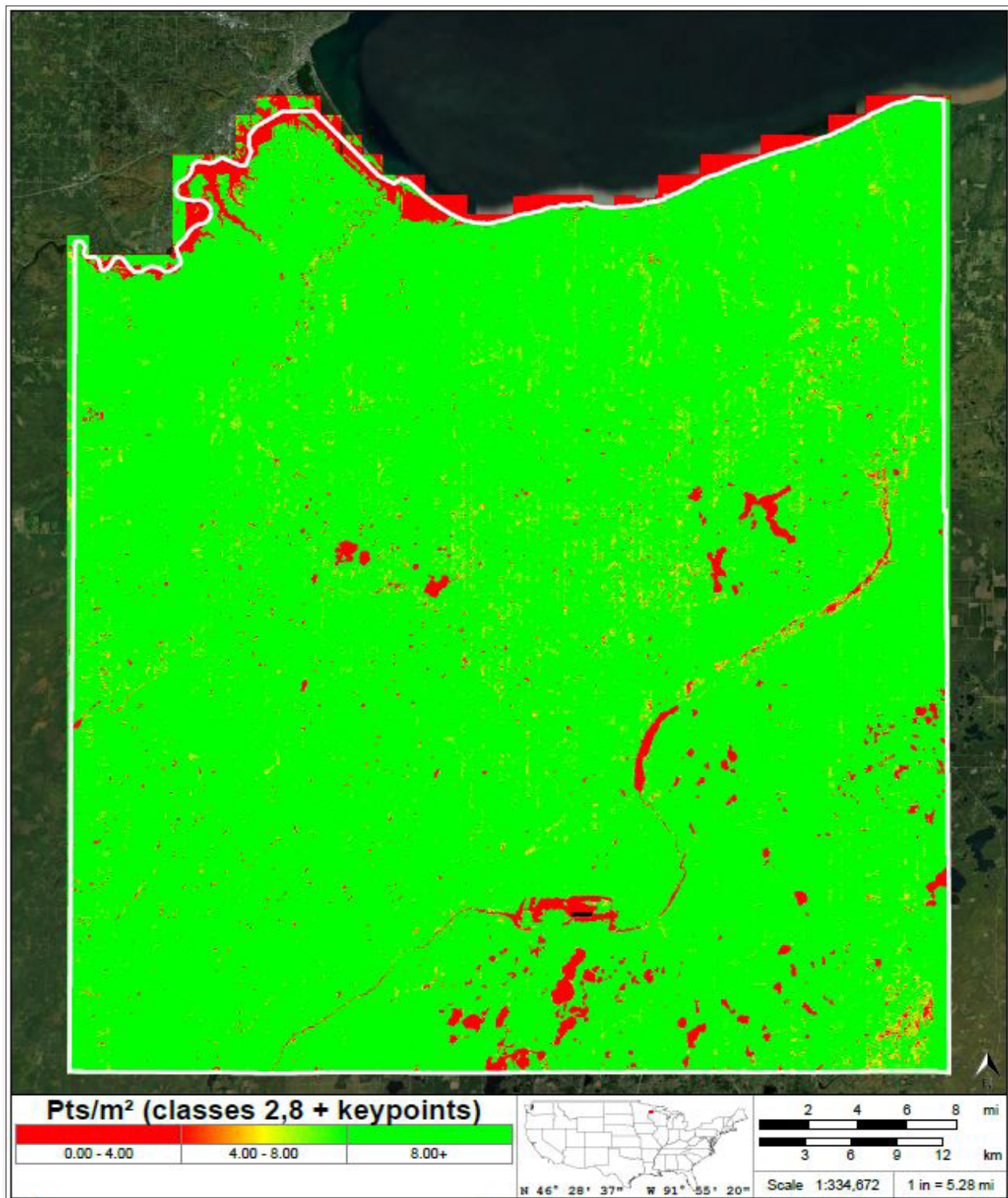


Figure 5. Ground Density



## WI 12 County - Douglas Work Unit 300213 Tile Layout

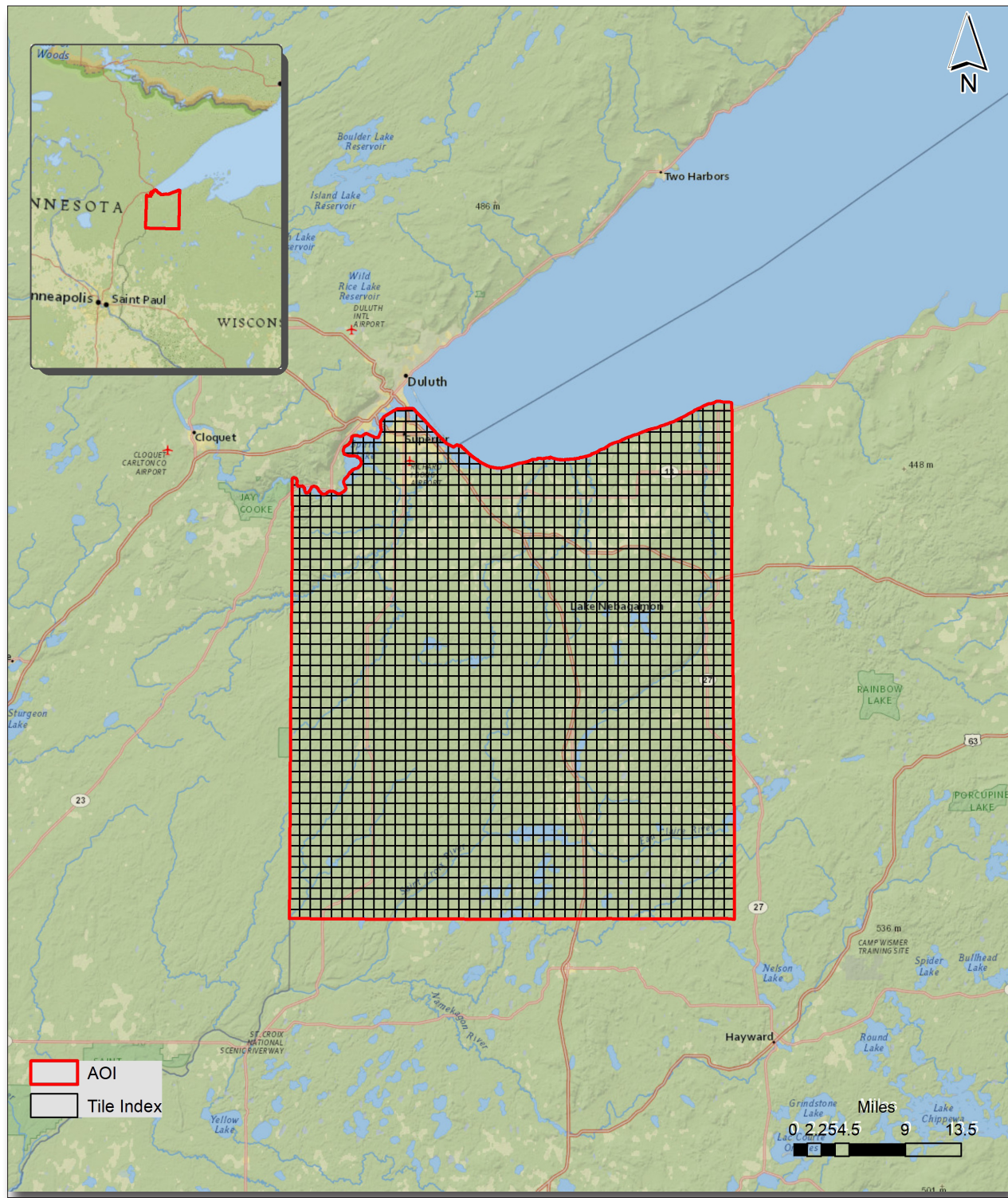


Figure 6. Lidar Tile Layout

## 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.

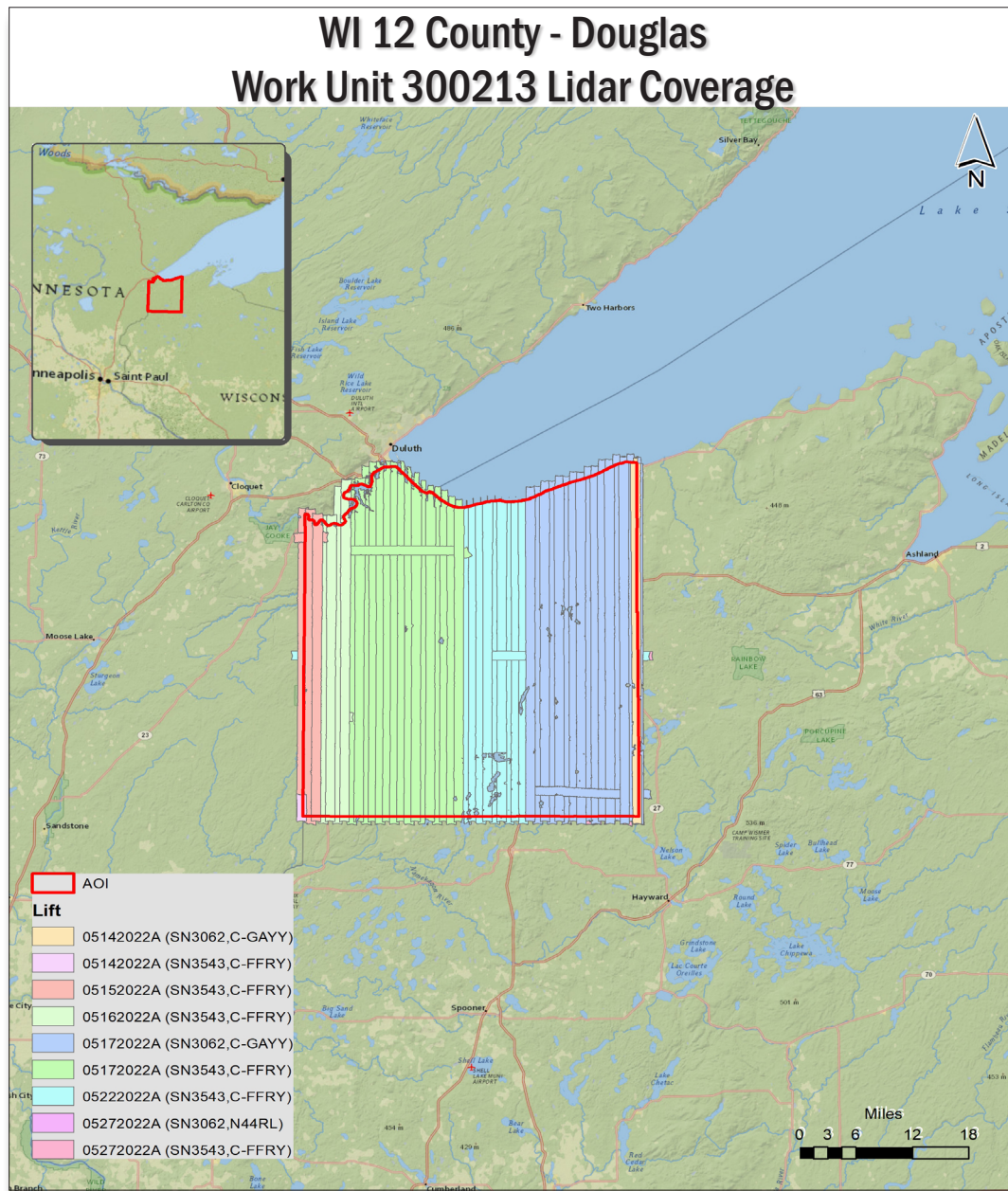


Figure 7. Lidar Coverage

## 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 1,663 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.

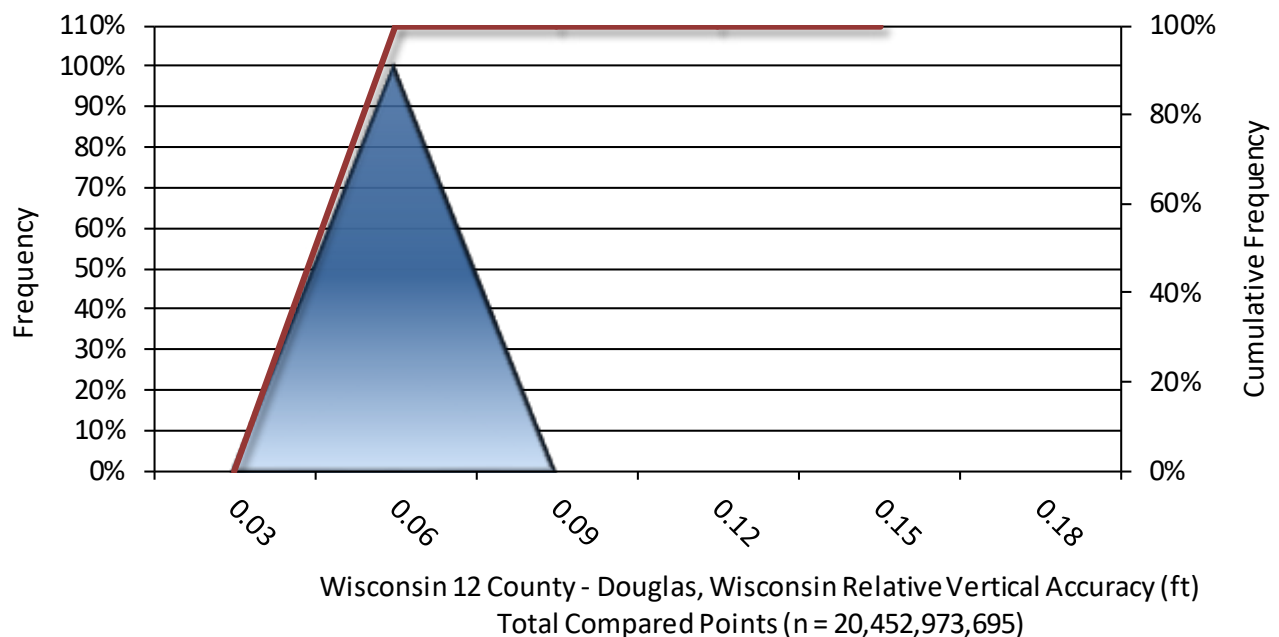
Horizontal Accuracy	
$RMSE_r$	0.34 ft
	0.104 m
$ACC_r$	0.60 ft
	0.18 m



## 5.2. Relative Vertical Accuracy

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 WI 12 County - Douglas project was 0.051 feet (0.015 meters). A summary is shown below.

Relative Vertical Accuracy	
Sample	54 flight line surfaces
Average	0.051 ft
	0.015 m
Median	0.051 ft
	0.016 m
RMSE	0.051 ft
	0.016 m
Standard Deviation ( $1\sigma$ )	0.003 ft
	0.001 m
1.96 $\sigma$	0.005 ft
	0.002 m



### 5.3. Intrawath Precision (Smooth Surface Precision)

Intrawath 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:

$$\text{Precision} = \text{Range} - (\text{Slope} \times \text{Cellsize} \times 1.414)$$

**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 2.5 cm, minimum slope-corrected range to be 0 cm, and the maximum slope-corrected range to be 11 cm.

## Project Report Appendices

**The following section contains the appendices as listed in the WI 12 County - Douglas Lidar Project Report.**

## Appendix A

### Flight Logs



# LIDAR Flight Log

Date	May 14, 2022	Aircraft	C-FFRY
Project	3238_NV5_WI3DEP_QL1	Pilot	Kane G
Location	Duluth MI	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-11C 30Kt Wind/ Moderate to Severe  
H- 71% Turbulence  
AMLS-278m  
Hpa-1012  
Time to next maintenance: \_\_\_\_\_ ☉ 50 hr ○ 100 hr

Aircraft Block Time			
Engine On	11:58	Takeoff	12:15
Engine Off	17:58	Landing	17:47
Total	6.0 hrs	Total	5.5 hrs

Mission Plan					
AGL Height	1584	m	Pulse Rate	1200	khz/ch
Target Speed	160	kts	Scan Rate	188	hz/ch
Laser Current	100	%	FOV	60	degs

Static Alignment	GPS Time	
	Start	End
Pre Mission	1203	1208
Post Mission	1752	1757

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted	Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp
F8			1245	1250			
3007	432213401		1258	1315		125801	
3008	432213402		1319	1337		131909	
3009	432213403		1340	1358		134041	
3010	432213404		1404	1421		140416	
3011	432213405		1425	1443		142544	
3012	432213406		1446	1504		144656	
3013	432213407		1507	1526		150759	
3014	432213408		1529	1546		152948	
3019	432213409		1549	1607		154920	
3020	432213410		1610	1626		161028	
Xtie	432213411		1630	1635		163007	
F8			1635	1640			
F8			1716	1721			
1001			1730	1732	1732	173024	Aborted Rain 3237_NV5_QL1



















# LIDAR Flight Log

Date	May 17, 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- 5C
H- 75%
AMLS-435m
Hpa-1017
Time to next maintenance: _____ ☉ 50 hr ○ 100 hr

Aircraft Block Time		
Engine On	10:46	Takeoff 11:07
Engine Off	16:28	Landing 16:16
Total	5.7 hrs	Total 5.2 hrs

Mission Plan				
AGL Height	1600	m	Pulse Rate	1100 khz/ch
Target Speed	160	kts	Scan Rate	177hz/ch
Laser Current	100	%	FOV	60 degs

Static Alignment	GPS Time	
	Start	End
Pre Mission	1052	1057
Post Mission	1622	1627

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted	Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp
F8			1110	1115			
1008	432213701		1117	1131			111745
1009	432213702		1134	1148			113424
1010	432213703		1151	1205			115155
1011	432213704		1209	1223			120903
1012	432213705		1226	1241			122658
1013	432213706		1244	1259			124424
1014	432213707		1302	1316			130223
1015	432213708		1320	1334			132006
1016	432213709		1338	1351			133804
1017	432213710		1355	1409			135512
1018	432213711		1412	1426			141251
1019	432213712		1429	1443			142934
1020	432213713		1446	1459			144626
1021	432213714		1502	1516			150247







# 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	178	hz/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			3238_NV5_QL1_2022
3120	432214211		0210	0210			021008
3119	432214212		0213	0215			021333
3118	432214213		0219	0223			021939



# 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	178	hz/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			3237_NV5_QL1_20222
1007	432214223		0425	0431			Refly 16nm FNE
F8			0432	0437			









## LIDAR Flight Log

Date	May 27th, 2022	Aircraft	G-FFRY
Project	3237_NV5_WI3DEP_QL1	Pilot	K.B, P.B
Location	CYQT	Operator	RMG
<b>Mission Objective</b> 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    O 50 hr    O 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	Comments
			Start	End	Time	nmi to End	Time Stamp
Figure 8		8	16:38	16:43			220527_153451
1048	432214712	182.4	16:45	16:59			220527_164511
1041	432214713	002.2	17:03	17:18			170324
1042	432214714	182.2	17:21	17:35			172147
1043	432214715	002.2	17:38	17:52			173800
1044	432214716	182.2	17:55	18:09			175508
1045	432214717	002.2	18:13	18:29			181342
1046	432214718	182.3	18:32	18:46			183204
1047	432214719	002.2	18:48	19:03			184837
1048	432214720	182.3	19:05	19:19			190507
1046	432214721	002.2	19:23	19:37			192304
1041	432214722	182.3	19:44	19:54			194411
X-Tie_41-48	432214723	092.3	20:02	20:05			200224
Figure 8		20:06	20:06	20:09			Delayed on parking





# LIDAR Flight Log

Date	April 10, 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:	<div> <div></div> <div>50 hr</div> <div>100 hr</div> </div>

Aircraft Block Time			
Engine On	15:05	Takeoff	15:18
Engine Off	21:38	Landing	21:29
Total	6.6 hrs	Total	6.2 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	15:08	15:13
Post Mission	21:31	21:36

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp	
figure 8		-	15:38	15:42			-	
X-TIE	622213030	273°	15:46	15:53			154659	
3151	622213031	001°	15:58	16:05			155811	
3152	622213032	181°	16:09	16:17			160913	
3153	622213033	001°	16:19	16:28			161959	
3154	622213034	181°	16:31	16:40			163152	
3155	622213035	001°	16:43	16:54			164309	
3156	622213036	181°	16:57	17:07			165707	
3157	622213037	001°	17:10	17:21			171031	
3158	622213038	181°	17:23	17:34			172354	
3159	622213039	001°	17:37	17:47			173704	
3160	622213040	181°	17:50	18:01			175037	
3161	622213041	001°	18:03	18:14			180353	
3162	622213042	181°	18:16	18:27			181659	
3163	622213043	001°	18:32	18:44			183217	



# LIDAR Flight Log

Date	April 10, 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	15:05	Takeoff 15:18
Engine Off	21:38	Landing 21:29
Total	6.6 hrs	Total 6.2 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	15:08	15:13
Post Mission	21:31	21:36

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp	
3164	622213044	181°	18:47	18:59			184733	
3165	622213045	001°	19:03	19:15			190306	
3166	622213046	181°	19:18	19:30			191816	
3167	622213047	001°	19:33	19:45			193332	
3168	622213048	181°	19:48	20:01			194852	
3169	622213049	001°	20:04	20:16			200409	
3170	622213050	181°	20:19	20:31			201930	
3171	622213051	001°	20:34	20:47			203456	
3172	622213052	181°	20:53	21:01			205306	
figure 8		-	21:02	21:06			-	



# 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:	<div> <div></div> <div>50 hr</div> <div>100 hr</div> </div>

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
Post Mission	18:16	18:21

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





# LIDAR Flight Log

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







# LIDAR Flight Log

Date	May 27, 2022	Aircraft	N44RL
Project	3237_NV5_WIDEP_QL1	Pilot	Hattie
Location	KGFK -> KBJI	Operator	Grayson
Mission Objective			

System	Reigl VQ1560ii
Unit	62
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	14:07	Takeoff 14:26
Engine Off	20:15	Landing 20:03
Total	6.1 hrs	Total 5.6 hrs

Mission Plan				
AGL Height	1600	m	Pulse Rate	1100 khz/ch
Target Speed	160	kts	Scan Rate	181 lps/ch
Laser Current	100	%	FOV	60 degs

Static Alignment	GPS Time	
	Start	End
Pre Mission	14:13	14:18
Post Mission	20:08	20:13

Flight Line	LiDAR File Name	Flight Direction	GPS Time		Line Aborted		Mission ID	Comments
			Start	End	Time	nmi to End	Time Stamp	
Figure 8		-	15:47	15:52			-	
1020	622214701	S	15:53	15:59			155358	
1033	622214702	N	16:10	16:25			161026	
1034	622214703	S	16:28		16:38		162816	Clouds on line, refly last part
1034	622214704	S	16:45	16:49			164517	
1035	622214705	N	16:53	17:09			165328	
1036	622214706	S	17:13	17:26			171301	
1037	622214707	N	17:30	17:45			173004	
1038	622214708	S	17:48	18:02			174841	
1039	622214709	N	18:08	18:23			180818	
1040	622214710	S	18:27	18:41			182722	
X-tie	622214711	W	18:54	18:59			185425	
Figure 8		-	19:00	19:04			-	



## 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

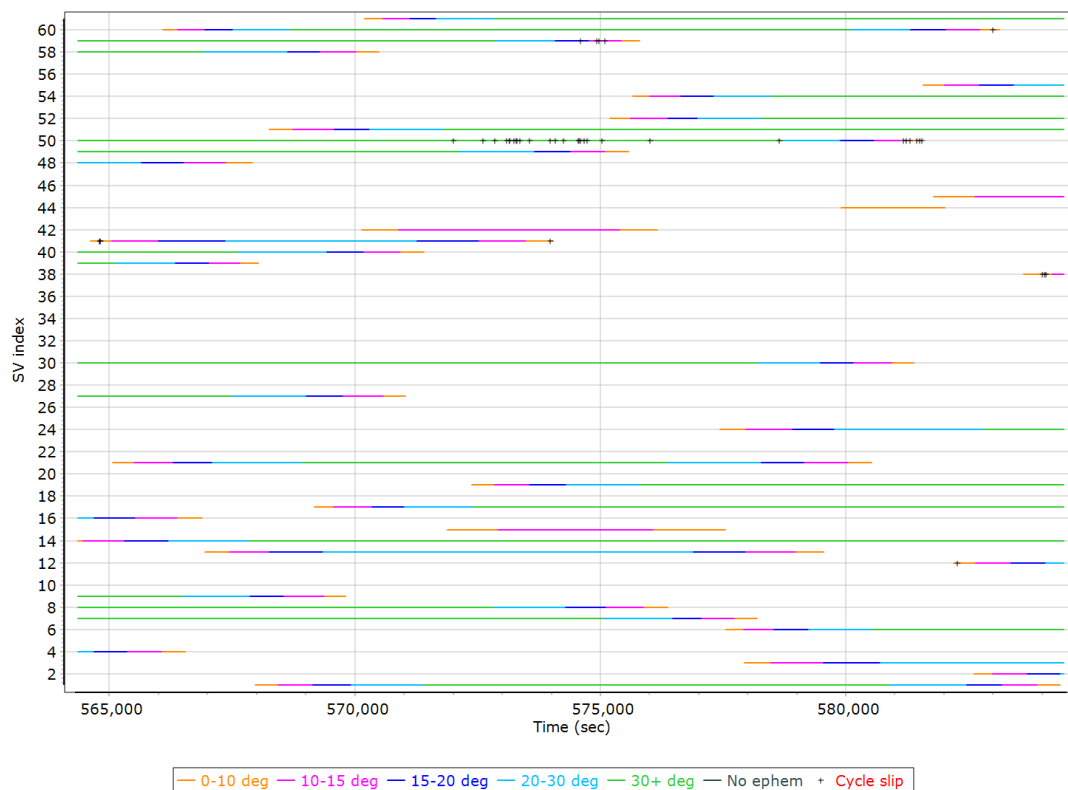
## Rover Data QC

### Raw IMU Import QC Summary

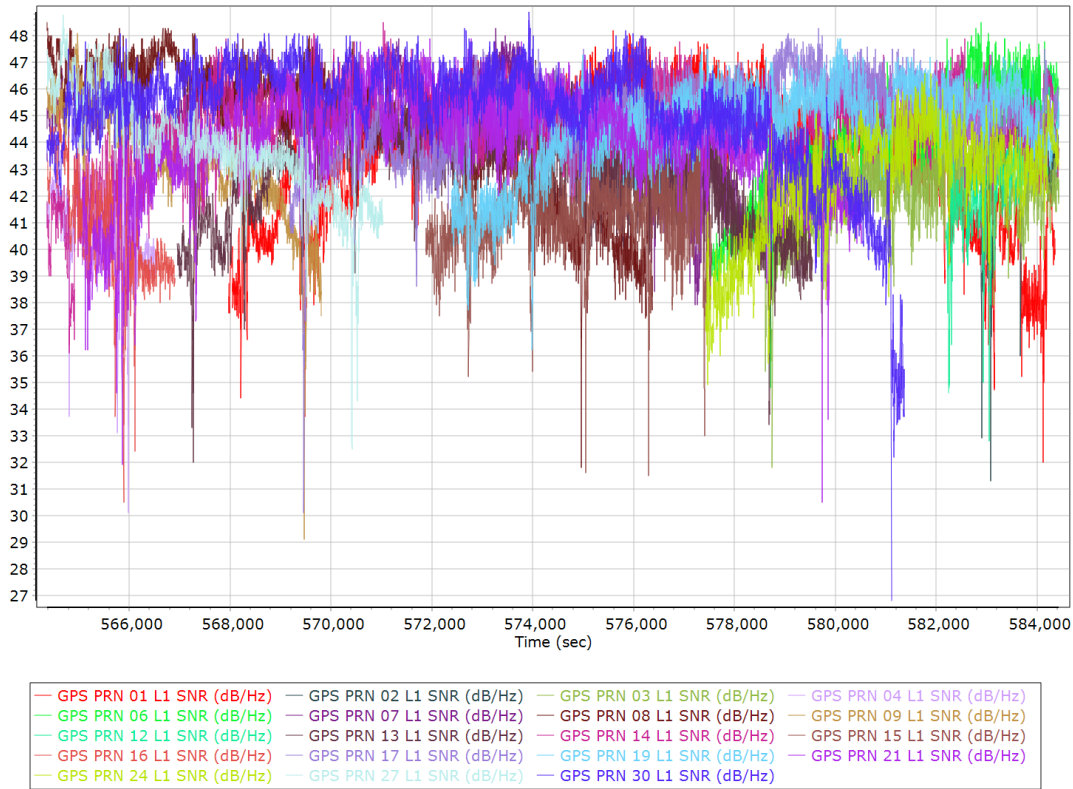
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05142022A_3062.log
IMU Records Processed	4011930
Termination Status	Normal
IMU Anomalies	0

## Primary Observables & Satellite Data

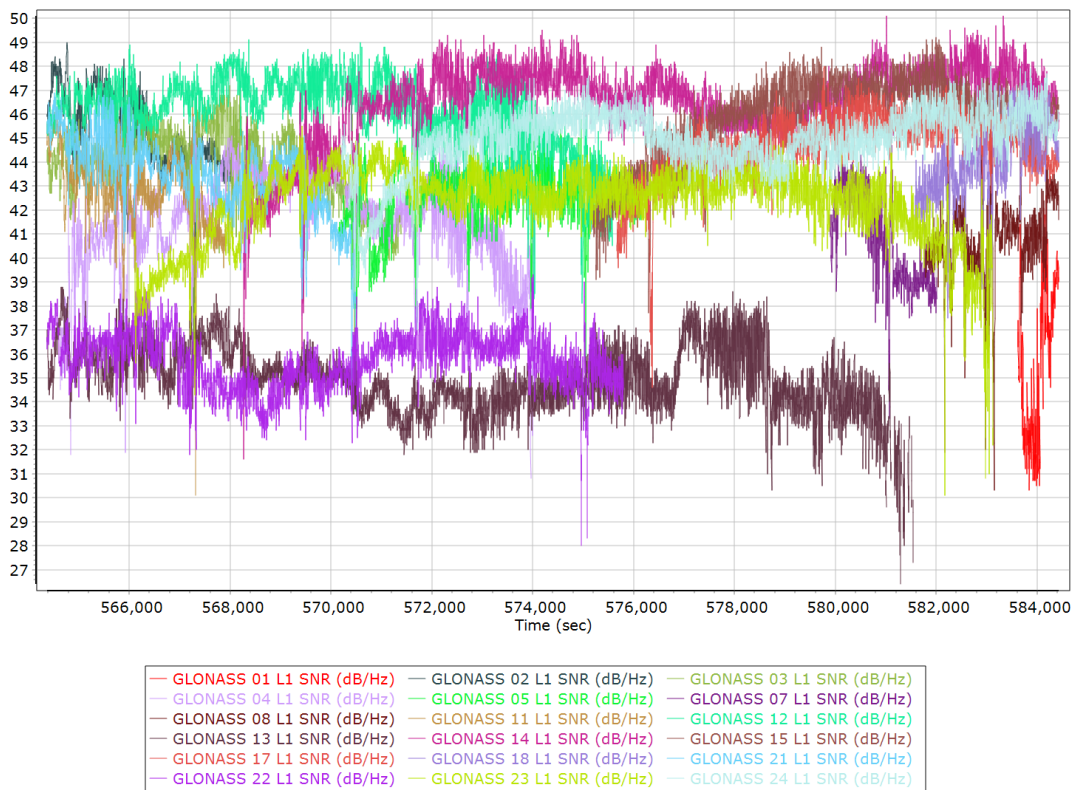
### GPS/GLONASS L1 Satellite Lock/Elevation



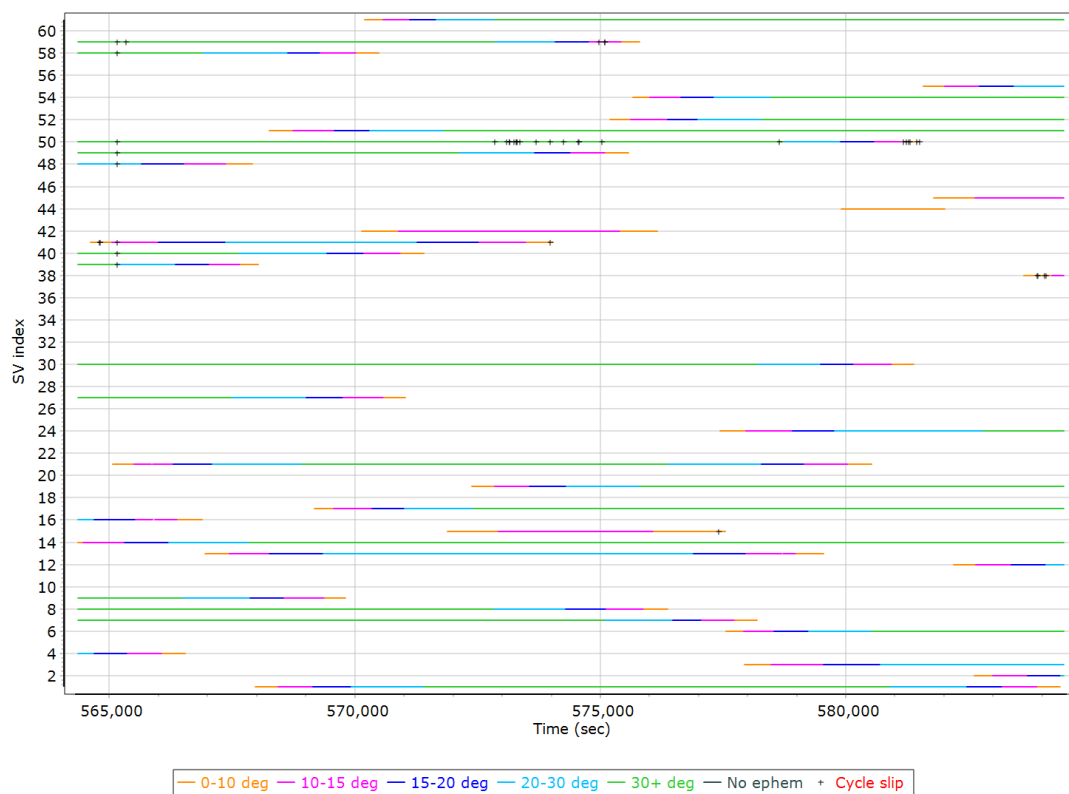
## GPS L1 SNR



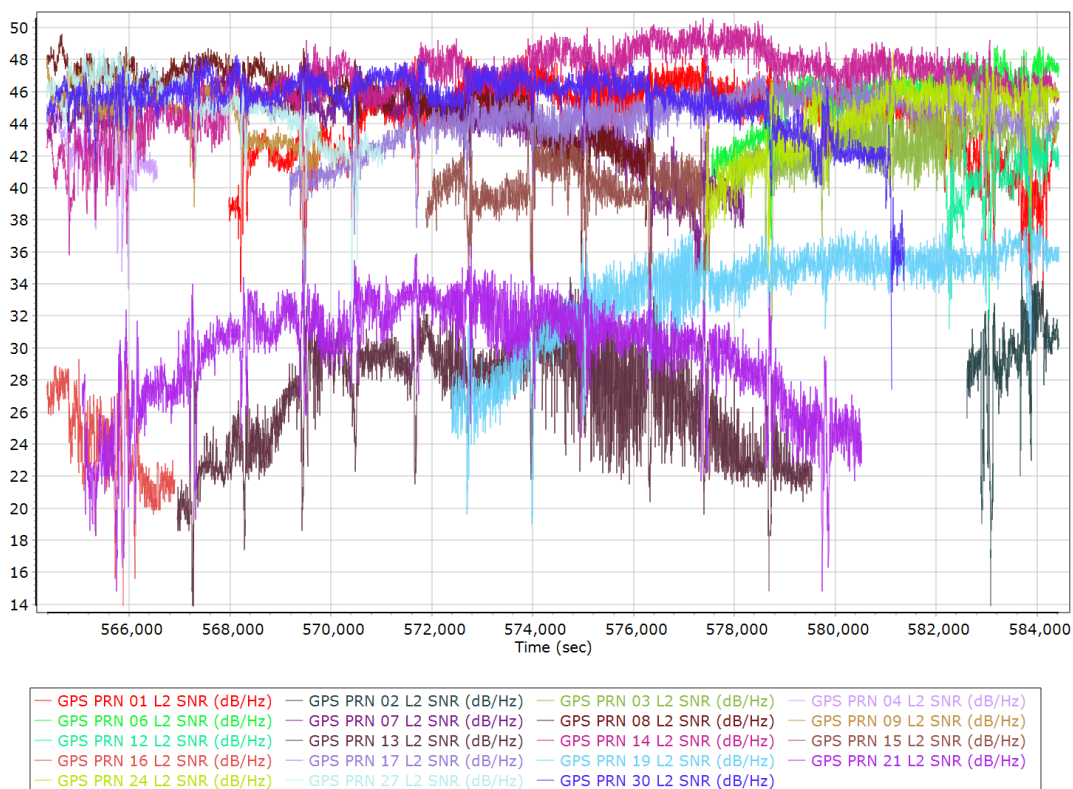
## GLONASS L1 SNR



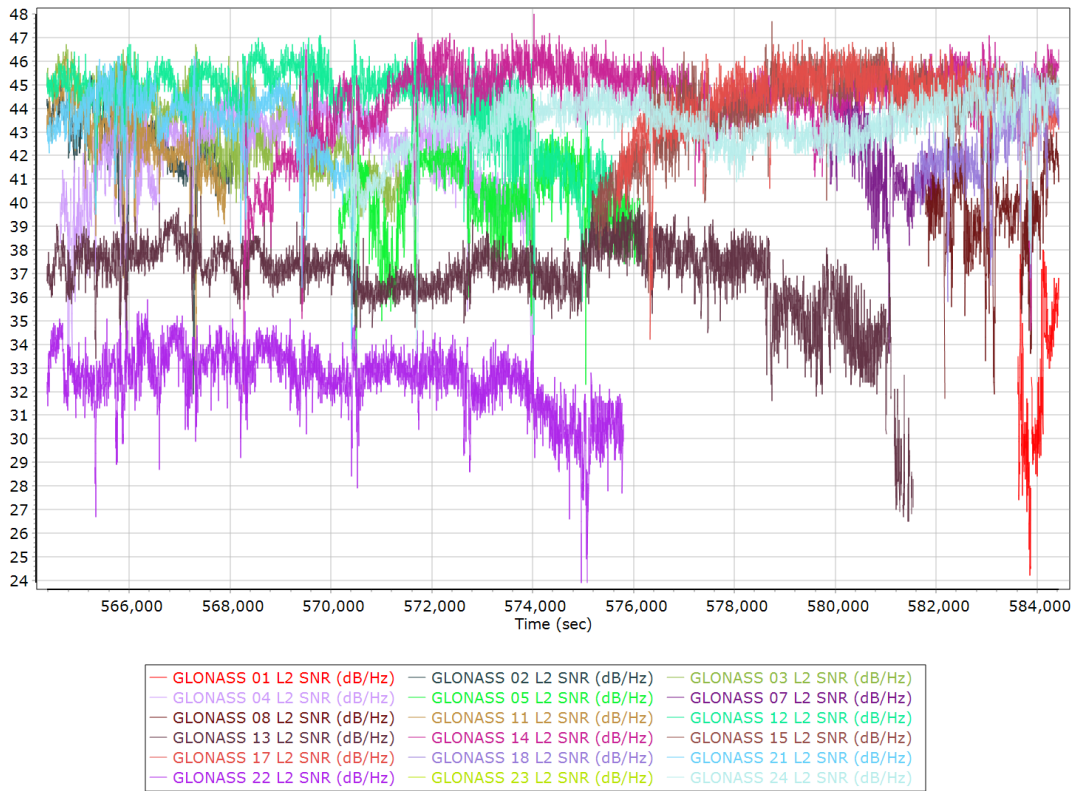
## GPS/GLONASS L2 Satellite Lock/Elevation



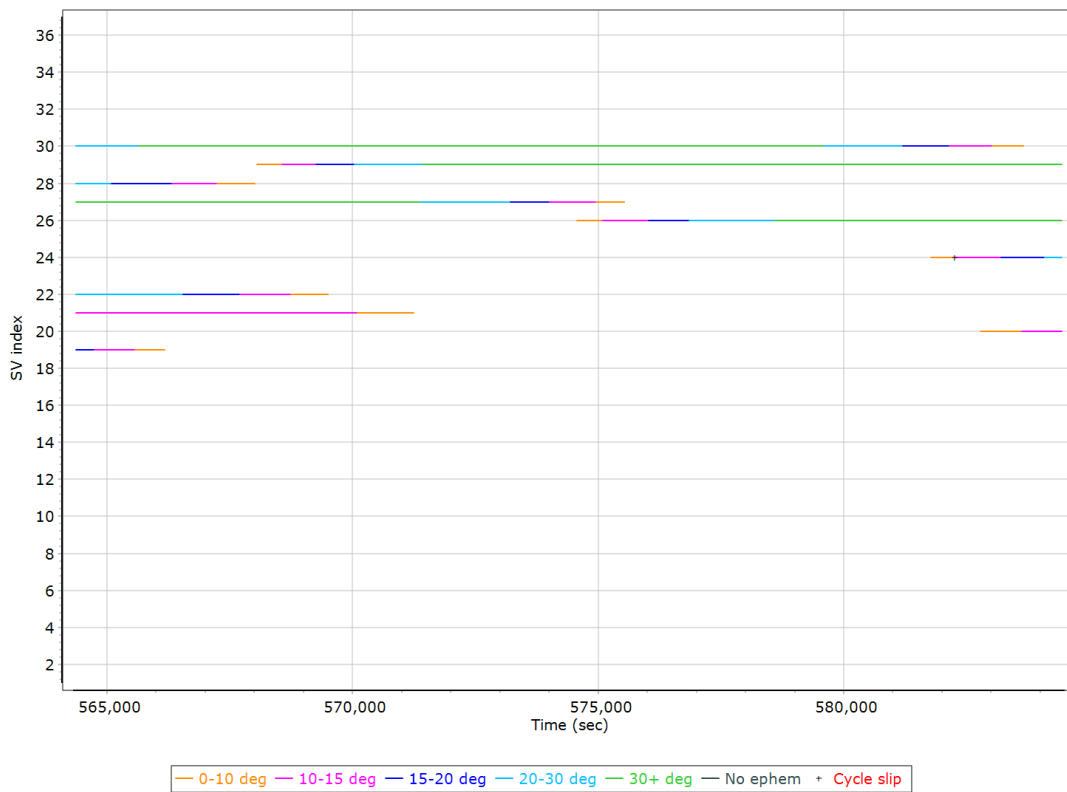
## GPS L2 SNR



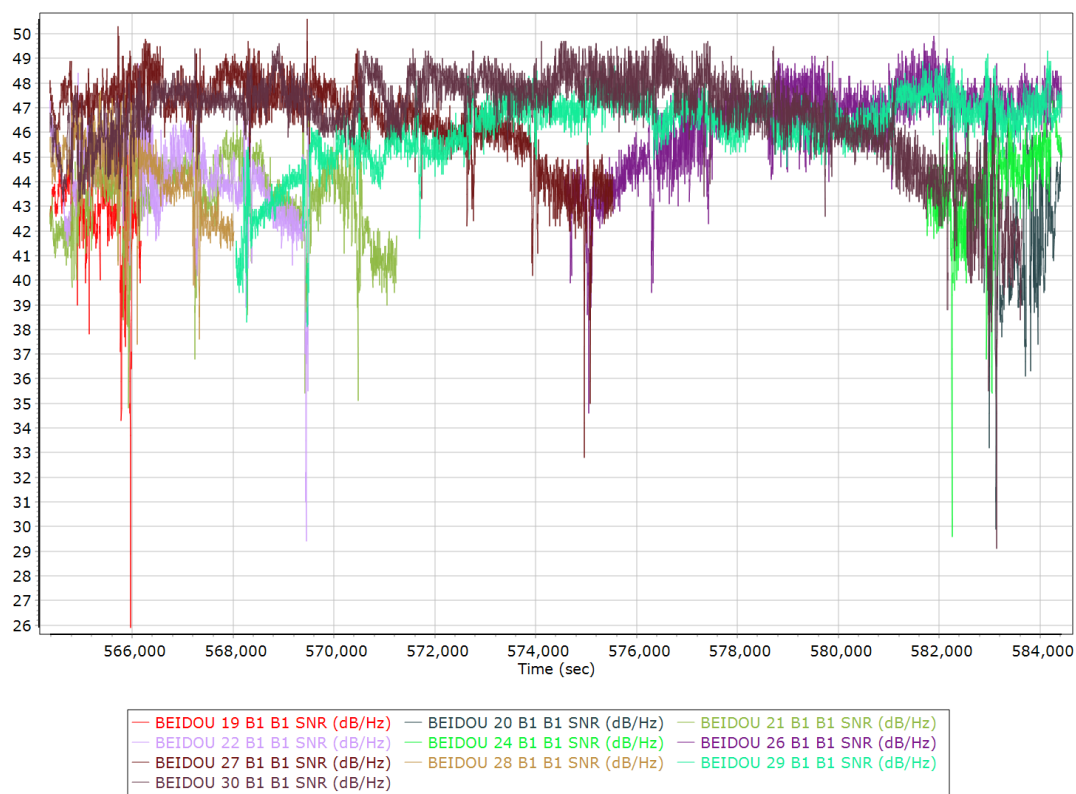
## GLONASS L2 SNR



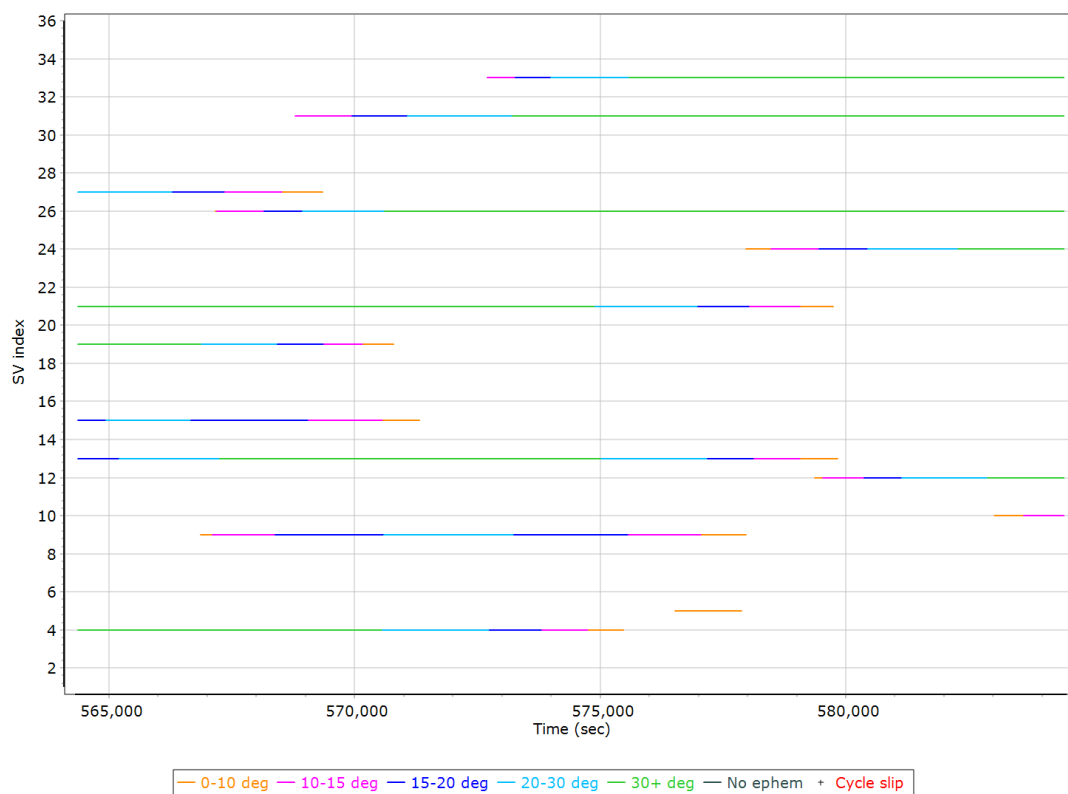
## BEIDOU Satellite Lock/Elevation



## BEIDOU SNR

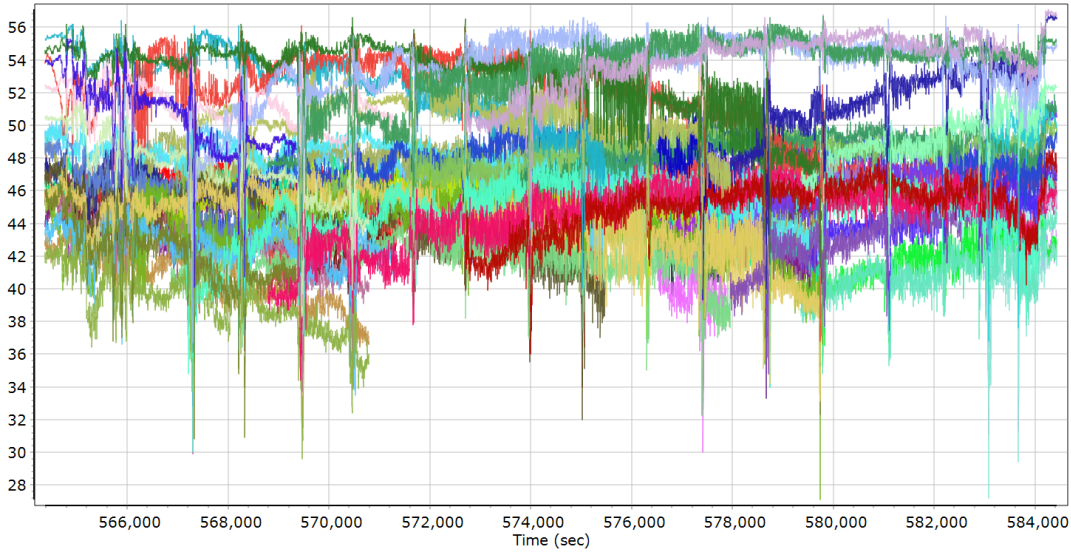


## GALILEO Satellite Lock/Elevation





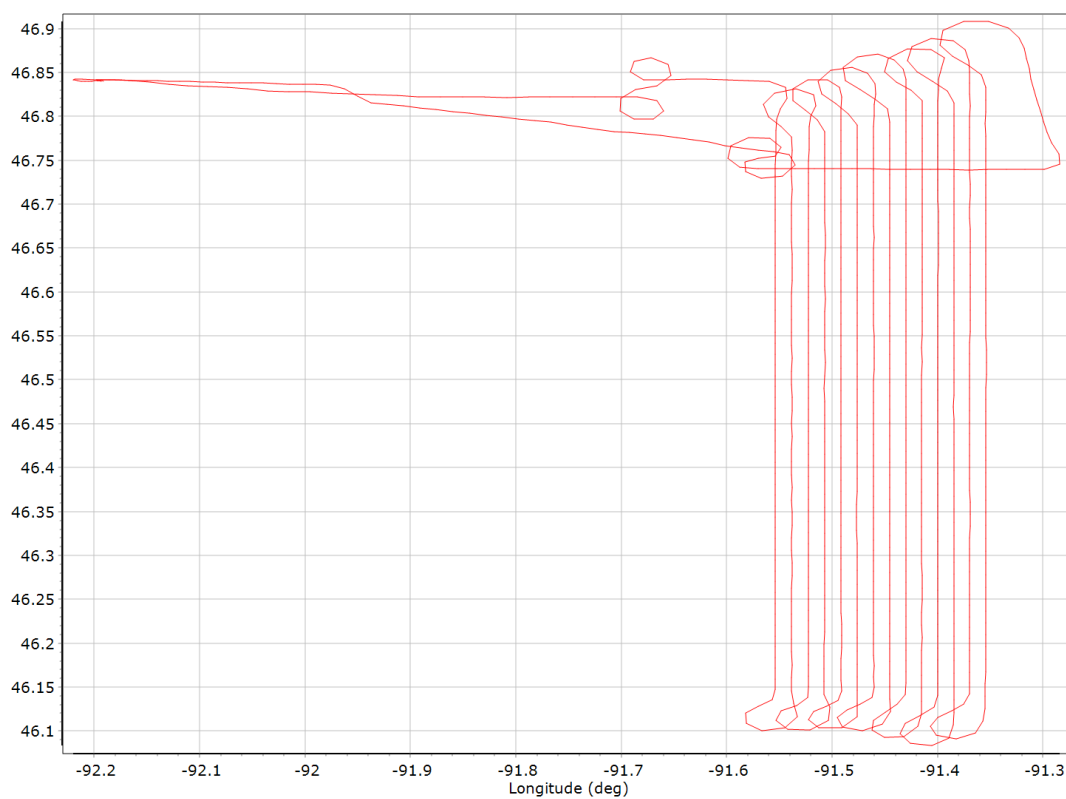
## GALILEO SNR



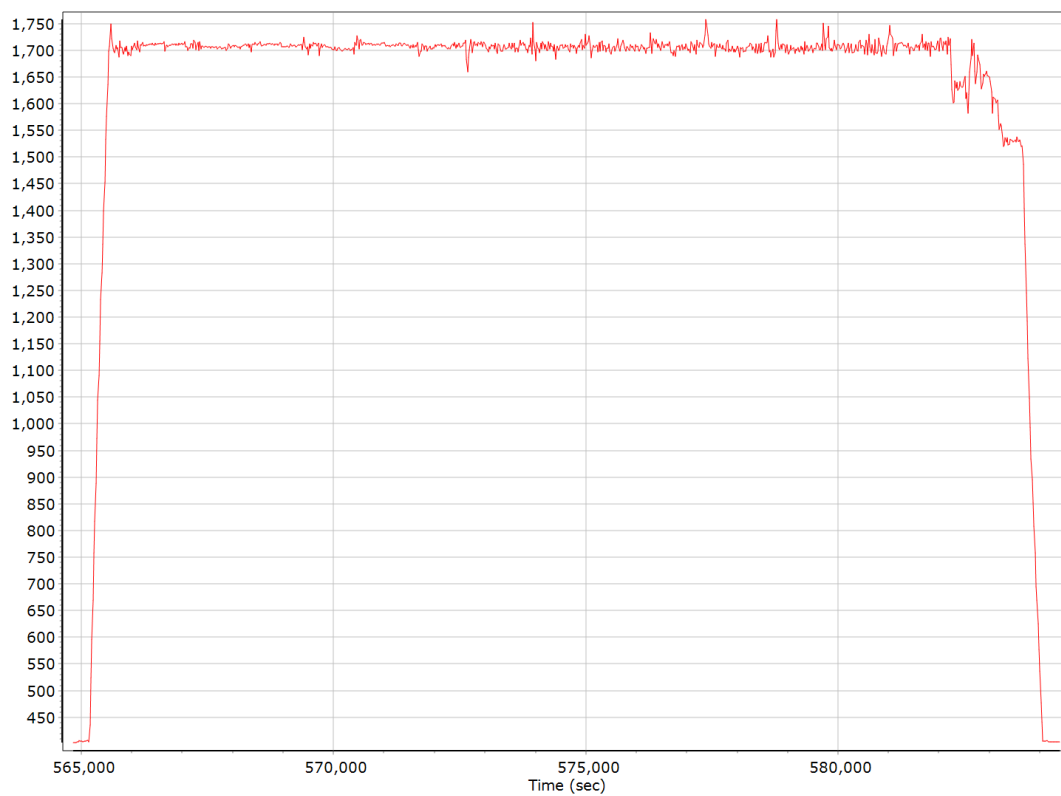
— GALILEO 04 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 05 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 09 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 10 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 13 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 15 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— 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

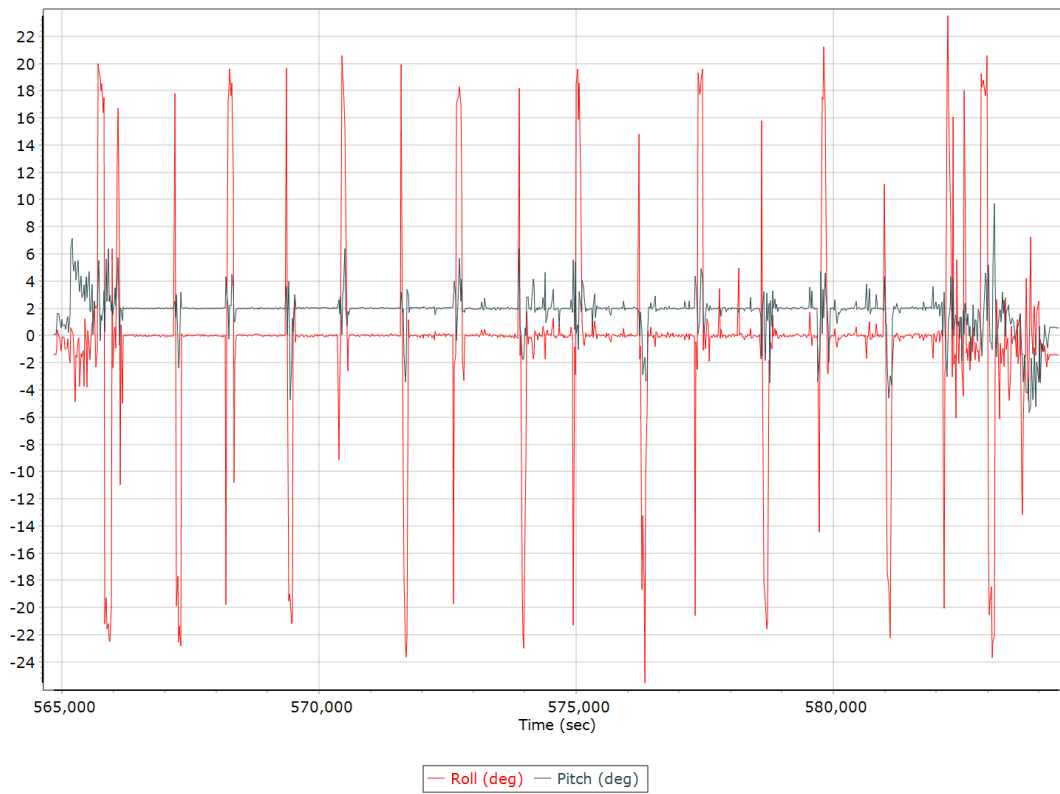
### Top View



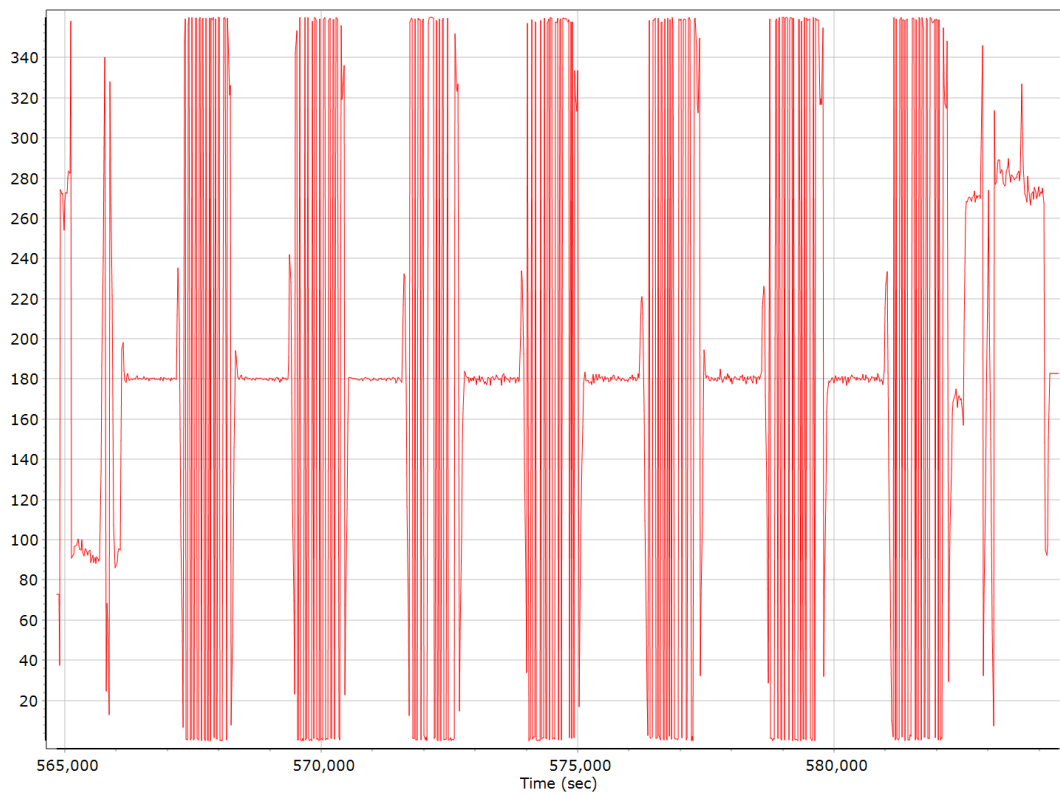
### Altitude



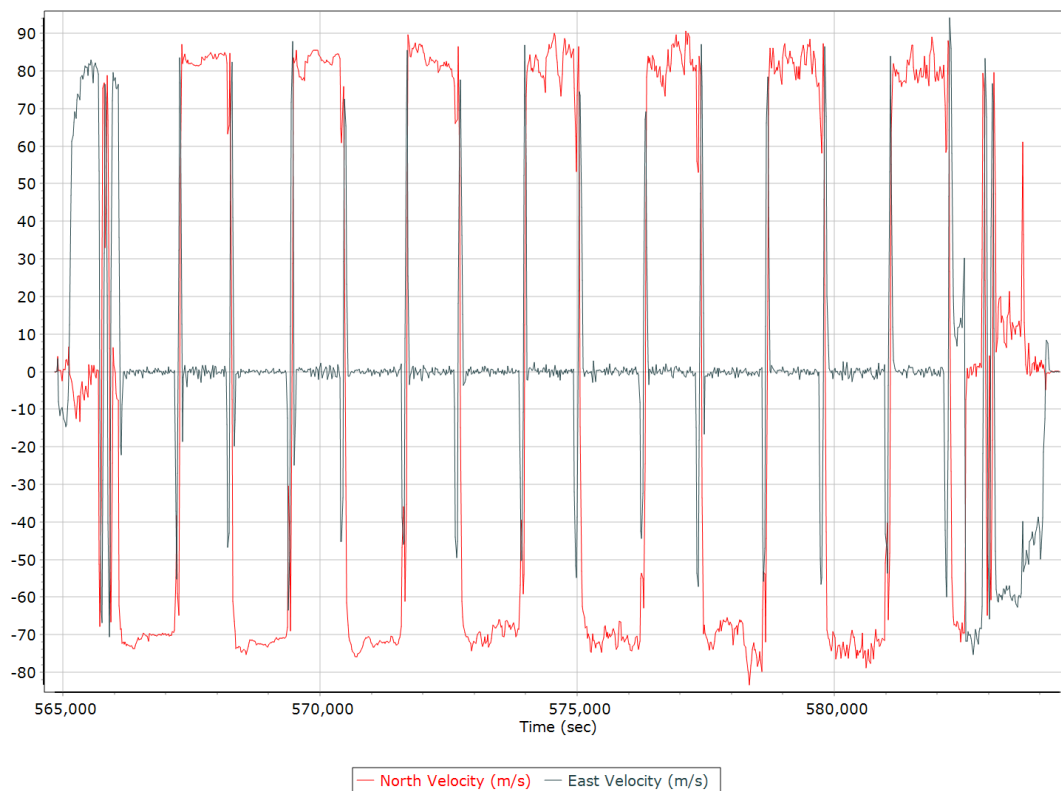
## Roll/Pitch



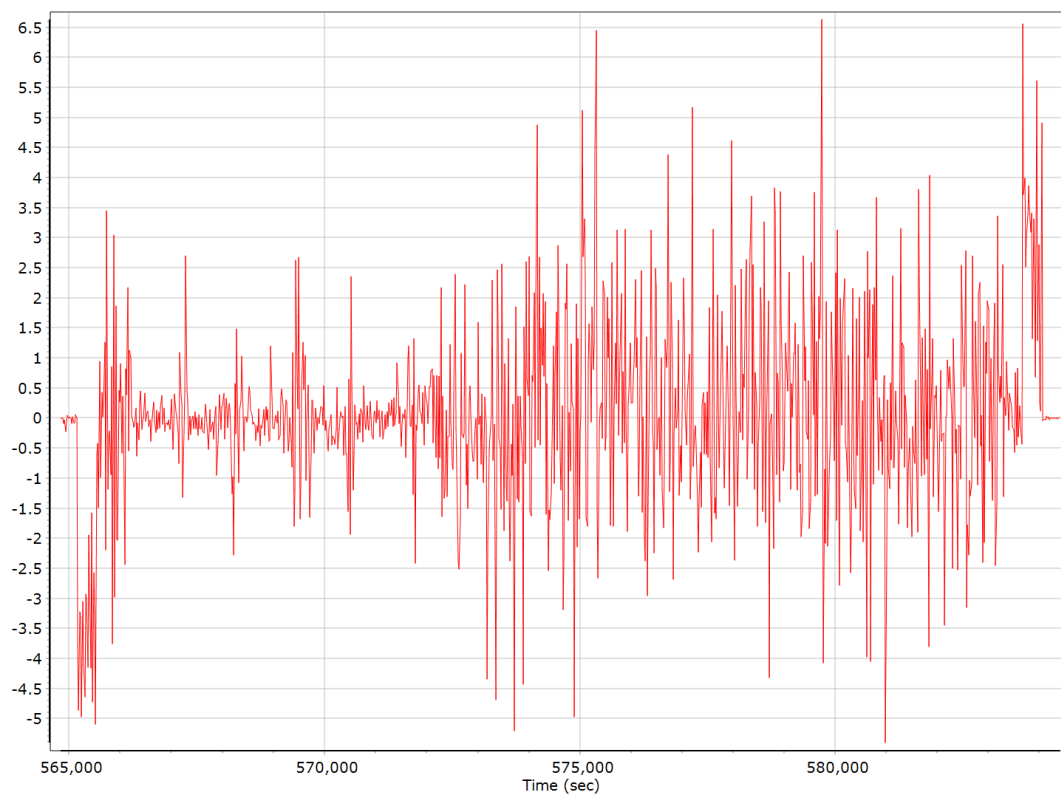
## Heading



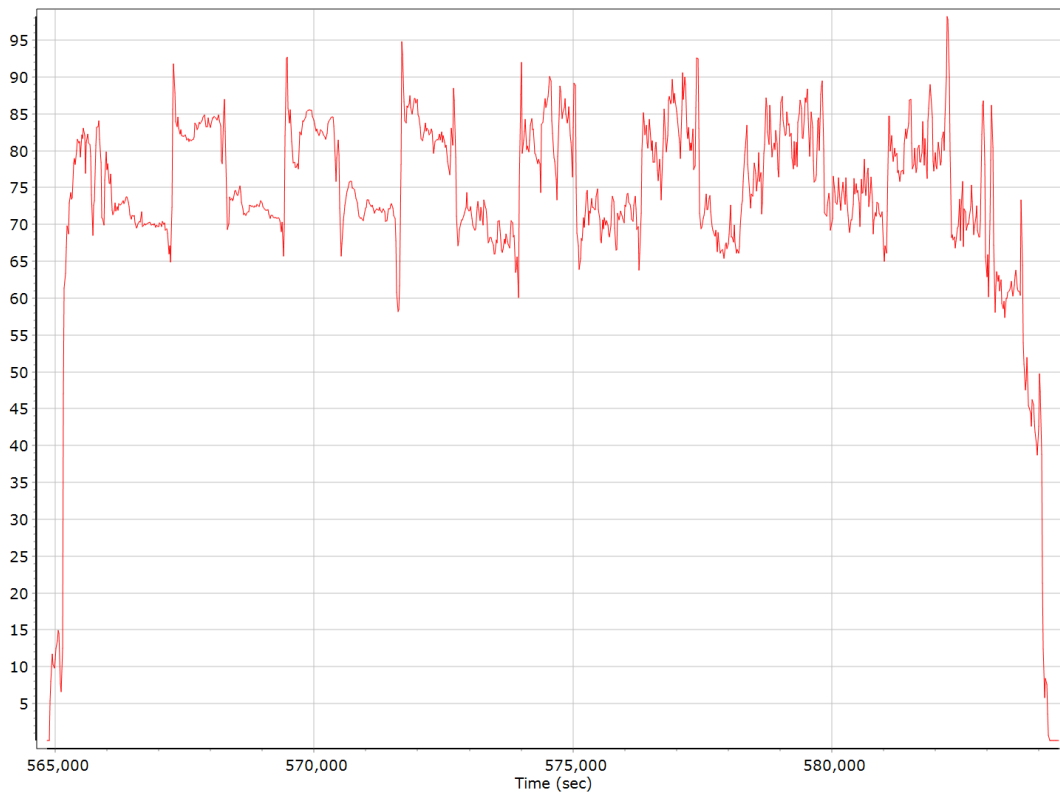
## North/East Velocity



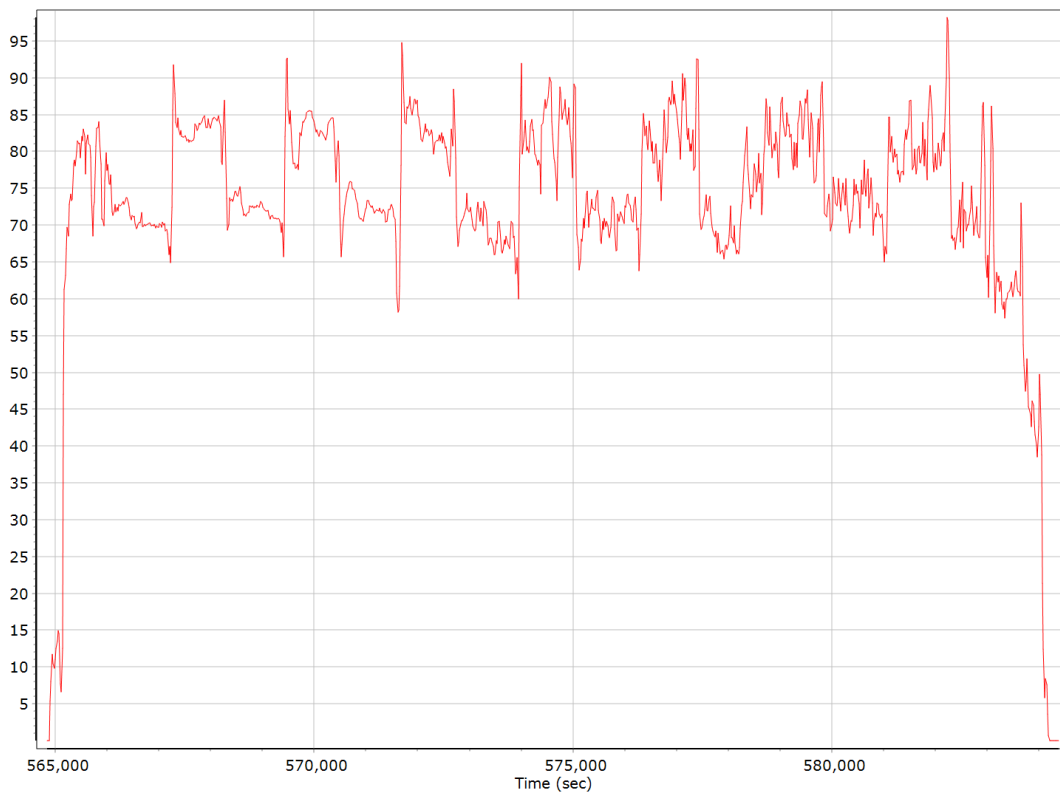
## Down Velocity



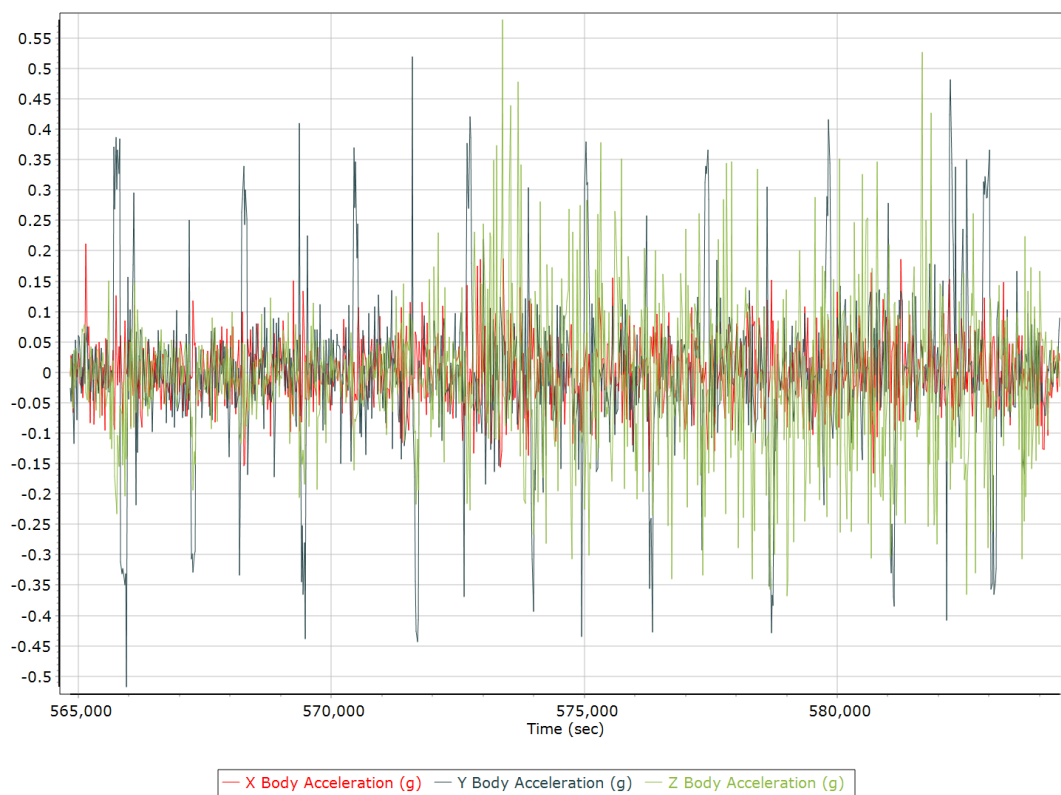
## Total Speed



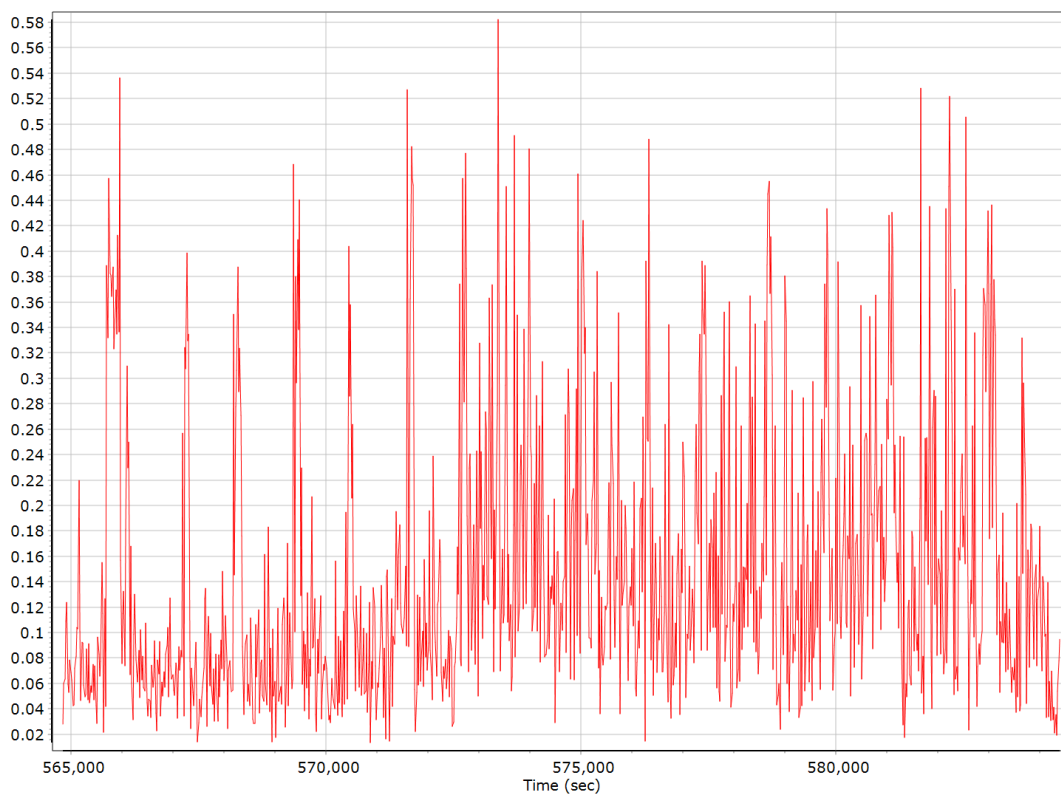
## Ground Speed



## Body Acceleration



## Total Body Acceleration



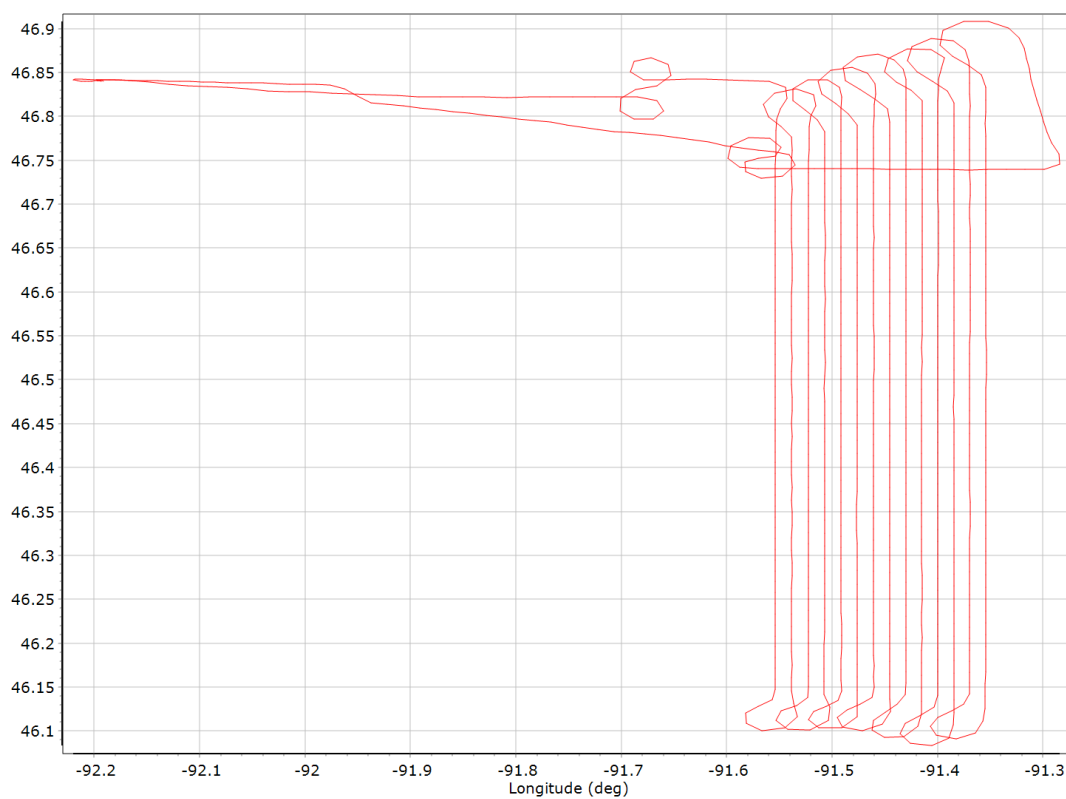


## Body Angular Rate

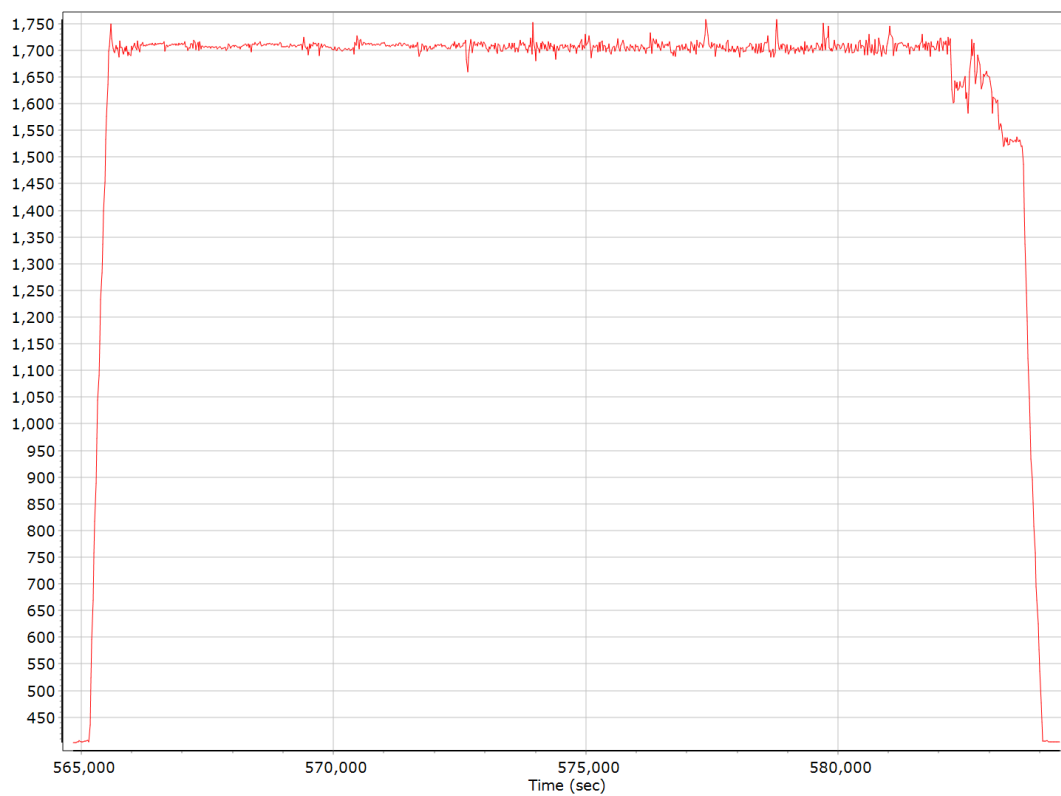


## Forward Processed Trajectory Information

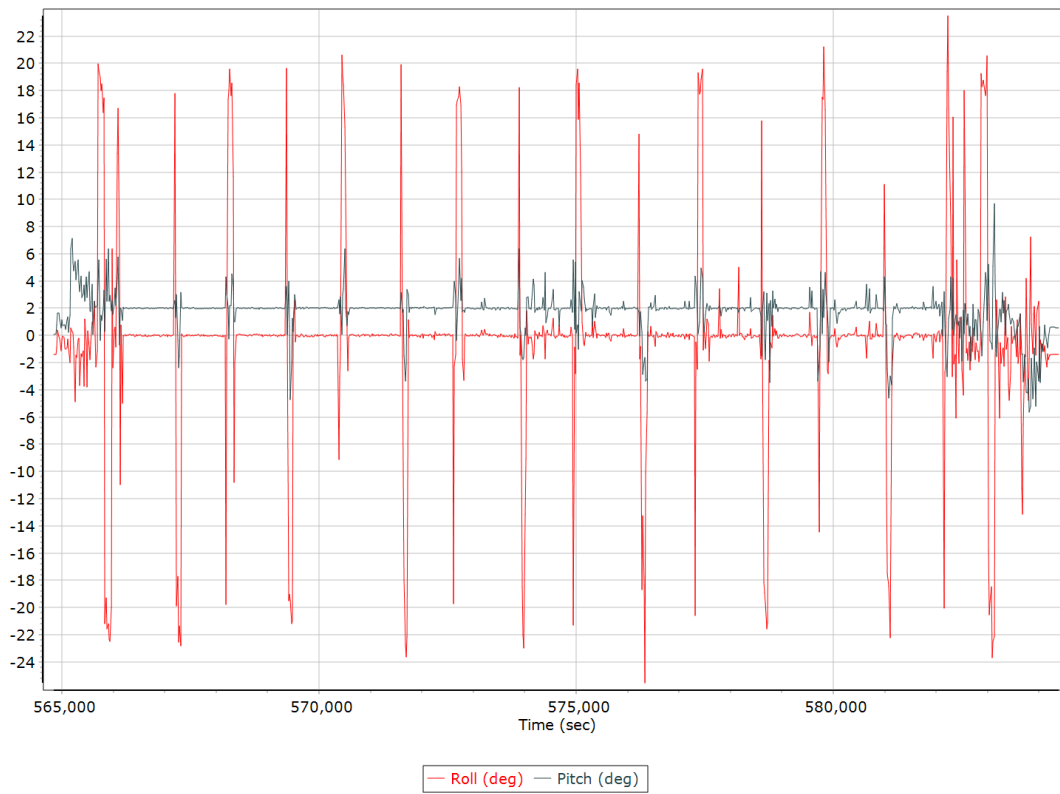
### Top View



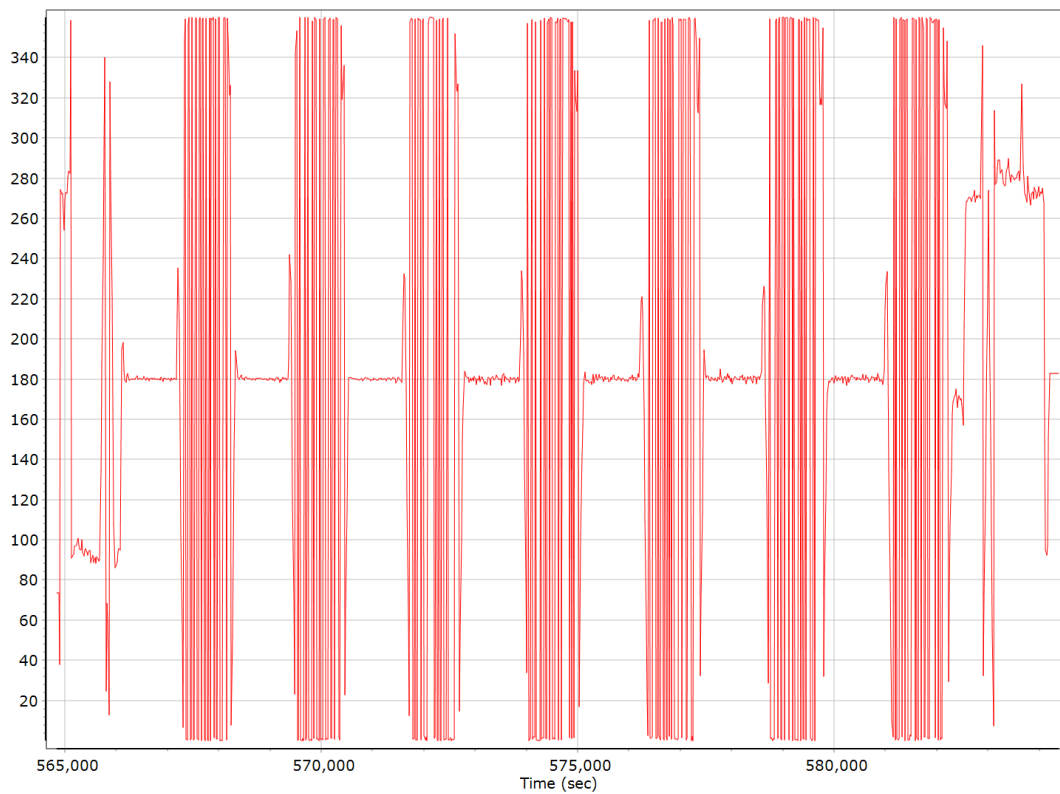
### Altitude



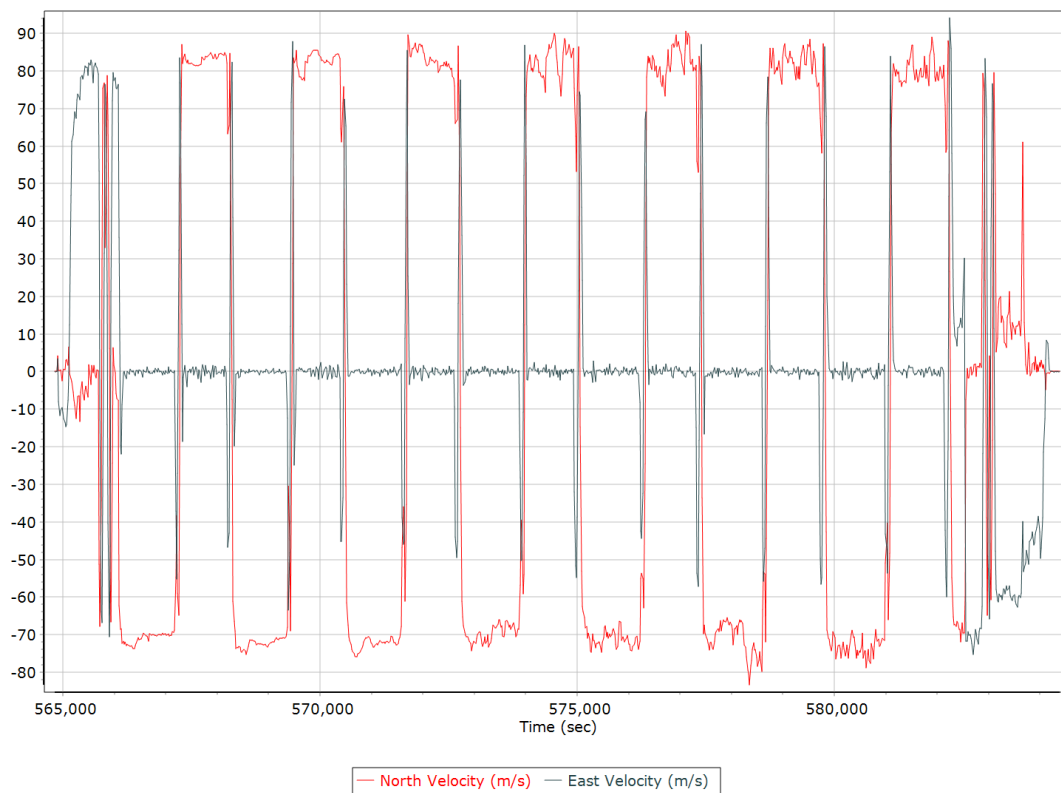
## Roll/Pitch



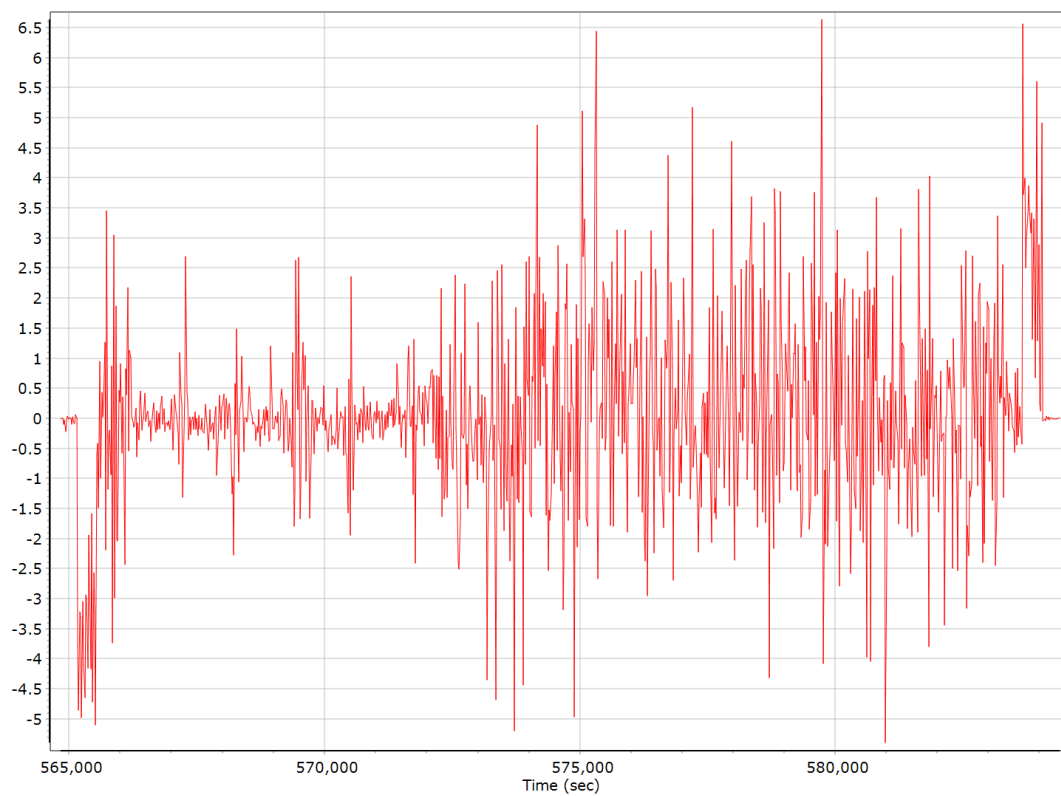
## Heading



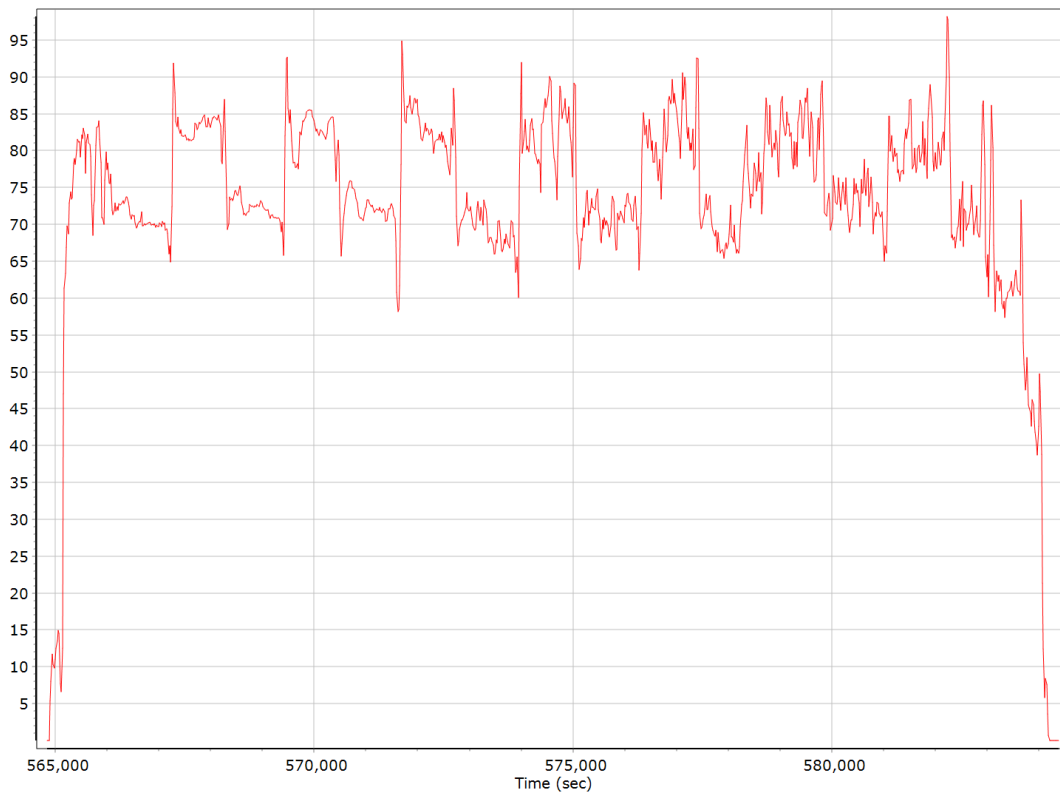
## North/East Velocity



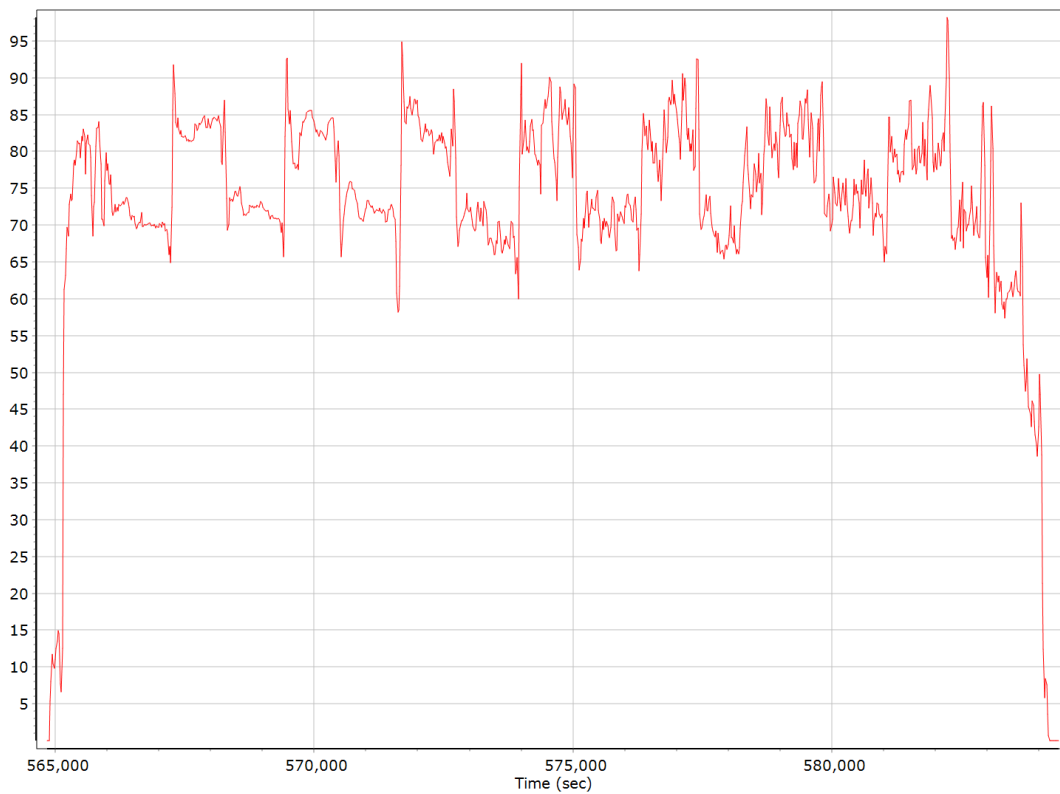
## Down Velocity



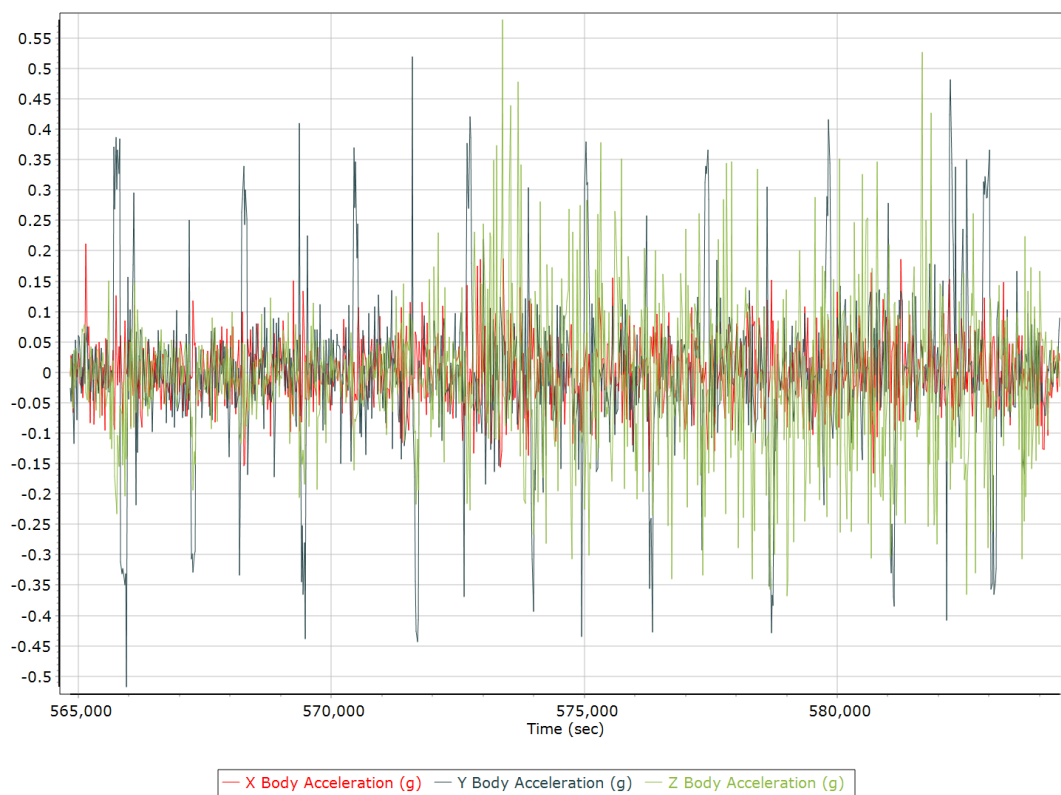
## Total Speed



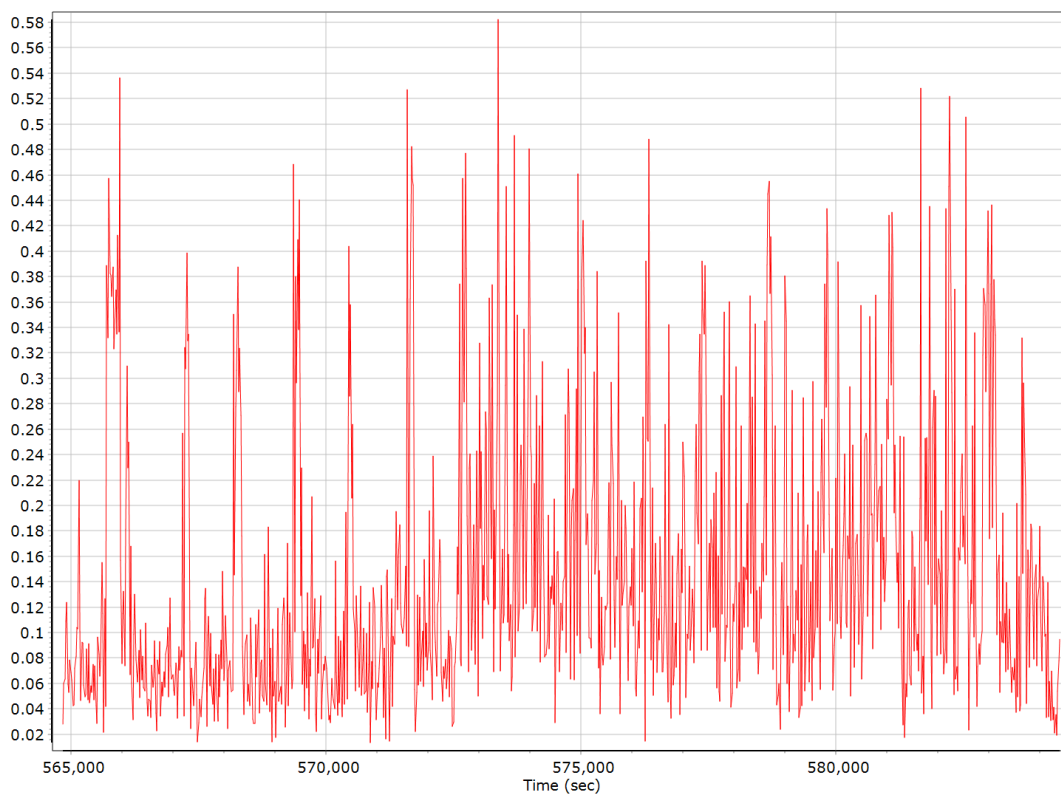
## Ground Speed



## Body Acceleration



## Total Body Acceleration



## Body Angular Rate



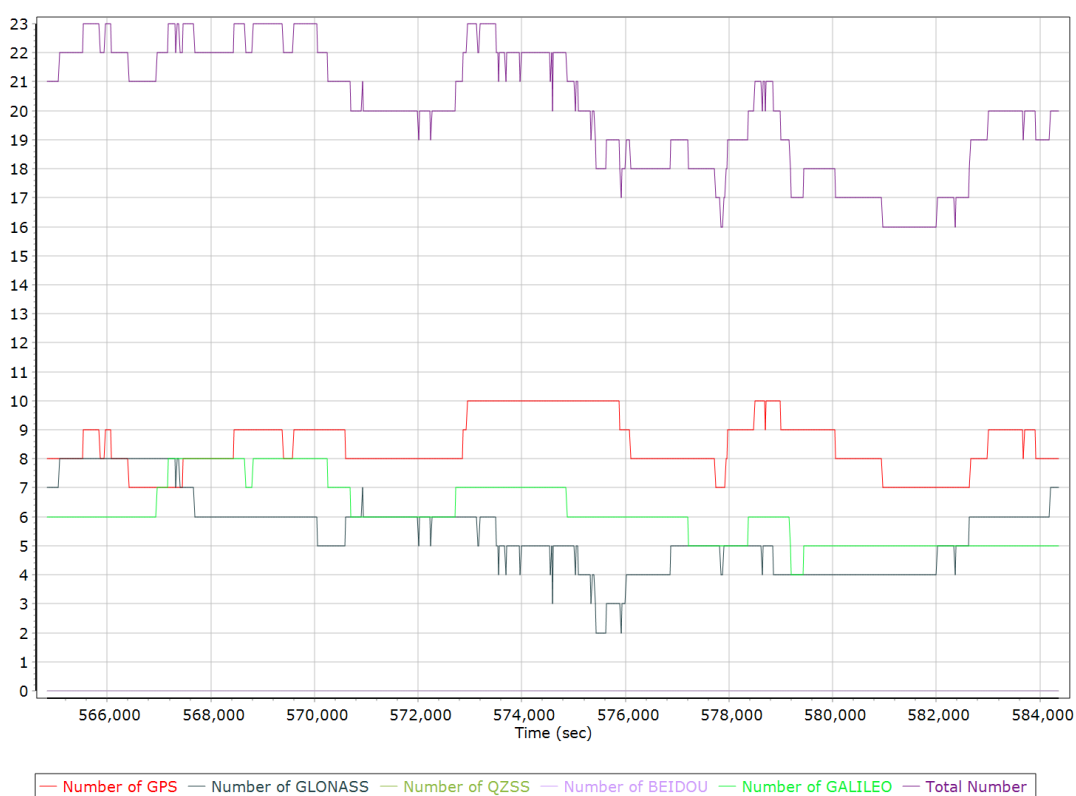


## GNSS QC

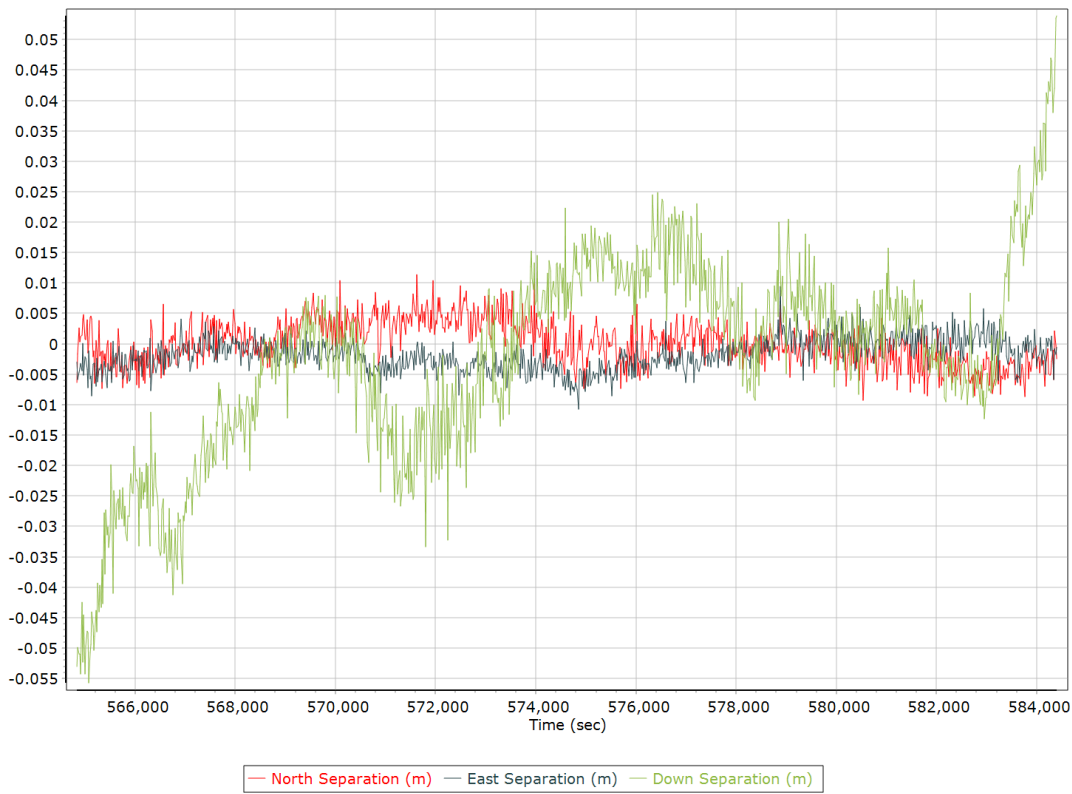
### GNSS QC Statistics

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

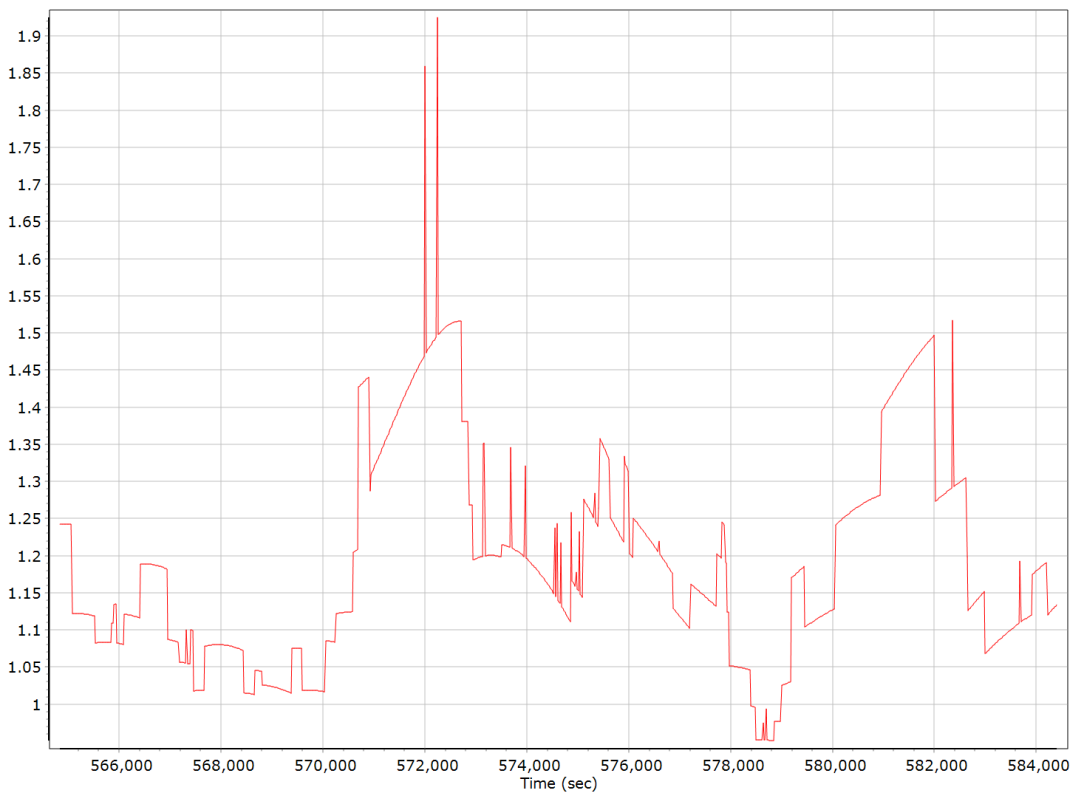
### Num SVs in solution



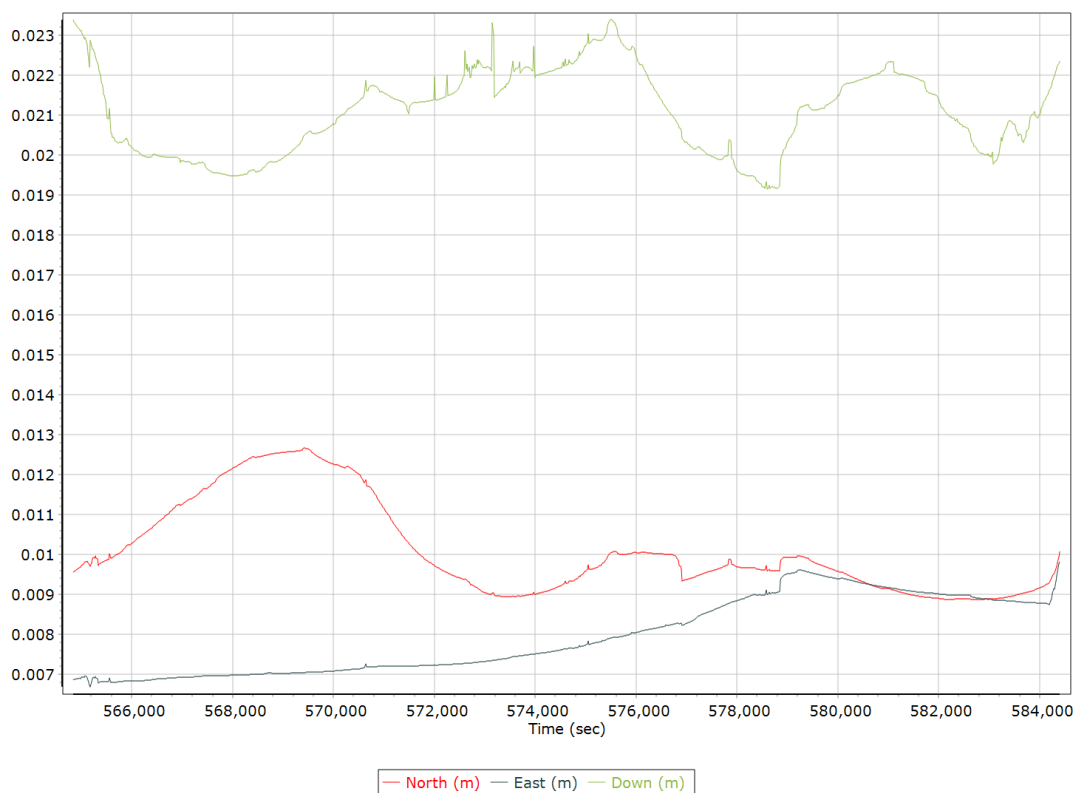
## Forward/Reverse Separation



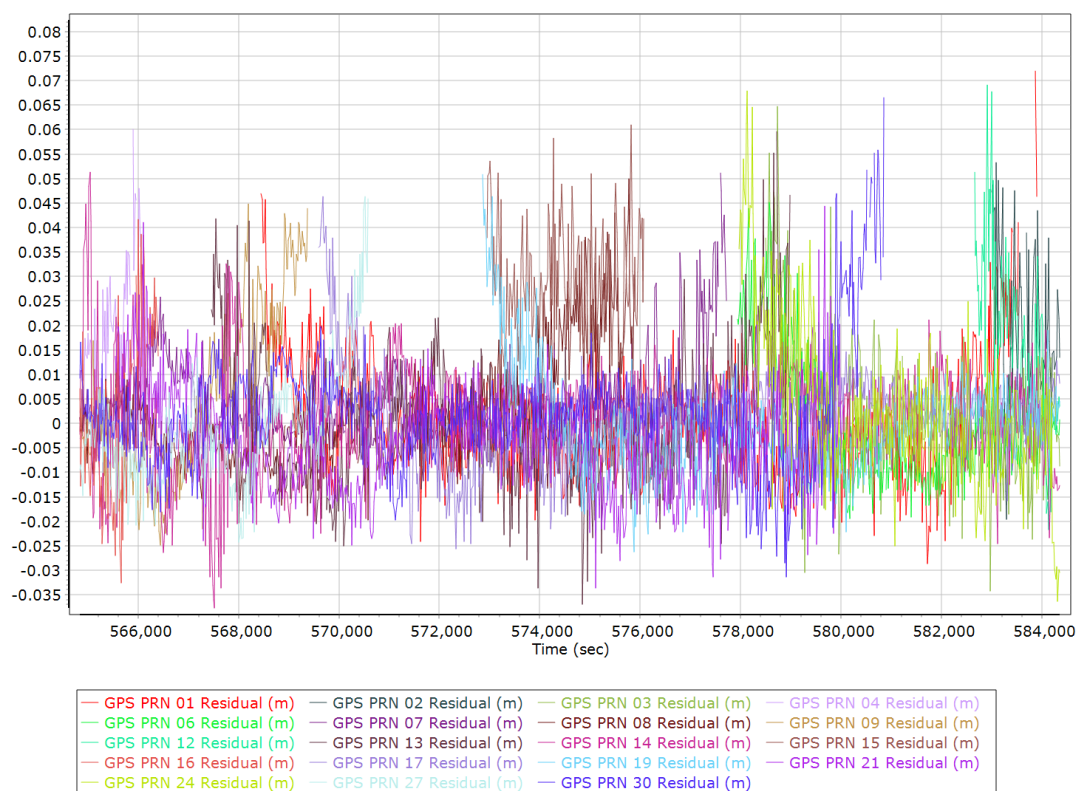
## PDOP



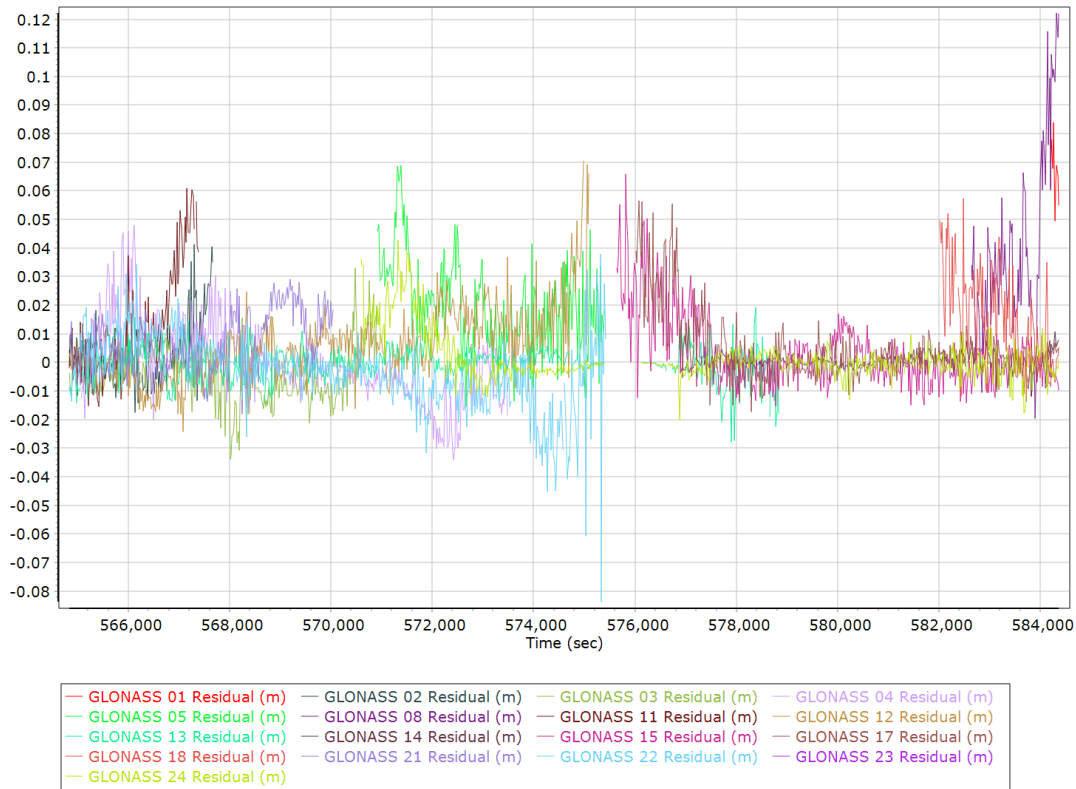
## Estimated Position Accuracy



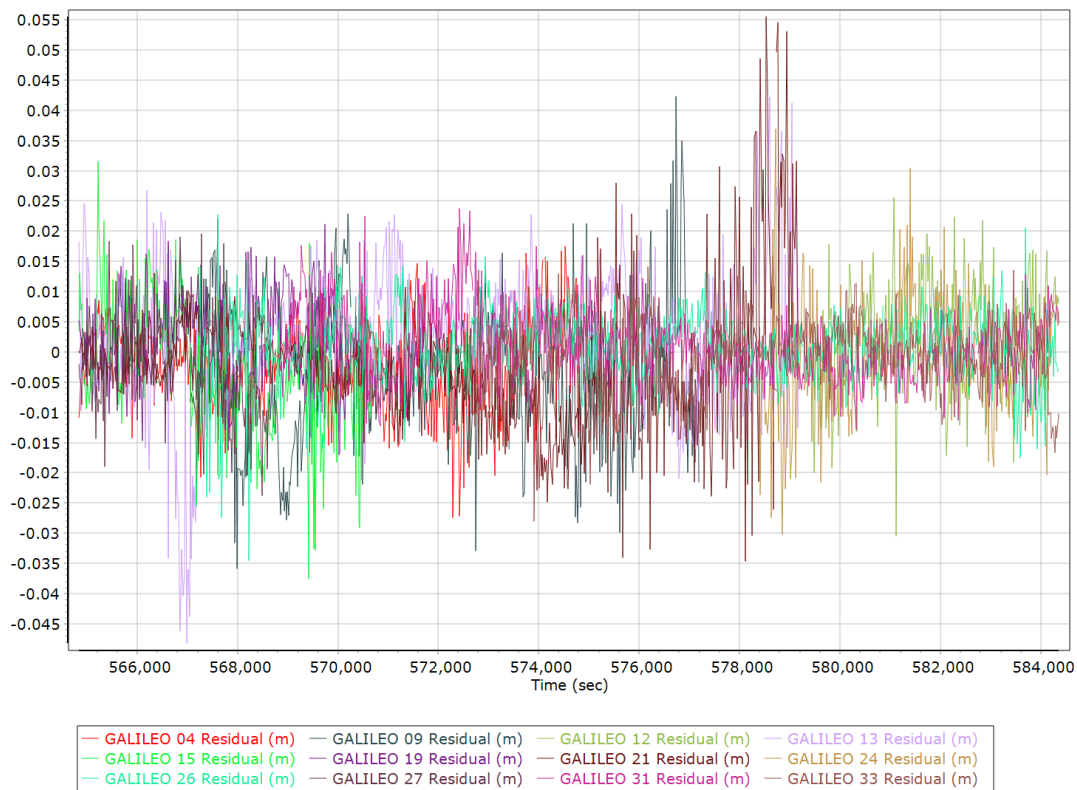
## GPS Residuals



## GLONASS Residuals



## GALILEO Residuals



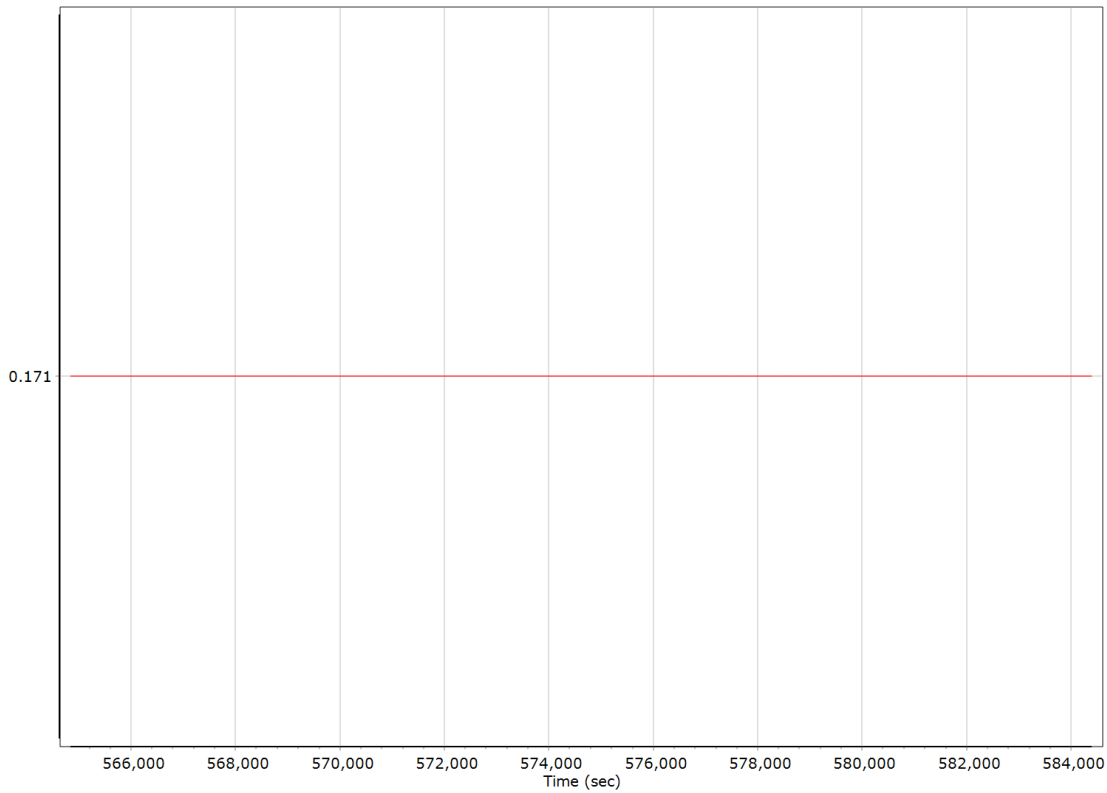
## GNSS-Inertial Processor Configuration

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

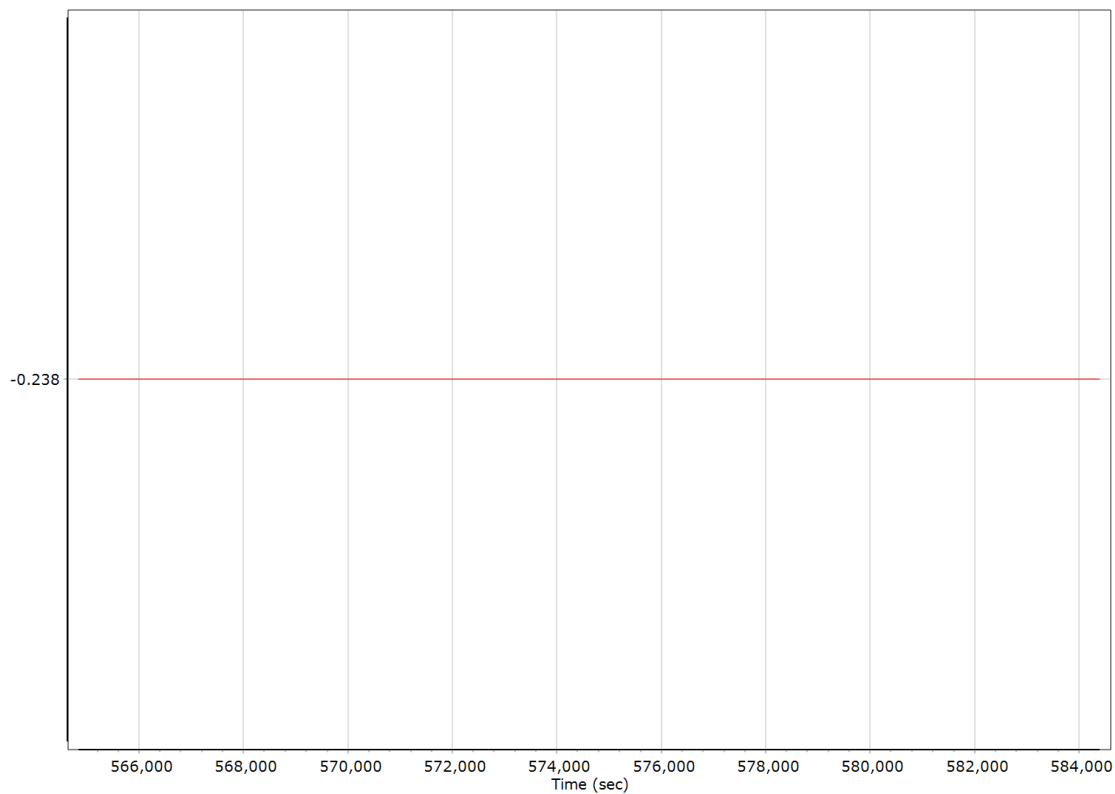
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

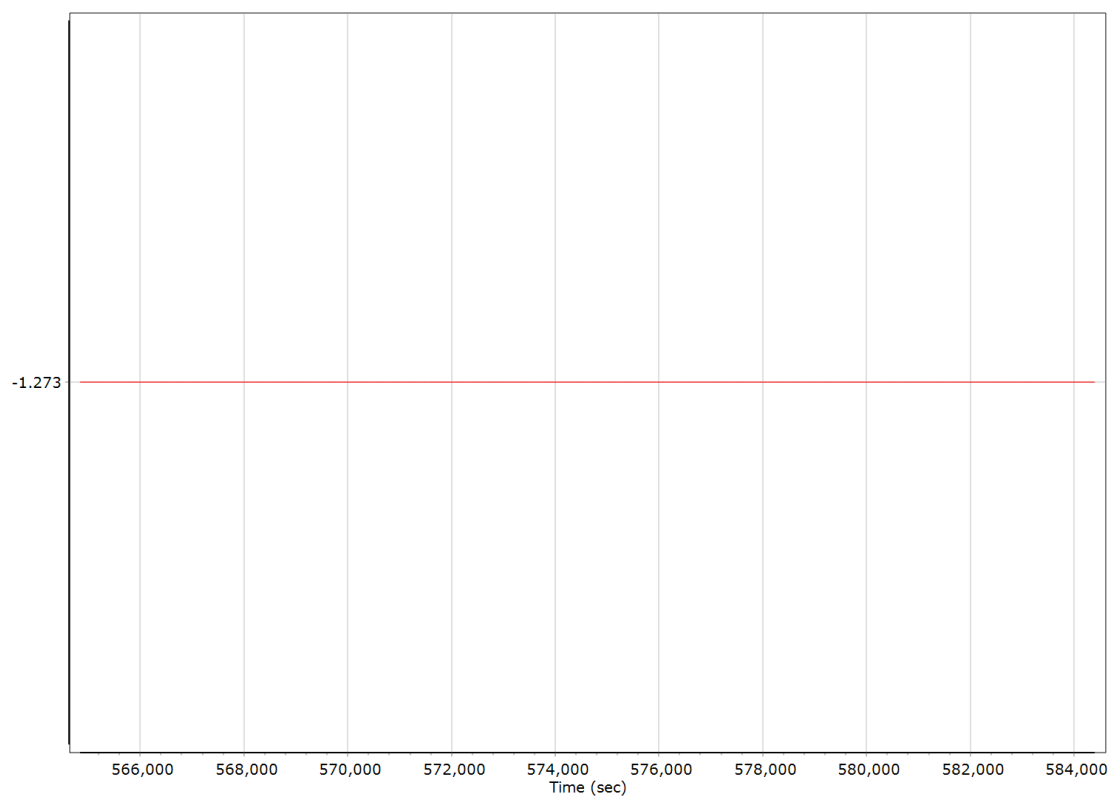
#### X Reference-Primary GNSS Lever Arm (m)



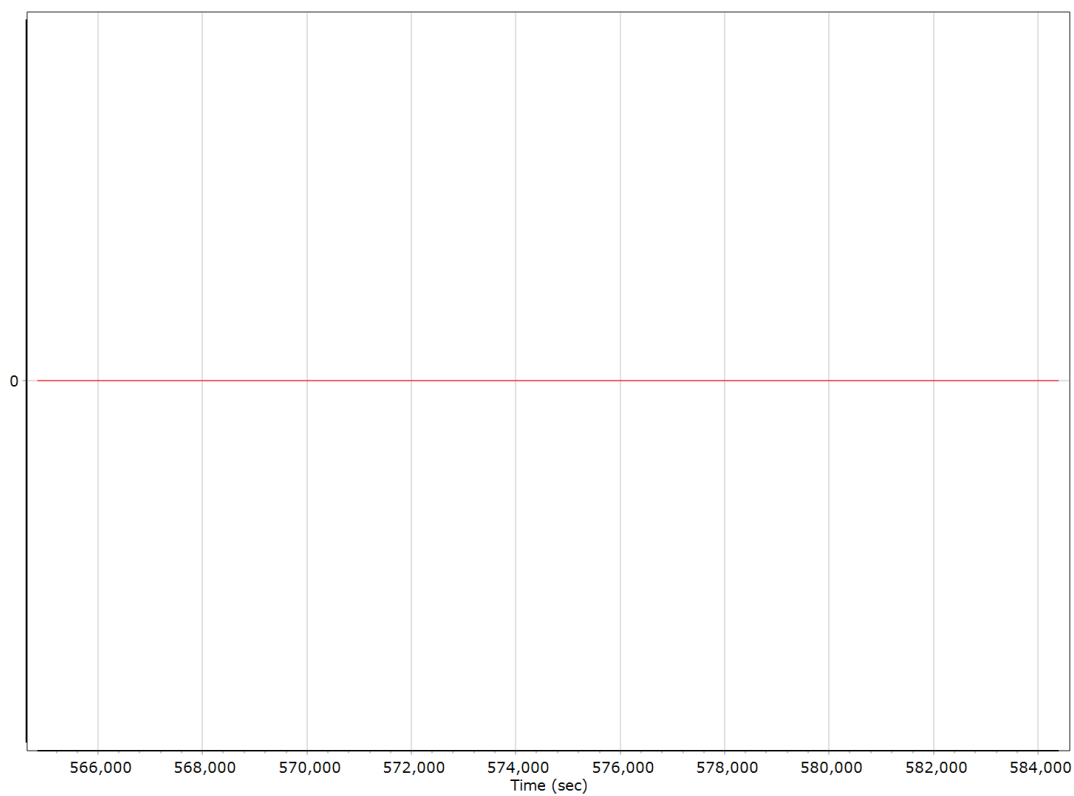
#### Y Reference-Primary GNSS Lever Arm (m)



### Z Reference-Primary GNSS Lever Arm (m)



### Reference-Primary GNSS Lever Arm Figure of Merit

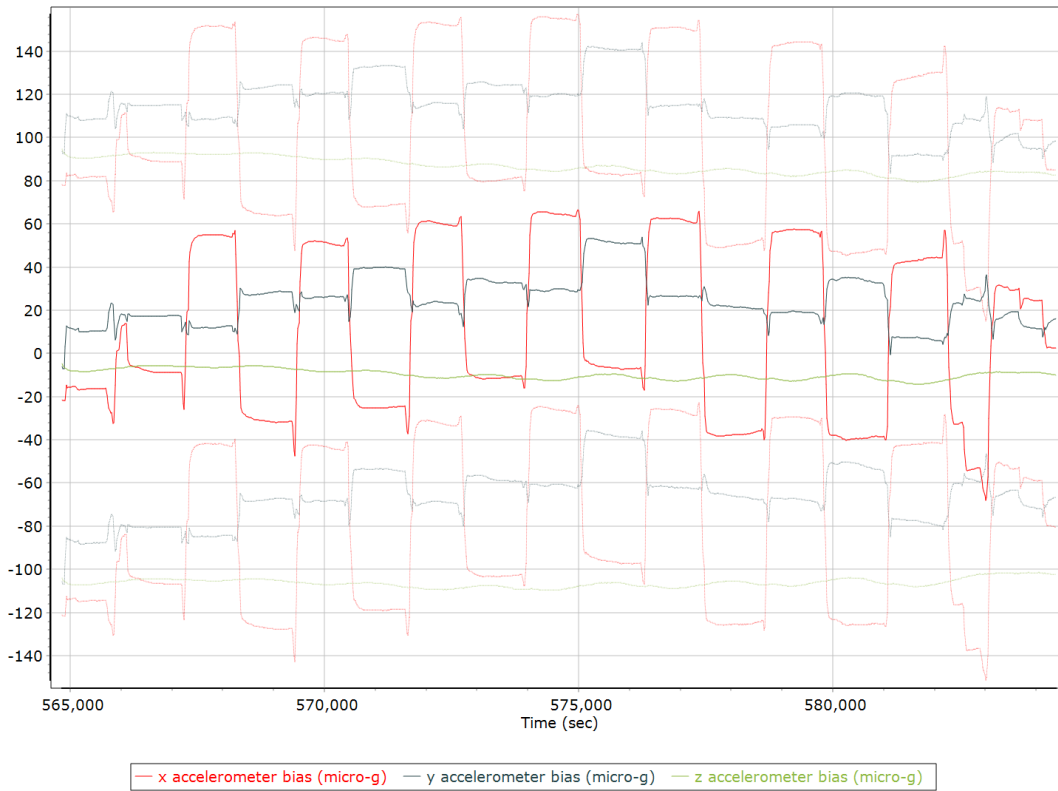




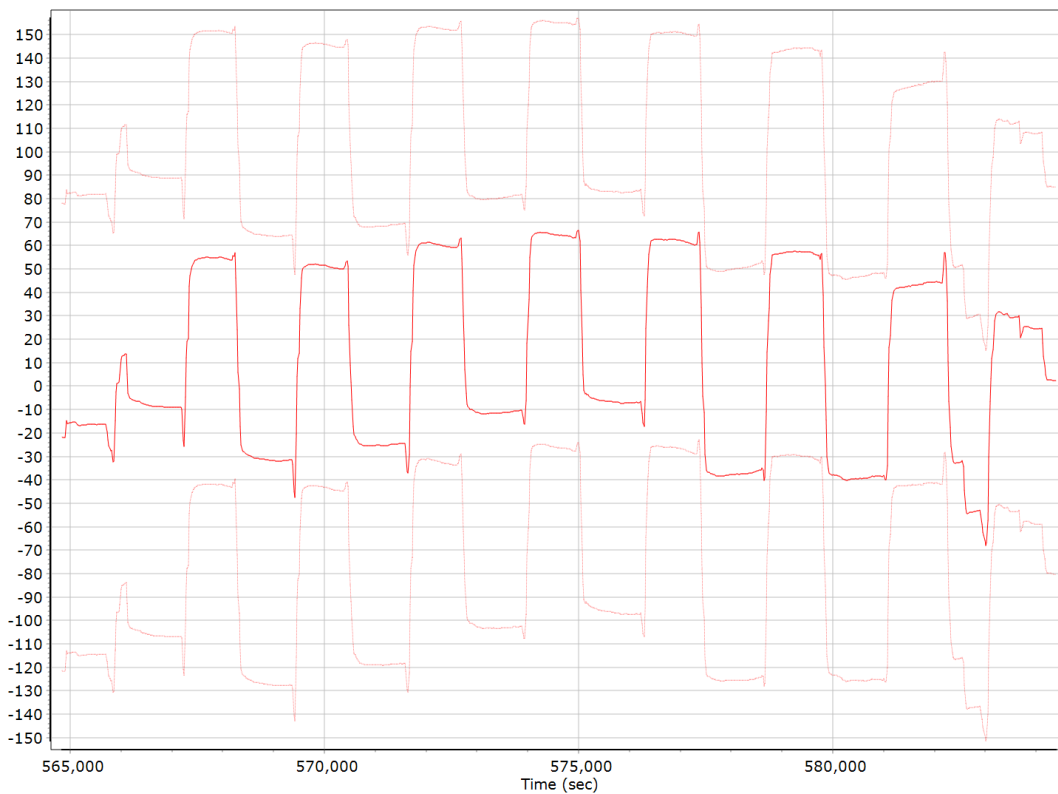
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

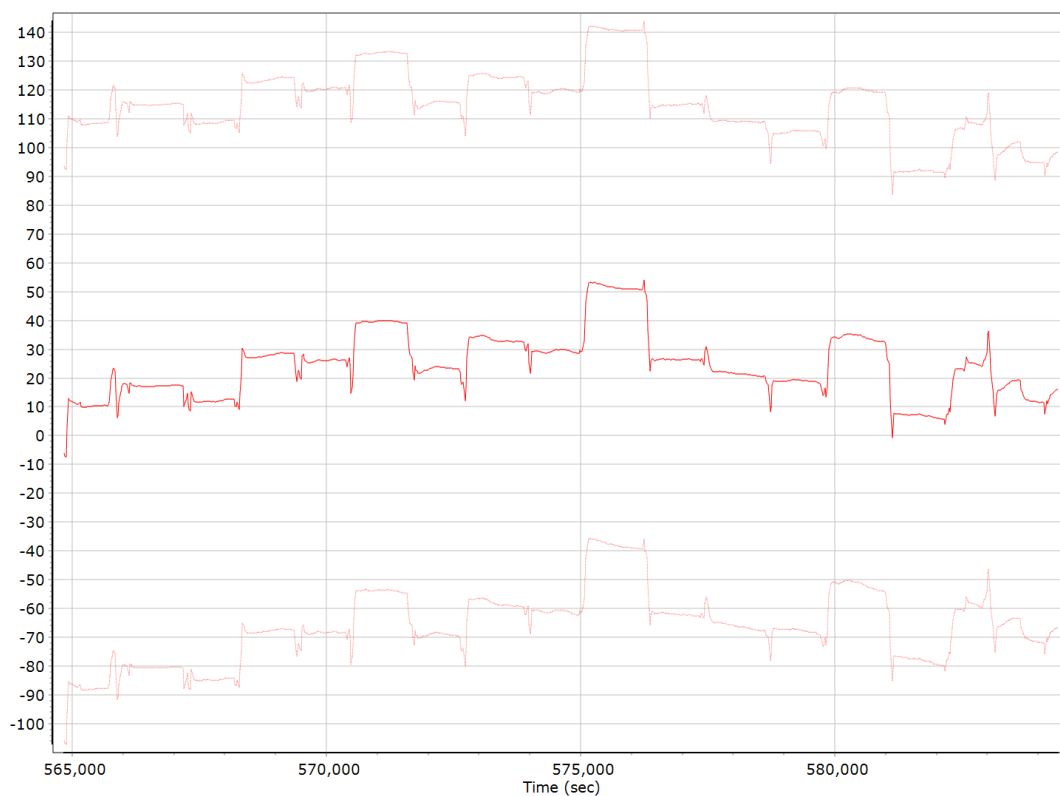
#### Accelerometer Bias (micro-g)



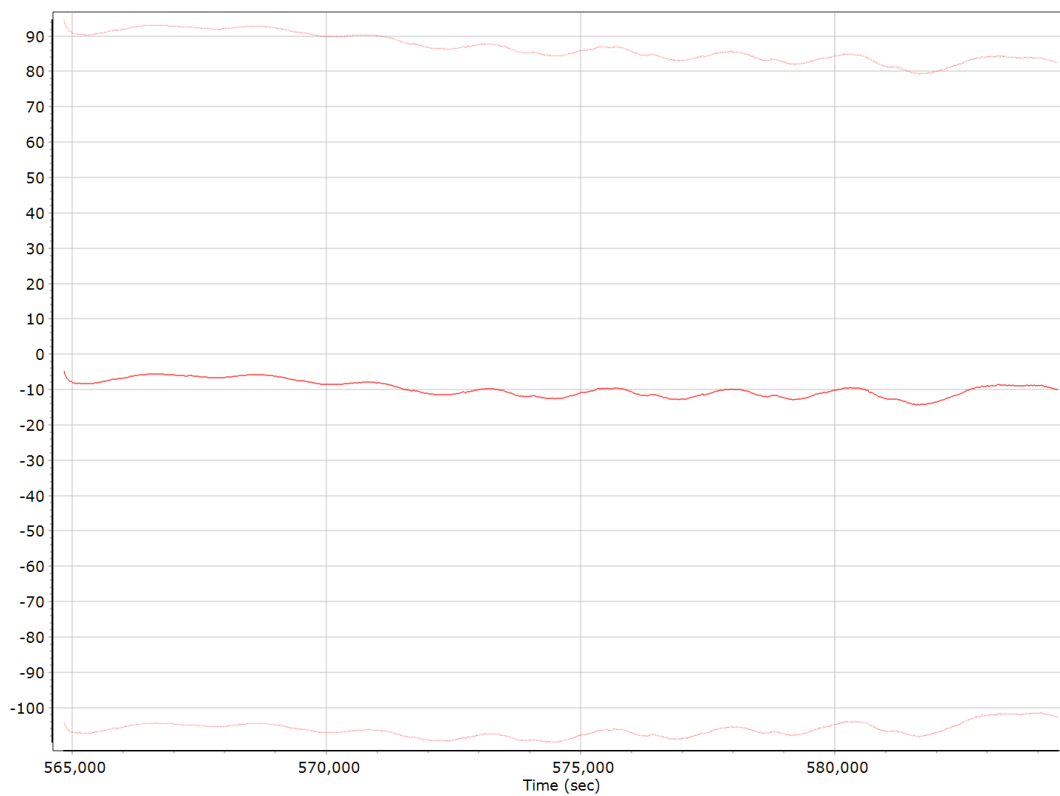
#### X Accelerometer Bias (micro-g)



### Y Accelerometer Bias (micro-g)



### Z Accelerometer Bias (micro-g)



### Accelerometer Scale Error (ppm)



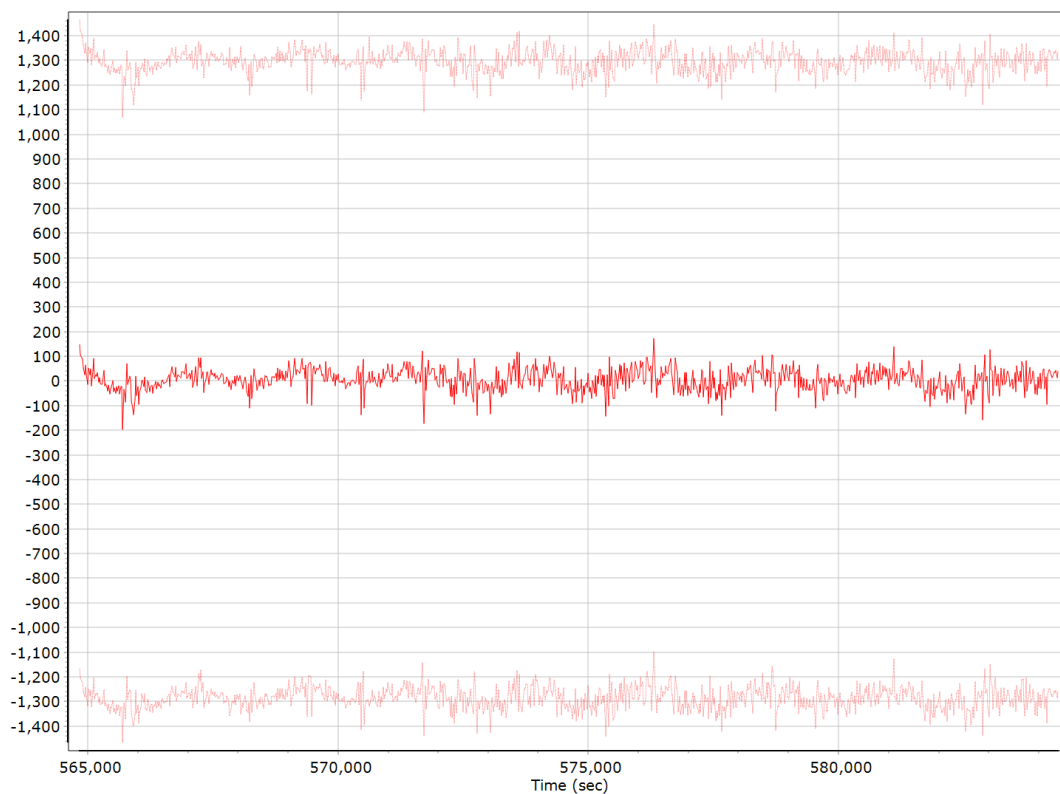
### X Accelerometer Scale Error (ppm)



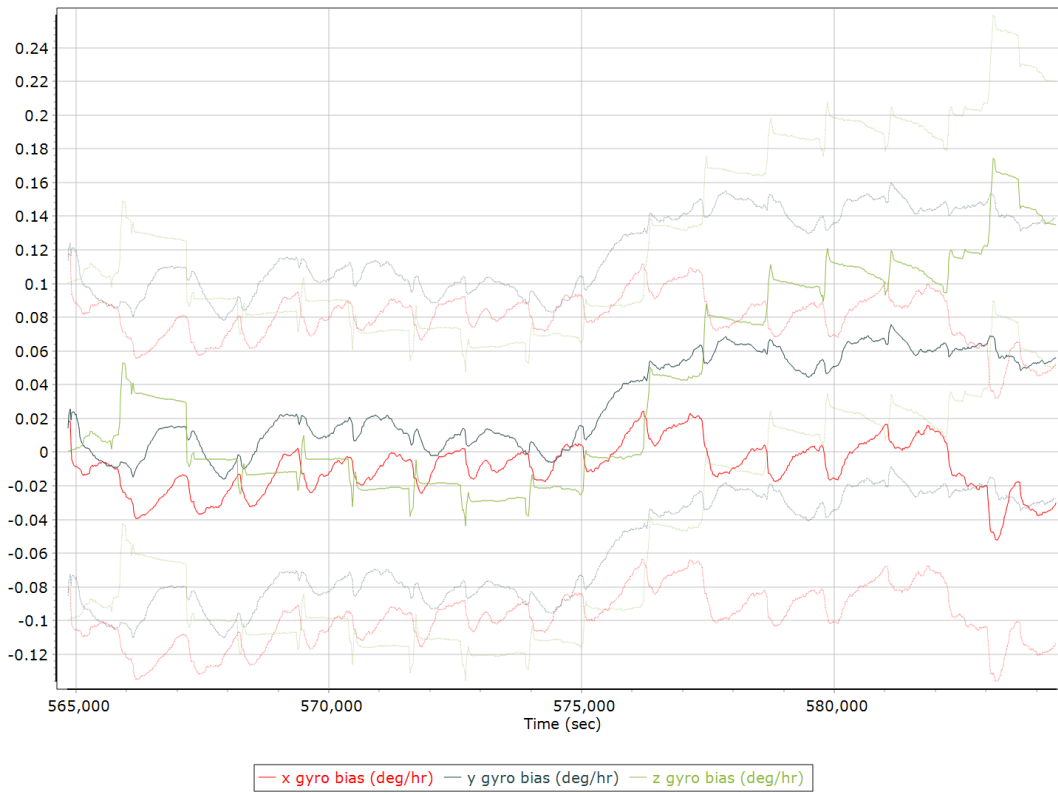
### Y Accelerometer Scale Error (ppm)



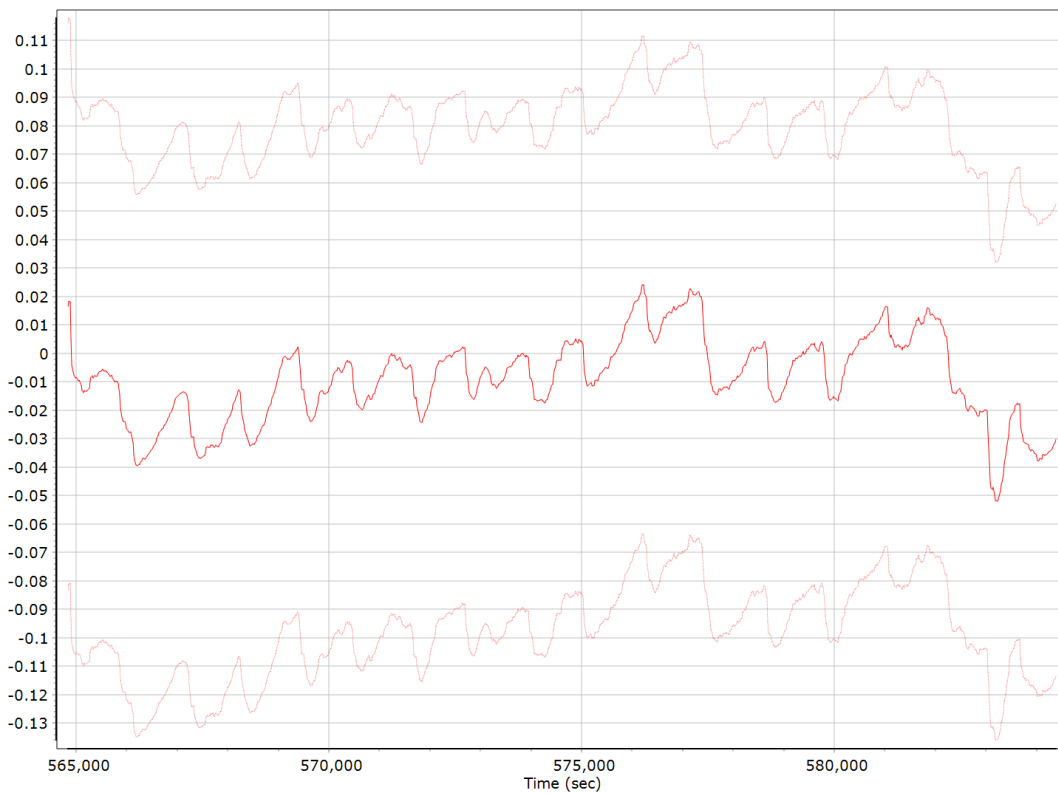
### Z Accelerometer Scale Error (ppm)



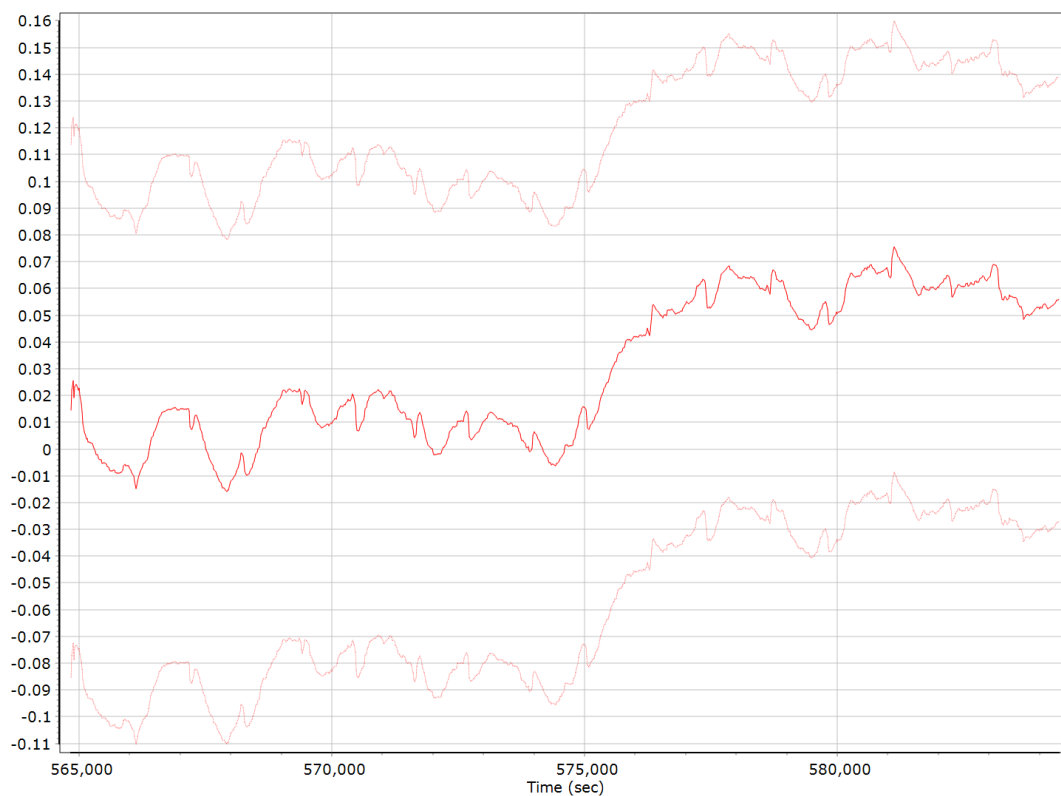
## Gyro Bias (deg/h)



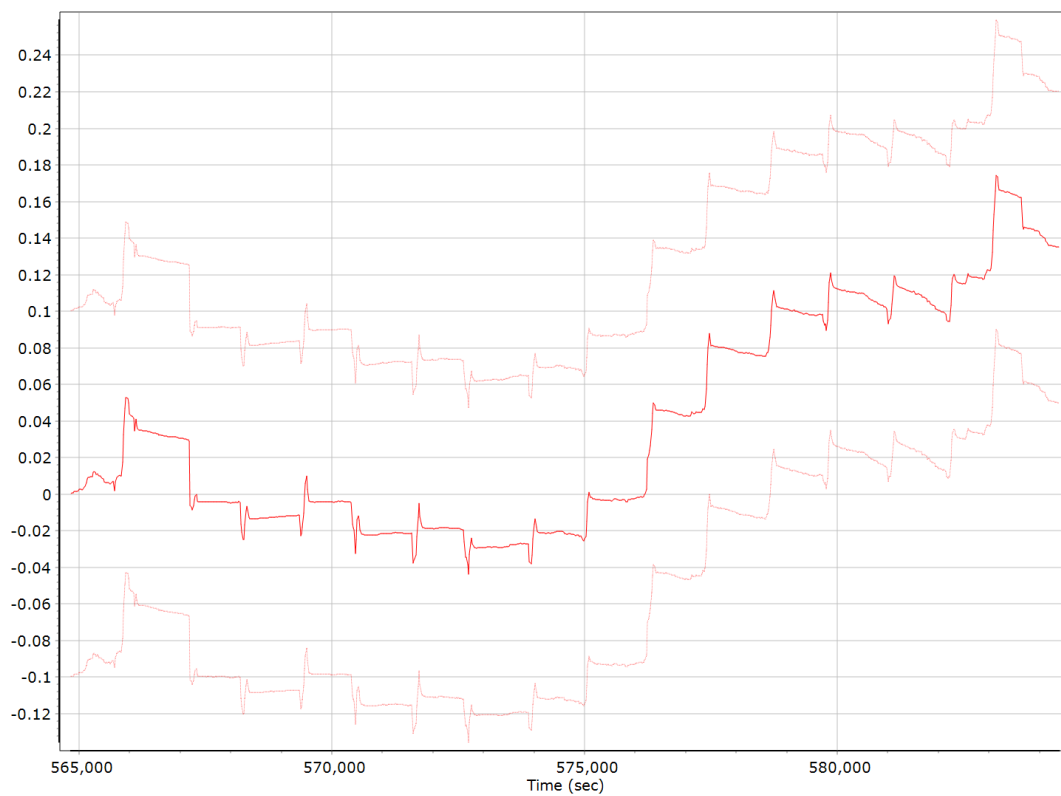
## X Gyro Bias (deg/h)



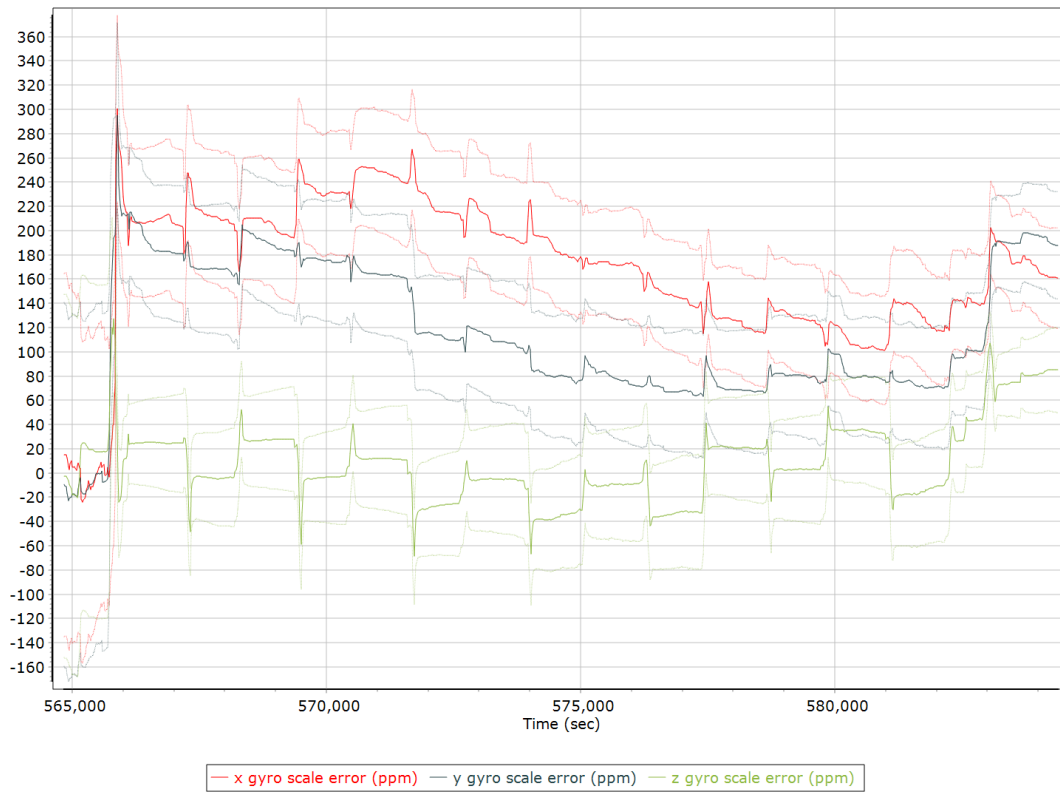
### Y Gyro Bias (deg/h)



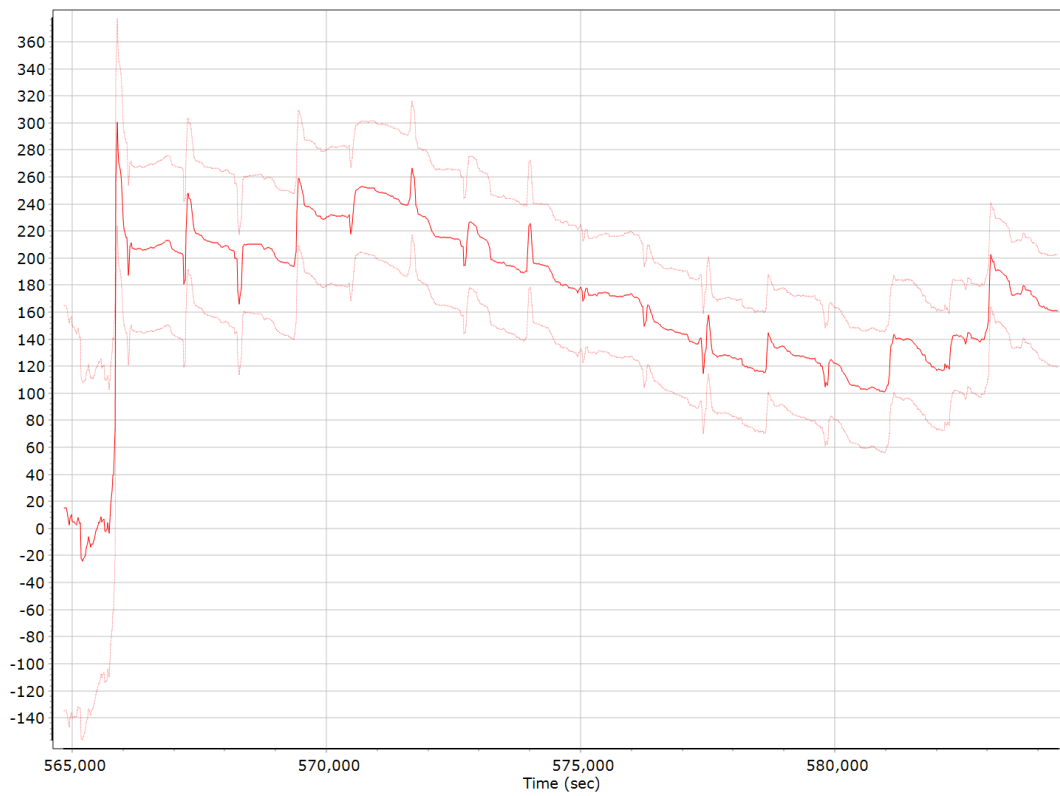
### Z Gyro Bias (deg/h)



## Gyro Scale Error (ppm)

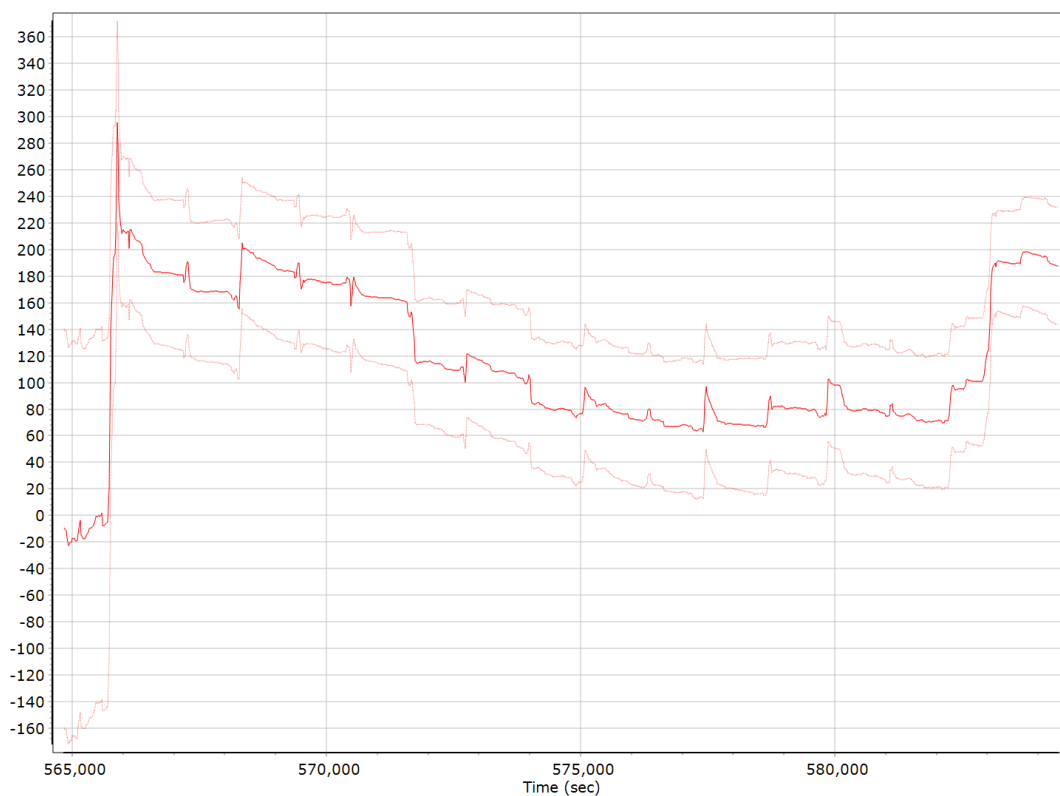


## X Gyro Scale Error (ppm)

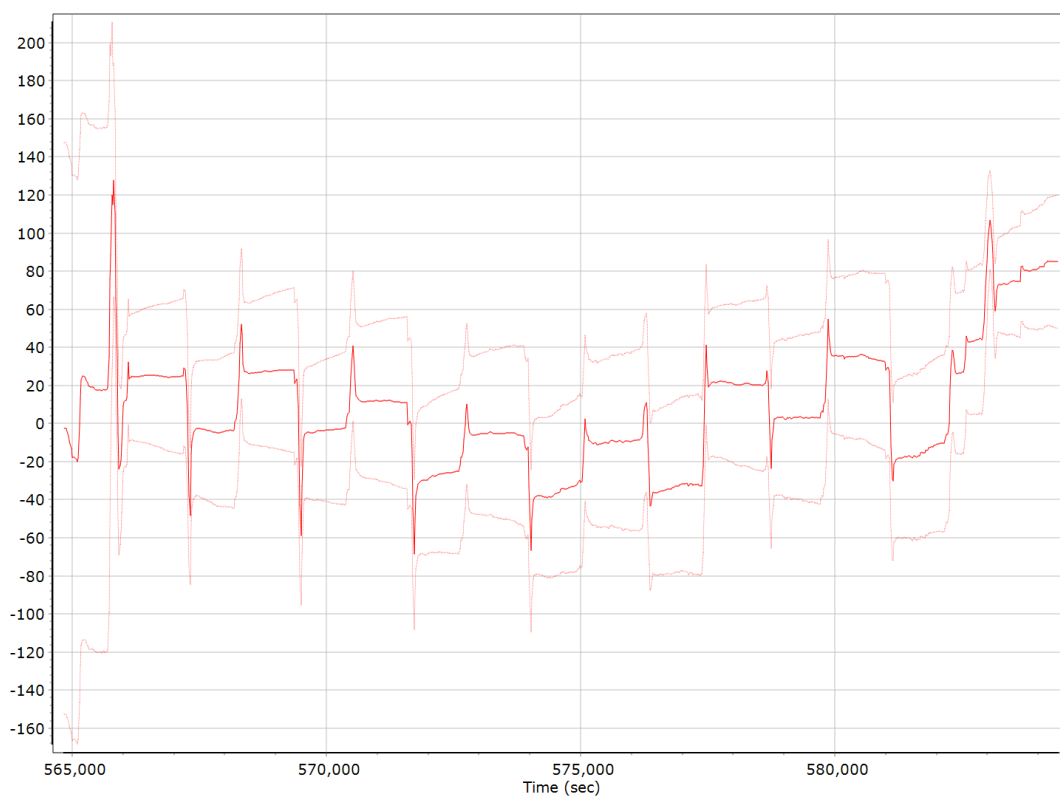




### Y Gyro Scale Error (ppm)

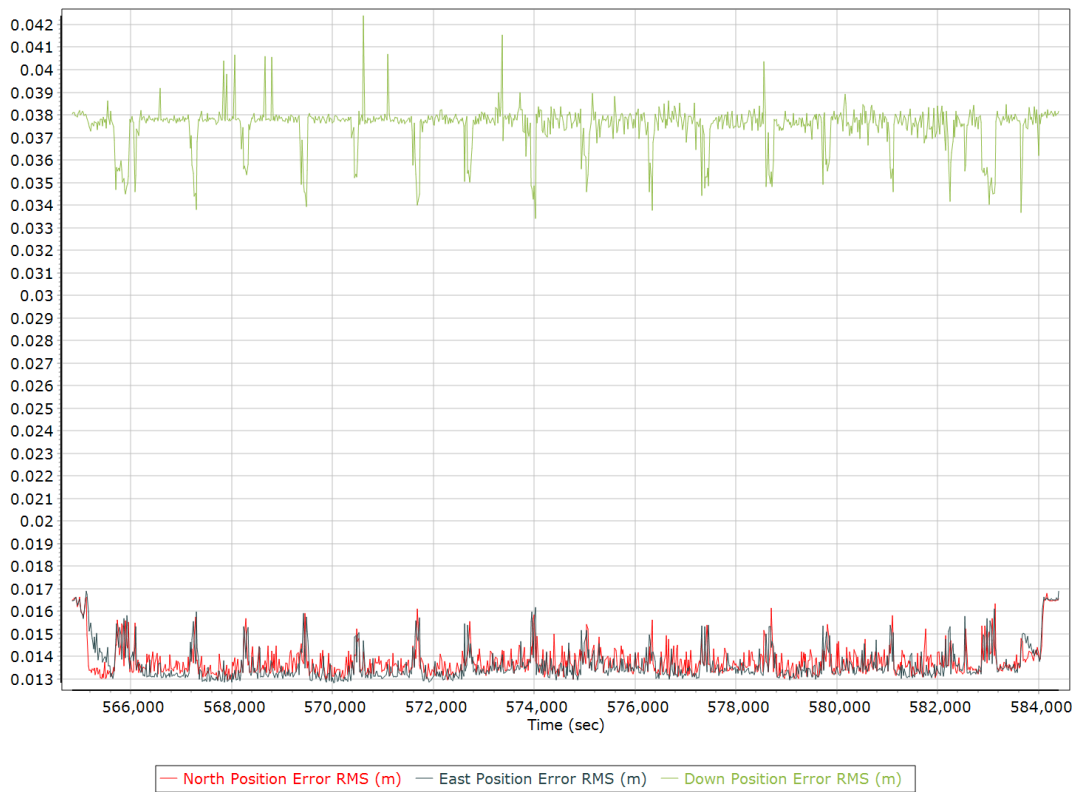


### Z Gyro Scale Error (ppm)

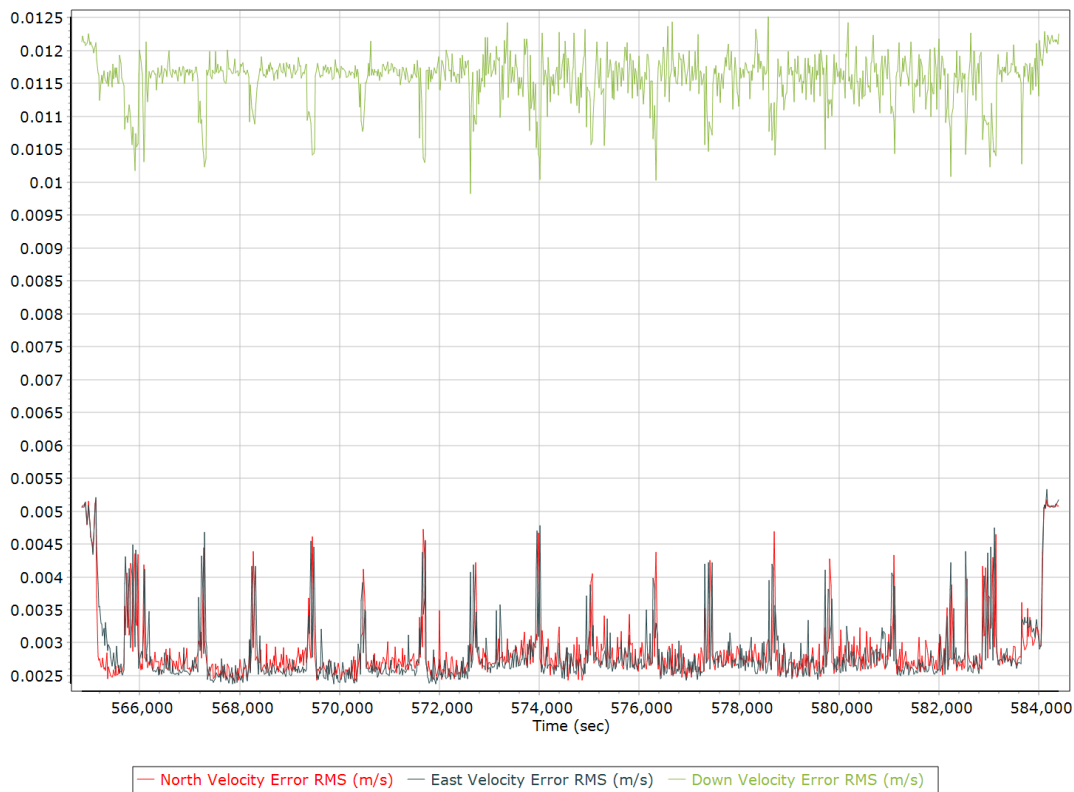


## Smoothed Performance Metrics

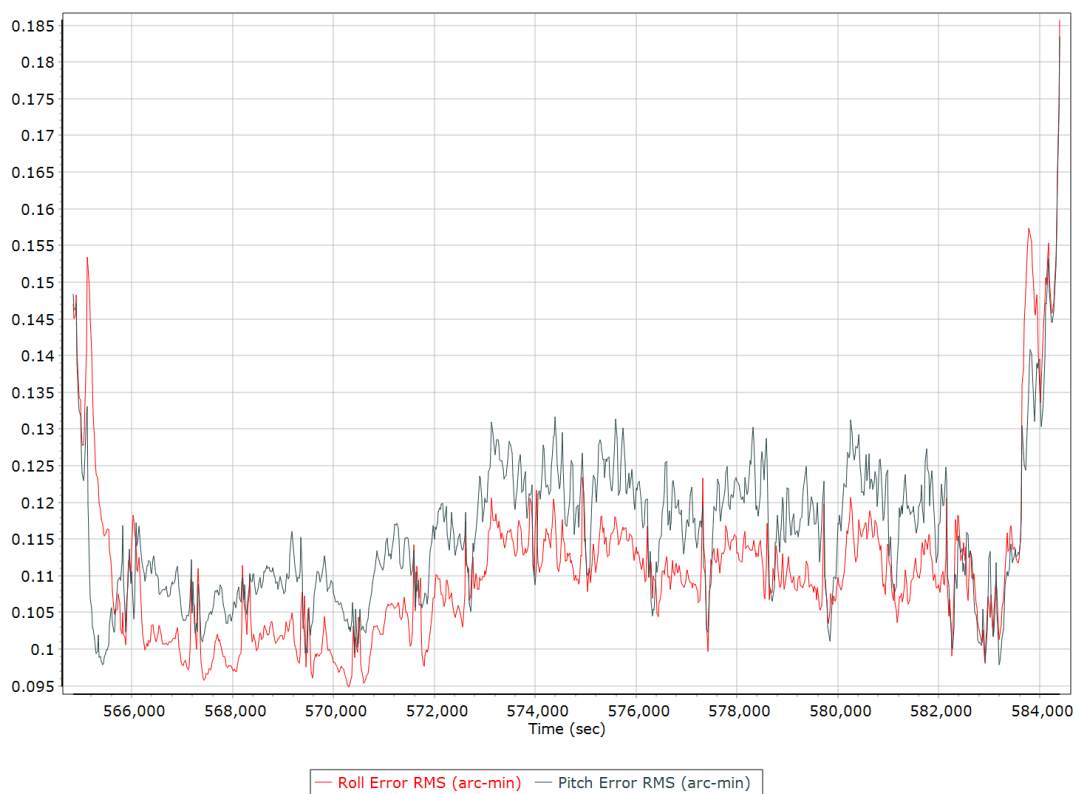
### Position Error RMS (m)



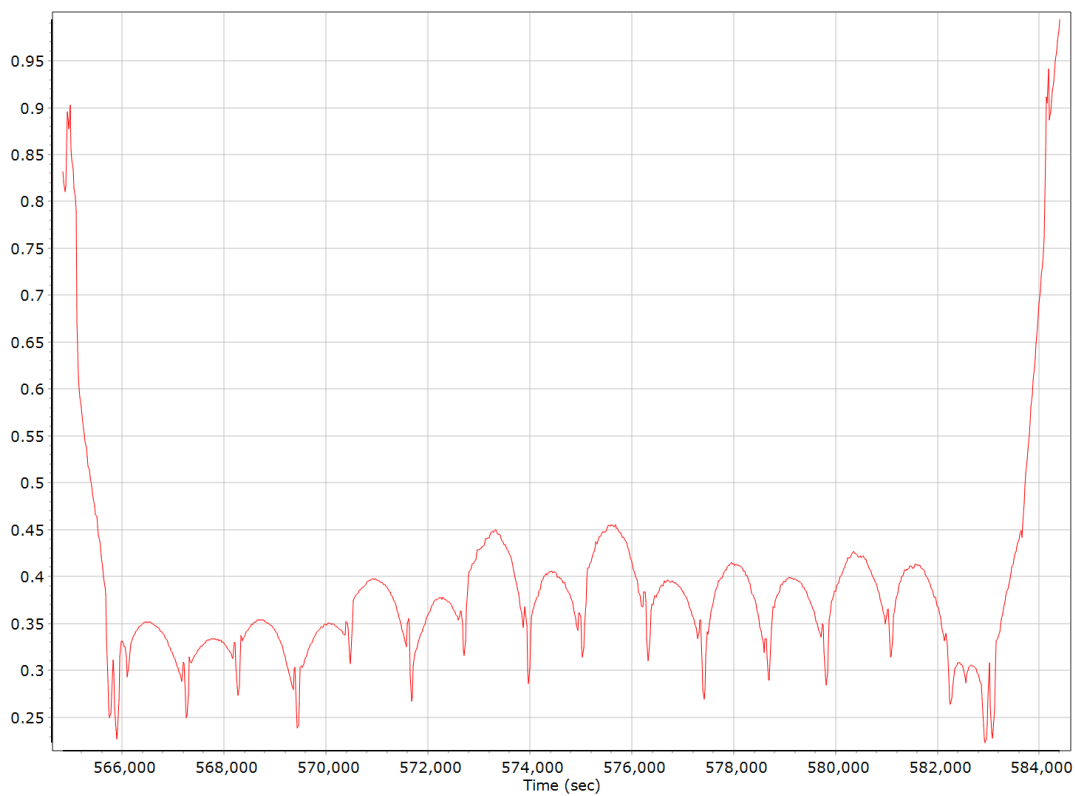
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

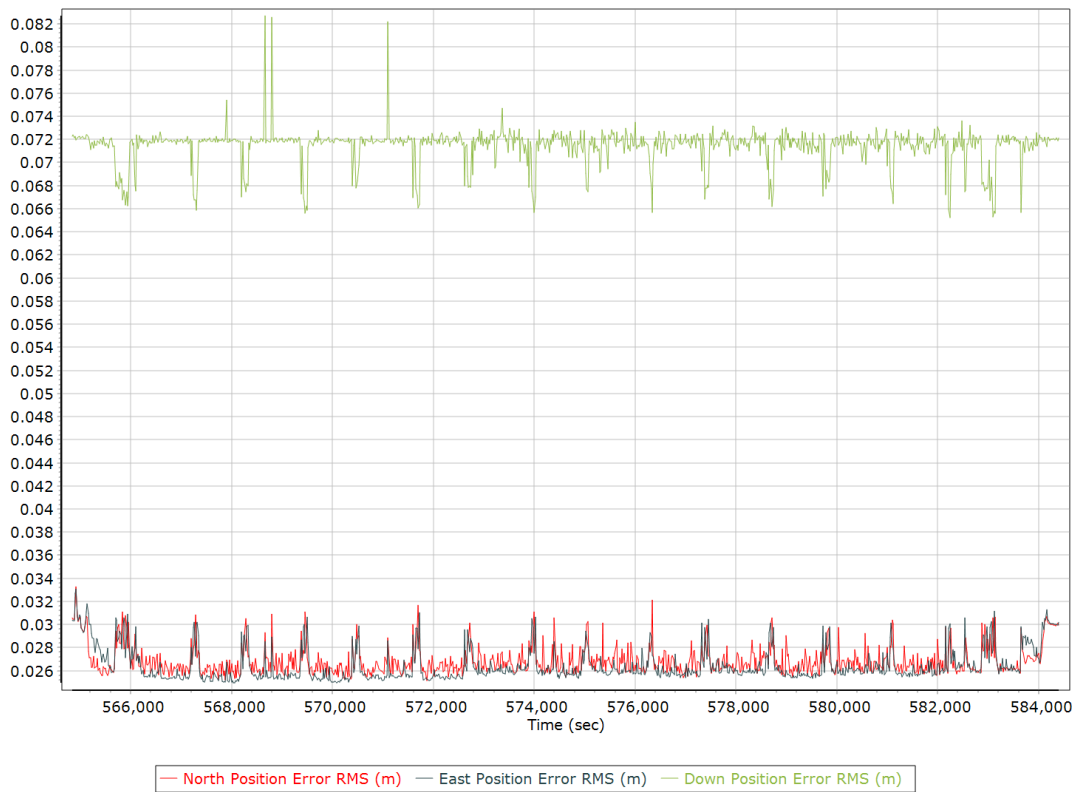


### Heading Error RMS (arc-min)



## Forward Processed Performance Metrics

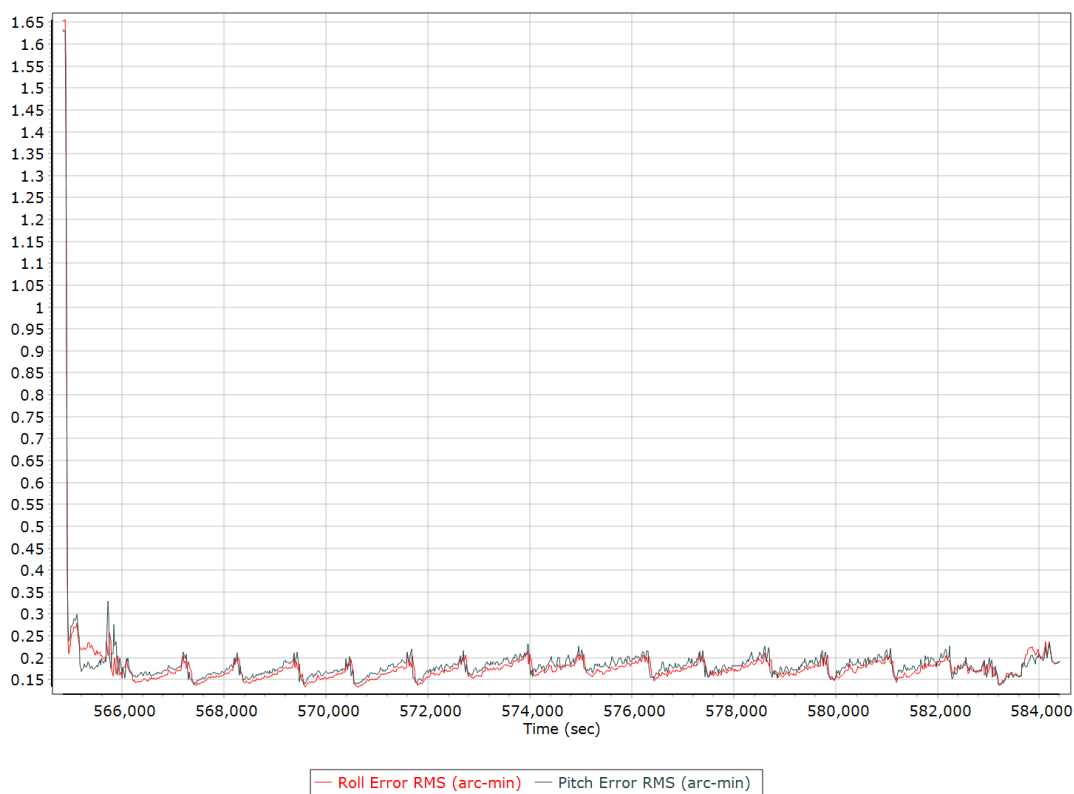
### Position Error RMS (m)



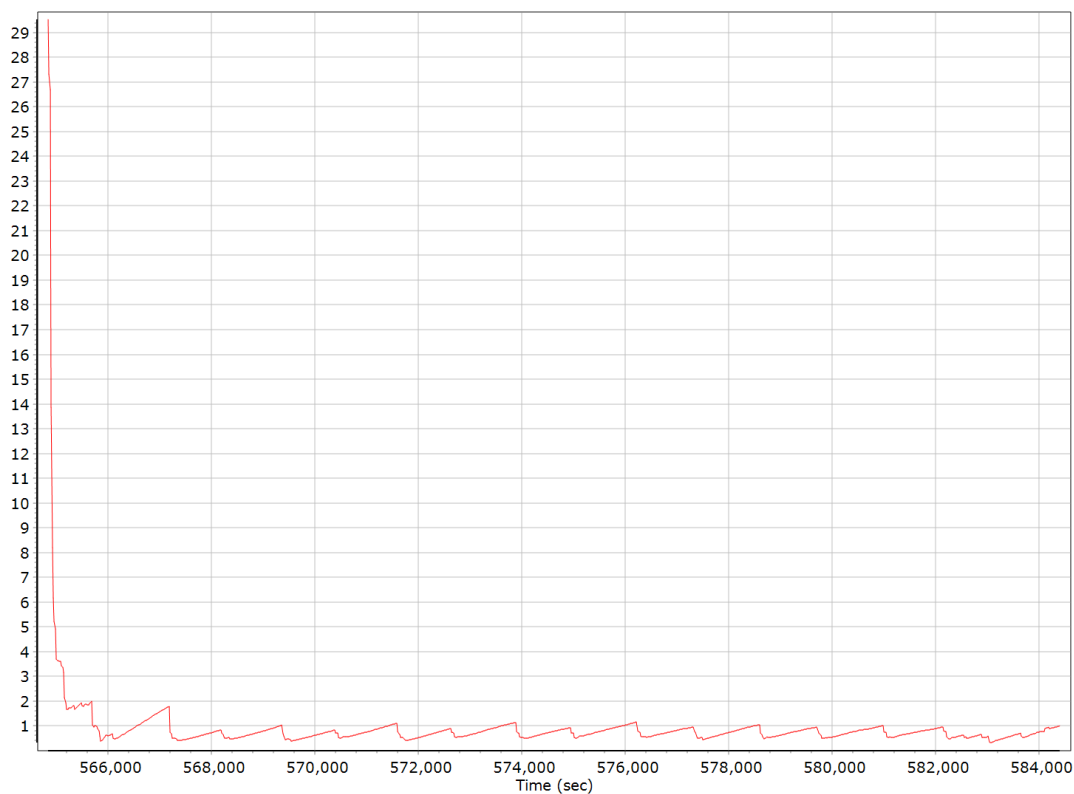
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

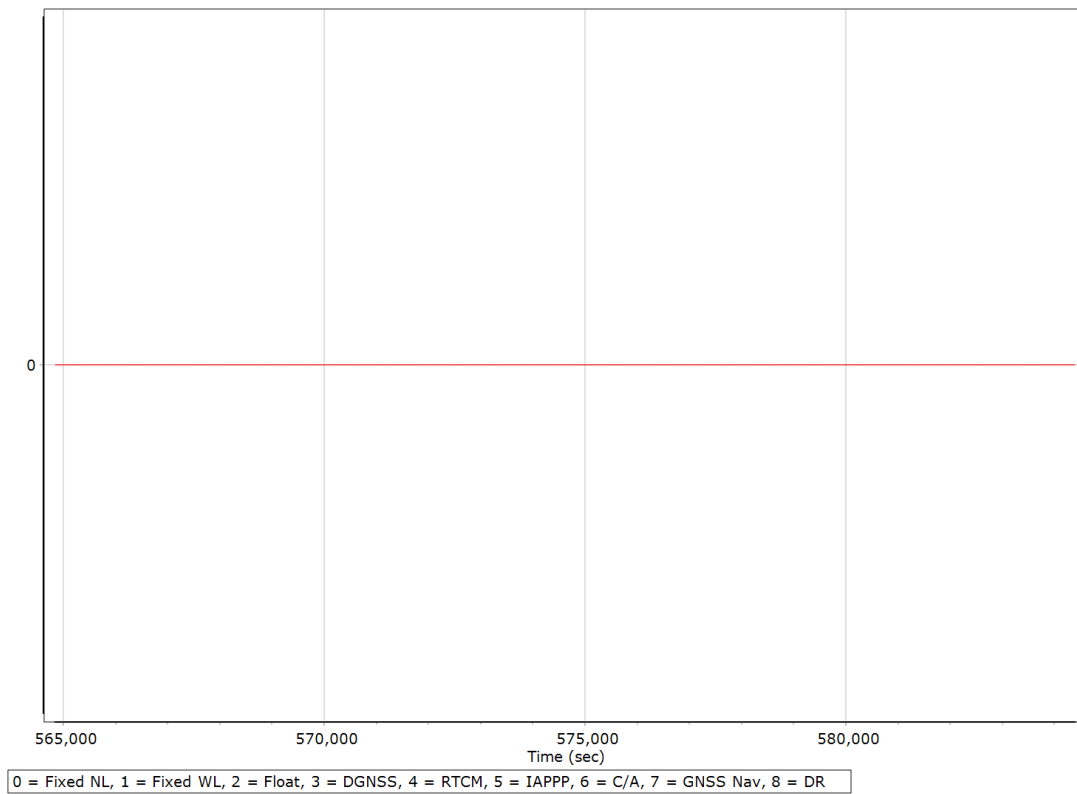


### Heading Error RMS (arc-min)

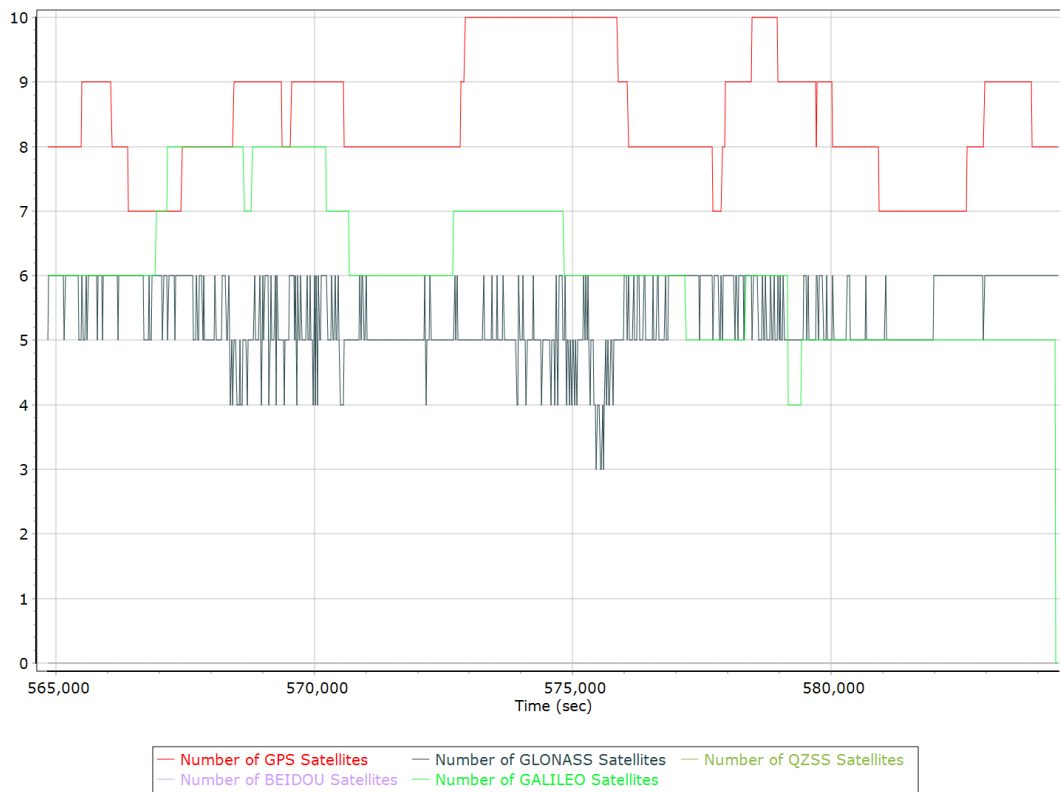


## Forward Processed Solution Status

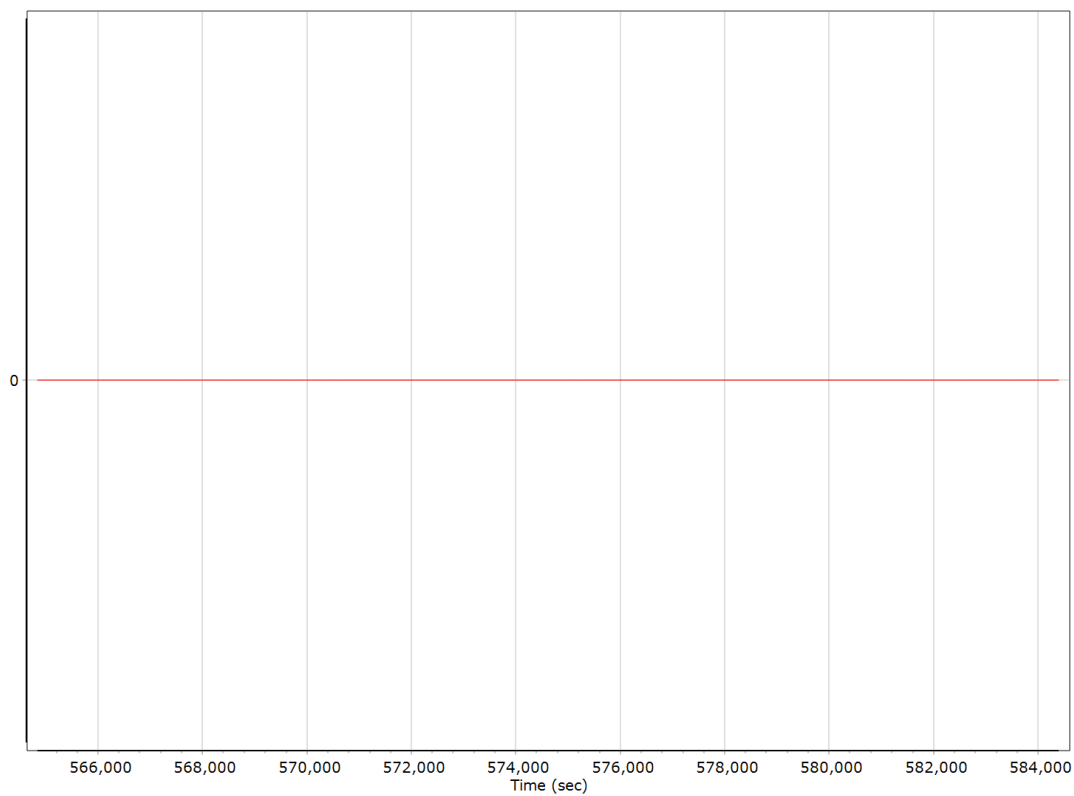
### Processing Mode



### Number of Satellites



## Baseline Length





## General Information

### Mission Information

Project name	05142022A_3543
Processing date	2022-05-18 11:39:02
Mission date	2022-05-14 12:06:53
Mission duration	05:49:35.046
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
N62756178.005	POS Data
N62756178.006	POS Data
N62756178.007	POS Data
N62756178.008	POS Data
N62756178.009	POS Data
N62756178.010	POS Data
N62756178.011	POS Data
N62756178.012	POS Data
N62756178.013	POS Data
N62756178.014	POS Data
N62756178.015	POS Data
N62756178.016	POS Data
N62756178.017	POS Data
N62756178.018	POS Data
N62756178.019	POS Data
N62756178.020	POS Data
N62756178.021	POS Data
N62756178.022	POS Data
N62756178.023	POS Data
N62756178.024	POS Data
N62756178.025	POS Data
N62756178.026	POS Data
N62756178.027	POS Data
N62756178.028	POS Data
N62756178.029	POS Data
N62756178.030	POS Data
N62756178.031	POS Data
N62756178.032	POS Data
N62756178.033	POS Data
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N62756178.041	POS Data
N62756178.042	POS Data
N62756178.043	POS Data
N62756178.044	POS Data
N62756178.045	POS Data
N62756178.046	POS Data
N62756178.047	POS Data
N62756178.048	POS Data
N62756178.049	POS Data
N62756178.050	POS Data
N62756178.051	POS Data
N62756178.052	POS Data
N62756178.053	POS Data
N62756178.054	POS Data
N62756178.055	POS Data
N62756178.056	POS Data
N62756178.057	POS Data
N62756178.058	POS Data
N62756178.059	POS Data
N62756178.060	POS Data
N62756178.061	POS Data
N62756178.062	POS Data
N62756178.063	POS Data

File name	File type
N62756178.064	POS Data
N62756178.065	POS Data
N62756178.066	POS Data
N62756178.067	POS Data
N62756178.068	POS Data
N62756178.069	POS Data

## Input Files

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

## Output Files

Filename	File type
sbt_05142022A_3543.out	SBET Trajectory File

## Rover Data Summary

First raw data file	N62756178.005		
Last raw data file	N62756178.069		
Start GPS week	2209		
Start time	561994.339 (5/14/2022 12:06:34 PM)		
End time	582969.385 (5/14/2022 5:56:09 PM)		
Start of fine alignment	562180.467 (5/14/2022 12:09:40 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

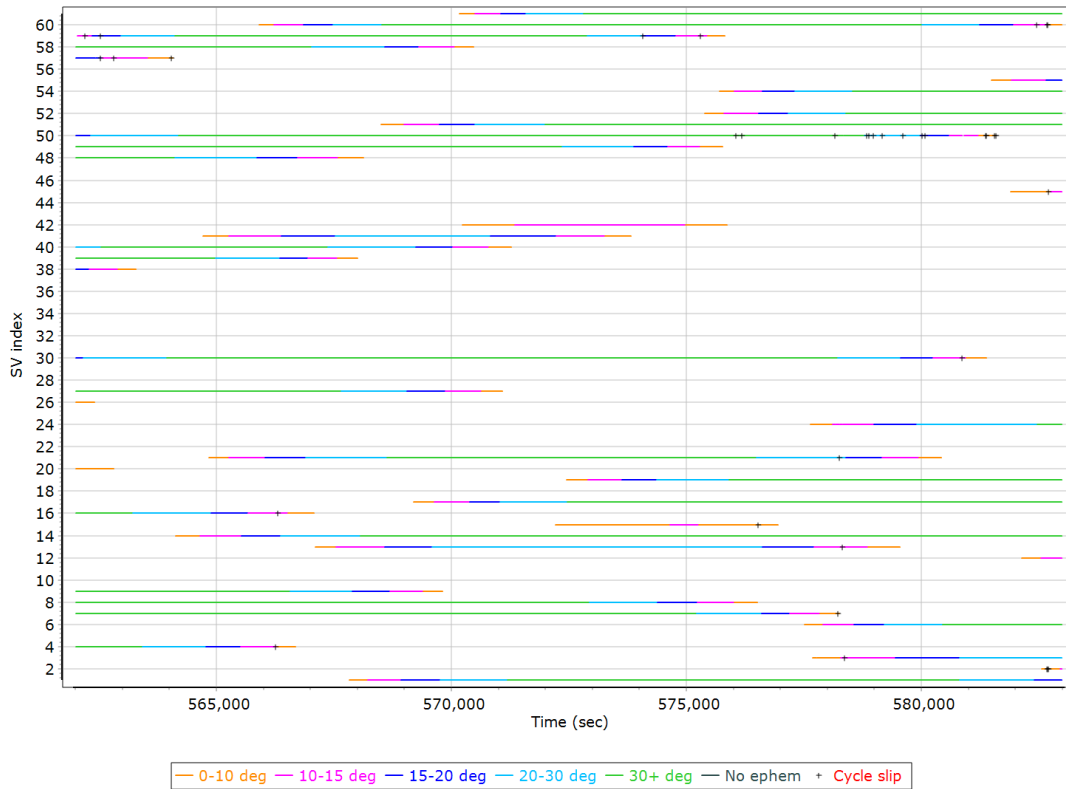
## Rover Data QC

### Raw IMU Import QC Summary

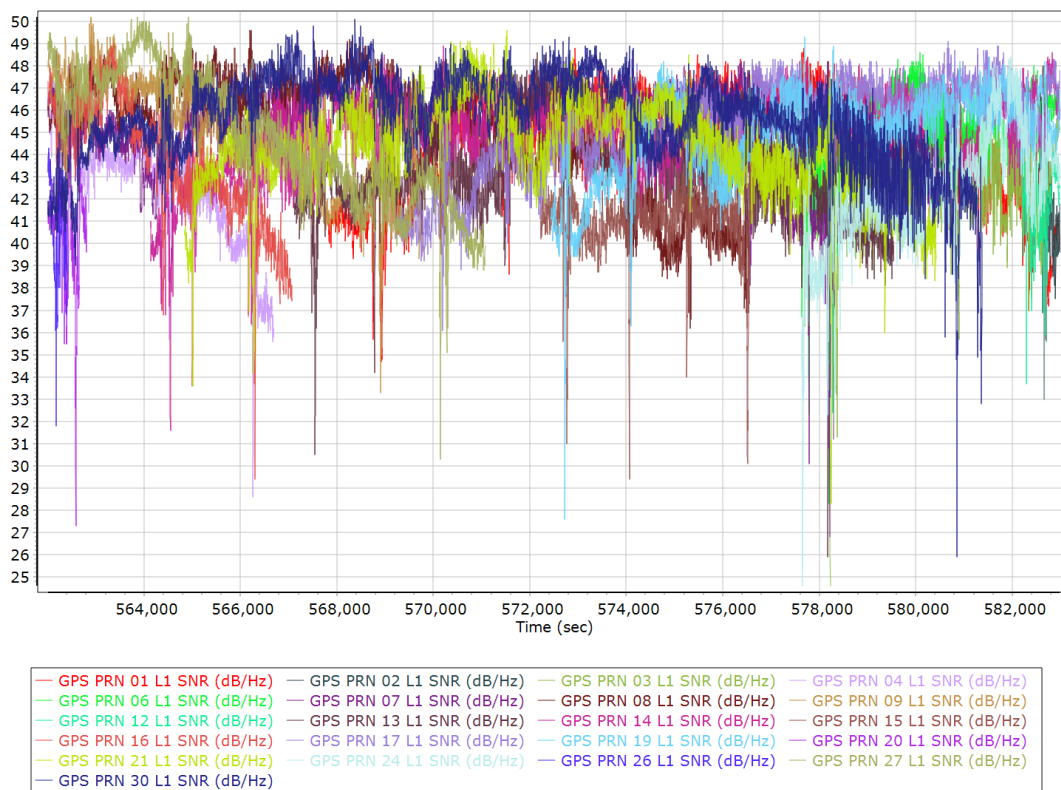
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05142022A_3543.log
IMU Records Processed	4194089
Termination Status	Normal
IMU Anomalies	0

## Primary Observables & Satellite Data

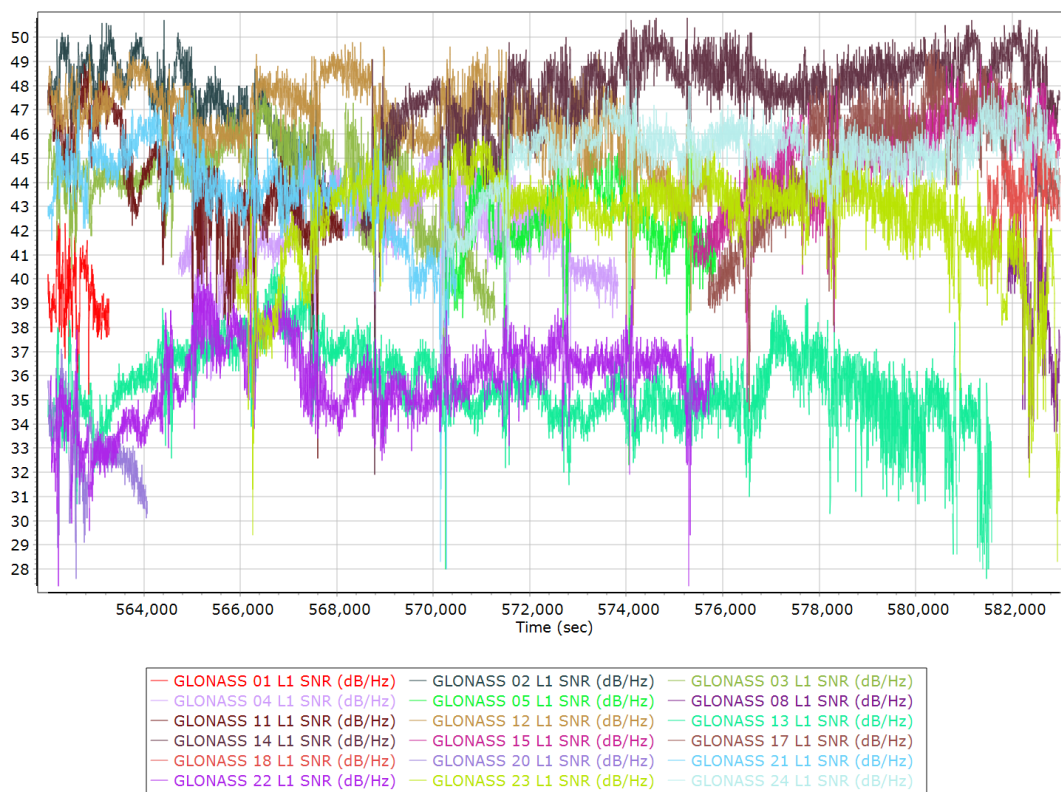
### GPS/GLONASS L1 Satellite Lock/Elevation



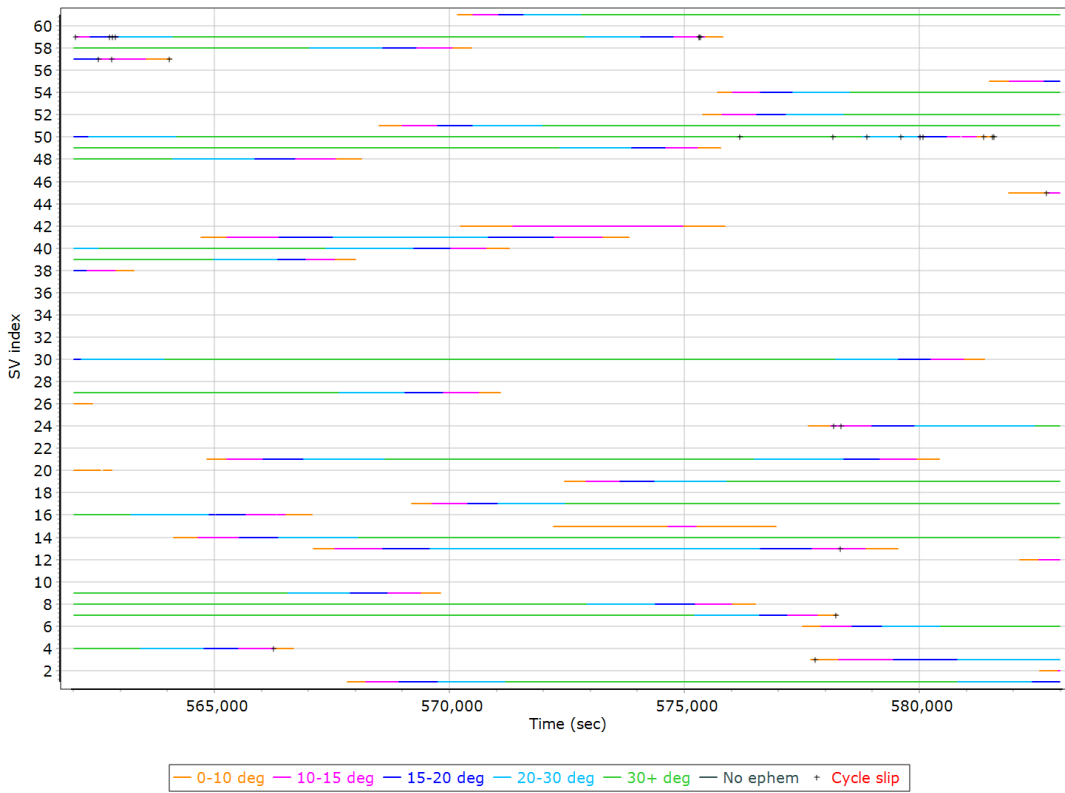
## GPS L1 SNR



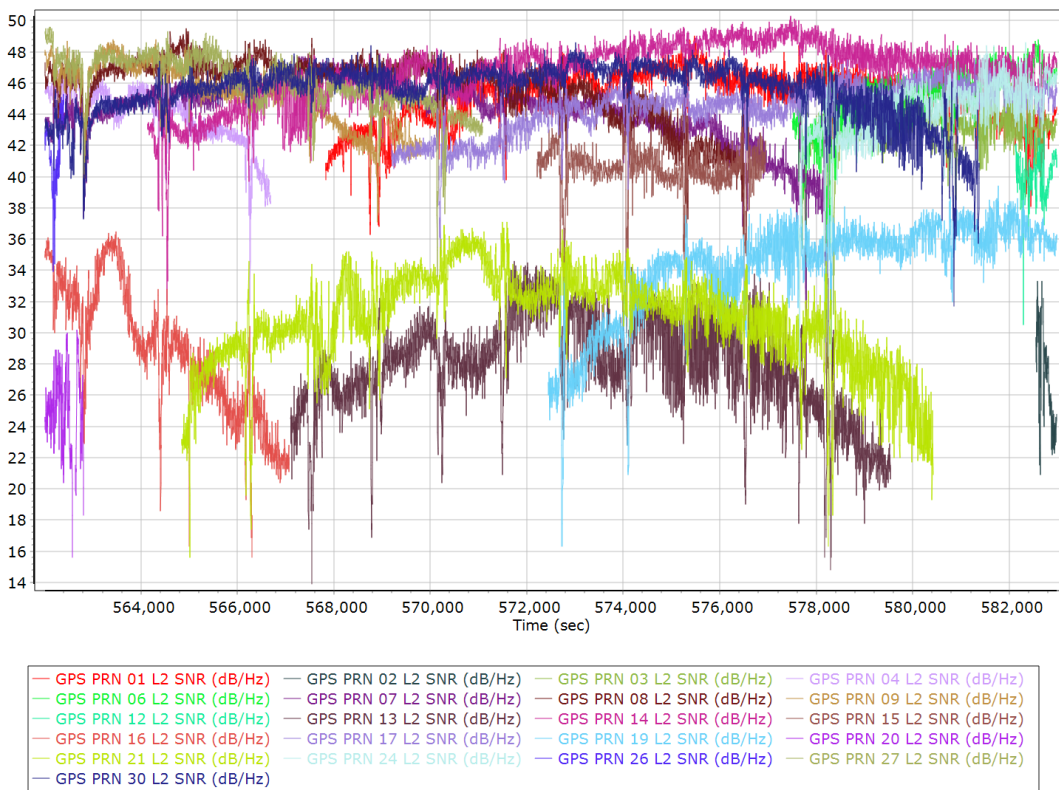
## GLONASS L1 SNR



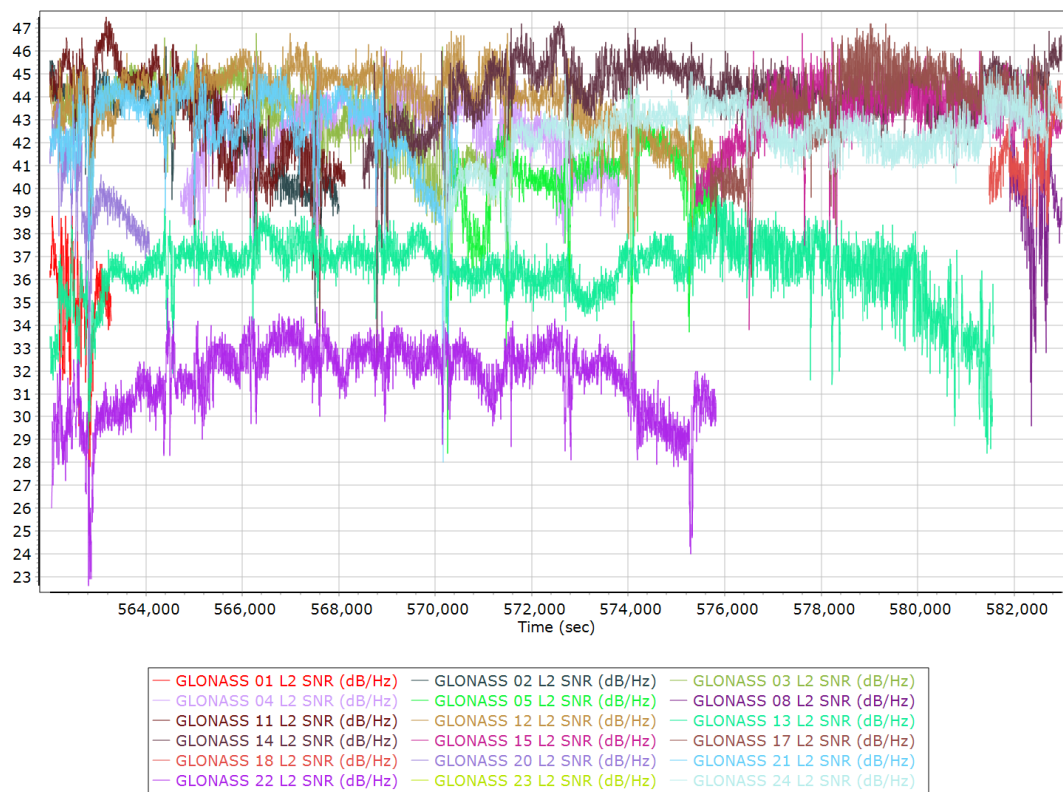
## GPS/GLONASS L2 Satellite Lock/Elevation



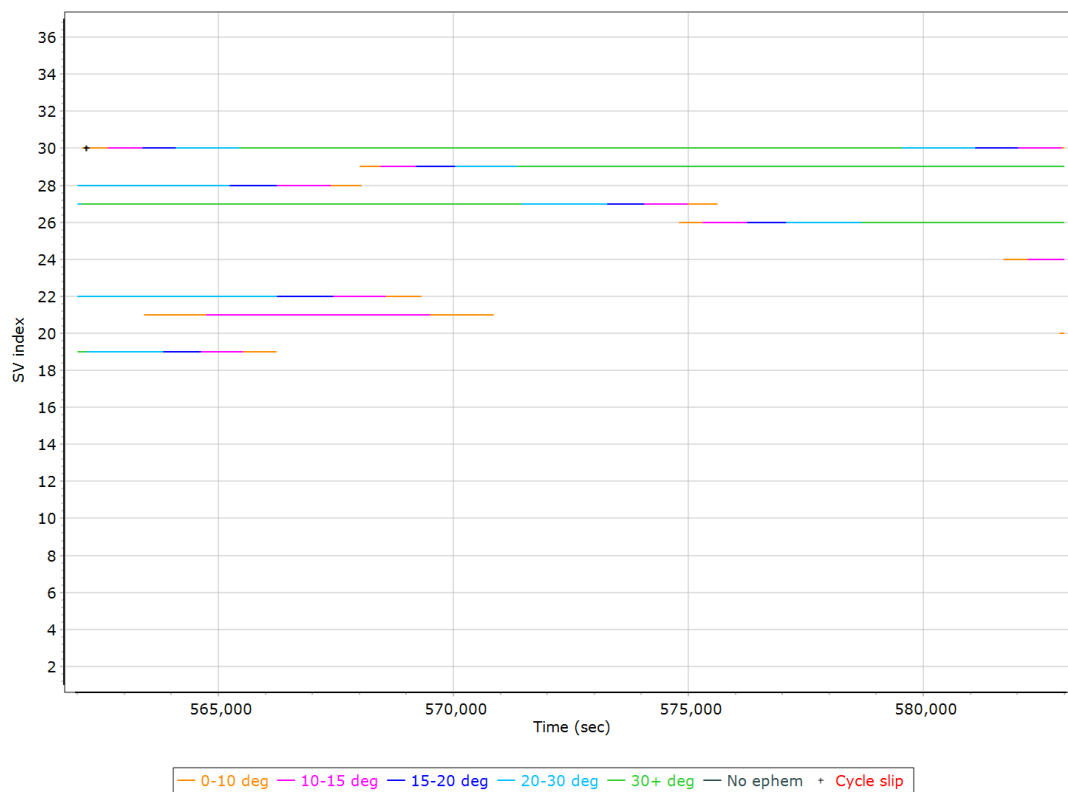
## GPS L2 SNR



## GLONASS L2 SNR

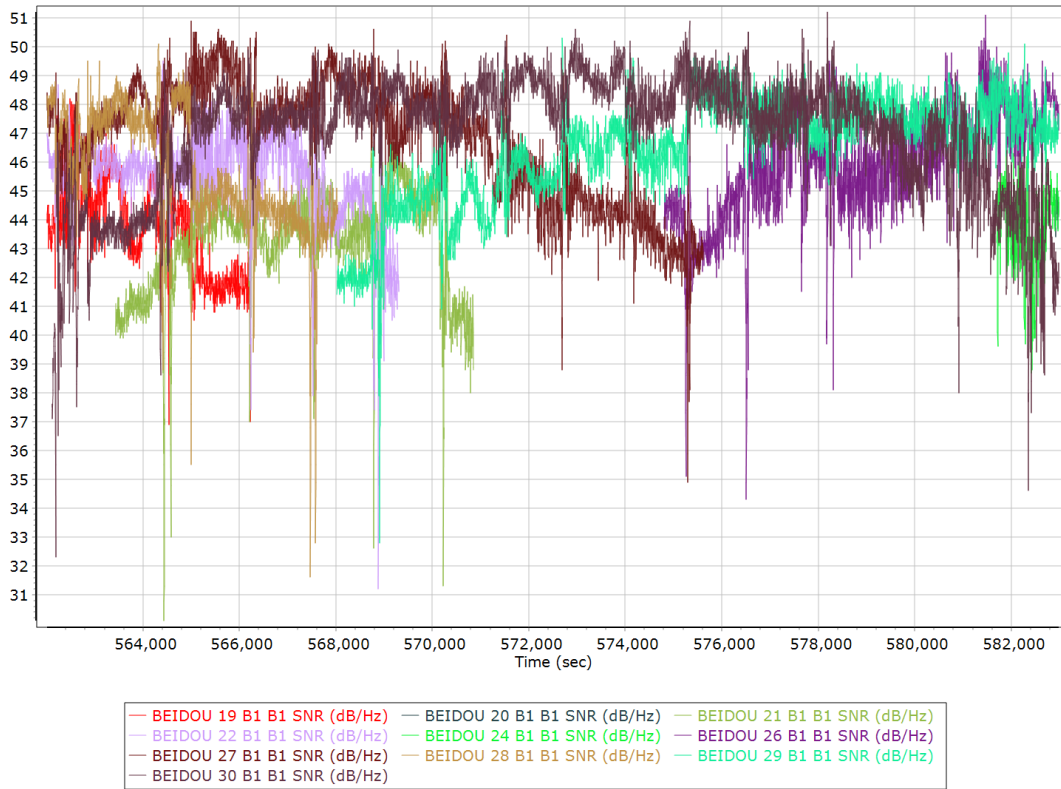


## BEIDOU Satellite Lock/Elevation

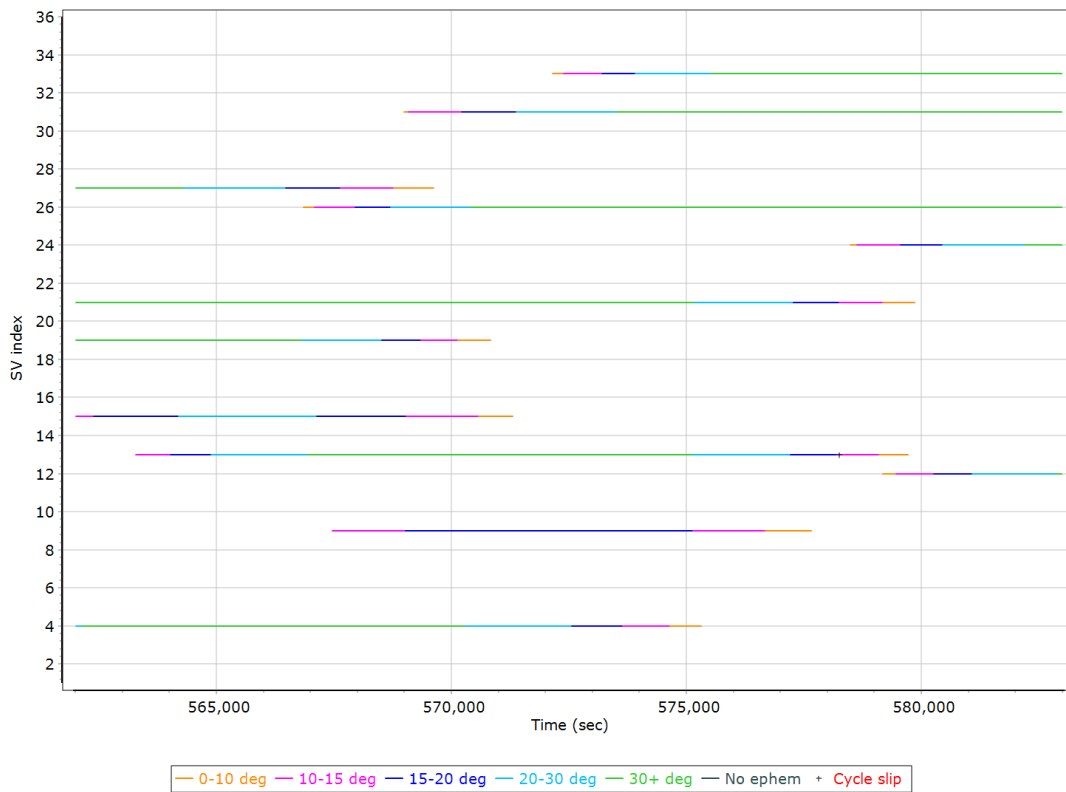




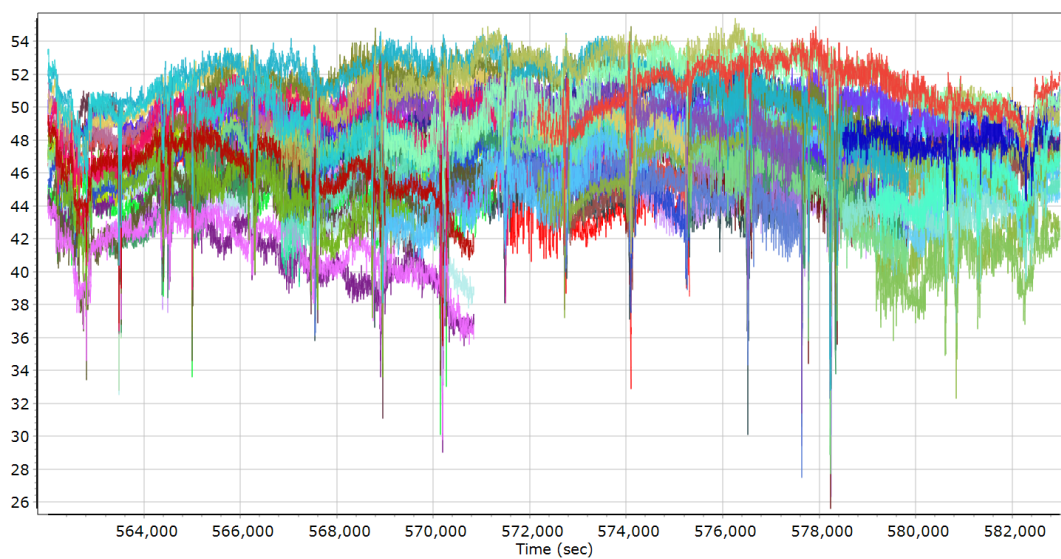
## BEIDOU SNR



## GALILEO Satellite Lock/Elevation



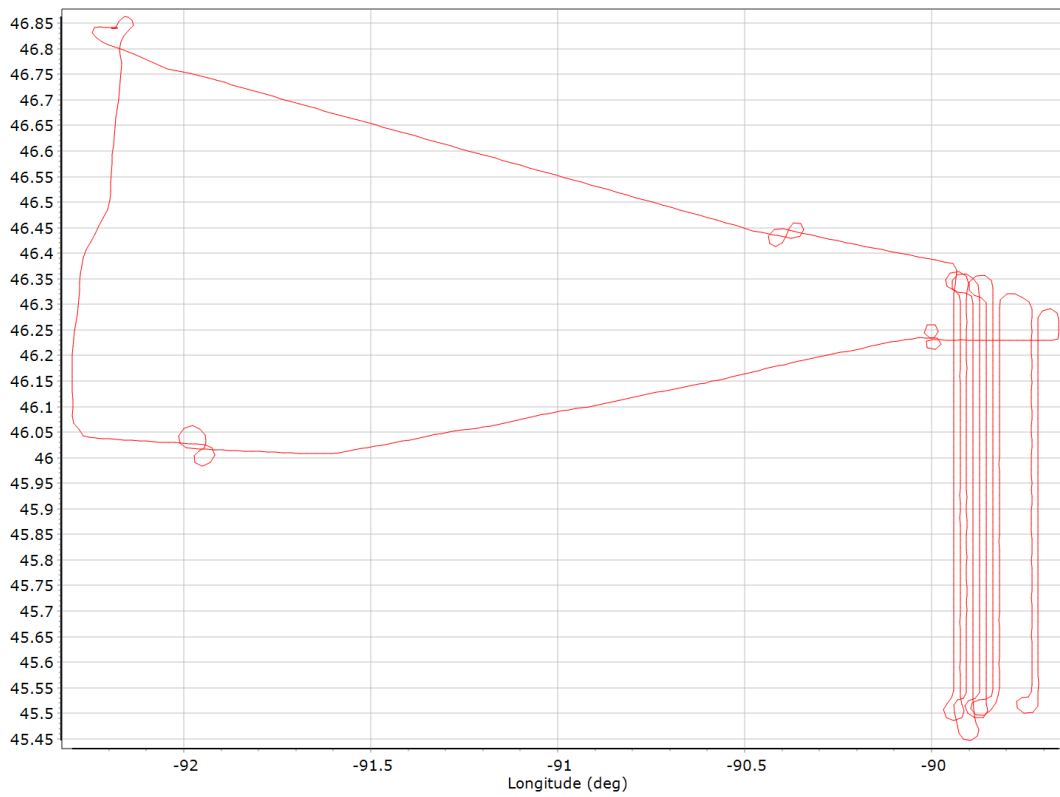
## GALILEO SNR



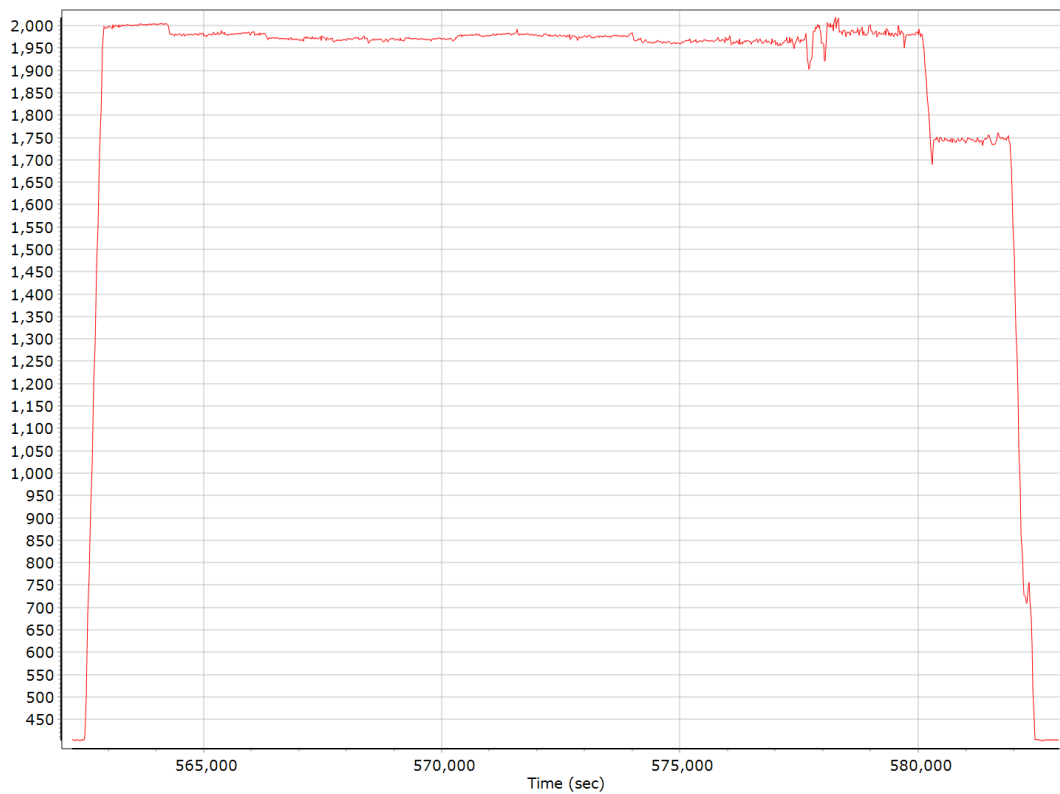
— GALILEO 04 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 09 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 13 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 15 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 19 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 21 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— 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 09 L5E5A BPSK10_PD SNR (dB/Hz)
— GALILEO 12 L5E5A BPSK10_PD SNR (dB/Hz)	— GALILEO 13 L5E5A BPSK10_PD SNR (dB/Hz)
— GALILEO 15 L5E5A BPSK10_PD SNR (dB/Hz)	— GALILEO 19 L5E5A BPSK10_PD SNR (dB/Hz)
— GALILEO 21 L5E5A BPSK10_PD SNR (dB/Hz)	— GALILEO 24 L5E5A BPSK10_PD SNR (dB/Hz)

## Smoothed Trajectory Information

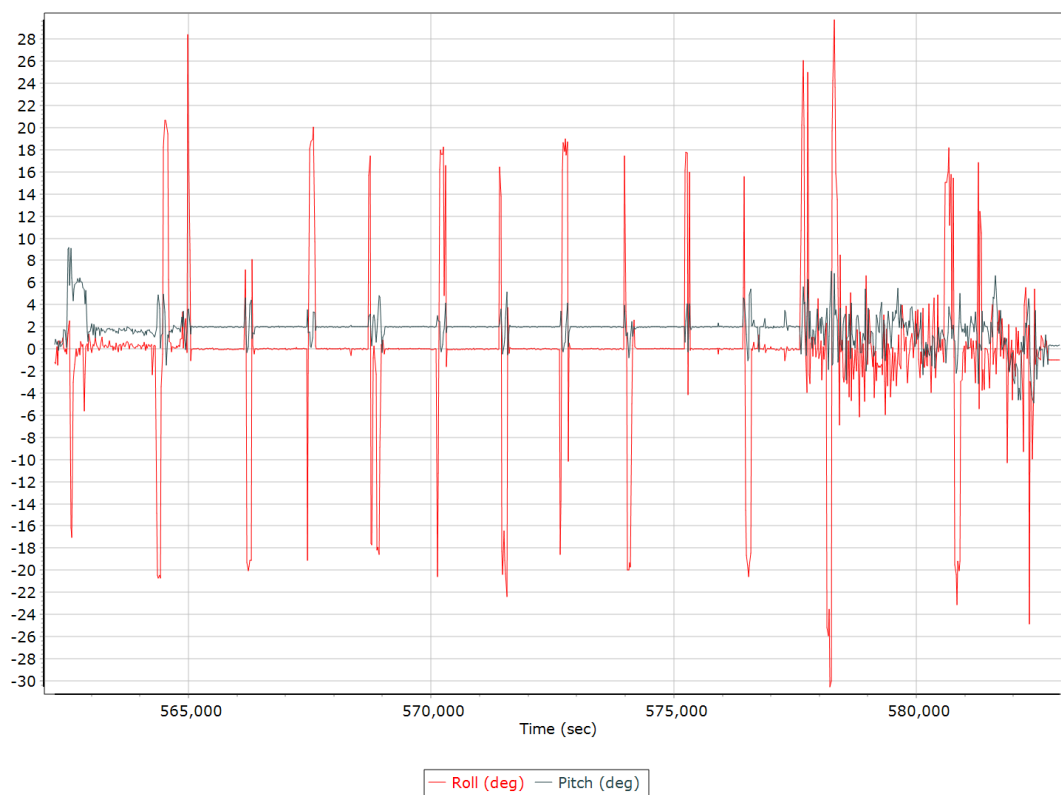
### Top View



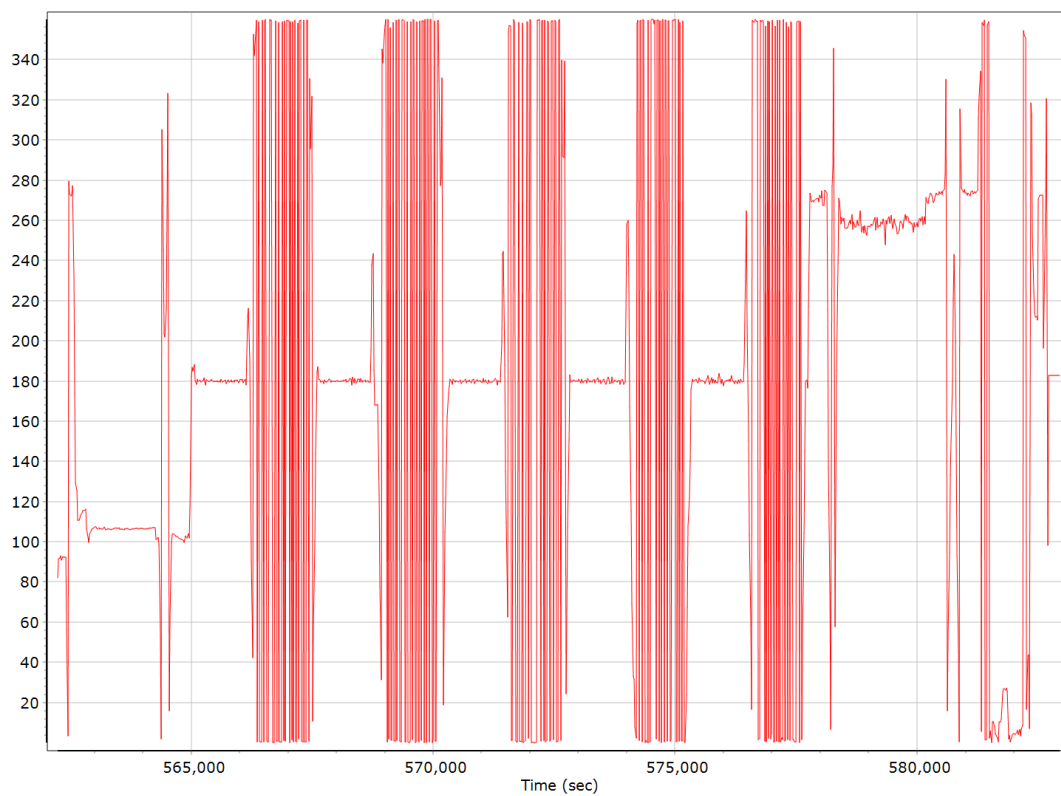
### Altitude



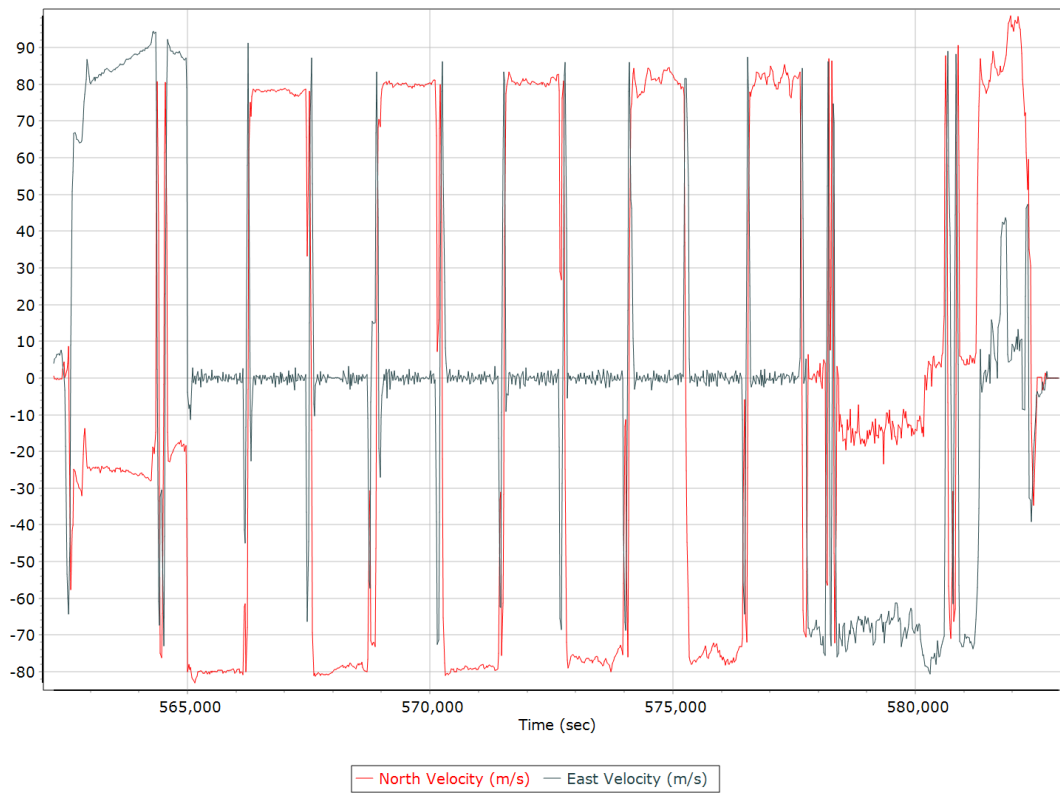
## Roll/Pitch



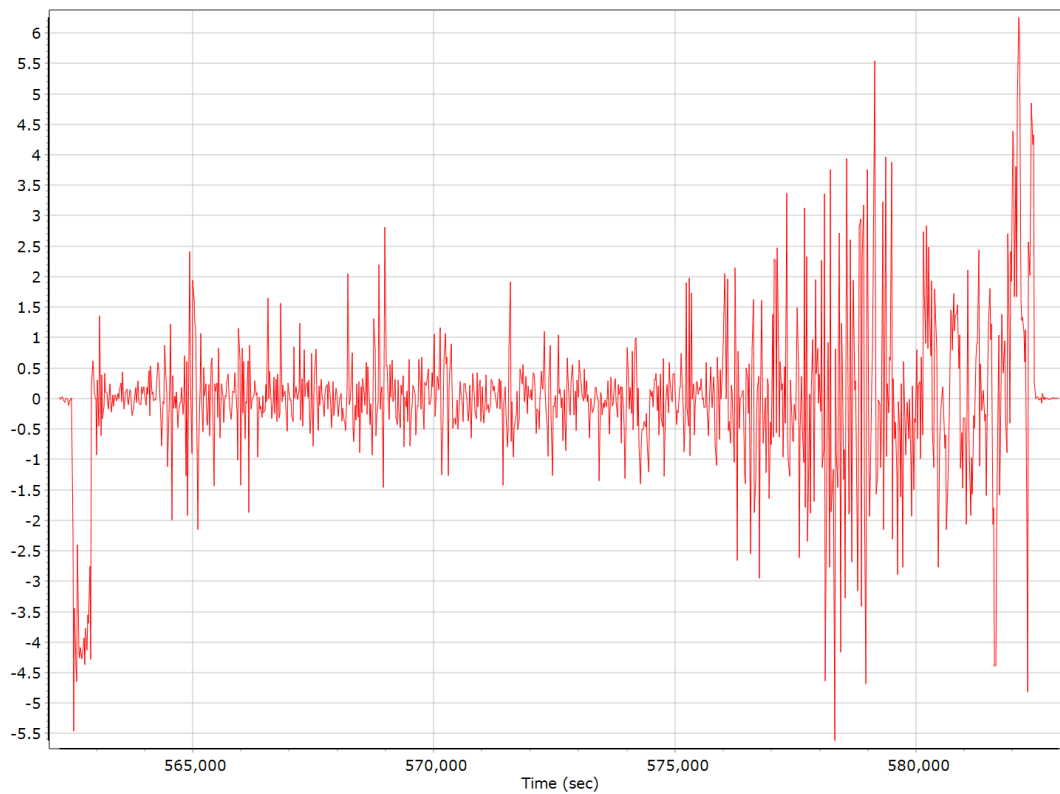
## Heading



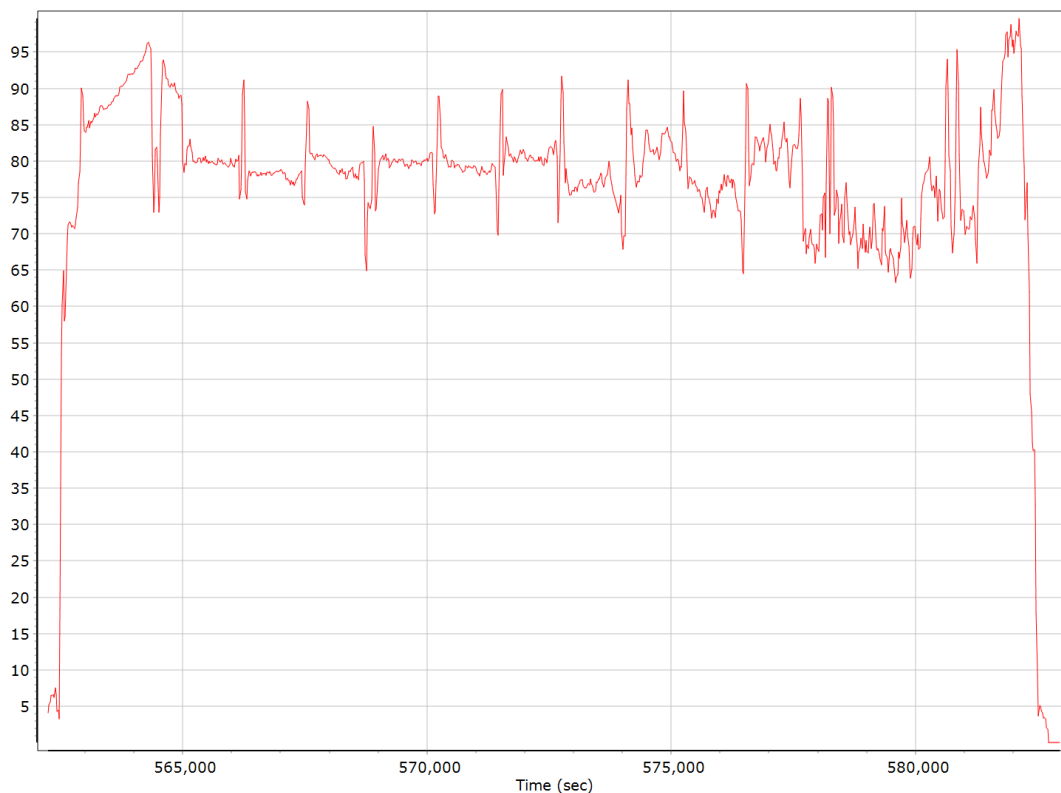
## North/East Velocity



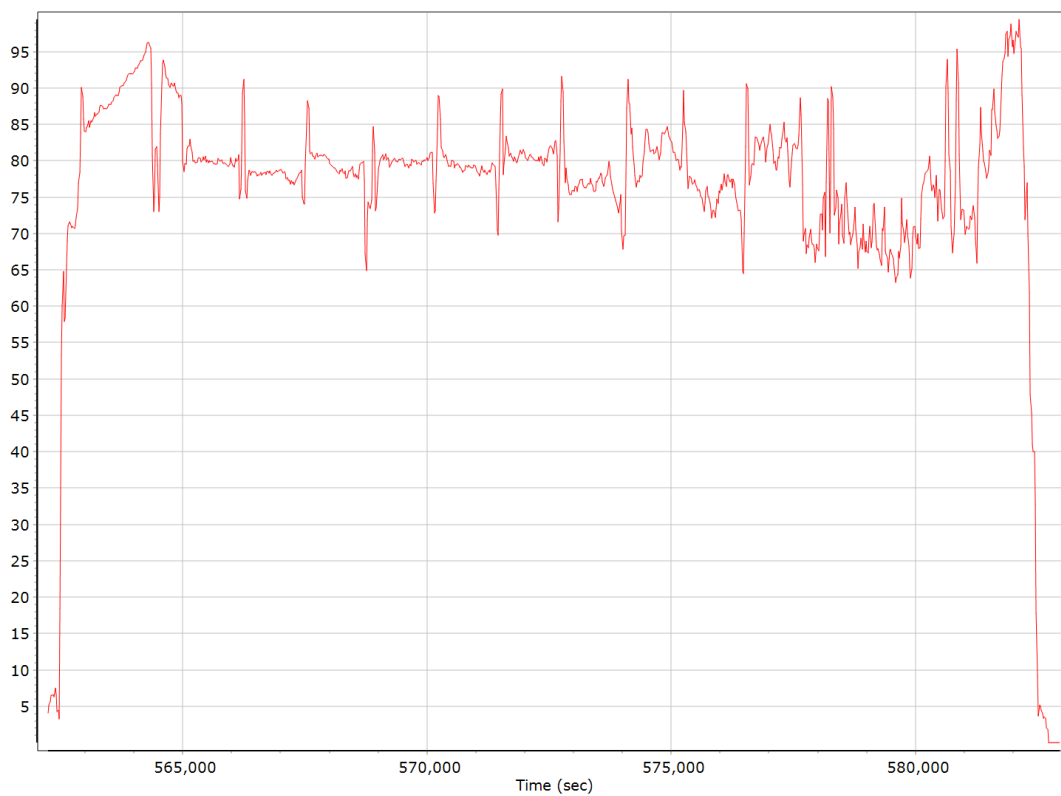
## Down Velocity



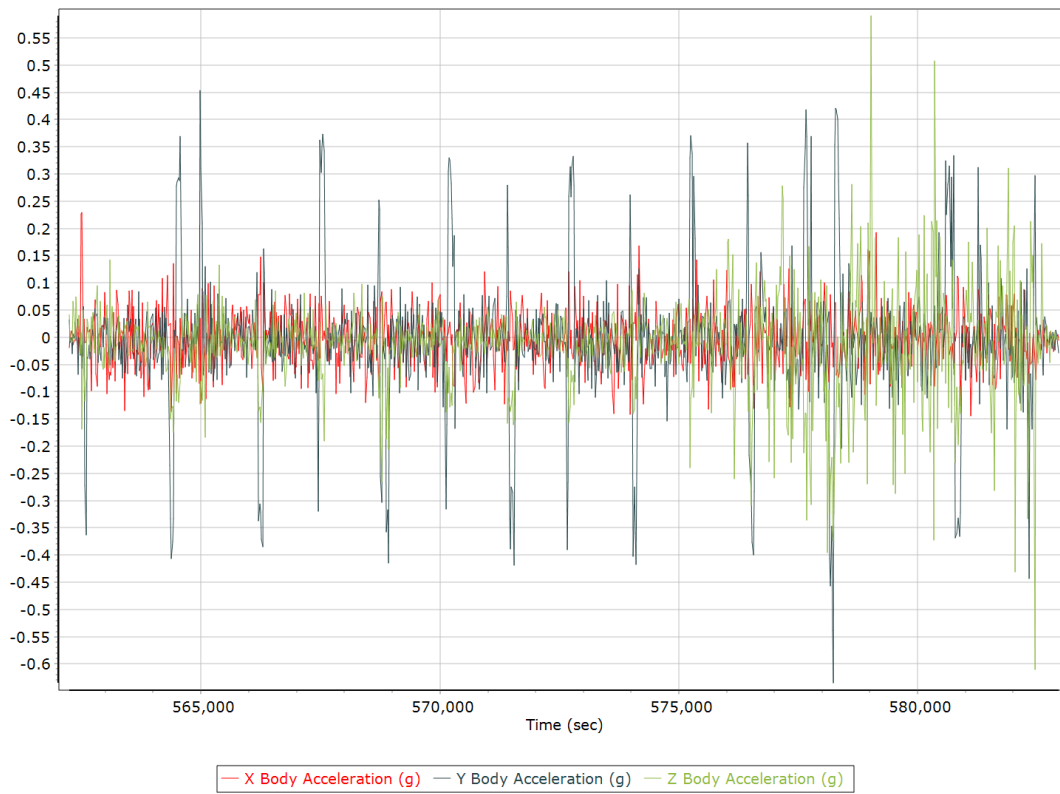
## Total Speed



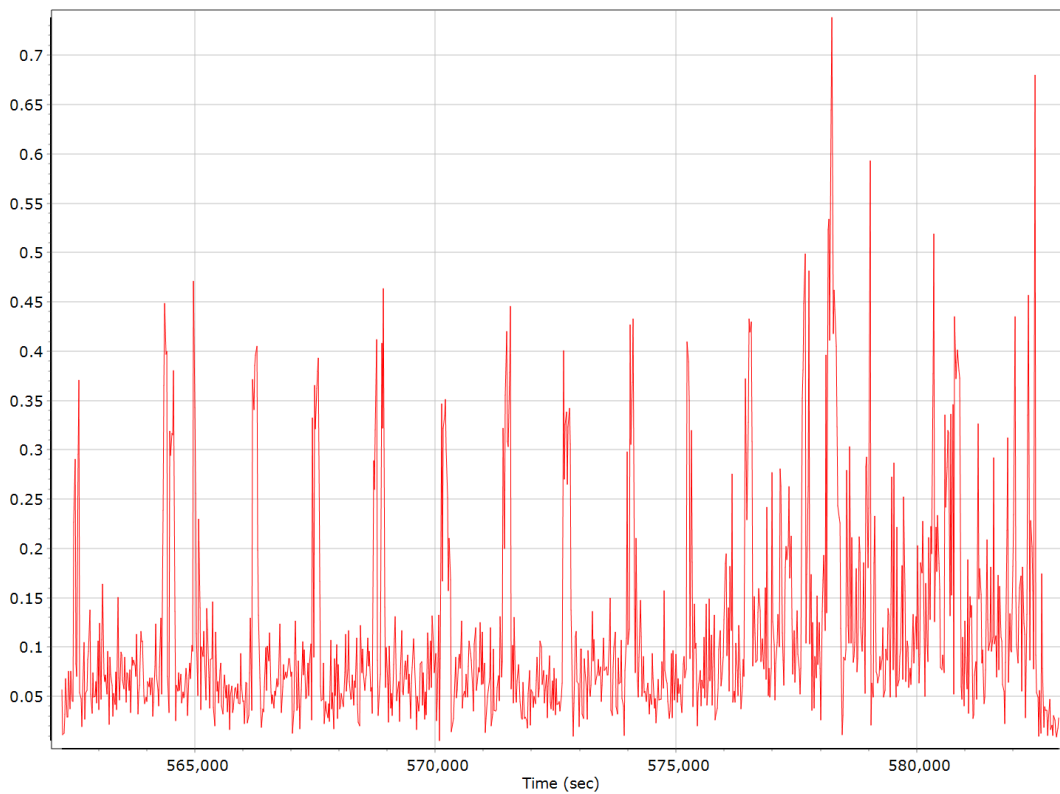
## Ground Speed



## Body Acceleration



## Total Body Acceleration



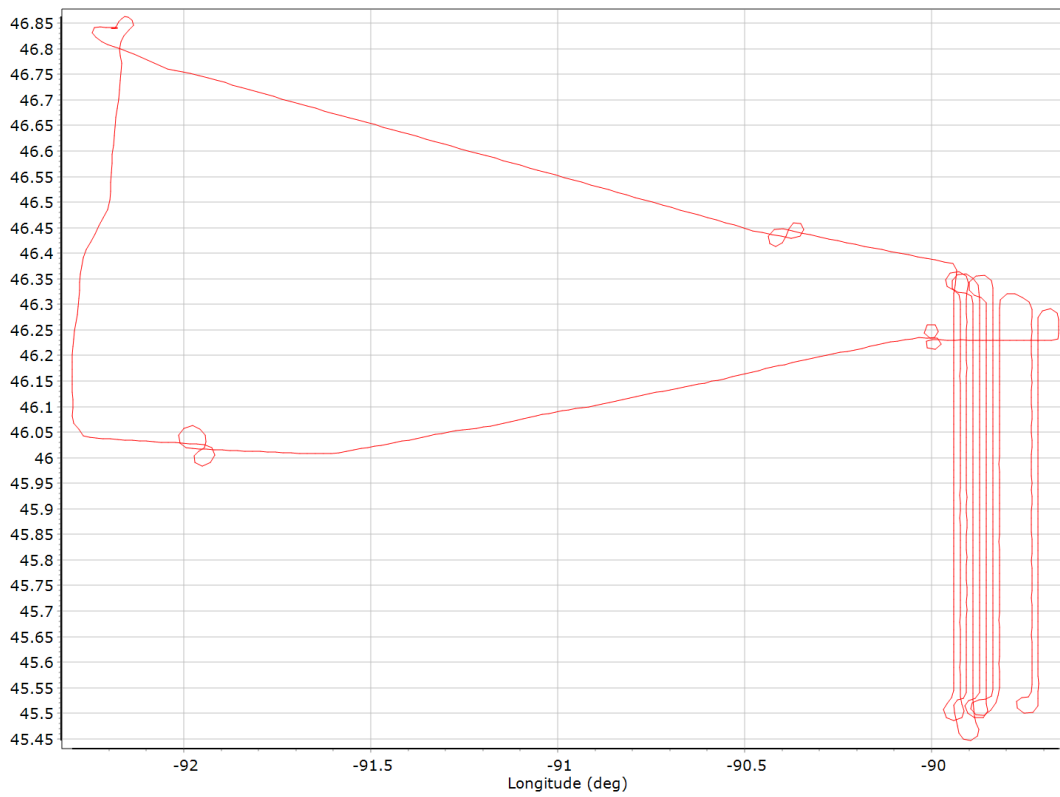
## Body Angular Rate



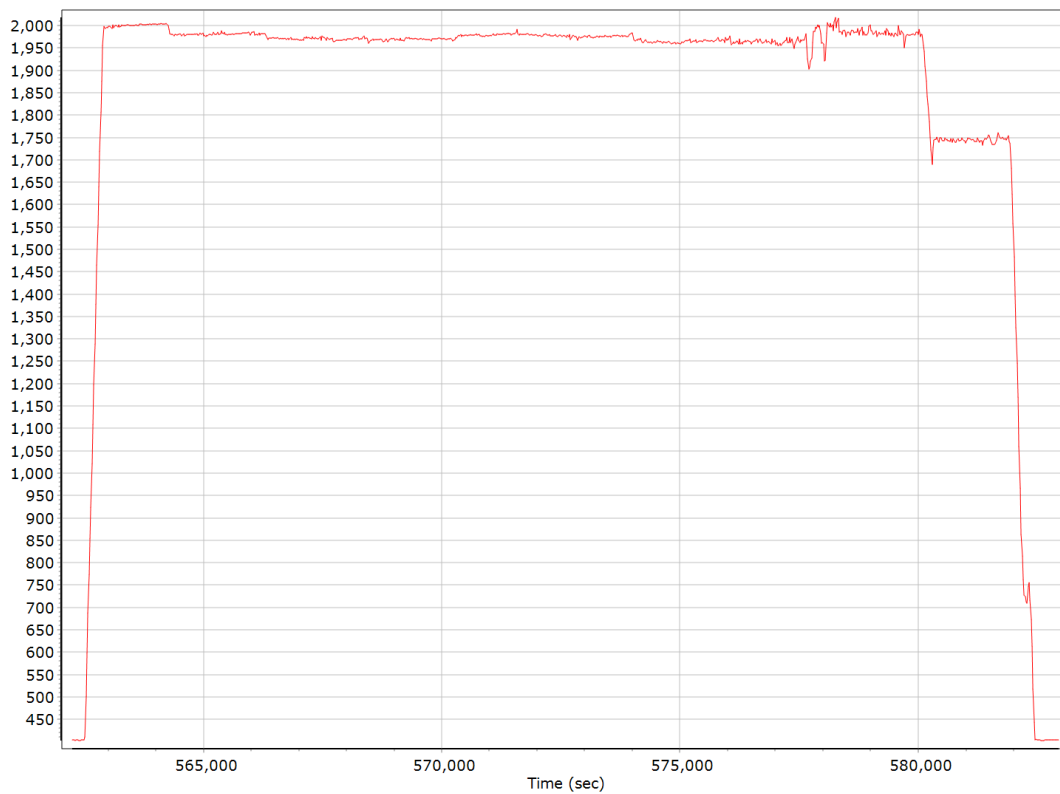


## Forward Processed Trajectory Information

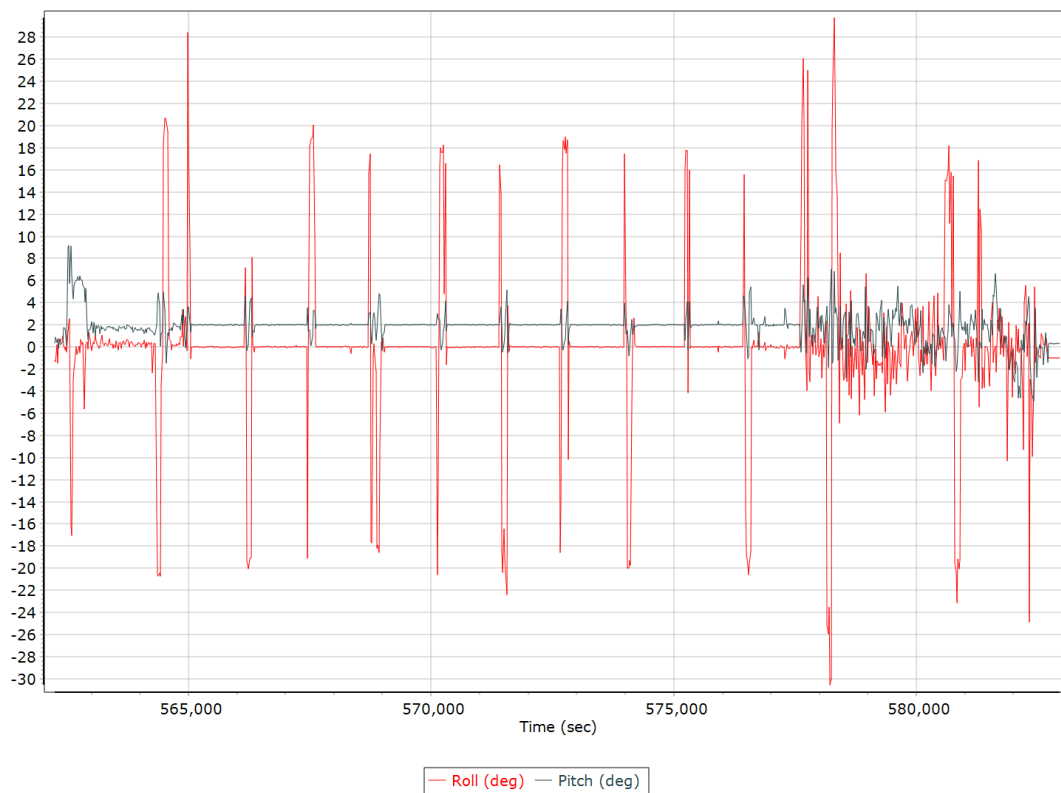
### Top View



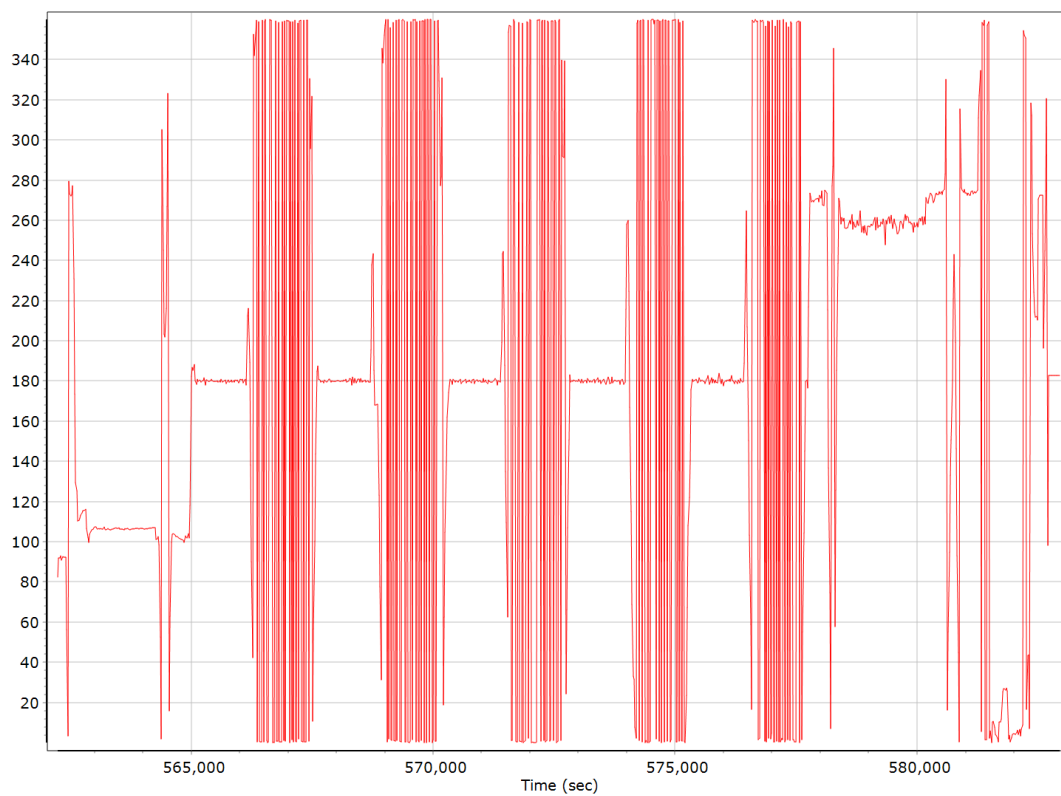
### Altitude



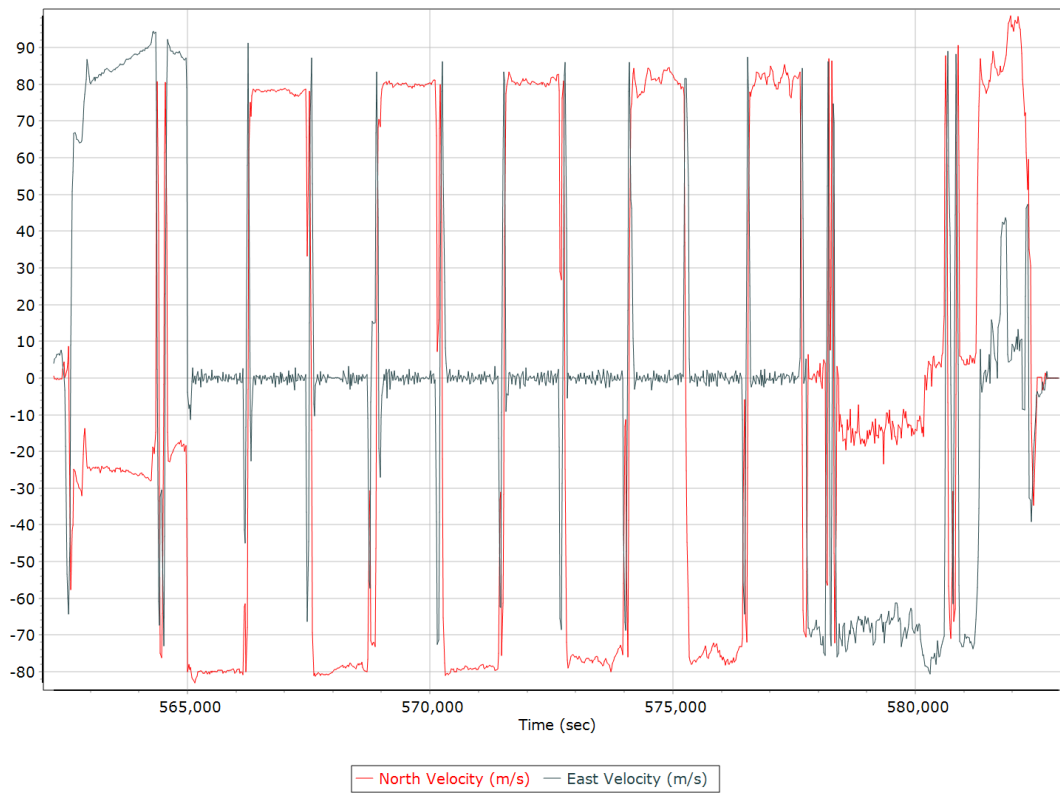
## Roll/Pitch



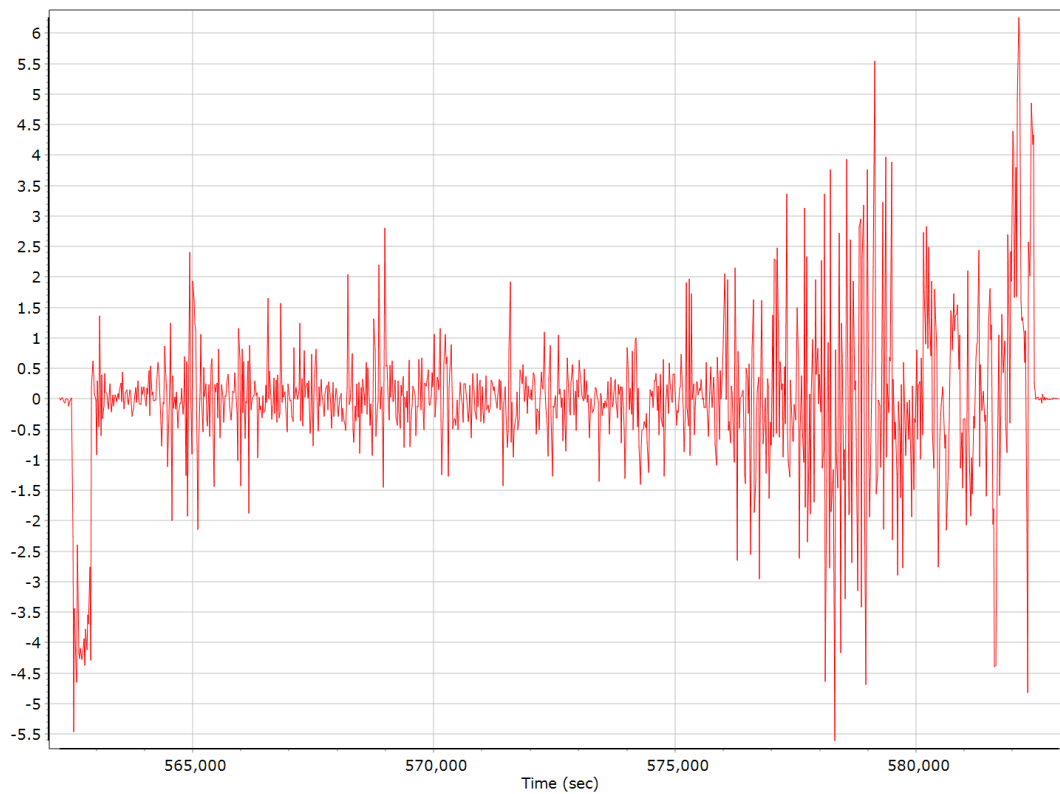
## Heading



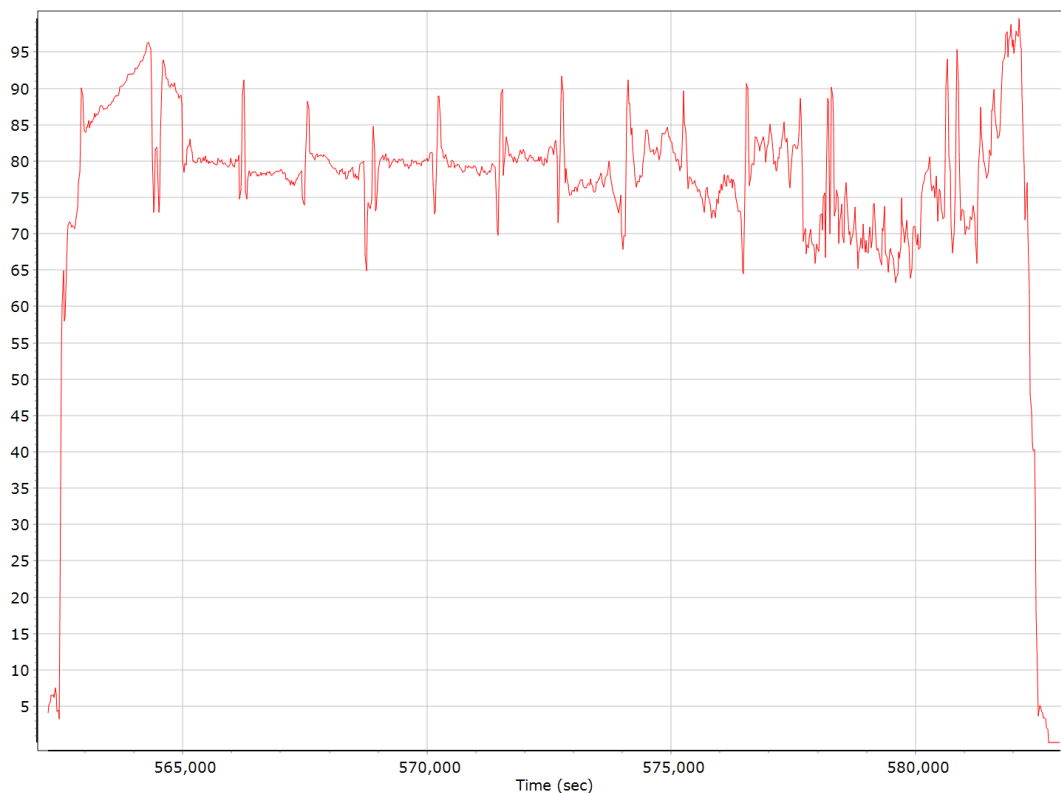
## North/East Velocity



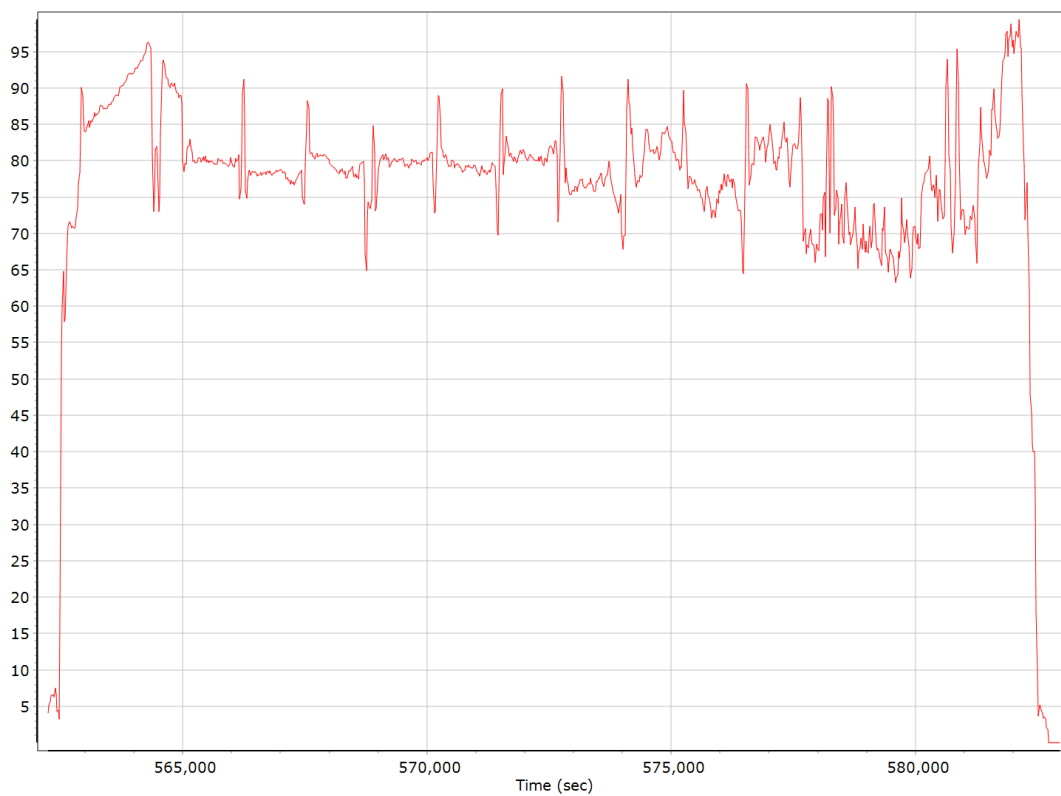
## Down Velocity



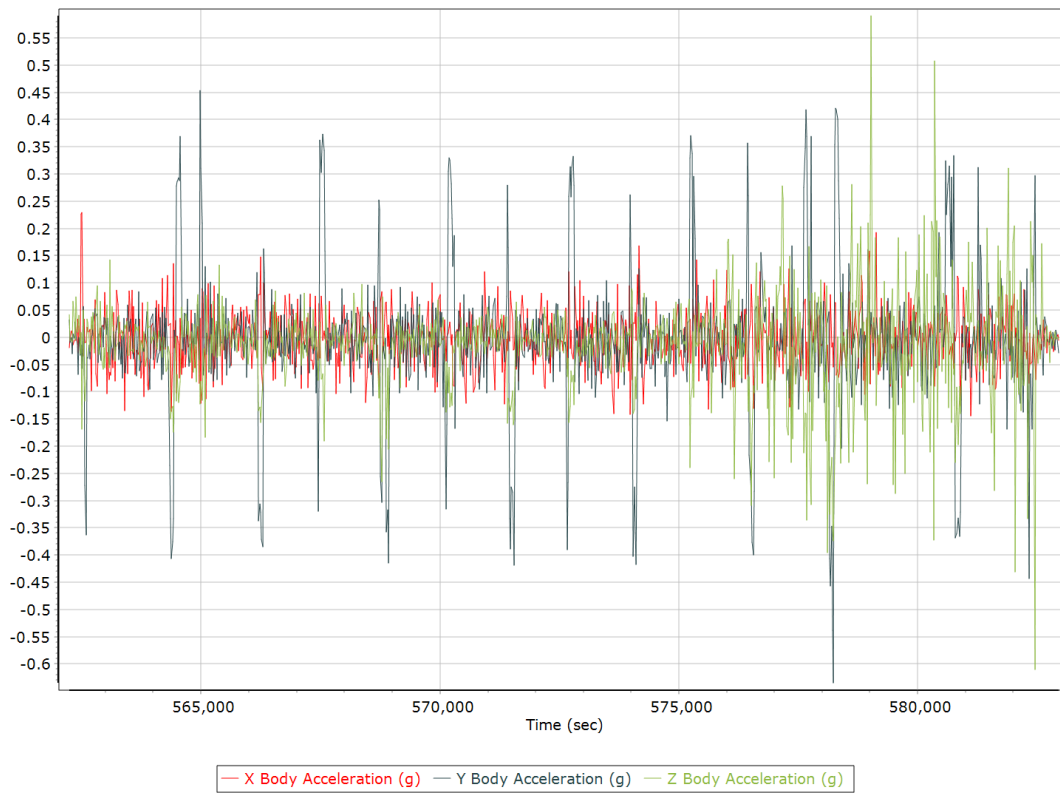
## Total Speed



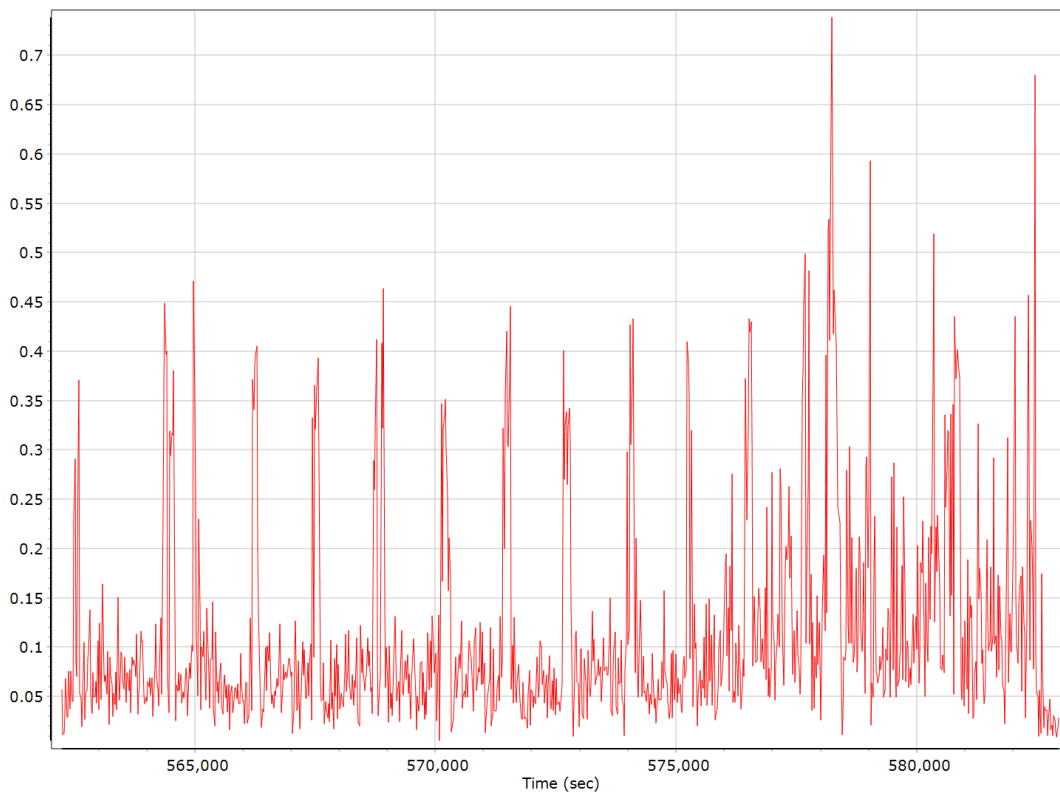
## Ground Speed



## Body Acceleration



## Total Body Acceleration



## Body Angular Rate

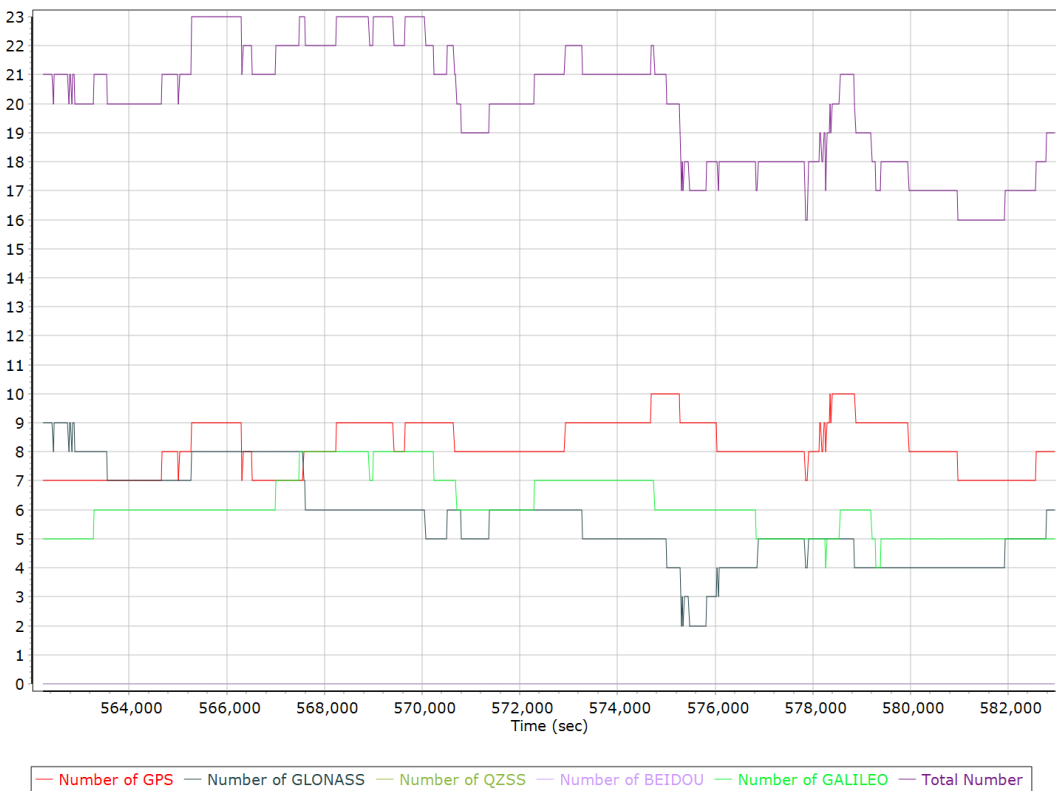


## GNSS QC

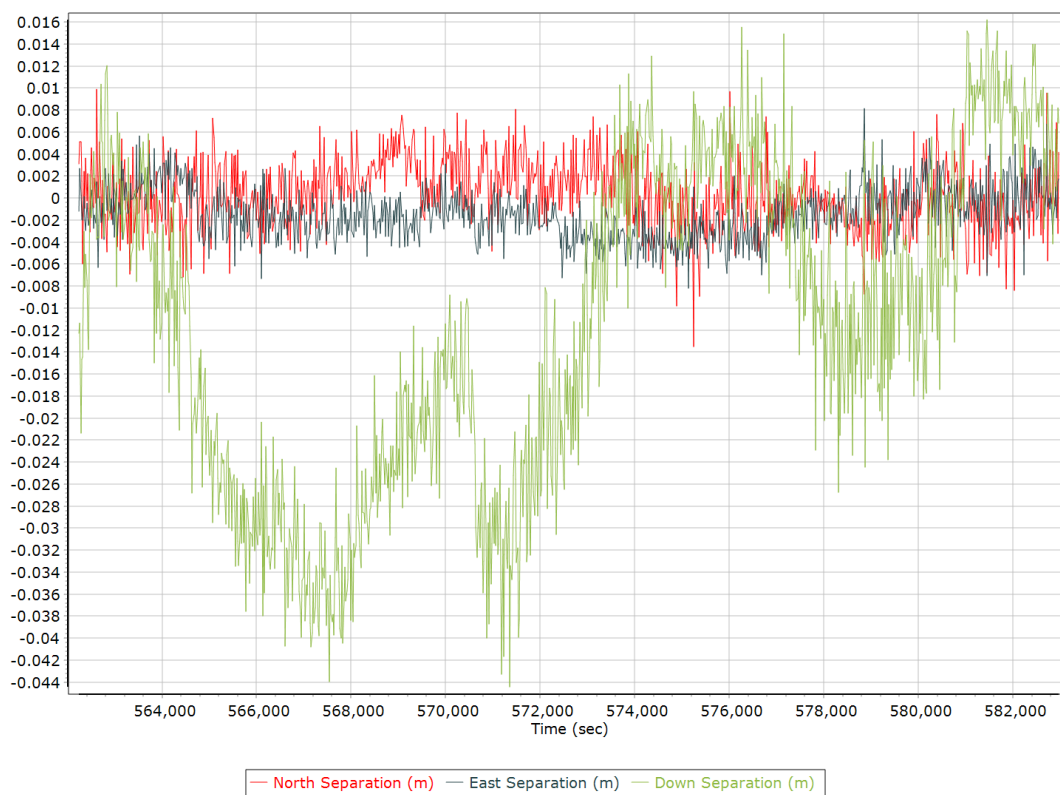
### GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	7	10	8
Number of GLONASS SV	2	9	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	16	24	20
PDOP	0.95	1.51	1.22
QC Solution Gaps	0.00	0.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	20930.00	0.00	0.00
Percentage	100.00	0.00	0.00

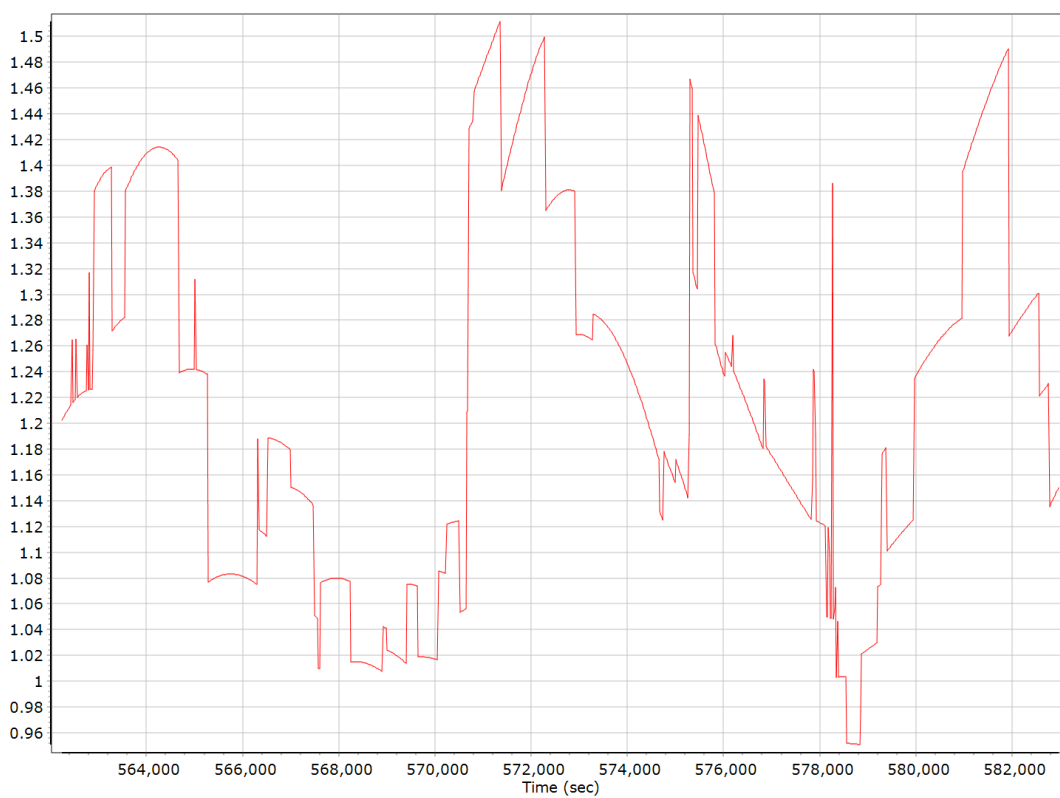
### Num SVs in solution



## Forward/Reverse Separation

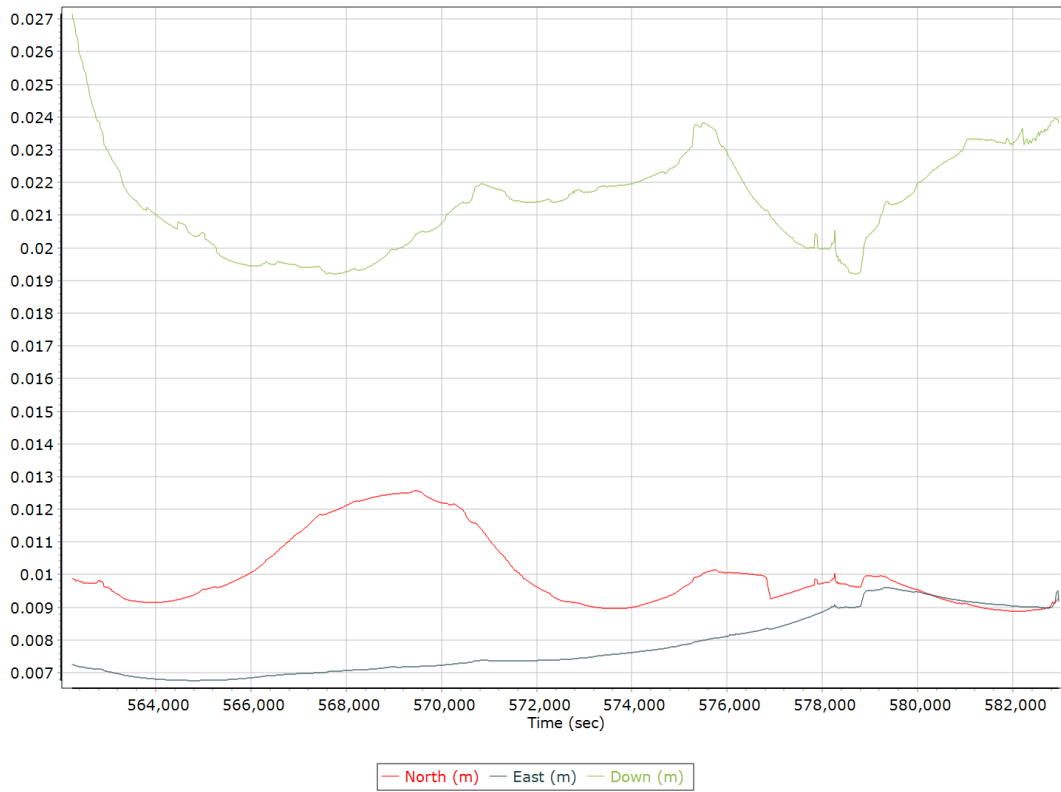


## PDOP

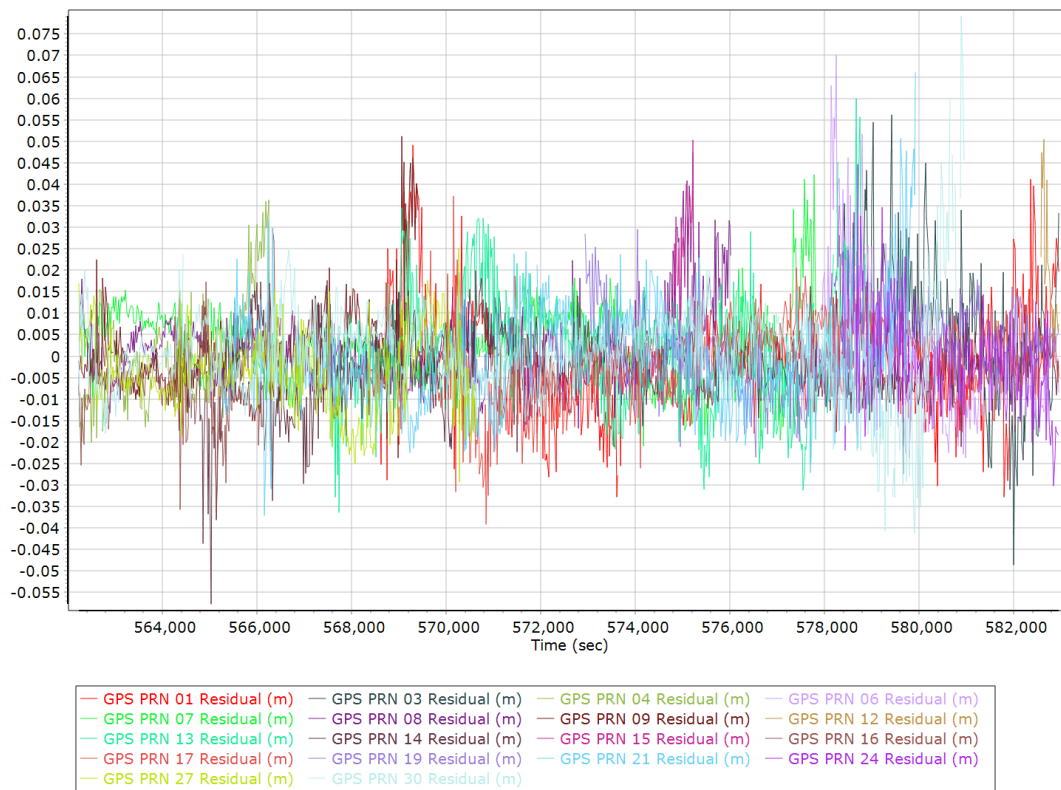




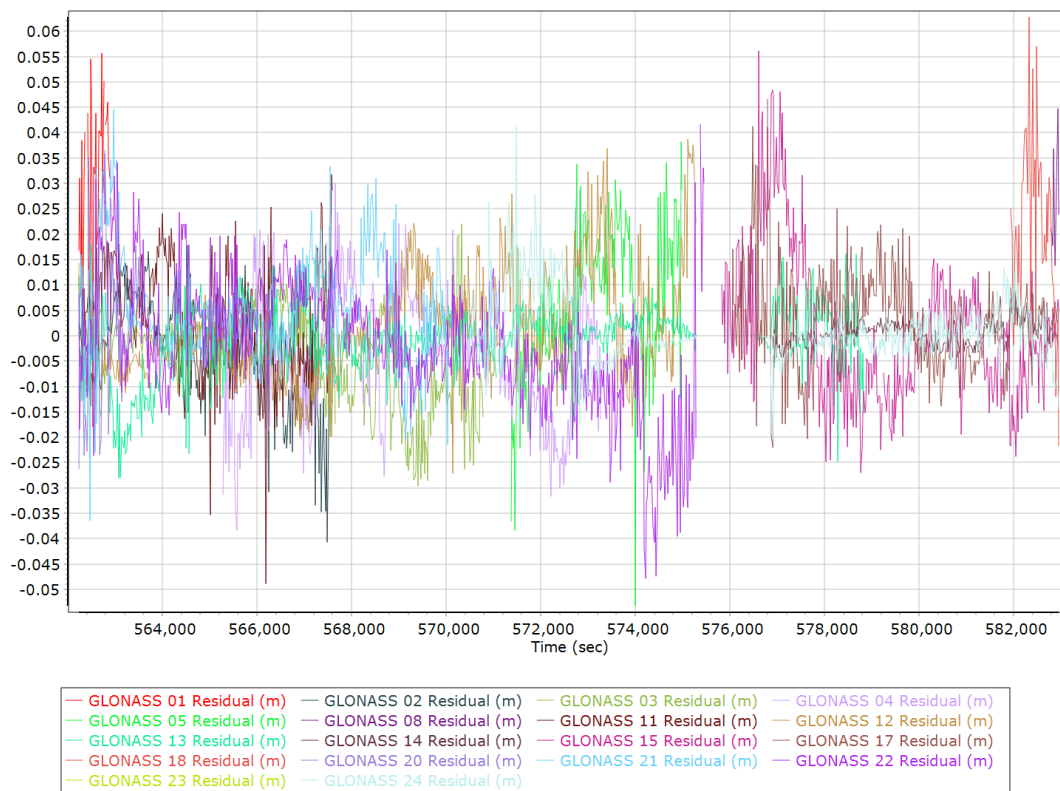
## Estimated Position Accuracy



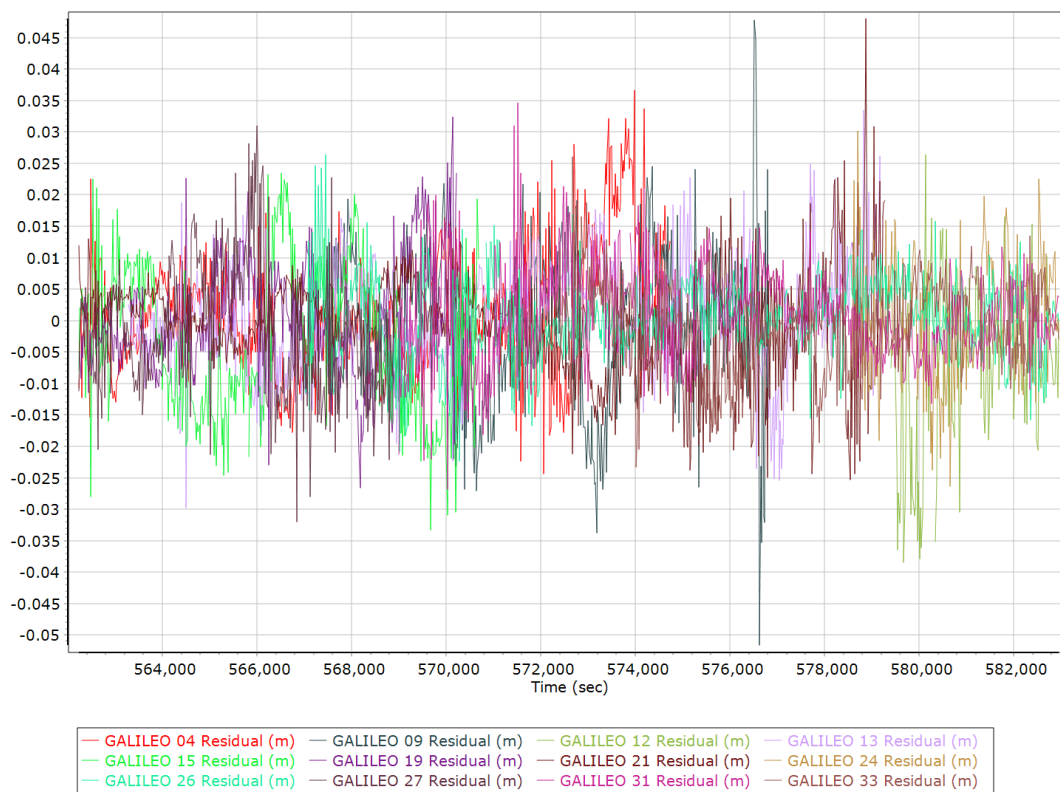
## GPS Residuals



## GLONASS Residuals



## GALILEO Residuals



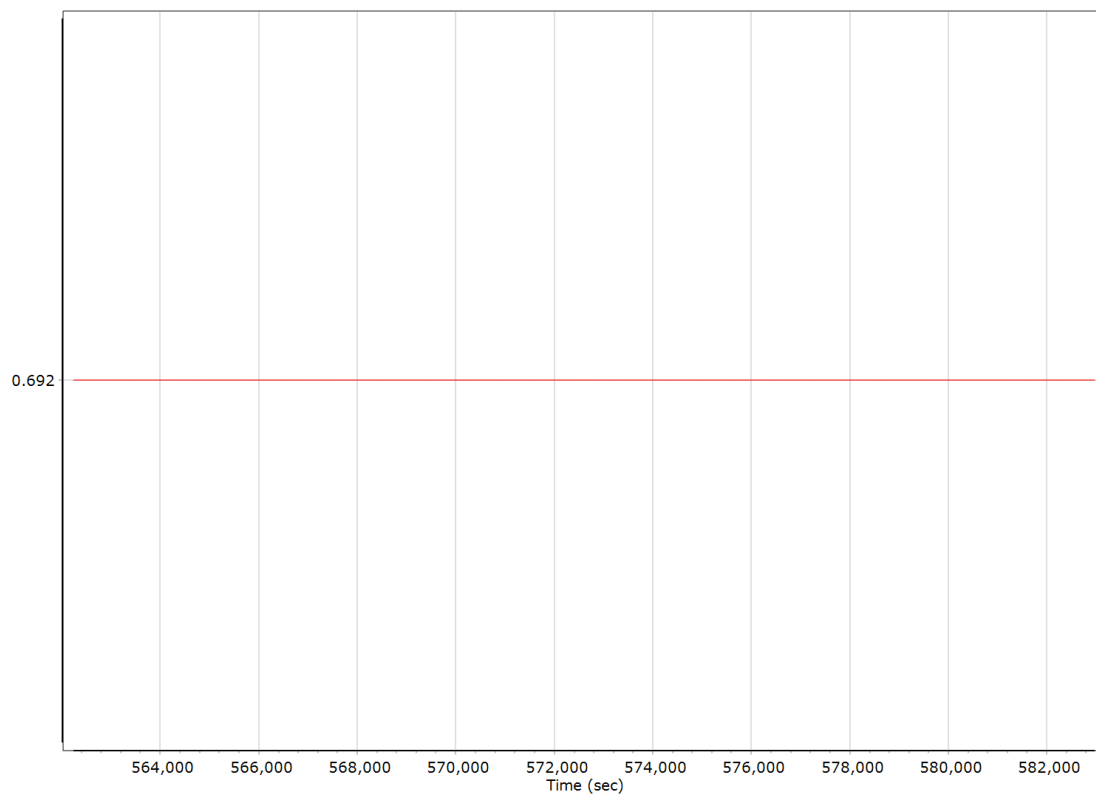
## GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	561995.000 (5/14/2022 12:06:35 PM)		
Processing end time	582969.000 (5/14/2022 5:56:09 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

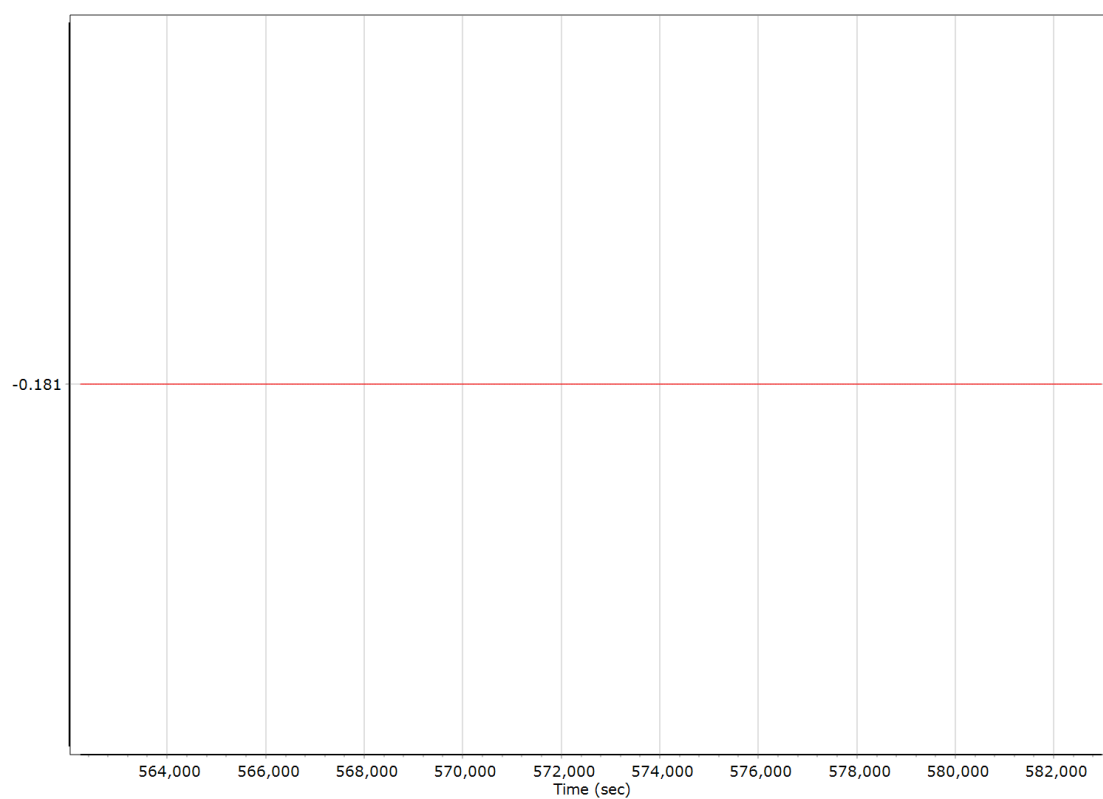
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

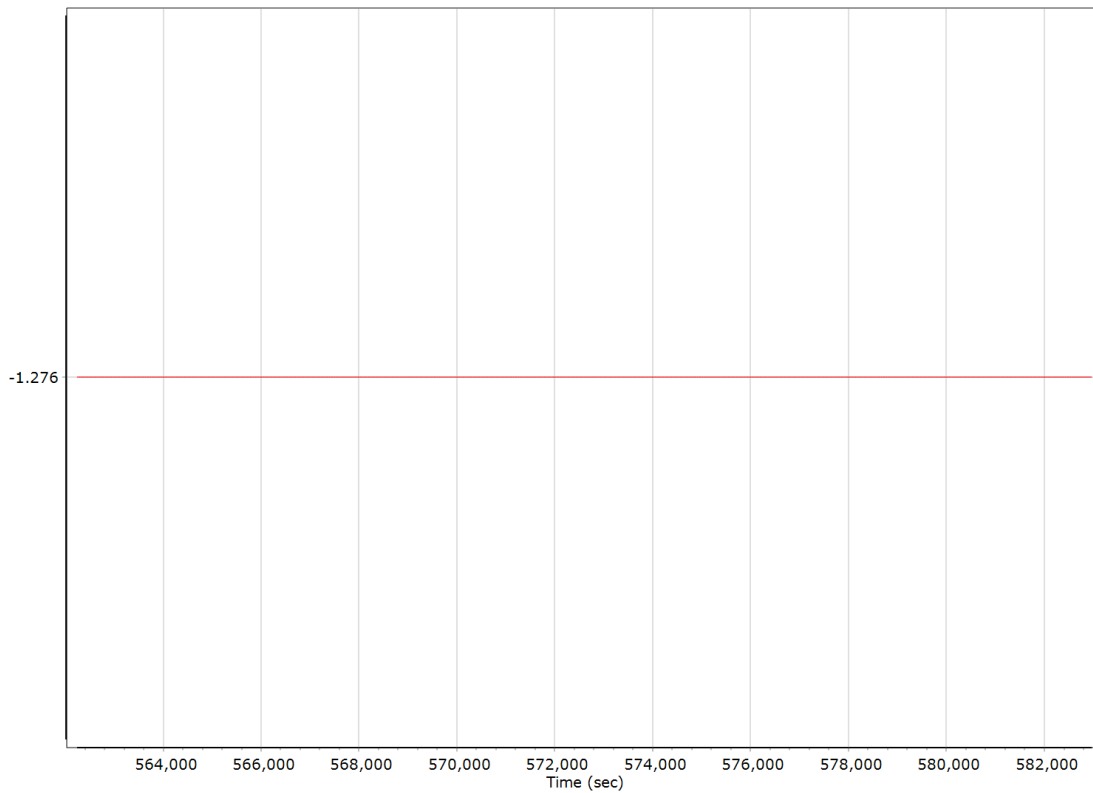
#### X Reference-Primary GNSS Lever Arm (m)



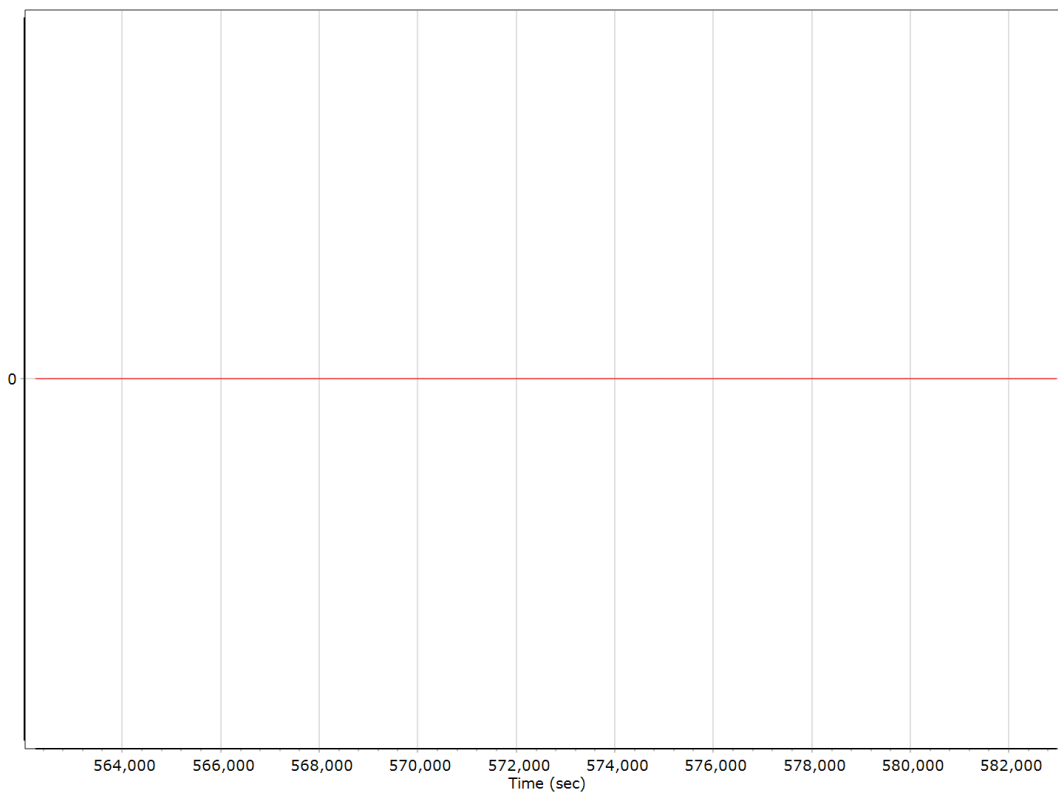
#### Y Reference-Primary GNSS Lever Arm (m)



### Z Reference-Primary GNSS Lever Arm (m)



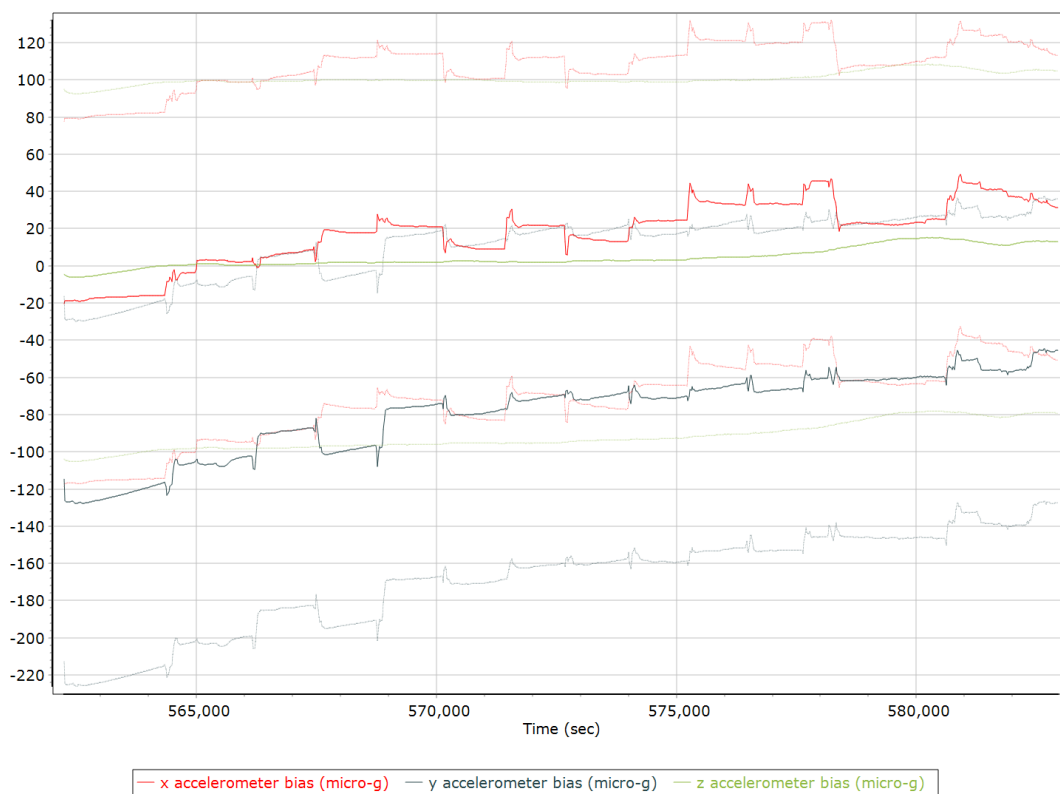
### Reference-Primary GNSS Lever Arm Figure of Merit



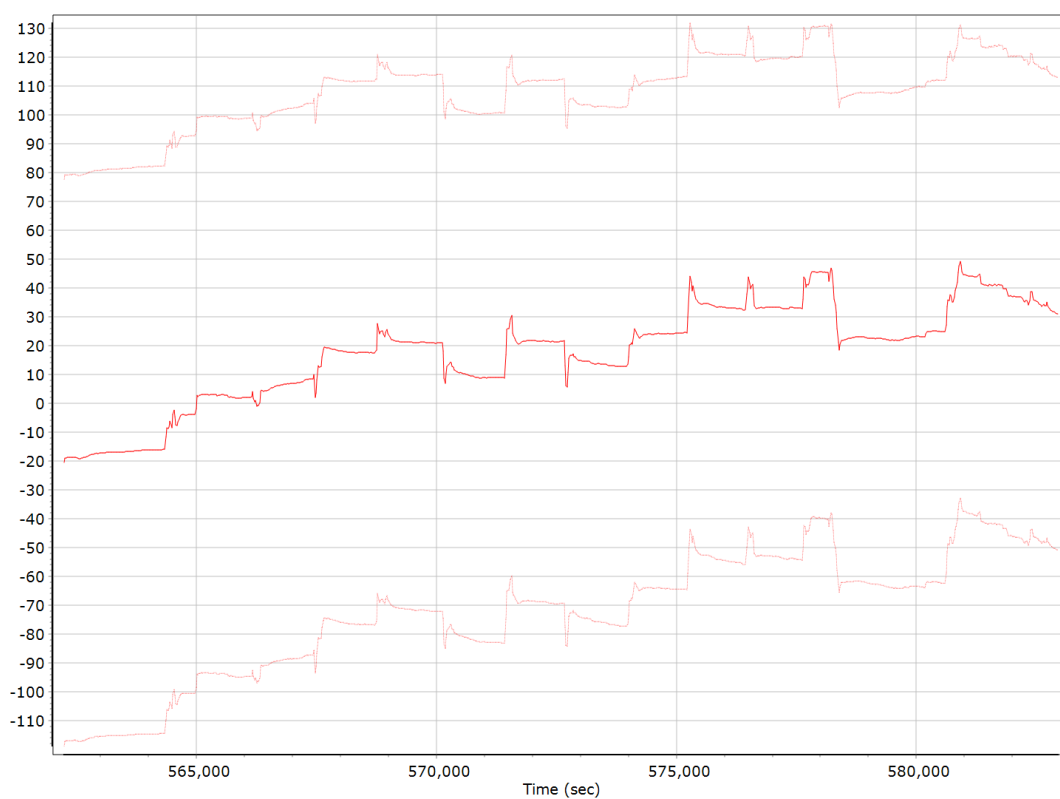
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

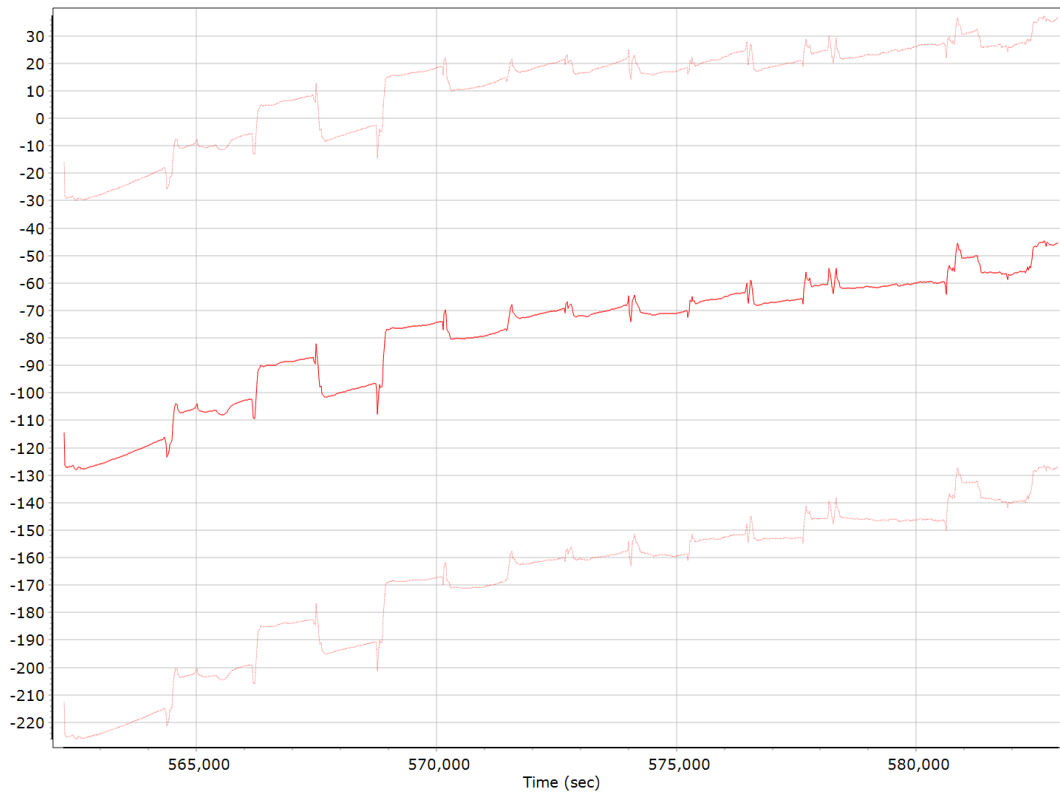
#### Accelerometer Bias (micro-g)



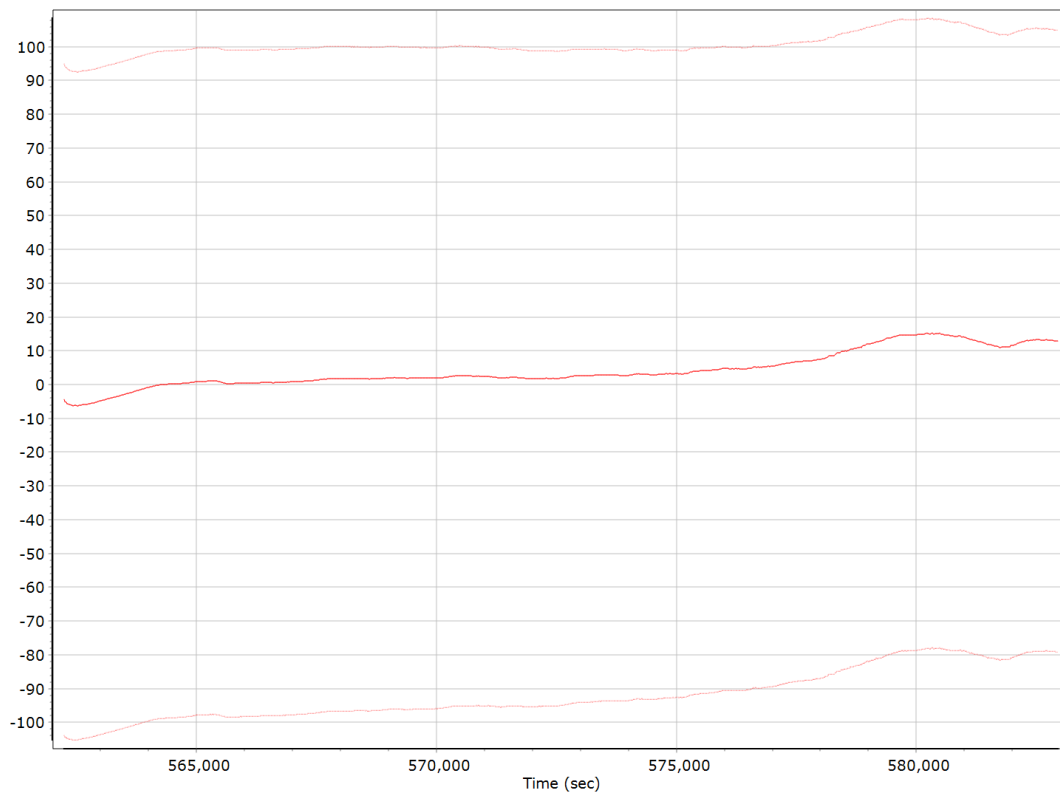
#### X Accelerometer Bias (micro-g)



### Y Accelerometer Bias (micro-g)



### Z Accelerometer Bias (micro-g)



## Accelerometer Scale Error (ppm)



## X Accelerometer Scale Error (ppm)





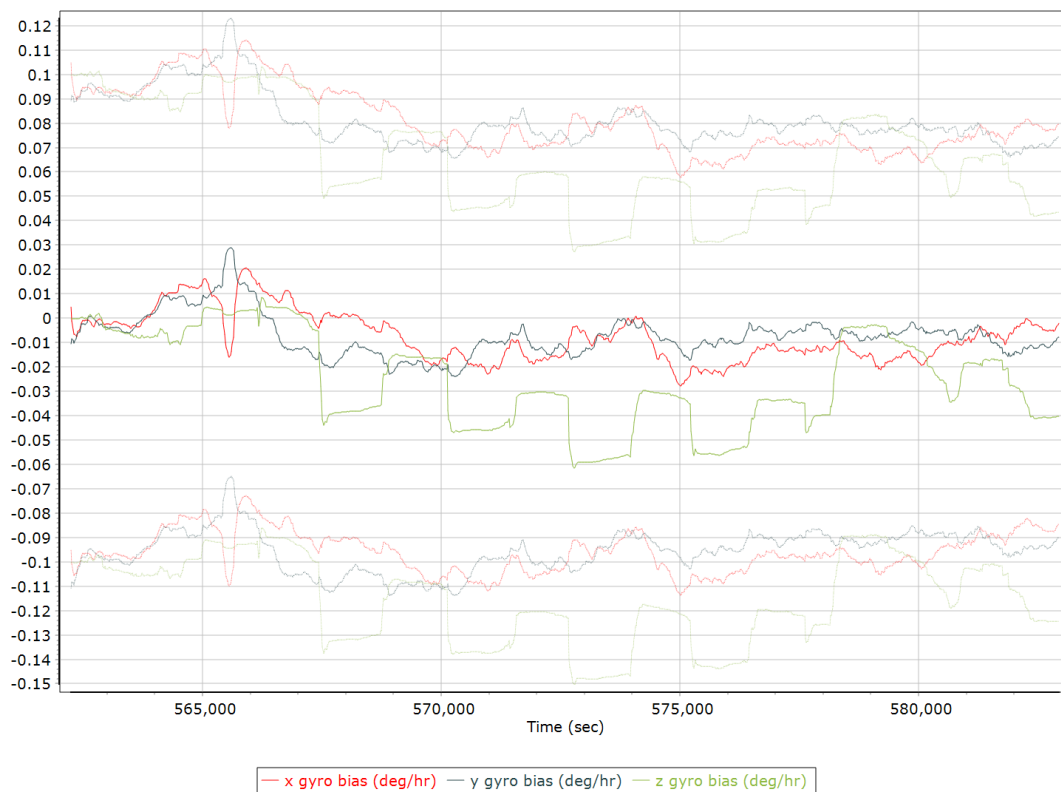
### Y Accelerometer Scale Error (ppm)



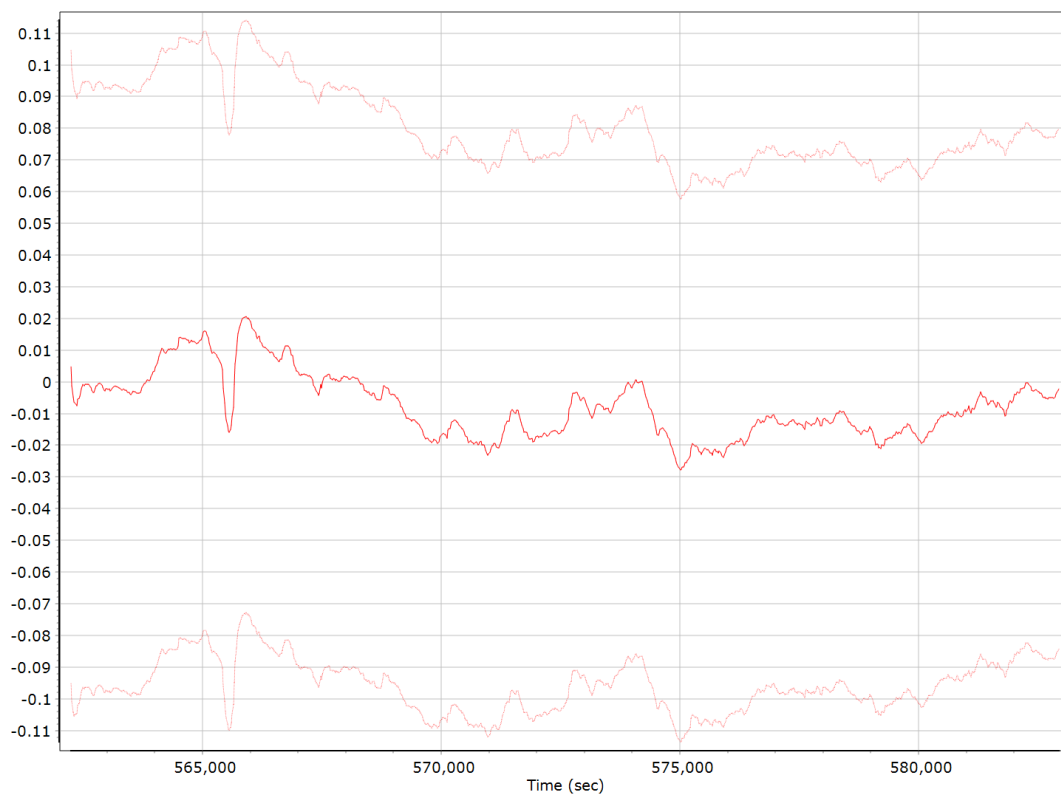
### Z Accelerometer Scale Error (ppm)



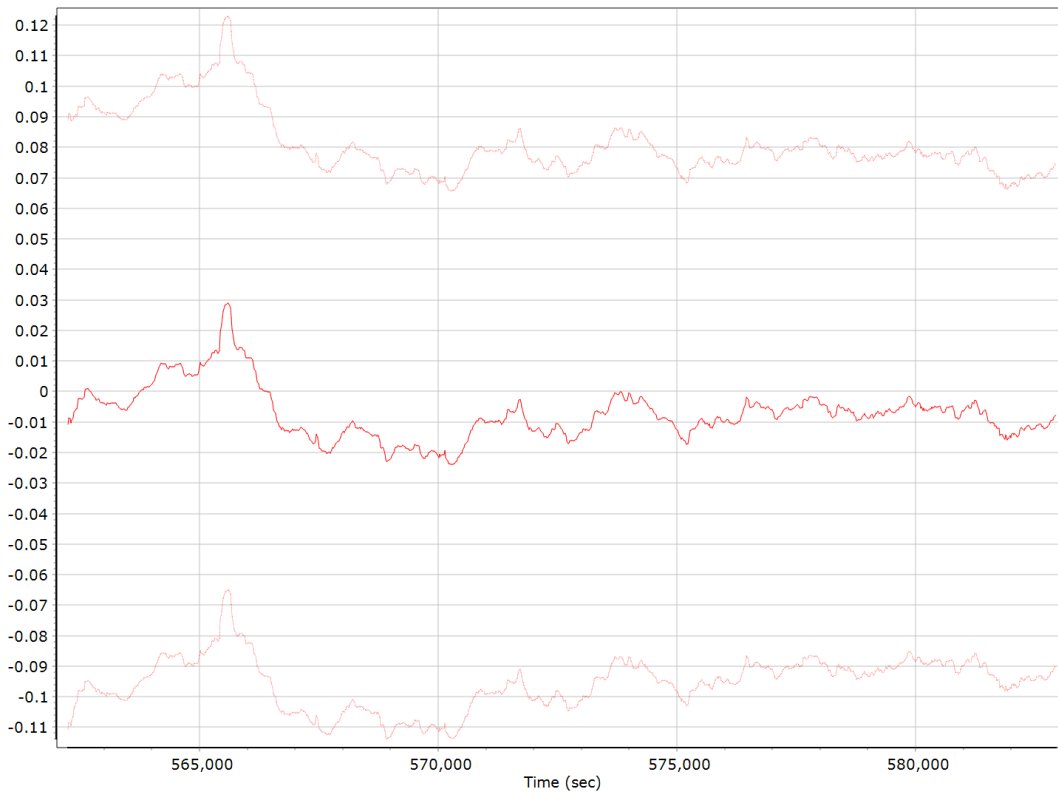
## Gyro Bias (deg/h)



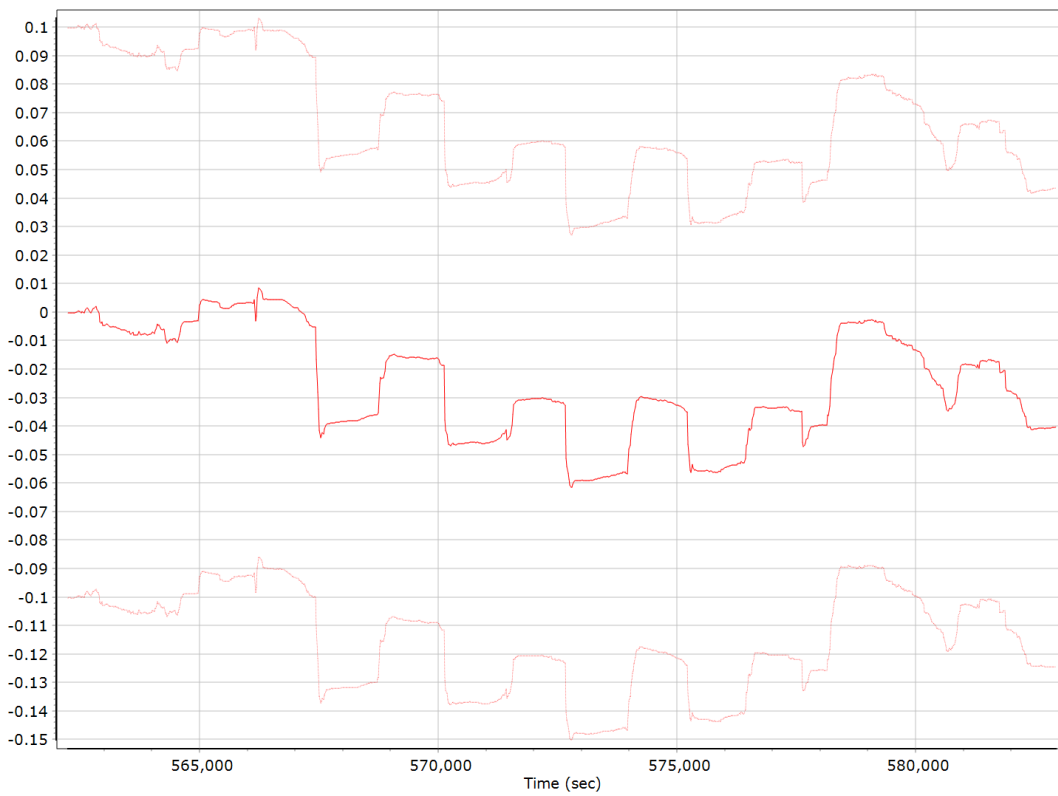
## X Gyro Bias (deg/h)



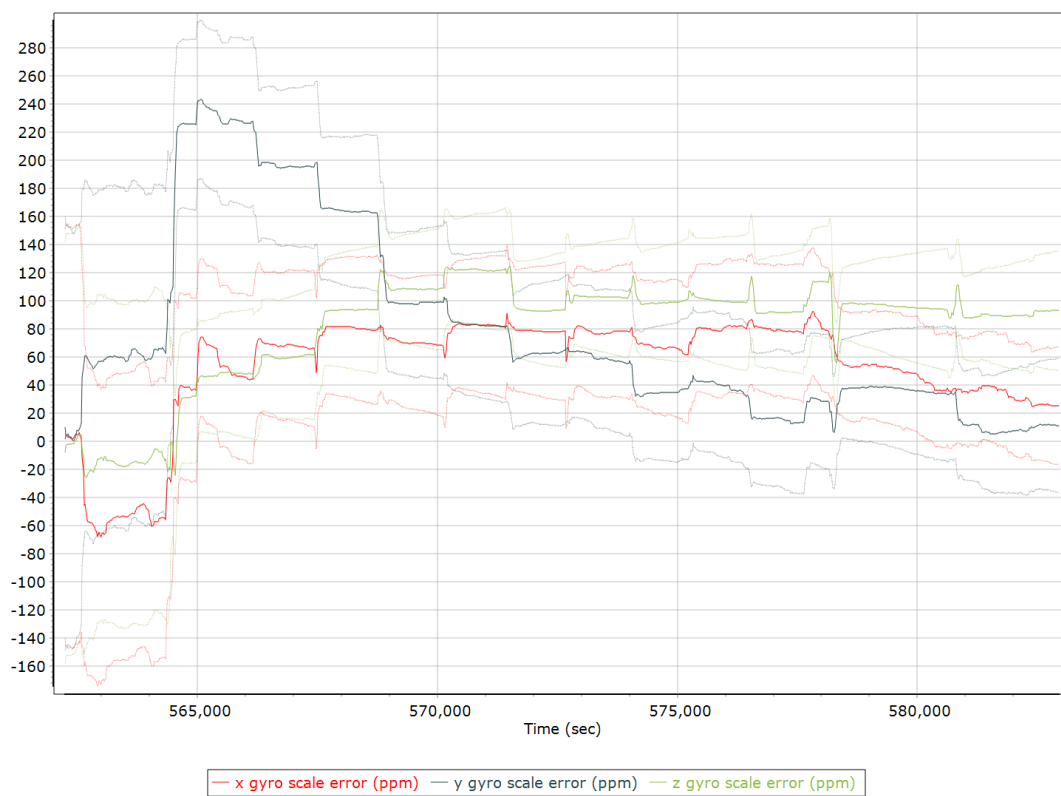
### Y Gyro Bias (deg/h)



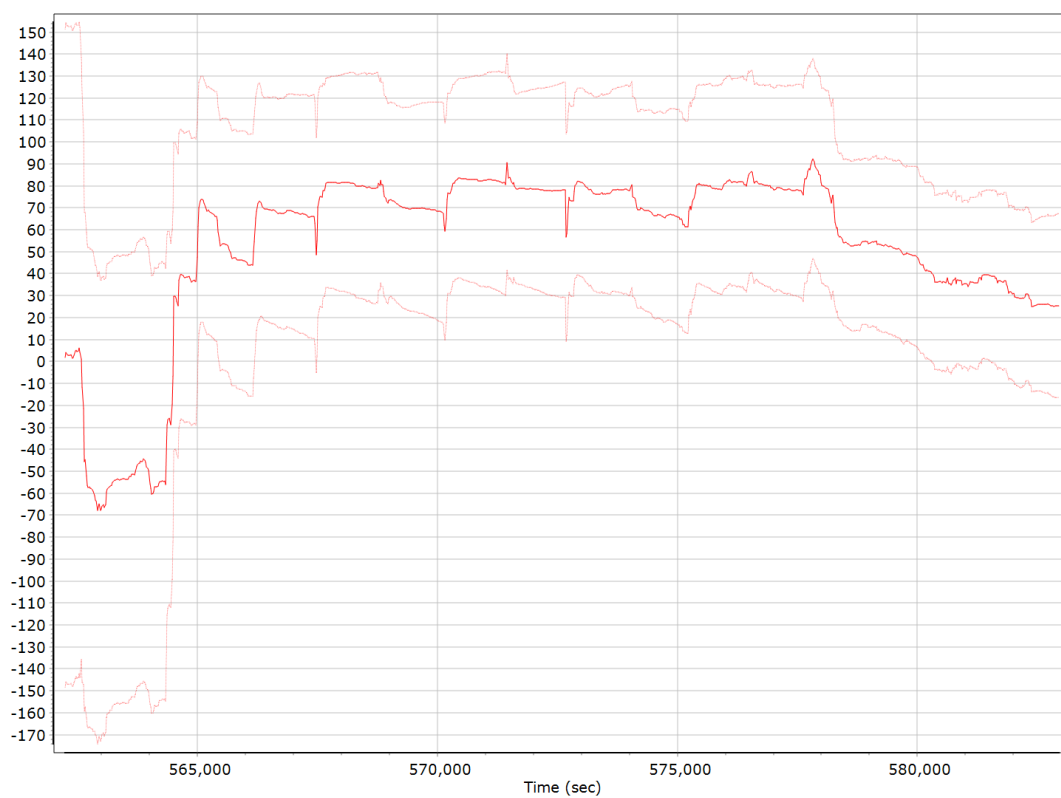
### Z Gyro Bias (deg/h)



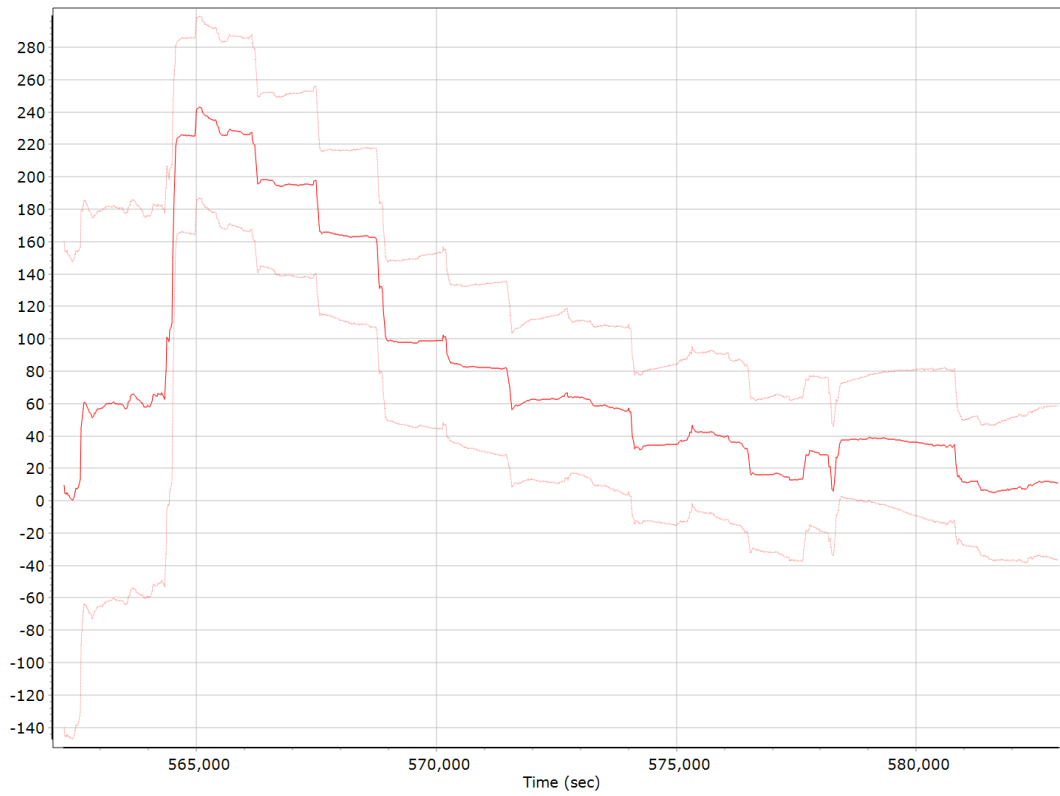
### Gyro Scale Error (ppm)



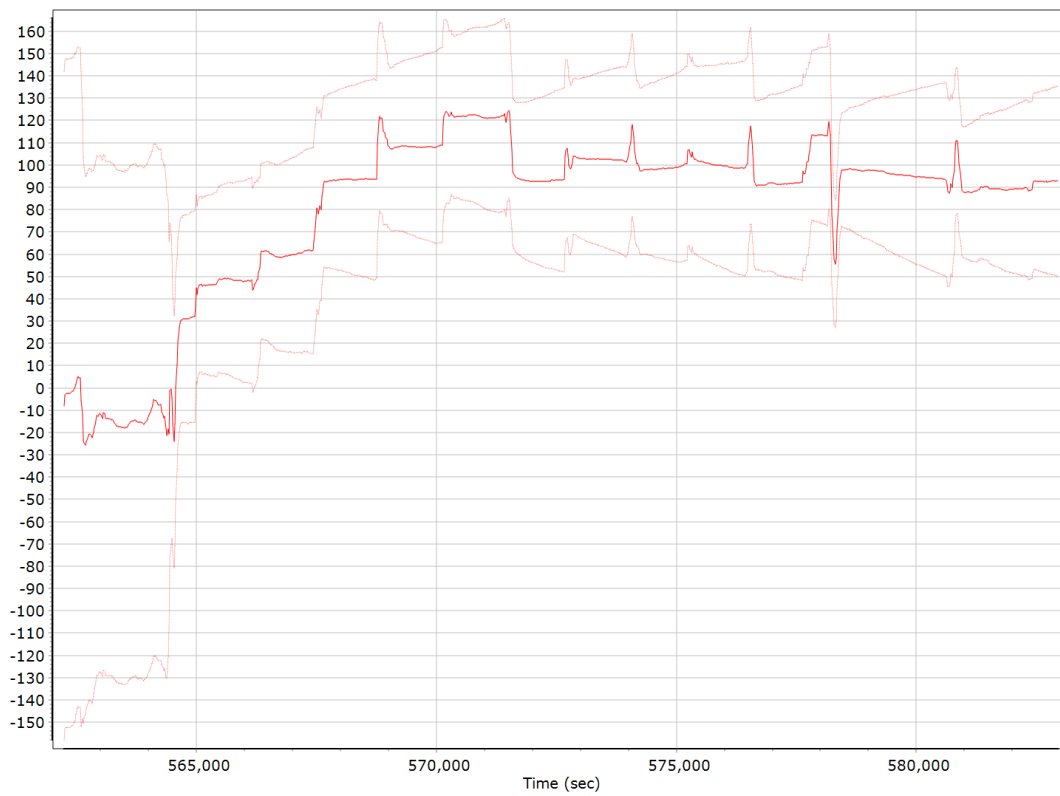
### X Gyro Scale Error (ppm)



### Y Gyro Scale Error (ppm)

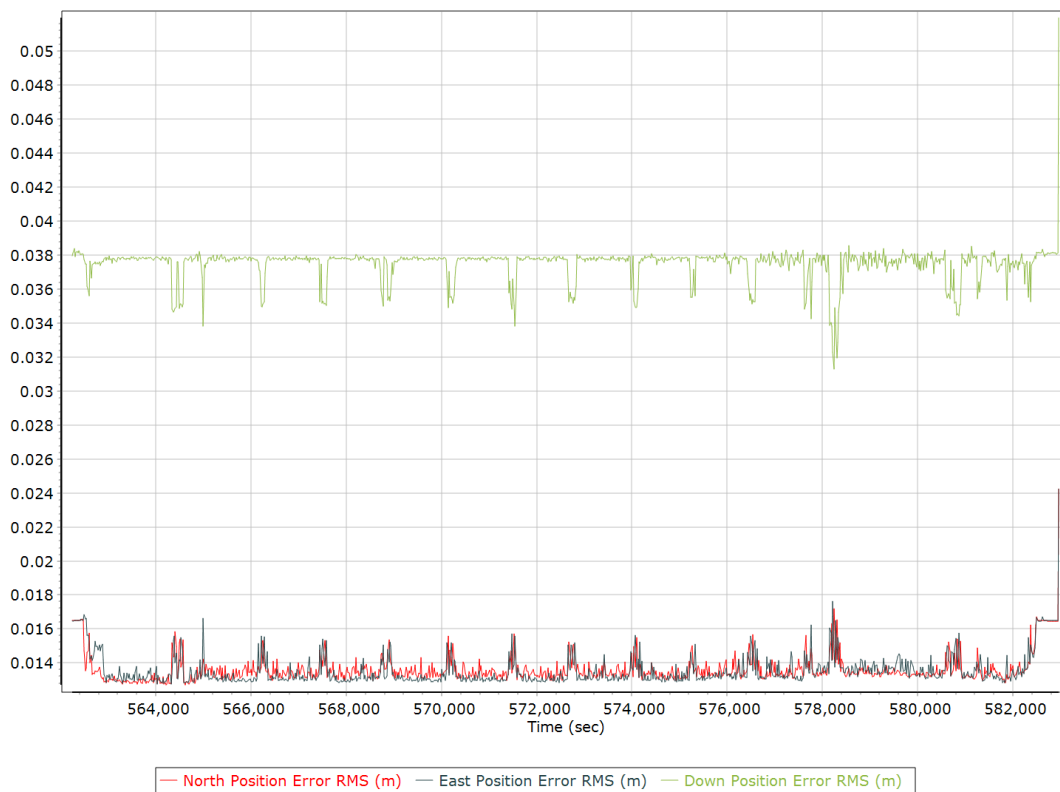


### Z Gyro Scale Error (ppm)



## Smoothed Performance Metrics

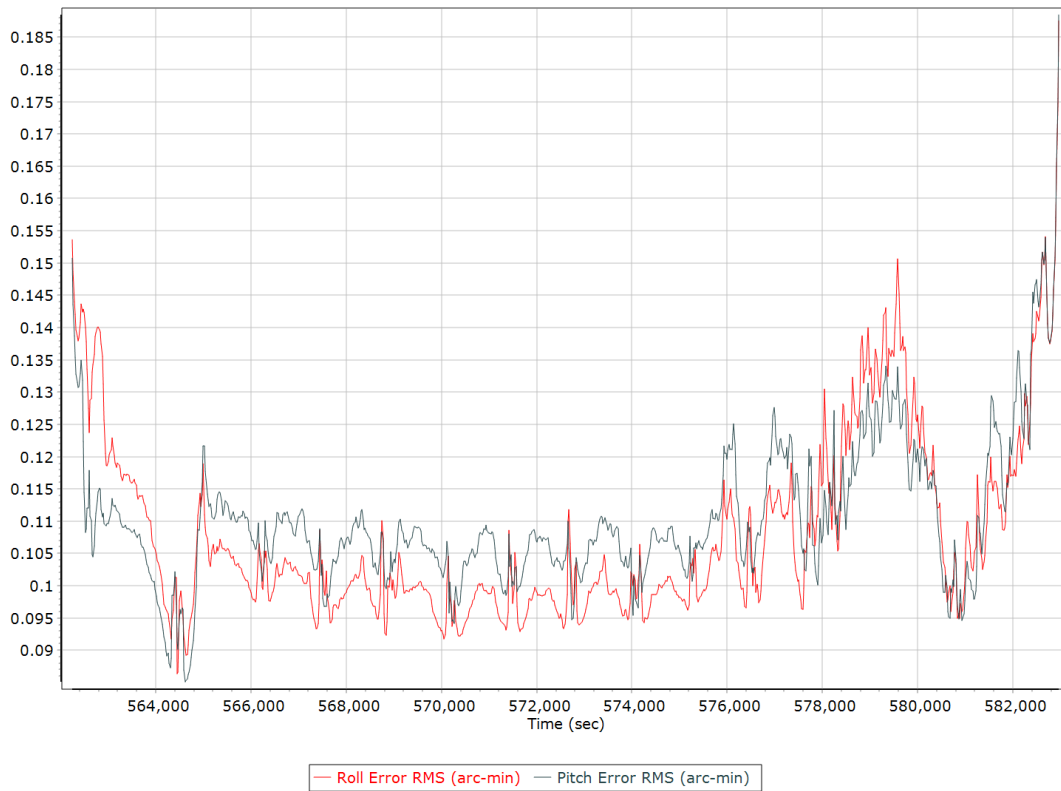
### Position Error RMS (m)



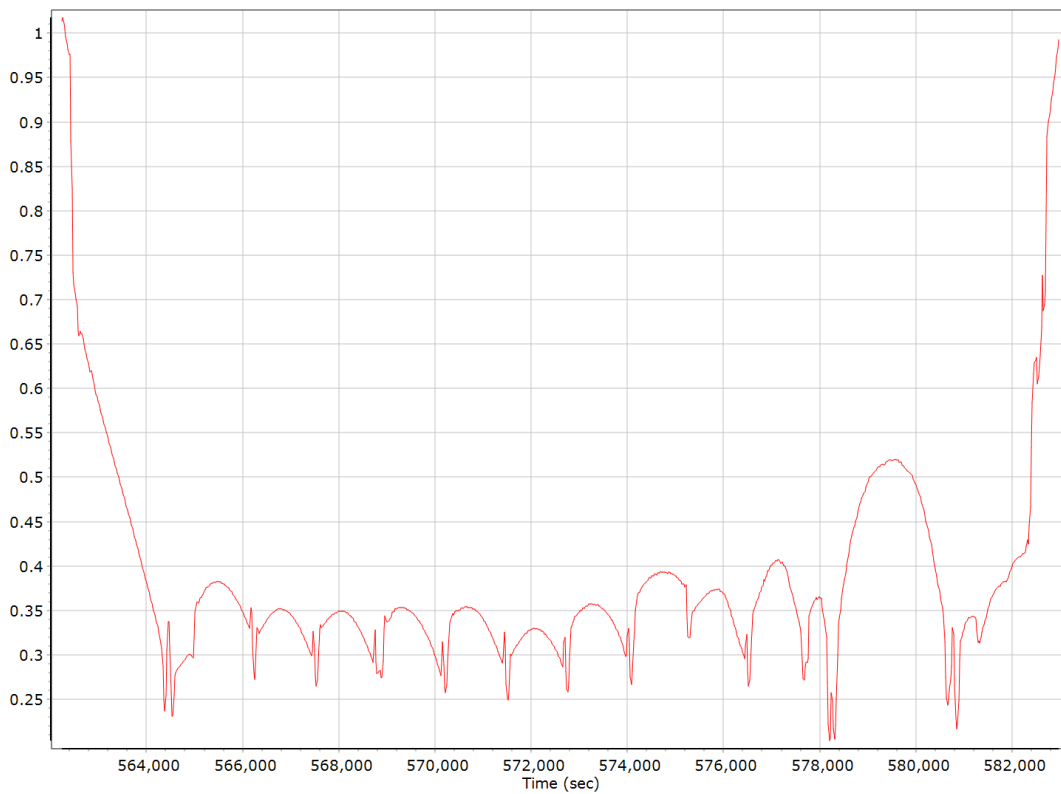
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

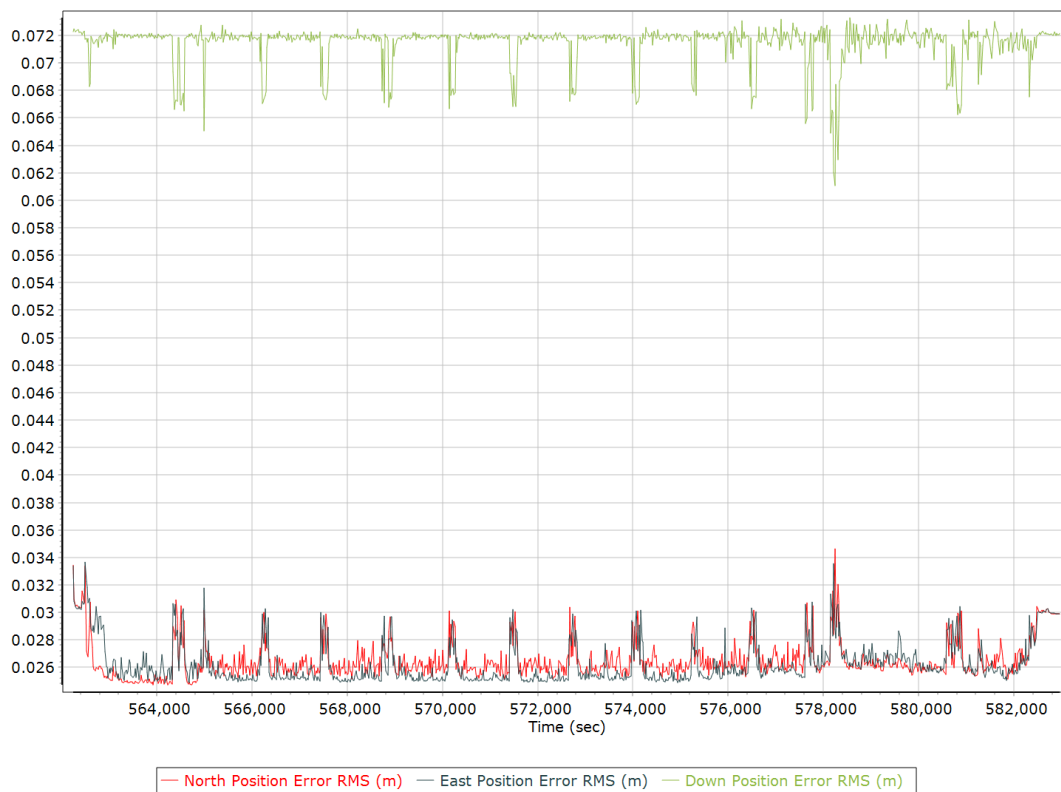


### Heading Error RMS (arc-min)

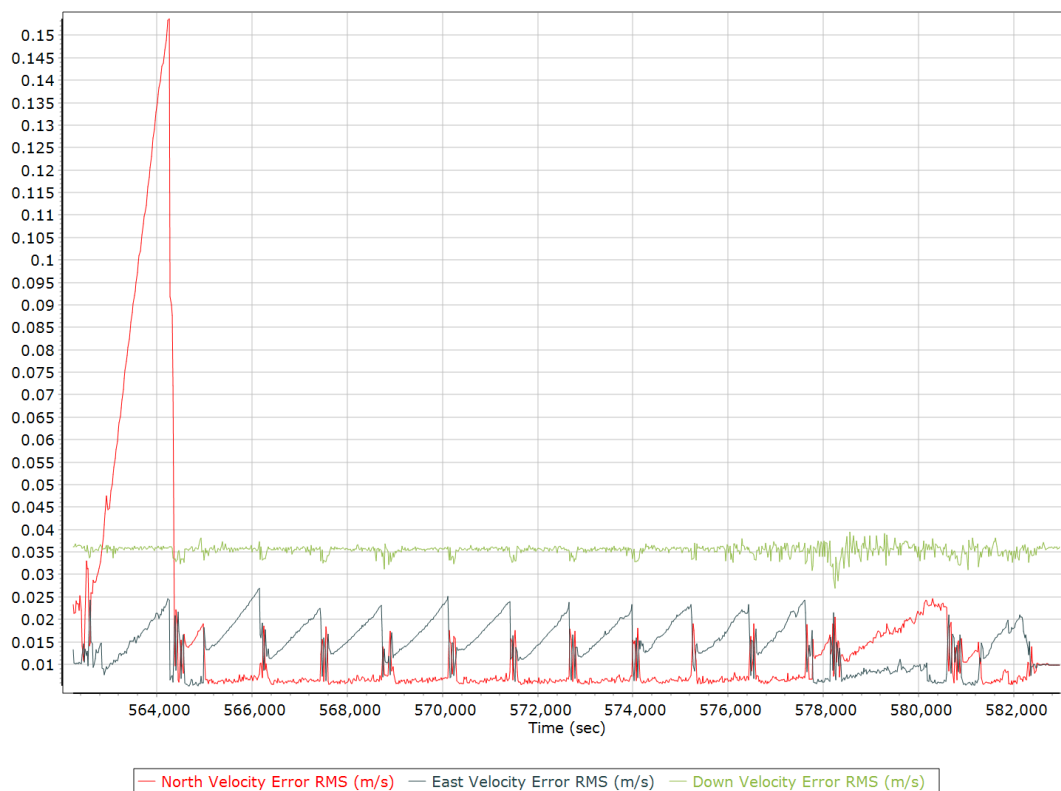


## Forward Processed Performance Metrics

### Position Error RMS (m)

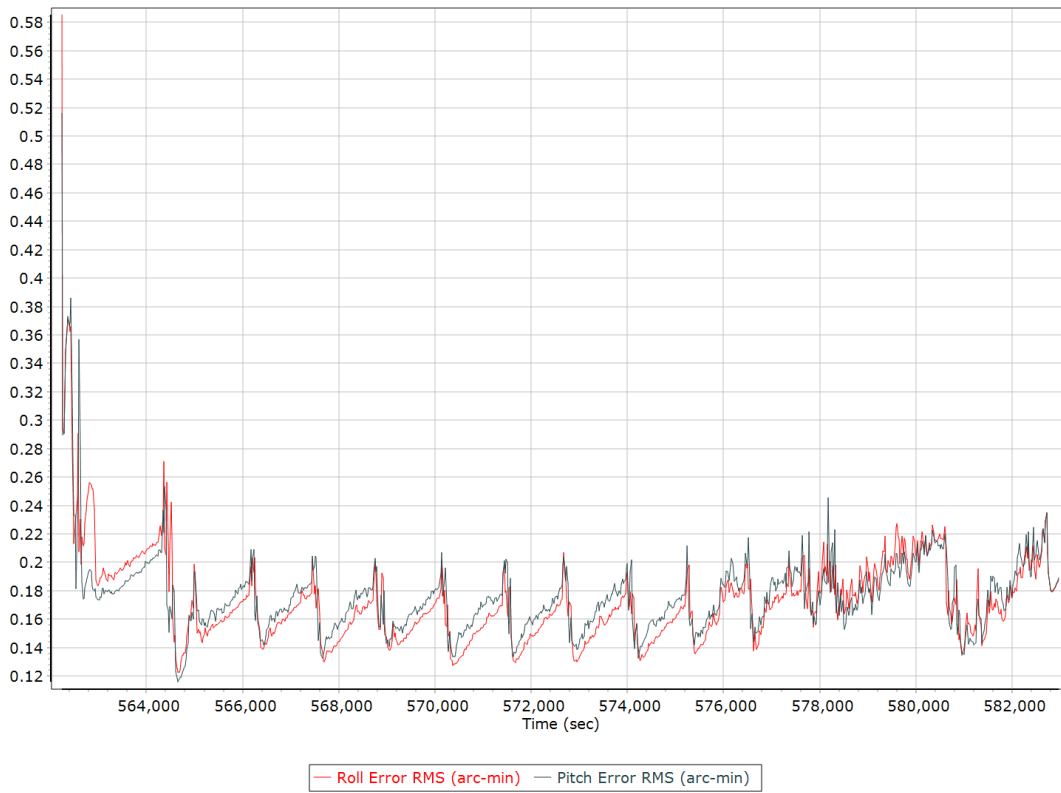


### Velocity Error RMS (m/s)

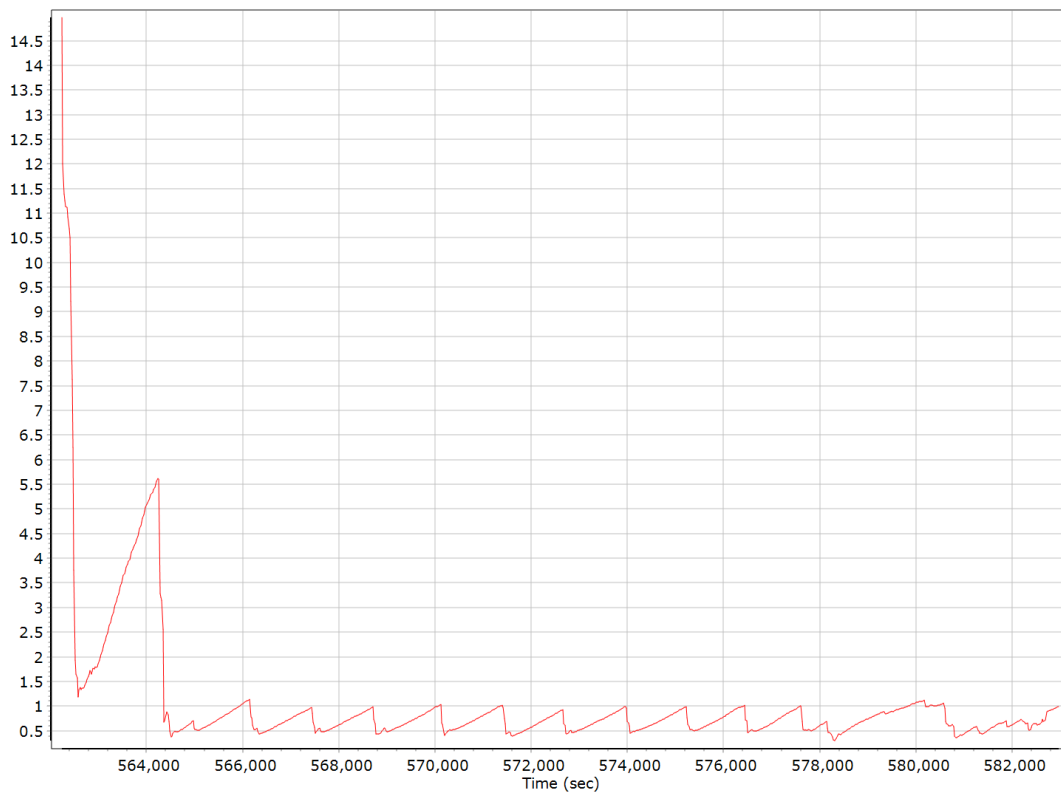




### Roll/Pitch Error RMS (arc-min)

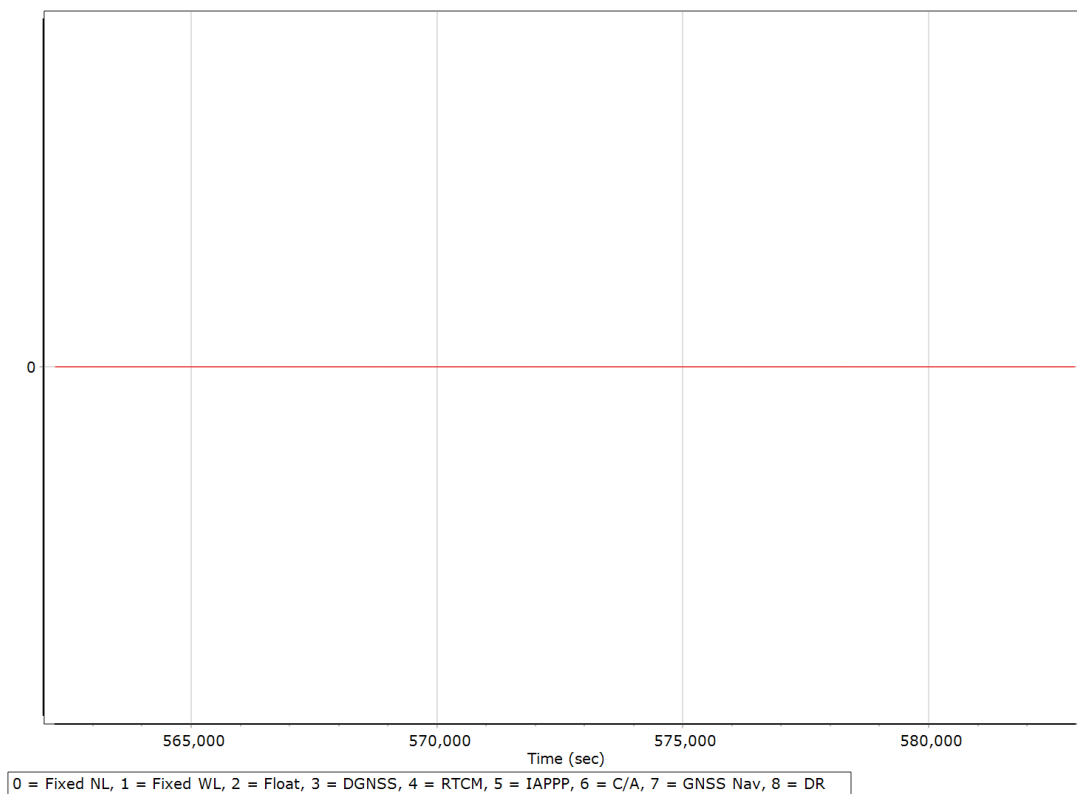


### Heading Error RMS (arc-min)

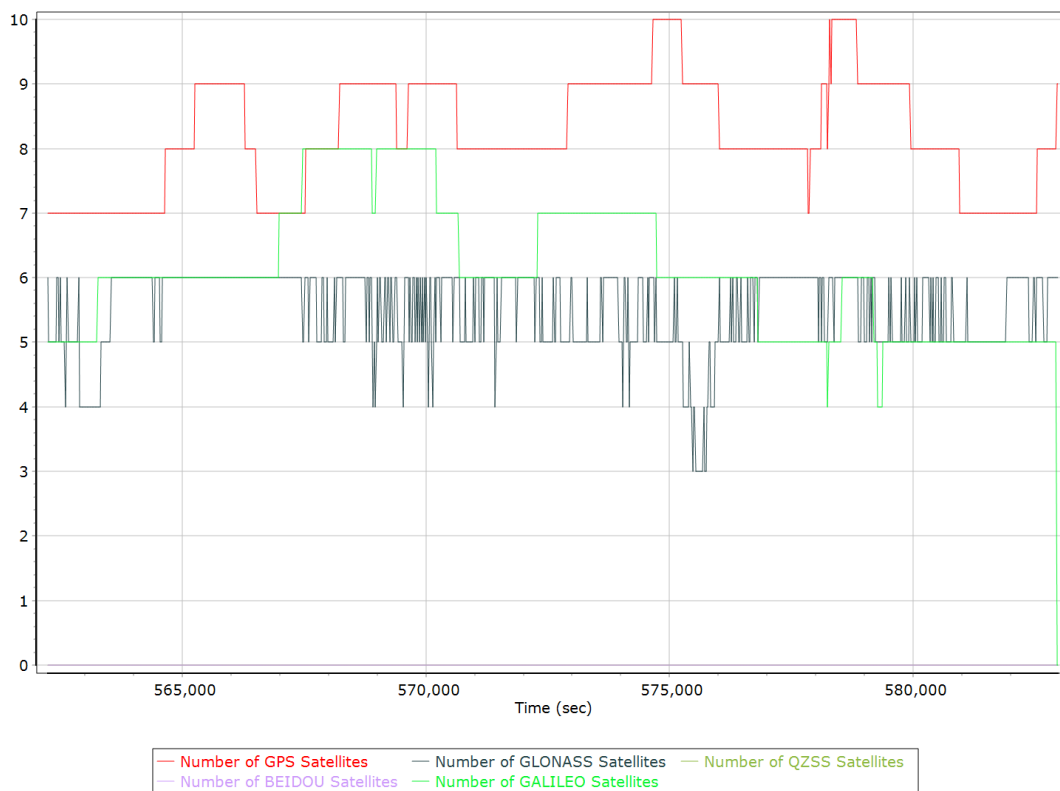


## Forward Processed Solution Status

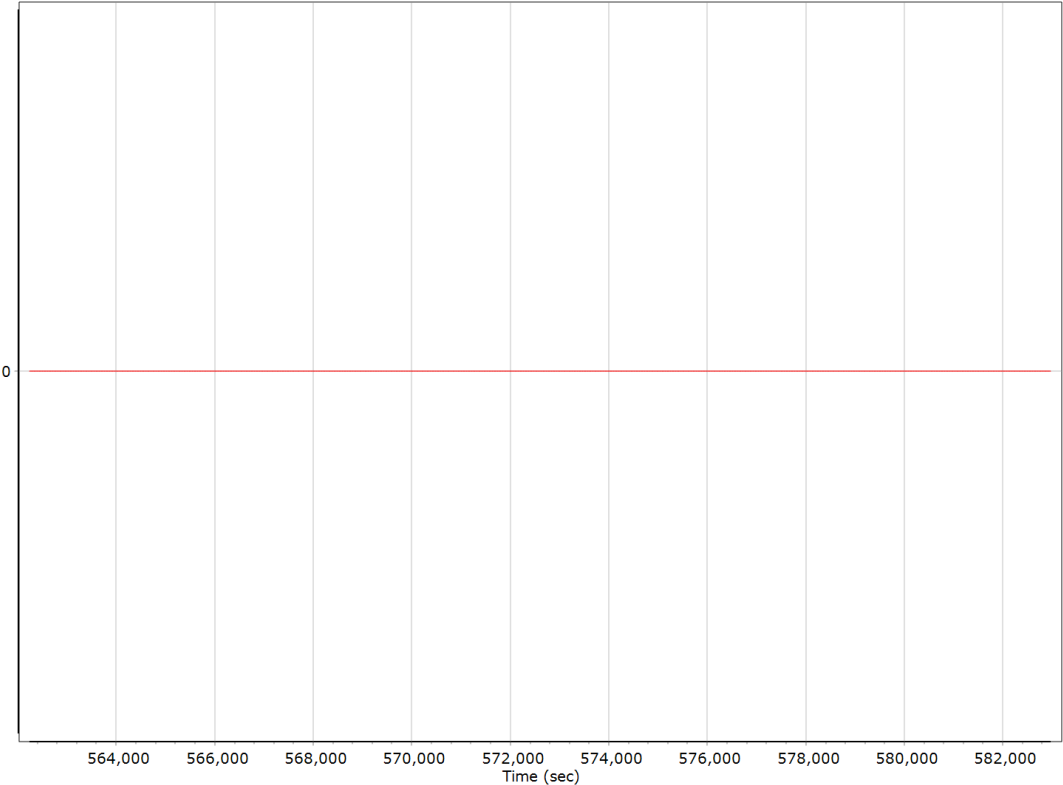
### Processing Mode



### Number of Satellites



Baseline Length



## General Information

### Mission Information

Project name	05152022A_3543
Processing date	2022-05-18 11:30:48
Mission date	2022-05-15 12:03:24
Mission duration	05:47:35.043
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
N62756178.071	POS Data
N62756178.072	POS Data
N62756178.073	POS Data
N62756178.074	POS Data
N62756178.075	POS Data
N62756178.076	POS Data
N62756178.077	POS Data
N62756178.078	POS Data
N62756178.079	POS Data
N62756178.080	POS Data
N62756178.081	POS Data
N62756178.082	POS Data
N62756178.083	POS Data
N62756178.084	POS Data
N62756178.085	POS Data
N62756178.086	POS Data
N62756178.087	POS Data
N62756178.088	POS Data
N62756178.089	POS Data
N62756178.090	POS Data
N62756178.091	POS Data
N62756178.092	POS Data
N62756178.093	POS Data
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

File name	File type
N62756178.130	POS Data
N62756178.131	POS Data
N62756178.132	POS Data
N62756178.133	POS Data
N62756178.134	POS Data
N62756178.135	POS Data

## Input Files

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

## Output Files

Filename	File type
sbt_05152022A_3543.out	SBET Trajectory File

## Rover Data Summary

First raw data file	N62756178.071		
Last raw data file	N62756178.135		
Start GPS week	2210		
Start time	43385.864 (5/15/2022 12:03:05 PM)		
End time	64240.907 (5/15/2022 5:50:40 PM)		
Start of fine alignment	43661.053 (5/15/2022 12:07:41 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

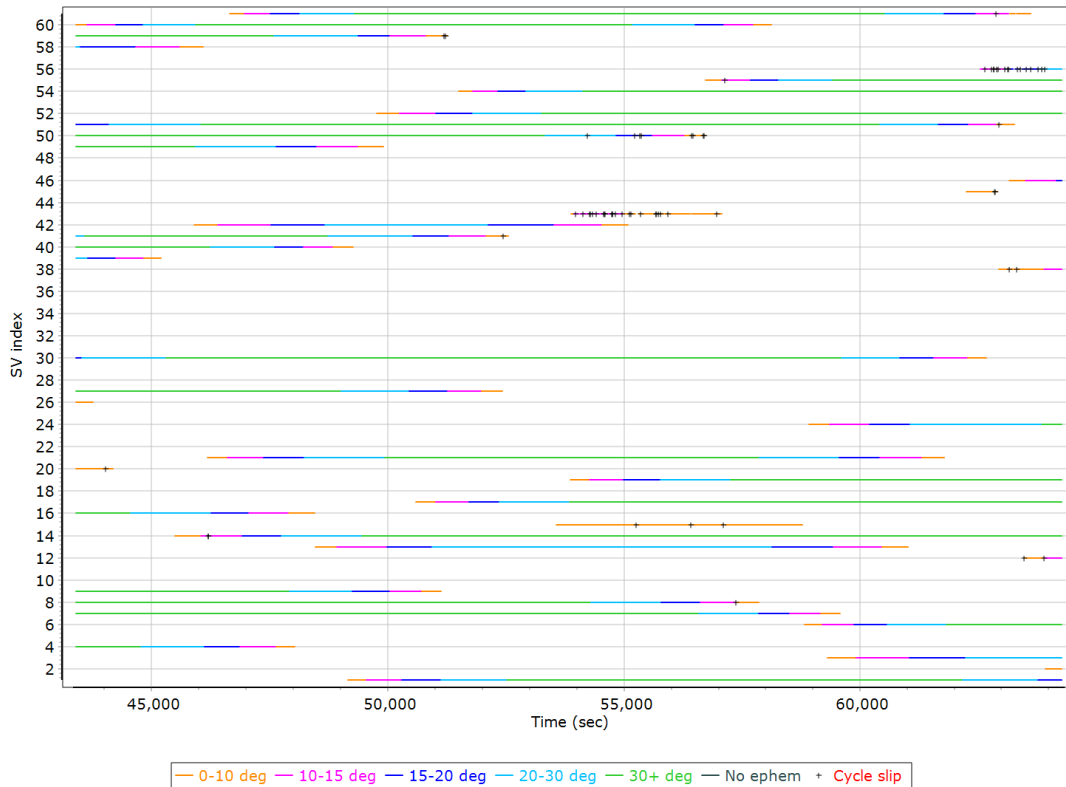
## Rover Data QC

### Raw IMU Import QC Summary

IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05152022A_3543.log
IMU Records Processed	4170909
Termination Status	Normal
IMU Anomalies	0

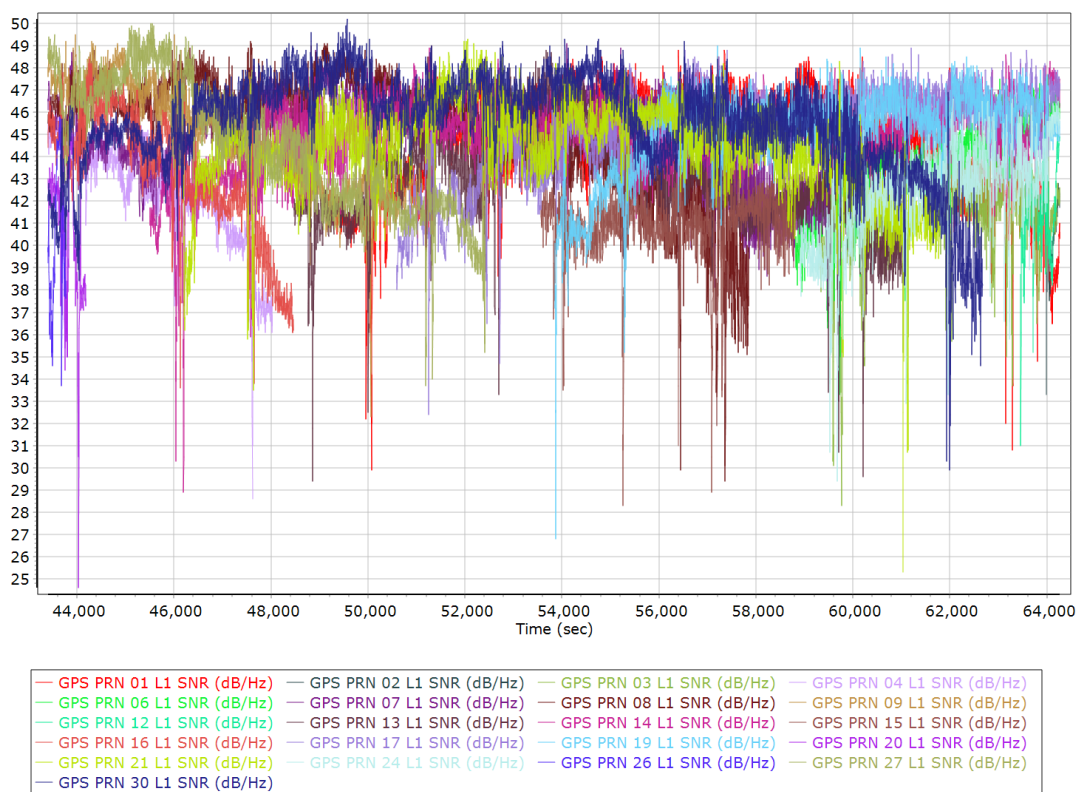
## Primary Observables & Satellite Data

### GPS/GLONASS L1 Satellite Lock/Elevation

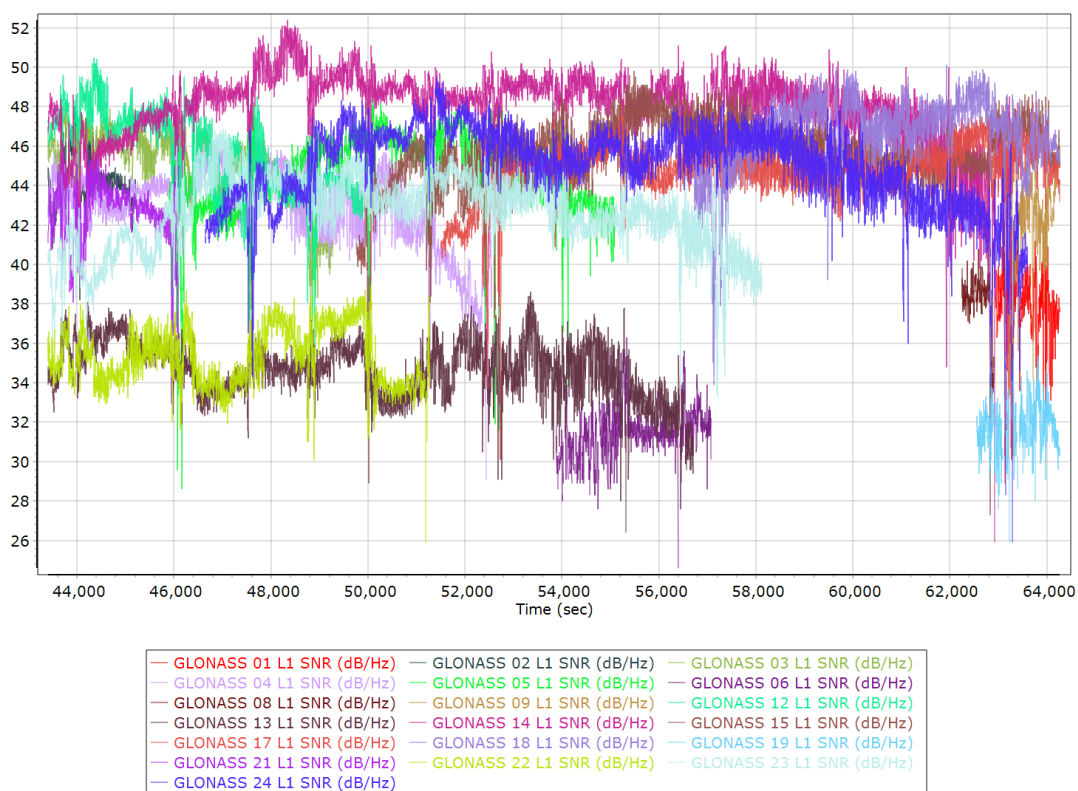




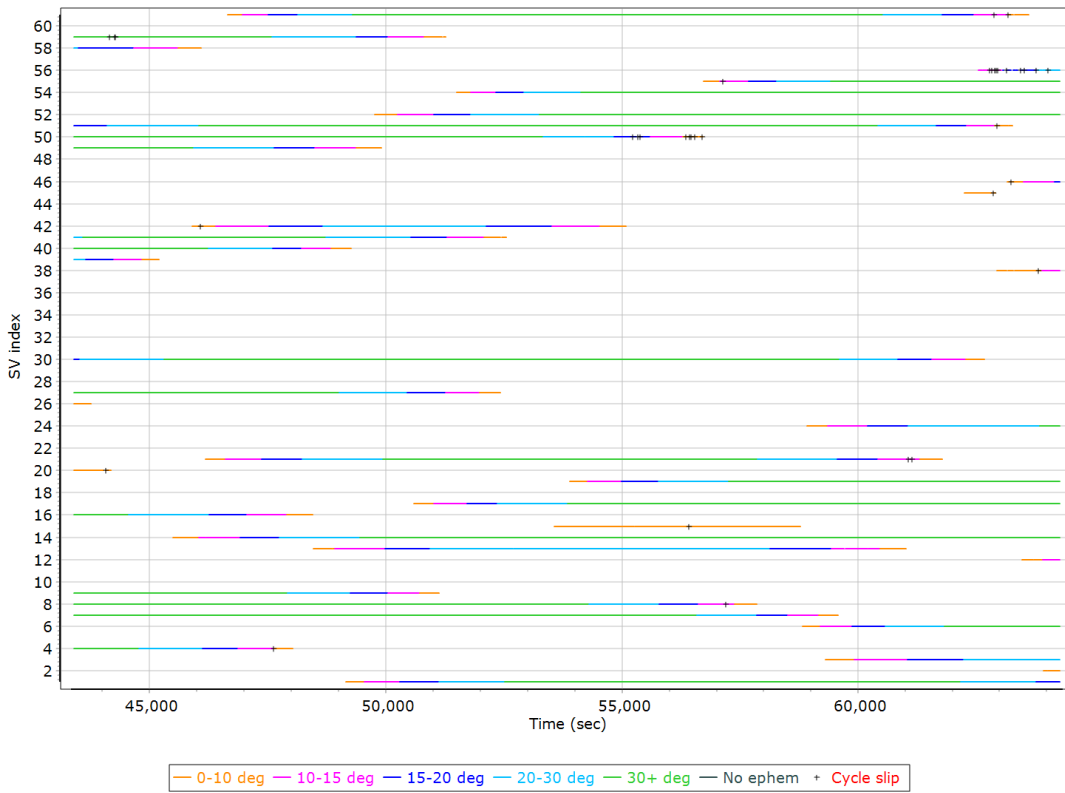
## GPS L1 SNR



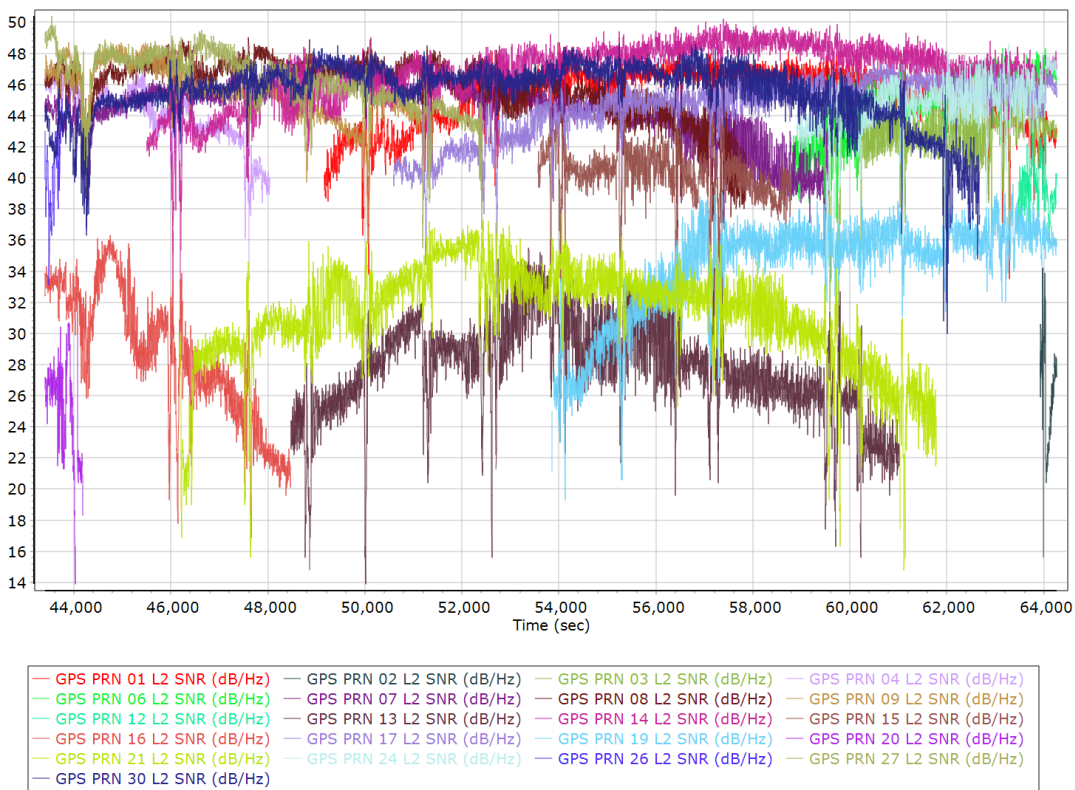
## GLONASS L1 SNR



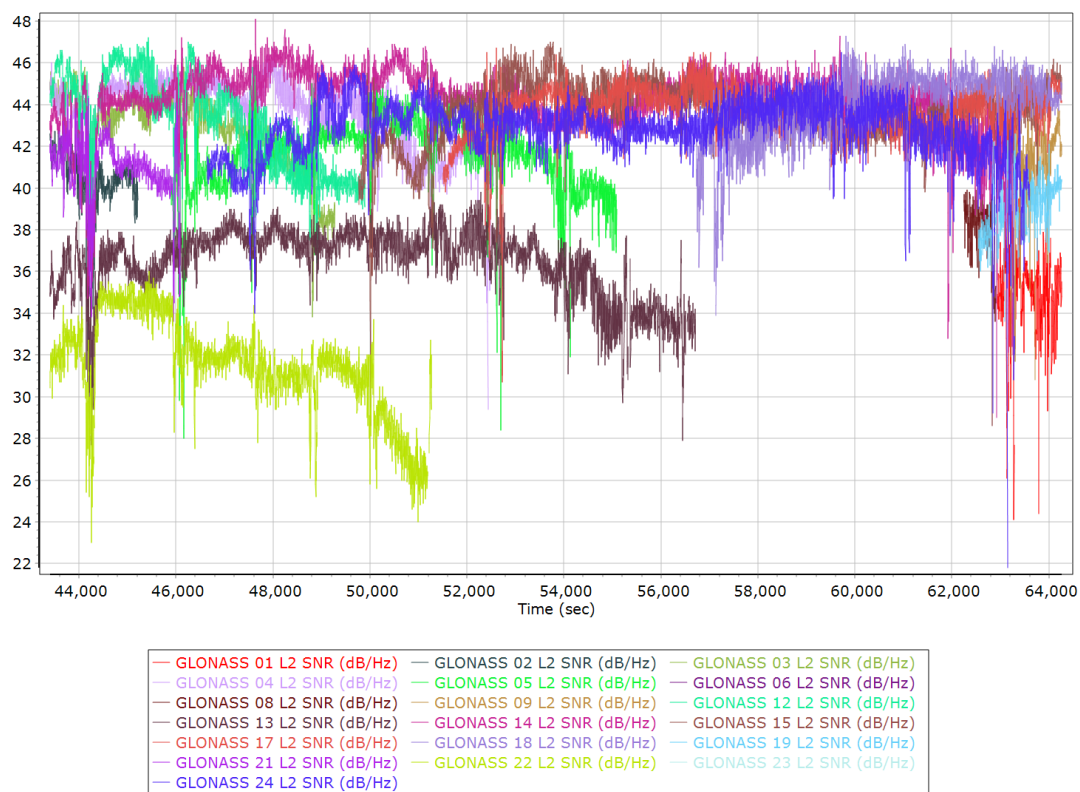
## GPS/GLONASS L2 Satellite Lock/Elevation



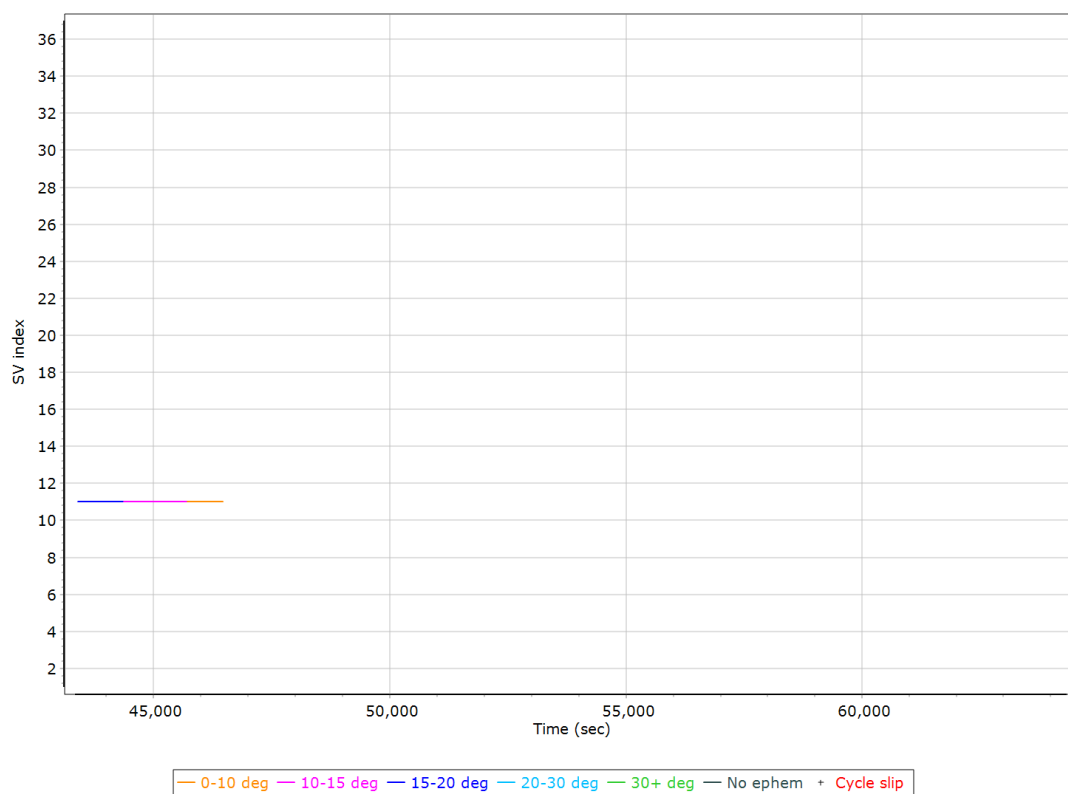
## GPS L2 SNR



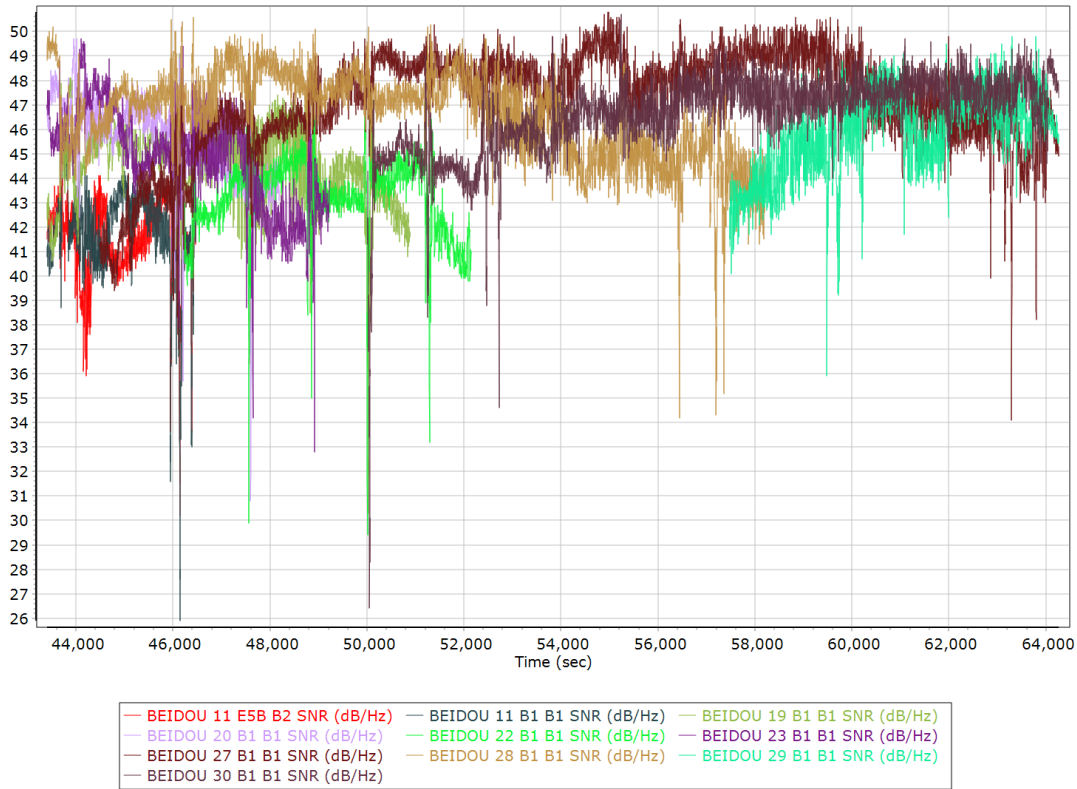
## GLONASS L2 SNR



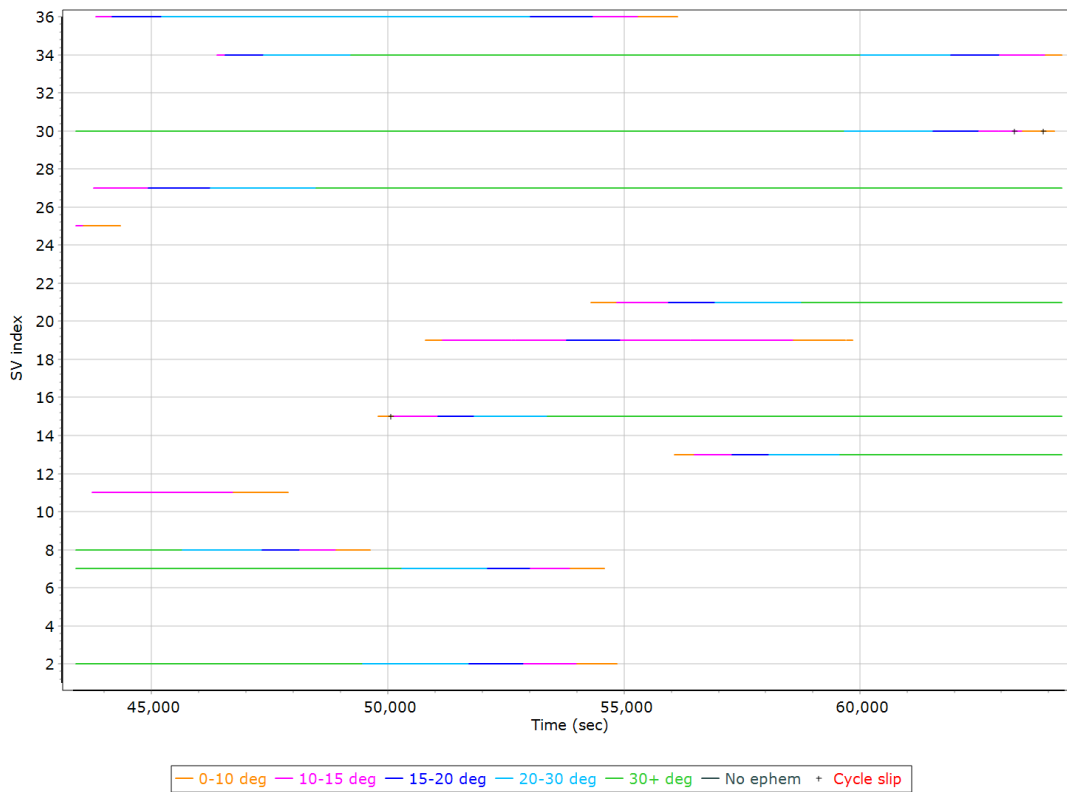
## BEIDOU Satellite Lock/Elevation



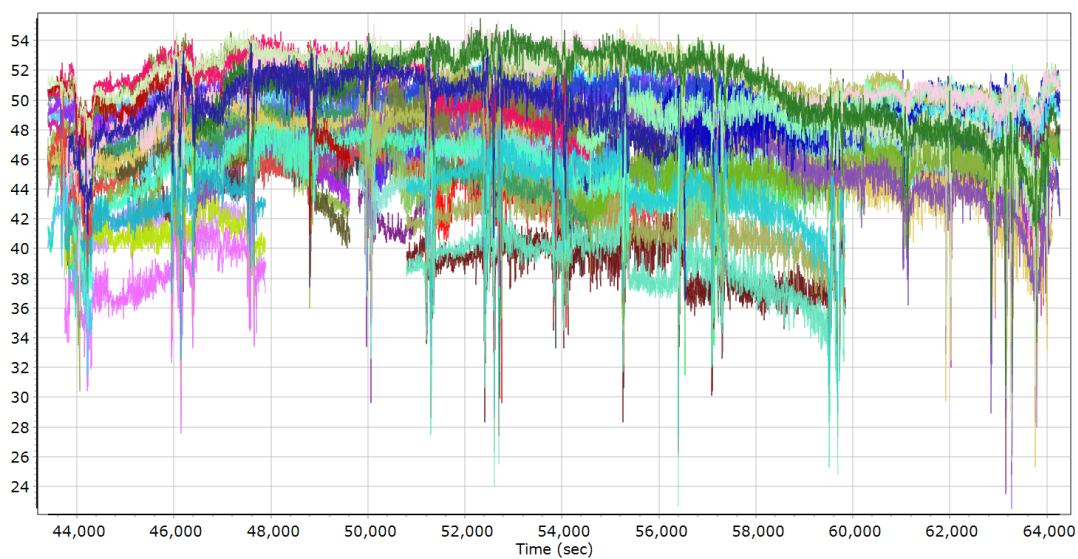
## BEIDOU SNR



## GALILEO Satellite Lock/Elevation



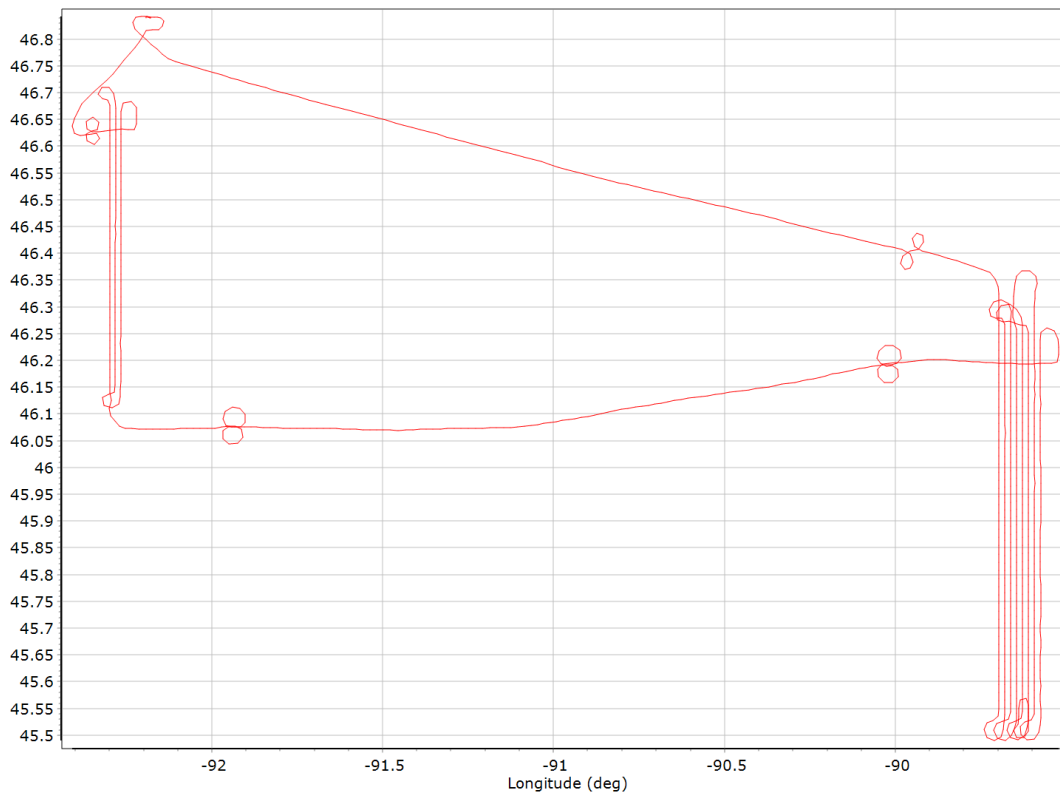
## GALILEO SNR



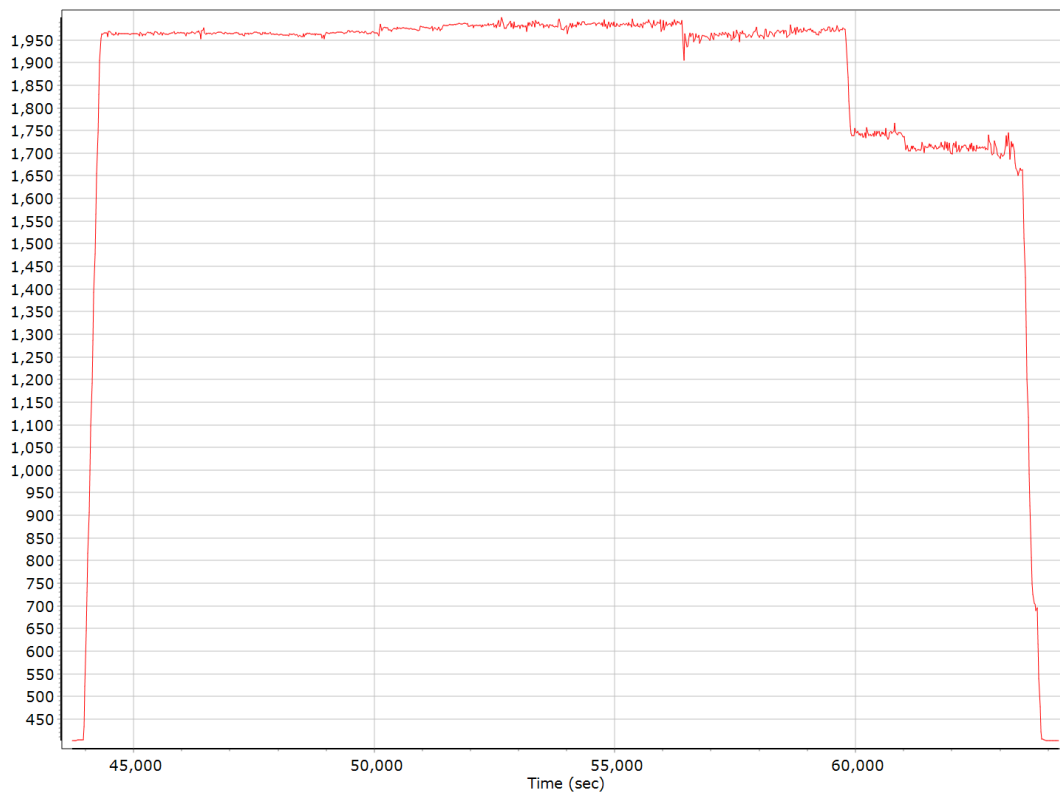
— GALILEO 02 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 07 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 08 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 11 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 13 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 15 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 19 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 21 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 25 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 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)	— GALILEO 19 L5E5A BPSK10_PD SNR (dB/Hz)

## Smoothed Trajectory Information

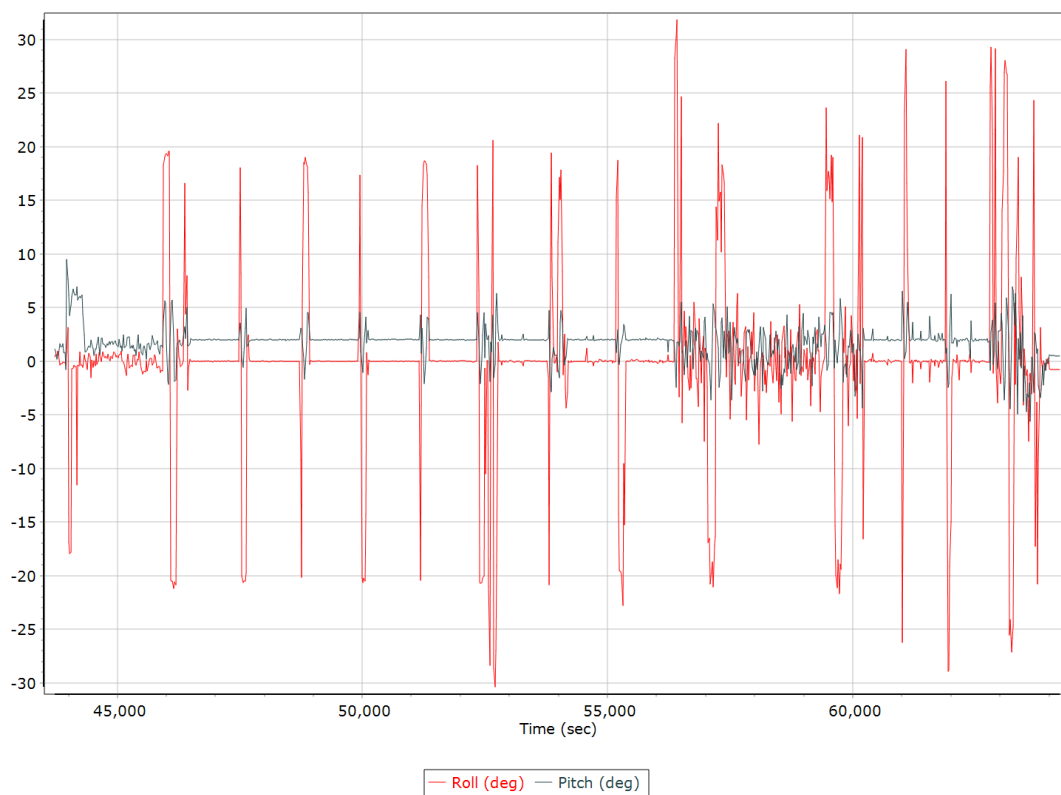
### Top View



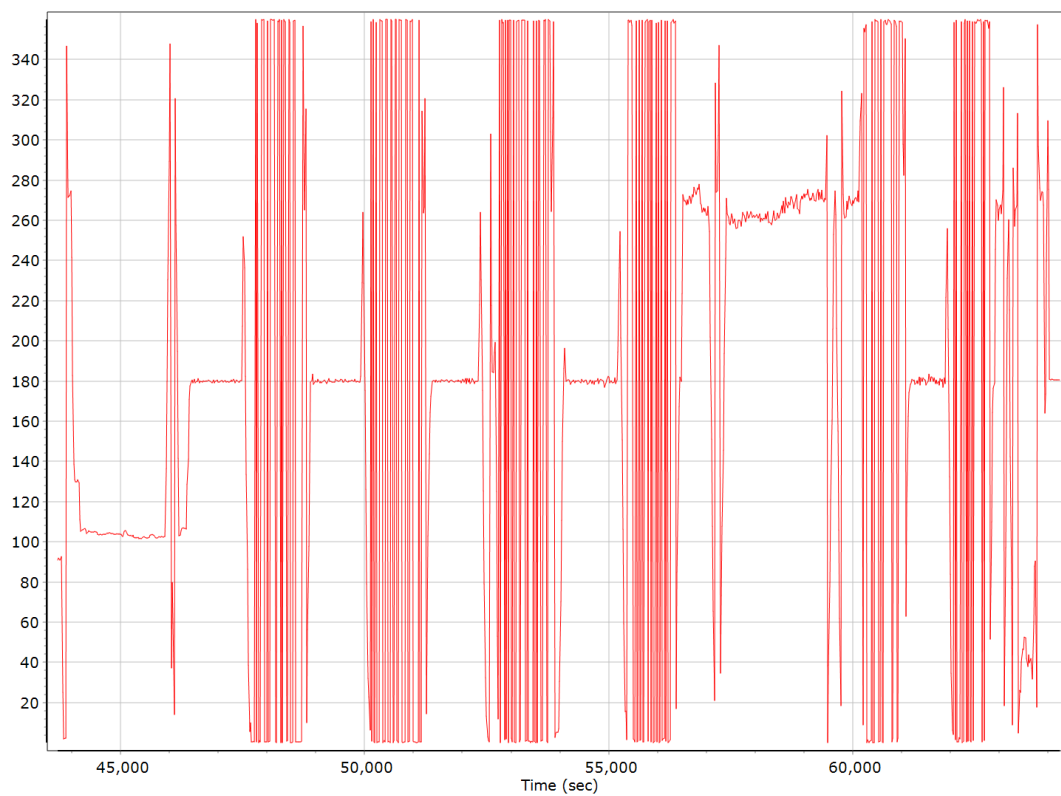
### Altitude



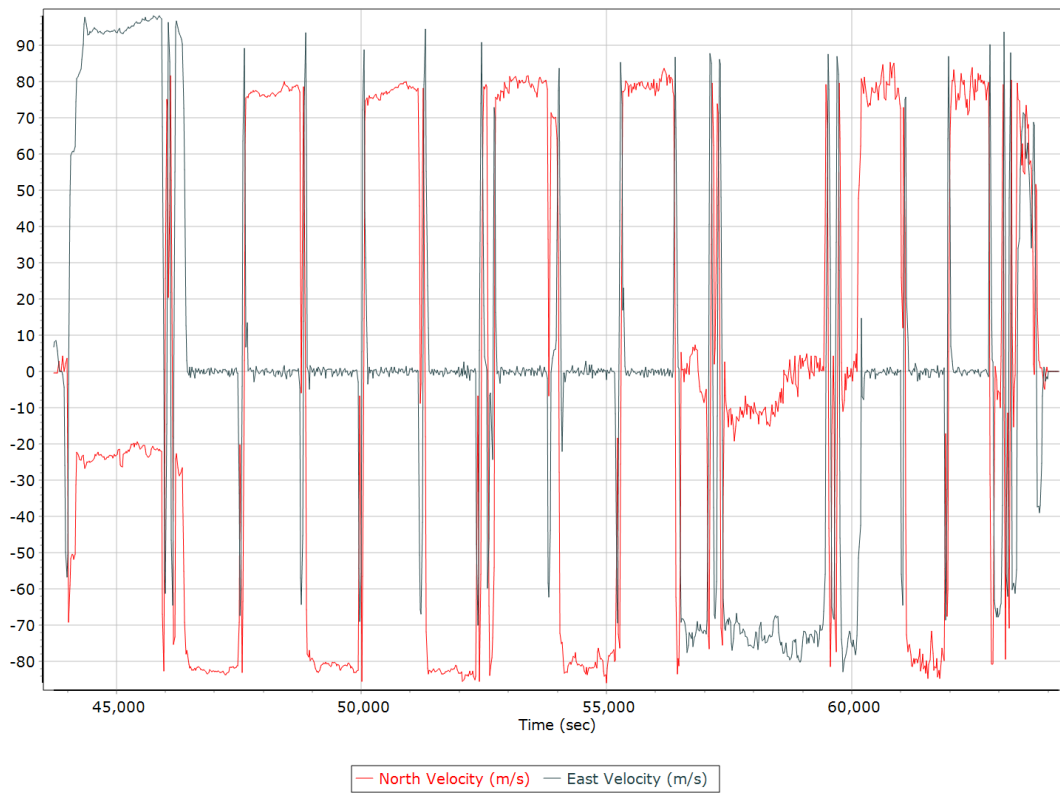
## Roll/Pitch



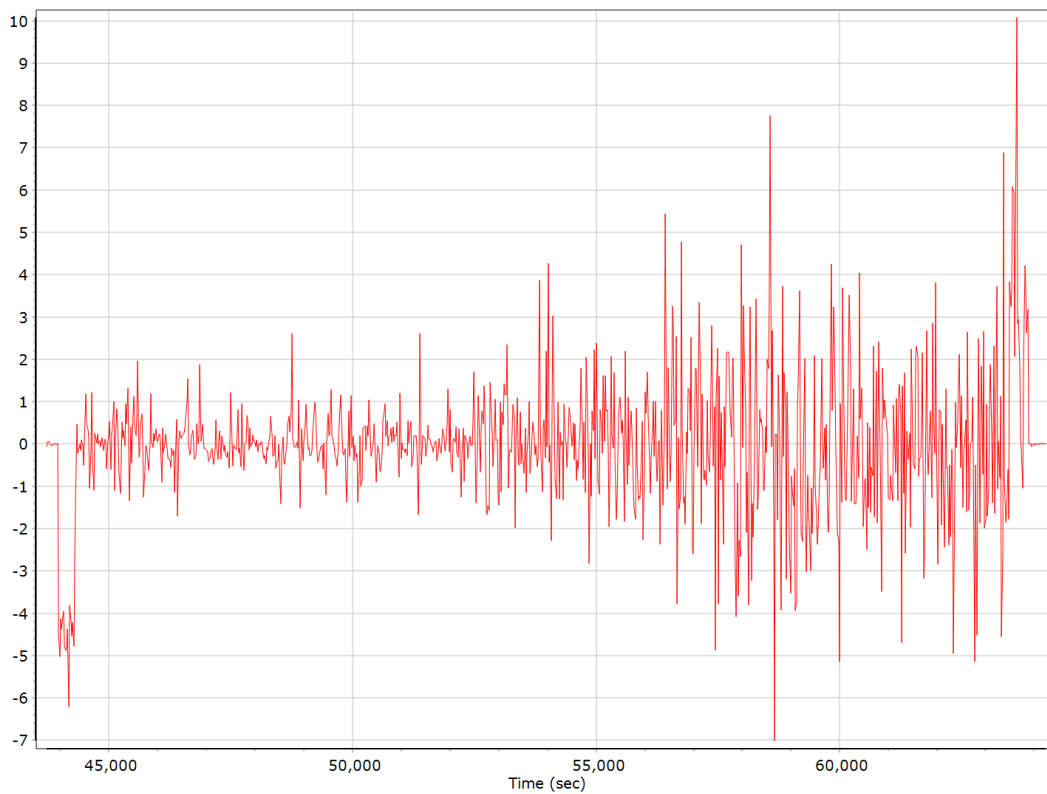
## Heading



## North/East Velocity

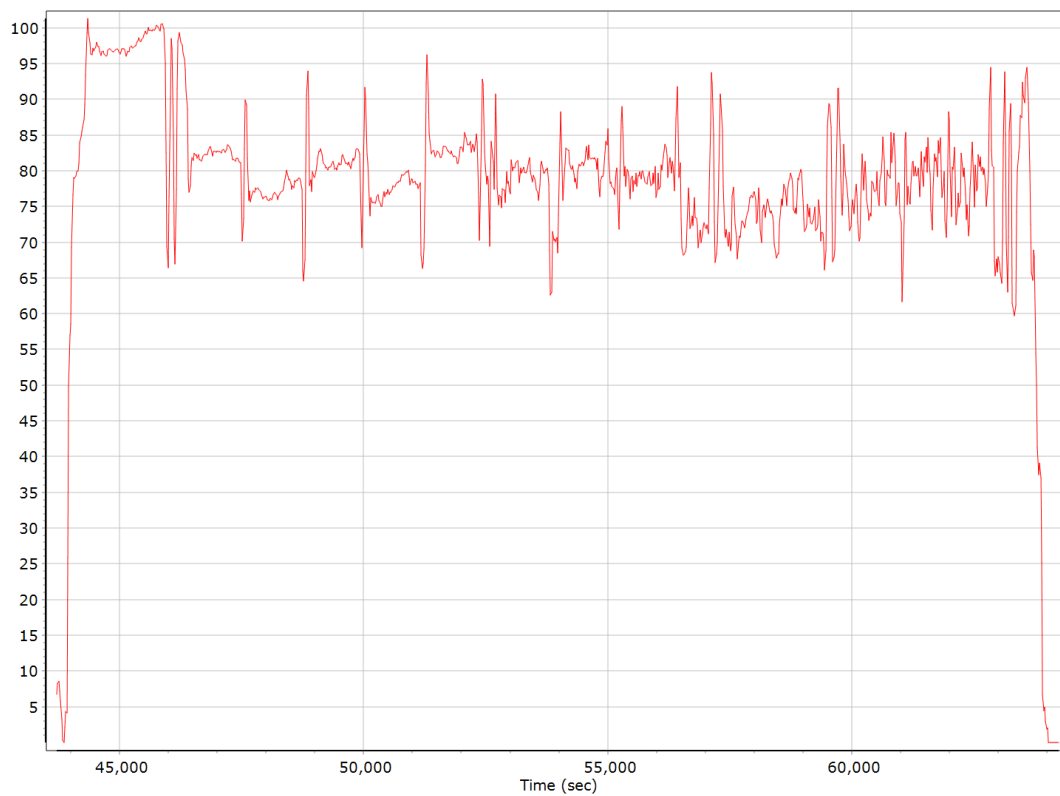


## Down Velocity

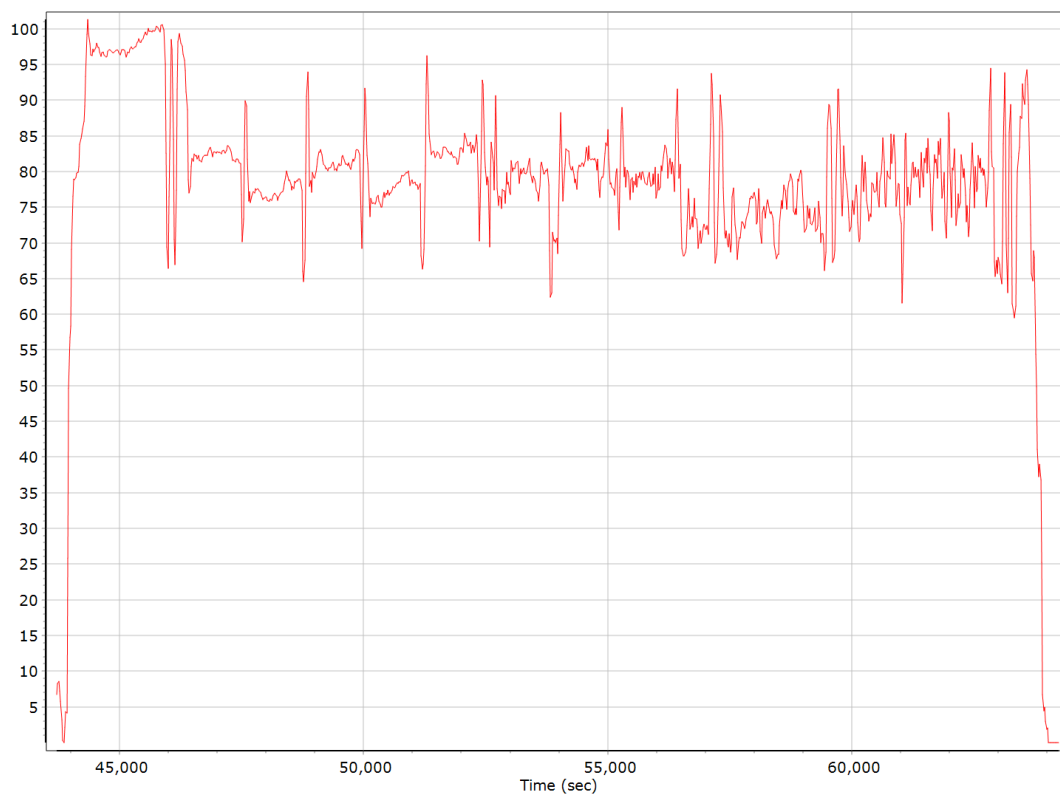




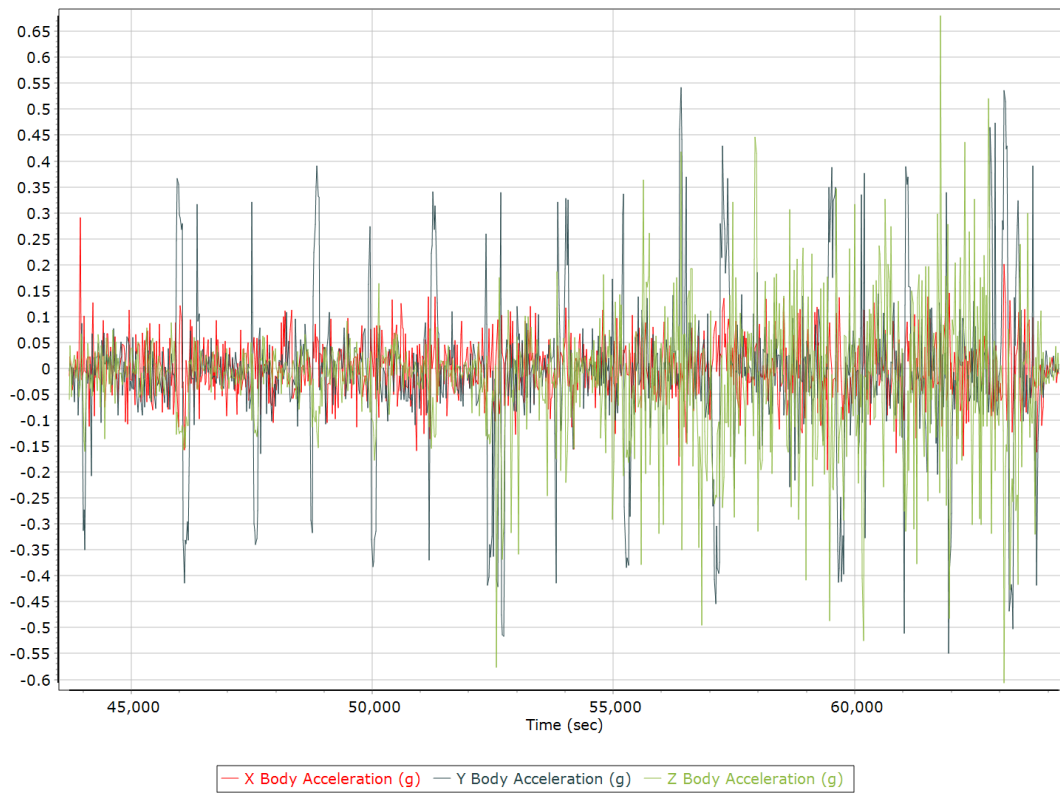
## Total Speed



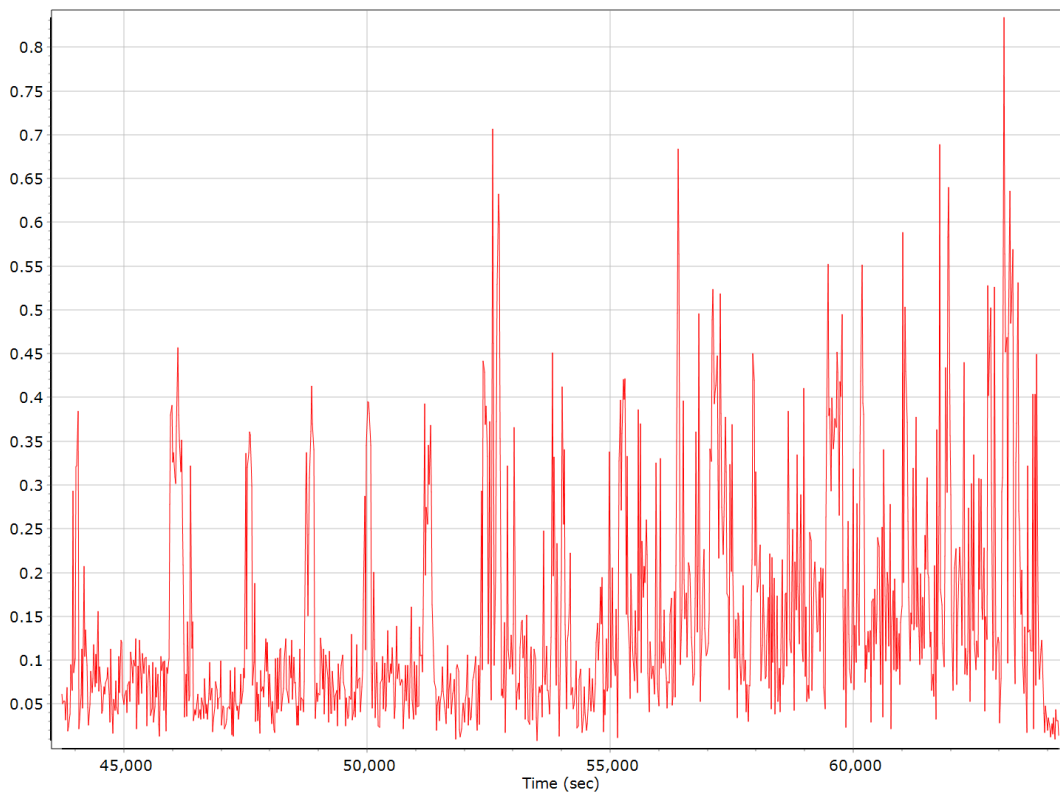
## Ground Speed



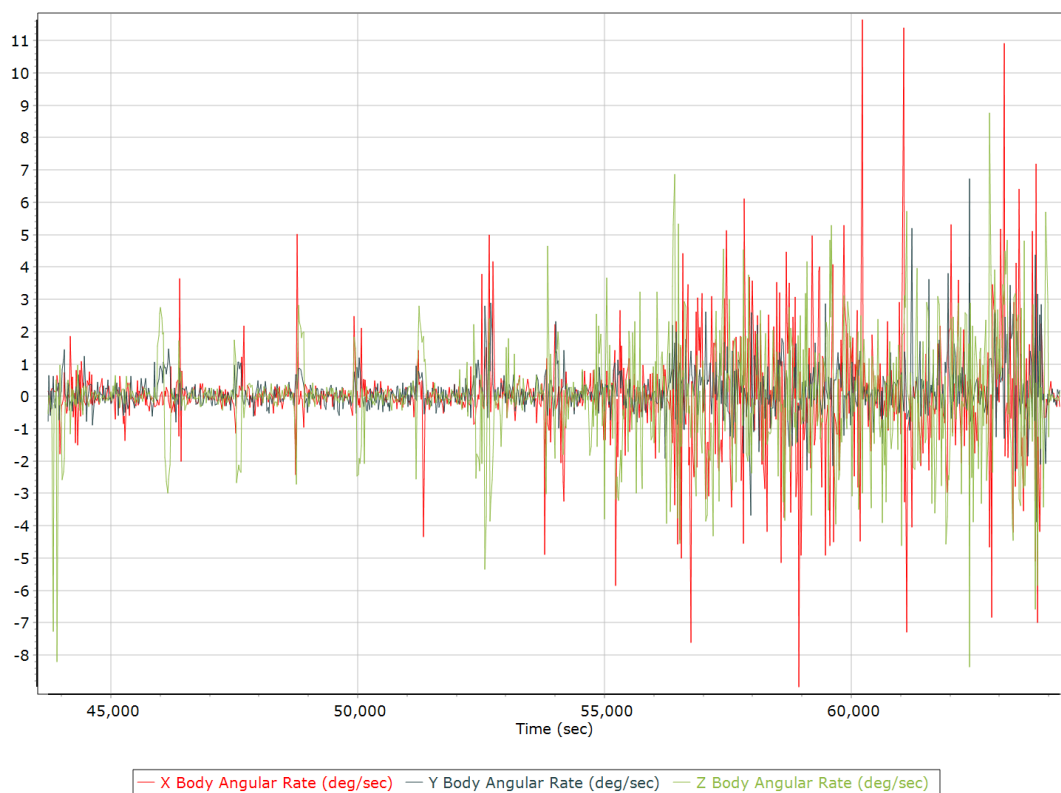
## Body Acceleration



## Total Body Acceleration

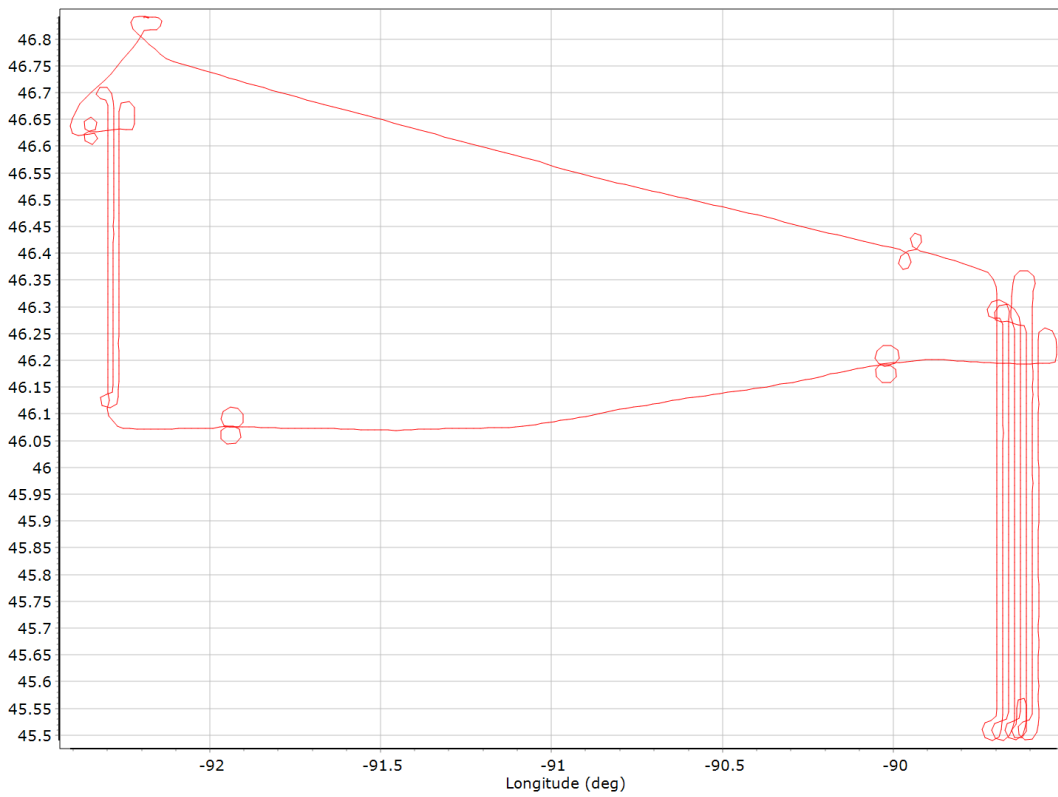


## Body Angular Rate

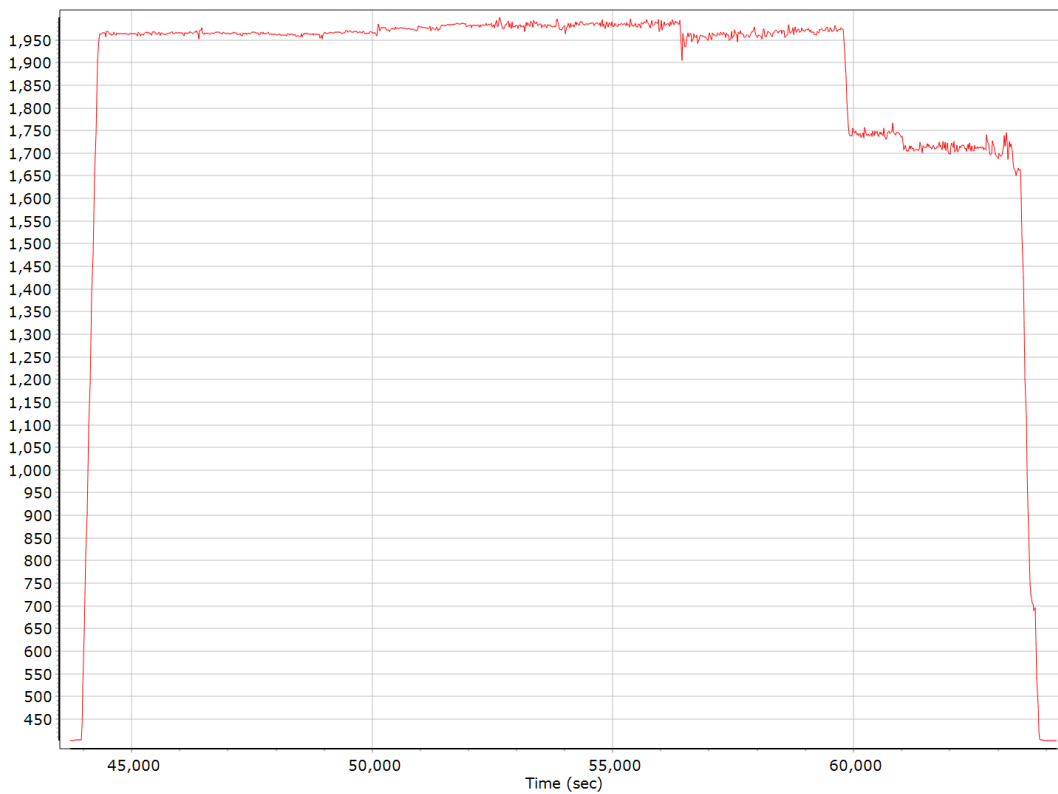


## Forward Processed Trajectory Information

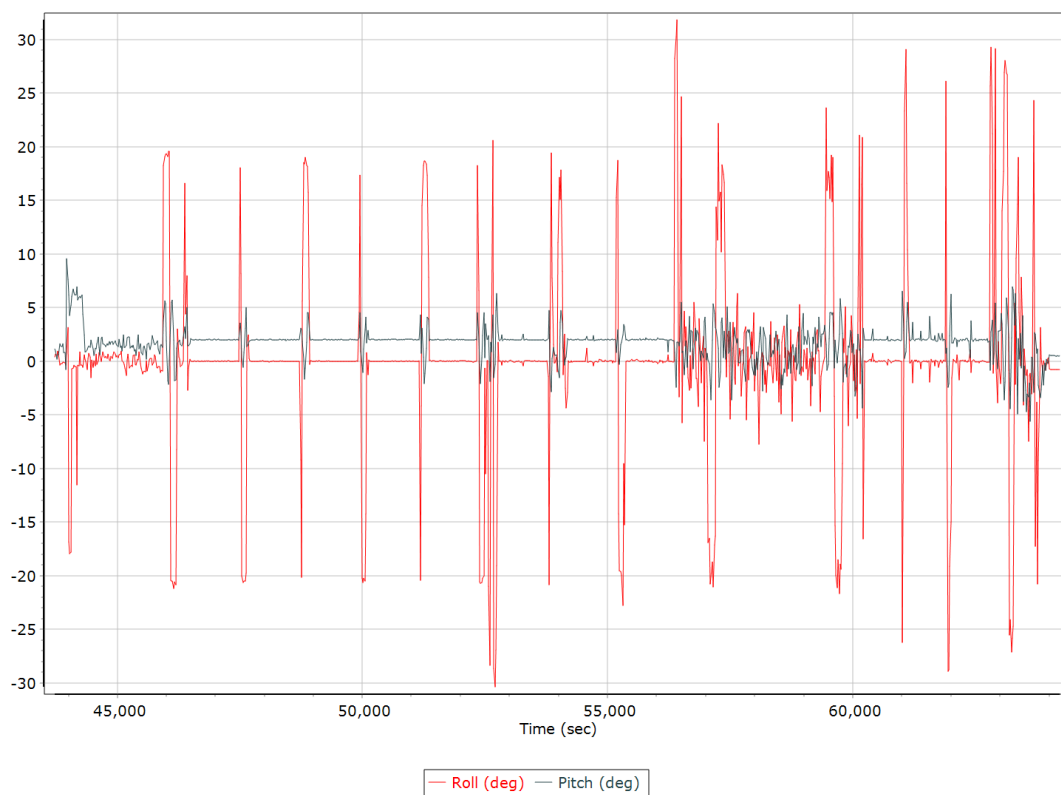
### Top View



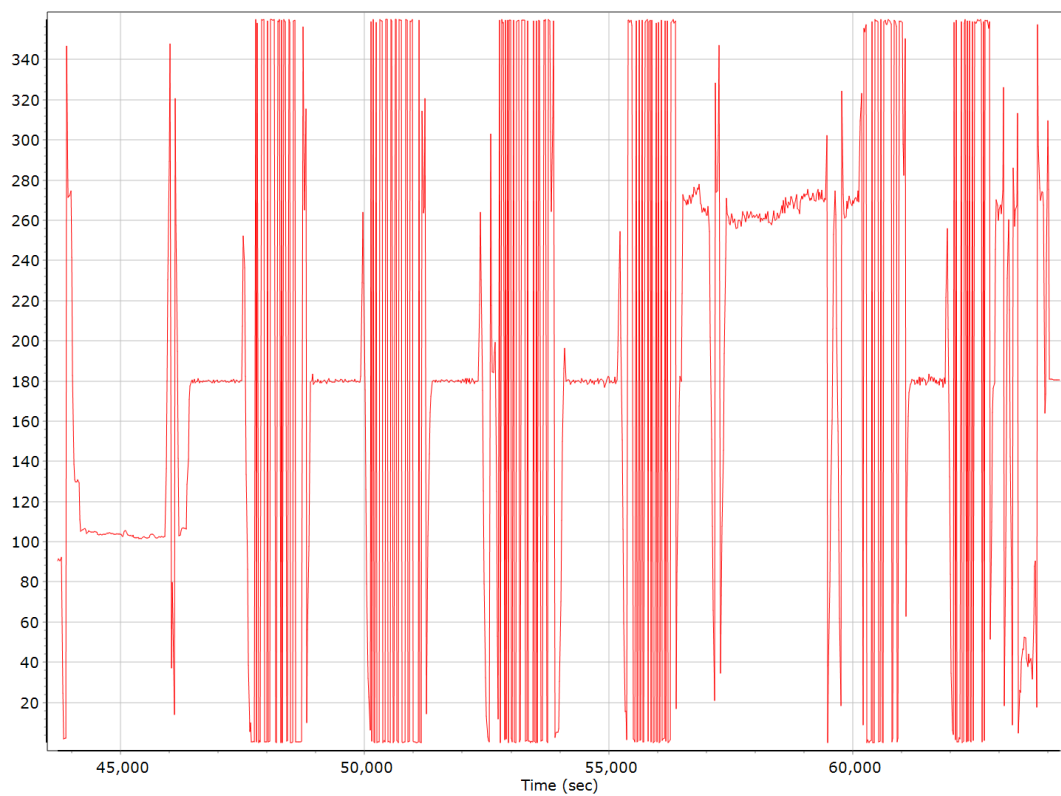
### Altitude



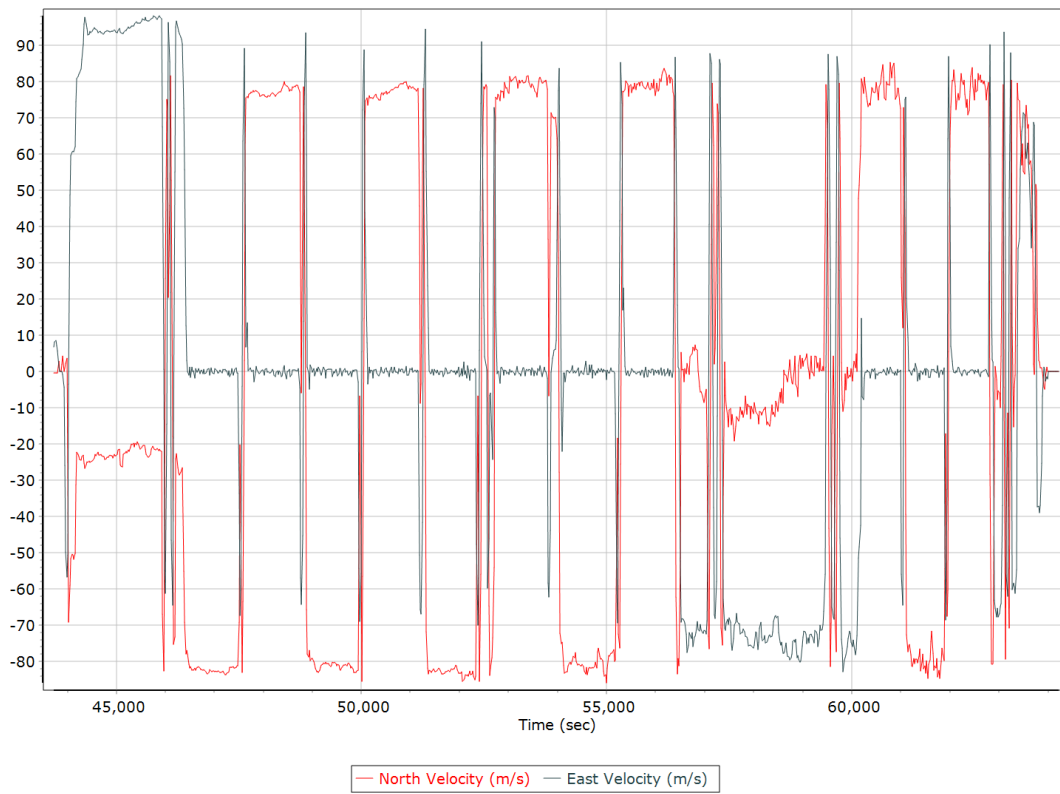
## Roll/Pitch



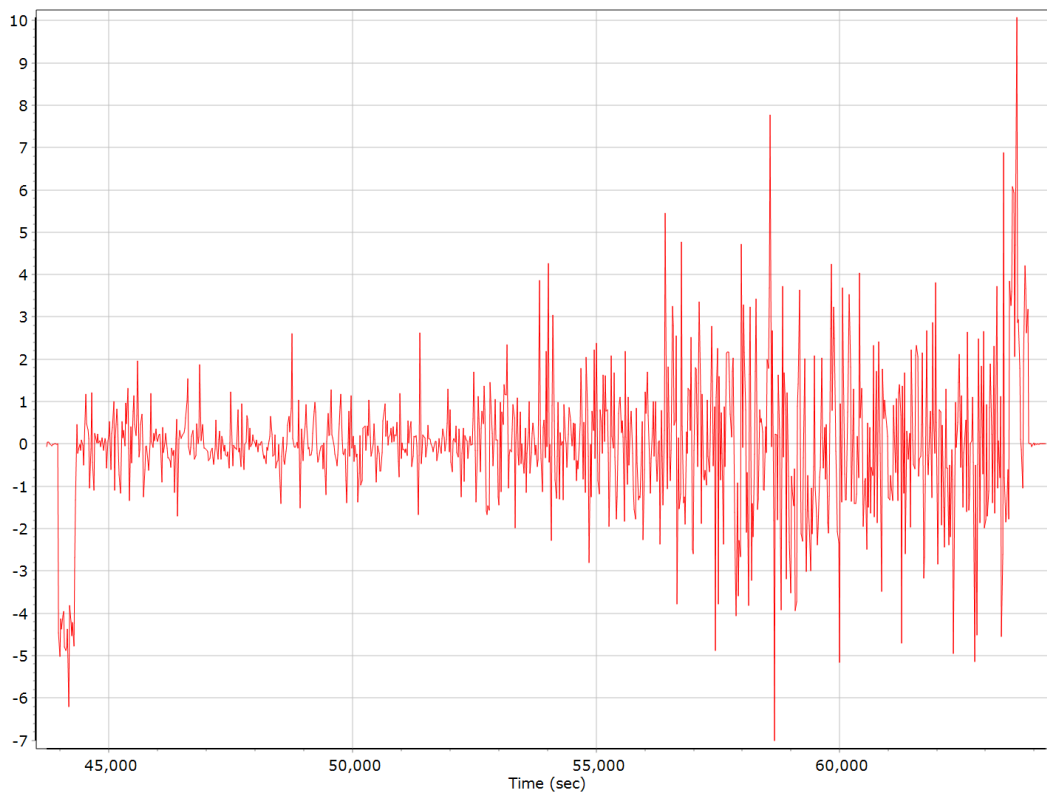
## Heading



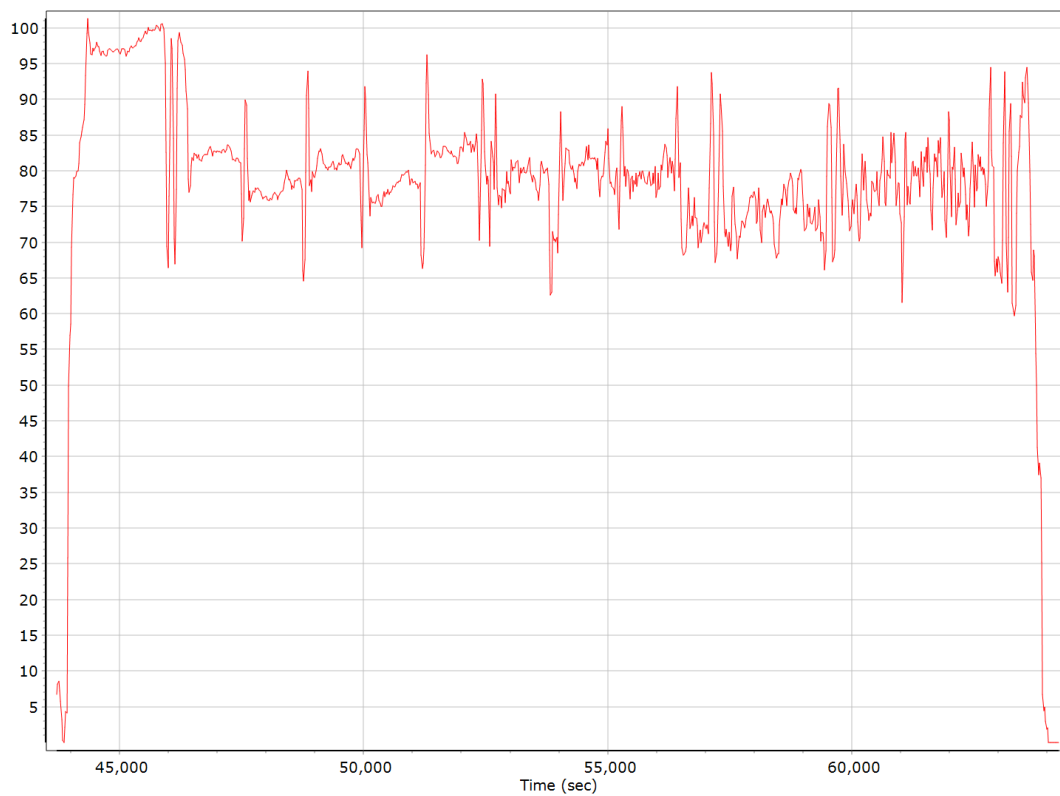
## North/East Velocity



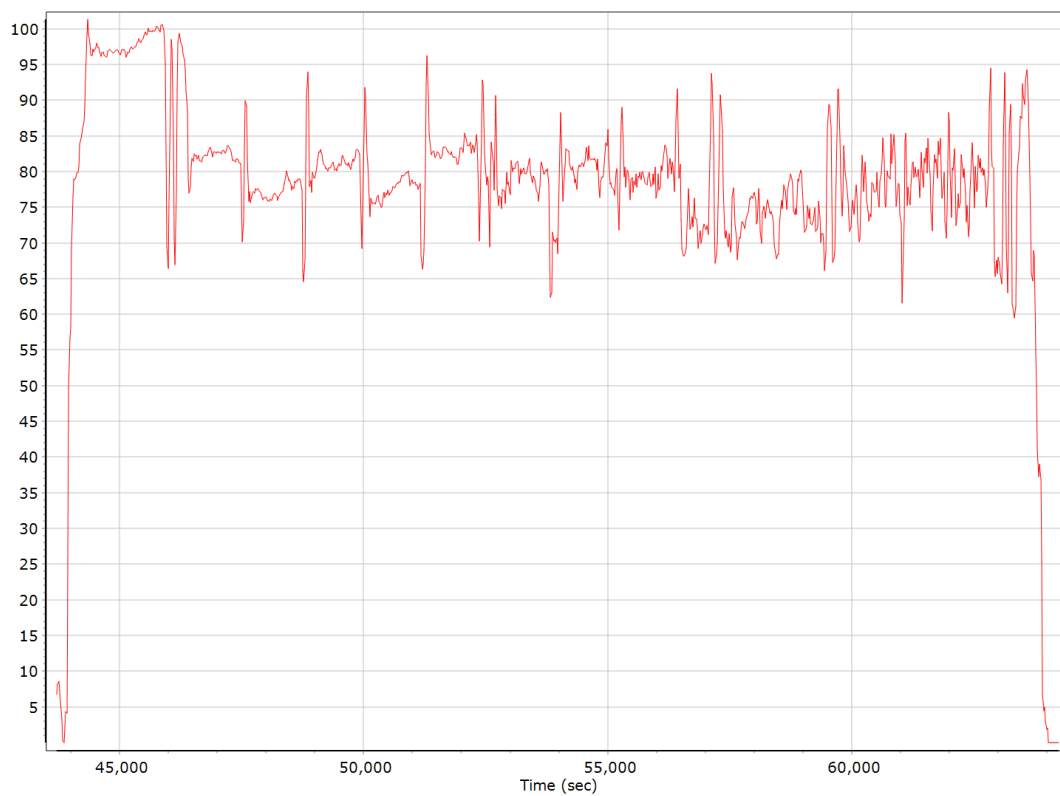
## Down Velocity



## Total Speed



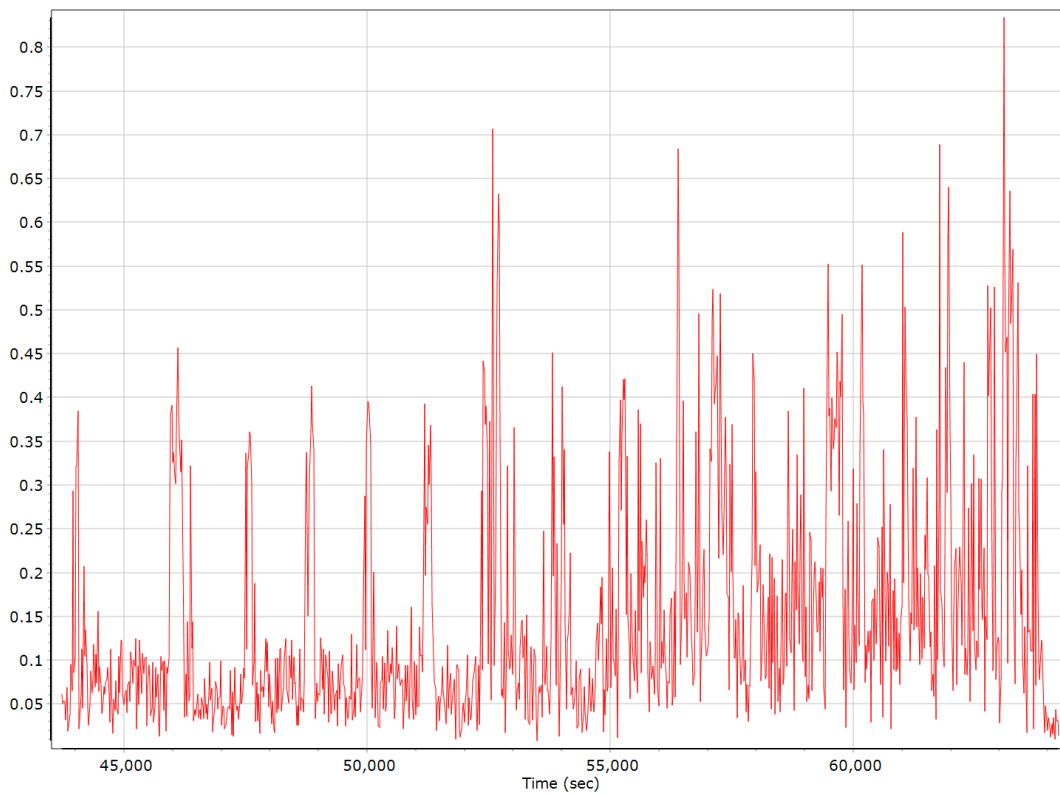
## Ground Speed



## Body Acceleration



## Total Body Acceleration





## Body Angular Rate

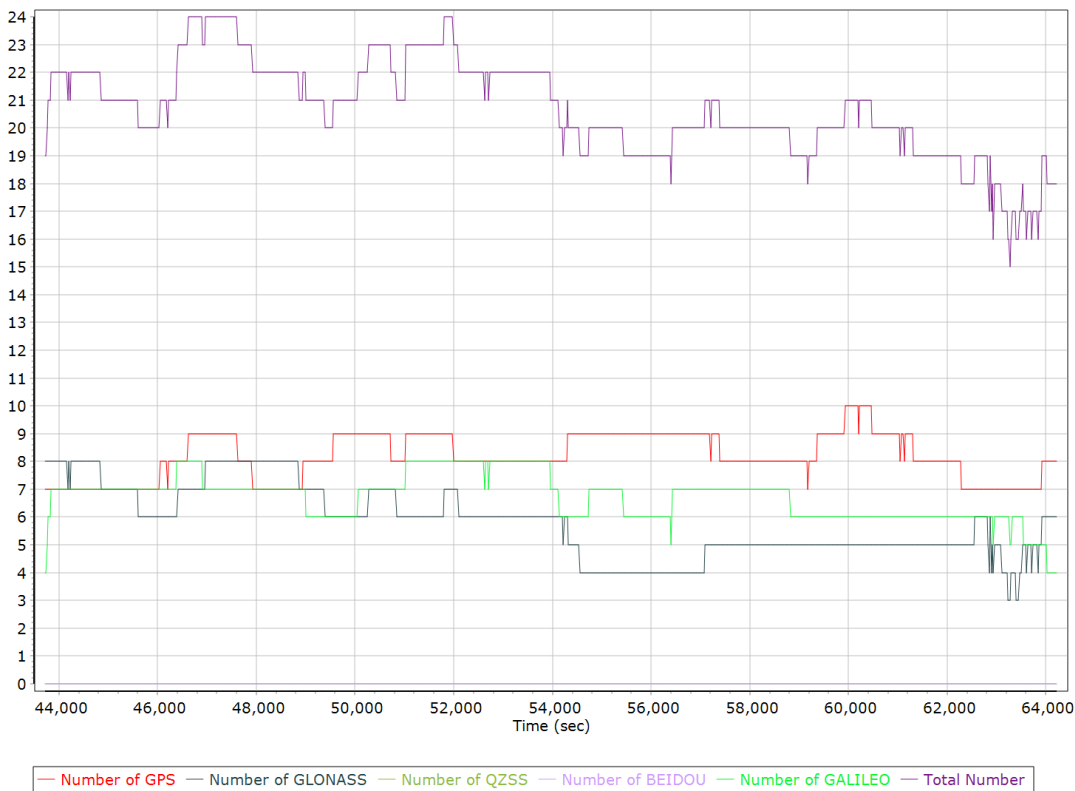


## GNSS QC

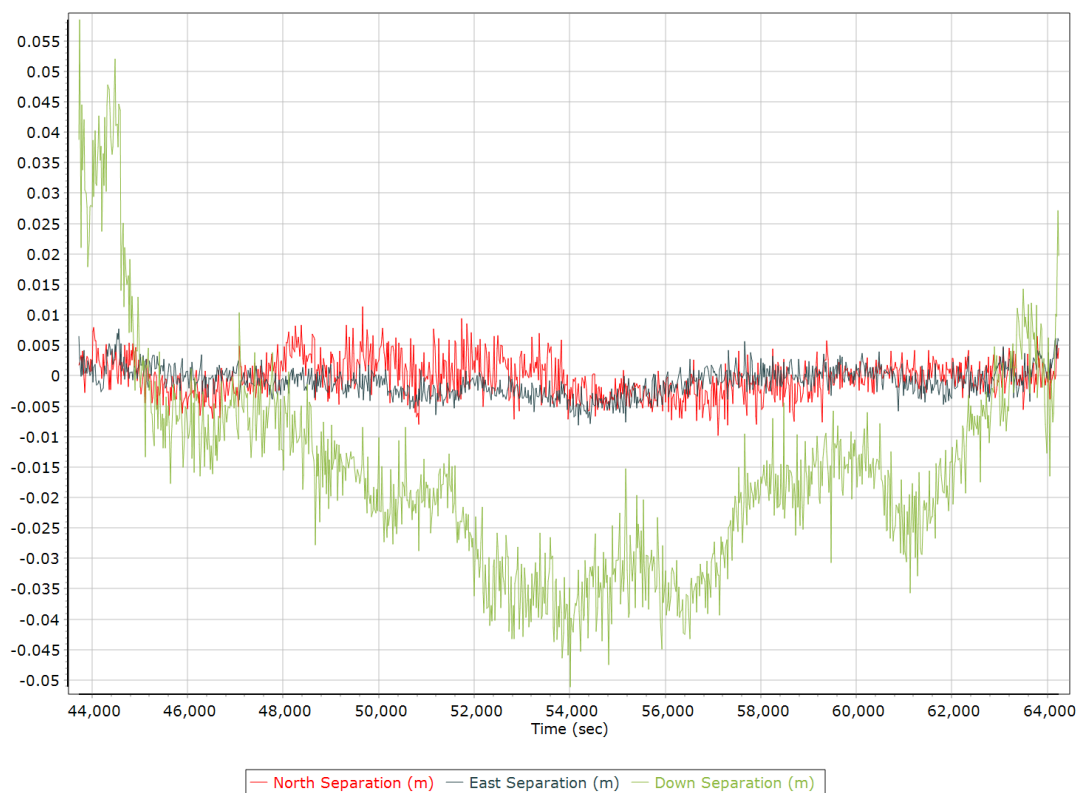
### GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	7	10	8
Number of GLONASS SV	3	8	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	0	0
Number of GALILEO SV	4	8	7
Total number of SV	15	24	21
PDOP	0.97	1.70	1.18
QC Solution Gaps	0.00	0.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	20816.00	0.00	0.00
Percentage	100.00	0.00	0.00

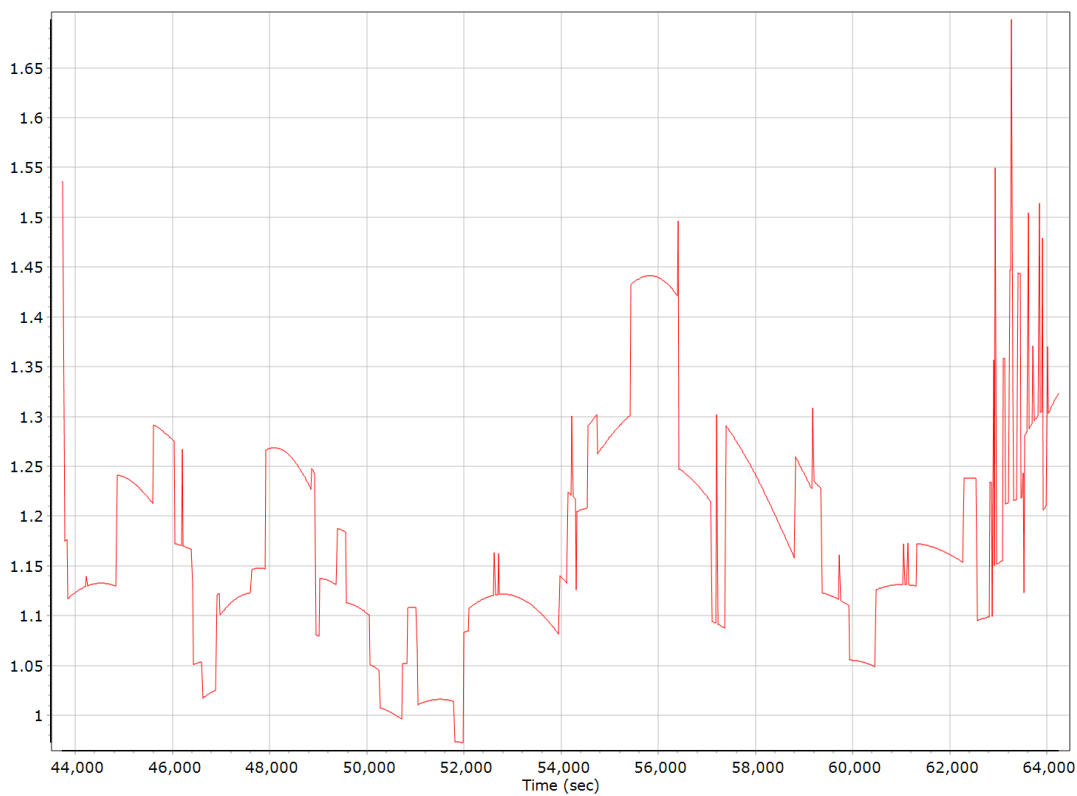
### Num SVs in solution



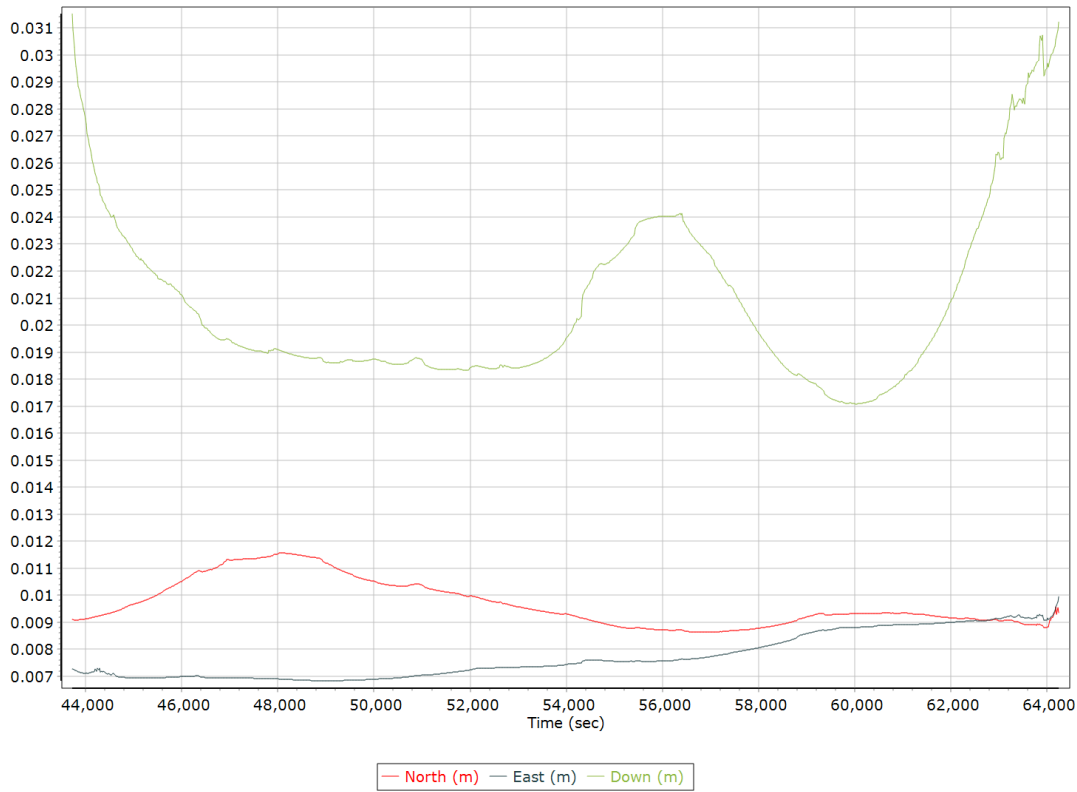
## Forward/Reverse Separation



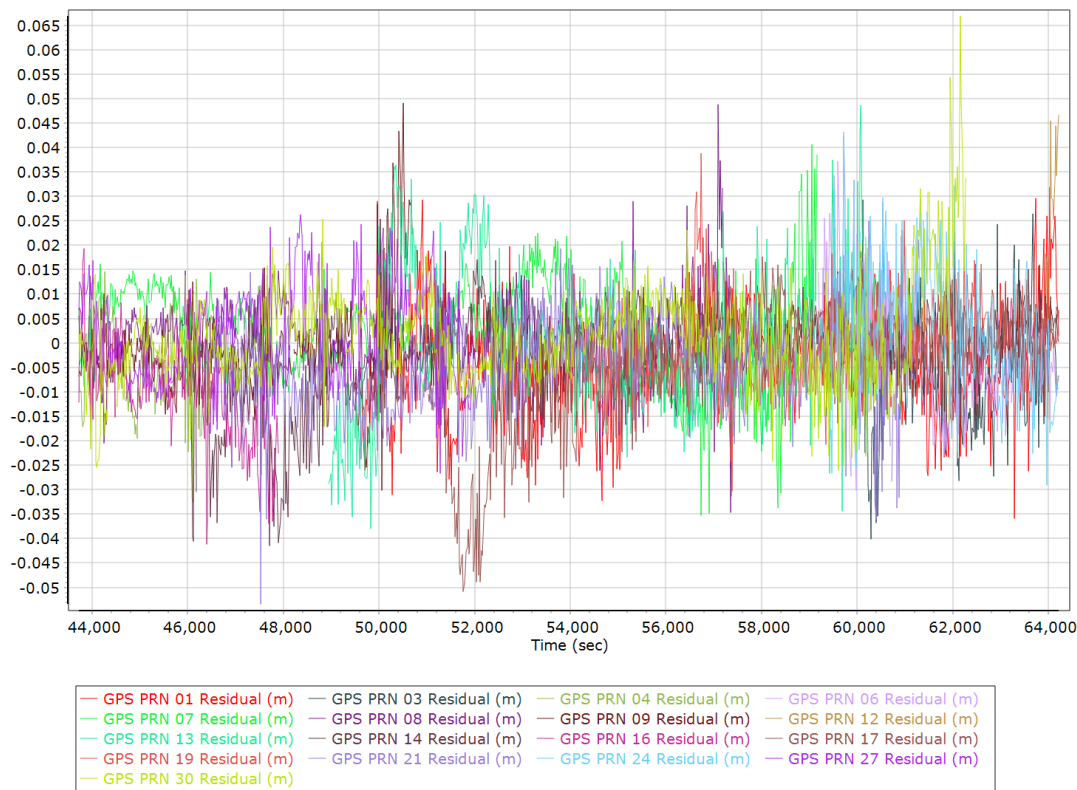
## PDOP



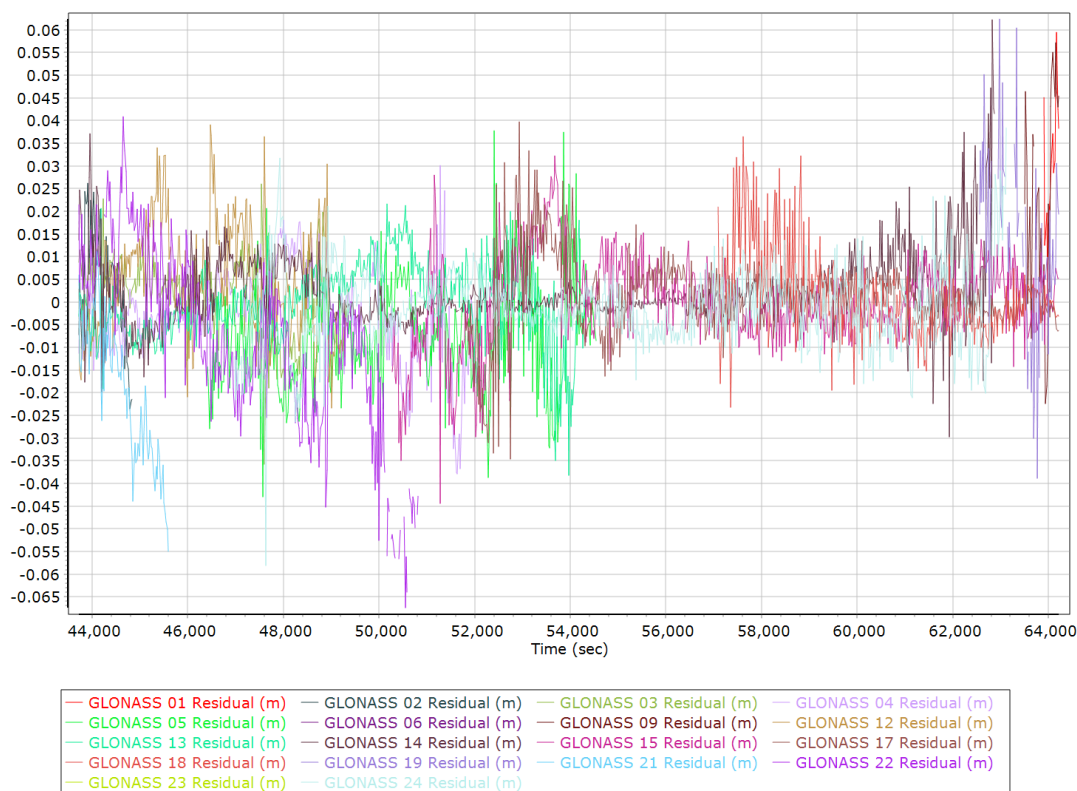
## Estimated Position Accuracy



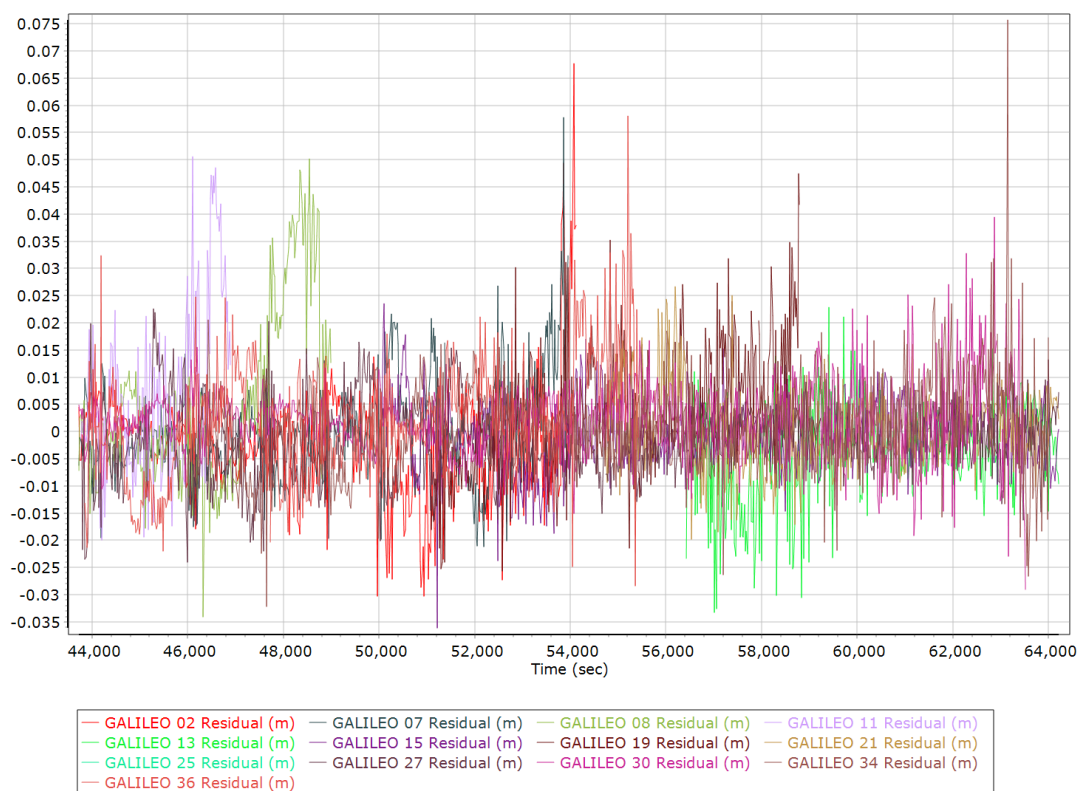
## GPS Residuals



## GLONASS Residuals



## GALILEO Residuals



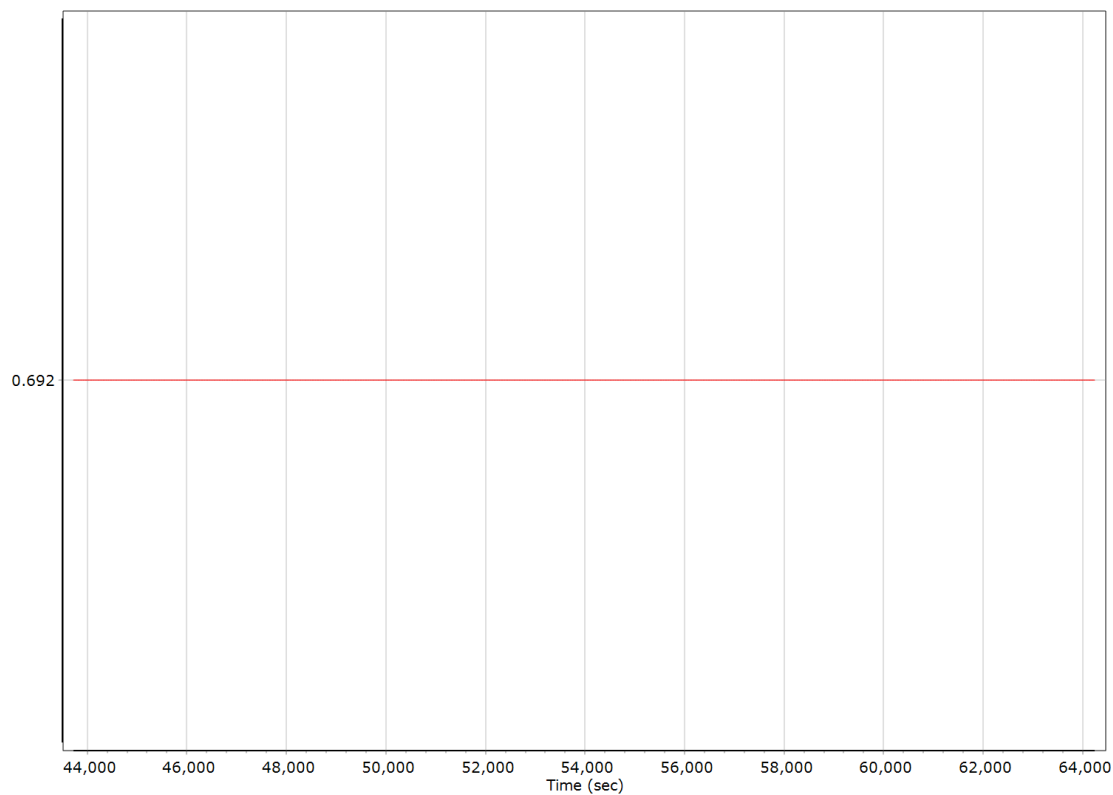
## GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	43386.000 (5/15/2022 12:03:06 PM)		
Processing end time	64245.000 (5/15/2022 5:50:45 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

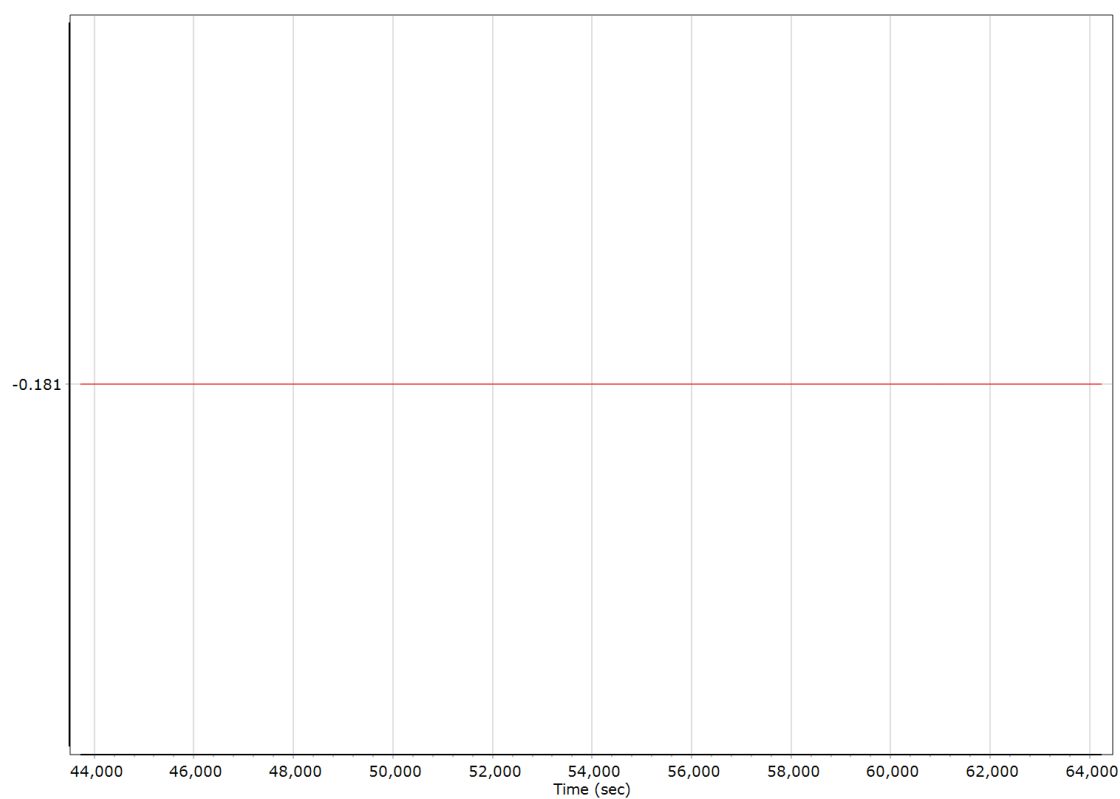
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

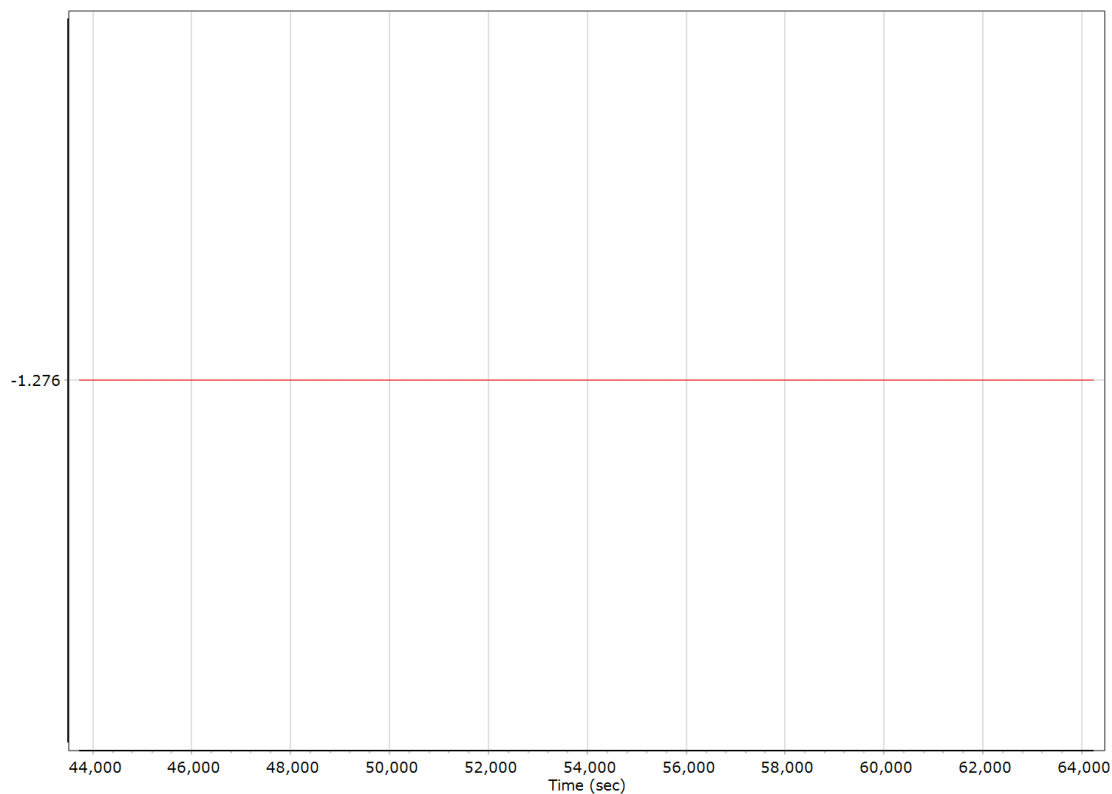
#### X Reference-Primary GNSS Lever Arm (m)



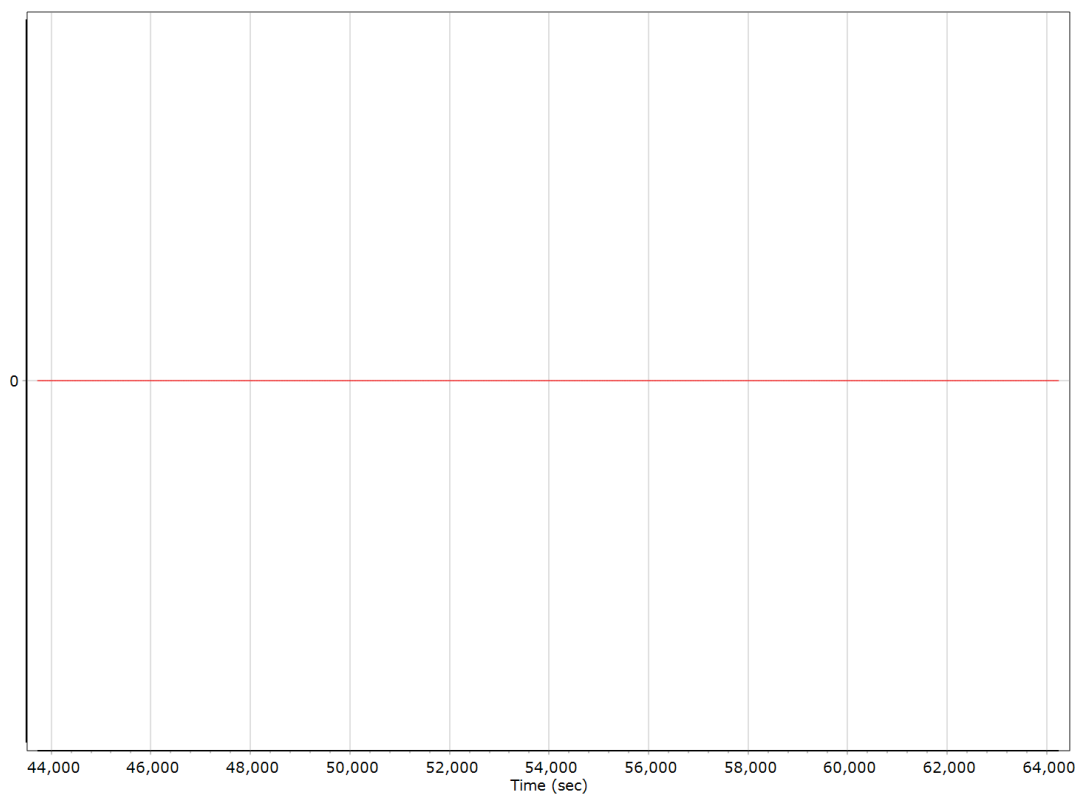
#### Y Reference-Primary GNSS Lever Arm (m)



### Z Reference-Primary GNSS Lever Arm (m)



### Reference-Primary GNSS Lever Arm Figure of Merit

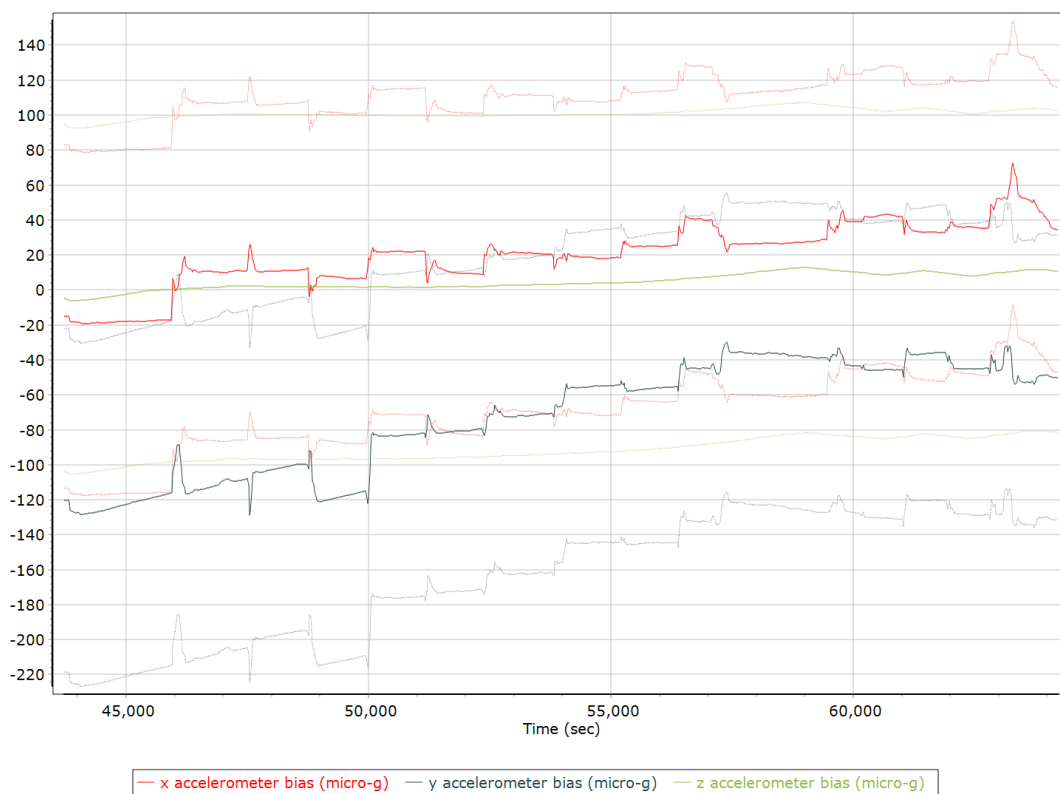




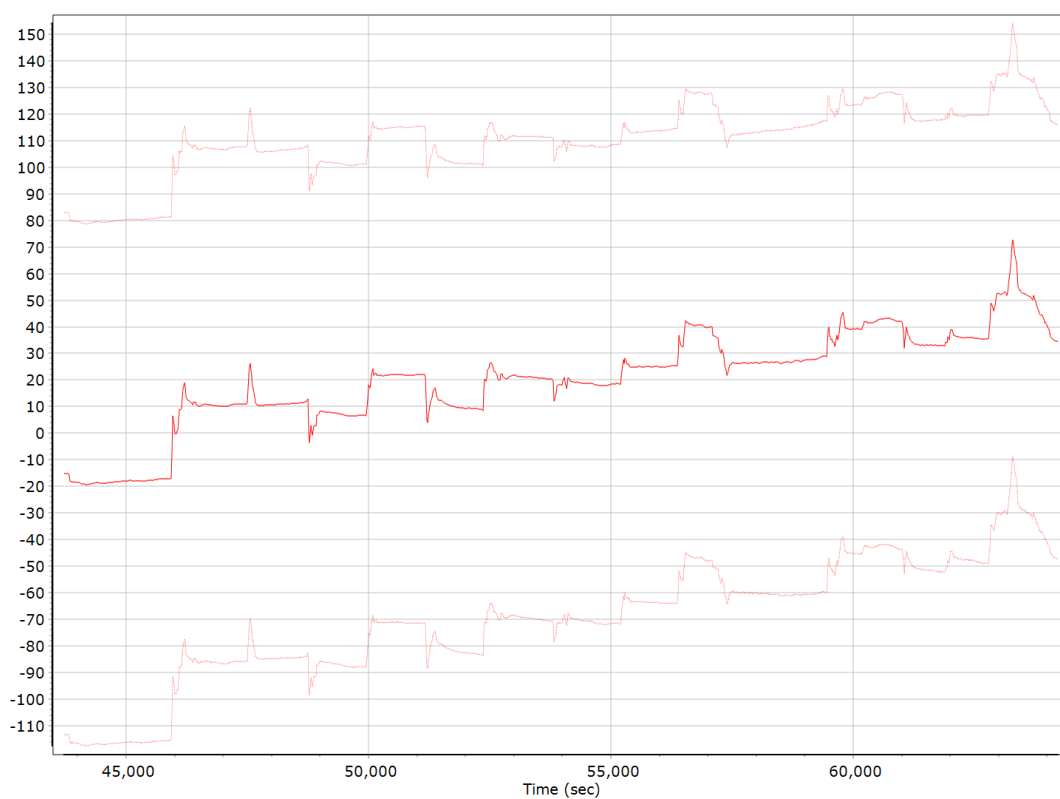
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

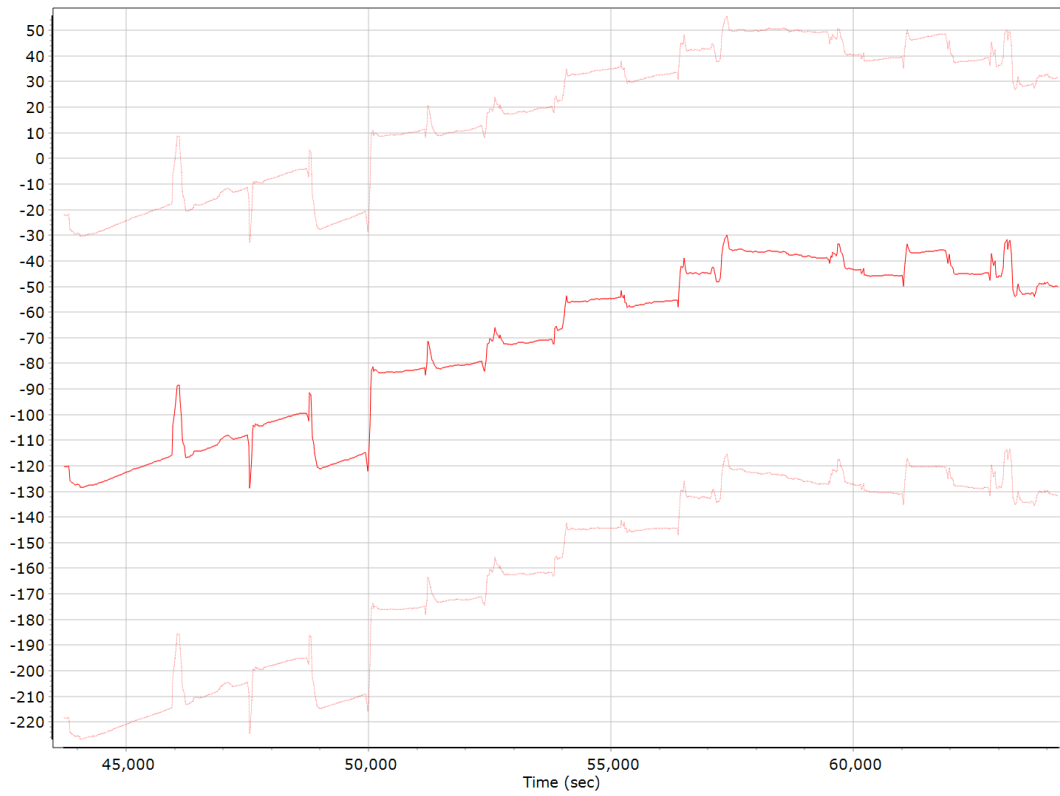
#### Accelerometer Bias (micro-g)



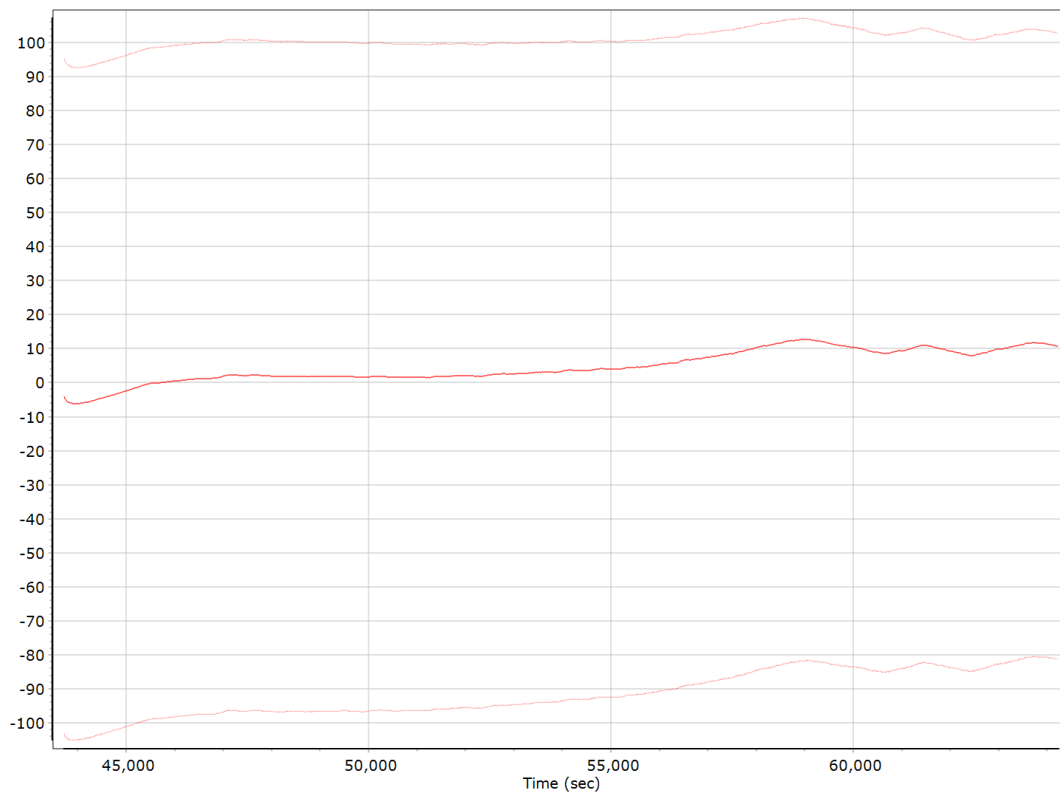
#### X Accelerometer Bias (micro-g)



### Y Accelerometer Bias (micro-g)



### Z Accelerometer Bias (micro-g)



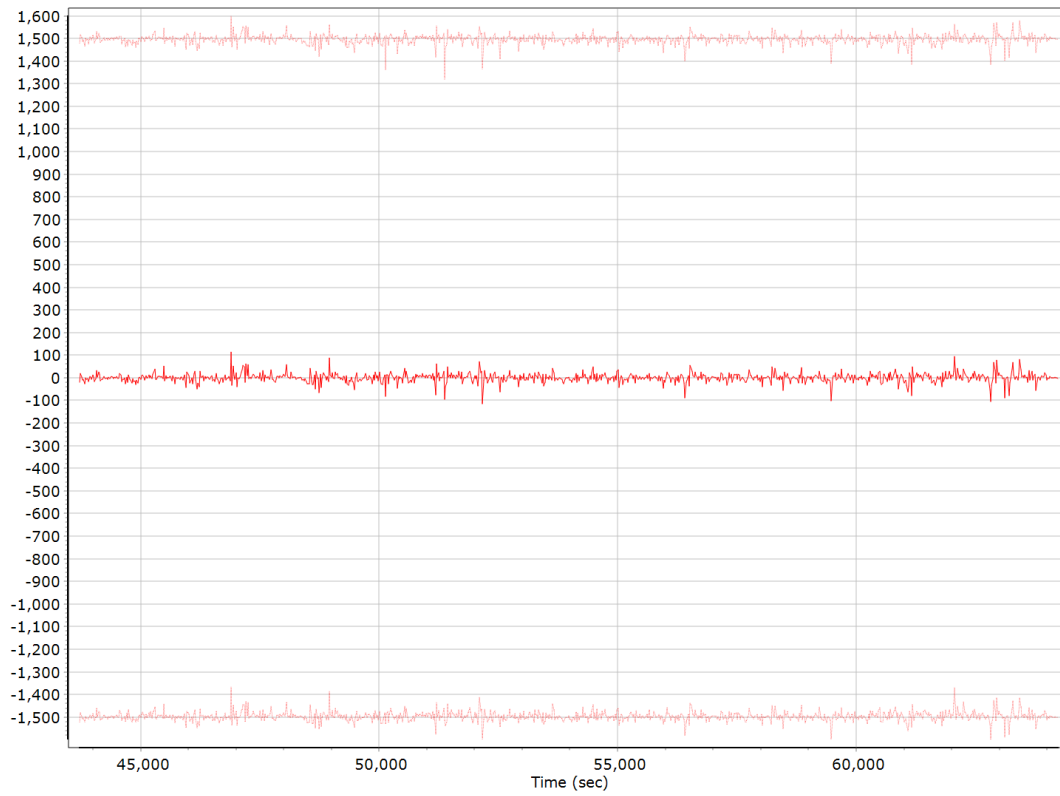
## Accelerometer Scale Error (ppm)



## X Accelerometer Scale Error (ppm)



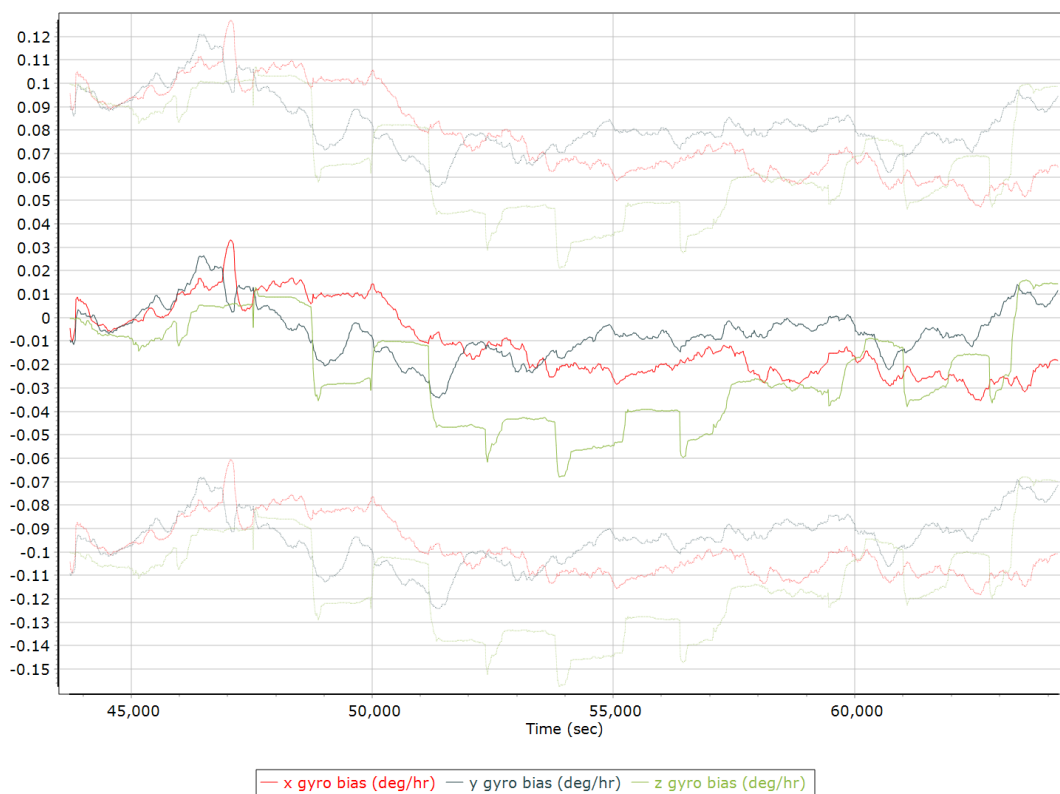
### Y Accelerometer Scale Error (ppm)



### Z Accelerometer Scale Error (ppm)



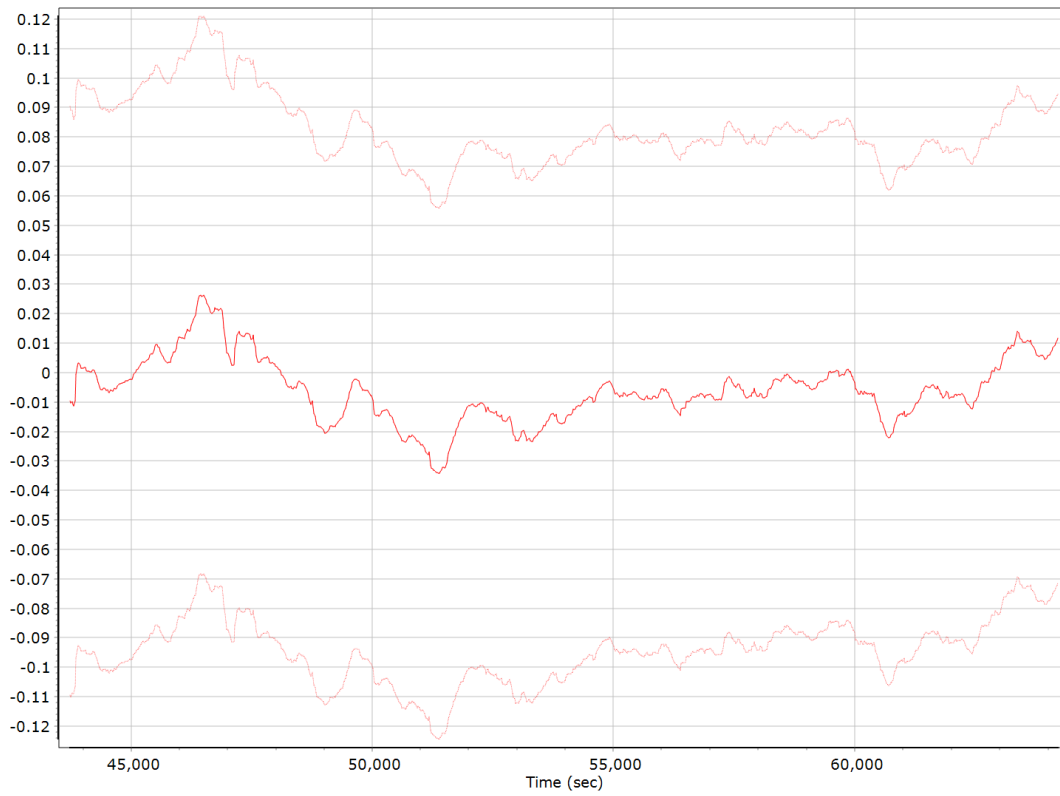
## Gyro Bias (deg/h)



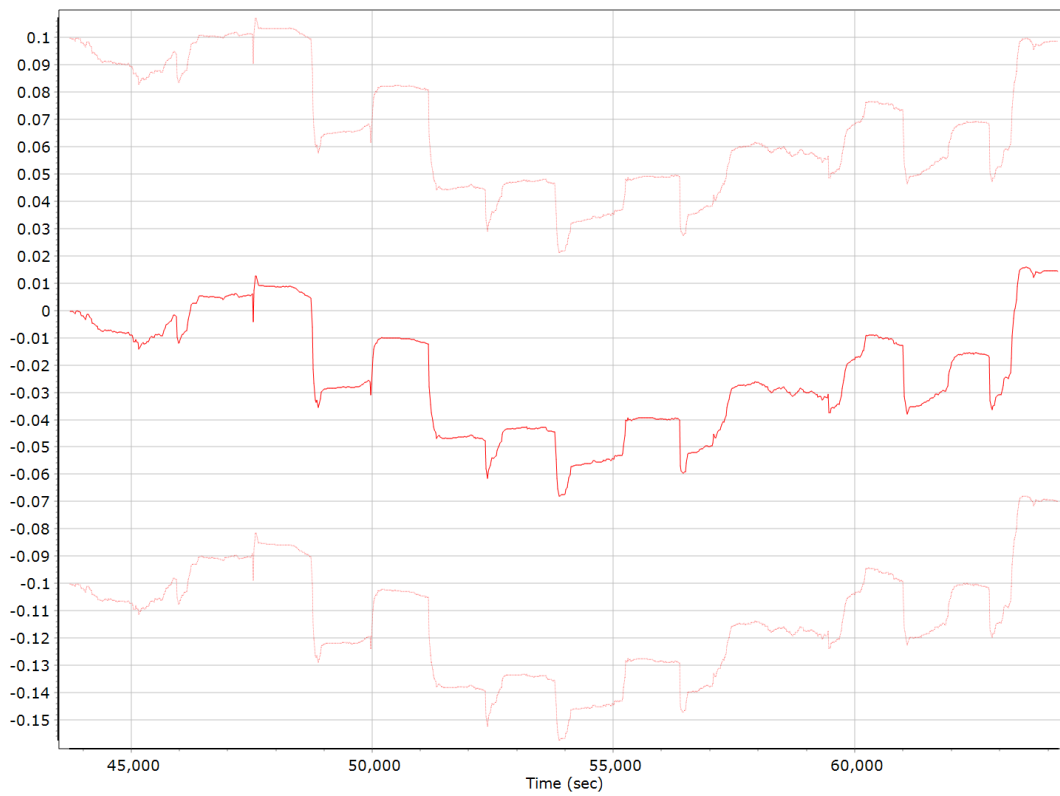
## X Gyro Bias (deg/h)



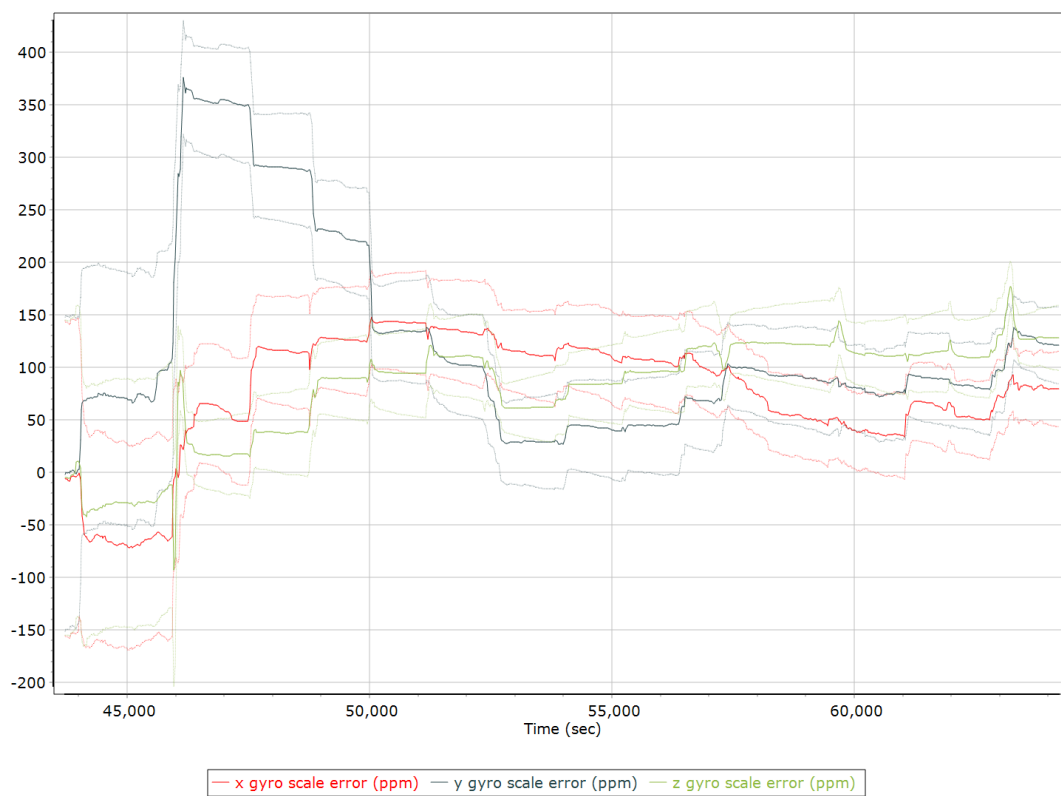
### Y Gyro Bias (deg/h)



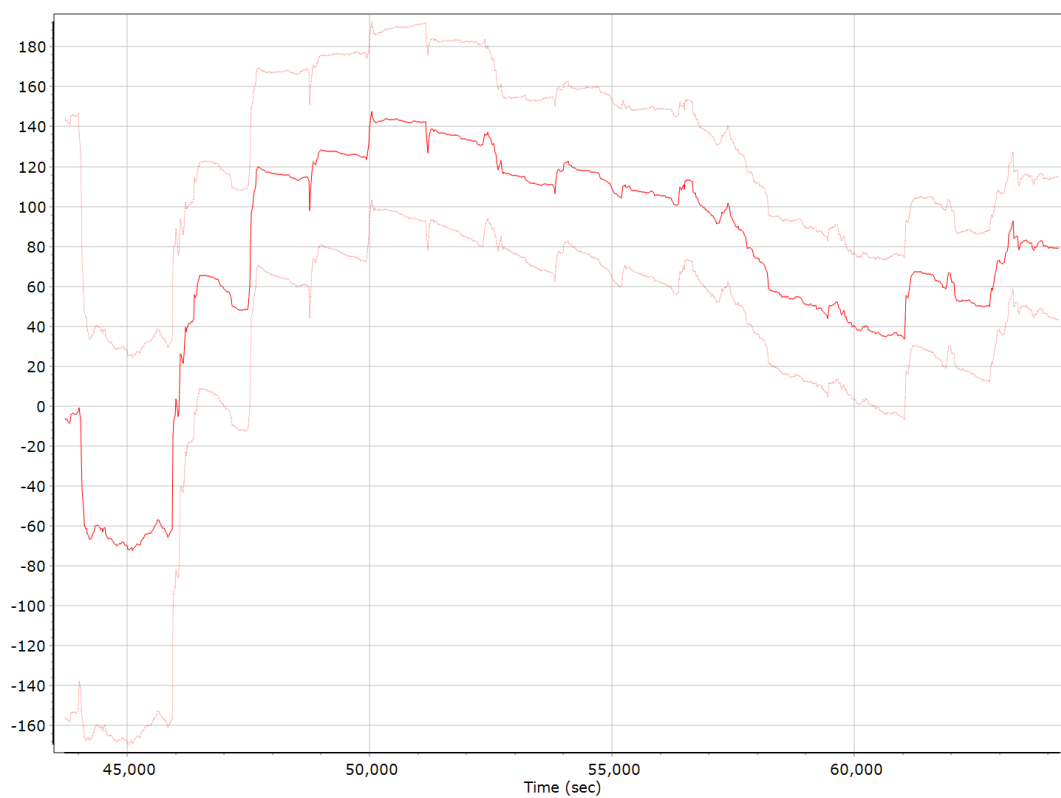
### Z Gyro Bias (deg/h)



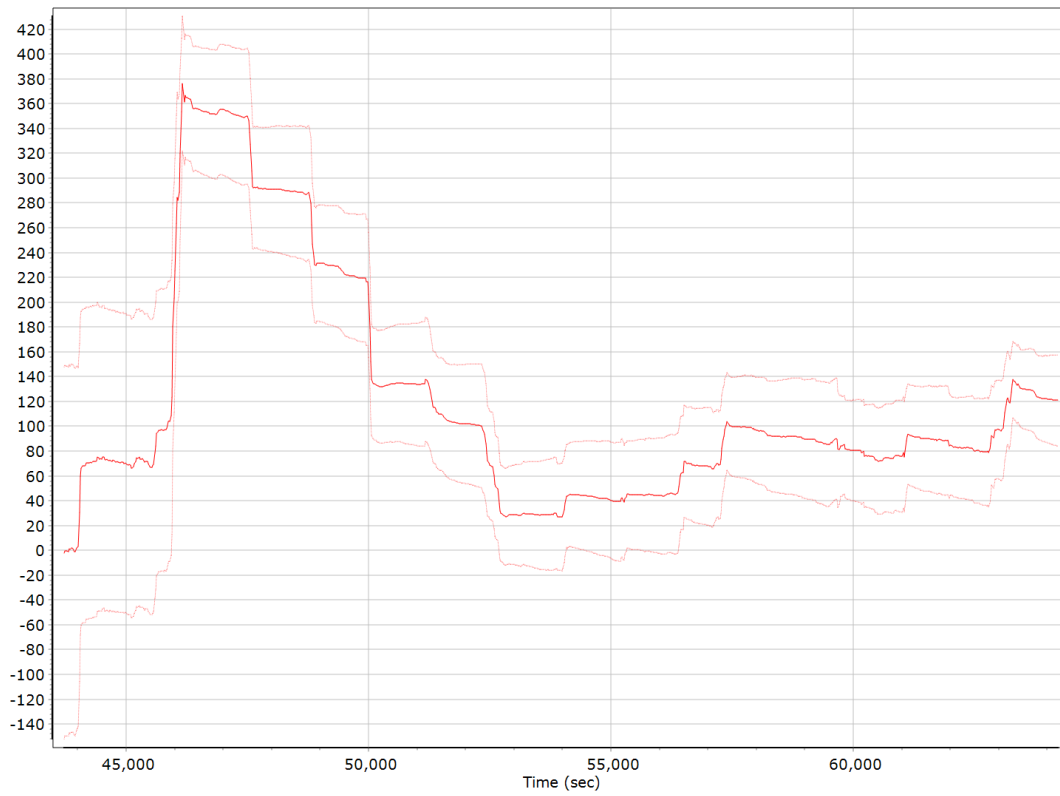
### Gyro Scale Error (ppm)



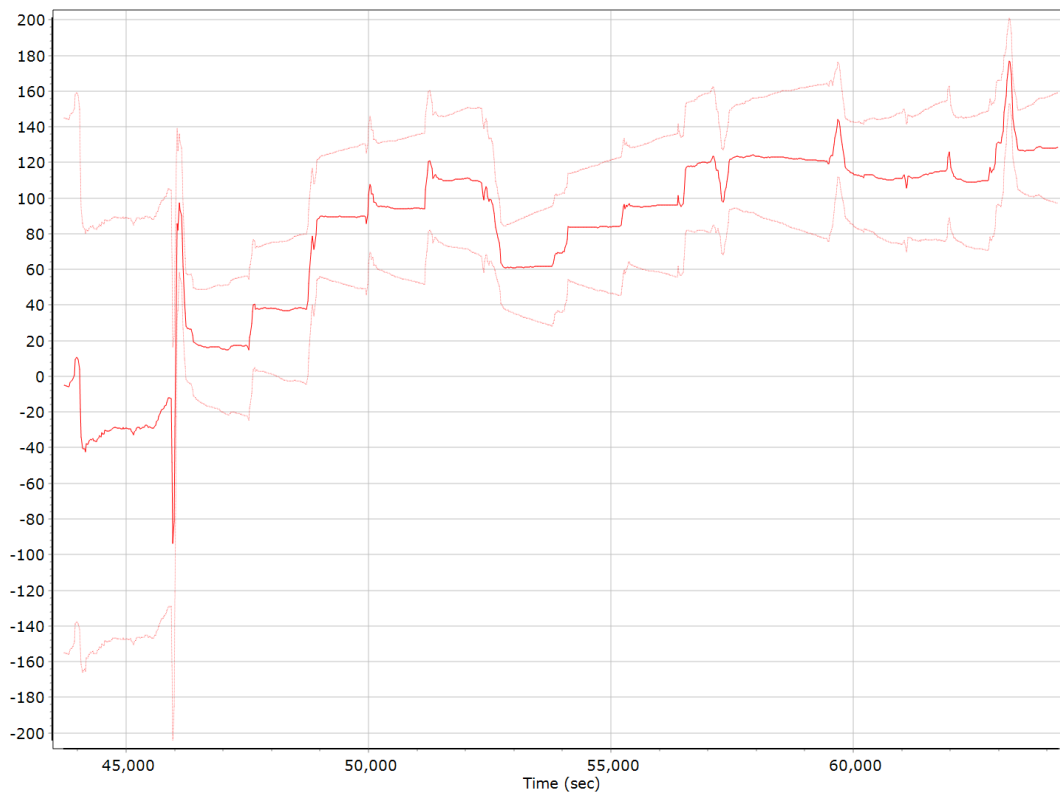
### X Gyro Scale Error (ppm)



### Y Gyro Scale Error (ppm)



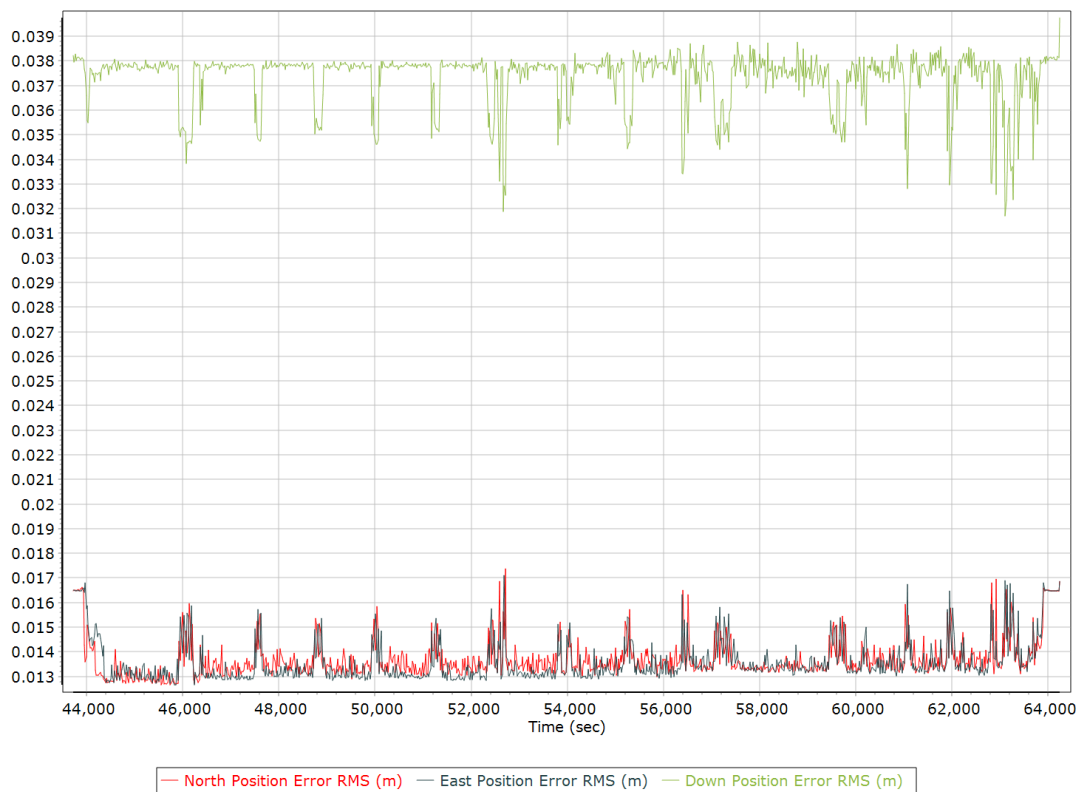
### Z Gyro Scale Error (ppm)



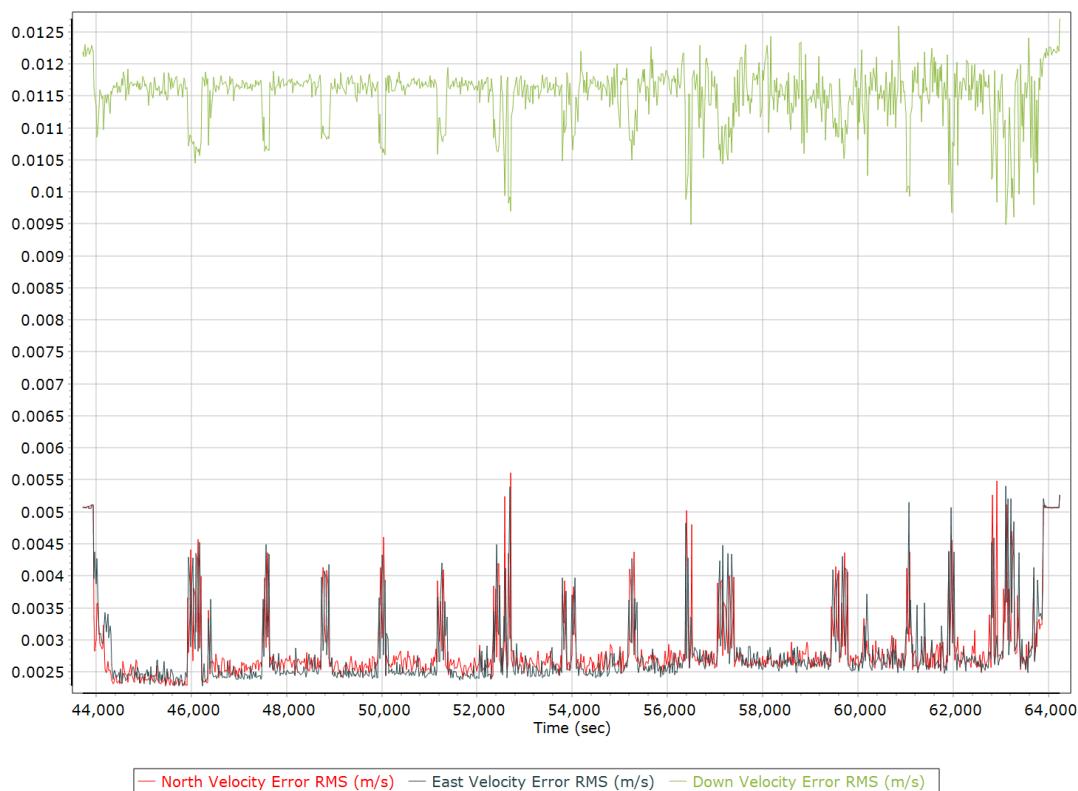


## Smoothed Performance Metrics

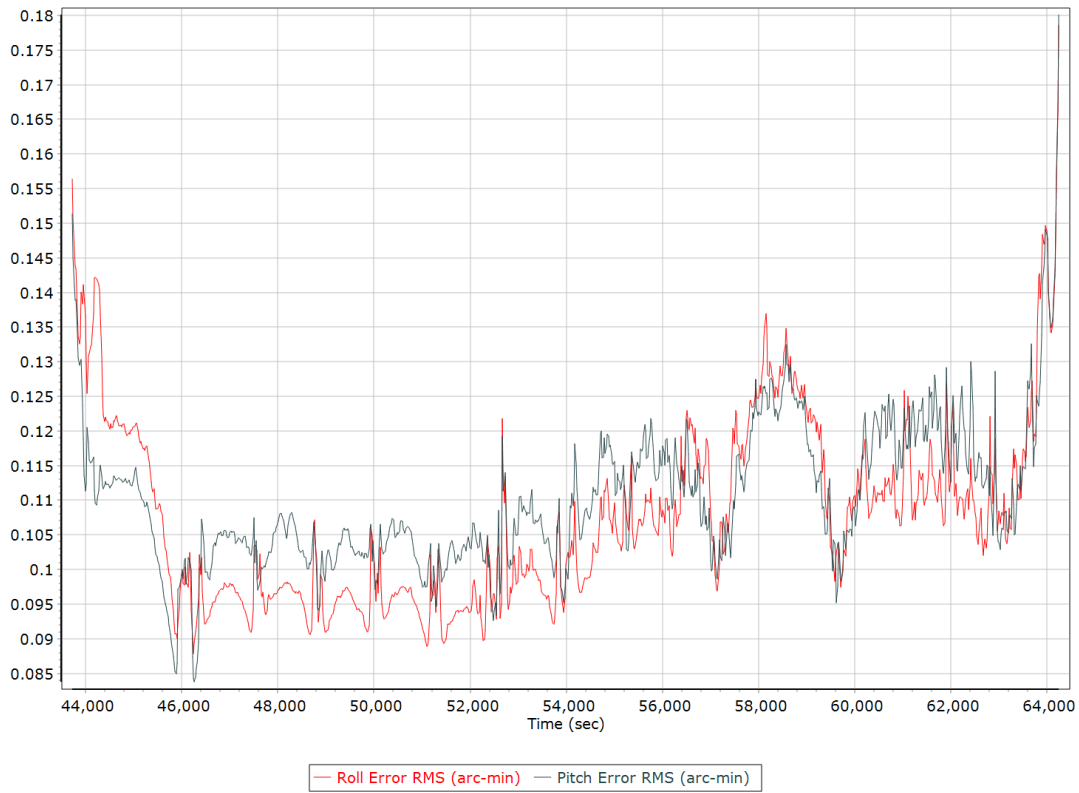
### Position Error RMS (m)



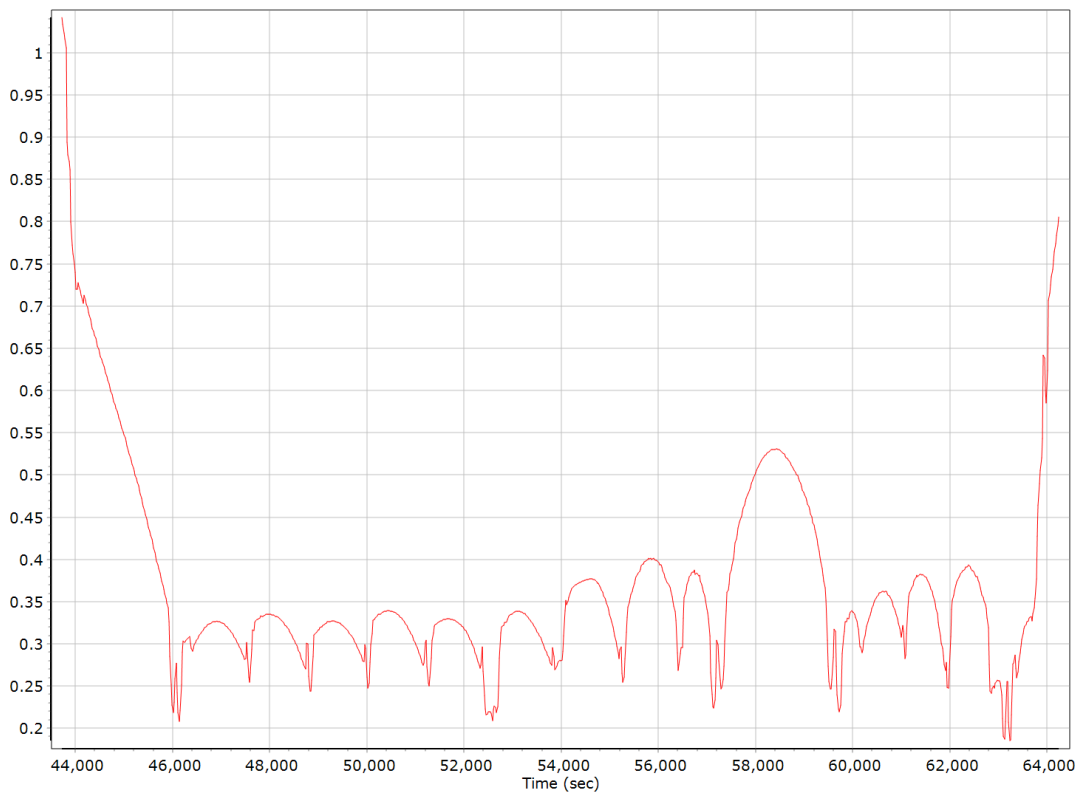
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

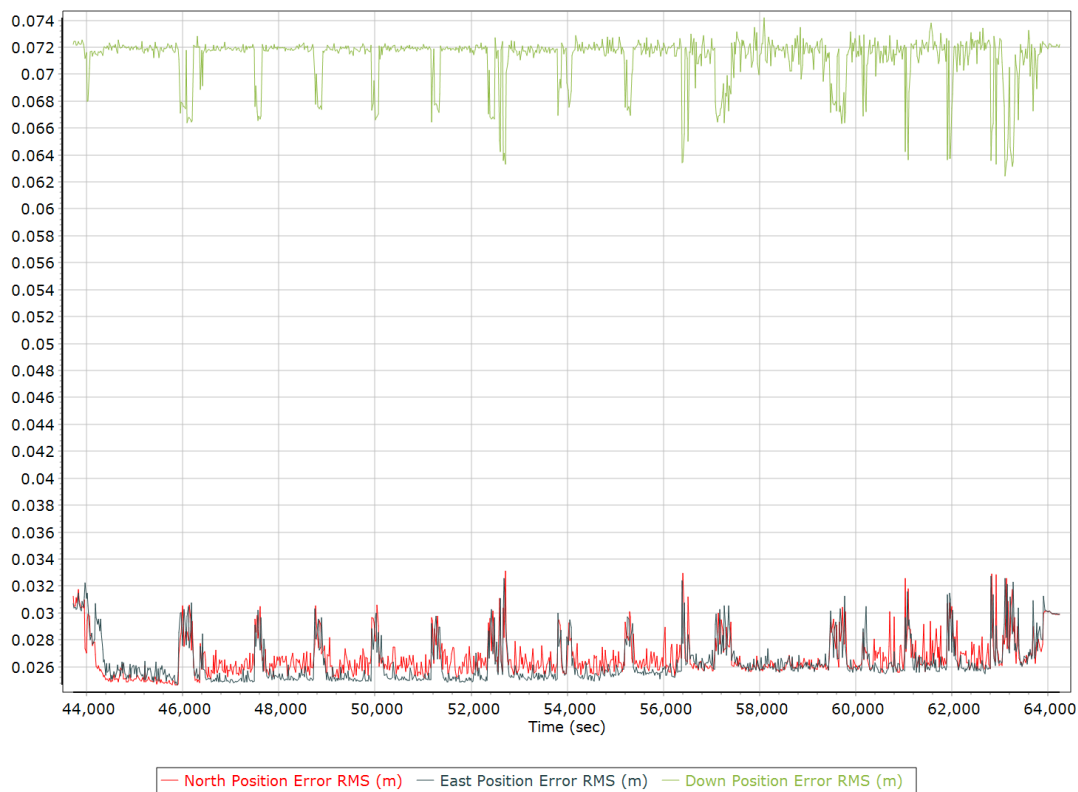


### Heading Error RMS (arc-min)



## Forward Processed Performance Metrics

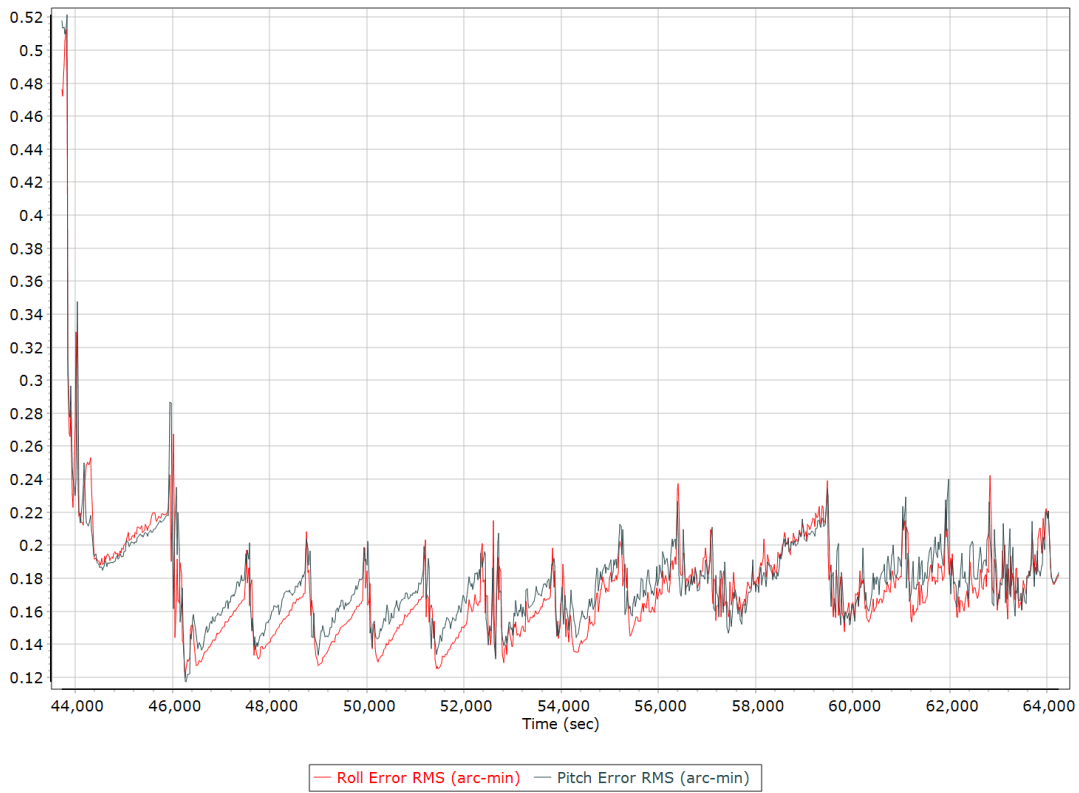
### Position Error RMS (m)



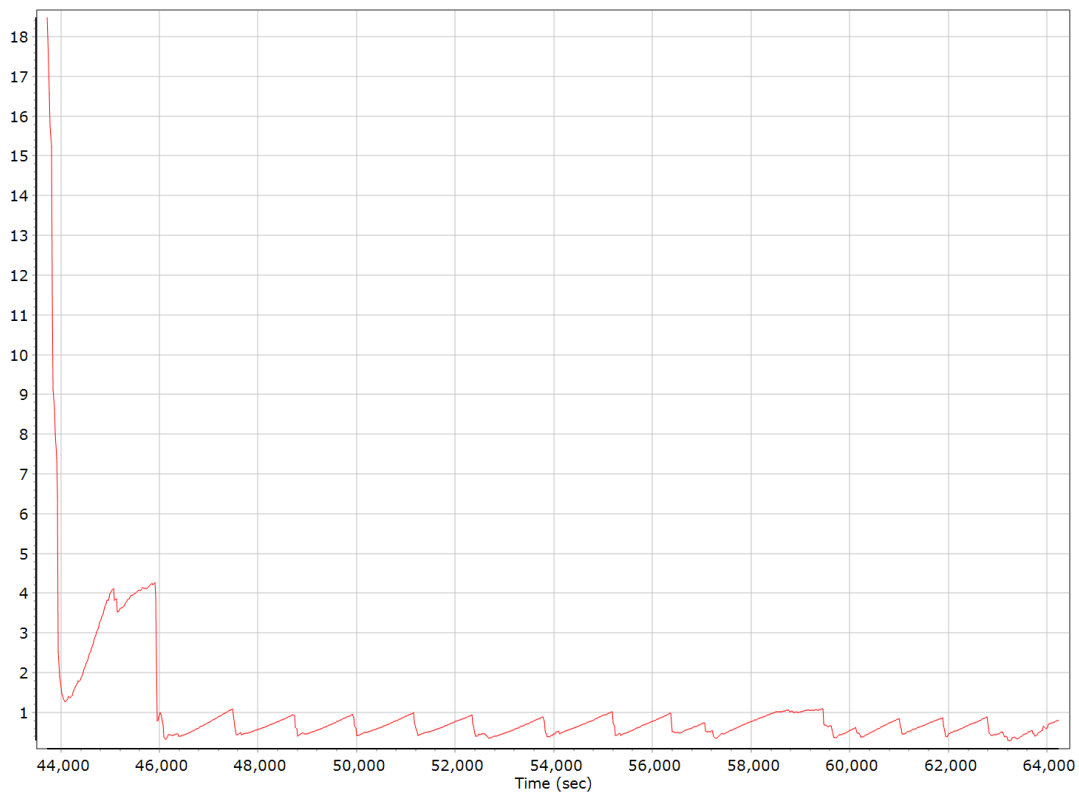
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

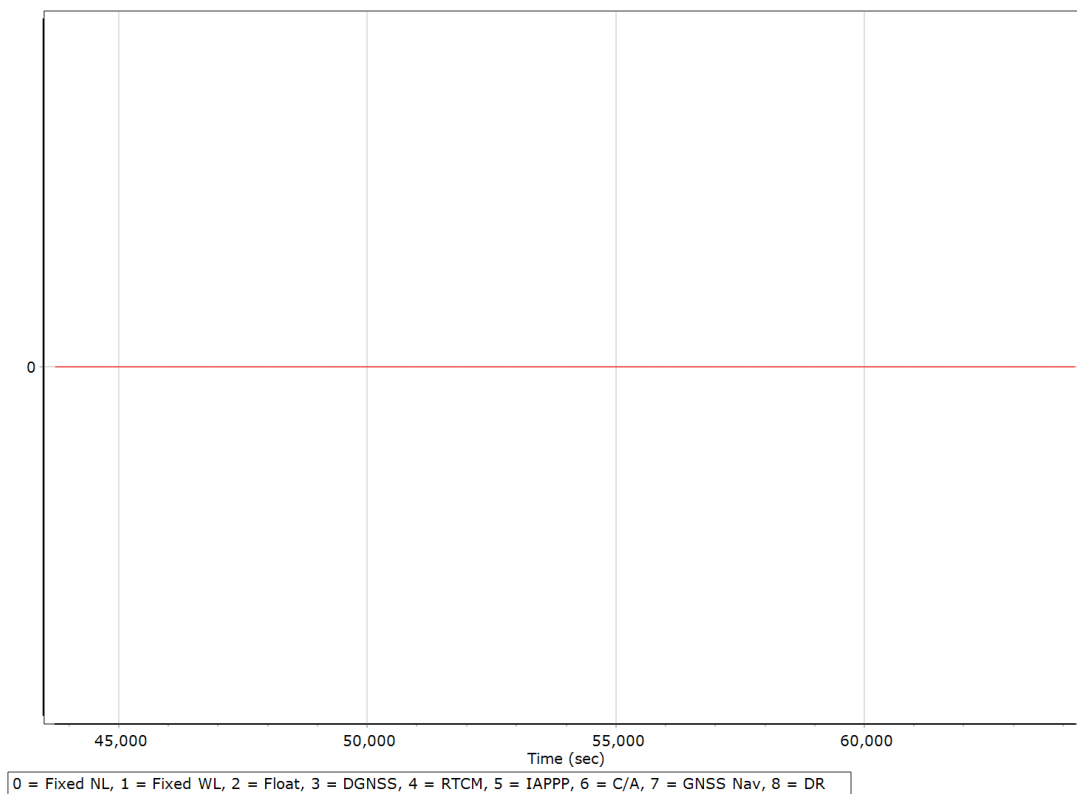


### Heading Error RMS (arc-min)

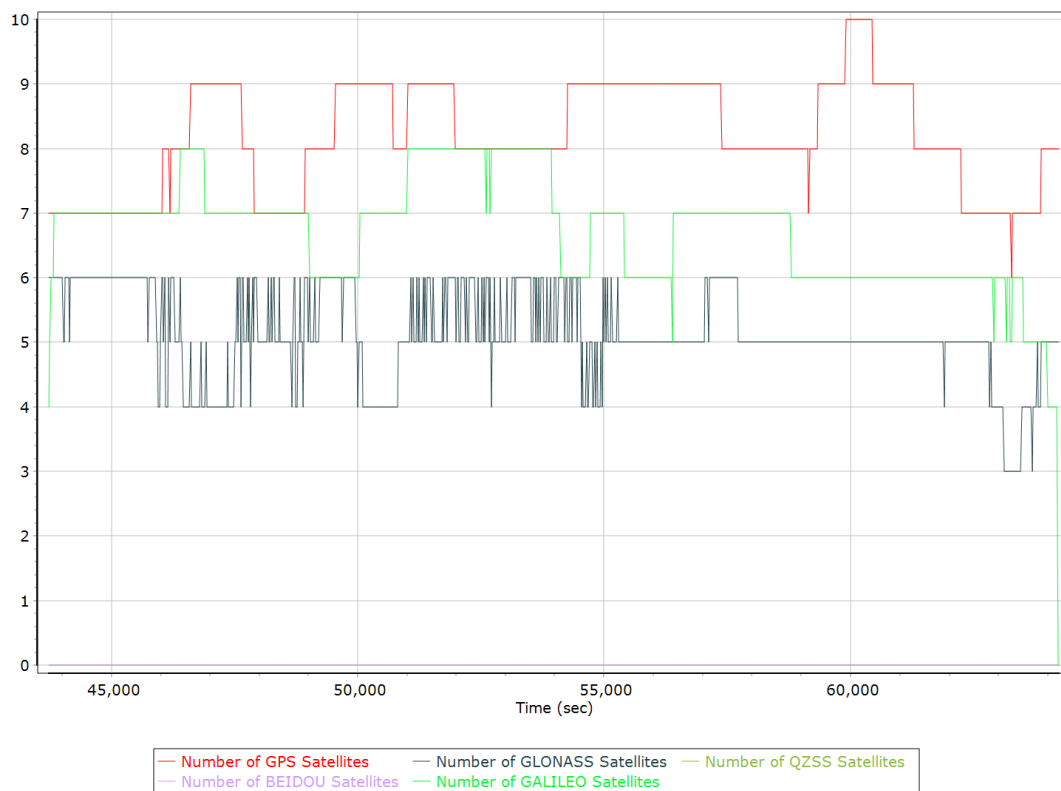


## Forward Processed Solution Status

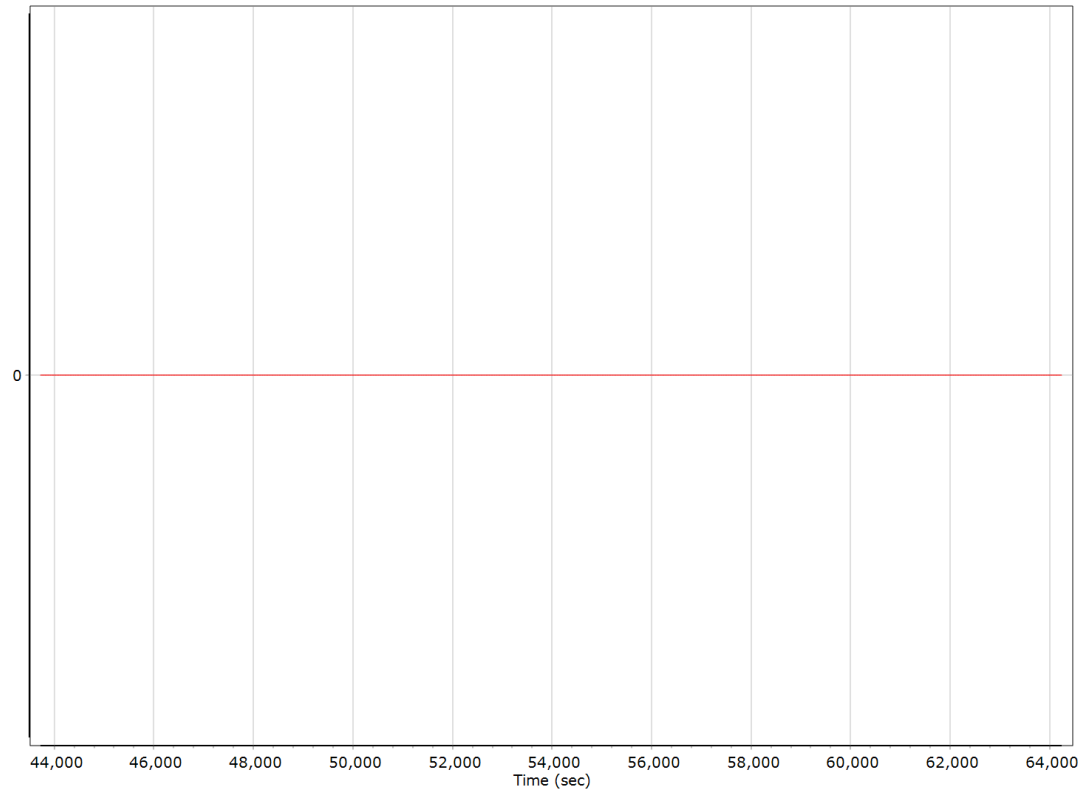
### Processing Mode



### Number of Satellites



Baseline Length



## General Information

### Mission Information

Project name	05162022A_3543
Processing date	2022-05-17 20:25:22
Mission date	2022-05-16 11:39:16
Mission duration	02:34:54.234
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
4322136a.000	POS Data
4322136a.001	POS Data
4322136a.002	POS Data
4322136a.003	POS Data
4322136a.004	POS Data
4322136a.005	POS Data
4322136a.006	POS Data
4322136a.007	POS Data
4322136a.008	POS Data
4322136a.009	POS Data
4322136a.010	POS Data
4322136a.011	POS Data
4322136a.012	POS Data
4322136a.013	POS Data
4322136a.014	POS Data
4322136a.015	POS Data
4322136a.016	POS Data
4322136a.017	POS Data
4322136a.018	POS Data
4322136a.019	POS Data
4322136a.020	POS Data
4322136a.021	POS Data
4322136a.022	POS Data
4322136a.023	POS Data
4322136a.024	POS Data
4322136a.025	POS Data
4322136a.026	POS Data
4322136a.027	POS Data
4322136a.028	POS Data
4322136a.029	POS Data

### Input Files

File Name	File Type
Ephm1360.22g	GLONASS Broadcast Ephemeris
Ephm1360.22n	GPS Broadcast Ephemeris

### Output Files

Filename	File type
sbet_05162022A_3543.out	SBET Trajectory File



## Rover Data Summary

First raw data file	4322136a.000		
Last raw data file	4322136a.029		
Start GPS week	2210		
Start time	128337.092 (5/16/2022 11:38:57 AM)		
End time	137631.326 (5/16/2022 2:13:51 PM)		
Start of fine alignment	128969.765 (5/16/2022 11:49:29 AM)		
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

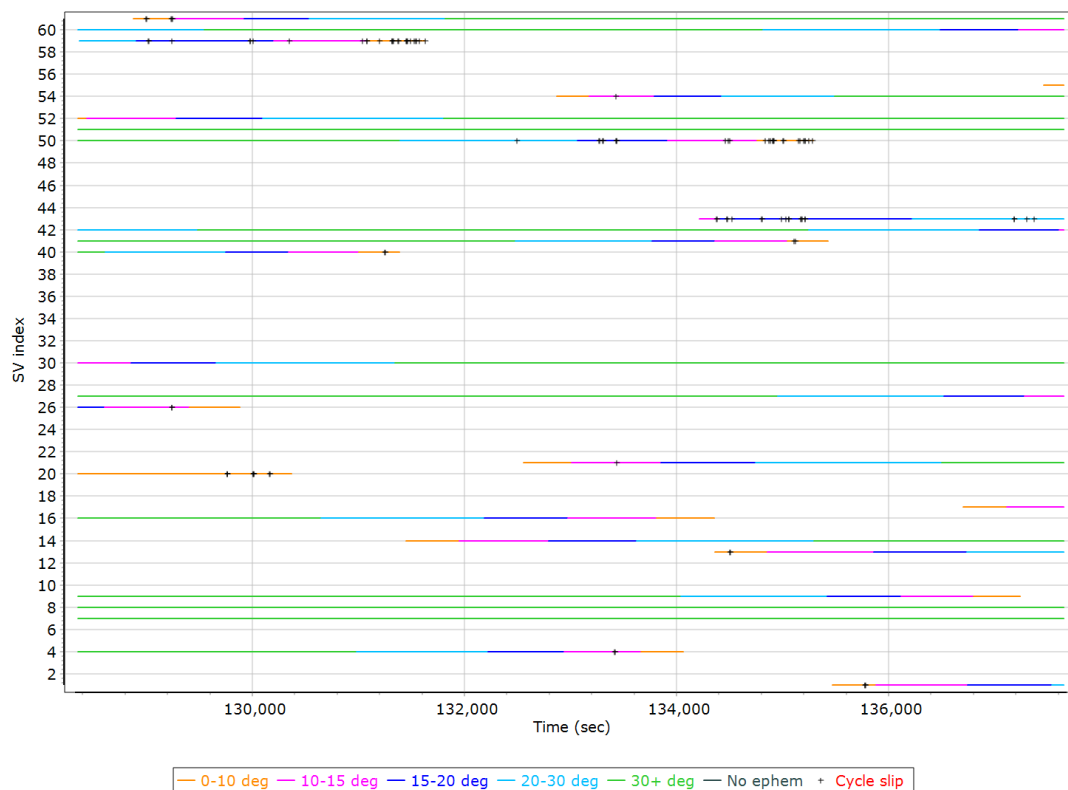
## Rover Data QC

### Raw IMU Import QC Summary

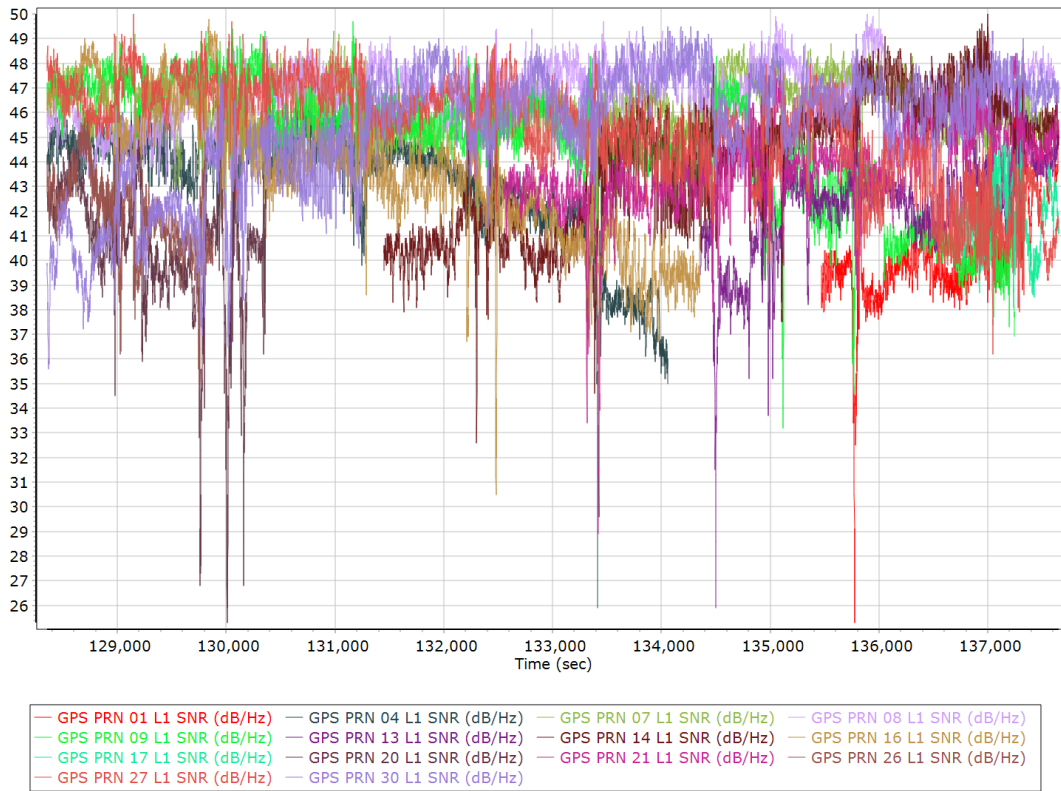
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05162022A_3543.log
IMU Records Processed	1858463
Termination Status	Normal
IMU Anomalies	0

## Primary Observables & Satellite Data

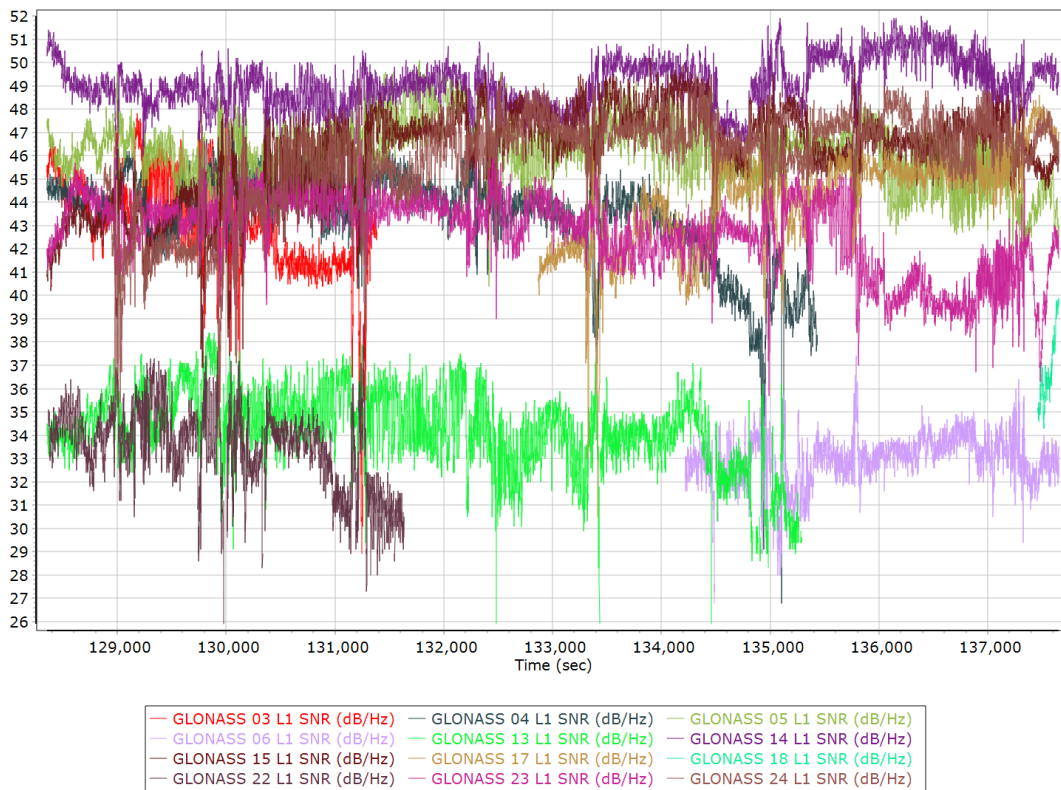
### GPS/GLONASS L1 Satellite Lock/Elevation



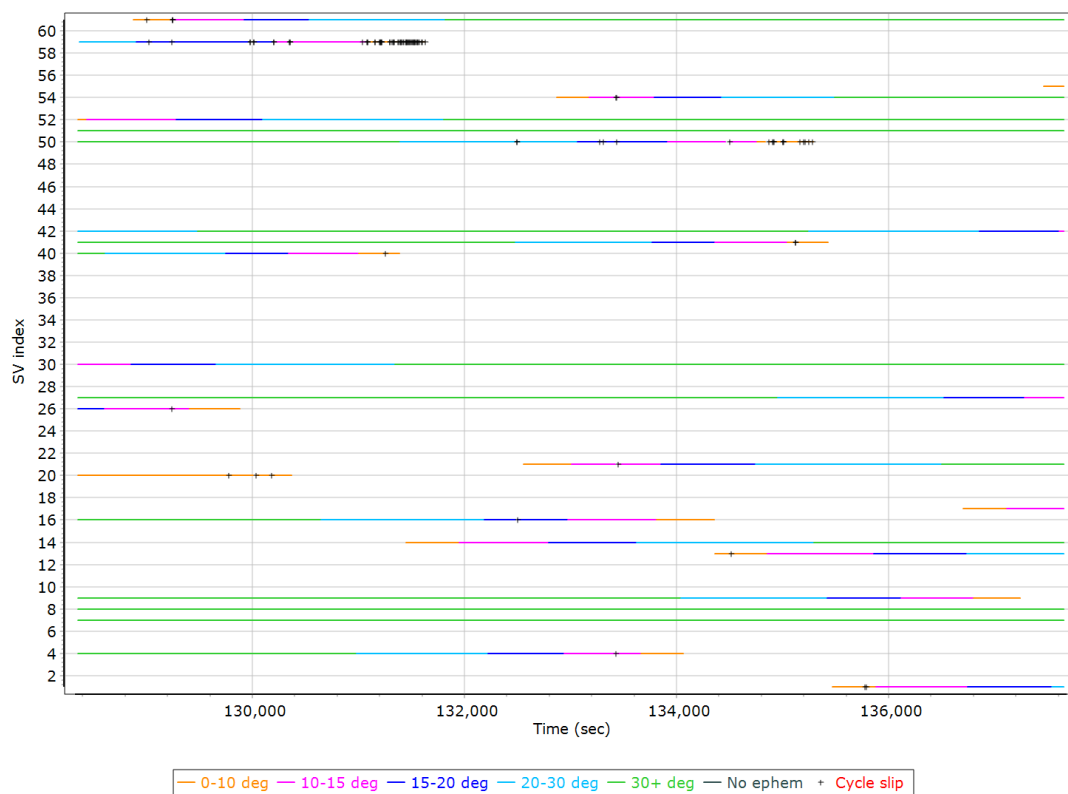
## GPS L1 SNR



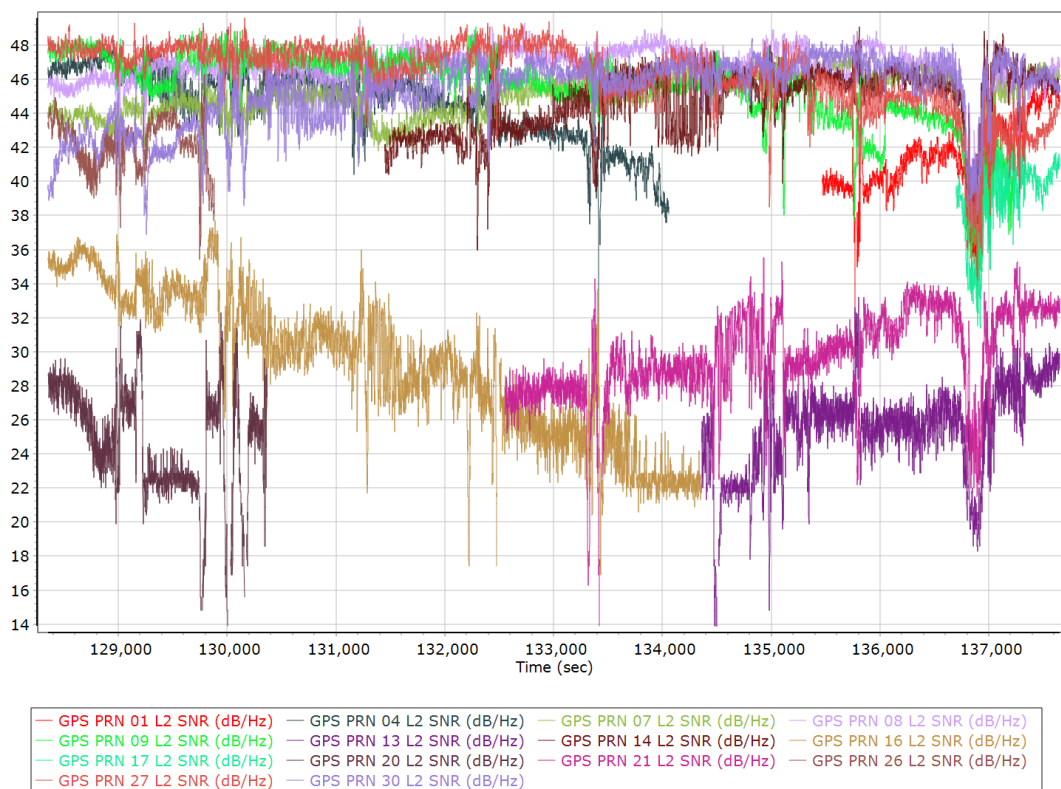
## GLONASS L1 SNR



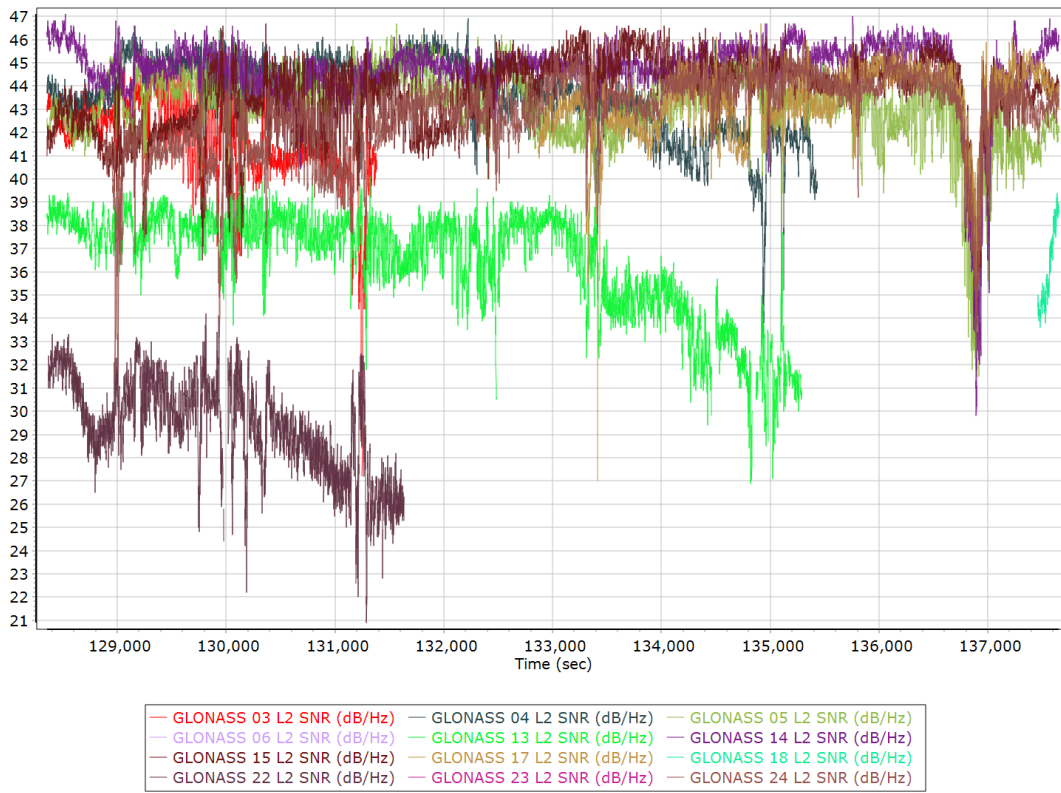
## GPS/GLONASS L2 Satellite Lock/Elevation



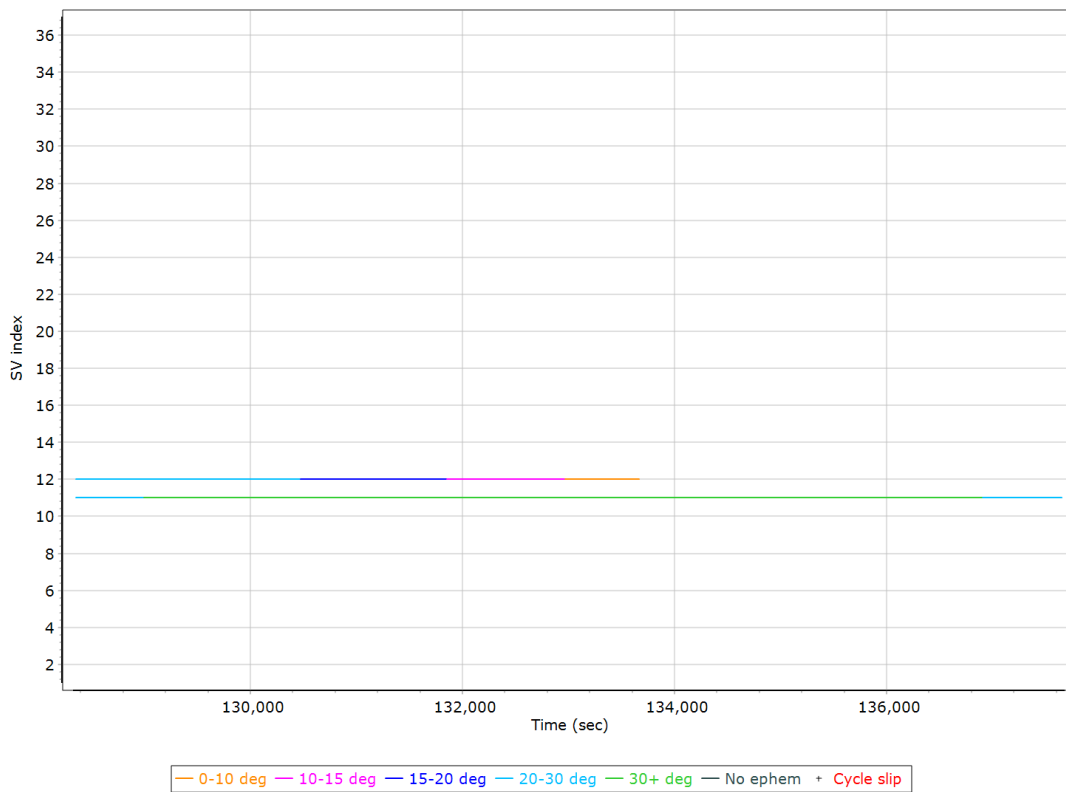
## GPS L2 SNR



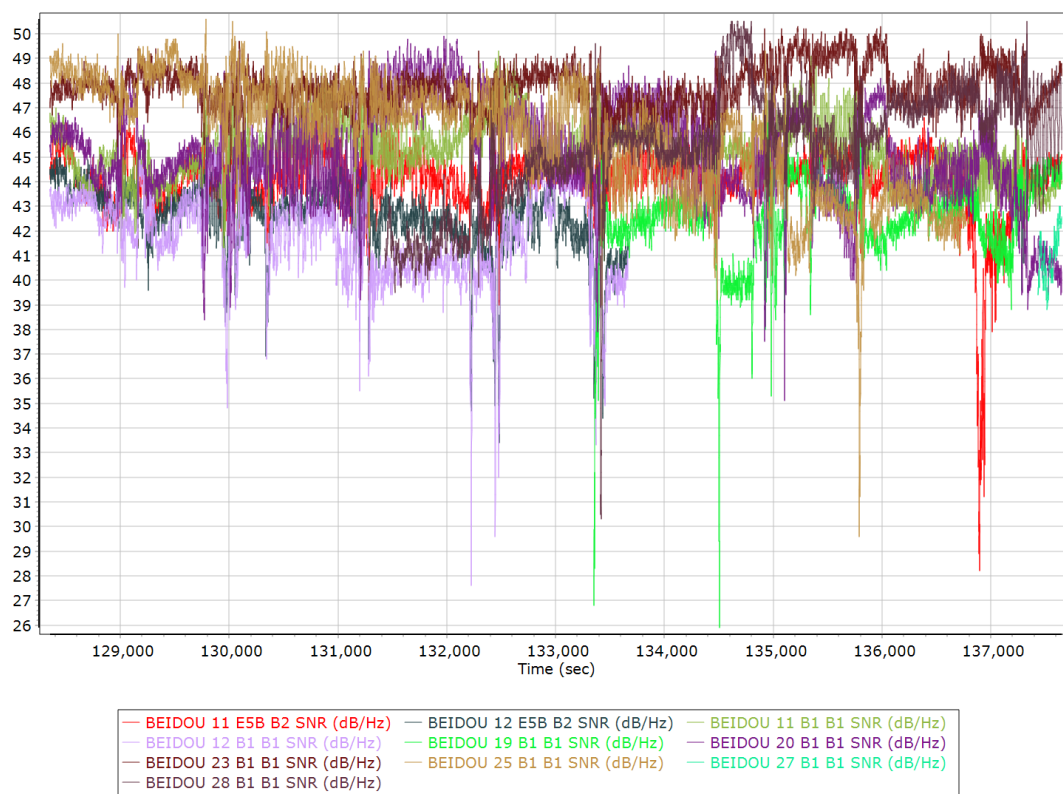
## GLONASS L2 SNR



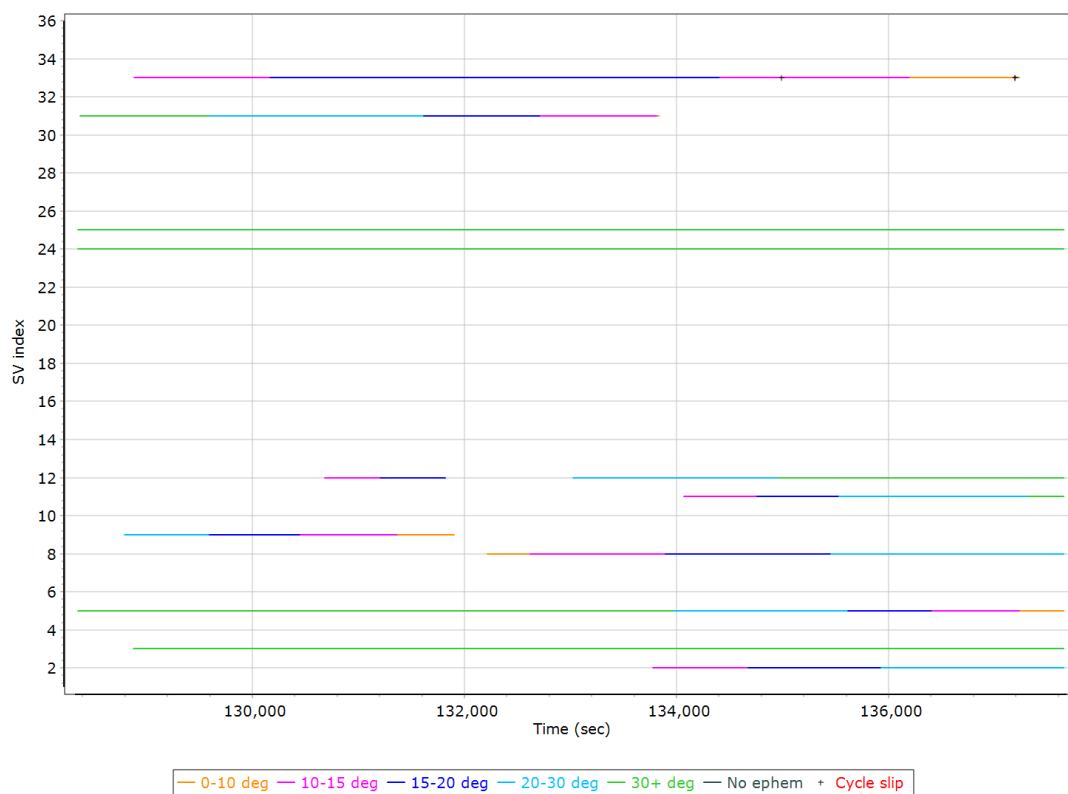
## BEIDOU Satellite Lock/Elevation



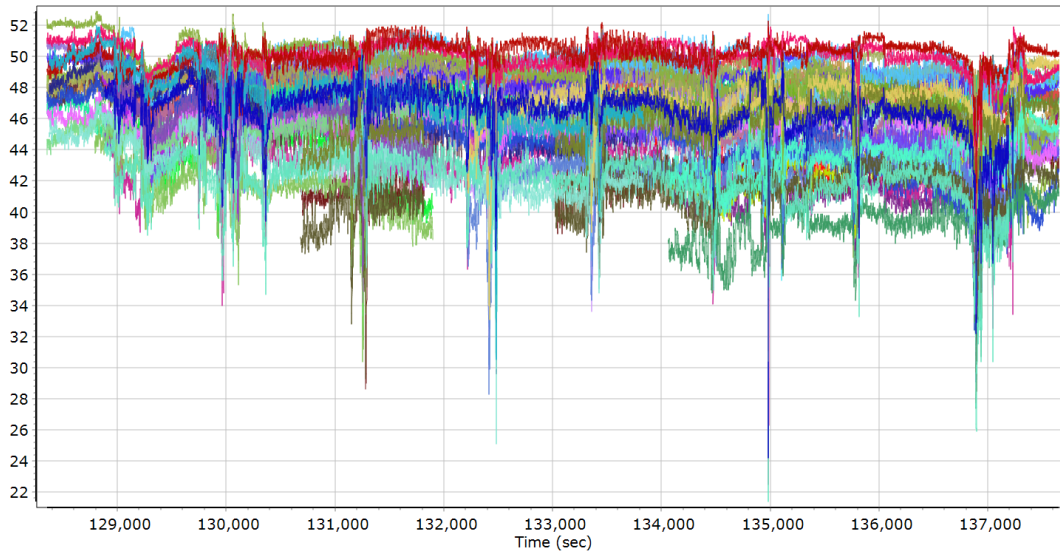
## BEIDOU SNR



## GALILEO Satellite Lock/Elevation



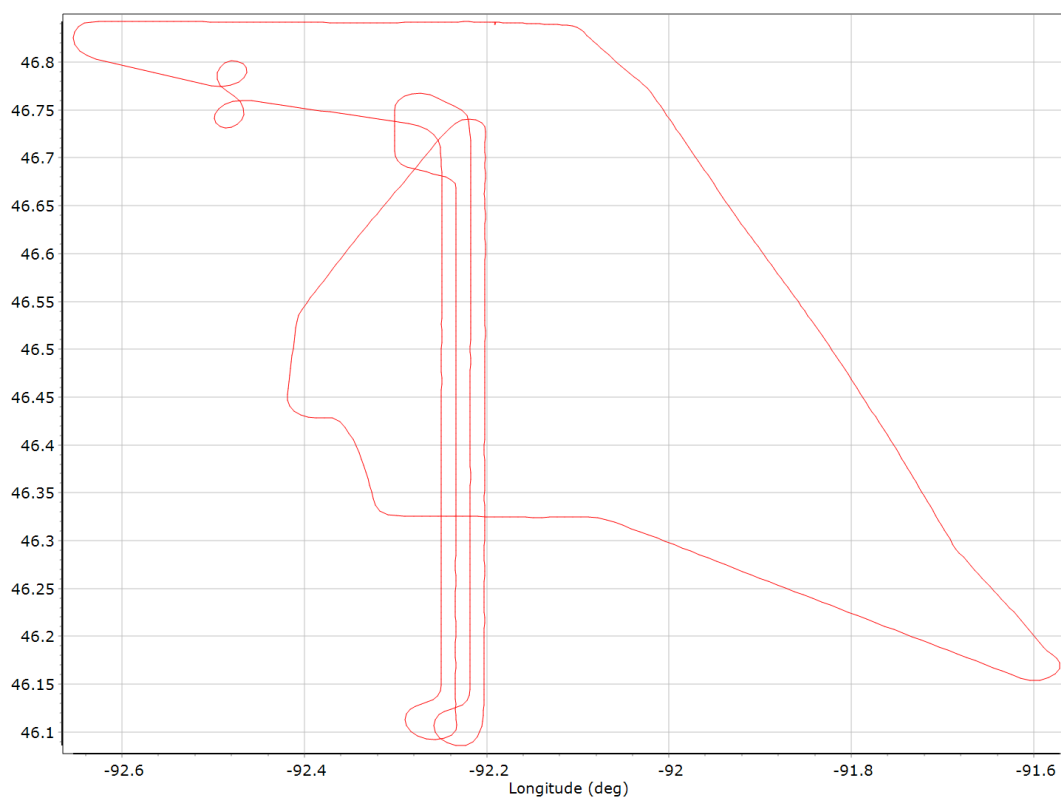
## GALILEO SNR



— GALILEO 02 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 03 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 31 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 33 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 05 L5E5A BPSK10_PD SNR (dB/Hz)
— GALILEO 08 L5E5A BPSK10_PD SNR (dB/Hz)	— GALILEO 09 L5E5A BPSK10_PD SNR (dB/Hz)
— GALILEO 11 L5E5A BPSK10_PD SNR (dB/Hz)	— GALILEO 12 L5E5A BPSK10_PD SNR (dB/Hz)
— GALILEO 24 L5E5A BPSK10_PD SNR (dB/Hz)	— GALILEO 25 L5E5A BPSK10_PD SNR (dB/Hz)

## Smoothed Trajectory Information

### Top View

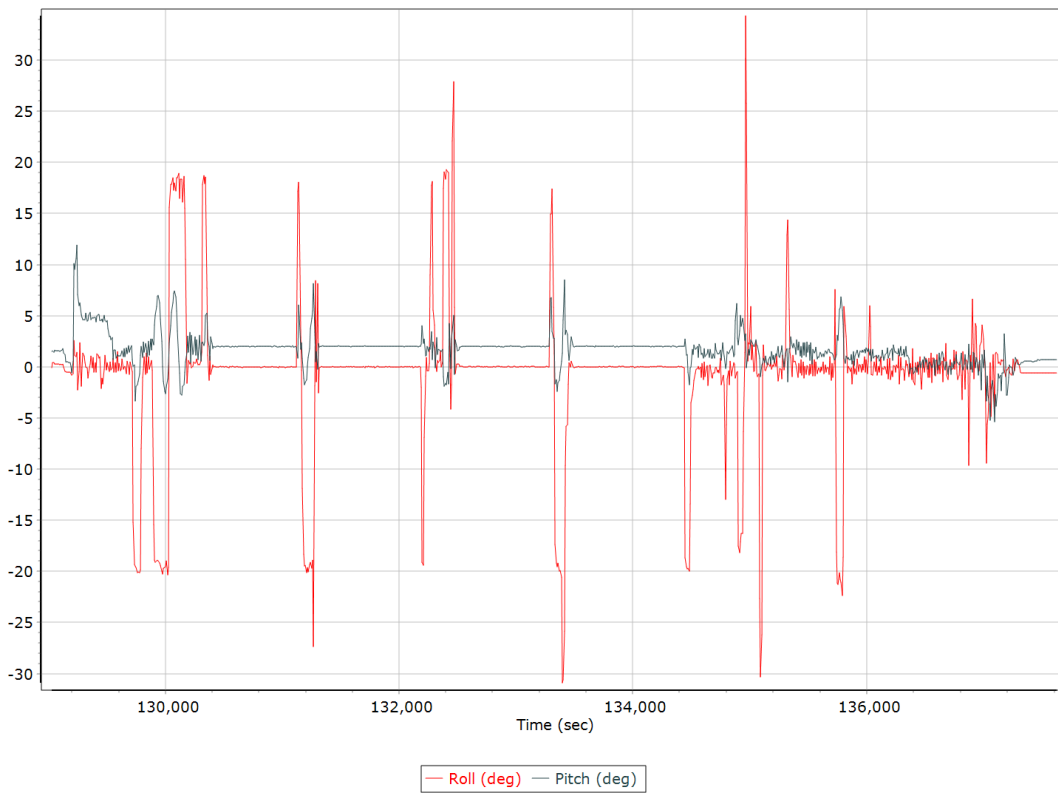


### Altitude

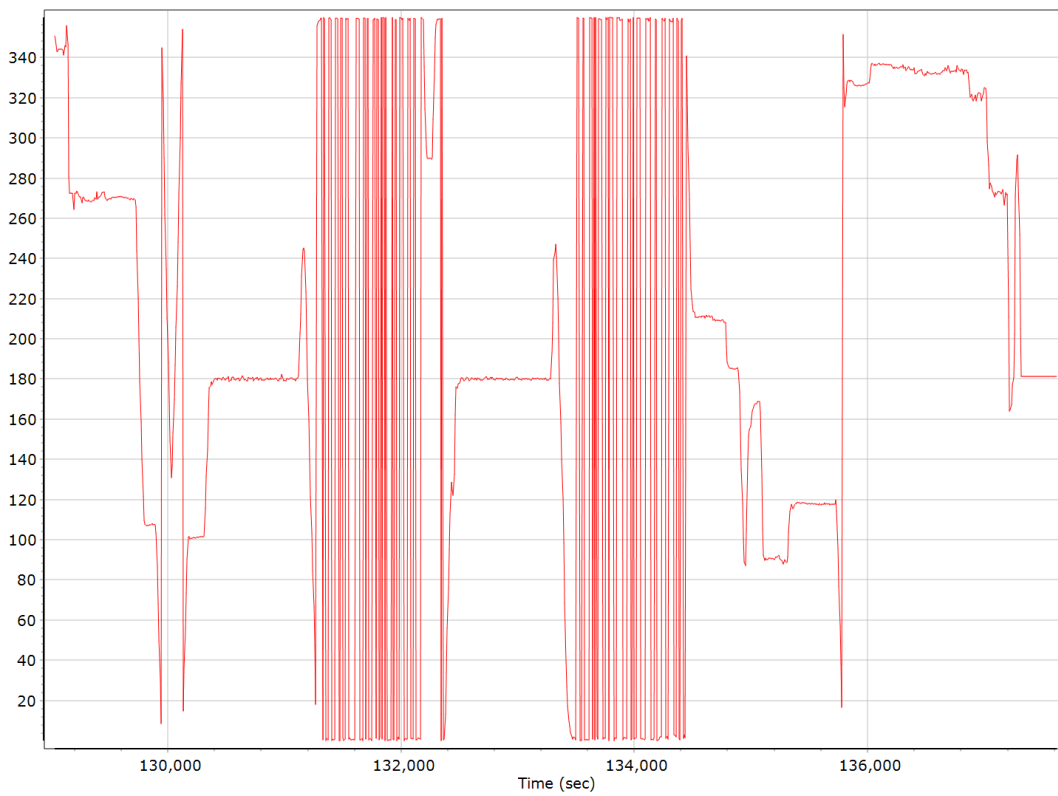




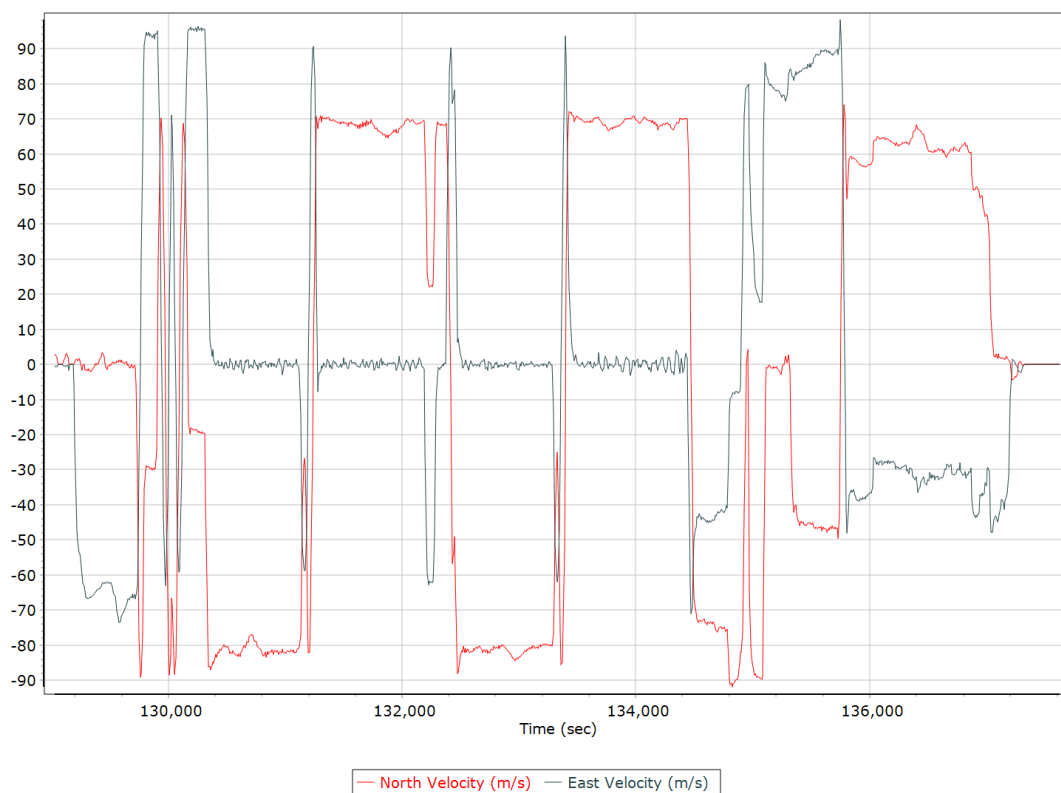
## Roll/Pitch



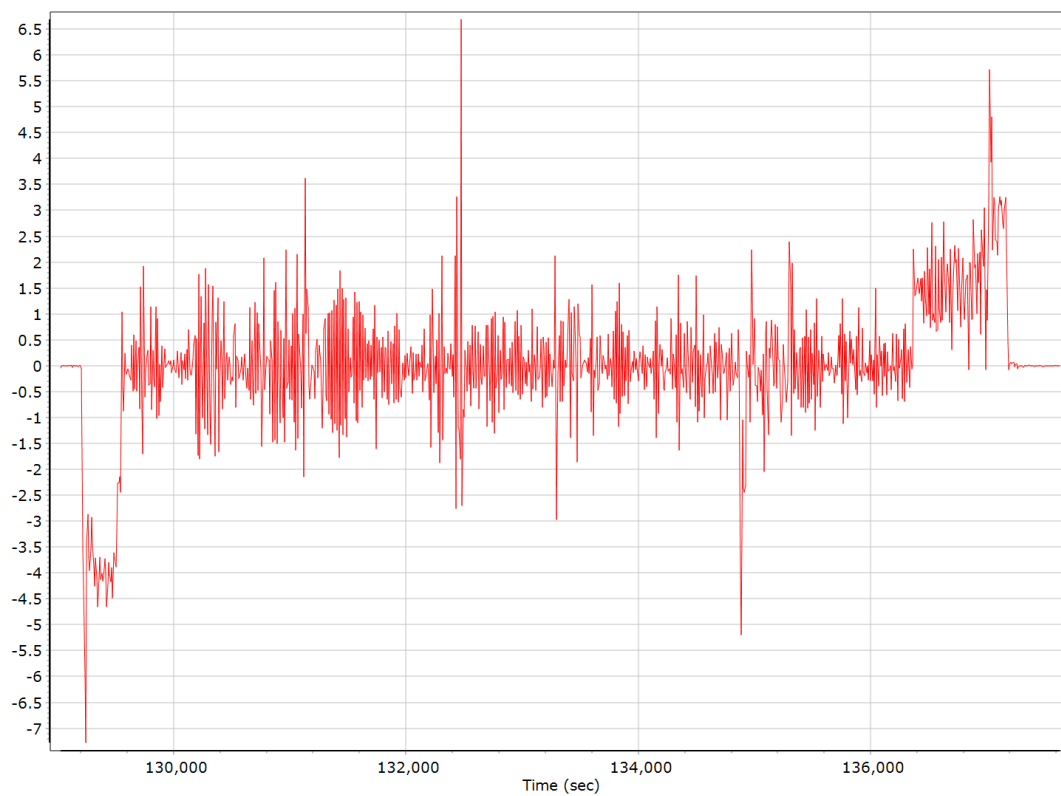
## Heading



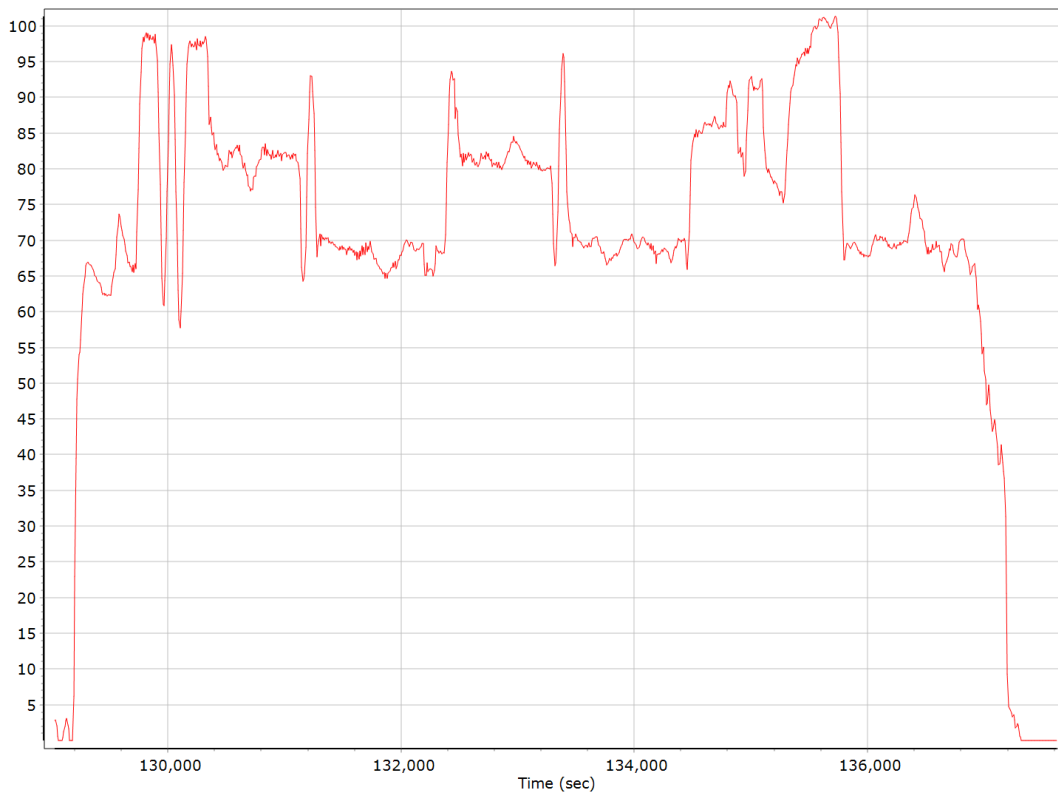
## North/East Velocity



## Down Velocity



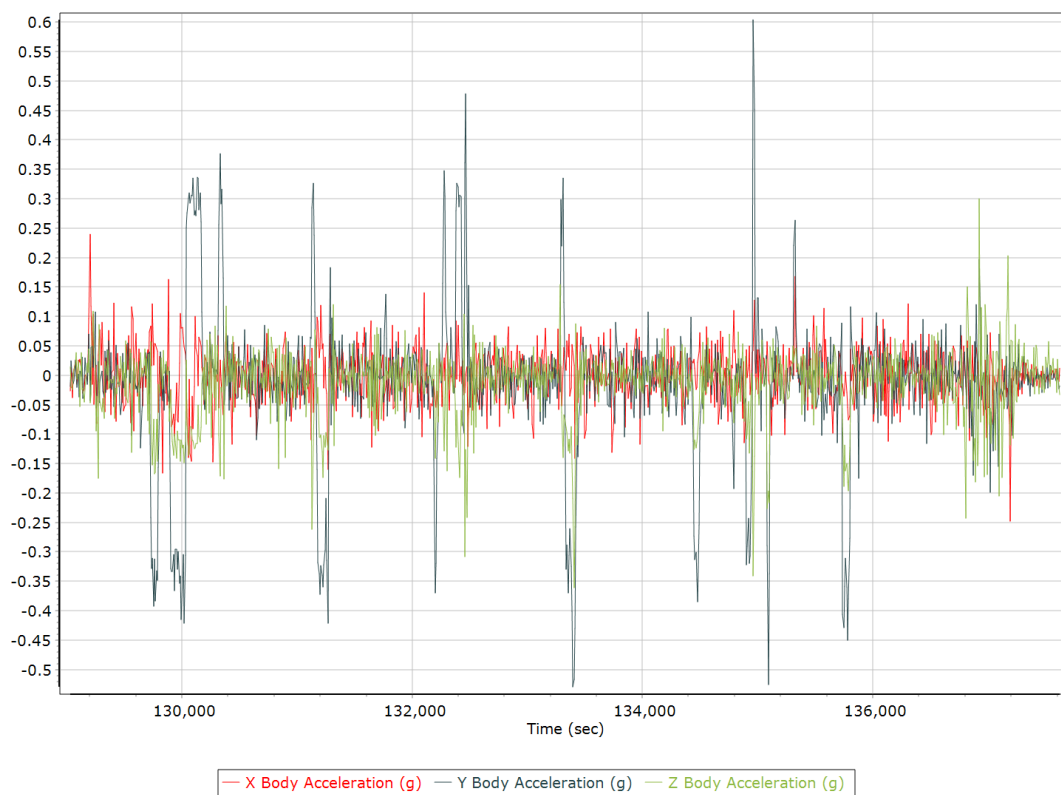
## Total Speed



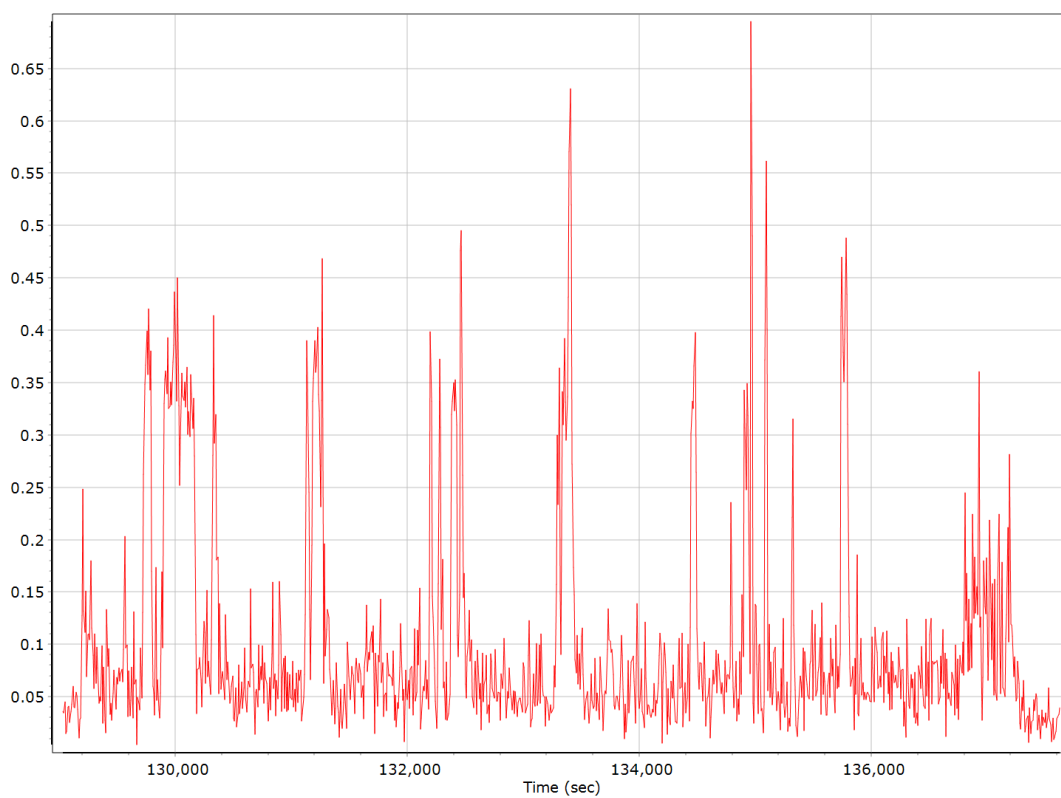
## Ground Speed



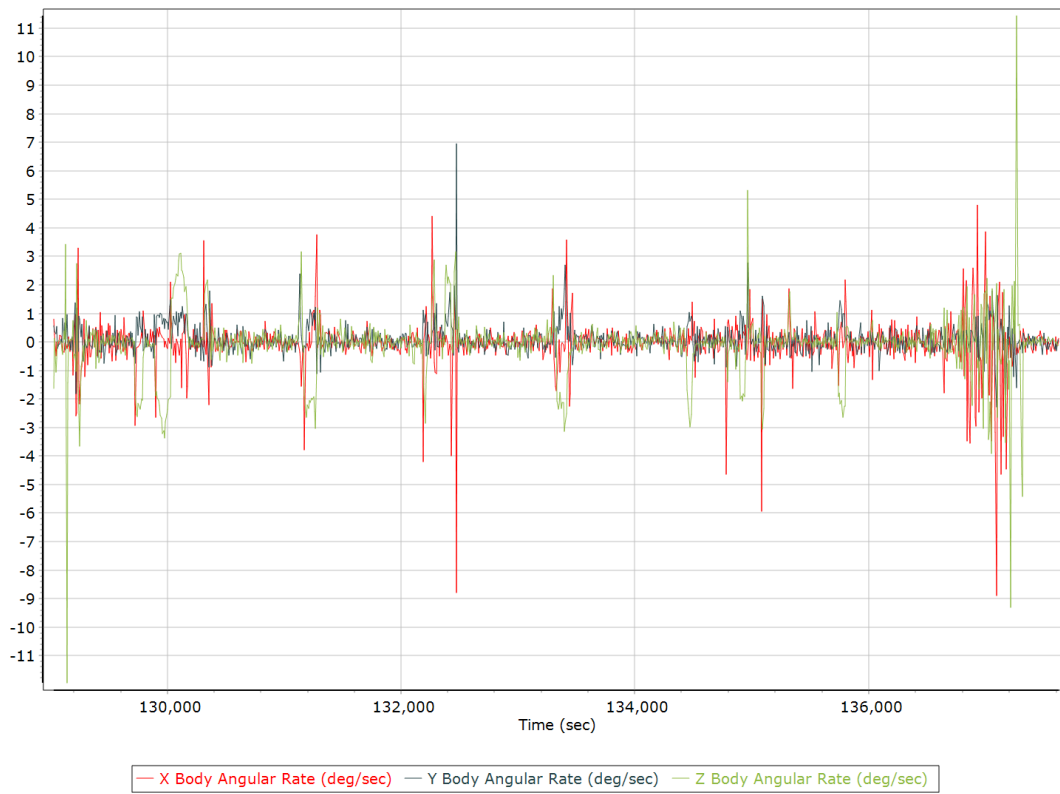
## Body Acceleration



## Total Body Acceleration



## Body Angular Rate



## Forward Processed Trajectory Information

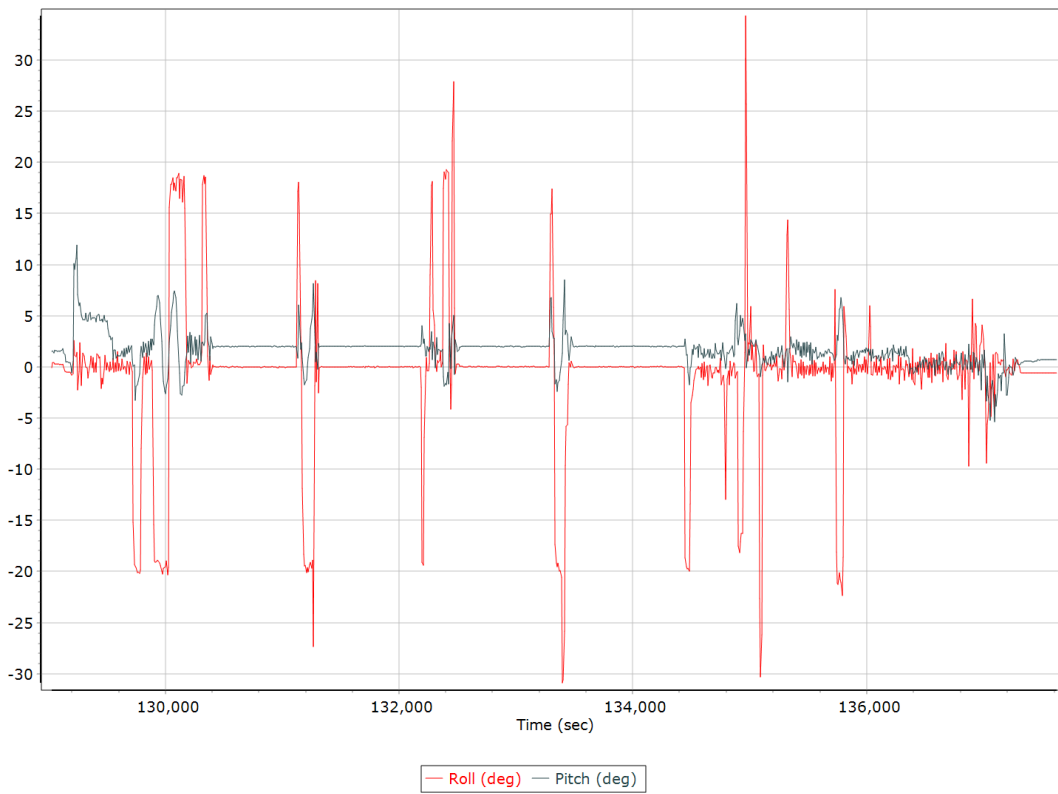
### Top View



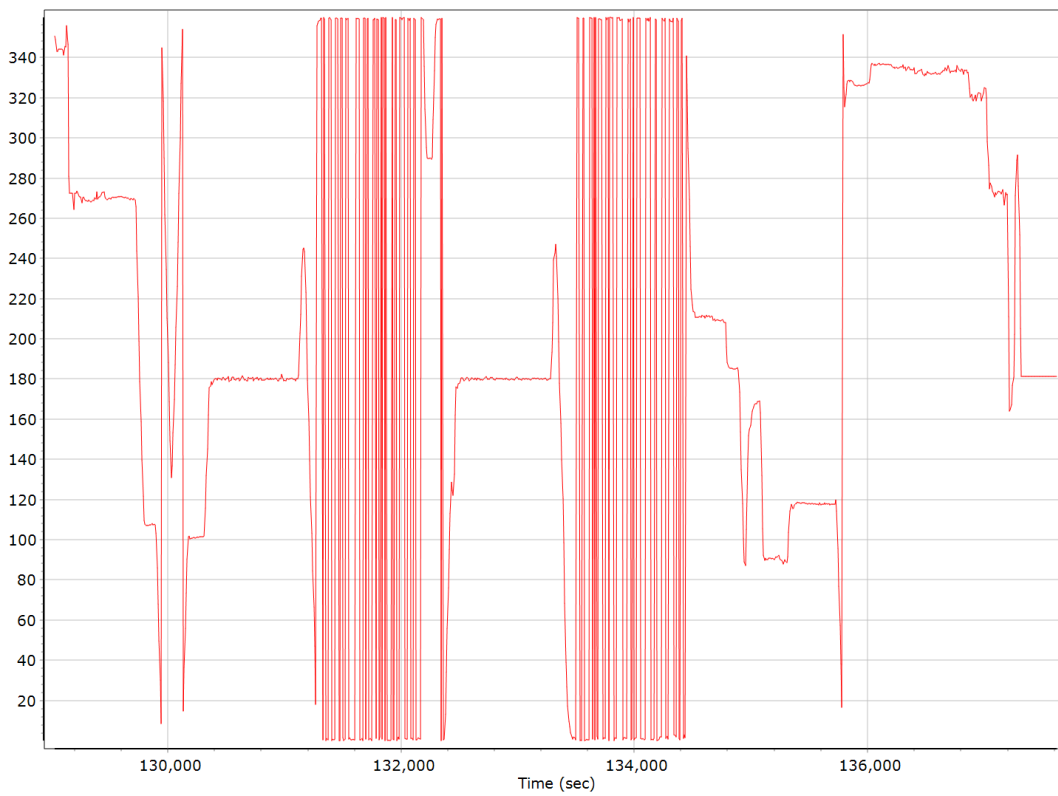
### Altitude



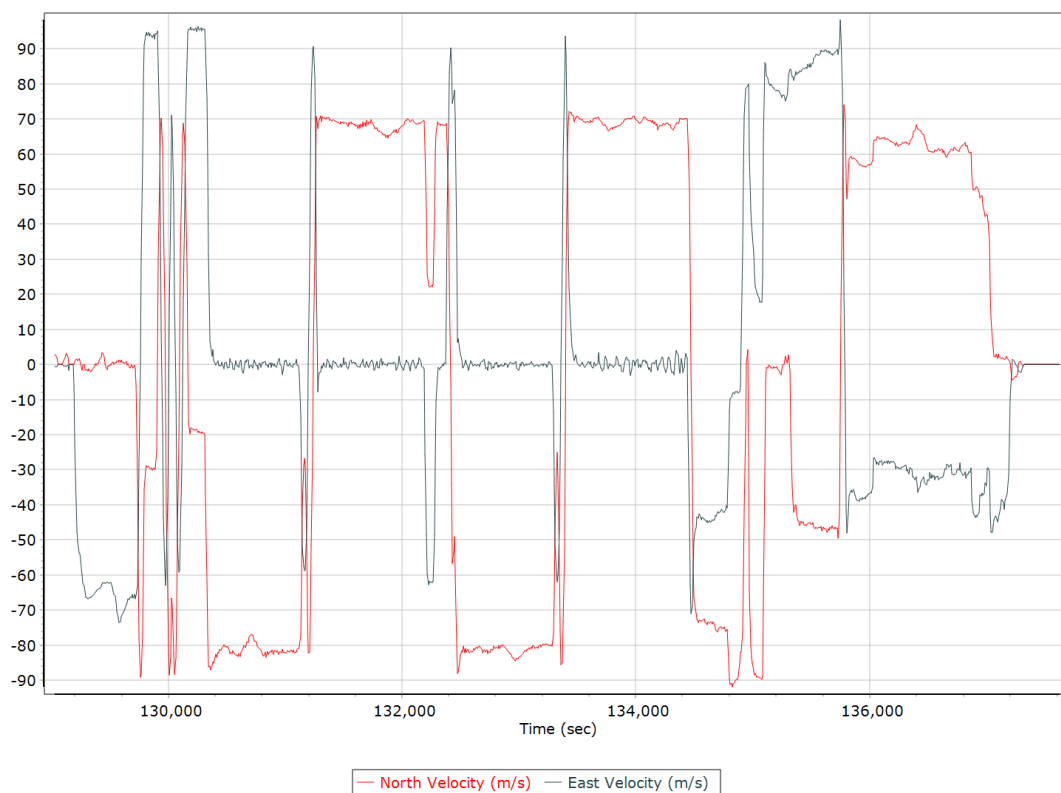
## Roll/Pitch



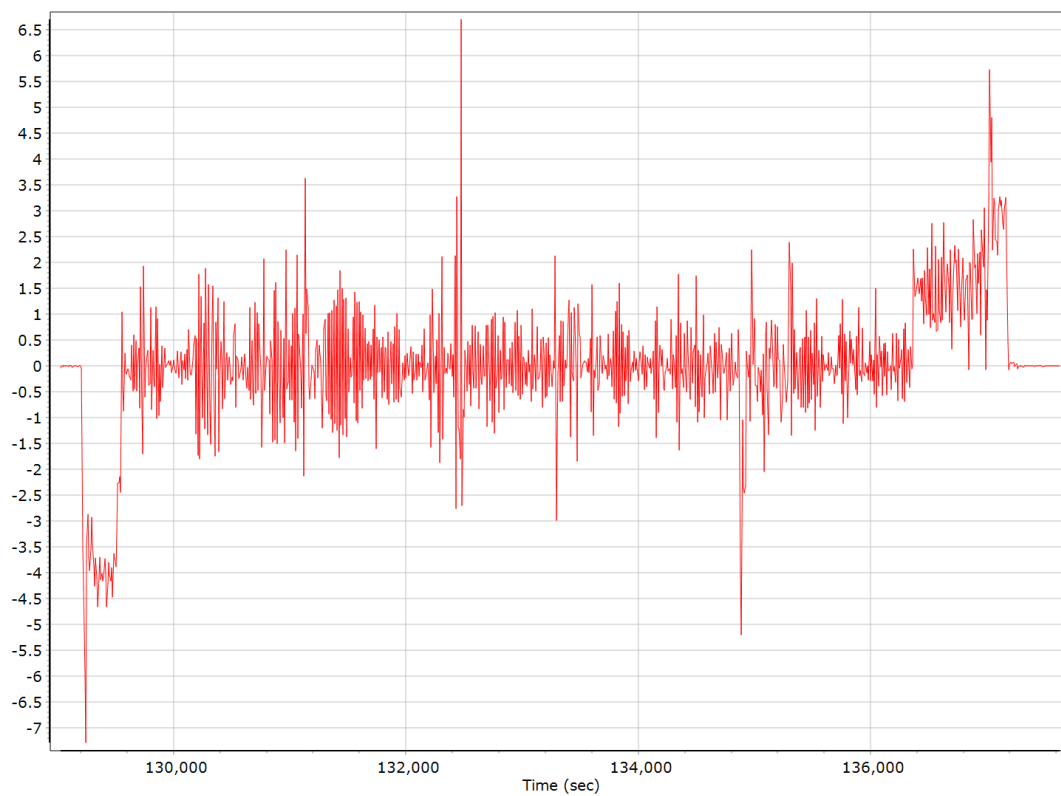
## Heading



## North/East Velocity



## Down Velocity





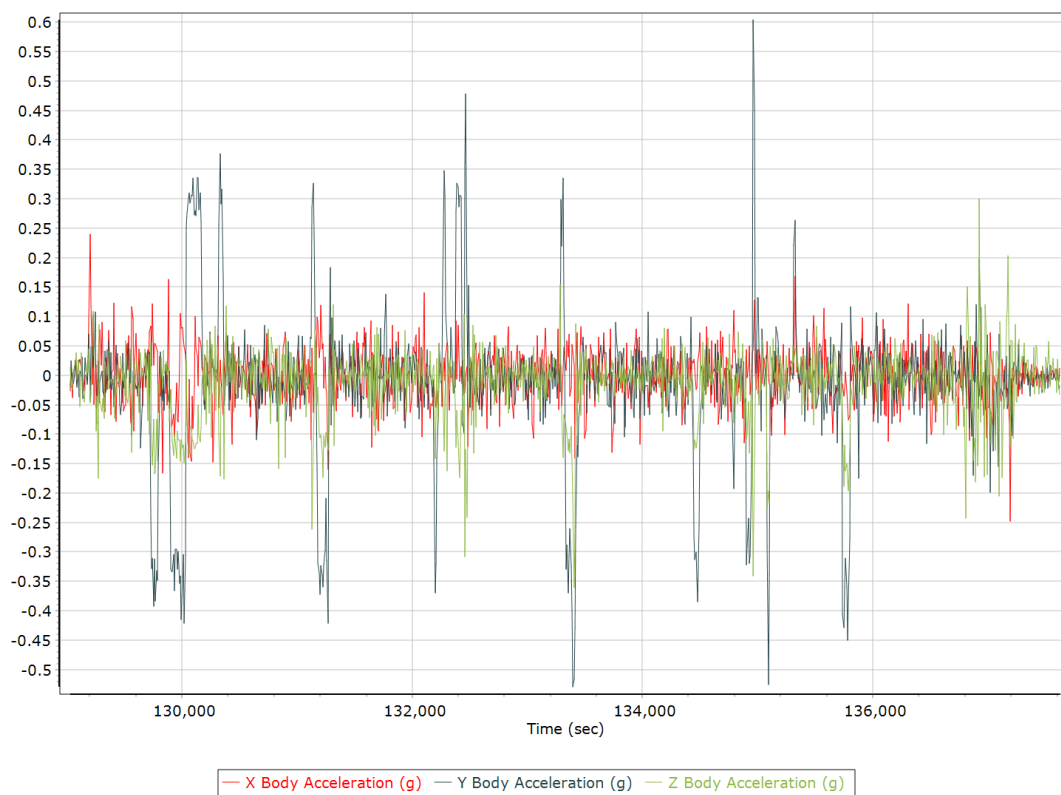
## Total Speed



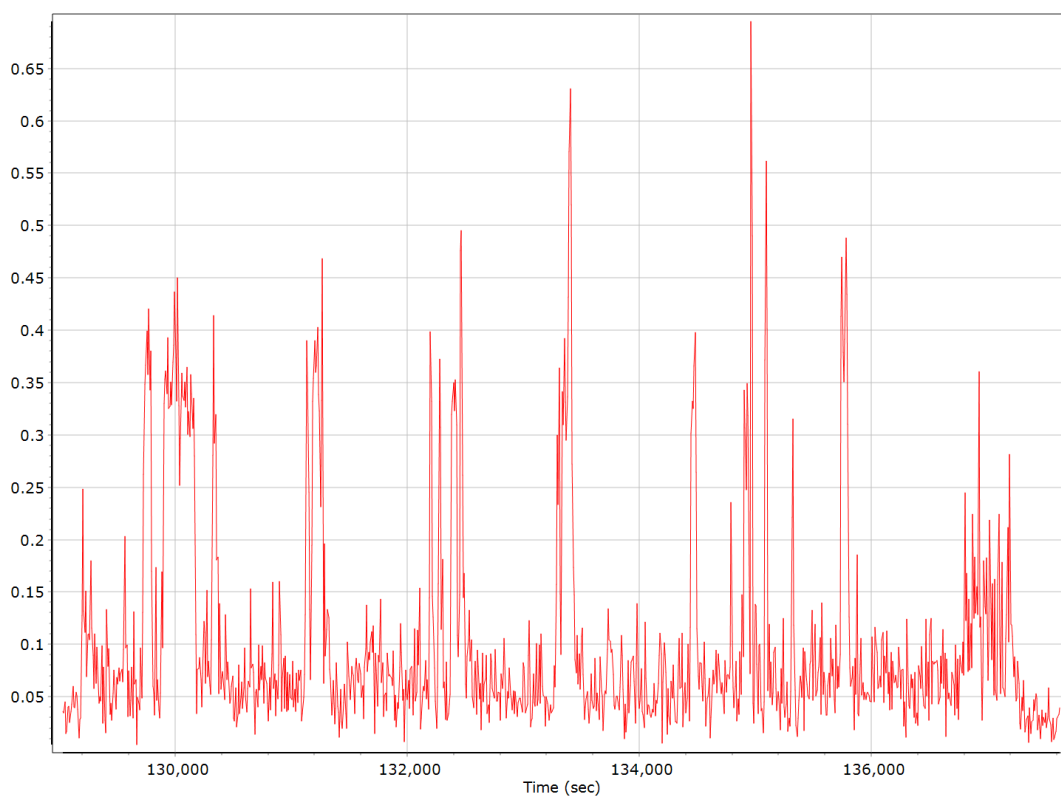
## Ground Speed



## Body Acceleration



## Total Body Acceleration



## Body Angular Rate

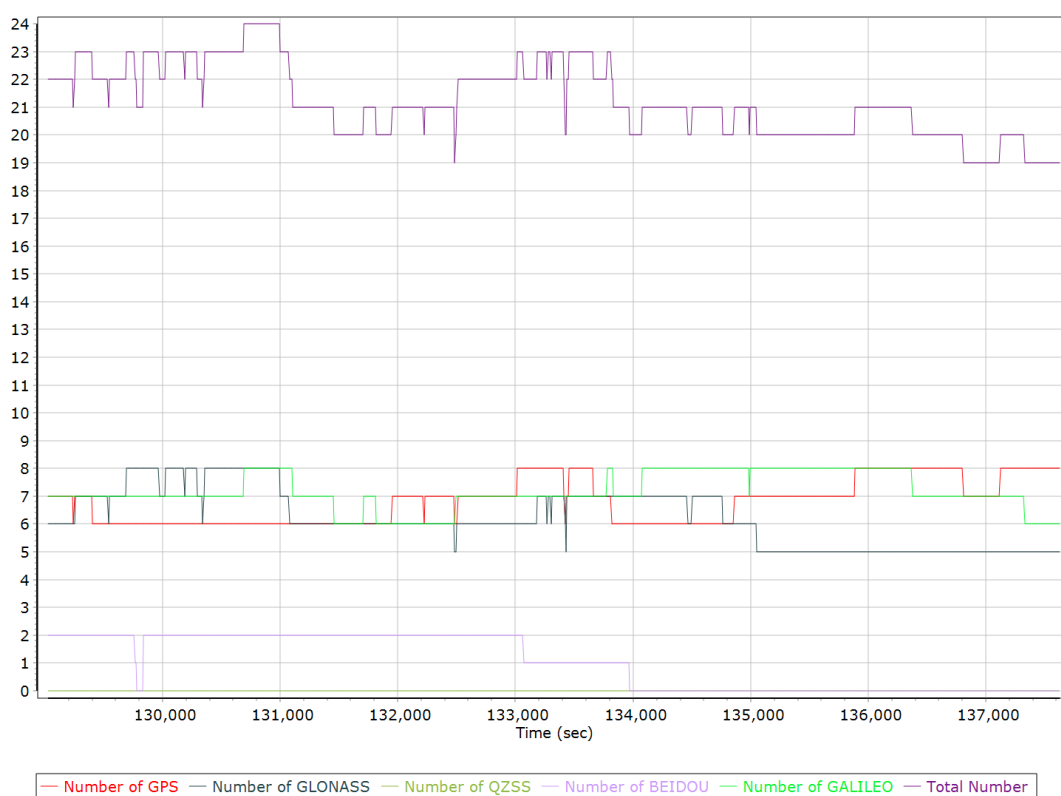


## GNSS QC

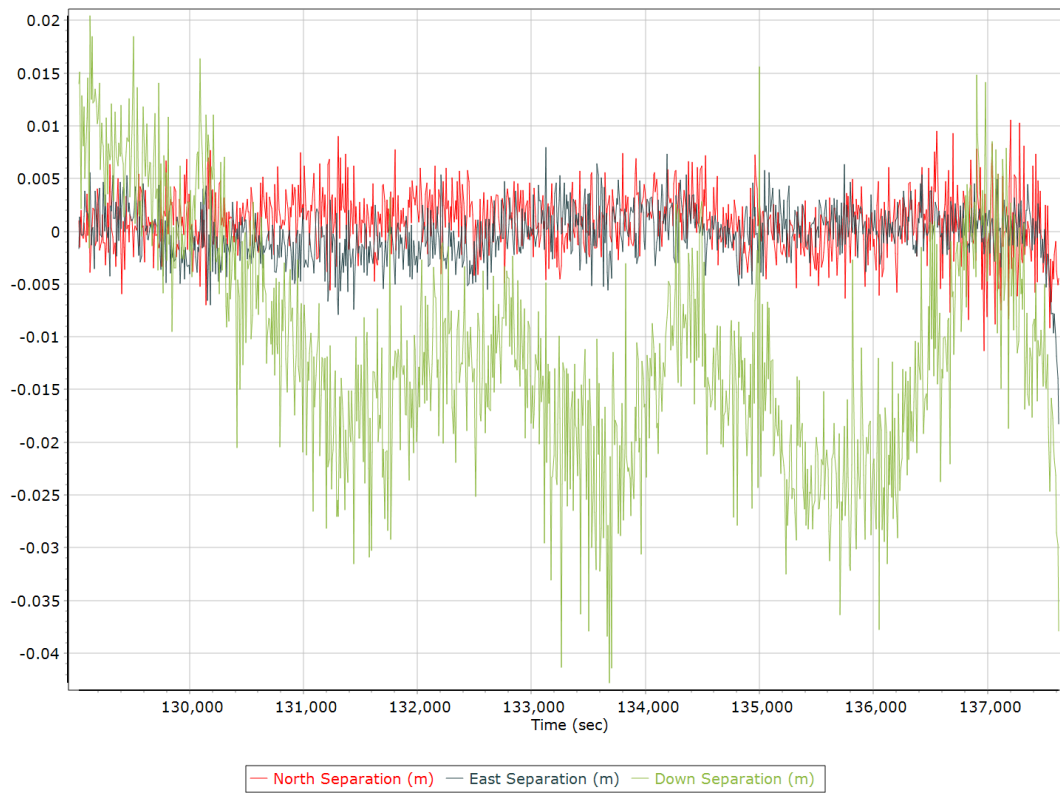
### GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	6	8	7
Number of GLONASS SV	5	8	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	2	1
Number of GALILEO SV	3	8	7
Total number of SV	15	24	21
PDOP	1.06	1.54	1.22
QC Solution Gaps	0.00	0.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	9267.00	0.00	0.00
Percentage	100.00	0.00	0.00

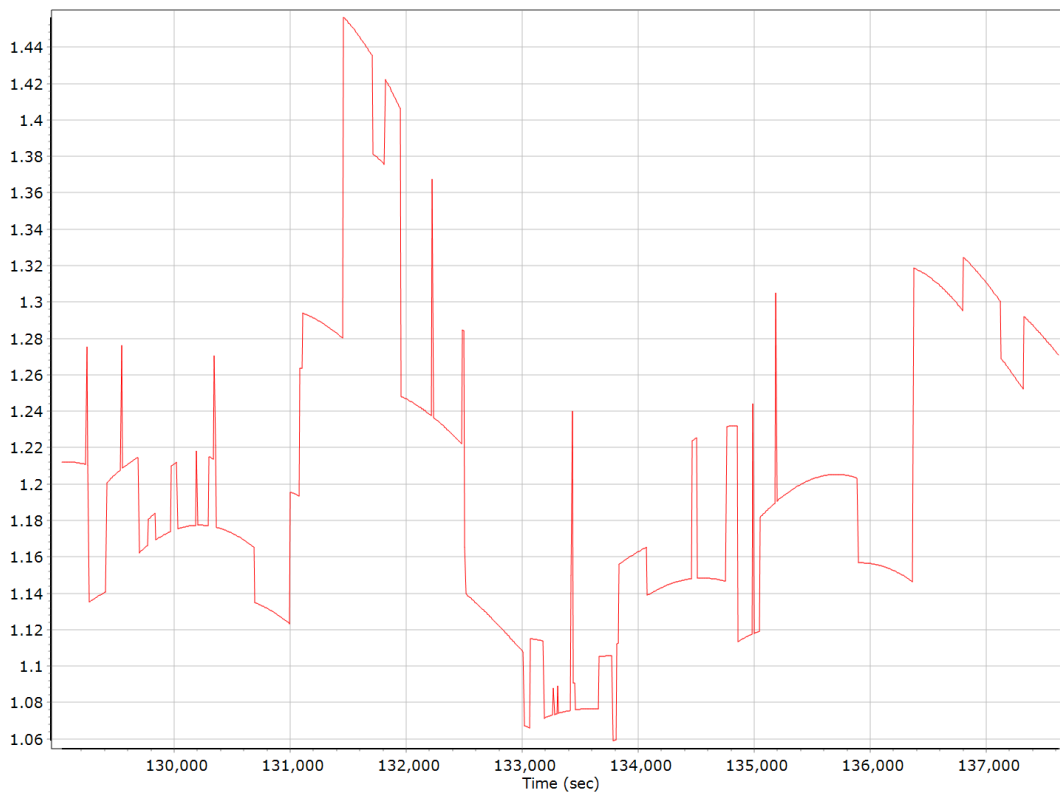
### Num SVs in solution



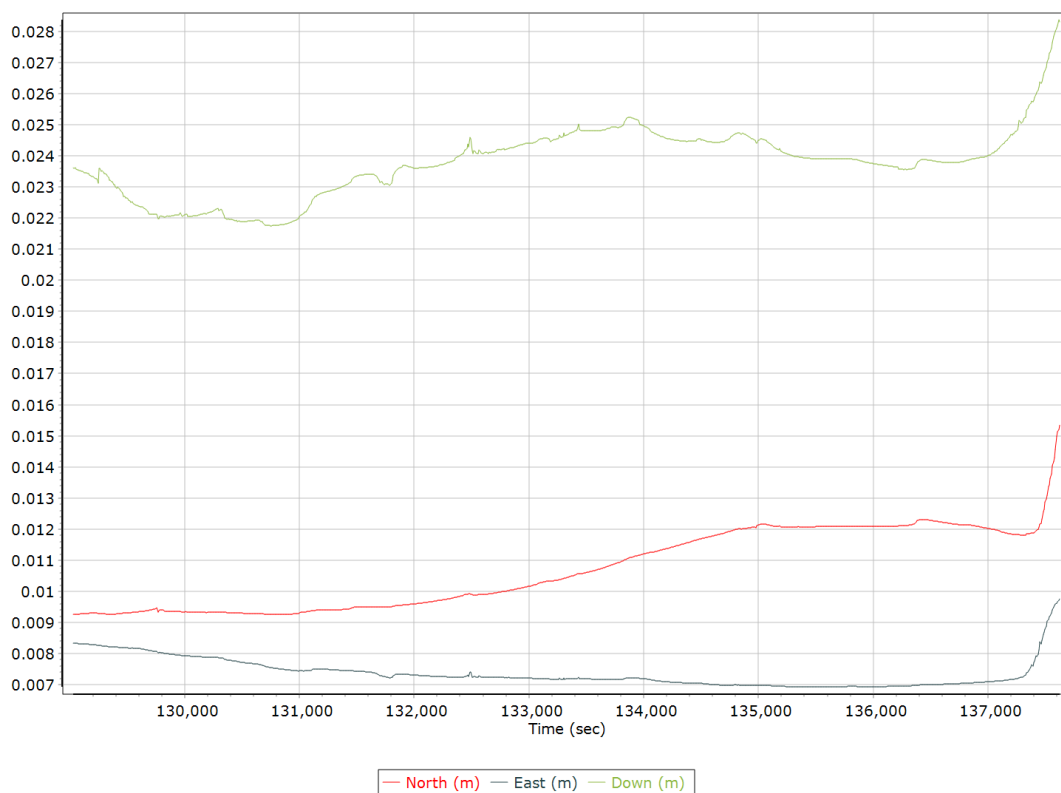
## Forward/Reverse Separation



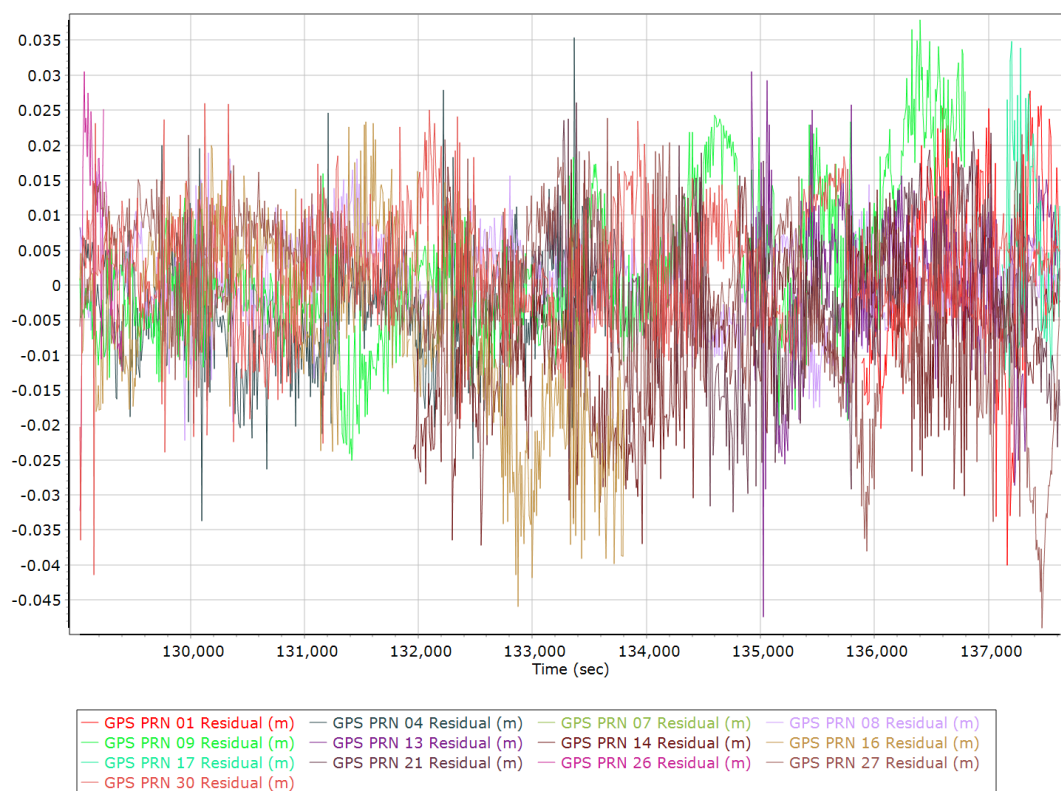
## PDOP



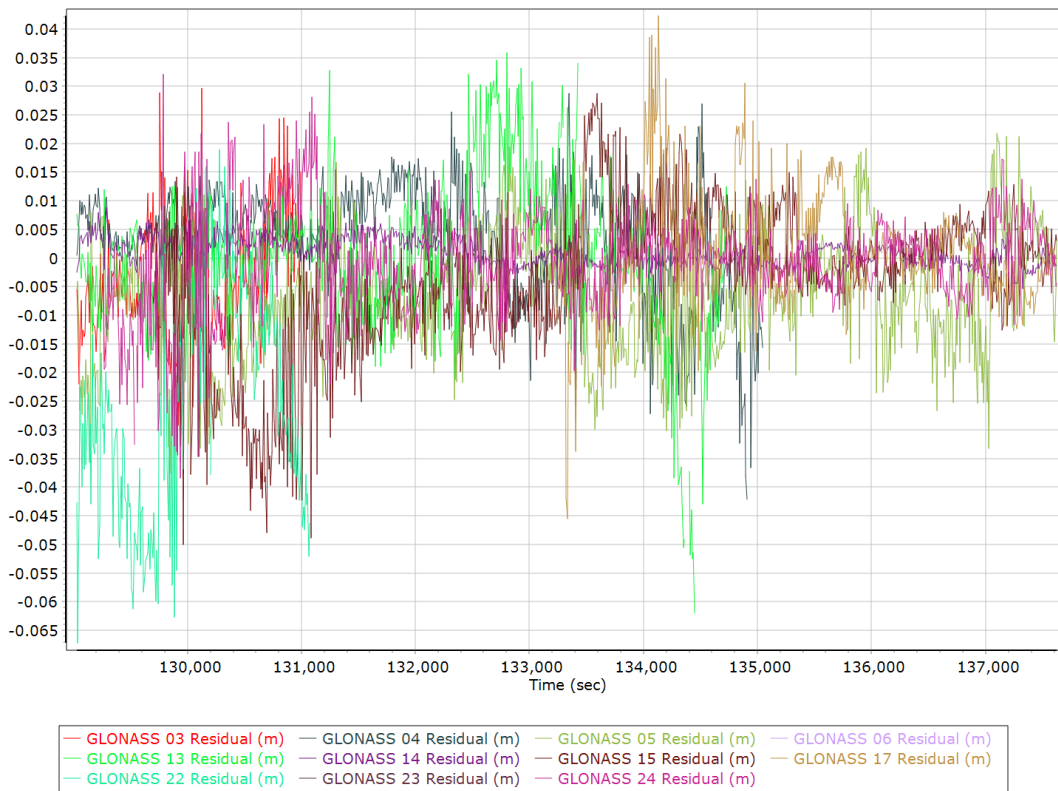
## Estimated Position Accuracy



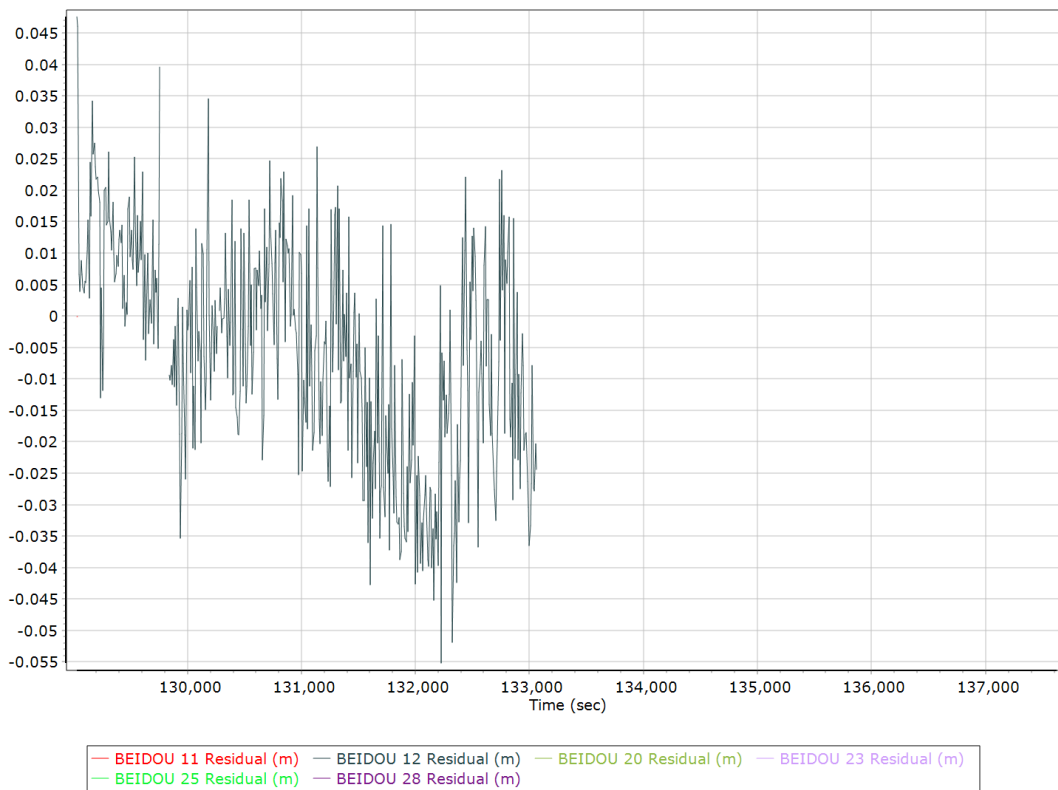
## GPS Residuals



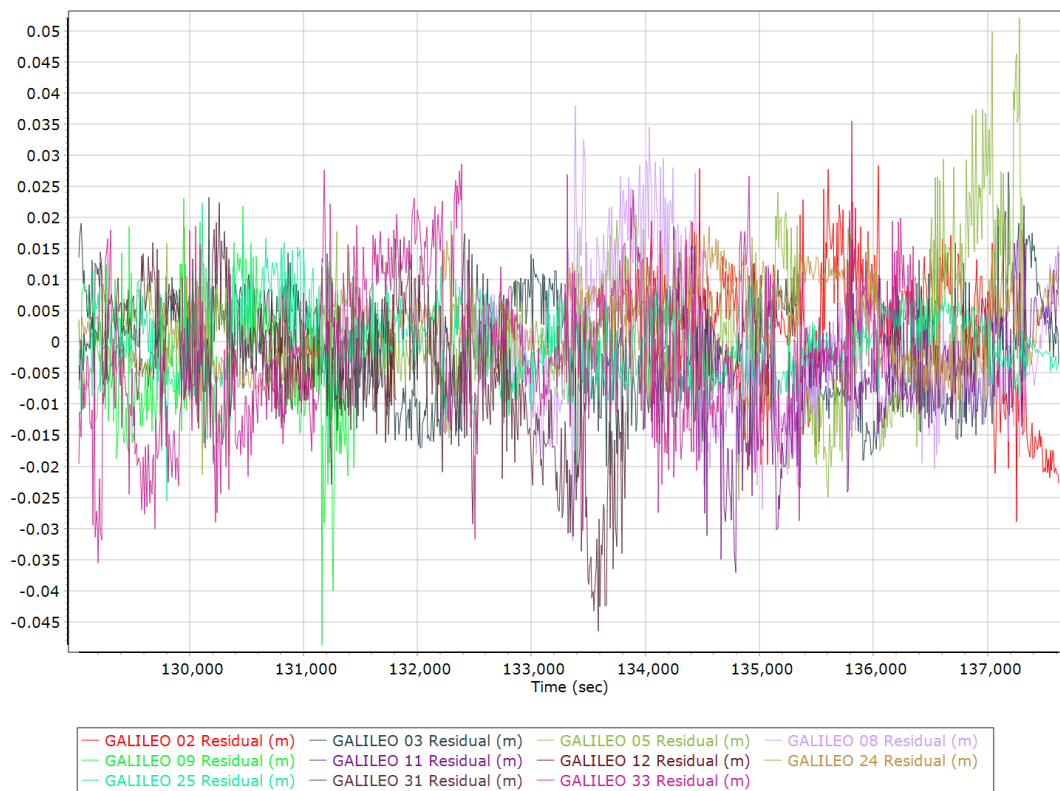
## GLONASS Residuals



## BEIDOU Residuals



## GALILEO Residuals





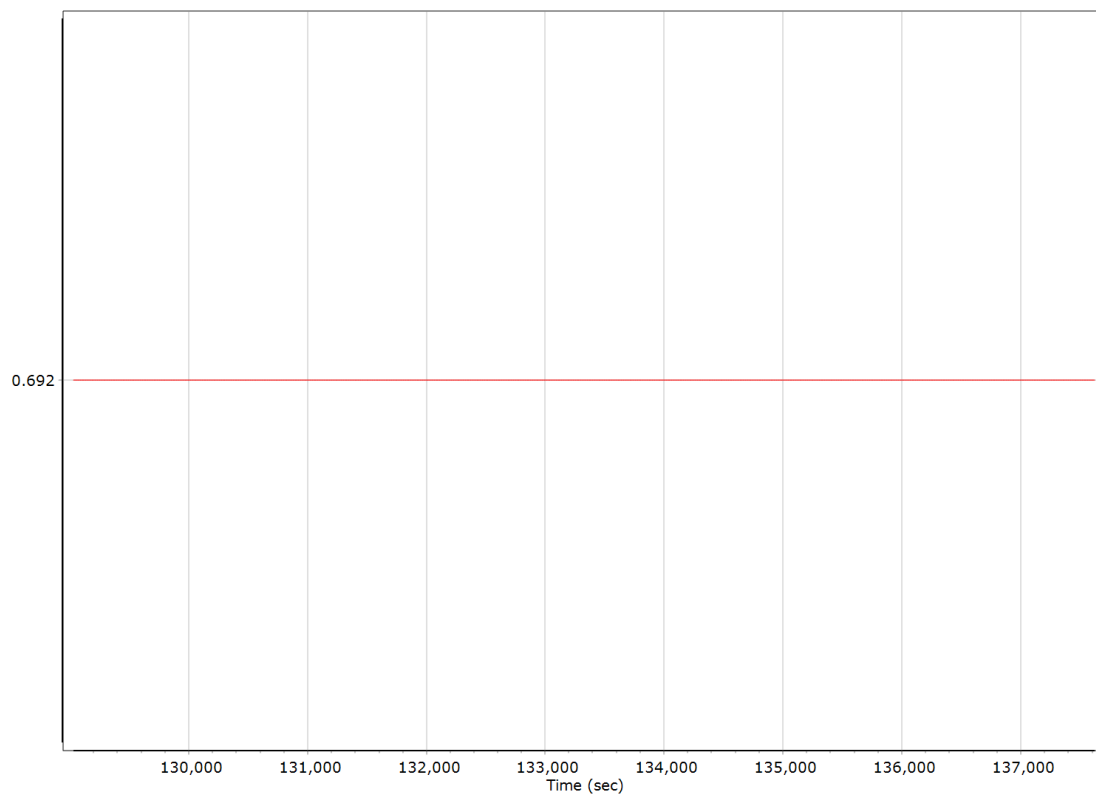
## GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	128338.000 (5/16/2022 11:38:58 AM)		
Processing end time	137631.000 (5/16/2022 2:13:51 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

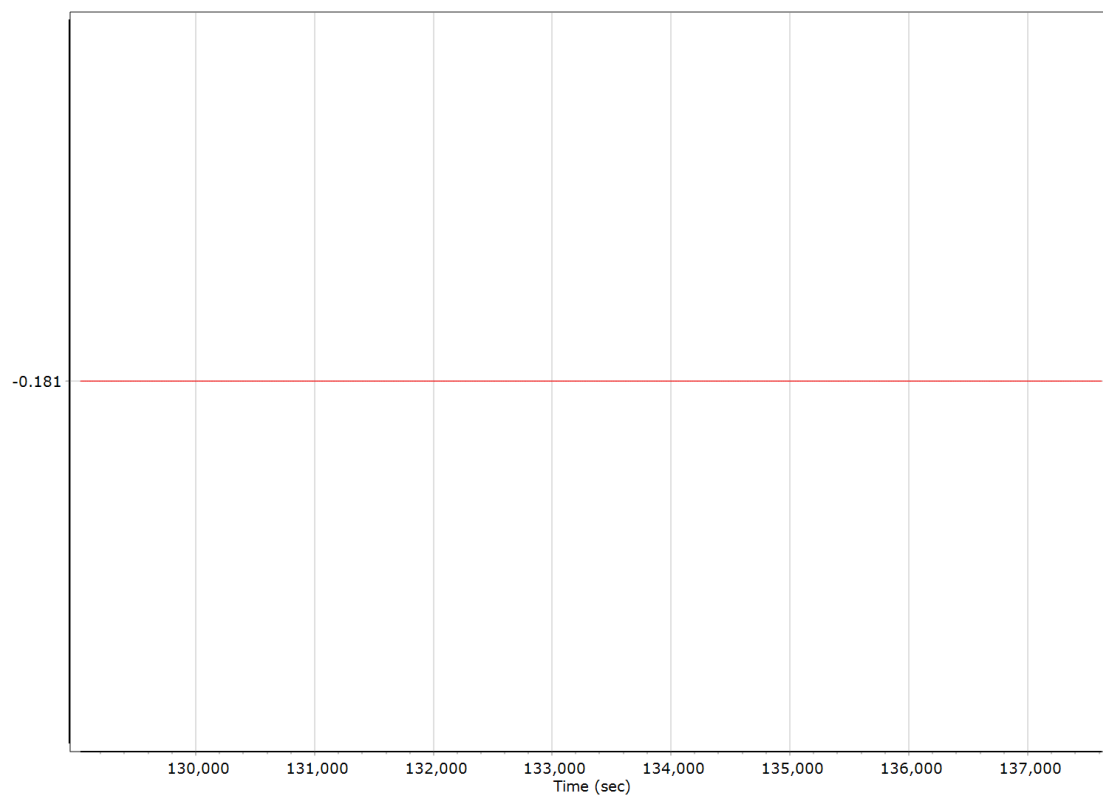
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

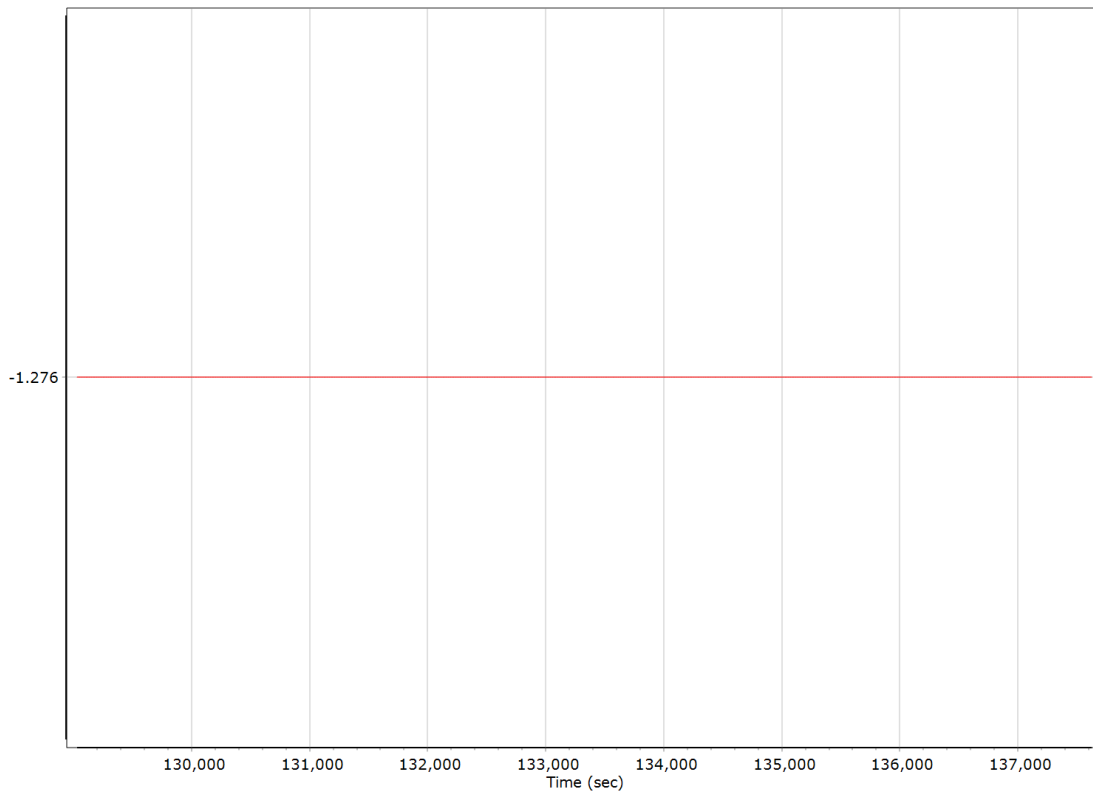
#### X Reference-Primary GNSS Lever Arm (m)



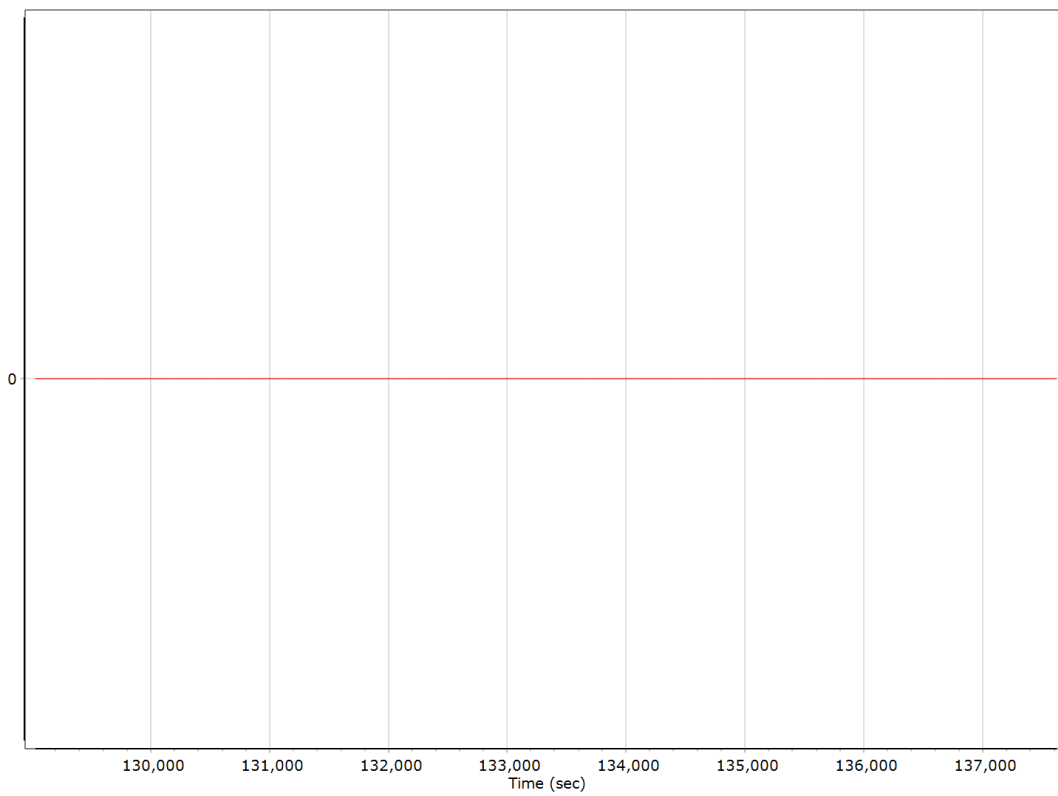
#### Y Reference-Primary GNSS Lever Arm (m)



### Z Reference-Primary GNSS Lever Arm (m)



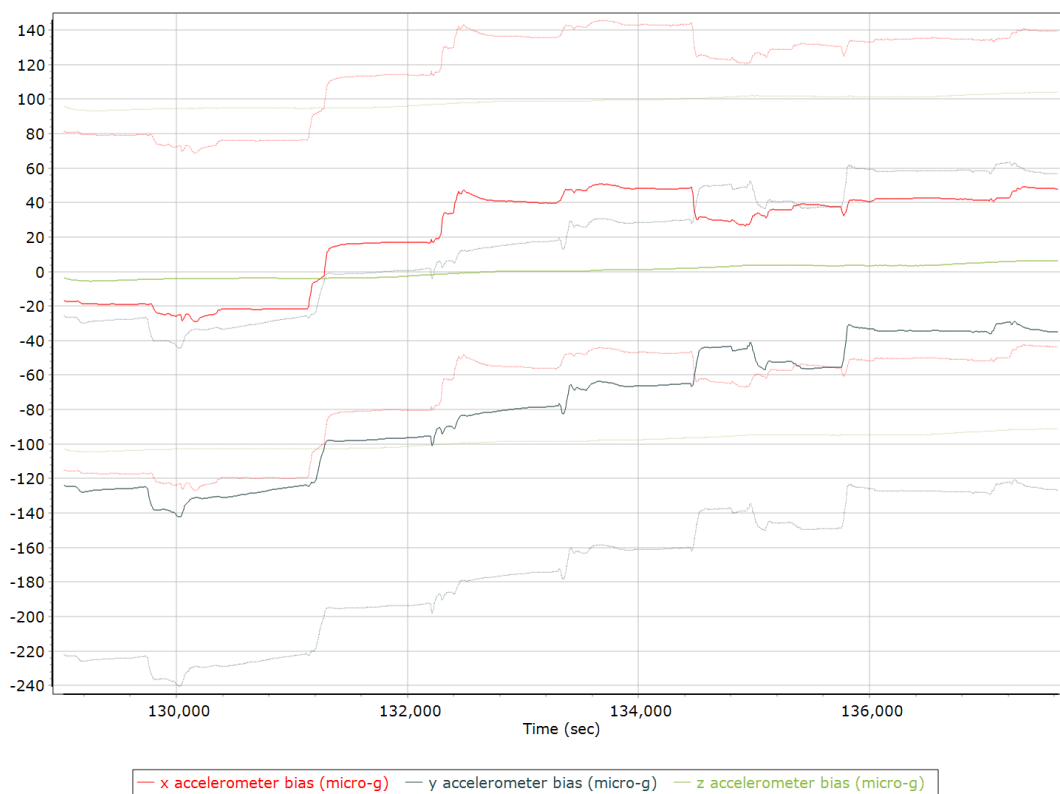
### Reference-Primary GNSS Lever Arm Figure of Merit



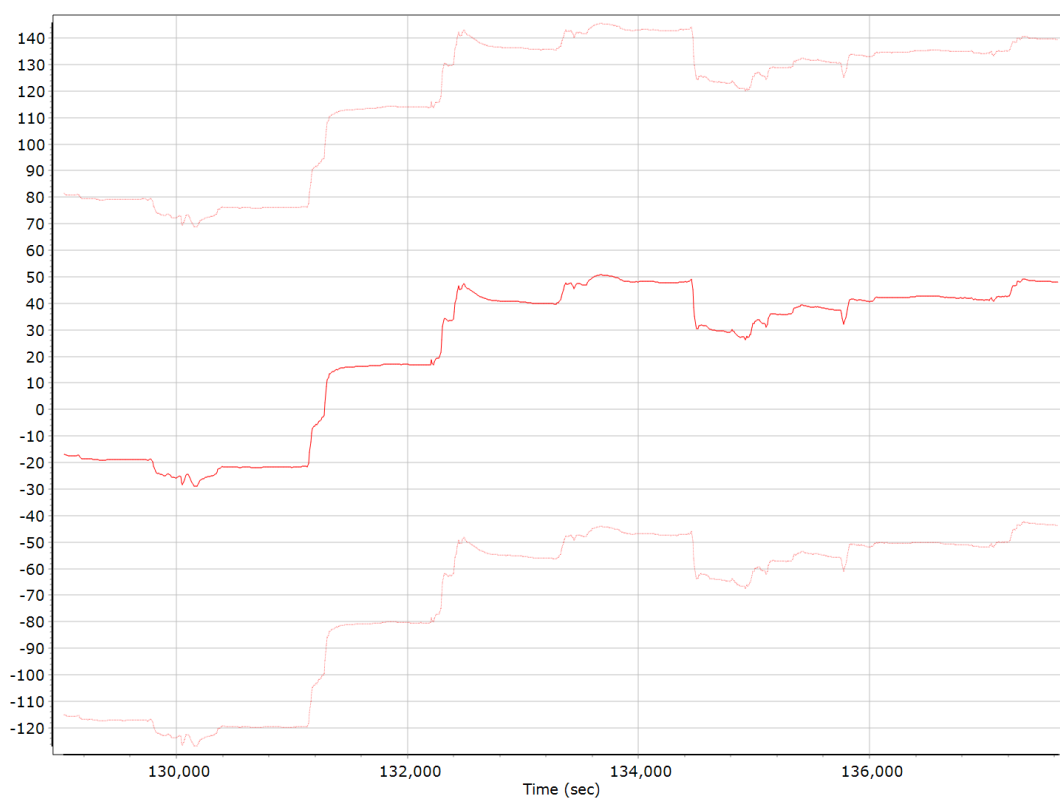
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

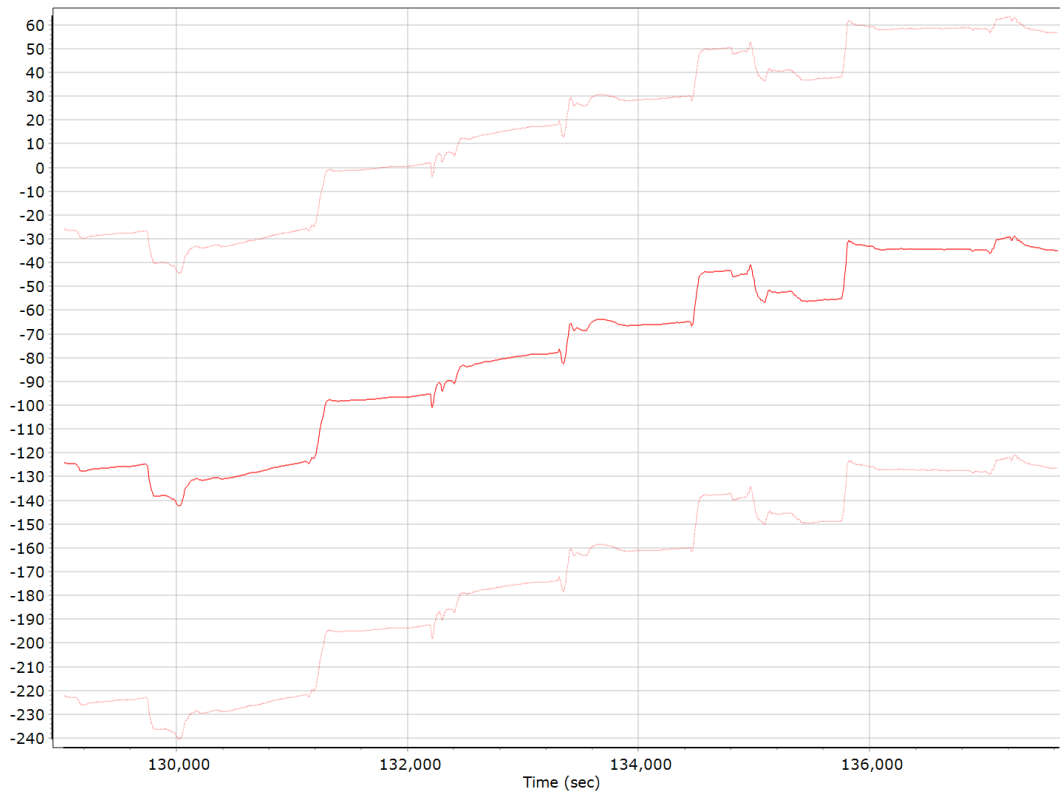
#### Accelerometer Bias (micro-g)



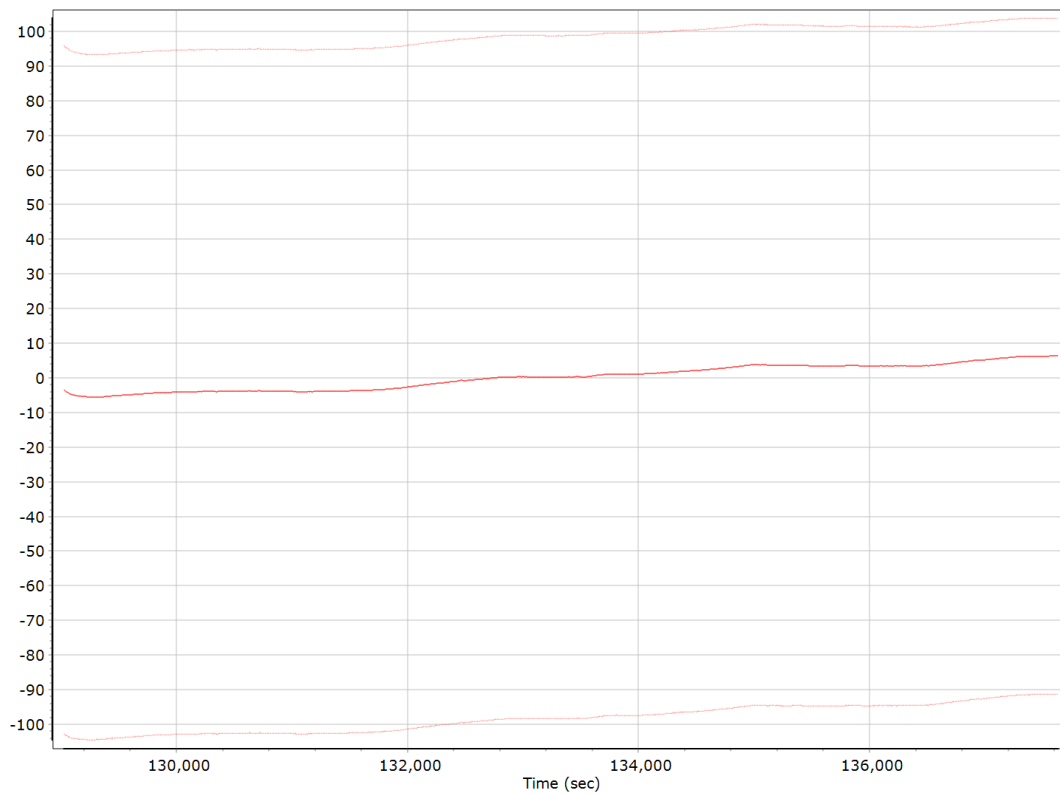
#### X Accelerometer Bias (micro-g)



### Y Accelerometer Bias (micro-g)



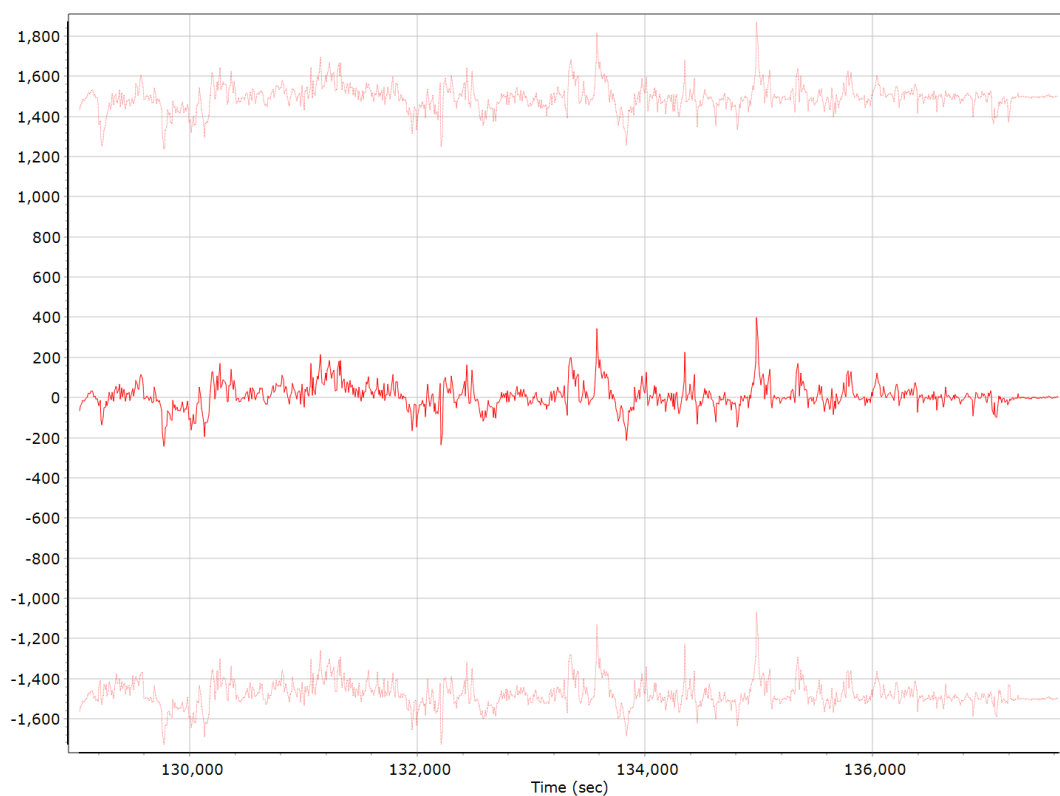
### Z Accelerometer Bias (micro-g)



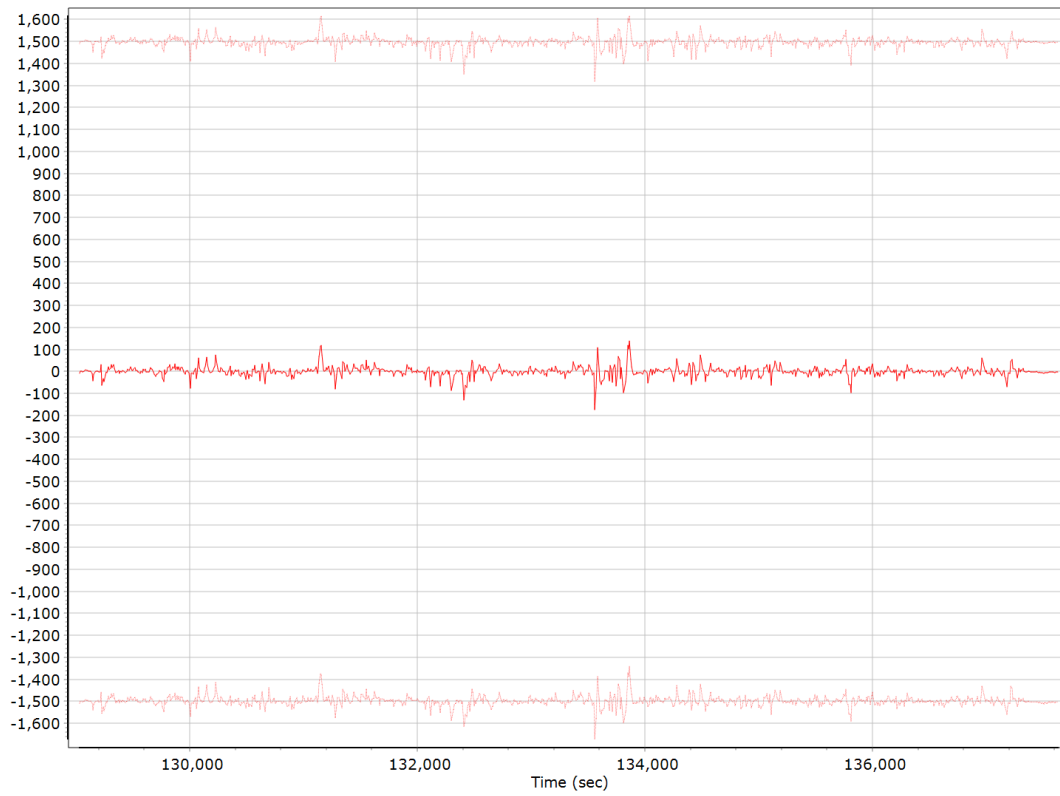
### Accelerometer Scale Error (ppm)



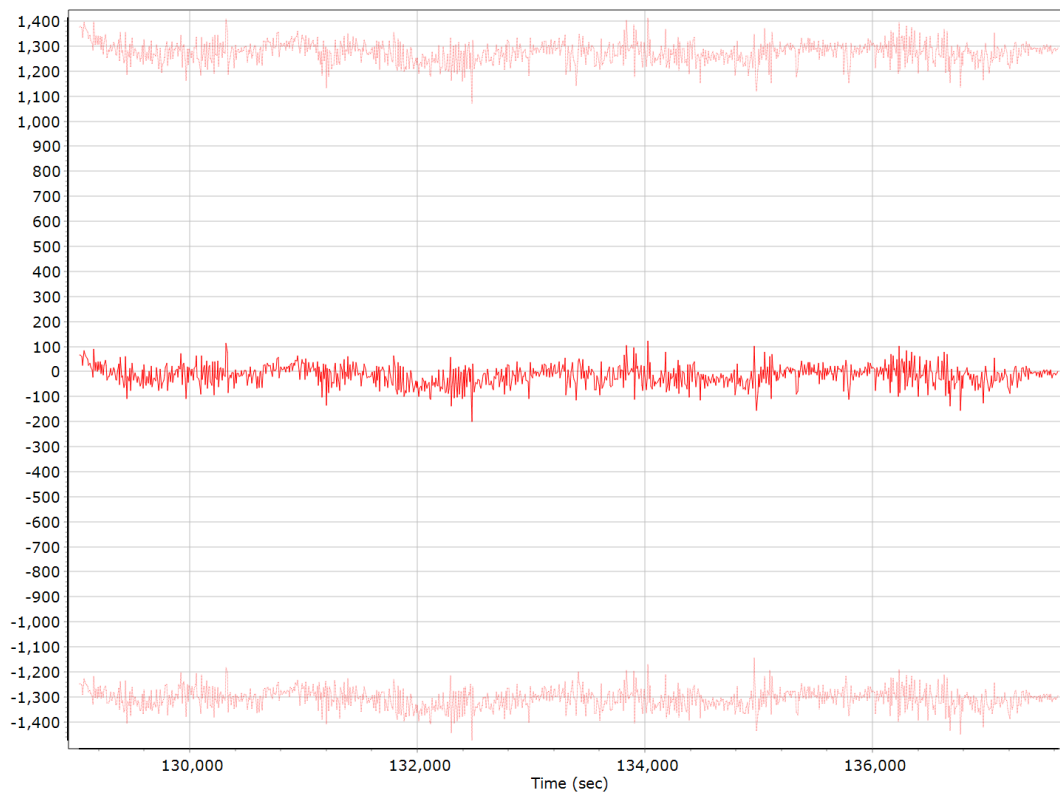
### X Accelerometer Scale Error (ppm)



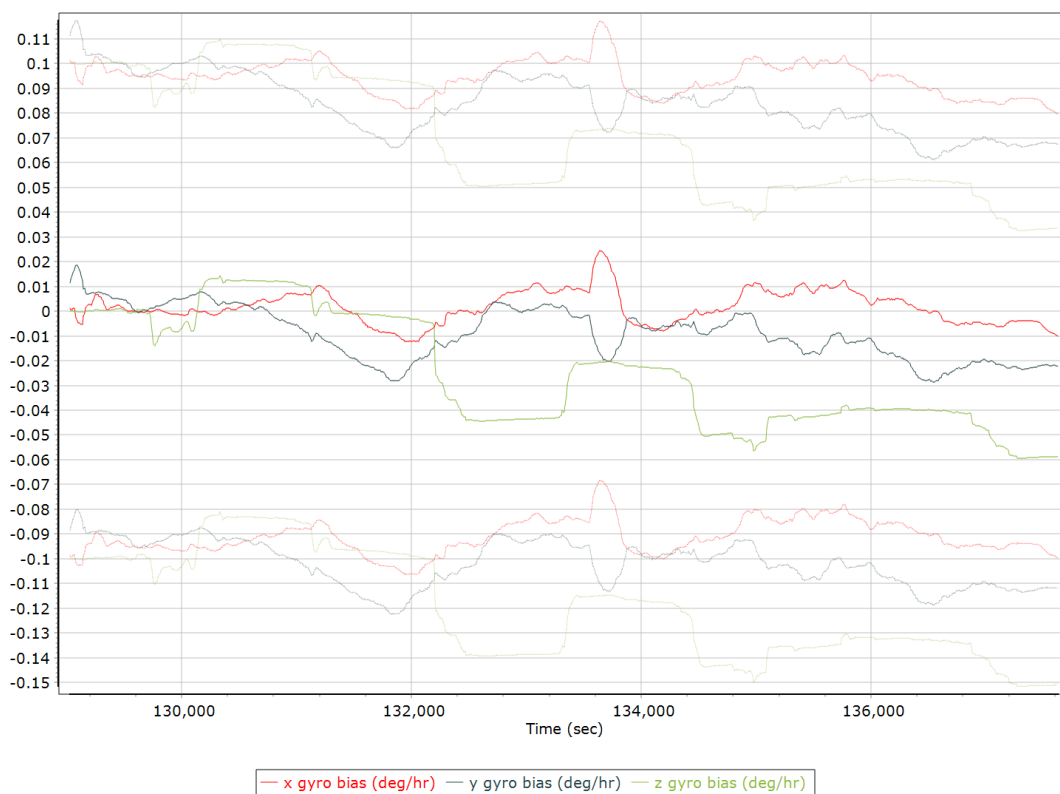
### Y Accelerometer Scale Error (ppm)



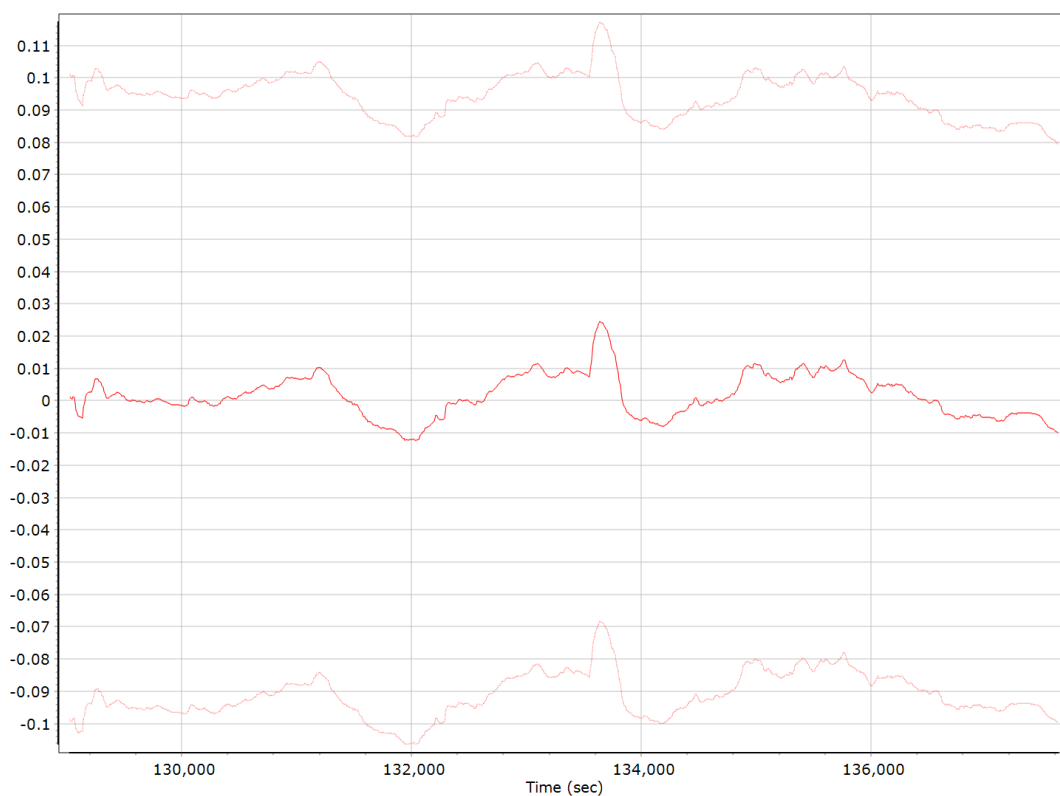
### Z Accelerometer Scale Error (ppm)



## Gyro Bias (deg/h)

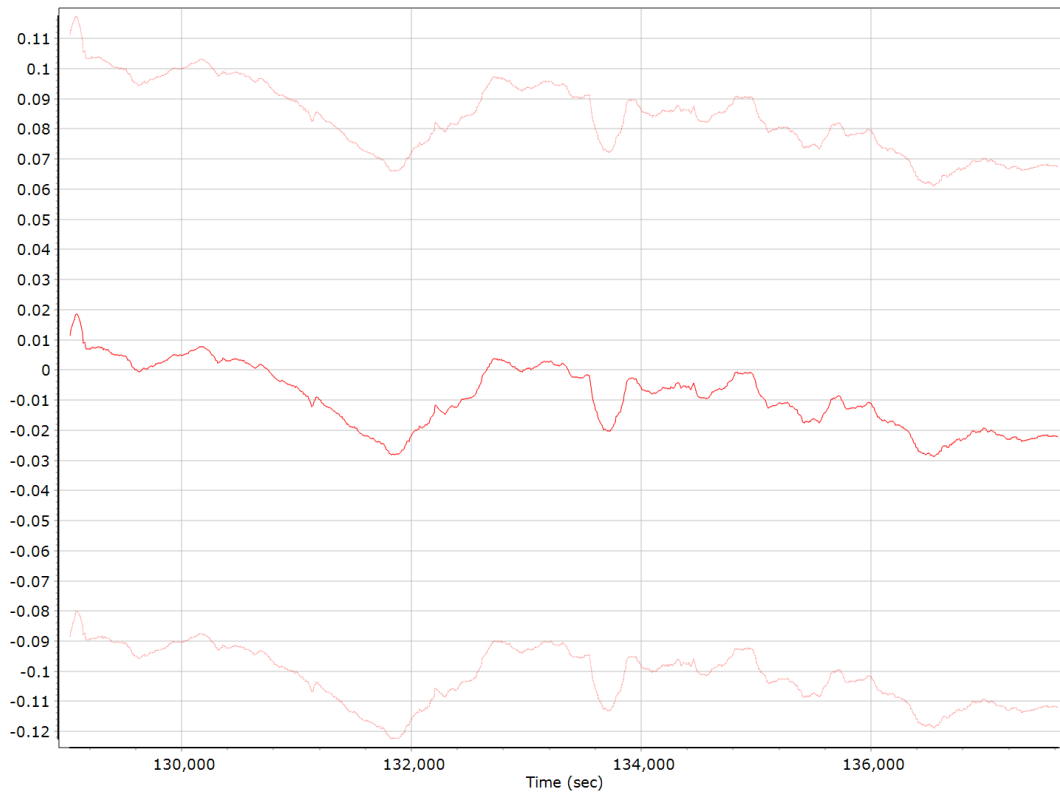


## X Gyro Bias (deg/h)

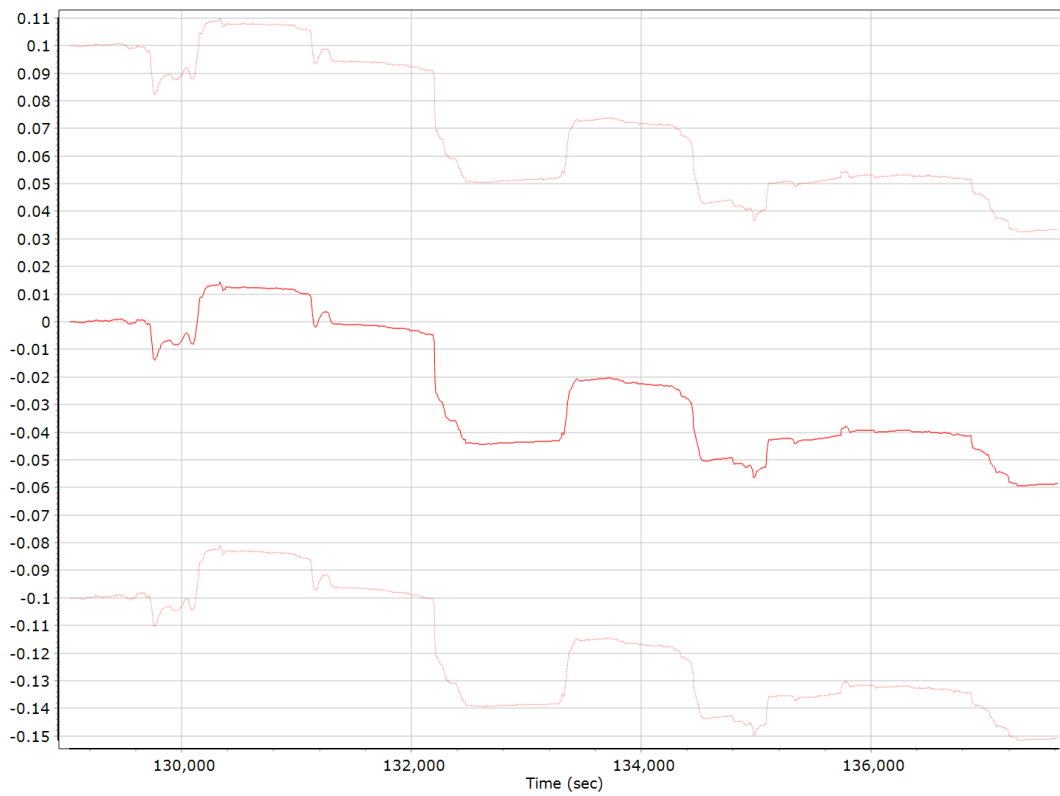




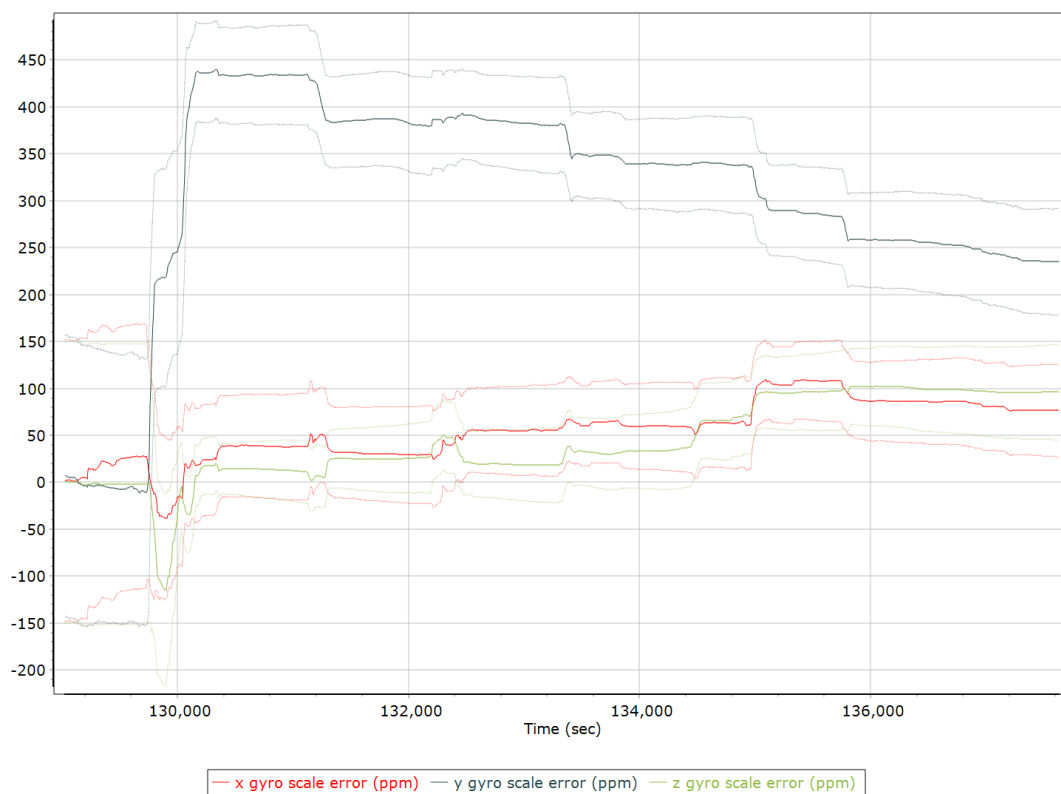
### Y Gyro Bias (deg/h)



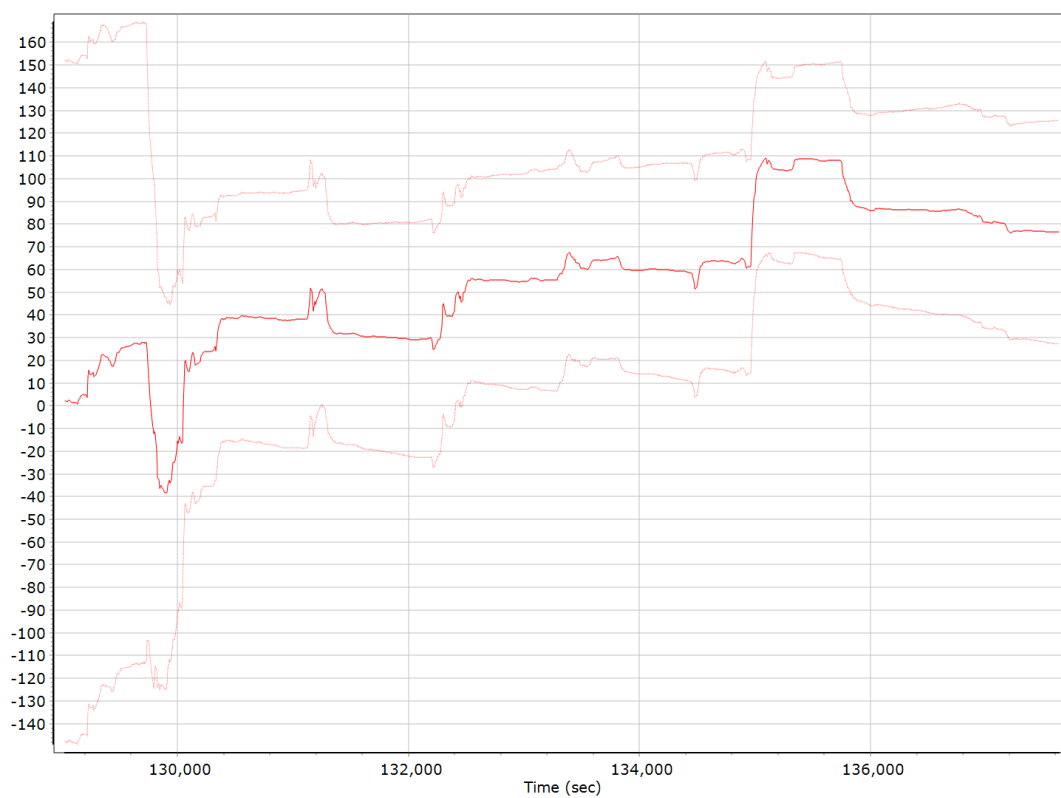
### Z Gyro Bias (deg/h)



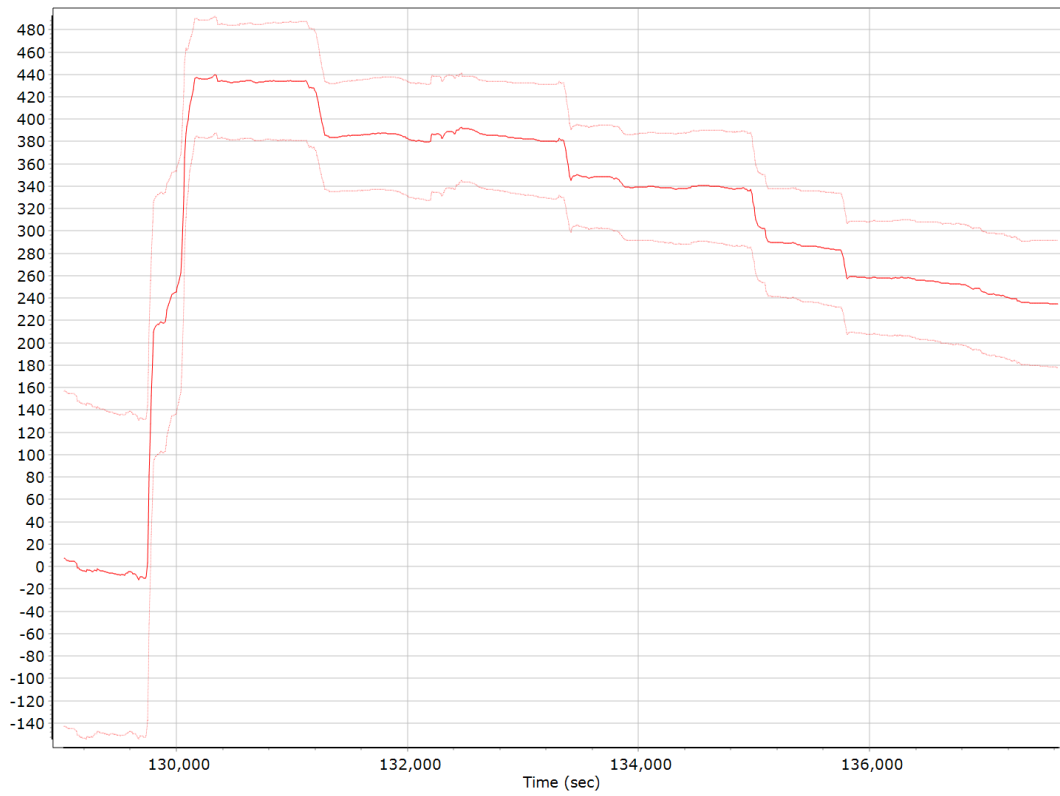
### Gyro Scale Error (ppm)



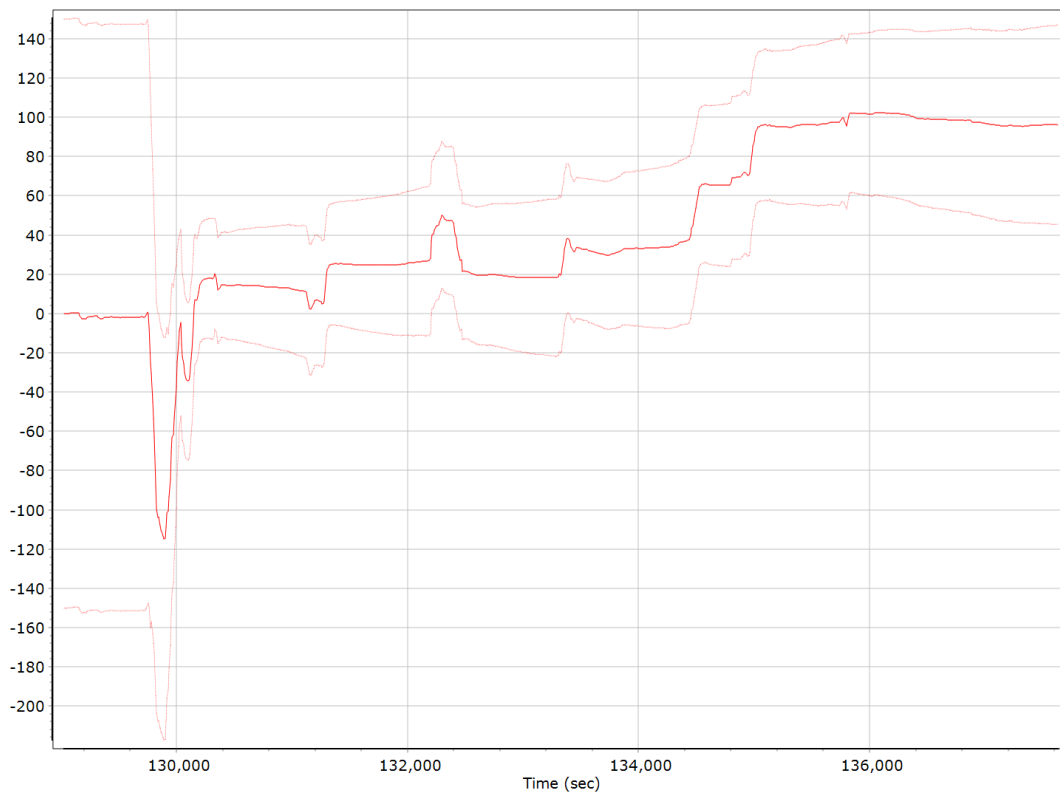
### X Gyro Scale Error (ppm)



### Y Gyro Scale Error (ppm)

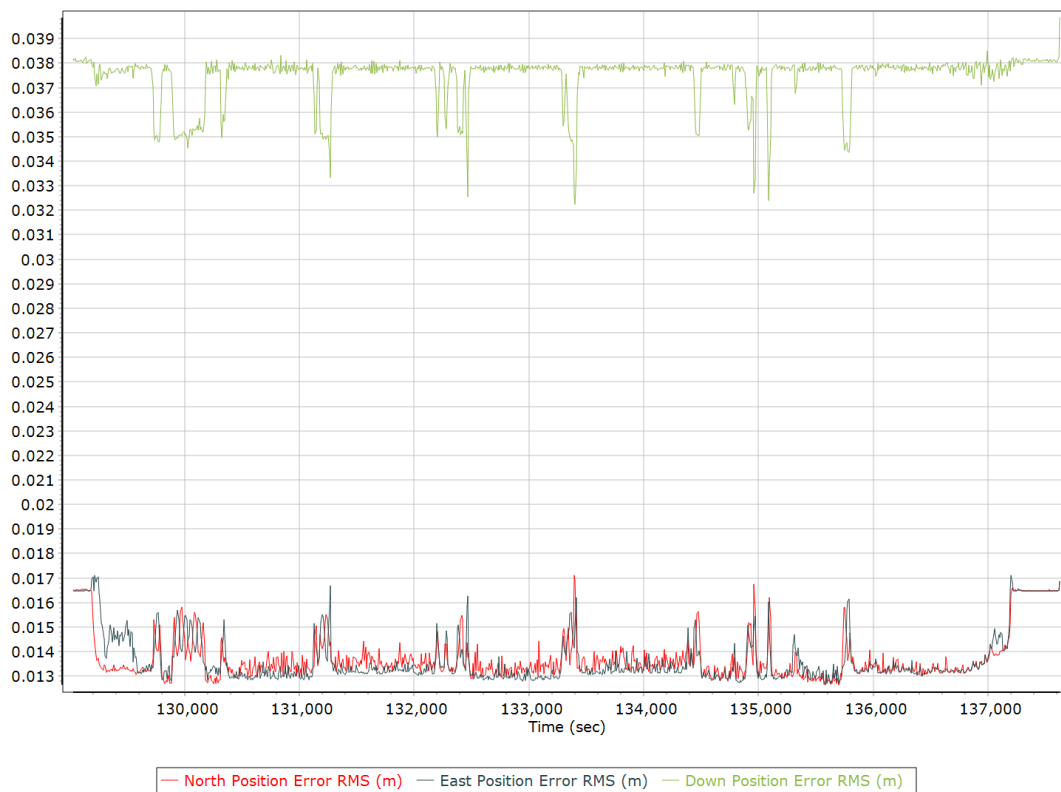


### Z Gyro Scale Error (ppm)

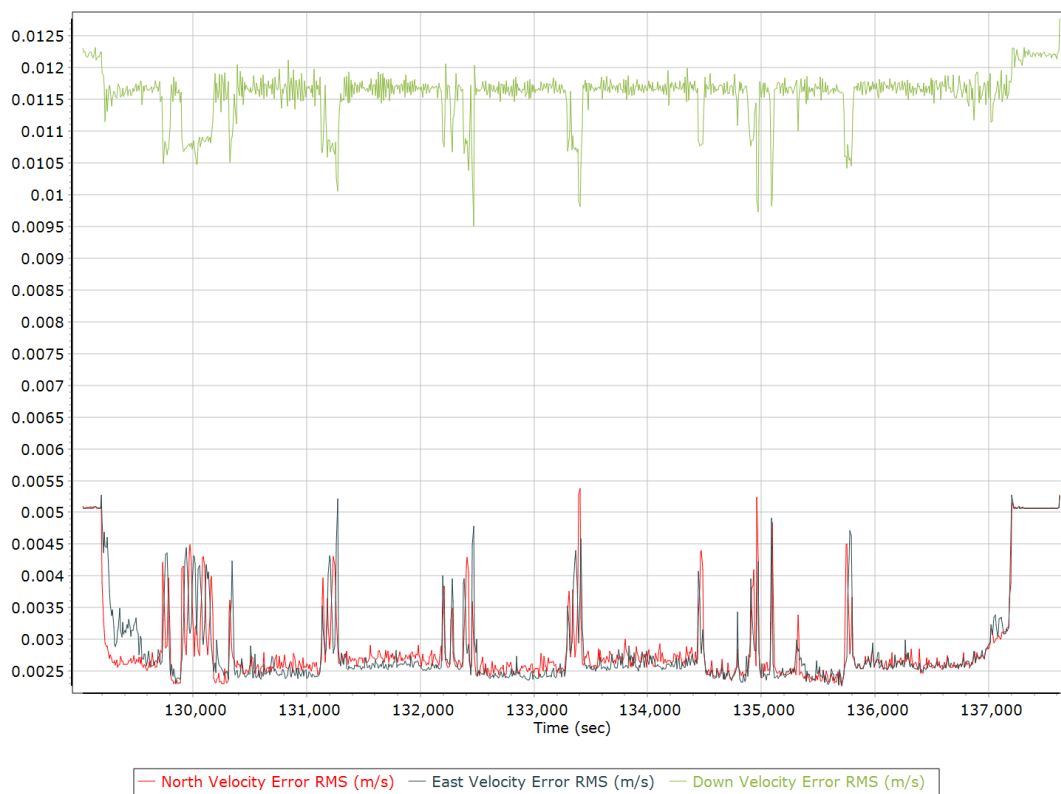


## Smoothed Performance Metrics

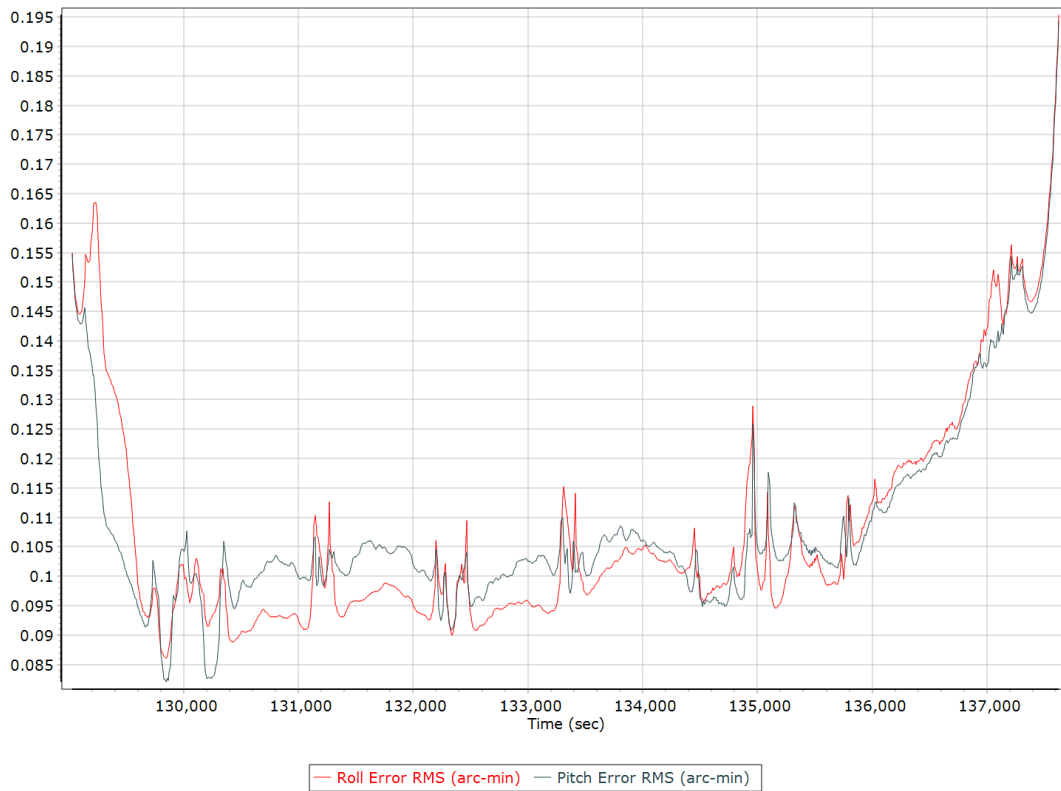
### Position Error RMS (m)



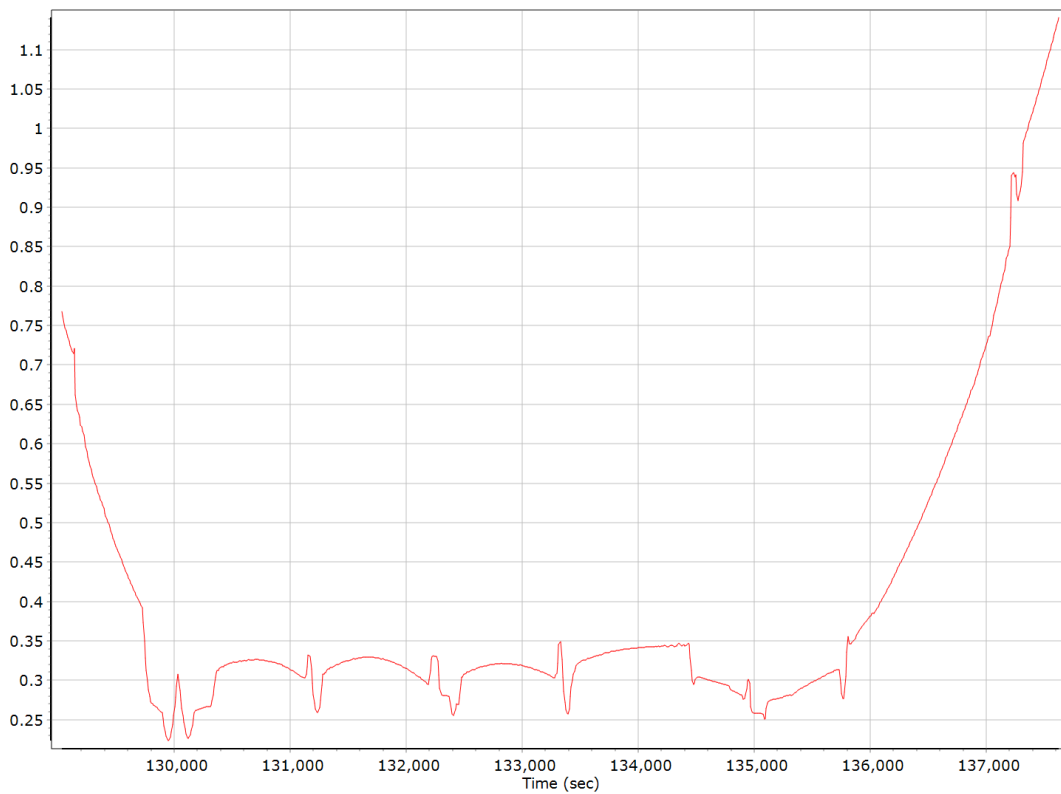
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

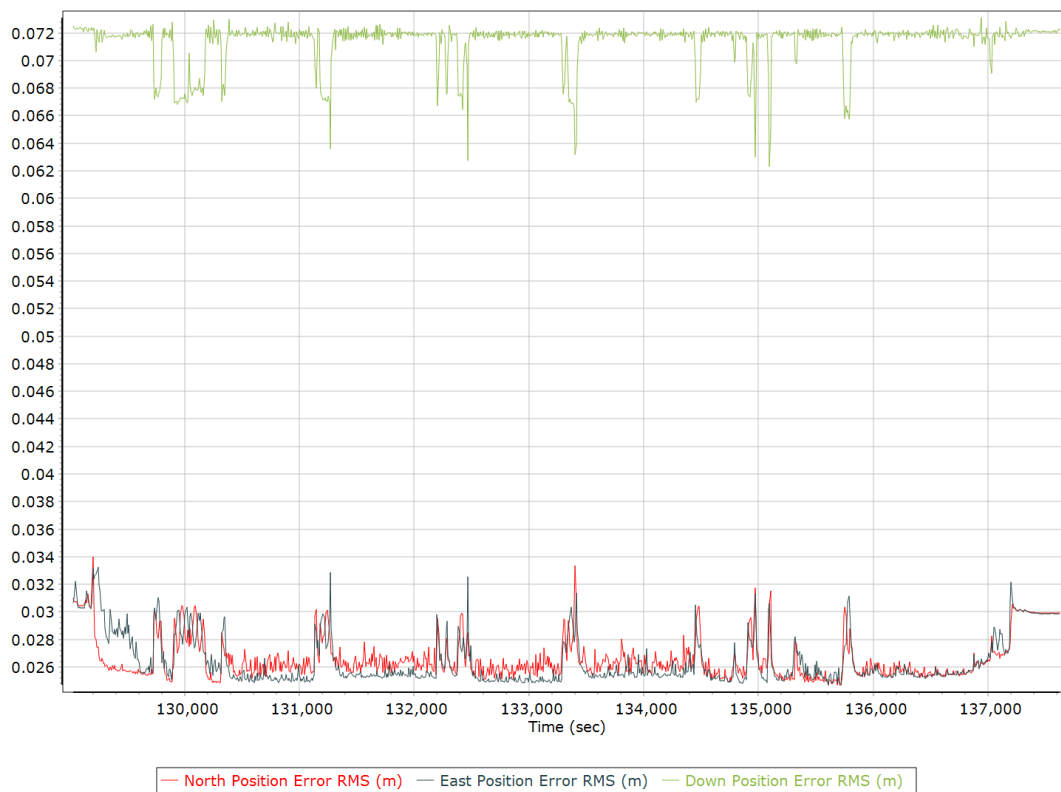


### Heading Error RMS (arc-min)

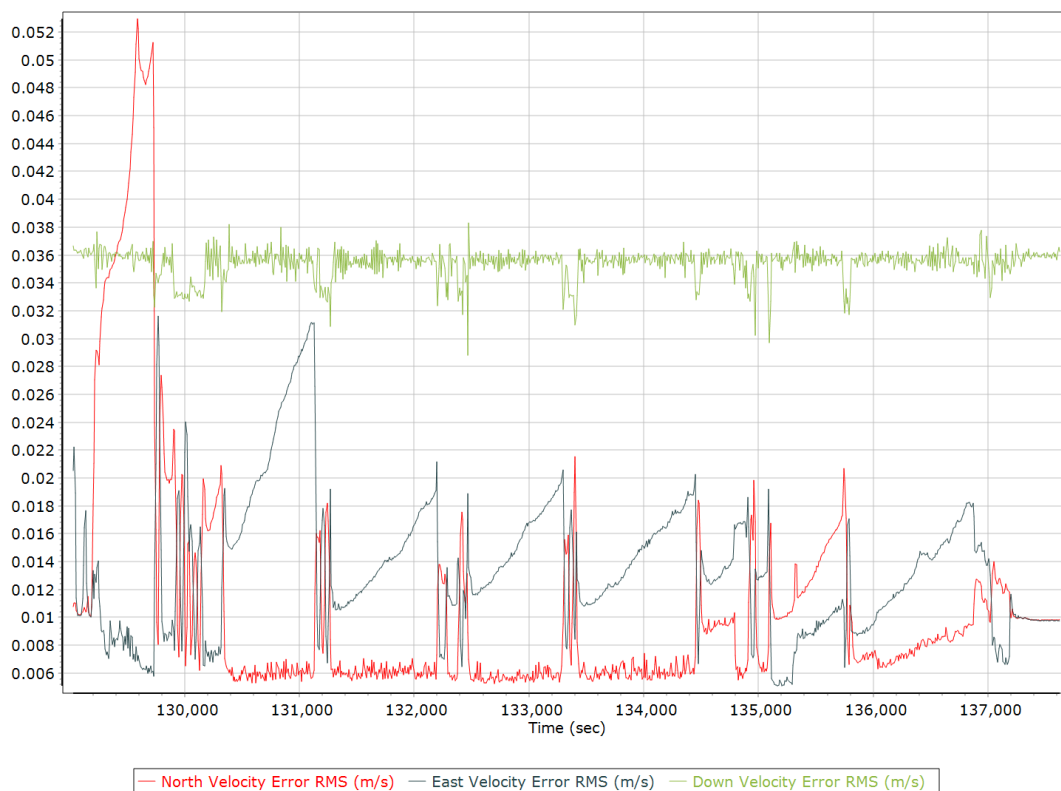


## Forward Processed Performance Metrics

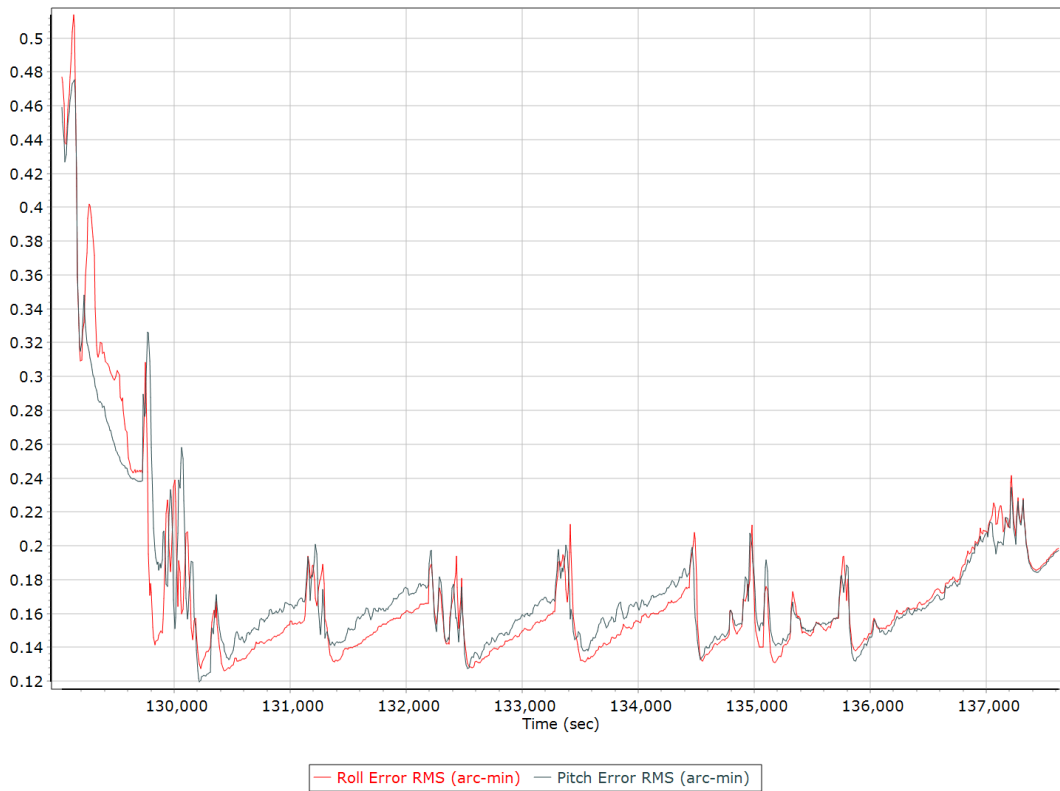
### Position Error RMS (m)



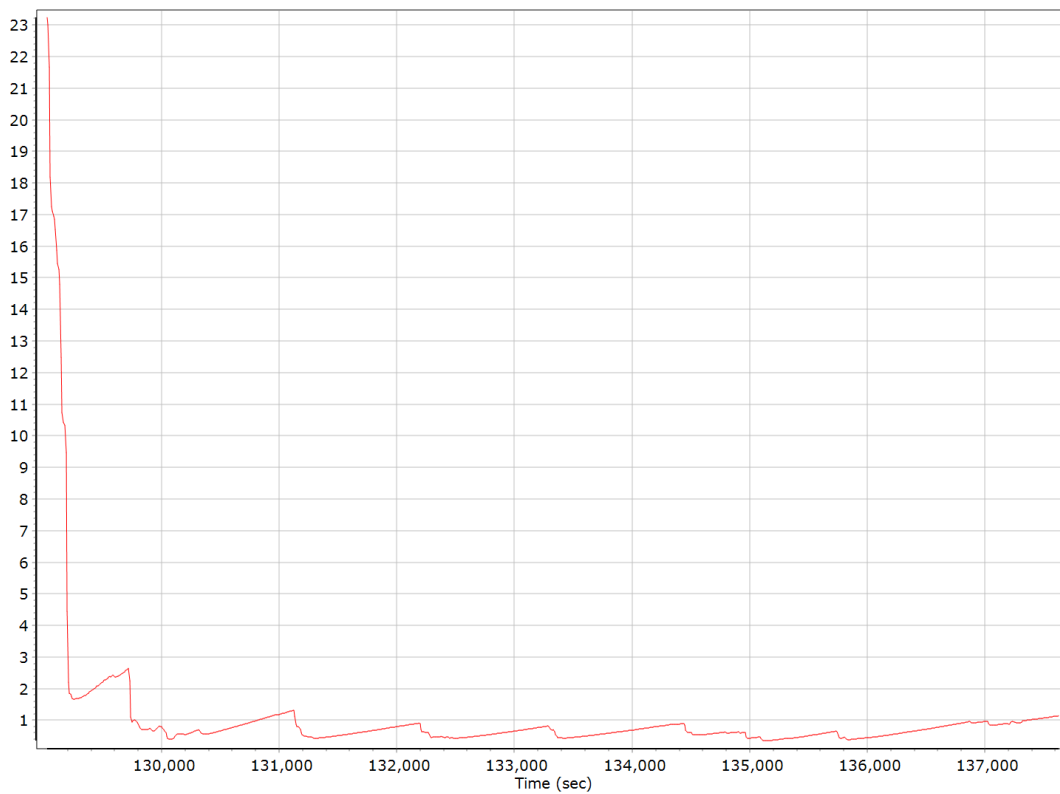
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

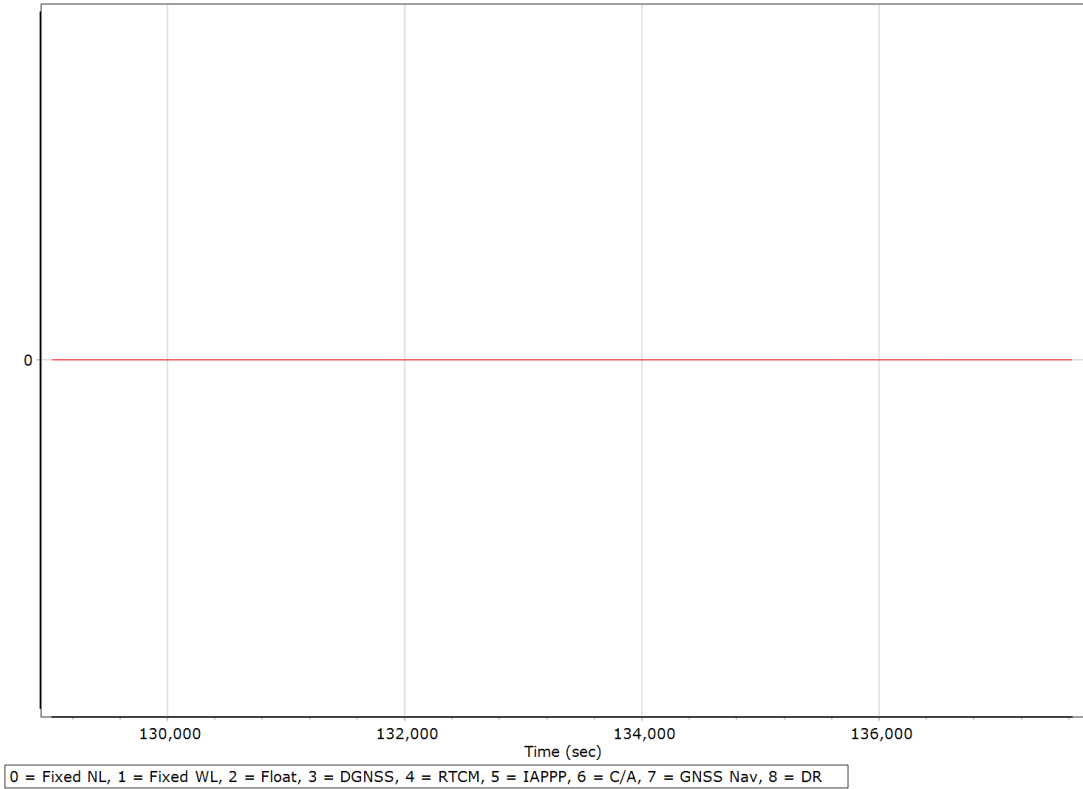


### Heading Error RMS (arc-min)

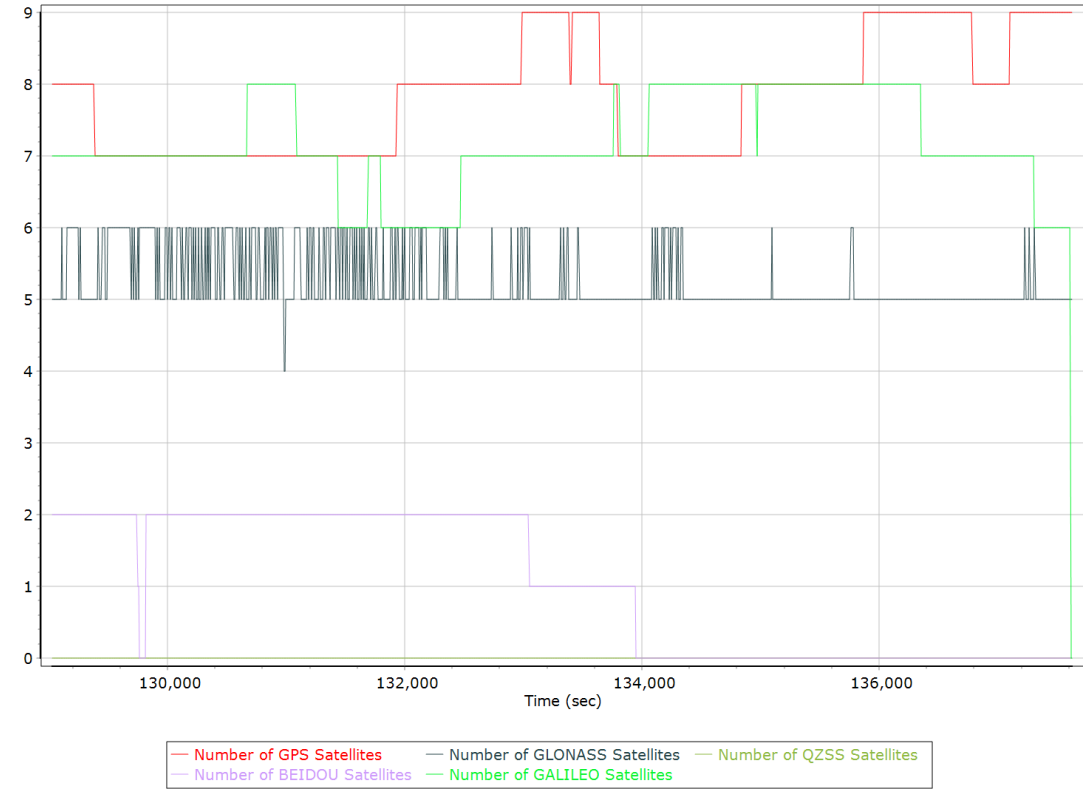


Forward Processed Solution Status

Processing Mode

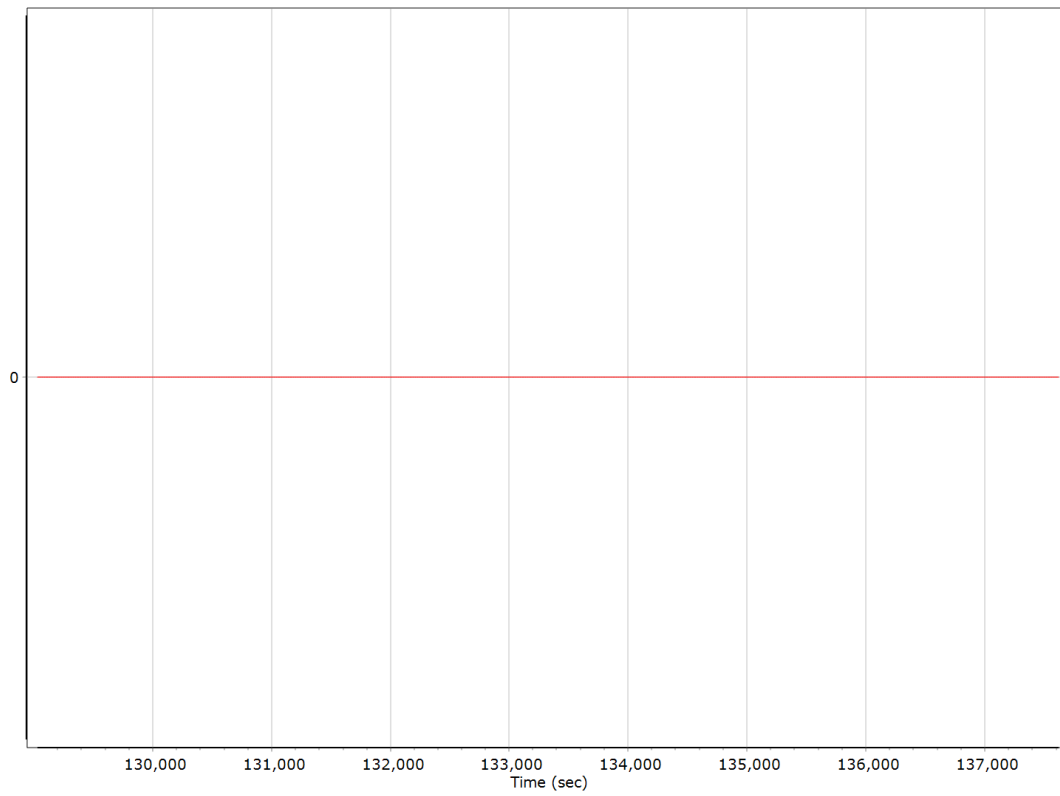


Number of Satellites





## Baseline Length



## General Information

### Mission Information

Project name	05172022A_3543
Processing date	2022-05-19 18:41:06
Mission date	2022-05-17 10:55:06
Mission duration	05:32:04.781
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
N62756178.031	POS Data
N62756178.032	POS Data
N62756178.033	POS Data
N62756178.034	POS Data
N62756178.035	POS Data
N62756178.036	POS Data
N62756178.037	POS Data
N62756178.038	POS Data
N62756178.039	POS Data
N62756178.040	POS Data
N62756178.041	POS Data
N62756178.042	POS Data
N62756178.043	POS Data
N62756178.044	POS Data
N62756178.045	POS Data
N62756178.046	POS Data
N62756178.047	POS Data
N62756178.048	POS Data
N62756178.049	POS Data
N62756178.050	POS Data
N62756178.051	POS Data
N62756178.052	POS Data
N62756178.053	POS Data
N62756178.054	POS Data
N62756178.055	POS Data
N62756178.056	POS Data
N62756178.057	POS Data
N62756178.058	POS Data
N62756178.059	POS Data
N62756178.060	POS Data
N62756178.061	POS Data
N62756178.062	POS Data
N62756178.063	POS Data
N62756178.064	POS Data
N62756178.065	POS Data
N62756178.066	POS Data
N62756178.067	POS Data
N62756178.068	POS Data
N62756178.069	POS Data
N62756178.070	POS Data
N62756178.071	POS Data
N62756178.072	POS Data
N62756178.073	POS Data
N62756178.074	POS Data
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N62756178.077	POS Data
N62756178.078	POS Data
N62756178.079	POS Data
N62756178.080	POS Data
N62756178.081	POS Data
N62756178.082	POS Data
N62756178.083	POS Data
N62756178.084	POS Data
N62756178.085	POS Data
N62756178.086	POS Data
N62756178.087	POS Data
N62756178.088	POS Data
N62756178.089	POS Data

File name	File type
N62756178.090	POS Data
N62756178.091	POS Data
N62756178.092	POS Data

## Input Files

File Name	File Type
Ephm1370.22g	GLONASS Broadcast Ephemeris
Ephm1370.22n	GPS Broadcast Ephemeris

## Output Files

Filename	File type
sbet_05172022A_3543.out	SBET Trajectory File

## Rover Data Summary

First raw data file	N62756178.031		
Last raw data file	N62756178.092		
Start GPS week	2210		
Start time	212087.545 (5/17/2022 10:54:47 AM)		
End time	232012.326 (5/17/2022 4:26:52 PM)		
Start of fine alignment	212425.251 (5/17/2022 11:00:25 AM)		
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

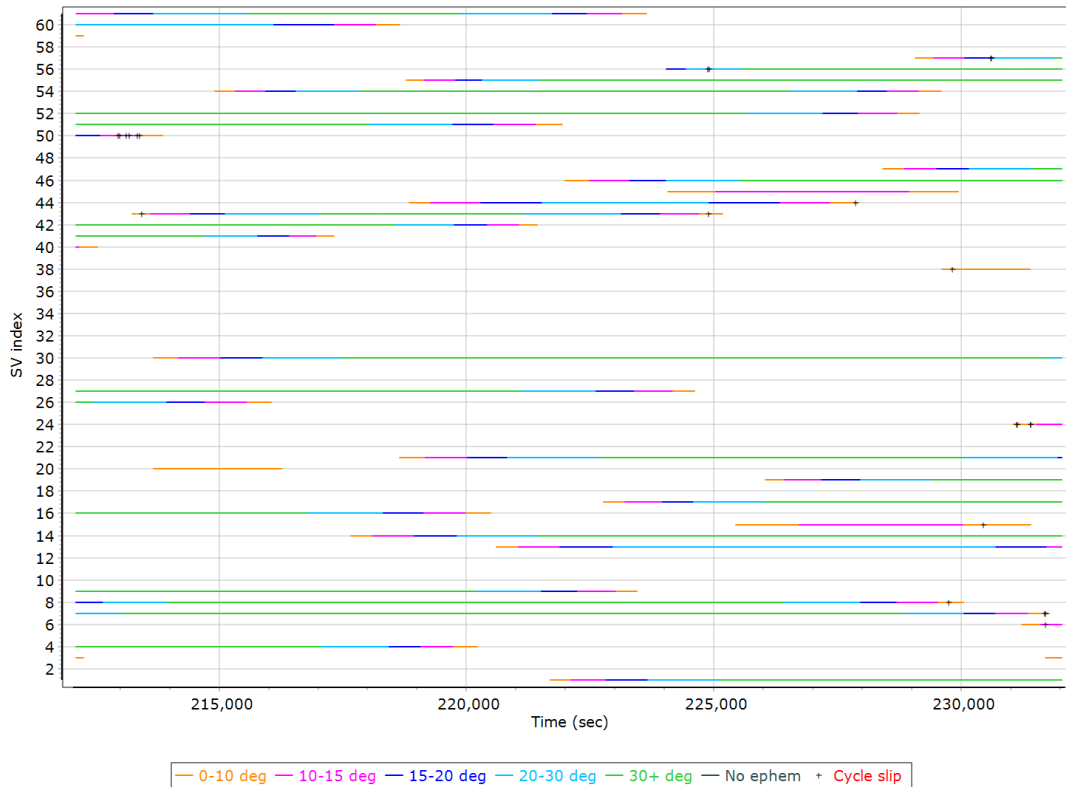
## Rover Data QC

### Raw IMU Import QC Summary

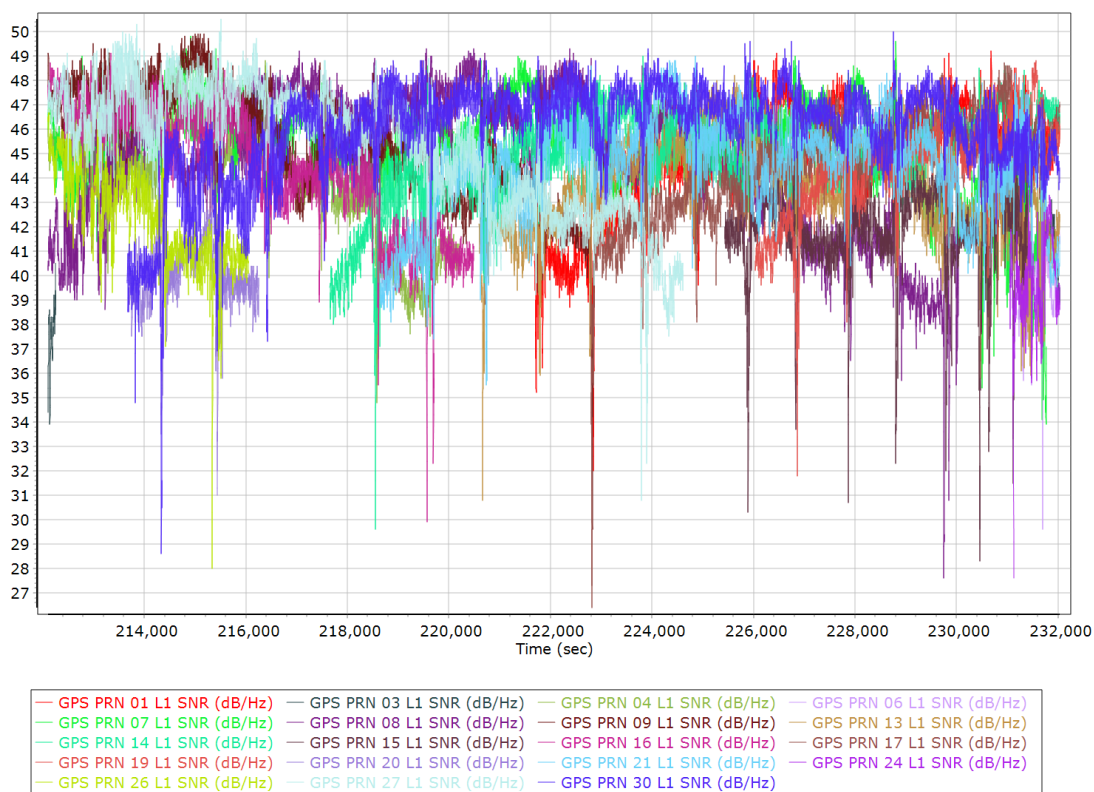
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05172022A_3543.log
IMU Records Processed	3984641
Termination Status	Normal
IMU Anomalies	0

## Primary Observables & Satellite Data

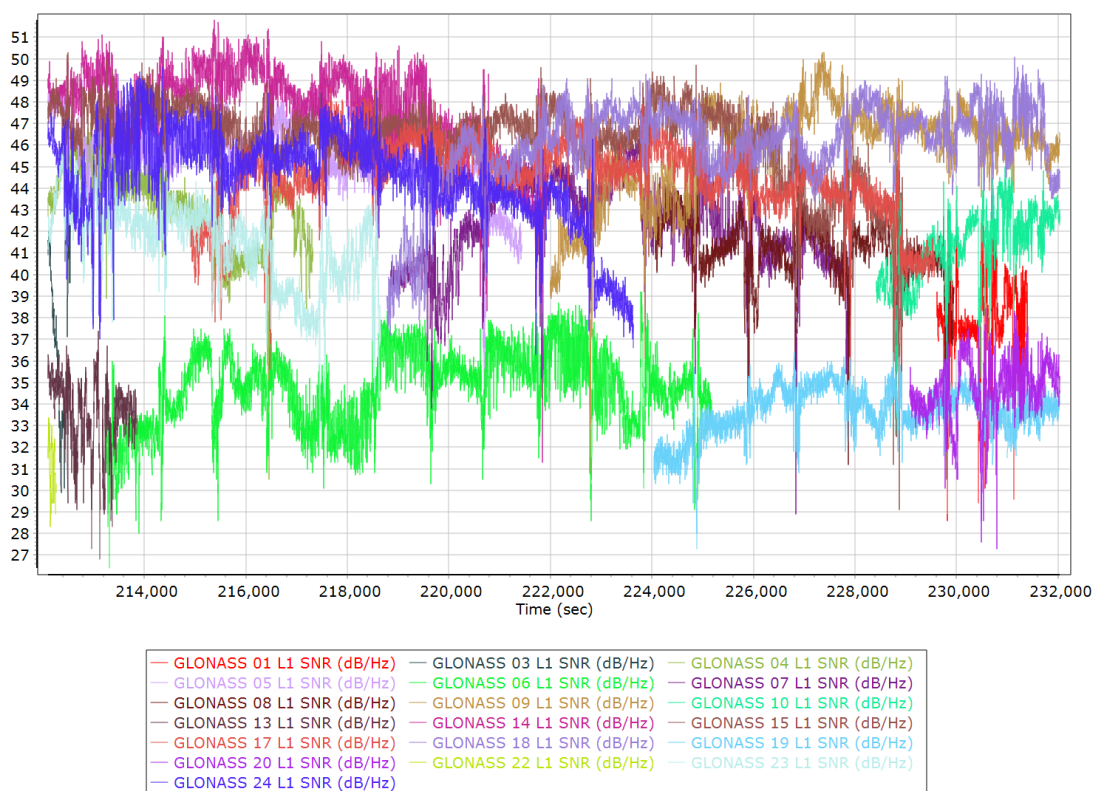
### GPS/GLONASS L1 Satellite Lock/Elevation



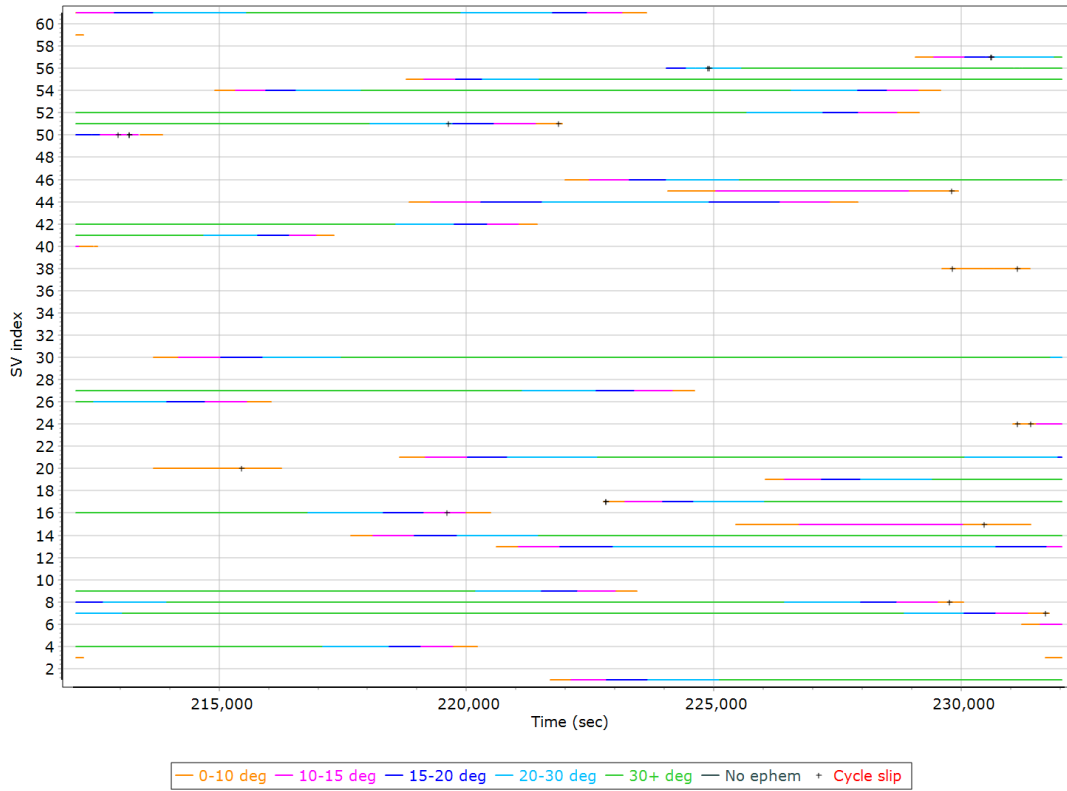
## GPS L1 SNR



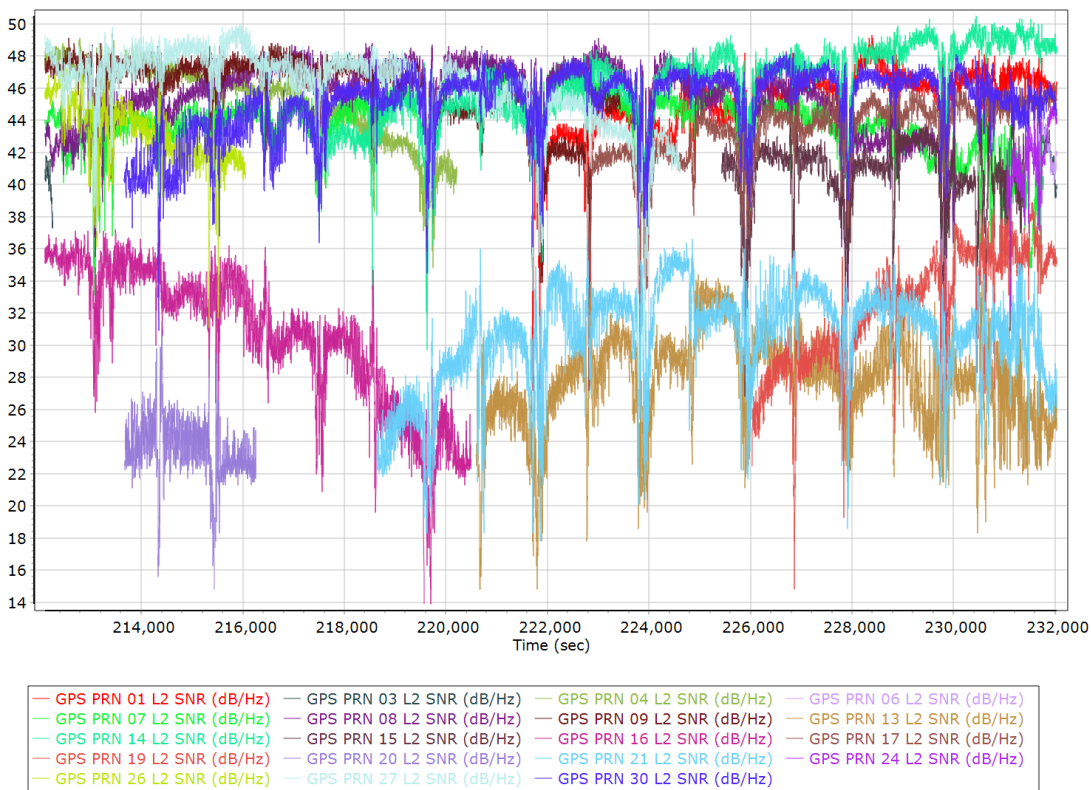
## GLONASS L1 SNR



## GPS/GLONASS L2 Satellite Lock/Elevation

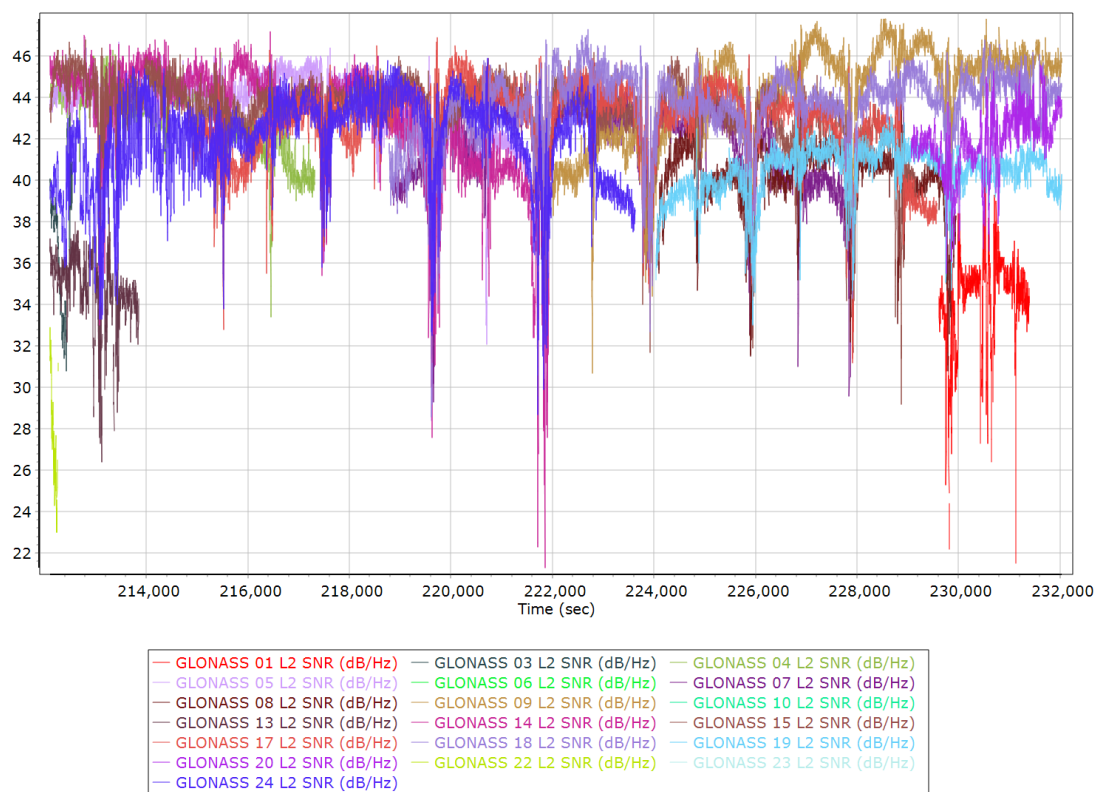


## GPS L2 SNR

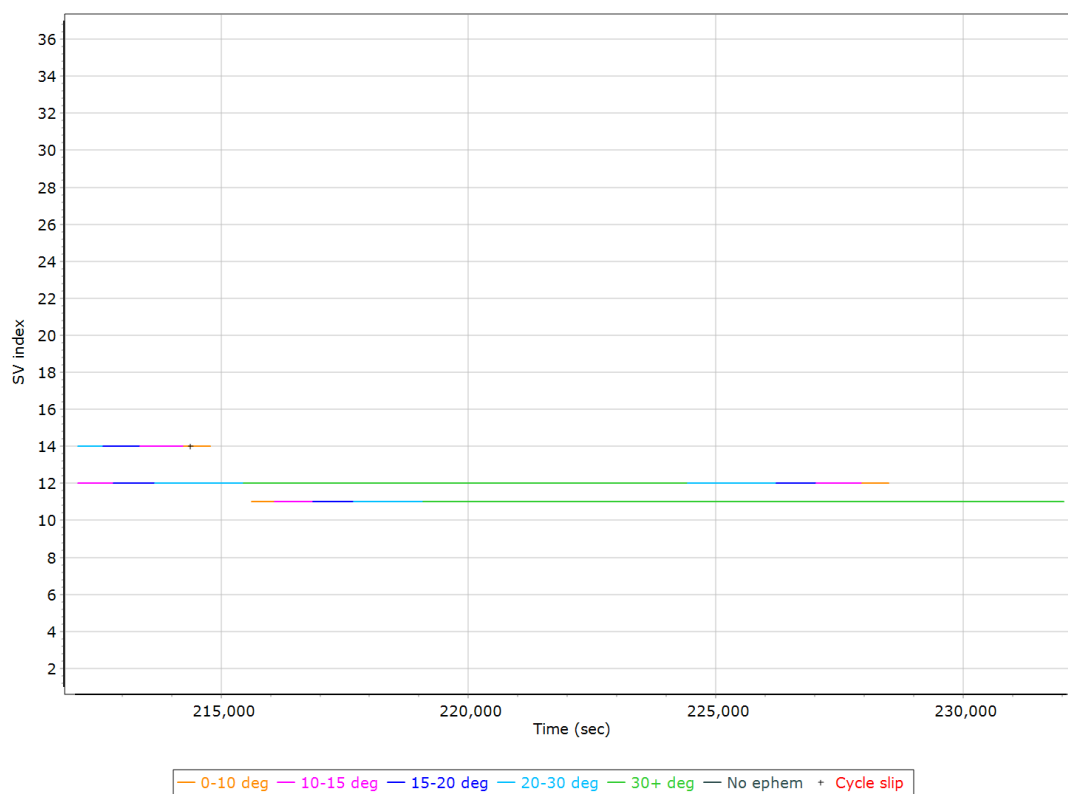




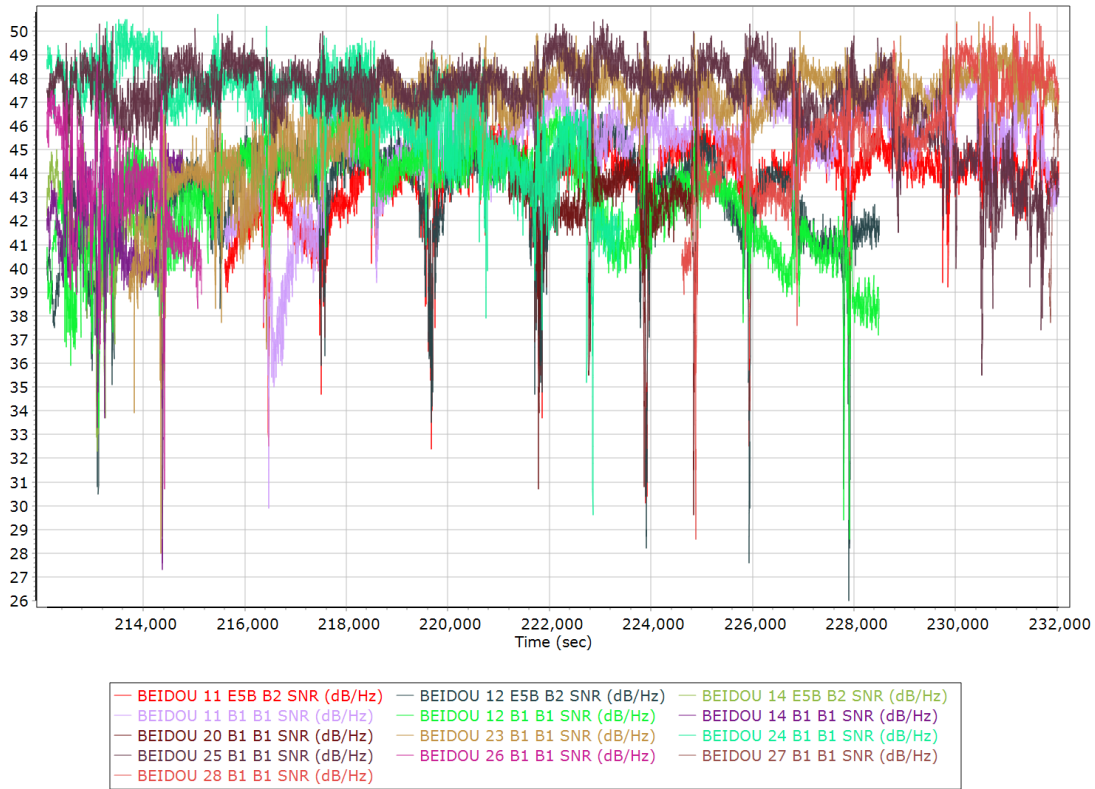
## GLONASS L2 SNR



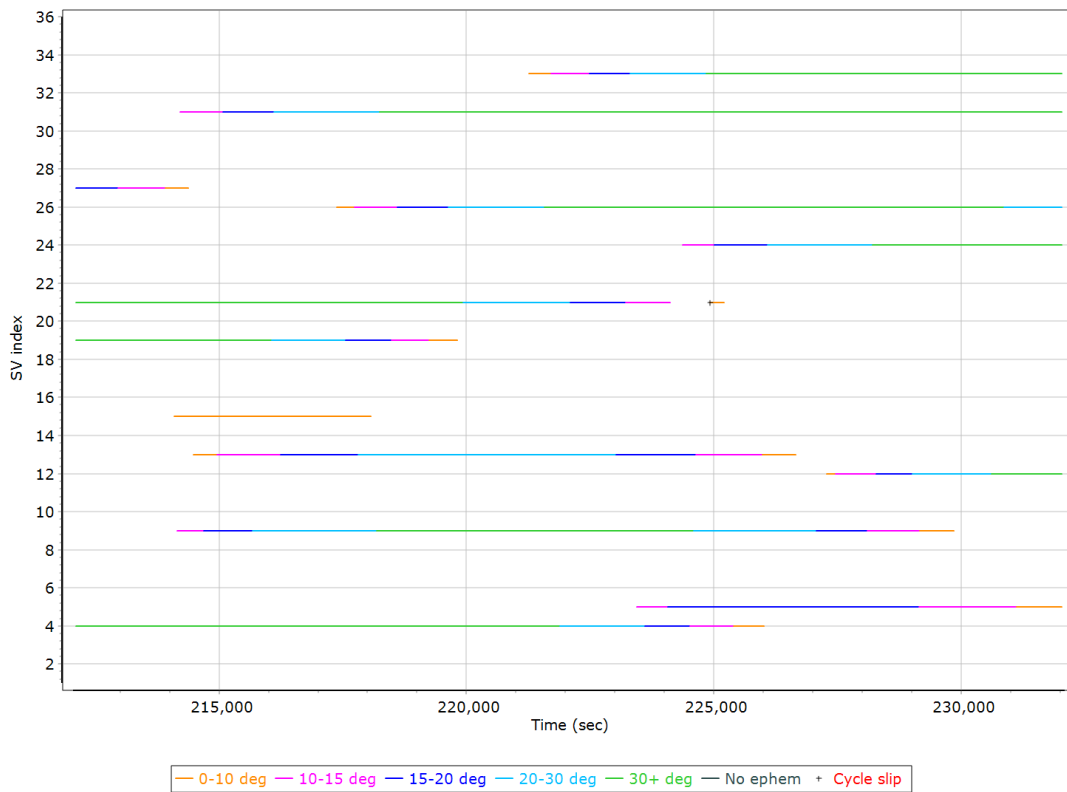
## BEIDOU Satellite Lock/Elevation



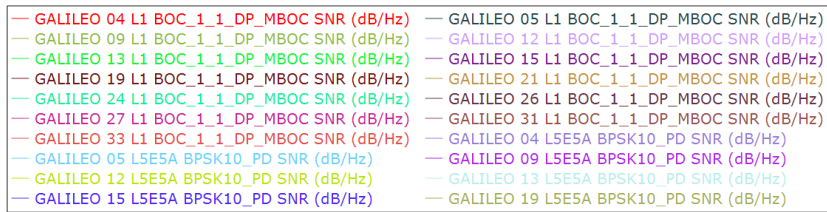
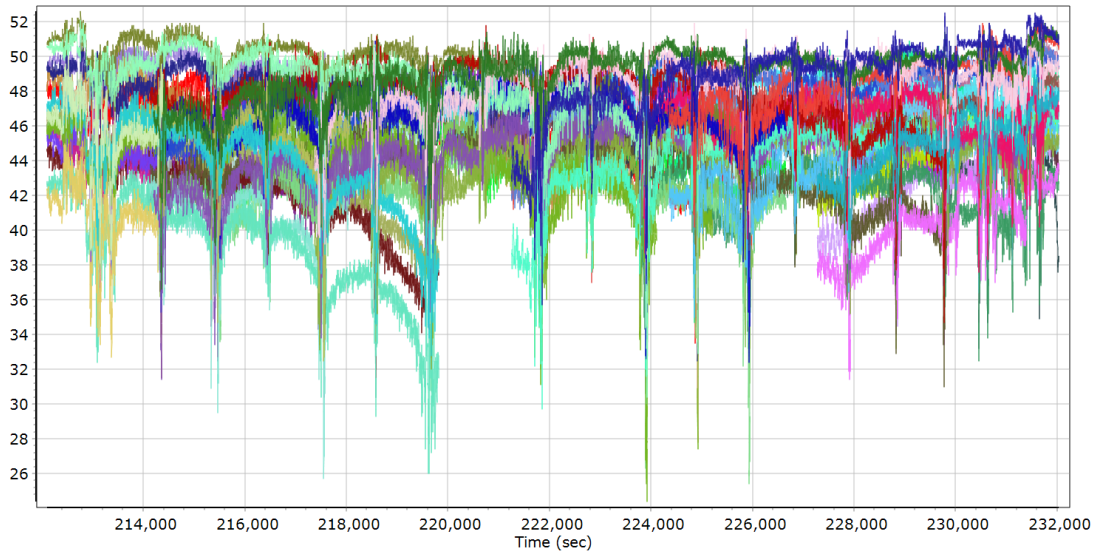
## BEIDOU SNR



## GALILEO Satellite Lock/Elevation

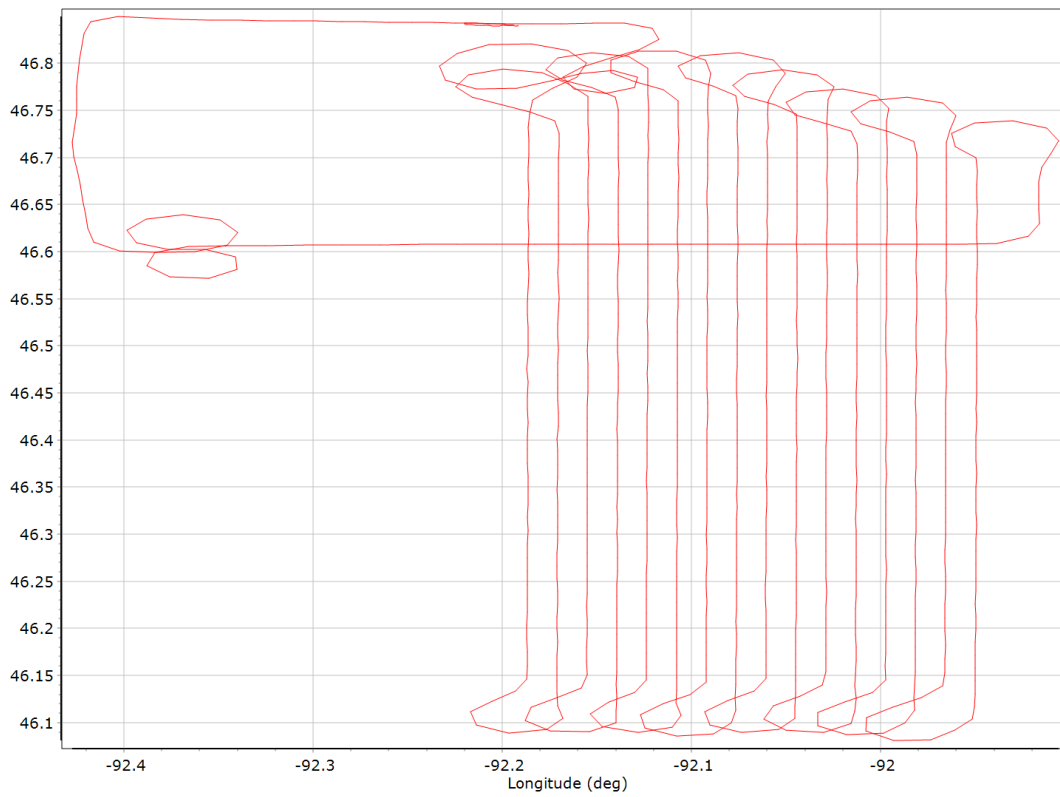


## GALILEO SNR

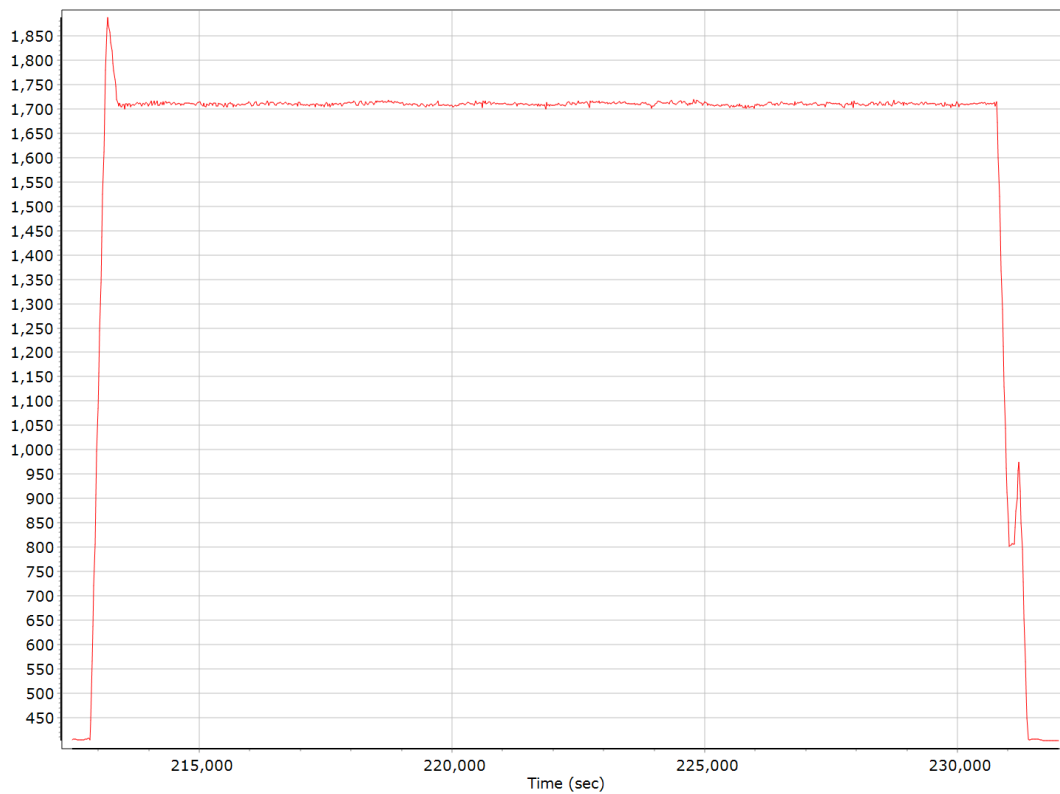


## Smoothed Trajectory Information

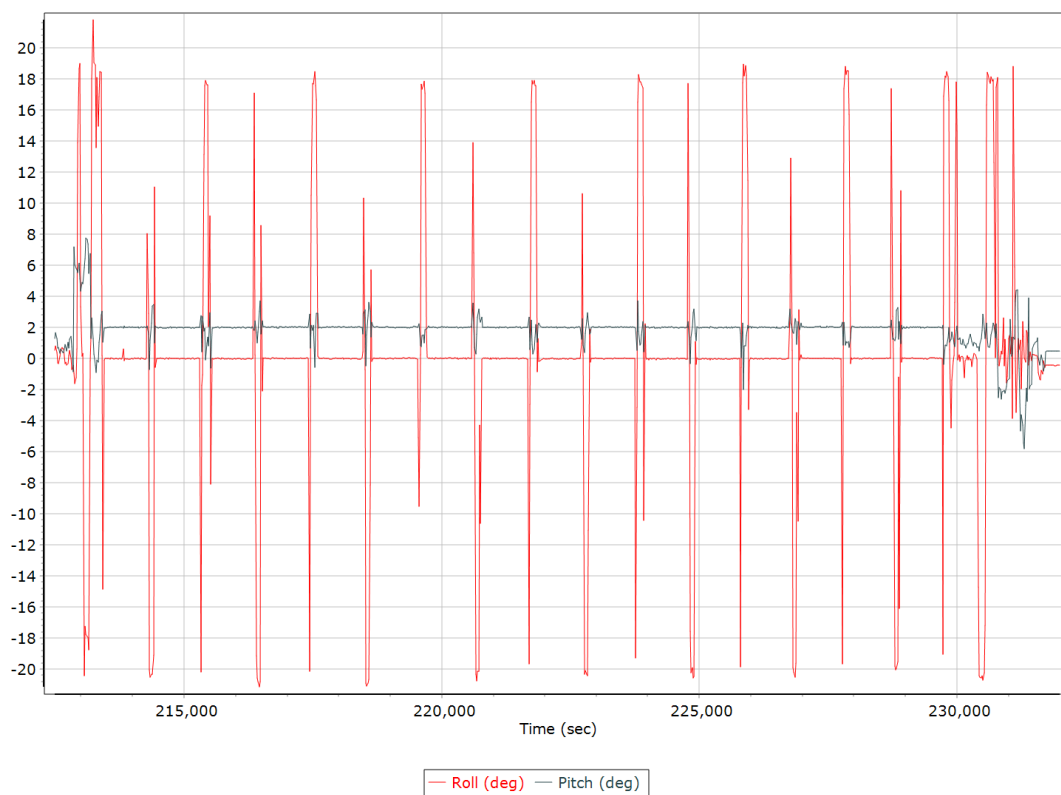
### Top View



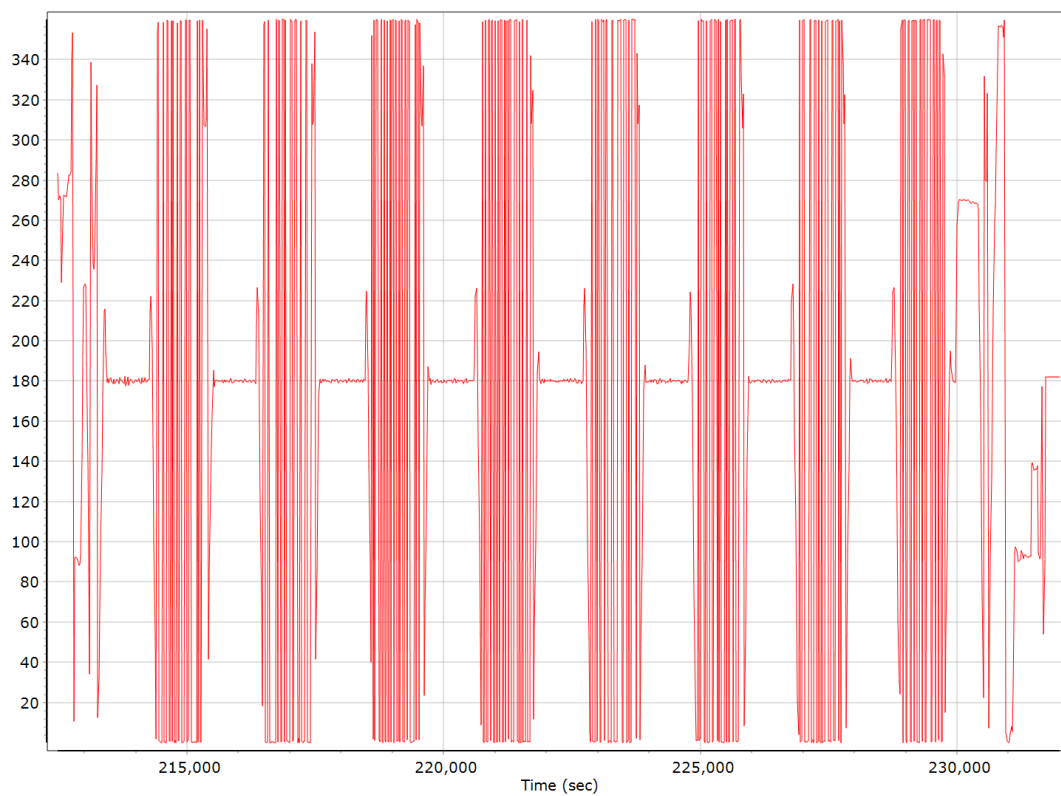
### Altitude



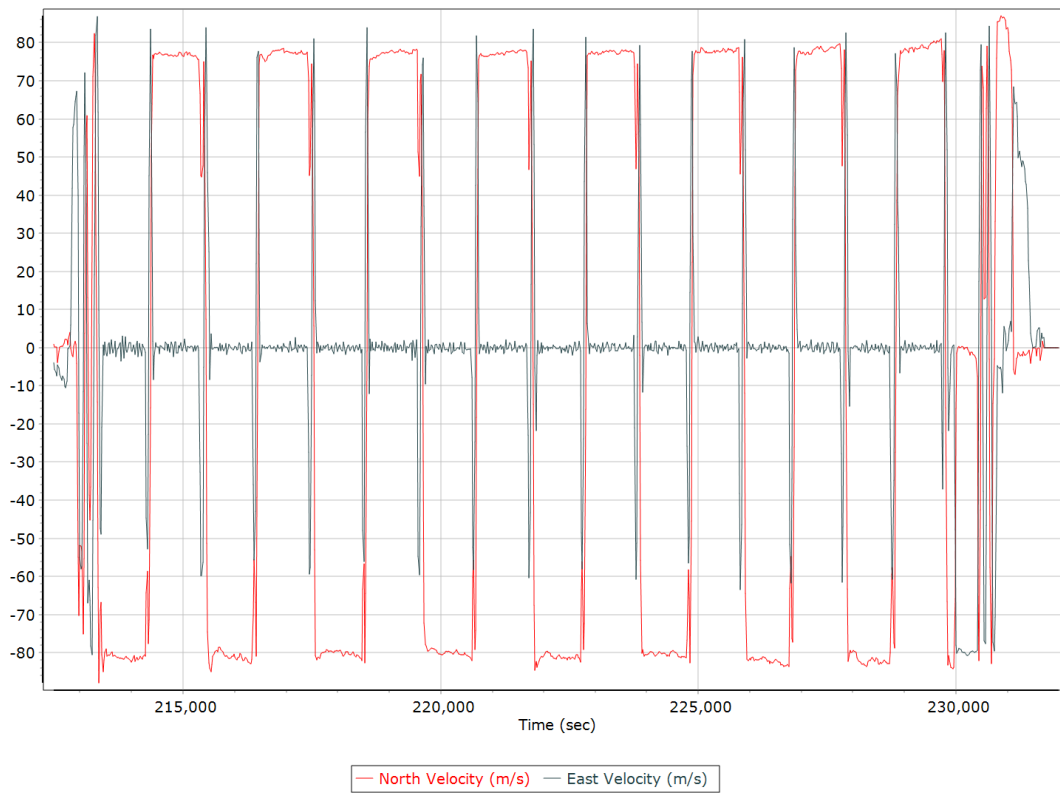
## Roll/Pitch



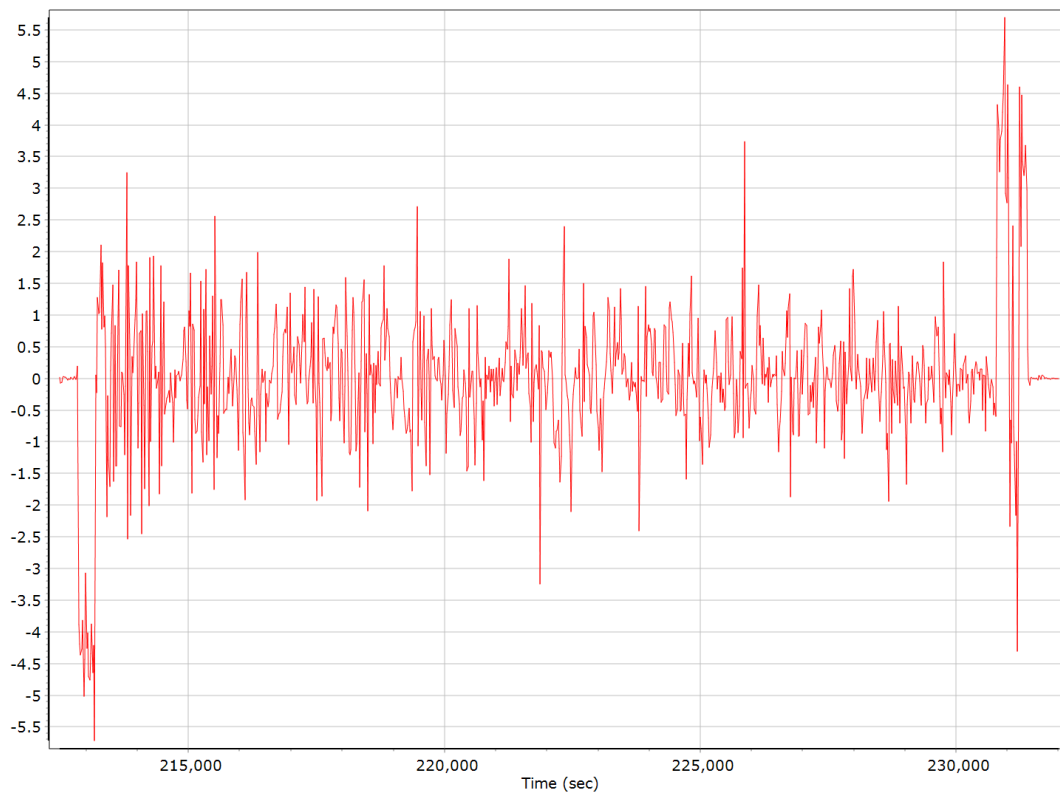
## Heading



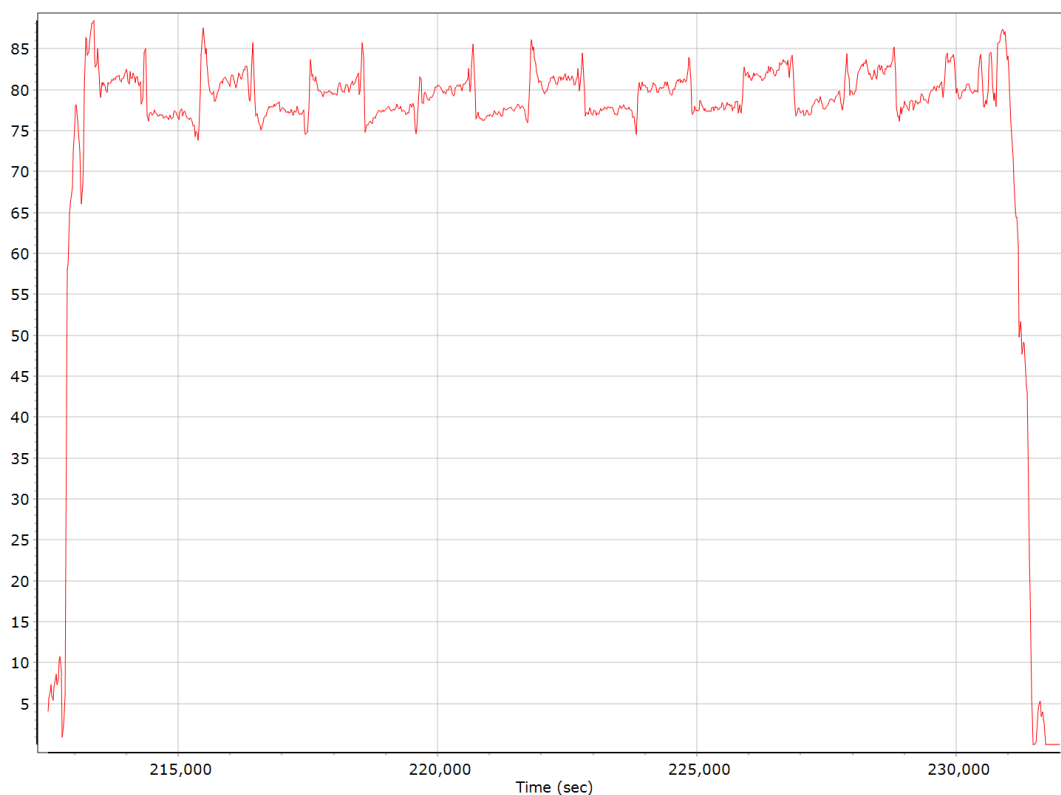
## North/East Velocity



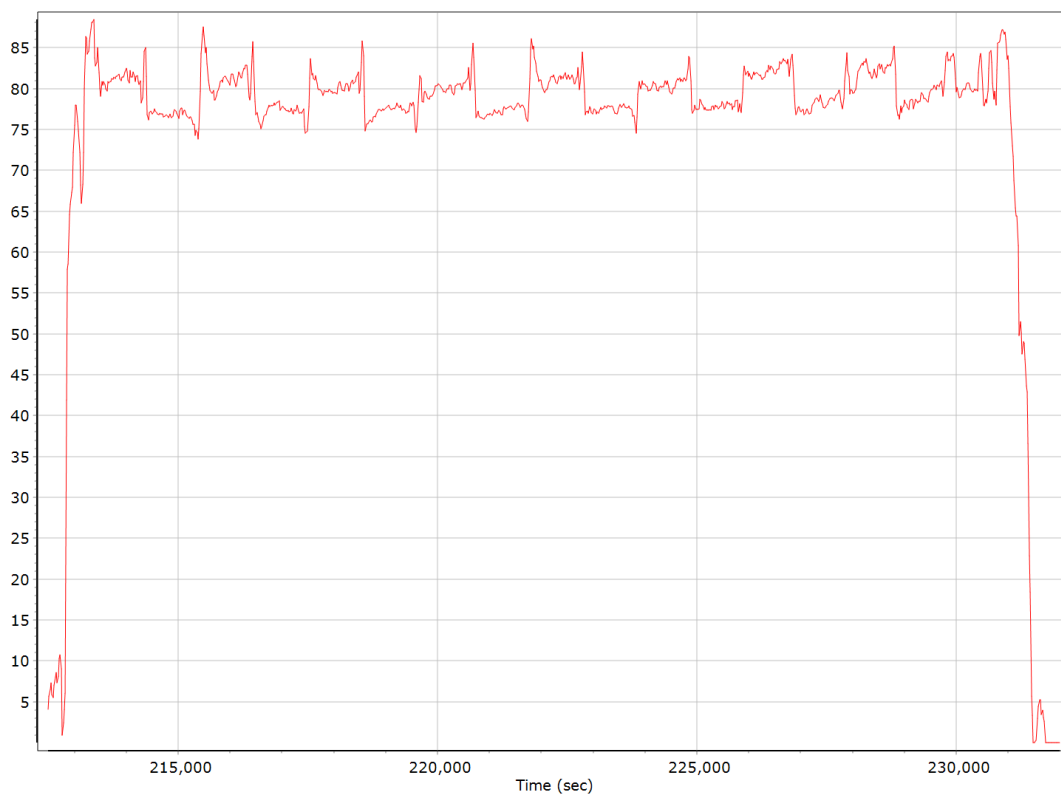
## Down Velocity



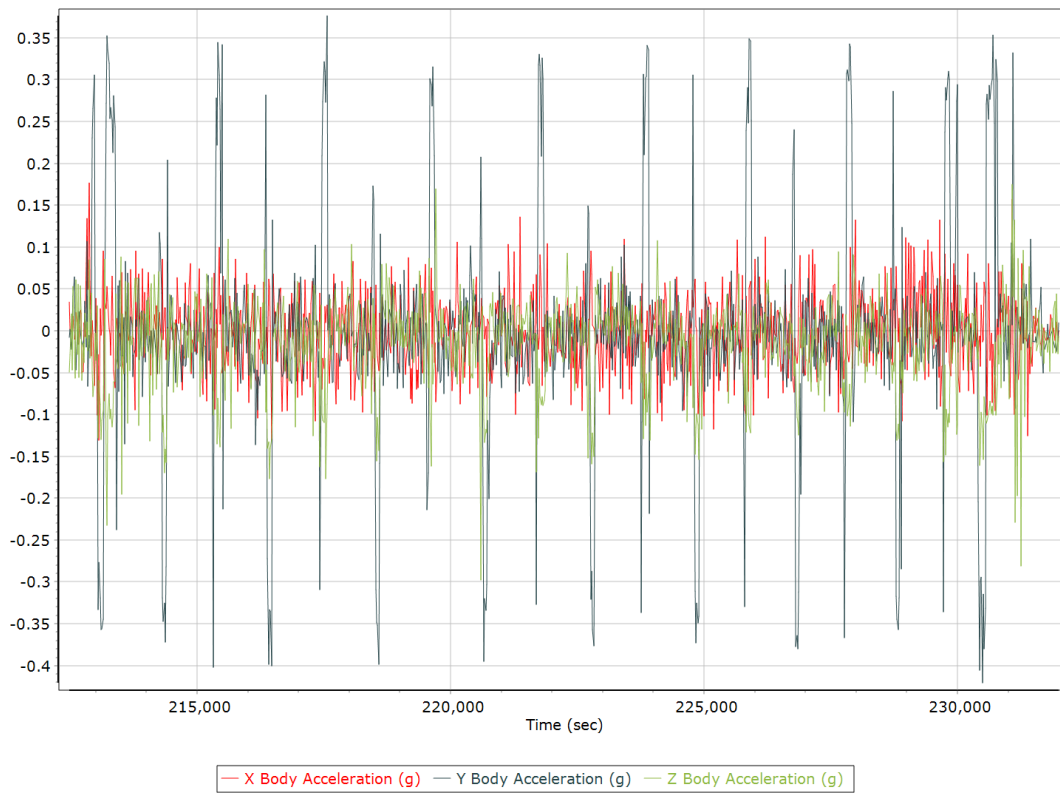
## Total Speed



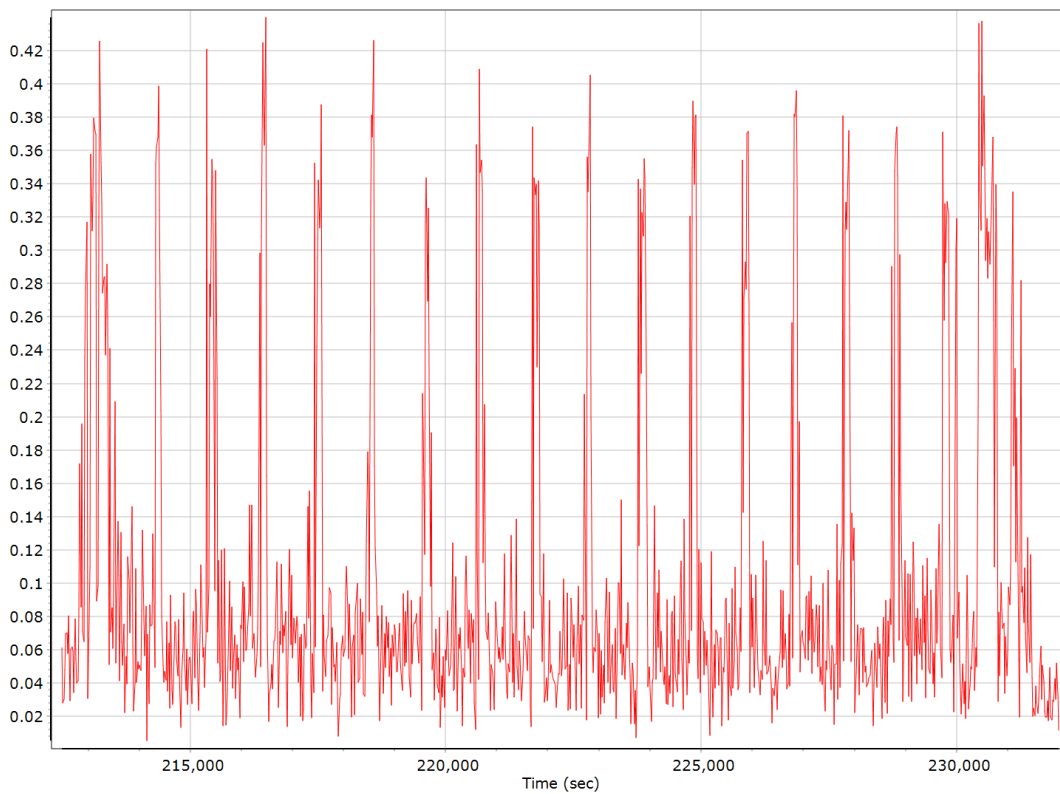
## Ground Speed



## Body Acceleration



## Total Body Acceleration



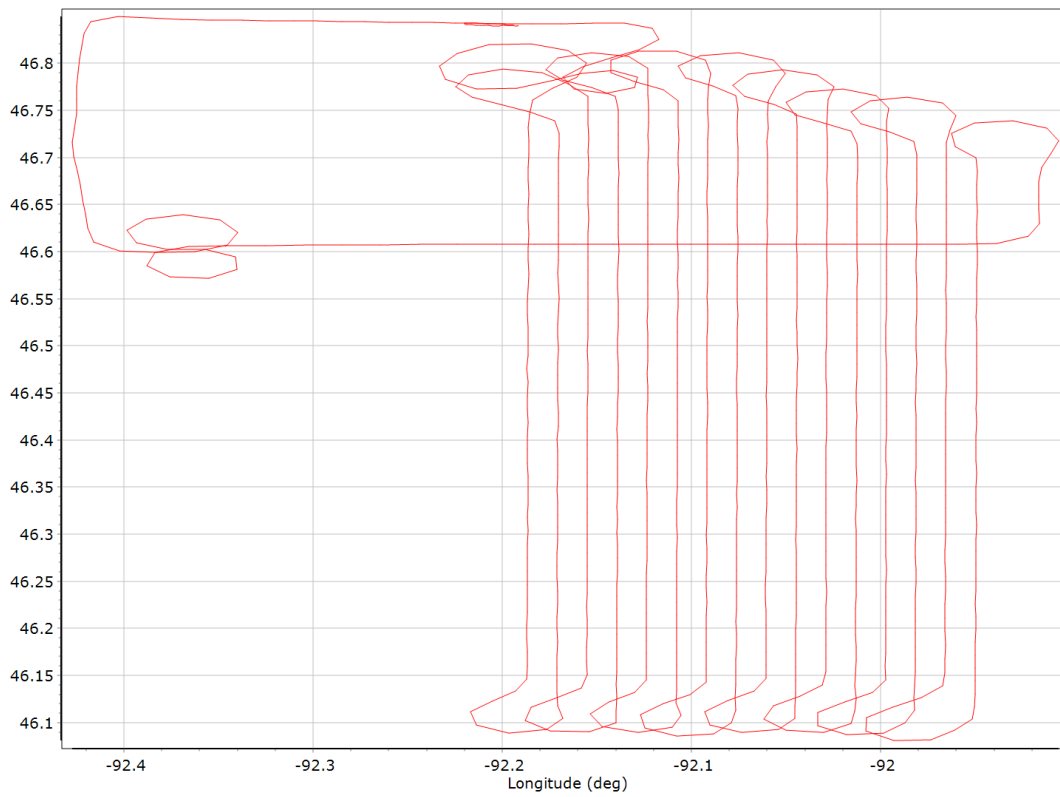


## Body Angular Rate

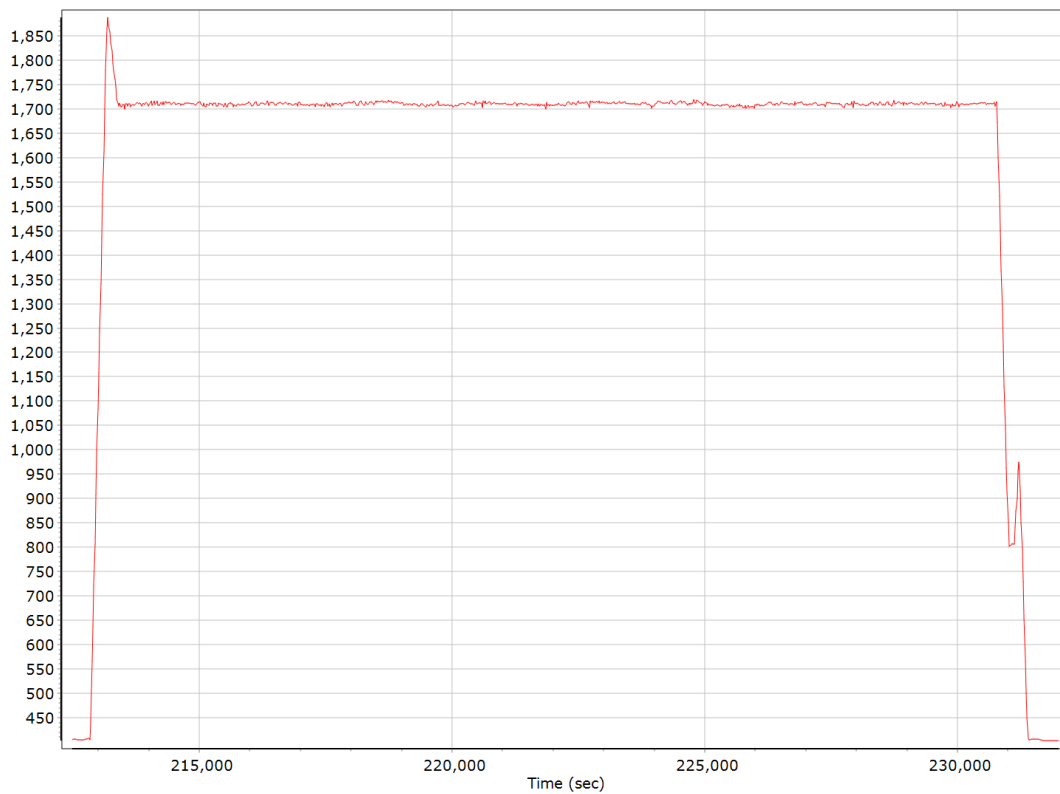


## Forward Processed Trajectory Information

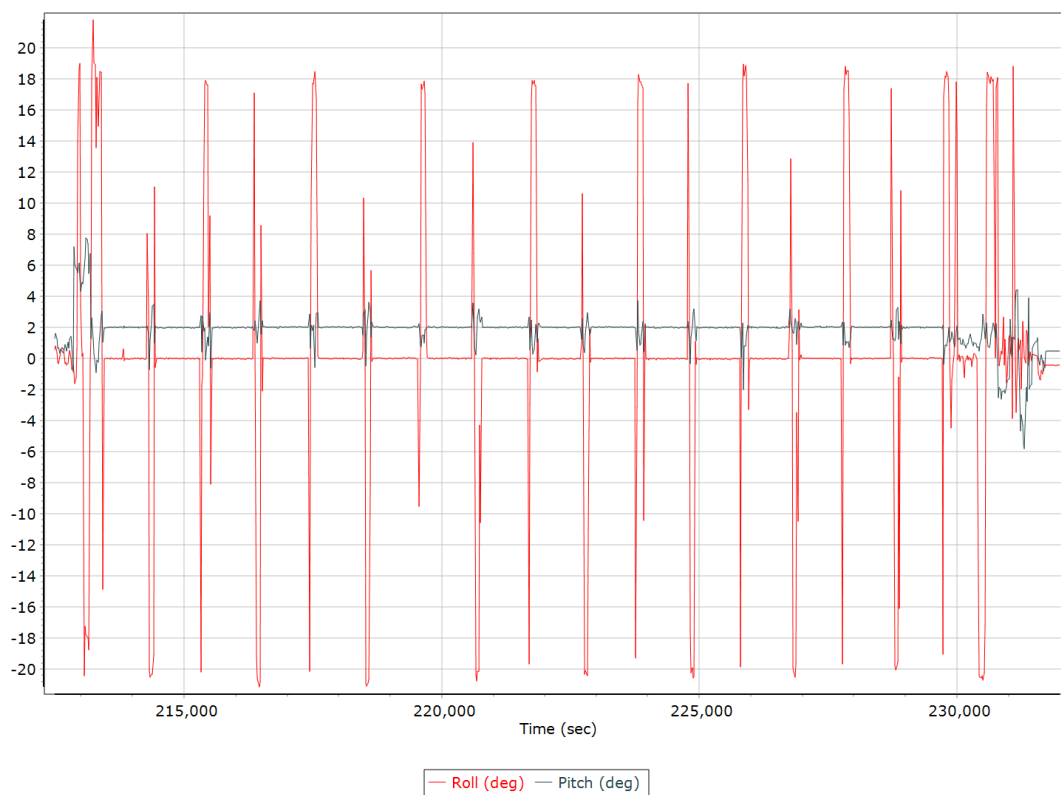
### Top View



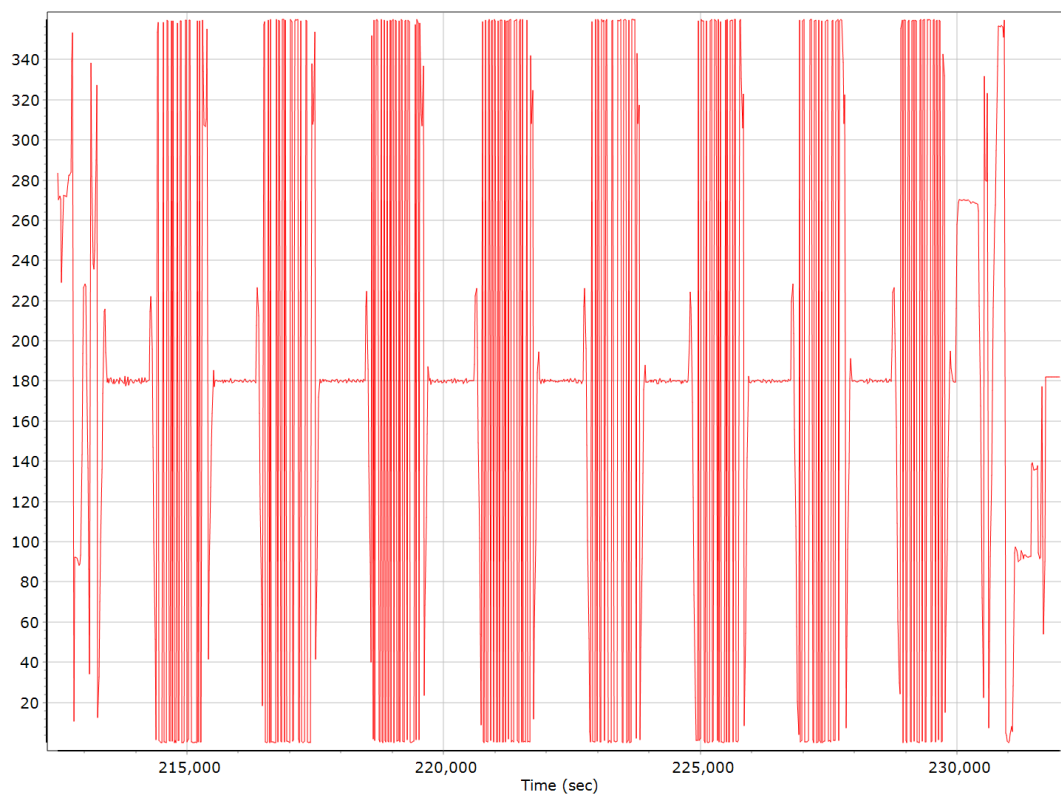
### Altitude



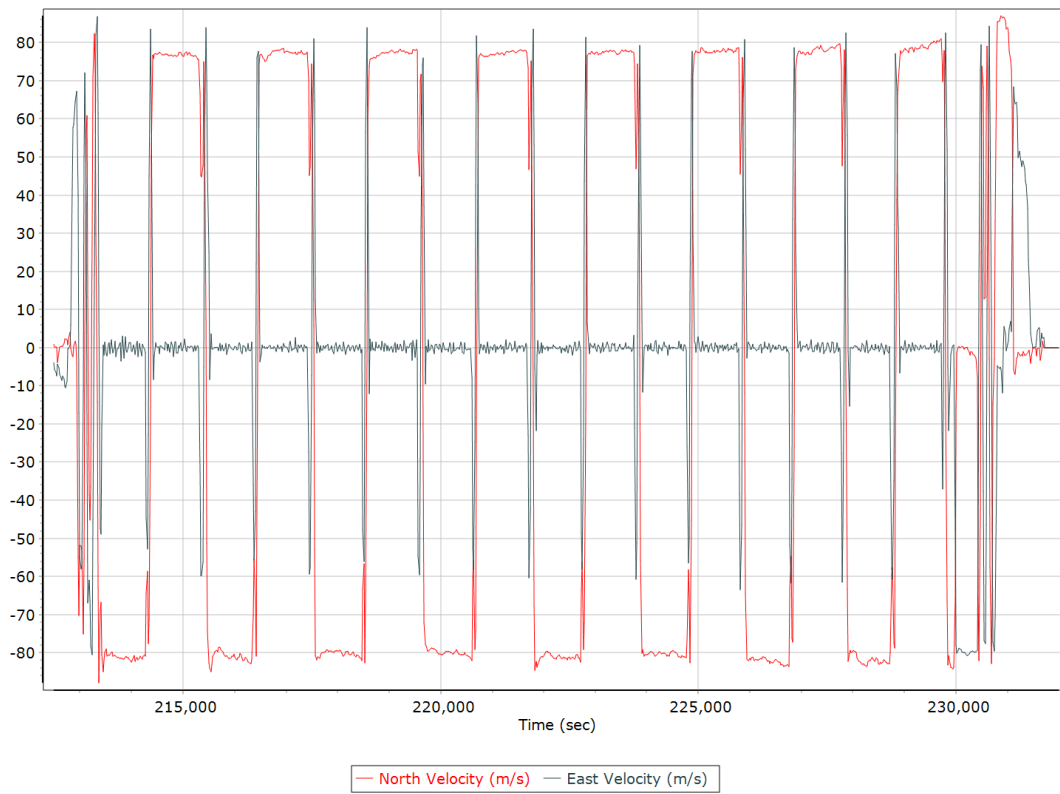
## Roll/Pitch



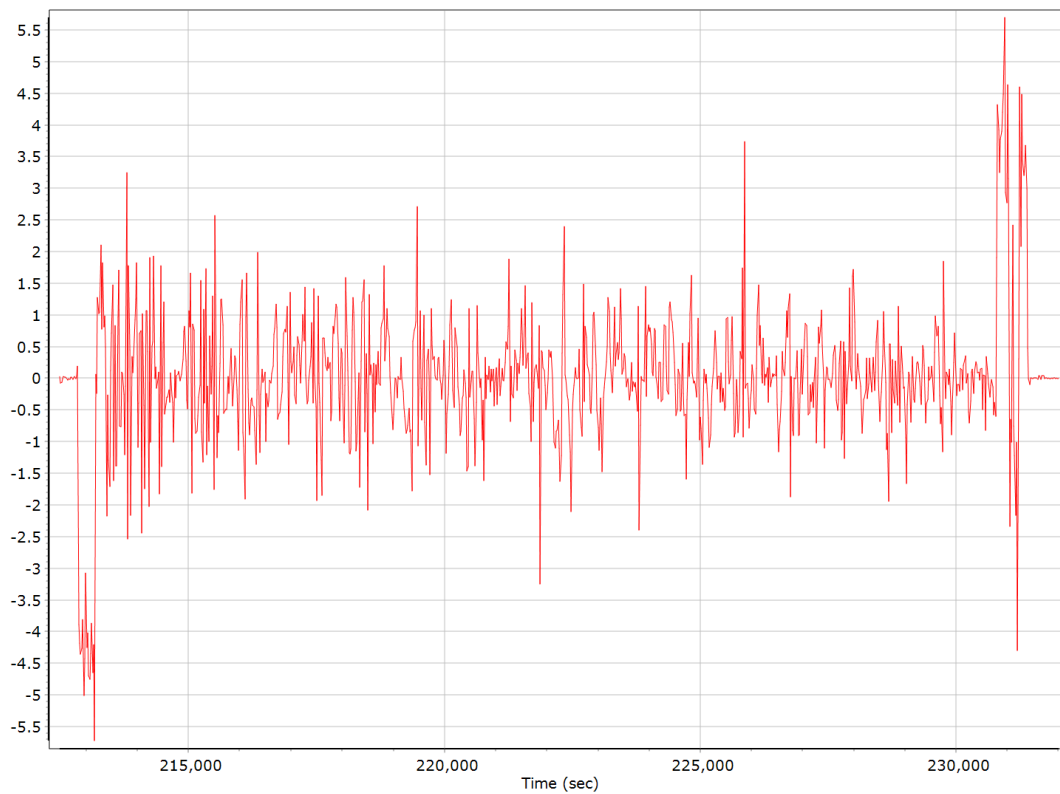
## Heading



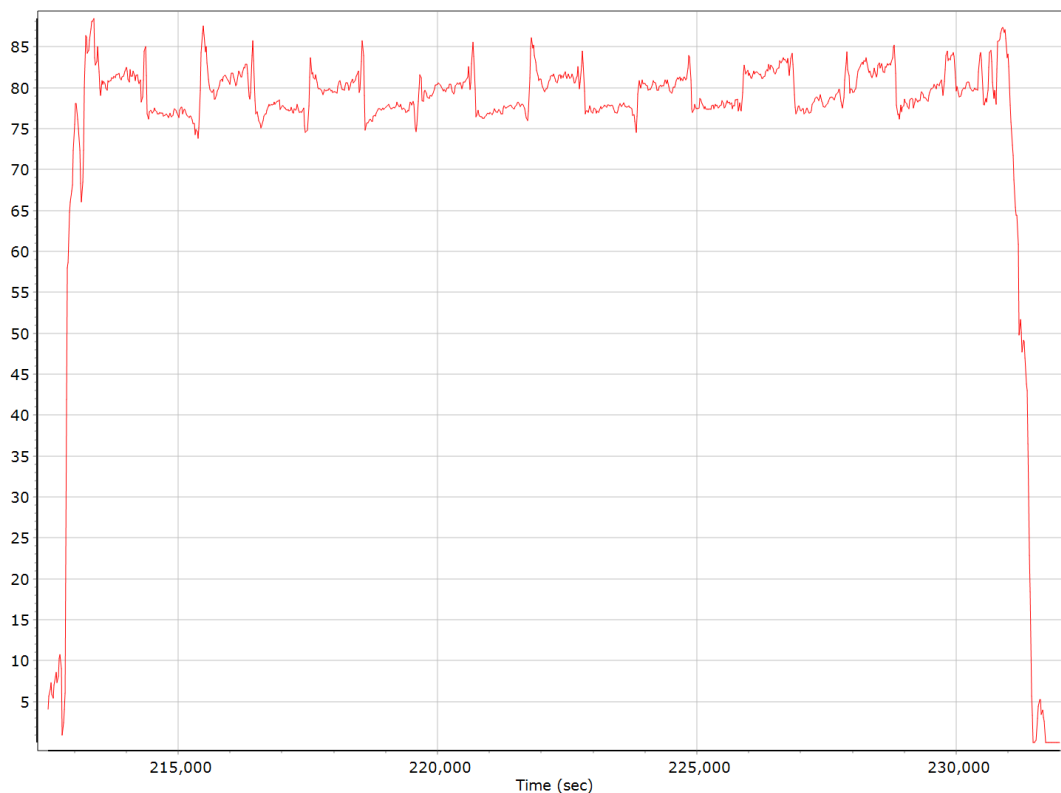
## North/East Velocity



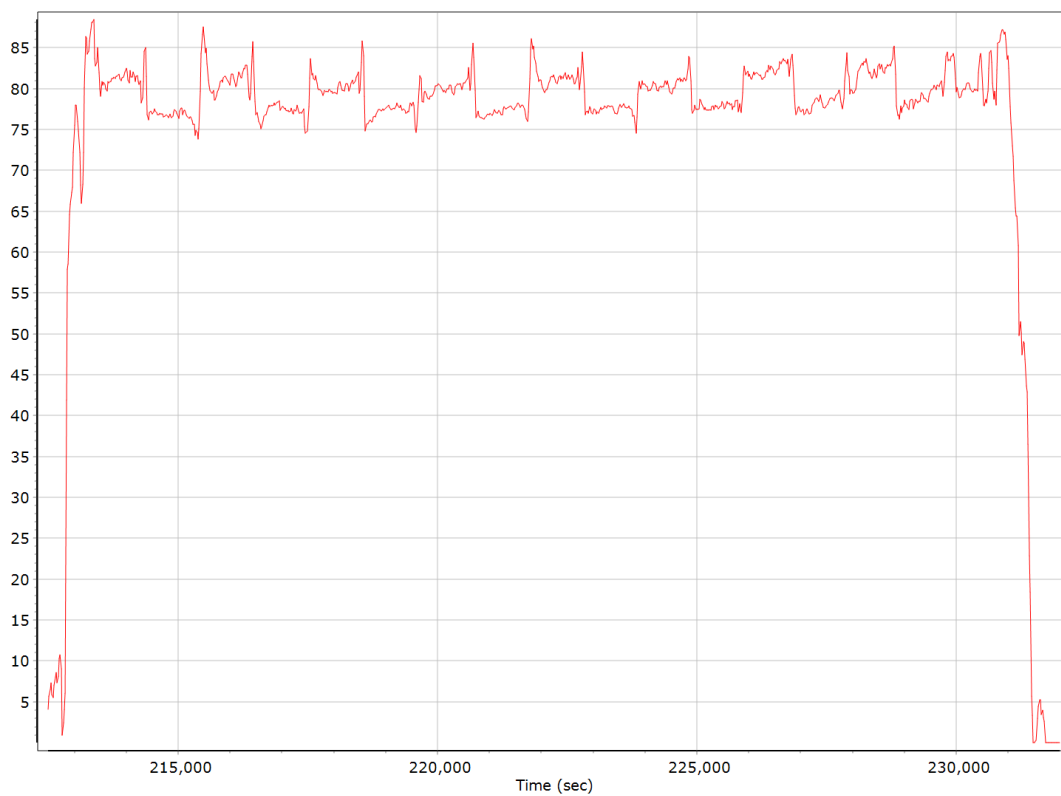
## Down Velocity



## Total Speed



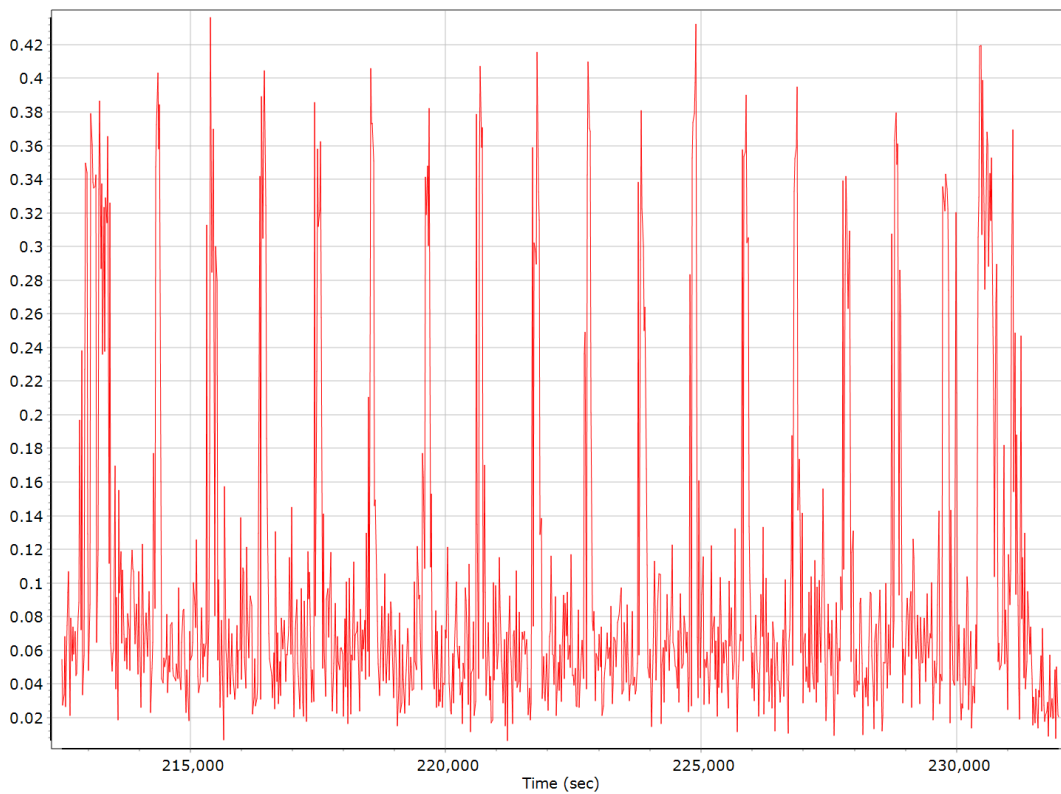
## Ground Speed



## Body Acceleration



## Total Body Acceleration



## Body Angular Rate

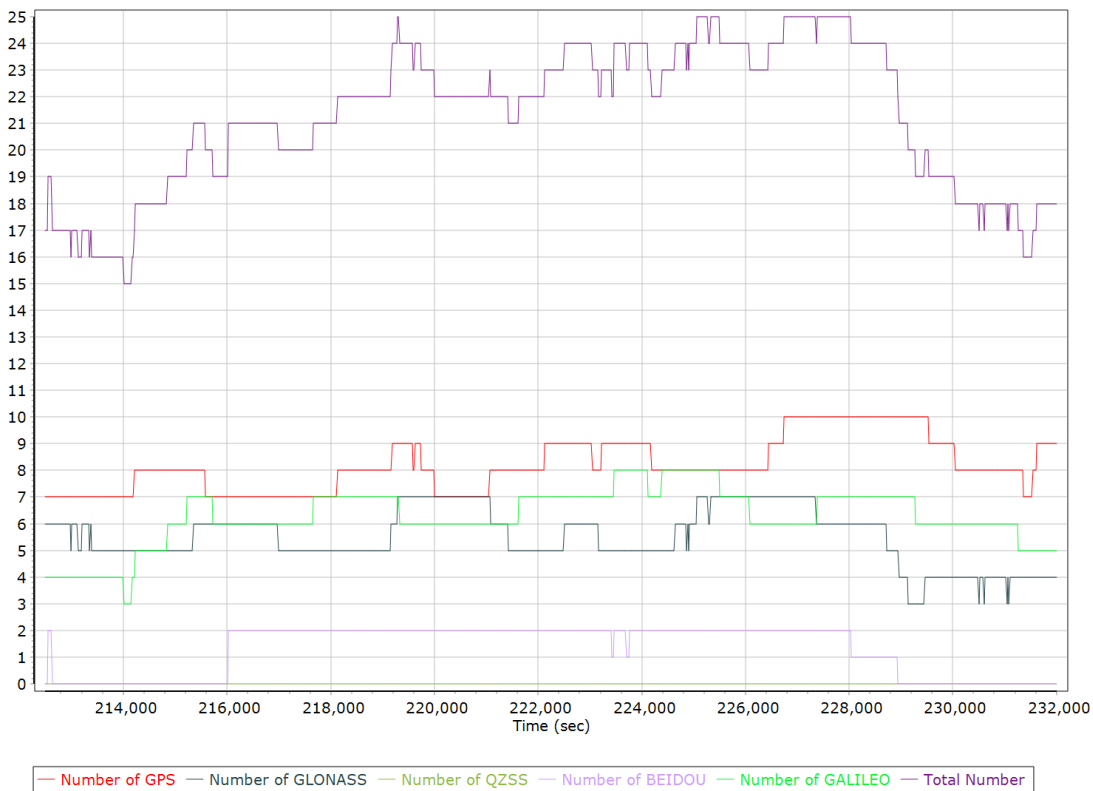


## GNSS QC

### GNSS QC Statistics

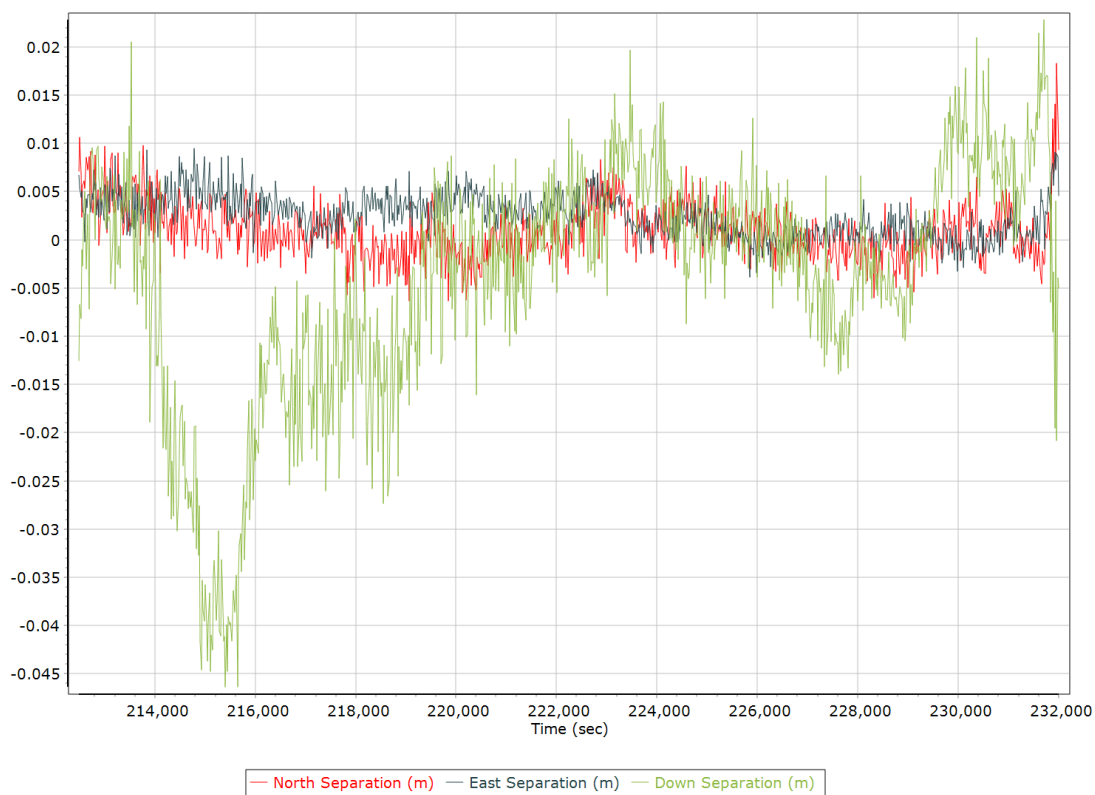
Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	5	10	8
Number of GLONASS SV	3	7	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	2	1
Number of GALILEO SV	3	8	6
Total number of SV	13	25	21
PDOP	0.96	1.98	1.23
QC Solution Gaps	0.00	0.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	19906.00	0.00	0.00
Percentage	100.00	0.00	0.00

### Num SVs in solution

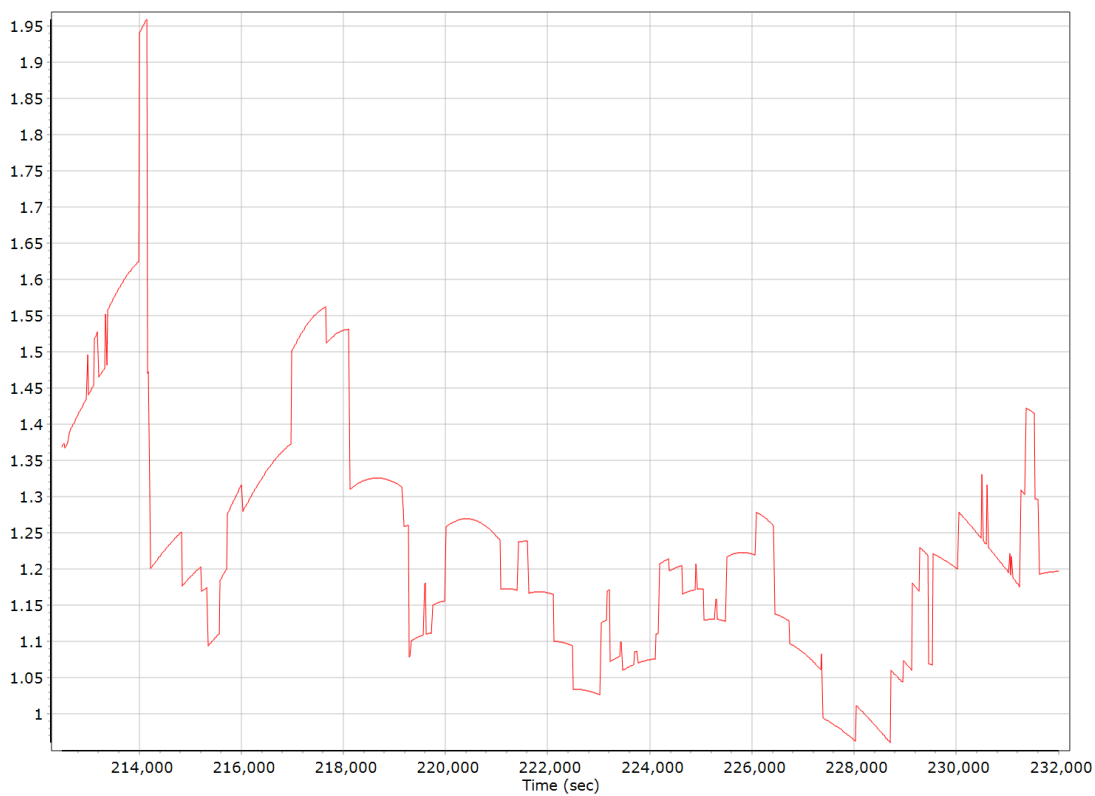




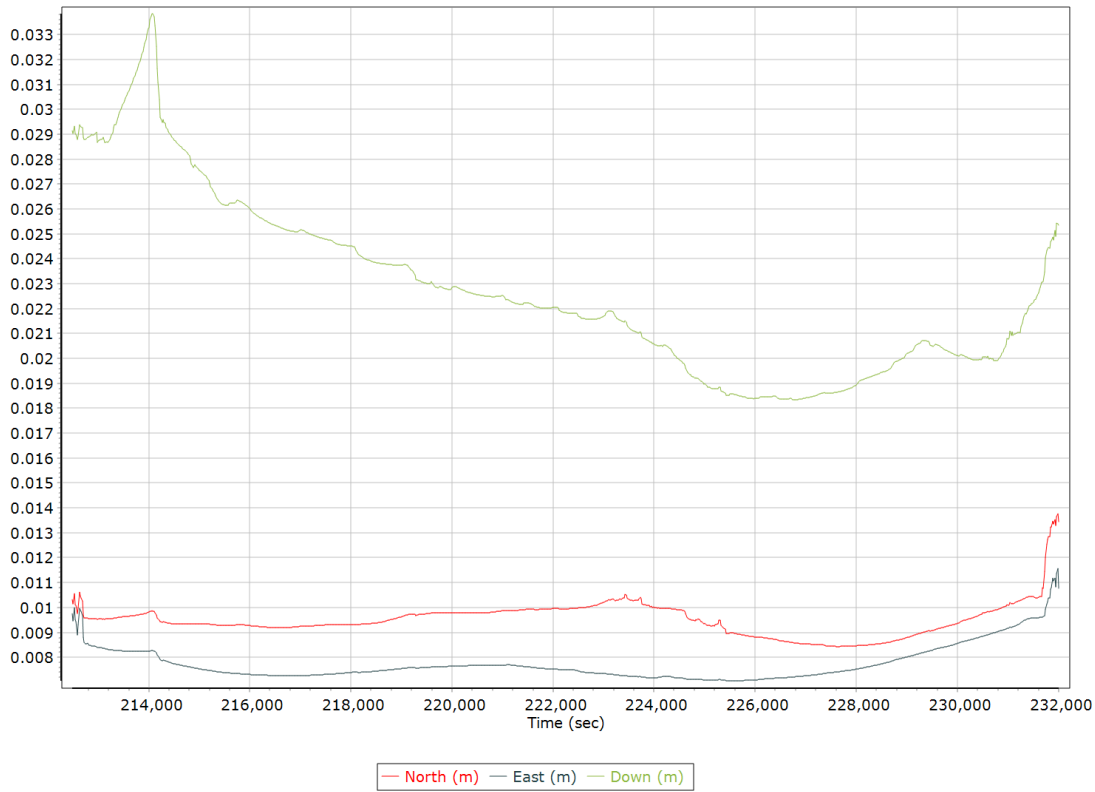
## Forward/Reverse Separation



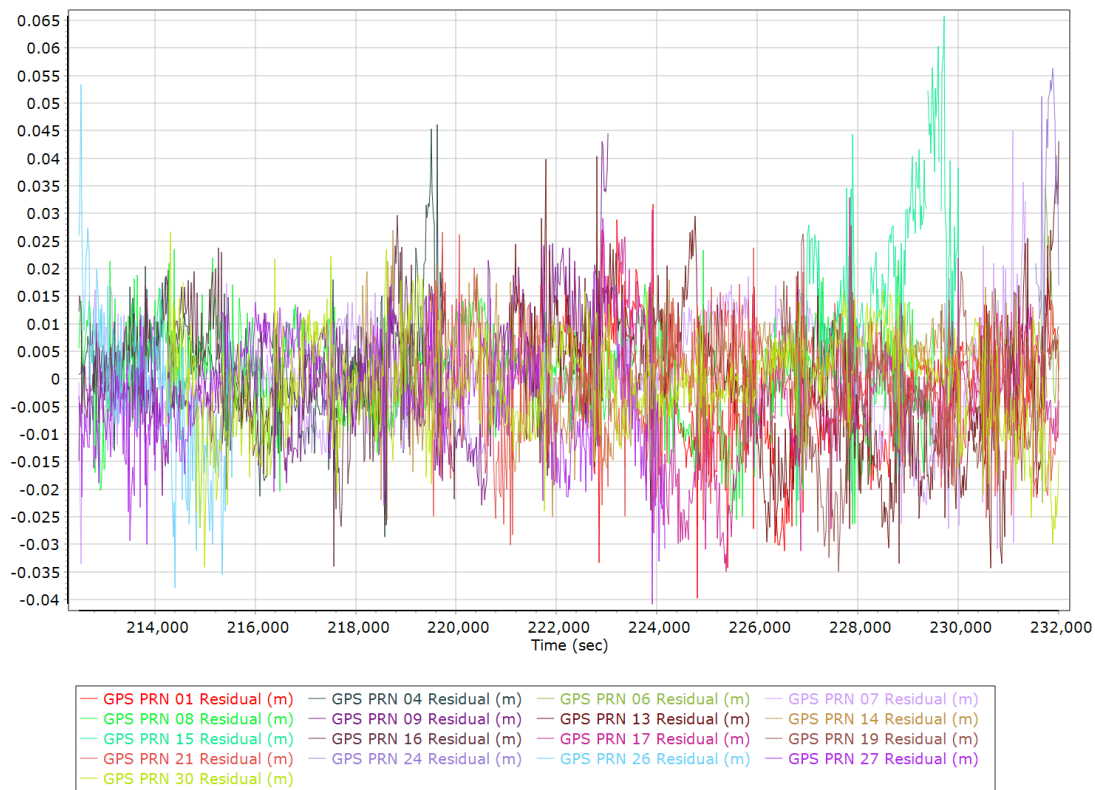
## PDOP



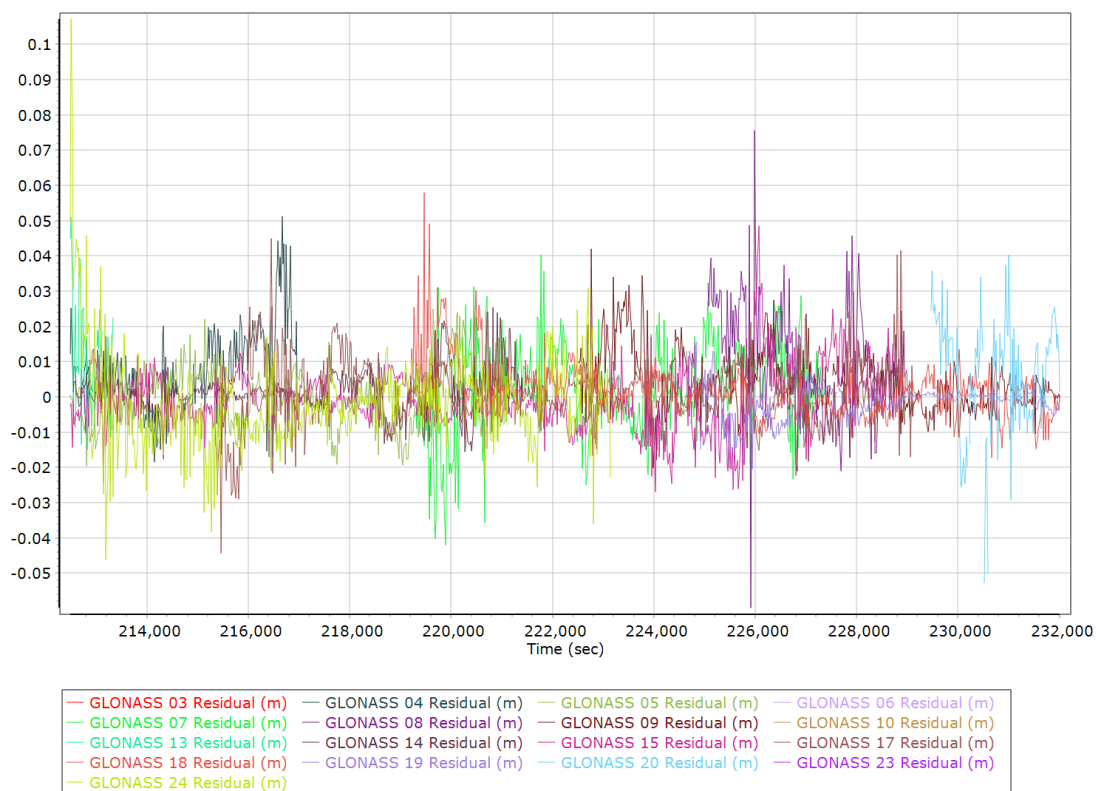
## Estimated Position Accuracy



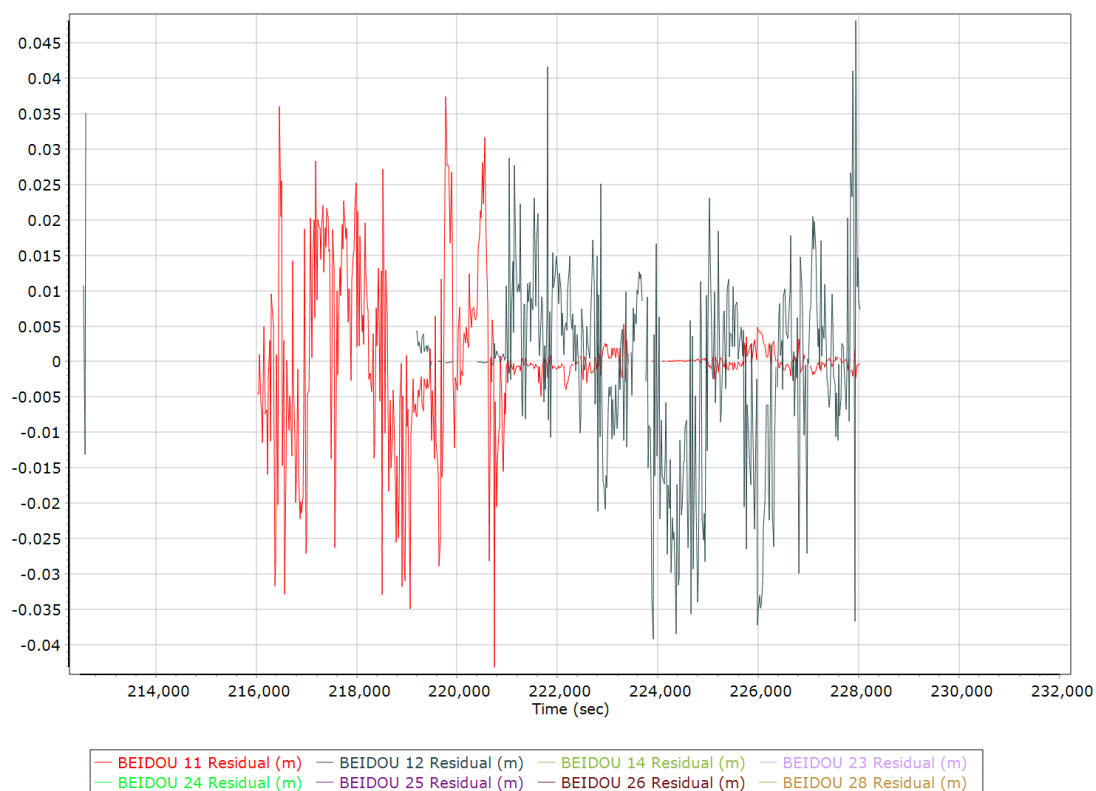
## GPS Residuals



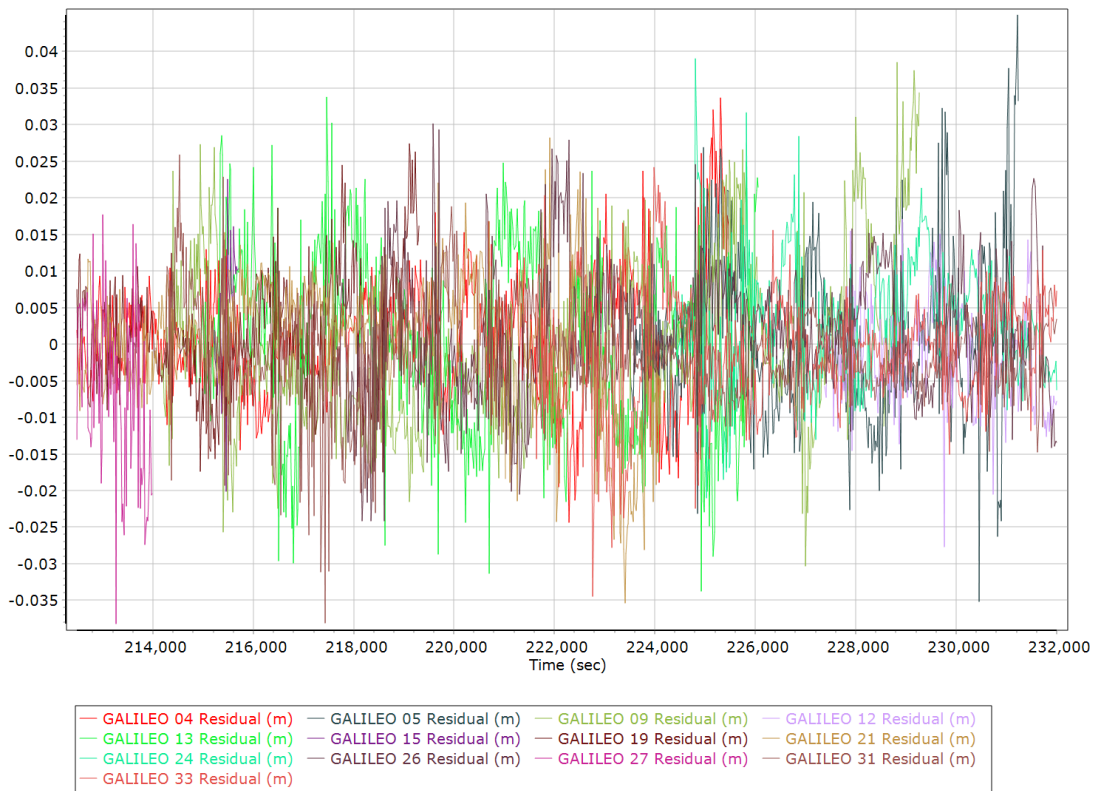
## GLONASS Residuals



## BEIDOU Residuals



## GALILEO Residuals



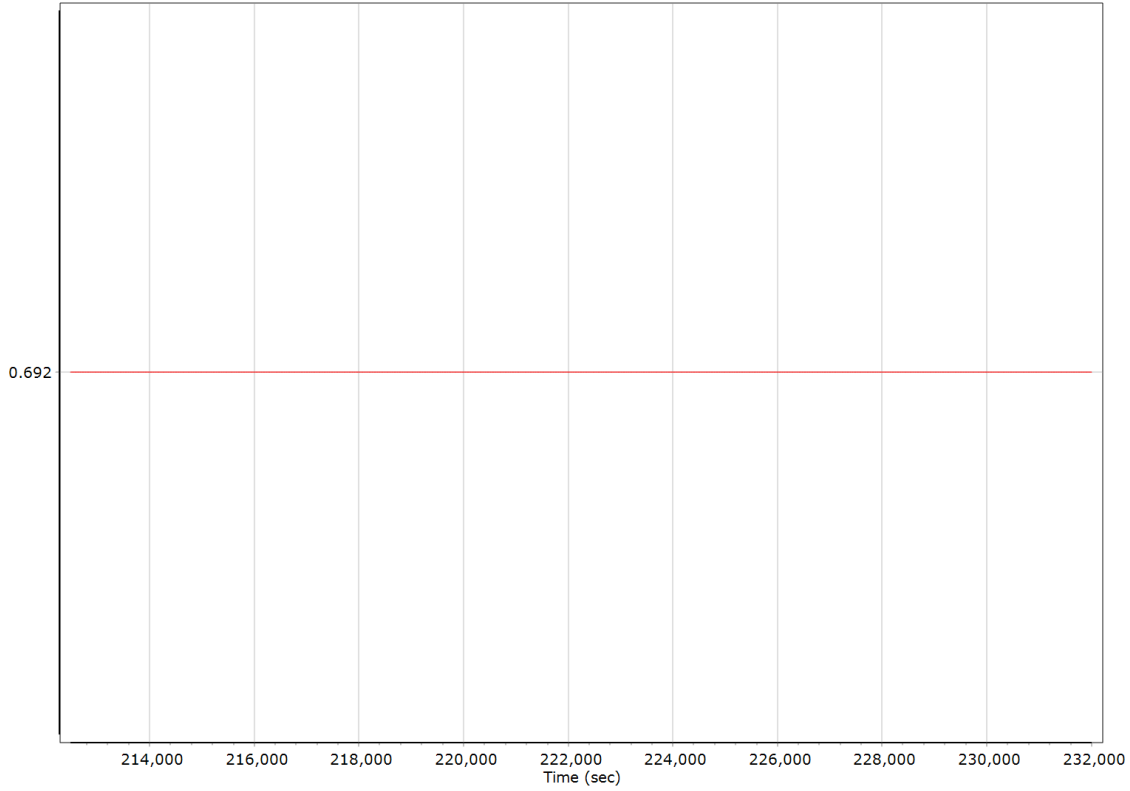
## GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	212088.000 (5/17/2022 10:54:48 AM)		
Processing end time	232015.000 (5/17/2022 4:26:55 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

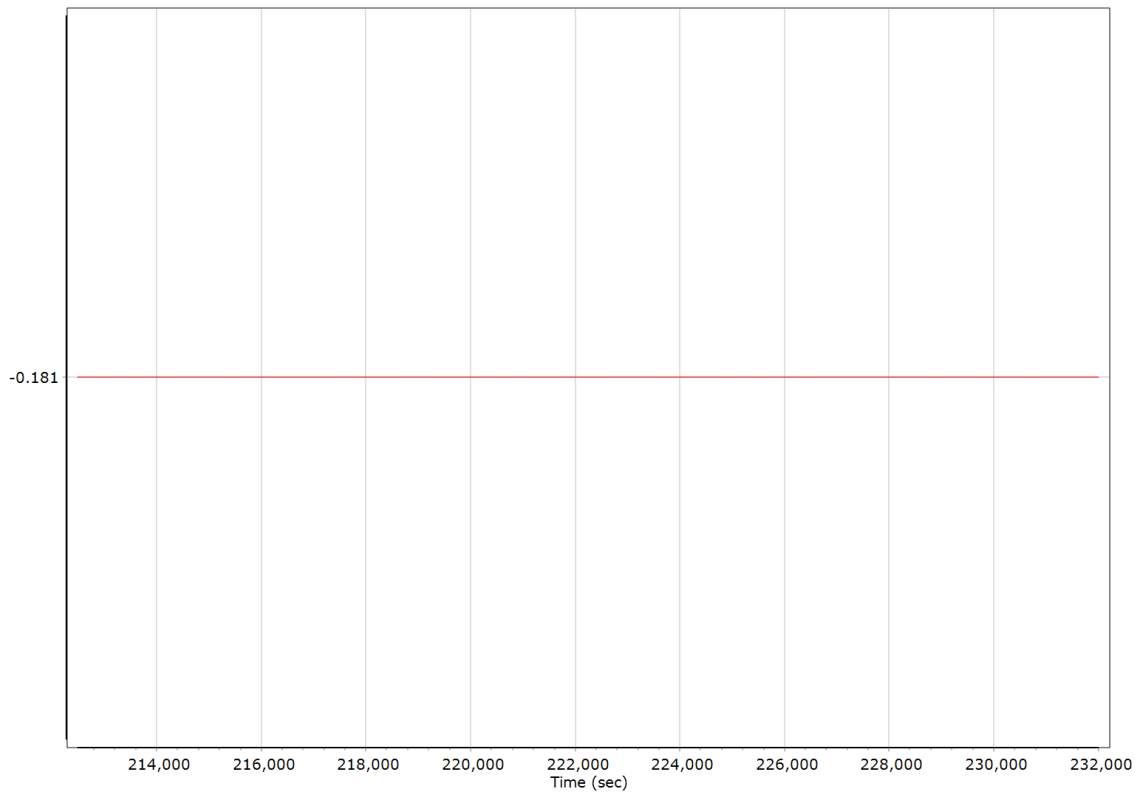
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

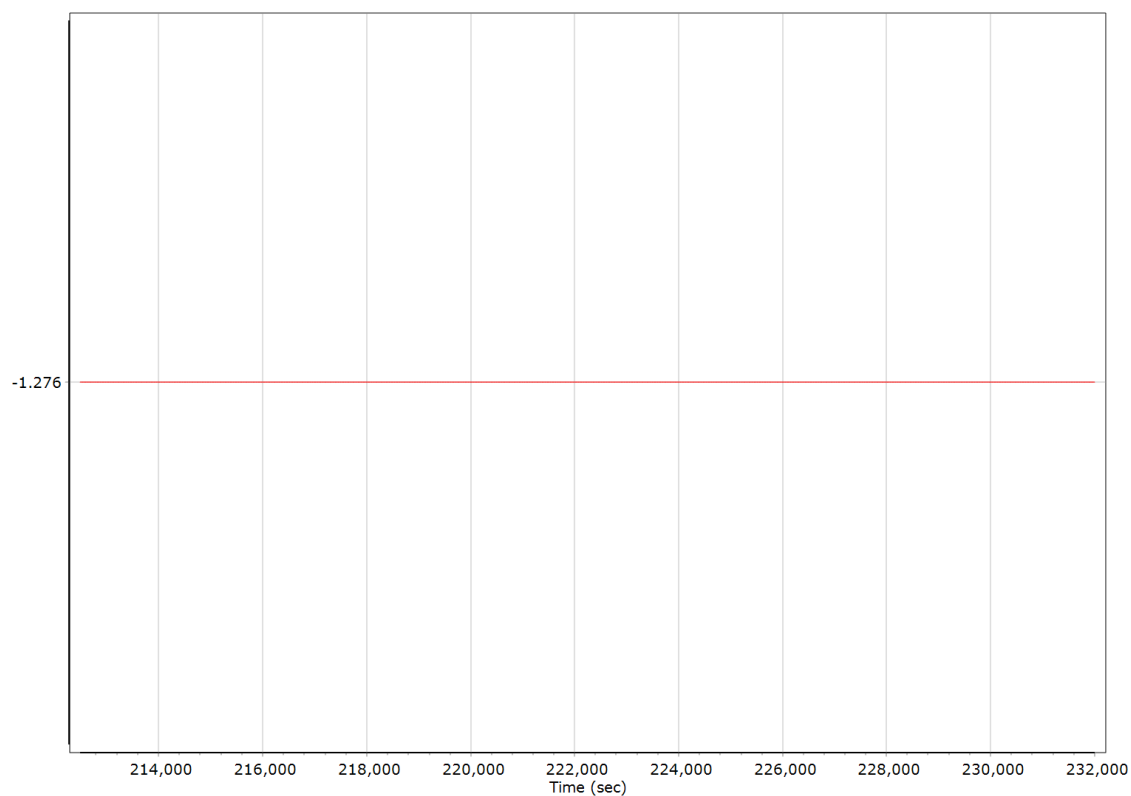
#### X Reference-Primary GNSS Lever Arm (m)



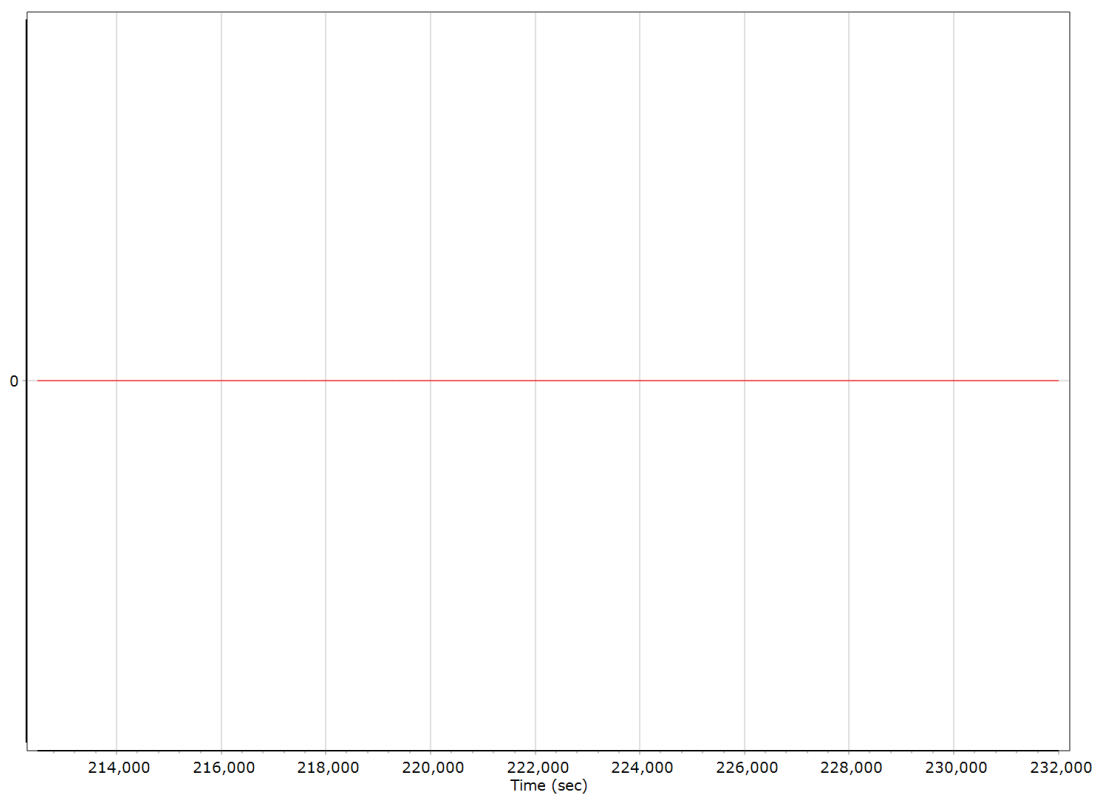
#### Y Reference-Primary GNSS Lever Arm (m)



### Z Reference-Primary GNSS Lever Arm (m)



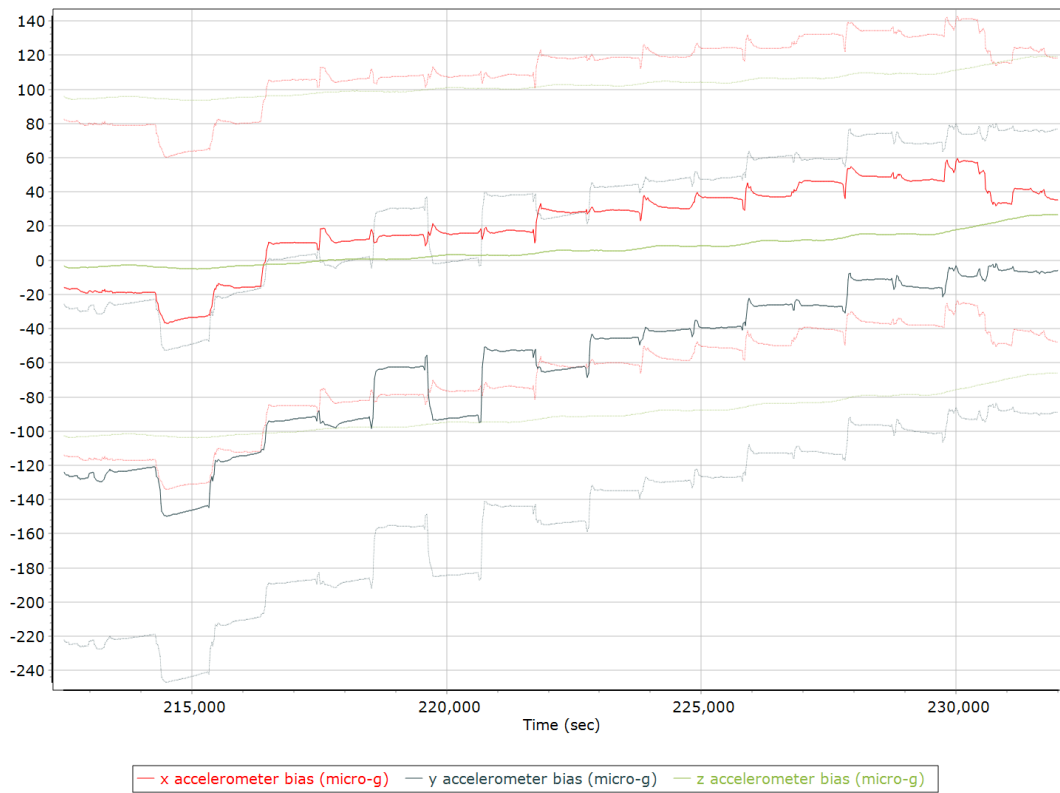
### Reference-Primary GNSS Lever Arm Figure of Merit



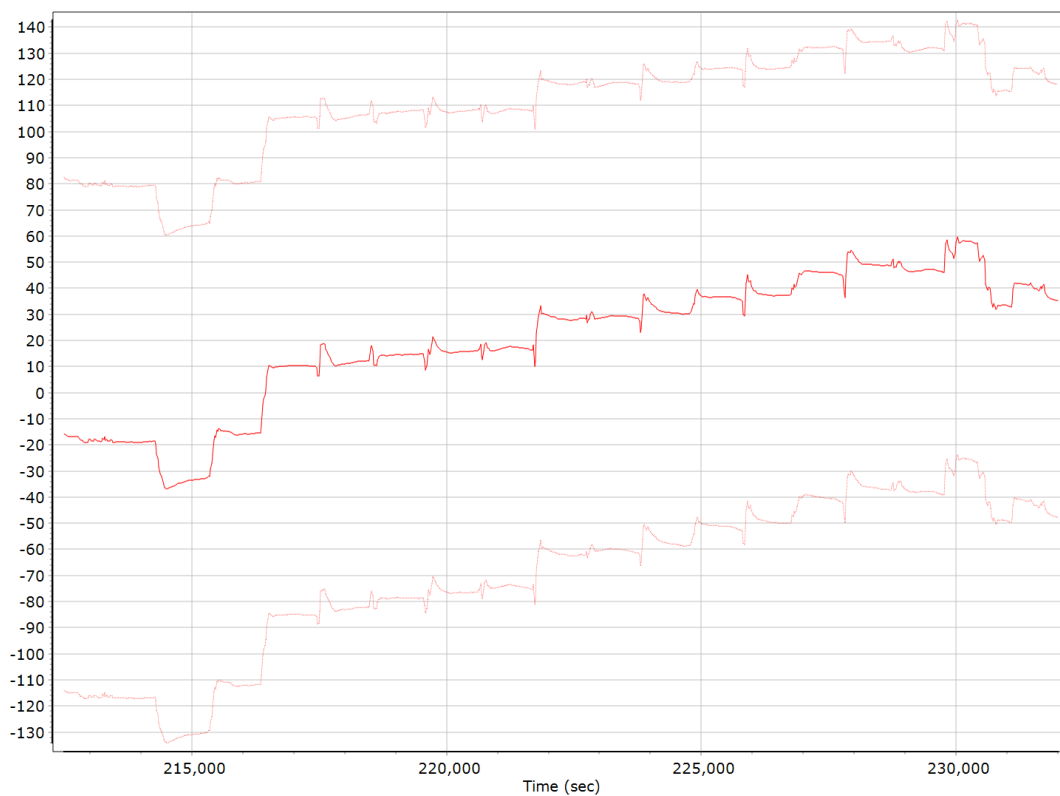
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

#### Accelerometer Bias (micro-g)

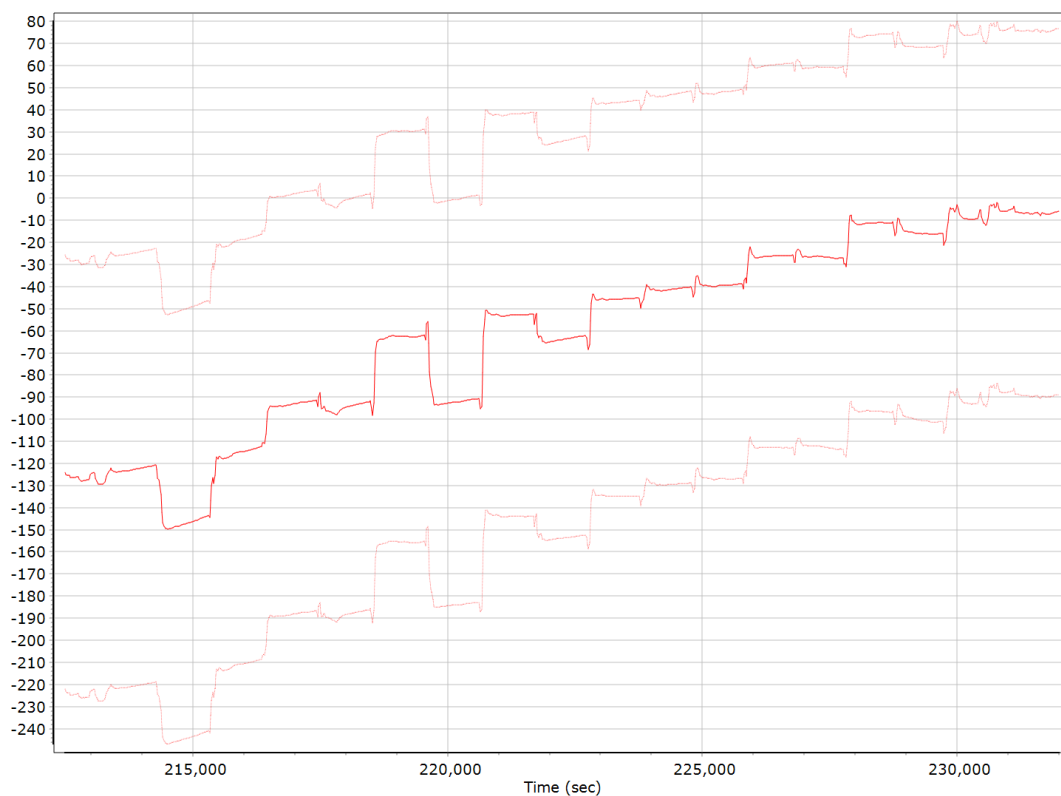


#### X Accelerometer Bias (micro-g)

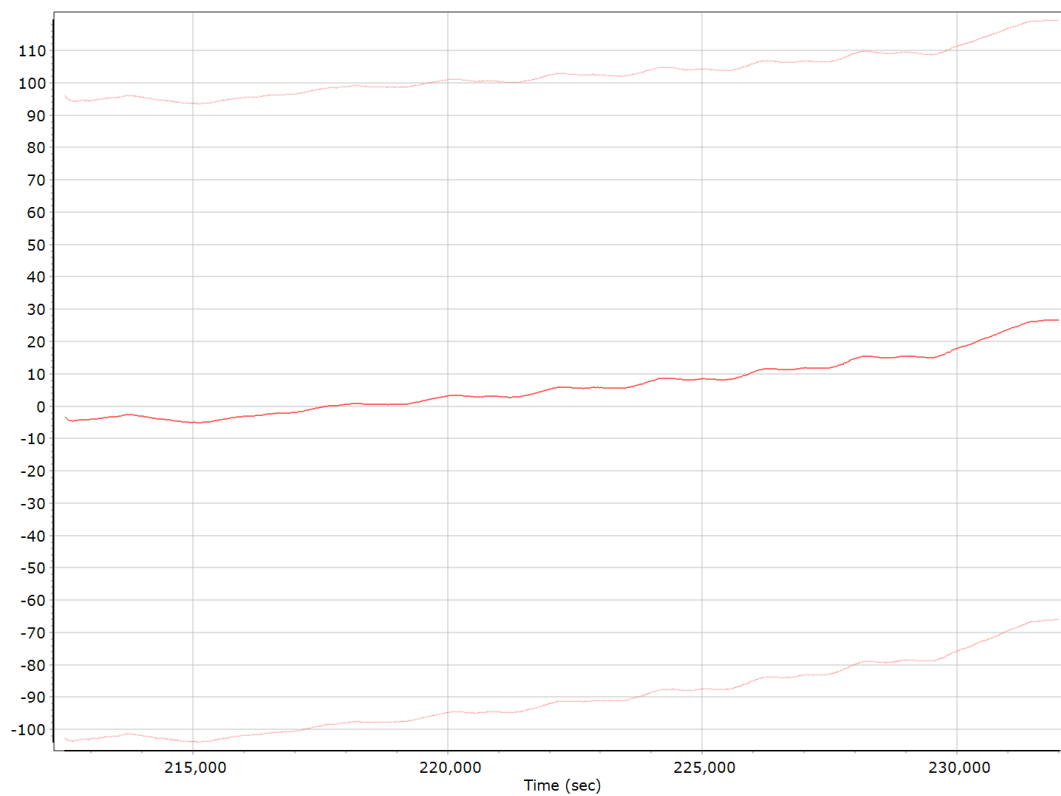




### Y Accelerometer Bias (micro-g)



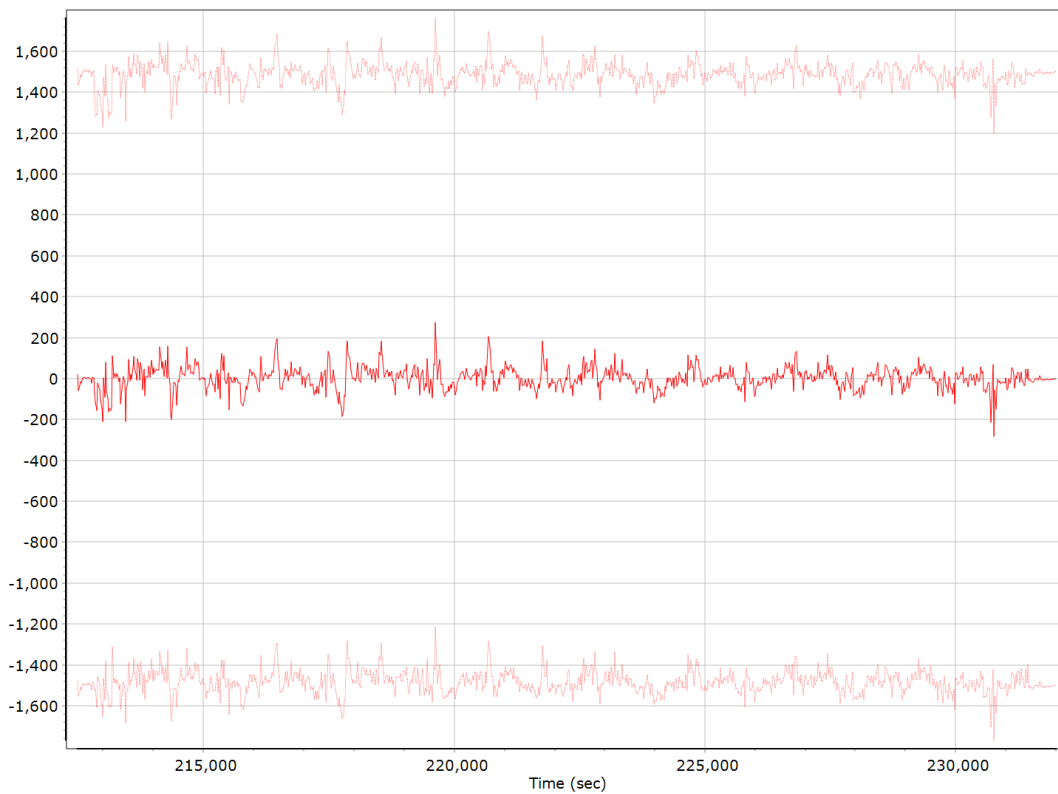
### Z Accelerometer Bias (micro-g)



### Accelerometer Scale Error (ppm)



### X Accelerometer Scale Error (ppm)



### Y Accelerometer Scale Error (ppm)



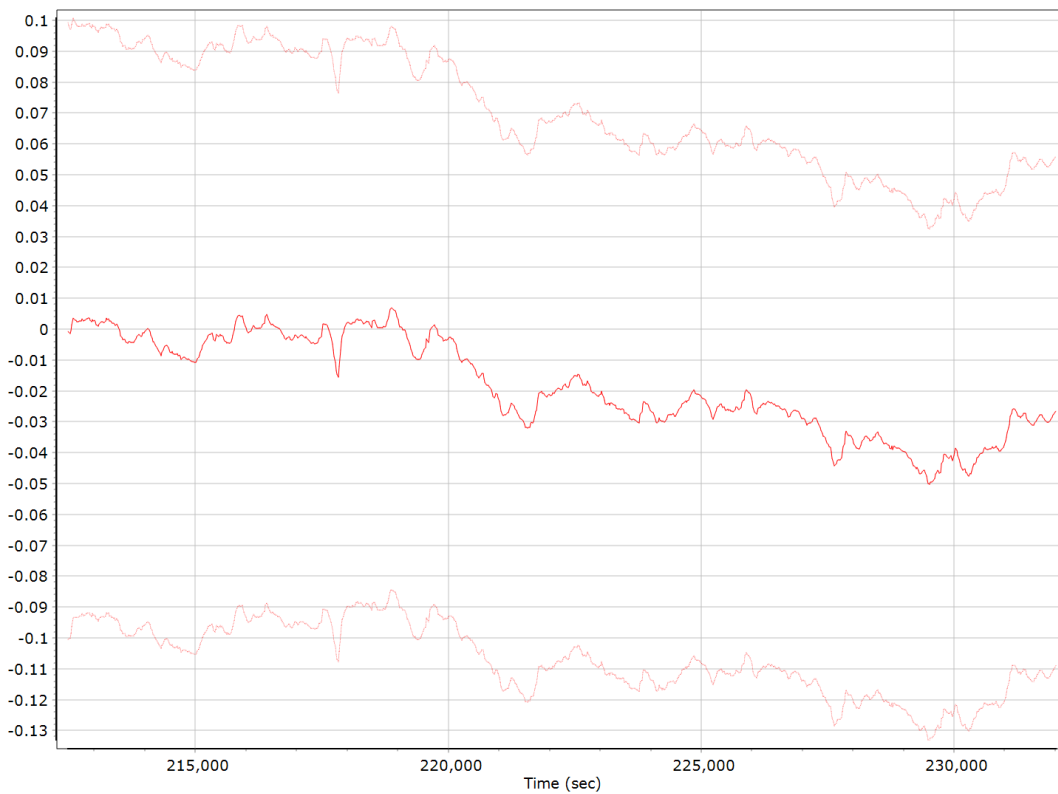
### Z Accelerometer Scale Error (ppm)



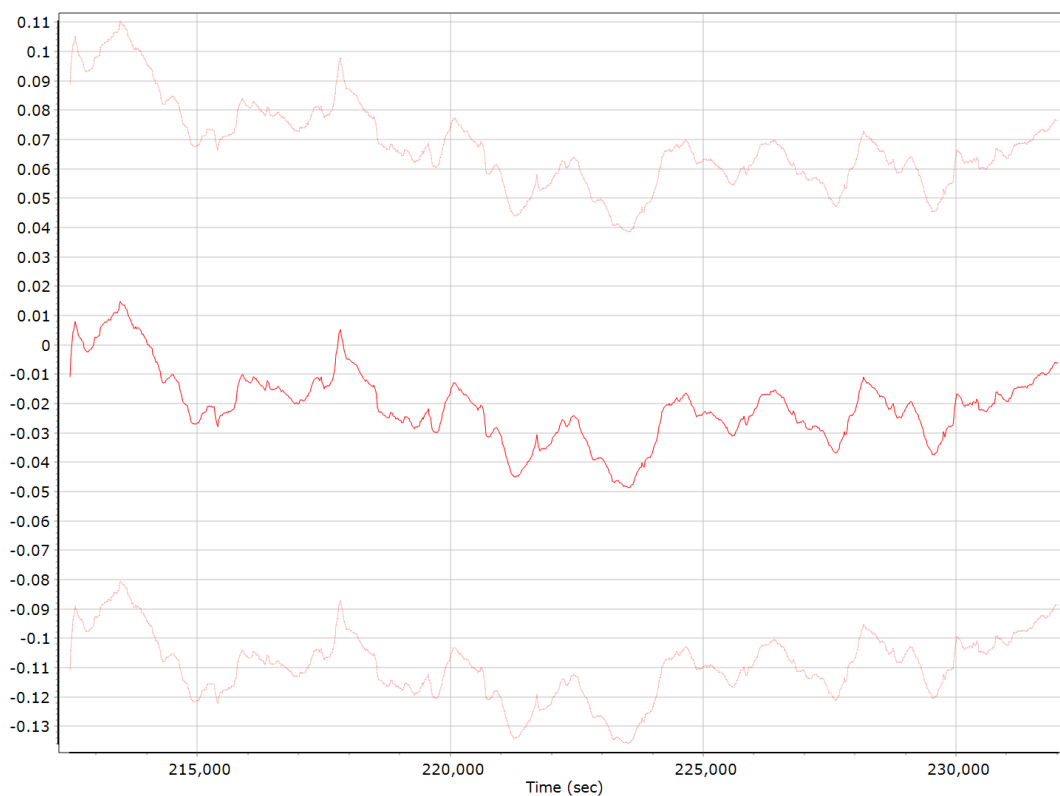
## Gyro Bias (deg/h)



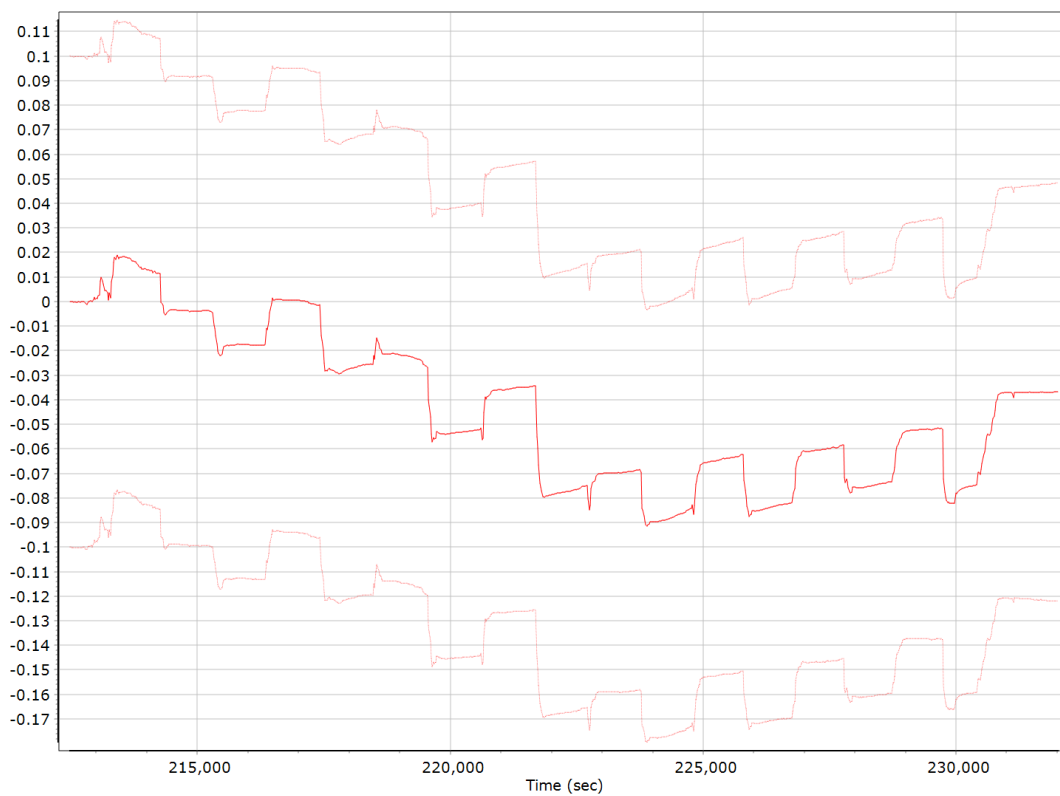
## X Gyro Bias (deg/h)



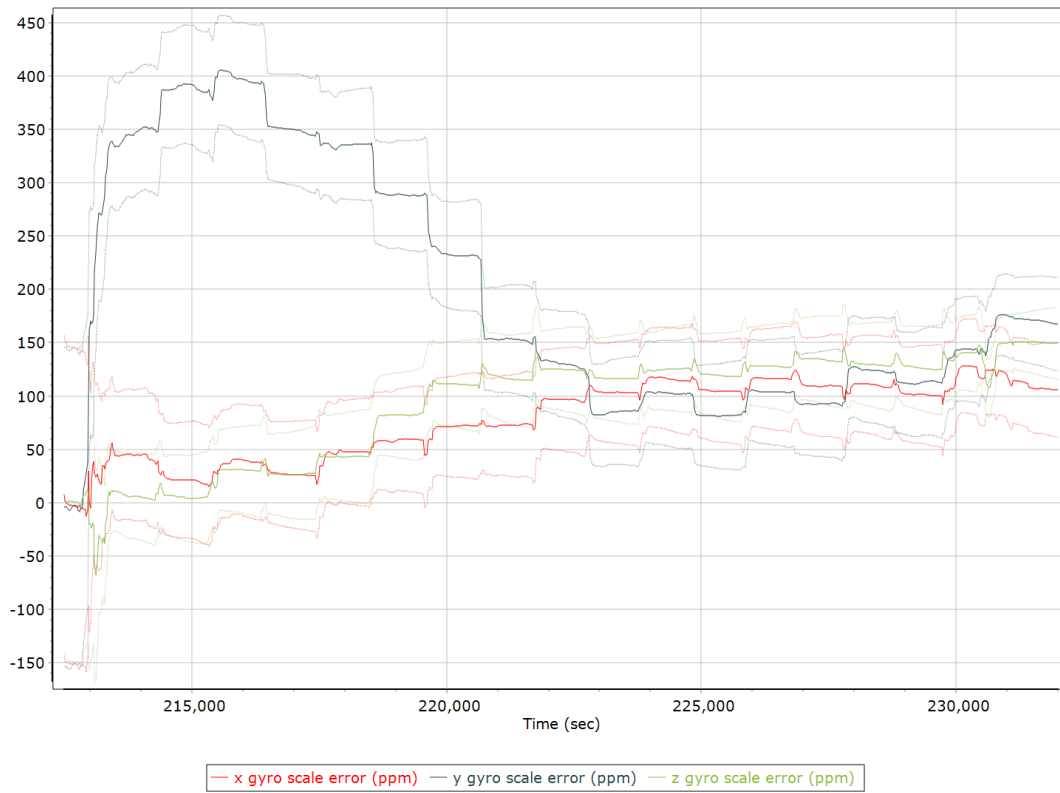
### Y Gyro Bias (deg/h)



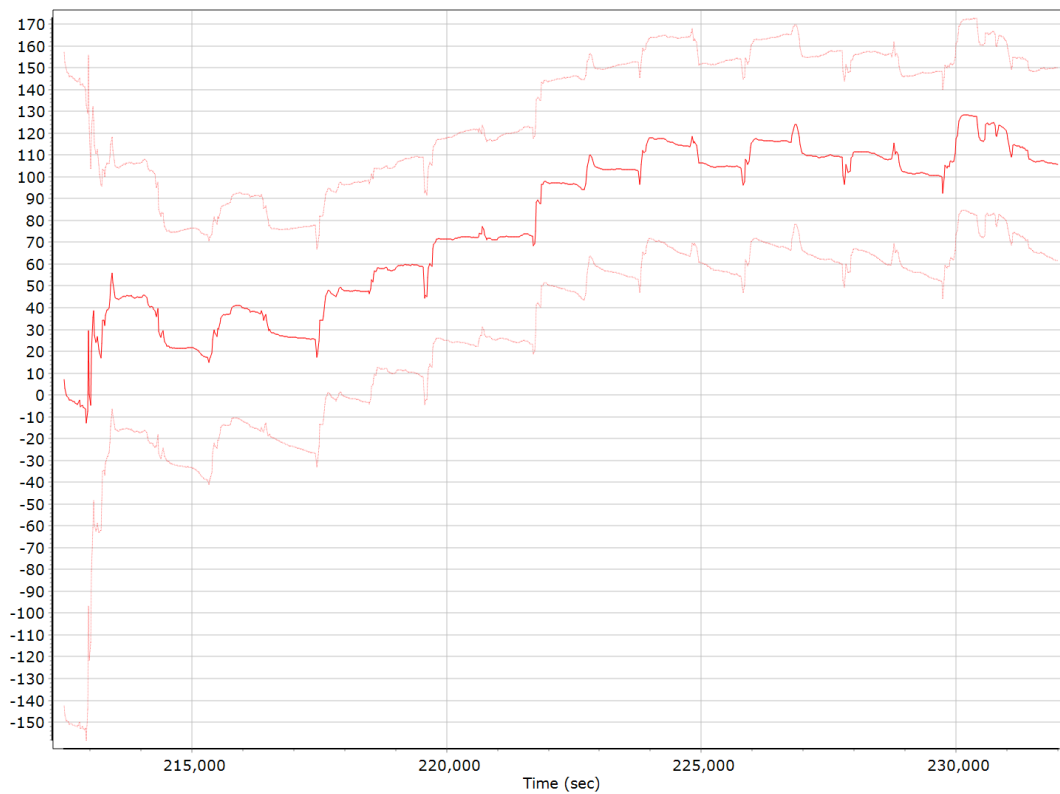
### Z Gyro Bias (deg/h)



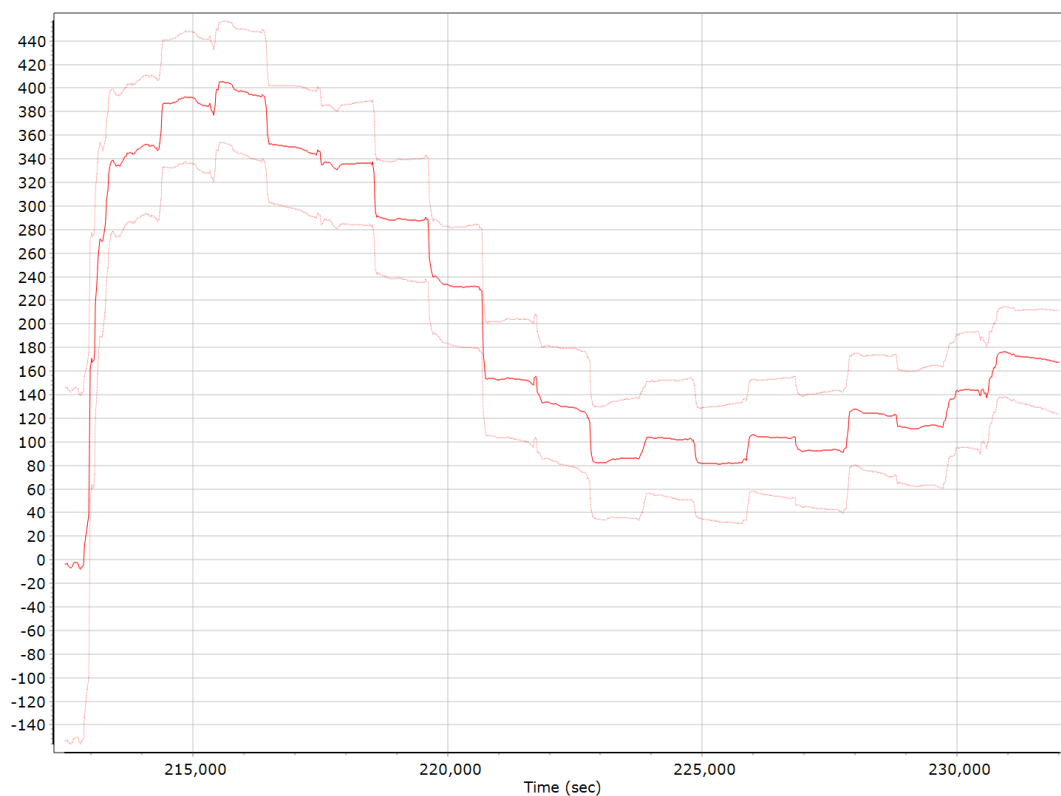
### Gyro Scale Error (ppm)



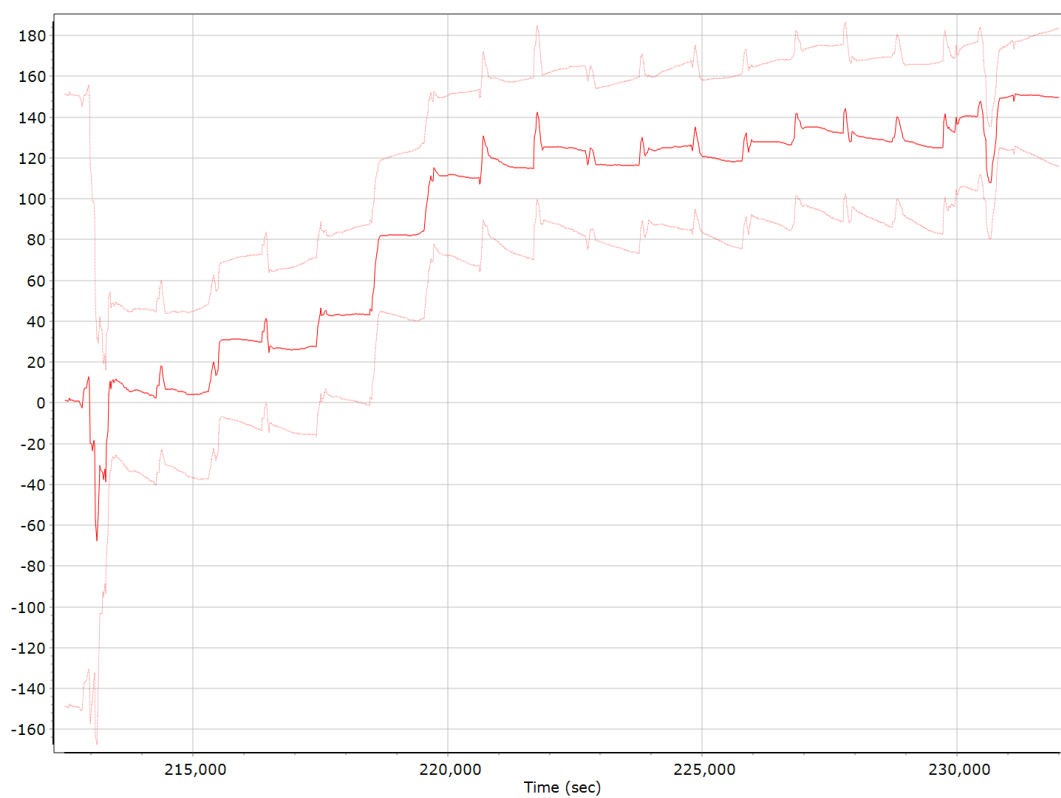
### X Gyro Scale Error (ppm)



### Y Gyro Scale Error (ppm)



### Z Gyro Scale Error (ppm)

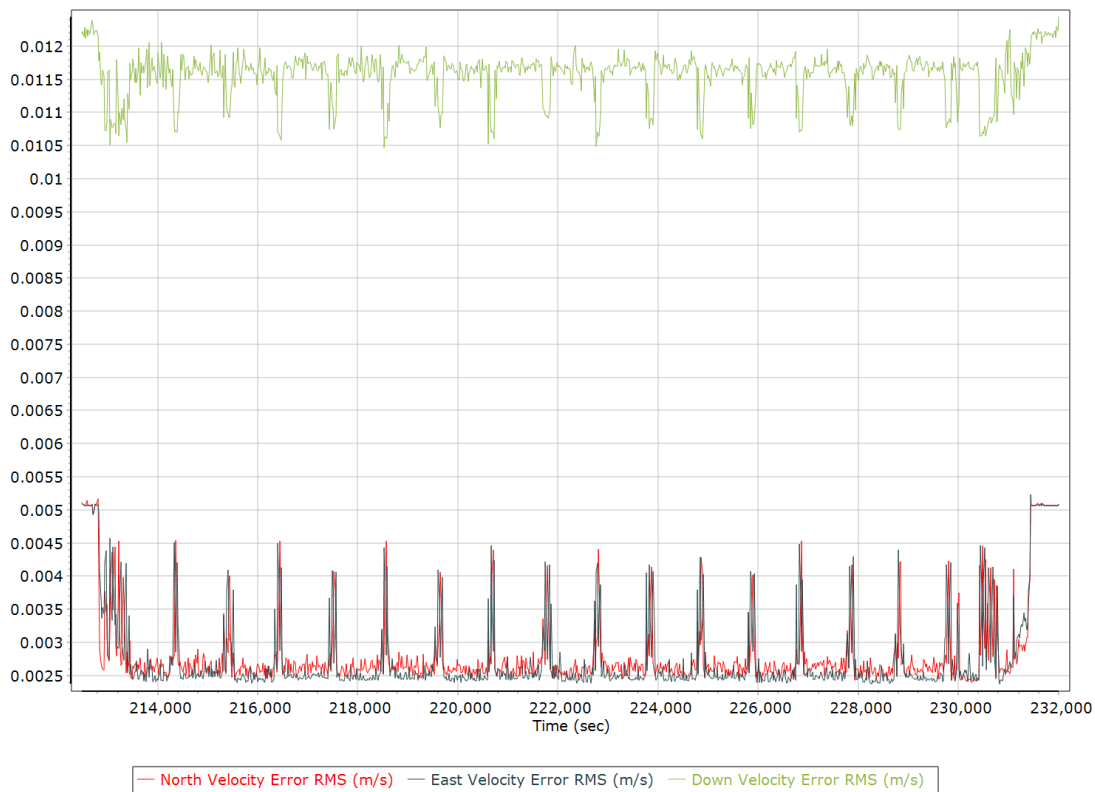


## Smoothed Performance Metrics

### Position Error RMS (m)

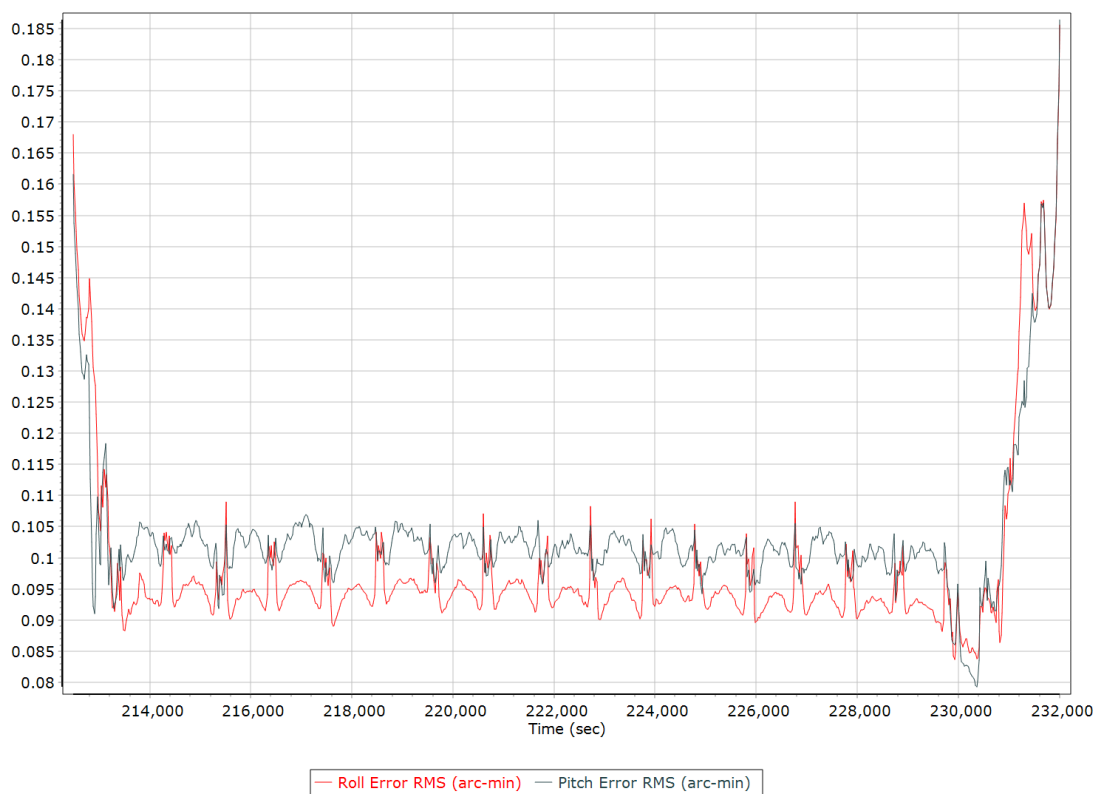


### Velocity Error RMS (m/s)

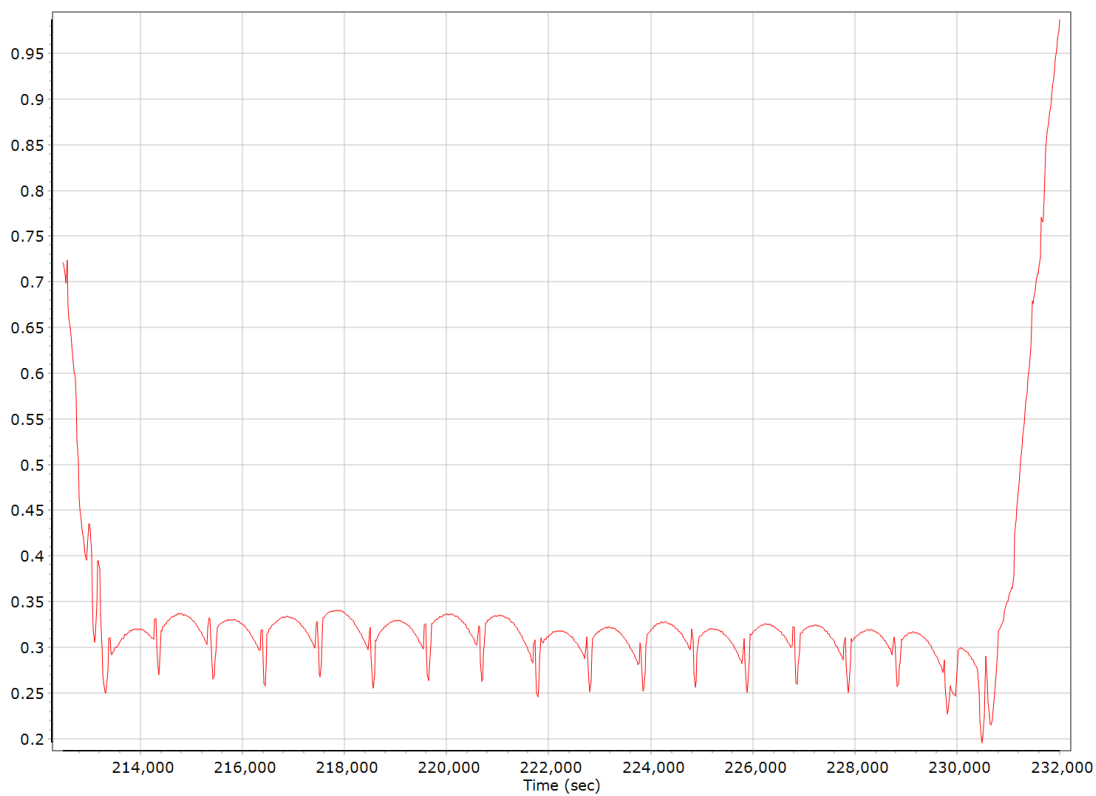




### Roll/Pitch Error RMS (arc-min)

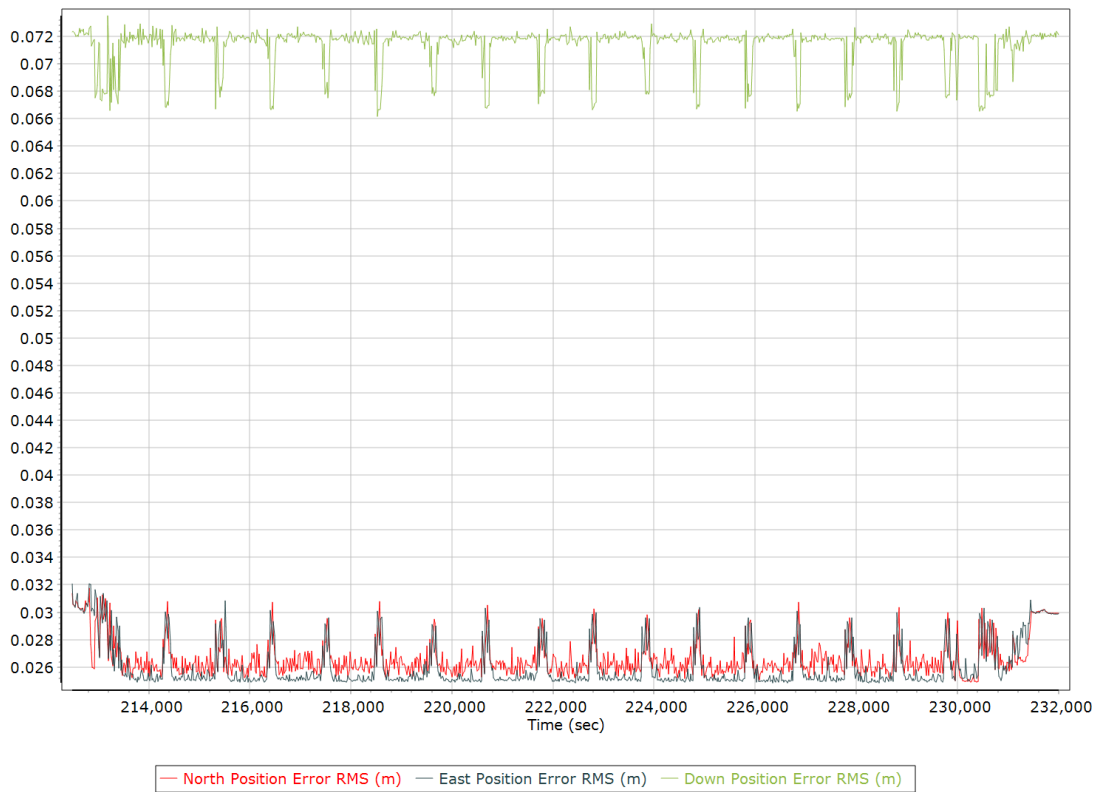


### Heading Error RMS (arc-min)

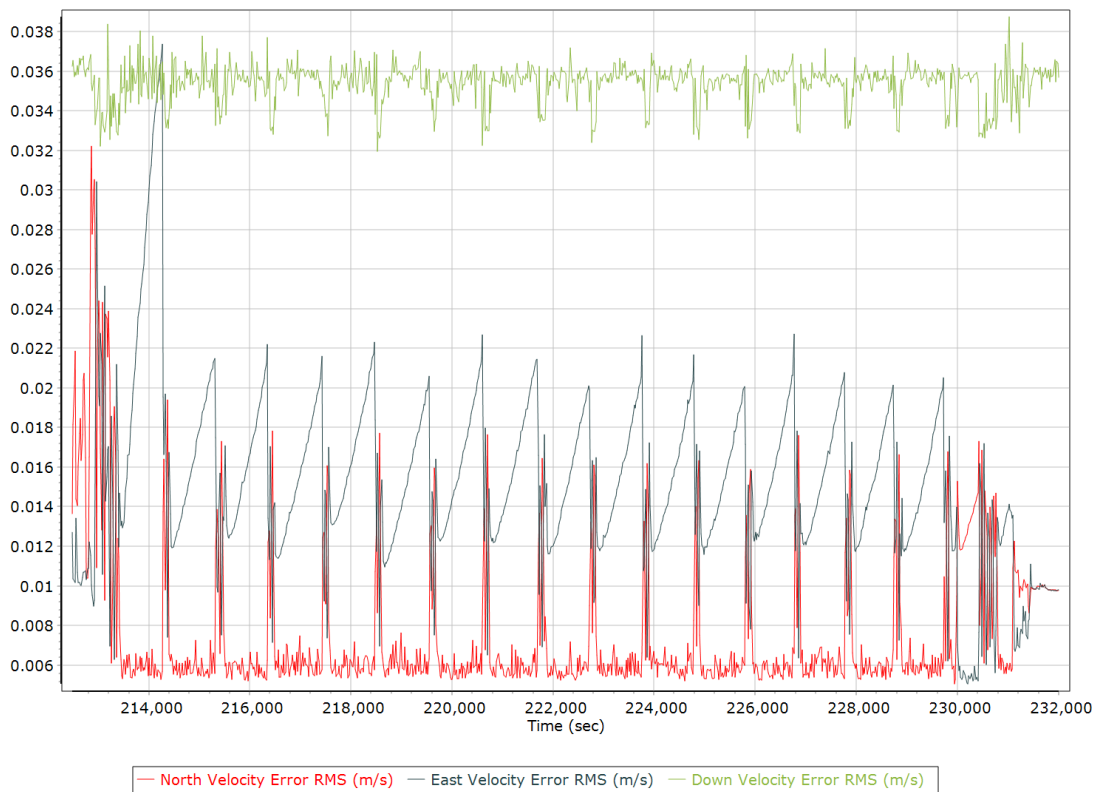


## Forward Processed Performance Metrics

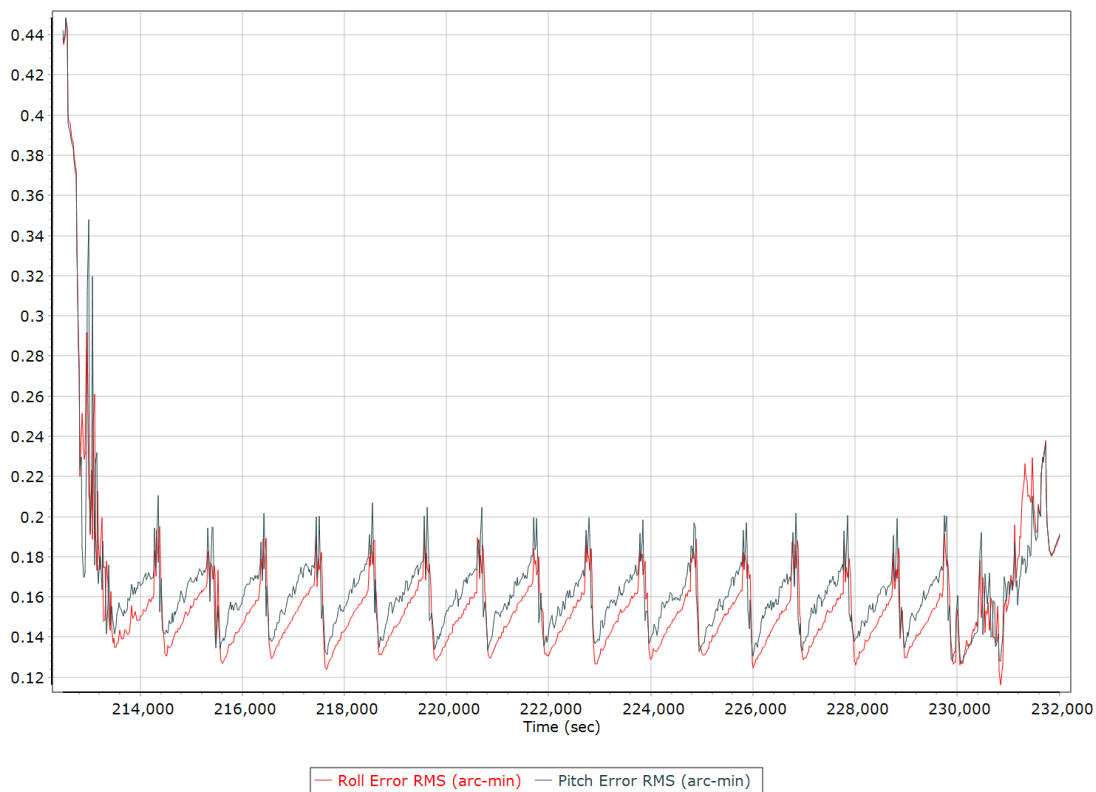
### Position Error RMS (m)



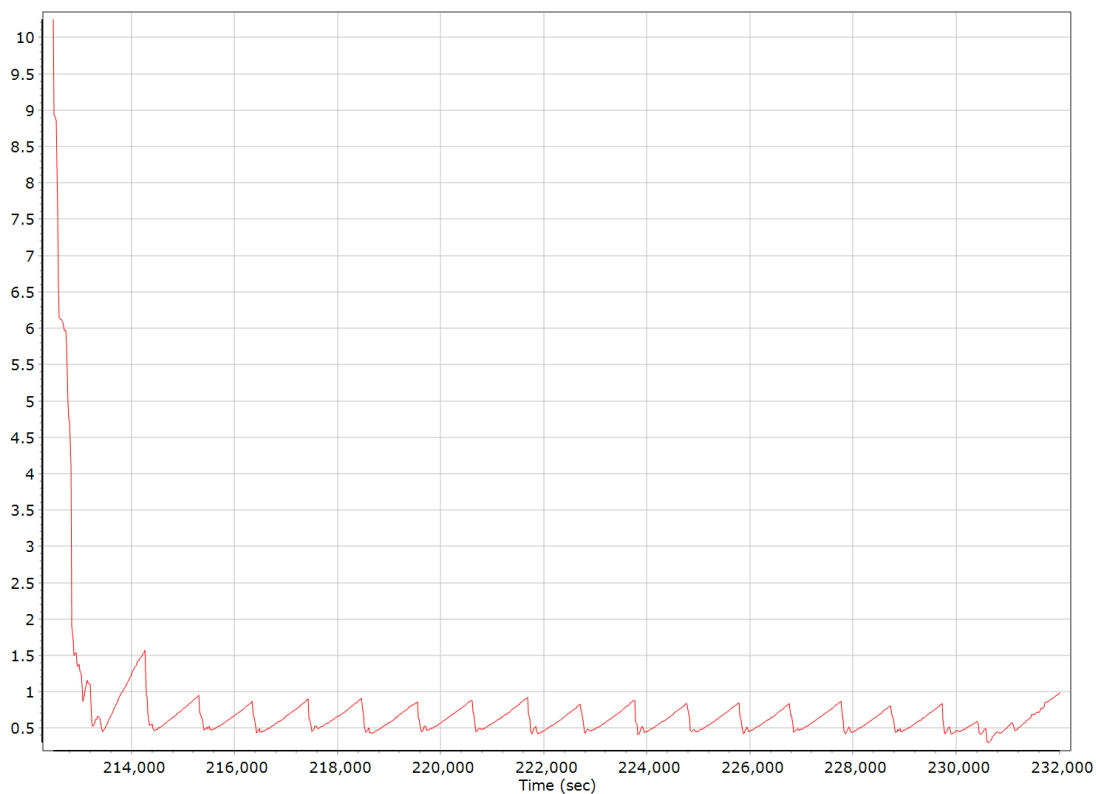
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

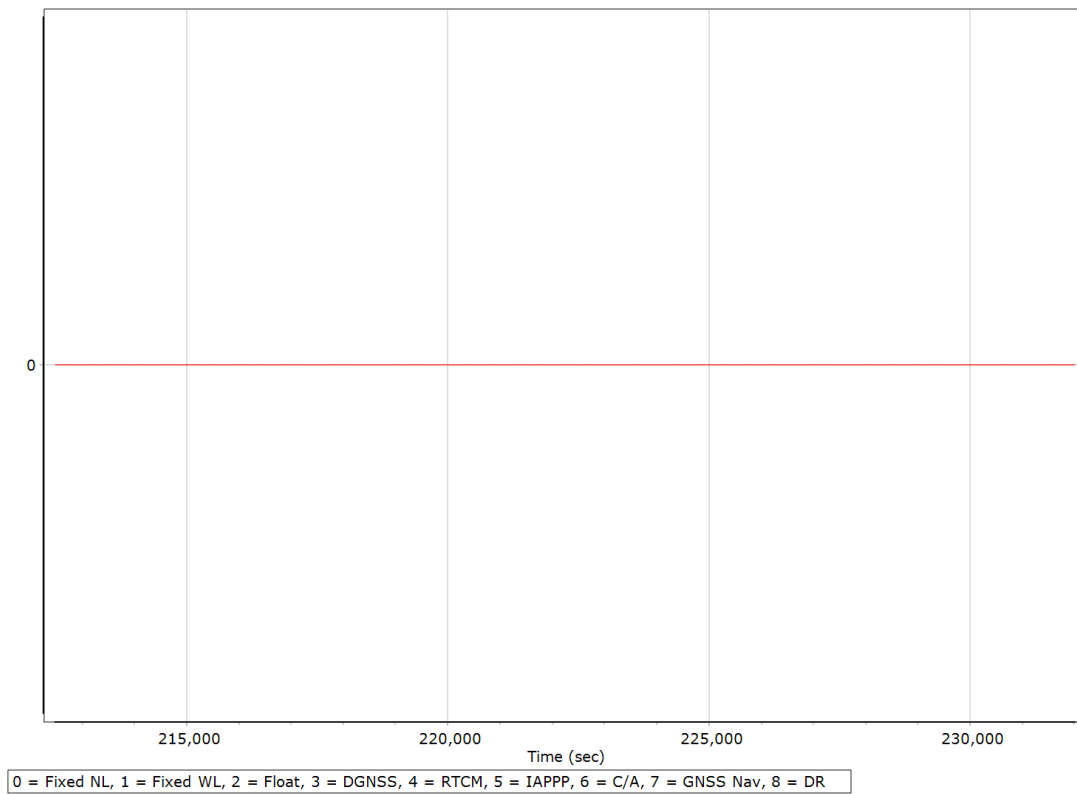


### Heading Error RMS (arc-min)

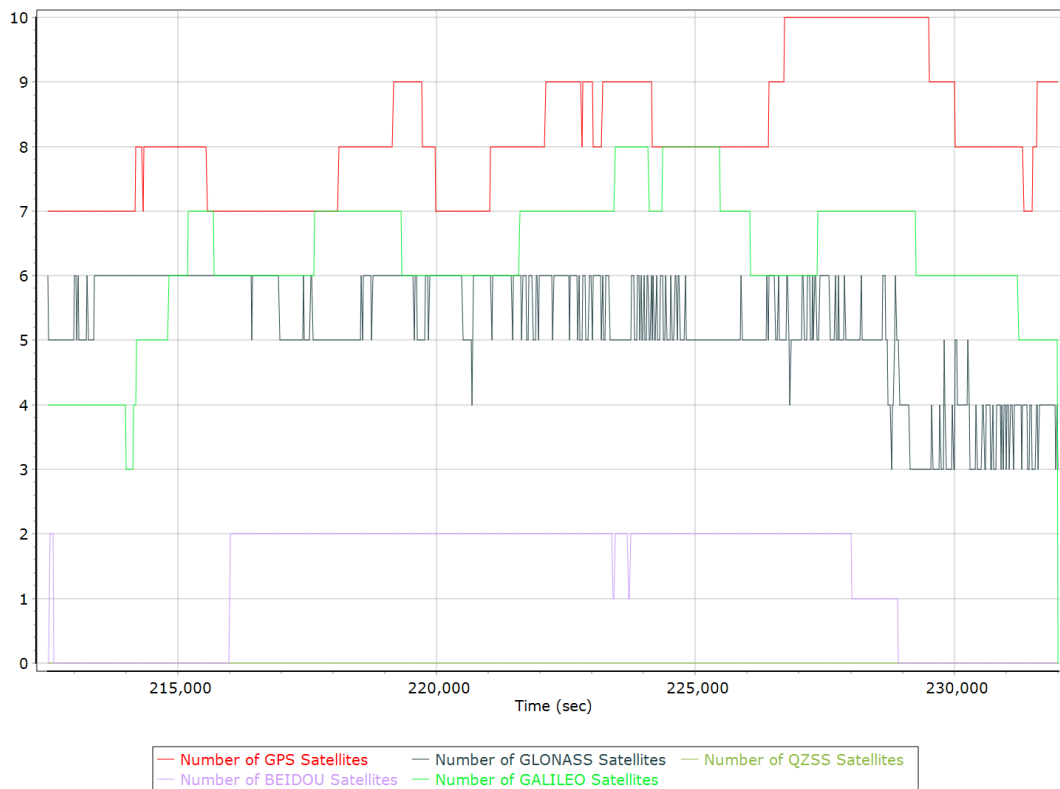


## Forward Processed Solution Status

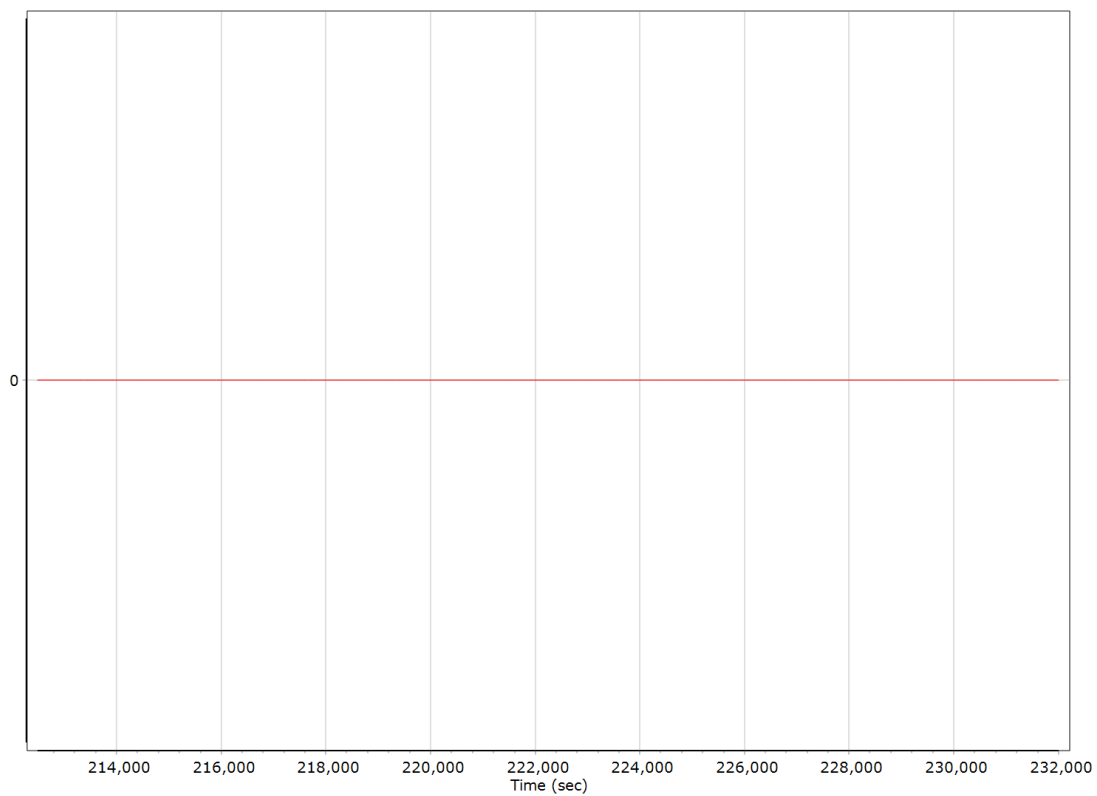
### Processing Mode



### Number of Satellites



## Baseline Length



## General Information

### Mission Information

Project name	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
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
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
sbt_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

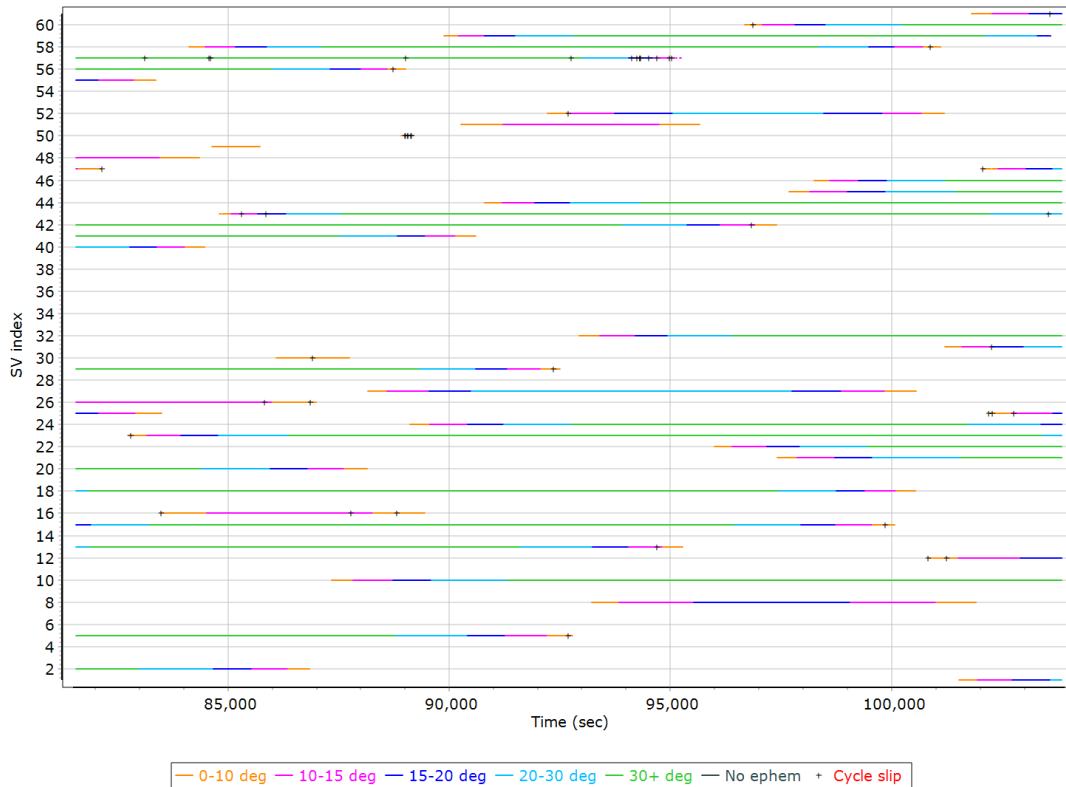
## Rover Data QC

### Raw IMU Import QC Summary

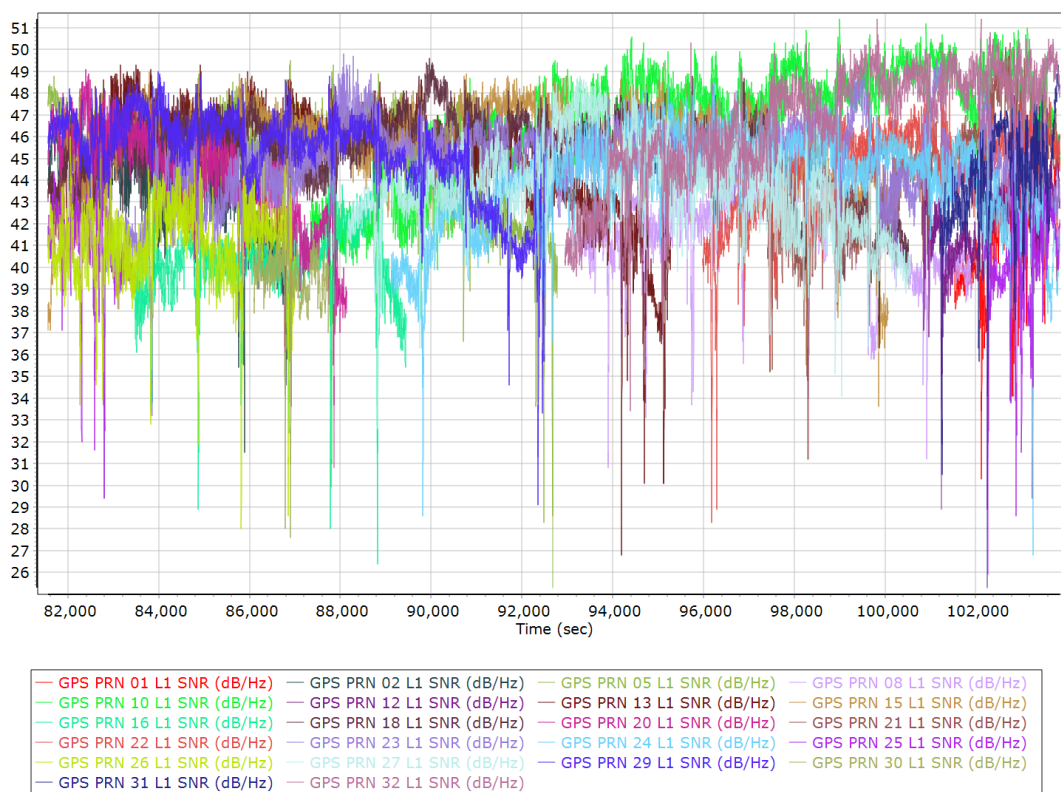
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05222022A_3543.log
IMU Records Processed	4456624
Termination Status	Normal
IMU Anomalies	0

## Primary Observables & Satellite Data

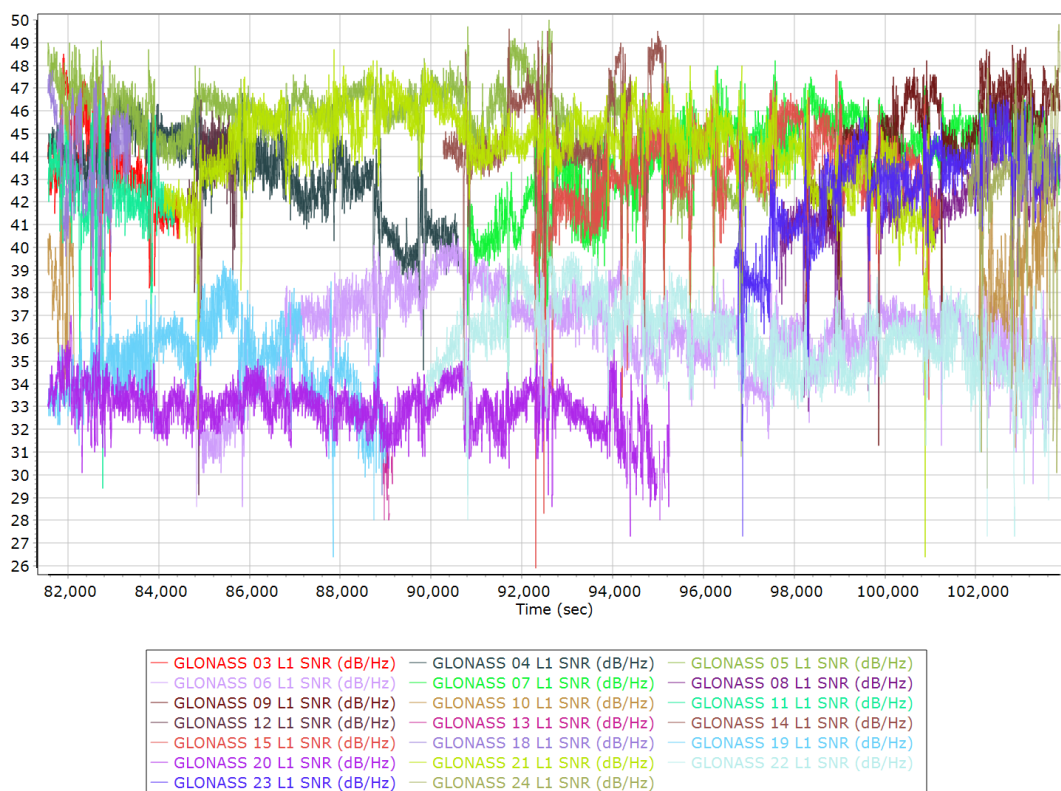
### GPS/GLONASS L1 Satellite Lock/Elevation



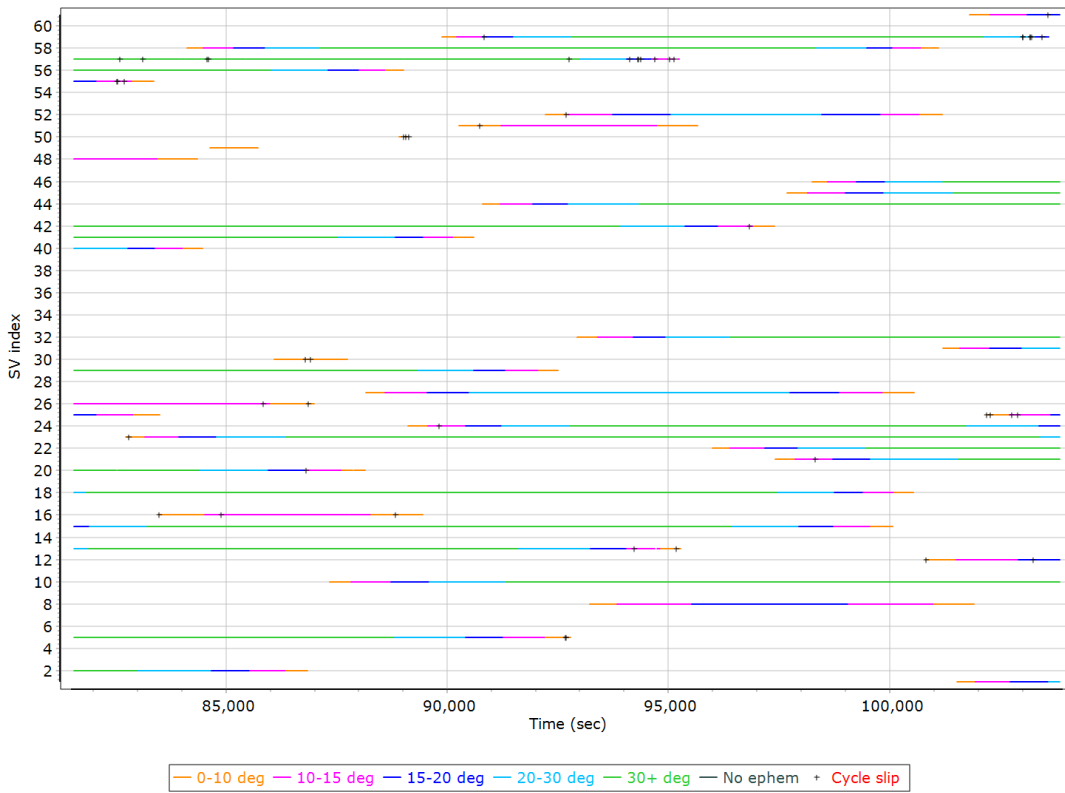
## GPS L1 SNR



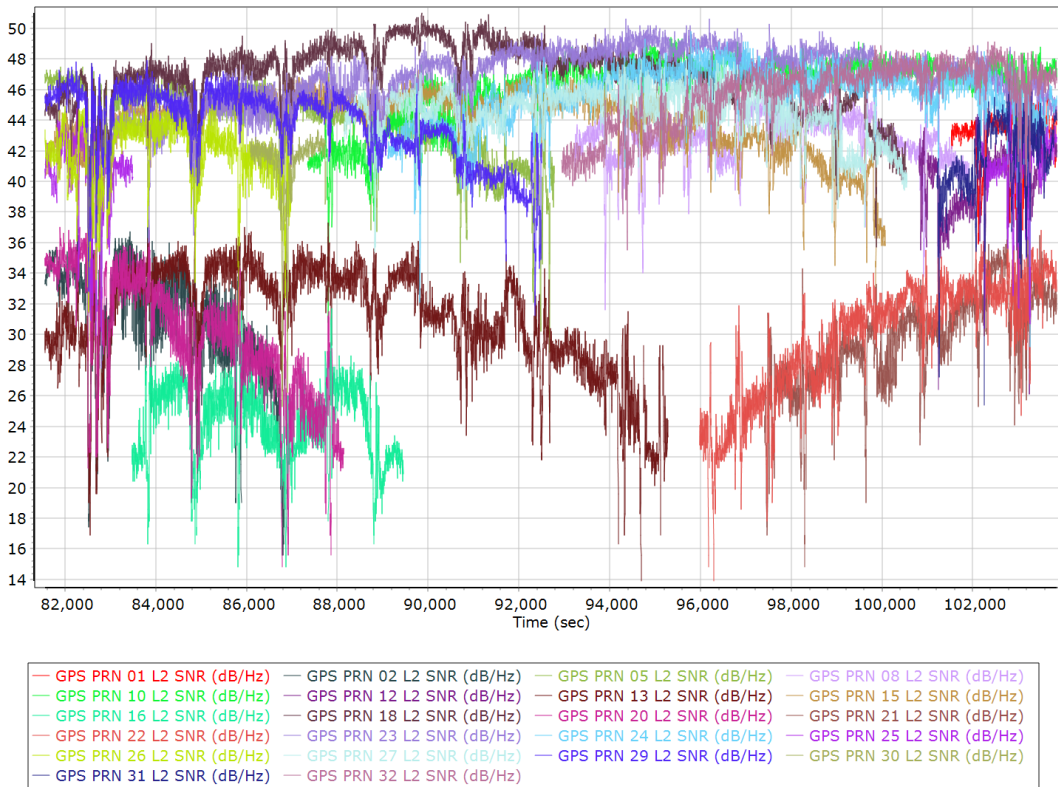
## GLONASS L1 SNR



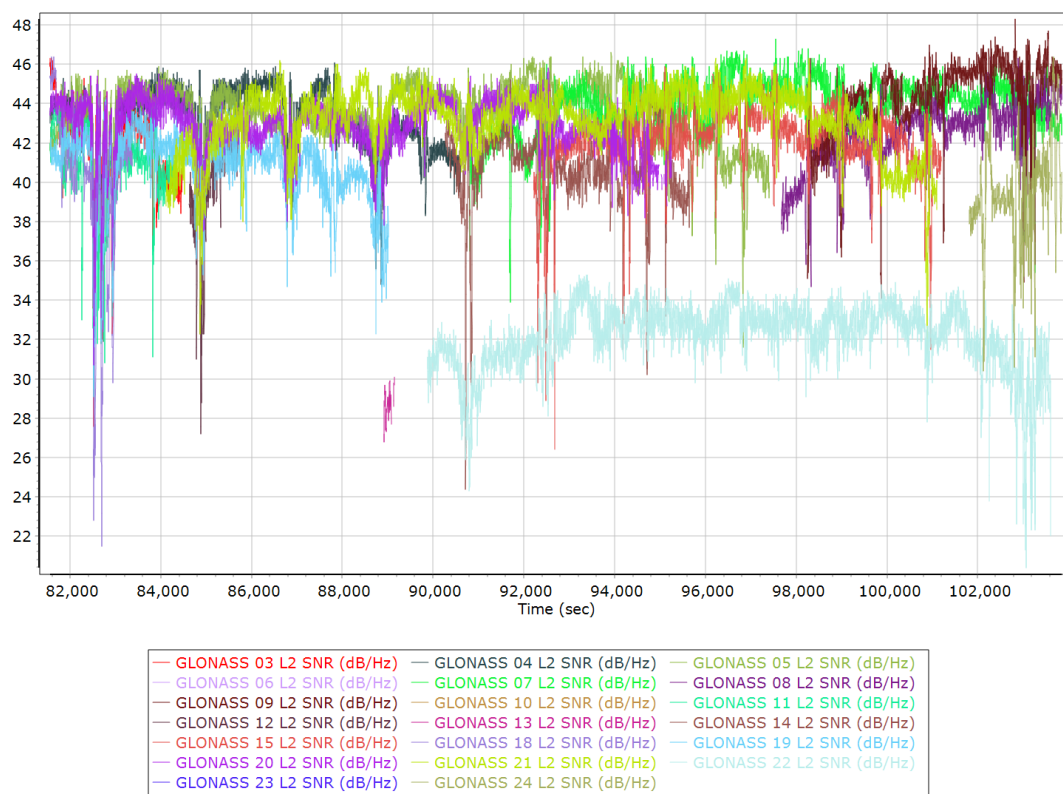
## GPS/GLONASS L2 Satellite Lock/Elevation



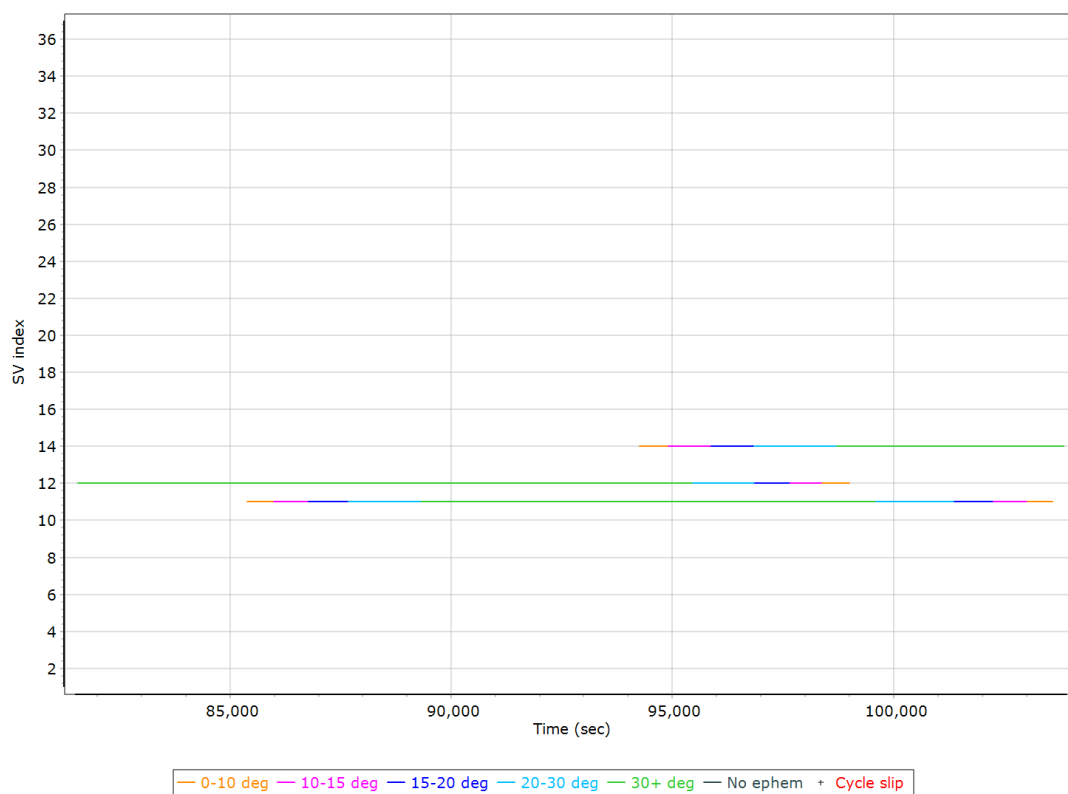
## GPS L2 SNR



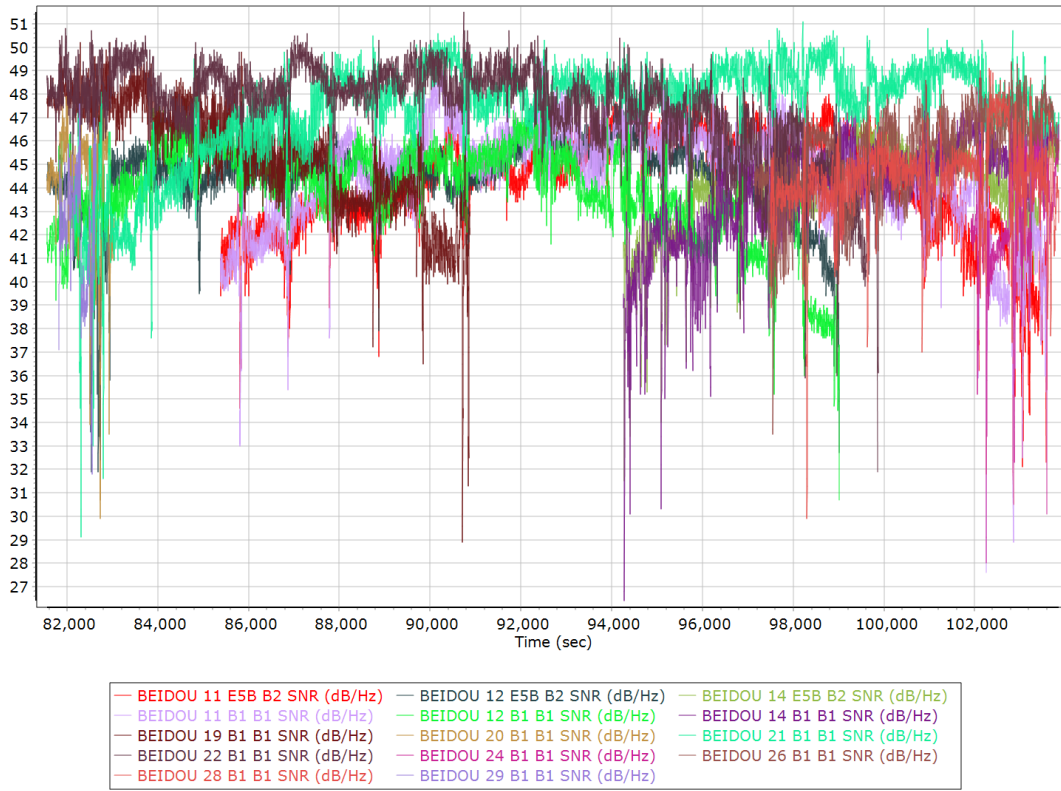
## GLONASS L2 SNR



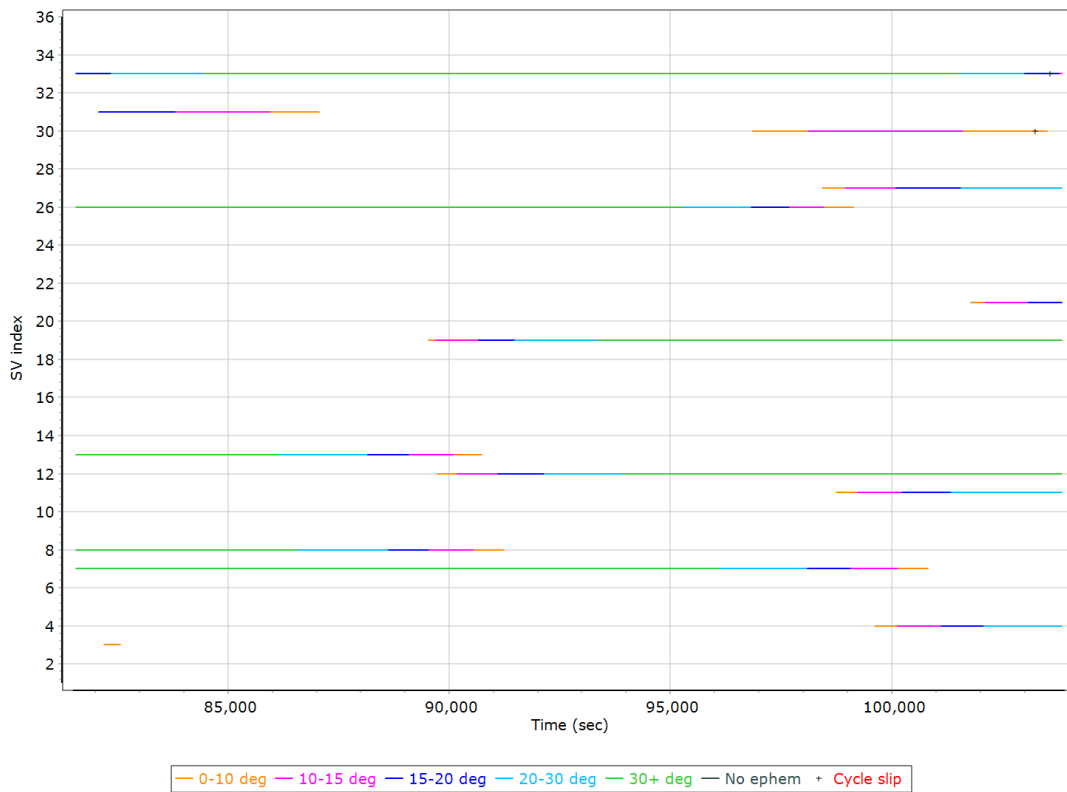
## BEIDOU Satellite Lock/Elevation



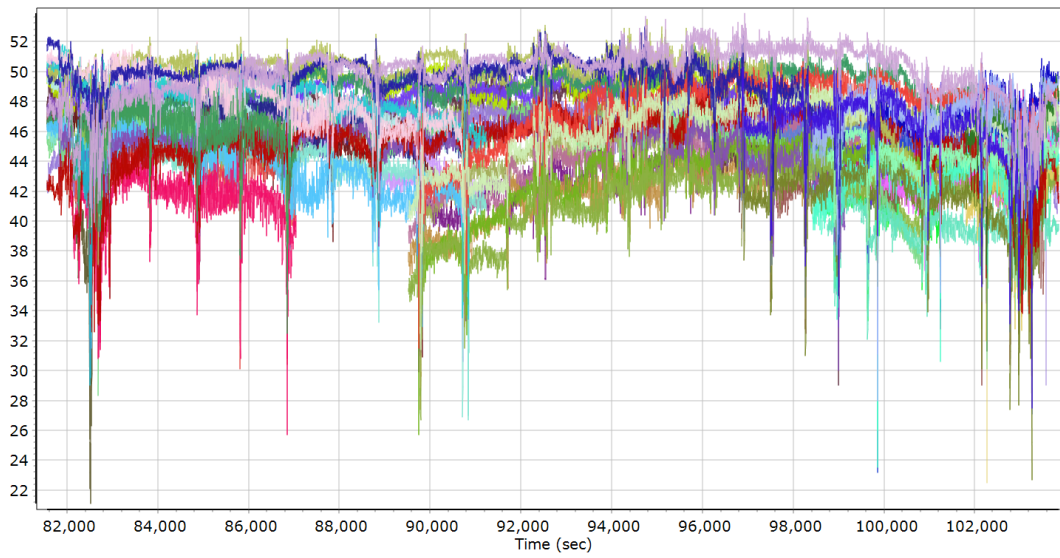
## BEIDOU SNR



## GALILEO Satellite Lock/Elevation

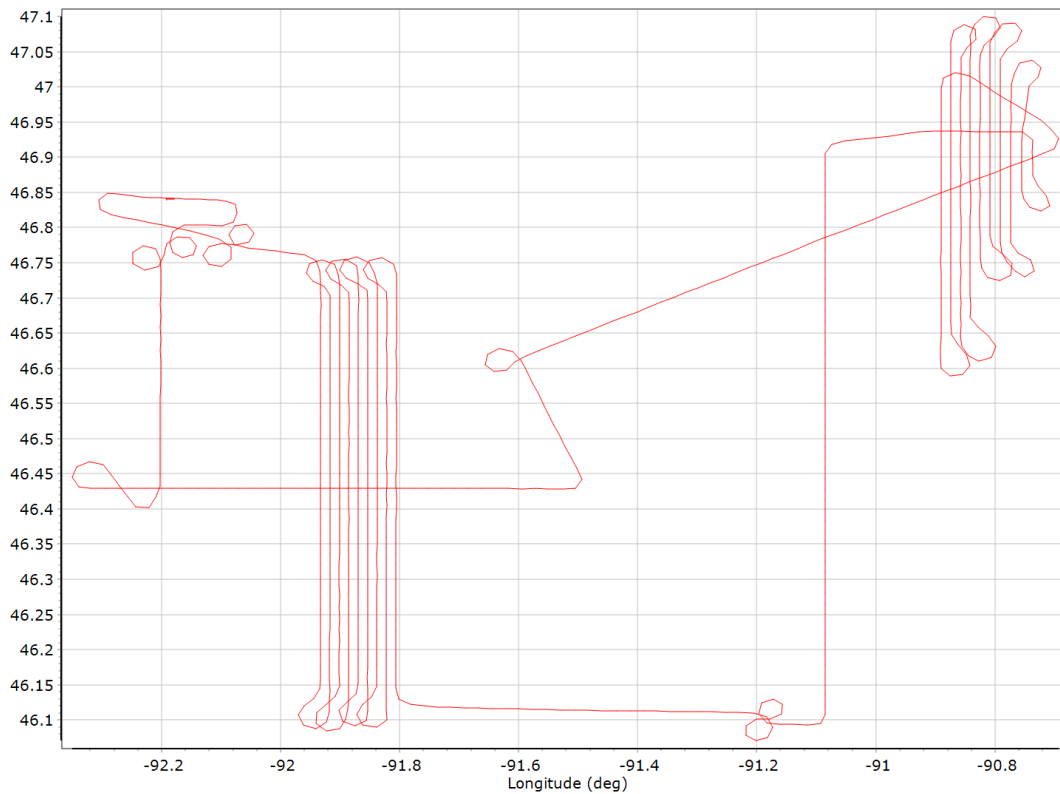


## GALILEO SNR

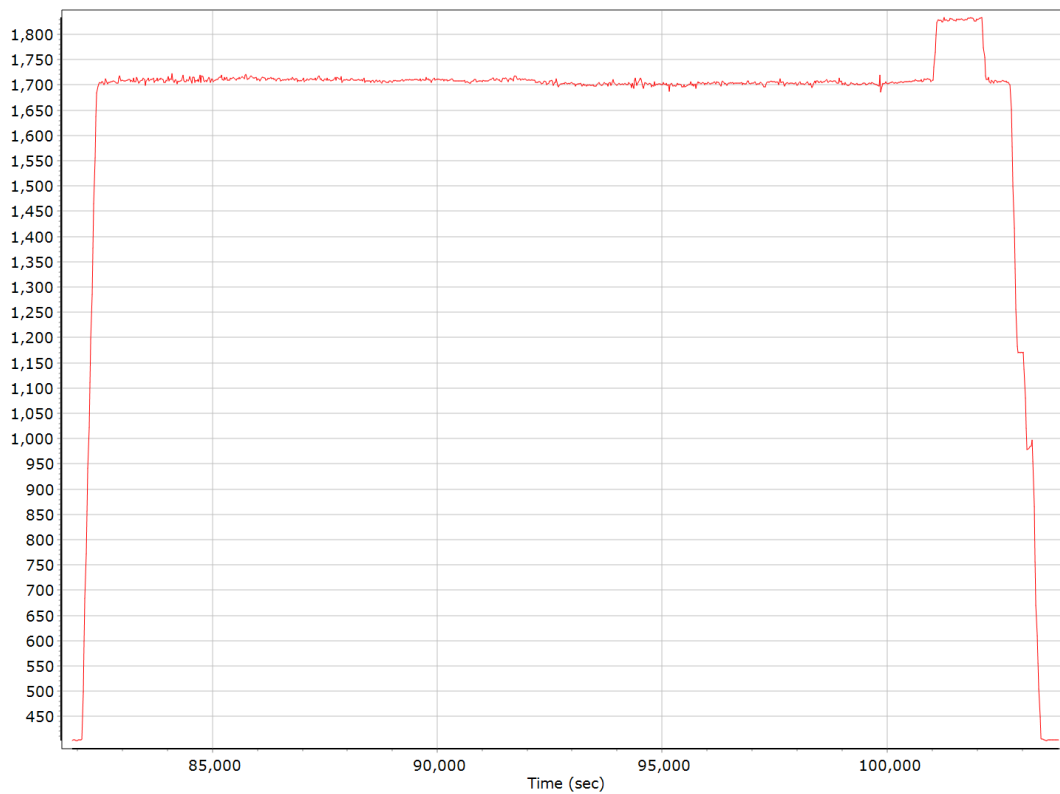


## Smoothed Trajectory Information

### Top View

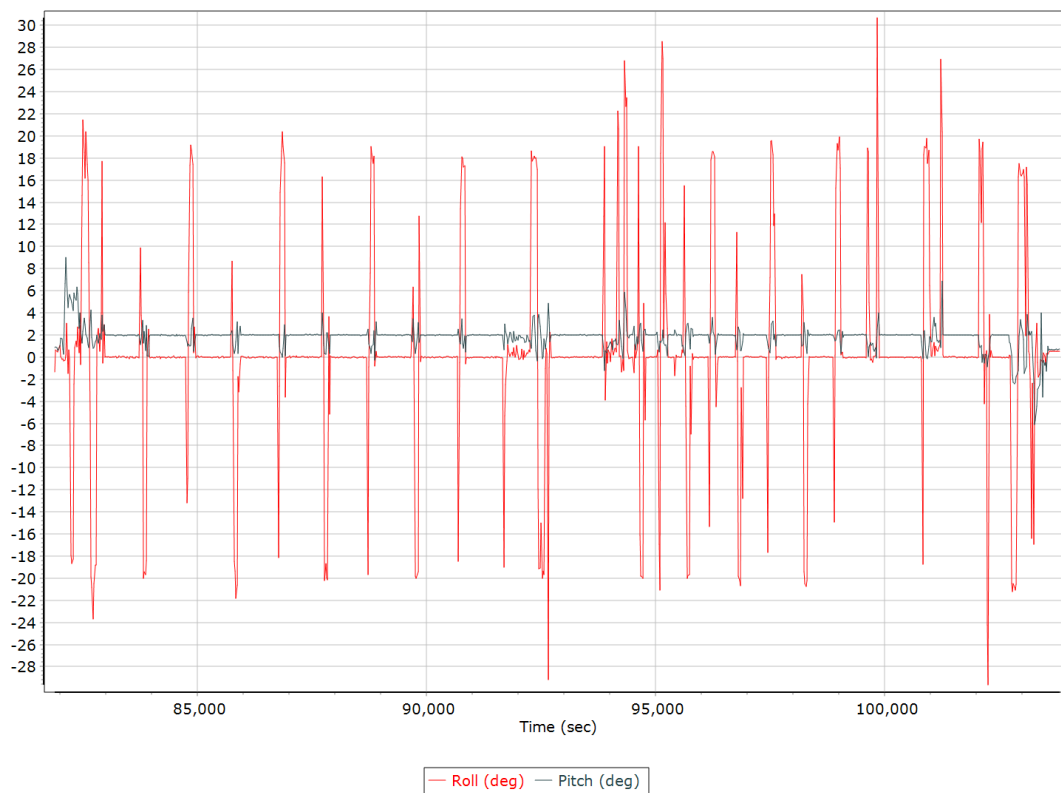


### Altitude

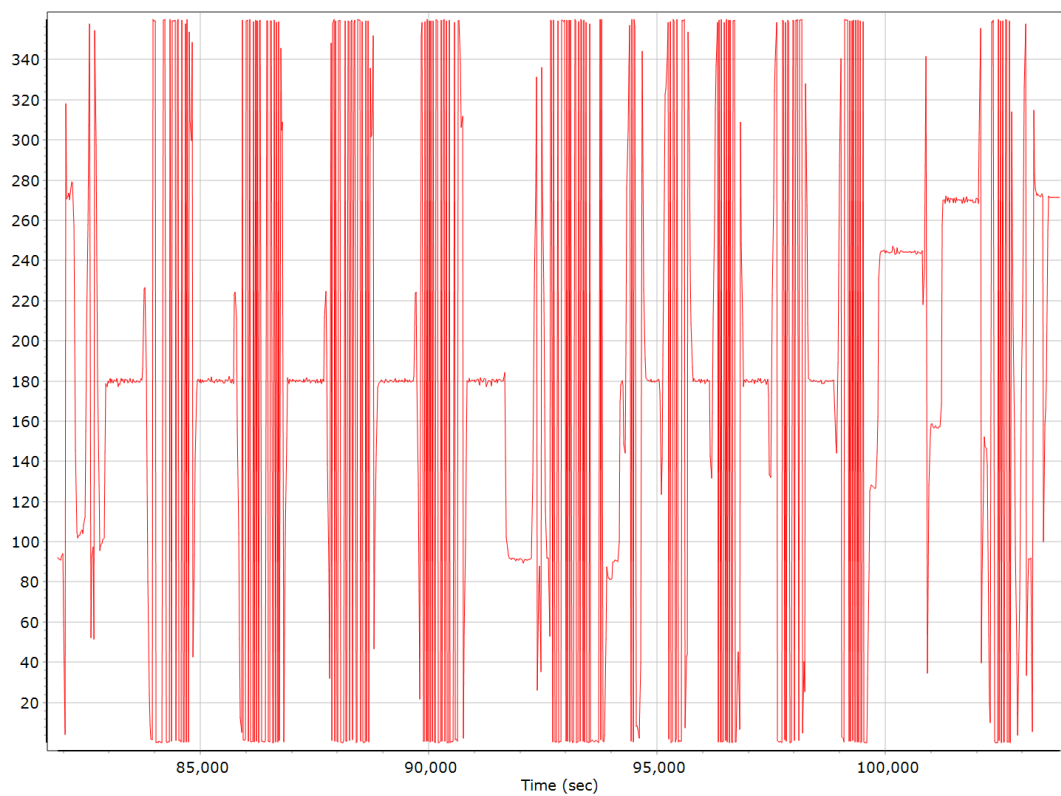




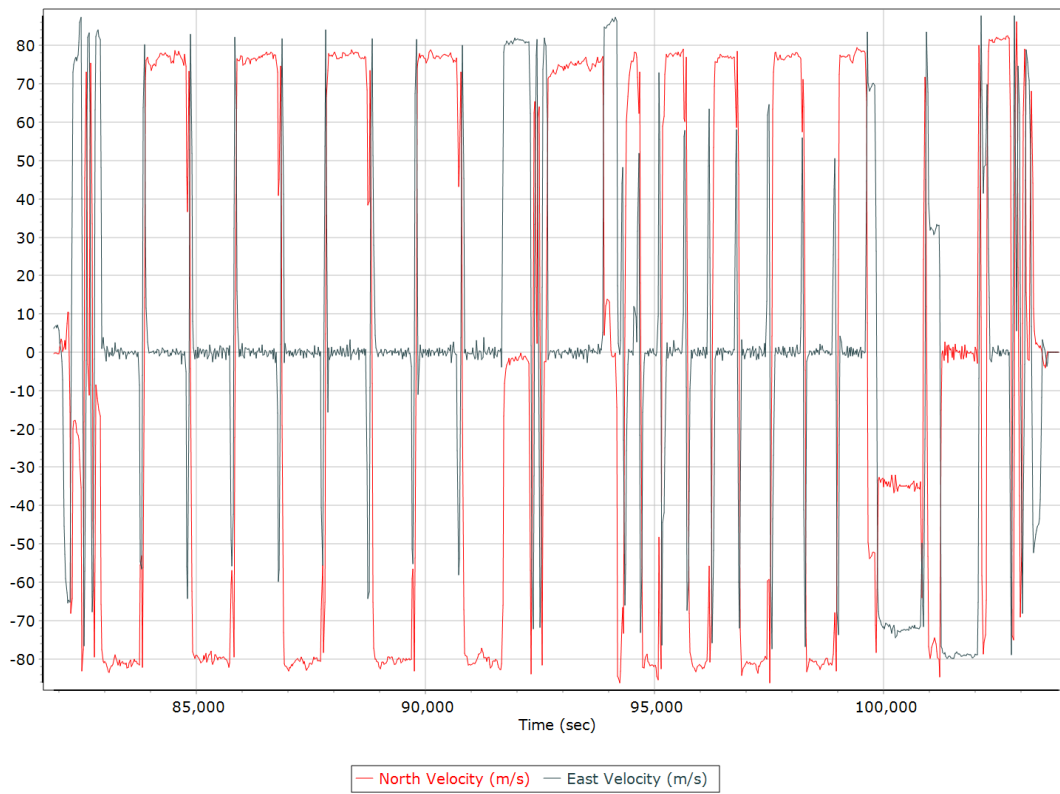
## Roll/Pitch



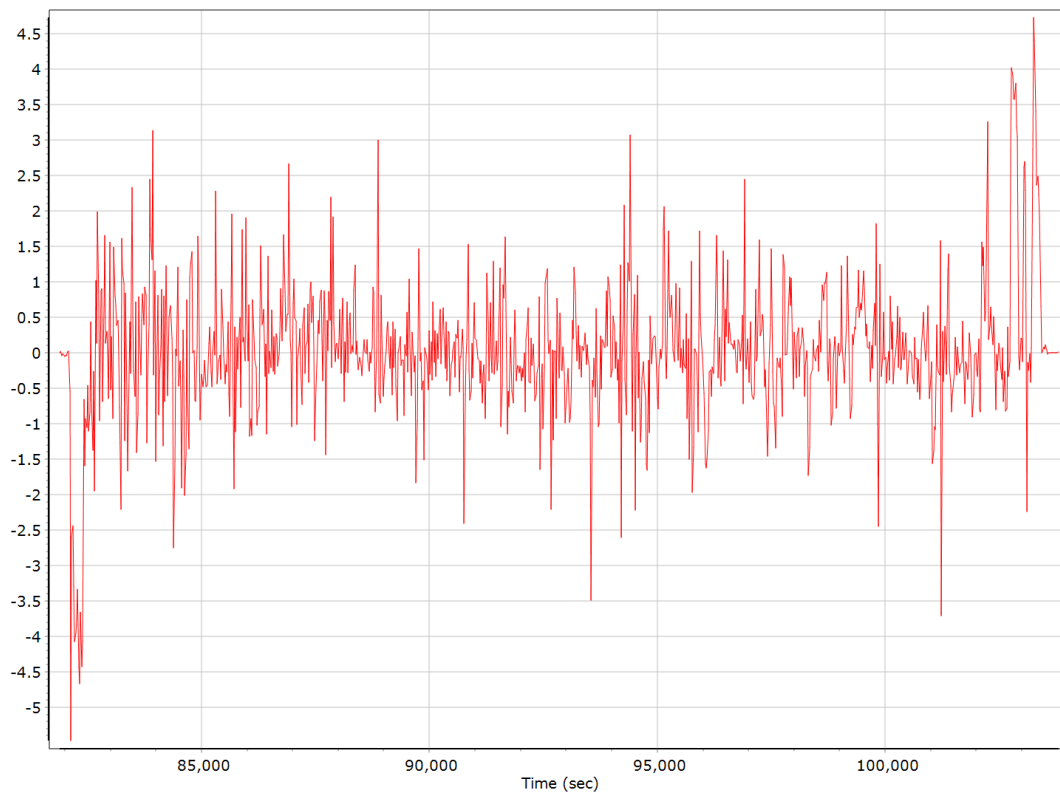
## Heading



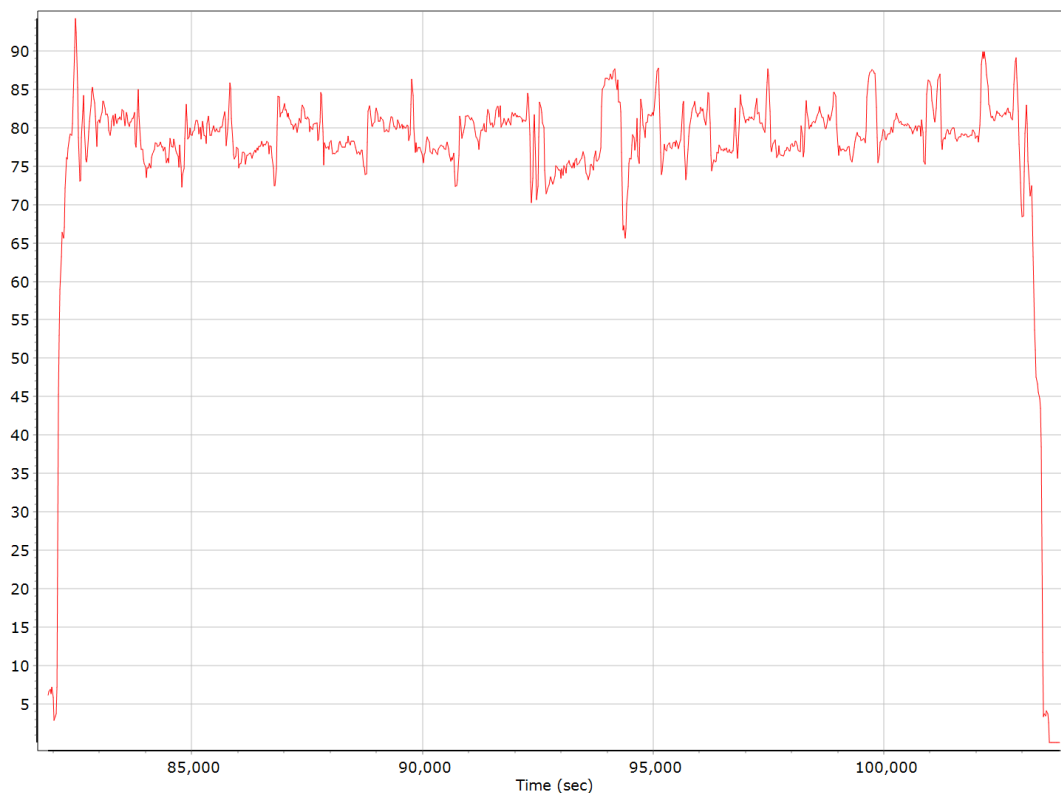
## North/East Velocity



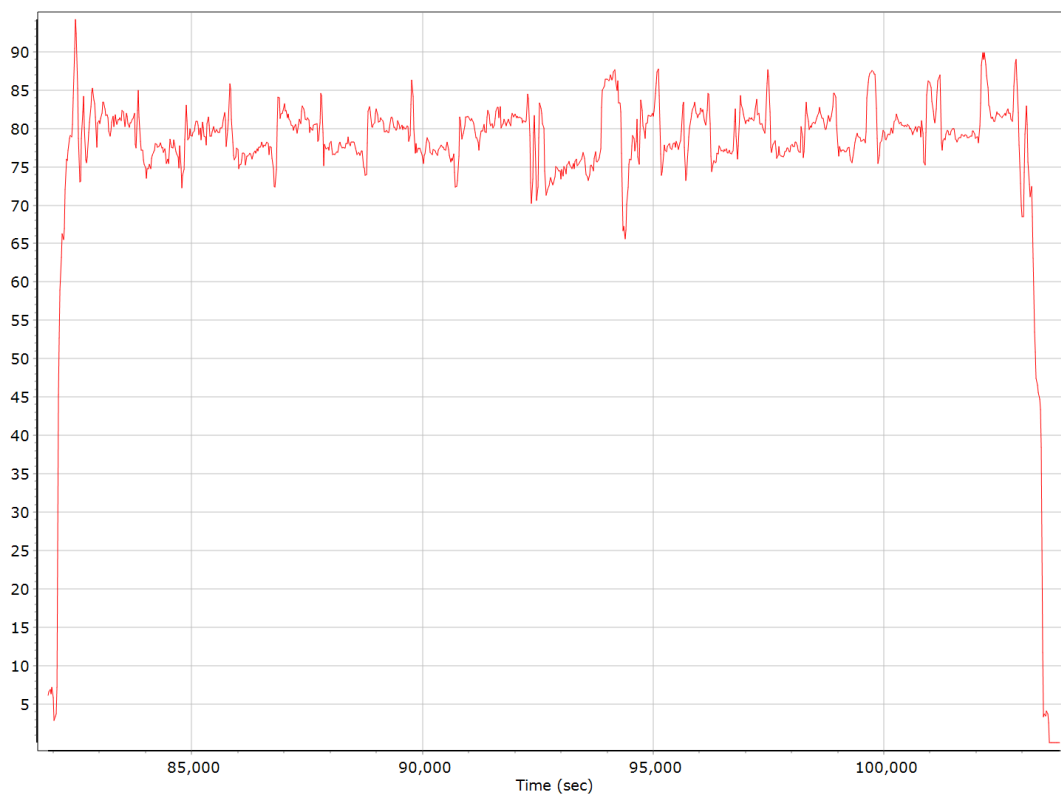
## Down Velocity



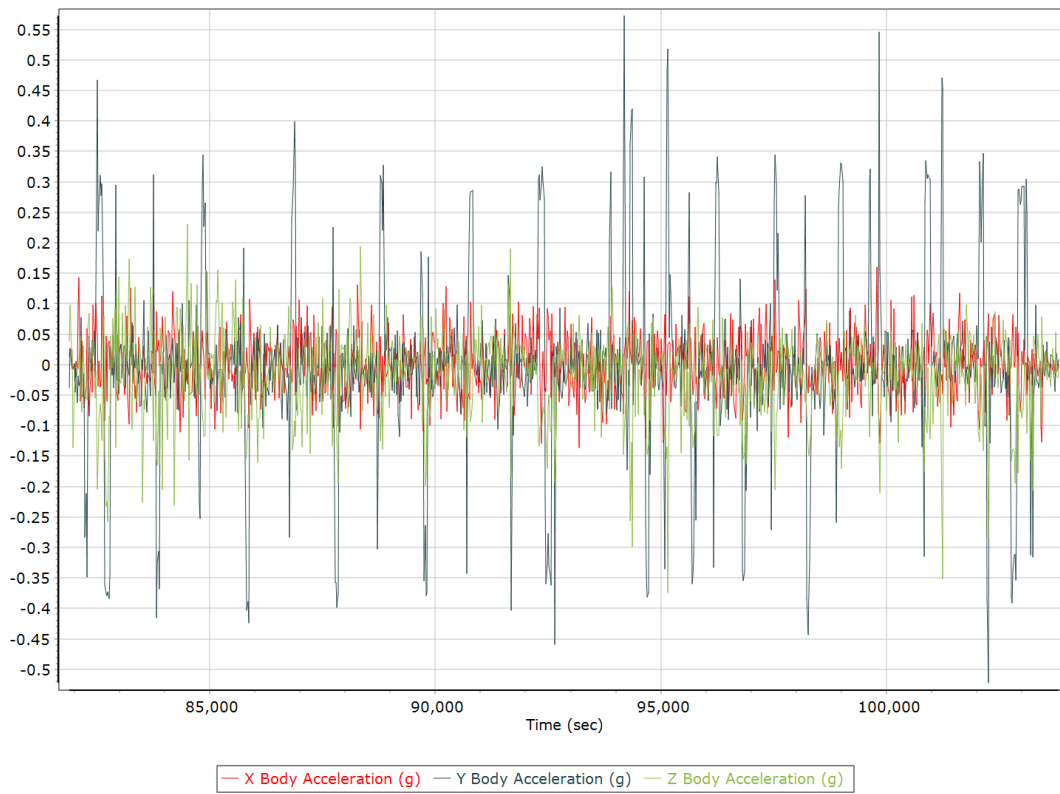
## Total Speed



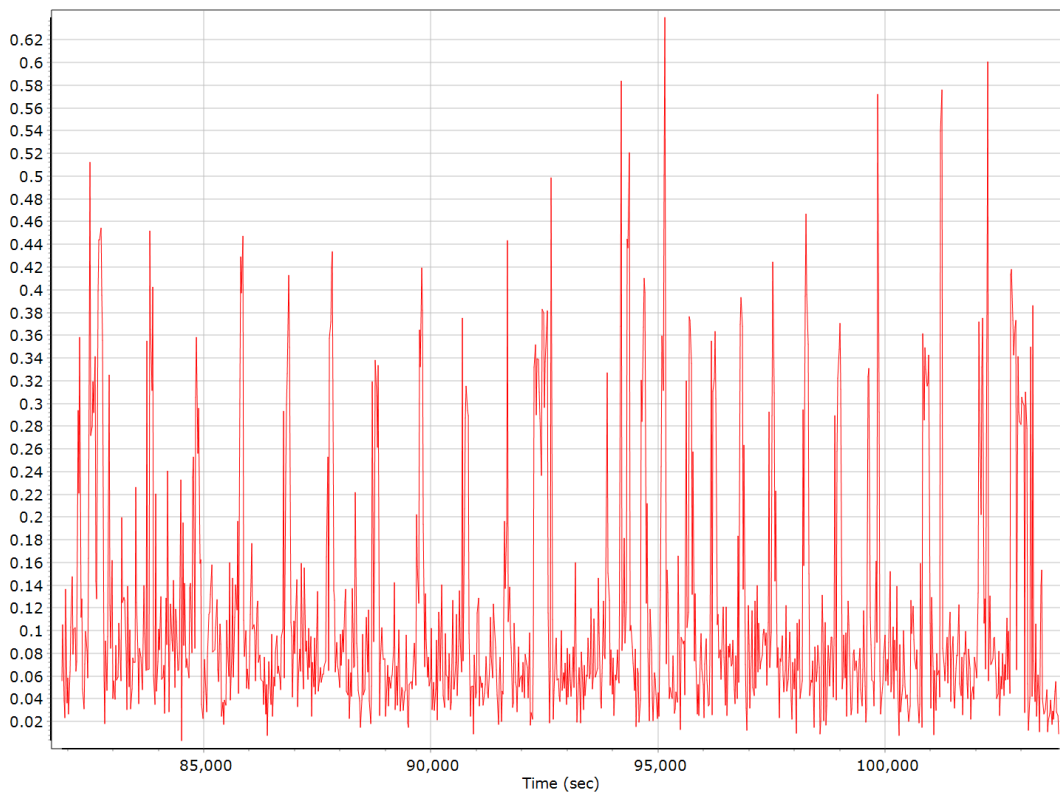
## Ground Speed



## Body Acceleration



## Total Body Acceleration



## Body Angular Rate

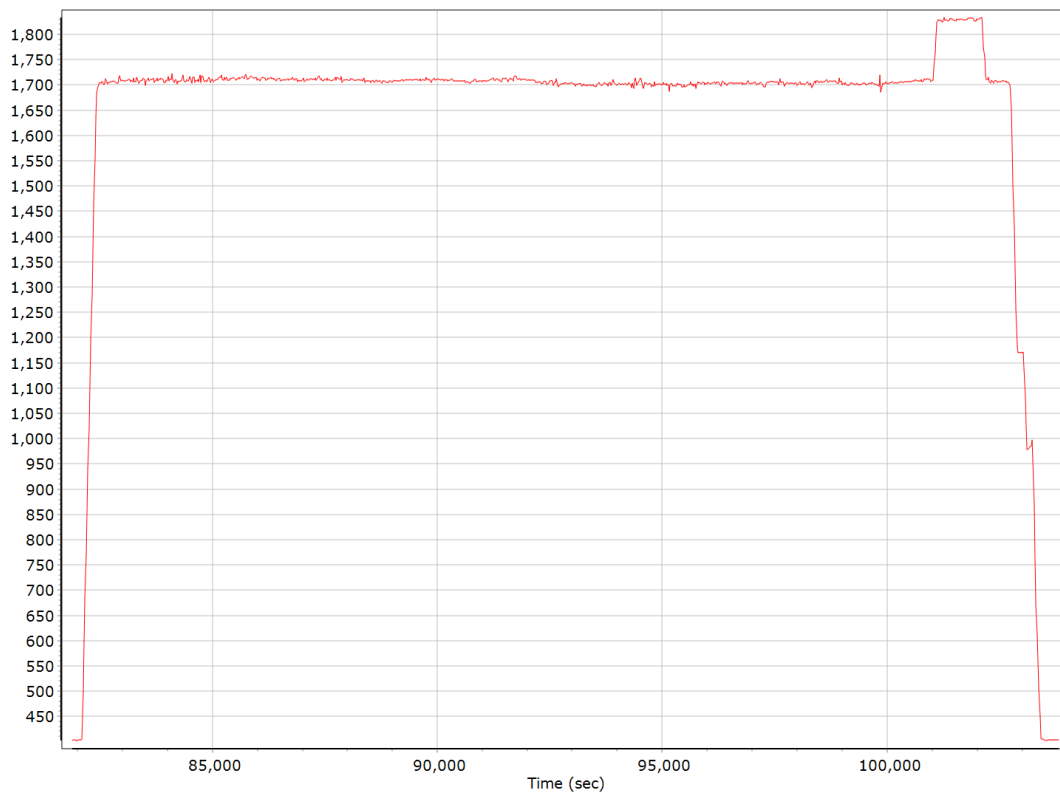


## Forward Processed Trajectory Information

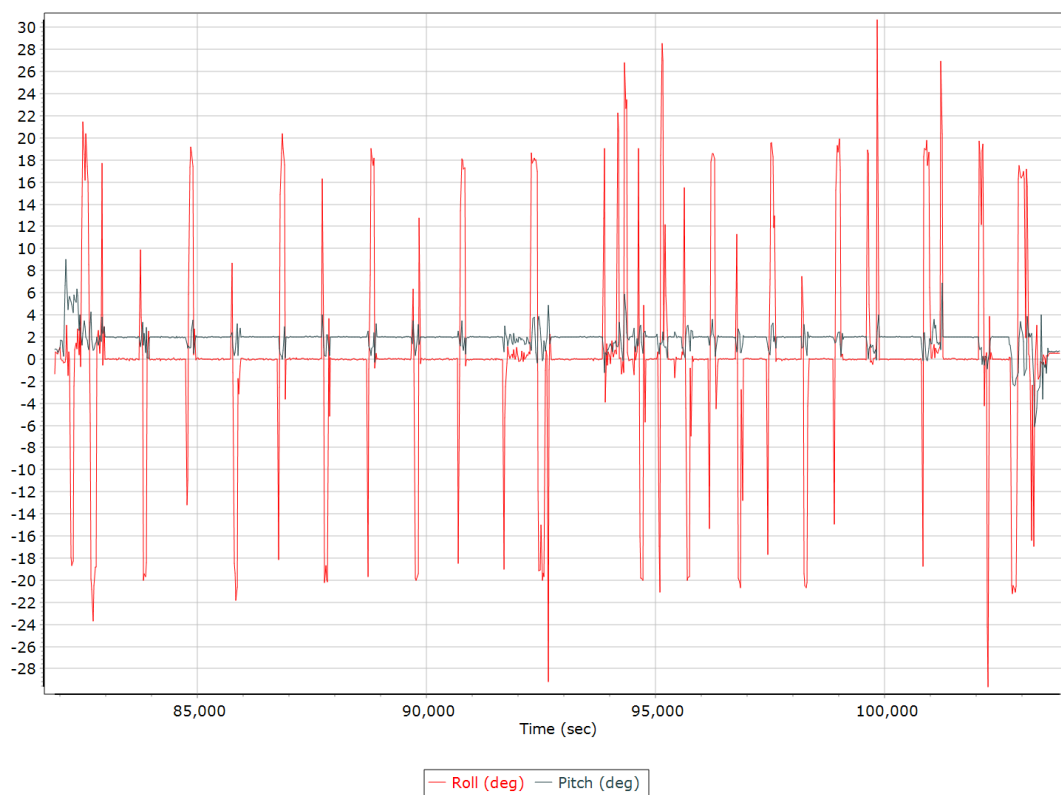
### Top View



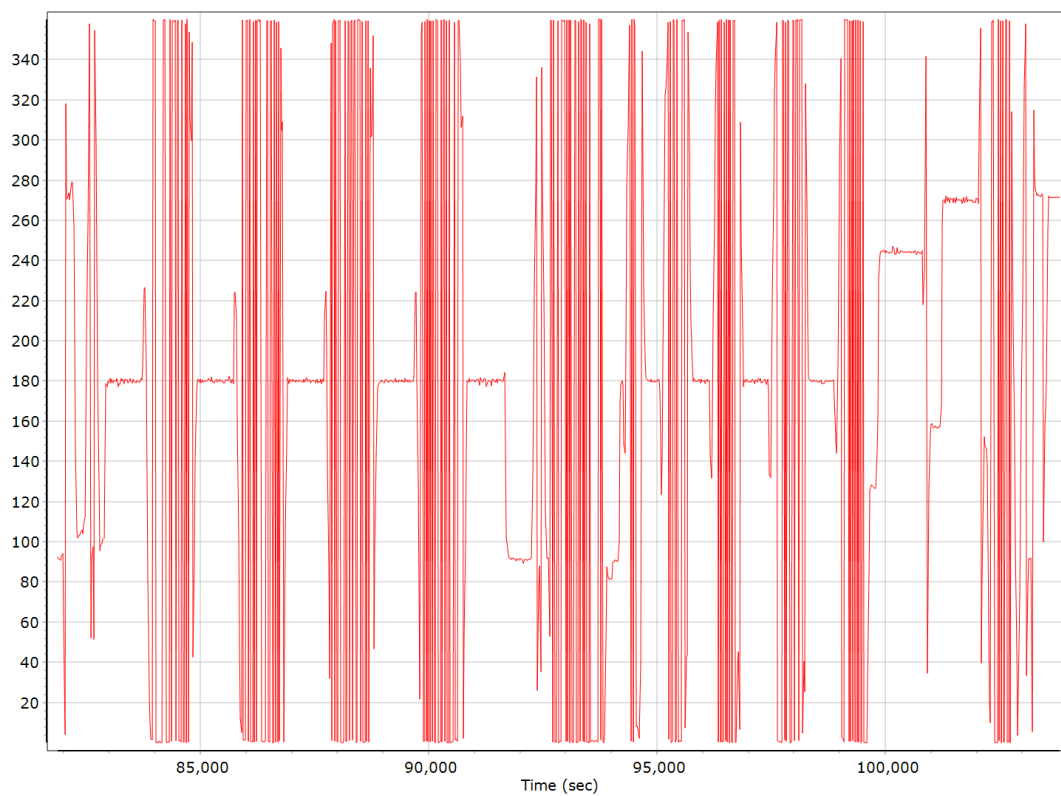
### Altitude



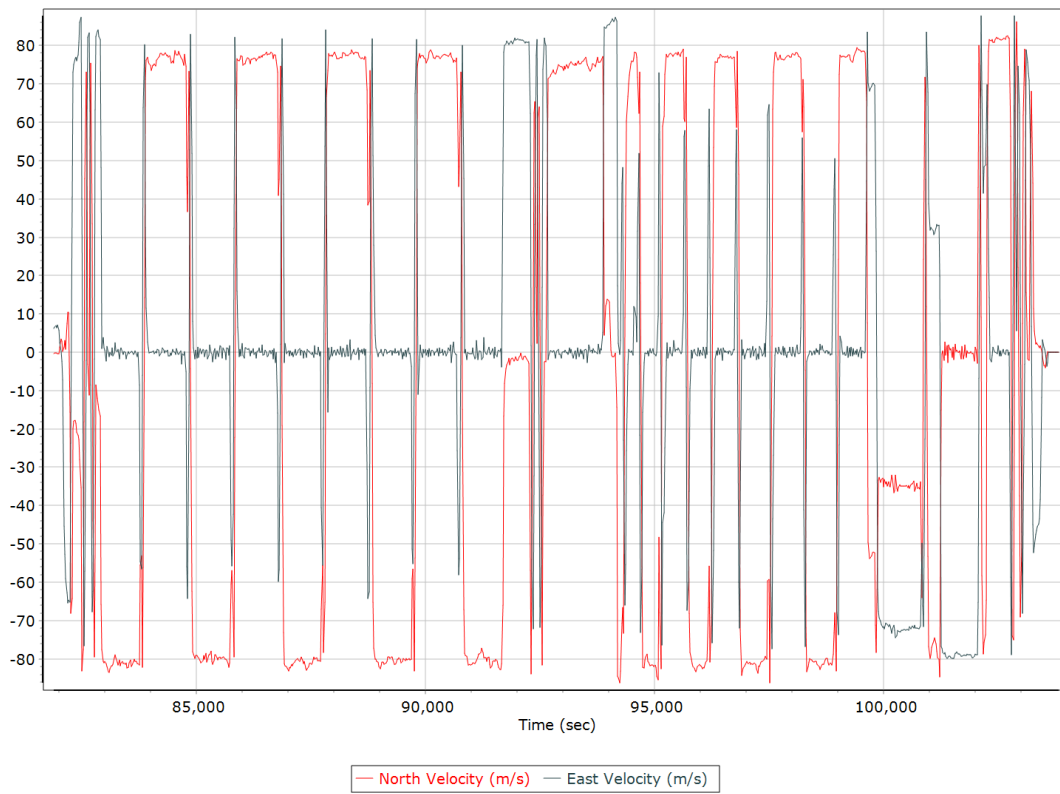
## Roll/Pitch



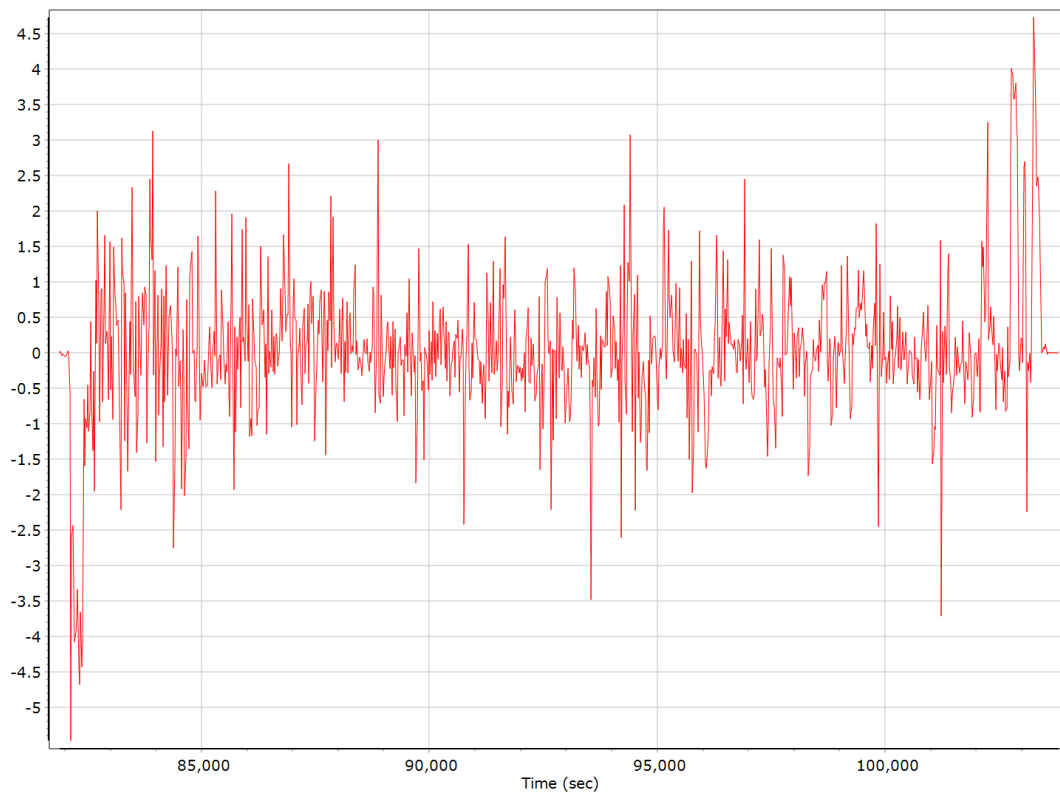
## Heading



## North/East Velocity

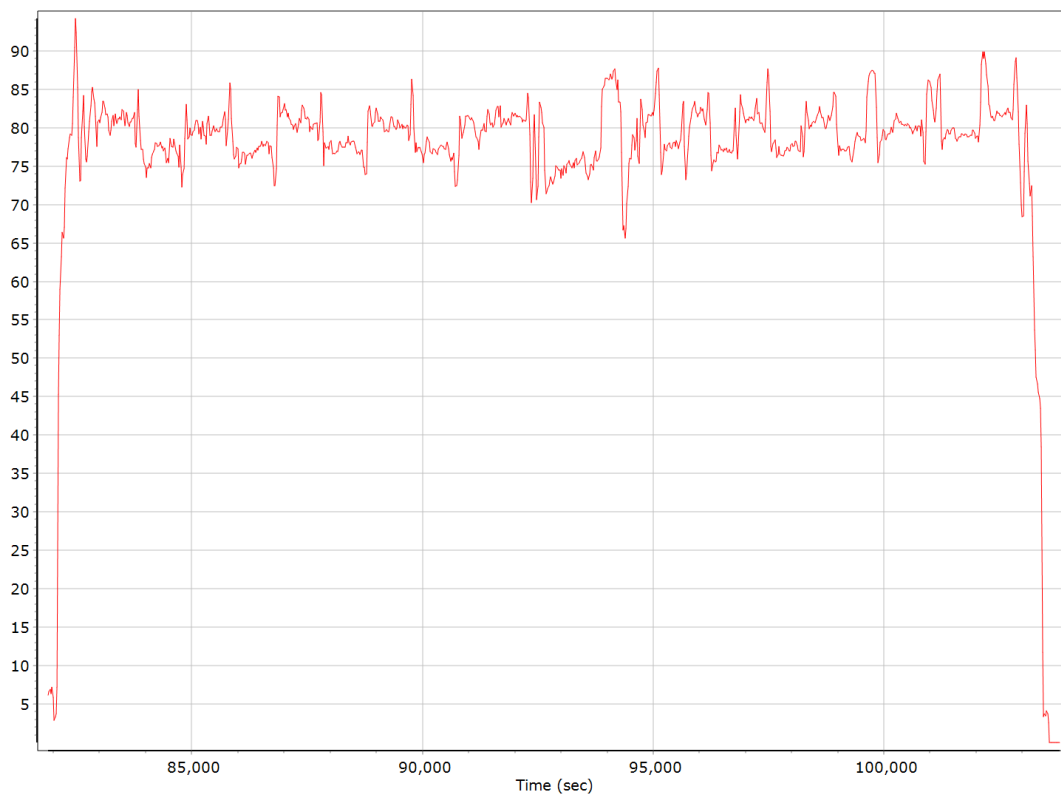


## Down Velocity

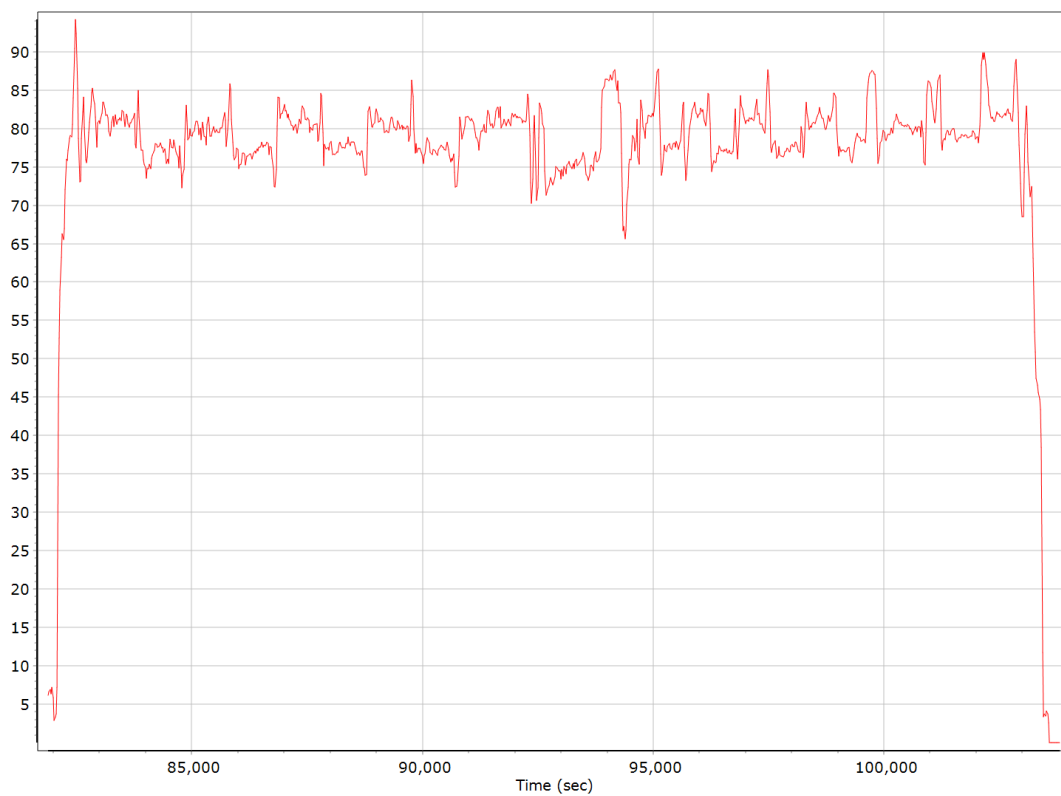




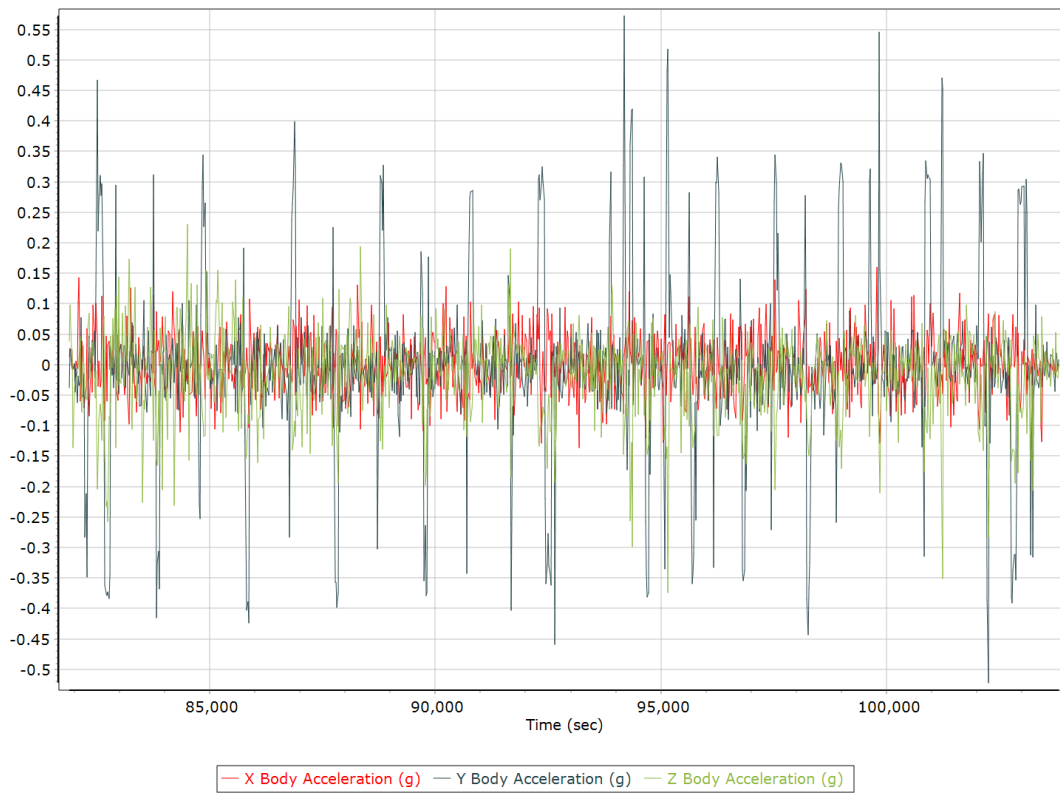
## Total Speed



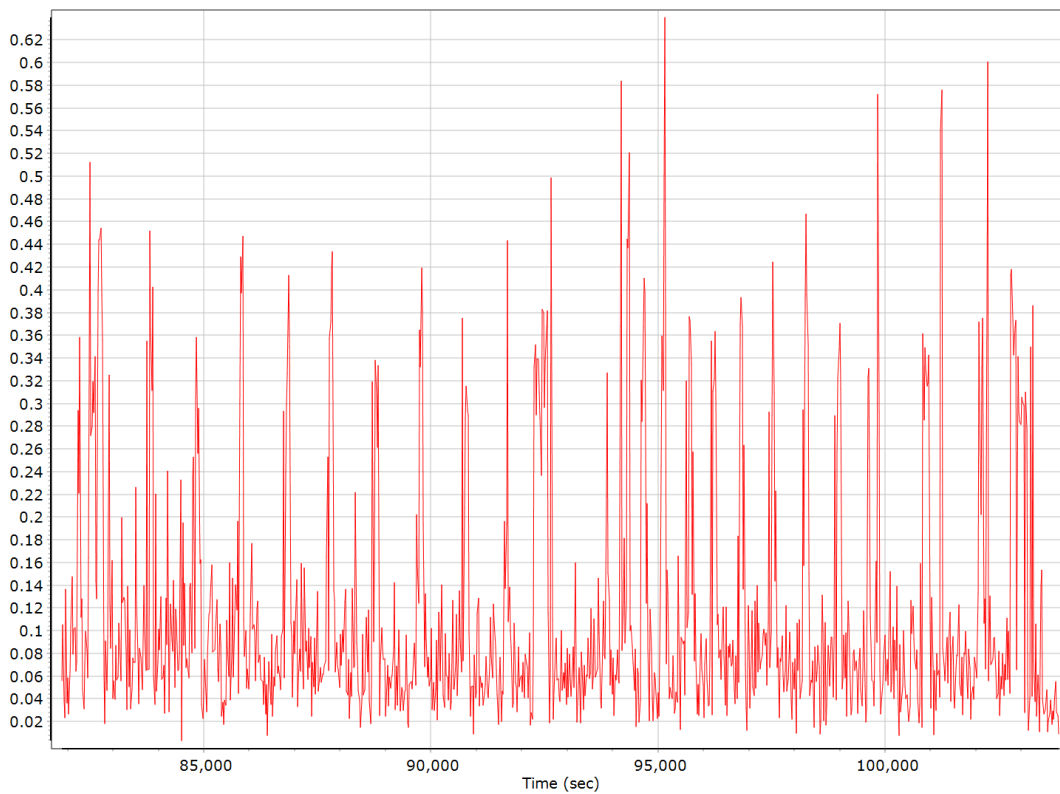
## Ground Speed



## Body Acceleration



## Total Body Acceleration



Body Angular Rate

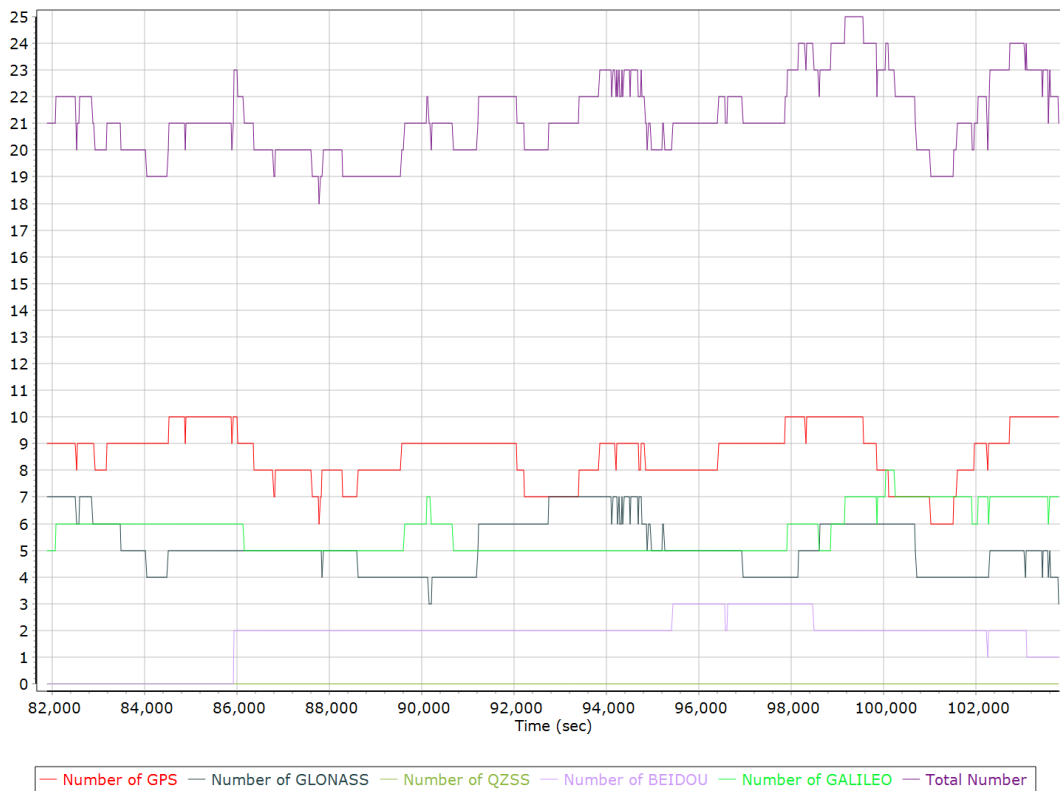


## GNSS QC

### 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

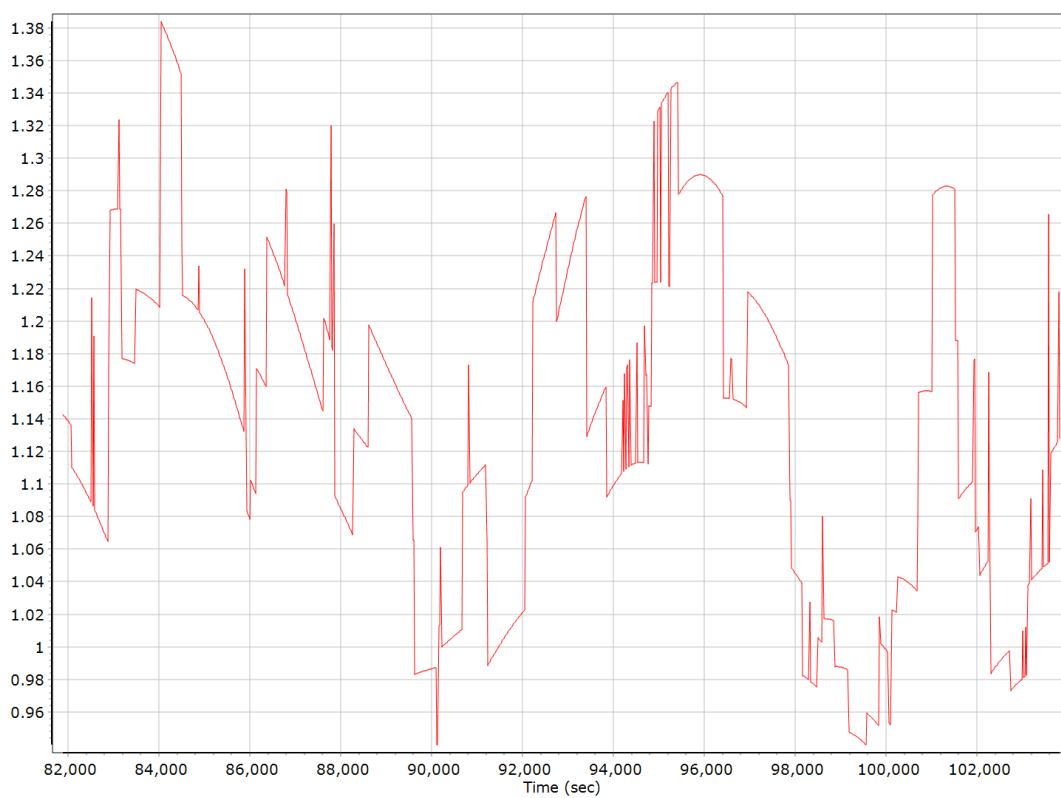
### Num SVs in solution



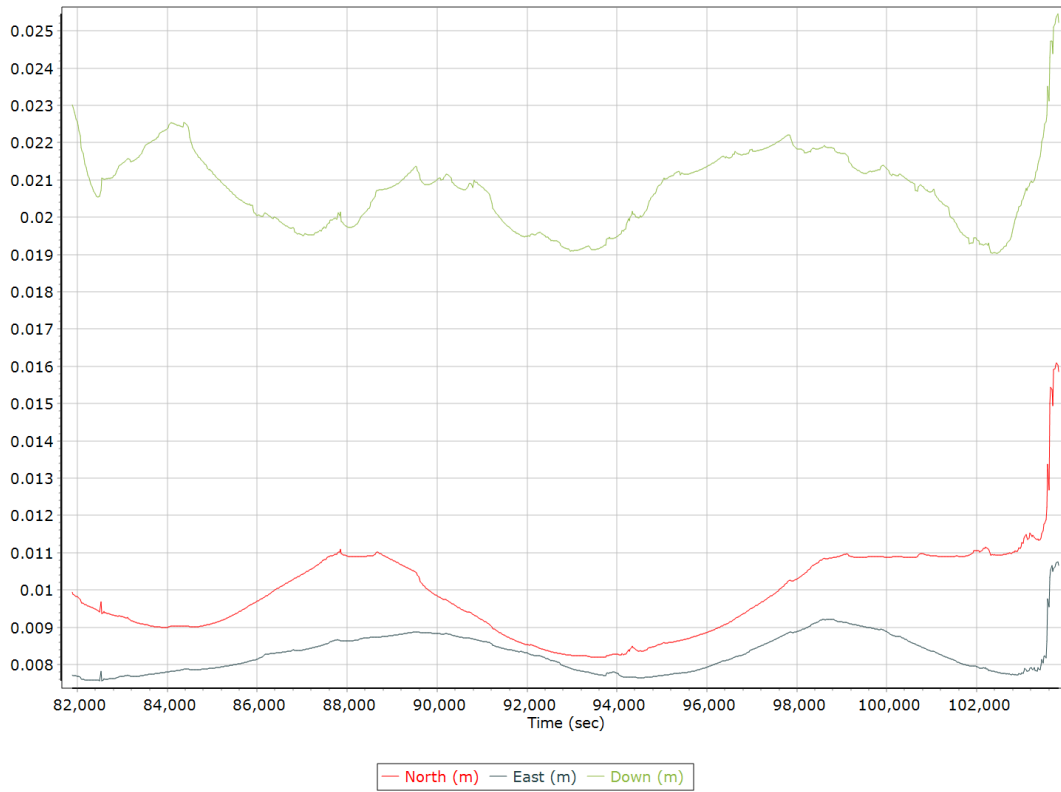
## Forward/Reverse Separation



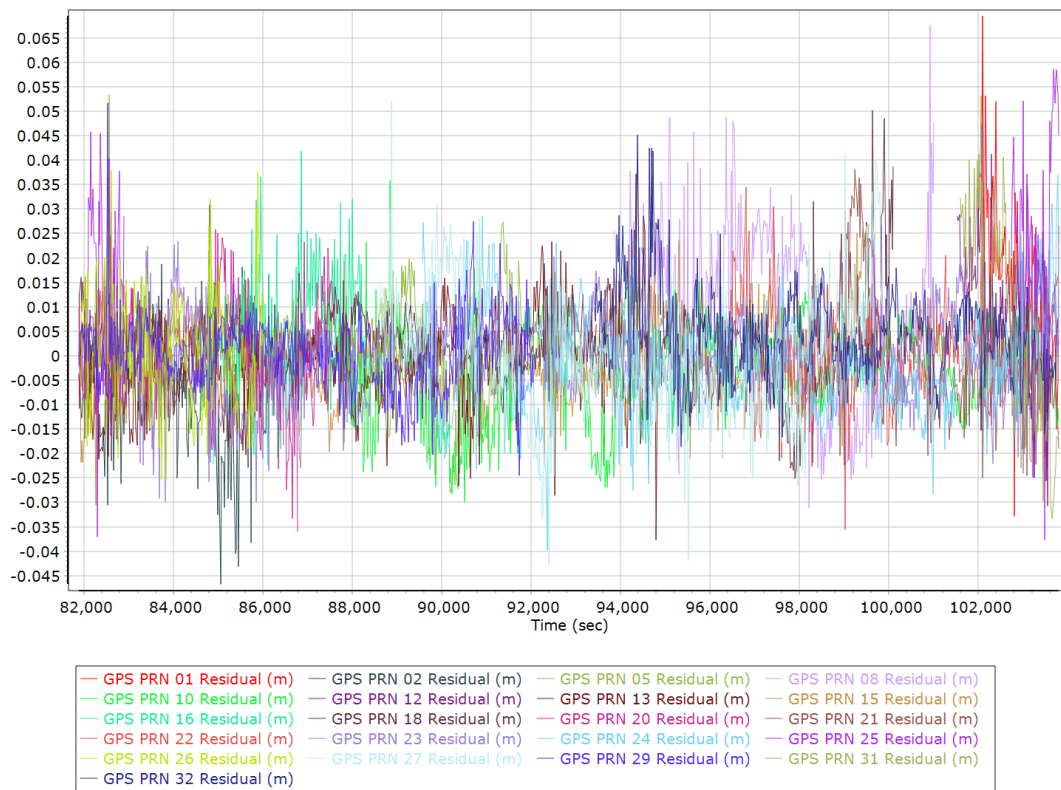
## PDOP



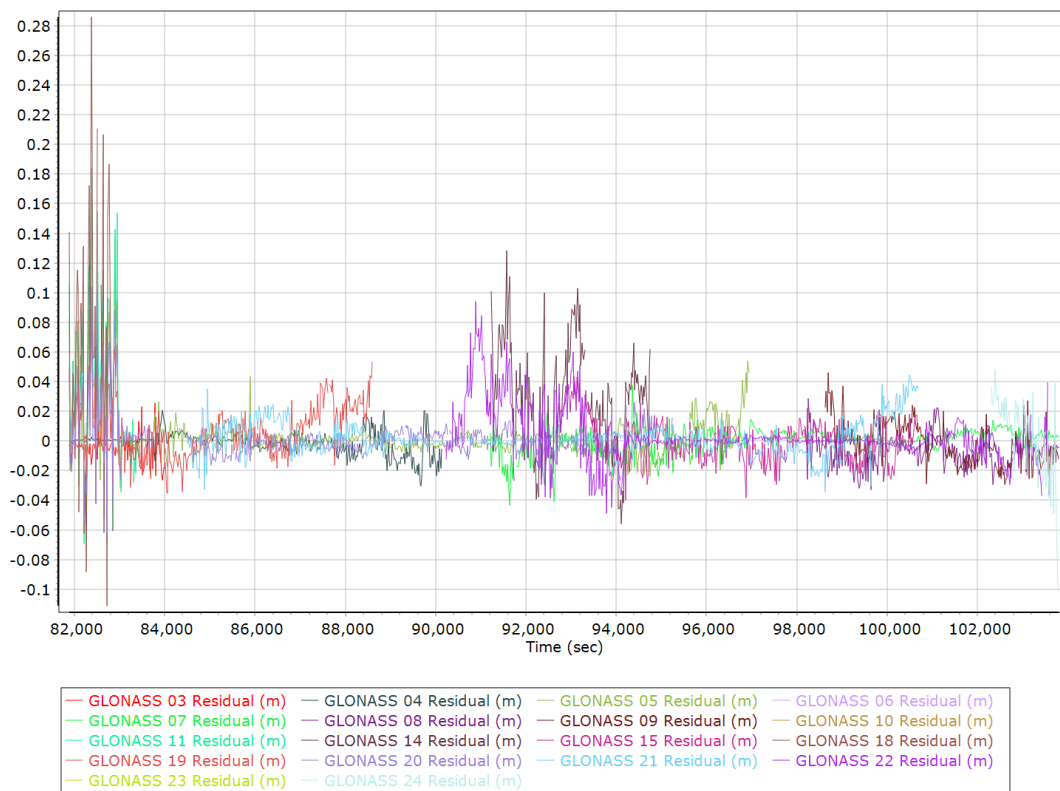
## Estimated Position Accuracy



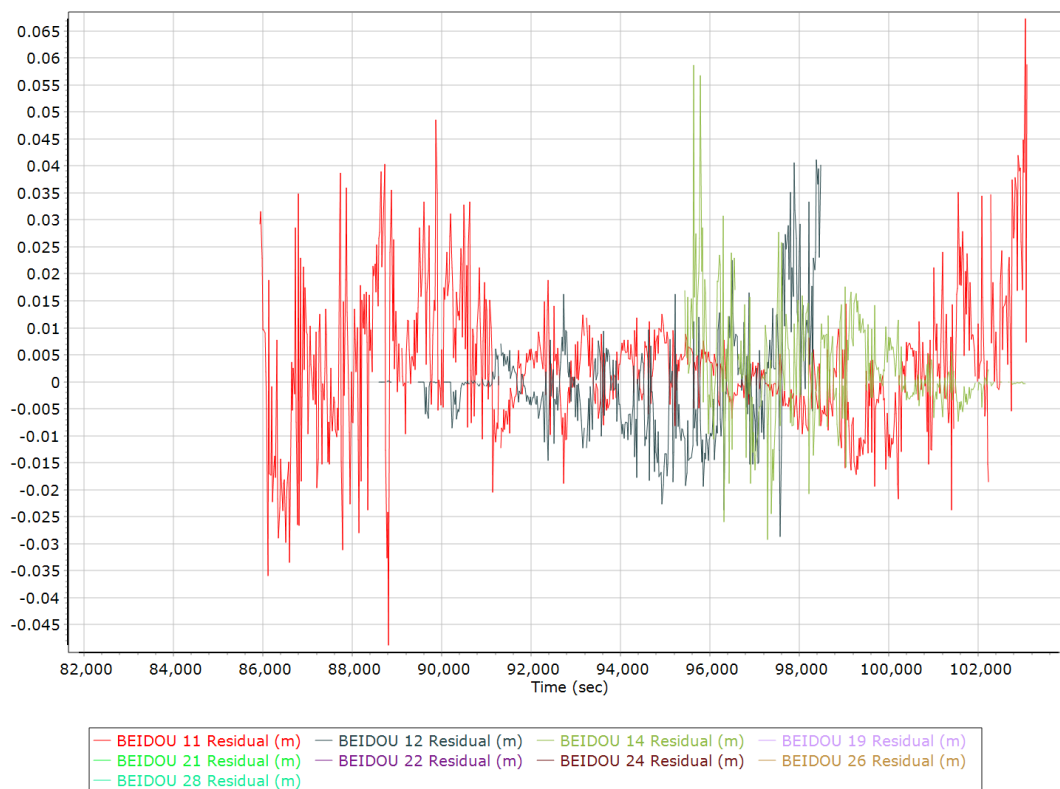
## GPS Residuals



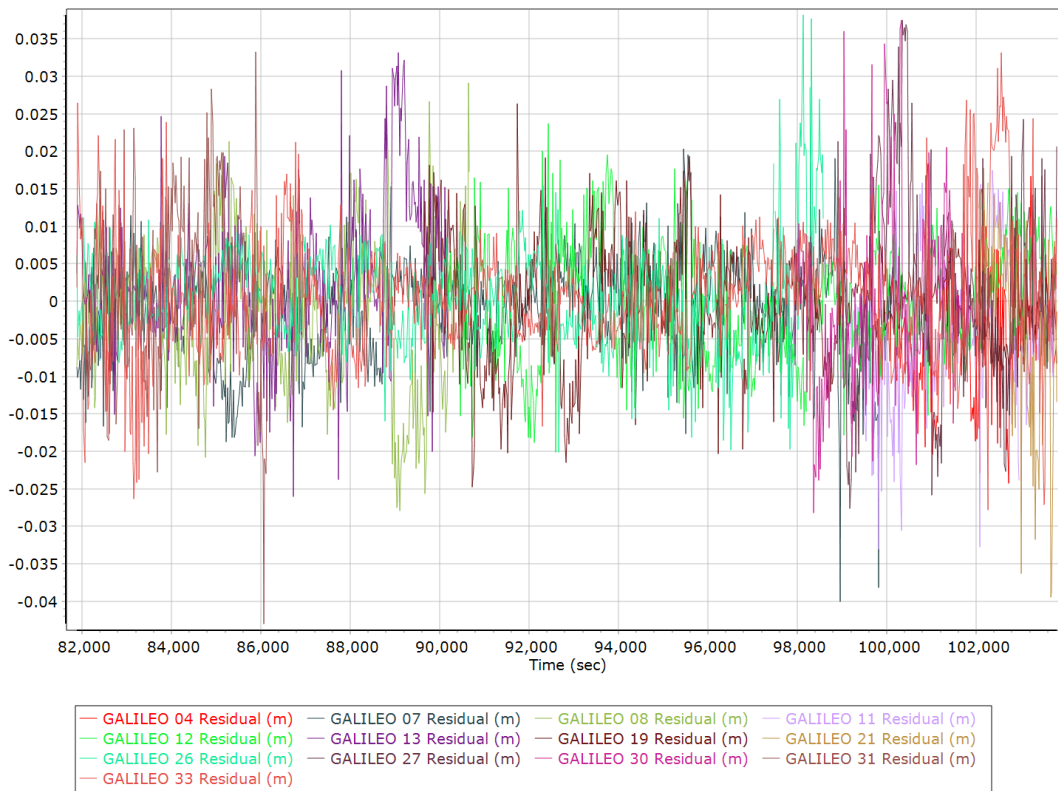
## GLONASS Residuals



## BEIDOU Residuals



## GALILEO Residuals





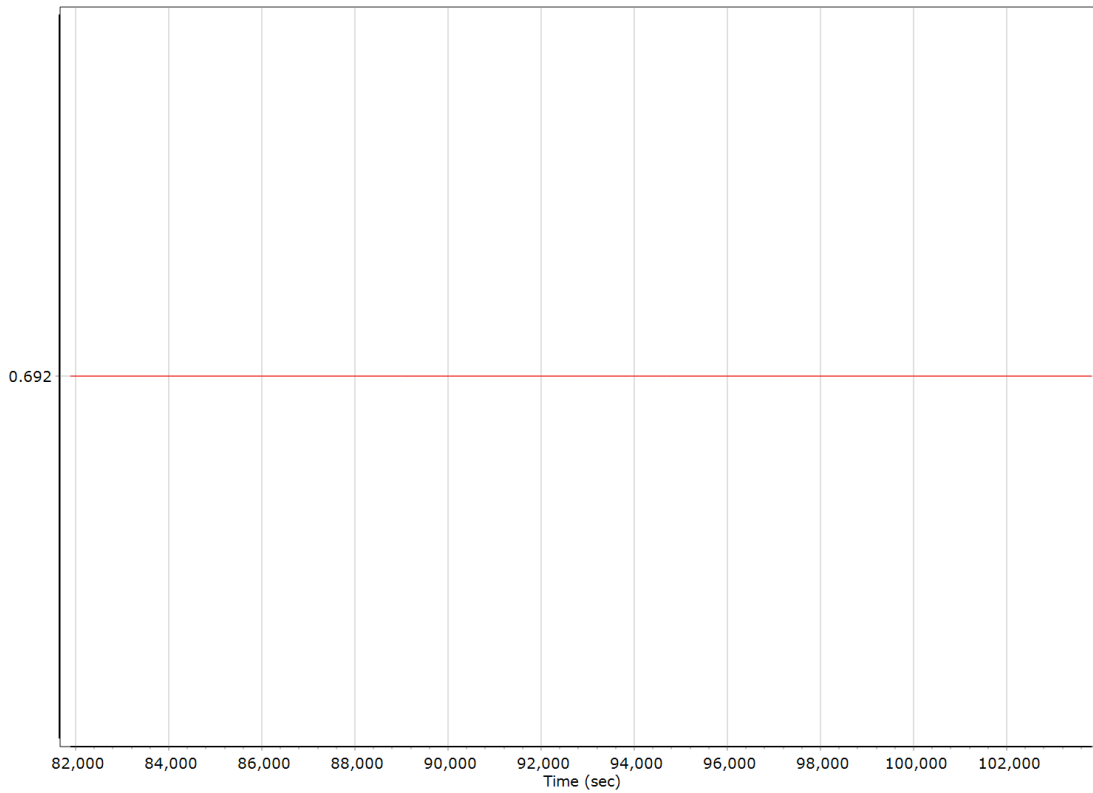
## GNSS-Inertial Processor Configuration

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

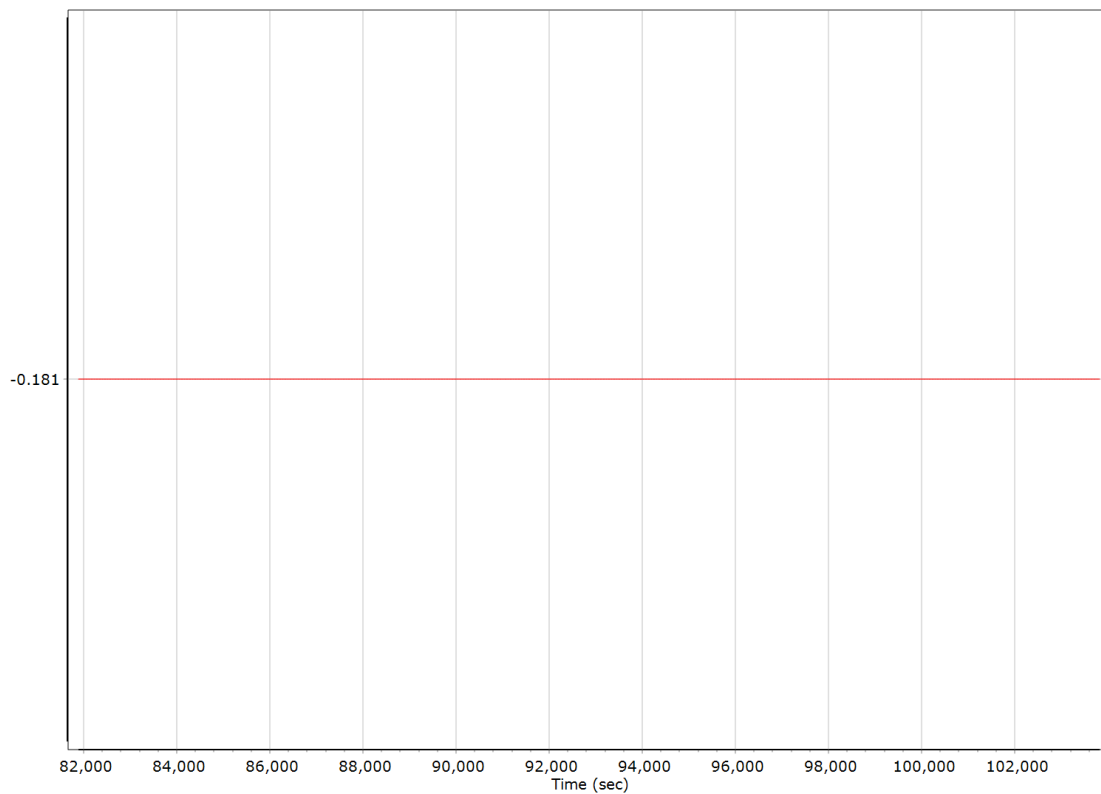
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

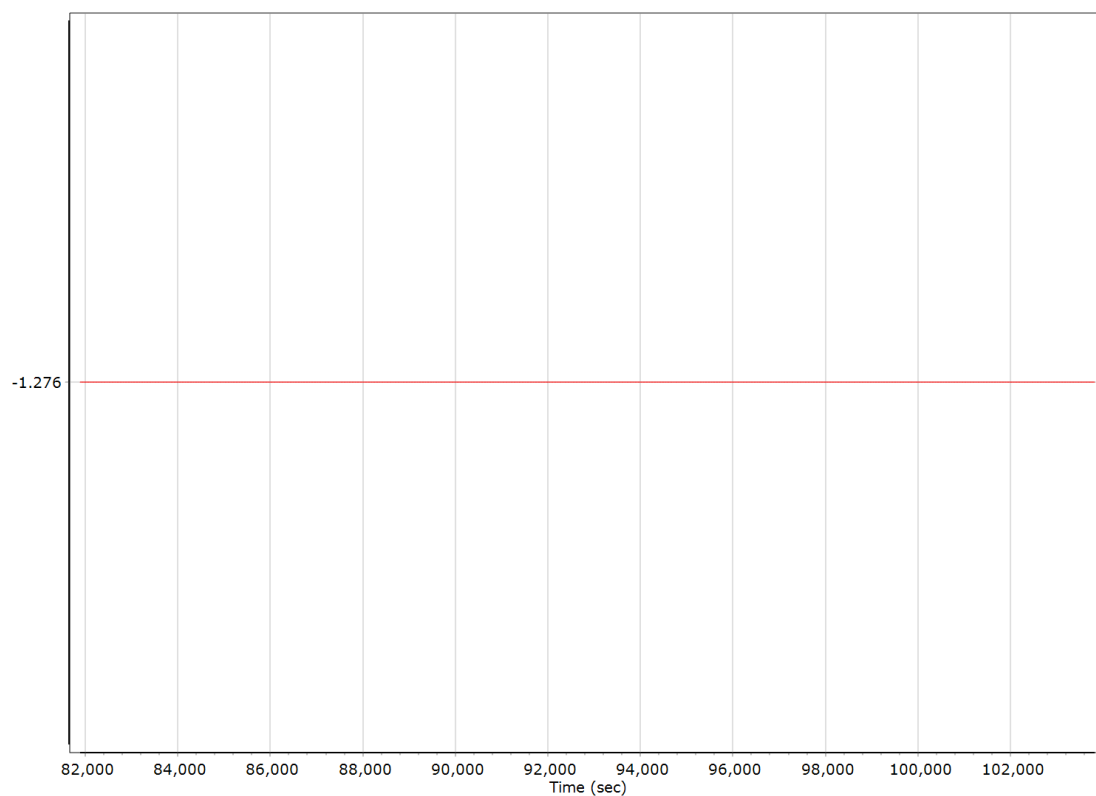
#### X Reference-Primary GNSS Lever Arm (m)



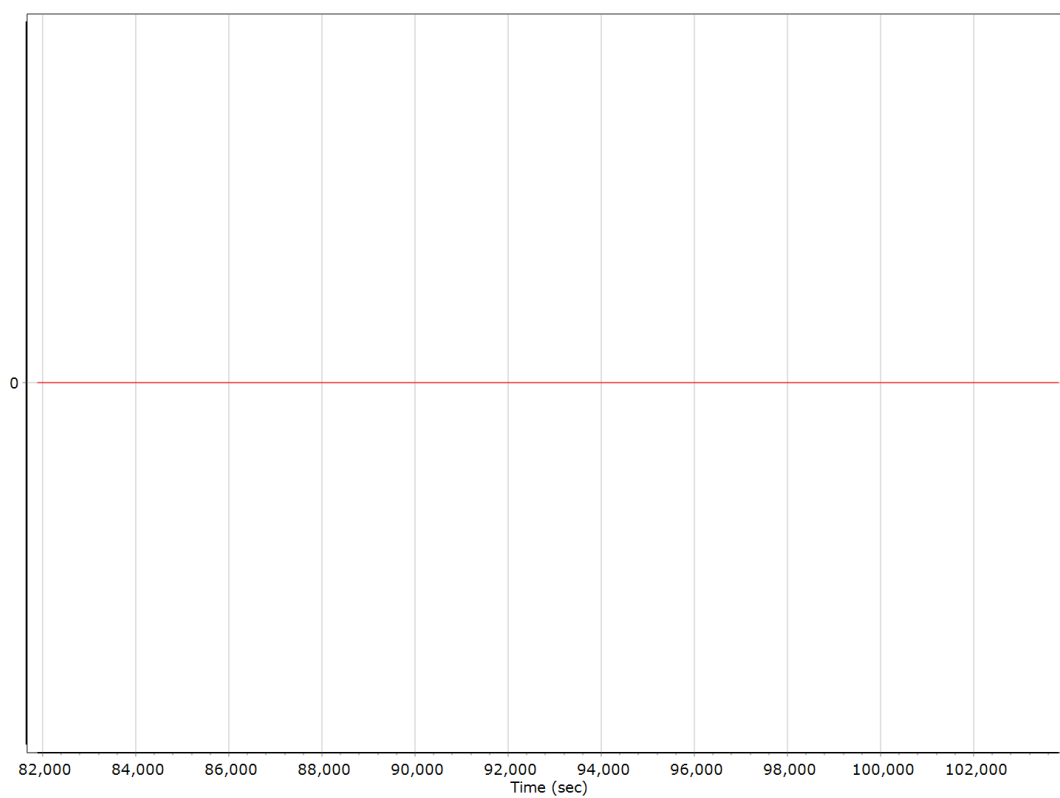
#### Y Reference-Primary GNSS Lever Arm (m)



### Z Reference-Primary GNSS Lever Arm (m)



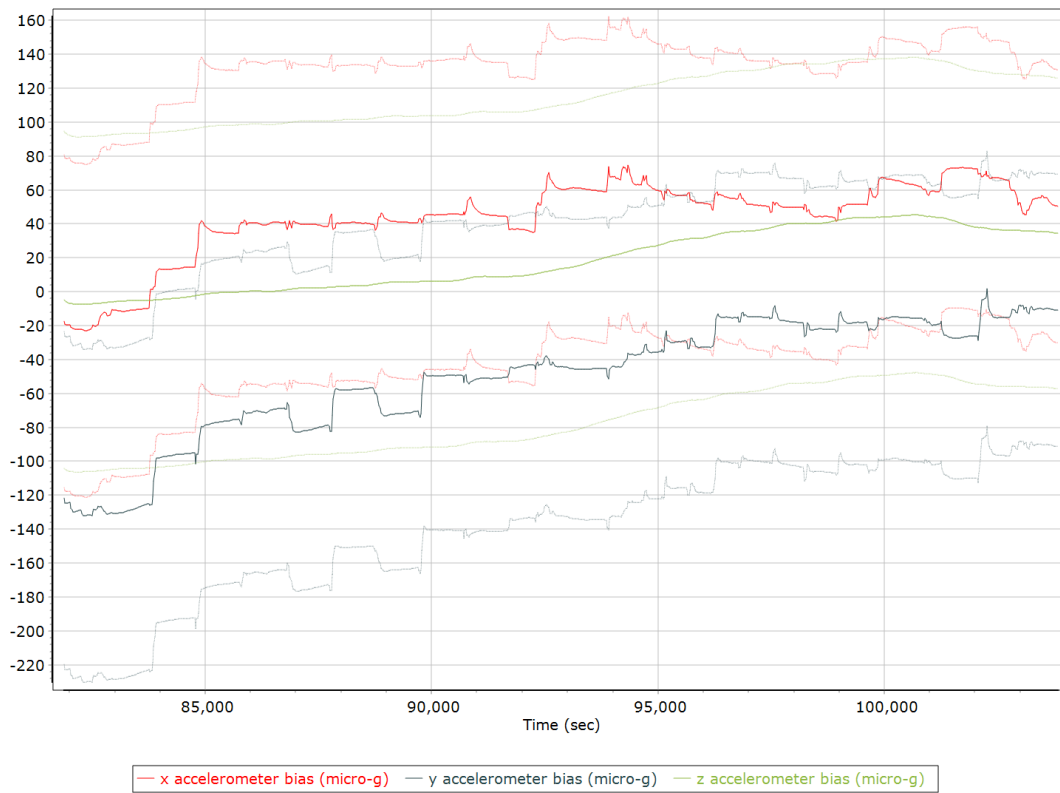
### Reference-Primary GNSS Lever Arm Figure of Merit



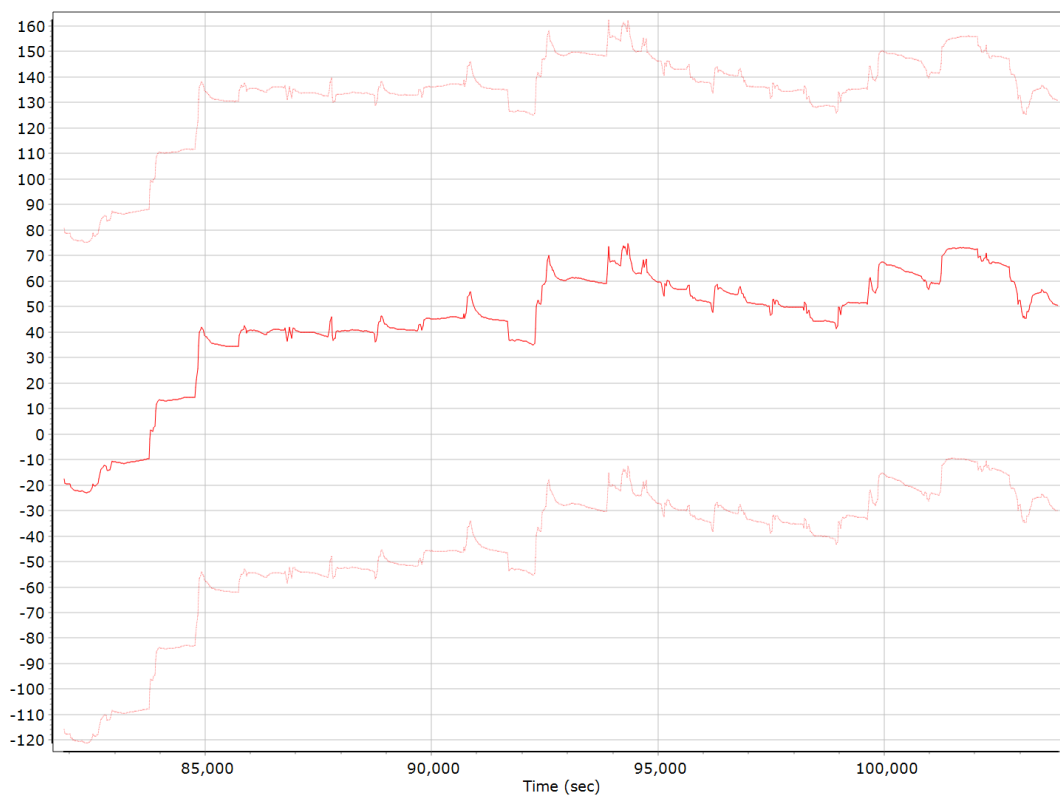
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

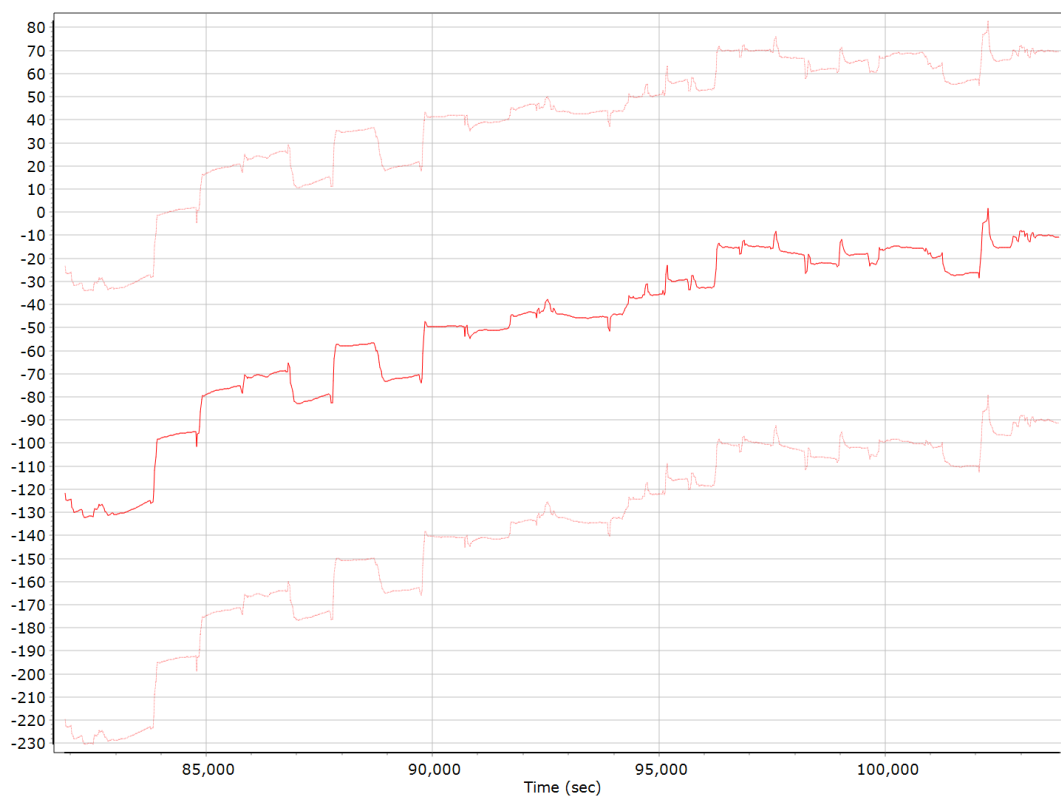
#### Accelerometer Bias (micro-g)



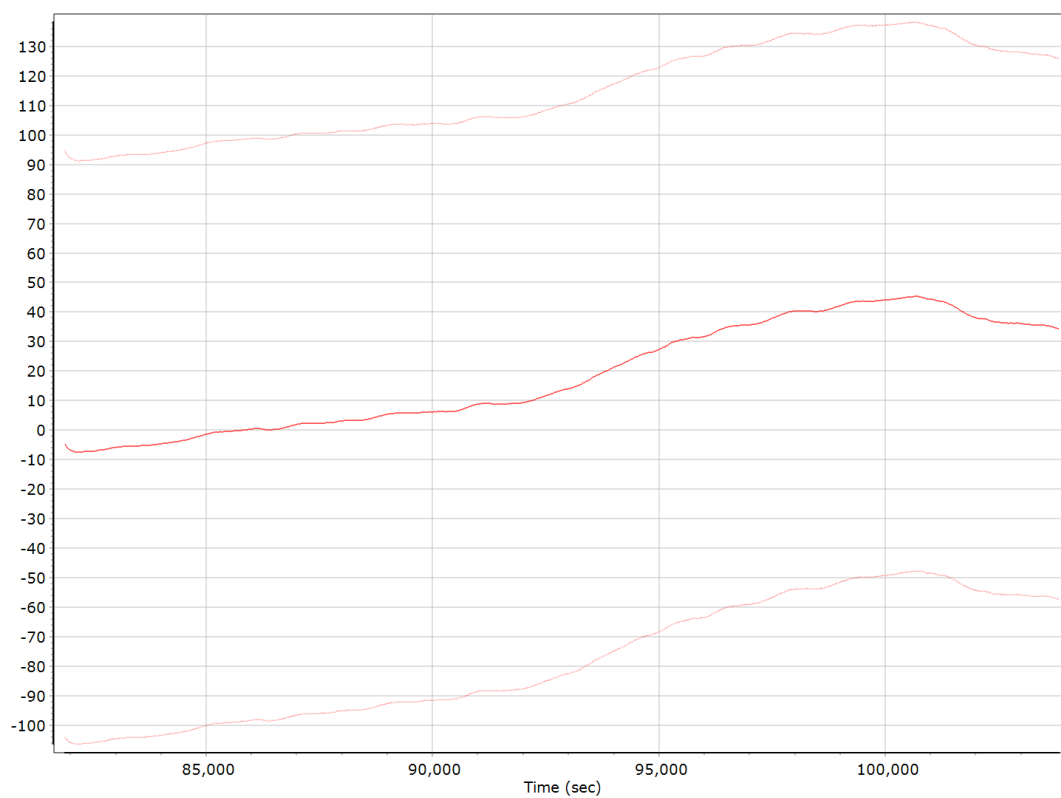
#### X Accelerometer Bias (micro-g)



### Y Accelerometer Bias (micro-g)



### Z Accelerometer Bias (micro-g)



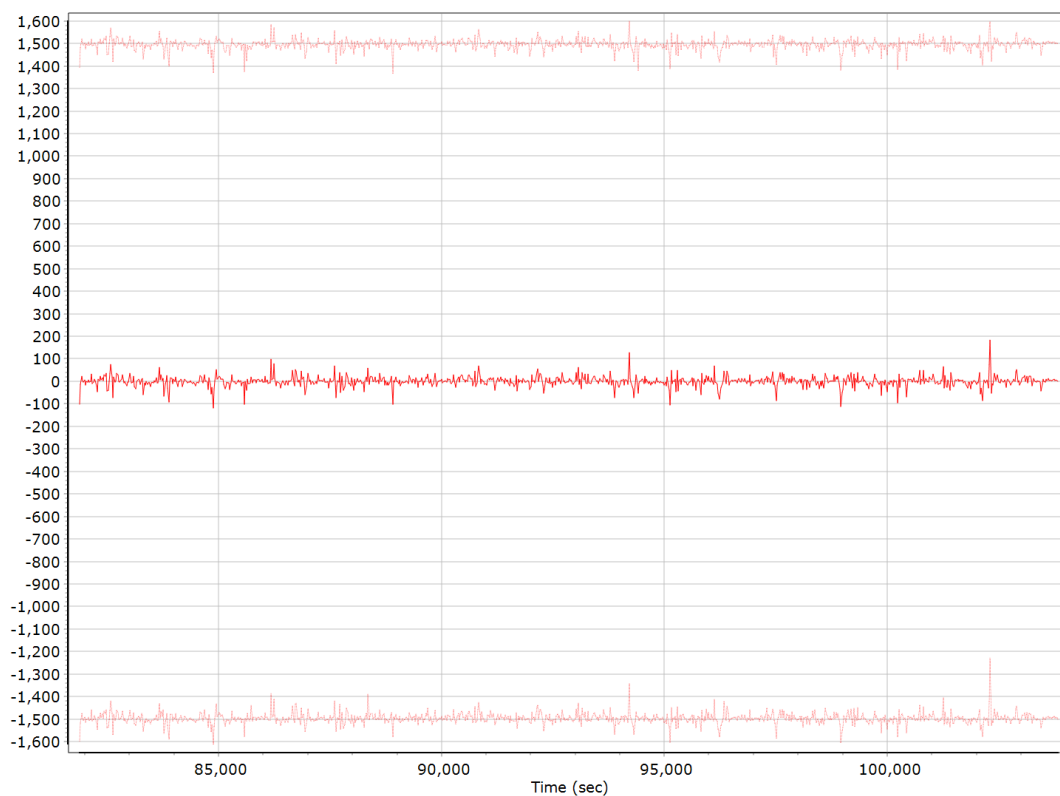
### Accelerometer Scale Error (ppm)



### X Accelerometer Scale Error (ppm)



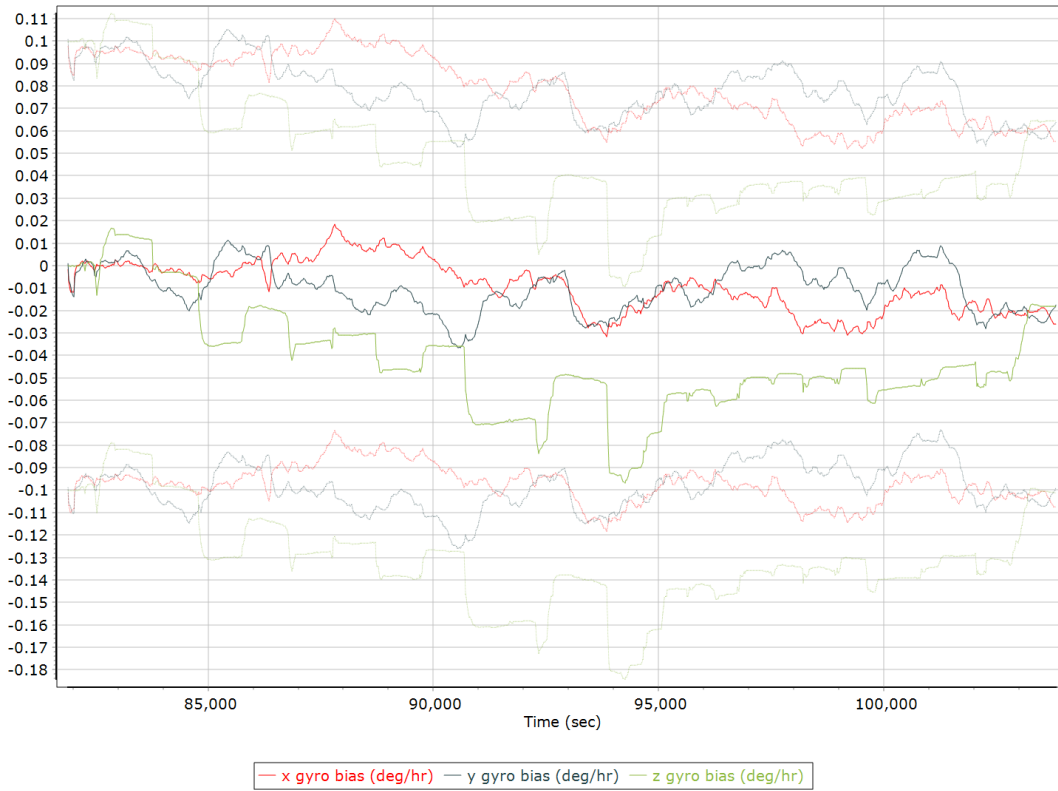
### Y Accelerometer Scale Error (ppm)



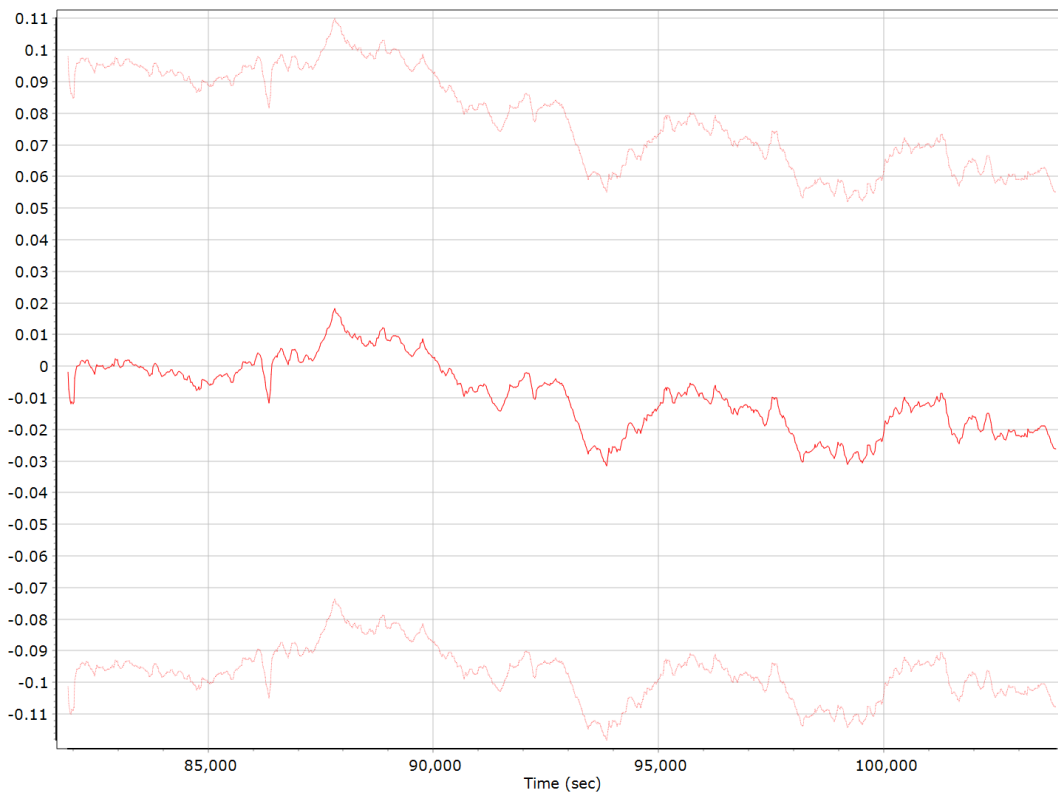
### Z Accelerometer Scale Error (ppm)



## Gyro Bias (deg/h)

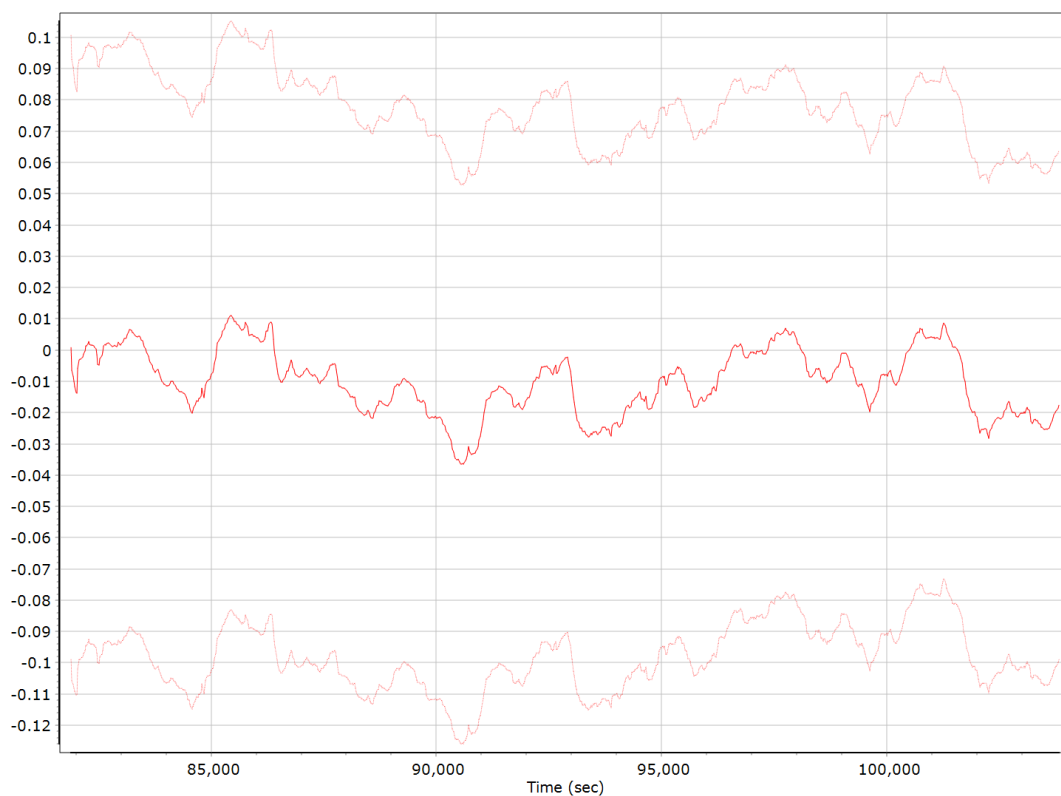


## X Gyro Bias (deg/h)

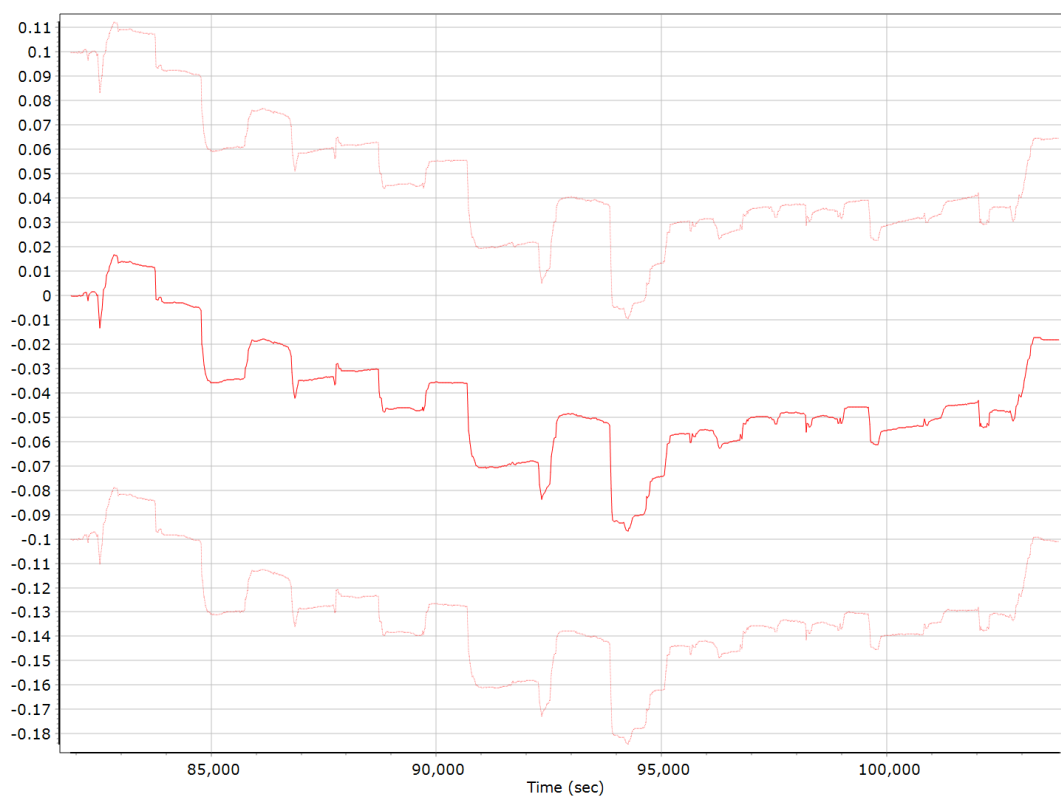




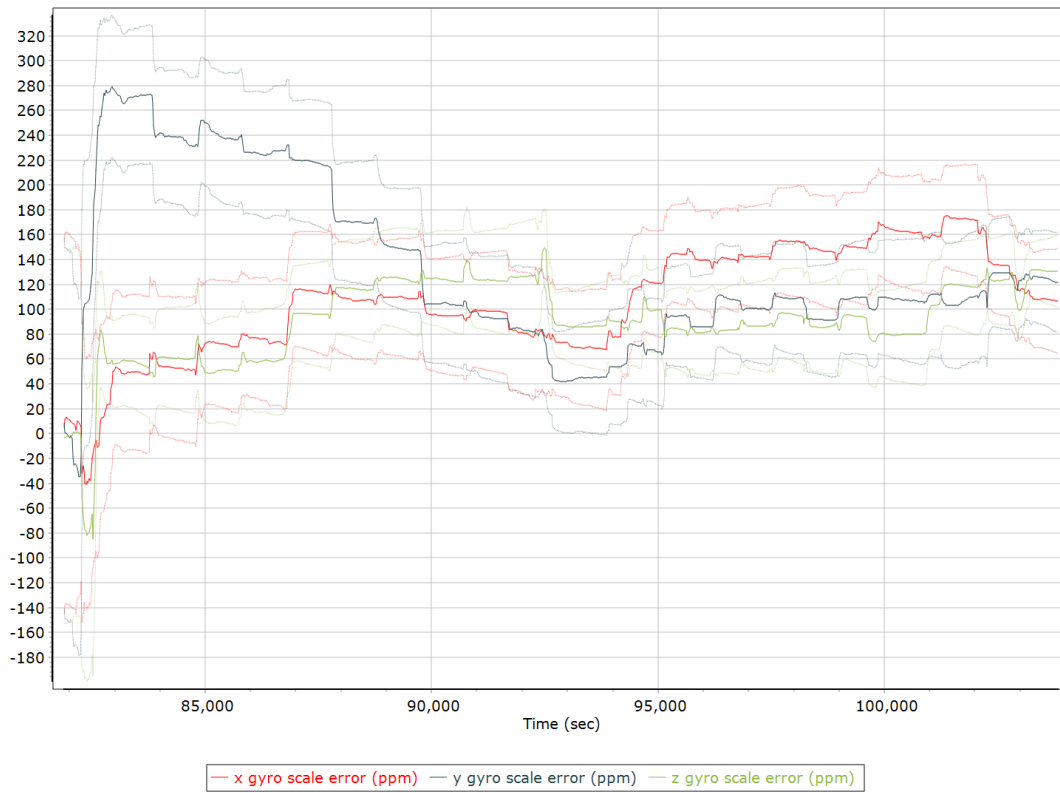
### Y Gyro Bias (deg/h)



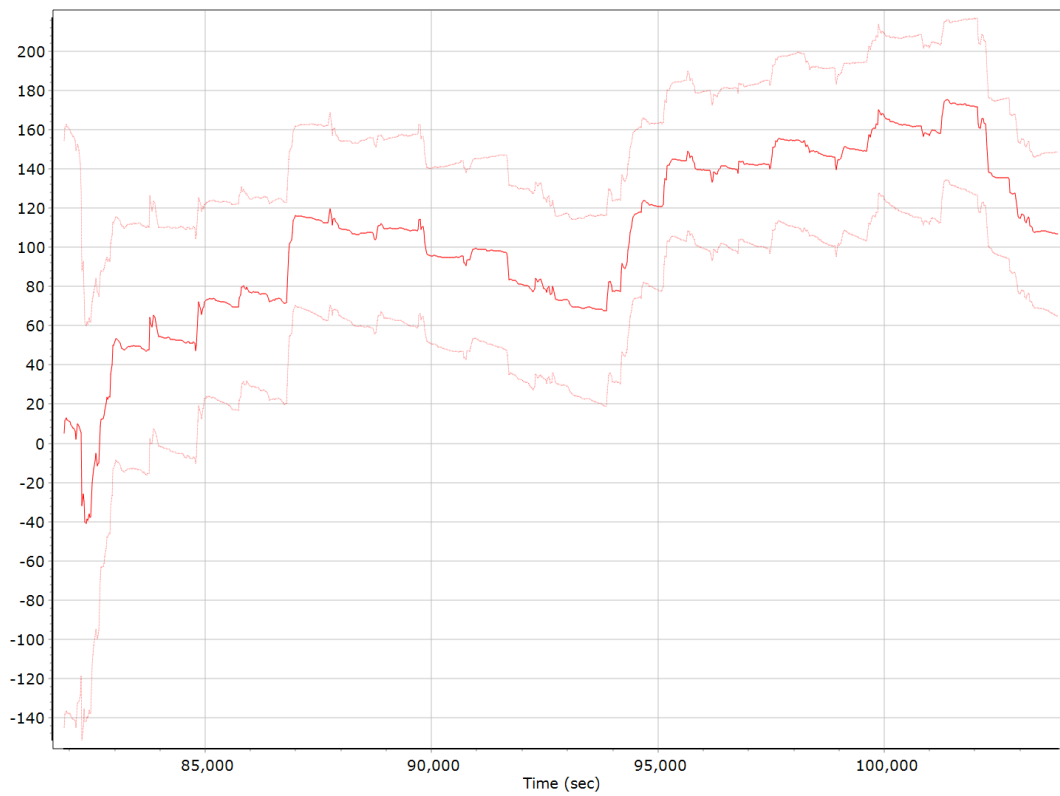
### Z Gyro Bias (deg/h)



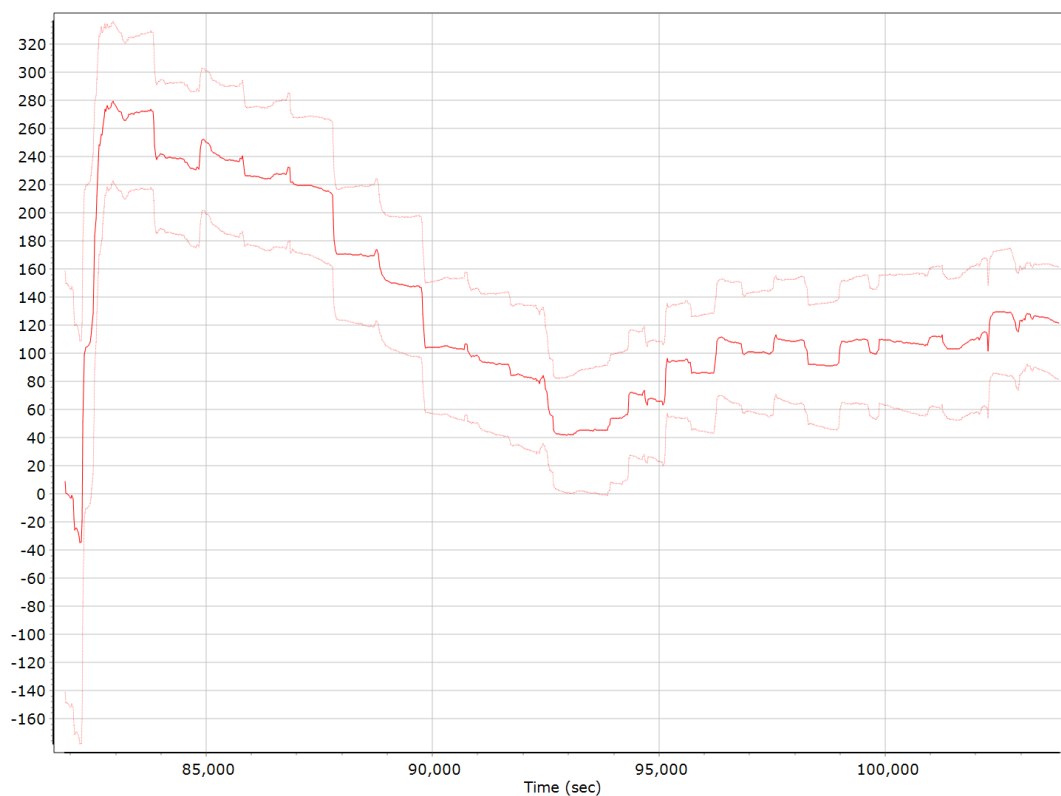
### Gyro Scale Error (ppm)



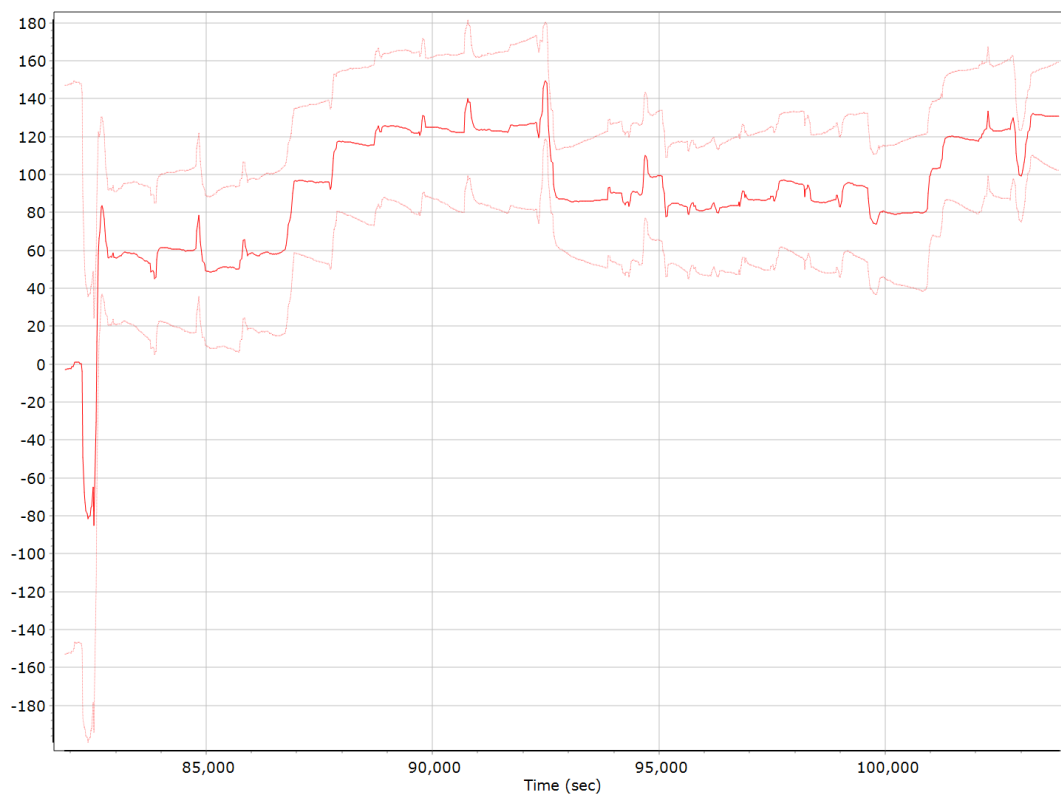
### X Gyro Scale Error (ppm)



### Y Gyro Scale Error (ppm)

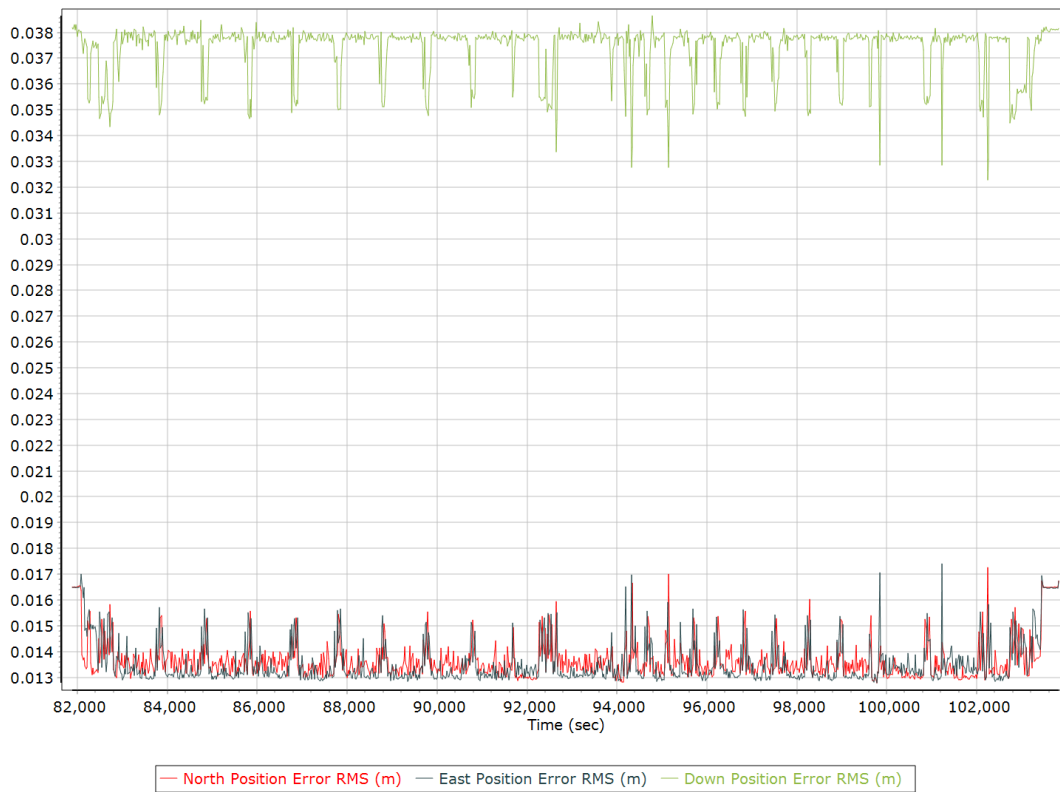


### Z Gyro Scale Error (ppm)

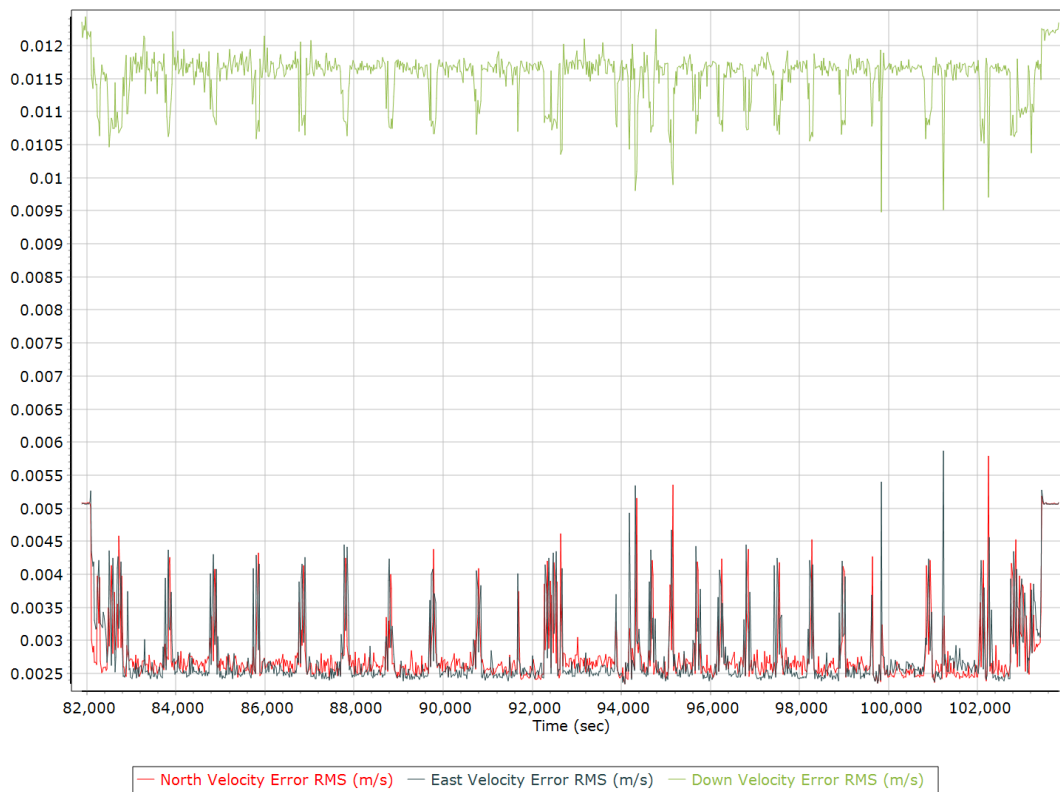


## Smoothed Performance Metrics

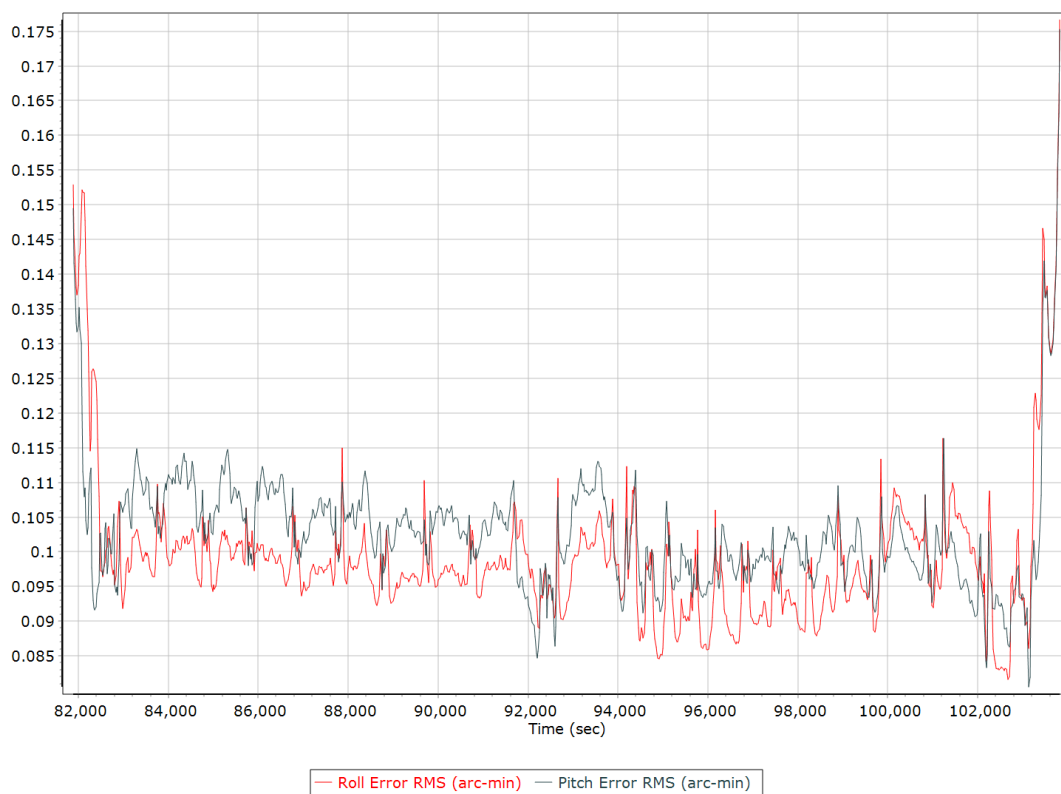
### Position Error RMS (m)



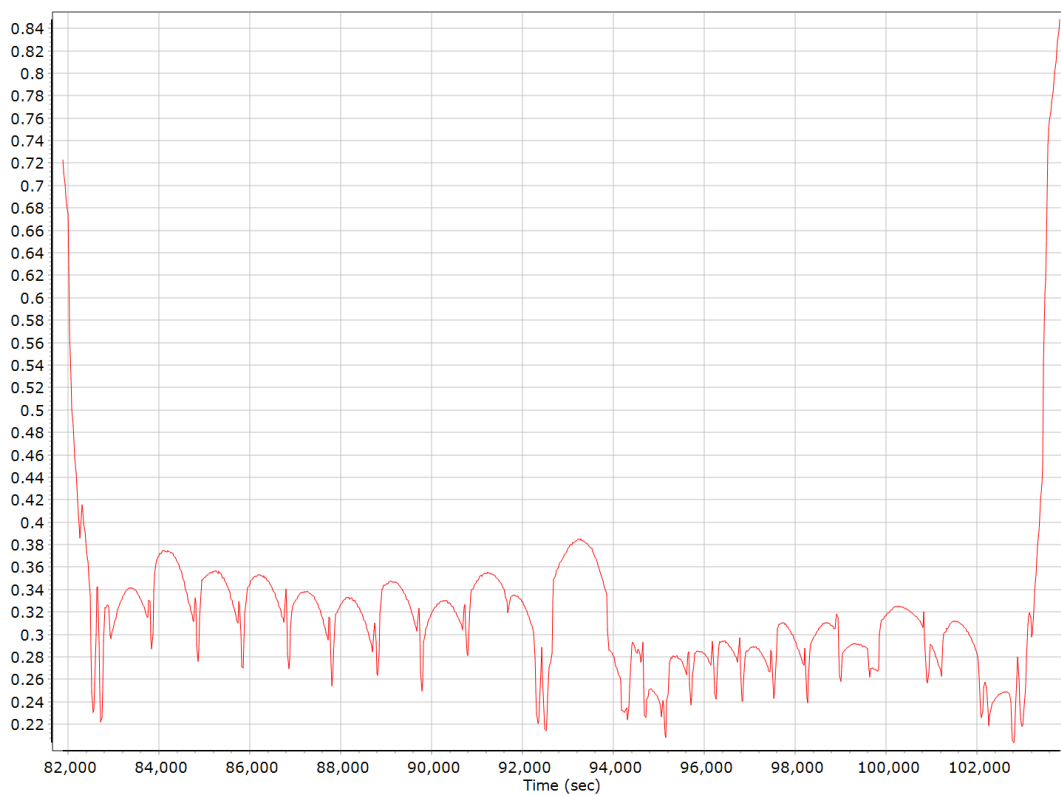
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

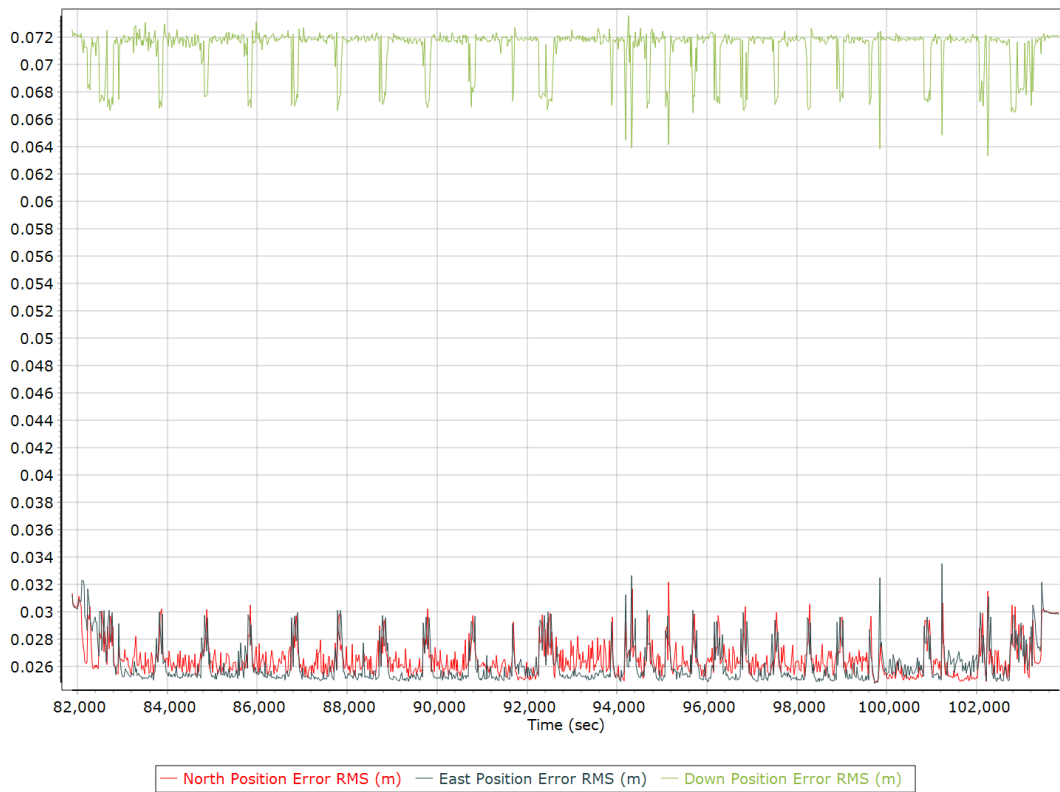


### Heading Error RMS (arc-min)



## Forward Processed Performance Metrics

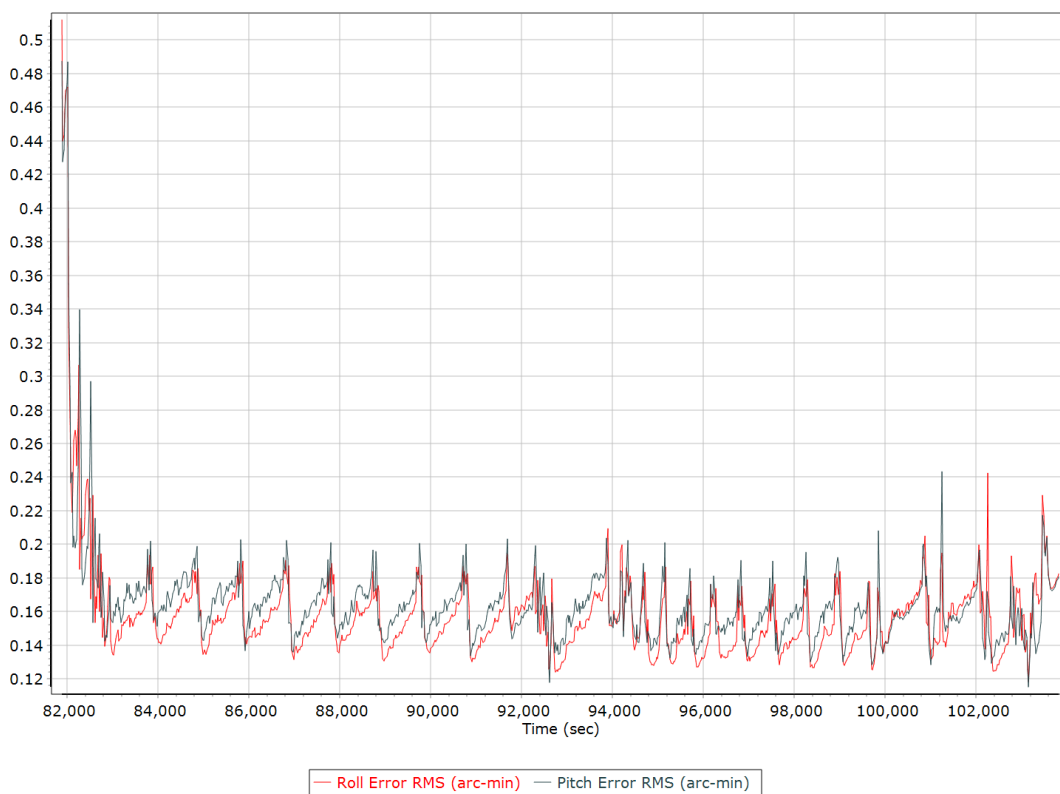
### Position Error RMS (m)



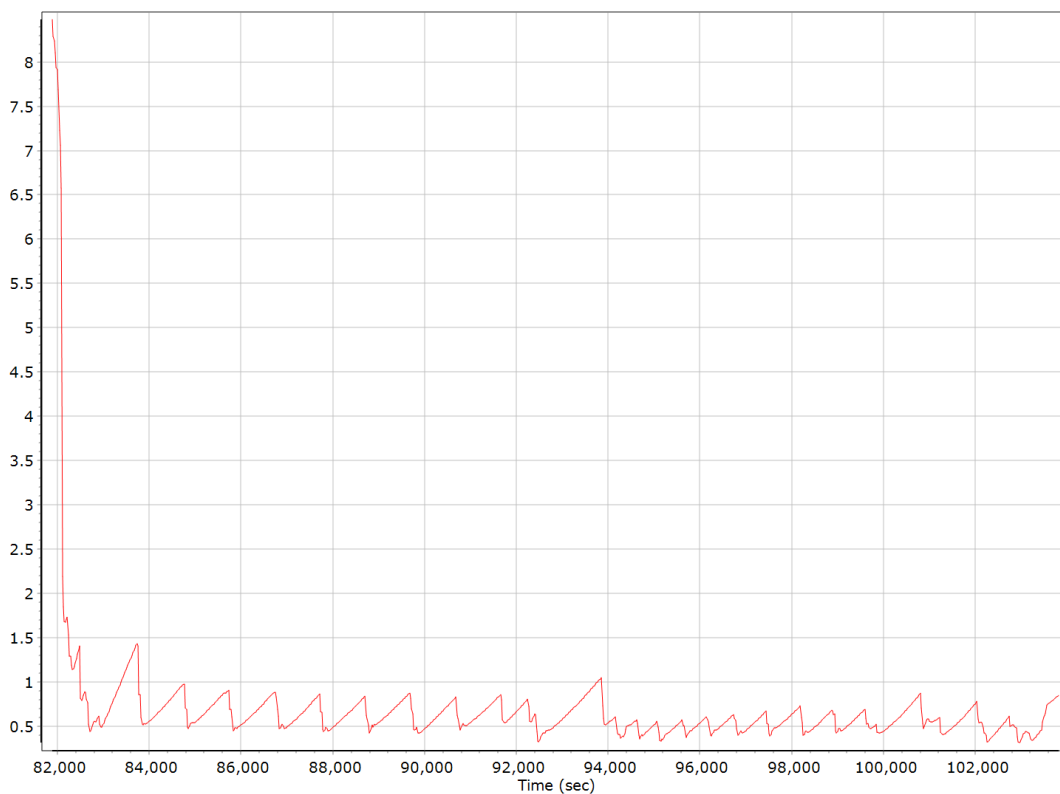
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

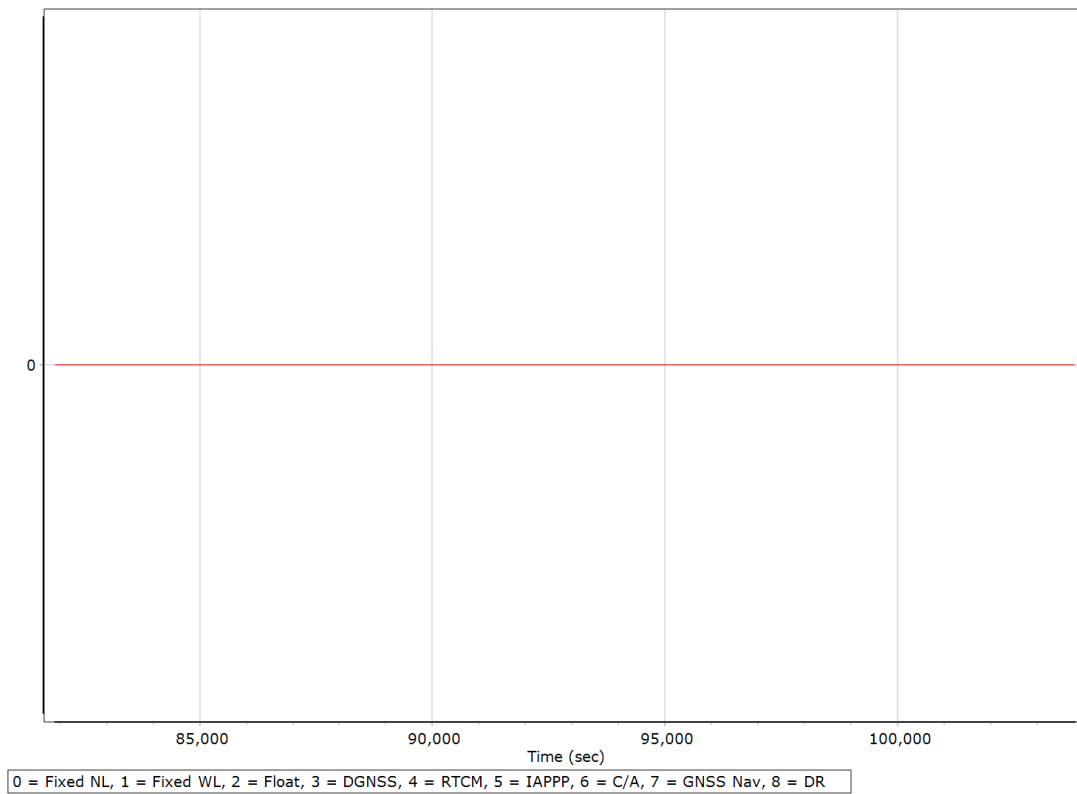


### Heading Error RMS (arc-min)

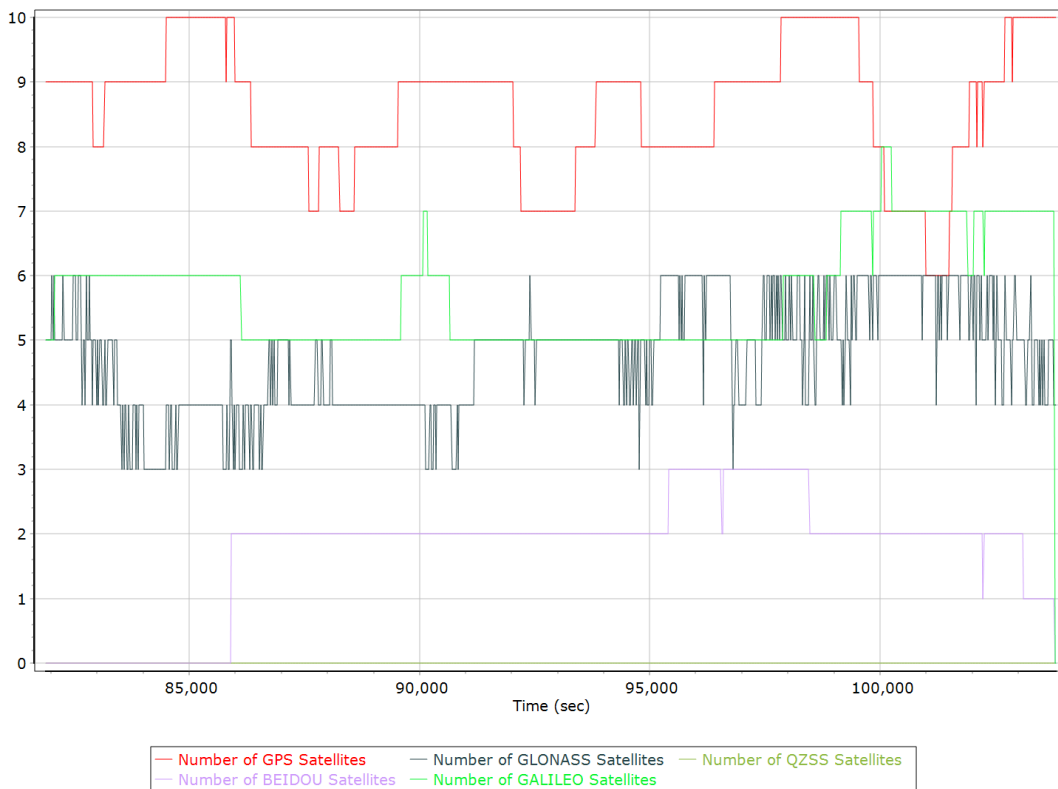


## Forward Processed Solution Status

### Processing Mode

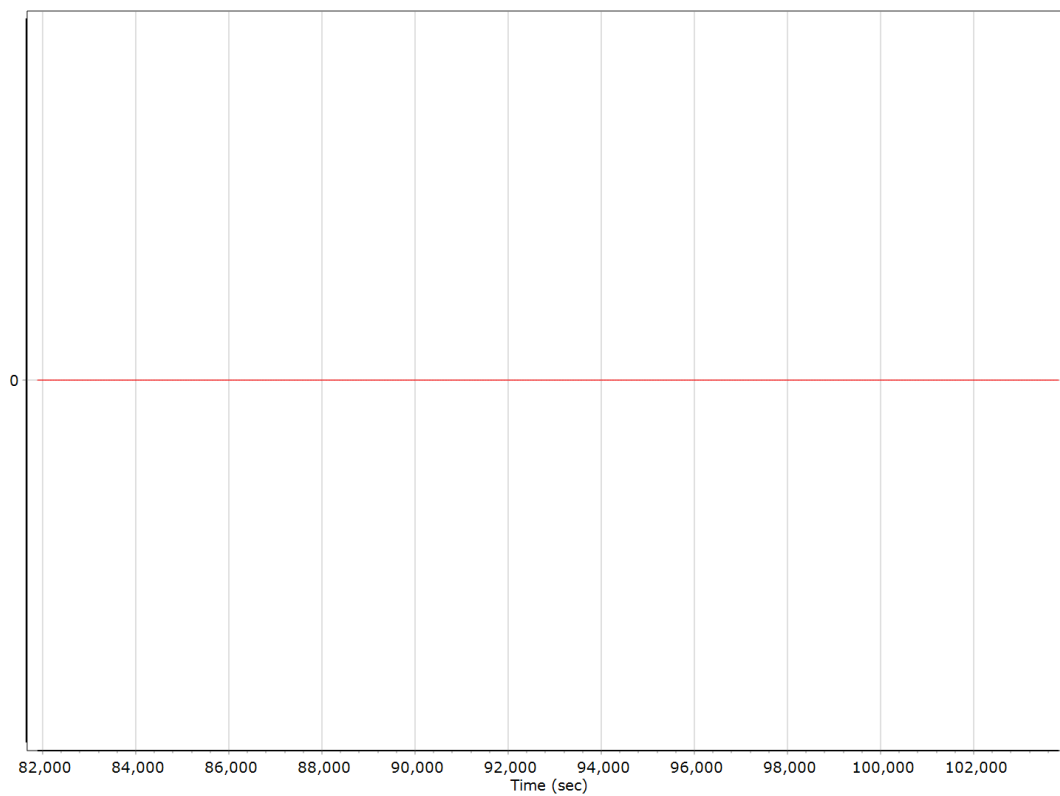


### Number of Satellites





## Baseline Length



## General Information

### Mission Information

Project name	05272022A_3062
Processing date	2022-06-01 14:49:44
Mission date	2022-05-27 14:09:55
Mission duration	06:04:05.309
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
ALS.000	POS Data
ALS.001	POS Data
ALS.002	POS Data
ALS.003	POS Data
ALS.004	POS Data
ALS.005	POS Data
ALS.006	POS Data
ALS.007	POS Data
ALS.008	POS Data
ALS.009	POS Data
ALS.010	POS Data
ALS.011	POS Data
ALS.012	POS Data
ALS.013	POS Data
ALS.014	POS Data
ALS.015	POS Data
ALS.016	POS Data
ALS.017	POS Data
ALS.018	POS Data
ALS.019	POS Data
ALS.020	POS Data
ALS.021	POS Data
ALS.022	POS Data
ALS.023	POS Data
ALS.024	POS Data
ALS.025	POS Data
ALS.026	POS Data
ALS.027	POS Data
ALS.028	POS Data
ALS.029	POS Data
ALS.030	POS Data
ALS.031	POS Data
ALS.032	POS Data
ALS.033	POS Data
ALS.034	POS Data
ALS.035	POS Data
ALS.036	POS Data
ALS.037	POS Data
ALS.038	POS Data
ALS.039	POS Data
ALS.040	POS Data
ALS.041	POS Data
ALS.042	POS Data
ALS.043	POS Data
ALS.044	POS Data
ALS.045	POS Data
ALS.046	POS Data
ALS.047	POS Data
ALS.048	POS Data
ALS.049	POS Data

### Input Files

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

### Output Files

Filename	File type
sbet_05272022A_3062.out	SBET Trajectory File

## Rover Data Summary

First raw data file	ALS.000		
Last raw data file	ALS.049		
Start GPS week	2211		
Start time	482976.979 (5/27/2022 2:09:36 PM)		
End time	504822.288 (5/27/2022 8:13:42 PM)		
Start of fine alignment	483787.427 (5/27/2022 2:23:07 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

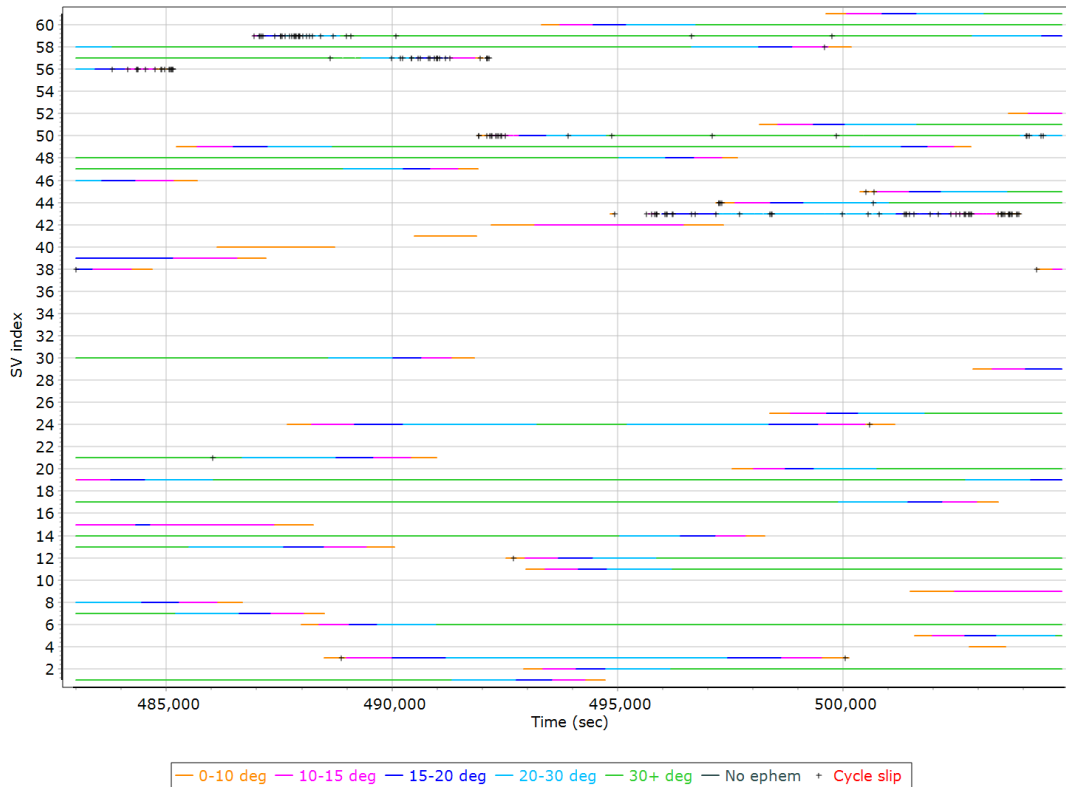
## Rover Data QC

### Raw IMU Import QC Summary

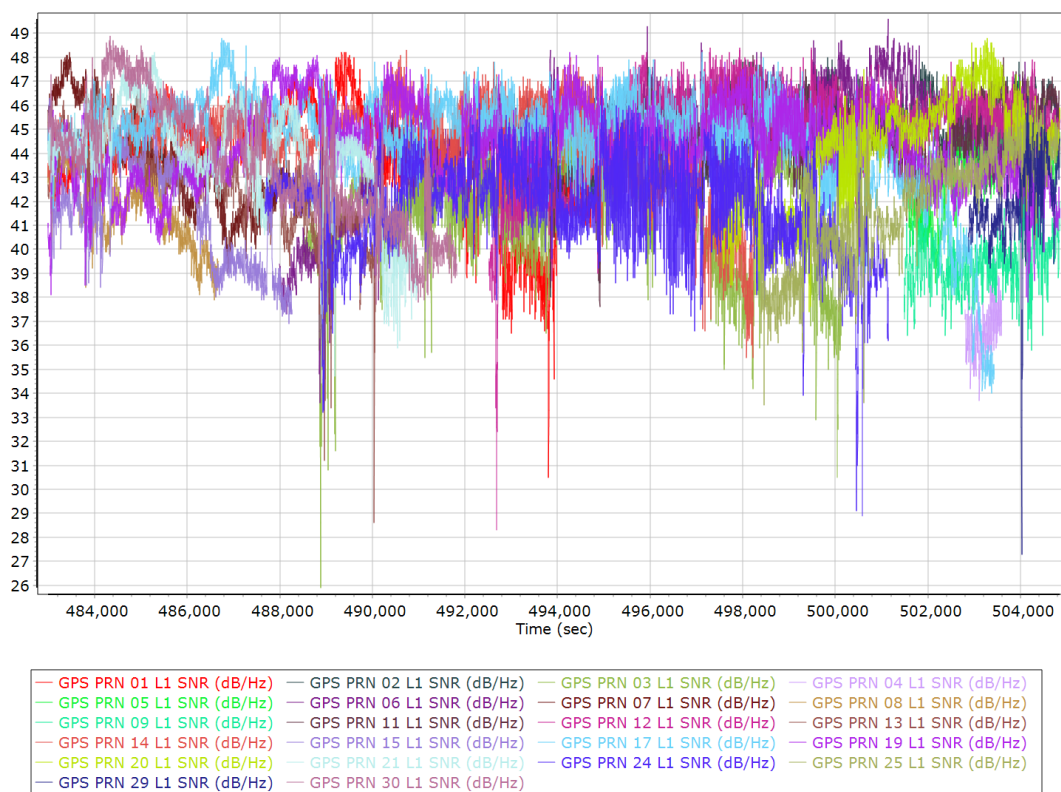
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05272022A_3062.log
IMU Records Processed	4369665
Termination Status	Normal
IMU Anomalies	0

## Primary Observables & Satellite Data

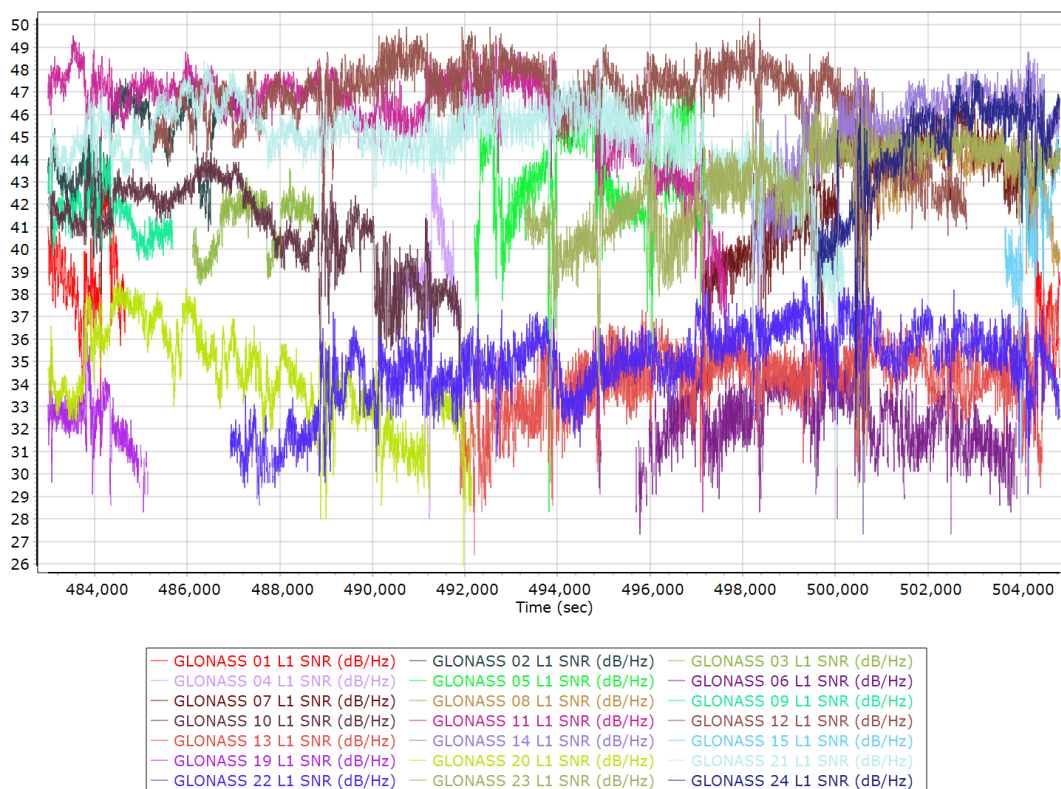
### GPS/GLONASS L1 Satellite Lock/Elevation



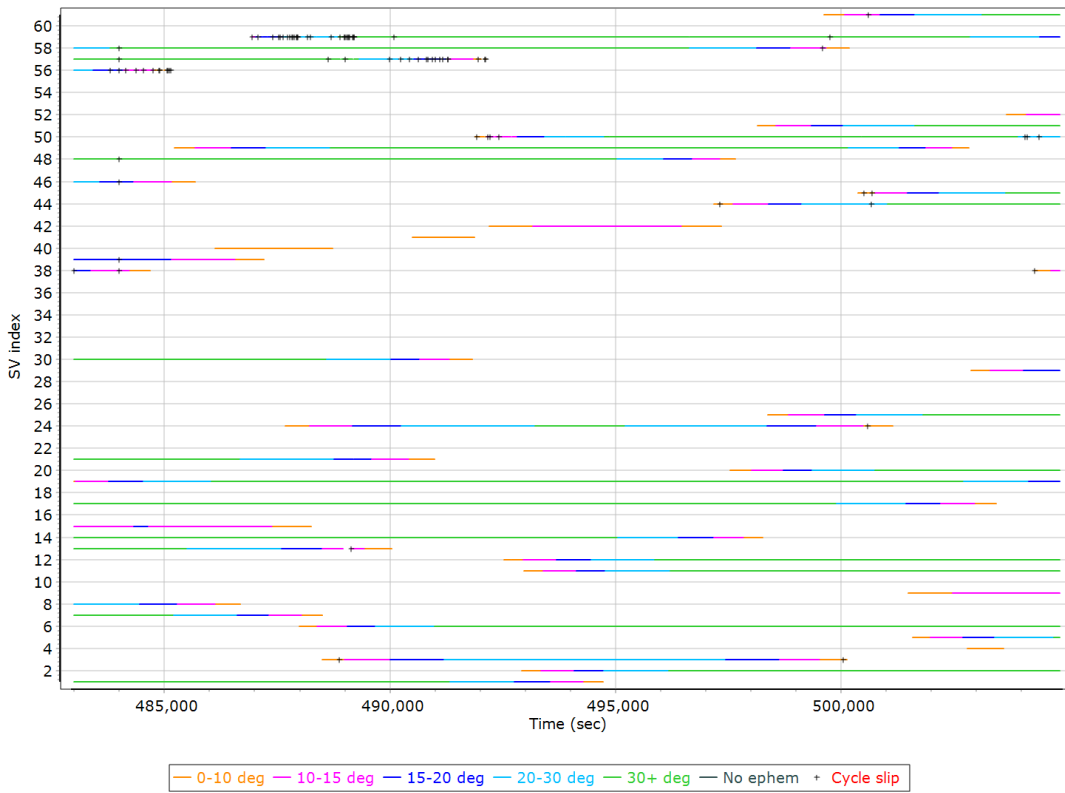
## GPS L1 SNR



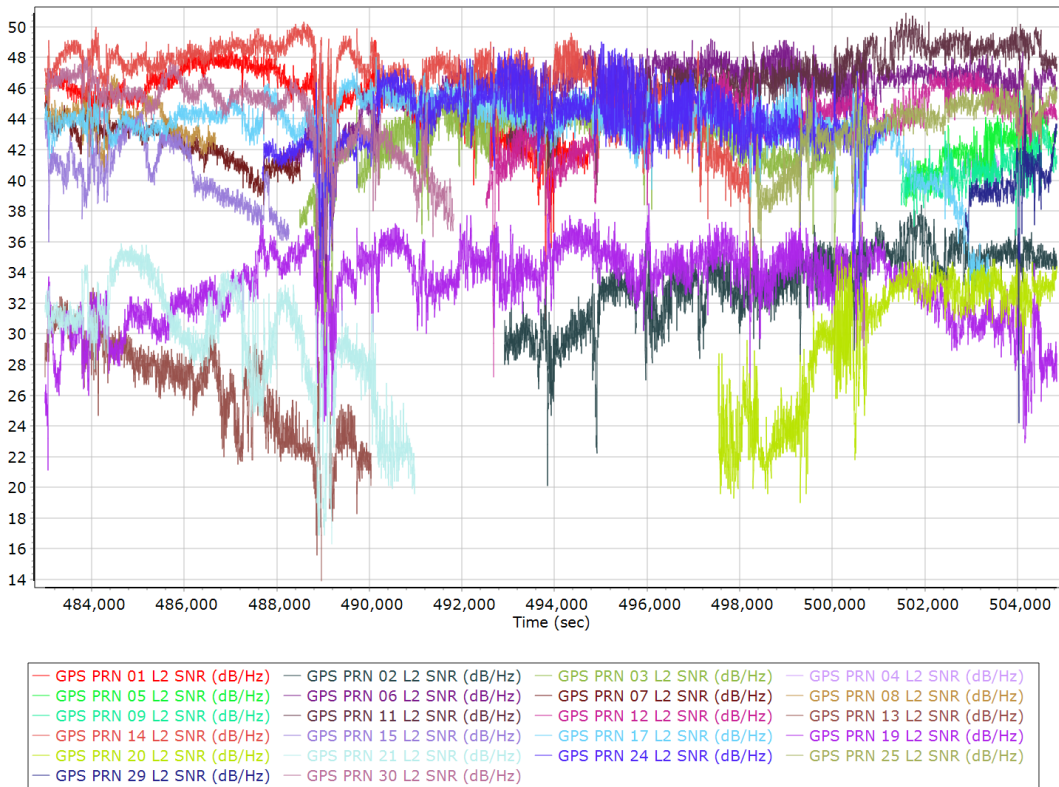
## GLONASS L1 SNR



## GPS/GLONASS L2 Satellite Lock/Elevation

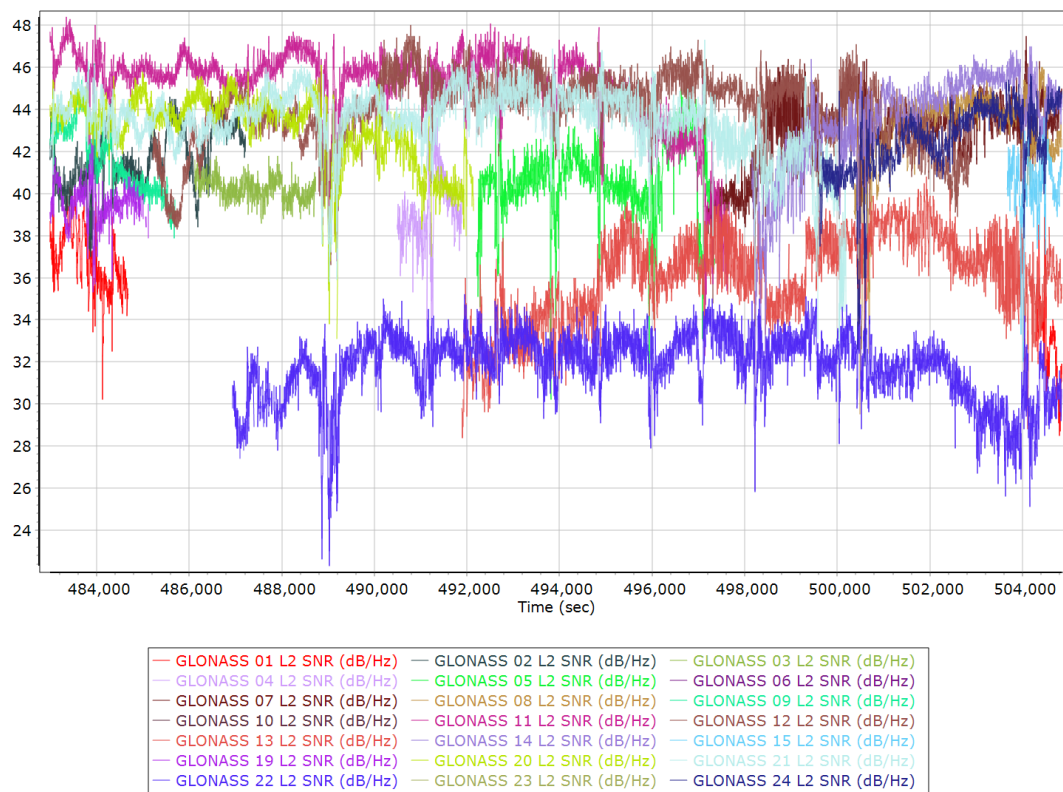


## GPS L2 SNR

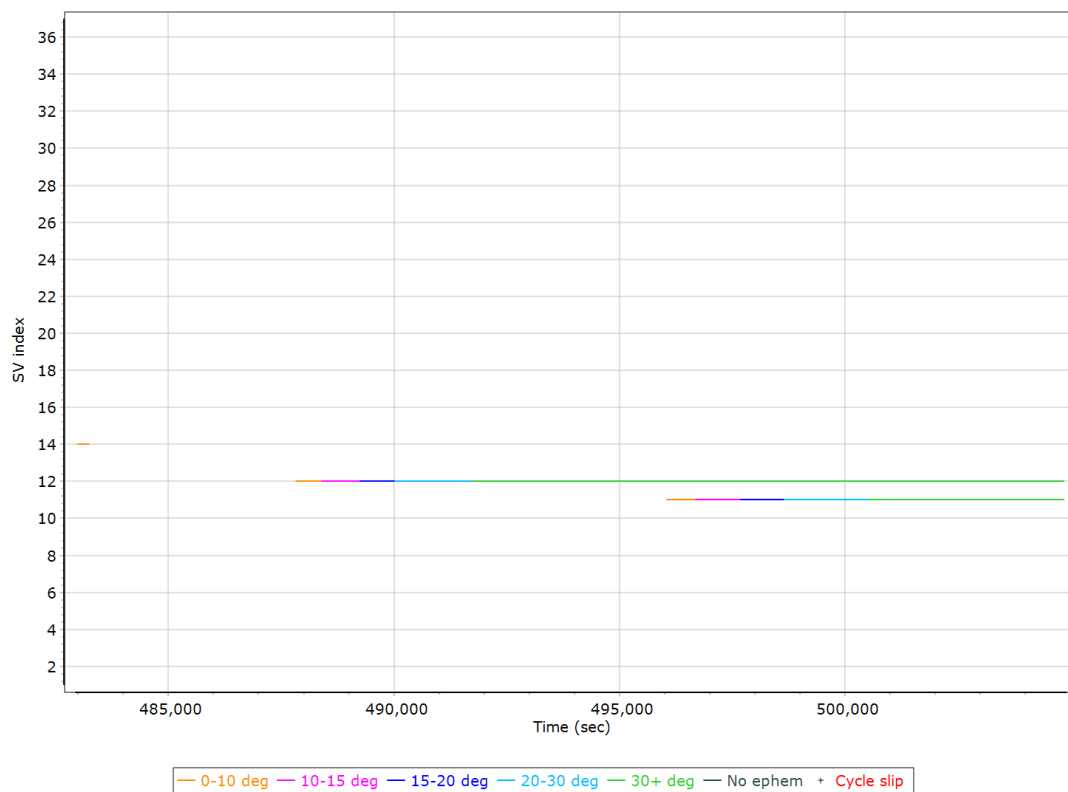




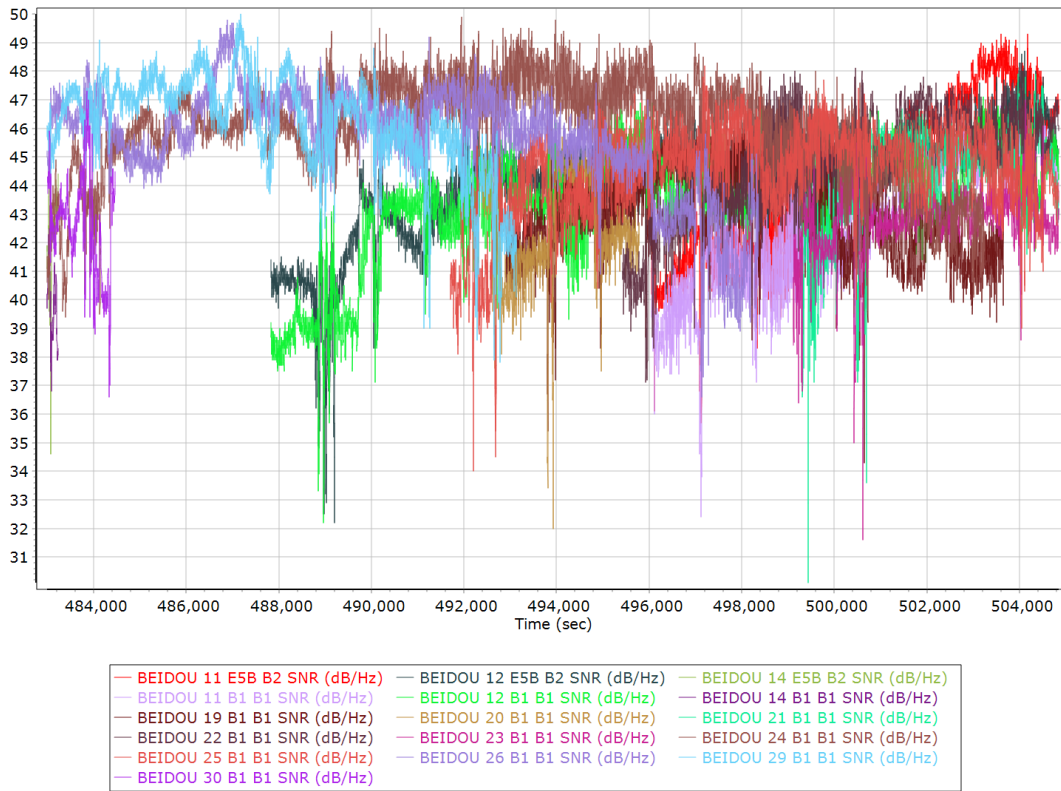
## GLONASS L2 SNR



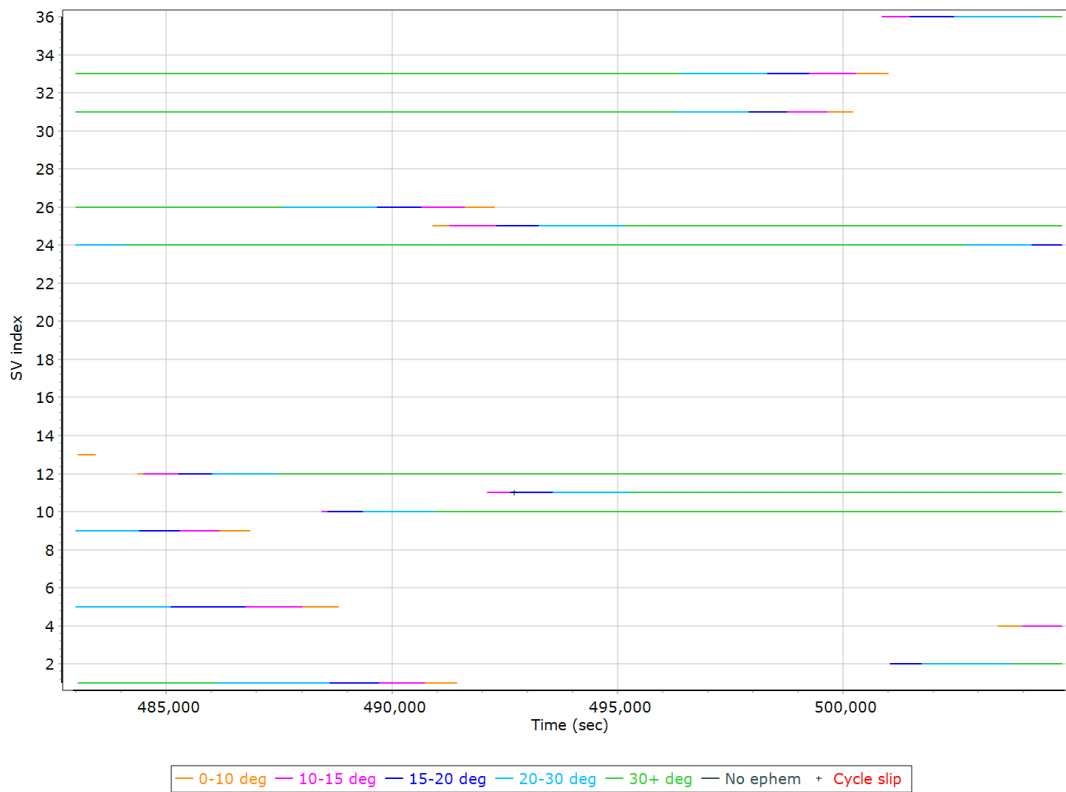
## BEIDOU Satellite Lock/Elevation



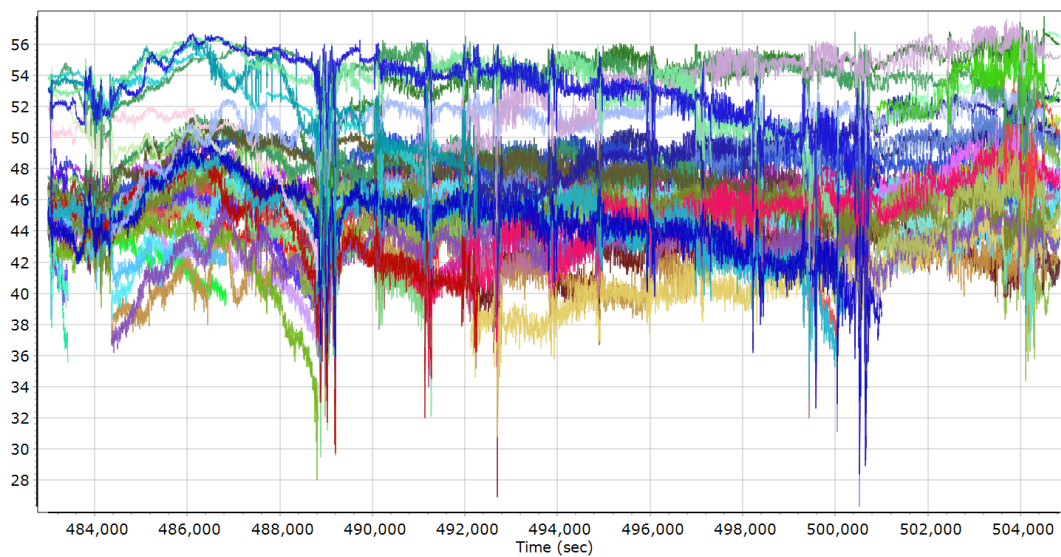
## BEIDOU SNR



## GALILEO Satellite Lock/Elevation

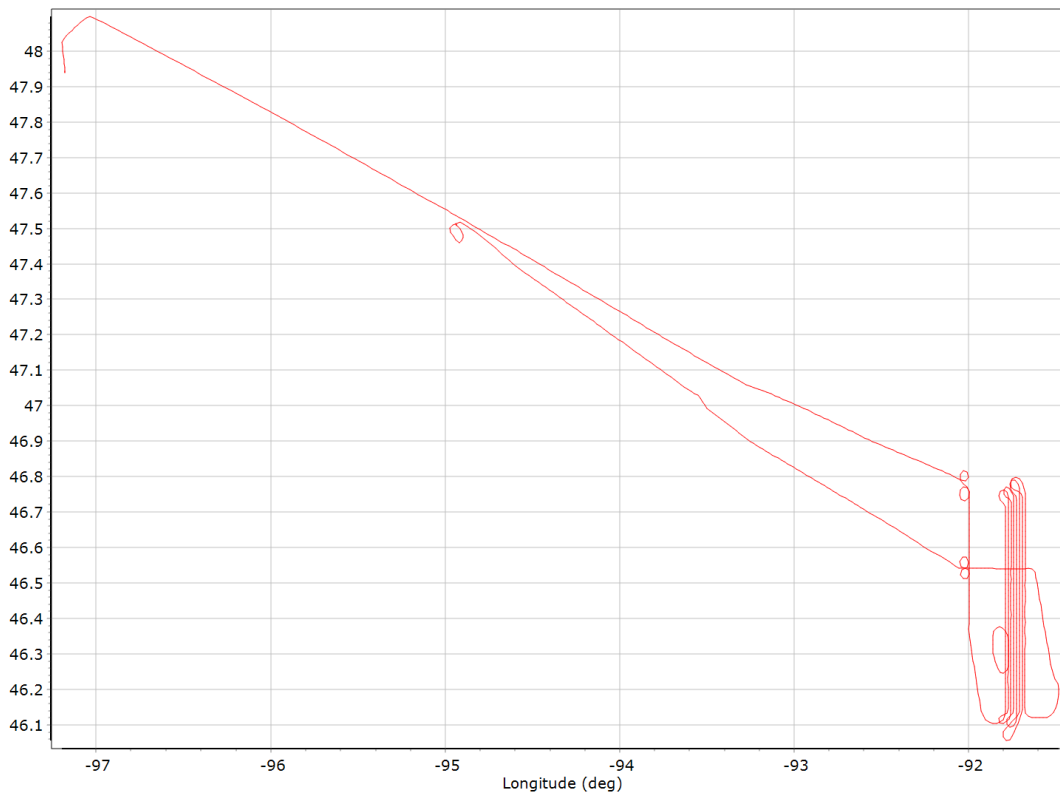


## GALILEO SNR

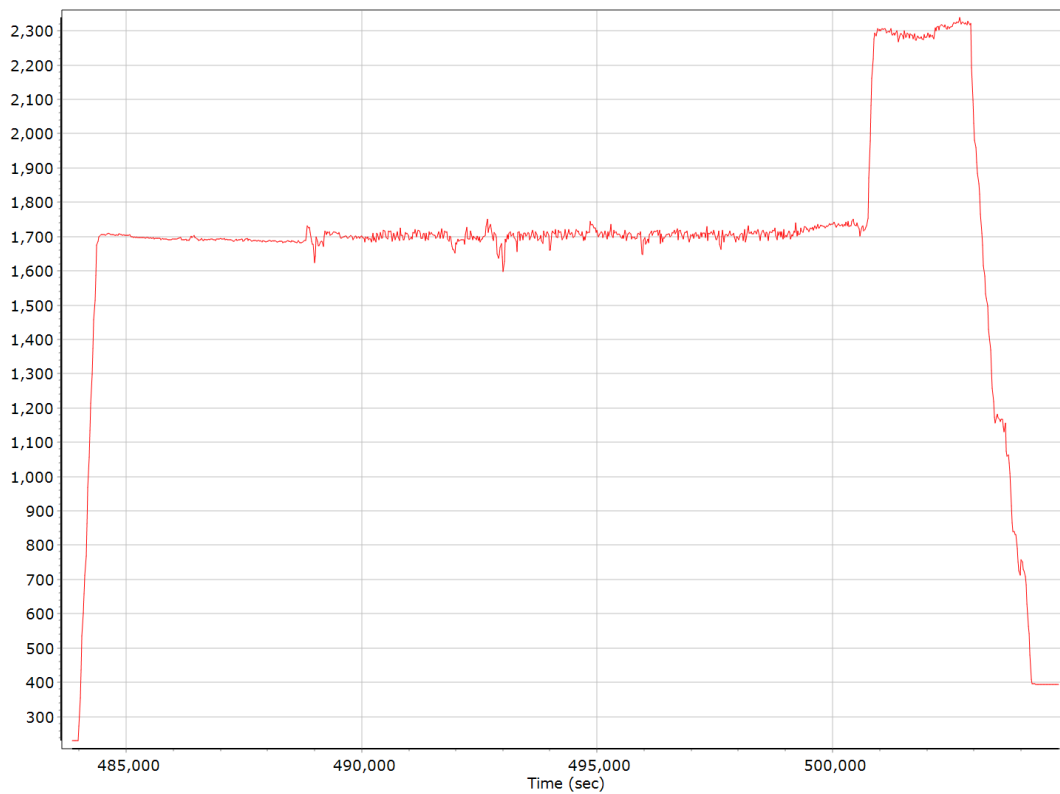


## Smoothed Trajectory Information

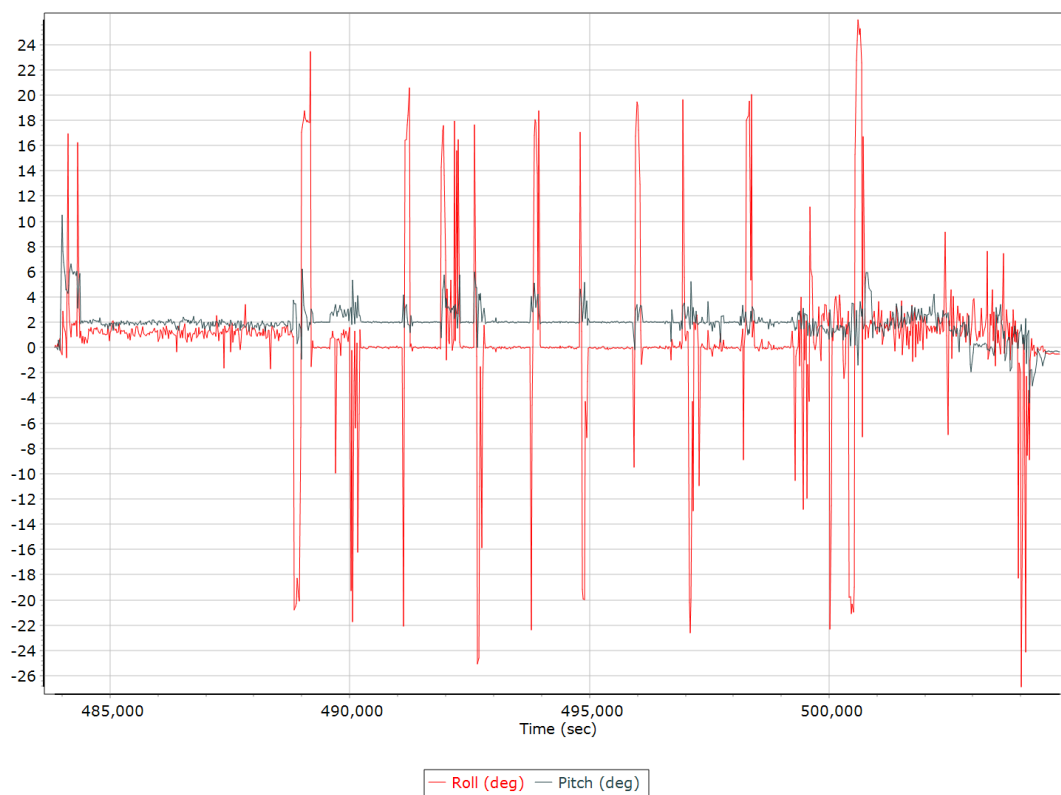
### Top View



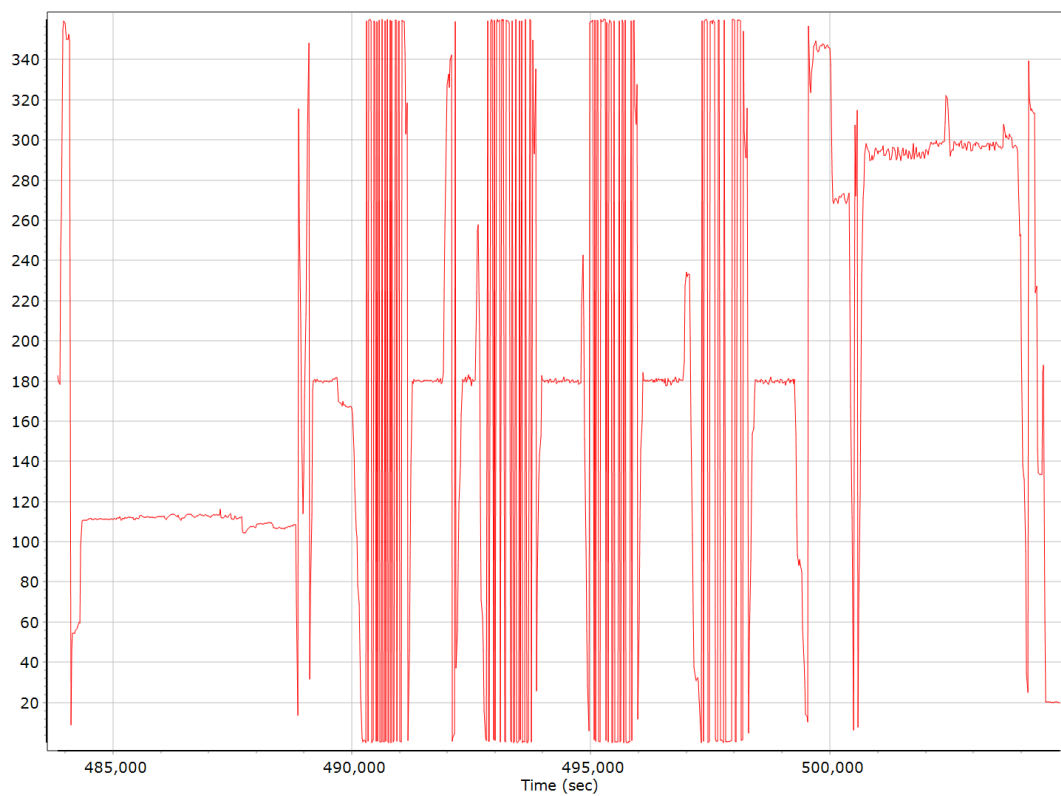
### Altitude



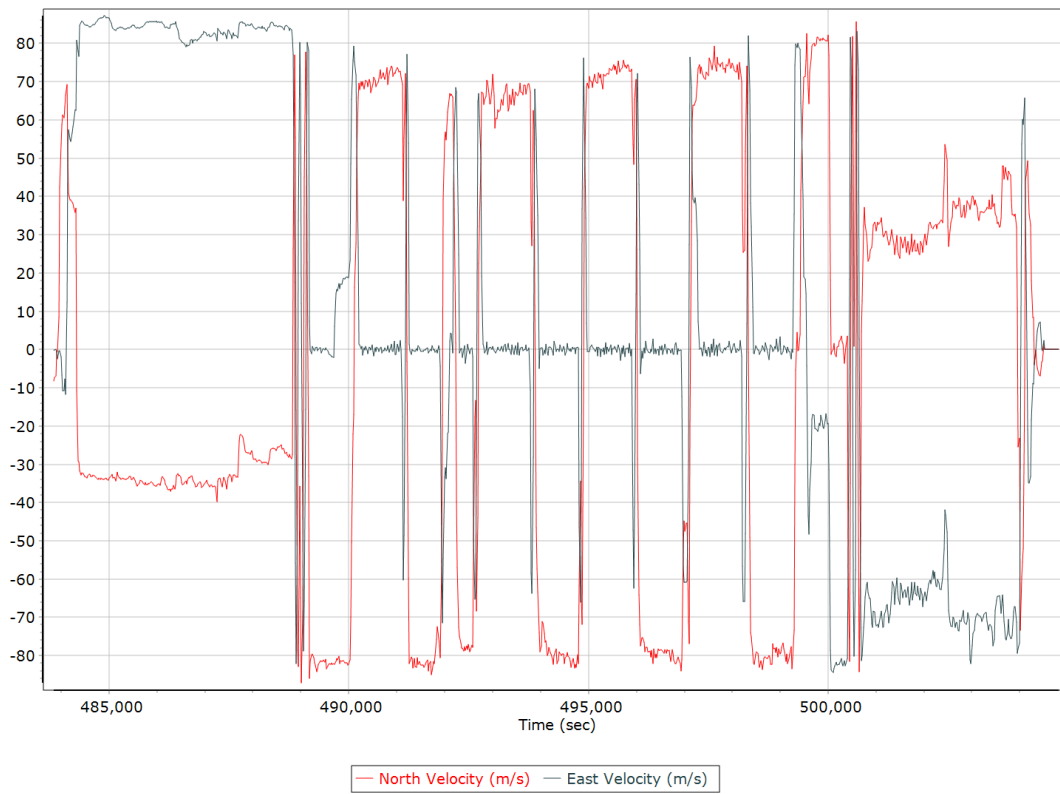
## Roll/Pitch



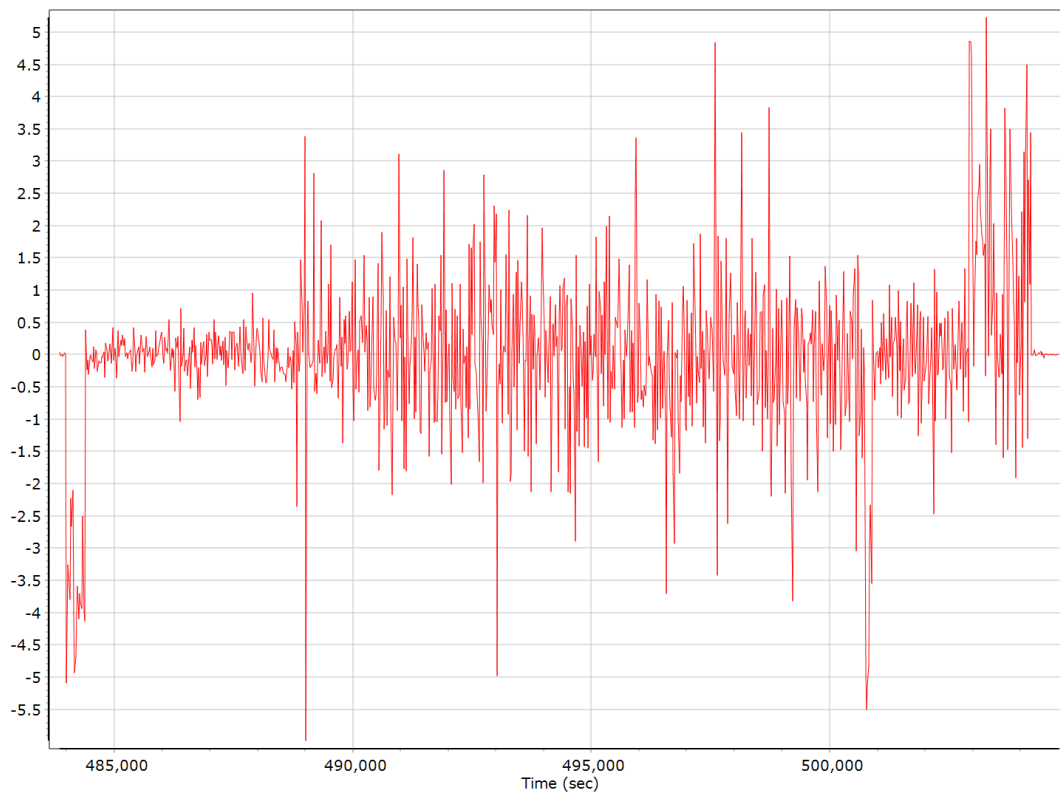
## Heading



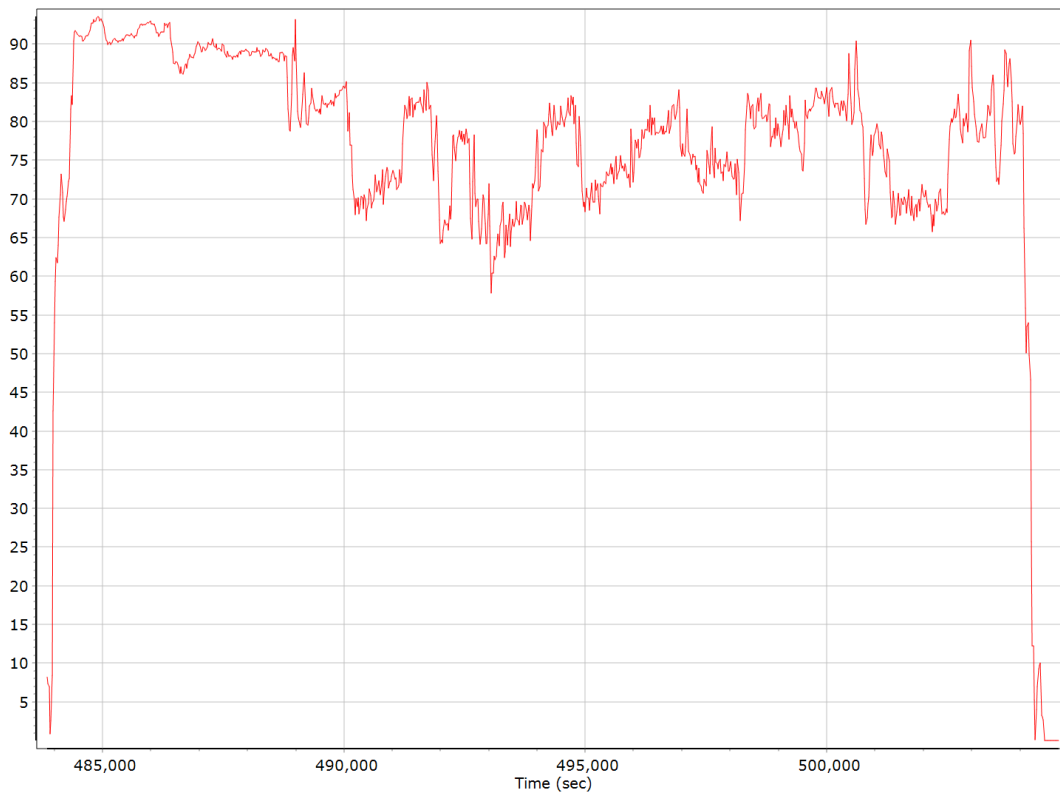
## North/East Velocity



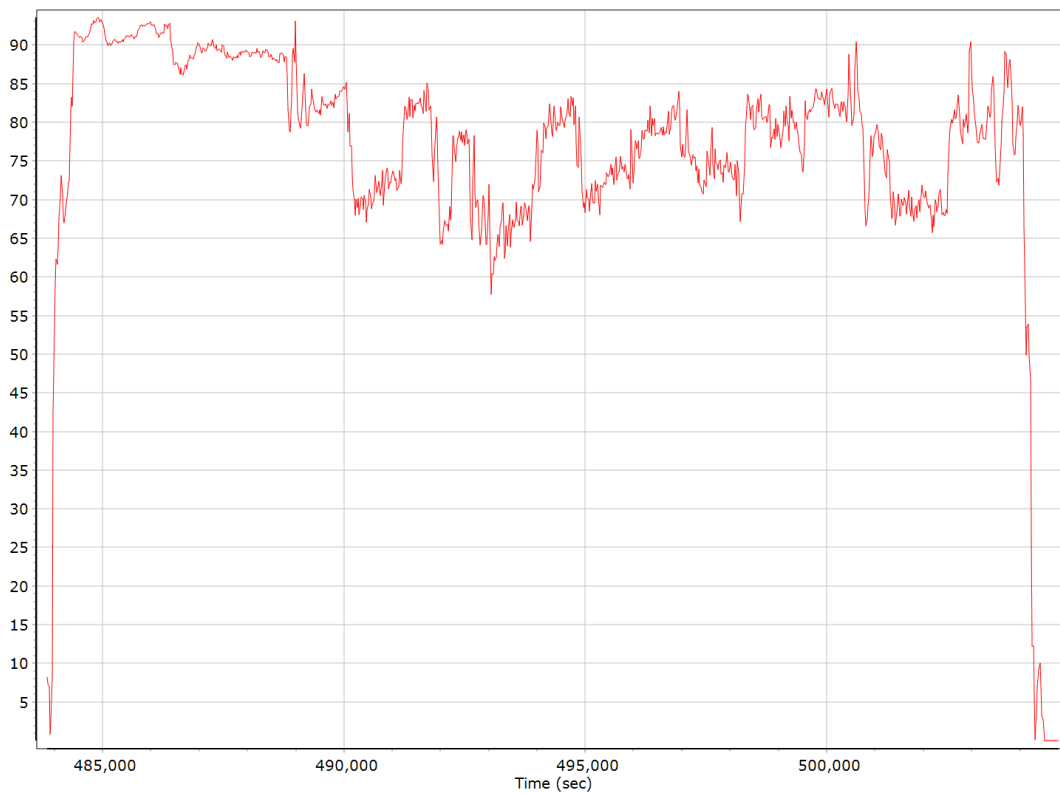
## Down Velocity



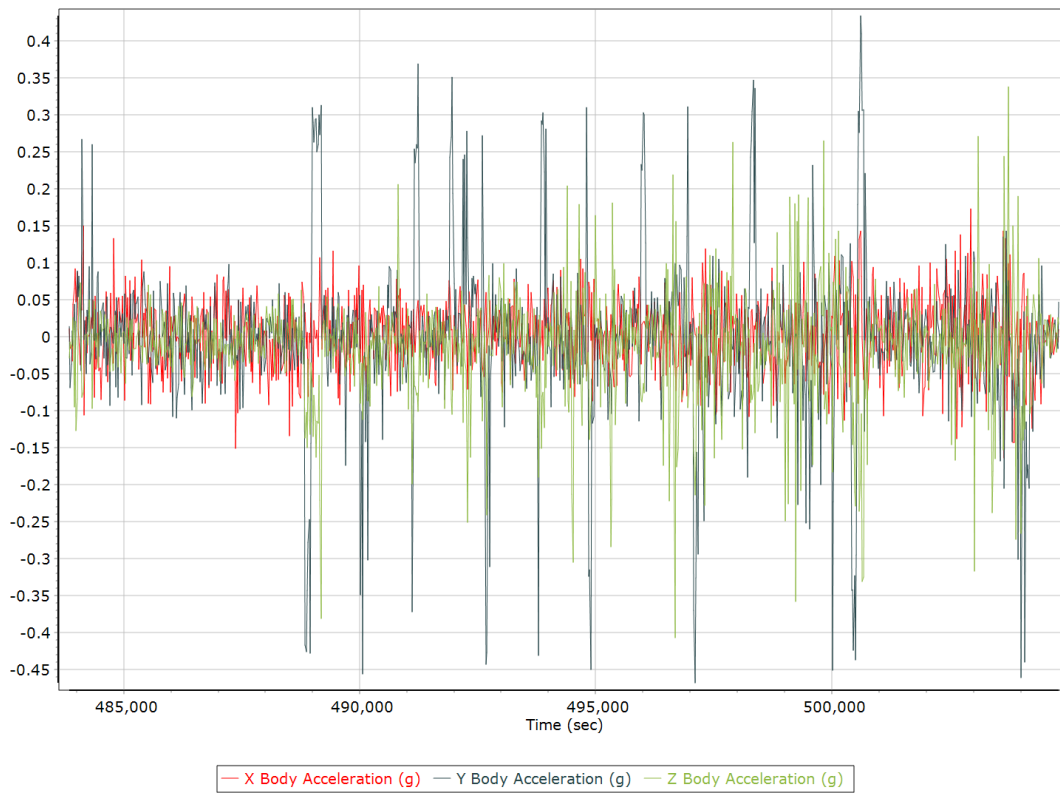
## Total Speed



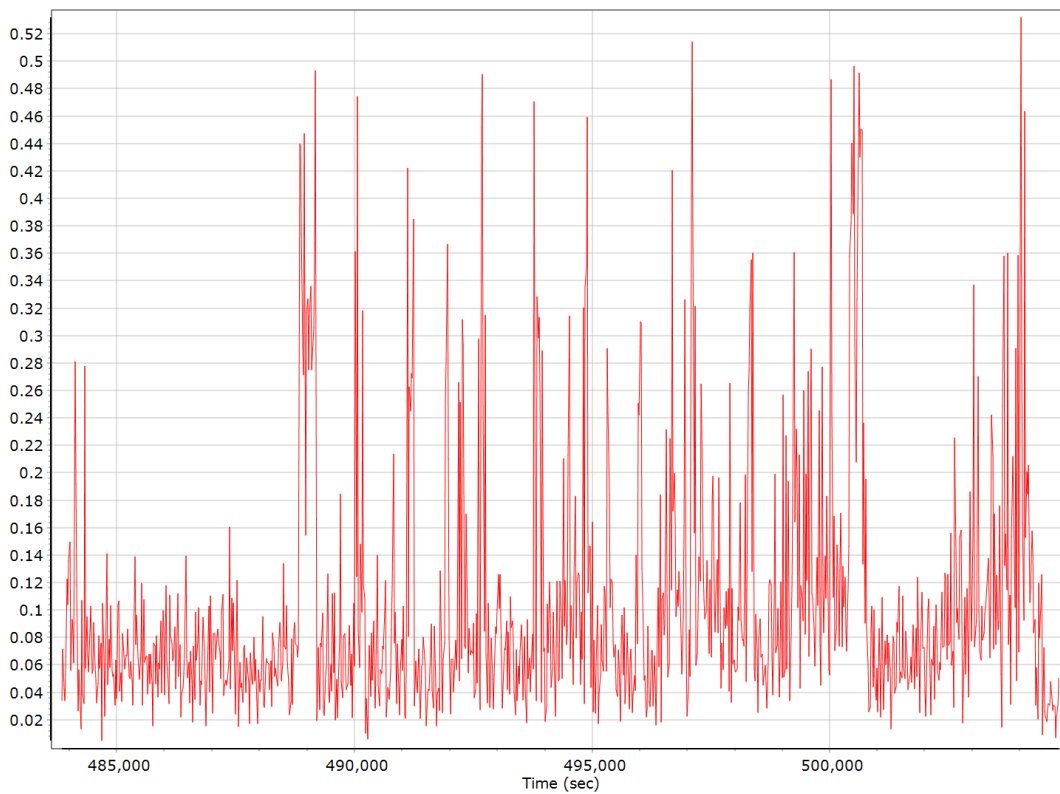
## Ground Speed



## Body Acceleration



## Total Body Acceleration



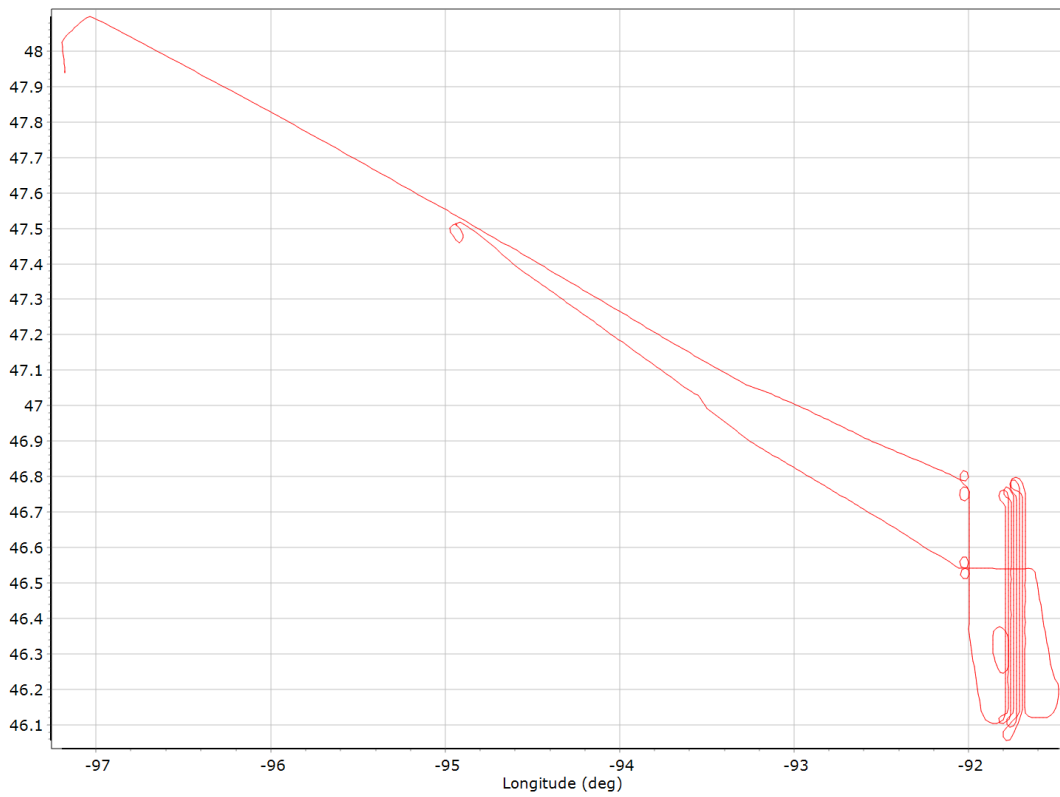


## Body Angular Rate

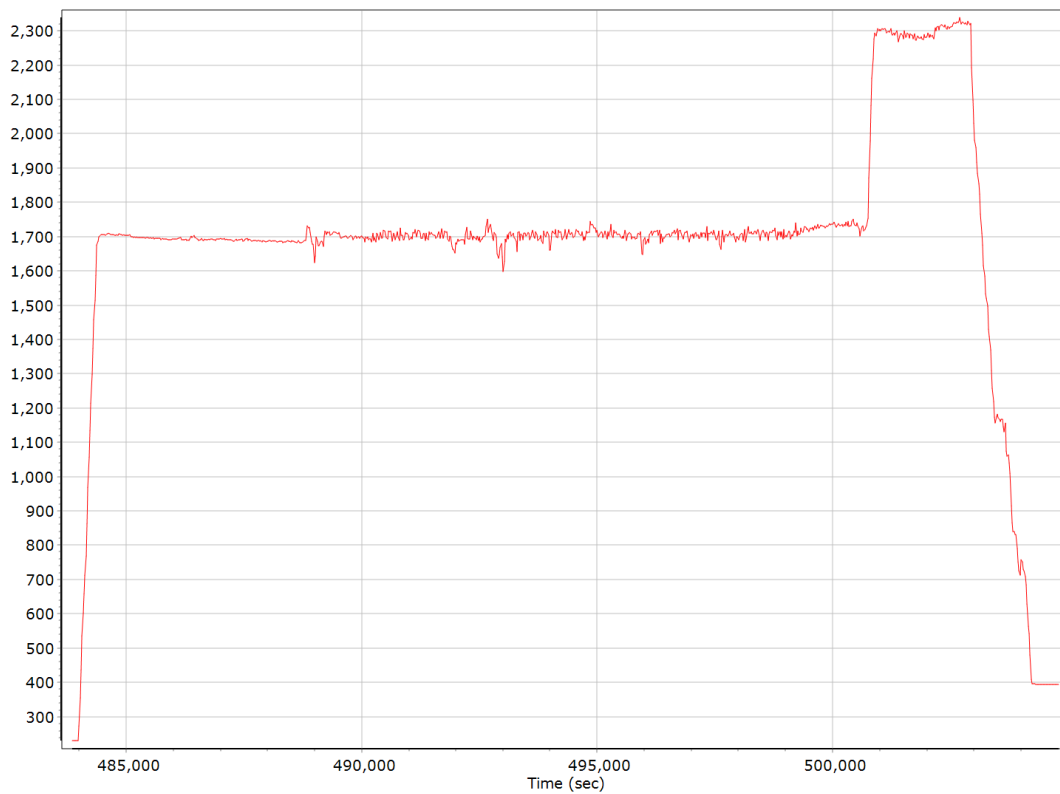


## Forward Processed Trajectory Information

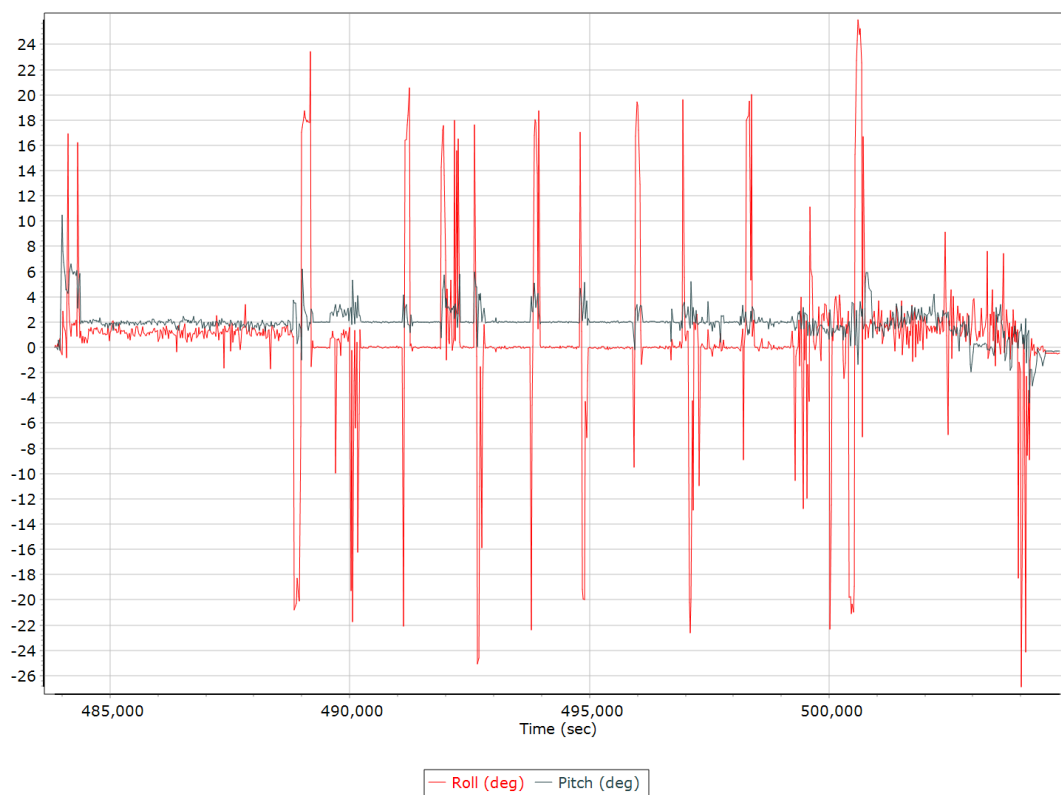
### Top View



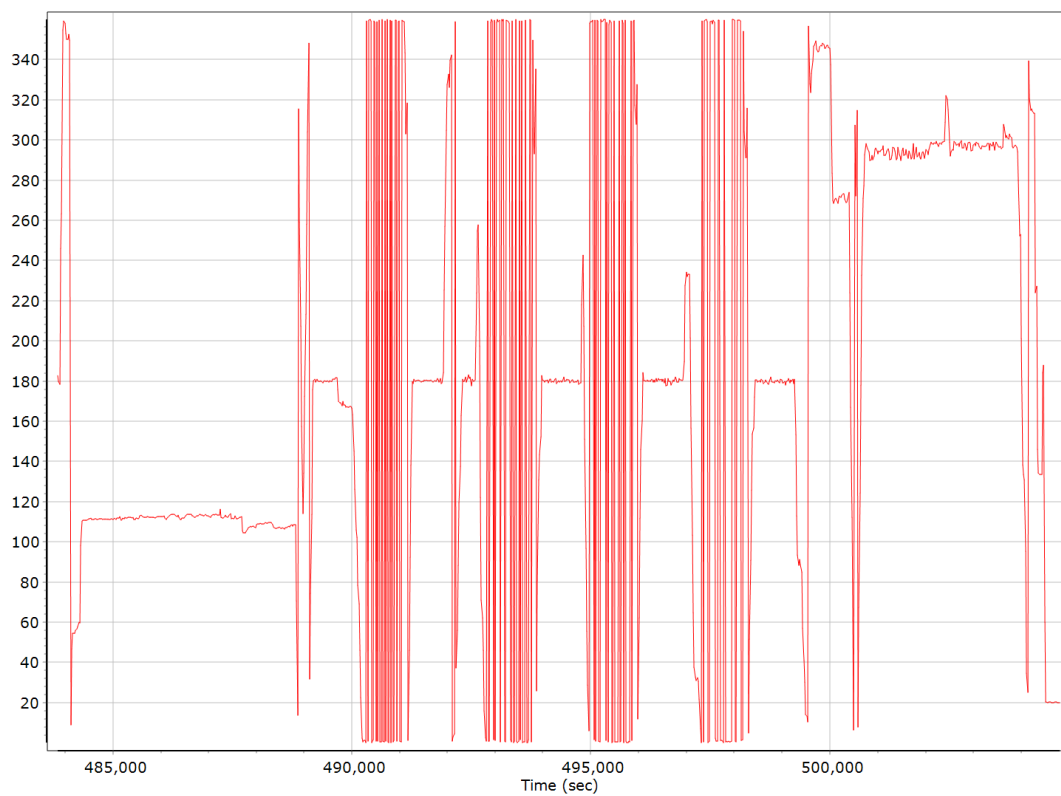
### Altitude



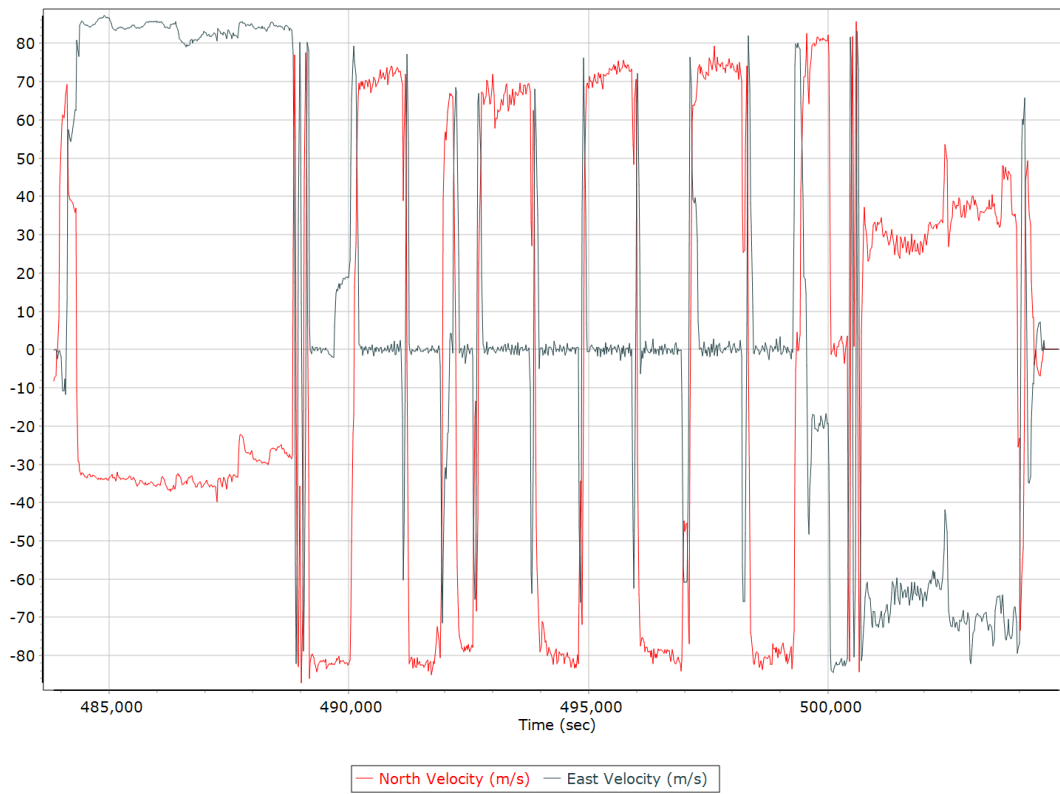
## Roll/Pitch



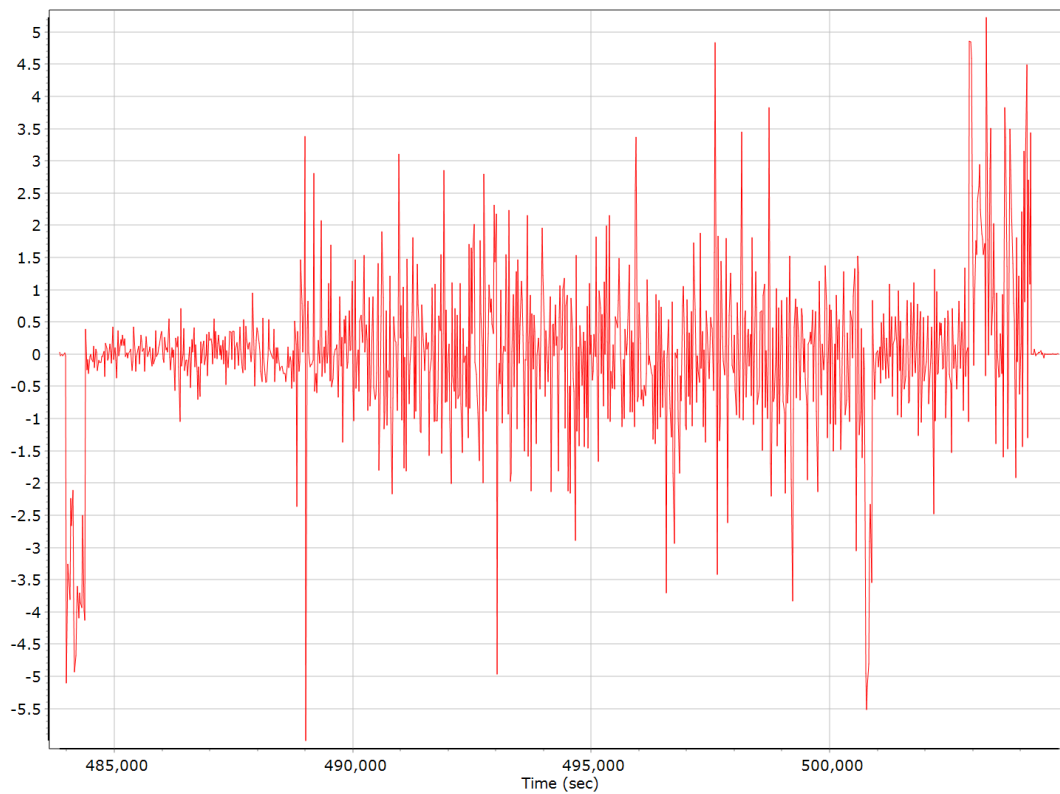
## Heading



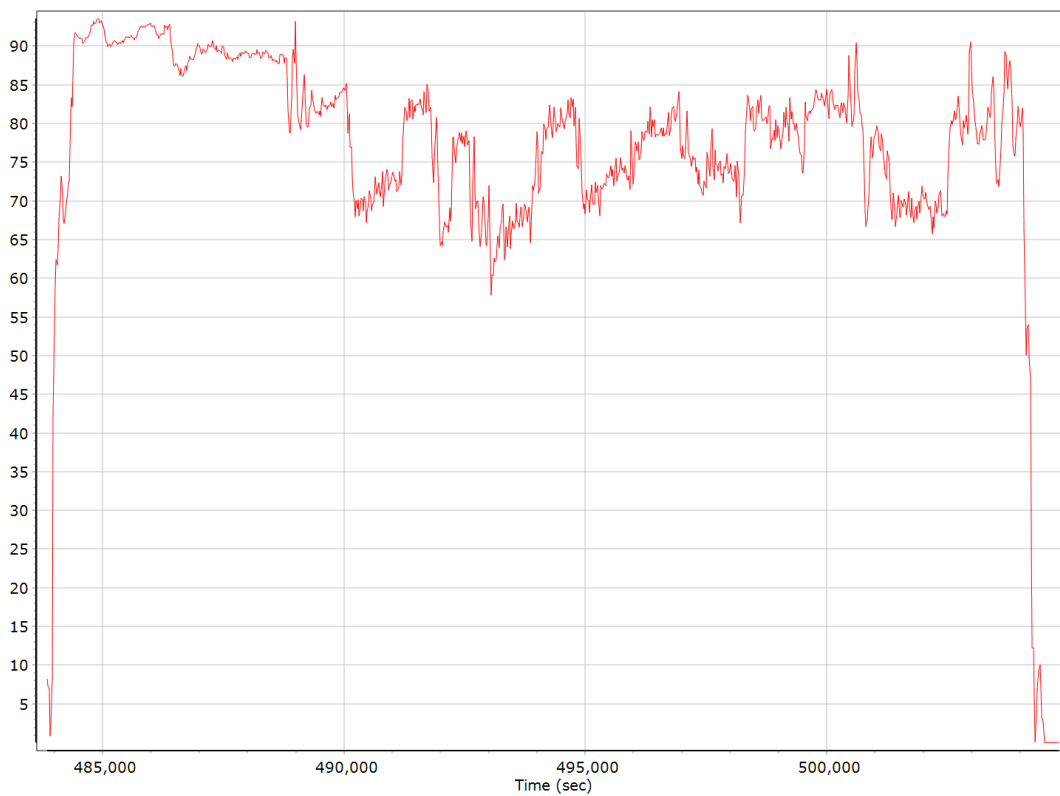
## North/East Velocity



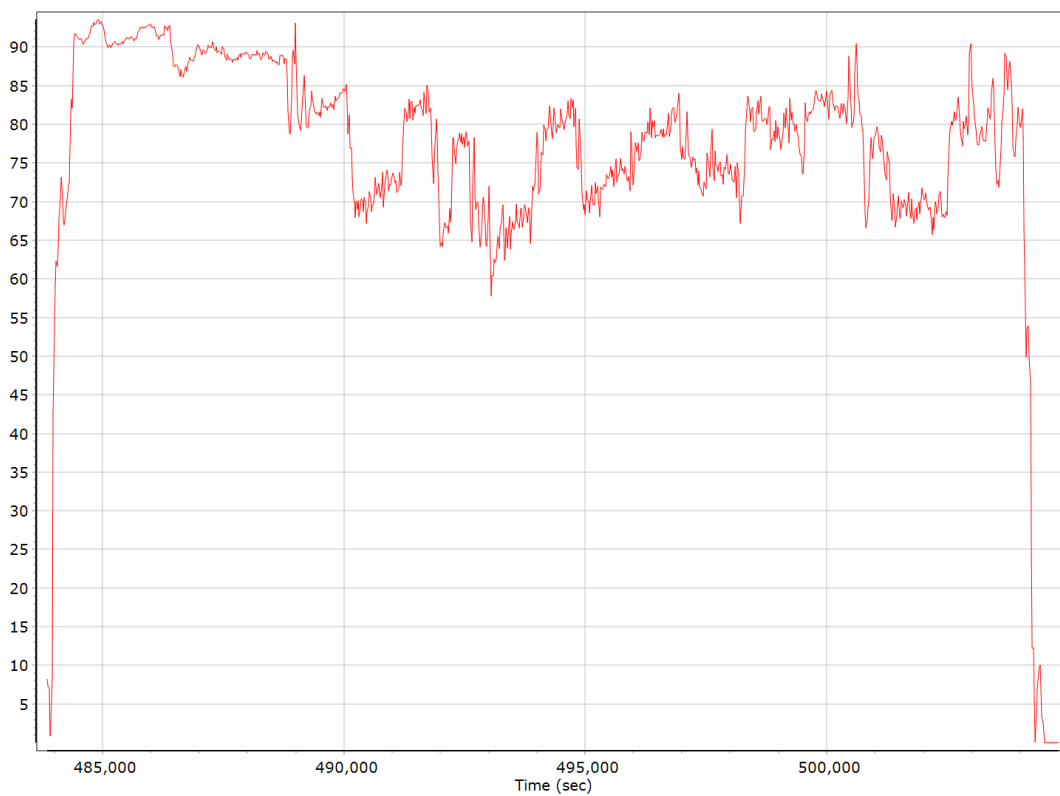
## Down Velocity



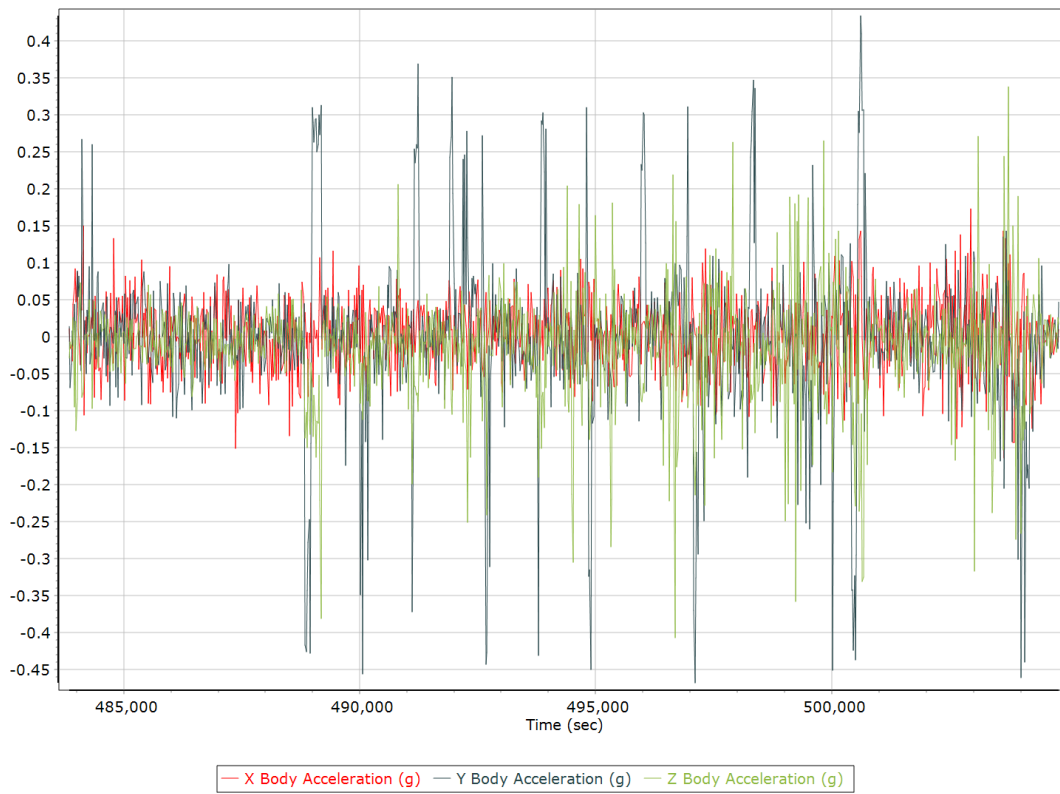
## Total Speed



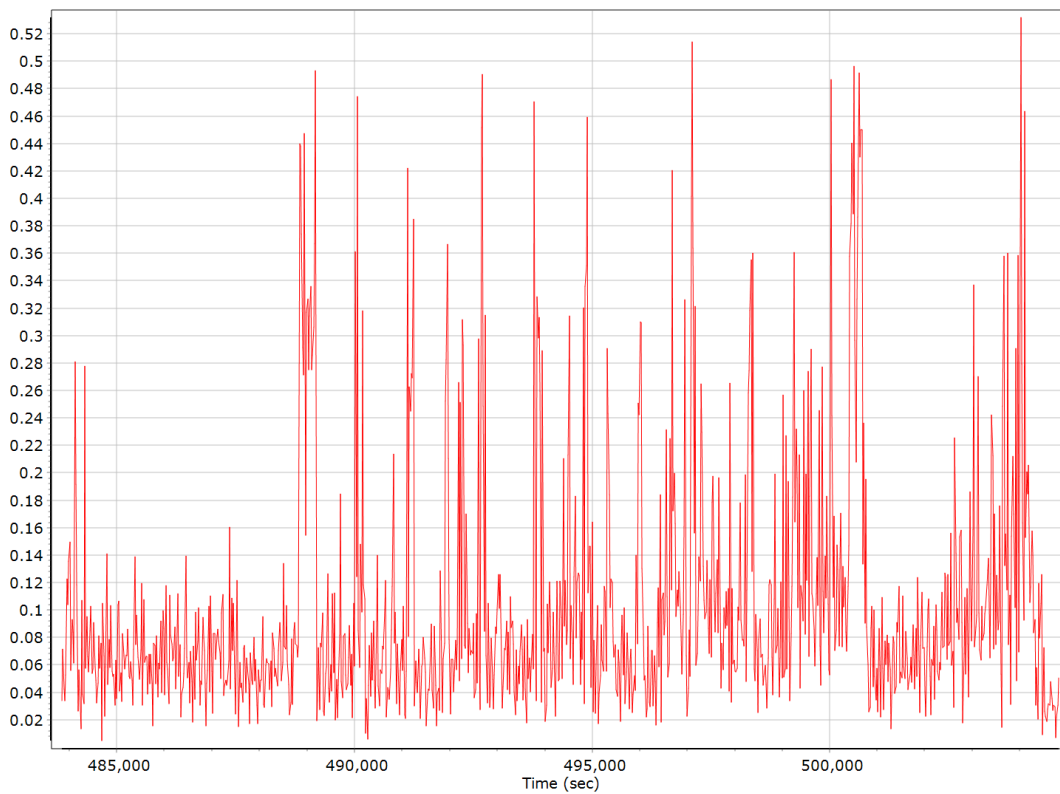
## Ground Speed



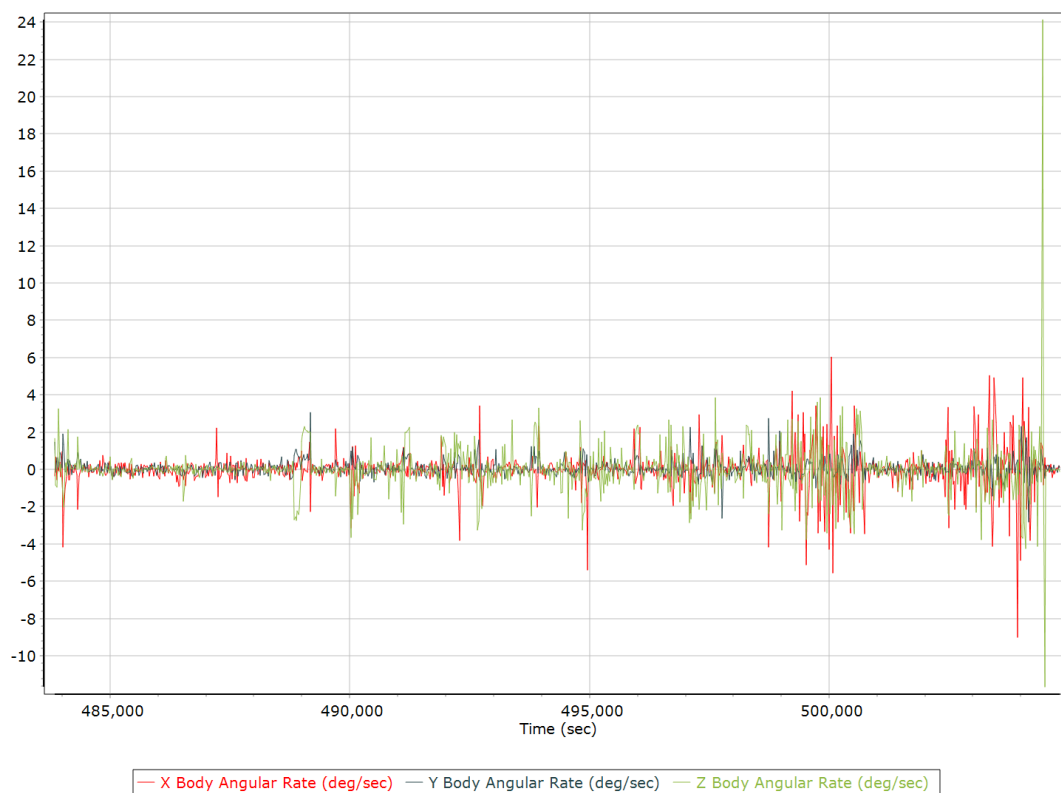
## Body Acceleration



## Total Body Acceleration



## Body Angular Rate

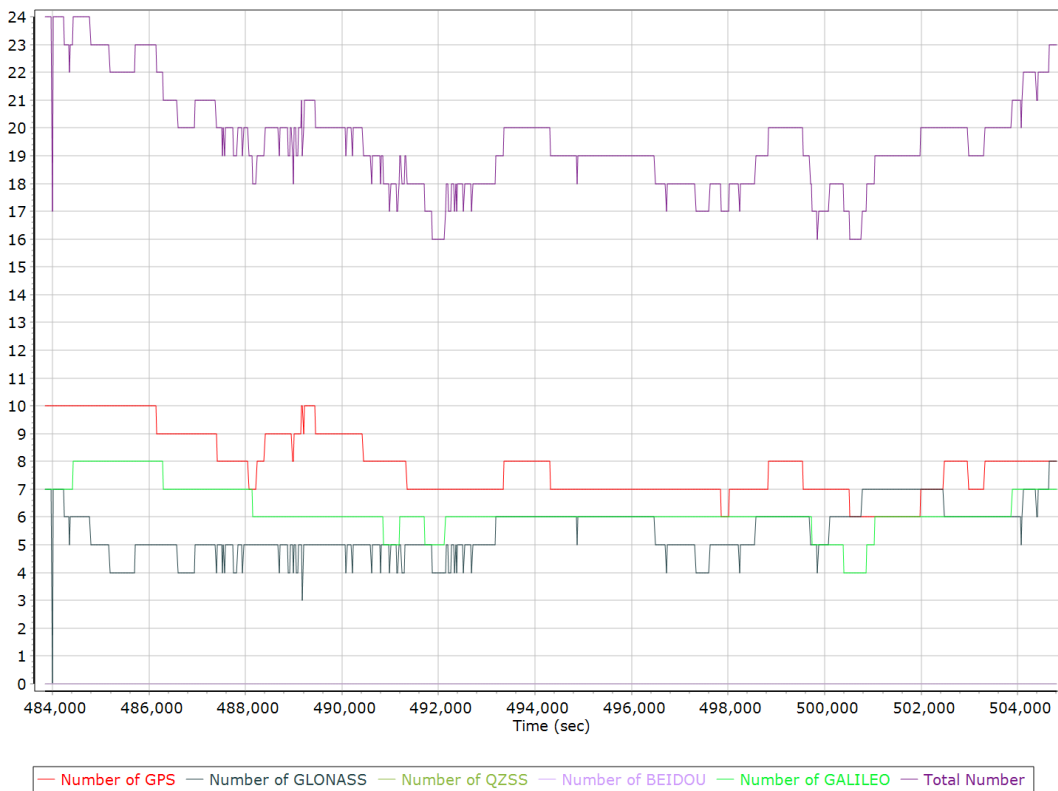


## GNSS QC

### 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	0	8	6
Number of QZSS SV	0	0	0
Number of BEIDOU SV	0	0	0
Number of GALILEO SV	3	8	6
Total number of SV	15	24	20
PDOP	0.99	1.70	1.18
QC Solution Gaps	1.00	1.00	
Solution Type	Fixed	Float	No solution
Epoch (sec)	21840.00	0.00	2.00
Percentage	99.99	0.00	0.01

### Num SVs in solution

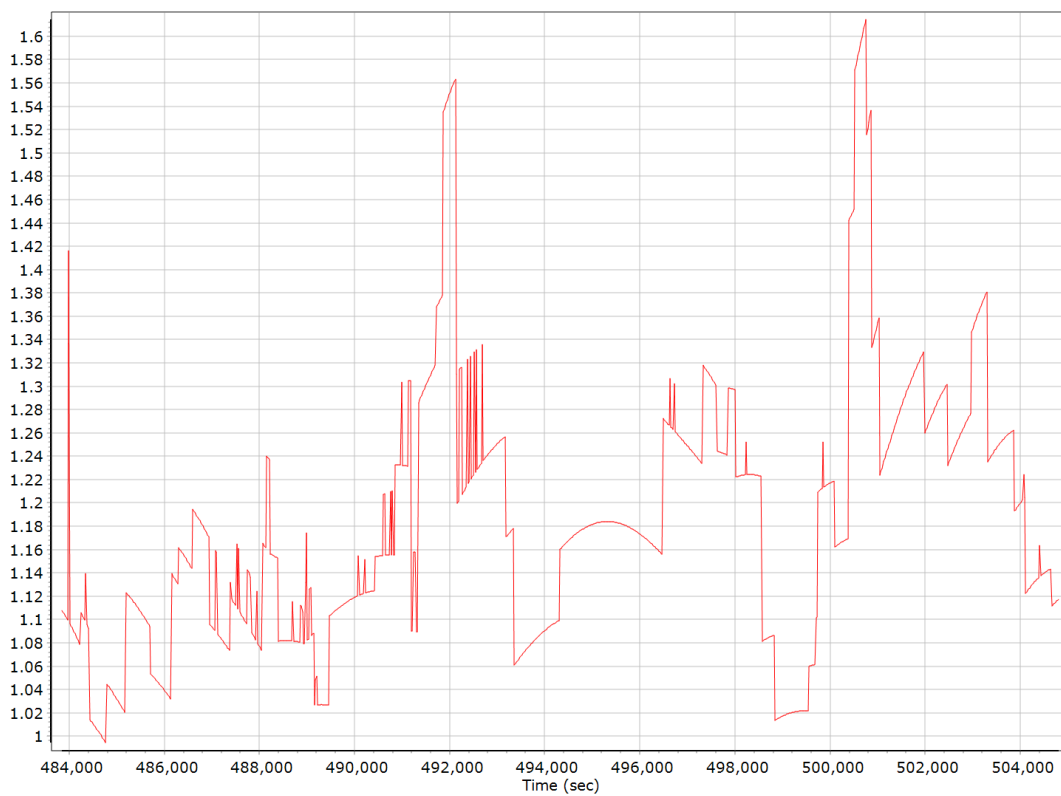




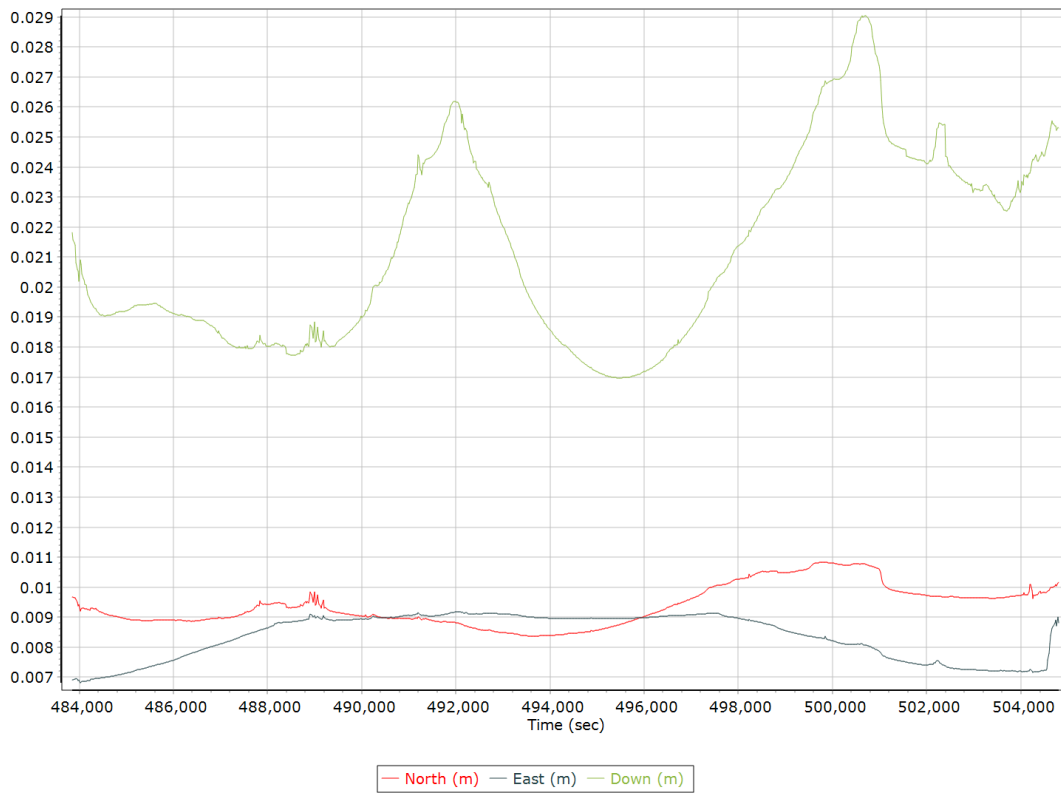
## Forward/Reverse Separation



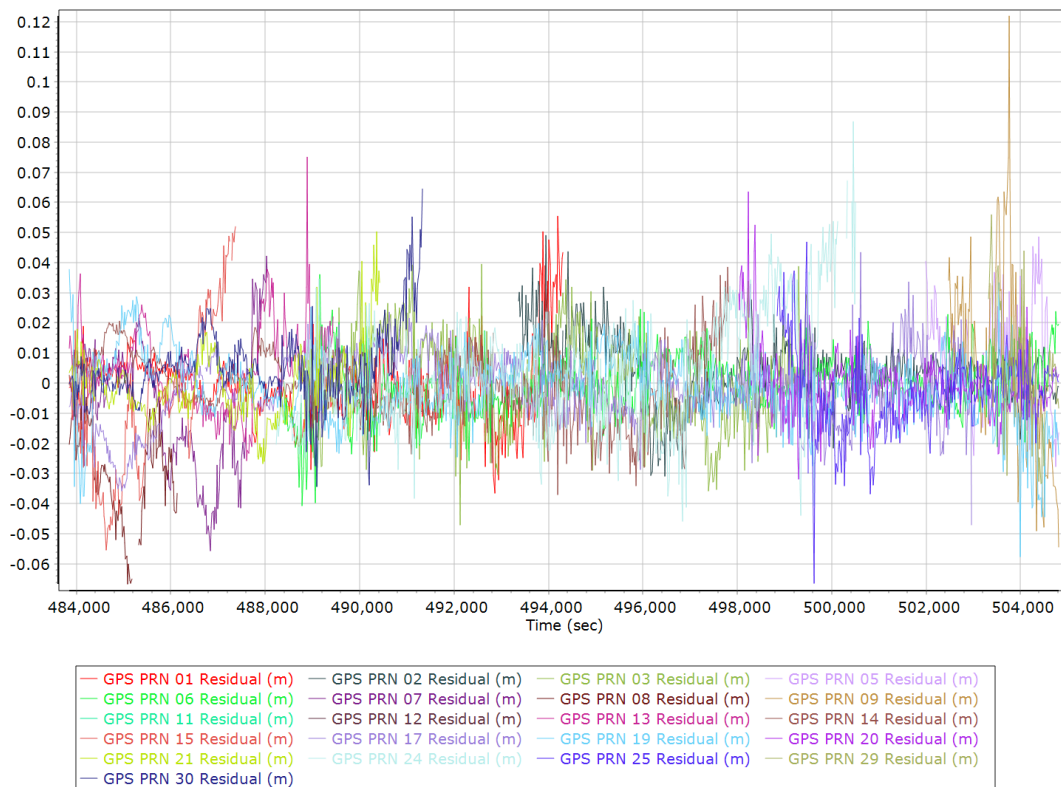
## PDOP



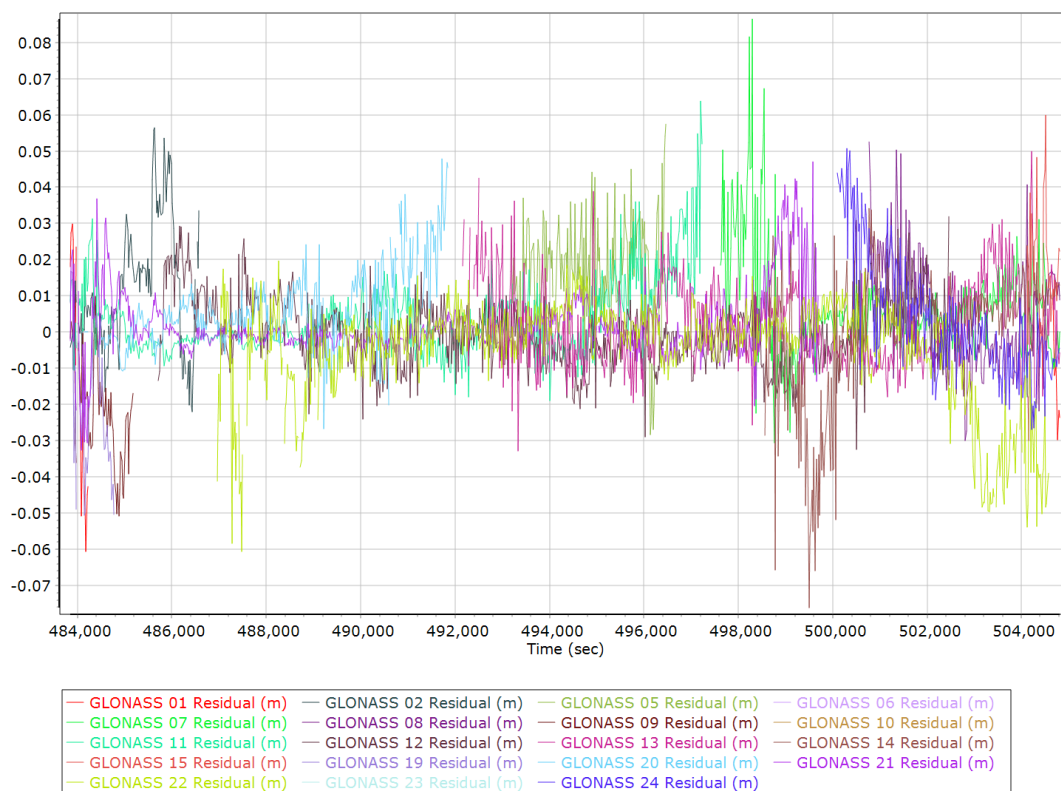
## Estimated Position Accuracy



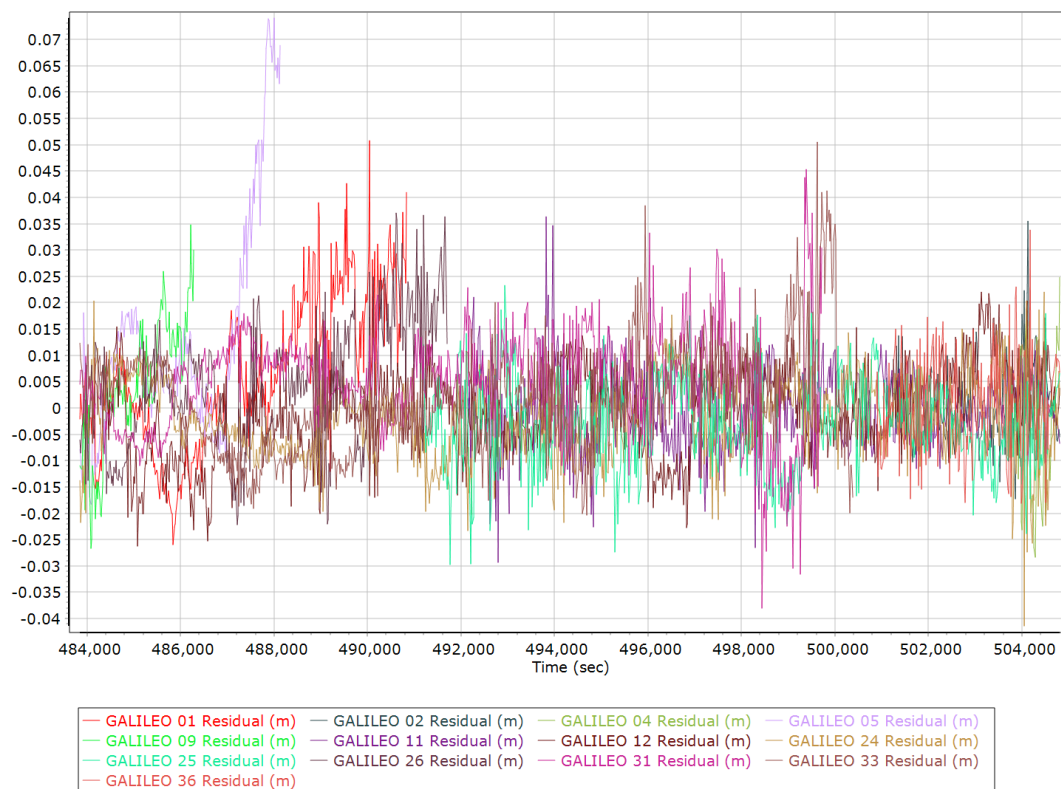
## GPS Residuals



## GLONASS Residuals



## GALILEO Residuals



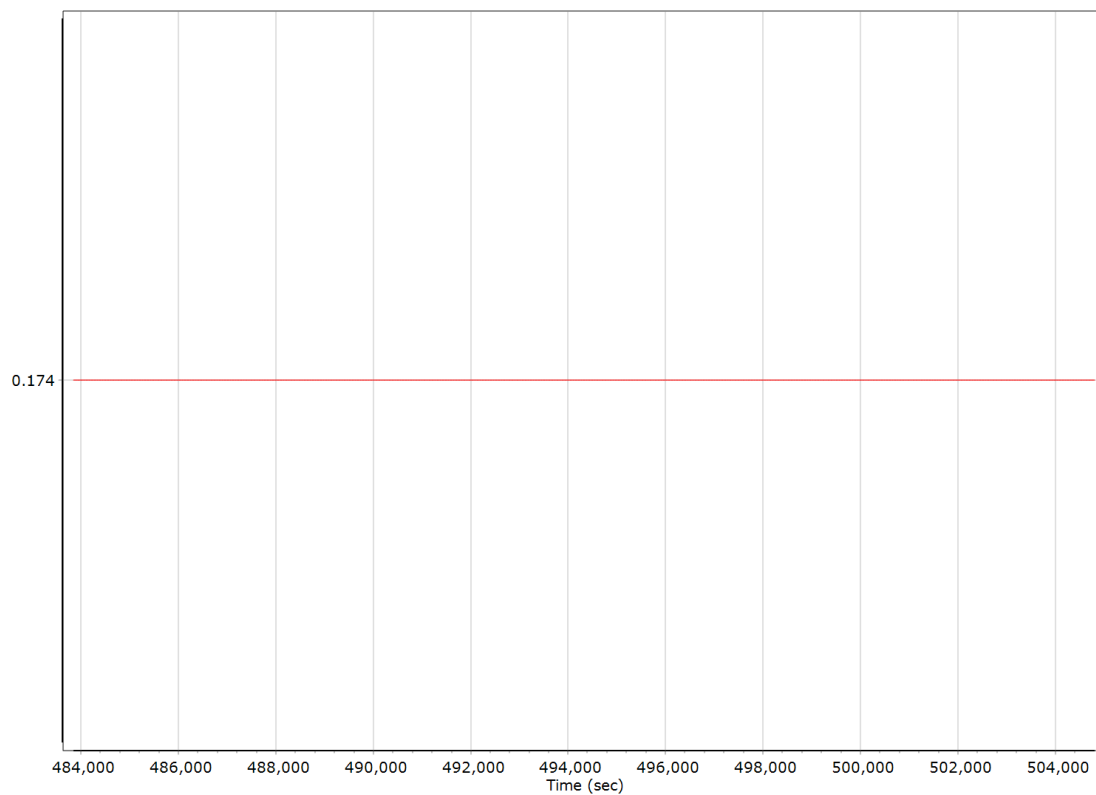
## GNSS-Inertial Processor Configuration

Processing mode	IN-Fusion PP-RTX		
Stabilized mount	True		
Processing start time	482977.000 (5/27/2022 2:09:37 PM)		
Processing end time	504830.000 (5/27/2022 8:13:50 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)	0.174	-0.254	-1.284
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

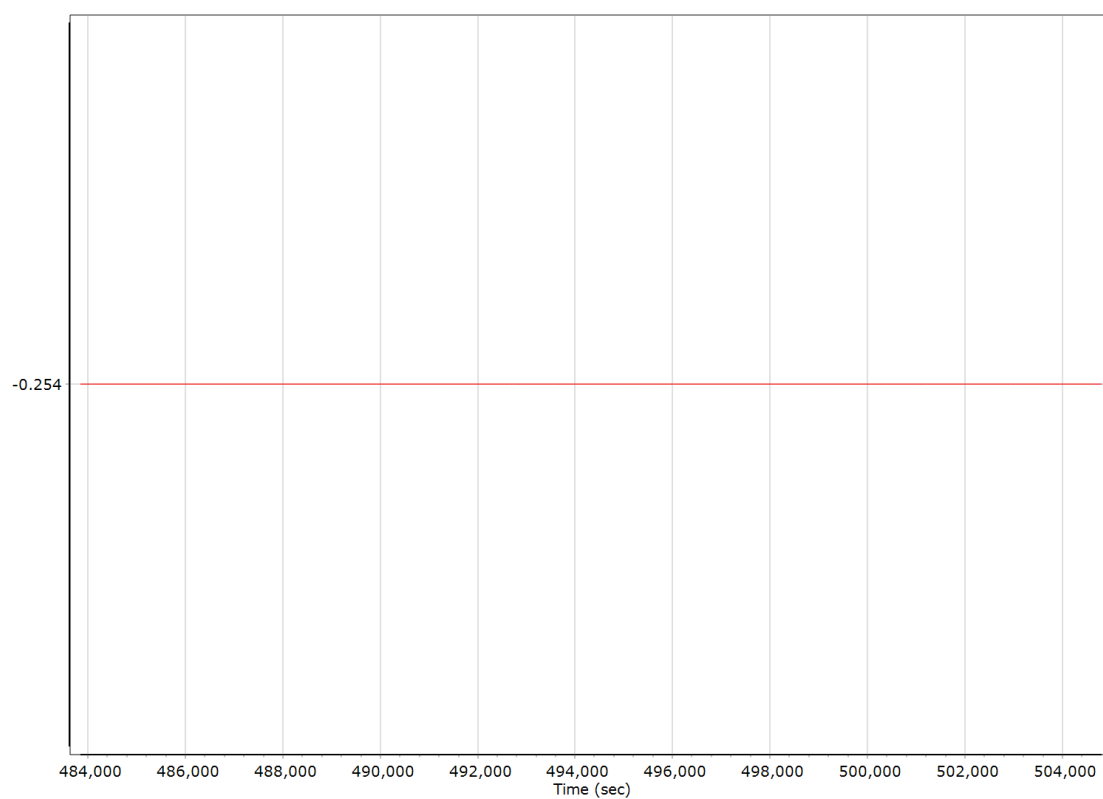
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

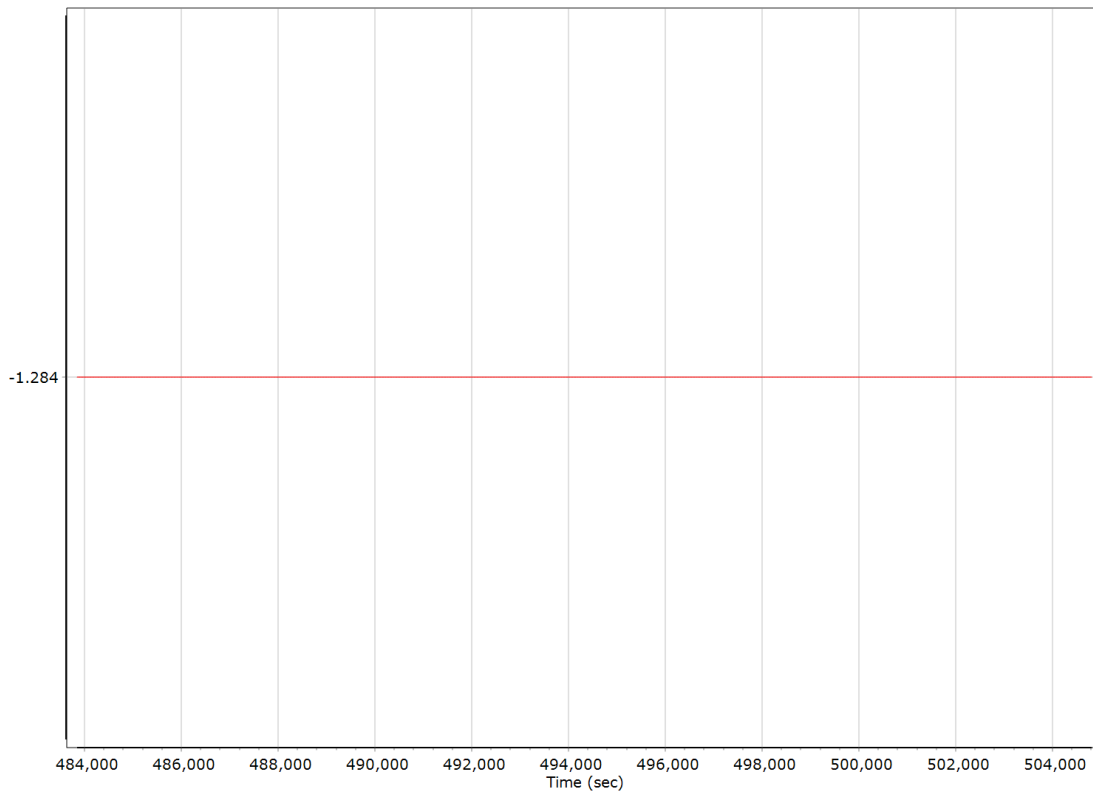
#### X Reference-Primary GNSS Lever Arm (m)



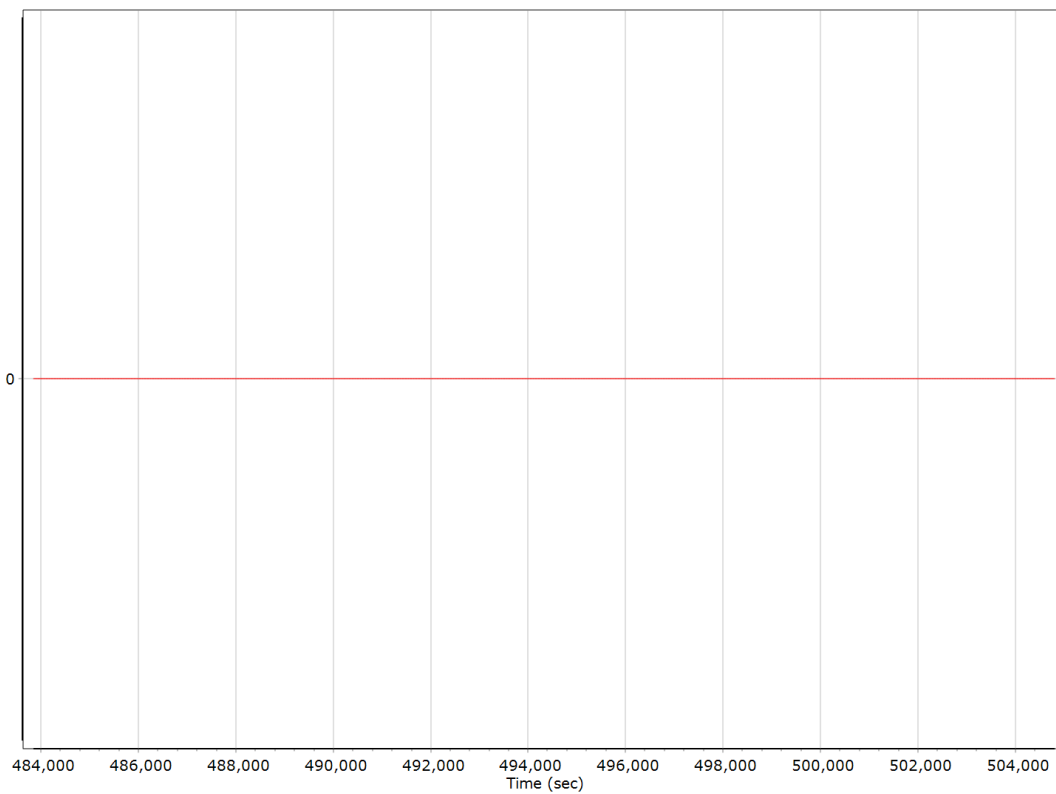
#### Y Reference-Primary GNSS Lever Arm (m)



### Z Reference-Primary GNSS Lever Arm (m)



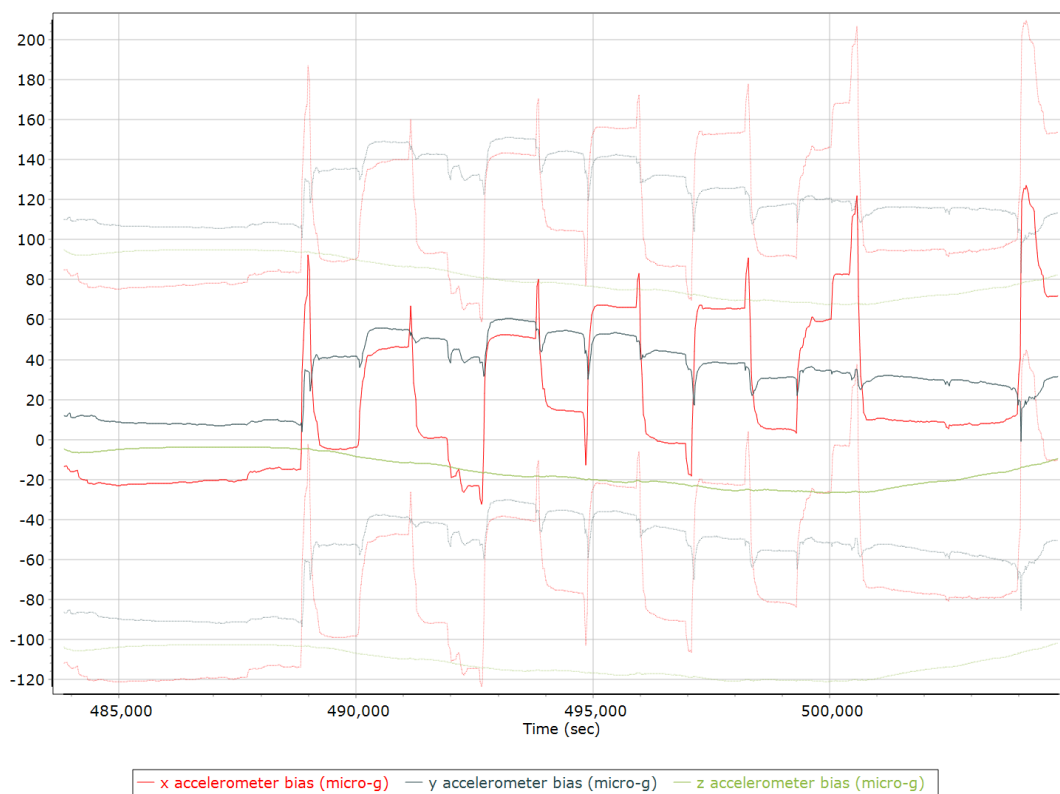
### Reference-Primary GNSS Lever Arm Figure of Merit



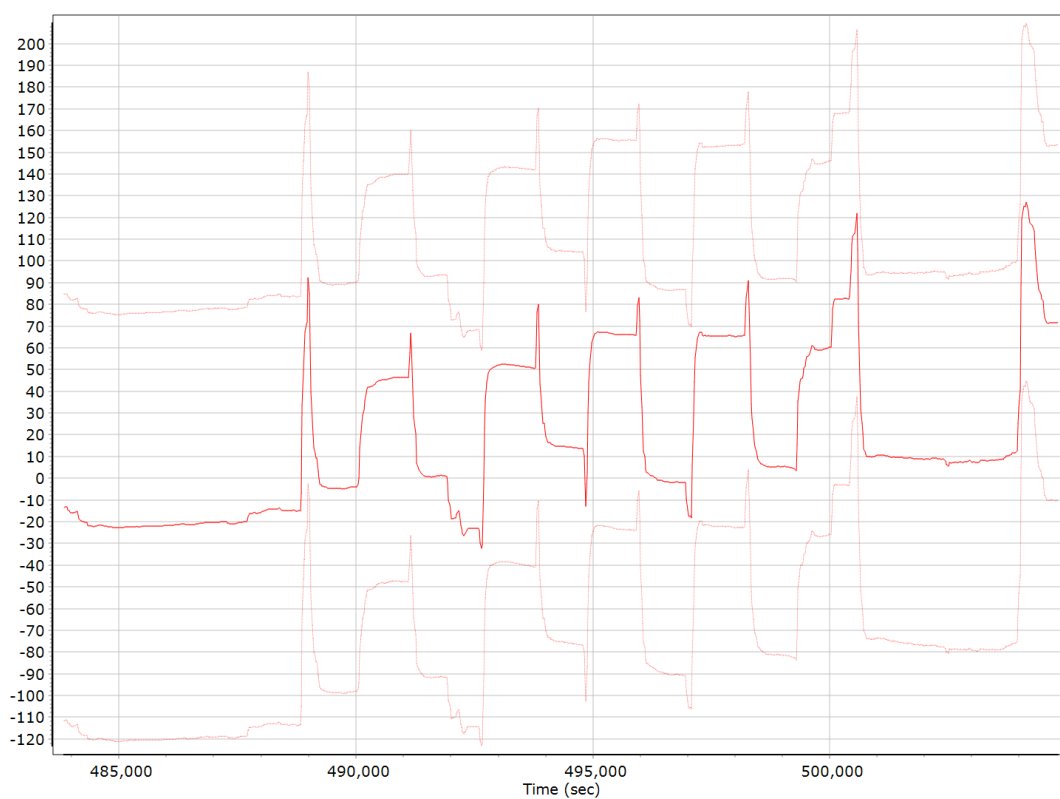
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

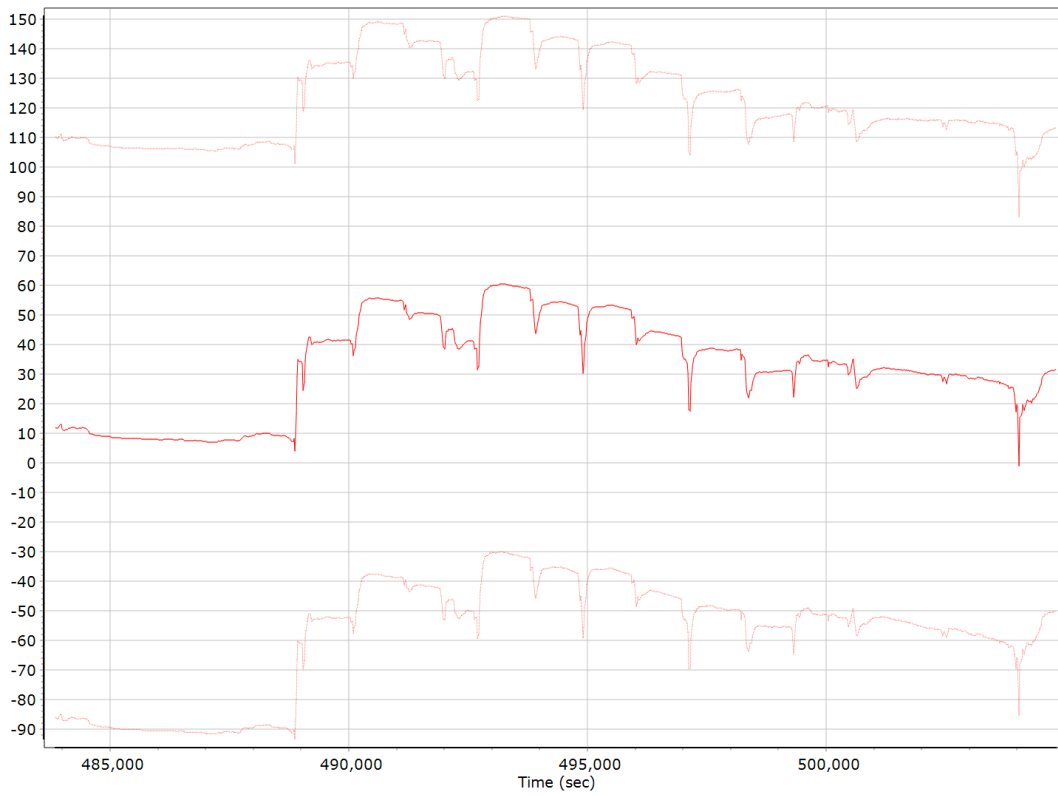
#### Accelerometer Bias (micro-g)



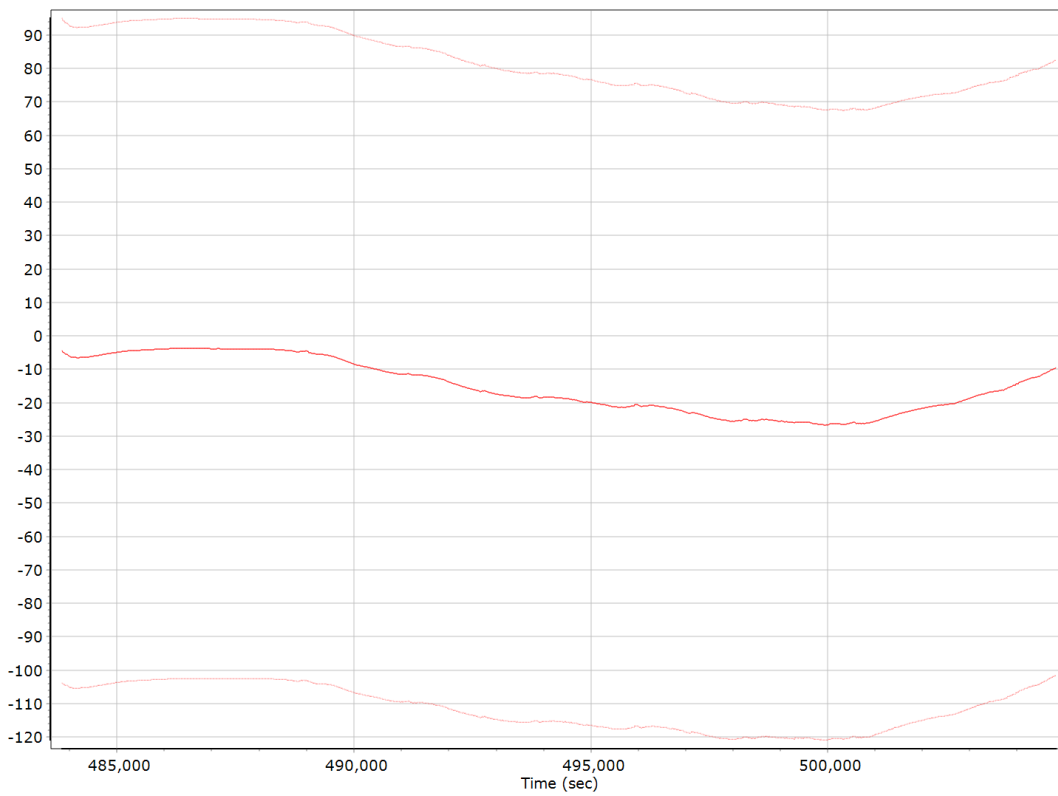
#### X Accelerometer Bias (micro-g)



### Y Accelerometer Bias (micro-g)



### Z Accelerometer Bias (micro-g)





### Accelerometer Scale Error (ppm)



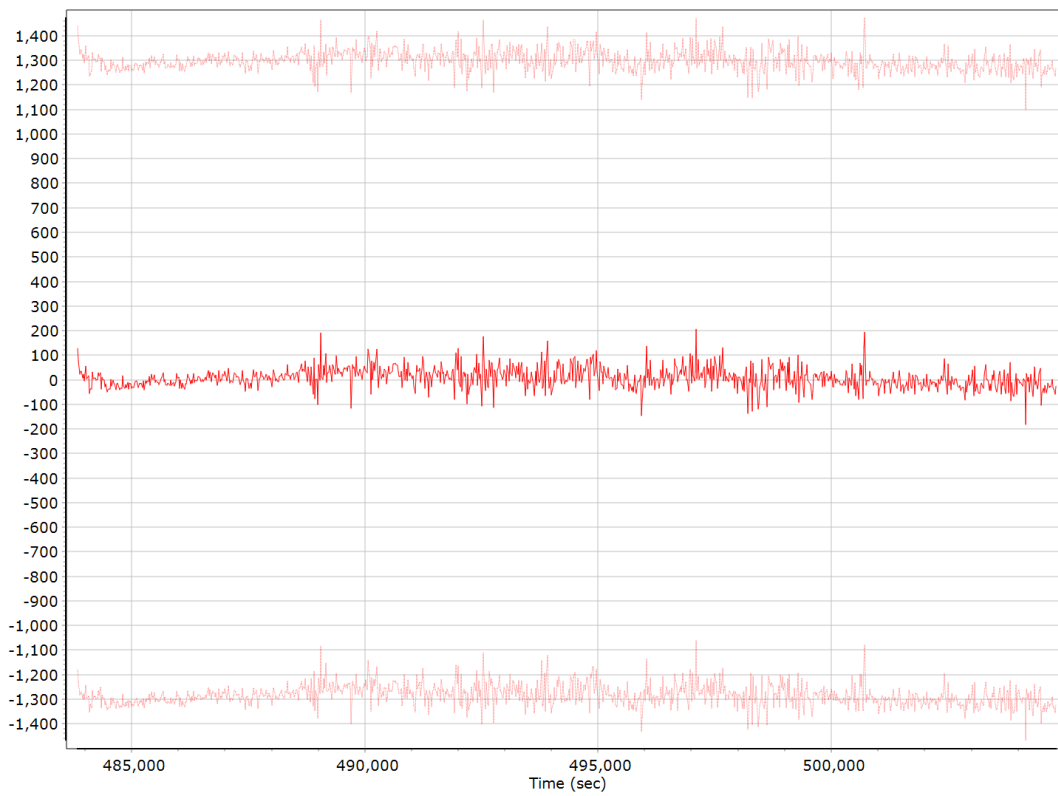
### X Accelerometer Scale Error (ppm)



### Y Accelerometer Scale Error (ppm)



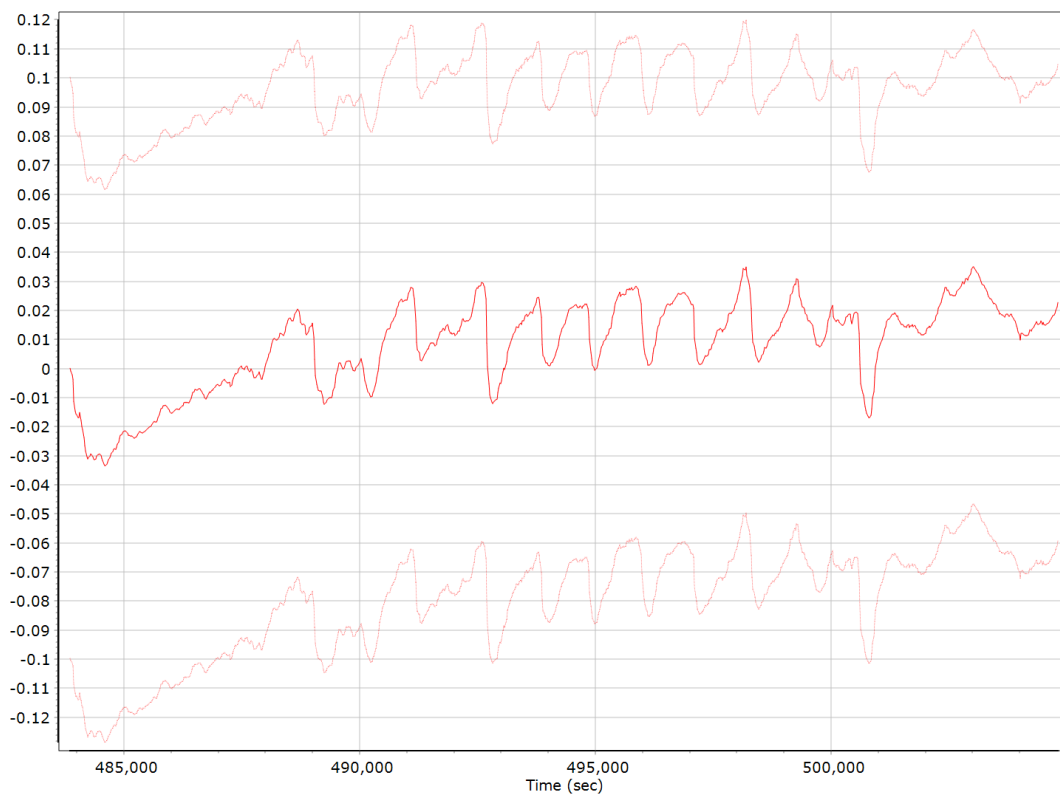
### Z Accelerometer Scale Error (ppm)



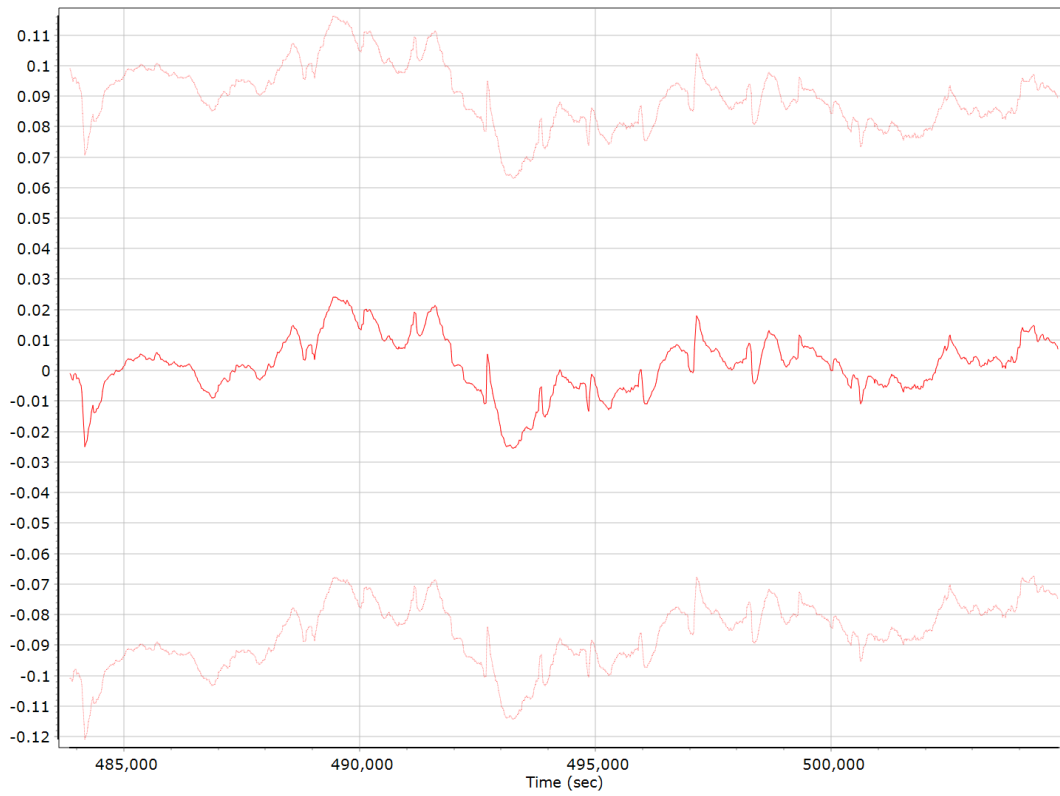
## Gyro Bias (deg/h)



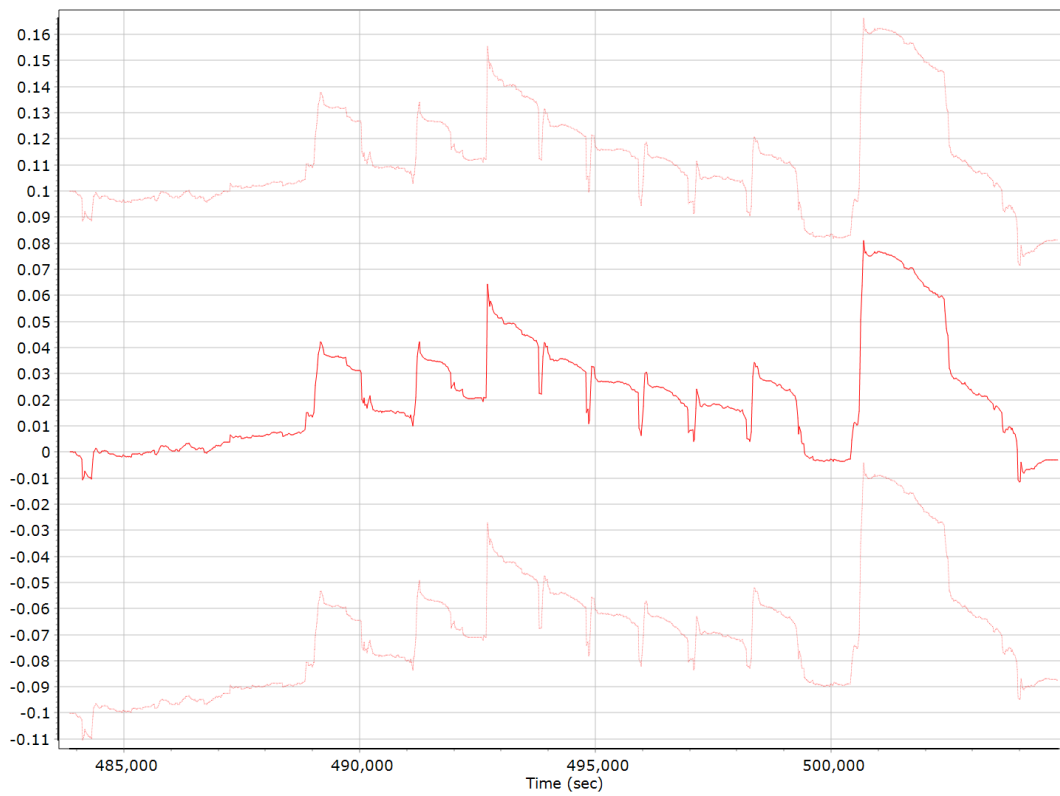
## X Gyro Bias (deg/h)



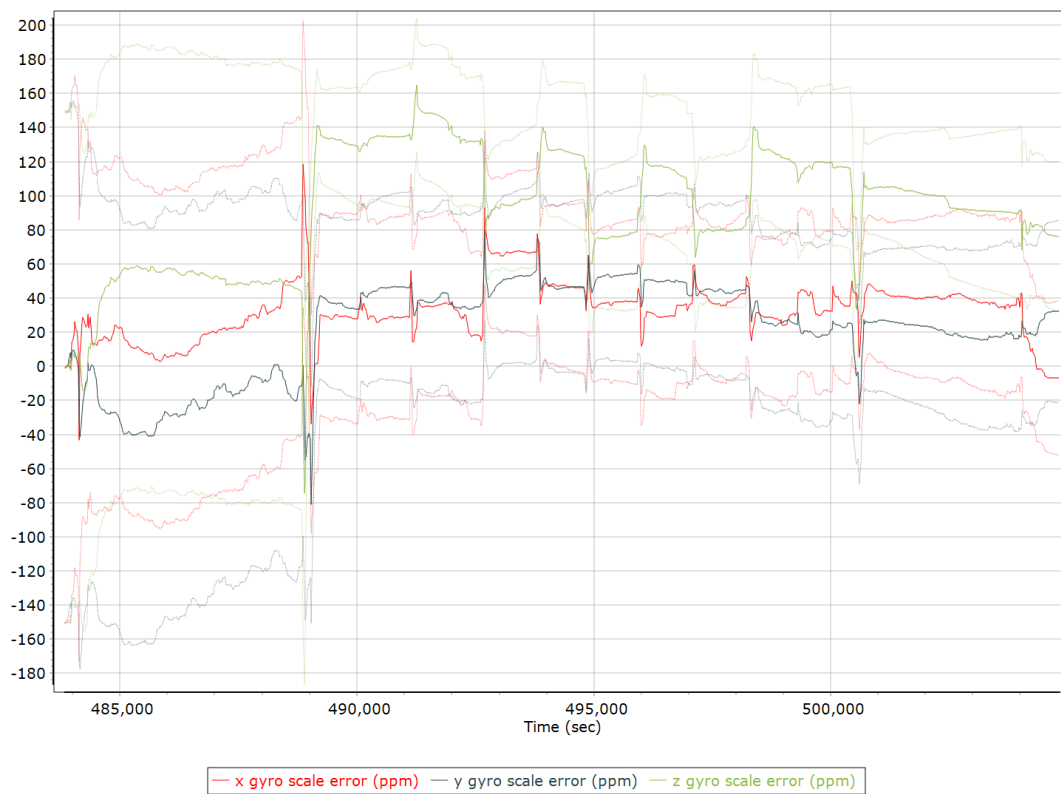
### Y Gyro Bias (deg/h)



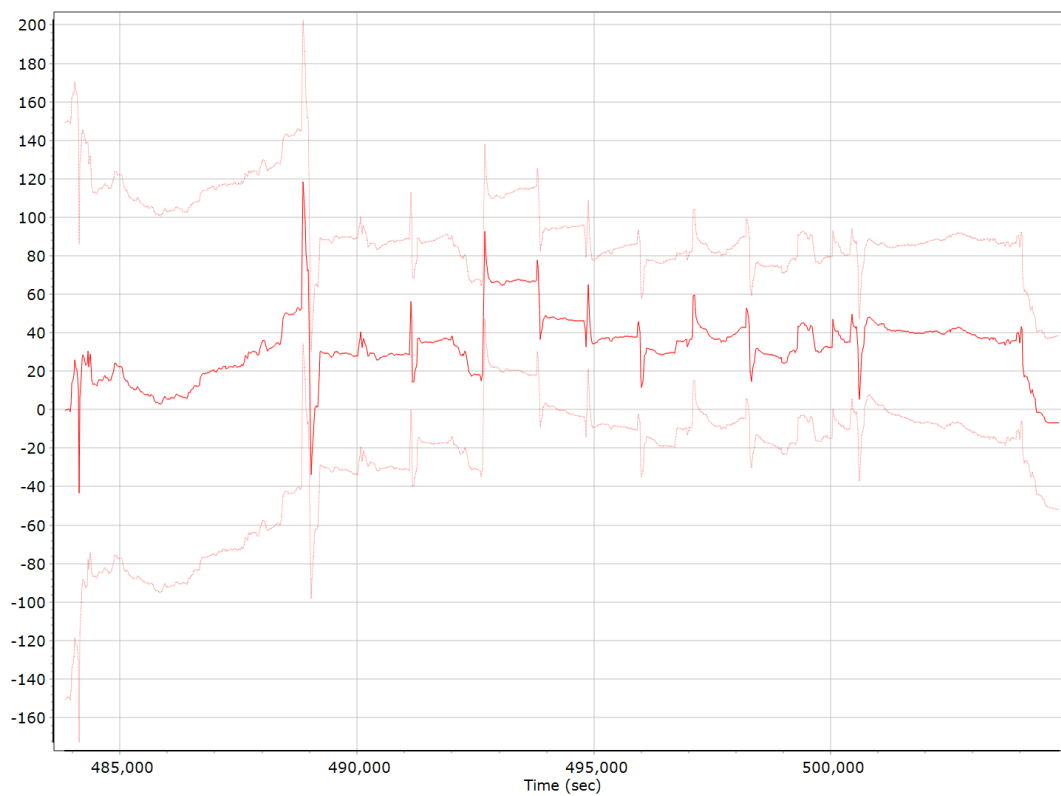
### Z Gyro Bias (deg/h)



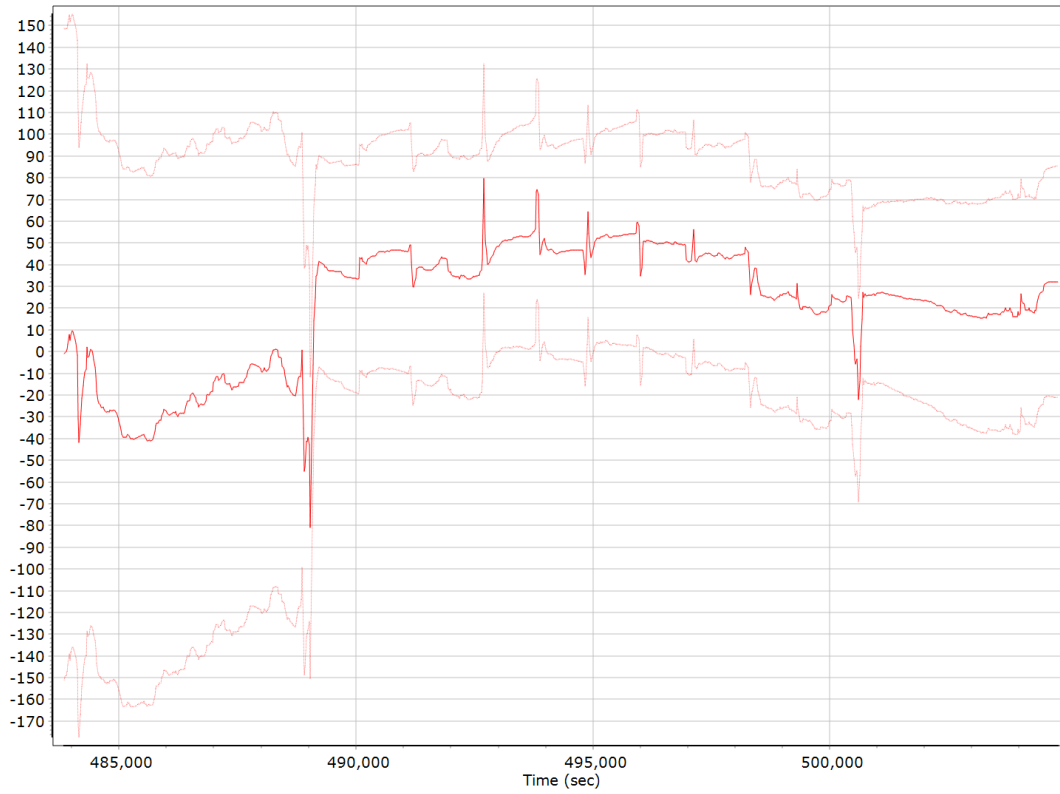
### Gyro Scale Error (ppm)



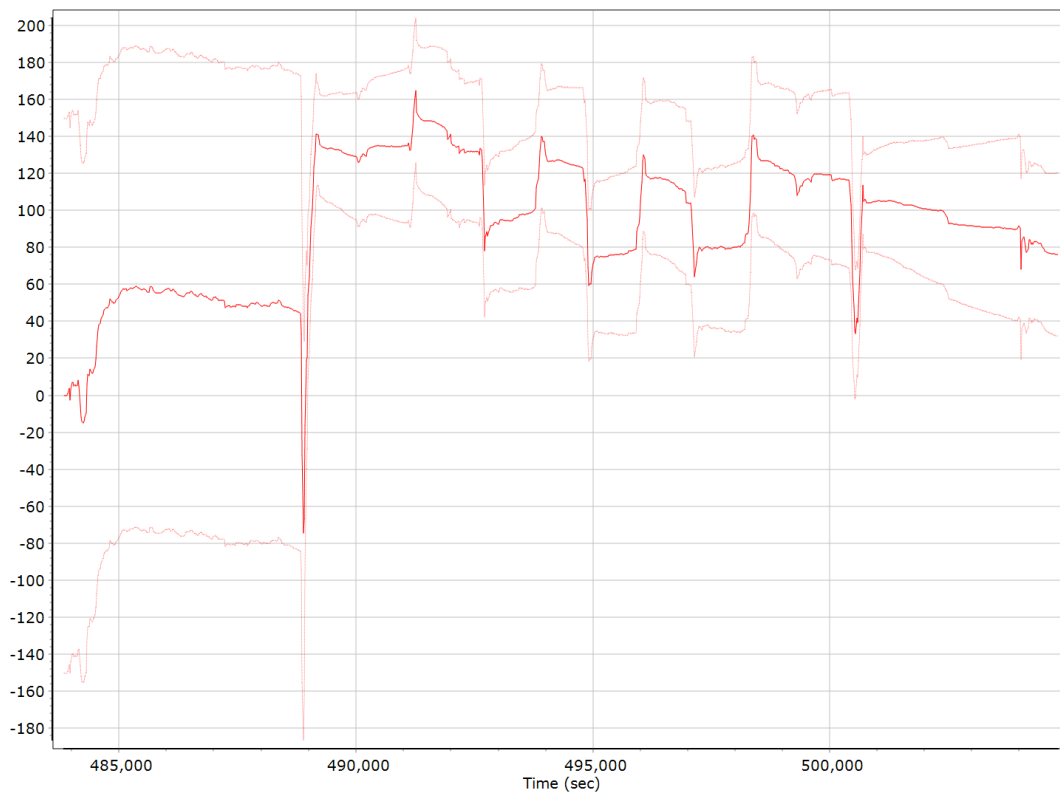
### X Gyro Scale Error (ppm)



### Y Gyro Scale Error (ppm)

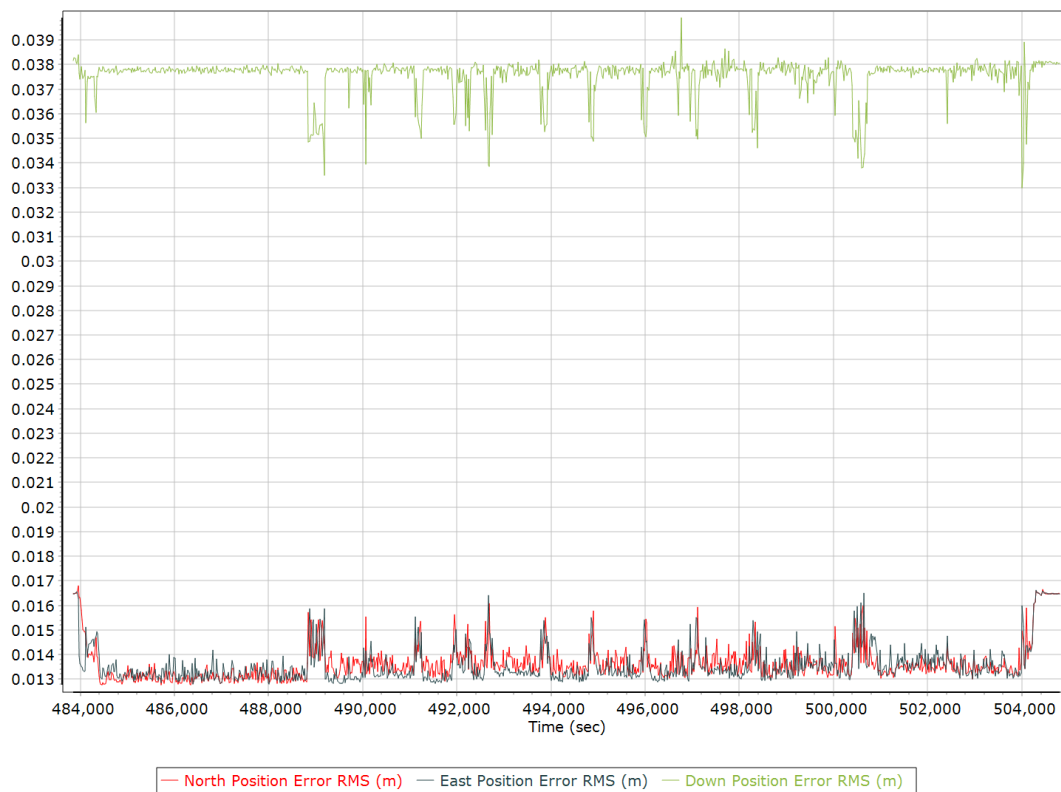


### Z Gyro Scale Error (ppm)

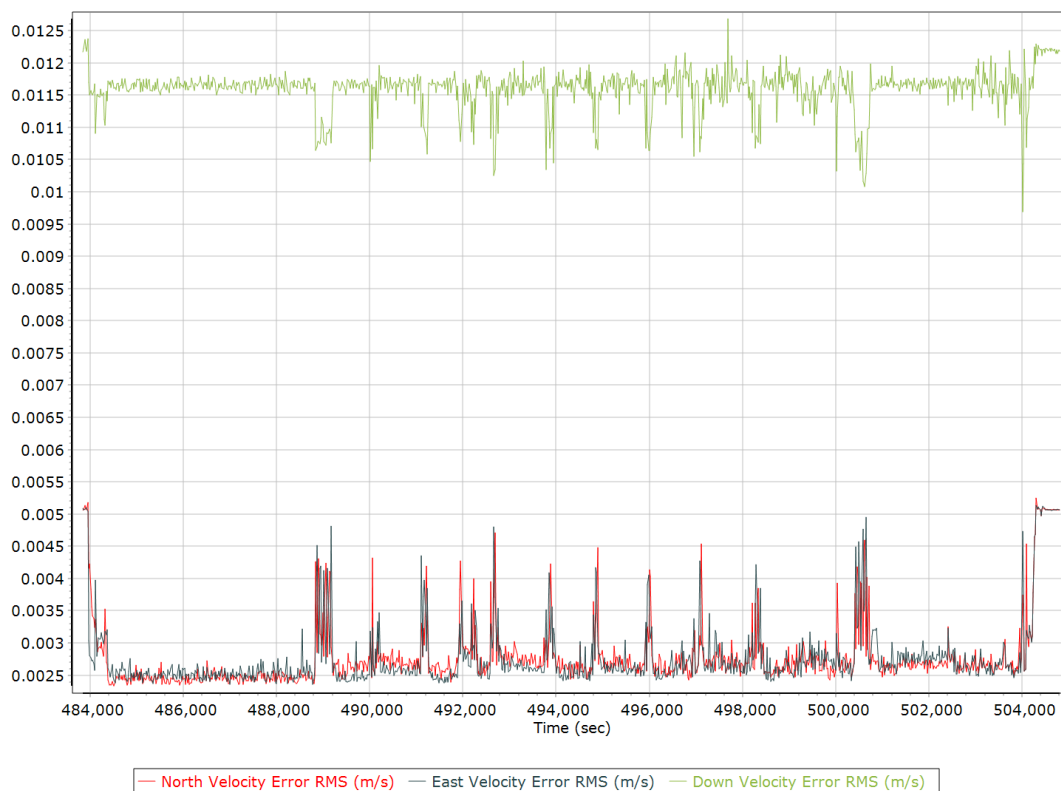


## Smoothed Performance Metrics

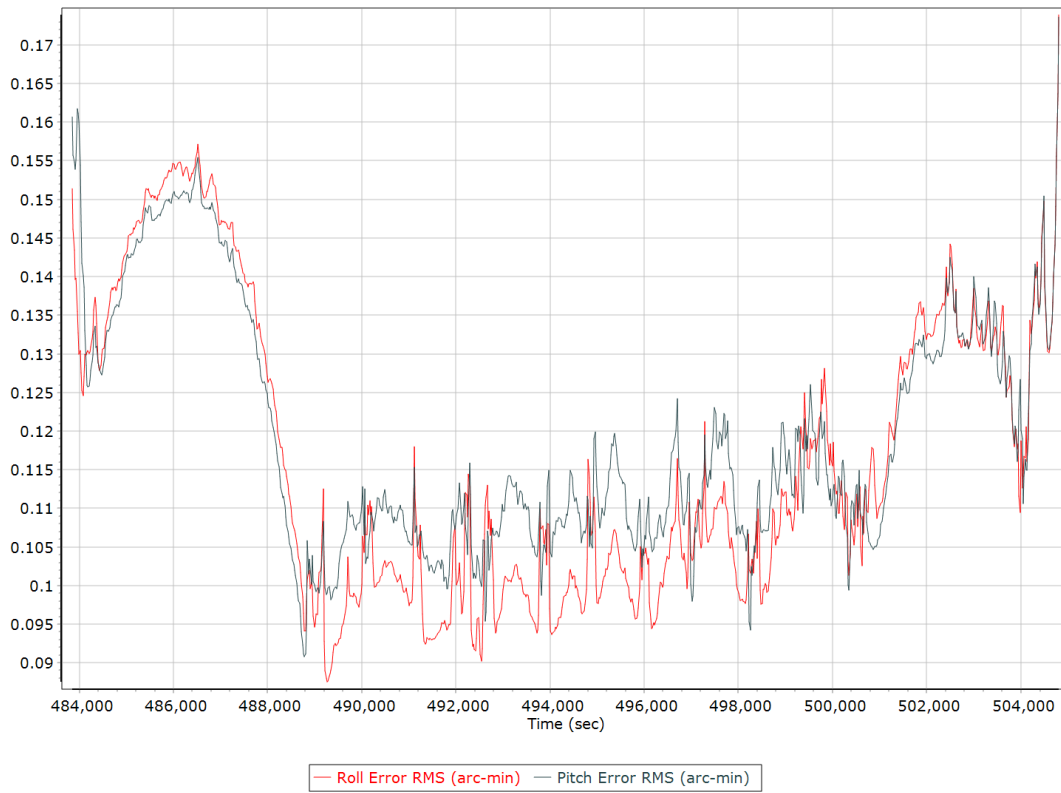
### Position Error RMS (m)



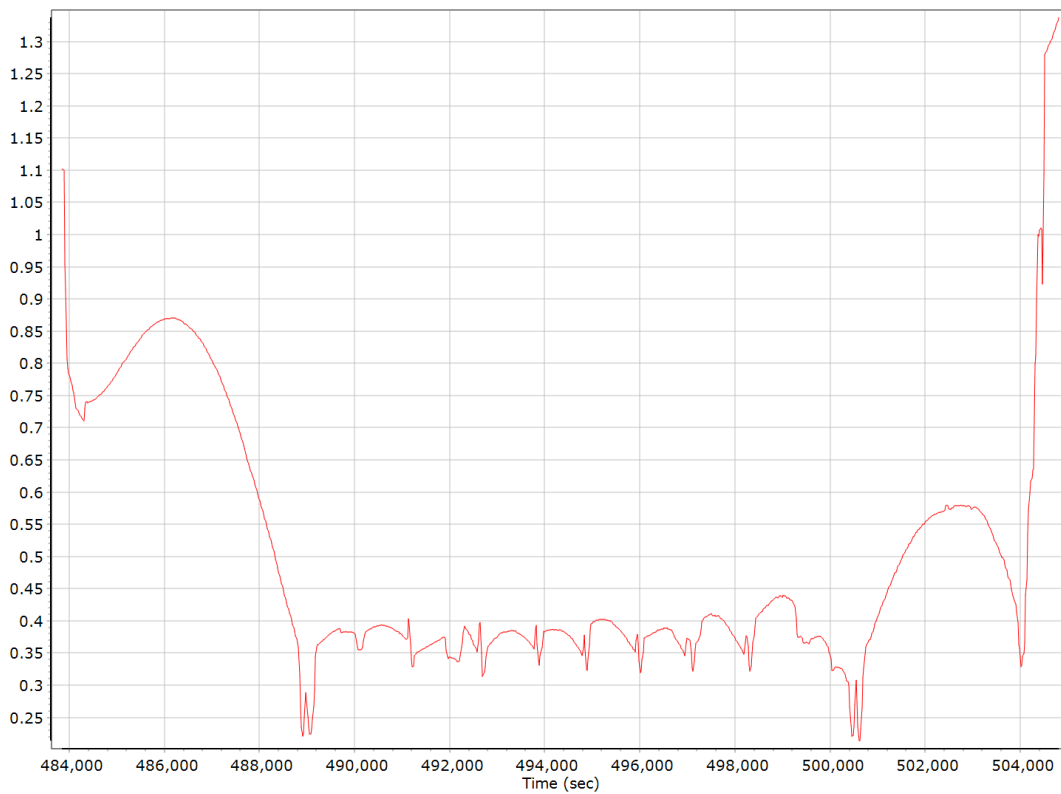
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)



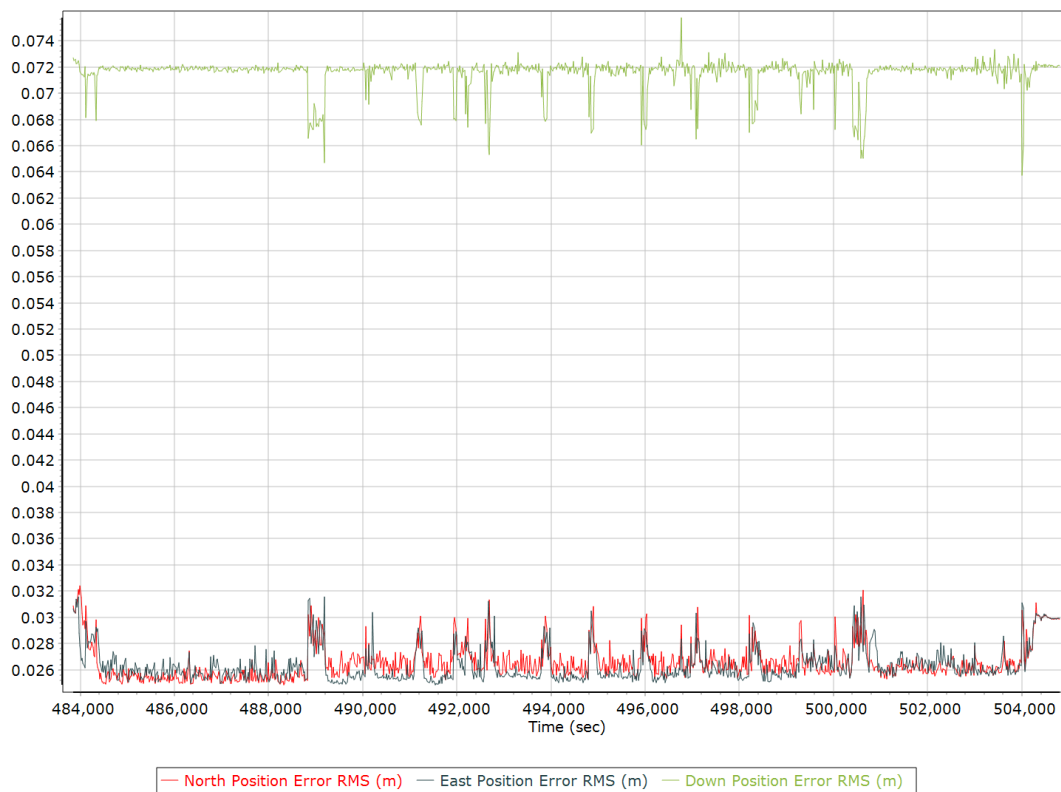
### Heading Error RMS (arc-min)



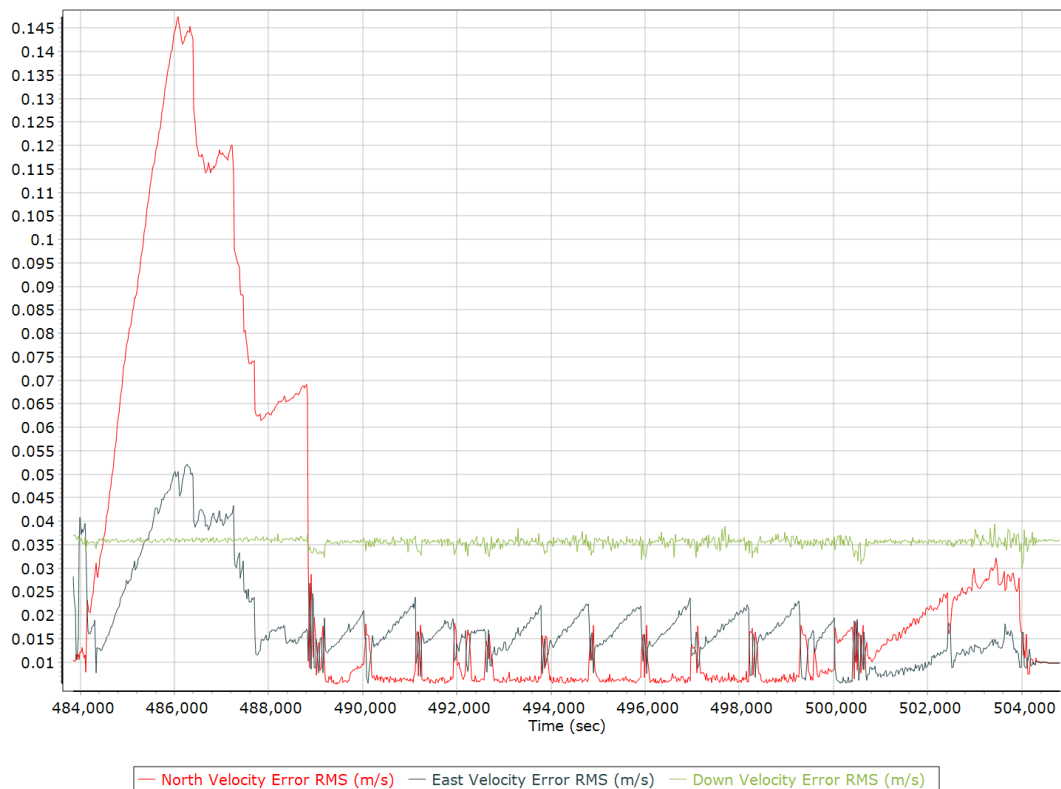


## Forward Processed Performance Metrics

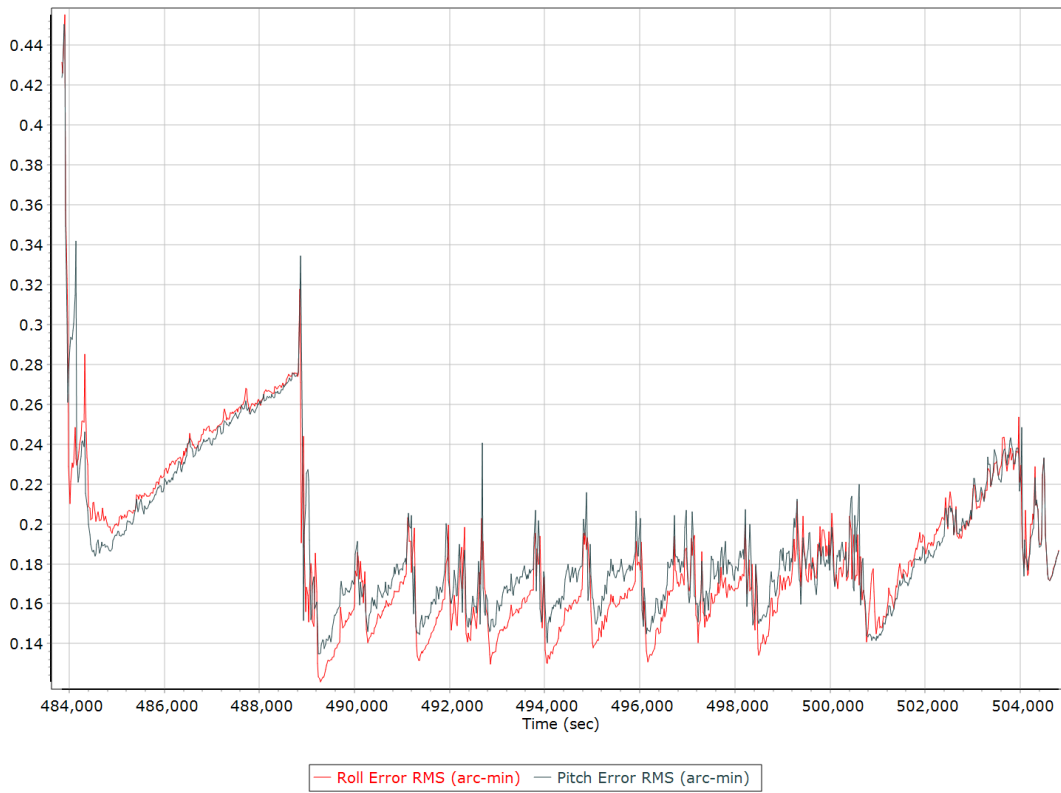
### Position Error RMS (m)



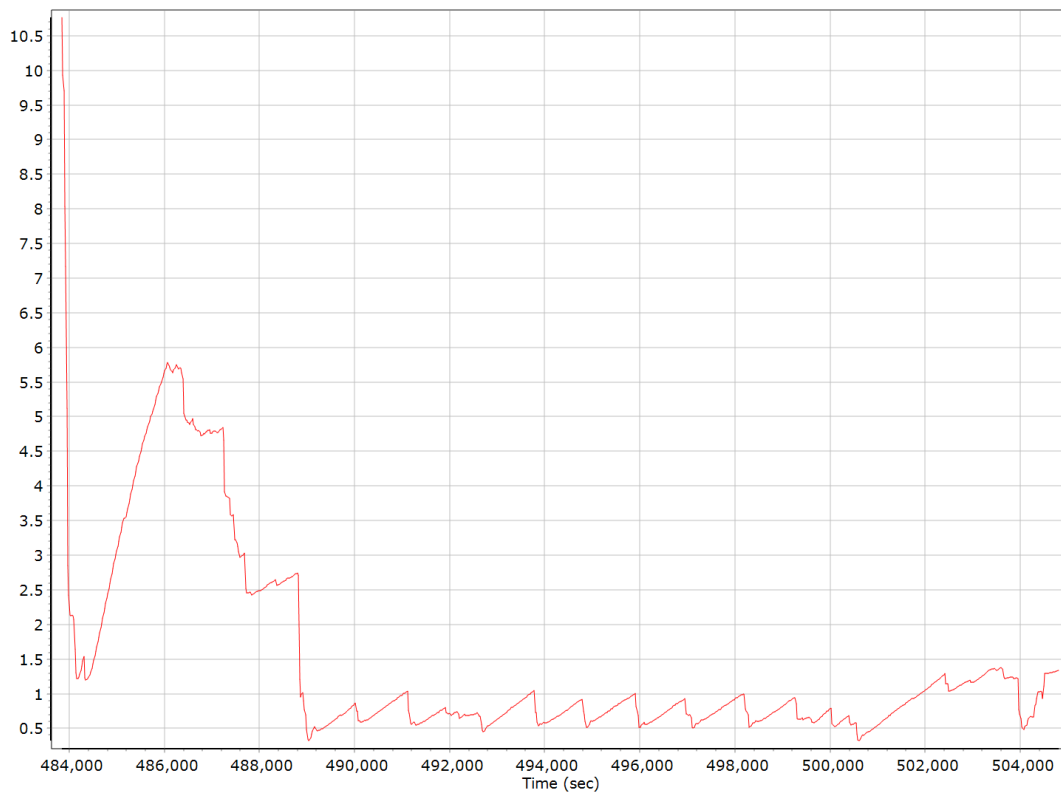
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

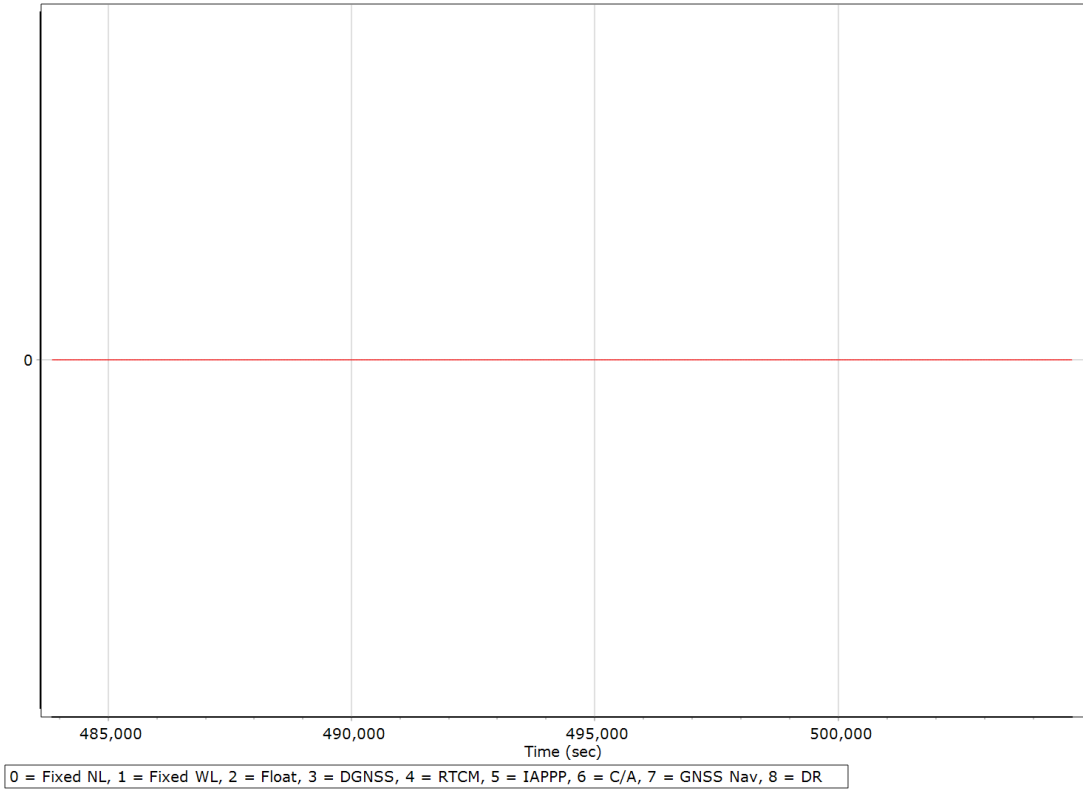


### Heading Error RMS (arc-min)

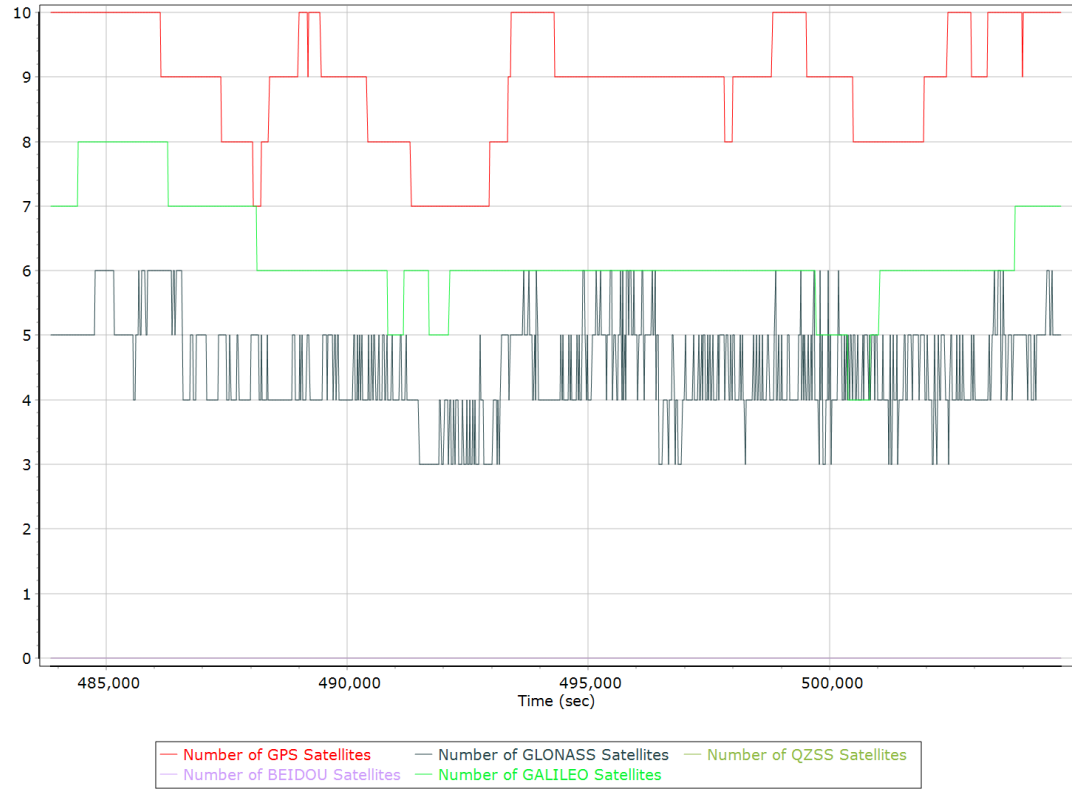


Forward Processed Solution Status

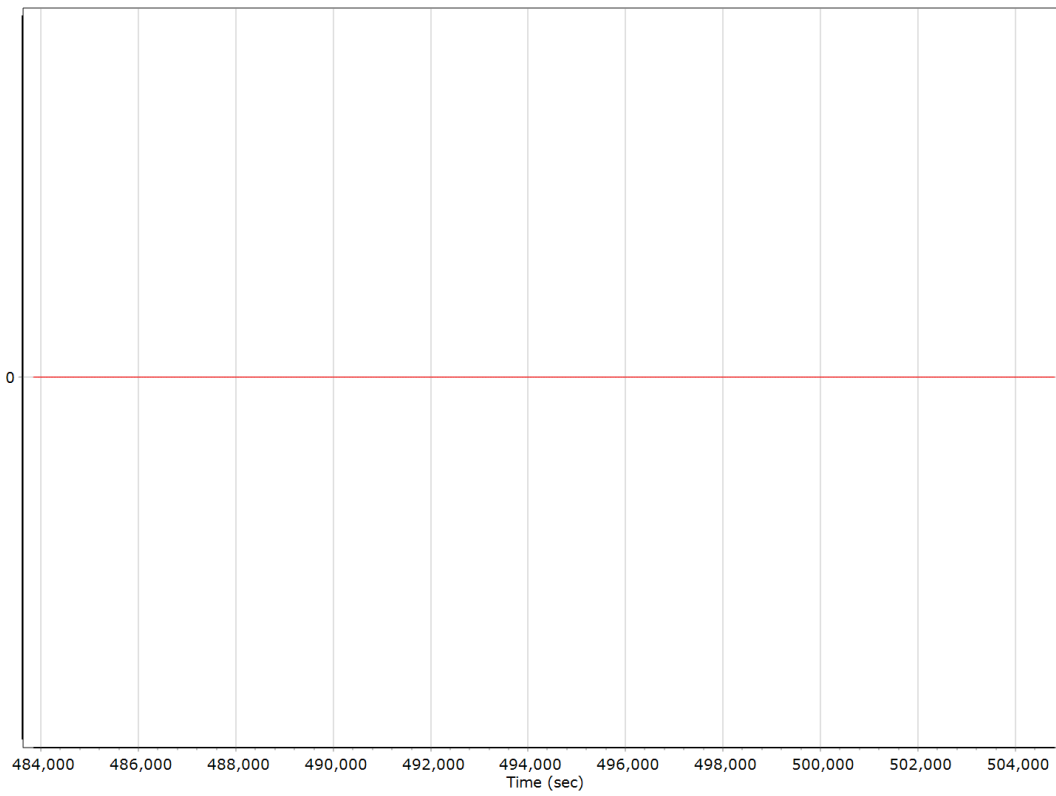
Processing Mode



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
N62756178.151	POS Data
N62756178.152	POS Data
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
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



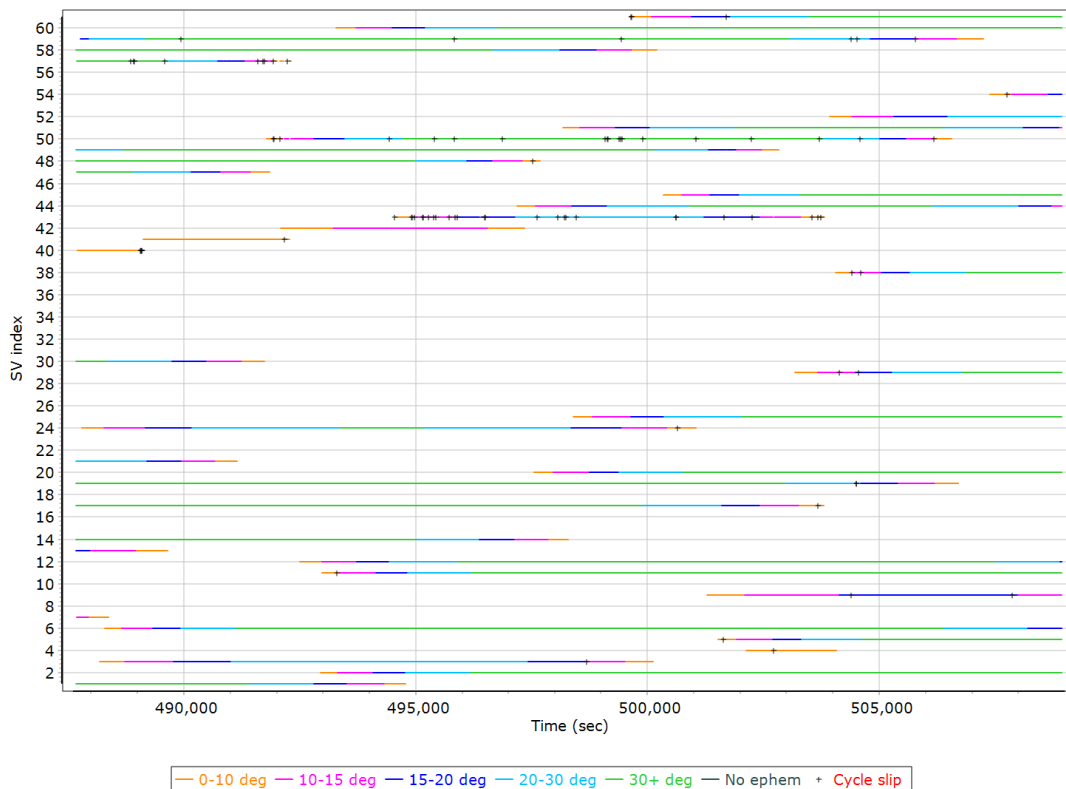
## Rover Data QC

### Raw IMU Import QC Summary

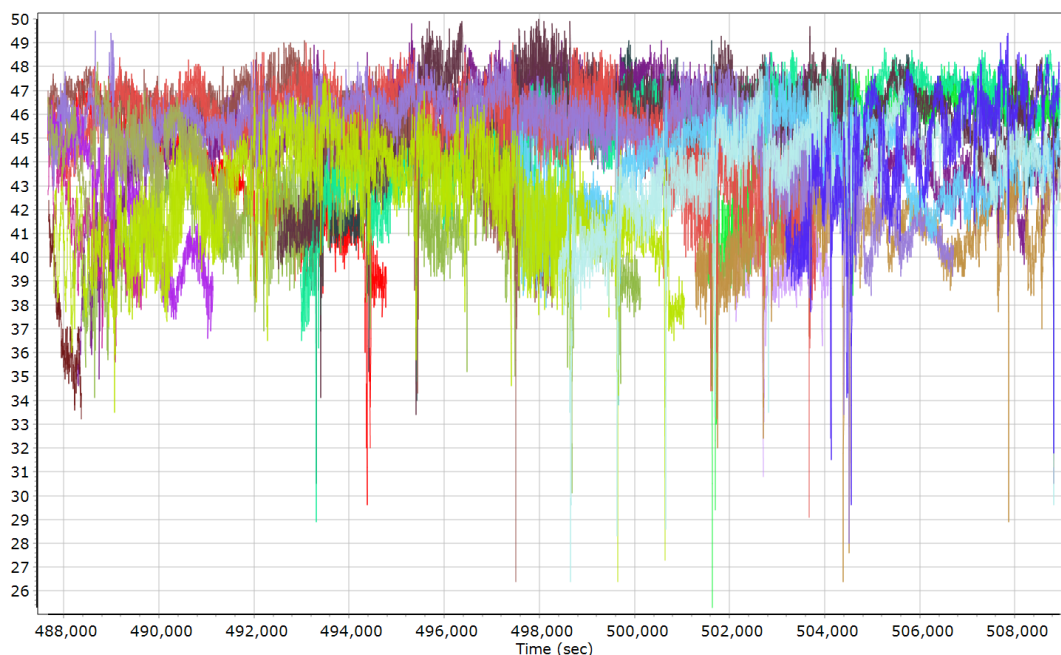
IMU data input file	imu_Mission 1.dat
IMU data check log file	imudt_05272022B_3543.log
IMU Records Processed	4253128
Termination Status	Warnings
IMU Anomalies	1
IMU Failure Messages	
487663.616 : WARNING : Gap of 487651.6547 seconds in CHECKDT input data	

## Primary Observables & Satellite Data

### GPS/GLONASS L1 Satellite Lock/Elevation

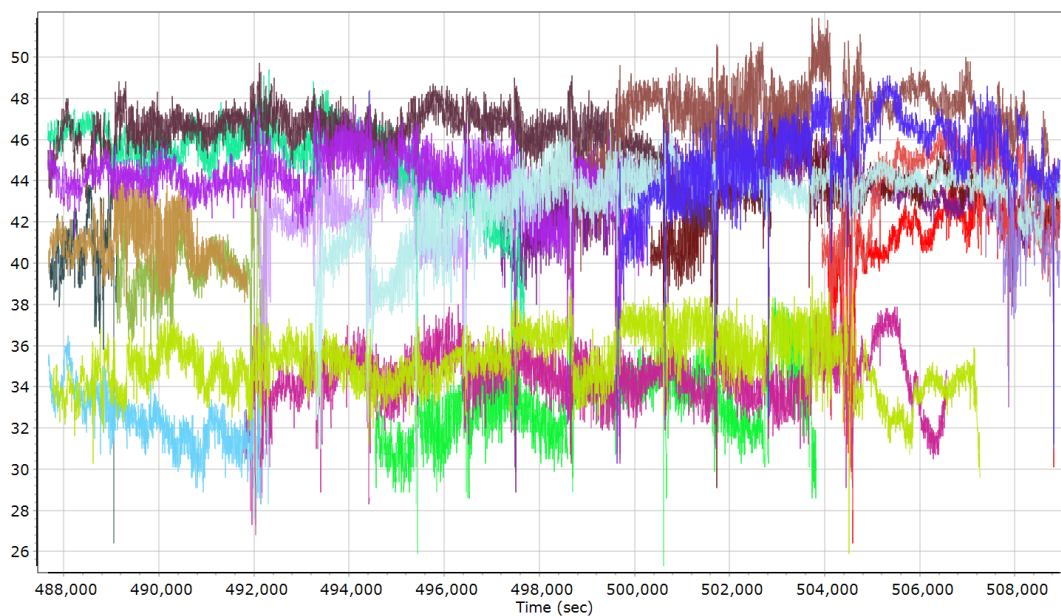


## GPS L1 SNR



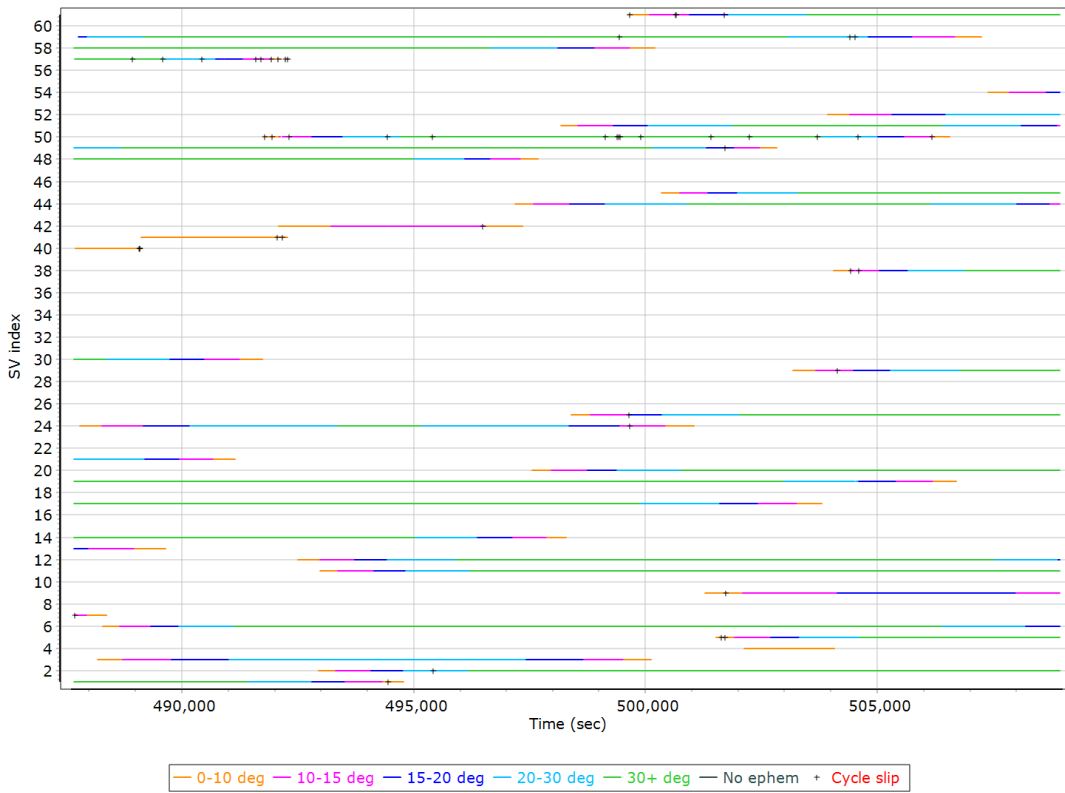
GPS PRN 01 L1 SNR (dB/Hz)	GPS PRN 02 L1 SNR (dB/Hz)	GPS PRN 03 L1 SNR (dB/Hz)	GPS PRN 04 L1 SNR (dB/Hz)
GPS PRN 05 L1 SNR (dB/Hz)	GPS PRN 06 L1 SNR (dB/Hz)	GPS PRN 07 L1 SNR (dB/Hz)	GPS PRN 09 L1 SNR (dB/Hz)
GPS PRN 11 L1 SNR (dB/Hz)	GPS PRN 12 L1 SNR (dB/Hz)	GPS PRN 13 L1 SNR (dB/Hz)	GPS PRN 14 L1 SNR (dB/Hz)
GPS PRN 17 L1 SNR (dB/Hz)	GPS PRN 19 L1 SNR (dB/Hz)	GPS PRN 20 L1 SNR (dB/Hz)	GPS PRN 21 L1 SNR (dB/Hz)
GPS PRN 24 L1 SNR (dB/Hz)	GPS PRN 25 L1 SNR (dB/Hz)	GPS PRN 29 L1 SNR (dB/Hz)	GPS PRN 30 L1 SNR (dB/Hz)

## GLONASS L1 SNR

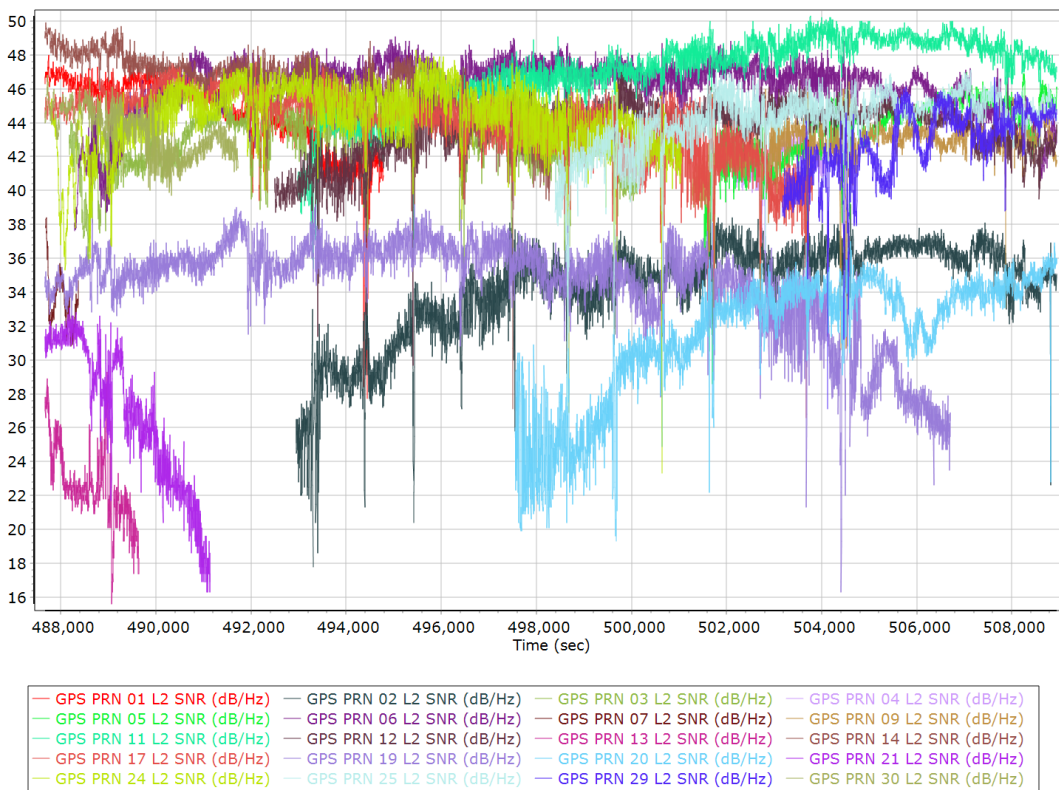


GLONASS 01 L1 SNR (dB/Hz)	GLONASS 03 L1 SNR (dB/Hz)	GLONASS 04 L1 SNR (dB/Hz)
GLONASS 05 L1 SNR (dB/Hz)	GLONASS 06 L1 SNR (dB/Hz)	GLONASS 07 L1 SNR (dB/Hz)
GLONASS 08 L1 SNR (dB/Hz)	GLONASS 10 L1 SNR (dB/Hz)	GLONASS 11 L1 SNR (dB/Hz)
GLONASS 12 L1 SNR (dB/Hz)	GLONASS 13 L1 SNR (dB/Hz)	GLONASS 14 L1 SNR (dB/Hz)
GLONASS 15 L1 SNR (dB/Hz)	GLONASS 17 L1 SNR (dB/Hz)	GLONASS 20 L1 SNR (dB/Hz)
GLONASS 21 L1 SNR (dB/Hz)	GLONASS 22 L1 SNR (dB/Hz)	GLONASS 23 L1 SNR (dB/Hz)
GLONASS 24 L1 SNR (dB/Hz)		

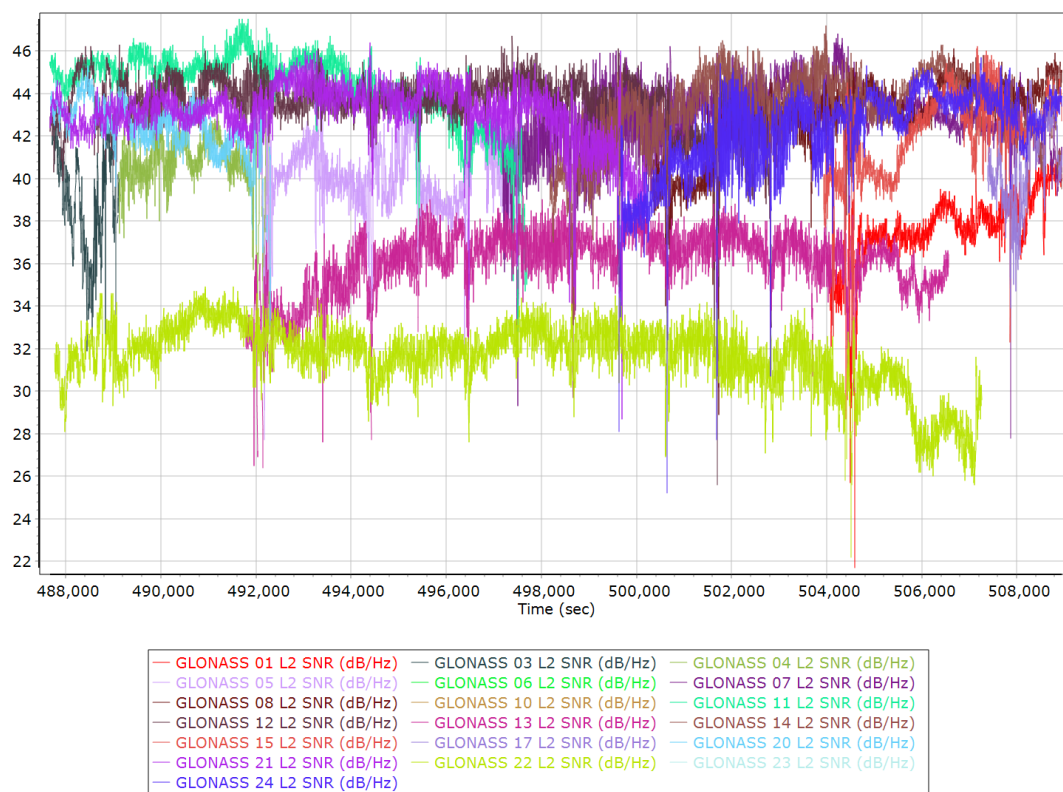
## GPS/GLONASS L2 Satellite Lock/Elevation



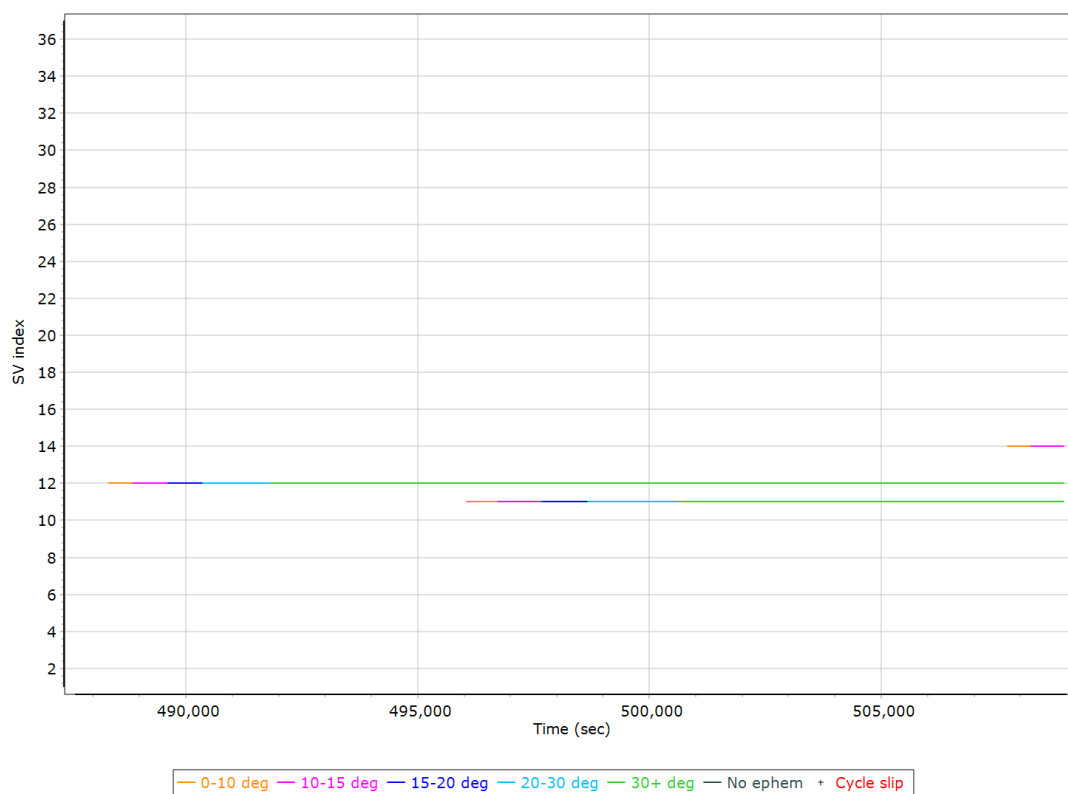
## GPS L2 SNR



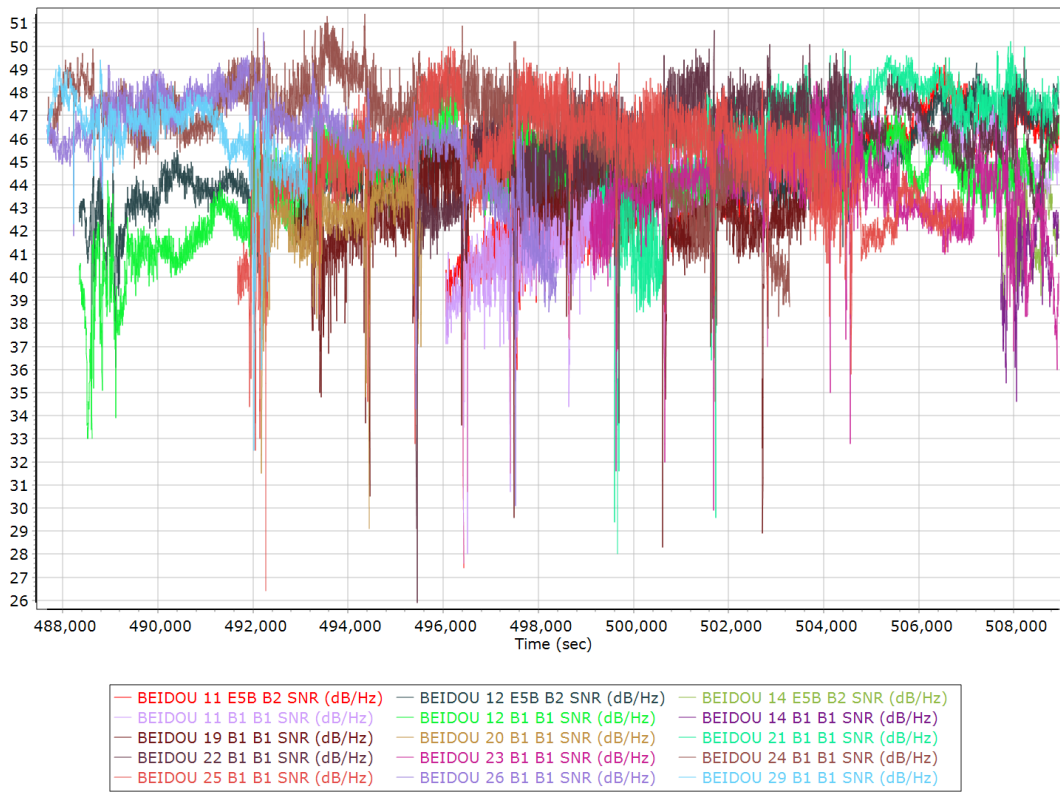
## GLONASS L2 SNR



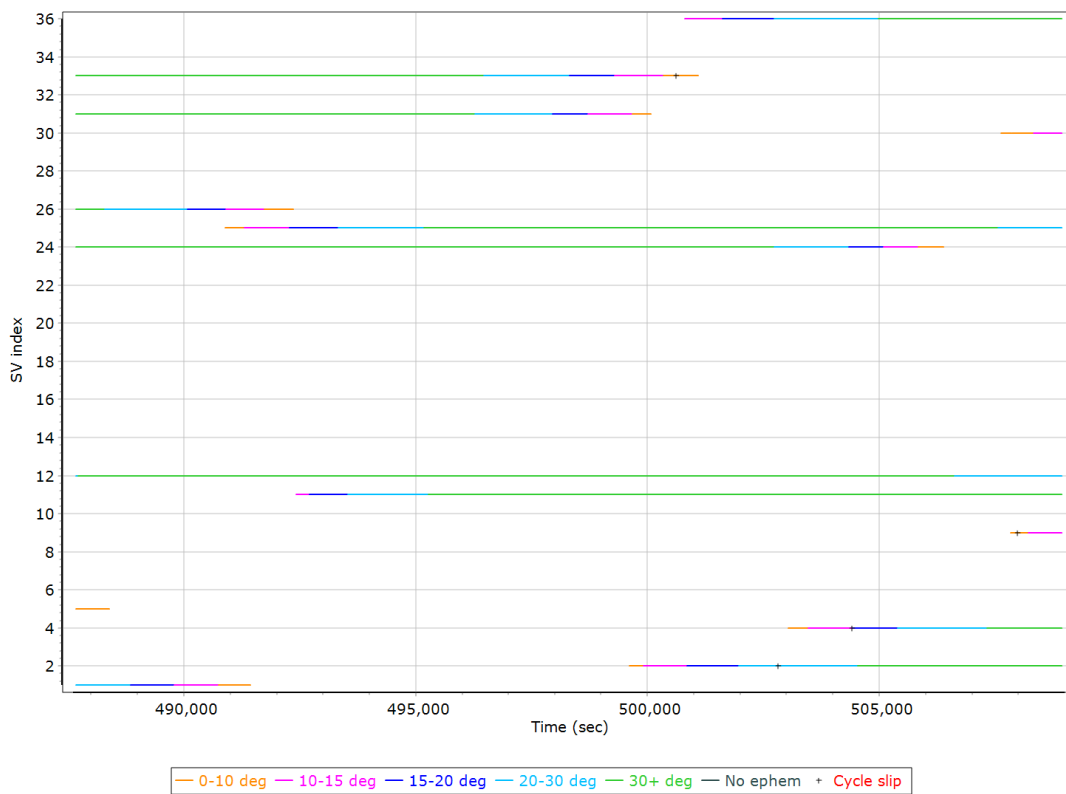
## BEIDOU Satellite Lock/Elevation



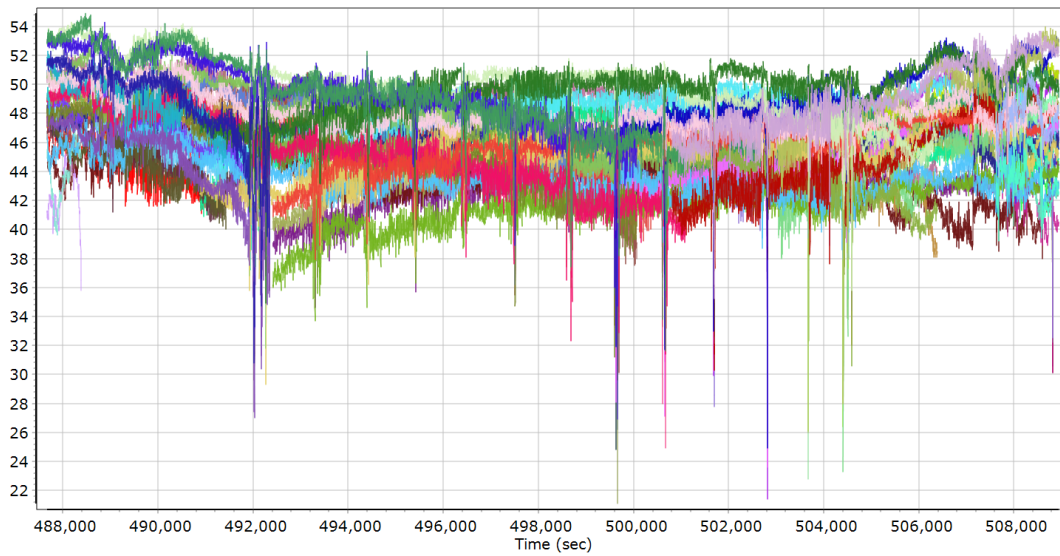
## BEIDOU SNR



## GALILEO Satellite Lock/Elevation



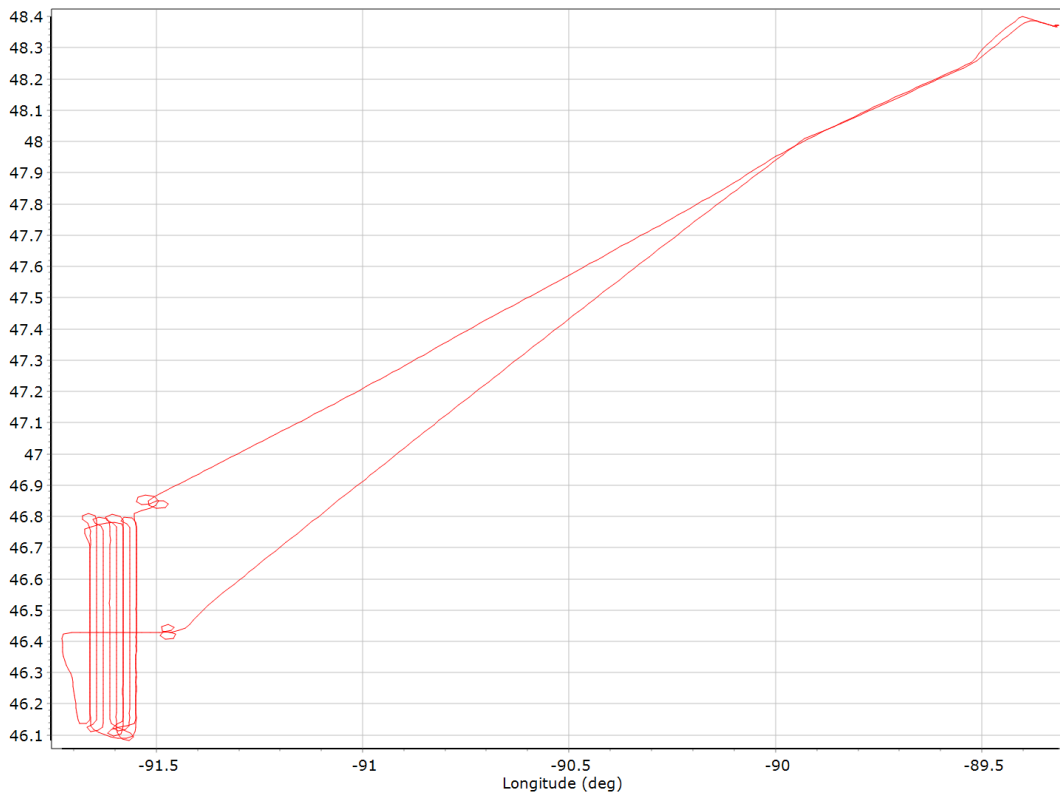
## GALILEO SNR



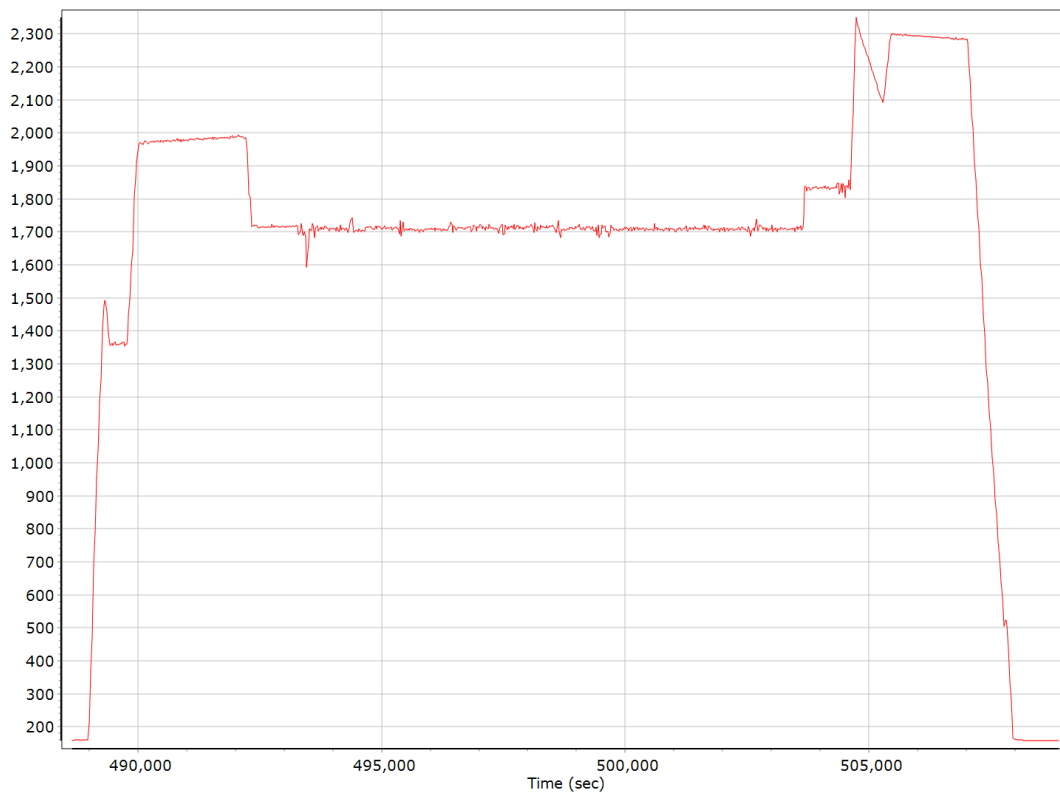
— GALILEO 01 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 02 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 04 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 05 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 09 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— GALILEO 11 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)
— GALILEO 12 L1 BOC_1_1_DP_MBOC SNR (dB/Hz)	— 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



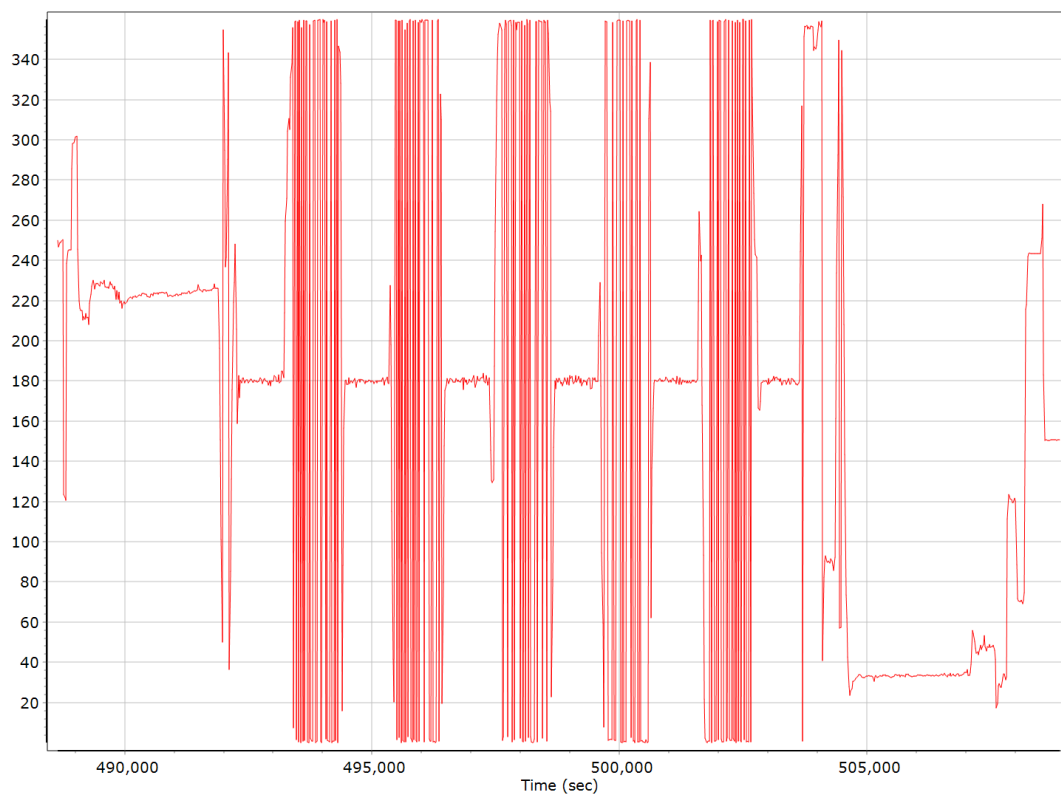
### Altitude



## Roll/Pitch

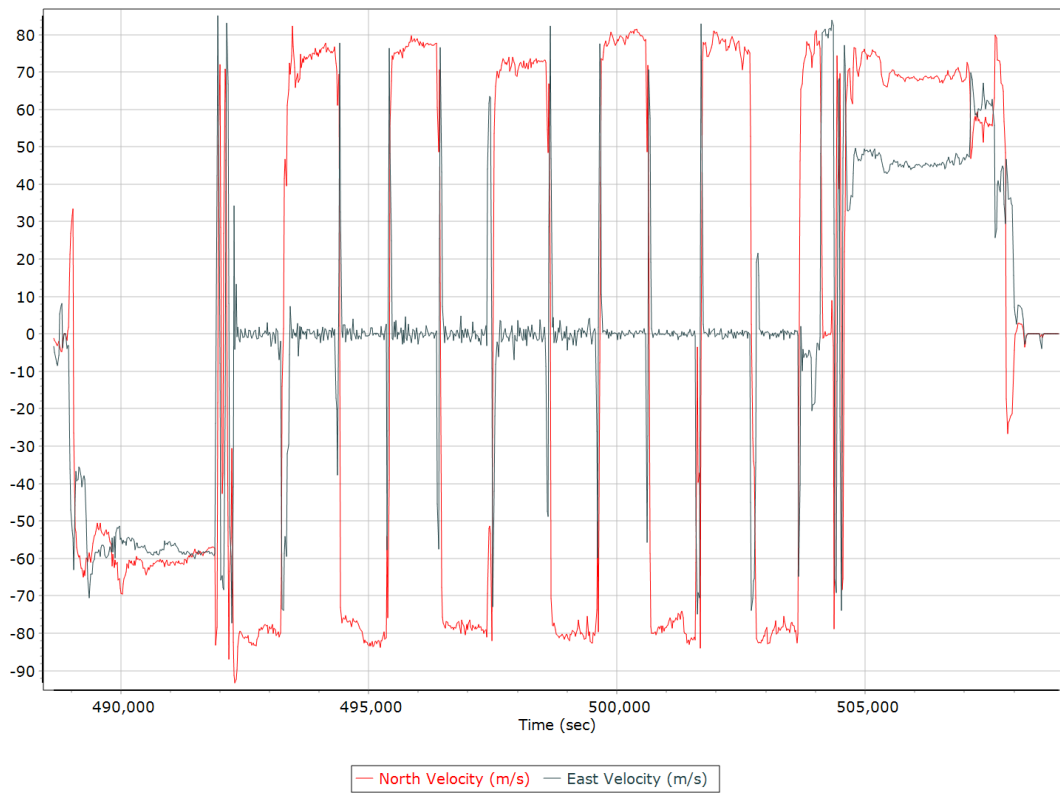


## Heading

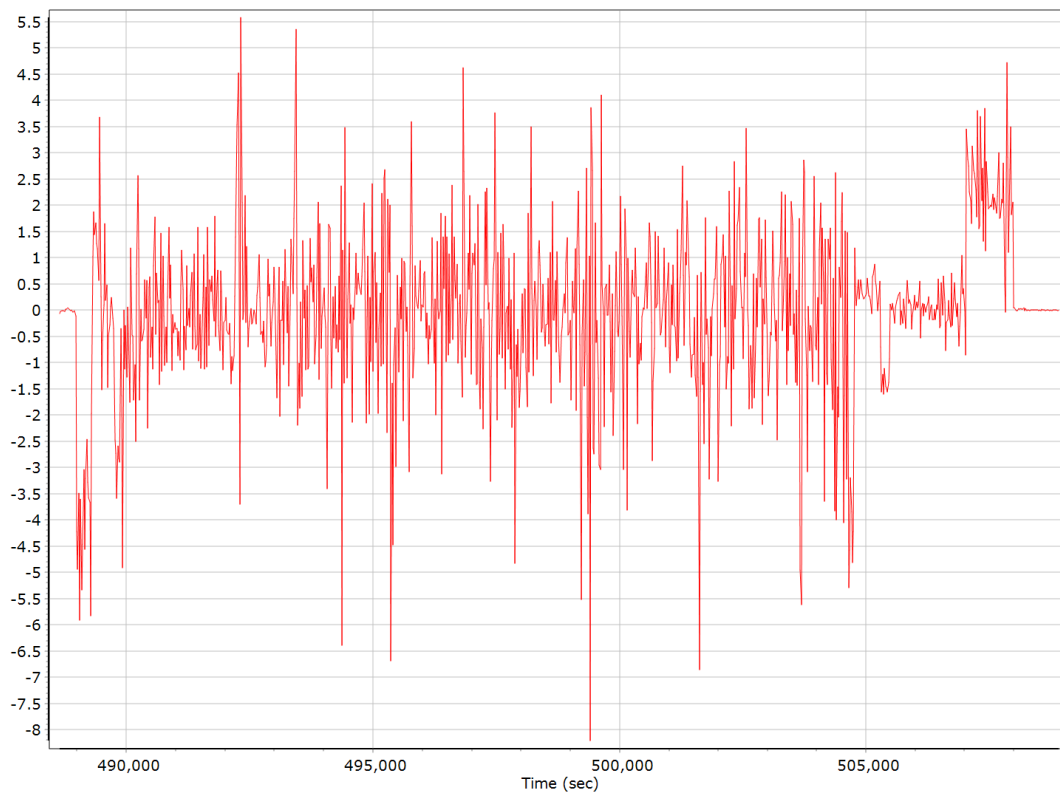




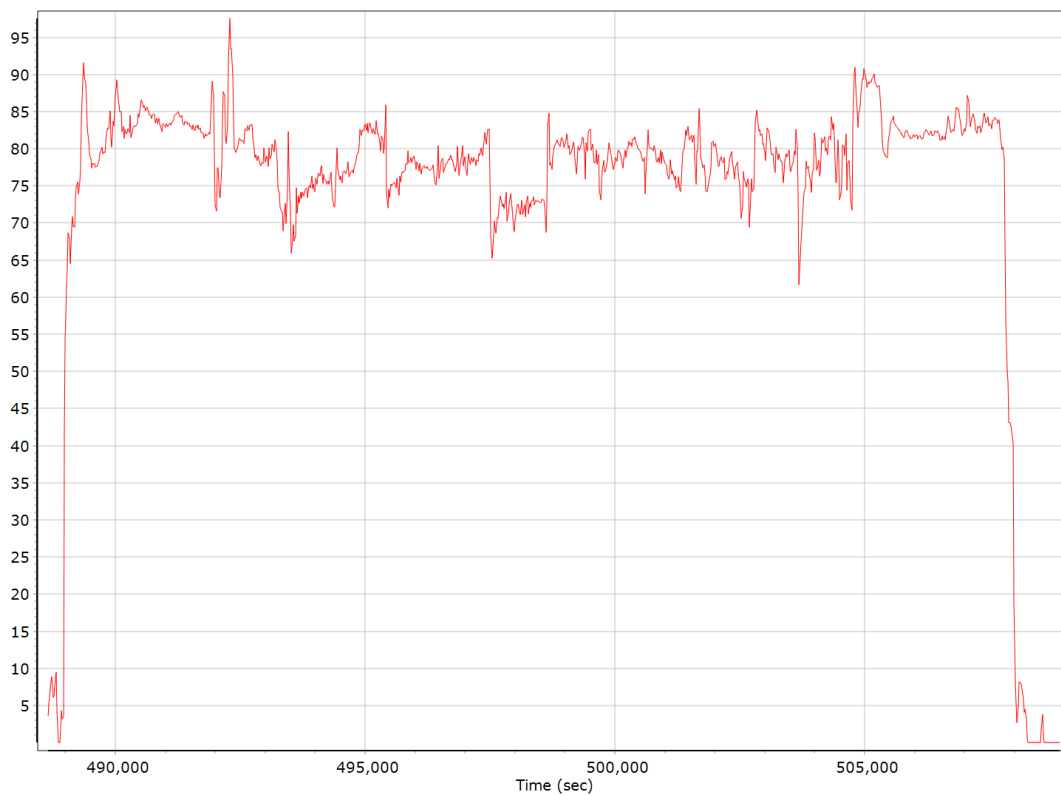
## North/East Velocity



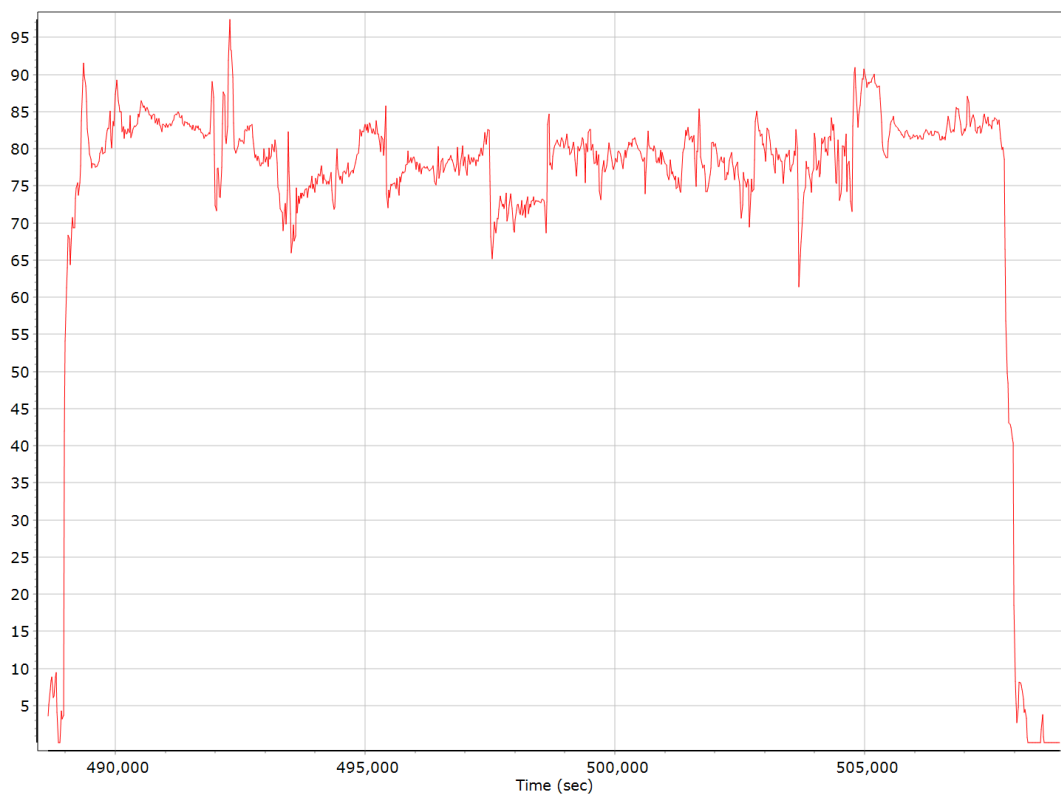
## Down Velocity



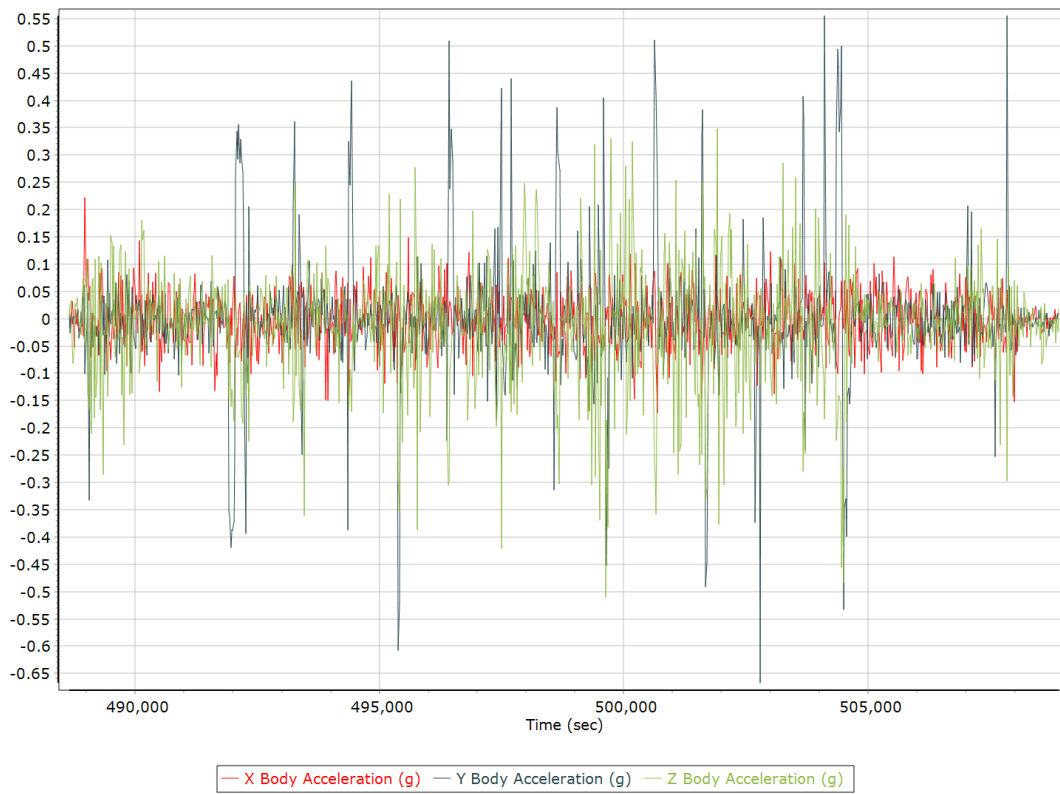
## Total Speed



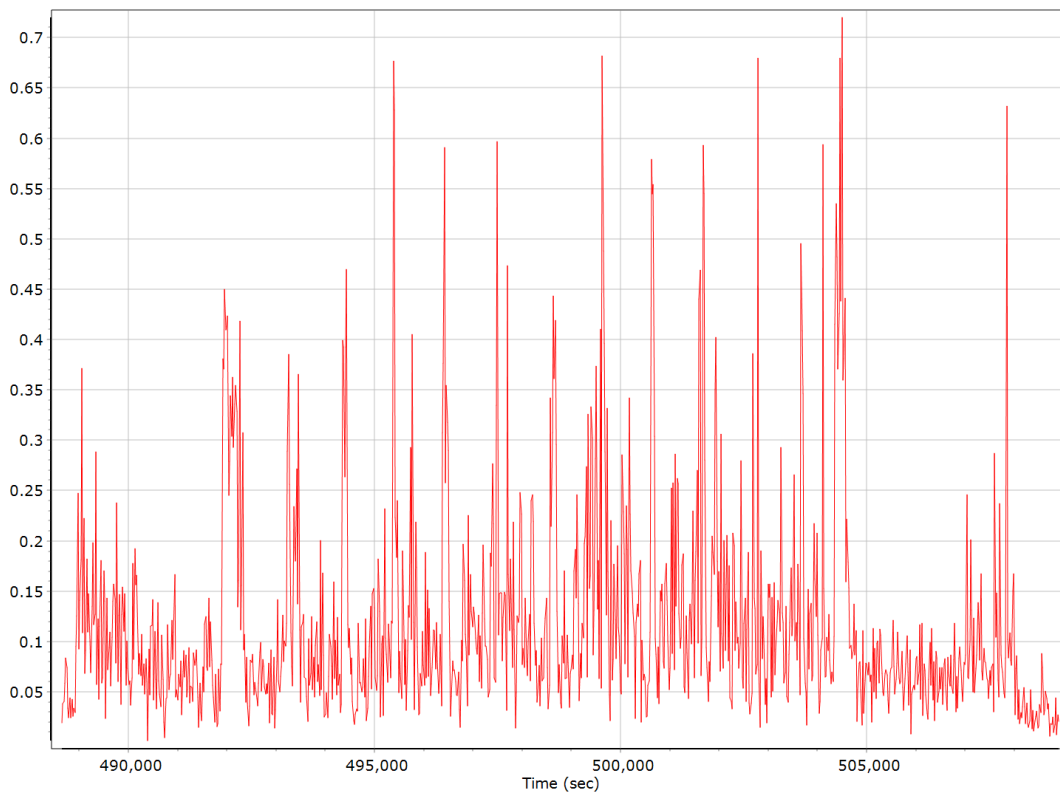
## Ground Speed



## Body Acceleration



## Total Body Acceleration

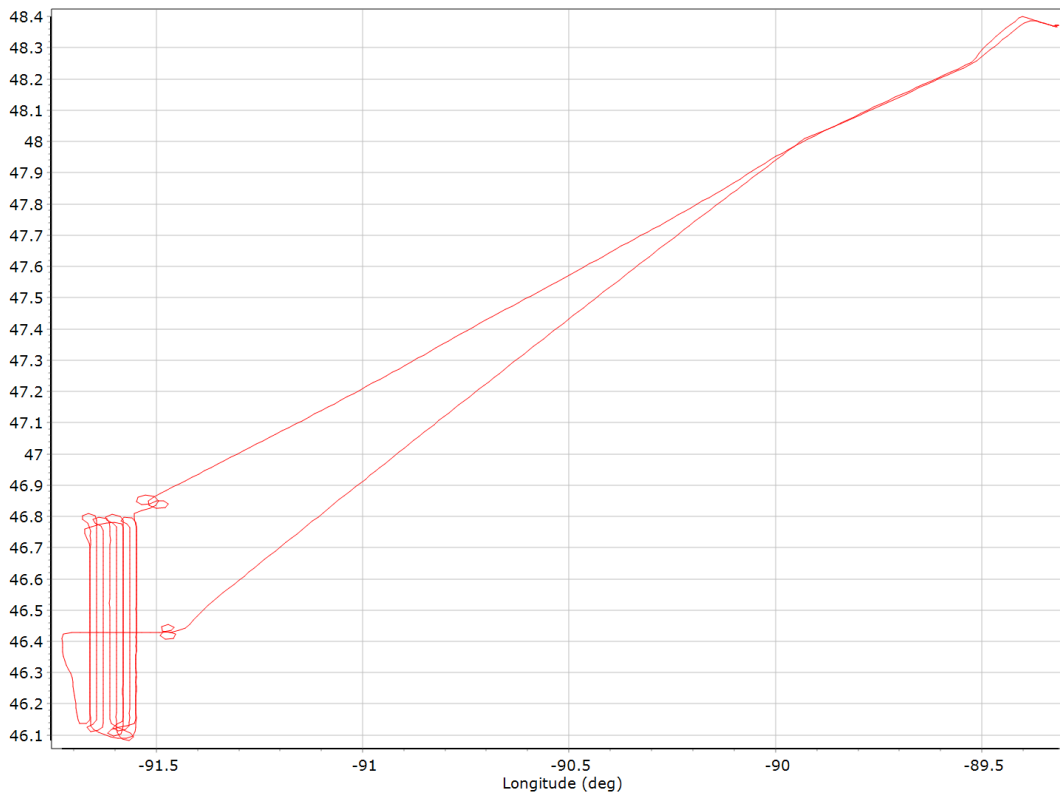


## Body Angular Rate

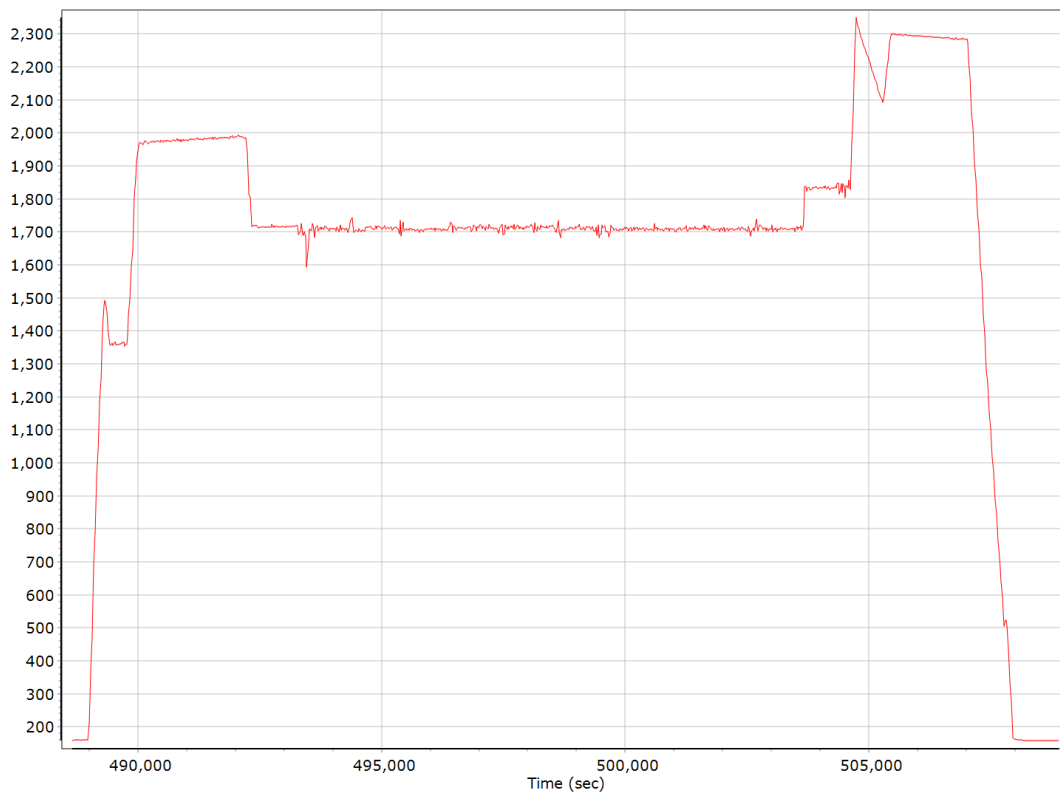


## Forward Processed Trajectory Information

### Top View



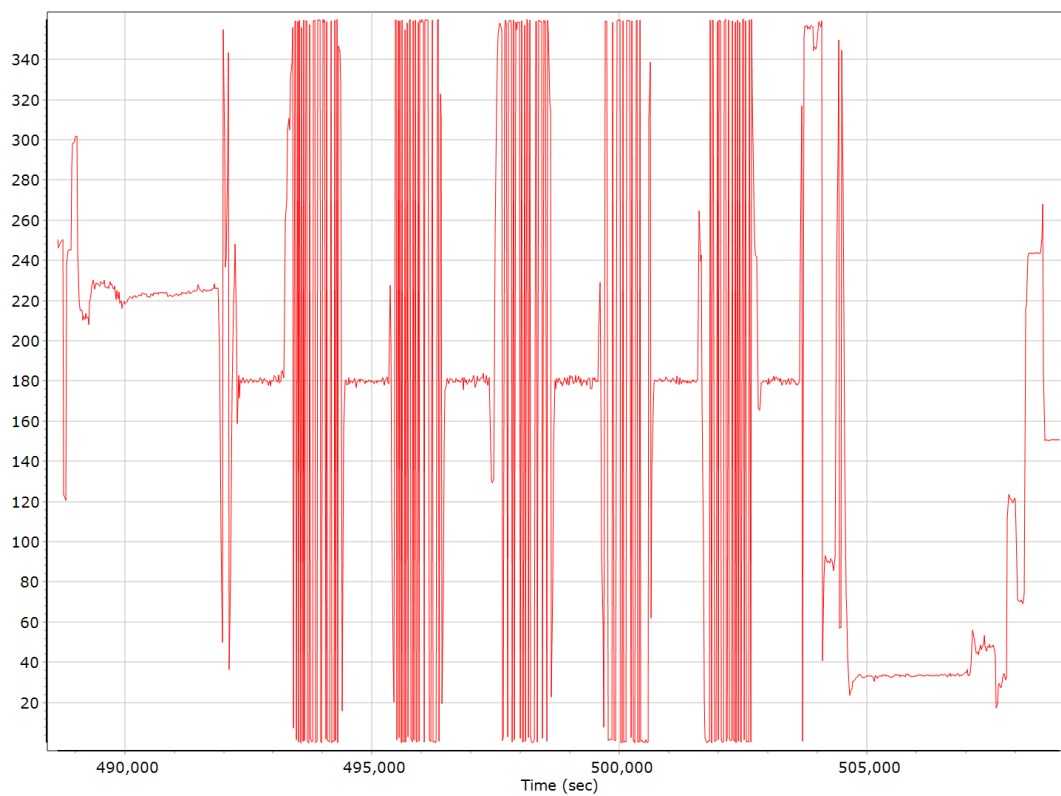
### Altitude



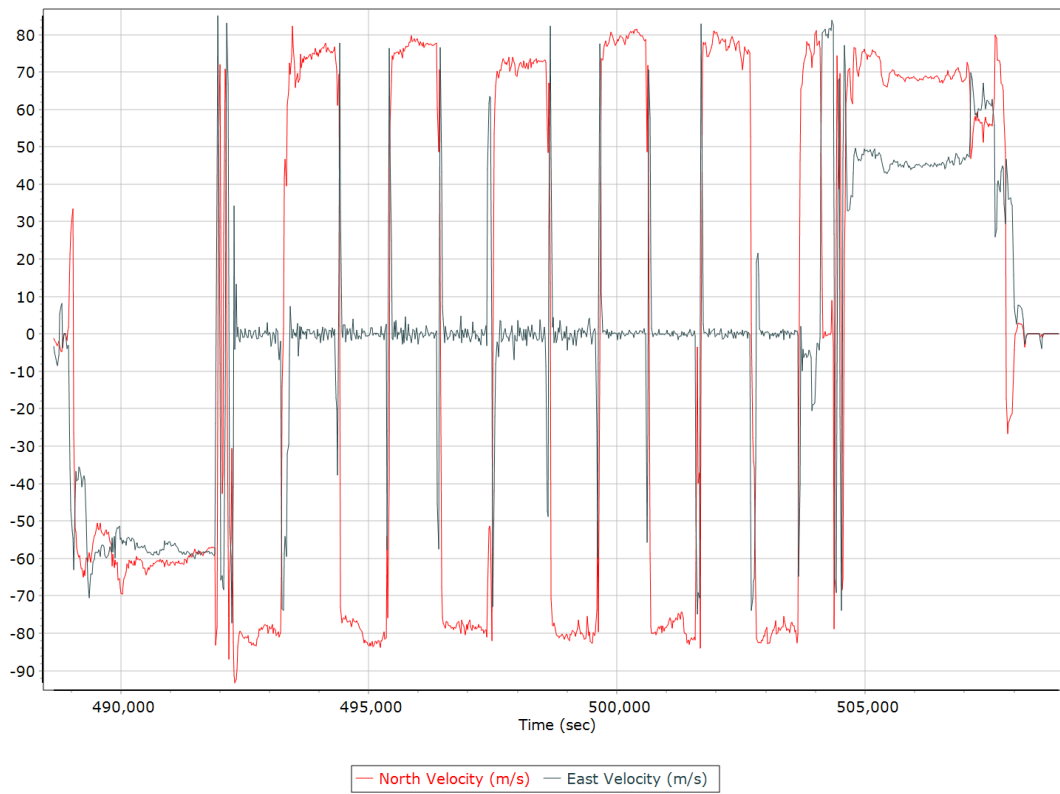
## Roll/Pitch



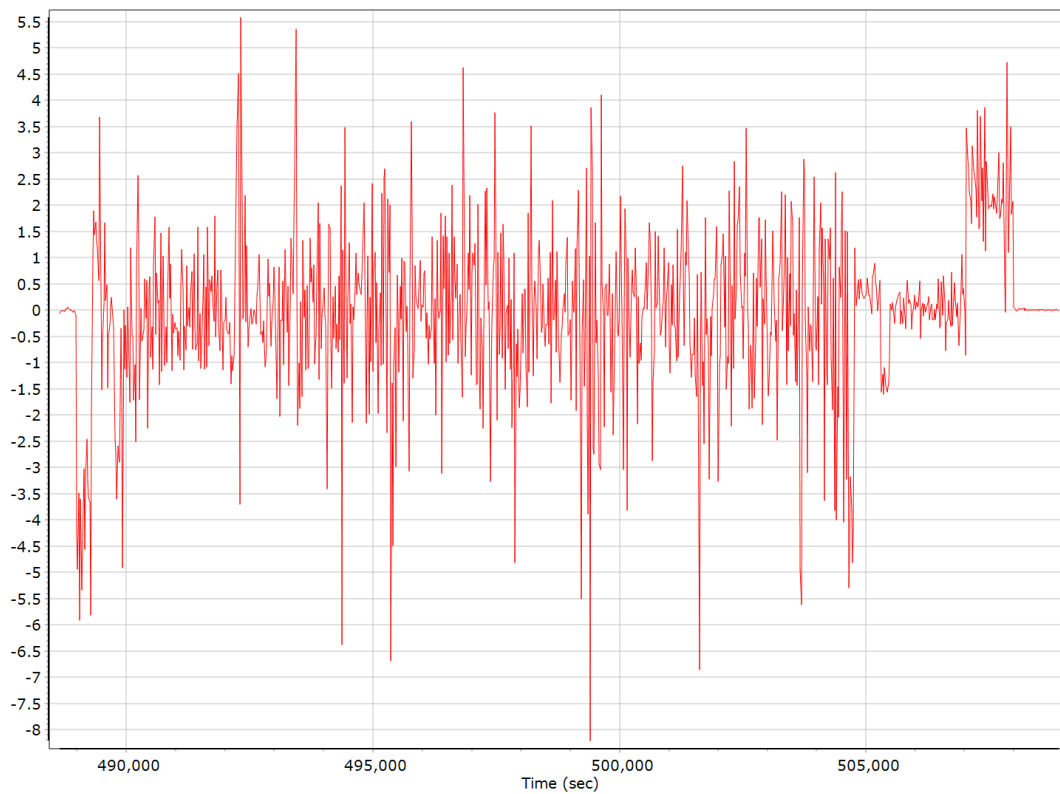
## Heading



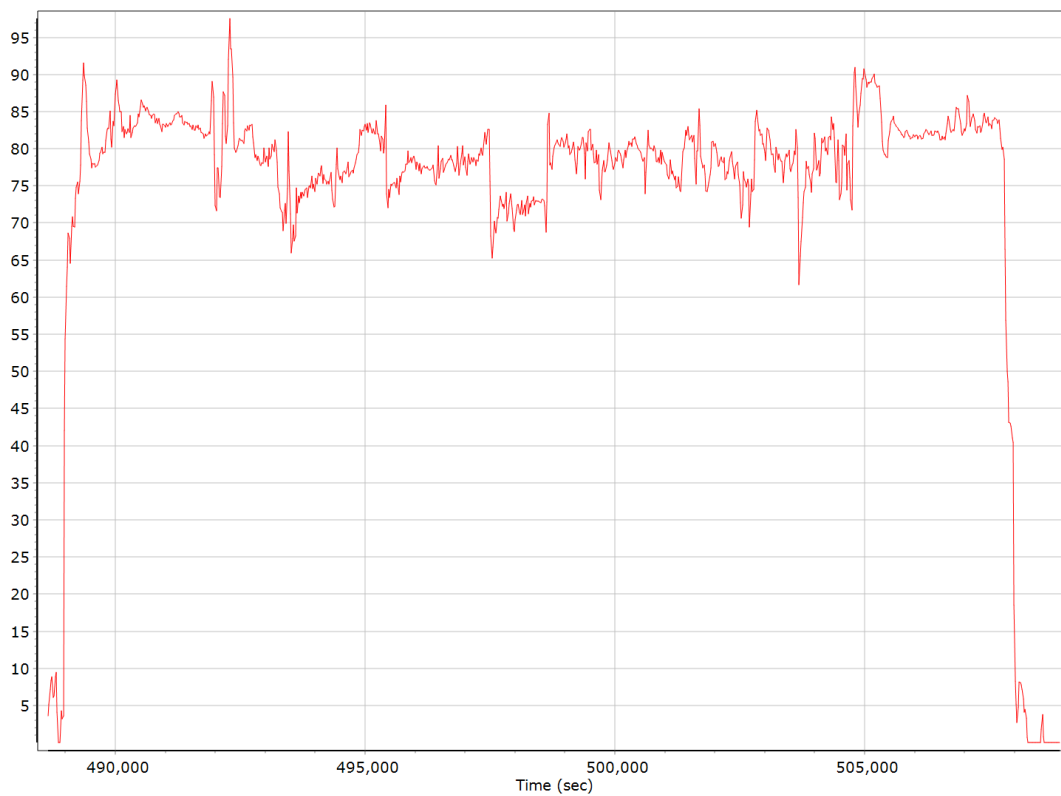
## North/East Velocity



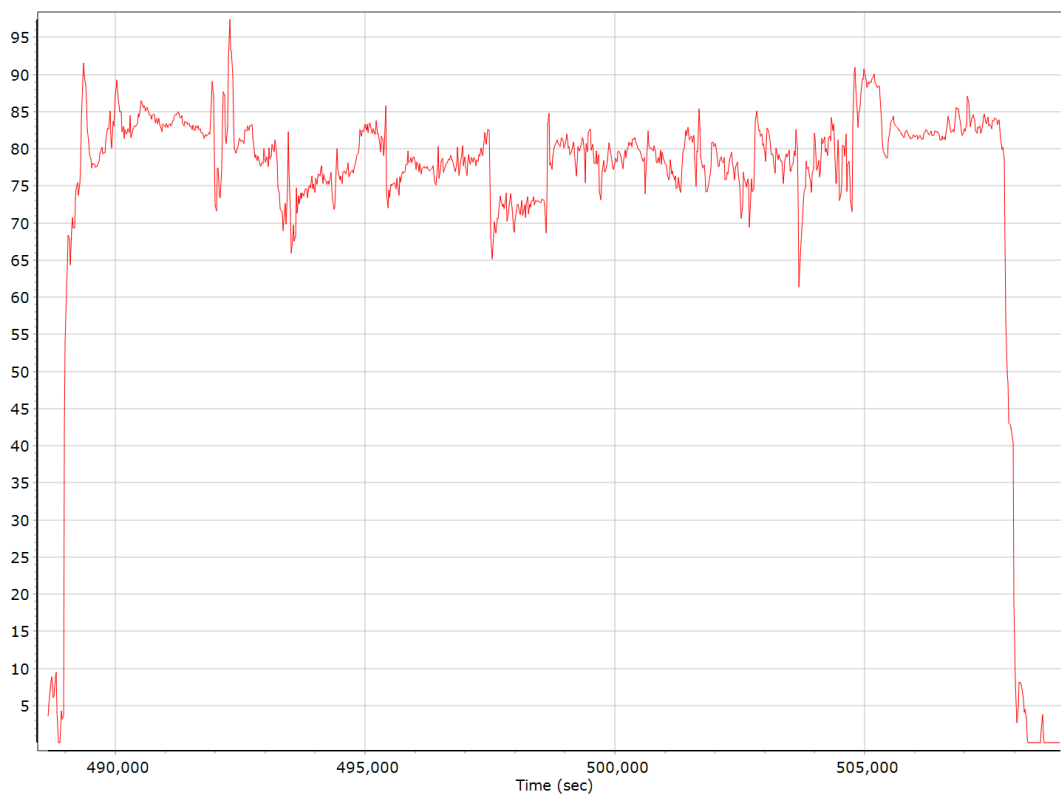
## Down Velocity



## Total Speed

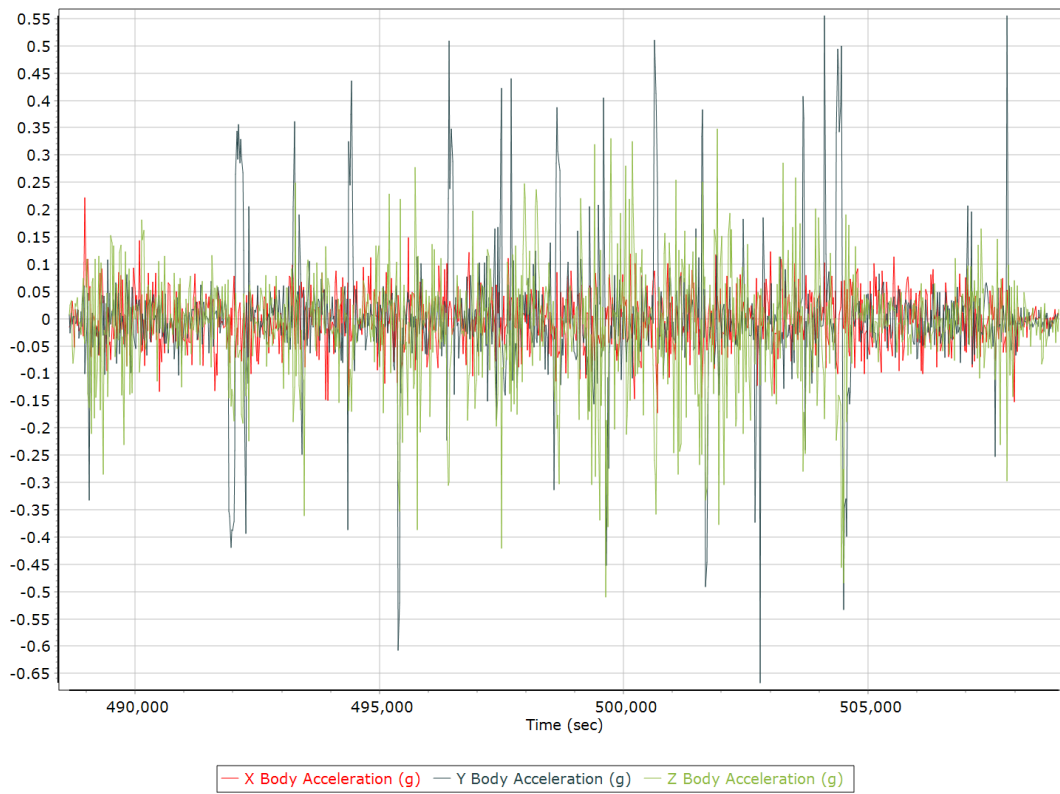


## Ground Speed

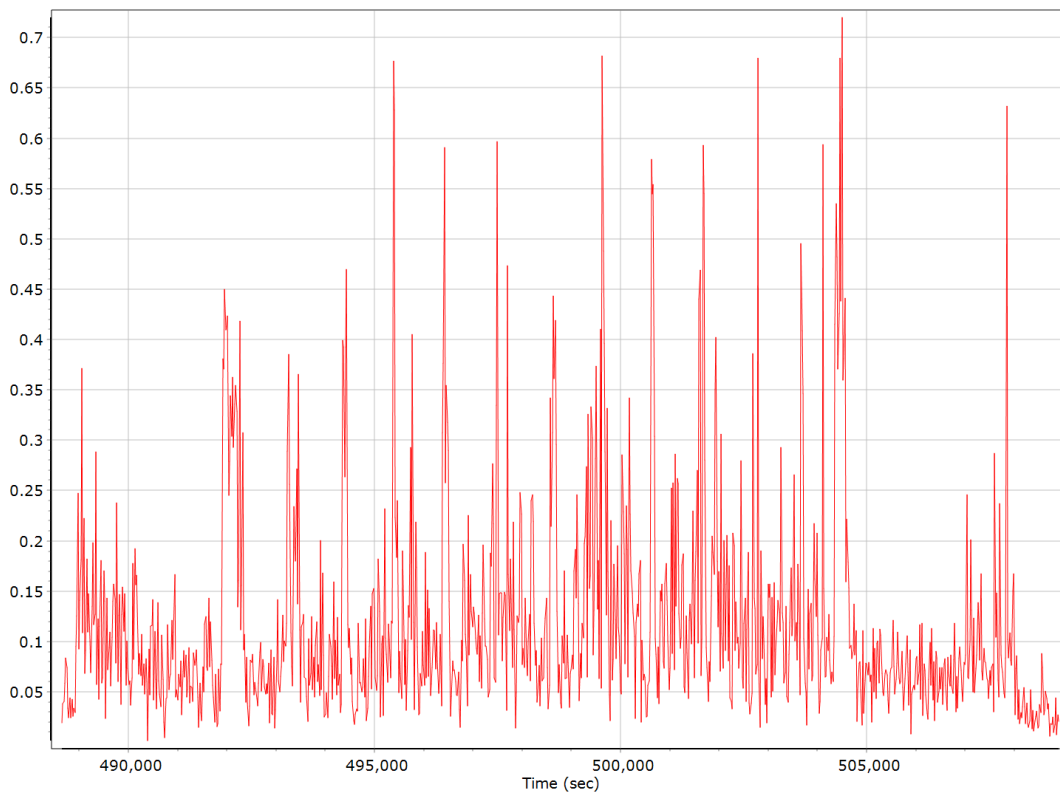




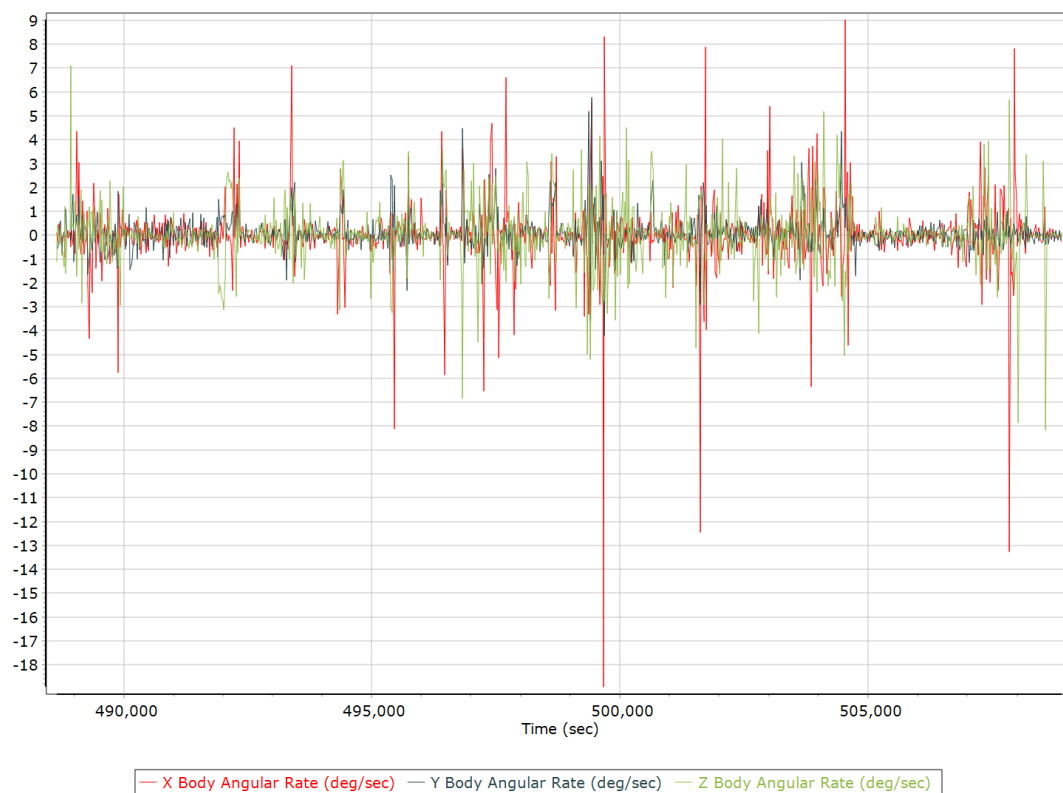
## Body Acceleration



## Total Body Acceleration



## Body Angular Rate

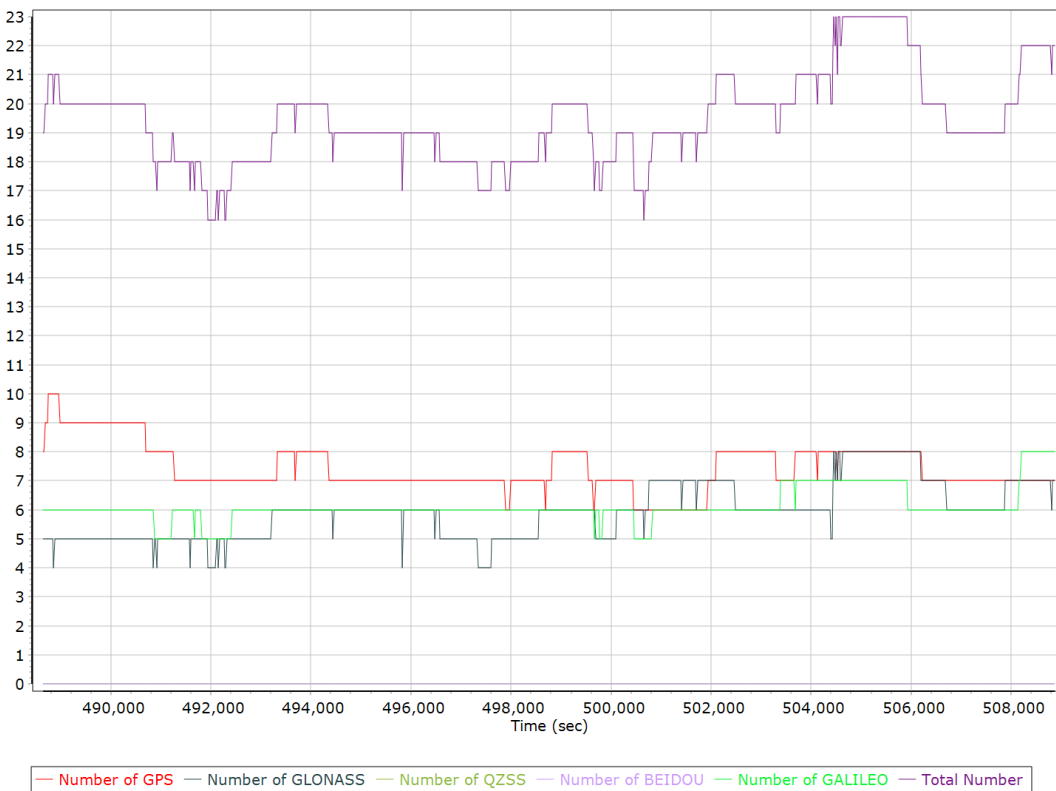


## GNSS QC

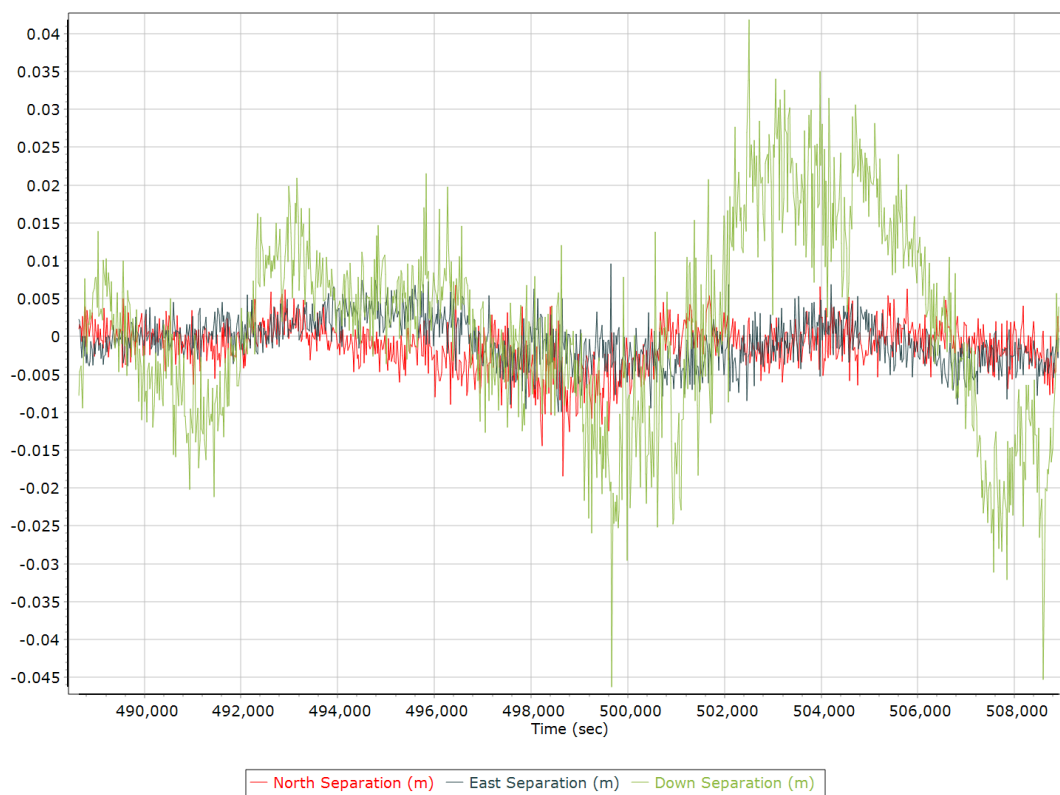
### GNSS QC Statistics

Statistics	Min	Max	Mean
Baseline length (km)	0.00	0.00	
Number of GPS SV	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

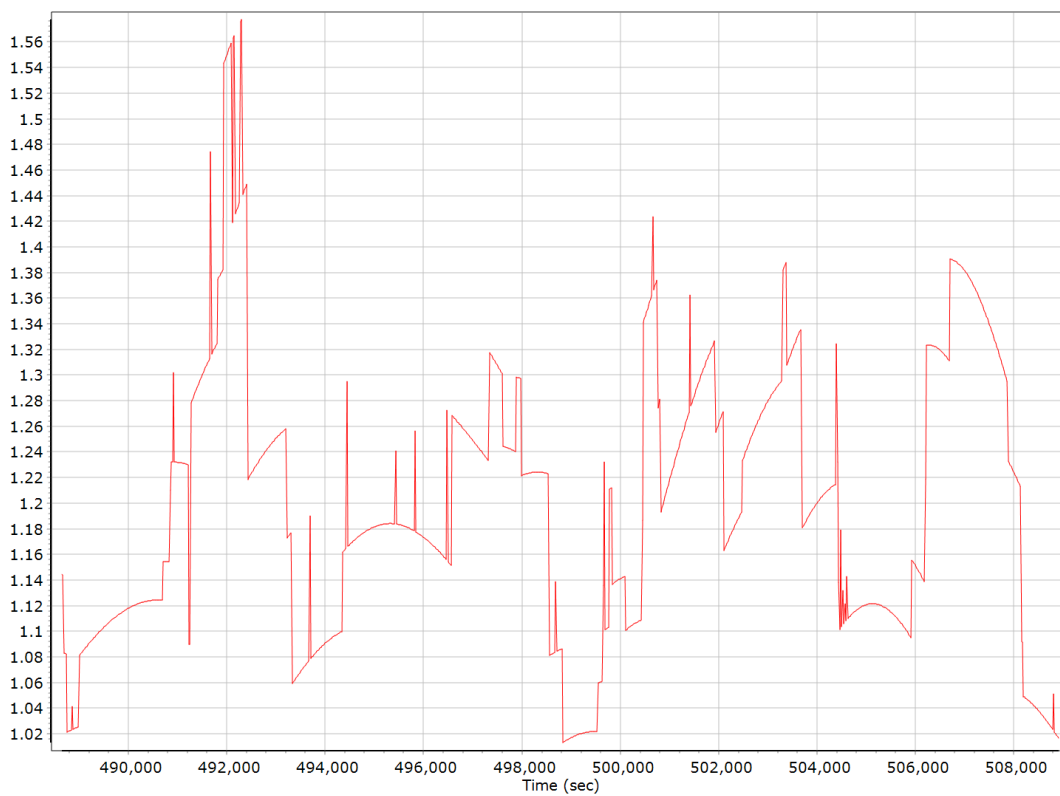
### Num SVs in solution



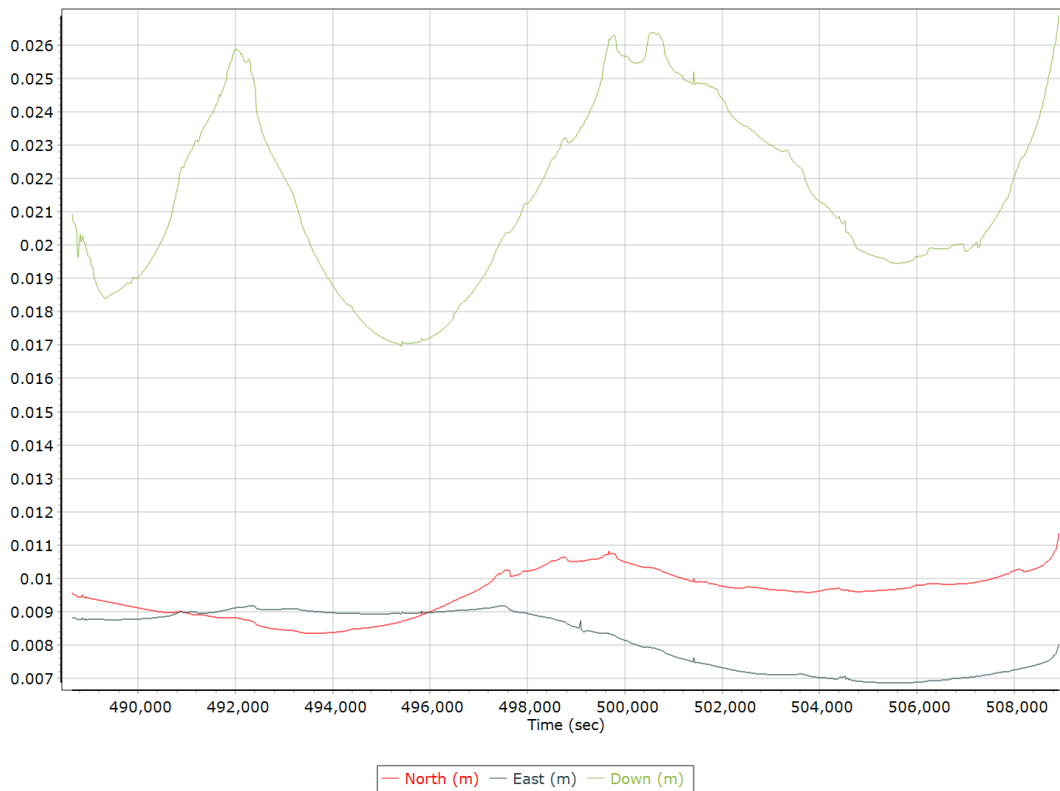
## Forward/Reverse Separation



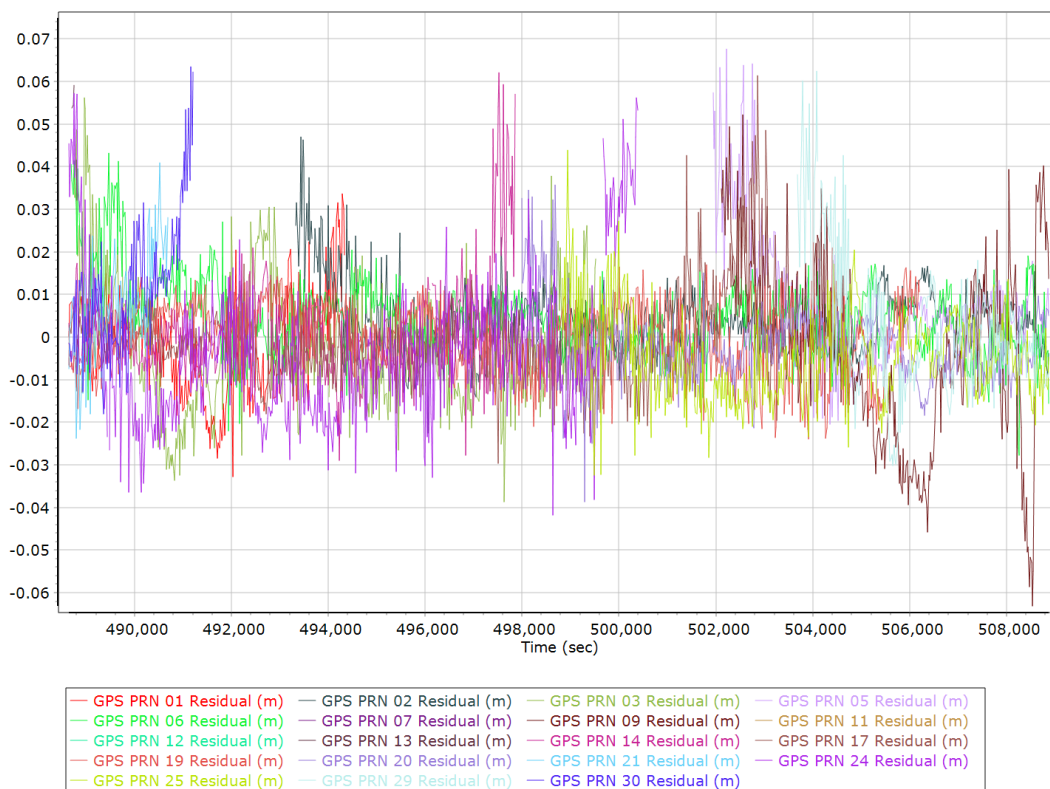
## PDOP



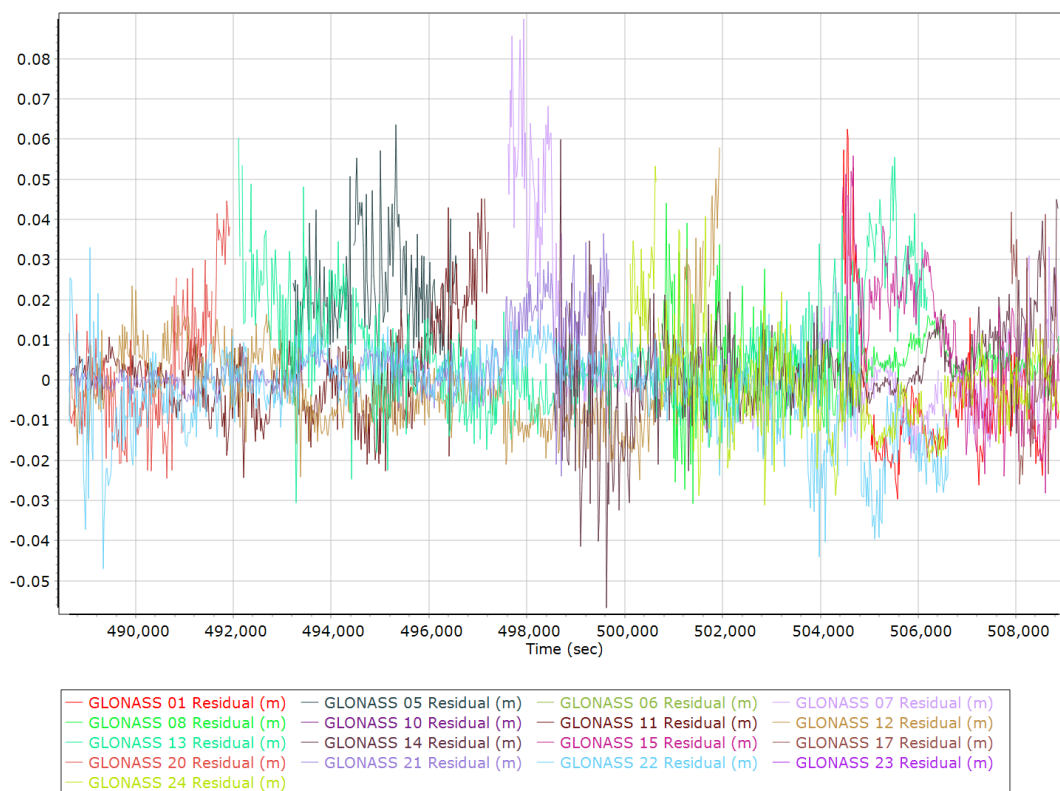
## Estimated Position Accuracy



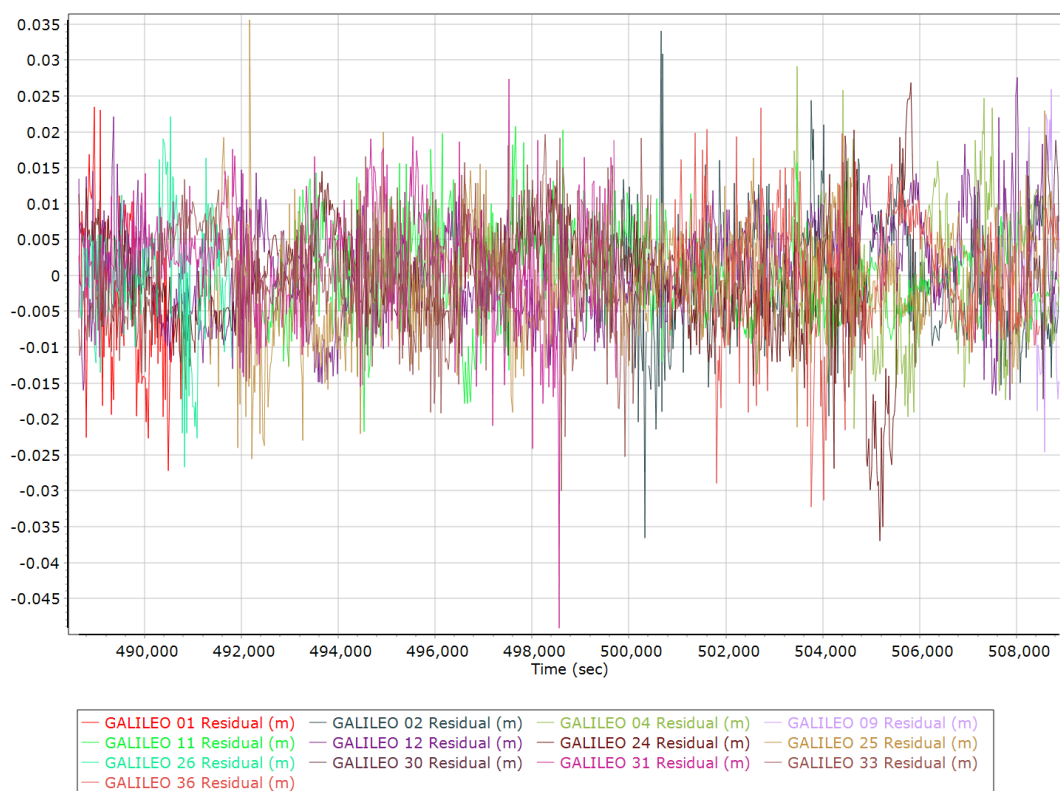
## GPS Residuals



## GLONASS Residuals



## GALILEO Residuals



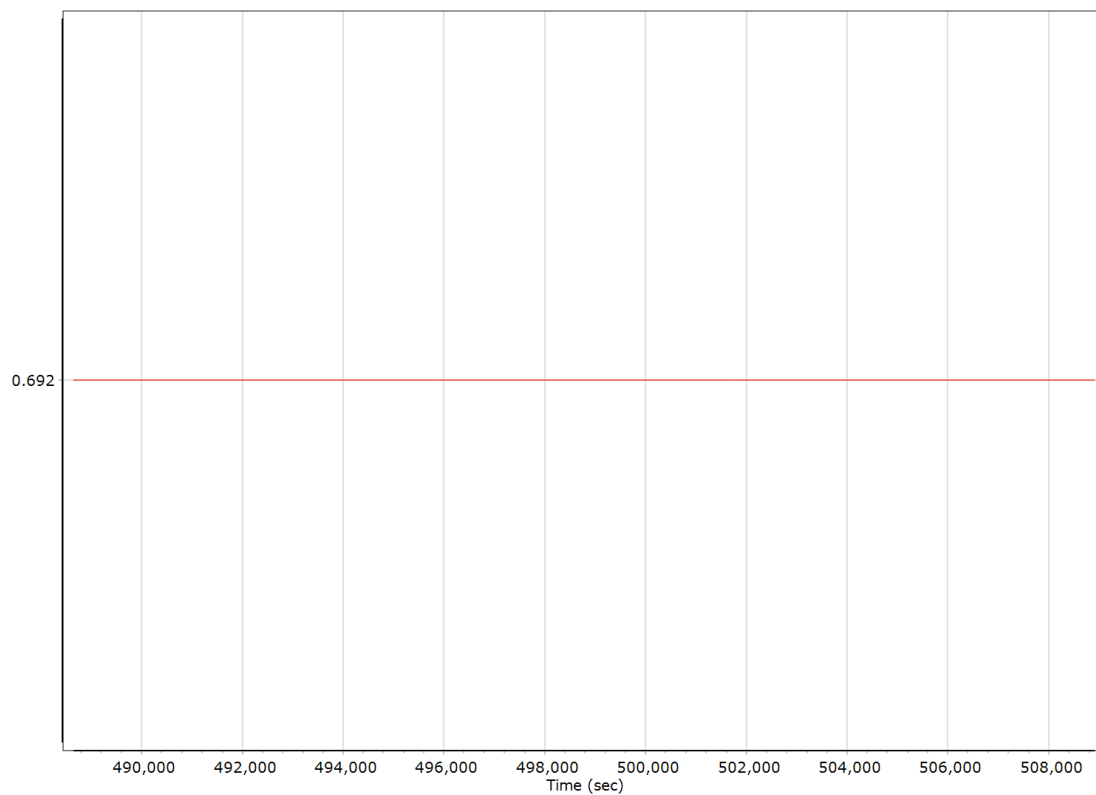
## GNSS-Inertial Processor Configuration

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

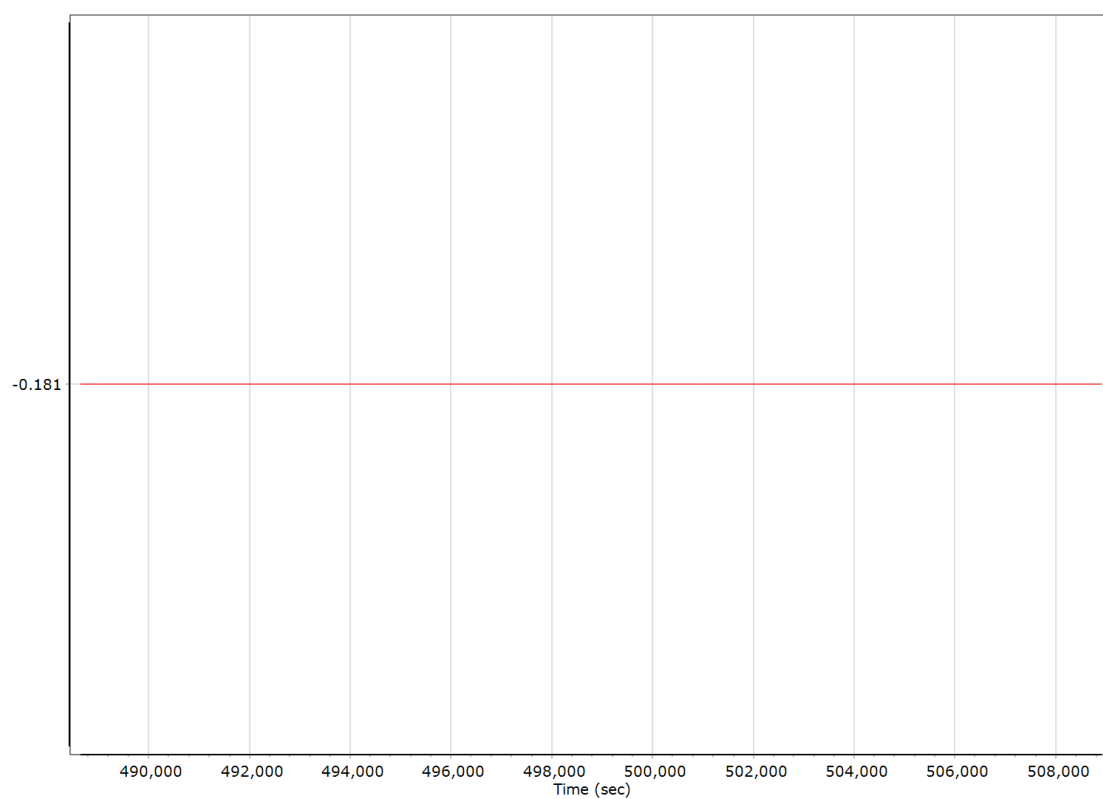
## Calibrated Installation Parameters

### Reference-Primary GNSS Lever Arm (m)

#### X Reference-Primary GNSS Lever Arm (m)

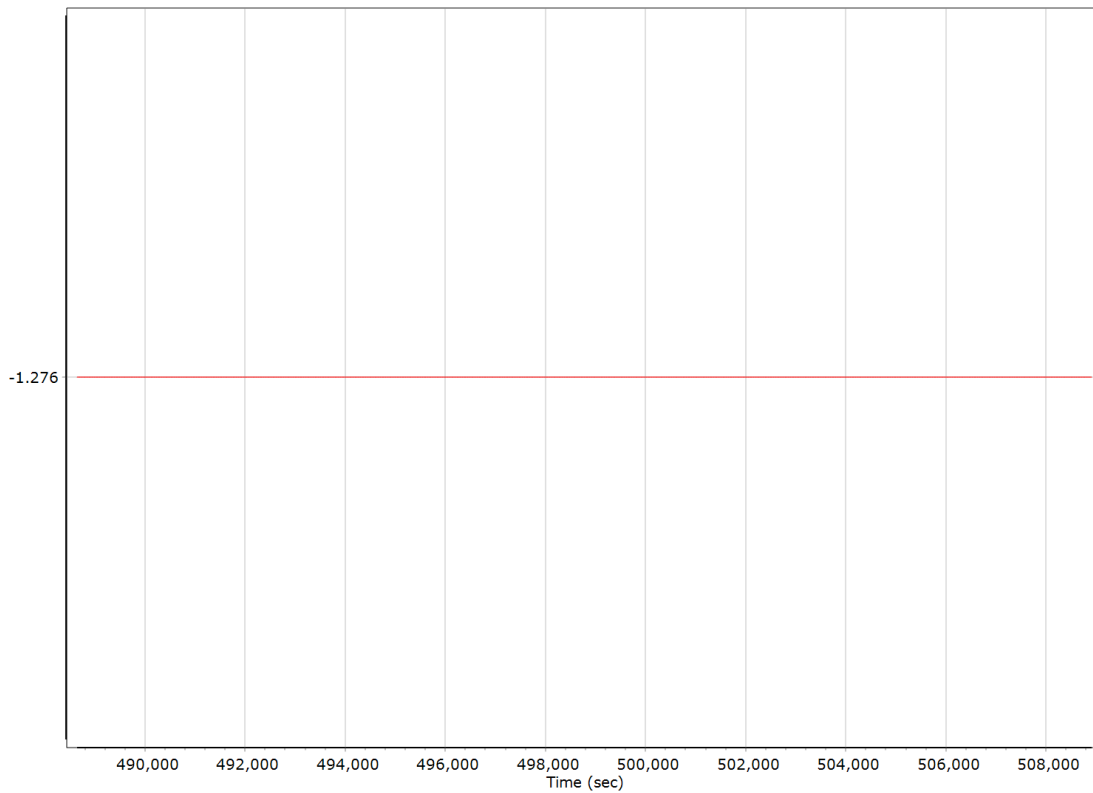


#### Y Reference-Primary GNSS Lever Arm (m)

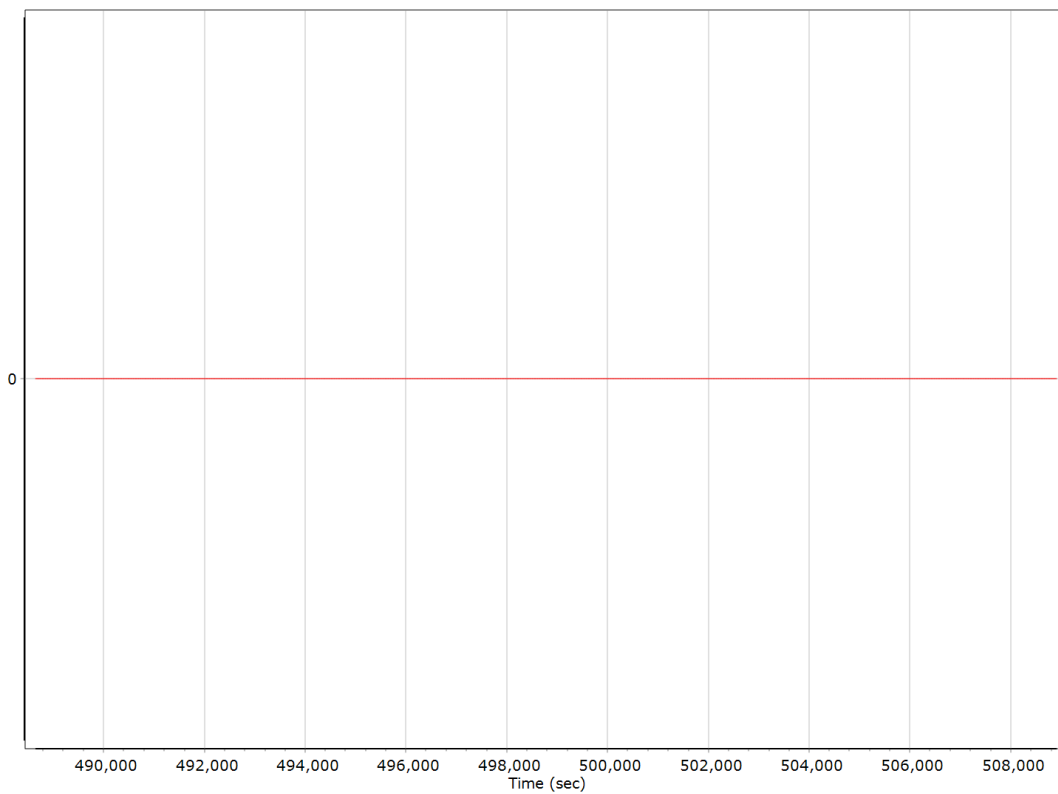




### Z Reference-Primary GNSS Lever Arm (m)



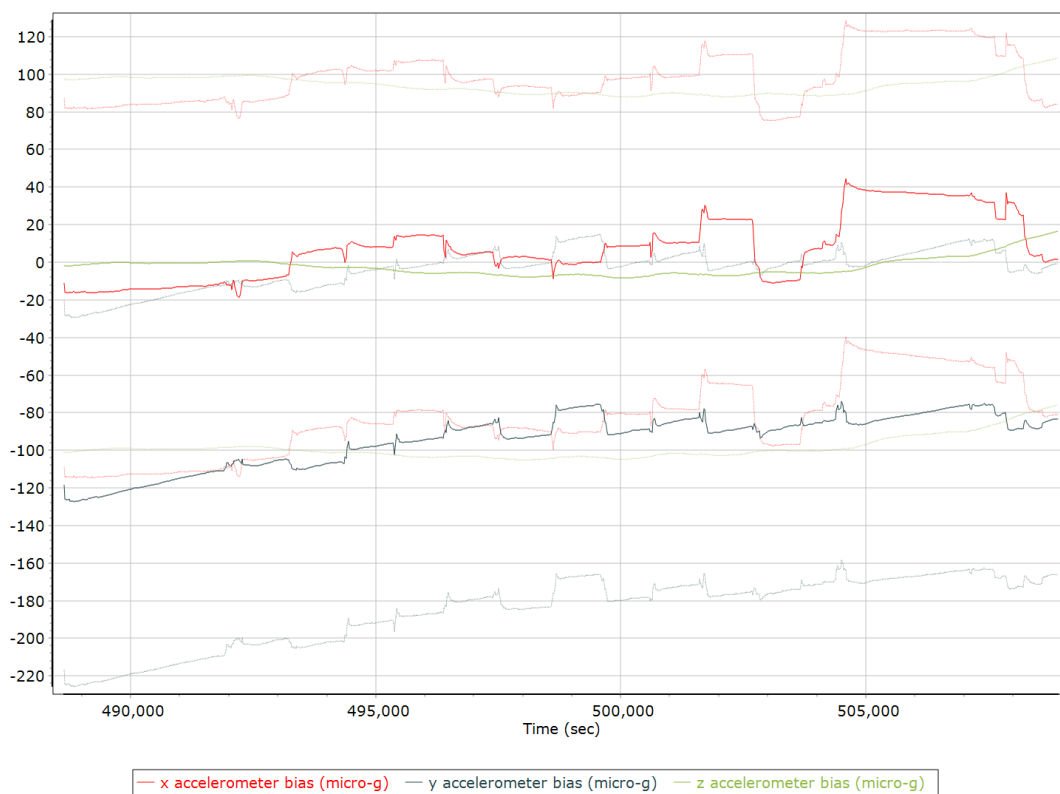
### Reference-Primary GNSS Lever Arm Figure of Merit



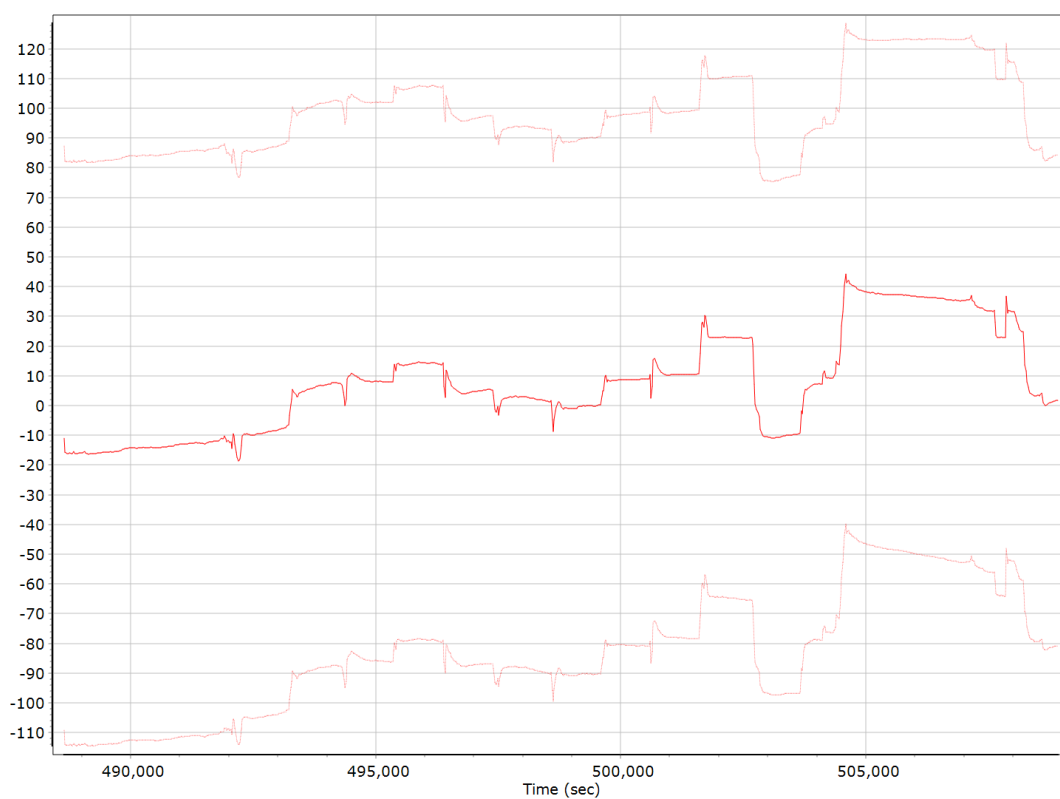
## IN-Fusion QC

### Forward Processed Estimated Errors, Reference Frame

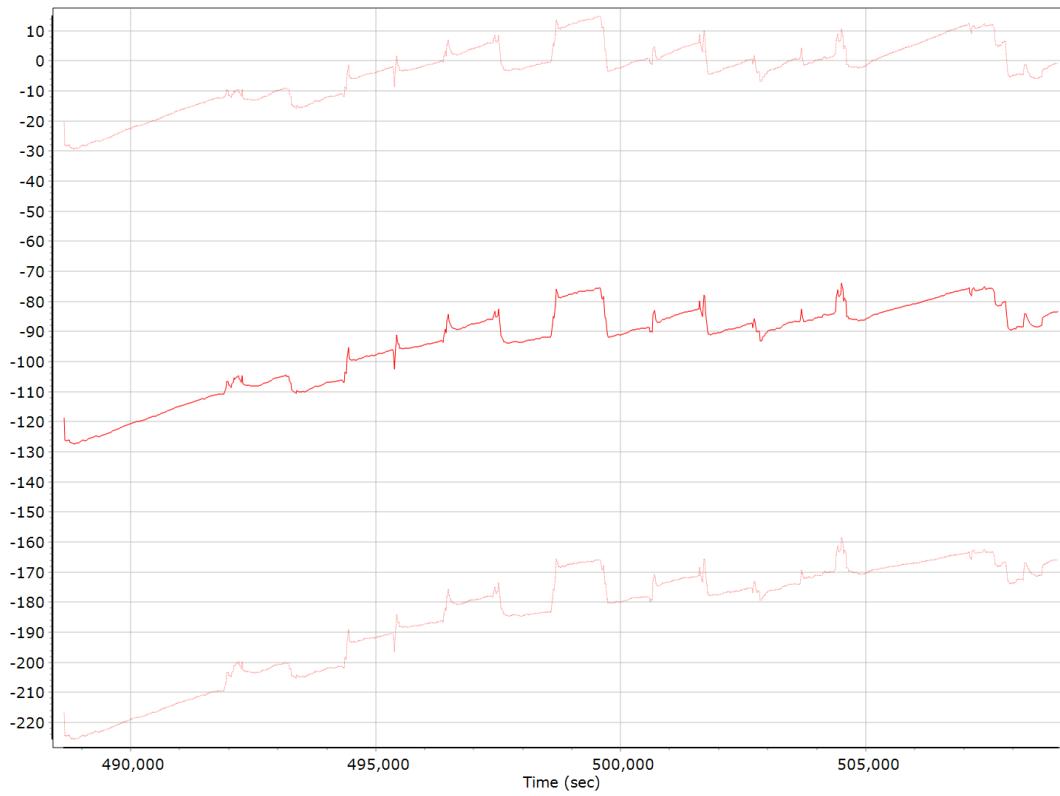
#### Accelerometer Bias (micro-g)



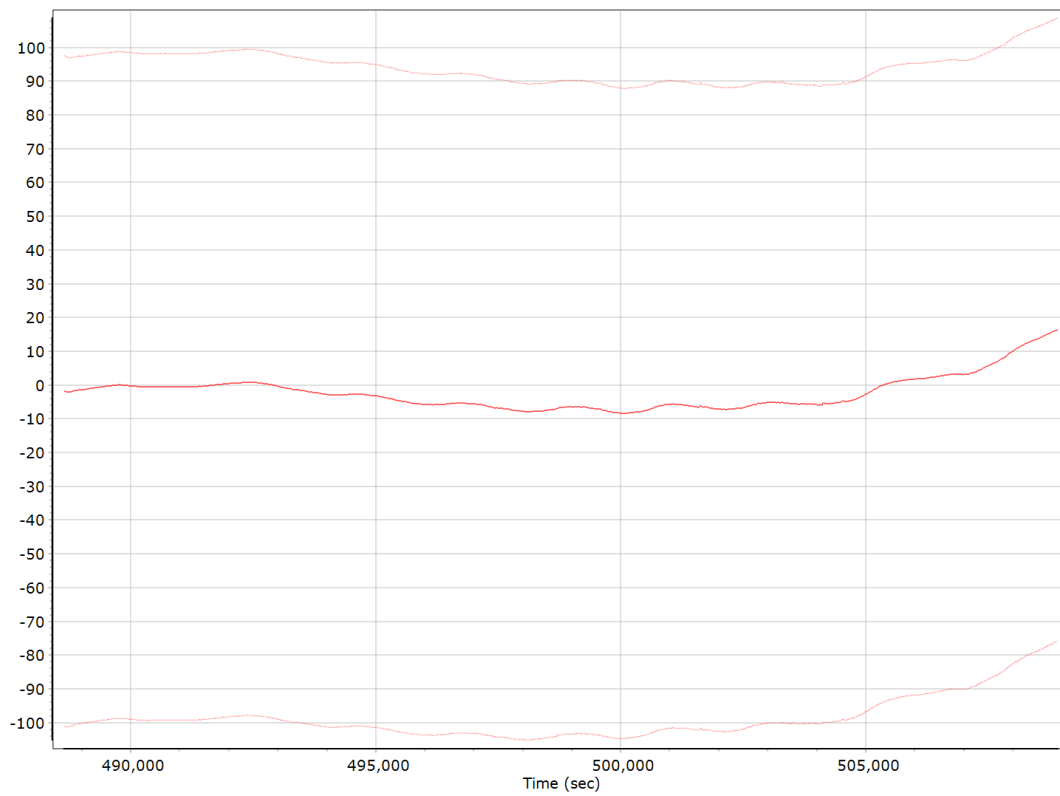
#### X Accelerometer Bias (micro-g)



### Y Accelerometer Bias (micro-g)



### Z Accelerometer Bias (micro-g)



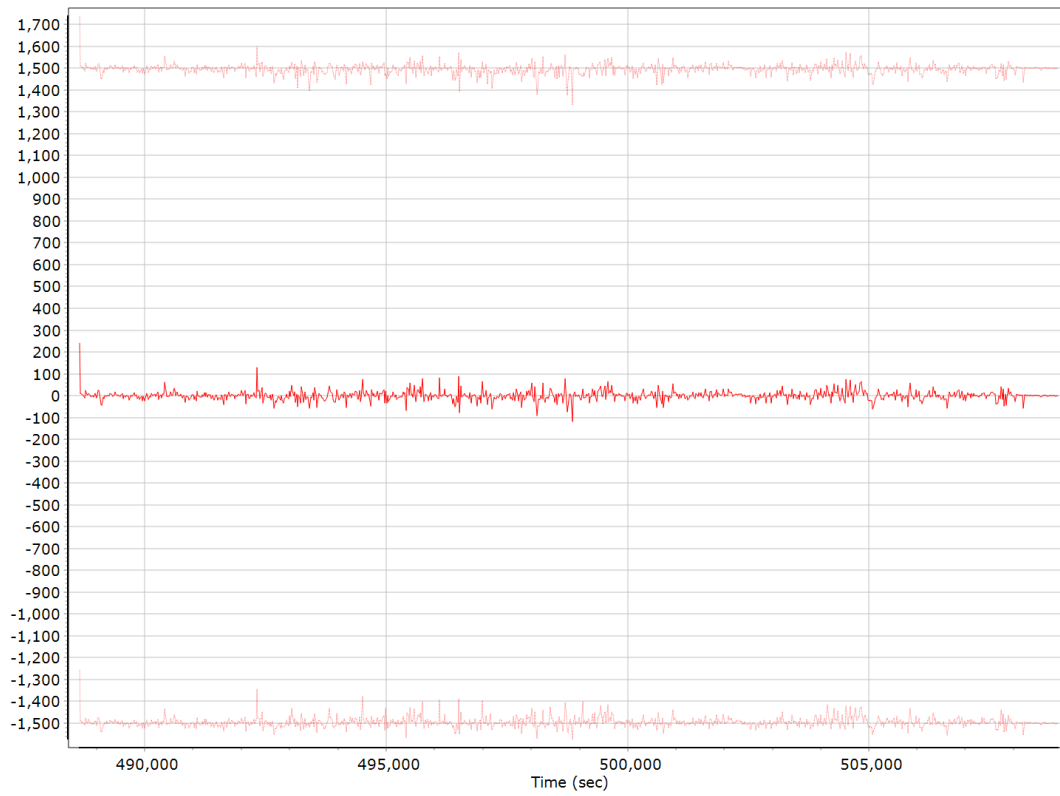
## Accelerometer Scale Error (ppm)



## X Accelerometer Scale Error (ppm)



### Y Accelerometer Scale Error (ppm)



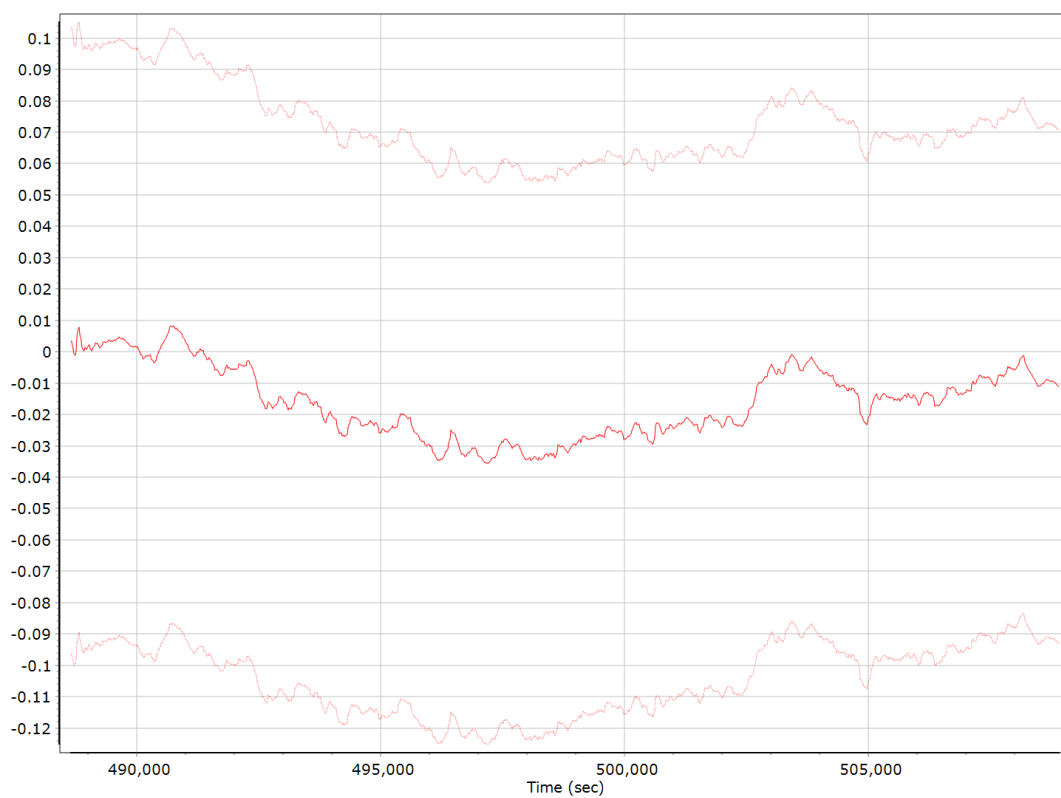
### Z Accelerometer Scale Error (ppm)



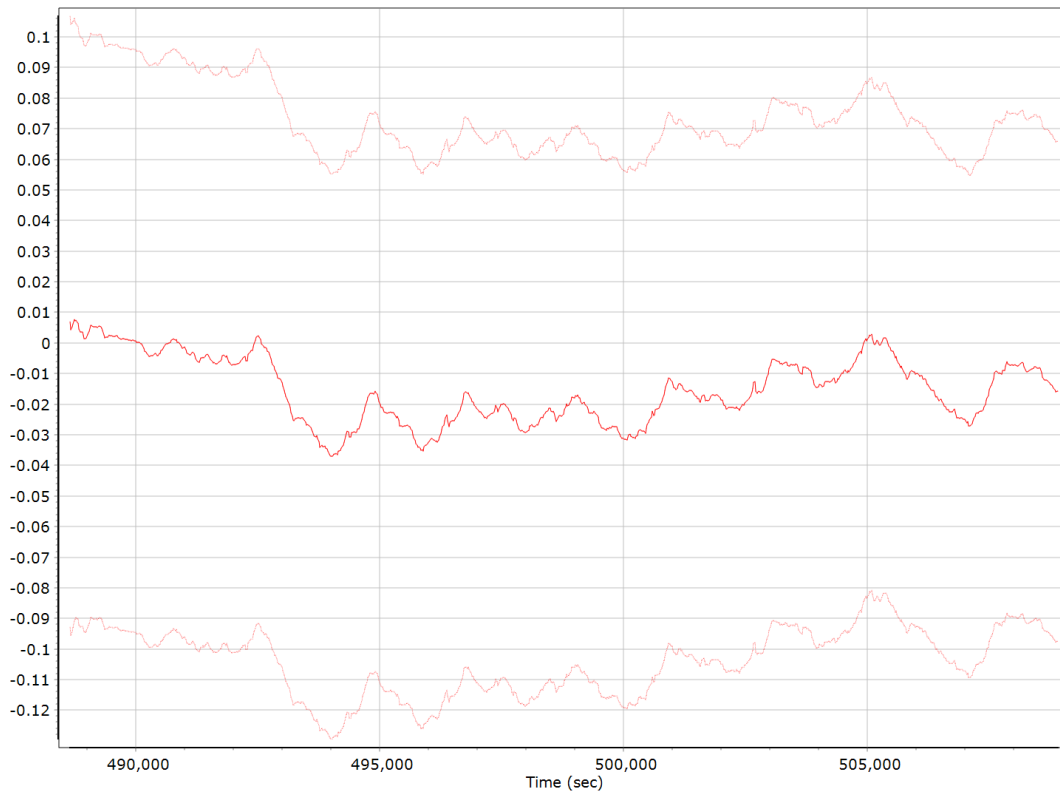
## Gyro Bias (deg/h)



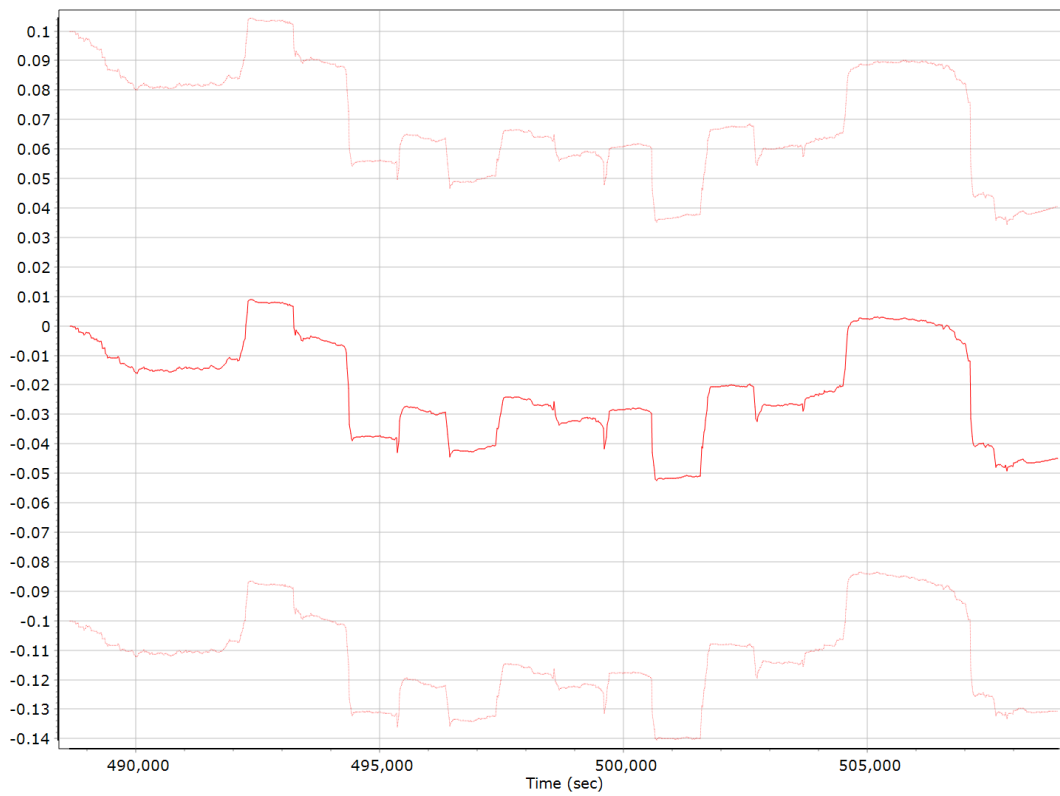
## X Gyro Bias (deg/h)



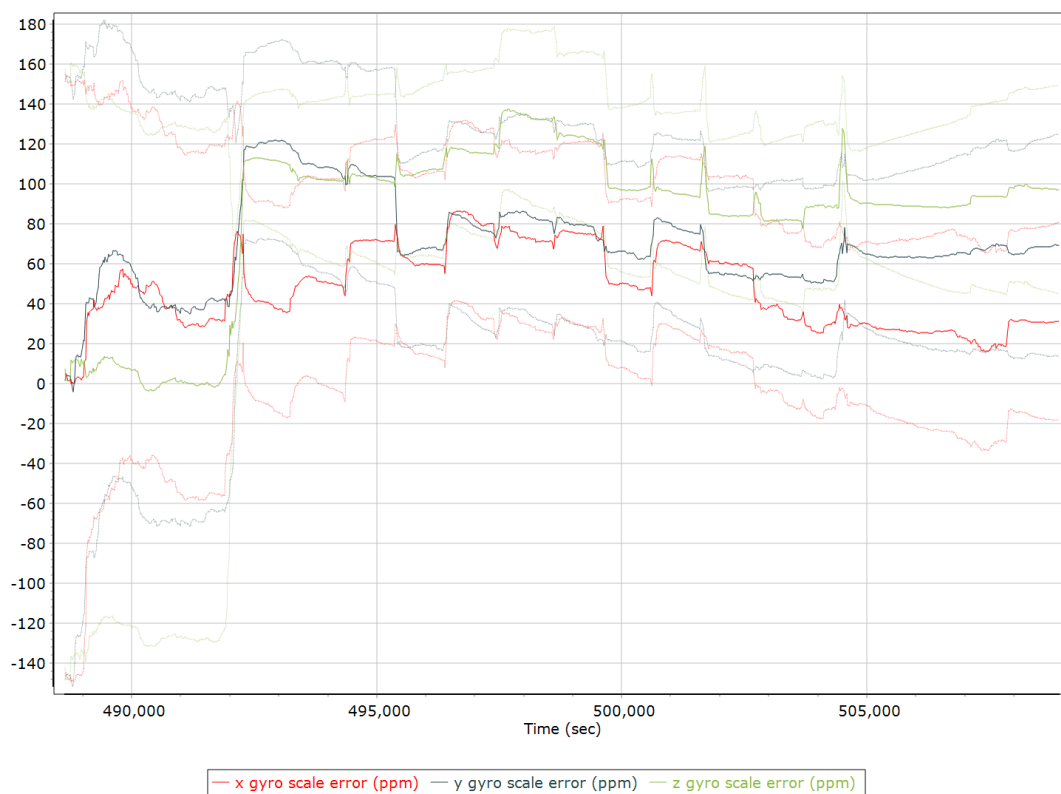
### Y Gyro Bias (deg/h)



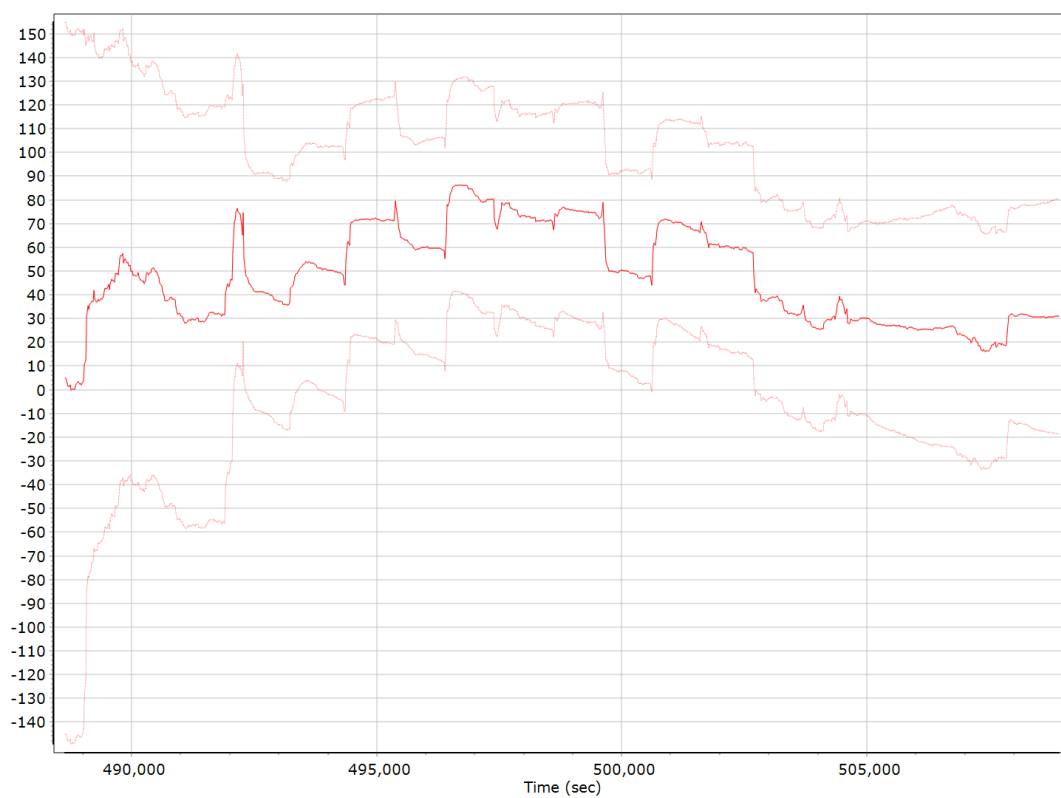
### Z Gyro Bias (deg/h)



### Gyro Scale Error (ppm)

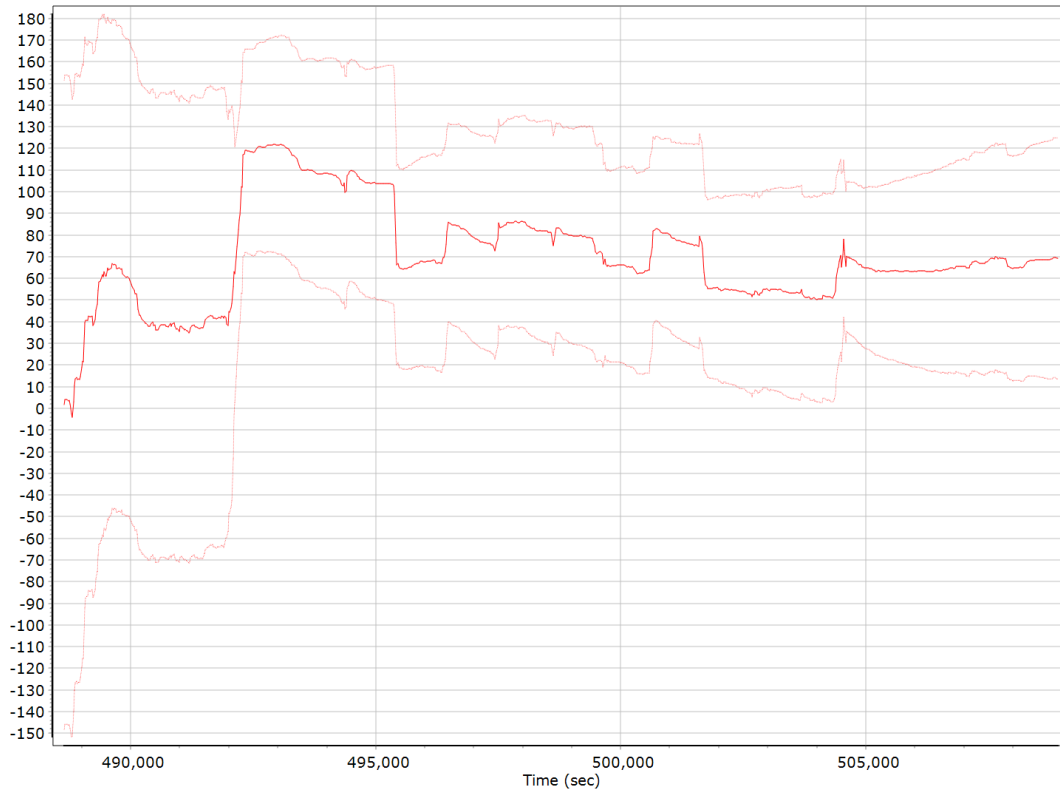


### X Gyro Scale Error (ppm)

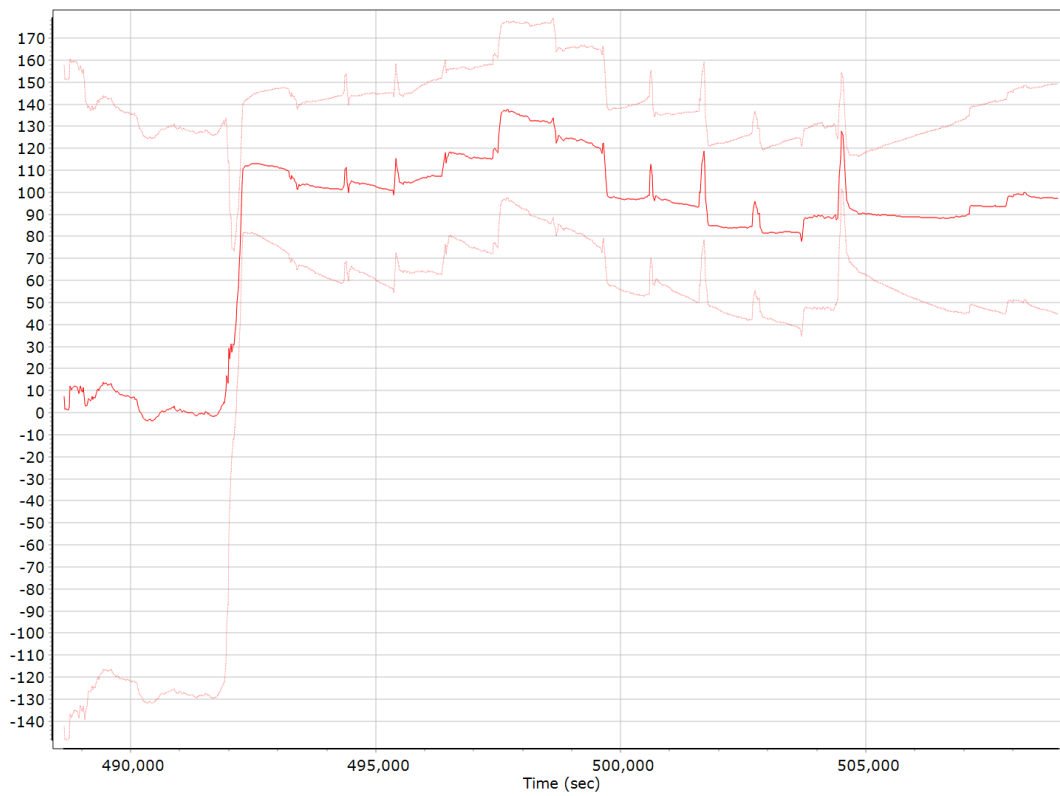




### Y Gyro Scale Error (ppm)

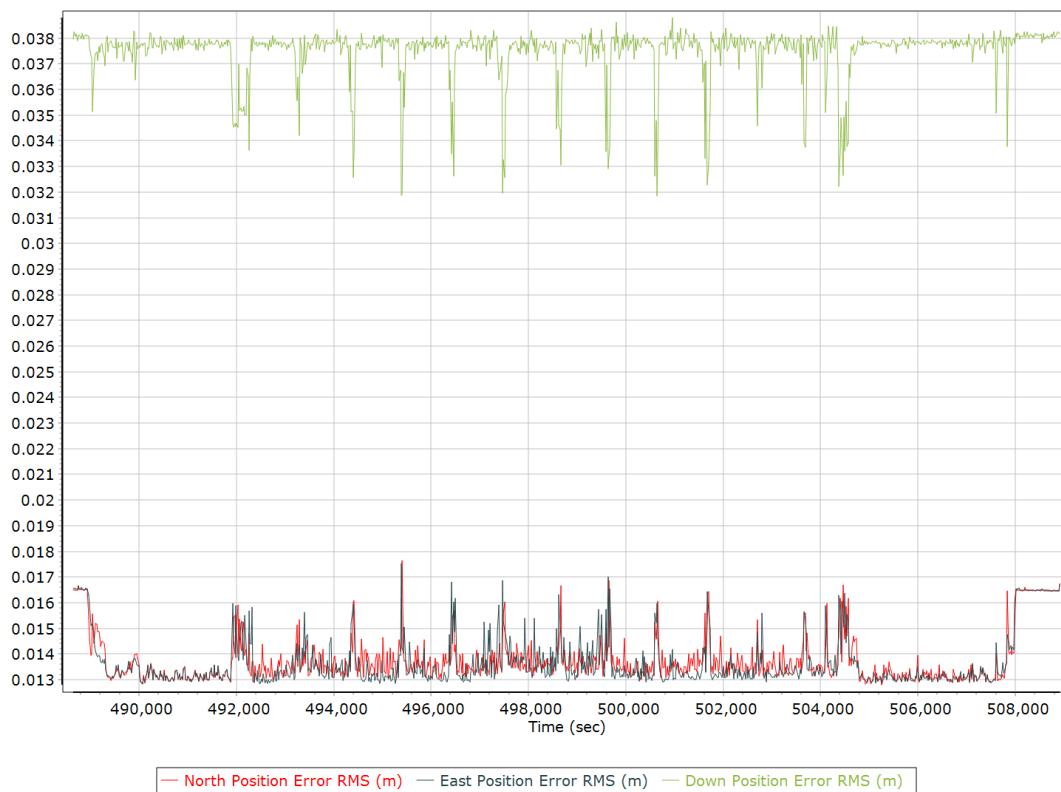


### Z Gyro Scale Error (ppm)

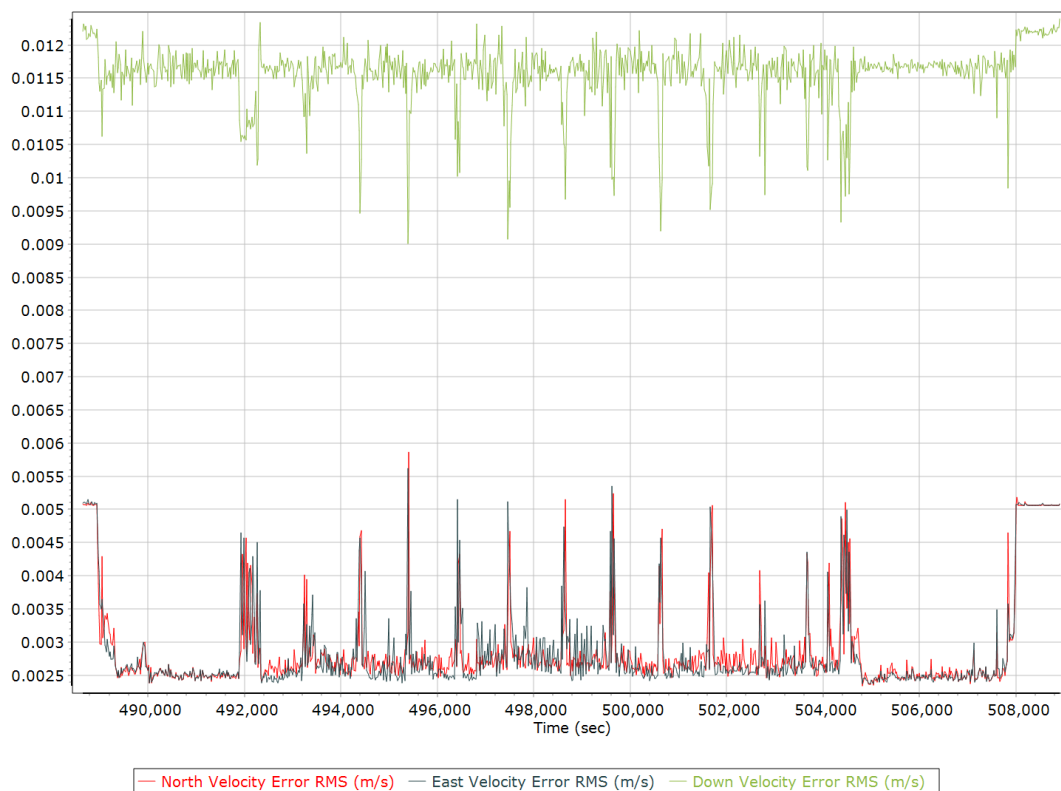


## Smoothed Performance Metrics

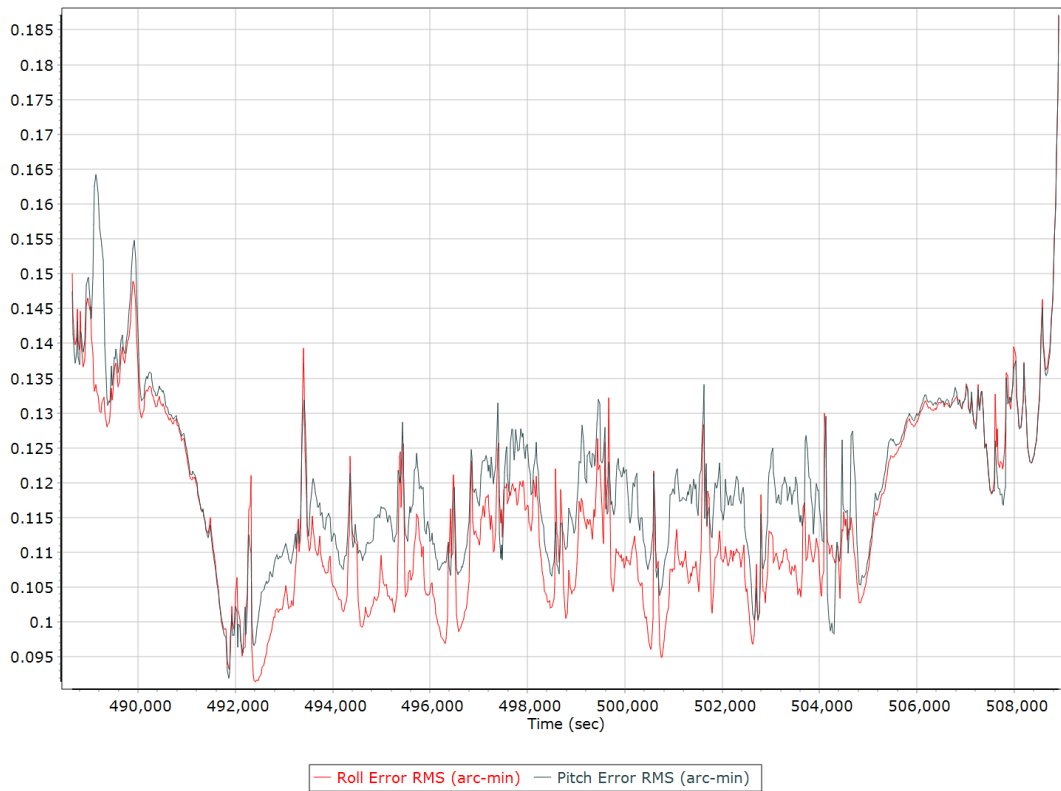
### Position Error RMS (m)



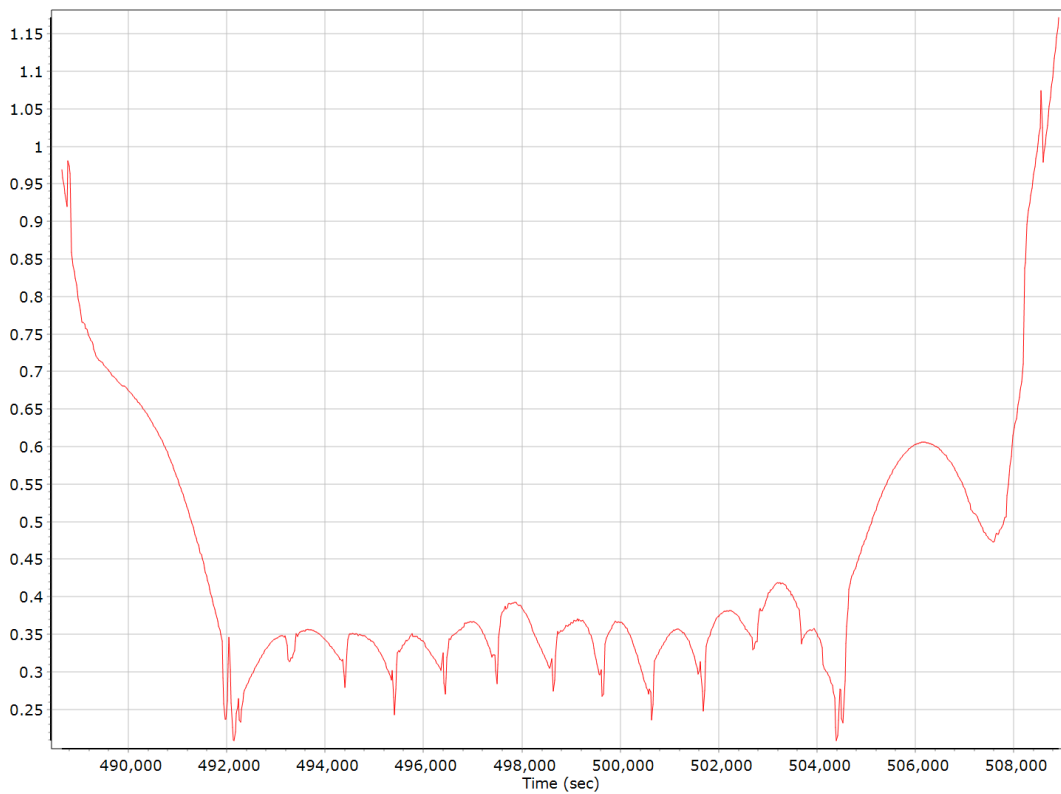
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

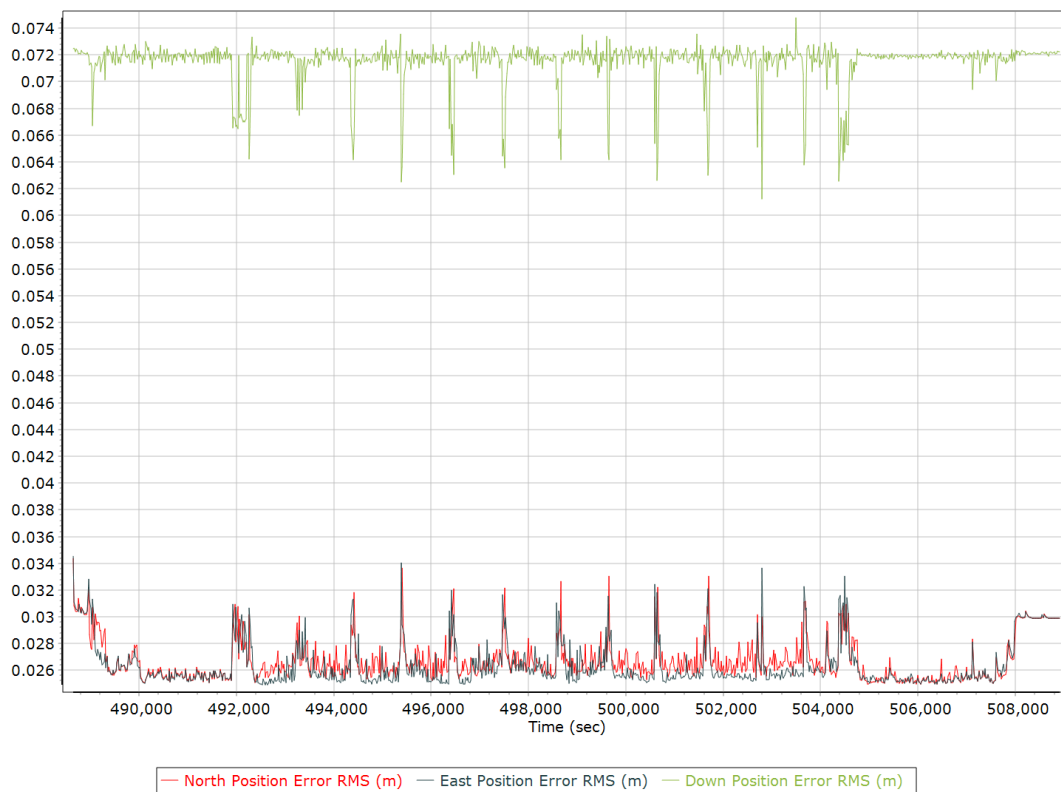


### Heading Error RMS (arc-min)

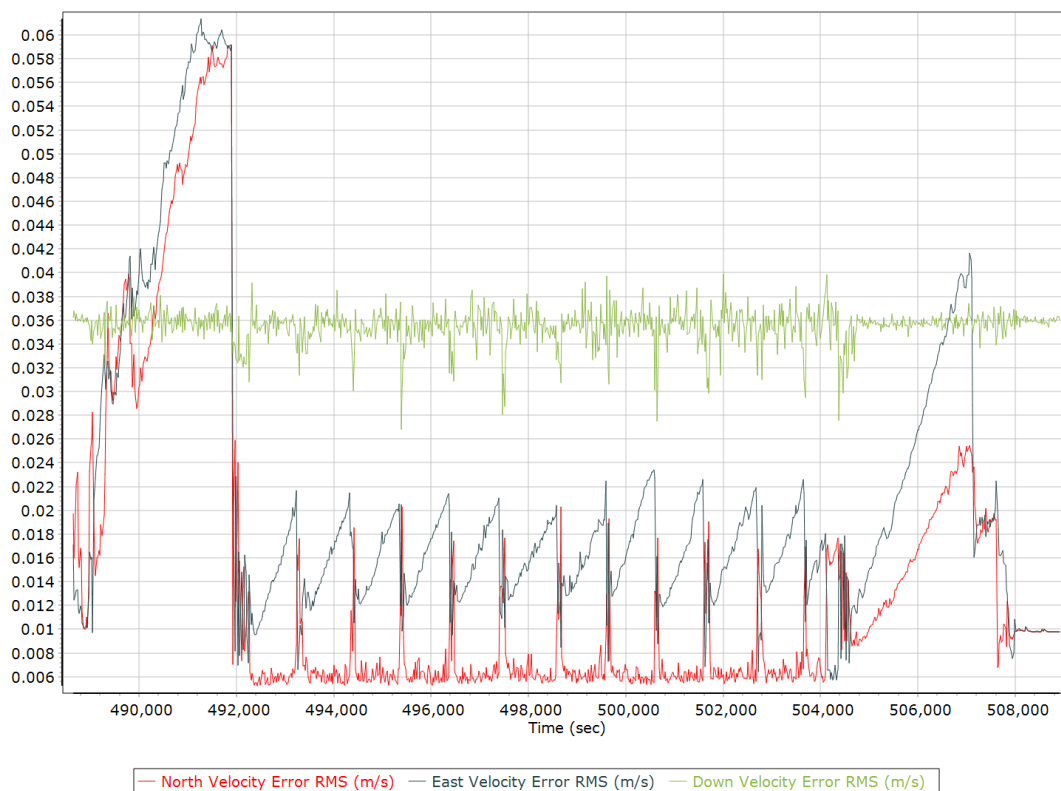


## Forward Processed Performance Metrics

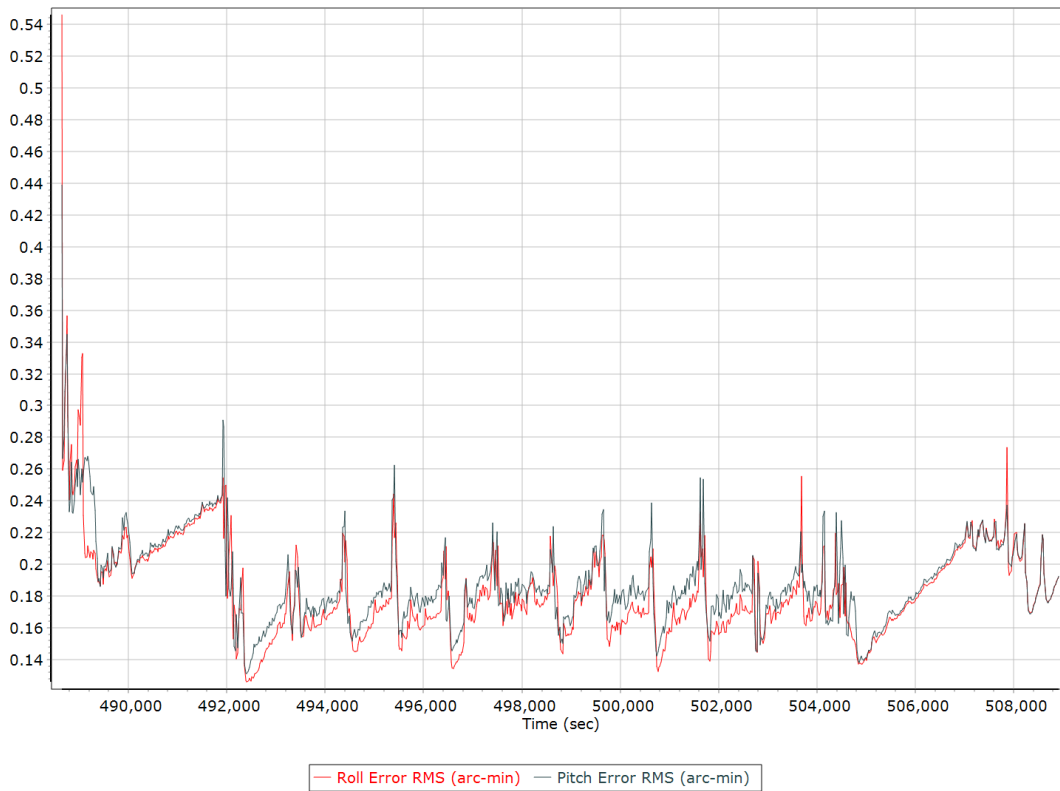
### Position Error RMS (m)



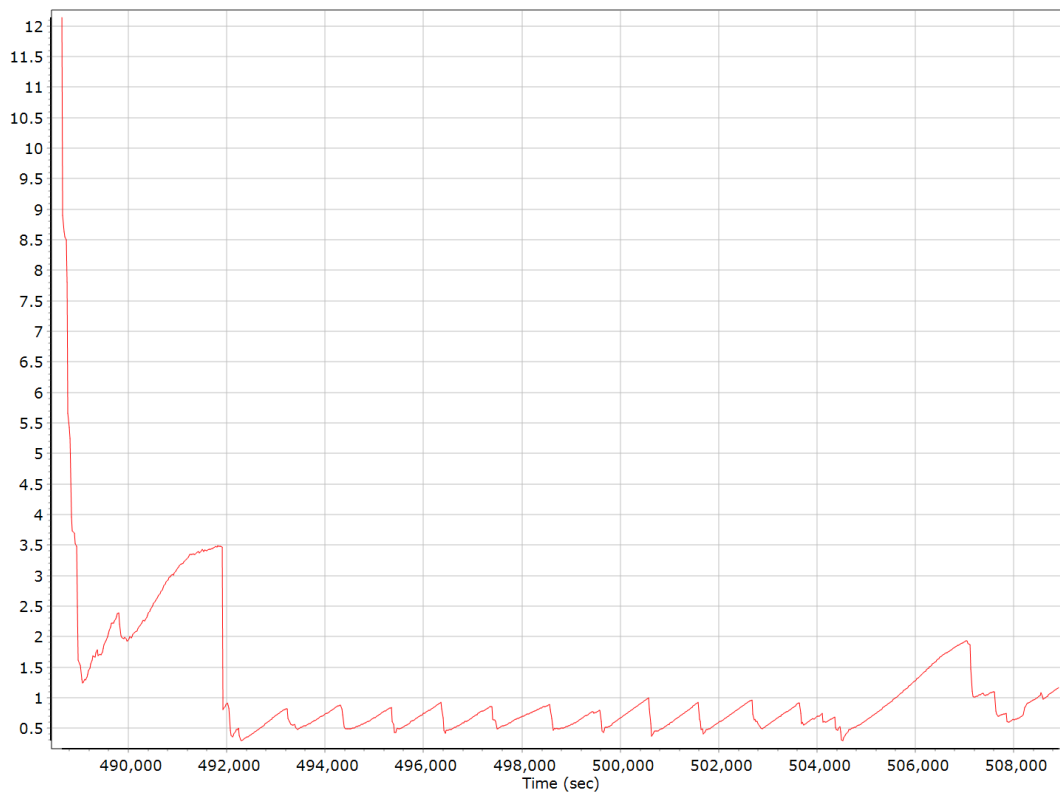
### Velocity Error RMS (m/s)



### Roll/Pitch Error RMS (arc-min)

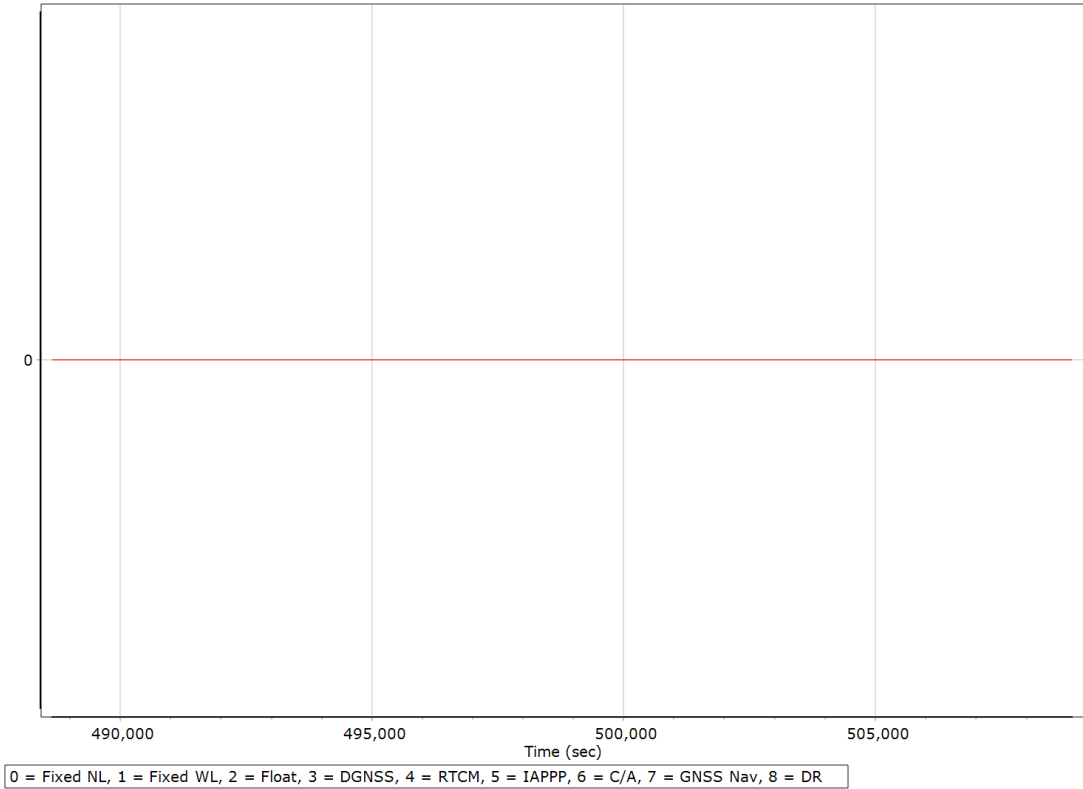


### Heading Error RMS (arc-min)

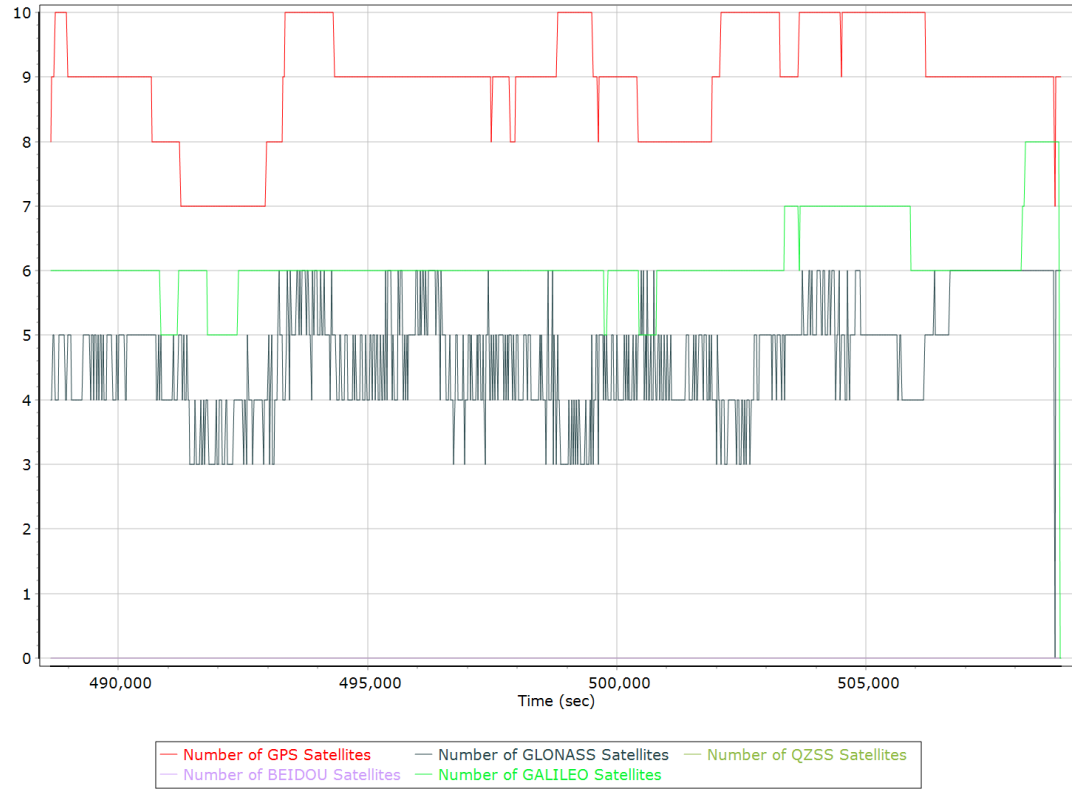


Forward Processed Solution Status

Processing Mode



Number of Satellites



Baseline Length

