LiDAR Mapping Report: AL_CoffeeDaleGenevaEscambia_2021_D21

LiDAR Collection, Processing, and QA/QC

140G0221F0236: AL_CoffeeDaleGenevaEscambia_2021_D21

QL2 LiDAR

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US Geological Survey

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Task Order: 140G0221F0236: AL_CoffeeDaleGenevaEscambia_2021_D21

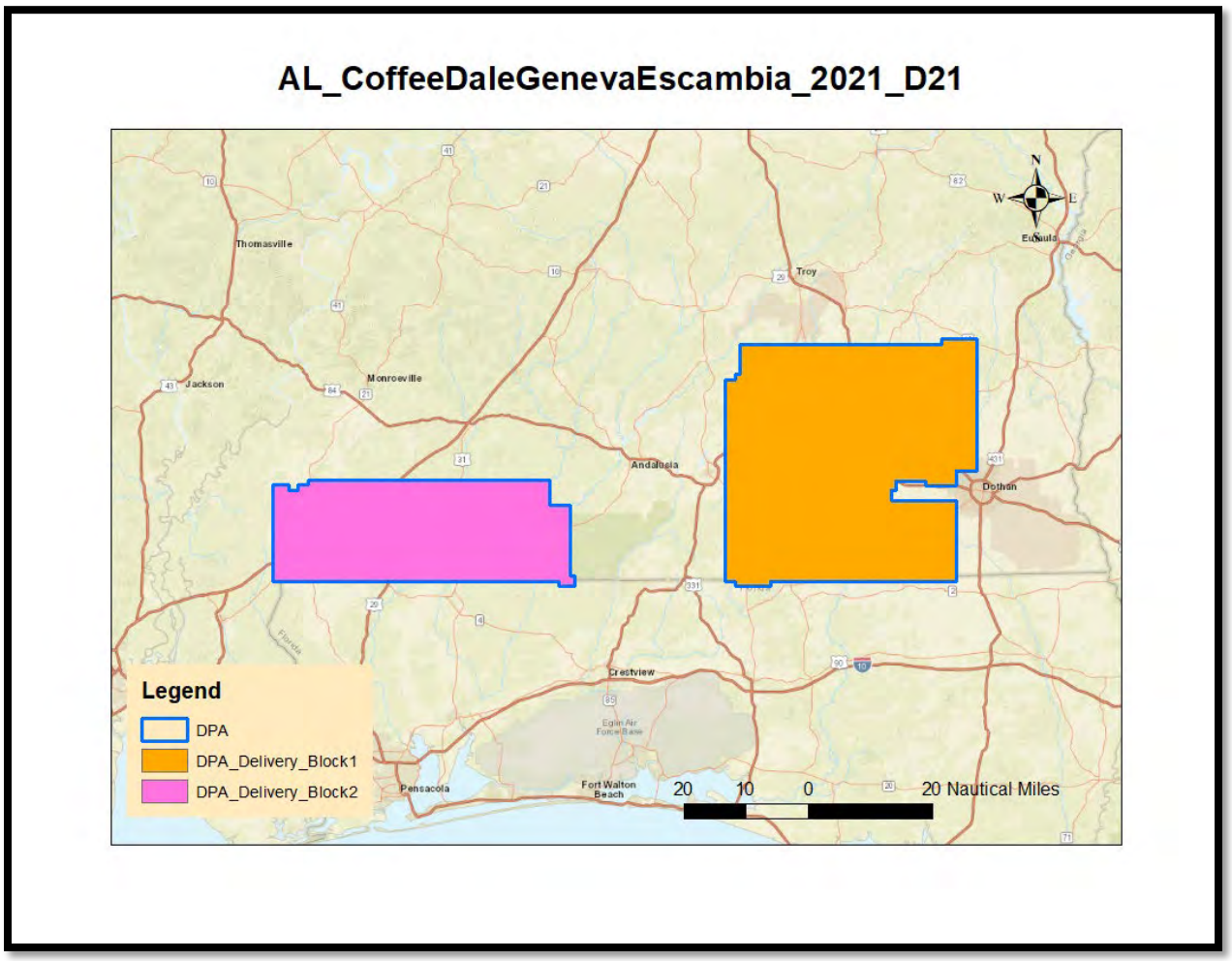

Figure 1 Define Project Area (DPA)

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1 Data Acquisition and Processing

1.1 Introduction

Digital Aerial Solutions, LLC (DAS) was tasked with planning, acquiring, processing and deriving elevation products for Light Detection and Ranging (LiDAR) for the **140G0221F0236 AL_CoffeeDaleGenevaEscambia_2021_D21**. The task order required Spring 2020/Fall 2020 leaf-off LiDAR survey to be collected at an aggregate nominal pulse spacing (ANPS) < 0.71 meters (QL2) including overlap, with up to 2 discrete returns per pulse along with intensity values of each return. Aerial LiDAR was collected over approximately 2,803 square miles of Coffee, Dale, Escambia and Geneva counties in the state of Alabama using the Leica Terrain Mapper as shown in Figure 1's Defined Project Area (DPA) for delivery.

LiDAR dataset were post processed to generate elevation point cloud swaths for each flight lines. Deliverables include tiled point cloud classified by land cover type, breaklines to support hydro-flattening of digital elevations models (DEM), intensity image and bare-earth DEM. Swath separation raster and Maximum Surface Height Raster (MSHR) are also delivered as ancillary data.

The point cloud deliverables are stored in the LAS Version 1.4-point data record format 6. The tiling scheme for the tiled deliverables is a **1,500 x 1,500 meters** grid. Tile naming convection is based on the US National Grid (USNG) format. All deliverables were generated in compliance with the U.S Geological Survey National Geospatial Program Guidelines and Base Specifications, Version 2020 Revision A. The spatial reference of the data is as follows;

Horizontal Spatial Reference

– Coordinates: UTM, Zone 16 North Meters (to 2 decimal places)

– Datum: North American Datum 1983 (2011), Meters (to 2 decimal places)

Vertical Spatial Reference

All datasets are available with orthometric elevation; point cloud datasets are also available with ellipsoid heights.

– Datum: North American Vertical Datum of 1988 (GEOID18)

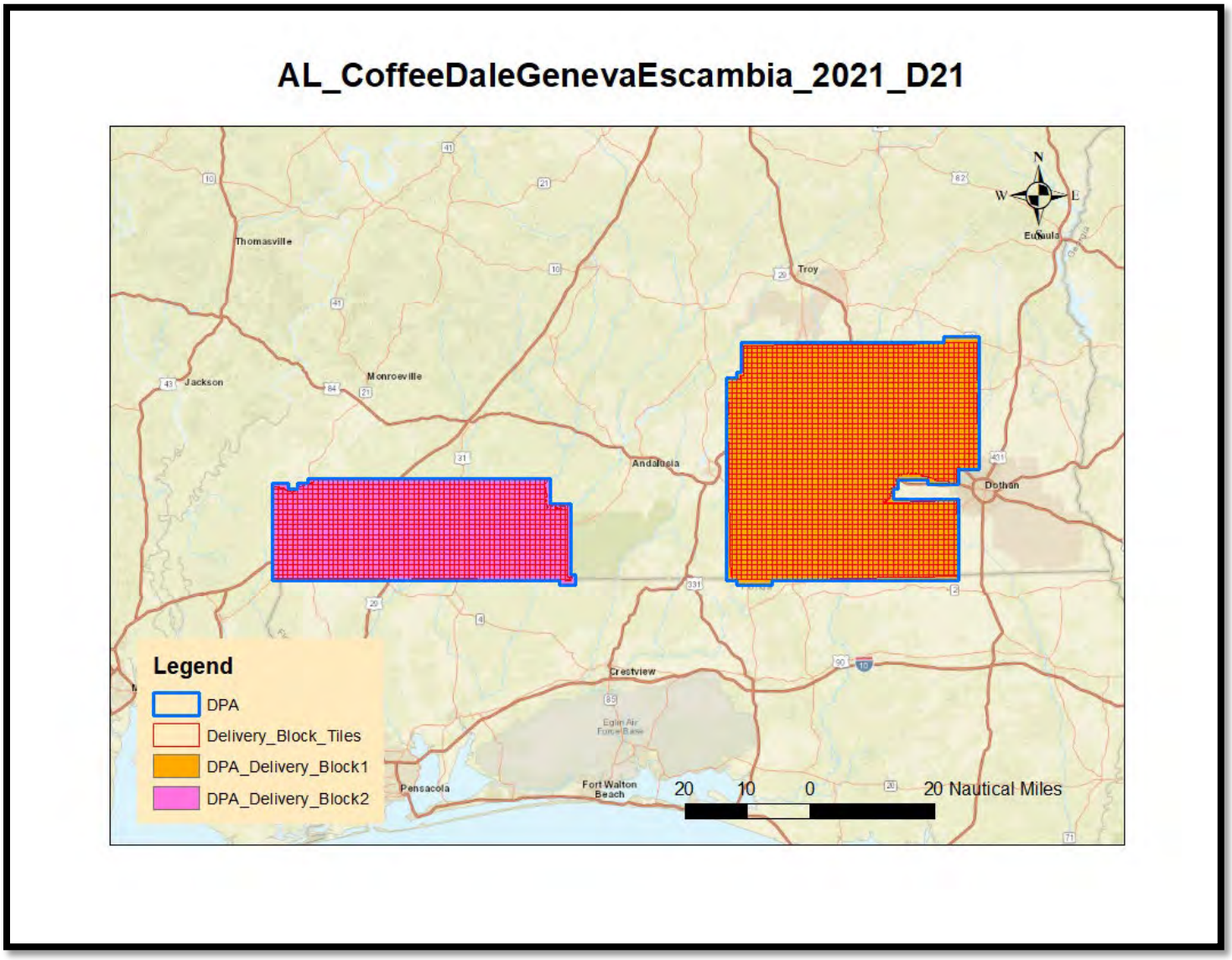

Figure 2 AL_CoffeeDaleGenevaEscambia_2021_D21 Delivery Blocks

1.2 Mission Acquisition

Mission acquisition for **140G0221F0236 AL_CoffeeDaleGenevaEscambia_2021_D21** survey was done using KEDN and KJ12, as base airports. A Leica Terrain Mapper (TM) was used for data collection. Ground GPS base stations were established to collect data at half (0.5) second epoch in support of all airborne acquisitions. All acquisition was completed in 9 missions between January 13, 2022 – January 23, 2022.There was a total of 149 flightlines covering the entire Delivery Block, approximately 2,803 square miles of Coffee, Dale, Escambia and Geneva counties in the state of Alabama. All mission flight logs and GPS Session forms can be found in Appendix A and B.

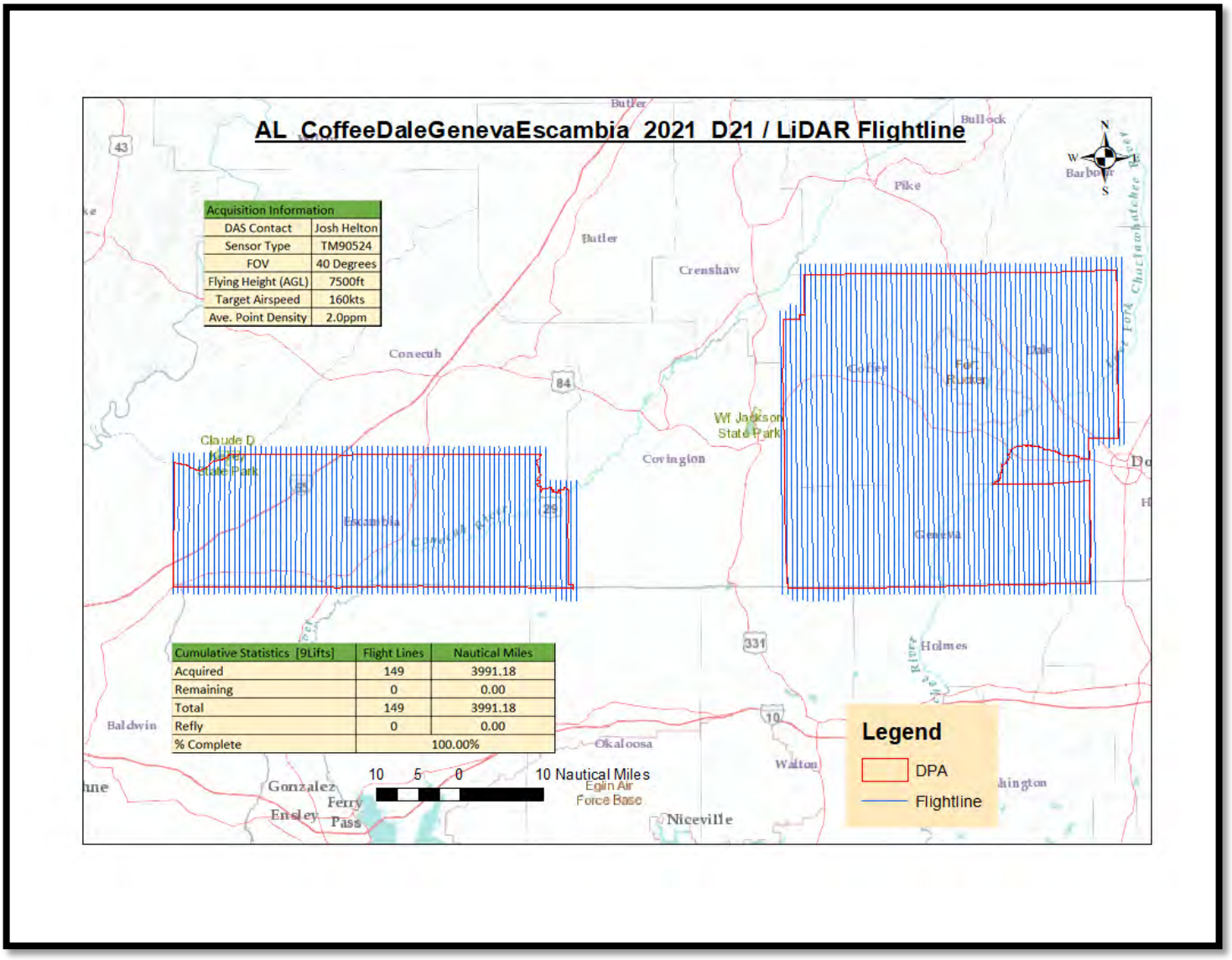

Figure 3 AL_CoffeeDaleGenevaEscambia_2021_D21 Flightlines

1.3 Acquisition Parameters

Acquisition parameters are designed to meet the project task order requirements. The sensor configuration and the flight plan characteristics are selected based on a number of project specific criteria. These include data accuracy, land cover types within the project area and the required nominal pulse spacing. Aggregate Nominal Pulse Density (ANPD) for QL2 is no less than 2ppm. Table 1 summarizes the project parameters for **AL_CoffeeDaleGenevaEscambia_2021_D21**.

IMU Misalignment estimation was performed for the Terrain Mapper sensor to correct angular offset in roll, pitch and heading between IMU measurement frame and mapping sensor measurement frame. Flight line design for measurement estimation includes, double cross lines at 200 meters, AGL (4 total strips) flown twice in opposite directions. The misalignment estimation steps include; Trajectory processing (smooth best estimate of trajectory) in Inertial Explorer software, followed by misalignment estimation in HxMap (Leica Propriety) software for roll, pitch and heading. Quality control report is created and analyzed to ensure the new calibration parameters computed is accurate to implement into LiDAR workflow.

Parameter (QL2)	Terrain Mapper (SN90524)
Flying Height Above Ground Level:	7,546 feet
Nominal Sidelap:	30 %
Nominal Speed Over Ground:	160 Knots
Field of View:	40°
Laser Rate:	650.00 kHz
Scan Rate:	150.00 Hz
Average Point Spacing:	0.58 meters

Table 1 Flight Parameters

1.4 Mission Conditions

The acquisition mission for **140G0221F0236 AL_CoffeeDaleGenevaEscambia_2021_D21** survey was conducted under optimal collection conditions.

2 ABGNSS-inertial Processing

2.1 Airborne GPS/IMU

Aircraft	Sensor	GPS Lever Arm (m)	IMU Lever Arm (m)
C421_NA811A	TM_9054	X: -0.050, Y: 0.188, Z: -1.100	X: 0.124, Y: -0.025, Z: 0.014

Table 2 Aircraft and Lever Arms

GPS Base Station Coordinates: North American Datum 1983 (2011), Vertical Ellipsoid, Meters

Name	Latitude	Longitude	Ellipsoid (m)
Enterprise Municipal Airport -KEDN	31° 17' 47.06488"	85° 54' 4.69876"	75.272
Brewton Municipal Airport -K12J	31°3' 2.32988"	87° 3' 41.16233"	-1.690

Table 3 Base station Locations

2.2 SMOOTH BEST ESTIMATE OF TRAJECTORY (SBET)

Inertial Explorer 8.90 software was used to compute inertial solution file (*.sol) for each mission using ground GPS base station (KEDN, K12J) and OPUS position coordinate in table 3 above. The resulting solution was checked to ensure a minimum accuracy of +/- 0.10m, combined separation, for horizontal and vertical positions respectively. Inertial Explorer methodology integrates Inertial Navigation Solution by processing the GPS data and Inertial Measurement Unit (IMU). The software applies the reference lever arms for the GPS and IMU, in table 2, during the process to determine the trajectory (position and orientation) of the LiDAR sensor during the acquisition mission. Inertial Explorer generated graphical results were reviewed to ensure that the IMU data was healthy. Graphical results for all lifts can be found in Appendix D.

2.3 Point Cloud Creation

Raw LiDAR sensor ranging data and the final solution sensor trajectory (*.sol), from Inertial Explorer, were processed in Leica's HxMap software to produce LiDAR point cloud swath for each flight line in LAS version 1.4 file format. Quality control of the swath point cloud was performed to validate proper functioning of the sensor system, full coverage of the project area and point density of the LiDAR data. Swath point clouds were assigned unique file source identification. The data was found to be complete and consistent with the sensor calibration parameters.

Point Cloud statistics analyses to determine Nominal Point Spacing (NPS) and Point Density for the AL_CoffeeDaleGenevaEscambia_2021_D21 dataset was performed using LP360 (Advanced 64-bit) v2021.1.47.0 software. A total of twenty-eight (28) point cloud tiles, carefully selected and well distributed in the defined project area (DPA) were used to determine the point cloud statistics for the project. LP360 "Point Cloud Statistics Extractor" point cloud task (module) enables a summary statistics for a point cloud to be exported for all active dataset loaded into the software.

The procedure involved;

1) Adding all selected Point Cloud data into the software
2) Open the point cloud task command
3) Select the "Point Cloud Statistics Extractor" task
4) Define the point cloud statistics to report for each active point cloud
5) Apply and execute command to export an ASCII text report.

For the AL_CoffeeDaleGenevaEscambia_2021_D21 point cloud, the computed average NPS is 0.331 (target <=0.71) and the average point density is 9.385 (target >=2ppm). Detailed summary report is shown in the table below.

Number of Sample Tiles	Average Point Density	Average Point Density Class 1	Average Point Density Class 2	Average NPS
28	9.385	7.384	2.000	0.331

Tile	Total Point Count	Point Count Class 1	Point Count Class 2	Point Density	Point Density Class 1	Point Density Class 2	NPS
16RDV449450.las	23507817	19629816	3878001	10.448	8.724	1.724	0.309
16RDV450437.las	13823055	8972477	4849869	6.144	3.988	2.156	0.403
16RDV462437.las	22133058	17263730	4869328	9.837	7.673	2.164	0.319
16RDV470452.las	20415429	16257745	4154545	9.074	7.226	1.846	0.332
16RDV483434.las	23565500	19936117	3629383	10.474	8.861	1.613	0.309
16RDV483452.las	20353884	16401565	3949404	9.046	7.290	1.755	0.332
16RDV494455.las	20166594	15959165	4205360	8.963	7.093	1.869	0.334
16REV500438.las	25015033	21787180	3227853	11.118	9.683	1.435	0.300
16REV518447.las	22640463	18829283	3808944	10.063	8.369	1.693	0.315
16REV519437.las	20765863	17336914	3428949	9.229	7.705	1.524	0.329
16REV522447.las	24871808	21272117	3599691	11.054	9.454	1.600	0.301
16REV585434.las	21610726	17018928	4575582	9.605	7.564	2.034	0.323
16REV585459.las	19637200	14309855	5323867	8.728	6.360	2.366	0.338
16REV587476.las	20204874	14893154	5293265	8.980	6.619	2.353	0.334
16REV588489.las	28501460	25181924	3319536	12.667	11.192	1.475	0.281
16REV590449.las	15783614	10841817	4928977	7.015	4.819	2.191	0.378
16REV599438.las	21434382	17057574	4375365	9.527	7.581	1.945	0.324
16RFV602489.las	23571996	18677360	4893616	10.477	8.301	2.175	0.309
16RFV606461.las	15056564	9134914	5915085	6.692	4.060	2.629	0.387
16RFV608462.las	18577009	13443080	5133270	8.257	5.975	2.281	0.348
16RFV609464.las	22243342	17140697	5101978	9.886	7.618	2.268	0.318
16RFV614449.las	21007926	16290218	4717553	9.337	7.240	2.097	0.327
16RFV614474.las	26091855	21954229	4137626	11.597	9.758	1.839	0.294
16RFV617440.las	14666151	9065437	5599478	6.518	4.029	2.489	0.392
16RFV623486.las	21282414	16712371	4568780	9.459	7.428	2.031	0.325
16RFV632468.las	21071009	16963124	4074333	9.365	7.539	1.811	0.327
16RFV633441.las	14430709	9621339	4780339	6.414	4.276	2.125	0.395
16RFV638492.las	28833443	23203113	5629714	12.815	10.313	2.502	0.279

Table 4 Point Density Statistics

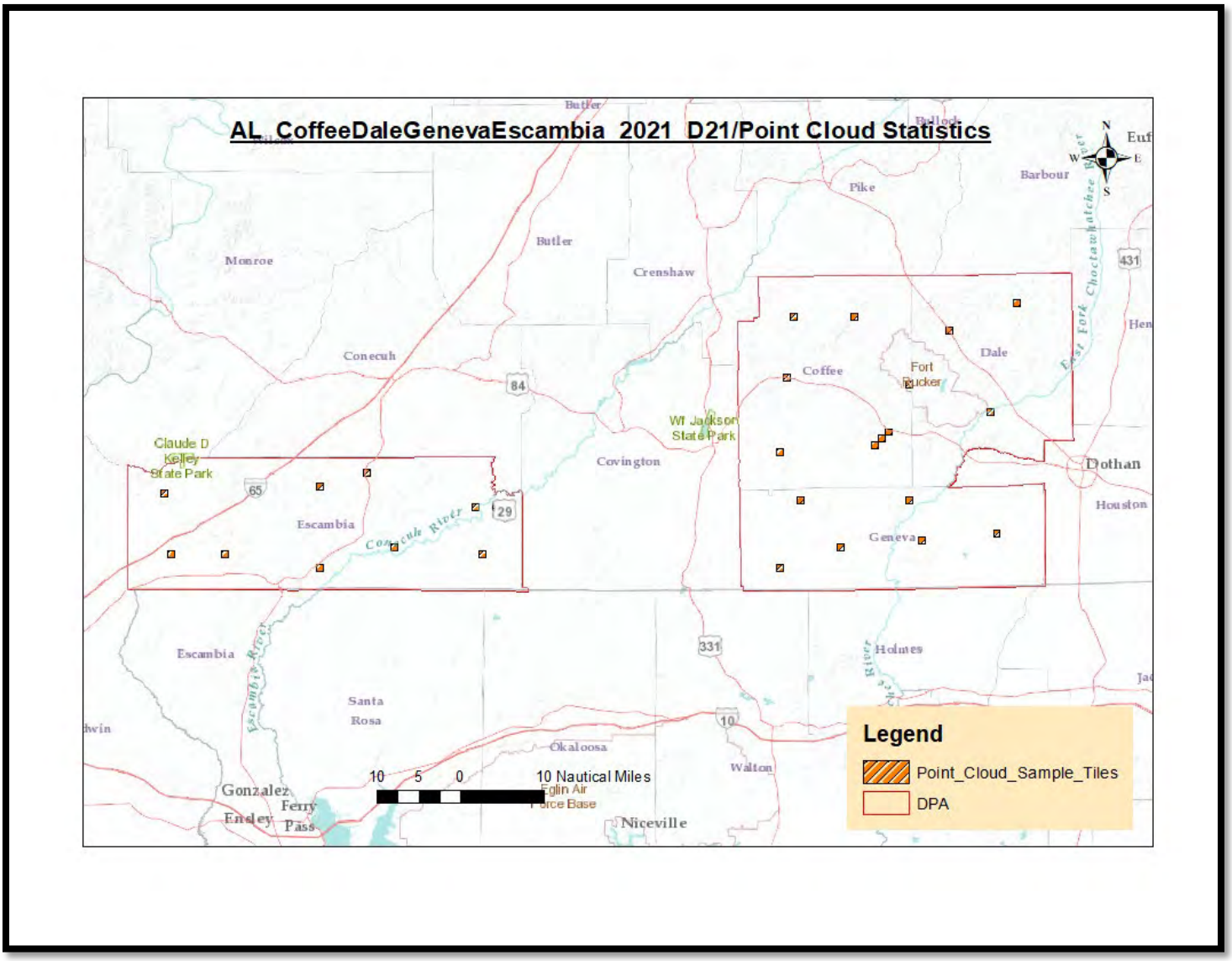

Figure 4 AL_CoffeeDaleGenevaEscambia_2021_D21 Point Cloud Sample Statistics

2.4 Geometric Calibration

LiDAR data calibration was done using Leica HxMap v2.7.0 software. HxMap is the common workflow platform for Leica airborne sensors. The processing workflow involves; Ingest, Block Creation, LiDAR Matching, Quality Assurance (QA) and Product Generation. LiDAR is processed in HxMap by generating point clouds from raw sensor data during the Ingest step. Noise filtering, sensor installation calibration and atmospheric condition parameters are also applied during the ingest process. Once all data is processed through ingest, they are assembled into a block for LiDAR Matching. The LiDAR Matching step resolves LiDAR registration errors which remain in the point clouds after sensor and installation calibration parameters are applied in the ingest step.

After LiDAR Matching is complete, QA tool is run on the Block to verify quality of results. QA Tool measurements are 2D patches with vertical statistics computed, therefore patches are only found on open terrain with moderate slope. Patches are not expected in areas of forest or crop, or on mountainous slopes. The QA results are reviewed to ensure that, 95% of patches<5cm for Vertical Scan Direction and Vertical Line Separation. Ground control points are also included to assess absolute accuracy for the point cloud data. HxMap's detailed QA results can be found in Appendix E.

LiDAR products are finally generated in the Product Generation step as LAS swaths (LAS 1.4). Vertical (Z) shift (calculated from QA step) is also applied during the product generation. The exported LAS 1.4 swath data from HxMap is imported into GeoCue Group's product workflow management software, GeoCue v2017. The full point cloud is tiled into a manageable size for processing in TerraScan. The final geometrically calibrated swath point clouds were compared to the bare-earth profile survey data. The data fit the profile surveys within the vertical accuracy tolerance specified for the project. Full documentation of the vertical accuracy checks maybe found in section 3.2

For **140G0221F0236 AL_CoffeeDaleGenevaEscambia_2021_D21** QL2 LiDAR project, the control lines listed below were used in data adjustment.

Point ID	Easting	Northing	Ortho Height
GS0004	631991.7	3469221	52.037
GS0011	637732.4	3492328	135.485
GS0033	613709.2	3475373	112.99
GS0054	634258.3	3442229	82.98
GS0066	599930.6	3438502	54.817
GS0092	589770.4	3449375	81.938
GS0095	586188.5	3460049	95.204
GS0119	522872	3447202	54.478
GS0142	483289.5	3434823	37.899
GS0167	470625.4	3452009	104.993
GS0177	450318.4	3437298	90.305
GS0188	462643.2	3437525	84.108
GS0016	622907.7	3487211	101.229
GS0026	602694	3490292	111.661
GS0040	609429.2	3464603	107.637
GS0046	614950.4	3449352	40.21
GS0060	617835.3	3440257	77.545
GS0075	585705.2	3434452	47.804
GS0083	606568.4	3460734	107.791
GS0104	587979.5	3475922	59.873
GS0110	589194.2	3490240	91.139
GS0115	608243.1	3462522	109.459
GS0122	517708.9	3447563	40.215
GS0128	519686.4	3437321	71.105
GS0136	500349.1	3438762	27.257
GS0149	483379.5	3451765	88.074
GS0158	493827	3455314	79.533
GS0173	449790.9	3450173	92.906

Table 5 Ground Control Points

3. Geometric Quality

3.1 Point Cloud

Geometric calibration quality control validates that the positional accuracy requirements of the project are met, and includes relative accuracy assessments for intra-swath (within) and inter-swath (between) accuracy, along with absolute accuracy assessments against project ground control.

Figure 3 below, shows the swath-to-swath calibration assessment depicted by an intensity ortho created by using all returns, and colored by elevation difference between the swaths. The source deltas are an image type used for visualizing the elevation mismatch between overlapping swaths of LAS data. The granularity is controlled by the interval's selection. The interval size specifies the Z threshold at which the color bands apply. The interval used to create the difference elevation image is 0.040m. Colors shown as green indicates swath separation <0.040m, yellow indicates separation > 0.040m and <0.080m, red indicates separation >0.080m. All red areas depicted in the image have been reviewed and represent locations of high vegetation.

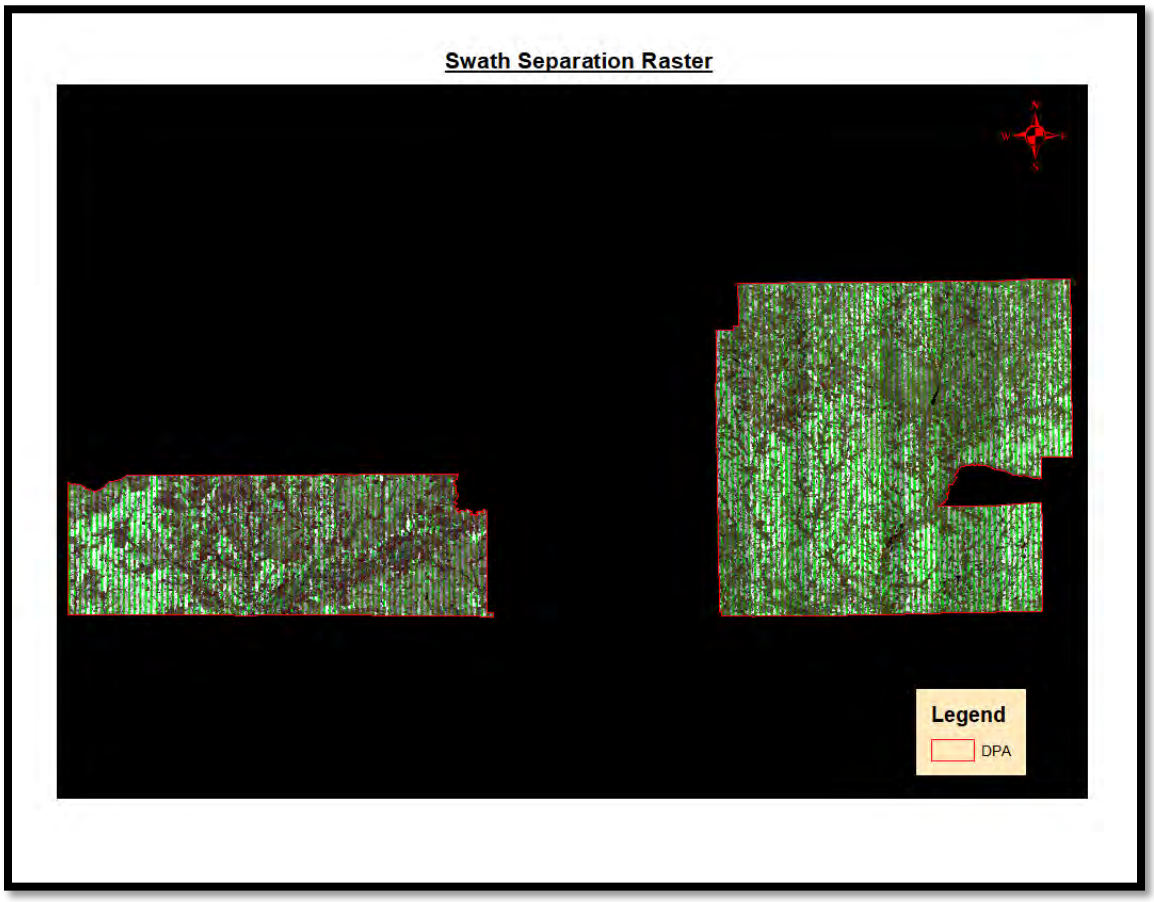

Figure 5 Swath Separation Raster

3.2 Accuracy Assessment

This data set was produced to meet **ASPRS "Positional Accuracy Standards for Digital Geospatial Data" (2014)** for a 36.0 (cm) RMSEx / RMSEy Horizontal Accuracy Class which equates to Positional Horizontal Accuracy =+/- 71.0 cm at a 95%

The absolute vertical accuracy of the point cloud data is assessed against ground check point data. For the **140G0221F0236 AL_CoffeeDaleGenevaEscambia_2021_D21** project, ground check point data were surveyed using VRS- GPS techniques.

Local TIN models of the elevation points are built around each ground check points. The tin model elevation is sampled at the horizontal position of the ground check point. The TIN model elevation and ground check point survey elevation values were used to calculate the Non-vegetated Vertical Accuracy (NVA) of the swath point clouds. Calculations were produced to meet ASPRS "Positional Accuracy Standards for Digital Geospatial Data" (2014).

The tiled point cloud products were reviewed for full coverage of the AOI and proper classification. As part of the QC process, TINs are built in the Terramodeler software for each tile using the ground class and the hydro-flattening breaklines. The TINs are reviewed for non-ground features, and edited where necessary to remove any remaining non-ground features. Points were also reviewed for absolute elevation, and points falling below the selected orthometric elevation for water were removed from the ground class.

Tested Accuracy	$RMSE_Z$	NVA	VVA
Classified LiDAR	0.066	95	72
Digital Elevation Model	0.066	95	72

Table 6 Tested $RMSE_Z$ of NVA, NVA and VVA of LiDAR Point Cloud and Digital Elevation Model

Total #	# NVA	# VVA
167	95	72

Table 7 Number of Survey Points used to calculate accuracy of data.

4. Production

4.1 Point Cloud Classification

Georeferenced information was applied to the swath point cloud LAS files. Geometrically calibrated swath point cloud was cut into **1,500-meter x 1,500-meter** LAS 1.4 format tiles for point cloud classification. Tiled point cloud data was processed in Terrasolid's TerraScan software to assign initial classification values. The TerraScan software provides a number of automated routines to algorithmically detect and assign points to their appropriate classes. Points left unclassified by the algorithmic routine remain as Class 1– Processed, but unclassified. Automated classification routines assigned points to one of the following classes:

Class 1- Processed, but unclassified

Class 2- Bare-earth ground

Class 7- Low Noise (low, manually identified, if necessary)

Class 9-Water

Class 17- Bridge Decks

Class 18- High Noise (high, manually identified, if necessary)

Class 20- Ignored Ground (Breakline Proximity)

Class 21- Snow (if present and identifiable)

Class 22- Temporal exclusion (typically non-favored data in intertidal, use as necessary)

Automated classification results were reviewed for each tiled point cloud, and manual edits were made where necessary to correct for misclassified points.

4.2 Breakline Collection

Hydrographic breakline features were compiled in ArcGIS Desktop v10.7.0, using LiDAR intensity ortho and surface terrain model of the entire project area. The 2D features were checked to ensure they had no geometric or topological errors. Three-dimensional (3D) breakline conflation was done using a fully automated elevation conflation method in GeoCue LP360 v.2021.1.47.0 software. QA/QC procedure was done in ArcGIS Desktop using python scripts to check for monotonicity and vertical variance, to ensure that the 3D breakline features met 3DEP requirements.

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4.3 DEM Generation

Bare earth Digital Elevation Model (DEM) was created using LP360 v.2021.1.47.0 software. Input data for DEM creation include classified LAS point cloud (bare earth, class2), 3D hydrographic breaklines, and project tile index. The breakline features were used to classify water (class 9) and ignored ground (class 20) in the point cloud. These points (classes 9 & 20) are excluded in the DEM generation. Raster (DEM) production methodology include, hydro breakline enforcement and bilinear interpolation resample. Final DEM are exported in GEOTIFF format and tiled to USNG tile extent. GDAL V2.4.2 was used to write final header information for all DEM products.

Appendix A. Flight Logs

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8			Lift	Temp °C Before		Temp °C After		Pressure (kPa)		Sensor Operator	
				1	13		16		101.86		Chuck Harris	
Date/Julian:	1.13.2022		Disk Drive		Sensor						Pilot	
Hobbs End	7487.1		MM30 (105,106)		TM_90524						Ross Woodley	
Hobbs ST	7481.6		TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height		Aircraft	Airport Identifcation:
Flight Time	5.5		7,600	160	KEDN1		KEDN2		1.500		C441-N207SS	KEDN (Enterprise,AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	149	149 N										Gimbal data PAV missing. Abnormal reflection.
												Airstart
	149	149 S	17:38	17:46	184°	7624	155	7101	13	1.6	0.9	Abnormal reflection
	148	148 N	17:51	18:00	5°	7623	153	7095	13	1.5	0.9	Abnormal reflection
	147	147 S	18:05	18:14	184°	7618	156	7088	14	1.5	0.9	Abnormal reflection
	146	146 N	18:20	18:30	4°	7610	155	7074	14	1.4	0.8	Abnormal reflection
	145	145 S	18:34	18:43	184°	7607	153	7074	14	1.4	0.8	Abnormal reflection
	144	144 N	18:49	18:57	4°	7600	153	7067	15	1.2	0.7	Abnormal reflection
	143	143 S	19:03	19:19	185°	7589	153	7059	15	1.3	0.7	Abnormal reflection
	142	142 N	19:25	19:40	4°	7604	150	7046	15	1.3	0.7	Abnormal reflection
	141	141 S	19:46	20:01	184°	7574	155	7033	16	1.2	0.7	Abnormal reflection
	135	135 N	20:05	20:21	4°	7589	145	7018	16	1.2	0.6	Abnormal reflection. Controller temp
	136	136 S	20:28	20:43	184°	7563	156	7005	15	1.3	0.7	Abnormal reflection
	137	137 N	20:51	21:08	4°	7566	147	6993	16	1.3	0.7	Abnormal reflection
	138	138 S	21:14	21:29	185°	7536	161	6979	17	1.2	0.6	Abnormal reflection
	139	139 N	21:36	21:52	5°	7555	153	6966	17	1.3	0.6	Abnormal reflection
	140	140 S	21:57	22:13	184°	7542	158	6954	17	1.3	0.6	Abnormal reflection

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8	Lift	Temp °C Before	Temp °C After	Pressure (kPa)	Sensor Operator
		2	8	16	101.76	Chuck Harris

Date/Julian:	1.14.2022	Disk Drive	Sensor	Pilot
Hobbs End	7492.5	MM30 (105,106)	TM_90524	Ross Woodley

Hobbs ST	7487.1	TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height	Aircraft	Airport Identifcation:
Flight Time	5.4	7,600	160	KEDN1		KEDN2		1.500	C441-N207SS	KEDN (Enterprise,AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	122	122 N	15:16	15:32	4°	7522	155	6941	13	1.8	1	Abnormal reflection
	121	121 S	15:37	15:52	184°	7539	154	6926	14	1.7	0.9	Abnormal reflection
	120	120 N	15:59	16:14	4°	7545	135	6913	14	1.7	0.8	Abnormal reflection
	119	119 S	16:19	16:34	184°	7536	154	6899	16	1.3	0.7	Abnormal reflection
	118	118 N	16:39	16:54	4°	7538	153	6887	14	1.4	0.9	Abnormal reflection
	117	117 S	16:59	17:14	184°	7537	160	6873	12	1.8	1	Abnormal reflection
	112	112 N	17:19	17:34	4°	7530	158	6860	13	1.4	0.8	Abnormal reflection
	111	111 S	17:39	17:54	184°	7488	156	6846	14	1.2	0.7	Abnormal reflection
	110	110 N	18:00	18:16	4°	7486	155	6832	13	1.4	0.7	Abnormal reflection
	109	109 S	18:19	18:35	184°	7486	156	6818	14	1.2	0.8	Abnormal reflection
	108	108 N	18:40	18:55	4°	7467	156	6806	15	1.4	0.7	Abnormal reflection
	107	107 S	19:00	19:16	184°	7471	164	6793	15	1.3	0.7	Abnormal reflection
	106	106 N	19:21	19:36	4°	7460	159	6779	15	1.3	0.7	Abnormal reflection
	105	105 S	19:41	19:56	184°	7480	154	6765	15	1.3	0.7	Abnormal reflection

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8		Lift	Temp °C Before	Temp °C After	Pressure (kPa)	Sensor Operator	
			3	16	7	101.46	Cynthia Williams	
Date/Julian:	1.14.2022	Disk Drive		Sensor			Pilot	
Hobbs End	7497.2			TM_90524				
Hobbs ST	7492.3	TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height	Aircraft	Airport Identifcation:
Flight Time	4.9	7,600	160	KEDN1		KEDN2		1.500	C441-N207SS	KEDN (Enterprise,AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	94	94	21:22	21:37	4°	7572	157	6753	16	1.4	0.7	
	93	93	21:41	21:57	184°	7569	151	6739	18	1.3	0.6	
	92	92	22:00	22:17	4°	7548	155	6726	19	1.2	0.6	
	91	91	22:20	22:36	184°	7546	160	6712	19	1.3	0.6	
	90	90	22:52	23:11	4°	7554	157	6993	18	1.3	0.7	
	89	89	23:15	23:31	184°	7553	154	6680	16	1.2	0.7	
	88	88	23:34	23:50	4°	7543	153	6666	16	1.2	0.7	
	104	104	23:55	:12	184°	7574	155	6653	16	1.2	0.7	
	103	103	:14	:30	4°	7509	160	6640	16	1.3	0.7	
	102	102	:34	:49	184°	7520	155	6626	17	1.1	0.7	
	101	101	:52	1:08	4°	7531	155	6613	16	1.2	0.7	
	100	100	1:11	1:27	184°	7525	158	6599	15	1.4	0.8	
	99	99	1:30	1:45	4°	7529	159	6586	17	1.2	0.7	

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8_mod		Lift	Temp °C Before	Temp °C After	Pressure (kPa)	Sensor Operator	
			4	3	13	102.40	Chuck Harris	
Date/Julian:	1.18.2022	Disk Drive		Sensor			Pilot	
Hobbs End	7505.5	TM MM30 (105, 106)		TM_90524			Ross Woodley	
Hobbs ST	7500	TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height	Aircraft	Airport Identifcation:
Flight Time	5.5	7,600	160	KEDN1		KEDN2		1.500	C441-N207SS	KEDN (Enterprise,AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	98	98 N	15:10	15:26	4°	7490	152	6568	14	1.3	0.7	Abnormal Reflection
	97	97 S	15:30	15:45	184°	7500	160	6554	16	1.2	0.6	Abnormal Reflection
	116	116 N	15:52	16:09	4°	7509	150	6542	16	1.2	0.7	Abnormal Reflection
	115	115 S	16:13	16:28	184°	7511	159	6530	17	1.0	0.6	Abnormal Reflection
	114	114 N	16:33	16:48	4°	7505	156	6517	14	1.3	0.8	Abnormal Reflection
	113	113 S	16:53	17:08	184°	7501	157	6505	13	1.6	0.9	Abnormal Reflection
	134	134 N	17:15	17:30	4°	7572	152	6494	14	1.4	0.8	Abnormal Reflection
	133	133 S	17:34	17:49	184°	7601	158	6481	13	1.4	0.8	Abnormal Reflection
	132	132 N	17:54	18:10	4°	7580	156	6469	14	1.5	0.8	Abnormal Reflection
	131	131 S	18:15	18:30	184°	7576	157	6454	14	1.5	0.8	Abnormal Reflection
	125	125 N	18:33	18:48	4°	7564	155	6445	16	1.2	0.7	Abnormal Reflection
	124	124 S	18:53	19:08	184°	7566	162	6431	16	1.2	0.7	Abnormal Reflection
	123	123 N	19:13	19:28	4°	7555	155	6420	16	1.3	0.7	Abnormal Reflection
	96	96 S	19:37	19:52	184°	7557	155	6408	15	1.3	0.7	Abnormal Reflection
	95	95 N	19:57	20:12	4°	7561	158	6396	15	1.3	0.7	Abnormal Reflection

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8_mod		Lift	Temp °C Before	Temp °C After	Pressure (kPa)	Sensor Operator	
			5	14	5	102.20	Chuck Harris	
Date/Julian:	1.18.2022	Disk Drive		Sensor			Pilot	
Hobbs End	7509.6	TM MM30 (105, 106)		TM_90524			Mike Wasielewski	
Hobbs ST	7505.5	TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height	Aircraft	Airport Identifcation:
Flight Time	4.1	7,600	160	KEDN1		KEDN2		1.500	C441-N207SS	KEDN (Enterprise,AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	130	130 N	21:45	22:00	4°	7553	150	6383	17	1.2	0.6	Abnormal Reflection
	129	129 S	22:04	22:20	184°	7556	159	6370	20	1.1	0.6	Abnormal Reflection
	128	128 N	22:24	22:38	4°	7544	159	6356	17	1.3	0.7	Abnormal Reflection
	127	127 S	22:42	22:57	184°	7551	156	6345	17	1.2	0.7	Abnormal Reflection
	126	126 N	23:01	23:16	3°	7552	157	6331	15	1.3	0.8	Abnormal Reflection
	87	87 S	23:27	23:42	184°	7524	157	6320	14	1.4	0.9	Abnormal Reflection
	86	86 N	23:46	24:01	4°	7527	158	6308	15	1.3	0.8	Abnormal Reflection
	85	85 S	24:05	24:20	184°	7532	156	6295	15	1.3	0.8	Abnormal Reflection 55%
	84	84 N	24:24	24:37	4°	7559	159	6282	15	1.3	0.7	Abnormal Reflection 54%
	83	83 S	24:41	24:54	184°	7550	158	6270	15	1.3	0.7	Abnormal Reflection
	82	82 N	24:58	1:11	4°	7567	160	6261	14	1.3	0.7	Abnormal Reflection 43%
	81	81 S	1:14	1:27	184°	7556	161	6250	13	1.4	0.8	Abnormal Reflection 49%

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8_mod			Lift	Temp °C Before		Temp °C After		Pressure (kPa)		Sensor Operator	
				6	9		12		102.44		Chuck Harris	
Date/Julian:	1.18.2022		Disk Drive		Sensor						Pilot	
Hobbs End	7510.7		TM MM30 (105, 106)		TM_90524						Ross Woodley	
Hobbs ST	7509.6		TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height		Aircraft	Airport Identifcation:
Flight Time	1.1		7,600	160	KEDN1		KEDN2		1.500		C441-N207SS	KEDN (Enterprise,AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	80	80 S	15:25	15:30	183°	7504	158	6239	14	1.5	0.7	Abnormal Reflection 62%
	79	79 N	15:35	15:40	3°	7520	158	6234	14	1.4	0.7	Abnormal Reflection 57%
	66	66										Abort - clouds

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8_mod			Lift	Temp °C Before		Temp °C After		Pressure (kPa)		Sensor Operator	
				7	8		8		102.78		Cynthia Williams	
Date/Julian:	1.22.22		Disk Drive		Sensor						Pilot	
Hobbs End	7518.9		TM MM30 (105, 106)		TM_90524						Ross Woodley	
Hobbs ST	7514		TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height		Aircraft	Airport Identifcation:
Flight Time	4.9		7,600	160	KEDN1		KEDN2		1.500		C441-N207SS	K12J (Brewton, AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	47	47	18:57	19:05	183°	7469	155	6227	15	1.4	0.7	
	46	46	19:08	19:15	3°	7457	151	6221	14	1.3	0.7	
	45	45	19:19	19:28	183°	7464	156	6216	14	1.3	0.7	
	44	44	19:30	19:37	4°	7452	159	6211	14	1.2	0.7	
	43	43	19:41	19:49	183°	7459	156	6205	13	1.6	0.8	
	42	42	19:53	20:00	3°	7454	158	6200	14	1.3	0.7	
	41	41	20:05	20:12	183°	7460	158	6193	14	1.4	0.7	
	40	40	20:16	20:24	0°	7450	160	6186	16	1.3	0.7	
	39	39	2:07	20:35	184°	7457	155	6182	16	1.3	0.7	
	38	38	20:39	20:46	3°	7451	160	6715	16	1.3	0.7	
	37	37	20:51	20:57	183°	7455	155	6168	16	1.4	0.7	
	36	36	21:07	21:07	3°	7446	159	6163	16	1.4	0.7	
	35	35	21:21	21:21	183°	7447	157	6156	17	1.4	0.7	
	34	34	21:32	21:32	4°	7447	159	6151	19	1.2	0.6	
	33	33	21:45	21:45	184°	7454	158	6146	18	1.4	0.6	
	32	32	21:56	21:56	3°	7443	157	6139	19	1.1	0.6	
	31	31	22:08	22:08	183°	7457	156	6135	17	1.5	0.7	
	30	30	22:19	22:19	3°	7444	157	6130	18	1.4	0.7	
	29	29	22:31	22:31	183°	7455	156	6123	18	1.3	0.7	
	28	28	22:42	22:42	3°	7448	154	6118	17	1.2	0.7	
	27	27	22:54	22:54	183°	7457	154	6112	16	1.3	0.7	
	26	26	23:06	23:06	3°	7444	158	6107	16	1.2	0.7	
	25	25	23:17	23:17	183°	7461	158	6100	15	1.3	0.8	
	24	24	23:29	23:29	3°	7454	155	6096	16	1.2	0.7	

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8_mod			Lift	Temp °C Before		Temp °C After		Pressure (kPa)		Sensor Operator	
				8	2		11		102.57		Cynthia Williams	
Date/Julian:	1.22.22		Disk Drive		Sensor						Pilot	
Hobbs End	7524.3		TM MM30 (105, 106)		TM_90524						Mike Wasielewski	
Hobbs ST	7518.9		TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height		Aircraft	Airport Identifcation:
Flight Time	5.4		7,600	160	KEDN1		KEDN2		1.500		C441-N207SS	K12J (Brewton, AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	23	23	160:04	16:11	3°	7495	158	690	14	1.2	0.7	
	22	22	16:15	16:22	183°	7500	156	6085	13	1.4	0.8	
	21	21	16:25	16:32	3°	7497	158	6078	12	1.7	1	
	20	20	16:35	16:43	183°	7499	157	6074	13	1.8	1	
	19	19	16:46	16:53	3°	7507	160	6068	13	1.4	0.8	
	18	18	16:56	17:03	183°	7542	159	6063	11	1.7	1	
	17	17	17:06	17:13	3°	7548	156	6058	12	1.4	0.9	
	16	16	17:17	17:24	183°	7535	160	6053	12	1.4	0.9	
	15	15	17:26	17:35	3°	7543	154	6048	13	1.4	0.8	
	14	14	17:32	17:43	183°	7573	160	6044	13	1.3	0.8	
	13	13	17:48	17:54	3°	7578	158	6037	15	1.2	0.7	
	12	12	17:58	18:00	183°	7564	162	6033	14	1.3	0.7	
	11	11	18:06	18:13	3°	7591	158	6028	15	1.2	0.7	
	10	10	18:16	18:23	183°	7575	160	6021	16	1.2	0.6	
	9	9	18:26	18:33	3°	7566	158	6017	16	1.2	0.6	
	8	8	18:36	18:43	183°	7567	159	6611	16	1.2	0.6	
	7	7	18:45	18:51	3°	7563	157	6006	15	1.3	0.7	
	6	6	18:55	19:01	183°	7544	160	6001	15	1.3	0.7	
	5	5	19:04	19:11	3°	7561	157	5997	16	1.3	0.7	
	4	4	19:13	19:20	183°	7546	162	5990	15	1.3	0.8	
	3	3	19:22	19:29	3°	7562	155	5986	17	1.2	0.7	
	2	2	19:32	19:39	183°	7536	159	5981	17	1.4	0.8	
	1	1	19:42	19:49	3°	7566	158	5974	17	1.2	0.7	
	52	52	20:01	20:09	183°	7446	160	5969	17	1.3	0.6	
	51	51	20:11	20:19	3°	7454	157	5963	18	1.2	0.6	
	50	50	20:21	20:29	183°	7456	161	5956	18	1.3	0.6	

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8_mod			Lift	Temp °C Before		Temp °C After		Pressure (kPa)		Sensor Operator	
				8	2		11		102.57		Cynthia Williams	
Date/Julian:	1.22.22		Disk Drive		Sensor						Pilot	
Hobbs End	7524.3		TM MM30 (105, 106)		TM_90524						Mike Wasielewski	
Hobbs ST	7518.9		TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height		Aircraft	Airport Identifcation:
Flight Time	5.4		7,600	160	KEDN1		KEDN2		1.500		C441-N207SS	K12J (Brewton, AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	49	49	20:31	20:39	3°	7456	159	5951	19	1.3	0.6	
	48	48	20:41	20:49	183°	7449	157	5944	19	1.3	0.6	
	54	54	20:52	20:59	3°	7470	158	5939	18	1.4	0.6	
	53	53	21:02	21:09	183°	7483	158	5933	19	1.3	0.6	

Digital Aerial Solutions Flight Log

Project/Flight Plan:	AL_2021_Counties_QL2_V12_8_mod			Lift	Temp °C Before		Temp °C After		Pressure (kPa)		Sensor Operator	
				9	11		8		102.64		Cynthia Williams	
Date/Julian:	1.23.22		Disk Drive		Sensor						Pilot	
Hobbs End	7529.1		TM MM30 (105, 106)		TM_90524						Ross Woodley	
Hobbs ST	7524.3		TARGET MSL	Target AIRSPD	Base Name	PID	Base Name	PID	Base Height		Aircraft	Airport Identifcation:
Flight Time	4.8		7,600	160	KEDN1		KEDN2		1.500		C441-N207SS	K12J (Brewton, AL)

∠	Flight Line	Mission Line	UTC time:		Direction	GPS Altitude	Speed	Available	S/Vs	Position Acc.		Comments and Conditions:
			Begin:	End:				MM Space		AVG PDOP	AVG HDOP	
	78	78	22:13	22:20	4°	7563	157	5926	18	1.3	0.7	
	77	77	22:23	22:30	184°	7553	151	2921	18	1.2	0.7	
	76	76	22:34	22:40	4°	7569	156	5916	17	1.2	0.7	
	75	75	22:44	22:50	184°	7569	157	5912	16	1.2	0.7	
	74	74	22:54	23:01	4°	7567	155	5907	16	1.2	0.7	
	73	73	23:05	23:12	184°	7569	157	5900	16	1.3	0.7	
	72	72	23:17	23:24	4°	7567	153	5894	17	1.2	0.7	
	71	71	23:28	23:36	184°	7566	156	5889	16	1.3	0.7	
	70	70	23:40	23:47	3°	7569	154	5884	16	1.3	0.7	
	69	69	23:52	23:52	184°	7571	157	5877	16	1.3	0.7	
	68	68	:3	23:59	3°	7571	154	5871	15	1.4	0.7	
	67	67	:14	:1	184°	7581	156	5866	15	1.3	0.7	
	66	66	:26	:22	3°	7567	153	5859	15	1.3	0.7	
	65	65	:37	:33	183°	7572	154	5854	15	1.1	0.7	
	64	64	:49	:44	3°	7519	159	5848	15	1.1	0.7	
	63	63	1:00	:56	183°	7533	152	5843	13	1.3	0.8	
	62	62	1:11	1:20	3°	7533	155	5836	14	1.2	0.7	
	61	61	1:23	1:30	183°	7529	153	5830	14	1.2	0.7	
	60	60	1:34	1:41	3°	7532	159	5825	14	1.2	0.7	
	59	59	1:45	1:52	183°	7541	155	5818	15	1.1	0.7	
	58	58	1:57	2:04	3°	7538	158	5813	15	1.3	0.7	
	57	57	2:08	2:16	183°	7525	157	5809	16	1.1	0.6	
	56	56	2:20	2:27	3°	7525	157	58002	16	1.3	0.6	
	55	55	2:31	2:38	183°	7523	152	5798	16	1.3	0.6	

Appendix B. Base Station GPS Session Forms

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/13/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN1	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	6674_0113_112453.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1516674

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**6194452**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/13/2022	**15:27**	**N 31 17 47.08680**

End Date (UTC)	End Time (UTC)	Approx. Long. *(if available)*
1/13/2022	**21:45**	**W 85 54 4.72766**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/13/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN2	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	1514_0113_112526.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1501514

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**3725413**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/13/2022	**15:27**	**N 31 17 47.67068**
End Date (UTC)	**End Time (UTC)**	**Approx. Long.** *(if available)*
1/13/2022	**22:25**	**W 85 54 4.70110**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/14/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN1	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	6674_0114_152518.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1516674

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**6194452**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/14/2022	**19:25**	**N 31 17 47.08680**

End Date (UTC)	End Time (UTC)	Approx. Long. *(if available)*
1/14/2022	**1:01**	**W 85 54 4.72766**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/14/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN2	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	1514_0114_092601.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1501514

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**3725413**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/14/2022	**13:28**	**N 31 17 47.67068**
End Date (UTC)	**End Time (UTC)**	**Approx. Long.** *(if available)*
1/14/2022	**1:01**	**W 85 54 4.70110**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/18/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Chuck Harris**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN1	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	6674_0118_092004.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1516674

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**6194452**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/18/2022	**14:20**	**N 31 17 47.08680**
End Date (UTC)	**End Time (UTC)**	**Approx. Long.** *(if available)*
1/19/2022	**1:53**	**W 85 54 4.72766**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/18/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Chuck Harris**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN2	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	1514_0118_091511.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1501514

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**3725413**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/18/2022	**14:15**	**N 31 17 47.67068**

End Date (UTC)	End Time (UTC)	Approx. Long. *(if available)*
1/19/2022	**1:52**	**W 85 54 4.70110**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/19/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Chuck Harris**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN1	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	6674_0119_093350.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1516674

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**6194452**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/19/2022	**14:34**	**N 31 17 47.08680**

End Date (UTC)	End Time (UTC)	Approx. Long. *(if available)*
1/19/2022	**16:20**	**W 85 54 4.72766**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/19/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Chuck Harris**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
KEDN2	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	1514_0119_092936.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1501514

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**3725413**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/19/2022	**14:29**	**N 31 17 47.67068**
End Date (UTC)	**End Time (UTC)**	**Approx. Long.** *(if available)*
1/19/2022	**16:19**	**W 85 54 4.70110**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/22/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
K12J1	

	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	6674_0122_131917.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1516674

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**6194452**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/22/2022	**17:12**	**N 31 3 2.32988**

End Date (UTC)	End Time (UTC)	Approx. Long. *(if available)*
1/22/2022	**22:54**	**W 87 3 41.16233**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/22/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
K12J2	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	1514_0122_131206.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1501514

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**3725413**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

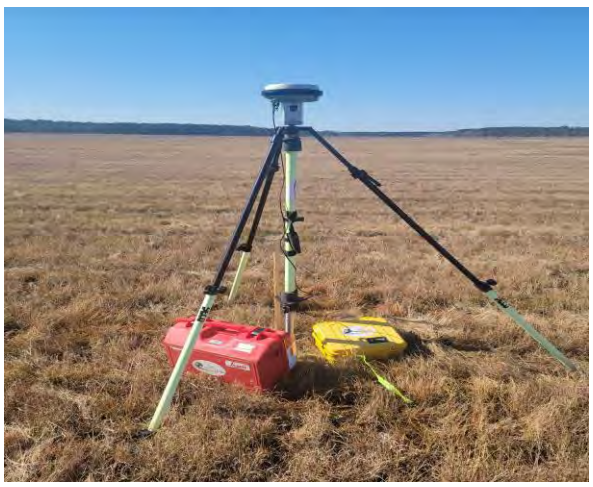
Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/22/2022	**17:19**	**N 31 3 2.30987**
End Date (UTC)	**End Time (UTC)**	**Approx. Long.** *(if available)*
1/22/022	**22:52**	**W 87 3 41.71093**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo



GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/23/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
K12J1	

	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	6674_0123_093435.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1516674

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**6194452**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/23/2022	**13:40**	**N 31 3 2.32988**
End Date (UTC)	**End Time (UTC)**	**Approx. Long.** *(if available)*
1/23/2022	**0:00**	**W 87 3 41.16233**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo

GPS SESSION FORM

Contract # / TO #	Client / Project Name	Date
140G0221F0236	USGS AL_CoffeeDaleGenevaEscambia_2021_D21	**1/23/2022**

DAS Project No.	Survey Firm	Operator Name
22001	DAS	**Cynthia Williams**

Monument Name/Designation	Exact Stamping *(include photo in survey report)*
K12J2	

Monument No./PID	Collection Type *(circle one)*	File Name *(receiver generated)*
	ABGPS **STATIC** RTK	1514_0123_093959.m00

Receiver Manufacturer	Receiver Model	Receiver Serial No.
N/A	N/A	**N/A**

Data Collector Manufacturer	Data Collector Model	Data Collector Serial No.
Leica	N/A	1501514

Antenna Part No.	Antenna Model	Antenna Serial No.
N/A	**N/A**	**3725413**

Starting Antenna Height in Feet				Starting Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

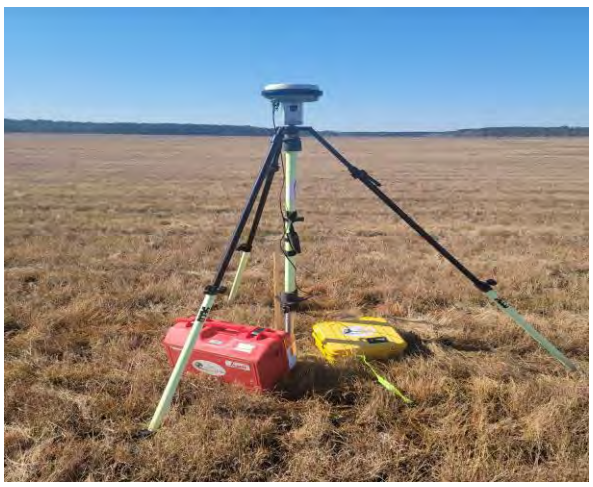
Ending Antenna Height in Feet				Ending Antenna Height in Meters				Type of Measurement *(circle one)*
1	2	3	AVG	1	2	3	AVG	**TRUE VERTICAL** ARP
							1.5	

Antenna Reference Point *(include and reference a dimensional diagram in Survey Report)*
(e.g., bottom edge of notch in ground plane, Page 5, Figure 2)

Start Date (UTC)	Start Time (UTC)	Approx. Lat. *(if available)*
1/23/2022	**13:40**	**N 31 3 2.30987**
End Date (UTC)	**End Time (UTC)**	**Approx. Long.** *(if available)*
1/23/2022	**2:06**	**W 87 3 41.71093**

Describe any abnormalites and/or problems encountered during the session, include time of occurance and duration.

Site Diagram/Setup-Photo



Appendix C. Vertical Accuracy Calculations

Project Information

Prepared By: R Yao-Kumah
Project Name: AL_CoffeeDaleGenevaEscambia2021_D21
Sensor Info: TM
Required Nominal Pulse Spacing: 0.71
Vendor Name: Digital Aerial Solutions
Units: Meters
Percent of Extent Tolerance: Extents Not Checked
Date of Aquisition: Start: 1/13/2022 Finish: 1/23/2022

Metadata Information

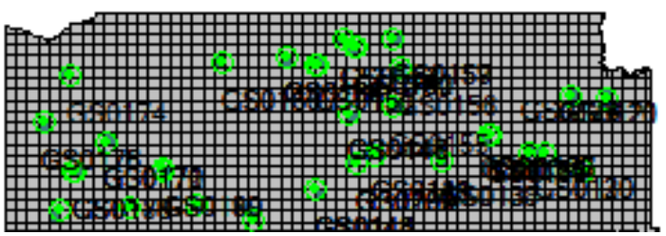
Tile Index:
- Filename: AL_CoffeeDaleGenevaEscambia2021_D21_MTI.shp
- Number of Polys: 0

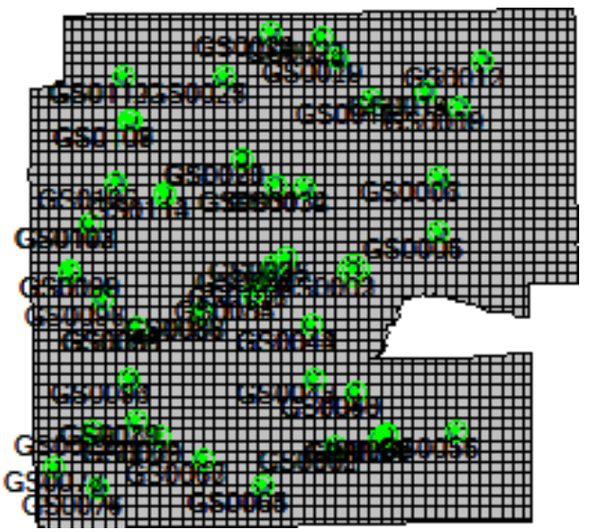
Intensity:
- Tile Index Attribute: Not Specified
- Data Filename: Not Specified

DEM:
- Tile Index Attribute: Name
- Data Filename: NEW_DEM

LAS:
- Tile Index Attribute: Name
- Data Filename: LAS

Tiled-Data Area





LiDAR Accuracy Assessment Summary

LC Type	# Points	NVA	VVA	RMSE Z
LAS		95% Confidence	95 Percentile	
Bare Earth	58	0.106		0.054
High Vegetation	46		0.108	0.066
Low Vegetation	17		0.144	0.077
Medium Vegetation	9		0.119	0.058
Urban Terrain	37	0.154		0.079
NVA Total:	95	0.127		0.065
VVA Total:	72		0.115	0.068
Total:	167			0.066
DEM		95% Confidence	95 Percentile	
Bare Earth	58	0.109		0.055
High Vegetation	46		0.115	0.070
Low Vegetation	17		0.155	0.076
Medium Vegetation	9		0.109	0.059
Urban Terrain	37	0.156		0.079
NVA Total:	95	0.129		0.066
VVA Total:	72		0.115	0.070
Total:	167			0.066
			Units:	Meters

Coordinates and Offsets of Analyzed Locations

		ID					
			Survey X	**Survey Y**	**Z1**	**Z DEM**	**Z LAS**
					LC Type	**ΔZ DEM**	**ΔZ LAS**
1)	☑	**GS0003**					
			620264.92	3463968.57	70.234	70.184	70.205
					Bare Earth	-0.05	-0.029
2)	☑	**GS0006**					
			632001.92	3469201.23	52.084	52.058	52.07
					Bare Earth	-0.026	-0.014
3)	☑	**GS0013**					
			637707.61	3492328.93	135.456	135.4	135.405
					Bare Earth	-0.056	-0.051
4)	☑	**GS0014**					
			630154.29	3488387.47	130.79	130.83	130.83
					Bare Earth	0.04	0.04
5)	☑	**GS0015**					
			630123.43	3488384.79	130.802	130.82	130.827
					Bare Earth	0.018	0.026
6)	☑	**GS0018**					
			622890.59	3487176.72	100.994	100.992	100.989
					Bare Earth	-0.002	-0.005
7)	☑	**GS0021**					
			615988.2	3495681.18	81.929	81.878	81.89
					Bare Earth	-0.051	-0.039

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
8)	☑	**GS0031**					
			609624.19	3475559.72	123.97	123.916	123.943
					Bare Earth	-0.054	-0.027
9)	☑	**GS0041**					
			609440.86	3464583.14	107.124	107.157	107.153
					Bare Earth	0.033	0.029
10)	☑	**GS0047**					
			614963.37	3449314.7	40.056	40.055	40.054
					Bare Earth	-0.001	-0.002
11)	☑	**GS0049**					
			620784.79	3447594.69	81.485	81.373	81.344
					Bare Earth	-0.112	-0.141
12)	☑	**GS0052**					
			623965.15	3441389.63	80.997	80.97	80.979
					Bare Earth	-0.027	-0.018
13)	☑	**GS0055**					
			634274.88	3442258.55	83.377	83.407	83.398
					Bare Earth	0.03	0.021
14)	☑	**GS0056**					
			634251.5	3442268.32	83.497	83.433	83.423
					Bare Earth	-0.064	-0.074

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
15)	☑	**GS0058**					
			624923.23	3441739.18	76.733	76.752	76.757
					Bare Earth	0.019	0.024
16)	☑	**GS0059**					
			624897.42	3441735.15	77.402	77.425	77.421
					Bare Earth	0.023	0.019
17)	☑	**GS0062**					
			617858.24	3440274.93	76.785	76.884	76.866
					Bare Earth	0.099	0.081
18)	☑	**GS0064**					
			608181.9	3434773.96	33.761	33.759	33.755
					Bare Earth	-0.002	-0.006
19)	☑	**GS0067**					
			599950.63	3438516.62	54.996	55.032	55.045
					Bare Earth	0.036	0.049
20)	☑	**GS0068**					
			599946.55	3438540.98	54.837	54.891	54.913
					Bare Earth	0.054	0.076
21)	☑	**GS0072**					
			584745.37	3442444.18	49.712	49.72	49.714
					Bare Earth	0.008	0.002

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
22)	☑	**GS0073**					
			584744.56	3442425.29	48.927	48.921	48.923
					Bare Earth	-0.006	-0.004
23)	☑	**GS0079**					
			590833.46	3443687.42	60.227	60.246	60.248
					Bare Earth	0.019	0.021
24)	☑	**GS0087**					
			599626.07	3458275.84	63.648	63.705	63.706
					Bare Earth	0.057	0.058
25)	☑	**GS0088**					
			599661.39	3458289.04	62.405	62.416	62.416
					Bare Earth	0.011	0.011
26)	☑	**GS0091**					
			590947.03	3456346.27	100.068	100.046	100.063
					Bare Earth	-0.022	-0.005
27)	☑	**GS0094**					
			589767.75	3449398.22	81.267	81.32	81.329
					Bare Earth	0.053	0.062
28)	☑	**GS0097**					
			586227.91	3460028.14	93.559	93.637	93.619
					Bare Earth	0.078	0.06

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
29) ☑	**GS0099**					
		581592.41	3463842.17	89.076	89.057	89.057
				Bare Earth	-0.019	-0.019
30) ☑	**GS0100**					
		581604.85	3463815.51	88.889	88.96	88.936
				Bare Earth	0.071	0.047
31) ☑	**GS0101**					
		584678.6	3470476.43	96.389	96.428	96.433
				Bare Earth	0.039	0.044
32) ☑	**GS0102**					
		584698.92	3470453.82	97.612	97.647	97.655
				Bare Earth	0.035	0.043
33) ☑	**GS0112**					
		589239.99	3490233.38	90.297	90.335	90.32
				Bare Earth	0.038	0.023
34) ☑	**GS0114**					
		594857.89	3474368.51	122.669	122.596	122.605
				Bare Earth	-0.073	-0.064
35) ☑	**GS0116**					
		608215.71	3462516.29	109.968	109.994	109.996
				Bare Earth	0.026	0.028

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
36)	GS0121					
		522920.76	3447209.51	55.008	55.026	55.027
				Bare Earth	0.018	0.019
37)	GS0131					
		512407.47	3439811.56	58.73	58.672	58.685
				Bare Earth	-0.058	-0.045
38)	GS0143					
		483308.46	3434841.9	37.661	37.652	37.645
				Bare Earth	-0.009	-0.016
39)	GS0147					
		487861.34	3445199.01	70.667	70.569	70.603
				Bare Earth	-0.098	-0.064
40)	GS0148					
		487881.56	3445176.05	69.912	69.803	69.795
				Bare Earth	-0.109	-0.117
41)	GS0150					
		483370.74	3451791.5	87.9	87.837	87.835
				Bare Earth	-0.063	-0.065
42)	GS0154					
		486944.9	3455121.82	62.003	61.876	61.87
				Bare Earth	-0.127	-0.133

Coordinates and Offsets of Analyzed Locations (Continued)

	ID					
		Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
43)	GS0155					
		493580.26	3445993.75	59.581	59.587	59.599
				Bare Earth	0.006	0.018
44)	GS0157					
		493853.1	3455318.32	79.422	79.441	79.436
				Bare Earth	0.019	0.014
45)	GS0159					
		493818.06	3455345.61	80.385	80.363	80.364
				Bare Earth	-0.022	-0.021
46)	GS0162					
		488561.56	3454129.82	71.945	71.894	71.905
				Bare Earth	-0.051	-0.04
47)	GS0170					
		454626.39	3441334.54	86.025	86.211	86.207
				Bare Earth	0.186	0.182
48)	GS0171					
		454647.83	3441369.46	85.291	85.366	85.357
				Bare Earth	0.075	0.066
49)	GS0180					
		450412.05	3437309.17	90.023	90.004	90.013
				Bare Earth	-0.019	-0.01

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
50)	**GS0190**					
		462596.65	3437528.15	84.681	84.684	84.693
				Bare Earth	0.003	0.012
51)	**GS0193**					
		466985.34	3432866.52	80.496	80.525	80.53
				Bare Earth	0.029	0.034
52)	**GS0194**					
		466961.91	3432900.63	81.651	81.663	81.65
				Bare Earth	0.012	-0.001
53)	**GS0198**					
		474862	3430700.57	24.62	24.661	24.67
				Bare Earth	0.041	0.05
54)	**GS0199**					
		488891.93	3438309.8	31.619	31.61	31.634
				Bare Earth	-0.009	0.015
55)	**GS0200**					
		488870.57	3438290.12	31.326	31.351	31.308
				Bare Earth	0.025	-0.019
56)	**GS0042**					
		614834.12	3456593.02	90.123	90.067	90.063
				Bare Earth	-0.056	-0.061

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
57)	☑	**GS0071**					
			593933.9	3441470.58	65.677	65.616	65.627
					Bare Earth	-0.061	-0.05
58)	☑	**GS0070**					
			593915.23	3441511.49	65.465	65.508	65.512
					Bare Earth	0.043	0.047
59)	☑	**GS0043**					
			614800.99	3456571.81	89.889	89.836	89.827
					Urban Terrain	-0.053	-0.062
60)	☑	**GS0002**					
			620285.29	3463985.38	70.967	70.916	70.91
					Urban Terrain	-0.051	-0.057
61)	☑	**GS0007**					
			631878.37	3476678.43	103.403	103.392	103.388
					Urban Terrain	-0.011	-0.015
62)	☑	**GS0010**					
			634751.14	3486158.58	83.014	83.01	83.005
					Urban Terrain	-0.004	-0.009
63)	☑	**GS0012**					
			637755.82	3492332.31	135.824	135.724	135.727
					Urban Terrain	-0.1	-0.097

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
64)	☑	**GS0020**					
			618331.13	3492812.48	149.192	149.109	149.126
					Urban Terrain	-0.083	-0.066
65)	☑	**GS0022**					
			615985.59	3495735.9	82.381	82.333	82.33
					Urban Terrain	-0.048	-0.051
66)	☑	**GS0023**					
			609118.84	3496377.4	92.716	92.719	92.717
					Urban Terrain	0.003	0.001
67)	☑	**GS0027**					
			602673.76	3490296.48	111.759	111.759	111.753
					Urban Terrain	0	-0.006
68)	☑	**GS0036**					
			611191	3465806.56	107.861	107.764	107.801
					Urban Terrain	-0.097	-0.06
69)	☑	**GS0048**					
			620771.85	3447573.89	81.476	81.357	81.366
					Urban Terrain	-0.119	-0.11
70)	☑	**GS0050**					
			620806.41	3447589.17	82.063	81.933	81.925
					Urban Terrain	-0.13	-0.138

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
71)	☑	**GS0051**					
			623940.12	3441372.25	80.926	80.974	80.925
					Urban Terrain	0.048	-0.001
72)	☑	**GS0063**					
			608159.25	3434775.2	33.915	33.922	33.921
					Urban Terrain	0.007	0.006
73)	☑	**GS0076**					
			585679.56	3434460.32	48.685	48.71	48.706
					Urban Terrain	0.025	0.021
74)	☑	**GS0077**					
			579572.68	3437510.33	45.757	45.802	45.807
					Urban Terrain	0.045	0.05
75)	☑	**GS0078**					
			579598.98	3437497.19	45.316	45.129	45.113
					Urban Terrain	-0.187	-0.204
76)	☑	**GS0080**					
			590865.26	3443700.19	60.844	60.807	60.827
					Urban Terrain	-0.037	-0.017
77)	☑	**GS0085**					
			606596.75	3460710.33	107.836	107.786	107.786
					Urban Terrain	-0.05	-0.05

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
78)	☑	**GS0089**					
			590961.35	3456392.69	98.656	98.641	98.646
					Urban Terrain	-0.015	-0.01
79)	☑	**GS0105**					
			588009.36	3475921.58	59.674	59.722	59.715
					Urban Terrain	0.048	0.041
80)	☑	**GS0106**					
			588037.3	3475919.46	59.701	59.692	59.69
					Urban Terrain	-0.009	-0.011
81)	☑	**GS0107**					
			589967.69	3484320.96	66.535	66.492	66.49
					Urban Terrain	-0.043	-0.045
82)	☑	**GS0109**					
			590011.21	3484326.86	66.195	66.18	66.176
					Urban Terrain	-0.015	-0.019
83)	☑	**GS0126**					
			514239.4	3439888.05	72.518	72.237	72.249
					Urban Terrain	-0.281	-0.269
84)	☑	**GS0130**					
			519659.57	3437297.12	70.795	70.698	70.677
					Urban Terrain	-0.097	-0.118

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
85)	☑	**GS0138**					
			500337.14	3438787.71	27.633	27.666	27.662
					Urban Terrain	0.033	0.029
86)	☑	**GS0139**					
			491082.2	3439640.2	38.82	38.73	38.722
					Urban Terrain	-0.09	-0.098
87)	☑	**GS0144**					
			483282.54	3434862.47	37.646	37.614	37.628
					Urban Terrain	-0.032	-0.018
88)	☑	**GS0146**					
			487839.64	3445218.4	71.49	71.393	71.391
					Urban Terrain	-0.097	-0.099
89)	☑	**GS0152**					
			486904.76	3455113.88	64.194	64.168	64.155
					Urban Terrain	-0.026	-0.039
90)	☑	**GS0156**					
			494718.48	3451274.71	72.429	72.498	72.497
					Urban Terrain	0.069	0.068
91)	☑	**GS0160**					
			488582.39	3454120.87	71.72	71.699	71.695
					Urban Terrain	-0.021	-0.025

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
92)	☑	**GS0163**					
			479215.61	3452827.1	50.181	50.158	50.176
					Urban Terrain	-0.023	-0.005
93)	☑	**GS0176**					
			446209.71	3443979.04	94.433	94.434	94.446
					Urban Terrain	0.001	0.013
94)	☑	**GS0195**					
			474833.62	3430671.32	24.602	24.619	24.612
					Urban Terrain	0.017	0.01
95)	☑	**GS0202**					
			488836.51	3438240	30.913	30.844	30.85
					Urban Terrain	-0.069	-0.063
96)	☑	**GS0005**					
			631961.39	3469210.69	51.563	51.592	51.591
					Low Vegetation	0.029	0.028
97)	☑	**GS0017**					
			622925.69	3487186.4	101.131	101.14	101.134
					Low Vegetation	0.009	0.003
98)	☑	**GS0035**					
			611198.14	3465781.65	107.183	107.193	107.182
					Low Vegetation	0.01	-0.001

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
99)	☑	**GS0069**					
			593940.63	3441498.92	66.013	66.02	66.02
					Low Vegetation	0.007	0.007
100)	☑	**GS0093**					
			589738.79	3449380.99	81.727	81.882	81.871
					Low Vegetation	0.155	0.144
101)	☑	**GS0096**					
			586196.8	3460011.59	94.224	94.286	94.292
					Low Vegetation	0.062	0.068
102)	☑	**GS0124**					
			517750.63	3447594.57	38.49	38.544	38.544
					Low Vegetation	0.054	0.054
103)	☑	**GS0125**					
			514227.72	3439913.49	71.897	71.714	71.717
					Low Vegetation	-0.183	-0.18
104)	☑	**GS0153**					
			486868.59	3455097.79	66.641	66.645	66.638
					Low Vegetation	0.004	-0.004
105)	☑	**GS0164**					
			479239.75	3452814.78	50.041	50.091	50.089
					Low Vegetation	0.05	0.048

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
106)	☑	**GS0165**					
			479199.72	3452830.47	50.04	50.141	50.146
					Low Vegetation	0.101	0.106
107)	☑	**GS0168**					
			470666.65	3452023.03	104.697	104.774	104.777
					Low Vegetation	0.077	0.08
108)	☑	**GS0169**					
			470649.89	3452048.85	104.774	104.845	104.856
					Low Vegetation	0.071	0.082
109)	☑	**GS0191**					
			466946.77	3432819.47	81.307	81.345	81.343
					Low Vegetation	0.038	0.036
110)	☑	**GS0192**					
			466970.73	3432842.53	80.609	80.631	80.629
					Low Vegetation	0.022	0.02
111)	☑	**GS0196**					
			474851.53	3430651.84	24.129	24.155	24.166
					Low Vegetation	0.026	0.037
112)	☑	**GS0197**					
			474866.92	3430674.11	24.553	24.64	24.646
					Low Vegetation	0.087	0.093

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
113)	☑	**GS0009**					
			634783.2	3486142.42	83.01	83.029	83.033
					Medium Vegetation	0.019	0.023
114)	☑	**GS0044**					
			614782.86	3456525.92	88.832	88.773	88.793
					Medium Vegetation	-0.059	-0.039
115)	☑	**GS0057**					
			624911.72	3441760.91	76.813	76.861	76.844
					Medium Vegetation	0.048	0.031
116)	☑	**GS0065**					
			608205.26	3434763.88	33.962	34.071	34.081
					Medium Vegetation	0.109	0.119
117)	☑	**GS0090**					
			590928.52	3456361.56	99.93	99.905	99.903
					Medium Vegetation	-0.025	-0.027
118)	☑	**GS0117**					
			608225.09	3462470.51	109.66	109.724	109.72
					Medium Vegetation	0.064	0.06
119)	☑	**GS0123**					
			517722.56	3447587.91	39.619	39.711	39.709
					Medium Vegetation	0.092	0.09

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
120)	☑	**GS0127**					
			514221.55	3439874.38	71.654	71.639	71.634
					Medium Vegetation	-0.015	-0.02
121)	☑	**GS0179**					
			450392.37	3437284.39	90.154	90.144	90.142
					Medium Vegetation	-0.01	-0.012
122)	☑	**GS0008**					
			631852.41	3476706.02	103.955	104.044	104.032
					High Vegetation	0.089	0.077
123)	☑	**GS0019**					
			618352.39	3492814.06	149.889	149.811	149.82
					High Vegetation	-0.078	-0.069
124)	☑	**GS0024**					
			609156.19	3496380.52	91.899	91.887	91.884
					High Vegetation	-0.012	-0.015
125)	☑	**GS0025**					
			602723.75	3490283.79	111.434	111.535	111.525
					High Vegetation	0.101	0.091
126)	☑	**GS0028**					
			605200.3	3479052.14	108.718	108.717	108.725
					High Vegetation	-0.001	0.007

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
127)	☑	**GS0029**					
			605193.07	3479102.86	108.922	108.875	108.904
					High Vegetation	-0.047	-0.018
128)	☑	**GS0030**					
			609643.96	3475565.98	122.828	122.827	122.835
					High Vegetation	-0.001	0.007
129)	☑	**GS0032**					
			613701.24	3475351.01	113.257	113.209	113.188
					High Vegetation	-0.048	-0.069
130)	☑	**GS0034**					
			613687.64	3475393.53	114.126	114.088	114.083
					High Vegetation	-0.038	-0.044
131)	☑	**GS0039**					
			609377.86	3464604.79	106.845	106.87	106.871
					High Vegetation	0.025	0.026
132)	☑	**GS0045**					
			614968.8	3449332.59	40.231	40.187	40.205
					High Vegetation	-0.044	-0.026
133)	☑	**GS0053**					
			623903.8	3441378.82	80.235	80.25	80.263
					High Vegetation	0.015	0.028

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
134)	☑	**GS0061**					
			617817.65	3440270.24	77.012	76.991	76.977
					High Vegetation	-0.021	-0.035
135)	☑	**GS0074**					
			585686.91	3434434.38	48.446	48.409	48.374
					High Vegetation	-0.037	-0.072
136)	☑	**GS0084**					
			606570.43	3460708.28	107.713	107.7	107.703
					High Vegetation	-0.013	-0.01
137)	☑	**GS0086**					
			599602.97	3458269	64.16	64.289	64.252
					High Vegetation	0.129	0.092
138)	☑	**GS0098**					
			581576.33	3463864.26	89.006	89.042	89.042
					High Vegetation	0.036	0.036
139)	☑	**GS0103**					
			584710.89	3470474.82	97.855	97.97	97.97
					High Vegetation	0.115	0.115
140)	☑	**GS0108**					
			589990.36	3484307.28	66	66.043	66.038
					High Vegetation	0.043	0.037

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
141)	☑	**GS0111**					
			589208.55	3490259.87	90.948	90.904	90.917
					High Vegetation	-0.044	-0.031
142)	☑	**GS0113**					
			594879.8	3474348.37	122.91	122.868	122.912
					High Vegetation	-0.042	0.002
143)	☑	**GS0120**					
			522892.77	3447208.58	54.952	55.044	55.06
					High Vegetation	0.092	0.108
144)	☑	**GS0129**					
			519687.56	3437296.4	69.769	69.78	69.778
					High Vegetation	0.011	0.009
145)	☑	**GS0132**					
			512376.41	3439829.49	60.177	60.108	60.115
					High Vegetation	-0.069	-0.062
146)	☑	**GS0133**					
			506851.89	3442261.49	31.864	31.884	31.879
					High Vegetation	0.02	0.015
147)	☑	**GS0134**					
			506823.59	3442315.75	32.356	32.356	32.38
					High Vegetation	0	0.024

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
148)	☑	**GS0135**					
			506796.69	3442310.78	31.77	31.739	31.75
					High Vegetation	-0.031	-0.02
149)	☑	**GS0137**					
			500375.21	3438780.56	27.56	27.537	27.542
					High Vegetation	-0.023	-0.018
150)	☑	**GS0140**					
			491068.51	3439618.48	38.731	38.639	38.623
					High Vegetation	-0.092	-0.108
151)	☑	**GS0141**					
			491078.4	3439591.36	37.839	37.757	37.767
					High Vegetation	-0.082	-0.072
152)	☑	**GS0145**					
			483263	3434824.41	37.39	37.5	37.491
					High Vegetation	0.11	0.101
153)	☑	**GS0151**					
			483333.85	3451796.88	87.149	87.074	87.099
					High Vegetation	-0.075	-0.05
154)	☑	**GS0161**					
			488609.43	3454132.49	71.368	71.265	71.283
					High Vegetation	-0.103	-0.085

Coordinates and Offsets of Analyzed Locations (Continued)

	ID	Survey X	Survey Y	Z1	Z DEM	Z LAS
				LC Type	ΔZ DEM	ΔZ LAS
155) ☑	**GS0166**					
		479221.53	3452863.05	50.132	50.357	50.347
				High Vegetation	0.225	0.215
156) ☑	**GS0172**					
		454607.3	3441332.5	86.473	86.514	86.511
				High Vegetation	0.041	0.038
157) ☑	**GS0174**					
		449787.65	3450230.35	92.84	92.88	92.873
				High Vegetation	0.04	0.032
158) ☑	**GS0175**					
		446245.69	3443961.77	94.071	94.036	94.036
				High Vegetation	-0.035	-0.035
159) ☑	**GS0178**					
		450329.88	3437271.34	90.322	90.361	90.351
				High Vegetation	0.039	0.029
160) ☑	**GS0182**					
		448427.93	3431949.63	75.94	75.835	75.844
				High Vegetation	-0.105	-0.096
161) ☑	**GS0183**					
		448400.53	3431959.22	76.649	76.688	76.698
				High Vegetation	0.039	0.049

Coordinates and Offsets of Analyzed Locations (Continued)

		ID					
			Survey X	Survey Y	Z1	Z DEM	Z LAS
					LC Type	ΔZ DEM	ΔZ LAS
162)	☑	**GS0184**					
			457841.35	3432354.94	88.241	88.304	88.293
					High Vegetation	0.063	0.052
163)	☑	**GS0185**					
			457787.55	3432341.62	88.314	88.423	88.414
					High Vegetation	0.109	0.1
164)	☑	**GS0186**					
			457775.17	3432368.03	88.271	88.357	88.355
					High Vegetation	0.086	0.084
165)	☑	**GS0187**					
			457743.63	3432366.33	88.294	88.354	88.359
					High Vegetation	0.06	0.065
166)	☑	**GS0189**					
			462638.6	3437552.51	84.108	84.105	84.097
					High Vegetation	-0.003	-0.011
167)	☑	**GS0201**					
			488859.49	3438258.18	30.89	30.889	30.9
					High Vegetation	-0.001	0.01

LAS

Nonvegetated Vertical Accuracy

LandCover Type: Bare Earth, Urban Terrain

Minimum DZ: -0.269

Maximum DZ: 0.182

Mean DZ: -0.015

Mean Magnitude DZ: 0.214

Number Observations: 95

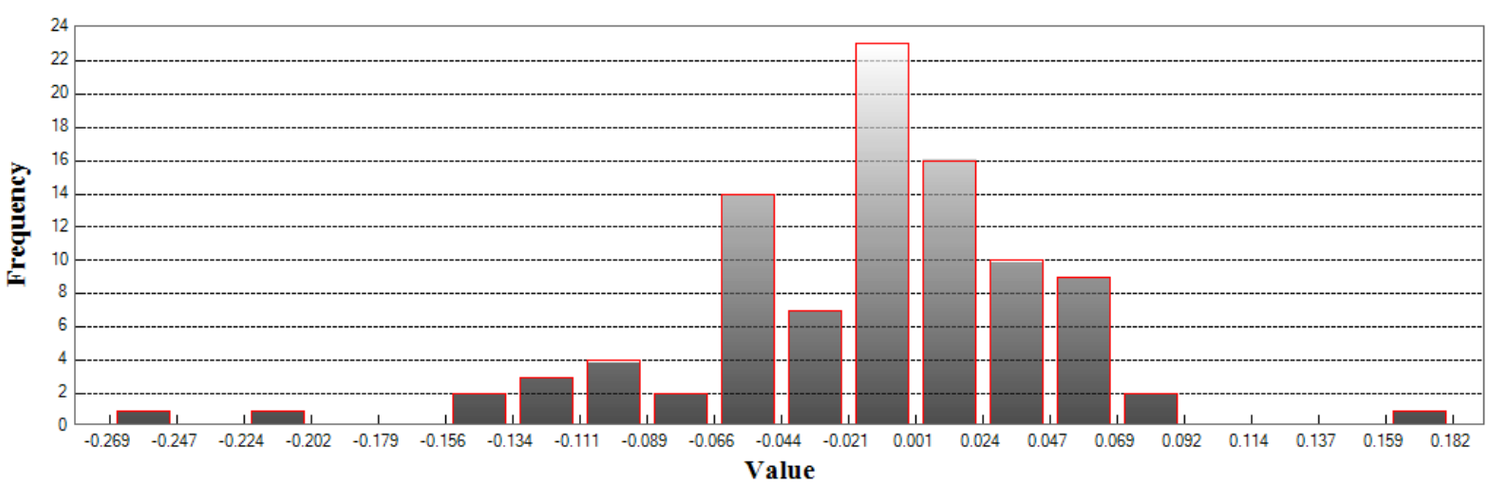
Standard Deviation DZ: 0.063

RMSE Z: 0.065

95% Confidence Level Z: 0.127

Units: Meters

Histogram



Min: -0.269

Max: 0.182

Number Of Bins: 20

Bin Interval: 0.023

LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: High Vegetation

Minimum DZ: -0.108

Maximum DZ: 0.215

Mean DZ: 0.011

Mean Magnitude DZ: 0.228

Number Observations: 46

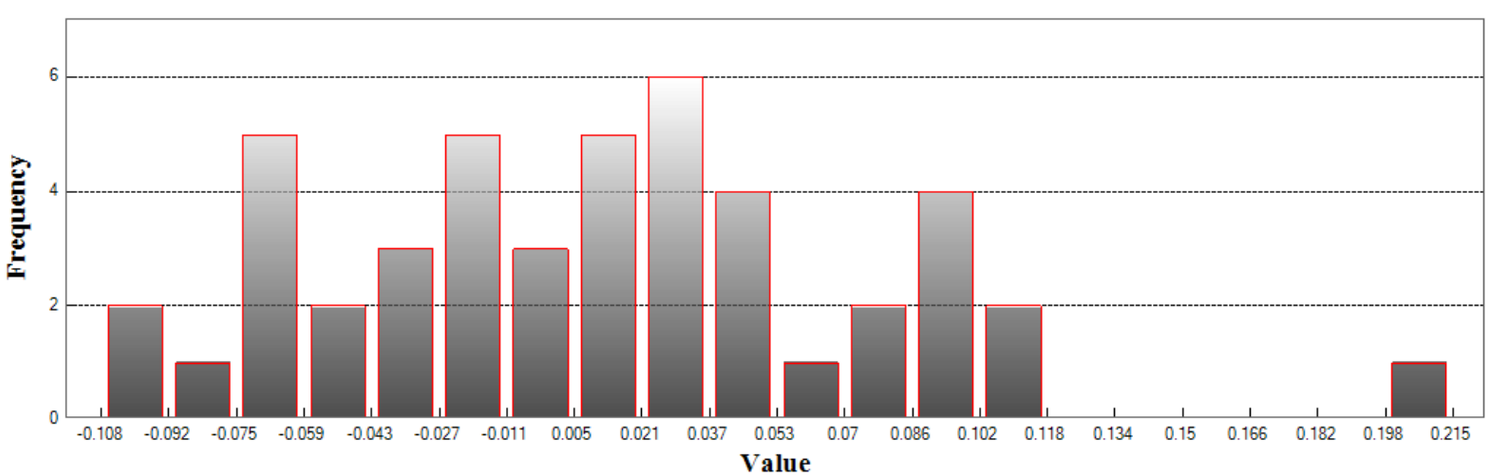
Standard Deviation DZ: 0.066

RMSE Z: 0.066

95th Percentile: 0.108

Units: Meters

Histogram



Min: -0.108

Max: 0.215

Number Of Bins: 20

Bin Interval: 0.016

LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: Low Vegetation

Minimum DZ: -0.18

Maximum DZ: 0.144

Mean DZ: 0.037

Mean Magnitude DZ: 0.241

Number Observations: 17

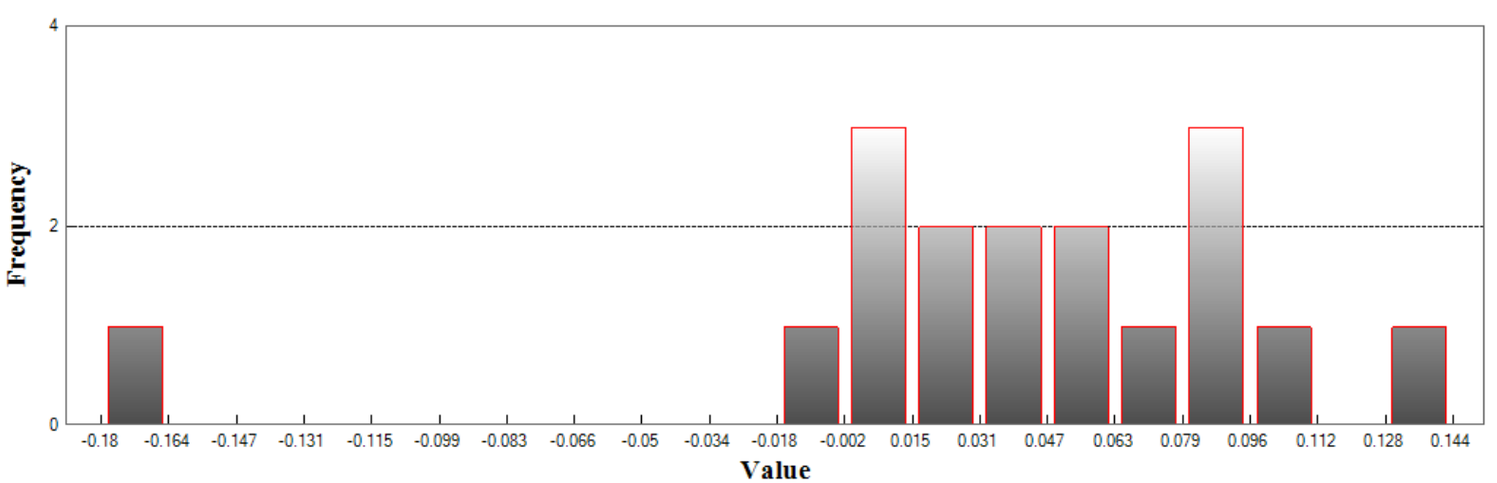
Standard Deviation DZ: 0.069

RMSE Z: 0.077

95th Percentile: 0.144

Units: Meters

Histogram



Min: -0.18

Max: 0.144

Number Of Bins: 20

Bin Interval: 0.016

LAS (Continued)

Vegetated Vertical Accuracy

LandCover Type: Medium Vegetation

Minimum DZ: -0.039

Maximum DZ: 0.119

Mean DZ: 0.025

Mean Magnitude DZ: 0.216

Number Observations: 9

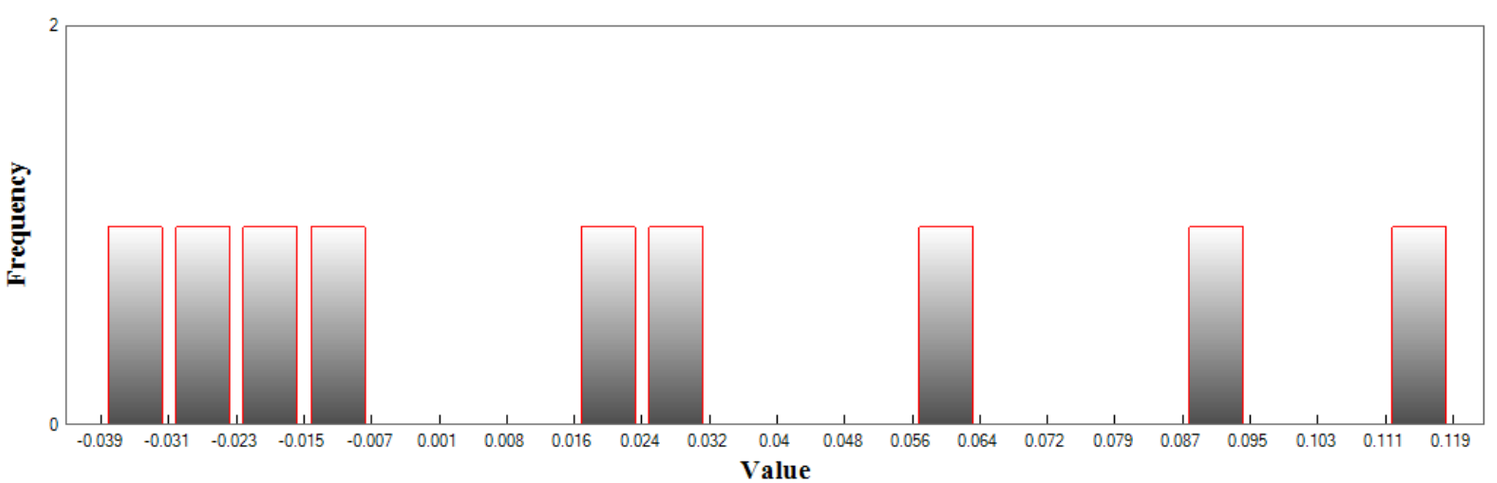
Standard Deviation DZ: 0.055

RMSE Z: 0.058

95th Percentile: 0.119

Units: Meters

Histogram



Min: -0.039

Max: 0.119

Number Of Bins: 20

Bin Interval: 0.008

DEM

Nonvegetated Vertical Accuracy

LandCover Type: Bare Earth, Urban Terrain

Minimum DZ: -0.281

Maximum DZ: 0.186

Mean DZ: -0.016

Mean Magnitude DZ: 0.22

Number Observations: 95

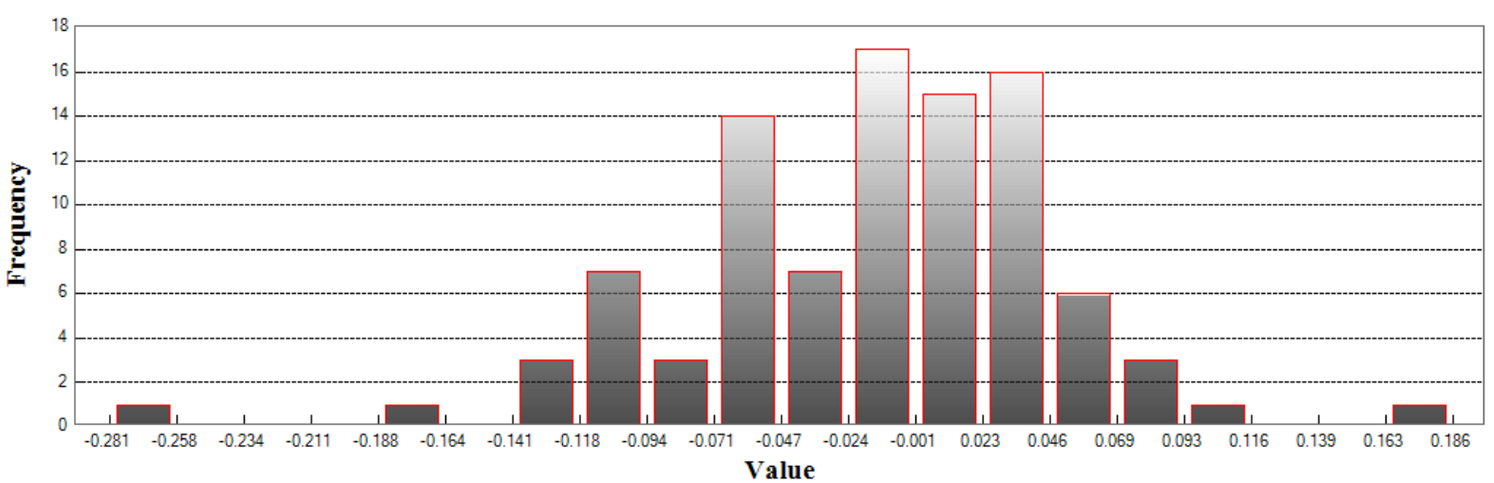
Standard Deviation DZ: 0.064

RMSE Z: 0.066

95% Confidence Level Z: 0.129

Units: Meters

Histogram



Min: -0.281

Max: 0.186

Number Of Bins: 20

Bin Interval: 0.023

DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: High Vegetation

Minimum DZ: -0.105

Maximum DZ: 0.225

Mean DZ: 0.01

Mean Magnitude DZ: 0.235

Number Observations: 46

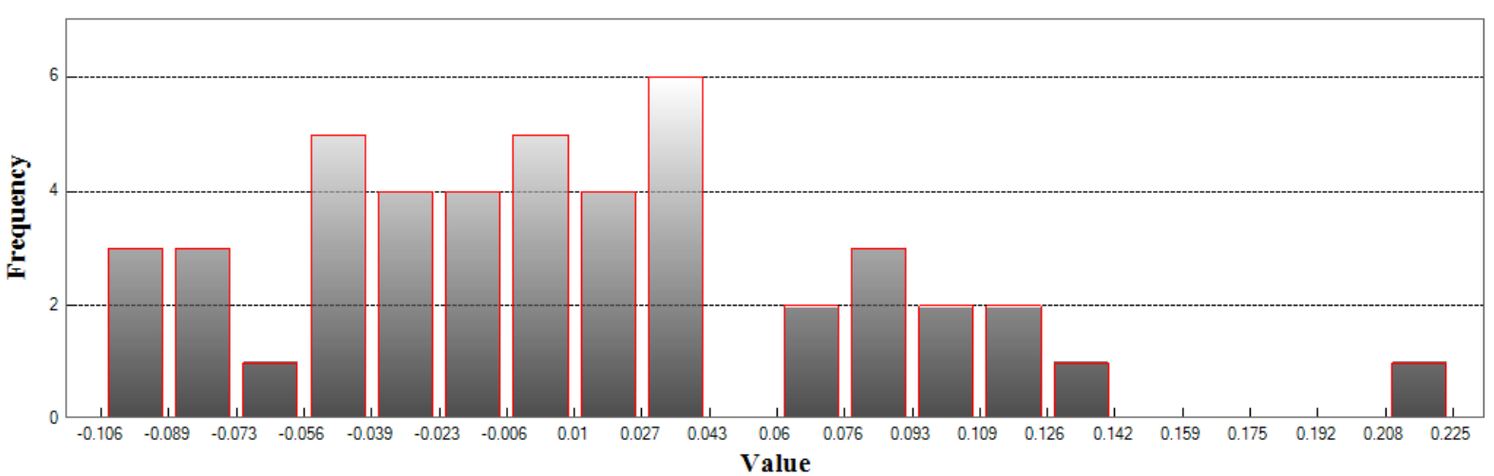
Standard Deviation DZ: 0.07

RMSE Z: 0.07

95th Percentile: 0.115

Units: Meters

Histogram



Min: -0.105

Max: 0.225

Number Of Bins: 20

Bin Interval: 0.017

DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: Low Vegetation

Minimum DZ: -0.183

Maximum DZ: 0.155

Mean DZ: 0.036

Mean Magnitude DZ: 0.24

Number Observations: 17

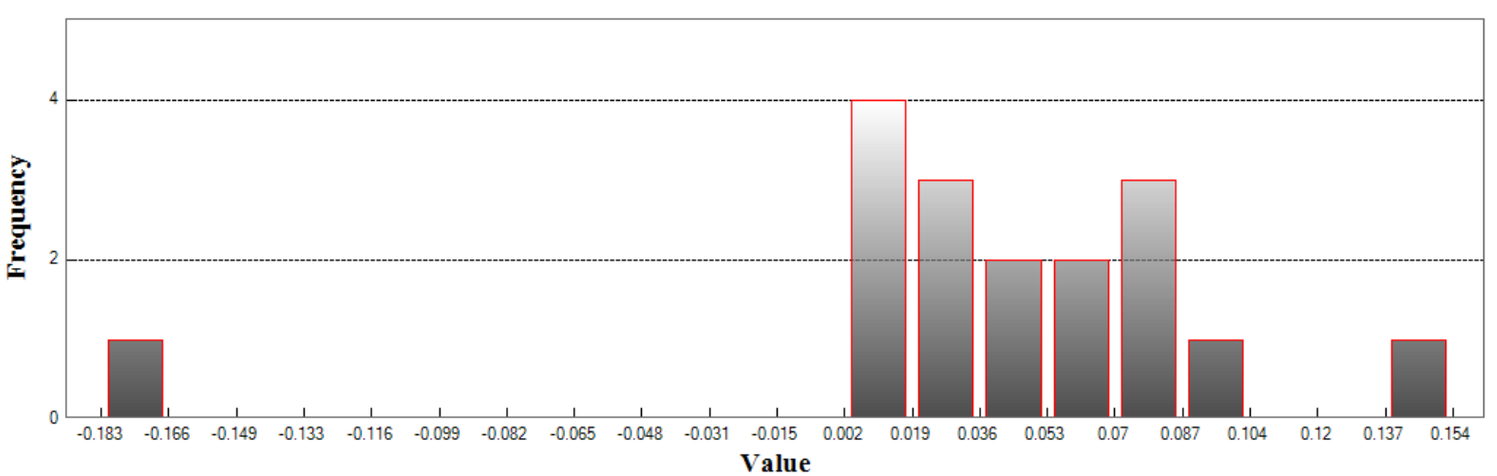
Standard Deviation DZ: 0.069

RMSE Z: 0.076

95th Percentile: 0.155

Units: Meters

Histogram



Min: -0.183

Max: 0.155

Number Of Bins: 20

Bin Interval: 0.017

DEM (Continued)

Vegetated Vertical Accuracy

LandCover Type: Medium Vegetation

Minimum DZ: -0.059

Maximum DZ: 0.109

Mean DZ: 0.025

Mean Magnitude DZ: 0.222

Number Observations: 9

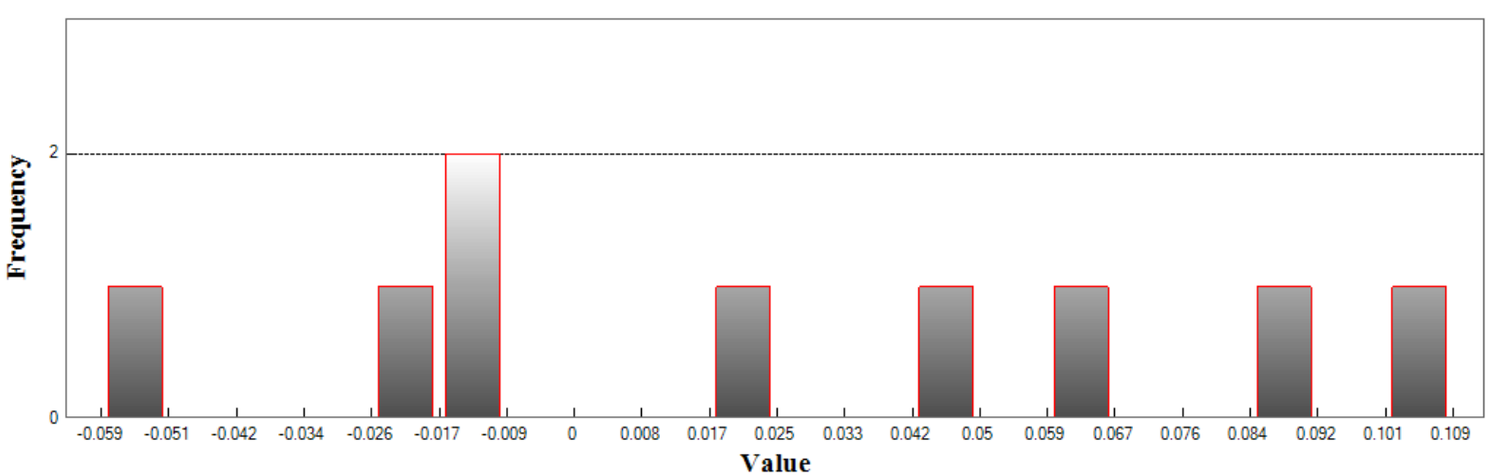
Standard Deviation DZ: 0.057

RMSE Z: 0.059

95th Percentile: 0.109

Units: Meters

Histogram



Min: -0.059

Max: 0.109

Number Of Bins: 20

Bin Interval: 0.008

Point: GS0003

Survey X: 620264.92, Survey Y: 3463968.57, Z1: 70.23, Z DEM: 70.18, Z LAS: 70.2, ΔZ DEM: -0.05, ΔZ LAS: -0.03

North

South

East

West

Point: GS0006

Survey X: 632001.92, Survey Y: 3469201.23, Z1: 52.08, Z DEM: 52.06, Z LAS: 52.07, ΔZ DEM: -0.03, ΔZ LAS: -0.01

North

South

East

West

Point: GS0013

Survey X: 637707.61, Survey Y: 3492328.93, Z1: 135.46, Z DEM: 135.4, Z LAS: 135.4, ΔZ DEM: -0.06, ΔZ LAS: -0.05

North

South

East

West

Point: GS0014

Survey X: 630154.29, Survey Y: 3488387.47, Z1: 130.79, Z DEM: 130.83, Z LAS: 130.83, ΔZ DEM: 0.04, ΔZ LAS: 0.04

North

South

East

West

Point: GS0015

Survey X: 630123.43, Survey Y: 3488384.79, Z1: 130.8, Z DEM: 130.82, Z LAS: 130.83, ΔZ DEM: 0.02, ΔZ LAS: 0.03

North

South

East

West

Point: GS0018

Survey X: 622890.59, Survey Y: 3487176.72, Z1: 100.99, Z DEM: 100.99, Z LAS: 100.99, ΔZ DEM: 0, ΔZ LAS: 0

North

South

East

West

Point: GS0021

Survey X: 615988.2, Survey Y: 3495681.18, Z1: 81.93, Z DEM: 81.88, Z LAS: 81.89, ΔZ DEM: -0.05, ΔZ LAS: -0.04

North

South

East

West

Point: GS0031

Survey X: 609624.19, Survey Y: 3475559.72, Z1: 123.97, Z DEM: 123.92, Z LAS: 123.94, ΔZ DEM: -0.05, ΔZ LAS: -0.03

North

South

East

West

Point: GS0041

Survey X: 609440.86, Survey Y: 3464583.14, Z1: 107.12, Z DEM: 107.16, Z LAS: 107.15, ΔZ DEM: 0.03, ΔZ LAS: 0.03

North

South

East

West

Point: GS0047

Survey X: 614963.37, Survey Y: 3449314.7, Z1: 40.06, Z DEM: 40.05, Z LAS: 40.05, ΔZ DEM: 0, ΔZ LAS: 0

North

South

East

West

Point: GS0049

Survey X: 620784.79, Survey Y: 3447594.69, Z1: 81.49, Z DEM: 81.37, Z LAS: 81.34, ΔZ DEM: -0.11, ΔZ LAS: -0.14

North

South

East

West

Point: GS0052

Survey X: 623965.15, Survey Y: 3441389.63, Z1: 81, Z DEM: 80.97, Z LAS: 80.98, ΔZ DEM: -0.03, ΔZ LAS: -0.02

North

South

East

West

Point: GS0055

Survey X: 634274.88, Survey Y: 3442258.55, Z1: 83.38, Z DEM: 83.41, Z LAS: 83.4, ΔZ DEM: 0.03, ΔZ LAS: 0.02

North

South

East

West

Point: GS0056

Survey X: 634251.5, Survey Y: 3442268.32, Z1: 83.5, Z DEM: 83.43, Z LAS: 83.42, ΔZ DEM: -0.06, ΔZ LAS: -0.07

North

South

East

West

Point: GS0058

Survey X: 624923.23, Survey Y: 3441739.18, Z1: 76.73, Z DEM: 76.75, Z LAS: 76.76, ΔZ DEM: 0.02, ΔZ LAS: 0.02

North

South

East

West

Point: GS0059

Survey X: 624897.42, Survey Y: 3441735.15, Z1: 77.4, Z DEM: 77.43, Z LAS: 77.42, ΔZ DEM: 0.02, ΔZ LAS: 0.02

North

South

East

West

Point: GS0062

Survey X: 617858.24, Survey Y: 3440274.93, Z1: 76.79, Z DEM: 76.88, Z LAS: 76.87, ΔZ DEM: 0.1, ΔZ LAS: 0.08

North

South

East

West

Point: GS0064

Survey X: 608181.9, Survey Y: 3434773.96, Z1: 33.76, Z DEM: 33.76, Z LAS: 33.76, ΔZ DEM: 0, ΔZ LAS: -0.01

North

South

East

West

Point: GS0067

Survey X: 599950.63, Survey Y: 3438516.62, Z1: 55, Z DEM: 55.03, Z LAS: 55.05, ΔZ DEM: 0.04, ΔZ LAS: 0.05

North

South

East

West

Point: GS0068

Survey X: 599946.55, Survey Y: 3438540.98, Z1: 54.84, Z DEM: 54.89, Z LAS: 54.91, ΔZ DEM: 0.05, ΔZ LAS: 0.08

North

South

East

West

Point: GS0072

Survey X: 584745.37, Survey Y: 3442444.18, Z1: 49.71, Z DEM: 49.72, Z LAS: 49.71, ΔZ DEM: 0.01, ΔZ LAS: 0

North

South

East

West

Point: GS0073

Survey X: 584744.56, Survey Y: 3442425.29, Z1: 48.93, Z DEM: 48.92, Z LAS: 48.92, ΔZ DEM: -0.01, ΔZ LAS: 0

North

South

East

West

Point: GS0079

Survey X: 590833.46, Survey Y: 3443687.42, Z1: 60.23, Z DEM: 60.25, Z LAS: 60.25, ΔZ DEM: 0.02, ΔZ LAS: 0.02

North

South

East

West

Point: GS0087

Survey X: 599626.07, Survey Y: 3458275.84, Z1: 63.65, Z DEM: 63.7, Z LAS: 63.71, ΔZ DEM: 0.06, ΔZ LAS: 0.06

North

South

East

West

Point: GS0088

Survey X: 599661.39, Survey Y: 3458289.04, Z1: 62.41, Z DEM: 62.42, Z LAS: 62.42, ΔZ DEM: 0.01, ΔZ LAS: 0.01

North

South

East

West

Point: GS0091

Survey X: 590947.03, Survey Y: 3456346.27, Z1: 100.07, Z DEM: 100.05, Z LAS: 100.06, ΔZ DEM: -0.02, ΔZ LAS: 0

North

South

East

West

Point: GS0094

Survey X: 589767.75, Survey Y: 3449398.22, Z1: 81.27, Z DEM: 81.32, Z LAS: 81.33, ΔZ DEM: 0.05, ΔZ LAS: 0.06

North

South

East

West

Point: GS0097

Survey X: 586227.91, Survey Y: 3460028.14, Z1: 93.56, Z DEM: 93.64, Z LAS: 93.62, ΔZ DEM: 0.08, ΔZ LAS: 0.06

North

South

East

West

Point: GS0099

Survey X: 581592.41, Survey Y: 3463842.17, Z1: 89.08, Z DEM: 89.06, Z LAS: 89.06, ΔZ DEM: -0.02, ΔZ LAS: -0.02

North

South

East

West

Point: GS0100

Survey X: 581604.85, Survey Y: 3463815.51, Z1: 88.89, Z DEM: 88.96, Z LAS: 88.94, ΔZ DEM: 0.07, ΔZ LAS: 0.05

North

South

East

West

Point: GS0101

Survey X: 584678.6, Survey Y: 3470476.43, Z1: 96.39, Z DEM: 96.43, Z LAS: 96.43, ΔZ DEM: 0.04, ΔZ LAS: 0.04

North

South

East

West

Point: GS0102

Survey X: 584698.92, Survey Y: 3470453.82, Z1: 97.61, Z DEM: 97.65, Z LAS: 97.66, ΔZ DEM: 0.03, ΔZ LAS: 0.04

North

South

East

West

Point: GS0112

Survey X: 589239.99, Survey Y: 3490233.38, Z1: 90.3, Z DEM: 90.33, Z LAS: 90.32, ΔZ DEM: 0.04, ΔZ LAS: 0.02

North

South

East

West

Point: GS0114

Survey X: 594857.89, Survey Y: 3474368.51, Z1: 122.67, Z DEM: 122.6, Z LAS: 122.61, ΔZ DEM: -0.07, ΔZ LAS: -0.06

North

South

East

West

Point: GS0116

Survey X: 608215.71, Survey Y: 3462516.29, Z1: 109.97, Z DEM: 109.99, Z LAS: 110, ΔZ DEM: 0.03, ΔZ LAS: 0.03

North

South

East

West

Point: GS0121

Survey X: 522920.76, Survey Y: 3447209.51, Z1: 55.01, Z DEM: 55.03, Z LAS: 55.03, ΔZ DEM: 0.02, ΔZ LAS: 0.02

North

South

East

West

Point: GS0131

Survey X: 512407.47, Survey Y: 3439811.56, Z1: 58.73, Z DEM: 58.67, Z LAS: 58.69, ΔZ DEM: -0.06, ΔZ LAS: -0.05

North

South

East

West

Point: GS0143

Survey X: 483308.46, Survey Y: 3434841.9, Z1: 37.66, Z DEM: 37.65, Z LAS: 37.64, ΔZ DEM: -0.01, ΔZ LAS: -0.02

North

South

East

West

Point: GS0147

Survey X: 487861.34, Survey Y: 3445199.01, Z1: 70.67, Z DEM: 70.57, Z LAS: 70.6, ΔZ DEM: -0.1, ΔZ LAS: -0.06

North

South

East

West

Point: GS0148

Survey X: 487881.56, Survey Y: 3445176.05, Z1: 69.91, Z DEM: 69.8, Z LAS: 69.79, ΔZ DEM: -0.11, ΔZ LAS: -0.12

North

South

East

West

Point: GS0150

Survey X: 483370.74, Survey Y: 3451791.5, Z1: 87.9, Z DEM: 87.84, Z LAS: 87.83, ΔZ DEM: -0.06, ΔZ LAS: -0.07

North

South

East

West

Point: GS0154

Survey X: 486944.9, Survey Y: 3455121.82, Z1: 62, Z DEM: 61.88, Z LAS: 61.87, ΔZ DEM: -0.13, ΔZ LAS: -0.13

North

South

East

West

Point: GS0155

Survey X: 493580.26, Survey Y: 3445993.75, Z1: 59.58, Z DEM: 59.59, Z LAS: 59.6, ΔZ DEM: 0.01, ΔZ LAS: 0.02

North

South

East

West

Point: GS0157

Survey X: 493853.1, Survey Y: 3455318.32, Z1: 79.42, Z DEM: 79.44, Z LAS: 79.44, ΔZ DEM: 0.02, ΔZ LAS: 0.01

North

South

East

West

Point: GS0159

Survey X: 493818.06, Survey Y: 3455345.61, Z1: 80.39, Z DEM: 80.36, Z LAS: 80.36, ΔZ DEM: -0.02, ΔZ LAS: -0.02

North

South

East

West

Point: GS0162

Survey X: 488561.56, Survey Y: 3454129.82, Z1: 71.94, Z DEM: 71.89, Z LAS: 71.91, ΔZ DEM: -0.05, ΔZ LAS: -0.04

North

South

East

West

Point: GS0170

Survey X: 454626.39, Survey Y: 3441334.54, Z1: 86.03, Z DEM: 86.21, Z LAS: 86.21, ΔZ DEM: 0.19, ΔZ LAS: 0.18

North

South

East

West

Point: GS0171

Survey X: 454647.83, Survey Y: 3441369.46, Z1: 85.29, Z DEM: 85.37, Z LAS: 85.36, ΔZ DEM: 0.07, ΔZ LAS: 0.07

North

South

East

West

Point: GS0180

Survey X: 450412.05, Survey Y: 3437309.17, Z1: 90.02, Z DEM: 90, Z LAS: 90.01, ΔZ DEM: -0.02, ΔZ LAS: -0.01

North

South

East

West

Point: GS0190

Survey X: 462596.65, Survey Y: 3437528.15, Z1: 84.68, Z DEM: 84.68, Z LAS: 84.69, ΔZ DEM: 0, ΔZ LAS: 0.01

North

South

East

West

Point: GS0193

Survey X: 466985.34, Survey Y: 3432866.52, Z1: 80.5, Z DEM: 80.53, Z LAS: 80.53, ΔZ DEM: 0.03, ΔZ LAS: 0.03

North

South

East

West

Point: GS0194

Survey X: 466961.91, Survey Y: 3432900.63, Z1: 81.65, Z DEM: 81.66, Z LAS: 81.65, ΔZ DEM: 0.01, ΔZ LAS: 0

North

South

East

West

Point: GS0198

Survey X: 474862, Survey Y: 3430700.57, Z1: 24.62, Z DEM: 24.66, Z LAS: 24.67, ΔZ DEM: 0.04, ΔZ LAS: 0.05

North

South

East

West

Point: GS0199

Survey X: 488891.93, Survey Y: 3438309.8, Z1: 31.62, Z DEM: 31.61, Z LAS: 31.63, ΔZ DEM: -0.01, ΔZ LAS: 0.01

North

South

East

West

Point: GS0200

Survey X: 488870.57, Survey Y: 3438290.12, Z1: 31.33, Z DEM: 31.35, Z LAS: 31.31, ΔZ DEM: 0.02, ΔZ LAS: -0.02

North

South

East

West

Point: GS0042

Survey X: 614834.12, Survey Y: 3456593.02, Z1: 90.12, Z DEM: 90.07, Z LAS: 90.06, ΔZ DEM: -0.06, ΔZ LAS: -0.06

North

South

East

West

Point: GS0071

Survey X: 593933.9, Survey Y: 3441470.58, Z1: 65.68, Z DEM: 65.62, Z LAS: 65.63, ΔZ DEM: -0.06, ΔZ LAS: -0.05

North

South

East

West

Point: GS0070

Survey X: 593915.23, Survey Y: 3441511.49, Z1: 65.47, Z DEM: 65.51, Z LAS: 65.51, ΔZ DEM: 0.04, ΔZ LAS: 0.05

North

South

East

West

Point: GS0043

Survey X: 614800.99, Survey Y: 3456571.81, Z1: 89.89, Z DEM: 89.84, Z LAS: 89.83, ΔZ DEM: -0.05, ΔZ LAS: -0.06

North

South

East

West

Point: GS0002

Survey X: 620285.29, Survey Y: 3463985.38, Z1: 70.97, Z DEM: 70.92, Z LAS: 70.91, ΔZ DEM: -0.05, ΔZ LAS: -0.06

North

South

East

West

Point: GS0007

Survey X: 631878.37, Survey Y: 3476678.43, Z1: 103.4, Z DEM: 103.39, Z LAS: 103.39, ΔZ DEM: -0.01, ΔZ LAS: -0.01

North

South

East

West

Point: GS0010

Survey X: 634751.14, Survey Y: 3486158.58, Z1: 83.01, Z DEM: 83.01, Z LAS: 83.01, ΔZ DEM: 0, ΔZ LAS: -0.01

North

South

East

West

Point: GS0012

Survey X: 637755.82, Survey Y: 3492332.31, Z1: 135.82, Z DEM: 135.72, Z LAS: 135.73, ΔZ DEM: -0.1, ΔZ LAS: -0.1

North

South

East

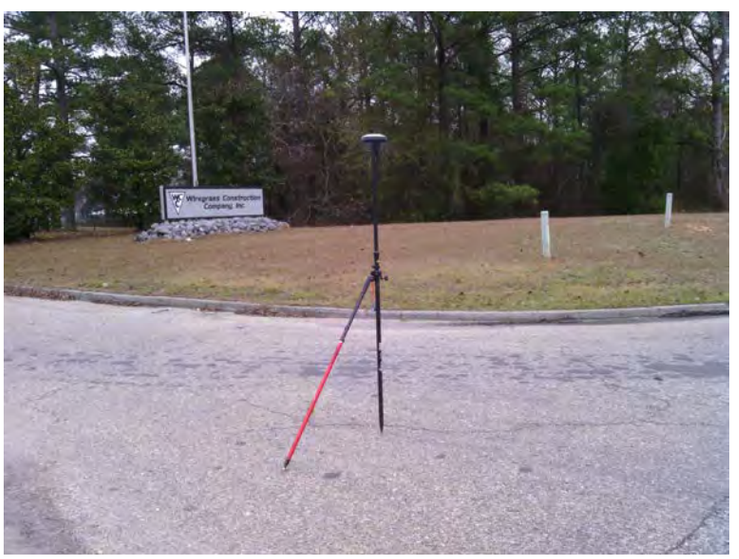
West

Point: GS0020

Survey X: 618331.13, Survey Y: 3492812.48, Z1: 149.19, Z DEM: 149.11, Z LAS: 149.13, ΔZ DEM: -0.08, ΔZ LAS: -0.07

North

South



East

West

Point: GS0022

Survey X: 615985.59, Survey Y: 3495735.9, Z1: 82.38, Z DEM: 82.33, Z LAS: 82.33, ΔZ DEM: -0.05, ΔZ LAS: -0.05

North

South

East

West

Point: GS0023

Survey X: 609118.84, Survey Y: 3496377.4, Z1: 92.72, Z DEM: 92.72, Z LAS: 92.72, ΔZ DEM: 0, ΔZ LAS: 0

North

South

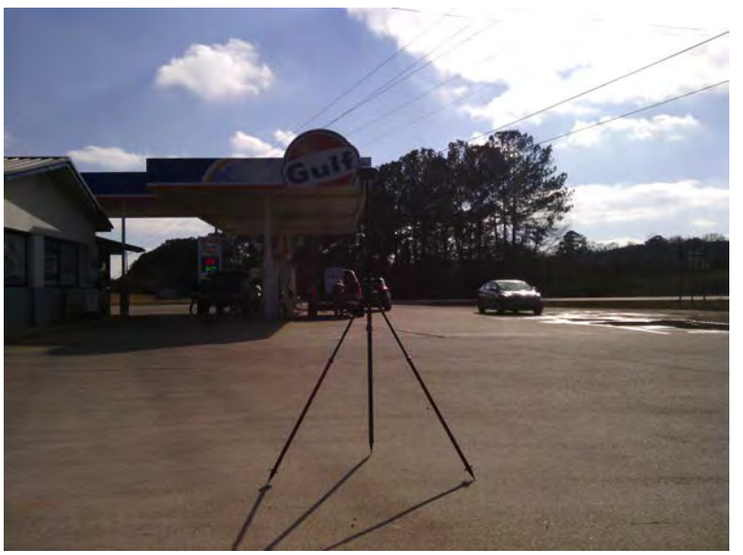
East

West

Point: GS0027

Survey X: 602673.76, Survey Y: 3490296.48, Z1: 111.76, Z DEM: 111.76, Z LAS: 111.75, ΔZ DEM: 0, ΔZ LAS: -0.01

North



South

East

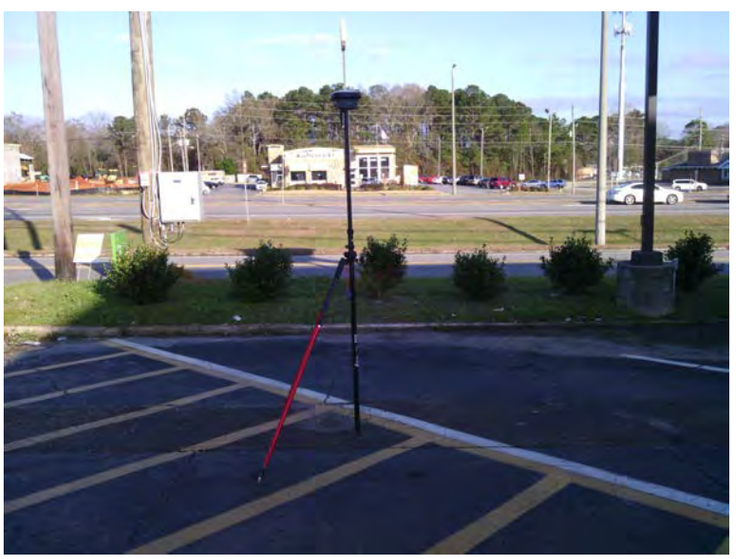
West

Point: GS0036

Survey X: 611191, Survey Y: 3465806.56, Z1: 107.86, Z DEM: 107.76, Z LAS: 107.8, ΔZ DEM: -0.1, ΔZ LAS: -0.06

North

South



East

West

Point: GS0048

Survey X: 620771.85, Survey Y: 3447573.89, Z1: 81.48, Z DEM: 81.36, Z LAS: 81.37, ΔZ DEM: -0.12, ΔZ LAS: -0.11

North

South

East

West

Point: GS0050

Survey X: 620806.41, Survey Y: 3447589.17, Z1: 82.06, Z DEM: 81.93, Z LAS: 81.93, ΔZ DEM: -0.13, ΔZ LAS: -0.14

North

South

East

West

Point: GS0051

Survey X: 623940.12, Survey Y: 3441372.25, Z1: 80.93, Z DEM: 80.97, Z LAS: 80.93, ΔZ DEM: 0.05, ΔZ LAS: 0

North

South

East

West

Point: GS0063

Survey X: 608159.25, Survey Y: 3434775.2, Z1: 33.92, Z DEM: 33.92, Z LAS: 33.92, ΔZ DEM: 0.01, ΔZ LAS: 0.01

North

South

East

West

Point: GS0076

Survey X: 585679.56, Survey Y: 3434460.32, Z1: 48.69, Z DEM: 48.71, Z LAS: 48.71, ΔZ DEM: 0.03, ΔZ LAS: 0.02

North

South

East

West

Point: GS0077

Survey X: 579572.68, Survey Y: 3437510.33, Z1: 45.76, Z DEM: 45.8, Z LAS: 45.81, ΔZ DEM: 0.04, ΔZ LAS: 0.05

North

South

East

West

Point: GS0078

Survey X: 579598.98, Survey Y: 3437497.19, Z1: 45.32, Z DEM: 45.13, Z LAS: 45.11, ΔZ DEM: -0.19, ΔZ LAS: -0.2

North

South

East

West

Point: GS0080

Survey X: 590865.26, Survey Y: 3443700.19, Z1: 60.84, Z DEM: 60.81, Z LAS: 60.83, ΔZ DEM: -0.04, ΔZ LAS: -0.02

North

South

East

West

Point: GS0085

Survey X: 606596.75, Survey Y: 3460710.33, Z1: 107.84, Z DEM: 107.79, Z LAS: 107.79, ΔZ DEM: -0.05, ΔZ LAS: -0.05

North

South

East

West

Point: GS0089

Survey X: 590961.35, Survey Y: 3456392.69, Z1: 98.66, Z DEM: 98.64, Z LAS: 98.65, ΔZ DEM: -0.02, ΔZ LAS: -0.01

North

South

East

West

Point: GS0105

Survey X: 588009.36, Survey Y: 3475921.58, Z1: 59.67, Z DEM: 59.72, Z LAS: 59.72, ΔZ DEM: 0.05, ΔZ LAS: 0.04

North

South

East

West

Point: GS0106

Survey X: 588037.3, Survey Y: 3475919.46, Z1: 59.7, Z DEM: 59.69, Z LAS: 59.69, ΔZ DEM: -0.01, ΔZ LAS: -0.01

North

South

East

West

Point: GS0107

Survey X: 589967.69, Survey Y: 3484320.96, Z1: 66.54, Z DEM: 66.49, Z LAS: 66.49, ΔZ DEM: -0.04, ΔZ LAS: -0.04

North

South

East

West

Point: GS0109

Survey X: 590011.21, Survey Y: 3484326.86, Z1: 66.19, Z DEM: 66.18, Z LAS: 66.18, ΔZ DEM: -0.02, ΔZ LAS: -0.02

North

South

East

West

Point: GS0126

Survey X: 514239.4, Survey Y: 3439888.05, Z1: 72.52, Z DEM: 72.24, Z LAS: 72.25, ΔZ DEM: -0.28, ΔZ LAS: -0.27

North

South

East

West

Point: GS0130

Survey X: 519659.57, Survey Y: 3437297.12, Z1: 70.8, Z DEM: 70.7, Z LAS: 70.68, ΔZ DEM: -0.1, ΔZ LAS: -0.12

North

South

East

West

Point: GS0138

Survey X: 500337.14, Survey Y: 3438787.71, Z1: 27.63, Z DEM: 27.67, Z LAS: 27.66, ΔZ DEM: 0.03, ΔZ LAS: 0.03

North

South

East

West

Point: GS0139

Survey X: 491082.2, Survey Y: 3439640.2, Z1: 38.82, Z DEM: 38.73, Z LAS: 38.72, ΔZ DEM: -0.09, ΔZ LAS: -0.1

North

South

East

West

Point: GS0144

Survey X: 483282.54, Survey Y: 3434862.47, Z1: 37.65, Z DEM: 37.61, Z LAS: 37.63, ΔZ DEM: -0.03, ΔZ LAS: -0.02

North

South

East

West

Point: GS0146

Survey X: 487839.64, Survey Y: 3445218.4, Z1: 71.49, Z DEM: 71.39, Z LAS: 71.39, ΔZ DEM: -0.1, ΔZ LAS: -0.1

North

South

East

West

Point: GS0152

Survey X: 486904.76, Survey Y: 3455113.88, Z1: 64.19, Z DEM: 64.17, Z LAS: 64.16, ΔZ DEM: -0.03, ΔZ LAS: -0.04

North

South

East

West

Point: GS0156

Survey X: 494718.48, Survey Y: 3451274.71, Z1: 72.43, Z DEM: 72.5, Z LAS: 72.5, ΔZ DEM: 0.07, ΔZ LAS: 0.07

North

South

East

West

Point: GS0160

Survey X: 488582.39, Survey Y: 3454120.87, Z1: 71.72, Z DEM: 71.7, Z LAS: 71.69, ΔZ DEM: -0.02, ΔZ LAS: -0.03

North

South

East

West

Point: GS0163

Survey X: 479215.61, Survey Y: 3452827.1, Z1: 50.18, Z DEM: 50.16, Z LAS: 50.18, ΔZ DEM: -0.02, ΔZ LAS: -0.01

North

South

East

West

Point: GS0176

Survey X: 446209.71, Survey Y: 3443979.04, Z1: 94.43, Z DEM: 94.43, Z LAS: 94.45, ΔZ DEM: 0, ΔZ LAS: 0.01

North

South

East

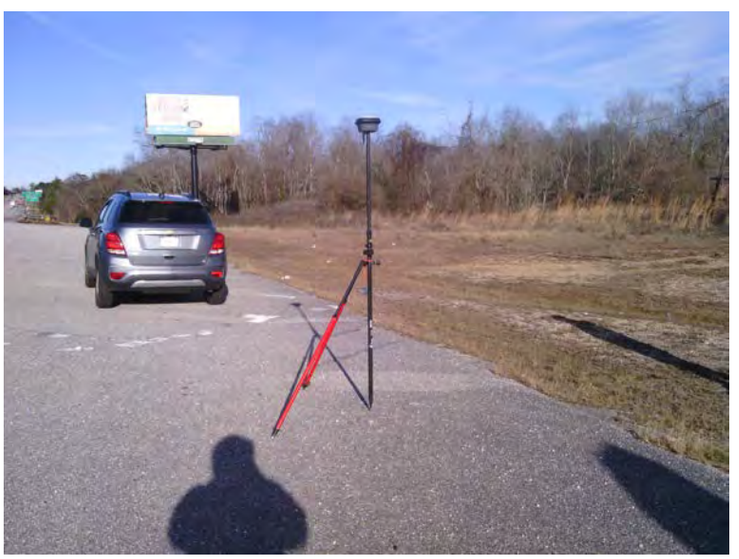
West

Point: GS0195

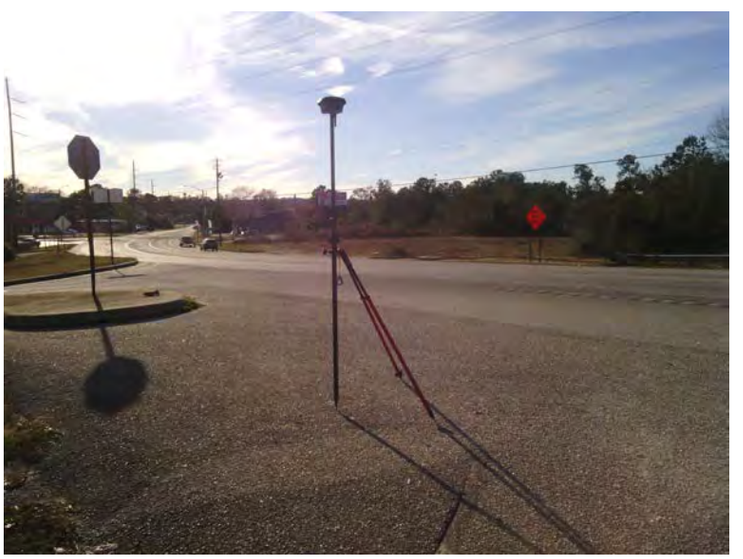
Survey X: 474833.62, Survey Y: 3430671.32, Z1: 24.6, Z DEM: 24.62, Z LAS: 24.61, ΔZ DEM: 0.02, ΔZ LAS: 0.01

North

South



East



West

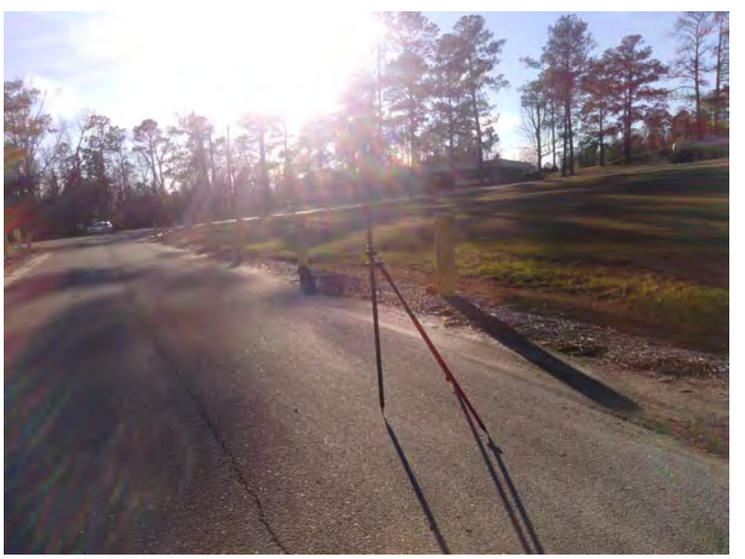
Point: GS0202

Survey X: 488836.51, Survey Y: 3438240, Z1: 30.91, Z DEM: 30.84, Z LAS: 30.85, ΔZ DEM: -0.07, ΔZ LAS: -0.06

North

South

East



West

Point: GS0005

Survey X: 631961.39, Survey Y: 3469210.69, Z1: 51.56, Z DEM: 51.59, Z LAS: 51.59, ΔZ DEM: 0.03, ΔZ LAS: 0.03

North

South

East

West

Point: GS0017

Survey X: 622925.69, Survey Y: 3487186.4, Z1: 101.13, Z DEM: 101.14, Z LAS: 101.13, ΔZ DEM: 0.01, ΔZ LAS: 0

North

South

East

West

Point: GS0035

Survey X: 611198.14, Survey Y: 3465781.65, Z1: 107.18, Z DEM: 107.19, Z LAS: 107.18, ΔZ DEM: 0.01, ΔZ LAS: 0

North

South

East

West

Point: GS0069

Survey X: 593940.63, Survey Y: 3441498.92, Z1: 66.01, Z DEM: 66.02, Z LAS: 66.02, ΔZ DEM: 0.01, ΔZ LAS: 0.01

North

South

East

West

Point: GS0093

Survey X: 589738.79, Survey Y: 3449380.99, Z1: 81.73, Z DEM: 81.88, Z LAS: 81.87, ΔZ DEM: 0.15, ΔZ LAS: 0.14

North

South

East

West

Point: GS0096

Survey X: 586196.8, Survey Y: 3460011.59, Z1: 94.22, Z DEM: 94.29, Z LAS: 94.29, ΔZ DEM: 0.06, ΔZ LAS: 0.07

North

South

East

West

Point: GS0124

Survey X: 517750.63, Survey Y: 3447594.57, Z1: 38.49, Z DEM: 38.54, Z LAS: 38.54, ΔZ DEM: 0.05, ΔZ LAS: 0.05

North

South

East

West

Point: GS0125

Survey X: 514227.72, Survey Y: 3439913.49, Z1: 71.9, Z DEM: 71.71, Z LAS: 71.72, ΔZ DEM: -0.18, ΔZ LAS: -0.18

North

South

East

West

Point: GS0153

Survey X: 486868.59, Survey Y: 3455097.79, Z1: 66.64, Z DEM: 66.65, Z LAS: 66.64, ΔZ DEM: 0, ΔZ LAS: 0

North

South

East

West

Point: GS0164

Survey X: 479239.75, Survey Y: 3452814.78, Z1: 50.04, Z DEM: 50.09, Z LAS: 50.09, ΔZ DEM: 0.05, ΔZ LAS: 0.05

North

South

East

West

Point: GS0165

Survey X: 479199.72, Survey Y: 3452830.47, Z1: 50.04, Z DEM: 50.14, Z LAS: 50.15, ΔZ DEM: 0.1, ΔZ LAS: 0.11

North

South

East

West

Point: GS0168

Survey X: 470666.65, Survey Y: 3452023.03, Z1: 104.7, Z DEM: 104.77, Z LAS: 104.78, ΔZ DEM: 0.08, ΔZ LAS: 0.08

North

South

East

West

Point: GS0169

Survey X: 470649.89, Survey Y: 3452048.85, Z1: 104.77, Z DEM: 104.85, Z LAS: 104.86, ΔZ DEM: 0.07, ΔZ LAS: 0.08

North

South

East

West

Point: GS0191

Survey X: 466946.77, Survey Y: 3432819.47, Z1: 81.31, Z DEM: 81.34, Z LAS: 81.34, ΔZ DEM: 0.04, ΔZ LAS: 0.04

North

South

East

West

Point: GS0192

Survey X: 466970.73, Survey Y: 3432842.53, Z1: 80.61, Z DEM: 80.63, Z LAS: 80.63, ΔZ DEM: 0.02, ΔZ LAS: 0.02

North

South

East

West

Point: GS0196

Survey X: 474851.53, Survey Y: 3430651.84, Z1: 24.13, Z DEM: 24.15, Z LAS: 24.17, ΔZ DEM: 0.03, ΔZ LAS: 0.04

North

South

East

West

Point: GS0197

Survey X: 474866.92, Survey Y: 3430674.11, Z1: 24.55, Z DEM: 24.64, Z LAS: 24.65, ΔZ DEM: 0.09, ΔZ LAS: 0.09

North

South

East

West

Point: GS0009

Survey X: 634783.2, Survey Y: 3486142.42, Z1: 83.01, Z DEM: 83.03, Z LAS: 83.03, ΔZ DEM: 0.02, ΔZ LAS: 0.02

North

South

East

West

Point: GS0044

Survey X: 614782.86, Survey Y: 3456525.92, Z1: 88.83, Z DEM: 88.77, Z LAS: 88.79, ΔZ DEM: -0.06, ΔZ LAS: -0.04

North

South

East

West

Point: GS0057

Survey X: 624911.72, Survey Y: 3441760.91, Z1: 76.81, Z DEM: 76.86, Z LAS: 76.84, ΔZ DEM: 0.05, ΔZ LAS: 0.03

North

South

East

West

Point: GS0065

Survey X: 608205.26, Survey Y: 3434763.88, Z1: 33.96, Z DEM: 34.07, Z LAS: 34.08, ΔZ DEM: 0.11, ΔZ LAS: 0.12

North

South

East

West

Point: GS0090

Survey X: 590928.52, Survey Y: 3456361.56, Z1: 99.93, Z DEM: 99.9, Z LAS: 99.9, ΔZ DEM: -0.03, ΔZ LAS: -0.03

North

South

East

West

Point: GS0117

Survey X: 608225.09, Survey Y: 3462470.51, Z1: 109.66, Z DEM: 109.72, Z LAS: 109.72, ΔZ DEM: 0.06, ΔZ LAS: 0.06

North

South

East

West

Point: GS0123

Survey X: 517722.56, Survey Y: 3447587.91, Z1: 39.62, Z DEM: 39.71, Z LAS: 39.71, ΔZ DEM: 0.09, ΔZ LAS: 0.09

North

South

East

West

Point: GS0127

Survey X: 514221.55, Survey Y: 3439874.38, Z1: 71.65, Z DEM: 71.64, Z LAS: 71.63, ΔZ DEM: -0.02, ΔZ LAS: -0.02

North

South

East

West

Point: GS0179

Survey X: 450392.37, Survey Y: 3437284.39, Z1: 90.15, Z DEM: 90.14, Z LAS: 90.14, ΔZ DEM: -0.01, ΔZ LAS: -0.01

North

South

East

West

Point: GS0008

Survey X: 631852.41, Survey Y: 3476706.02, Z1: 103.96, Z DEM: 104.04, Z LAS: 104.03, ΔZ DEM: 0.09, ΔZ LAS: 0.08

North

South

East

West

Point: GS0019

Survey X: 618352.39, Survey Y: 3492814.06, Z1: 149.89, Z DEM: 149.81, Z LAS: 149.82, ΔZ DEM: -0.08, ΔZ LAS: -0.07

North

South

East

West

Point: GS0024

Survey X: 609156.19, Survey Y: 3496380.52, Z1: 91.9, Z DEM: 91.89, Z LAS: 91.88, ΔZ DEM: -0.01, ΔZ LAS: -0.01

North

South

East

West

Point: GS0025

Survey X: 602723.75, Survey Y: 3490283.79, Z1: 111.43, Z DEM: 111.54, Z LAS: 111.53, ΔZ DEM: 0.1, ΔZ LAS: 0.09

North

South

East

West

Point: GS0028

Survey X: 605200.3, Survey Y: 3479052.14, Z1: 108.72, Z DEM: 108.72, Z LAS: 108.73, ΔZ DEM: 0, ΔZ LAS: 0.01

North

South

East

West

Point: GS0029

Survey X: 605193.07, Survey Y: 3479102.86, Z1: 108.92, Z DEM: 108.88, Z LAS: 108.9, ΔZ DEM: -0.05, ΔZ LAS: -0.02

North

South

East

West

Point: GS0030

Survey X: 609643.96, Survey Y: 3475565.98, Z1: 122.83, Z DEM: 122.83, Z LAS: 122.84, ΔZ DEM: 0, ΔZ LAS: 0.01

North

South

East

West

Point: GS0032

Survey X: 613701.24, Survey Y: 3475351.01, Z1: 113.26, Z DEM: 113.21, Z LAS: 113.19, ΔZ DEM: -0.05, ΔZ LAS: -0.07

North

South

East

West

Point: GS0034

Survey X: 613687.64, Survey Y: 3475393.53, Z1: 114.13, Z DEM: 114.09, Z LAS: 114.08, ΔZ DEM: -0.04, ΔZ LAS: -0.04

North

South

East

West

Point: GS0039

Survey X: 609377.86, Survey Y: 3464604.79, Z1: 106.85, Z DEM: 106.87, Z LAS: 106.87, ΔZ DEM: 0.03, ΔZ LAS: 0.03

North

South

East

West

Point: GS0045

Survey X: 614968.8, Survey Y: 3449332.59, Z1: 40.23, Z DEM: 40.19, Z LAS: 40.21, ΔZ DEM: -0.04, ΔZ LAS: -0.03

North

South

East

West

Point: GS0053

Survey X: 623903.8, Survey Y: 3441378.82, Z1: 80.24, Z DEM: 80.25, Z LAS: 80.26, ΔZ DEM: 0.01, ΔZ LAS: 0.03

North

South

East

West

Point: GS0061

Survey X: 617817.65, Survey Y: 3440270.24, Z1: 77.01, Z DEM: 76.99, Z LAS: 76.98, ΔZ DEM: -0.02, ΔZ LAS: -0.04

North

South

East

West

Point: GS0074

Survey X: 585686.91, Survey Y: 3434434.38, Z1: 48.45, Z DEM: 48.41, Z LAS: 48.37, ΔZ DEM: -0.04, ΔZ LAS: -0.07

North

South

East

West

Point: GS0084

Survey X: 606570.43, Survey Y: 3460708.28, Z1: 107.71, Z DEM: 107.7, Z LAS: 107.7, ΔZ DEM: -0.01, ΔZ LAS: -0.01

North

South

East

West

Point: GS0086

Survey X: 599602.97, Survey Y: 3458269, Z1: 64.16, Z DEM: 64.29, Z LAS: 64.25, ΔZ DEM: 0.13, ΔZ LAS: 0.09

North

South

East

West

Point: GS0098

Survey X: 581576.33, Survey Y: 3463864.26, Z1: 89.01, Z DEM: 89.04, Z LAS: 89.04, ΔZ DEM: 0.04, ΔZ LAS: 0.04

North

South

East

West

Point: GS0103

Survey X: 584710.89, Survey Y: 3470474.82, Z1: 97.86, Z DEM: 97.97, Z LAS: 97.97, ΔZ DEM: 0.12, ΔZ LAS: 0.12

North

South

East

West

Point: GS0108

Survey X: 589990.36, Survey Y: 3484307.28, Z1: 66, Z DEM: 66.04, Z LAS: 66.04, ΔZ DEM: 0.04, ΔZ LAS: 0.04

North

South

East

West

Point: GS0111

Survey X: 589208.55, Survey Y: 3490259.87, Z1: 90.95, Z DEM: 90.9, Z LAS: 90.92, ΔZ DEM: -0.04, ΔZ LAS: -0.03

North

South

East

West

Point: GS0113

Survey X: 594879.8, Survey Y: 3474348.37, Z1: 122.91, Z DEM: 122.87, Z LAS: 122.91, ΔZ DEM: -0.04, ΔZ LAS: 0

North

South

East

West

Point: GS0120

Survey X: 522892.77, Survey Y: 3447208.58, Z1: 54.95, Z DEM: 55.04, Z LAS: 55.06, ΔZ DEM: 0.09, ΔZ LAS: 0.11

North

South

East

West

Point: GS0129

Survey X: 519687.56, Survey Y: 3437296.4, Z1: 69.77, Z DEM: 69.78, Z LAS: 69.78, ΔZ DEM: 0.01, ΔZ LAS: 0.01

North

South

East

West

Point: GS0132

Survey X: 512376.41, Survey Y: 3439829.49, Z1: 60.18, Z DEM: 60.11, Z LAS: 60.12, ΔZ DEM: -0.07, ΔZ LAS: -0.06

North

South

East

West

Point: GS0133

Survey X: 506851.89, Survey Y: 3442261.49, Z1: 31.86, Z DEM: 31.88, Z LAS: 31.88, ΔZ DEM: 0.02, ΔZ LAS: 0.01

North

South

East

West

Point: GS0134

Survey X: 506823.59, Survey Y: 3442315.75, Z1: 32.36, Z DEM: 32.36, Z LAS: 32.38, ΔZ DEM: 2.95, ΔZ LAS: 0.02

North

South

East

West

Point: GS0135

Survey X: 506796.69, Survey Y: 3442310.78, Z1: 31.77, Z DEM: 31.74, Z LAS: 31.75, ΔZ DEM: -0.03, ΔZ LAS: -0.02

North

South

East

West

Point: GS0137

Survey X: 500375.21, Survey Y: 3438780.56, Z1: 27.56, Z DEM: 27.54, Z LAS: 27.54, ΔZ DEM: -0.02, ΔZ LAS: -0.02

North

South

East

West

Point: GS0140

Survey X: 491068.51, Survey Y: 3439618.48, Z1: 38.73, Z DEM: 38.64, Z LAS: 38.62, ΔZ DEM: -0.09, ΔZ LAS: -0.11

North

South

East

West

Point: GS0141

Survey X: 491078.4, Survey Y: 3439591.36, Z1: 37.84, Z DEM: 37.76, Z LAS: 37.77, ΔZ DEM: -0.08, ΔZ LAS: -0.07

North

South

East

West

Point: GS0145

Survey X: 483263, Survey Y: 3434824.41, Z1: 37.39, Z DEM: 37.5, Z LAS: 37.49, ΔZ DEM: 0.11, ΔZ LAS: 0.1

North

South

East

West

Point: GS0151

Survey X: 483333.85, Survey Y: 3451796.88, Z1: 87.15, Z DEM: 87.07, Z LAS: 87.1, ΔZ DEM: -0.08, ΔZ LAS: -0.05

North

South

East

West

Point: GS0161

Survey X: 488609.43, Survey Y: 3454132.49, Z1: 71.37, Z DEM: 71.27, Z LAS: 71.28, ΔZ DEM: -0.1, ΔZ LAS: -0.09

North

South

East

West

Point: GS0166

Survey X: 479221.53, Survey Y: 3452863.05, Z1: 50.13, Z DEM: 50.36, Z LAS: 50.35, ΔZ DEM: 0.23, ΔZ LAS: 0.21

North

South

East

West

Point: GS0172

Survey X: 454607.3, Survey Y: 3441332.5, Z1: 86.47, Z DEM: 86.51, Z LAS: 86.51, ΔZ DEM: 0.04, ΔZ LAS: 0.04

North

South

East

West

Point: GS0174

Survey X: 449787.65, Survey Y: 3450230.35, Z1: 92.84, Z DEM: 92.88, Z LAS: 92.87, ΔZ DEM: 0.04, ΔZ LAS: 0.03

North

South

East

West

Point: GS0175

Survey X: 446245.69, Survey Y: 3443961.77, Z1: 94.07, Z DEM: 94.04, Z LAS: 94.04, ΔZ DEM: -0.03, ΔZ LAS: -0.03

North

South

East

West

Point: GS0178

Survey X: 450329.88, Survey Y: 3437271.34, Z1: 90.32, Z DEM: 90.36, Z LAS: 90.35, ΔZ DEM: 0.04, ΔZ LAS: 0.03

North

South

East

West

Point: GS0182

Survey X: 448427.93, Survey Y: 3431949.63, Z1: 75.94, Z DEM: 75.83, Z LAS: 75.84, ΔZ DEM: -0.11, ΔZ LAS: -0.1

North

South

East

West

Point: GS0183

Survey X: 448400.53, Survey Y: 3431959.22, Z1: 76.65, Z DEM: 76.69, Z LAS: 76.7, ΔZ DEM: 0.04, ΔZ LAS: 0.05

North

South

East

West

Point: GS0184

Survey X: 457841.35, Survey Y: 3432354.94, Z1: 88.24, Z DEM: 88.3, Z LAS: 88.29, ΔZ DEM: 0.06, ΔZ LAS: 0.05

North

South

East

West

Point: GS0185

Survey X: 457787.55, Survey Y: 3432341.62, Z1: 88.31, Z DEM: 88.42, Z LAS: 88.41, ΔZ DEM: 0.11, ΔZ LAS: 0.1

North

South

East

West

Point: GS0186

Survey X: 457775.17, Survey Y: 3432368.03, Z1: 88.27, Z DEM: 88.36, Z LAS: 88.36, ΔZ DEM: 0.09, ΔZ LAS: 0.08

North

South

East

West

Point: GS0187

Survey X: 457743.63, Survey Y: 3432366.33, Z1: 88.29, Z DEM: 88.35, Z LAS: 88.36, ΔZ DEM: 0.06, ΔZ LAS: 0.06

North

South

East

West

Point: GS0189

Survey X: 462638.6, Survey Y: 3437552.51, Z1: 84.11, Z DEM: 84.11, Z LAS: 84.1, ΔZ DEM: 0, ΔZ LAS: -0.01

North

South

East

West

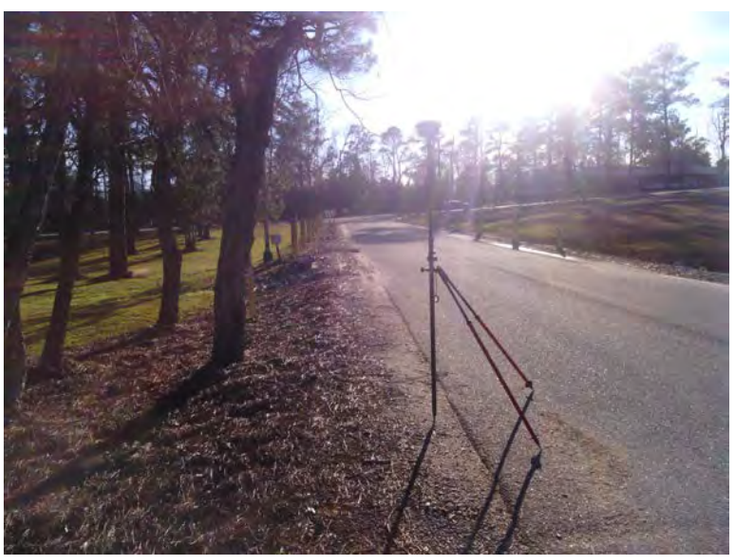
Point: GS0201

Survey X: 488859.49, Survey Y: 3438258.18, Z1: 30.89, Z DEM: 30.89, Z LAS: 30.9, ΔZ DEM: 0, ΔZ LAS: 0.01

North

South

East



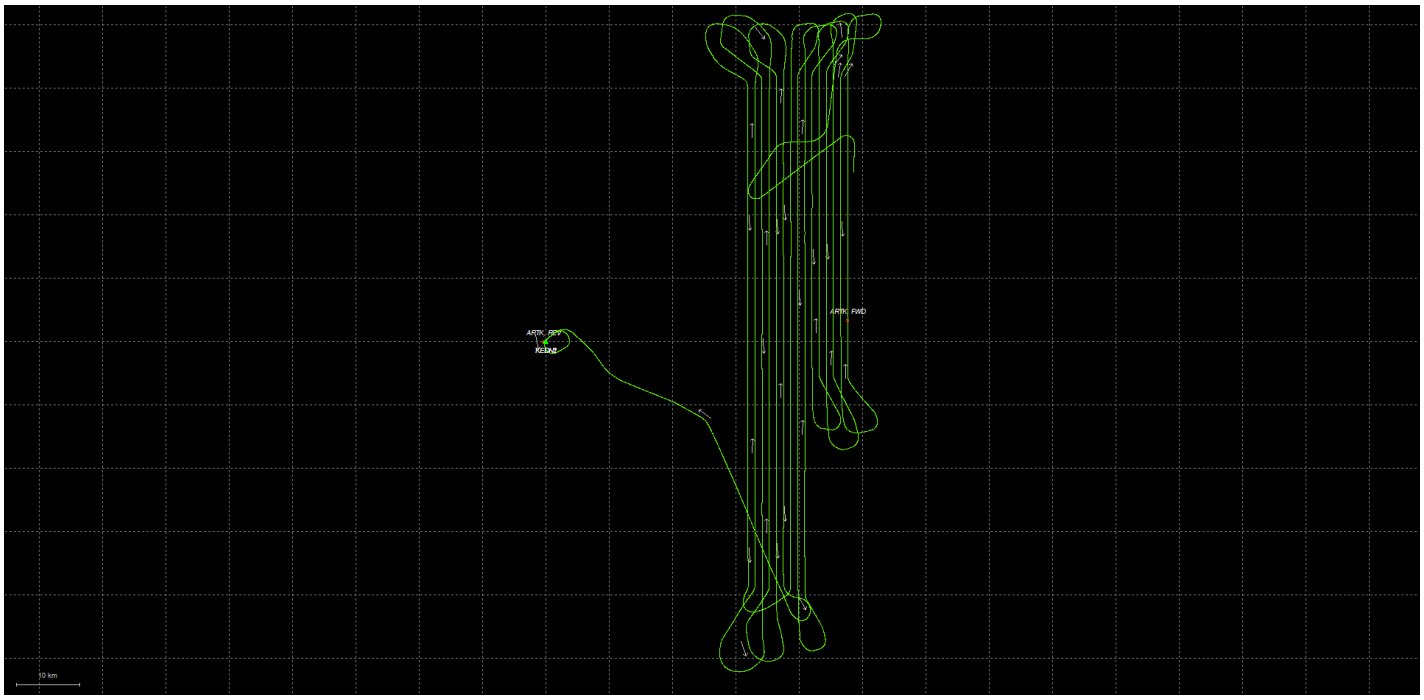
West

Appendix D. Inertial Explorer

Output Results for 20220113172108_1

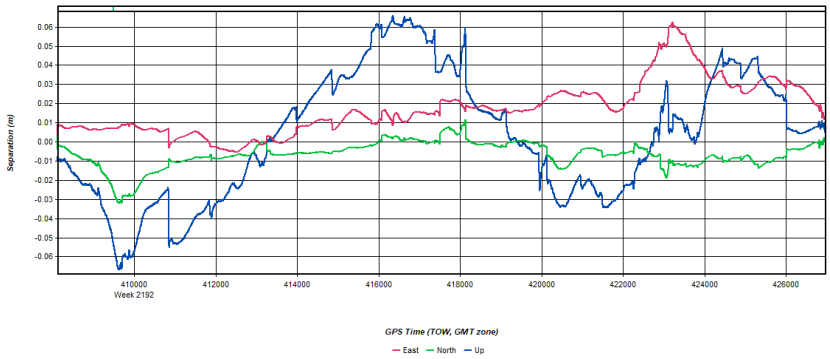
Inertial Explorer Version 8.90.2124
01/17/2022

Figure 1: Smoothed TC Combined - Map



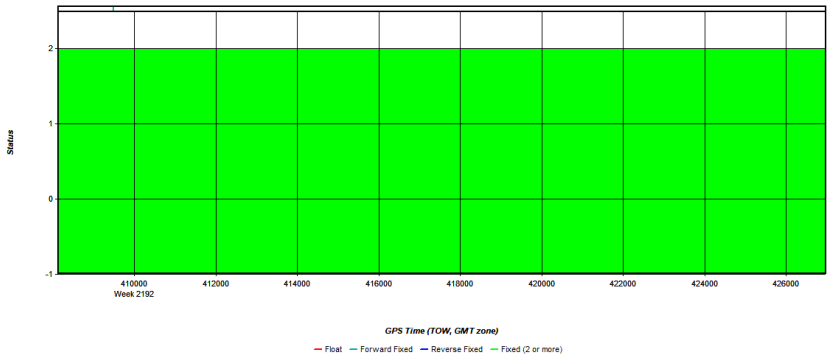
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 2: 20220113172108_1 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot



Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 3: 20220113172108_1 [Smoothed TC Combined] - Float or Fixed Ambiguity

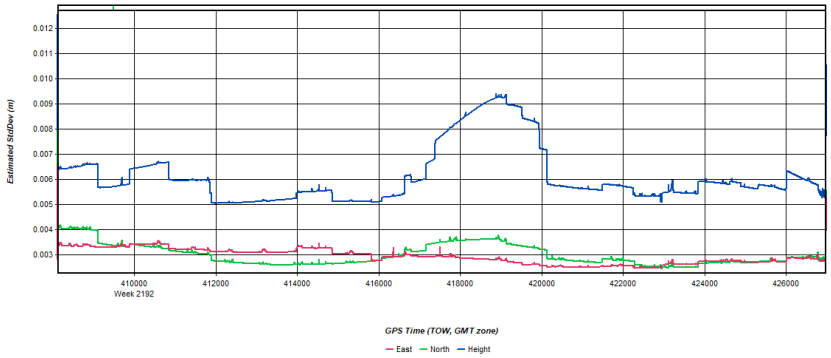


Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 4: 20220113172108_1 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)

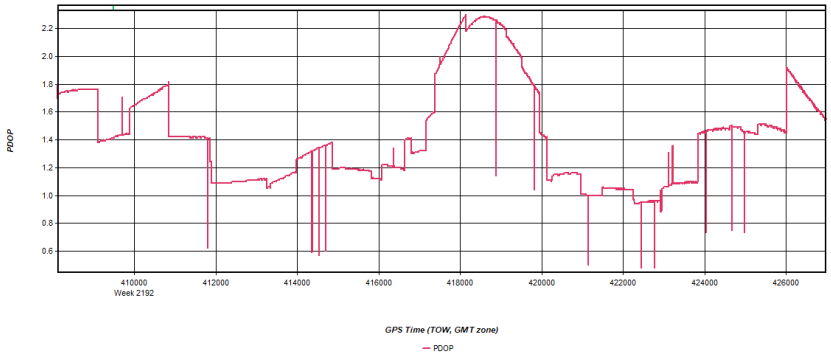
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 5: 20220113172108_1 [Smoothed TC Combined] - Estimated Position Accuracy Plot



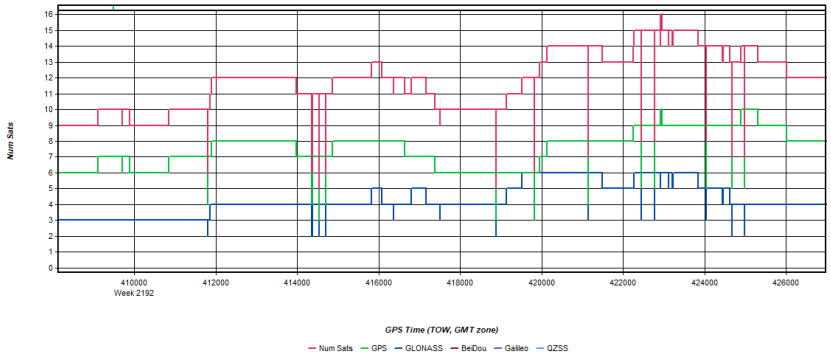
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 6: 20220113172108_1 [Smoothed TC Combined] - PDOP Plot



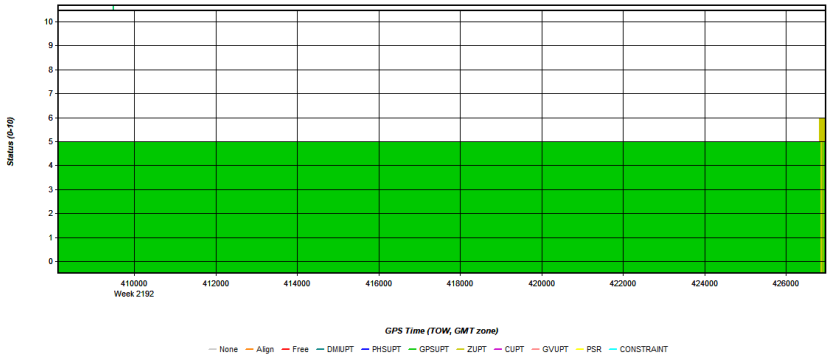
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 7: 20220113172108_1 [Smoothed TC Combined] - Number of Satellites Line Plot



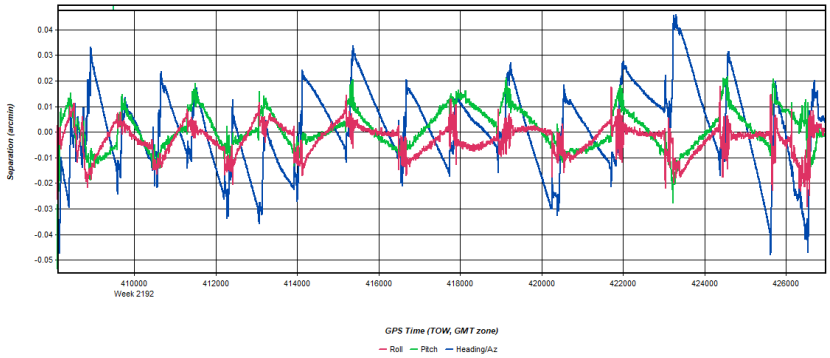
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 8: 20220113172108_1 [Smoothed TC Combined] - Status flag for IMU processing



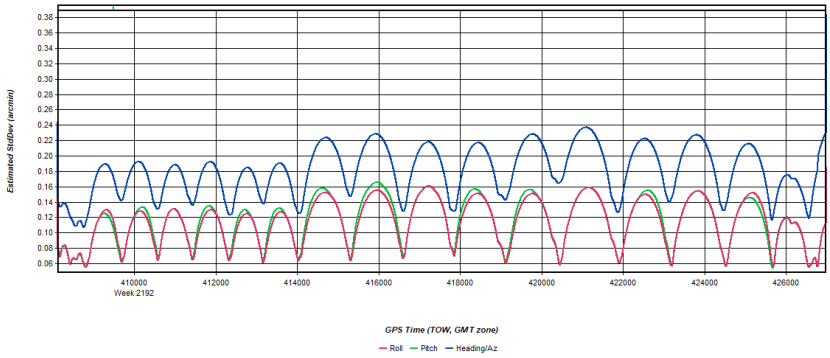
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 9: 20220113172108_1 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



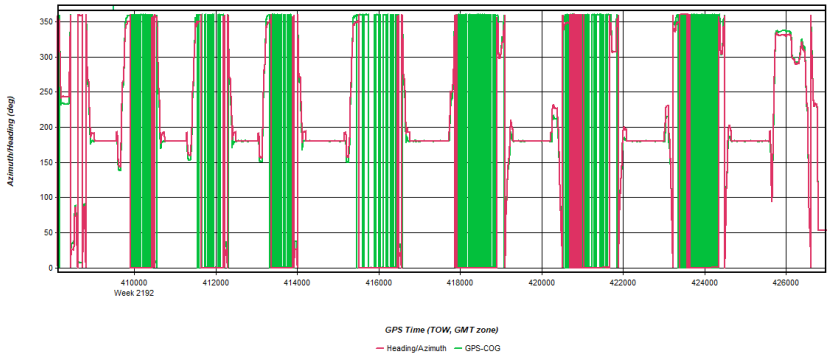
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 10: 20220113172108_1 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



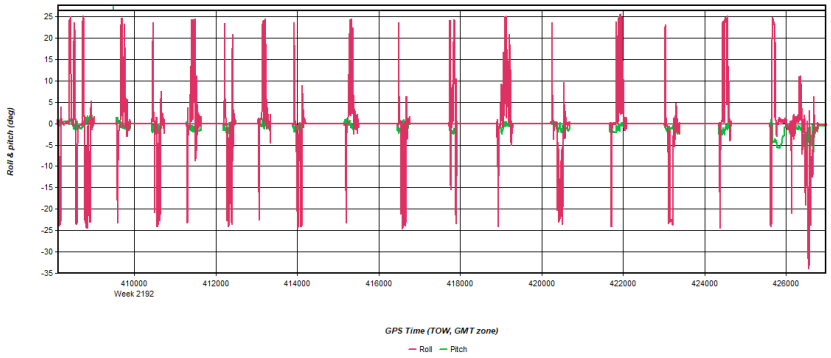
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 11: 20220113172108_1 [Smoothed TC Combined] - Azimuth Plot



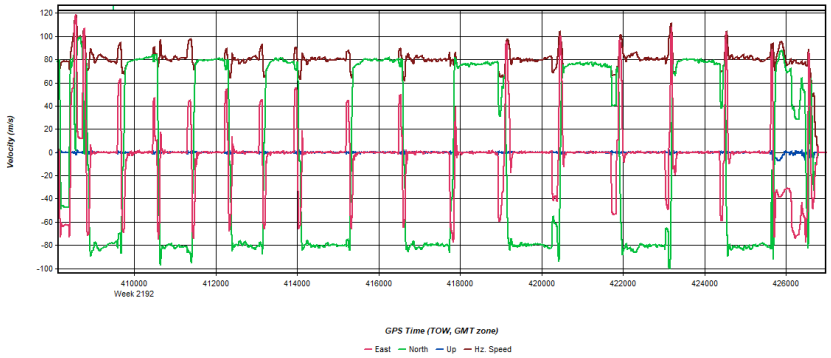
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 12: 20220113172108_1 [Smoothed TC Combined] - Roll & Pitch Plot



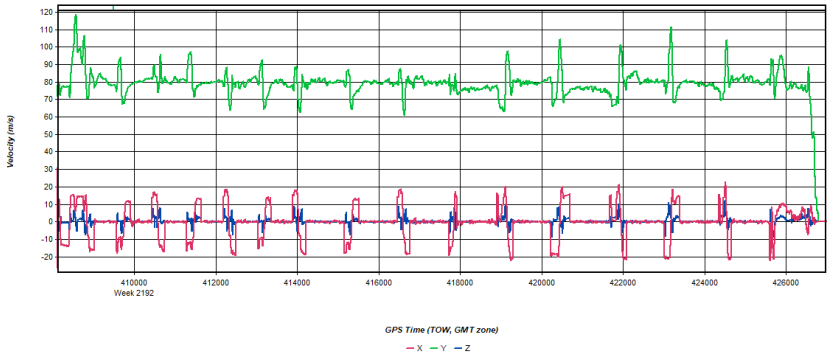
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 13: 20220113172108_1 [Smoothed TC Combined] - Velocity Profile Plot



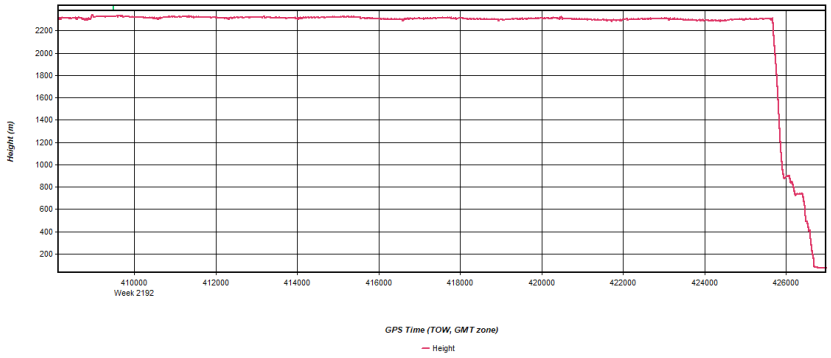
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 14: 20220113172108_1 [Smoothed TC Combined] - Body Frame Velocity Plot



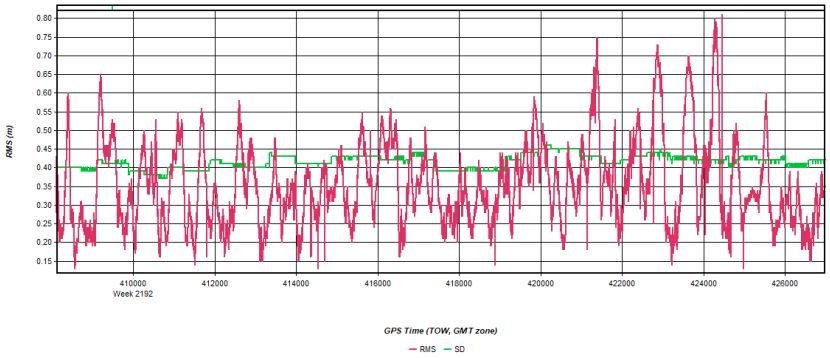
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 15: 20220113172108_1 [Smoothed TC Combined] - Height Profile Plot



Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 16: 20220113172108_1 [Smoothed TC Combined] - C/A Code Residual RMS Plot



Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

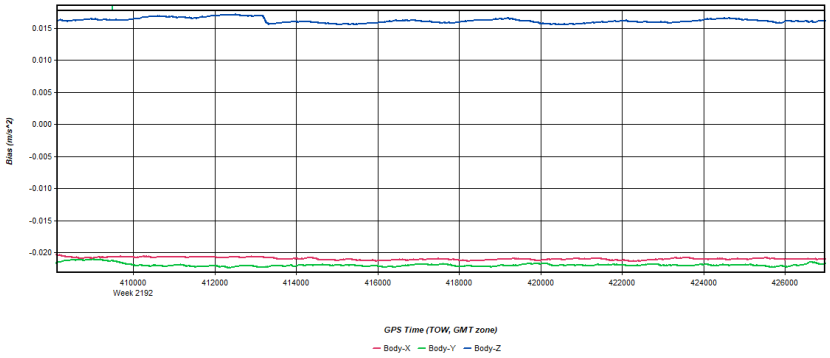
Figure 17: 20220113172108_1 [Smoothed TC Combined] - Carrier Residual RMS Plot

Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 18: 20220113172108_1 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot

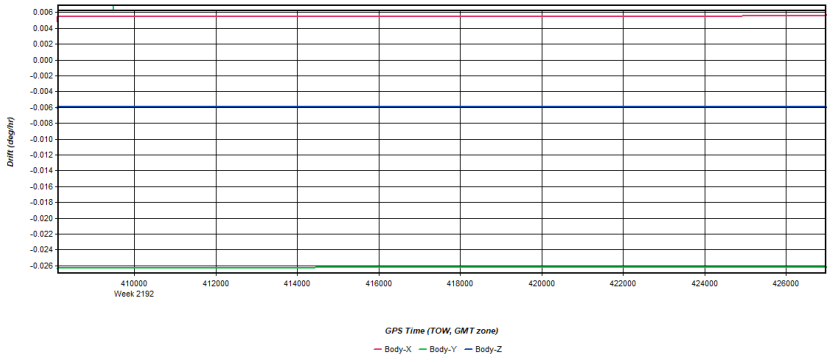
Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 19: 20220113172108_1 [Smoothed TC Combined] - Accelerometer Bias Plot



Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Figure 20: 20220113172108_1 [Smoothed TC Combined] - Gyro Drift Plot

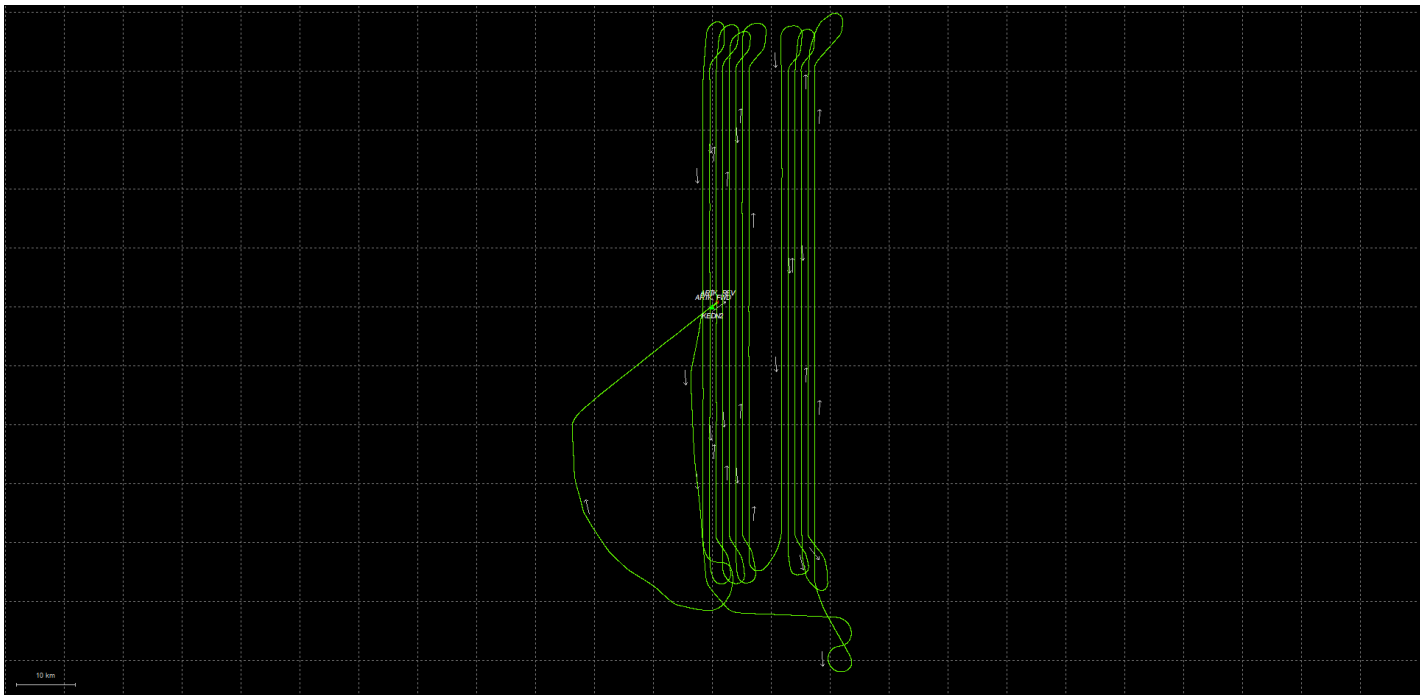


Process	20220113172108_1	by Unknown	on 1/17/2022	at 18:34:39

Output Results for 20220114144638_2

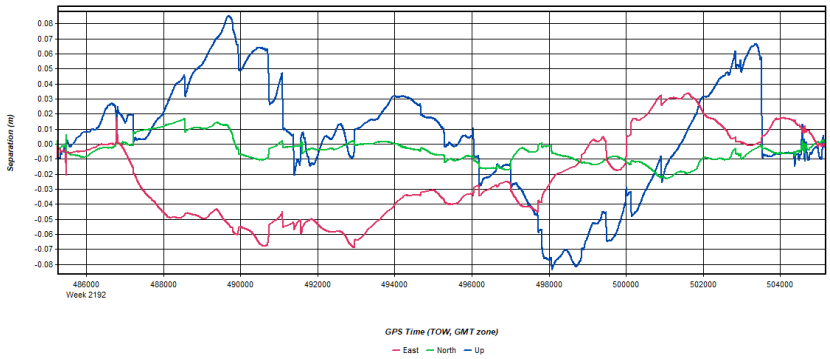
Inertial Explorer Version 8.90.2124
01/17/2022

Figure 1: Smoothed TC Combined - Map



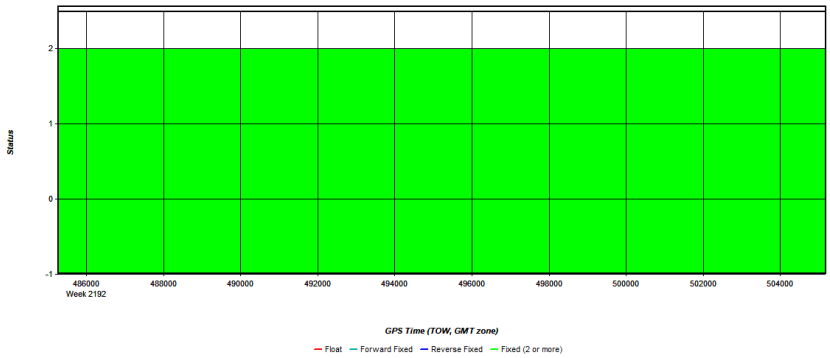
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 2: 20220114144638_2 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot



Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 3: 20220114144638_2 [Smoothed TC Combined] - Float or Fixed Ambiguity

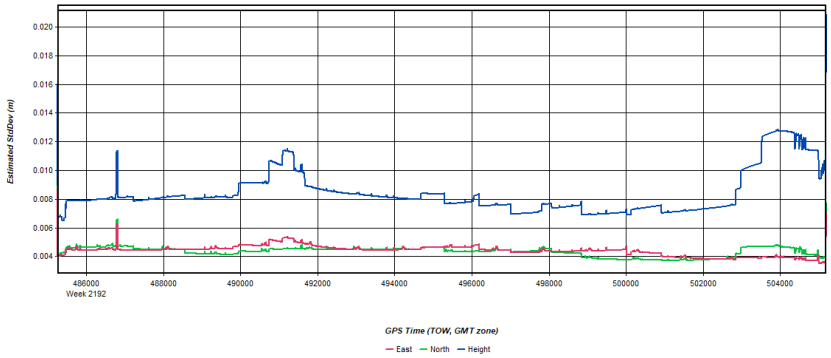


Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 4: 20220114144638_2 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)

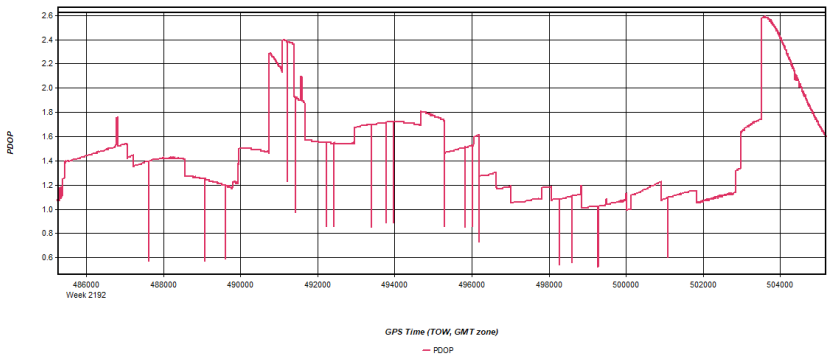
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 5: 20220114144638_2 [Smoothed TC Combined] - Estimated Position Accuracy Plot



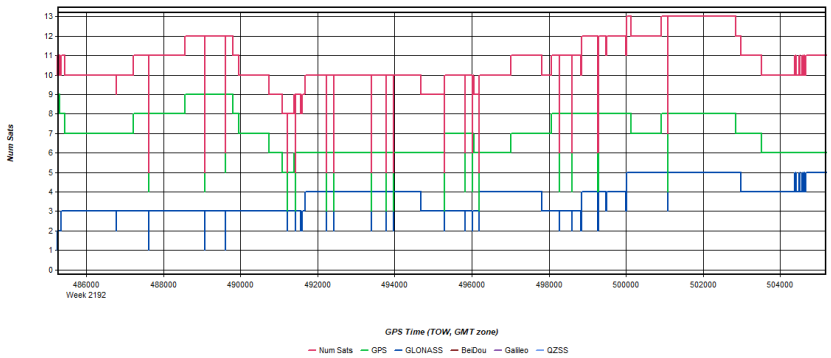
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 6: 20220114144638_2 [Smoothed TC Combined] - PDOP Plot



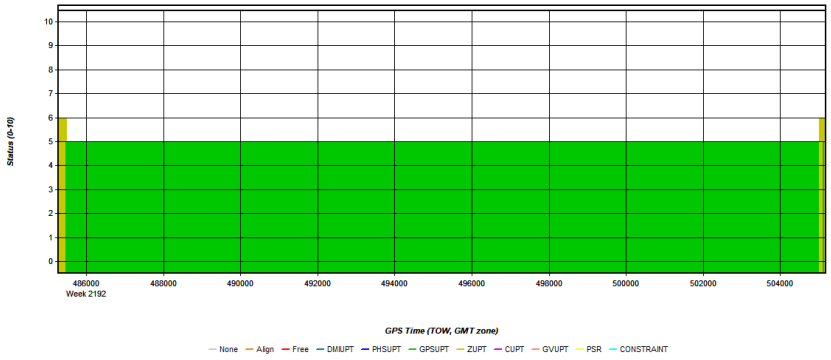
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 7: 20220114144638_2 [Smoothed TC Combined] - Number of Satellites Line Plot



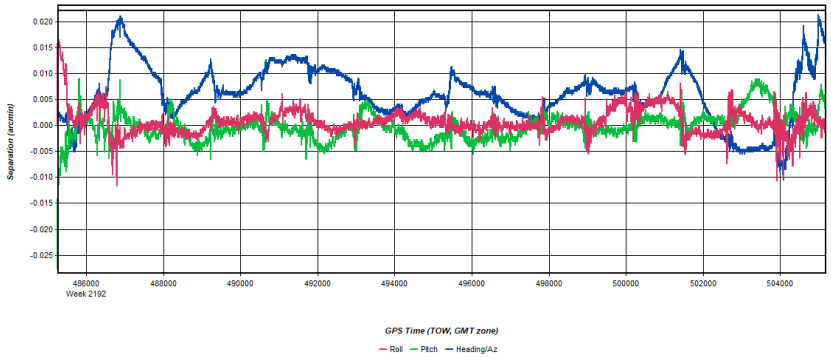
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 8: 20220114144638_2 [Smoothed TC Combined] - Status flag for IMU processing



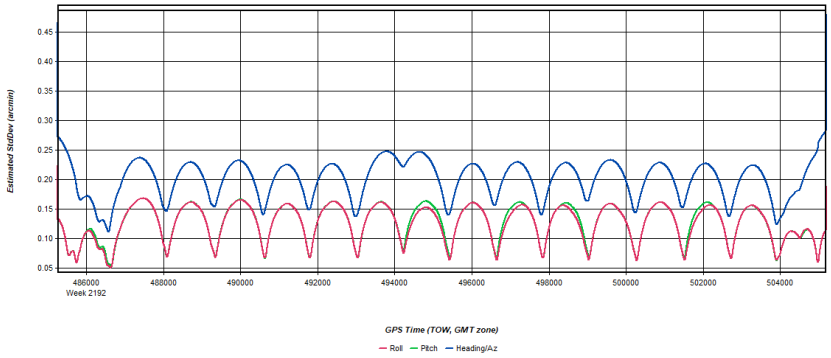
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 9: 20220114144638_2 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



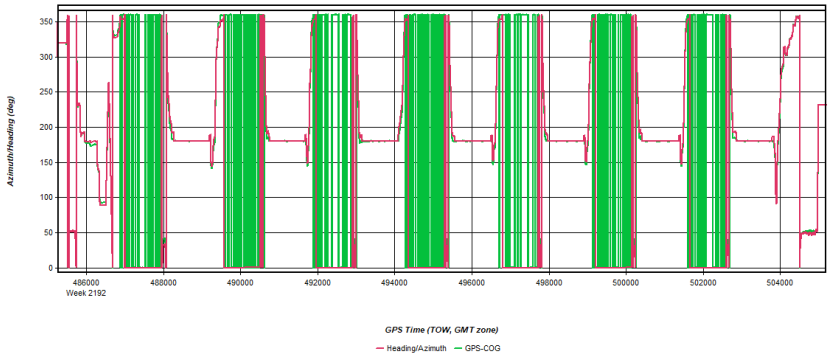
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 10: 20220114144638_2 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



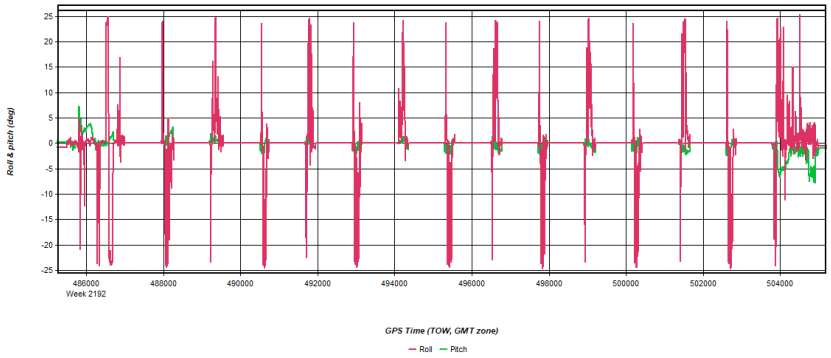
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 11: 20220114144638_2 [Smoothed TC Combined] - Azimuth Plot



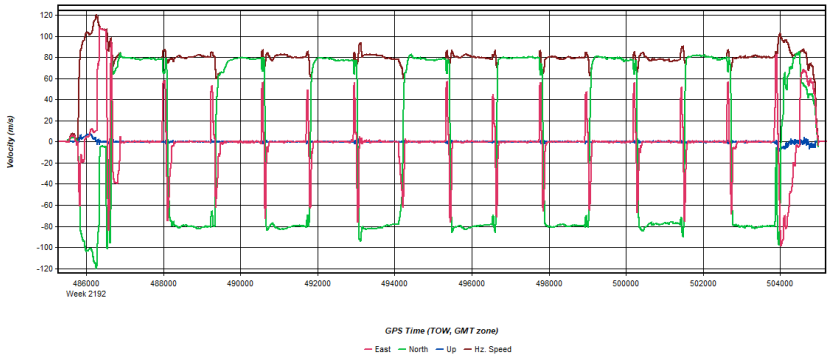
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 12: 20220114144638_2 [Smoothed TC Combined] - Roll & Pitch Plot



Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 13: 20220114144638_2 [Smoothed TC Combined] - Velocity Profile Plot

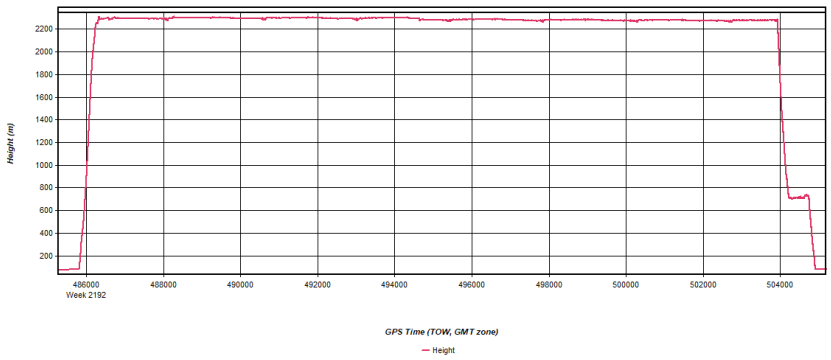


Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 14: 20220114144638_2 [Smoothed TC Combined] - Body Frame Velocity Plot

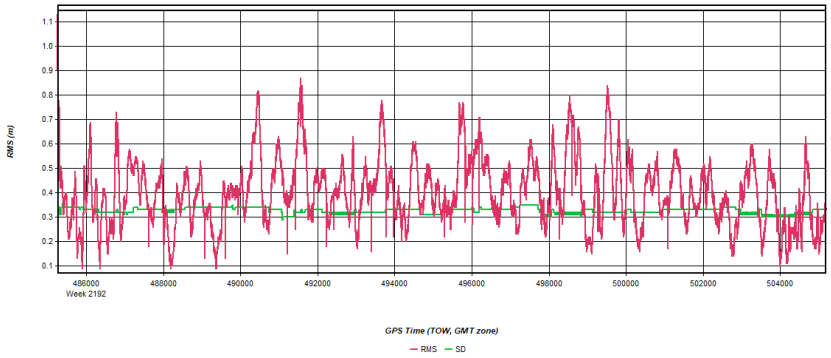
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 15: 20220114144638_2 [Smoothed TC Combined] - Height Profile Plot



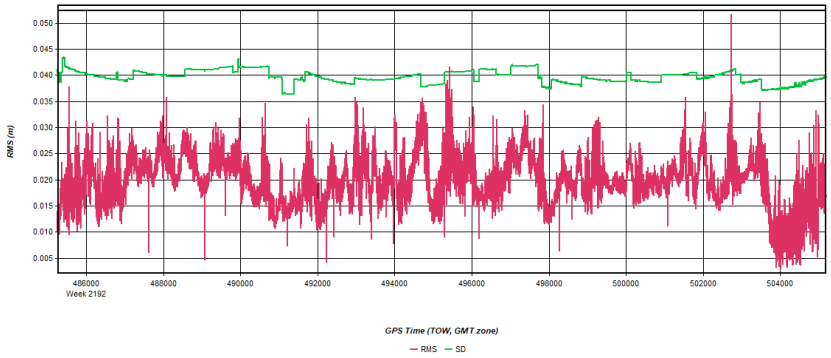
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 16: 20220114144638_2 [Smoothed TC Combined] - C/A Code Residual RMS Plot



Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 17: 20220114144638_2 [Smoothed TC Combined] - Carrier Residual RMS Plot

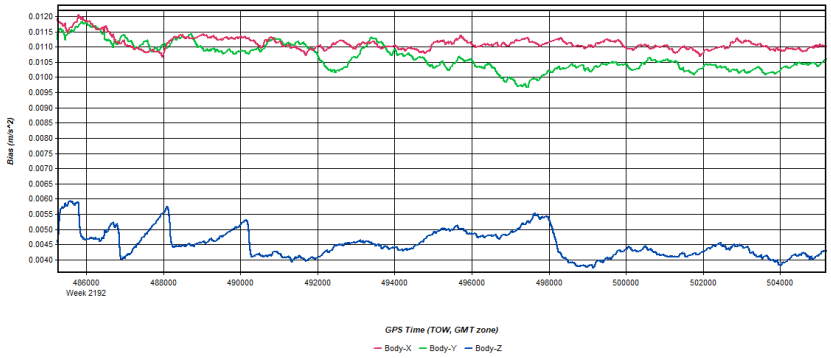


Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 18: 20220114144638_2 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot

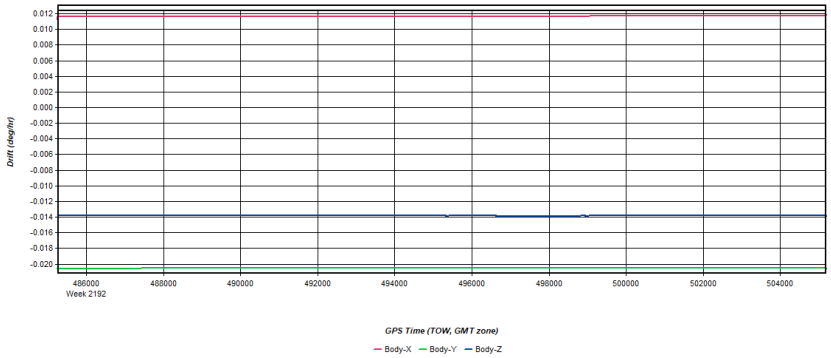
Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 19: 20220114144638_2 [Smoothed TC Combined] - Accelerometer Bias Plot



Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Figure 20: 20220114144638_2 [Smoothed TC Combined] - Gyro Drift Plot

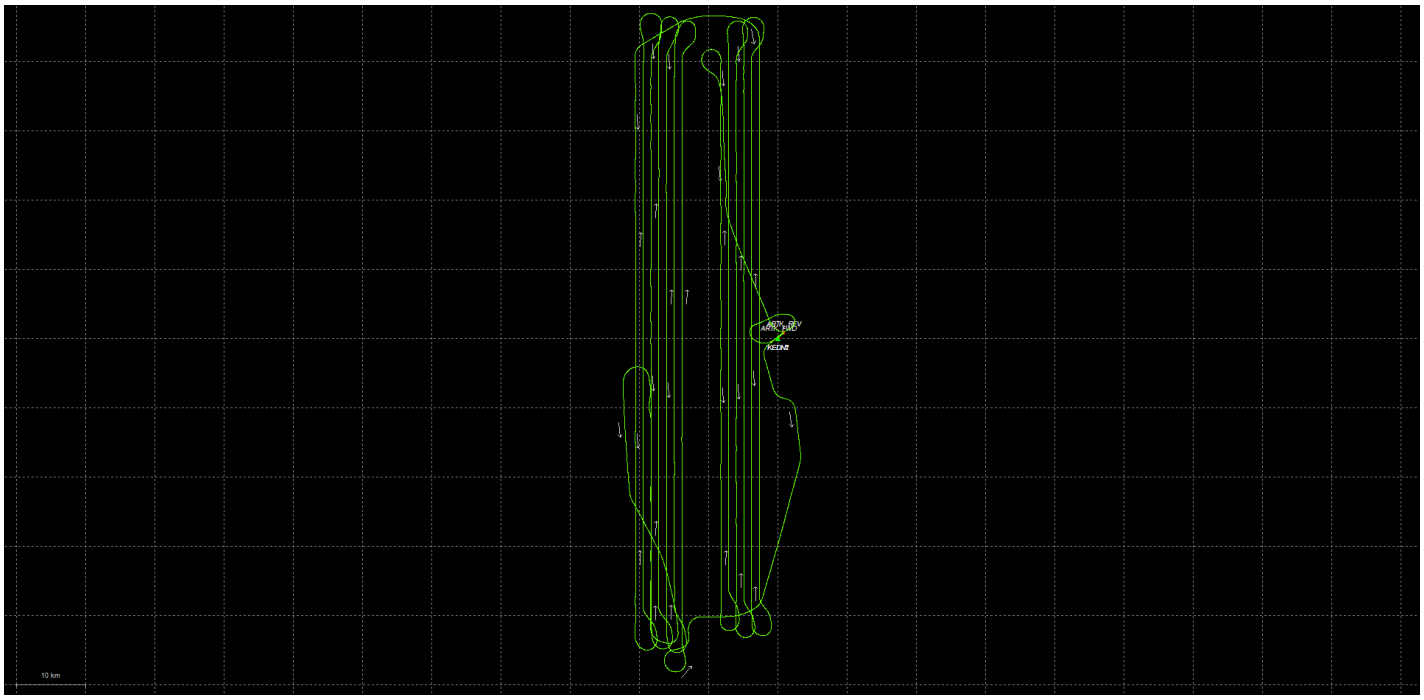


Process	20220114144638_2	by Unknown	on 1/17/2022	at 10:52:47

Output Results for 20220114210050_3

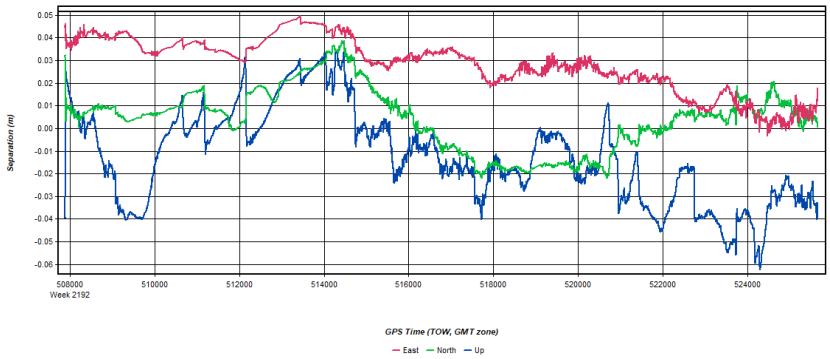
Inertial Explorer Version 8.90.2124
01/17/2022

Figure 1: Smoothed TC Combined - Map



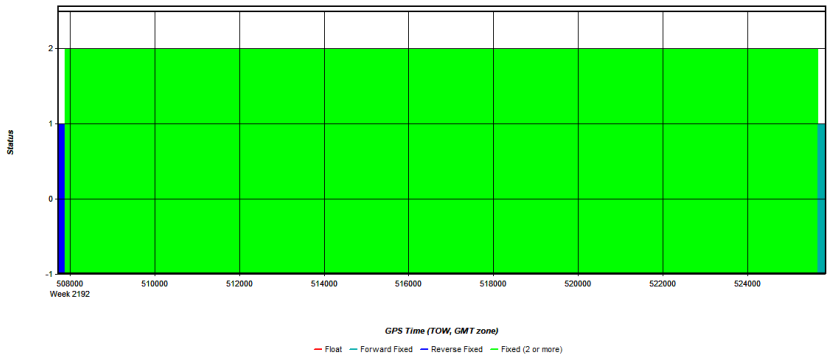
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 2: 20220114210050_3 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot



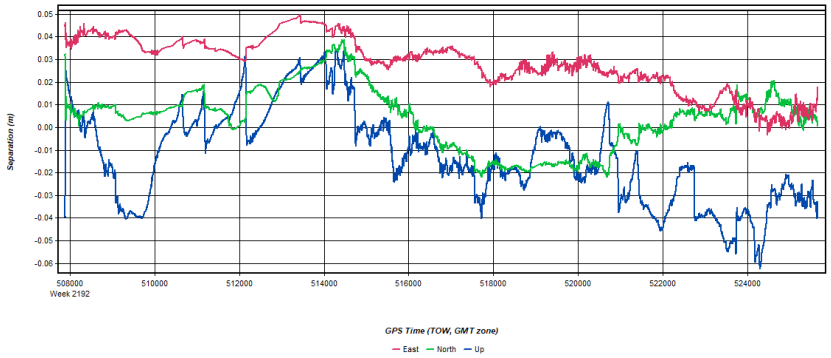
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 3: 20220114210050_3 [Smoothed TC Combined] - Float or Fixed Ambiguity



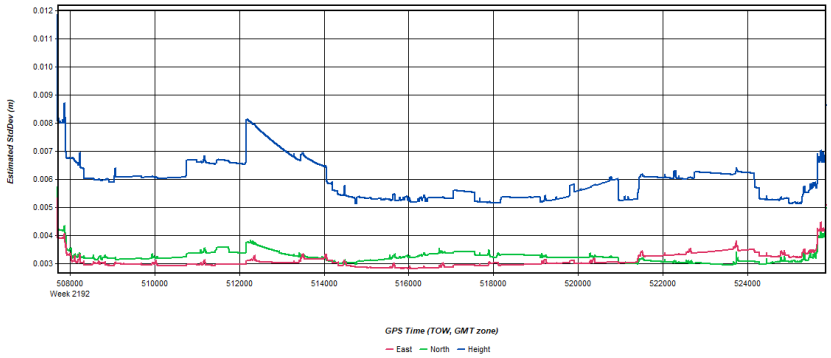
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 4: 20220114210050_3 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)



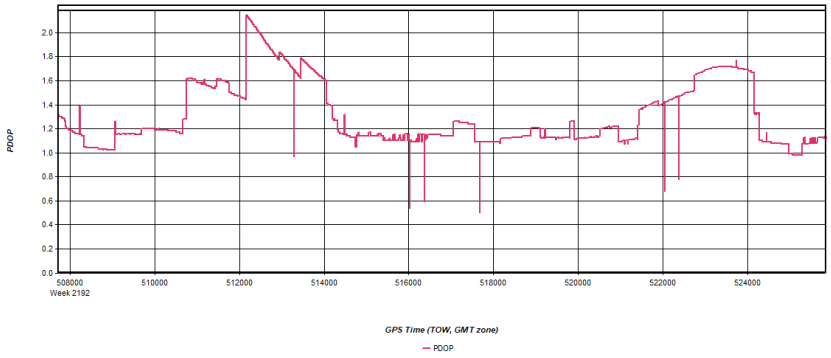
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 5: 20220114210050_3 [Smoothed TC Combined] - Estimated Position Accuracy Plot



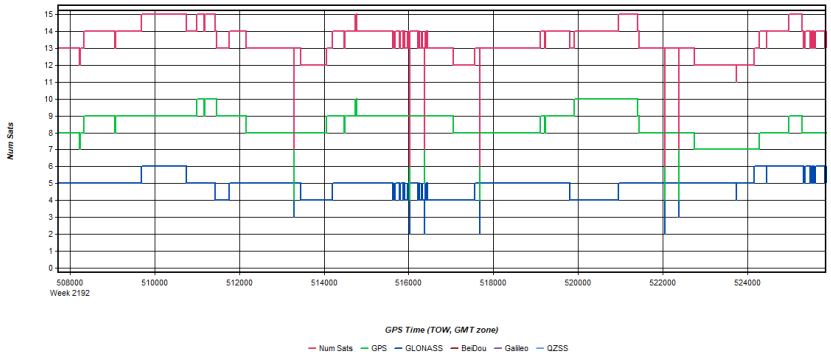
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 6: 20220114210050_3 [Smoothed TC Combined] - PDOP Plot



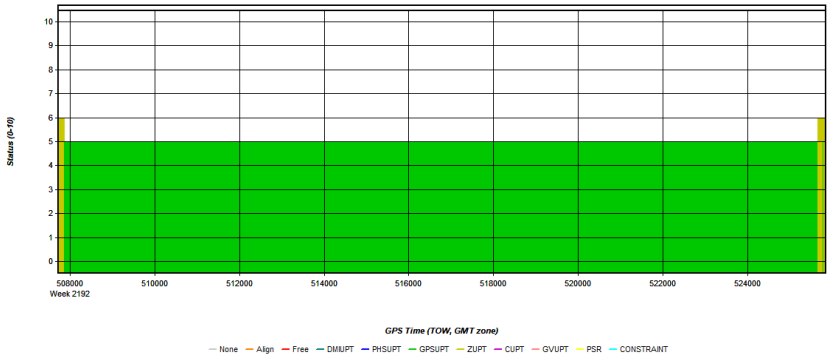
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 7: 20220114210050_3 [Smoothed TC Combined] - Number of Satellites Line Plot



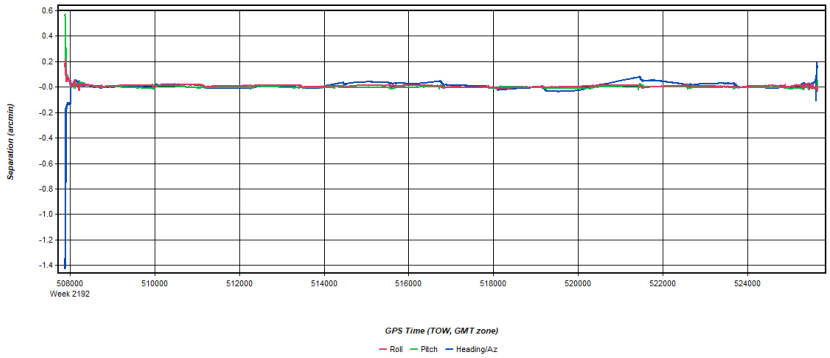
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 8: 20220114210050_3 [Smoothed TC Combined] - Status flag for IMU processing



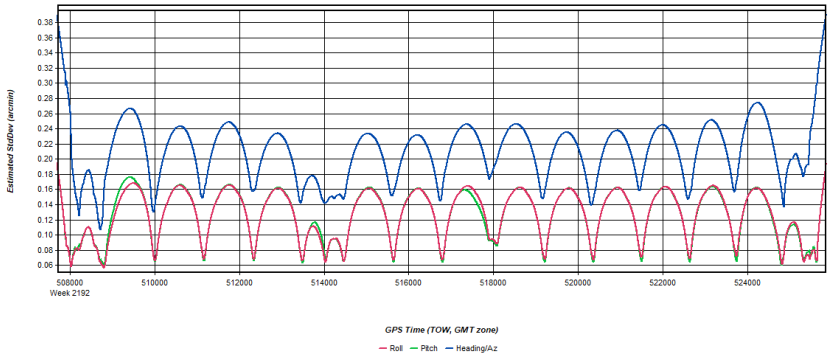
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 9: 20220114210050_3 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



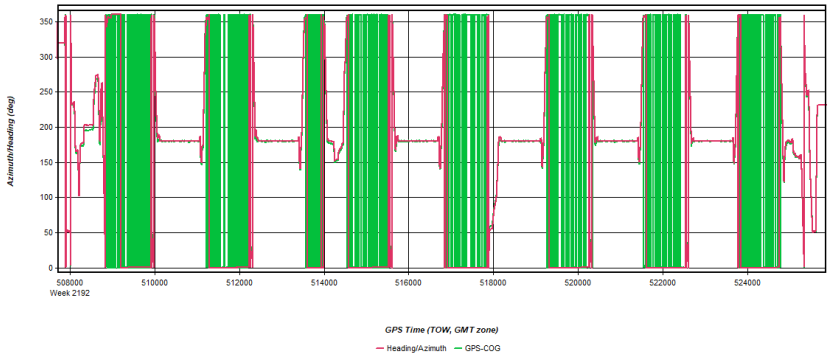
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 10: 20220114210050_3 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



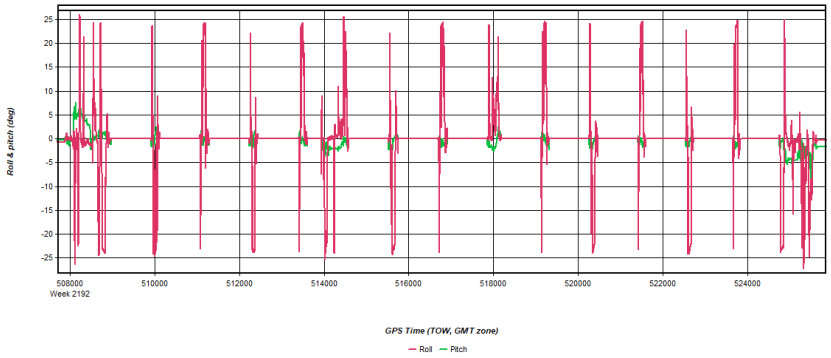
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 11: 20220114210050_3 [Smoothed TC Combined] - Azimuth Plot



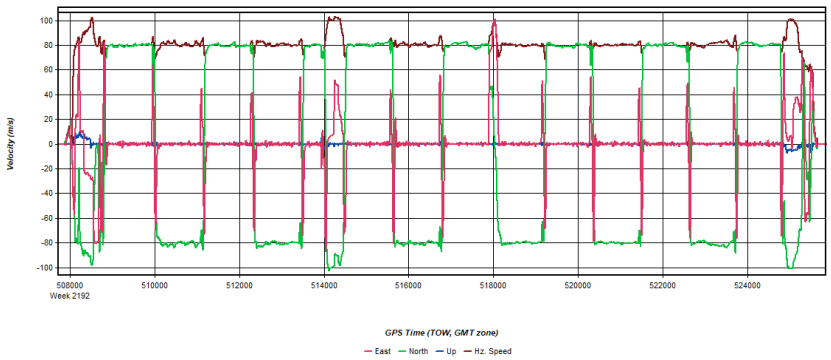
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 12: 20220114210050_3 [Smoothed TC Combined] - Roll & Pitch Plot



Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 13: 20220114210050_3 [Smoothed TC Combined] - Velocity Profile Plot

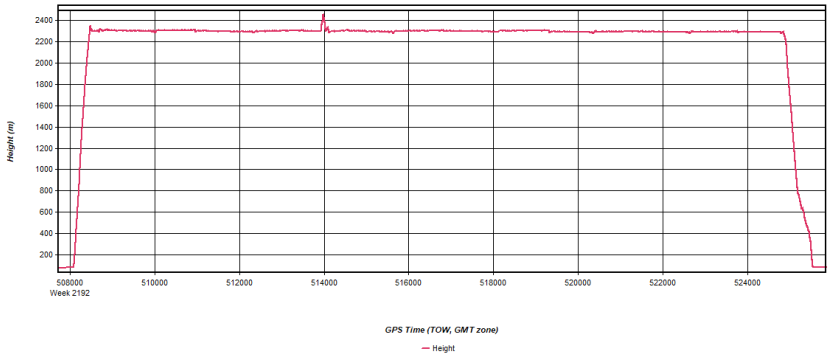


Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 14: 20220114210050_3 [Smoothed TC Combined] - Body Frame Velocity Plot

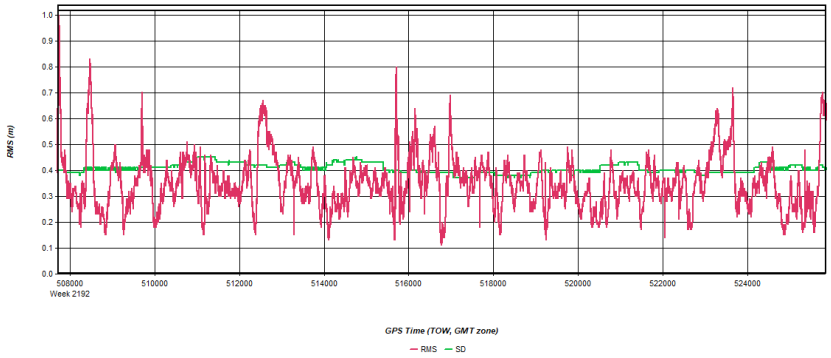
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 15: 20220114210050_3 [Smoothed TC Combined] - Height Profile Plot



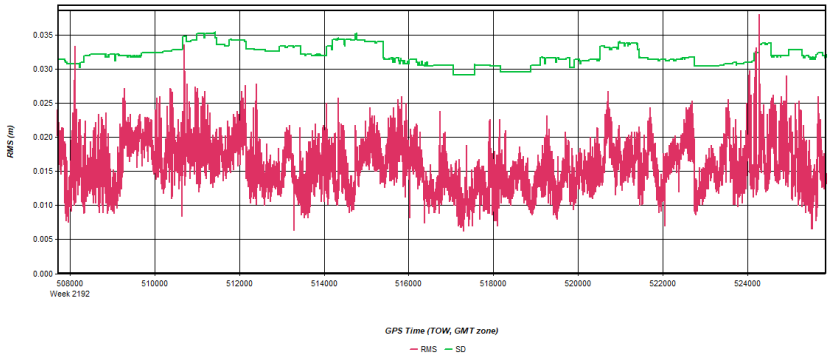
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 16: 20220114210050_3 [Smoothed TC Combined] - C/A Code Residual RMS Plot



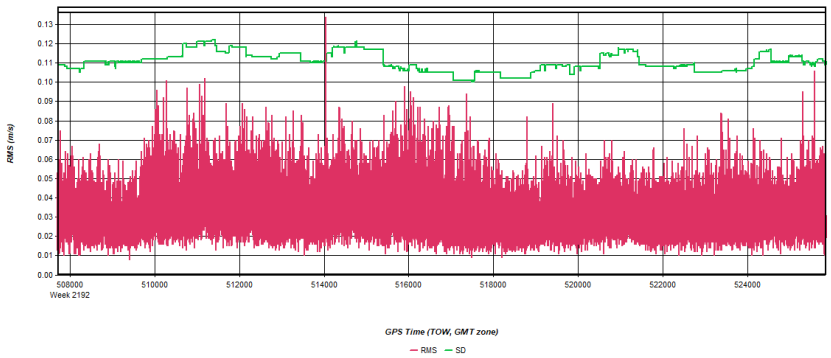
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 17: 20220114210050_3 [Smoothed TC Combined] - Carrier Residual RMS Plot



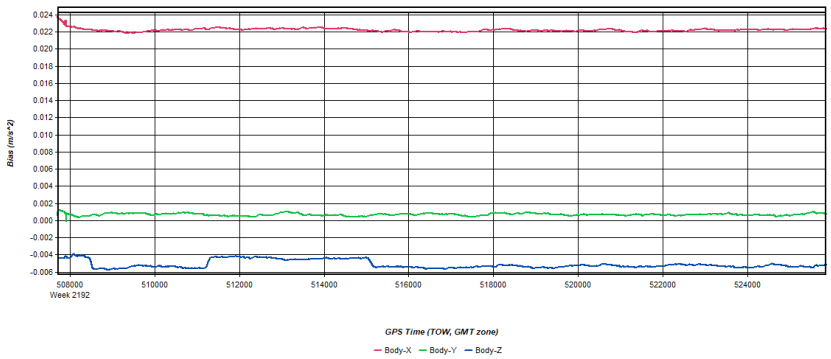
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 18: 20220114210050_3 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot



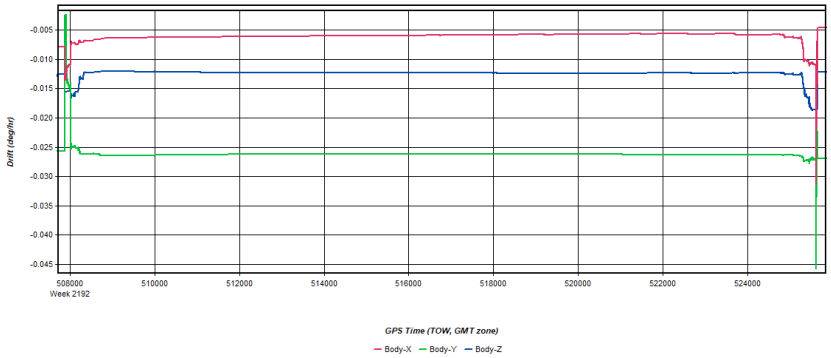
Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 19: 20220114210050_3 [Smoothed TC Combined] - Accelerometer Bias Plot



Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Figure 20: 20220114210050_3 [Smoothed TC Combined] - Gyro Drift Plot

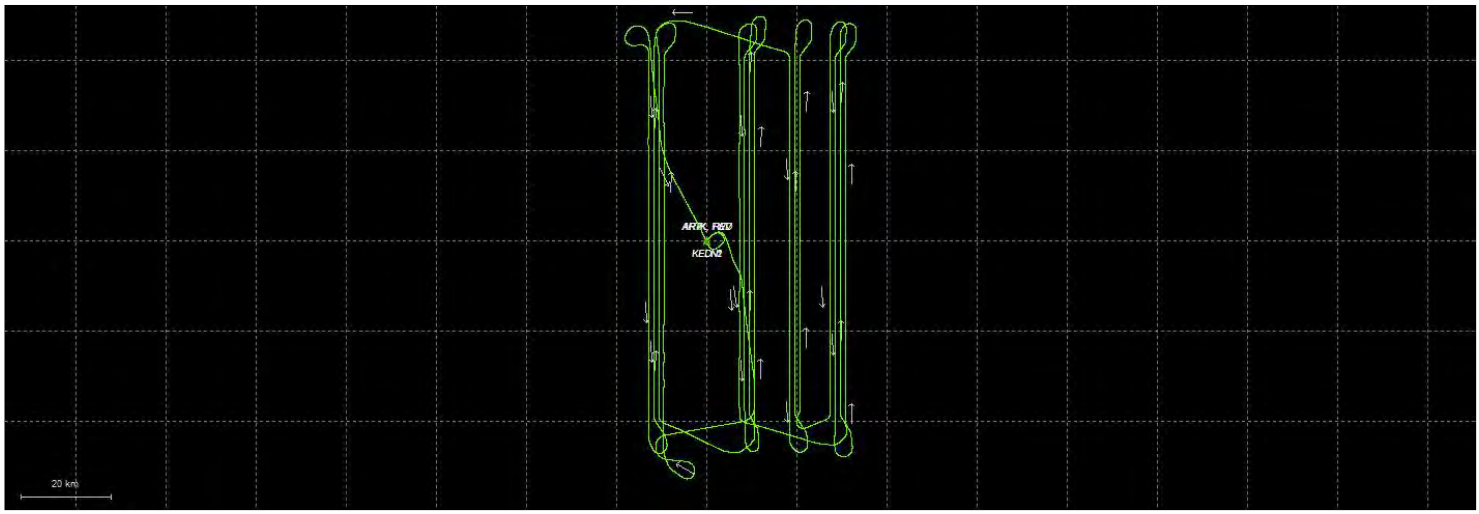


Process	20220114210050_3	by Unknown	on 1/17/2022	at 12:57:45

Output Results for 20220118144303_4

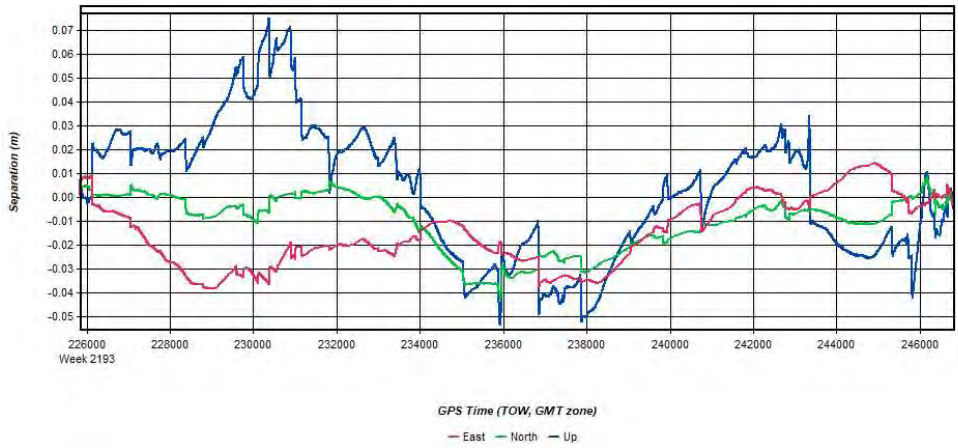
Inertial Explorer Version 8.90.2124
01/20/2022

Figure 1: Smoothed TC Combined - Map



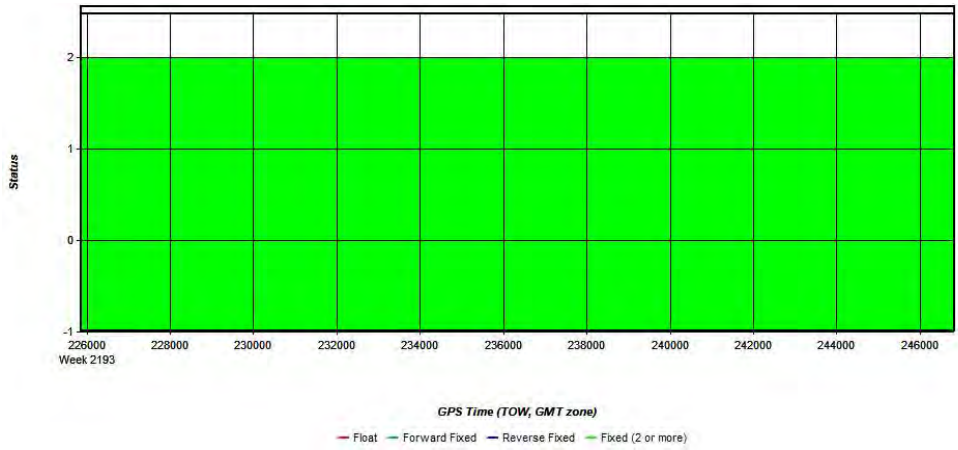
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 2: 20220118144303_4 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot



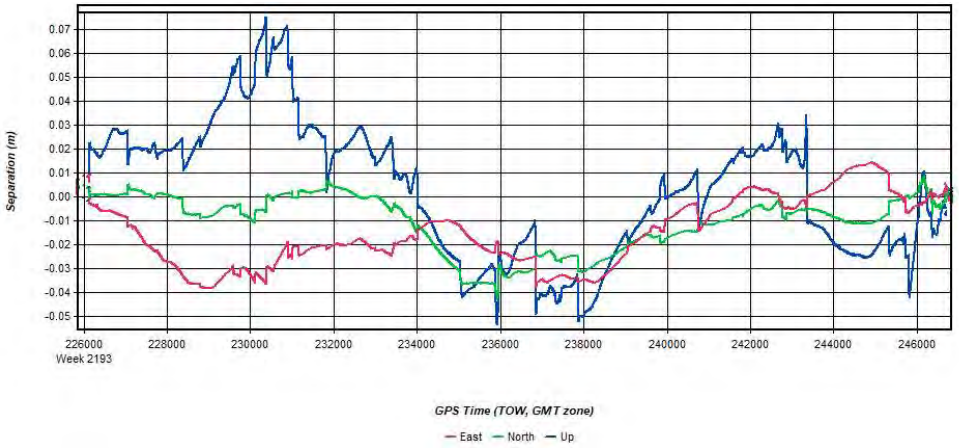
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 3: 20220118144303_4 [Smoothed TC Combined] - Float or Fixed Ambiguity



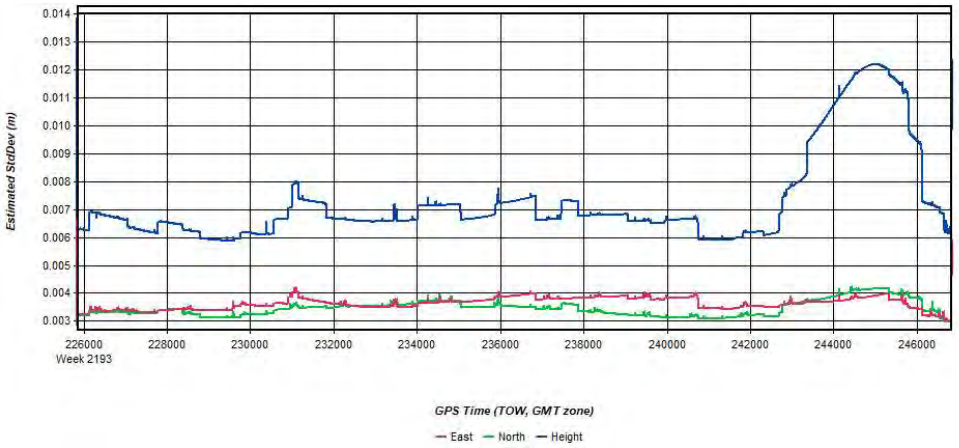
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 4: 20220118144303_4 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)



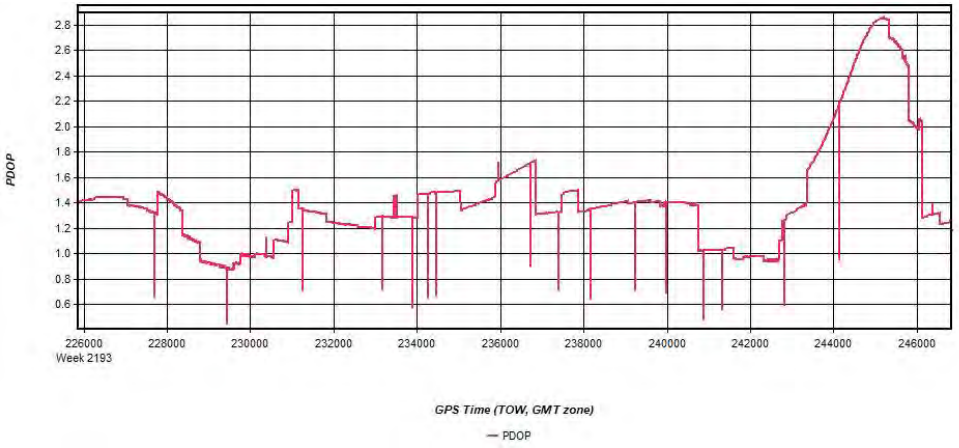
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 5: 20220118144303_4 [Smoothed TC Combined] - Estimated Position Accuracy Plot



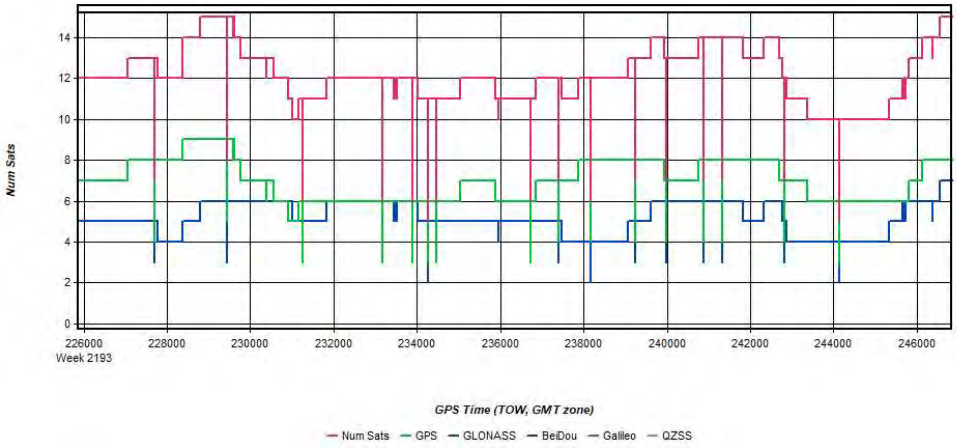
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 6: 20220118144303_4 [Smoothed TC Combined] - PDOP Plot



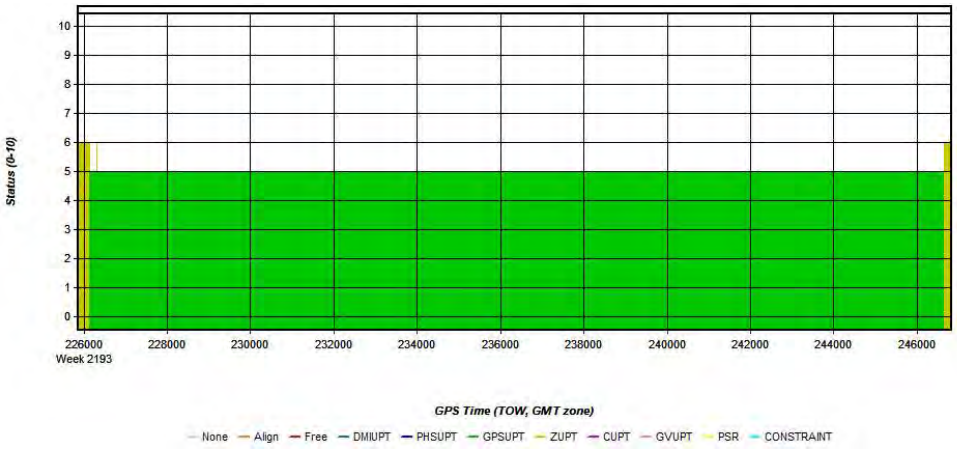
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 7: 20220118144303_4 [Smoothed TC Combined] - Number of Satellites Line Plot



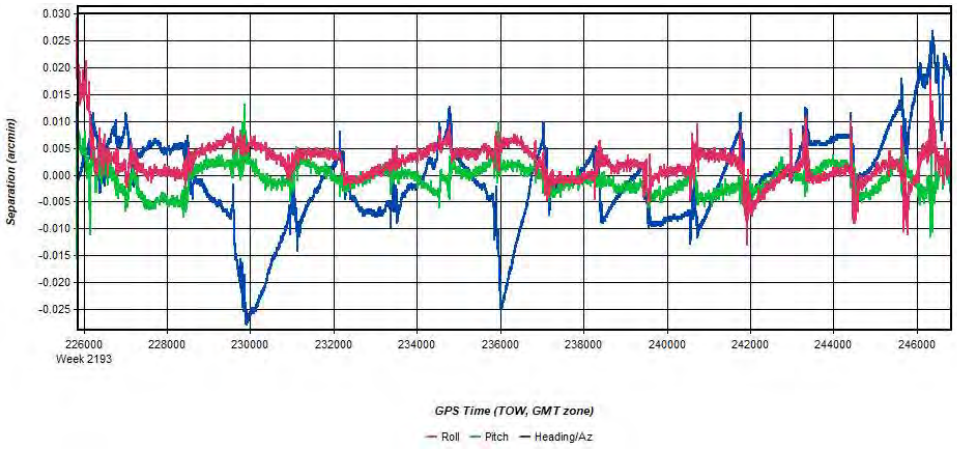
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 8: 20220118144303_4 [Smoothed TC Combined] - Status flag for IMU processing



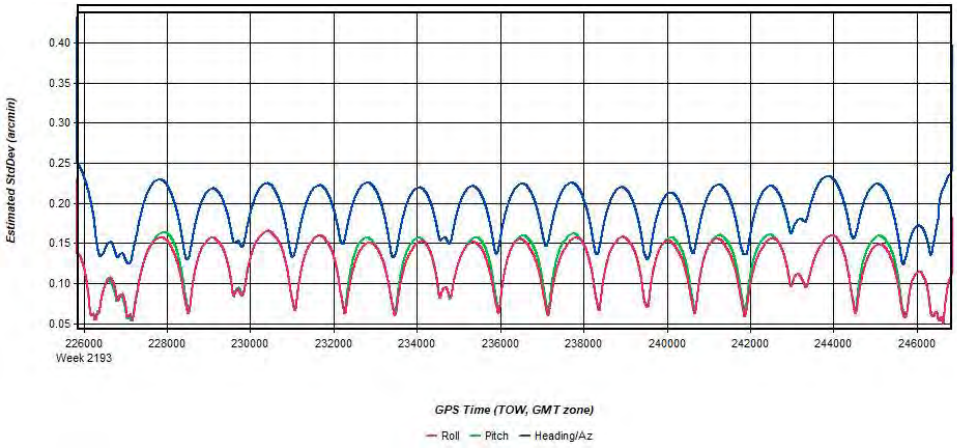
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 9: 20220118144303_4 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



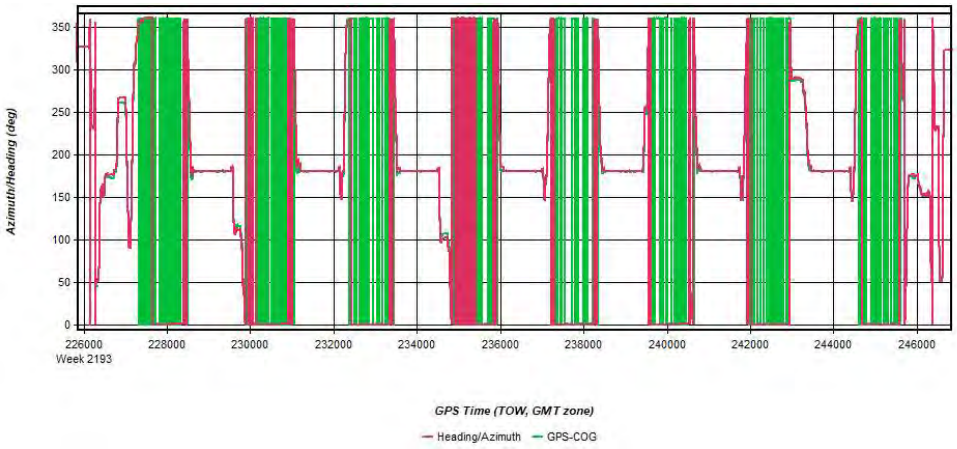
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 10: 20220118144303_4 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



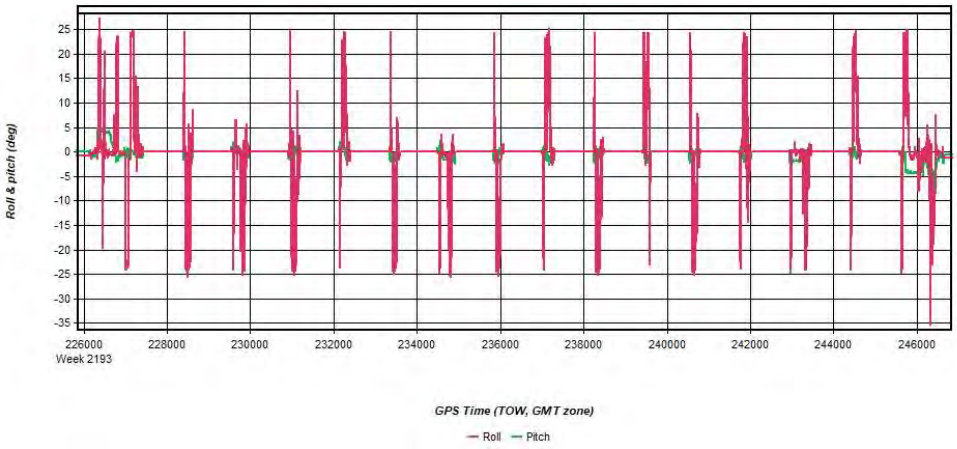
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 11: 20220118144303_4 [Smoothed TC Combined] - Azimuth Plot



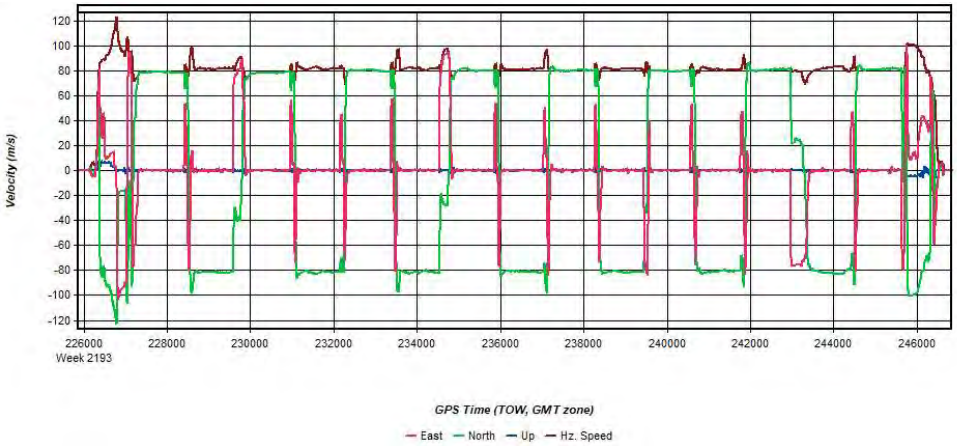
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 12: 20220118144303_4 [Smoothed TC Combined] - Roll & Pitch Plot



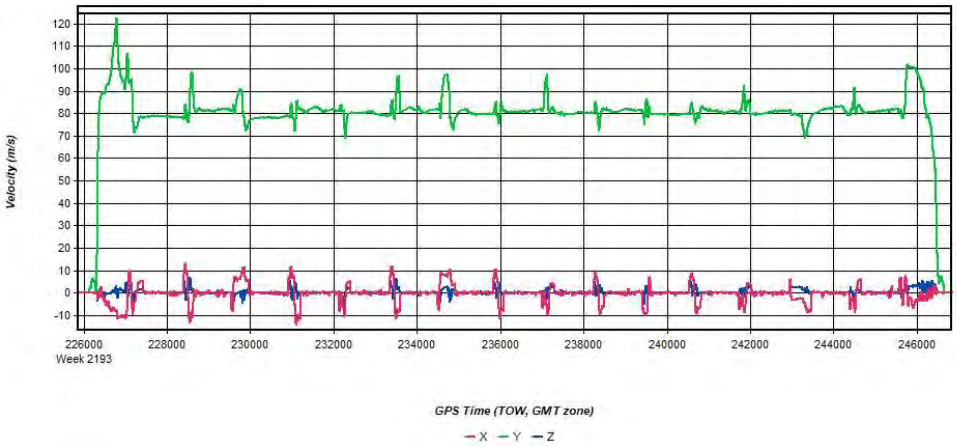
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 13: 20220118144303_4 [Smoothed TC Combined] - Velocity Profile Plot



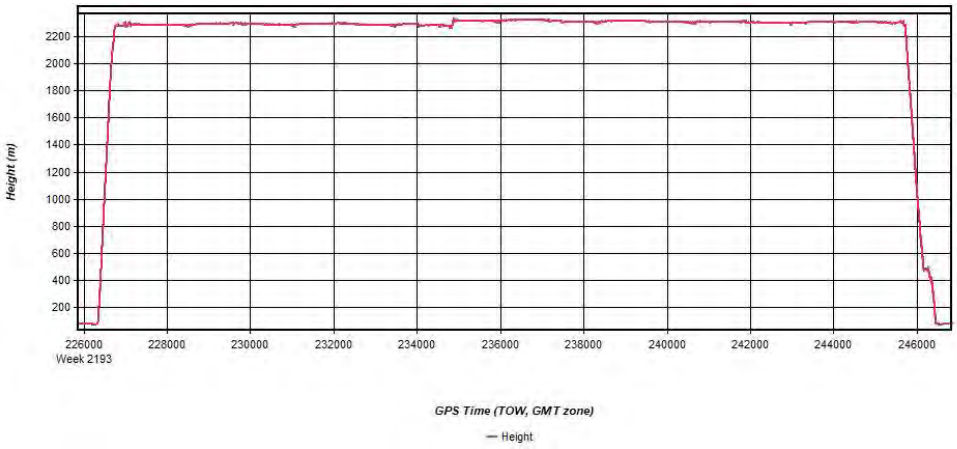
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 14: 20220118144303_4 [Smoothed TC Combined] - Body Frame Velocity Plot



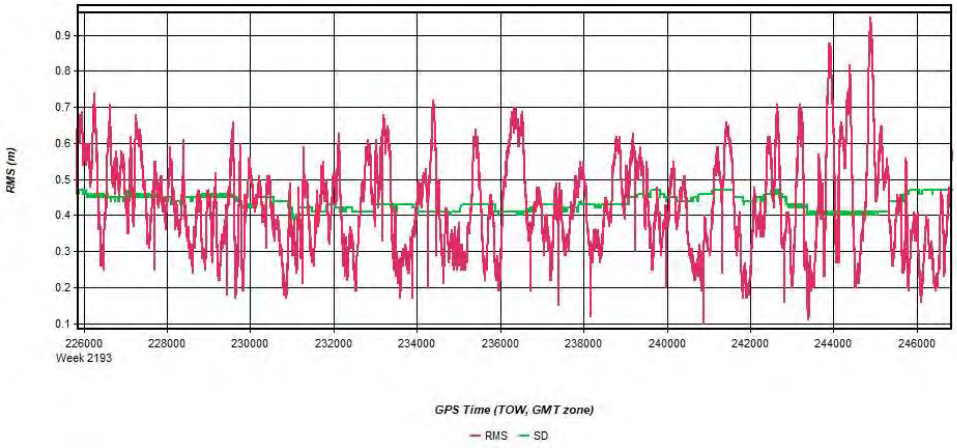
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 15: 20220118144303_4 [Smoothed TC Combined] - Height Profile Plot



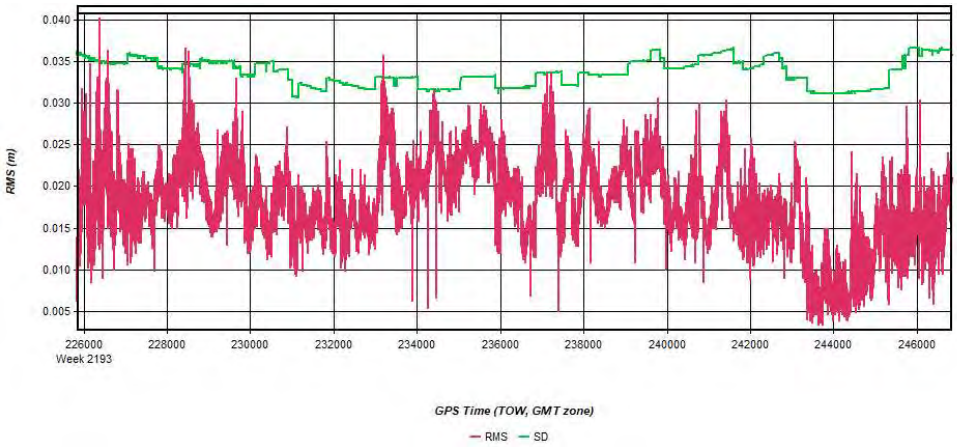
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 16: 20220118144303_4 [Smoothed TC Combined] - C/A Code Residual RMS Plot



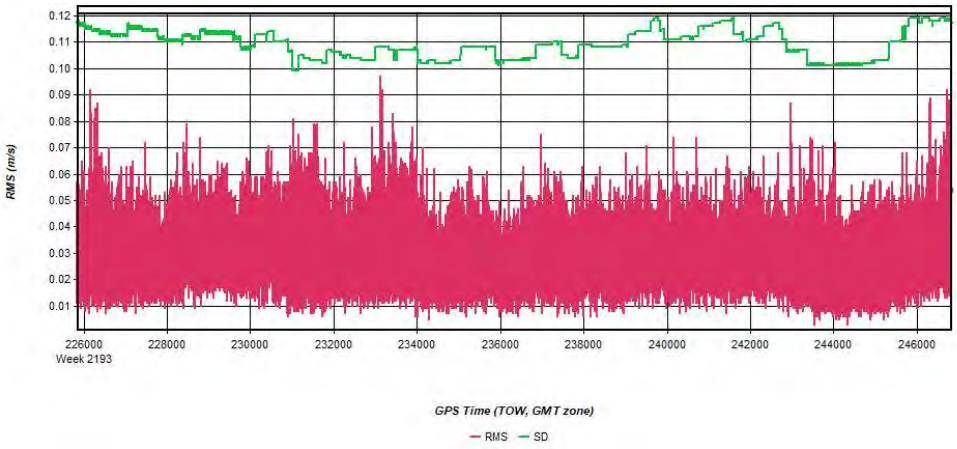
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 17: 20220118144303_4 [Smoothed TC Combined] - Carrier Residual RMS Plot



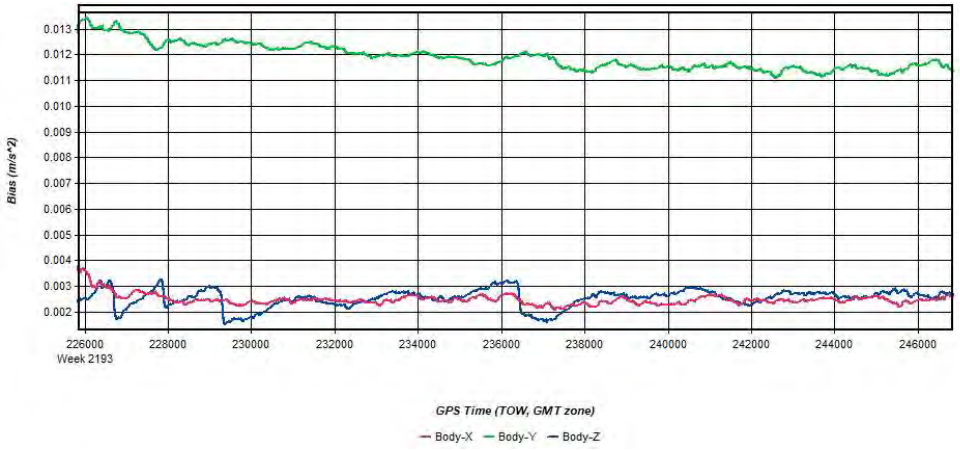
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 18: 20220118144303_4 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot



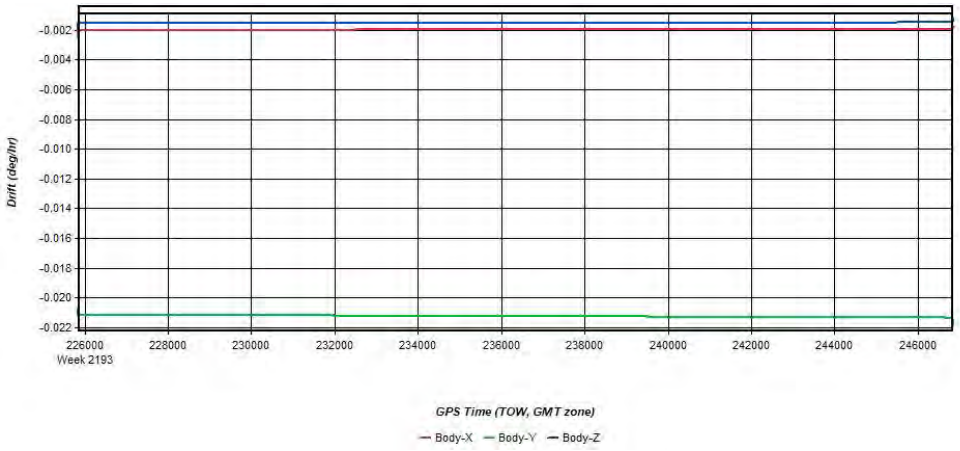
Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 19: 20220118144303_4 [Smoothed TC Combined] - Accelerometer Bias Plot



Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Figure 20: 20220118144303_4 [Smoothed TC Combined] - Gyro Drift Plot

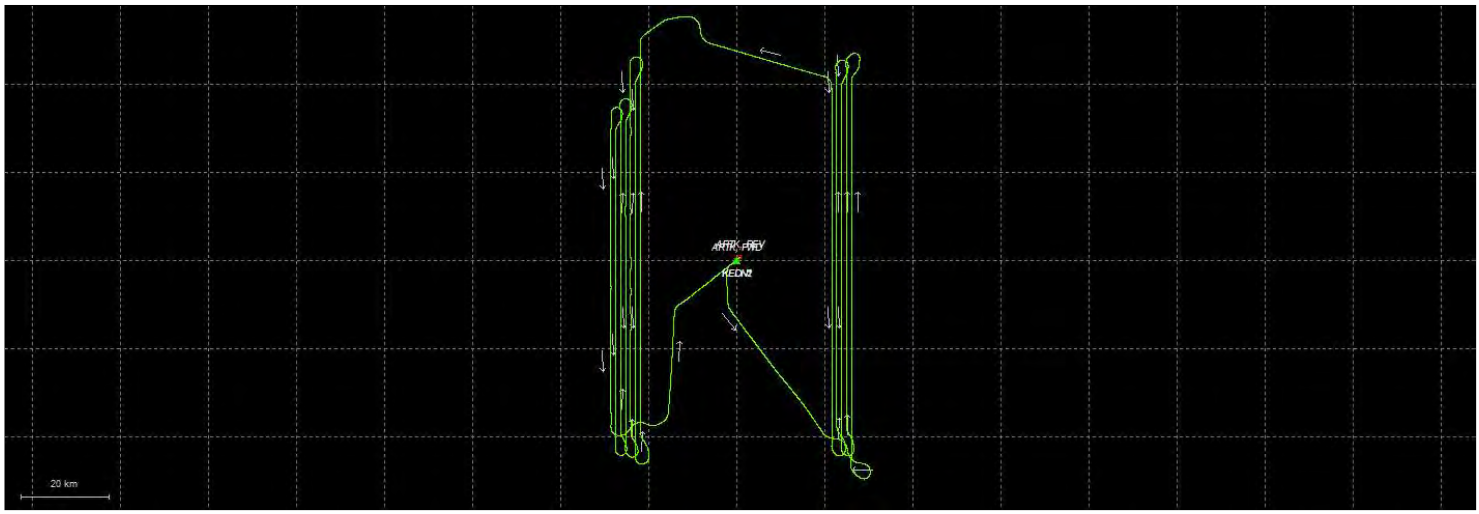


Process	20220118144303_4	by Unknown	on 1/20/2022	at 12:33:20

Output Results for 20220118212322_5

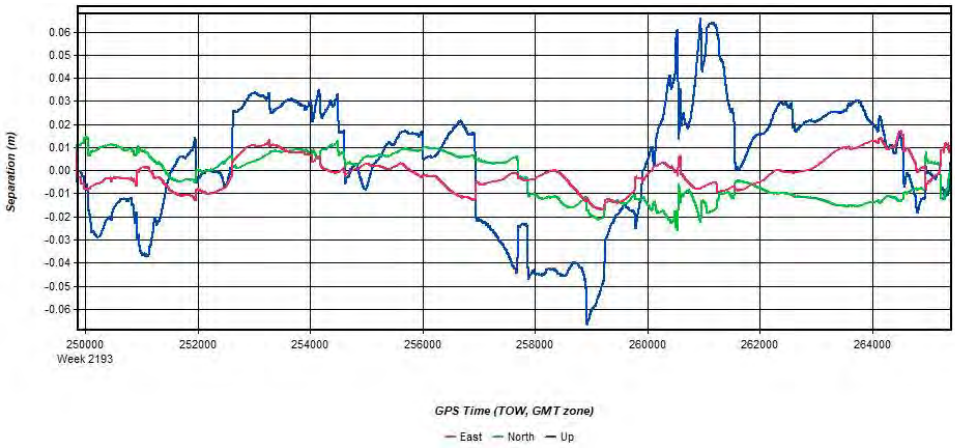
Inertial Explorer Version 8.90.2124
01/20/2022

Figure 1: Smoothed TC Combined - Map



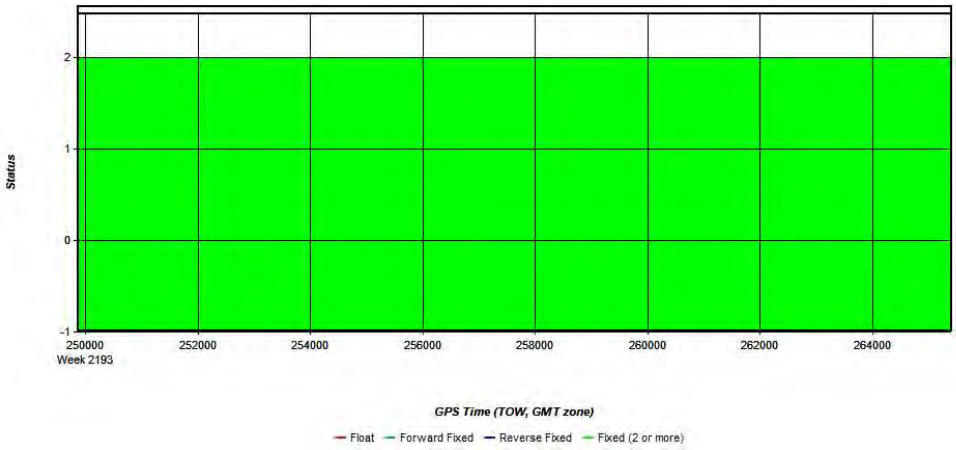
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 2: 20220118212322_5 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot



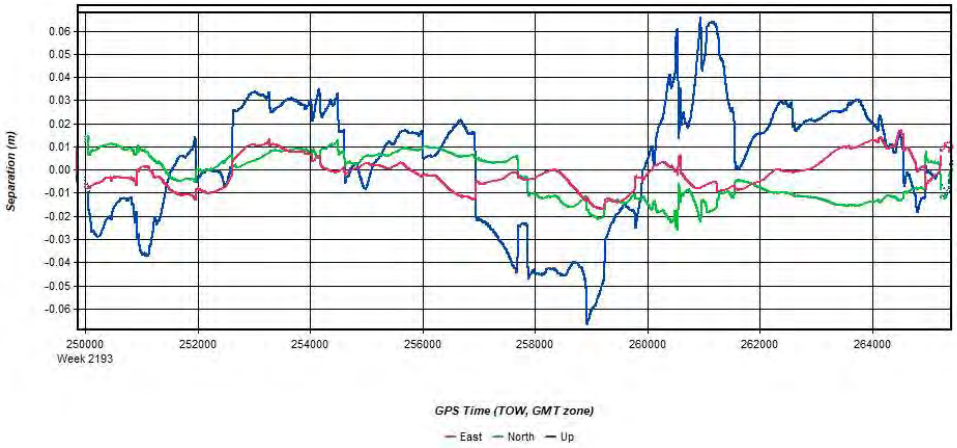
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 3: 20220118212322_5 [Smoothed TC Combined] - Float or Fixed Ambiguity



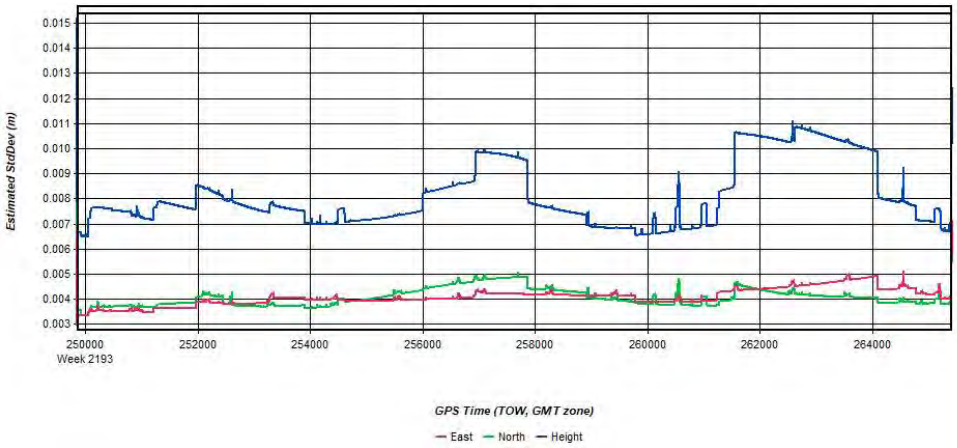
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 4: 20220118212322_5 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)



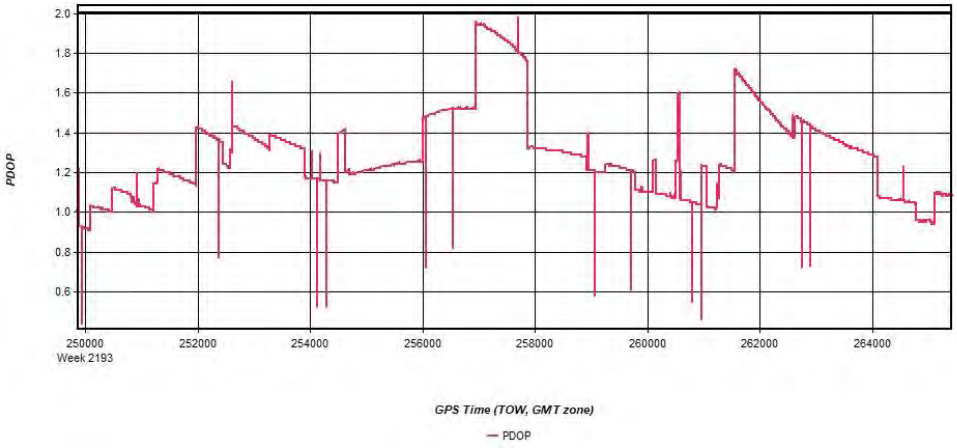
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 5: 20220118212322_5 [Smoothed TC Combined] - Estimated Position Accuracy Plot



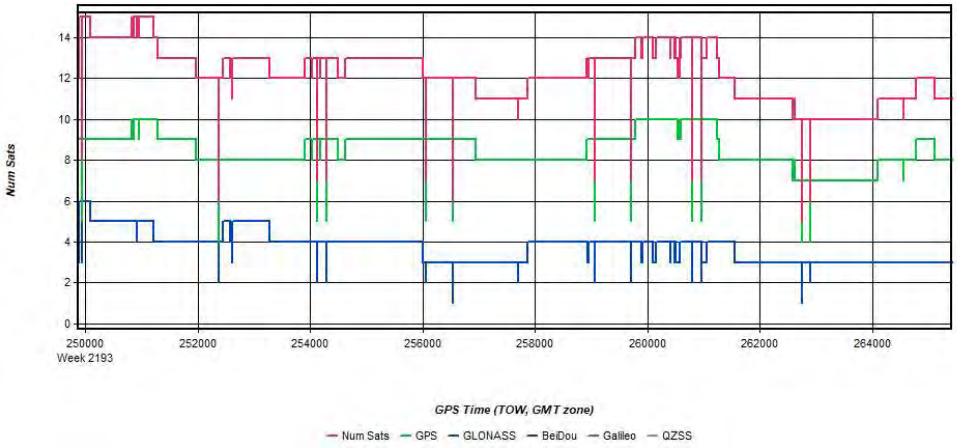
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 6: 20220118212322_5 [Smoothed TC Combined] - PDOP Plot



Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 7: 20220118212322_5 [Smoothed TC Combined] - Number of Satellites Line Plot

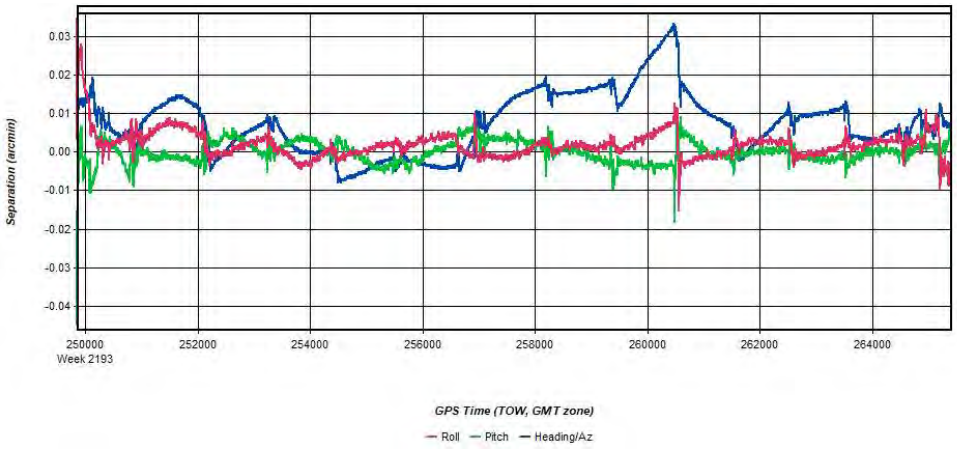


Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 8: 20220118212322_5 [Smoothed TC Combined] - Status flag for IMU processing

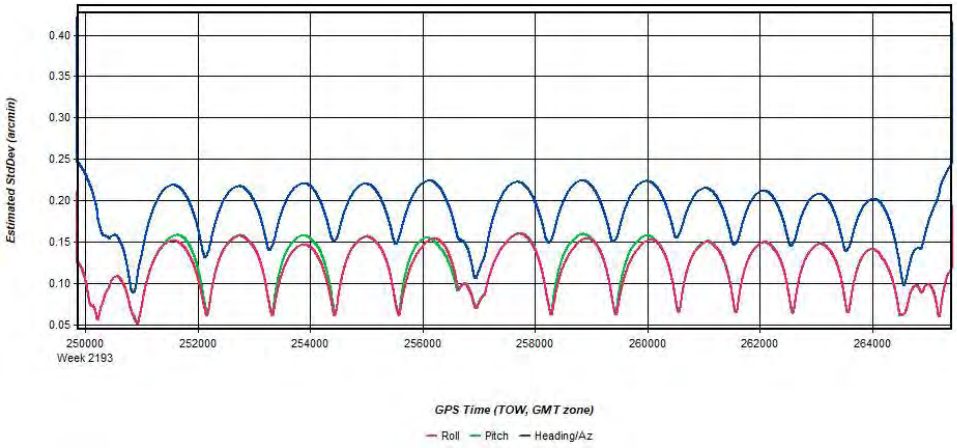
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 9: 20220118212322_5 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



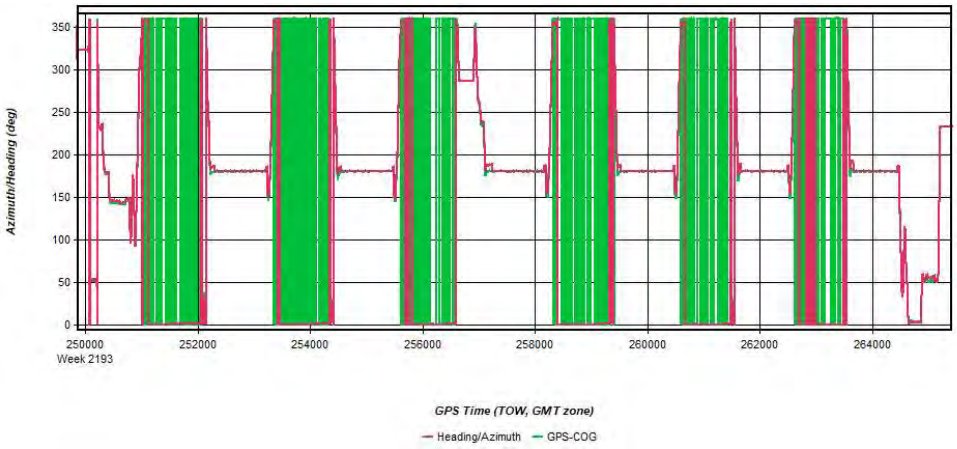
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 10: 20220118212322_5 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



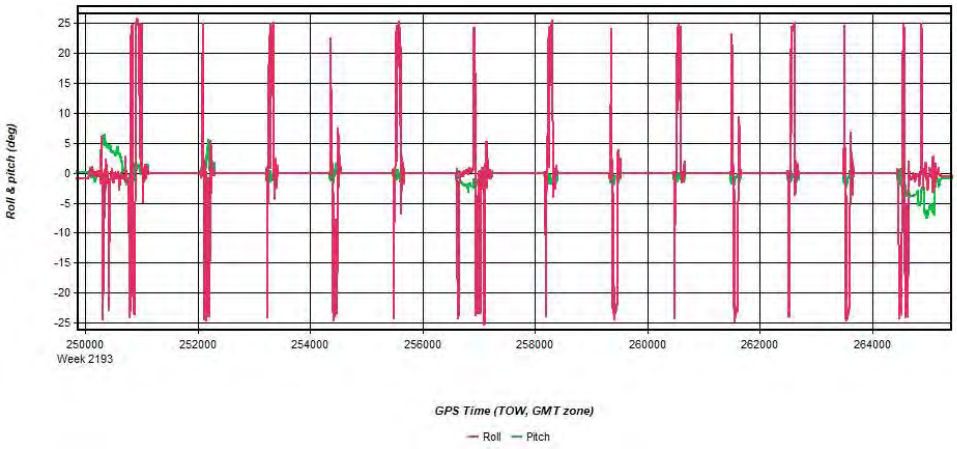
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 11: 20220118212322_5 [Smoothed TC Combined] - Azimuth Plot



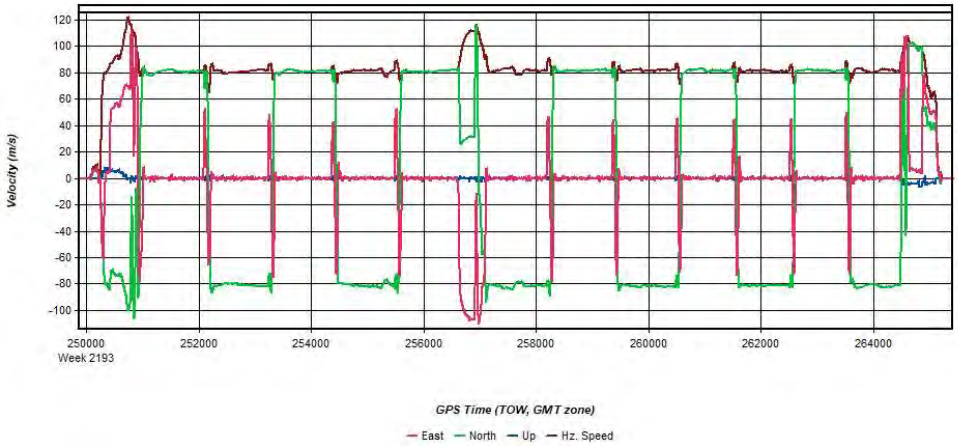
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 12: 20220118212322_5 [Smoothed TC Combined] - Roll & Pitch Plot



Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 13: 20220118212322_5 [Smoothed TC Combined] - Velocity Profile Plot

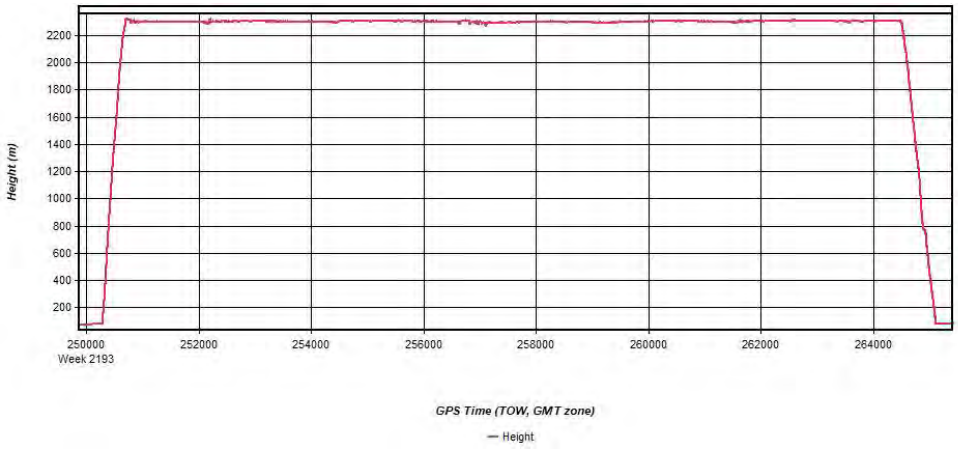


Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 14: 20220118212322_5 [Smoothed TC Combined] - Body Frame Velocity Plot

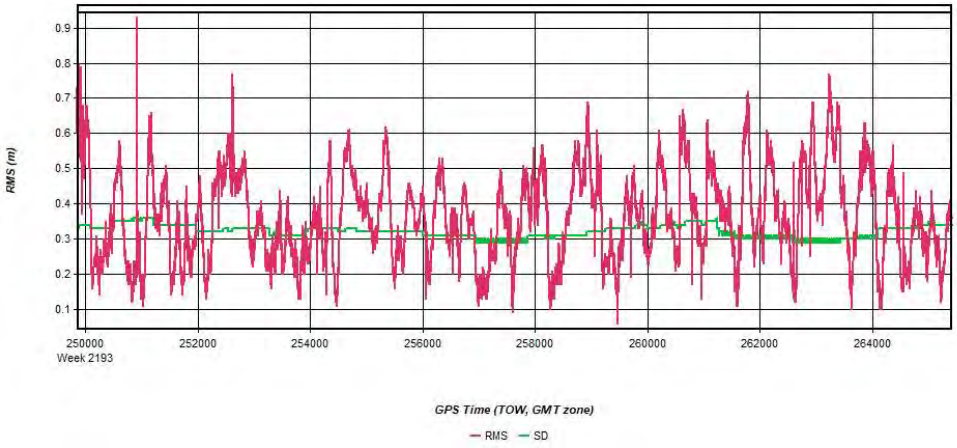
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 15: 20220118212322_5 [Smoothed TC Combined] - Height Profile Plot



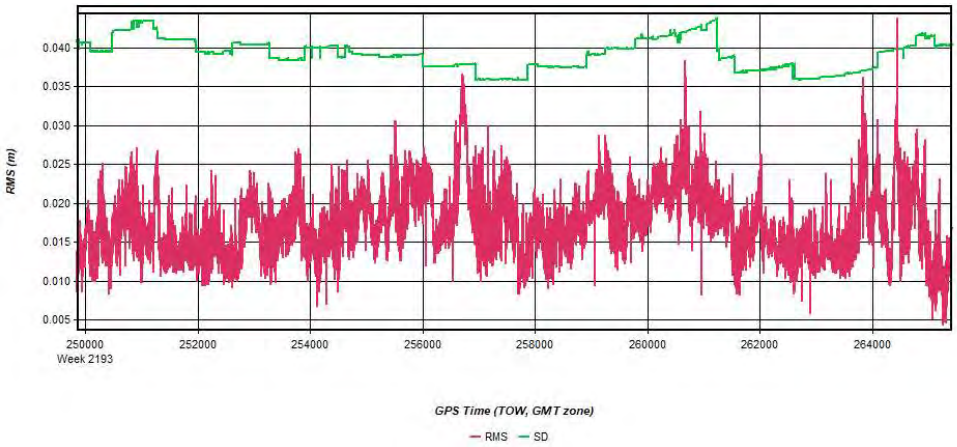
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 16: 20220118212322_5 [Smoothed TC Combined] - C/A Code Residual RMS Plot



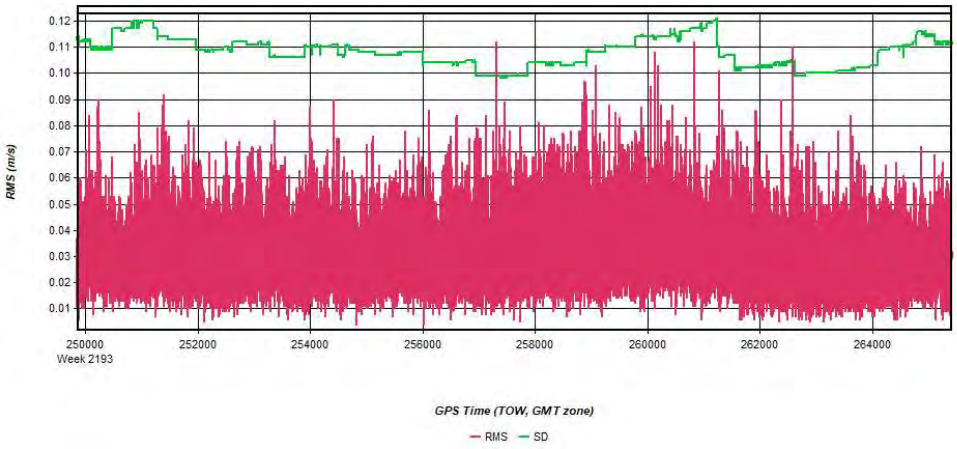
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 17: 20220118212322_5 [Smoothed TC Combined] - Carrier Residual RMS Plot



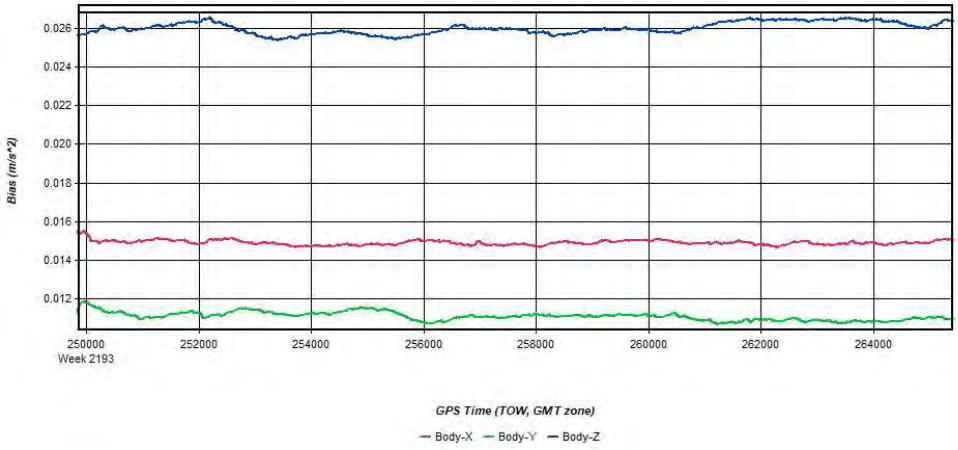
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 18: 20220118212322_5 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot



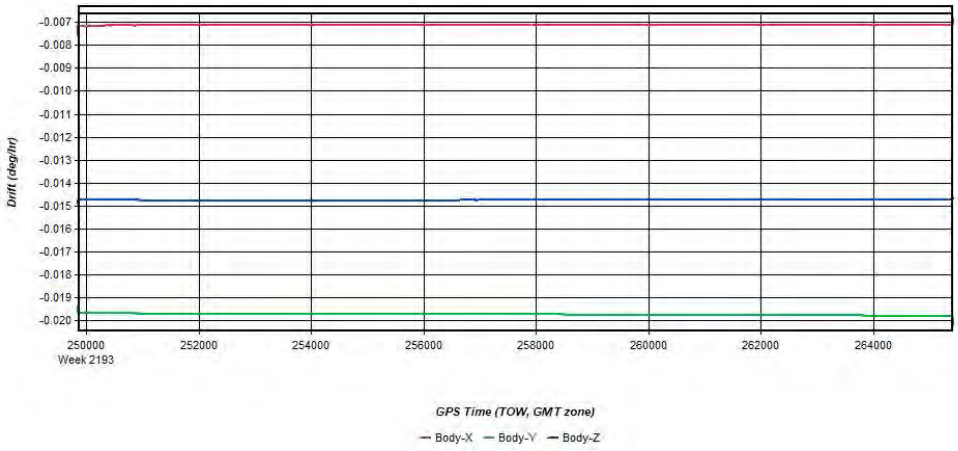
Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 19: 20220118212322_5 [Smoothed TC Combined] - Accelerometer Bias Plot



Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Figure 20: 20220118212322_5 [Smoothed TC Combined] - Gyro Drift Plot

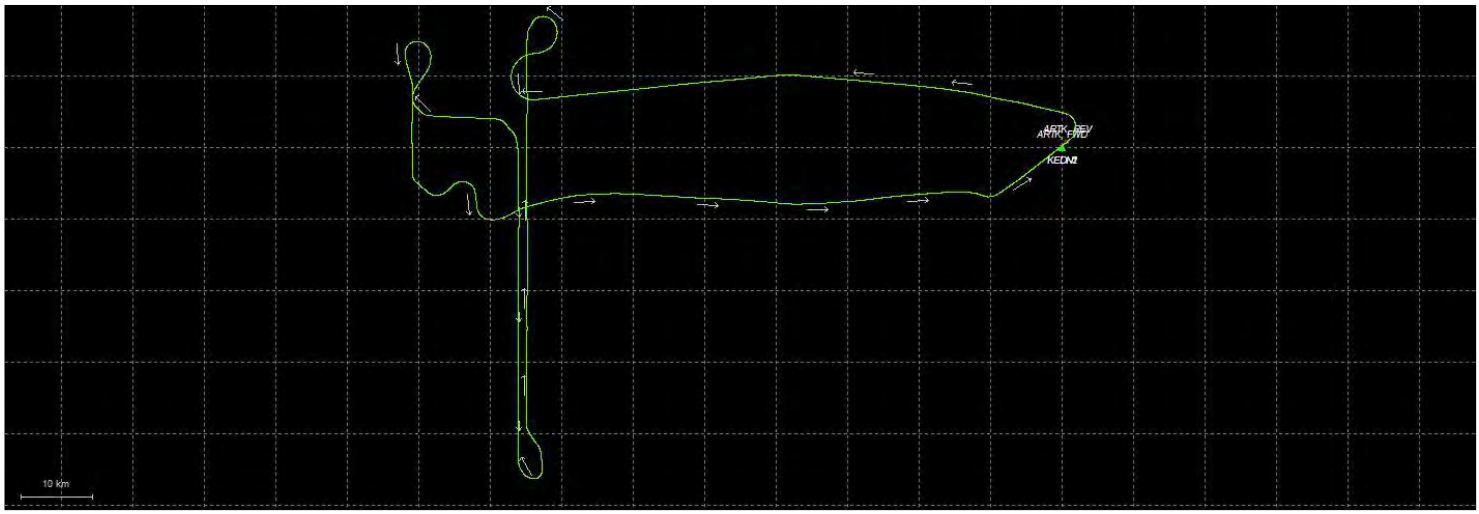


Process	20220118212322_5	by Unknown	on 1/20/2022	at 14:35:51

Output Results for 20220119145430_6

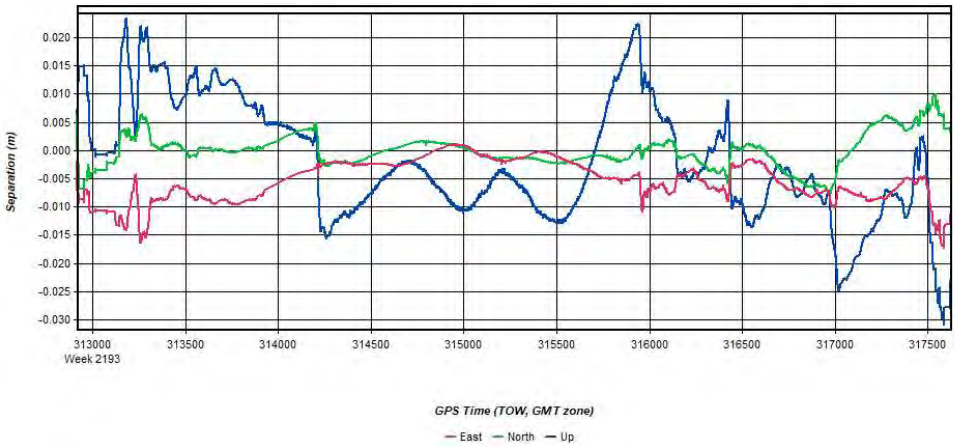
Inertial Explorer Version 8.90.2124
01/20/2022

Figure 1: Smoothed TC Combined - Map



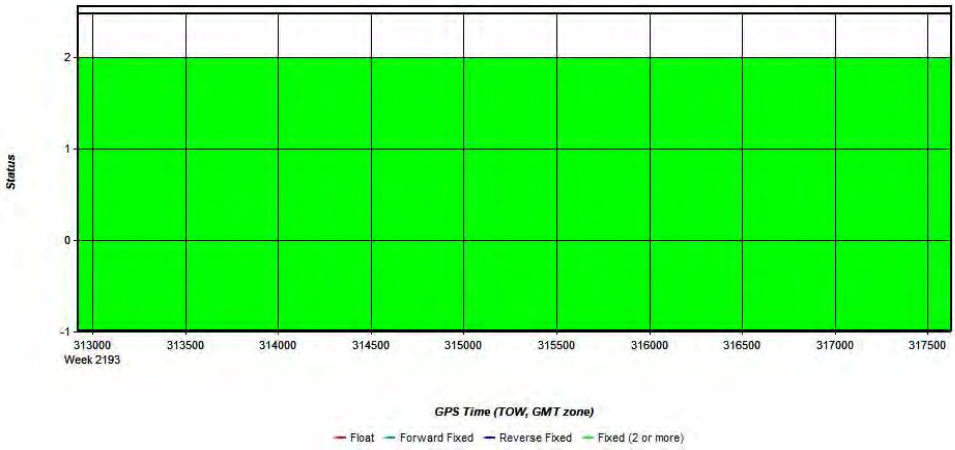
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 2: 20220119145430_6 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot



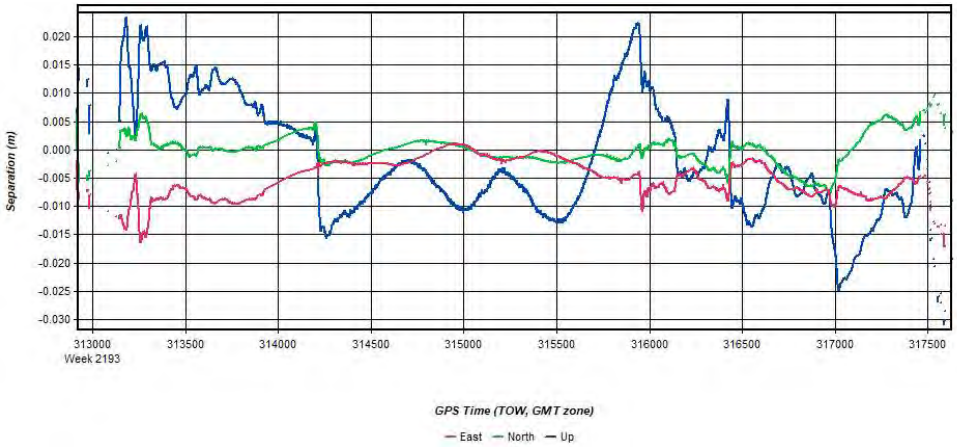
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 3: 20220119145430_6 [Smoothed TC Combined] - Float or Fixed Ambiguity



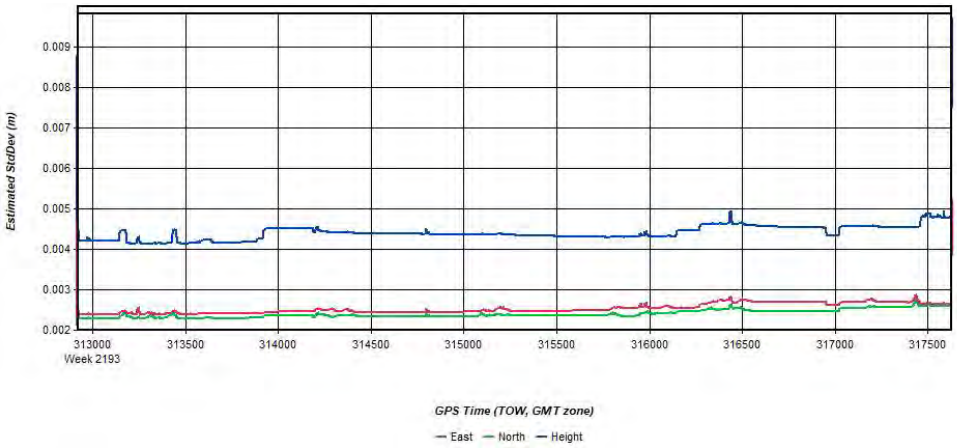
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 4: 20220119145430_6 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)



Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 5: 20220119145430_6 [Smoothed TC Combined] - Estimated Position Accuracy Plot

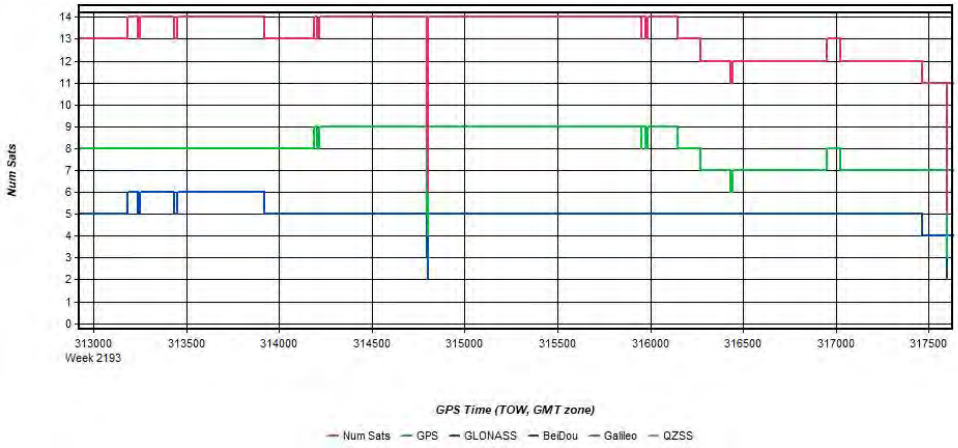


Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 6: 20220119145430_6 [Smoothed TC Combined] - PDOP Plot

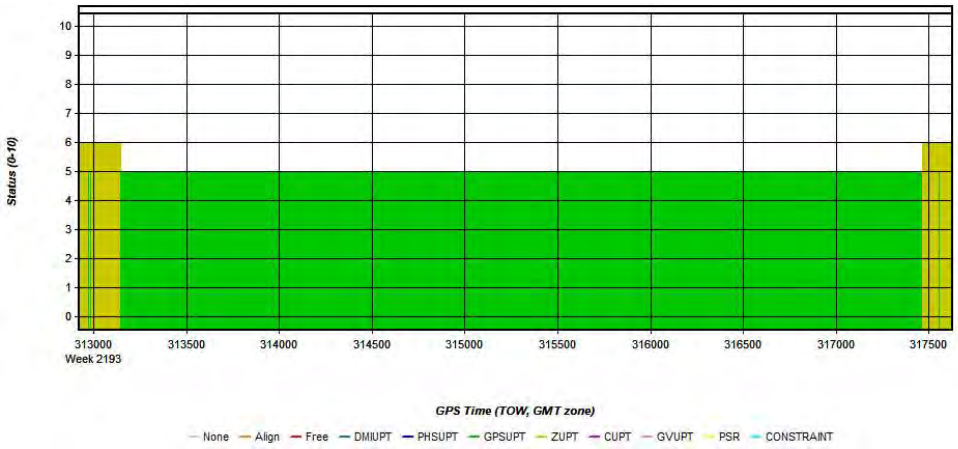
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 7: 20220119145430_6 [Smoothed TC Combined] - Number of Satellites Line Plot



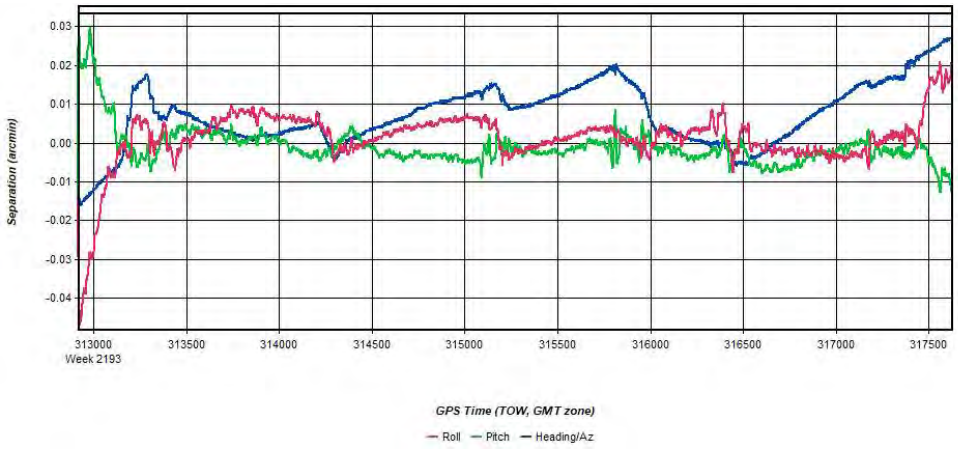
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 8: 20220119145430_6 [Smoothed TC Combined] - Status flag for IMU processing



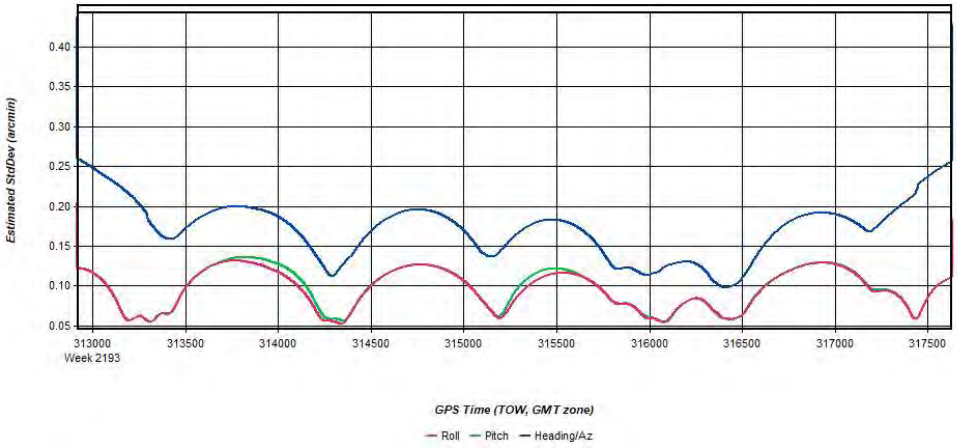
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 9: 20220119145430_6 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



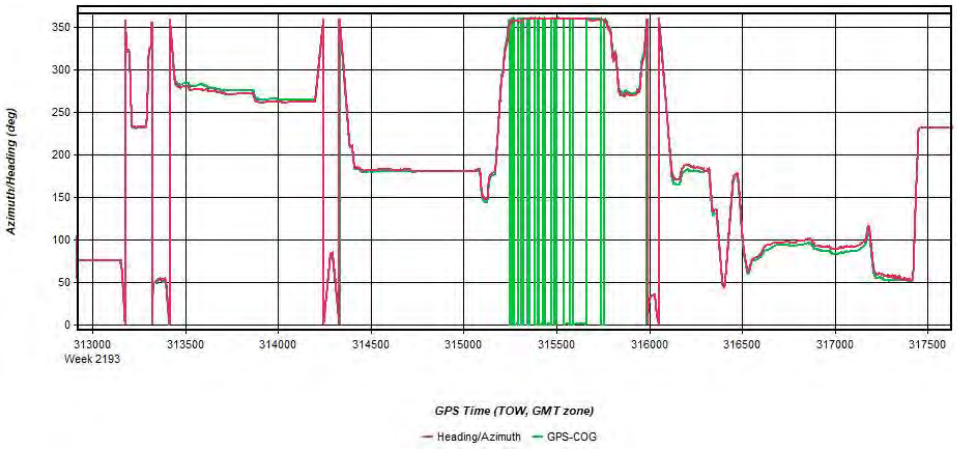
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 10: 20220119145430_6 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



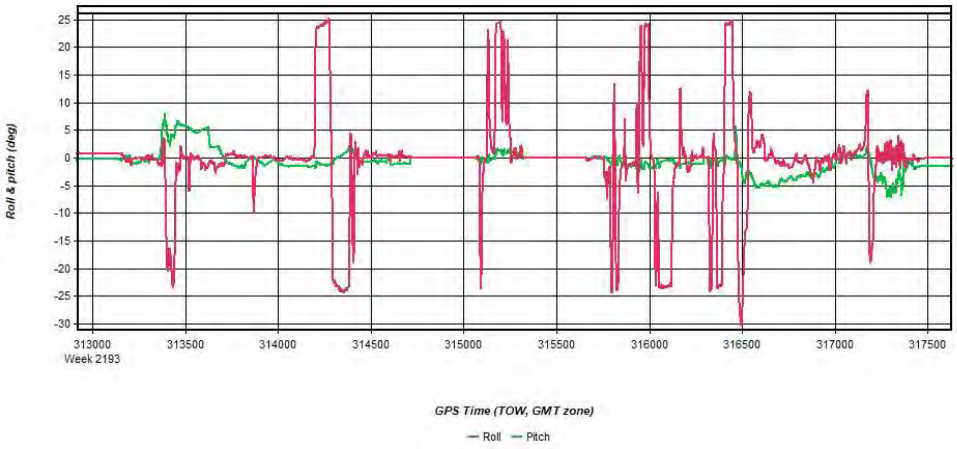
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 11: 20220119145430_6 [Smoothed TC Combined] - Azimuth Plot



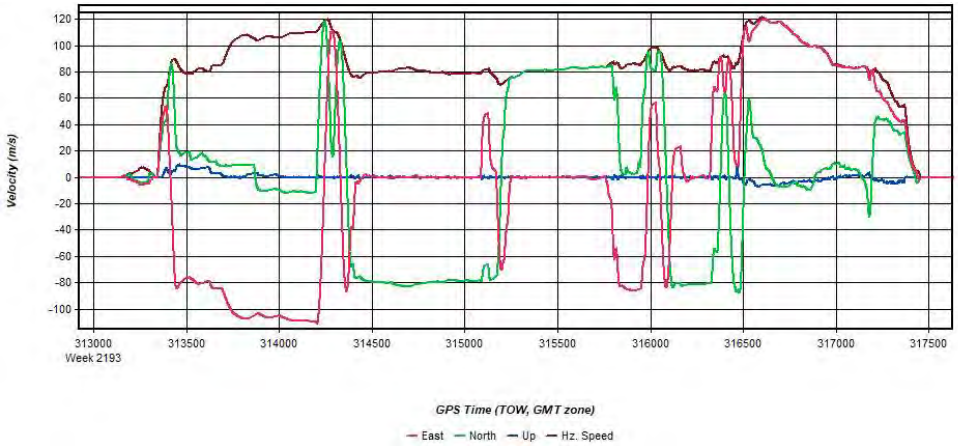
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 12: 20220119145430_6 [Smoothed TC Combined] - Roll & Pitch Plot



Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 13: 20220119145430_6 [Smoothed TC Combined] - Velocity Profile Plot

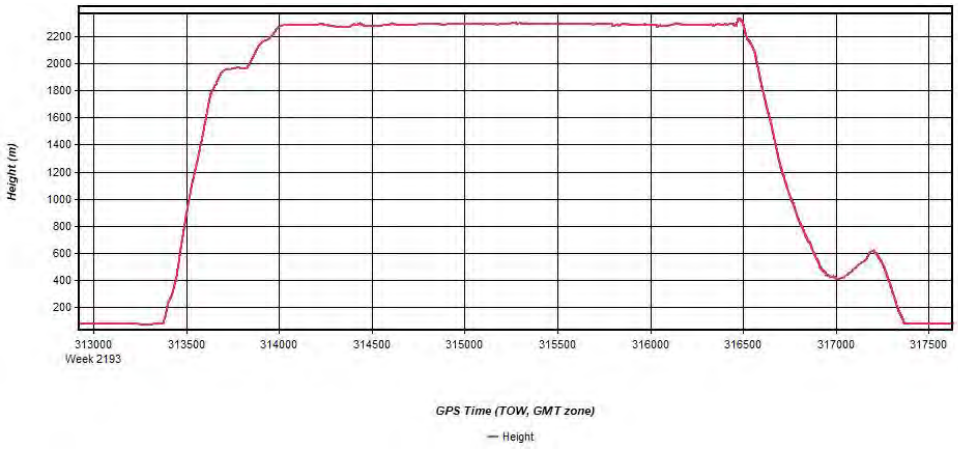


Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 14: 20220119145430_6 [Smoothed TC Combined] - Body Frame Velocity Plot

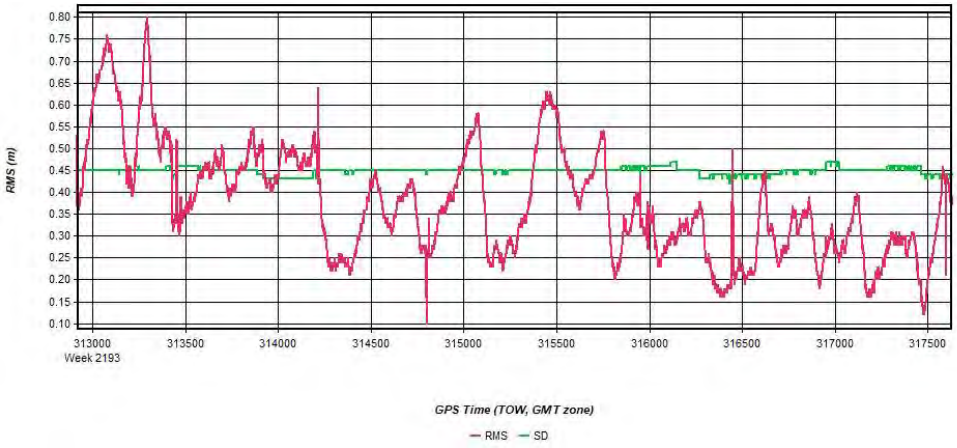
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 15: 20220119145430_6 [Smoothed TC Combined] - Height Profile Plot



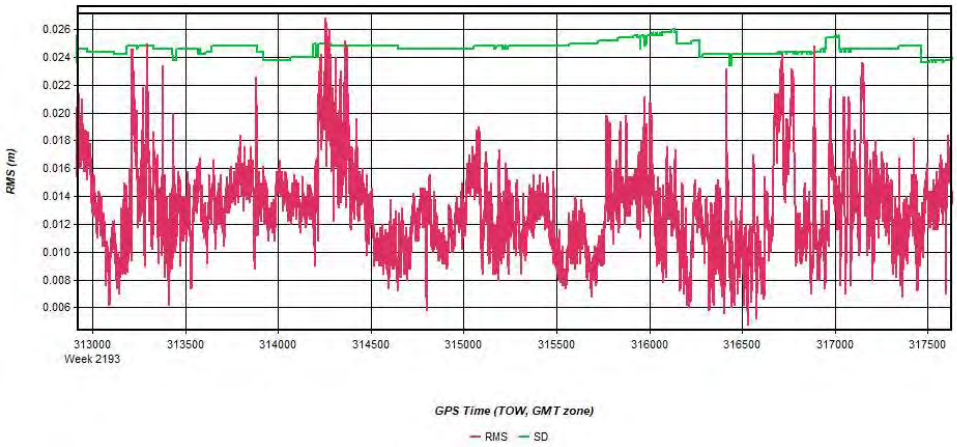
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 16: 20220119145430_6 [Smoothed TC Combined] - C/A Code Residual RMS Plot



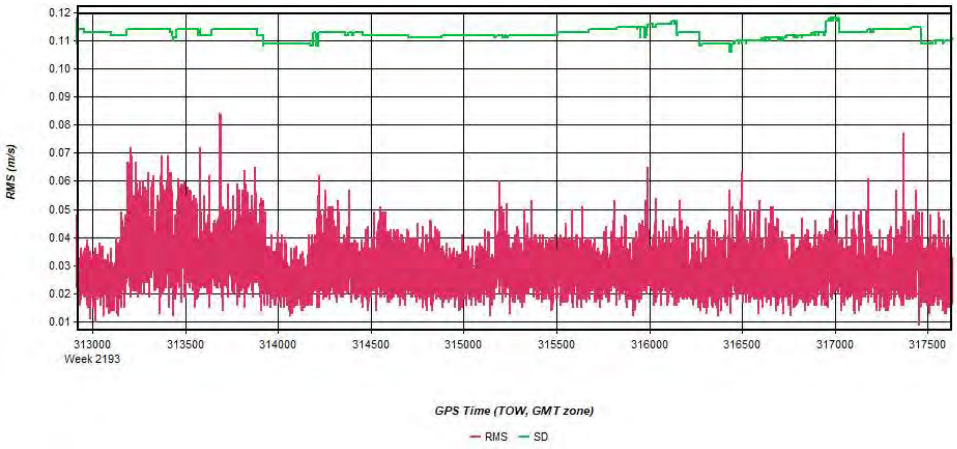
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 17: 20220119145430_6 [Smoothed TC Combined] - Carrier Residual RMS Plot



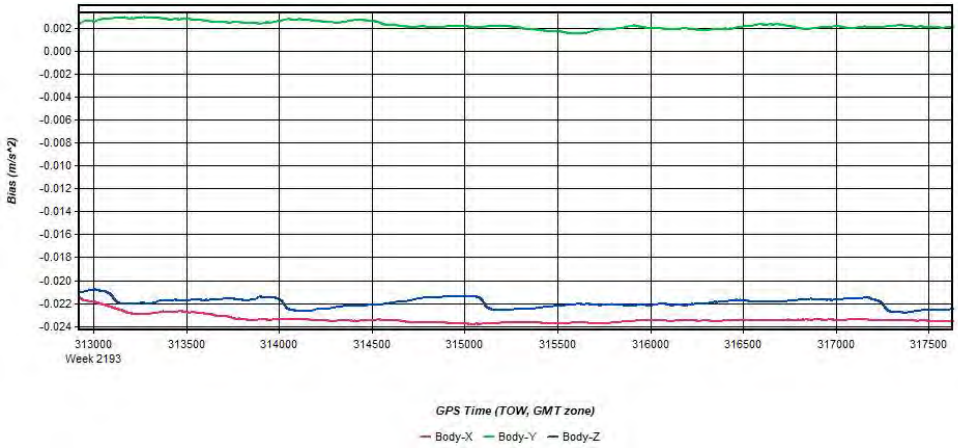
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 18: 20220119145430_6 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot



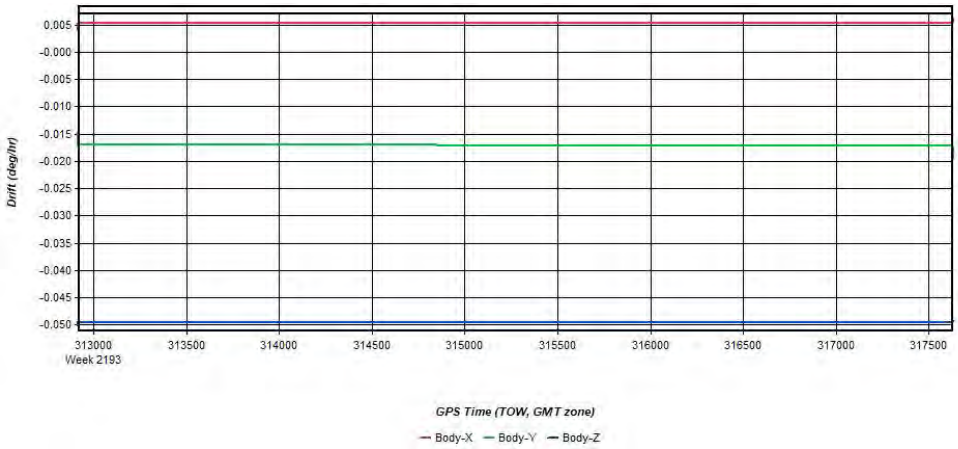
Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 19: 20220119145430_6 [Smoothed TC Combined] - Accelerometer Bias Plot



Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Figure 20: 20220119145430_6 [Smoothed TC Combined] - Gyro Drift Plot

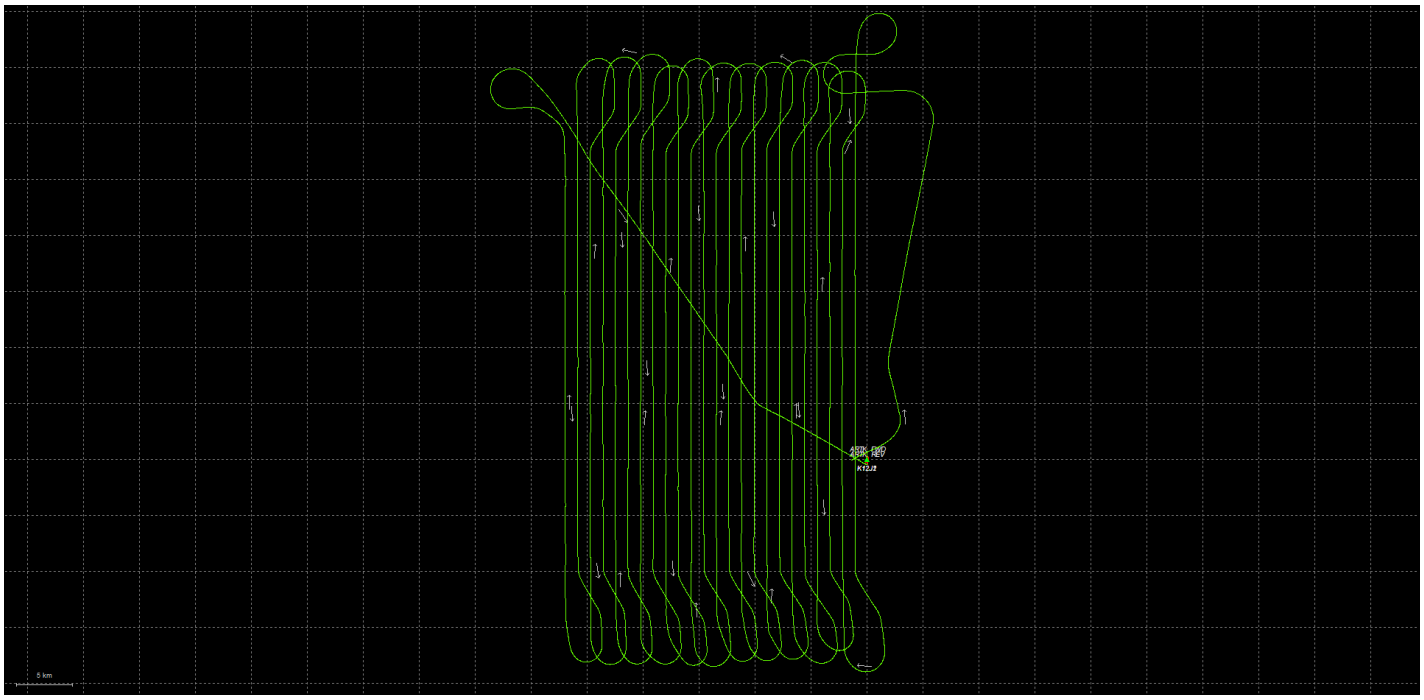


Process	20220119145430_6	by Unknown	on 1/20/2022	at 10:23:26

Output Results for 20220122183201_7

Inertial Explorer Version 8.90.2124
01/25/2022

Figure 1: Smoothed TC Combined - Map

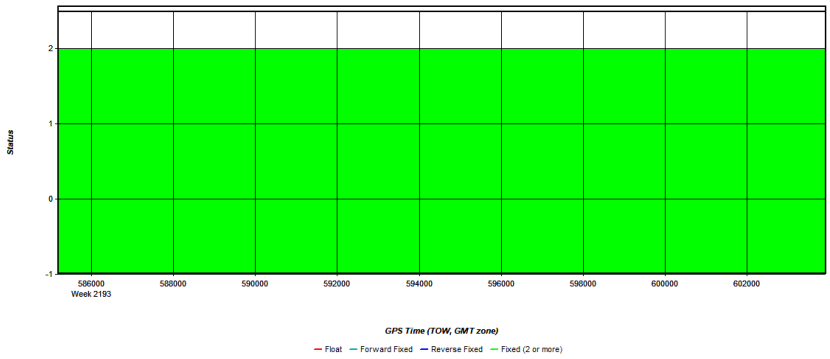


Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 2: 20220122183201_7 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot

Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 3: 20220122183201_7 [Smoothed TC Combined] - Float or Fixed Ambiguity

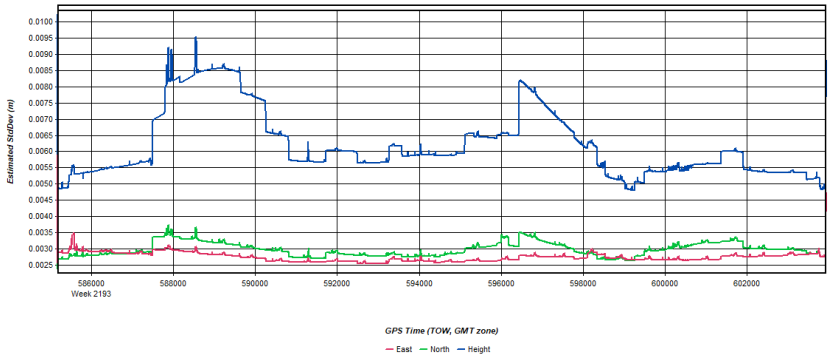


Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 4: 20220122183201_7 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)

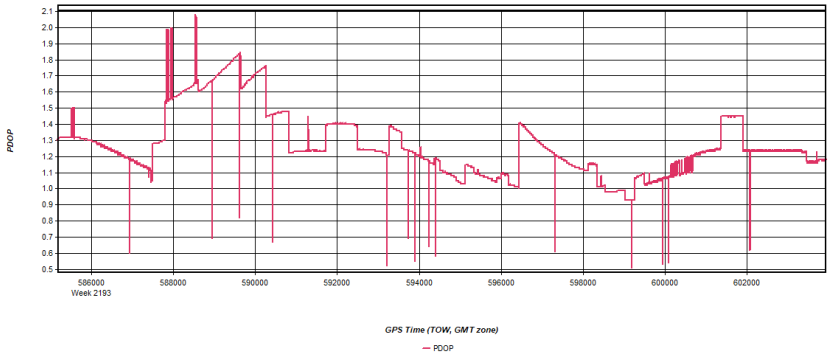
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 5: 20220122183201_7 [Smoothed TC Combined] - Estimated Position Accuracy Plot



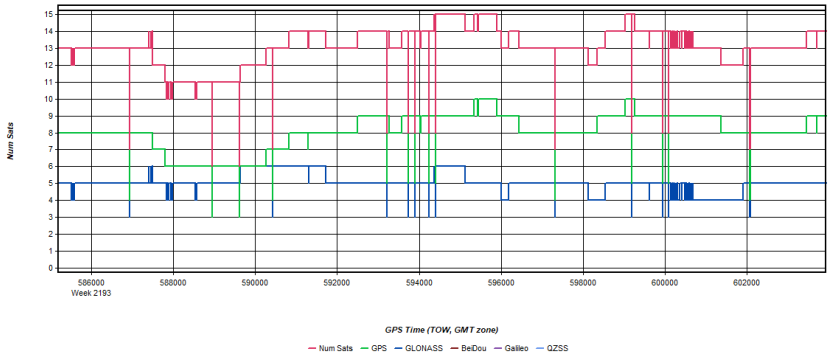
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 6: 20220122183201_7 [Smoothed TC Combined] - PDOP Plot



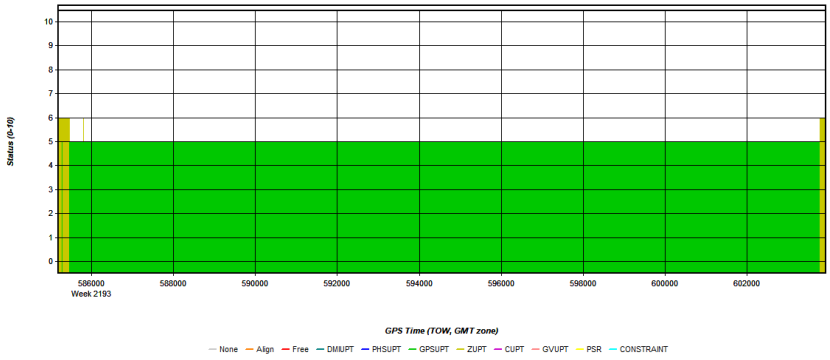
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 7: 20220122183201_7 [Smoothed TC Combined] - Number of Satellites Line Plot



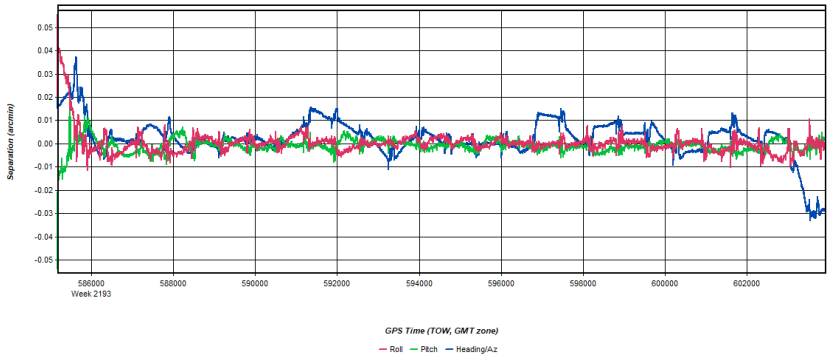
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 8: 20220122183201_7 [Smoothed TC Combined] - Status flag for IMU processing



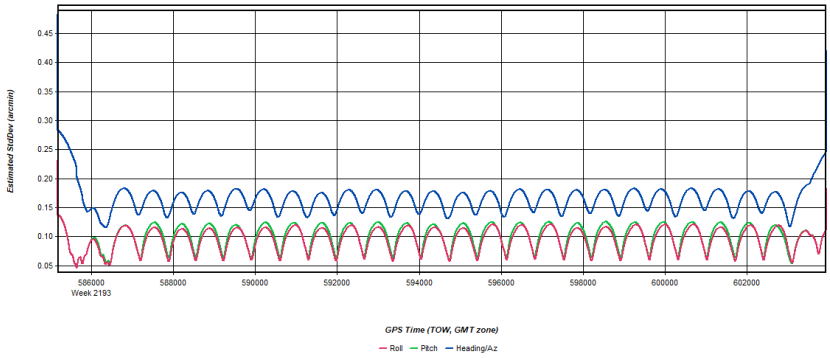
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 9: 20220122183201_7 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



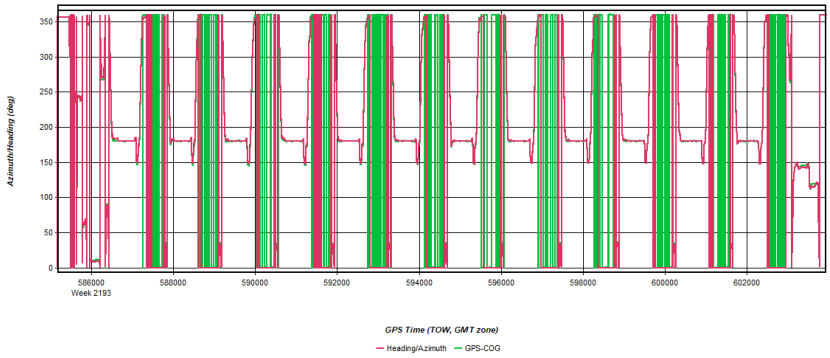
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 10: 20220122183201_7 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



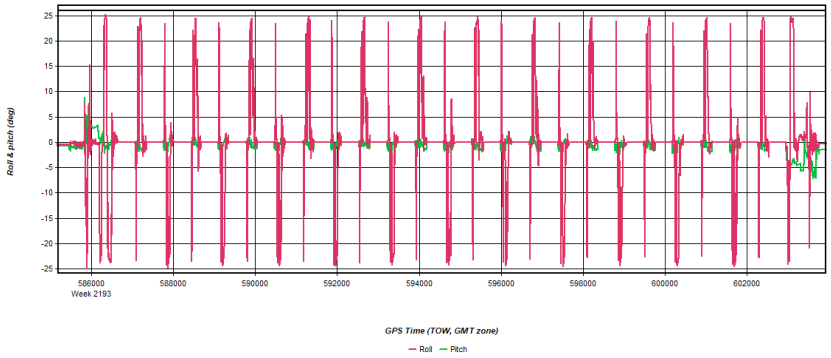
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 11: 20220122183201_7 [Smoothed TC Combined] - Azimuth Plot



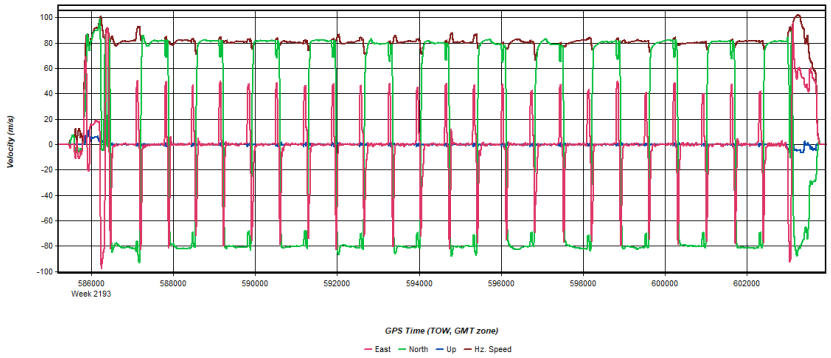
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 12: 20220122183201_7 [Smoothed TC Combined] - Roll & Pitch Plot



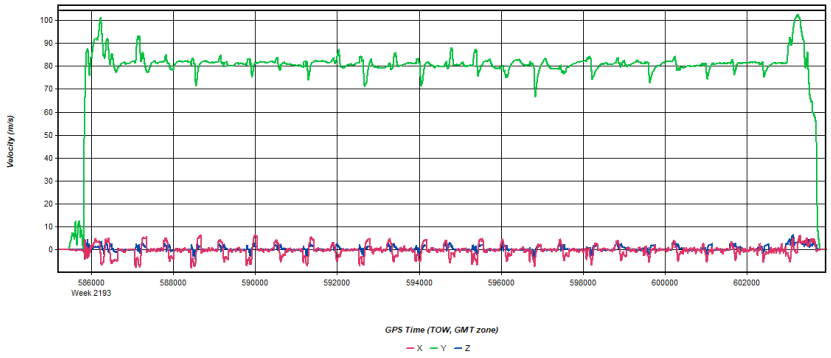
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 13: 20220122183201_7 [Smoothed TC Combined] - Velocity Profile Plot



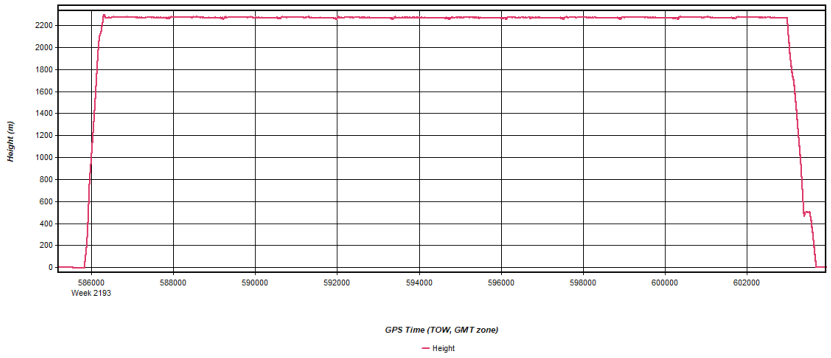
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 14: 20220122183201_7 [Smoothed TC Combined] - Body Frame Velocity Plot



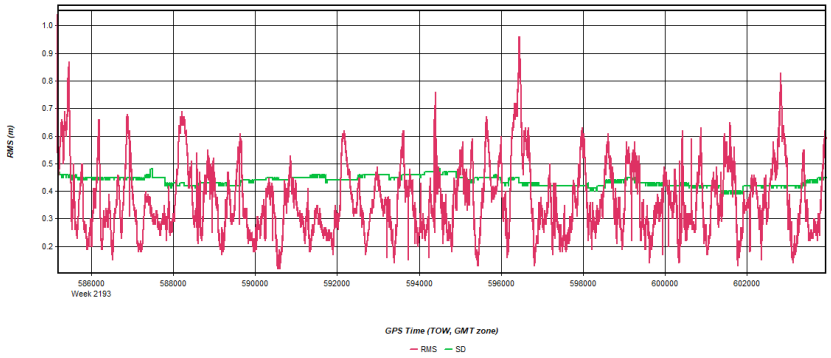
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 15: 20220122183201_7 [Smoothed TC Combined] - Height Profile Plot



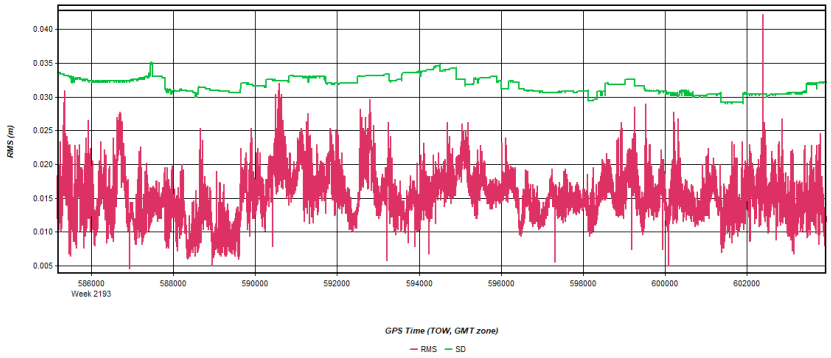
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 16: 20220122183201_7 [Smoothed TC Combined] - C/A Code Residual RMS Plot



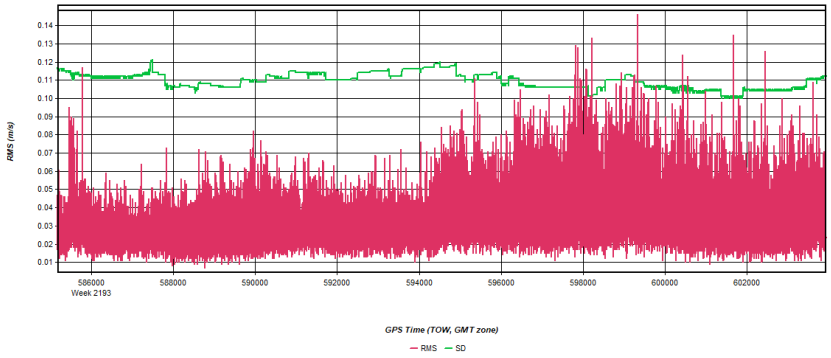
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 17: 20220122183201_7 [Smoothed TC Combined] - Carrier Residual RMS Plot



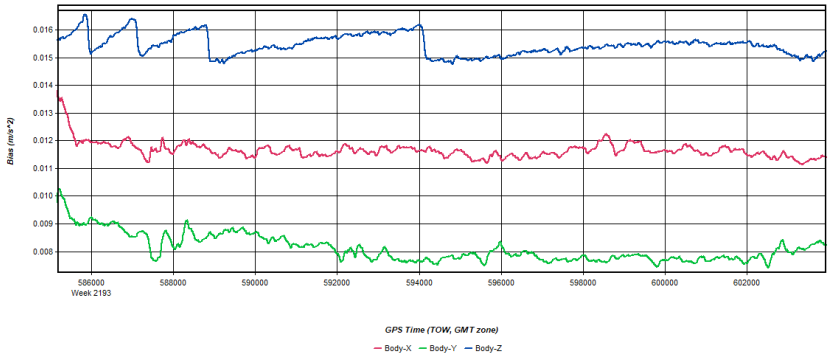
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 18: 20220122183201_7 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot



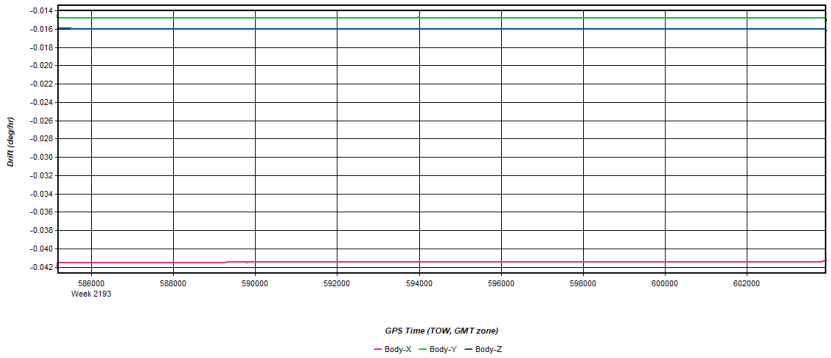
Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 19: 20220122183201_7 [Smoothed TC Combined] - Accelerometer Bias Plot



Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Figure 20: 20220122183201_7 [Smoothed TC Combined] - Gyro Drift Plot

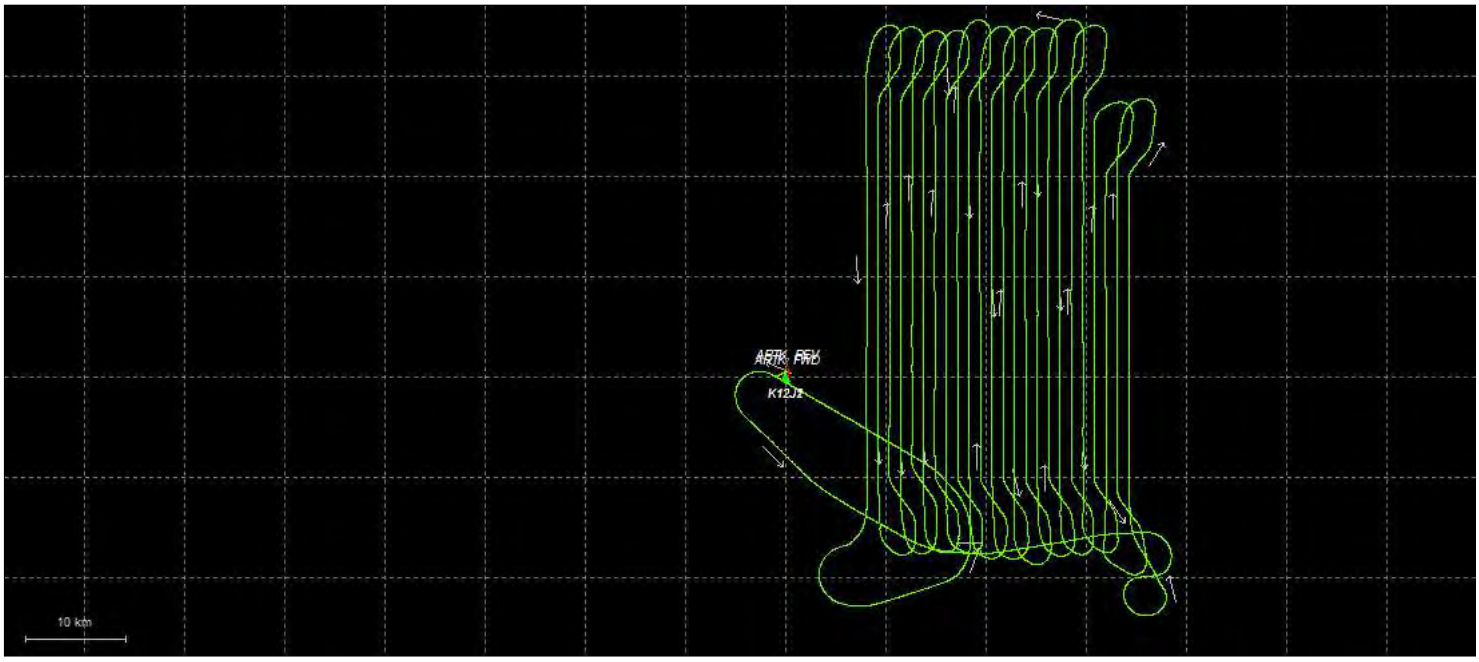


Process	20220122183201_7	by Unknown	on 1/25/2022	at 10:40:47

Output Results for 20220123215056_9

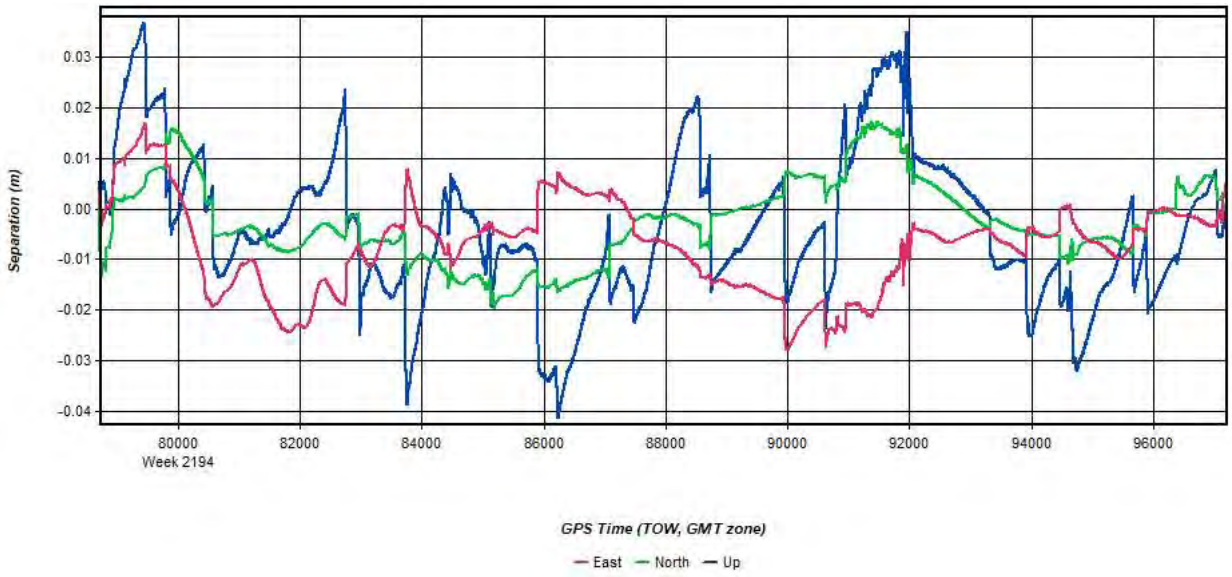
Inertial Explorer Version 8.90.2124
01/25/2022

Figure 1: Smoothed TC Combined - Map



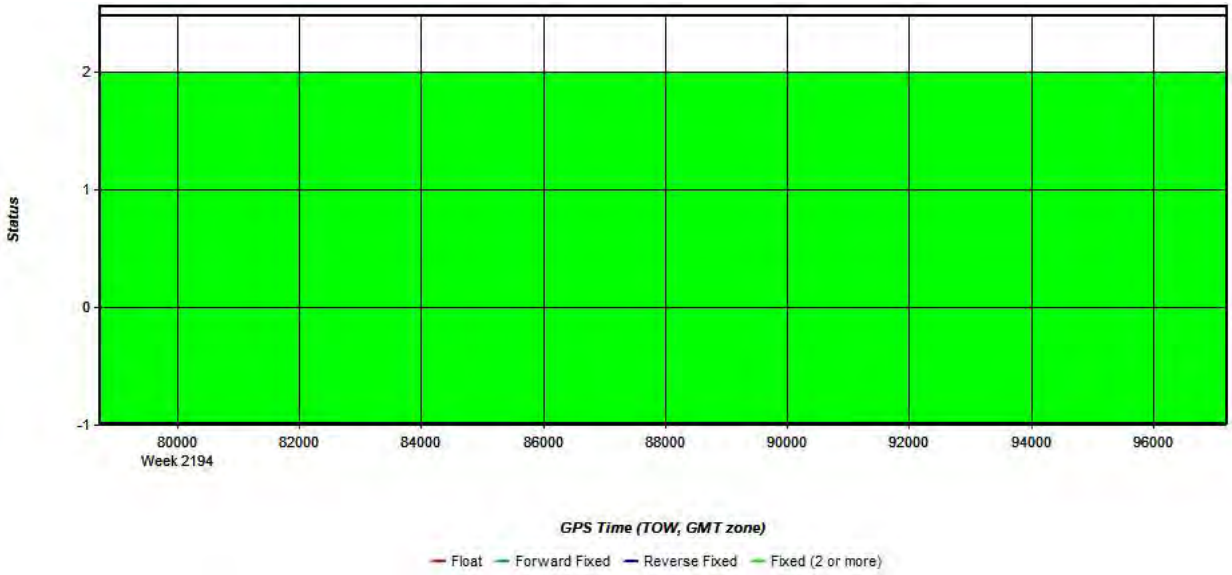
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 2: 20220123215056_9 [Smoothed TC Combined] - Forward/Reverse or Combined Separation Plot



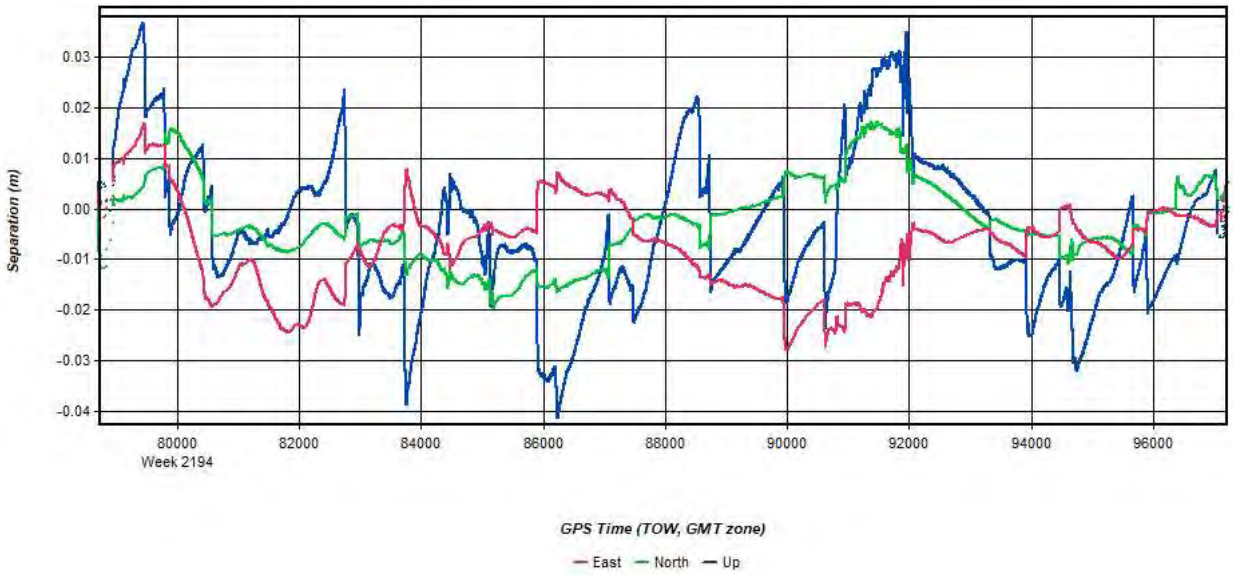
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 3: 20220123215056_9 [Smoothed TC Combined] - Float or Fixed Ambiguity



Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 4: 20220123215056_9 [Smoothed TC Combined] - Forward/Reverse Separation Plot (Fixed)

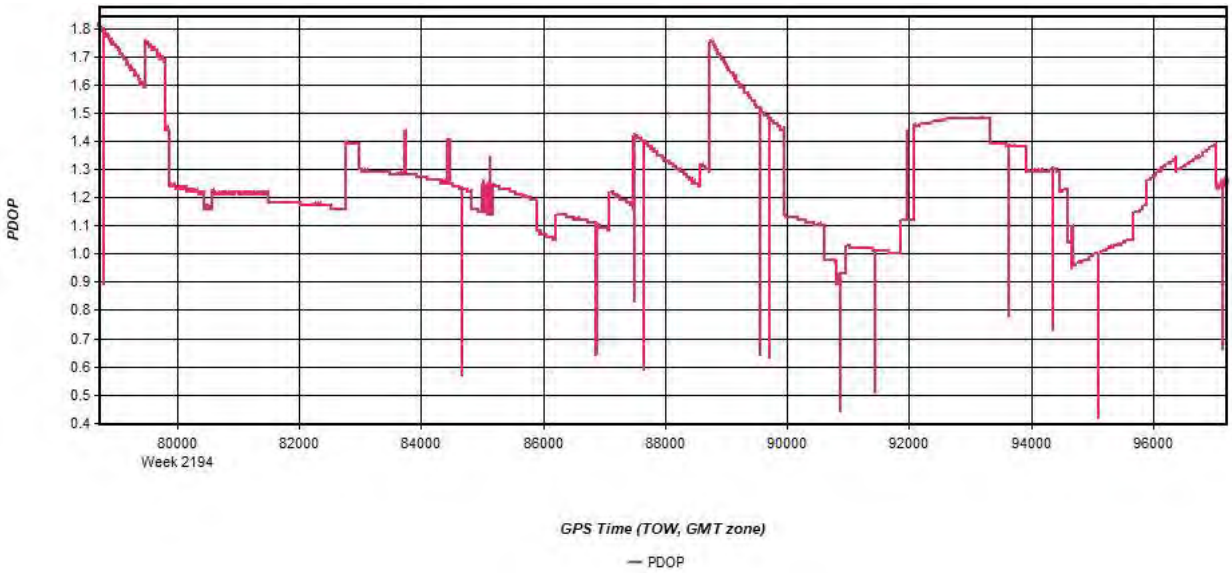


Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 5: 20220123215056_9 [Smoothed TC Combined] - Estimated Position Accuracy Plot

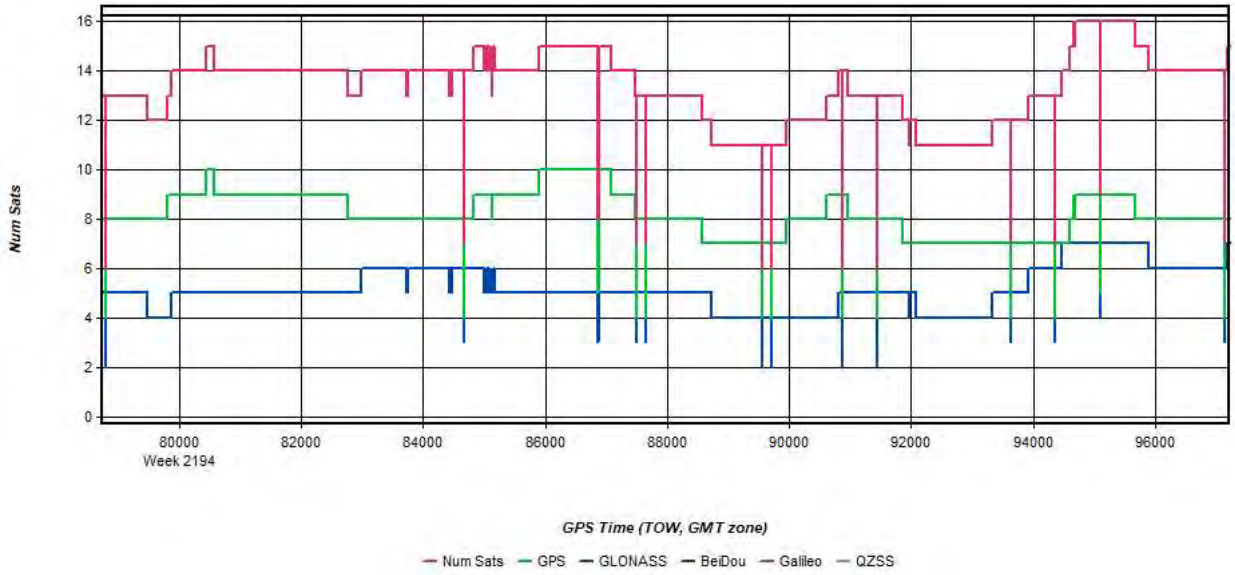
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 6: 20220123215056_9 [Smoothed TC Combined] - PDOP Plot



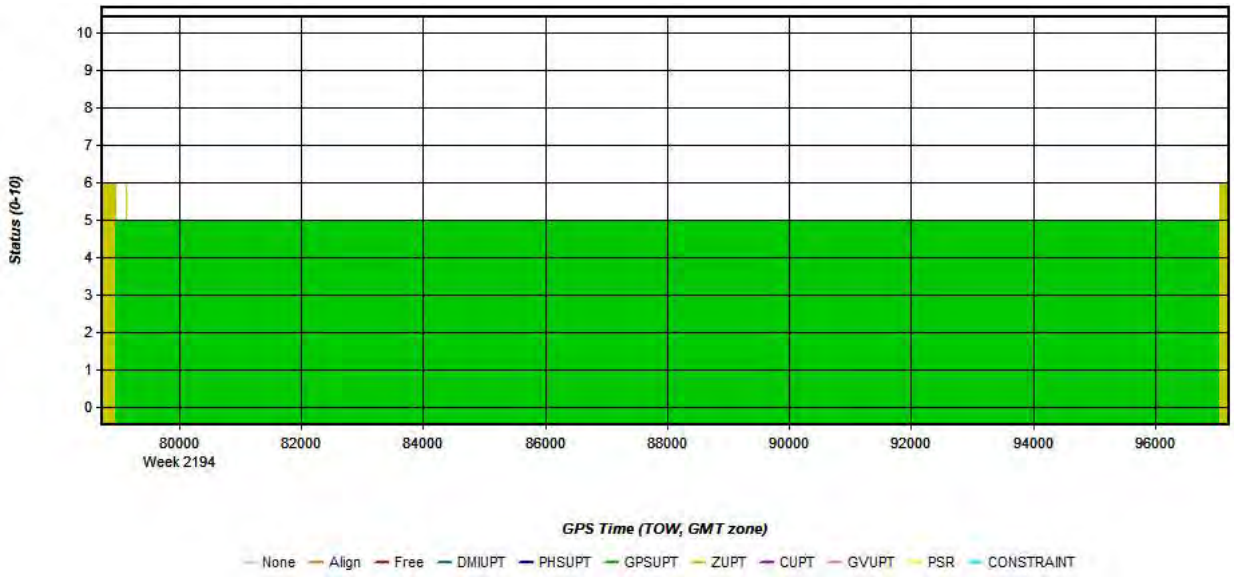
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 7: 20220123215056_9 [Smoothed TC Combined] - Number of Satellites Line Plot



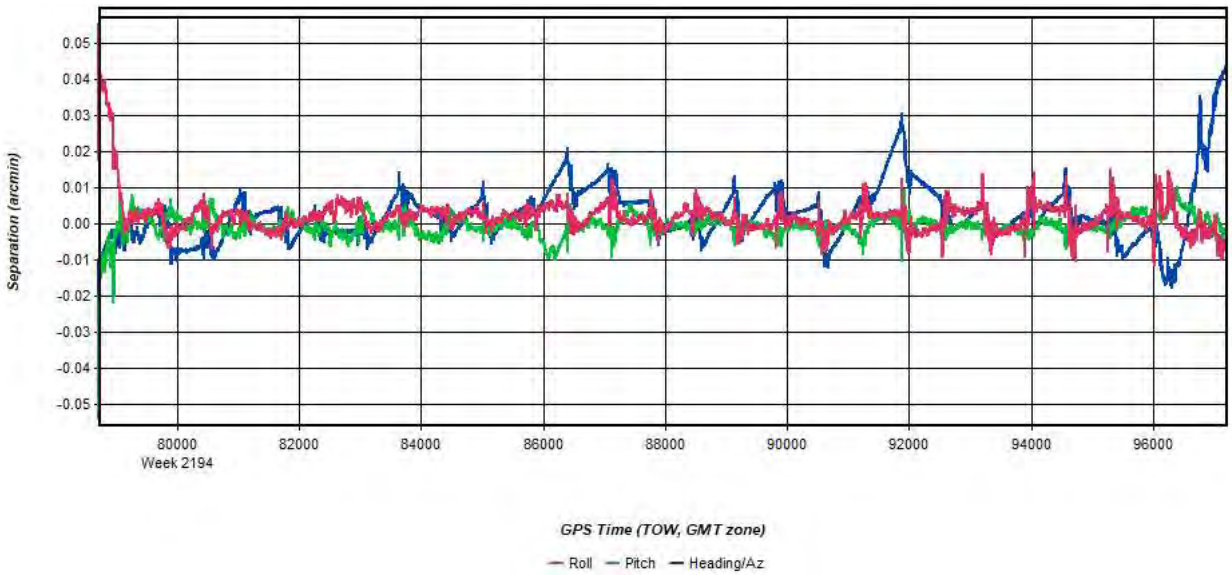
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 8: 20220123215056_9 [Smoothed TC Combined] - Status flag for IMU processing



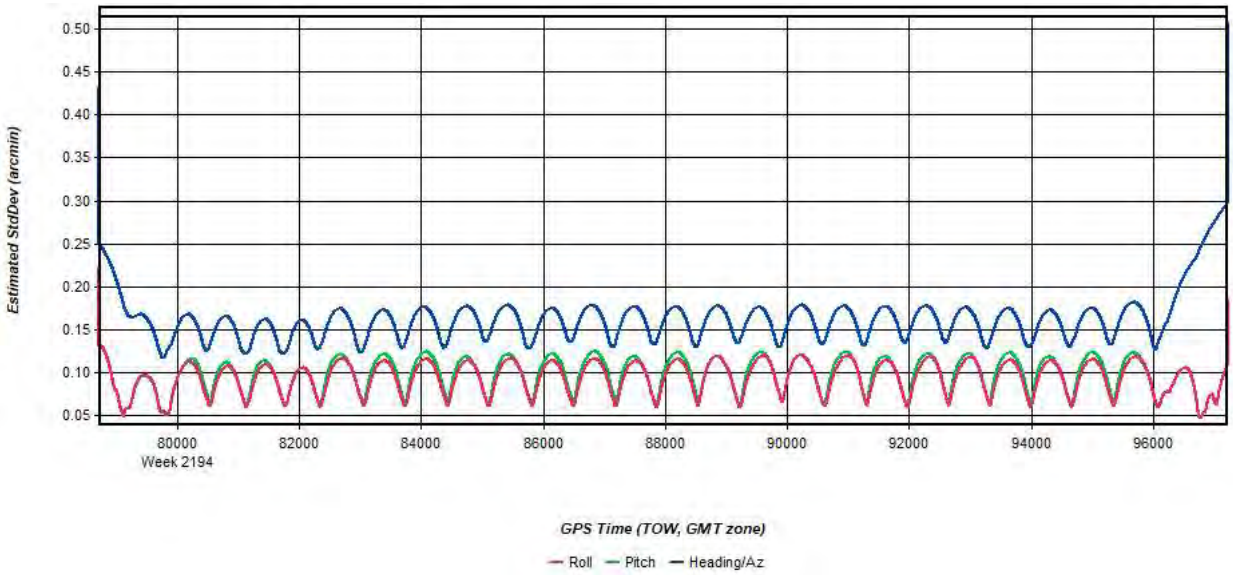
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 9: 20220123215056_9 [Smoothed TC Combined] - Fwd/Rev Attitude Separation Plot



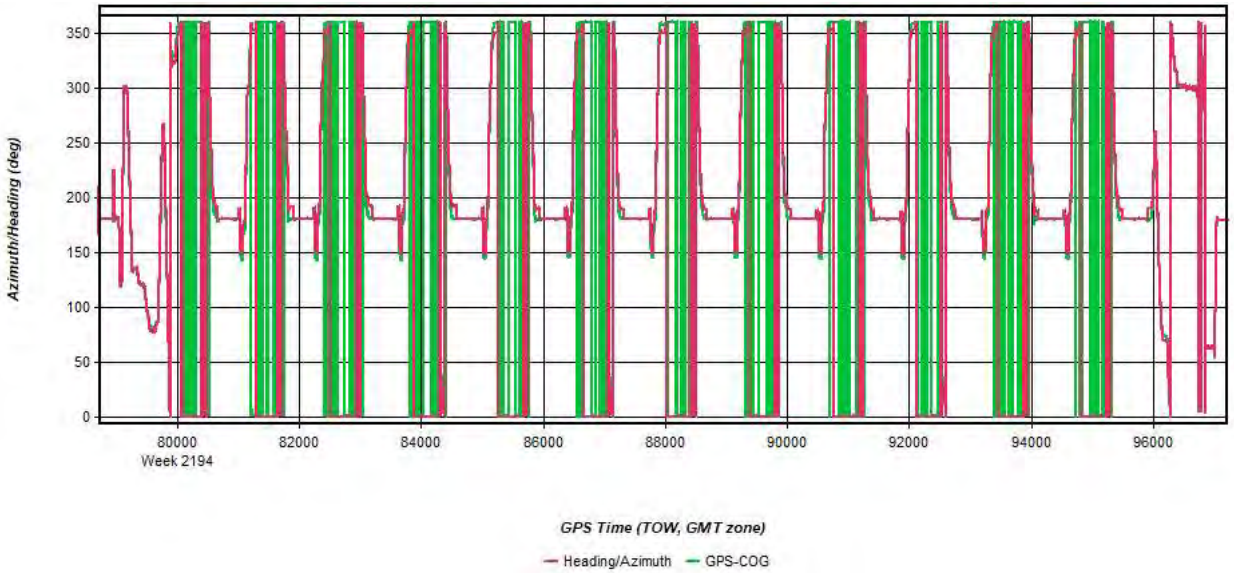
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 10: 20220123215056_9 [Smoothed TC Combined] - Estimated Attitude Accuracy Plot



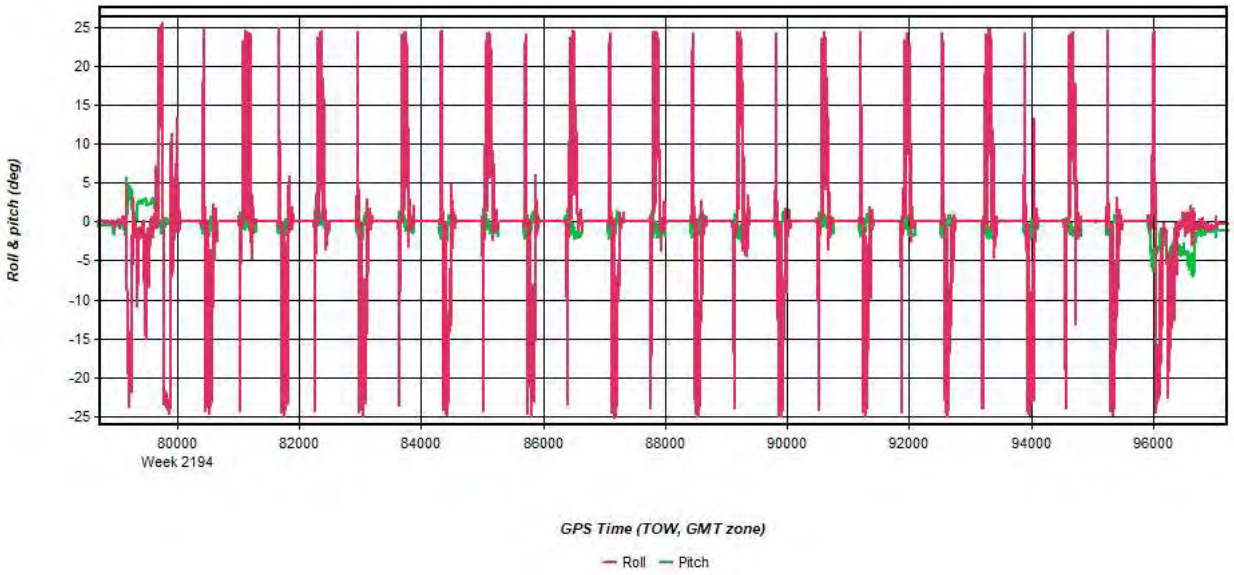
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 11: 20220123215056_9 [Smoothed TC Combined] - Azimuth Plot



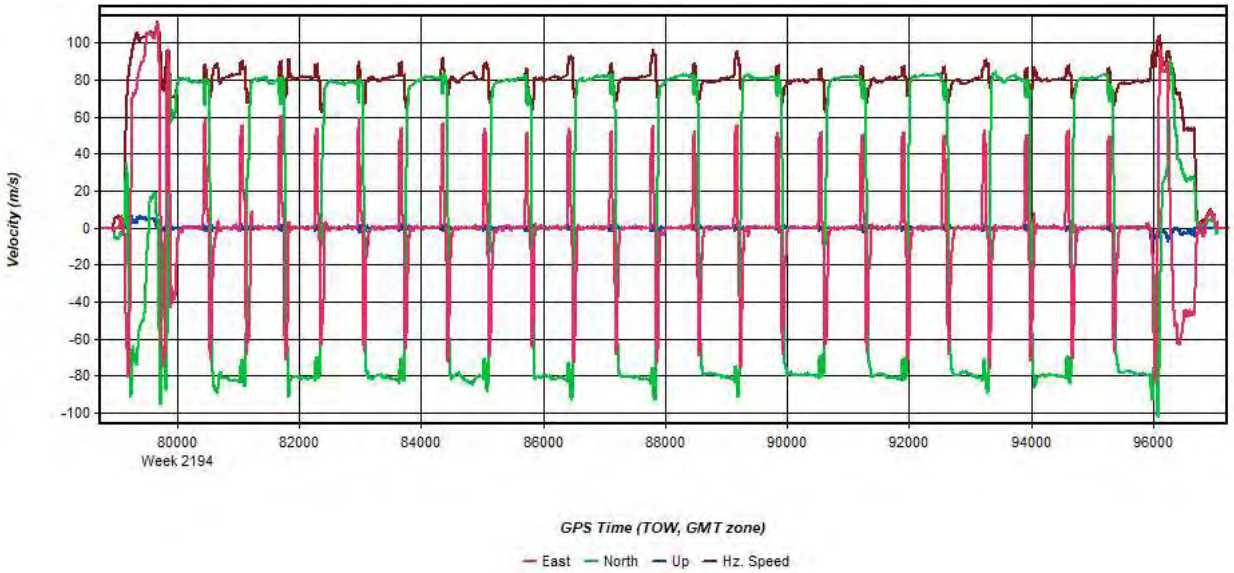
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 12: 20220123215056_9 [Smoothed TC Combined] - Roll & Pitch Plot



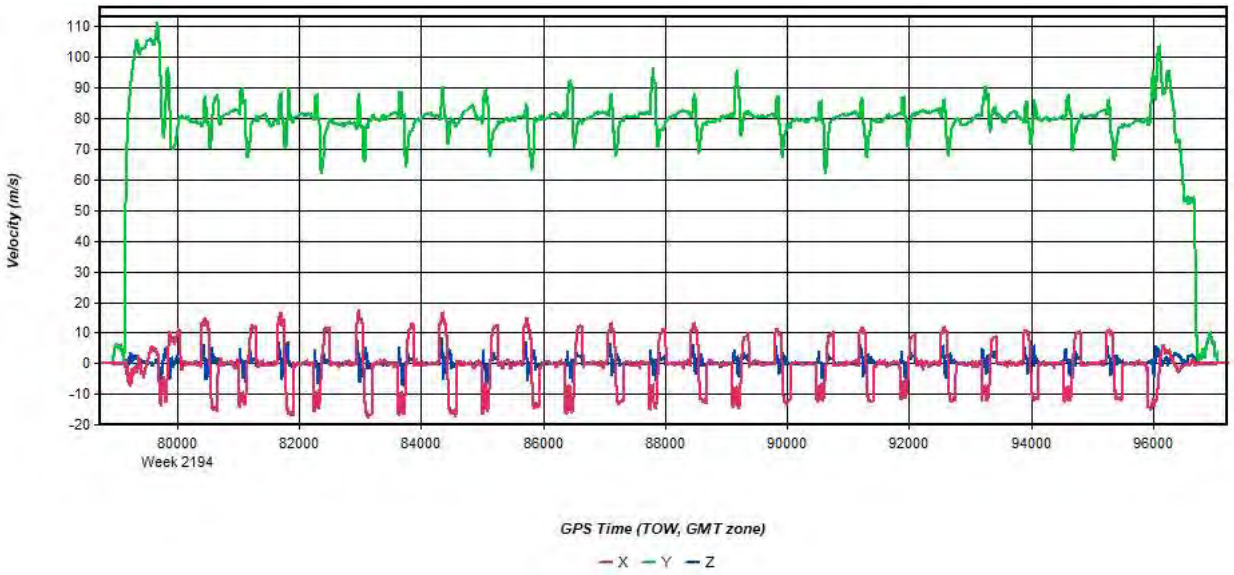
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 13: 20220123215056_9 [Smoothed TC Combined] - Velocity Profile Plot



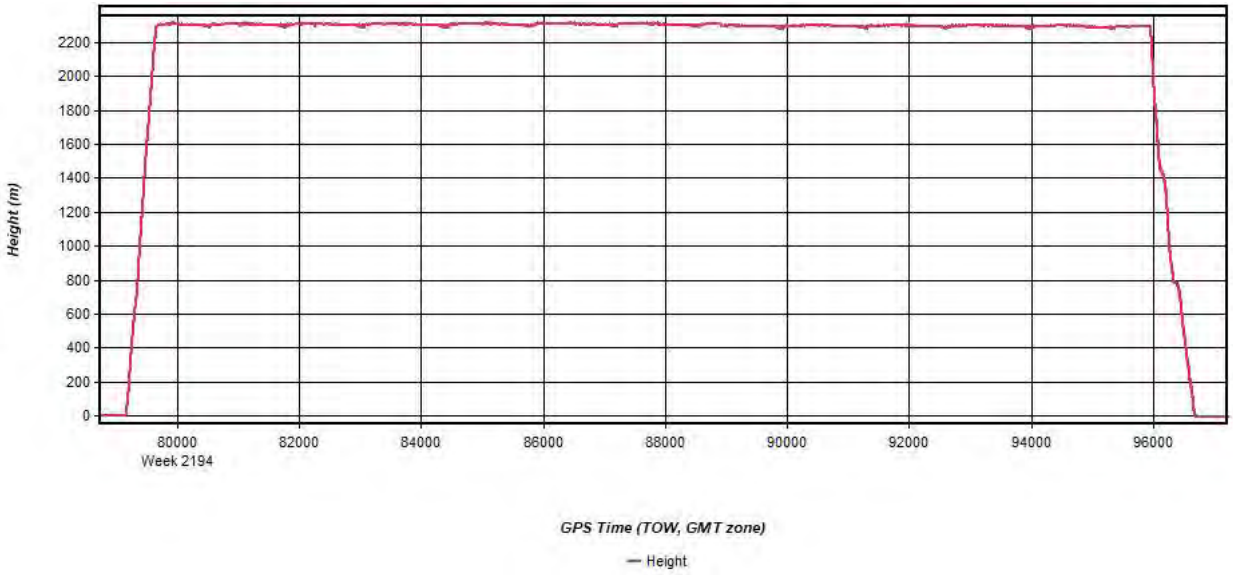
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 14: 20220123215056_9 [Smoothed TC Combined] - Body Frame Velocity Plot



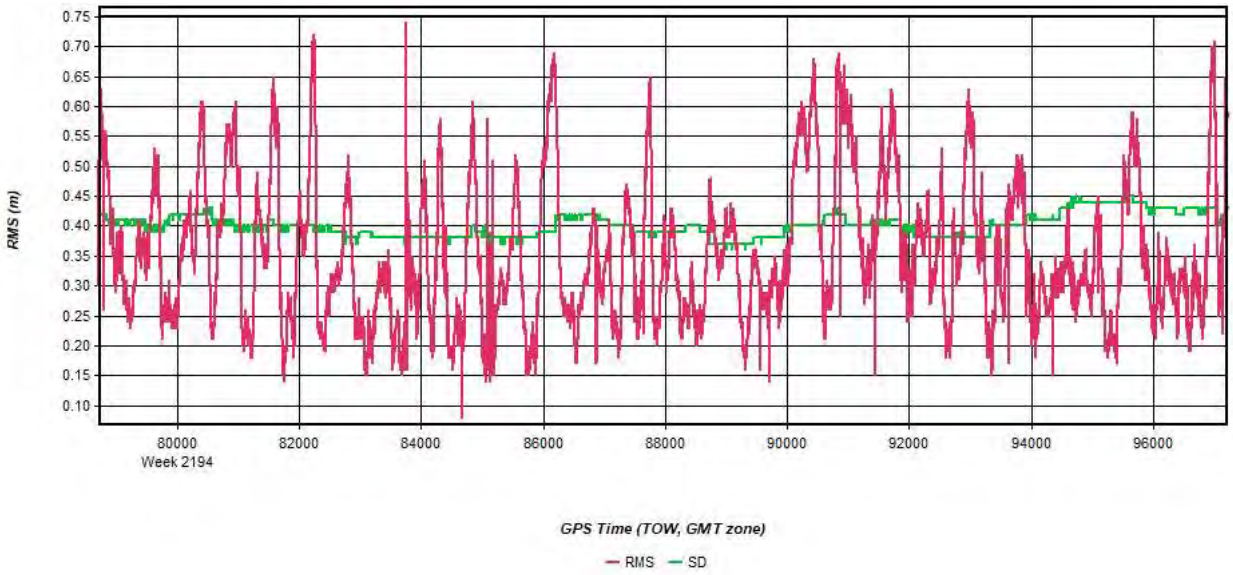
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 15: 20220123215056_9 [Smoothed TC Combined] - Height Profile Plot



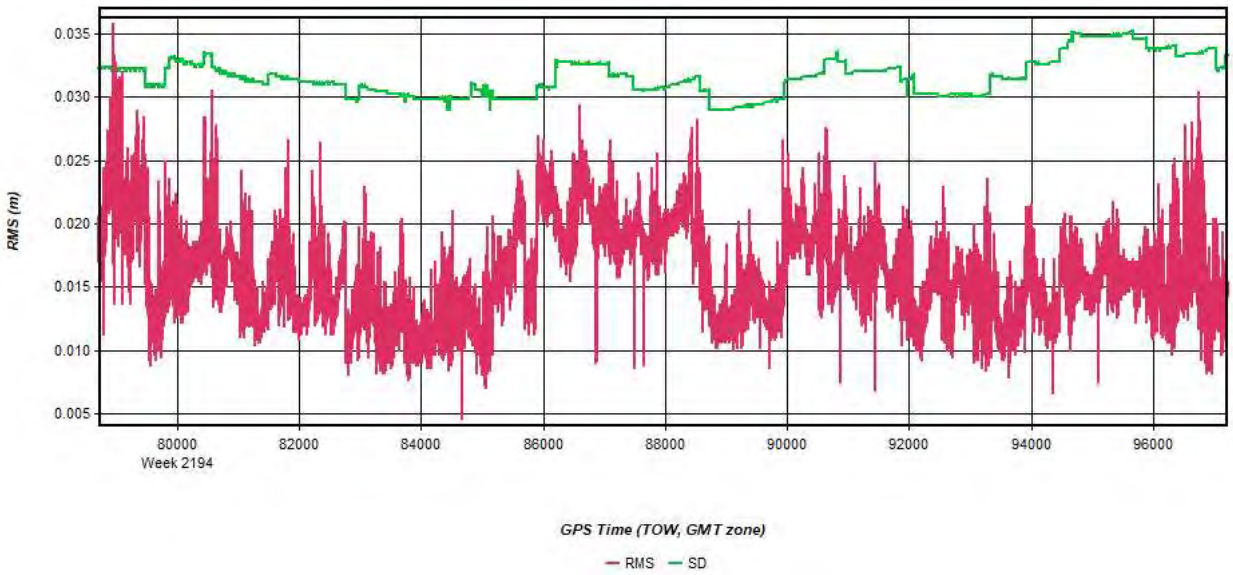
Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 16: 20220123215056_9 [Smoothed TC Combined] - C/A Code Residual RMS Plot



Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 17: 20220123215056_9 [Smoothed TC Combined] - Carrier Residual RMS Plot



Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

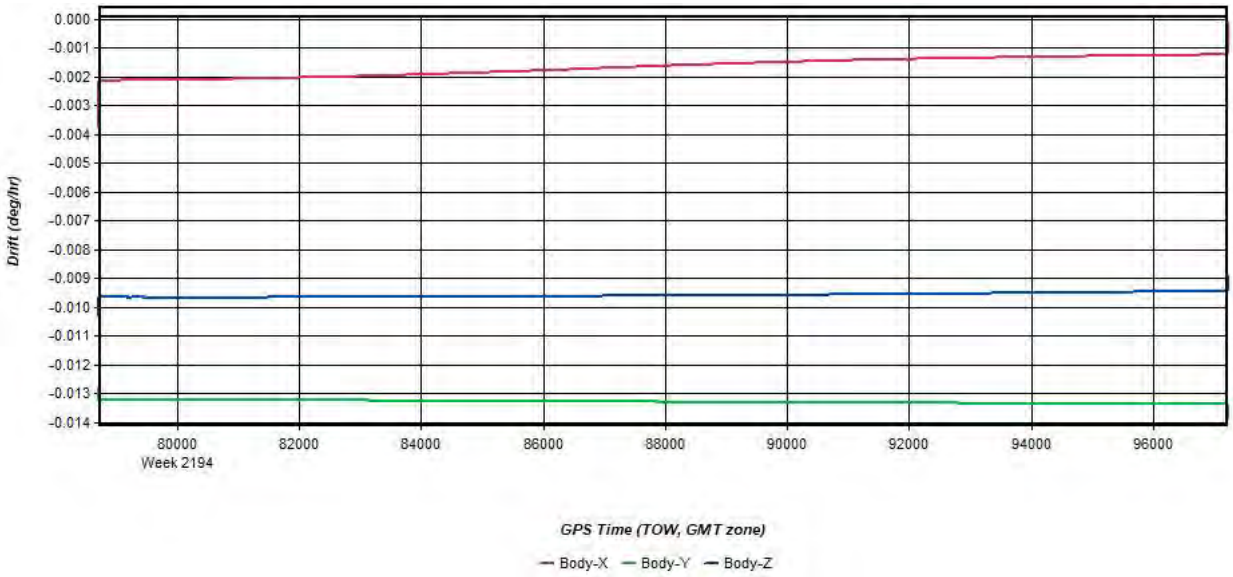
Figure 18: 20220123215056_9 [Smoothed TC Combined] - L1 Doppler Residual RMS Plot

Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 19: 20220123215056_9 [Smoothed TC Combined] - Accelerometer Bias Plot

Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Figure 20: 20220123215056_9 [Smoothed TC Combined] - Gyro Drift Plot



Process	20220123215056_9	by Unknown	on 1/25/2022	at 16:21:07

Appendix E. Vertical Accuracy Flight Line & Scan Direction