Project Report Appendices

The following section contains the appendices as listed in the S.C. Pennsylvania 2017 QL2 LiDAR Project Report.

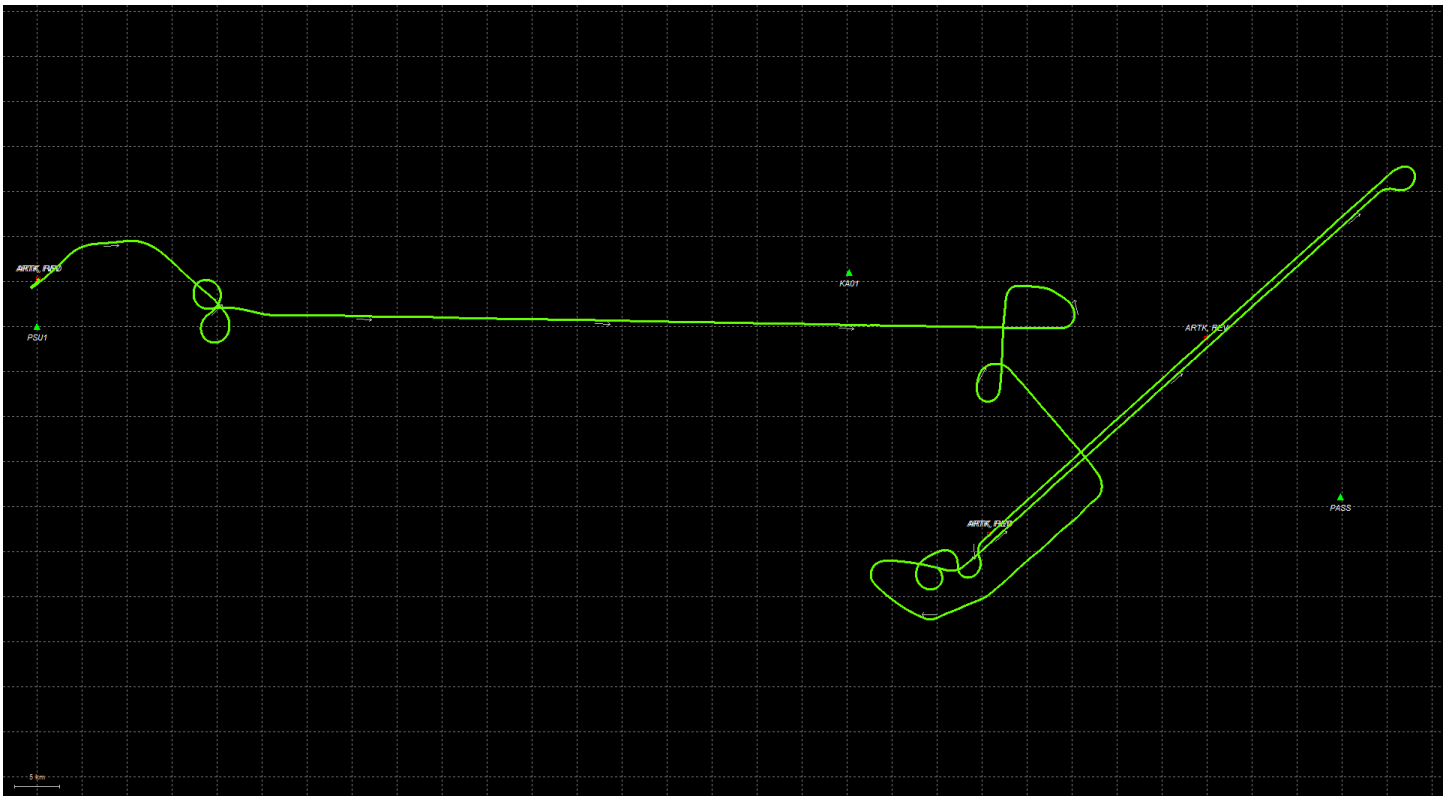
Appendix A

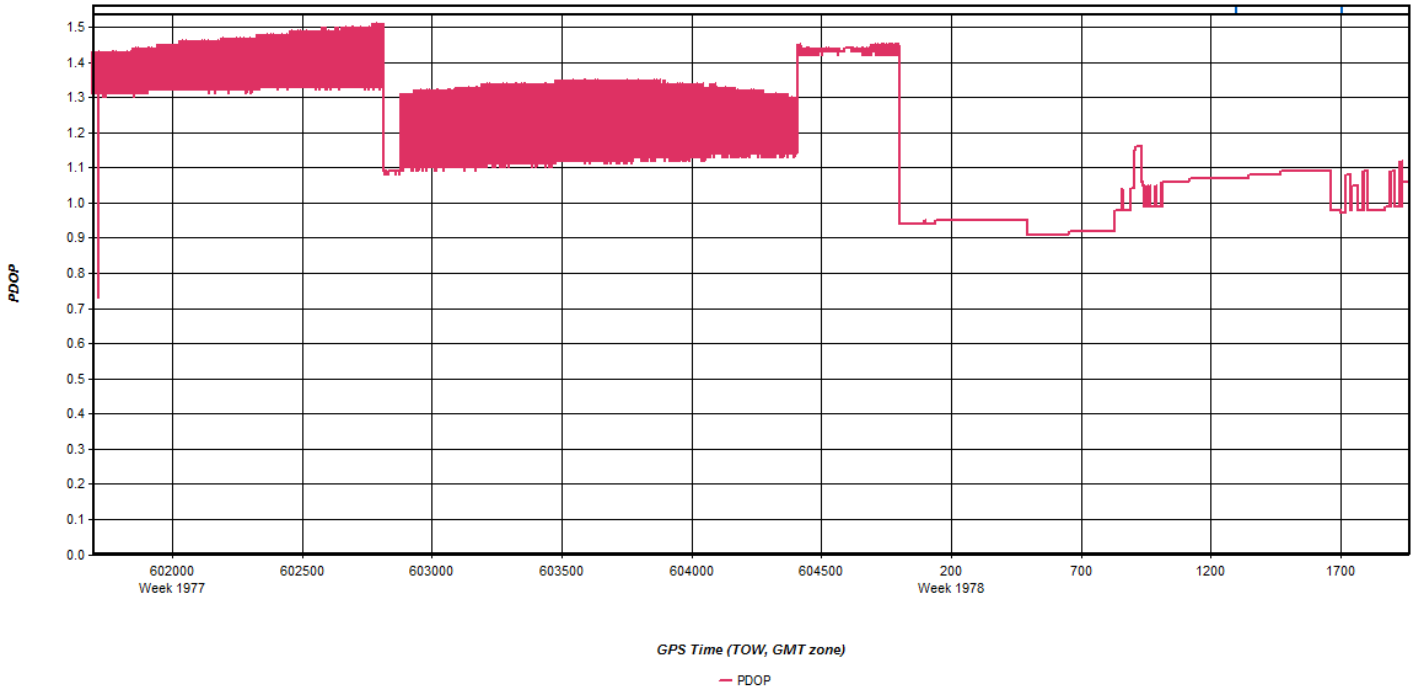
GPS/IMU Processing Statistics
Flight Logs
Base Station Logs

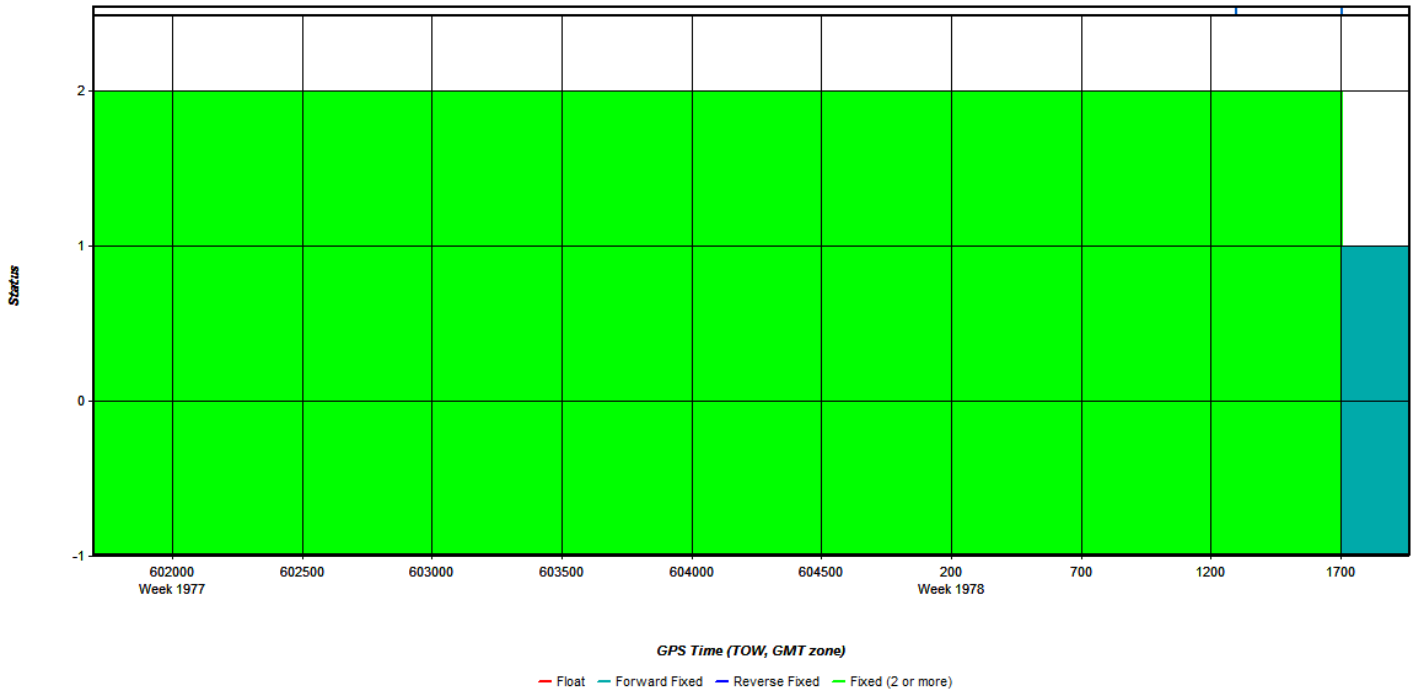
There were twenty total lifts. Flight-related data are found on the following pages.

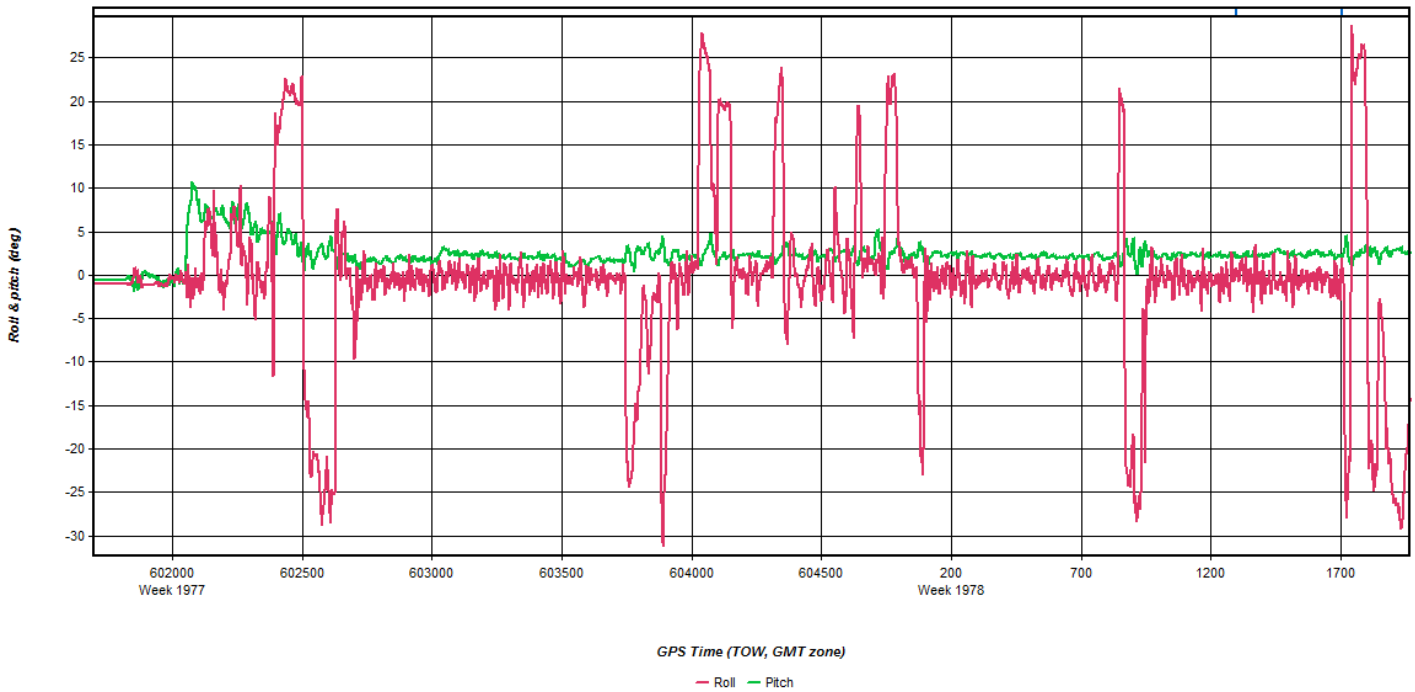
December 2, 2017-C (SN7161, N812TB) 1
December 3, 2017-B (SN7161, N812TB) 10
December 4, 2017-A (SN7161, N812TB) 19
February 27, 2018-A (SN7229, N103RM) 28
February 27, 2018-B (SN7229, N103RM) 36
February 28, 2018-A (SN7229, N103RM) 44
February 28, 2018-B (SN7229, N103RM) 52
February 28, 2018-C (SN7229, N103RM) 60
March 1, 2018-A (SN7229, N103RM) 67
March 6, 2018-A (SN7229, N103RM) 75
March 6, 2018-B (SN7229, N103RM) 83
April 5, 2018-A (SN7229, N103RM) 91
April 7, 2018-A1 (SN7229, N103RM) 100
April 7, 2018-A2 (SN7229, N103RM) 107
April 7, 2018-B (SN7229, N103RM) 115
April 9, 2018-A (SN7229, N103RM) 123
April 11, 2018-A1 (SN7229, N103RM) 131
April 11, 2018-A2 (SN7229, N103RM) 138
April 12, 2018-A (SN7229, N103RM) 146
April 13, 2018-A (SN7229, N103RM) 154

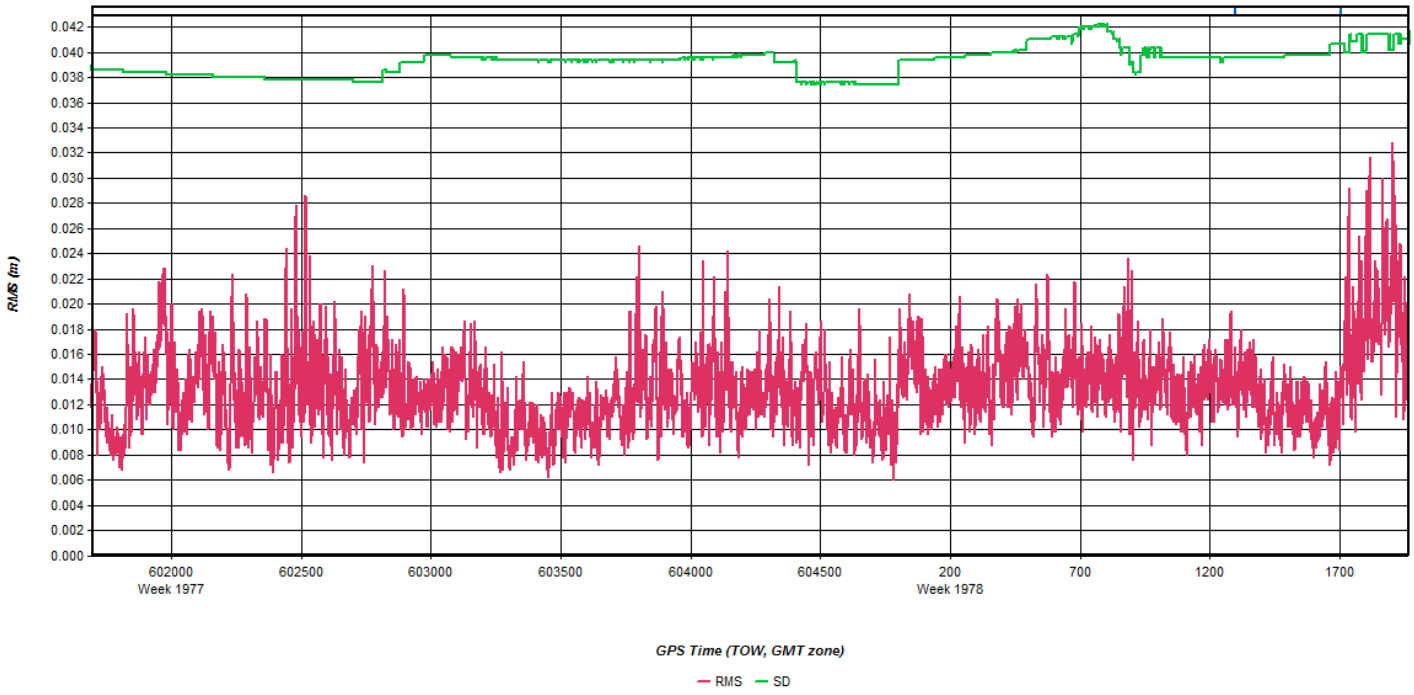
December 2, 2017-C (N812TB, SN7161)

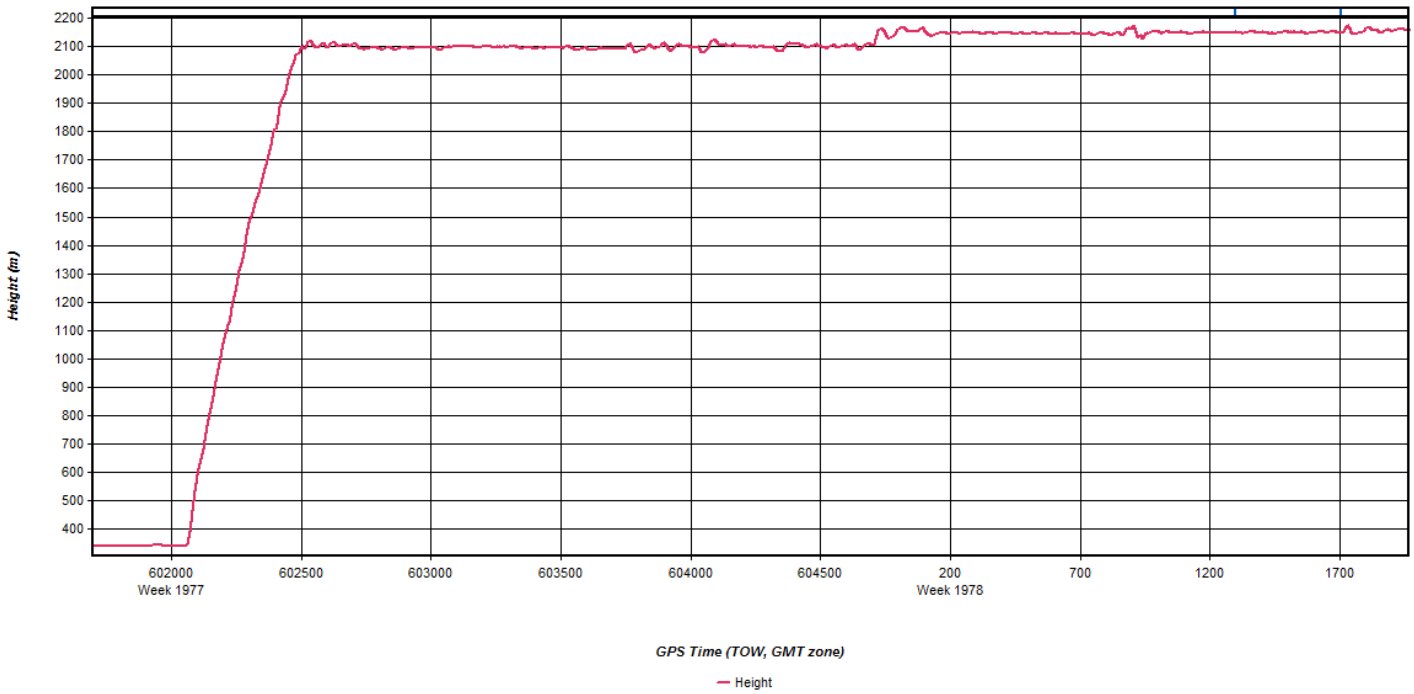

ARTK, FIXD
PSU1
KA01
ARTK, REV
ARTK, FIXD
PASS
5 km

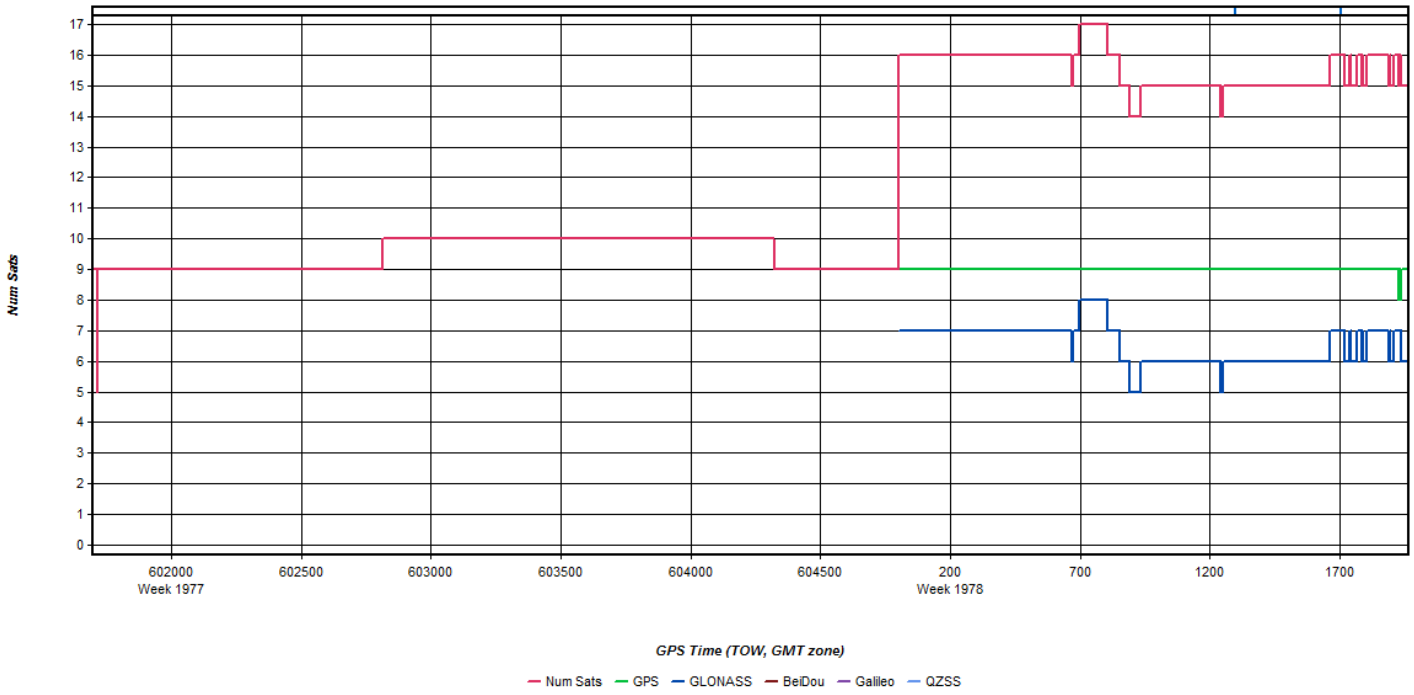

PDOP
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
PDOP

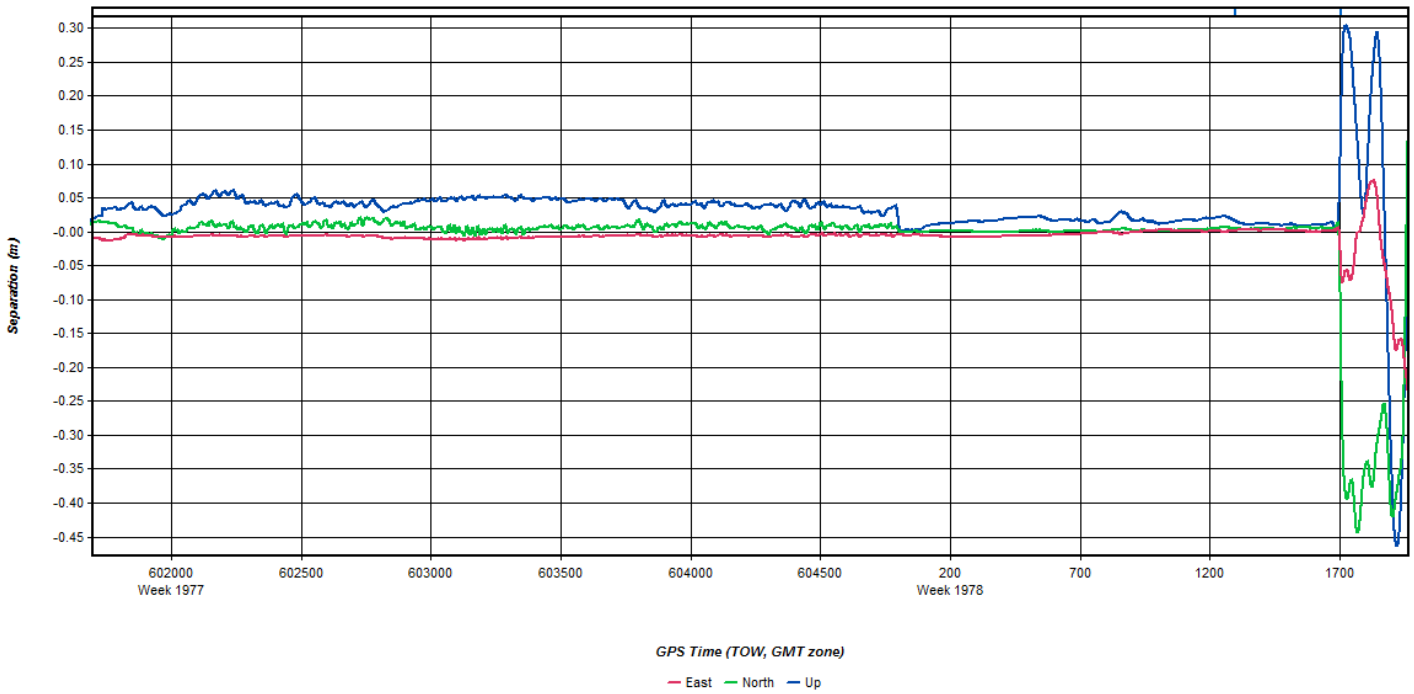

Status
2
1
0
-1
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

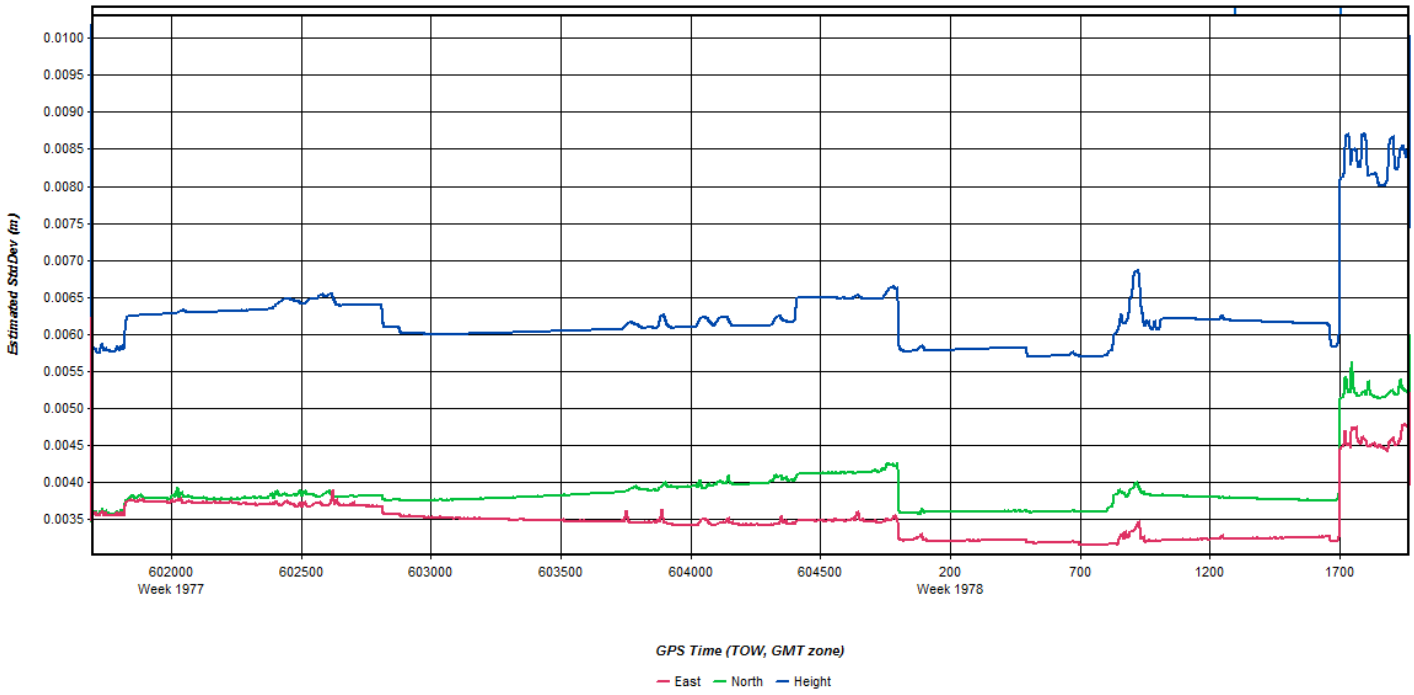

Roll & pitch (deg)
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
Roll
Pitch

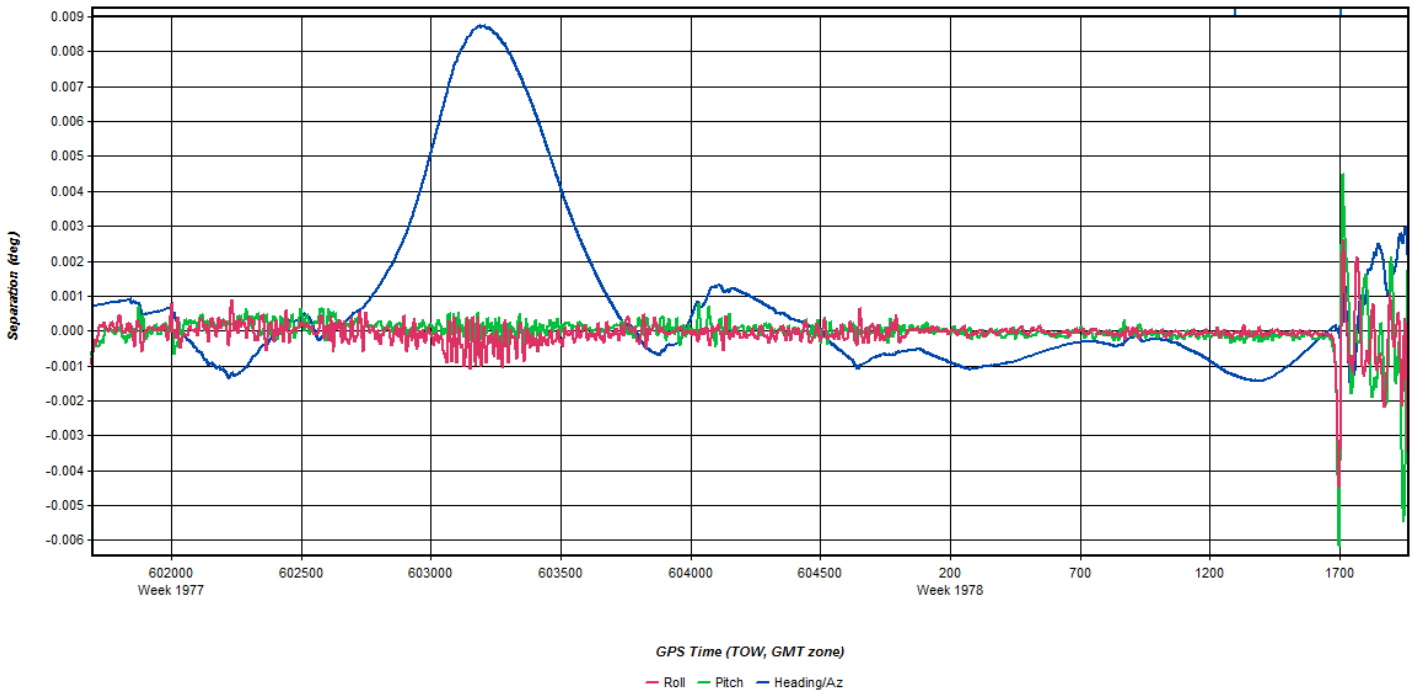

RMS (m)
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
RMS
SD

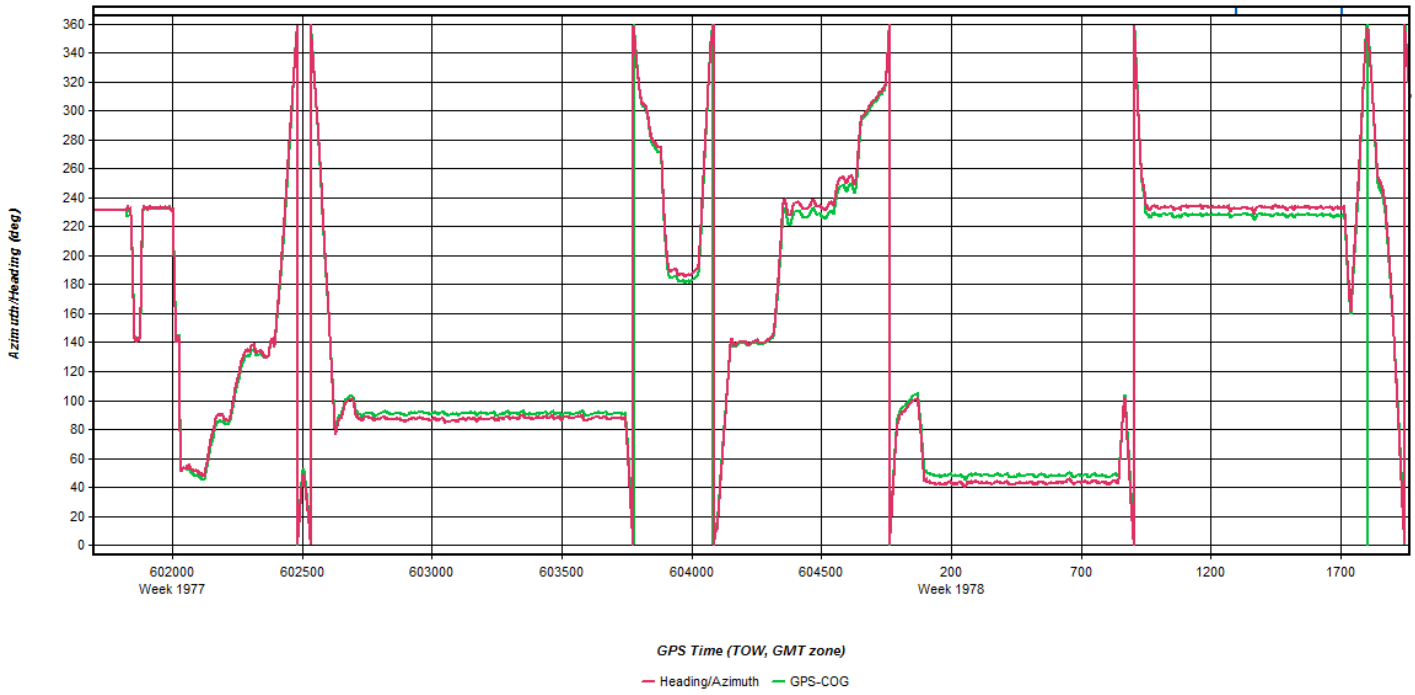

Height (m)
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
Height

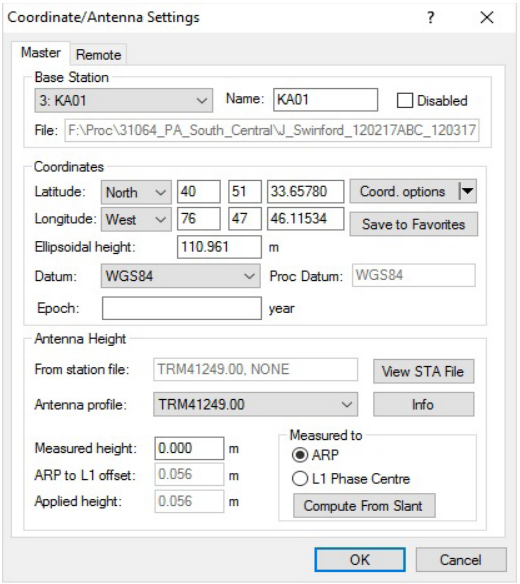

Num Sats
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS

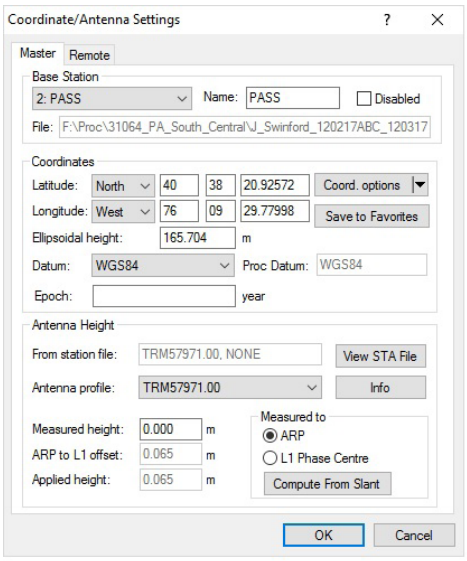

Separation (m)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
-0.45
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
East
North
Up

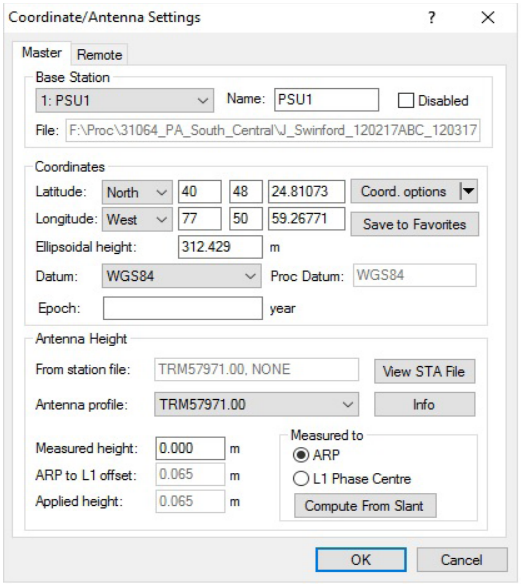

Estimated StdDev (m)
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
602000
Week 1977
602500
603000
603500
604000
604500
200
Week 1978
700
1200
1700
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
3: KA01
Name: KA01
Disabled
File: F:\Proc\31064_PA_South_Central\J_Swinford_120217ABC_120317
Coordinates
Latitude: North 40 51 33.65780
Coord. options
Longitude: West 76 47 46.11534
Save to Favorites
Ellipsoidal height: 110.961 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM41249.00, NONE
View STA File
Antenna profile: TRM41249.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.056 m
Applied height: 0.056 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel


Coordinate/Antenna Settings
Master
Remote
Base Station
2: PASS
Name: PASS
Disabled
File: F:\Proc\31064_PA_South_Central\J_Swinford_120217ABC_120317
Coordinates
Latitude: North 40 38 20.92572 Coord. options
Longitude: West 76 09 29.77998 Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PSU1
Name: PSU1
Disabled
File: F:\Proc\31064_PA_South_Central\J_Swinford_120217ABC_120317
Coordinates
Latitude: North 40 48 24.81073 Coord. options
Longitude: West 77 50 59.26771 Save to Favorites
Ellipsoidal height: 312.429 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc

(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 12/02/2017

Lift: A B (C) D E Pg 1 of 1

Project: PA LiDAR Proj #: 31064 Flight Mgmt File:

Aircraft: N812TB Begin Hobbs: 4811.9 End Hobbs: 4813.7 Total: 1.8 Pilot: Billington Co-Pilot: Tech: SWINFORD

Dep Apt: KUNV Dep Time (Lcl): 6:15 (Z): 23:15 Arr Apt: KUNV Arr Time (Local): (Z): Tot Time Aloft: 1.8

CORS: (Y) / N Sta 1: Sta 2: Flyovers: Y / (N) If Y, times: Sta1) Sta2)

GPS Unit: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

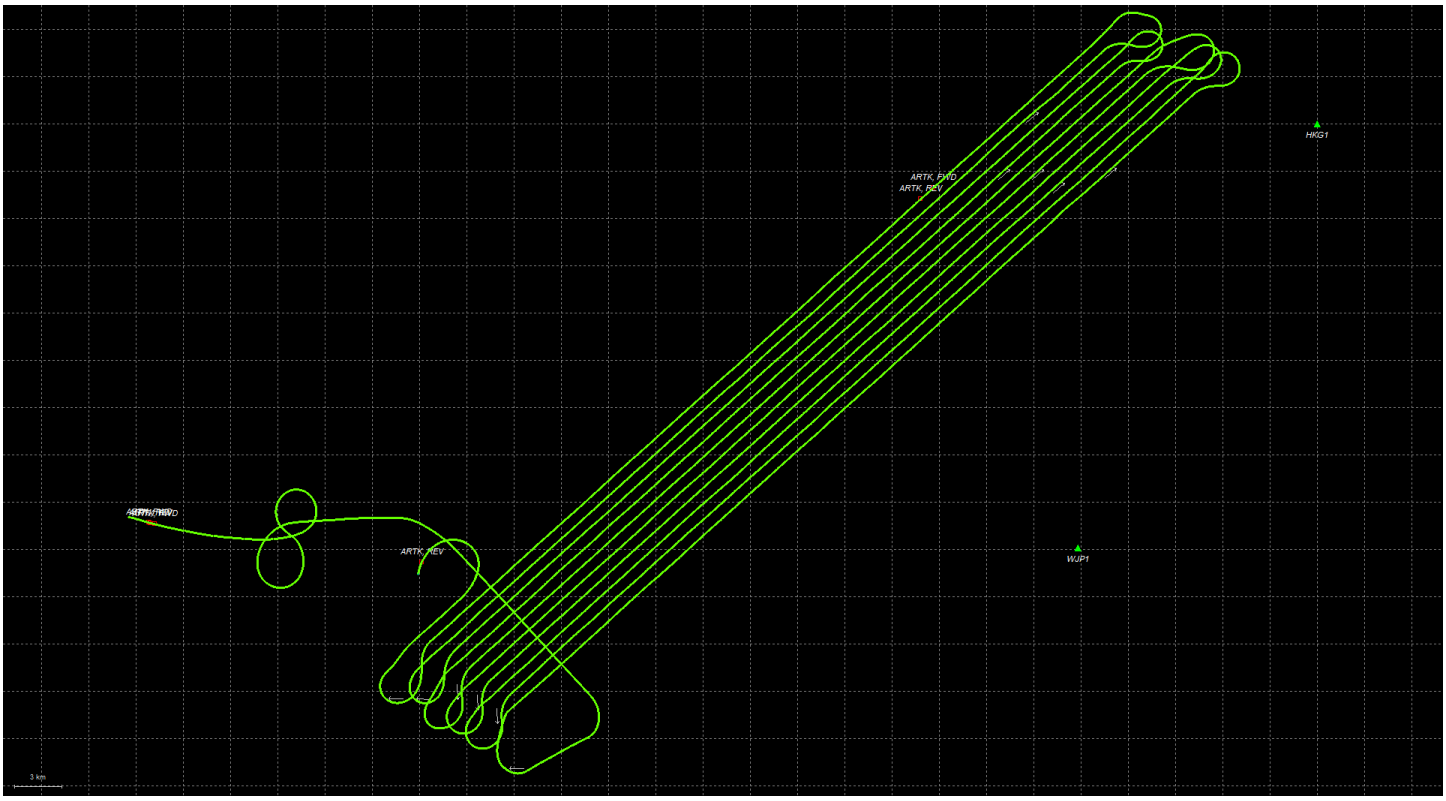
Gd Temp beg: °c End: °c OAT beg: °c End: °c Altimeter begin: end:

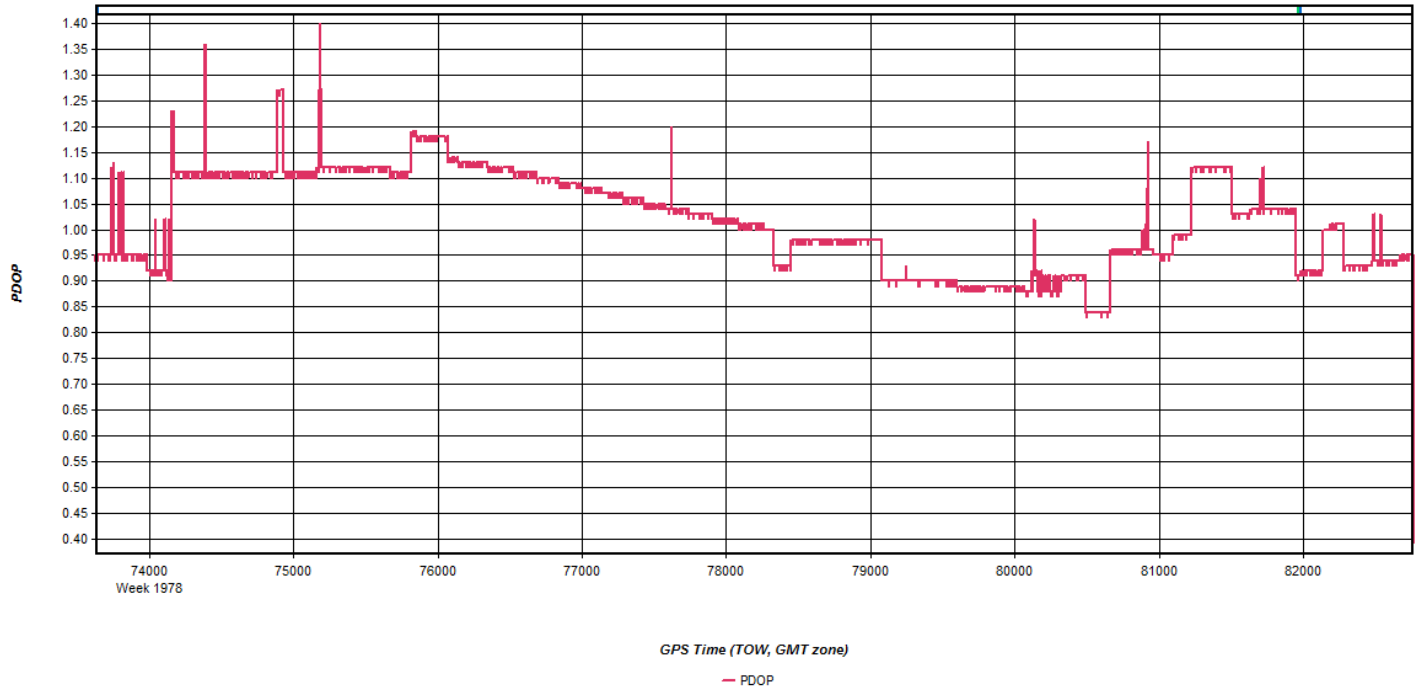
LiDAR									
Type ALS 70	Serial # 7161	Alt AGL	Alt AMSL	Avg Terr Ht	Max Gdspd	Avg Pt Spacing		Beg GB 145	Storage Name/# 016
FOV 36	Scan Freq 56	MpiA Y / N	Pulses In Air 2	Pulse Rate 274	Power 100 %	PPSM		End GB 128	
								Tot GB 17	

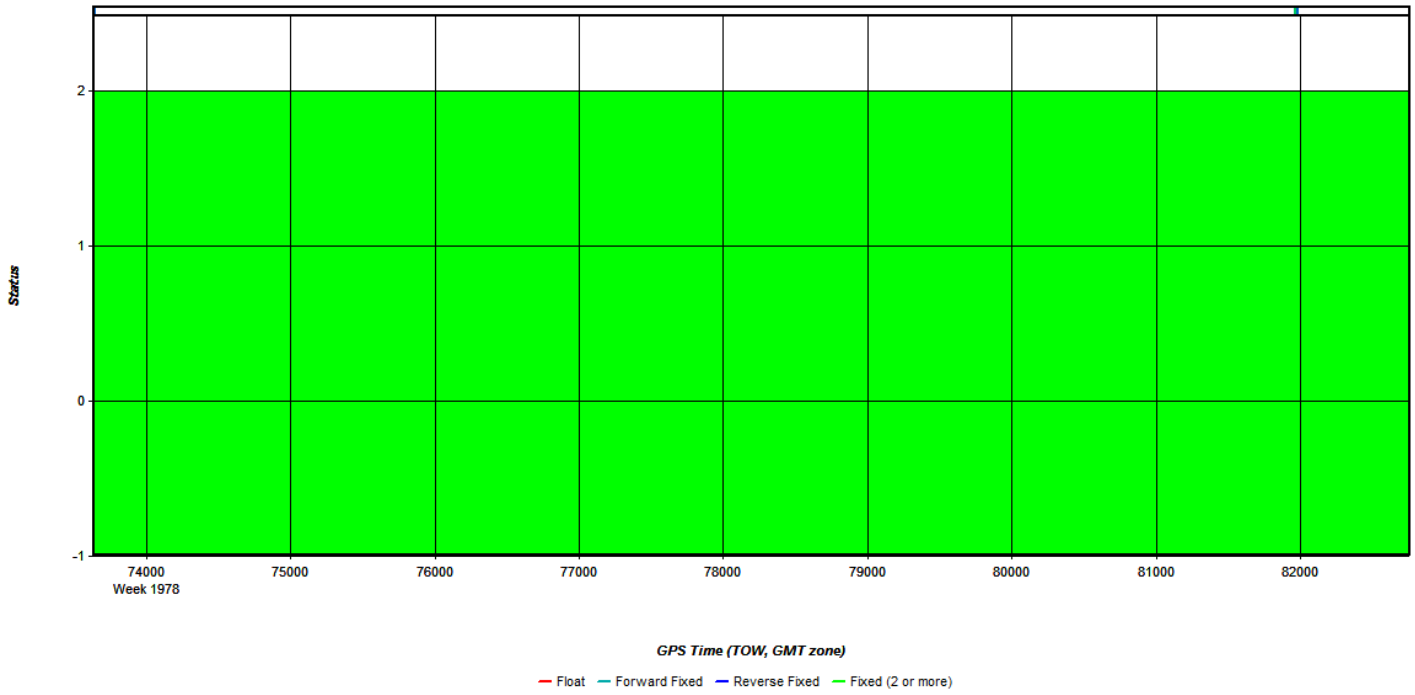
Line #	Hdg	Start (UTC):	End (UTC):	Gd Spd	PDOP/# Sats	GPS Altitude	Crab	Turb (0, -, +)	FLIGHT LINE NOTES – visibility, clouds, smoke, partial, etc.
1042	091	23:26	23:42	158	1.2/18	6800	10	0	FIG 8 @ 23:22 / REFLIGHT OF 1042
XTIE	180	23:45	23:47	161	1.4/17	6800	0	0	UNPLANNED LINE
XTIE	142	23:49	23:51	169	1.4/17	6800	0	0	UNPLANNED LINE / GPS MID-NIGHT
2023	048	00:02	00:14	155	1.4/18	7100	8	0	
2022	228	00:16	00:28	151	1.1/18	7100	8	0	AFTER END OF LINE (ALS ERROR - TDC RAN OUT OF BUFFER / REBOOT + ERROR CAME BACK)
									RTB
									ALS WARNING - TDC DATA FETCH TIMEOUT ERROR DUE TO NO MEM SWITCH SIGNAL ON I/O AUX 1 CONNECTION TO TDC

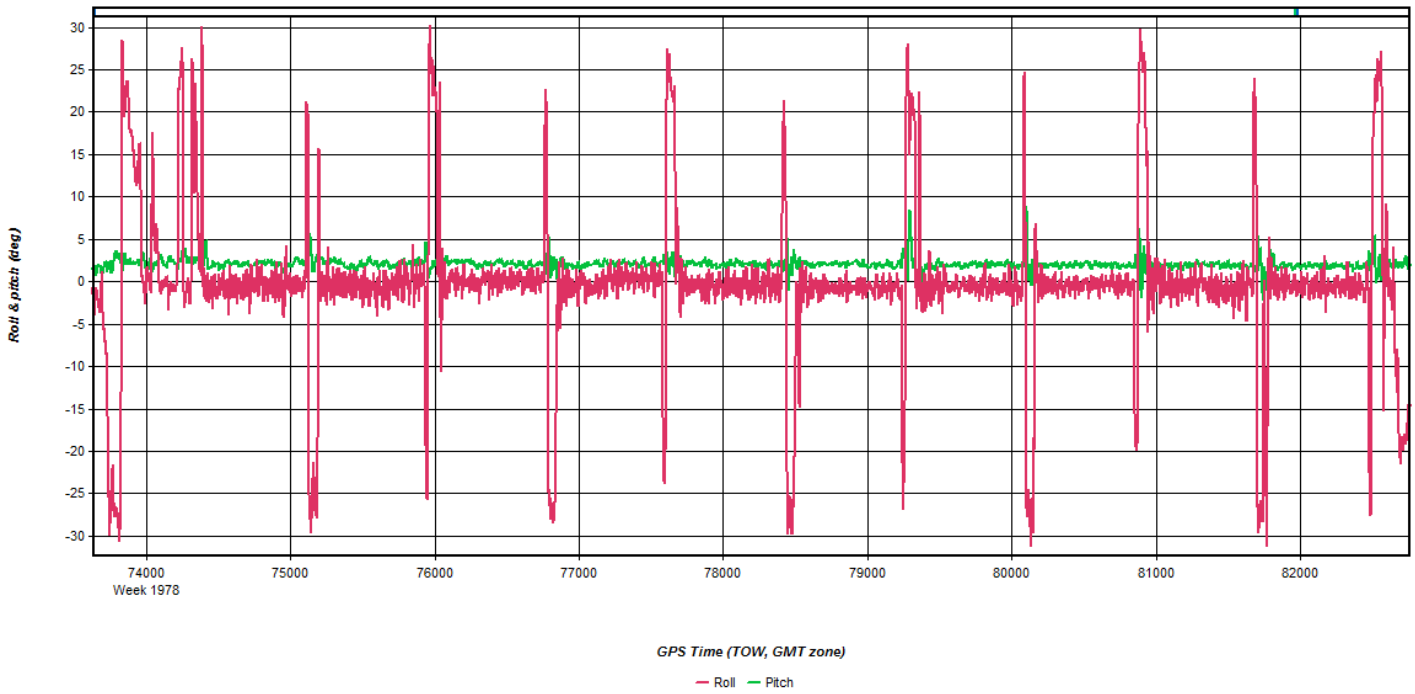
Total Proj Lines: Lines Flown: Lines Remain: Online Time: 1.0 Mob Time: .75 Notes:

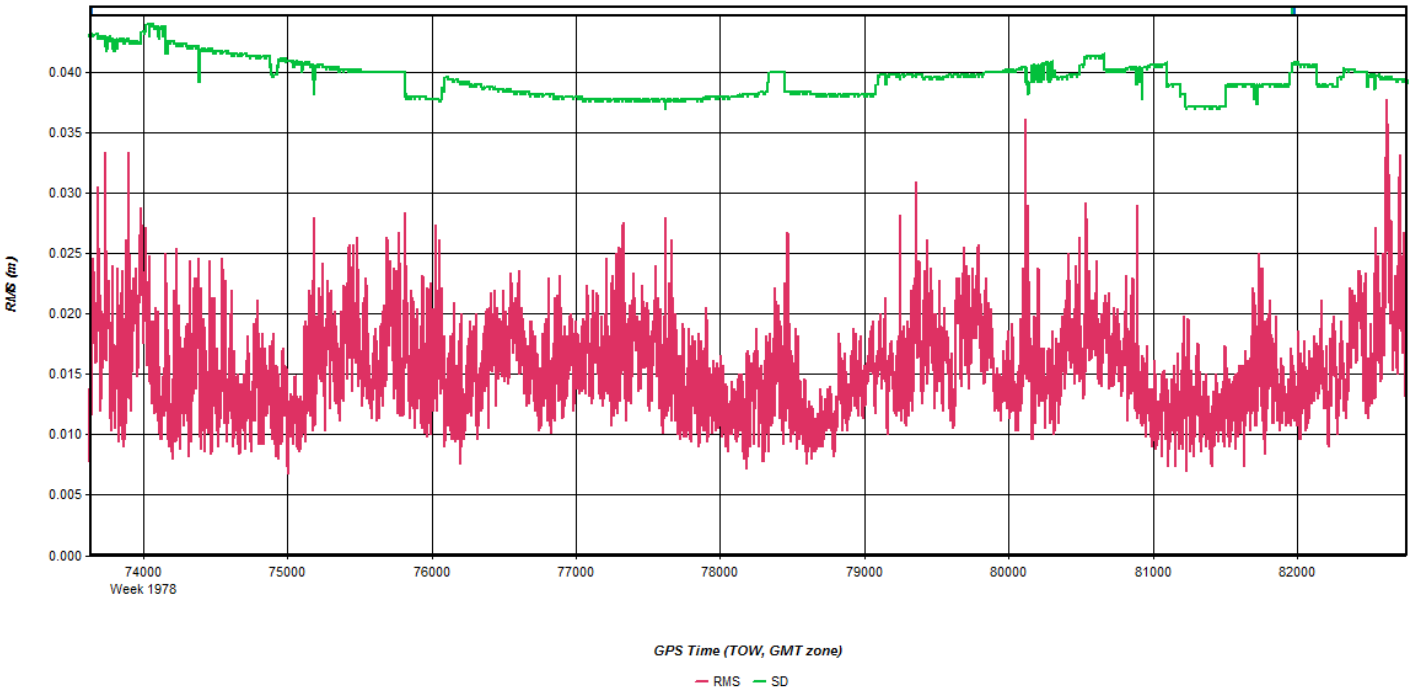
December 3, 2017-B (N812TB, SN7161)

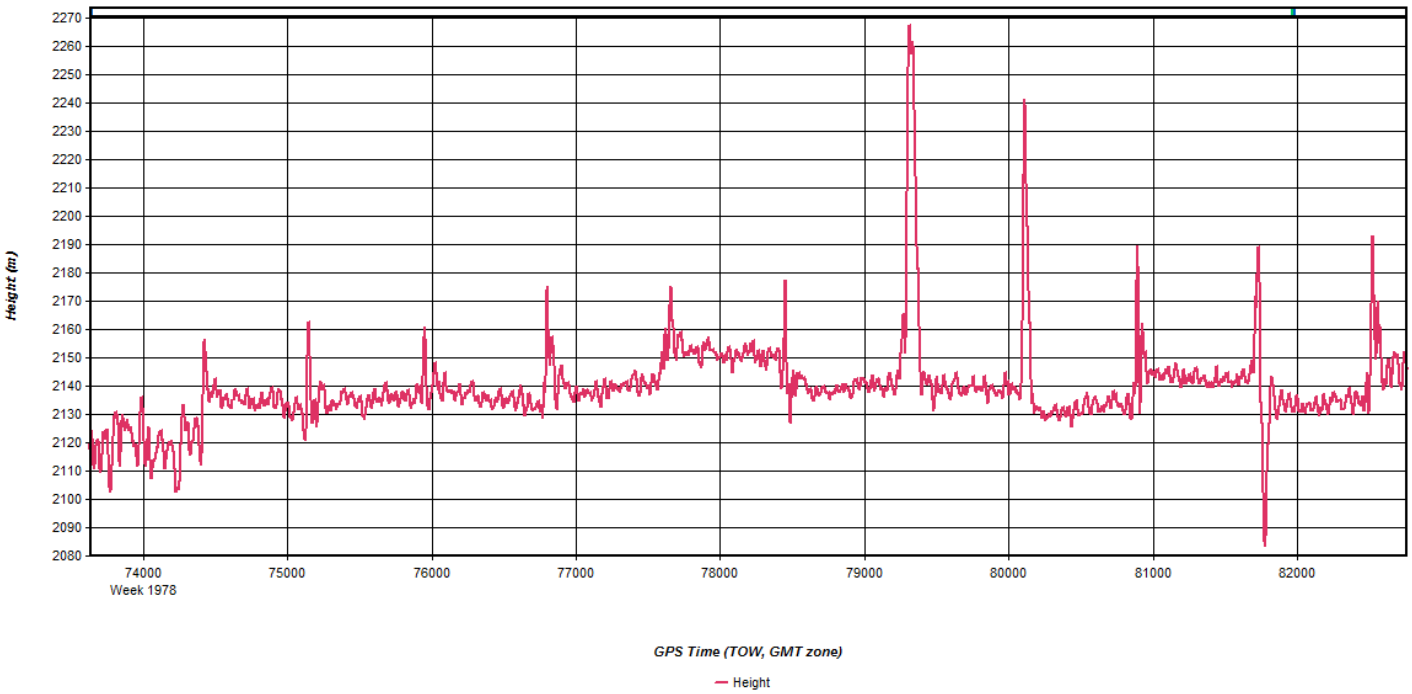

HKG1
ARTK_FWD
ARTK_REV
WJP1
ARTK_REV
3 km

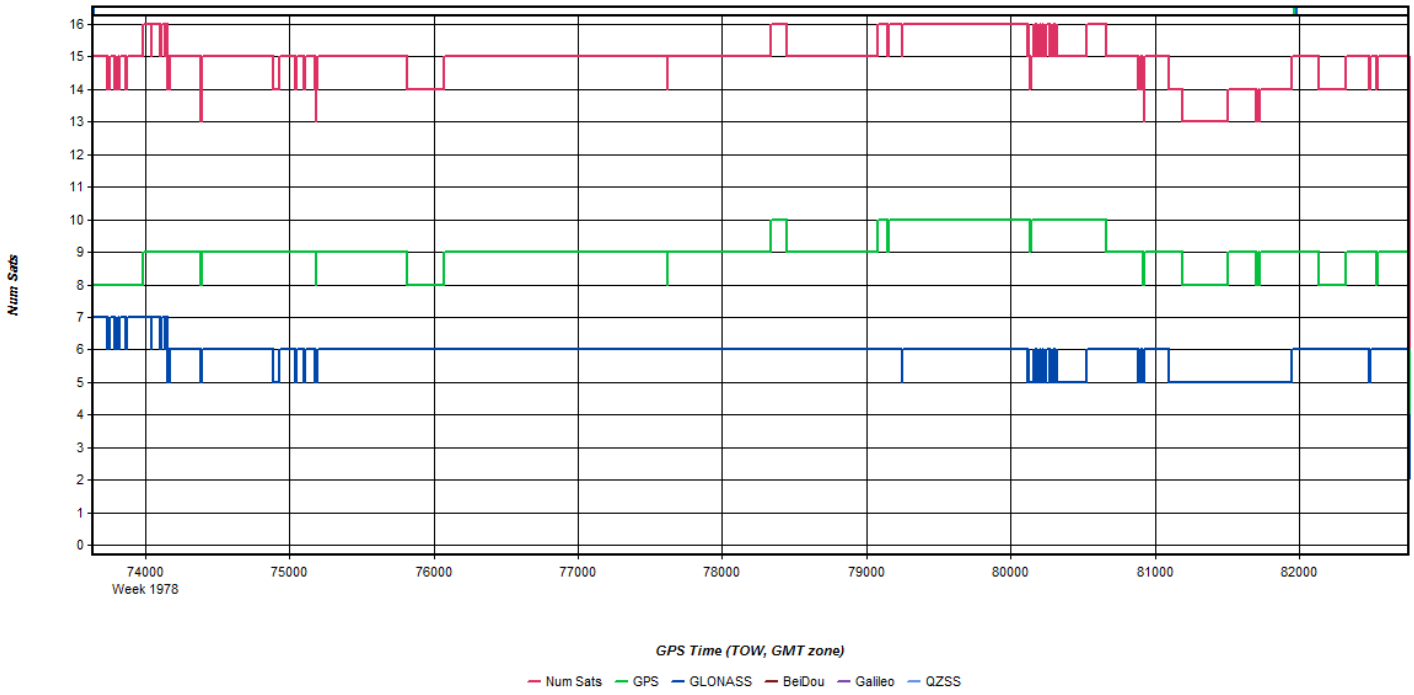

PDOP
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
PDOP

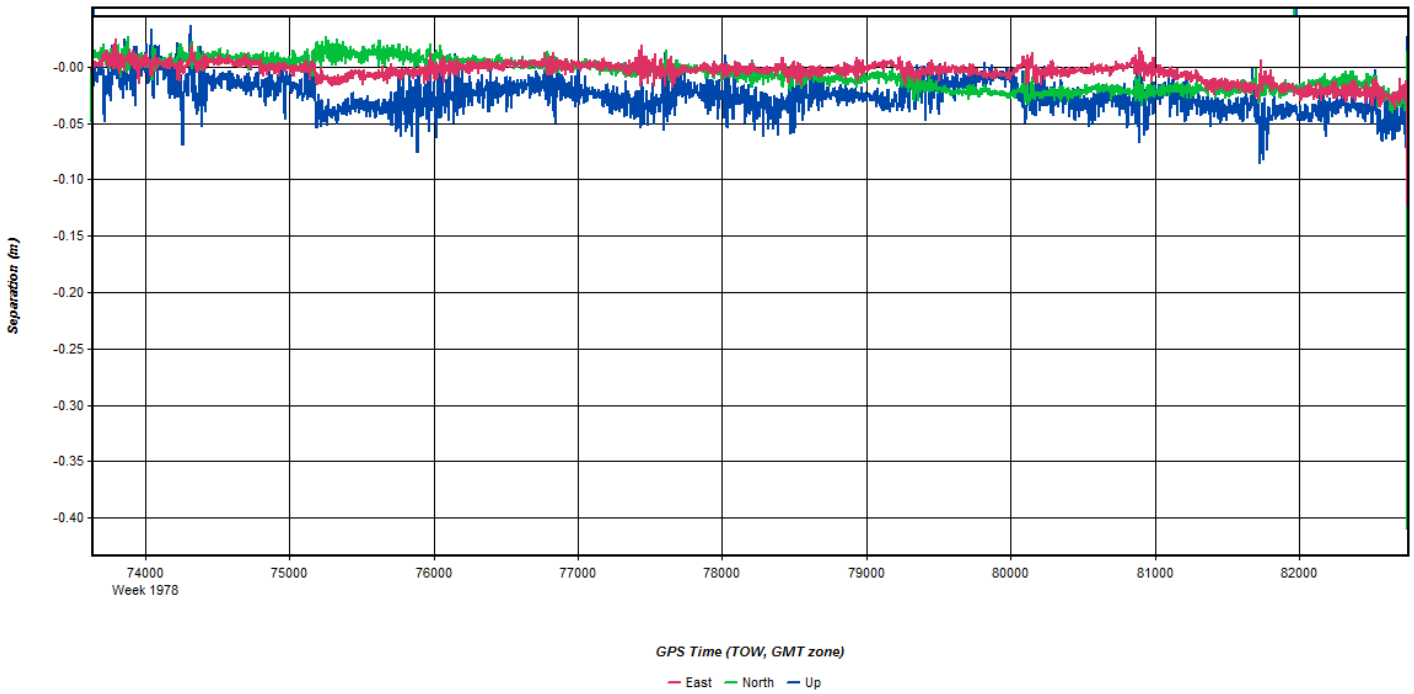

Status
2
1
0
-1
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

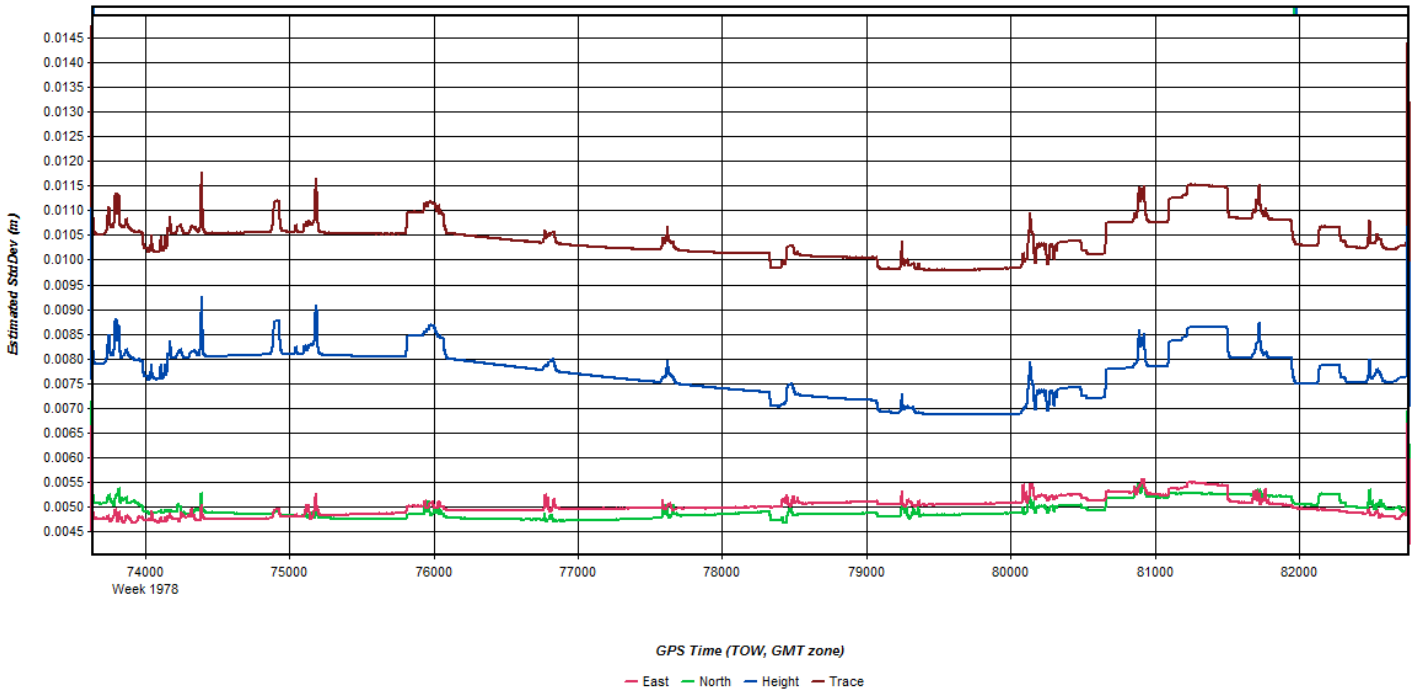

Roll & pitch (deg)
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
Roll
Pitch

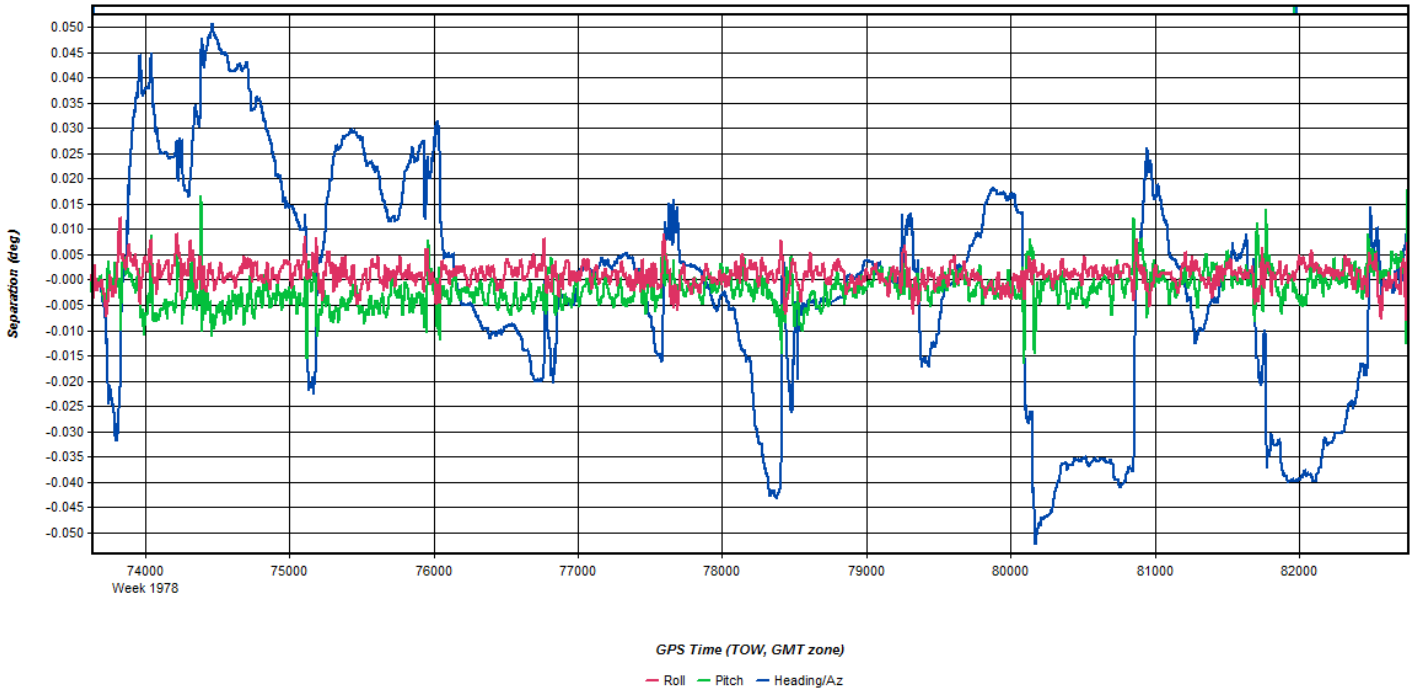

RMS (m)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
RMS
SD

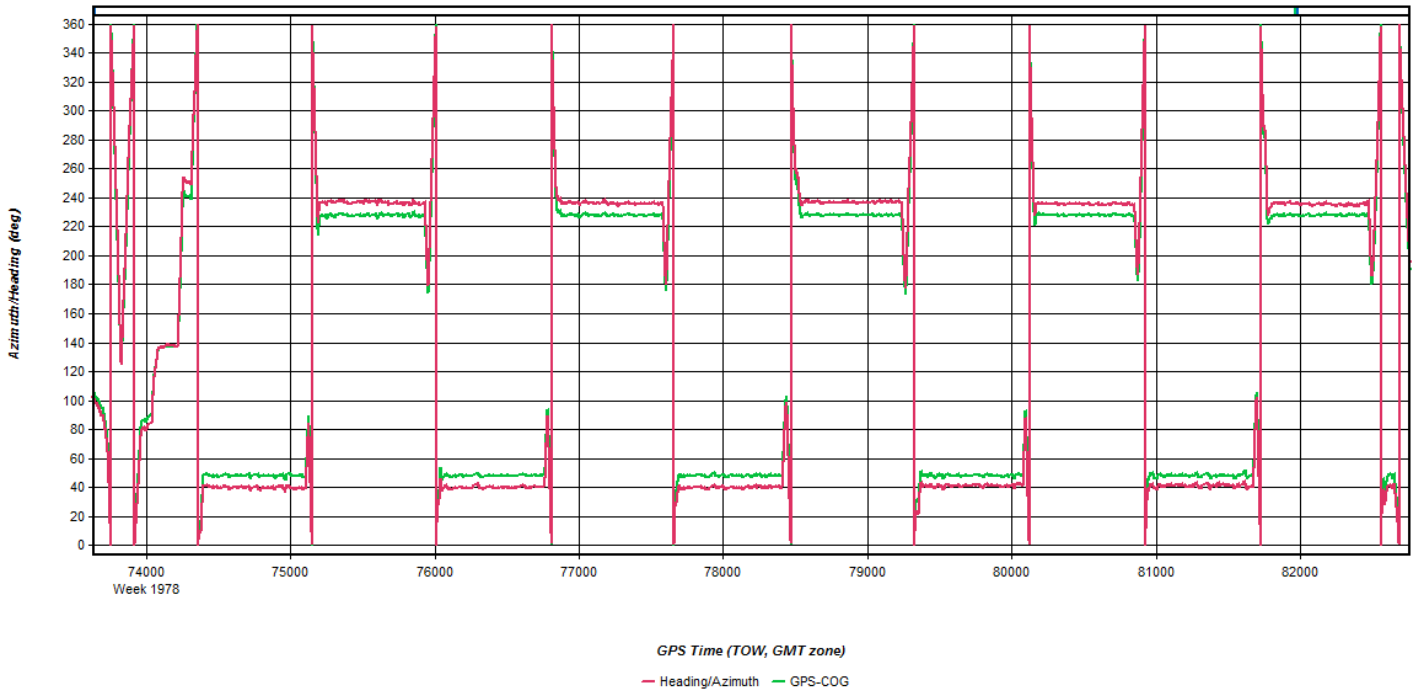

Height (m)
2270
2260
2250
2240
2230
2220
2210
2200
2190
2180
2170
2160
2150
2140
2130
2120
2110
2100
2090
2080
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
Height

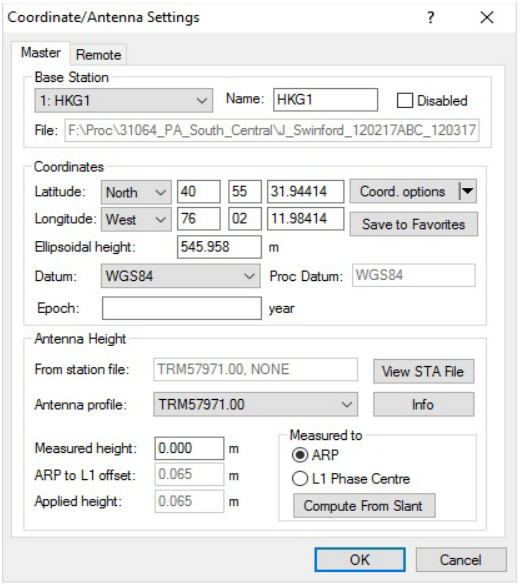

Num Sats
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS

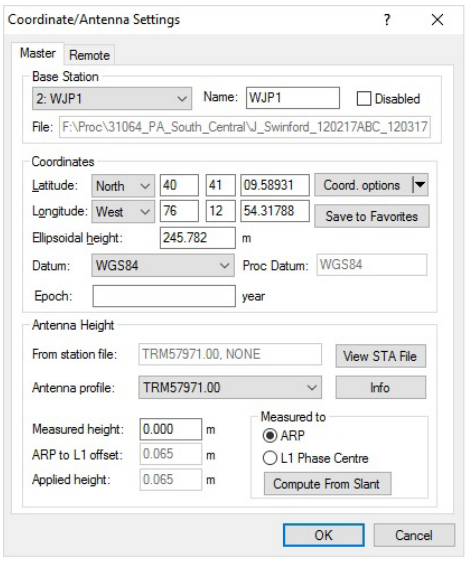

Separation (m)
-0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0145
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
East
North
Height
Trace


Separation (deg)
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
-0.000
-0.005
-0.010
-0.015
-0.020
-0.025
-0.030
-0.035
-0.040
-0.045
-0.050
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
74000
Week 1978
75000
76000
77000
78000
79000
80000
81000
82000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: HKG1
Name: HKG1
Disabled
File: F:\Proc\31064_PA_South_Central\J_Swinford_120217ABC_120317
Coordinates
Latitude: North 40 55 31.94414
Coord. options
Longitude: West 76 02 11.98414
Save to Favorites
Ellipsoidal height: 545.958 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel


Coordinate/Antenna Settings
Master
Remote
Base Station
2: WJP1
Name: WJP1
Disabled
File: F:\Proc\31064_PA_South_Central\J_Swinford_120217ABC_120317
Coordinates
Latitude: North 40 41 09.58931 Coord. options
Longitude: West 76 12 54.31788 Save to Favorites
Ellipsoidal height: 245.782 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc

(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 12/03/2017 Lift: A (B) C D E Pg 1 of 1

Project: PA LiDAR Proj #: 31064 Flight Mgmt File: 20171203_195226

Aircraft: N812TB Begin Hobbs: 4814.5 End Hobbs: 4818.0 Total: 3.5 Pilot: BILLINGTON Co-Pilot: Tech: SWINFORD

Dep Apt: KUNV Dep Time (Lcl): 3:00 (Z): 20:00 Arr Apt: KUNV Arr Time (Local): 7:00 (Z): 00:00 Tot Time Aloft: 3.5

CORS: (Y) / N Sta 1: Sta 2: Flyovers: Y / (N) If Y, times: Sta1) Sta2)

GPS Unit: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

Gd Temp beg: °c End: °c OAT beg: °c End: °c Altimeter begin: end:

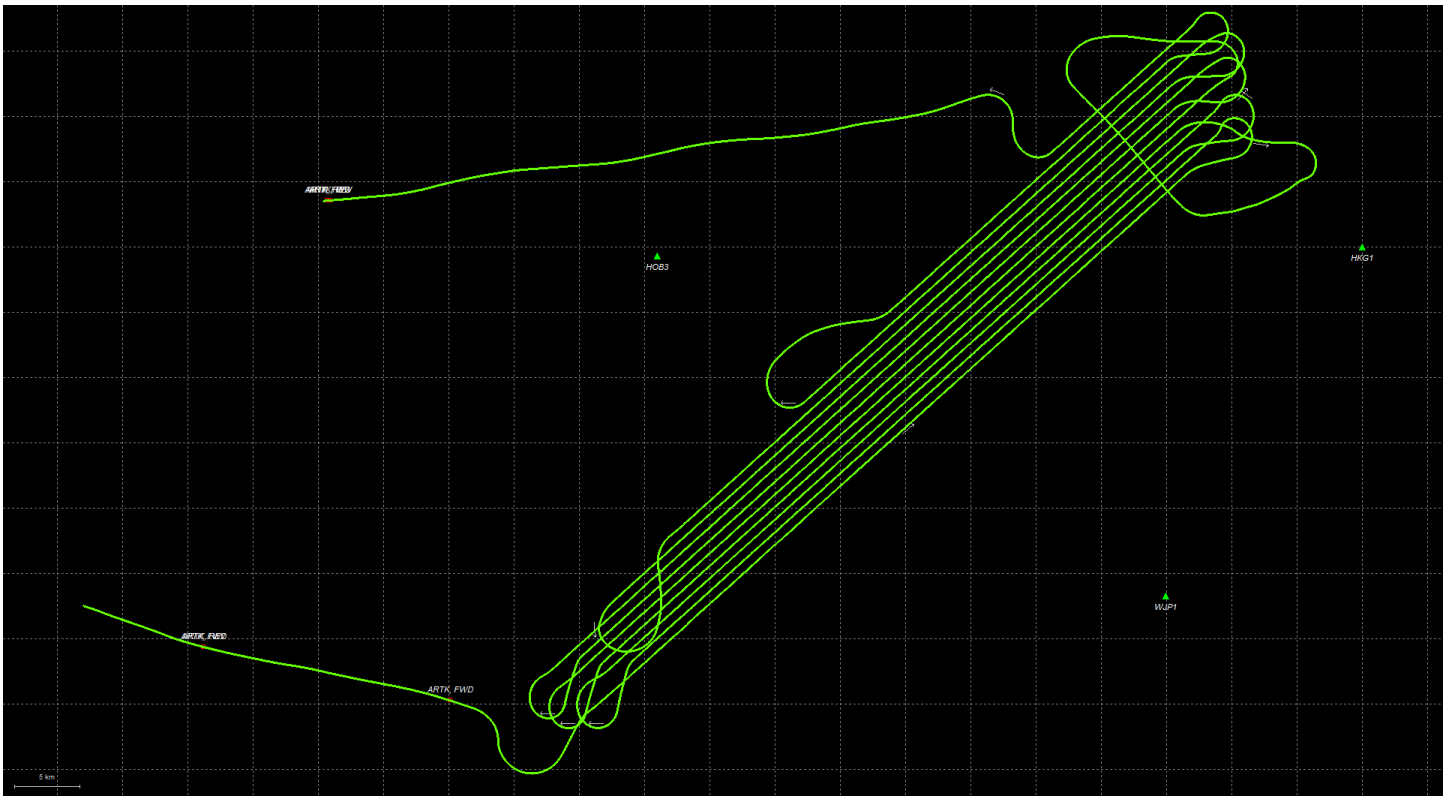
	Type	Serial #	Alt AGL	Alt AMSL	Avg Terr Ht	Max Gdspd	Avg Pt Spacing
LiDAR	ALS70	7161					
	FOV 36	Scan Freq 56	MpIA Y / N	Pulses in Air 2	Pulse Rate 274	Power 100%	PPSM

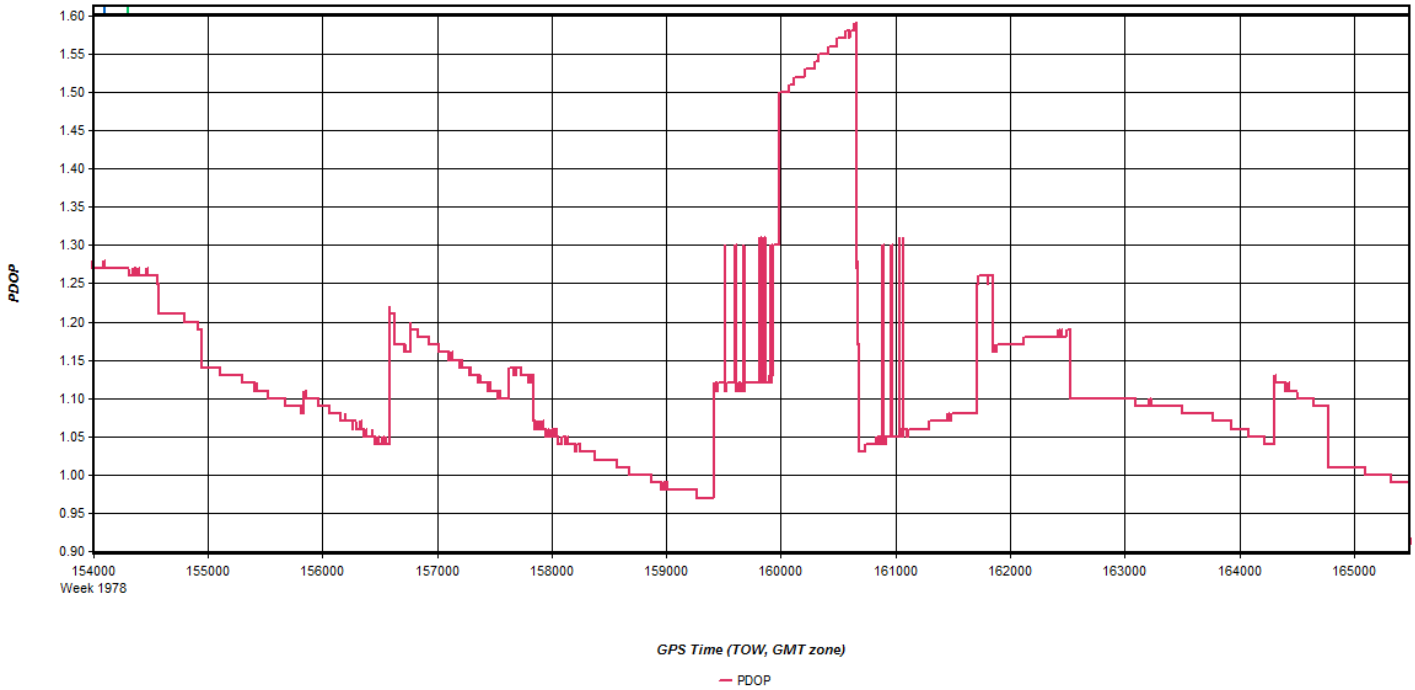
	Beg GB	End GB	Tot GB	Storage Name/#
	371	325	46	018

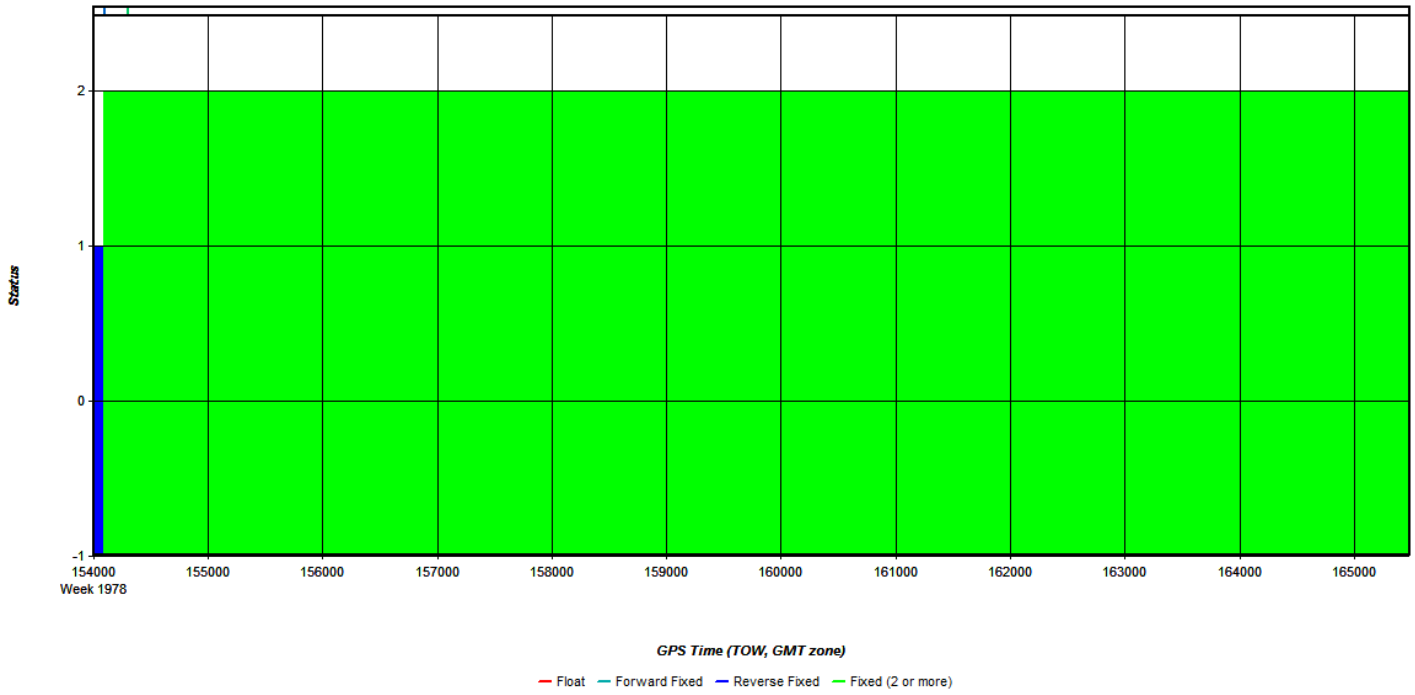
Line #	Hdg	Start (UTC):	End (UTC):	Gd Spd	PDOP/# Sats	GPS Altitude	Crab	Turb (0, -, +)	FLIGHT LINE NOTES – visibility, clouds, smoke, partial, etc.
X-TIE	136	20:34	20:36	175	1.1/18	6900	0	0	FIG 8 @ 20:29 / UNPLANNED CROSS TIE LINE OVER 2009-2021
2021	048	20:39	20:52	158	1.1/18	7000	5	0	
2020	228	20:54	21:06	158	1.2/18	7000	5	0	
2019	048	21:08	21:19	154	1.2/17	7000	5	0	
2018	228	21:22	21:33	155	1.4/15	7000	5	0	
2017	048	21:35	21:47	155	1.2/16	7000	5	0	EXIT FILE + RELOAD
2016	228	21:49	22:00	160	1.1/17	7000	5	0	
2015	048	22:03	22:14	163	1.2/16	7000	5	0	
2014	228	22:16	22:27	160	1.1/17	7000	5	0	
2013	048	22:29	22:41	154	1.0/17	7000	5	0	
2012	228	22:43	22:54	160	1.1/17	7000	5	0	EXIT FILE + RELOAD
~~2011~~	~~048~~	~~22:56~~	23 ABORT			~~7000~~	~~5~~	~~0~~	ALS ERROR TDC BUFFER / SHUT DOWN + RESTART
~~2011~~	~~048~~	~~23:~~	ABORT			~~7000~~		~~0~~	ERROR CAME RIGHT BACK / RESTART / FAILED 3RD TIME
									RETURN TO BASE
									SELFTEST; LASER DATA RECORDING FAILED
1030	FOR TEST LINE / ERROR @ IP								INTER

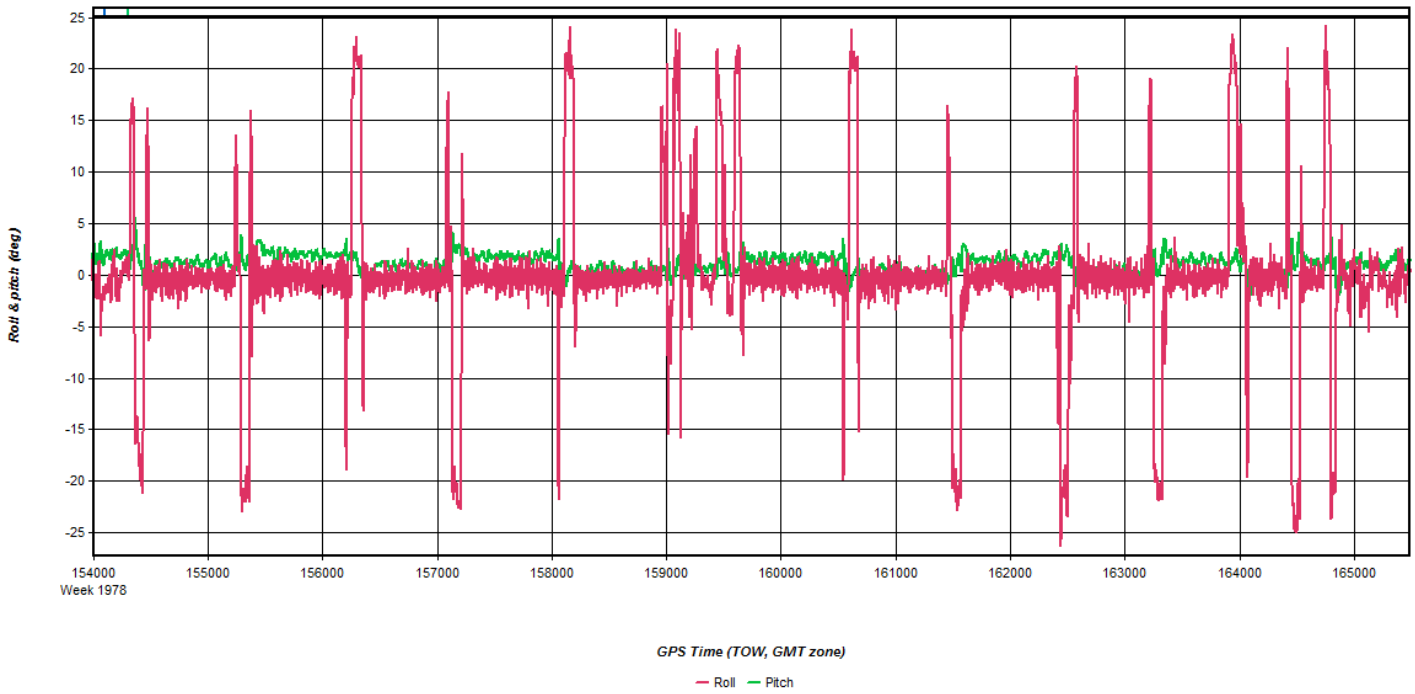
Total Proj Lines:	Lines Flown:	Lines Remain:	On-line Time: 3.0	Mob Time: .5	Notes:

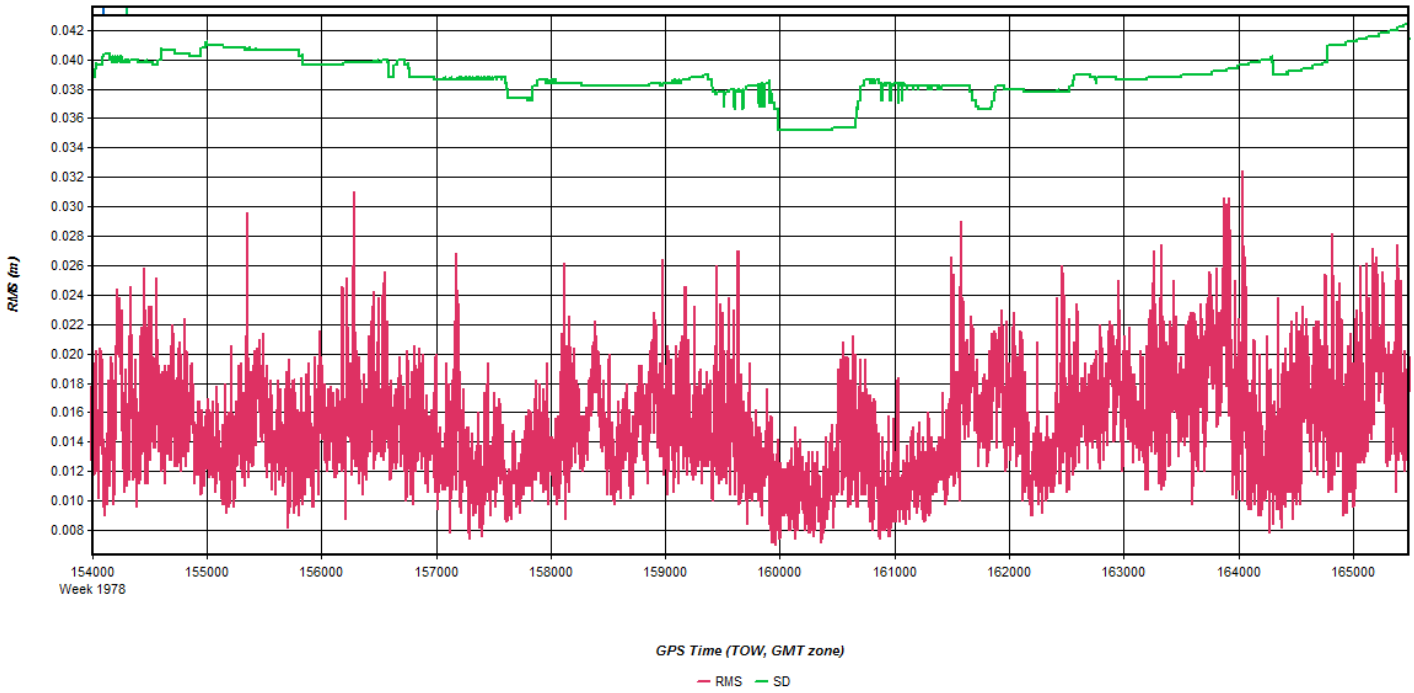
December 4, 2017-A (N812TB, SN7161)

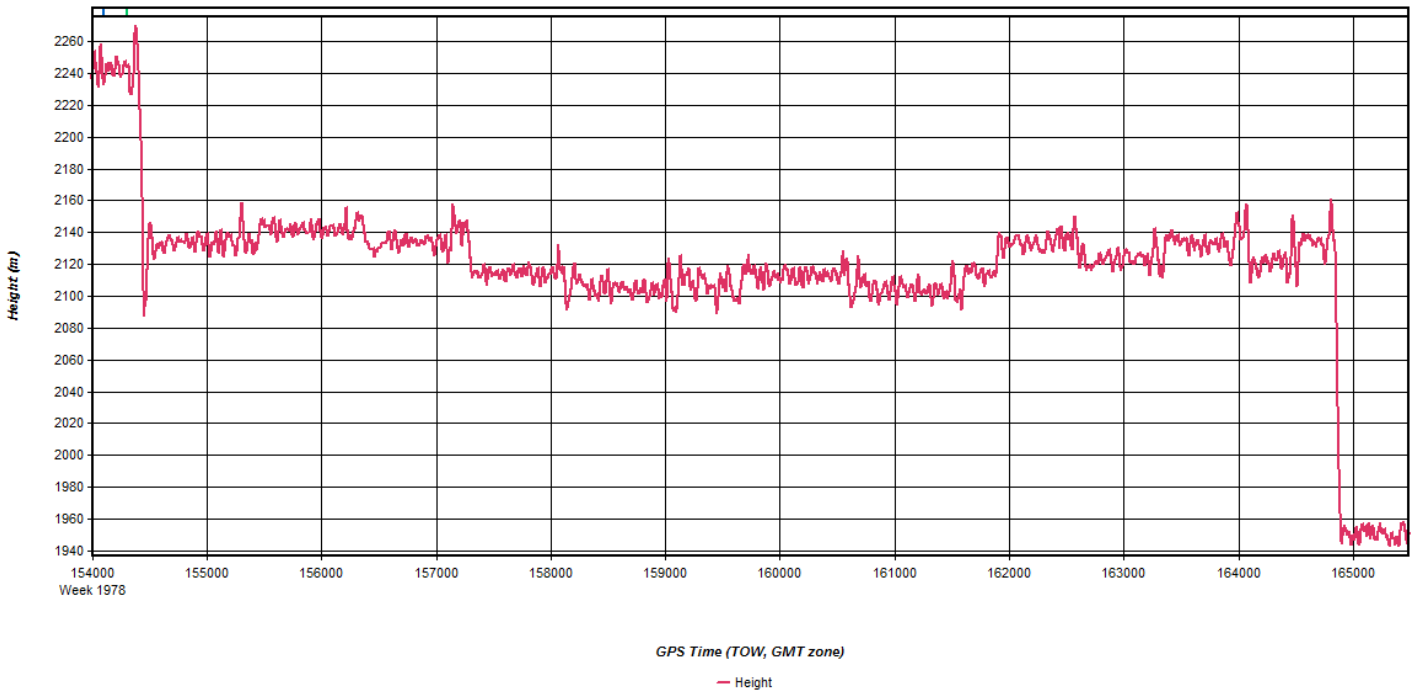

ARTK, FWD
HOB3
HKG1
WUP1
ARTK, FWD
ARTK, FWD
5 km

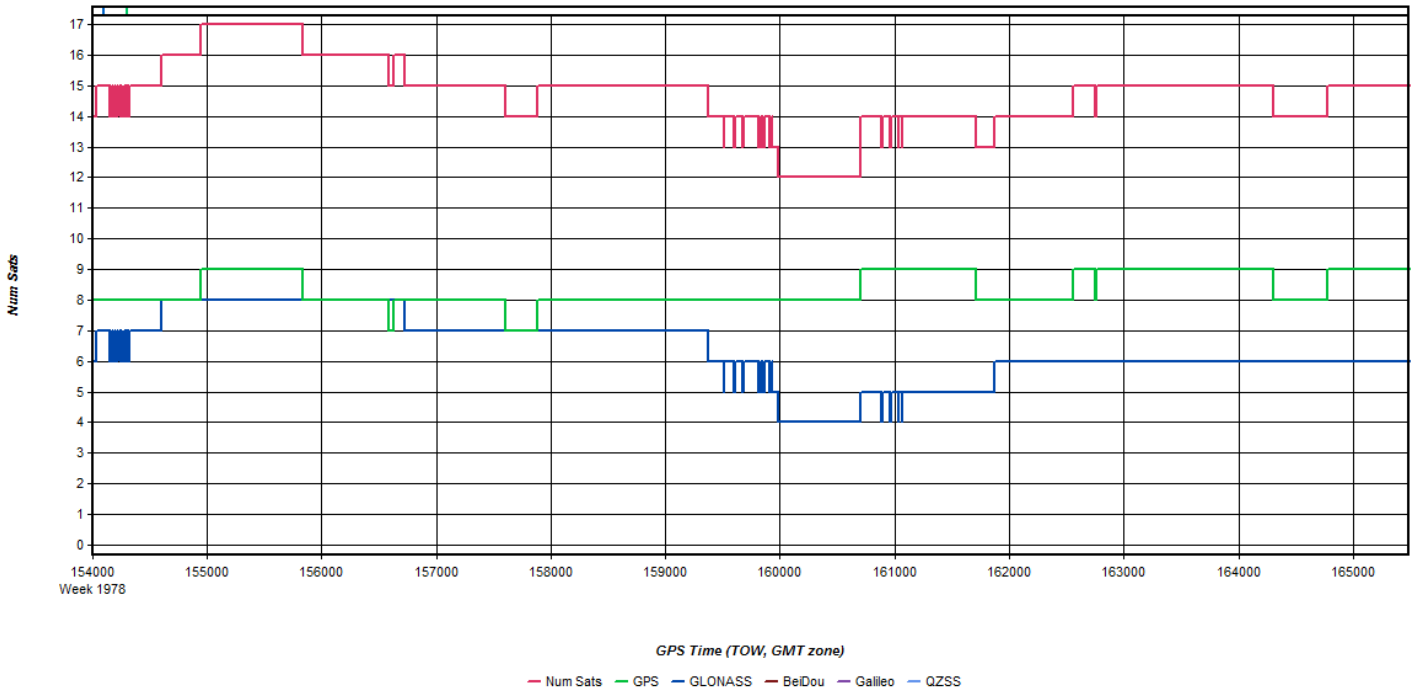

PDOP
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
PDOP

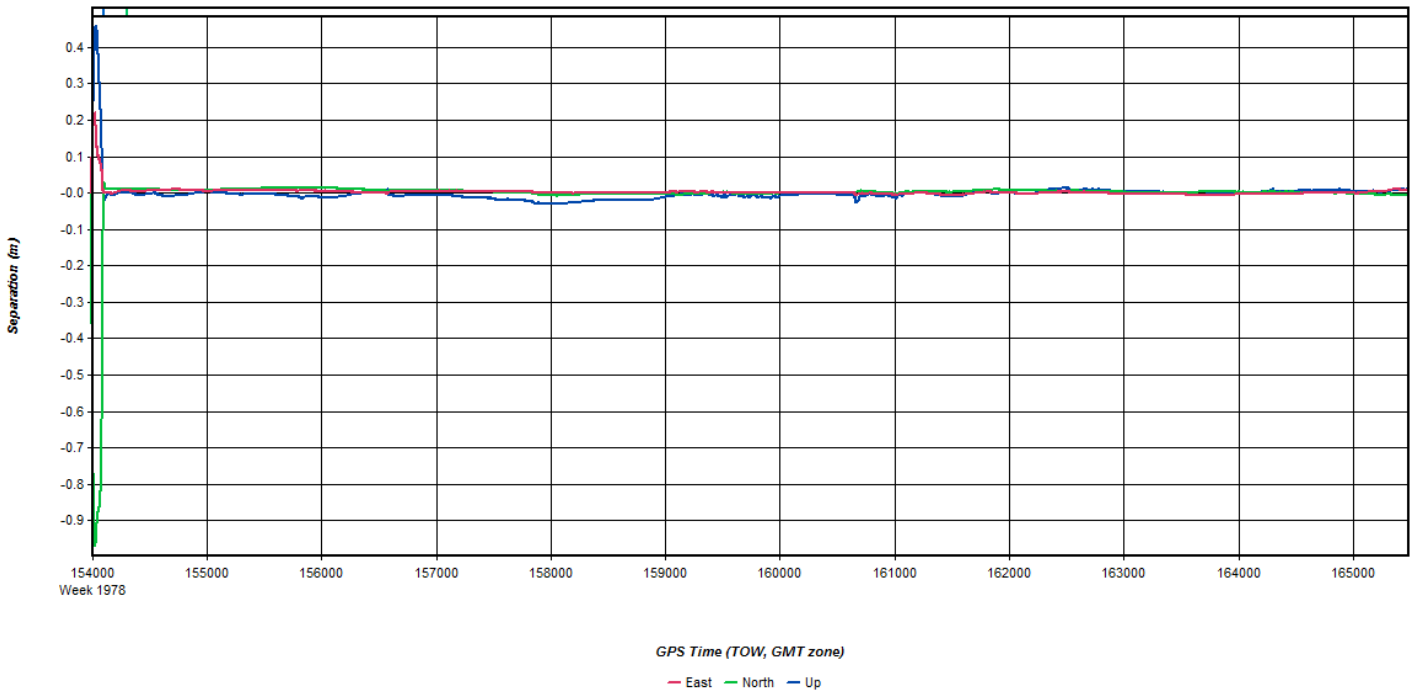

Status
2
1
0
-1
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

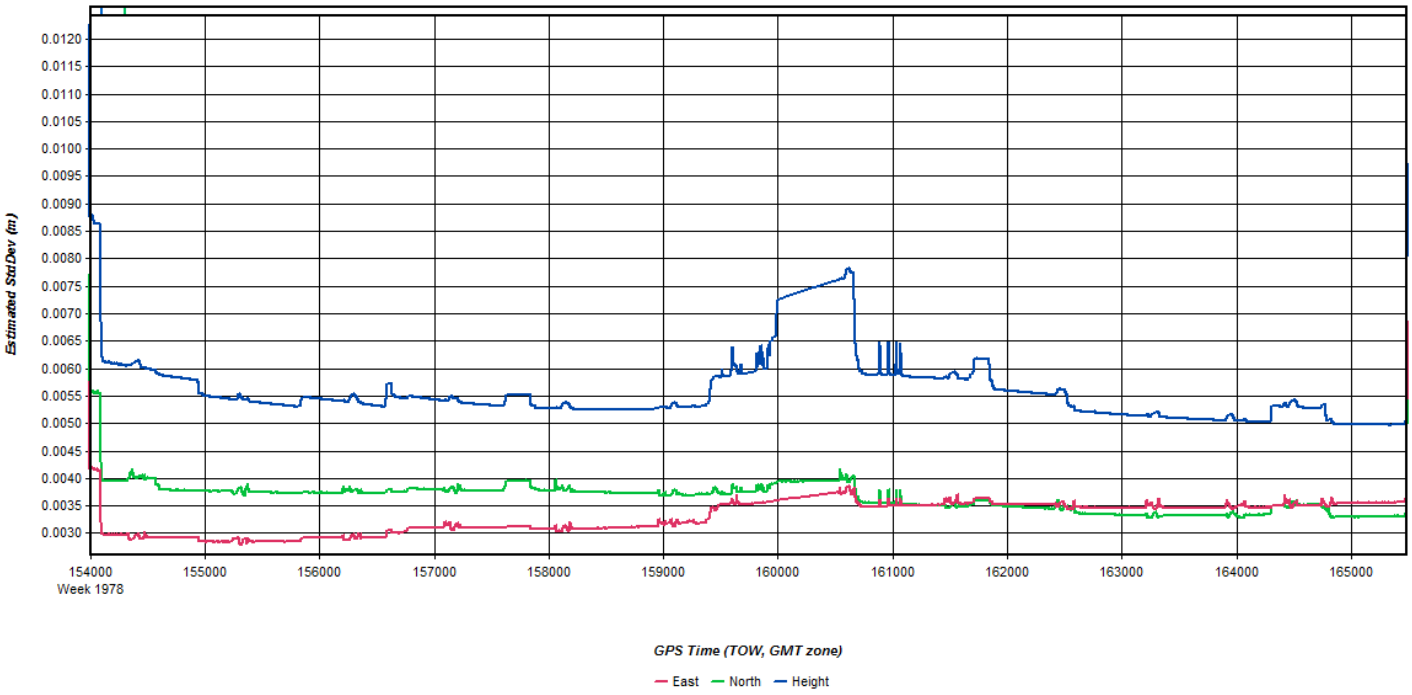

Roll & pitch (deg)
25
20
15
10
5
0
-5
-10
-15
-20
-25
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
Roll
Pitch

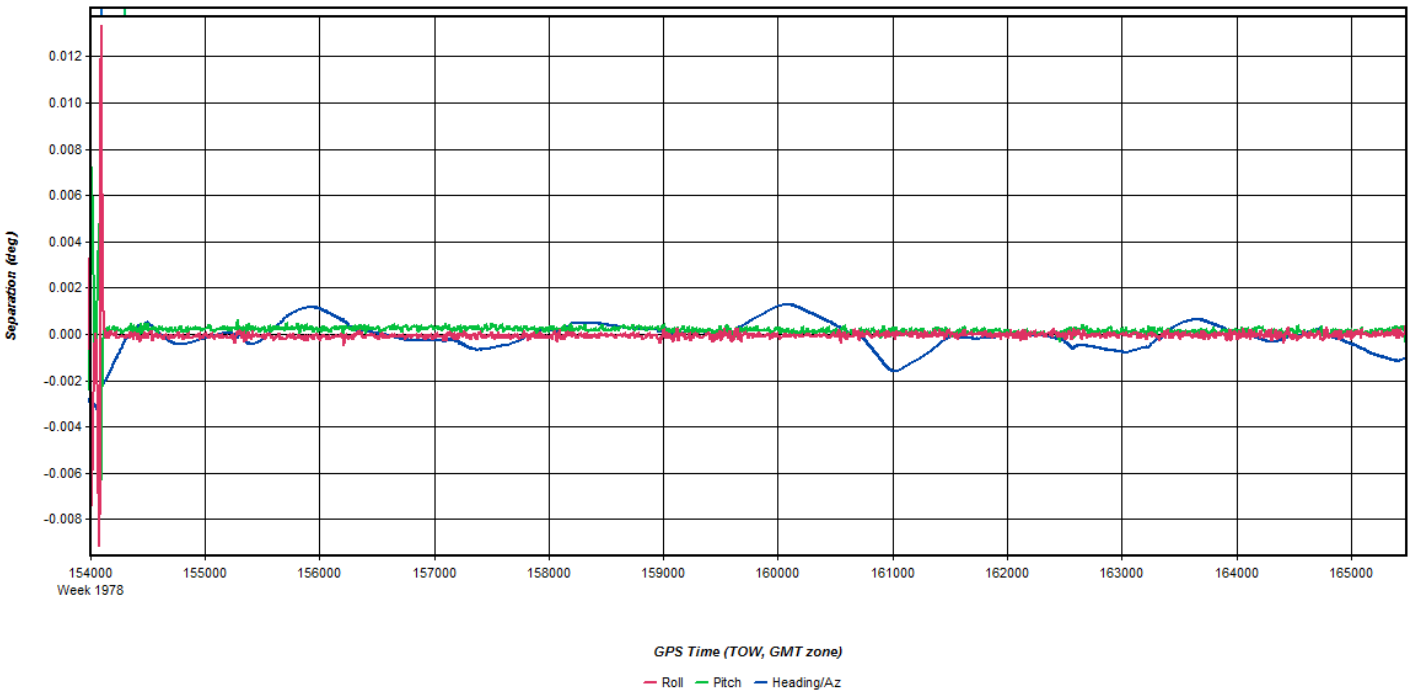

RMS (m)
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
RMS
SD

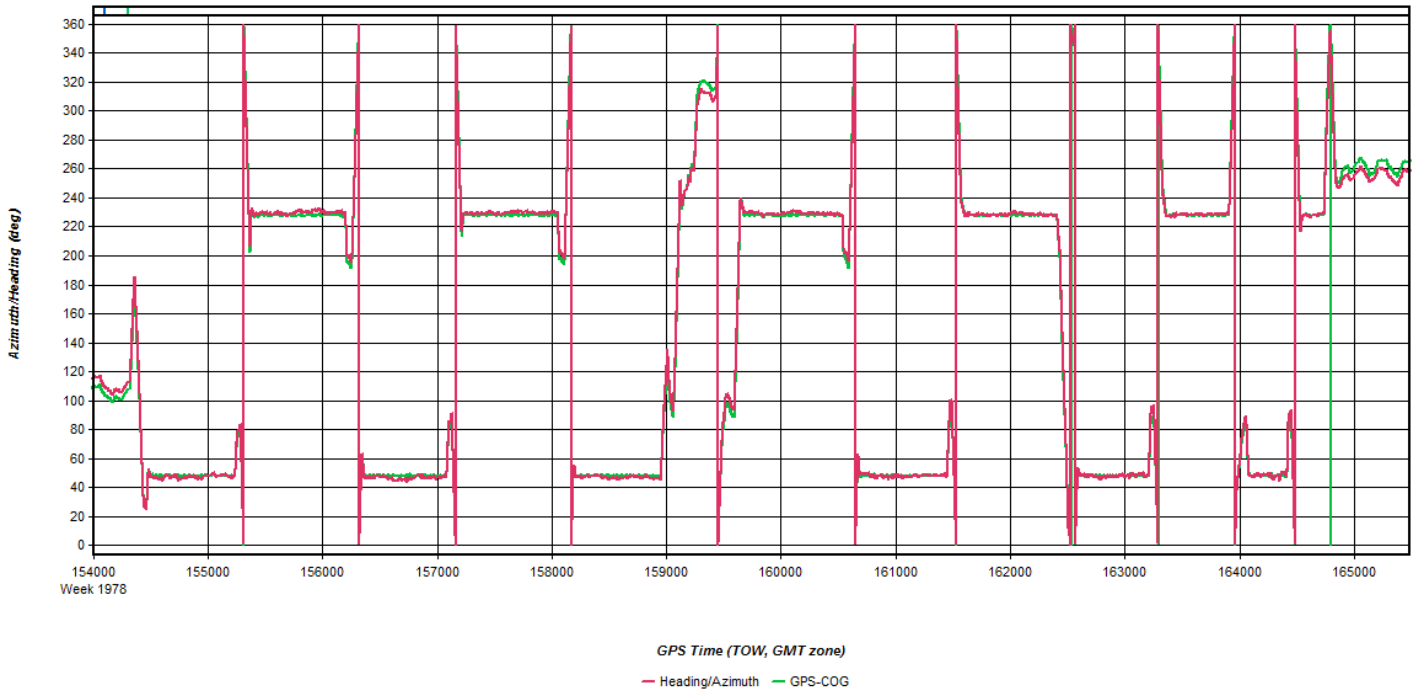

Height (m)
2260
2240
2220
2200
2180
2160
2140
2120
2100
2080
2060
2040
2020
2000
1980
1960
1940
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
Height

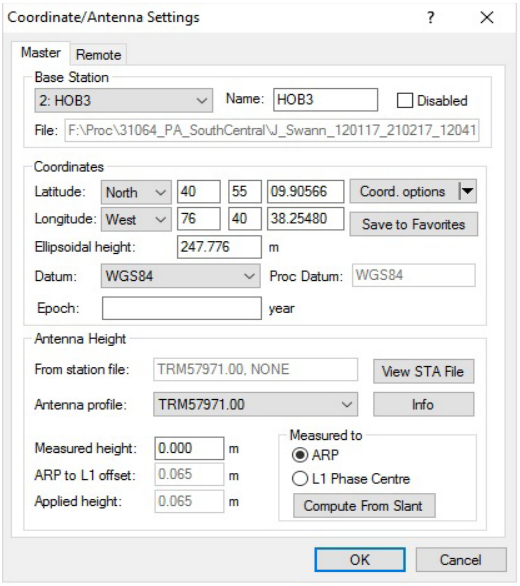

Num Sats
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS

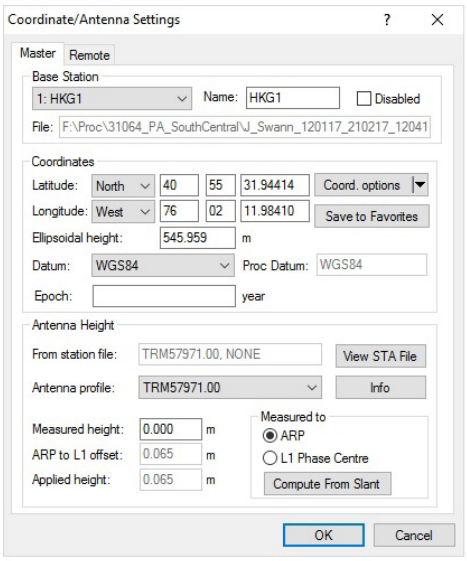

Separation (m)
0.4
0.3
0.2
0.1
-0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
East
North
Up

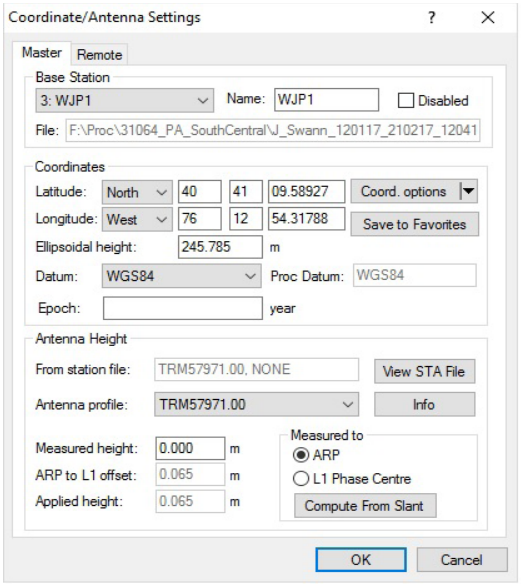

Estimated StdDev (m)
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
-0.002
-0.004
-0.006
-0.008
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az

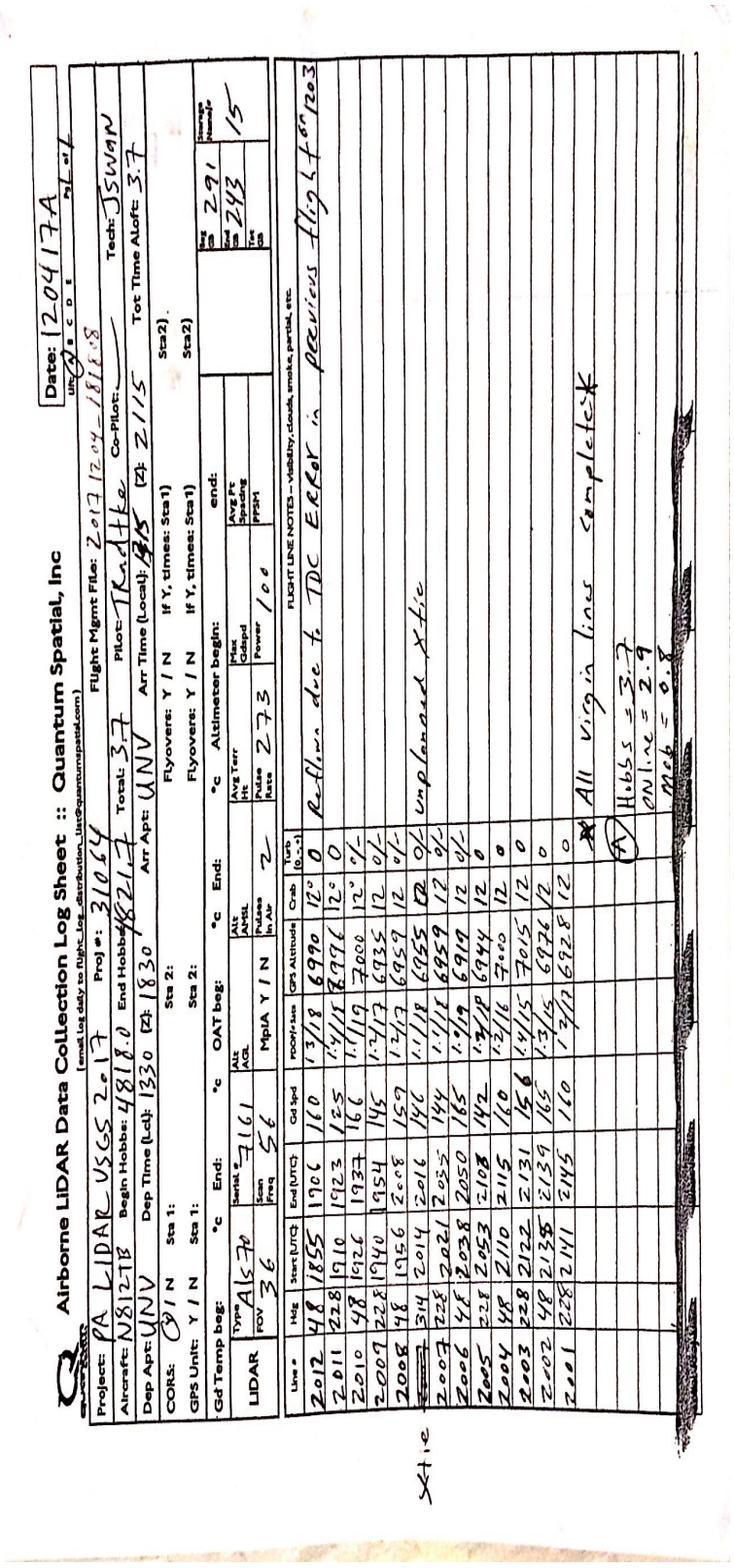

Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
154000
Week 1978
155000
156000
157000
158000
159000
160000
161000
162000
163000
164000
165000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
2: HOB3
Name: HOB3
Disabled
File: F:\Proc\31064_PA_SouthCentral\J_Swann_120117_210217_12041
Coordinates
Latitude: North 40 55 09.90566
Coord. options
Longitude: West 76 40 38.25480
Save to Favorites
Ellipsoidal height: 247.776 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel


Coordinate/Antenna Settings
Master
Remote
Base Station
1: HKG1
Name: HKG1
Disabled
File: F:\Proc\31064_PA_SouthCentral\J_Swann_120117_210217_12041
Coordinates
Latitude: North 40 55 31.94414 Coord. options
Longitude: West 76 02 11.98410 Save to Favorites
Ellipsoidal height: 545.959 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel


Coordinate/Antenna Settings
Master
Remote
Base Station
3: WJP1
Name: WJP1
Disabled
File: F:\Proc\31064_PA_SouthCentral\J_Swann_120117_210217_12041
Coordinates
Latitude: North 40 41 09.58927 Coord. options
Longitude: West 76 12 54.31788 Save to Favorites
Ellipsoidal height: 245.785 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log



Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc

(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 120417A

Lift: (A) B C D E Pg 1 of 1

Project: PA LIDAR USGS 2017 Proj #: 31064 Flight Mgmt File: 2017 1204_181808

Aircraft: N812TB Begin Hobbs: 4818.0 End Hobbs: 4821.7 Total: 3.7 Pilot: TRadtke Co-Pilot: — Tech: JSWAN

Dep Apt: UNV Dep Time (Lcl): 1330 (Z): 1830 Arr Apt: UNV Arr Time (Local): 1315 (Z): 2115 Tot Time Aloft: 3.7

CORS: (Y) / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

GPS Unit: Y / N Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)

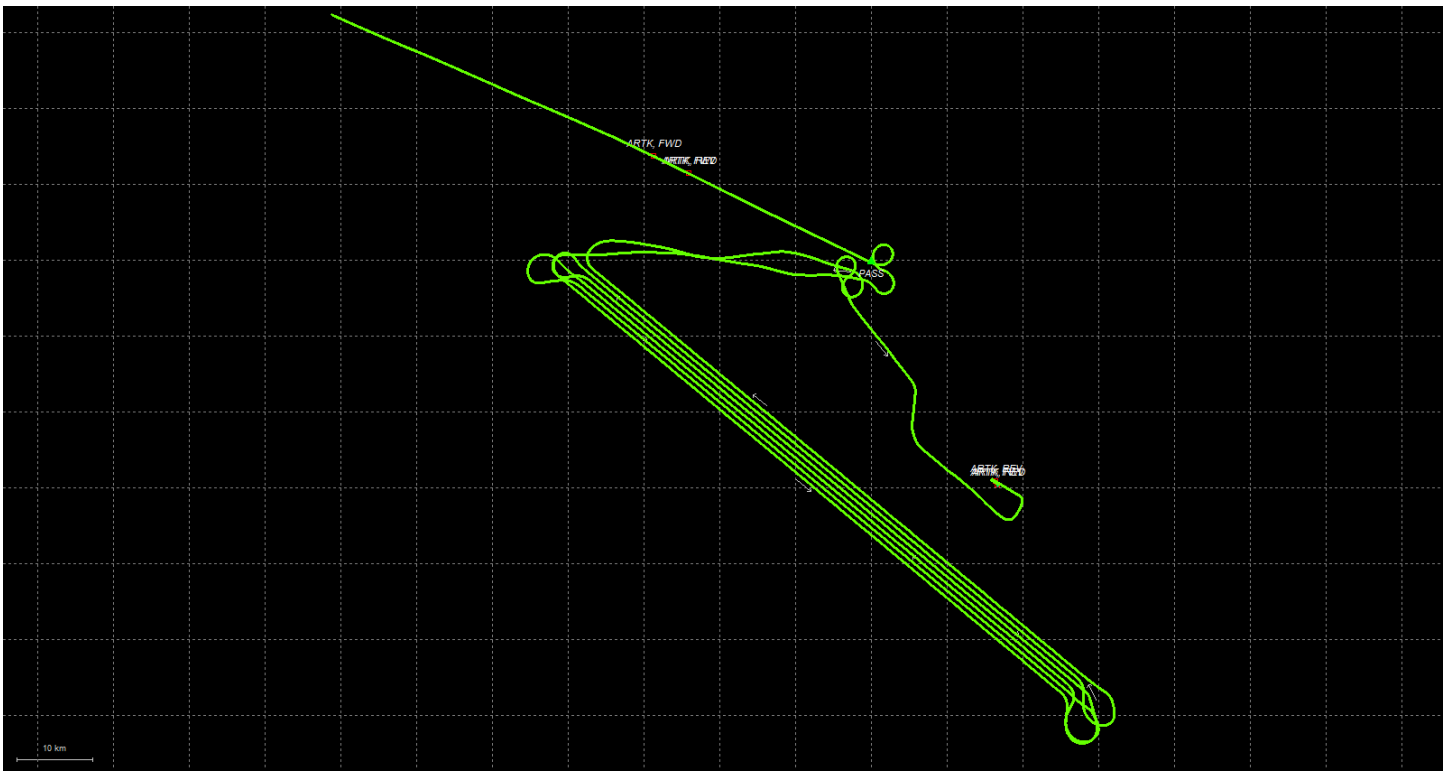
Gd Temp beg: °c End: °c OAT beg: °c End: °c Altimeter begin: end:

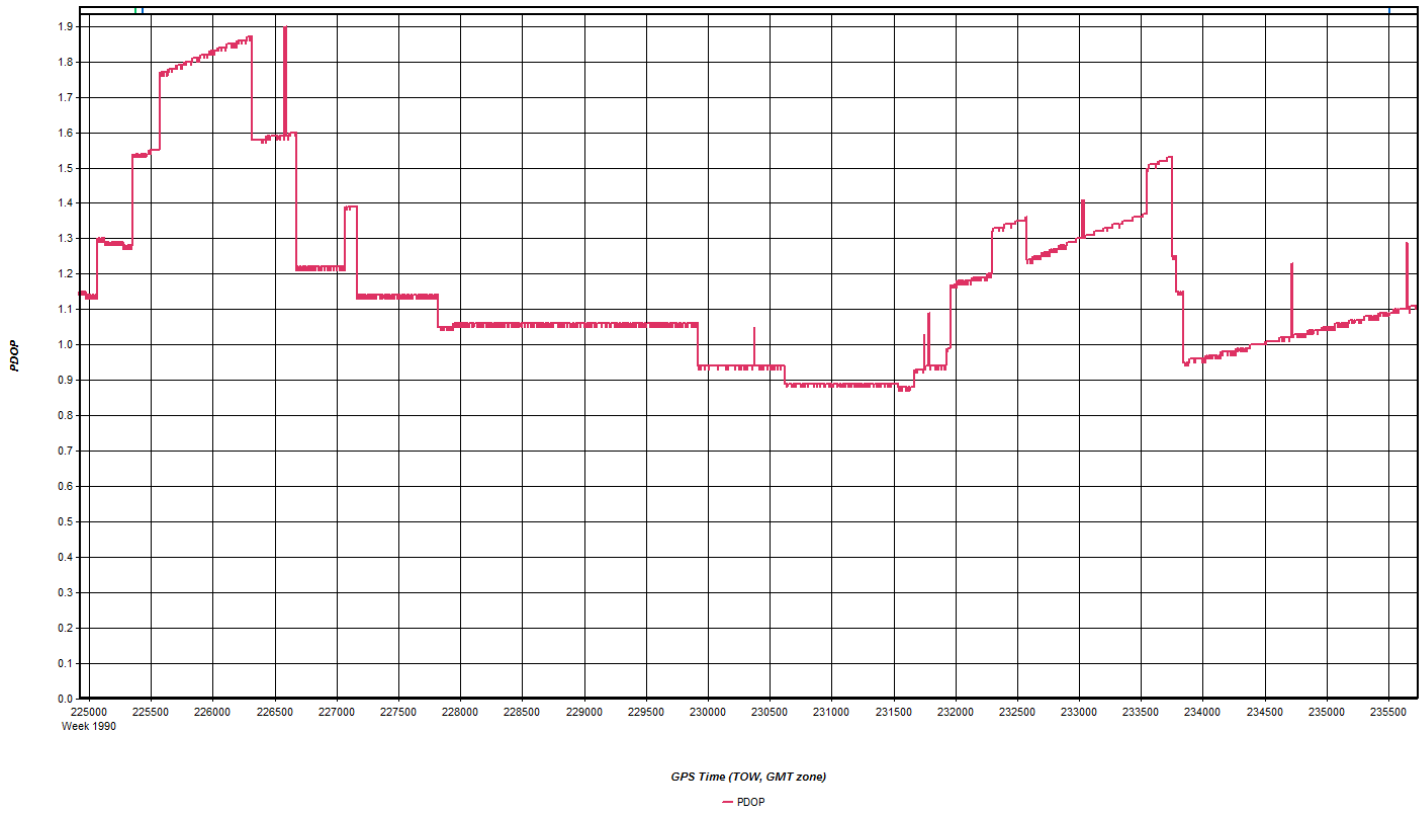
LIDAR	Type	Serial #	Alt AGL	Alt AMSL	Avg Terr Ht	Max Gdspd	Avg Pt Spacing	Beg GB	Storage Name/#
	Als70	7161						291	
	FOV	Scan Freq	MpIA Y / N	Pulses In Air	Pulse Rate	Power	PPSM	End GB	
	36	56		2	273	100		243	15
								Tot GB	

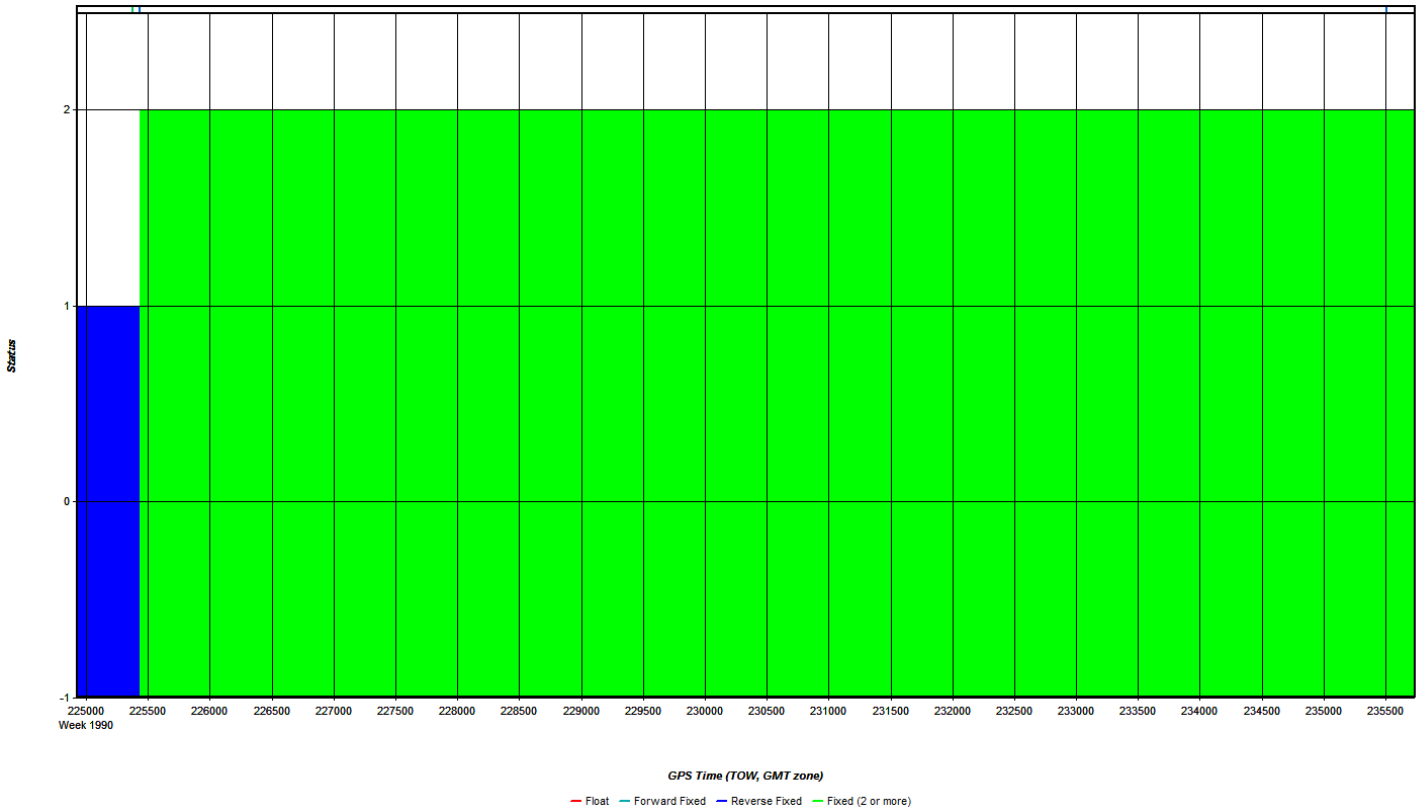
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	PDOP/# Sats	GPS Altitude	Crab	Turb (0, -, +)	FLIGHT LINE NOTES – visibility, clouds, smoke, partial, etc.
2012	48	1855	1906	160	1.3/18	6990	12°	0	Reflown due to TDC ERROR in previous flight on 1203
2011	228	1910	1923	125	1.4/18	7996	12°	0	
2010	48	1926	1937	166	1.1/19	7000	12°	0/-	
2009	228	1940	1954	145	1.2/17	6935	12	0/-	
2008	48	1956	2008	159	1.2/17	6959	12	0/-	
Xtie ~~2007~~	314	2014	2016	146	1.1/18	6955	12	0/-	unplanned xtie
2007	228	2021	2035	144	1.1/18	6959	12	0/-	
2006	48	2038	2050	165	1.0/19	6919	12	0/-	
2005	228	2053	2108	142	1.2/18	6944	12	0	
2004	48	2110	2115	160	1.2/16	7000	12	0	
2003	228	2122	2131	156	1.4/15	7015	12	0	
2002	48	2135	2139	165	1.3/15	6976	12	0	
2001	228	2141	2145	160	1.2/17	6928	12	0	
									* All virgin lines complete *
								(A)	Hobbs = 3.7
									ONline = 2.9
									Mob = 0.8

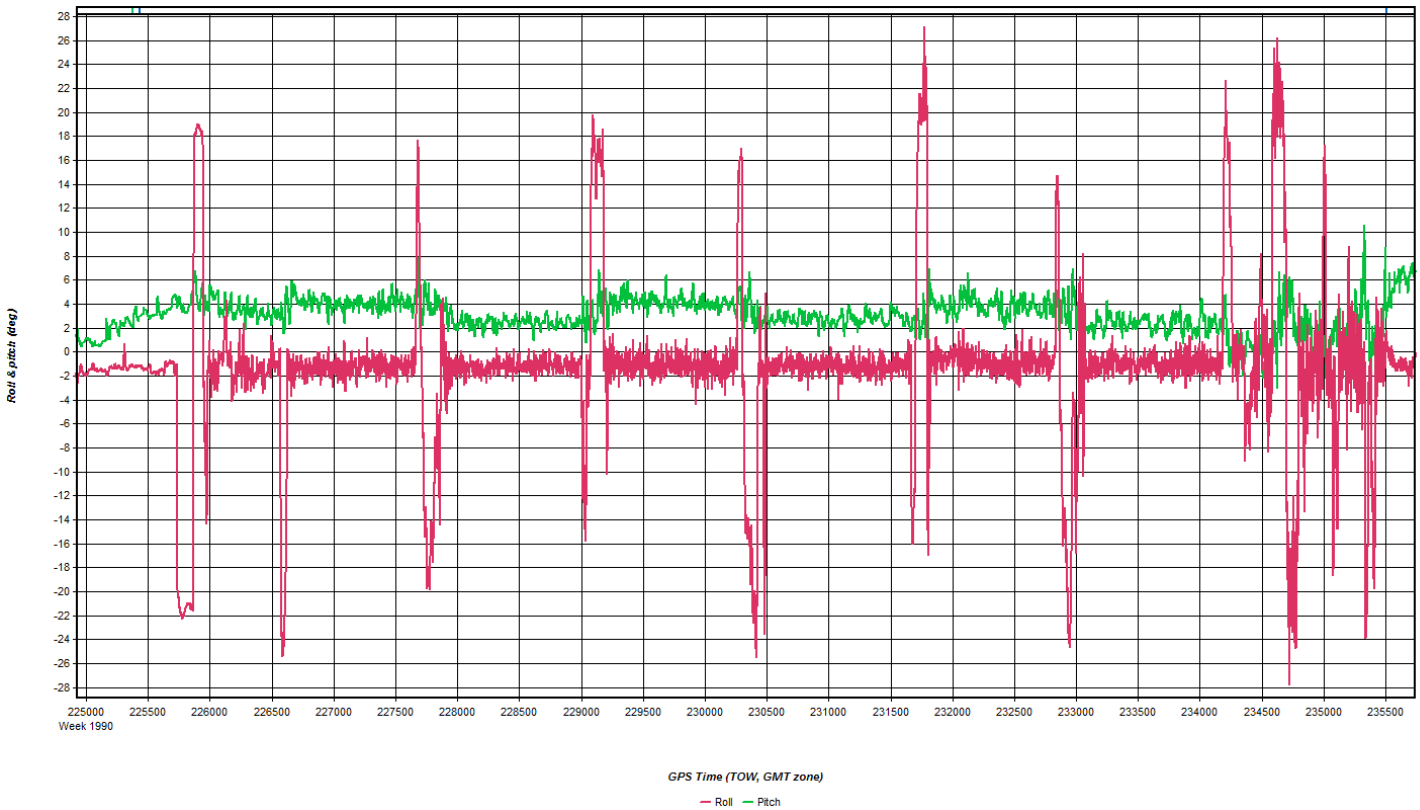
Scanned by CamScanner

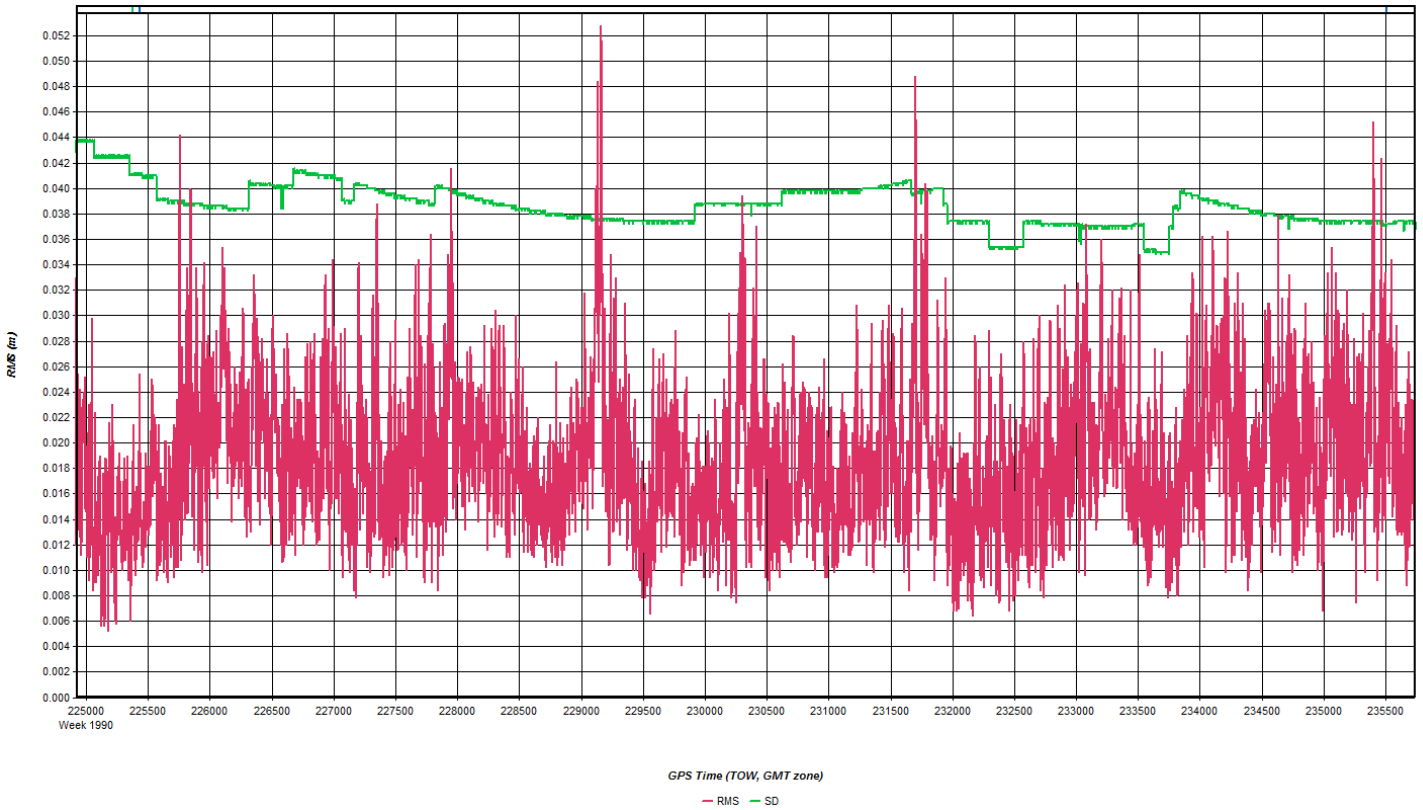
February 27, 2018-A (SN7229, N103RM)

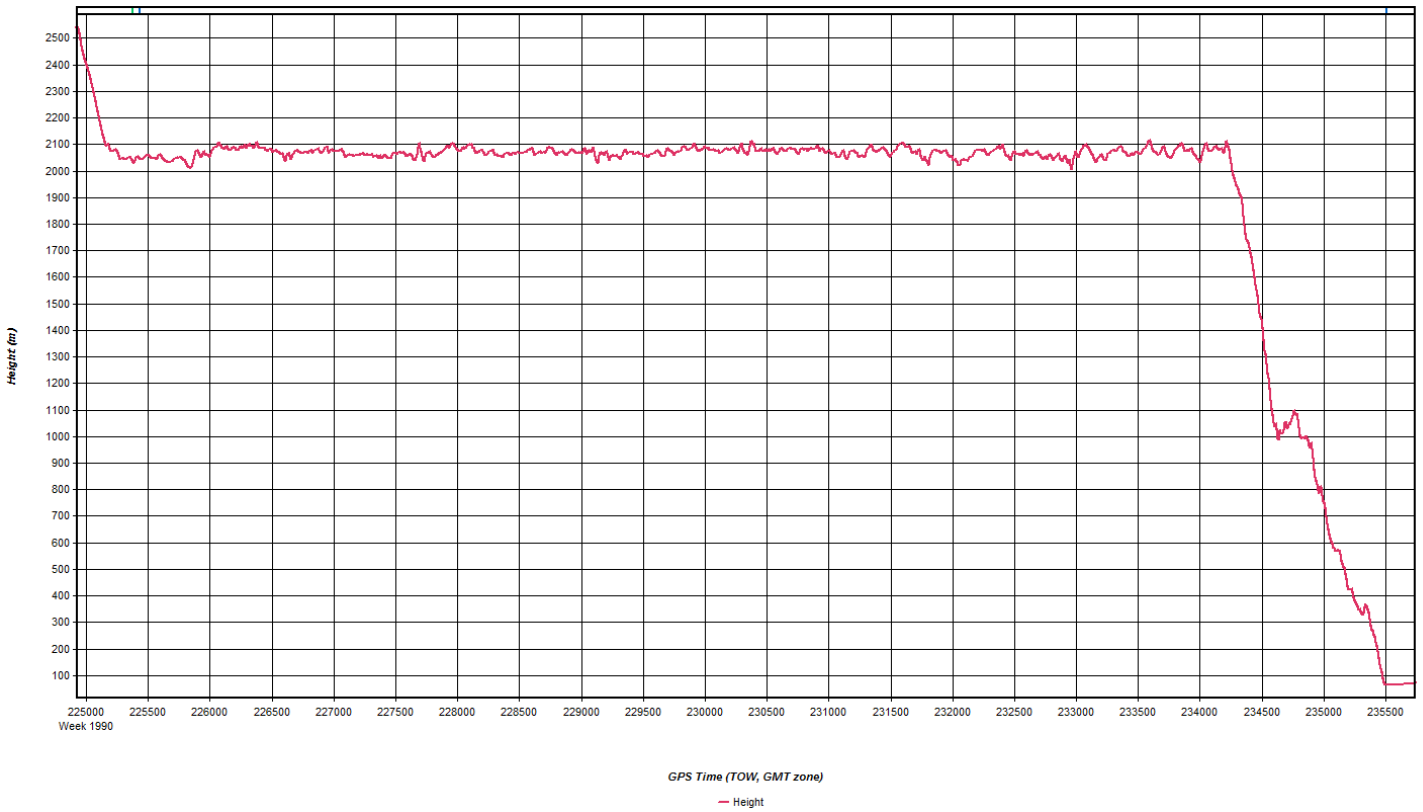

ARTK_FWD
PASS
10 km

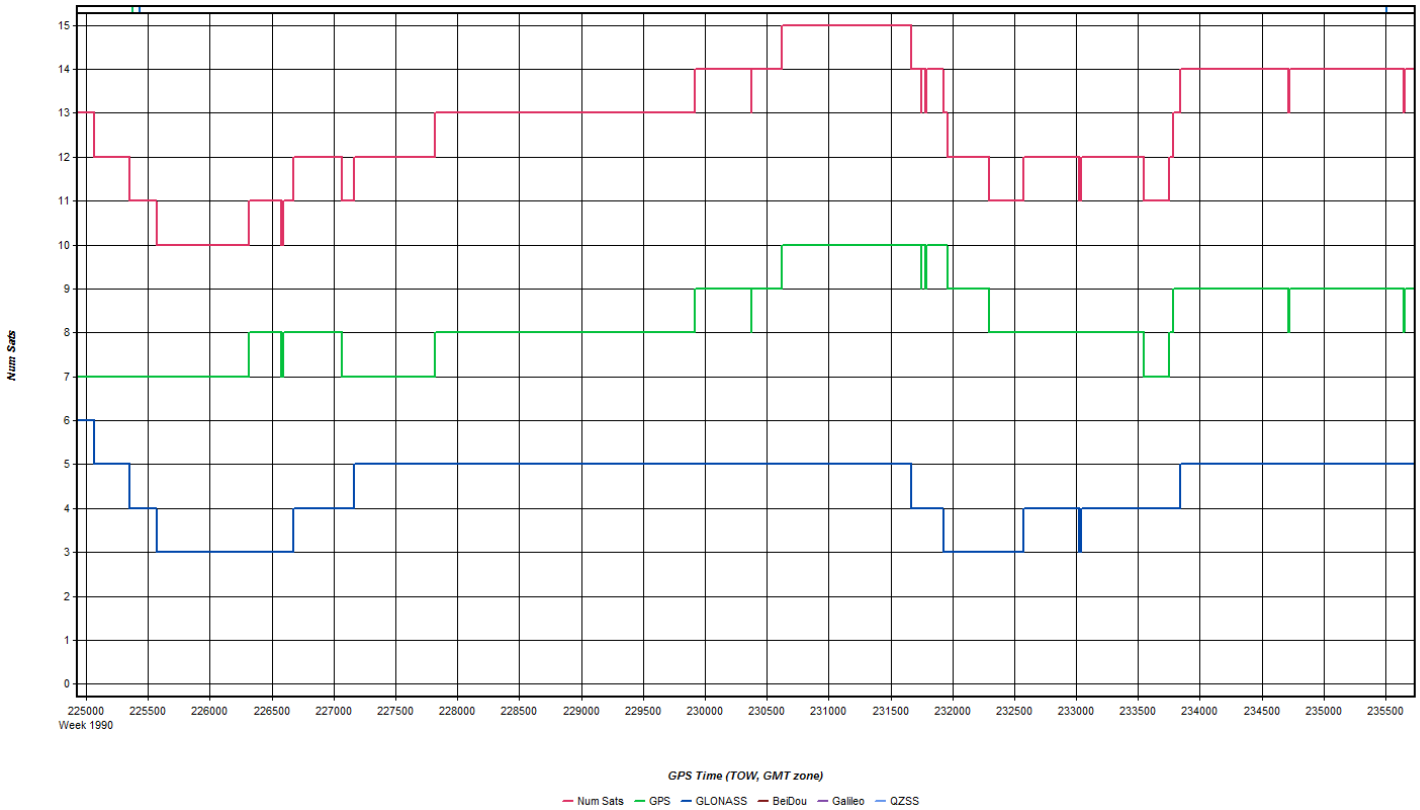

PDOP
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
225000
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
Week 1990
GPS Time (TOW, GMT zone)
PDOP

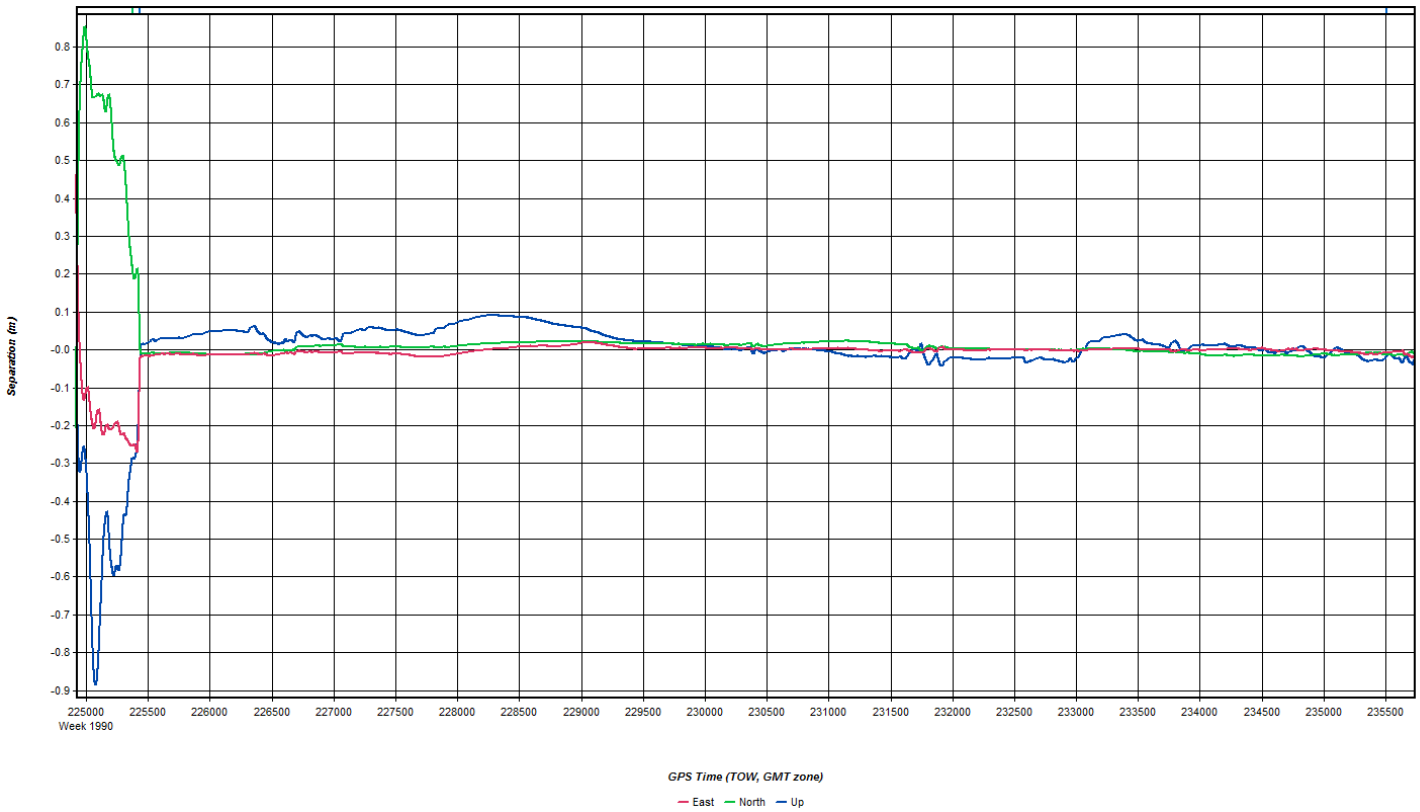

Status
2
1
0
-1
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

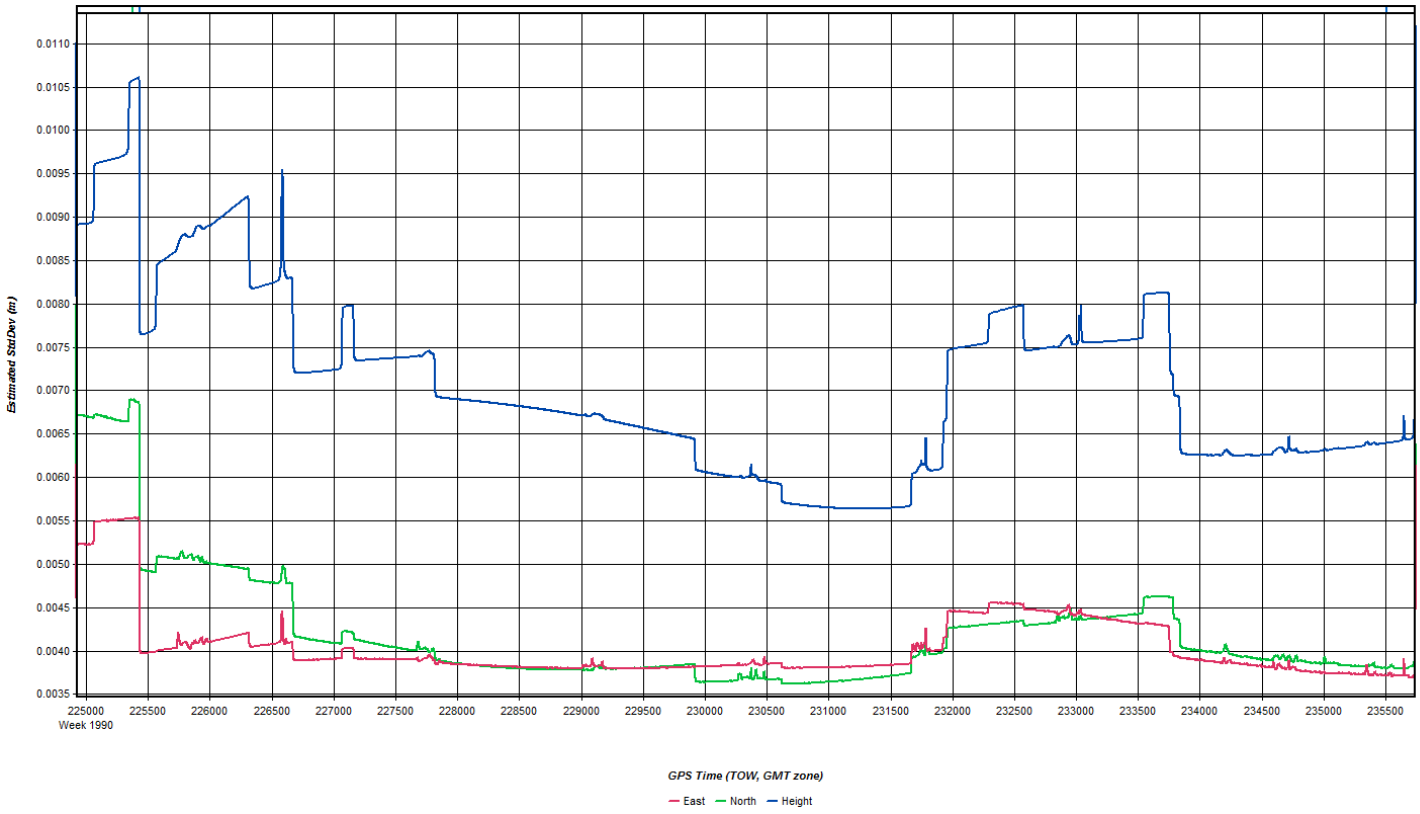

Roll & pitch (deg)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
Roll
Pitch

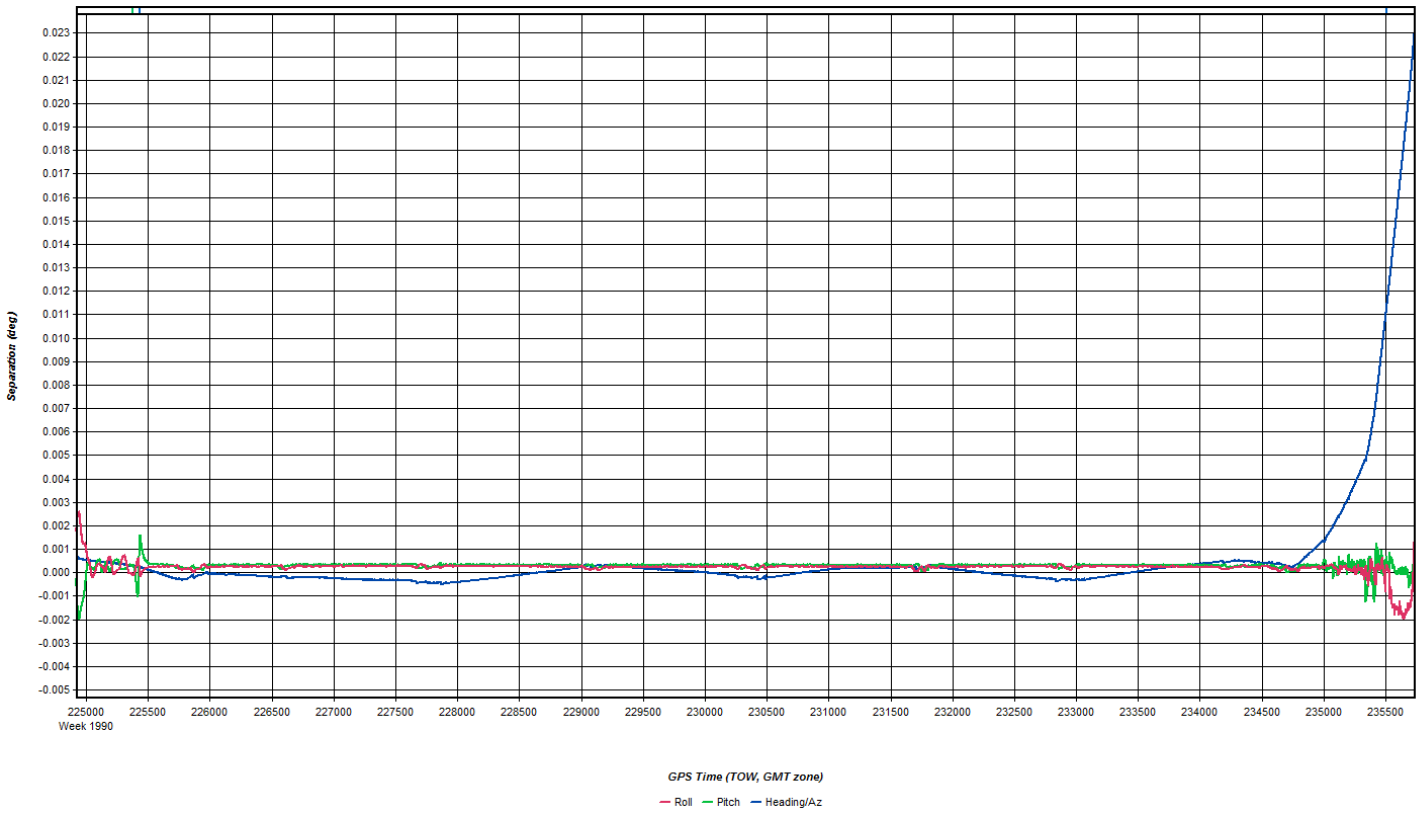

RMS (m)
0.052
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
RMS
SD

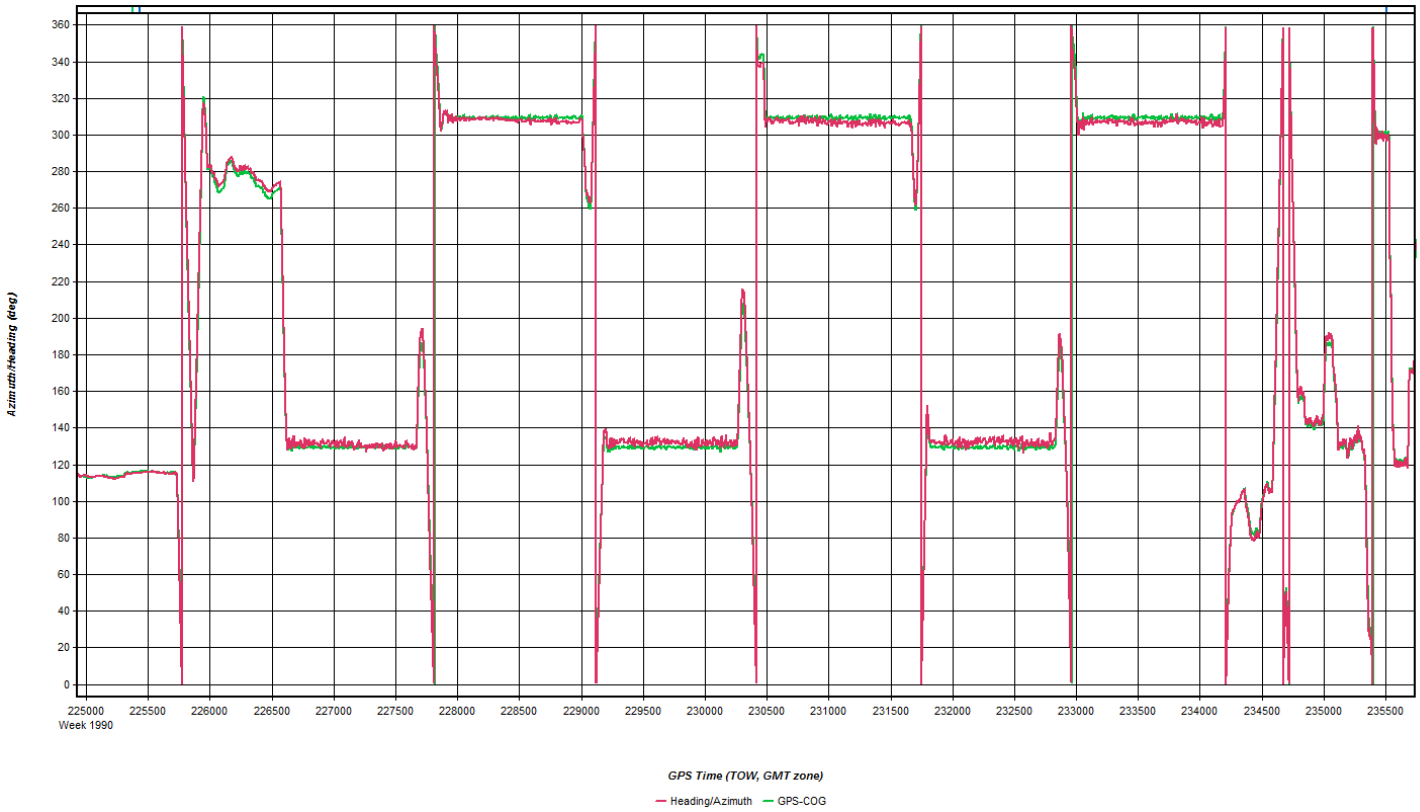

Height (m)
2500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
Height

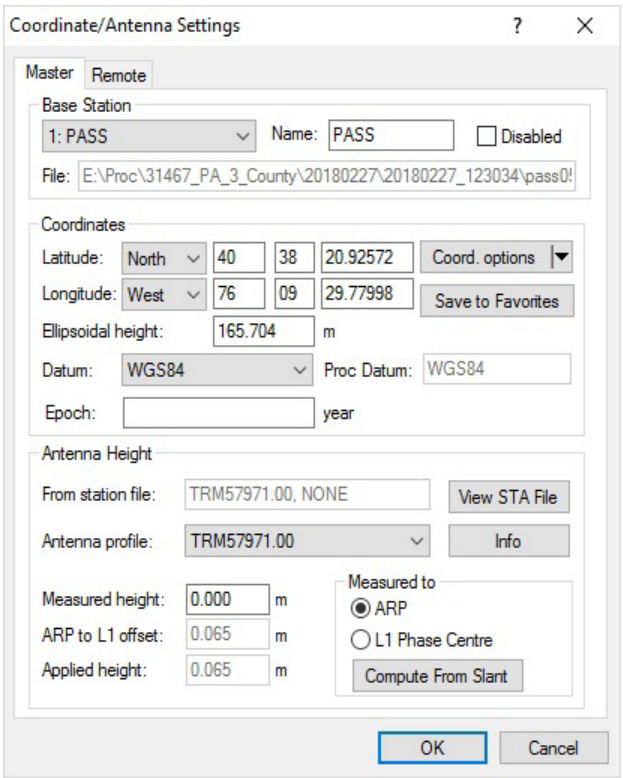

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.023
0.022
0.021
0.020
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
-0.002
-0.003
-0.004
-0.005
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
225000
Week 1990
225500
226000
226500
227000
227500
228000
228500
229000
229500
230000
230500
231000
231500
232000
232500
233000
233500
234000
234500
235000
235500
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180227\20180227_123034\pass0!
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

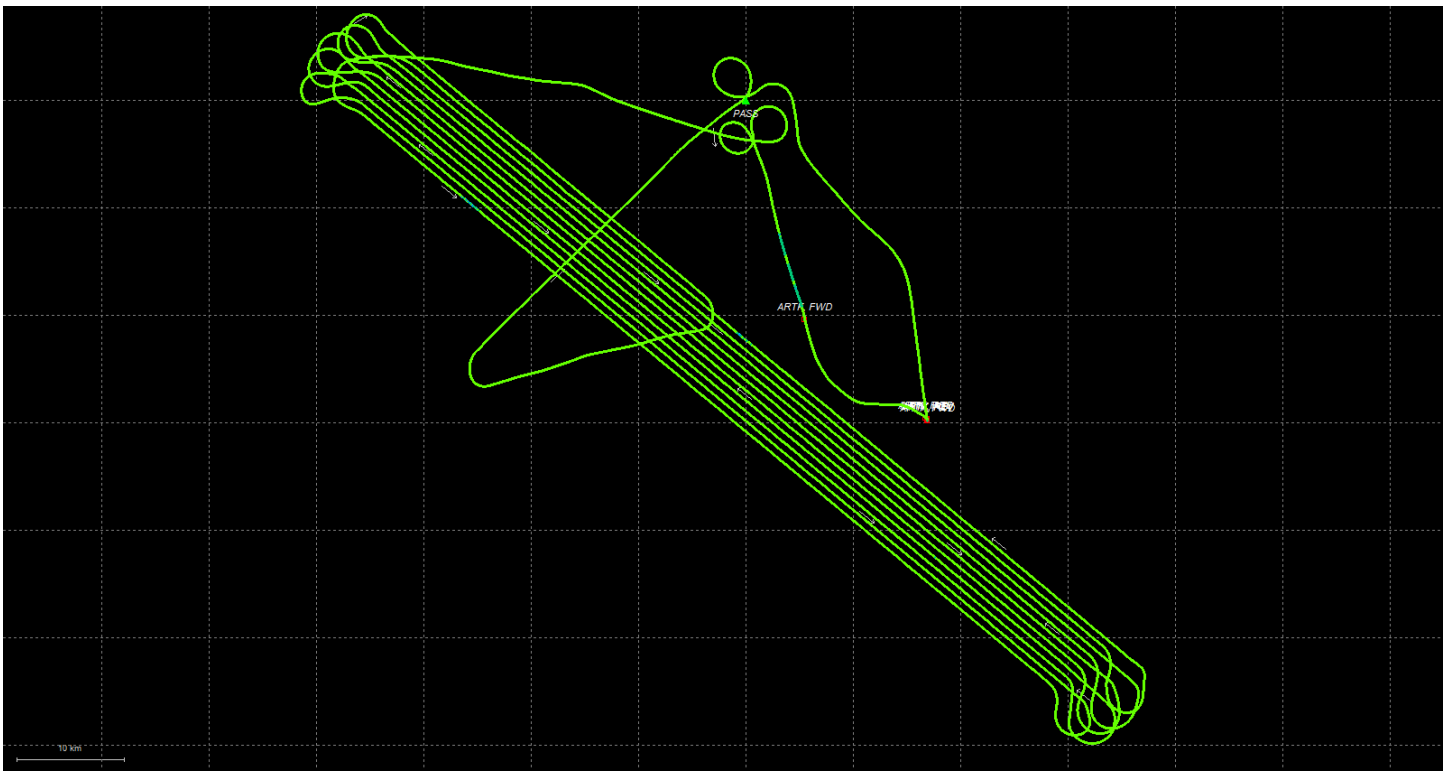
PROJECT NAME	QS – PA Flight1	**DATE**	02/27/2018
SENSOR OPERATOR	Michael Kettridge	**SENSOR(S)**	ALS70-HP / RCD30
PILOT	Andrew Werle	**IMU**	Honeywell uIRS
AIRCRAFT	103RM	**ABGPS**	IPAS-CUS6
AIRBASE	Reading PA	**DATA DRIVES**	Lidar 3
		STATIC ALIGNMENT	**GPS TIME**
			START / **END**
		Pre-Mission	14:41 / 14:46
		Post Mission	17:09 / 17:14

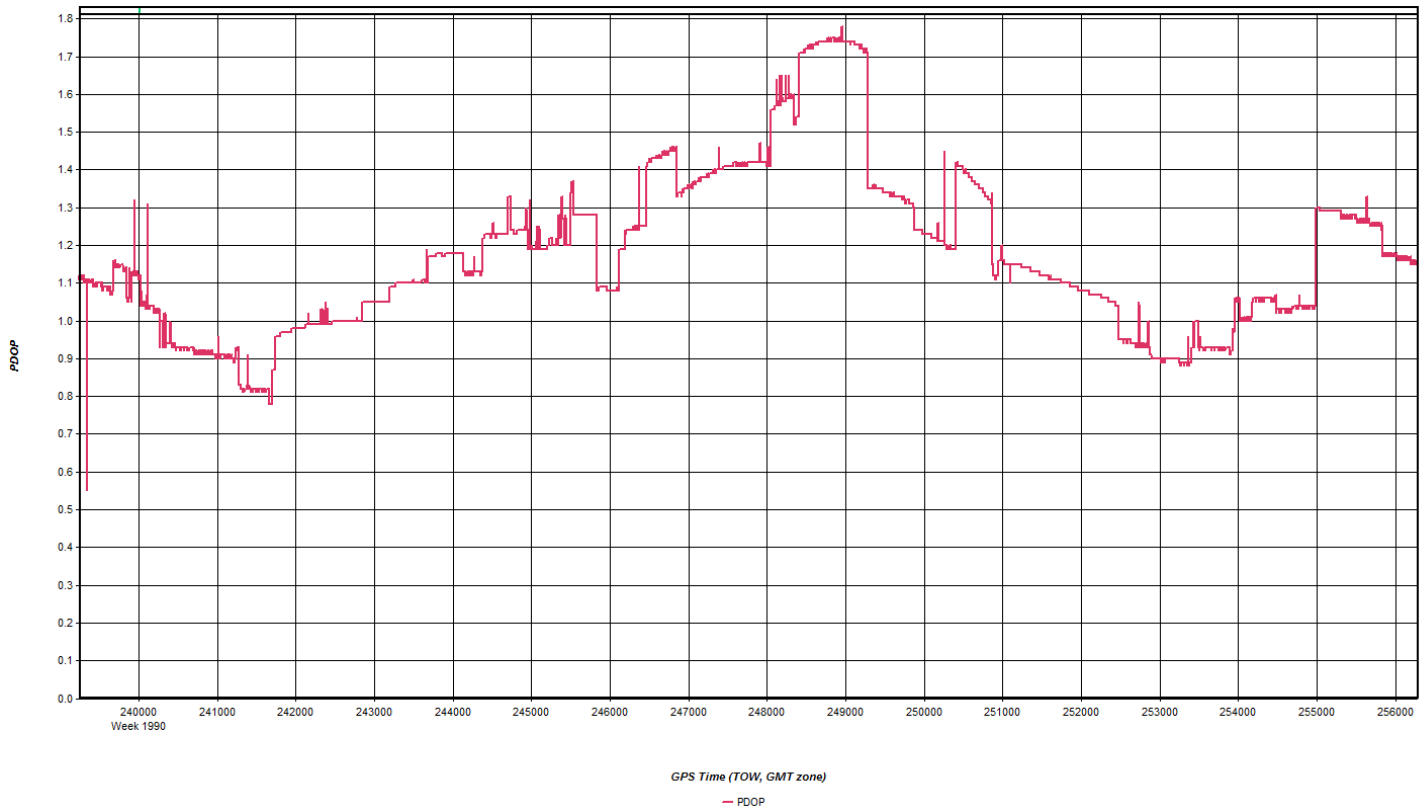
AIRCRAFT BLOCK TIME				**MISSION DETAILS**				
Engine On:	12:26	**Takeoff:**	12:34	**AGL Height:**	2000 m	**Pulse Rate:**	269KHz	
Engine Off:	17:32	**Landing:**	17:25	**Speed:**	150 kts	**Scan Rate:**	56Hz	
TOTAL:	5.1 hr	**TOTAL:**	4.9 hr	**Laser Power:**	100.00%	**FOV:**	36 °	

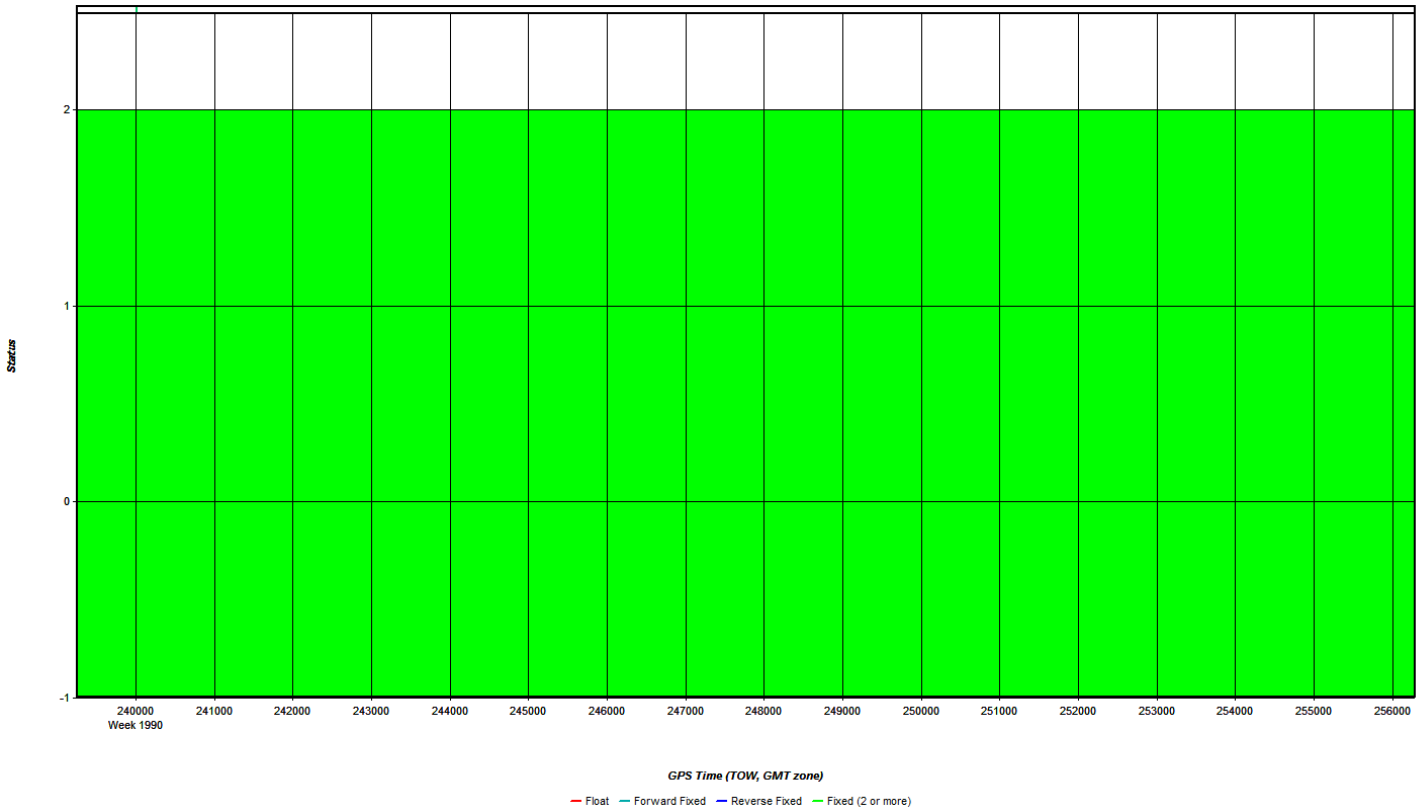
FLIGHT LINE #	**SET HISTO**	**DIRECTION**	**LiDAR File Name**	**GPS TIME**		**COMMENTS**
				Start	**END**	
85		141	180227_145720	14:57:20	15:14:03	good
84		321	180227_151828	15:18:28	15:36:23	good
83		141	180227_154022	15:40:22	15:57:20	good
82		321	180227_160141	16:01:41	16:20:46	good
81		141	180227_162336	16:23:36	16:40:13	good
80		321	180227_164414	16:44:14	17:02:42	good

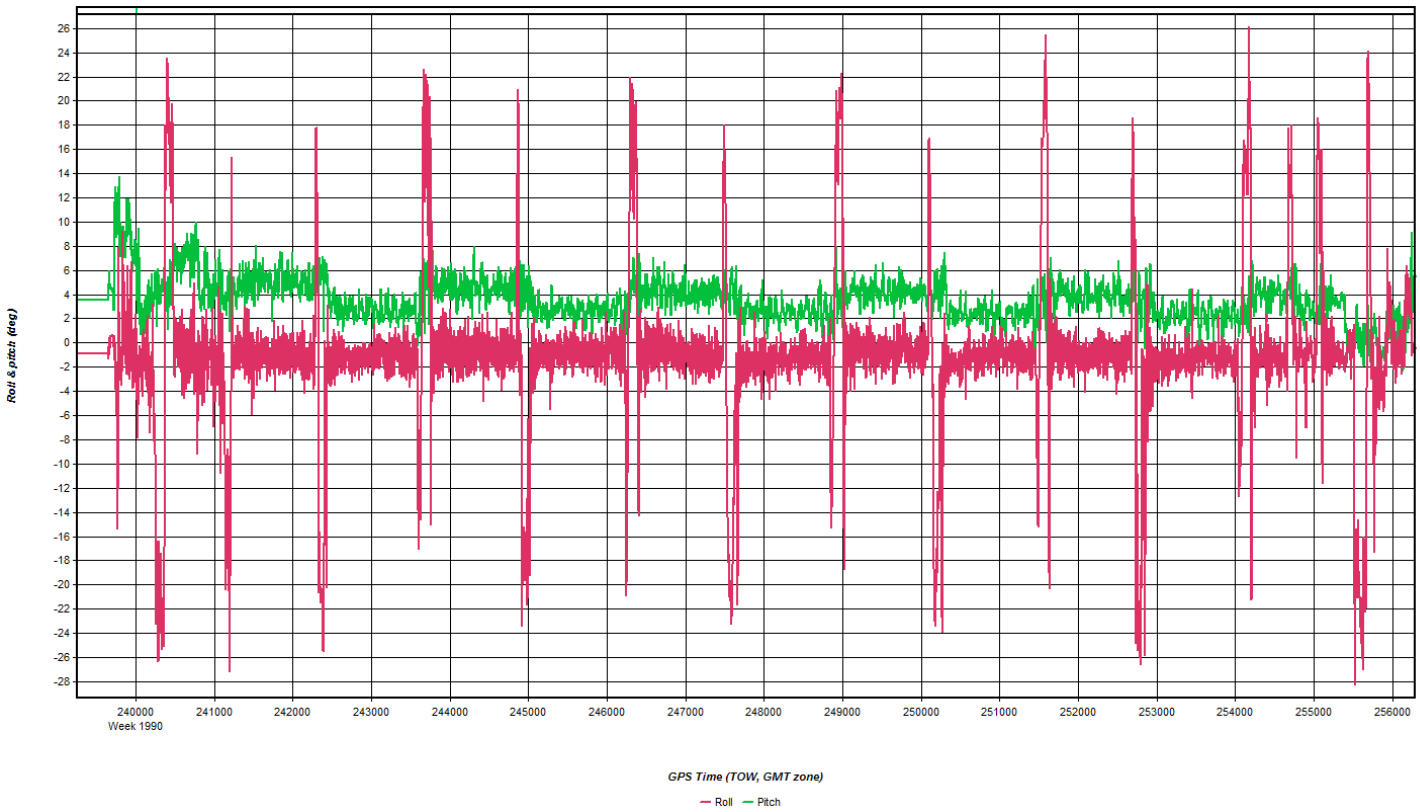
SUN ANGLE	Clear skies, winds were 26kts from the NE
@Start:	Sats – 17
@End:	DOPS – 1.2
@Peak:	The CORS station PASS was used for this flight.

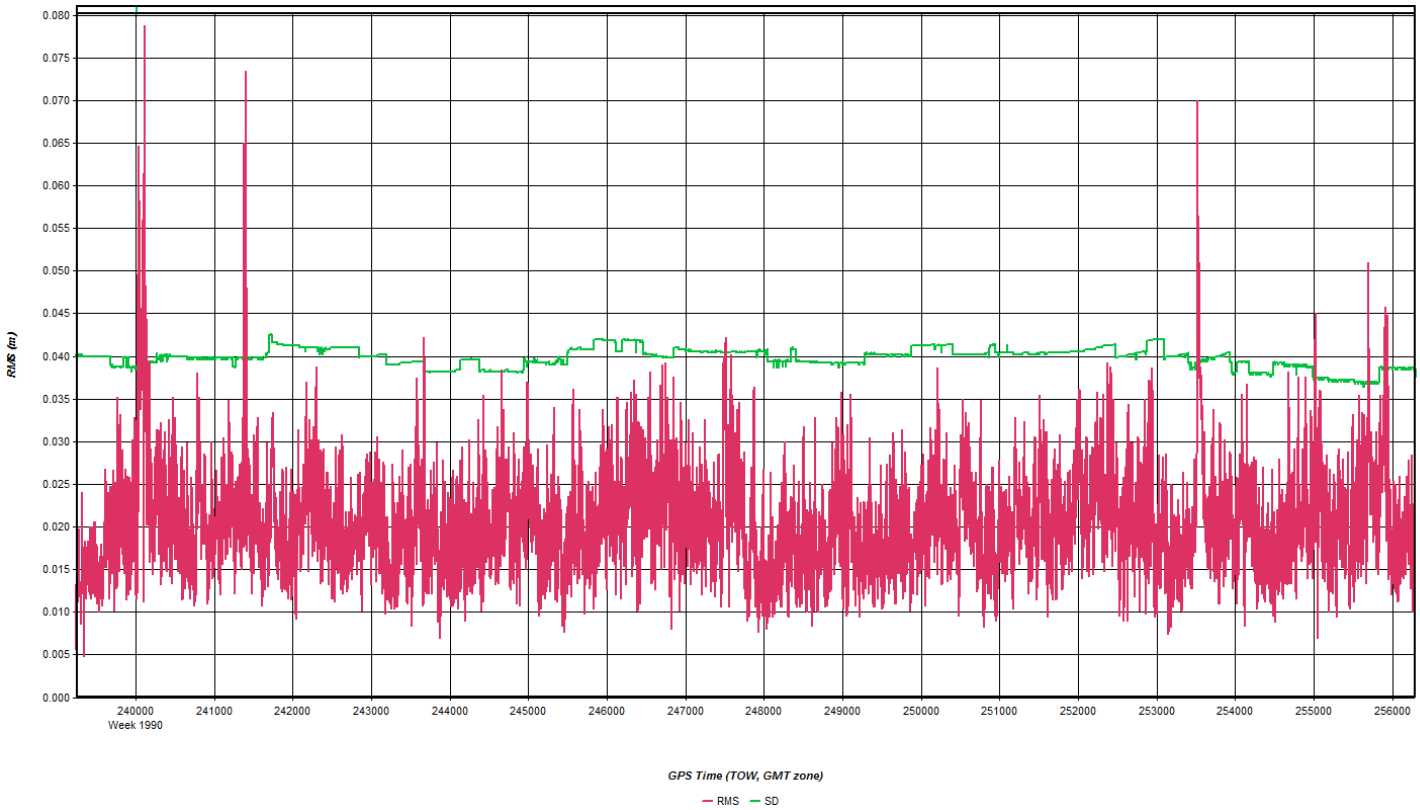
February 27, 2018-B (SN7229, N103RM)

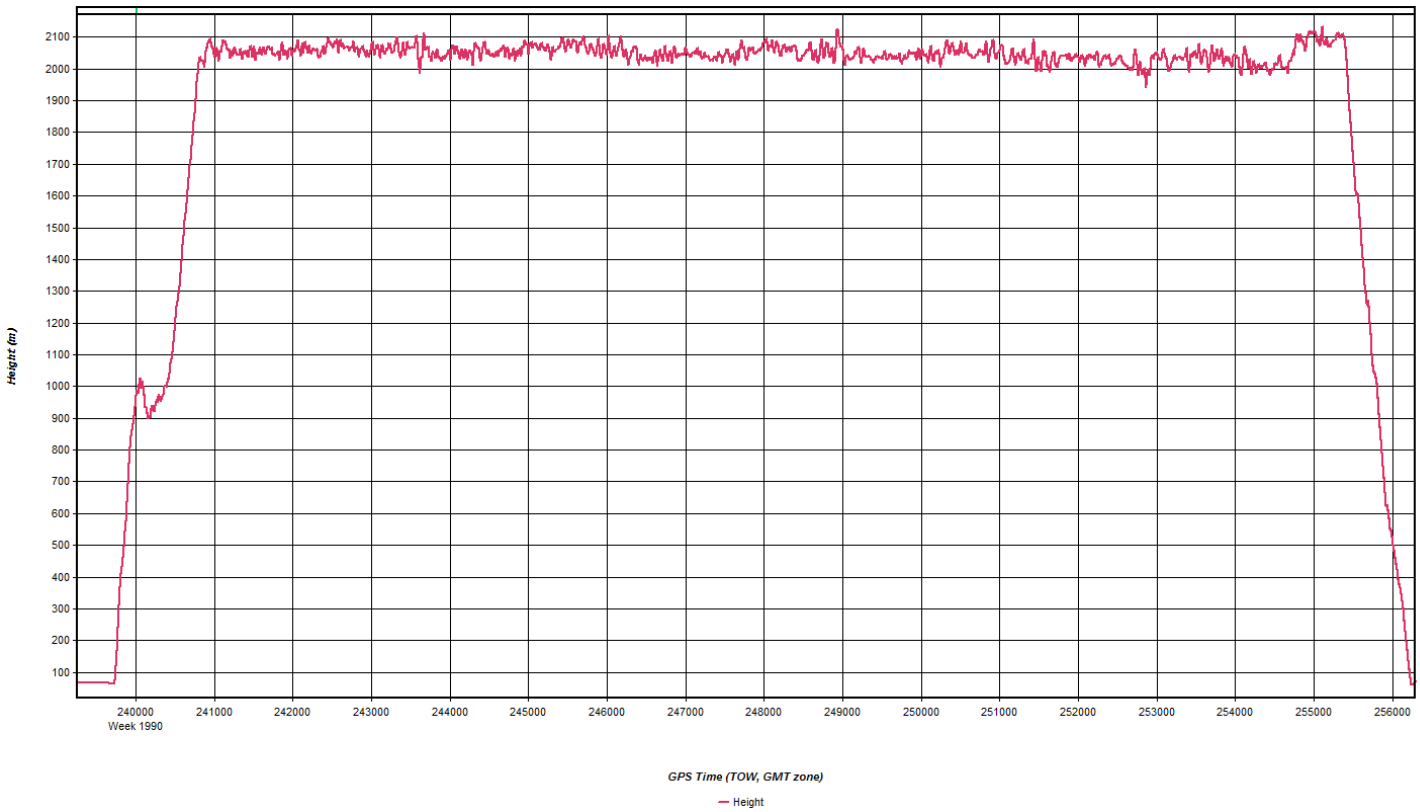

PASS
ARTA_FWD
10 km

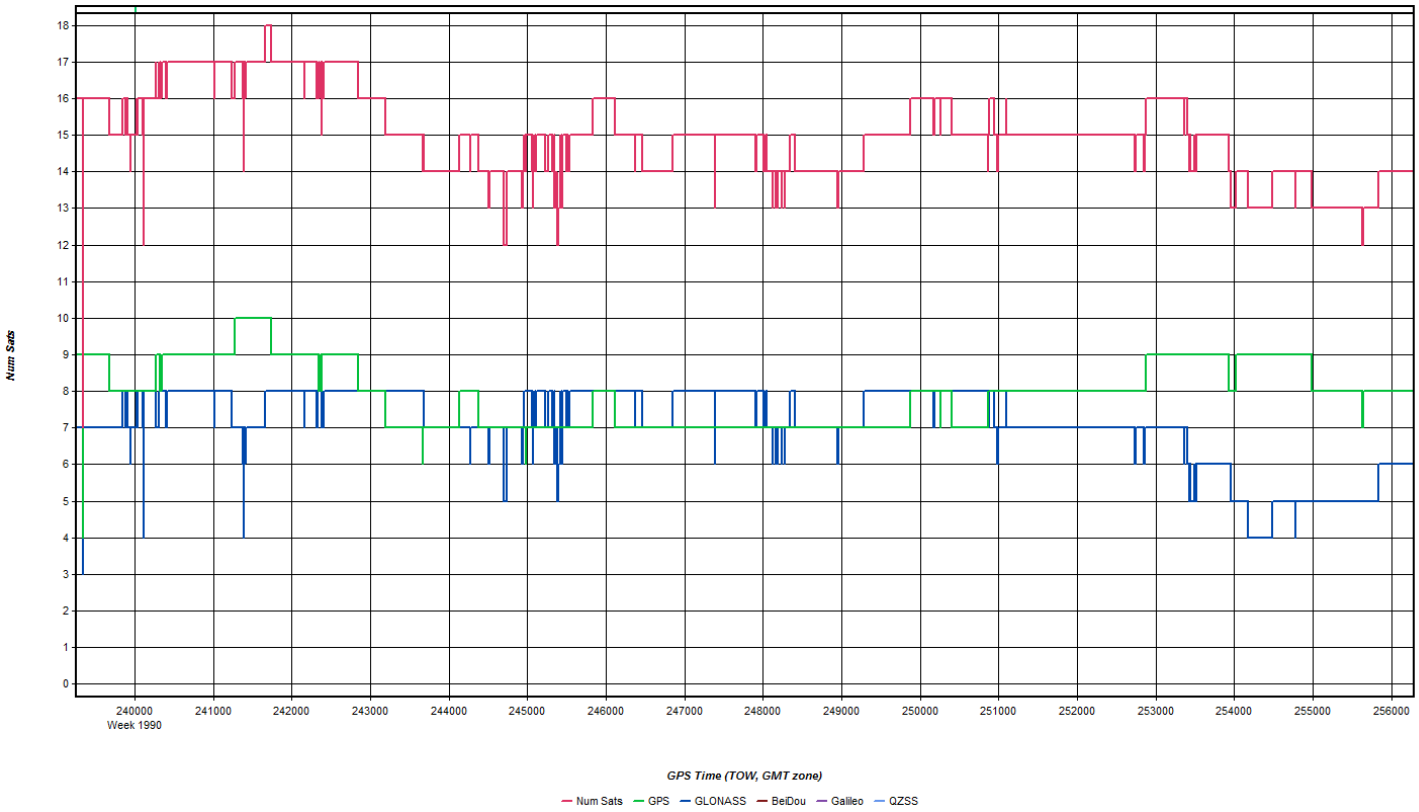

PDOP
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
PDOP

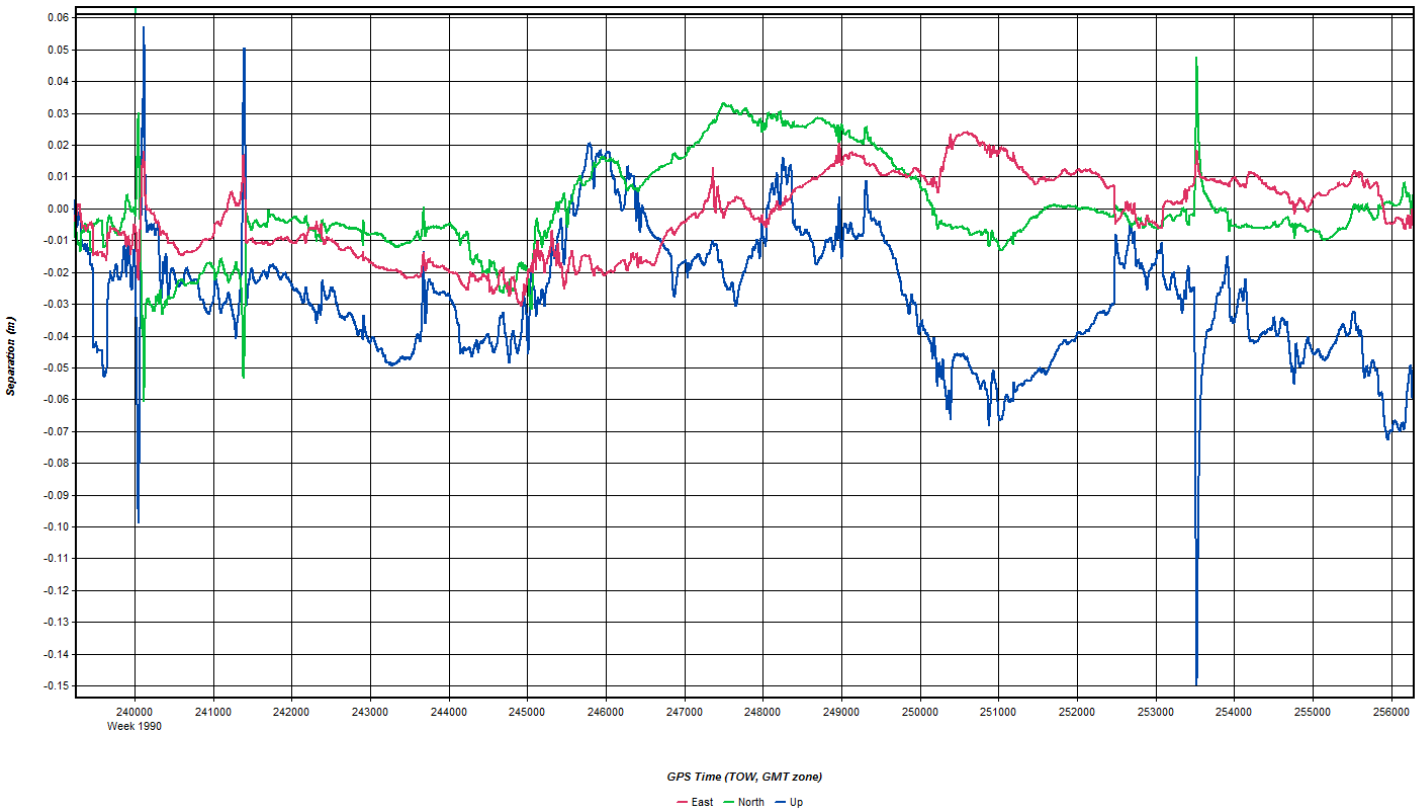

Status
2
1
0
-1
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

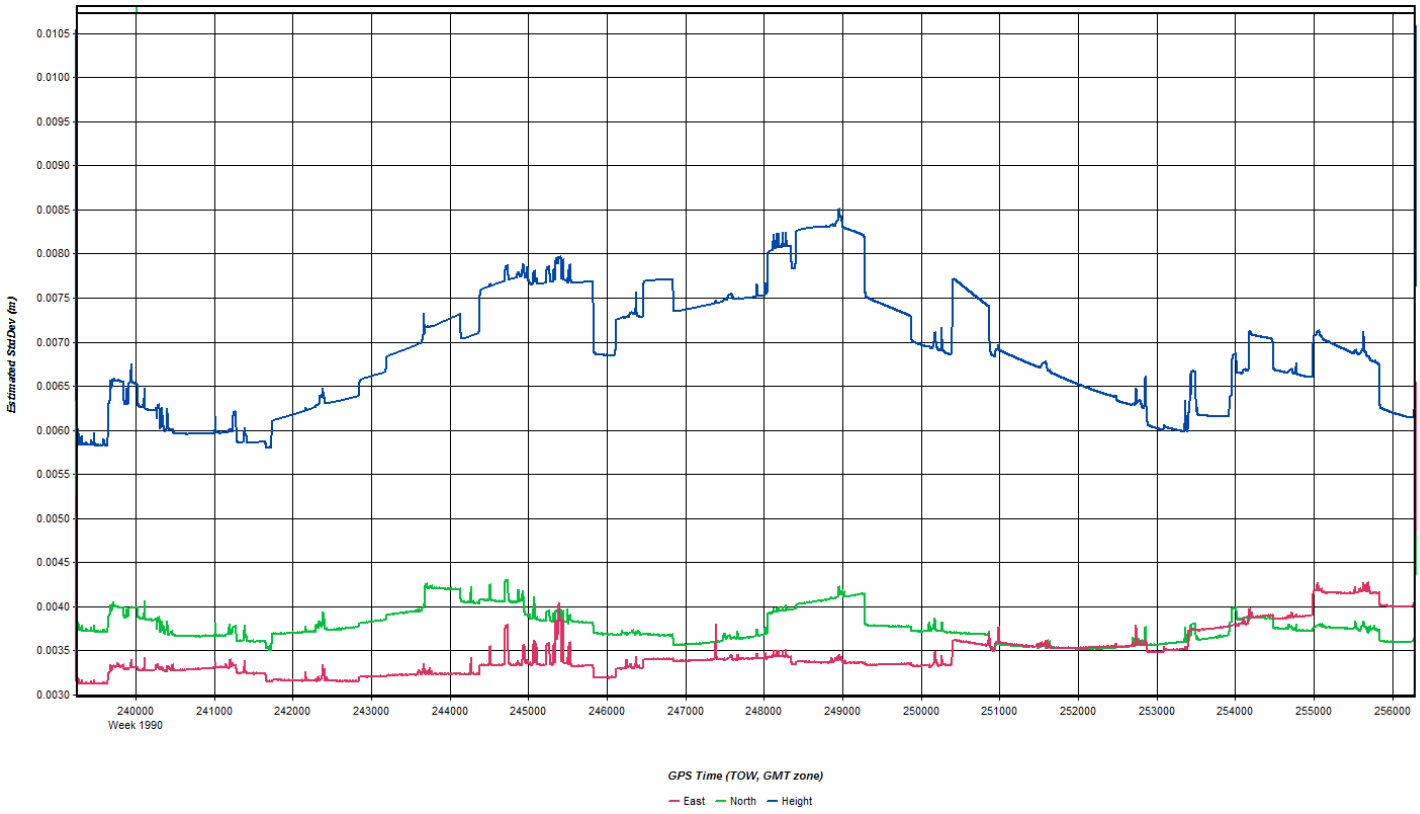

Roll & pitch (deg)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
Roll
Pitch

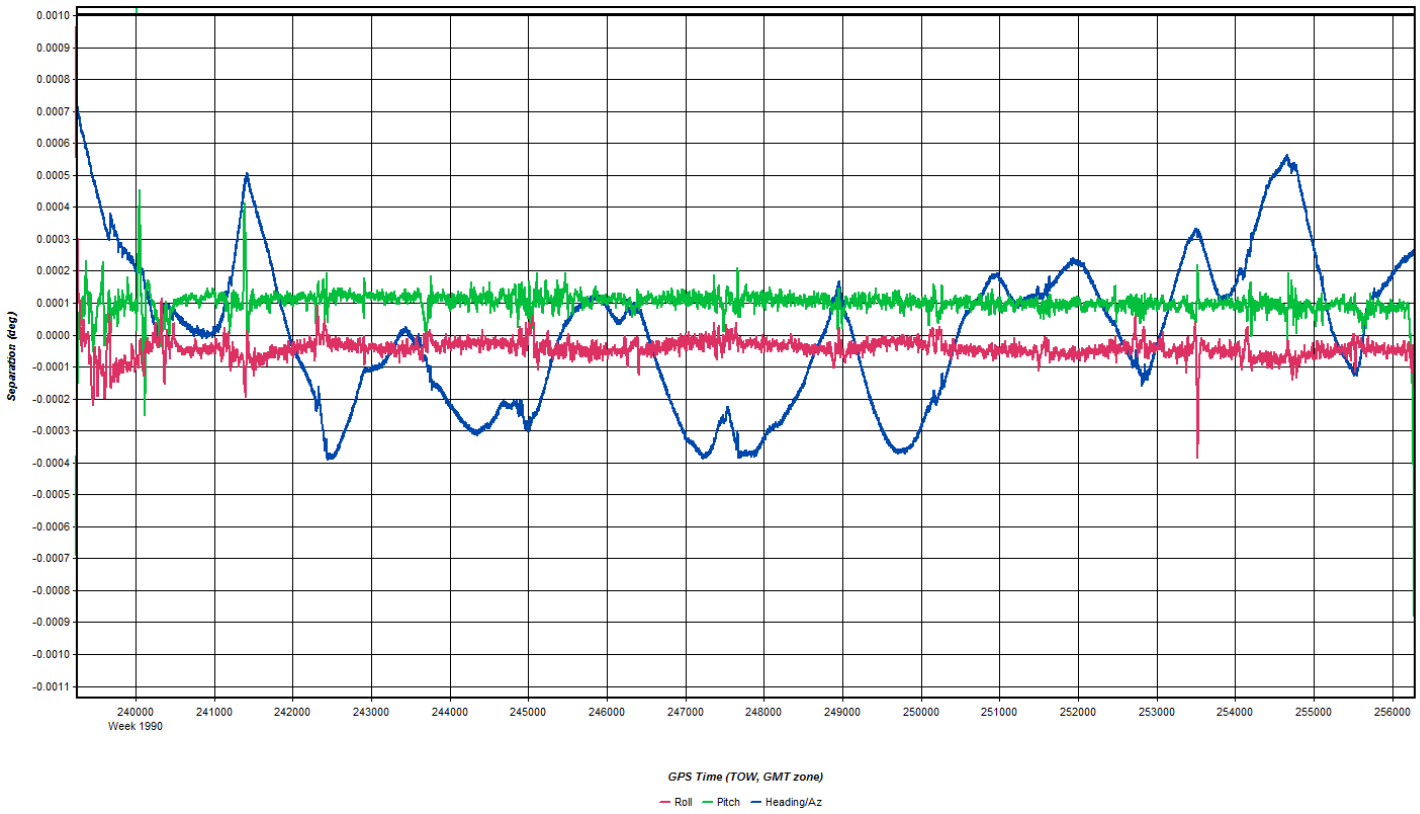

RMS (m)
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
RMS
SD

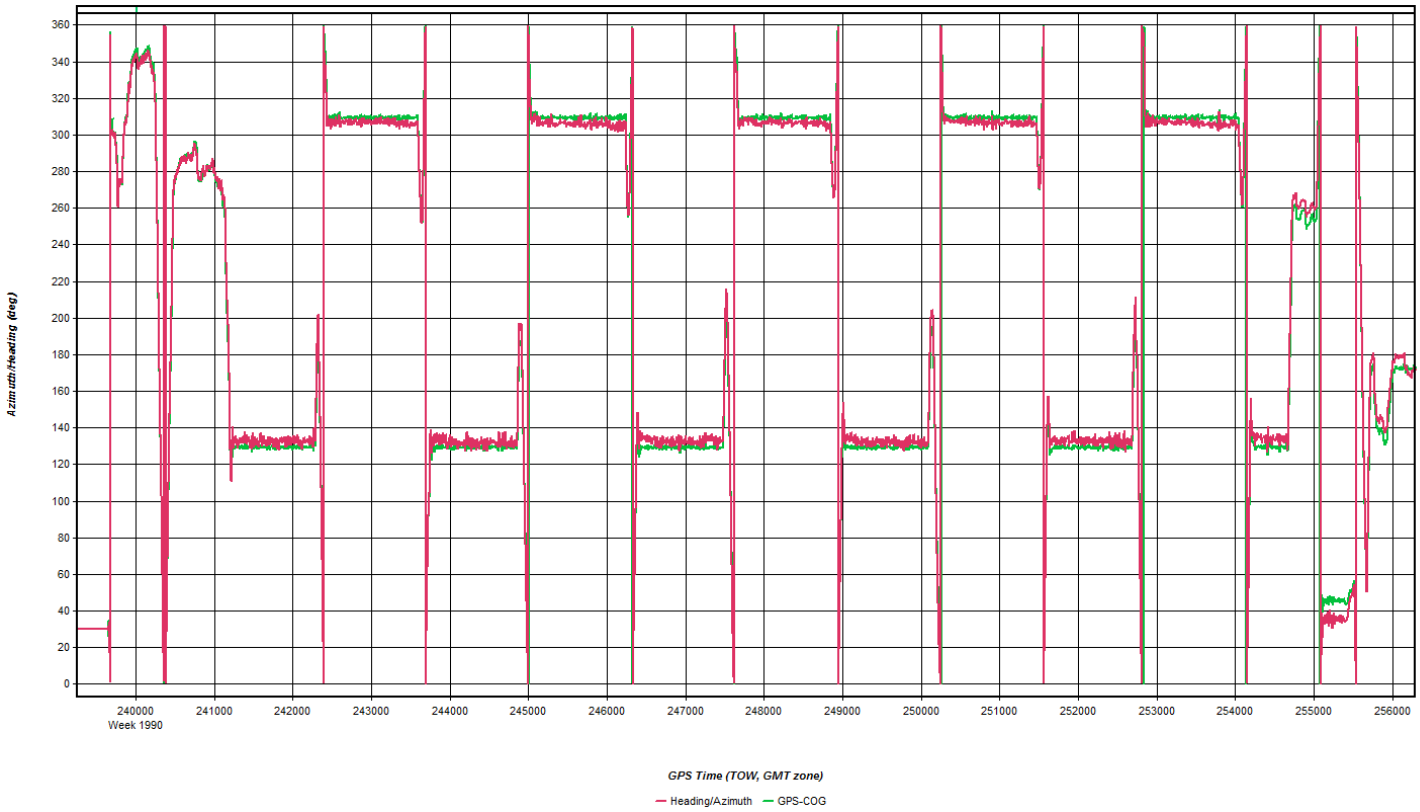

Height (m)
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
Height

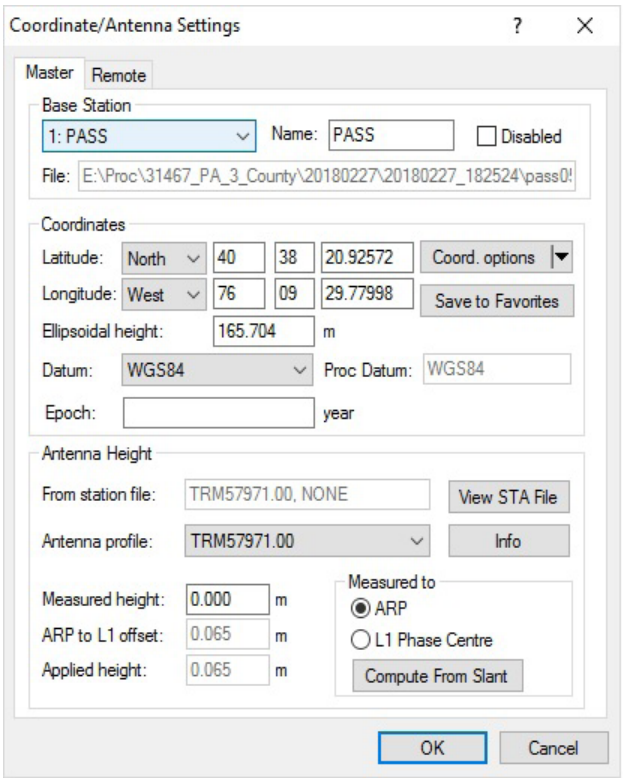

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
-0.08
-0.09
-0.10
-0.11
-0.12
-0.13
-0.14
-0.15
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
-0.0001
-0.0002
-0.0003
-0.0004
-0.0005
-0.0006
-0.0007
-0.0008
-0.0009
-0.0010
-0.0011
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
240000
Week 1990
241000
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
254000
255000
256000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180227\20180227_182524\pass0!
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS – PA Flight2	**DATE**	02/27/2018
SENSOR OPERATOR	Michael Kettridge	**SENSOR(S)**	ALS70-HP / RCD30
PILOT	Andrew Werle	**IMU**	Honeywell uIRS
AIRCRAFT	103RM	**ABGPS**	IPAS-CUS6
AIRBASE	Reading PA	**DATA DRIVES**	Lidar 3
		STATIC ALIGNMENT	**GPS TIME**
			START / **END**
		Pre-Mission	18:43 / 18:48
		Post Mission	22:58 / 23:02

AIRCRAFT BLOCK TIME

Engine On:	18:17	**Takeoff:**	18:34
Engine Off:	23:17	**Landing:**	23:11
TOTAL:	5 hr	**TOTAL:**	4.6 hr

MISSION DETAILS

AGL Height:	2000 m	**Pulse Rate:**	269KHz		
Speed:	150 kts	**Scan Rate:**	56Hz		
Laser Power:	100.00%	**FOV:**	36 °		

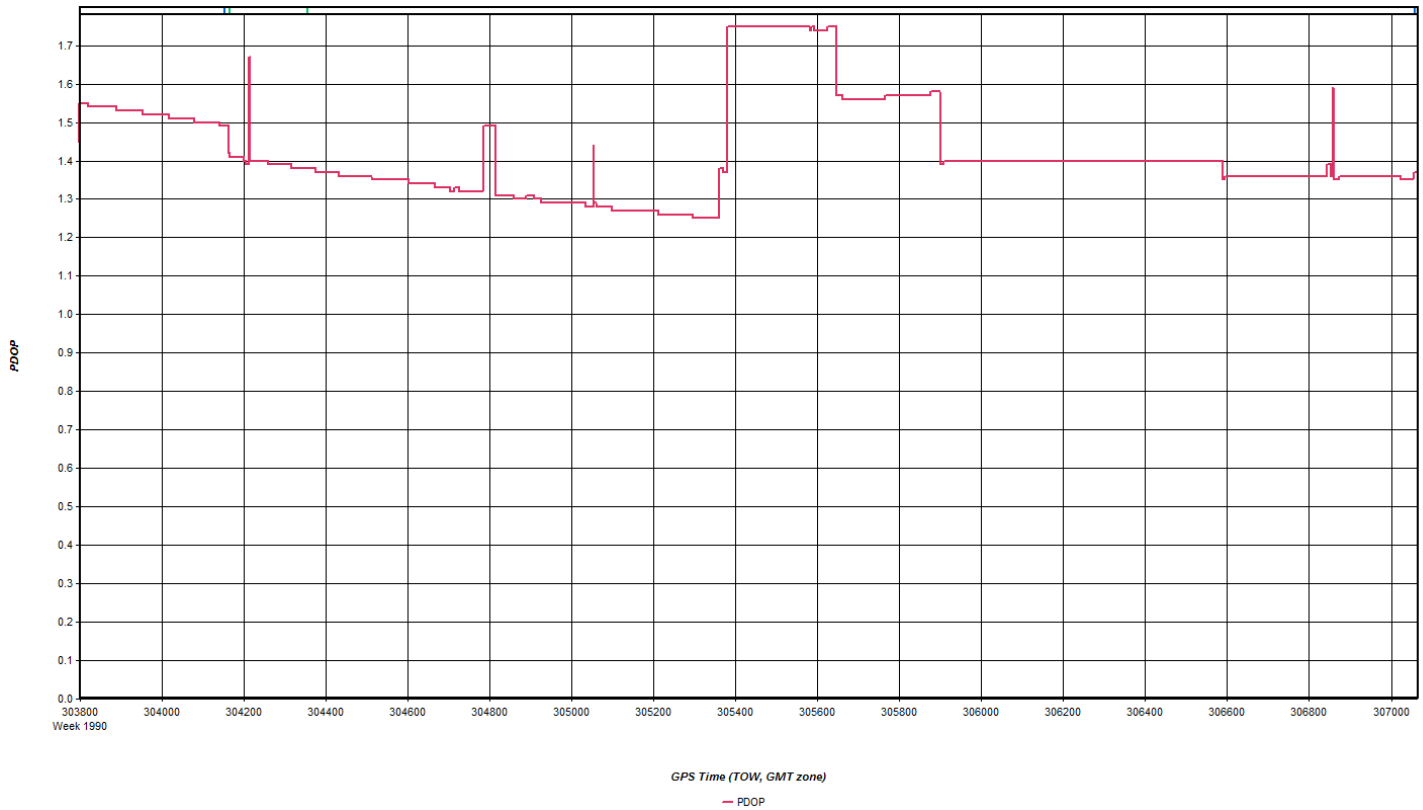
FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME Start	GPS TIME END	COMMENTS
79		141	180227_190007	19:00:07	19:19:00	good
78		321	180227_192105	19:21:05	19:39:25	good
77		141	180227_194259	19:42:59	20:00:42	good
76		321	180227_200441	20:04:41	20:23:18	good
75		141	180227_202713	20:27:13	20:44:18	good
74		321	180227_204831	20:04:31	21:06:54	good
73		141	180227_211049	21:10:49	21:27:48	good
72		321	180227_213221	21:32:21	21:50:41	good
71		141	180227_215413	21:54:13	22:11:10	good
70		321	180207_221505	22:15:05	22:33:39	70m offline 10nm from North.
69		141	180227_223224	22:32:24	22:45:30	Stopped line 11nm from North
Cross Line		57	180227_225159	22:51:59	22:56:20	Stopped line 10nm from West.

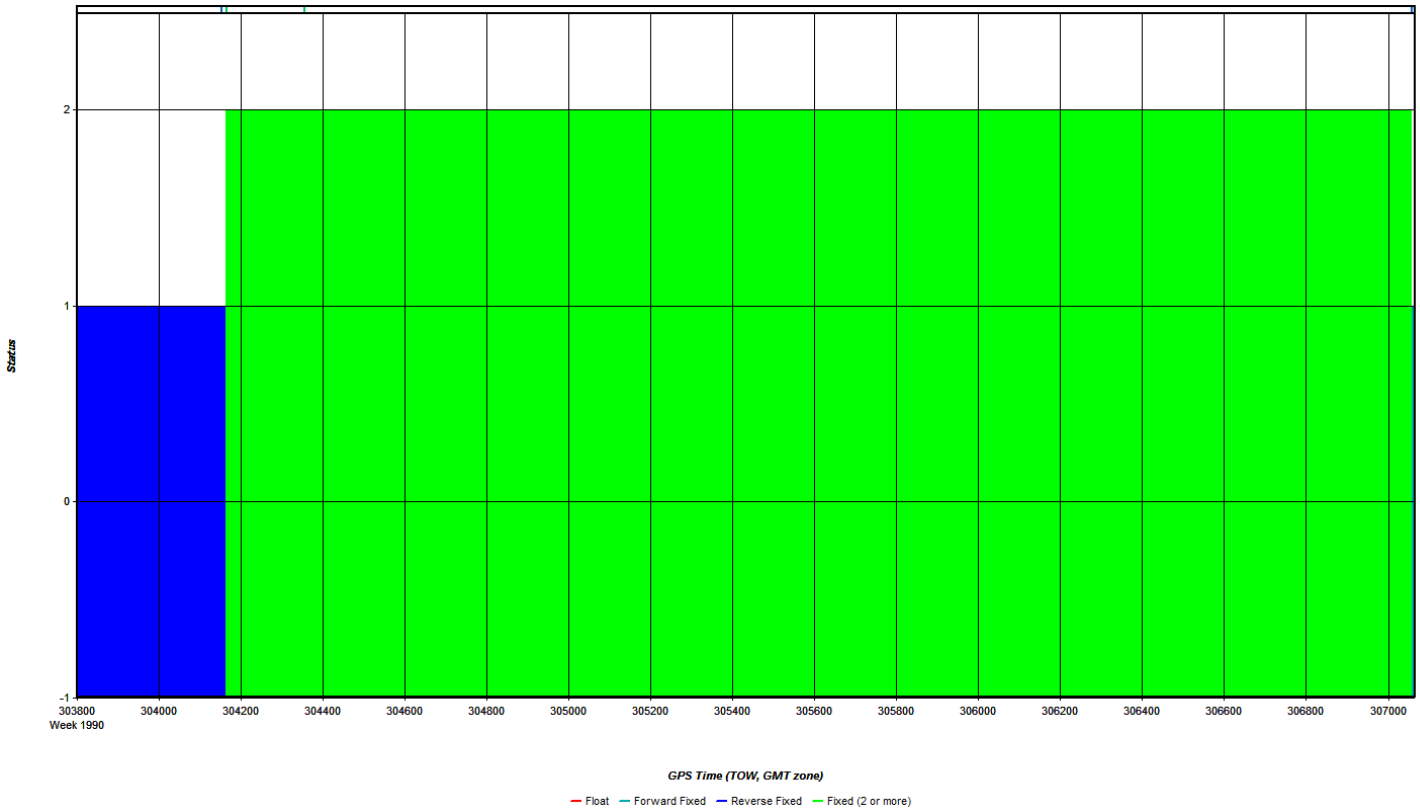
SUN ANGLE
@Start:
@End:
@Peak:

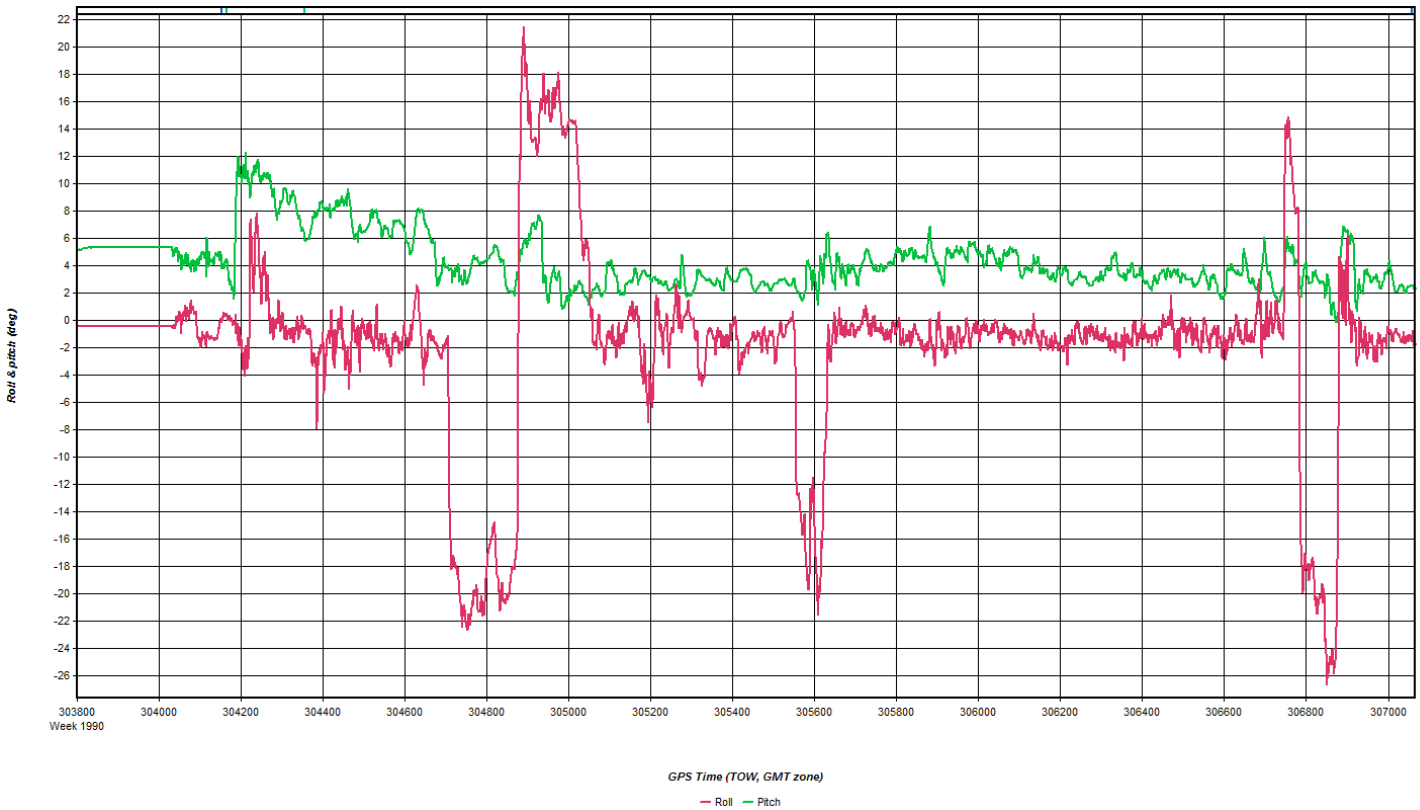
Clear skies, winds were 29kts from the NE
Sats avg 19
DOPS avg 1.2
The CORS station PASS was used for this flight.

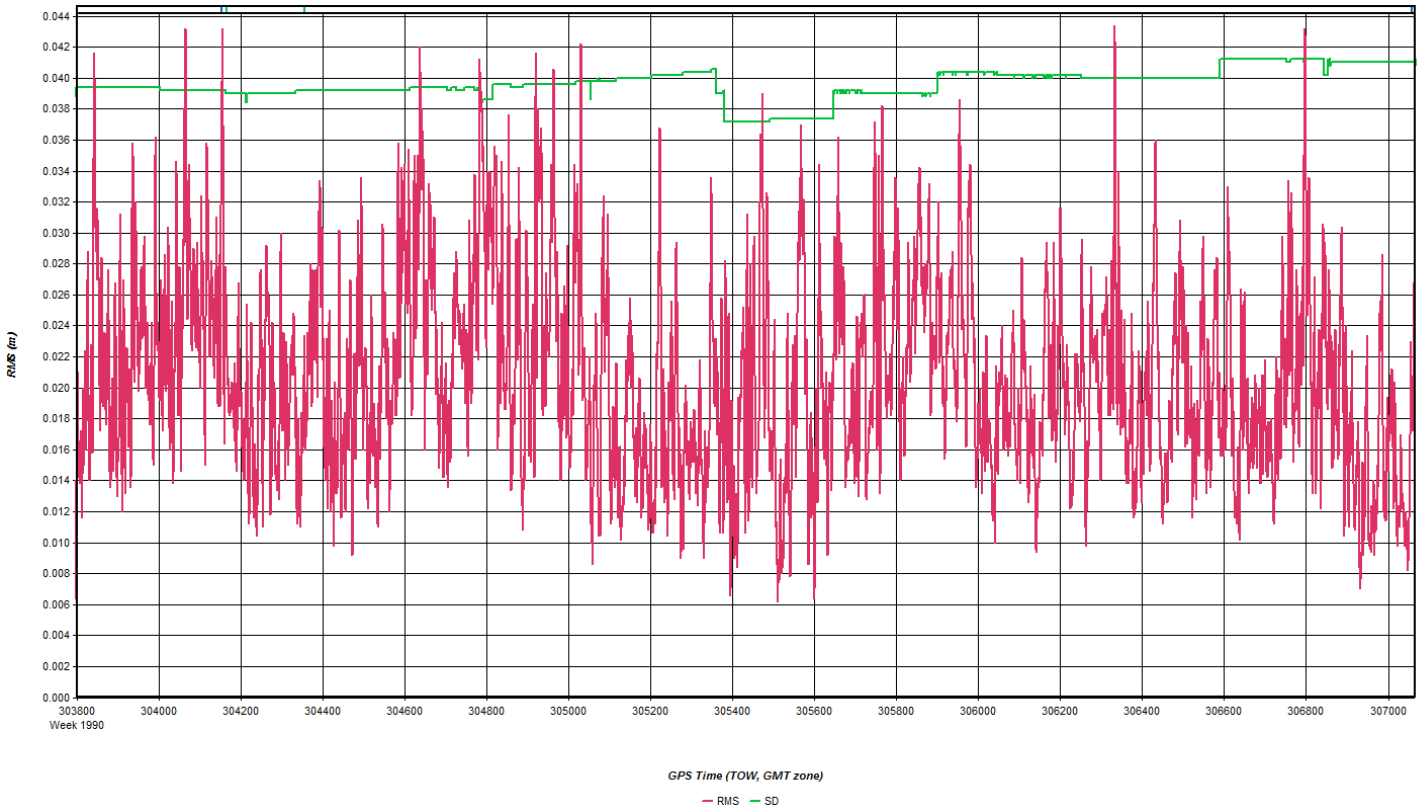
February 28, 2018-A (SN7229, N103RM)

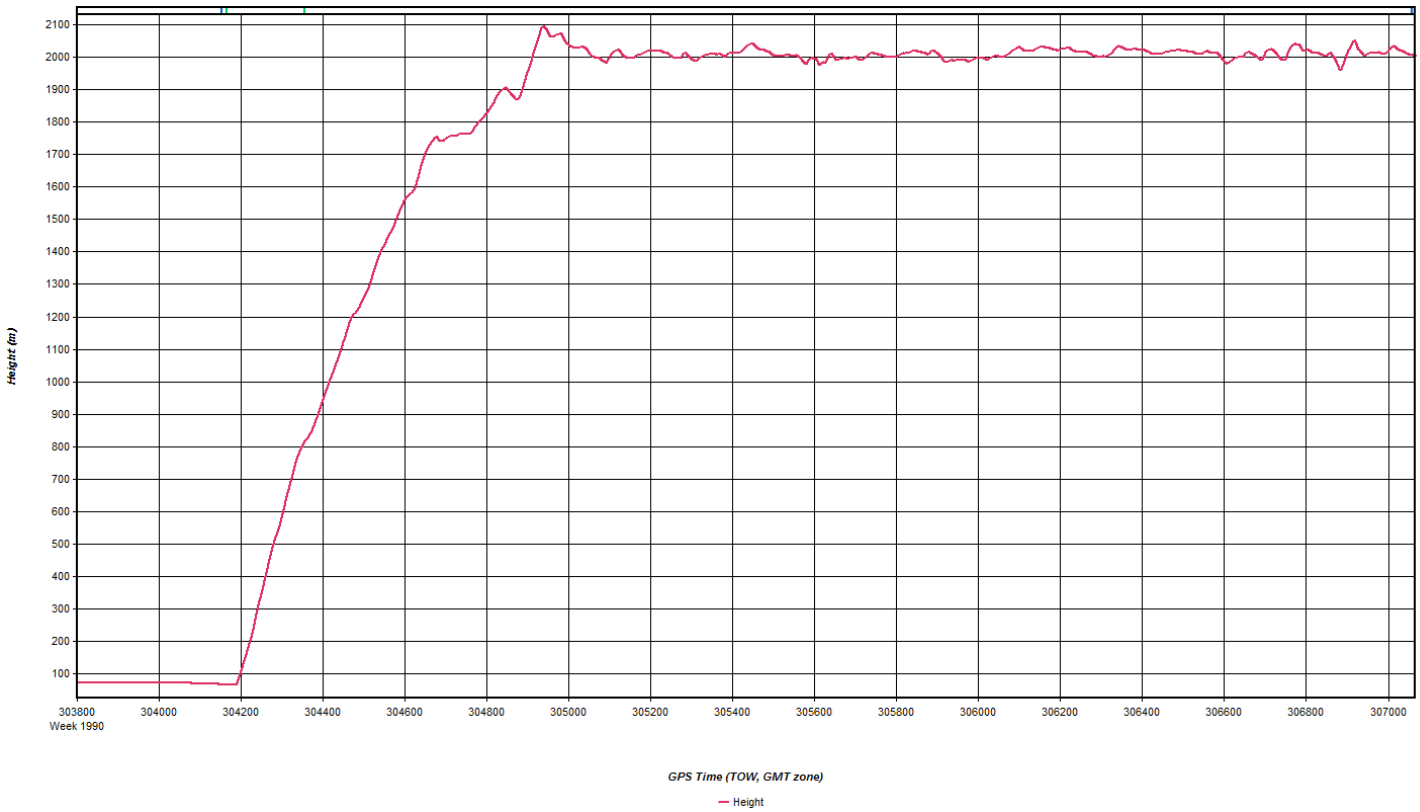

PASS
ARTC FWD
ARTC REV
ARTC REV
5 km

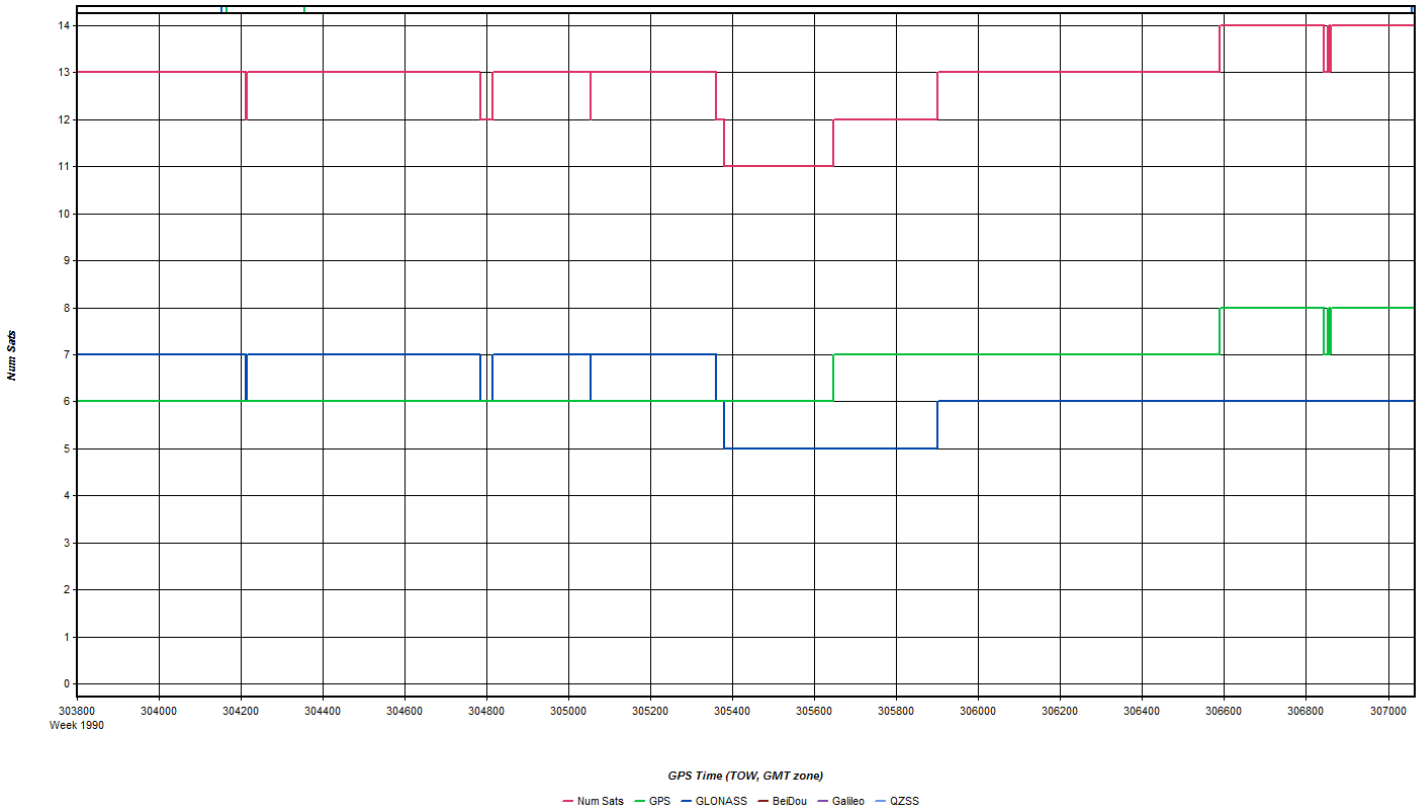

PDOP
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
PDOP

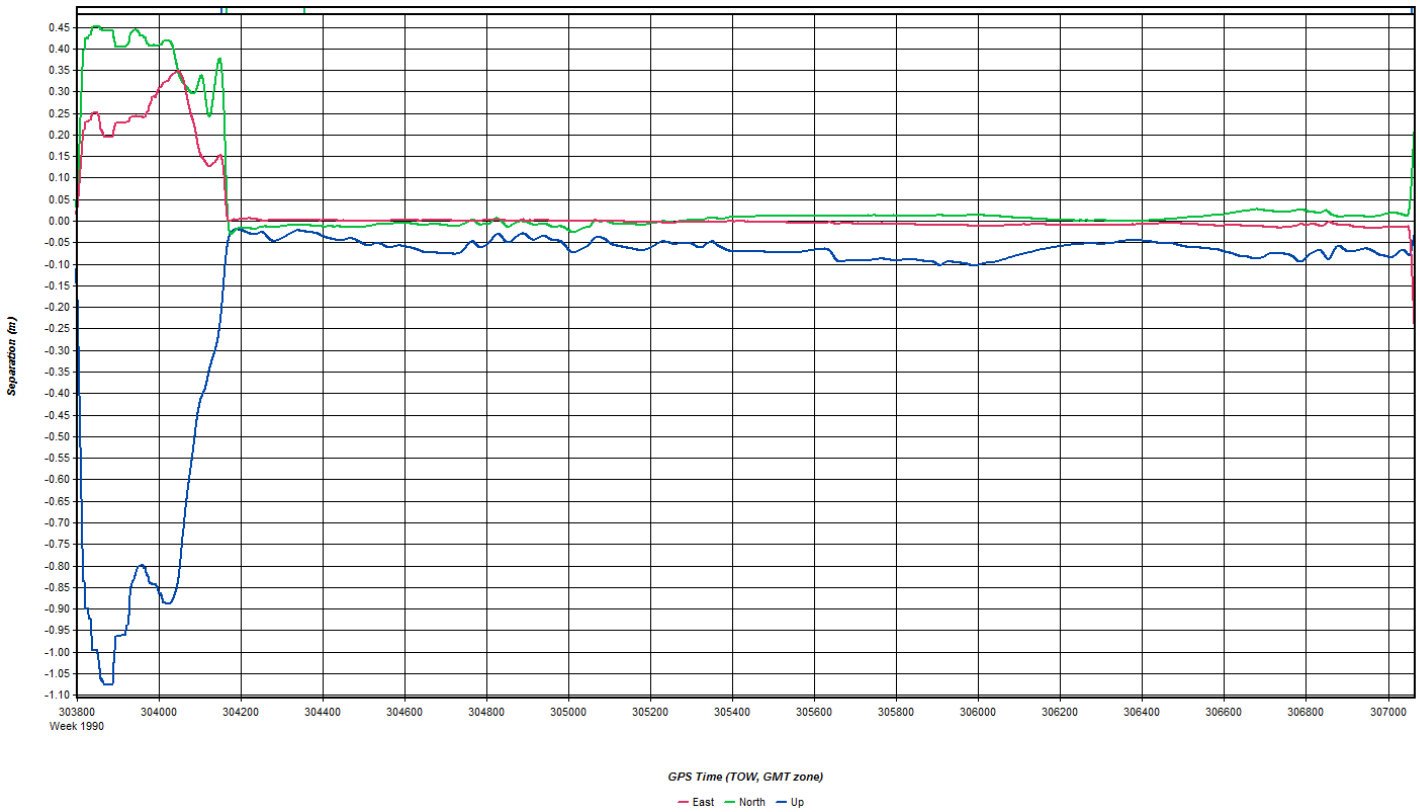

Status
2
1
0
-1
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

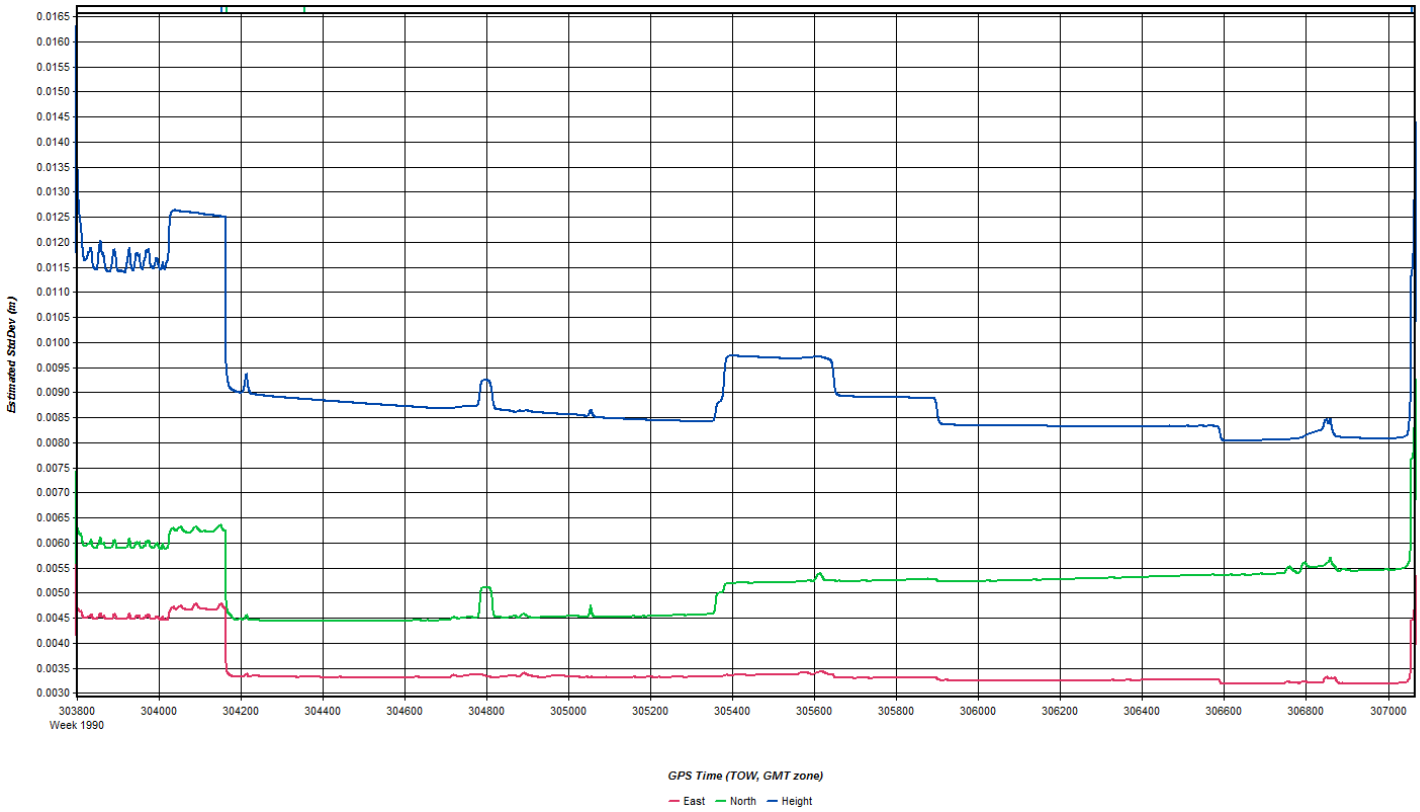

Roll & pitch (deg)
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
Roll
Pitch

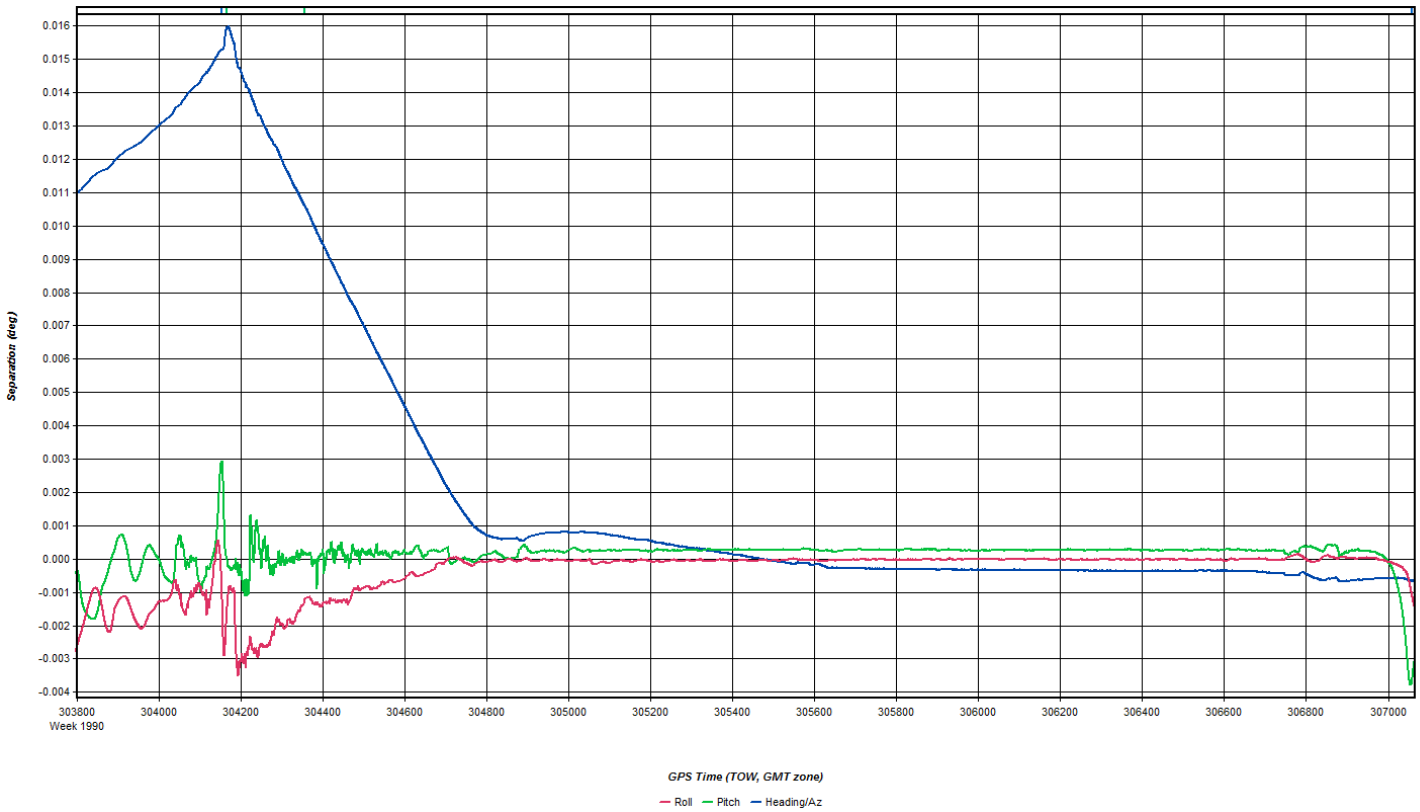

RMS (m)
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
RMS
SD

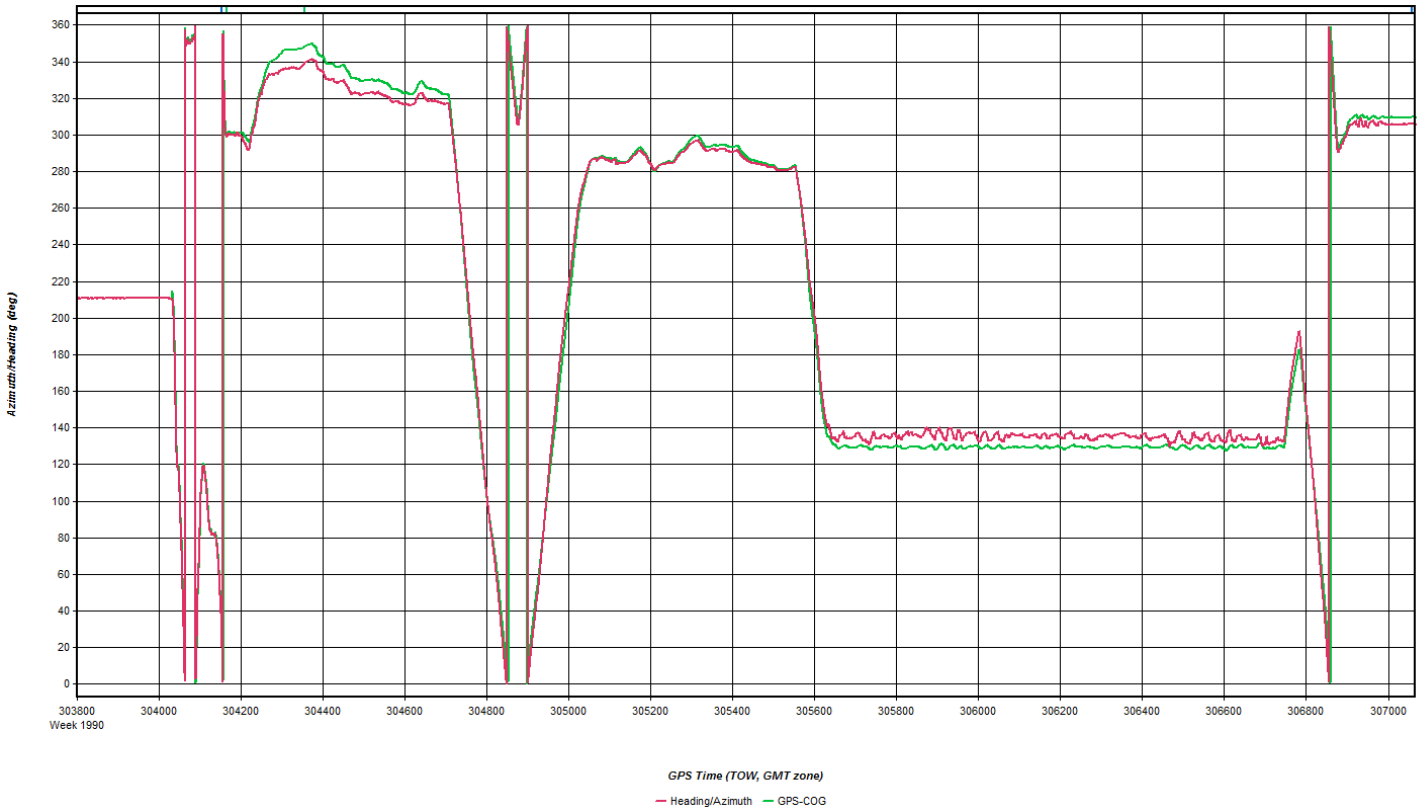

Height (m)
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
Height

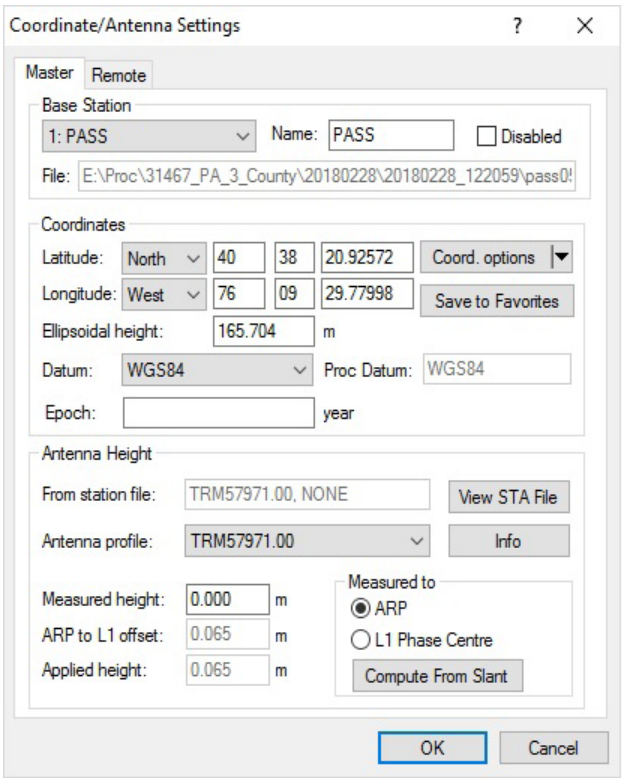

Num Sats
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
-0.45
-0.50
-0.55
-0.60
-0.65
-0.70
-0.75
-0.80
-0.85
-0.90
-0.95
-1.00
-1.05
-1.10
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0165
0.0160
0.0155
0.0150
0.0145
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
-0.002
-0.003
-0.004
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
303800
Week 1990
304000
304200
304400
304600
304800
305000
305200
305400
305600
305800
306000
306200
306400
306600
306800
307000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180228\20180228_122059\pass0
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS – PA Flight3
SENSOR OPERATOR	Michael Kettridge
PILOT	Andrew Werle
AIRCRAFT	103RM
AIRBASE	Reading PA

DATE	02/28/2018
SENSOR(S)	ALS70-HP / RCD30
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	Lidar 3
STATIC ALIGNMENT	

AIRCRAFT BLOCK TIME			
Engine On:	12:17	Takeoff:	12:30
Engine Off:	17:46	Landing:	17:41
TOTAL:	5.5 hr	TOTAL:	5.2 hr

MISSION DETAILS			
AGL Height:	2000 m	Pulse Rate:	269KHz
Speed:	150 kts	Scan Rate:	56Hz
Laser Power:	100.00%	FOV:	36 °

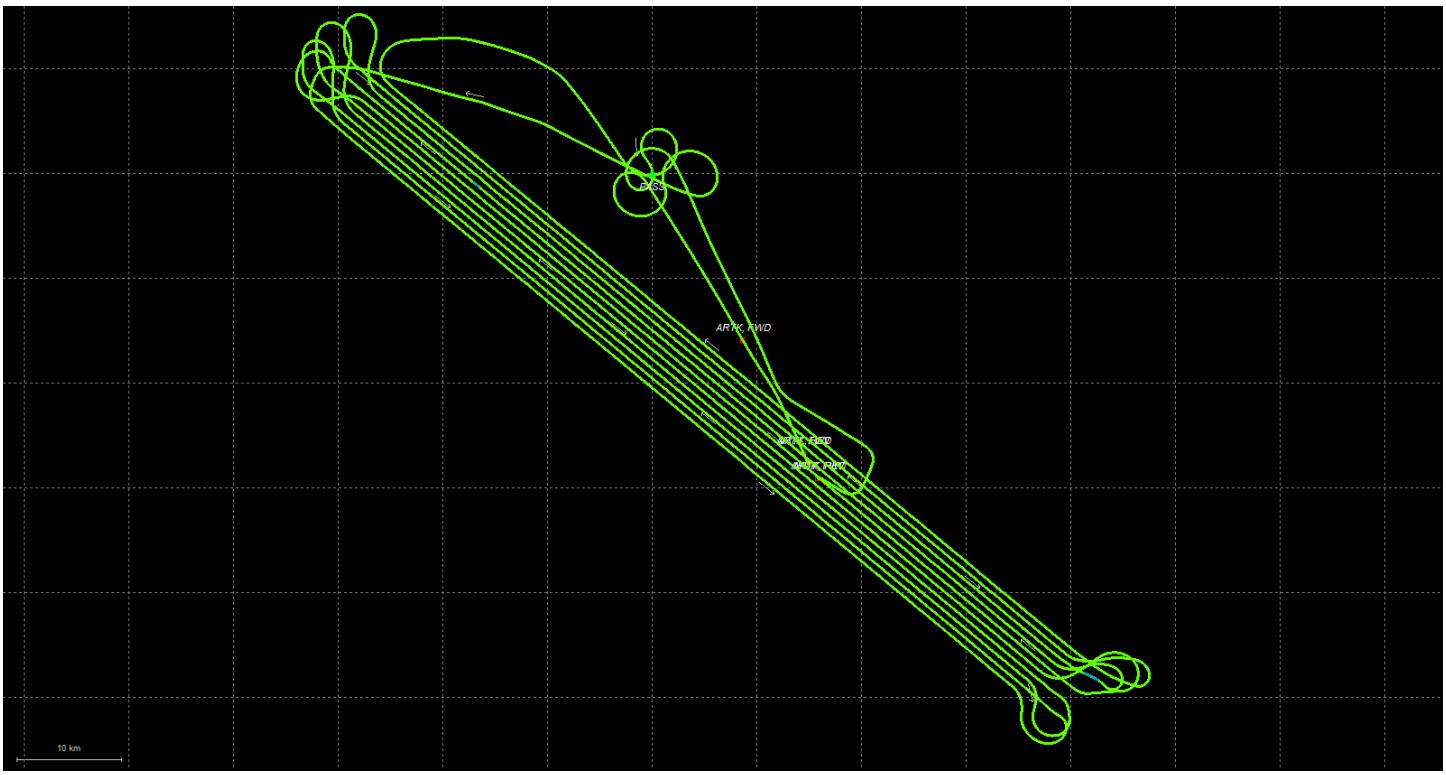
	GPS TIME	
	START	END
Pre-Mission	12:37	12:45
Post Mission	17:25	17:31

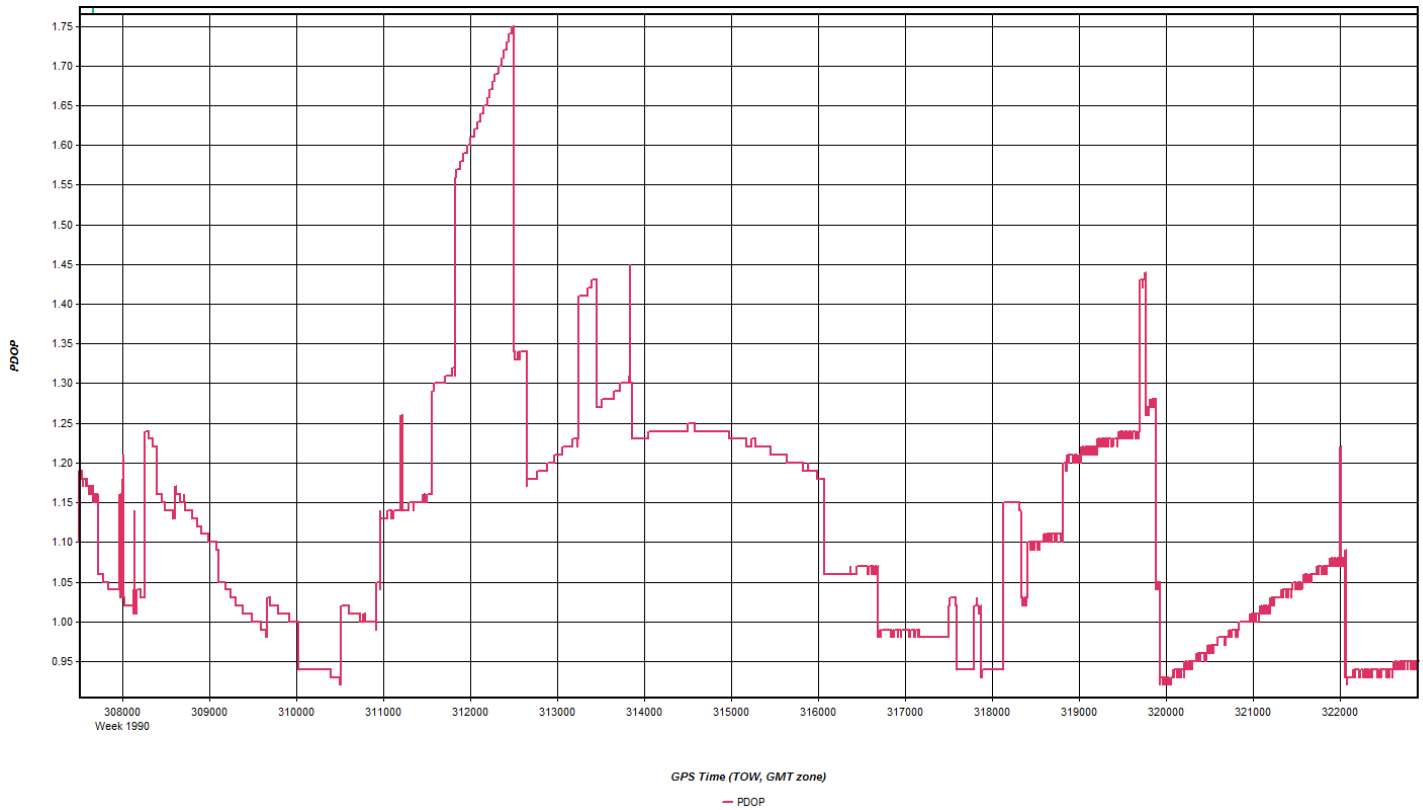
FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME Start	GPS TIME END	COMMENTS
69		141	180228_125429	12:54:29	13:11:55	good
68		321	180228_131540	13:15:40		IPAS error 3 minutes after start.
68		141	180228_134541	13:45:41	14:02:50	good
67		321	180228_140631	14:06:31	14:24:20	good
66		141	180228_142826	14:2826	14:46:32	good
65		321	180228_145013	14:50:13	15:07:50	good
64		141	180228_151225	15:12:25	15:29:51	good
63		321	180228_153439	15:34:39	15:52:44	good
62		141	180228_155651	15:56_51	16:14:14	good
61		321	180228_161749	16:17:49	16:36:00	good
60		141	180228_163952	16:39:52	16:57:41	good
59		321	180228_170203	17:02:03	17:19:57	good

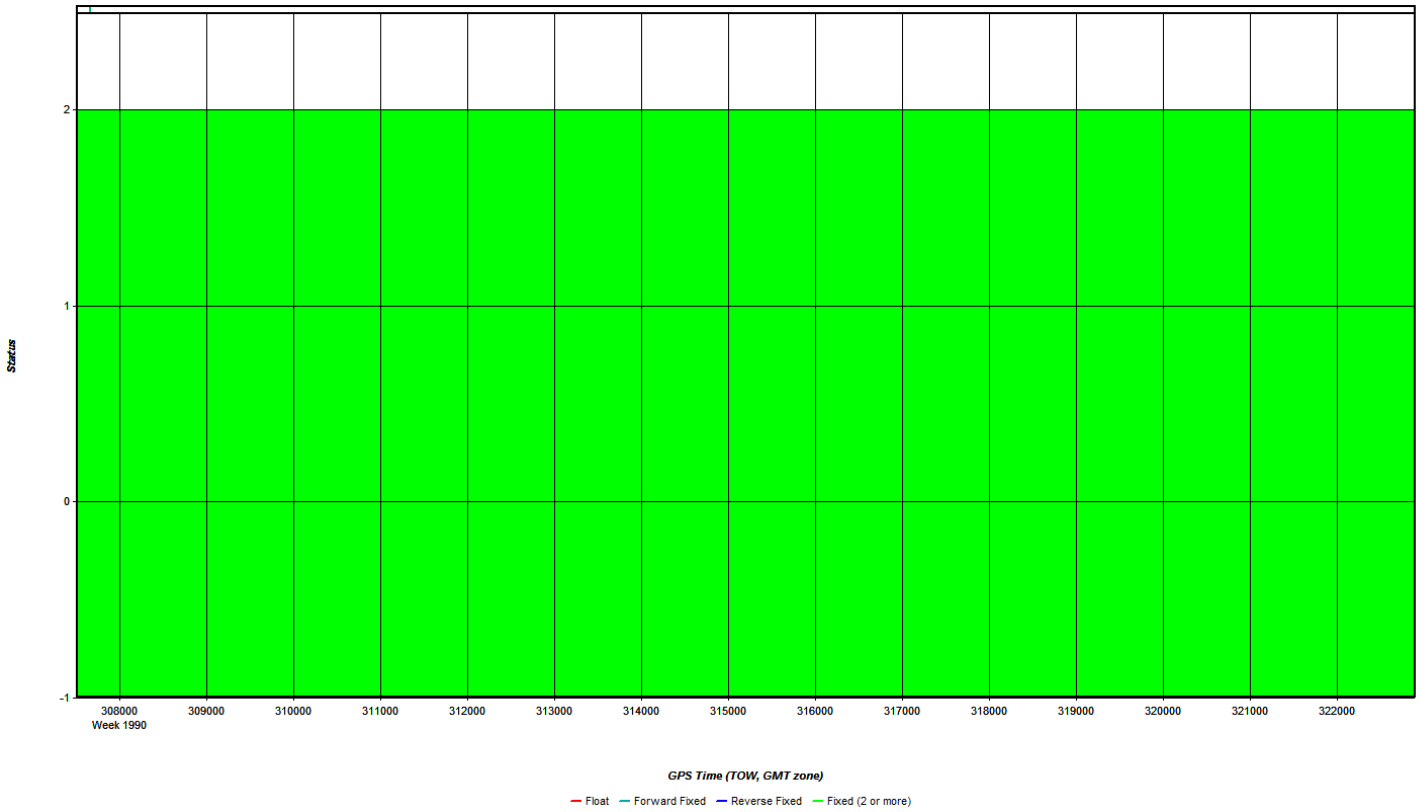
SUN ANGLE
@Start:
@End:
@Peak:

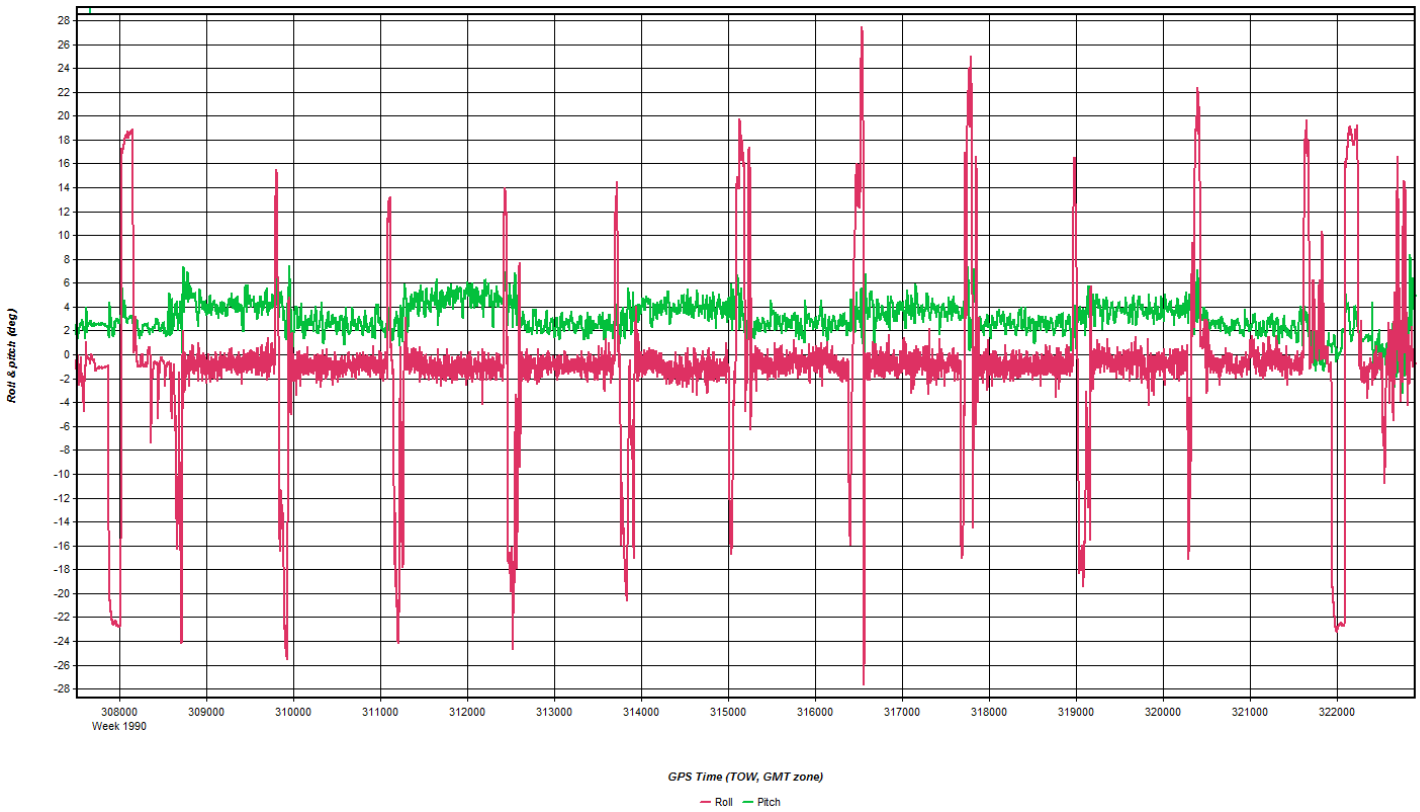
Clear skies, winds were 27kts from the NE
Sats avg 18, PDOPS avd 1.3
IPAS error 3 minutes into line 68. Had to do an air start. Need to confirm line 69 was not effected.
CORS station PASS was used for this flight.

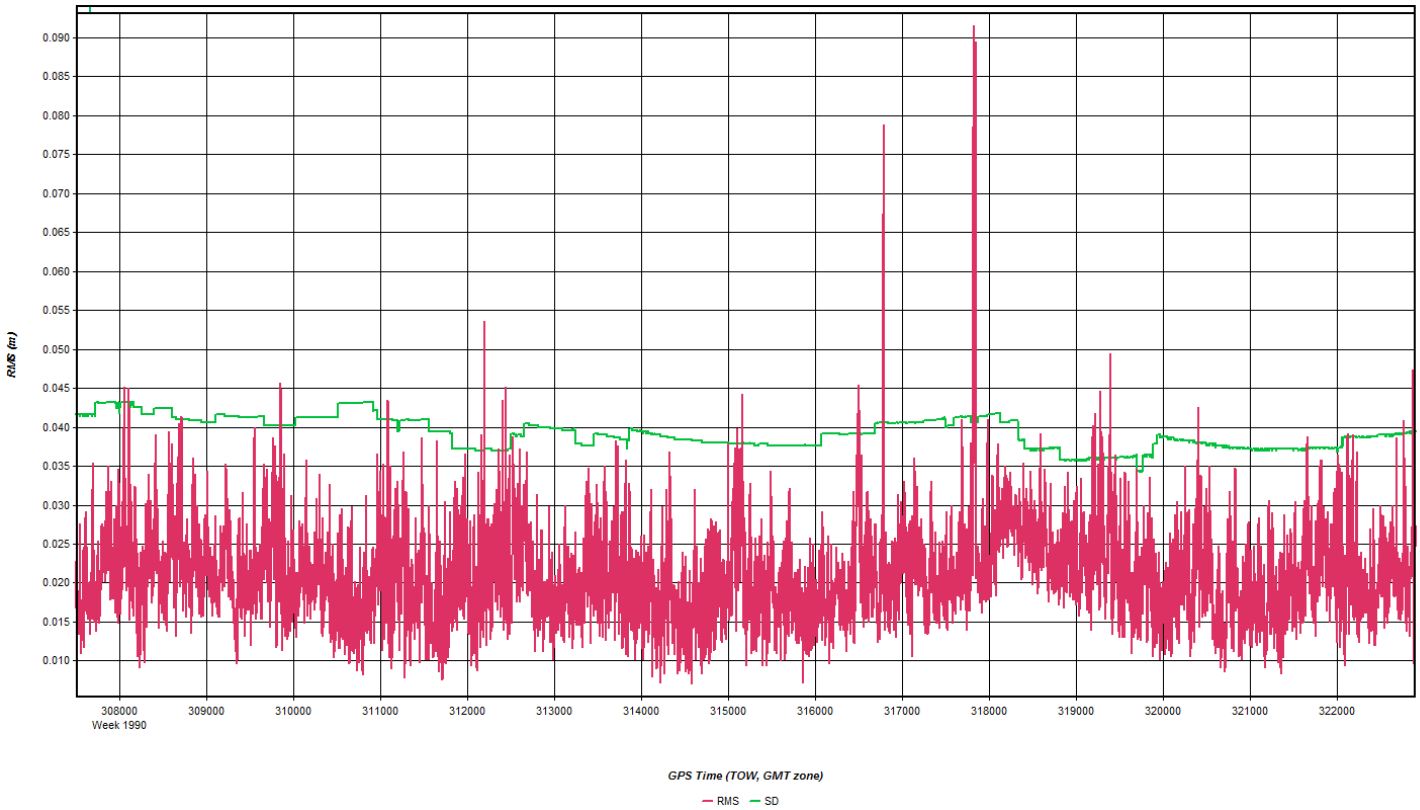
February 28, 2018-B (SN7229, N103RM)

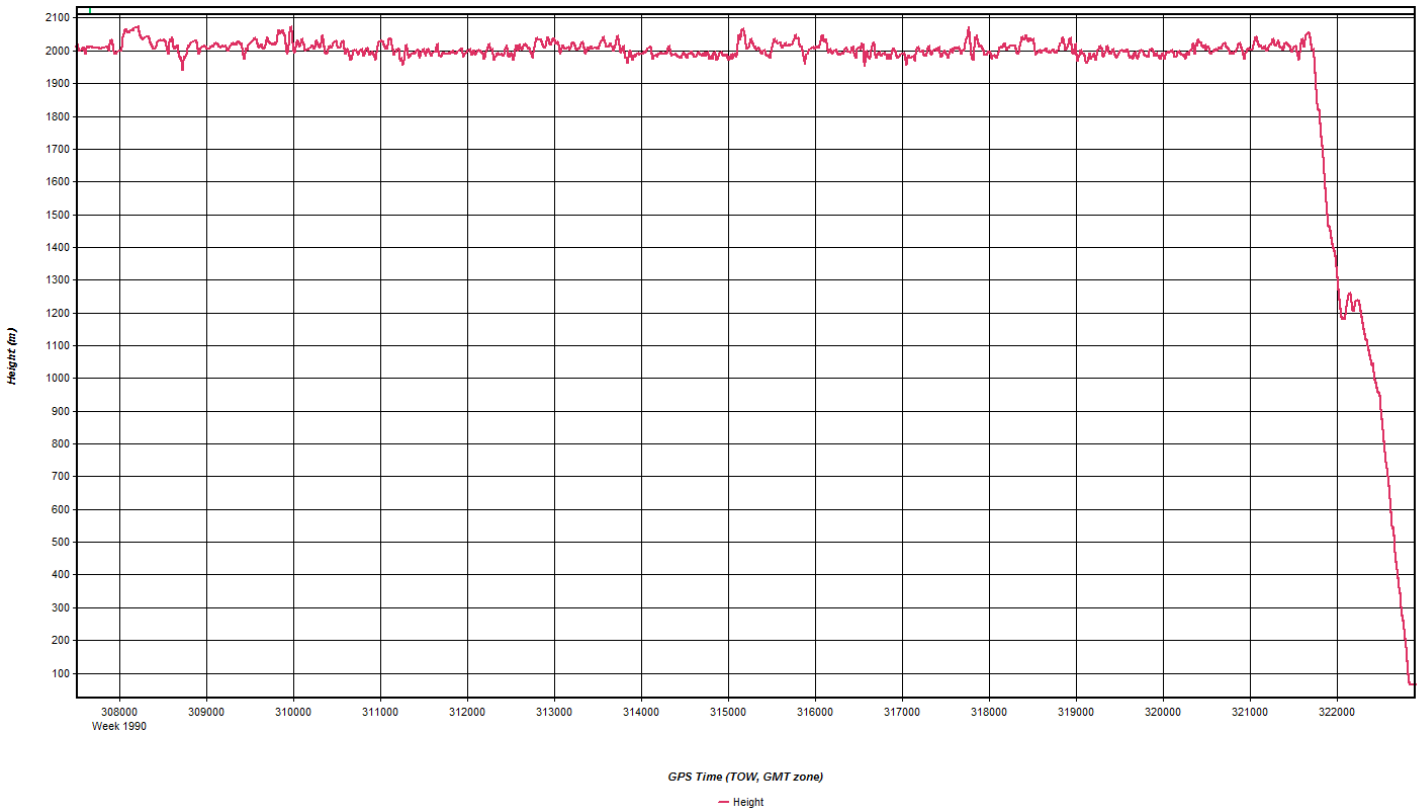

ARTK_FIXD
10 km

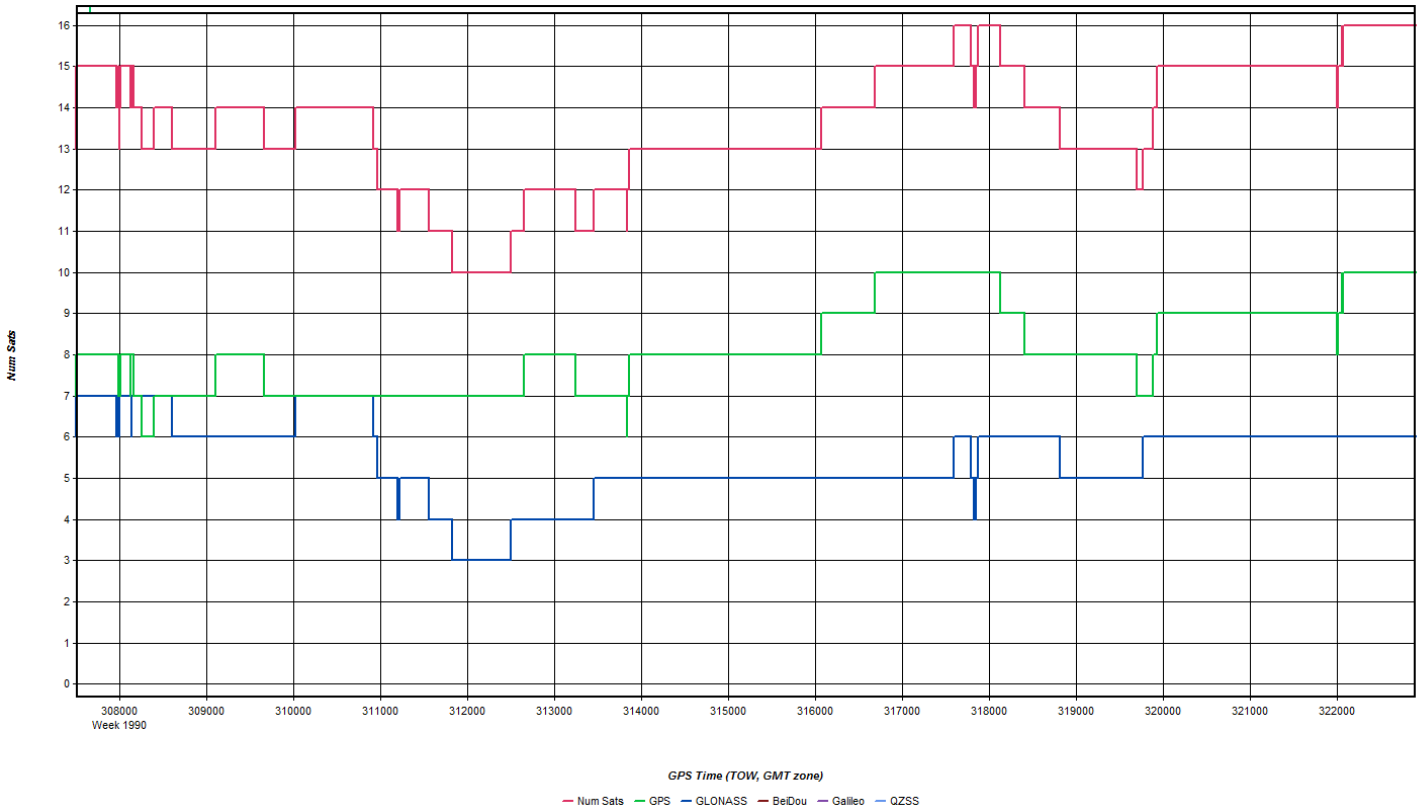

PDOP
1.75
1.70
1.65
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
PDOP

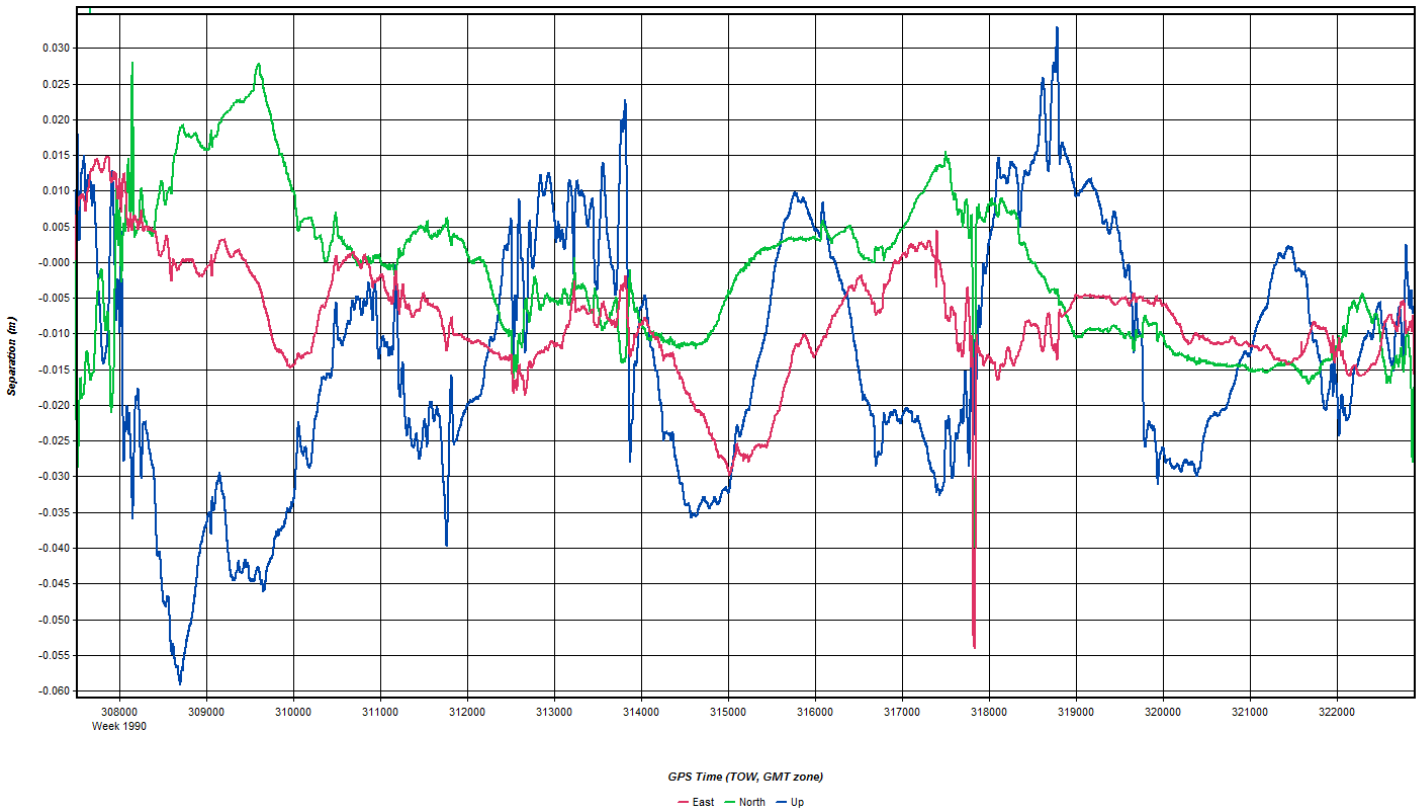

Status
2
1
0
-1
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

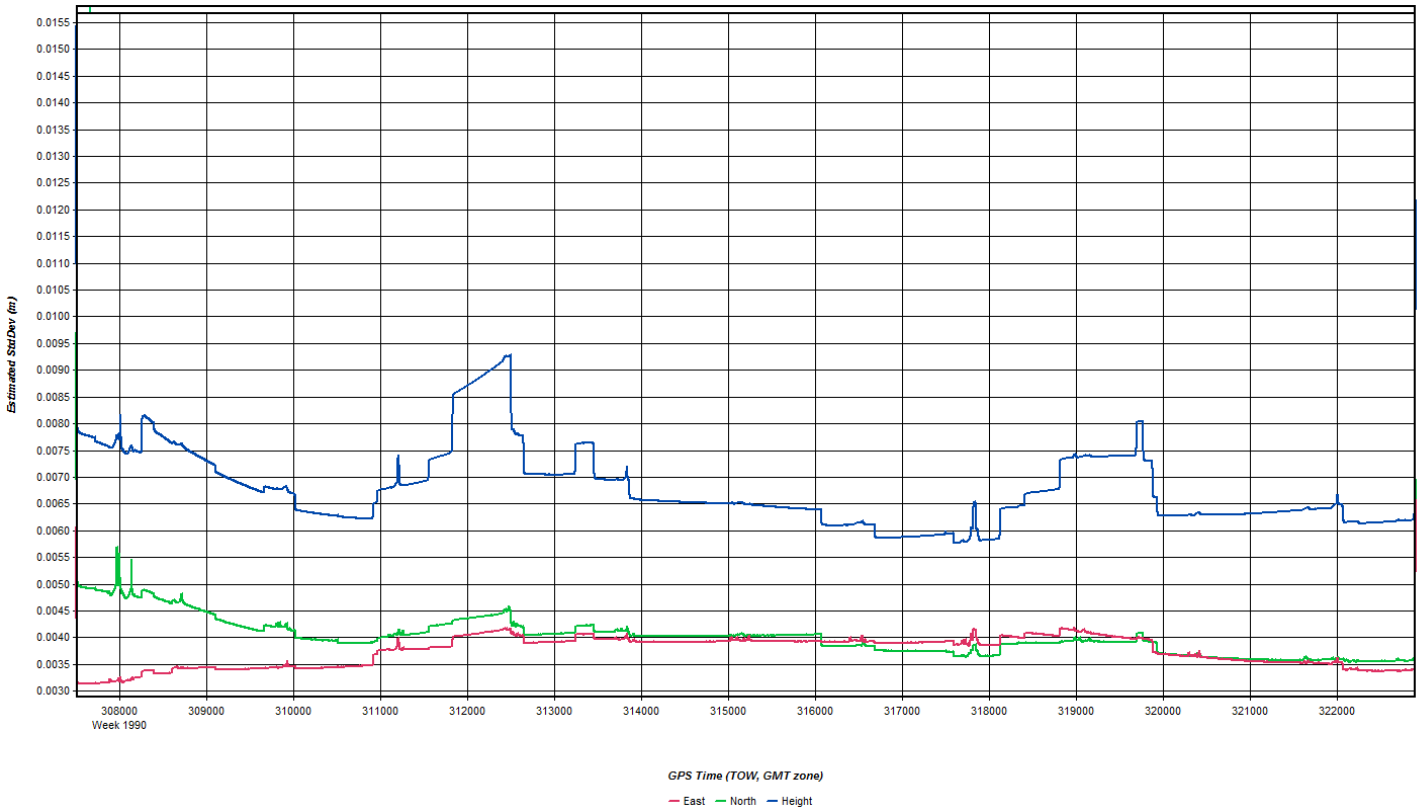

Roll & pitch (deg)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
Roll
Pitch

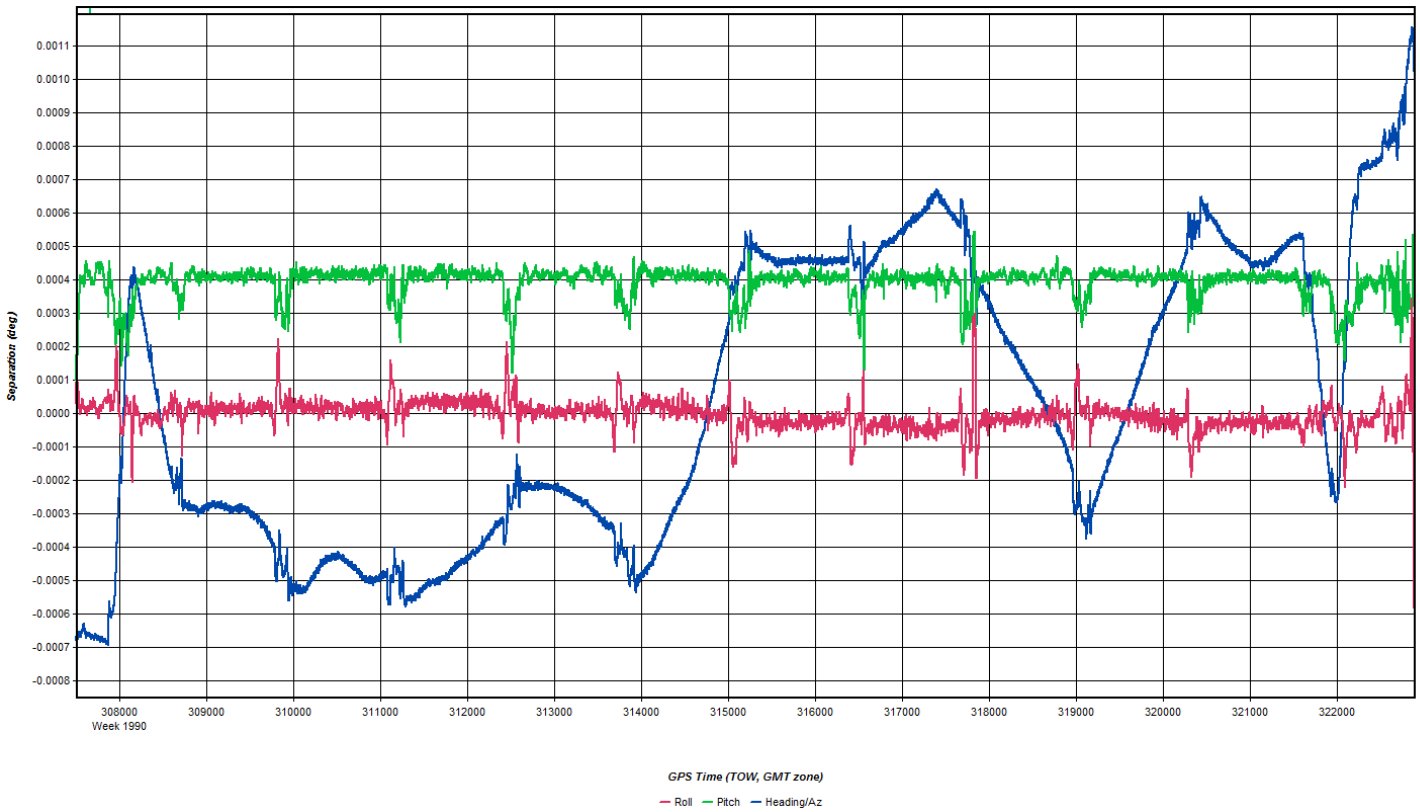

RMS (m)
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
RMS
SD

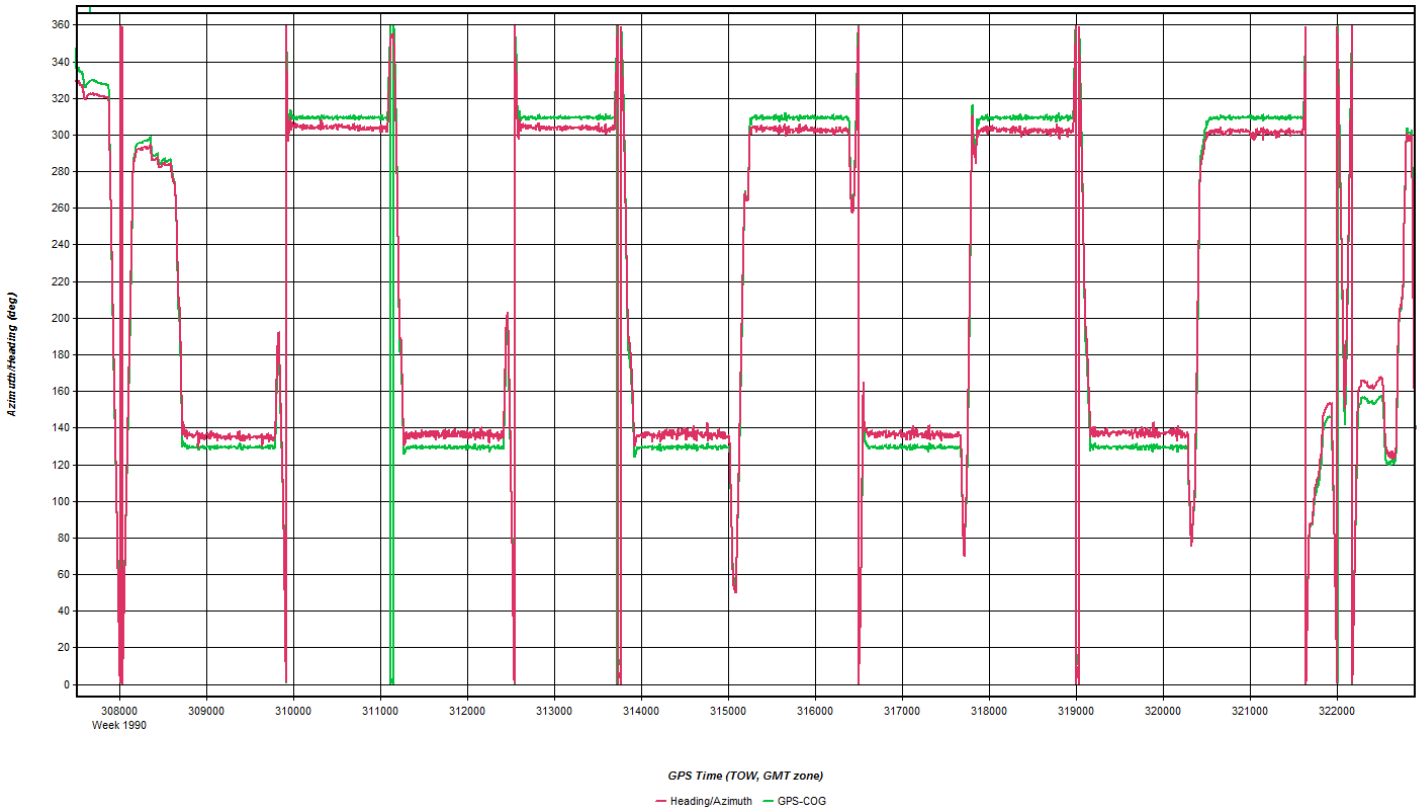

Height (m)
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
Height

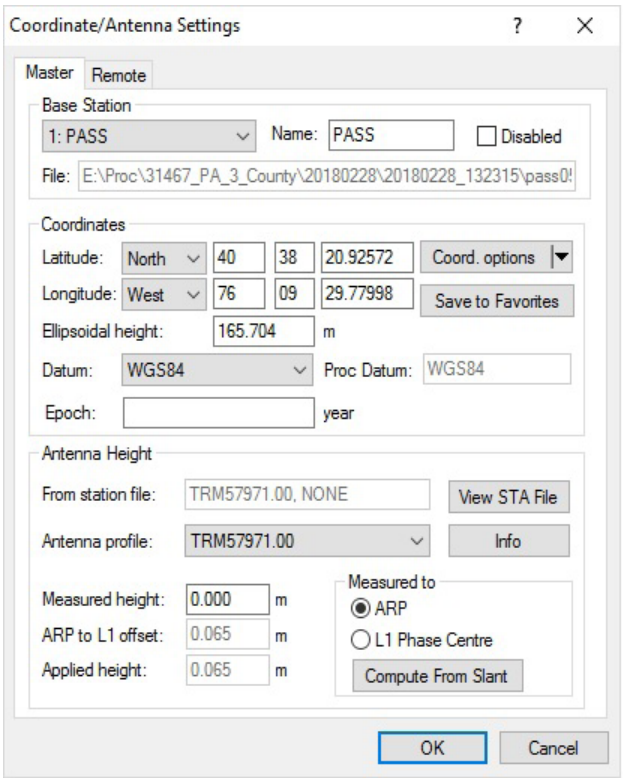

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.030
0.025
0.020
0.015
0.010
0.005
-0.000
-0.005
-0.010
-0.015
-0.020
-0.025
-0.030
-0.035
-0.040
-0.045
-0.050
-0.055
-0.060
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0155
0.0150
0.0145
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0011
0.0010
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
-0.0001
-0.0002
-0.0003
-0.0004
-0.0005
-0.0006
-0.0007
-0.0008
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
308000
Week 1990
309000
310000
311000
312000
313000
314000
315000
316000
317000
318000
319000
320000
321000
322000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180228\20180228_132315\pass0
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS – PA Flight 4	**DATE**	02/28/2018
SENSOR OPERATOR	Michael Kettridge	**SENSOR(S)**	ALS70-HP / RCD30
PILOT	Andrew Werle	**IMU**	Honeywell uIRS
AIRCRAFT	103RM	**ABGPS**	IPAS-CUS6
AIRBASE	Reading PA	**DATA DRIVES**	Lidar 3
		STATIC ALIGNMENT	

AIRCRAFT BLOCK TIME

Engine On:	18:41	**Takeoff:**	18:50
Engine Off:	23:44	**Landing:**	23:40
TOTAL:	5 hr	**TOTAL:**	4.8 hr

MISSION DETAILS

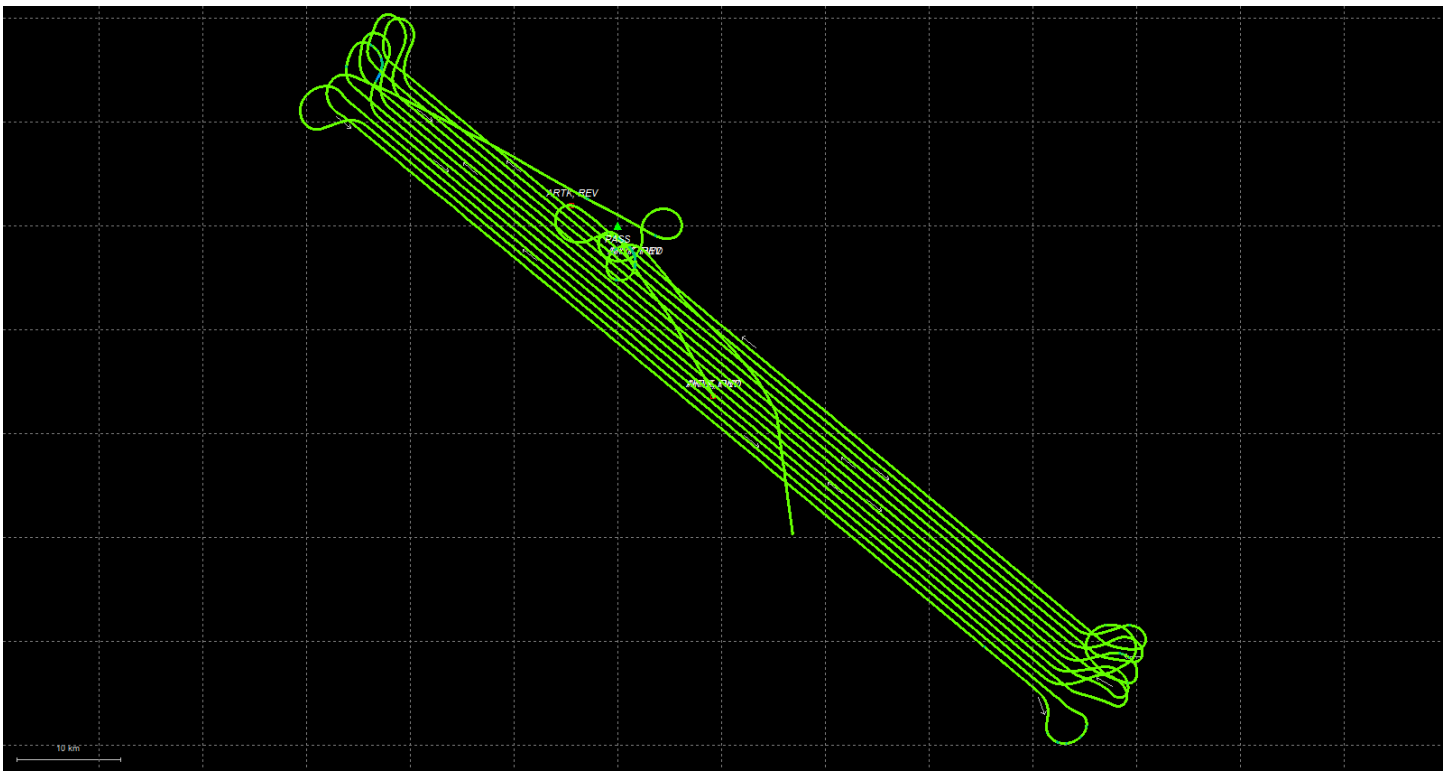
AGL Height:	2000 m	**Pulse Rate:**	269KHz	**Pre-Mission**	18:59	19:04
Speed:	150 kts	**Scan Rate:**	56Hz	**Post Mission**	23:28	23:33
Laser Power:	100.00%	**FOV:**	36 °			

FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME Start	GPS TIME END	COMMENTS
58		141	180228_191233	19:12:33	19:29:39	good
57		321	180228_193328	19:33:28	19:52:11	good
56		141	180228_195558	19:55:58	20:13:19	good
55		321	180228_201746	20:17:46	20:36:59	good
54		141	180228_204017	20:40:17	20:56:56	good
53		321	180228_210112	21:01:12	21:19:50	good
52		141	180228_212328	21:23:28	21:40:08	good
51		321	180228_214715	21:47:15	22:06:28	good
50		141	180228_221055	22:10:55	22:27:17	good
49		321	180228_223121	22:31:21	22:50:00	good
48		141	180228_225337	22:53:37	23:10:16	good
47		321	180228_231358	23:13:58	23:27:38	Aborted line 12nm from N due, rain

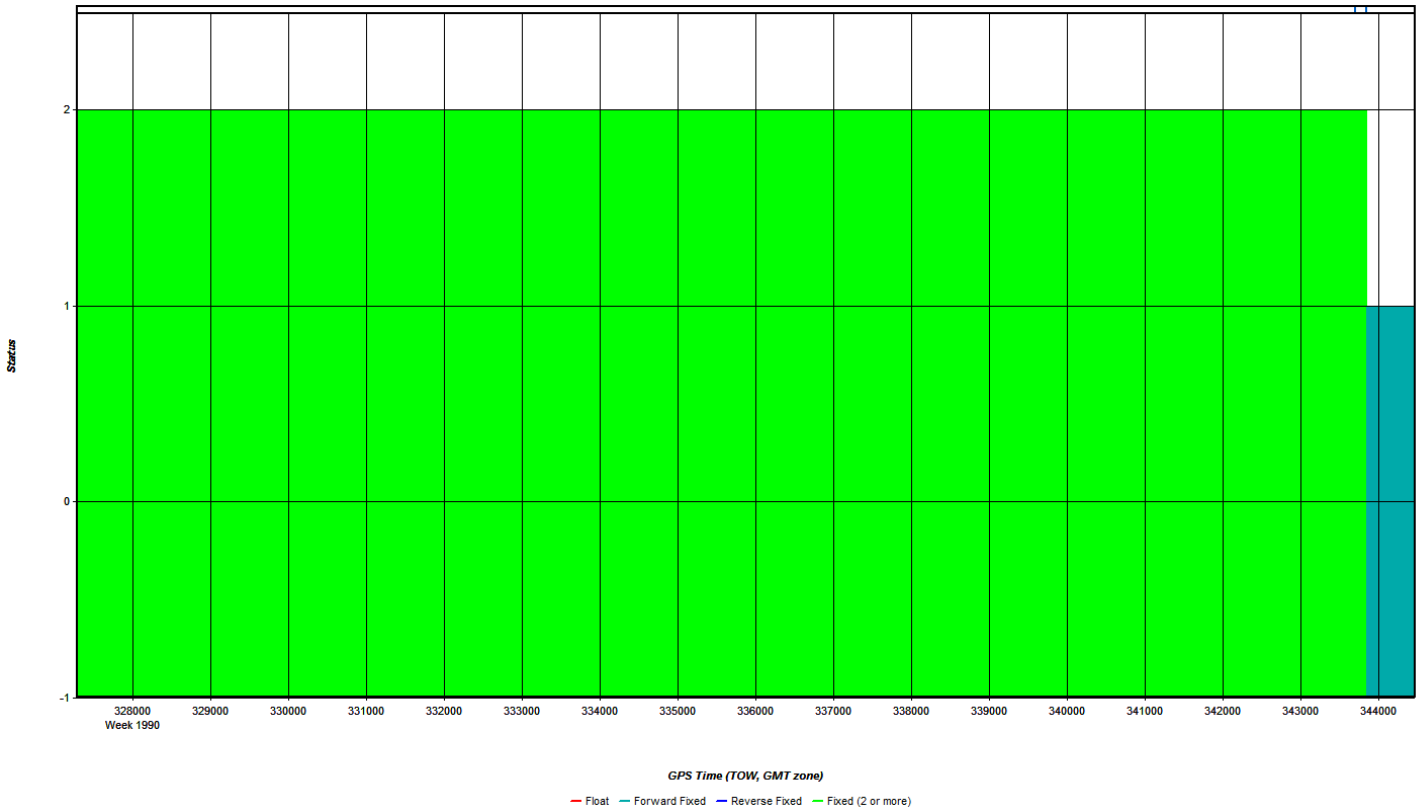
SUN ANGLE
@Start:
@End:
@Peak:

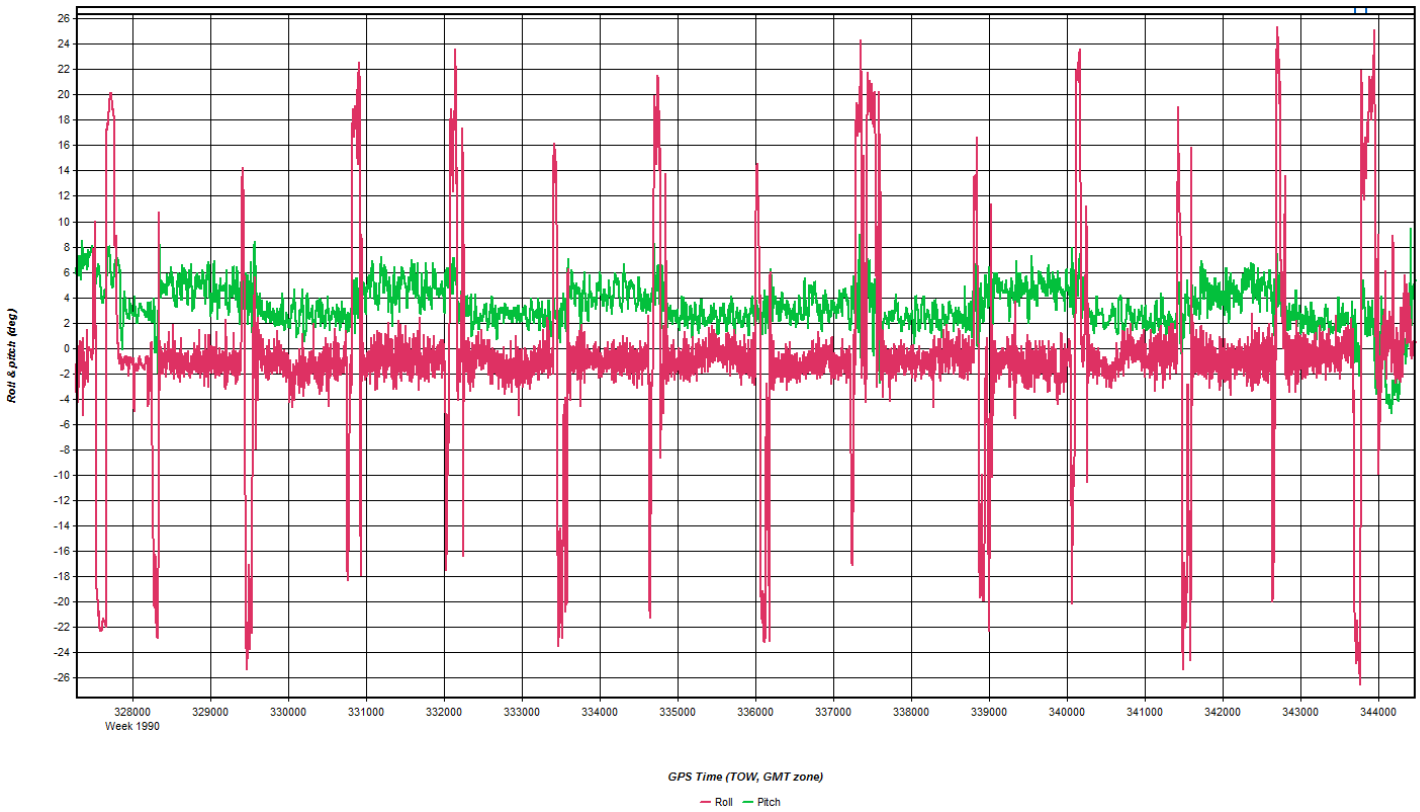
Clear skies, and the start but clouds were rolling in in the north. winds were 35kts from the NE
Sats avg 18, PDOPS avd 1.3
Towards the end of the flight we started hitting rain.
CORS station PASS was used for this flight.

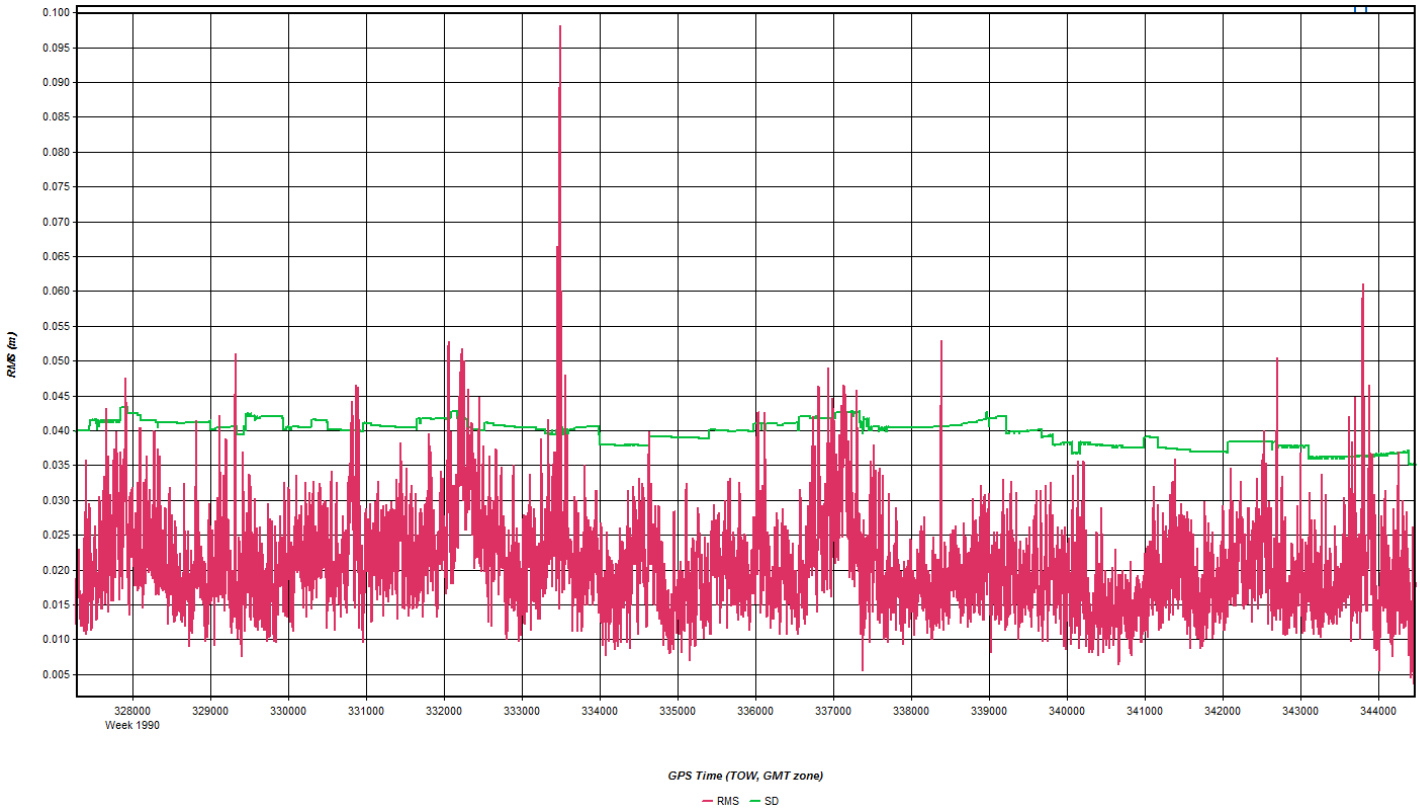
February 28, 2018-C (SN7229, N103RM)

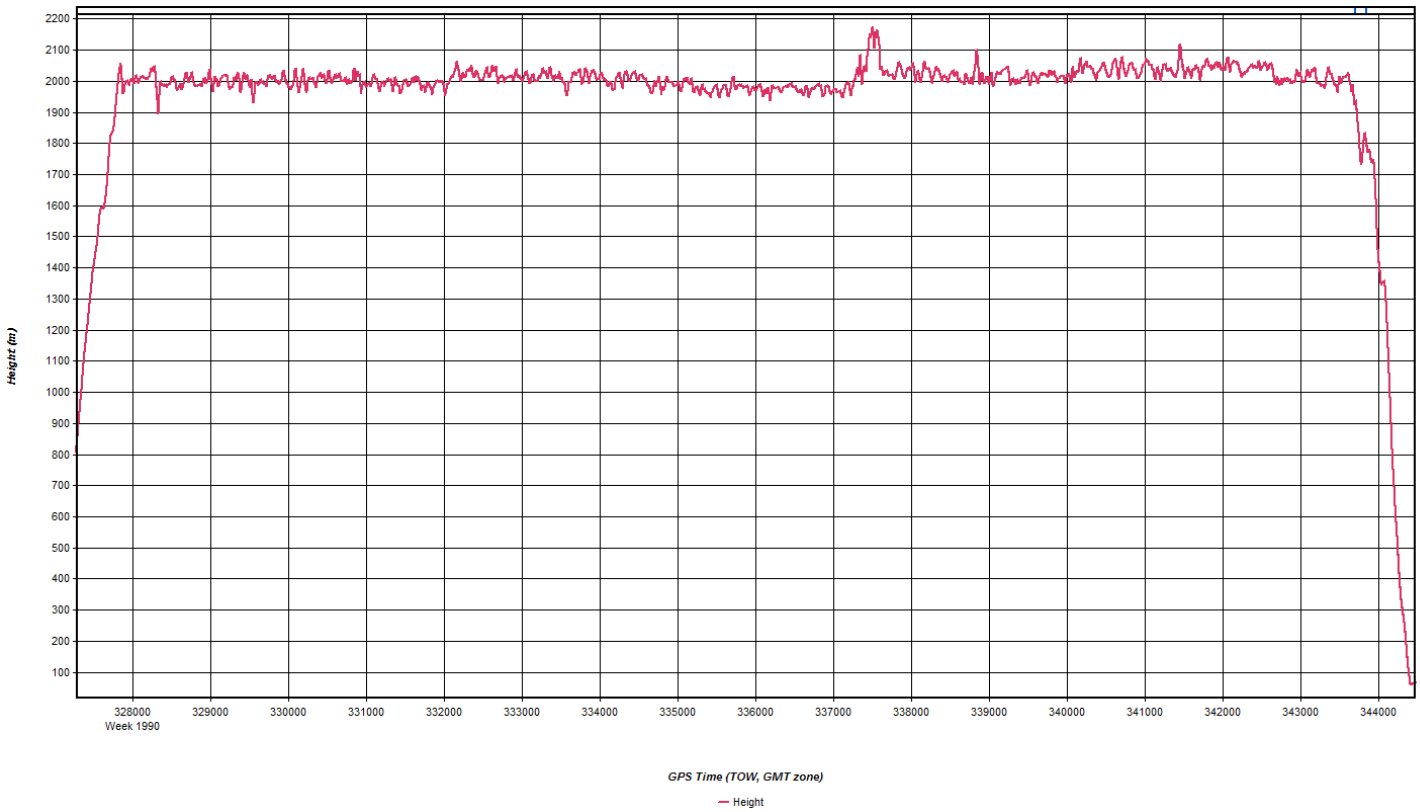

ARTA_REV
10 km

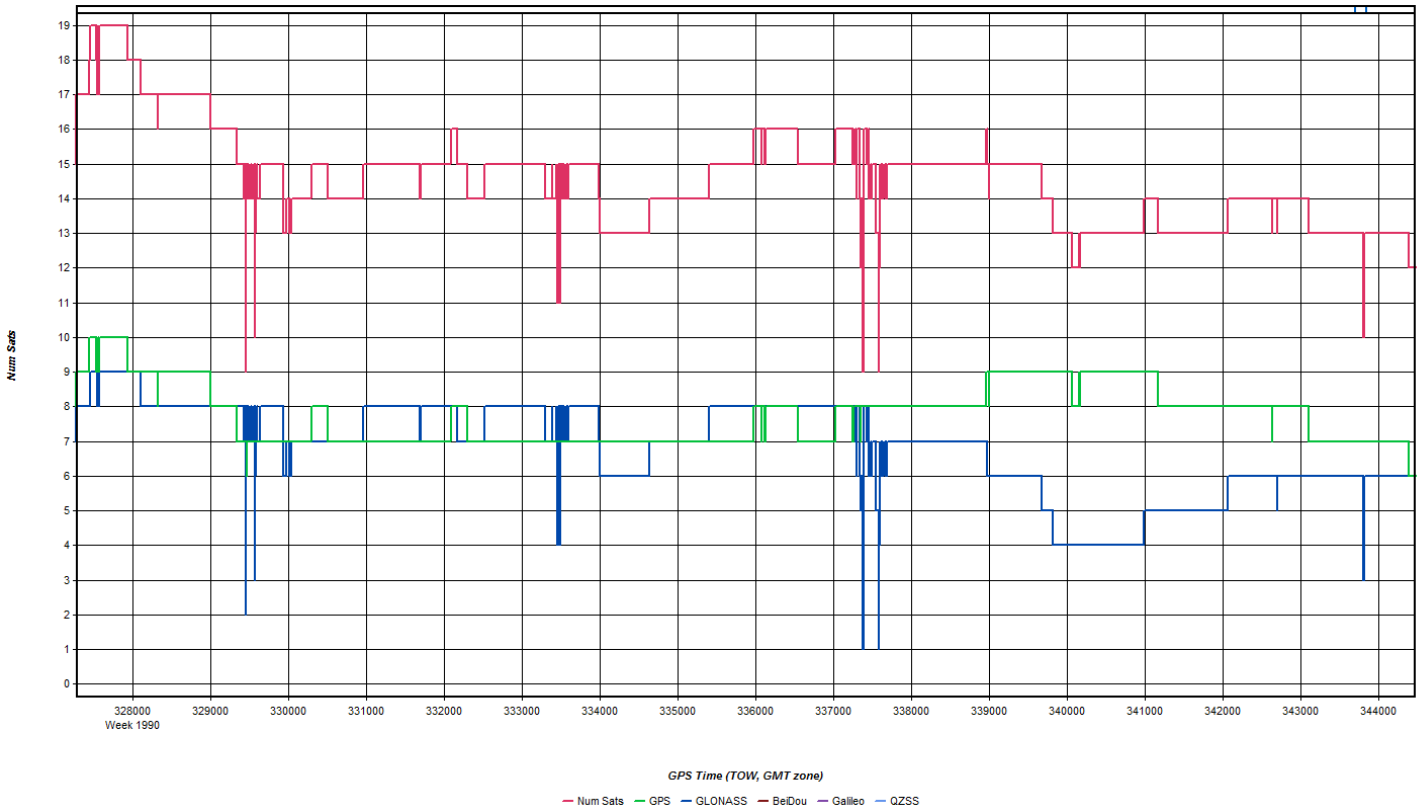

PDOP
1.70
1.65
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
PDOP

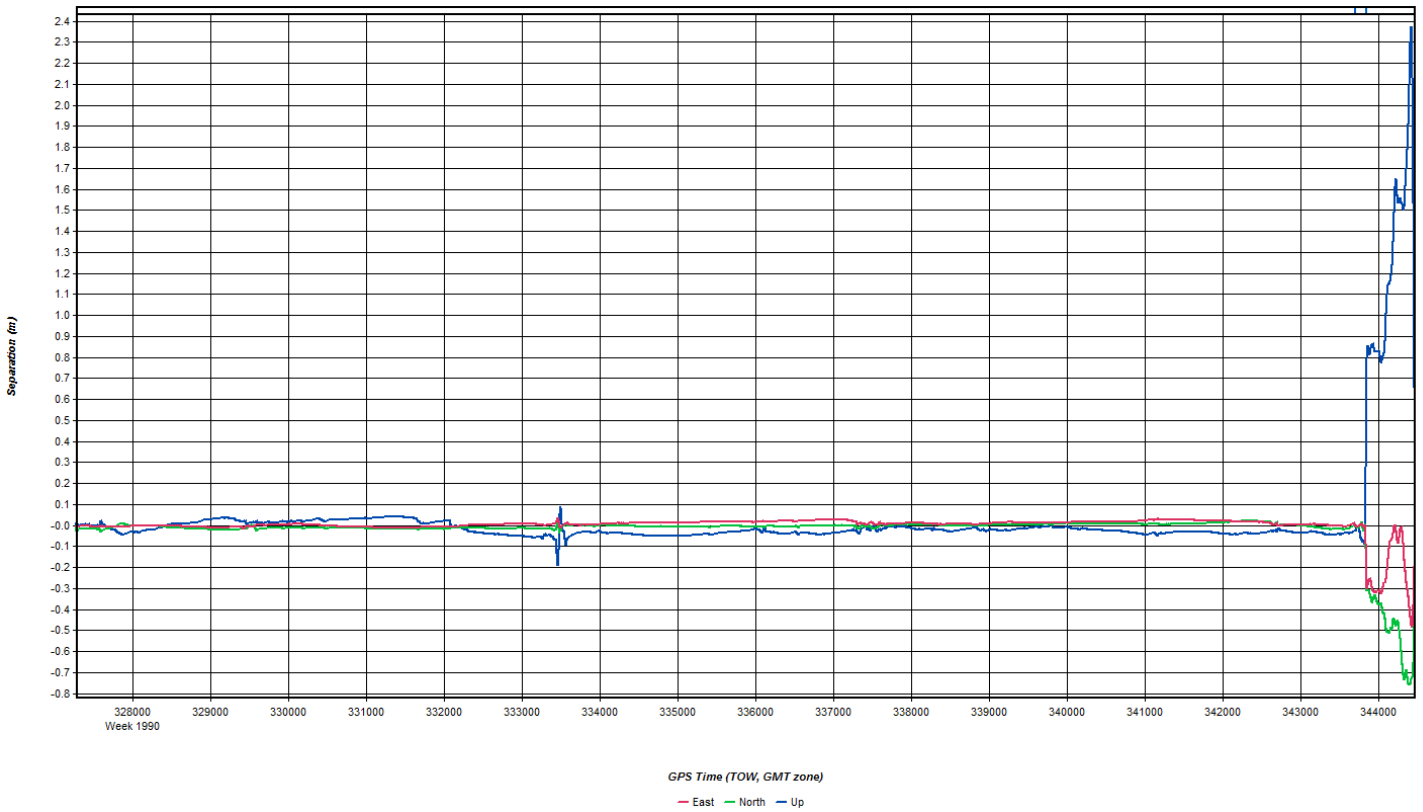

Status
2
1
0
-1
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

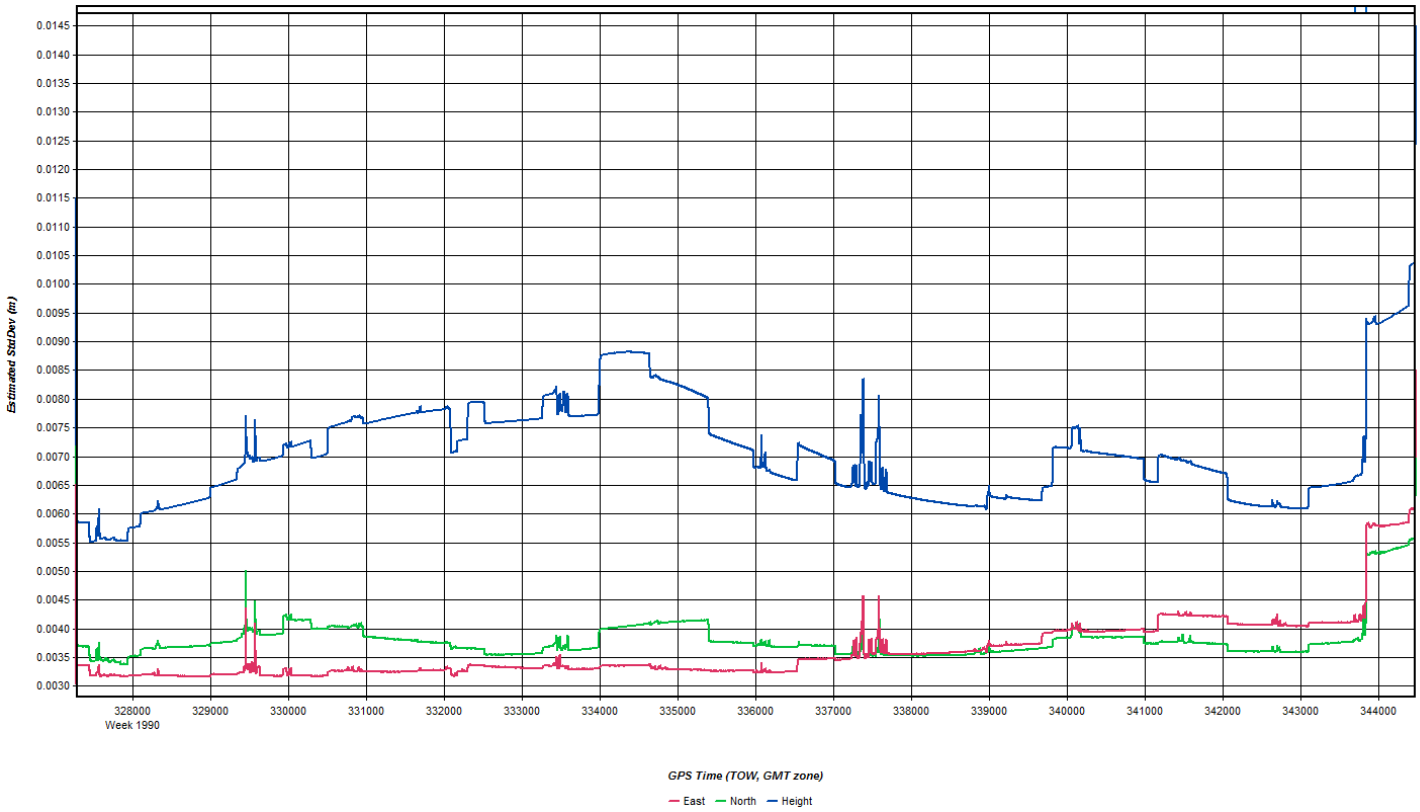

Roll & pitch (deg)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
Roll
Pitch

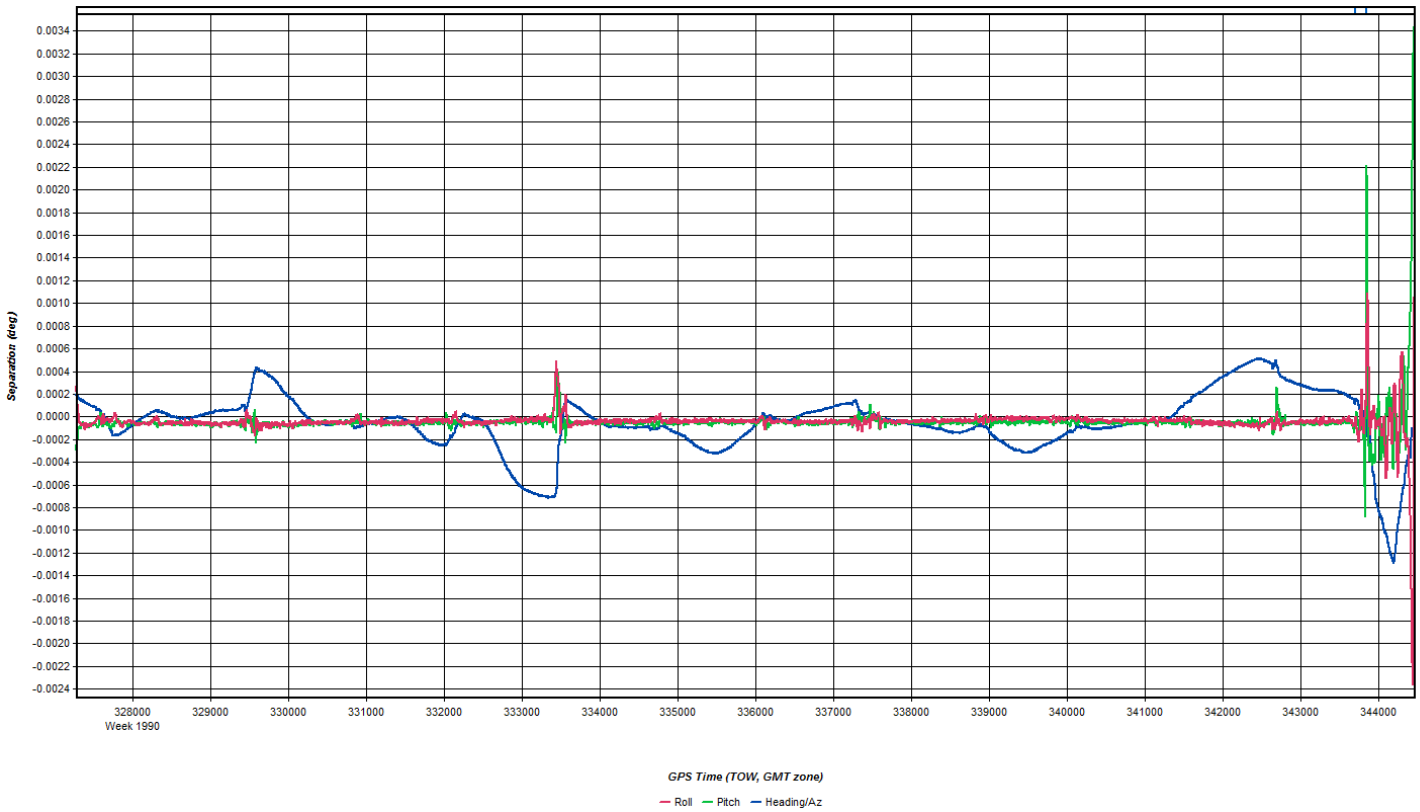

RMS (m)
0.100
0.095
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
RMS
SD

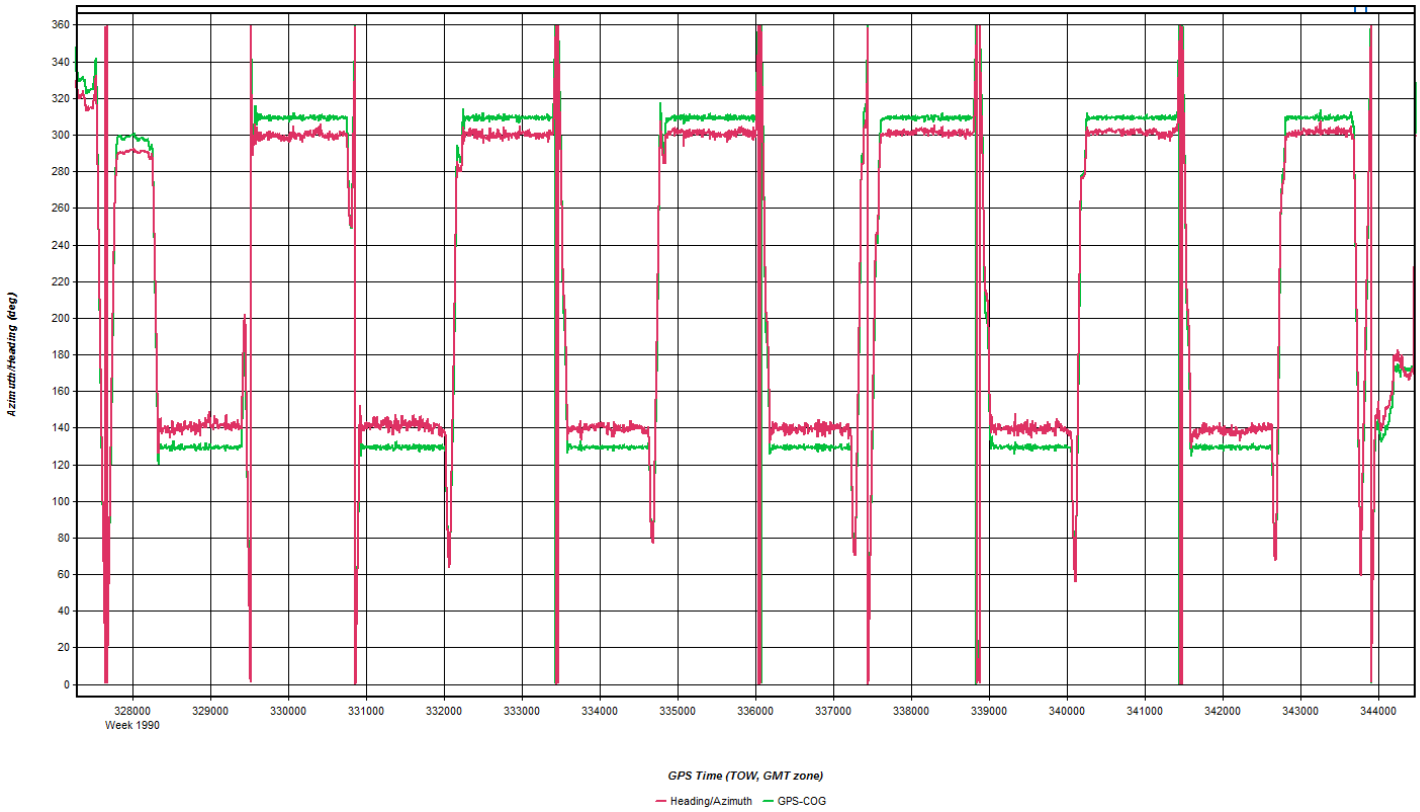

Height (m)
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
Height

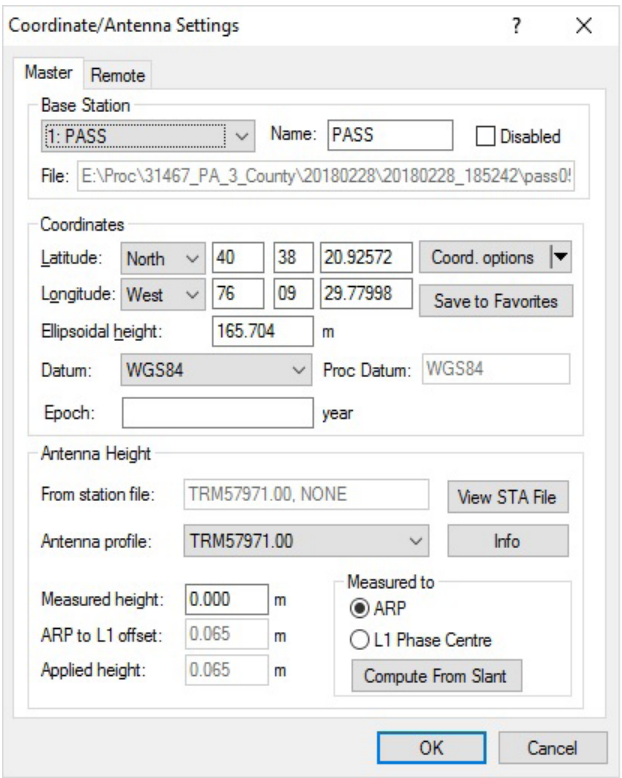

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
East
North
Up

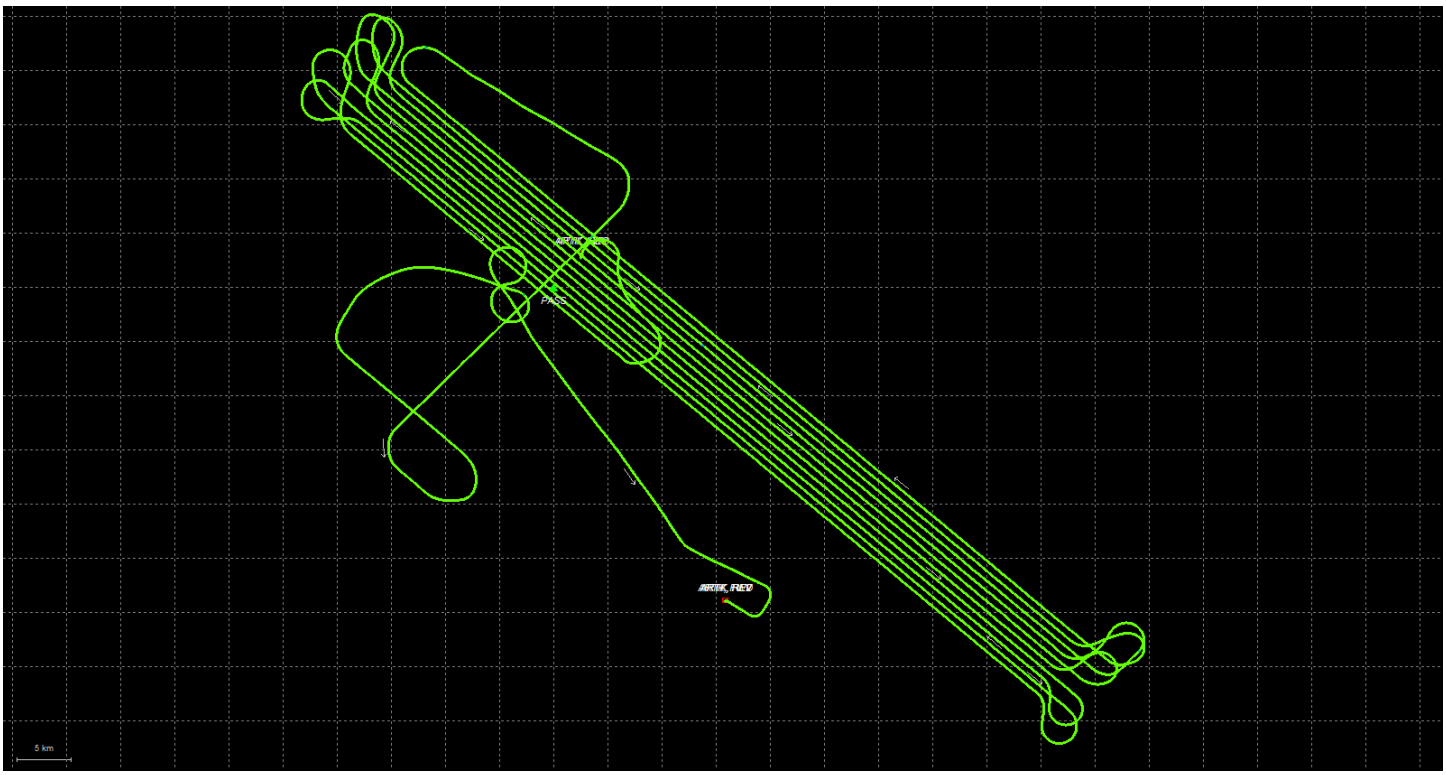

Estimated StdDev (m)
0.0145
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
East
North
Height

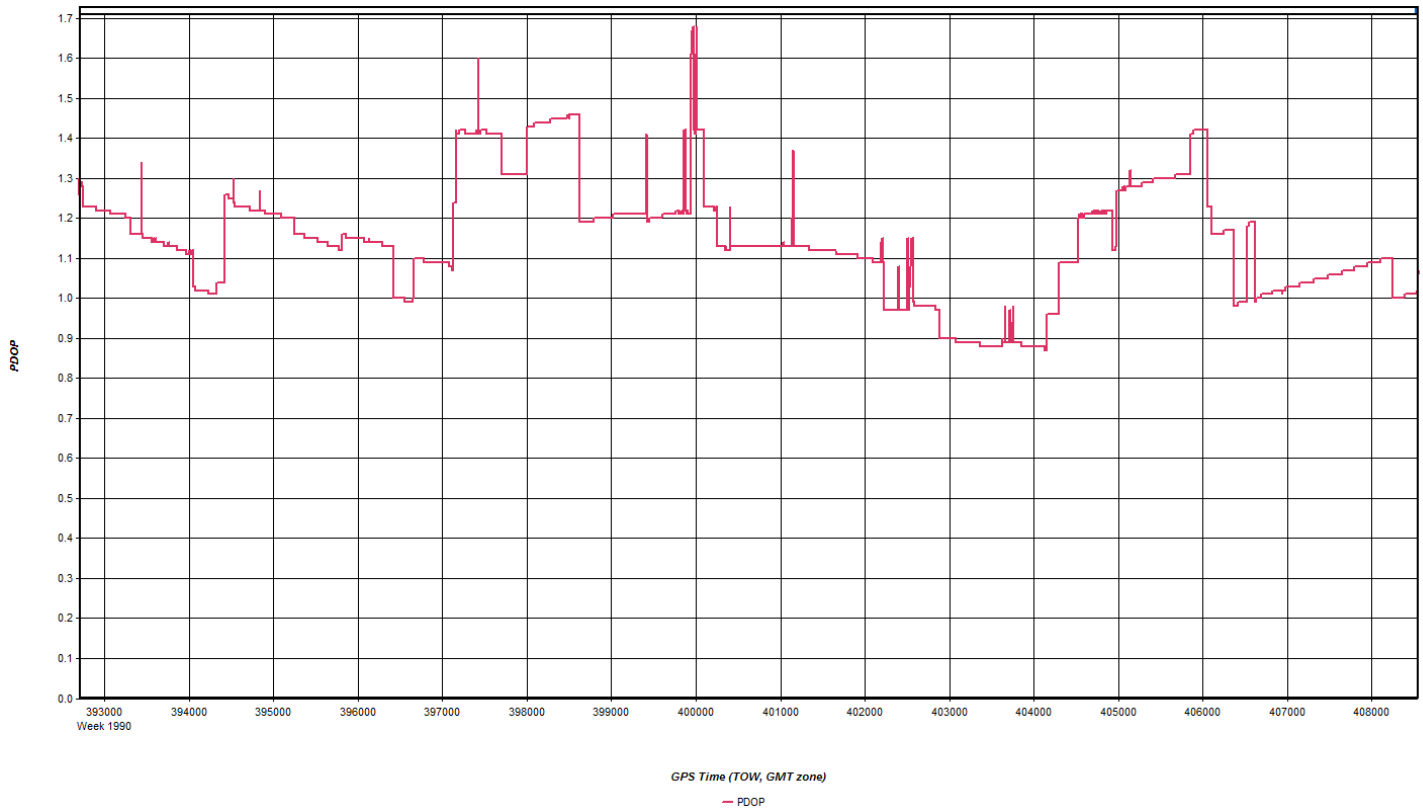

Separation (deg)
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
-0.0018
-0.0020
-0.0022
-0.0024
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az

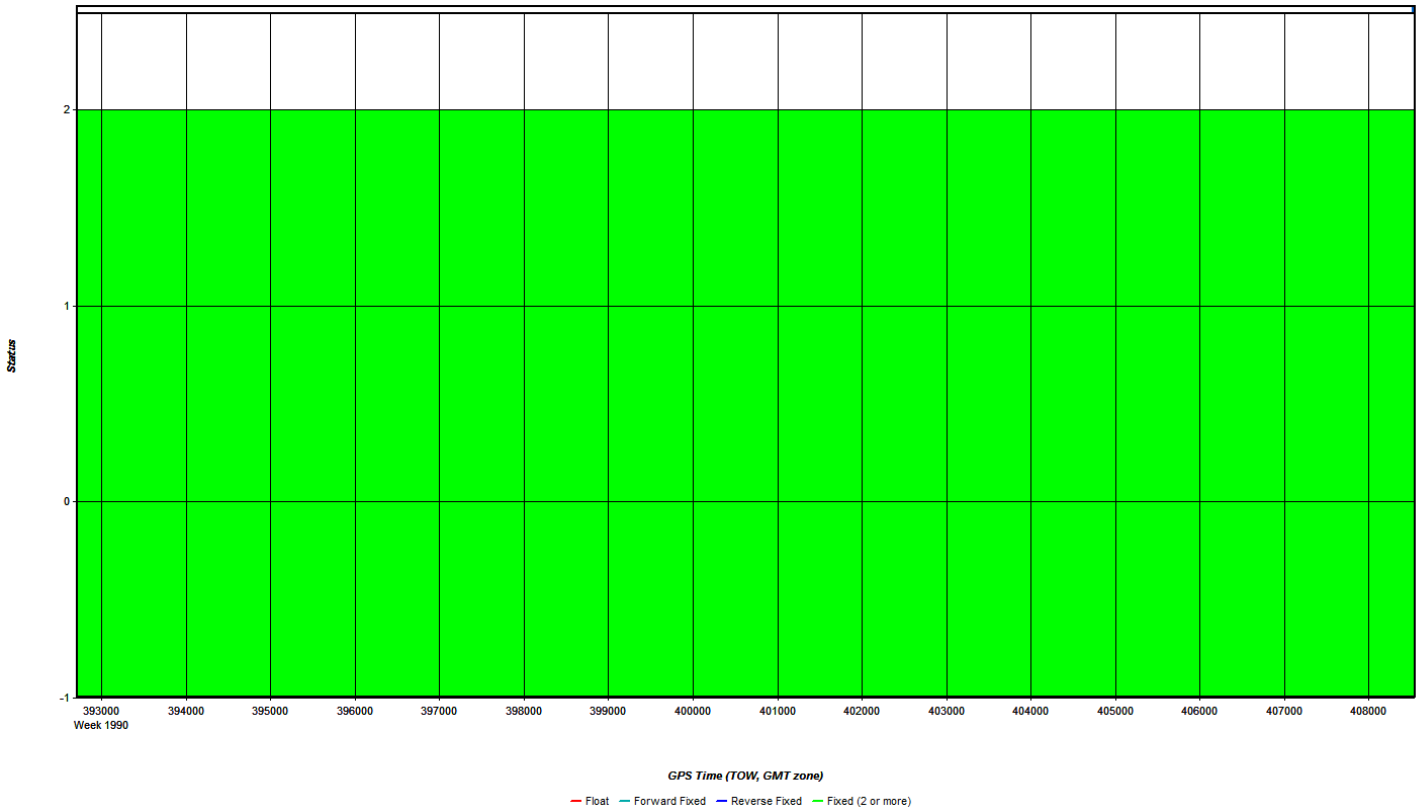

Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
328000
Week 1990
329000
330000
331000
332000
333000
334000
335000
336000
337000
338000
339000
340000
341000
342000
343000
344000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG

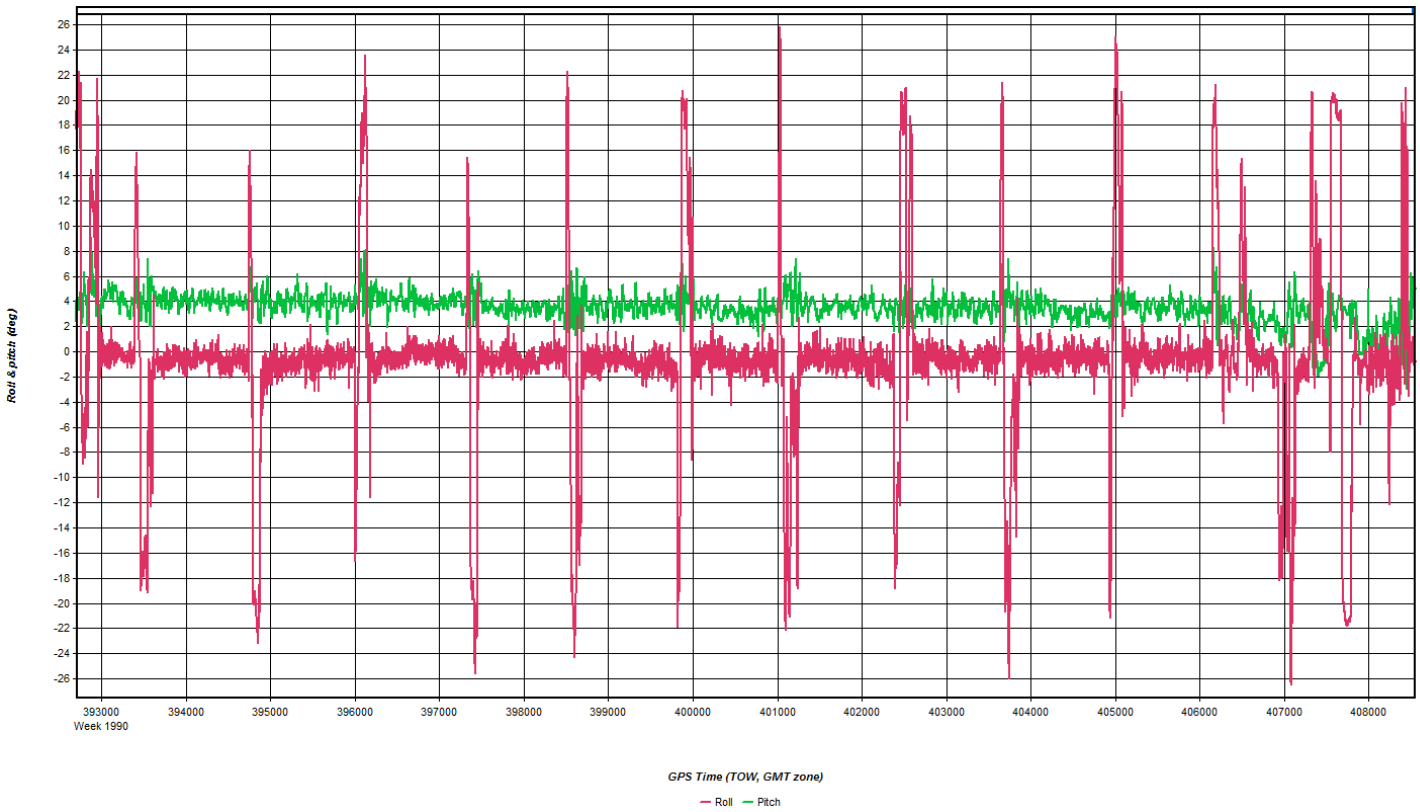

Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180228\20180228_185242\pass0
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

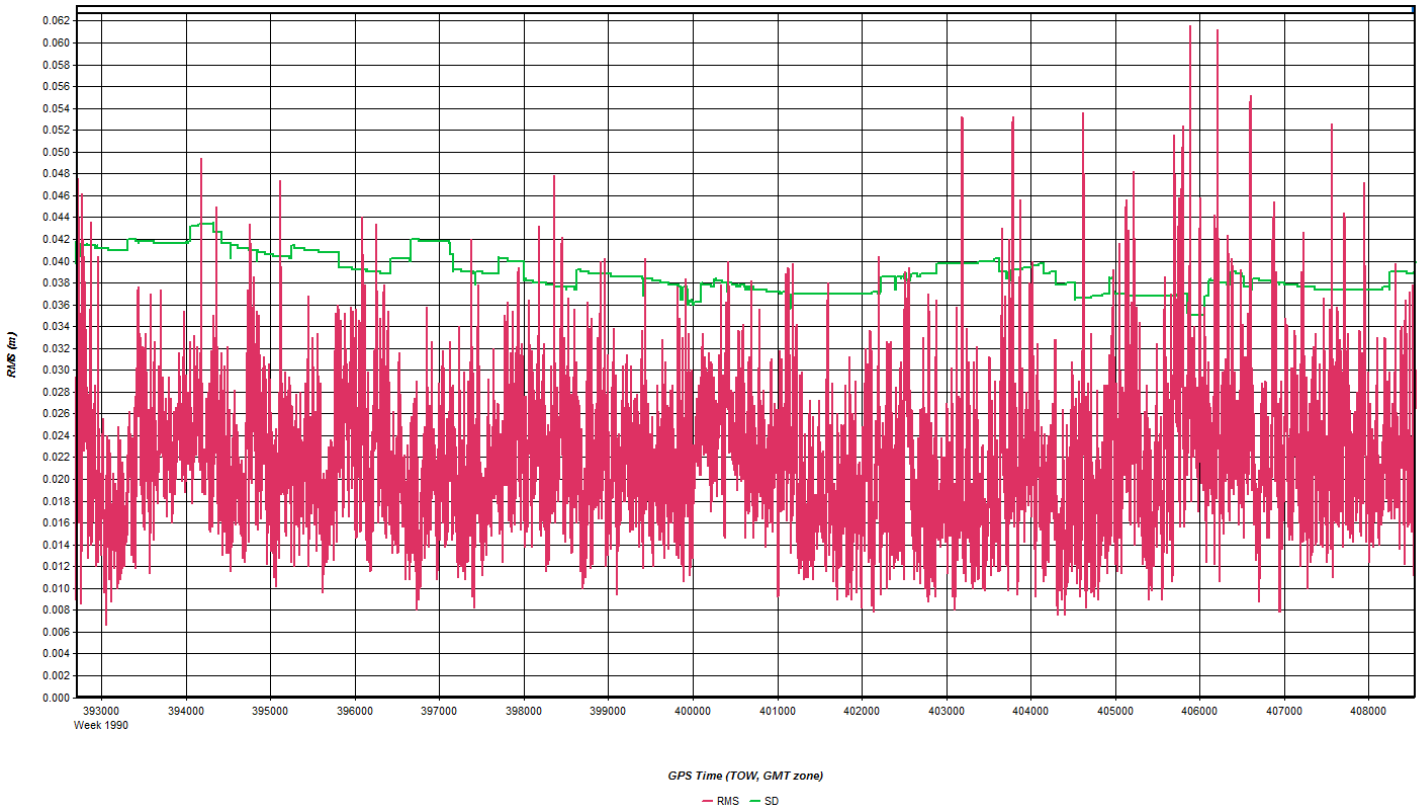
March 1, 2018-A (SN7229, N103RM)

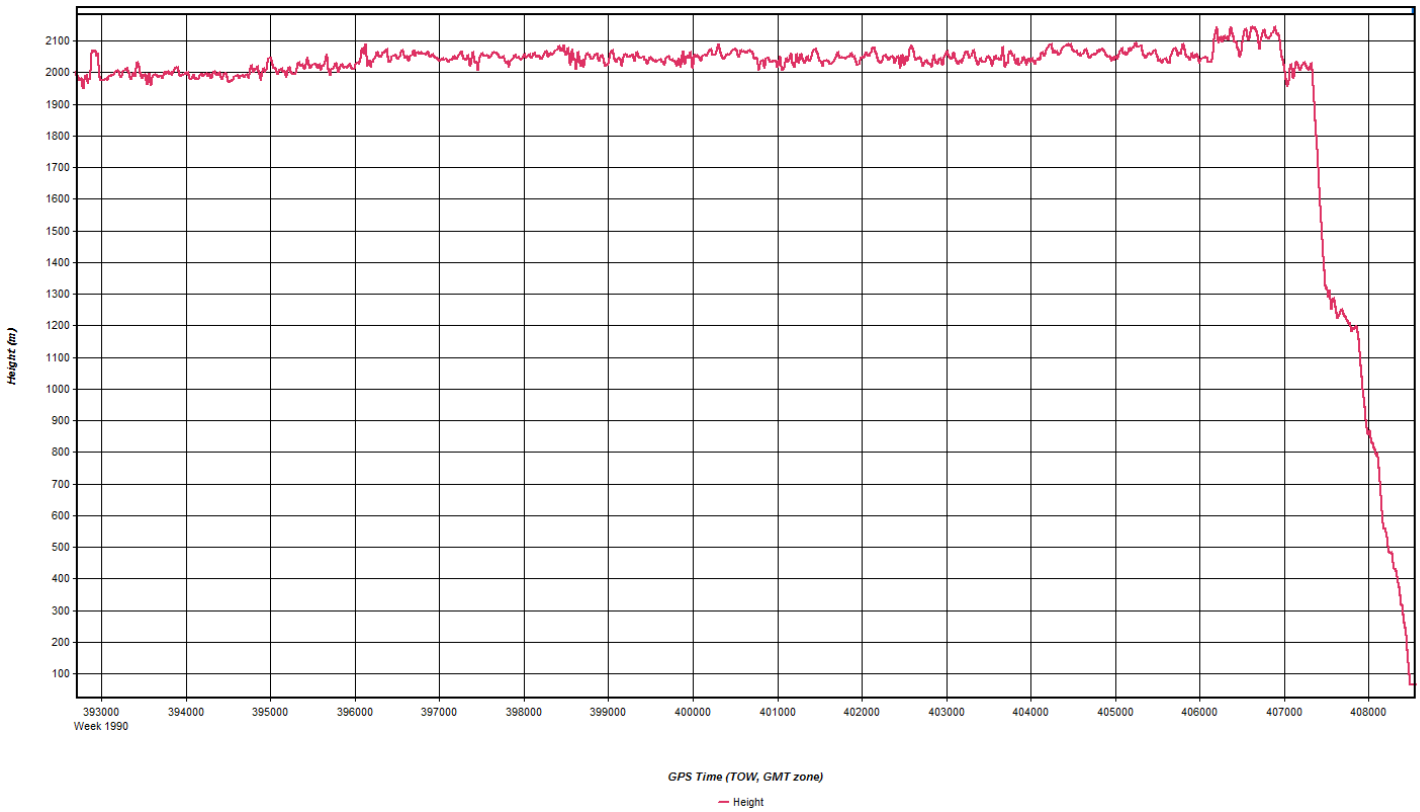

5 km

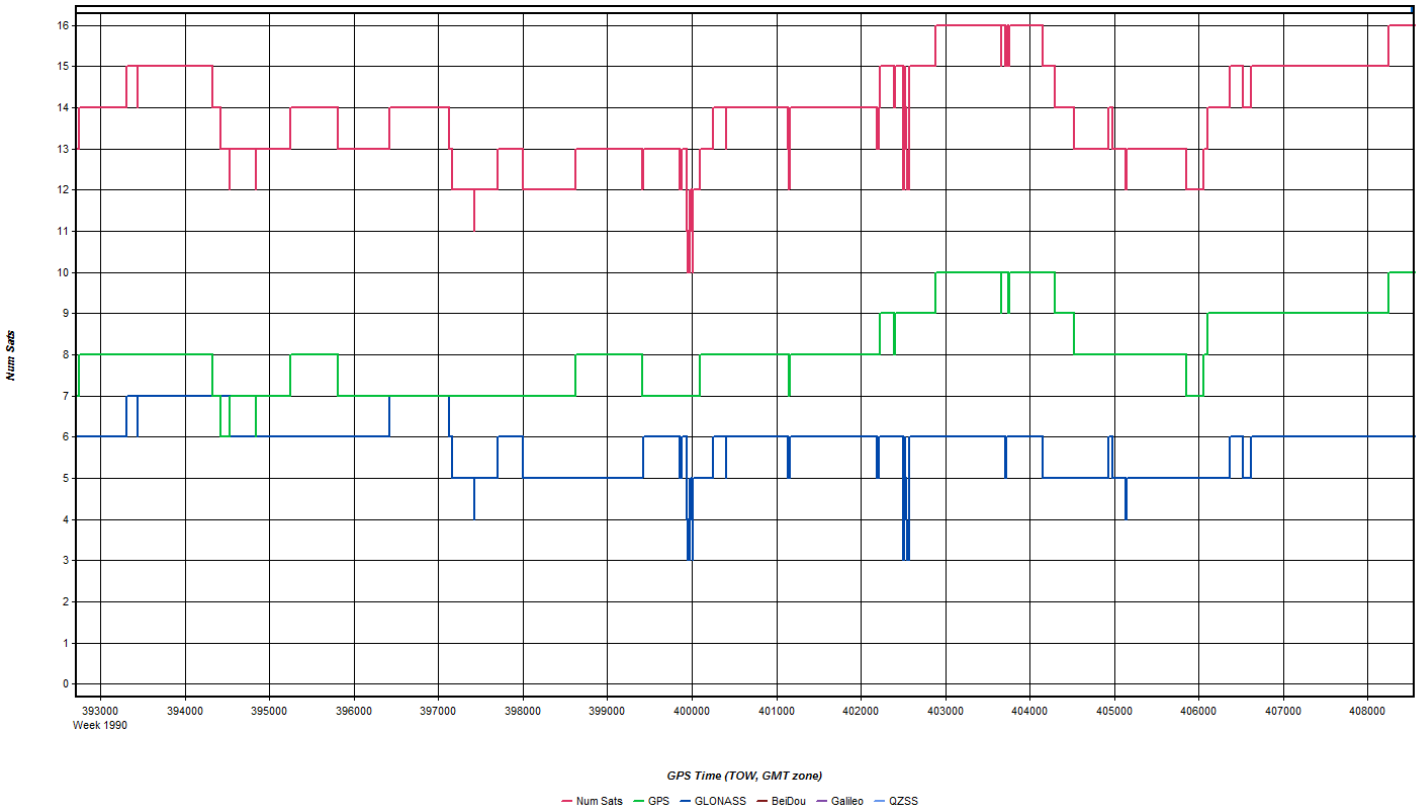

PDOP
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
PDOP


Status
2
1
0
-1
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

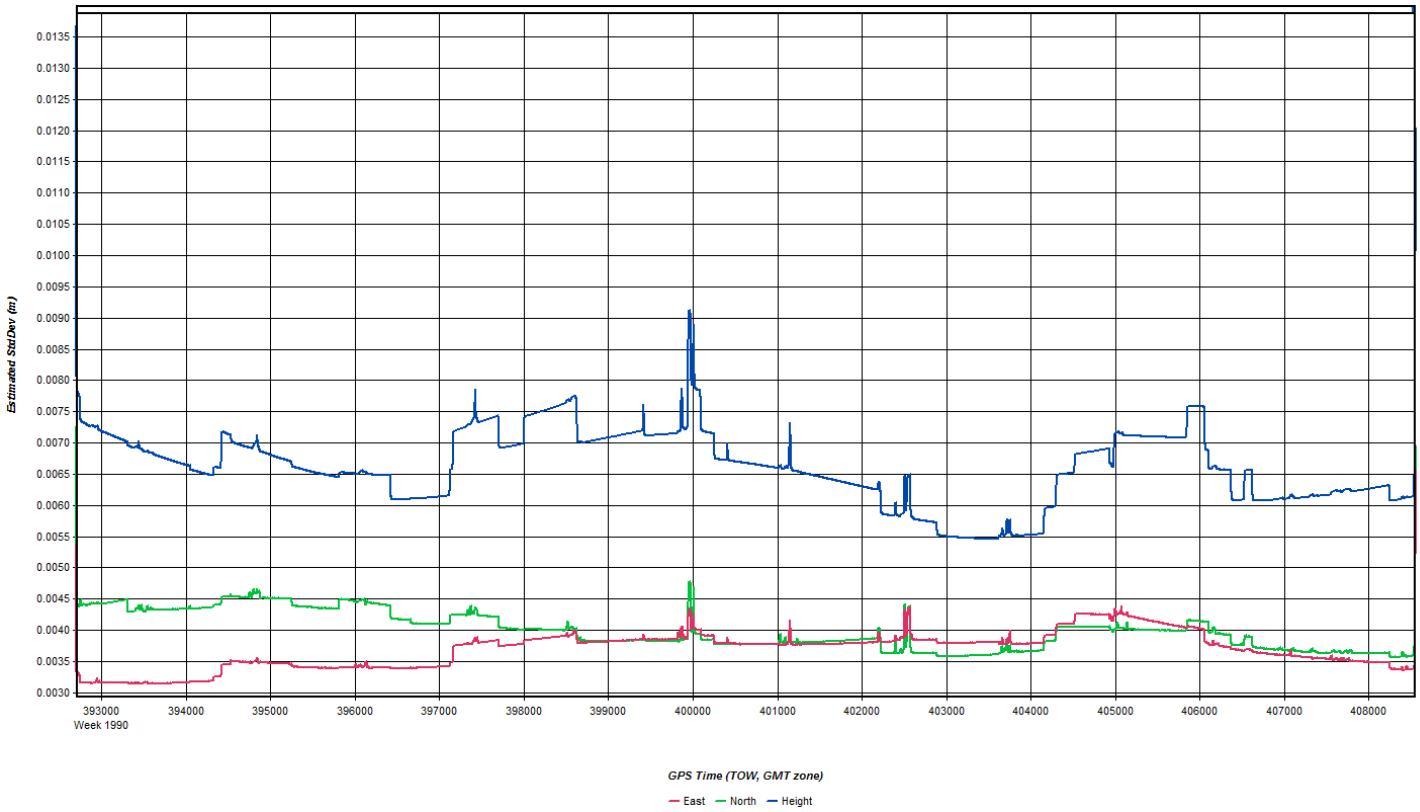

Roll & pitch (deg)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
Roll
Pitch

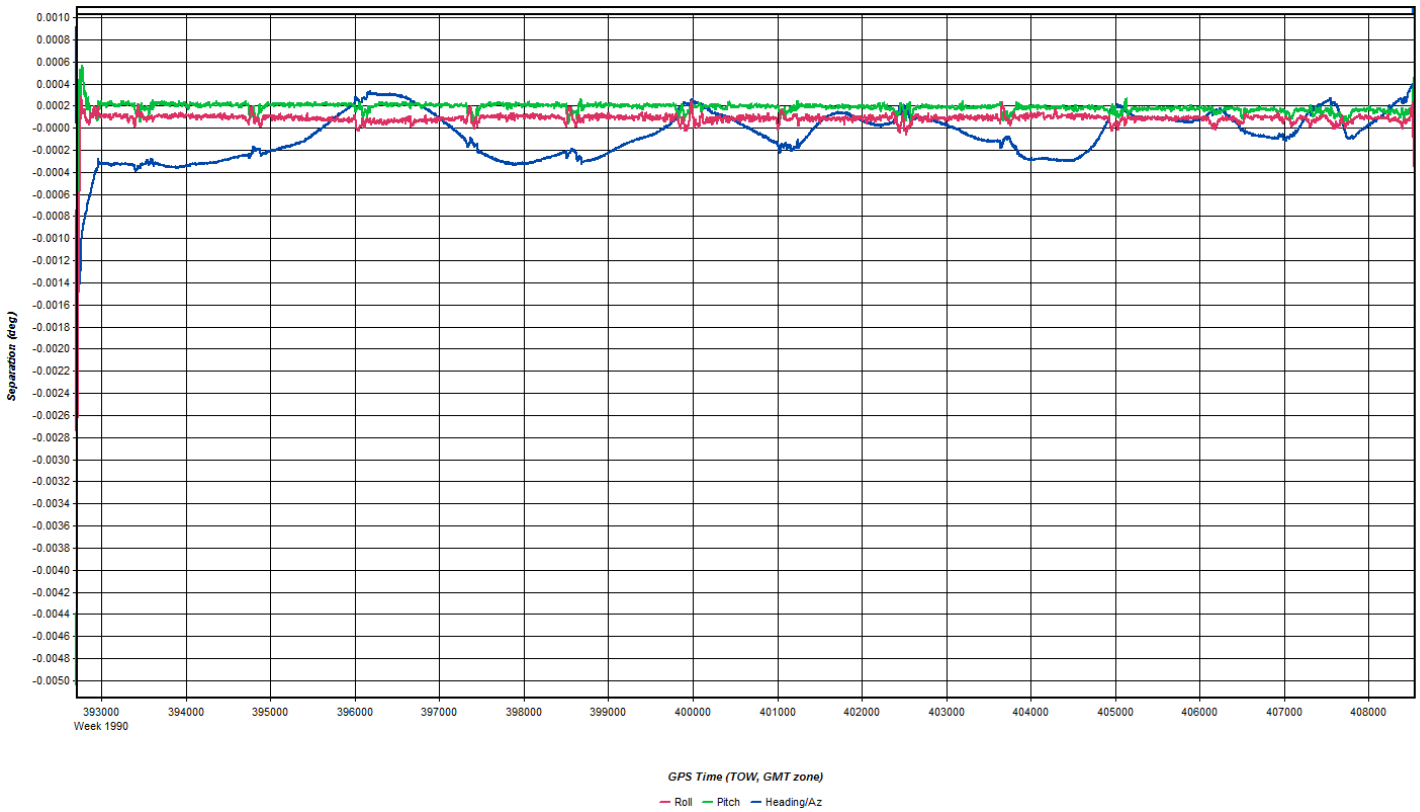

RMS (m)
0.062
0.060
0.058
0.056
0.054
0.052
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
RMS
SD

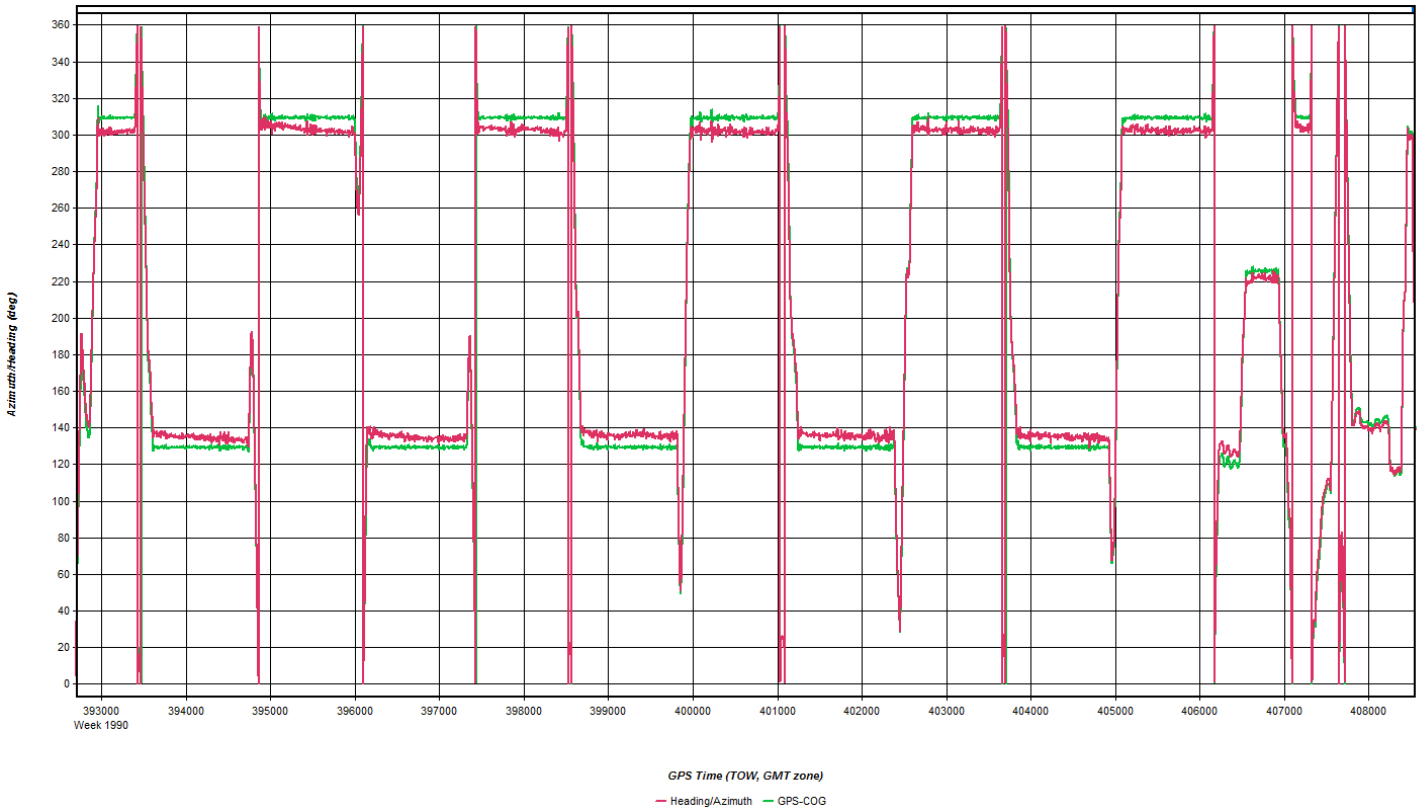

Height (m)
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
Height

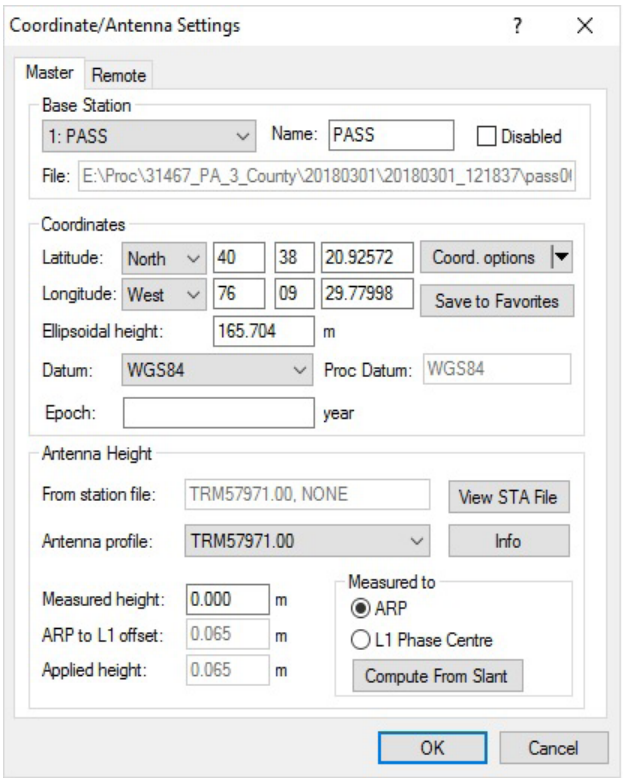

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0010
0.0008
0.0006
0.0004
0.0002
-0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
-0.0018
-0.0020
-0.0022
-0.0024
-0.0026
-0.0028
-0.0030
-0.0032
-0.0034
-0.0036
-0.0038
-0.0040
-0.0042
-0.0044
-0.0046
-0.0048
-0.0050
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
393000
Week 1990
394000
395000
396000
397000
398000
399000
400000
401000
402000
403000
404000
405000
406000
407000
408000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180301\20180301_121837\pass0
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS – PA Flight 5	**DATE**	03/01/2018
SENSOR OPERATOR	Michael Kettridge	**SENSOR(S)**	ALS70-HP / RCD30
PILOT	Andrew Werle	**IMU**	Honeywell uIRS
AIRCRAFT	103RM	**ABGPS**	IPAS-CUS6
AIRBASE	Reading PA	**DATA DRIVES**	Lidar 3
		STATIC ALIGNMENT	

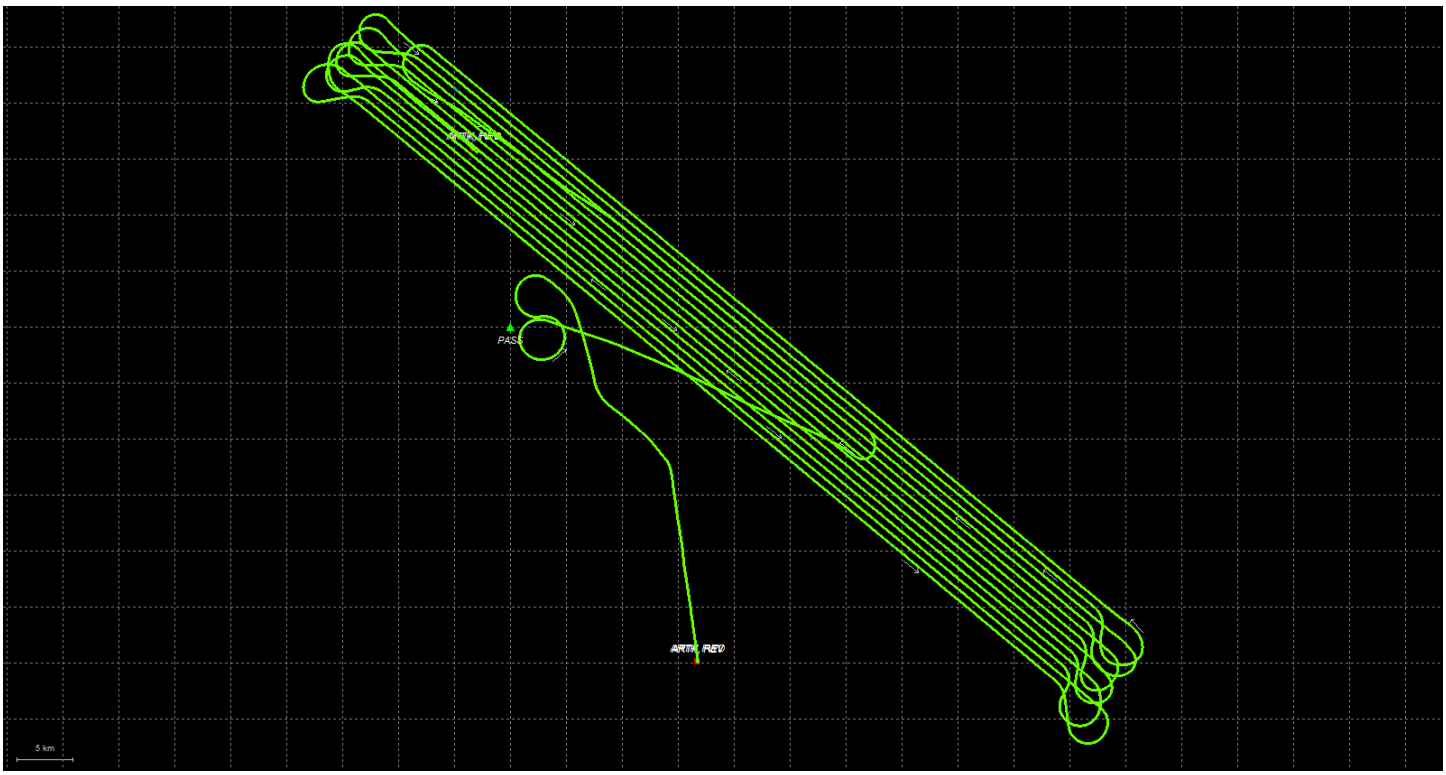
AIRCRAFT BLOCK TIME				**MISSION DETAILS**					**GPS TIME**	
Engine On:	12:16	**Takeoff:**	12:26	**AGL Height:**	**2000 m**	**Pulse Rate:**	269KHz	**Pre-Mission**	**START**	**END**
Engine Off:	17:33	**Landing:**	17:29	**Speed:**	**150 kts**	**Scan Rate:**	**56Hz**		12:35	12:41
TOTAL:	5.3 hr	**TOTAL:**	5.1 hr	**Laser Power:**	**100.00%**	**FOV:**	**36 °**	**Post Mission**	17:12	17:18

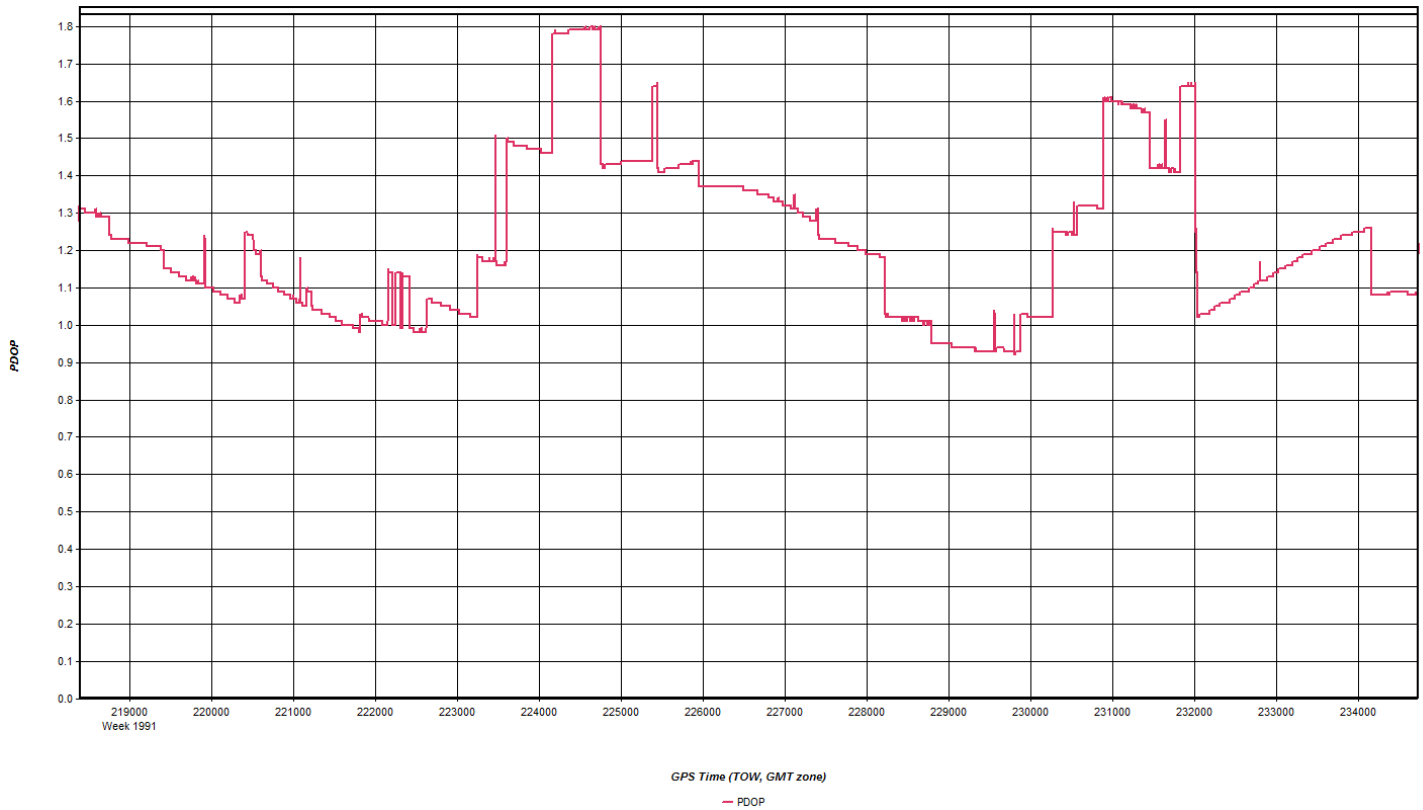
FLIGHT LINE #	**SET HISTO**	**DIRECTION**	**LiDAR File Name**	**GPS TIME**		**COMMENTS**
				Start	**END**	
47		321	180301_124433	12:44:33	12:50:47	Started 15nm from north
46		141	180301_125506	12:55:06		IPAS error, no reboot required
47		321	180301_130933	13:09:33	13:16:39	Started 15nm from North
46		141	180301_132036	13:20:36	13:38:45	good
45		321	180301_134150	13:41:50	13:59:40	good
44		141	180301_140312	14:03:12	14:21:42	good
43		321	180301_142438	14:24:38	14:41:23	good
42		141	180301_144508	14:45:08	15:03:20	good
41		321	180301_150632	15:06:32	15:23:06	good
40		141	180301_152754	15:27:54	15:46:02	good
39		321	180301_155027	15:50:27	16:06:58	good
38		141	180301_161051	16:10:51	16:28:23	good
37		321	180301_163203	16:32:03	16:48:48	good
CrossLine		238	180301_165604	16:56:04	17:01:50	good
70		321	180301_170558	17:05:58	17:08:07	13nm to 8nm from North to fill possible whole

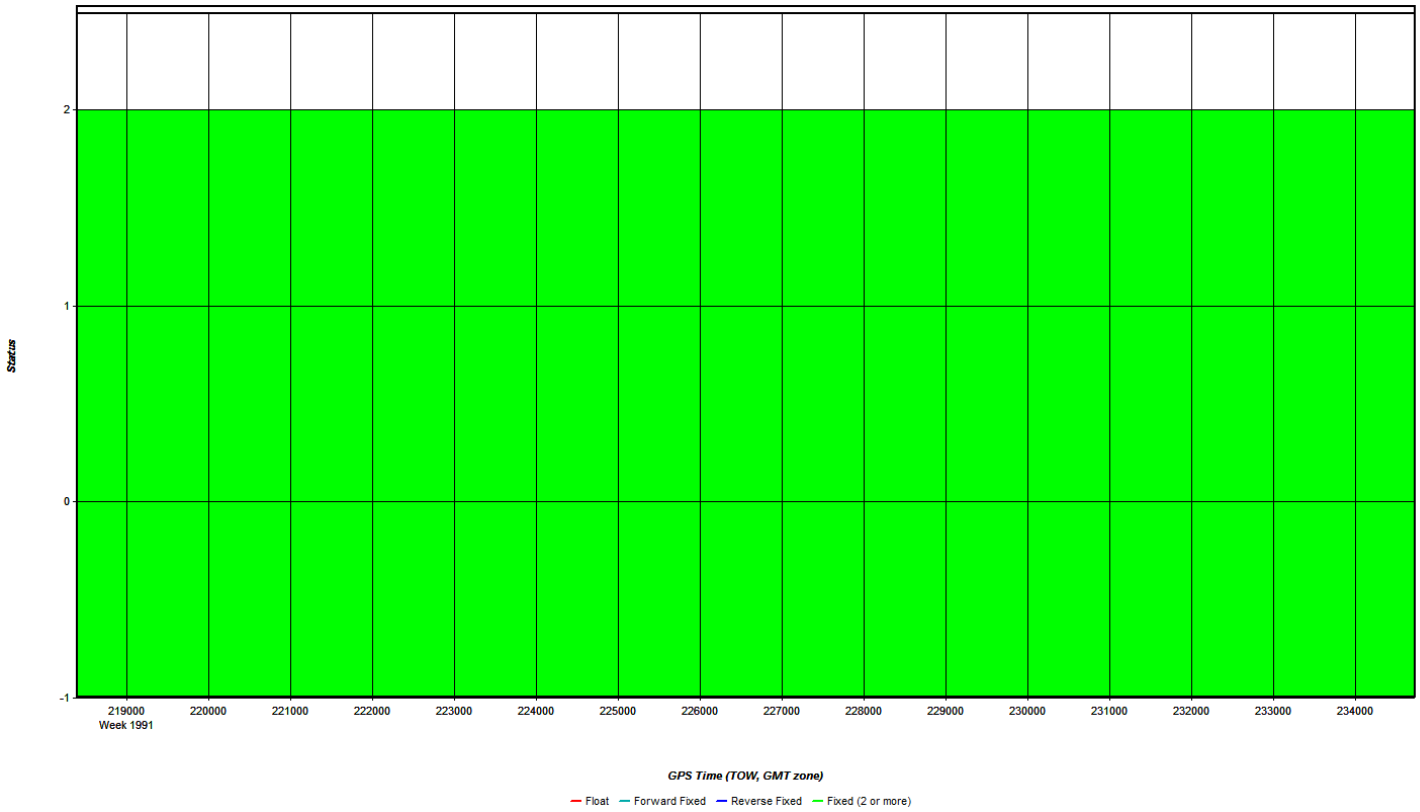
SUN ANGLE
@Start:
@End:
@Peak:

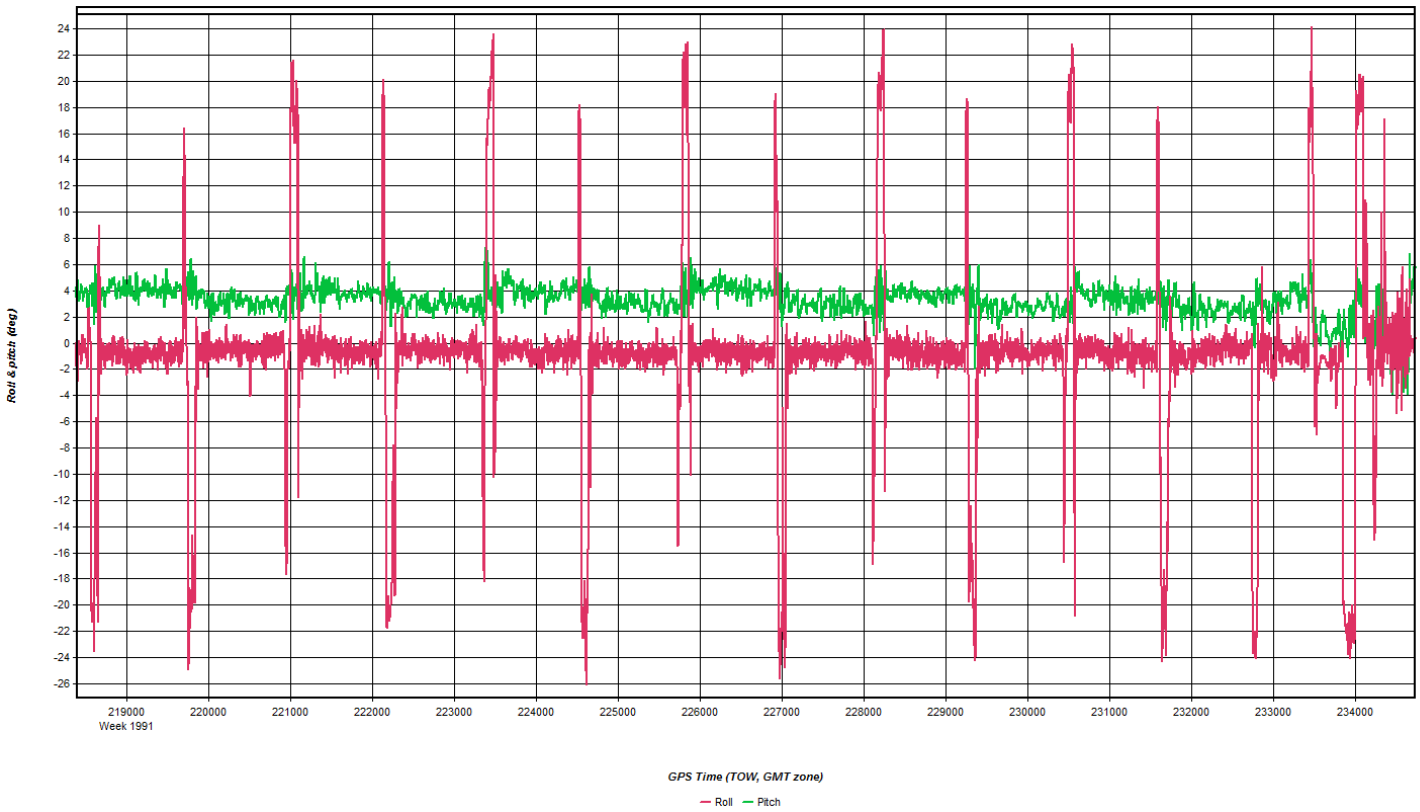
High overcast, winds were 23kts from the NE. Sats avg 17, PDOPS avg 1.3
A few minutes into our second line we received an IPAS error. Only seemed to be a gap. We were close to CORS station so we did an orbit and restarted the flight.
CORS station PASS was used for this flight.

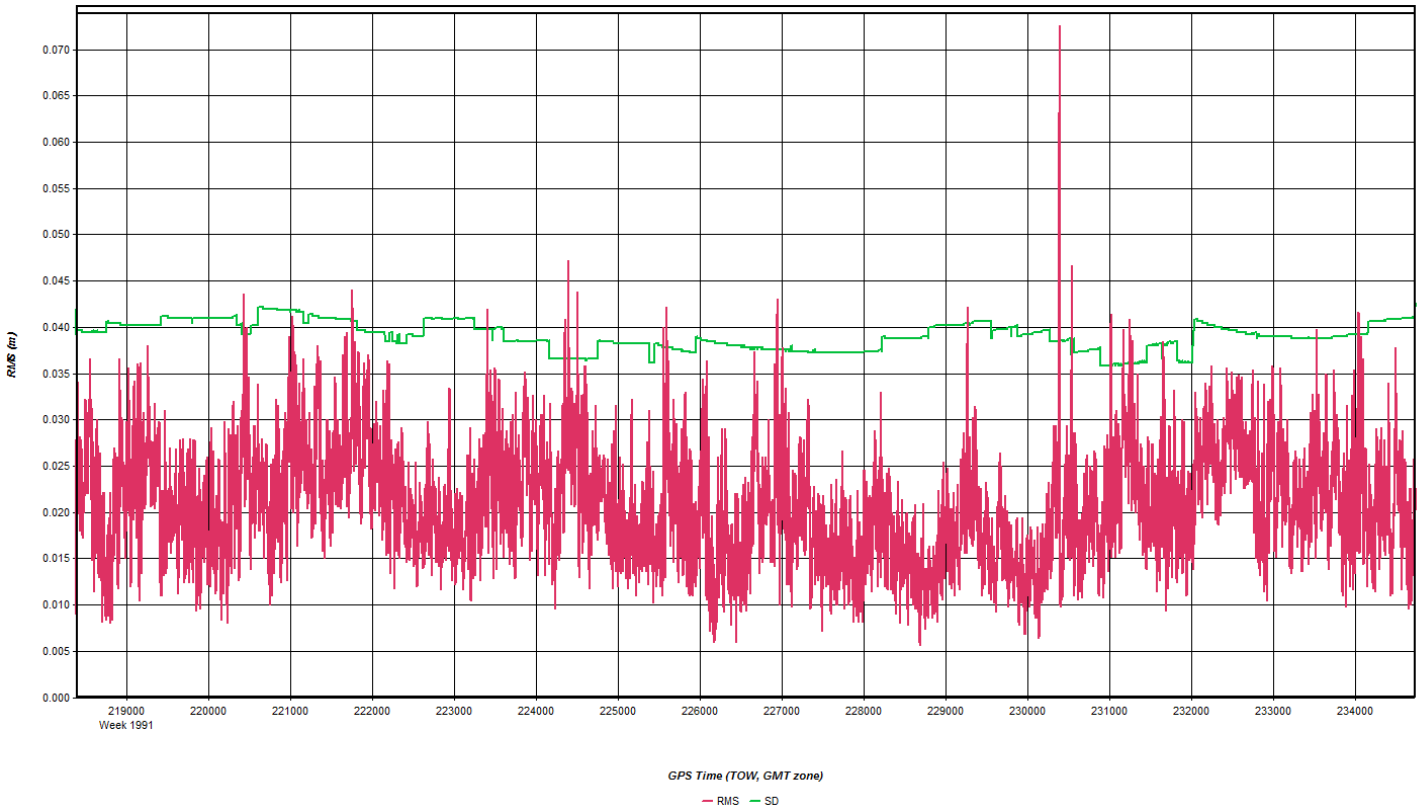
March 6, 2018-A (SN7229, N103RM)

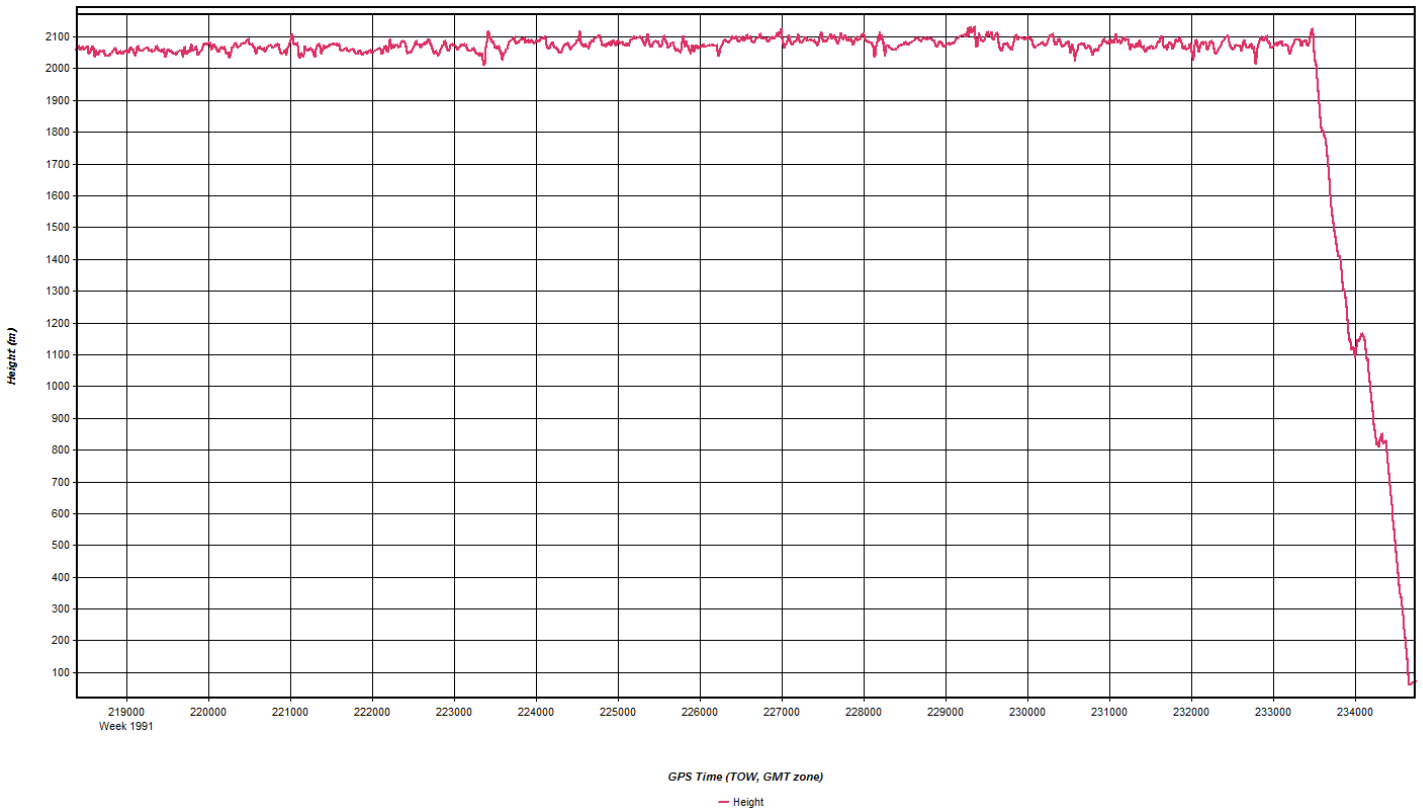

PASS
ARTK REV
5 km

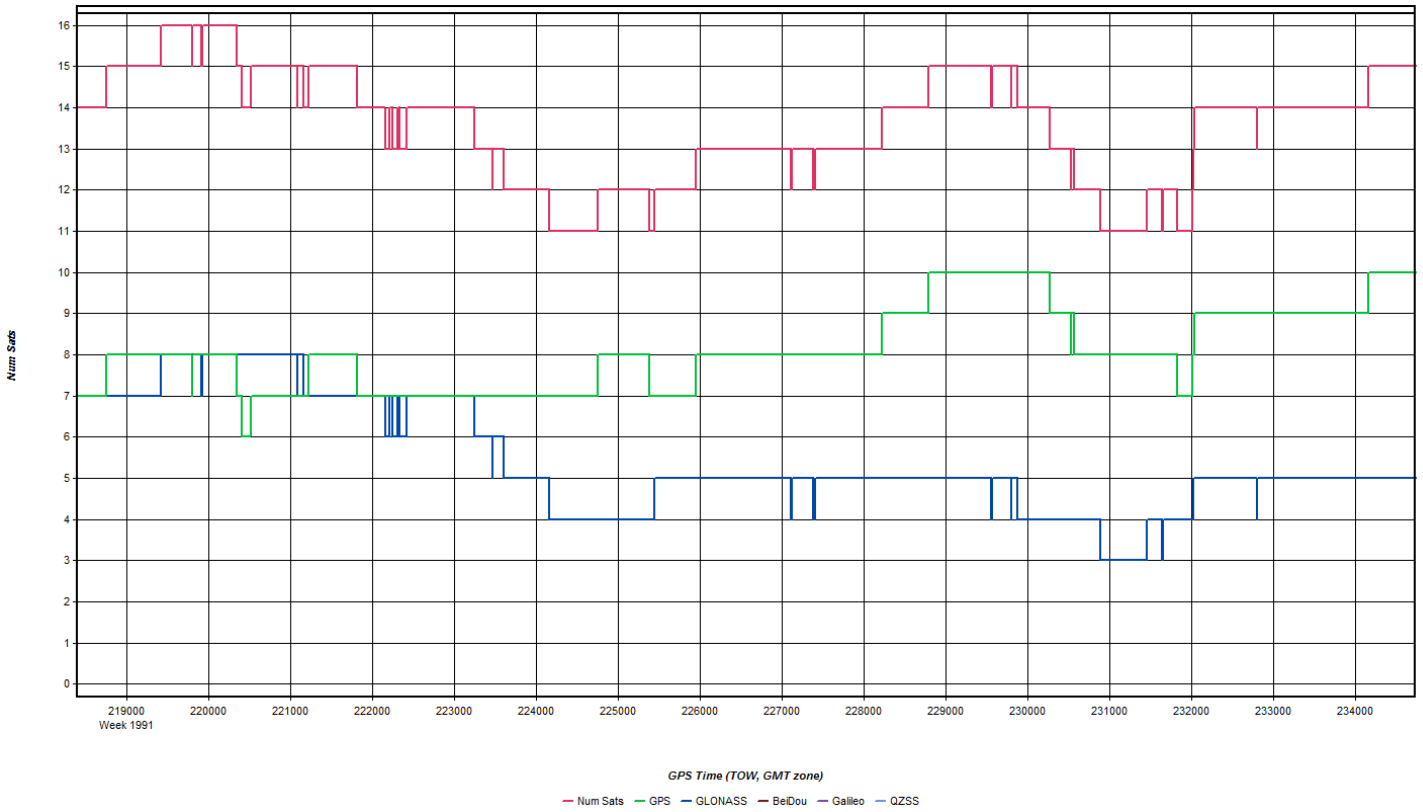

PDOP
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
PDOP

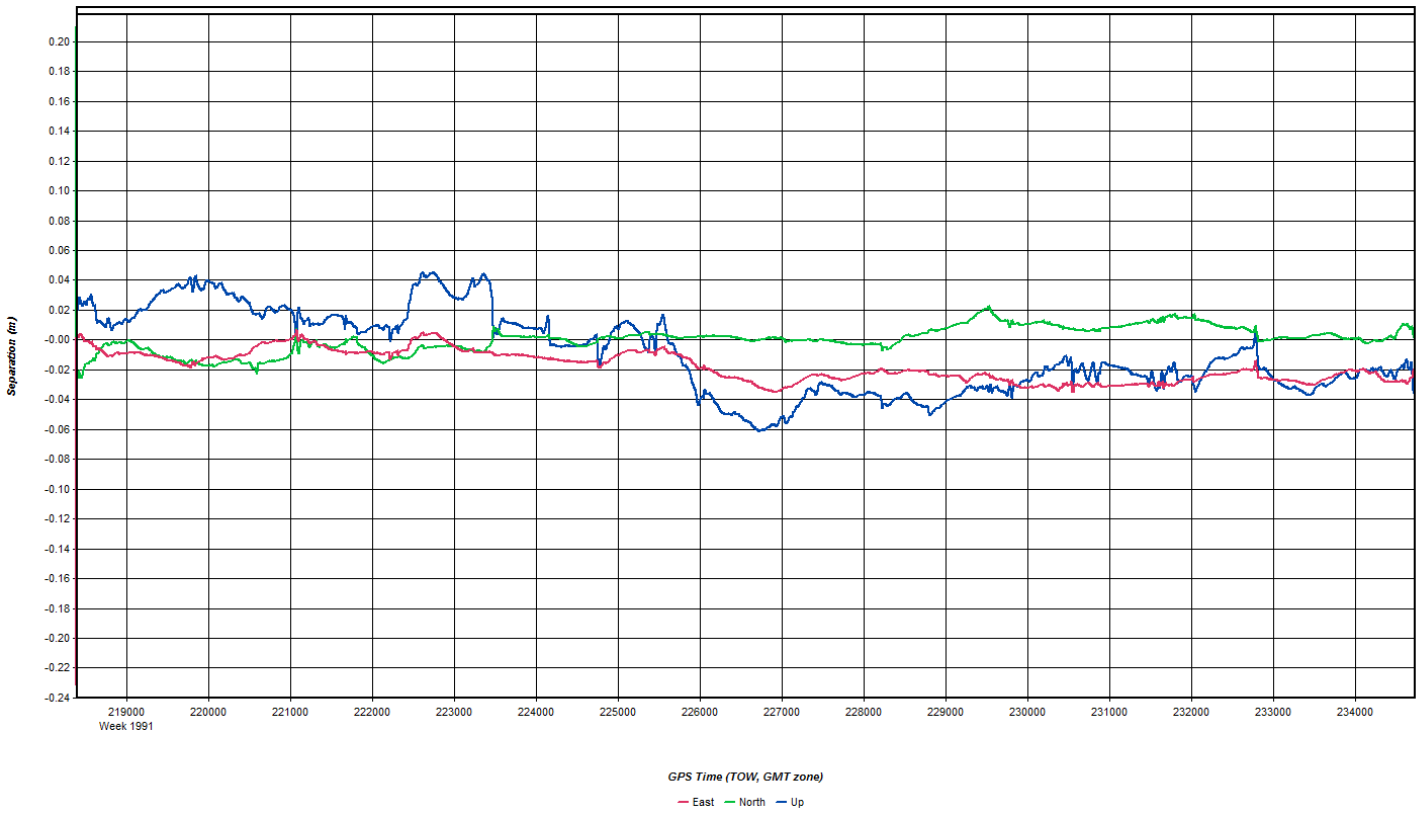

Status
2
1
0
-1
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

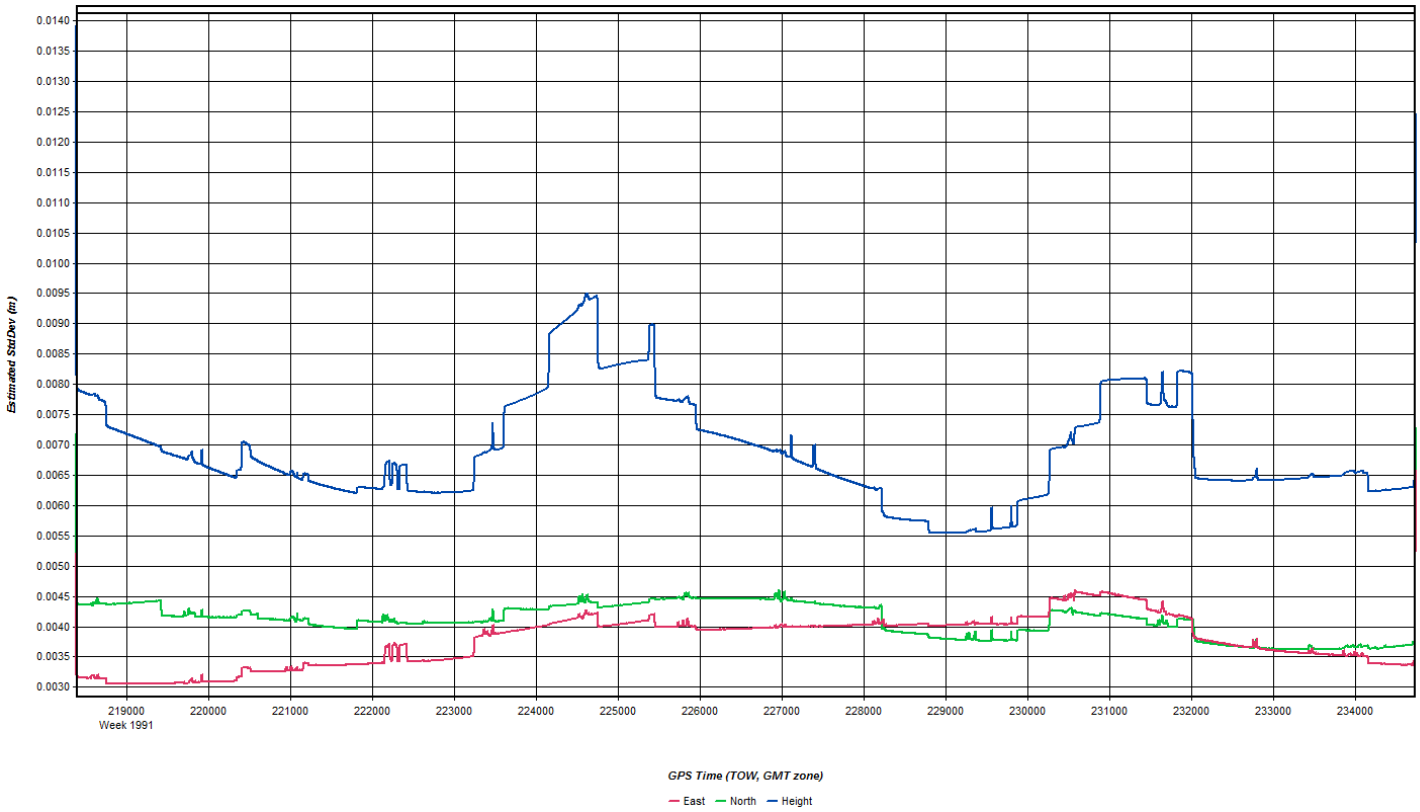

Roll & pitch (deg)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
Roll
Pitch

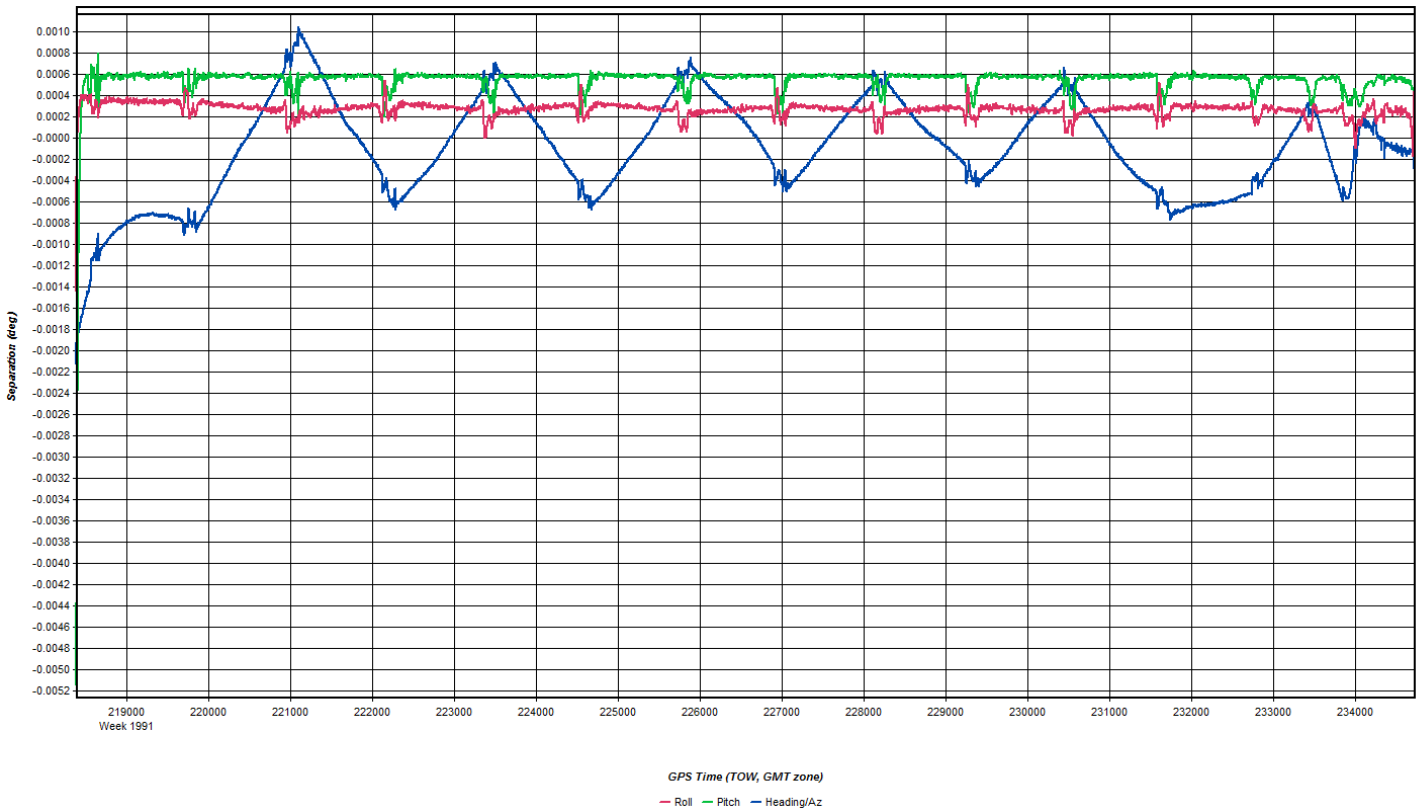

RMS (m)
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
RMS
SD

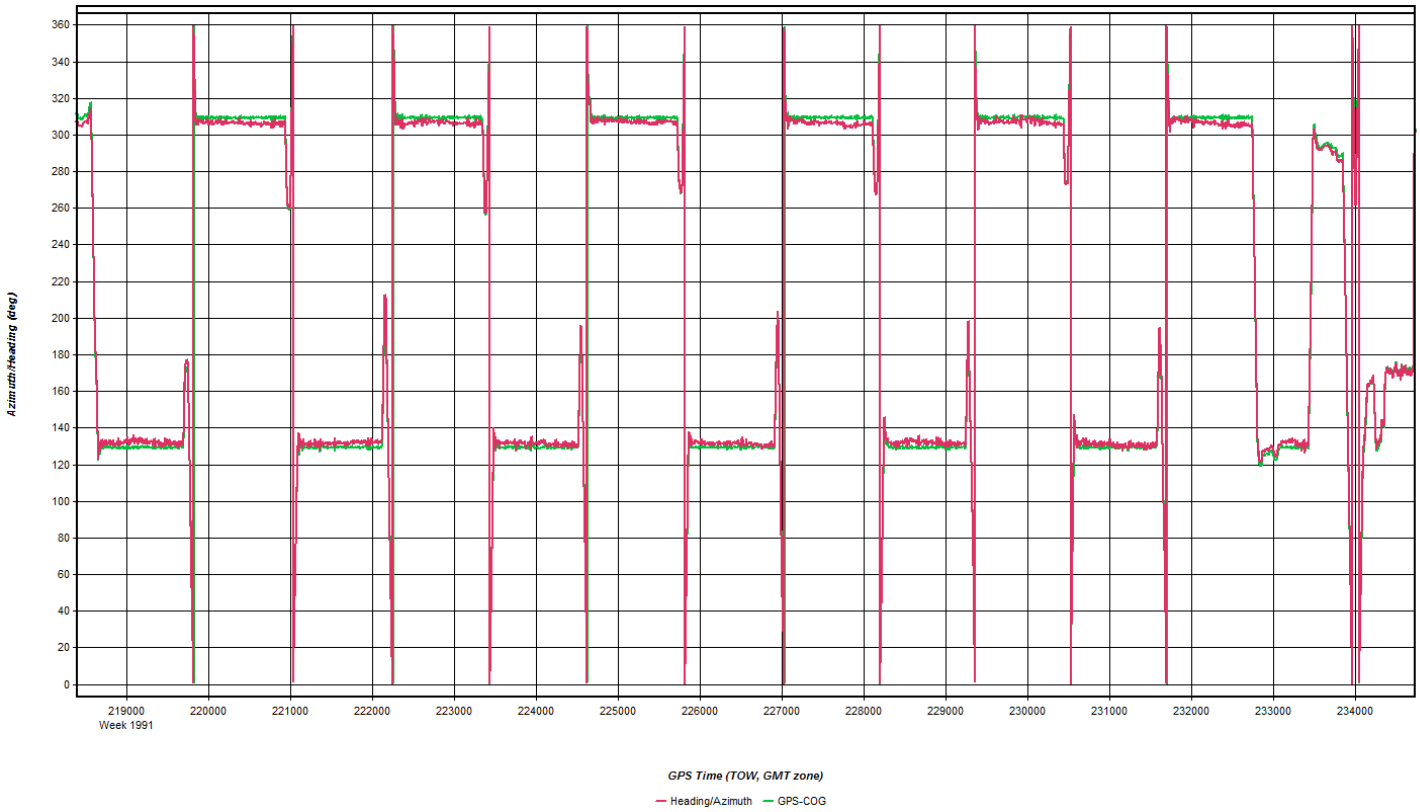

Height (m)
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
Height

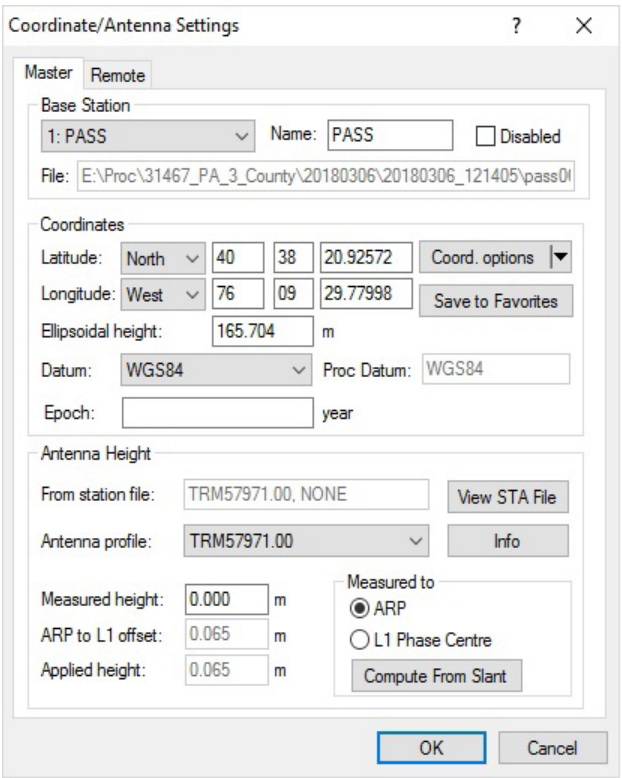

Num Sats
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
-0.00
-0.02
-0.04
-0.06
-0.08
-0.10
-0.12
-0.14
-0.16
-0.18
-0.20
-0.22
-0.24
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0010
0.0008
0.0006
0.0004
0.0002
-0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
-0.0018
-0.0020
-0.0022
-0.0024
-0.0026
-0.0028
-0.0030
-0.0032
-0.0034
-0.0036
-0.0038
-0.0040
-0.0042
-0.0044
-0.0046
-0.0048
-0.0050
-0.0052
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
219000
Week 1991
220000
221000
222000
223000
224000
225000
226000
227000
228000
229000
230000
231000
232000
233000
234000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180306\20180306_121405\pass0
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS – PA Flight 6
SENSOR OPERATOR	Michael Kettridge
PILOT	Andrew Werle
AIRCRAFT	103RM
AIRBASE	Reading PA

DATE	03/06/2018
SENSOR(S)	ALS70-HP / RCD30
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	Lidar 3
STATIC ALIGNMENT	GPS TIME START / END
Pre-Mission	12:19 / 12:26
Post Mission	16:57 / 17:02

AIRCRAFT BLOCK TIME			
Engine On:	12:02	Takeoff:	12:11
Engine Off:	17:13	Landing:	17:11
TOTAL:	5.2 hr	TOTAL:	5 hr

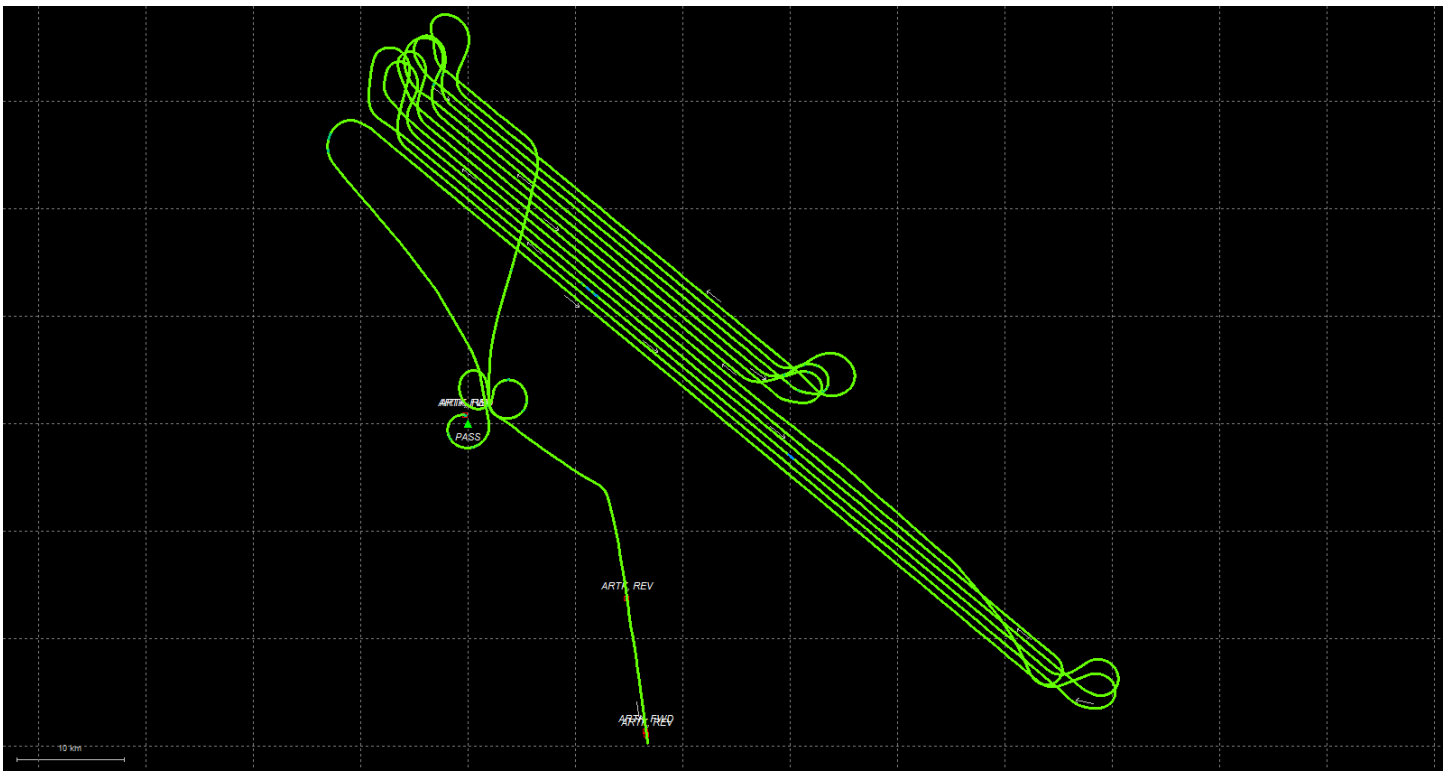
MISSION DETAILS			
AGL Height:	2000 m	Pulse Rate:	269KHz
Speed:	150 kts	Scan Rate:	56Hz
Laser Power:	100.00%	FOV:	36 °

FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME Start	GPS TIME END	COMMENTS
36		141	180306_123357	12:33:57		System reporting wrong elevation, possible IMU gap. Aborted line.
36		141	180306_124427	12:44:27	13:01:01	good
35		321	180306_130452	13:0452	13:21:46	good
34		141	180306_132518	13:25:18	13:41:33	good
33		321	180306_134504	13:45:04	14:02:00	good
32		141	180306_140506	14:05:06	14:21:28	good
31		321	180306_142440	14:24:40	14:41:42	good
30		141	180306_144454	14:44:54	15:01:27	good
29		321	180306_150434	15:04:34	15:21:23	good
28		141	180306_152439	15:24:39	15:40:23	good
27		321	180306_154337	15:43:37	16:00:15	25nm to 15nm from North possible cloud problems, re-fly necessary
26		141	180306_160331	16:03:31	16:19:20	good
25		321	180306_162240	16:22:40	16:38:38	good
27		141	180306_164513	16:45:13	16:50:05	14nm to 28nm from North re-flight.

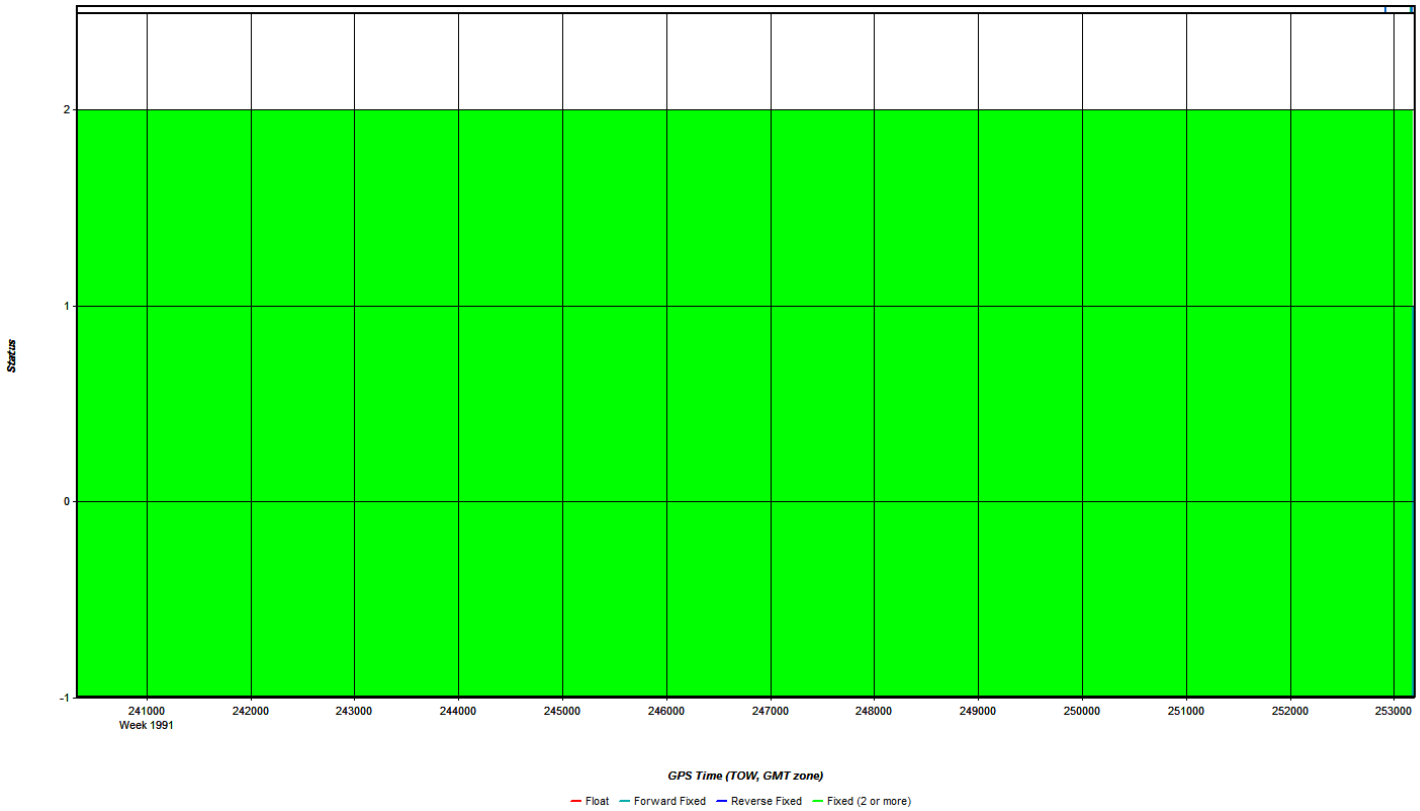
SUN ANGLE
@Start:
@End:
@Peak:

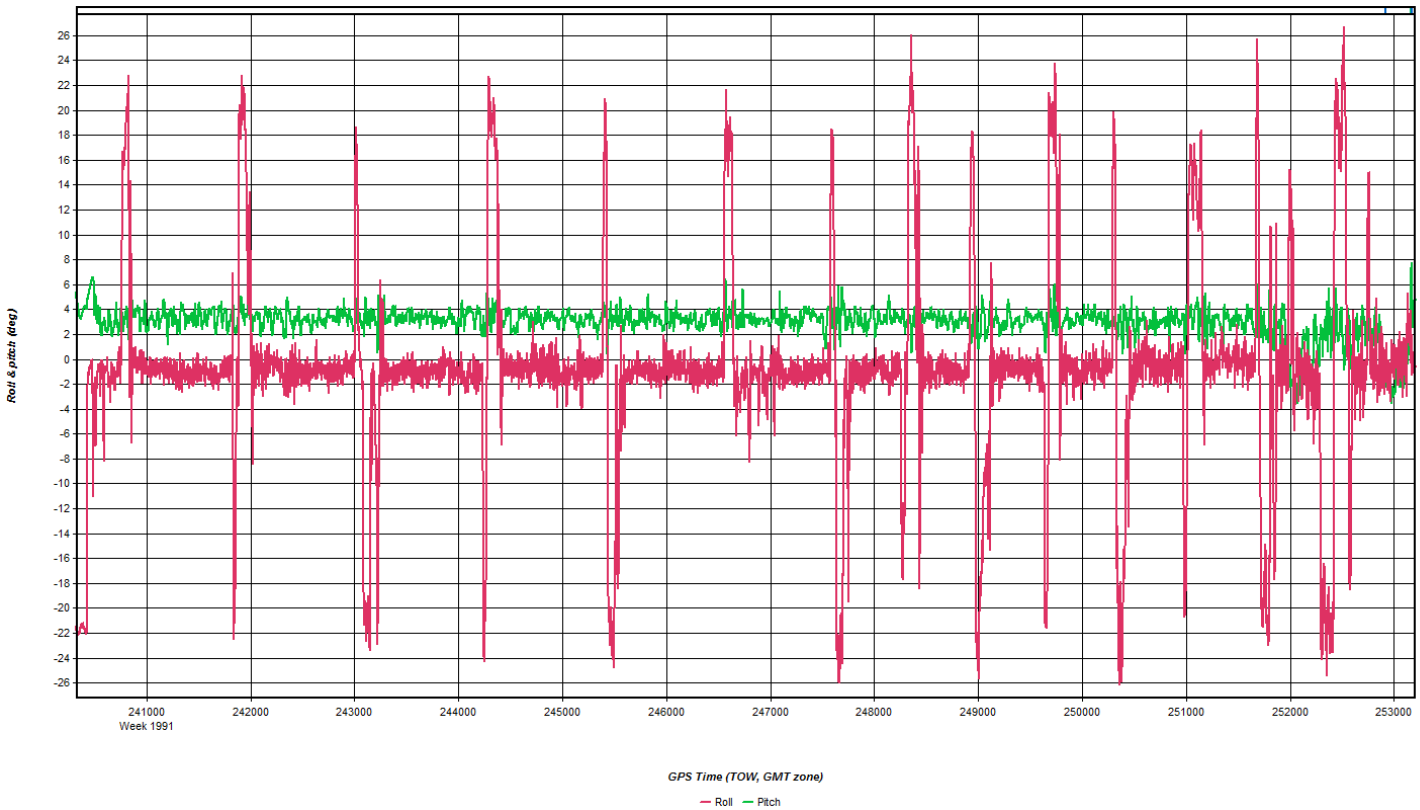
High broken overcast, temperature -2C. Winds were calm.
Sats 18 and PDOPS 1.2
Cors station PASS was used for this flight.

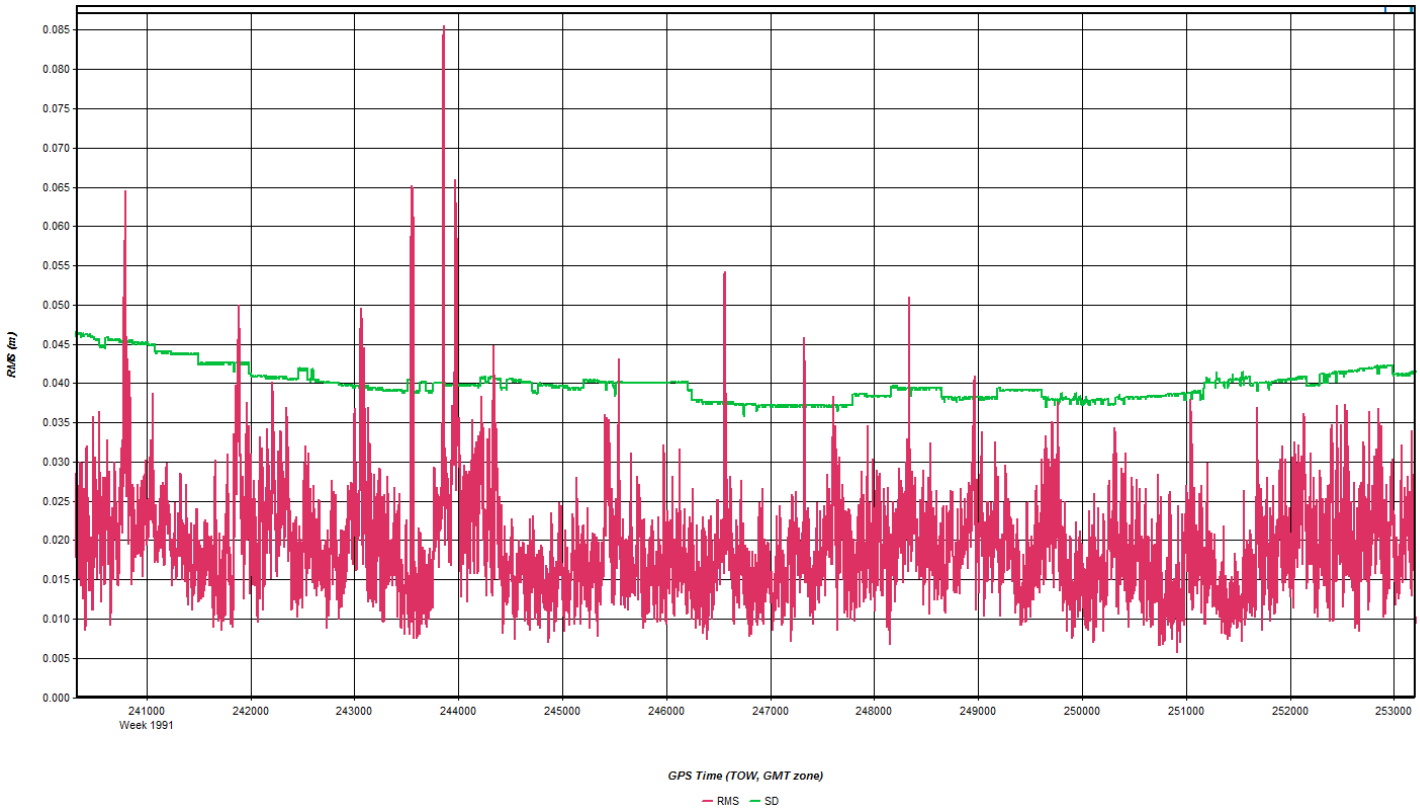
March 6, 2018-B (SN7229, N103RM)

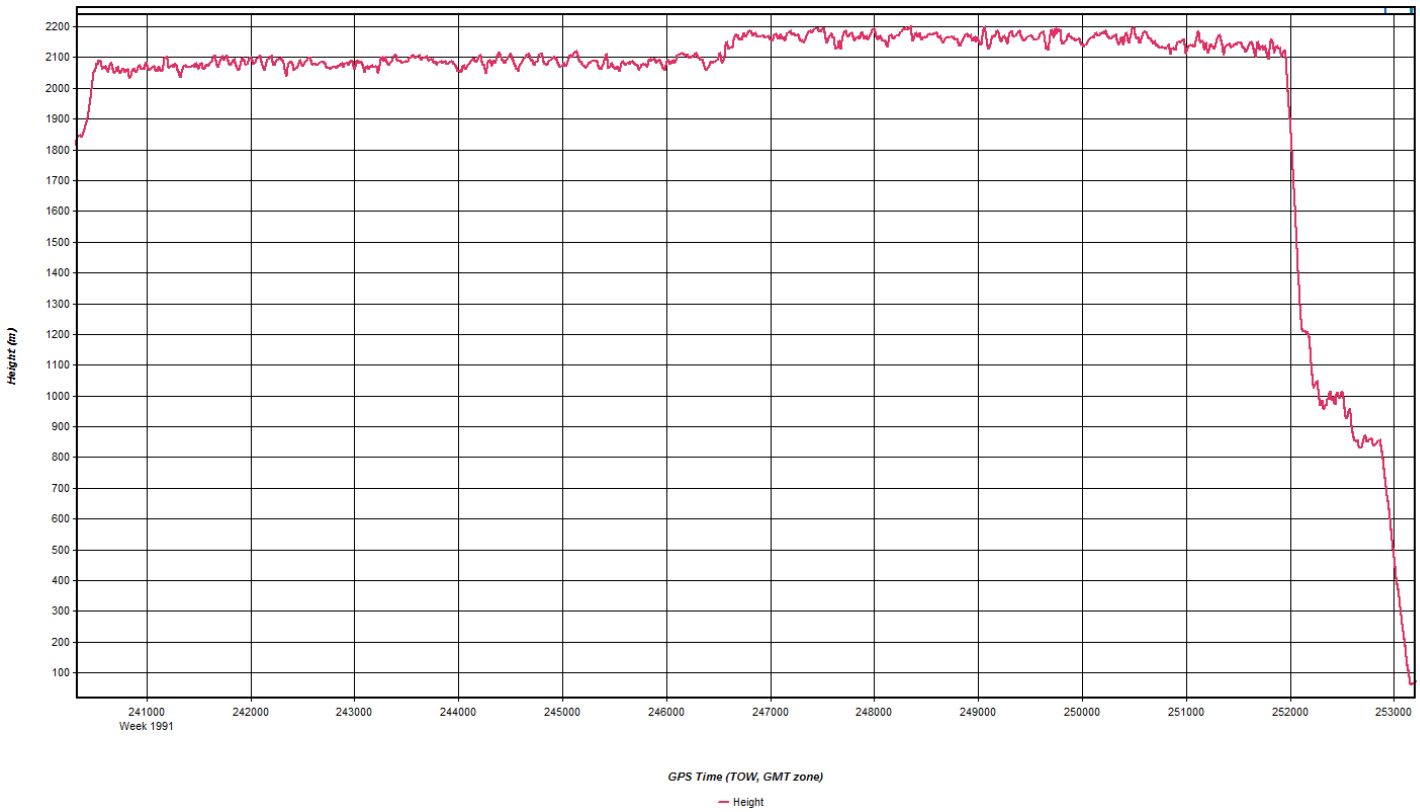

PASS
ARTC REV
10 km

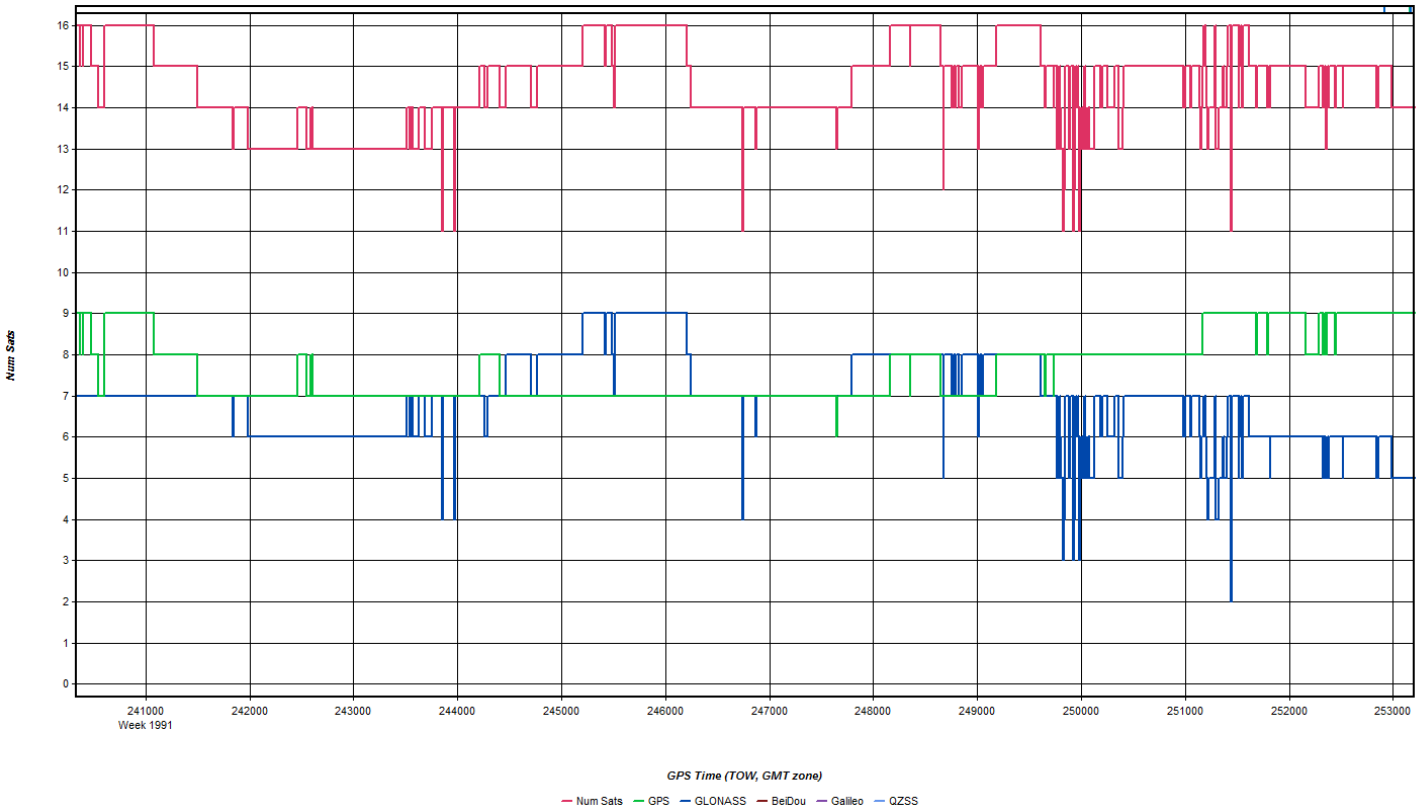

PDOP
1.65
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
PDOP

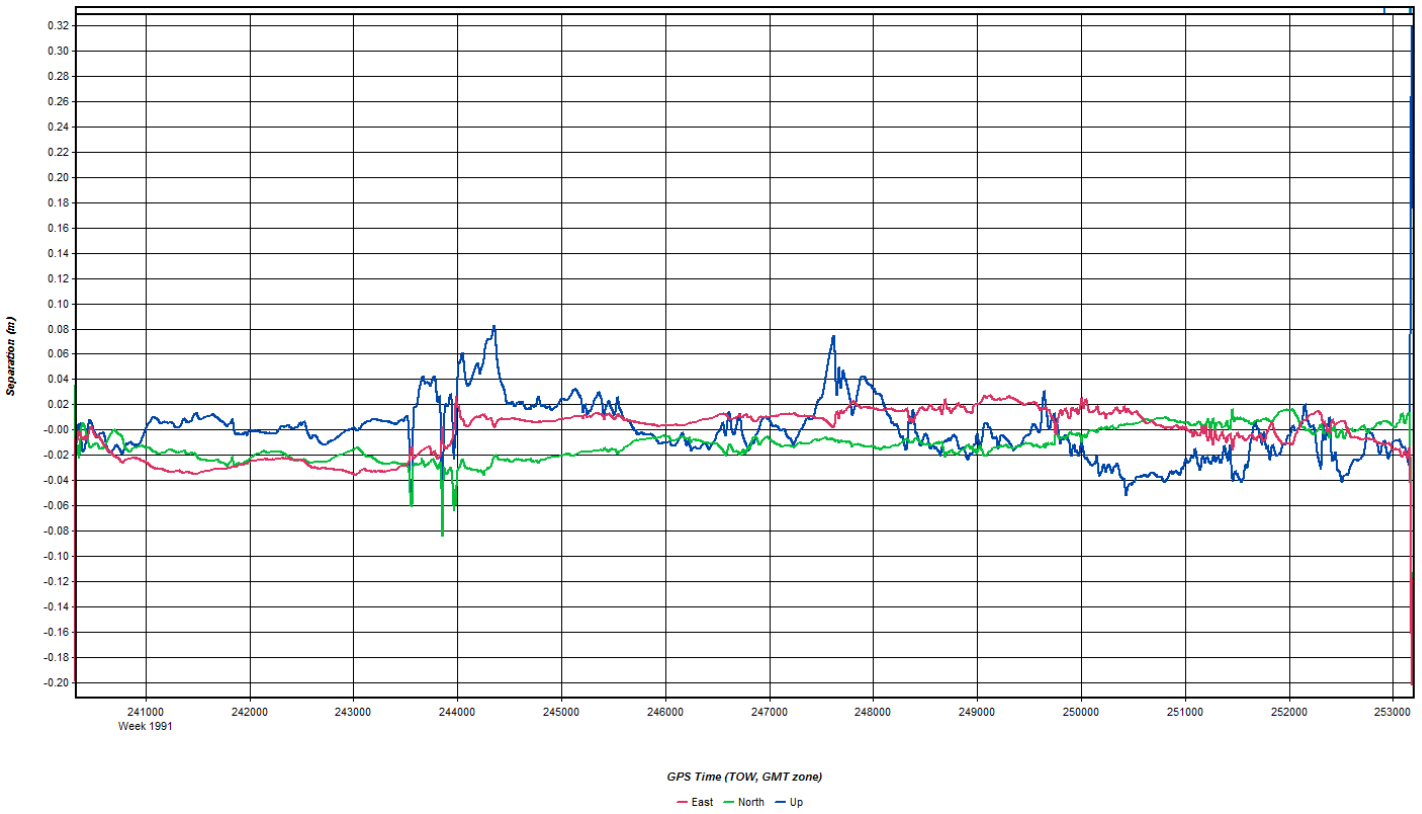

Status
2
1
0
-1
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

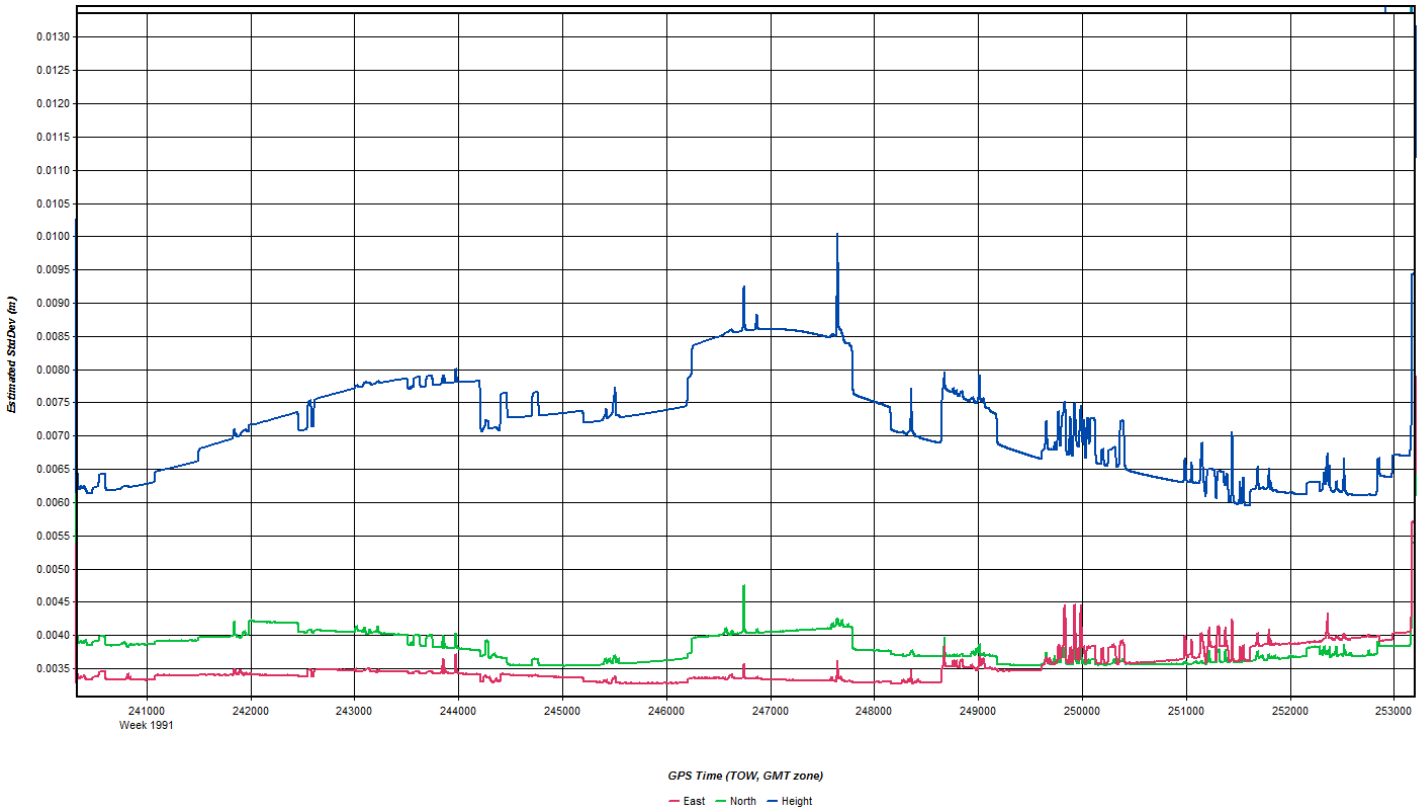

Roll & pitch (deg)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
Roll
Pitch

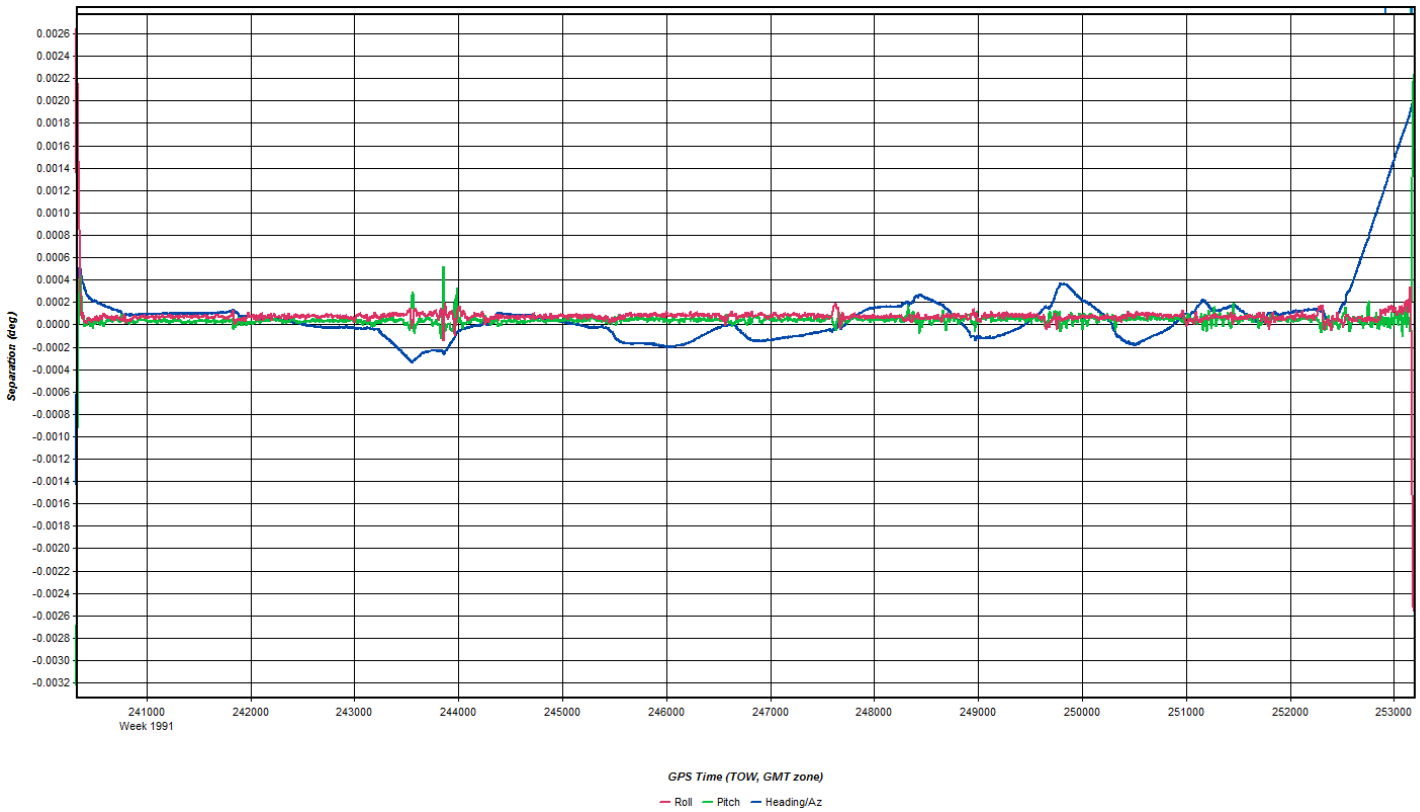

RMS (m)
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
RMS
SD

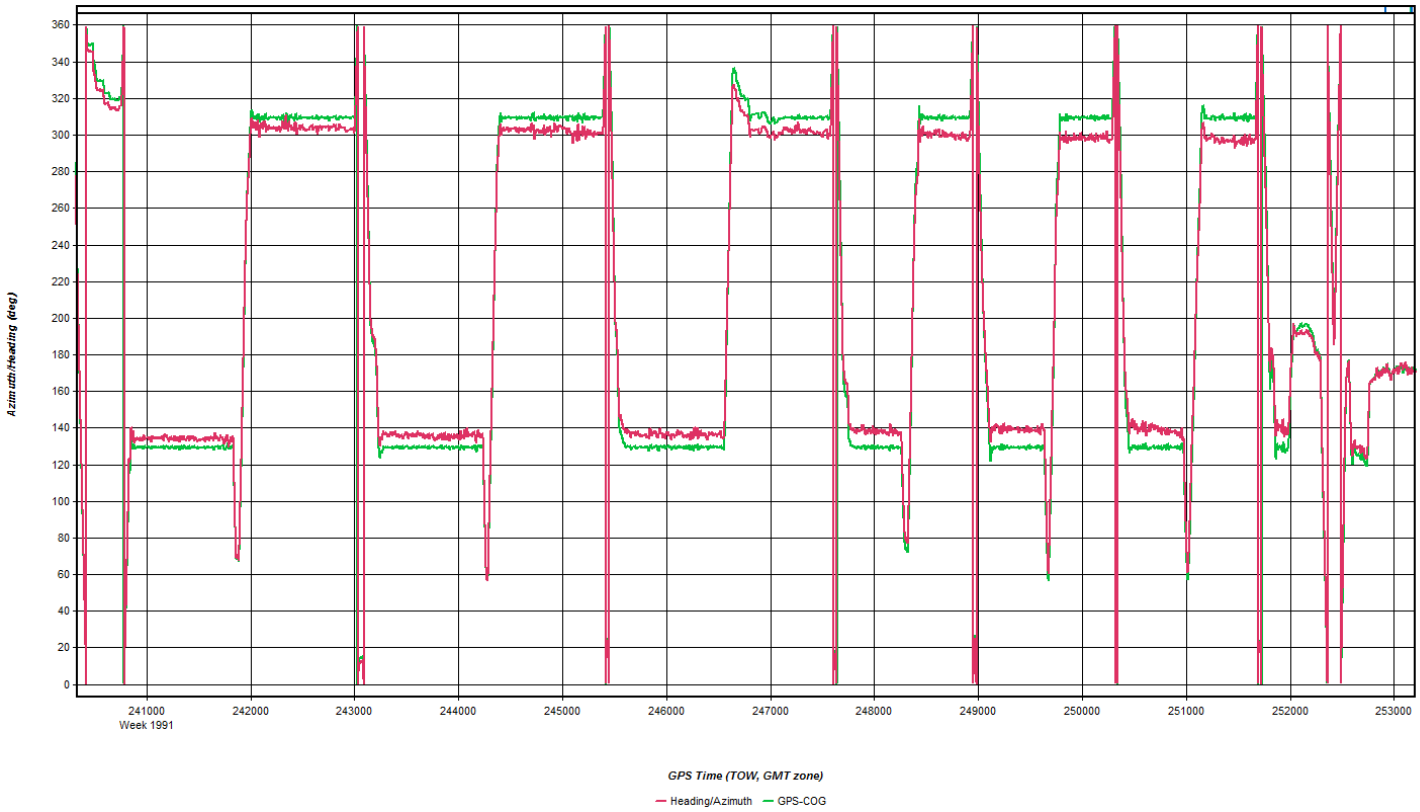

Height (m)
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
Height

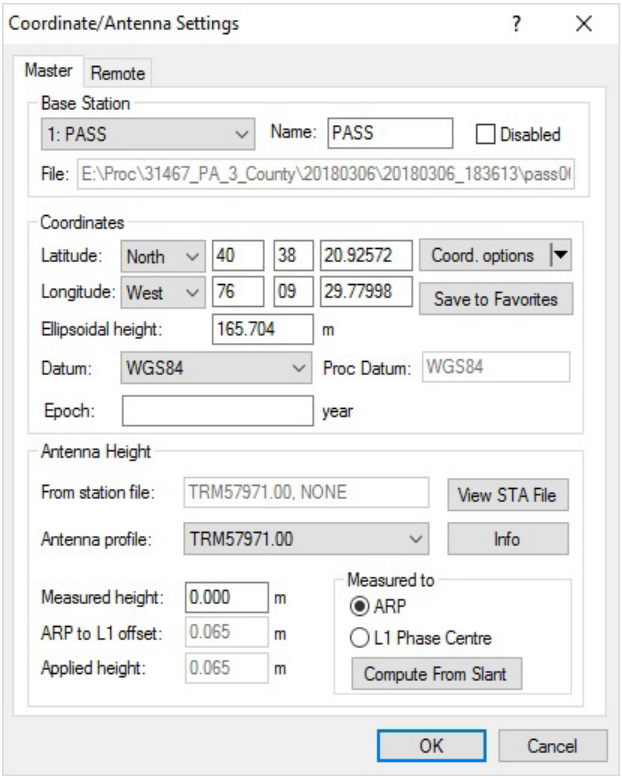

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
-0.00
-0.02
-0.04
-0.06
-0.08
-0.10
-0.12
-0.14
-0.16
-0.18
-0.20
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
-0.0018
-0.0020
-0.0022
-0.0024
-0.0026
-0.0028
-0.0030
-0.0032
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
241000
Week 1991
242000
243000
244000
245000
246000
247000
248000
249000
250000
251000
252000
253000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: PASS
Name: PASS
Disabled
File: E:\Proc\31467_PA_3_County\20180306\20180306_183613\pass0
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS – PA Flight 7
SENSOR OPERATOR	Michael Kettridge
PILOT	Andrew Werle
AIRCRAFT	103RM
AIRBASE	Reading PA

DATE	03/06/2018
SENSOR(S)	ALS70-HP / RCD30
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	Lidar 3
STATIC ALIGNMENT	GPS TIME

AIRCRAFT BLOCK TIME			
Engine On:	18:27	Takeoff:	18:34
Engine Off:	22:22	Landing:	22:20
TOTAL:	3.9 hr	TOTAL:	3.8 hr

MISSION DETAILS			
AGL Height:	2000 m	Pulse Rate:	269KHz
Speed:	150 kts	Scan Rate:	56Hz
Laser Power:	100.00%	FOV:	36 °

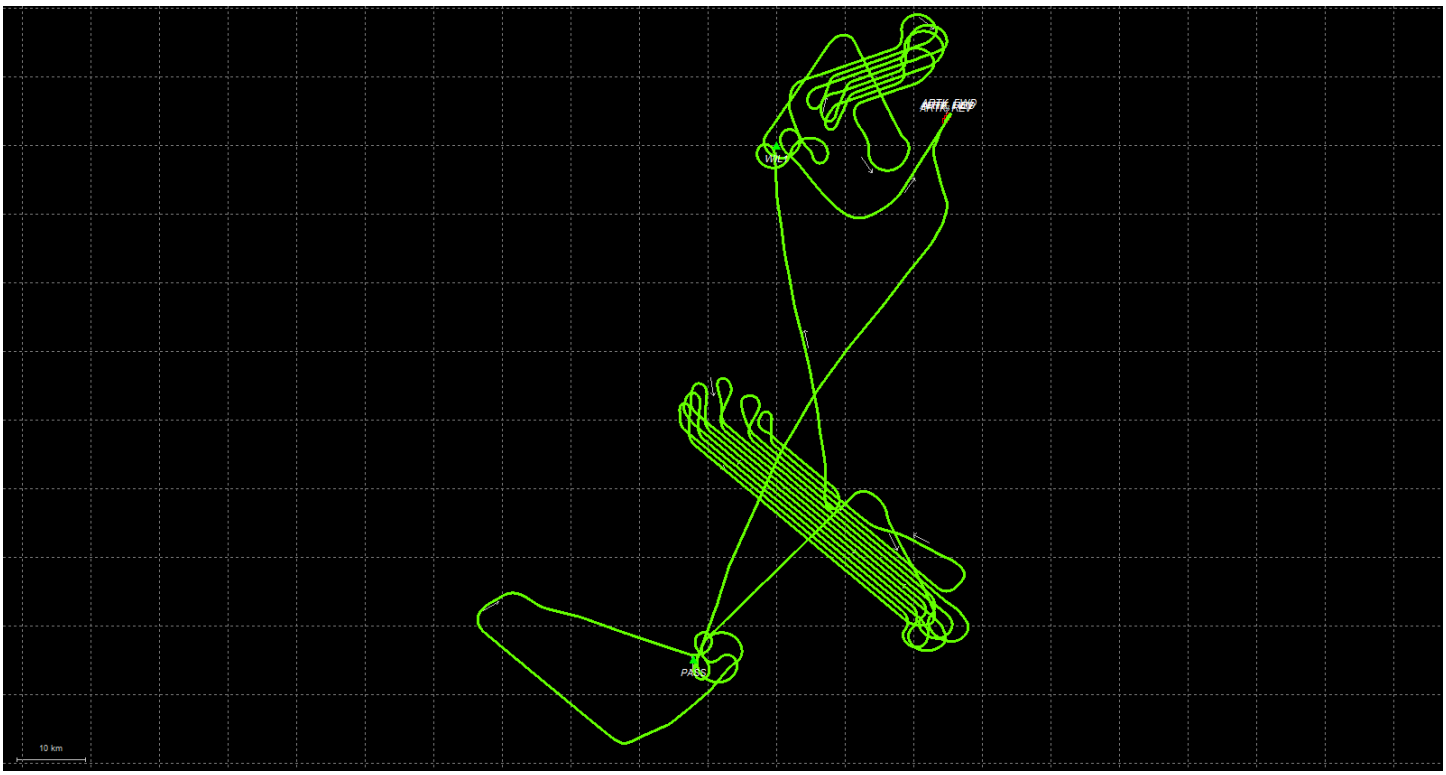
				GPS TIME			
						Pre-Mission	18:42
						Post Mission	22:03

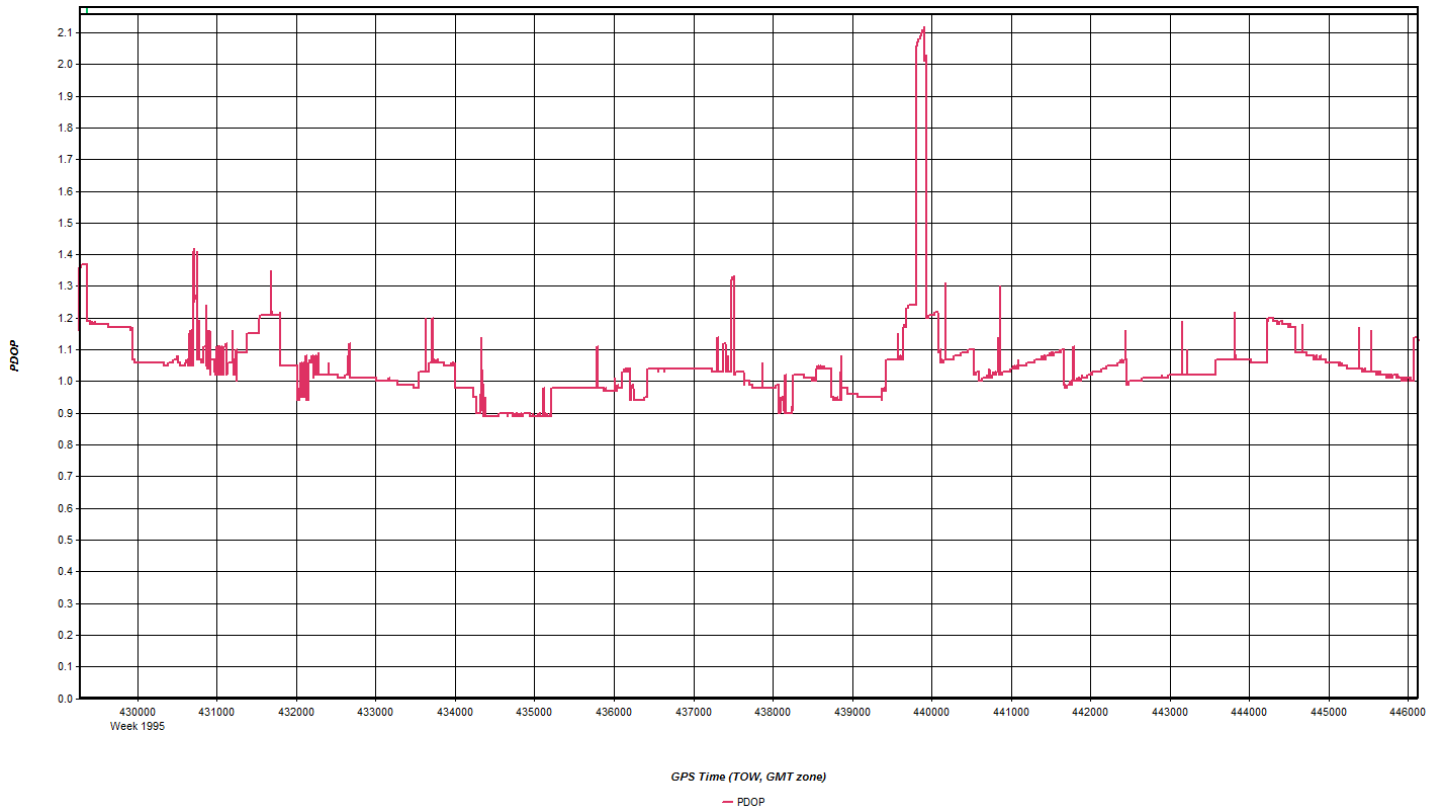
FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME Start	GPS TIME END	COMMENTS
24		141	180306_185436	18:54:36	19:10:11	good
23		321	180306_191354	19:13:54	19:29:40	good
22		141	180306_193426	19:34:26	19:50:18	good
21		321	180306_195346	19:53:46	20:09:25	good
20		141	180306_201309	20:13:09	20:28:50	good
19		321	180306_203831	20:38:31	20:45:52	good
18		141	180306_204932	20:49:32	20:57:24	good
17		321	180306_210049	21:00:49	21:08:20	good
16		141	180306_211215	21:12:15	21:20:13	good
15		321	180306_212324	21:23:24	21:31:04	good
14		141	180306_213435	21:34:35	21:42:31	good
13		321	180306_214625	21:46:25	21:54:13	good
12		141	180306_215805	21:58:05		Aborted do to rain, will re-fly

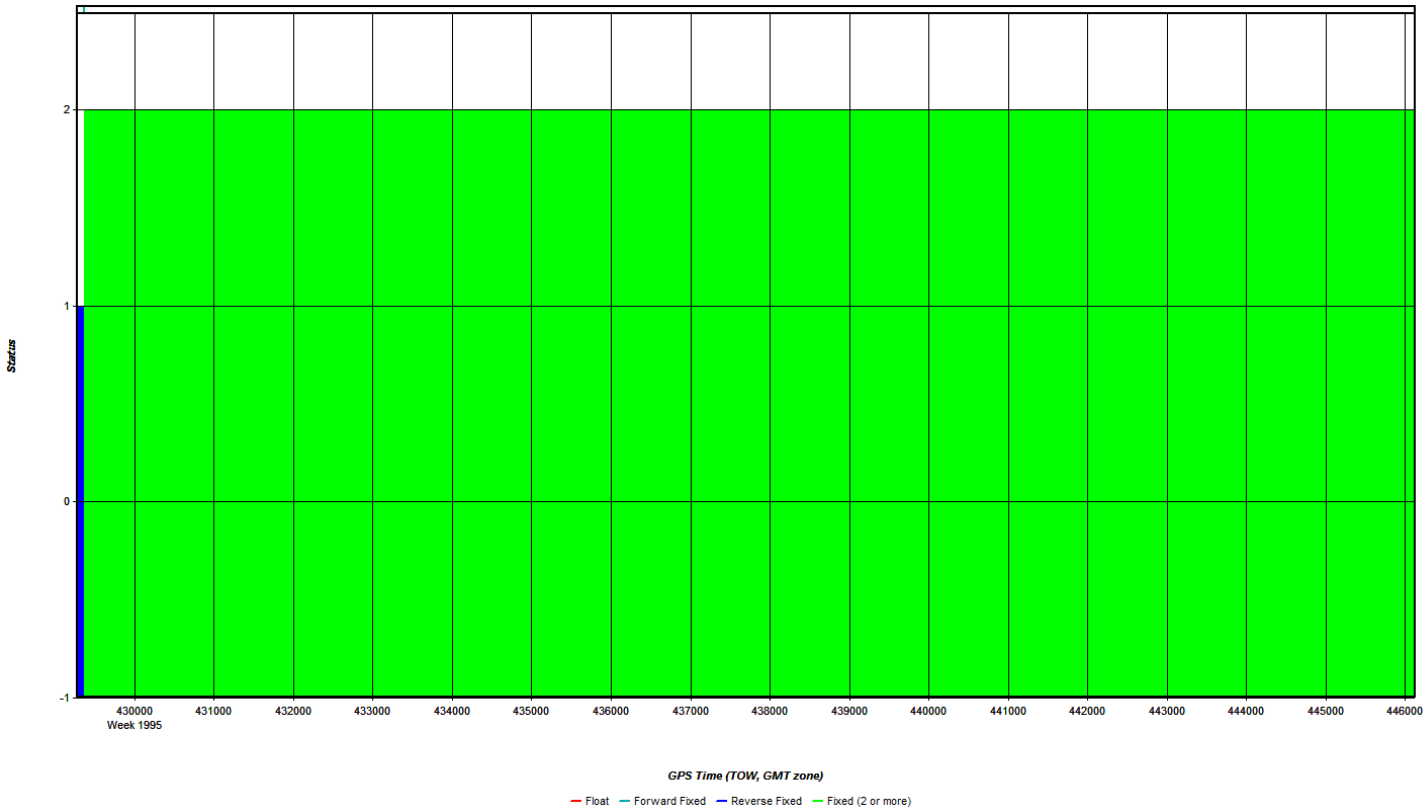
SUN ANGLE
@Start:
@End:
@Peak:

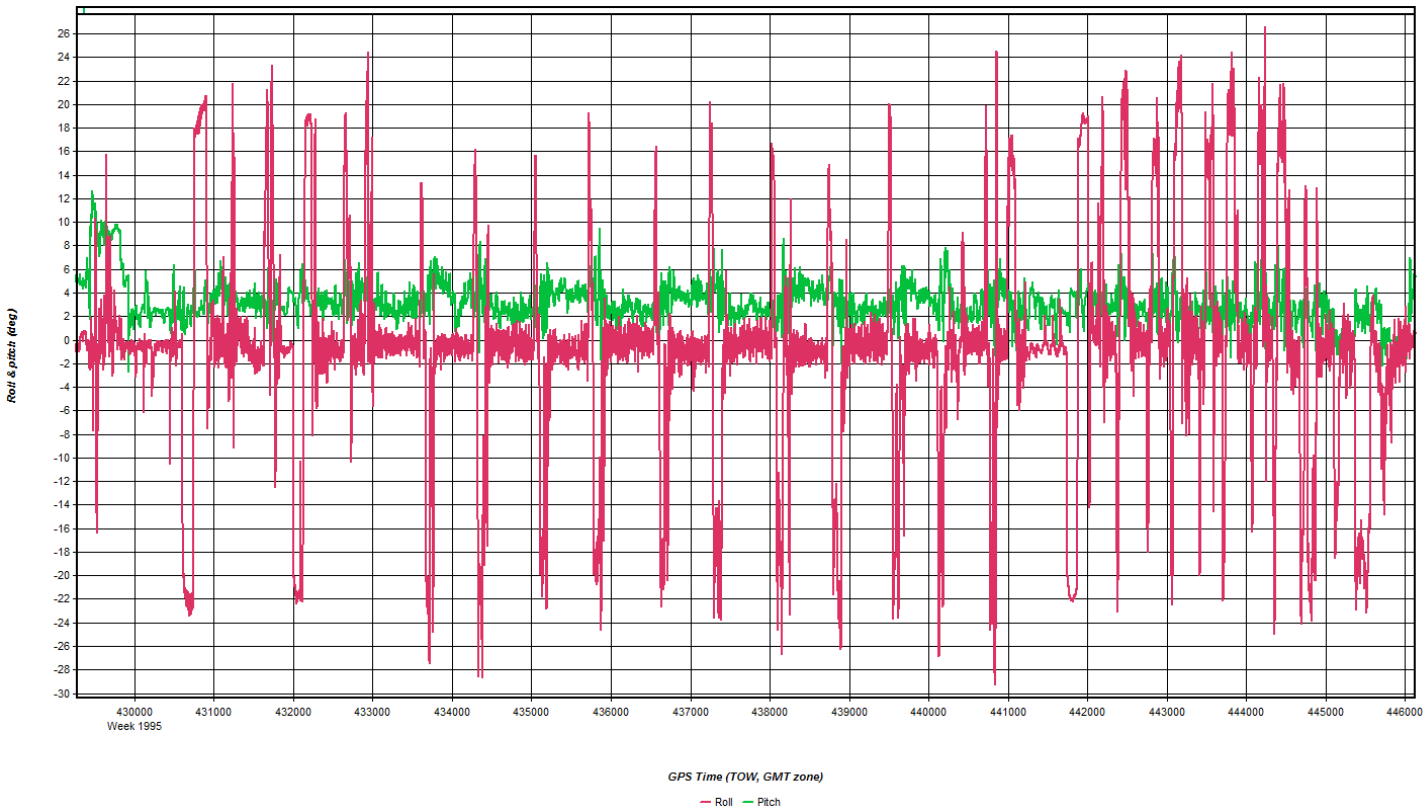
Sky was broken overcast at the start of the flight but clouds and rain moved in and eventually forced us to end the flight early.
Sats 18, PDOPS 1.2.
CORS station PASS was used for the flight.

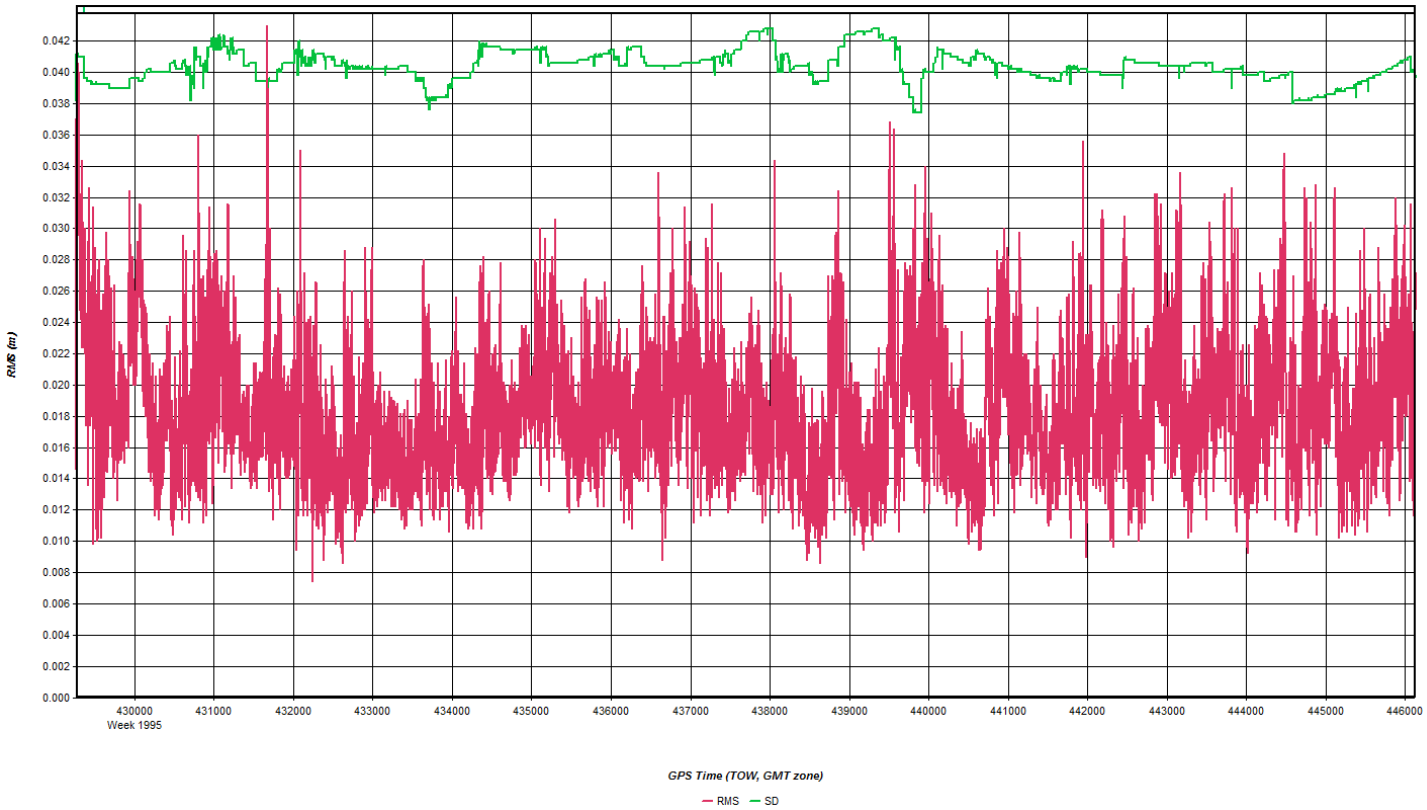
April 5, 2018-A (SN7229, N103RM)

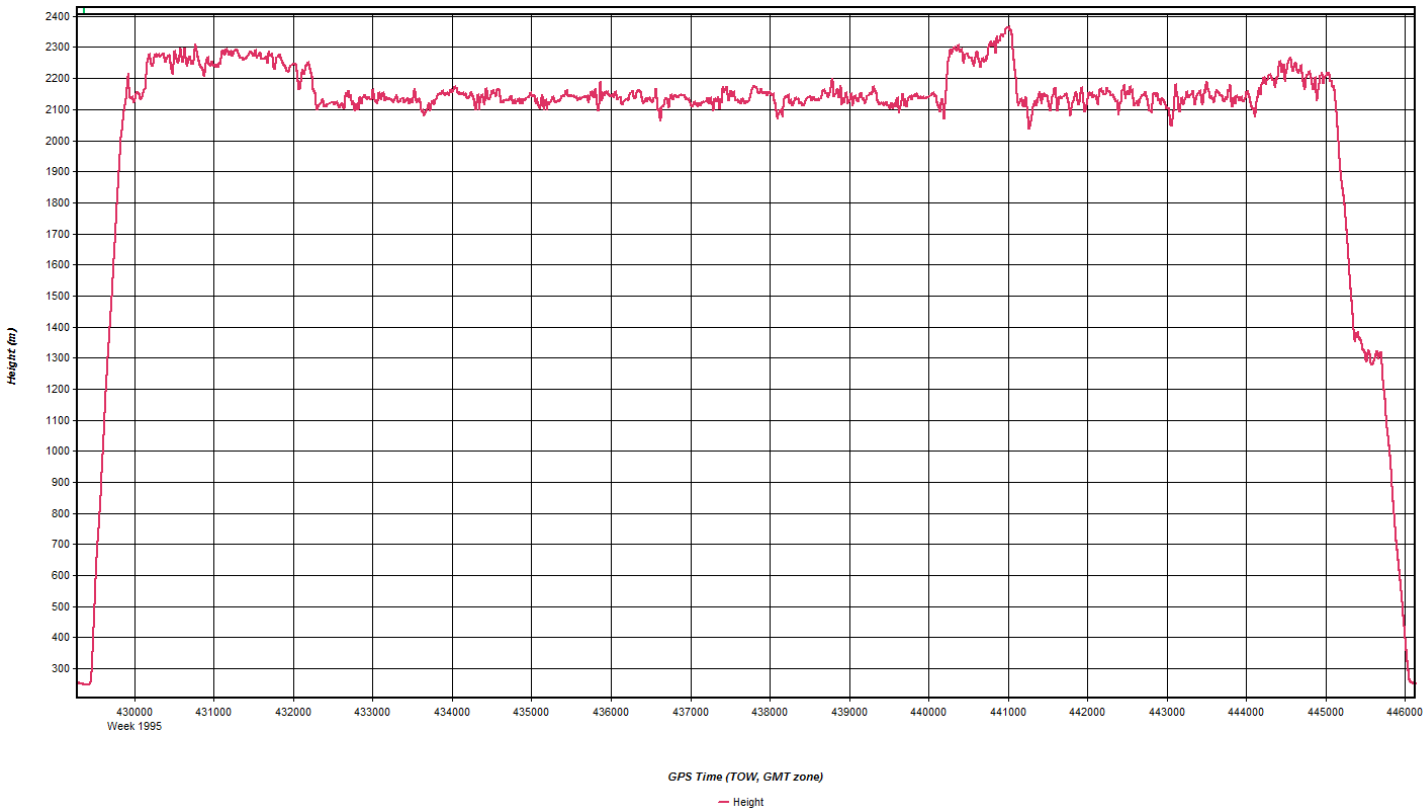

ARTK END
ARTK BEG
PASS
10 km

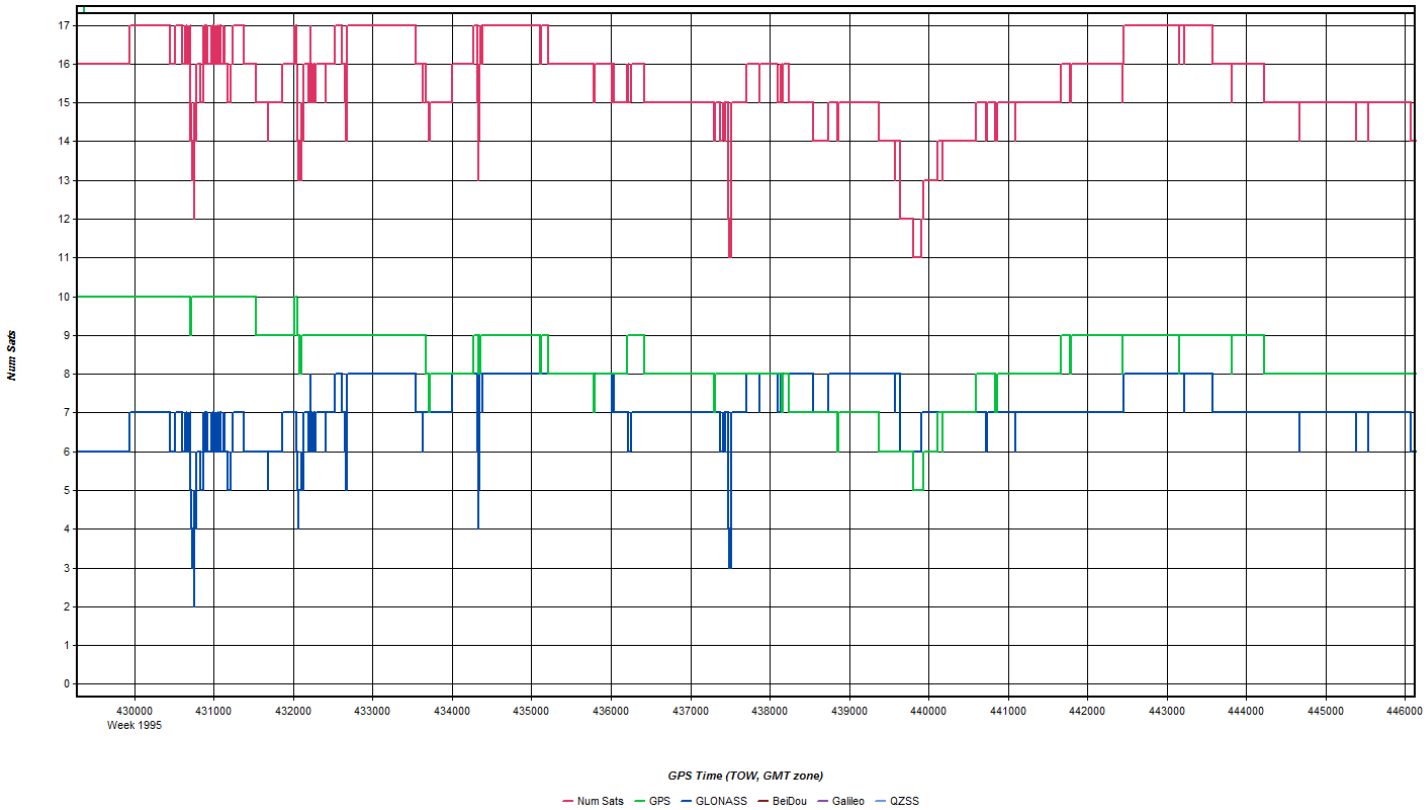

PDOP
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
PDOP

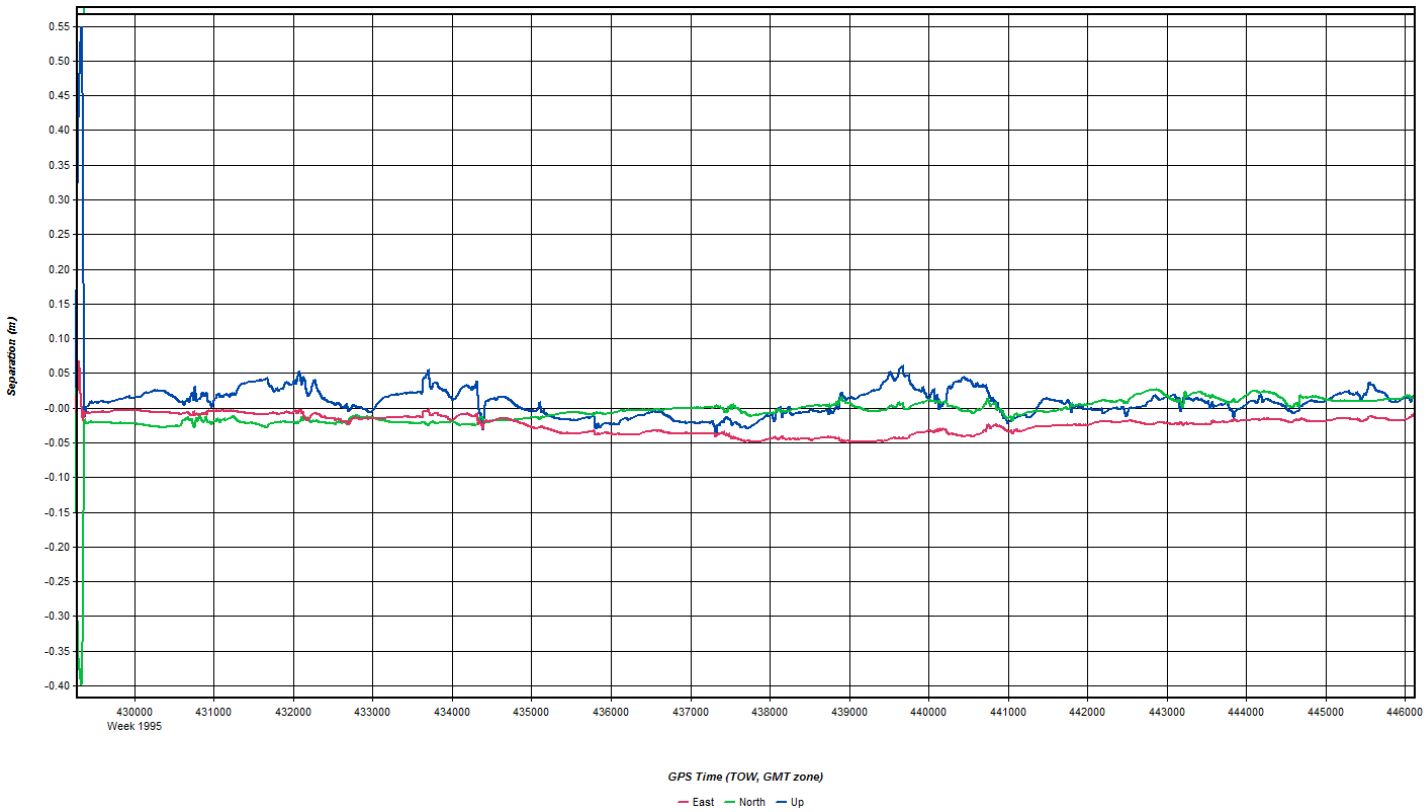

Status
2
1
0
-1
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

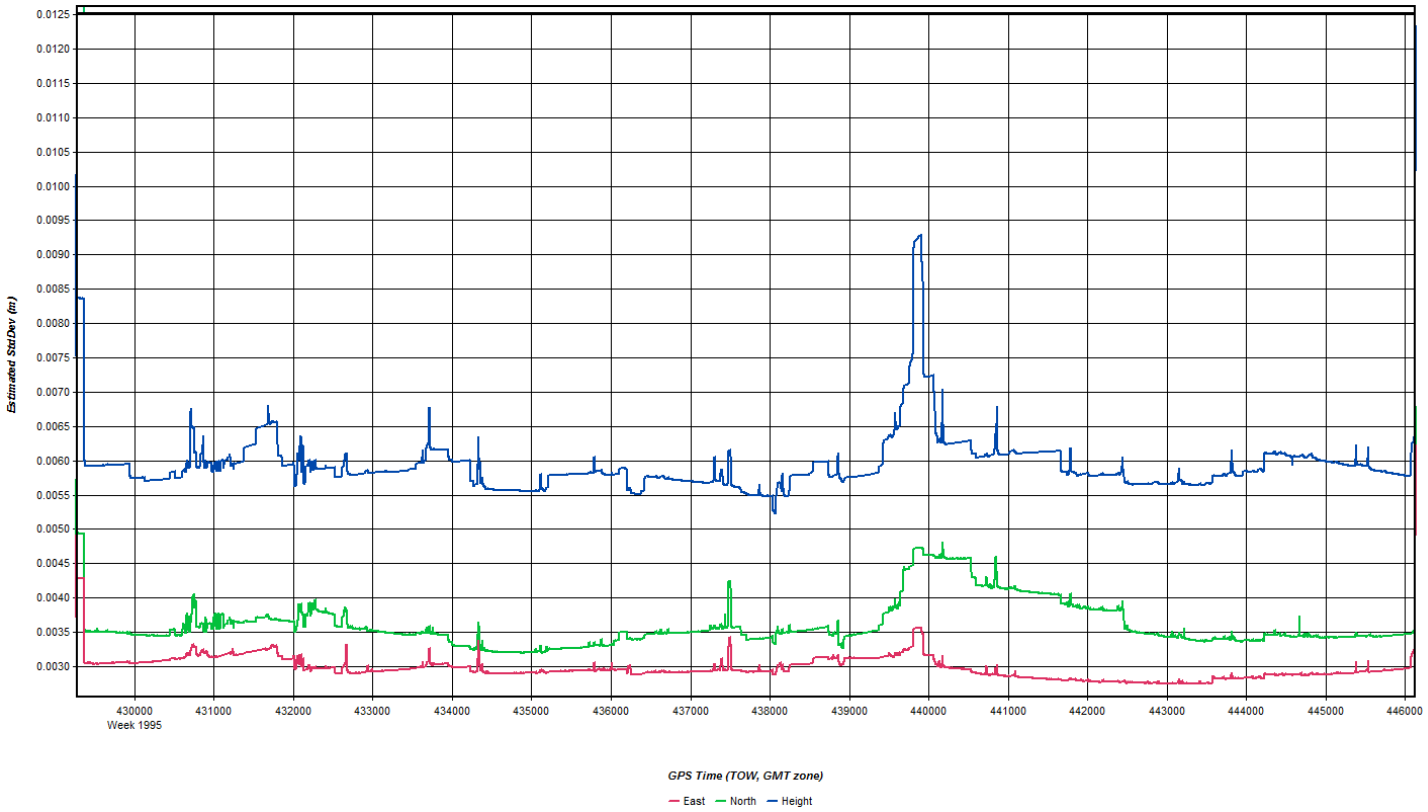

Roll & pitch (deg)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
Roll
Pitch

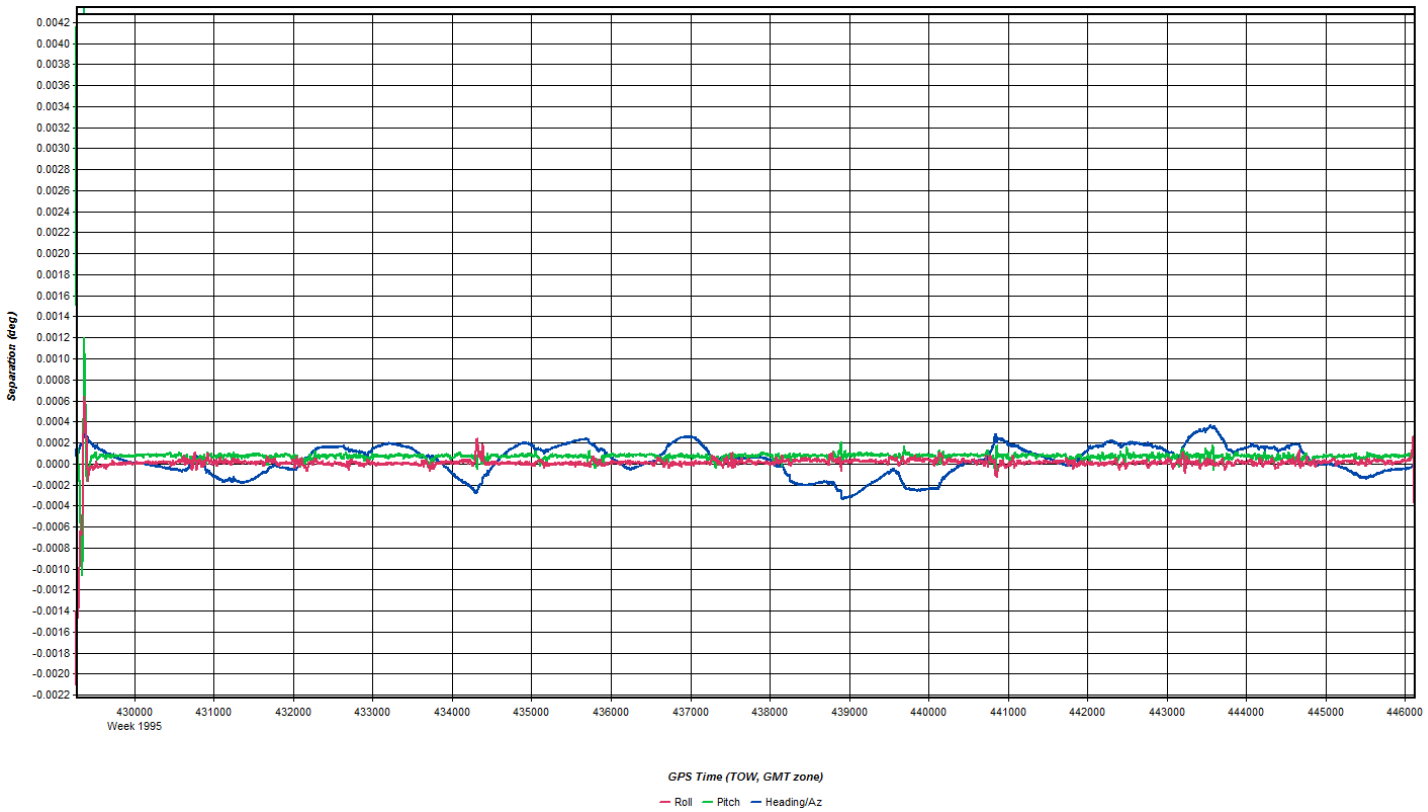

RMS (m)
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
RMS
SD

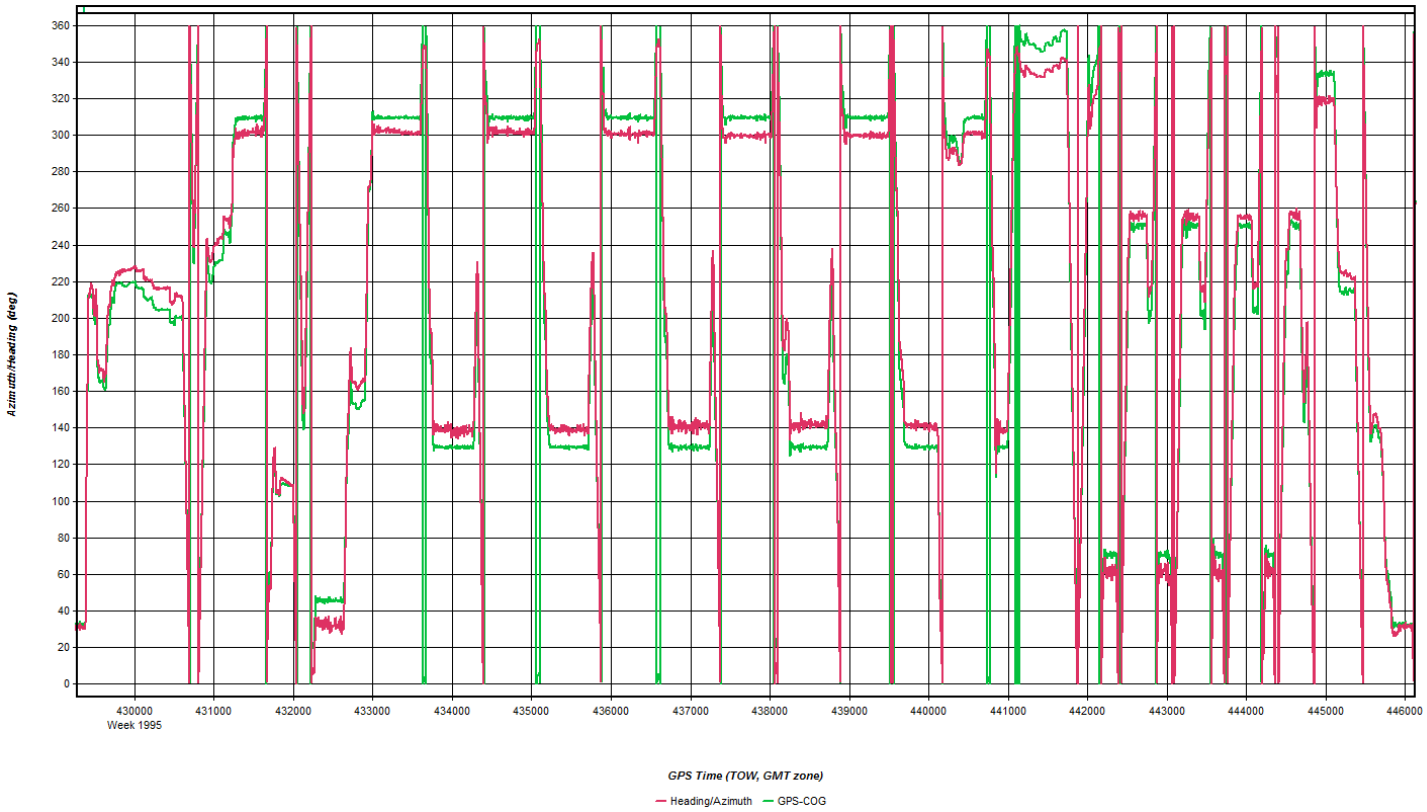

Height (m)
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
Height

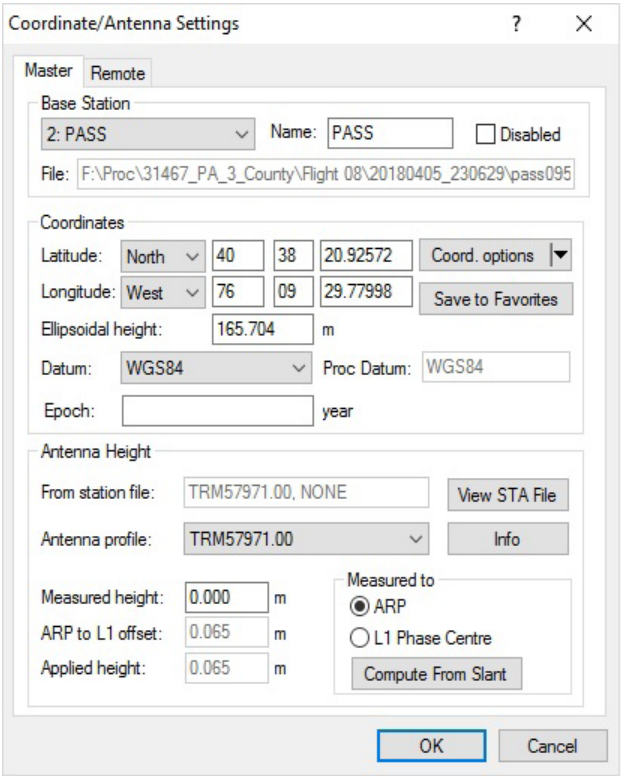

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS

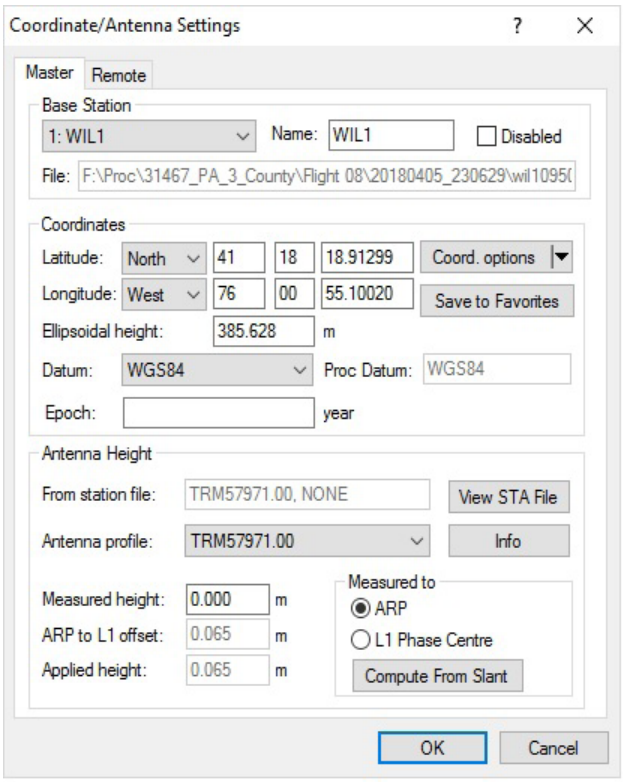

Separation (m)
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
-0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
-0.40
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0042
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
-0.0018
-0.0020
-0.0022
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
430000
Week 1995
431000
432000
433000
434000
435000
436000
437000
438000
439000
440000
441000
442000
443000
444000
445000
446000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
?
Master
Remote
Base Station
2: PASS
Name: PASS
Disabled
File: F:\Proc\31467_PA_3_County\Flight 08\20180405_230629\pass095
Coordinates
Latitude: North 40 38 20.92572
Coord. options
Longitude: West 76 09 29.77998
Save to Favorites
Ellipsoidal height: 165.704 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel


Coordinate/Antenna Settings
Master
Remote
Base Station
1: WIL1
Name: WIL1
Disabled
File: F:\Proc\31467_PA_3_County\Flight 08\20180405_230629\wil1095(
Coordinates
Latitude: North 41 18 18.91299
Coord. options
Longitude: West 76 00 55.10020
Save to Favorites
Ellipsoidal height: 385.628 m
Datum: WGS84
Proc Datum: WGS84
Epoch:
year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS_PA (Flight 11)
SENSOR OPERATOR	A. Brooker
PILOT	A. Werle
AIRCRAFT	103RM
AIRBASE	AVP – Scranton, PA

DATE	2018/04/05
SENSOR(S)	ALS70-HP
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	LiDAR 2

AIRCRAFT BLOCK TIME

Engine On:	23:03	Takeoff:	23:17
Engine Off:	04:00	Landing:	03:54
TOTAL:	5.1 hrs	TOTAL:	4.6 hrs

MISSION DETAILS

AGL Height:	1950m	Pulse Rate:	269Hz
Speed:	150kts	Scan Rate:	56Hz
Laser Power:	100%	FOV:	360

STATIC ALIGNMENT

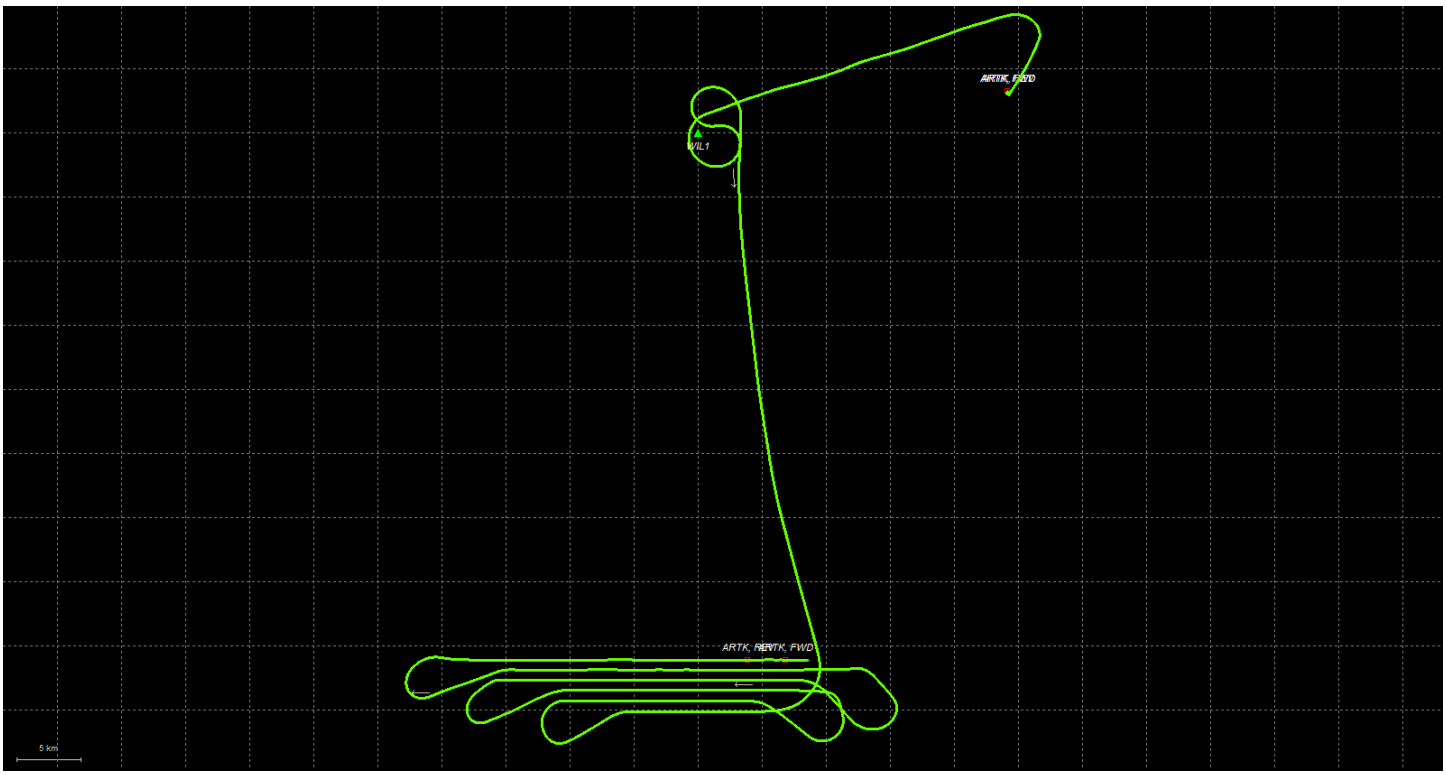
Pre-Mission	02:41
Post Mission	03:41

FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME START	GPS TIME END	COMMENTS	GPS TIME START	GPS TIME END	"S" TURN
001 (069)		321	234728	23:47:28	23:53:48	C			
S CROSS		057	000523	00:05:23	00:10:20	C (Partial line)			
012		321	001645	00:16:45	00:26:14	C			
011		141	002941	00:29:41	00:37:30	C			
010		321	004106	00:41:06	00:50:10	C			
009		141	005349	00:53:49	01:01:30	C			
008		321	010610	01:06:10	01:15:25	C			
007		141	011912	01:19:12	01:26:56	C			
006		321	013100	01:31:00	01:40:00	C			
005		141	014427	01:44:27	01:51:50	C			
004		321	015629	01:56:29	02:04:32	C			
003		141	020829	02:08:29	02:14:48	C			
002		321	022117	02:21:17	02:24:50	C			
001		141	022742	02:27:42	02:29:32	C			
001		82	025042	02:50:42	02:52:36	C			
002		262	025642	02:56:42	02:58:46	C			
003		82	030157	03:01:57	03:03:37	C			
004		262	030817	03:08:17	03:09:40	C			
005		82	031328	03:13:28	03:14:30	C			
006		262	031962	03:19:62	03:20:41	C			
007		82	032415	03:24:15	03:25:12	C			
008		262	032948	03:29:48	03:30:54	C			
SmallCross		345	033544	03:35:44	03:38:04	C			

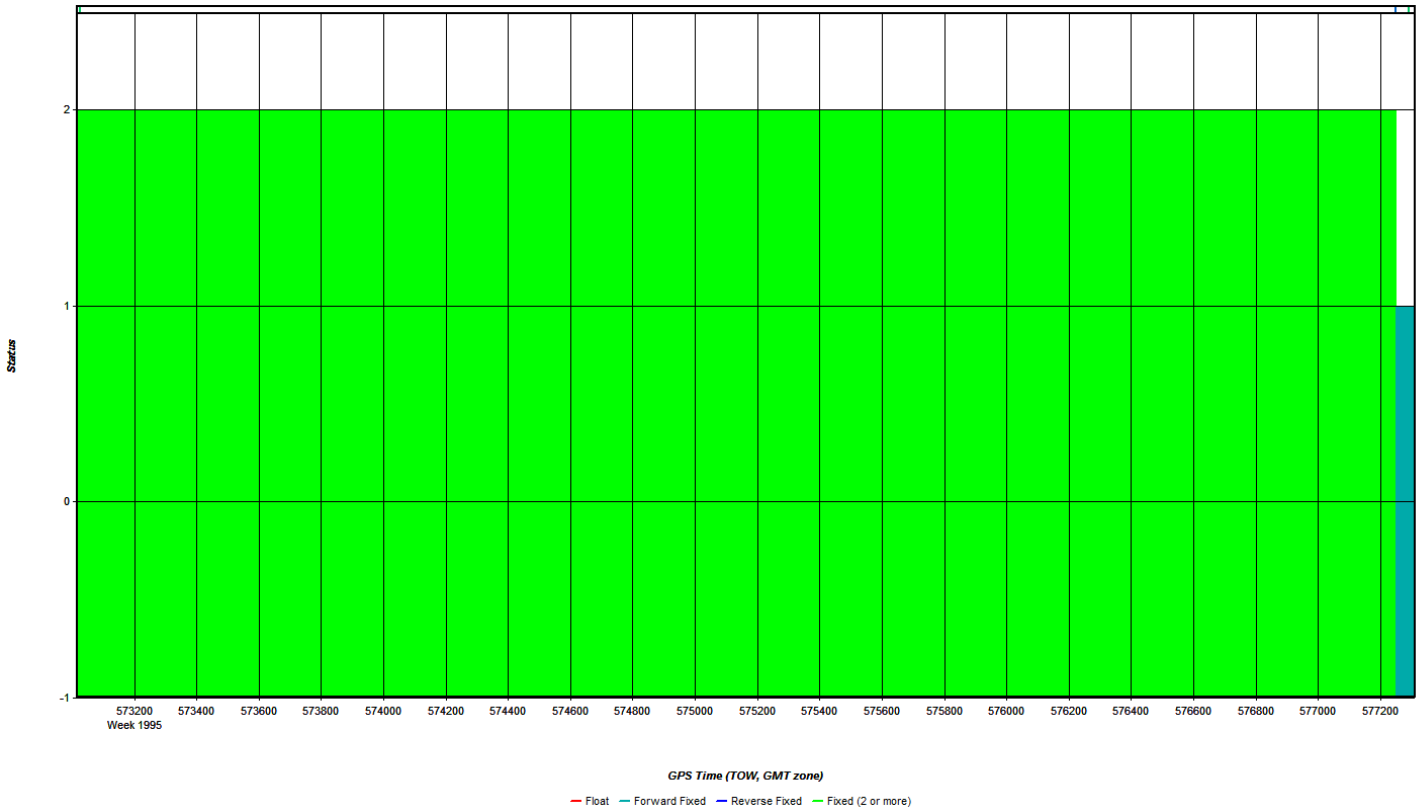
SUN ANGLE
@Start:
@End:
@Peak:

ADDITIONAL NOTES: Clouds in the area, flying under clouds with slight haze, Lidar return ok.
PDOP 1.5
18 Sats
Did KAR turns over PASS station before flight and then KAR turns over WIL1 station before and after second block

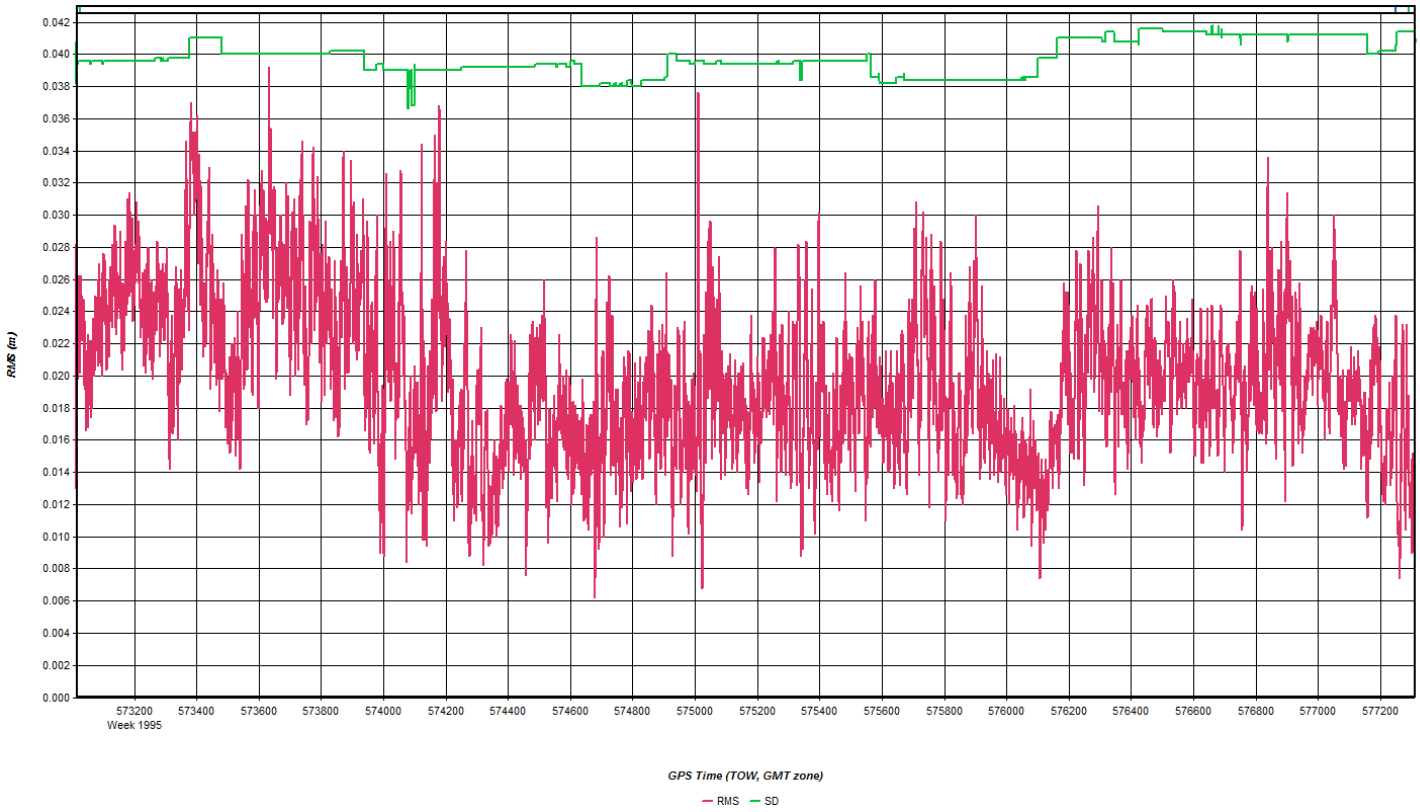
April 7, 2018-A1 (SN7229, N103RM)

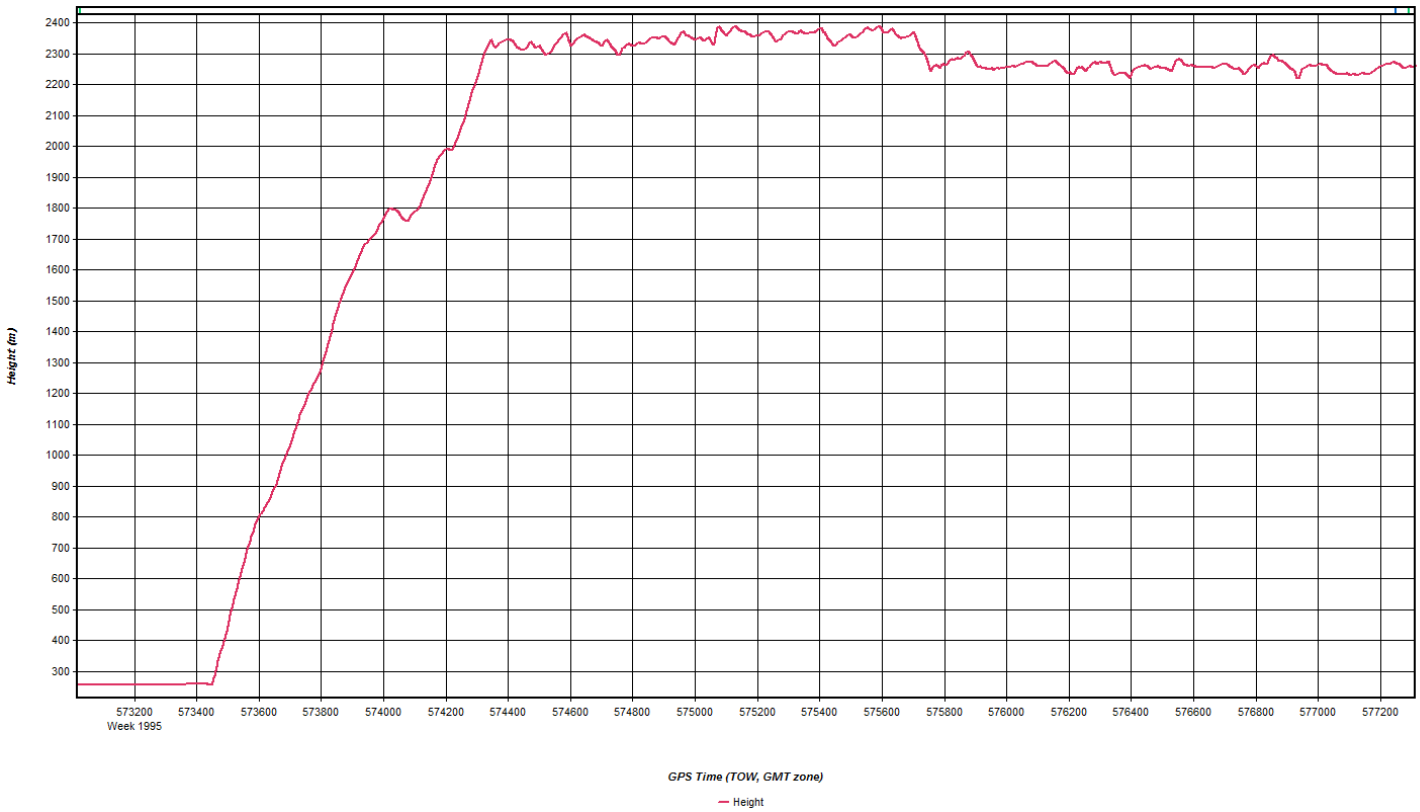

ARTK, FWD
WIL1
ARTK, FWD
5 km

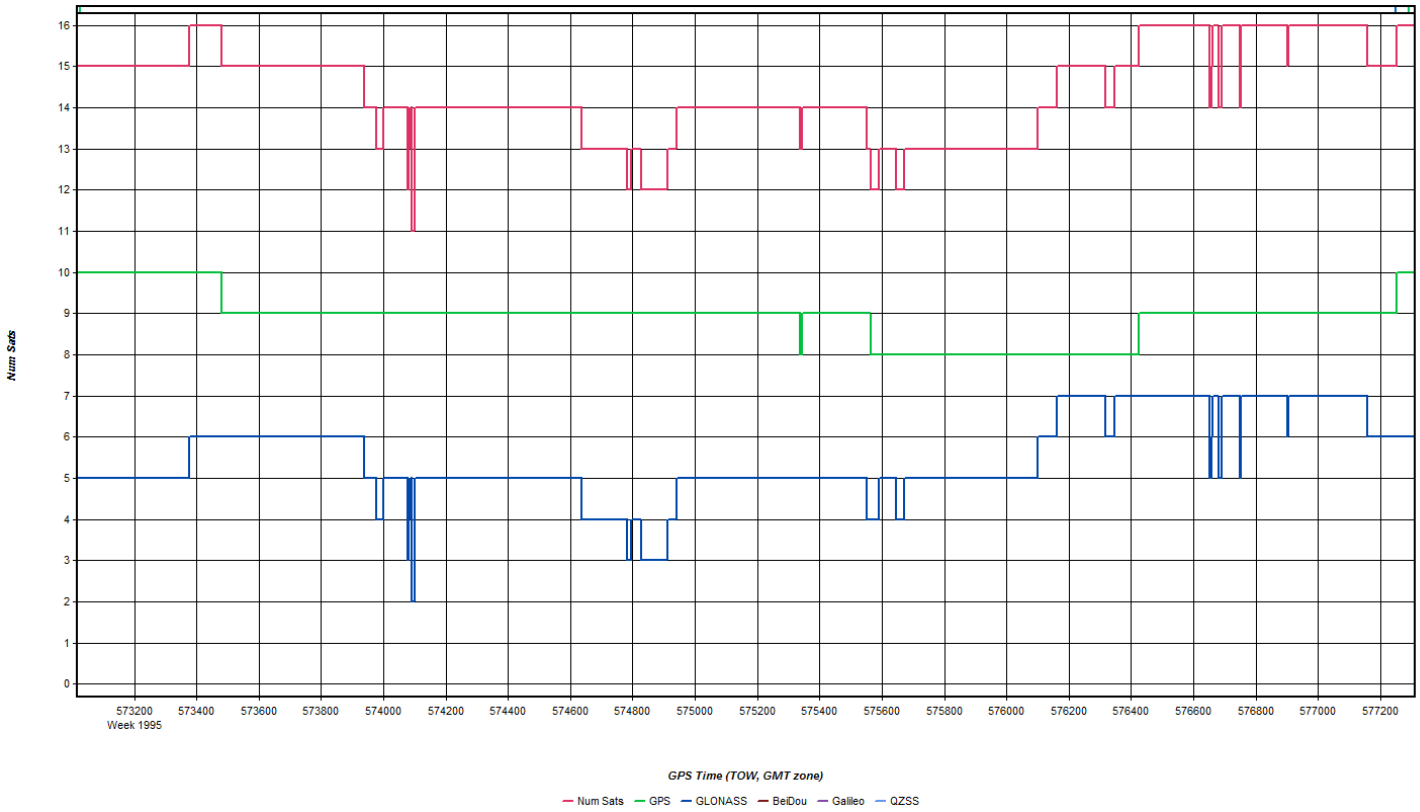

PDOP
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
PDOP

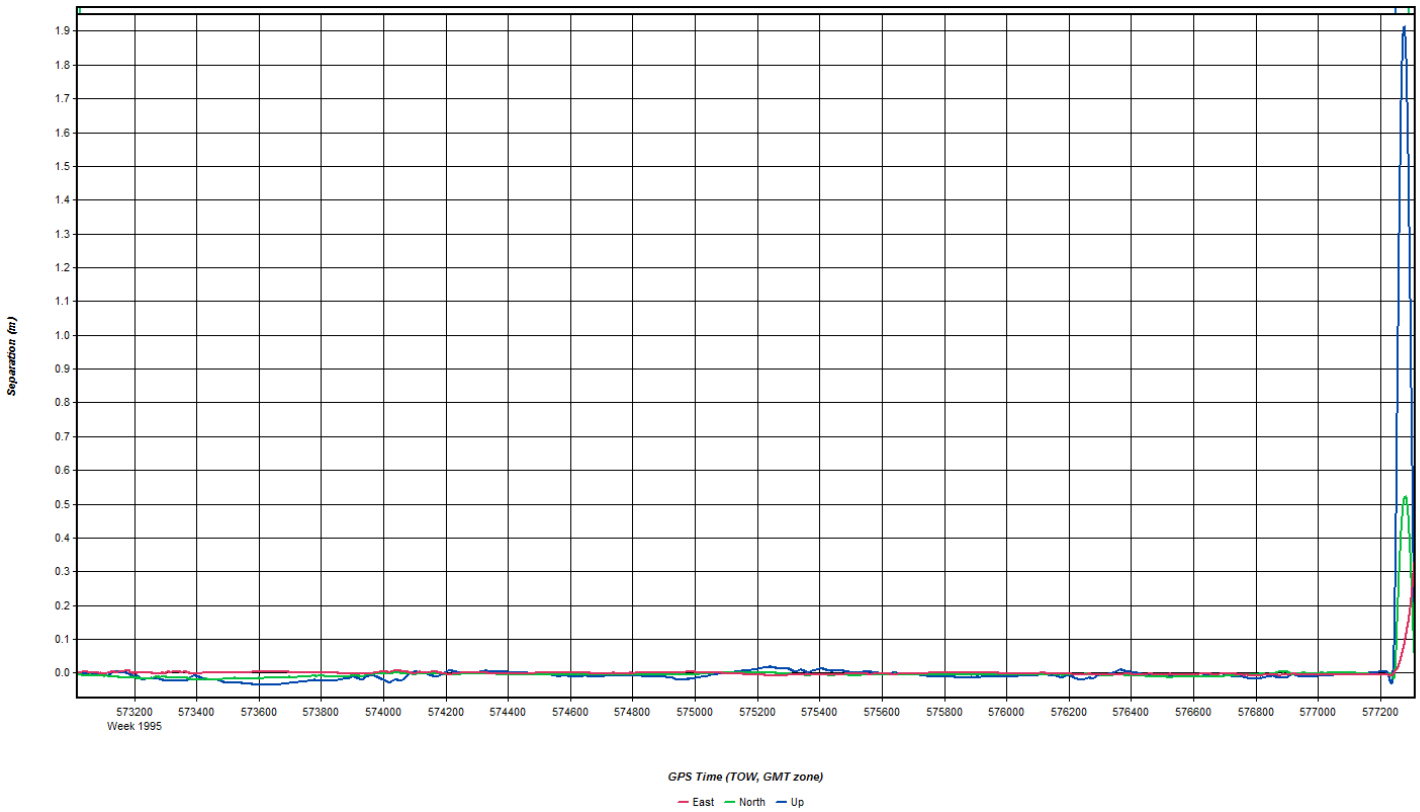

Status
2
1
0
-1
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

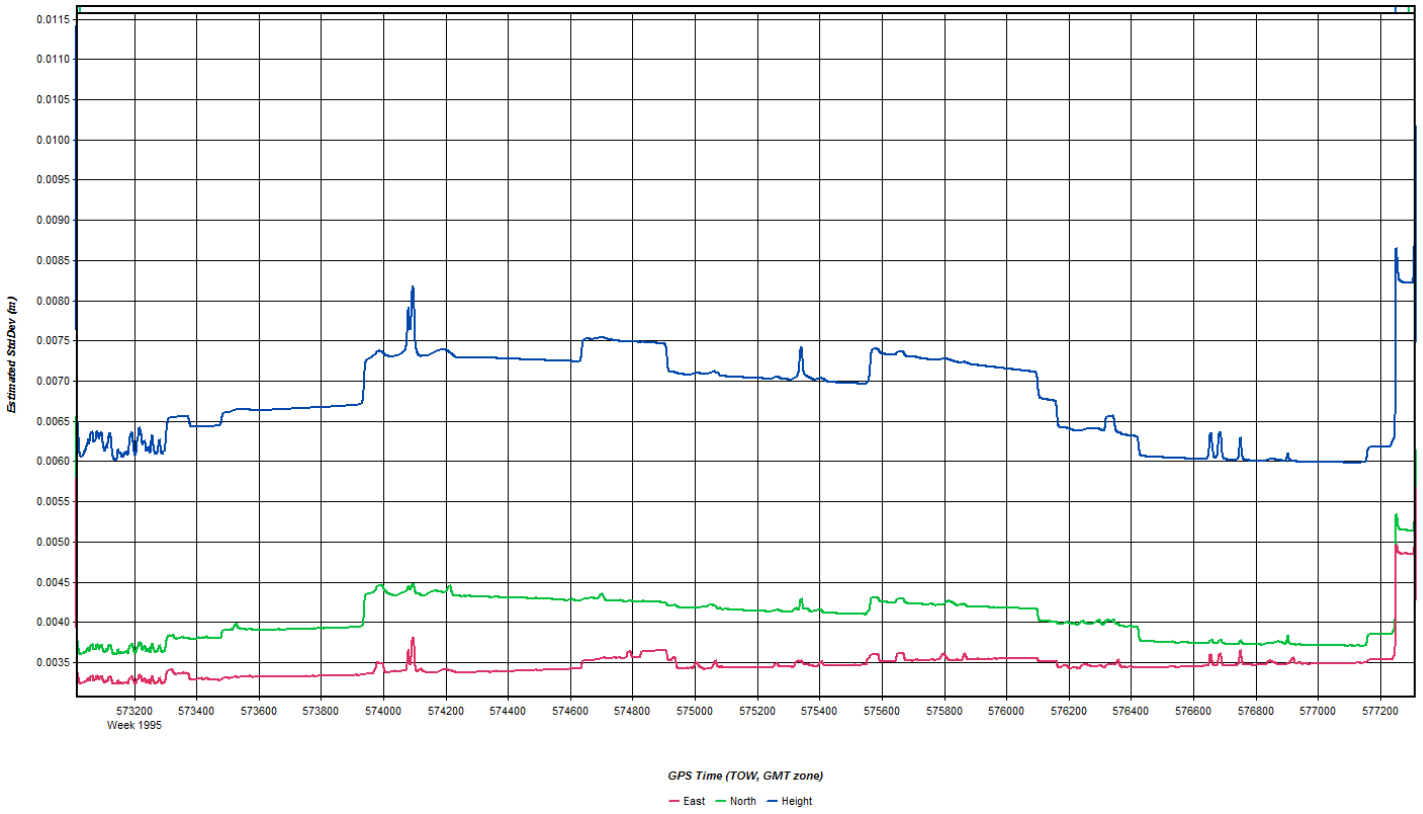

Roll & pitch (deg)
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
Roll
Pitch

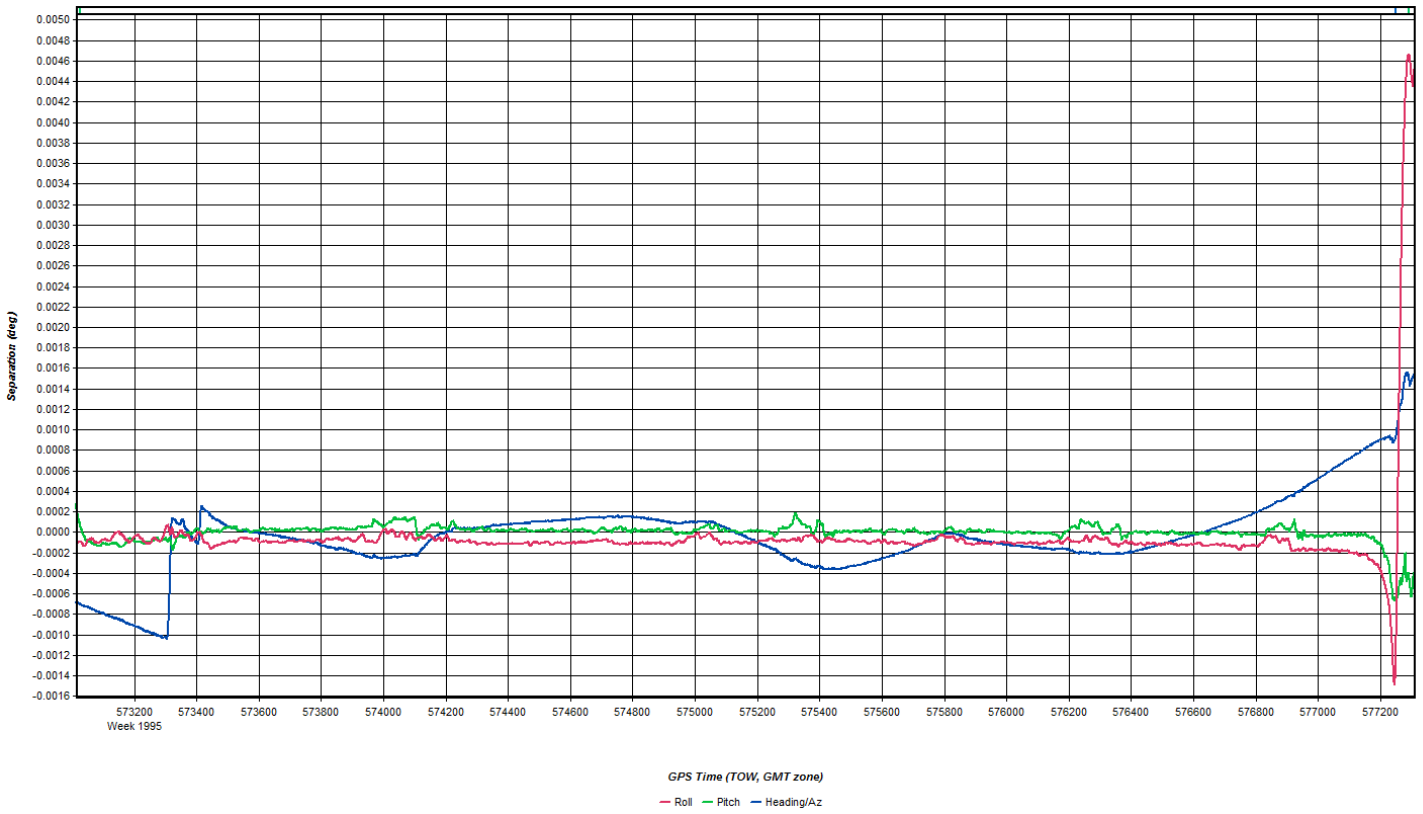

RMS (m)
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
RMS
SD

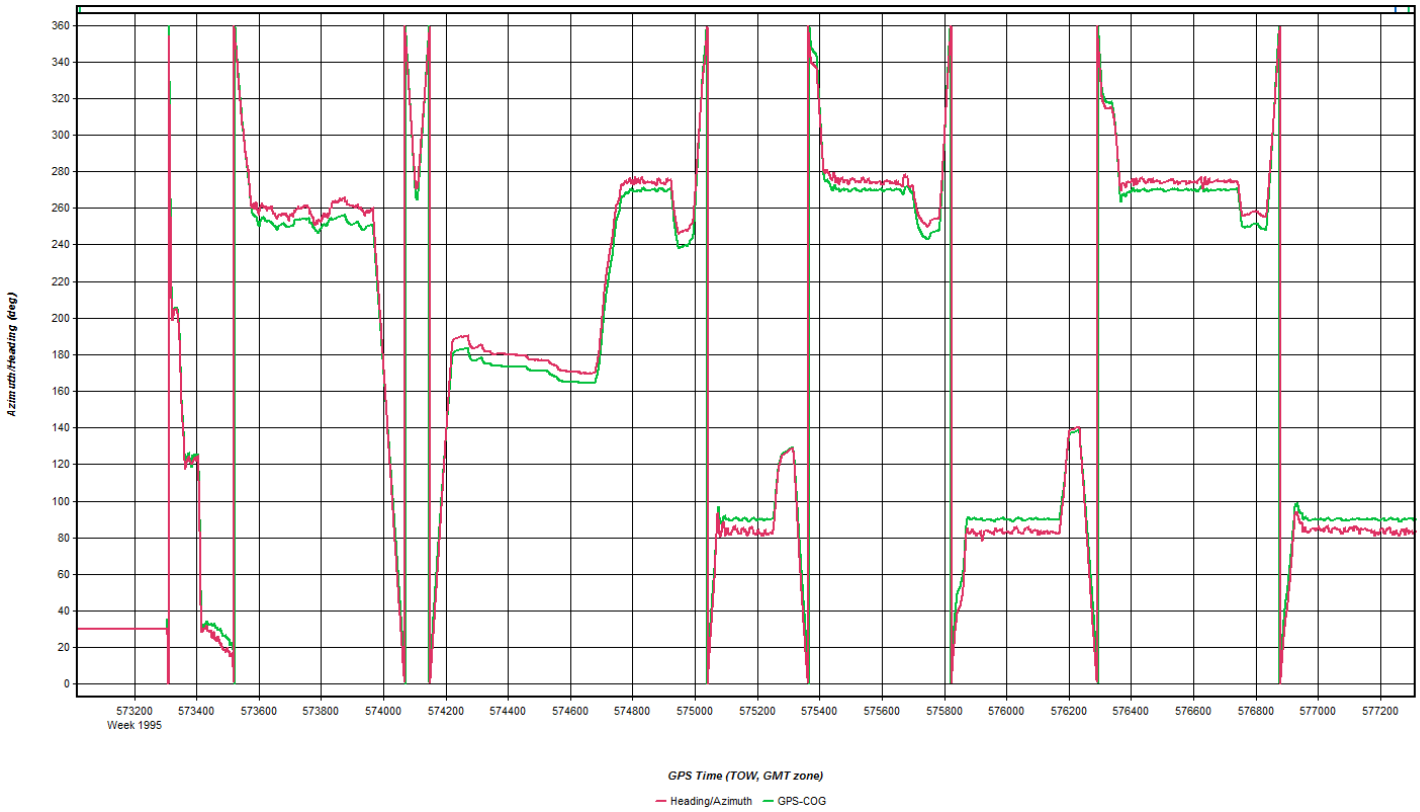

Height (m)
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
Height

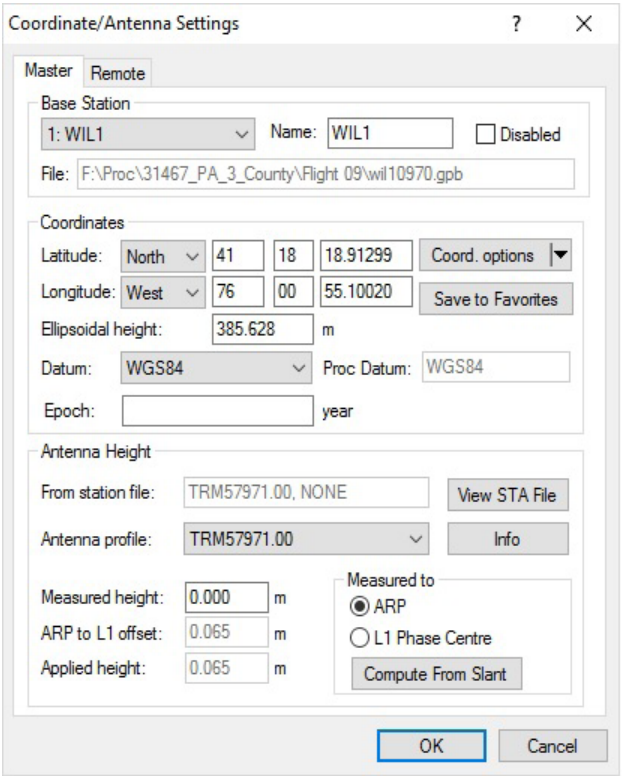

Num Sats
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
East
North
Up

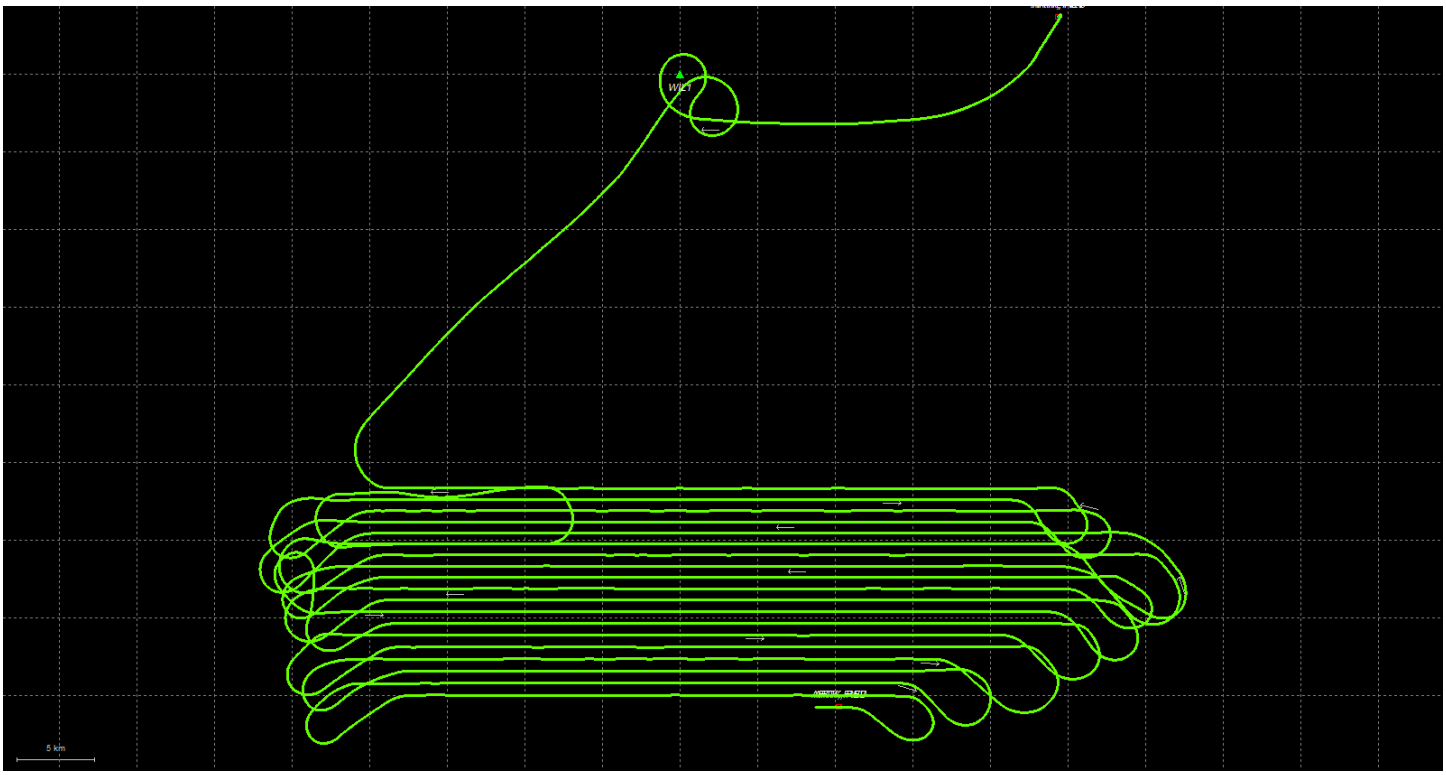

Estimated StdDev (m)
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
East
North
Height

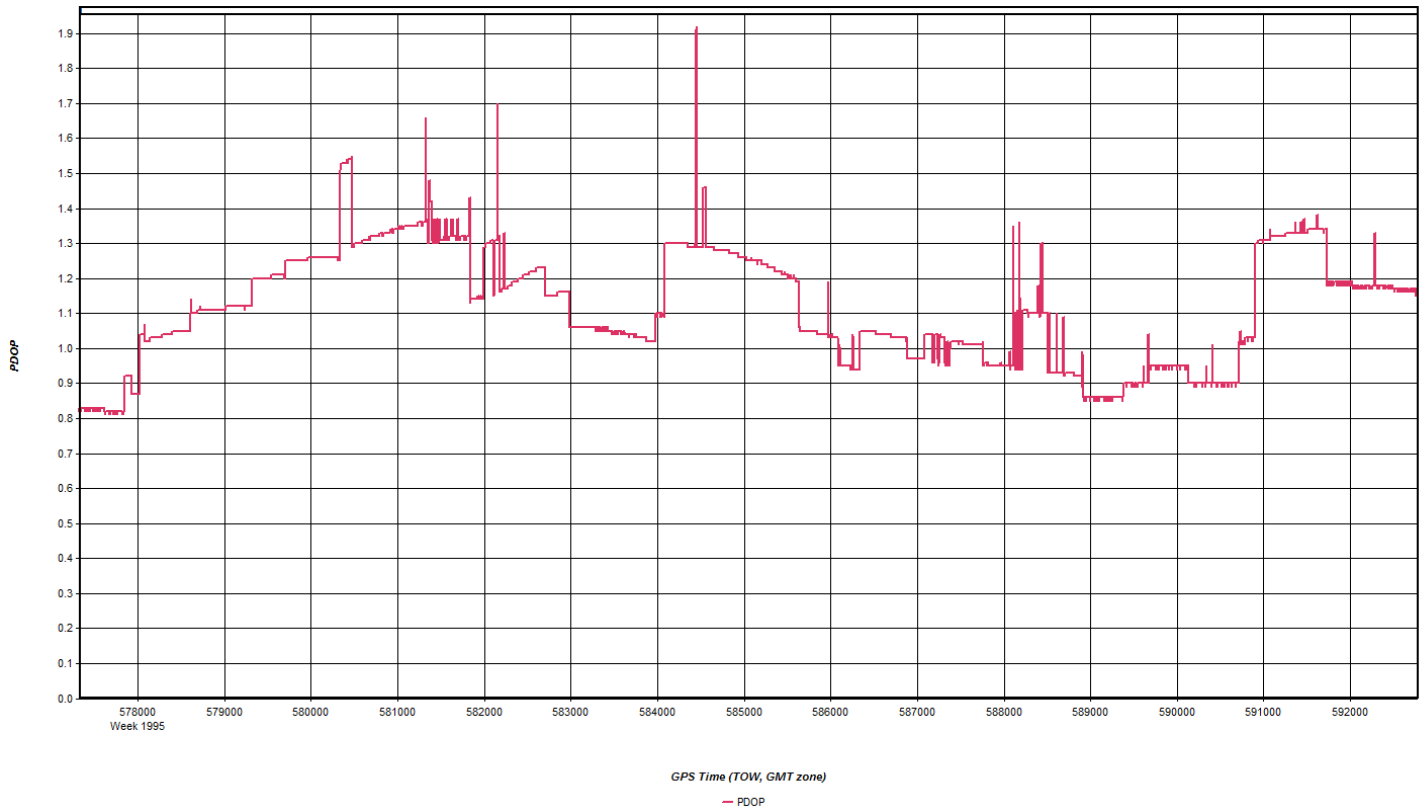

Separation (deg)
0.0050
0.0048
0.0046
0.0044
0.0042
0.0040
0.0038
0.0036
0.0034
0.0032
0.0030
0.0028
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az

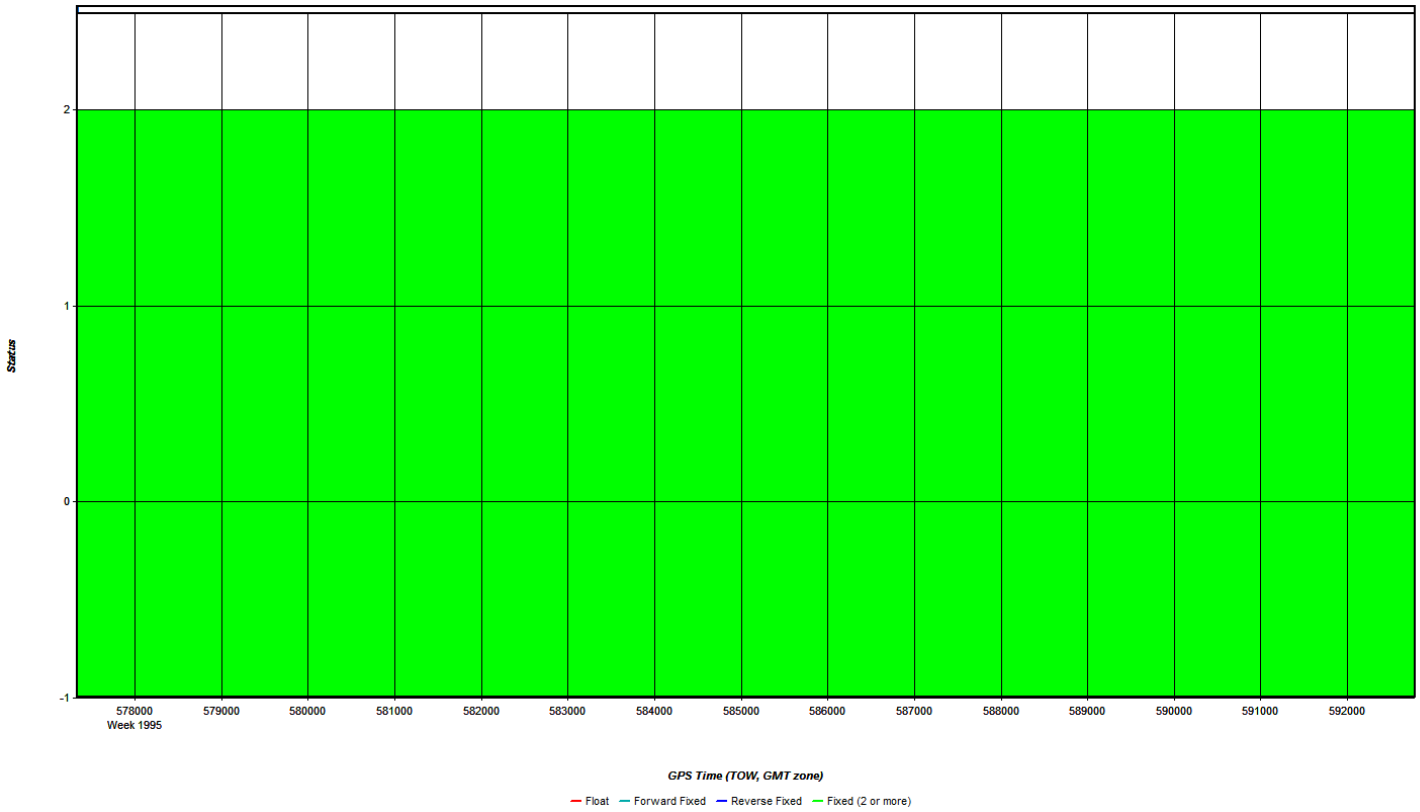

Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
573200
Week 1995
573400
573600
573800
574000
574200
574400
574600
574800
575000
575200
575400
575600
575800
576000
576200
576400
576600
576800
577000
577200
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG

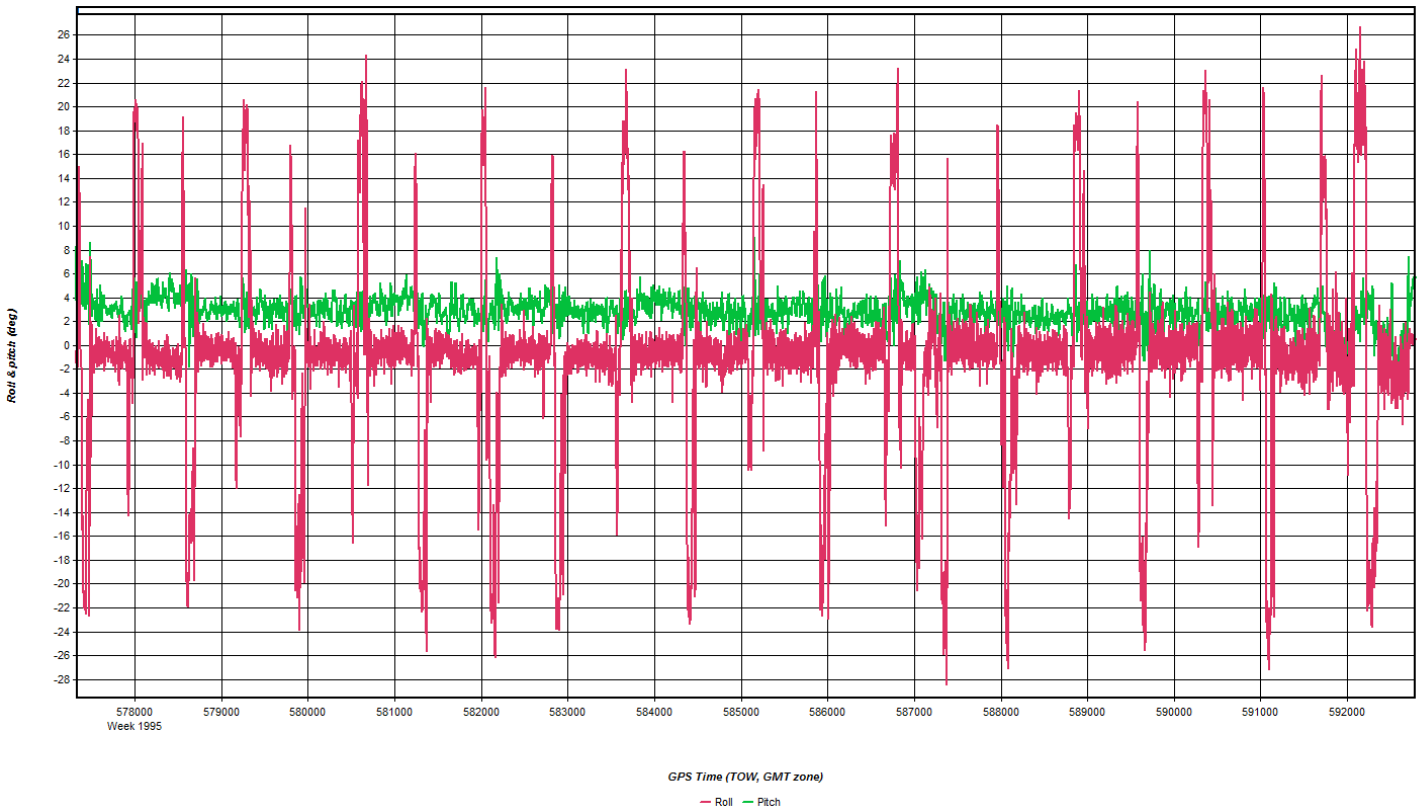

Coordinate/Antenna Settings
Master
Remote
Base Station
1: WIL1
Name: WIL1
Disabled
File: F:\Proc\31467_PA_3_County\Flight 09\wil10970.gpb
Coordinates
Latitude: North 41 18 18.91299
Coord. options
Longitude: West 76 00 55.10020
Save to Favorites
Ellipsoidal height: 385.628 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

April 7, 2018-A2 (SN7229, N103RM)

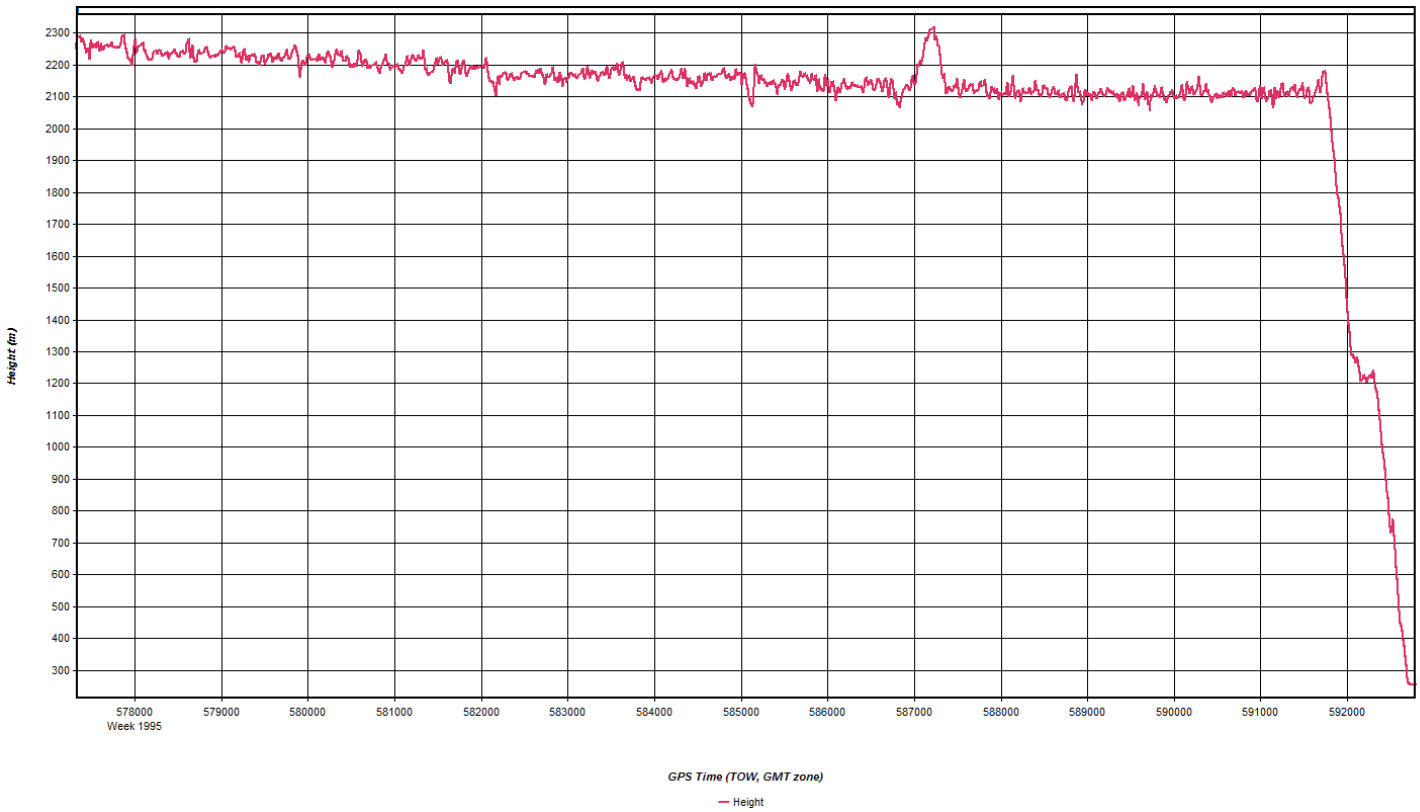

WE1
5 km

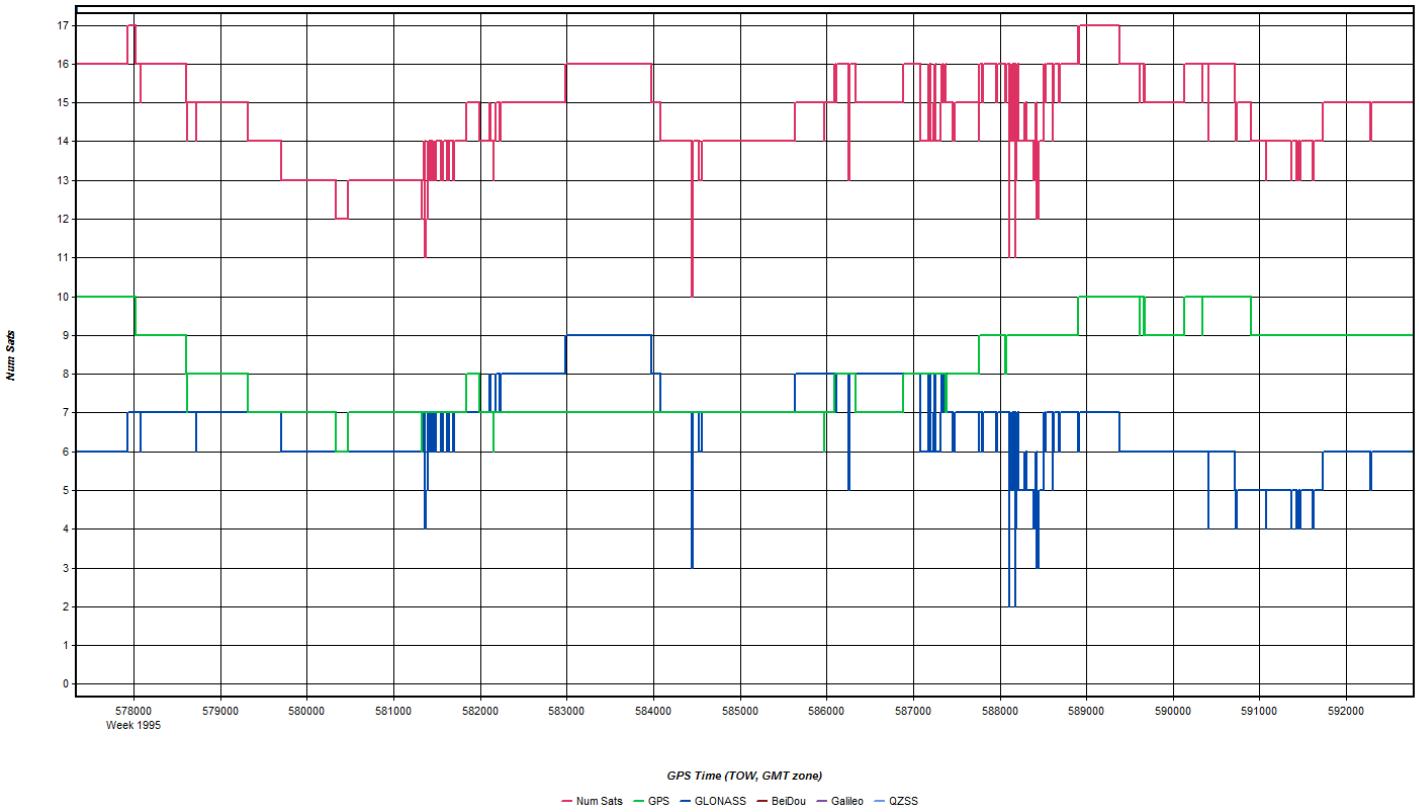

PDOP
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
PDOP

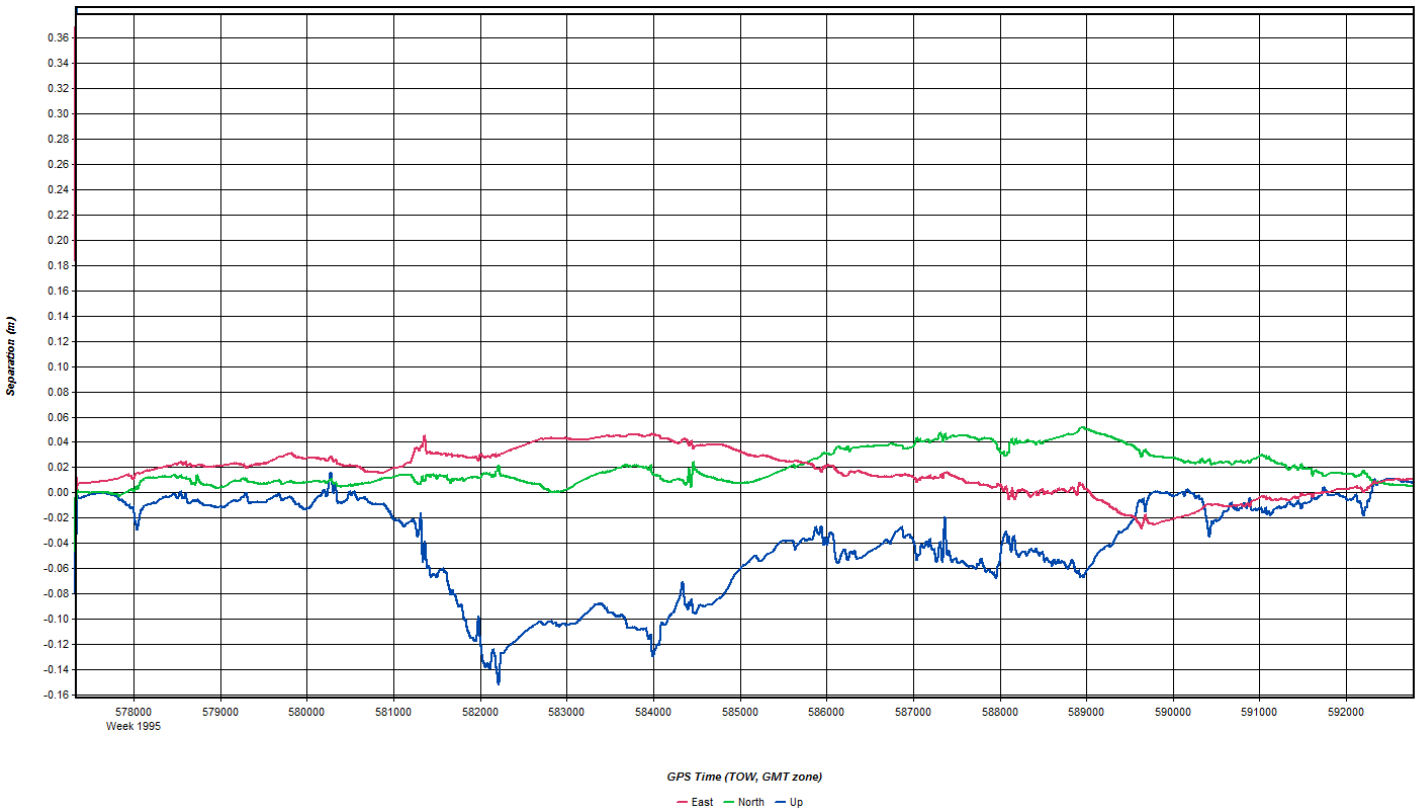

Status
2
1
0
-1
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

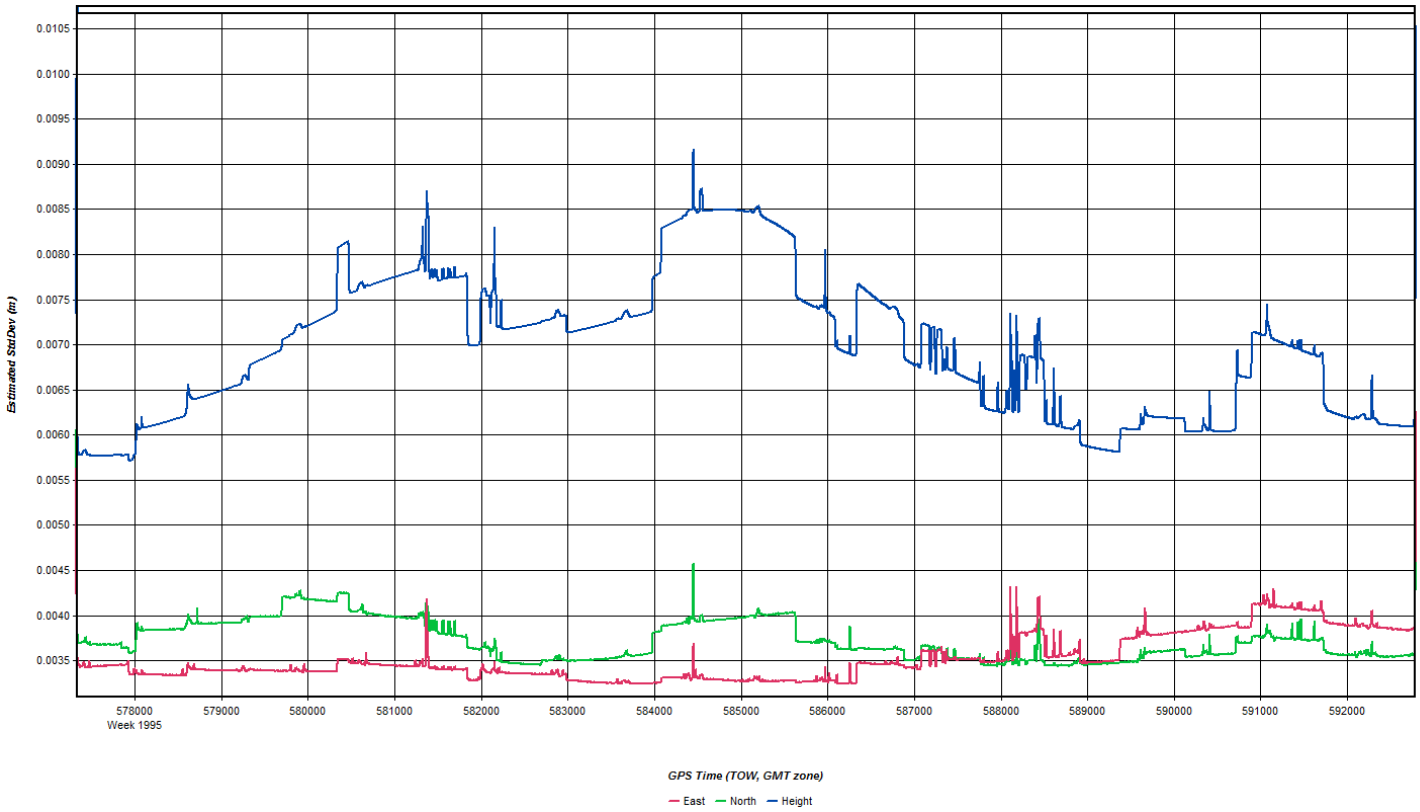

Roll & pitch (deg)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
Roll
Pitch

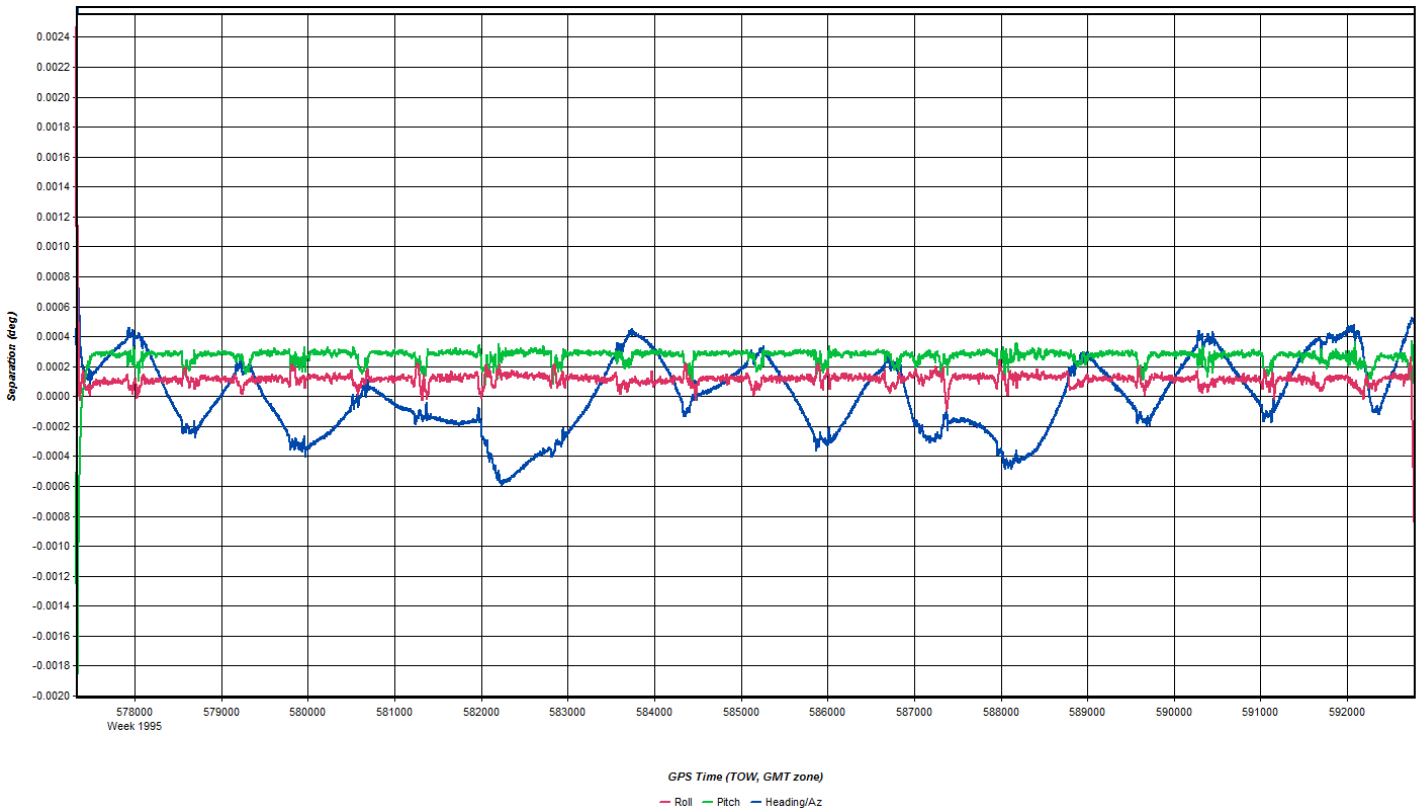

RMS (m)
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
RMS
SD

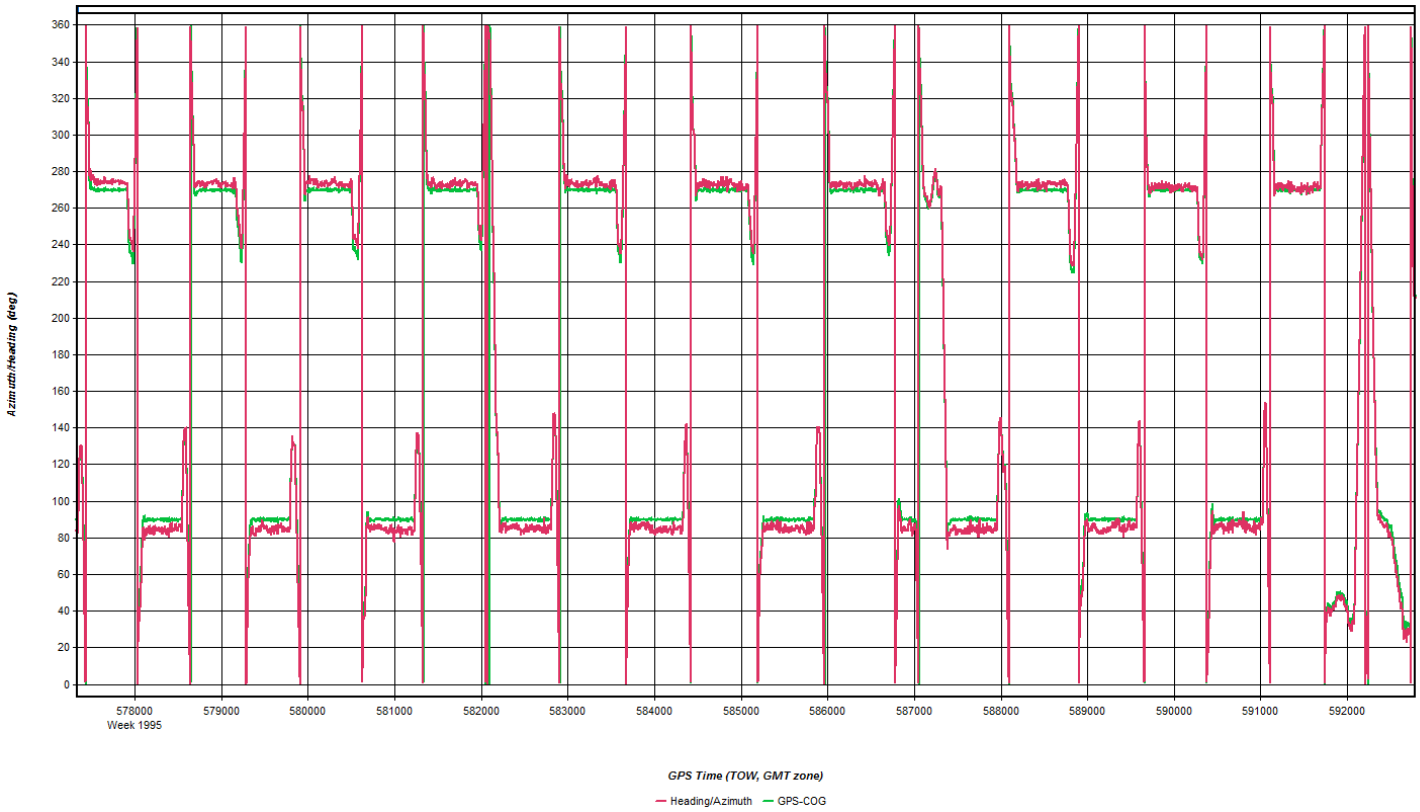

Height (m)
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
Height

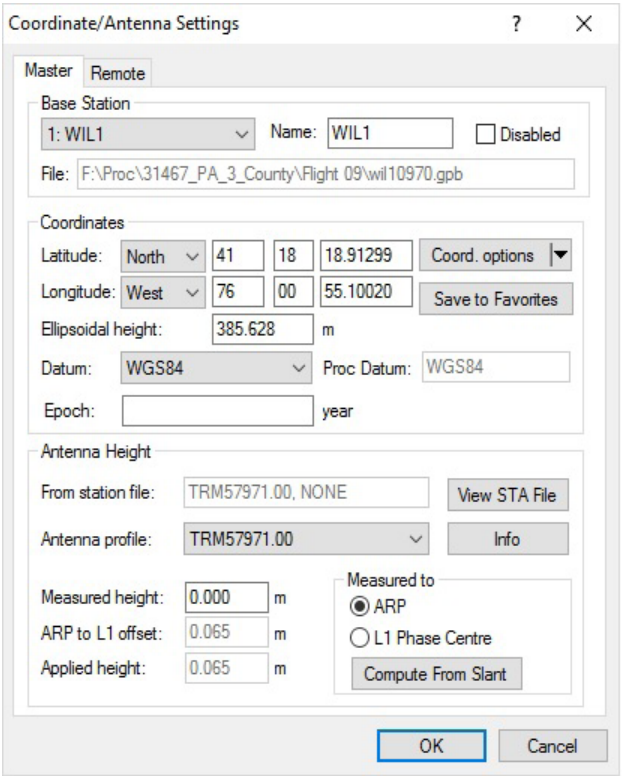

Num Sats
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.36
0.34
0.32
0.30
0.28
0.26
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
-0.02
-0.04
-0.06
-0.08
-0.10
-0.12
-0.14
-0.16
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
-0.0018
-0.0020
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
578000
Week 1995
579000
580000
581000
582000
583000
584000
585000
586000
587000
588000
589000
590000
591000
592000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: WIL1
Name: WIL1
Disabled
File: F:\Proc\31467_PA_3_County\Flight 09\wil10970.gpb
Coordinates
Latitude: North 41 18 18.91299
Coord. options
Longitude: West 76 00 55.10020
Save to Favorites
Ellipsoidal height: 385.628 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

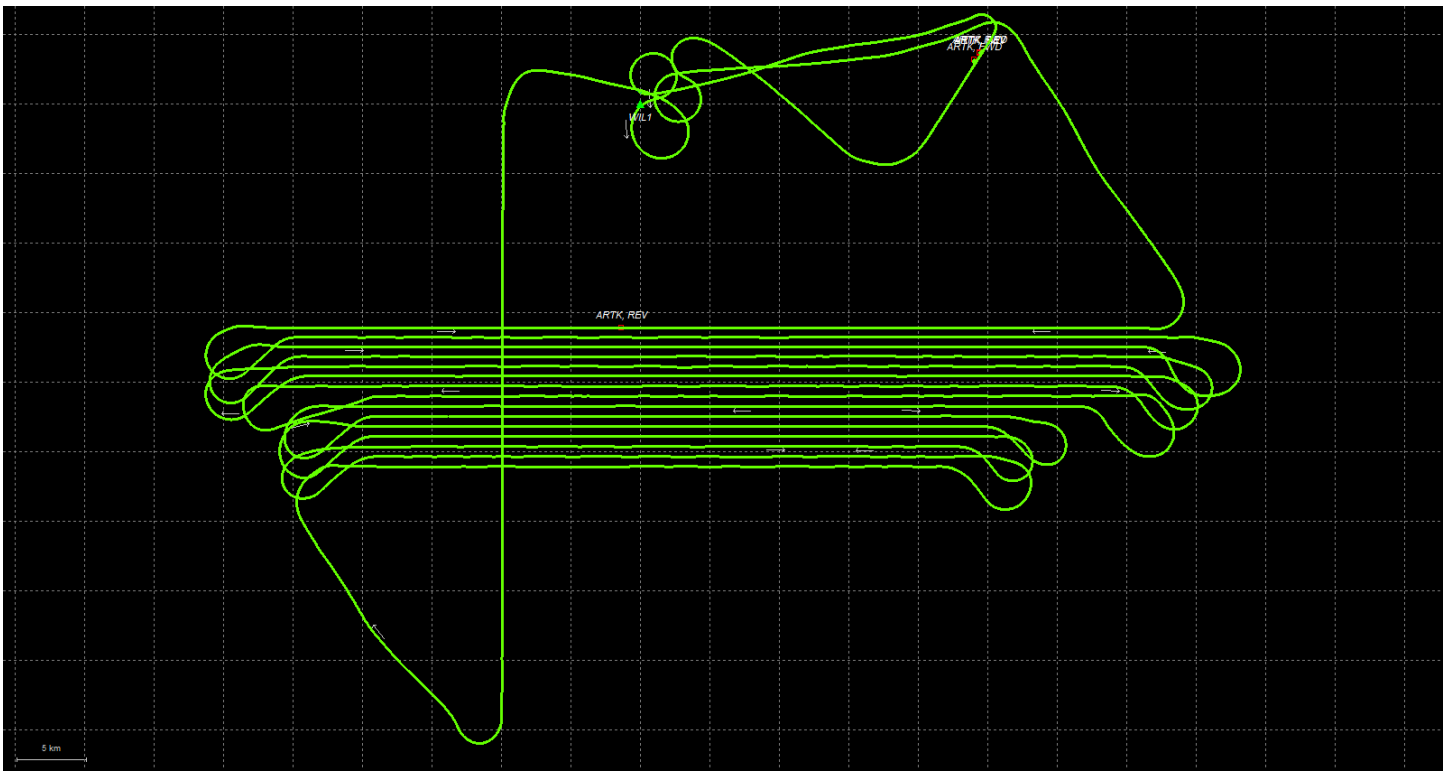
PROJECT NAME	QS_PA Flight 9	DATE	2018/04/07
SENSOR OPERATOR	A. Brooker	SENSOR(S)	ALS70-HP
PILOT	A. Werle	IMU	Honeywell uIRS
AIRCRAFT	103RM	ABGPS	IPAS-CUS6
AIRBASE	AVP – Scranton, PA	DATA DRIVES	LiDAR 2

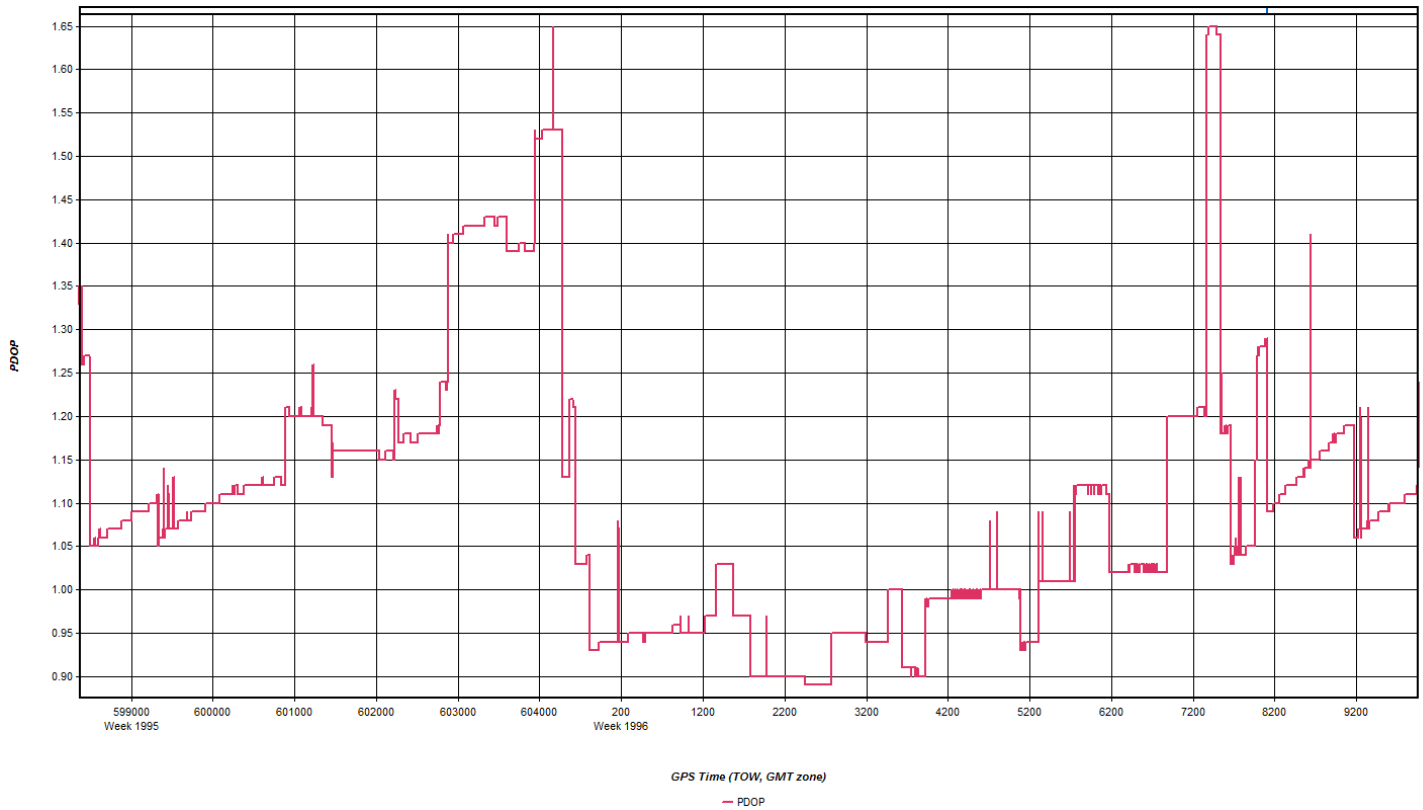
AIRCRAFT BLOCK TIME				MISSION DETAILS				STATIC ALIGNMENT	GPS TIME	
Engine On:	15:04	Takeoff:	15:17	AGL Height:	1950m	Pulse Rate:	269Hz		START	END
Engine Off:	20:41	Landing:	20:38	Speed:	150kts	Scan Rate:	56Hz	Pre-Mission	15:24	15:30
TOTAL:	5.6 hrs	TOTAL:	5.35 hrs	Laser Power:	100%	FOV:	36°	Post Mission	20:27	20:33

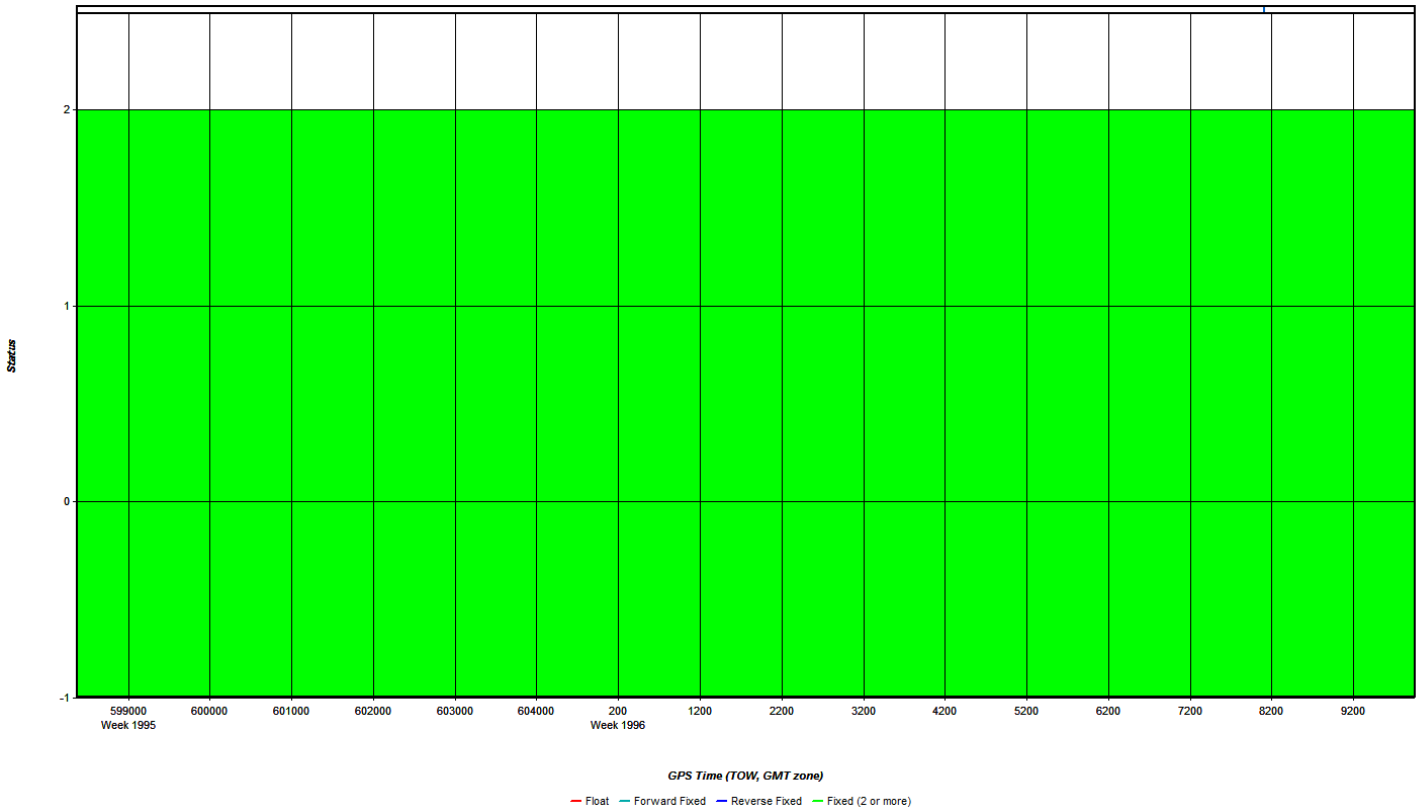
FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME START	GPS TIME END	COMMENTS	"S" TURN
106		282	153957	15:39:57	15:41:39	C	
105		101	154444	15:44:44	15:47:12	C	
104		282	155100	15:51:00	15:54:35	C	
103		101	155809	15:58:09	16:02:25	C	
102		282	160630	16:06:30	16:12:01	C	
101		101	161549	16:15:49	16:21:59	C	
100		282	162459	16:24:59	16:31:30	C	
099		101	163515	16:35:15	16:42:00	C	
098		282	164517	16:45:17	16:52:28	C	
097		101	165601	16:56:01	17:02:45	C	
096		282	170629	17:06:29	17:14:36	C	
095		101	171838	17:18:38	17:26:45	C	
094		282	172959	17:29:59	17:38:52	C	
093		101	174423	17:44:23	17:53:05	C	
092		282	175619	17:56:19	18:05:31	C	
091		101	180913	18:09:13	18:18:25	C	
090		282	182141	18:21:41	18:31:02	C	
089		101	183436	18:34:36	18:43:36	C	
088		282	184802	18:48:02	18:57:13	C	
087		101	190107	19:01:07	*ABORT*	*Aborted line due to ATC*	
087		101	190956	19:09:56	19:18:52	C	
086		282	192343	19:23:43	19:32:25	C	
085		101	193644	19:36:44	19:45:45	C	
084		282	194855	19:48:55	19:57:19	C	

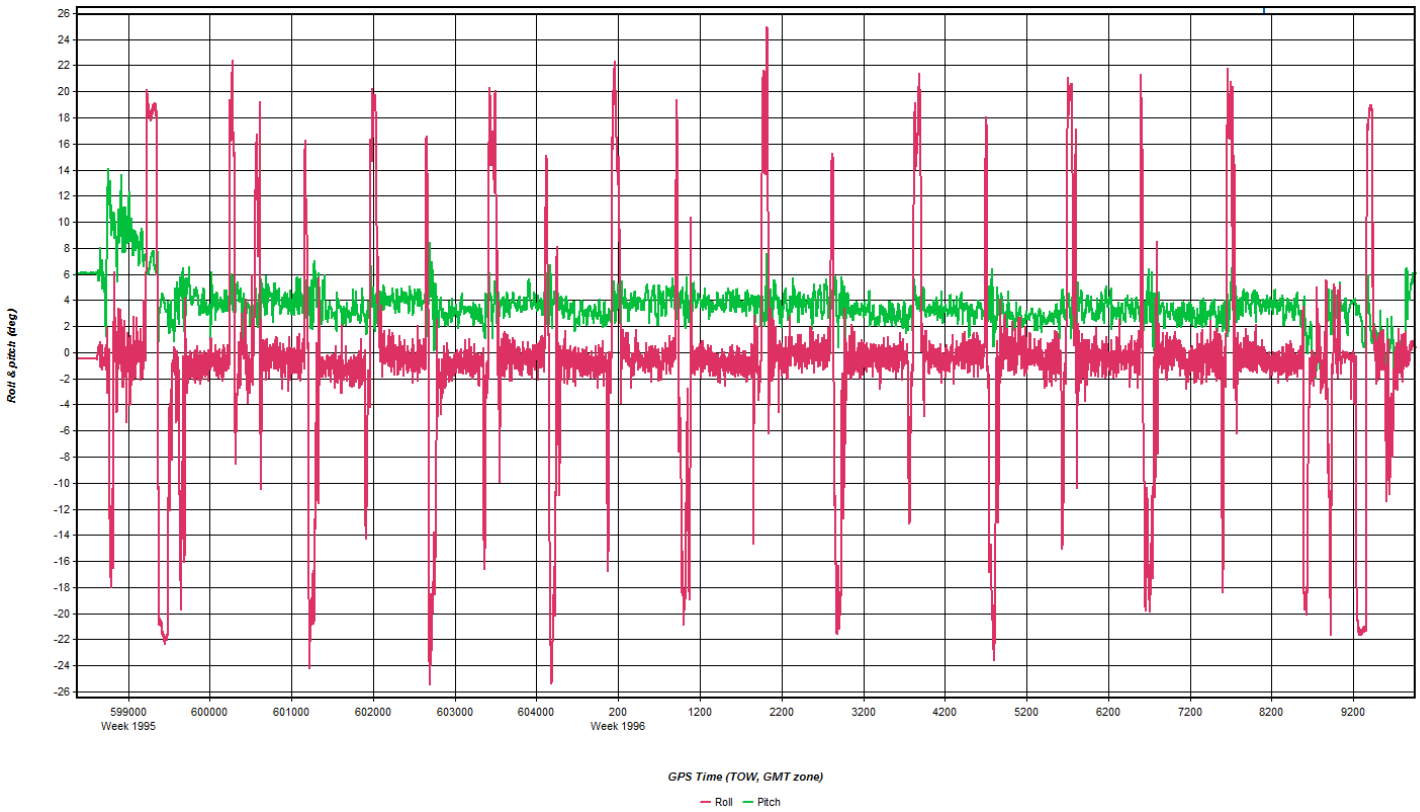
SUN ANGLE	ADDITIONAL NOTES:
@Start:	Clouds in the area but high enough for acquisition
@End:	PDOP 1.5
@Peak:	18 Sats

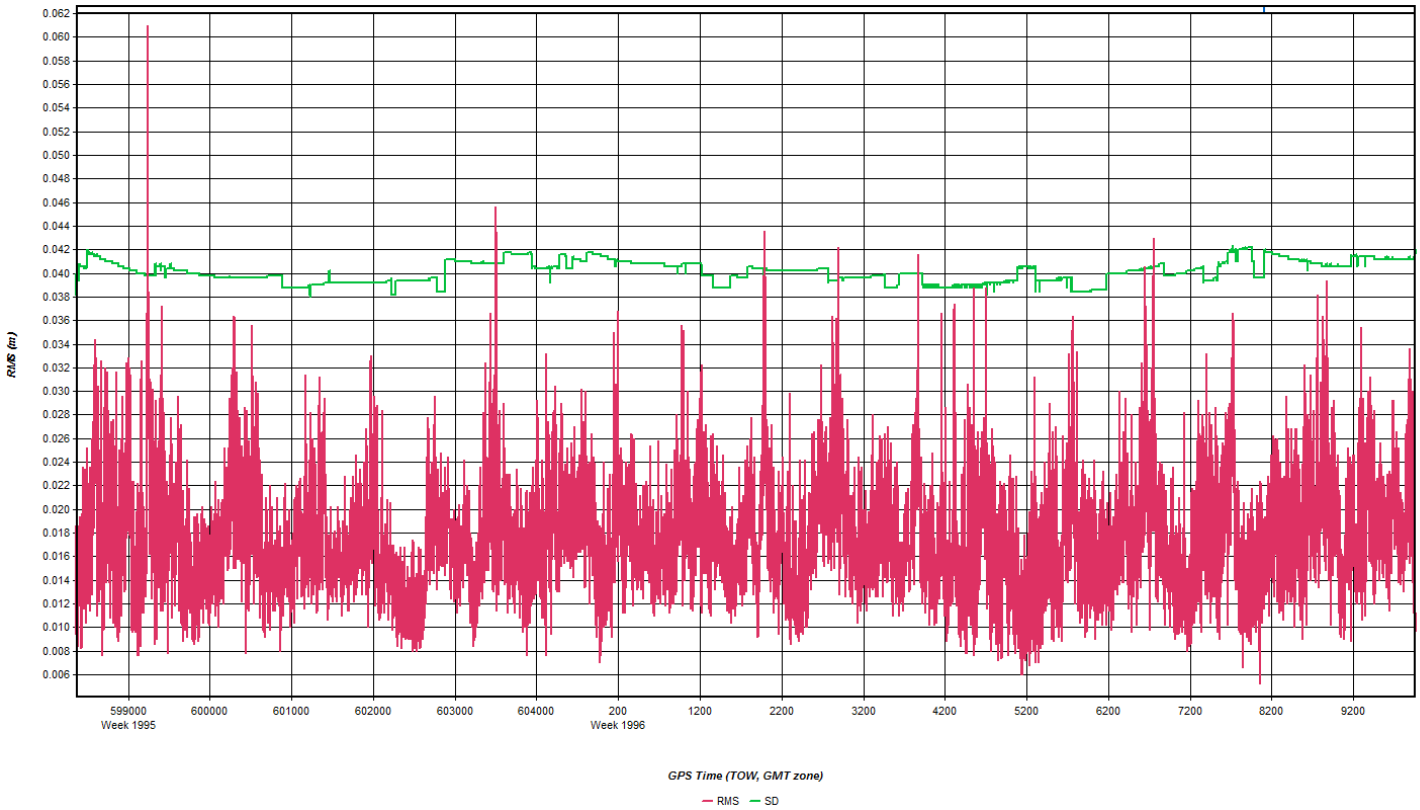
April 7, 2018-B (SN7229, N103RM)

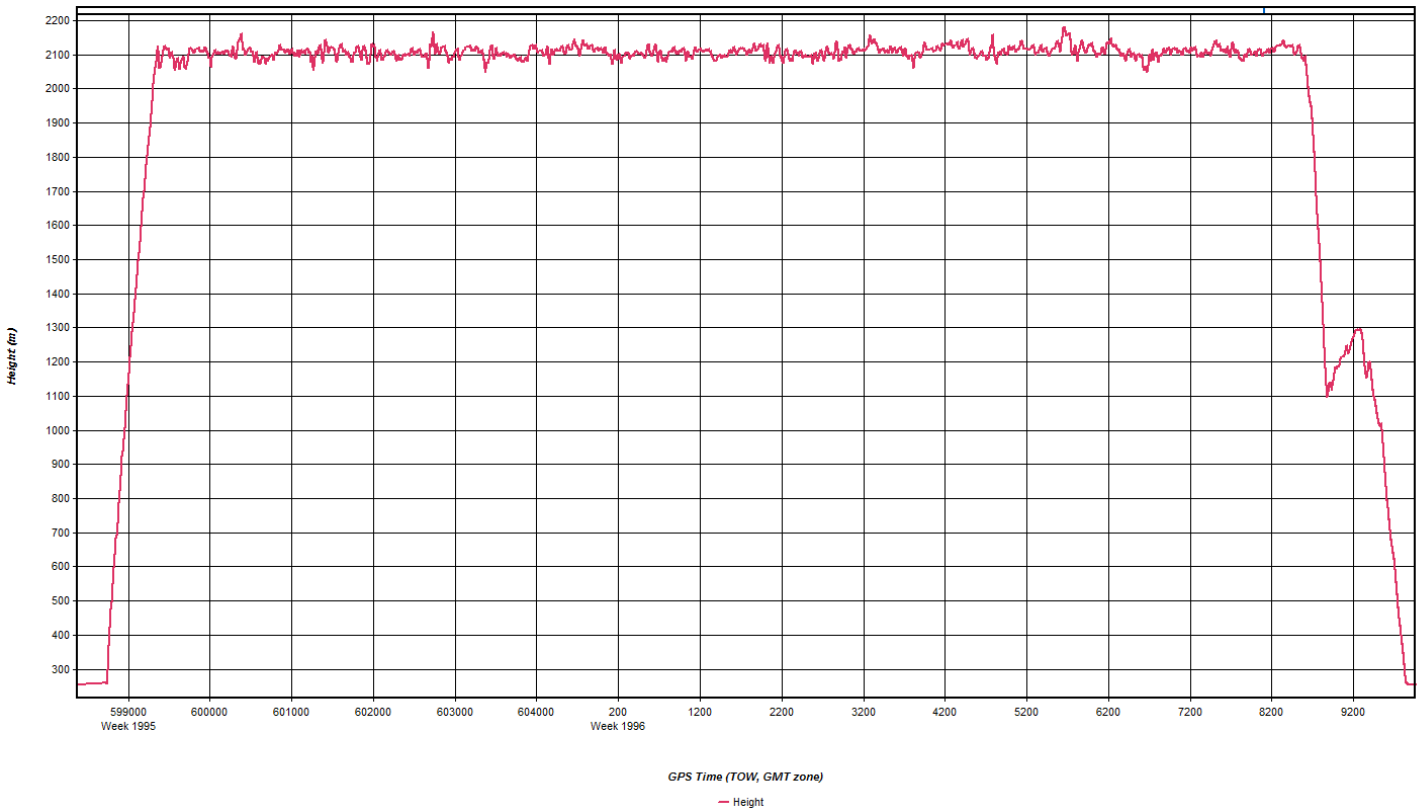

ARTK, REV
ARTK, REV
ARTK, REV
5 km

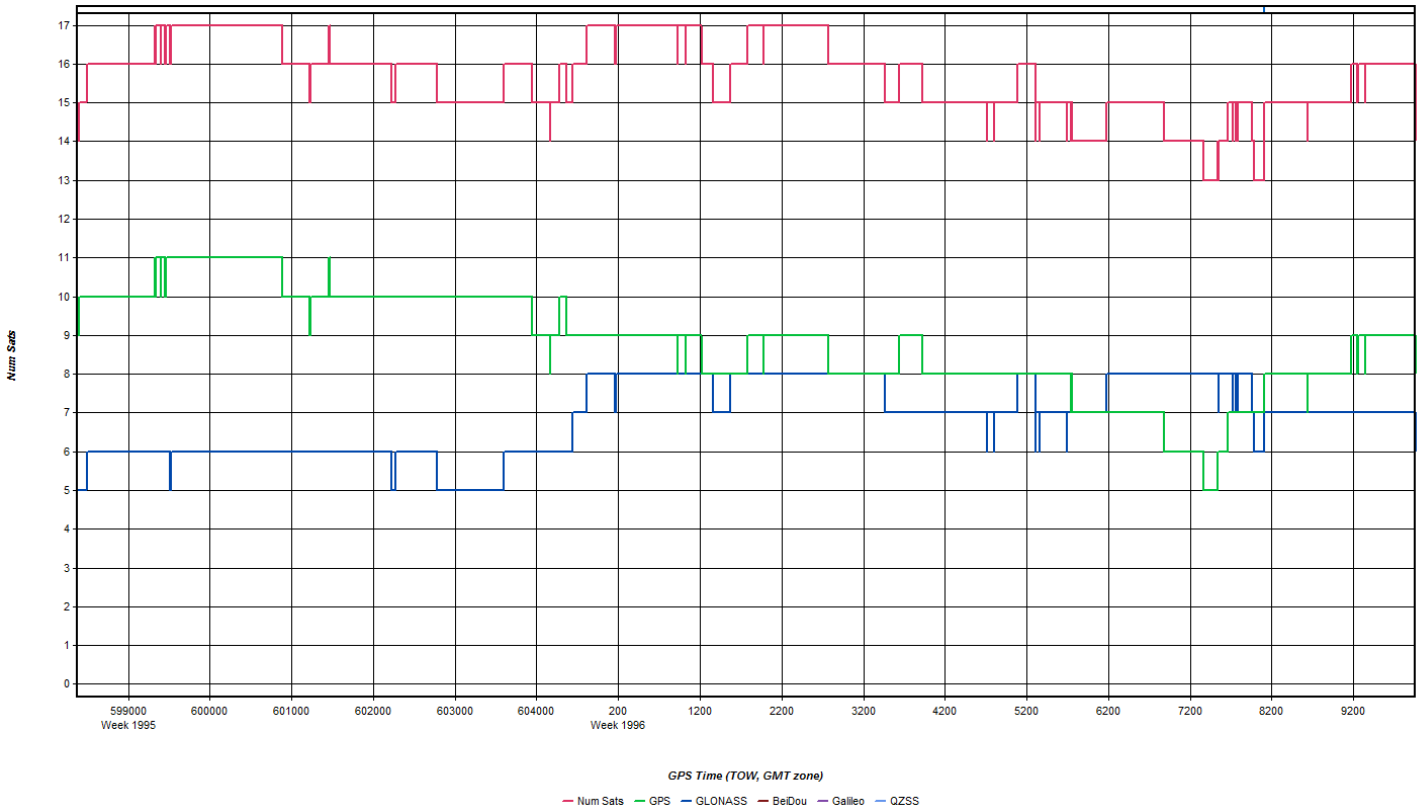

PDOP
1.65
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
1.20
1.15
1.10
1.05
1.00
0.95
0.90
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
PDOP

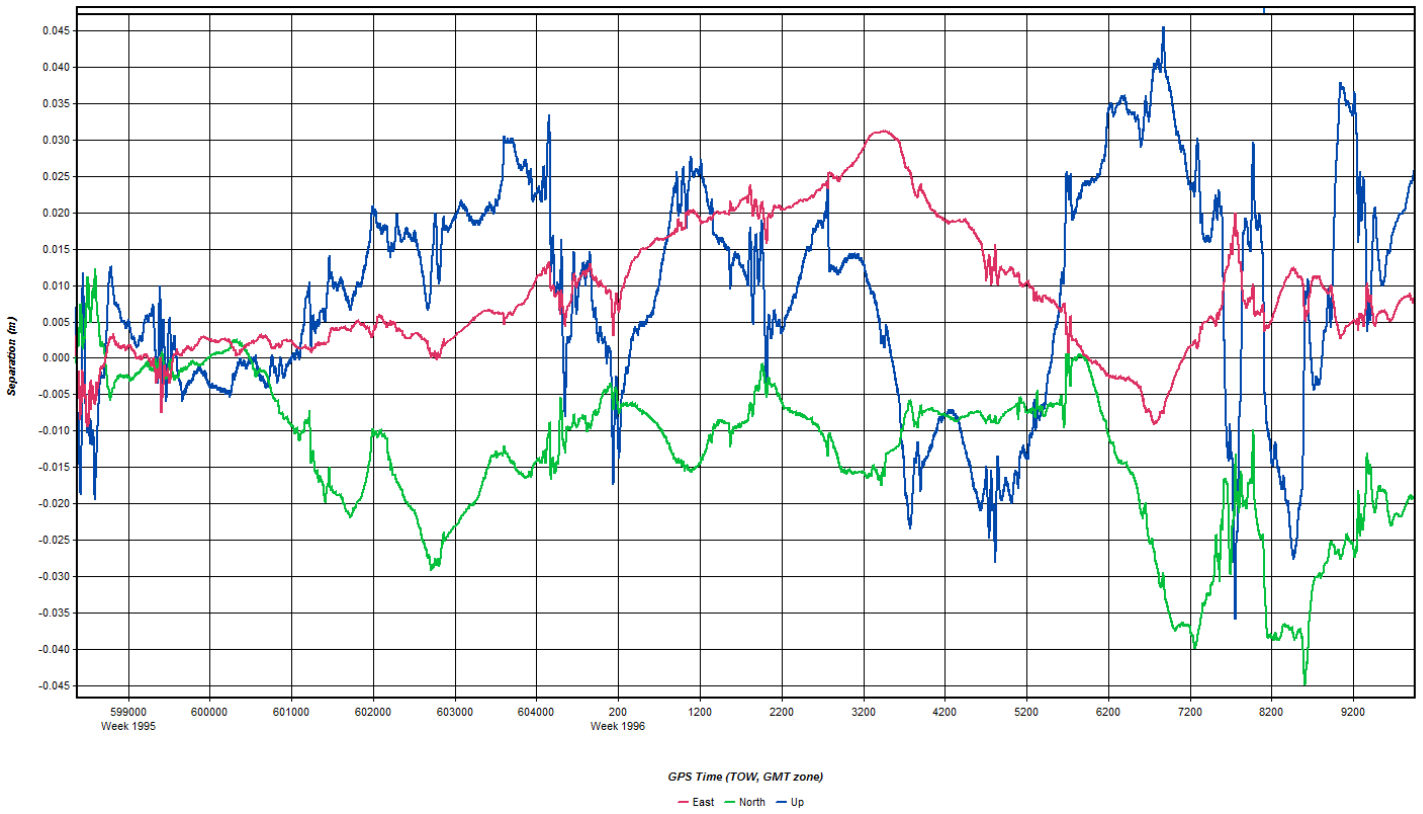

Status
2
1
0
-1
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

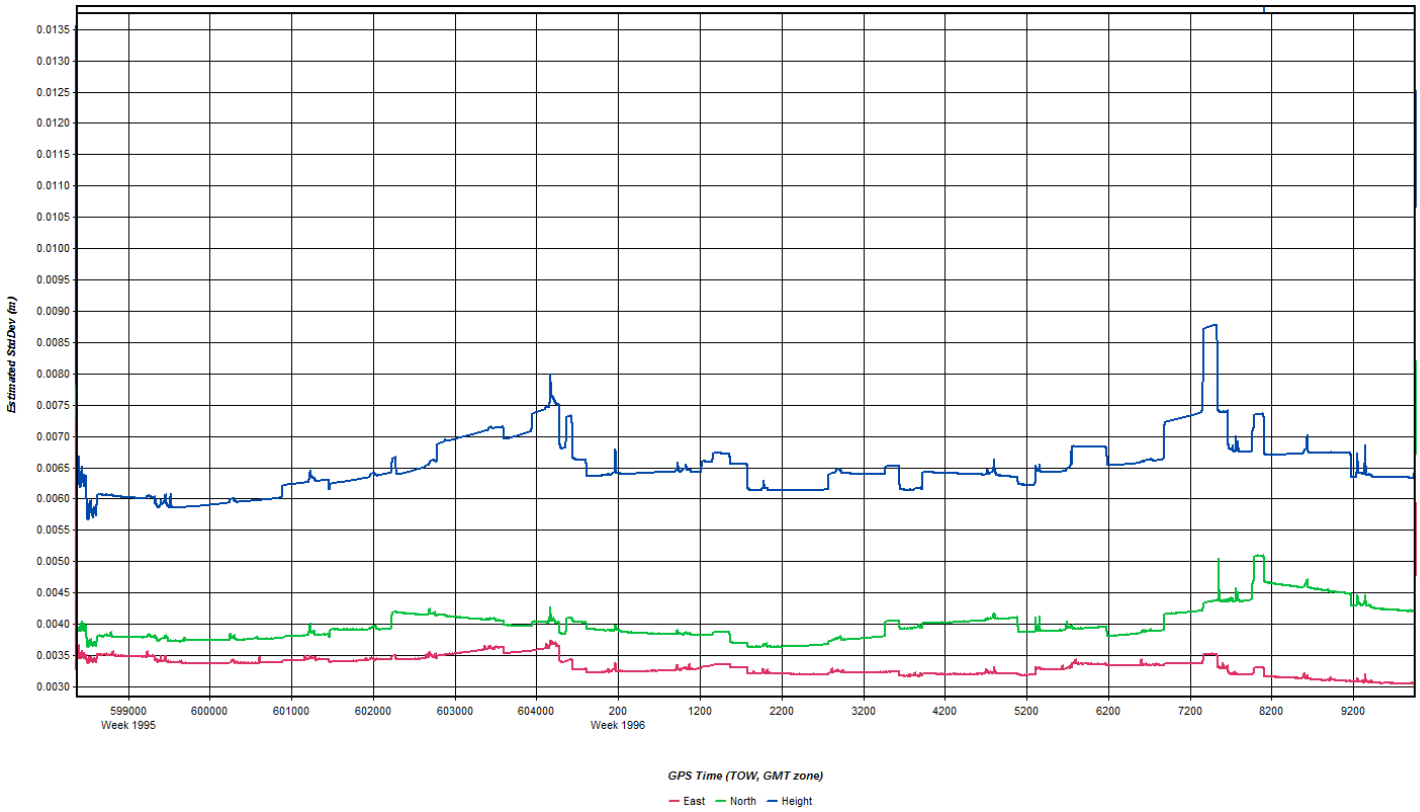

Roll & pitch (deg)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
Roll
Pitch

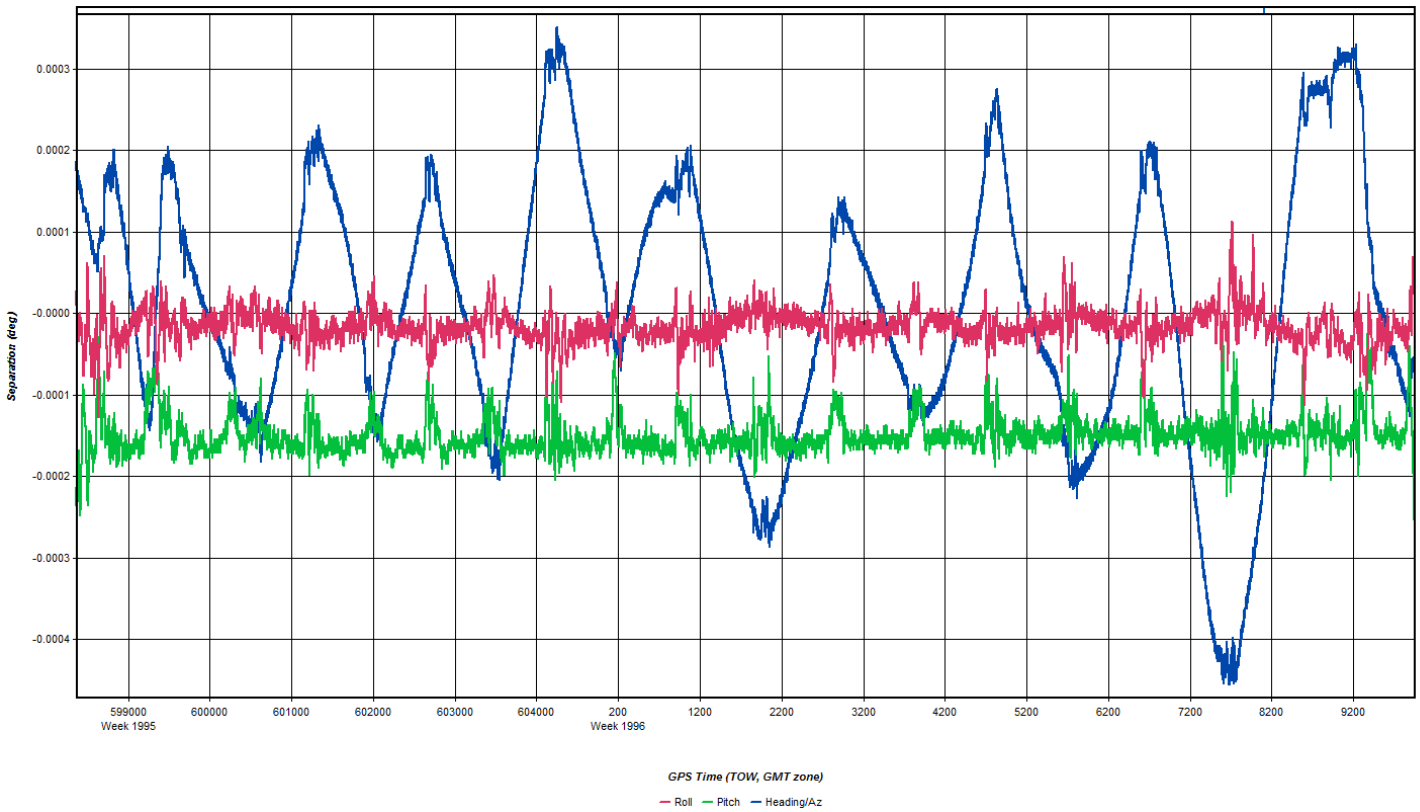

RMS (m)
0.062
0.060
0.058
0.056
0.054
0.052
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
RMS
SD

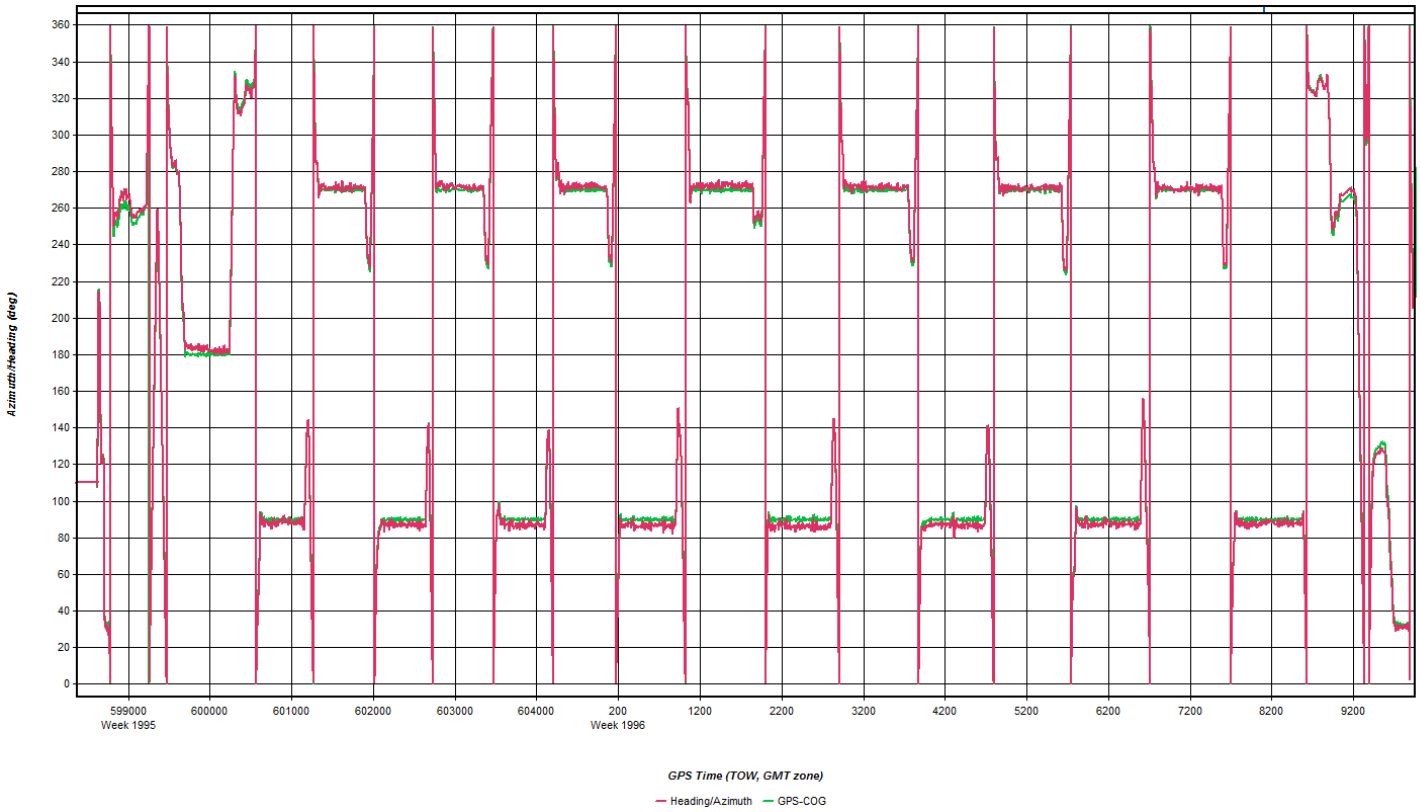

Height (m)
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
Height

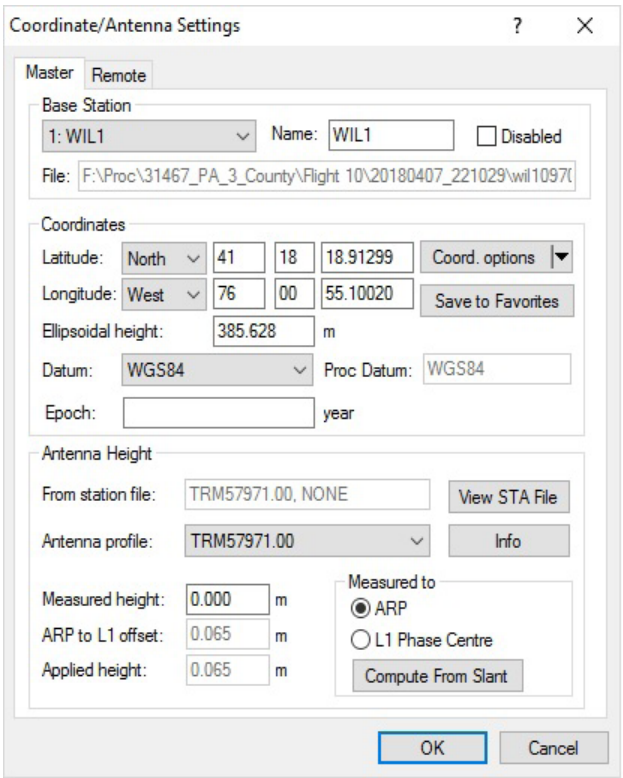

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
-0.005
-0.010
-0.015
-0.020
-0.025
-0.030
-0.035
-0.040
-0.045
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0003
0.0002
0.0001
-0.0000
-0.0001
-0.0002
-0.0003
-0.0004
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
599000
Week 1995
600000
601000
602000
603000
604000
200
Week 1996
1200
2200
3200
4200
5200
6200
7200
8200
9200
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: WIL1
Name: WIL1
Disabled
File: F:\Proc\31467_PA_3_County\Flight 10\20180407_221029\wil1097(
Coordinates
Latitude: North 41 18 18.91299
Coord. options
Longitude: West 76 00 55.10020
Save to Favorites
Ellipsoidal height: 385.628 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS_PA Flight 10
SENSOR OPERATOR	A. Brooker
PILOT	A. Werle
AIRCRAFT	103RM
AIRBASE	AVP – Scranton, PA

DATE	2018/04/07
SENSOR(S)	ALS70-HP
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	LiDAR 2

AIRCRAFT BLOCK TIME

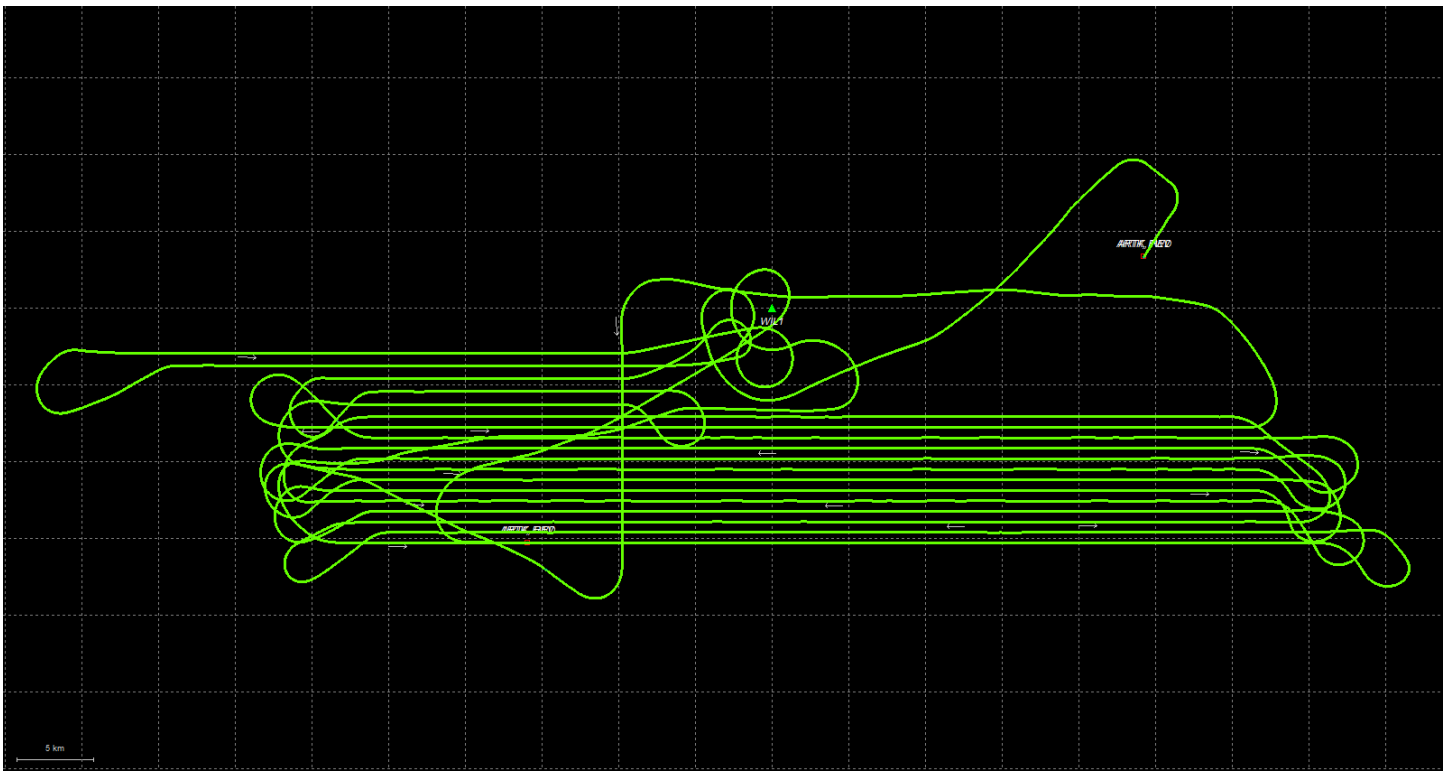
Engine On:	22:09	Takeoff:	22:18
Engine Off:	02:50	Landing:	02:45
TOTAL:	4.7 hrs	TOTAL:	4.5 hrs

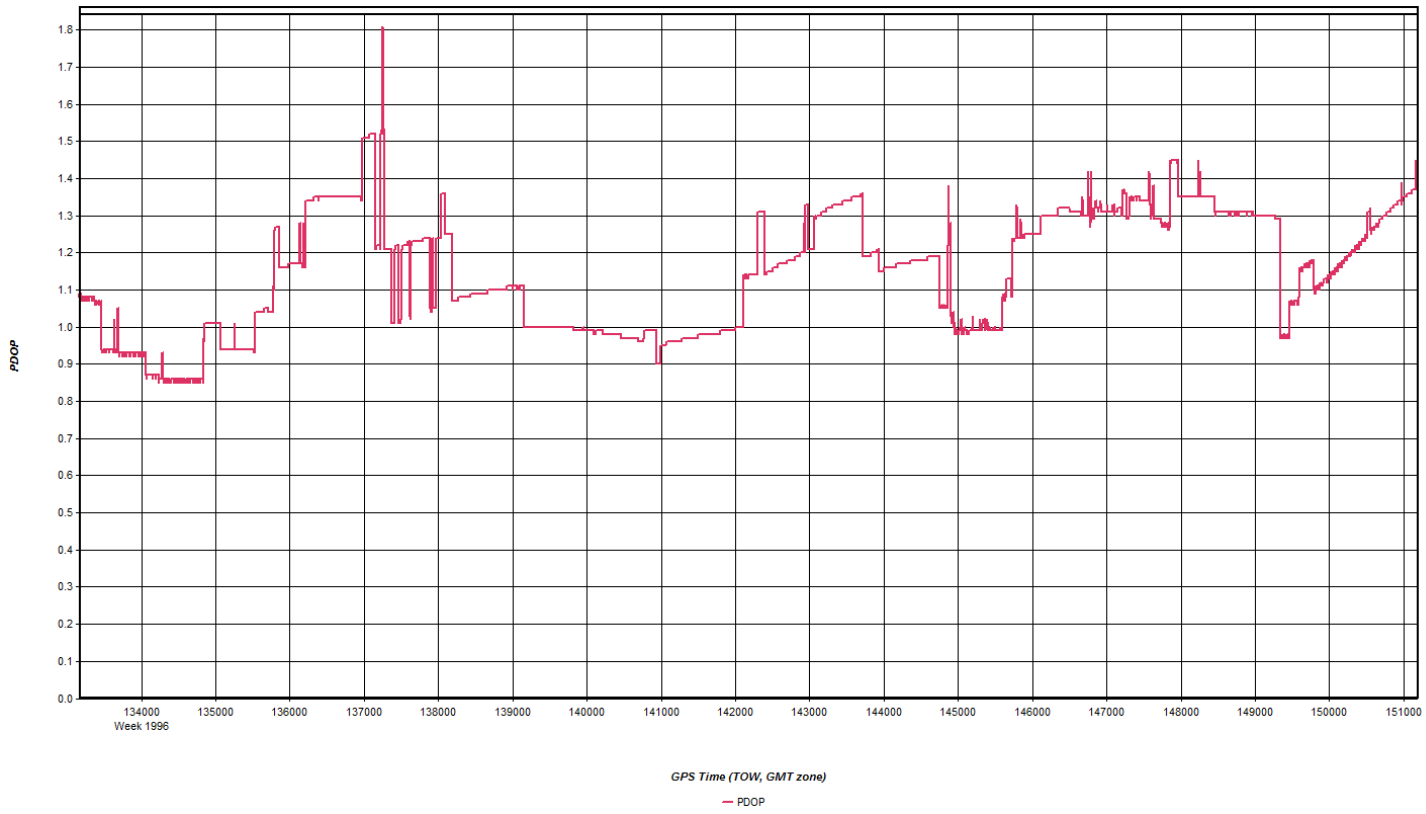
MISSION DETAILS

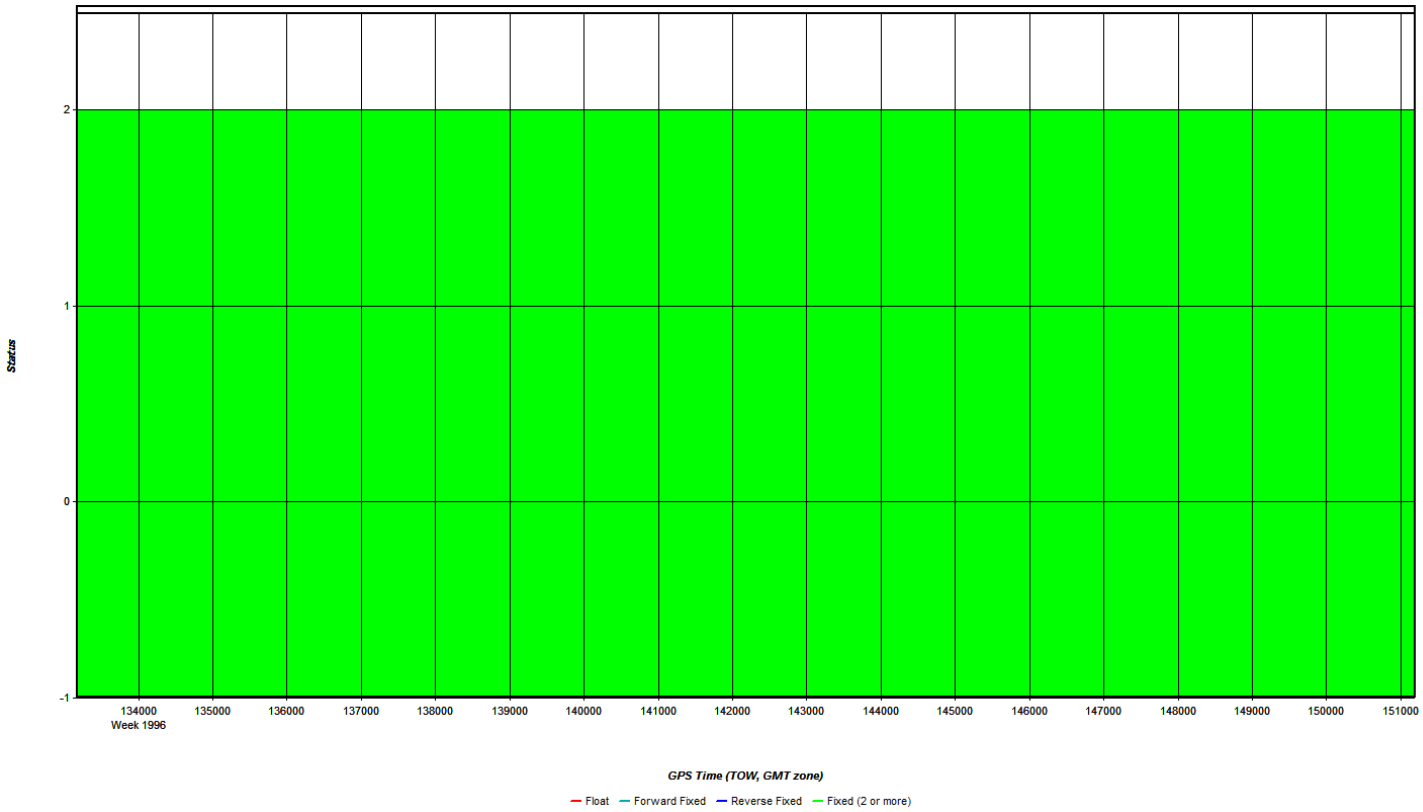
AGL Height:	1950m	Pulse Rate:	269Hz
Speed:	150kts	Scan Rate:	56Hz
Laser Power:	100%	FOV:	36°

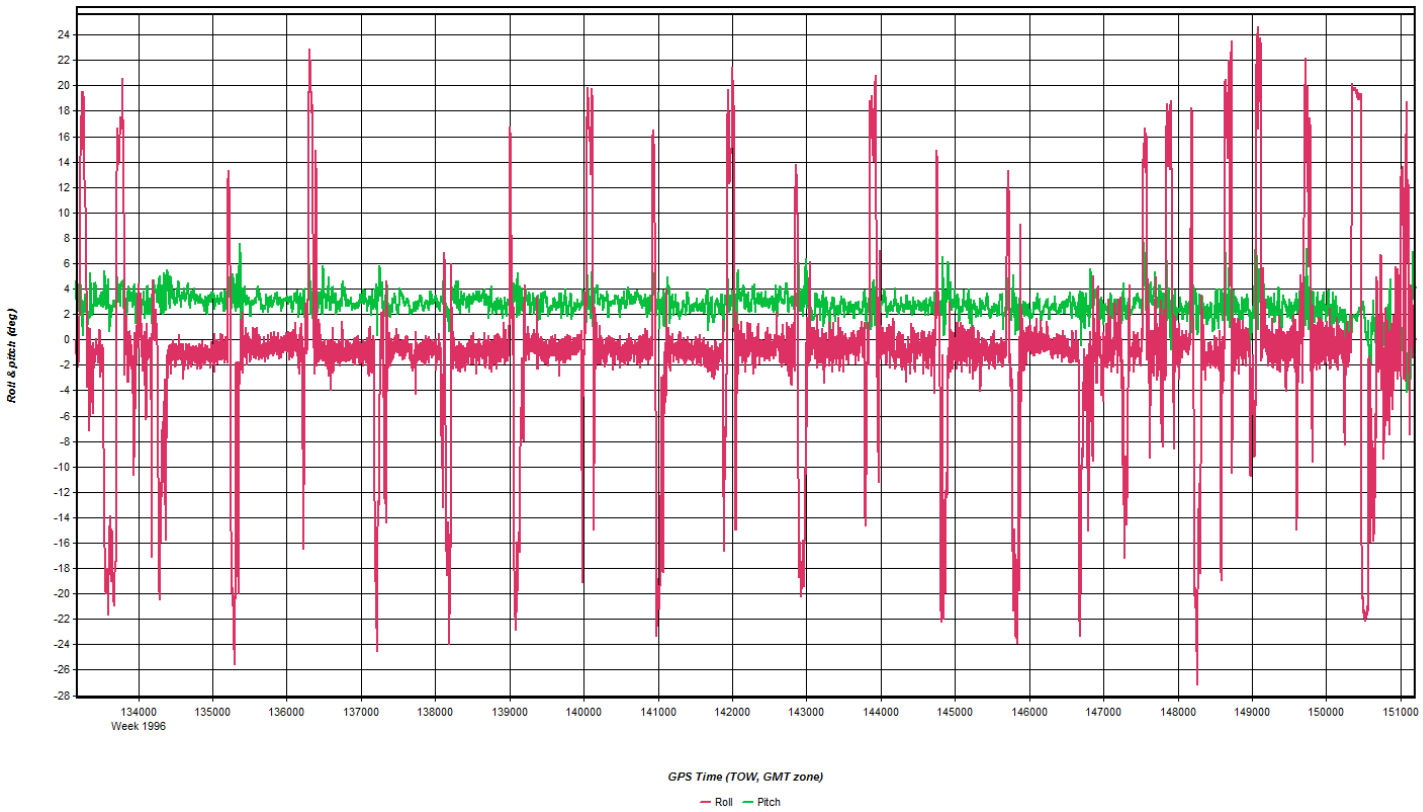
| | | |

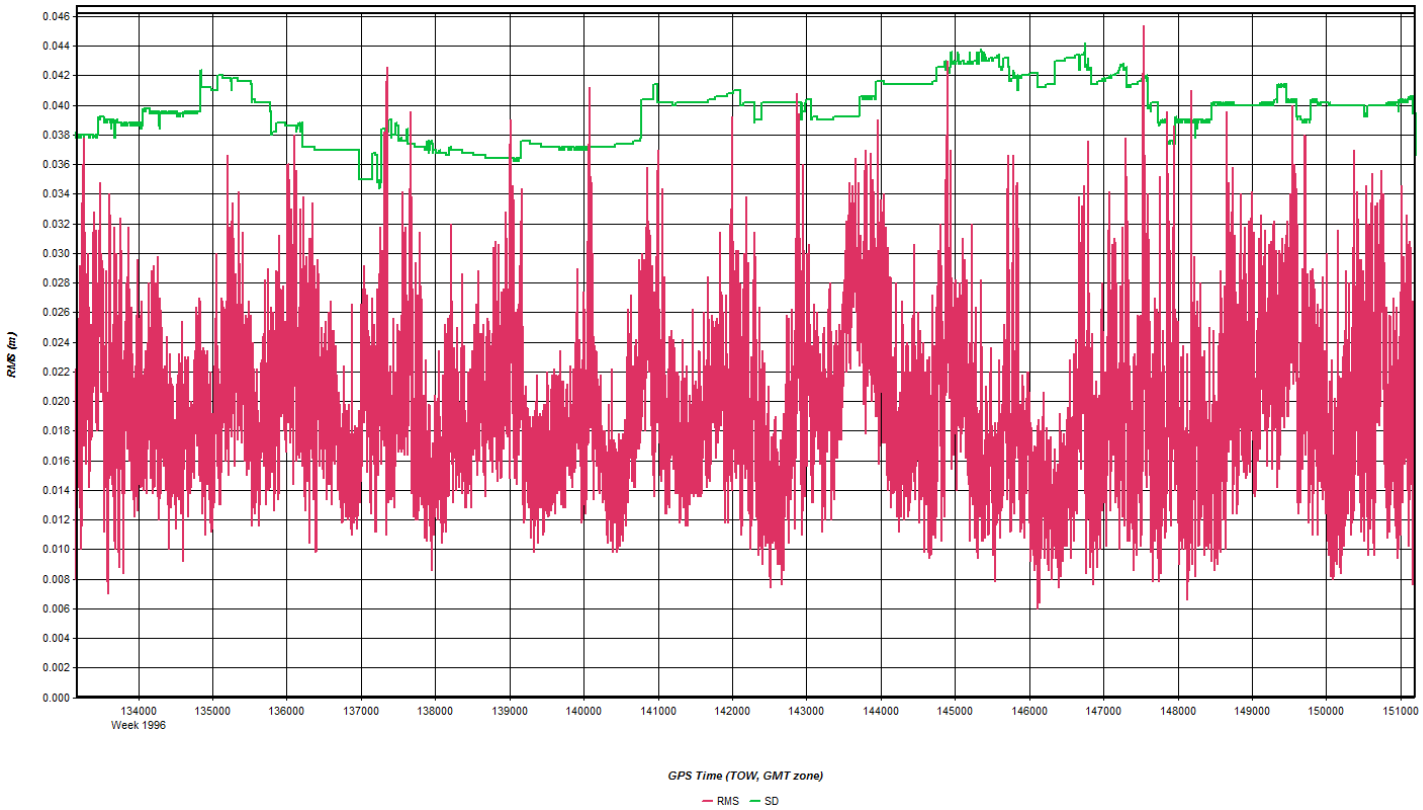
April 9, 2018-A (SN7229, N103RM)

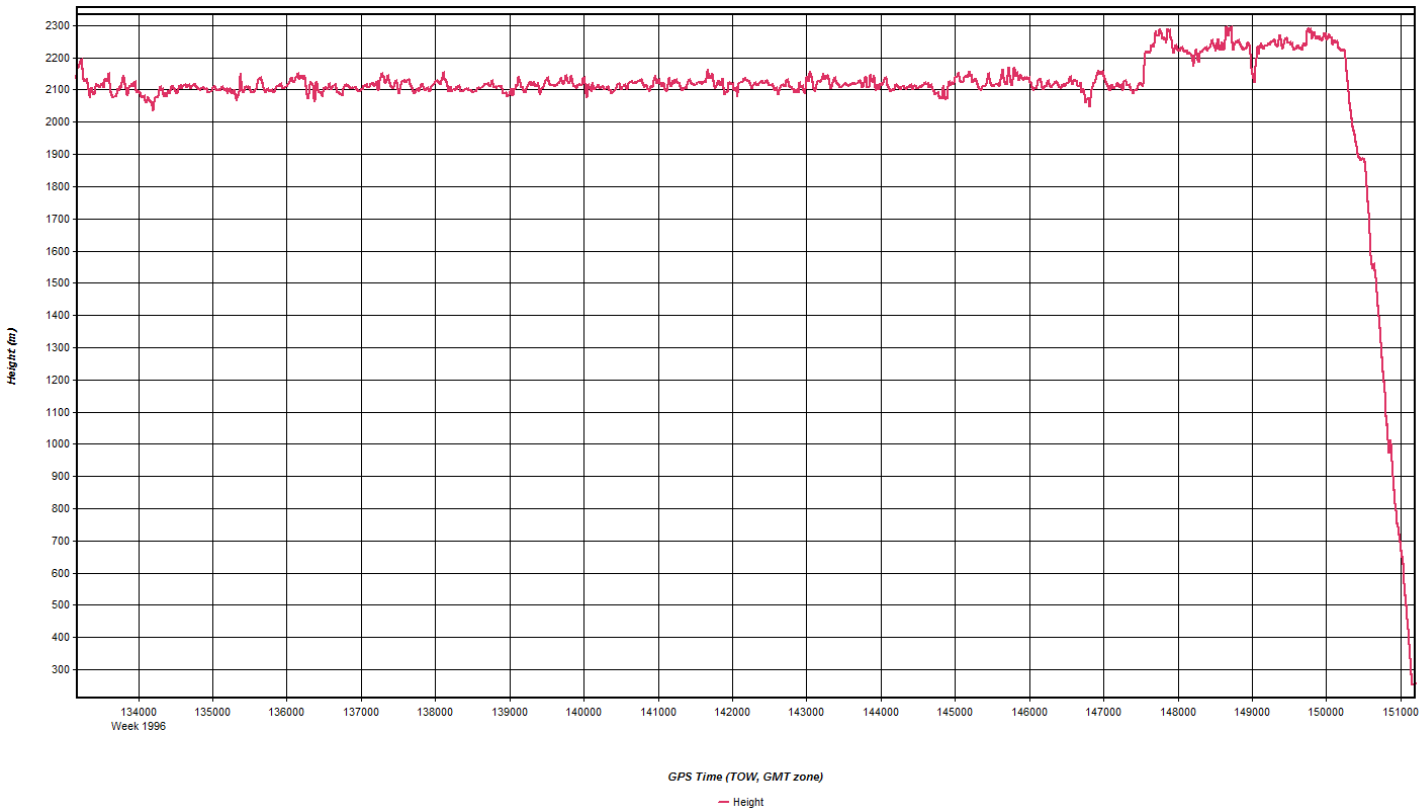

ARTIC_RED
WL1
ARTIC_RED
5 km

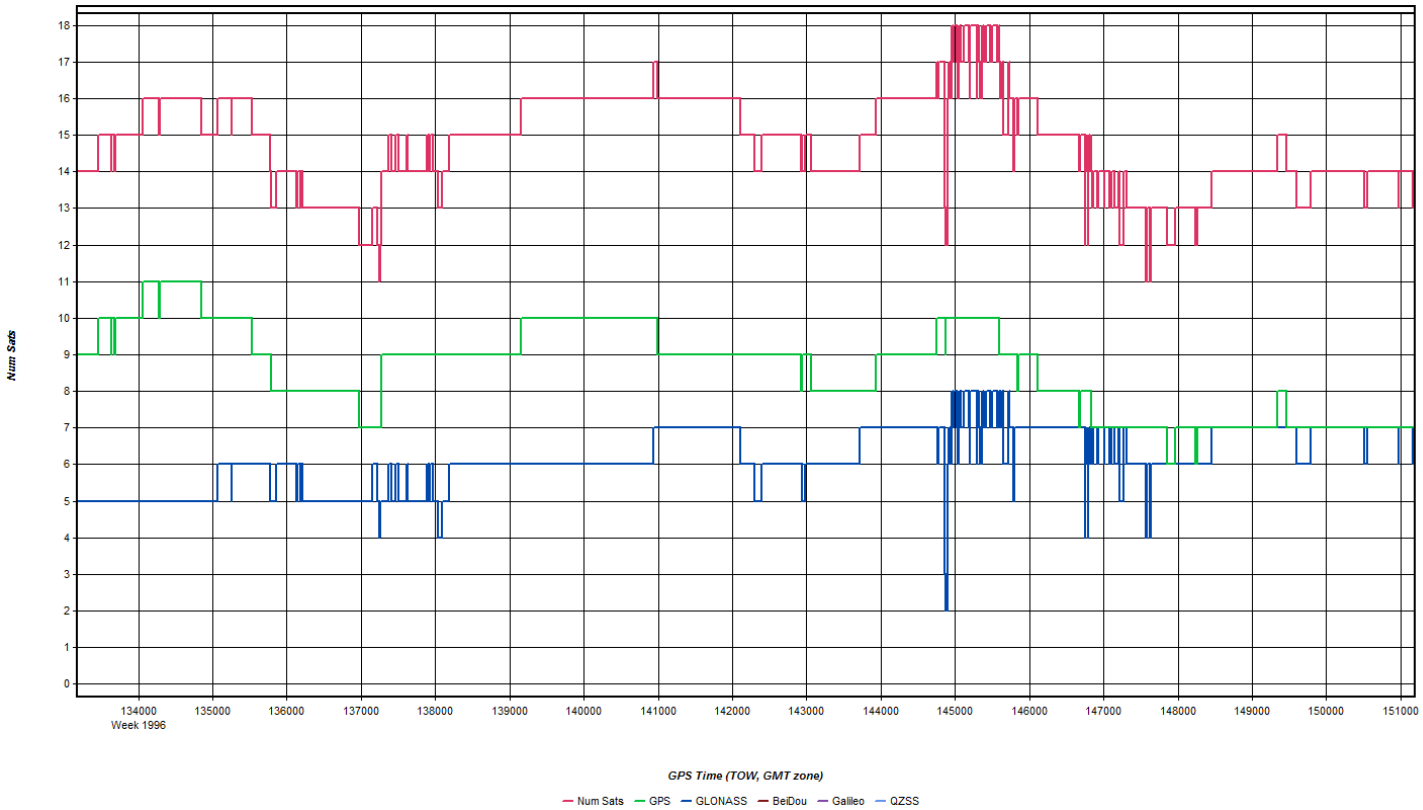

PDOP
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
PDOP

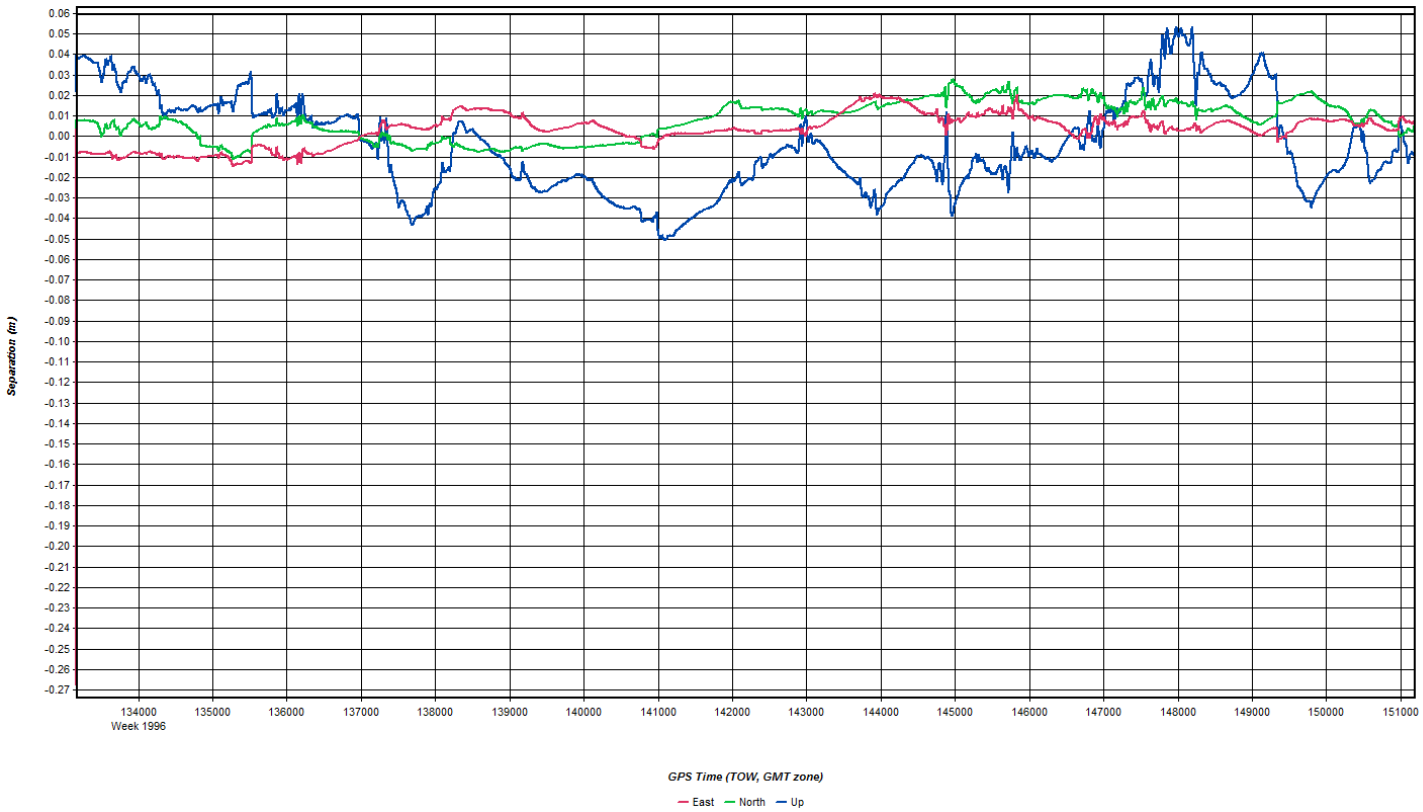

Status
2
1
0
-1
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

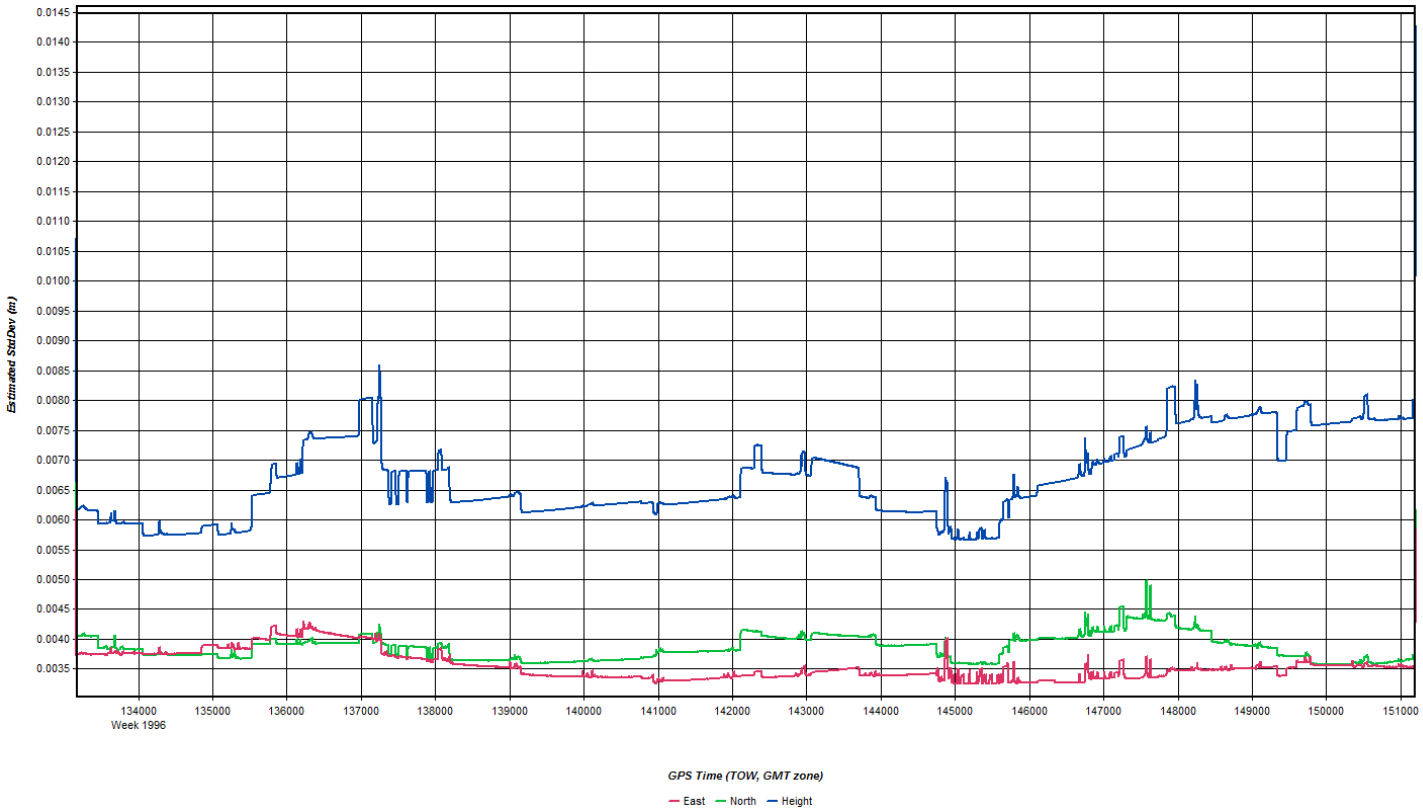

Roll & pitch (deg)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
Roll
Pitch

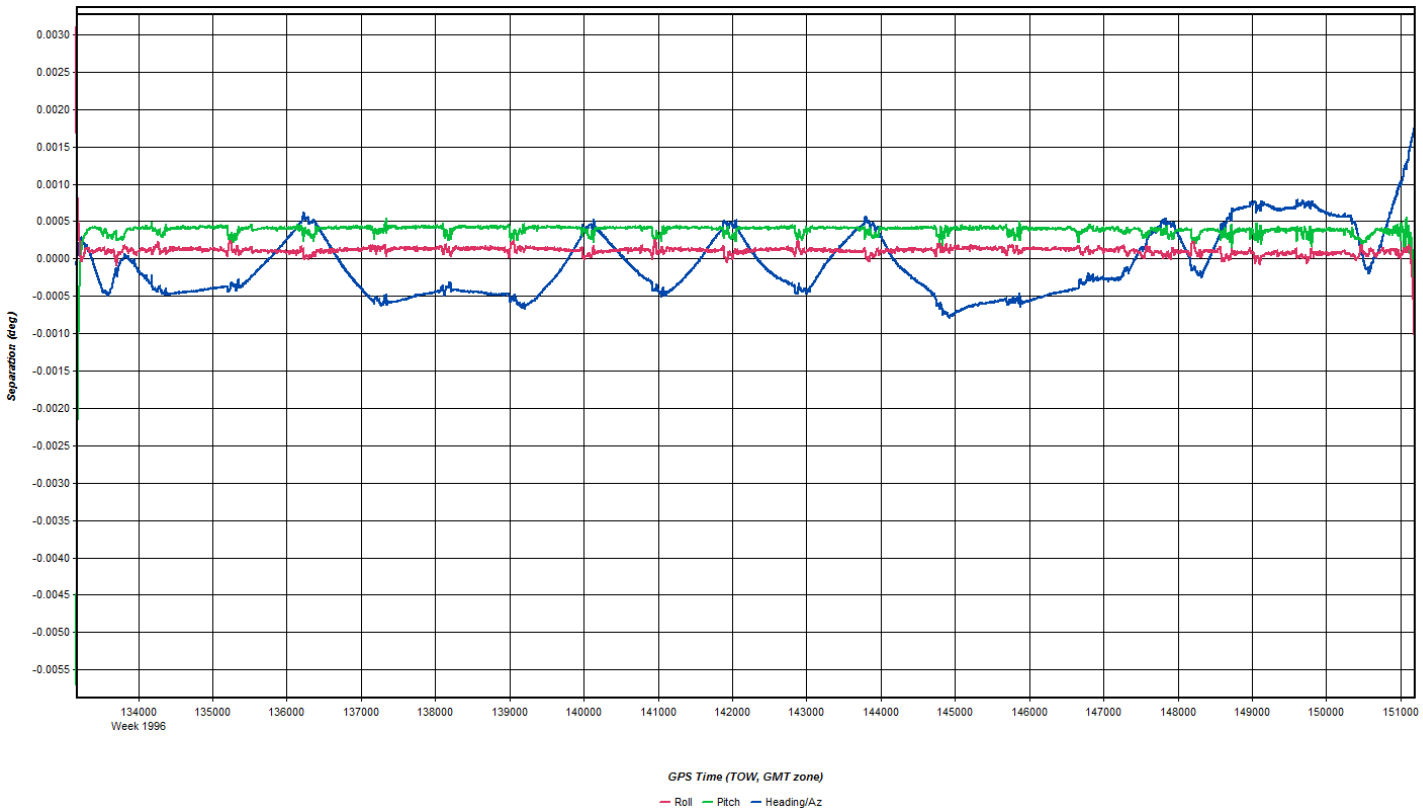

RMS (m)
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
RMS
SD

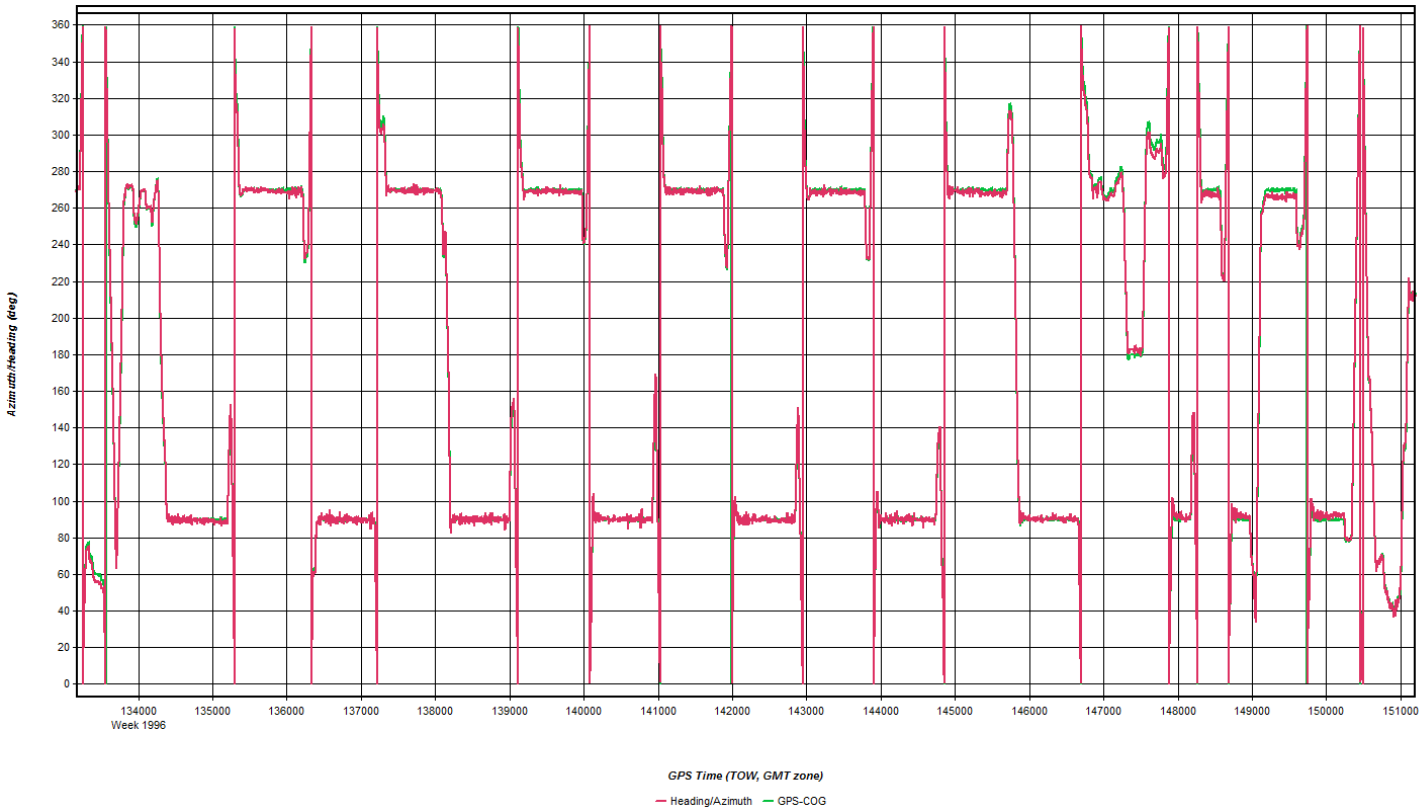

Height (m)
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
Height

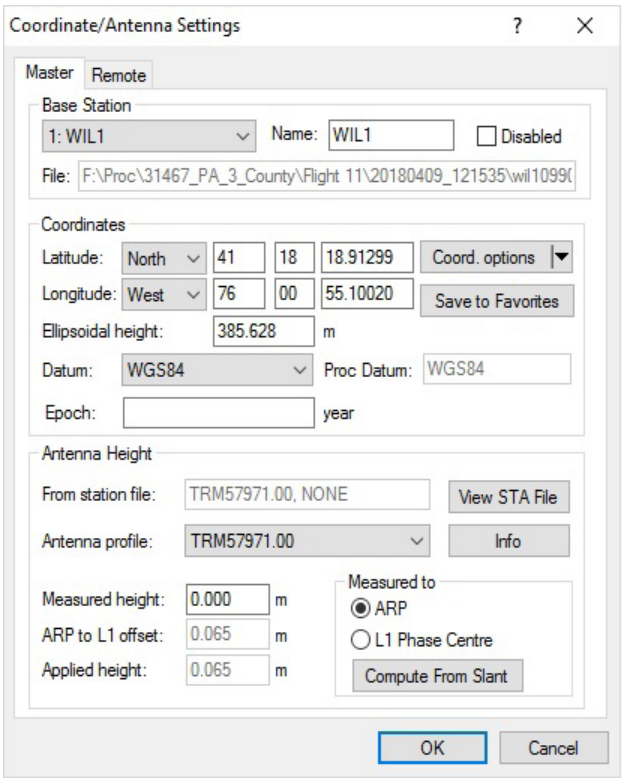

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
-0.08
-0.09
-0.10
-0.11
-0.12
-0.13
-0.14
-0.15
-0.16
-0.17
-0.18
-0.19
-0.20
-0.21
-0.22
-0.23
-0.24
-0.25
-0.26
-0.27
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0145
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
-0.0005
-0.0010
-0.0015
-0.0020
-0.0025
-0.0030
-0.0035
-0.0040
-0.0045
-0.0050
-0.0055
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
134000
Week 1996
135000
136000
137000
138000
139000
140000
141000
142000
143000
144000
145000
146000
147000
148000
149000
150000
151000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: WIL1
Name: WIL1
Disabled
File: F:\Proc\31467_PA_3_County\Flight 11\20180409_121535\wil1099(
Coordinates
Latitude: North 41 18 18.91299
Coord. options
Longitude: West 76 00 55.10020
Save to Favorites
Ellipsoidal height: 385.628 m
Datum: WGS84
Proc Datum: WGS84
Epoch:
year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS_PA (Flight 11)
SENSOR OPERATOR	A. Brooker
PILOT	A. Werle
AIRCRAFT	KBM – 103RM
AIRBASE	AVP – Scranton, PA

DATE	2018/04/09
SENSOR(S)	ALS70-HP
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	LiDAR 2
STATIC ALIGNMENT	GPS TIME: START / END
Pre-Mission	12:32 / 12:39
Post Mission	17:44 / 17:50

AIRCRAFT BLOCK TIME

Engine On:	12:14	Takeoff:	12:26
Engine Off:	18:02	Landing:	17:59
TOTAL:	5.8 hrs	TOTAL:	5.6 hrs

MISSION DETAILS

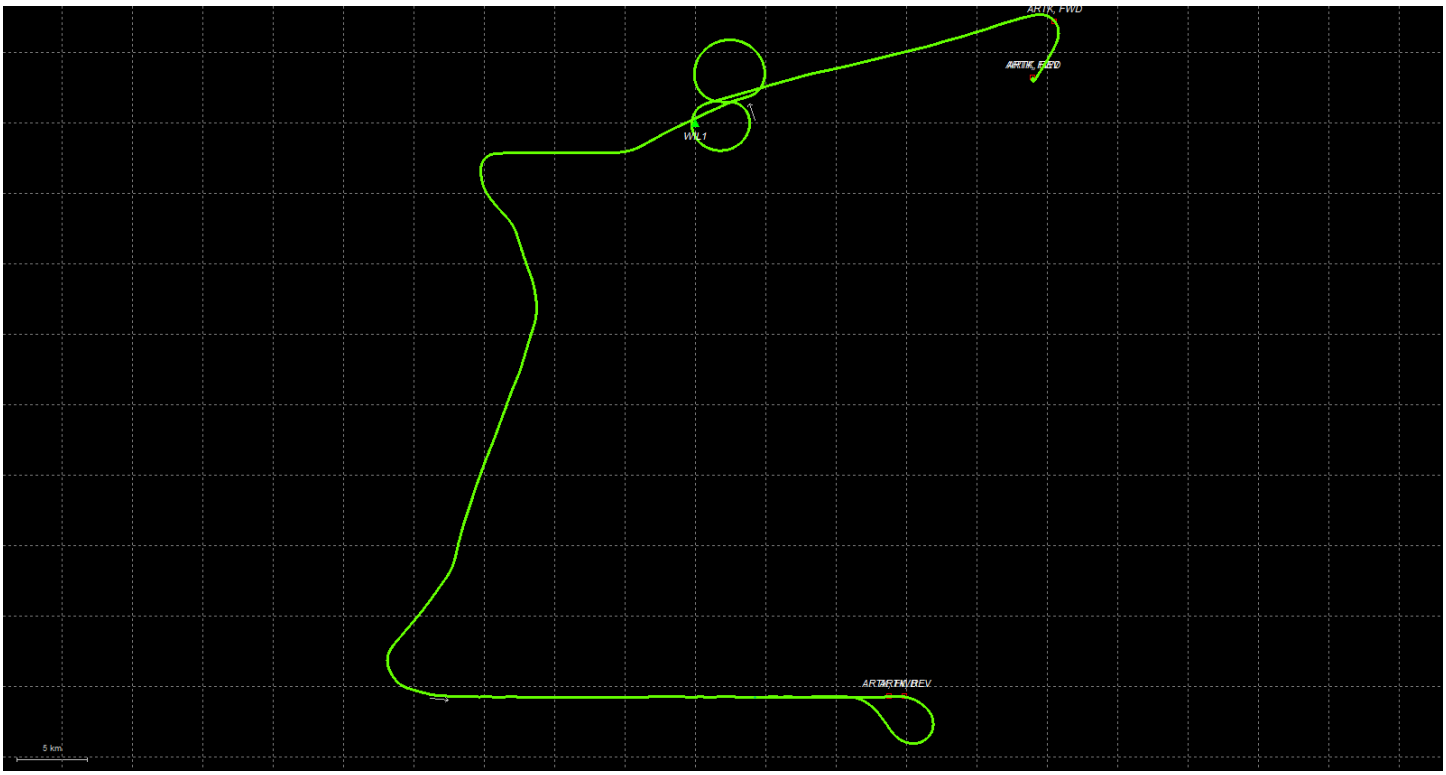
AGL Height:	1950m	Pulse Rate:	269Hz
Speed:	150kts	Scan Rate:	56Hz
Laser Power:	100%	FOV:	36°

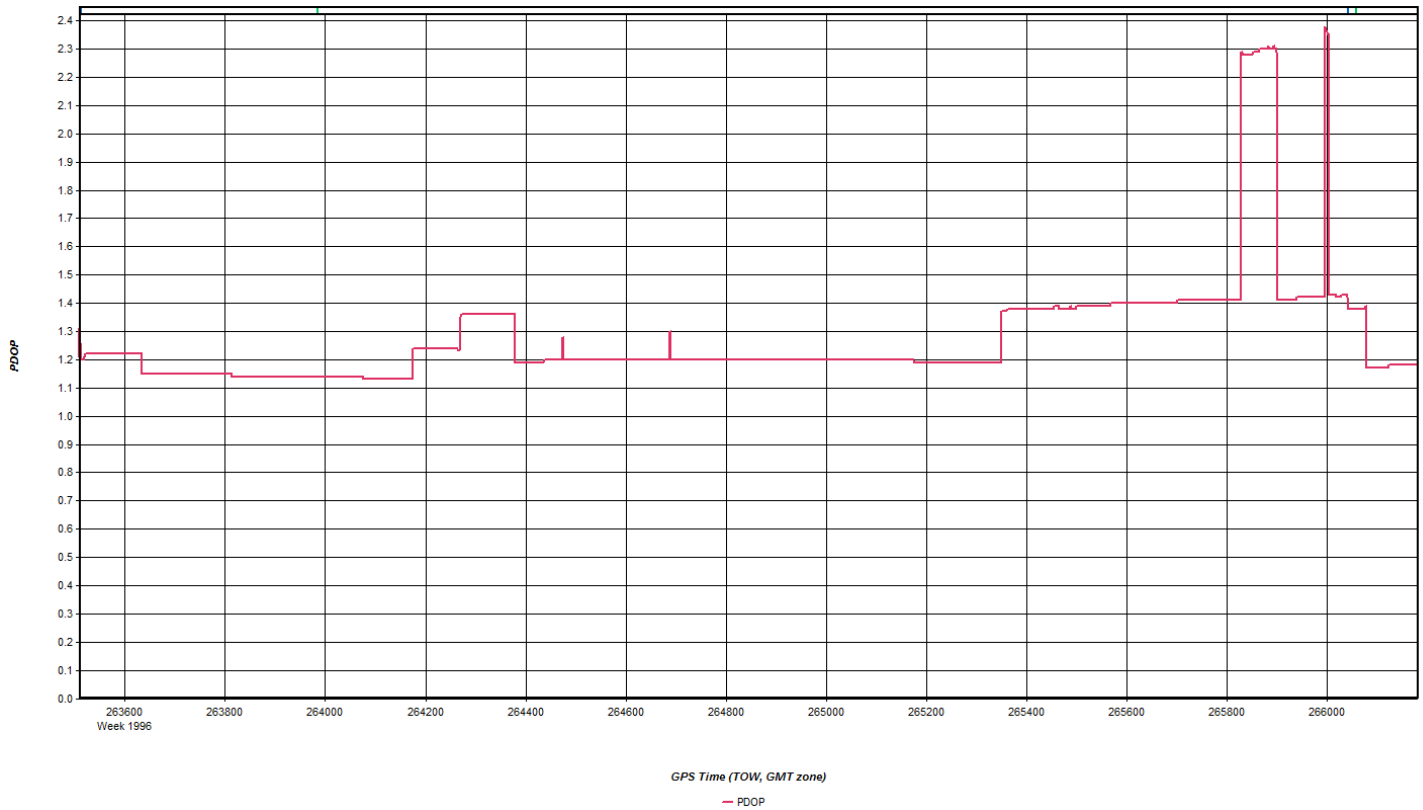
FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME START	GPS TIME END	COMMENTS	"S" TURN
066		282	124731	12:47:31	--:--:--	Abort - Dropped IMU	
066		101	132016	13:20:16	13:32:57	C	
065		282	133644	13:36:44	13:50:00	C	
064		101	135333	13:53:33	14:06:07	C	
054		282	140925	14:09:25	14:21:55	C	
062		101	142404	14:24:04	14:31:21	C	
063		282	144009	14:40:09	14:52:38	C	
061		101	145601	14:56:01	15:08:22	C	
060		282	151156	15:11:56	15:24:12	C	
059		101	152753	15:27:53	15:40:26	C	
058		282	154354	15:43:54	15:55:58	C	
057		101	155947	15:59:47	16:12:02	C	
056		282	161549	16:15:49	16:28:26	C	
055		101	163157	16:31:57	16:44:02	C	
NCROSS2		192	165542	16:55:42	16:58:57	C	
053		101	170547	17:05:47	17:09:09	C	
052		282	171222	17:12:22	17:15:54	C	
051		101	171906	17:19:06	17:22:30	C	
050		282	172645	17:26:45	17:32:50	C	
049		101	173647	17:36:47	17:43:41	C	

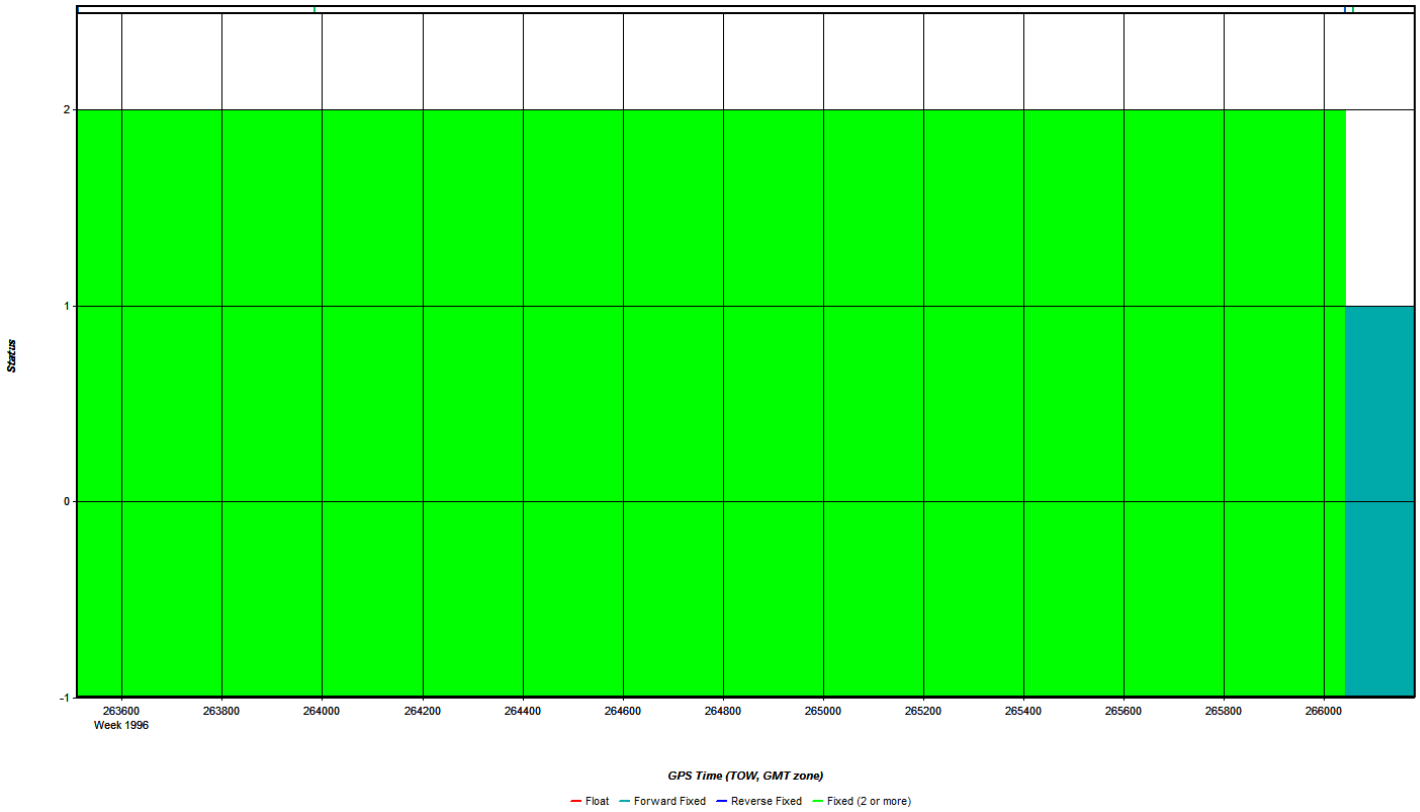
SUN ANGLE
@Start:
@End:
@Peak:

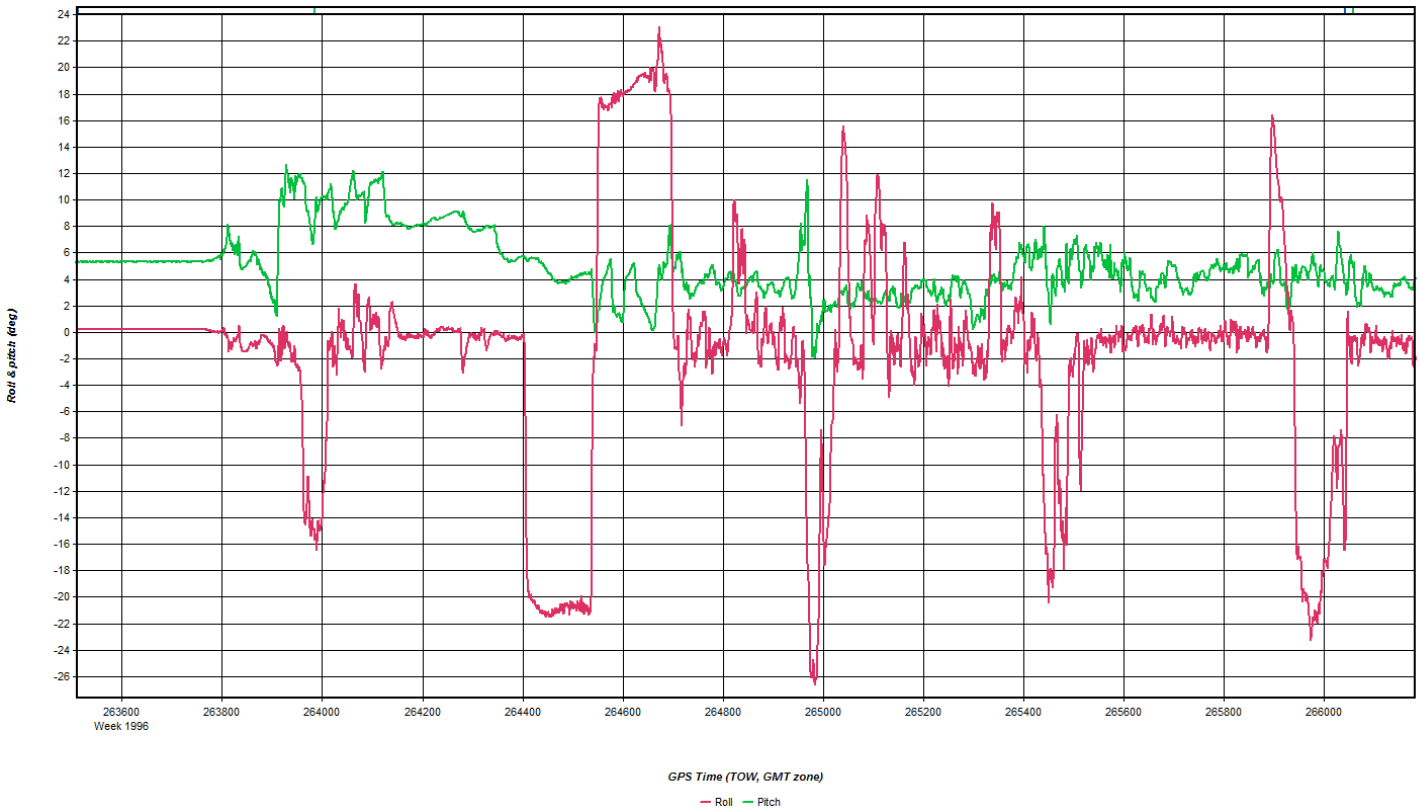
ADDITIONAL NOTES: Sunny with some cloud around the AOI. Moved around lines to deal with cloud which eventually completely moved out of the area.
PDOP 1.7
15 Sats
KAR Turns over WIL1. IMU dropped on first line, did another KAR turn and flew the line over.

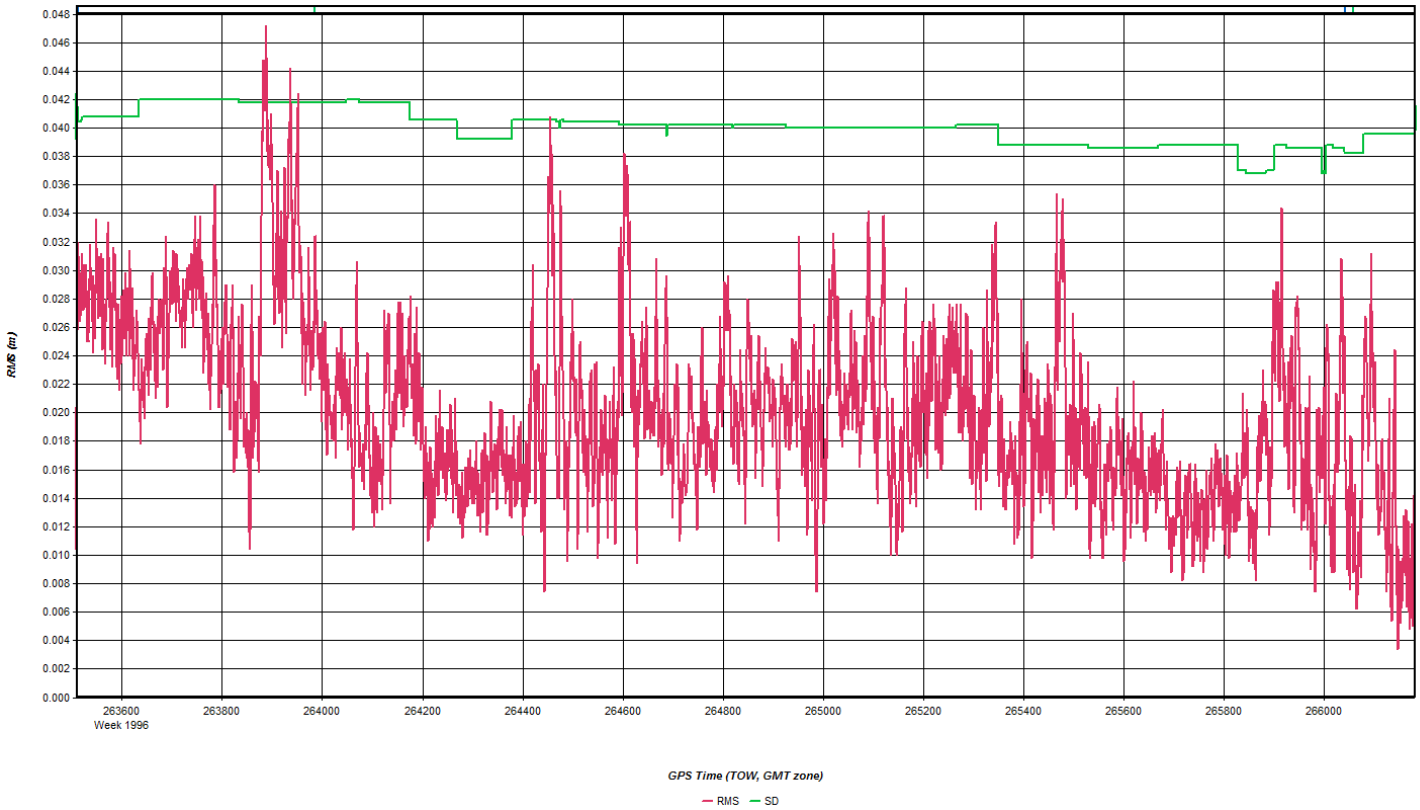
April 11, 2018-A1 (SN7229, N103RM)

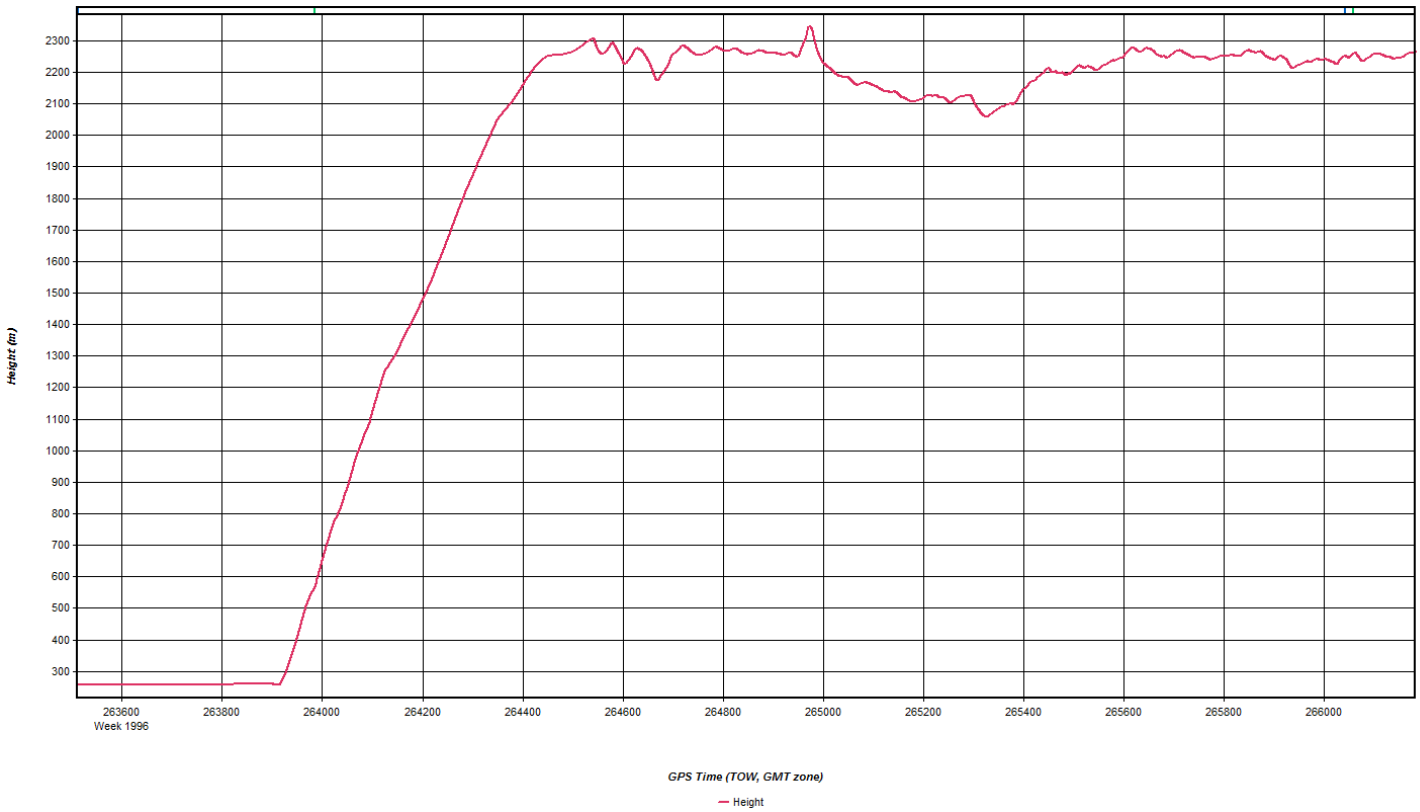

ARTK FWD
ARTK REV
WL1
5 km

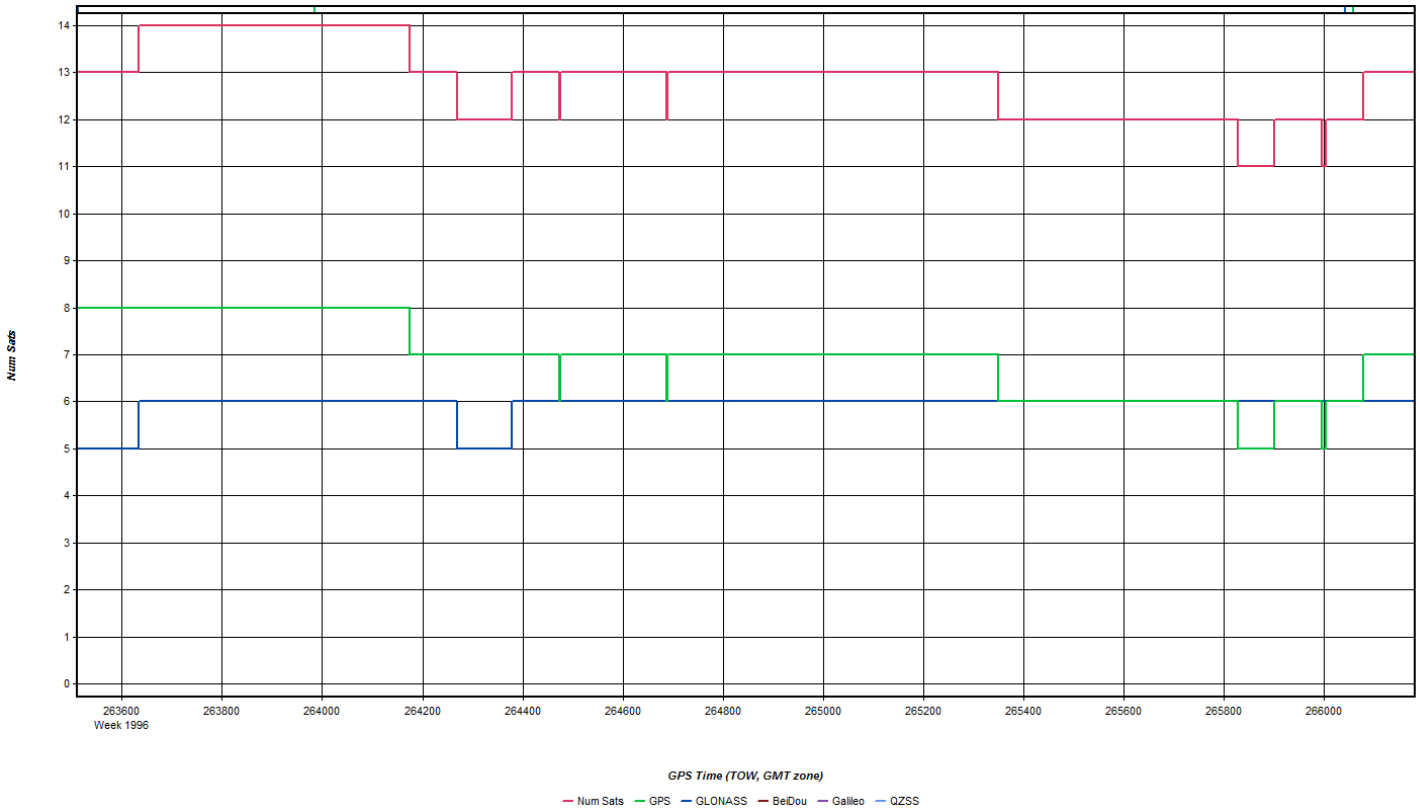

PDOP
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
PDOP

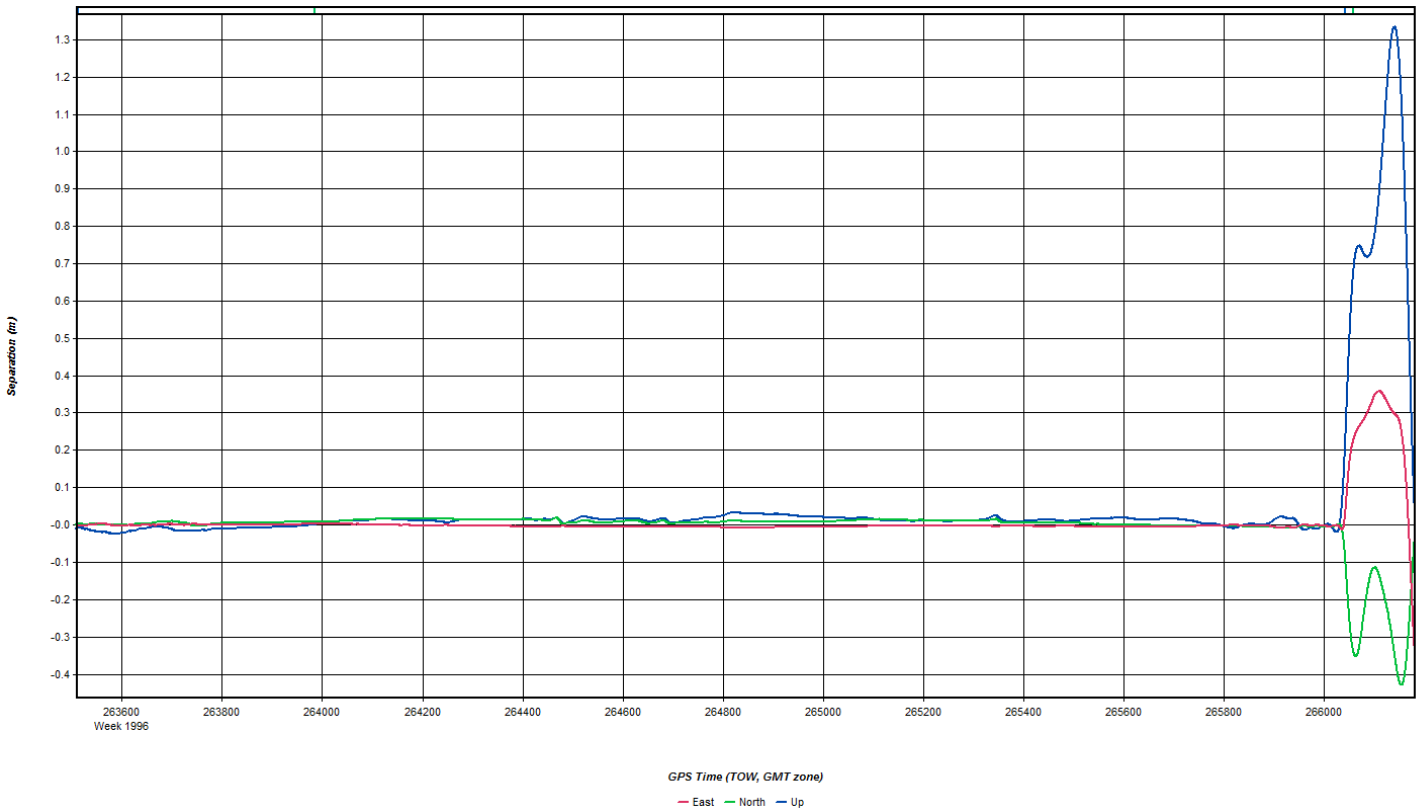

Status
2
1
0
-1
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

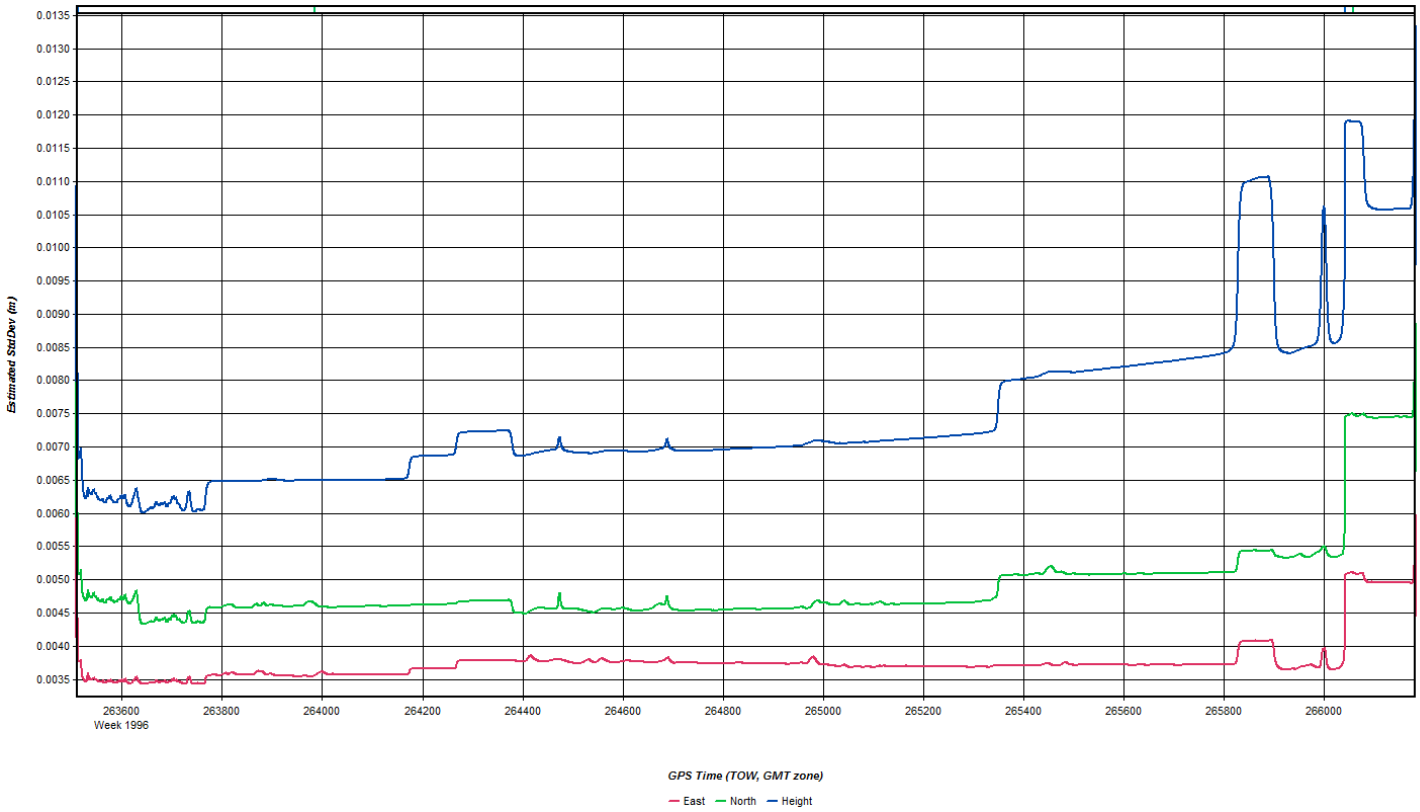

Roll & pitch (deg)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
Roll
Pitch

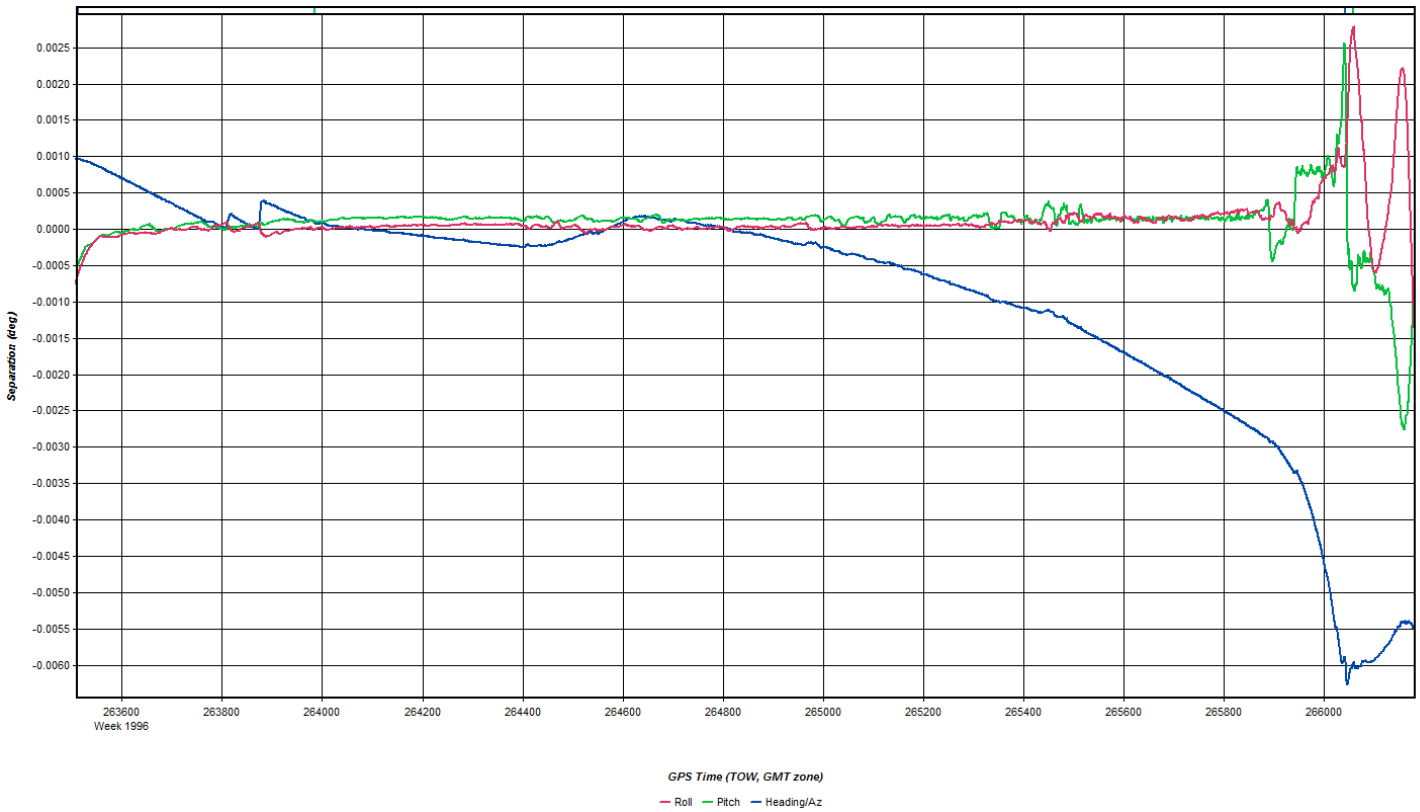

RMS (m)
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
RMS
SD

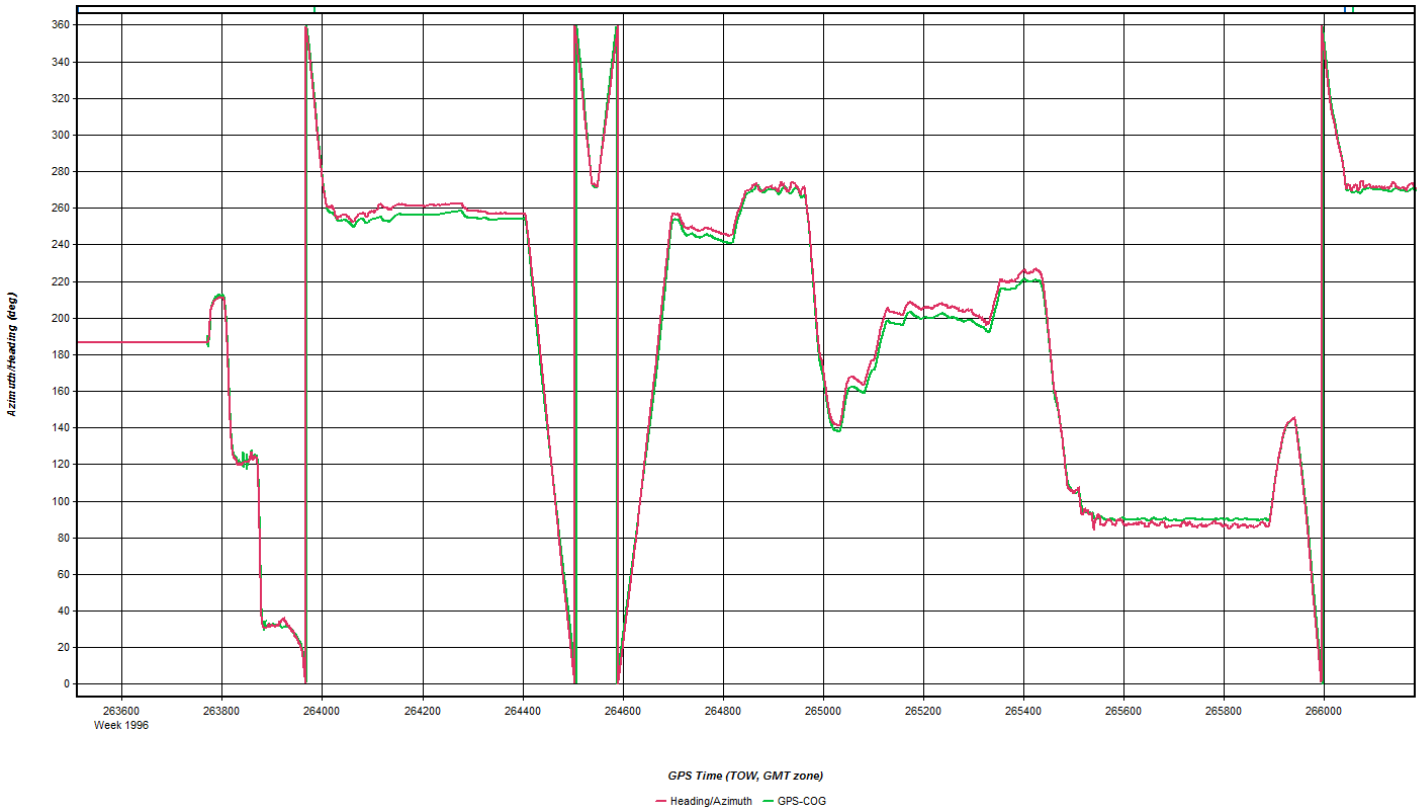

Height (m)
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
Height

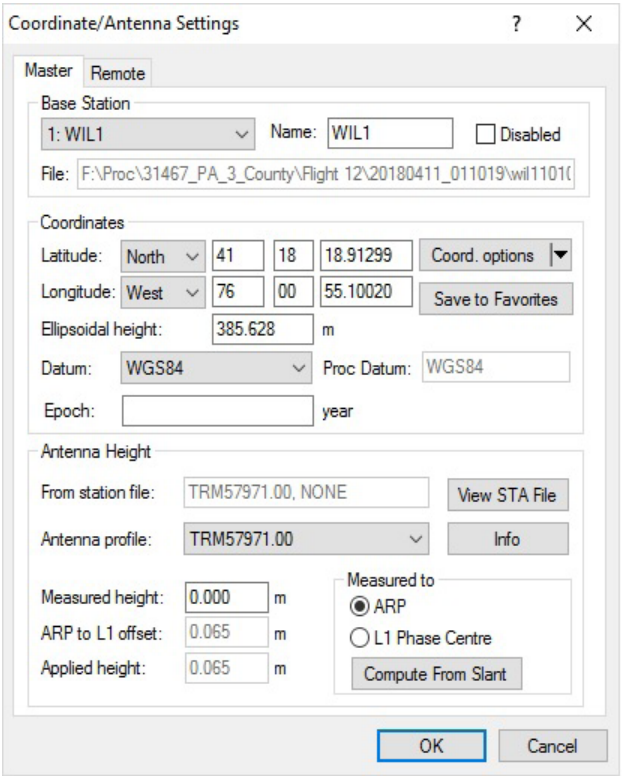

Num Sats
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-0.0
-0.1
-0.2
-0.3
-0.4
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
East
North
Up

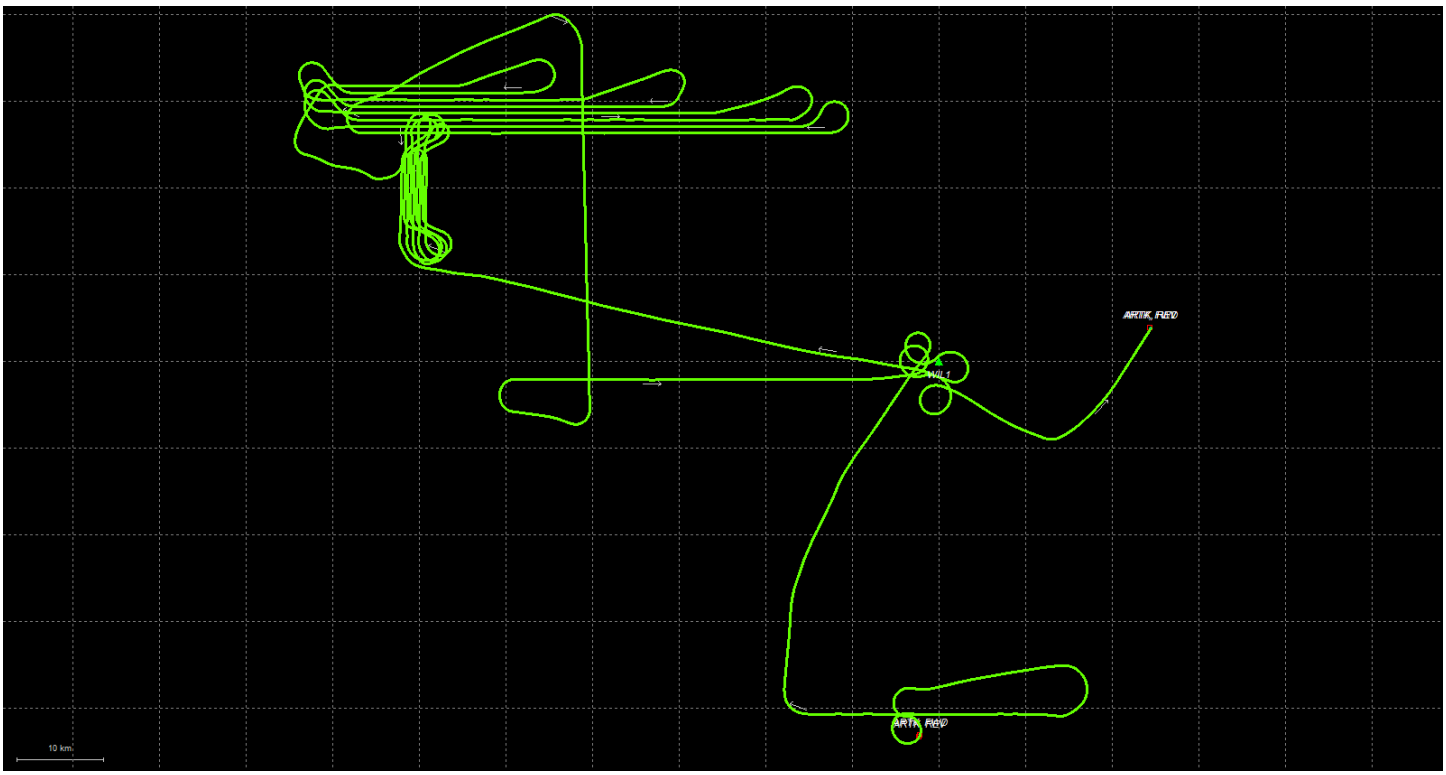

Estimated StdDev (m)
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
East
North
Height

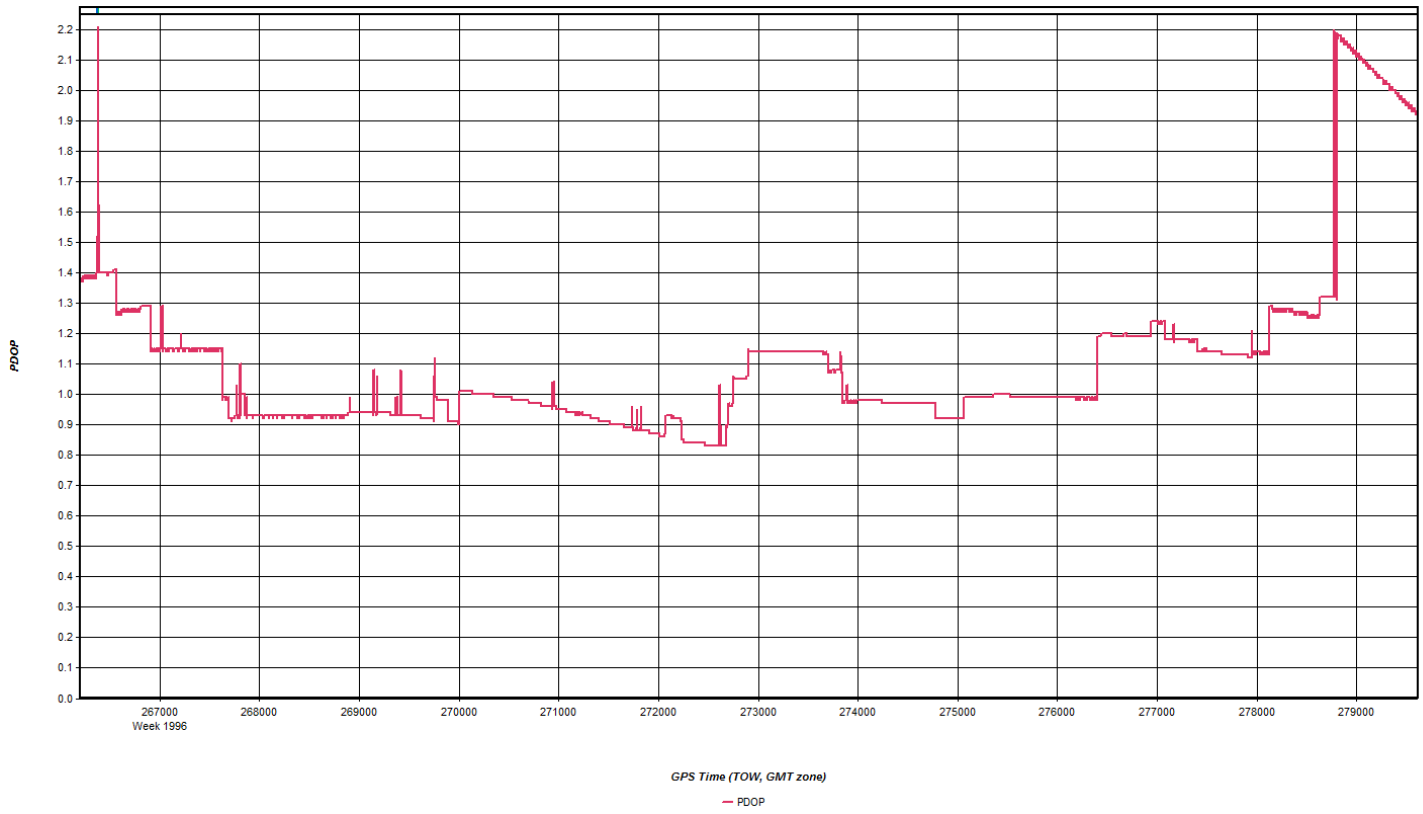

Separation (deg)
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
-0.0005
-0.0010
-0.0015
-0.0020
-0.0025
-0.0030
-0.0035
-0.0040
-0.0045
-0.0050
-0.0055
-0.0060
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az

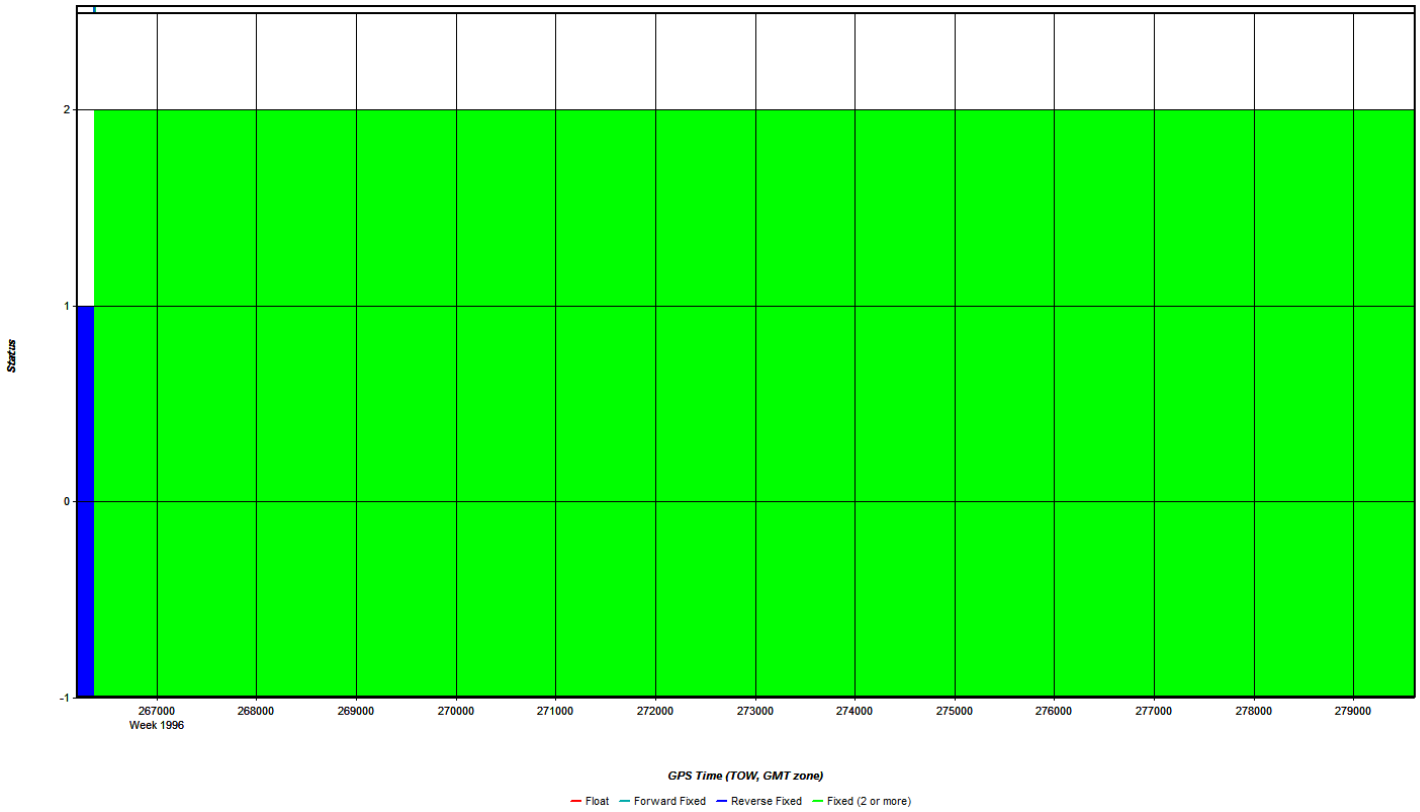

Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
263600
Week 1996
263800
264000
264200
264400
264600
264800
265000
265200
265400
265600
265800
266000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG

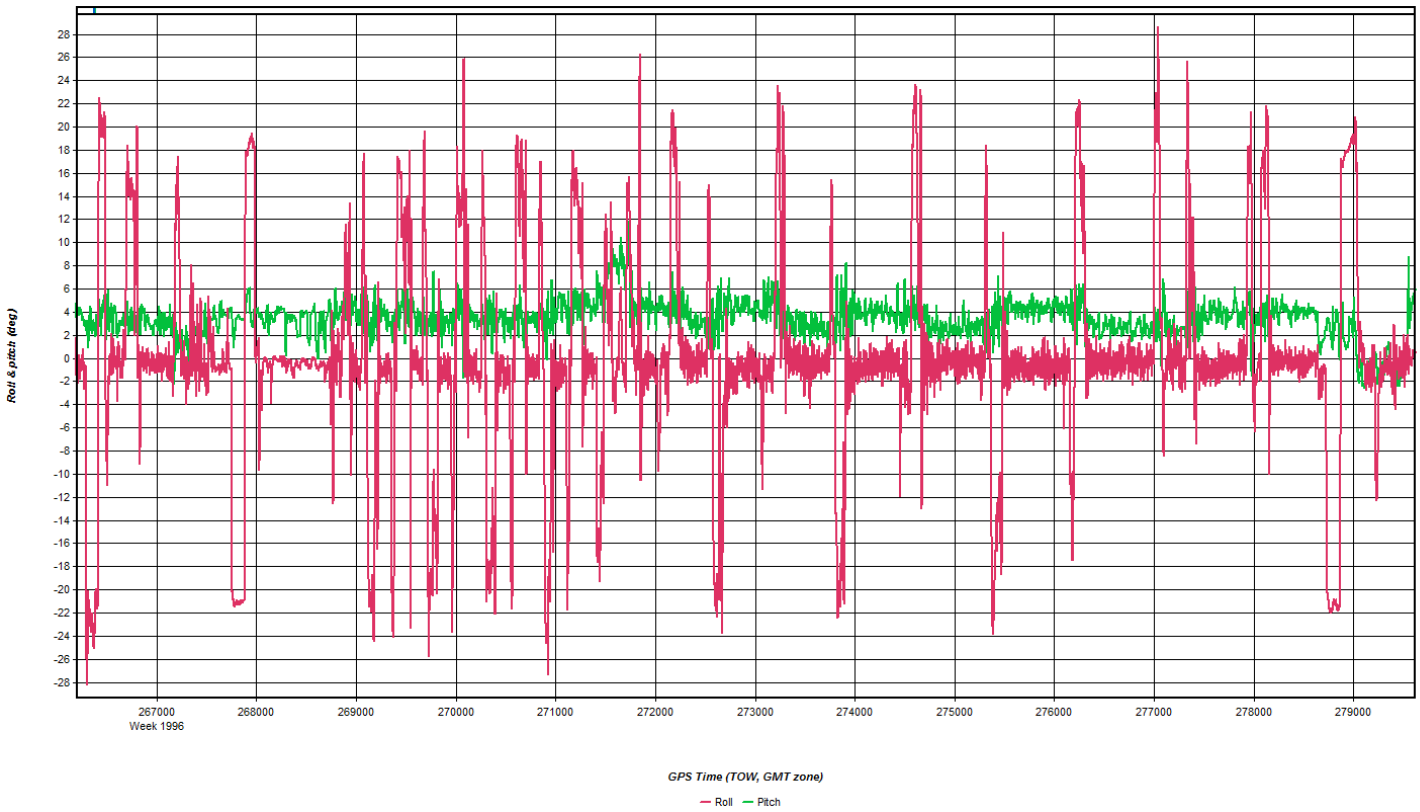

Coordinate/Antenna Settings
Master
Remote
Base Station
1: WIL1
Name: WIL1
Disabled
File: F:\Proc\31467_PA_3_County\Flight 12\20180411_011019\wil1101(
Coordinates
Latitude: North 41 18 18.91299
Coord. options
Longitude: West 76 00 55.10020
Save to Favorites
Ellipsoidal height: 385.628 m
Datum: WGS84
Proc Datum: WGS84
Epoch:
year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

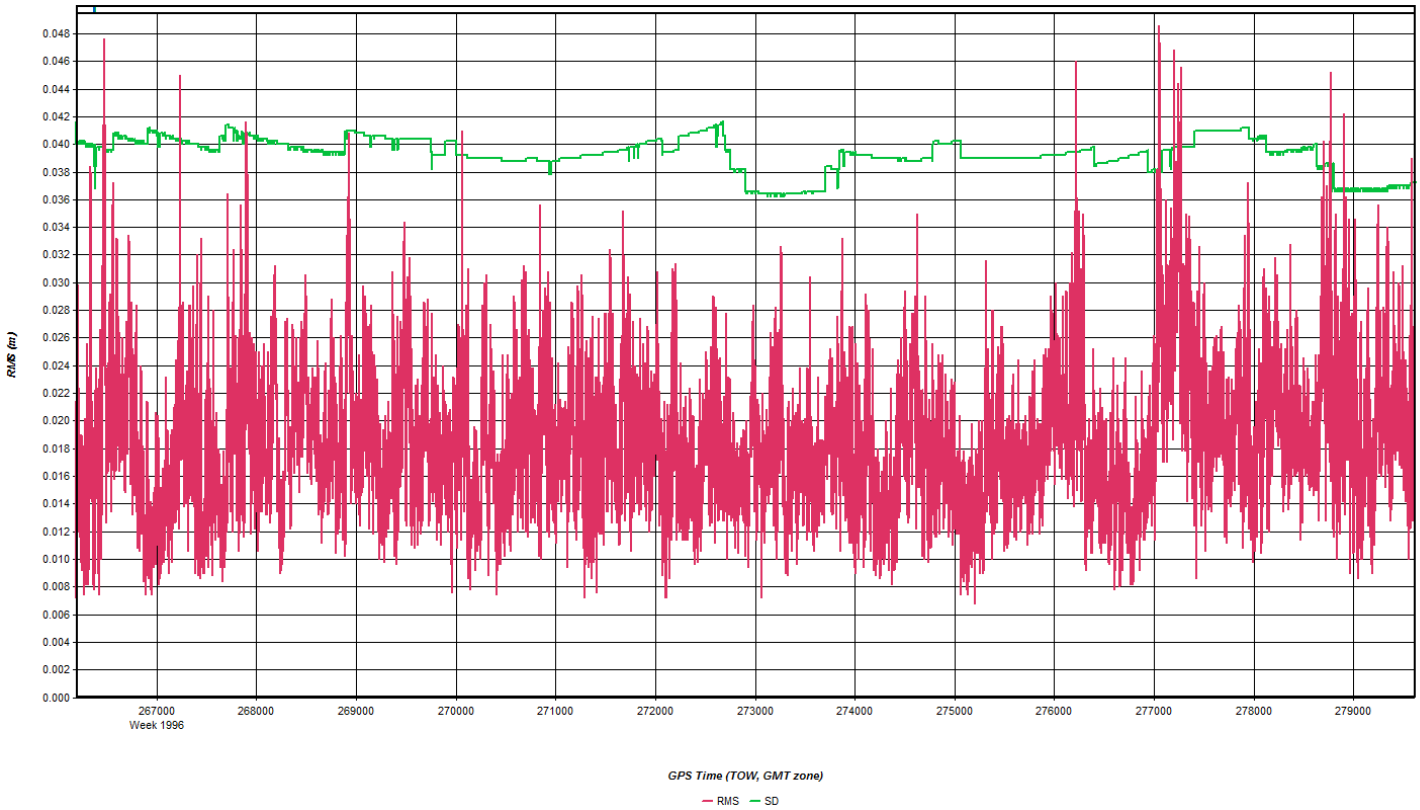
April 11, 2018-A2 (SN7229, N103RM)

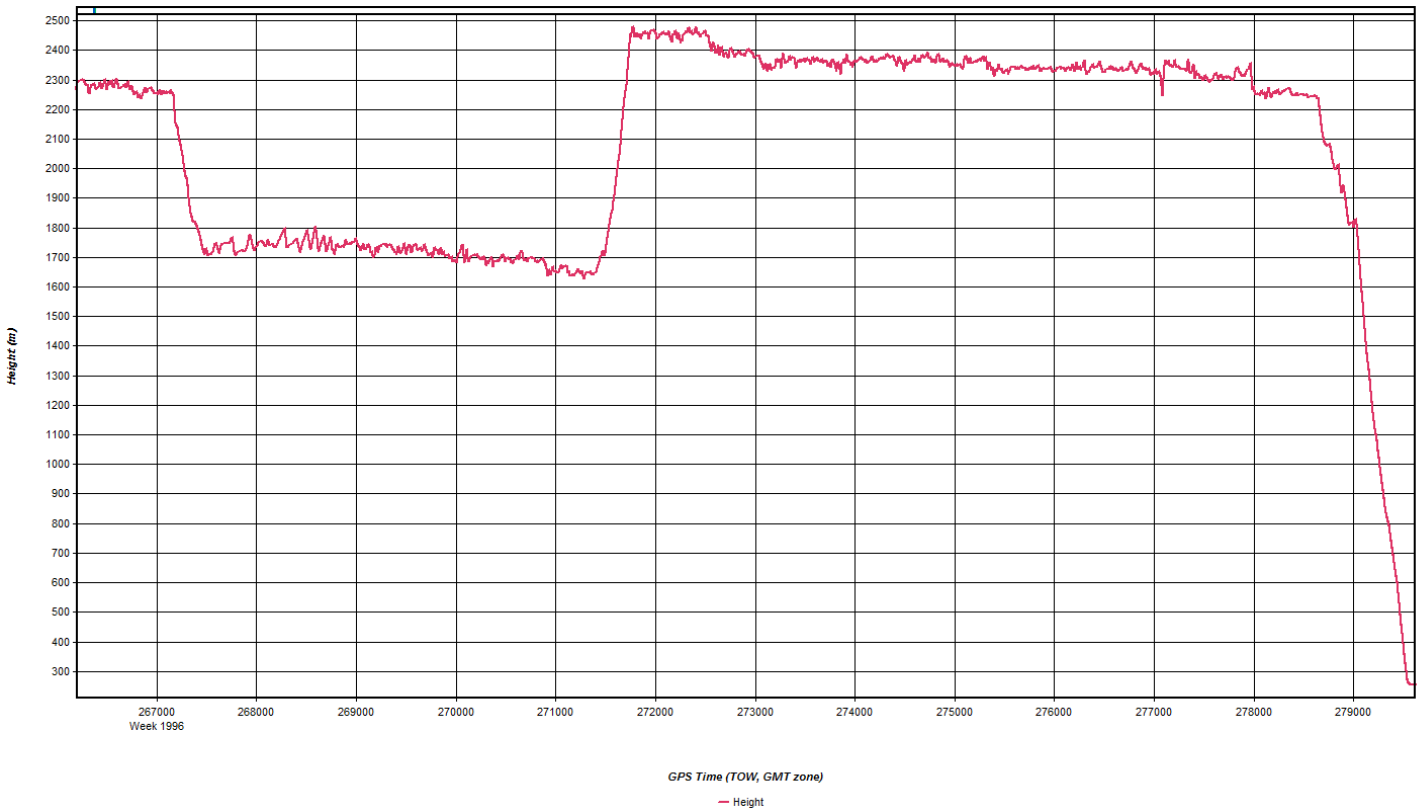

ARTK_REF0
10 km

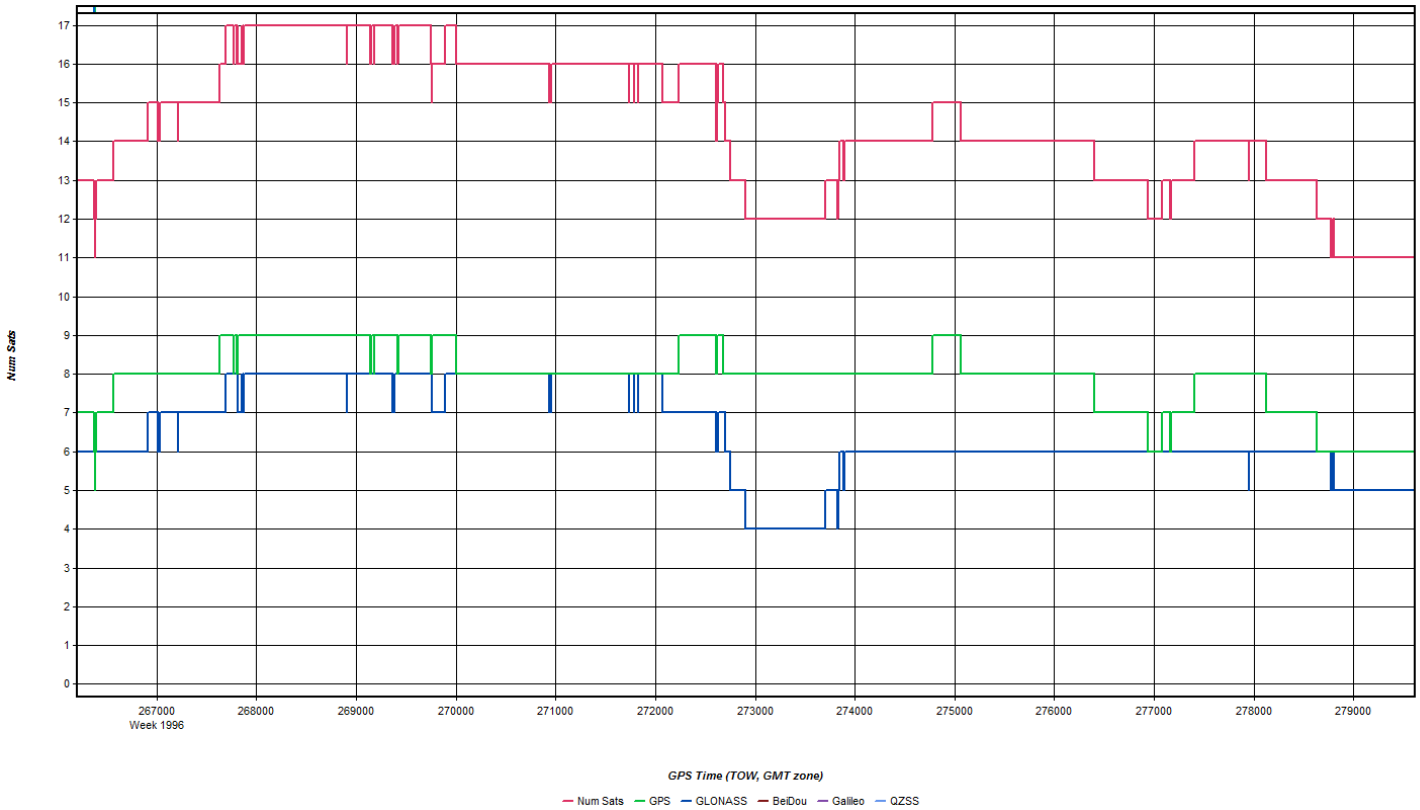

PDOP
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
PDOP

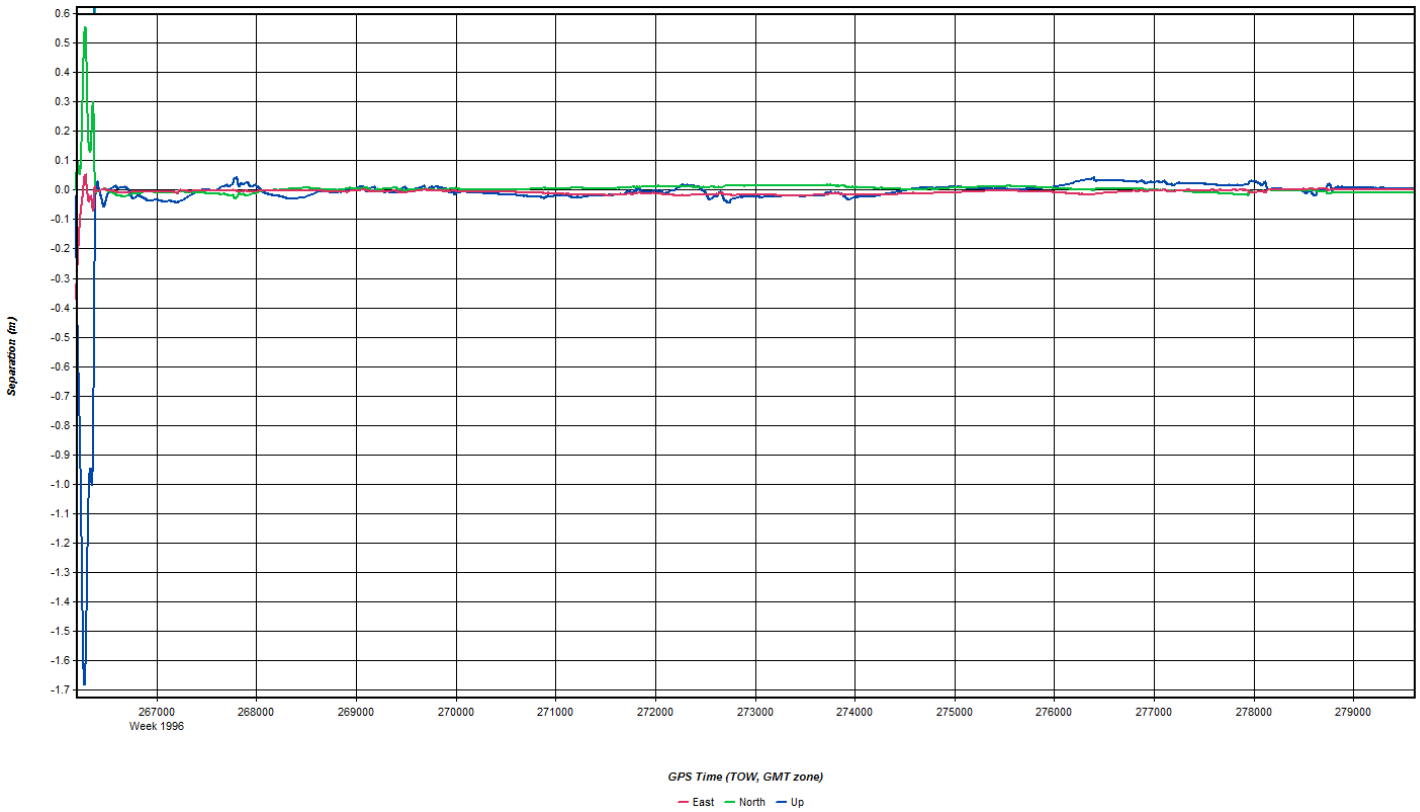

Status
2
1
0
-1
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

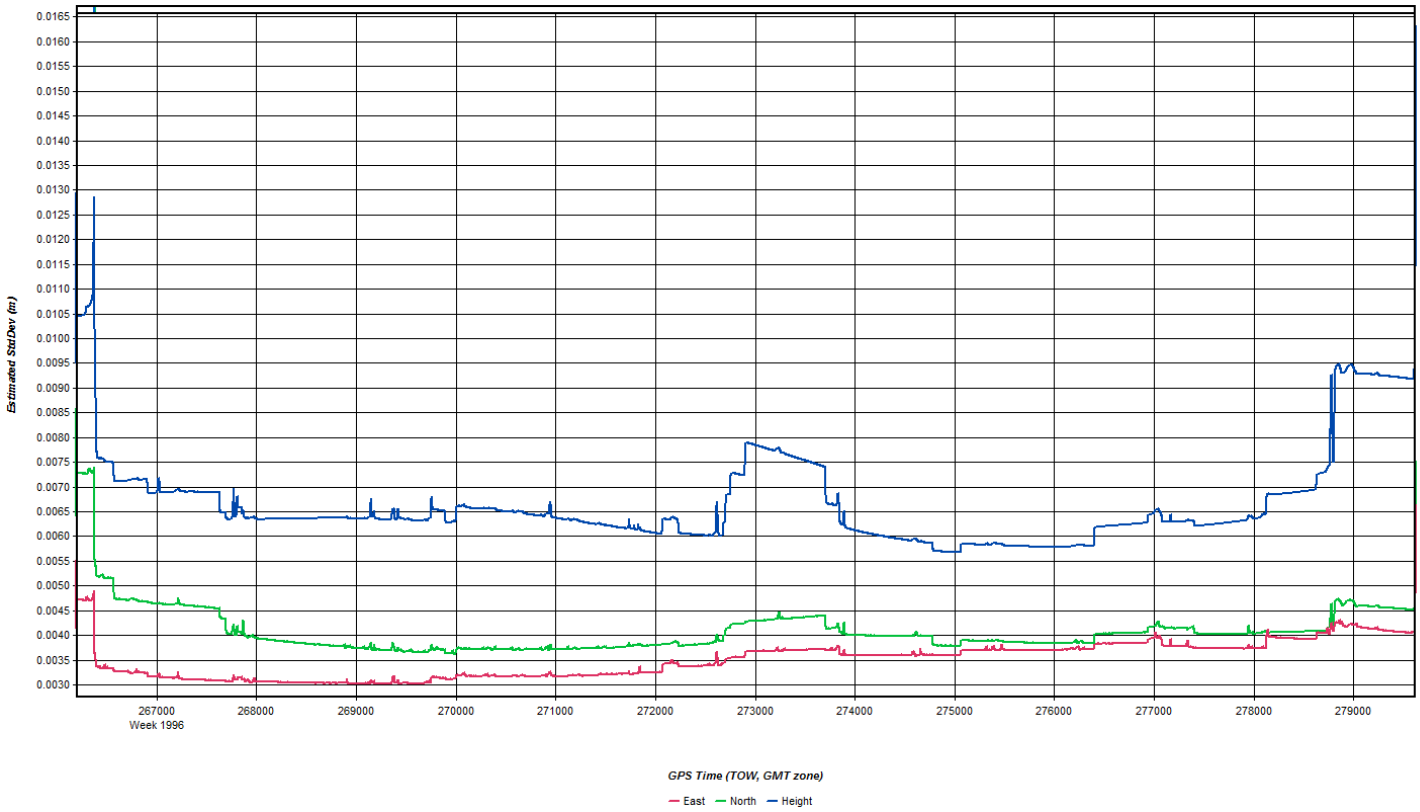

Roll & pitch (deg)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
Roll
Pitch

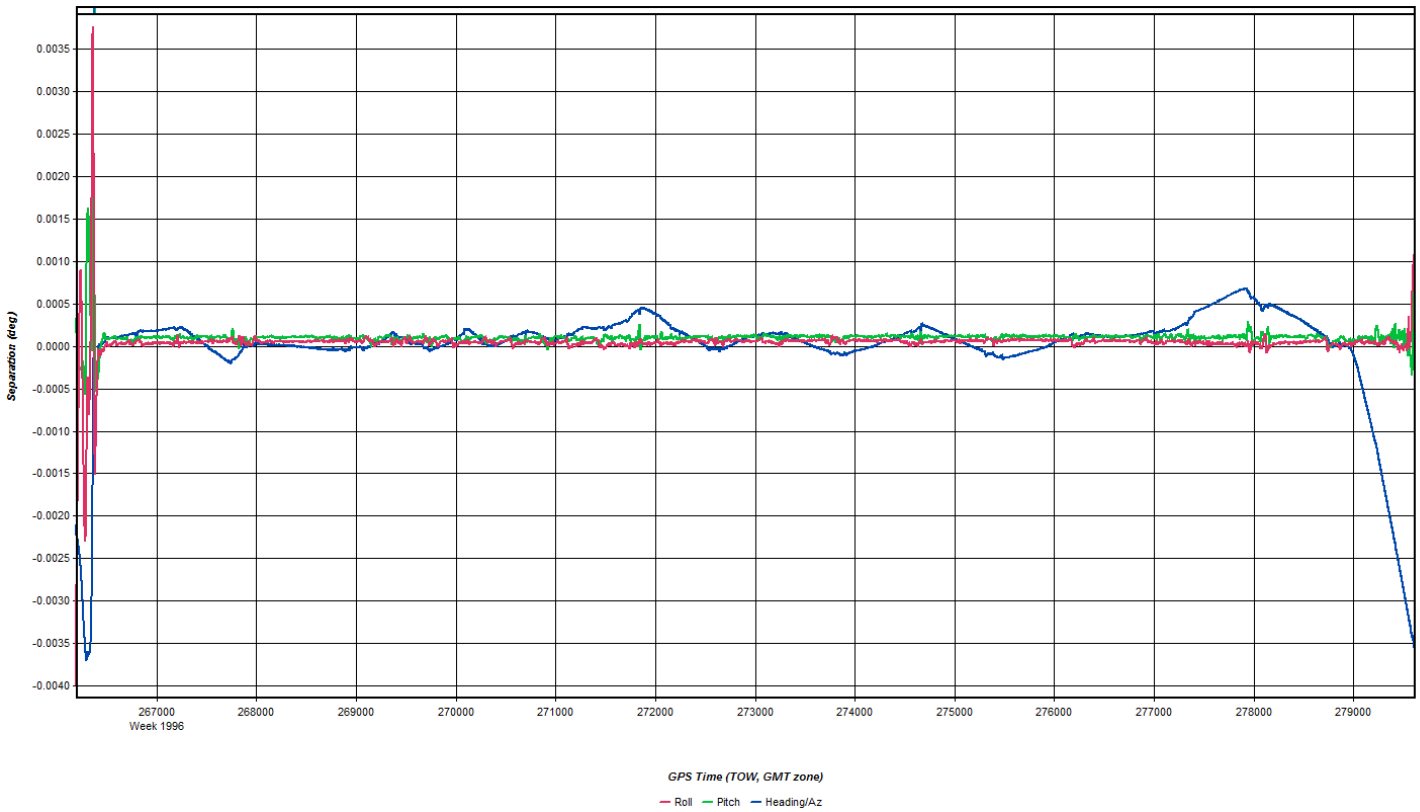

RMS (m)
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
RMS
SD

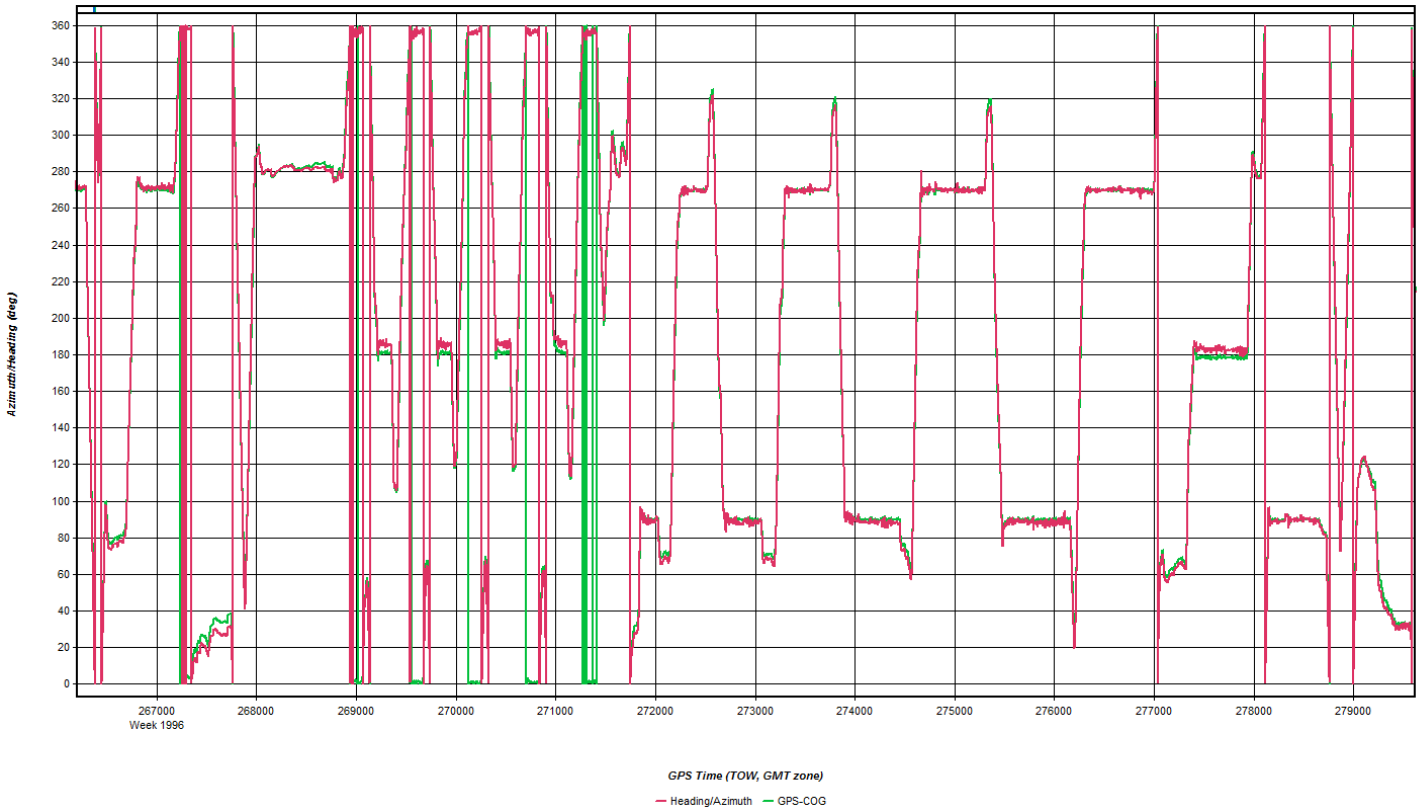

Height (m)
2500
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
Height

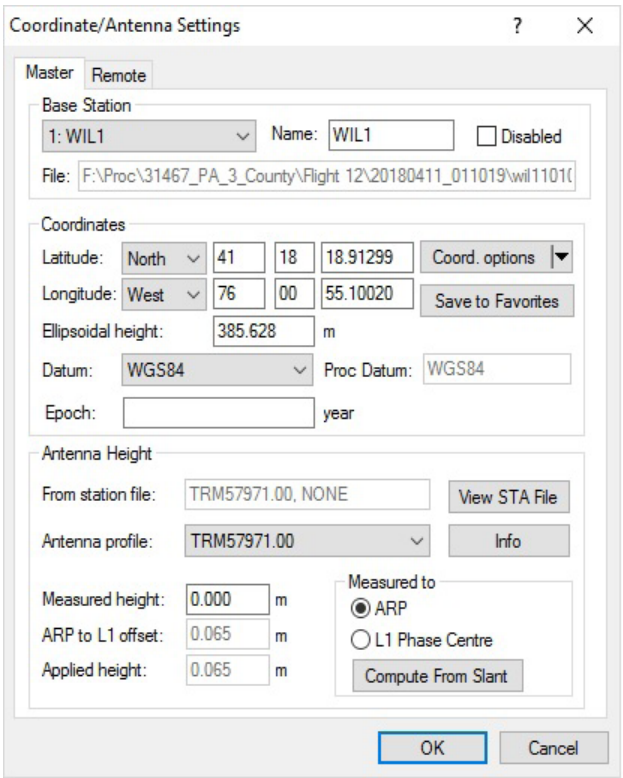

Num Sats
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.6
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0165
0.0160
0.0155
0.0150
0.0145
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
-0.0005
-0.0010
-0.0015
-0.0020
-0.0025
-0.0030
-0.0035
-0.0040
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
267000
Week 1996
268000
269000
270000
271000
272000
273000
274000
275000
276000
277000
278000
279000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: WIL1
Name: WIL1
Disabled
File: F:\Proc\31467_PA_3_County\Flight 12\20180411_011019\wil1101(
Coordinates
Latitude: North 41 18 18.91299
Coord. options
Longitude: West 76 00 55.10020
Save to Favorites
Ellipsoidal height: 385.628 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TRM57971.00, NONE
View STA File
Antenna profile: TRM57971.00
Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS_PA (Flight 12)
SENSOR OPERATOR	A. Brooker
PILOT	A. Werle
AIRCRAFT	KBM – 103RM
AIRBASE	AVP – Scranton, PA

DATE	2018/04/10
SENSOR(S)	ALS70-HP
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	LiDAR 2

AIRCRAFT BLOCK TIME

Engine On:	01:04	Takeoff:	01:18
Engine Off:	05:43	Landing:	05:39
TOTAL:	4.7 hrs	TOTAL:	4.4 hrs

MISSION DETAILS

AGL Height:	1950m	Pulse Rate:	269Hz
Speed:	150kts	Scan Rate:	56Hz
Laser Power:	100%	FOV:	36°

STATIC ALIGNMENT

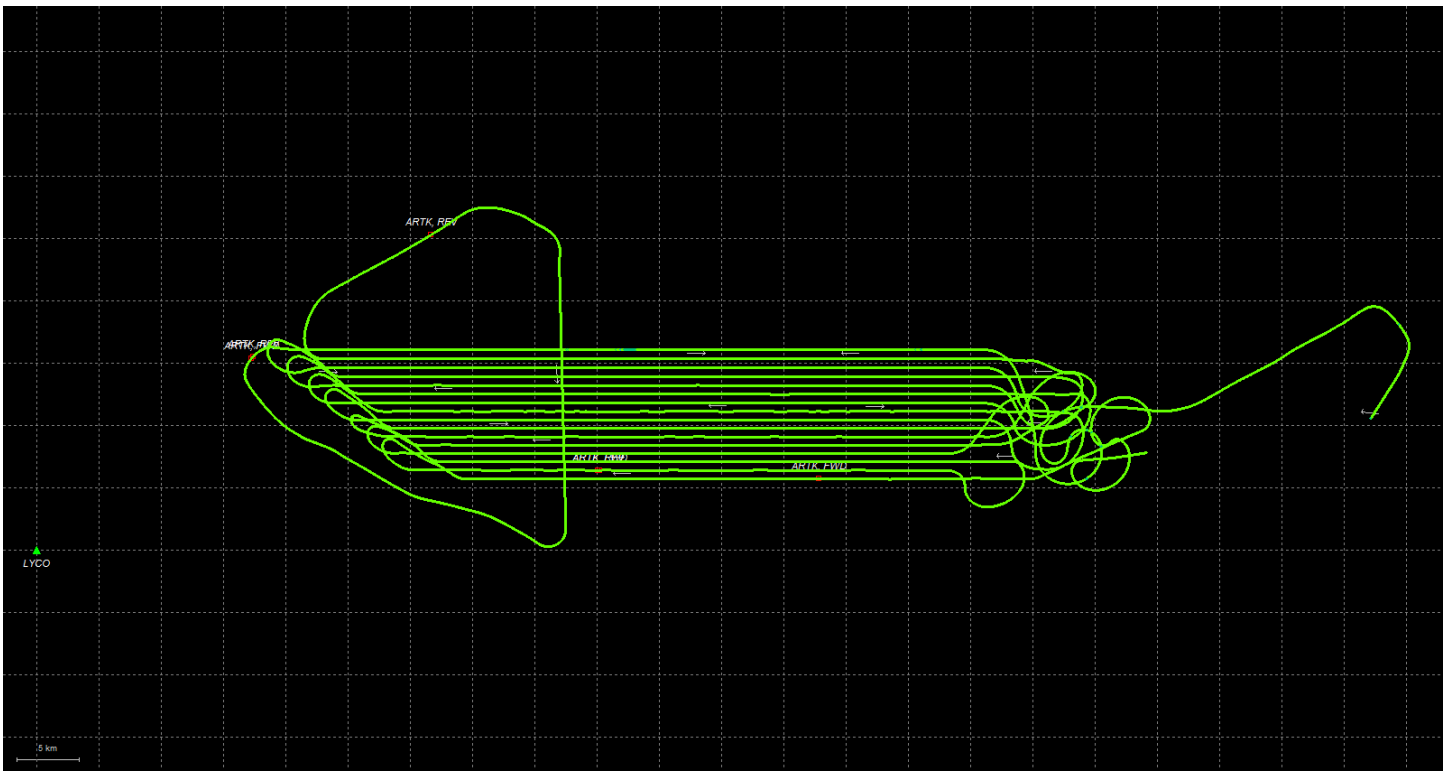
	START	END
Pre-Mission	01:25	02:27
Post Mission	05:25	05:32

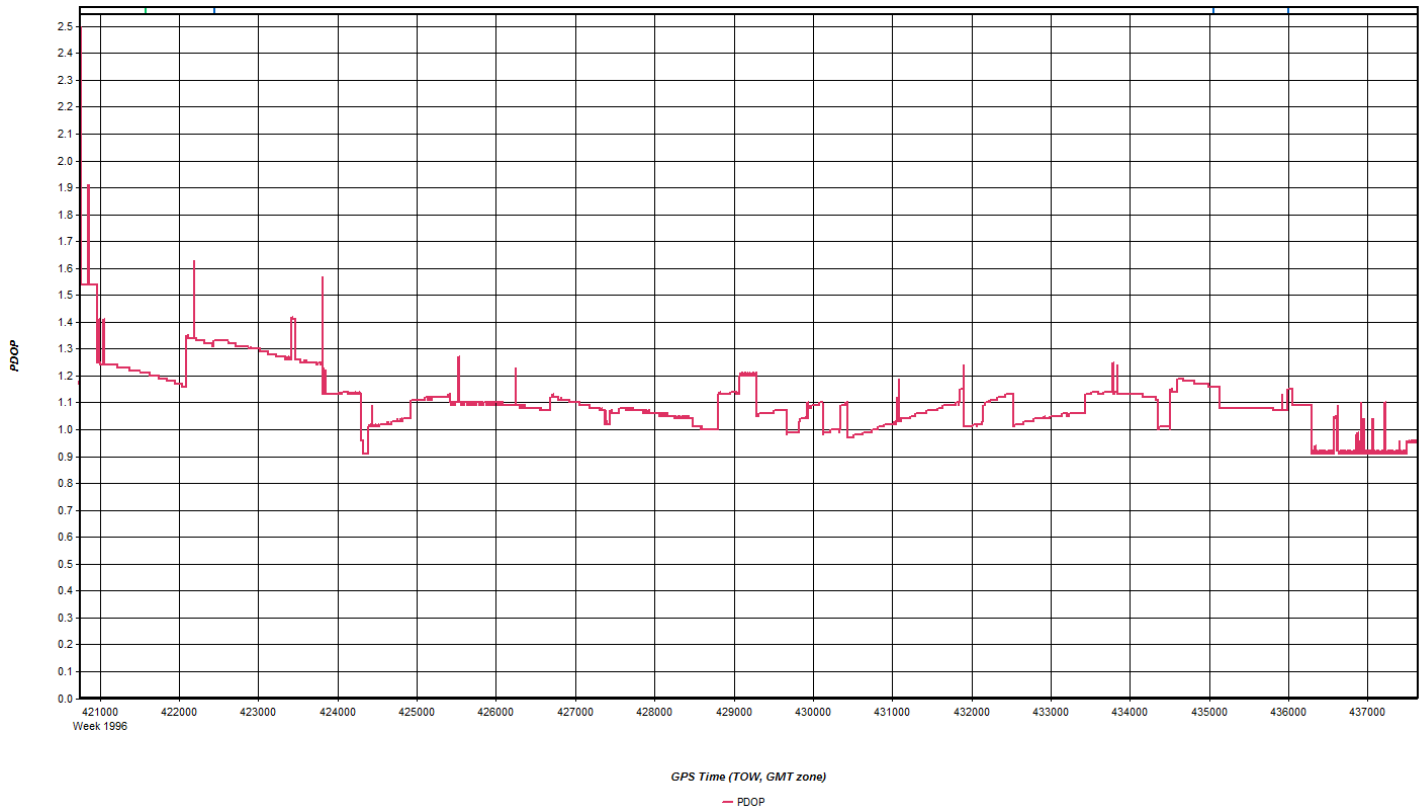
FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME START	GPS TIME END	COMMENTS	GPS TIME START	GPS TIME END	"S" TURN
*048		282	013448	01:34:48	--:--:--	*Aborted line - Clouds			
101		101	014523	01:45:23	01:51:12	C			
*101		282	015438	01:54:38	--:--:--	*Aborted line – IMU Error			
*101		282	020707	02:07:07	--:--:--	*Aborted line - Clouds			
KAR Turn over WIL1 (02:21/02:27), began QS_QI_Sample block (*See separate log sheet*), Continued Flight 12 after									
001		101	033101	03:31:01	03:33:22	C			
002		282	033739	03:37:39	03:41:41	C			
003		101	034516	03:45:16	03:50:43	C			
004		282	035519	03:55:19	04:02:10	C			
005		101	040534	04:05:34	04:13:37	C			
006		282	041810	04:18:10	04:28:04	C			
007		101	043144	04:31:44	04:42:15	C			
008		282	044545	04:45:45	04:56:20	C			
NCROSS1		190	050347	05:03:47	05:11:58	C			
048		101	051611	05:16:11	05:23:44	C			

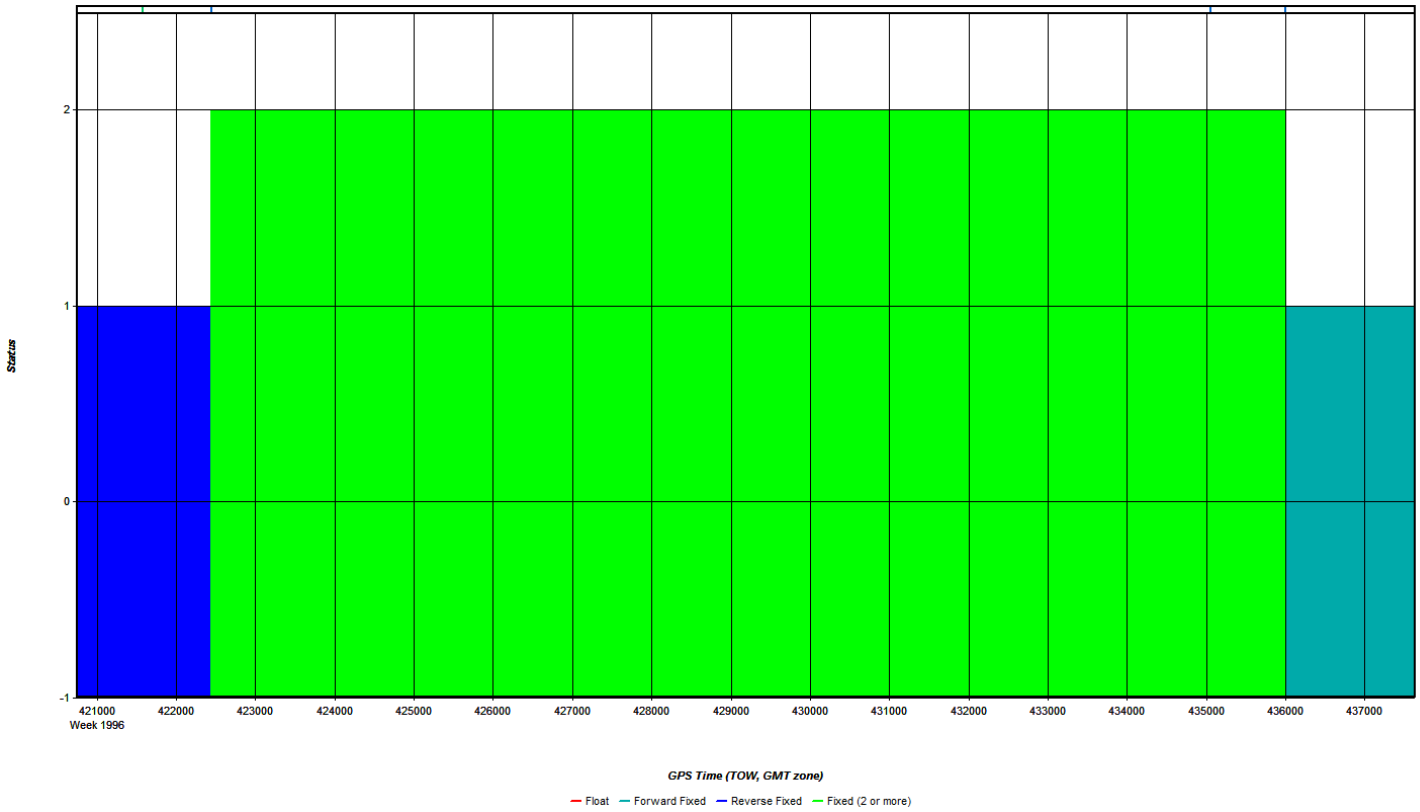
SUN ANGLE
@Start:
@End:
@Peak:

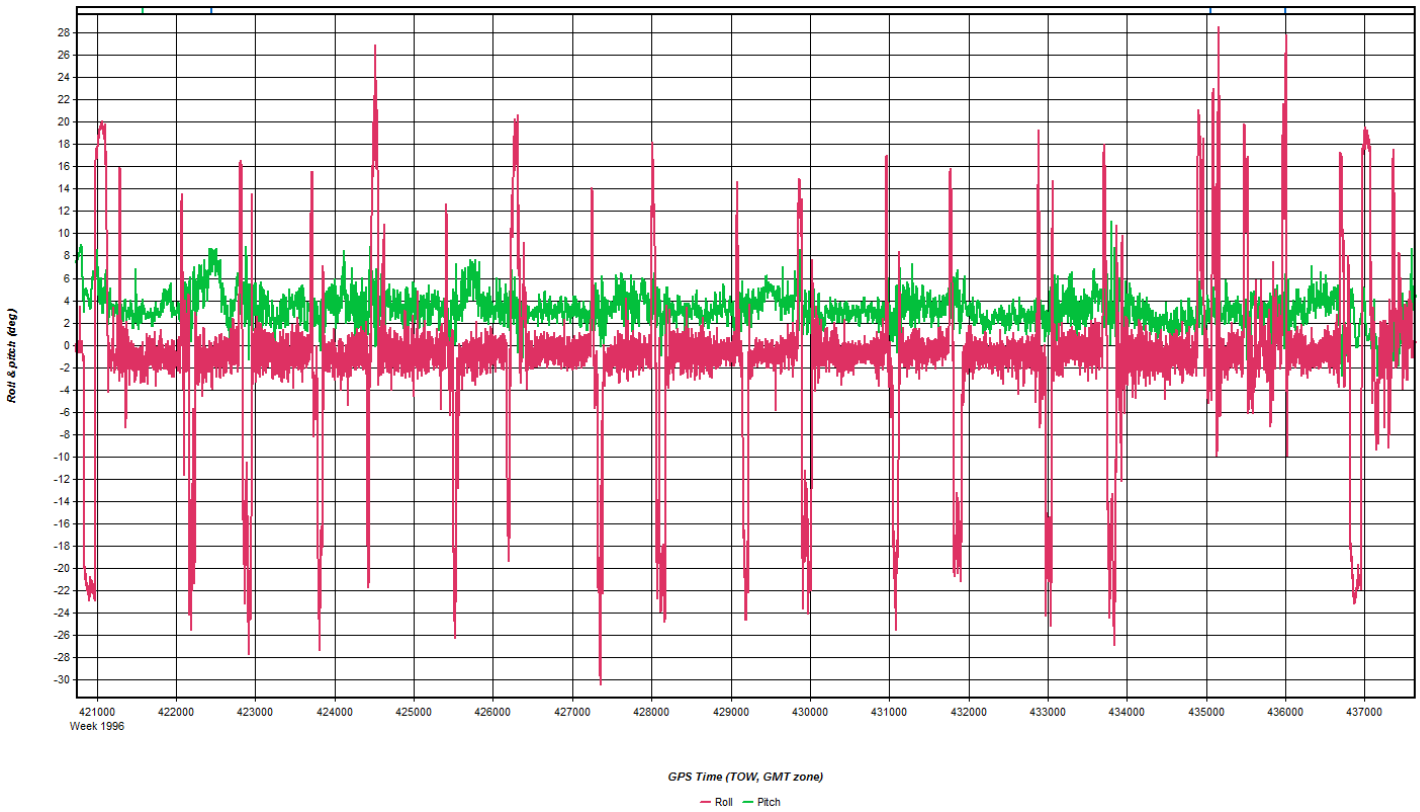
ADDITIONAL NOTES: Clear conditions. Problems with clouds and precipitation to start. *Reflew line 101, first attempt seemed a bit low at start, completed line but tried two more attempts and had an IMU error and then too many clouds on third attempt.*
PDOP 1.2 18 Sats
KAR Turns over WIL1.

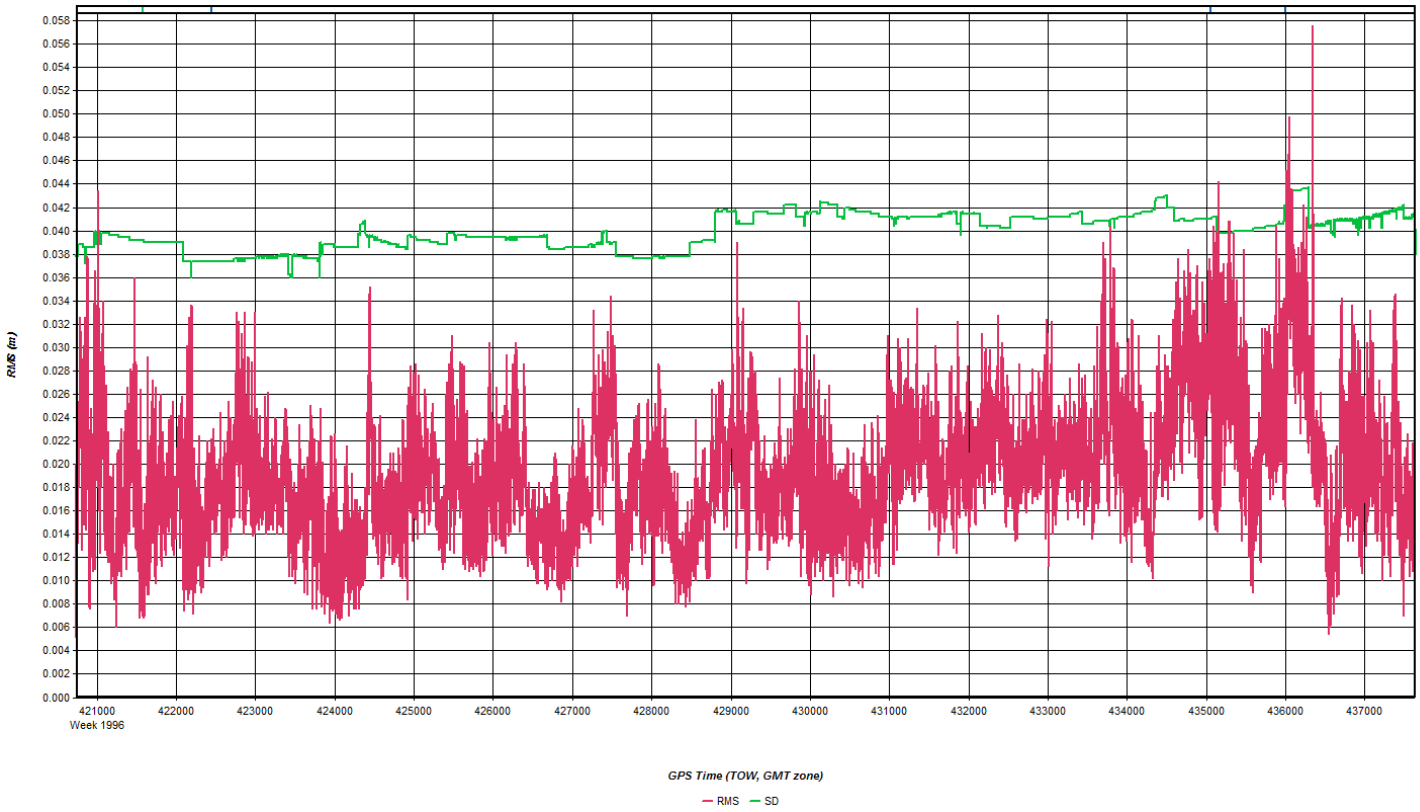
April 12, 2018-A (SN7229, N103RM)

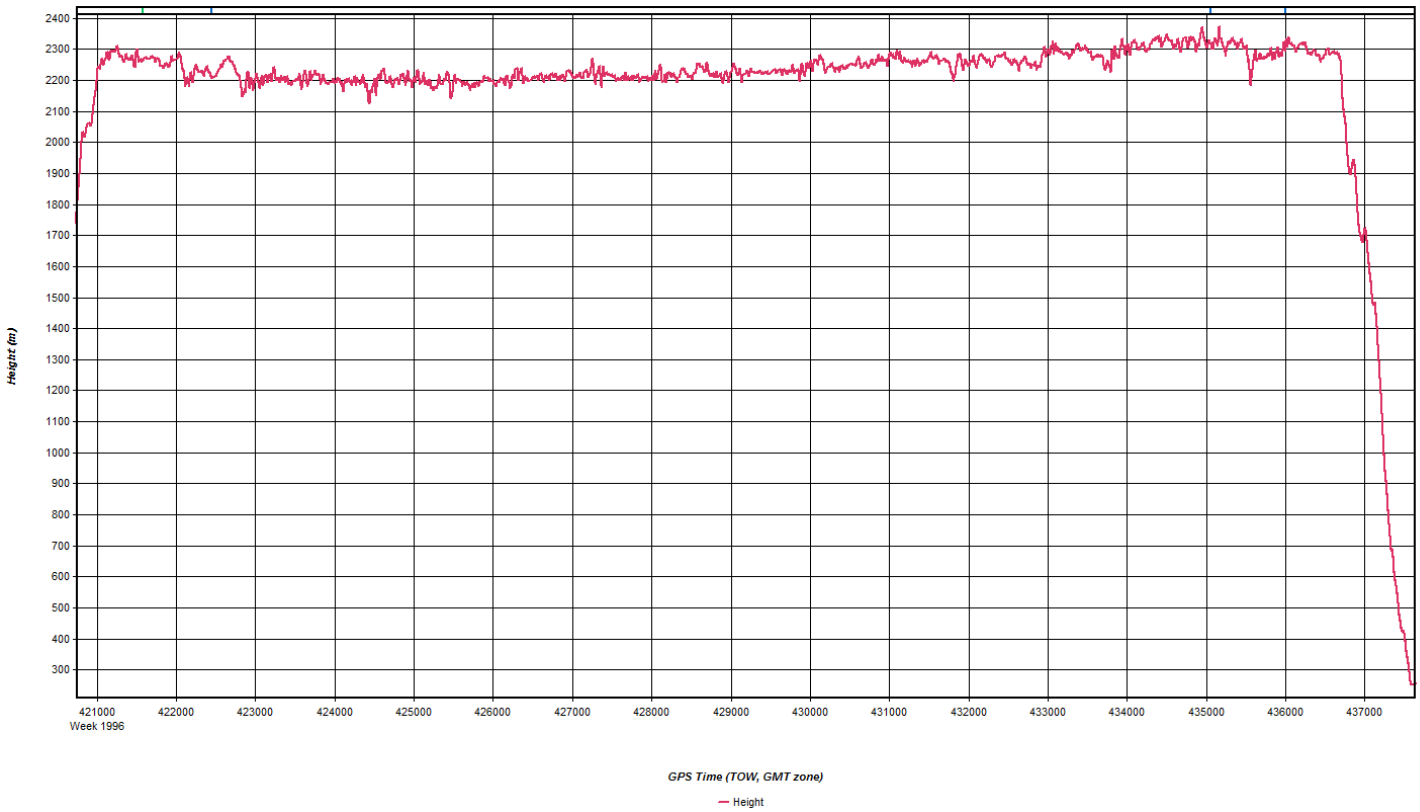

ARTK_REV
ARTK_REV
ARTK_FWD
ARTK_FWD
LYCO
5 km

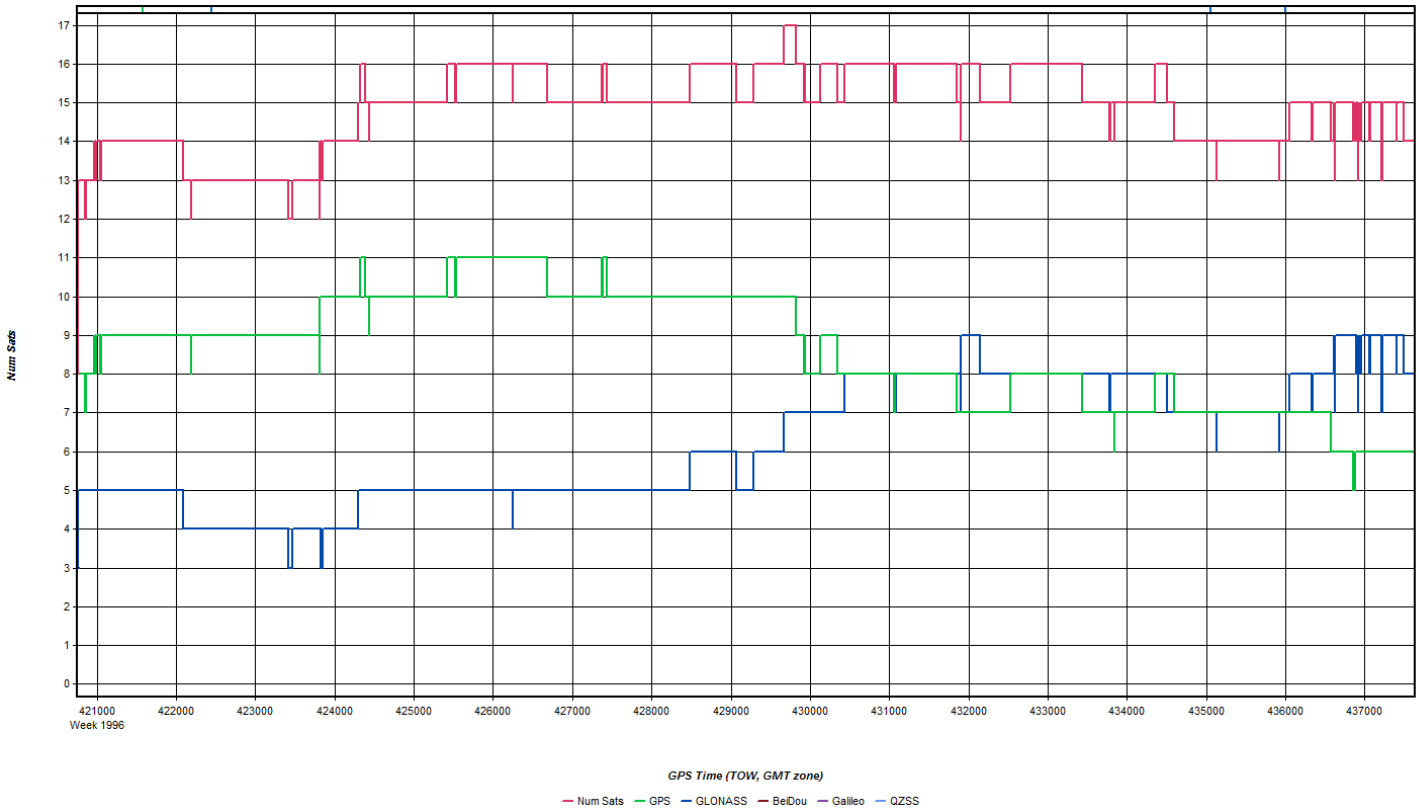

PDOP
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
PDOP

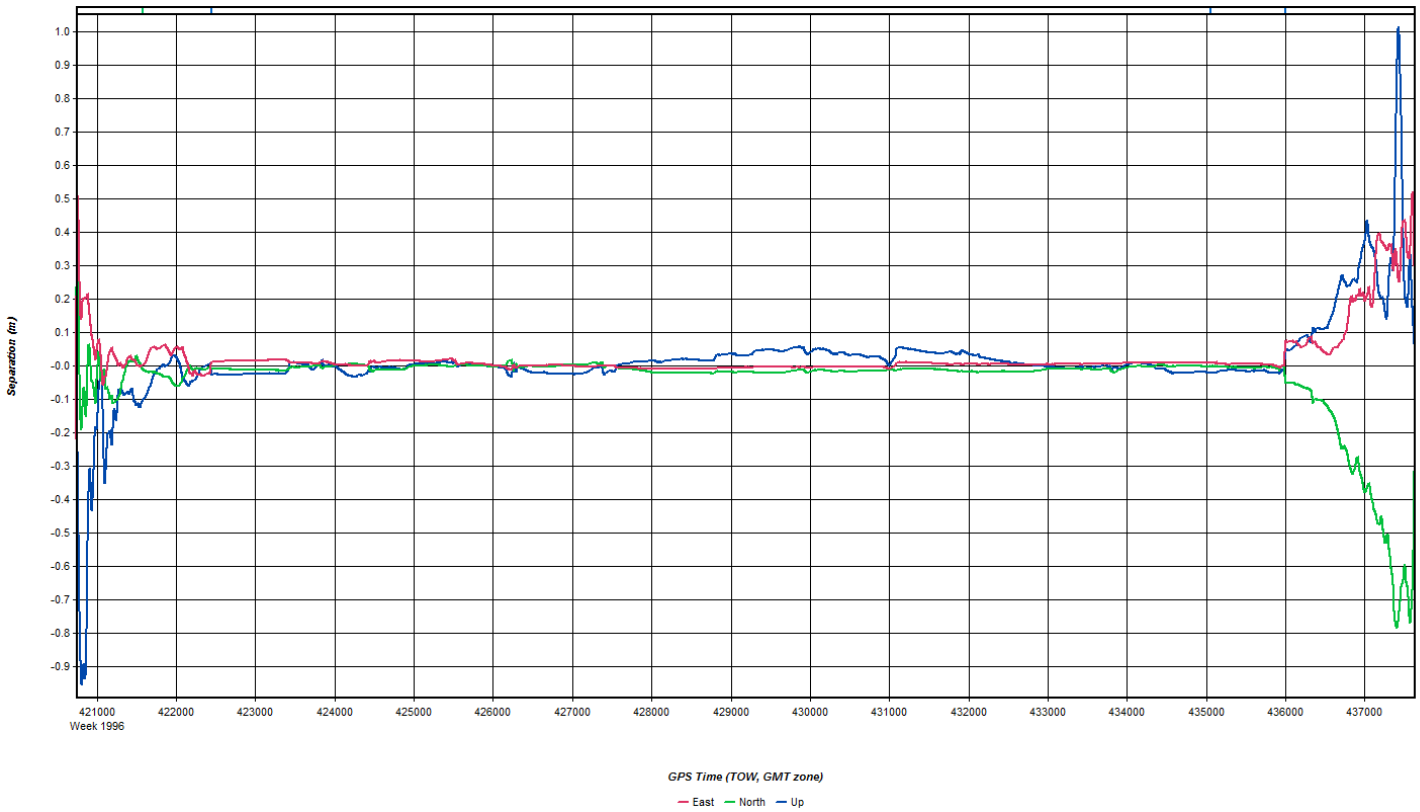

Status
2
1
0
-1
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

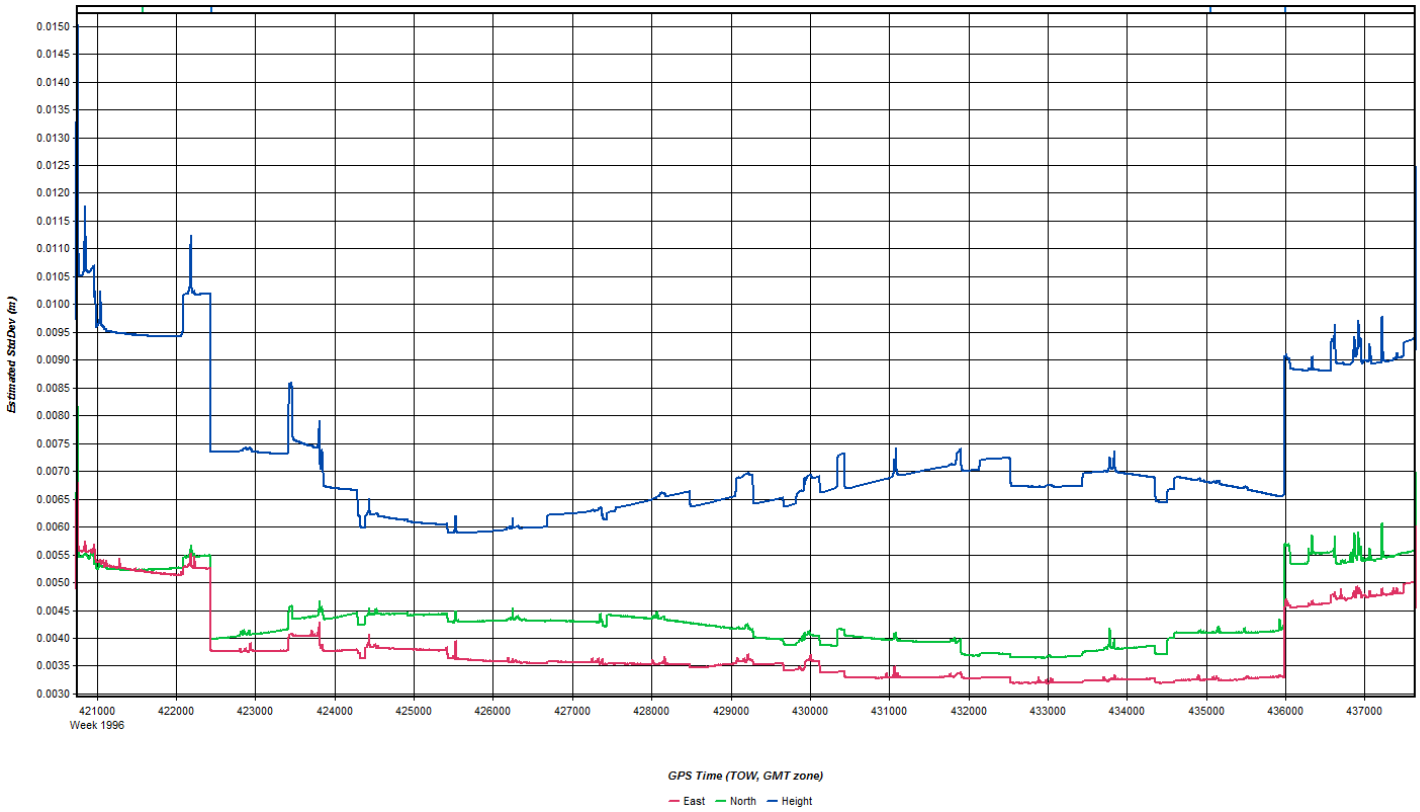

Roll & pitch (deg)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
Roll
Pitch

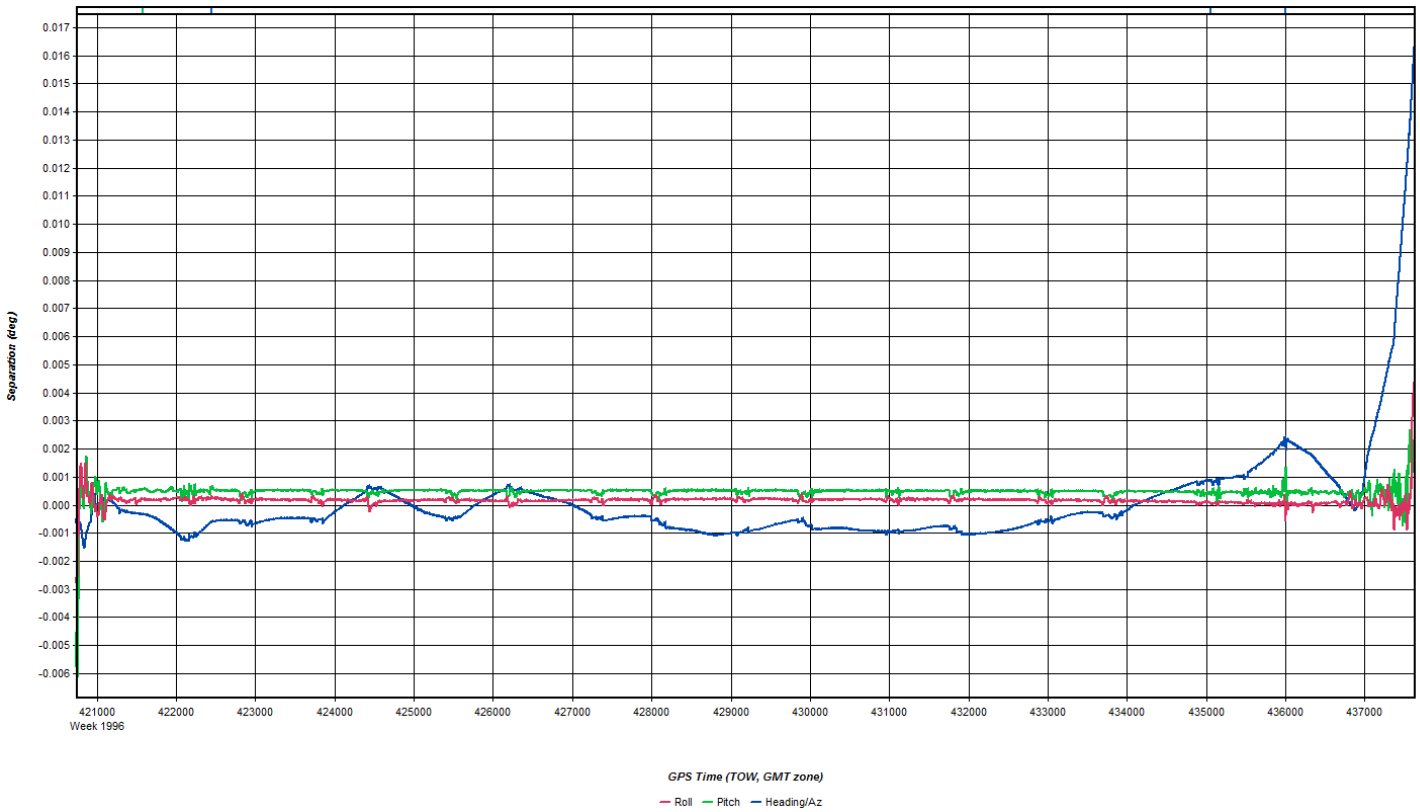

RMS (m)
0.058
0.056
0.054
0.052
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
RMS
SD

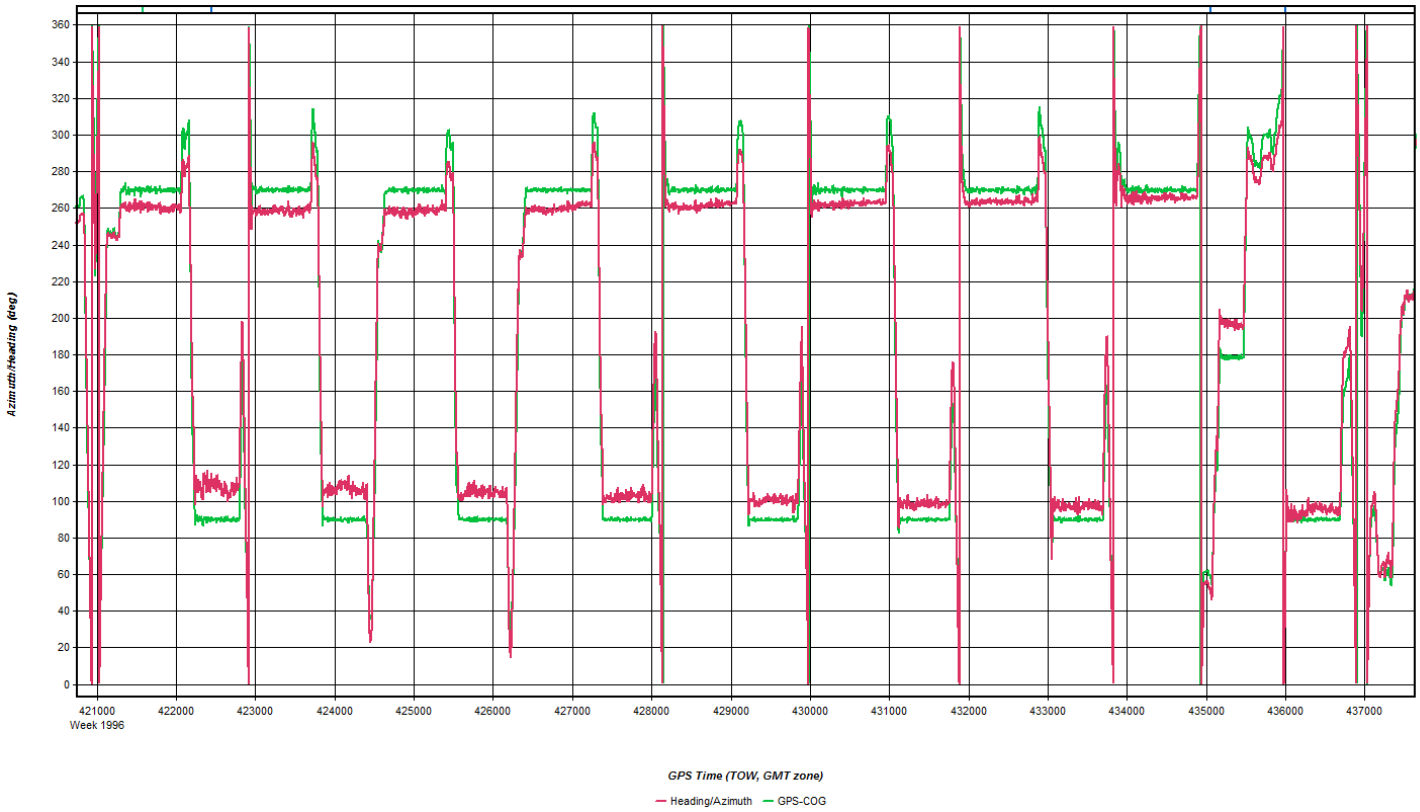

Height (m)
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
Height

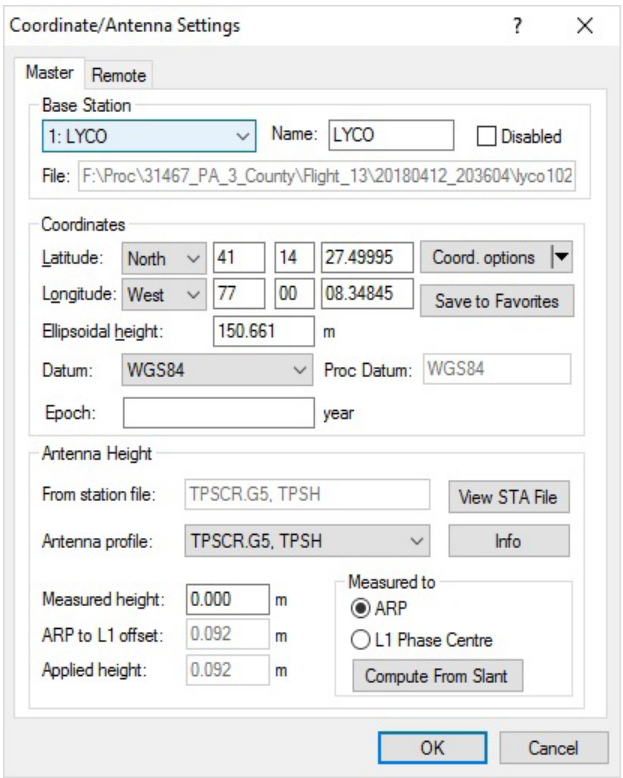

Num Sats
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
-0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0150
0.0145
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
0.0030
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
421000
Week 1996
422000
423000
424000
425000
426000
427000
428000
429000
430000
431000
432000
433000
434000
435000
436000
437000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: LYCO
Name: LYCO
Disabled
File: F:\Proc\31467_PA_3_County\Flight_13\20180412_203604\lyco102
Coordinates
Latitude: North 41 14 27.49995
Coord. options
Longitude: West 77 00 08.34845
Save to Favorites
Ellipsoidal height: 150.661 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TPSCR.G5, TPSH
View STA File
Antenna profile: TPSCR.G5, TPSH
Info
Measured height: 0.000 m
ARP to L1 offset: 0.092 m
Applied height: 0.092 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

LIDAR & AERIAL PHOTO FLIGHT LOG

20 YEARS OF EXCELLENCE — ATLIS — LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS_PA (Flight 13)	**DATE**	2018/04/12
SENSOR OPERATOR	A. Brooker	**SENSOR(S)**	ALS70-HP
PILOT	A. Werle	**IMU**	Honeywell uIRS
AIRCRAFT	KBM – 103RM	**ABGPS**	IPAS-CUS6
AIRBASE	AVP – Scranton, PA	**DATA DRIVES**	LiDAR 2

AIRCRAFT BLOCK TIME

Engine On:	20:38	**Takeoff:**	20:45
Engine Off:	01:37	**Landing:**	01:33
TOTAL:	5 hrs	**TOTAL:**	4.8 hrs

MISSION DETAILS

AGL Height:	1950m	**Pulse Rate:**	269Hz
Speed:	150kts	**Scan Rate:**	56Hz
Laser Power:	100%	**FOV:**	360

FLIGHT LINE #	**SET HISTO**	**DIRECTION**	**LiDAR File Name**	**GPS TIME START**	**GPS TIME END**	**COMMENTS**	**"S" TURN**
047		282	210312	21:03:12	21:13:56	C	
046		101	211734	21:17:34	21:26:13	C	
045		282	213028	21:30:28	21:41:17	C	
044		101	214422	21:44:22	21:53:31	C	
043		282	215719	21:57:19	22:09:35	C	
042		101	221249	22:12:49	22:22:30	C	
041		282	222748	22:27:48	22:40:18	C	
040		101	224323	22:43:23	22:52:59	C	
039		282	225754	22:57:54	23:10:53	Check for possible mist	
038		101	231400	23:14:00	23:23:48	Check for possible mist	
037		282	232848	23:48:48	23:42:14	C	
036		101	234533	23:45:33	23:55:33	C	
035		282	000031	00:00:31	00:14:20	C	
034		101	001736	00:17:36	00:27:57	C	
033		282	003304	00:33:04	00:47:48	C	
NCROSS1		190	005406	00:50:06	Missed	C	
032		101	010707	01:07:07	01:17:49	C	

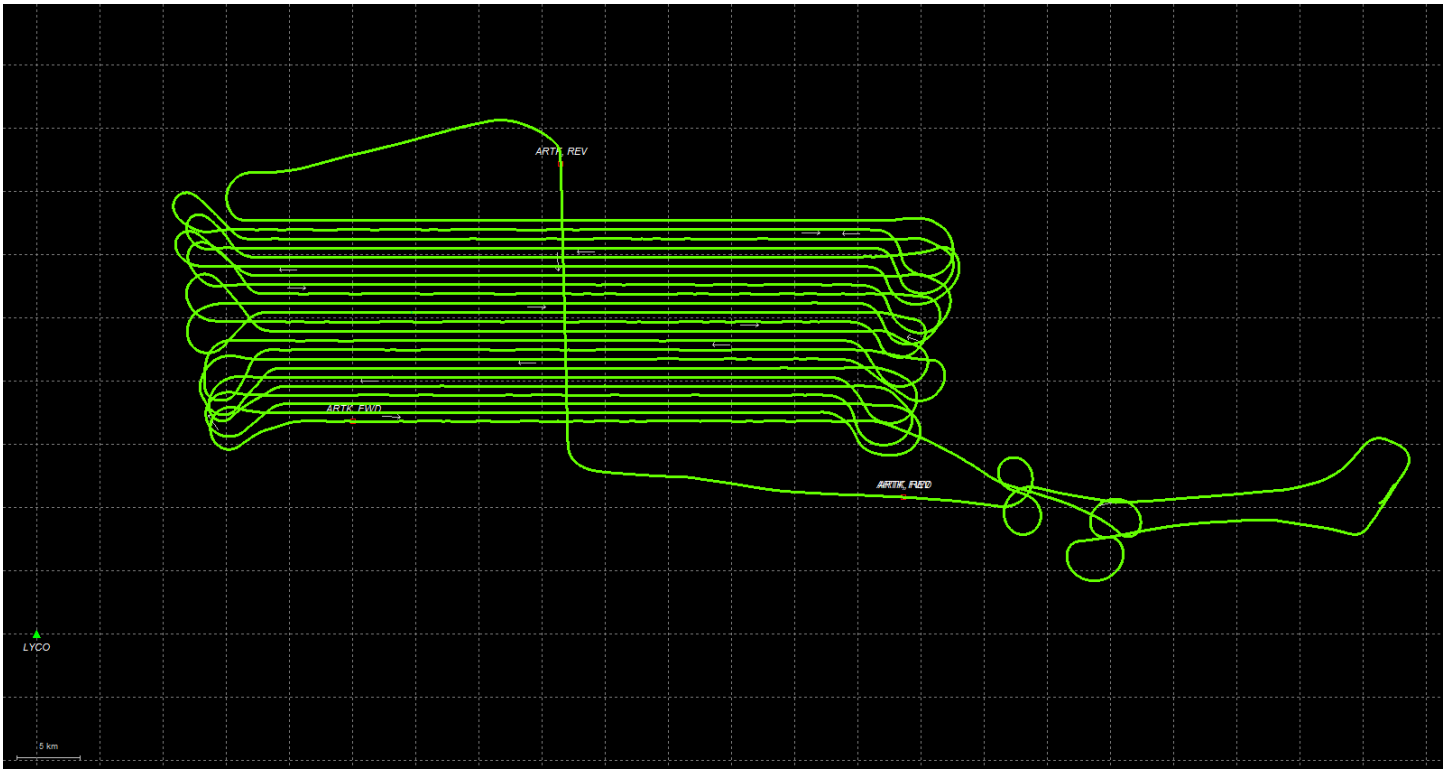
GPS TIME

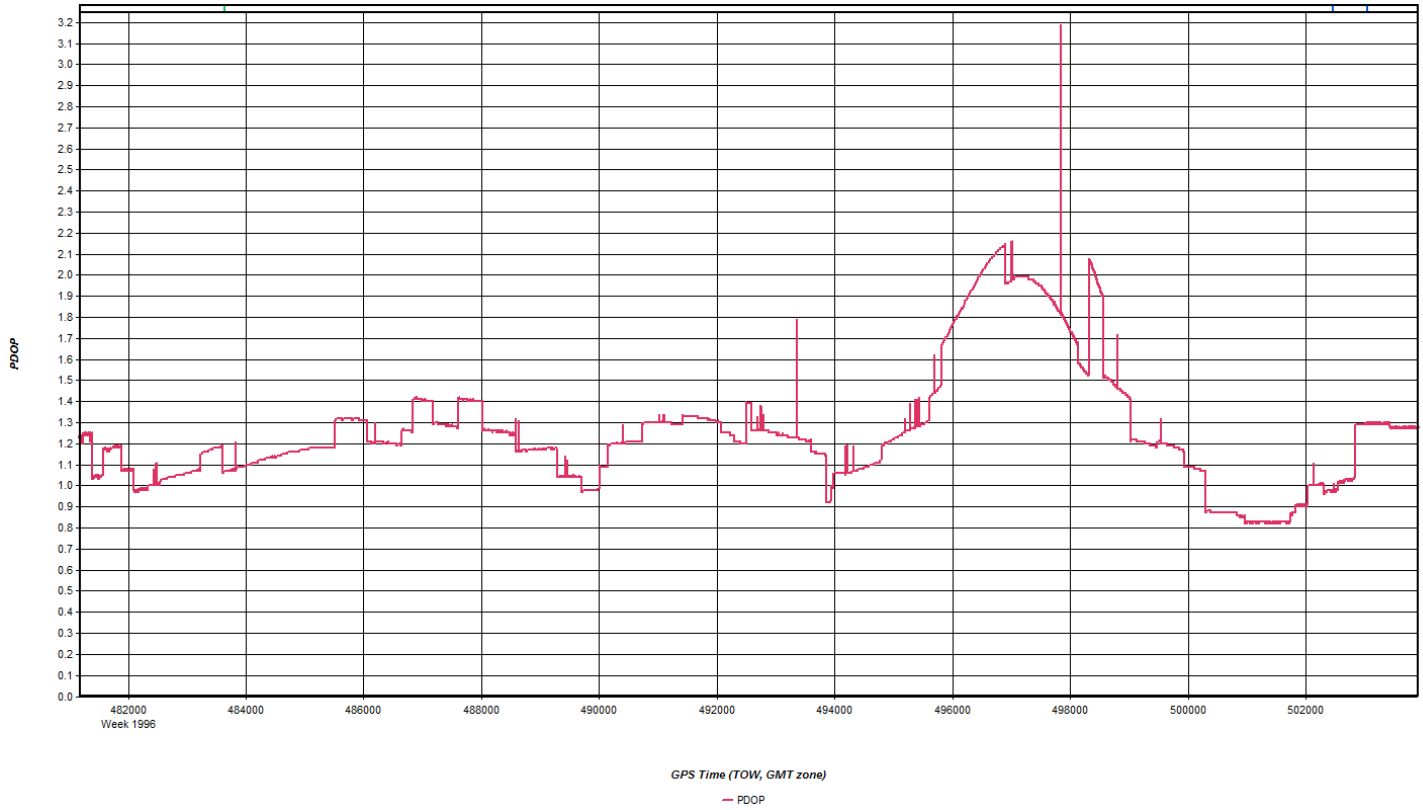
	START	**END**
Pre-Mission	20:52	21:01
Post Mission	01:19	01:25

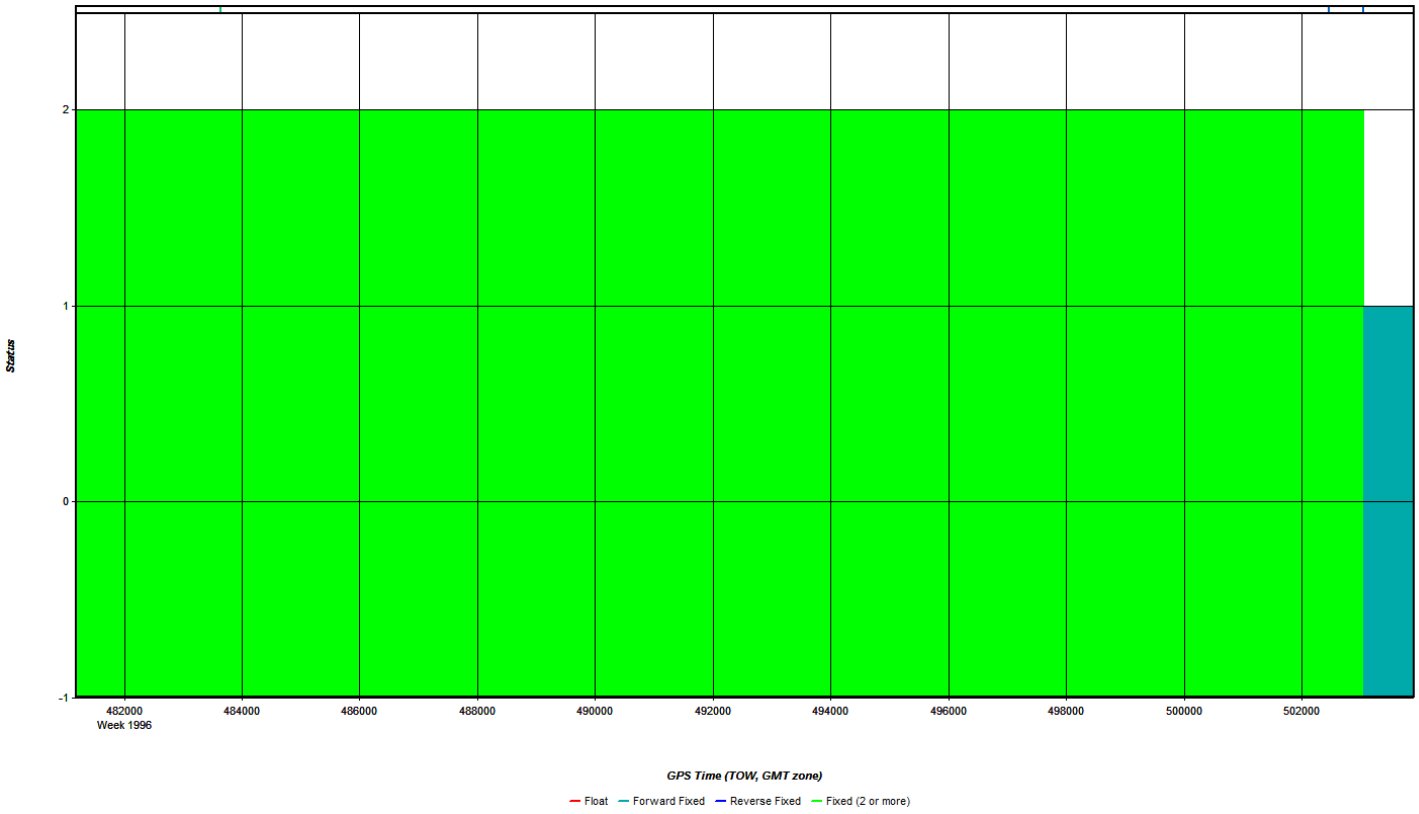
SUN ANGLE
@Start:
@End:
@Peak:

ADDITIONAL NOTES: Clouds in the area with some haze , strong winds out of the west
*****IMU Error prior to KAR turn*****
PDOP 1.3
16 Sats
Lines West to East are a bit fast due to tail wind

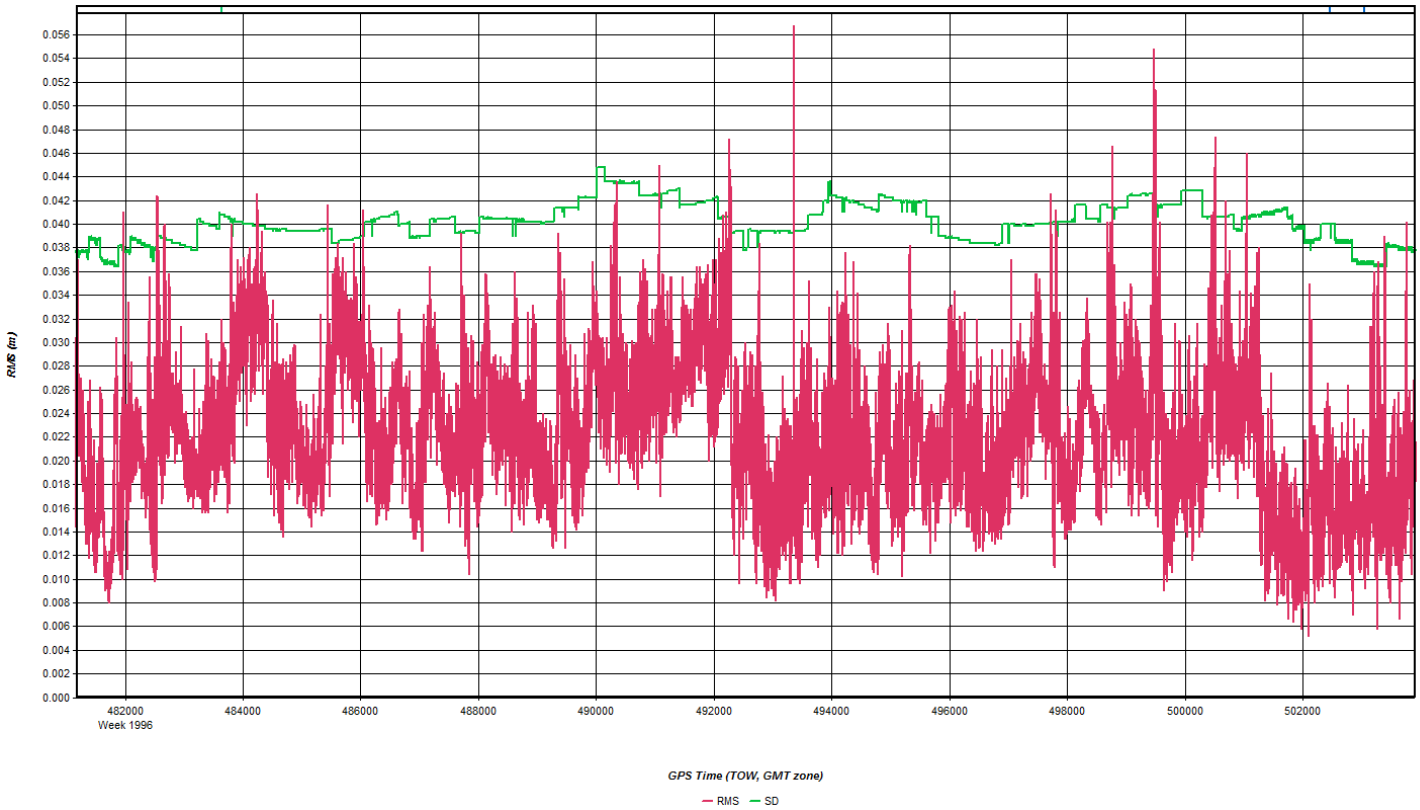
April 13, 2018-A (SN7229, N103RM)

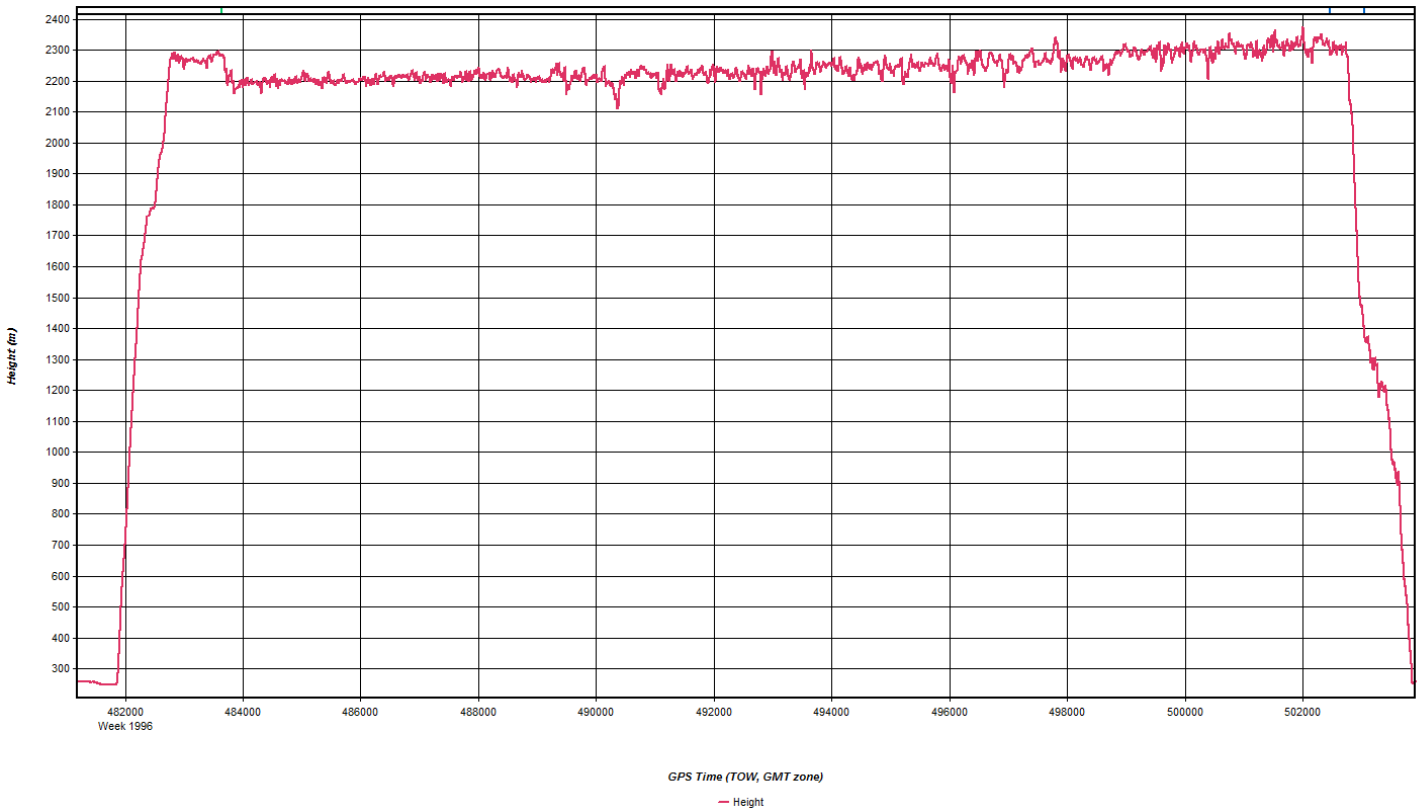

ARTK_REV
ARTK_FWD
ARTK_FWD
LYCO
5 km

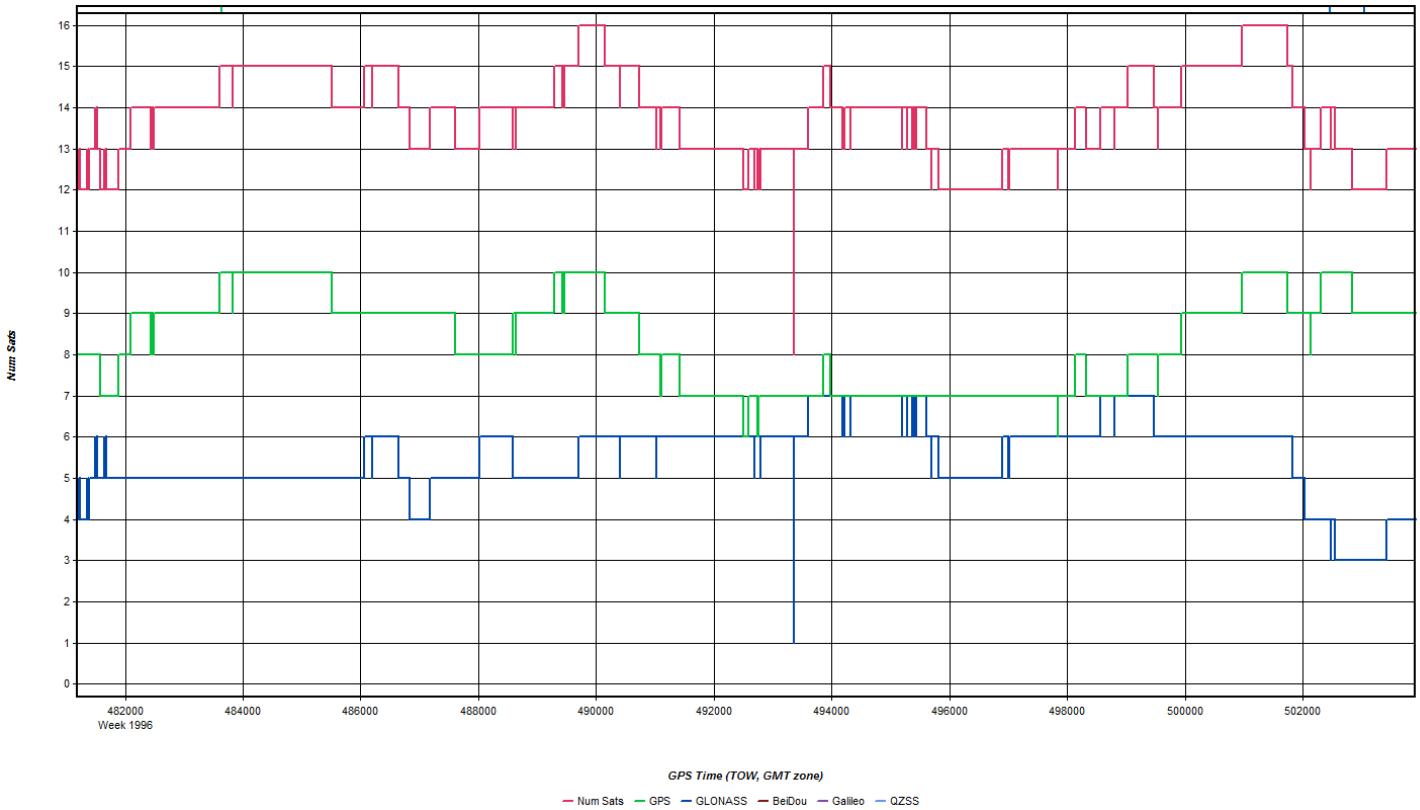

PDOP
3.2
3.1
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
PDOP

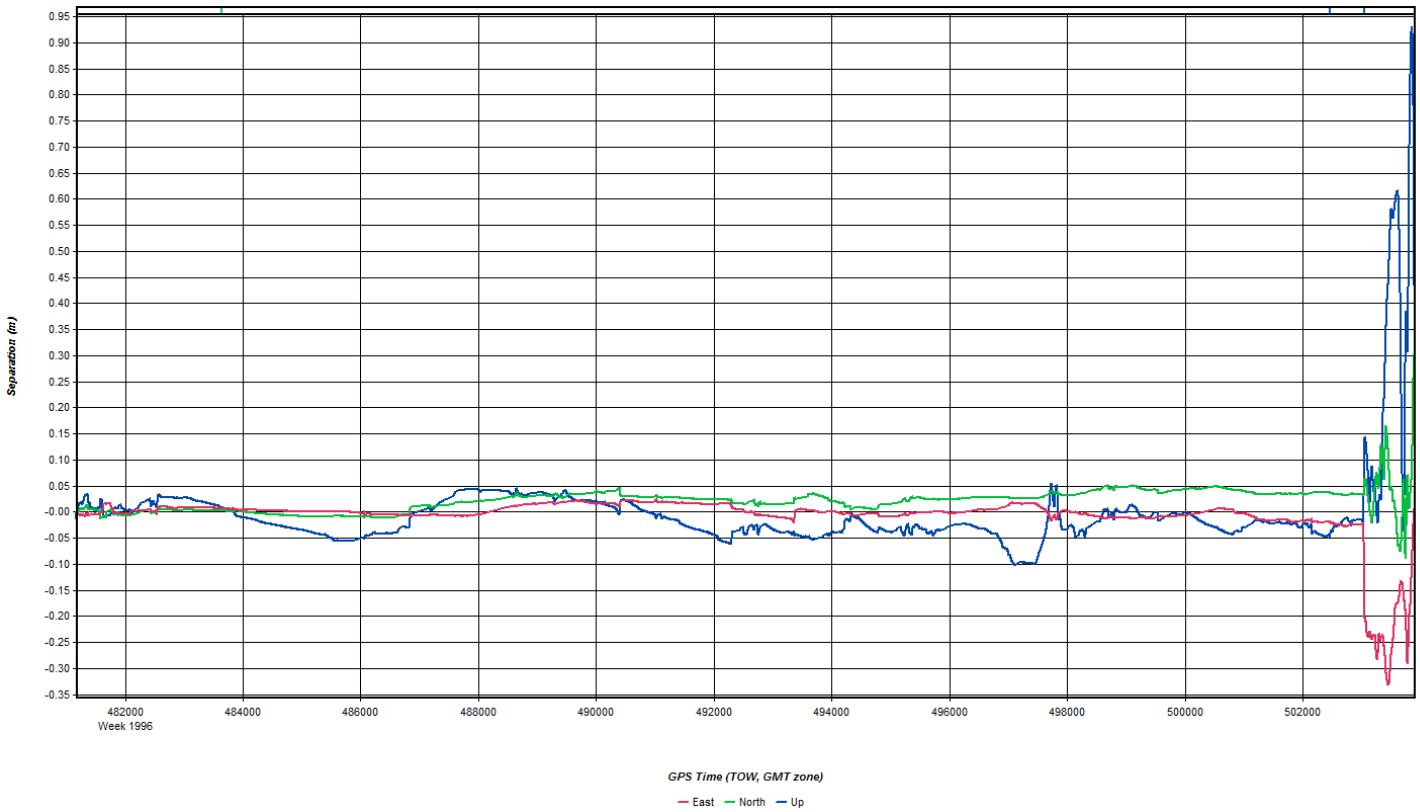

Status
2
1
0
-1
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
Float
Forward Fixed
Reverse Fixed
Fixed (2 or more)

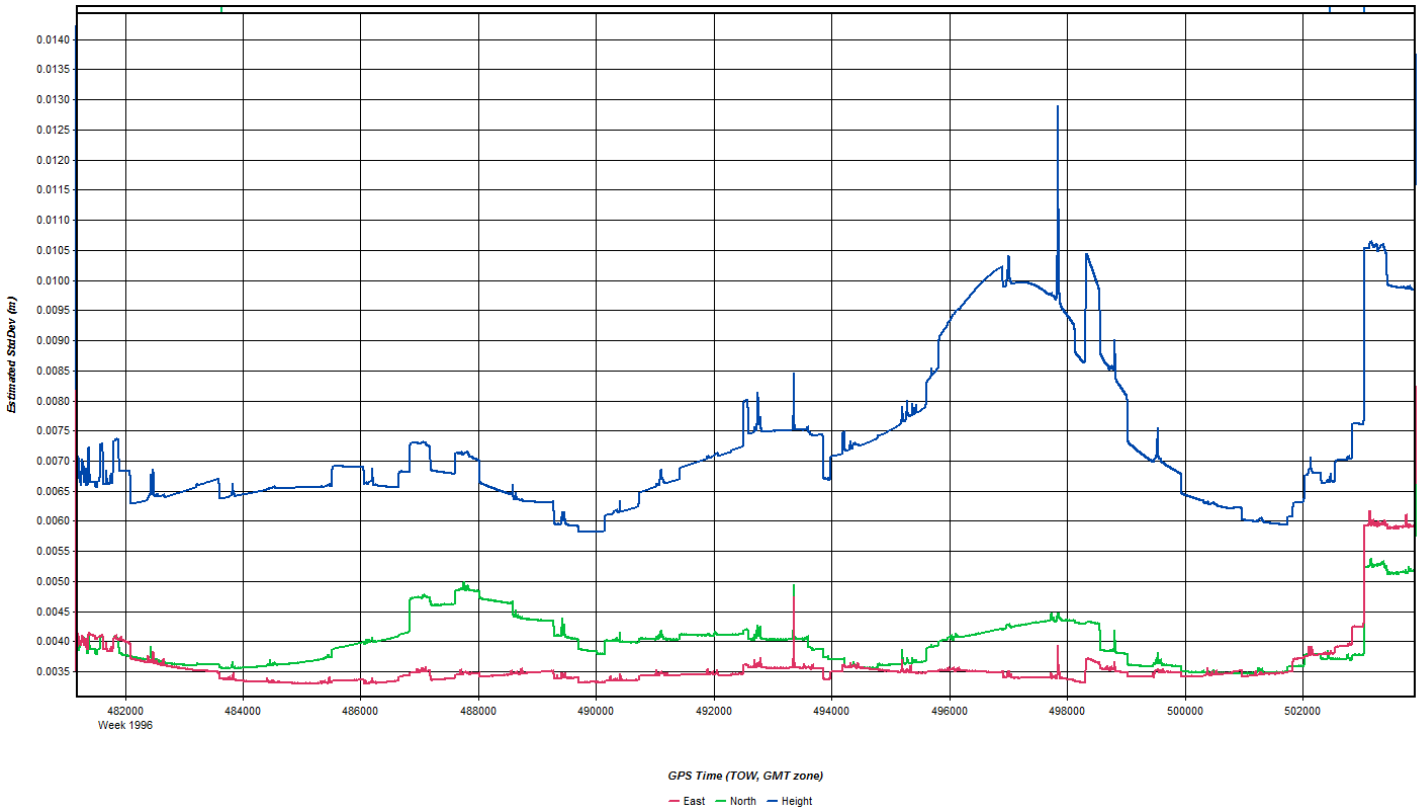

Roll & pitch (deg)
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
Roll
Pitch

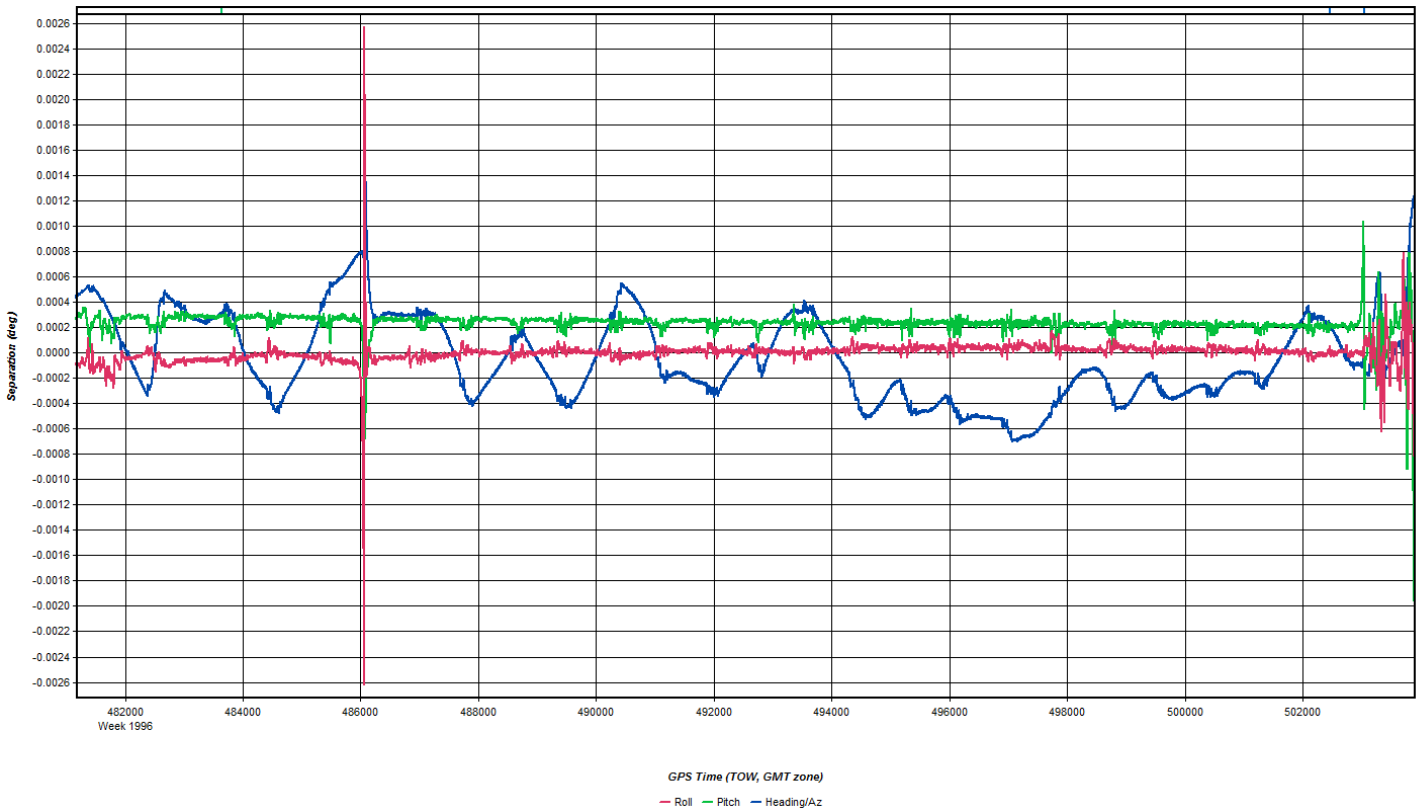

RMS (m)
0.056
0.054
0.052
0.050
0.048
0.046
0.044
0.042
0.040
0.038
0.036
0.034
0.032
0.030
0.028
0.026
0.024
0.022
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
RMS
SD

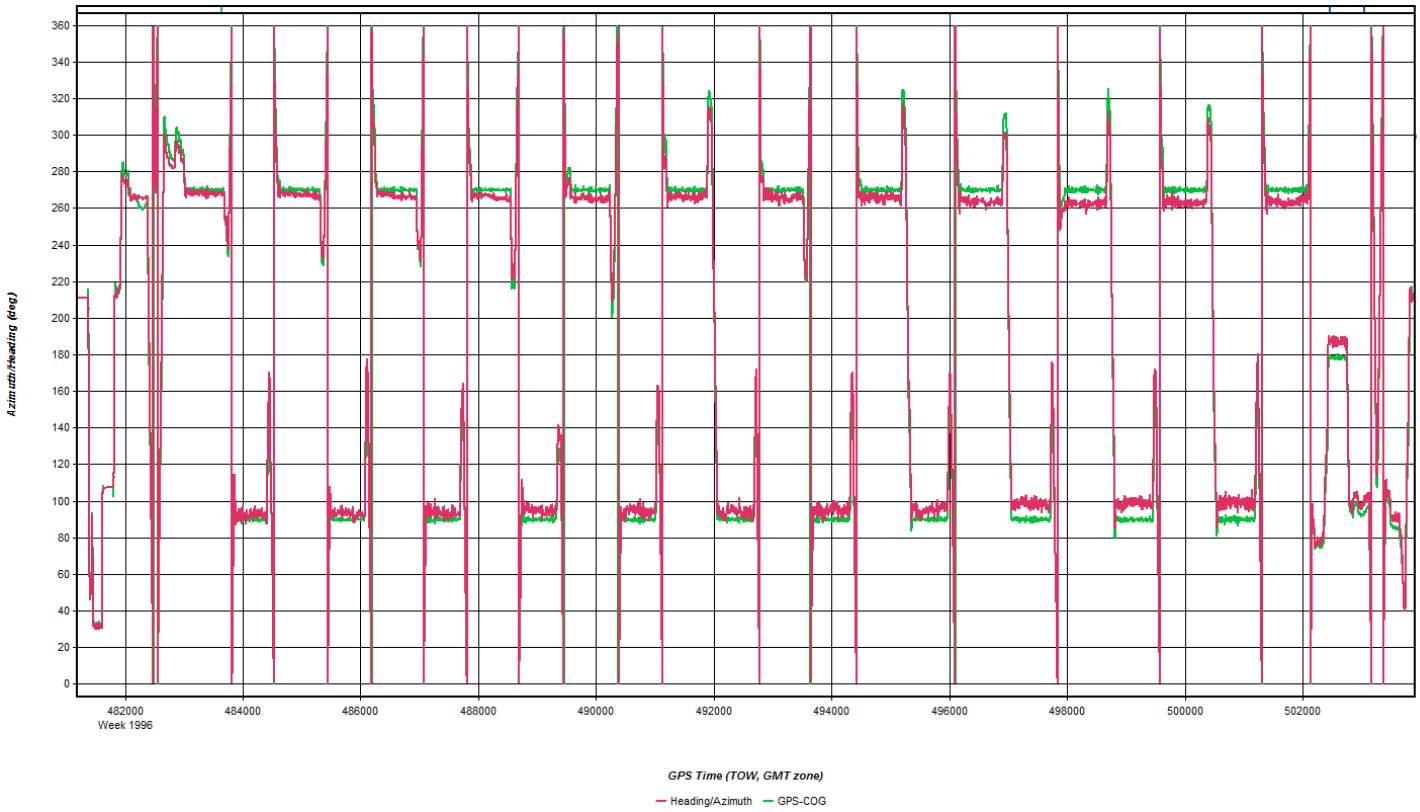

Height (m)
2400
2300
2200
2100
2000
1900
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
Height

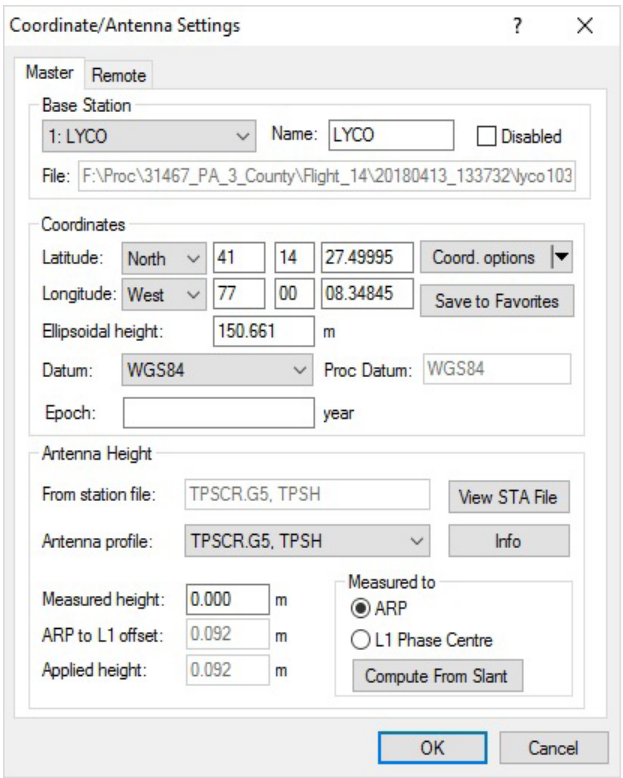

Num Sats
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
Num Sats
GPS
GLONASS
BeiDou
Galileo
QZSS


Separation (m)
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
-0.00
-0.05
-0.10
-0.15
-0.20
-0.25
-0.30
-0.35
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
East
North
Up


Estimated StdDev (m)
0.0140
0.0135
0.0130
0.0125
0.0120
0.0115
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
0.0080
0.0075
0.0070
0.0065
0.0060
0.0055
0.0050
0.0045
0.0040
0.0035
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
East
North
Height


Separation (deg)
0.0026
0.0024
0.0022
0.0020
0.0018
0.0016
0.0014
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
-0.0002
-0.0004
-0.0006
-0.0008
-0.0010
-0.0012
-0.0014
-0.0016
-0.0018
-0.0020
-0.0022
-0.0024
-0.0026
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
Roll
Pitch
Heading/Az


Azimuth/Heading (deg)
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
482000
Week 1996
484000
486000
488000
490000
492000
494000
496000
498000
500000
502000
GPS Time (TOW, GMT zone)
Heading/Azimuth
GPS-COG


Coordinate/Antenna Settings
Master
Remote
Base Station
1: LYCO
Name: LYCO
Disabled
File: F:\Proc\31467_PA_3_County\Flight_14\20180413_133732\lyco103
Coordinates
Latitude: North 41 14 27.49995
Coord. options
Longitude: West 77 00 08.34845
Save to Favorites
Ellipsoidal height: 150.661 m
Datum: WGS84
Proc Datum: WGS84
Epoch: year
Antenna Height
From station file: TPSCR.G5, TPSH
View STA File
Antenna profile: TPSCR.G5, TPSH
Info
Measured height: 0.000 m
ARP to L1 offset: 0.092 m
Applied height: 0.092 m
Measured to
ARP
L1 Phase Centre
Compute From Slant
OK
Cancel

Flight Log

Final Flight

20 YEARS OF EXCELLENCE

ATLIS

LIDAR + IMAGERY + GEOMATICS

PROJECT NAME	QS_PA (Flight 14)
SENSOR OPERATOR	A. Brooker
PILOT	A. Werle
AIRCRAFT	KBM – 103RM
AIRBASE	AVP – Scranton, PA

DATE	2018/04/13
SENSOR(S)	ALS70-HP
IMU	Honeywell uIRS
ABGPS	IPAS-CUS6
DATA DRIVES	LiDAR 2

AIRCRAFT BLOCK TIME			
Engine On:	13:35	Takeoff:	13:51
Engine Off:	20:02	Landing:	19:57
TOTAL:	6.5 hrs	TOTAL:	6.1 hrs

MISSION DETAILS			
AGL Height:	1950m	Pulse Rate:	269Hz
Speed:	150kts	Scan Rate:	56Hz
Laser Power:	100%	FOV:	360

STATIC ALIGNMENT	GPS TIME	
	START	END
Pre-Mission	13:58	14:05
Post Mission	19:45	19:51

FLIGHT LINE #	SET HISTO	DIRECTION	LiDAR File Name	GPS TIME		COMMENTS	"S" TURN
				START	END		
031		282	141057	14:10:57	14:21:00	C	
030		101	142449	14:24:49	14:33:03	C	
029		282	143741	14:37:41	14:47:38	C	
028		101	145156	14:51:56	15:00:52	C	
027		282	150503	15:05:03	15:15:26	C	
026		101	151859	15:18:59	15:27:48	C	
025		282	153151	15:31:51	15:42:03	C	
024		101	154603	15:46:03	15:54:03	C	
023		282	155942	15:59:42	16:10:10	C	
022		101	161411	16:14:11	16:23:09	C	
021		282	162712	16:27:12	16:38:10	C	
020		101	164136	16:41:36	16:50:21	C	
019		282	165423	16:54:23	17:04:58	C	
018		101	170832	17:08:32	17:18:02	C	
017		282	172207	17:22:07	17:32:30	C	
016		101	173614	17:36:14	17:45:48	C	
015		282	175004	17:50:04	18:01:17	C (Light Rain/Mist)	
014		101	180448	18:04:48	18:14:54	C	
013		282	181911	18:19:11	18:30:49	C	
012		101	183351	18:33:51	18:43:52	C	
011		282	184752	18:47:52	18:59:13	C	
010		101	190237	19:02:37	19:12:50	C	
009		282	191646	19:16:46	19:28:00	C	
NCROSS1		190	193437	19:34:37	19:38:56	C	

SUN ANGLE
@Start:
@End:
@Peak:

ADDITIONAL NOTES: High Clouds in the area with some haze, moderate winds out of west. Turbulent half way through flight.
KAR turns over WIL1
PDOP 1.2
17 Sats
Final flight, Complete

Appendix B

Survey Report

March 30th 2018, Revised May 18, 2018

SURVEY REPORT OF

LIDAR CALIBRATION & QUALITY CONTROL POINTS

USGS Contract: G16PC00016

PA_3 County South_Central_2018_D18

USGS Task Order: 140G0218F0041

Presented to:

USGS
science for a changing world

Submitted to:
Quantum Spatial, Inc.
10033 MLK Street North, Suite200
St. Petersburg, FL 33716
(407) 595-5518

Contents of Report

Project Procedure Summary.....3

Surveyor Certification Statement and Seal……..7

Area of Interest & Point Location Maps……....8

- Calibration Points……9
- NVA-Bare Earth Points……10
- NVA-Urban Area Points……..11
- VVA-Tall Weed Points……....12
- VVA-Forest Points……...13
- VVA-Brushland Points……....14

Final Point Coordinates-UTM18……....15

- Calibration Points……16
- NVA-Bare Earth Points……18
- NVA-Urban Area Points……20
- VVA-Tall Weed Points……....21
- VVA-Forest Points……...22
- VVA-Brushland Points……....24

Appendixes

Appendix A.....Calibration Point Log Sheets

Appendix B.....NVA-Bare Earth Point Log Sheets

Appendix C.....NVA-Urban Area Point Log Sheets

Appendix D.....VVA-Tall Weed Point Log Sheets

Appendix E.....VVA-Forest Point Log Sheets

Appendix F.....VVA-Brushland Point Log Sheets

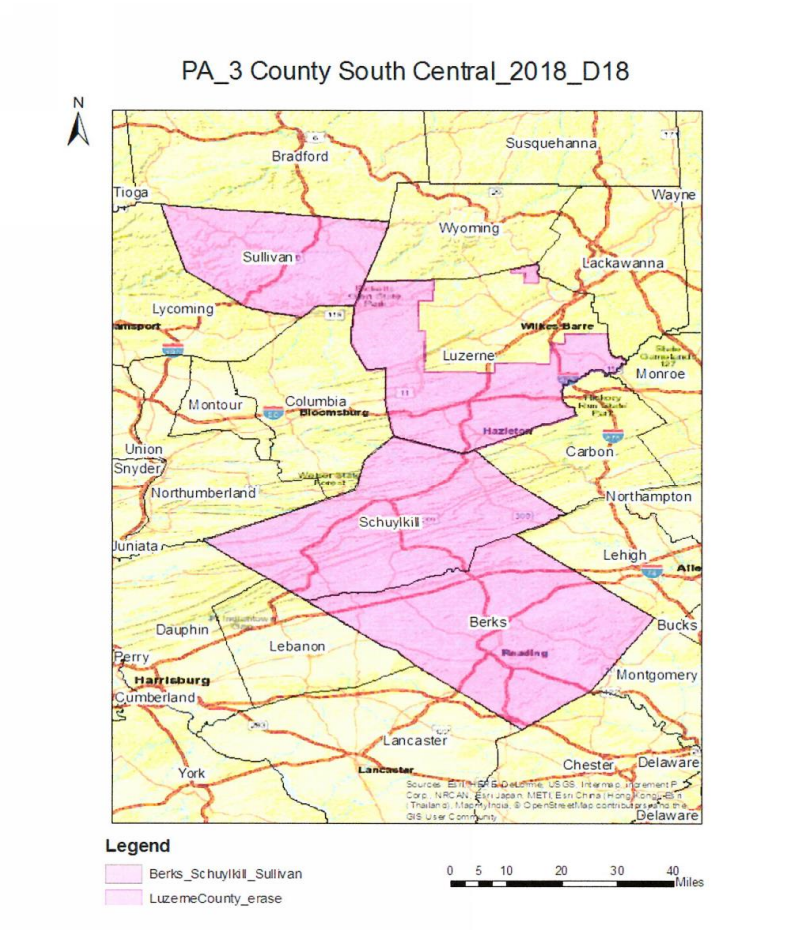
Appendix G.....Digital Data on DVD

Introduction

Quantum Spatial, Inc. was contracted by USGS under task order 140G0218F0041 to Survey LiDAR calibration and quality control points in support of PA_3 County South_Central_2018_ D18. Johnson, Mirmiran, and Thompson, Inc. was sub-contracted by Quantum Spatial, Inc. to provide field surveying services for the establishment of LiDAR calibration and quality control points. This is the report of the procedures used and individual data.

Project Area

The Area of Interest (AOI's), shown in the figure below, consists of approximately 2,681 square miles.



Technical Approach to Land Cover Validation Point Selection

Referencing ASPRS Positional Accuracy Standards for Digital Geospatial Data (Edition 1, Version 1.0, - November 2014) table C.1 Recommended Number of Checkpoints based on Area, Quantum Spatial calculated that 146 Non-Vegetated Vertical Assessment (NVA) and 64 Vegetated Vertical Assessment (VVA) points were required for this project area. A total of 210 points within approximately 2,681 square miles were located.

To ensure that checkpoints were distributed generally proportionate among the various vegetated land cover types, Quantum Spatial used existing USGS Land Cover data to divide both the NVA and VVA categories among the various types, calculating the approximate number of required points in each representative type proportionate to the total project area. The resulting point classes are detailed below:

NVA Class	# of Points
Bare Earth	54
Urban Area	31
Calibration	61
	146

VVA Class	# of Points
Forested	45
Tall Weeds/Crops	17
Brushland/Trees	2
	64

Quantum Spatial has adopted the philosophy that each vegetative class must be well distributed throughout the project area. While points in varying classes may be near to one another, points of a single vegetative class may not. Proposed point locations are selected with this distribution methodology in mind.

Survey Accuracy Requirements

Given that the survey accuracy of calibration and quality control check points should be 3 times more accurate than the required accuracy of the data set, Quantum Spatial requires that calibration and NVA points are better than 3 centimeters RMSE, both horizontally and vertically, and that VVA points be better than 5 centimeters RMSE, both horizontally and vertically. The surveyed accuracy of each point must be determined through redundant measurements and/or network adjustment using procedures and methodologies that reliably and consistently result in the accuracies.

Due to variances in reference control accuracy and adjustment, Quantum Spatial requires that the survey methodology used be explained, so that it can be repeated if necessary.

The GPS RMS value is based on all observations taken and include all DOP's (H,V,P,T=G).
The final RMS values is stated to express that 68% of the observations will fall within that RMS ellipse. The final averaged coordinate value is commonly well under the stated RMS value.

Note: There were a few observations that had a higher RMS value, however the differences between the observed measurements meet or exceed the accuracy tolerance.

Field Survey Methodology

Date Range: January 16, 2018 to March 31, 2018

Equipment Used:

Field crews used Trimble R6 and R8 dual frequency GNSS receivers and Topcon GR-3 dual frequency GNSS receivers as base stations and rovers.

GNSS Methodology:

A combination of GNSS RTN (KeyNET), fast static GPS and traditional surveying methods were used during this project. The GNSS RTN consisted of two (2) occupations for a duration of 180 epochs per point an average of 4 hours apart for redundant checks. The fast-static GPS method consisted of collecting a minimum 30 minutes of static data which was downloaded and processed using NGS "OPUS" (Online Positioning User Service).

In areas under the tree canopy, traditional surveying methods were used. Pairs of points were collected in open areas using GNSS methods. Multiple observations were collected at each point and the coordinates of the points were compared and averaged. These points were occupied using a total station to survey the forested check points.

All of the GPS RTN information was downloaded and analyzed using Trimble Business Center (TBC) software & Trimble's ASCII File Generator (AFG) "Quality Control Report". TBC provided a report of RMSE values in meters for Horizontal, Vertical & 3D components and the AFG reported any measurements above the input tolerance of 0.09' or 0.16' depending on the checkpoint classification tolerance.

Overall Project Accuracy Statement

Final averaged values meet or exceed the required tolerances for each classification of check point.

All coordinates have been reported in the North American Datum of 1983 (NAD83/ 2011) and all elevations are relative to the North American Vertical Datum of 1988 (NAVD88) using the Geoid 12B model. Universal Transverse Mercator Zone 18 (UTM18) coordinates are reported in meters for points in the following AOI's: Berks, Schuylkill, Sullivan Counties and portions of Luzerne County.

AOI Accuracy Requirements

Calibration Points
Average Horizontal RMSE is 0.023 meter
Average Elevation RMSE is 0.031 meter.
Average 3-dimensional RMSE is 0.010 meter.

NVA Points
Average Horizontal RMSE is 0.015 meter
Average Elevation RMSE is 0.028meter.
Average 3-dimensional RMSE is 0.007 meter.

VVA Points
Average Horizontal RMSE is 0.013 meter
Average Elevation RMSE is 0.023 meter.
Average 3-dimensional RMSE is 0.011 meter.

AOI Accuracy Tolerances

		Type:	Tolerance:
CA	=	Calibration Point	Better than **0.03 m** (0.098 US FT)
BE	=	Bare Earth Point	Better than **0.03 m** (0.098 US FT)
UA	=	Urban Area Point	Better than **0.03 m** (0.098 US FT)
TW	=	Tall Weed Point	Better than **0.05 m** (0.164 US FT)
FO	=	Forest Point	Better than **0.05 m** (0.164 US FT)
SH	=	Brushland Point	Better than **0.05 m** (0.164 US FT)

Note:
Three (3) place coordinates and elevations herein are used for computational purposes and do not imply a precision beyond two (2) place.

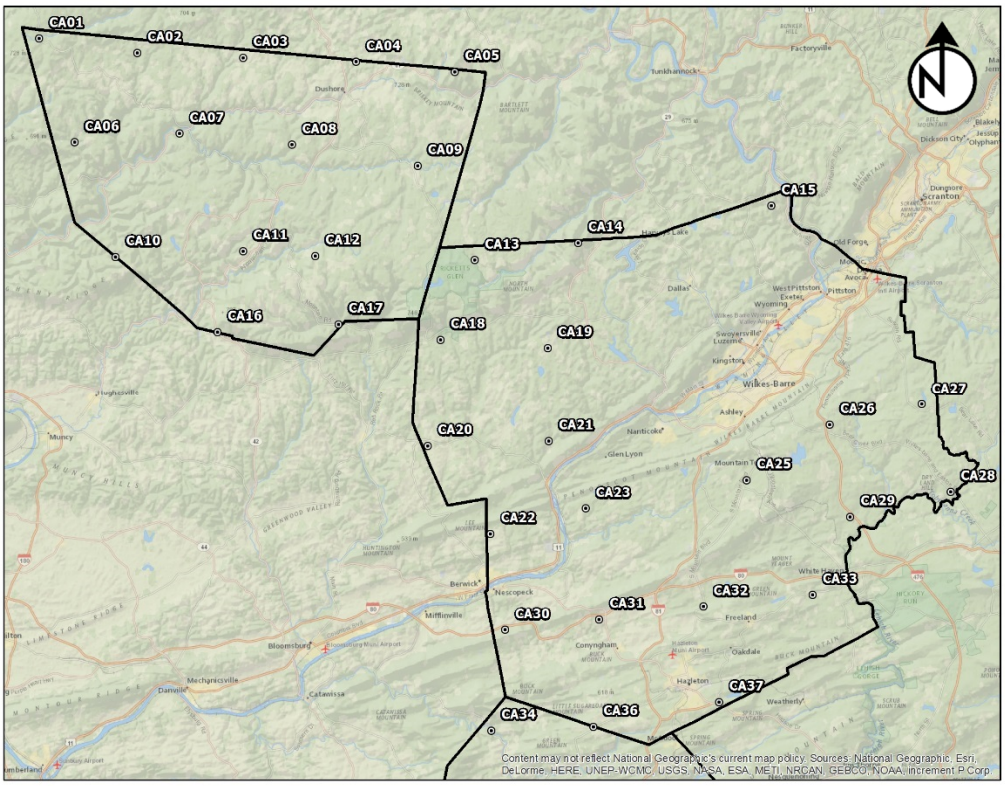
Surveyor's Certification

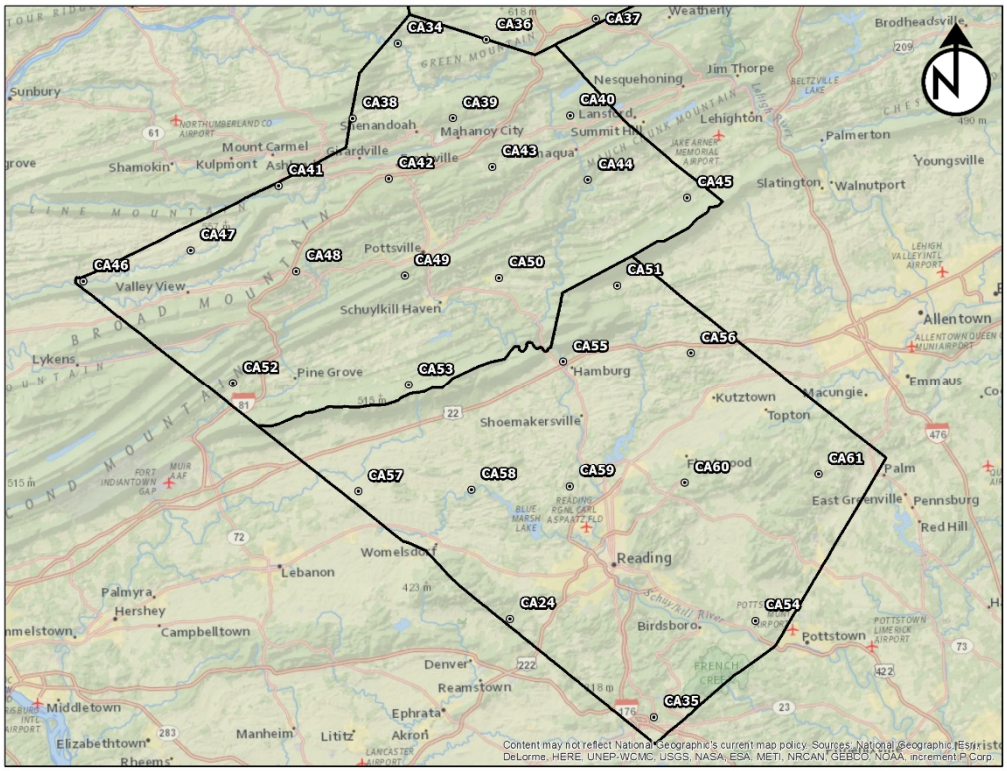
I hereby certify to Quantum Spatial, Inc. that the information contained herein is correct to the best of my knowledge, information and belief and that the survey was completed by acceptable surveying procedures and was completed under my direct supervision.

Thomas E. Farcht Jr., PLS
Johnson, Mirmiran & Thompson, Inc.
SU-037547-E (AGENT)

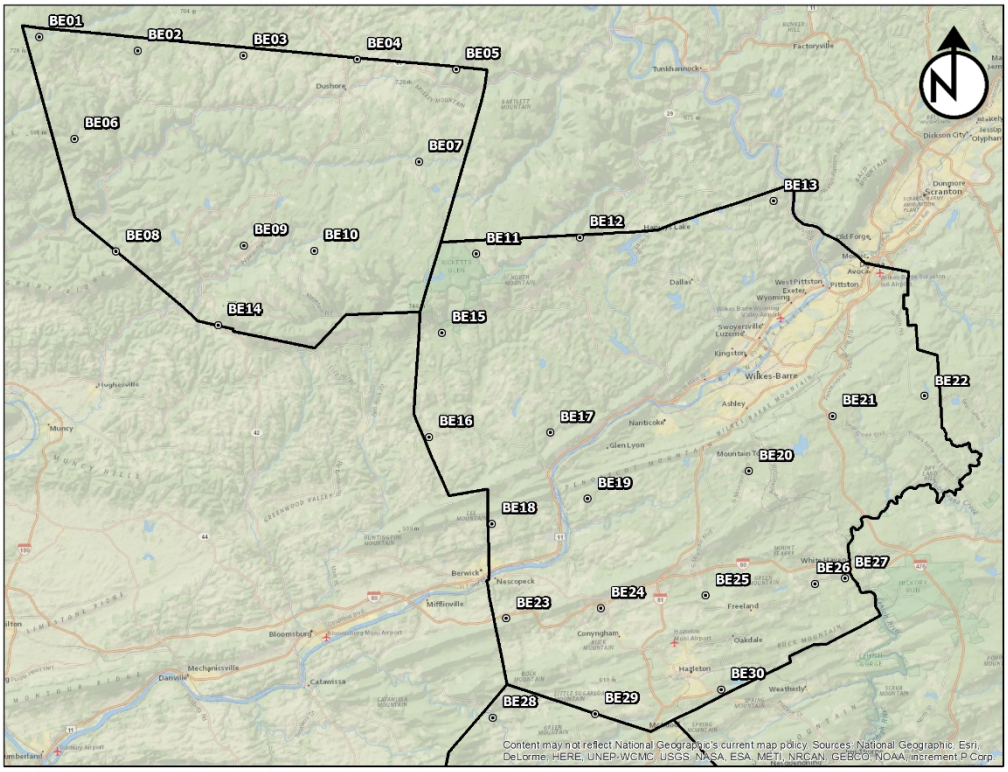
Project AOI & Point: Location Maps

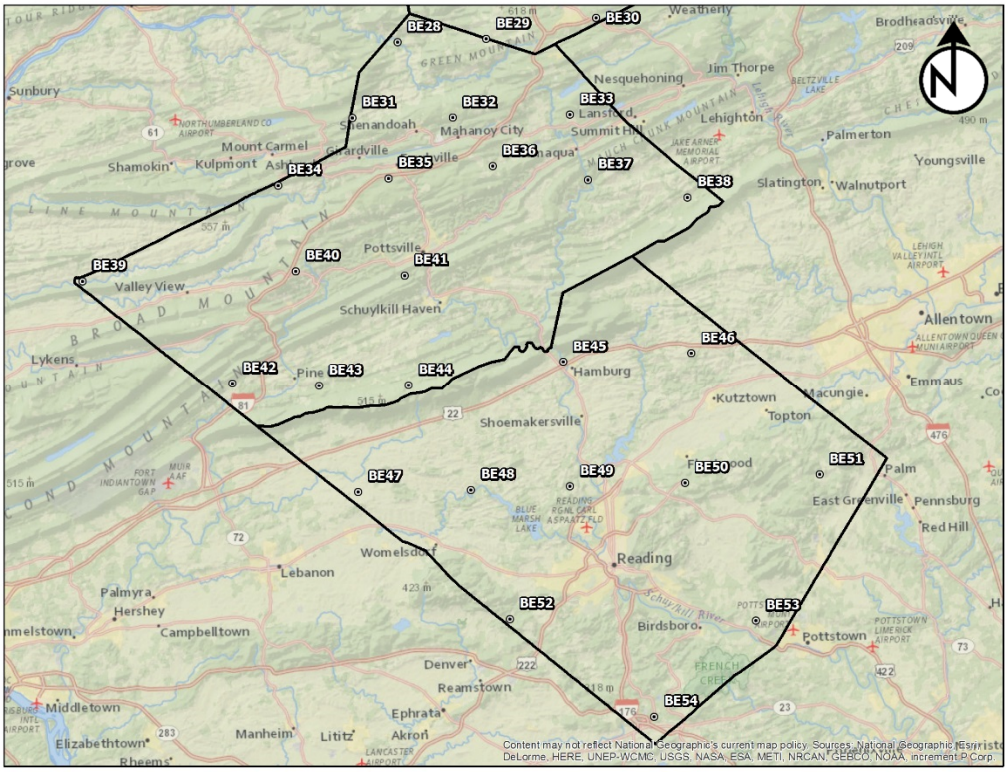
USGS LIDAR CALIBRATION POINTS (CA-61 TOTAL)



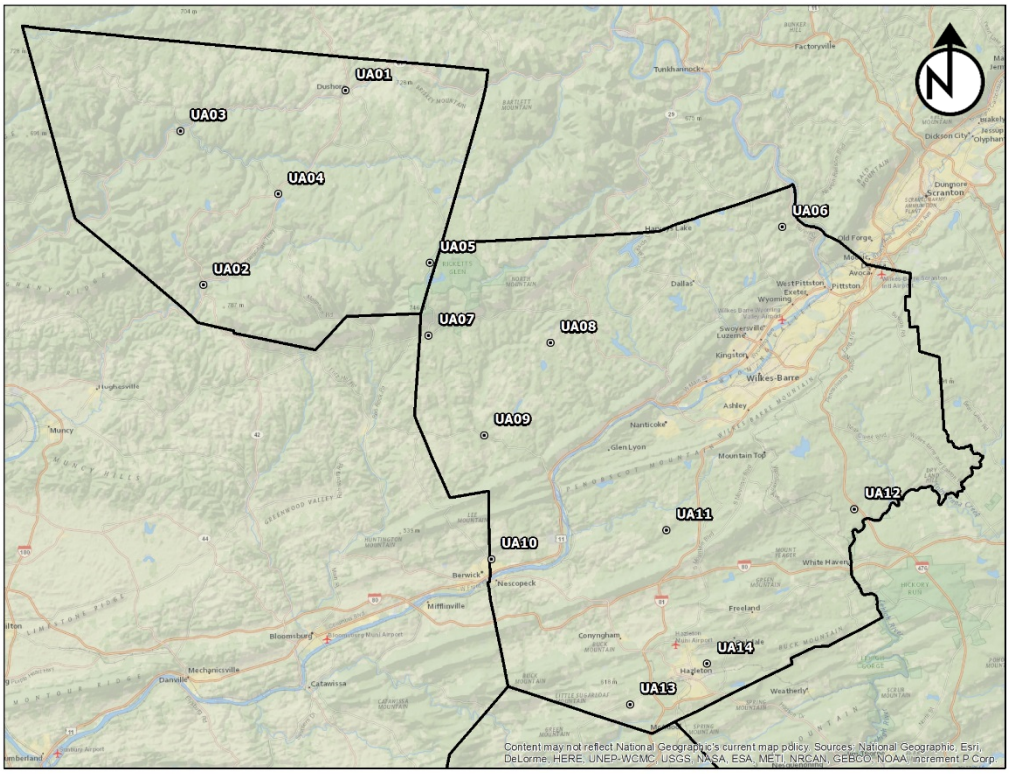


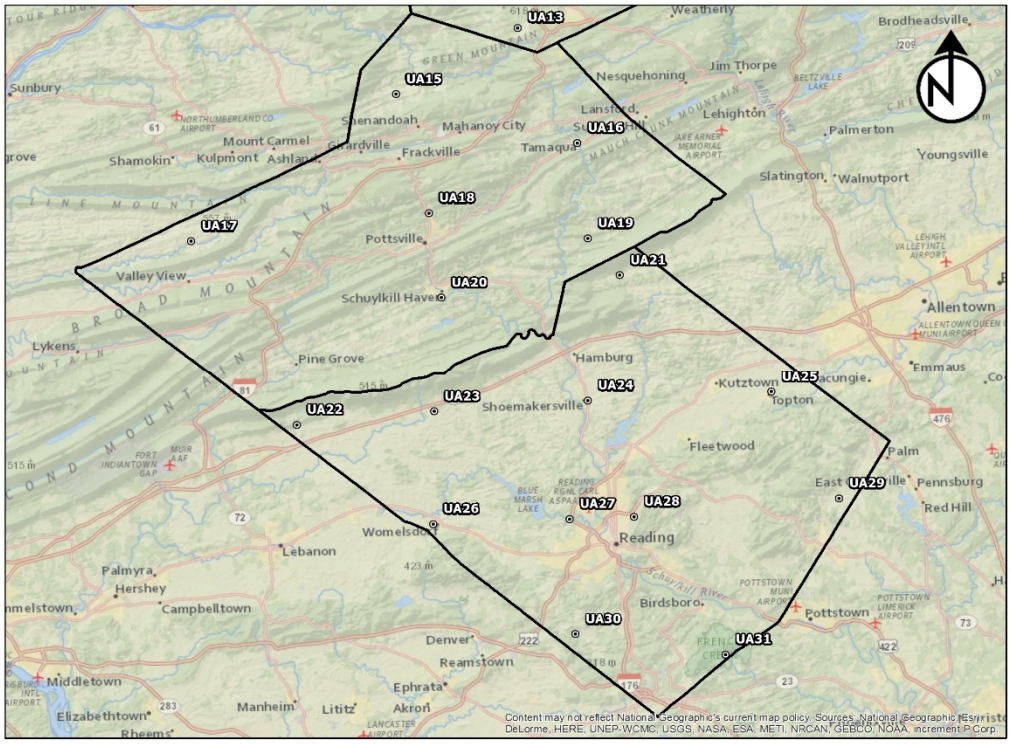
USGS LIDAR BARE EARTH POINTS (BE-54 TOTAL)



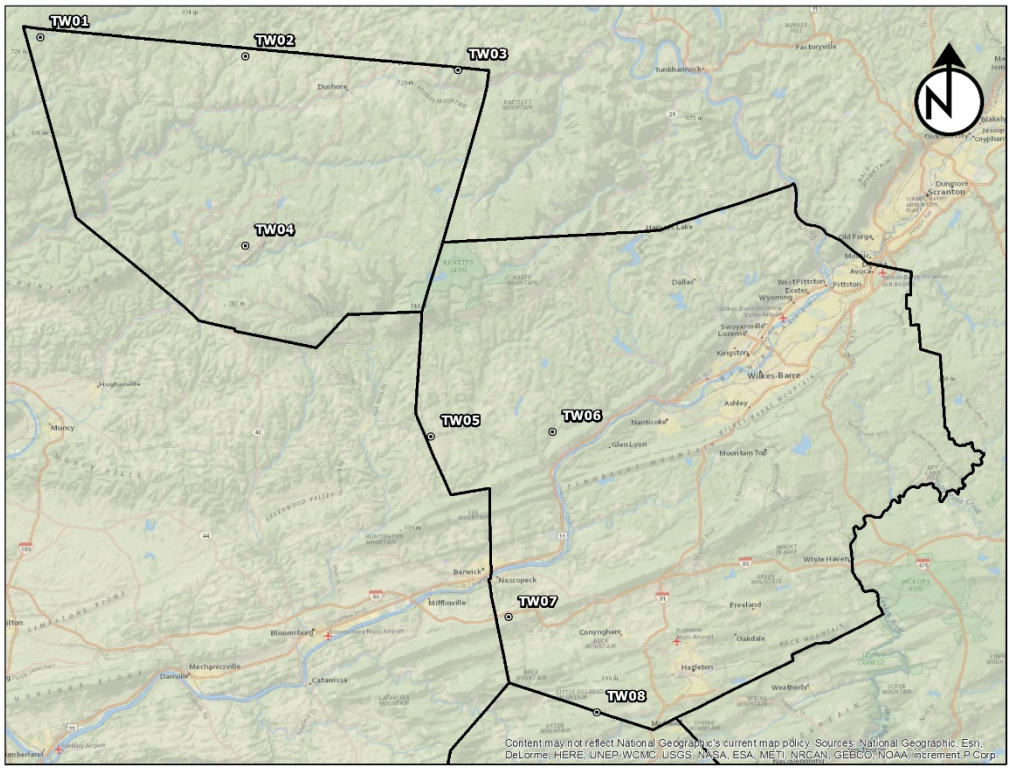


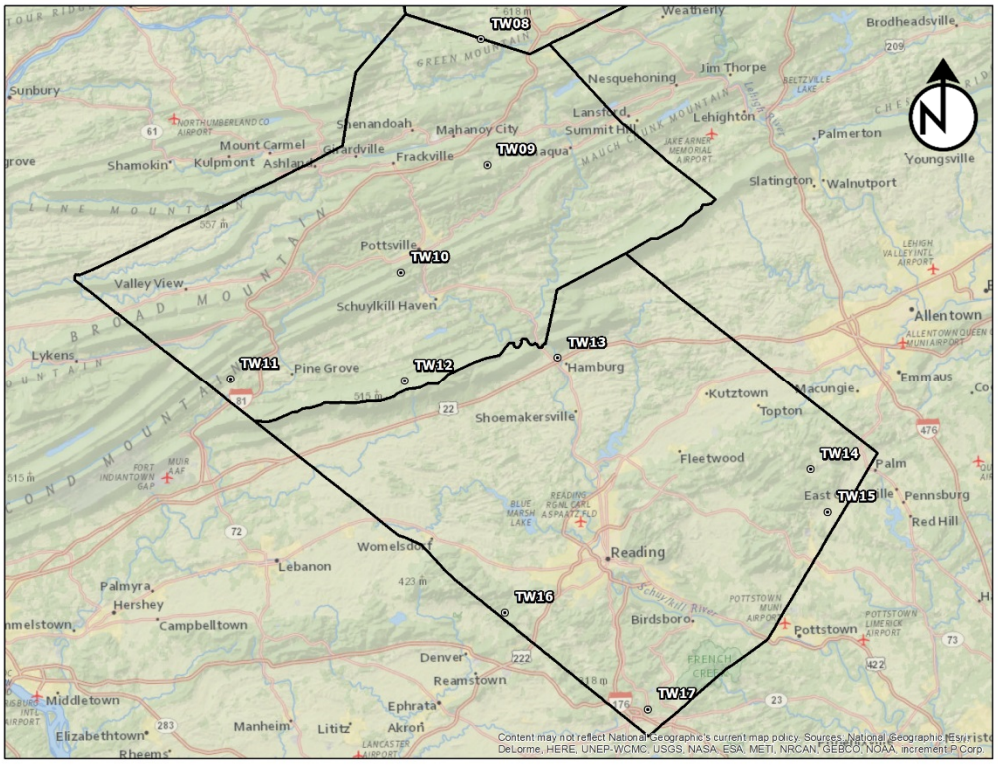
USGS LIDAR URBAN AREA POINTS (UA-31 TOTAL)



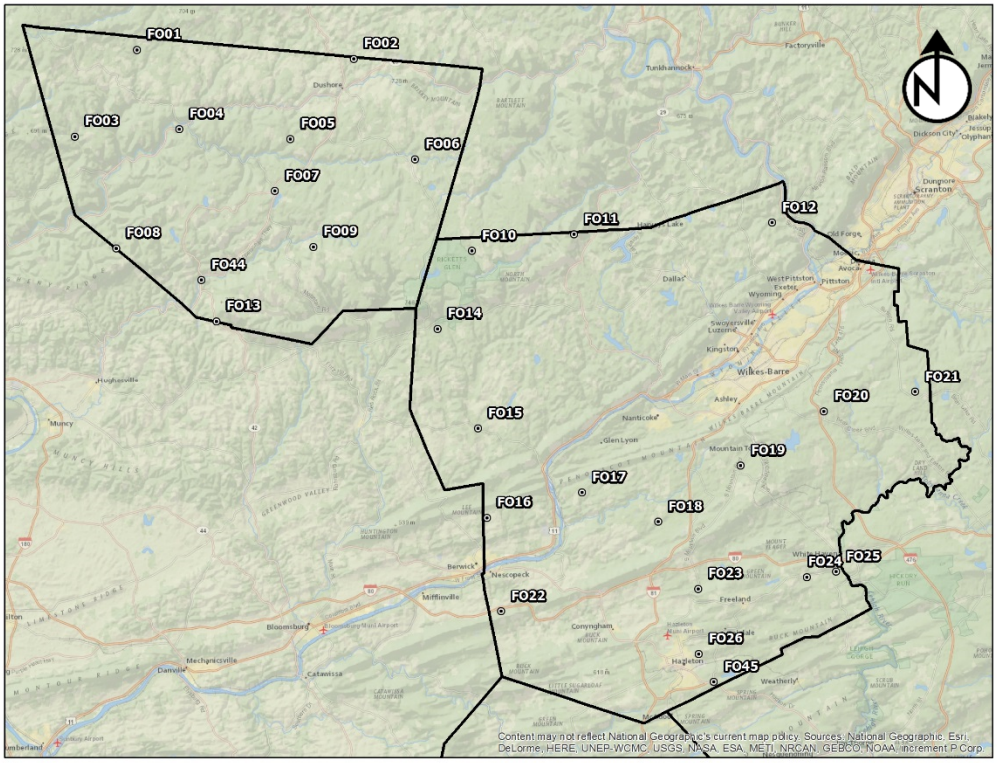


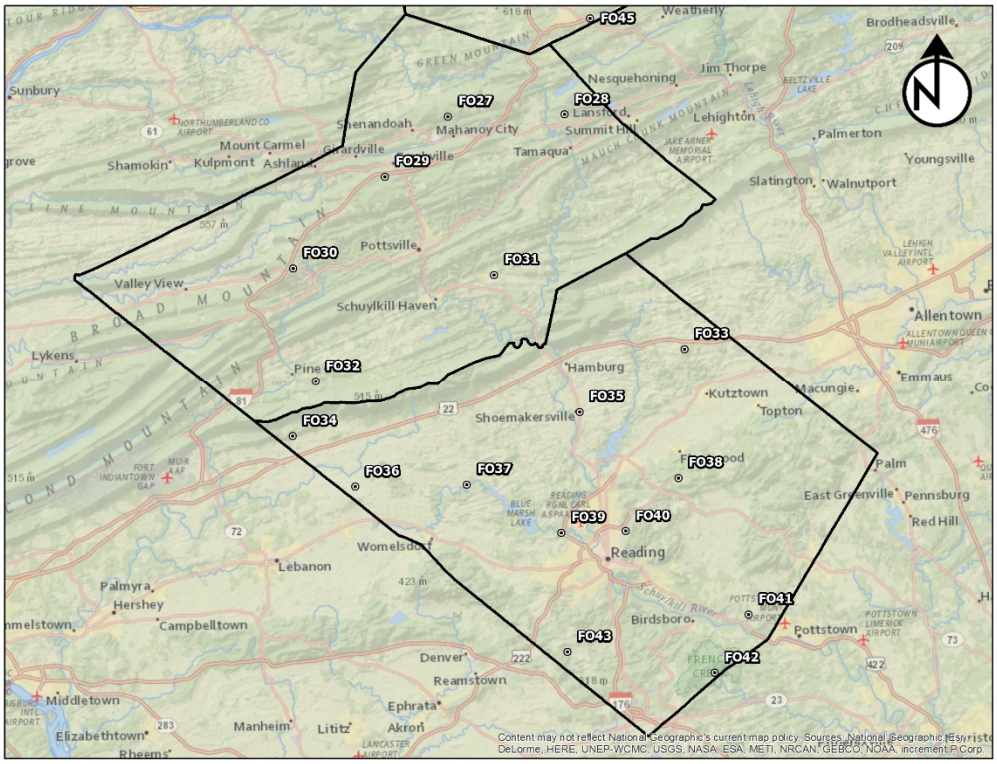
USGS LIDAR TALL WEED POINTS (TW-17 TOTAL)



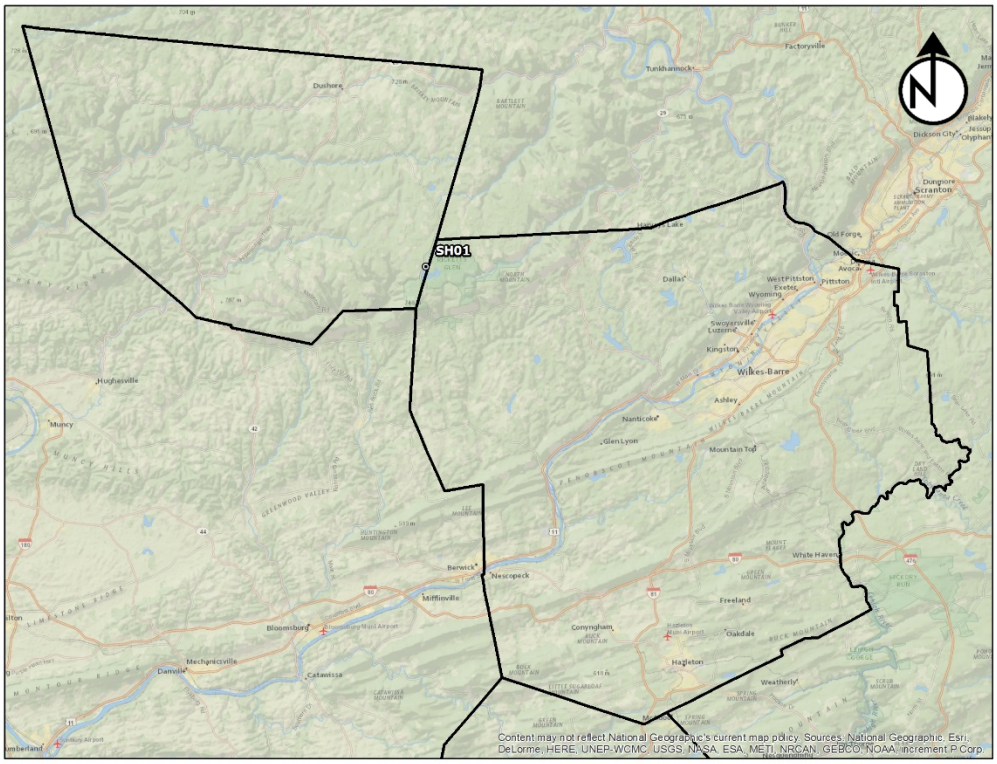


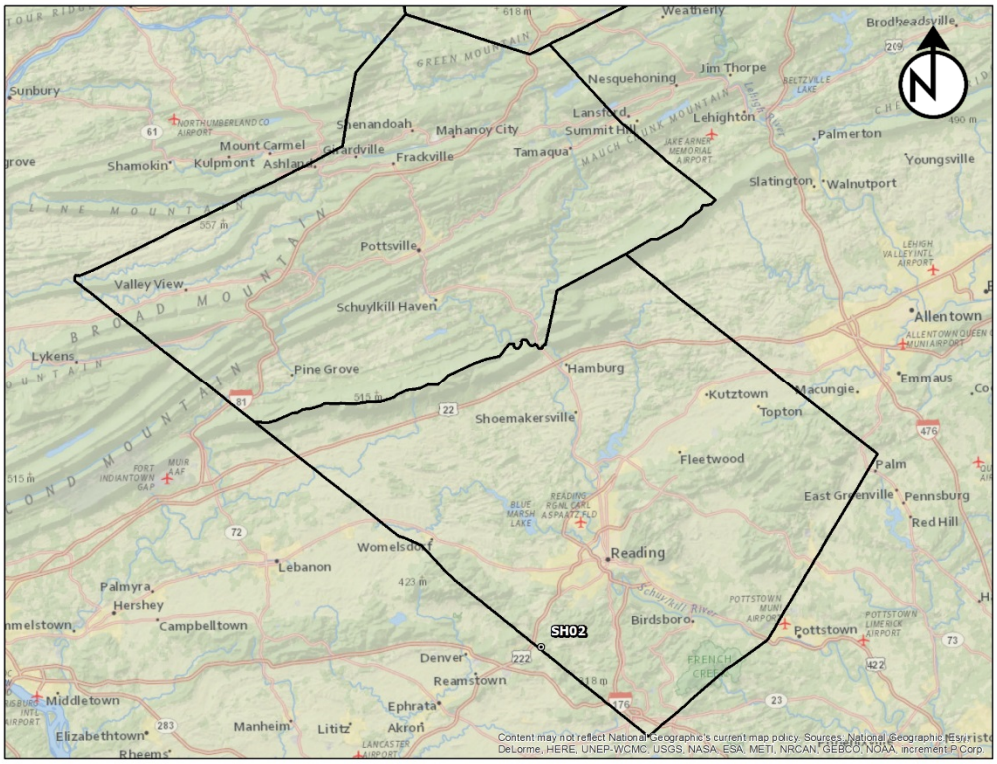
UGGS LIDAR FOREST POINTS (FO-45 TOTAL)





USGS LIDAR BRUSHLAND POINTS (SH-2 TOTAL)





Final Point Coordinates

UTM Zone18

Calibration Point Coordinates

Horizontal Datum - NAD83(2011)
UTM ZONE 18
Vertical Datum – NAVD 88
Geoid - GEOID12B
Units — Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
CA01	4604667.720	350627.745	637.398
CA02	4602849.907	361086.094	488.379
CA03	4601956.005	372365.923	524.065
CA04	4601160.544	384459.854	430.081
CA05	4599790.672	394978.726	685.011
CA06	4593675.939	354077.479	437.670
CA07	4594238.902	365333.180	311.079
CA08	4592697.505	377333.343	548.275
CA09	4590070.916	390707.529	555.986
CA10	4581540.780	358094.632	546.222
CA11	4581701.384	371755.306	490.982
CA12	4580980.411	379444.485	551.762
CA13	4580005.960	396491.592	659.143
CA14	4581459.080	407592.239	501.381
CA15	4584687.192	428395.350	304.195
CA16	4573321.774	368733.421	369.179
CA17	4573724.032	381715.336	364.640
CA18	4571770.773	392581.404	380.995
CA19	4570532.590	404010.913	393.760
CA20	4560586.487	390862.550	294.475
CA21	4560677.320	403790.935	242.288
CA22	4551133.548	397283.296	272.236
CA23	4553481.272	407558.133	305.192
CA24	4459259.010	408324.390	166.776
CA25	4555903.842	424847.931	411.300
CA26	4561468.114	433940.513	582.526
CA27	4563328.036	443834.942	610.079
CA28	4554001.596	446639.704	504.855
CA29	4551718.019	435808.847	408.917
CA30	4541016.298	398509.488	284.178
CA31	4541796.413	408627.613	343.810
CA32	4542792.684	419821.633	331.815
CA33	4543661.527	431539.325	433.832
CA34	4530459.607	396724.897	245.854
CA35	4446689.853	425638.701	175.919

Point ID	Northing (m)	Easting (m)	Elev. (m)
CA36	4530529.112	407624.854	522.493
CA37	4532702.121	421153.193	517.613
CA38	4521377.025	390891.978	378.621
CA39	4521036.177	403222.639	493.074
CA40	4520915.867	417623.961	380.750
CA41	4513389.042	381532.623	309.112
CA42	4513839.505	395093.987	485.892
CA43	4514908.393	407893.715	362.099
CA44	4512924.372	419582.572	220.675
CA45	4510343.884	431714.924	183.268
CA46	4502402.965	357192.987	161.115
CA47	4505789.965	370462.213	228.419
CA48	4502793.983	383378.764	470.487
CA49	4501845.977	396715.385	209.558
CA50	4501209.781	408269.432	206.220
CA51	4499825.912	422788.465	148.480
CA52	4489278.271	375192.909	206.338
CA53	4488363.092	396776.759	339.173
CA54	4458095.224	438468.538	72.588
CA55	4490657.626	415817.068	116.674
CA56	4491234.471	431590.903	193.605
CA57	4475445.211	390172.758	178.349
CA58	4475229.078	404044.827	103.585
CA59	4475269.484	416173.586	107.596
CA60	4475262.920	430305.042	249.953
CA61	4475782.852	446813.653	194.102

Bare Earth Point Coordinates

Horizontal Datum - NAD83(2011)
UTM ZONE 18
Vertical Datum NAVD 88
Geoid - GEOID12B
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
BE01	4604649.643	350602.870	637.795
BE02	4602848.366	361089.405	488.335
BE03	4601954.890	372365.122	524.068
BE04	4601172.111	384457.028	429.802
BE05	4599784.690	394974.266	684.610
BE06	4593670.996	354060.776	438.236
BE07	4590057.874	390710.633	556.934
BE08	4581542.903	358093.659	546.194
BE09	4581701.069	371755.417	490.982
BE10	4580916.895	379271.768	564.994
BE11	4580044.392	396503.013	661.521
BE12	4581457.375	407595.951	500.903
BE13	4584688.781	428397.211	304.249
BE14	4573320.270	368731.782	368.936
BE15	4571772.112	392578.273	380.927
BE16	4560591.116	390860.387	294.308
BE17	4560669.477	403792.597	241.779
BE18	4551131.458	397286.860	272.193
BE19	4553481.263	407563.809	305.337
BE20	4555884.405	424852.908	411.057
BE21	4561477.371	433941.631	582.880
BE22	4563325.249	443833.857	610.069
BE23	4541007.969	398497.108	284.934
BE24	4541791.914	408628.788	343.848
BE25	4542788.876	419817.456	331.861
BE26	4543666.908	431541.811	433.878
BE27	4544165.312	434728.848	383.576
BE28	4530465.447	396724.206	245.625
BE29	4530544.063	407626.154	522.963
BE30	4532701.490	421157.367	517.690
BE31	4521375.376	390892.981	378.541
BE32	4521038.438	403218.073	493.273
BE33	4520965.595	417611.722	384.091
BE34	4513391.291	381533.830	309.203
BE35	4513845.028	395098.375	485.882

Point ID	Northing (m)	Easting (m)	Elev. (m)
BE36	4514927.658	407913.270	360.793
BE37	4512917.003	419564.253	219.577
BE38	4510341.755	431715.552	183.129
BE39	4502405.036	357203.526	161.088
BE40	4502793.831	383373.326	470.247
BE41	4501859.098	396716.244	209.687
BE42	4489281.603	375196.791	206.539
BE43	4488664.563	385772.852	168.513
BE44	4488363.171	396774.633	339.224
BE45	4490657.618	415813.293	116.515
BE46	4491227.870	431586.656	193.506
BE47	4475407.592	390184.090	177.694
BE48	4475225.325	404038.165	103.307
BE49	4475278.607	416170.468	108.300
BE50	4475281.512	430298.781	250.714
BE51	4475790.804	446849.542	193.484
BE52	4459261.399	408288.673	165.574
BE53	4458118.810	438511.594	72.653
BE54	4446722.464	425648.967	177.196

Urban Area Point Coordinates

Horizontal Datum - NAD83(2011)
UTM ZONE 18
Vertical Datum NAVD 88
Geoid - GEOID12B
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
UA01	4597964.278	383048.527	440.286
UA02	4577822.539	367243.016	261.565
UA03	4594211.063	365335.818	312.169
UA04	4587203.594	375542.721	542.303
UA05	4579429.617	391426.684	716.847
UA06	4582037.071	429075.477	251.854
UA07	4571708.035	391065.845	386.281
UA08	4570532.495	404017.837	393.599
UA09	4560820.685	396672.102	236.107
UA10	4547575.998	397003.965	190.606
UA11	4550105.903	415736.399	331.617
UA12	4551715.536	435814.852	409.049
UA13	4531649.637	411278.430	547.997
UA14	4535770.124	419617.279	574.665
UA15	4523705.523	396122.148	344.238
UA16	4516789.649	418136.933	245.202
UA17	4505785.331	370460.018	228.256
UA18	4508417.217	399647.984	225.140
UA19	4504601.329	419024.155	202.298
UA20	4497613.221	400843.108	153.211
UA21	4499805.199	422793.474	150.664
UA22	4481864.305	382661.351	168.613
UA23	4483051.872	399523.862	178.979
UA24	4483842.190	418349.727	107.795
UA25	4484265.160	440903.474	143.028
UA26	4468712.580	398940.924	140.936
UA27	4468862.060	415689.043	77.503
UA28	4468895.989	423567.165	144.021
UA29	4470460.258	448734.340	136.174
UA30	4454207.451	415934.271	169.298
UA31	4451013.148	434202.515	164.697

Tall Weed Point Coordinates

Horizontal Datum - NAD83(2011)
UTM ZONE 18
Vertical Datum - NAVD 88
Geoid - GEOID12B
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
TW01	4604684.950	350611.353	637.215
TW02	4601955.179	372377.106	524.060
TW03	4599768.212	394995.078	686.401
TW04	4581708.658	371761.274	491.747
TW05	4560582.352	390868.717	295.164
TW06	4560692.505	403795.590	242.509
TW07	4541007.887	398513.728	285.474
TW08	4530547.203	407574.361	524.424
TW09	4514894.757	407888.933	363.110
TW10	4501864.835	396710.509	209.765
TW11	4489282.742	375187.925	206.829
TW12	4488359.268	396777.512	339.493
TW13	4490668.592	415845.928	117.278
TW14	4475792.182	446803.916	194.291
TW15	4470435.399	448726.481	138.138
TW16	4459242.732	408323.097	169.387
TW17	4446747.482	425690.585	175.722

Forest Point Coordinates

Horizontal Datum – NAD83(2011)
UTM ZONE 18

Vertical Datum – NAVD 88
Geoid – GEOID12B
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
FO01	4602820.100	361086.018	487.072
FO02	4601136.140	384464.468	430.648
FO03	4593703.933	354076.782	439.469
FO04	4594167.269	365368.878	312.044
FO05	4592704.909	377356.351	548.463
FO06	4590078.536	390726.790	552.393
FO07	4587168.581	375502.755	548.845
FO08	4581530.425	358157.772	543.875
FO09	4581002.510	379463.488	553.932
FO10	4580041.761	396528.839	663.455
FO11	4581476.966	407605.171	499.106
FO12	4582072.862	429017.320	255.768
FO13	4573324.493	368721.799	368.274
FO14	4571756.194	392557.062	380.440
FO15	4560790.493	396598.599	232.699
FO16	4551140.240	397265.609	273.572
FO17	4553534.769	407589.816	305.737
FO18	4550136.246	415724.655	330.874
FO19	4555895.804	424816.658	418.710
FO20	4561473.425	433985.573	579.691
FO21	4563293.358	443856.270	609.557
FO22	4541022.103	398478.199	283.342
FO23	4542766.699	419794.520	335.351
FO24	4543674.762	431572.633	433.098
FO25	4544142.637	434735.896	382.995
FO26	4535768.892	419645.485	575.064
FO27	4521060.494	403189.320	495.551
FO28	4520878.276	417625.608	378.670
FO29	4513831.711	395130.229	482.815
FO30	4502807.957	383350.345	470.496
FO31	4501228.673	408285.999	208.077
FO32	4488670.546	385738.454	168.433
FO33	4491235.732	431610.894	195.630
FO34	4481880.704	382638.046	168.785
FO35	4483782.320	418352.606	112.497

Point ID	Northing (m)	Easting (m)	Elev. (m)
FO36	4475399.122	390202.541	177.000
FO37	4475242.113	404097.073	107.642
FO38	4475236.871	430343.848	248.957
FO39	4468905.867	415610.023	77.061
FO40	4468854.692	423608.352	150.030
FO41	4458101.038	438521.273	69.842
FO42	4451009.801	434120.479	165.623
FO43	4454165.842	415922.546	166.039
FO44	4577822.431	367266.695	264.595
FO45	4532681.097	421198.937	519.452

Brushland Point Coordinates

Horizontal Datum - NAD83(2011)
UTM ZONE 18
Vertical Datum - NAVD 88
Geoid - GEOID12B
Units – Meters

Point ID	Northing (m)	Easting (m)	Elev. (m)
SH01	4578559.222	391504.224	697.970
SH02	4454899.141	412654.952	204.484

Calibration Point Log Sheets

220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA01
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Grover

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4604667.720	350627.745	637.398

Operator	Jim Sanderson
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.649 Meters

Date (MM-DD-YYYY)	03-20-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	CA001



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA02
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Shunk

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4602849.907	361086.094	488.379

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.051
RMSE Z	0.068
GPS Method	Network

PHOTOS:



Point ID	CA002



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA03
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Overton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4601956.005	372365.923	524.065

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.056
RMSE Z	0.064
GPS Method	Network

PHOTOS:



Point ID	CA003



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA04
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Dushore

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4601160.544	384459.854	430.081

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.045
RMSE Z	0.054
GPS Method	Network

PHOTOS:



Point ID	CA004



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA05
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Colley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4599790.672	394978.726	685.011

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.076
RMSE Z	0.094
GPS Method	Network

PHOTOS:









Point ID	CA005



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA06
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Barbours

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4593675.939	354077.479	437.670

Operator	Jim Sanderson
Receiver Model	Trimble R8, Model 3
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-20-2018
RMSE Hz	0.008
RMSE Z	0.021
GPS Method	Static

PHOTOS:



Point ID	CA006



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA07
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Eagles Mere

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4594238.902	365333.180	311.079

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	05-17-2018
RMSE Hz	0.007
RMSE Z	0.035
GPS Method	Static

PHOTOS:



Point ID	CA007



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA08
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Laporte

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4592697.505	377333.343	548.275

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.088
RMSE Z	0.145
GPS Method	Network

PHOTOS:



Point ID	CA08



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA09
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Lopez

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4590070.916	390707.529	555.986

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	0.020
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	CA09



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA10
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Picture Rocks

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581540.780	358094.632	546.222

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.027
RMSE Z	0.030
GPS Method	Network

PHOTOS:









Point ID	CA10



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA11
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Eagles Mere

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581701.384	371755.306	490.982

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-19-2018
RMSE Hz	0.022
RMSE Z	0.035
GPS Method	Network

PHOTOS:



Point ID	CA11



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA12
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Elk Grove

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4580980.411	379444.485	551.762

Operator	Jim Sanderson
Receiver Model	Trimble R8, Model 3
Receiver S/N	5303424093
Antenna Height	1.695 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.018
RMSE Z	0.074
GPS Method	Static

PHOTOS:



Point ID	CA12



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA13
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sweet Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4580005.960	396491.592	659.143

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	1.602 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.006
RMSE Z	0.027
GPS Method	Static

PHOTOS:









Point ID	CA13



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA14
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Noxen

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581459.080	407592.239	501.381

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.019
RMSE Z	0.027
GPS Method	Network

PHOTOS:









Point ID	CA14



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA15
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Ransom

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4584687.192	428395.350	304.195

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.022
RMSE Z	0.032
GPS Method	Network

PHOTOS:



Point ID	CA15



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA16
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Sonestown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4573321.774	368733.421	369.179

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-19-2018
RMSE Hz	0.023
RMSE Z	0.031
GPS Method	Network

PHOTOS:






Point ID	CA16



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA17
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Elk Grove

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4573724.032	381715.336	364.640

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	Network

PHOTOS:









Point ID	CA17



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA18
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Red Rock

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4571770.773	392581.404	380.995

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.020
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	CA18



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA19
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sweet Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4570532.590	404010.913	393.760

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.015
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	CA19



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA20
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Stillwater

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560586.487	390862.550	294.475

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.013
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	CA20



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA21
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Shickshinny

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560677.320	403790.935	242.288

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.018
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	CA21



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA22
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4551133.548	397283.296	272.236

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.022
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	CA22



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA23
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Nanticoke

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4553481.272	407558.133	305.192

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.019
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	CA23



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA24
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Sinking Spring

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4459259.010	408324.390	166.776

Operator	Layne Clark
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.017
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	CA24



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA25
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Wilkes-Barre West

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

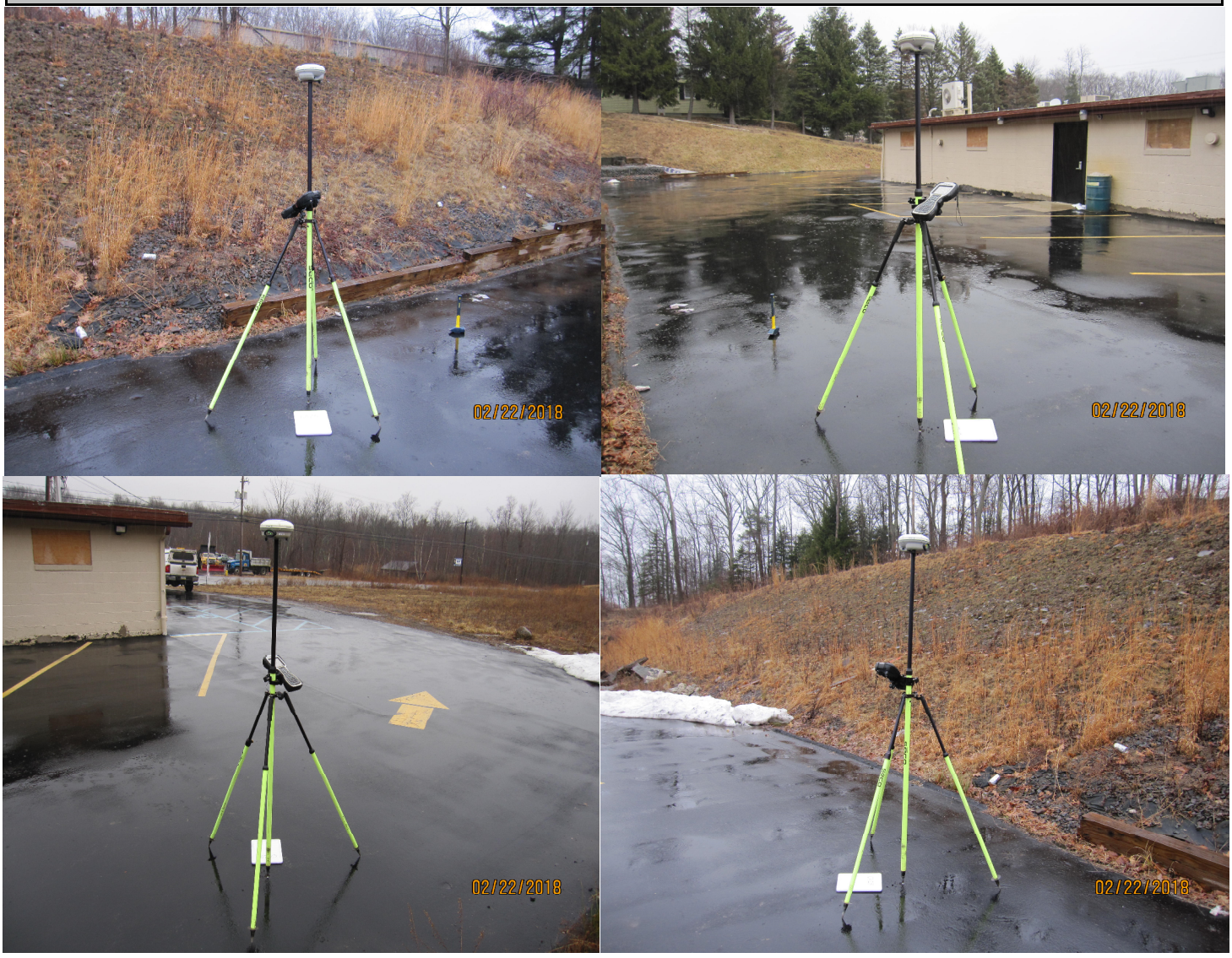
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4555903.842	424847.931	411.300

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	0.017
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	CA25



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA26
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Wilkes-Barre East

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4561468.114	433940.513	582.526

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-23-2018
RMSE Hz	0.017
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	CA26



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA27
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Pleasant View Summit

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4563328.036	443834.942	610.079

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-01-2018
RMSE Hz	0.018
RMSE Z	0.023
GPS Method	Network

PHOTOS:









Point ID	CA27



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA28
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Pleasant View Summit

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4554001.596	446639.704	504.855

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-23-2018
RMSE Hz	0.020
RMSE Z	0.029
GPS Method	Network

PHOTOS:









Point ID	CA28



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA29
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	White Haven

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4551718.019	435808.847	408.917

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-23-2018
RMSE Hz	0.020
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	CA29



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA30
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4541016.298	398509.488	284.178

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.021
RMSE Z	0.033
GPS Method	Network

PHOTOS:



Point ID	CA30



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA31
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sybertsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4541796.413	408627.613	343.810

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.014
RMSE Z	0.017
GPS Method	Network

PHOTOS:



Point ID	CA31



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA32
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Freeland

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4542792.684	419821.633	331.815

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.023
RMSE Z	0.039
GPS Method	Network

PHOTOS:



Point ID	CA32



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA33
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	White Haven

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4543661.527	431539.325	433.832

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	CA33



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA34
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Nuremberg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4530459.607	396724.897	245.854

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.023
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	CA34



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA35
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Elverson

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4446689.853	425638.701	175.919

Operator	Layne Clark/Tod Yeisley
Receiver Model	Topcon GR3/Trimble R-8, Model 3
Receiver S/N	444-0153/ 5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-02-2018
RMSE Hz	0.025
RMSE Z	0.040
GPS Method	Network

PHOTOS:









Point ID	CA35



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA36
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Conyngham

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4530529.112	407624.854	522.493

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.018
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	CA36



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA37
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Hazleton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4532702.121	421153.193	517.613

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.019
RMSE Z	0.031
GPS Method	Network

PHOTOS:



Point ID	CA37



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA38
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Ashland

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4521377.025	390891.978	378.621

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.017
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	CA38



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA39
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Shenandoah

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4521036.177	403222.639	493.074

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.020
RMSE Z	0.027
GPS Method	Network

PHOTOS:



Point ID	CA39



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA40
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tamaqua

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4520915.867	417623.961	380.750

Operator	Barry Palmer
Receiver Model	Trimble R-6 Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.014
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	CA40



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA41
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Mount Carmel

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4513389.042	381532.623	309.112

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.021
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	CA41



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA42
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Shenandoah

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4513839.505	395093.987	485.892

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.021
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	CA42



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA43
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Delano

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4514908.393	407893.715	362.099

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.015
RMSE Z	0.019
GPS Method	Network

PHOTOS:









Point ID	CA43



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA44
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tamaqua

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

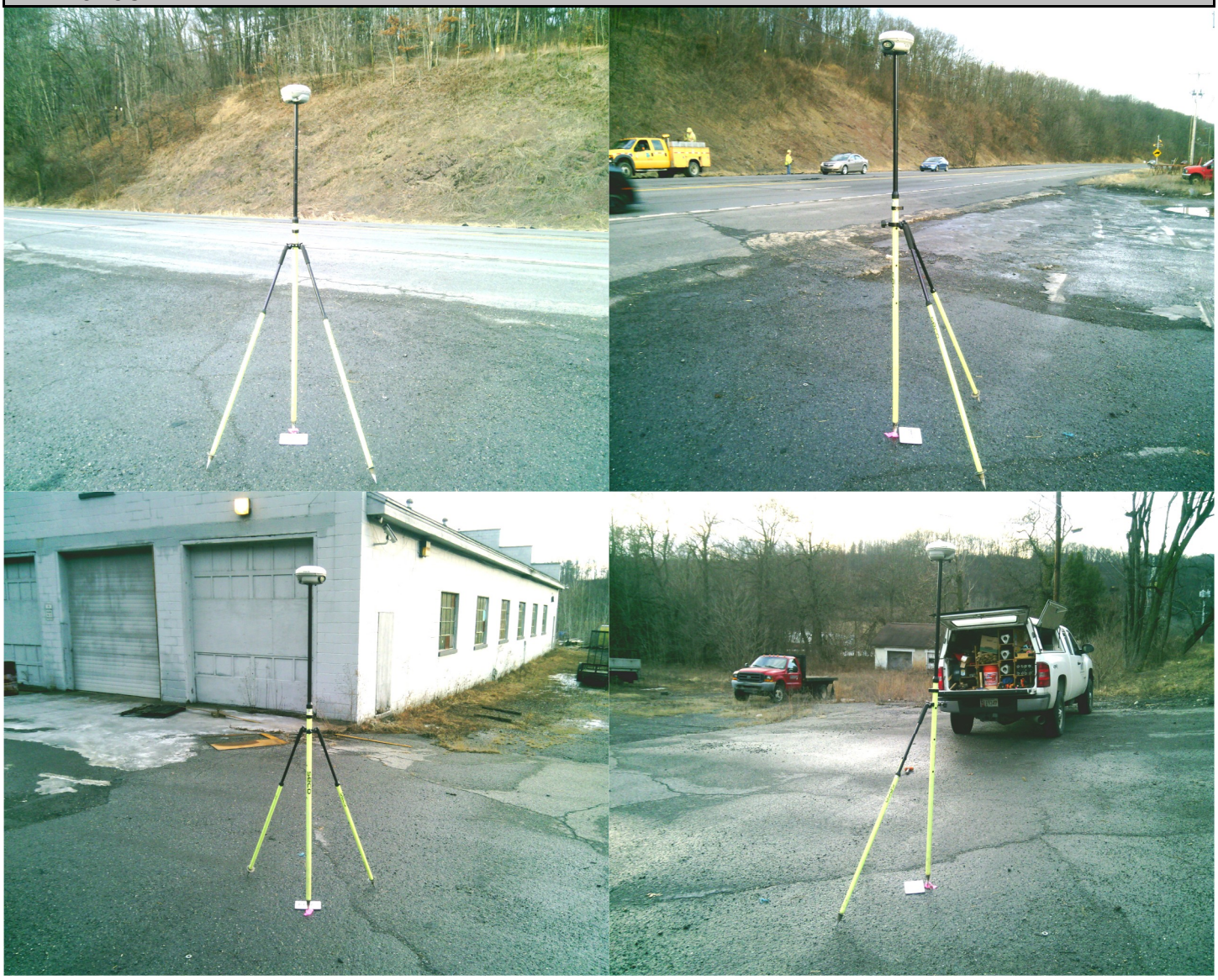
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4512924.372	419582.572	220.675

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.017
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	CA44



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA45
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	New Tripoli

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4510343.884	431714.924	183.268

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.022
RMSE Z	0.033
GPS Method	Network

PHOTOS:



Point ID	CA45



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA46
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Klingerstown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4502402.965	357192.987	161.115

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.016
RMSE Z	0.020
GPS Method	Network

PHOTOS:



Point ID	CA46



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA47
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Valley View

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4505789.965	370462.213	228.419

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.016
RMSE Z	0.020
GPS Method	Network

PHOTOS:



Point ID	CA47



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA48
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tremont

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4502793.983	383378.764	470.487

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.016
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	CA48



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA49
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Pottsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

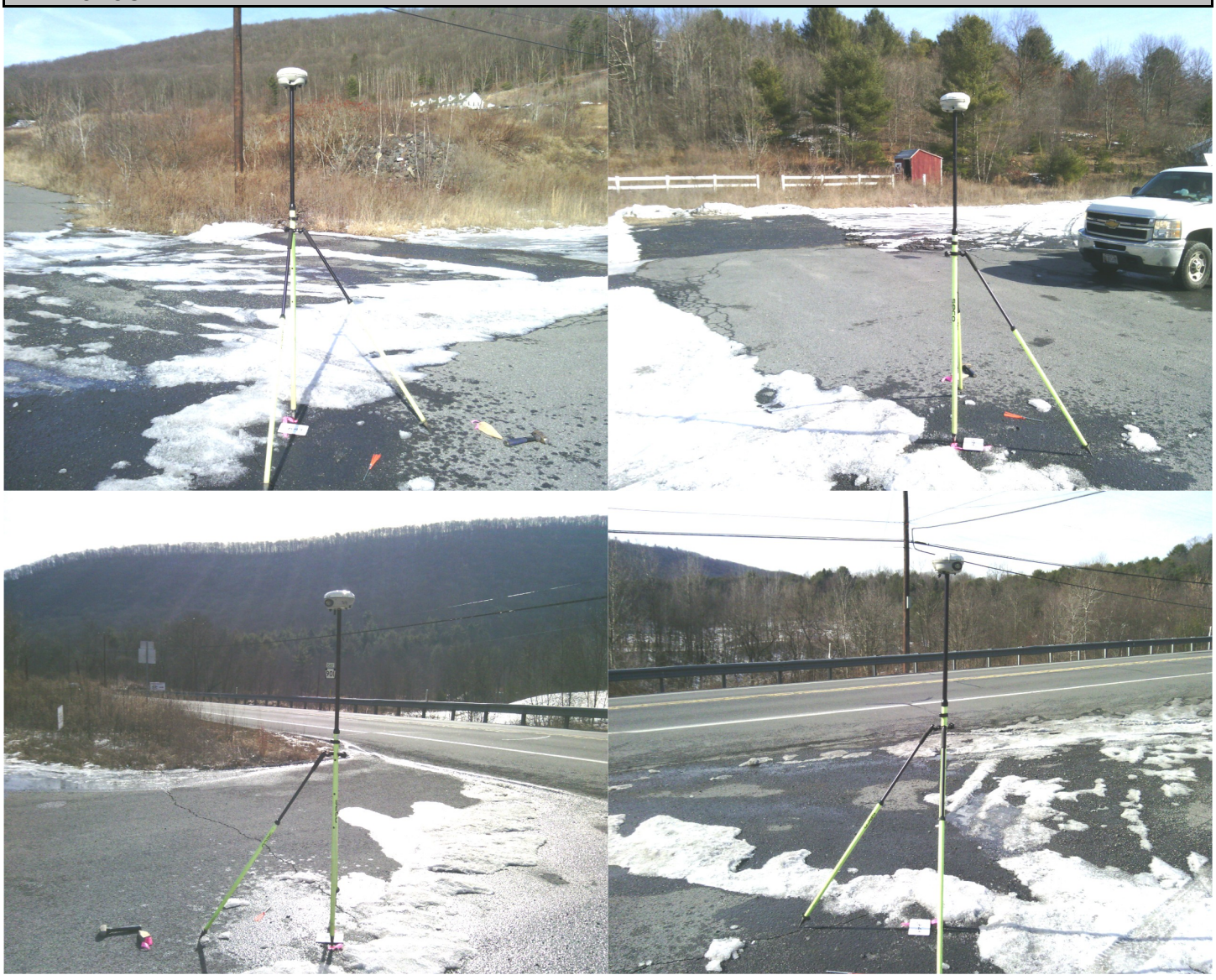
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4501845.977	396715.385	209.558

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.018
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	CA49



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA50
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Orwigsburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

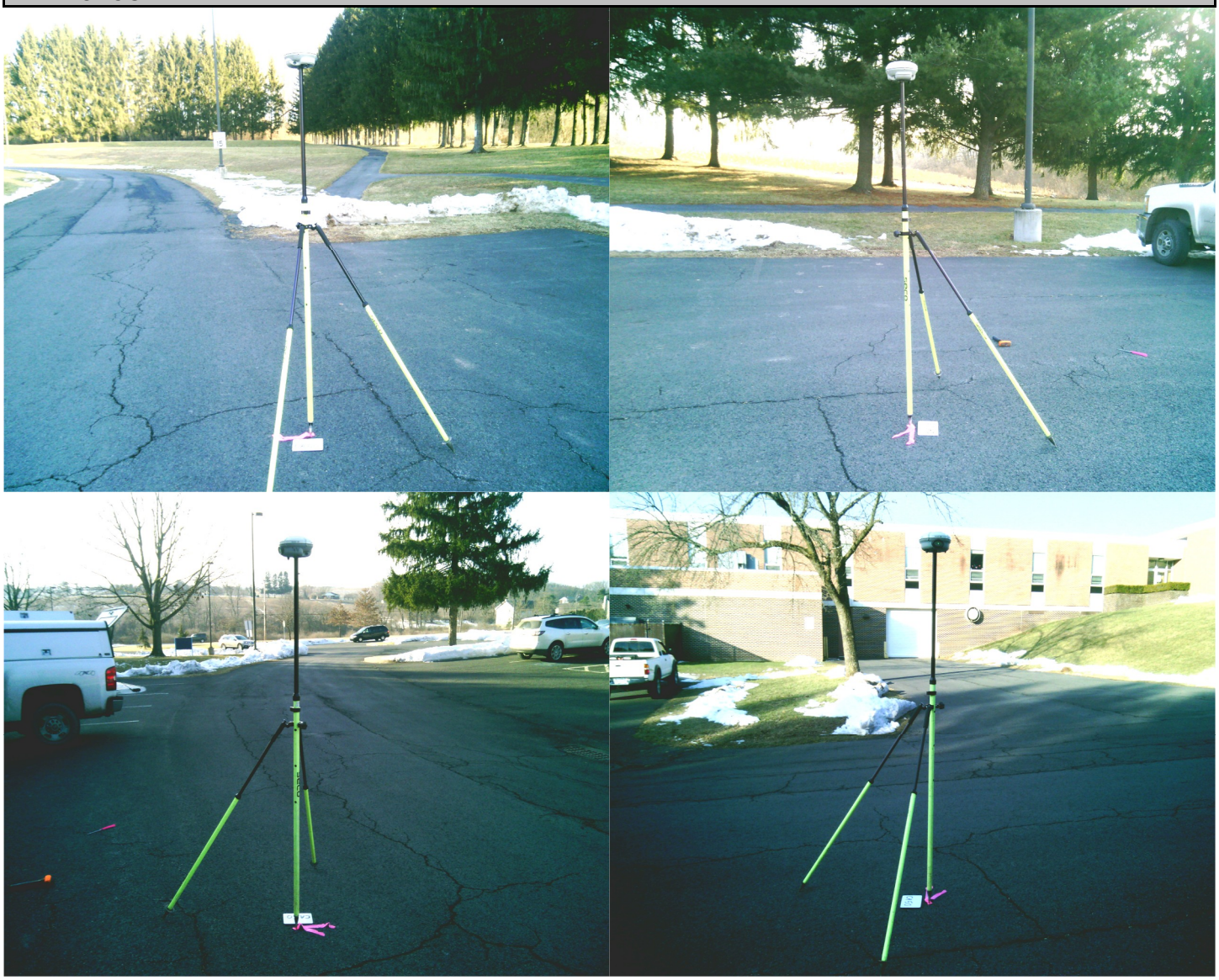
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4501209.781	408269.432	206.220

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.020
RMSE Z	0.027
GPS Method	Network

PHOTOS:



Point ID	CA50



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA51
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	New Ringgold

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

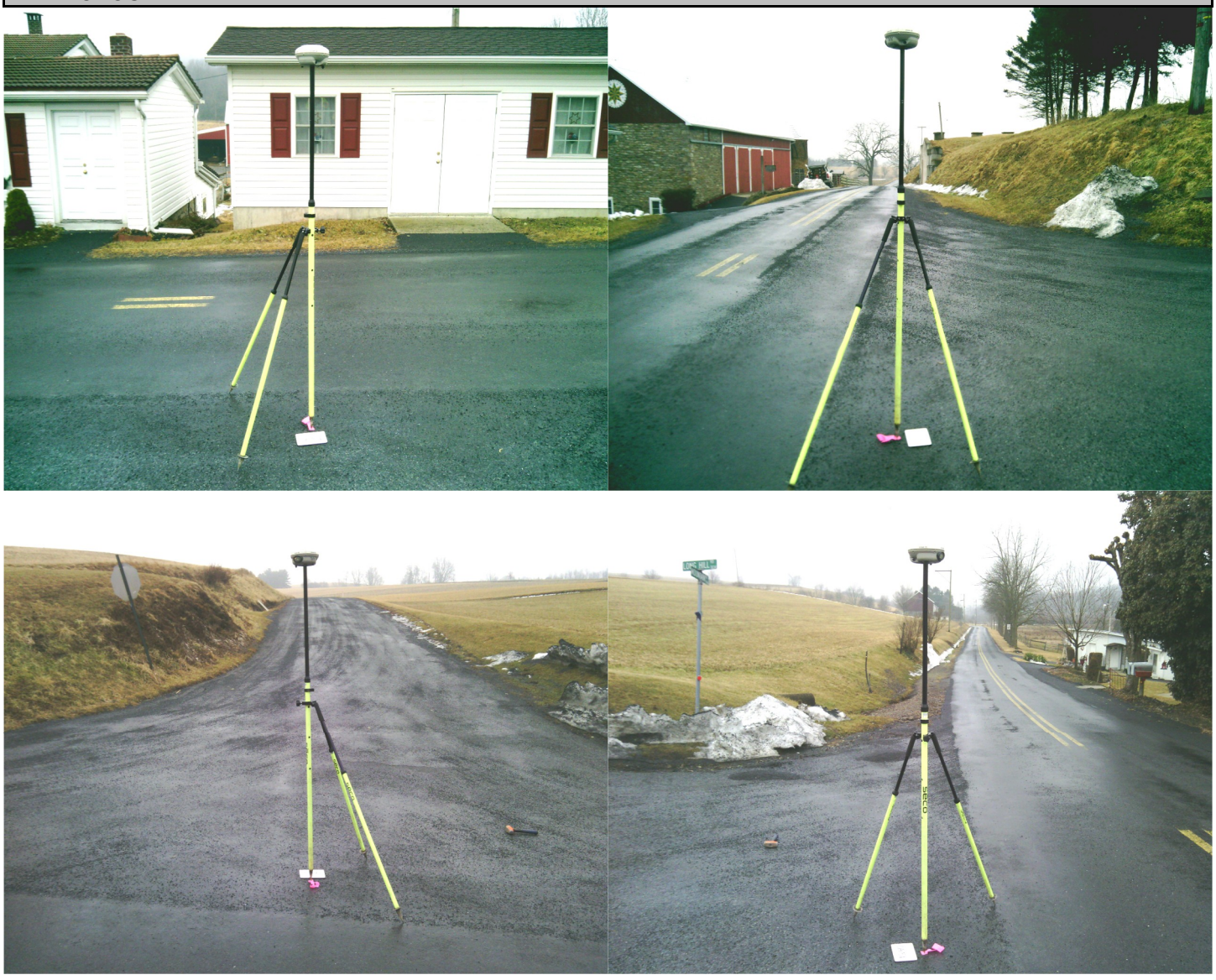
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4499825.912	422788.465	148.480

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	CA51



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA52
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Pine Grove

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4489278.271	375192.909	206.338

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.024
RMSE Z	0.030
GPS Method	Network

PHOTOS:



Point ID	CA52



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA53
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Friedensburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4488363.092	396776.759	339.173

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.024
RMSE Z	0.030
GPS Method	Network

PHOTOS:



Point ID	CA53



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA54
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Boyertown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4458095.224	438468.538	72.588

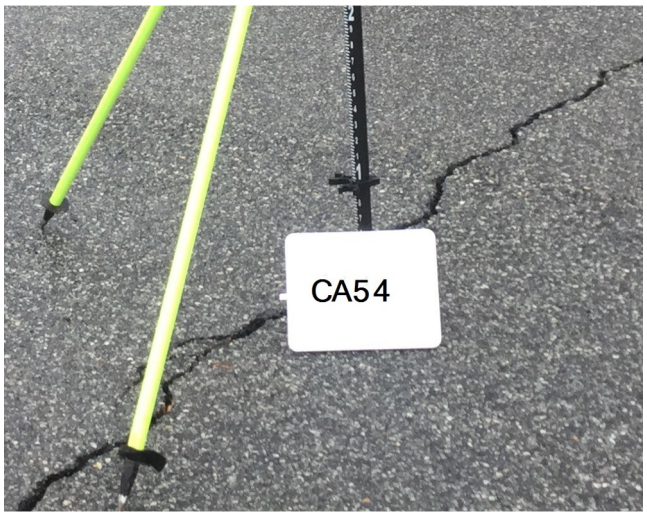
Operator	Layne Clark/Tod Yeisley
Receiver Model	Topcon GR3/Trimble R-8, Model 3
Receiver S/N	444-0153/ 5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-02-2018
RMSE Hz	0.028
RMSE Z	0.040
GPS Method	Network

PHOTOS:



Point ID	CA54



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA55
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Hamburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4490657.626	415817.068	116.674

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.020
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	CA55



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA56
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Kutztown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4491234.471	431590.903	193.605

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.017
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	CA56



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA57
Project No.	31467
Project Name	PA 13-County Lidar
State	Pennsylvania
County	Berks
Quad	Bethel

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475445.211	390172.758	178.349

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-17-2018
RMSE Hz	0.019
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	CA57



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA58
Project No.	31467
Project Name	PA 13-County Lidar
State	Pennsylvania
County	Berks
Quad	Strausstown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475229.078	404044.827	103.585

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-17-2018
RMSE Hz	0.022
RMSE Z	0.028
GPS Method	Network

PHOTOS:



Point ID	CA58



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA59
Project No.	31467
Project Name	PA 13-County Lidar
State	Pennsylvania
County	Berks
Quad	Temple

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475269.484	416173.586	107.596

Operator	Barry Palmer
Receiver Model	Trimble R-6 Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.016
RMSE Z	0.020
GPS Method	Network

PHOTOS:









Point ID	CA59



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA60
Project No.	31467
Project Name	PA 13-County Lidar
State	Pennsylvania
County	Berks
Quad	Fleetwood

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475262.920	430305.042	249.953

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	0.016
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	CA60



220 St Charles Way, Suite 200 York, PA 17402

Point ID	CA61
Project No.	31467
Project Name	PA 13-County Lidar
State	Pennsylvania
County	Berks
Quad	Manatawny

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475782.852	446813.653	194.102

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	0.022
RMSE Z	0.031
GPS Method	Network

PHOTOS:



Point ID	CA61



NVA-Bare Earth Point Log Sheet

Appendix B

220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE01
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Grover

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4604649.643	350602.870	637.795

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5304424093
Antenna Height	1.692 Meters

Date (MM-DD-YYYY)	03-20-2018
RMSE Hz	0.006
RMSE Z	0.021
GPS Method	Static

PHOTOS:



Point ID	BE01



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE02
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Shunk

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4602848.366	361089.405	488.335

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.041
RMSE Z	0.055
GPS Method	Network

PHOTOS:



Point ID	BE02



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE03
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Overton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4601954.890	372365.122	524.068

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.049
RMSE Z	0.061
GPS Method	Network

PHOTOS:



Point ID	BE03



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE04
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Dushore

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4601172.111	384457.028	429.802

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.056
RMSE Z	0.070
GPS Method	Network

PHOTOS:



Point ID	BE04



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE05
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Colley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4599784.690	394974.266	684.610

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.094
RMSE Z	0.108
GPS Method	Network

PHOTOS:



Point ID	BE05



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE06
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Barbours

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4593670.996	354060.776	438.236

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303424093
Antenna Height	1.692 Meters

Date (MM-DD-YYYY)	03-20-2018
RMSE Hz	0.007
RMSE Z	0.040
GPS Method	Static

PHOTOS:



Point ID	BE06



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE07
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Lopez

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4590057.874	390710.633	556.934

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-22-18
RMSE Hz	0.023
RMSE Z	0.027
GPS Method	Network

PHOTOS:









Point ID	BE07



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE08
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Picture Rocks

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581542.903	358093.659	546.194

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.019
RMSE Z	0.022
GPS Method	Network

PHOTOS:









Point ID	BE08



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE09
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Eagles Mere

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581701.069	371755.417	490.982

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.055
RMSE Z	0.084
GPS Method	Network

PHOTOS:



Point ID	BE09



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE10
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Elk Grove

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4580916.895	379271.768	564.994

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	1.508 Meters

Date (MM-DD-YYYY)	03-23-2018
RMSE Hz	0.006
RMSE Z	0.020
GPS Method	Static

PHOTOS:



Point ID	BE10



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE11
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sweet Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4580044.392	396503.013	661.521

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303424093
Antenna Height	1.594 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.006
RMSE Z	0.028
GPS Method	Static

PHOTOS:



Point ID	BE11



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE12
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Noxen

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581457.375	407595.951	500.903

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.020
RMSE Z	0.029
GPS Method	Network

PHOTOS:









Point ID	BE12



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE13
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Ransom

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4584688.781	428397.211	304.249

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.019
RMSE Z	0.026
GPS Method	Network

PHOTOS:









Point ID	BE13



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE14
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Sonestown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4573320.270	368731.782	368.936

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-19-2018
RMSE Hz	0.025
RMSE Z	0.032
GPS Method	Network

PHOTOS:



Point ID	BE14



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE15
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Red Rock

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4571772.112	392578.273	380.927

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.020
RMSE Z	0.023
GPS Method	Network

PHOTOS:

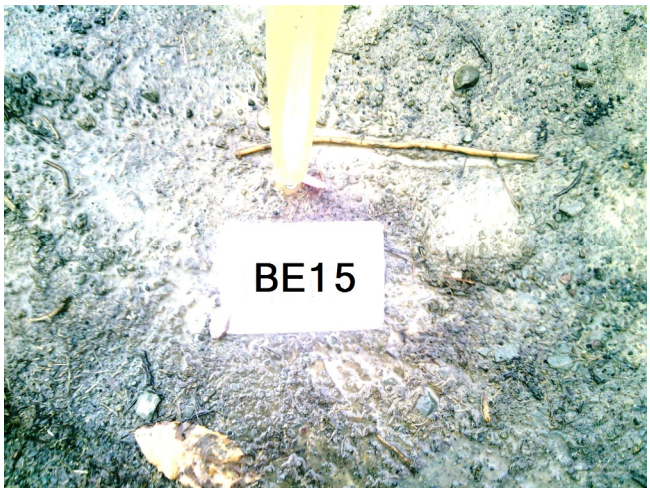








Point ID	BE15



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE16
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Stillwater

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560591.116	390860.387	294.308

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.014
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	BE16



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE17
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Shickshinny

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560669.477	403792.597	241.779

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.021
RMSE Z	0.028
GPS Method	Network

PHOTOS:









Point ID	BE17



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE18
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4551131.458	397286.860	272.193

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.023
RMSE Z	0.030
GPS Method	Network

PHOTOS:



Point ID	BE18



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE19
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Nanticoke

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

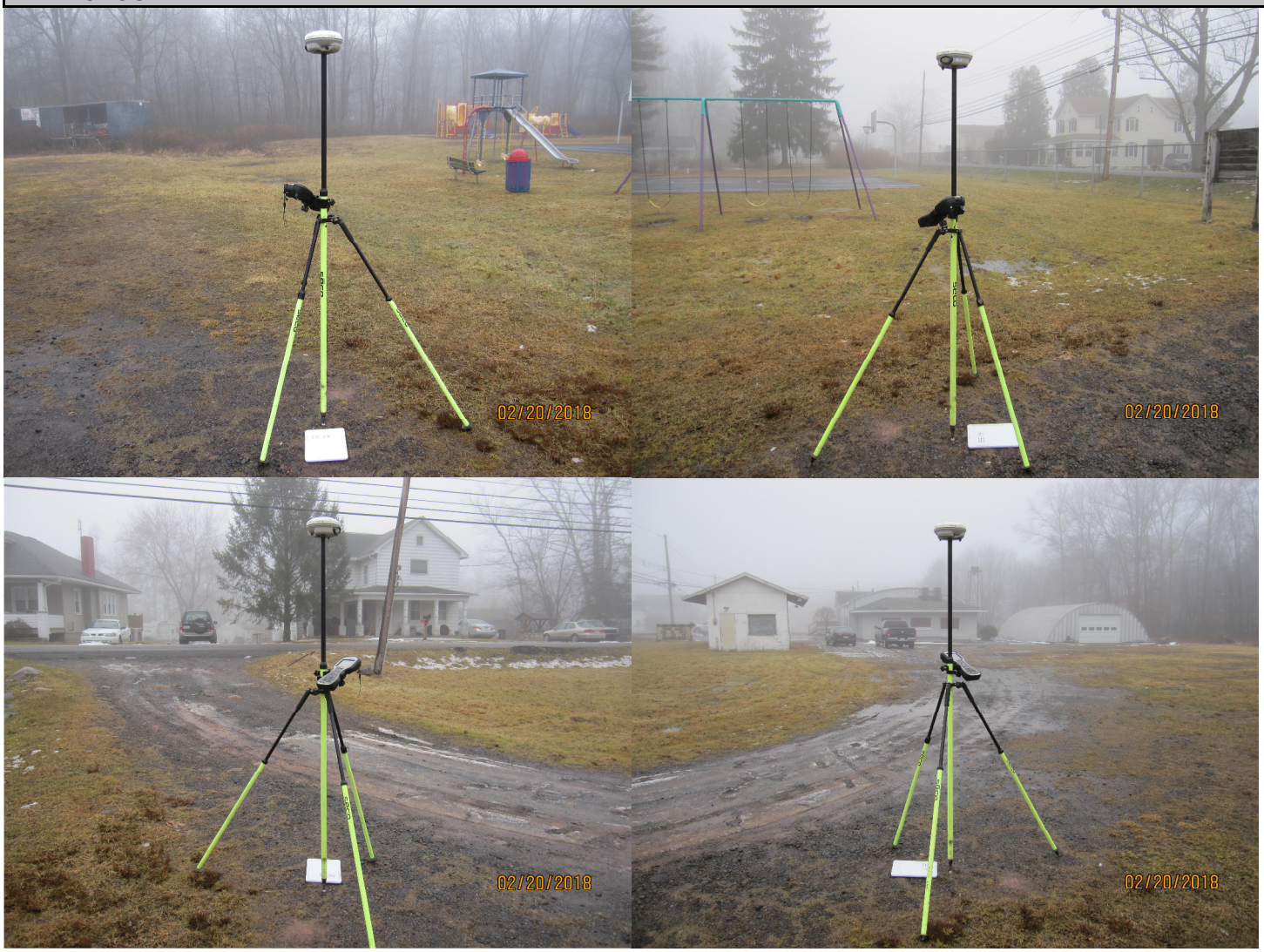
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4553481.263	407563.809	305.337

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.017
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	BE19



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE20
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Wilkes-Barre West

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4555884.405	424852.908	411.057

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	0.018
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	BE20



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE21
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Wilkes-Barre East

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4561477.371	433941.631	582.880

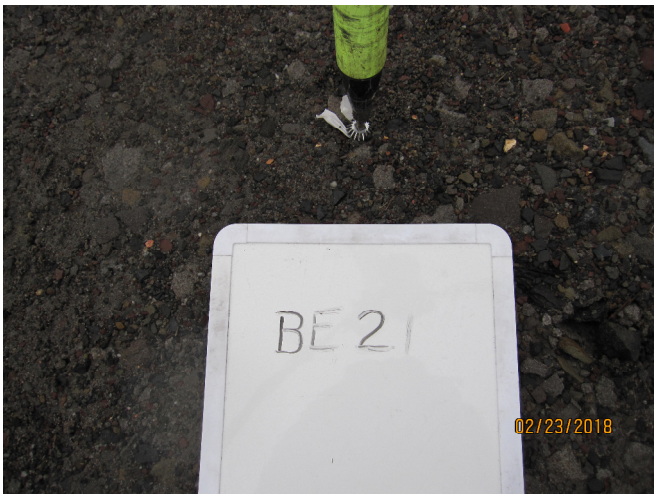
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-01-2018
RMSE Hz	0.017
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	BE21



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE22
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Pleasant View Summit

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4563325.249	443833.857	610.069

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-23-2018
RMSE Hz	0.017
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	BE21



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE23
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4541007.969	398497.108	284.934

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.019
RMSE Z	0.027
GPS Method	Network

PHOTOS:









Point ID	BE21



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE24
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sybertsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4541791.914	408628.788	343.848

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.015
RMSE Z	0.018
GPS Method	Network

PHOTOS:



Point ID	BE24



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE25
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Freeland

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4542788.876	419817.456	331.861

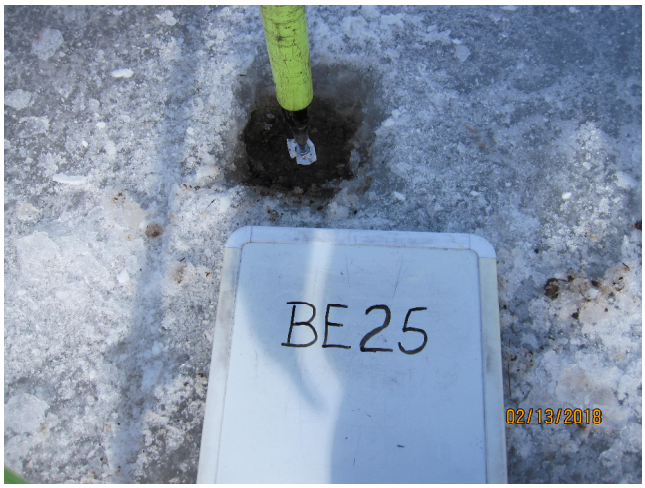
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.023
RMSE Z	0.041
GPS Method	Network

PHOTOS:



Point ID	BE25



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE26
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	White Haven

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4543666.908	431541.811	433.878

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.018
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	BE26



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE27
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	White Haven

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4544165.312	434728.848	383.576

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.018
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	BE27



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE28
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Nuremberg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4530465.447	396724.206	245.625

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.028
RMSE Z	0.030
GPS Method	Network

PHOTOS:



Point ID	BE28



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE29
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Conyngham

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4530544.063	407626.154	522.963

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	BE29



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE30
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Hazleton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4532701.490	421157.367	517.690

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.020
RMSE Z	0.029
GPS Method	Network

PHOTOS:



Point ID	BE30



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE31
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Ashland

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4521375.376	390892.981	378.541

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.017
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	BE31



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE32
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Shenandoah

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

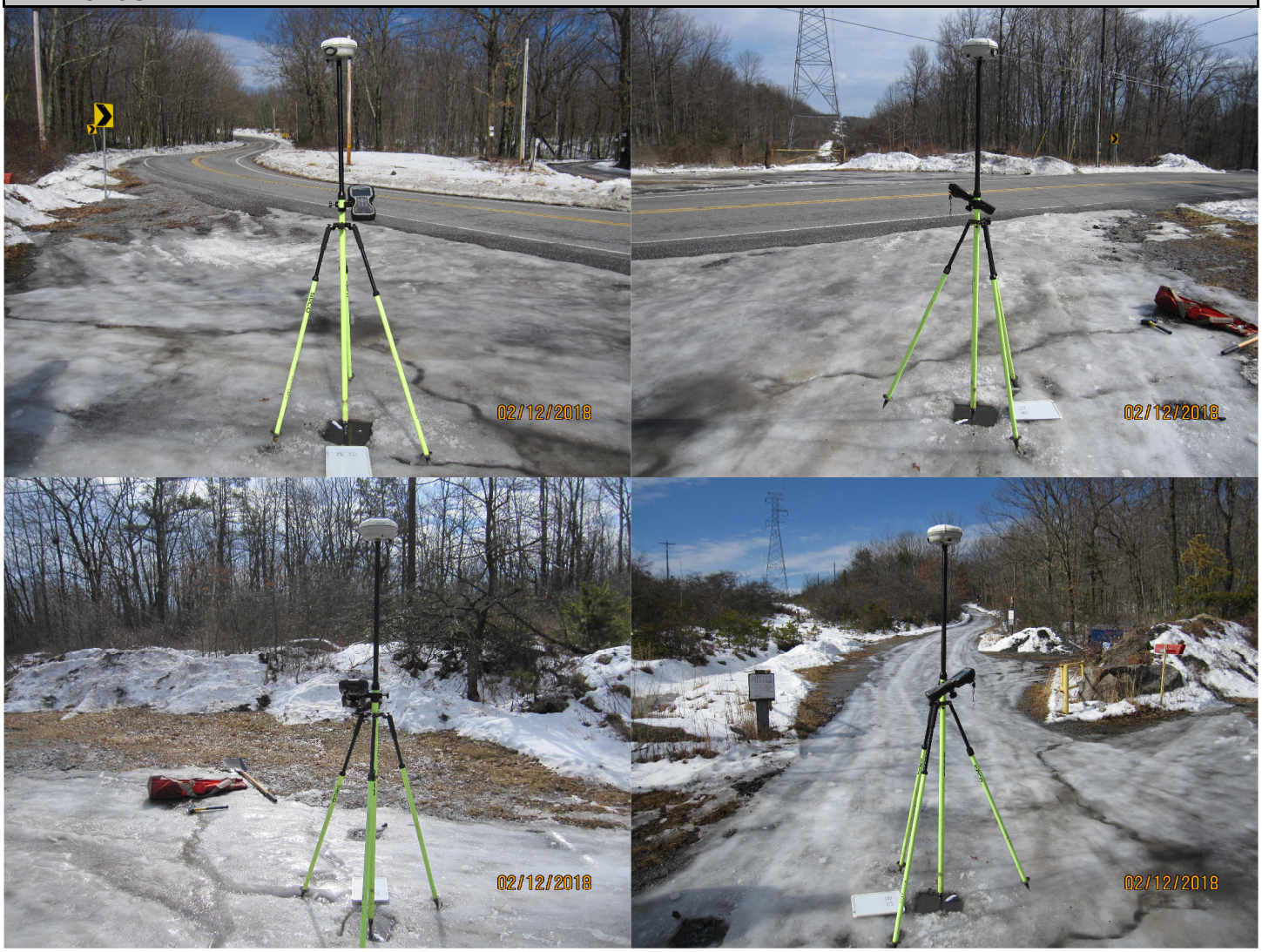
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4521038.438	403218.073	493.273

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.021
RMSE Z	0.027
GPS Method	Network

PHOTOS:



Point ID	BE32



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE33
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tamaqua

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4520965.595	417611.722	384.091

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.015
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	BE33



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE34
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Mount Carmel

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4513391.291	381533.830	309.203

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.022
RMSE Z	0.030
GPS Method	Network

PHOTOS:



Point ID	BE34



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE35
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Shenandoah

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4513845.028	395098.375	485.882

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.017
RMSE Z	0.021
GPS Method	Network

PHOTOS:









Point ID	BE35



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE36
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Delano

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4514927.658	407913.270	360.793

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.016
RMSE Z	0.020
GPS Method	Network

PHOTOS:



Point ID	BE36



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE37
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tamaqua

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4512917.003	419564.253	219.577

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.020
RMSE Z	0.029
GPS Method	Network

PHOTOS:






Point ID	BE37



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE38
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	New Tripoli

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

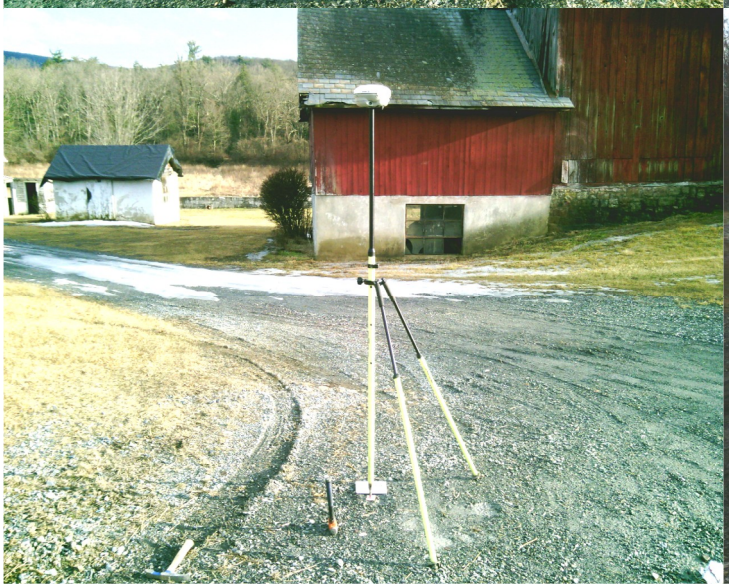
Northing	Easting	Elevation
4510341.755	431715.552	183.129

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.021
RMSE Z	0.031
GPS Method	Network

PHOTOS:






Point ID	BE38



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE39
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Klingerstown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4502405.036	357203.526	161.088

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.018
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	BE39



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE40
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tremont

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

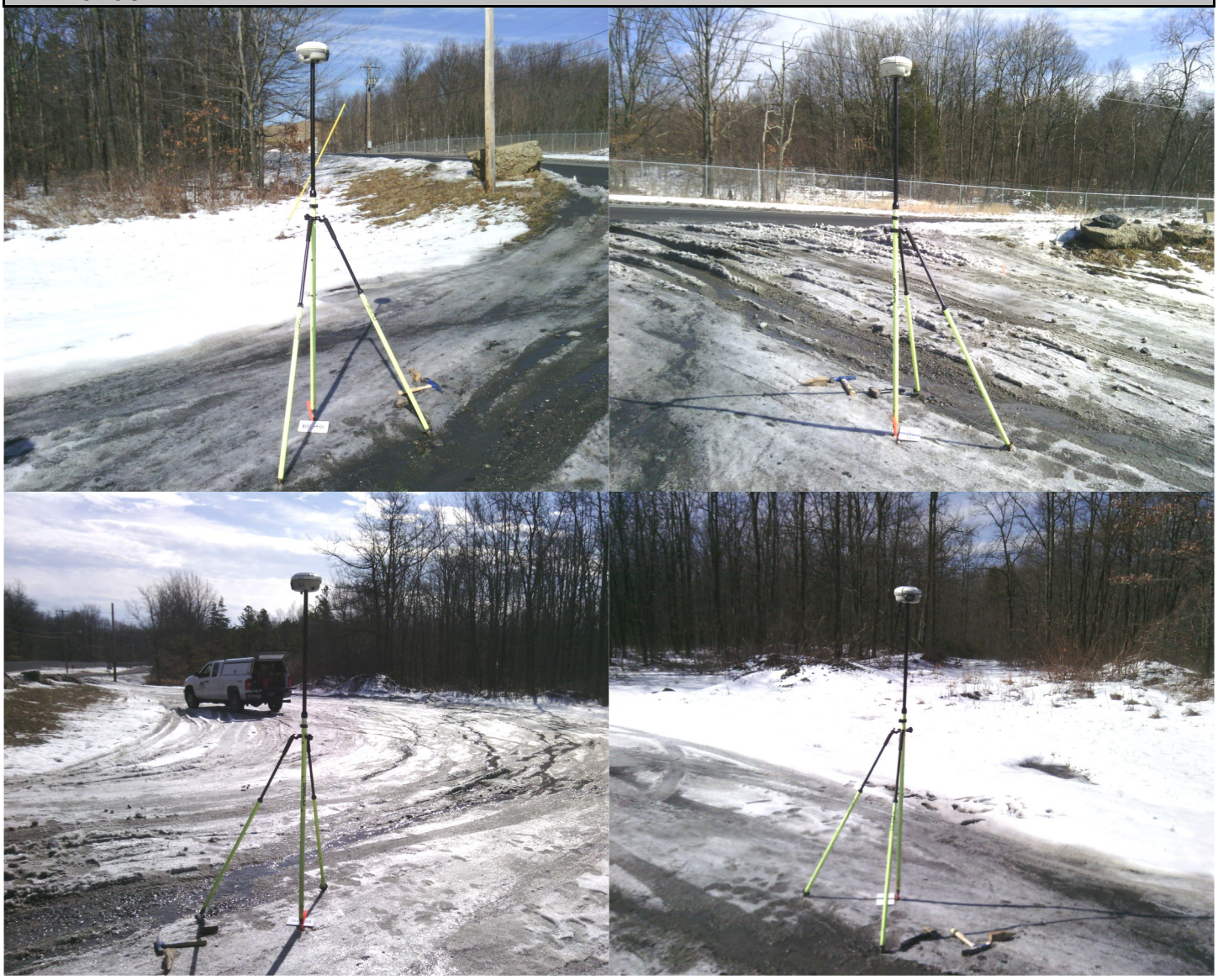
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4502793.831	383373.326	470.247

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.016
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	BE40



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE41
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Pottsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

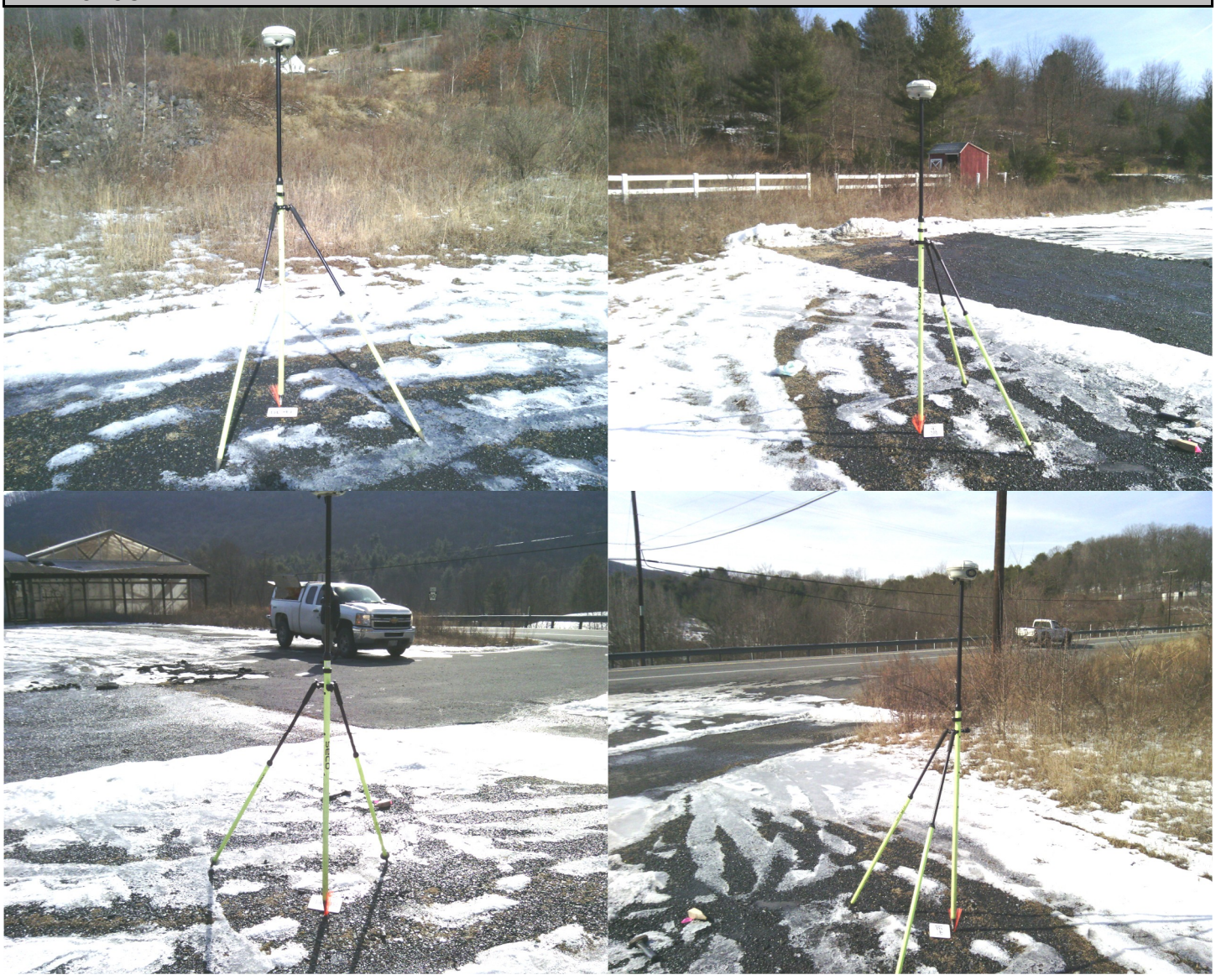
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4501859.098	396716.244	209.687

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.018
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	BE41



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE42
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Pine Grove

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4489281.603	375196.791	206.539

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.019
RMSE Z	0.022
GPS Method	Network

PHOTOS:









Point ID	BE42



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE43
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Swatara Hill

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4488664.563	385772.852	168.513

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.016
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	BE43



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE44
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Friedensburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4488363.171	396774.633	339.224

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.023
RMSE Z	0.031
GPS Method	Network

PHOTOS:



Point ID	BE44



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE45
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Hamburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4490657.618	415813.293	116.515

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.020
RMSE Z	0.027
GPS Method	Network

PHOTOS:









Point ID	BE45



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE46
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Kutztown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4491227.870	431586.656	193.506

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.017
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	BE46



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE47
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Bethel

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475407.592	390184.090	177.694

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-17-2018
RMSE Hz	0.019
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	BE47



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE48
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Strausstown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475225.325	404038.165	103.307

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-17-2018
RMSE Hz	0.019
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	BE48



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE49
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Temple

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475278.607	416170.468	108.300

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.014
RMSE Z	0.018
GPS Method	Network

PHOTOS:



Point ID	BE49



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE50
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Fleetwood

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475281.512	430298.781	250.714

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	0.017
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	BE50



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE51
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Manatawny

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475790.804	446849.542	193.484

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	0.028
RMSE Z	0.054
GPS Method	Network

PHOTOS:



Point ID	BE51



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE52
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Sinking Spring

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4459261.399	408288.673	165.574

Operator	Layne Clark
Receiver Model	Topcon GR-3
Receiver S/N	444-0153
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.018
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	BE52



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE53
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Boyertown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4458118.810	438511.594	72.653

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-07-2018
RMSE Hz	0.025
RMSE Z	0.032
GPS Method	Network

PHOTOS:



Point ID	BE53



220 St Charles Way, Suite 200 York, PA 17402

Point ID	BE54
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Elverson

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4446722.464	425648.967	177.196

Operator	Layne Clark/Tod Yeisley
Receiver Model	Topcon GR3/Trimble R-8, Model 3
Receiver S/N	444-0153/ 5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-02-2018
RMSE Hz	0.020
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	BE54



NVA-Urban Area Point Log Sheets

Appendix C

220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA01
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Dushore

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4597964.278	383048.527	440.286

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.051
RMSE Z	0.073
GPS Method	Network

PHOTOS:



Point ID	UA01



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA02
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Sonestown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4577822.539	367243.016	261.565

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.019
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	UA02



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA03
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Eagles Mere

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4594211.063	365335.818	312.169

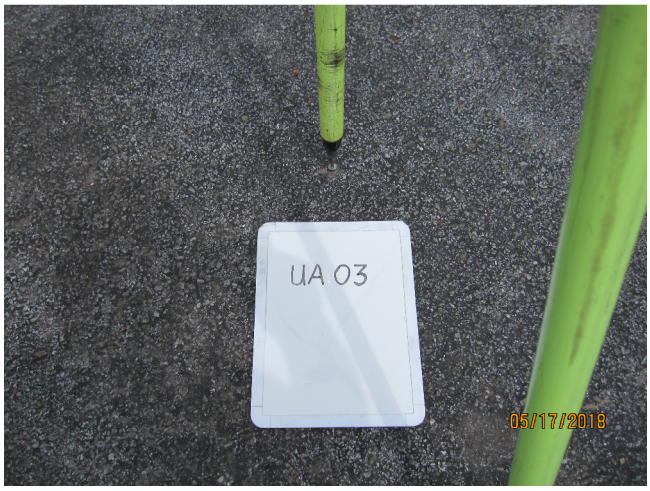
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303424093
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	05-17-2018
RMSE Hz	0.007
RMSE Z	0.033
GPS Method	Static

PHOTOS:



Point ID	UA03



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA04
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Laporte

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4587203.594	375542.721	542.303

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.047
RMSE Z	0.057
GPS Method	Network

PHOTOS:



Point ID	UA04



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA05
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Red Rock

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4579429.617	391426.684	716.847

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	1.679 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.008
RMSE Z	0.035
GPS Method	Static

PHOTOS:



Point ID	UA05



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA06
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Ransom

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4582037.071	429075.477	251.854

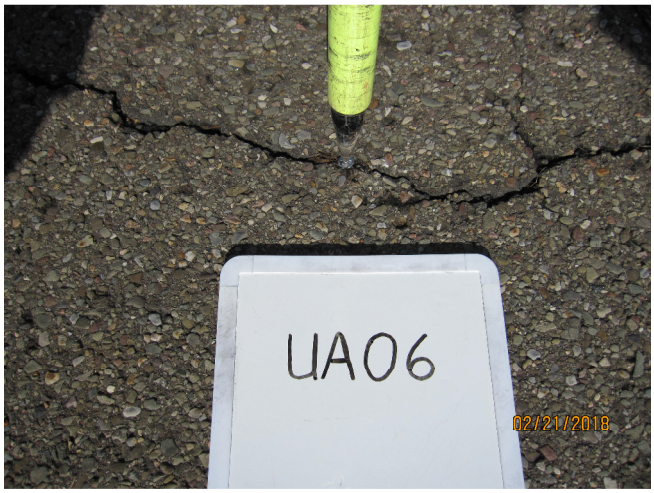
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	UA06



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA07
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Red Rock

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

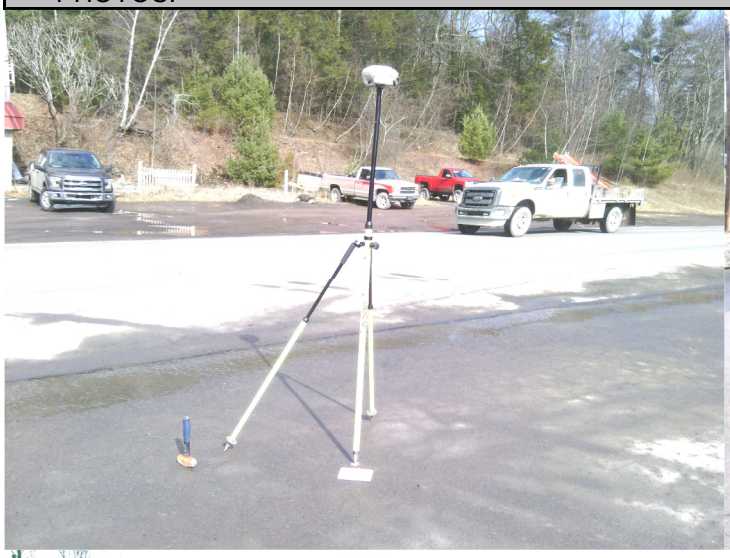
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4571708.035	391065.845	386.281

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.017
RMSE Z	0.023
GPS Method	Network

PHOTOS:









Point ID	UA07



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA08
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sweet Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4570532.495	404017.837	393.599

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.016
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	UA08



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA09
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Shickshinny

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560820.685	396672.102	236.107

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.019
RMSE Z	0.029
GPS Method	Network

PHOTOS:









Point ID	UA09



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA10
Project No.	31467
Project Name	PA 3 COUNTY SOUTH CENTRAL 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4547575.998	397003.965	190.606

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.020
RMSE Z	0.030
GPS Method	Network

PHOTOS:









Point ID	UA10



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA11
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sybertsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4550105.903	415736.399	331.617

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	0.020
RMSE Z	0.029
GPS Method	Network

PHOTOS:



Point ID	UA11



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA12
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	White Haven

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4551715.536	435814.852	409.049

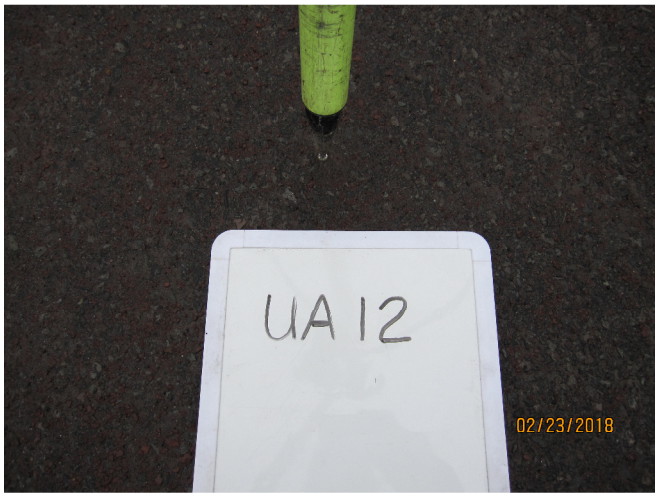
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-23-2018
RMSE Hz	0.023
RMSE Z	0.027
GPS Method	Network

PHOTOS:



Point ID	UA12



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA13
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Conyngham

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4531649.637	411278.430	547.997

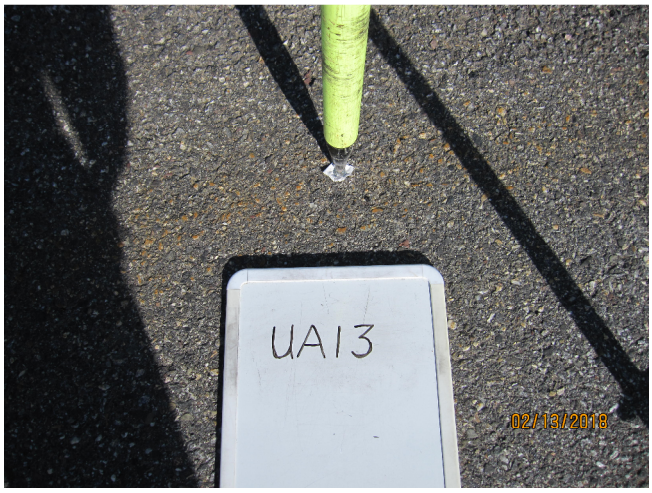
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.020
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	UA13



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA14
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Hazleton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4535770.124	419617.279	574.665

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.019
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	UA14



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA15
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Shenandoah

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4523705.523	396122.148	344.238

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.019
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	UA15



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA16
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tamaqua

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4516789.649	418136.933	245.202

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.020
RMSE Z	0.027
GPS Method	Network

PHOTOS:



Point ID	UA16



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA17
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Valley View

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4505785.331	370460.018	228.256

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.014
RMSE Z	0.019
GPS Method	Network

PHOTOS:



Point ID	UA17



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA18
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Pottsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

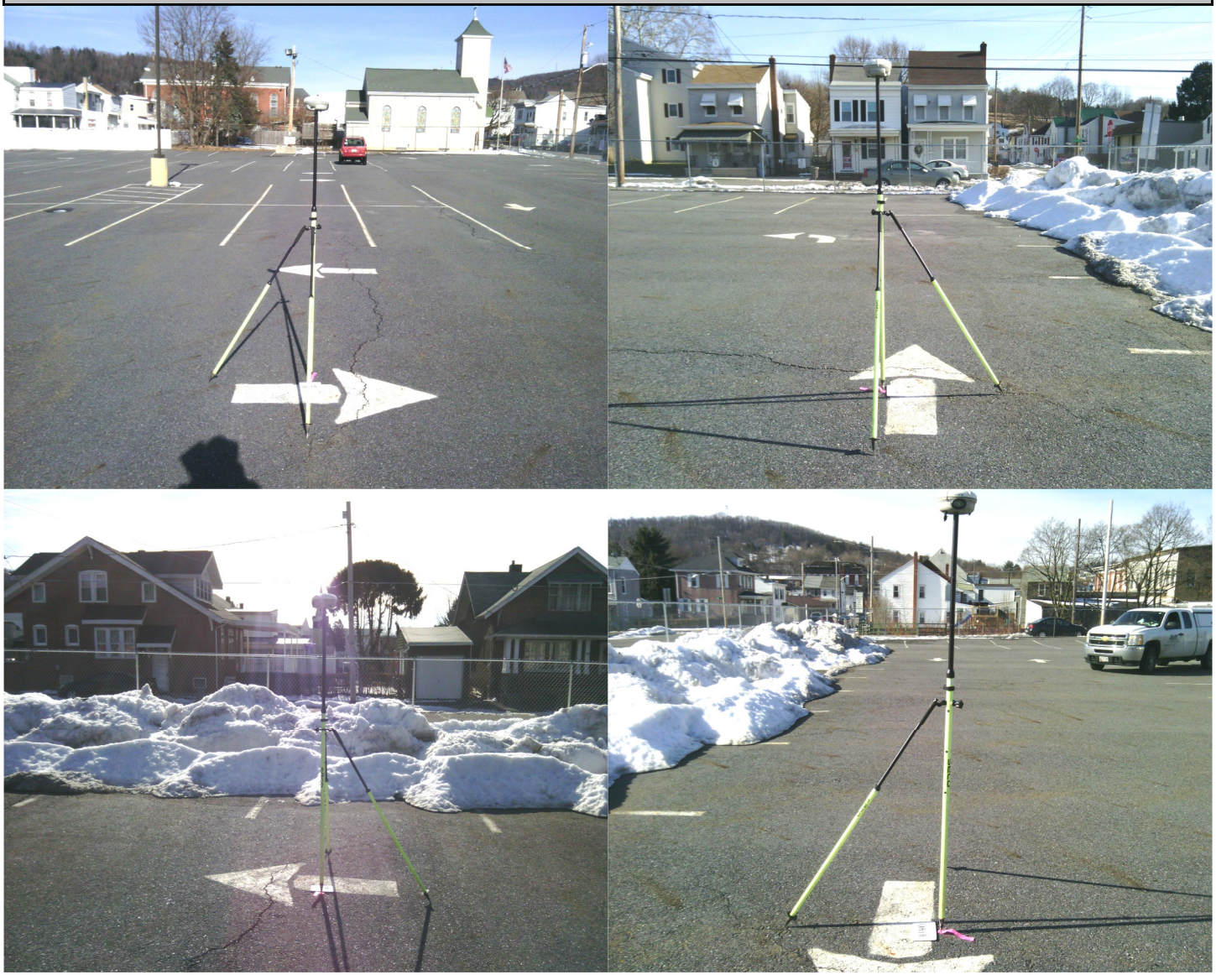
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4508417.217	399647.984	225.140

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.017
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	UA18



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA19
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	New Ringgold

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

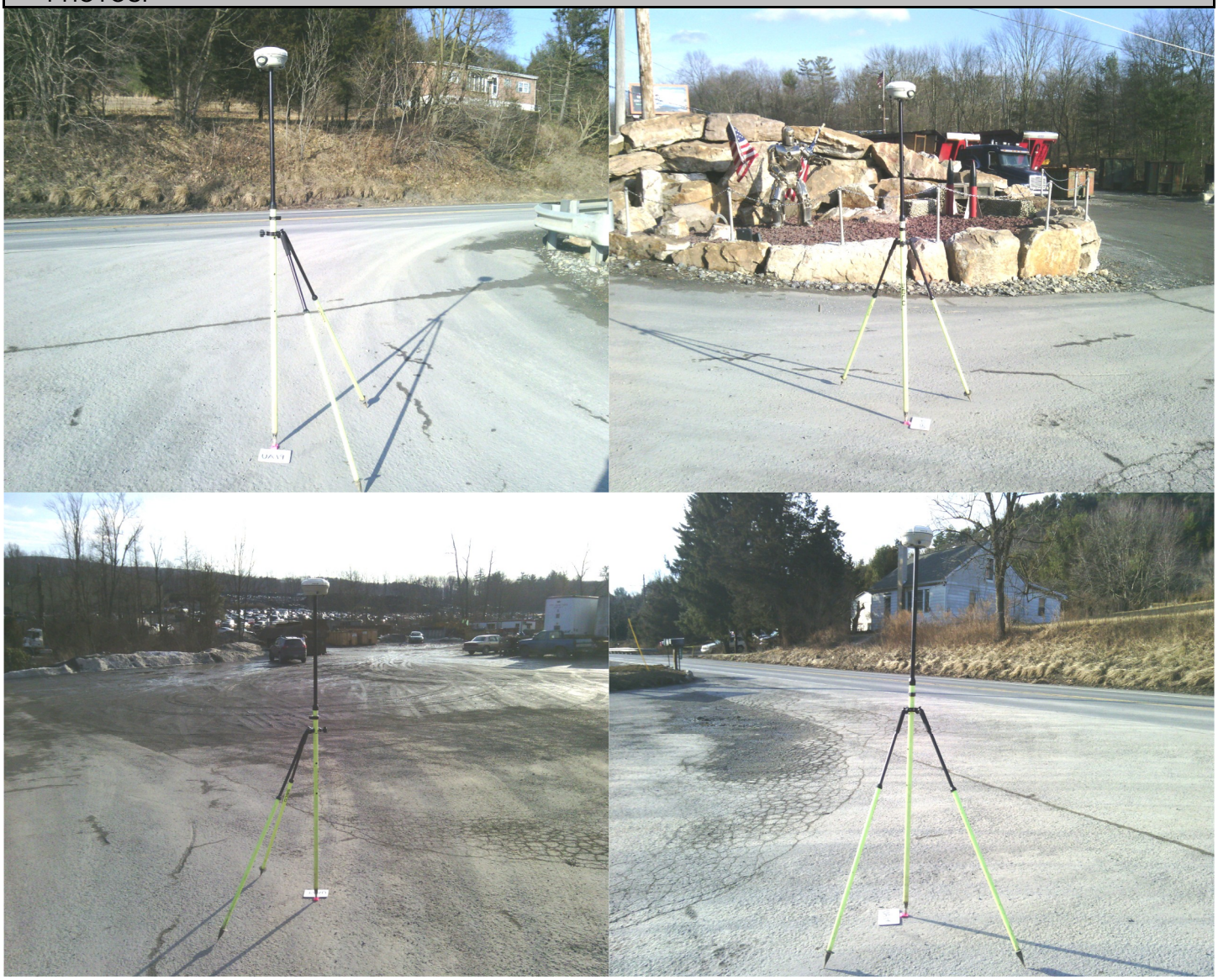
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4504601.329	419024.155	202.298

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	0.019
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	UA19



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA20
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Friedensburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4497613.221	400843.108	153.211

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.020
RMSE Z	0.025
GPS Method	Network

PHOTOS:









Point ID	UA20



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA21
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	New Ringgold

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4499805.199	422793.474	150.664

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.015
RMSE Z	0.020
GPS Method	Network

PHOTOS:



Point ID	UA21



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA22
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Fredericksburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4481864.305	382661.351	168.613

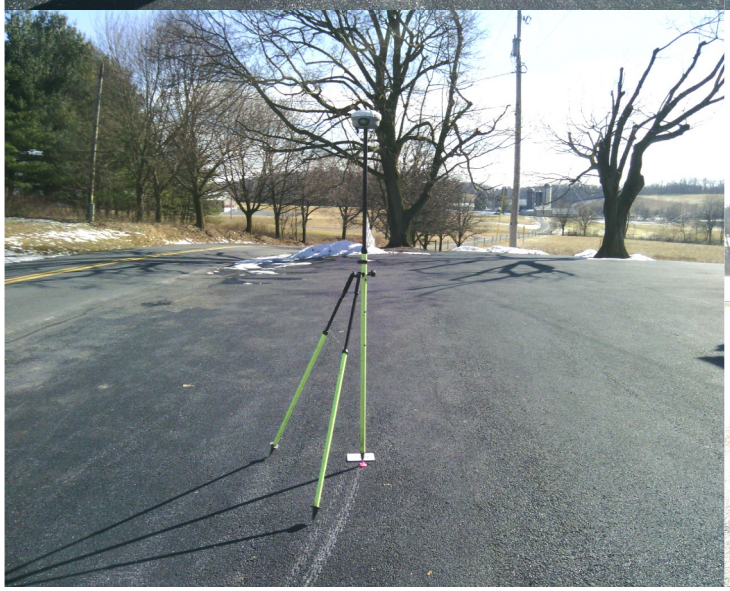
Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.013
RMSE Z	0.018
GPS Method	Network

PHOTOS:









Point ID	UA22



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA23
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Strausstown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4483051.872	399523.862	178.979

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-17-2018
RMSE Hz	0.018
RMSE Z	0.022
GPS Method	Network

PHOTOS:



Point ID	UA23



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA24
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Hamburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4483842.190	418349.727	107.795

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.019
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	UA24



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA25
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Topton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4484265.160	440903.474	143.028

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	0.016
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	UA25



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA26
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Womelsdorf

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4468712.580	398940.924	140.936

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-17-2018
RMSE Hz	0.017
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	UA26



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA27
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Reading

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4468862.060	415689.043	77.503

Operator	Layne Clark
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.015
RMSE Z	0.018
GPS Method	Network

PHOTOS:

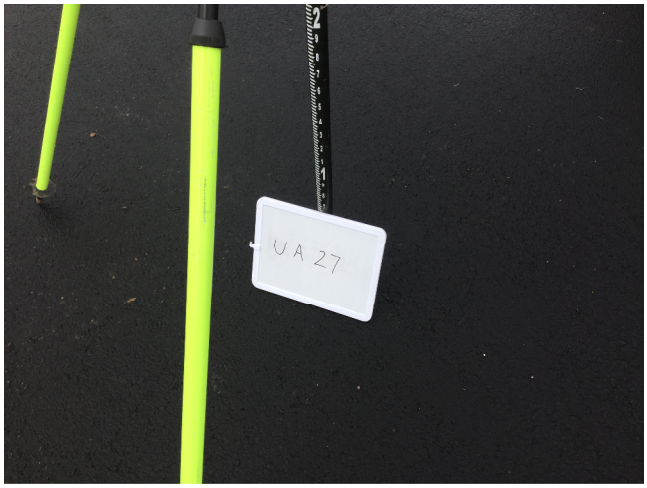








Point ID	UA27



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA28
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Reading

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4468895.989	423567.165	144.021

Operator	Layne Clark/Tod Yeisley
Receiver Model	Topcon GR3/Trimble R-8, Model 3
Receiver S/N	444-0153/ 5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-01-2018
RMSE Hz	0.014
RMSE Z	0.016
GPS Method	Network

PHOTOS:



Point ID	UA28



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA29
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	East Greenville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4470460.258	448734.340	136.174

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	0.019
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	UA29



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA30
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Morgantown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4454207.451	415934.271	169.298

Operator	Layne Clark
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.017
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	UA30



220 St Charles Way, Suite 200 York, PA 17402

Point ID	UA31
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Elverson

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

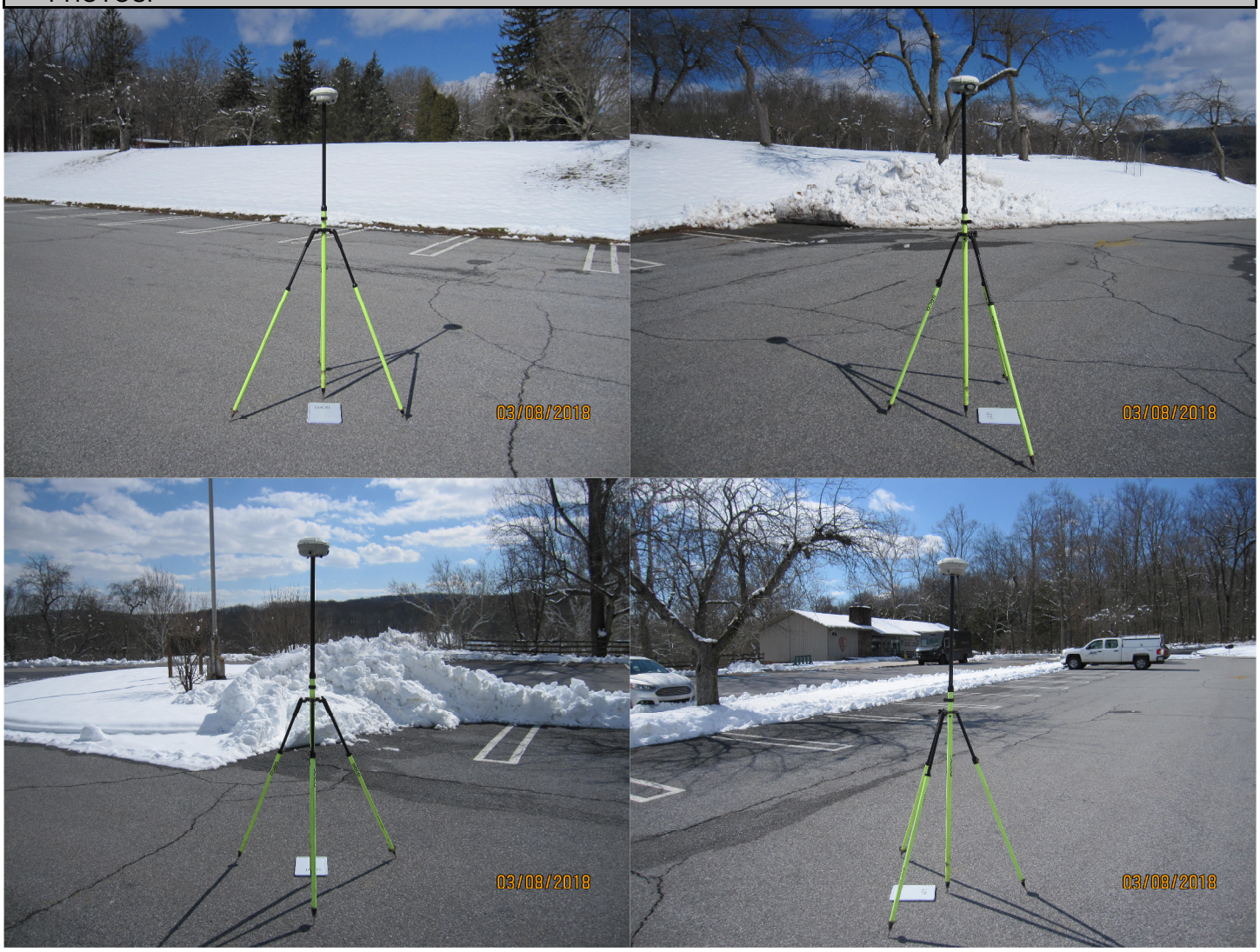
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4451013.148	434202.515	164.697

Operator	Tod Yeisley
Receiver Model	Trimble R8, Model 3
Receiver S/N	5304224093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-08-2018
RMSE Hz	0.033
RMSE Z	0.038
GPS Method	Network

PHOTOS:



Point ID	UA31



VVA-Tall Weed Point Log Sheets

220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW01
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Grover

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

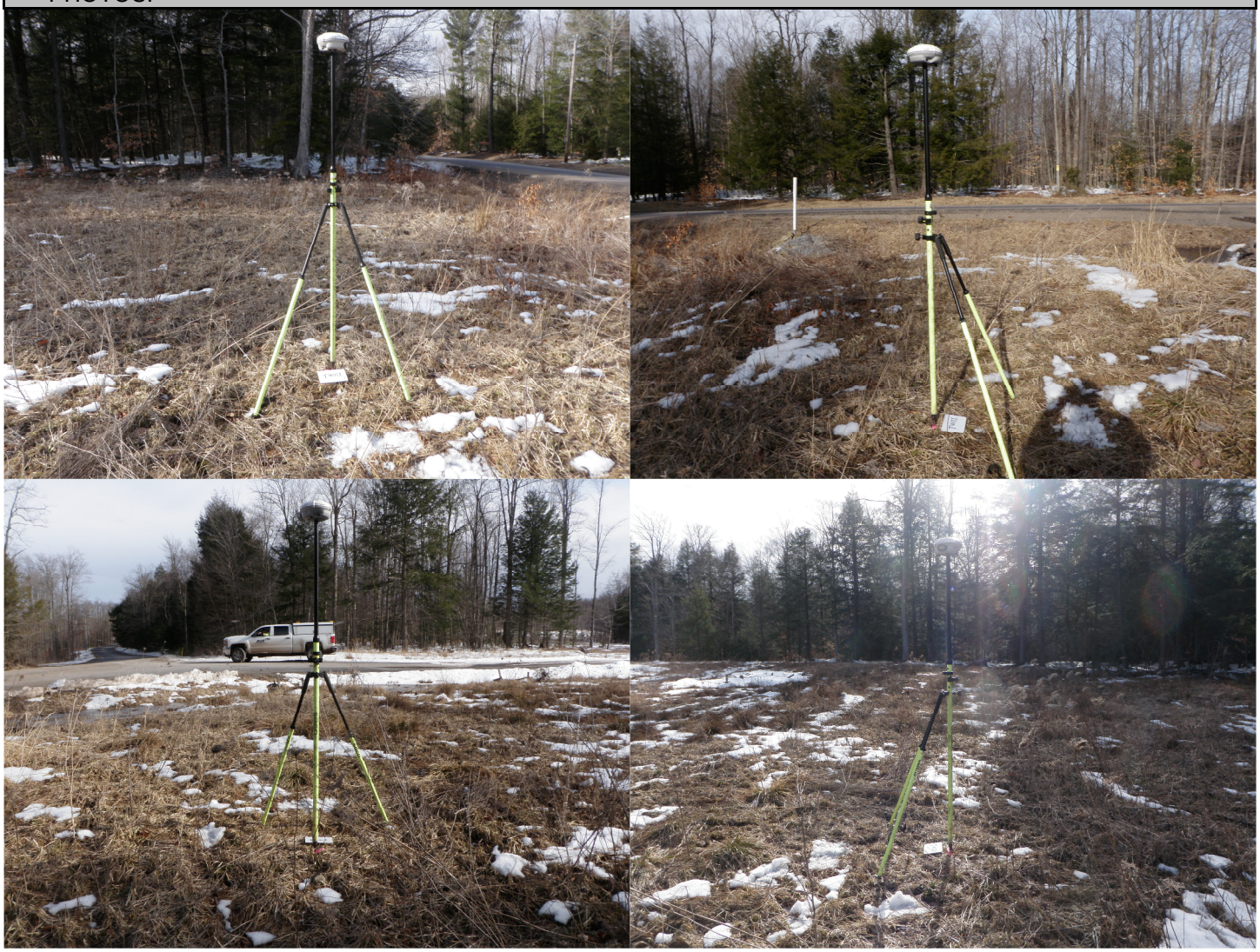
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4604684.950	350611.353	637.215

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-20-2018
RMSE Hz	0.006
RMSE Z	0.020
GPS Method	Static

PHOTOS:



Point ID	TW01



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW02
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Overton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4601955.179	372377.106	524.060

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.051
RMSE Z	0.065
GPS Method	Network

PHOTOS:



Point ID	TW02



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW03
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Colley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4599768.212	394995.078	686.401

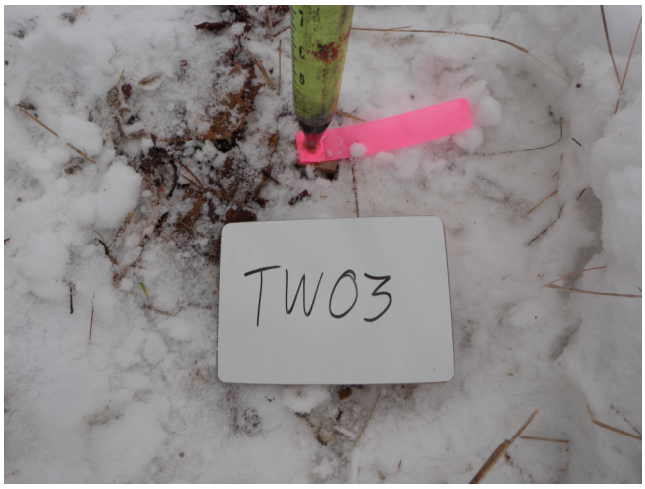
Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.119
RMSE Z	0.129
GPS Method	Network

PHOTOS:



Point ID	TW03



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW04
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Eagles Mere

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581708.658	371761.274	491.747

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.058
RMSE Z	0.091
GPS Method	Network

PHOTOS:



Point ID	TW04



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW05
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Stillwater

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

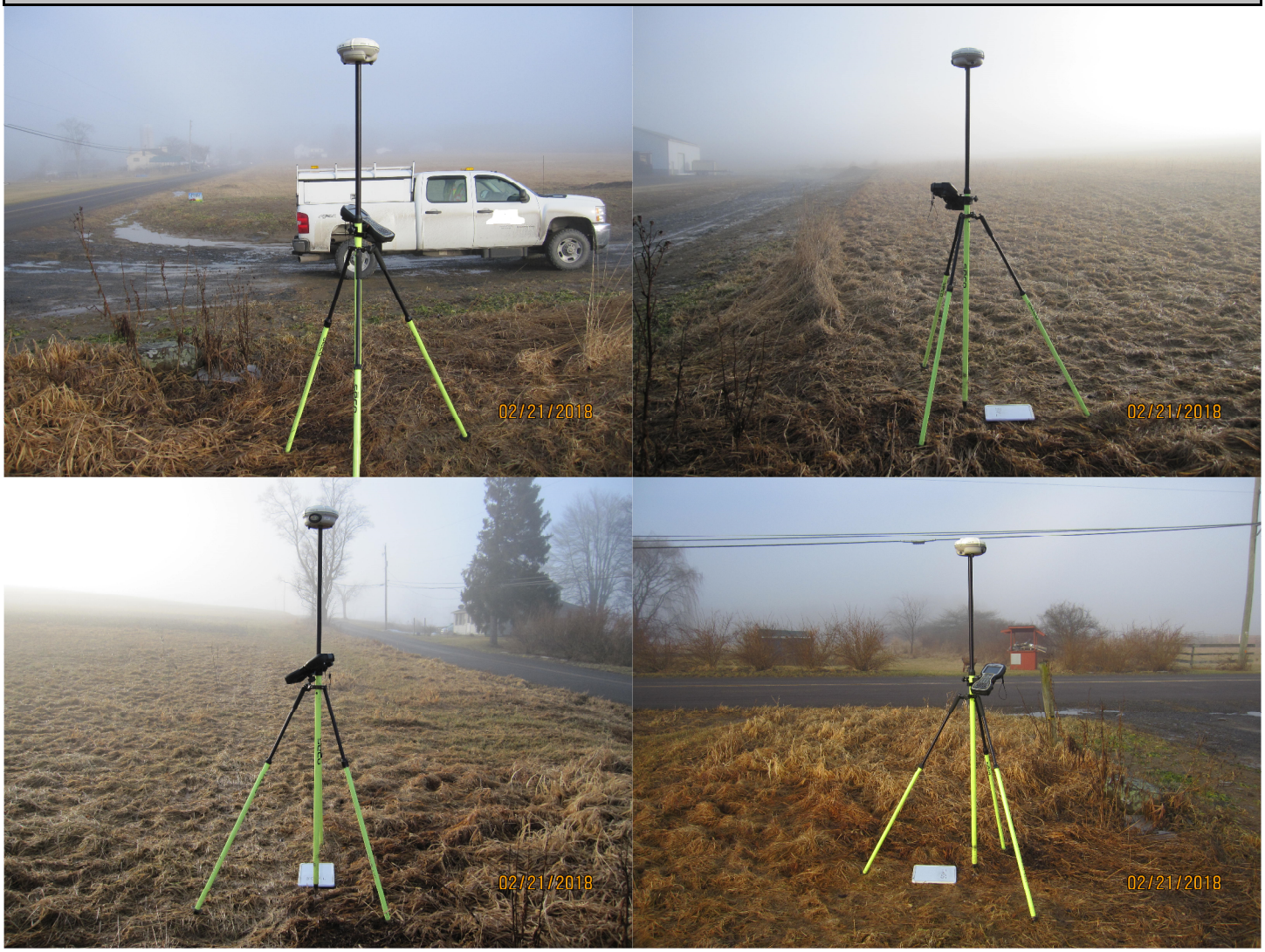
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560582.352	390868.717	295.164

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.014
RMSE Z	0.021
GPS Method	Network

PHOTOS:



Point ID	TW05



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW06
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Shickshinny

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560692.505	403795.590	242.509

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.020
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	TW06



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW07
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4541007.887	398513.728	285.474

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.017
RMSE Z	0.023
GPS Method	Network

PHOTOS:



Point ID	TW07



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW08
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Conyngham

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4530547.203	407574.361	524.424

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.021
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	TW08



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW09
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Delano

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4514894.757	407888.933	363.110

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.016
RMSE Z	0.019
GPS Method	Network

PHOTOS:



Point ID	TW09



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW10
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Pottsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

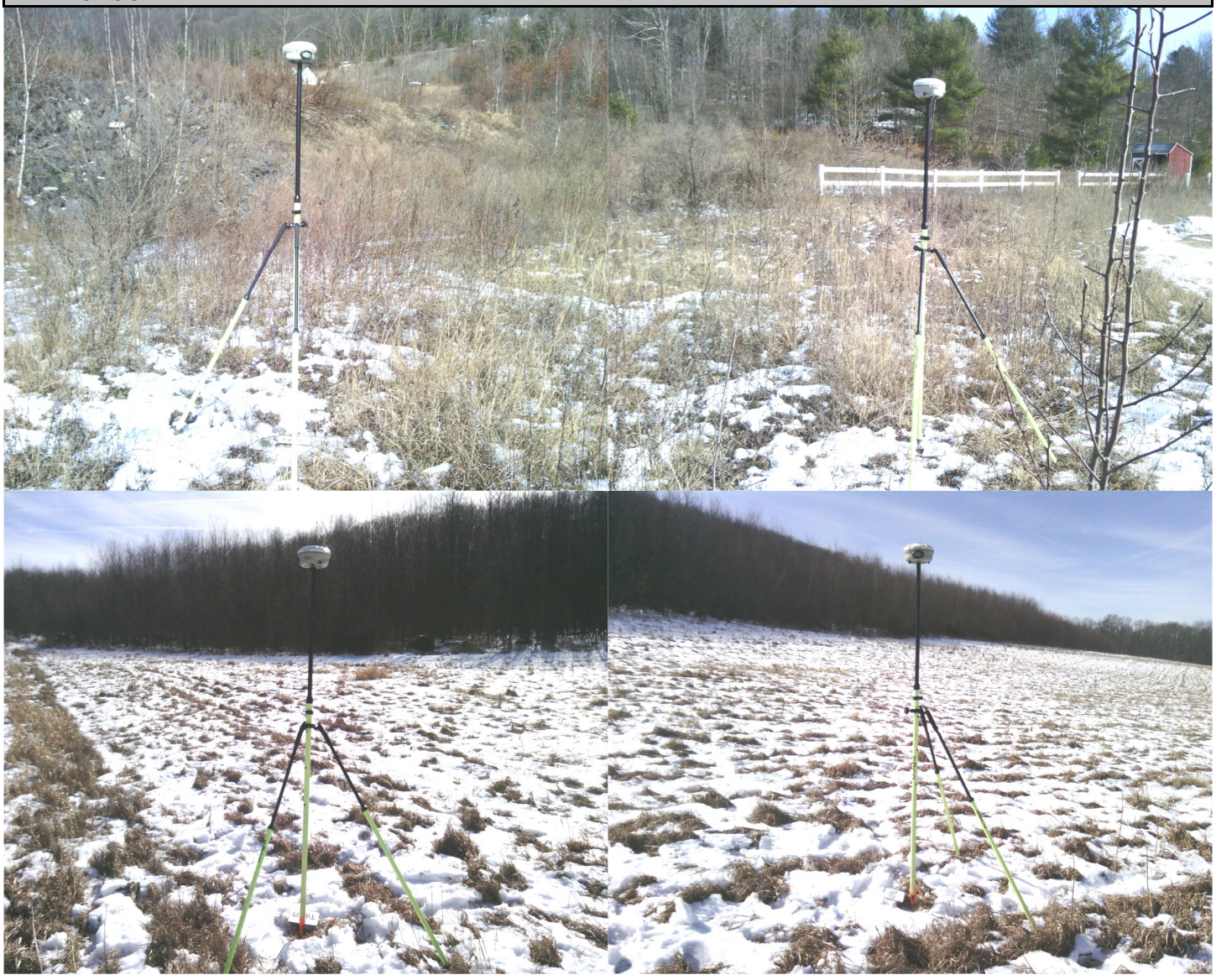
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4501864.835	396710.509	209.765

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	TW10



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW11
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Pine Grove

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4489282.742	375187.925	206.829

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.020
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	TW11



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW12
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Friednesburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4488359.268	396777.512	339.493

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.024
RMSE Z	0.040
GPS Method	Network

PHOTOS:



Point ID	TW12



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW13
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Hamburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4490668.592	415845.928	117.278

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.020
RMSE Z	0.028
GPS Method	Network

PHOTOS:



Point ID	TW13



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW14
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	East Greenville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

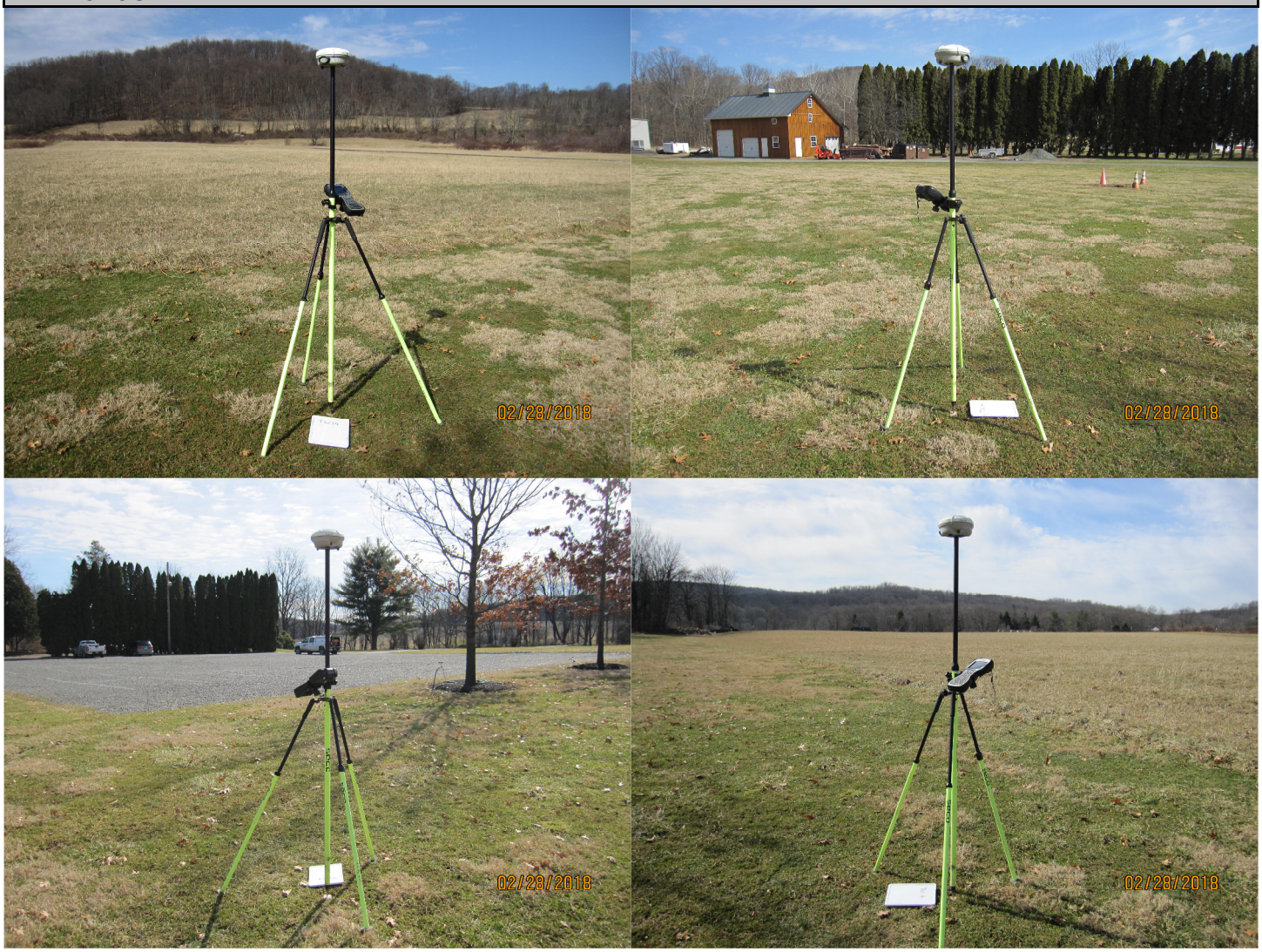
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475792.182	446803.916	194.291

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	0.024
RMSE Z	0.033
GPS Method	Network

PHOTOS:



Point ID	TW14



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW15
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	East Greenville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

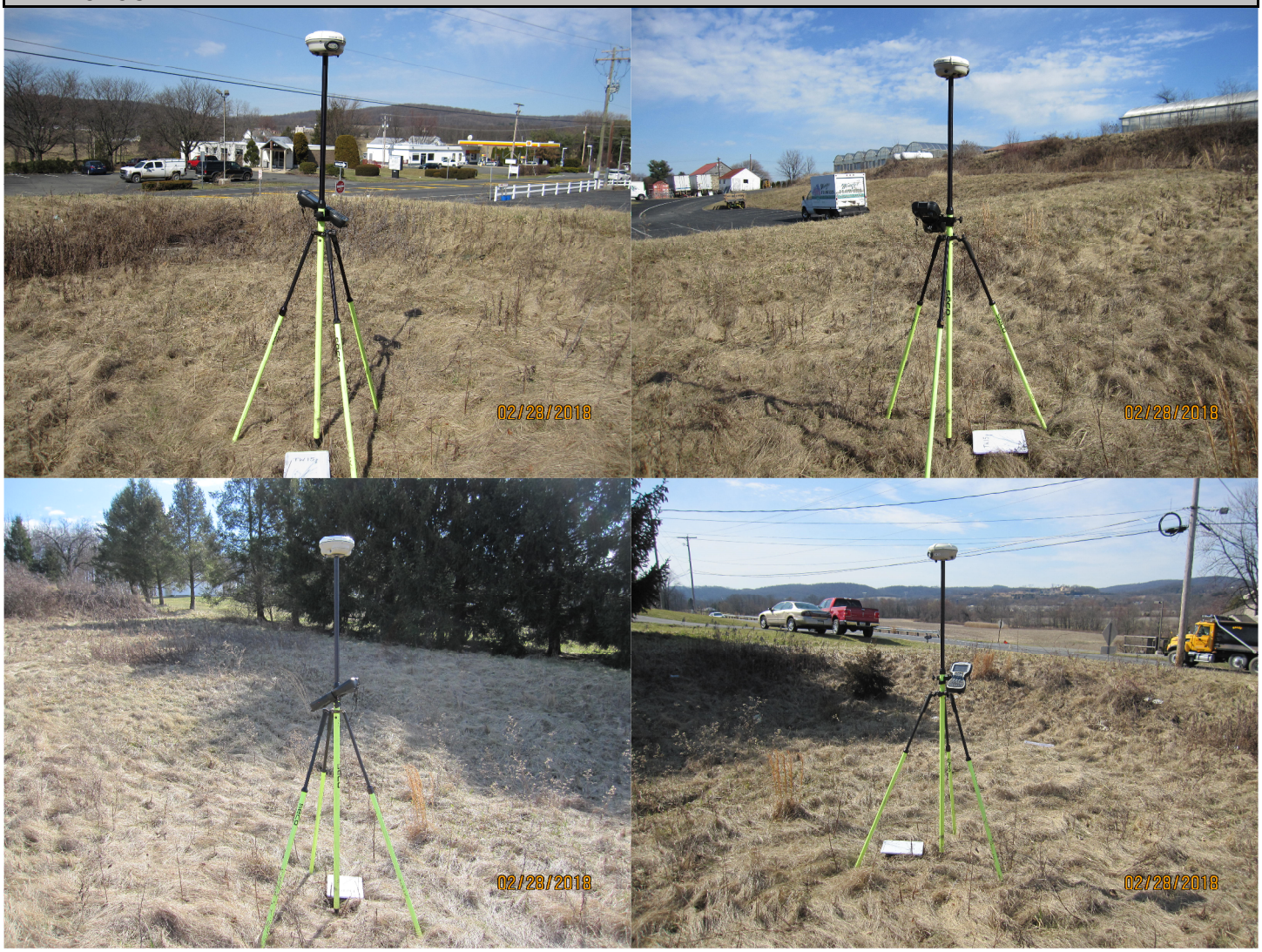
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4470435.399	448726.481	138.138

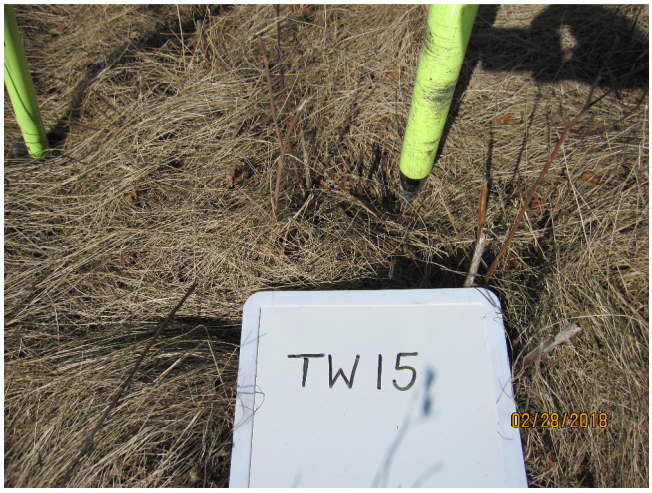
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	2-28-2018
RMSE Hz	0.021
RMSE Z	0.031
GPS Method	Network

PHOTOS:



Point ID	TW15



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW16
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Sinking Spring

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4459242.732	408323.097	169.387

Operator	Layne Clark
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.019
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	TW16



220 St Charles Way, Suite 200 York, PA 17402

Point ID	TW17
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Elverson

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4446747.482	425690.585	175.722

Operator	Layne Clark/Tod Yeisley
Receiver Model	Topcon GR3/Trimble R-8, Model 3
Receiver S/N	444-0153/ 5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-01-2018
RMSE Hz	0.025
RMSE Z	0.035
GPS Method	Network

PHOTOS:



Point ID	TW17



VVA-Forest Point Log Sheets

Appendix E

220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO01
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Shunk

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4602820.100	361086.018	487.072

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.074
RMSE Z	0.098
GPS Method	Network

PHOTOS:



Point ID	FO01



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO02
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Dushore

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4601136.140	384464.468	430.648

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	0.051
RMSE Z	0.061
GPS Method	Network

PHOTOS:



Point ID	FO02



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO03
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Barbours

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4593703.933	354076.782	439.469

Operator	Jim Sanderson
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.649 Meters

Date (MM-DD-YYYY)	03-20-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO03



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO04
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Eagles Mere

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4594167.269	365368.878	312.044

Operator	Jim Sanderson
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.649 Meters

Date (MM-DD-YYYY)	03-21-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO04



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO05
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Laporte

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4592704.909	377356.351	548.463

Operator	Jim Sanderson
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.649 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional**

PHOTOS:



**GPS observed, but due to the conditions conventional traverse utilitized.

Point ID	FO05



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO06
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Lopez

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4590078.536	390726.790	552.393

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	03-28-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO06



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO07
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Laporte

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4587168.581	375502.755	548.845

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Network/Conventional Traverse**

PHOTOS:






**GPS observed, but due to the conditions conventional traverse utilitized.

Point ID	FO07



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO08
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Pictures Rock

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

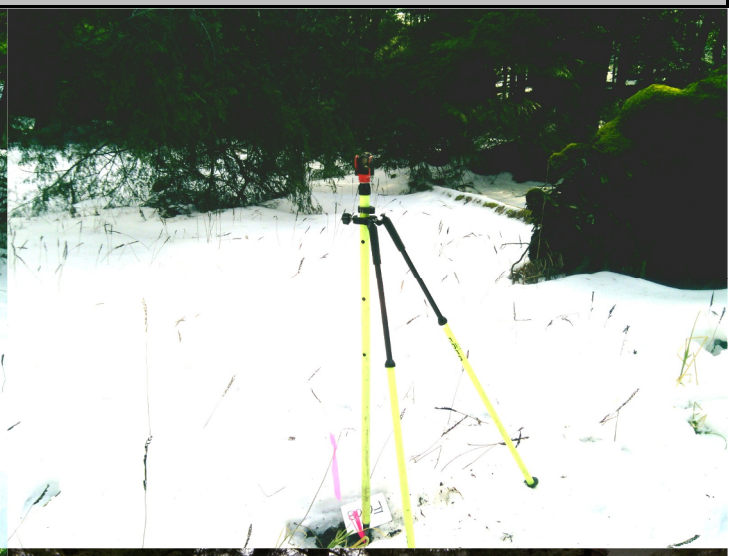
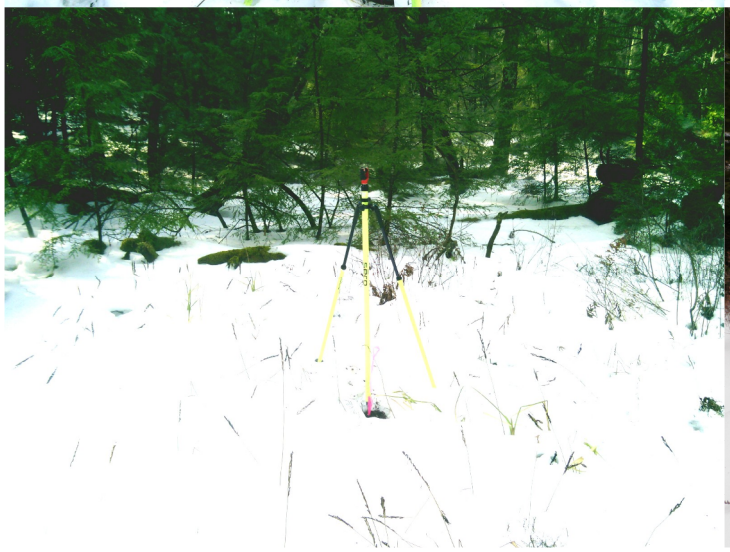
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581530.425	358157.772	543.875

Operator	Barry Palmer
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.408 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:


**Picture taken at later time

Point ID	FO08



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO09
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Elk Grove

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581002.510	379463.488	553.932

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	03-27-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO09



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO10
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sweet Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4580041.761	396528.839	663.455

Operator	Jim Sanderson
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.649 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO10



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO11
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sweet Valley

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4581476.966	407605.171	499.106

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO11



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO12
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Ransom

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4582072.862	429017.320	255.768

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.025
RMSE Z	0.031
GPS Method	Network

PHOTOS:



Point ID	FO12



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO13
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Sonestown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4573324.493	368721.799	368.274

Operator	Barry Palmer
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.408 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



**Picture taken at later time

Point ID	FO13



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO14
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Red Rock

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4571756.194	392557.062	380.440

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-21-2018
RMSE Hz	0.026
RMSE Z	0.030
GPS Method	Network

PHOTOS:



Point ID	FO14



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO15
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Shickshinny

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4560790.493	396598.599	232.699

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.023
RMSE Z	0.033
GPS Method	Network

PHOTOS:



Point ID	FO15



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO16
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Lycoming
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4551140.240	397265.609	273.572

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO16



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO17
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Nanticoke

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

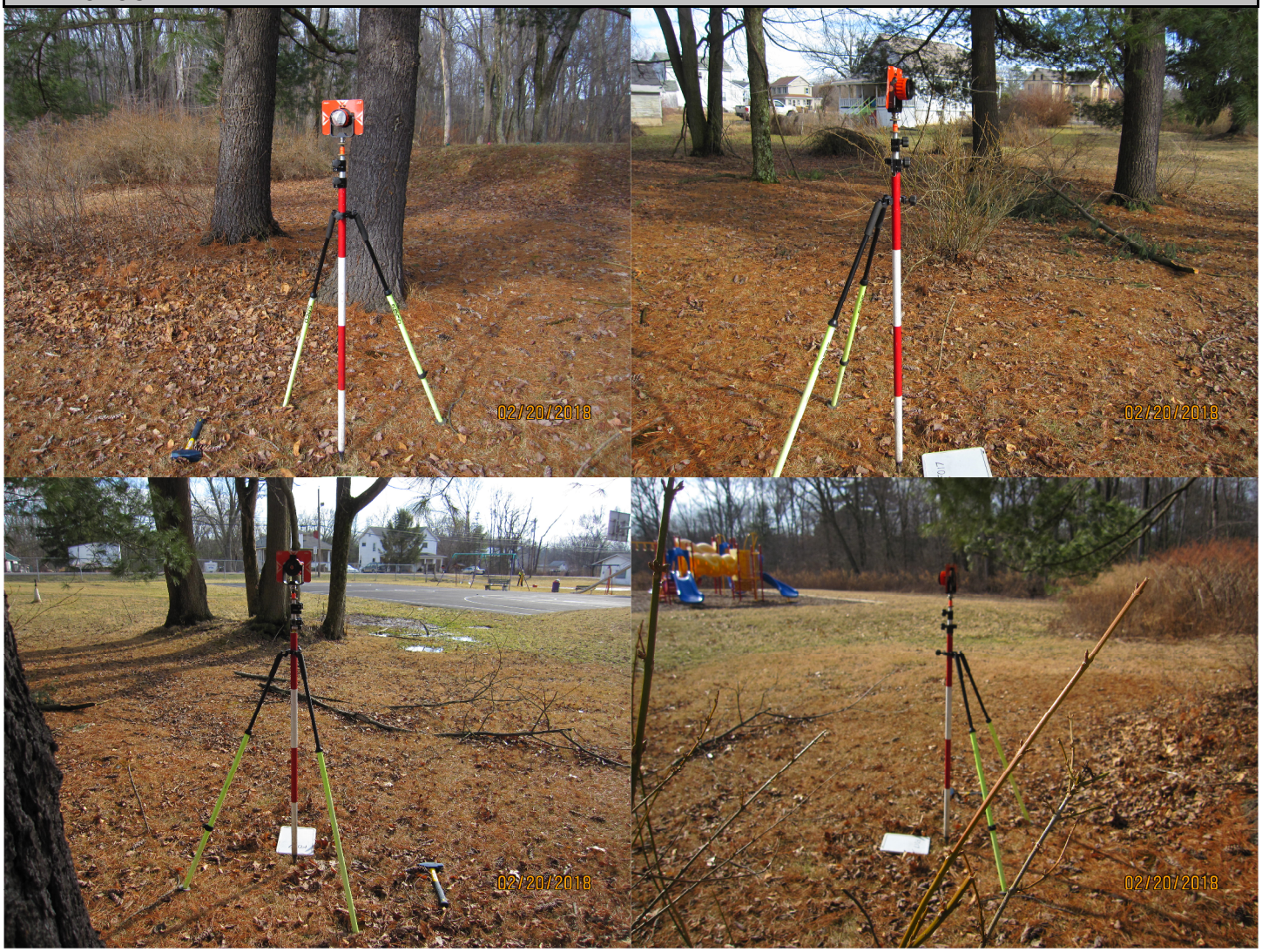
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4553534.769	407589.816	305.737

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO17



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO18
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Sybertsville

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4550136.246	415724.655	330.874

Operator	Tod Yeisley
Receiver Model	Trimble R8, Model 3
Receiver S/N	5303423309
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	0.029
RMSE Z	0.035
GPS Method	Network

PHOTOS:



Point ID	FO18



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO19
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Wilkes-Barre West

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4555895.804	424816.658	418.710

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	0.019
RMSE Z	0.027
GPS Method	Network

PHOTOS:



Point ID	FO19



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO20
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Wilkes-Barre East

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4561473.425	433985.573	579.691

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.750 Meters

Date (MM-DD-YYYY)	03-01-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO20



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO21
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Pleasant View Summit

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4563293.358	443856.270	609.557

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-23-2018
RMSE Hz	0.026
RMSE Z	0.034
GPS Method	Network

PHOTOS:



Point ID	FO21



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO22
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Berwick

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4541022.103	398478.199	283.342

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO22



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO23
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Freeland

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4542766.699	419794.520	335.351

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO23



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO24
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	White Haven

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4543674.762	431572.633	433.098

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO24



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO25
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	White Haven

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

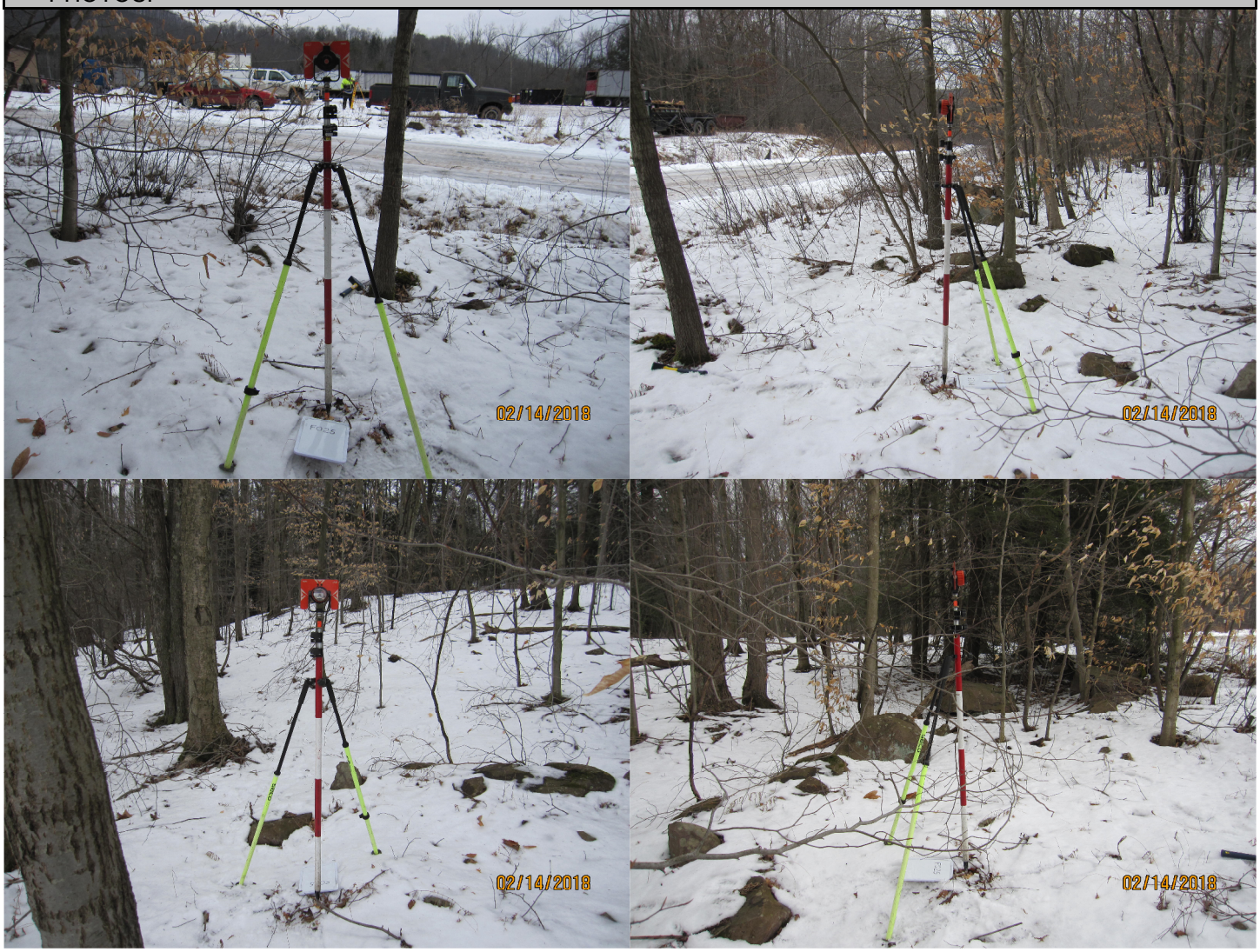
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4544142.637	434735.896	382.995

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO25



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO26
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Hazleton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4535768.892	419645.485	575.064

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	002-13-2018
RMSE Hz	0.024
RMSE Z	0.034
GPS Method	Network

PHOTOS:



Point ID	FO26



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO27
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Shenandoah

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

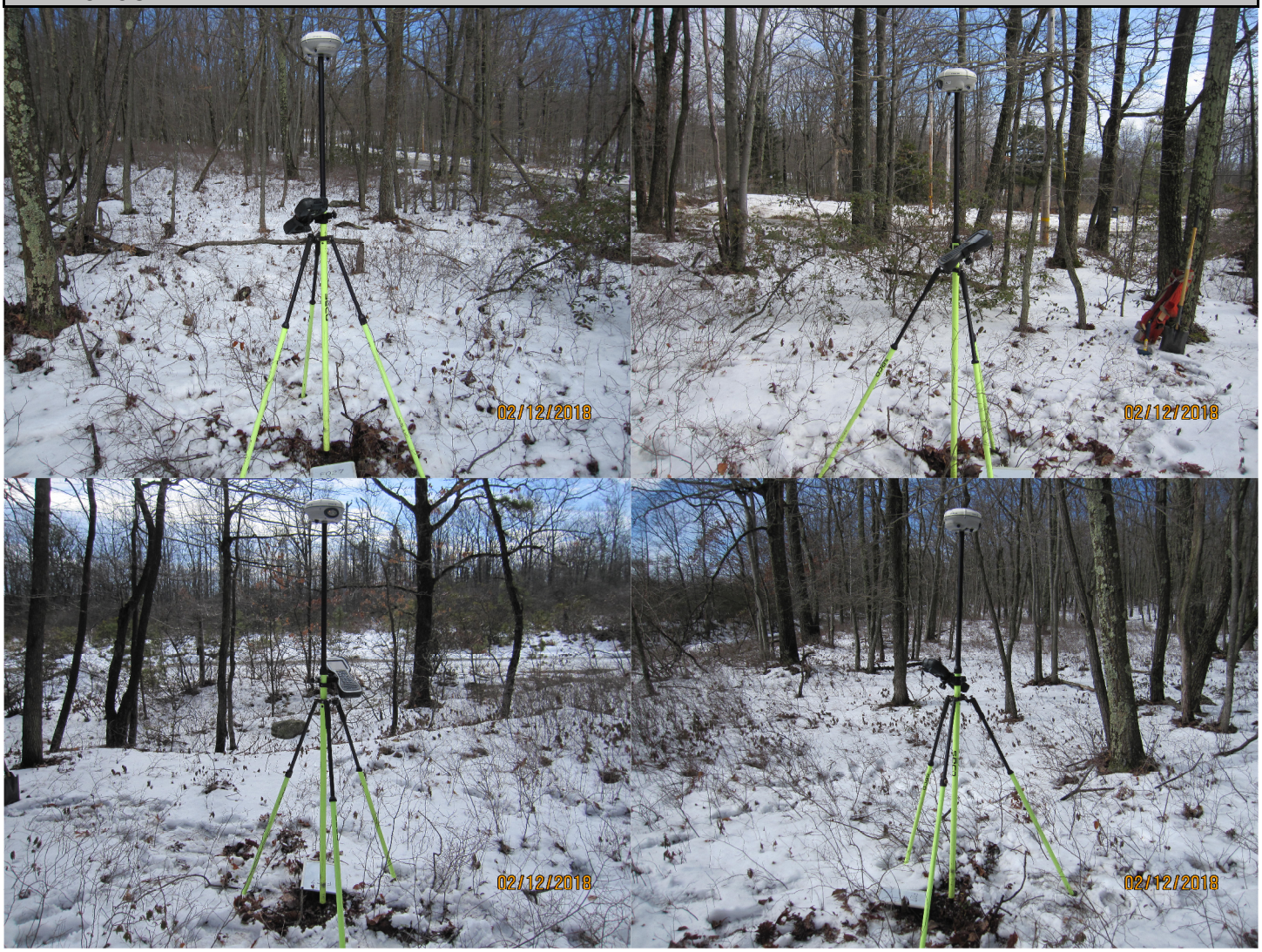
Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4521060.494	403189.320	495.551

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.030
RMSE Z	0.046
GPS Method	Network

PHOTOS:



Point ID	FO27



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO28
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Tamaqua

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4520878.276	417625.608	378.670

Operator	Barry Palmer
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.408 Meters

Date (MM-DD-YYYY)	02-16-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



*** Pictures taken with GPS Receiver, but was located by conventional methods.

Point ID	FO28



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO29
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Sheanandoah

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4513831.711	395130.229	482.815

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-13-2018
RMSE Hz	0.023
RMSE Z	0.031
GPS Method	Network

PHOTOS:



Point ID	FO29



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO30
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Trement

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4502807.957	383350.345	470.496

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.032
RMSE Z	0.042
GPS Method	Network

PHOTOS:



Point ID	FO30



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO31
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Orwigsburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4501228.673	408285.999	208.077

Operator	Barry Palmer
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.408 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:









Point ID	FO31



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO32
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Schuylkill
Quad	Swatara Hill

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4488670.546	385738.454	168.433

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.027
RMSE Z	0.039
GPS Method	Network

PHOTOS:



Point ID	FO32



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO33
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Kutztown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4491235.732	431610.894	195.630

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Net	2.00 Meters

Date (MM-DD-YYYY)	02-15-2018
RMSE Hz	0.023
RMSE Z	0.029
GPS Method	Network

PHOTOS:



Point ID	FO33



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO34
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Fredericksburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4481880.704	382638.046	168.785

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-12-2018
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	Network

PHOTOS:



Point ID	FO34



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO35
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Hamburg

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4483782.320	418352.606	112.497

Operator	Barry Palmer
Receiver Model	Trimble R-6, Model 2
Receiver S/N	5423467676
Antenna Height	2.00 Meters

Date (MM-DD-YYYY)	02-14-2018
RMSE Hz	0.027
RMSE Z	0.038
GPS Method	Network

PHOTOS:



Point ID	FO35



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO36
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Bethel

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475399.122	390202.541	177.000

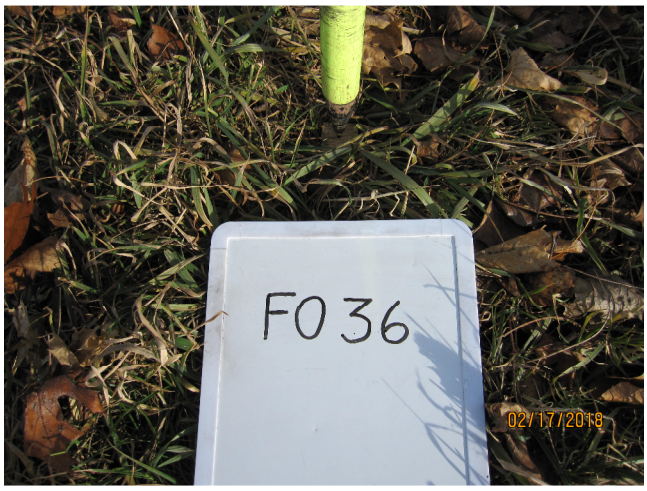
Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-17-2018
RMSE Hz	0.019
RMSE Z	0.027
GPS Method	Network

PHOTOS:



Point ID	FO36



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO37
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Strausstown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475242.113	404097.073	107.642

Operator	Tod Yeisley
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5303423309
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	2-17-2018
RMSE Hz	0.020
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	FO37



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO38
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Fleetwood

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4475236.871	430343.848	248.957

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	02-28-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO38



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO39
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Reading

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4468905.867	415610.023	77.061

Operator	Layne Clark
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.021
RMSE Z	0.025
GPS Method	Network

PHOTOS:



Point ID	FO39



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO40
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Reading

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4468854.692	423608.352	150.030

Operator	Layne Clark
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.500 Meters

Date (MM-DD-YYYY)	02-22-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO40



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO41
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Boyertown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4458101.038	438521.273	69.842

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	03-07-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO41



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO42
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Elverson

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4451009.801	434120.479	165.623

Operator	Tod Yeisley
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.579 Meters

Date (MM-DD-YYYY)	03-08-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO42



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO43
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Morgantown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4454165.842	415922.546	166.039

Operator	Layne Clark
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.600 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:









Point ID	FO43



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO44
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Sonestown

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4577822.431	367266.695	264.595

Operator	Barry Palmer
Receiver Model	N/A
Receiver S/N	N/A
Antenna Height	1.408 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	N/A
RMSE Z	N/A
GPS Method	Conventional Traverse

PHOTOS:



Point ID	FO44



220 St Charles Way, Suite 200 York, PA 17402

Point ID	FO45
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Luzerne
Quad	Hazleton

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4532681.097	421198.937	519.452

Operator	Layne Clark
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.032
RMSE Z	0.046
GPS Method	Network

PHOTOS:



Point ID	FO45



VVA-Brushland Point Log Sheets

220 St Charles Way, Suite 200 York, PA 17402

Point ID	SH01
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Sullivan
Quad	Red Rock

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4578559.222	391504.224	697.970

Operator	Jim Sanderson
Receiver Model	Trimble R-8, Model 4
Receiver S/N	5423467672
Antenna Height	1.724 Meters

Date (MM-DD-YYYY)	03-22-2018
RMSE Hz	0.007
RMSE Z	0.026
GPS Method	Network

PHOTOS:



Point ID	SH01



220 St Charles Way, Suite 200 York, PA 17402

Point ID	SH02
Project No.	31467
Project Name	PA 3 County South Central 2018 D8
State	Pennsylvania
County	Berks
Quad	Terre Hill

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control
	Photo ID
	Published Control

Coordinate System
NAD83(2011)
UTM18
NAVD88
GEOID12B
Meters

Northing	Easting	Elevation
4454899.141	412654.952	204.484

Operator	Layne Clark
Receiver Model	Trimble R-8, Model 3
Receiver S/N	5304424093
Antenna Height	2.000 Meters

Date (MM-DD-YYYY)	02-20-2018
RMSE Hz	0.022
RMSE Z	0.033
GPS Method	Network

PHOTOS:



Point ID	SH02



PA South Central LIDAR Data On DVD

Appendix G