Project Report Appendices

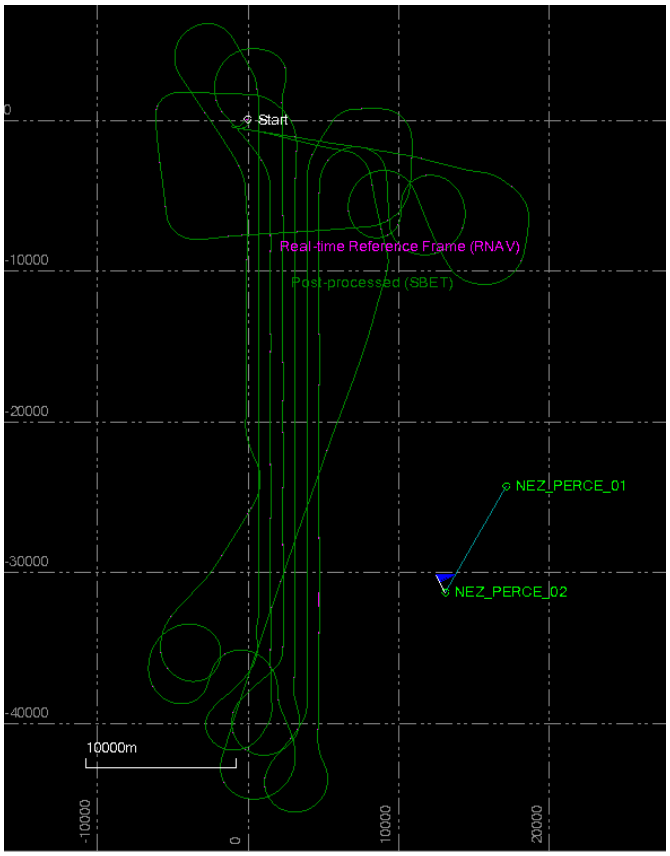
The following section contains the appendices as listed in the Nez Perce, Idaho 2016 QL1/QL2 LiDAR Project Report.

Appendix A

GPS/IMU Processing Statistics
Flight Logs

There were 23 total individual lifts (some lifts acquired QL1 and QL2 data within the same lift). Graph reports generated from processing software and flight logs are found on the following pages.

Oct 29, 2016-A
(C-FFRY, SN2221256)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Post-processed (SBET)
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10000
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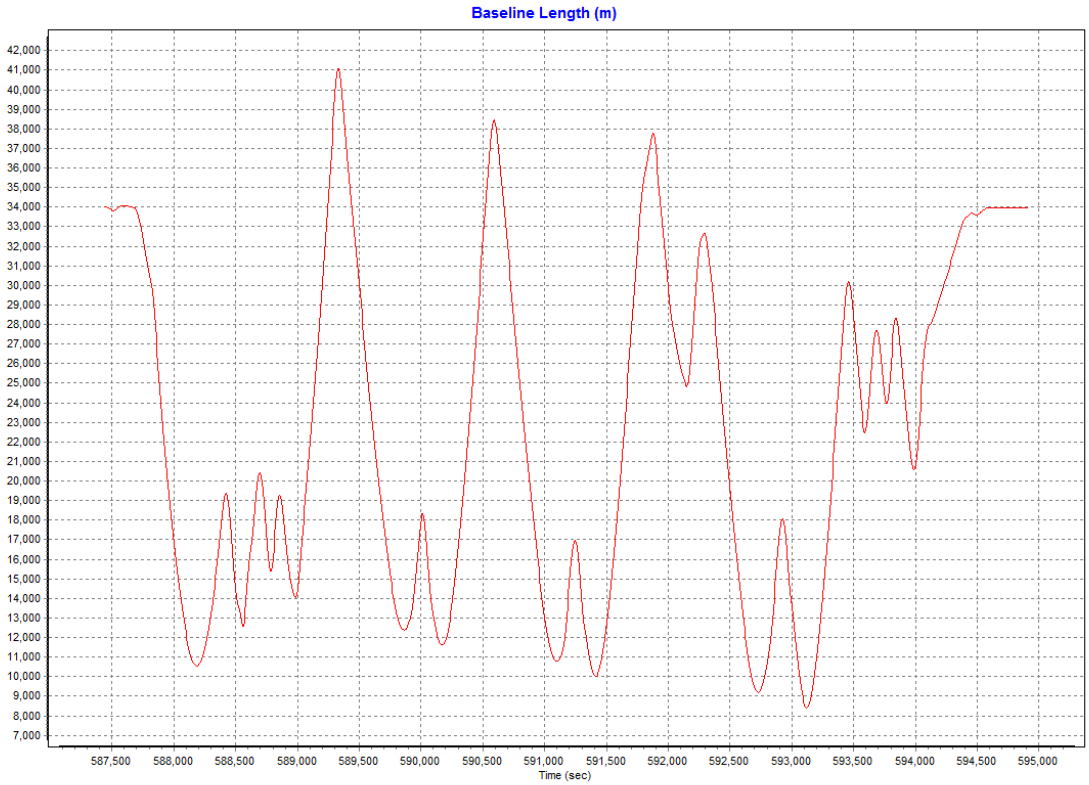
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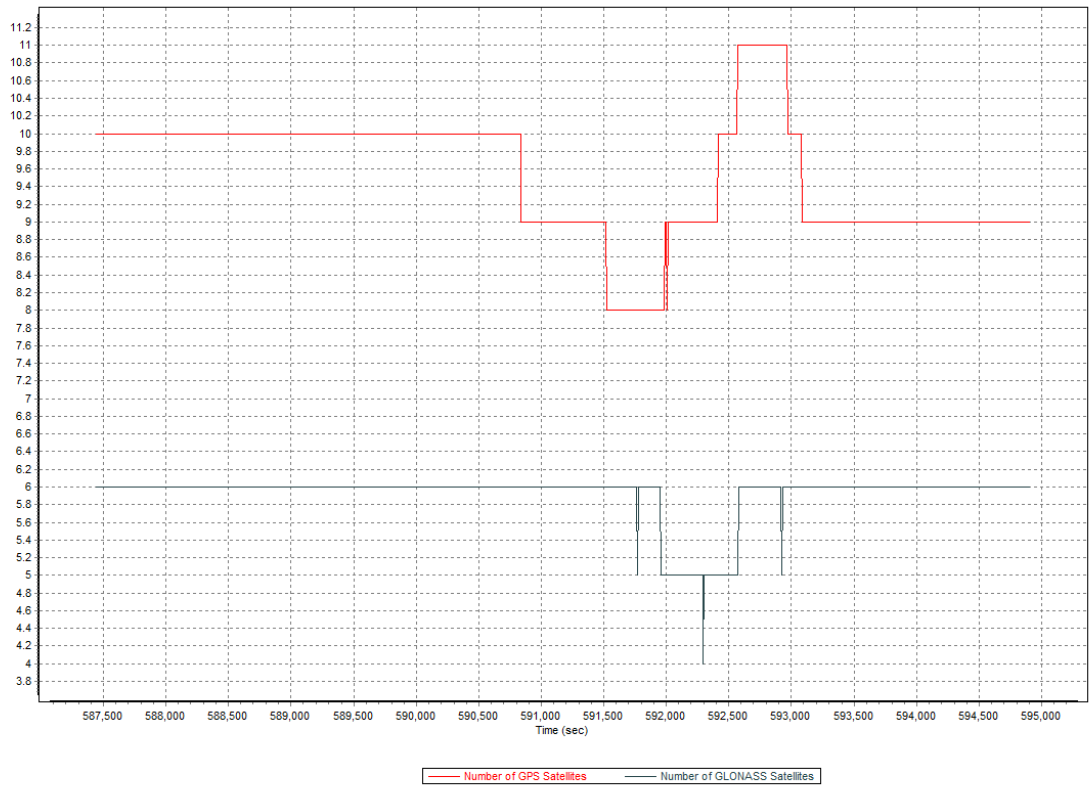
Time (sec)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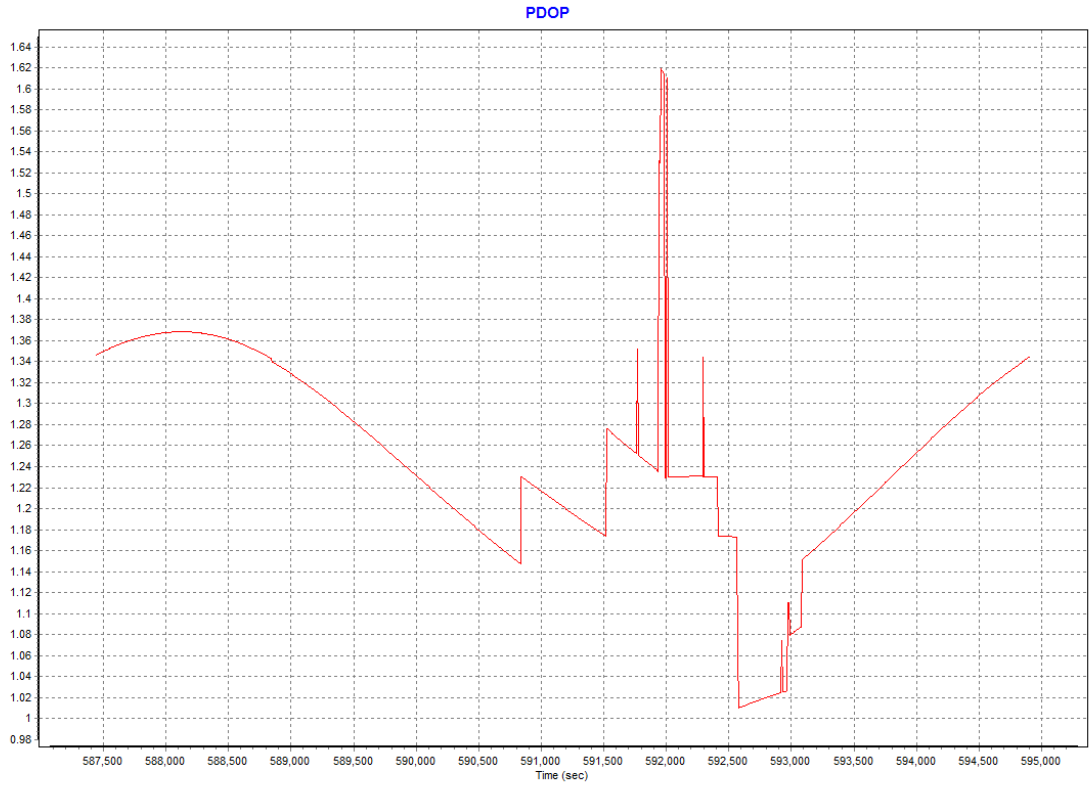
Number of GPS Satellites
Number of GLONASS Satellites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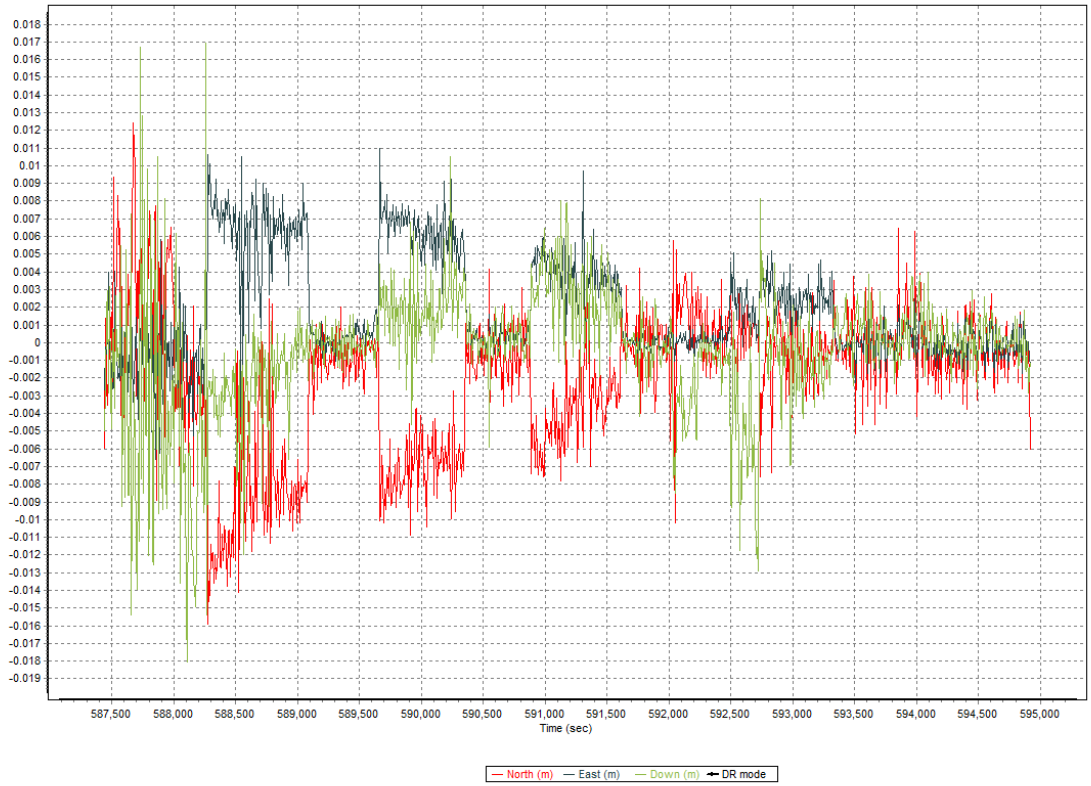
Time (sec)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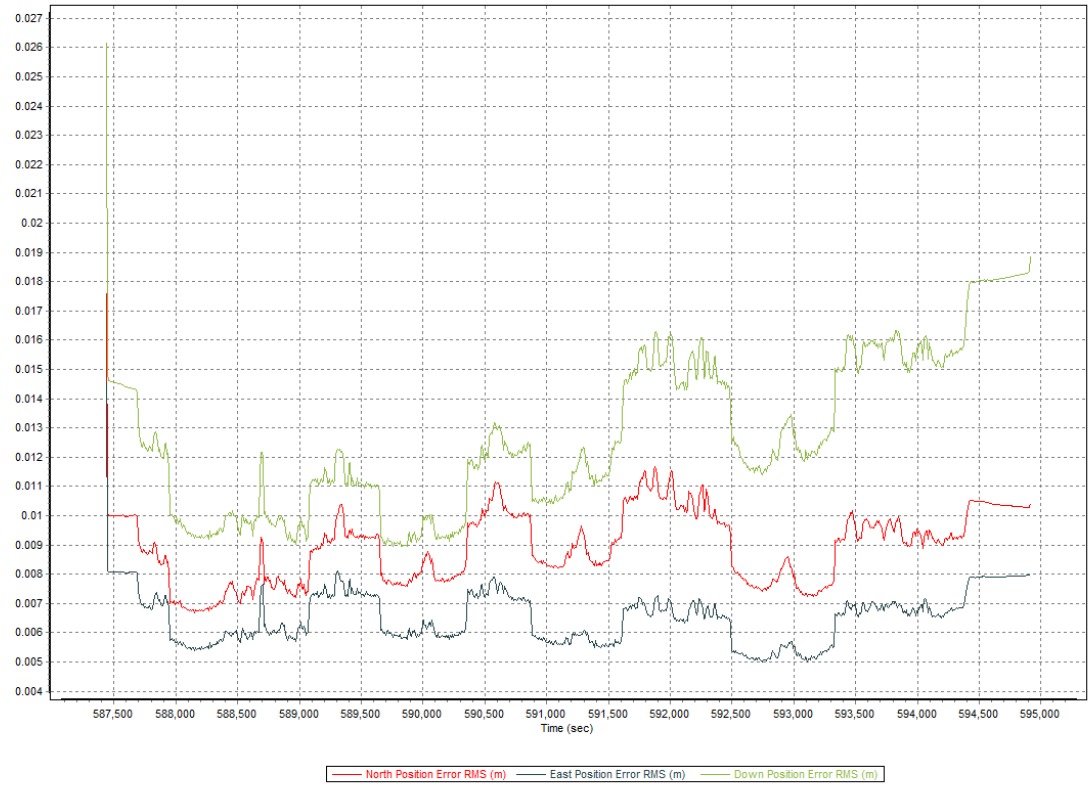
East (m)
Down (m)
DR mode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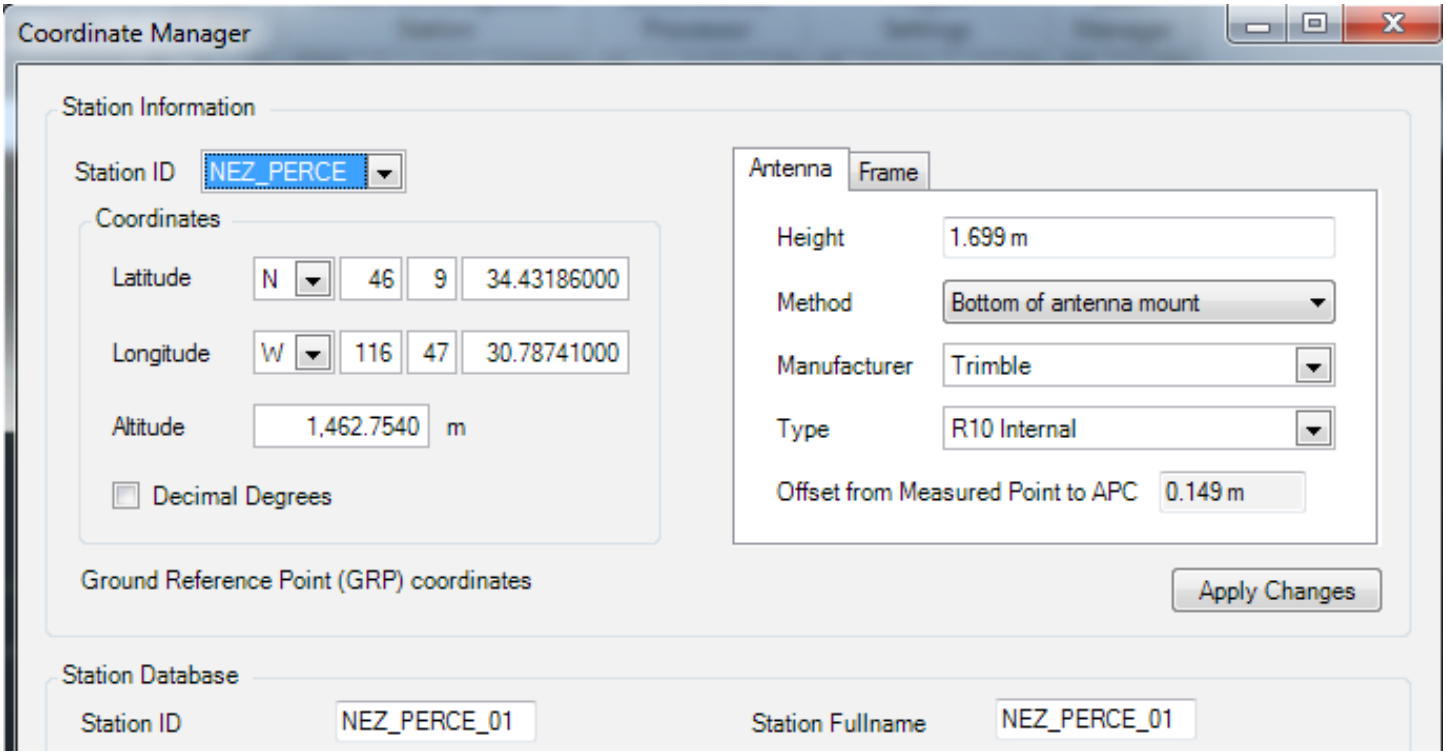
East Position Error RMS (m)
Down Position Error RMS (m)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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
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Method
Bottom of antenna mount
Manufacturer
Trimble
Type
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Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
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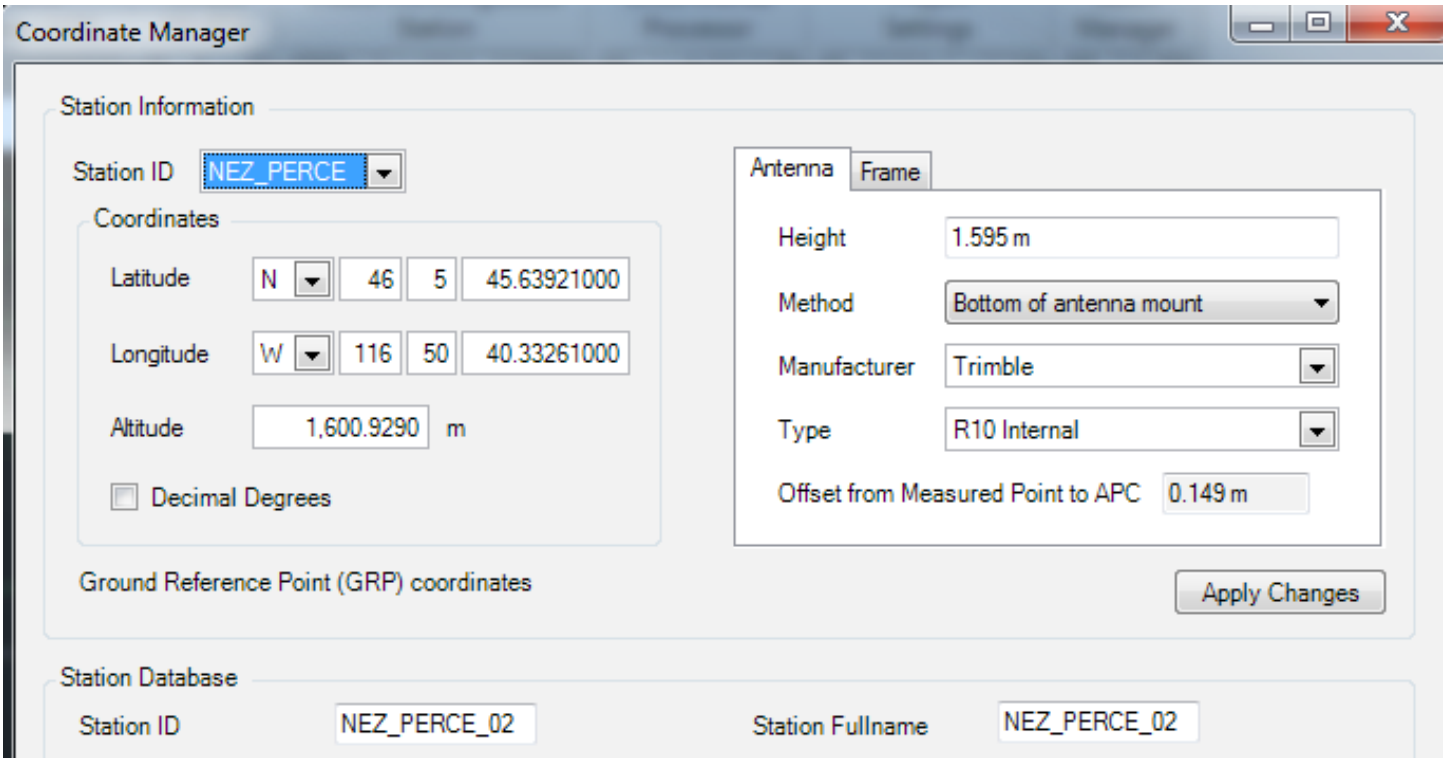
Station Fullname
NEZ_PERCE_01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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
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Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_02
Station Fullname
NEZ_PERCE_02

Flight Log

Julian Day	Flight
303	A

LIDAR Flight Log

5416303A

AIRBORNE IMAGING
A Clean Harbors Company

Date OCT 29 2016	Aircraft PA-31 C-FFRY
Project 3119_NEZPERCE	Pilot B. Harrity
Location LEWISTON IDAHO	Operator B. Whiteley
Mission Objective	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes 19 00 (12 00 LOCAL)
Temp 10
Humidity 76 %
Altimeter 30 °
Terrain Height 4138
WIND 070 @ 08 KNOTS

Aircraft Block Time		
Engine On 18 53	Ramp Out 19 09	Takeoff 19 15
Engine Off 21 19	Ramp In 21 07	Landing 21 06
Total hrs	Total hrs	Total hrs

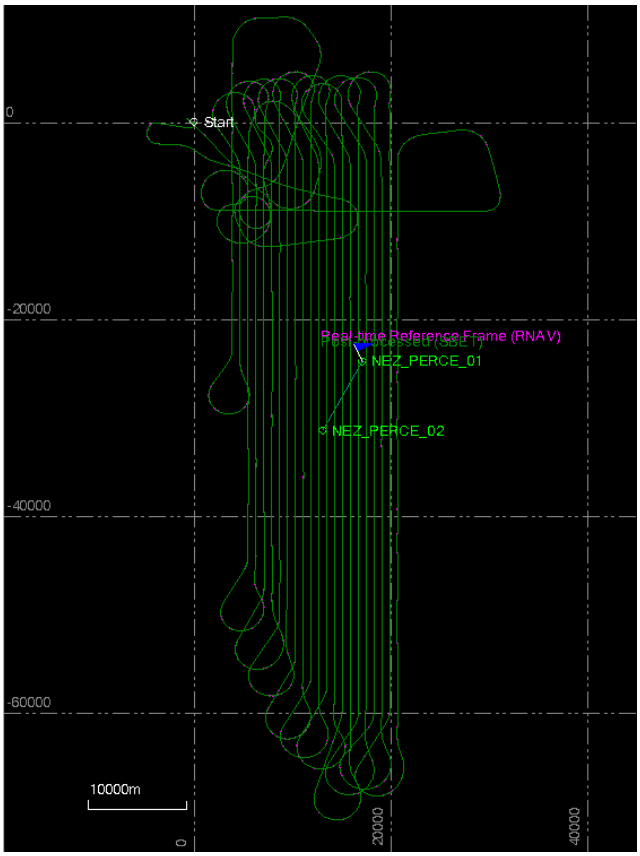
Mission Plan			
AGL Height 2200	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 182	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	18 58	19 04
Post Mission	21 10	21 15

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
CIRCLE 8		↷		19 26	19 34				FULL FIGUR8 FOR IMU
TEST STRIP		↷		19 34	19 35			161029-193456	TEST STRIP ONLY
171	5416303 01	0	8200'	19 38	19 39			193831	
172	02	180		19 45	19 51			194510	
173	03	0		19 55	20:00			195530	
174	04	180		20 05	20 12			200548	
175	05	0		20 15	20 21			201556	
XTIE	06	90		20 27	20 29			202708	XTIE LN'S 171+181 W→E
176	07	180	↓	20 33	20 40			203300	HIT A FEW DROPS RAIN VERY NORTH END
177	54163308	0	8200'	20 43	20 50			204331	HIT RAIN NORTH END
CIRCLE 8		↷		20 52	20 58				TWO FULL CIRCLES FOR IMU
								**	WILL RE-FLY NORTH
									ENDS 176 & 177

Pg 1 of 1

Nov 2, 2016-A (C-FFRY, SN2221256)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Real-time Reference Frame (RNAV)
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NEZ_PERCE_02
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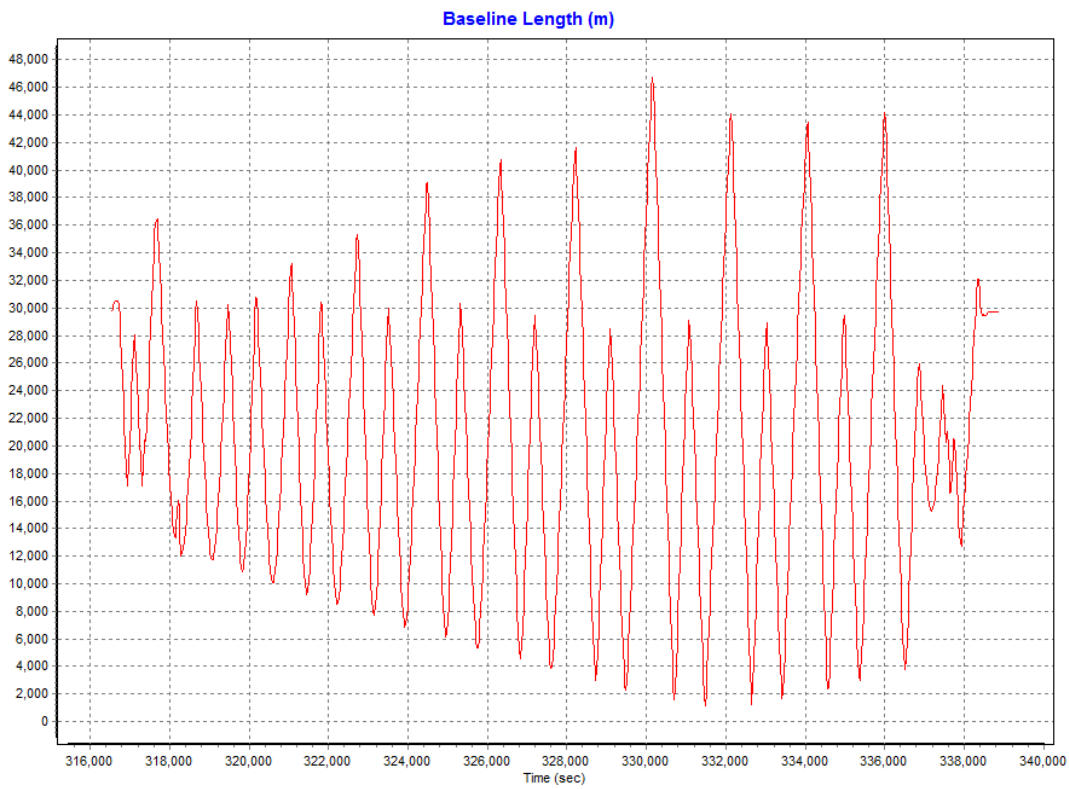
0
-20000
-40000
-60000
20000
40000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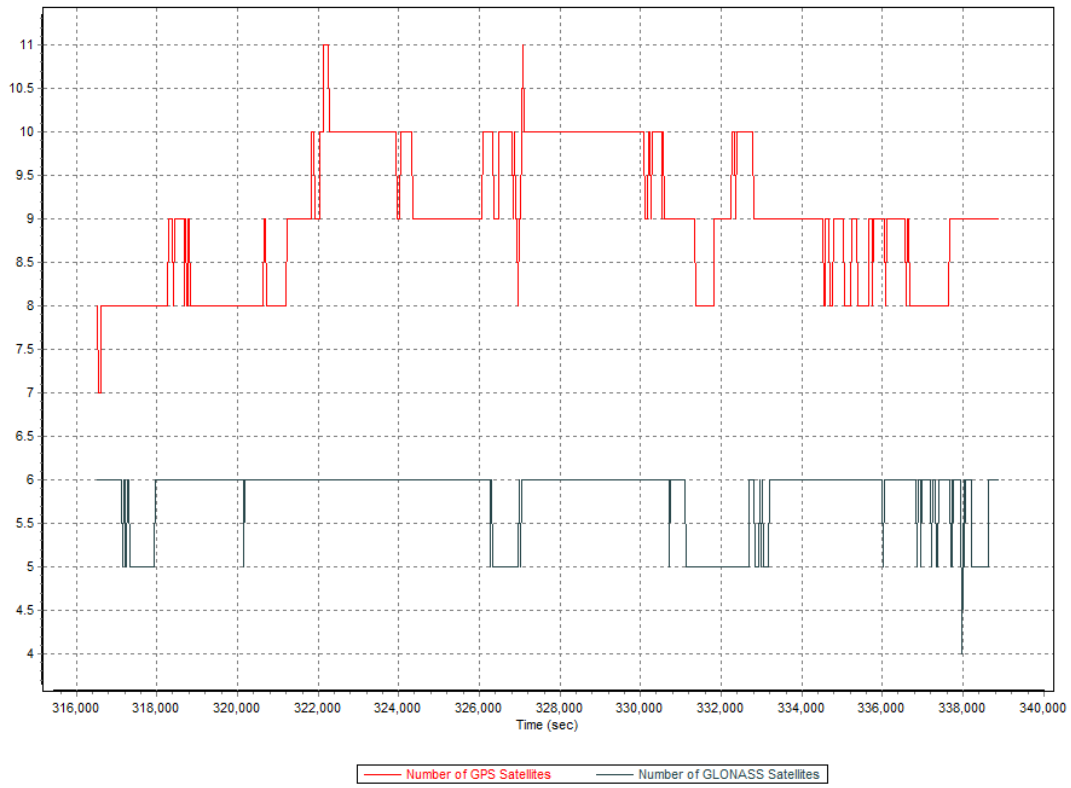
Time (sec)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322,000
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326,000
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332,000
334,000
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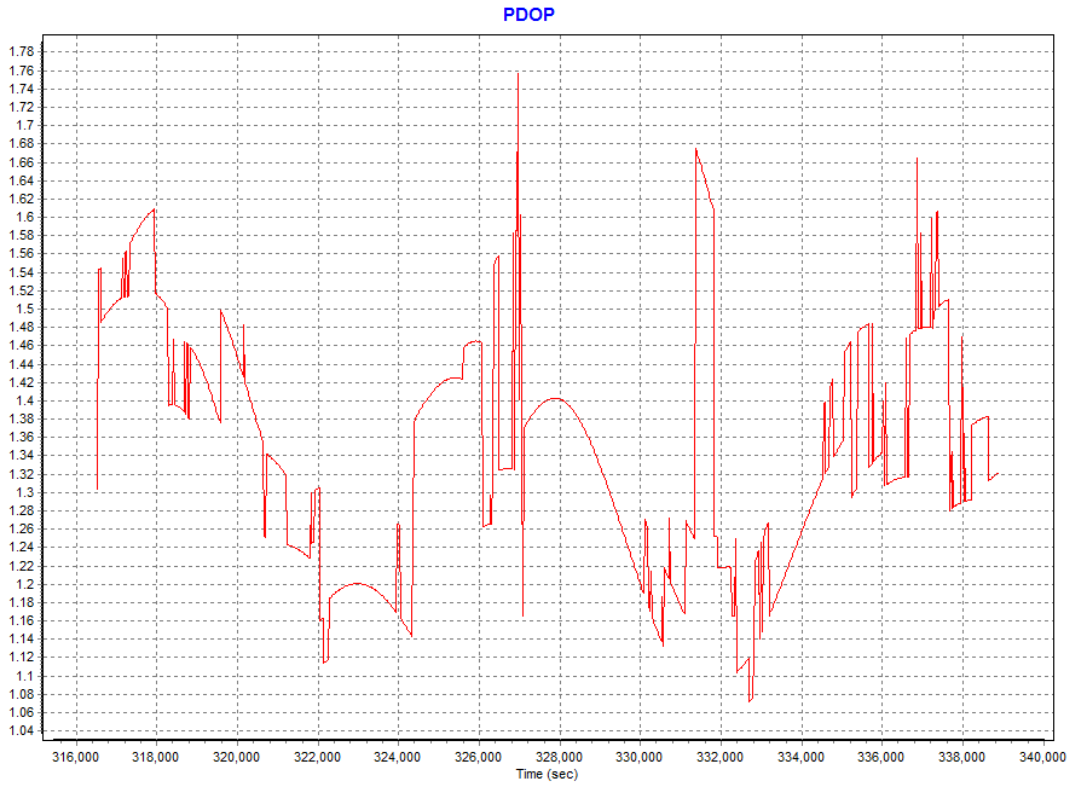
338,000
340,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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1.08
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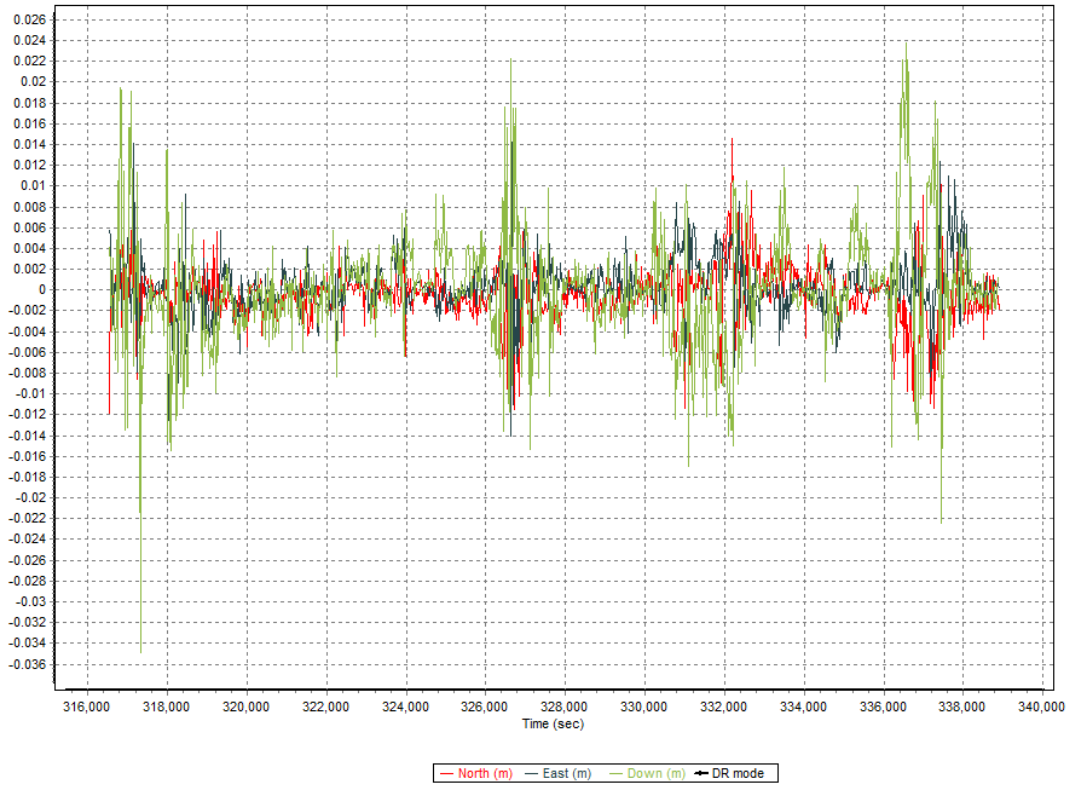
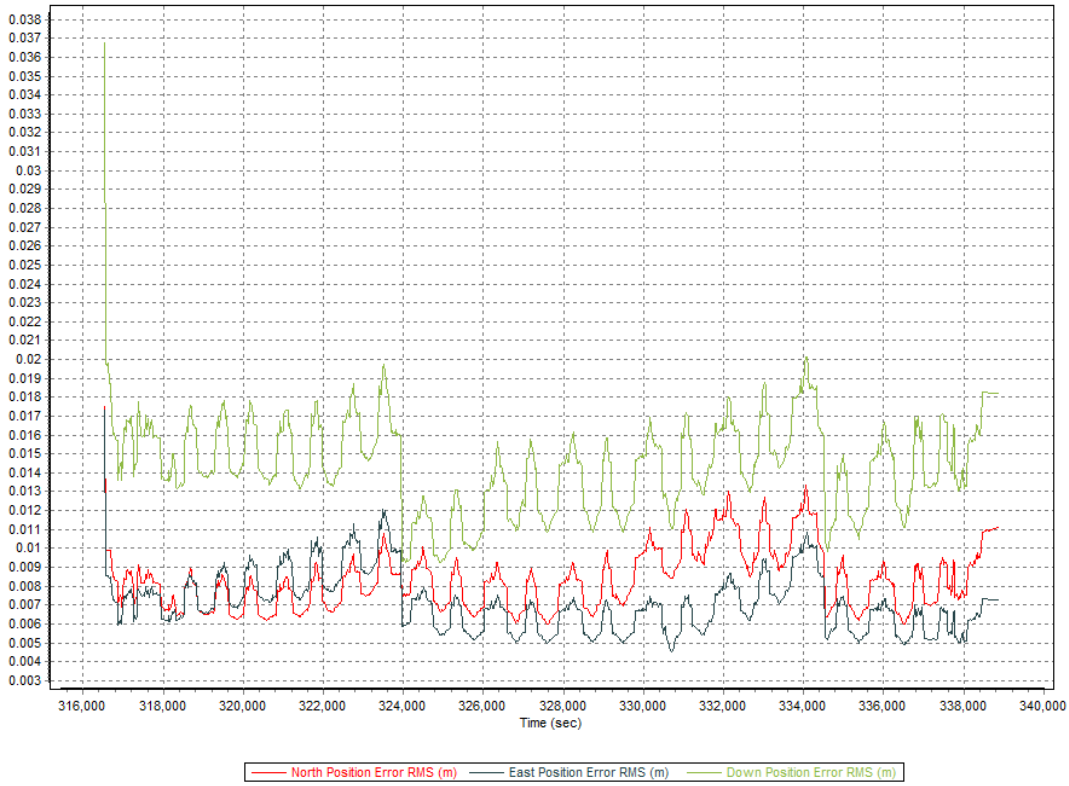
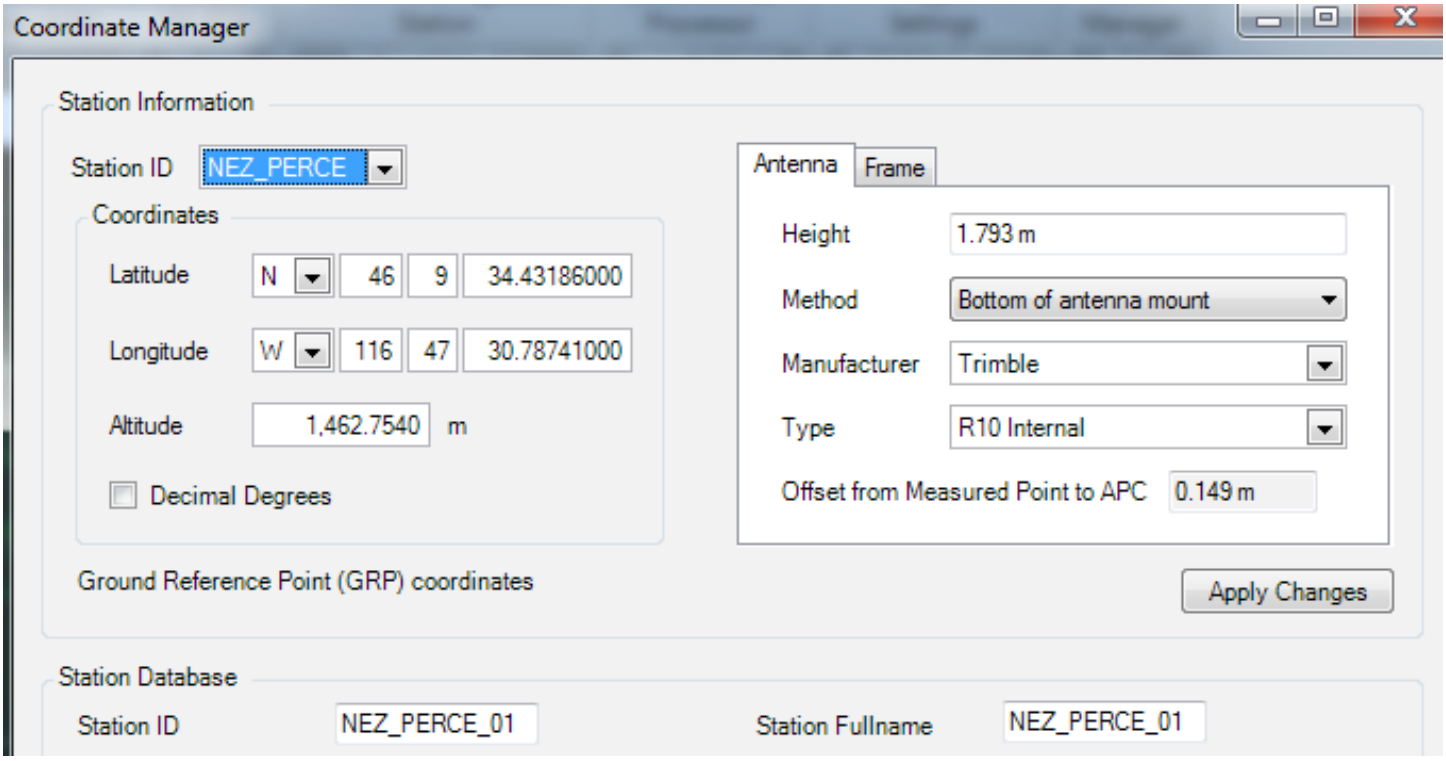
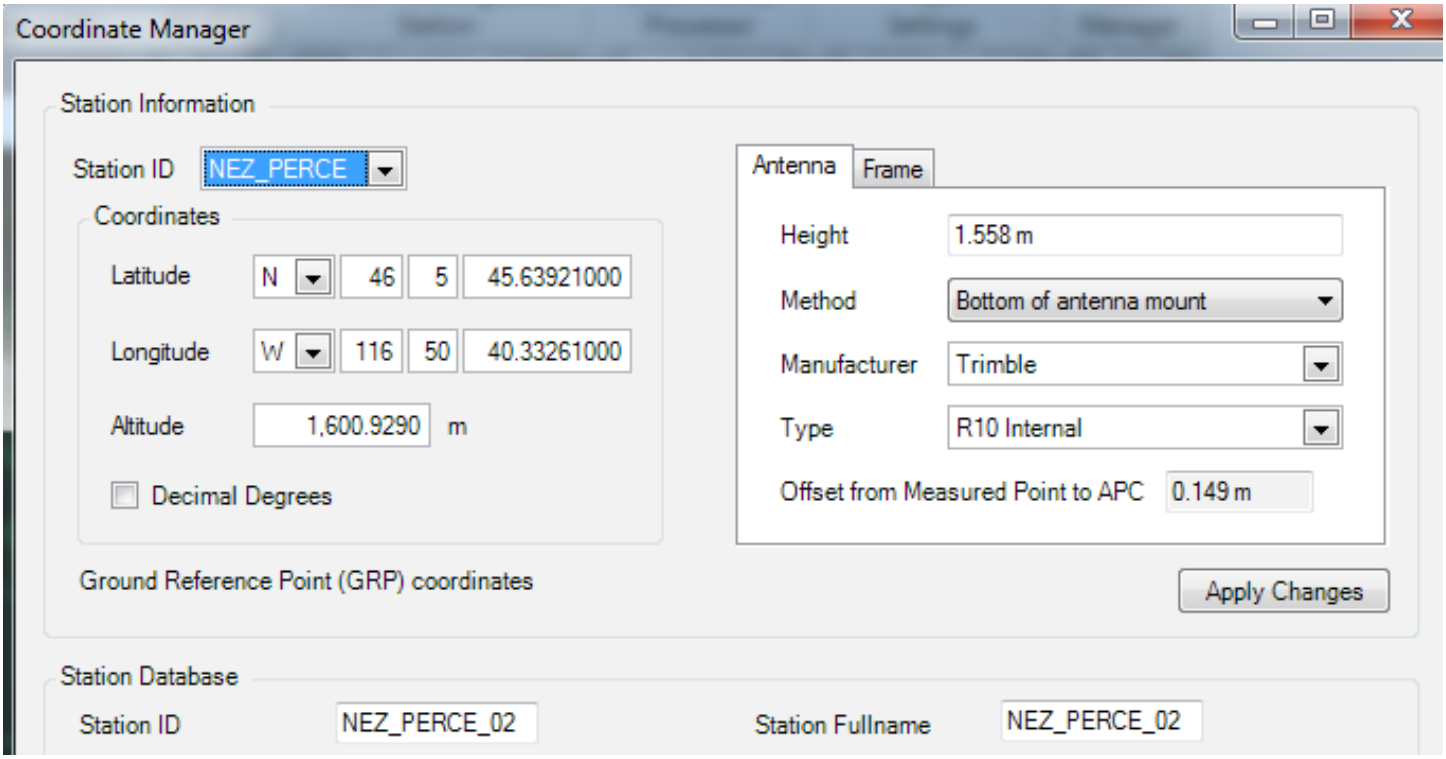
Time (sec)


Time (sec)
North (m)
East (m)
Down (m)
DR mode


Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
9
34.43186000
Longitude
W
116
47
30.78741000
Altitude
1,462.7540
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.793 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_01
Station Fullname
NEZ_PERCE_01


Coordinate Manager
Station Information
Station ID
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Coordinates
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46
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Longitude
W
116
50
40.33261000
Altitude
1,600.9290
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.558 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_02
Station Fullname
NEZ_PERCE_02

Flight Log

Julian Day 307	Flight A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date NOV 2 2016	Aircraft PA-31 C-FFRY
Project 3119 - NEZ PERCE	Pilot B. HARRITY
Location LEWISTON IDAHO	Operator B. Whiteley
Mission Objective	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes @ 1545
Temp 7°C
Humidity 81%
Altimeter 30.20 RISING
Terrain Height 438m
WINDS -

Aircraft Block Time		
Engine On 1544	Ramp Out 1555	Takeoff 1558
Engine Off 2213	Ramp In 2201	Landing 2200
Total 6.5 hrs	Total hrs	Total 6.0 hrs

Mission Plan			
AGL Height	2200 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	182 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	1549	1554
Post Mission	2203	2208

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
FIGURE 8		∿		1601	1610				WAKE UP IMU
176	5416307 01	180	8200'	1618	1622			161102-161815	NORTH 9.5 nm ONLY
177	02	0	8200'	1625	1629			162555	NORTH 8.7 nm ONLY
178	03	180	8200'	1633	1642			163328	
179	04	0	8300'	1646	1654			164623	
180	05	180	8300'	1658	1708			165852	
181	06	0	8300'	1712	1721			171257	
182	07	180	8300'	1725	1736			172557	
183	08	0	8300'	1740	1749			174007	
184	09	180	8300'	1754	1805			175419	
185	10	0	8400'	1809	1819			180951	
186	11	180	8400'	1824	1836			182441	
187	12	0	8400	1840	1850			184048	
188	13	180	8400'	1855	1907			185541	
189	5416307 14	0	8400'	1912	1922			191203	

Pg 1 of 2

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Julian Day	307	Flight	A

Date	Nov 2 2016	Aircraft	PA-31 C-FFRY
Project	3119. NEZ PERCE	Pilot	B. Harrity
Location	LEWISTON IDAHO	Operator	B. Whiteley
Mission Objective			

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes @ 22:00
Temp 17°C
Humidity 53
Altimeter 30.14
Terrain Height 438

Aircraft Block Time		
Engine On 15:44	Ramp Out 15:55	Takeoff 15:58
Engine Off 22:13	Ramp In 22:01	Landing 22:00
Total 6.5 hrs	Total hrs	Total 6.0 hrs

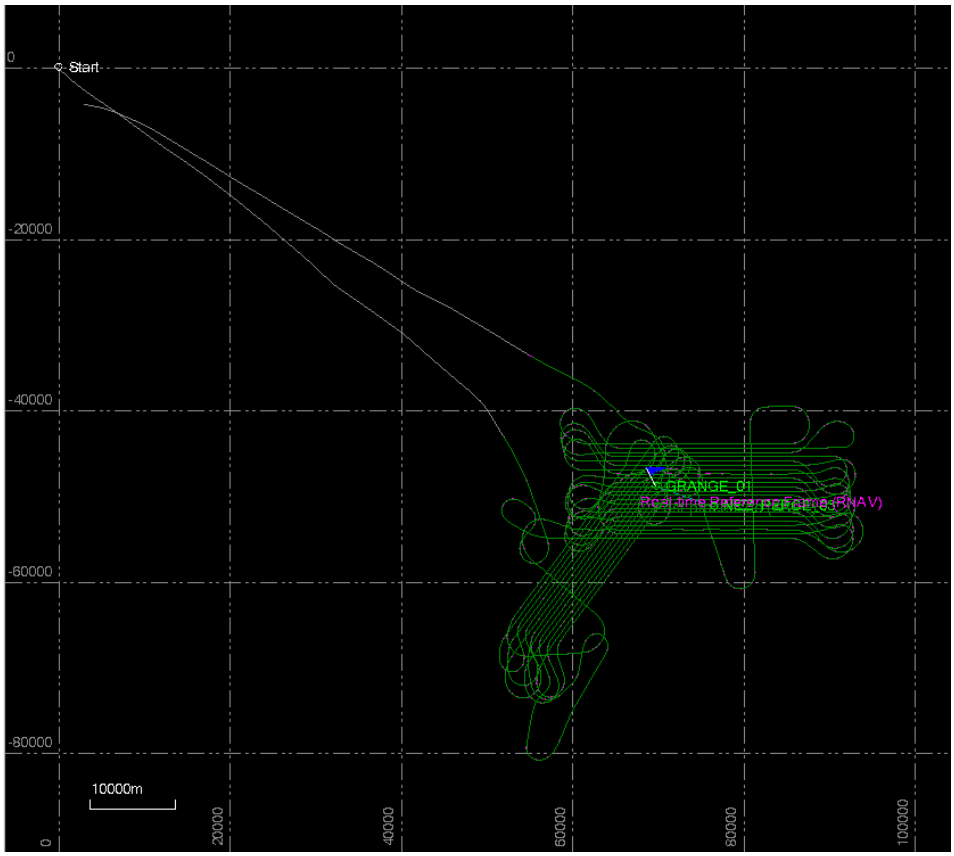
Mission Plan			
AGL Height 2200	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 182	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	15:49	15:54
Post Mission	22:03	22:08

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
190	5416307 15	180	8400'	19:27	19:39			161102-192700	
191	16	0	↓	19:45	19:55			194502	
192	17	180		20:00	20:12			200002	
193	18	0		20:17	20:27			201726	
194	19	180		20:32	20:44			203243	
195	20	0		20:49	21:00			204928	
196	21	180		21:05	21:17			210519	
197	5416307 22	0	8400'	21:21	21:32			212159	
XTIE	5416307 23	270	8400'	21:37	21:43			213748	LINES 197→176 E-W
FIGURE 8		∿		21:43	21:49				CLOSING LOOP ON SWATH

Pg 2 of 2

Nov 2, 2016-A (N-44RL, SN2220764)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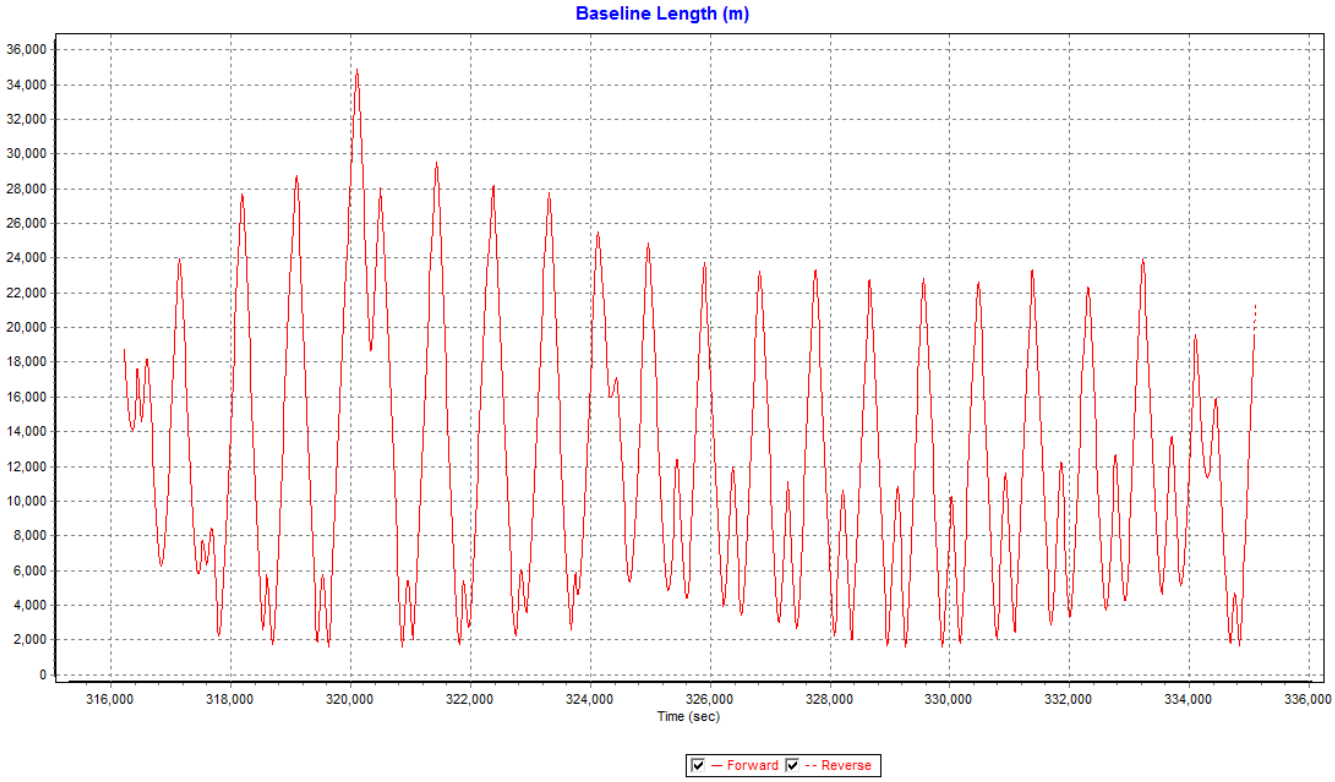
GRANGE_01
Real-time Reference Frame (RNAV)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316,000
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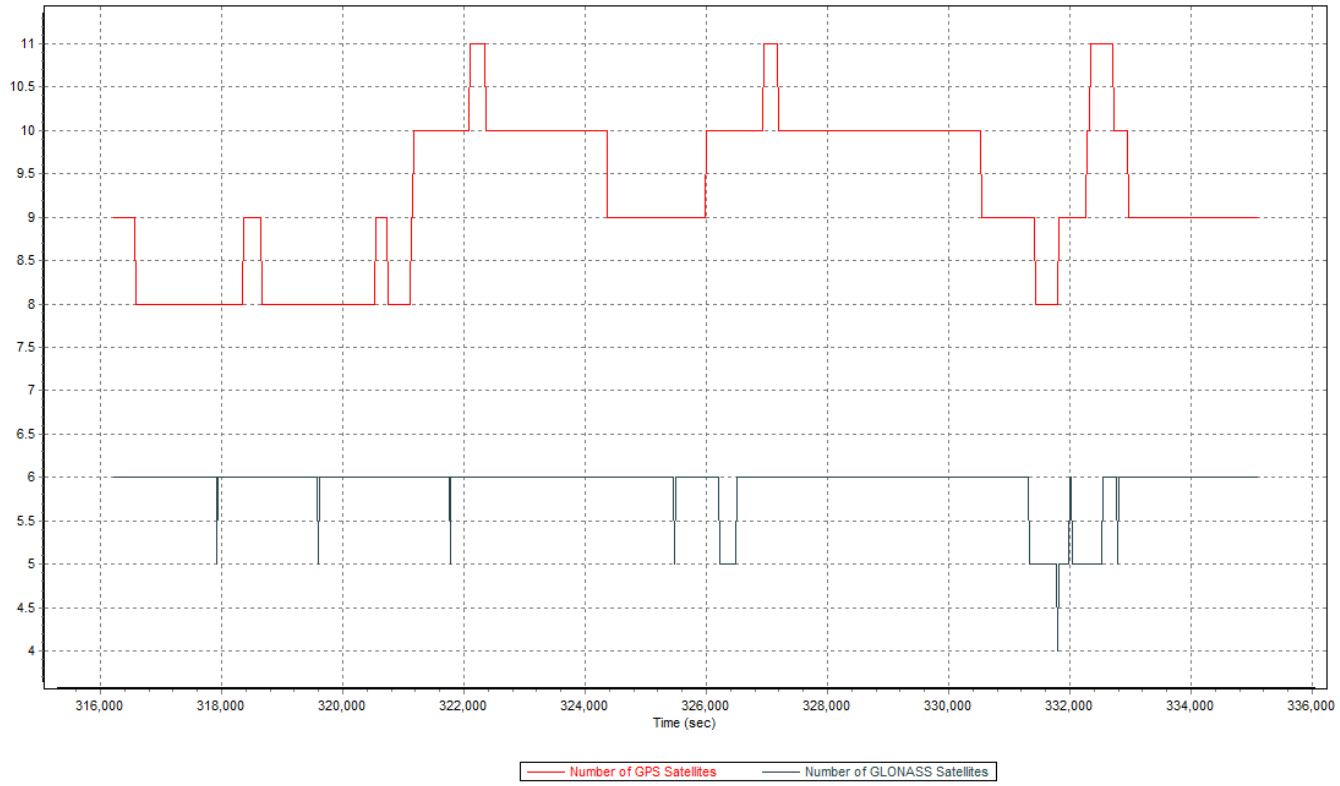
334,000
336,000
Time (sec)
Forward
Reverse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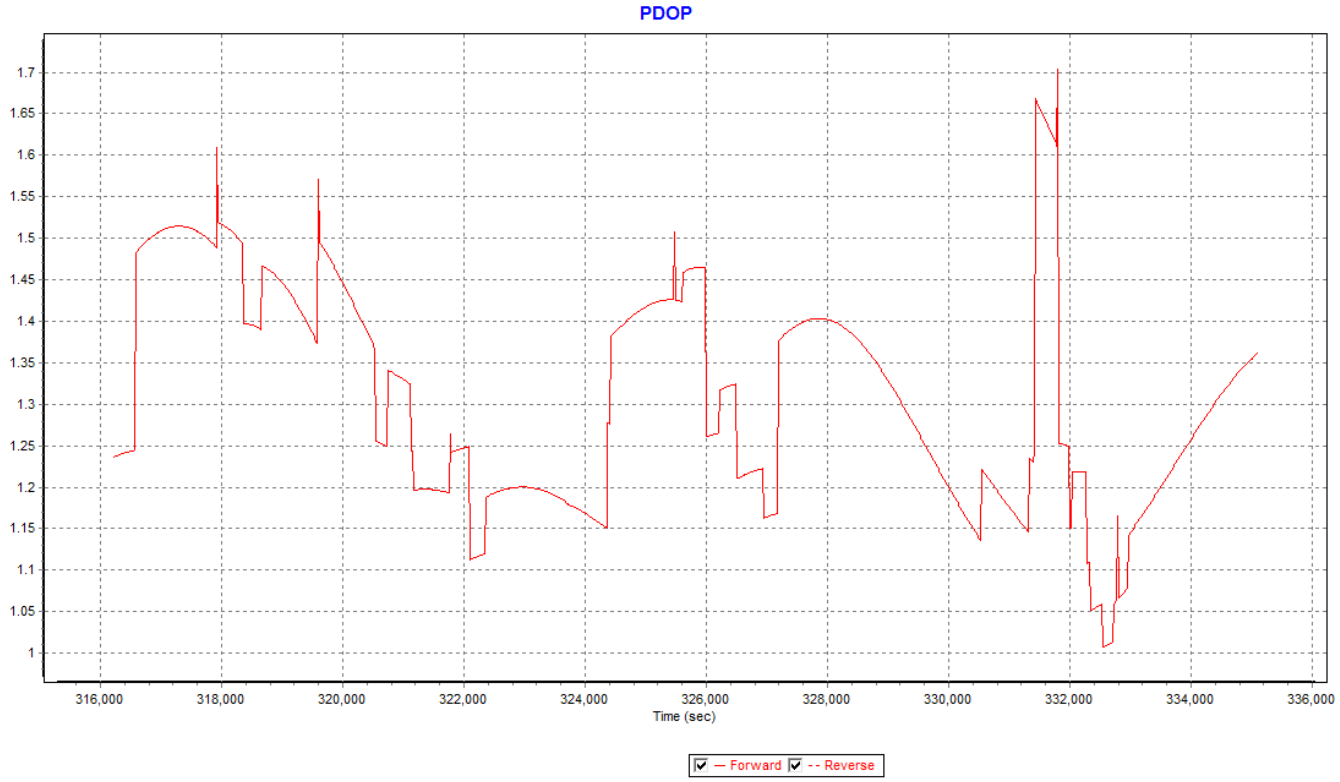
316,000
318,000
320,000
322,000
324,000
326,000
328,000
330,000
332,000
334,000
336,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
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1.05
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316,000
318,000
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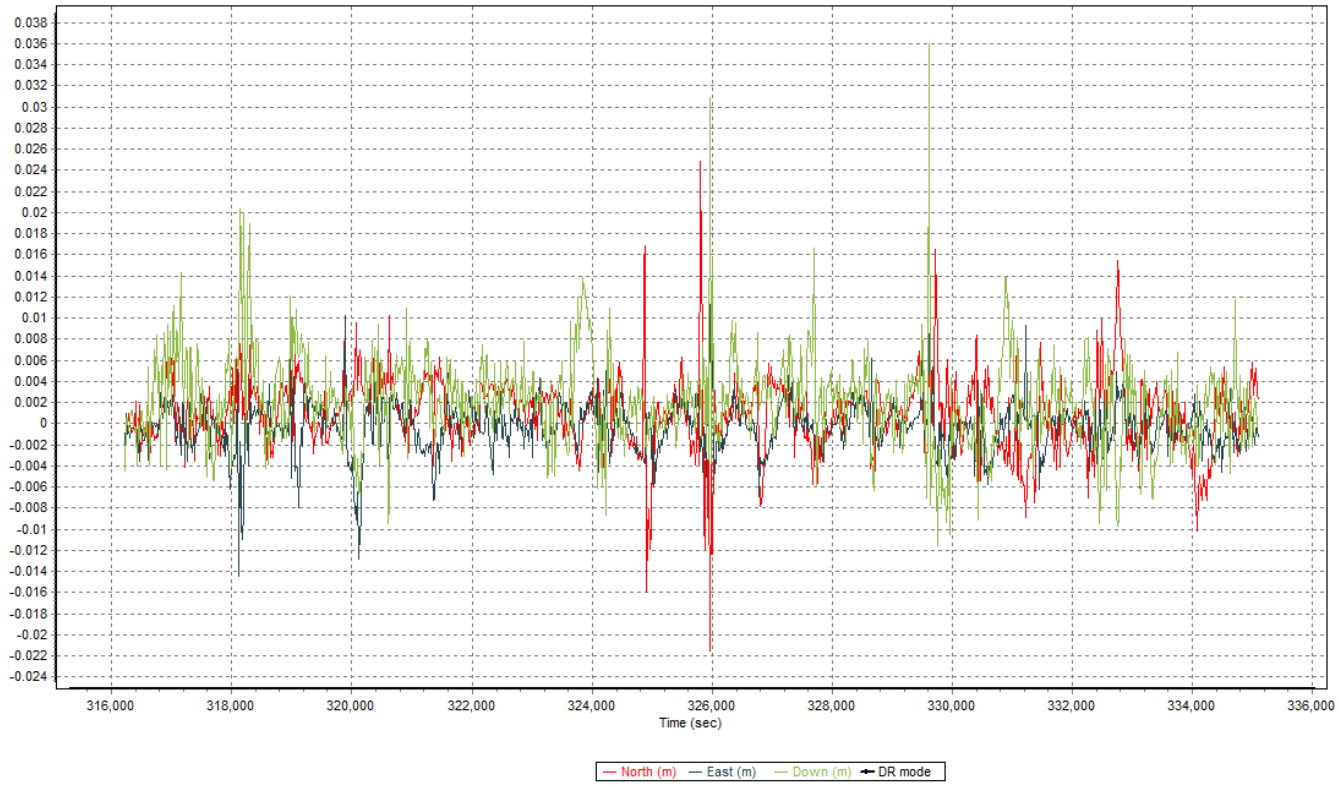
324,000
326,000
328,000
330,000
332,000
334,000
336,000
Time (sec)
Forward
Reverse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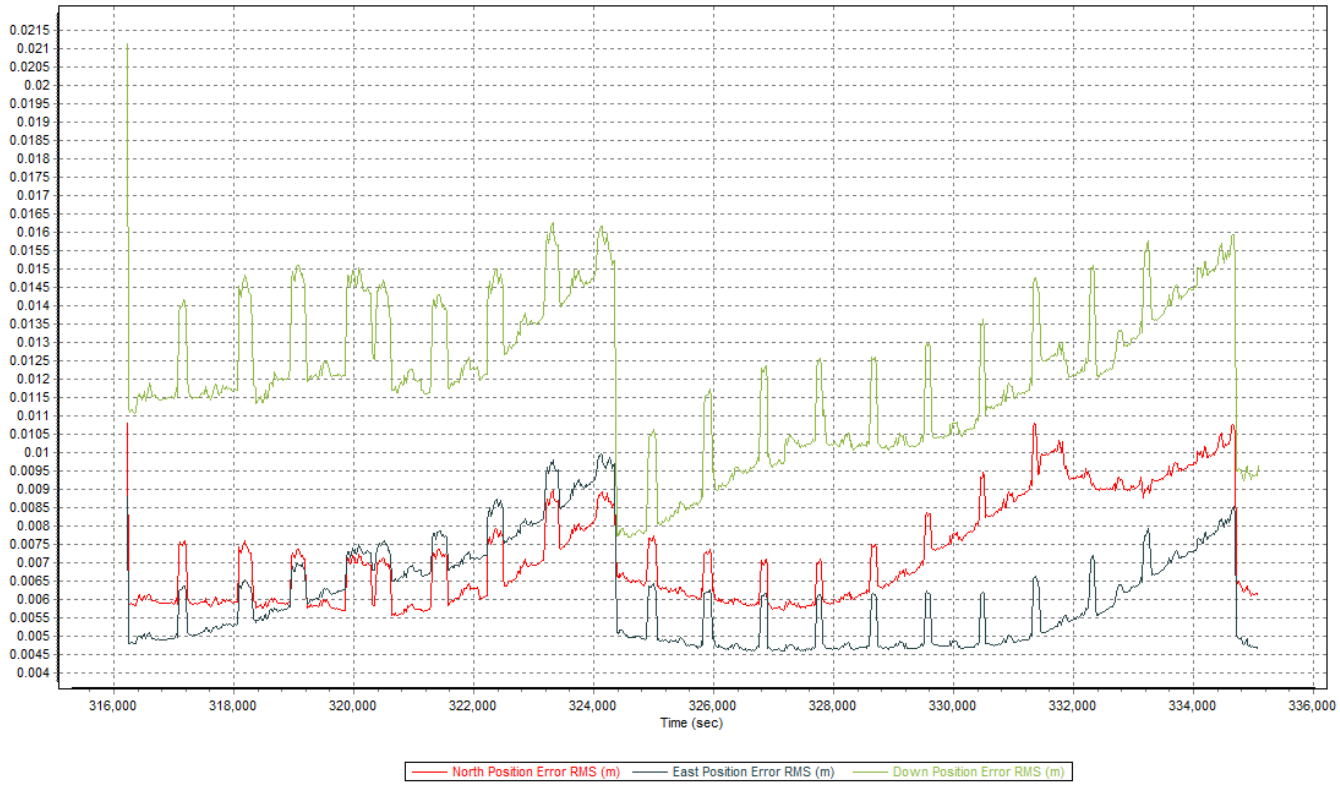
Time (sec)
North (m)
East (m)
Down (m)
DR mode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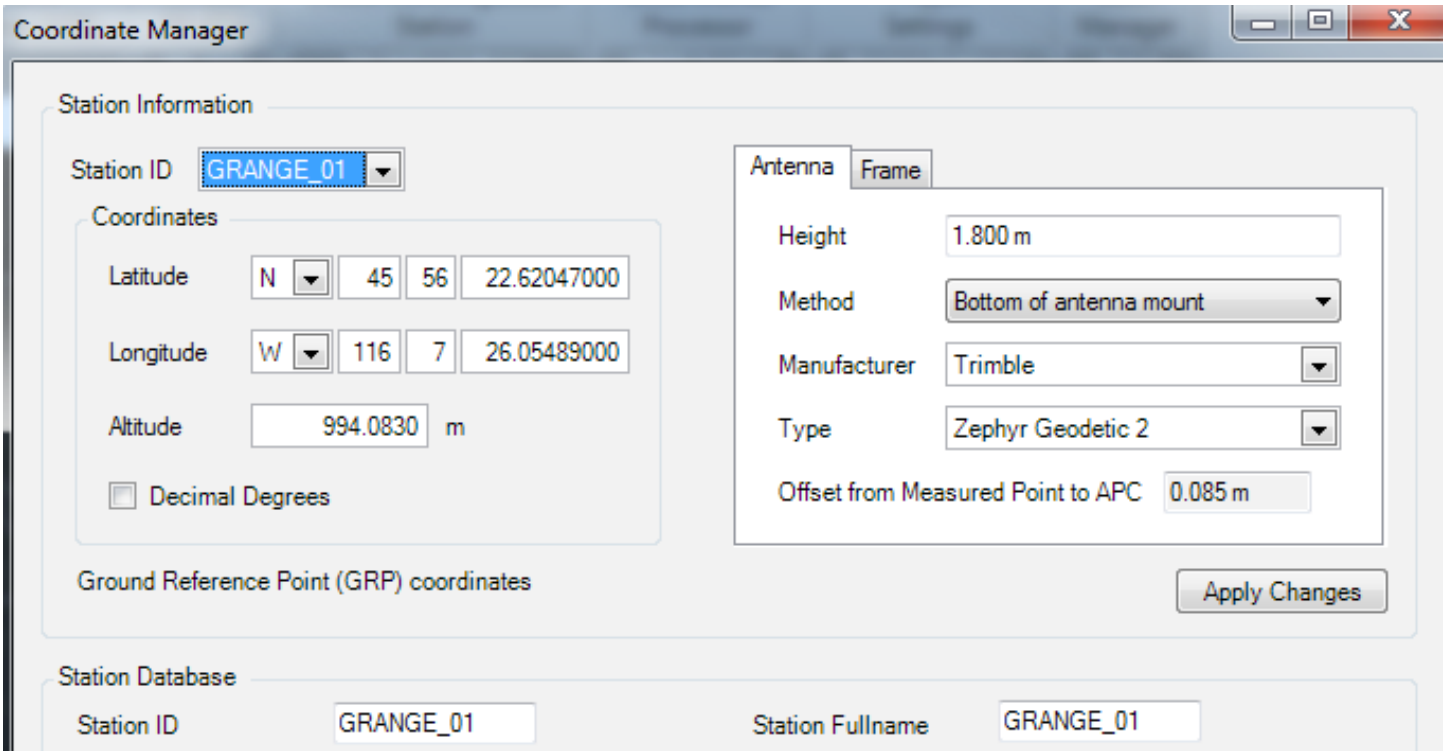
334,000
336,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
GRANGE_01
Coordinates
Latitude
N
45
56
22.62047000
Longitude
W
116
7
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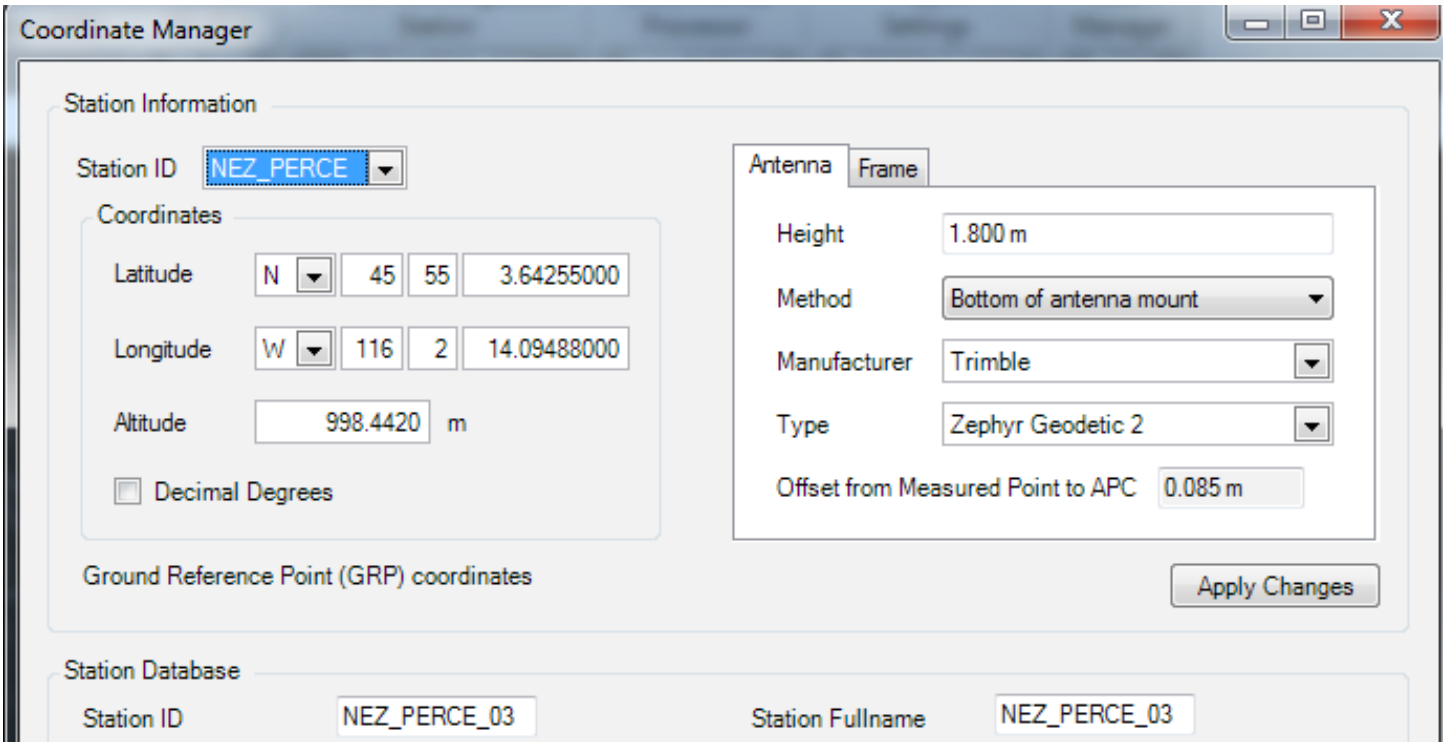
Altitude
994.0830
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
GRANGE_01
Station Fullname
GRANGE_01


Coordinate Manager
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Station ID
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Coordinates
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Longitude
W
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2
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Altitude
998.4420
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_03
Station Fullname
NEZ_PERCE_03

Flight Log

Julian Day	Flight
307	A

LIDAR Flight Log

Date Nov. 2 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective Complete AOI 17 + 18	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes
Wind: 180° (S) @ 4 knots
Temp: 9°C
Pressure: 3020
Clouds: overcast @ 11,000
Visibility: 16 km clear

Aircraft Block Time		
Engine On 15:22	Ramp Out	Takeoff 15:35
Engine Off 21:24	Ramp In	Landing 21:18
Total 6.0 hrs	Total hrs	Total 5.7 hrs

Mission Plan	
AGL Height 1900 m	Laser Pulse Rate 800 Hz
Target Speed 160 kts	Scan Rate 195 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	—	—
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 16 11 02 —
TEST			1300m	154424	15:46.			
412		90/77	8500'	155950	16.04:40			AOI 17
411		257	8400'	160738	16:12:27			- fog on next line - switching blocks.
425		217/203	8400'	161739	16:22:04			AOI 18 -
424		37	8400'	162446	16:29:11			
423		217	8400'	163211	16:36:49			
422		37	8500'	163953	16:44:34			
421		217	8500'	164726	16:51:28			
420		37	8600'	170318	17:07:20			SNAPSHOT - FROZE ON SETUP RESTART P.Display x 2 to get it going.
419		217	8600'	171058	17:15:09			
418		37	7900'	171855	17:22:53			
417		217	7900'	172634	17:30:54			
416		37	7900'	173429	173834			
415		217	7900'	174230	174649			
414		37	7900'	174957	175347			

Pg 1 of 3

Julian Day 307	Flight 1

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov 2 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 15:22	Ramp Out	Takeoff 15:35
Engine Off 21:24	Ramp In	Landing 21:18
Total 6.0 hrs	Total hrs	Total 5.7 hrs

Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	—	—
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161102 –
413		217	7900'	175727	180109			
X-TIE		293	8400'	180448	180638			X-TIE AOI 18
410		90	8400'	181011	181410			AOI 17
409		270	8400'	181819	182230			
408		90	8300'	182555	182945			
407		270	8300'	183342	183756			
406		90	8300'	184117	184515			
405		270	8300'	184906	185315			
404		90	8300'	185633	190035			
403		270	8300'	190429	190838			
402		90	8200'	191150	191555			
401		270	8200'	191932	192333			
400		90	8200'	192657	193050			
399		270	8200'	193434	193846			
398		90	8200'	194158	194546			

Pg 2 of 3

Julian Day 307	Flight A

LIDAR Flight Log

Date Nov. 2 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes @ 21:00 UTC @ KLW
Wind: 070 @ 12
Temp: 16° C
Pressure: 3015
Clouds: clear
Visibility: 10 st. miles

Aircraft Block Time		
Engine On 15:22	Ramp Out	Takeoff 15:35
Engine Off 21:24	Ramp in	Landing 21:18
Total 6.0 hrs	Total hrs	Total 5.7 hrs

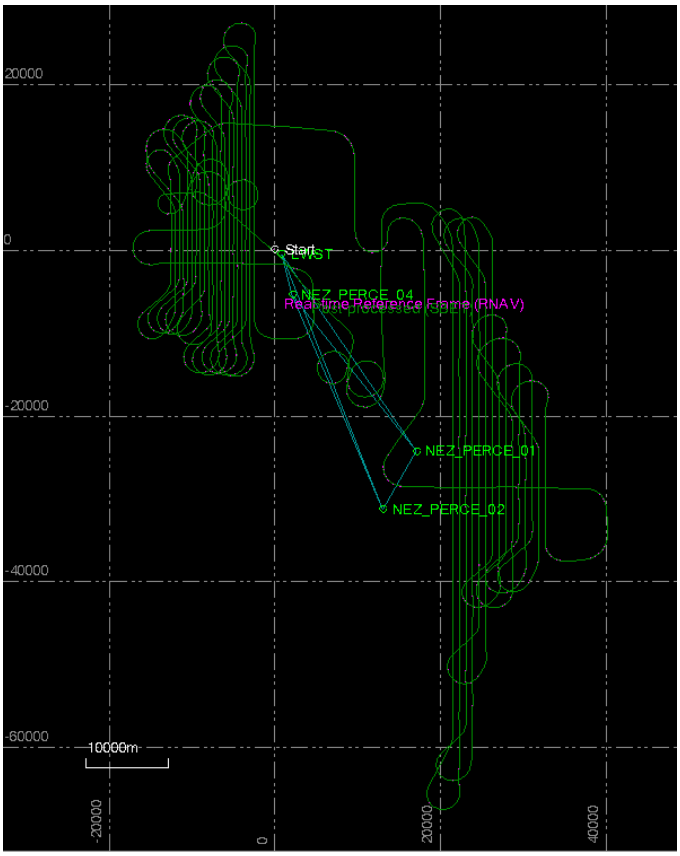
Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	—	—
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161102 —
397		270	8100'	194941	195344			
396		90	8100'	195706	200100			
395		270	8100'	200454	200905			
394		90	8100'	161102	201633			
393		270	8100'	202006	202417			
392		90	8100'	202749	203141			
391		270	8100'	203538	203945			
390		90	8100'	204342	204732			
X-TIE		180	8100'	205014	205328			X-TIE AOI 17
				2054	2104			IMU Maneuver

Pg 3 of 3

Nov 3, 2016-A (C-FFRY, SN2221256)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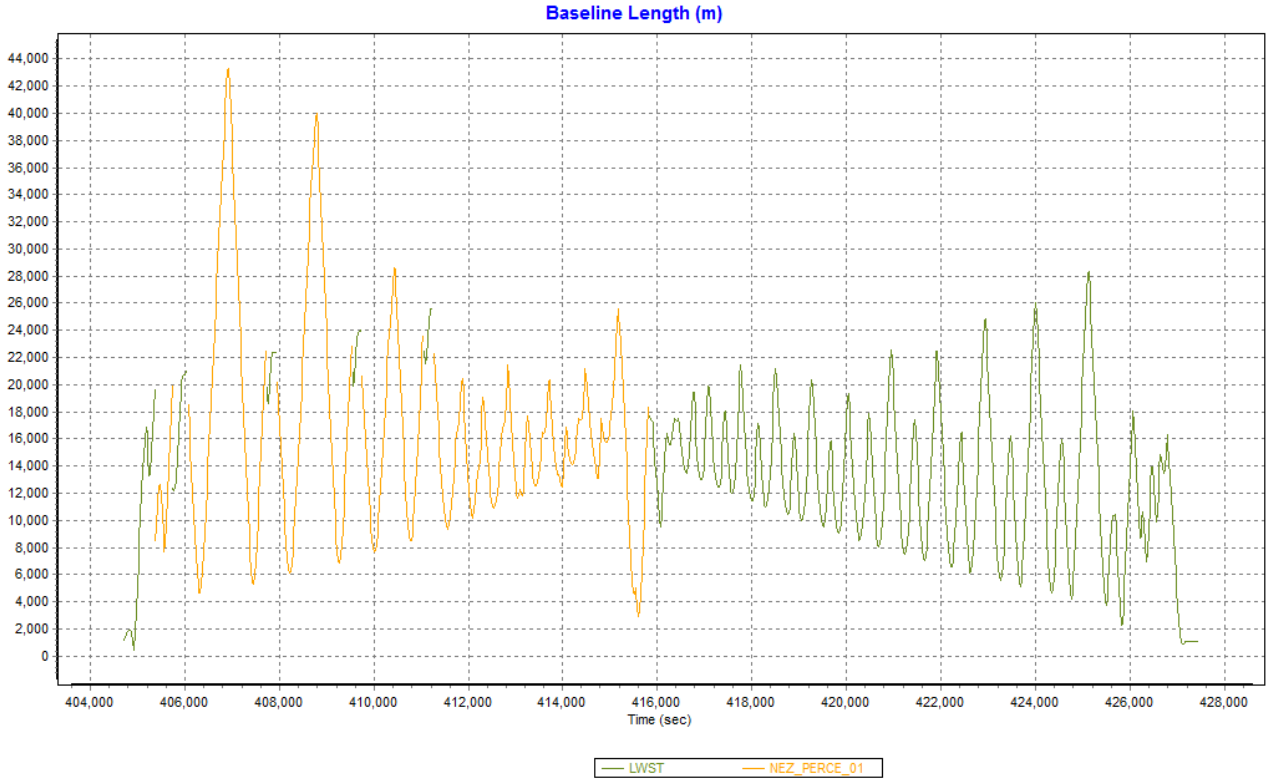
0
-20000
-40000
-60000
10000m
-20000
0
20000
40000
Start
LWST
NEZ_PERCE_04
Real-time Reference Frame (RNAV)
NEZ_PERCE_01
NEZ_PERCE_02


Baseline Length (m)
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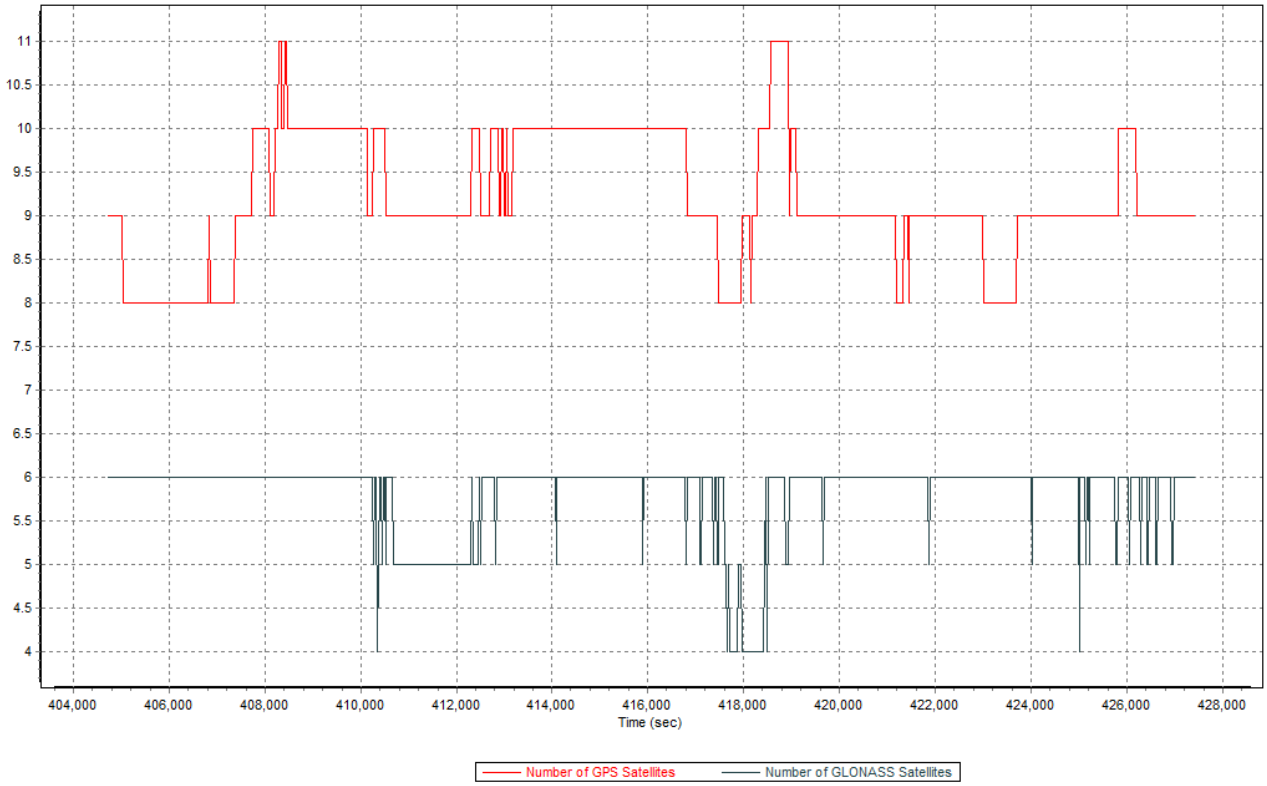
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)
LWST
NEZ_PERCE_01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10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
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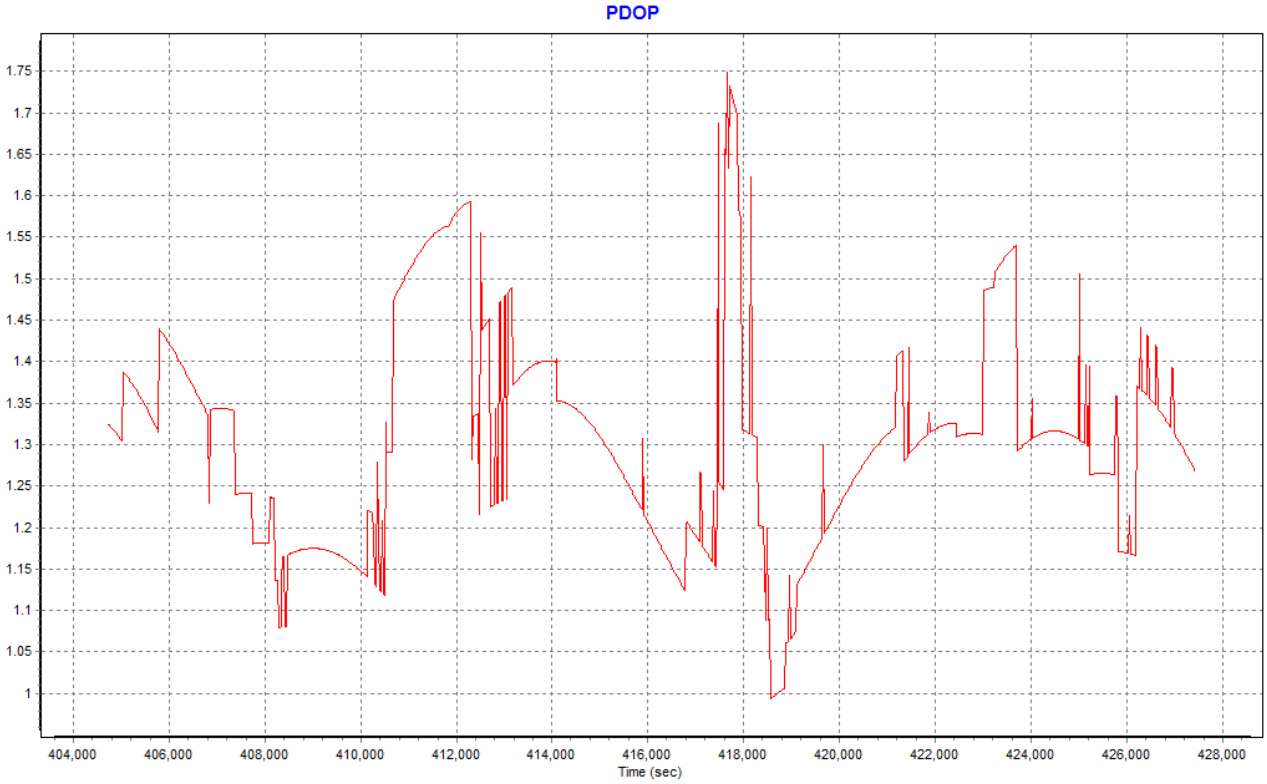
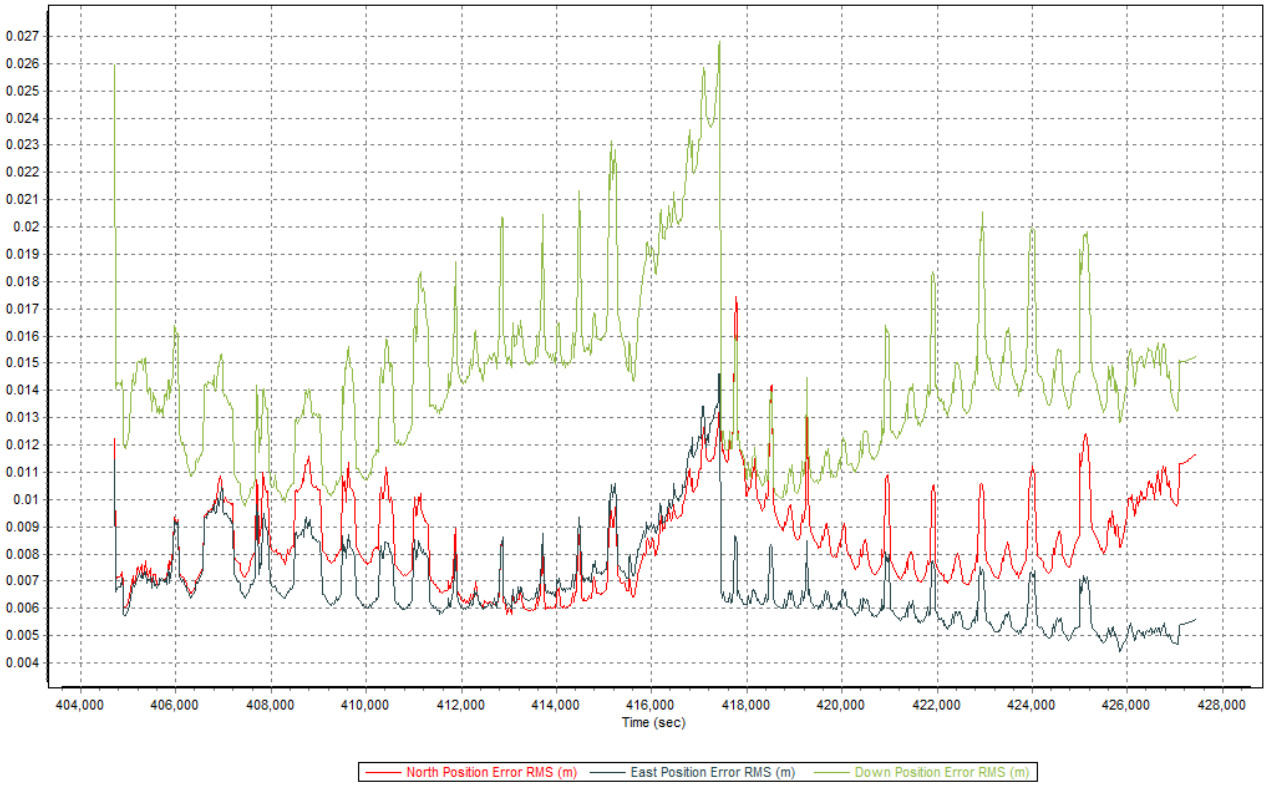
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.75
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)


0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
-0.02
-0.025
-0.03
-0.035
-0.04
-0.045
-0.05
-0.055
-0.06
-0.065
-0.07
-0.075
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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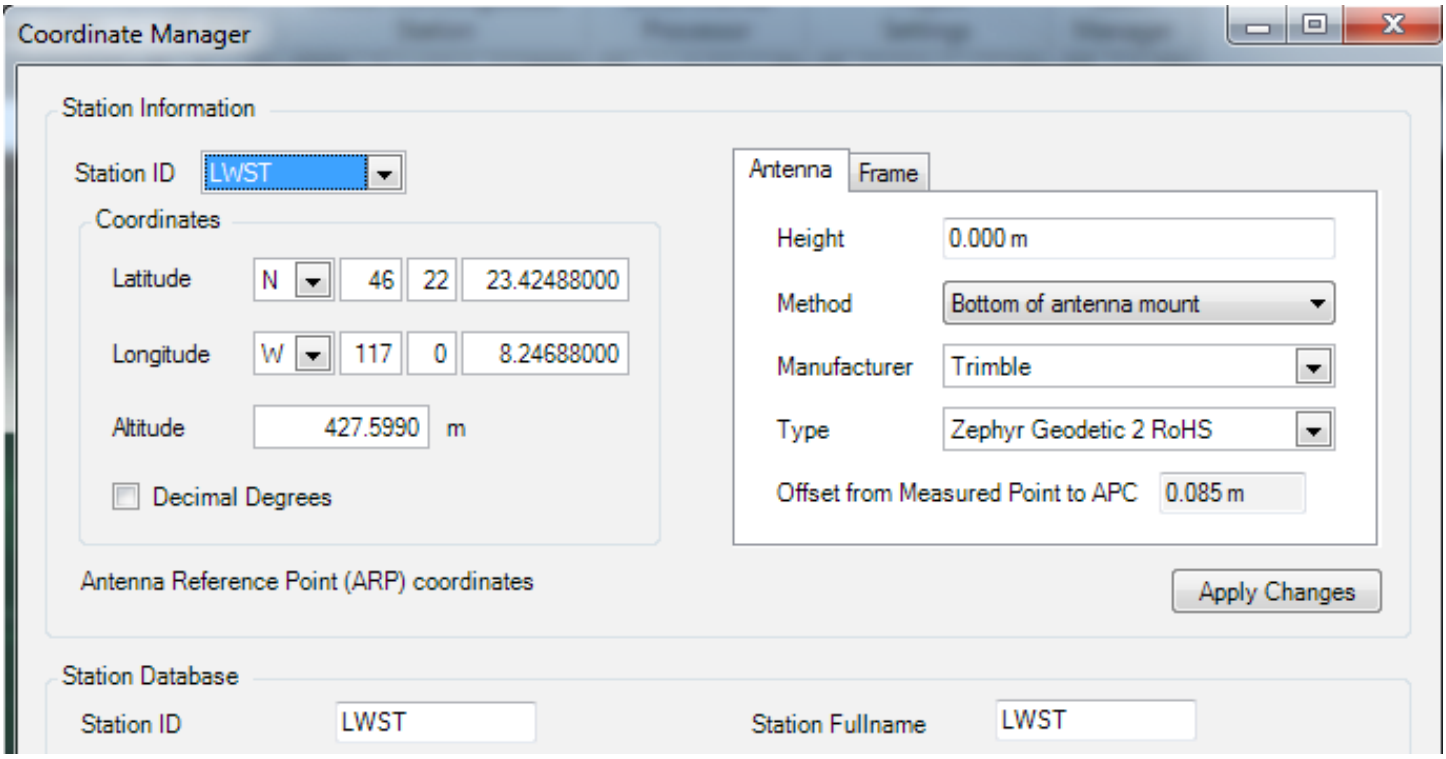
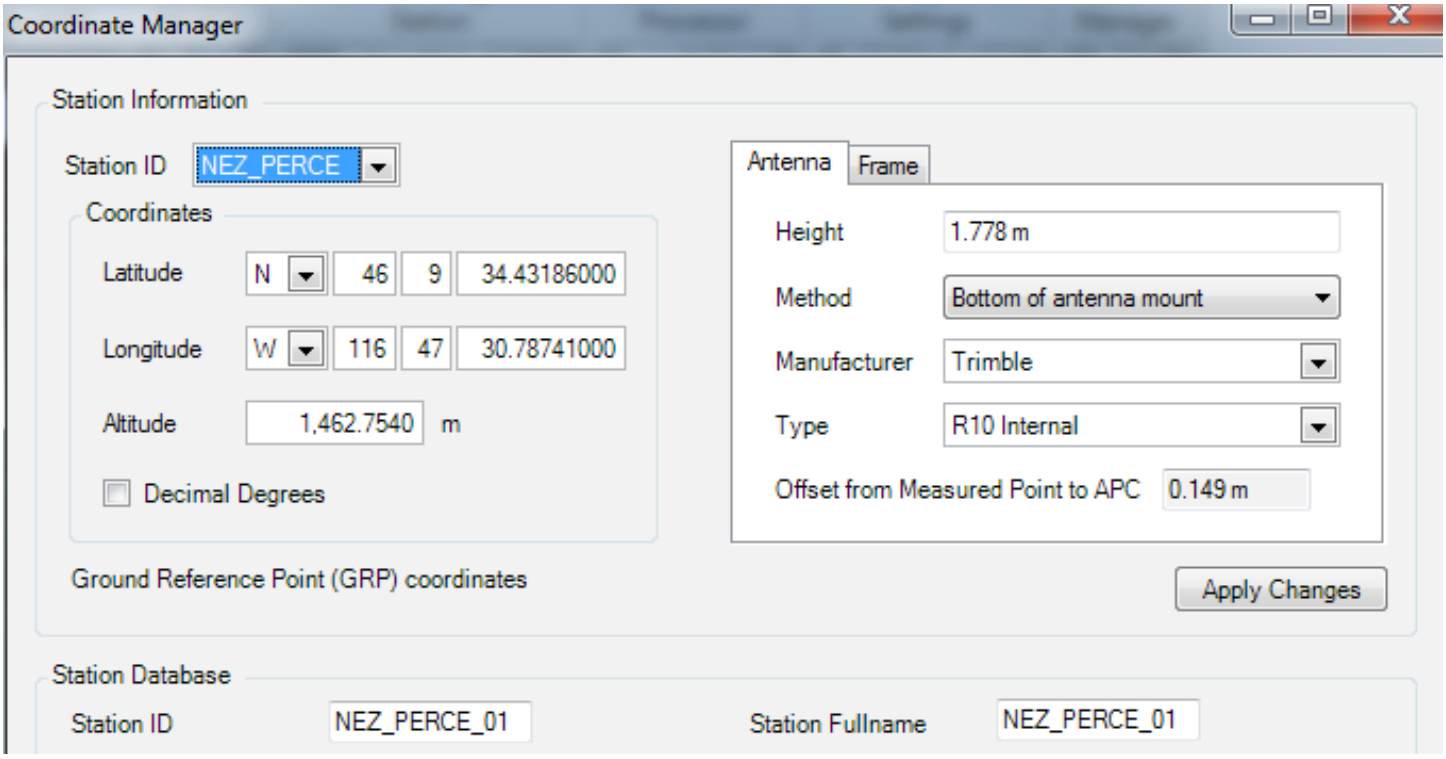
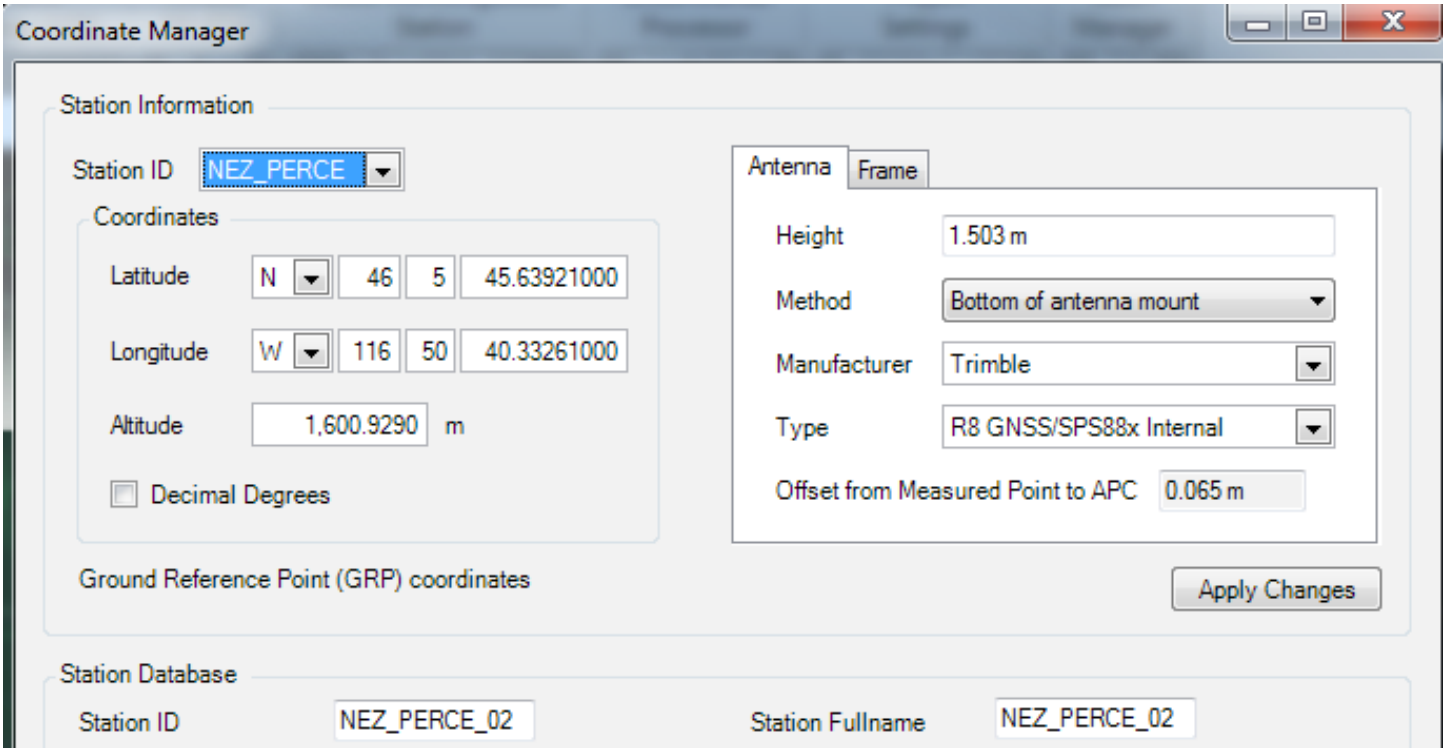
0.026
0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
LWST
Coordinates
Latitude
N
46
22
23.42488000
Longitude
W
117
0
8.24688000
Altitude
427.5990
m
Decimal Degrees
Antenna Reference Point (ARP) coordinates
Antenna
Frame
Height
0.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2 RoHS
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
LWST
Station Fullname
LWST


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
9
34.43186000
Longitude
W
116
47
30.78741000
Altitude
1,462.7540
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.778 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_01
Station Fullname
NEZ_PERCE_01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Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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46
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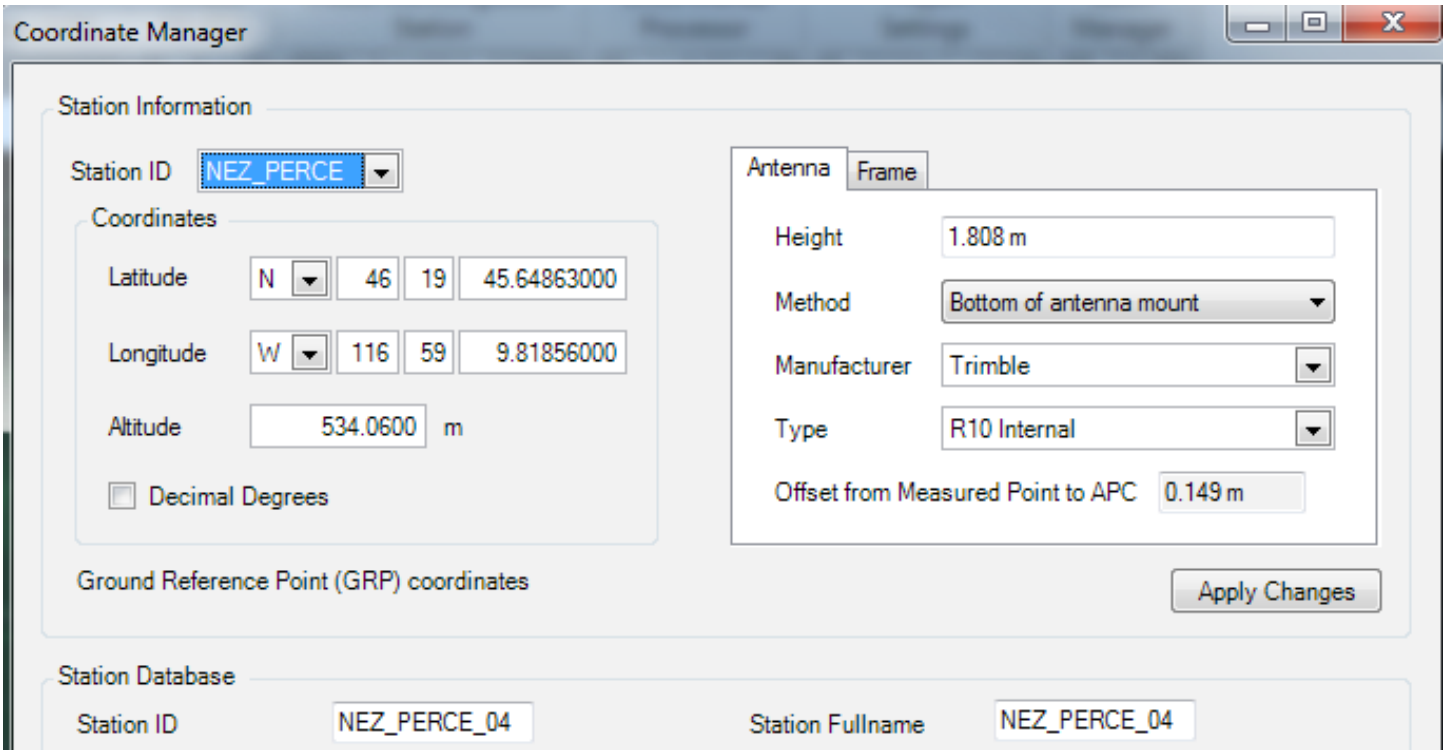
45.63921000
Longitude
W
116
50
40.33261000
Altitude
1,600.9290
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.503 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R8 GNSS/SPS88x Internal
Offset from Measured Point to APC
0.065 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_02
Station Fullname
NEZ_PERCE_02


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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Longitude
W
116
59
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Altitude
534.0600
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.808 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_04
Station Fullname
NEZ_PERCE_04

Flight Log

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Julian Day	Flight
308	A

Date Nov 3 2016	Aircraft PA-31 C-FFRY
Project 3119 - NEZ PERCE	Pilot B. Harrity
Location LEWISTON	Operator B. Whiteley
Mission Objective COMPLETE BLOCK QL2 AOI 07 START BLOCK QL1 AOI 03	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes
Temp
Humidity
Altimeter
Terrain Height

Aircraft Block Time		
Engine On 16 10	Ramp Out 16 23	Takeoff 16 28
Engine Off 22 47	Ramp In 22 38	Landing 22 37
Total 6 6 hrs	Total hrs	Total 6 2 hrs

Mission Plan			
AGL Height 2200 / 1900	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 182 / 195	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	16 17	16 22
Post Mission	22 39	22 44

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
212	5416308 15	180	11 000	19 15	19 17			161103_191535	QL2 AOI 07
XTIE	5416308 16	270	10200→9000	19 21				192120	XTIE LN'S 212→198 E-W
									MOVE OVER TO BLOCK
080	5416308 17	180	7600	1942	19 44			194231	QL1 AOI 03
081	18	0	7800	19 48	19 49			194814	
082	19	180	8000	19 53	19 55			195350	
083	20	0	7800	19 59	20 00			195911	
084	21	180	7200	20 04	20 07			200453	
085	22	0		20 11	20 13			201101	
086	23	180		20 17	20 19			201730	
087	24	0		20 23	20 25			202332	
088	25	180		20 30	20 32			203002	
089	26	0		20 36	20 38			203626	
090	5416308 27	180	7200	20 42	20 46			204248	

Pg 2 of 3

Julian Day	308	Flight	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date	Nov 3 2016	Aircraft	PA-31 C-FFRY
Project	3119. NEZPEACE	Pilot	B. Harrity
Location	LEWISTON	Operator	B. Whiteley
Mission Objective	COMPLETE BLOCK QL2 AOI 07 START BLOCK QL1 AOI 03		

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A 1
Scanner 2 Drive	A 2

Additional Notes	@ 22 40.
Temp	18 °C
Humidity	55 %
Altimeter	30.29
Terrain Height	438

Aircraft Block Time		
Engine On 16:10	Ramp Out 16 23	Takeoff 16 28
Engine Off 22 47	Ramp In 22 38	Landing 22 37
Total 6.6 hrs	Total hrs	Total 6.2 hrs

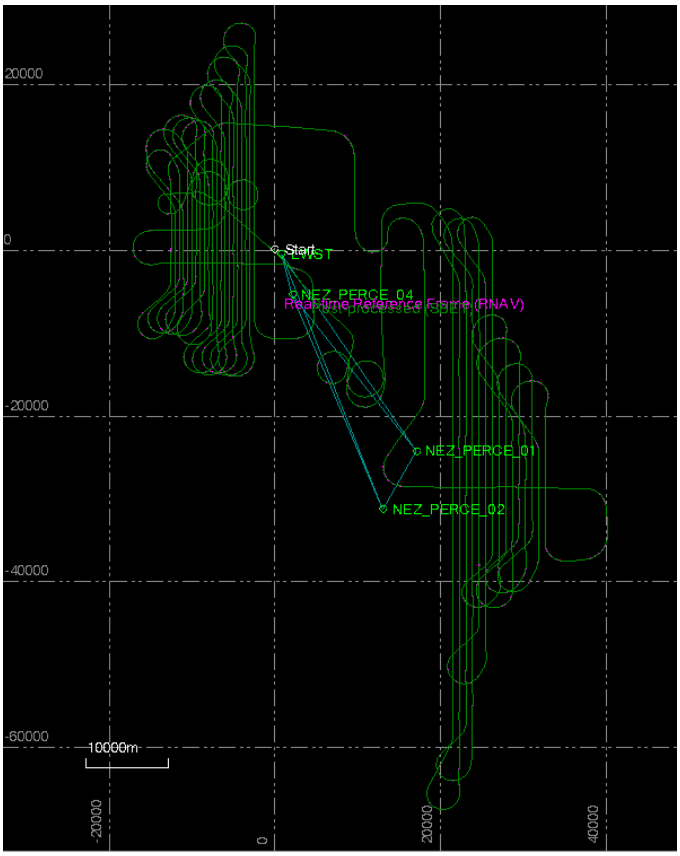
Mission Plan			
AGL Height	1900 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	56 %	FOV	600 Deg's

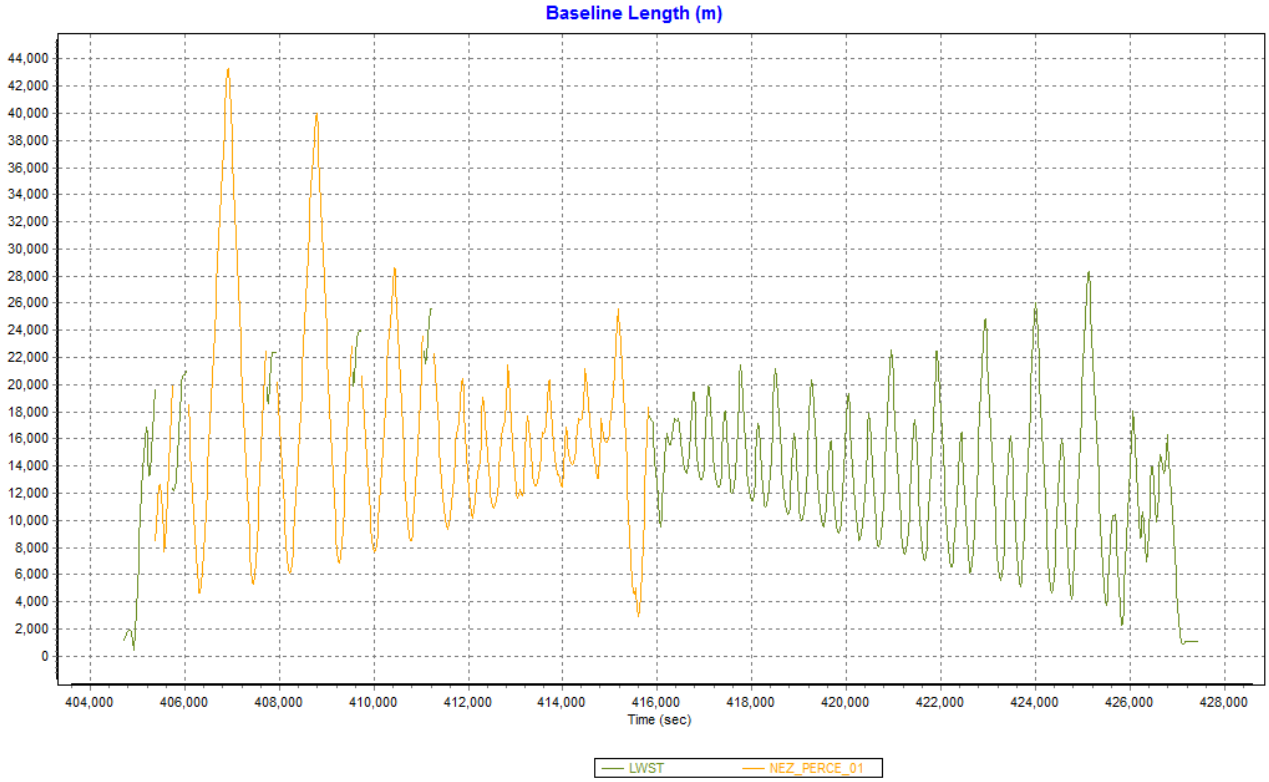
Static Alignment	GPS Time	
	Start	End
Pre Mission	16 17	16 22
Post Mission	22 39	22 44

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
091	5416308 28	0	7200'	20 49	20 53			161103_204956	QL1 AOI 03
092	29	180		20 57	21 02			205746	
093	30	0		21 05	21 09			210559	
094	31	180		21 13	21 18			211338	
095	32	0		21 22	21 26			212215	
096	33	180		21 30	21 35			213038	
097	34	0		21 39	21 44			213943	
098	35	180		21 48	21 53			214803	
099	36	0		21 57	22 03			215746	
100	5416308 37	180	7200'	22 07	22 13			220714	DID NOT APPEAR ON SUMP SHOT ?? UPON COMPLETION.
XTIE	5416308 38	270	7200'	22 17	22 20			221712	LINES 100→80 E→W
FIGURE 8		∿		22 22	22 30				CLOSE OUT SURVEY

Pg 3 of 3

Nov 3, 2016-A (C-FFRY, SN2221256)


20000
0
-20000
-40000
-60000
10000m
-20000
0
20000
40000
Start
LWST
NEZ_PERCE_04
Real-time Reference Frame (RNAV)
NEZ_PERCE_01
NEZ_PERCE_02


Baseline Length (m)
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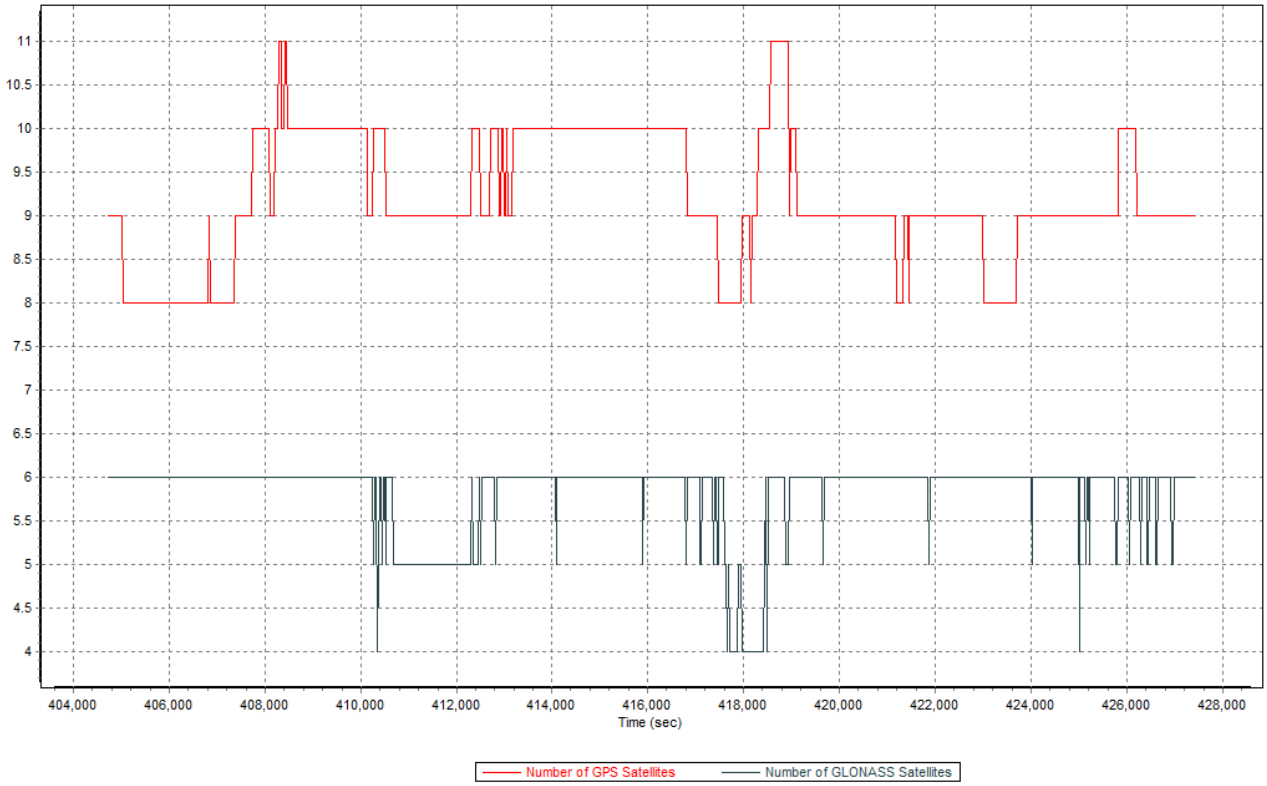
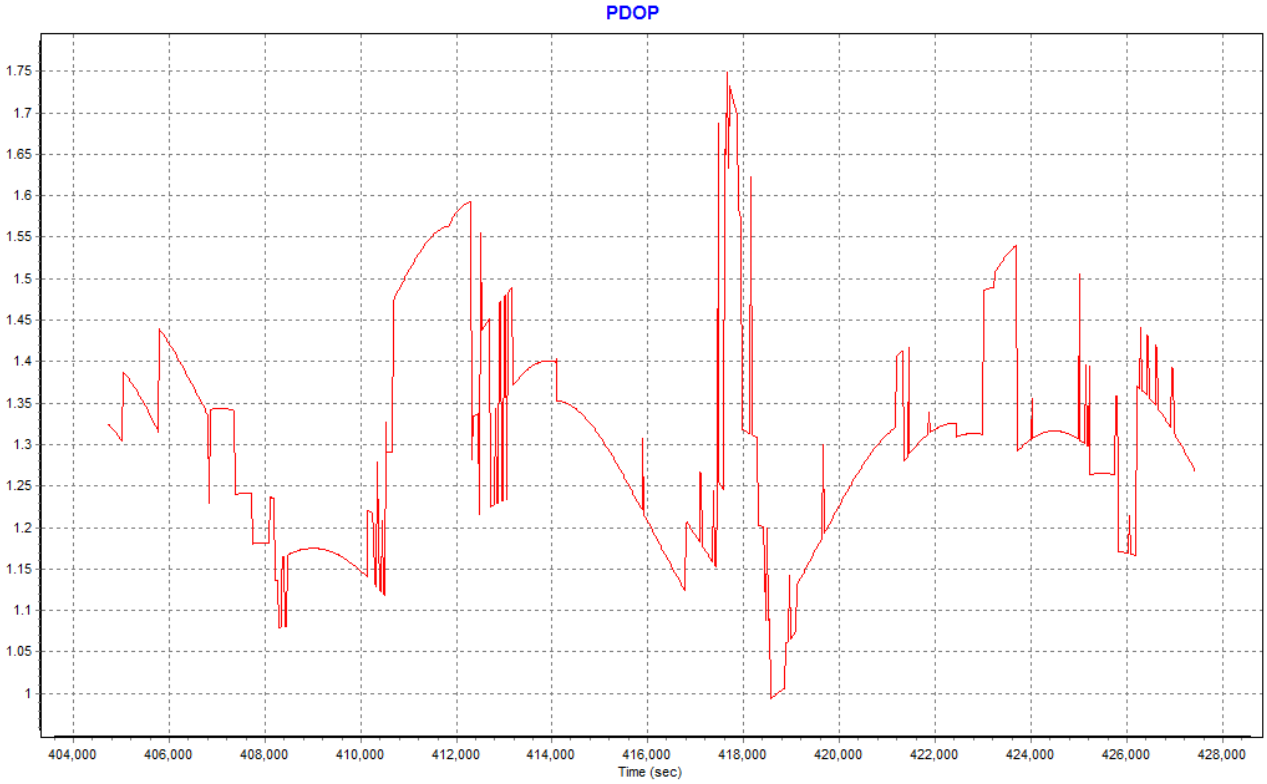
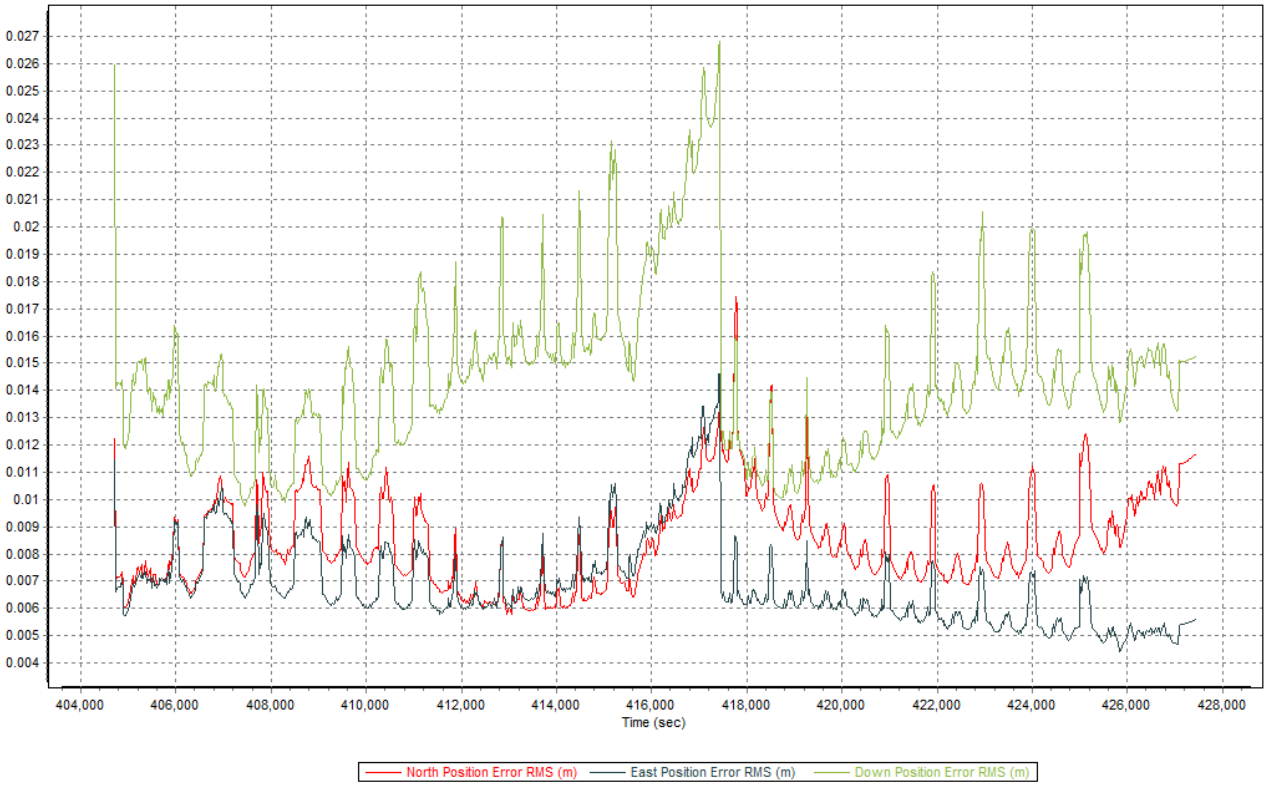
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)
LWST
NEZ_PERCE_01


11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.75
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)


0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
-0.02
-0.025
-0.03
-0.035
-0.04
-0.045
-0.05
-0.055
-0.06
-0.065
-0.07
-0.075
404,000
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.02
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0.014
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0.009
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0.004
404,000
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408,000
410,000
412,000
414,000
416,000
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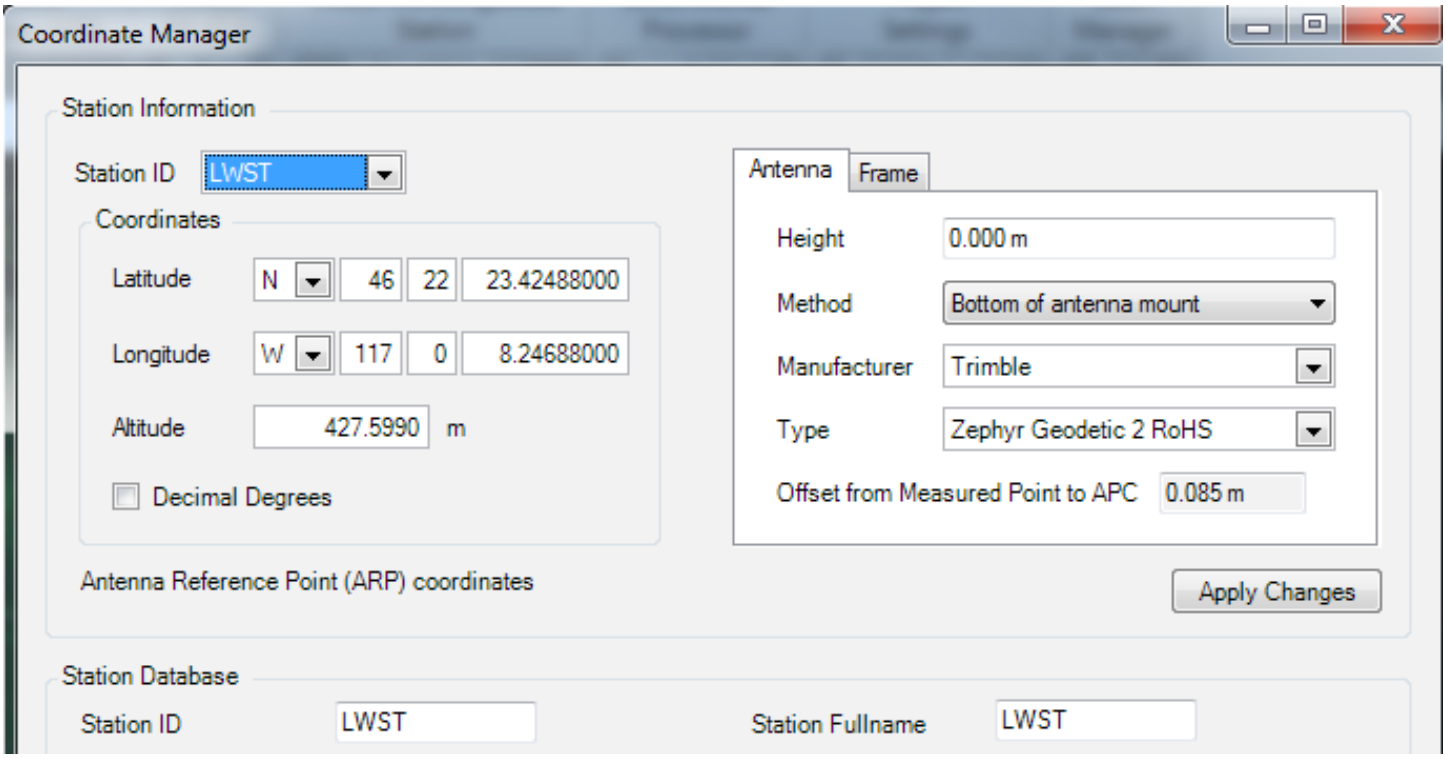
420,000
422,000
424,000
426,000
428,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
LWST
Coordinates
Latitude
N
46
22
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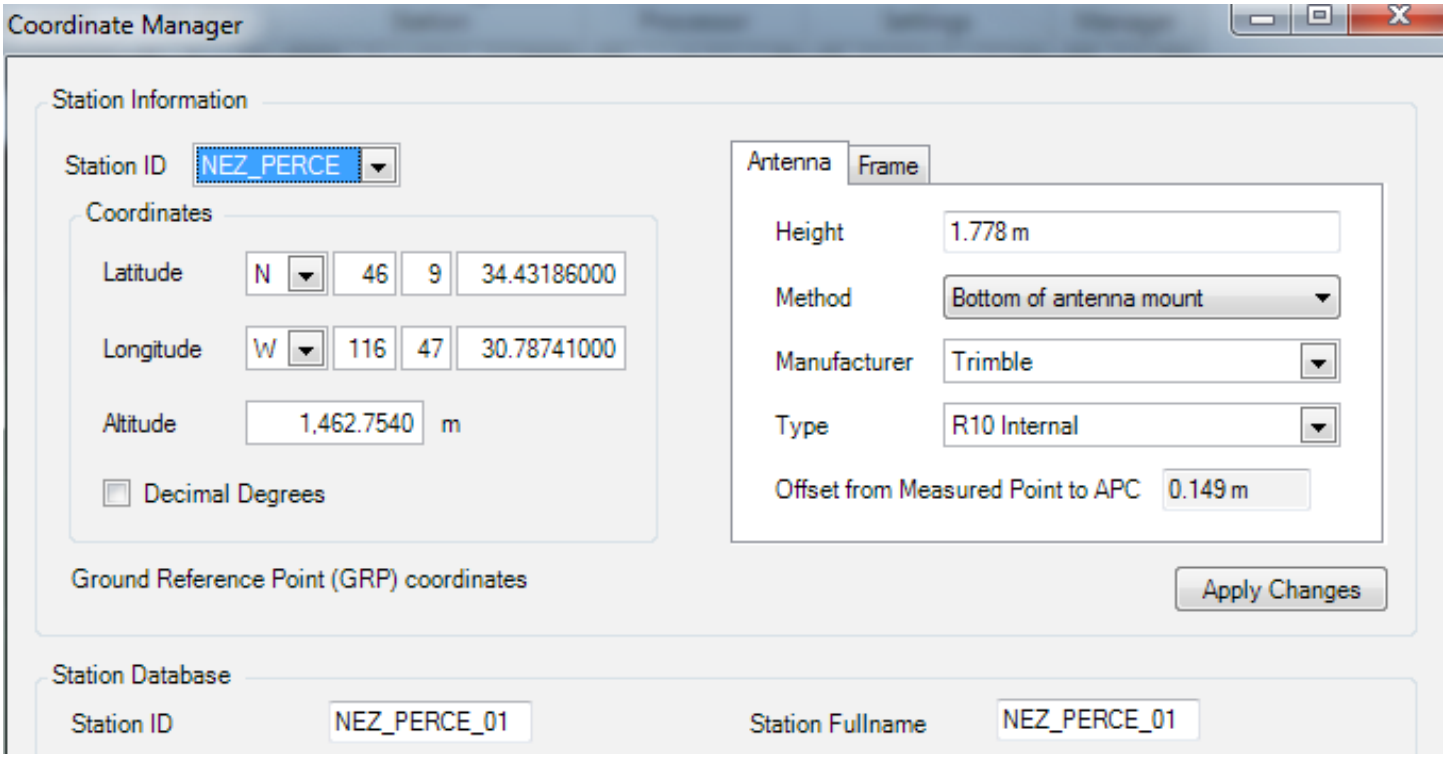
Longitude
W
117
0
8.24688000
Altitude
427.5990
m
Decimal Degrees
Antenna Reference Point (ARP) coordinates
Antenna
Frame
Height
0.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2 RoHS
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
LWST
Station Fullname
LWST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Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
9
34.43186000
Longitude
W
116
47
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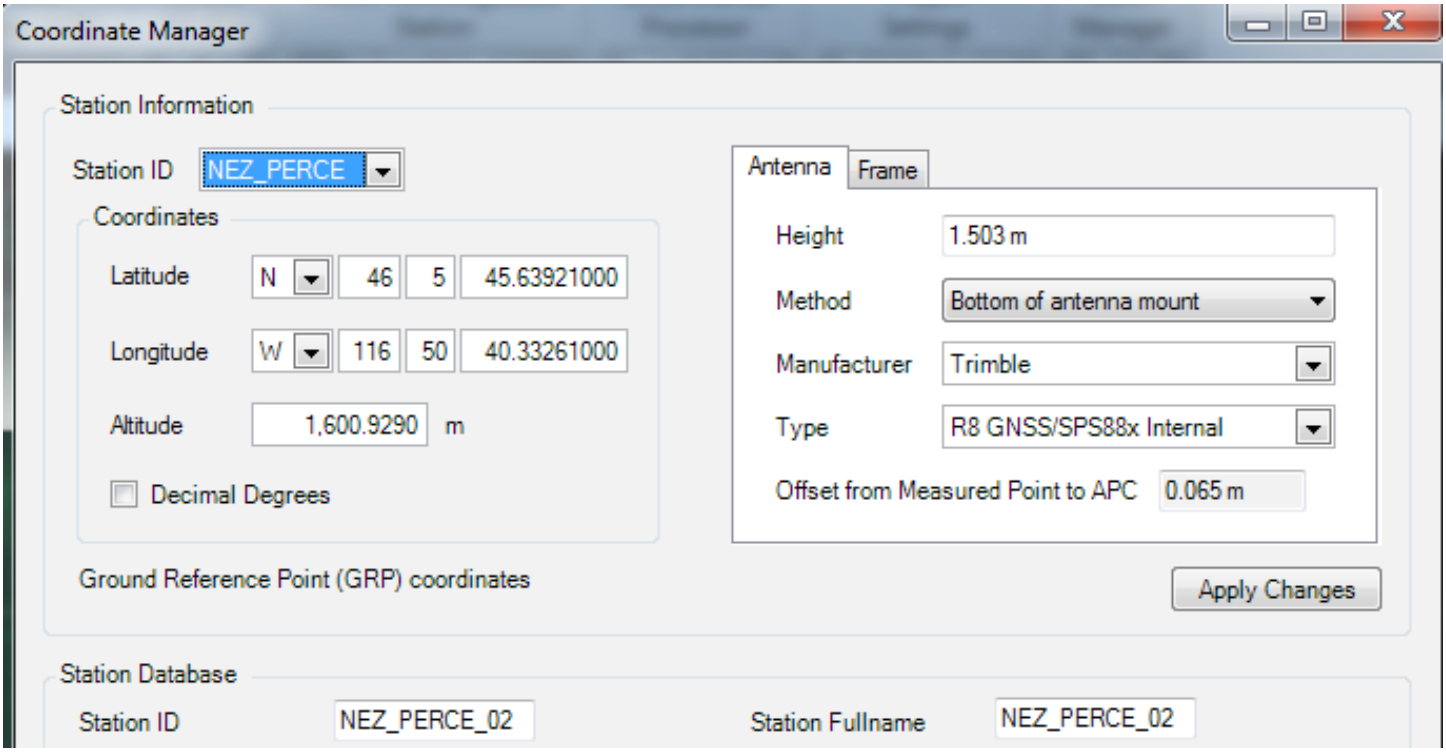
Altitude
1,462.7540
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.778 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_01
Station Fullname
NEZ_PERCE_01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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.503 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
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Station Database
Station ID
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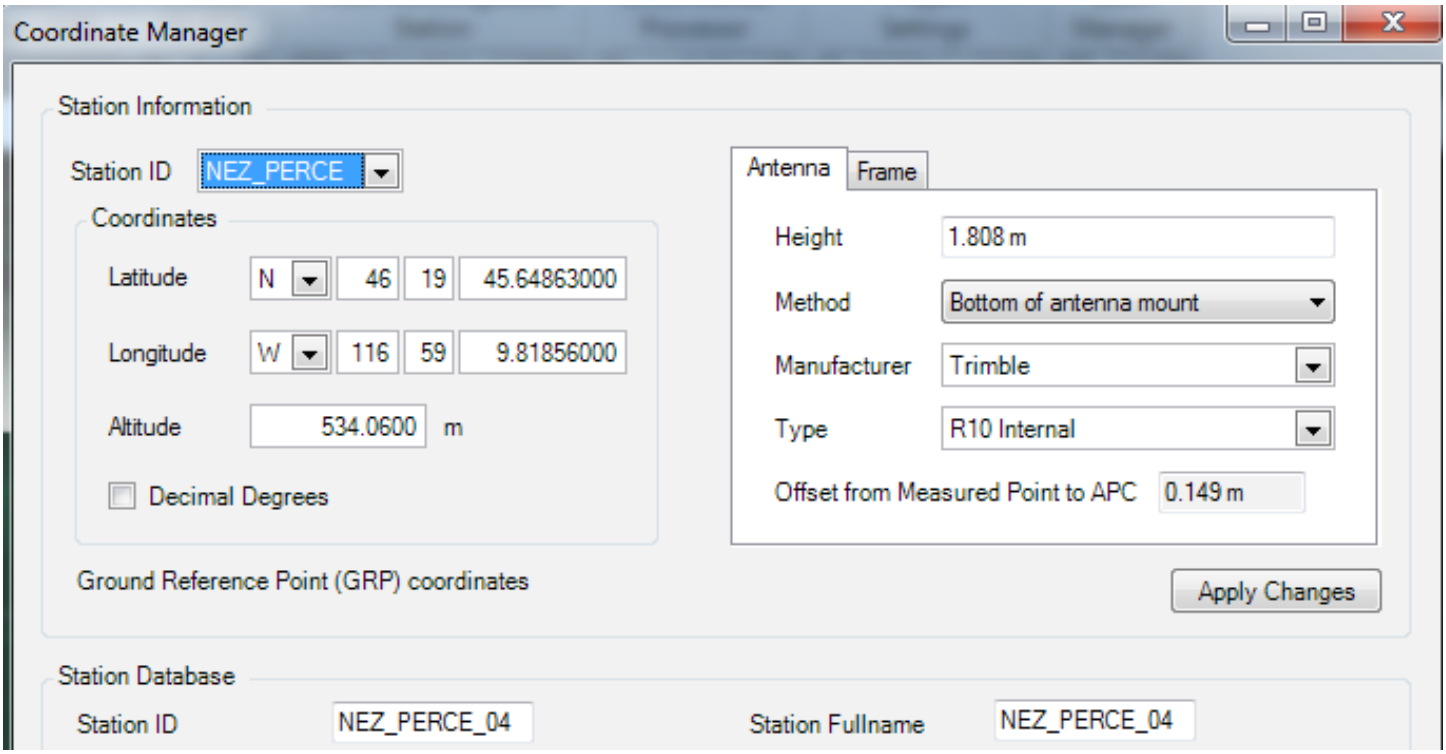
Station Fullname
NEZ_PERCE_02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Station Information
Station ID
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Longitude
W
116
59
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Altitude
534.0600
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.808 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_04
Station Fullname
NEZ_PERCE_04

Flight Log

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Julian Day 308	Flight A

Date Nov 3 2016	Aircraft PA-31 C-FFRY
Project 3119 - NEZPERCE	Pilot B. Harrity
Location LEWISTON	Operator B. Whiteley
Mission Objective: COMPLETE BLOCK QL2 AOI 07	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes @ 1600
Temp 11°C
Humidity 74%
Altimeter 30.39
Terrain Height 438
WIND 080@05

Aircraft Block Time		
Engine On 16:10	Ramp Out 16:23	Takeoff 16:28
Engine Off 22:47	Ramp In 22:38	Landing 22:37
Total 6.6 hrs	Total hrs	Total 6.2 hrs

Mission Plan			
AGL Height 2200	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 182	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	16:17	16:22
Post Mission	22:39	22:44

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		16:31	16:40				WAKE UP IMU
198	5416308 01	180	8400'	16:47	16:59			161103-164739	QL2 AOI 07
199	02	0	8500'	17:04	17:14			170411	
200	03	180	8500'	17:19	17:30			171922	
201	04	0	8500'	17:35	17:44			173503	
202	05	180	8500'	17:49	17:58			174915	
203	06	0	8600'	18:02	18:10			180226	
204	07	180	9900'	18:14	18:21			181448	
205	08	0	10400'	18:25	18:29			182557	
206	09	180	10200'	18:34	18:38			183400	
207	10	0	9600'	18:42	18:44			184201	
208	11	180	10500'	18:50	18:52			185013	
209	12	0	10500'	18:56	18:58			185628	
210	13	180	10500'	19:03	19:05			190317	
211	5416308 14	0	10600	19:09	19:10			190915	

Pg 1 of 3

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Julian Day	Flight
308	A

Date Nov 3 2016	Aircraft PA-31 C-FFRY
Project 3119 - NEZ PERCE	Pilot B. Harrity
Location LEWISTON	Operator B. Whiteley
Mission Objective COMPLETE BLOCK QL2 AOI 07 START BLOCK QL1 AOI 03	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes
Temp
Humidity
Altimeter
Terrain Height

Aircraft Block Time		
Engine On 16 10	Ramp Out 16 23	Takeoff 16 28
Engine Off 22 47	Ramp In 22 38	Landing 22 37
Total 6 hrs	Total hrs	Total 6 hrs

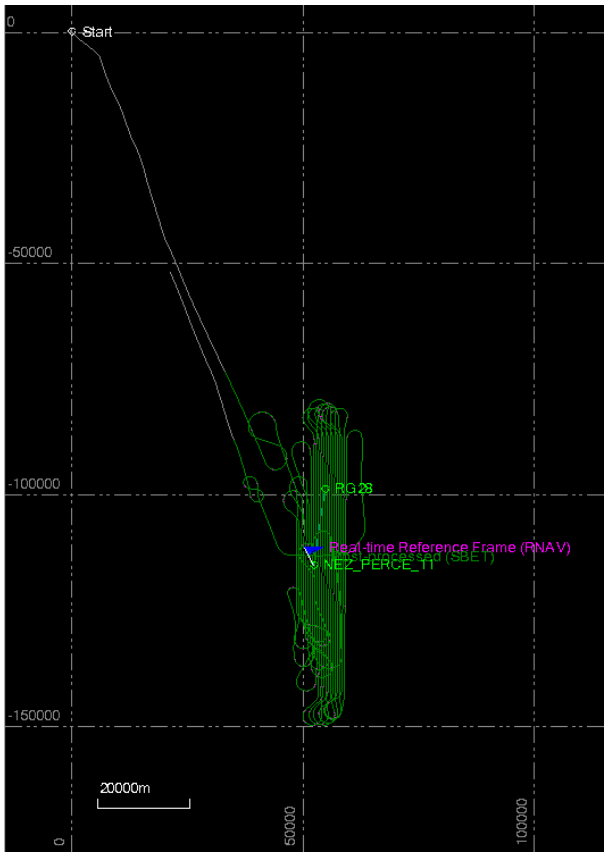
Mission Plan	
AGL Height 2200 / 1900 m	Pulse Rate 800 KHz
Target Speed 160 kts	Scan Rate 182 / 195 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	16 17	16 22
Post Mission	22 39	22 44

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
212	5416308 15	180	11 000	19 15	19 17			161103_191535	QL2 AOI 07
XTIE	5416308 16	270	10200→9000	19 21				192120	XTIE LN'S 212→198 E-W
									MOVE OVER TO BLOCK
080	5416308 17	180	7600	1942	19 44			194231	QL1 AOI 03
081	18	0	7800	19 48	19 49			194814	
082	19	180	8000	19 53	19 55			195350	
083	20	0	7800	19 59	20 00			195911	
084	21	180	7200	20 04	20 07			200453	
085	22	0		20 11	20 13			201101	
086	23	180		20 17	20 19			201730	
087	24	0		20 23	20 25			202332	
088	25	180		20 30	20 32			203002	
089	26	0		20 36	20 38			203626	
090	5416308 27	180	7200	20 42	20 46			204248	

Pg 2 of 3

Nov 3, 2016-A (N-44RL, SN2220764)


Start
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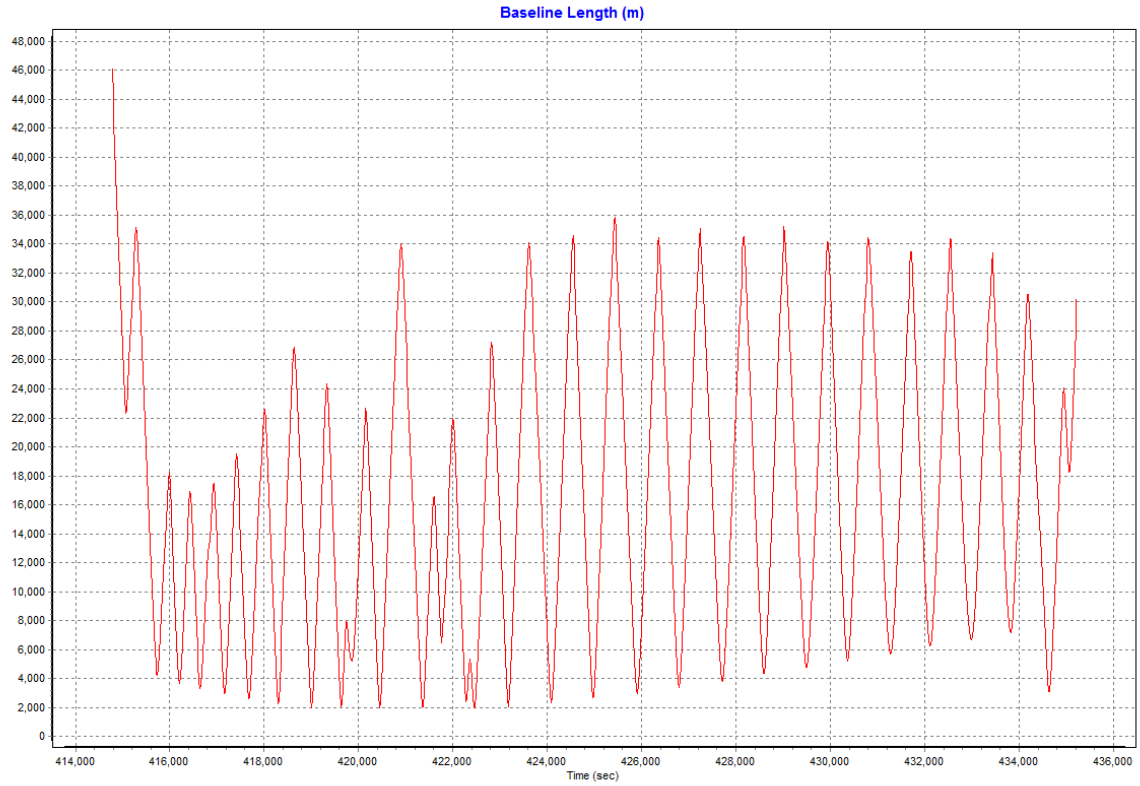
-50000
-100000
-150000
P.G.23
Real-time Reference Frame (RNAV)
NEZ_PERCE_T1
20000m
0
50000
100000


Baseline Length (m)
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42,000
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36,000
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32,000
30,000
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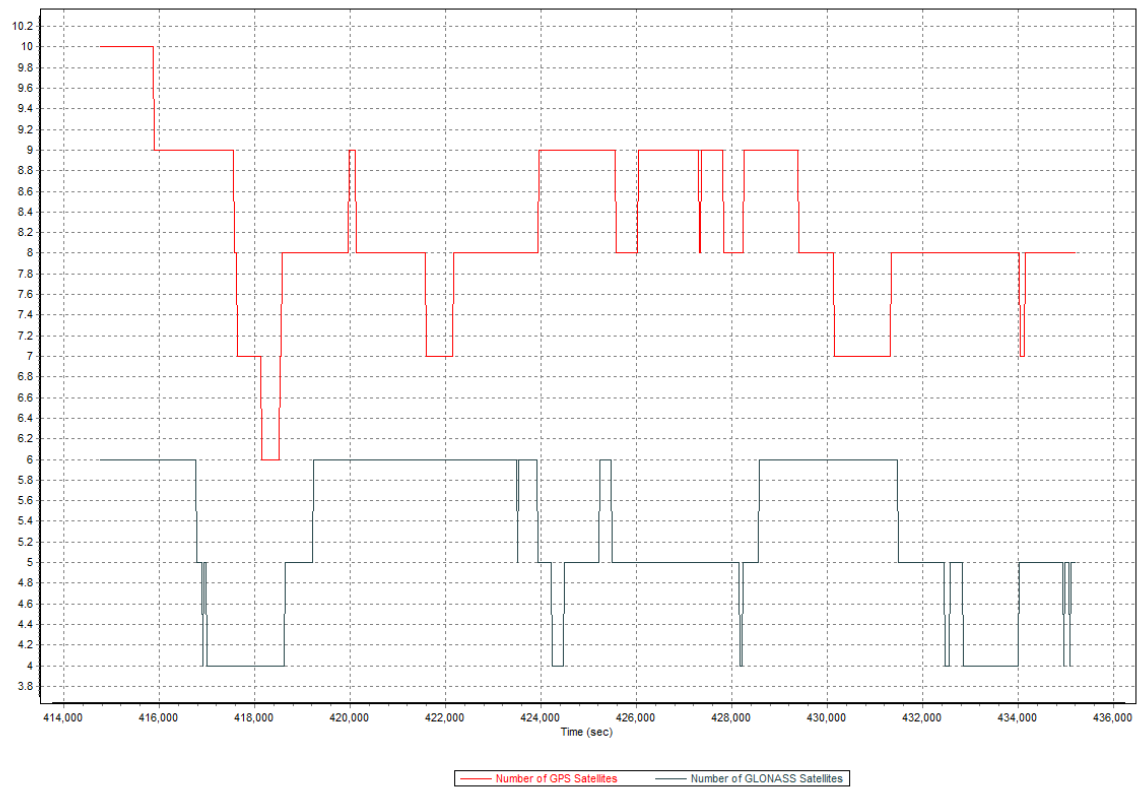
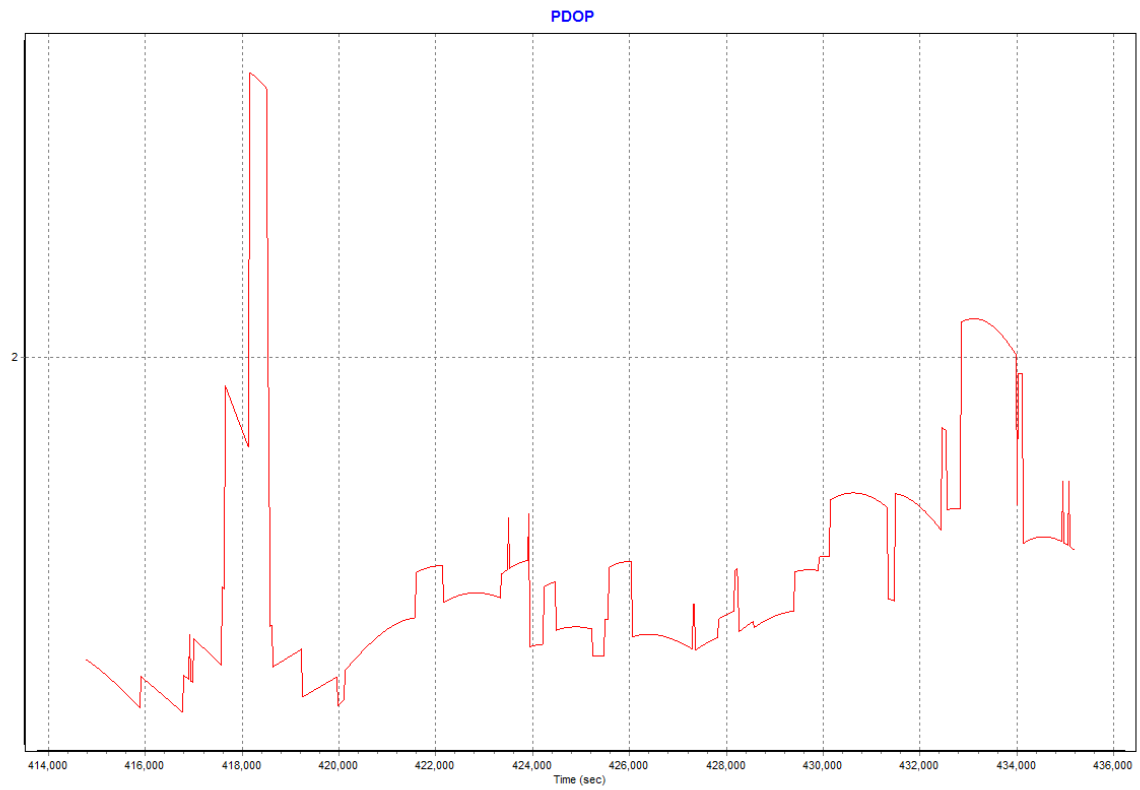
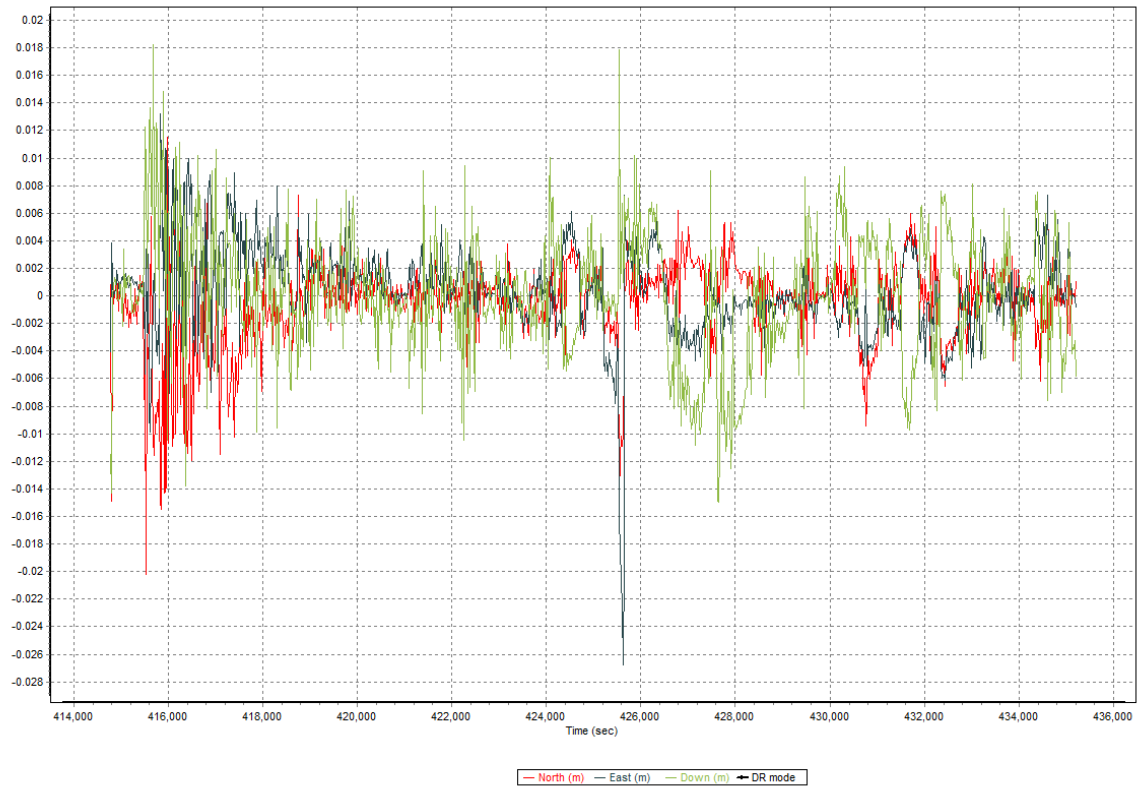
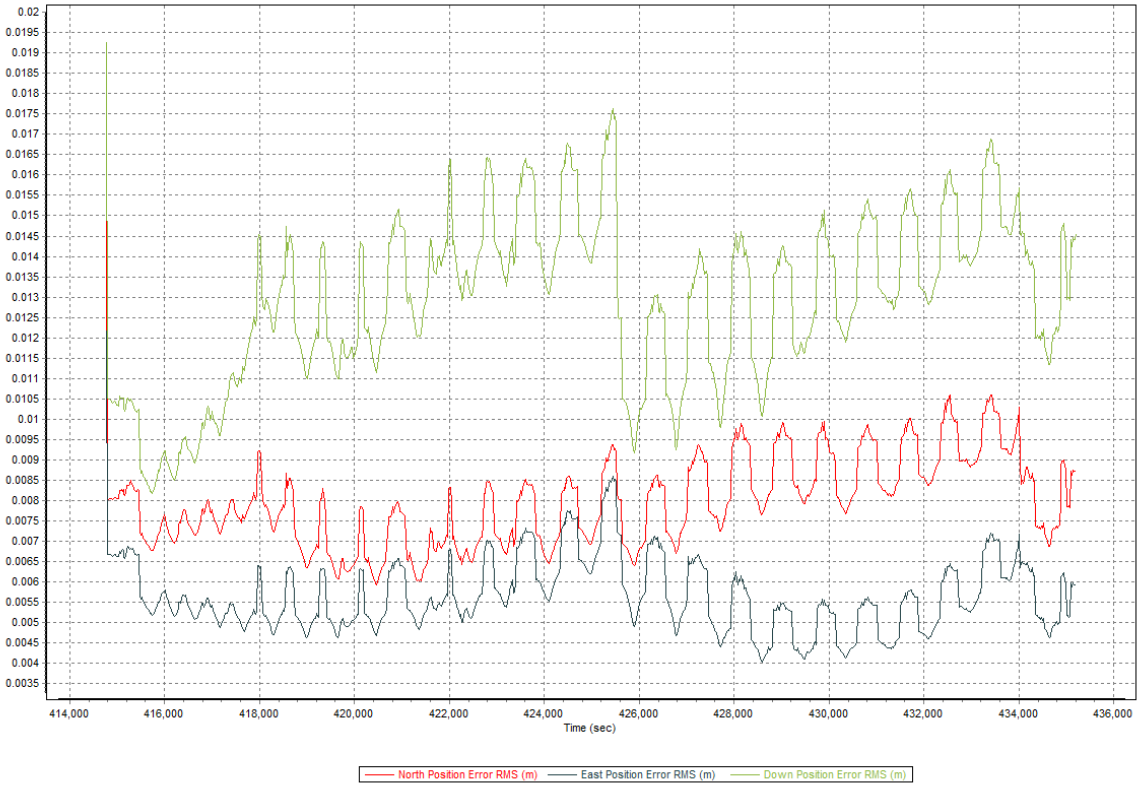
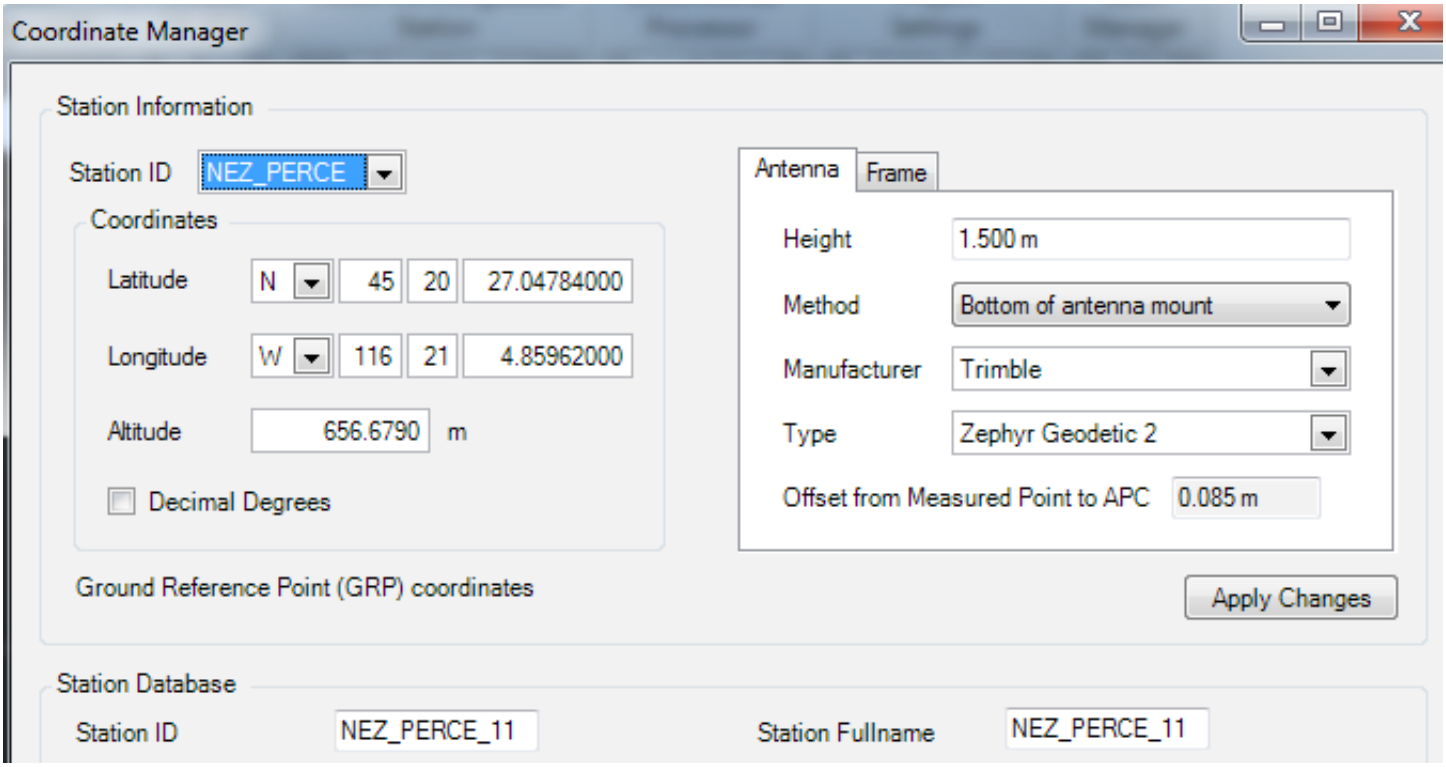
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
430,000
432,000
434,000
436,000
Time (sec)

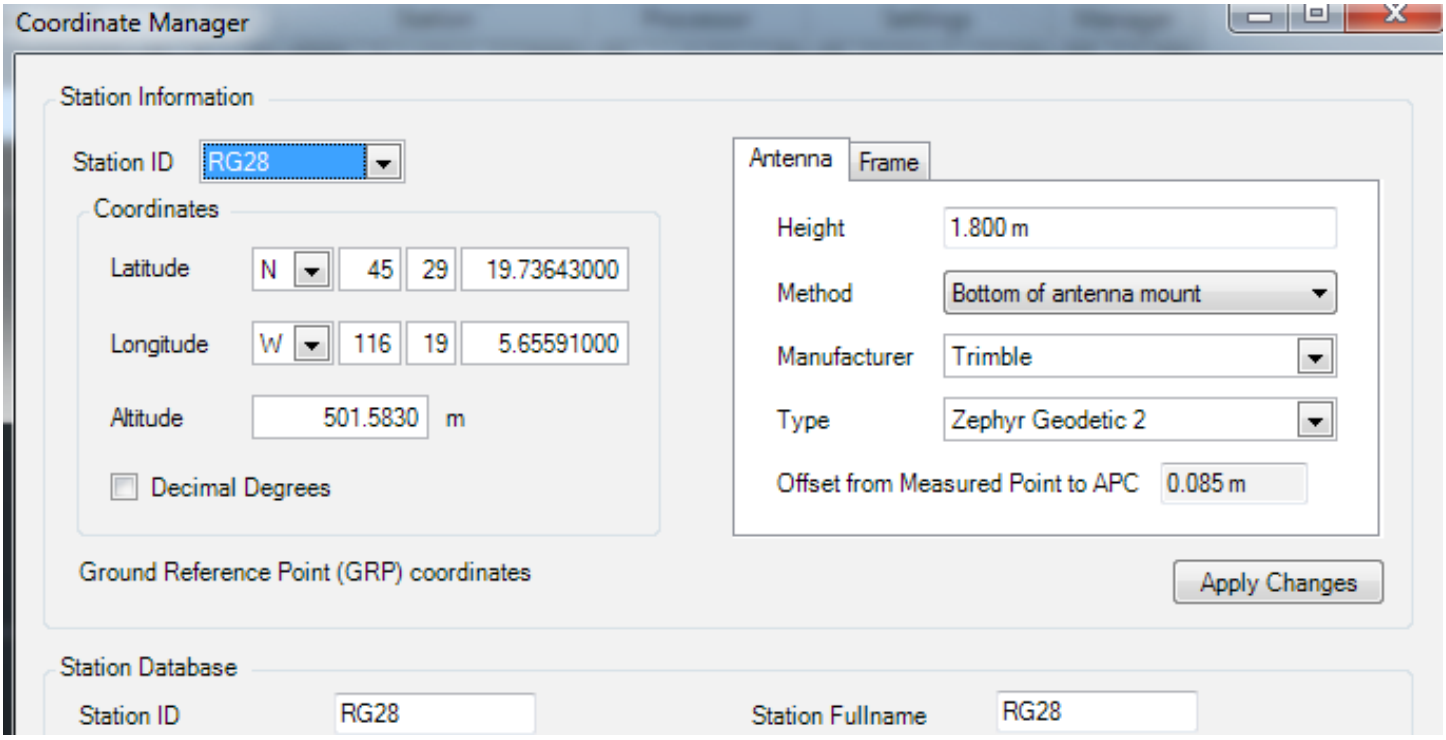

10.2
10
9.8
9.6
9.4
9.2
9
8.8
8.6
8.4
8.2
8
7.8
7.6
7.4
7.2
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
430,000
432,000
434,000
436,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
2
414,000
416,000
418,000
420,000
422,000
424,000
426,000
428,000
430,000
432,000
434,000
436,000
Time (sec)


Time (sec)
North (m)
East (m)
Down (m)
DR mode


Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
45
20
27.04784000
Longitude
W
116
21
4.85962000
Altitude
656.6790
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.500 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_11
Station Fullname
NEZ_PERCE_11


Coordinate Manager
Station Information
Station ID
RG28
Coordinates
Latitude
N
45
29
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Longitude
W
116
19
5.65591000
Altitude
501.5830
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
RG28
Station Fullname
RG28

Flight Log

Julian Day 308	Flight A

LIDAR Flight Log

Date Nov. 3rd 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective: Complete AIO 20	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes @ 1800 UTC KLWS
Wind: 040(NE) @ 3 kn/s
Temp: 12.8°C
Pressure: 1029 hPa
Clouds: clear
Visibility: 16.1 km

Aircraft Block Time		
Engine On 18:45	Ramp Out	Takeoff 18:54
Engine Off 0114	Ramp In	Landing 0110
Total 6.5 hrs	Total hrs	Total 6.3 hrs

Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	—	—
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments (Time Stamp: 161103)
TEST			8700'	191527	191643			195 - within range
444		181	8700'	192713	193048			AOI 20
445		01	8600'	193449	193819			
446		181	8600'	194221	194619			Skif of snow on hill tops @ Send.
447		01	8500'	194626	194628			- hit IP on the turn
447		01	8500'	195028	195424			
448		181	8500'	195855	200432			
449		01	8400'	200829	201351			
450		181	8400'	201919	202628			
451		01	8400'	203047		203440	13.1	Snapshot froze - restart
451		01	8400'	204610	205301			complete line 451 N end
452		181	8300'	205642		210856	6nmi	-CHANGED PILOT DISPLAY
452		181	8300'	212853	212423			S 7.5nmi from N
453		01	8300'	212825	213811			
454		181	8200'	214202	215335			

Pg 1 of 2

Julian Day 308	Flight A

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov. 3rd 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes @ 00:53 UTC
Wind: calm
Temp: 14°C
Pressure: 3025
Clouds: Clear
Visibility: 10 miles

23:24:44

Aircraft Block Time		
Engine On 1845	Ramp Out	Takeoff 1854
Engine Off 0114	Ramp In	Landing 0110
Total 6.5 **hrs**	Total **hrs**	Total 6.3 **hrs**

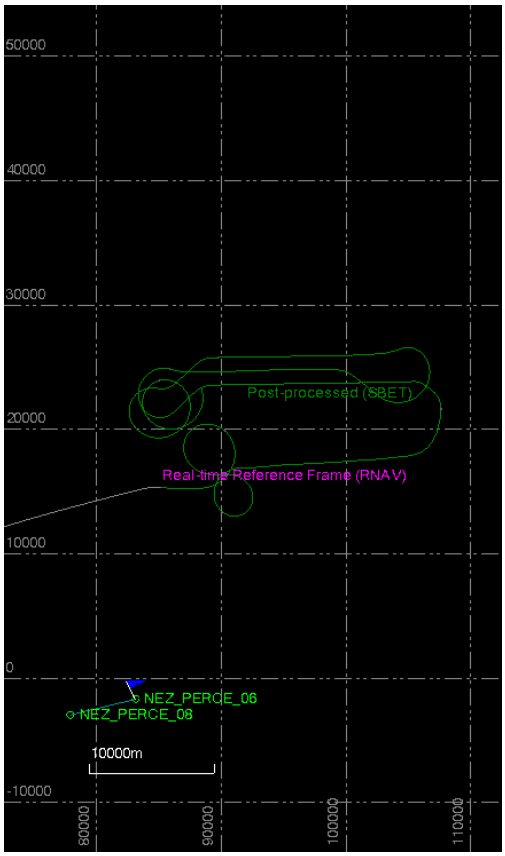
Mission Plan			
AGL Height	1900 **m**	Laser Pulse Rate	800 **Hz**
Target Speed	160 **kts**	Scan Rate	195 **Hz**
Laser Current	50 **%**	FOV	60 **Deg's**

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	—	—
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 161103
455		01	8100'	215716	220805			
456		181	8100'	211231	222447			
457		01	8100'	222742	223824			
458		181	8100'	224237	225401			
459		01	8100'	225743	230815			
460		181	8100'	231217	232349			13.3 nmi from N GAP - covered off with cross line
461		01	8100'	232720	233801			
462		181	8200'	234149	235323			
463		01	8200'	235632	000704			
464		181	8200'	001032	002155			Time stamp 161104 skiffs snow 14nmi
465		01	8200'	002505	003521			
X-TIE		270	9000'	004205	004451			covered gap from 460

Pg 2 of 2

Nov 4, 2016-A (C-FFRY, SN2221256)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40000
30000
20000
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110000
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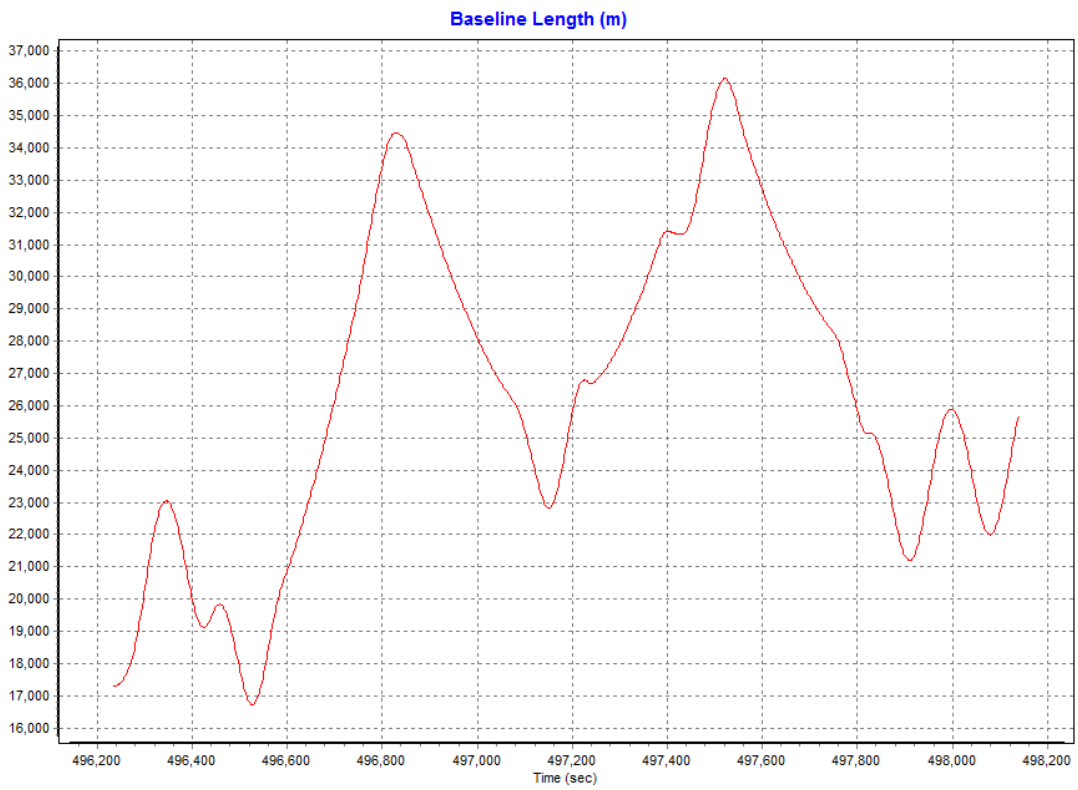
Real-time Reference Frame (RNAV)
NEZ_PERCE_06
NEZ_PERCE_08
10000m


Baseline Length (m)
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22,000
21,000
20,000
19,000
18,000
17,000
16,000
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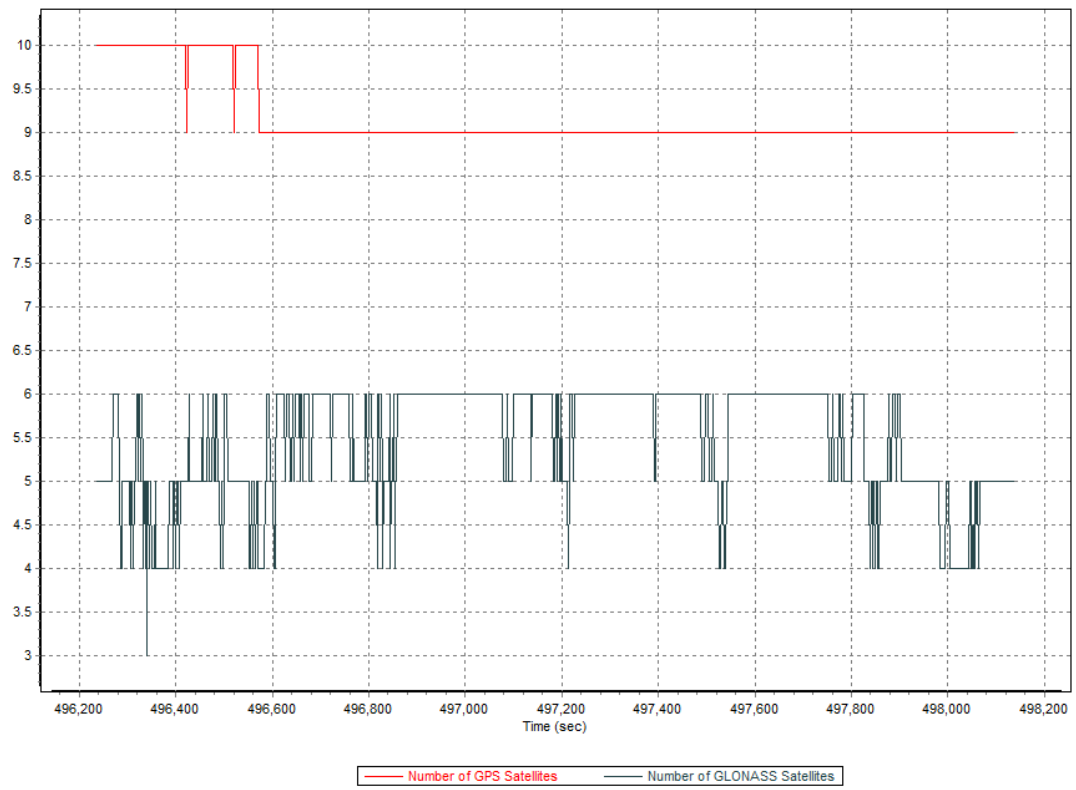
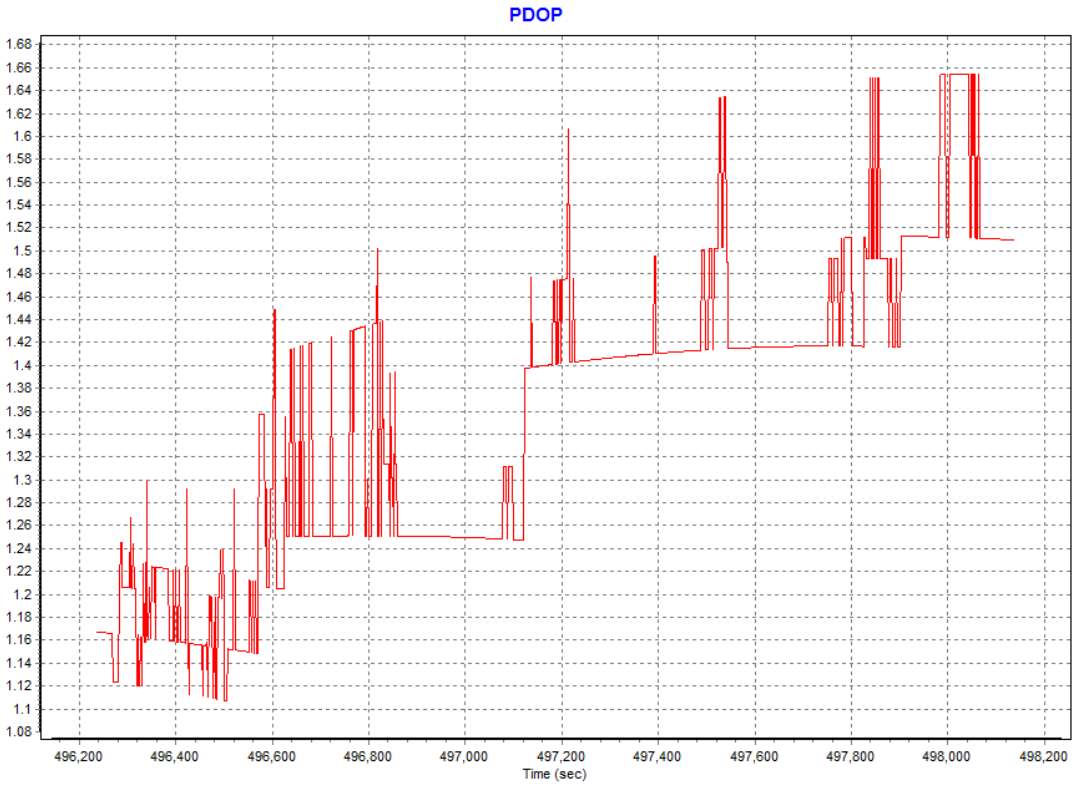
497,600
497,800
498,000
498,200
Time (sec)


10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
496,200
496,400
496,600
496,800
497,000
497,200
497,400
497,600
497,800
498,000
498,200
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.68
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1.62
1.6
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1.56
1.54
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1.5
1.48
1.46
1.44
1.42
1.4
1.38
1.36
1.34
1.32
1.3
1.28
1.26
1.24
1.22
1.2
1.18
1.16
1.14
1.12
1.1
1.08
496,200
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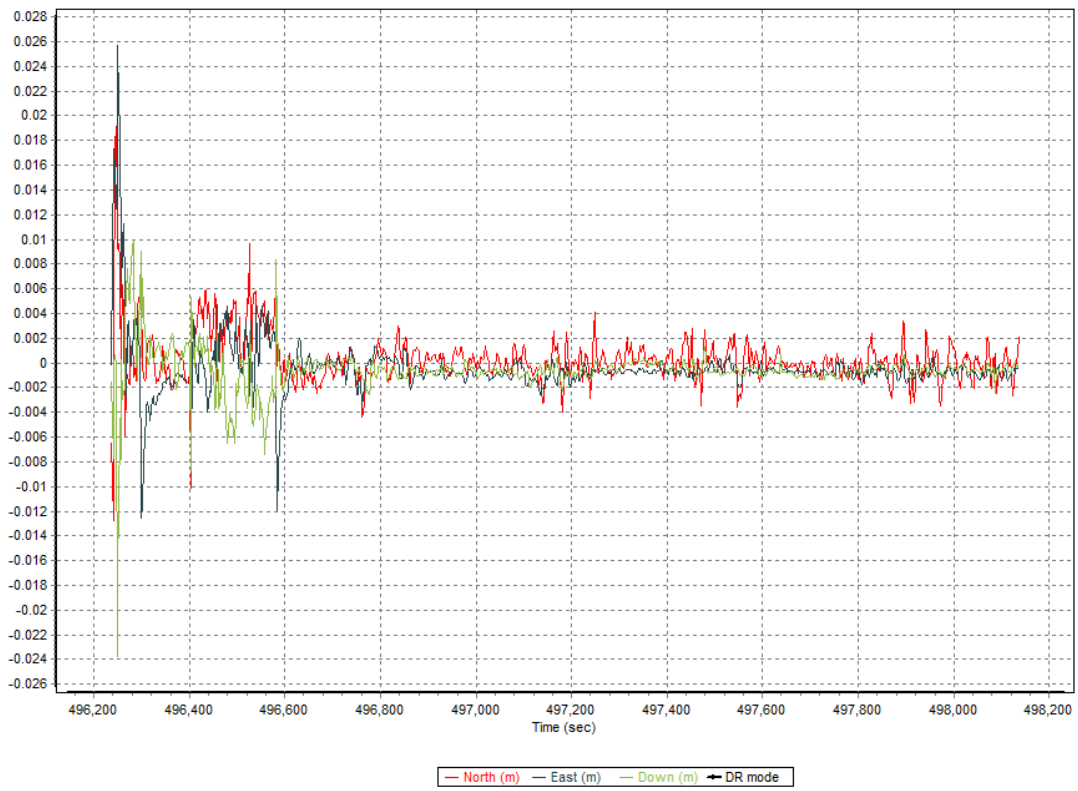
497,600
497,800
498,000
498,200
Time (sec)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0.016
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0.012
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0.008
0.006
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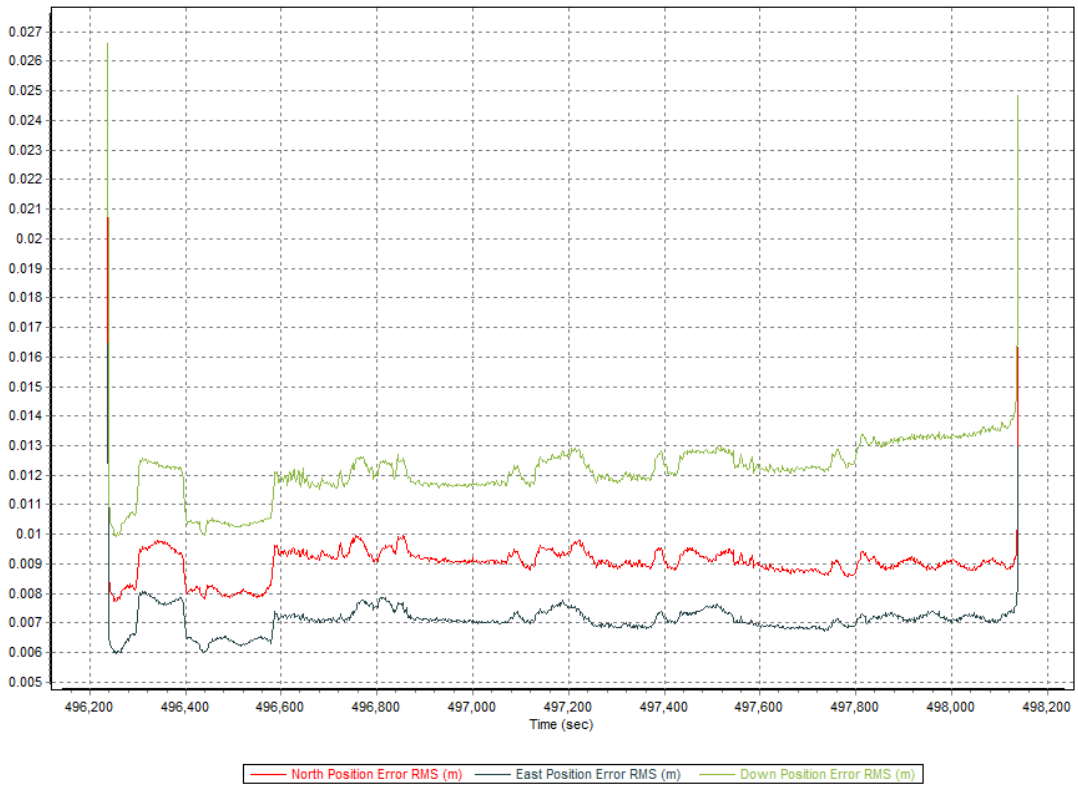
0.002
0
-0.002
-0.004
-0.006
-0.008
-0.01
-0.012
-0.014
-0.016
-0.018
-0.02
-0.022
-0.024
-0.026
496,200
496,400
496,600
496,800
497,000
497,200
497,400
497,600
497,800
498,000
498,200
Time (sec)
North (m)
East (m)
Down (m)
DR mode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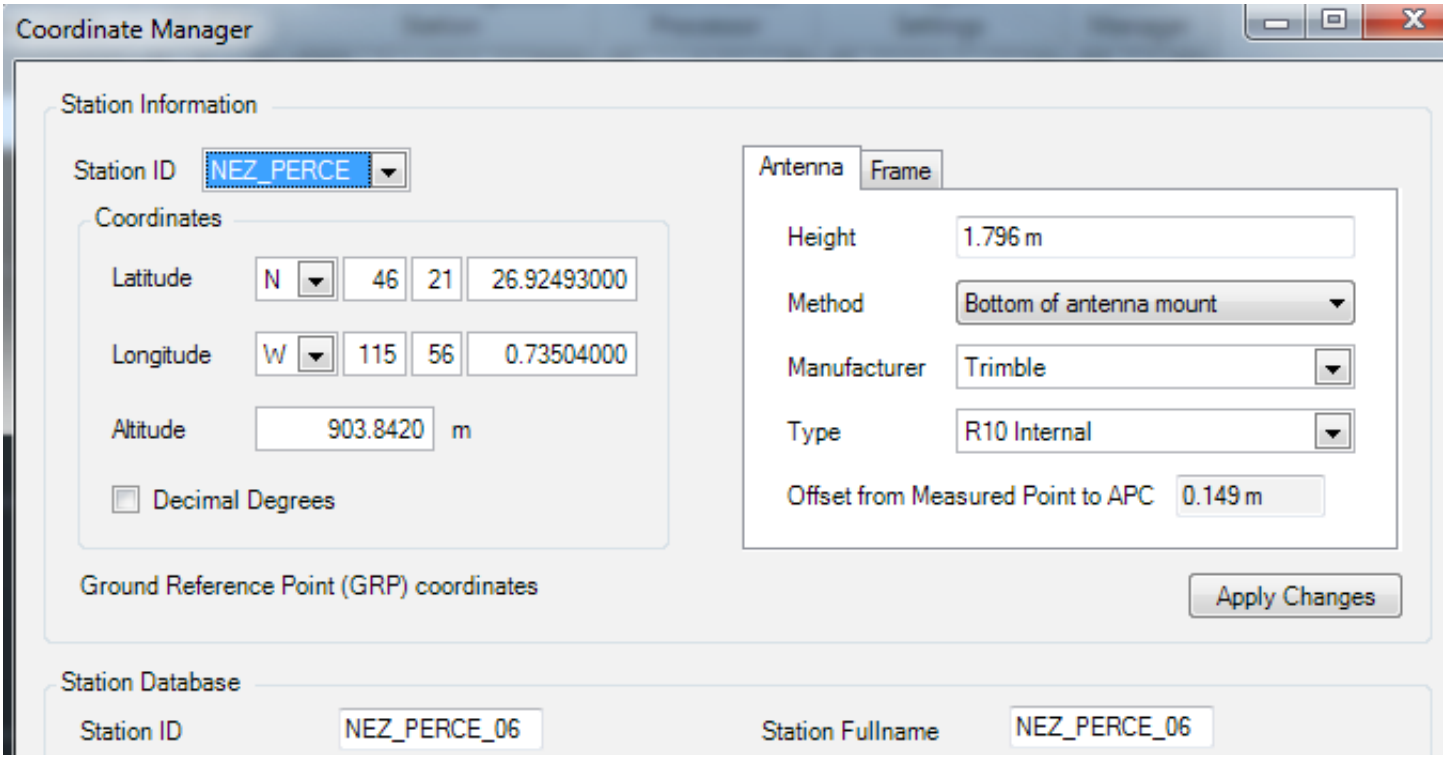
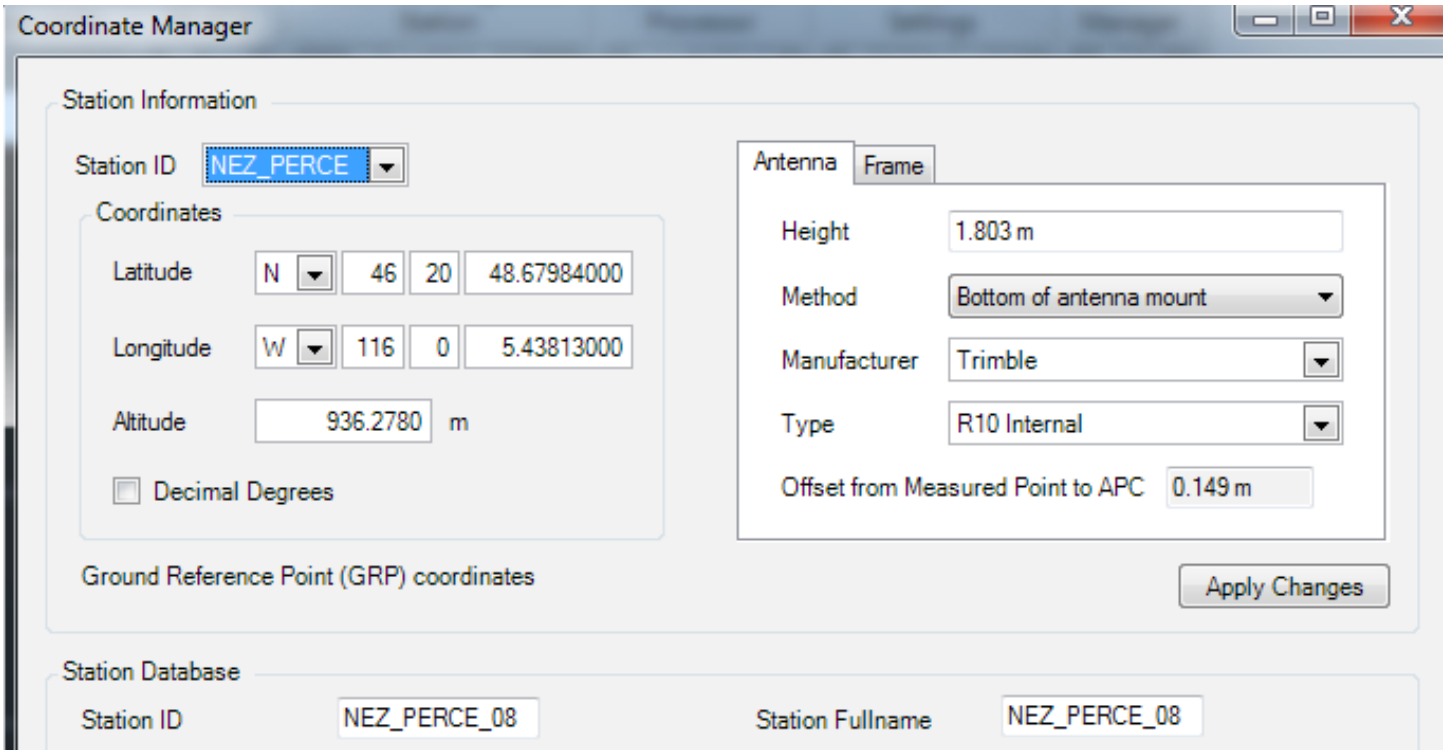
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
496,200
496,400
496,600
496,800
497,000
497,200
497,400
497,600
497,800
498,000
498,200
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
21
26.92493000
Longitude
W
115
56
0.73504000
Altitude
903.8420
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.796 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_06
Station Fullname
NEZ_PERCE_06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Longitude
W
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Altitude
936.2780
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.803 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_08
Station Fullname
NEZ_PERCE_08

Flight Log

Julian Day	Flight
309	A

LIDAR Flight Log 5416309A

AIRBORNE IMAGING
A Clean Harbors Company

Date Nov 4 2016	Aircraft PA-31 C-FFRY
Project 3119-NEZPERCE	Pilot B HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective BLOCK QL2AOI10 BLOCK QL1 AOI 04	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes @17 20
Temp 12°C
Humidity 55%
Altimeter 30 22
Terrain Height 438

Aircraft Block Time		
Engine On 17 19	Ramp Out 1728	Takeoff 17 31
Engine Off	Ramp In	Landing
Total hrs	Total hrs	Total hrs

Mission Plan			
AGL Height 2200 1900 m		Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 195	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
FIGURE 8		↷		17 50	17 58				WAKE UP IMU
270	5416309 01	269'	10,500'	18 02	18 04			161104. 180227	
269	02	89'	10400'	18 07	18 09			180755	
268	03	269'	10400'	18 13	18.15			181341	
267	04	89'							SCANNER FAILED!
X TIE	05	179							LINES 267→270 N-S
		* TRIED TO RE-INITIALIZE IN AIR - HAD TO DO A FULL SHUT DOWN.							
			WILL RE-SCAN ALL LINES SHOWN ABOVE - SEE 5416309C						

Pg 1 of 1

Julian Day 309	Flight C

LIDAR Flight Log 5416309C

AIRBORNE IMAGING
A Clean Harbors Company

Date Nov 4 2016	Aircraft PA-31 C-FFRY
Project 3119 - NEZ PERCE	Pilot B. HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective BLOCK QL2 AOI 10 BLOCK QL1 AOI 04	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes @ 17 20
Temp 12°C
Humidity 55%
Altimeter 30.22
Terrain Height 438

Aircraft Block Time		
Engine On 17 19	Ramp Out 17 28	Takeoff 17 31
Engine Off 23 31	Ramp In 23 27	Landing 23 26
Total 6 2 hrs	Total hrs	Total 5 9 hrs

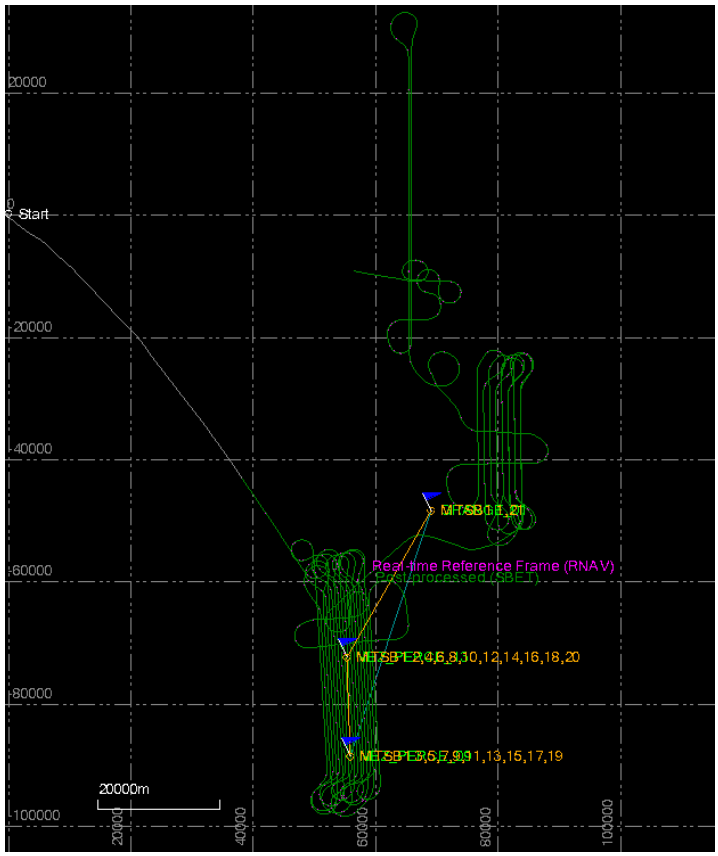
Mission Plan			
AGL Height 1900 (2200) m		Pulse Rate 800 KHz	
Target Speed 160 kts		Scan Rate 195 Hz	
Laser Current 50 %		FOV 60 Deg's	

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	IN FLIGHT	RE-START
Post Mission	18 34	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		18 38	18 45				WAKE UP IMU
270	5416309 01	89'	10500'	18 46	18 48			161104_184635	BLOCK QL2 AOI 10
269	02	269'	10400'	18:52	18:54			185233	
268	03	89'	10400'	18:57	18:59			185753	
267	04	269'	10400'	19:04	19:05			190407	
XTIE 1	05	179	10400	19:10	19:12			191032	XTIE LN'S 267-270 N S
XTIE 2	06	90	10400	19:16	19:17			191650	LINES 339-341 W→E
341	07	180	10400	19:22	19:24			192245	BLOCK QL1 AOI 04
340	08	0	10300	19 29	19:30			192911	
339	09	180	10200	19:34	19 37			193455	
XTIE 3	10	90	7800'	19:42	19:44			194255	LINES 325-338 W→E
338	11	0	7800'	19:53	20:03			195333	
337	5416309 12	180	7800'	20:07	20:19			200737	

Pg 1 of 2

Nov 4, 2016-A (N-44RL, SN2220764)


Start
Real-time Reference Frame (RNAV)
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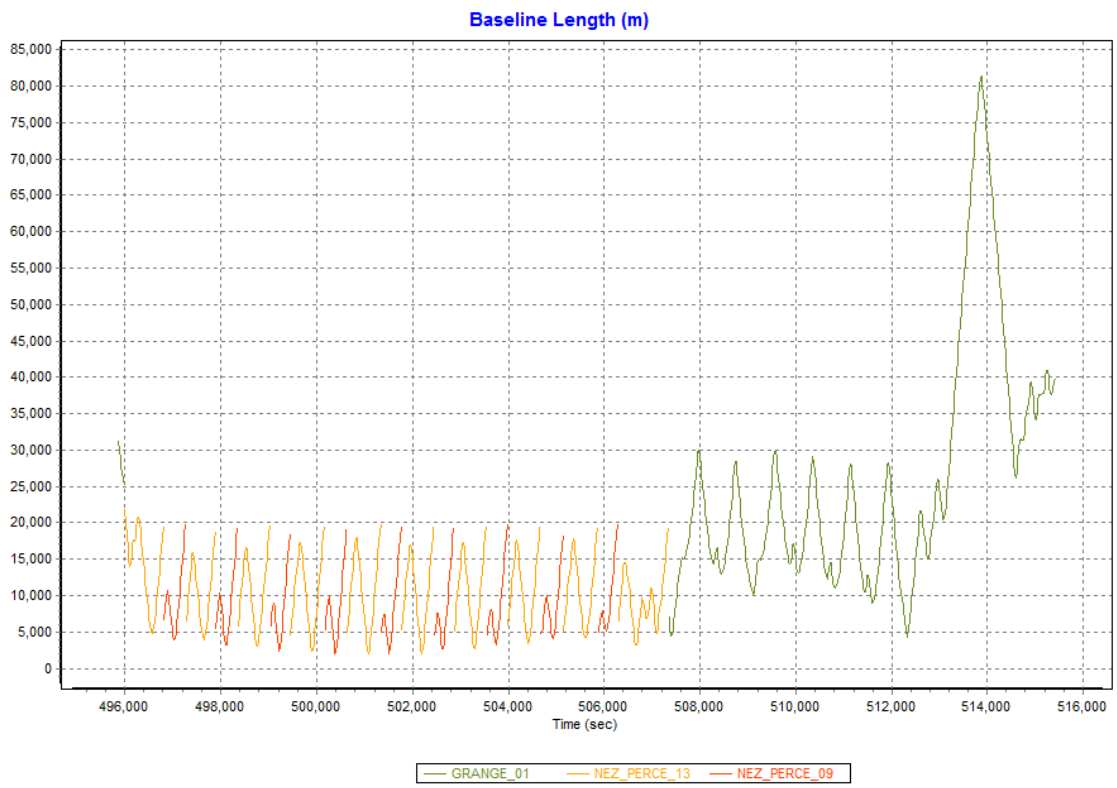
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Time (sec)
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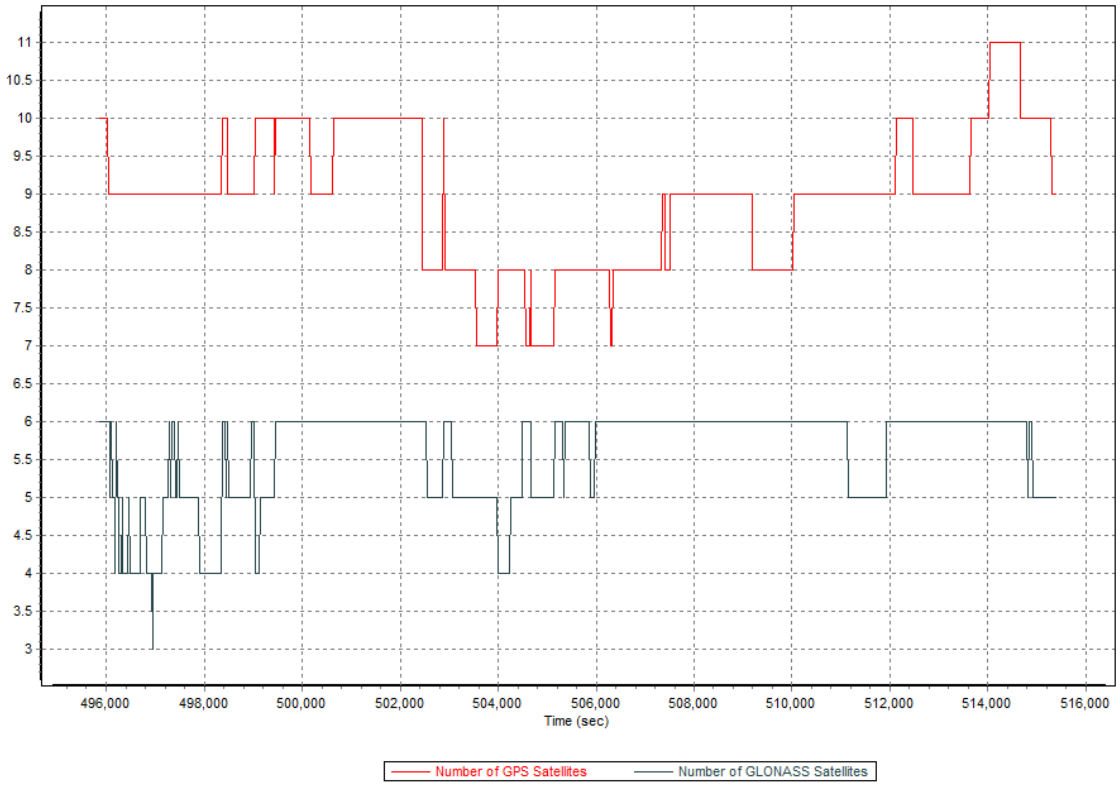
NEZ_PERCE_13
NEZ_PERCE_09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5.5
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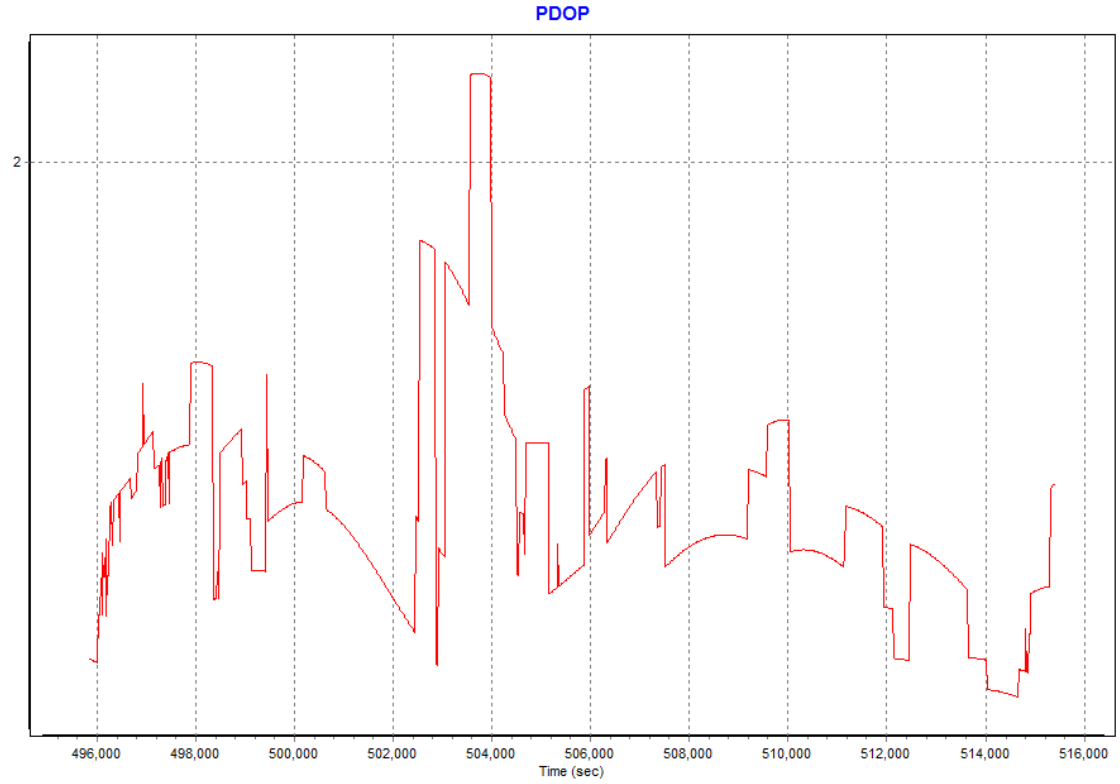
3
496,000
498,000
500,000
502,000
504,000
506,000
508,000
510,000
512,000
514,000
516,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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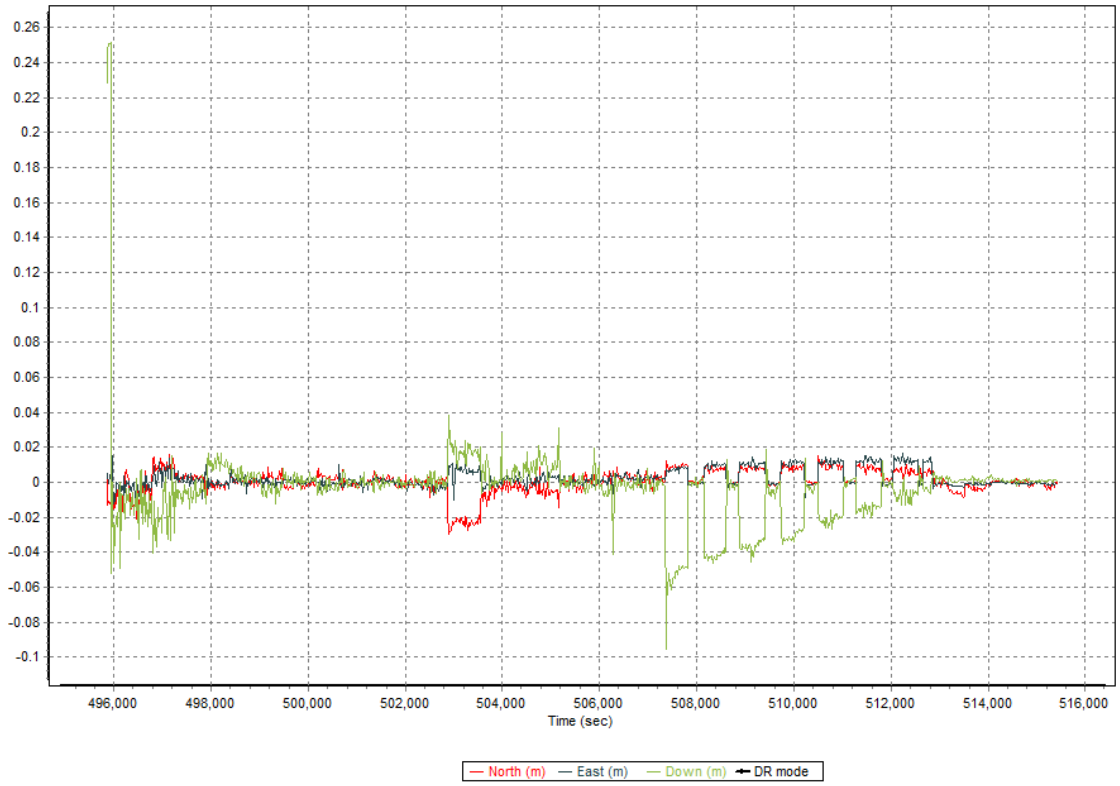
508,000
510,000
512,000
514,000
516,000
Time (sec)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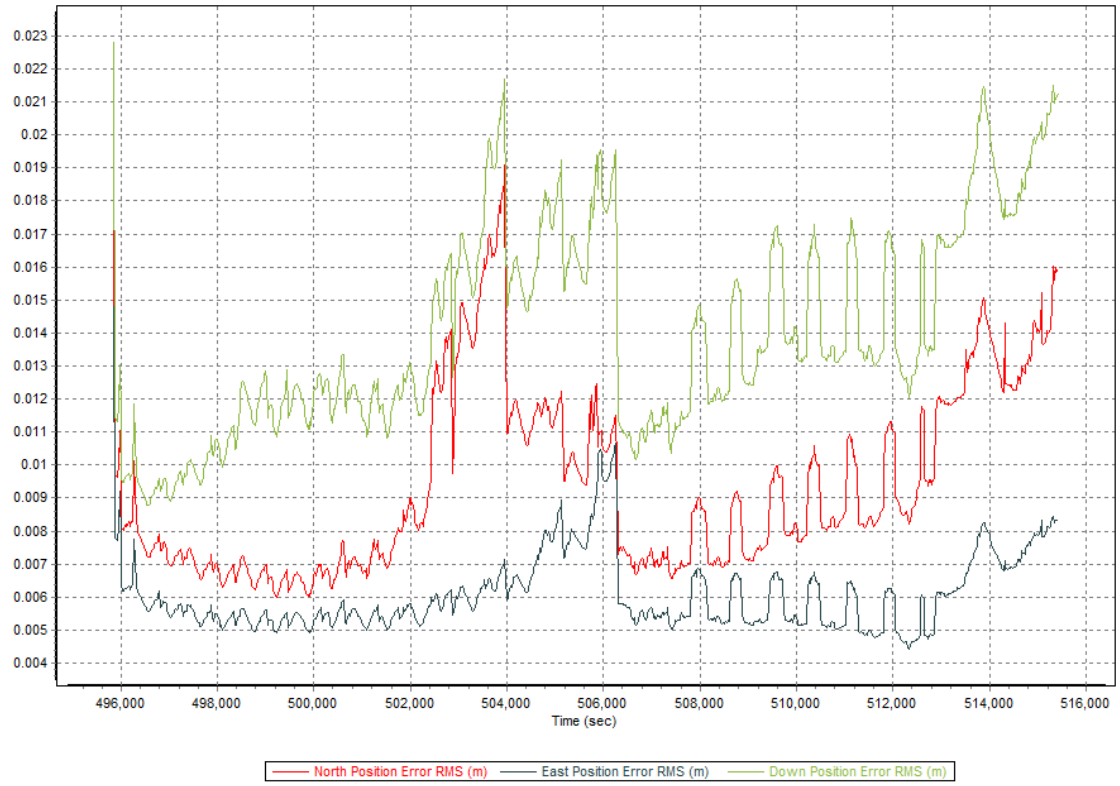
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
-0.08
-0.1
496,000
498,000
500,000
502,000
504,000
506,000
508,000
510,000
512,000
514,000
516,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.009
0.008
0.007
0.006
0.005
0.004
496,000
498,000
500,000
502,000
504,000
506,000
508,000
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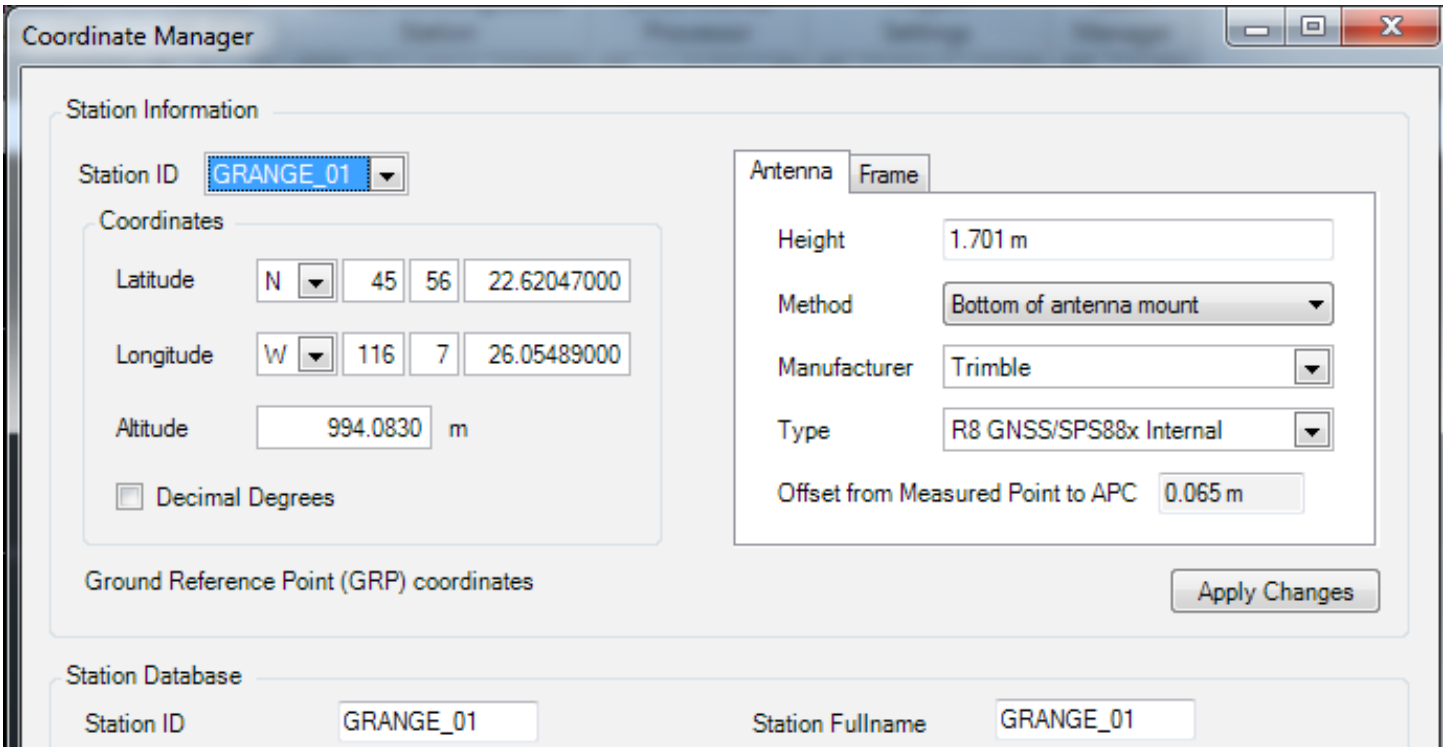
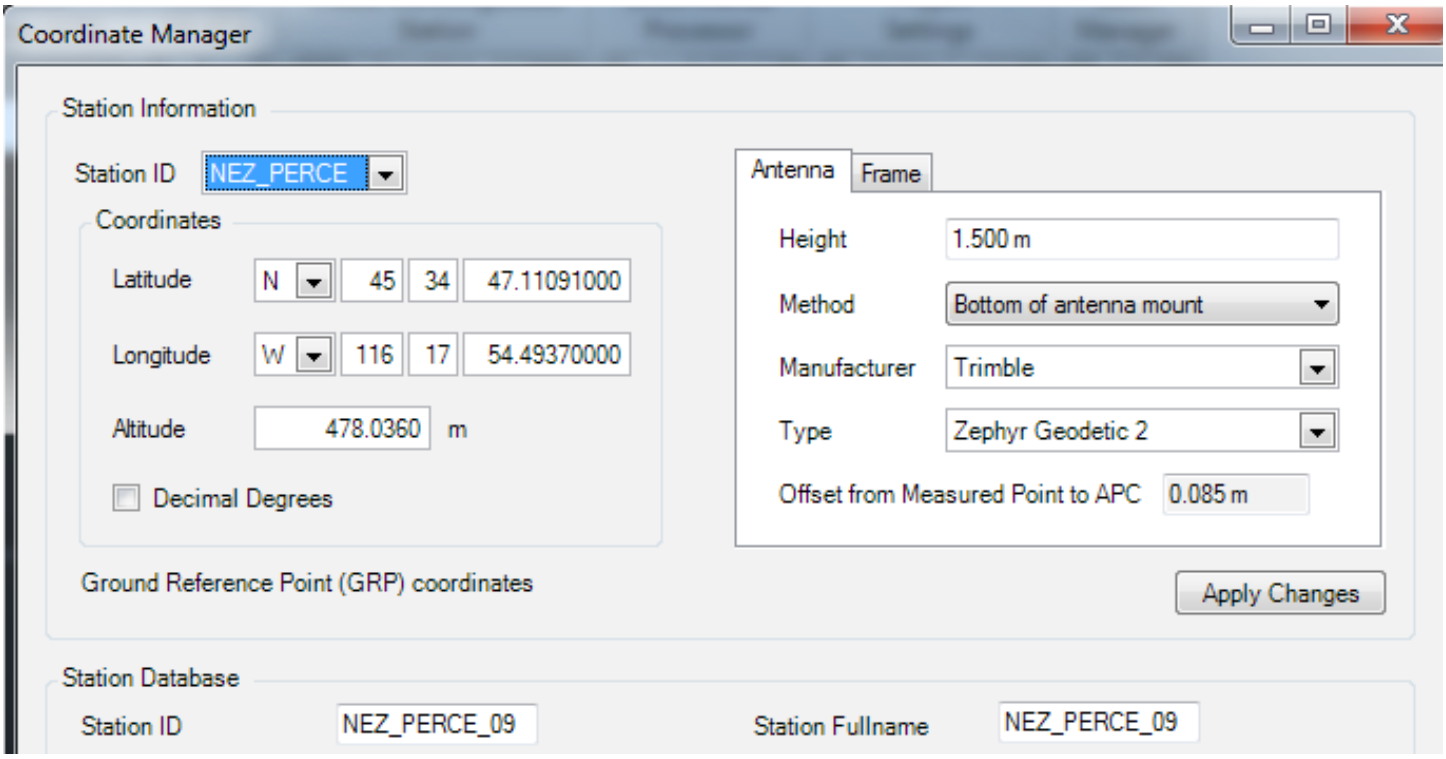
512,000
514,000
516,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
GRANGE_01
Coordinates
Latitude
N
45
56
22.62047000
Longitude
W
116
7
26.05489000
Altitude
994.0830
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.701 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R8 GNSS/SPS88x Internal
Offset from Measured Point to APC
0.065 m
Apply Changes
Station Database
Station ID
GRANGE_01
Station Fullname
GRANGE_01


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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47.11091000
Longitude
W
116
17
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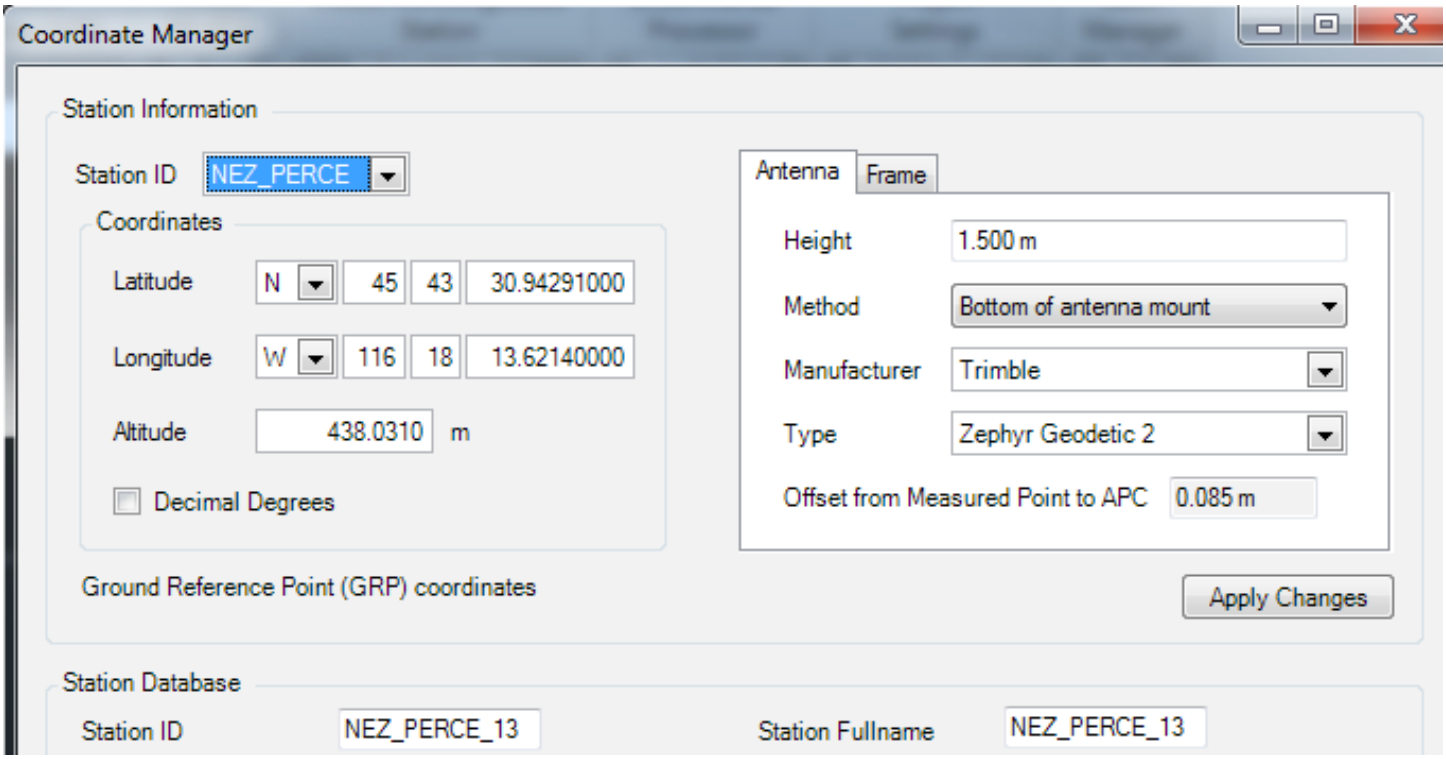
Altitude
478.0360
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.500 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_09
Station Fullname
NEZ_PERCE_09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Coordinates
Latitude
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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.500 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_13
Station Fullname
NEZ_PERCE_13

Flight Log

Julian Day 309	Flight A

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov. 4th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective Block 19, 14 and start on 13.	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes 1700 UTC @ KLWS
Wind: 070 (ENE) @ 8 kts
Temp: 11°C
Pressure: 1023
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1718	Ramp Out	Takeoff 1730
Engine Off 2328	Ramp In	Landing 2324
Total 6.2 hrs	Total hrs	Total 5.9 hrs

Mission Plan	
AGL Height 1900/2200 m	Laser Pulse Rate 800 Hz
Target Speed 160 kts	Scan Rate 195/182 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	—	—
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 161104
TEST				173857	173934			AOI 19
426		177	8700'	175509	175940			
427		357	8400'	180320	180823			
—				180839	180849			- hit IP
428		177	8200'	181211	181748			
429		357	8000'	182126	182651			
430		177	7900'	183022	183633			
431		357	7900'	183954	184536			
432		177	7900'	184927	185534			
433		357	7900'	185922	190507			
434		177	7900'	190906	191508			
435		357	7900'	191811	192401			
436		177	7900'	192743	193346			
437		357	8000'	193644	194223			
438		177	8000'	194602	195157			

Pg 1 of 3

Julian Day 309	Flight A

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov. 4th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1718	Ramp Out	Takeoff 1730
Engine Off 2328	Ramp In	Landing 2324
Total 6.2 hrs	Total hrs	Total 5.9 hrs

Mission Plan	
AGL Height 1900/2200m	Laser Pulse Rate 800 Hz
Target Speed 160 kts	Scan Rate 195/182 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	—	—
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161104
439		357	8000'	195519	200054			AOI 19
440		177	8100'	200450	201039			
441		357	8100'	201511	202027			
442		177	8200'	202444	203035			
443		357	8200'	203354	203912			
XTIE		250	8200'	204253	204540			AOI 19
349		179	8600'	210124	210436			AOI 14
348		359	8600'	210809	211115			@ wrong param.
347		179	8500'	211439	211739			
346		359	8500'	212047	212349			
349		179	8600'	212815	213116			@ 2200m param.
348		359	8600'	213445	213754			
347		179	8500'	214119	214419			
346		359	8500'	214746	215049			
345		179	8500'	215421	215727			

Pg 2 of 3

Julian Day 309	Flight A

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov. 4th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1718	Ramp Out	Takeoff 1730
Engine Off 2328	Ramp In	Landing 2324
Total 6.2 **hrs**	Total **hrs**	Total 5.9 **hrs**

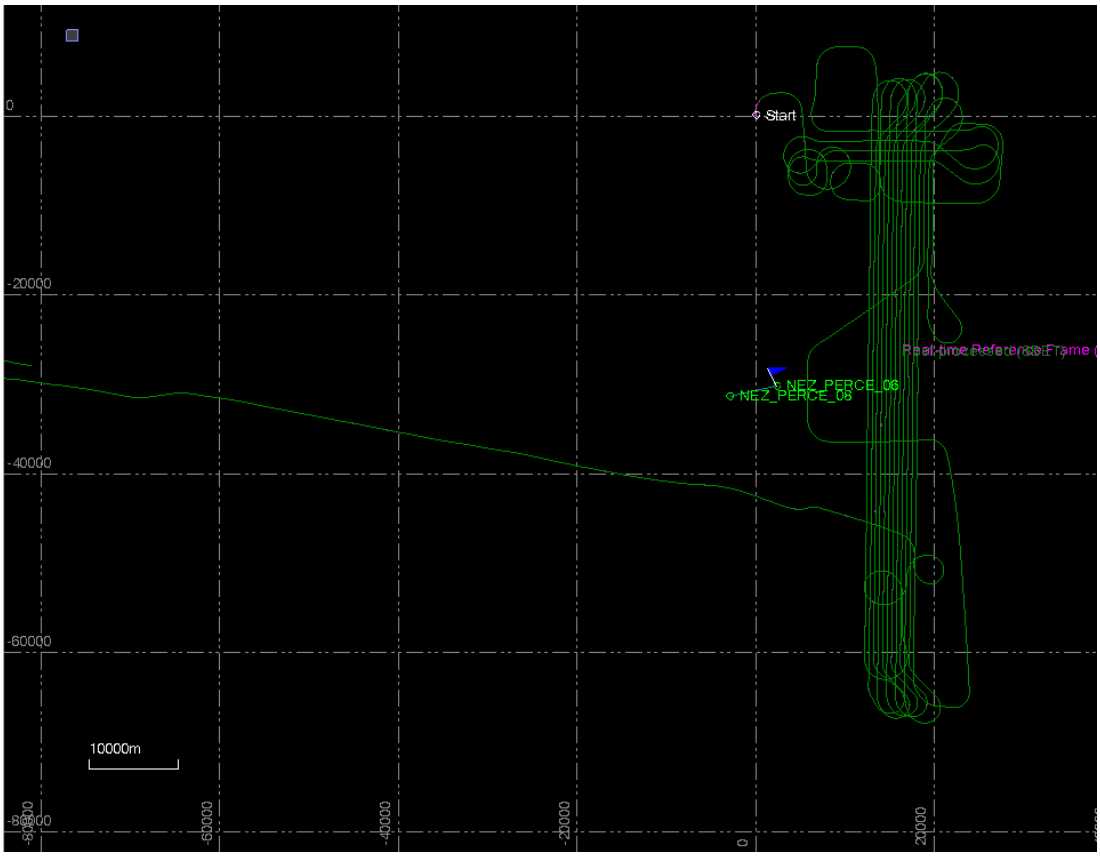
Mission Plan	
AGL Height 1900/2200 **m**	Laser Pulse Rate 800 **Hz**
Target Speed 160 **kts**	Scan Rate 195/182 **Hz**
Laser Current 50 **%**	FOV 60 **Deg's**

Static Alignment	GPS Time	
	Start	End
Pre Mission	—	—
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161104
344		359	8500'	220053	220353			AOI 14
343		179	8600'	220719	221021			
342		359	8600'	221414	221717			
XTIE		90	8600'	222015	222227			AOI 14 - complete block
271		0	7600'	223328	224226			AOI 13 @ 1900m
272		180	7600'	224632	225559			
XTIE		90	7600'	225803	225851			XTIE AOI 13 271-272

Pg 3 of 3

Nov 4, 2016-C (C-FFRY, SN2221256)


Start
NEZ_PERCE_06
NEZ_PERCE_08
10000m
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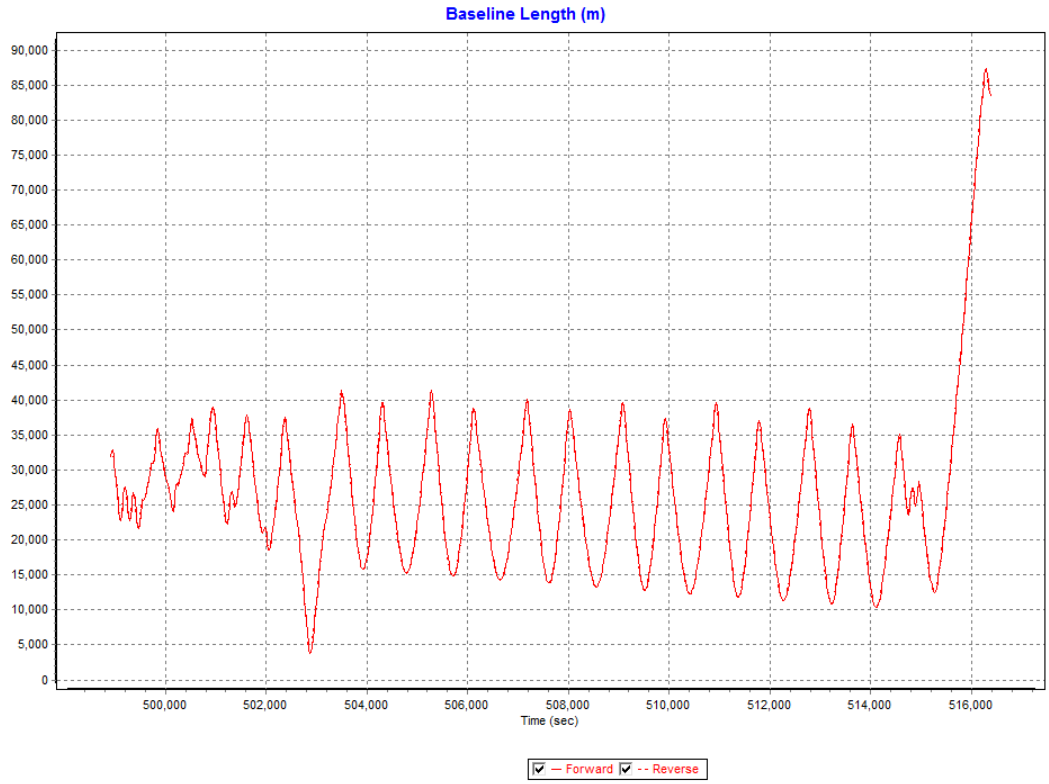
-40000
-60000
-80000
-60000
-40000
-20000
0
20000


Baseline Length (m)
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60,000
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50,000
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35,000
30,000
25,000
20,000
15,000
10,000
5,000
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504,000
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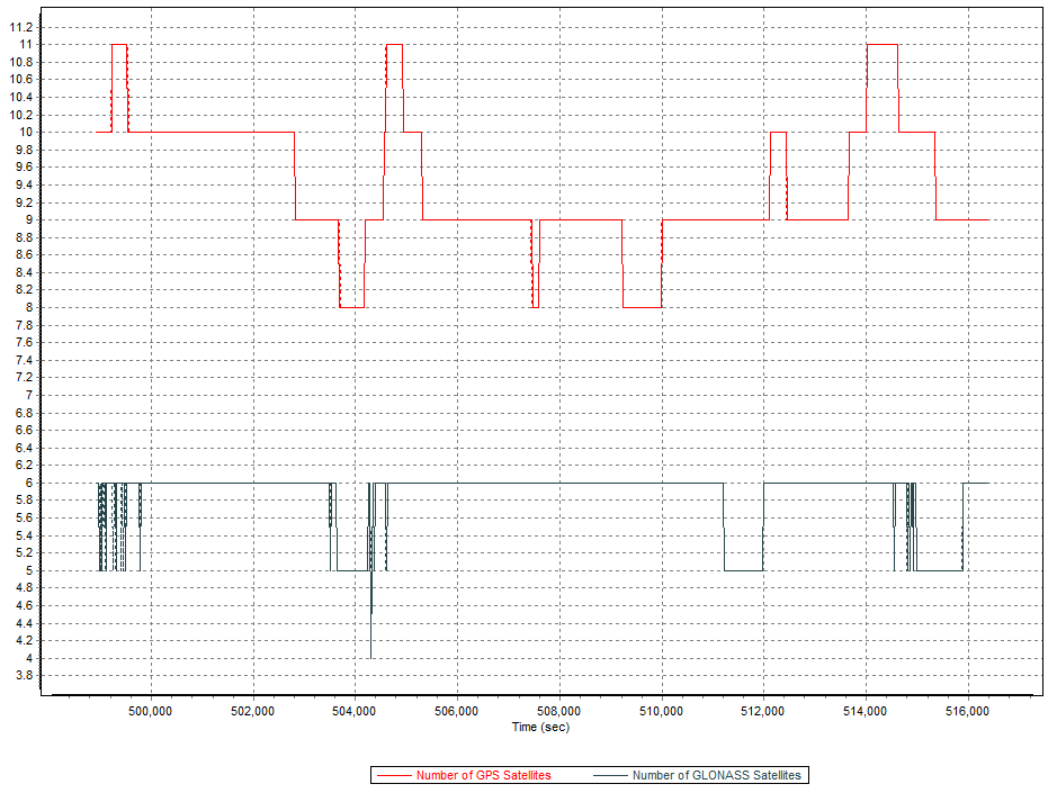
514,000
516,000
Time (sec)
Forward
Reverse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10
9.8
9.6
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8.8
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7.6
7.4
7.2
7
6.8
6.6
6.4
6.2
6
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5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
3.8
500,000
502,000
504,000
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510,000
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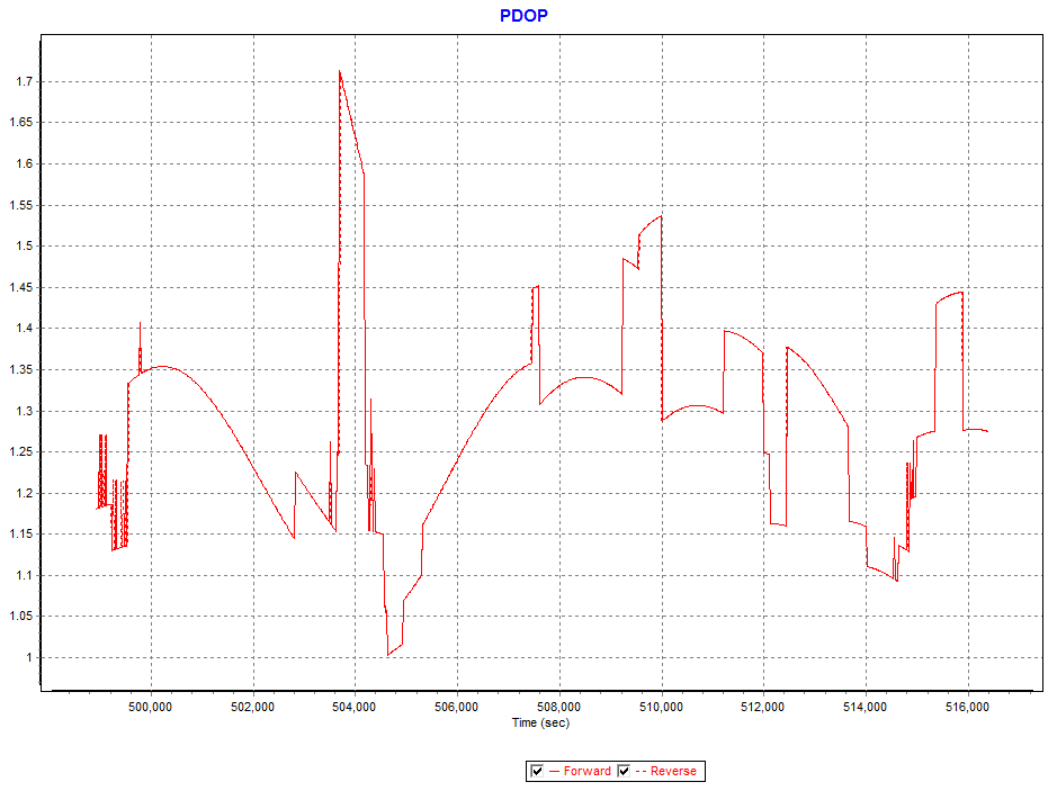
516,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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1.05
1
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506,000
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510,000
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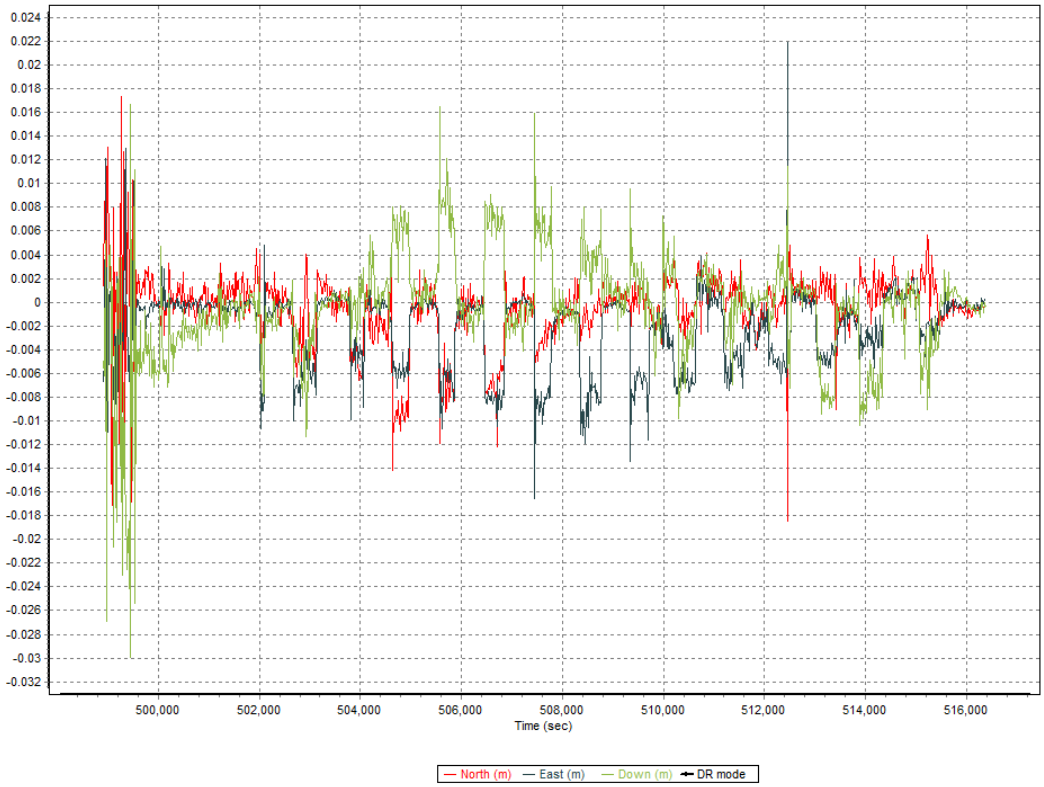
514,000
516,000
Time (sec)
Forward
Reverse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-0.032
500,000
502,000
504,000
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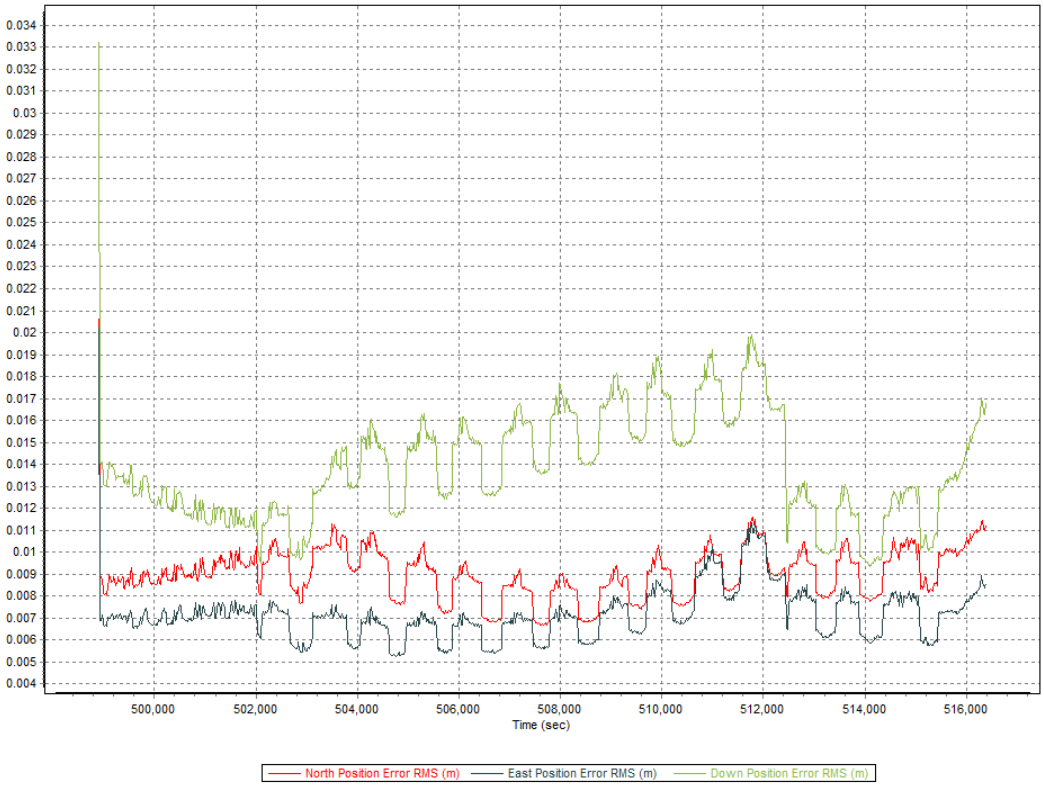
512,000
514,000
516,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.006
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0.004
500,000
502,000
504,000
506,000
508,000
510,000
512,000
514,000
516,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)

Flight Log

Julian Day	Flight
309	C

LIDAR Flight Log 5416309C

AIRBORNE IMAGING
A Clean Harbors Company

Date	Nov 4 2016	Aircraft	PA-31 C-FFRY
Project	3119 - NEZ PERCE	Pilot	B. HARRITY
Location	LEWISTON	Operator	B. Whiteley
Mission Objective	BLOCK QL2 AOI 10 BLOCK QL1 AOI 04		

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes @ 17 20
Temp 12°C
Humidity 55%
Altimeter 30.22
Terrain Height 438

Aircraft Block Time		
Engine On 17 19	Ramp Out 17 28	Takeoff 17 31
Engine Off 23 31	Ramp In 23 27	Landing 23 26
Total 6 2 hrs	Total hrs	Total 5 9 hrs

Mission Plan			
AGL Height 1900 (2200) m		Pulse Rate 800 KHz	
Target Speed 160 kts		Scan Rate 195 Hz	
Laser Current 50 %		FOV 60 Deg's	

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	IN FLIGHT	RE-START
Post Mission	18 34	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		18 38	18 45				WAKE UP IMU
270	5416309 01	89'	10500'	18 46	18 48			161104_184635	BLOCK QL2 AOI 10
269	02	269'	10400'	18:52	18:54			185233	
268	03	89'	10400'	18:57	18:59			185753	
267	04	269'	10400'	19:04	19:05			190407	
XTIE 1	05	179	10400	19:10	19:12			191032	XTIE LN'S 267-279 N S
XTIE 2	06	90	10400	19:16	19:17			191650	LINES 339-341 W→E
341	07	180	10400	19:22	19:24			192245	BLOCK QL1 AOI 04
340	08	0	10300	19 29	19:30			192911	
339	09	180	10200	19:34	19 37			193455	
XTIE 3	10	90	7800'	19:42	19:44			194255	LINES 325-338 W→E
338	11	0	7800'	19:53	20:03			195333	
337	5416309 12	180	7800'	20:07	20:19			200737	

Pg 1 of 2

Julian Day 309	Flight C

LIDAR Flight Log 5416309C

AIRBORNE IMAGING
A Clean Harbors Company

Date Nov 4 2016	Aircraft PA-31 C-FFRY
Project 3119_ NEZPERCE	Pilot B. HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL1 AOI 04	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes @ 23:10
Temp 18
Humidity
Altimeter 30.13
Terrain Height 438

Aircraft Block Time		
Engine On 17:19	Ramp Out 17:28	Takeoff 17:31
Engine Off 23:31	Ramp In 23:27	Landing 23:26
Total 6.2 hrs	Total hrs	Total 5.9 hrs

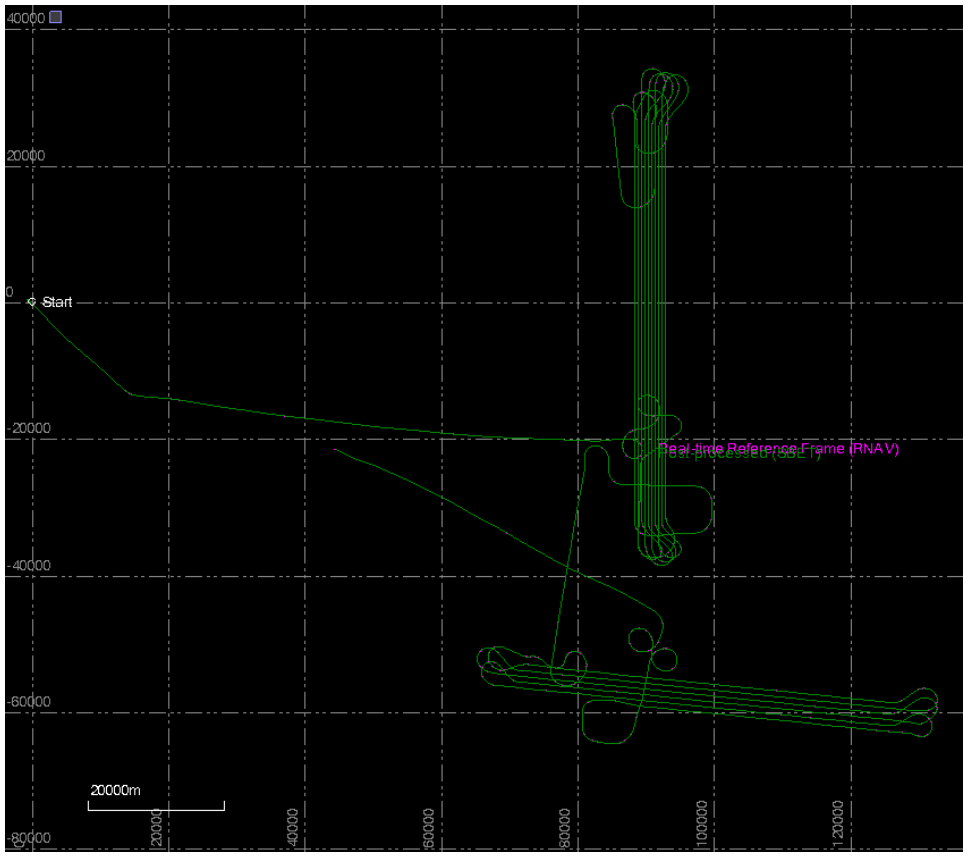
Mission Plan			
AGL Height 1900	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 195	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	IN FLIGHT	RE-START
Post Mission	18:34	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
336	5416 309 13	0	7800'	20:23	20:33			161104_202308	AOI 04
335	14	180	7900'	20:38	20:51			203803	
334	15	0	7900'	20:54	21:05			205439	
333	16	180	7900'	21:09	21:22			210949	
332	17	0	7900	21:26	21:36			212619	
331	18	180	7900'	21:40	21:53			214056	
330	19	0	7800'	21:57	22:07			215717	
329	20	180	7800'	22:12	22:24			221201	LOTS OF SMOKE IN AREA
328	21	0	7800'	22:28	22:38			222802	" "
327	5416309 22	180	7800'	22:42	22:55			224245	" "
FIGURE 8		↷		22:58	23:04				CLOSE OFF SURVEY

Pg 2 of 2

Nov 5, 2016-A (C-FFRY, SN2221256)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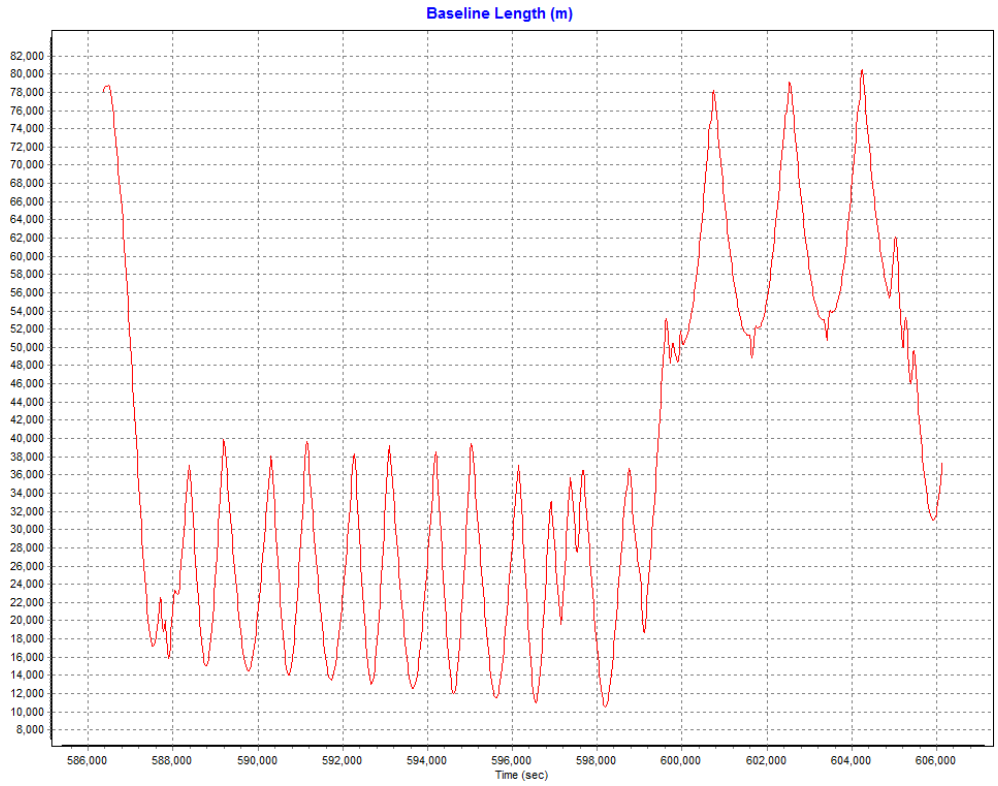
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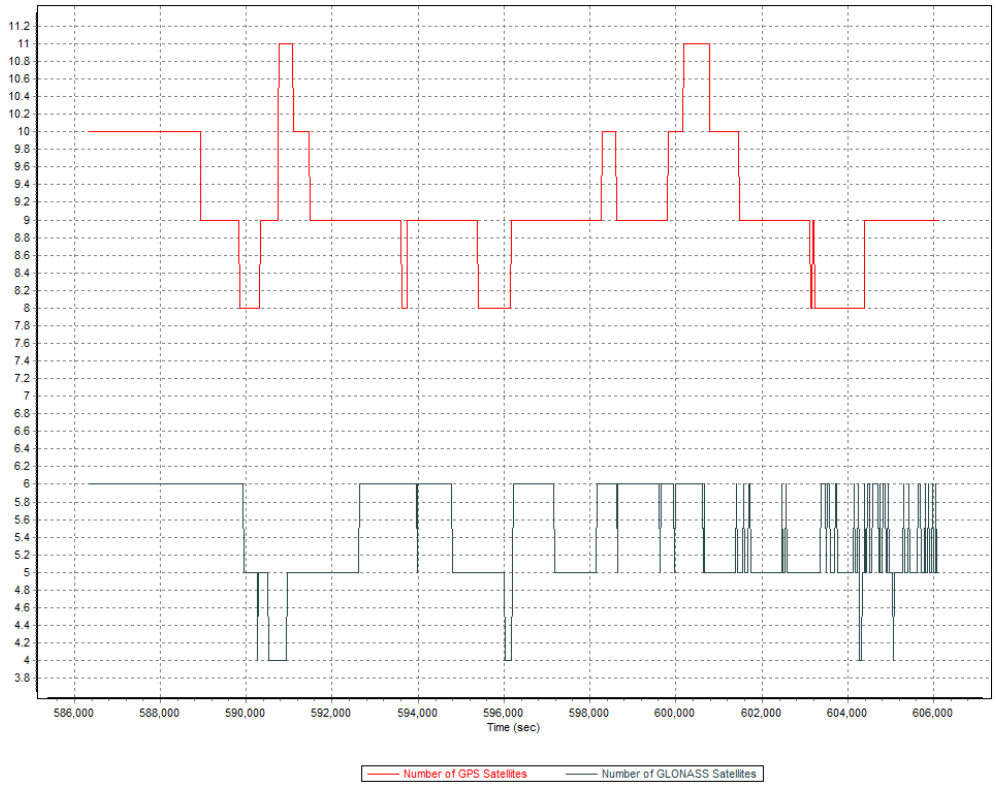
Time (sec)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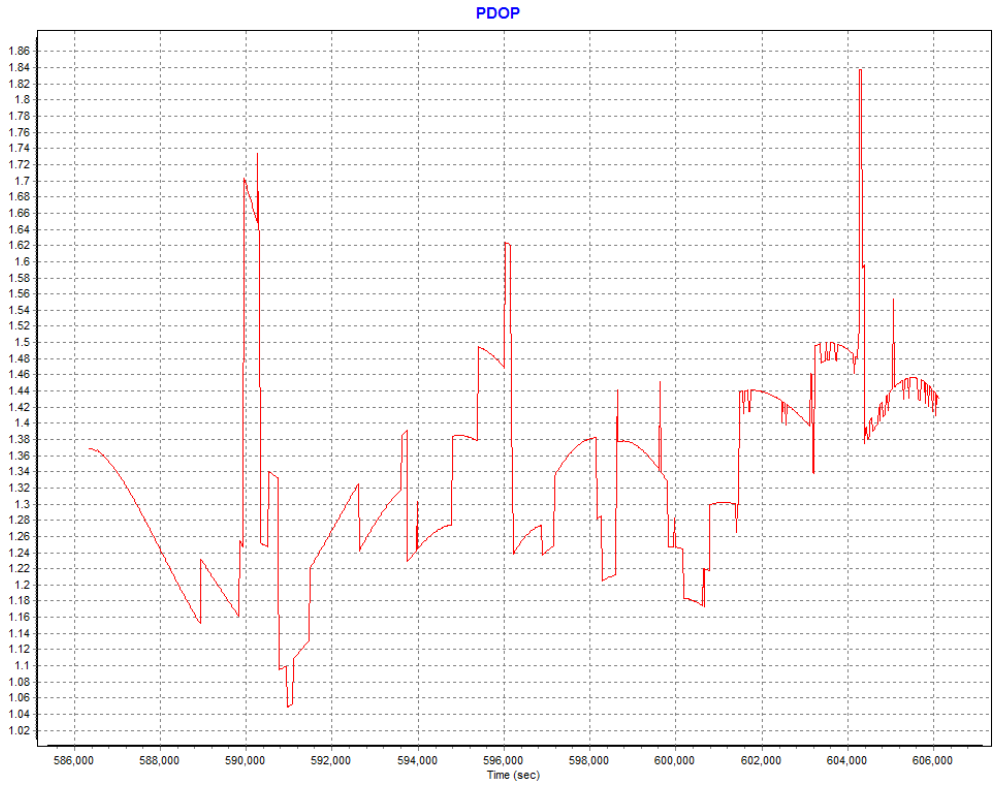
Number of GLONASS Satellites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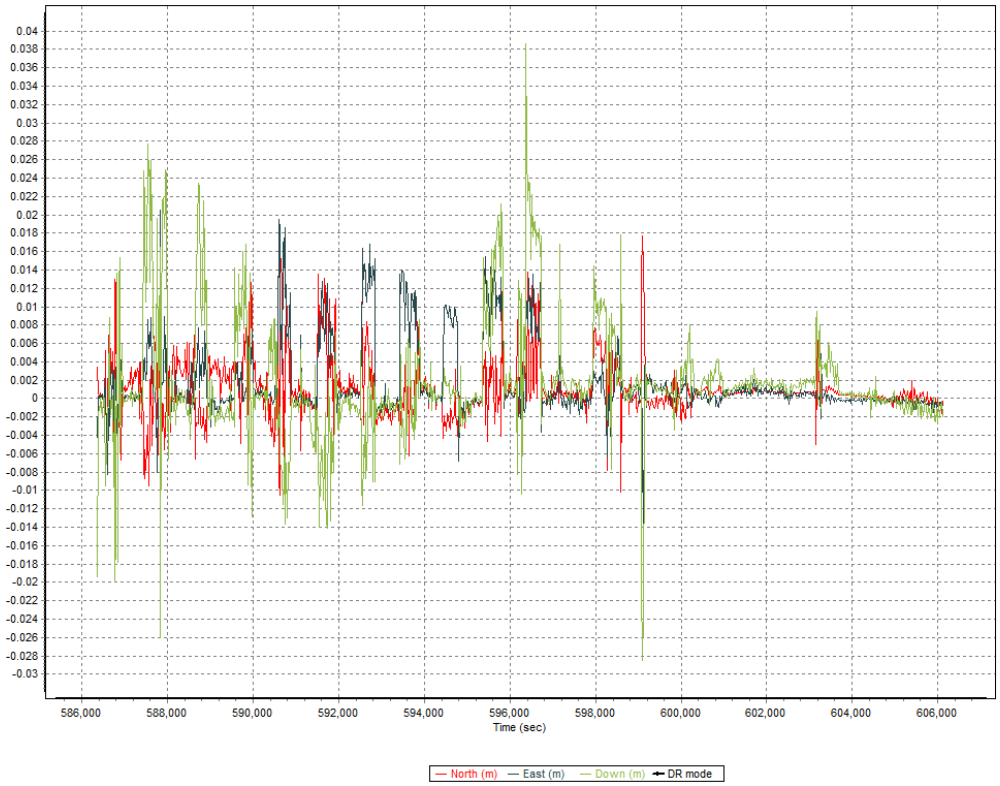
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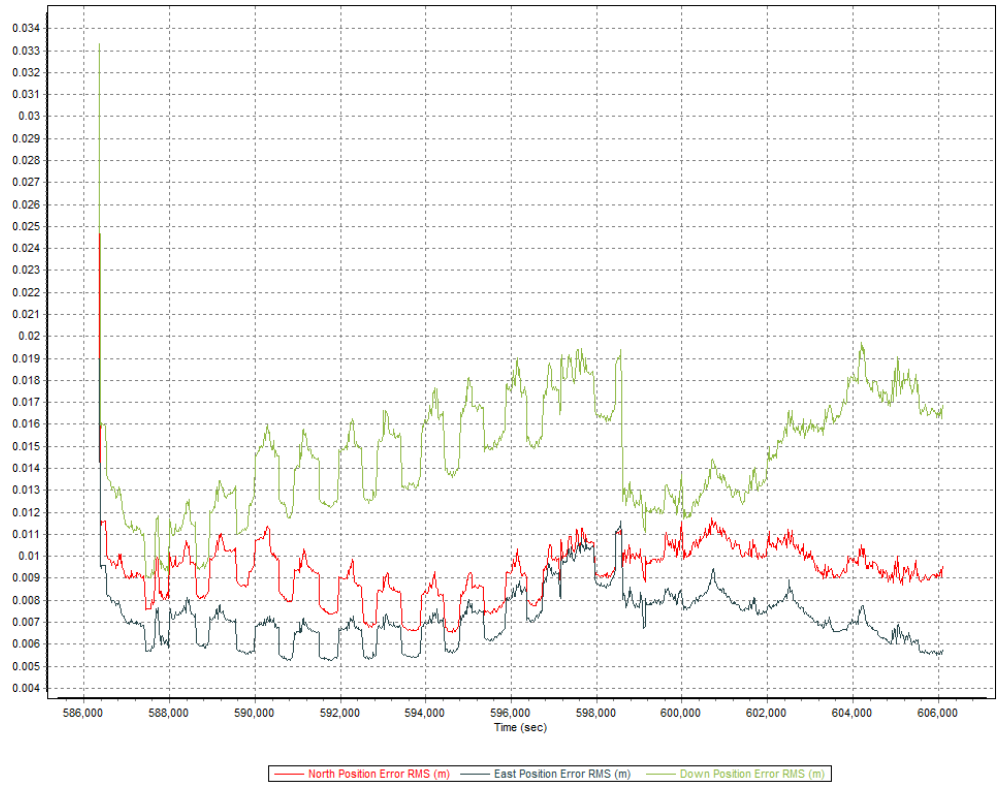
East (m)
Down (m)
DR mode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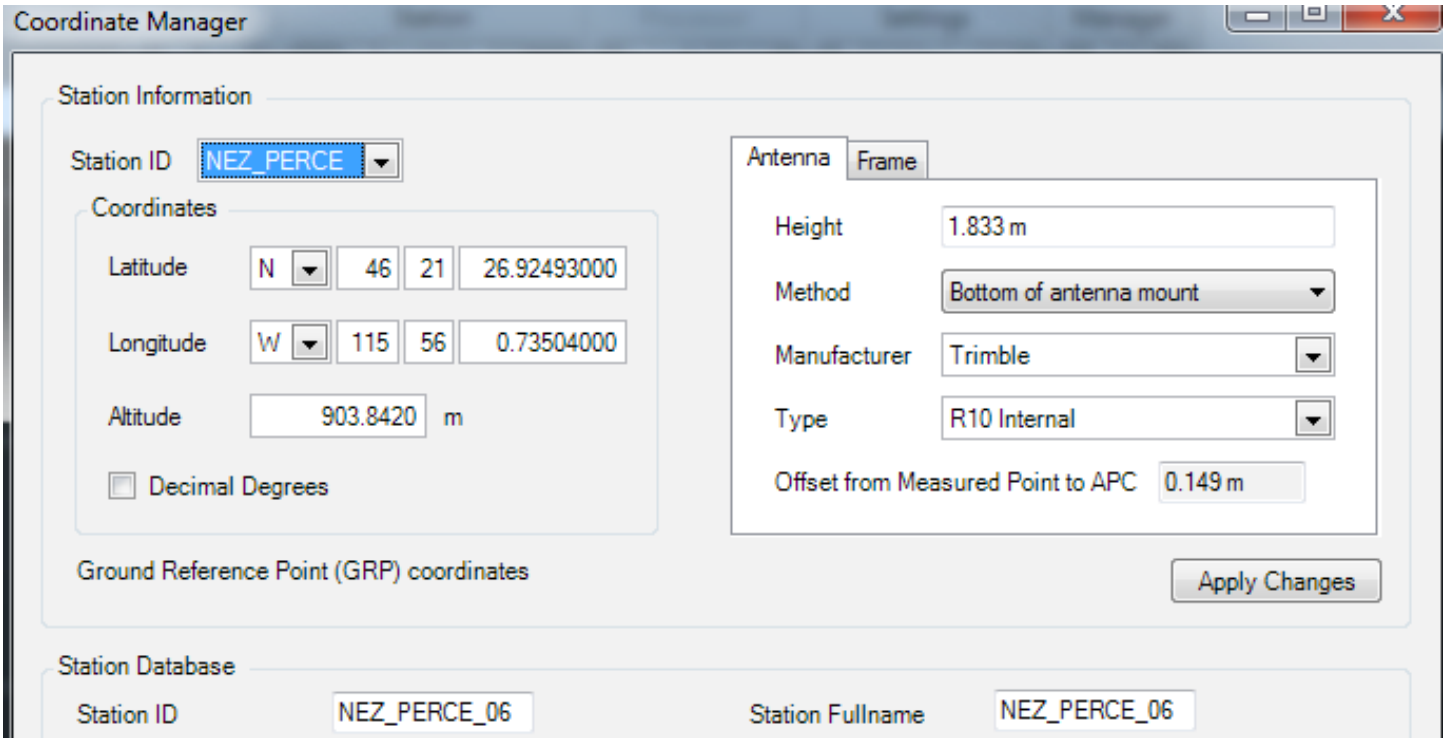
East Position Error RMS (m)
Down Position Error RMS (m)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NEZ_PERCE
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Longitude
W
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Altitude
903.8420
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.833 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
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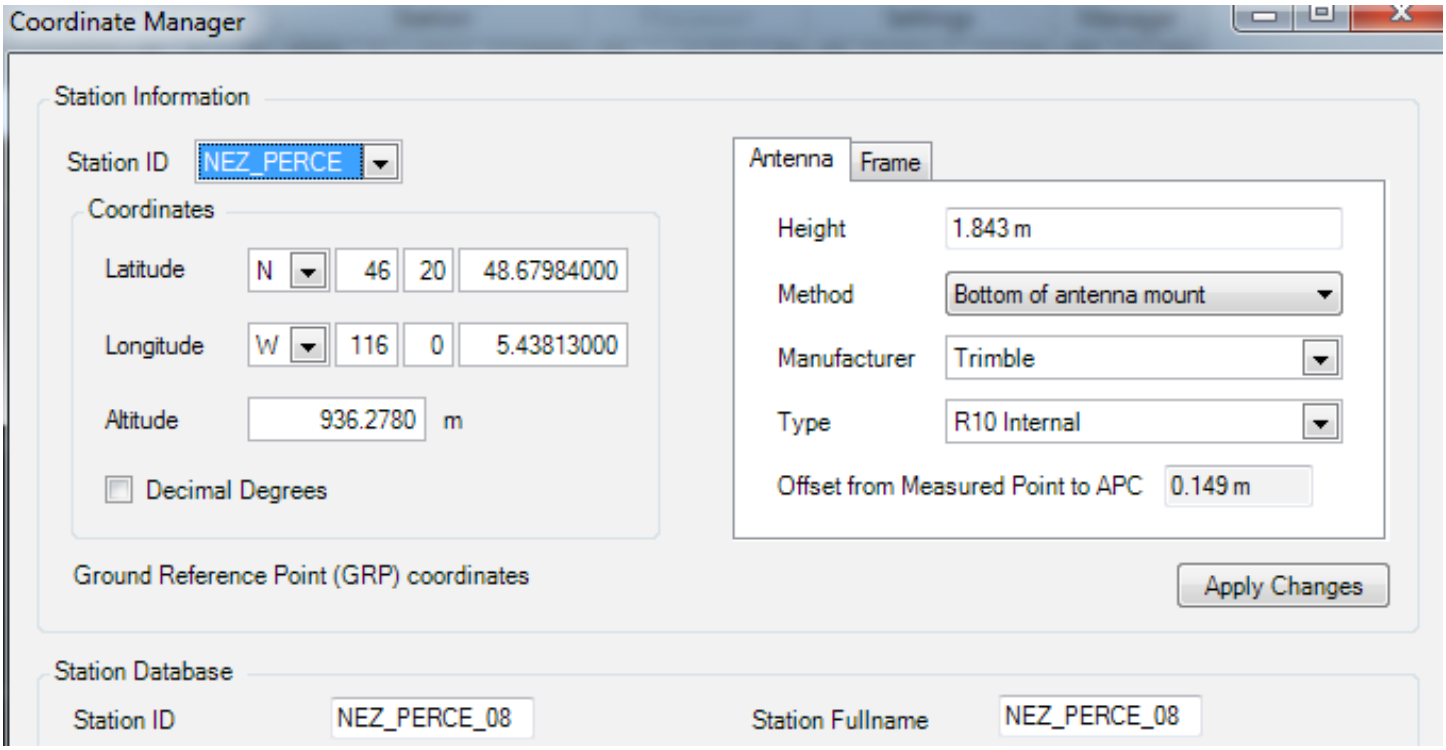
Station Fullname
NEZ_PERCE_06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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.843 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_08
Station Fullname
NEZ_PERCE_08

Flight Log

Julian Day 310	Flight A

LIDAR Flight Log 5416310A

AIRBORNE IMAGING
A Clean Harbors Company

Date Nov. 5 2016	Aircraft PA-31 C-FFRY
Project 3119_NEZPERCE	Pilot B. Harrity
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL1 AOI 04	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes @ 18 45
Temp 14°C
Humidity 70%
Altimeter 30.02
Terrain Height 438

Aircraft Block Time		
Engine On 18:41	Ramp Out 18:51	Takeoff 18:55
Engine Off	Ramp In	Landing 00:33
Total hrs	Total hrs	Total 5.6 hrs

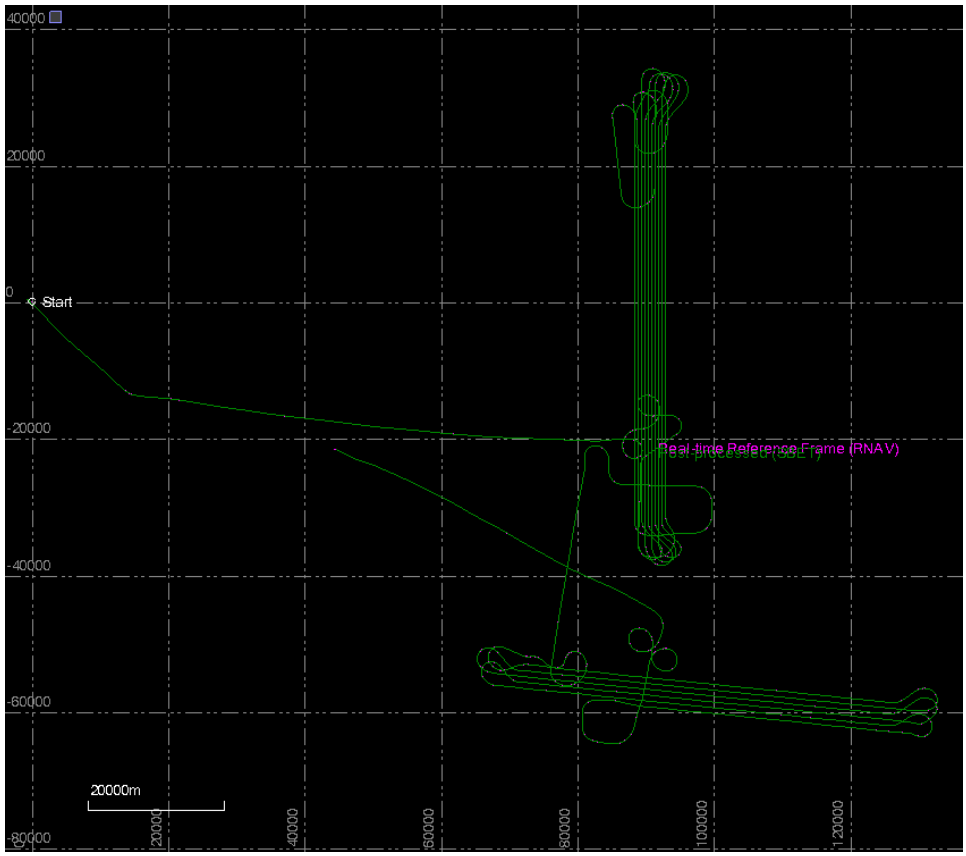
Mission Plan			
AGL Height	1900 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	18:46	18:51
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		∿		19:14	19:20				WAKE UP IMU
326	5416310 01	0	7800'	19:27	19:38			161105_192732	
325	02	180		19:42	19:56			194231	
324	03	0		19:59	20:10			195957	
323	04	180		20:14	20:29			201456	
322	05	0		20:32	20:43			203240	
321	06	180		20:47	21:01			204717	
320	07	0		21:04	21:15			210449	
319	08	180		21:19	21:33			211947	
318	09	0		21:37	21:47			213710	SNAPSHOT FROZE MN END!!
317	10	180	7800'	22:02	22:16			220255	HAD TO CIRCLE. LASER DID NOT FIRE ON 1ST GO!!
XTIE 1	5416310 11	270	7800'	22:21	22:23			222130	XTIE E-W
STURN				22:23	22:27				CLOSE OUT SURVEY
									MOVE TO BLOCK
									QL2 AOI

Pg 1 of 2

Nov 5, 2016-A (C-FFRY, SN2221256)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Post-processed (SBET)
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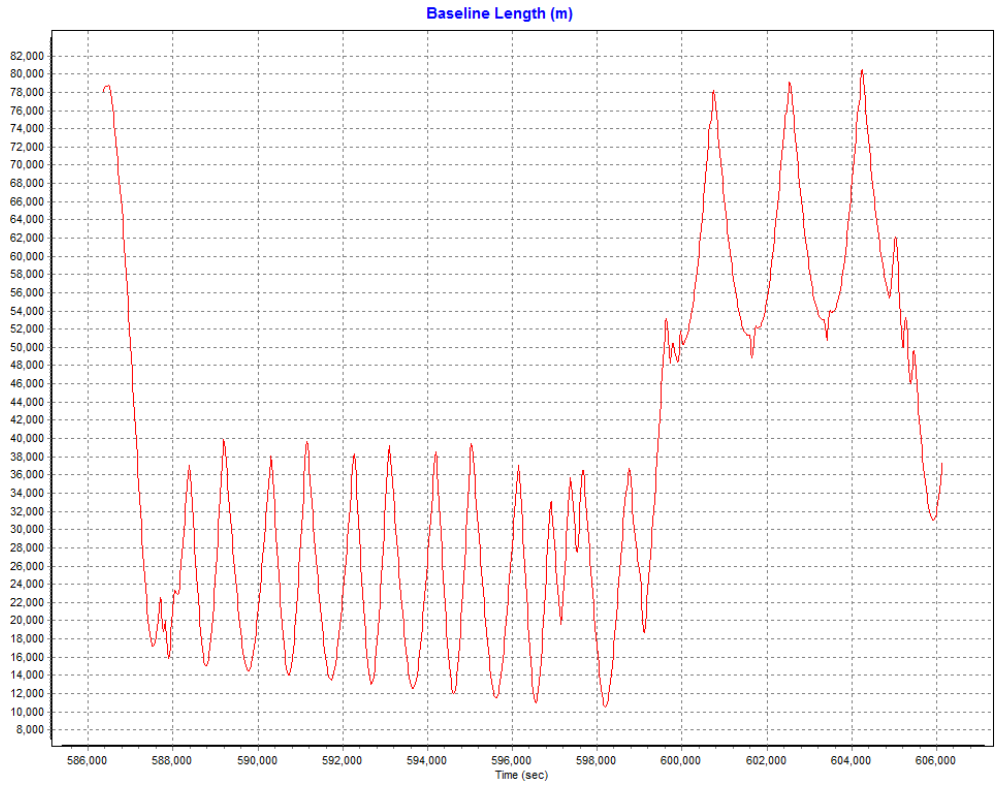
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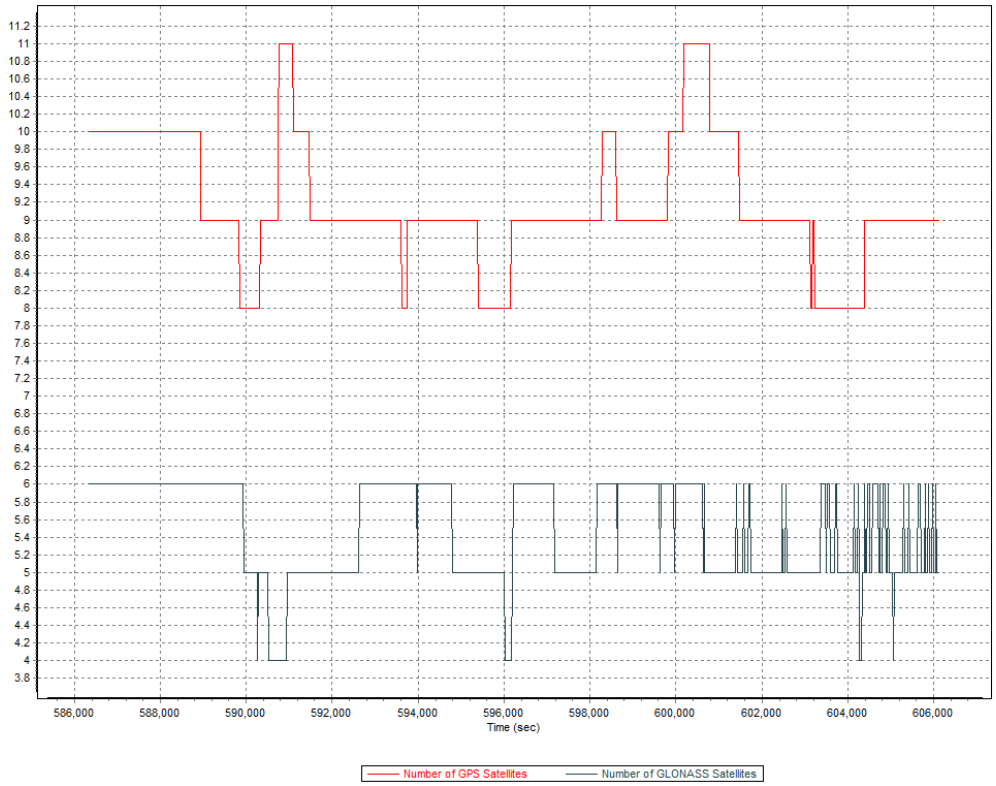
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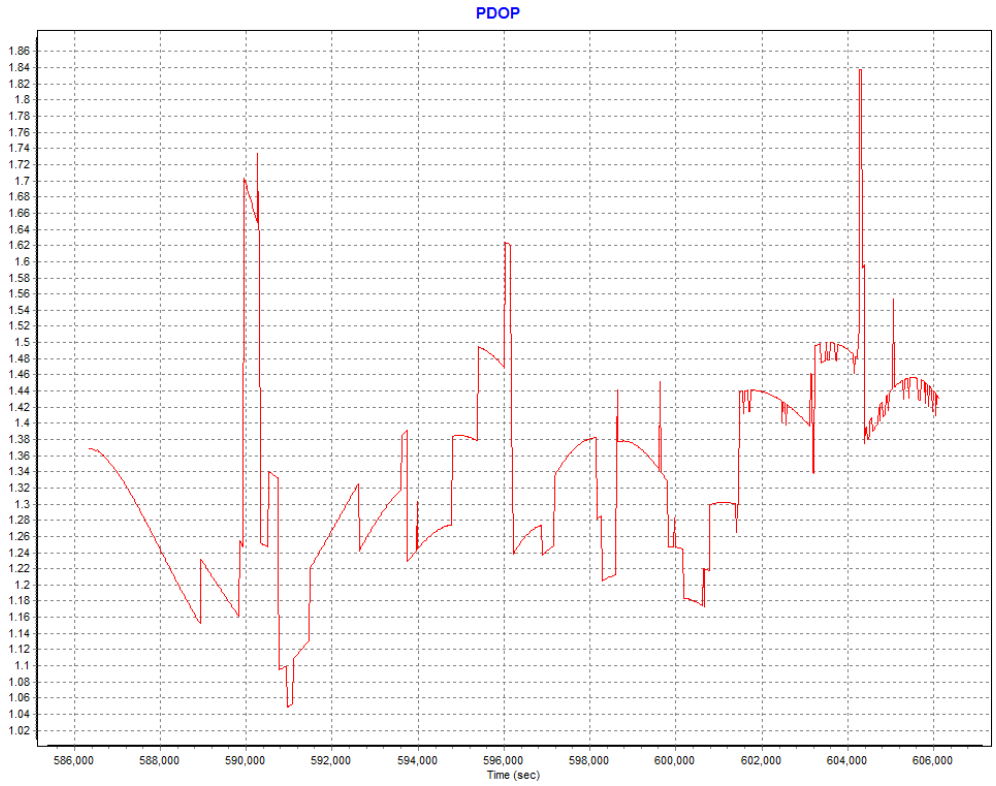
Number of GPS Satellites
Number of GLONASS Satellites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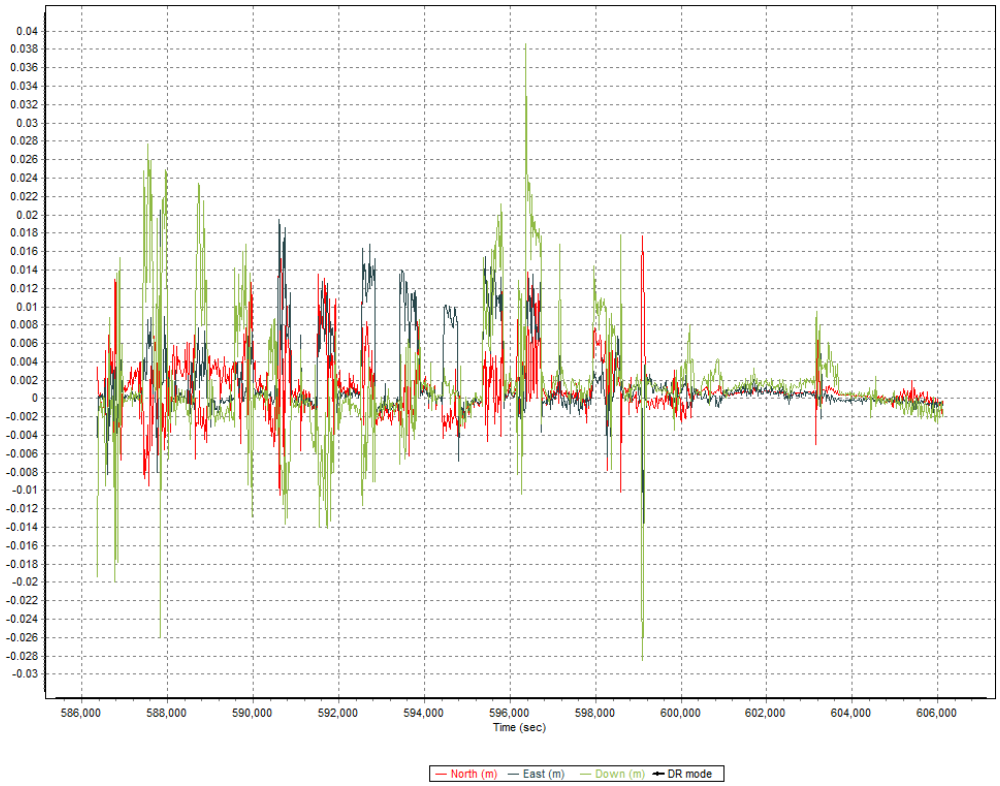
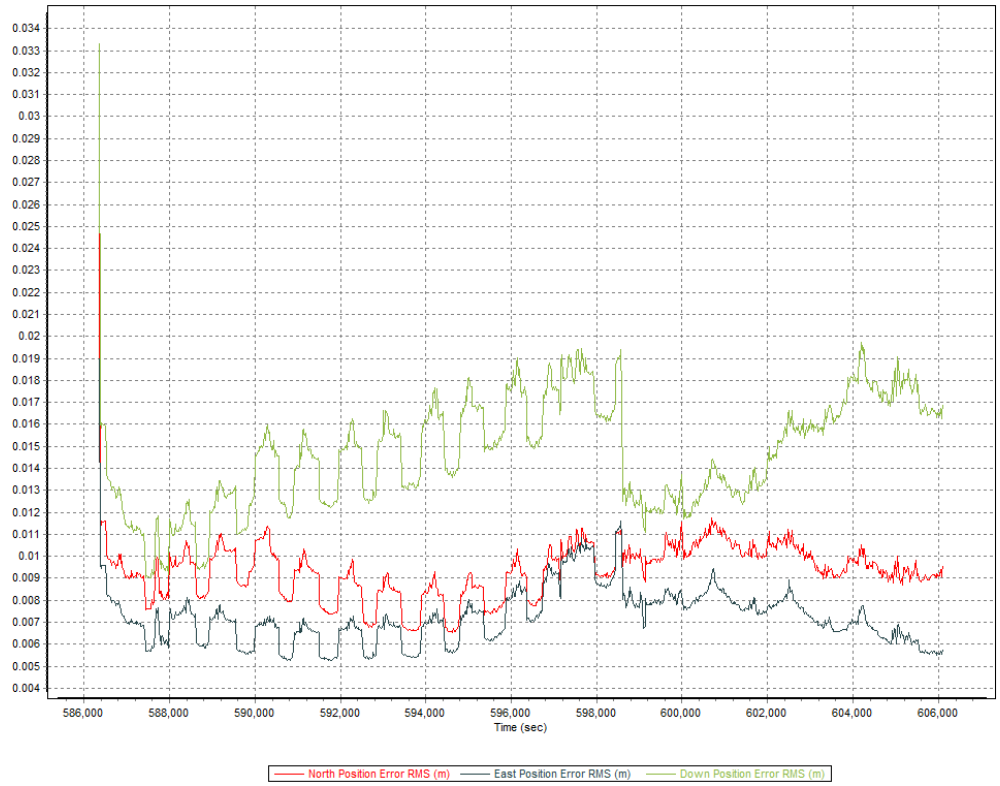
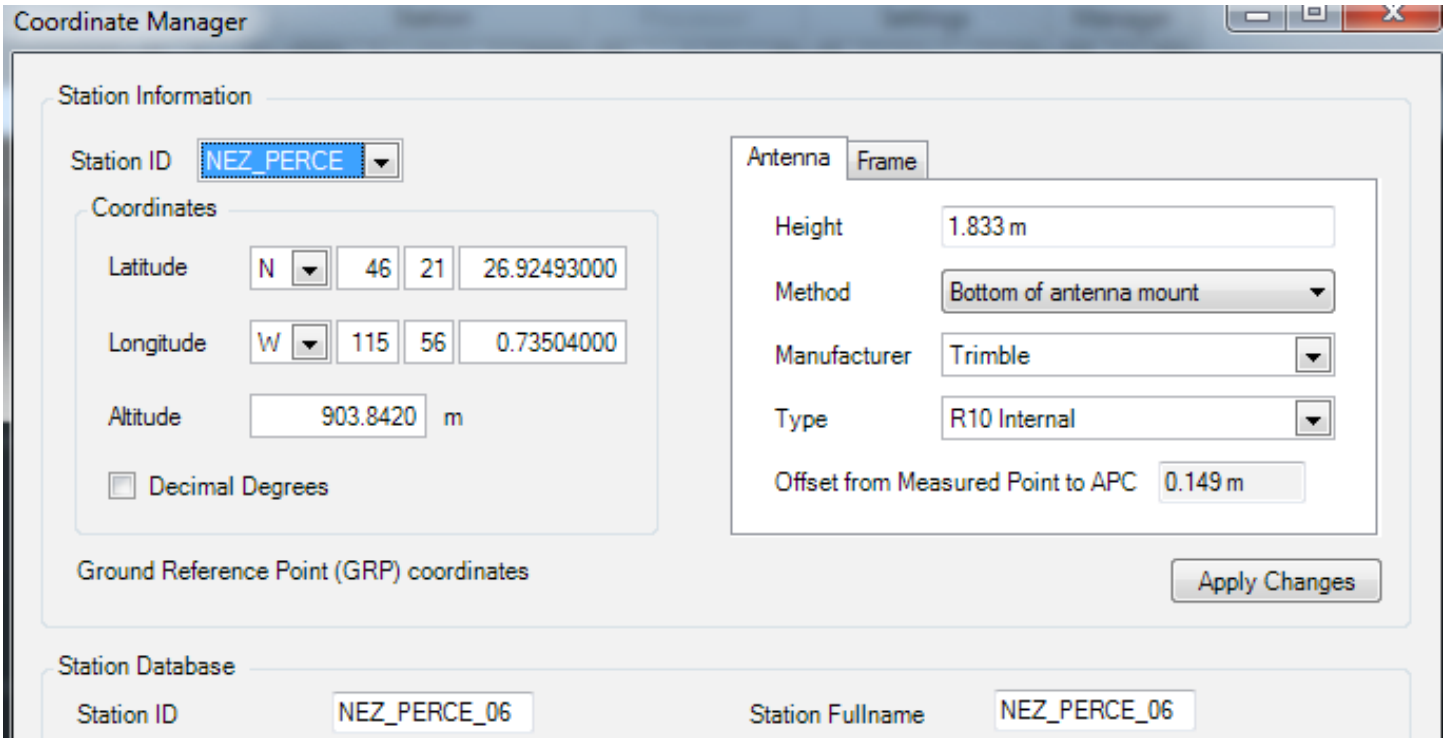
Time (sec)


Time (sec)
North (m)
East (m)
Down (m)
DR mode


Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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Longitude
W
115
56
0.73504000
Altitude
903.8420
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.833 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
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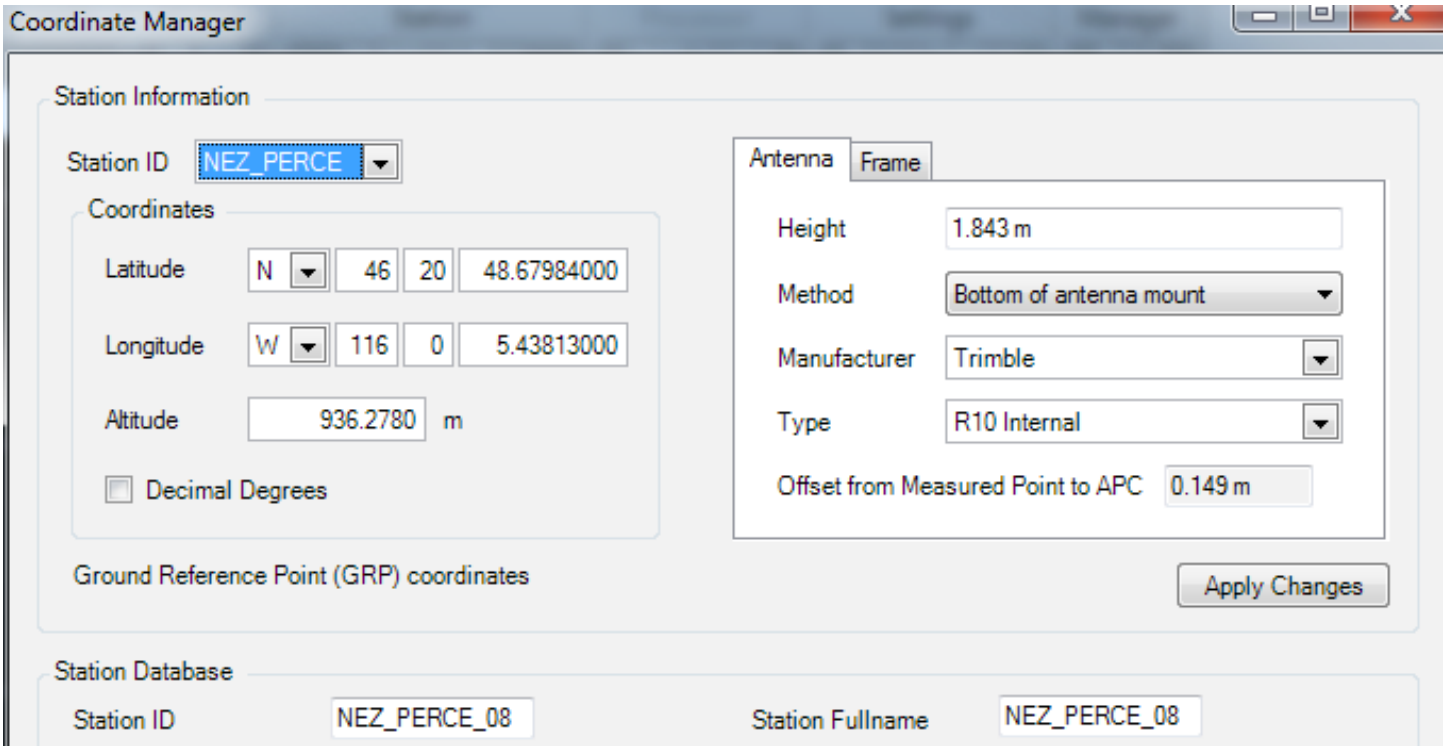
Station Fullname
NEZ_PERCE_06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20
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Longitude
W
116
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Altitude
936.2780
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.843 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_08
Station Fullname
NEZ_PERCE_08

Flight Log

Julian Day	Flight
30	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date NOV 5 2016	Aircraft PA-31 C-FFRY
Project 3119_NEZ PERCE	Pilot B. Harrity
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL2 AOI	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes @
Temp
Humidity
Altimeter
Terrain Height 438

Aircraft Block Time		
Engine On 18 41	Ramp Out 18 51	Takeoff 18 55
Engine Off 00 39	Ramp In	Landing 00 33
Total hrs	Total hrs	Total 5.6 hrs

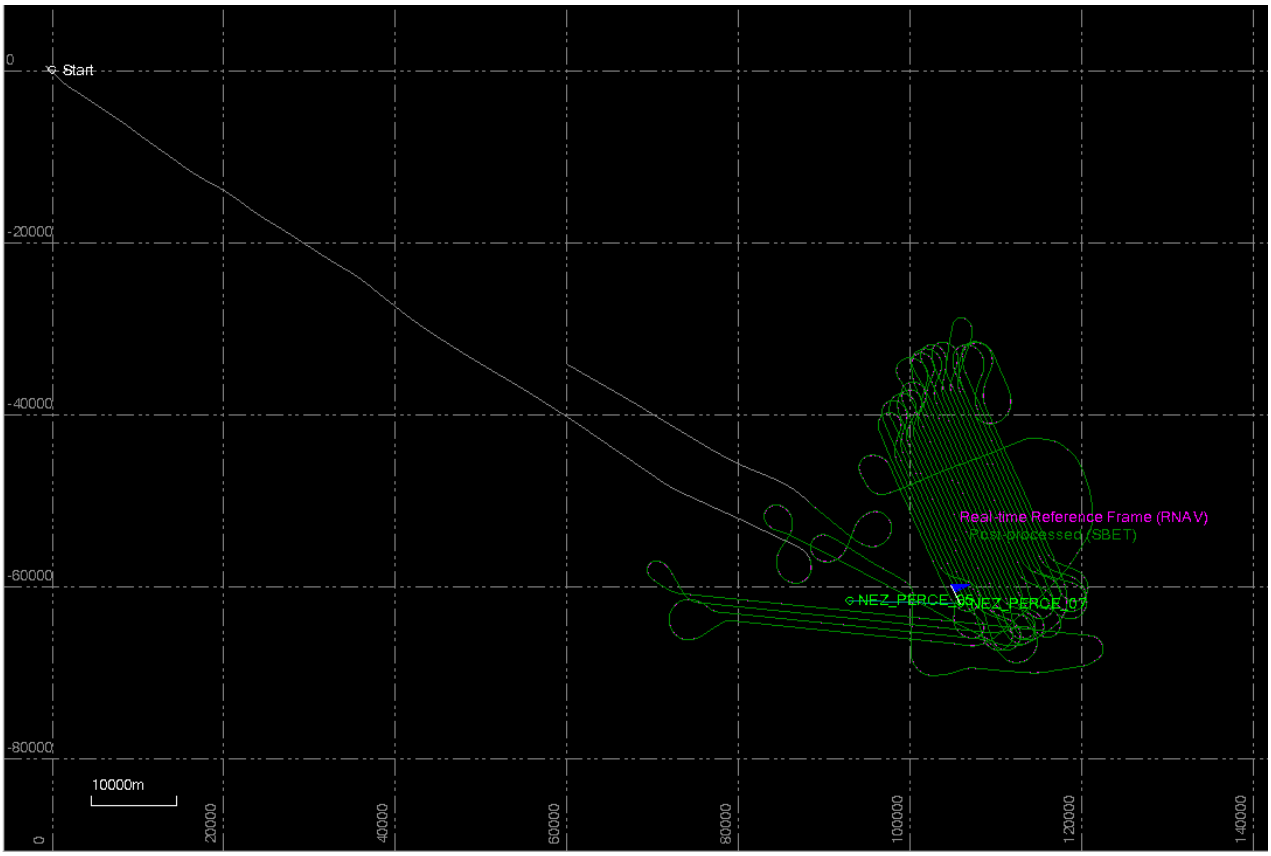
Mission Plan			
AGL Height	2200 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	182 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	18:46	18 51
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		22 33	22 39				WAKE UP IMU.
377	5416310 12	95.9	9200'	22 40	22 50			224003	LITTLE NORTH OF LINE @ START
378	13	275.9	9200'	22 54	23 06			225405	
379	14	95.9	9200'	23 09	23 20			230936	
380	15	275.9	9300'	23 23	23 35			232355	
381	16	95.9	9300'	23 39	23 48			233903	
382	17	275.9	9300'	23 52		01.14	~15nm	235217	SNAPSHOT FAILED AGAIN !!
XTIE 2	18	0.59	9300'	00 04	00 06			000442	XTIE SW→NE
FIGURE 8		↷		00 06	00 12				CLOSE OUT SURVEY.
									WILL RE-FLY 382.
							DID NOT	DO A SNAPSHOT RE-START	
							DUE TO	LOW FUEL & FAST APPROACHING	
								SUNSET ... IT WAS	
								GOING TO BE TIGHT ANYWAY!	

Pg 2 of 2

Nov 5, 2016-A (N-44RL, SN2220764)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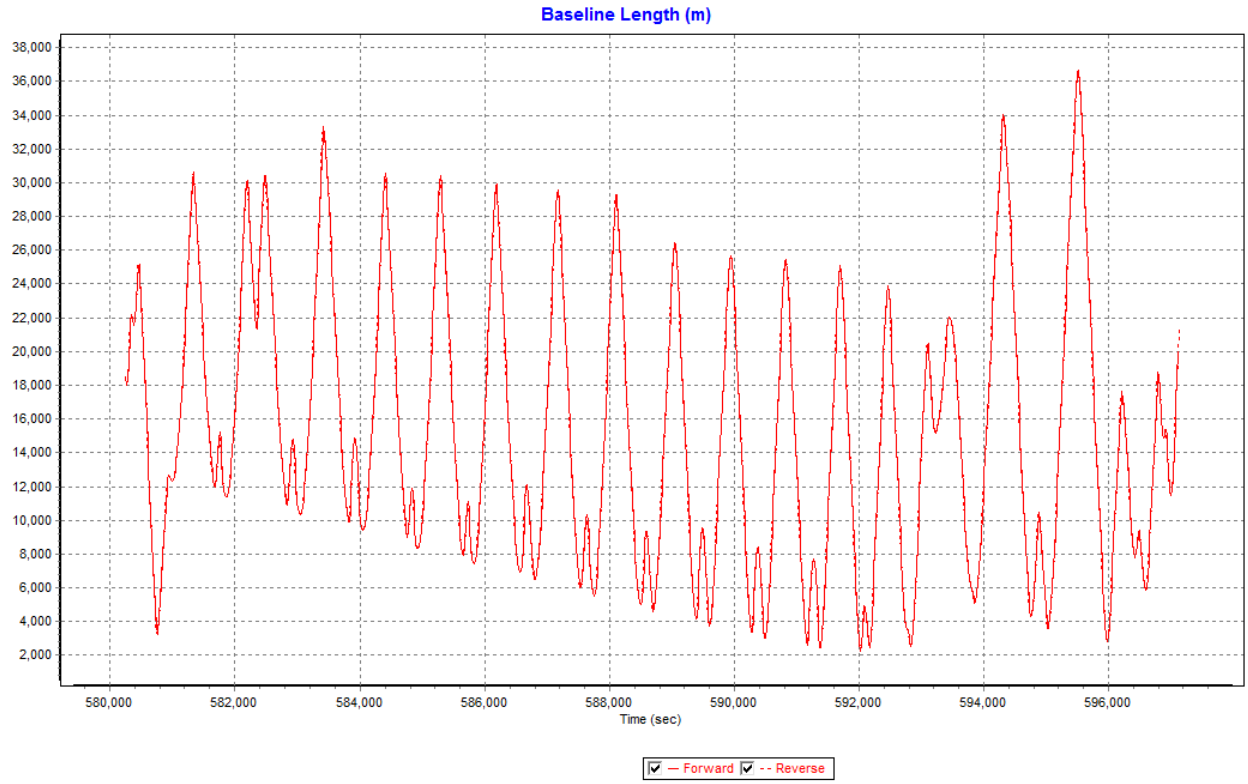
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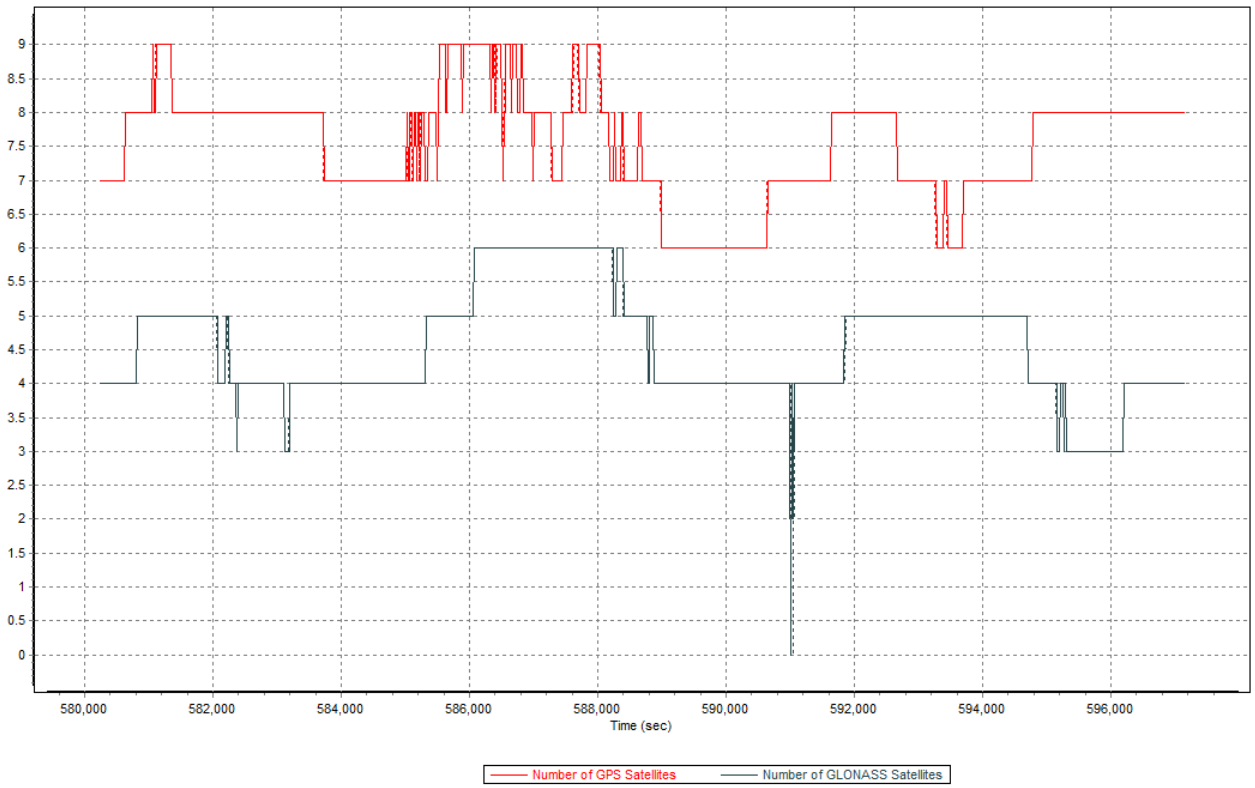
Time (sec)
Forward
Reverse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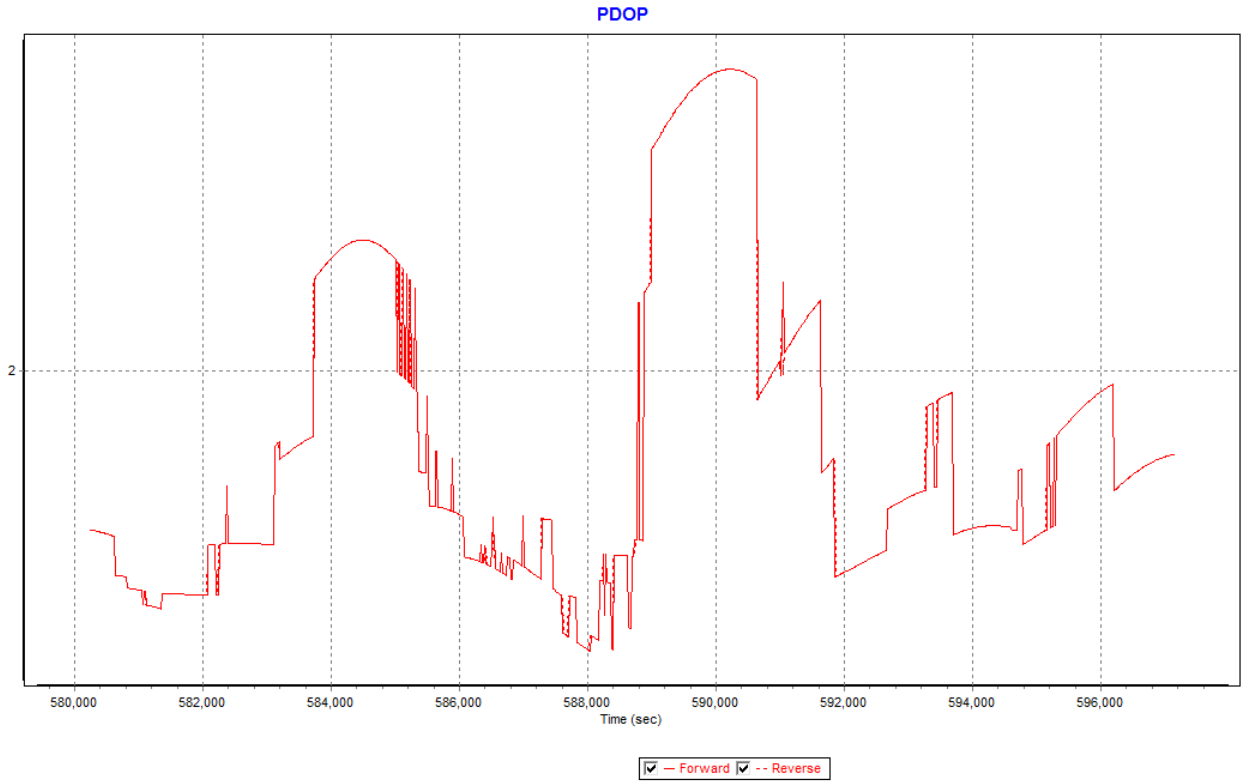
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
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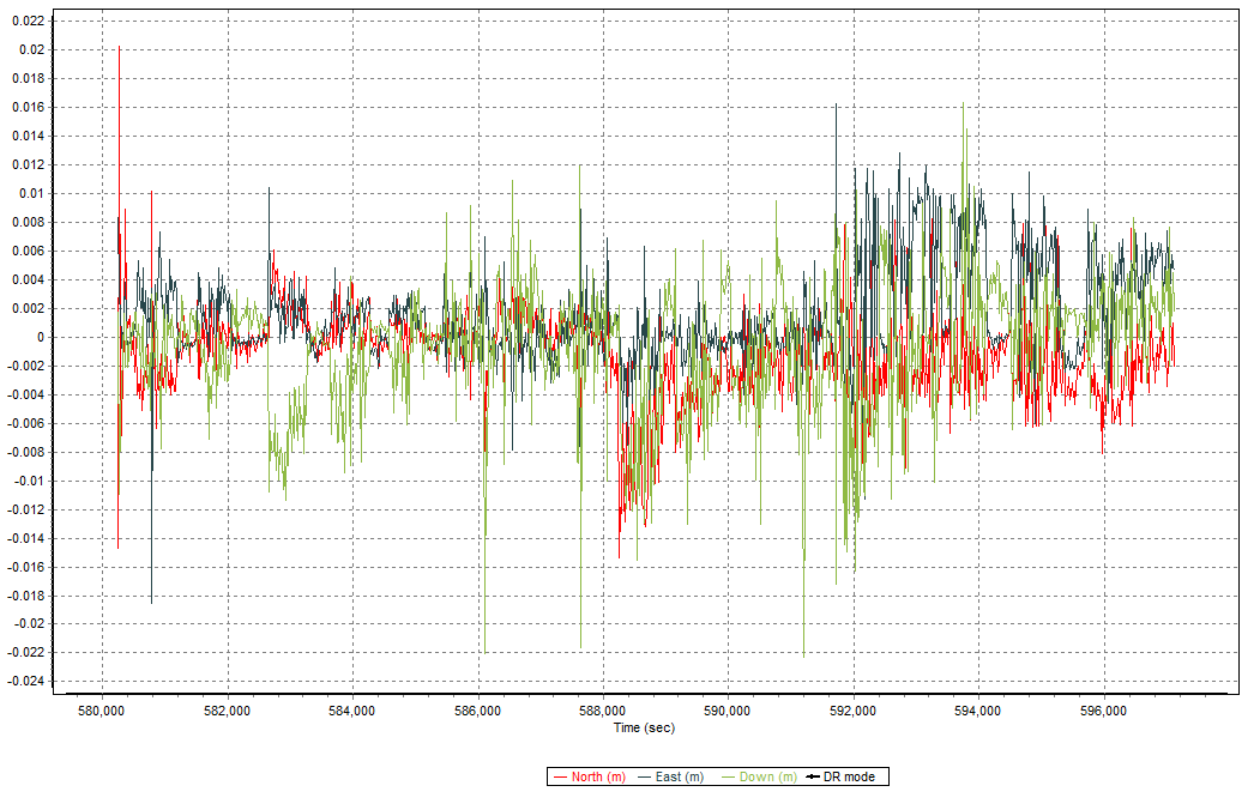
596,000
Time (sec)
Forward
Reverse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584,000
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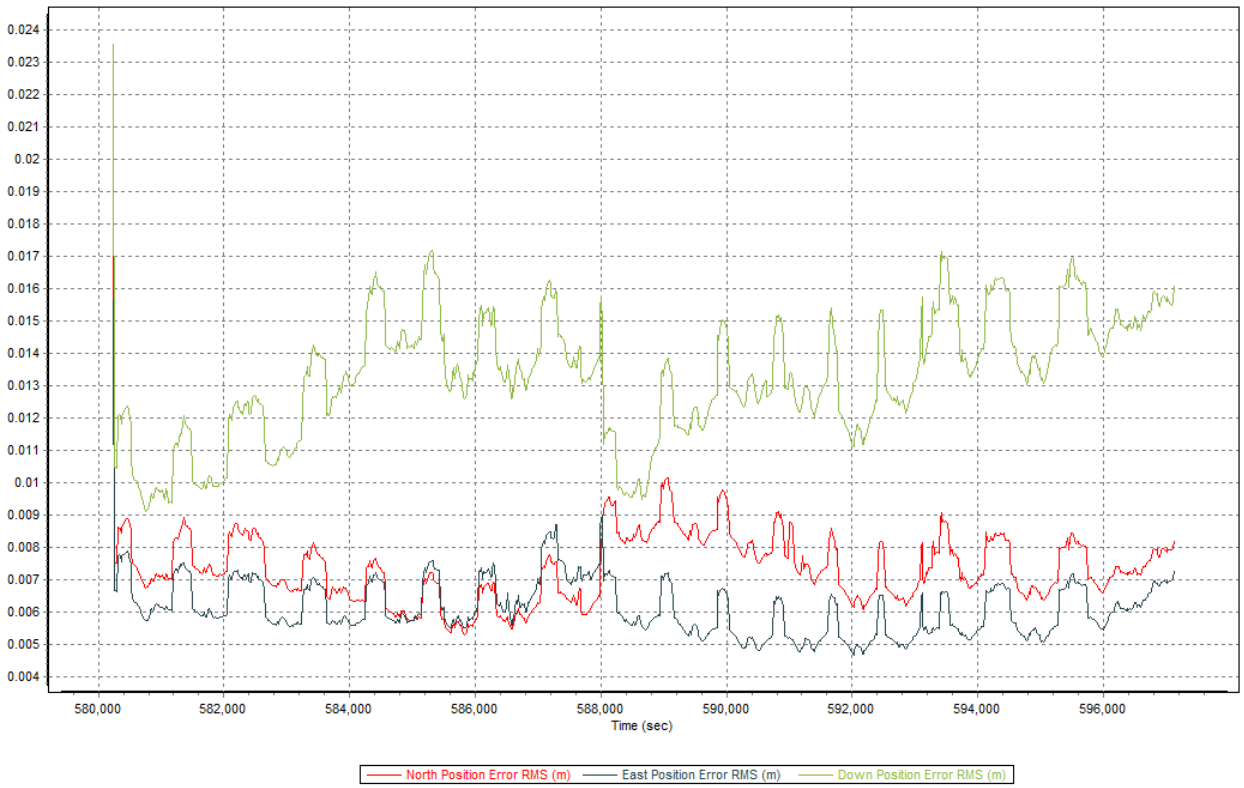
594,000
596,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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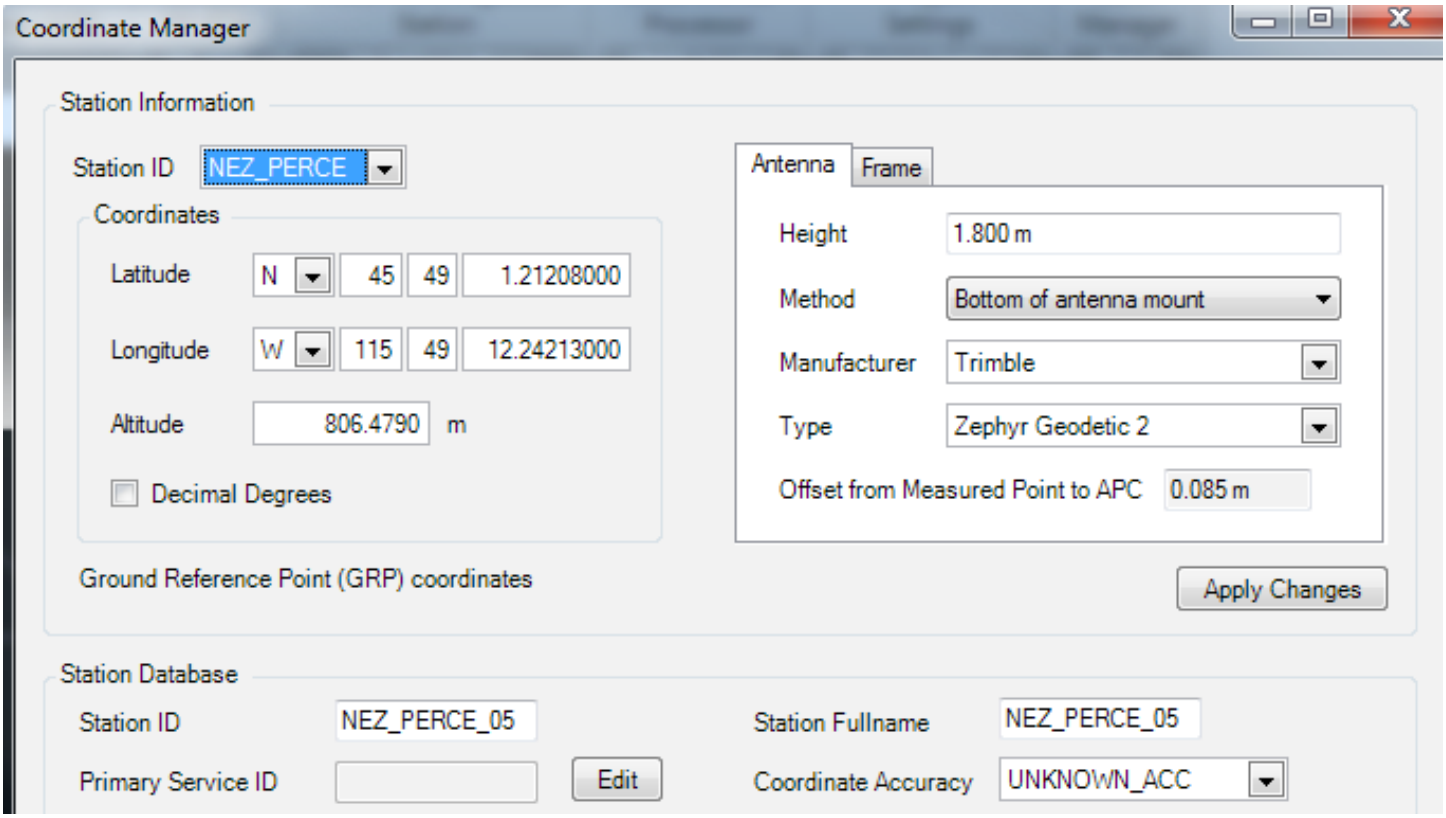
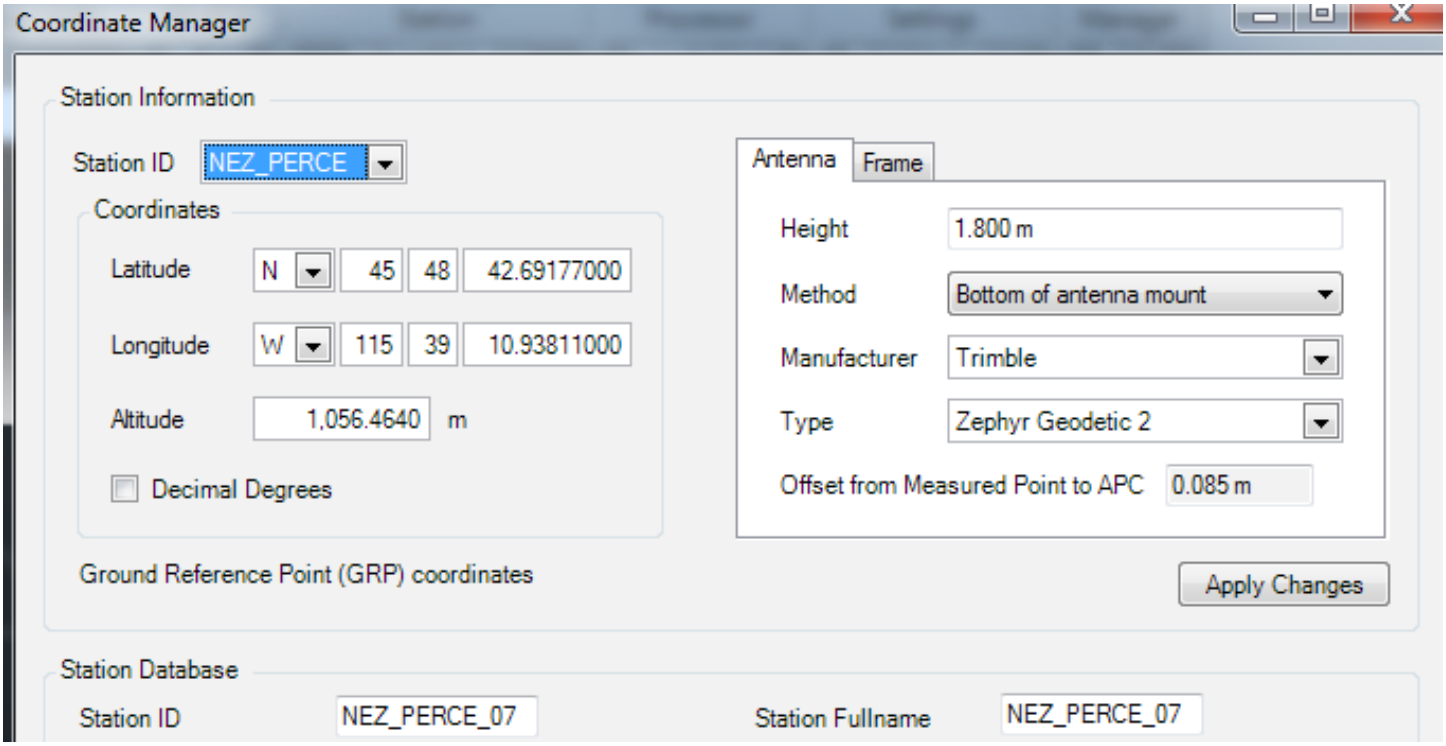
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
580,000
582,000
584,000
586,000
588,000
590,000
592,000
594,000
596,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
45
49
1.21208000
Longitude
W
115
49
12.24213000
Altitude
806.4790
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_05
Station Fullname
NEZ_PERCE_05
Primary Service ID
Edit
Coordinate Accuracy
UNKNOWN_ACC


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
45
48
42.69177000
Longitude
W
115
39
10.93811000
Altitude
1,056.4640
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_07
Station Fullname
NEZ_PERCE_07

Flight Log

Julian Day 310	Flight A

LIDAR Flight Log

Date Nov. 5th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective Complete AOI 15 and work on AOI 16	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes @1600UTC KLWS
Wind: 080(E) @ 13 knts
Temp: 9.4°C
Pressure: 1017
Clouds: Clear
Visibility: 16.1 km

Aircraft Block Time		
Engine On 1638	Ramp Out	Takeoff 1648
Engine Off 2216	Ramp In	Landing 2213
Total 5.6 **hrs**	Total **hrs**	Total 5.4 **hrs**

Mission Plan			
AGL Height	1900 **m**	Laser Pulse Rate	800 **Hz**
Target Speed	160 **kts**	Scan Rate	195 **Hz**
Laser Current	50 **%**	FOV	60 **Deg's**

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	—	—
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 161105-
TEST				165708	165744			
376		336	11300	172336	172656			AOI 15 @ 1900m
375		156	11500	173108	173432			
374		336	11400	173801	174124			
—				174144	174155			hit IP
373		156	10900	174950	175345			
372		336	10900	175748	180143			
371		156	11000	180610	181014			
370		336	10900	181433	181836			
369		156	10800	182153	182559			
368		336	10700	182912	183316			
367		156	10700	183639	184058			
366		336	10600	184357	184810			
365		156	10500	185128	185625			
364		336	10400	185957	190438			

Pg 1 of 3

Julian Day 310	Flight A

LIDAR Flight Log

Date Nov. 5th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1638	Ramp Out	Takeoff 1648
Engine Off 2216	Ramp In	Landing 2213
Total 5.6 **hrs**	Total **hrs**	Total 5.4 **hrs**

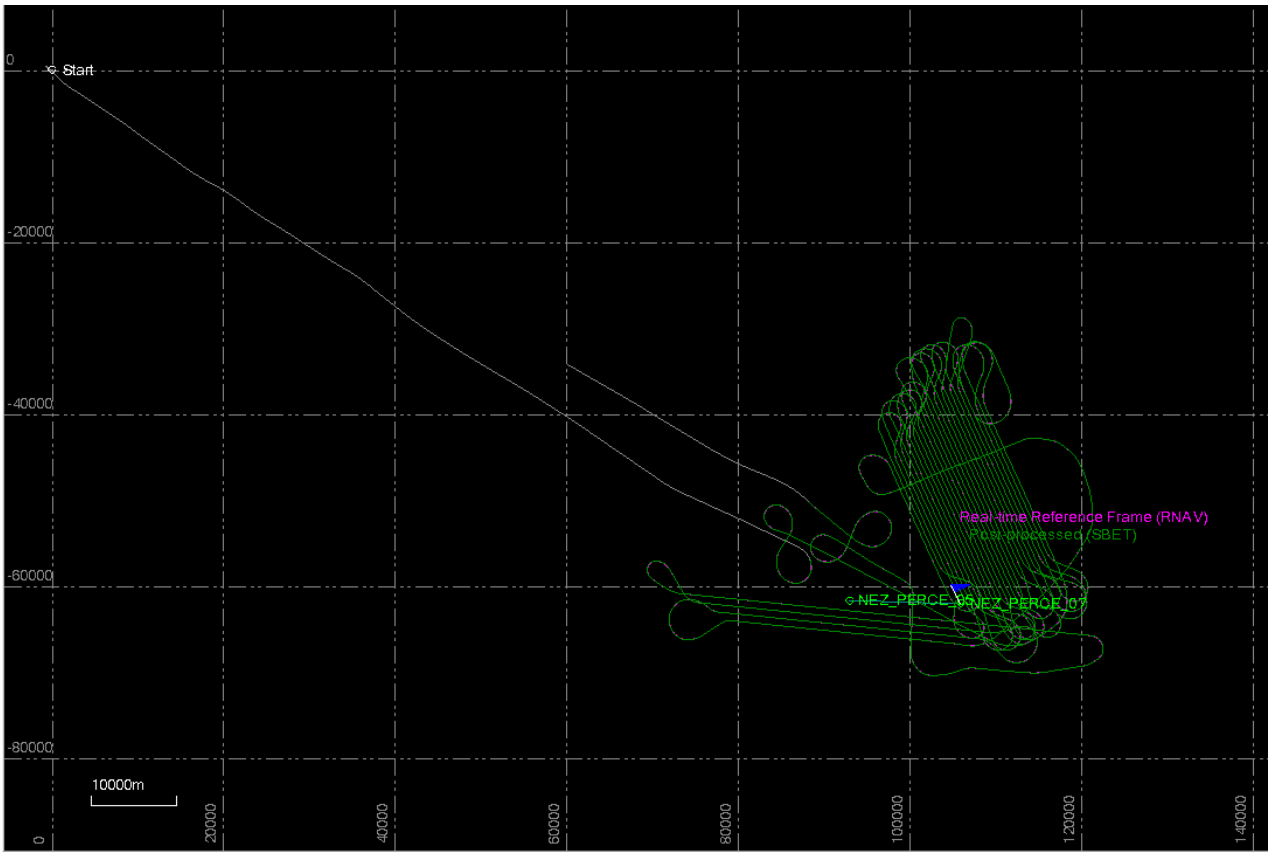
Mission Plan			
AGL Height	1900 **m**	Laser Pulse Rate	800 **Hz**
Target Speed	160 **kts**	Scan Rate	195 **Hz**
Laser Current	50 **%**	FOV	60 **Deg's**

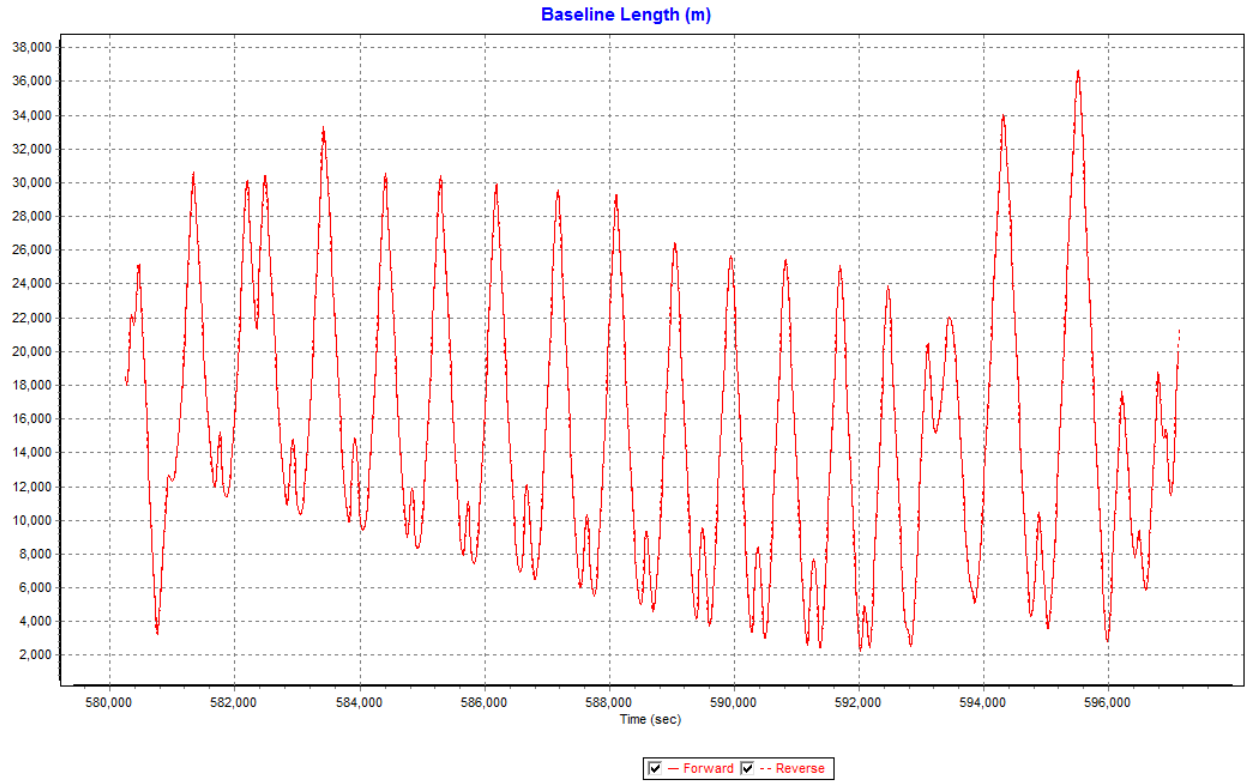
Static Alignment	GPS Time	
	Start	End
Pre Mission	—	—
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161105
363		156	10400	190757	191235			
362		336	10200	191543	192007			
361		156	10200	192351	192837			
360		336	10200	193135	193600			
359		156	10200	193911	194325			
358		336	10200	194640	195048			
357		156	10200	195417	195811			
356		336	10200	200133	200527			
355		156	10200	200849	201258			
354		336	10400	201622	202009			
353		156	10500	202322	202706			
352		336	11000	203016	203300			
351		156	11600	203559	203839			
350		336	11600	204152	204407			
XTIE		55	11500	204636	204938			AOI 15 X-tie

Pg 2 of 3

Nov 5, 2016-A (N-44RL, SN2220764)


Start
Real-time Reference Frame (RNAV)
Post-processed (SBET)
NEZ_PERCE_05
NEZ_PERCE_01
10000m
0
-20000
-40000
-60000
-80000
20000
40000
60000
80000
100000
120000
140000


Baseline Length (m)
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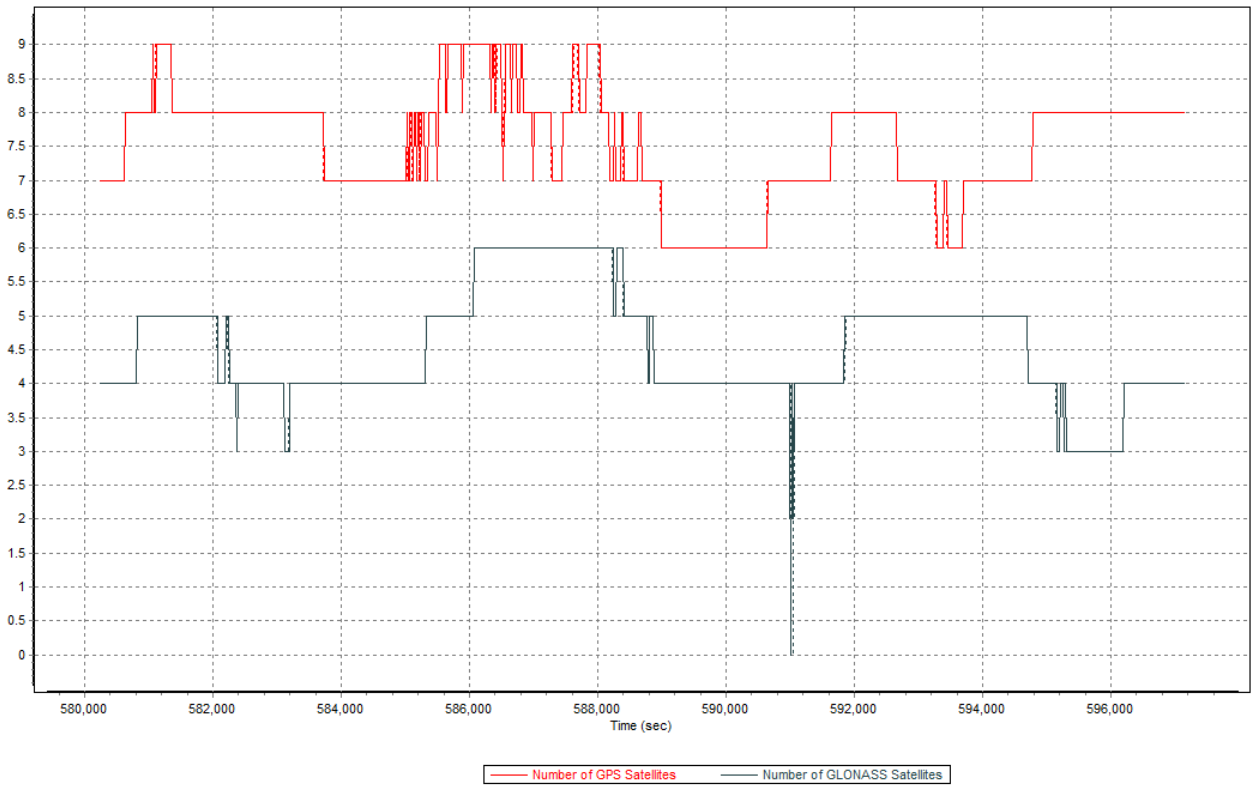
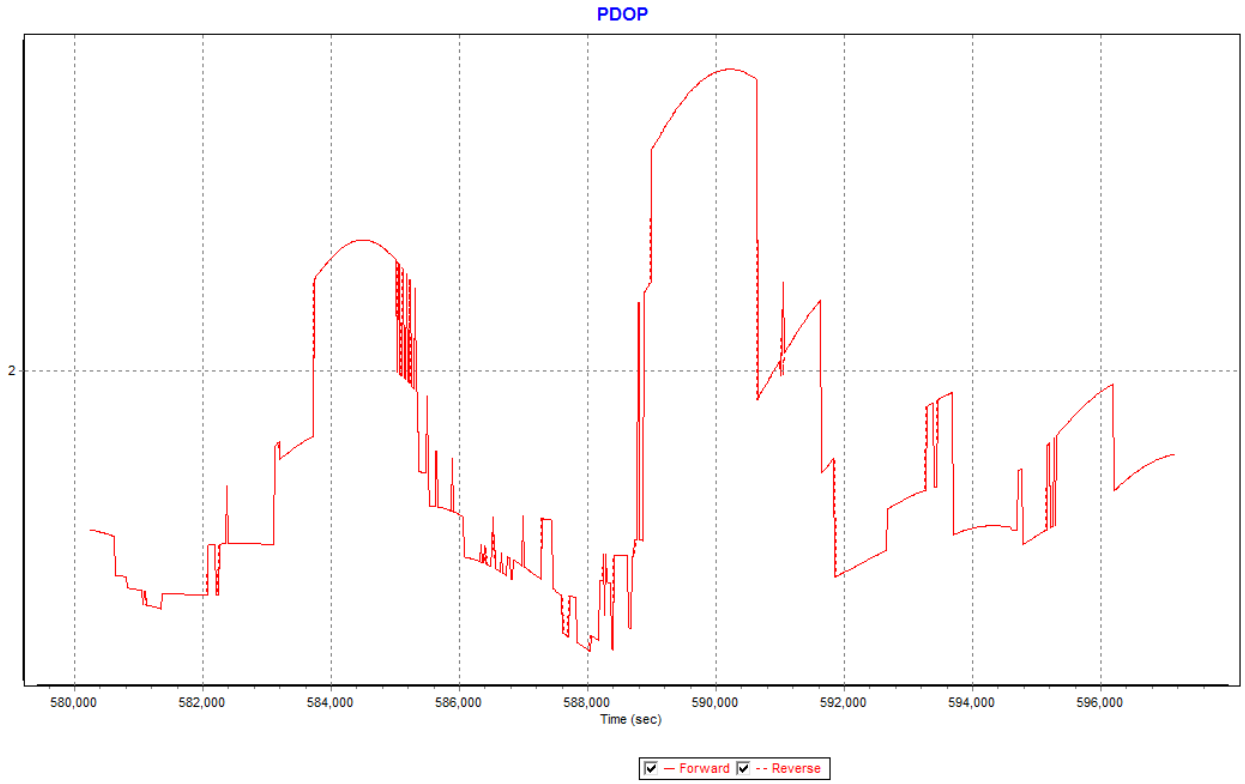
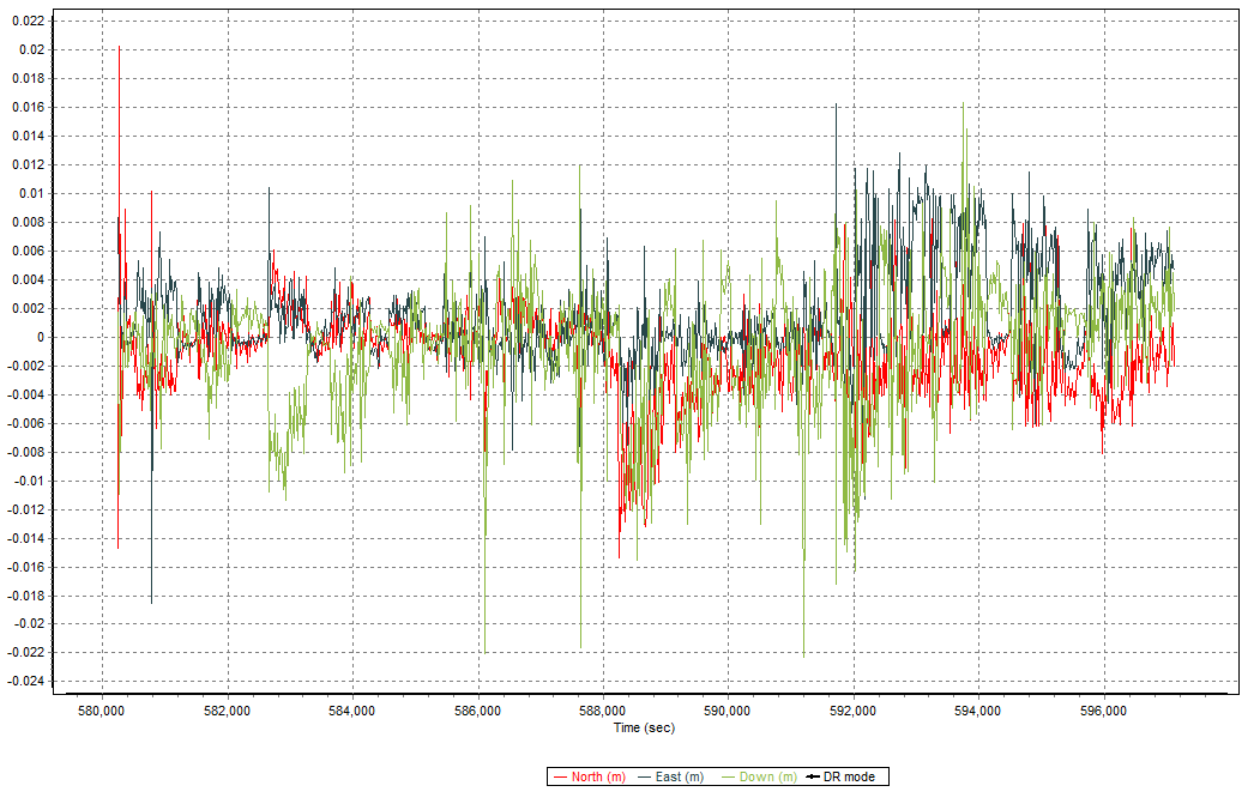
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
580,000
582,000
584,000
586,000
588,000
590,000
592,000
594,000
596,000
Time (sec)
Forward
Reverse


9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
580,000
582,000
584,000
586,000
588,000
590,000
592,000
594,000
596,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
2
580,000
582,000
584,000
586,000
588,000
590,000
592,000
594,000
596,000
Time (sec)
Forward
Reverse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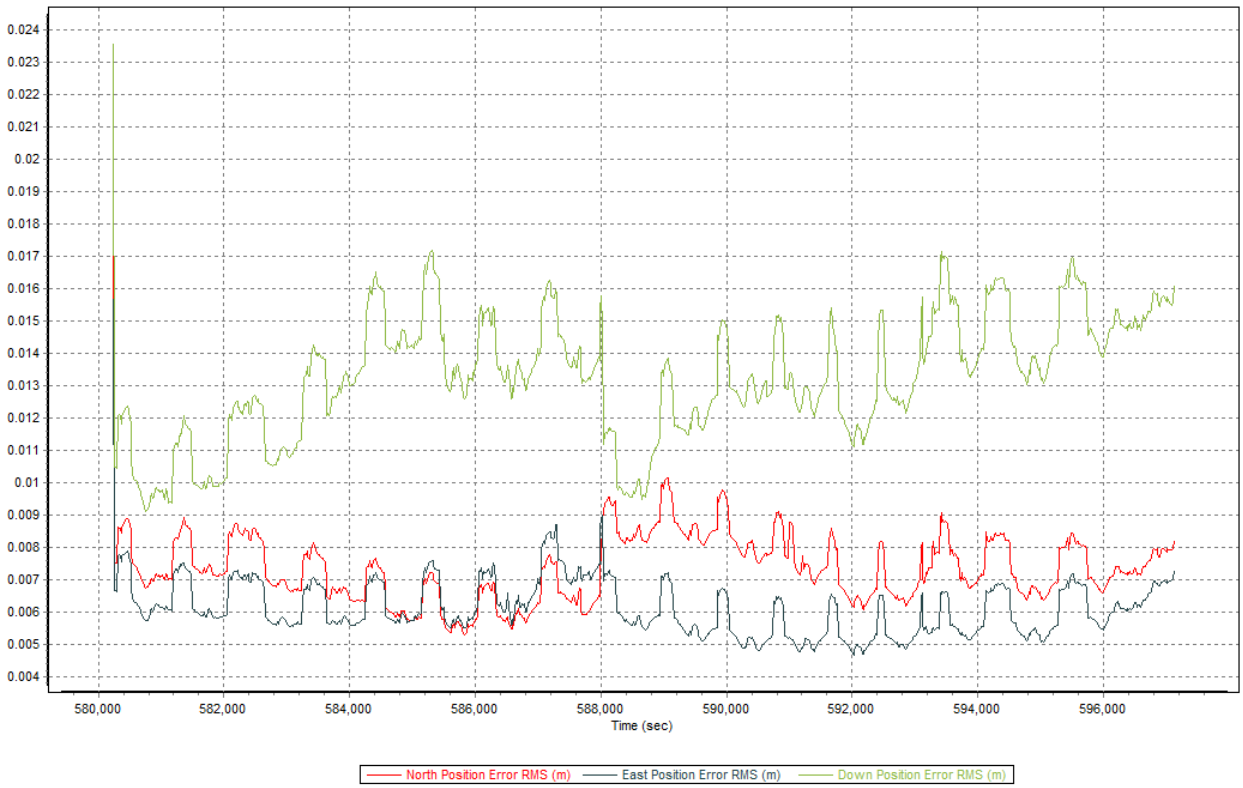
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
-0.002
-0.004
-0.006
-0.008
-0.01
-0.012
-0.014
-0.016
-0.018
-0.02
-0.022
-0.024
580,000
582,000
584,000
586,000
588,000
590,000
592,000
594,000
596,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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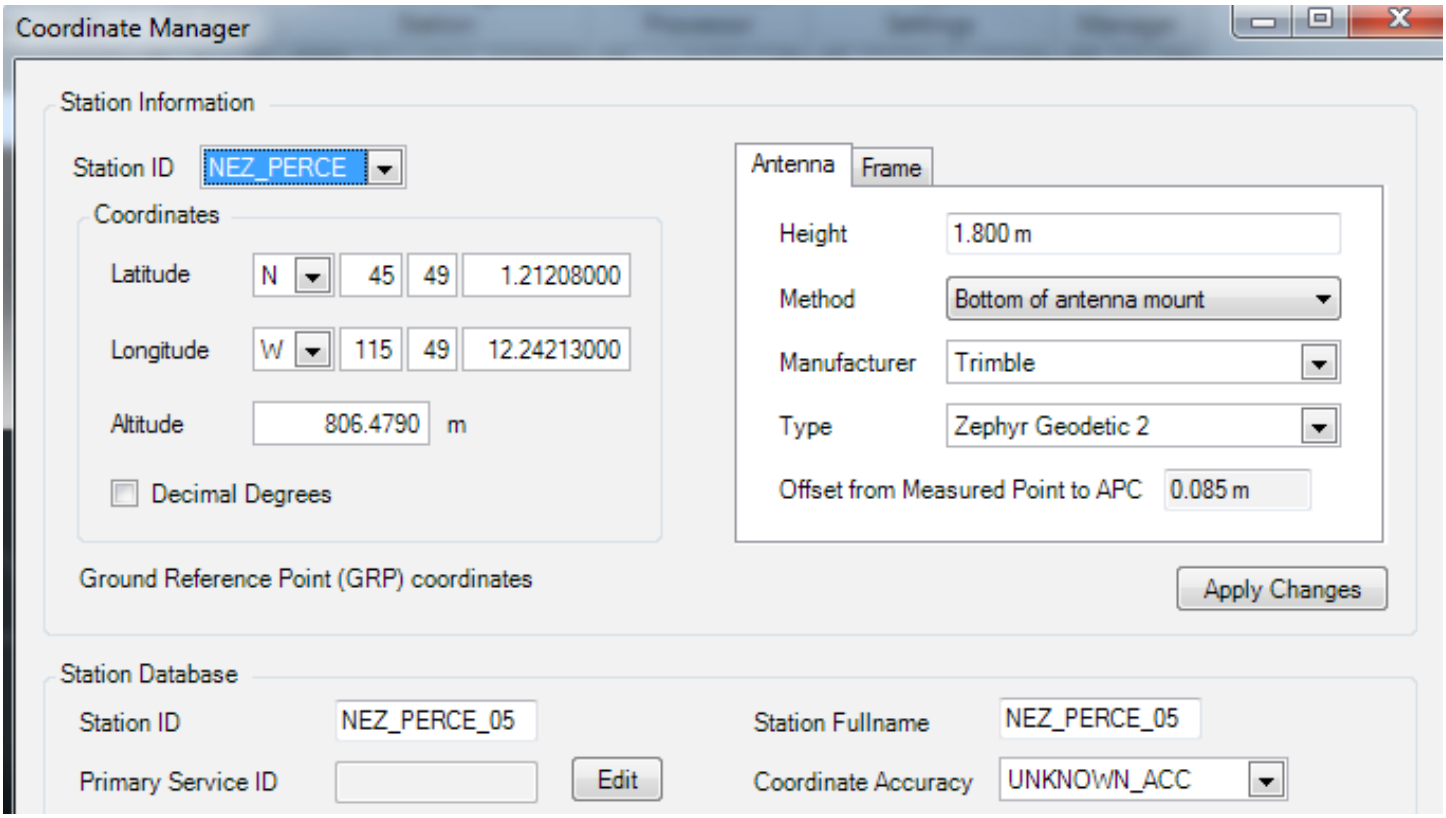
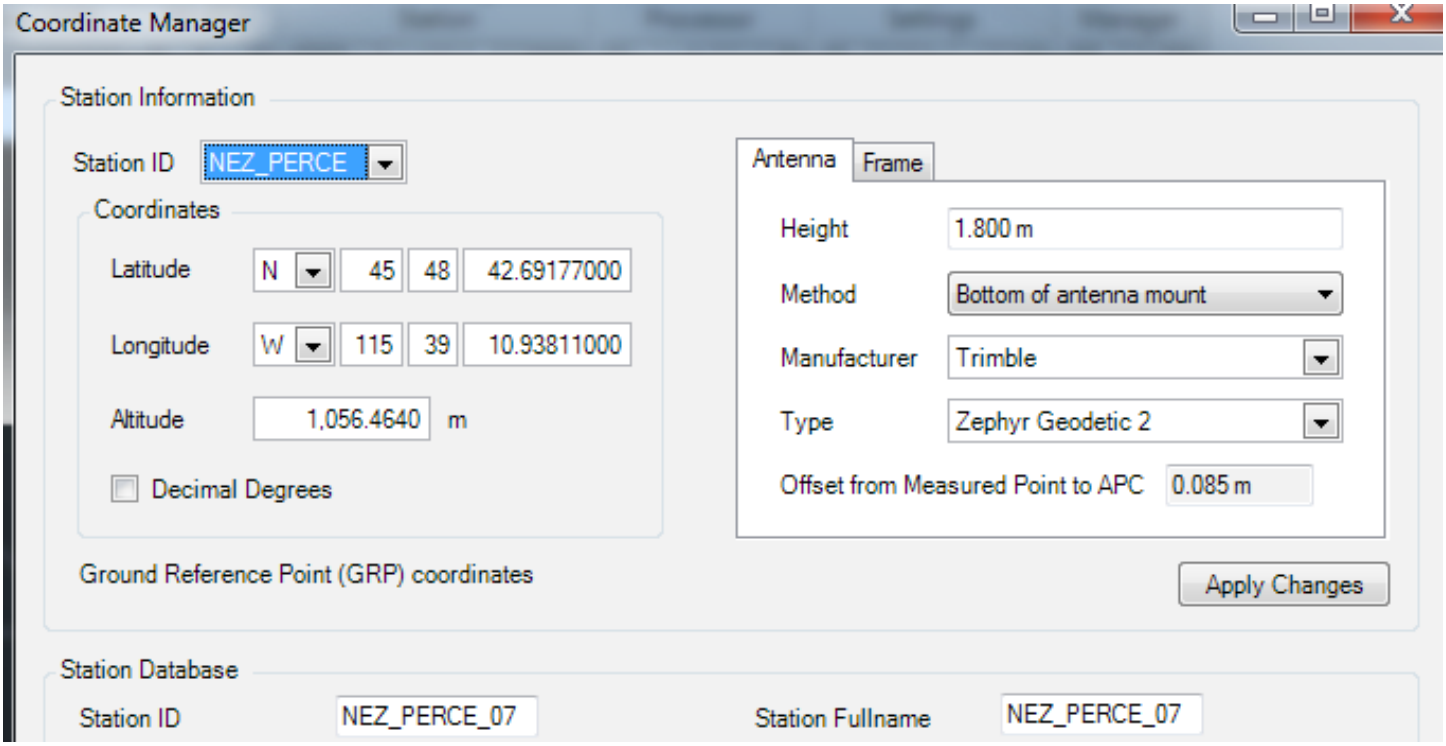
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
580,000
582,000
584,000
586,000
588,000
590,000
592,000
594,000
596,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
45
49
1.21208000
Longitude
W
115
49
12.24213000
Altitude
806.4790
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_05
Station Fullname
NEZ_PERCE_05
Primary Service ID
Edit
Coordinate Accuracy
UNKNOWN_ACC


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
45
48
42.69177000
Longitude
W
115
39
10.93811000
Altitude
1,056.4640
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_07
Station Fullname
NEZ_PERCE_07

Flight Log

Julian Day 310	Flight A

LIDAR Flight Log

Date Nov. 5th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes 2200 @ KLWS
Wind: 050 @ 6knts
Temp: 17 °C
Pressure:
Clouds: clear
Visibility: 10 miles

Aircraft Block Time		
Engine On 1638	Ramp Out	Takeoff 1648
Engine Off 2216	Ramp In	Landing 2213
Total 5.6 hrs	Total hrs	Total 5.4 hrs

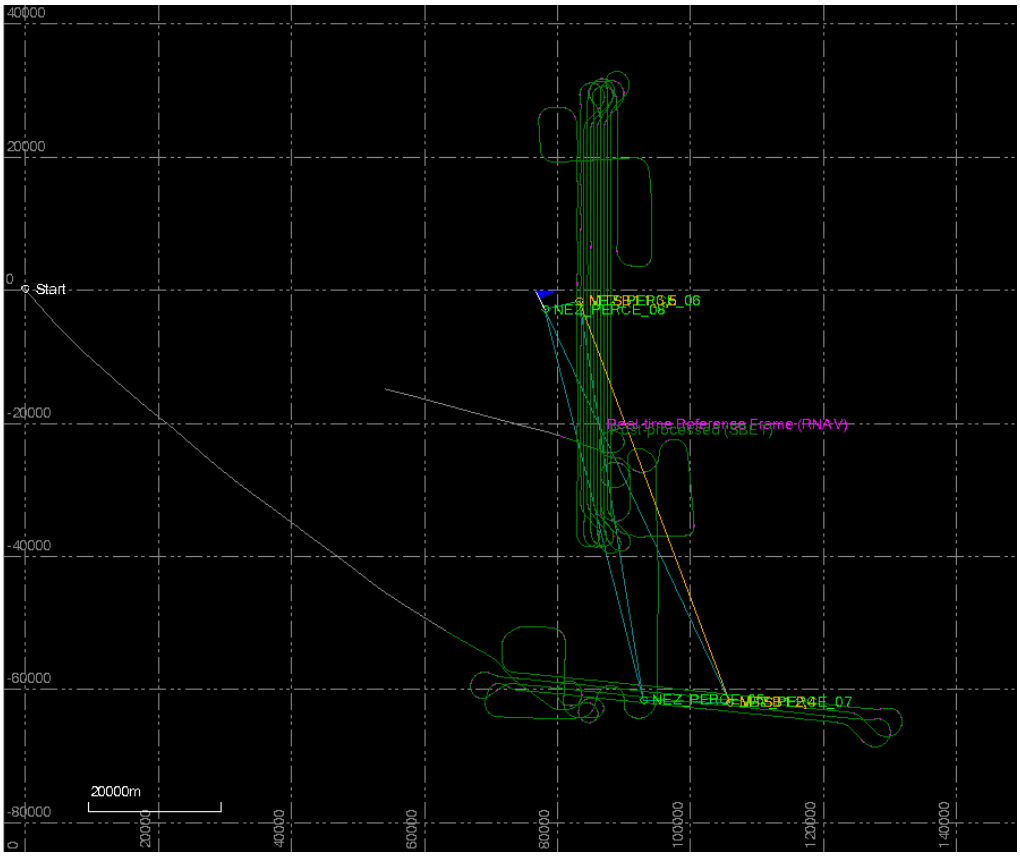
Mission Plan			
AGL Height	2200 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	182 Hz
Laser Current	50 %	FOV	60 Deg's

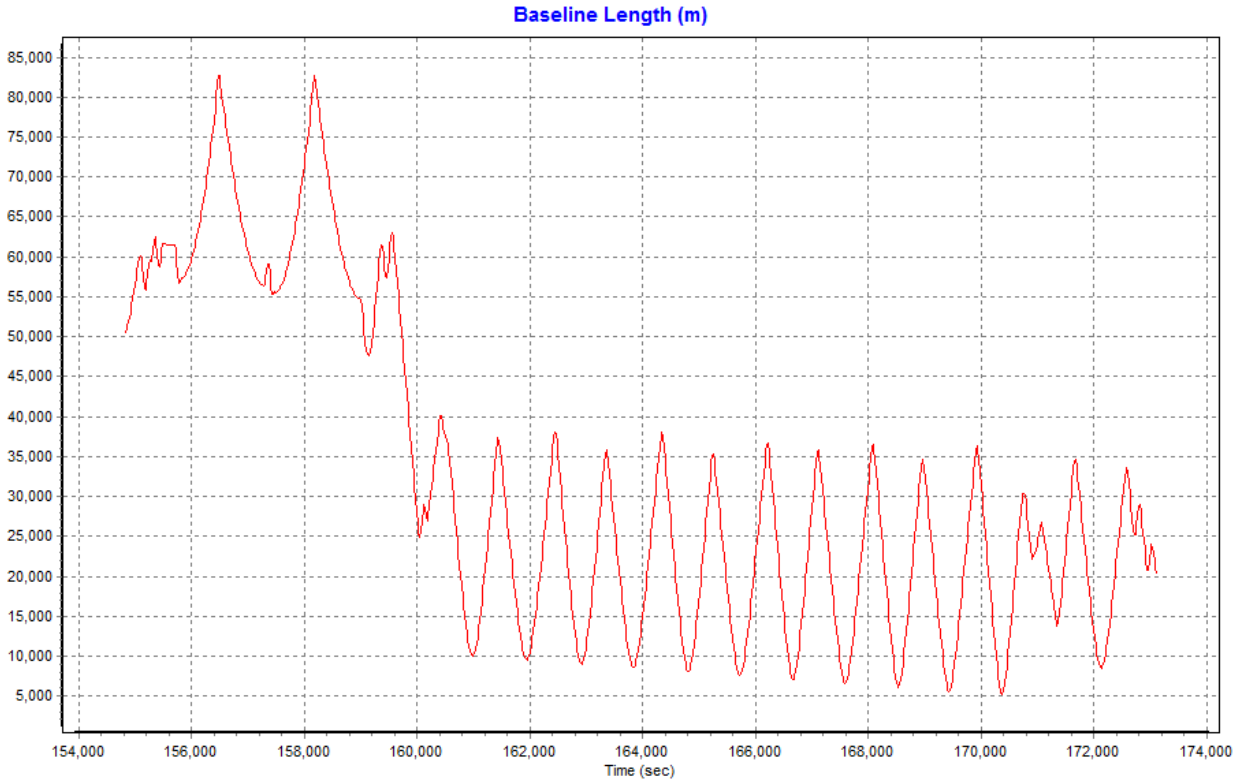
Static Alignment	GPS Time	
	Start	End
Pre Mission	–	–
Post Mission	–	–

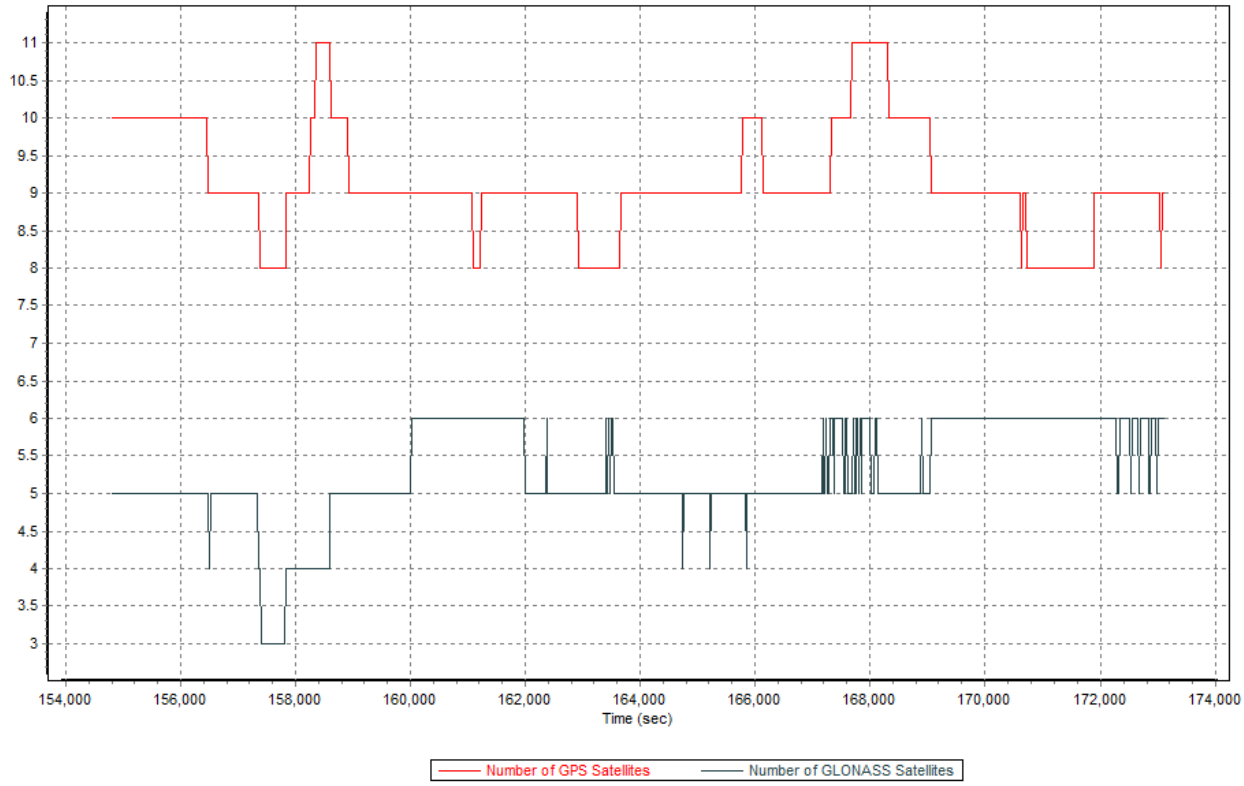
Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161105–
389		276	9900	205805	210313			AOI 16 @ 2200m
388		96	9800	210706	211316			
387		276	9800	211637	212328			V. turbulent @ East ends
–				212335	212344			hit IP
386		96	9400	212650	213615			
XTIE			9900	214212	214327			AOI 16 Lines 389-386

Pg 3 of 3

Nov 7, 2016-A (C-FFRY, SN2221256)


Start
Real-time Reference Frame (RNAV)
20000m


Baseline Length (m)
Time (sec)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9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
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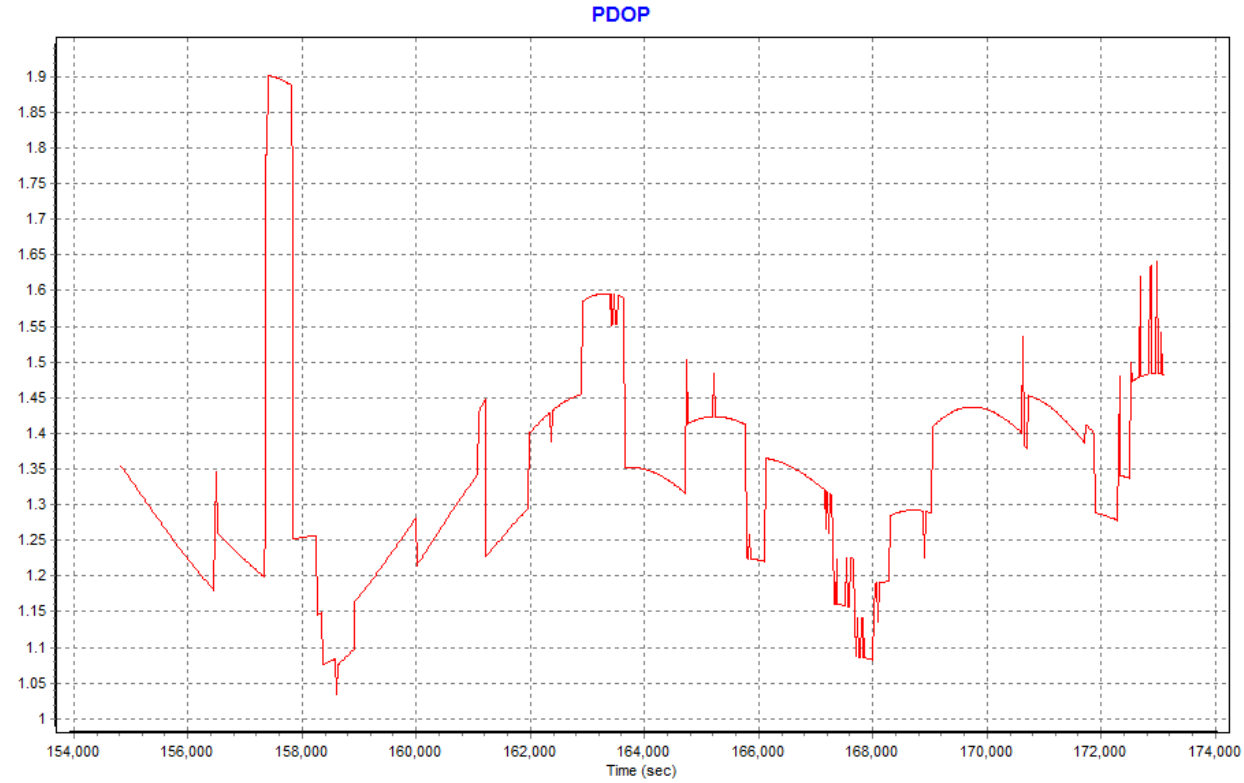
3.5
3
154,000
156,000
158,000
160,000
162,000
164,000
166,000
168,000
170,000
172,000
174,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
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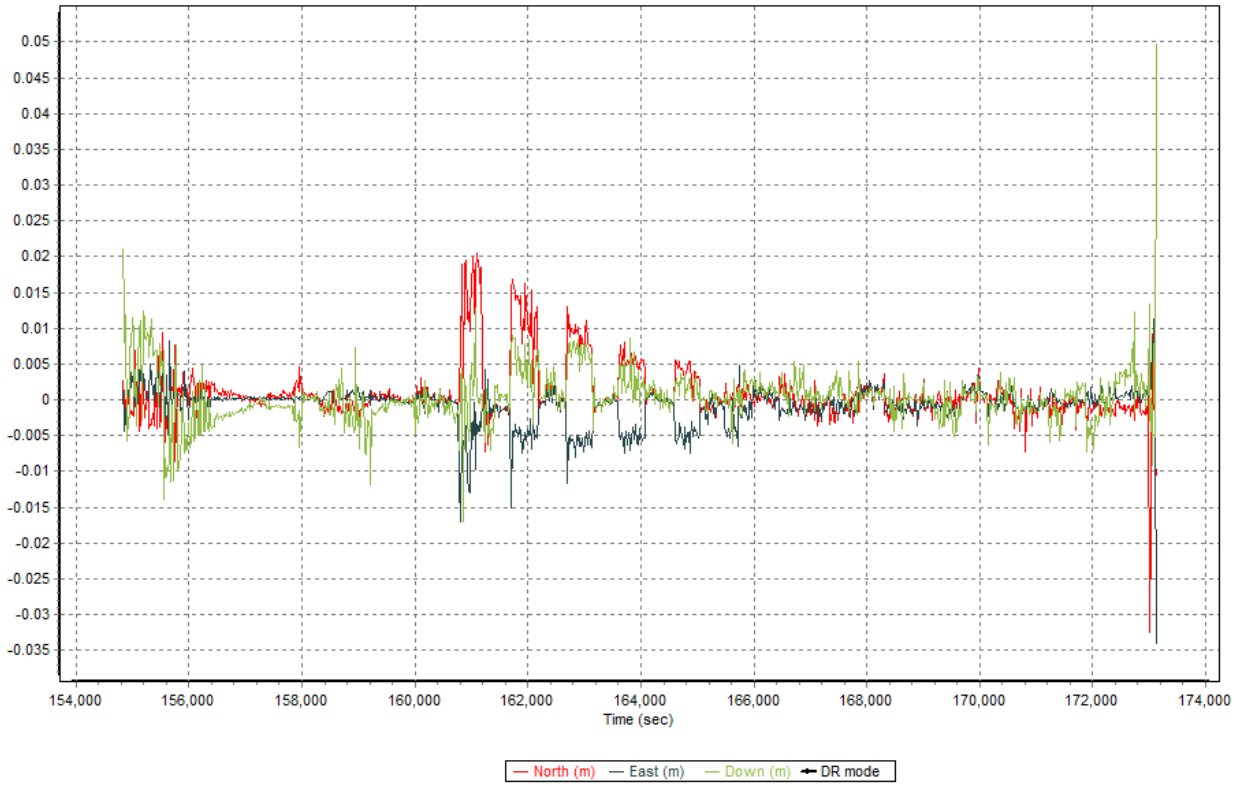
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
154,000
156,000
158,000
160,000
162,000
164,000
166,000
168,000
170,000
172,000
174,000
Time (sec)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0
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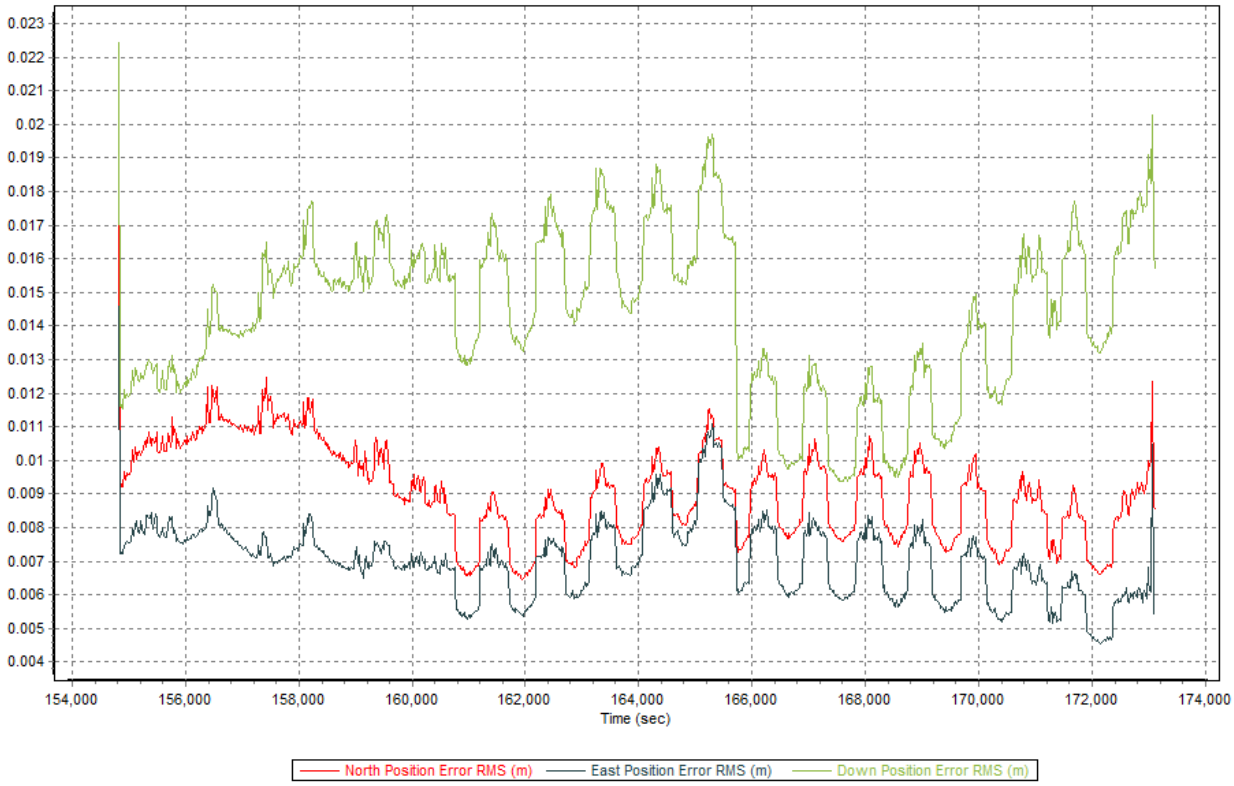
-0.01
-0.015
-0.02
-0.025
-0.03
-0.035
154,000
156,000
158,000
160,000
162,000
164,000
166,000
168,000
170,000
172,000
174,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.019
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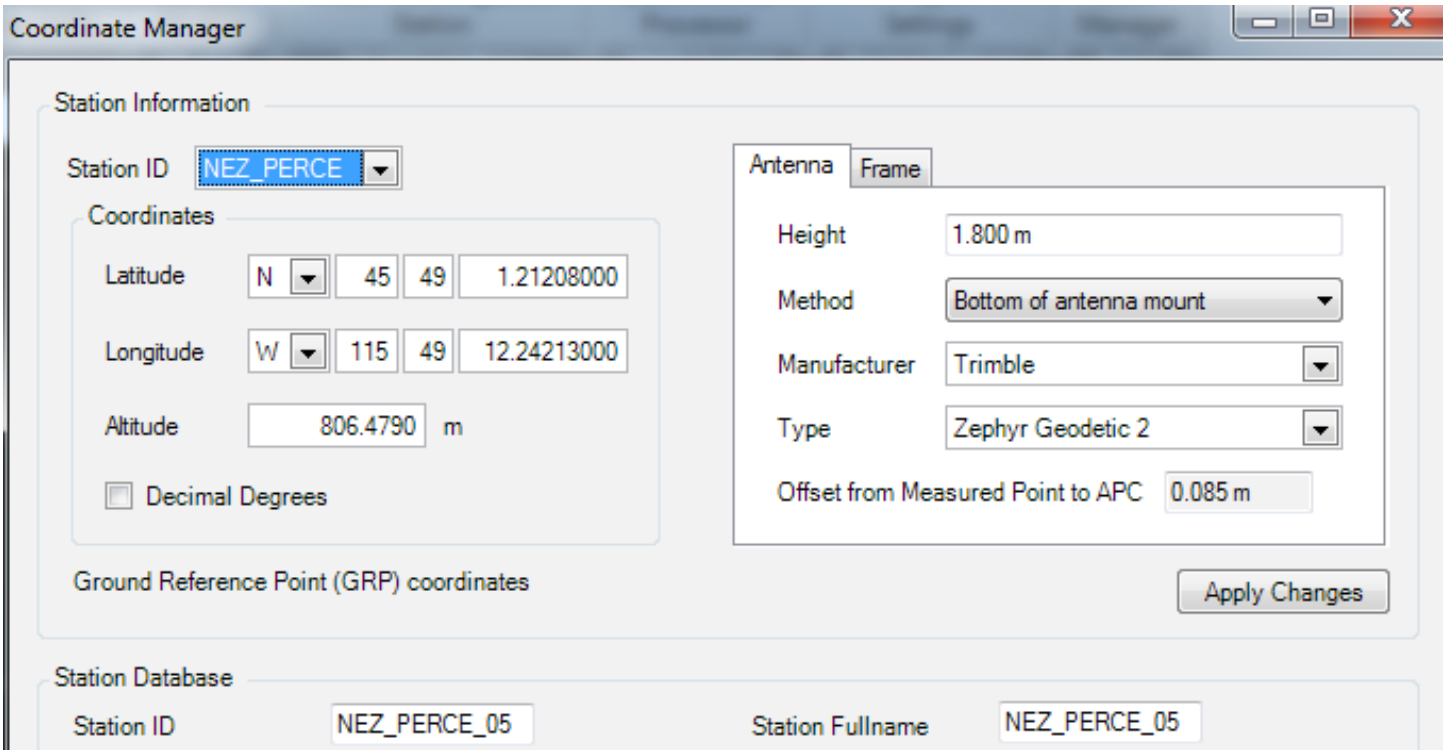
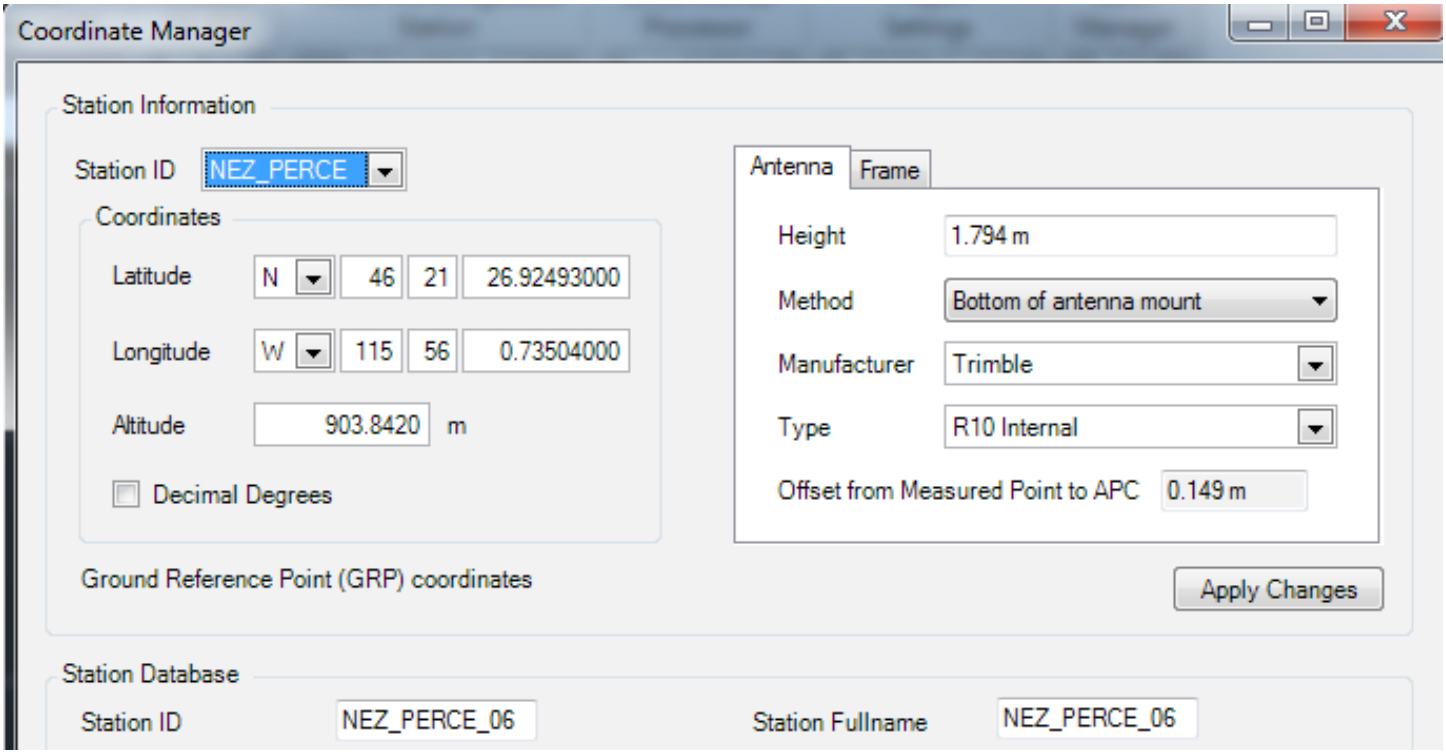
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
154,000
156,000
158,000
160,000
162,000
164,000
166,000
168,000
170,000
172,000
174,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
45
49
1.21208000
Longitude
W
115
49
12.24213000
Altitude
806.4790
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_05
Station Fullname
NEZ_PERCE_05


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
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21
26.92493000
Longitude
W
115
56
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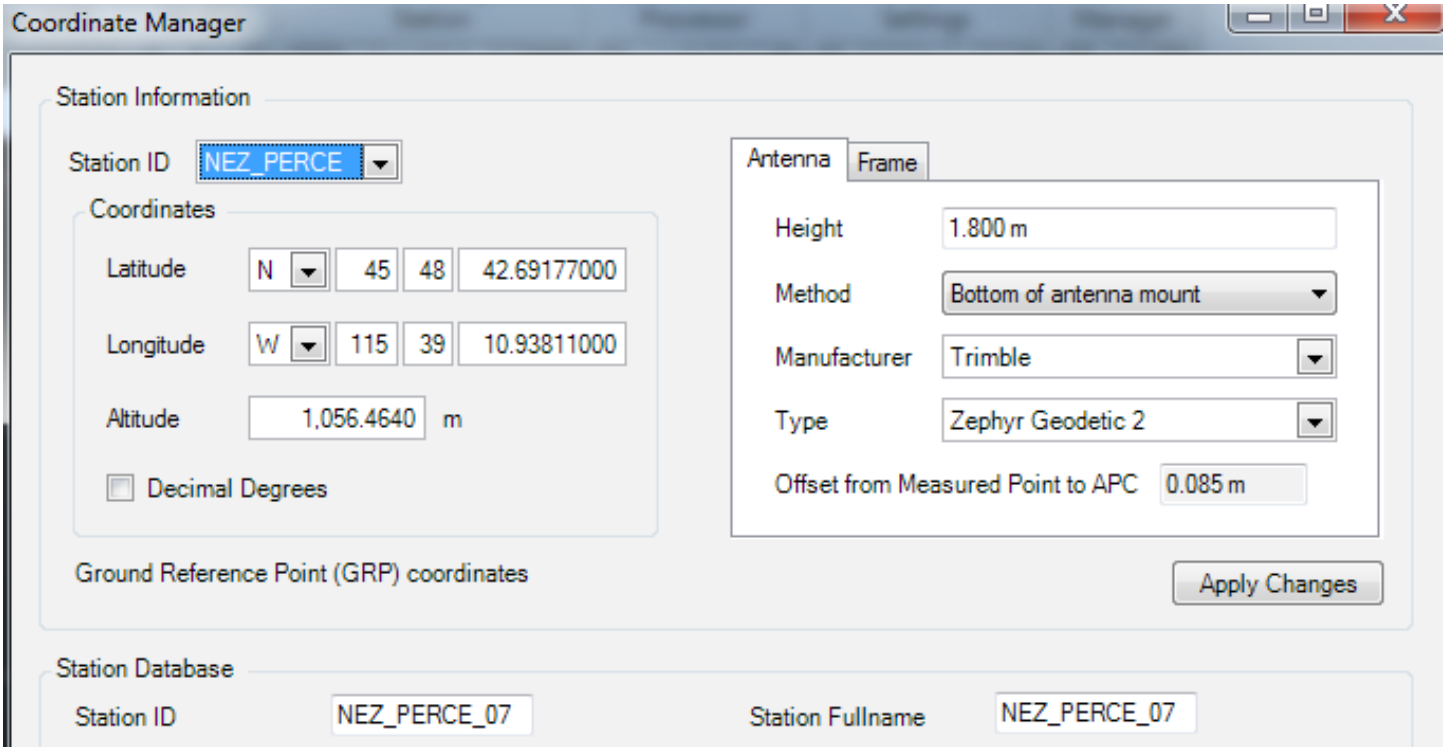
Altitude
903.8420
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.794 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_06
Station Fullname
NEZ_PERCE_06


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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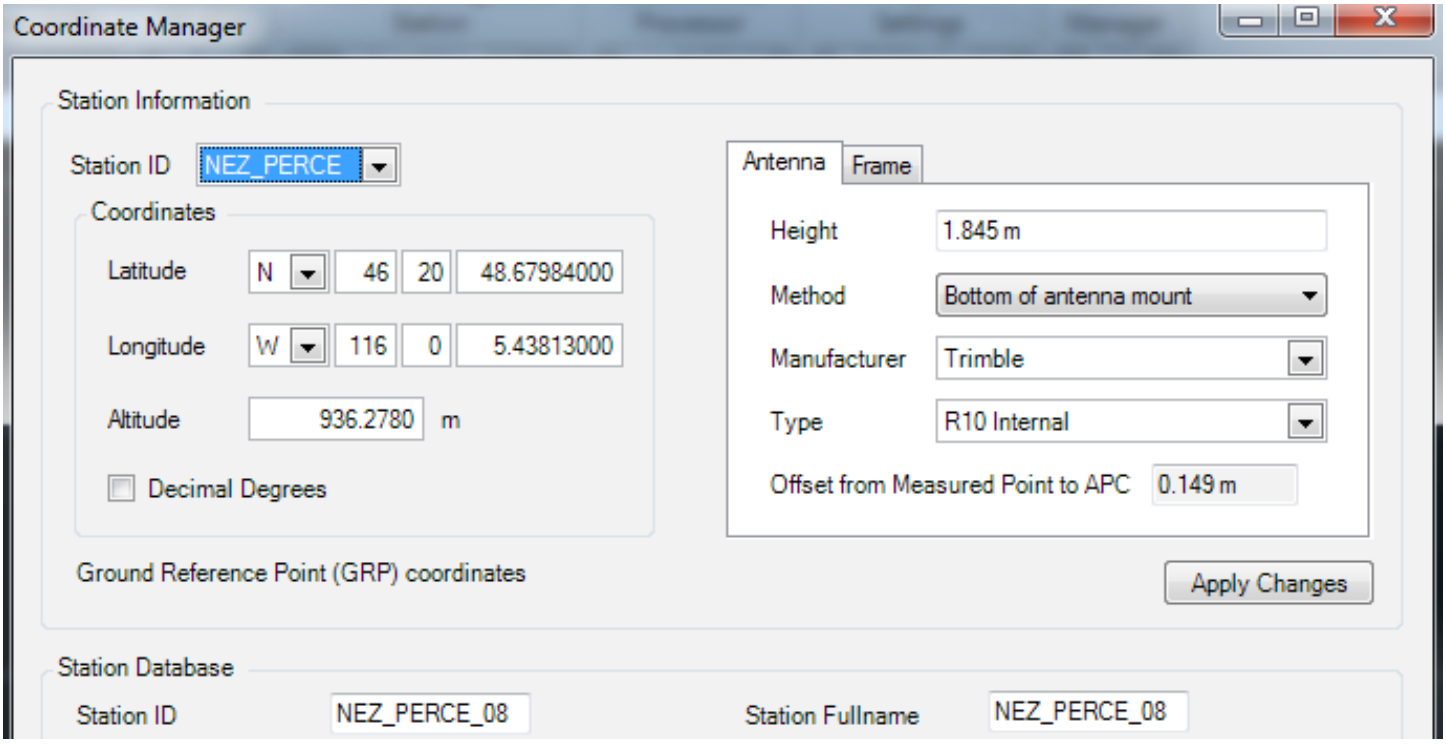
Longitude
W
115
39
10.93811000
Altitude
1,056.4640
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_07
Station Fullname
NEZ_PERCE_07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NEZ_PERCE
Coordinates
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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.845 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_08
Station Fullname
NEZ_PERCE_08

Flight Log

Julian Day	Flight
312	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date NOV 7 2016	Aircraft PA-31 C-FFRY
Project 3119- NEZ PERCE	Pilot B. Harrity
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL1 AOI 04	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes
Temp
Humidity
Altimeter
Terrain Height 438

Aircraft Block Time		
Engine On 18 29	Ramp Out 18:41	Takeoff 18 43
Engine Off 00:31	Ramp In	Landing 00:26
Total 6.0 hrs	Total hrs	Total 5.7 hrs

Mission Plan			
AGL Height	1900 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	20:26	20:36
Post Mission	INFLIGHT	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		20:26	20:36				WAKE UP IMU
316	5416312 06	0	7800'	20:37	20:48			161107-203708	
315	07	180	↓	20:52	21:05			205245	
314	08	0	↓	21:09	21:20			210919	
313	09	180	7800'	21:24	21:37			212438	ERROR @ END OF LINE
313	* SOF FILE '161107_212438_2' FINISHED UNSUCCESSFULLY WITH STATE 'CORRUPT'								RE-FLY @ END MISSION !!
312	5416312 10	0	7800'	21:40	21:52			214055	
311	11	180	↓	21:56	22:08			215610	
310	12	0	↓	22:11	22:23			221154	
309	13	180	↓	22:27	22:39			222717	
308	14	0	↓	22:43	22:54			224303	
307	15	180	↓	22:58	23:10			225806	
306	16	0	↓	23:13	23:24			231347	
XTIE 2	17	90	↓	23:28	23:30			232847	LINES 306-318 W→E
318	5416312 18	0	7800'	23:36	23:39			233637	RE-FLY NORTH 87 ONLY

Pg 2 of 3

Julian Day 312	Flight A

LIDAR Flight Log 5416312A

AIRBORNE IMAGING
A Clean Harbors Company

Date Nov. 7 2016	Aircraft **PA-31 C-FFRY**
Project 319_NEZPERCE	Pilot B. Harrity
Location LEWISTON	Operator **B. Whiteley**
Mission Objective	
BLOCK QL1 AOI 04	

System	**Riegl Q1560**
Unit	**2221256**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes	0010
Temp	13
Humidity	
Altimeter	30 28
Terrain Height	438

Aircraft Block Time		
Engine On 18:29	Ramp Out 18:41	Takeoff 18:43
Engine Off 00:31	Ramp In	Landing 00 26
Total 6.0 **hrs**	Total **hrs**	Total 5.7 **hrs**

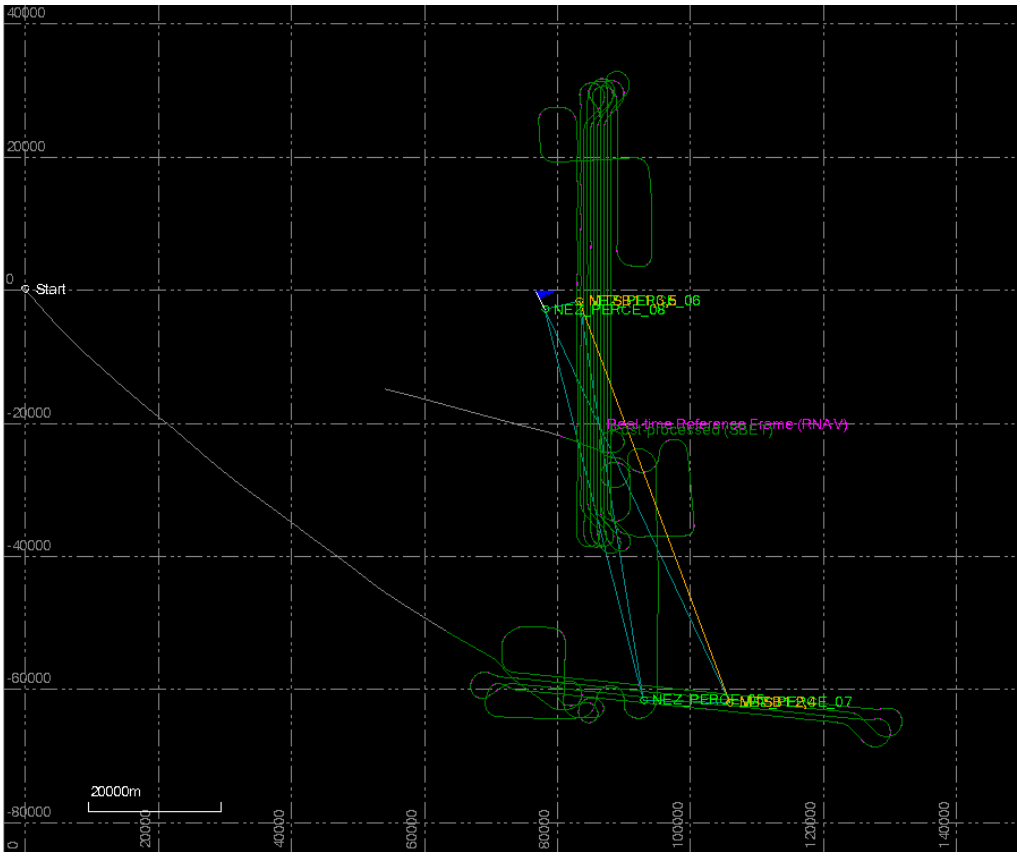
Mission Plan			
AGL Height 1900	**m**	Pulse Rate 800	**KHz**
Target Speed 160	**kts**	Scan Rate 195	**Hz**
Laser Current 50	**%**	FOV 60	**Deg's**

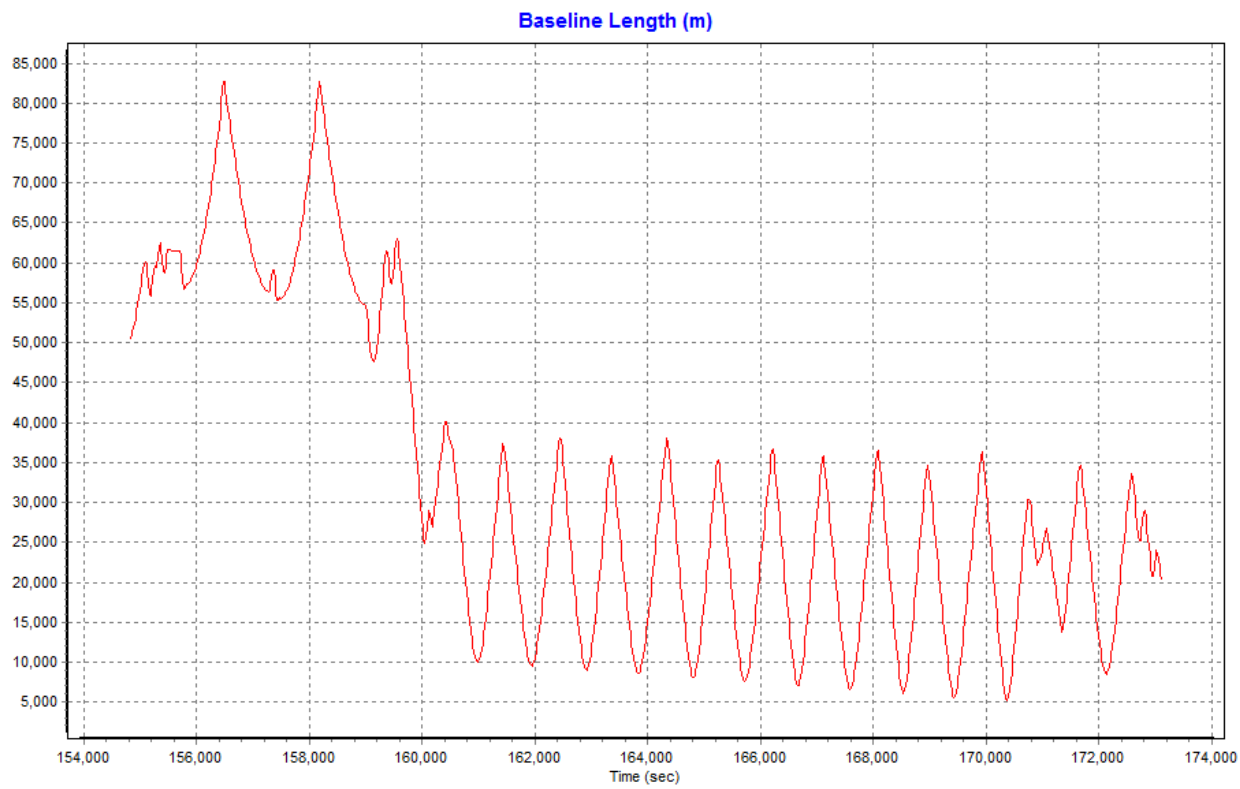
Static Alignment	GPS Time	
	Start	End
Pre Mission	IN FLIGHT	
Post Mission	23 58	00 04

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
313	5416312 19	180	7800'	23:43	23:55			161107_234301	RE FLY LINE FROM EARLIER
FIGURE 8		↷		23:58	00 04				CLOSE OFF SURVEY.

Pg 3 of 3

Nov 7, 2016-A (C-FFRY, SN2221256)


Start
Real-time Reference Frame (RNAV)
20000m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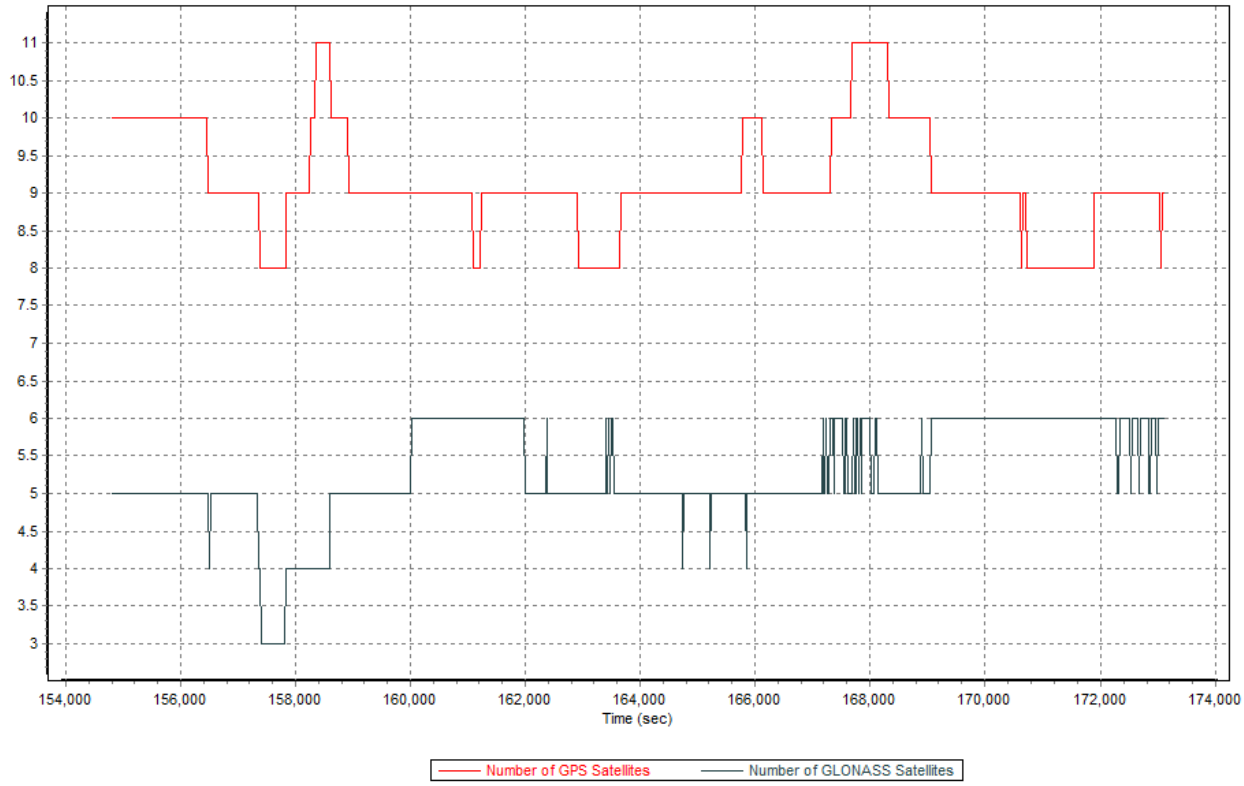
Time (sec)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5
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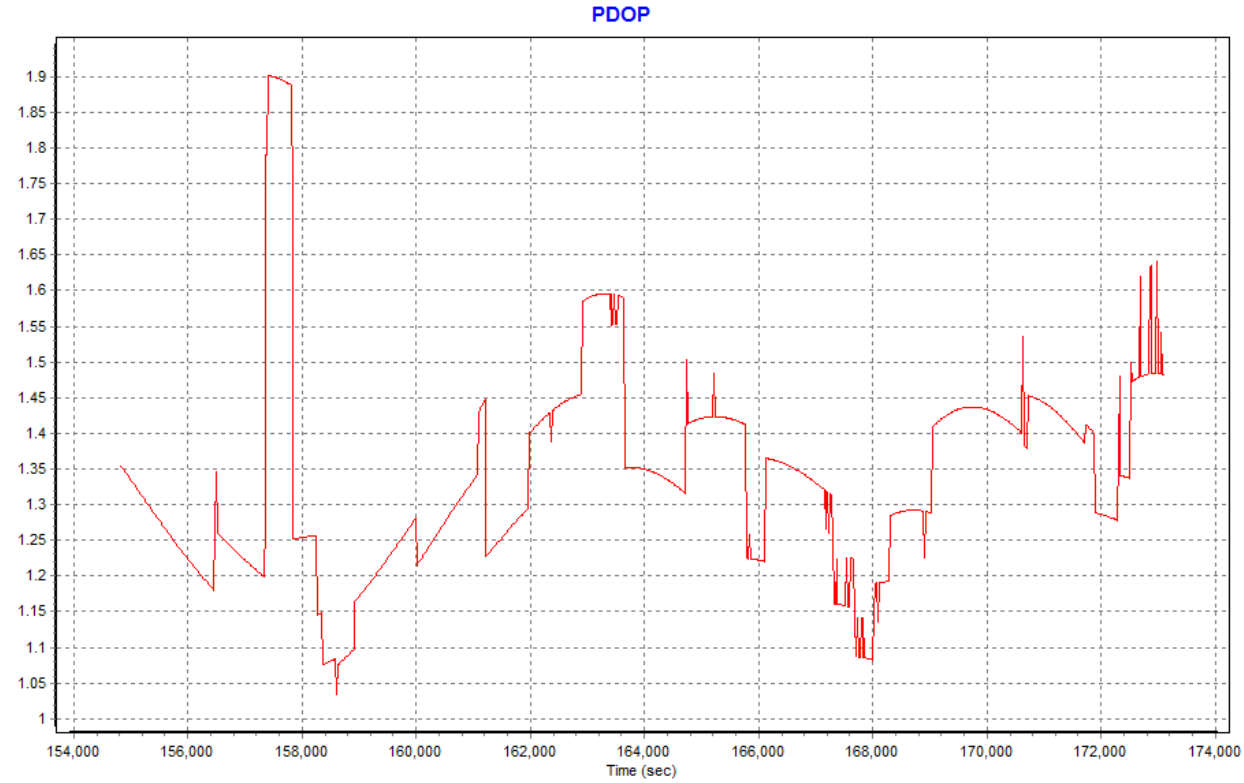
3.5
3
154,000
156,000
158,000
160,000
162,000
164,000
166,000
168,000
170,000
172,000
174,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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1.75
1.7
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1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
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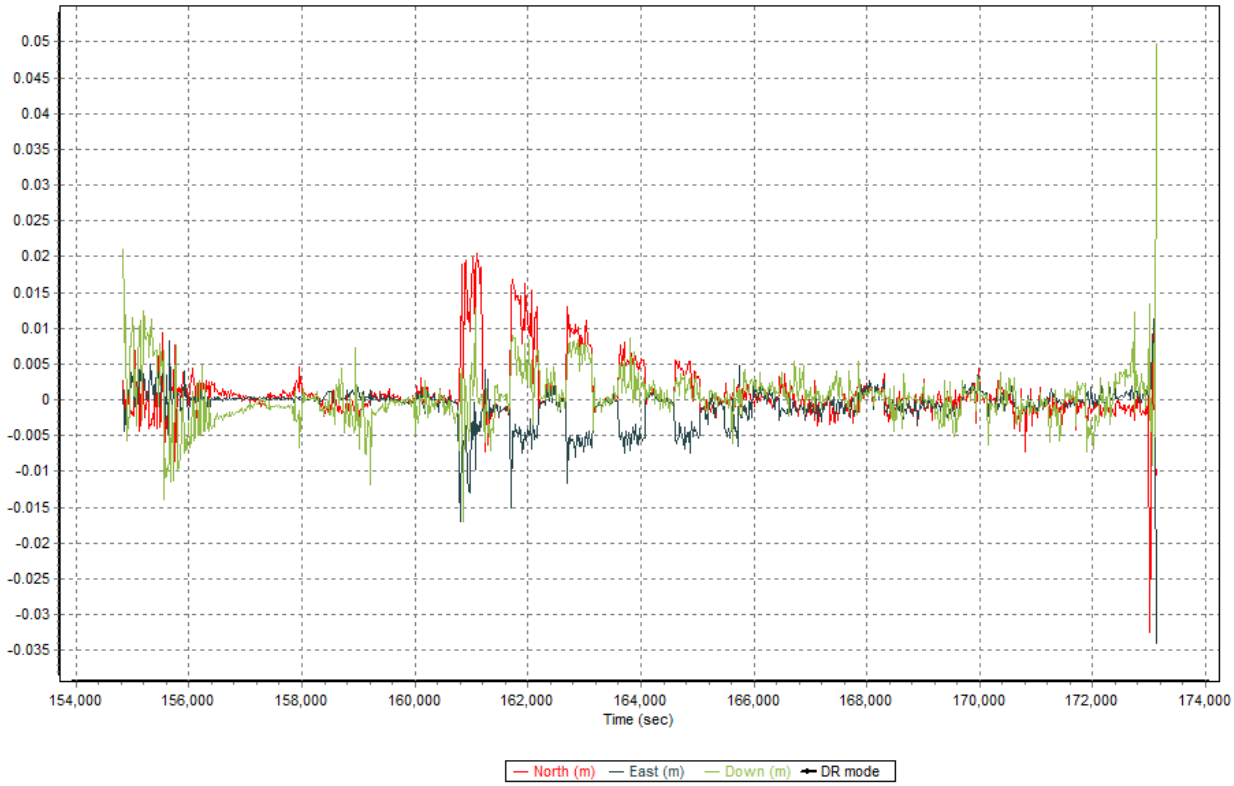
168,000
170,000
172,000
174,000
Time (sec)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0.04
0.035
0.03
0.025
0.02
0.015
0.01
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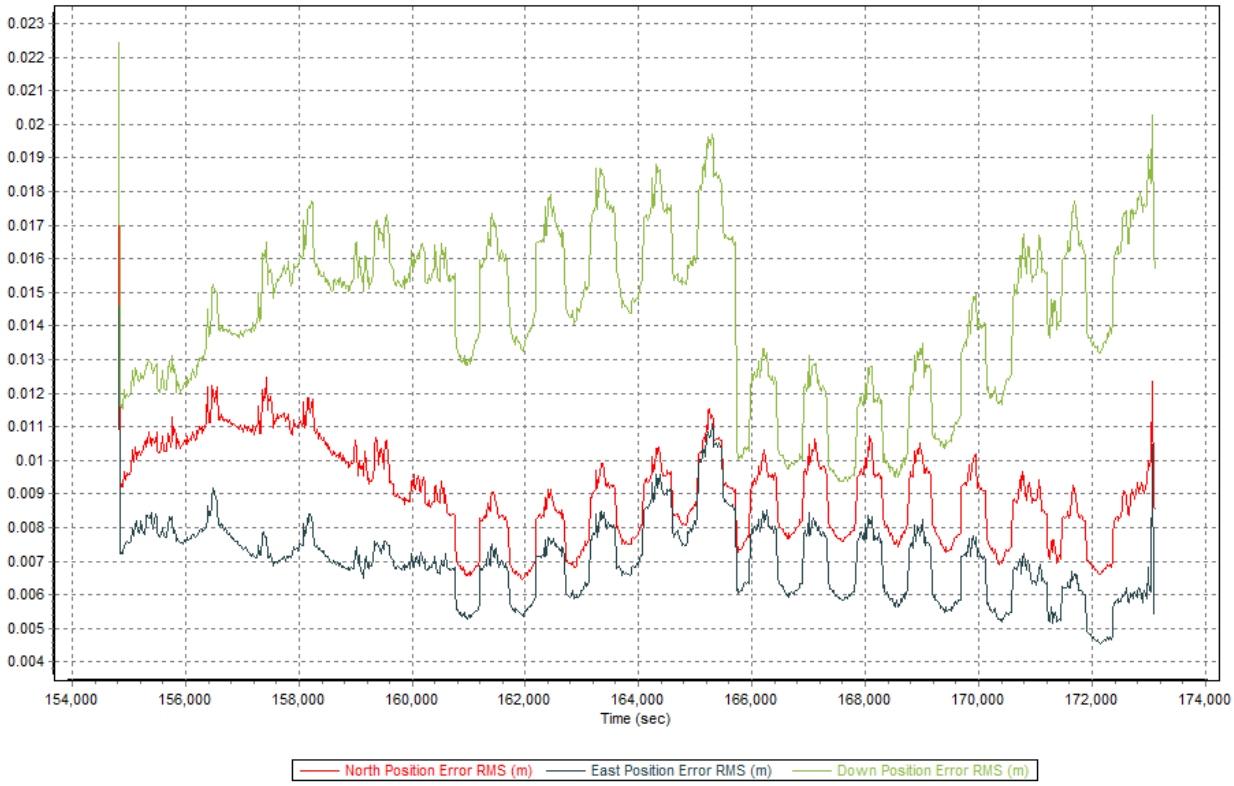
0
-0.005
-0.01
-0.015
-0.02
-0.025
-0.03
-0.035
154,000
156,000
158,000
160,000
162,000
164,000
166,000
168,000
170,000
172,000
174,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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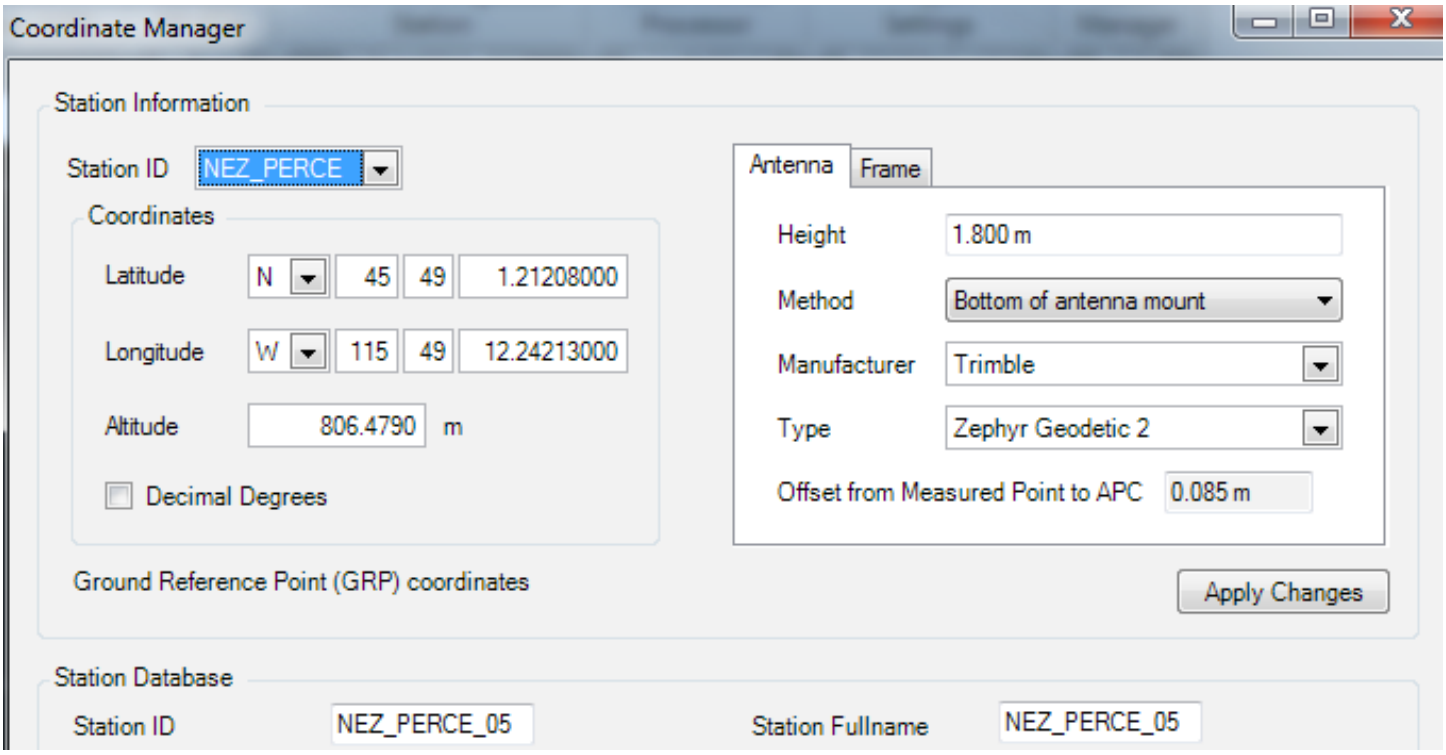
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
154,000
156,000
158,000
160,000
162,000
164,000
166,000
168,000
170,000
172,000
174,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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Station Information
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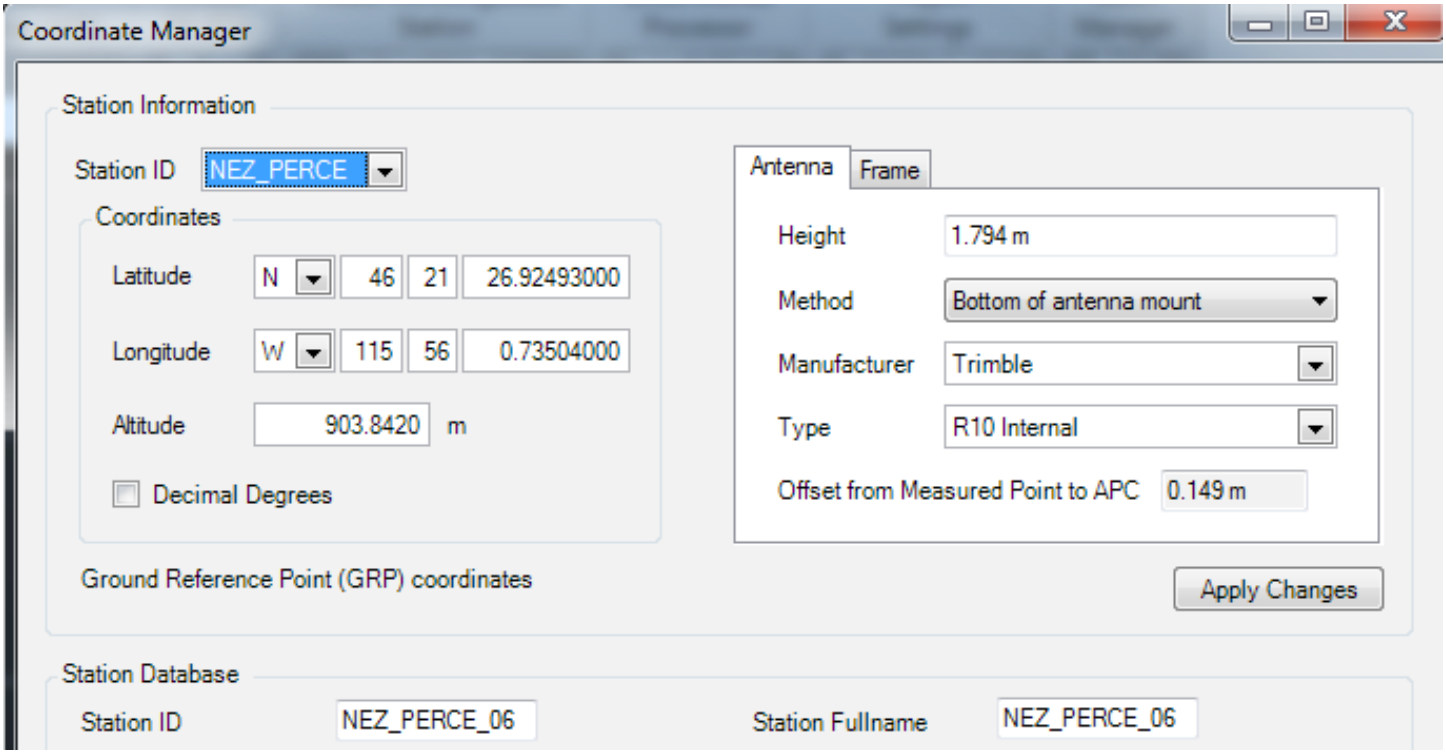
NEZ_PERCE
Coordinates
Latitude
N
45
49
1.21208000
Longitude
W
115
49
12.24213000
Altitude
806.4790
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_05
Station Fullname
NEZ_PERCE_05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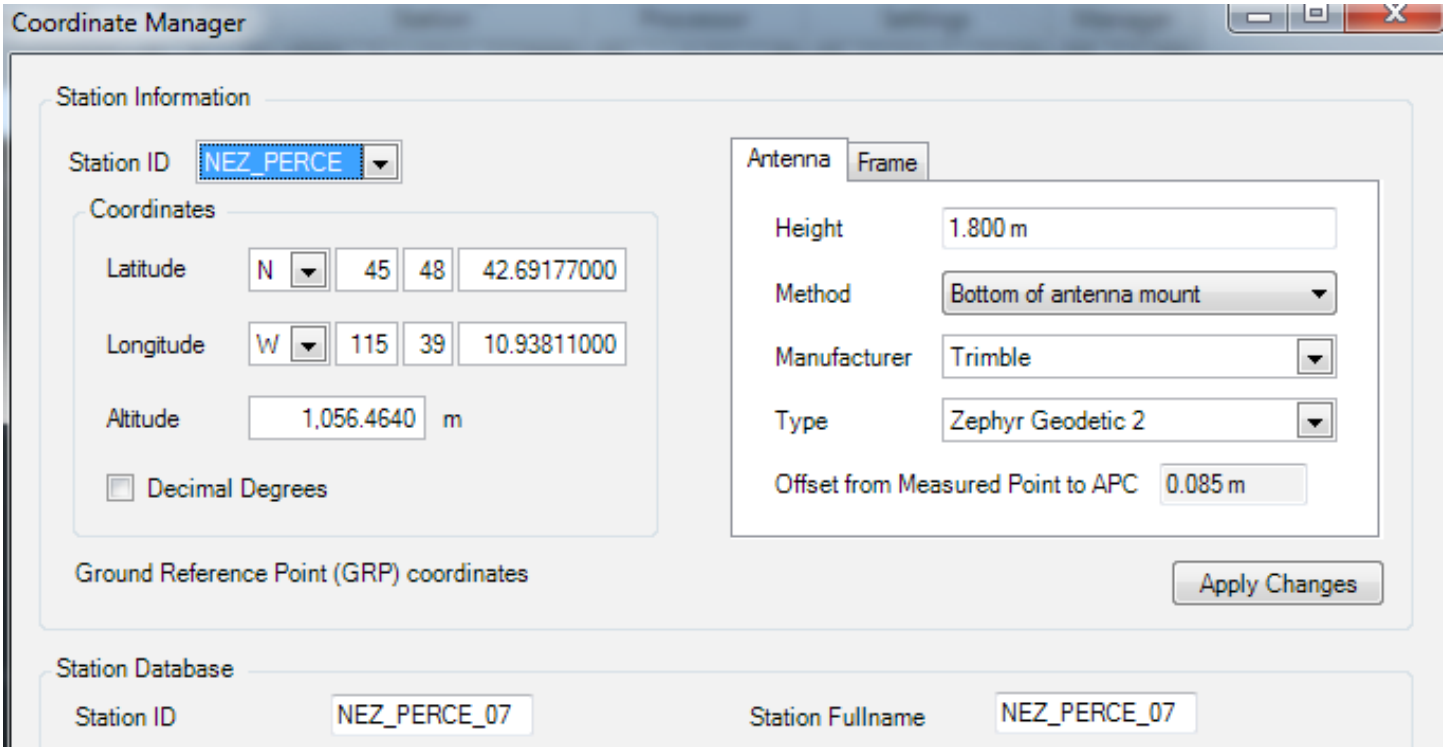
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
21
26.92493000
Longitude
W
115
56
0.73504000
Altitude
903.8420
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.794 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_06
Station Fullname
NEZ_PERCE_06


Coordinate Manager
Station Information
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48
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Longitude
W
115
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Altitude
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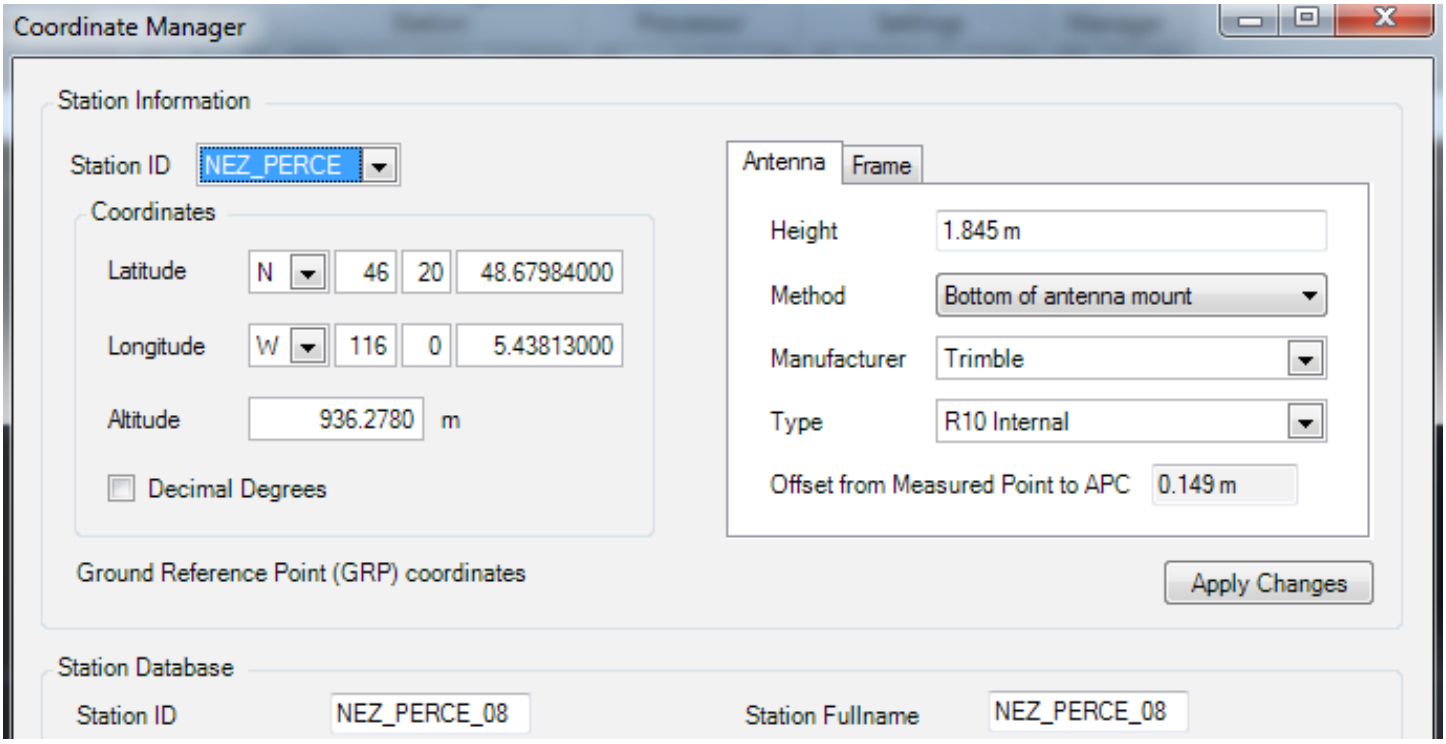
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_07
Station Fullname
NEZ_PERCE_07


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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46
20
48.67984000
Longitude
W
116
0
5.43813000
Altitude
936.2780
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.845 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_08
Station Fullname
NEZ_PERCE_08

Flight Log

LIDAR Flight Log

AIRBORNE HYDROGRAPHIC
A Clean Harbors Company

Julian Day	312	Flight	A

Date	Nov 7 2016	Aircraft	PA-31 C-FFRY
Project	3.9. NEZ PERCE	Pilot	B. HARRIS
Location	LEWISTON	Operator	B. Whiteley
Mission Objective	Block QL2 AOI 09		

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	3
Scanner 2 Drive	B2

Additional Notes [illegible]

Temp [illegible]
Humidity [illegible]
Altimeter [illegible]
Terrain Height [illegible]

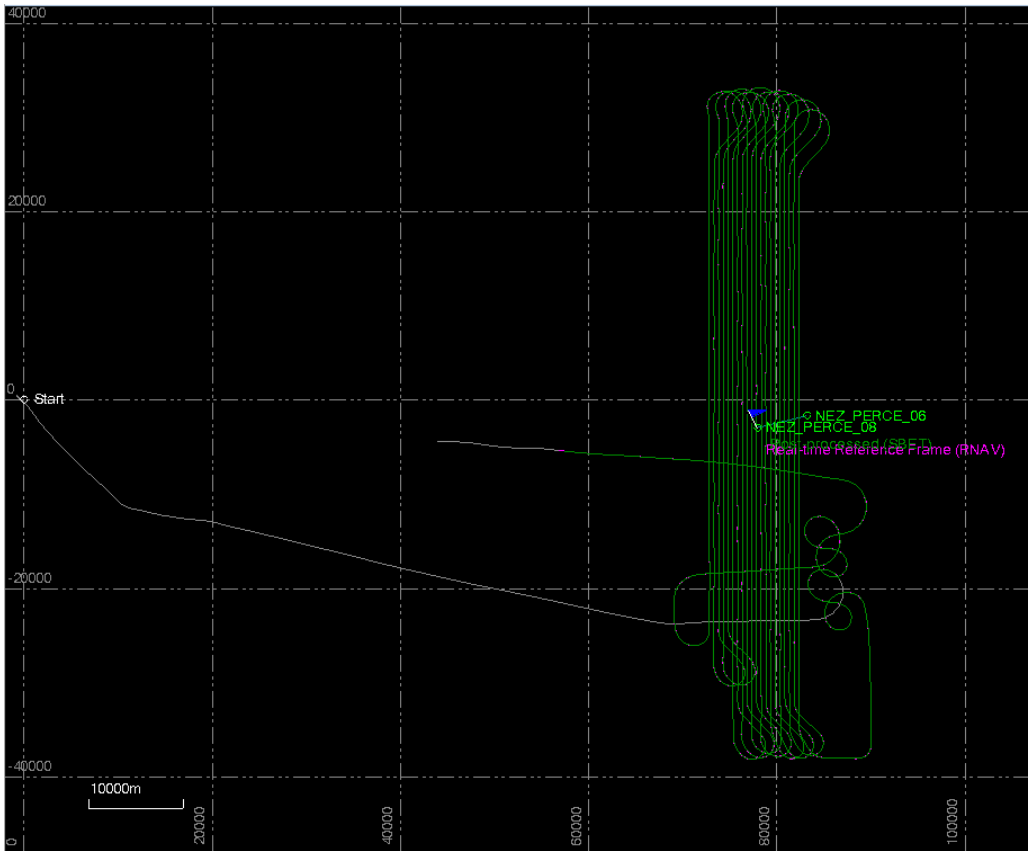
Aircraft Block Time			
Engine On	18 29	Ramp Out	18 41
Engine Off	20 31	Ramp In	
Total	6° hrs	Total	hrs
Takeoff	18 43		
Landing	00 26		
Total	5 7 hrs		

Mission Plan							
AGL Height	2200	m	Pulse Rate	800	KHz	Static Alignment	GPS Time Start / End
Target Speed	160	kts	Scan Rate	122	Hz	Pre Mission	[illegible]
Laser Current	50	%	FOV	60	Deg's	Post Mission	

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		19:04	19:12				WAKE UP IMU
385	5416312 01	95°	9400'	19:17	19 26		191707	161107_191707	
384	02	275°	9400'	19 30	19 41			193024	
383	03	95°	9300'	19 44	19:54			194450	
382	04	275°	9300'	19 58	20 09			195830	
XTIE 1	05	185°	9400'	20:13	20:15			201335	XTIE 377→385 N-S
S TURN		↷		20:15	20:20				CLOSE OFF SURVEY

Pg 1 of 3

Nov 8, 2016-A (C-FFRY, SN2221256)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-20000
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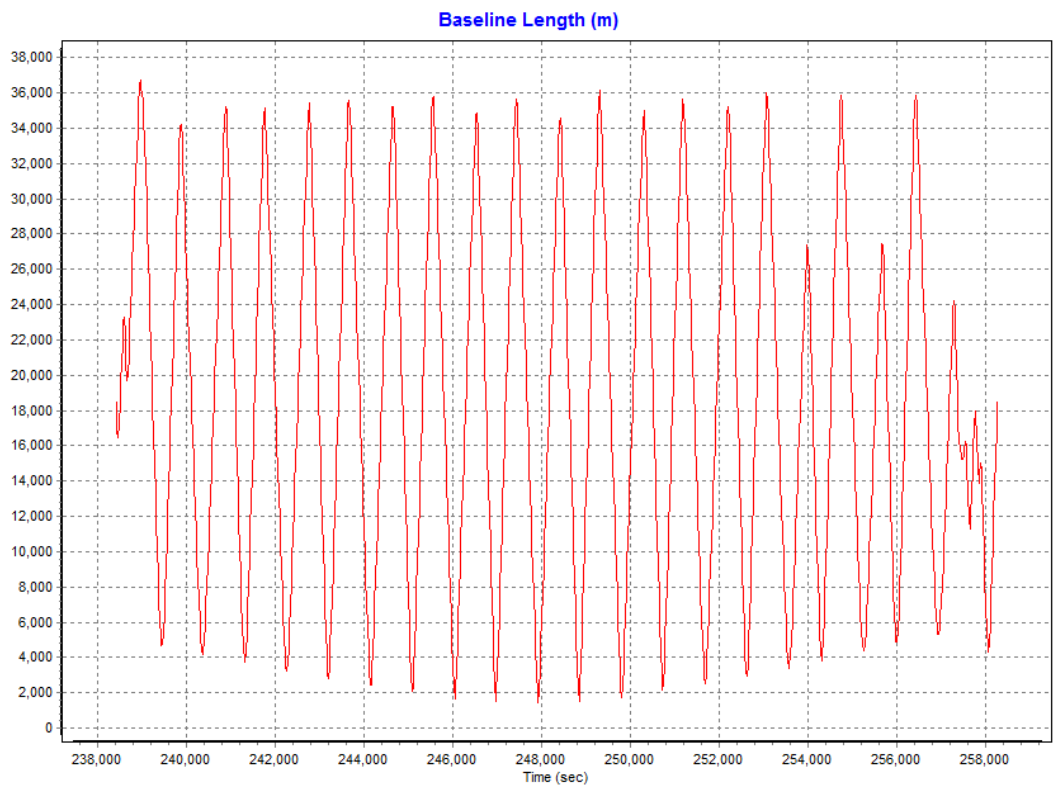
Start
NEZ_PERCE_06
NEZ_PERCE_08
Real-time Reference Frame (RNAV)
10000m
0
20000
40000
60000
80000
100000


Baseline Length (m)
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36,000
34,000
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26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
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244,000
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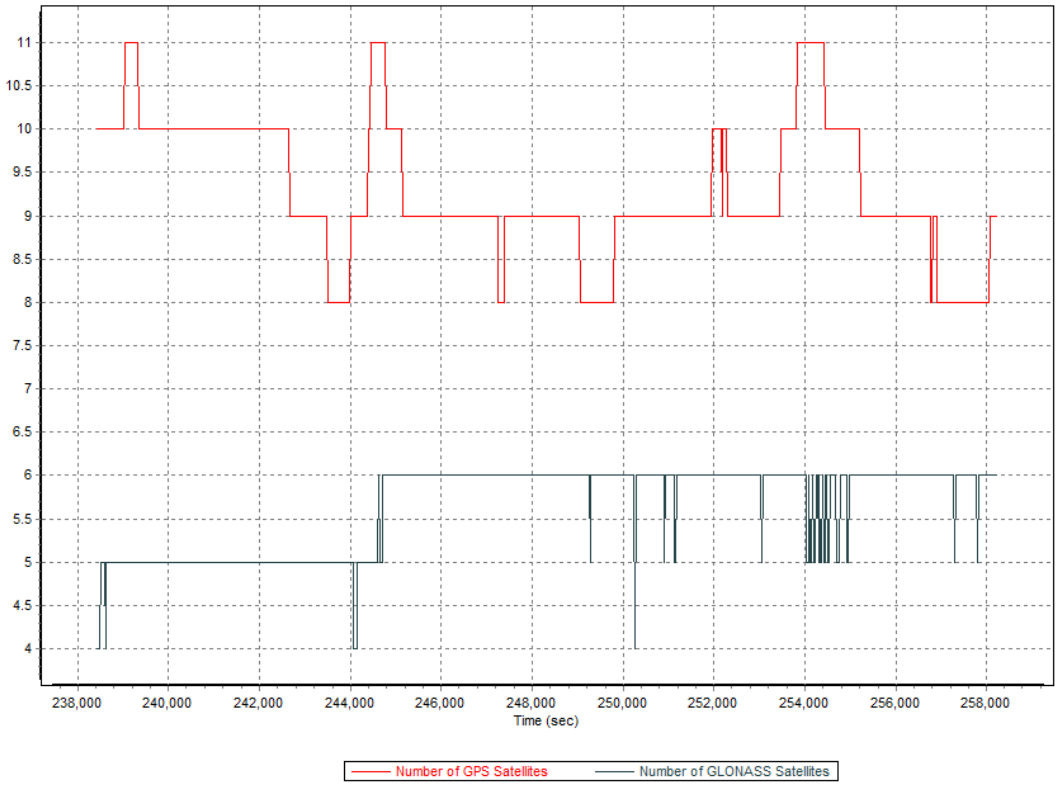
248,000
250,000
252,000
254,000
256,000
258,000
Time (sec)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9.5
9
8.5
8
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6.5
6
5.5
5
4.5
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240,000
242,000
244,000
246,000
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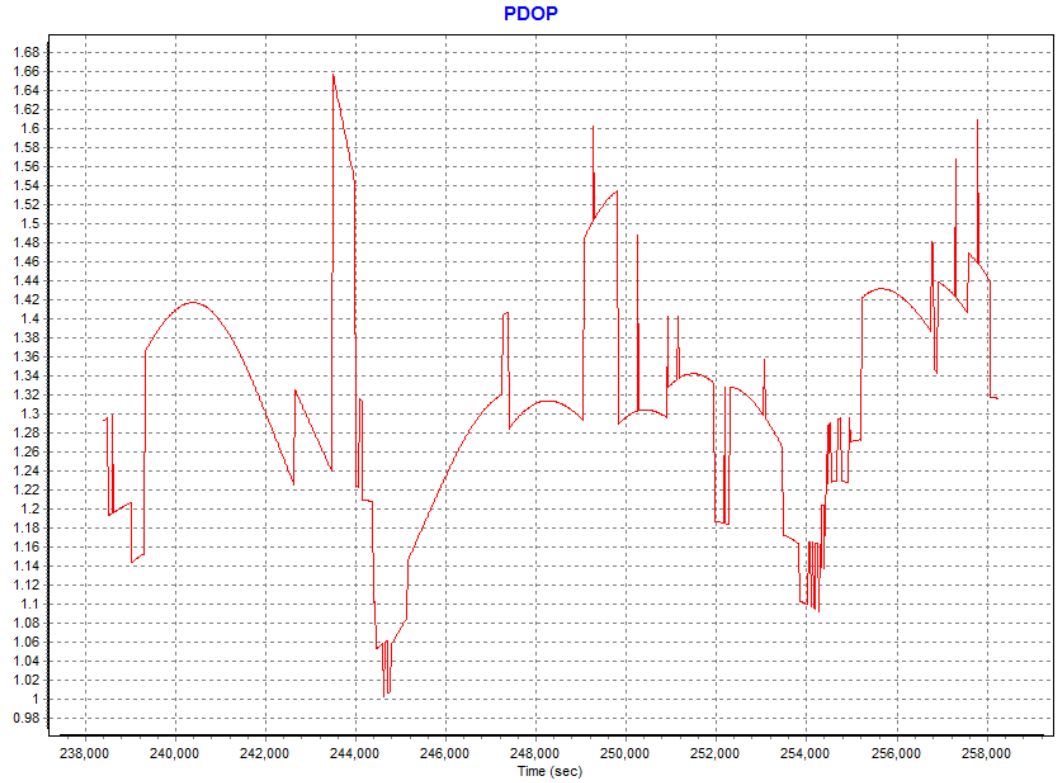
250,000
252,000
254,000
256,000
258,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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1.34
1.32
1.3
1.28
1.26
1.24
1.22
1.2
1.18
1.16
1.14
1.12
1.1
1.08
1.06
1.04
1.02
1
0.98
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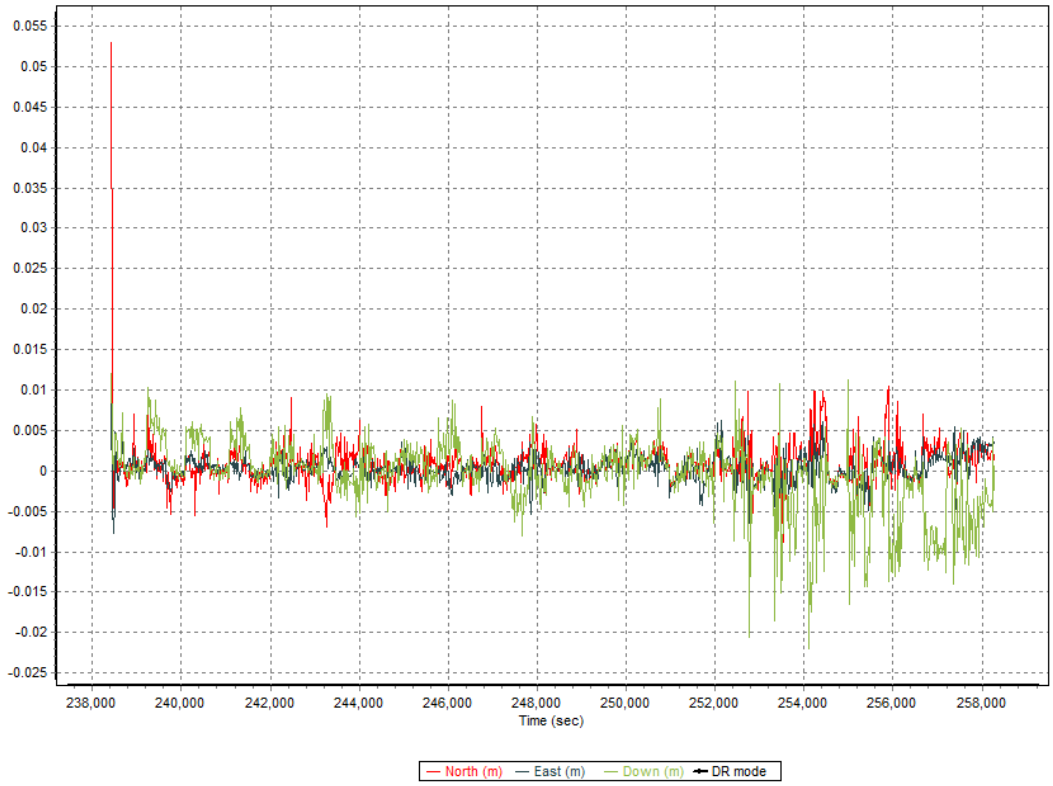
250,000
252,000
254,000
256,000
258,000
Time (sec)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238,000
240,000
242,000
244,000
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254,000
256,000
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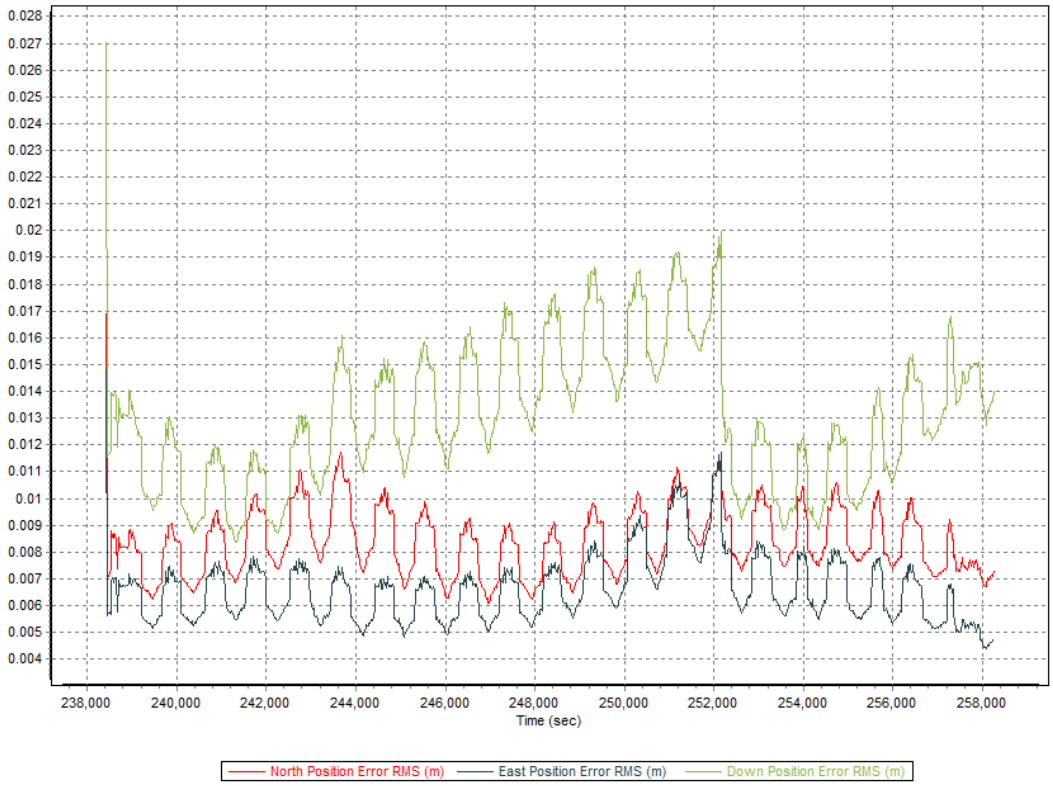
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.014
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0.012
0.011
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0.009
0.008
0.007
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0.005
0.004
238,000
240,000
242,000
244,000
246,000
248,000
250,000
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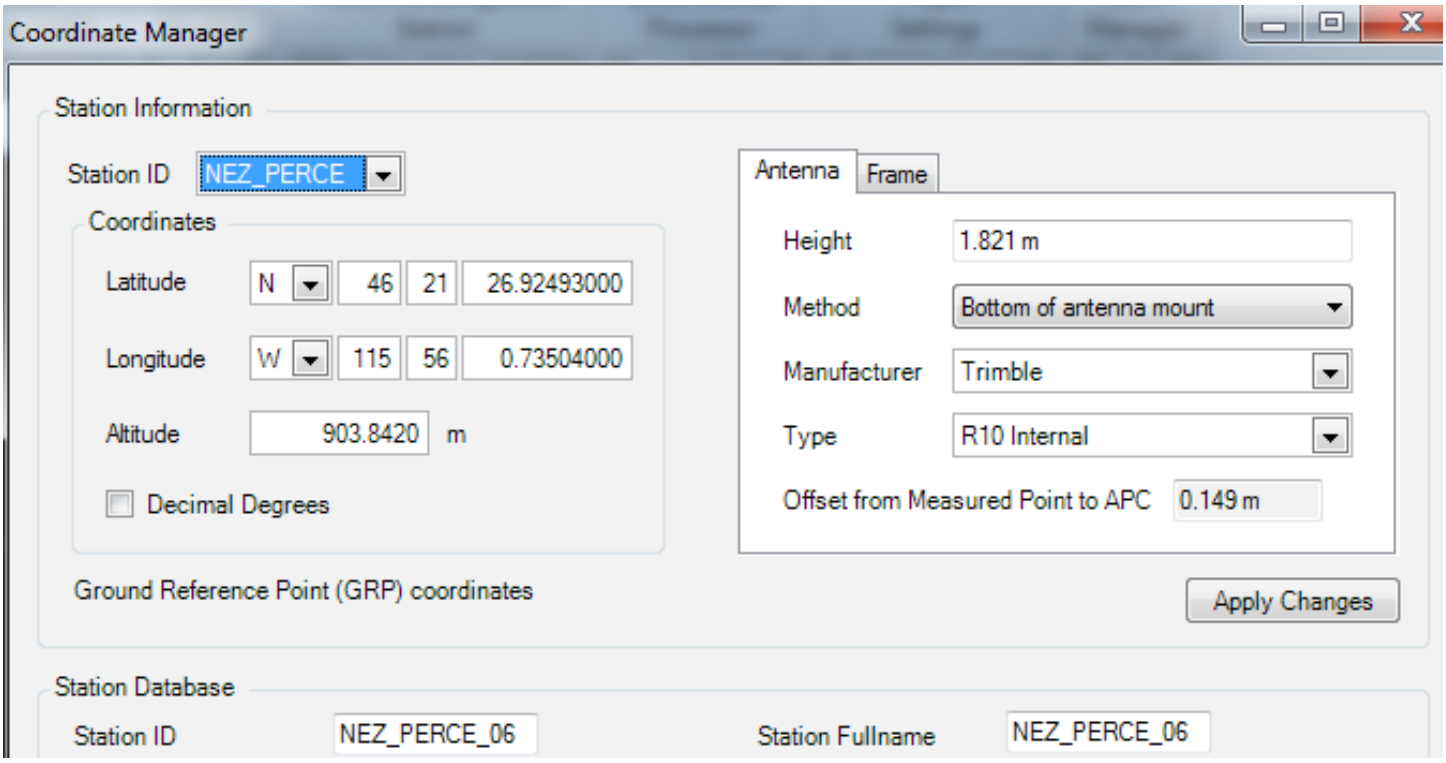
256,000
258,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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NEZ_PERCE
Coordinates
Latitude
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Longitude
W
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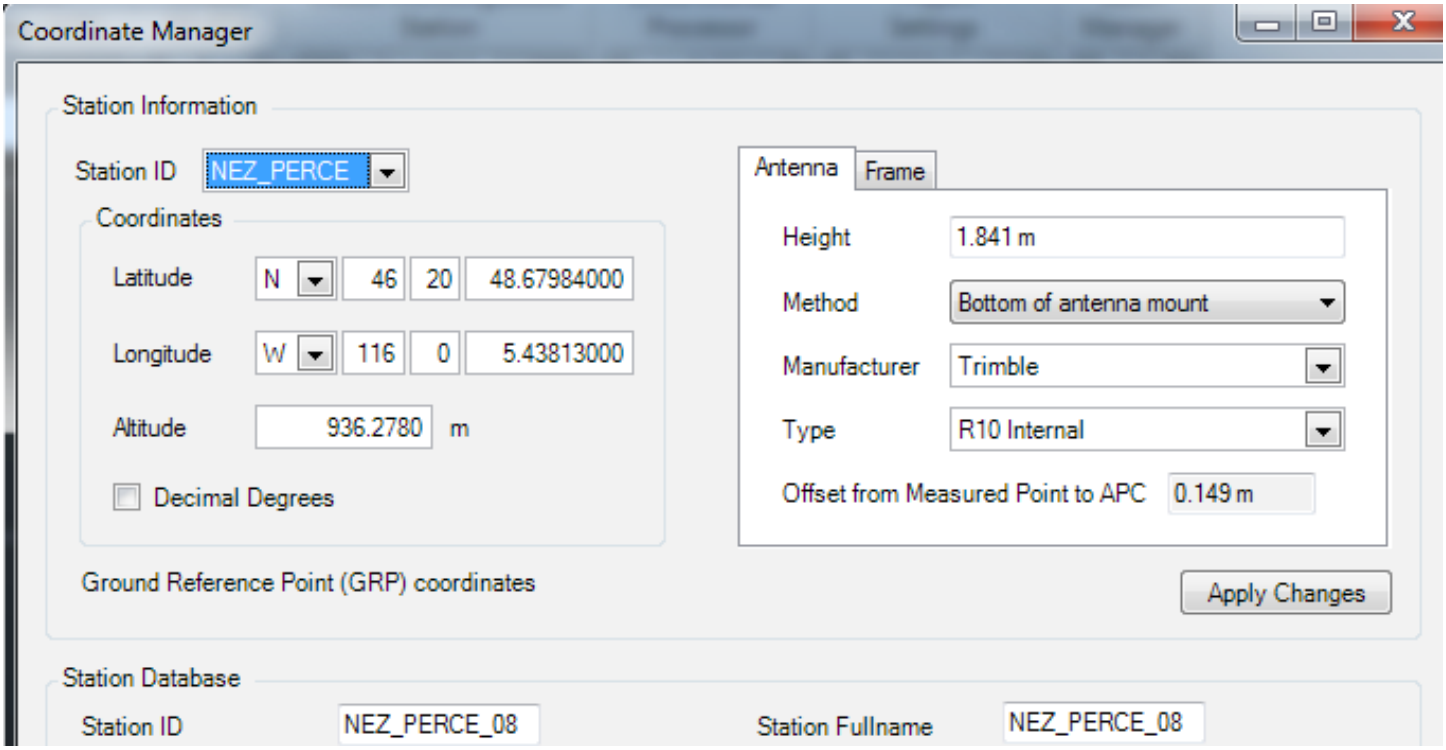
56
0.73504000
Altitude
903.8420
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.821 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_06
Station Fullname
NEZ_PERCE_06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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.841 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_08
Station Fullname
NEZ_PERCE_08

Flight Log

LIDAR Flight Log 5416313A

Julian Day 3 3	Flight A

Date NOV 3 2016	Aircraft PA-31 C-FFRY
Project 3.19. NEZ PERCE	Pilot 3 HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL1 AOI 04	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	1
Scanner 2 Drive	1 2

Additional Notes @ 17 44
Temp 13
Humidity 67%
Altimeter 30 24
Terrain Height 438
060 @ 09

AIRBORNE IMAGING
A Clean Harbors Company

Aircraft Block Time		
Engine On 17 39	Ramp Out 17 52	Takeoff 17 54
Engine Off 00:00	Ramp In 23 57	Landing 23 56
Total 6 4 hrs	Total hrs	Total 6 ° hrs

Mission Plan			
AGL Height 1900	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 195	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	18:09	18:20
Post Mission	IN FLIGHT	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		18:12	18:18				WAKE UP IMU
305	54163130 1	0	7800'	18:25	18:35			161113_182501	
304	02	180	7700'	18:39	18:52			183941	
303	03	0	↓	18:56	19:07			185607	
302	04	180		19:11	19:24			191109	
301	05	0		19:27	19:38			192729	
300	06	180		19:42	19:55			194249	
299	07	0		19:58	20:10			195855	
298	08	180		20:14	20:27			201421	
297	09	0		20:30	20:41			203011	
296	10	180		20:45	20:58			204531	
295	11	0		21:01	21:12			210130	
294	12	180		21:16	21:29			211654	
293	13	0		21:33	21:44			213304	
292	5416313 14	180	7700'	21:48	22:01			214808	

Pg 1 of 2

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Julian Day 313	Flight A

Date Nov 8 2016	Aircraft PA-31 C-FFRY
Project 3119 - NEZ PERCE	Pilot B HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective: Block QL1ADI04	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes @ 23:45
Temp 20°C
Humidity
Altimeter 30.14
Terrain Height 438

Aircraft Block Time		
Engine On 17:39	Ramp Out 17:52	Takeoff 17:54
Engine Off 00:00	Ramp In 23:57	Landing 23:56
Total 6.4 hrs	Total hrs	Total 6.0 hrs

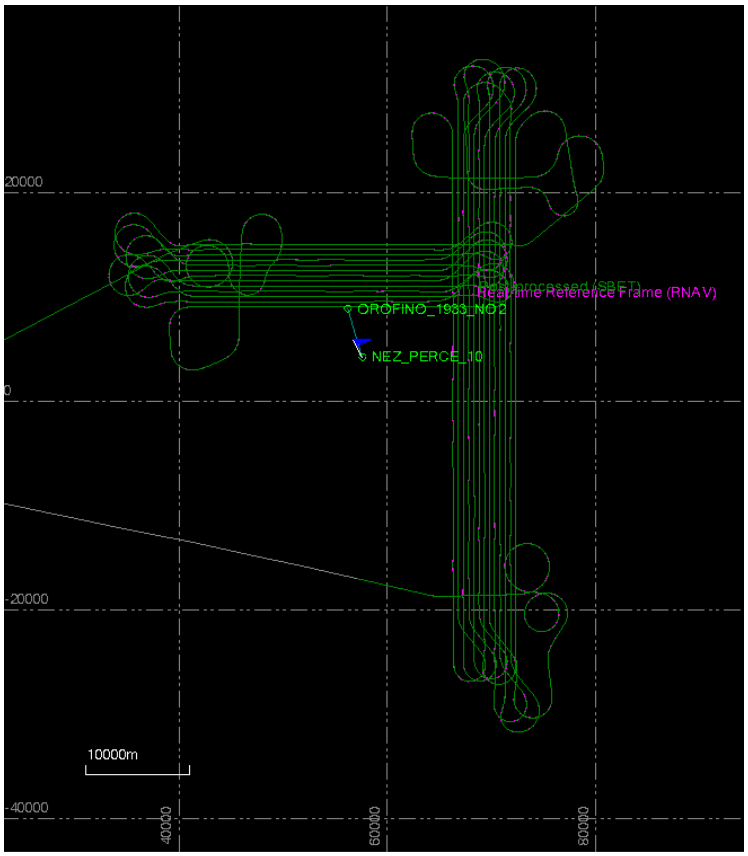
Mission Plan			
AGL Height 1900	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 195	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	IN FLIGHT	
Post Mission	23:32	23:33

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
291	541631315	0	7700'	22:04	22:15			161113_220439	
290	16	180	↓	22:19	22:31			221935	
289	17	0	↓	22:34	22:43			223419	
288	18	180	↓	22:47	22:59			224739	
287	19	0	↓	23:02	23:11			230225	
286	20	180	↓	23:15	23:27			231538	
XTIE	541631321	90	7700'	23:29	23:32			232945	
FIGURE 8		↝		23:32	23:37				CLOSE OFF SURVEY

Pg 2 of 2

Nov 9, 2016-A (C-FFRY, SN2221256)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Real-time Reference Frame (RNAV)
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10000m
-40000
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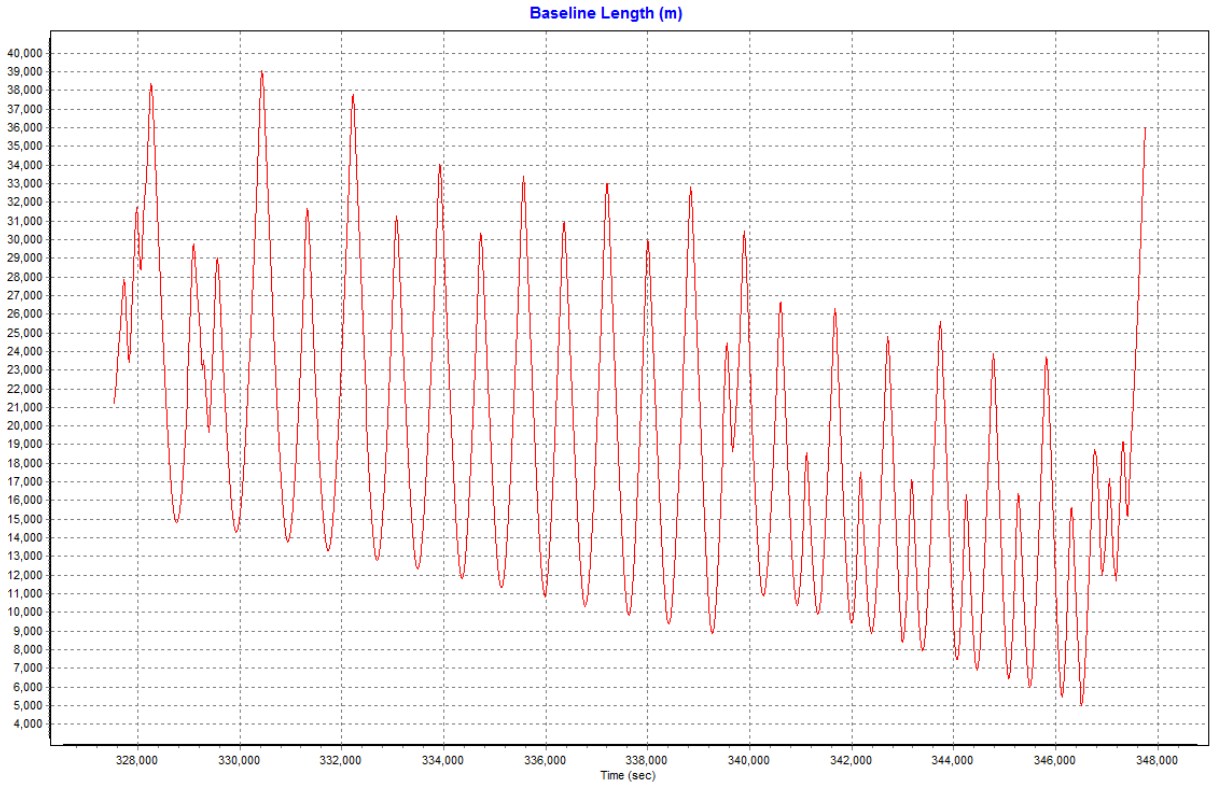
60000
80000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15,000
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13,000
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11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
328,000
330,000
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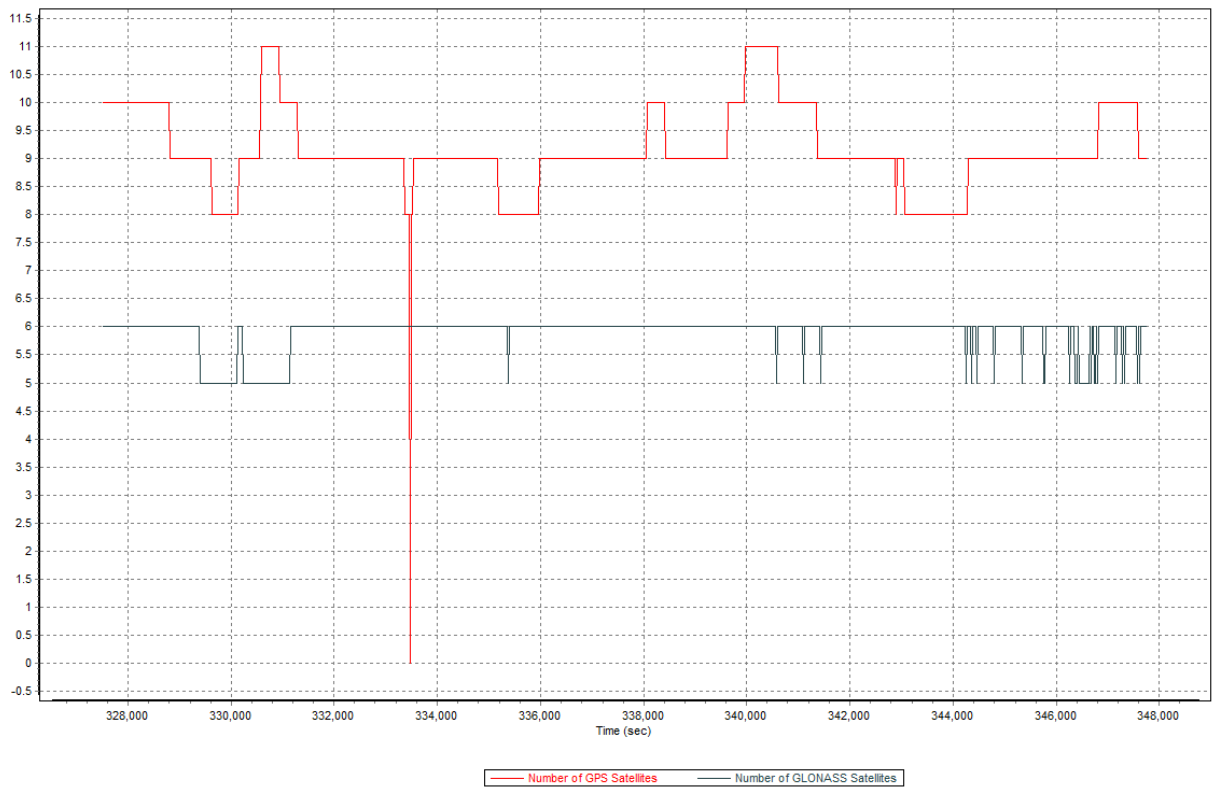
334,000
336,000
338,000
340,000
342,000
344,000
346,000
348,000
Time (sec)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11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
328,000
330,000
332,000
334,000
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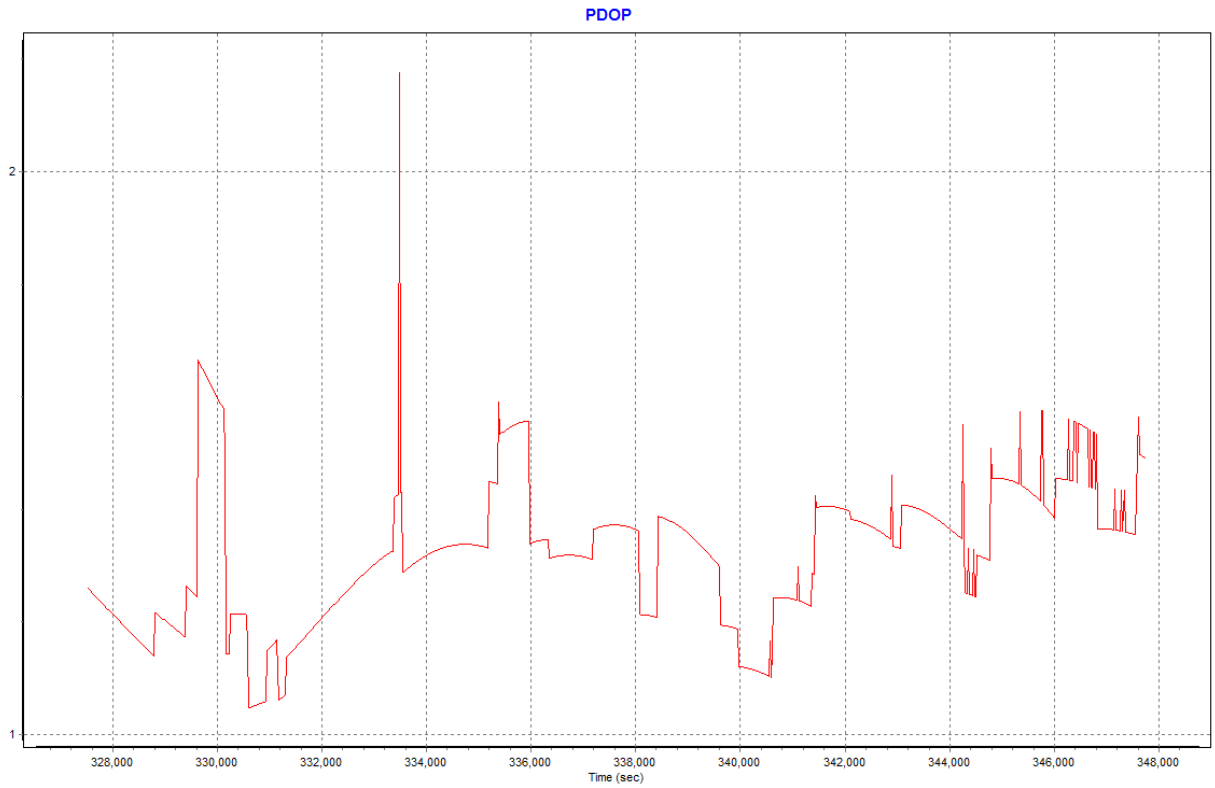
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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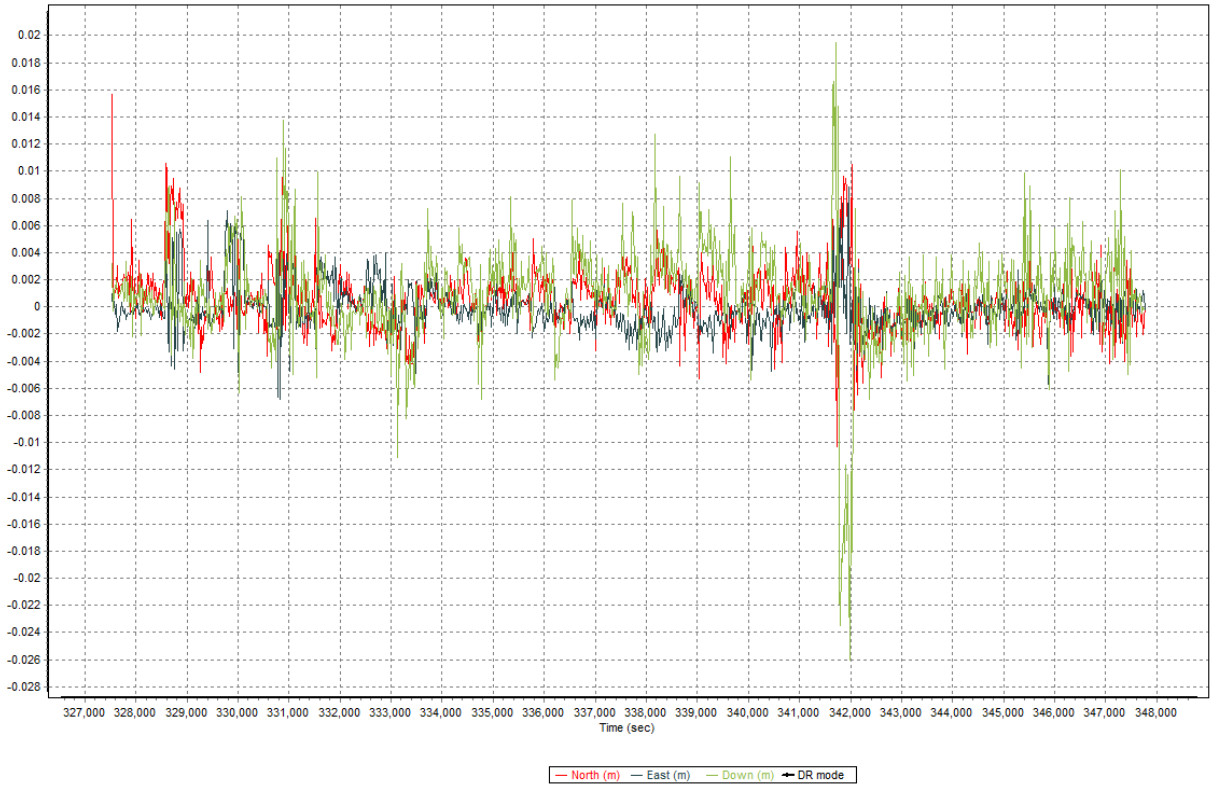
348,000
Time (sec)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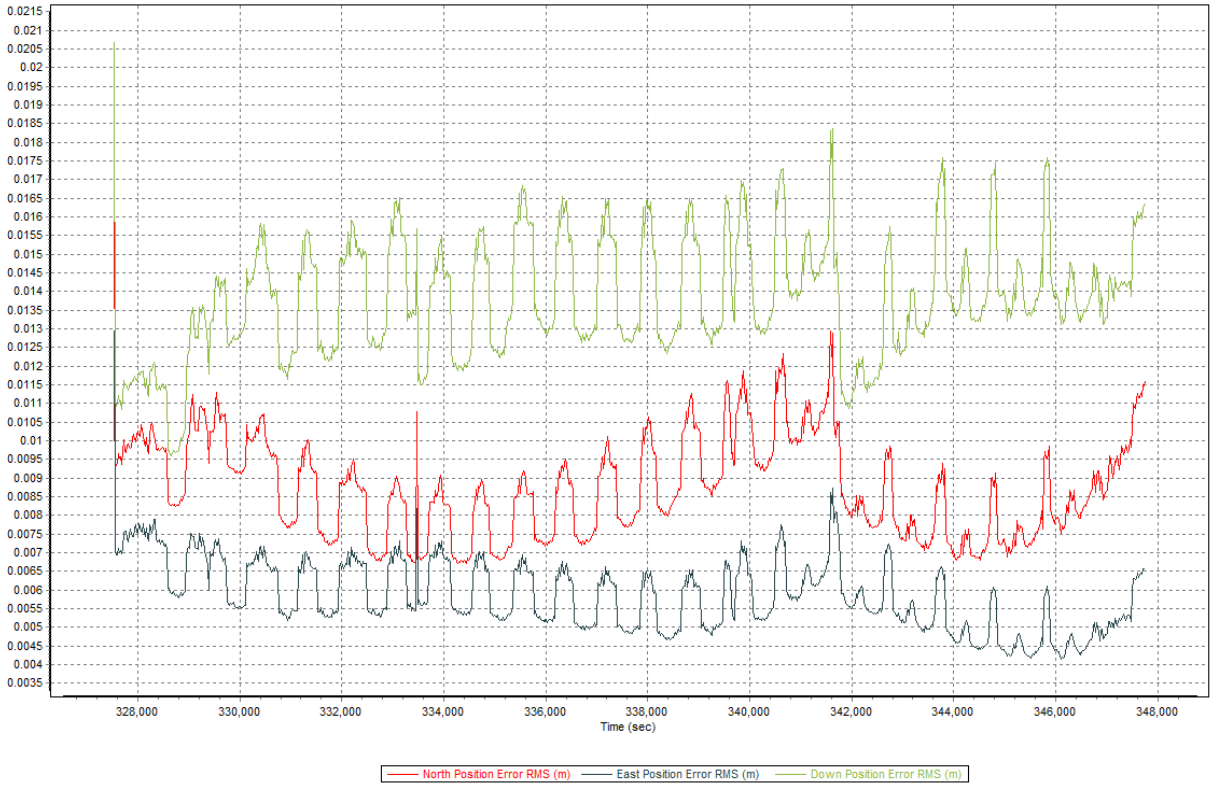
North (m)
East (m)
Down (m)
DR mode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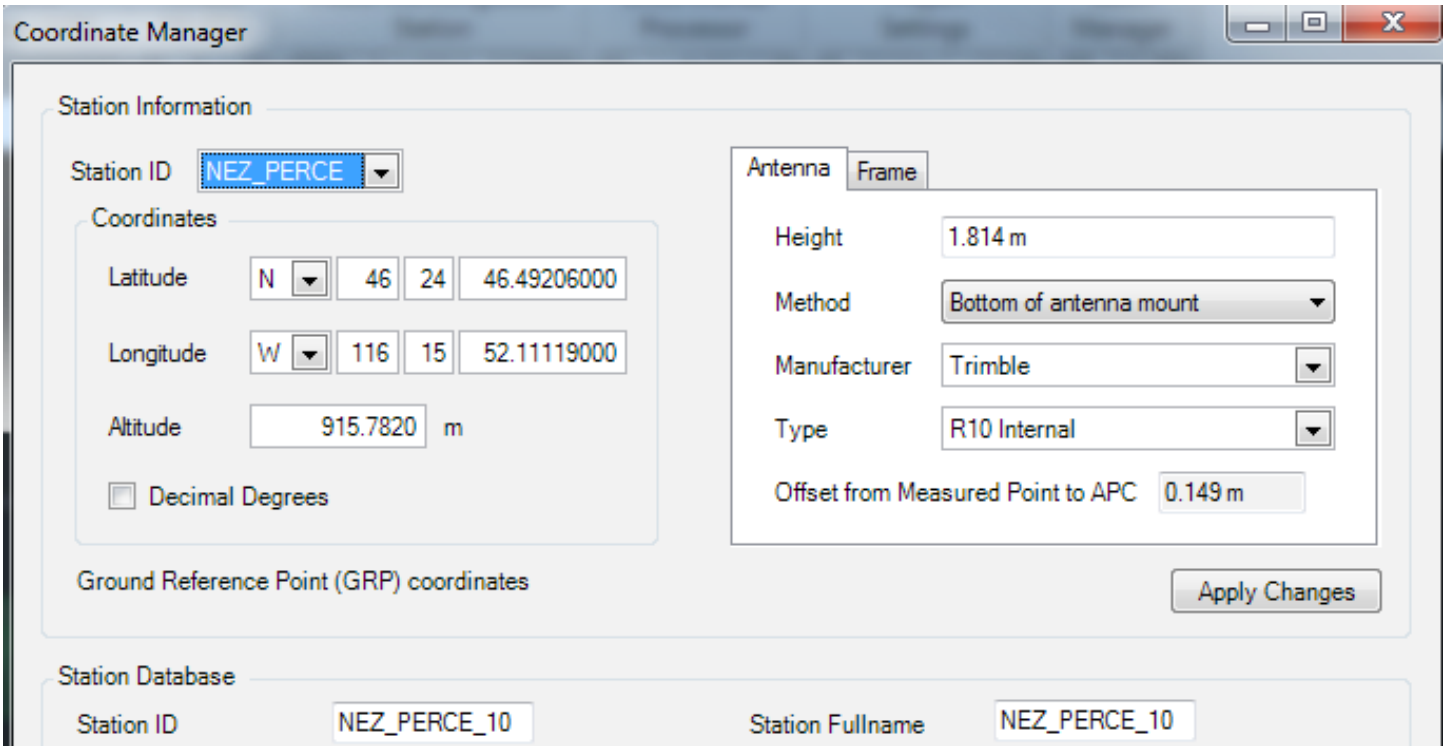
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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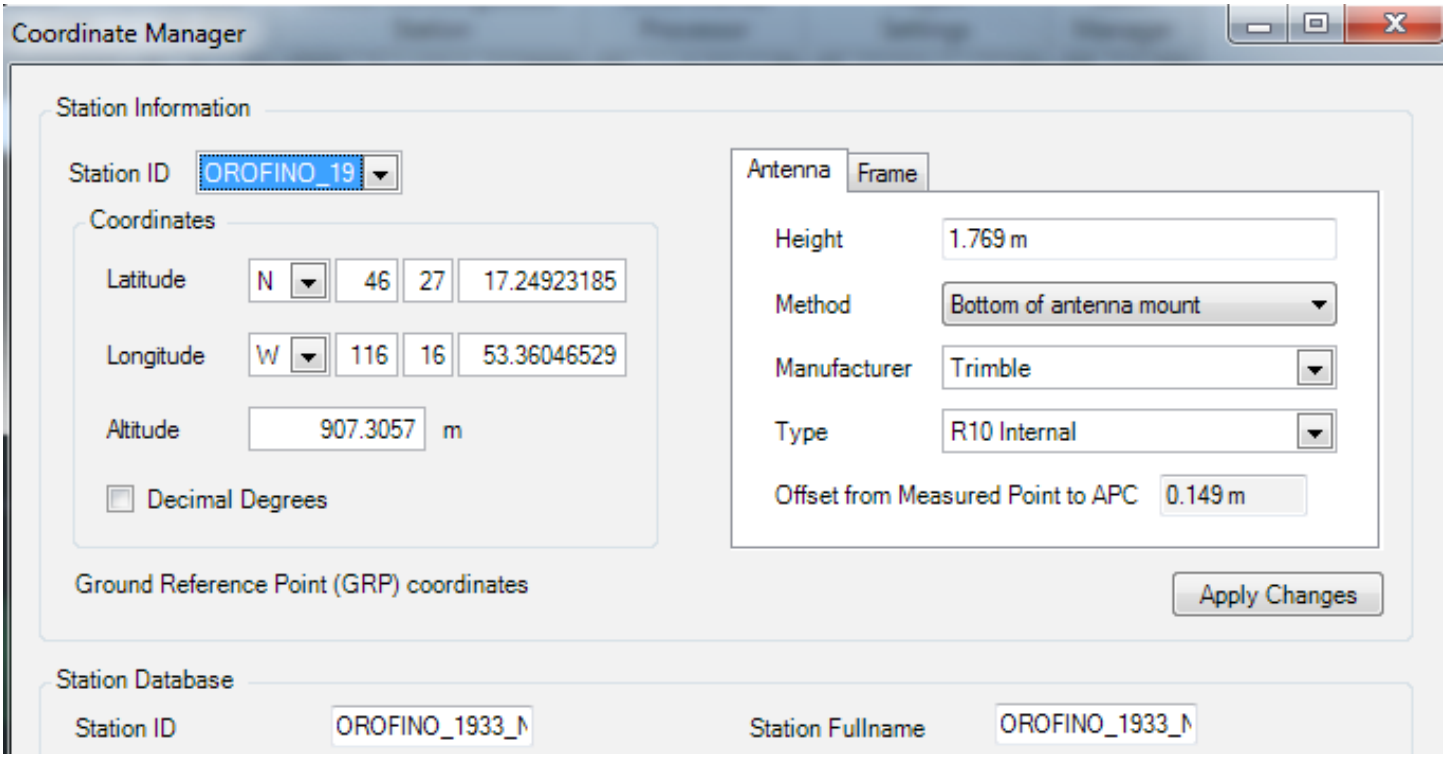
24
46.49206000
Longitude
W
116
15
52.11119000
Altitude
915.7820
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.814 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_10
Station Fullname
NEZ_PERCE_10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Station ID
OROFINO_19
Coordinates
Latitude
N
46
27
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Longitude
W
116
16
53.36046529
Altitude
907.3057
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.769 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
OROFINO_1933_N
Station Fullname
OROFINO_1933_N

Flight Log

Julian Day	Flight
314	A

LIDAR Flight Log 5416314A

AIRBORNE IMAGING
A Clean Harbors Company

Date	Nov. 9 2016	Aircraft	PA-31 C-FFRY
Project	3119- NEZ PERCE	Pilot	B. HARRITY
Location	LEWISTON	Operator	B. Whiteley
Mission Objective	BLOCK QL1AOI04		

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes	@ 18:30
Temp	14
Humidity	77
Altimeter	30.20
Terrain Height	438

Aircraft Block Time		
Engine On 18 29	Ramp Out 18 44	Takeoff 18:46
Engine Off 00 49	Ramp In 00 44	Landing 00:43
Total 6.3 hrs	Total hrs	Total 6.0 hrs

Mission Plan			
AGL Height	1900 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	18 58	19:09
Post Mission	IN FLIGHT	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		19:01	19:08				WAKE UP IMU
285	5416314 01	0	7700'	19:12	19:23			161114_191245	
284	02	180	7700'	19:34	19 45			193406	HAD TO RE-LOAD SNAPSHOT
283	03	0	7700'	19:49	20:00			194921	
282	04	180	7600'	20:04	20 15			200402	
281	05	0	↓	20:18	20:29			201838	
280	06	180		20:33	20:43			203328	
279	07	0		20:47	20:56			204715	
278	08	180		21:00	21:10			210038	
277	09	0		21:14	21:24			211418	
276	10	180		21:28	21:38			212815	
275	11	0		21:41	21:51			214148	
274	12	180		21:55	22 05			215520	
273	13	0		22:08	22:18			220859	
XTIE 1	5416 314 14	90	7600'	22:21	22:23			222128	XTIE LN's 273-285 W-E

Pg 1 of 2

Julian Day 31	Flight A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date NOV. 2016	Aircraft **PA-31 C-FFRY**
Project 3119-NEZ PERCE	Pilot B. HARRITY
Location LEWISTON	Operator **B. Whiteley**
Mission Objective	
BLOCK QL1 ADI 10	

System	**Riegl Q1560**
Unit	**2221256**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes	@ 00:23
Temp	16
Humidity	
Altimeter	30.20
Terrain Height	438

Aircraft Block Time		
Engine On 18:29	Ramp Out 18:44	Takeoff 18:46
Engine Off 00:49	Ramp In 00:44	Landing 00:43
Total 6.3 **hrs**	Total **hrs**	Total 6.0 **hrs**

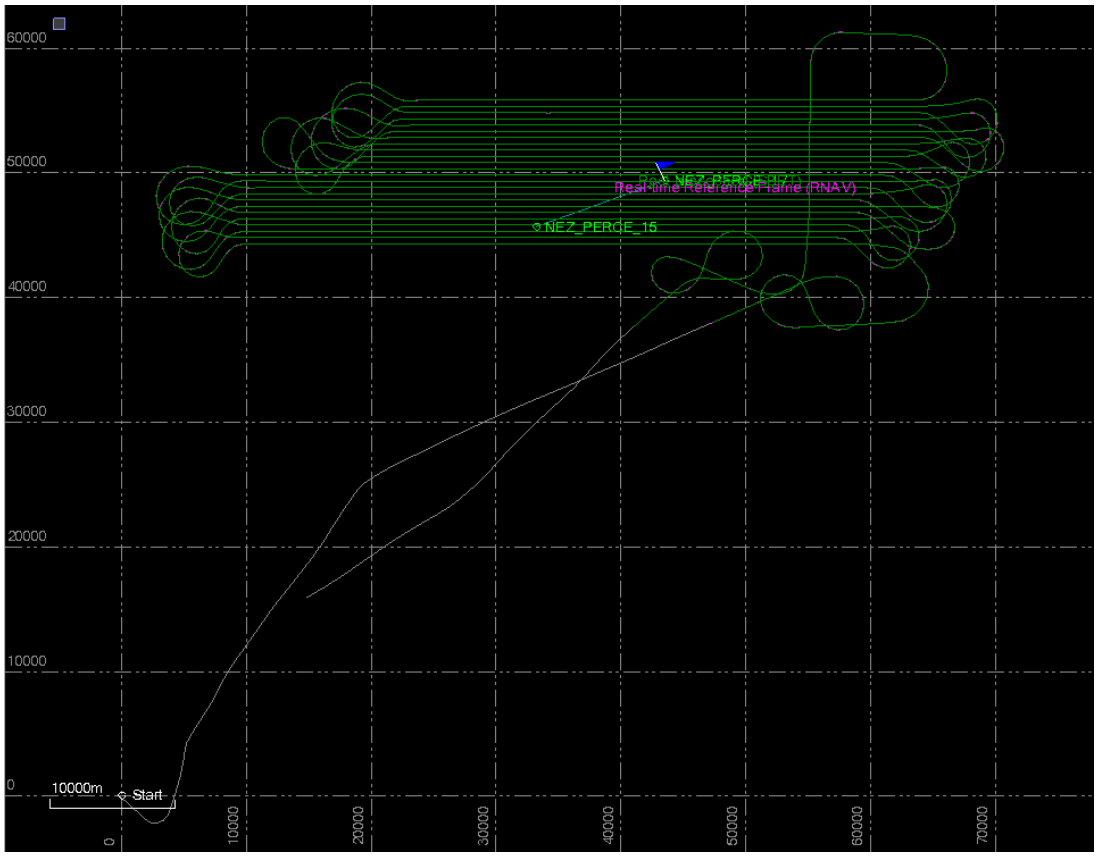
Mission Plan			
AGL Height	900 **m**	Pulse Rate	800 **KHz**
Target Speed	160 **kts**	Scan Rate	105 **Hz**
Laser Current	50 **%**	FOV	60 **Deg's**

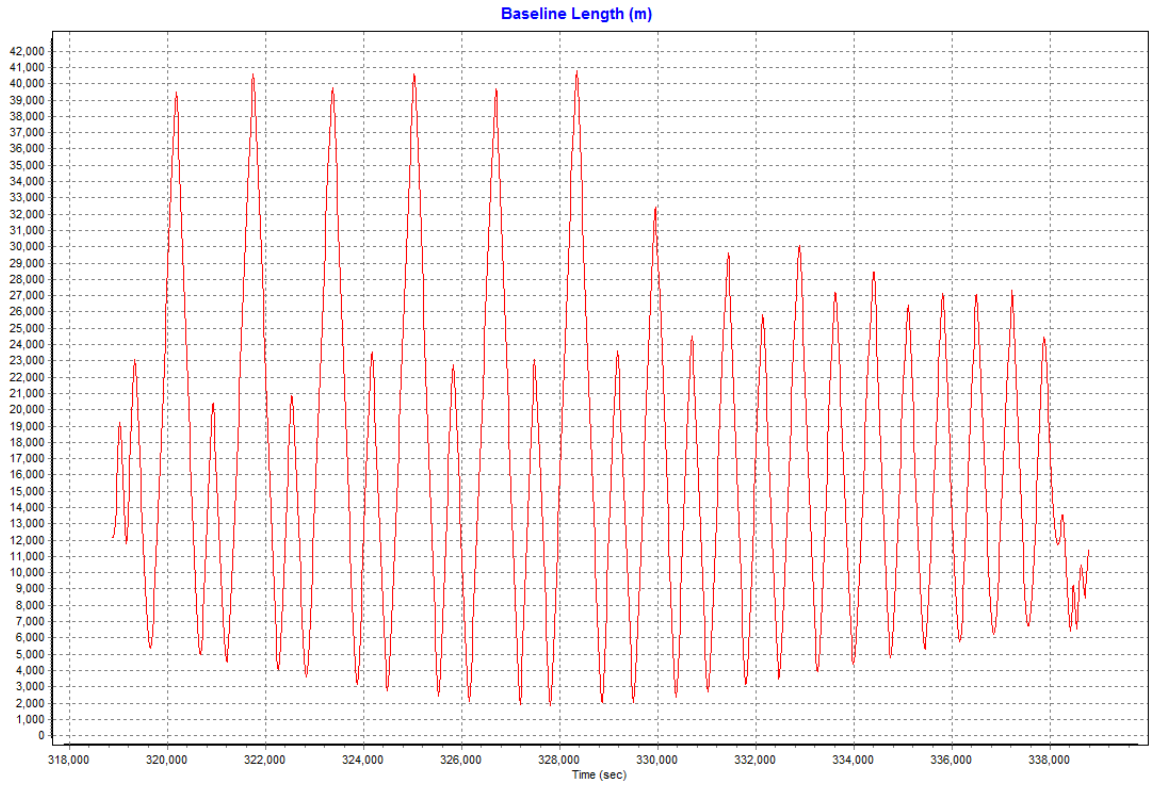
Static Alignment	GPS Time	
	Start	End
Pre Mission	IN FLIGHT	
Post Mission	00:24	00:36

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
254	5416314 15	270	6800'	22:29	22:34			161114_222939	
255	16	90	↓	22:38	22:43			223848	
256	17	270	↓	22:47	22:52			224722	
257	18	90	↓	22:56	23:01			225631	
258	19	270	↓	23:04	2309			230456	
259	20	90	↓	23:13	23:18			231327	
260	21	270	↓	23:21	23:26			232144	
261	22	90	6800'	23:31	23:35			233111	
262	23	270	6900'	23:39	23:44			233922	
263	24	90	↓	23:47	23:52			234757	
264	25	270	↓	23:56	00:01			235633	
265	26	90	↓	00:05	00:09			000518	
266	27	270	↓	00:13	00:18			001339	
XTIE 2	5416314 28	↻	6900'	00:22	00:23			002216	CLOSE OFF SURVEY
FIGURE 8		⤳		00:24	00:31				

Pg 2 **of** 2

Nov 9, 2016-A (N-44RL, SN2220764)


60000
50000
40000
30000
20000
10000
0
10000m
Start
Real-time Reference Frame (RNAV)
NEZ_PERCE_15
0
10000
20000
30000
40000
50000
60000
70000


Baseline Length (m)
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12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
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320,000
322,000
324,000
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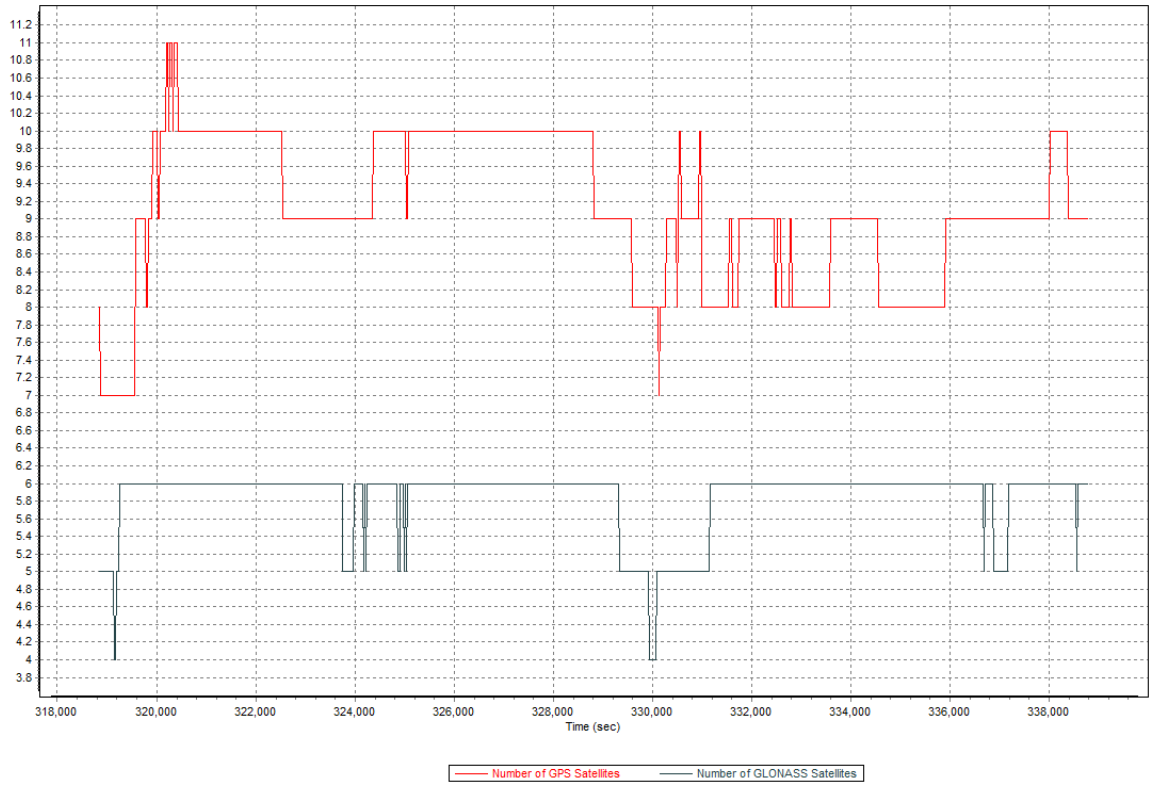
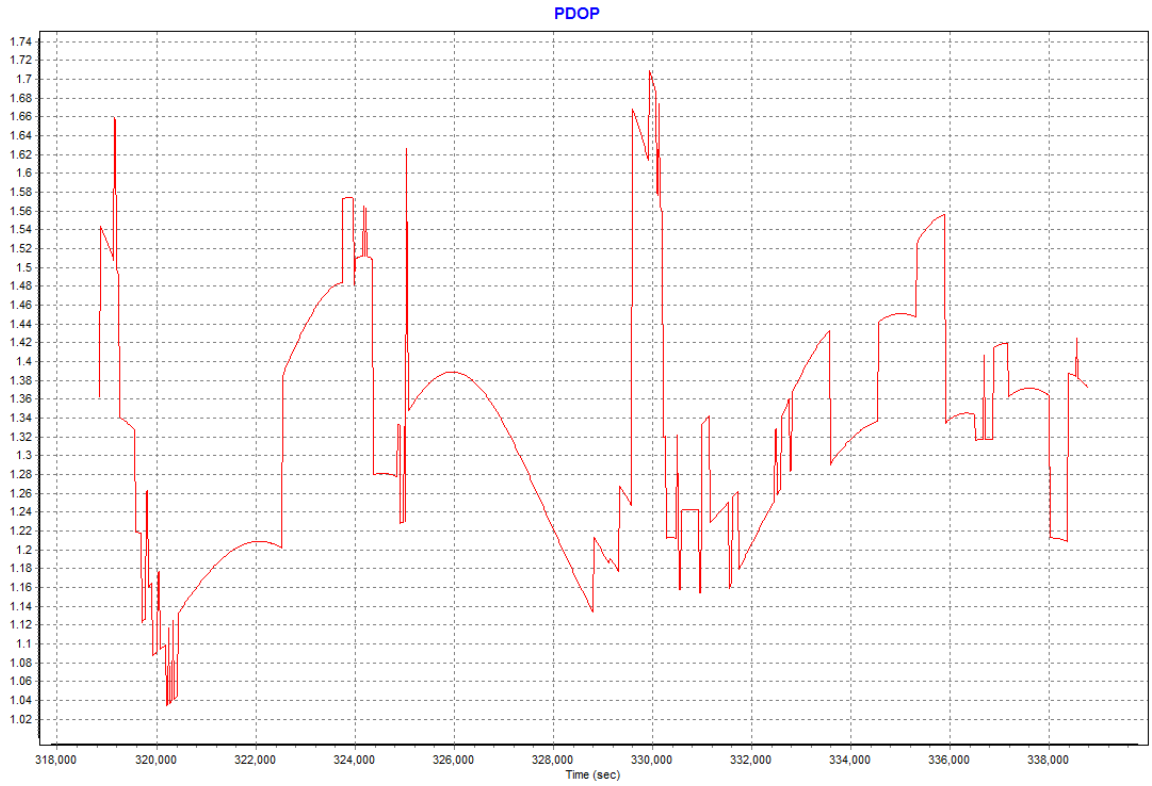
328,000
330,000
332,000
334,000
336,000
338,000
Time (sec)


Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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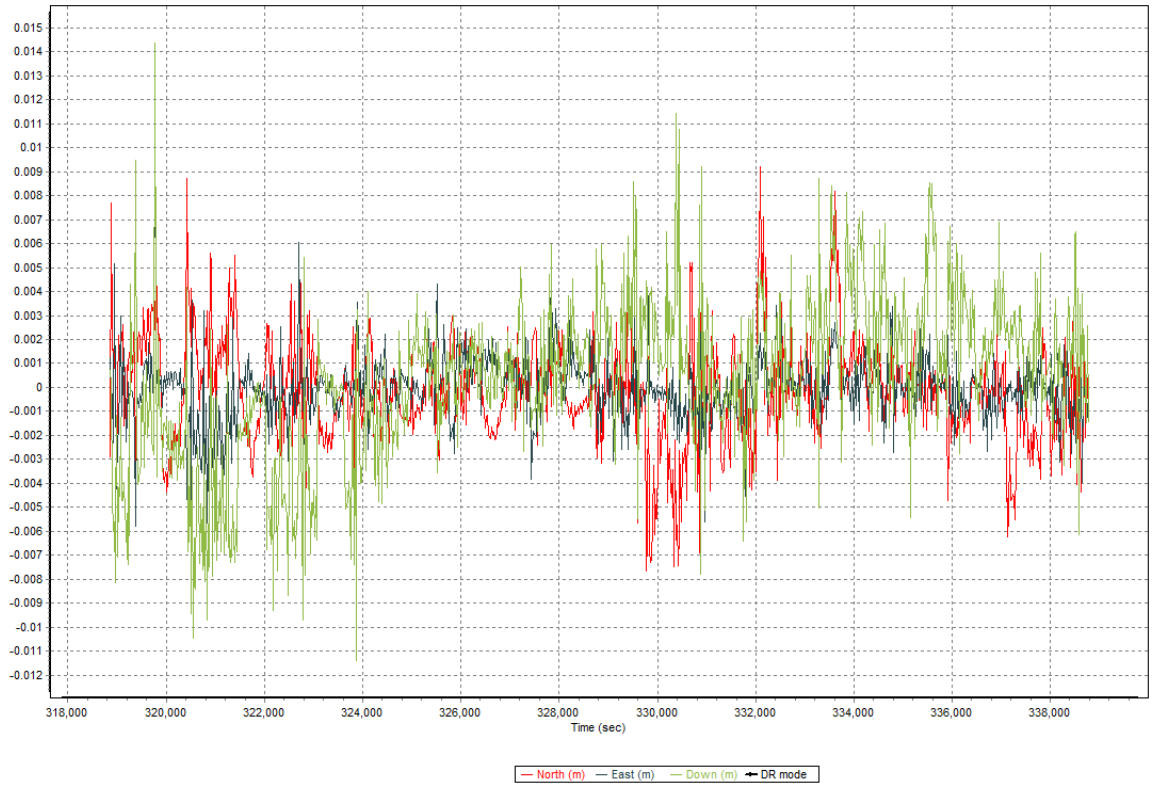
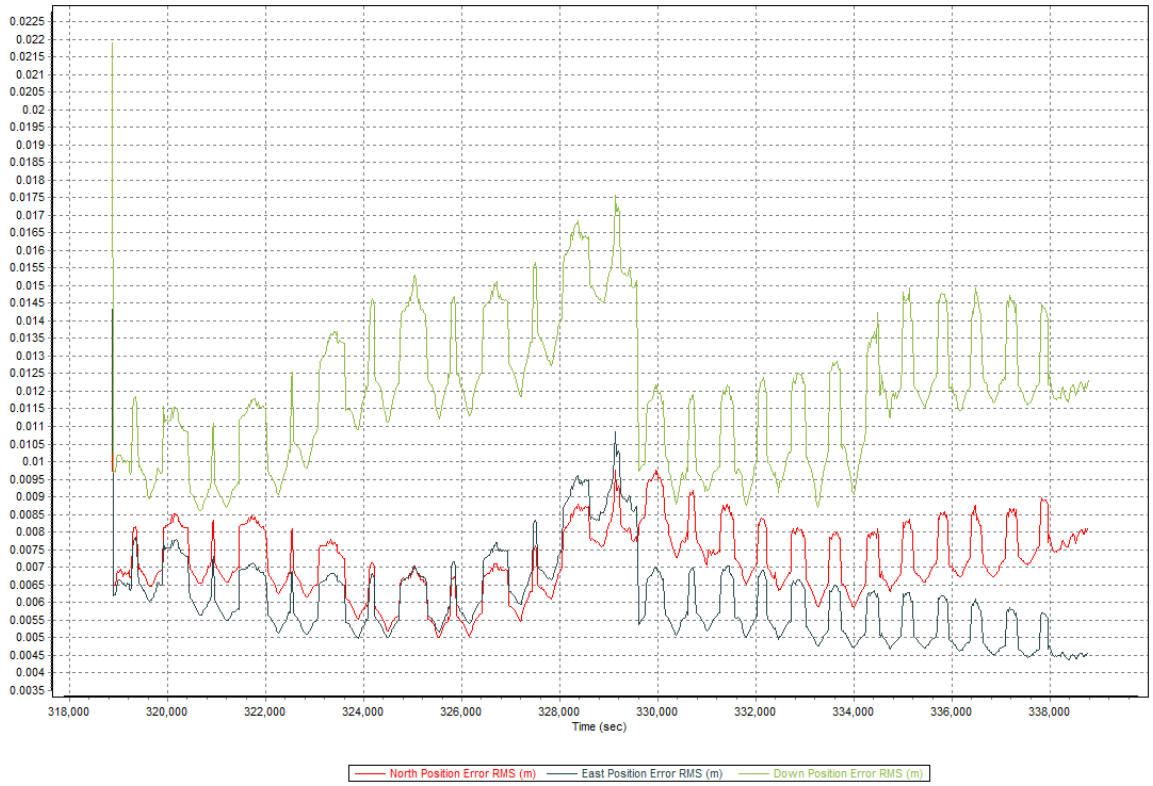
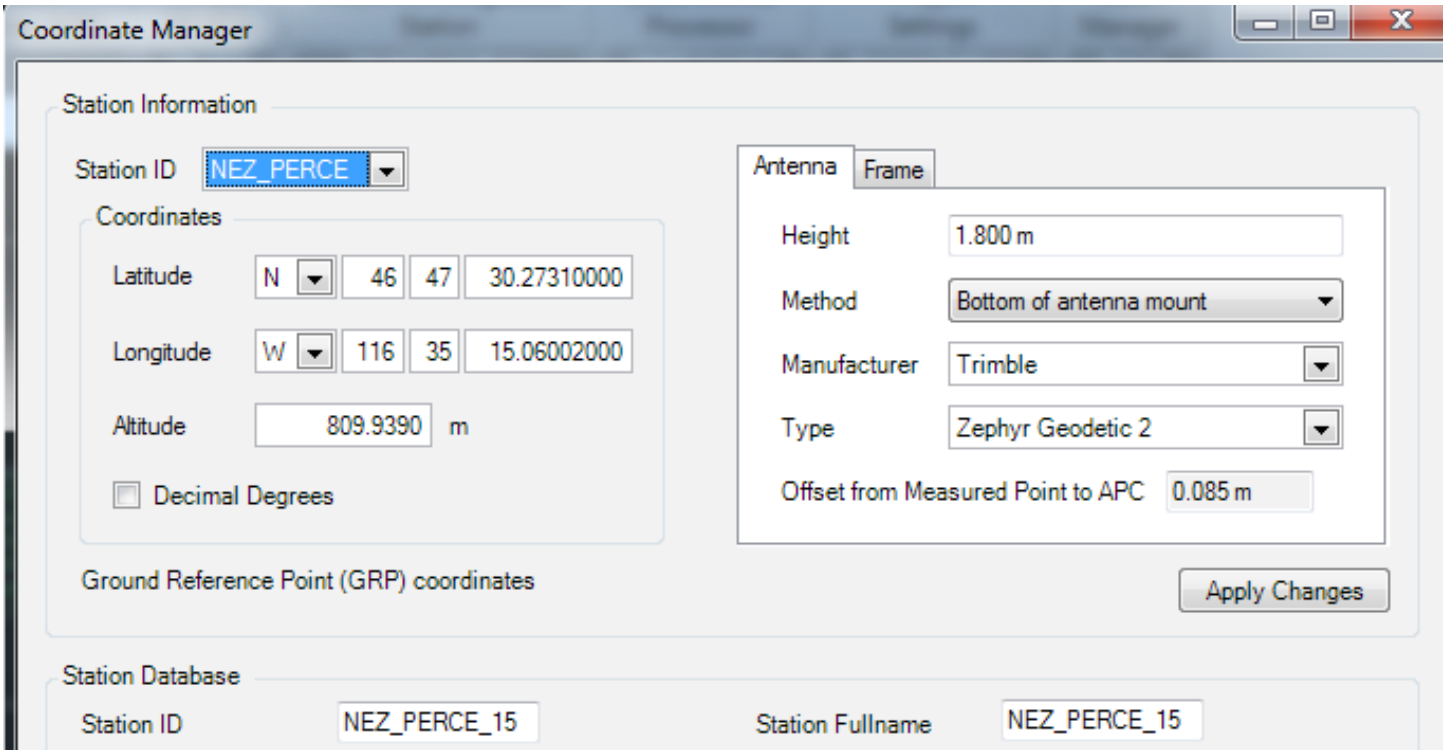
Time (sec)


Time (sec)
North (m)
East (m)
Down (m)
DR mode


Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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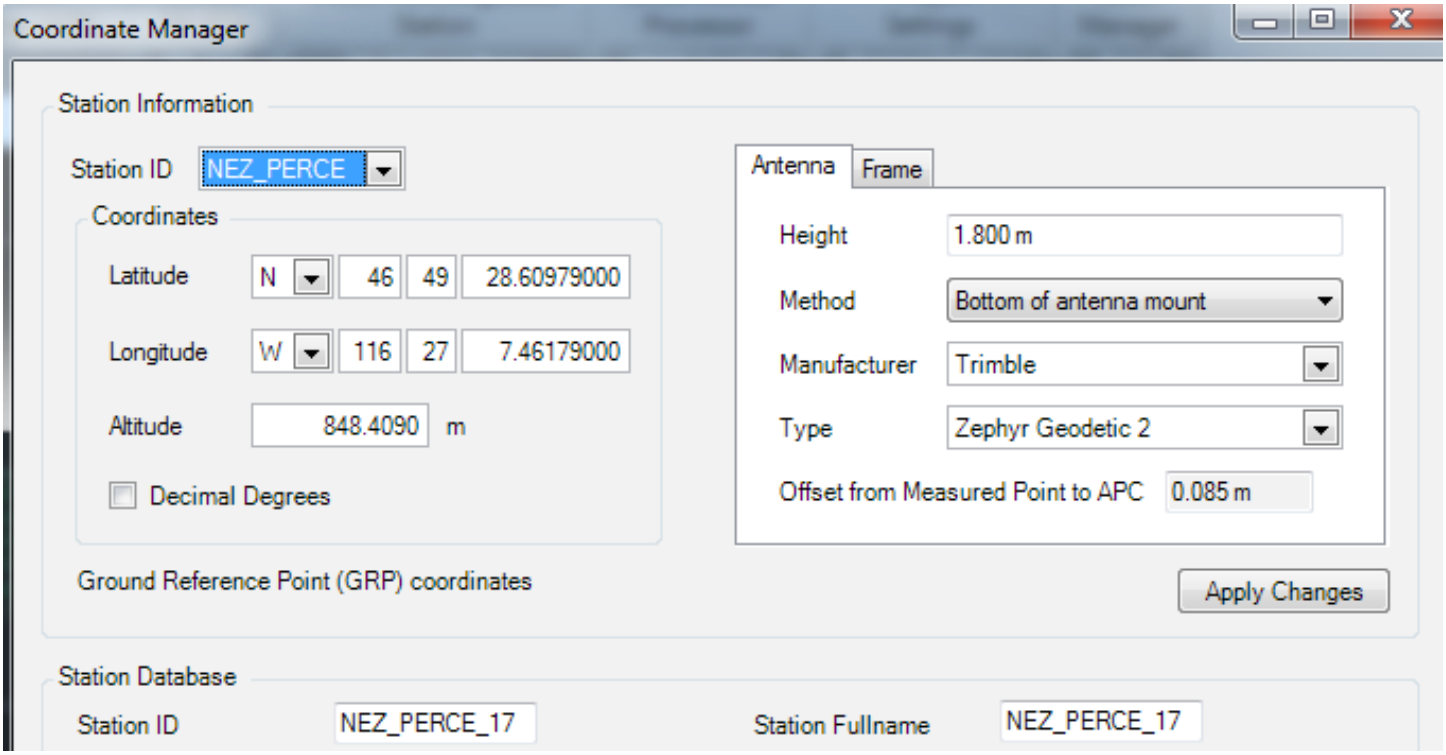
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
47
30.27310000
Longitude
W
116
35
15.06002000
Altitude
809.9390
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_15
Station Fullname
NEZ_PERCE_15


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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Longitude
W
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27
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Altitude
848.4090
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_17
Station Fullname
NEZ_PERCE_17

Flight Log

LIDAR Flight Log

Julian Day 3134	Flight A

Date Nov. 9th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective: Start S. side of AOI 6 Priority Area.	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes: 16132 @ KLWS
Wind: 100° (E) @ 5 knts
Temp: 12°C
Pressure: 1021
Clouds: clear
Visibility: 16.1 km

Aircraft Block Time		
Engine On 1611	Ramp Out	Takeoff 1620
Engine Off 2222	Ramp In	Landing 2219
Total 6.2 hrs	Total hrs	Total 6.0 hrs

Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	1629	1640
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments (Time Stamp: 161109-)
TEST				162709	162744			
		↗		1629	1640			IMU Figure 8
060		270	8800'	164422	165422			AOI 06
059		90	8800'	165729	170652			
058		270	8800'	171020	172022			
057		90	8800'	172407	173340			
056		270	8800'	173703	174727			
055		90	8800'	175049	180030			
054		270	8800'	180444	181509			
053		90	8800'	181848	182822			
052		270	8800'	183214	184259			
051		90	8800'	184630	185606			
050		270	8800'	185950	190950			
049		90	8900'	194030	192415			
048		270	8800'	192746	193753			

Pg 1 of 2

Julian Day 3174	Flight A

LIDAR Flight Log

Date Nov. 9th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes 2154 Z
Wind: calm
Temp: 18°C
Pressure:
Clouds: Clear
Visibility: 10 miles

Aircraft Block Time		
Engine On 1611	Ramp Out	Takeoff 1620
Engine Off 2222	Ramp In	Landing 2219
Total 6.2 hrs	Total hrs	Total 6.0 hrs

Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

~~Static~~ Alignment	GPS Time Start	GPS Time End
Pre Mission	—	—
Post Mission	2157	2207

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 161109
047		90	8900'	194112	194929			
046		270	8900'	195311	200152			
045		90	8900'	200515	201340			
044		270	8900'	201658	202552			
043		90	8900'	202948	203809			
042		270	9000'	204205	205102			
041		90	8900'	205448	210302			
040		270	9000'	210626	211458			
039		90	9000'	211813	212617			
038		270	9000'	212949	213819			
037		90	9000'	214148	215003			
X-TIE		180	9000'	215353	215704			X-TIE LINES 037-60
IMU		~		2157	2207			IMU Figure 8

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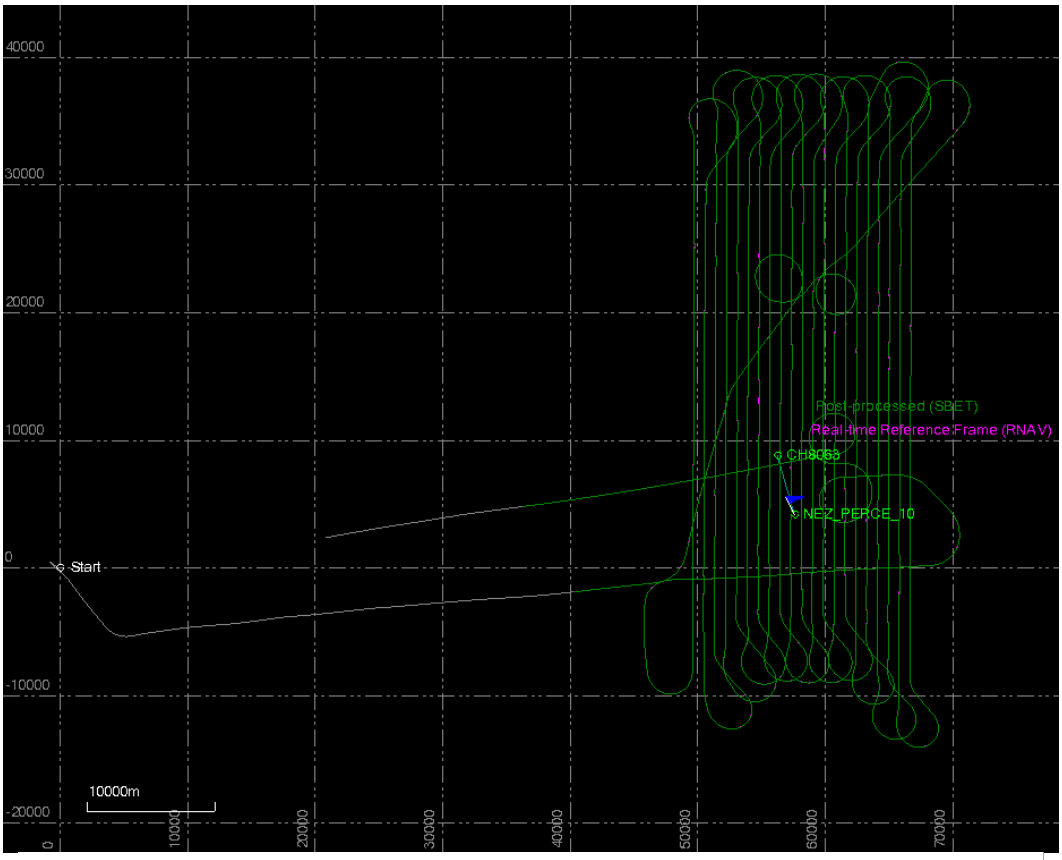
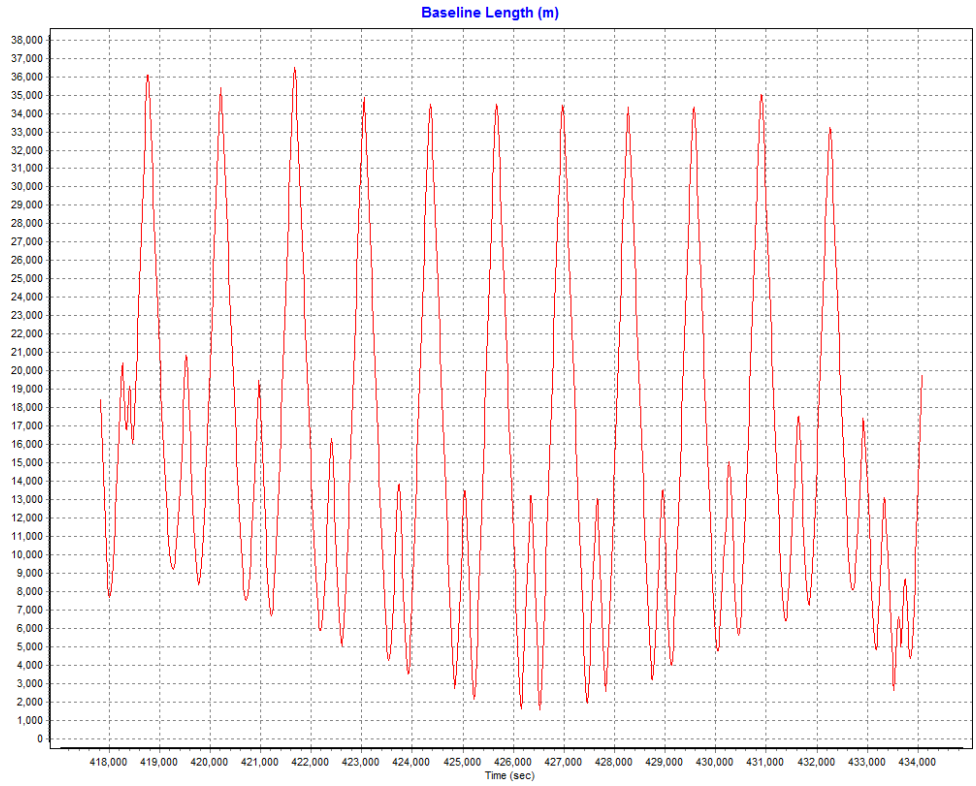
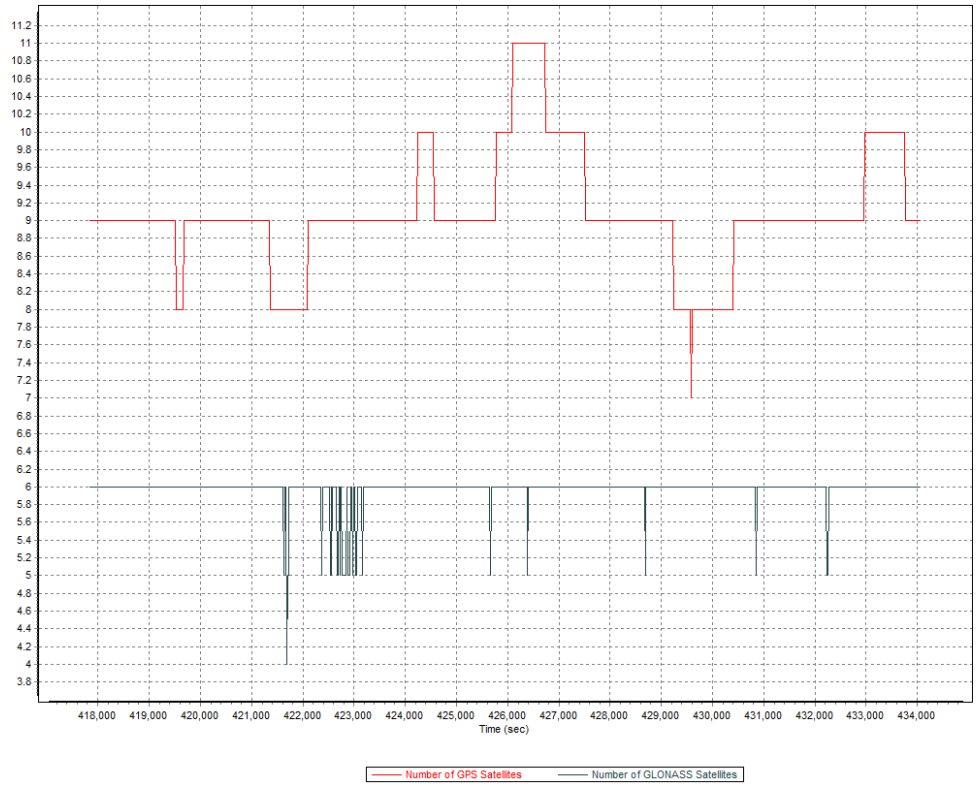
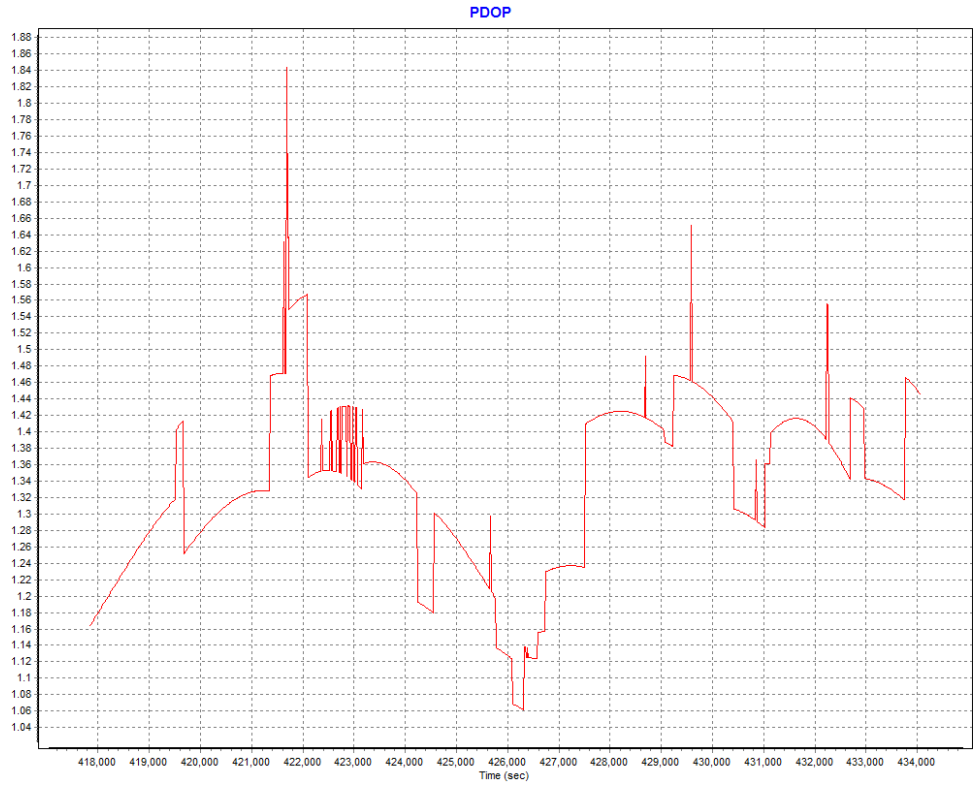
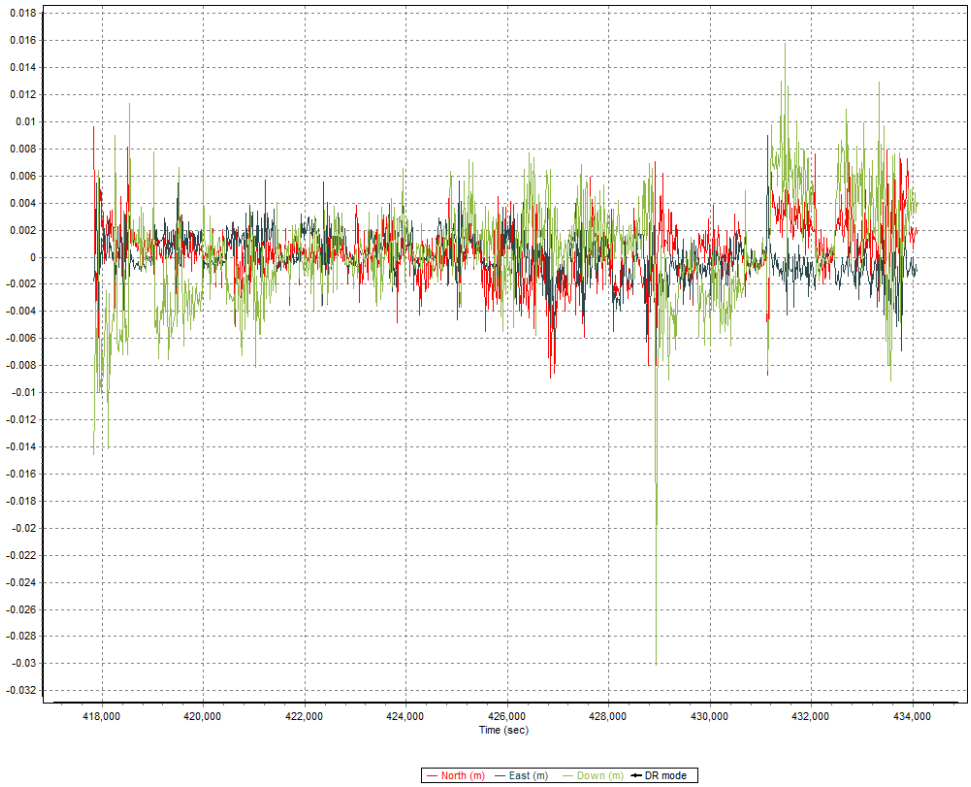
Nov 10, 2016-A (C-FFRY, SN2221256)

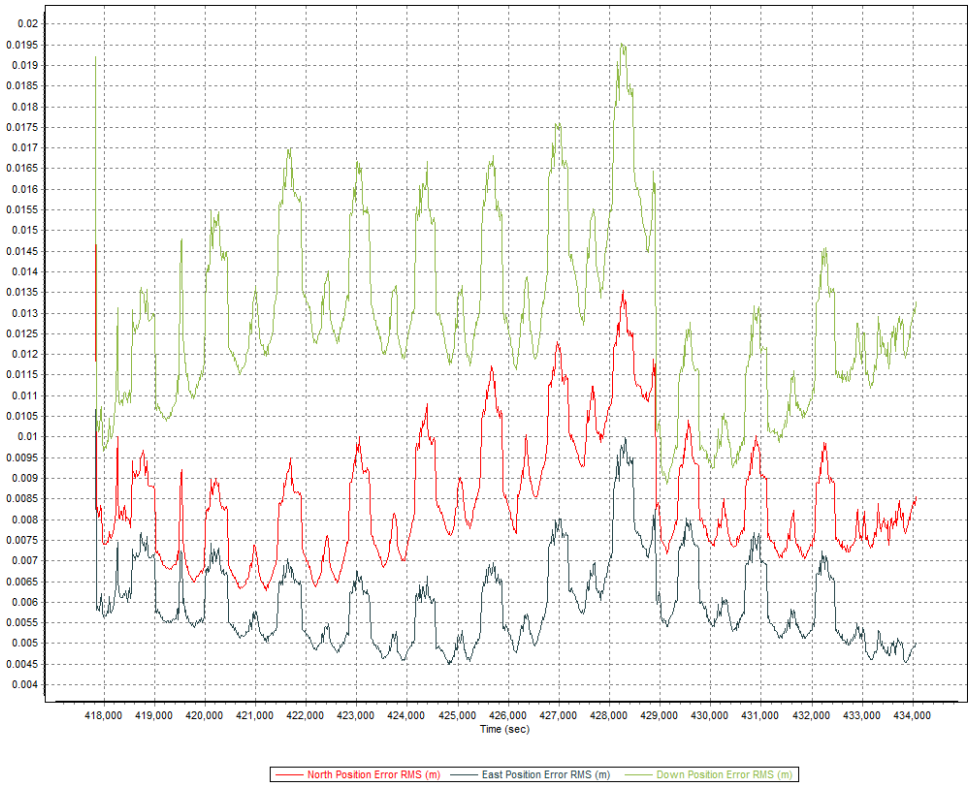

Post-processed (SBET)
Real-time Reference Frame (RNAV)
CH8063
NEZ_PERCE_10
Start
10000m

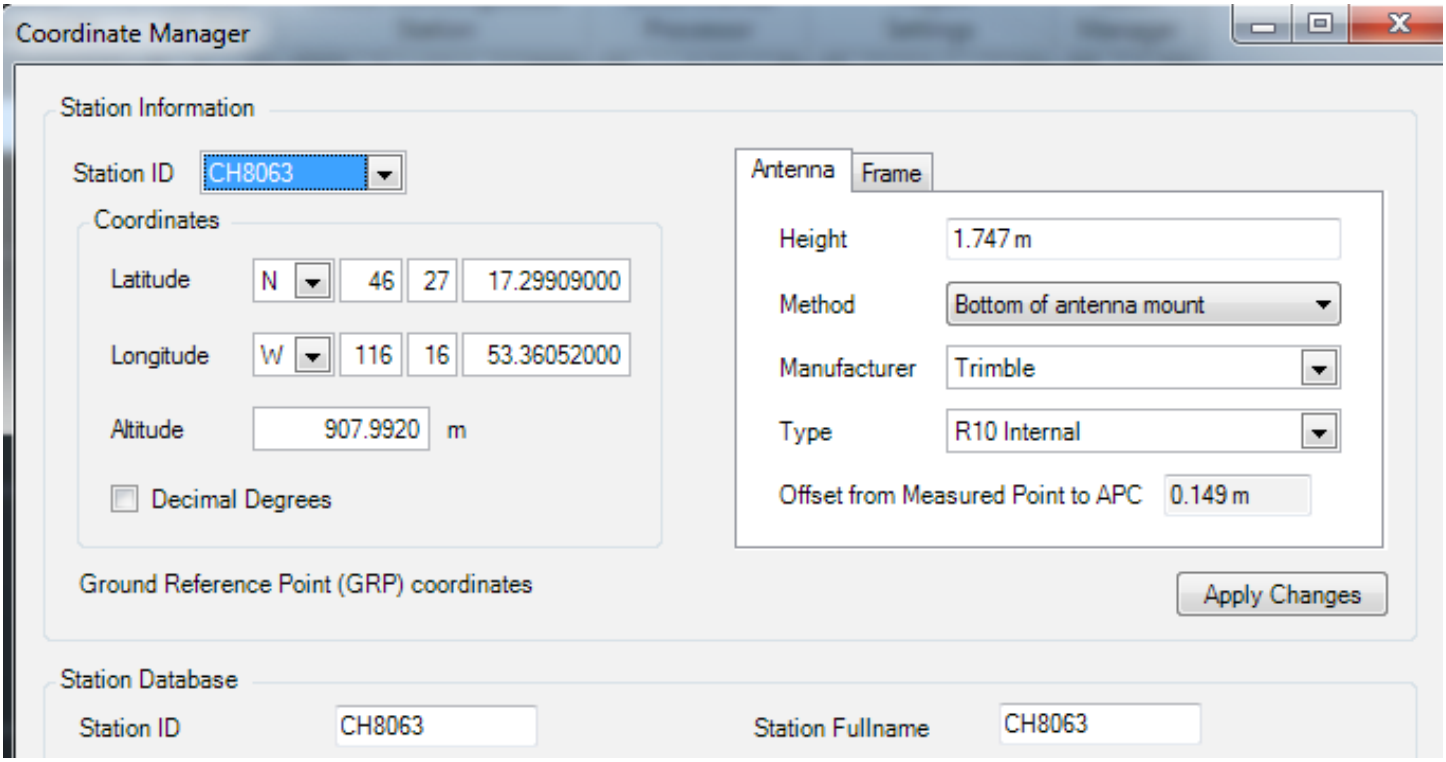

Baseline Length (m)
Time (sec)

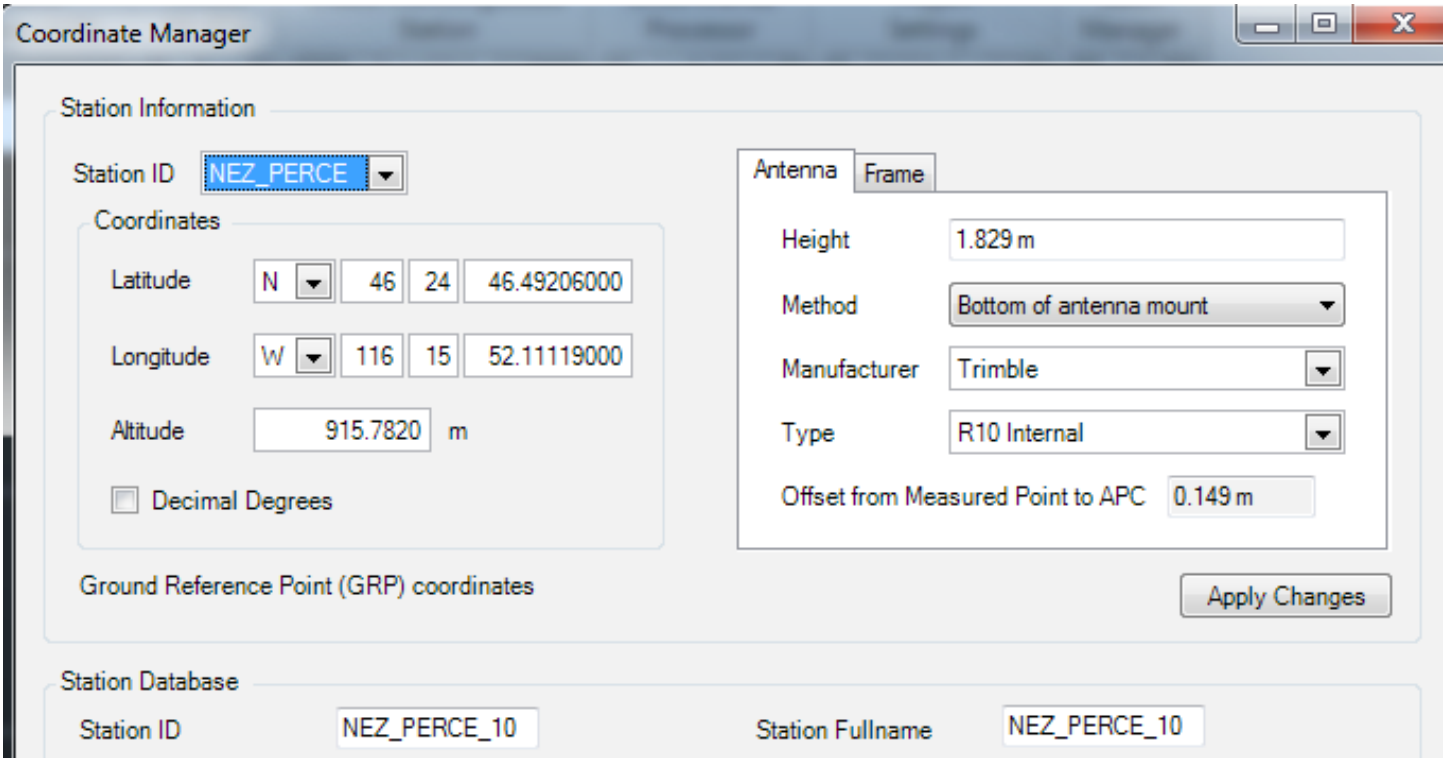

Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
Time (sec)


Time (sec)
North (m)
East (m)
Down (m)
DR mode


Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
CH8063
Coordinates
Latitude
N
46
27
17.29909000
Longitude
W
116
16
53.36052000
Altitude
907.9920
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.747 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
CH8063
Station Fullname
CH8063


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
24
46.49206000
Longitude
W
116
15
52.11119000
Altitude
915.7820
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.829 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_10
Station Fullname
NEZ_PERCE_10

Flight Log

Julian Day 315	Flight A

LIDAR Flight Log 5416315A

Date Nov 10 2016	Aircraft PA-31 C-FFRY
Project 3114 Nez Perce	Pilot B. HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL2 AOI06	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes 10/14/45
Temp 18
Humidity 75
Altimeter 10243 (3020)
Terrain Height 438

AIRBORNE IMAGING
A Clean Harbors Company

Aircraft Block Time		
Engine On 9:42	Ramp Out 19:53	Takeoff 19:54
Engine Off 00:49	Ramp In	Landing 00:43
Total 5 hrs	Total hrs	Total 4.8 hrs

Mission Plan			
AGL Height 2200	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 182	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	20:03	20:17
Post Mission	IN FLIGHT	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↷		20:10	20:15				WAKE UP IMU
253 REMOVE				20:17	20:17			REMOVE!!	WENT THROUGH A NORTHBOUND
253	5416315 01	180.2	8300'	20:21	20:30			161110.202125	
252	02	0.2	8200'	20:33	20:41			203343	
251	03	180.2	↓	20:45	20:54			204529	
250	04	0.2	↓	20:57	21:05			205757	
249	05	180.2	↓	21:10	21:18			211006	
248	06	0.2	↓	21:21	21:28			212140	
247	07	180.2	↓	21:32	21:40			213238	
246	08	0.2	↓	21:43	21:50			214342	
245	09	180.2	↓	21:54	22:02			215426	
244	10	0.2	↓	22:05	22:12			220530	
243	11	180.2	↓	22:16	22:24			221619	
242	12	0.2	↓	22:27	22:34			222715	
241	5416315 13	180.2	8200'	22:39	22:45			223807	

Pg 1 of 2

Julian Day 315	Flight A

LIDAR Flight Log 5416315A

AIRBORNE IMAGING
A Clean Harbors Company

Date	NOV 10 2016	Aircraft	PA-31 C-FFRY
Project	3119_NEZ PERCE	Pilot	B. HARRITY
Location	LEWISTON	Operator	B. Whiteley
Mission Objective	BLOCK QL2 AOI06		

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A
Scanner 2 Drive	A2

Additional Notes	@ 00 20
Temp	15
Humidity	
Altimeter	30.14
Terrain Height	438

Aircraft Block Time		
Engine On 19.42	Ramp Out 19 53	Takeoff 19 54
Engine Off 00.49	Ramp In	Landing 00 43
Total 5' hrs	Total hrs	Total 48 hrs

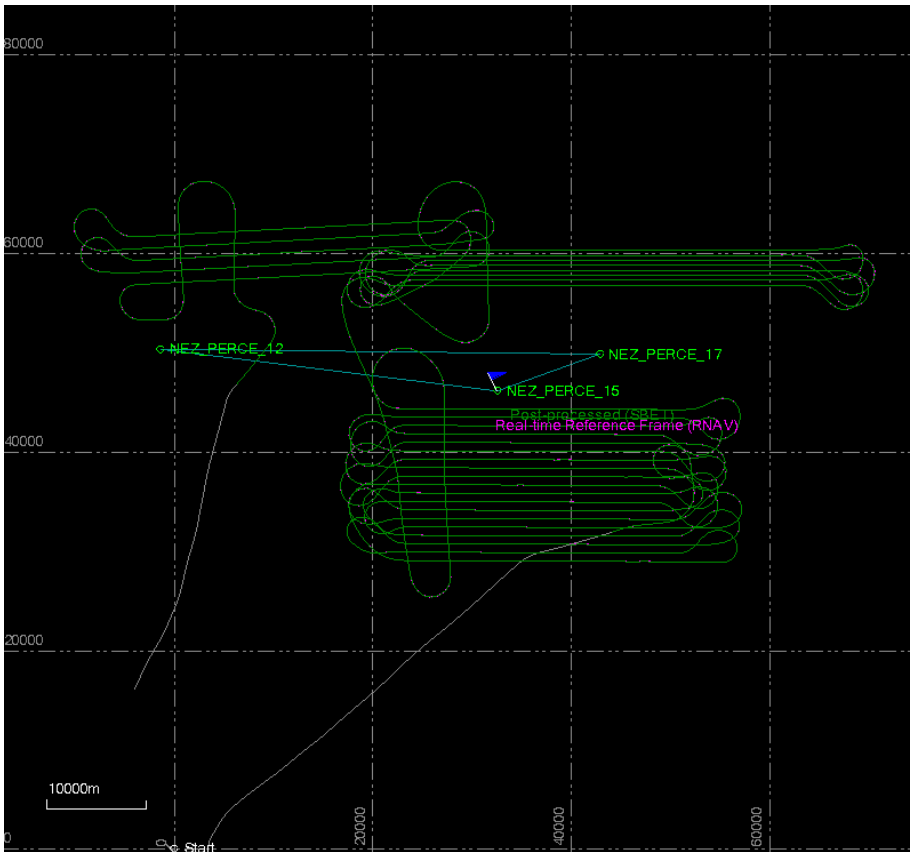
Mission Plan			
AGL Height	2200 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	182 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	IN FLIGHT	
Post Mission	00 22	00 35

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
240	541631514	0 2	8100'	22 48	22 55			161110-224257	
239	15	180 2		22 59	23 07			225939	
238	16	0 2		23 10	23 17			23r.31	
237	17	180 2		23 21	23 28			232110	
236	18	0 2		23 32	23 39			233224	
235	19	180 2		23 43	23 52			234335	
234	20	0 2		23 55	00 02			235503	
233	21	180 2	8100'	00 06	00 14			000612	
XTIE	5416315 22	90	8100'	00 17	00 21			001730	XTIE W/S 233-253 W→E
FIGURE 8		↷		00 24	00 30				CLOSE OFF SURVEY

Pg 2 of 2

Nov 10, 2016-A (N-44RL, SN2220764)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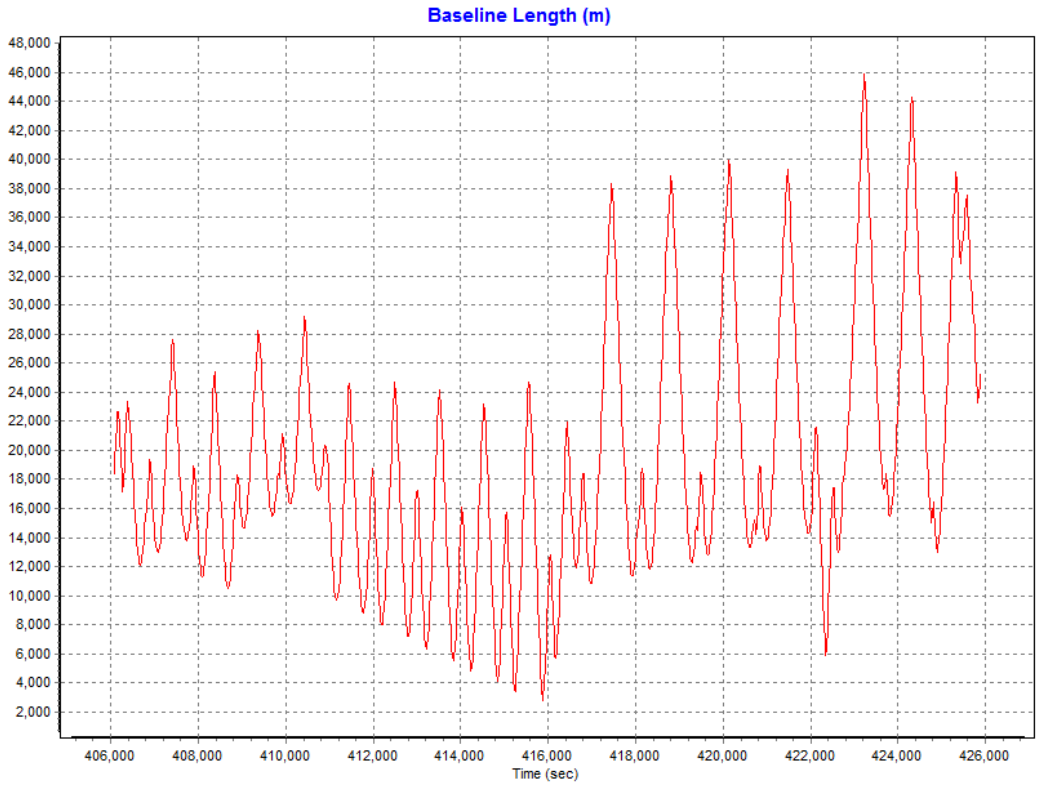
60000
40000
20000
NEZ_PERCE_12
NEZ_PERCE_17
NEZ_PERCE_15
Post-processed (SBET)
Real-time Reference Frame (RNAV)
10000m
0
20000
40000
60000
Start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30,000
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14,000
12,000
10,000
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4,000
2,000
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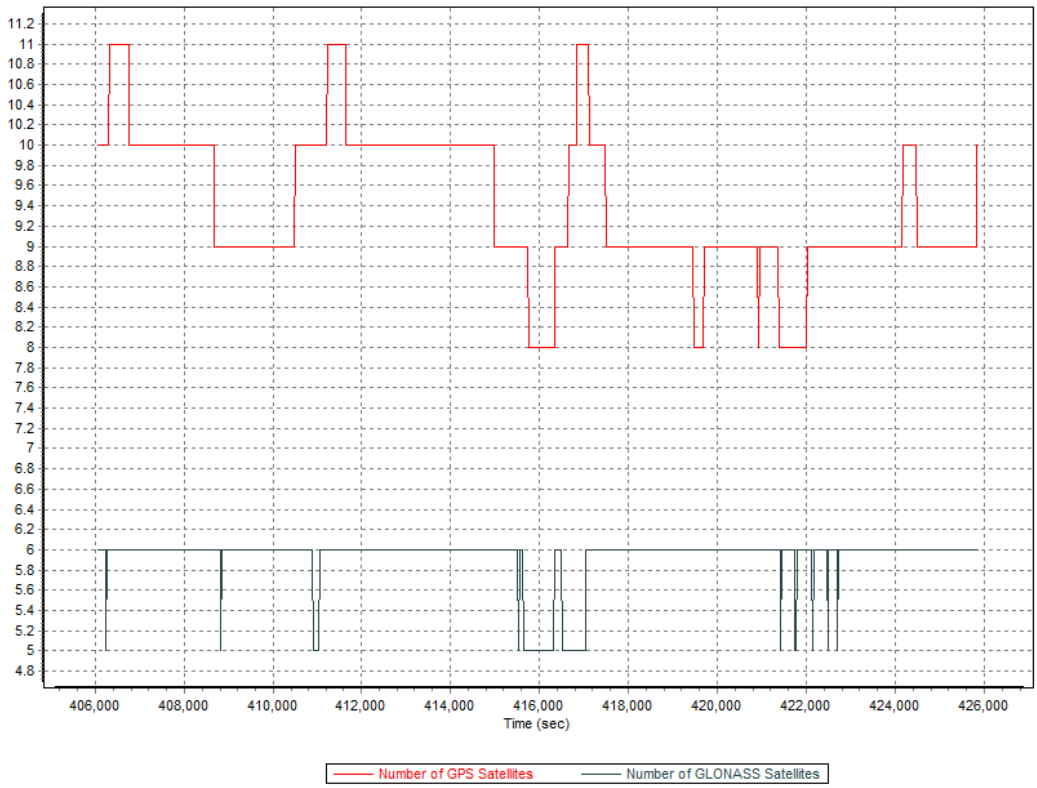
420,000
422,000
424,000
426,000
Time (sec)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10.6
10.4
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10
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9.6
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9
8.8
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8.4
8.2
8
7.8
7.6
7.4
7.2
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
406,000
408,000
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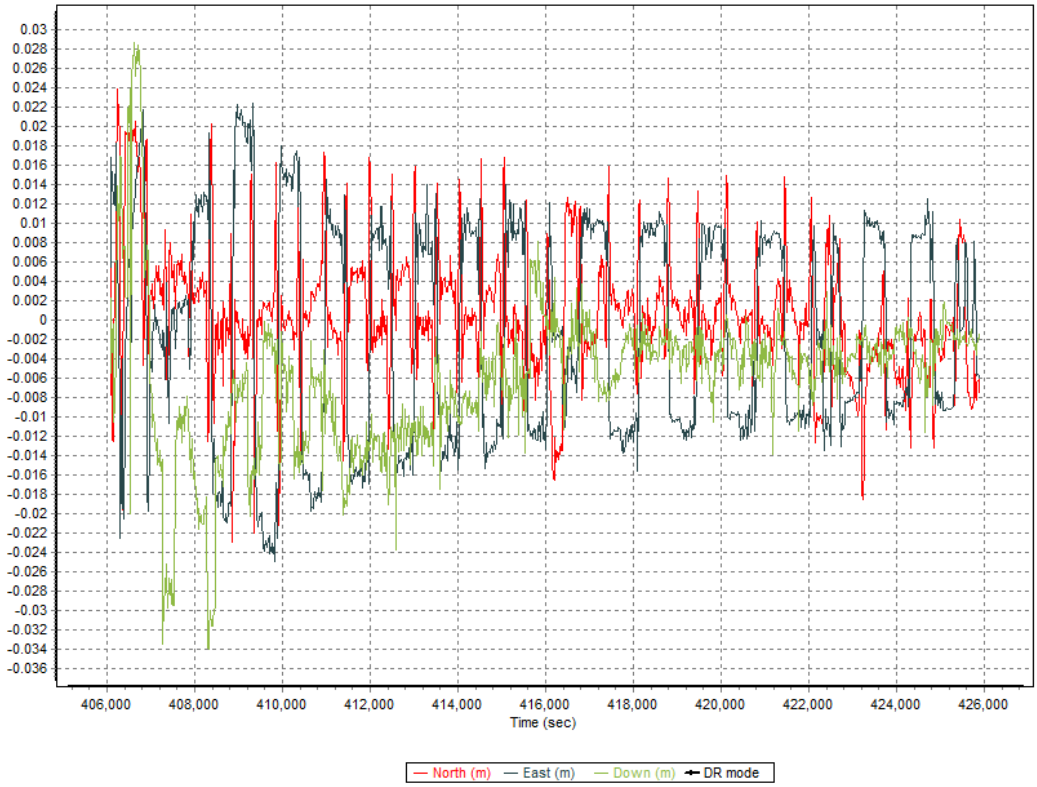
414,000
416,000
418,000
420,000
422,000
424,000
426,000
Time (sec)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0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
-0.002
-0.004
-0.006
-0.008
-0.01
-0.012
-0.014
-0.016
-0.018
-0.02
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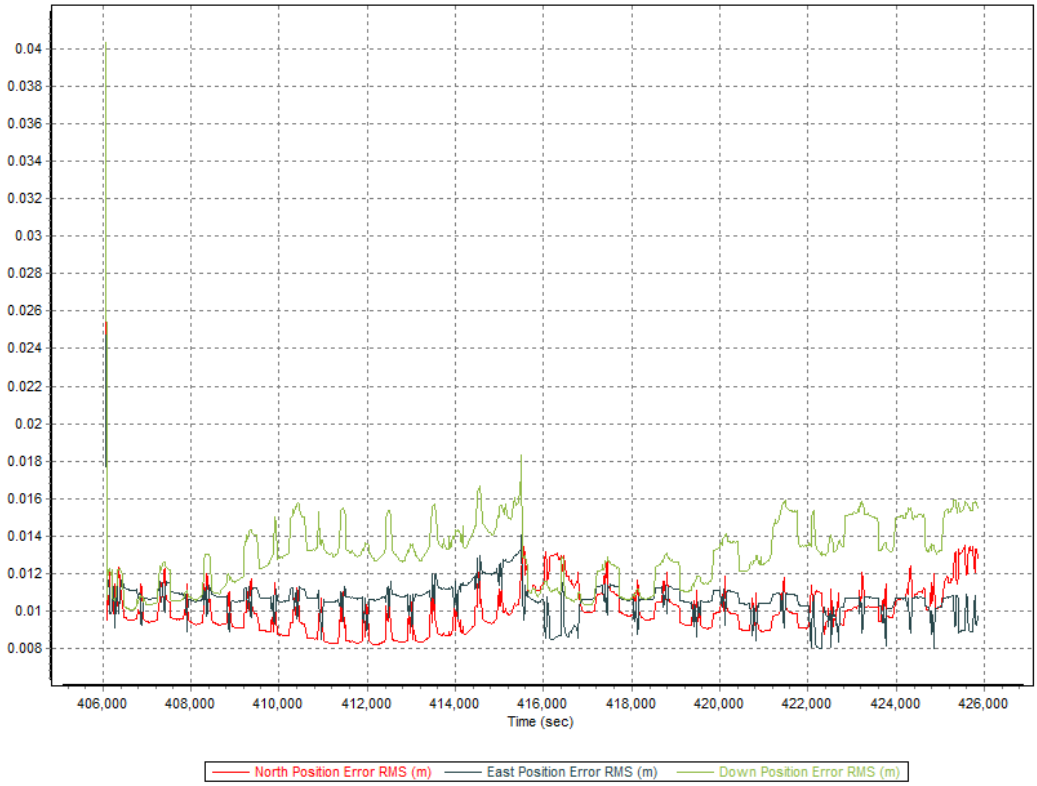
-0.024
-0.026
-0.028
-0.03
-0.032
-0.034
-0.036
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.026
0.024
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0.02
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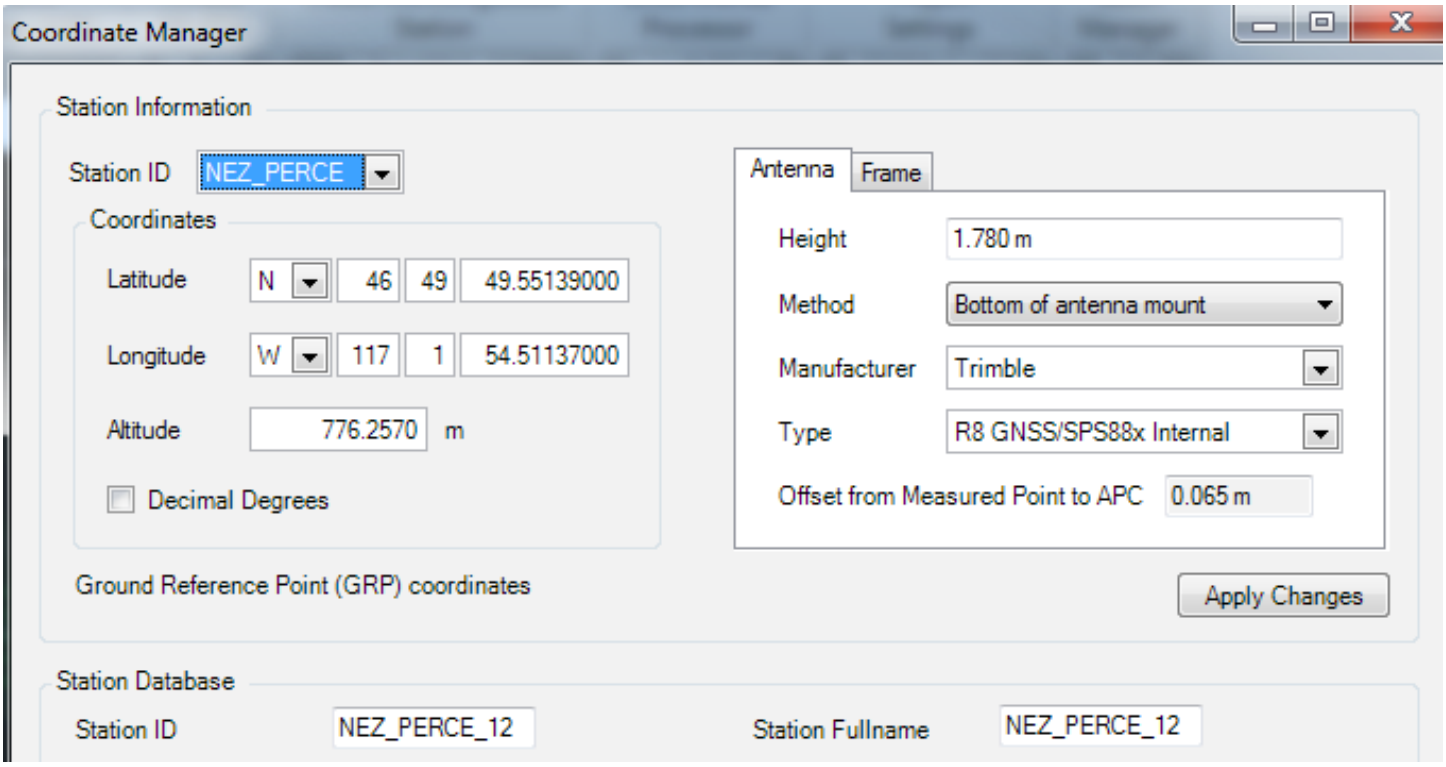
0.016
0.014
0.012
0.01
0.008
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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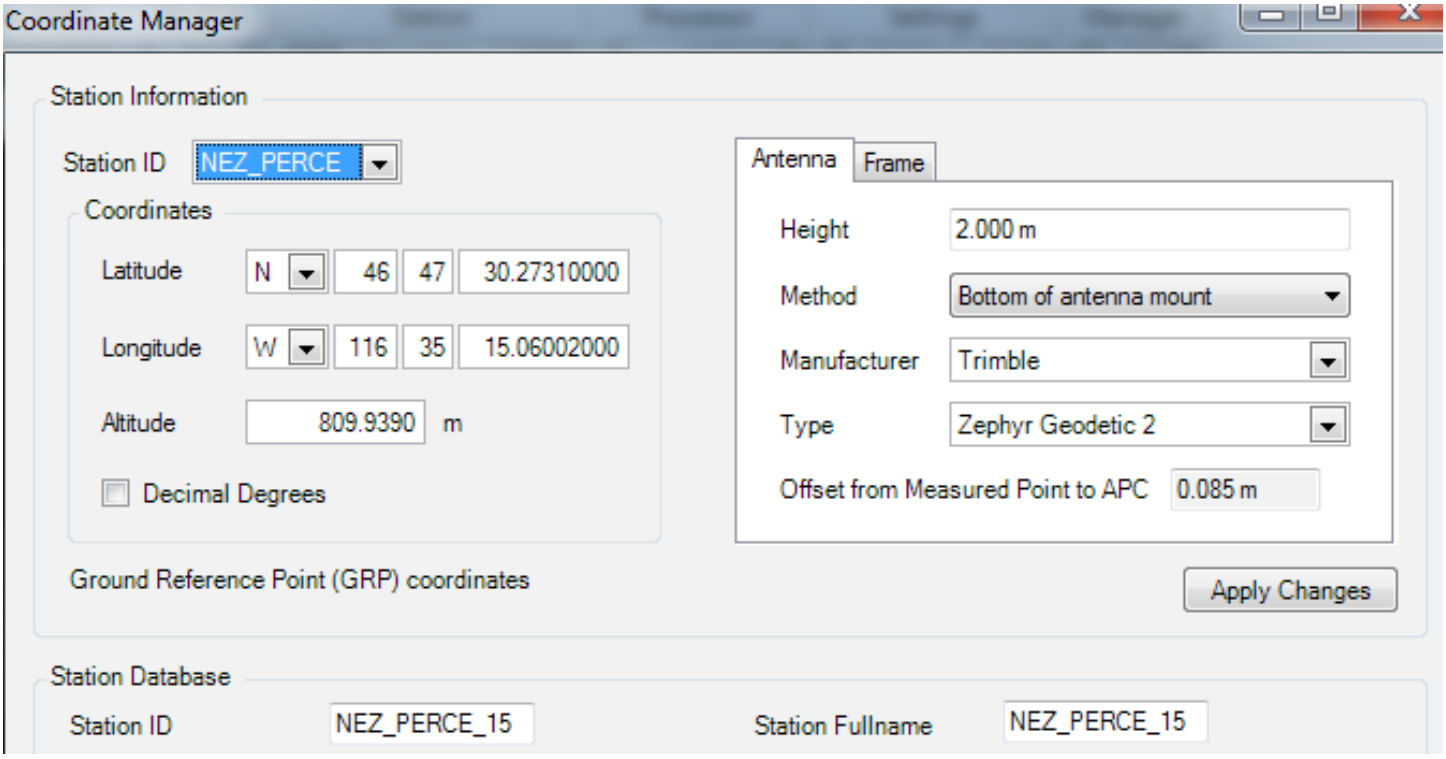
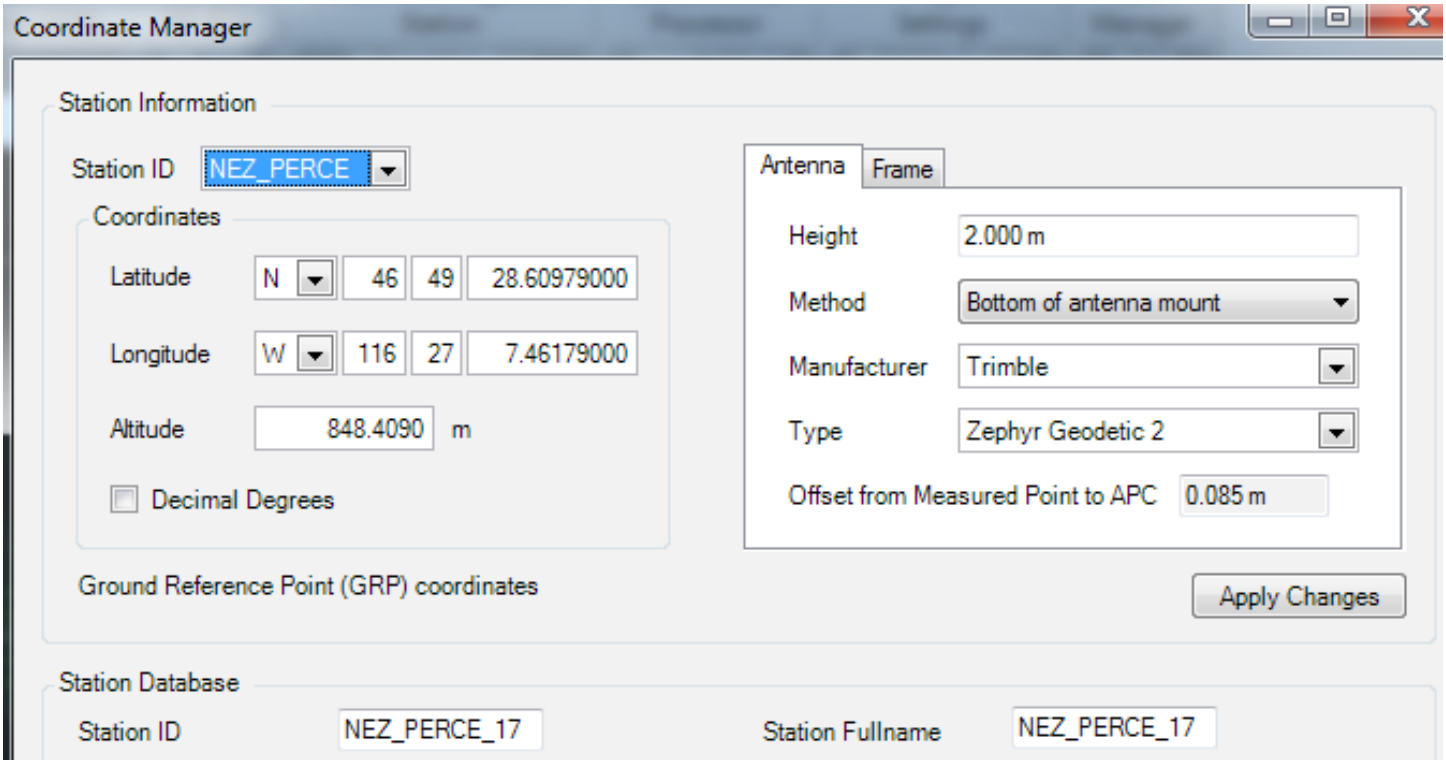
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
49
49.55139000
Longitude
W
117
1
54.51137000
Altitude
776.2570
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.780 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R8 GNSS/SPS88x Internal
Offset from Measured Point to APC
0.065 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_12
Station Fullname
NEZ_PERCE_12


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
47
30.27310000
Longitude
W
116
35
15.06002000
Altitude
809.9390
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_15
Station Fullname
NEZ_PERCE_15


Coordinate Manager
Station Information
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NEZ_PERCE
Coordinates
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Longitude
W
116
27
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Altitude
848.4090
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_17
Station Fullname
NEZ_PERCE_17

Flight Log

Julian Day 315	Flight A

LIDAR Flight Log

Date Nov. 10th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1624	Ramp Out	Takeoff 1634
Engine Off 2233	Ramp In	Landing 2229
Total 6.2 **hrs**	Total **hrs**	Total 5.9 **hrs**

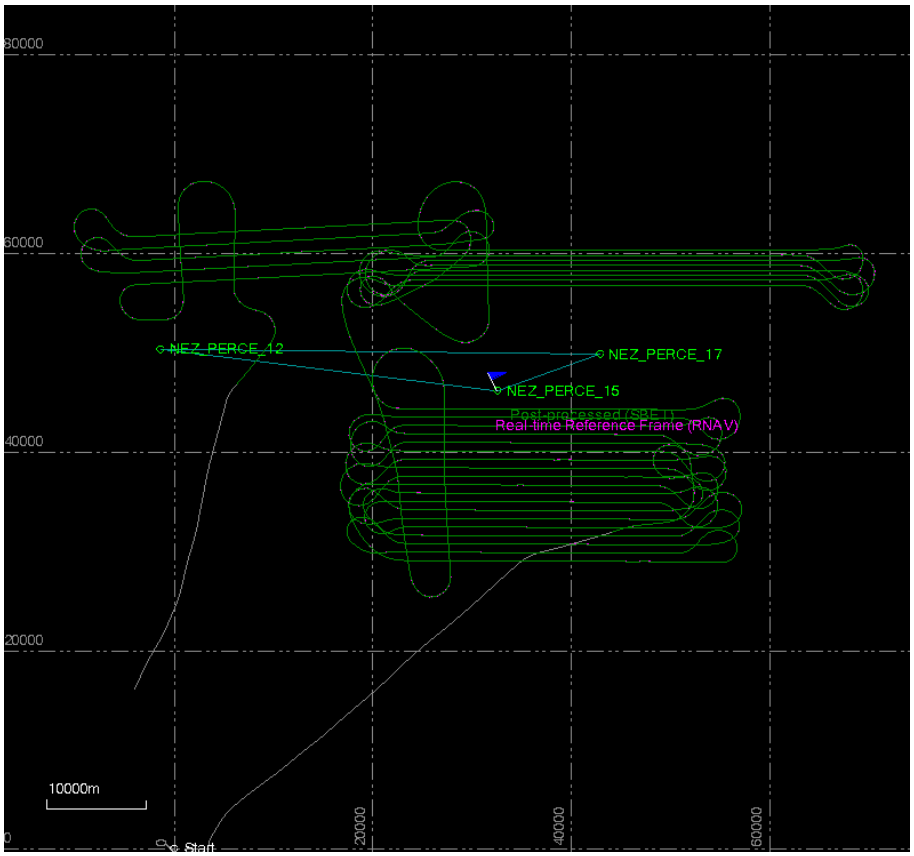
Mission Plan	
AGL Height 1900/2200 **m**	Laser Pulse Rate 800 **Hz**
Target Speed 160 **kts**	Scan Rate 195/182 **Hz**
Laser Current 50 **%**	FOV 60 **Deg's**

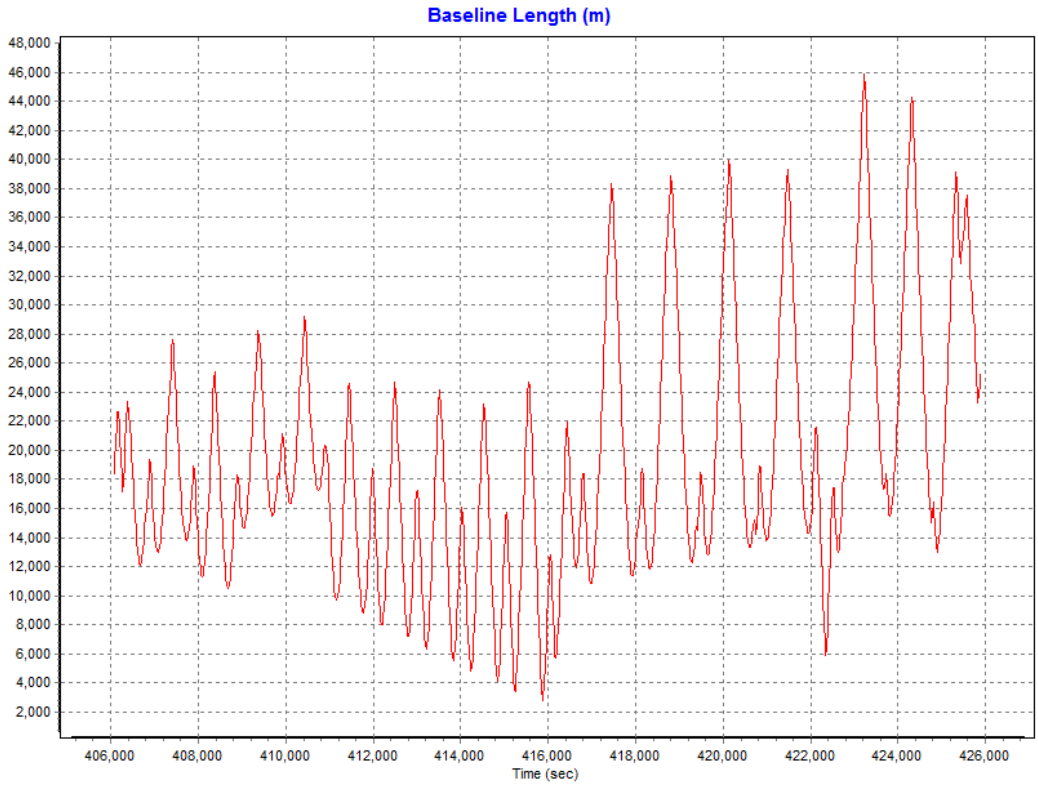
Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161110
065		270	9200'	185345	185858			
064		90	9300'	190209	190704			
063		270	9300'	191037	191546			
062		90	9400'	191856	192408			
061		270	9400'	192743	193300			
X-TIE		180	9000'	193603	193941			X-TIE AOI 07 All lines
036		90	8900'	194750	195540			Switch AOI 06 1900m Q7
035		270	9000'	195910	200656			
034		90	9100'	201037	201801			
033		270	9100'	202156	202927			
032		90	9100'	203248	204007			
031		270	9100'	204359	205123			
030		90	9000'	205531	210234			
029		270	9000'	210610	211331			
X-TIE		180	9000'	211632	211835			X-TIE AOI 06 029-036

Pg 2 of 3

Nov 10, 2016-A (N-44RL, SN2220764)


80000
60000
40000
20000
NEZ_PERCE_12
NEZ_PERCE_17
NEZ_PERCE_15
Real-time Reference Frame (RNAV)
10000m
0
20000
40000
60000
Start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44,000
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4,000
2,000
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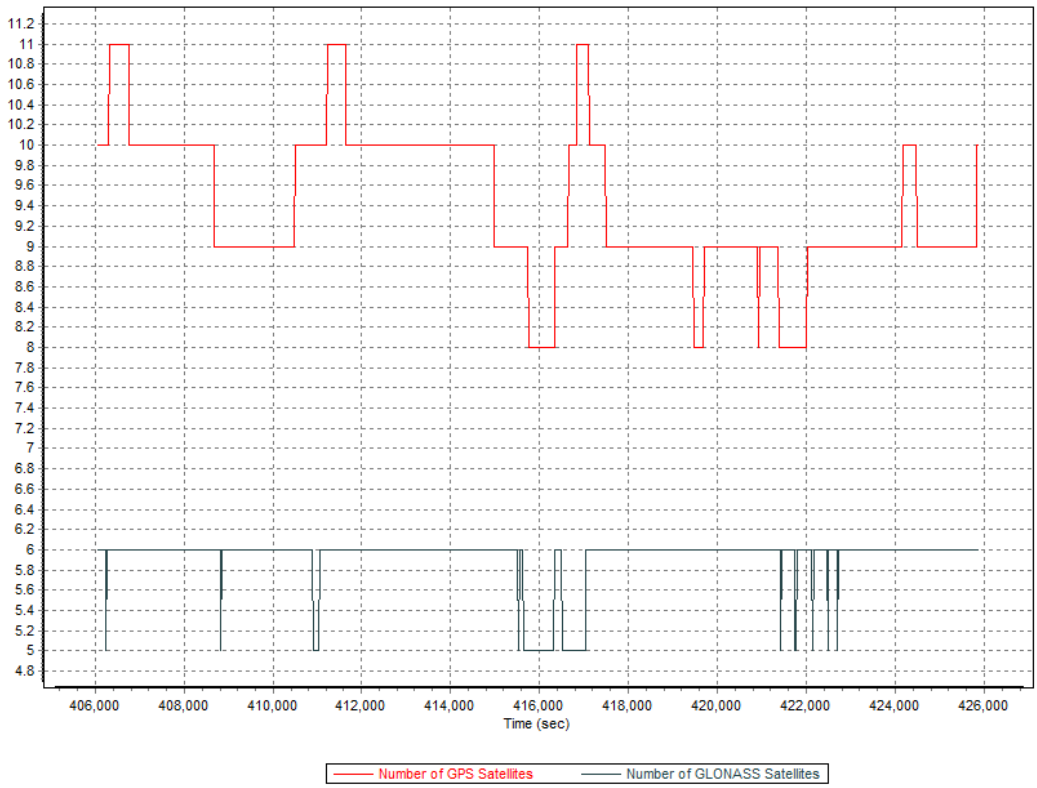
420,000
422,000
424,000
426,000
Time (sec)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10.4
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7
6.8
6.6
6.4
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6
5.8
5.6
5.4
5.2
5
4.8
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
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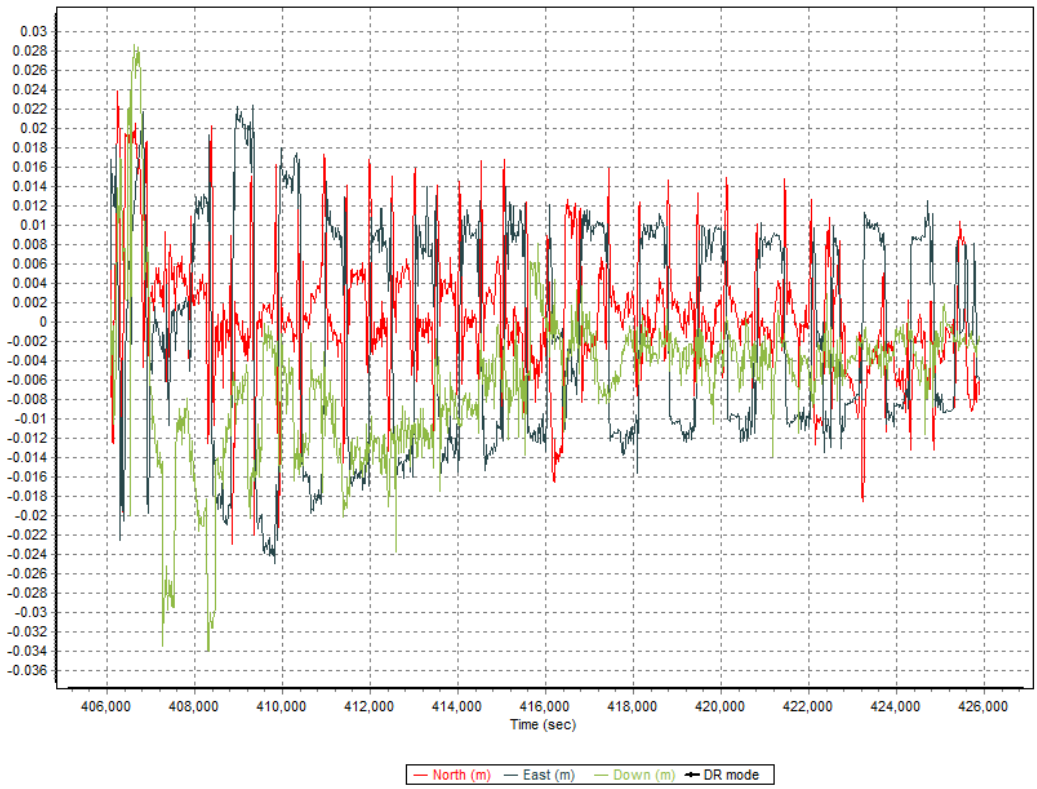
420,000
422,000
424,000
426,000
Time (sec)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422,000
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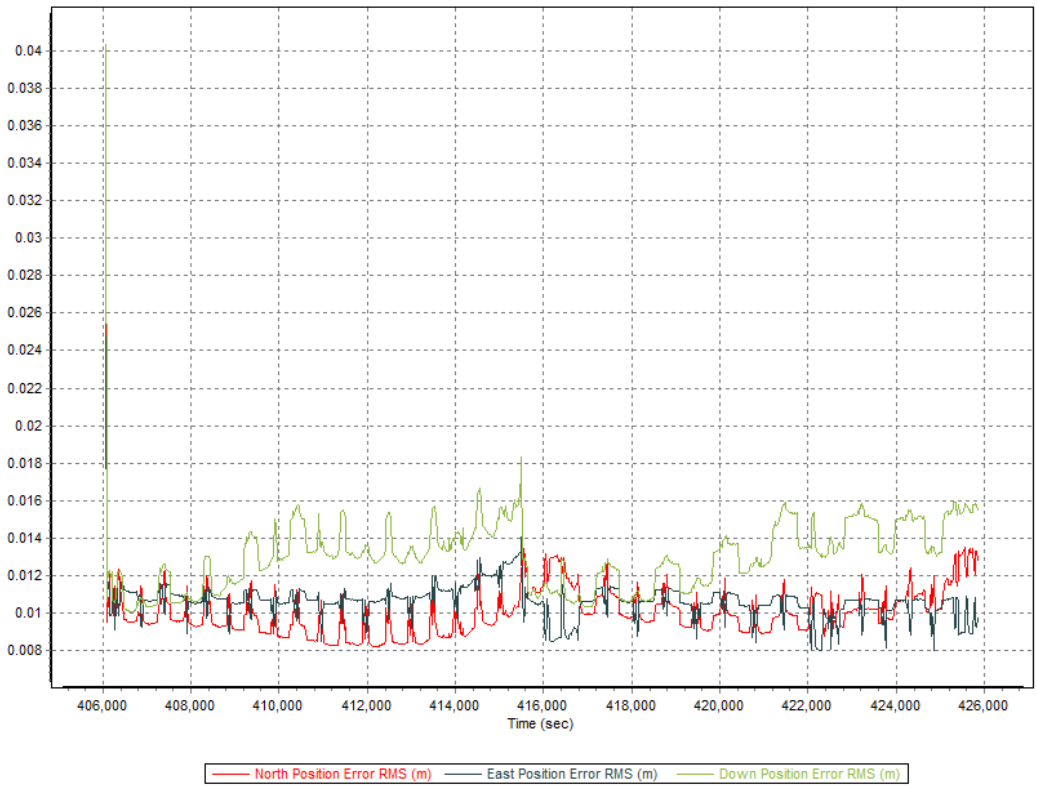
426,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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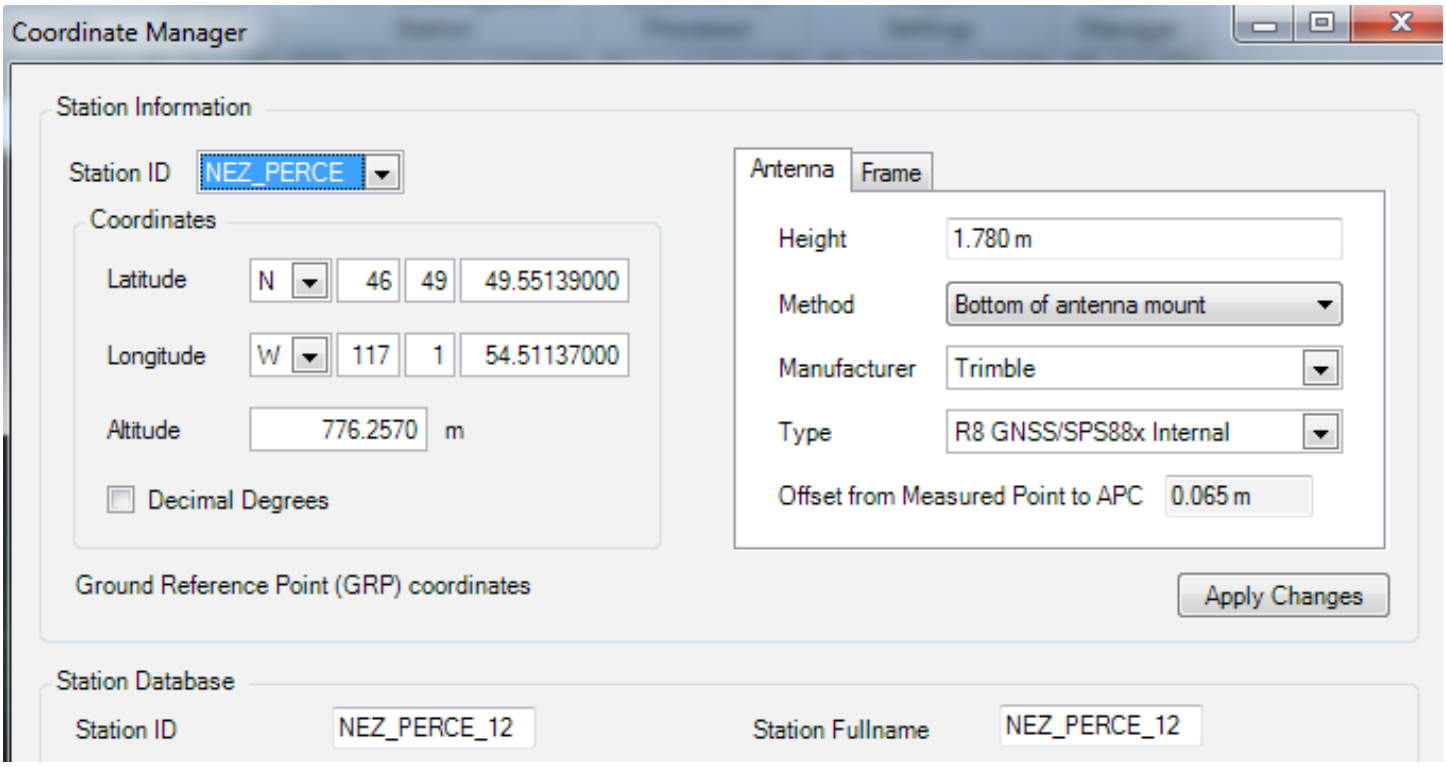
0.016
0.014
0.012
0.01
0.008
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
422,000
424,000
426,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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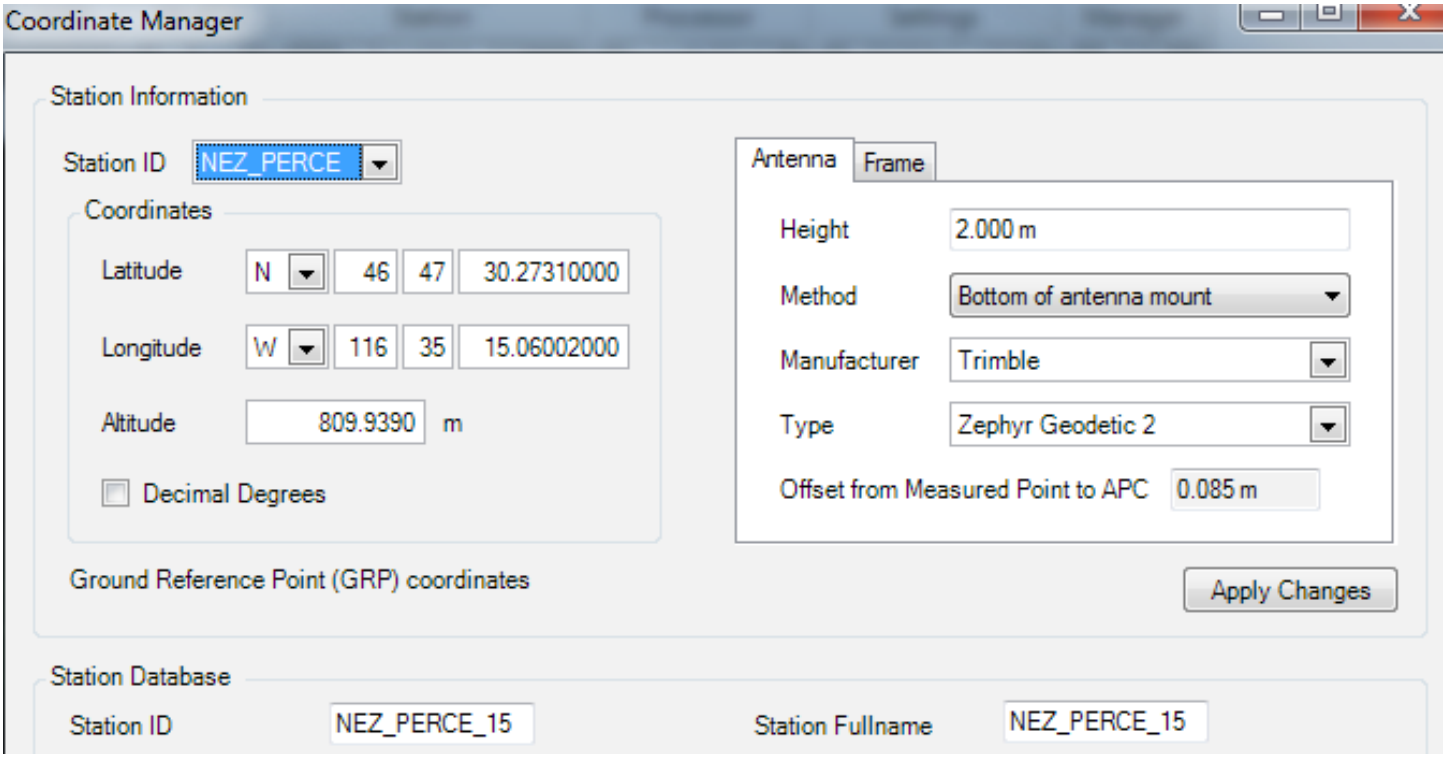
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
49
49.55139000
Longitude
W
117
1
54.51137000
Altitude
776.2570
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.780 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R8 GNSS/SPS88x Internal
Offset from Measured Point to APC
0.065 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_12
Station Fullname
NEZ_PERCE_12


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
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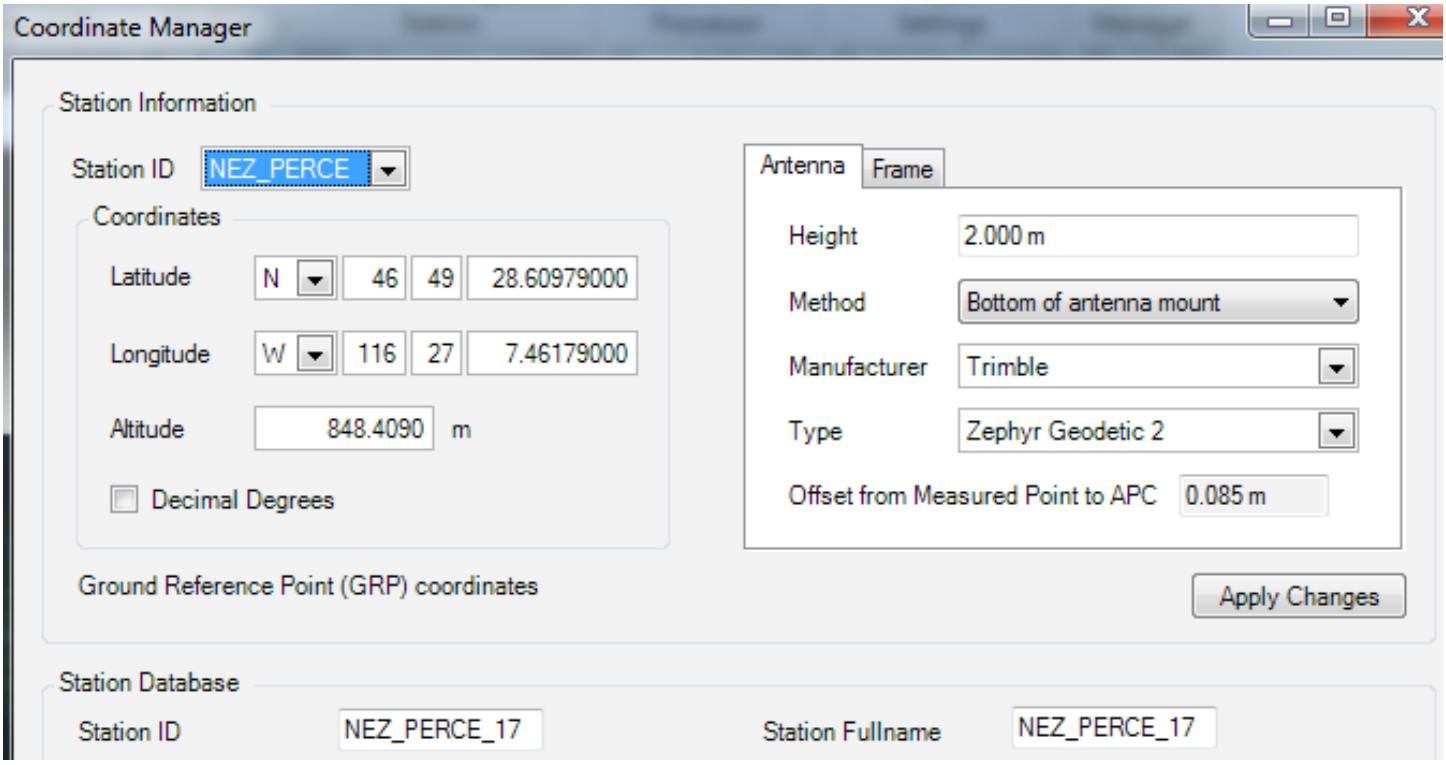
30.27310000
Longitude
W
116
35
15.06002000
Altitude
809.9390
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_15
Station Fullname
NEZ_PERCE_15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Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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49
28.60979000
Longitude
W
116
27
7.46179000
Altitude
848.4090
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_17
Station Fullname
NEZ_PERCE_17

Flight Log

Julian Day 315	Flight A

LIDAR Flight Log

Date Nov. 10th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective: Complete AOI07, AOI06 + work on small NW blocks.	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes: @16:00 UTC KLWS
Wind: 110° (ESE) @ 8 knts
Temp: 9°C 81% RH
Pressure: 1025 hPa
Clouds: clear
Visibility: 16.1 km

Aircraft Block Time		
Engine On 1624	Ramp Out	Takeoff 1634
Engine Off 2233	Ramp In	Landing 2229
Total 6.2 hrs	Total hrs	Total 5.9 hrs

Mission Plan	
AGL Height 1900/2200 m	Laser Pulse Rate 800 Hz
Target Speed 160 kts	Scan Rate 195/182 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	1641	1653
Post Mission	—	—

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments (Time Stamp: 161110–)
TEST				164351	164401			
073		270	8800'	165453	165935			AOI07 Q2 2200m
074		90	8800'	170244	170804			
075		270	8700'	171145	171716			
072		90	8900'	171942	172435			
071		270	8900'	172759	173308			
076		90	8600'	173531	174052			
077		270	8600'	174427	175000			
078		90	8500'	175313	175831			
079		270	8500'	180206	180731			
070		90	9000'	181052	181550			
069		270	9000'	181909	182438			
068		90	9100'	182810	183312			
067		270	9200'	183633	184145			
066		90	9200'	184506	185014			

Pg 1 of 3

Julian Day 315	Flight A

LIDAR Flight Log

Date Nov. 10th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1624	Ramp Out	Takeoff 1634
Engine Off 2233	Ramp In	Landing 2229
Total 6.2 **hrs**	Total **hrs**	Total 5.9 **hrs**

Mission Plan			
AGL Height 1900/2200 **m**		Laser Pulse Rate 800 **Hz**	
Target Speed 160 **kts**		Scan Rate 195/182 **Hz**	
Laser Current 50 **%**		FOV 60 **Deg's**	

Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161110
065		270	9200'	185345	185858			
064		90	9300'	190209	190704			
063		270	9300'	191037	191546			
062		90	9400'	191856	192408			
061		270	9400'	192743	193300			
X-TIE		180	9000'	193603	193941			X-TIE AOI 07 All lines
036		90	8900'	194750	195540			Switch AOI 06 1900m Q7
035		270	9000'	195910	200656			
034		90	9100'	201037	201801			
033		270	9100'	202156	202927			
032		90	9100'	203248	204007			
031		270	9100'	204359	205123			
030		90	9000'	205531	210234			
029		270	9000'	210610	211331			
X-TIE		180	9000'	211632	211835			X-TIE AOI 06 029-036

Pg 2 of 3

Julian Day 315	Flight A

LIDAR Flight Log

Date Nov. 10th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes 2217Z @ KLWS
Wind: 1050 @ 04 knts.
Temp: 18°C
Pressure: 3014 inchs
Clouds: clear
Visibility: 10

Aircraft Block Time		
Engine On 1624	Ramp Out	Takeoff 1634
Engine Off 2233	Ramp In	Landing 2229
Total 6.2 hrs	Total hrs	Total 5.9 hrs

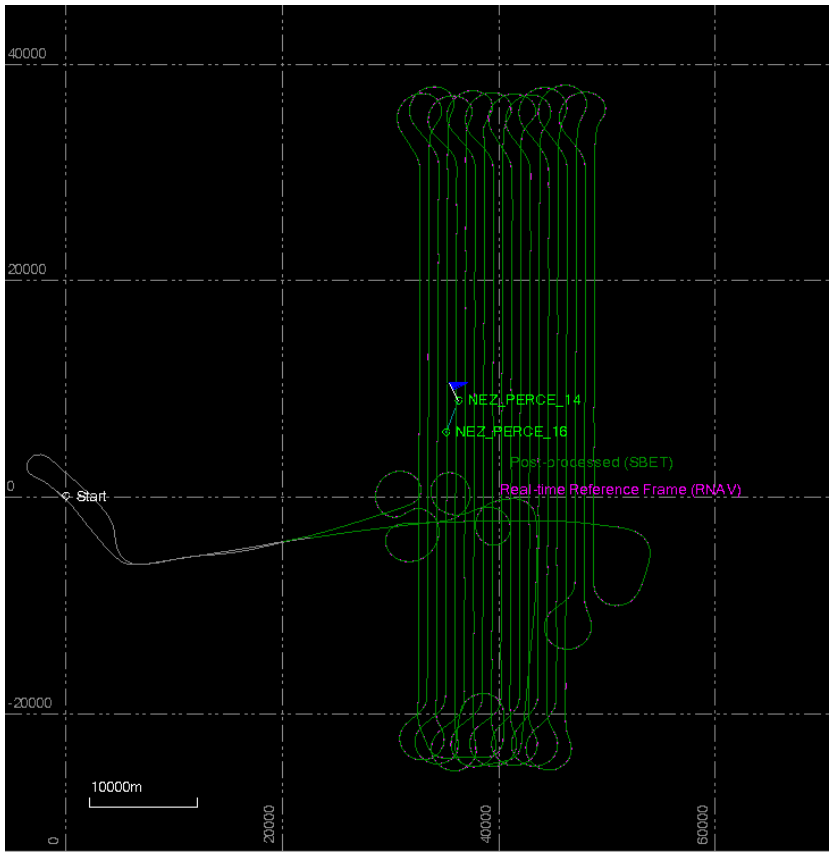
Mission Plan	
AGL Height 1900/2200m	Laser Pulse Rate 800 Hz
Target Speed 160 kts	Scan Rate 195/182 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	—	—
Post Mission	2213	2223

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 161110–
009		267	9600'	212627	213209			Switch to AOI 04 @ 2200m
010		87		213523	214100			
011		267		214422	215021			
012		87		215322	215916			
013		267	9600'	220219	210815			X-TIE AOI 04 - ALL LINES
X-TIE		355	9600'	221030	221222			
IMU				2213	2223			Figure 8 IMU CLOSE

Pg 3 of 3

Nov 11, 2016-A (C-FFRY, SN2221256)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NEZ_PERCE_16
Post-processed (SBET)
Real-time Reference Frame (RNAV)
Start
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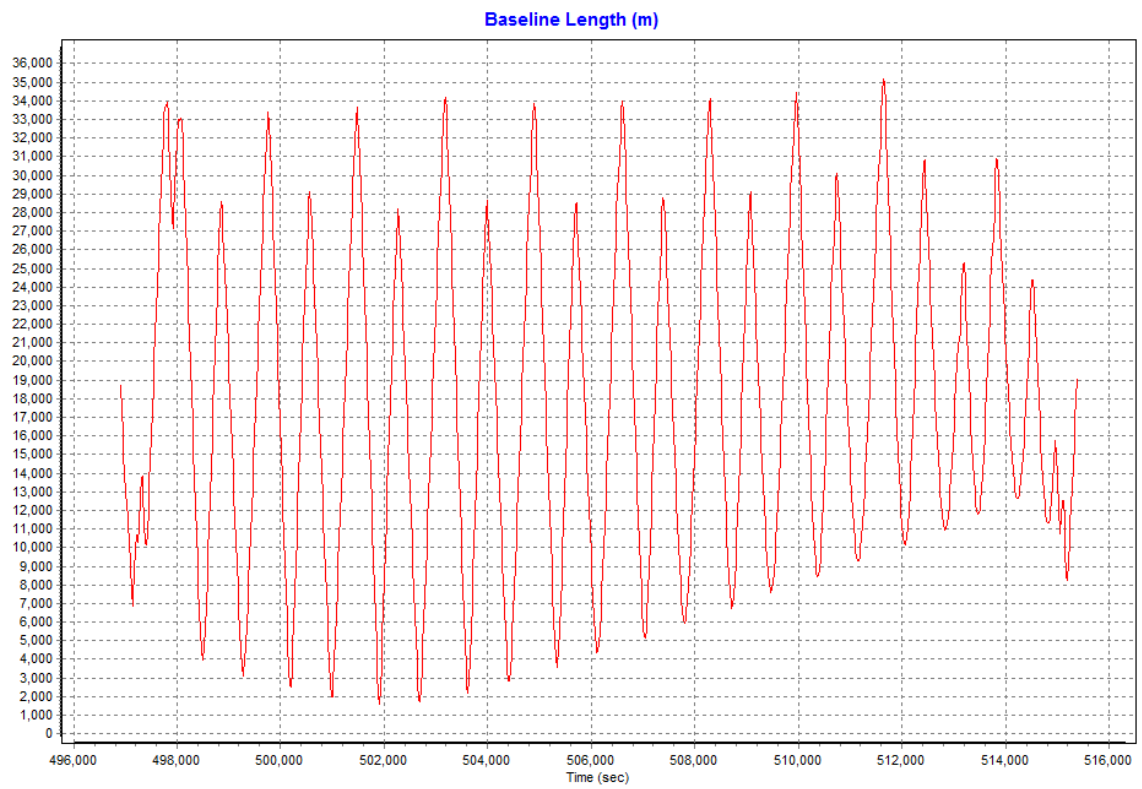
20000
40000
60000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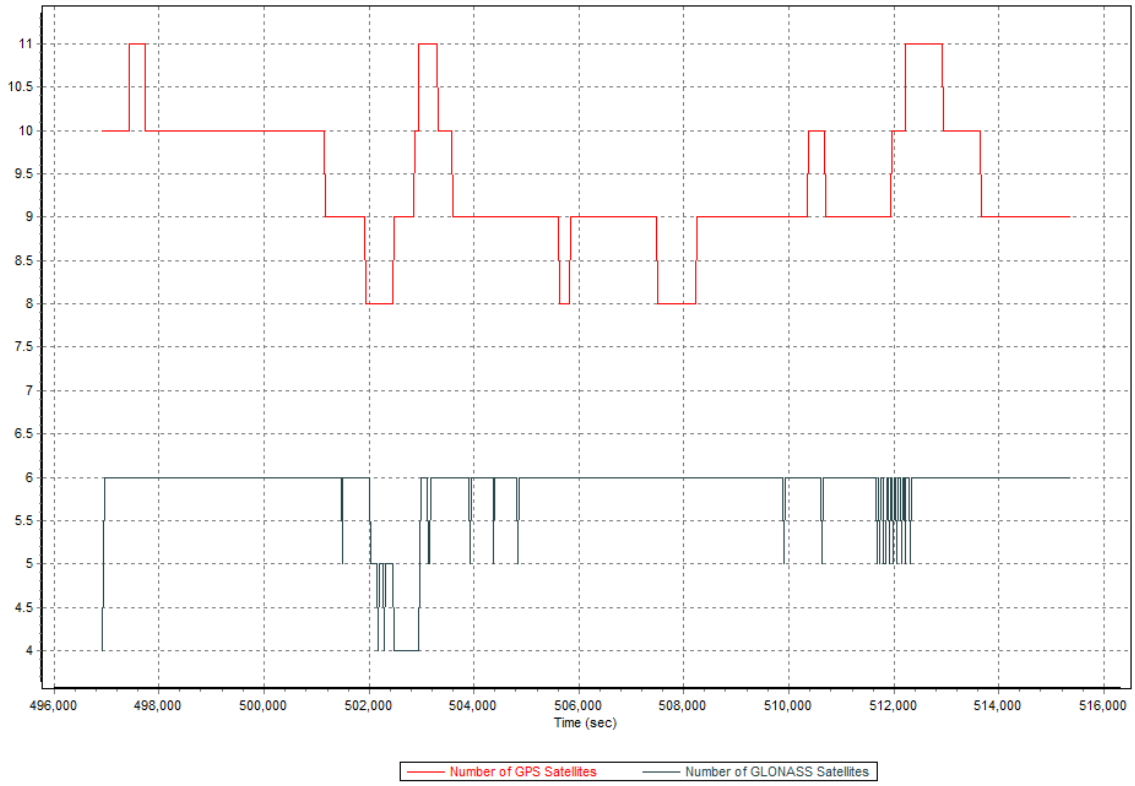
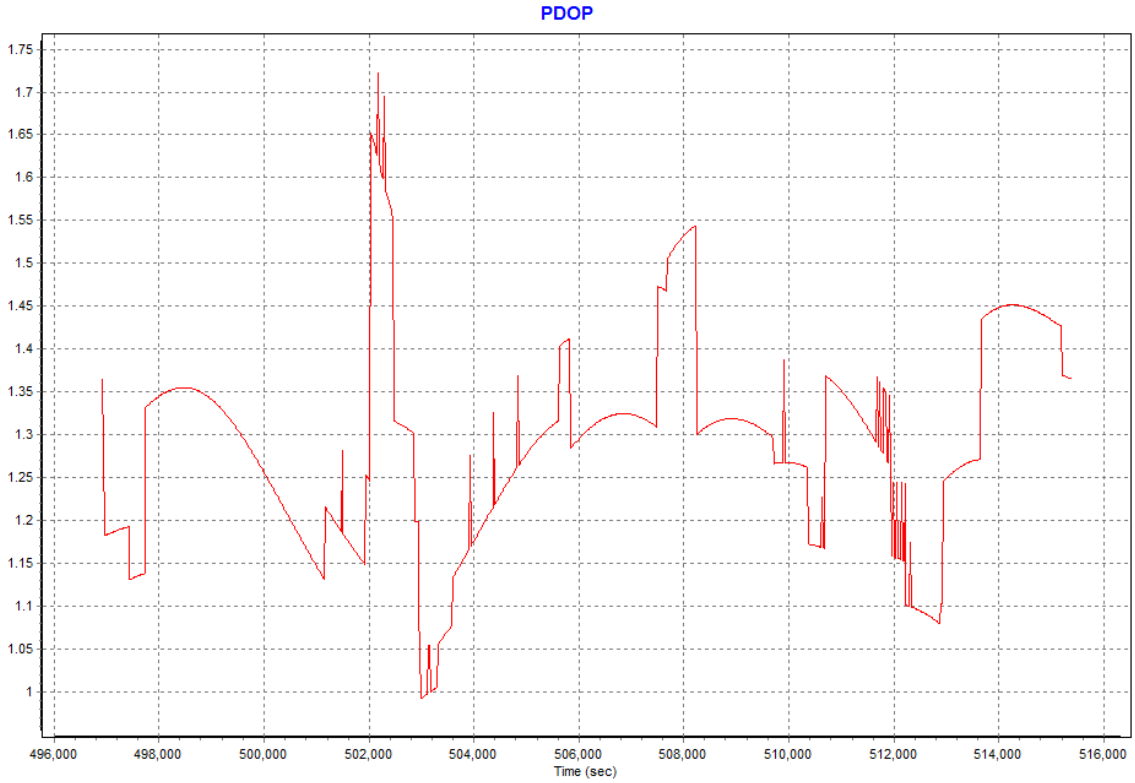
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
496,000
498,000
500,000
502,000
504,000
506,000
508,000
510,000
512,000
514,000
516,000
Time (sec)


11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
496,000
498,000
500,000
502,000
504,000
506,000
508,000
510,000
512,000
514,000
516,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.75
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
496,000
498,000
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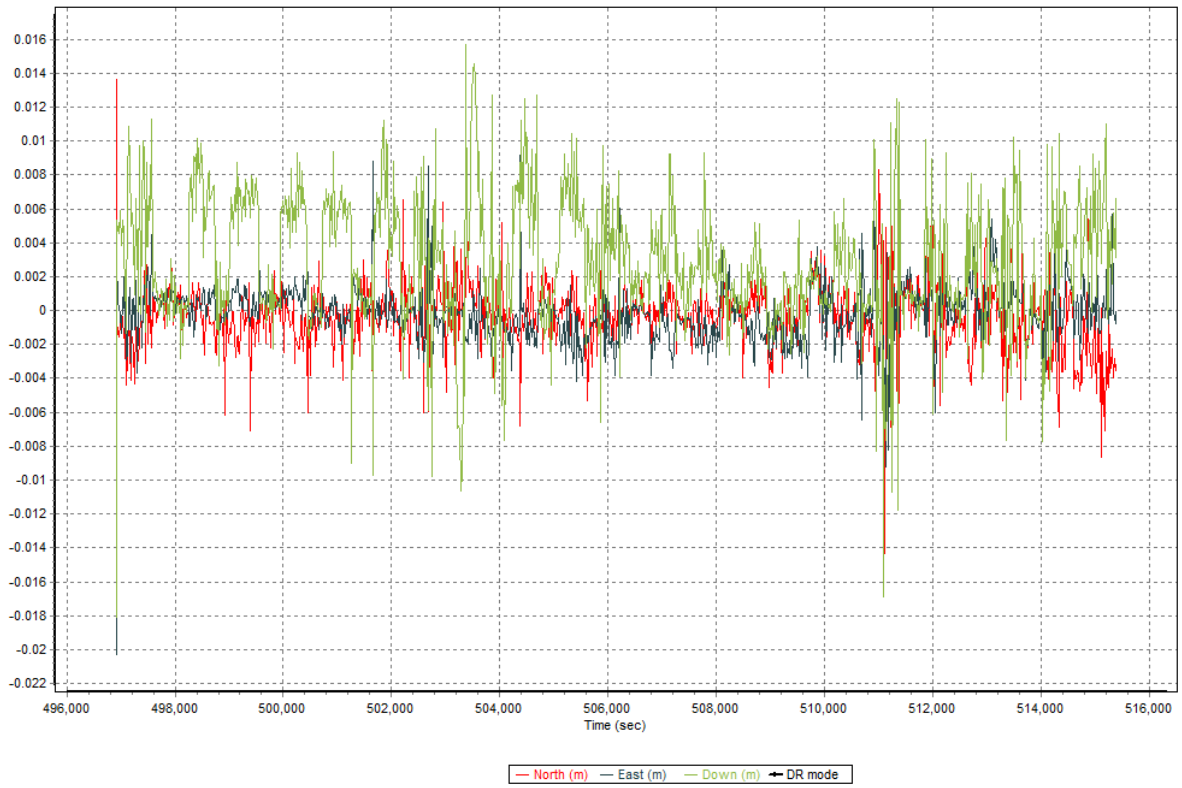
502,000
504,000
506,000
508,000
510,000
512,000
514,000
516,000
Time (sec)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0.012
0.01
0.008
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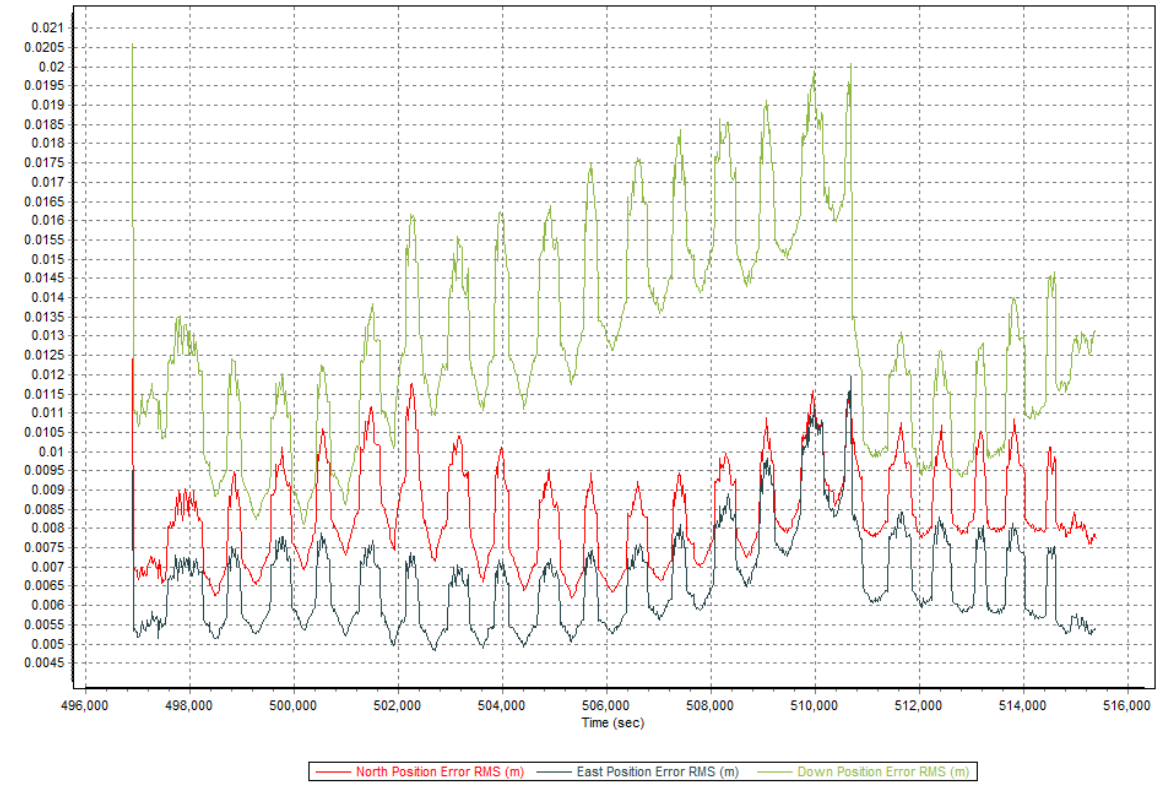
0.004
0.002
0
-0.002
-0.004
-0.006
-0.008
-0.01
-0.012
-0.014
-0.016
-0.018
-0.02
-0.022
496,000
498,000
500,000
502,000
504,000
506,000
508,000
510,000
512,000
514,000
516,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.0205
0.02
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0.019
0.0185
0.018
0.0175
0.017
0.0165
0.016
0.0155
0.015
0.0145
0.014
0.0135
0.013
0.0125
0.012
0.0115
0.011
0.0105
0.01
0.0095
0.009
0.0085
0.008
0.0075
0.007
0.0065
0.006
0.0055
0.005
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502,000
504,000
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512,000
514,000
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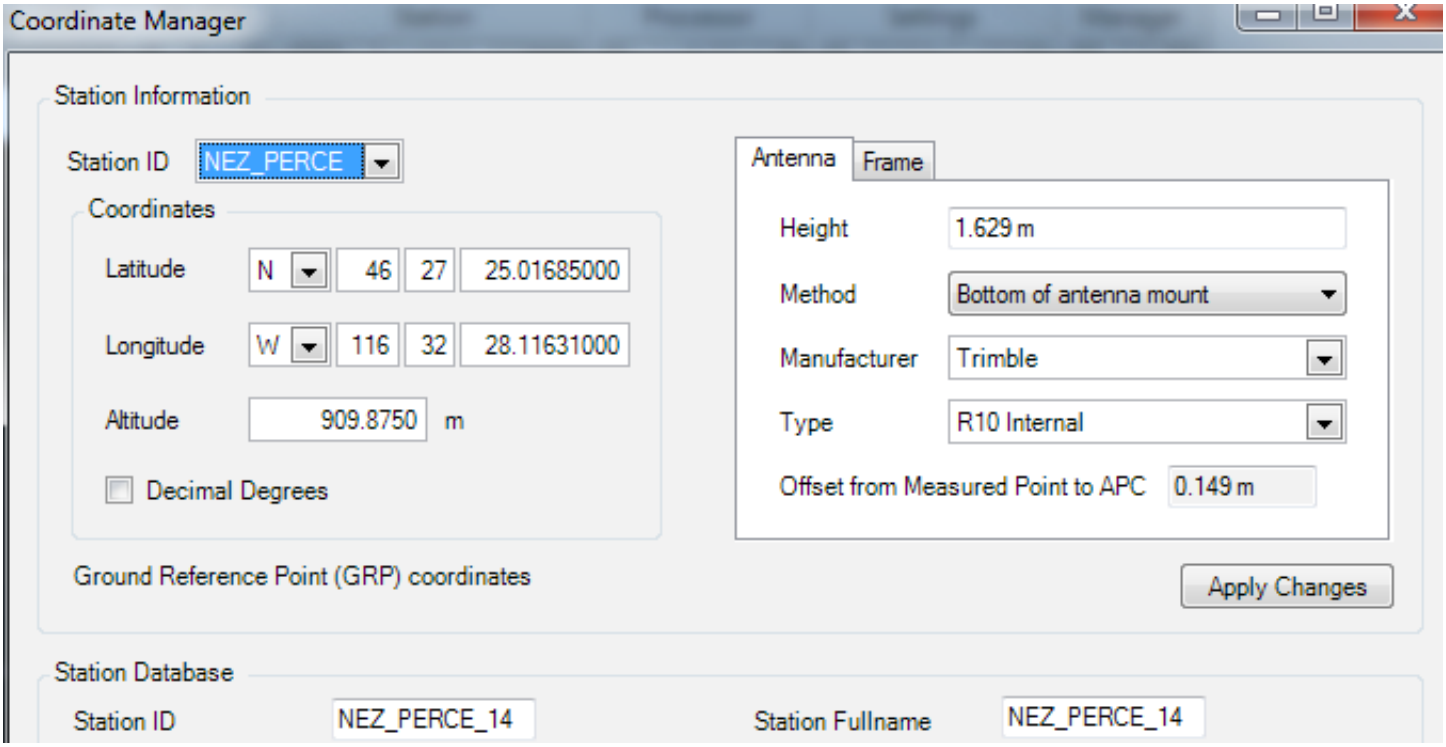
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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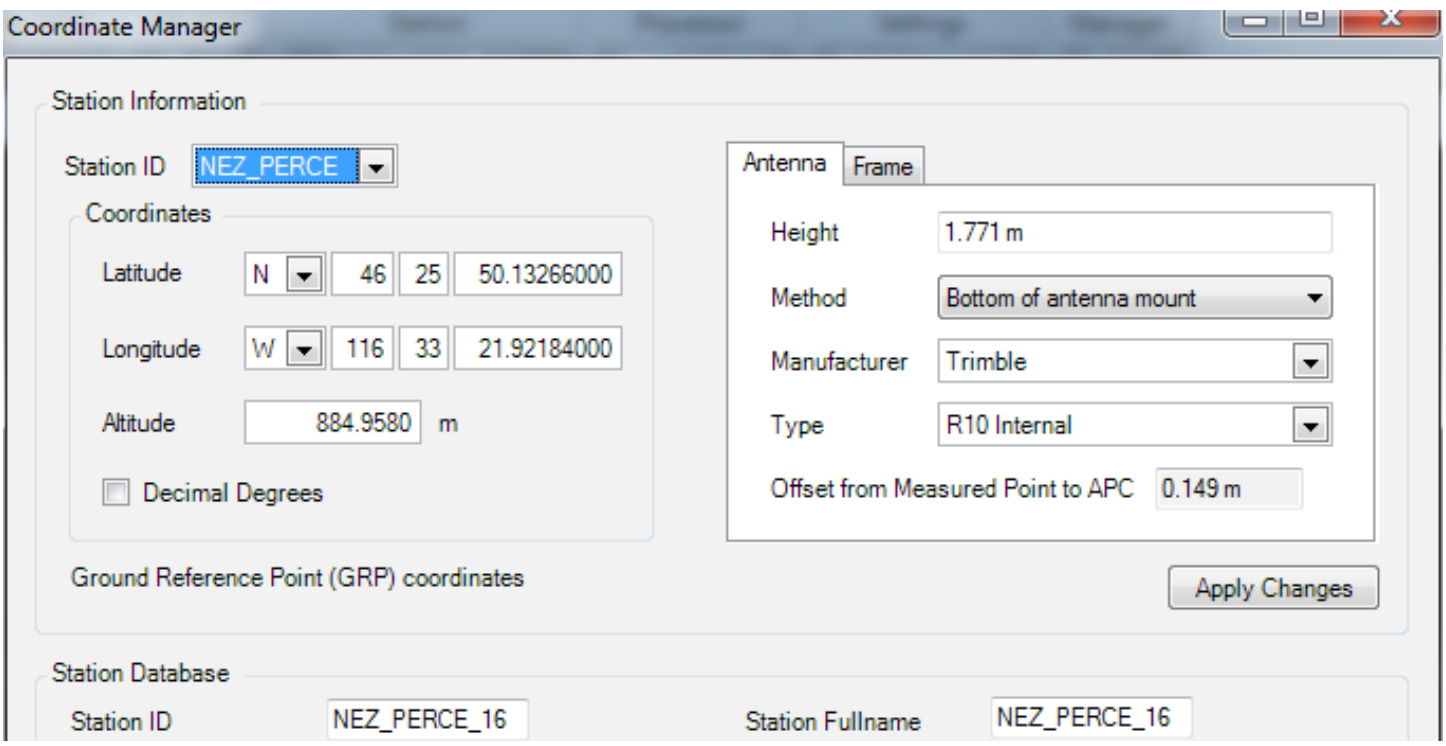
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
27
25.01685000
Longitude
W
116
32
28.11631000
Altitude
909.8750
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.629 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_14
Station Fullname
NEZ_PERCE_14


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
25
50.13266000
Longitude
W
116
33
21.92184000
Altitude
884.9580
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.771 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_16
Station Fullname
NEZ_PERCE_16

Flight Log

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Julian Day 310	Flight A

Date Nov 11 2016	Aircraft PA-31 C-FFRY
Project 3.14 NEZ PERCE	Pilot B HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL2 AOI 06	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B
Scanner 2 Drive	B2

Additional Notes @ T 30
Temp 2
Humidity 70%
Altimeter 30.09
Terrain Height -38
300@ 05 WNDS
- MOVE TO WEST END -
FOG ON EAST SIDE

Aircraft Block Time		
Engine On 17 40	Ramp Out 17 53	Takeoff 17 55
Engine Off 23 28	Ramp In	Landing 23:18
Total 5.8 hrs	Total hrs	Total 5.4 hrs

Mission Plan			
AGL Height 2200	m	Pulse Rate 800	KHz
Target Speed 160	kts	Scan Rate 182	Hz
Laser Current 50	%	FOV 60	Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	18:00	18:13
Post Mission	IN FLIGHT	

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8		↝		18:04	18:10				WAKE UP IMU
213	541631601	0°	8000'	18:22	18:32			161111-182243	ISSUES WITH SNAPSHOT - HAD TO CIRCLE -
214	02	180°	↓	18:36	18:47			183620	
215	03	0°	↓	18:50	19:00			185055	
216	04	180°	↓	19:04	19:16			190453	
217	05	0°	8100'	19:19	19:29			191932	
218	06	180°	↓	19:33	19:44			193306	
219	07	0°	↓	19:47	19:57			194759	
220	08	180°	↓	20:01	20:12			200151	
221	09	0°	↓	20:16	20:26			201633	
222	10	180°	↓	20:30	20:41			203021	
223	11	0°	↓	20:44	20:54			204455	
224	12	180°	↓	20:58	21:09			205827	
225	13	0°	↓	21:12	21:22			211258	
226	541631614	180°	↓	21:26	21:37			212621	

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Julian Day 316	Flight A

LIDAR Flight Log 2016316.A

AIRBORNE IMAGING
A Clean Harbors Company

Date NOV 11 2016	Aircraft PA-31 C-FFRY
Project 3119-NEZ PERCE	Pilot B HARRIM
Location LEWISTON	Operator B. Whiteley
Mission Objective	
BLOCK QL2 A0106	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes	@ 22 55
Temp	16
Humidity	
Altimeter	29.97
Terrain Height	628

Aircraft Block Time		
Engine On 17:40	Ramp Out 17:53	Takeoff 17:55
Engine Off 23:28	Ramp In	Landing 23:18
Total 5.8 hrs	Total hrs	Total 5.4 hrs

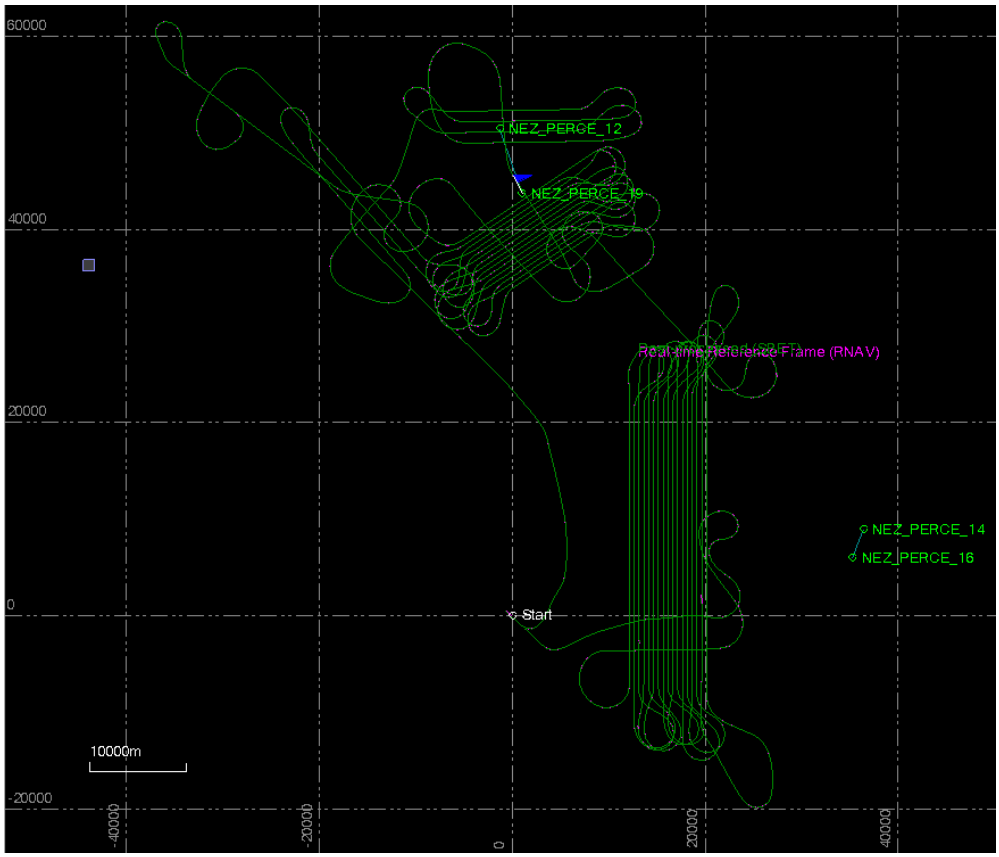
Mission Plan			
AGL Height	2200 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	182 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	1.1 FLIGHT	
Post Mission	23:01	23:11

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
227	5416316 15	0°	8100'	21:40	21:50			161111_214042	
228	16	180°	↓	21:54	22:05			215422	
229	17	0°		22:08	22:18			220851	
230	18	180°		22:22	22:30			222231	
231	19	0°		22:34	22:41			223425	
232	20	180°		22:45	22:54			224544	
XTIE	5416316 21	270	8100'	22:57	23:01			225716	XTIE LINE 232-213 E→W
FIGURE 8		↷		23:01	23:07				CLOSE OFF SURVEY
				23:21	23:26				GROUND STATIC

Pg 2 of 2

Nov 11, 2016-A (N-44RL, SN2220764)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-40000
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0
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40000
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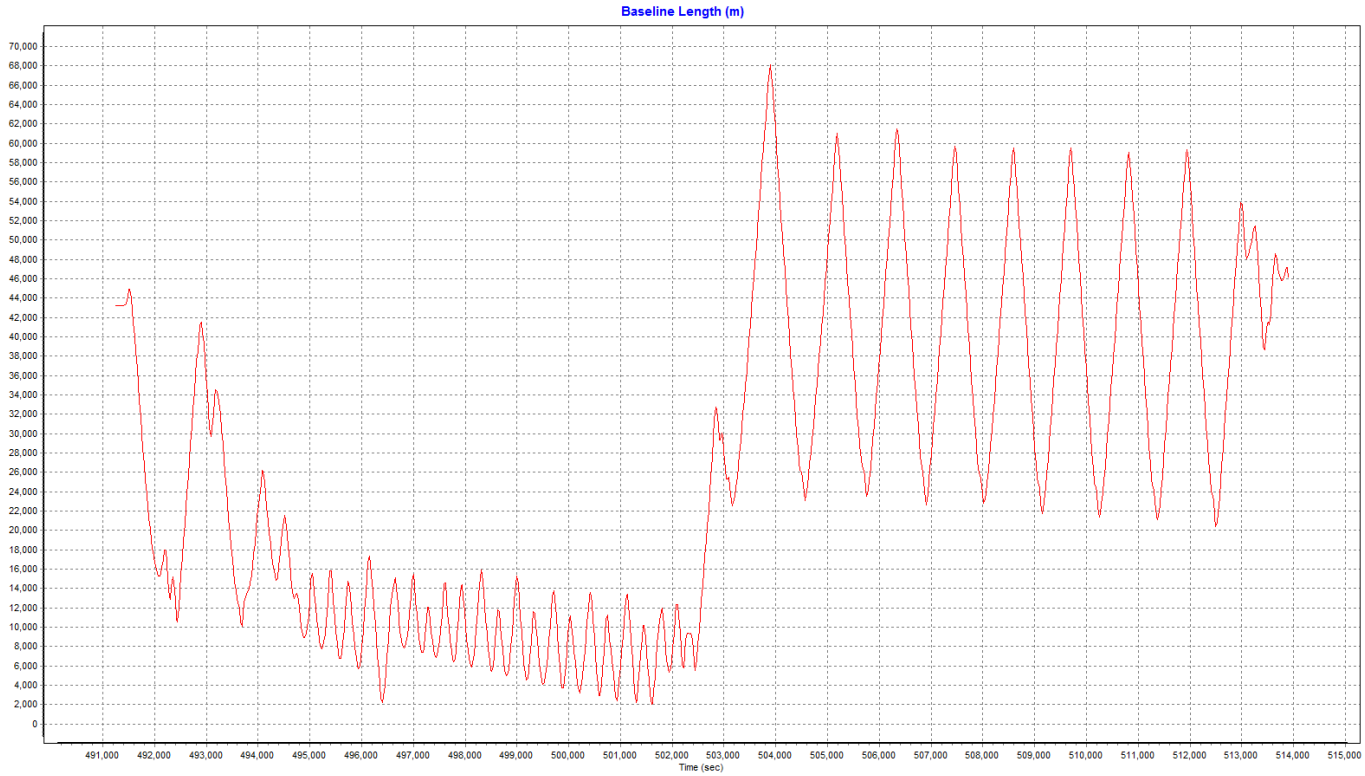
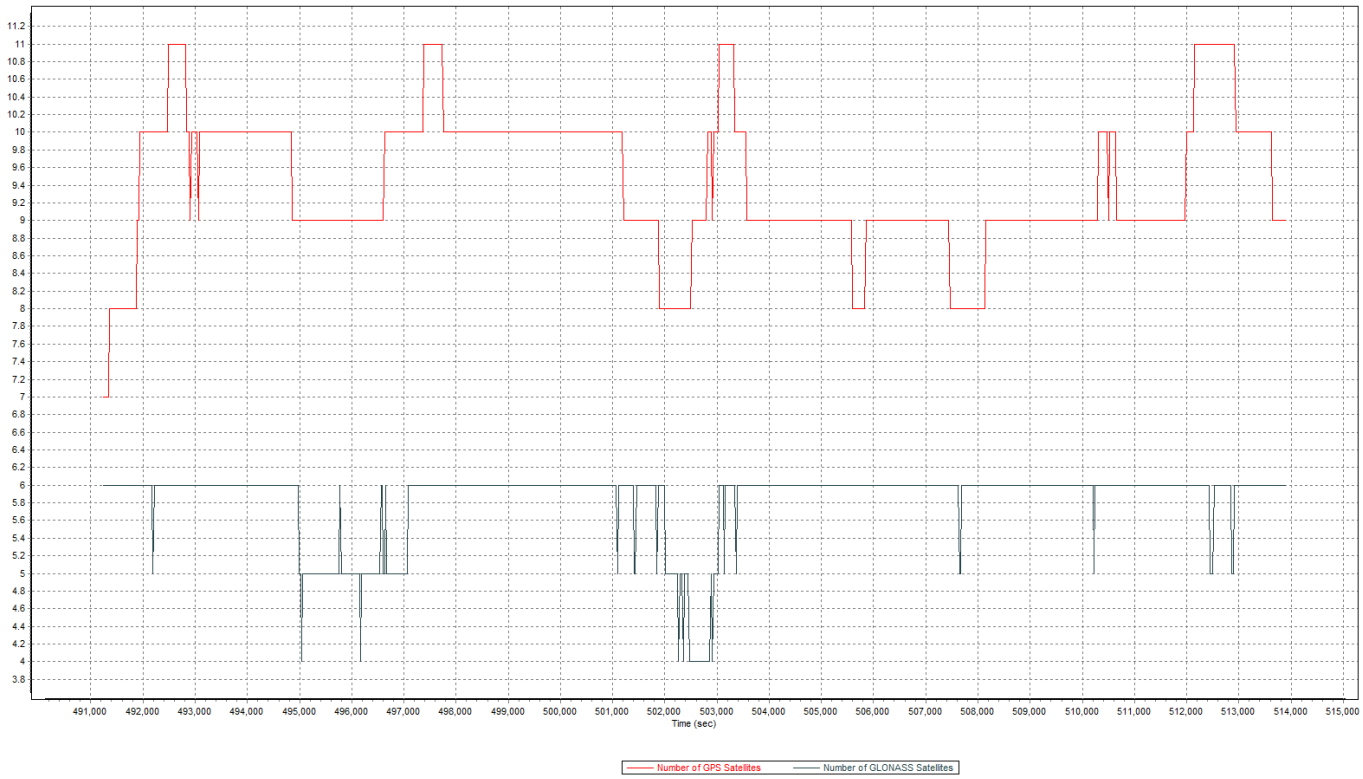
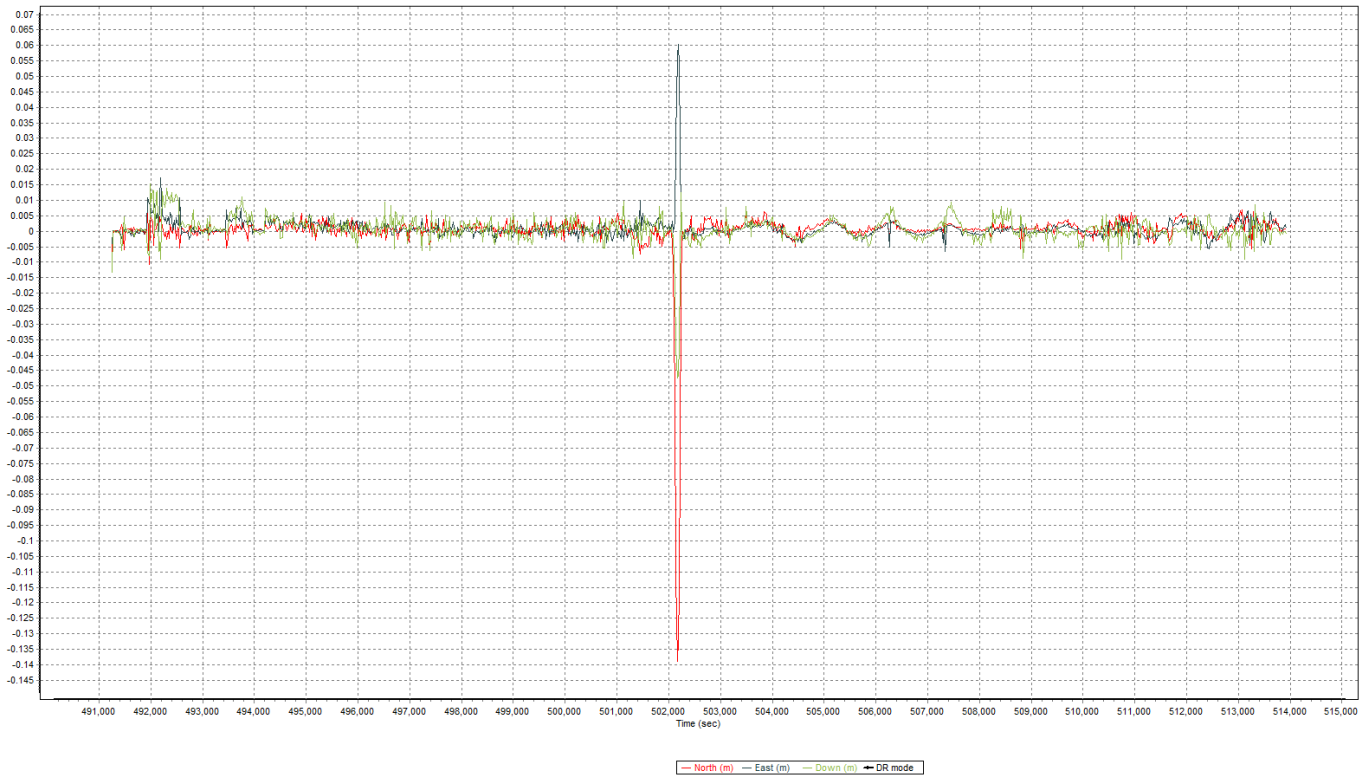
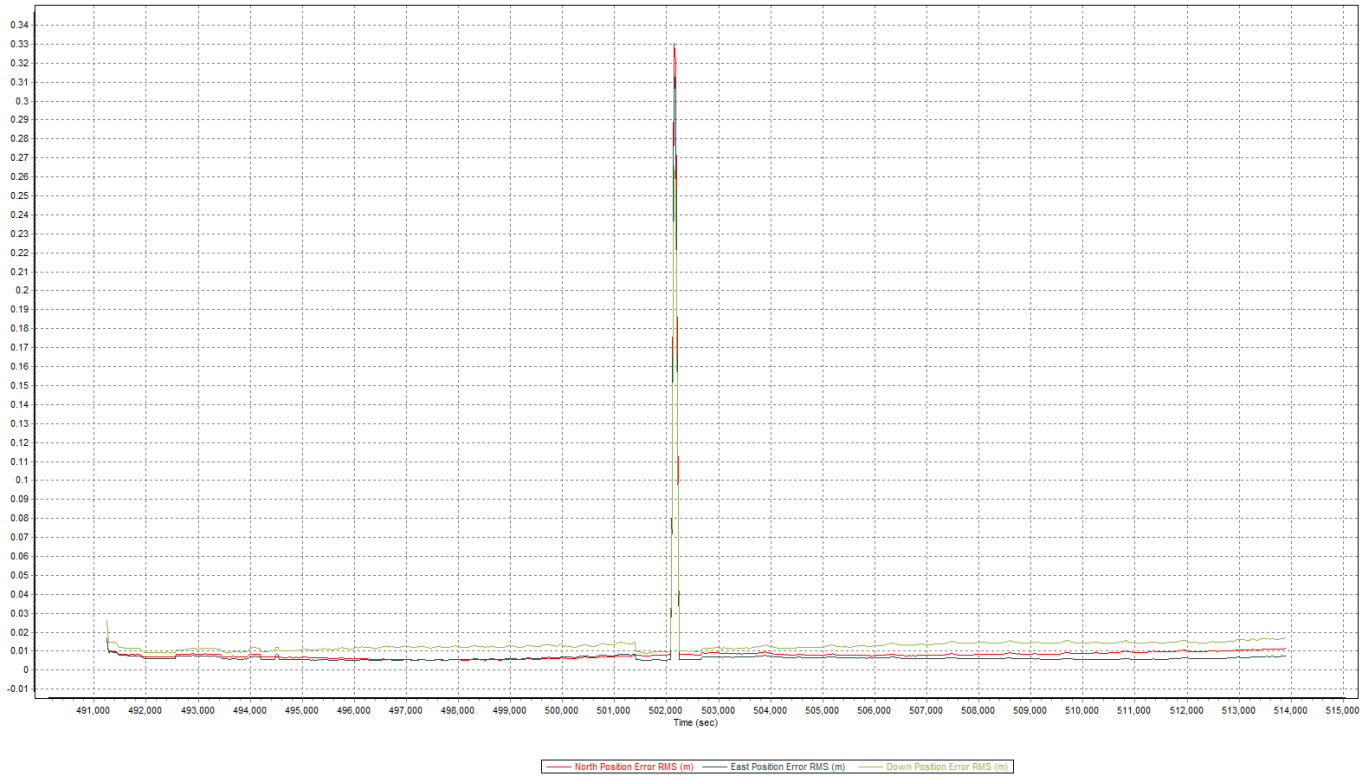
NEZ_PERCE_19
Real-time Reference Frame (RNAV)
NEZ_PERCE_14
NEZ_PERCE_16
Start
10000m

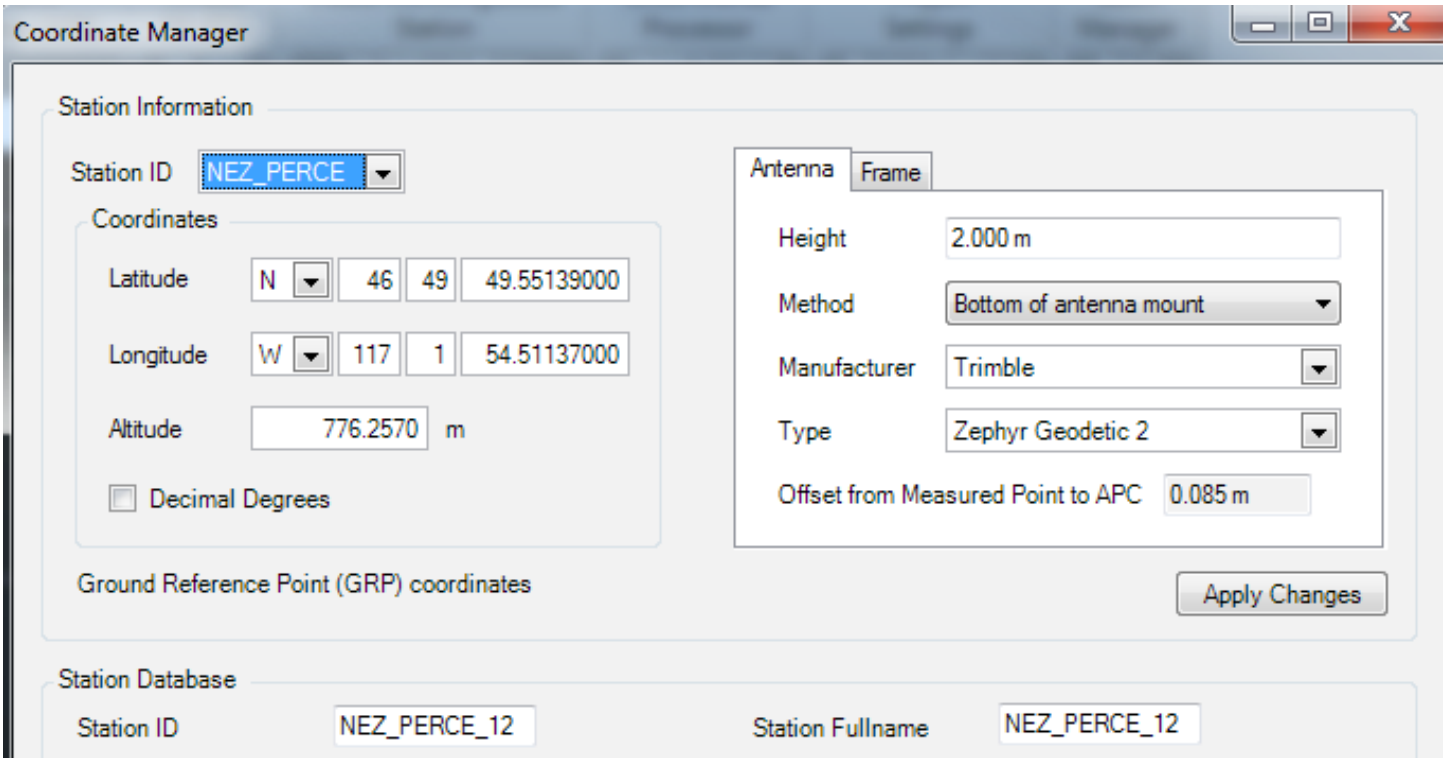

Baseline Length (m)
Time (sec)


Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
Time (sec)


Time (sec)
North (m)
East (m)
Down (m)
DR mode


Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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Station Information
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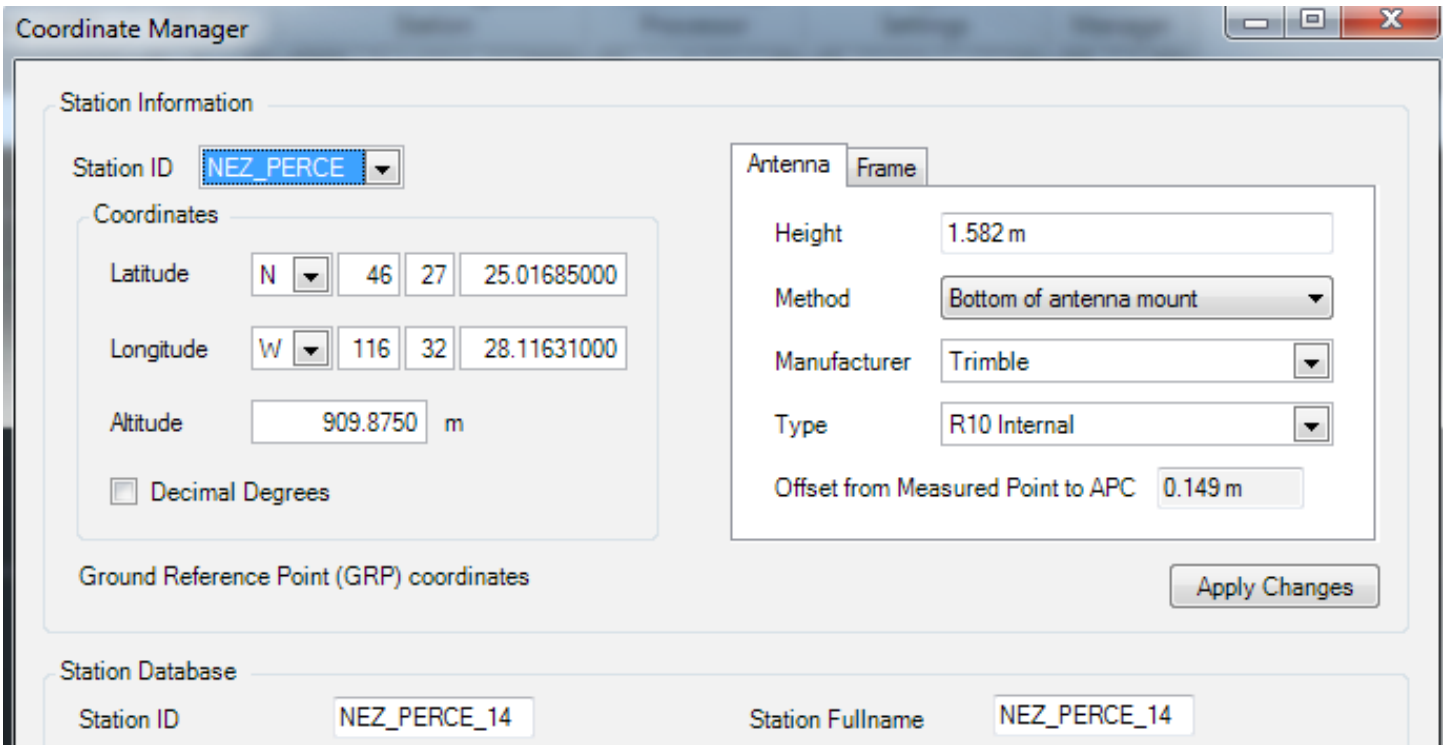
NEZ_PERCE
Coordinates
Latitude
N
46
49
49.55139000
Longitude
W
117
1
54.51137000
Altitude
776.2570
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_12
Station Fullname
NEZ_PERCE_12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Longitude
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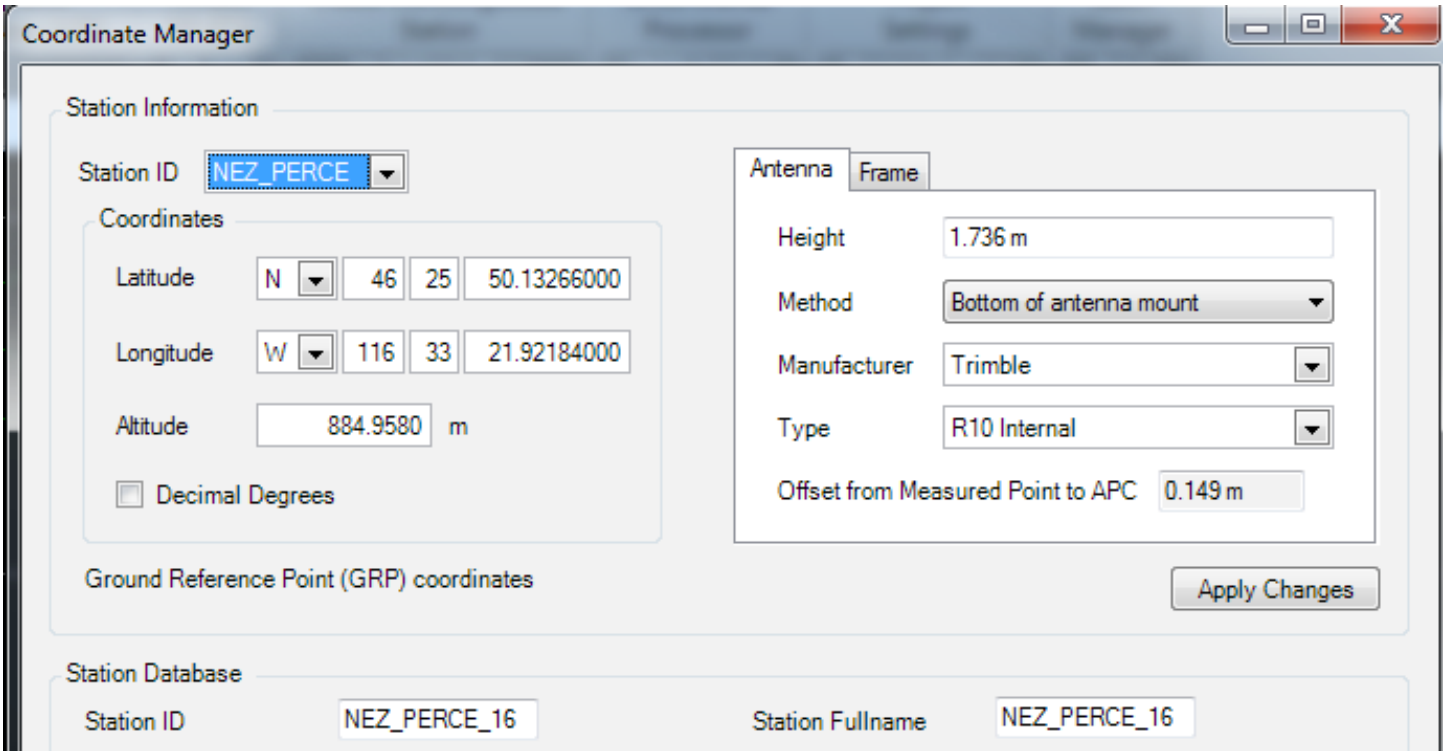
Altitude
909.8750
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.582 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_14
Station Fullname
NEZ_PERCE_14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Station Information
Station ID
NEZ_PERCE
Coordinates
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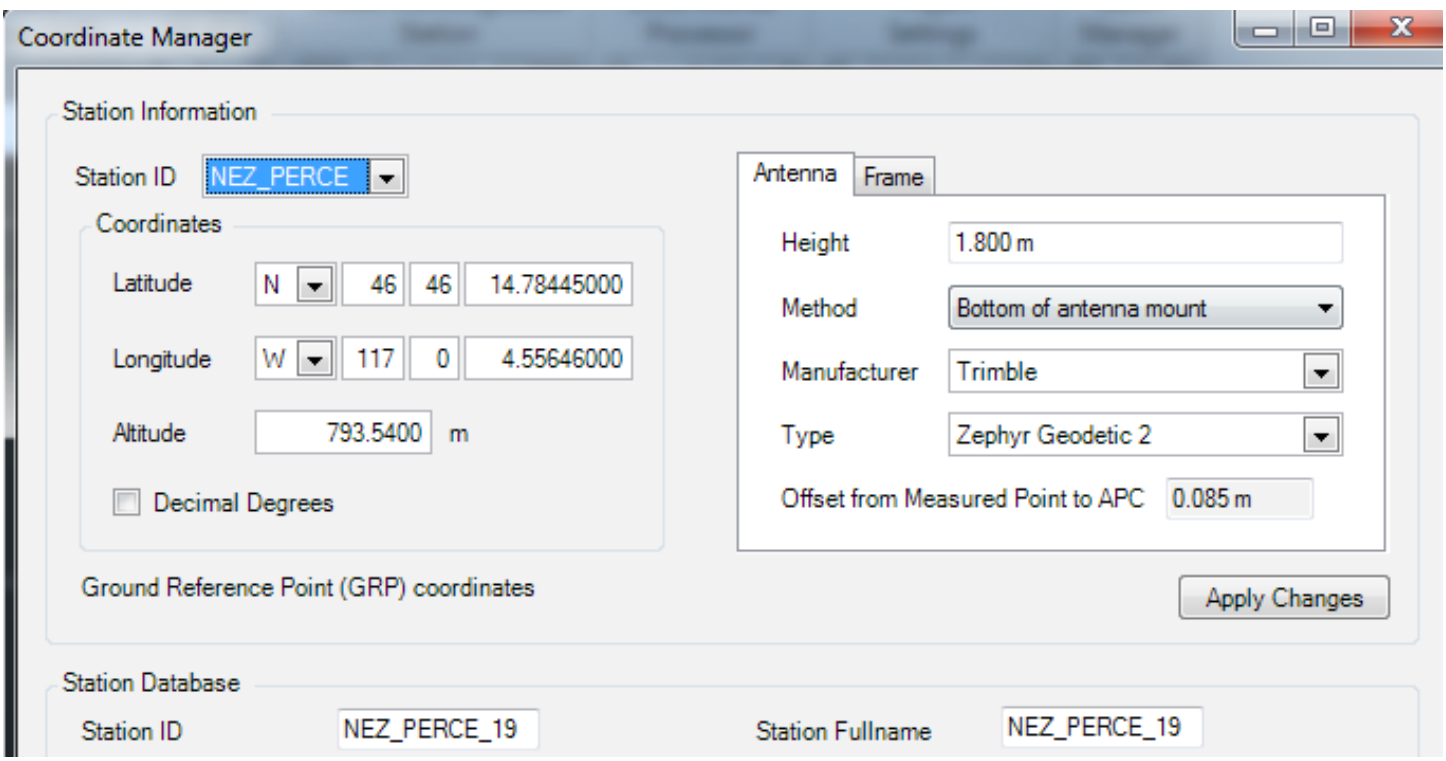
Longitude
W
116
33
21.92184000
Altitude
884.9580
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.736 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_16
Station Fullname
NEZ_PERCE_16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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_19
Station Fullname
NEZ_PERCE_19

Flight Log

Julian Day 316	Flight A

LIDAR Flight Log

Batteries.

AIRBORNE IMAGING

Date Nov. 11th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective Complete AOI's 01,02,03,04 Work on AOI 08	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes 16 00 Z @ KLWS
Wind: calm
Temp: 8°C 87% RH
Pressure 1019 hPa
Clouds: clear
Visibility: 11.3 km.

Aircraft Block Time		
Engine On 16.22	Ramp Out	Takeoff 16.31
Engine Off 2249	Ramp In	Landing 2246
Total 6.5 hrs	Total hrs	Total 6.3 hrs

Mission Plan	
AGL Height 1900/2200 m	Laser Pulse Rate 800 Hz
Target Speed 160 kts	Scan Rate 195/182 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161111
TEST		—	7000'	163859	163927			
001		307	9300'	165206	165302			Q2 AOI 01 @ 2200m
001		127	9300'	165638	165735			opposing direction
X-TIE		SW→NE	9300'	165947	170036			X-TIE 01
004		139	9400'	170400	170655			Q2 AOI 02 @ 2200m
003		319	9400'	171009	171303			
002		139	9400'	171612	171911			
X-TIE		37	9400'	172234	172414			X-TIE AOI 02
005		89	9700'	172707	172917			Q2 AOI 03
006		269		173242	173458			
007		89		173839	174044			
008		269		174434	174646			
X-TIE		176	9700'	175042	175224			X-TIE AOI 03
X-TIE		N→S	9000'	175306	175516			X-TIE AOI 05 Q1
028		236	8400'	175953	180139			

Pg 1 of 4

Julian Day 316	Flight A

LIDAR Flight Log

Date Nov. 11th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1622	Ramp Out	Takeoff 1631
Engine Off 2249	Ramp In	Landing 2246
Total 6.5 **hrs**	Total **hrs**	Total 6.3 **hrs**

Mission Plan	
AGL Height 1900/2200m	Laser Pulse Rate 800 **Hz**
Target Speed 160 **kts**	Scan Rate 195/182 **Hz**
Laser Current 50 **%**	FOV 60 **Deg's**

Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161111
027		56	8400'	180453	180639			AOI 5 Q1 @ 1900m
026		236		181005	181205			
025		56		181457	181652			
024		236		182118	182327			
023		56		182704	182908			
022		236		183237	183501			
021		56		183819	184030			
020		236		184413	184658			
019		56		184953	185208			
018		236		185557	185840			
017		56		190144	190359			
016		236		190755	191028			
015		56		191335	191547			
014		236		191917	192140			
X-TIE		NW→SE	8400'	192514	192723			X-TIE AOI 05 Q1 @ 1900m

Pg 2 of 4

Julian Day 316	Flight A

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov. 11th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1622	Ramp Out	Takeoff 1631
Engine Off 2249	Ramp In	Landing 2246
Total 6.5 **hrs**	Total **hrs**	Total 6.3 **hrs**

Mission Plan			
AGL Height	1900 **m**	Laser Pulse Rate	800 **Hz**
Target Speed	160 **kts**	Scan Rate	195 **Hz**
Laser Current	50 **%**	FOV	60 **Deg's**

Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161111
145		—		194323	194326			Hit IP
145		180	7300'	194806	195450			AOI08 Q1 1900m
144		360		200120	200722			hold in turn for ATC
143		180		201114	201755			
142		360		202127	202712			
141		180		203057	203705			
140		360		204055	204632			
139		180		204959	205605			
138		360		205918	210456			
137		180		210843	211452			
136		360		211808	212346			
135		180		212724	213317			
134		360		213637	214212			
133		180		214551	215154			
132		360	7300'	215515	220050			

Pg 3 of 4

Julian Day 316	Flight A

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov. 11th 2016	Aircraft **N-44RL**
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	**Riegl Q1560**
Unit	**2220764**
IMU	**Applanix AP50**
GPS Rx	**Trimble**
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1622	Ramp Out	Takeoff 1631
Engine Off 2249	Ramp In	Landing 2246
Total 6.5 **hrs**	Total **hrs**	Total 6.3 **hrs**

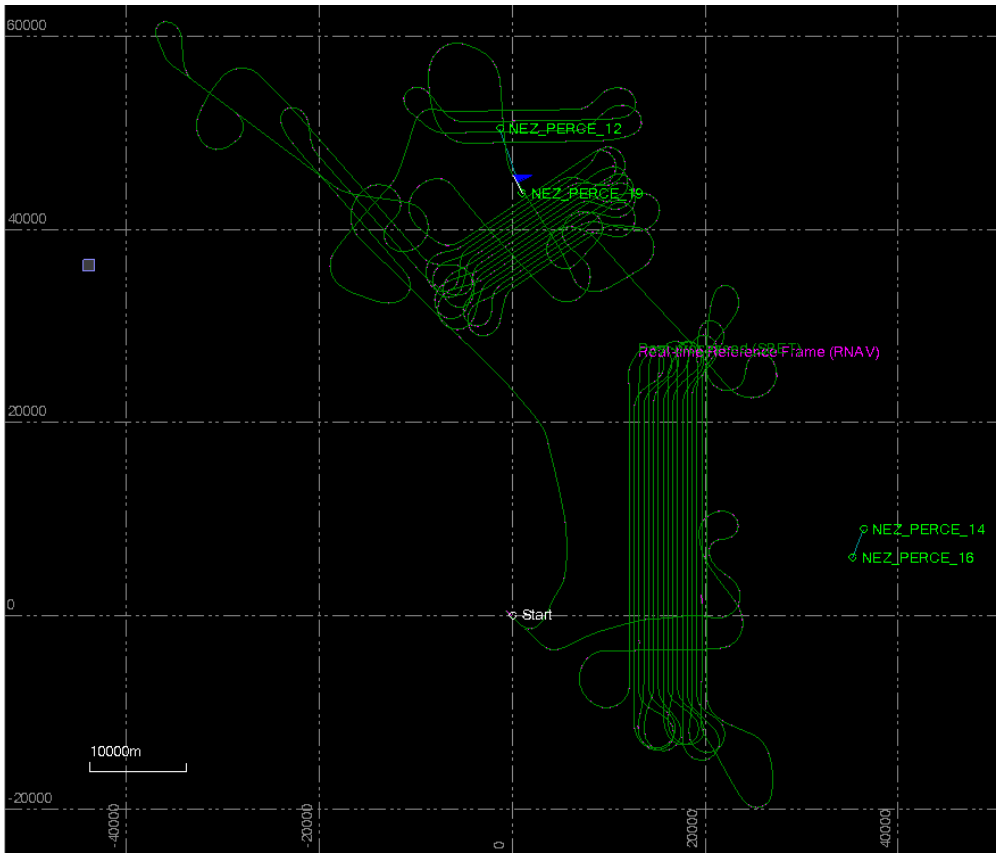
Mission Plan			
AGL Height	1900 **m**	Laser Pulse Rate	800 **Hz**
Target Speed	160 **kts**	Scan Rate	195 **Hz**
Laser Current	50 **%**	FOV	60 **Deg's**

Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161111
131		180	7300'	220423	221030			AOI 08 cont'd
130		360	↓	221405	221946			
129		180		222312	222910			
X-TIE		90	7300'	223146	223404			X-TIE AOI 08 Lines 129-145

Pg 4 of 4

Nov 11, 2016-A (N-44RL, SN2220764)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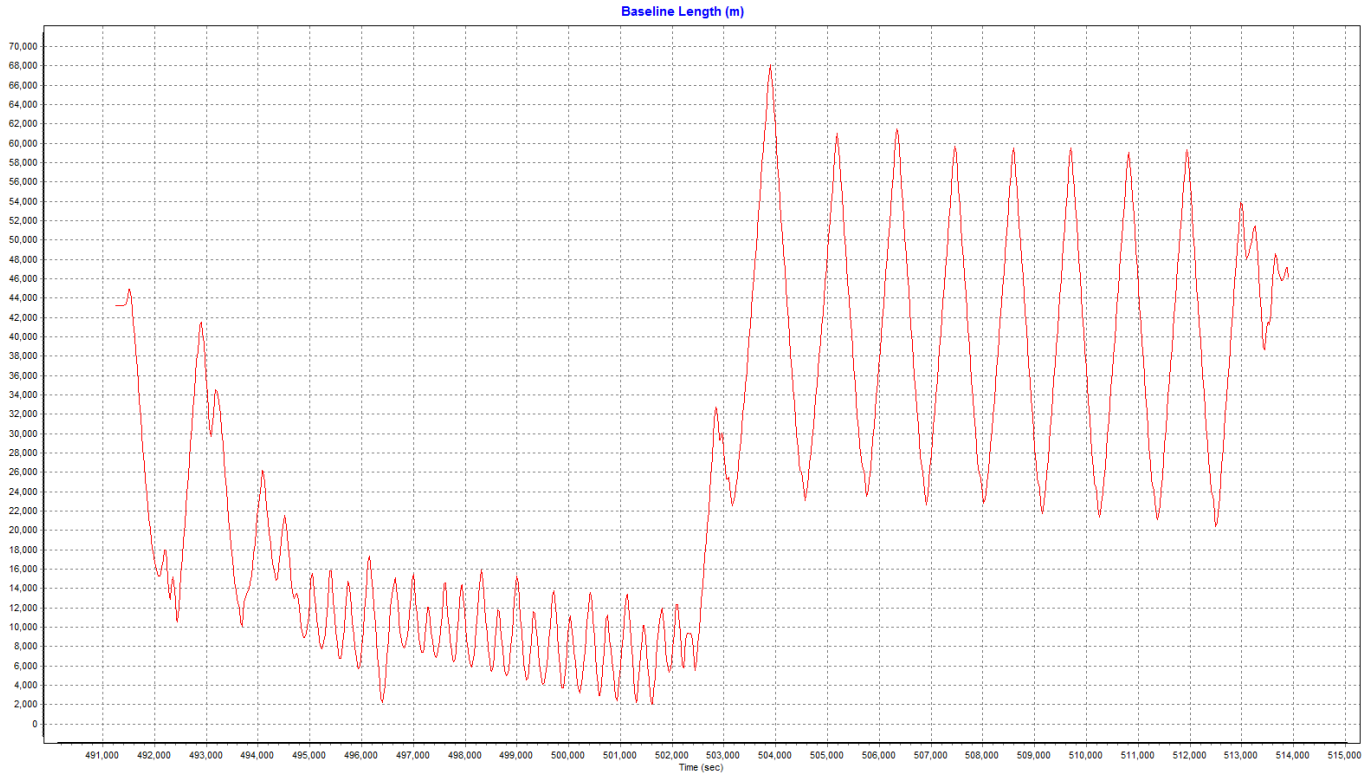
NEZ_PERCE_19
Real-time Reference Frame (RNAV)
NEZ_PERCE_14
NEZ_PERCE_16
Start
10000m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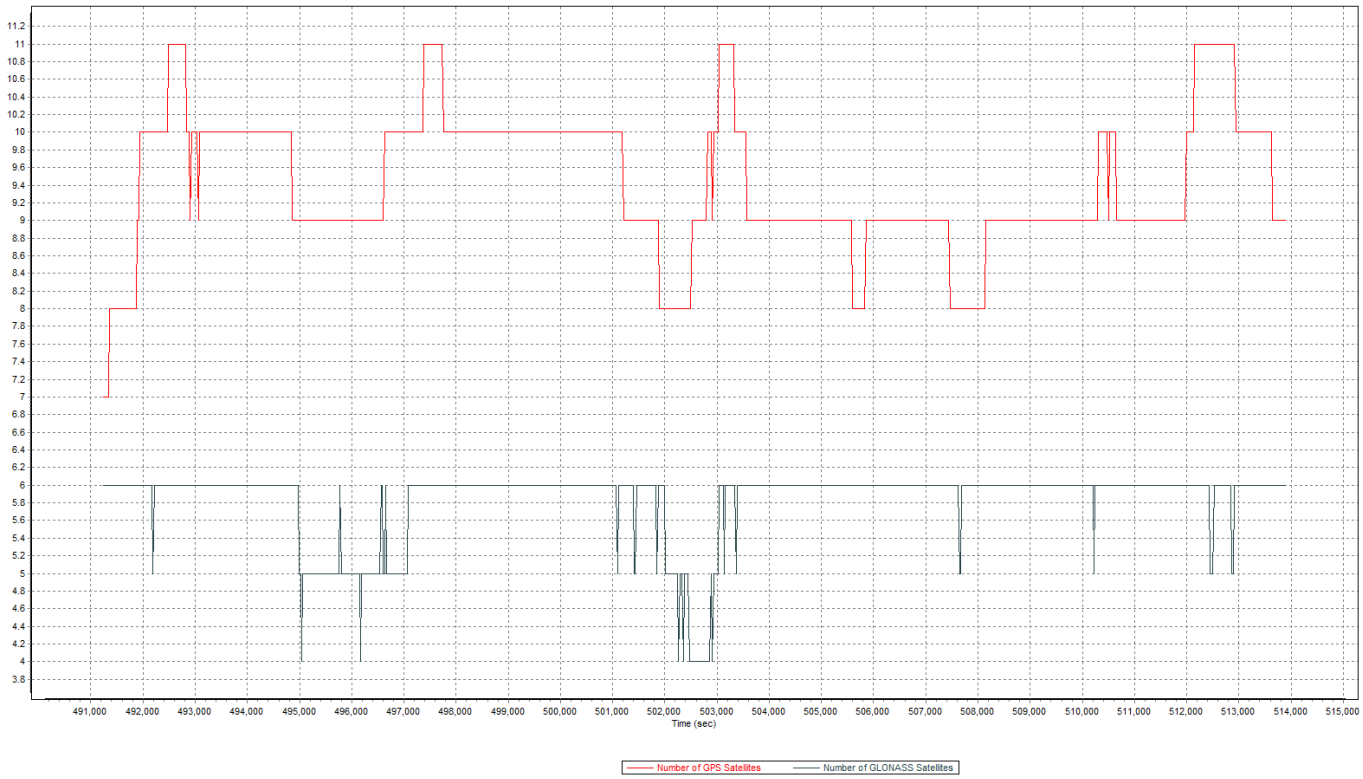
Time (sec)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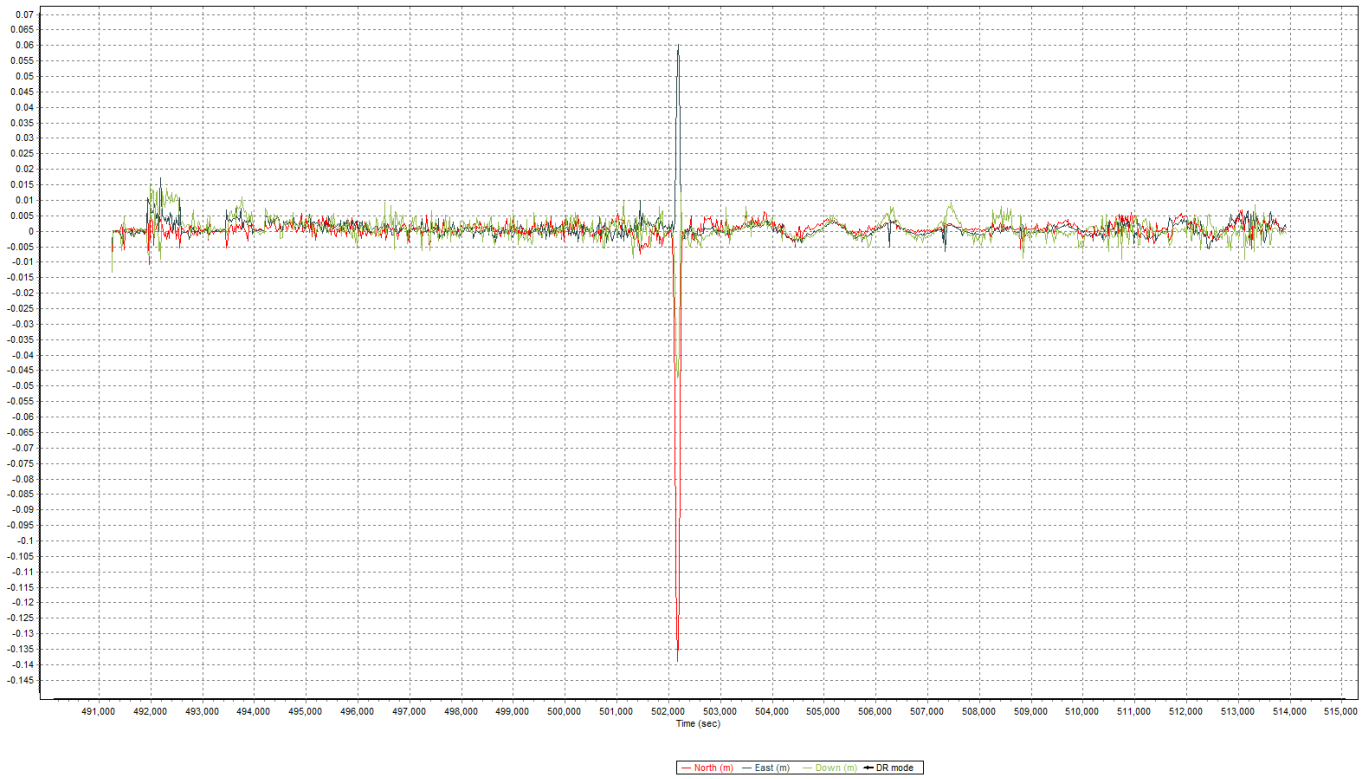
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
Time (sec)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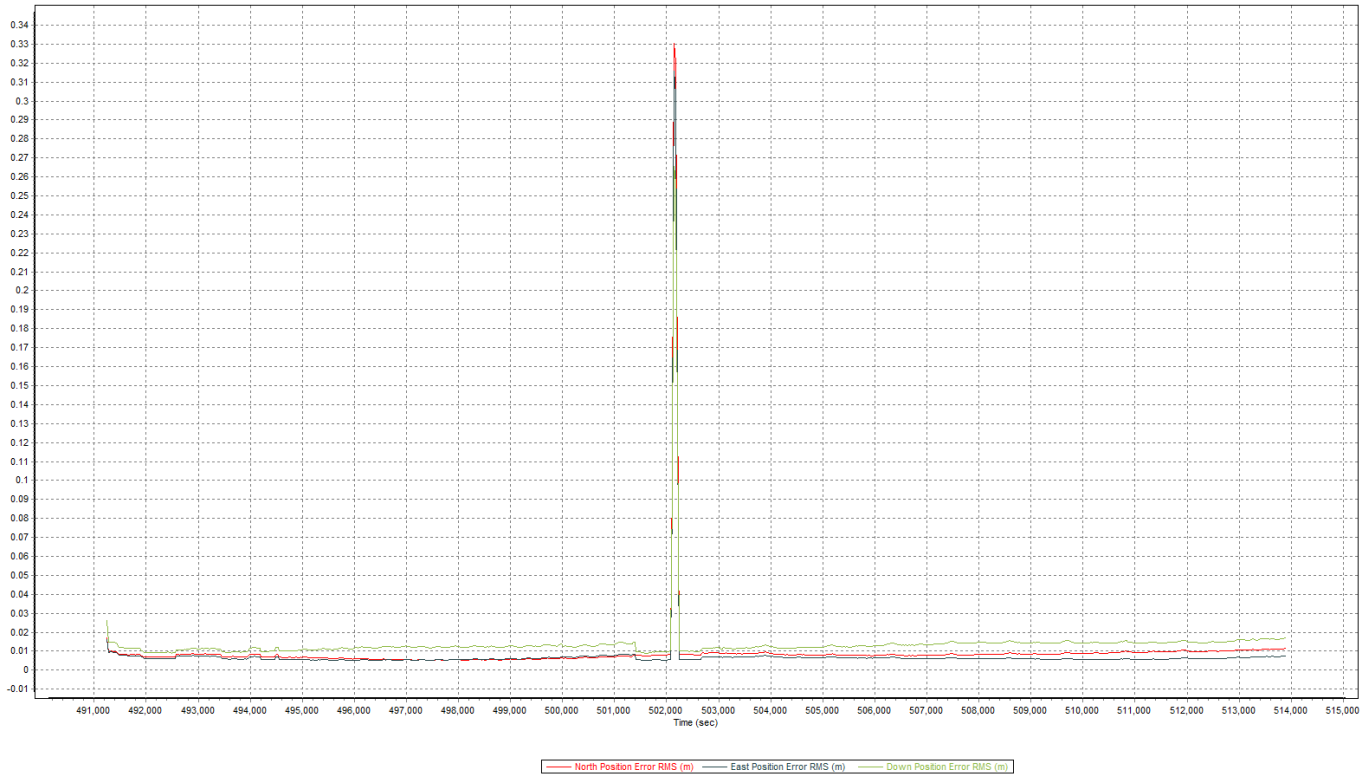
North (m)
East (m)
Down (m)
DR mode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North Position Error RMS (m)
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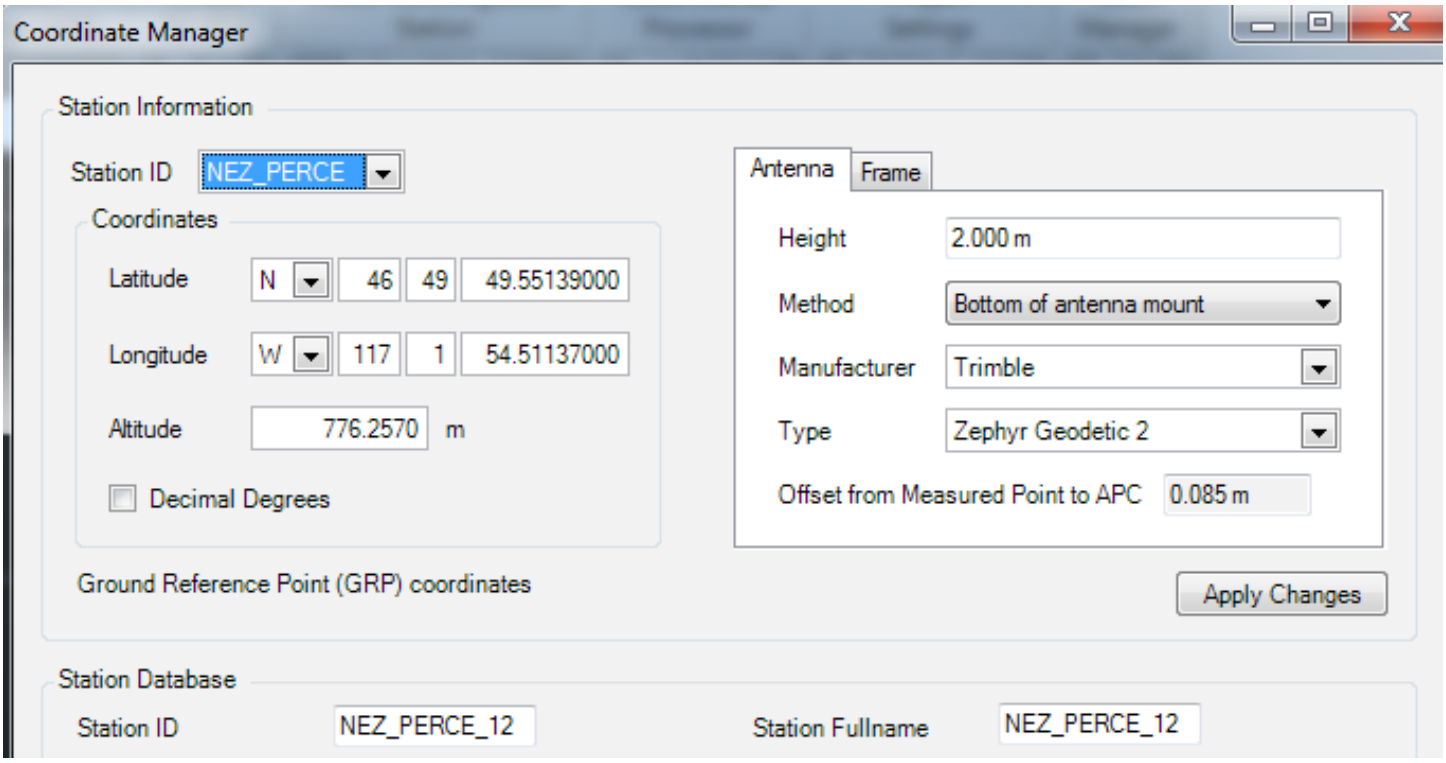
Down Position Error RMS (m)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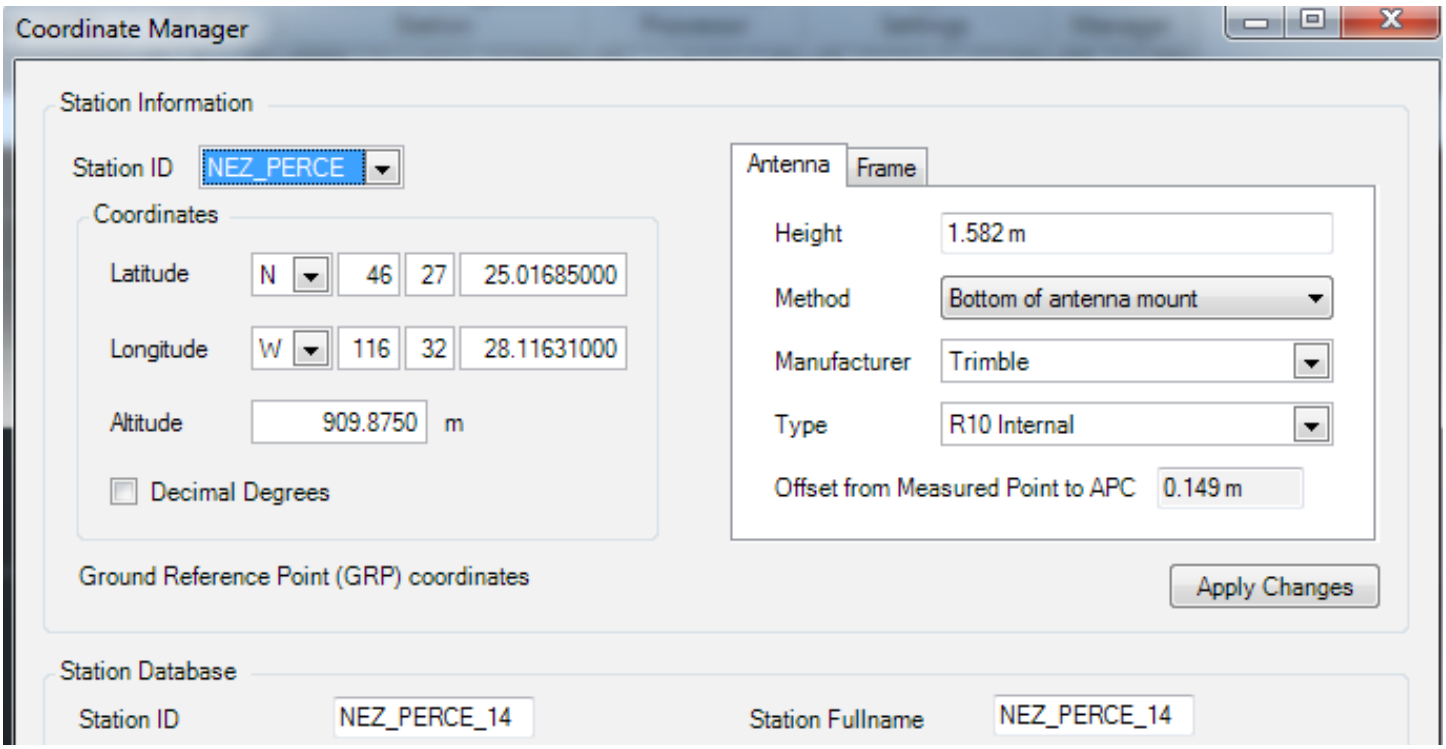
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
49
49.55139000
Longitude
W
117
1
54.51137000
Altitude
776.2570
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_12
Station Fullname
NEZ_PERCE_12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Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
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Longitude
W
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32
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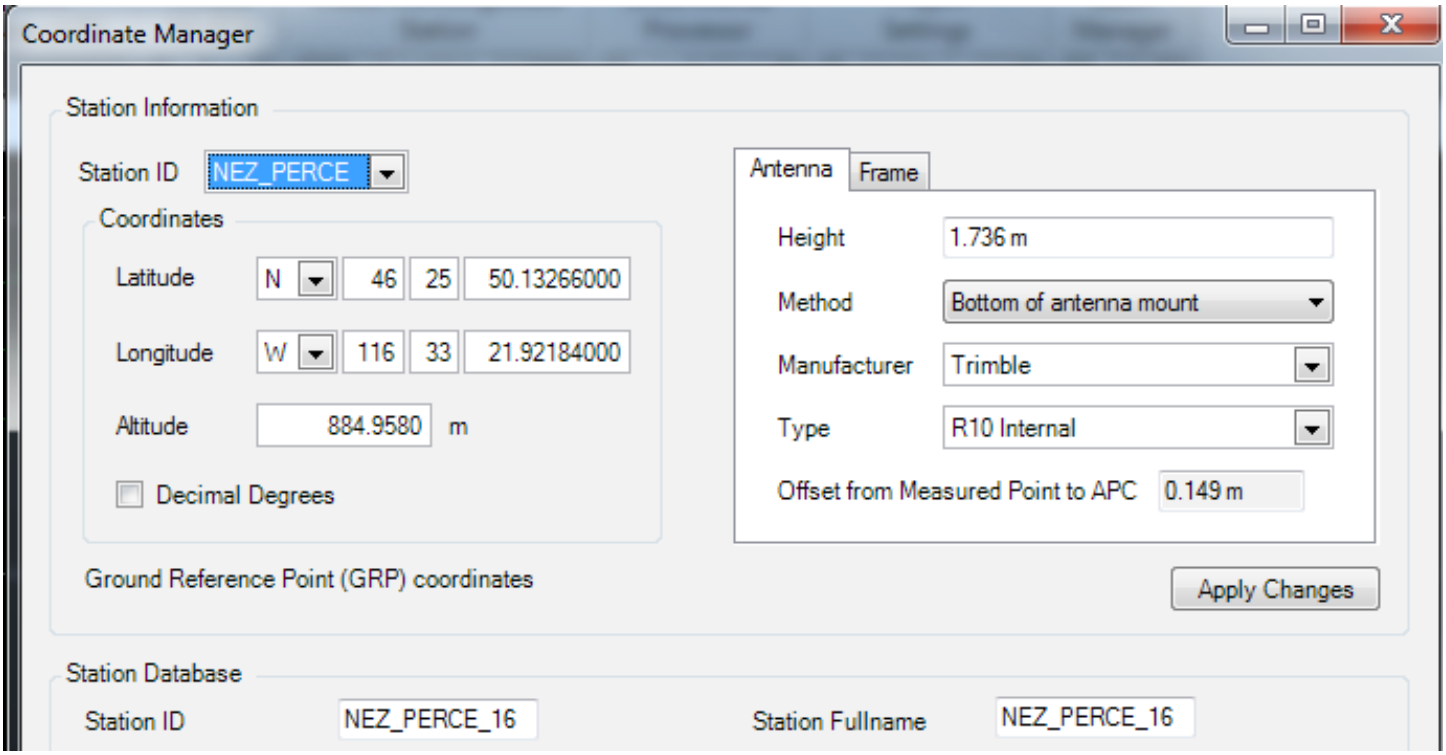
Altitude
909.8750
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.582 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_14
Station Fullname
NEZ_PERCE_14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Station Information
Station ID
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Coordinates
Latitude
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Longitude
W
116
33
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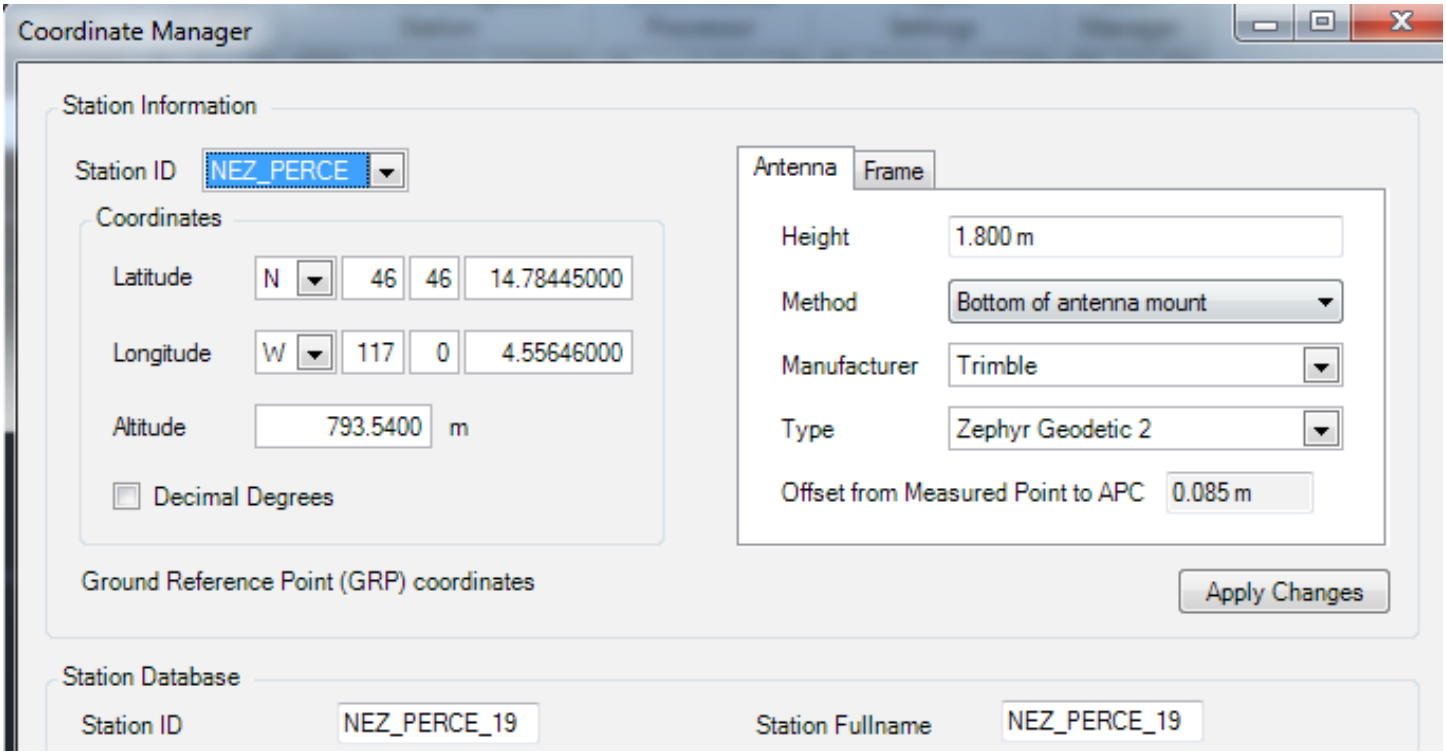
Altitude
884.9580
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.736 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_16
Station Fullname
NEZ_PERCE_16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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_19
Station Fullname
NEZ_PERCE_19

Flight Log

Julian Day 316	Flight A

LIDAR Flight Log

Batteries.

AIRBORNE IMAGING

Date Nov. 11th 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective Complete AOI's 01,02,03,04 Work on AOI 08	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes 16 00 Z @ KLWS
Wind: calm
Temp: 8°C 87% RH
Pressure 1019 hPa
Clouds: clear
Visibility: 11.3 km.

Aircraft Block Time		
Engine On 16.22	Ramp Out	Takeoff 16.31
Engine Off 2249	Ramp In	Landing 2246
Total 6.5 hrs	Total hrs	Total 6.3 hrs

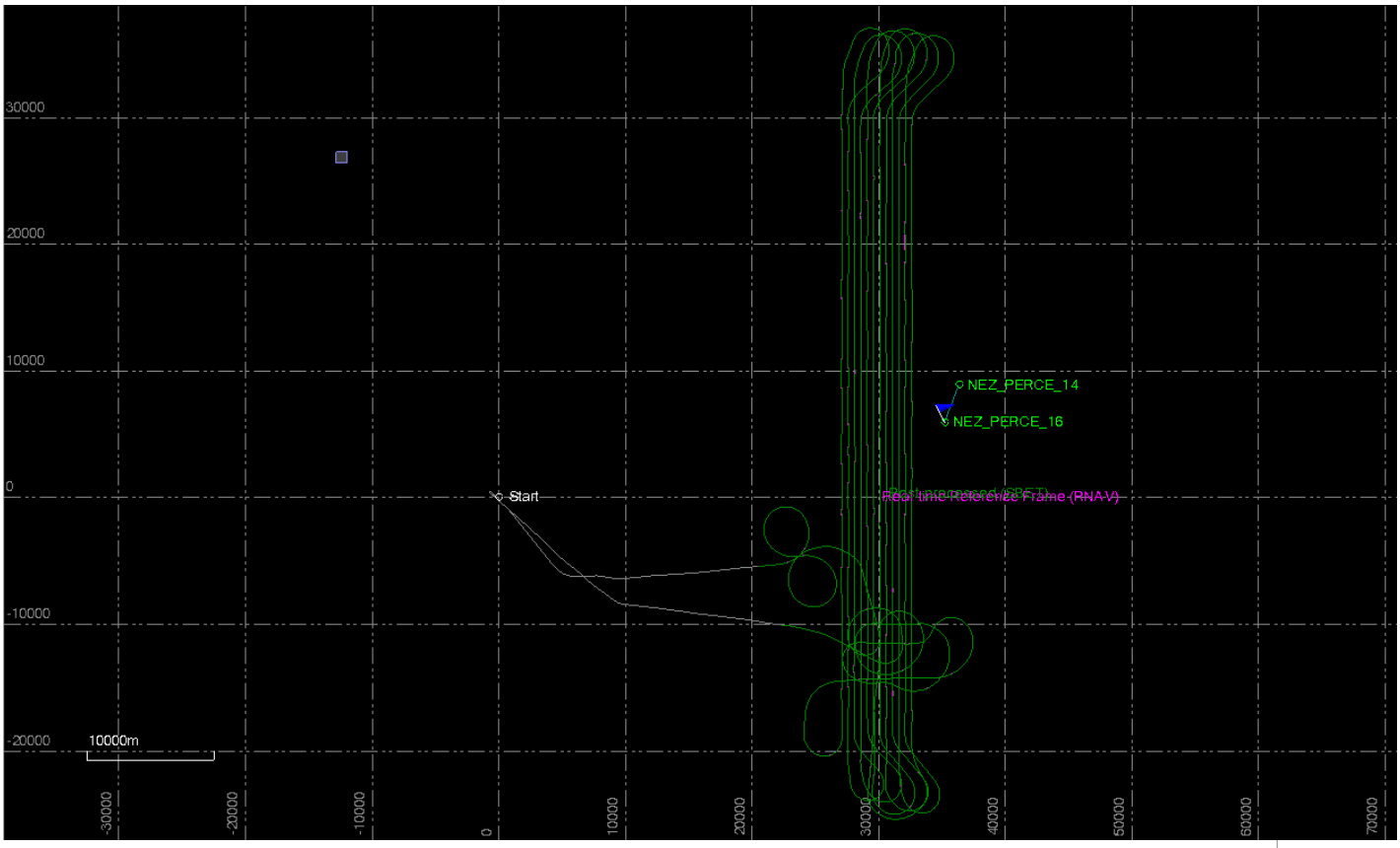
Mission Plan	
AGL Height 1900/2200 m	Laser Pulse Rate 800 Hz
Target Speed 160 kts	Scan Rate 195/182 Hz
Laser Current 50 %	FOV 60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission		
Post Mission		

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161111
TEST		—	7000'	163859	163927			
001		307	9300'	165206	165302			Q2 AOI 01 @ 2200m
001		127	9300'	165638	165735			opposing direction
X-TIE		SW→NE	9300'	165947	170036			X-TIE 01
004		139	9400'	170400	170655			Q2 AOI 02 @ 2200m
003		319	9400'	171009	171303			
002		139	9400'	171612	171911			
X-TIE		37	9400'	172234	172414			X-TIE AOI 02
005		89	9700'	172707	172917			Q2 AOI 03
006		269		173242	173458			
007		89		173839	174044			
008		269		174434	174646			
X-TIE		176	9700'	175042	175224			X-TIE AOI 03
X-TIE		N→S	9000'	175306	175516			X-TIE AOI 05 Q1
028		236	8400'	175953	180139			

Pg 1 of 4

Nov 12, 2016-A (C-FFRY, SN2221256)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10000m
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0
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40000
50000
60000
70000
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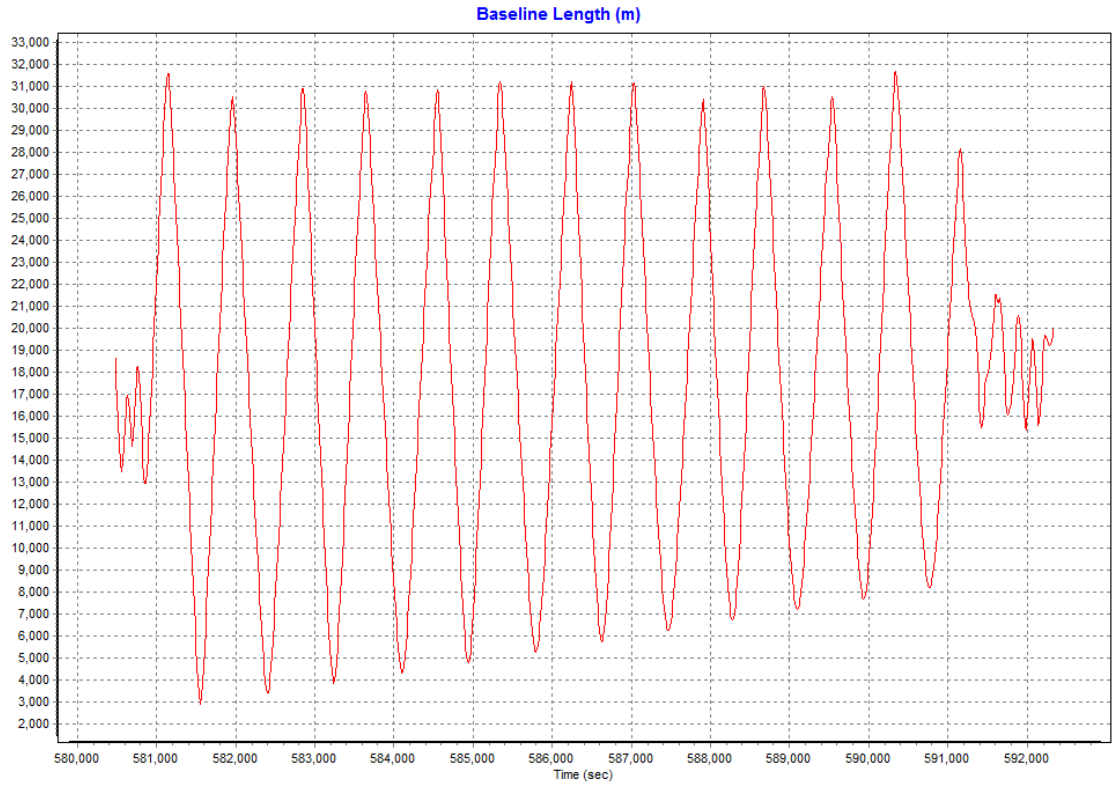
NEZ_PERCE_16
Start
Real-time Reference Frame (RNAV)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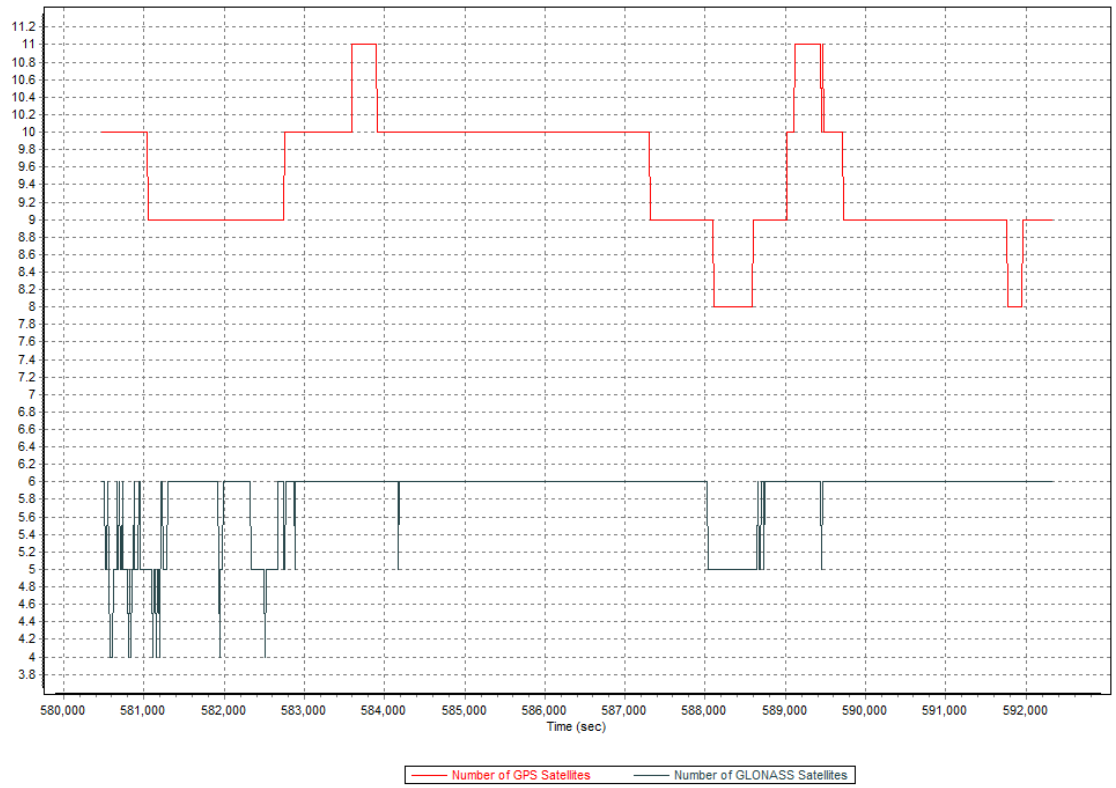
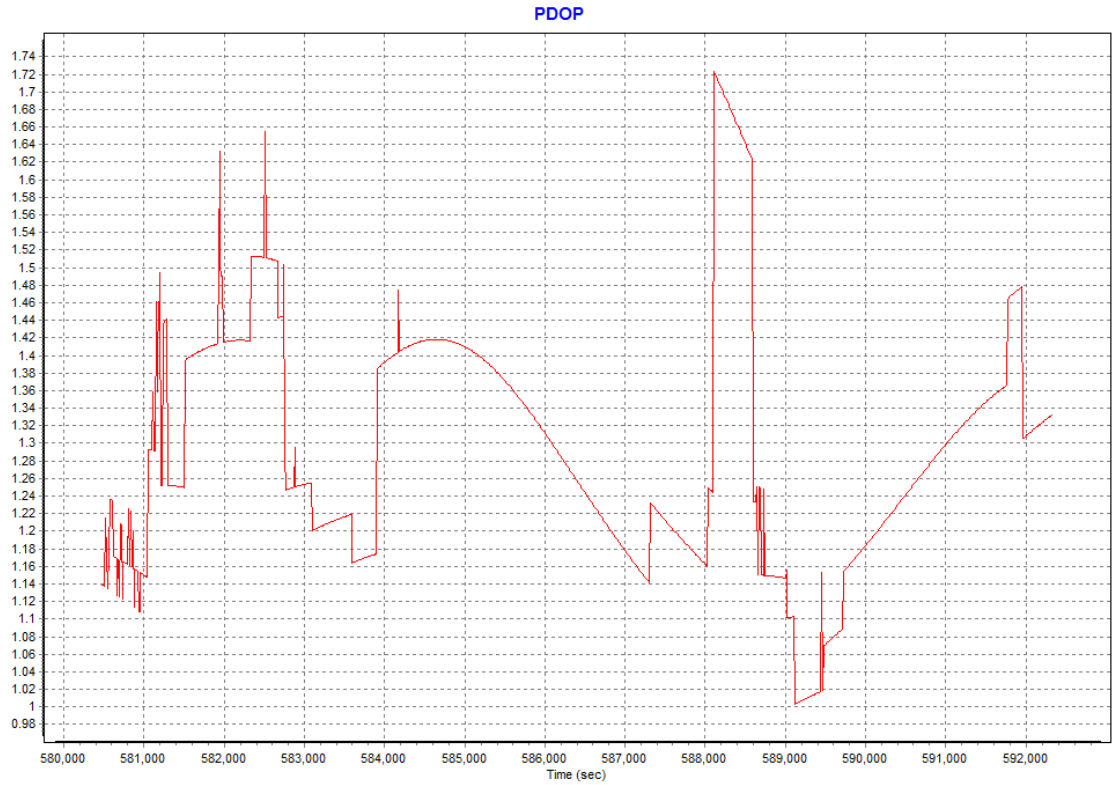
Time (sec)


Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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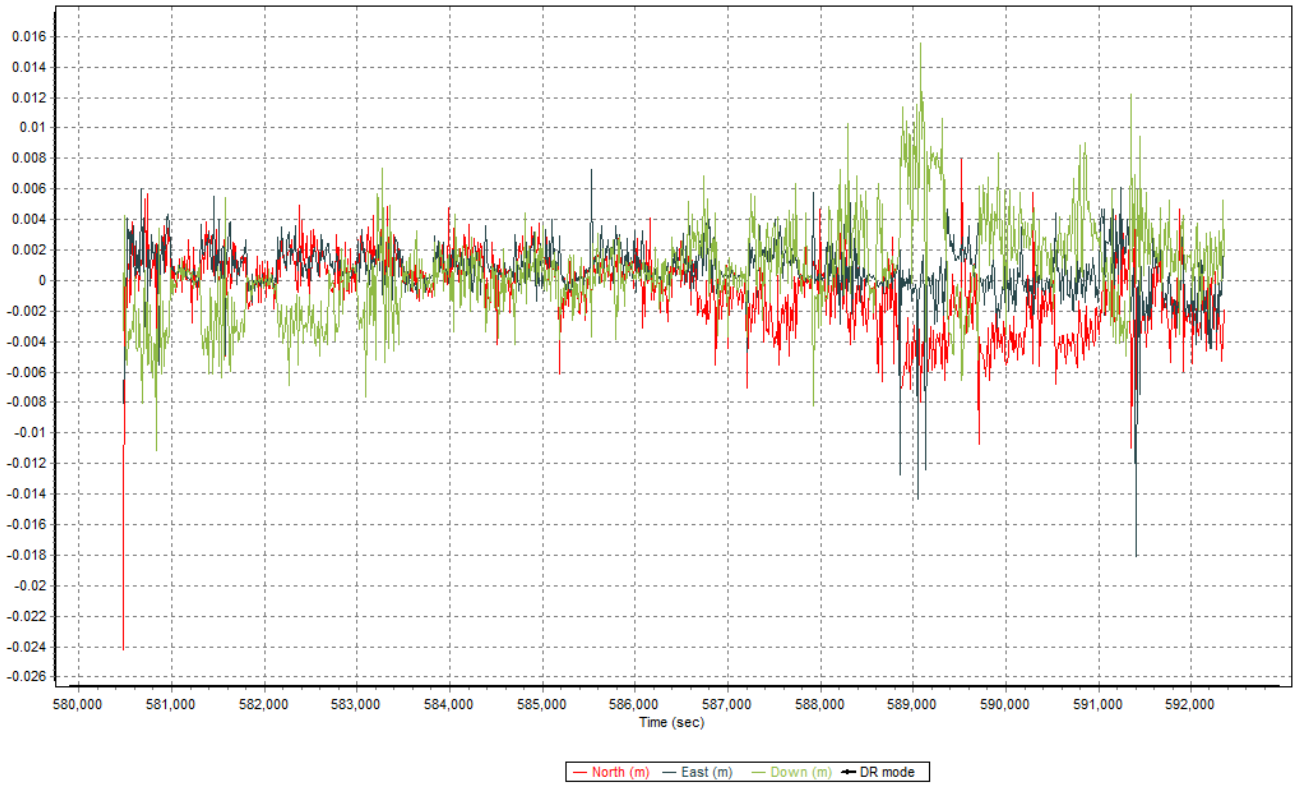
Time (sec)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-0.012
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581,000
582,000
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585,000
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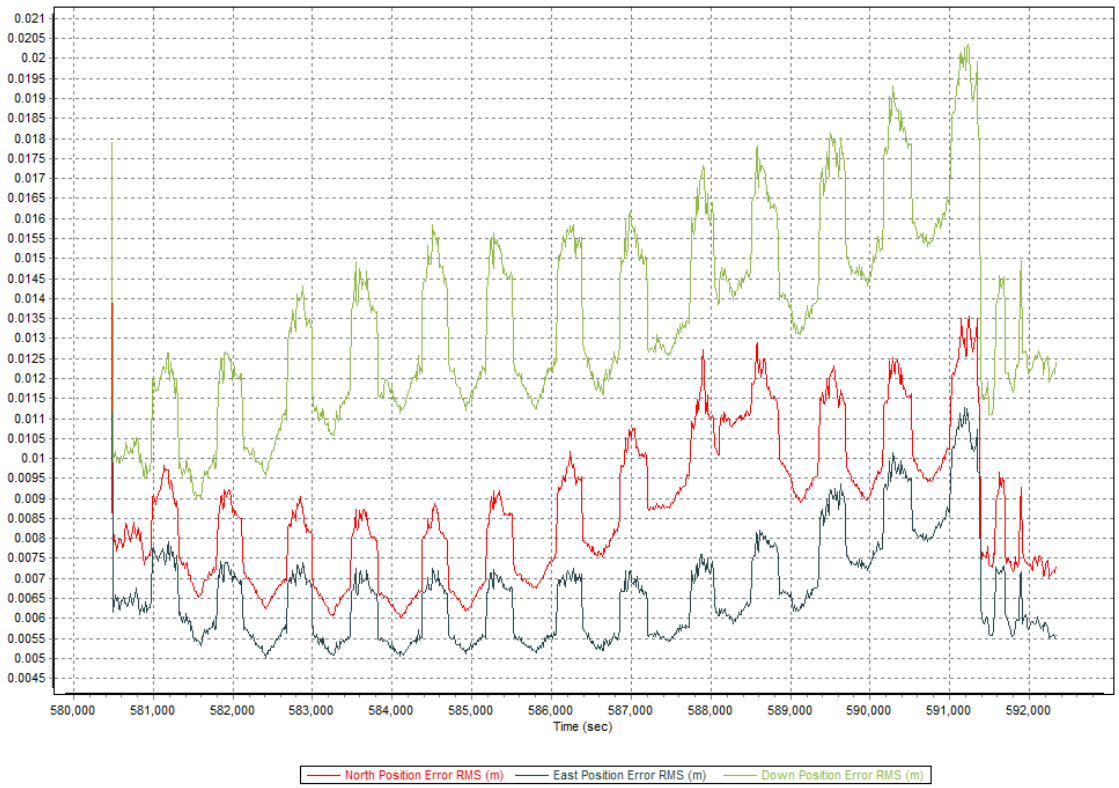
589,000
590,000
591,000
592,000
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.013
0.0125
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0.0115
0.011
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0.0085
0.008
0.0075
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0.0055
0.005
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583,000
584,000
585,000
586,000
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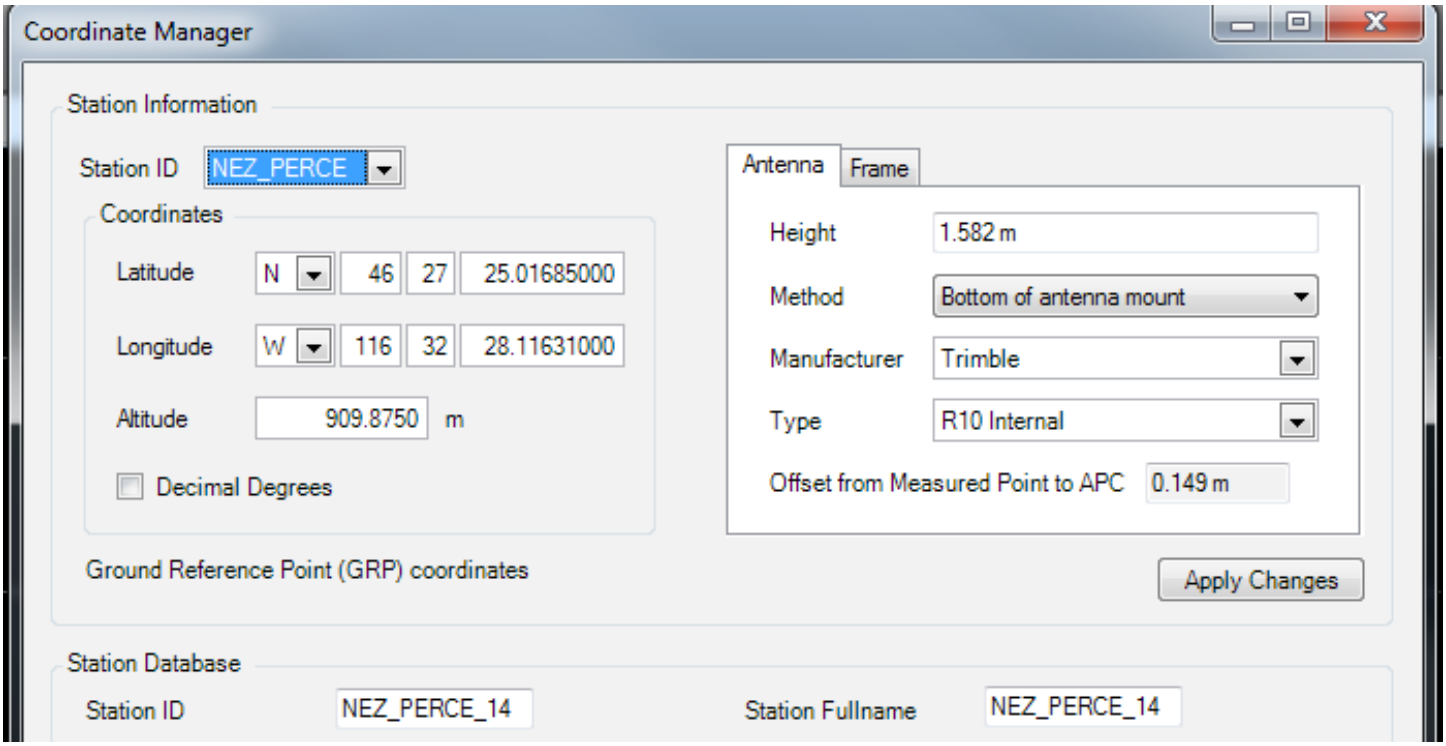
592,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)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Station Information
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NEZ_PERCE
Coordinates
Latitude
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25.01685000
Longitude
W
116
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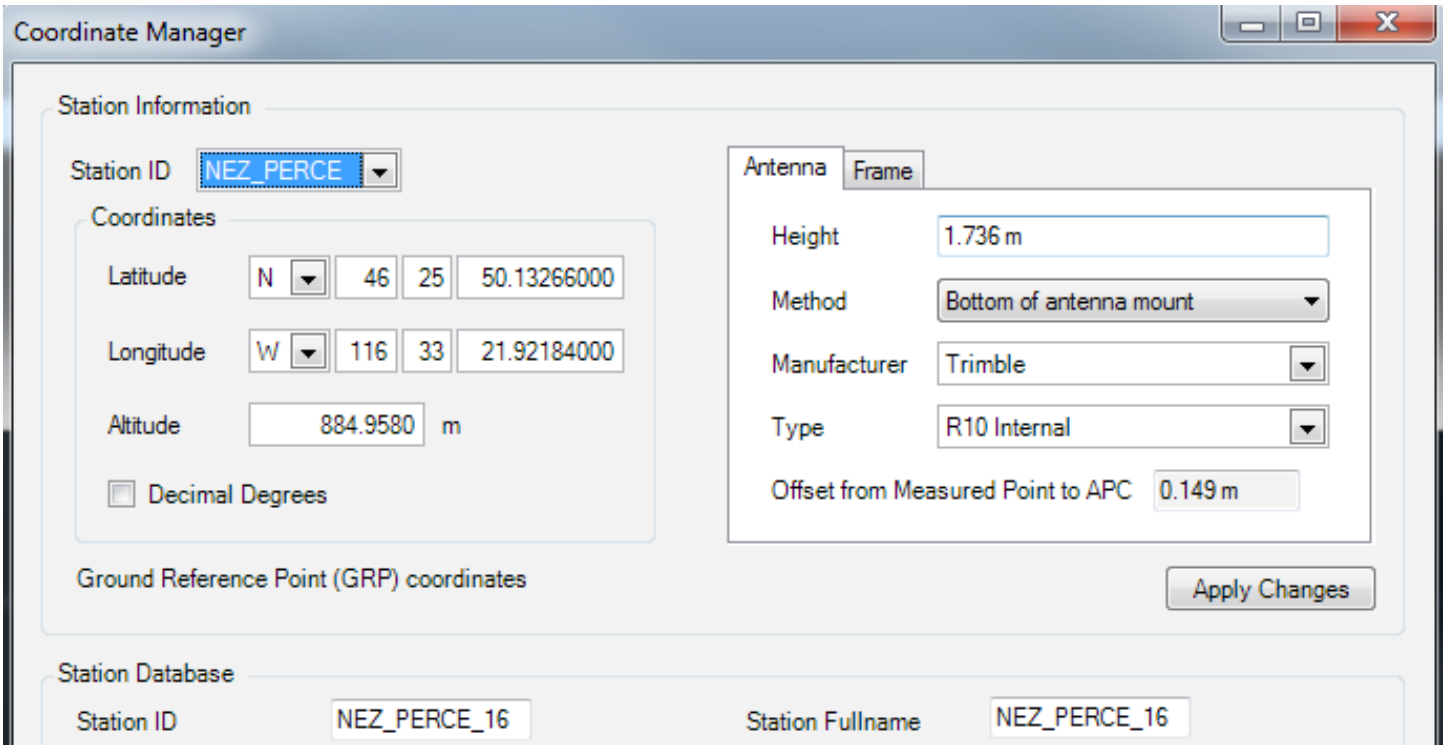
Altitude
909.8750
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.582 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_14
Station Fullname
NEZ_PERCE_14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Longitude
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.736 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_16
Station Fullname
NEZ_PERCE_16

Flight Log

Julian Day	Flight
317	A

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Date	NOV. 12 2016	Aircraft	PA-31 C-FFRY
Project	3119 - NEZ PERCE	Pilot	B. HARRITY
Location	LEWISTON	Operator	B. Whiteley
Mission Objective	BLOCK QL1 AOI 08		

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes	16 56
Temp	12°
Humidity	80%
Altimeter	29.98
Terrain Height	438

Aircraft Block Time		
Engine On 16:54	Ramp Out 17:07	Takeoff 17:09
Engine Off 20:50	Ramp In	Landing 20:39
Total 3.9 hrs	Total hrs	Total 3.5 hrs

Mission Plan			
AGL Height	1900 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	175 Hz
Laser Current	50 %	FOV	60 Deg's

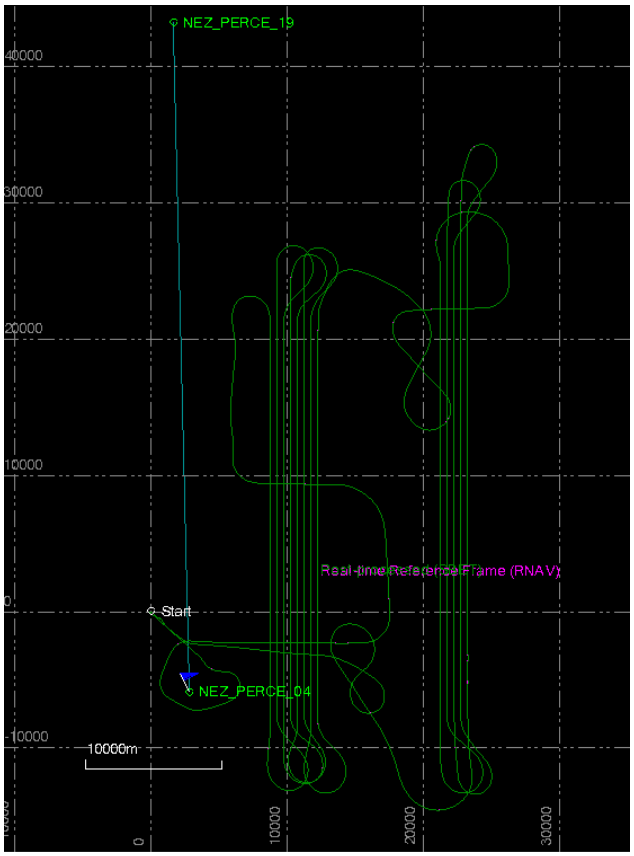
Static Alignment	GPS Time	
	Start	End
Pre Mission	16:59	17:04
Post Mission	20:43	20:48

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
FIGURE 8		↷		17:15	17:21				WAKE UP IMU
170	54163170 1	0	7400'	17:27	17:37			161112-172737	
169	02	180	↓	17:41	17:52			174111	
168	03	0		17:55	18:05			175542	
167	04	180		18:09	18:20			180921	
166	05	0		18:24	18:33			182402	
165	06	180		18:37	18:48			183740	
164	07	0		18:52	19:01			185212	
163	08	180	↓	19:05	19:16			190541	SMALL CLOUD TO THE WEST @ VERY NORTH END
162	09	0	7400'	19:19	19:29			191947	
161	10	180	7300'	19:33	19:44			193303	
160	11	0	7300'	19:46	19:56			194649	
159	12	180	7300'	20:00	20:11			200055	A FEW DROPS @ VERY NORTH END.
XTIE	54163113	90	7350'	20:14	20:15			201410	XTIE 159-170 W→E
FIGURE 8		↷		20:19	20:29				CLOSE OFF SURVEY

KINDA SORTA?

Pg | of |

Nov 12, 2016-A (N-44RL, SN2220764)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Real-time Reference Frame (RNAV)
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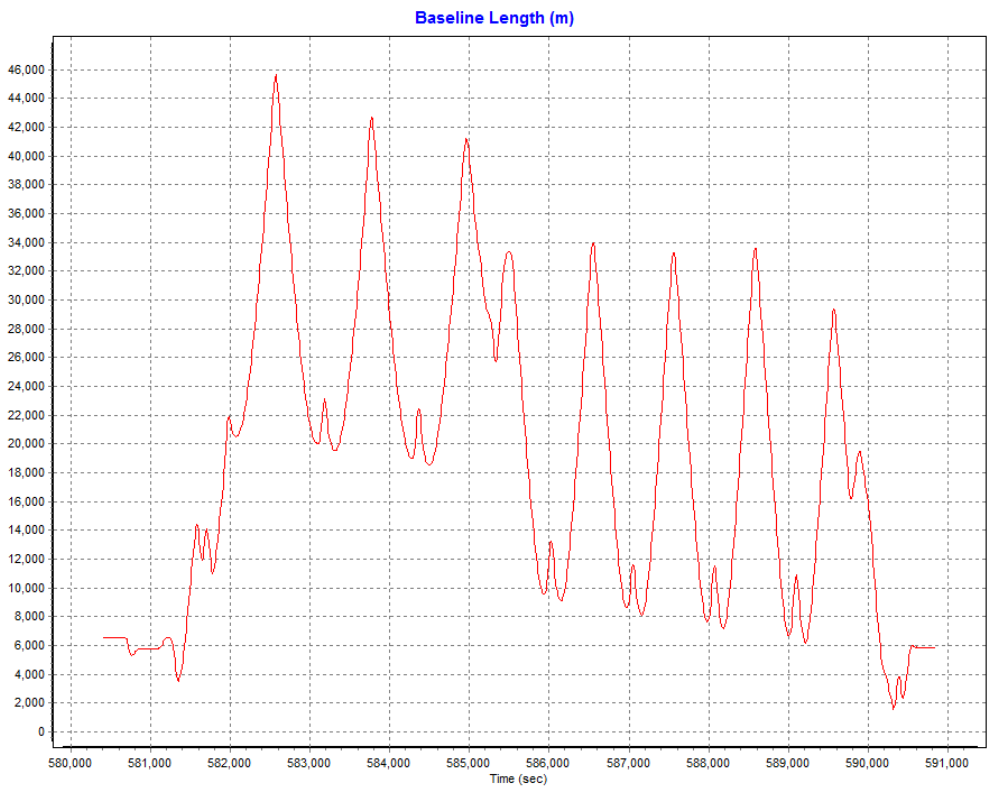
10000
20000
30000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28,000
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12,000
10,000
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6,000
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583,000
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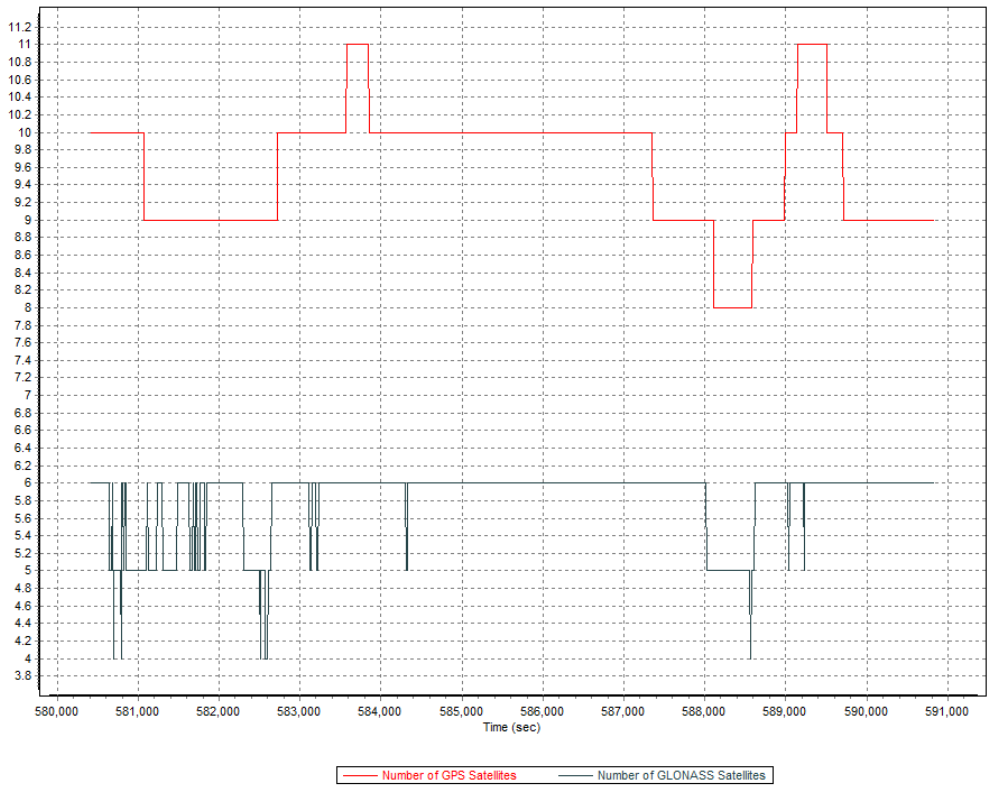
Time (sec)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7.6
7.4
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6.8
6.6
6.4
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4.8
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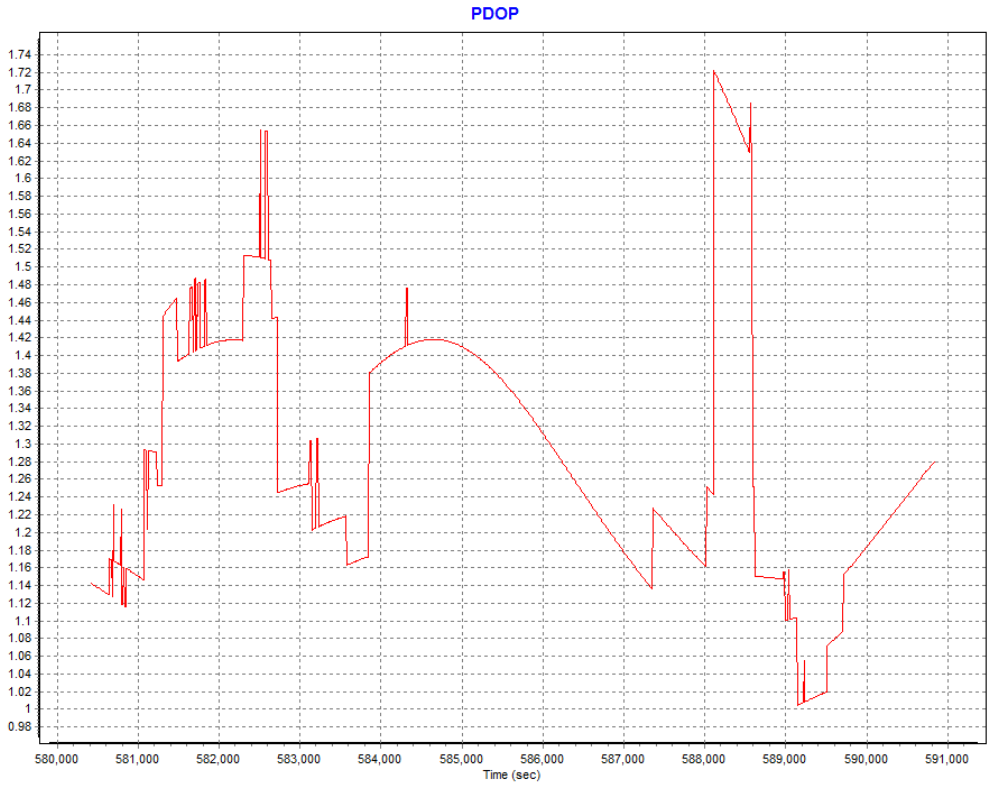
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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1.2
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1.16
1.14
1.12
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1.06
1.04
1.02
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590,000
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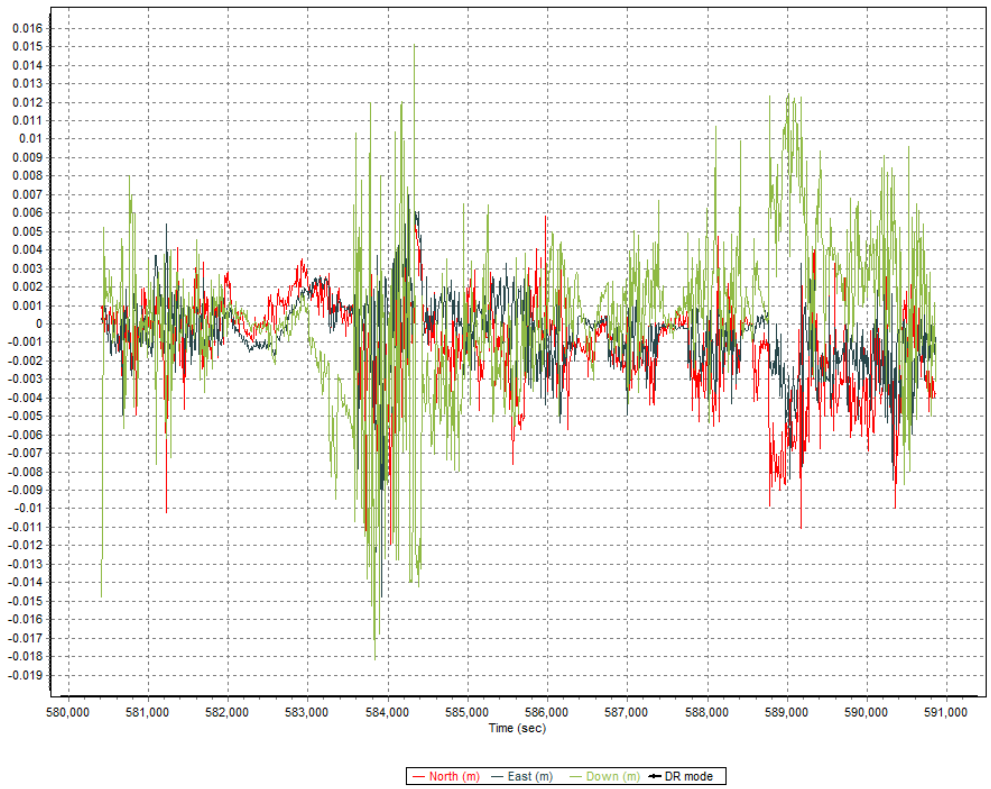
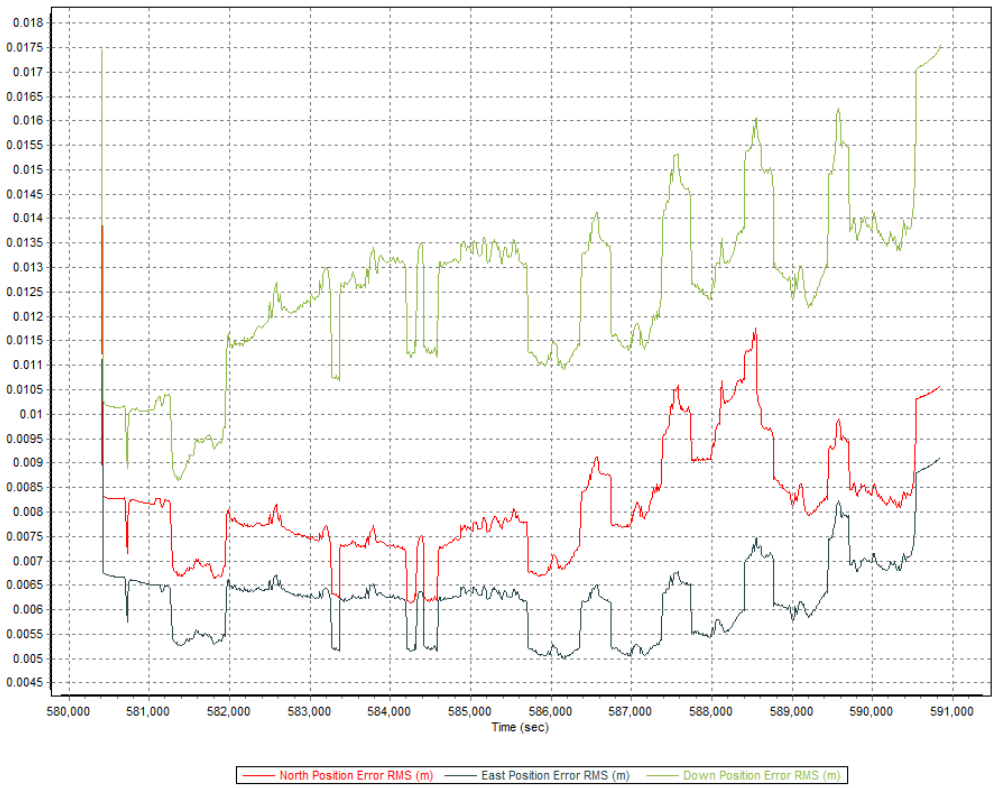
Time (sec)


Time (sec)
North (m)
East (m)
Down (m)
DR mode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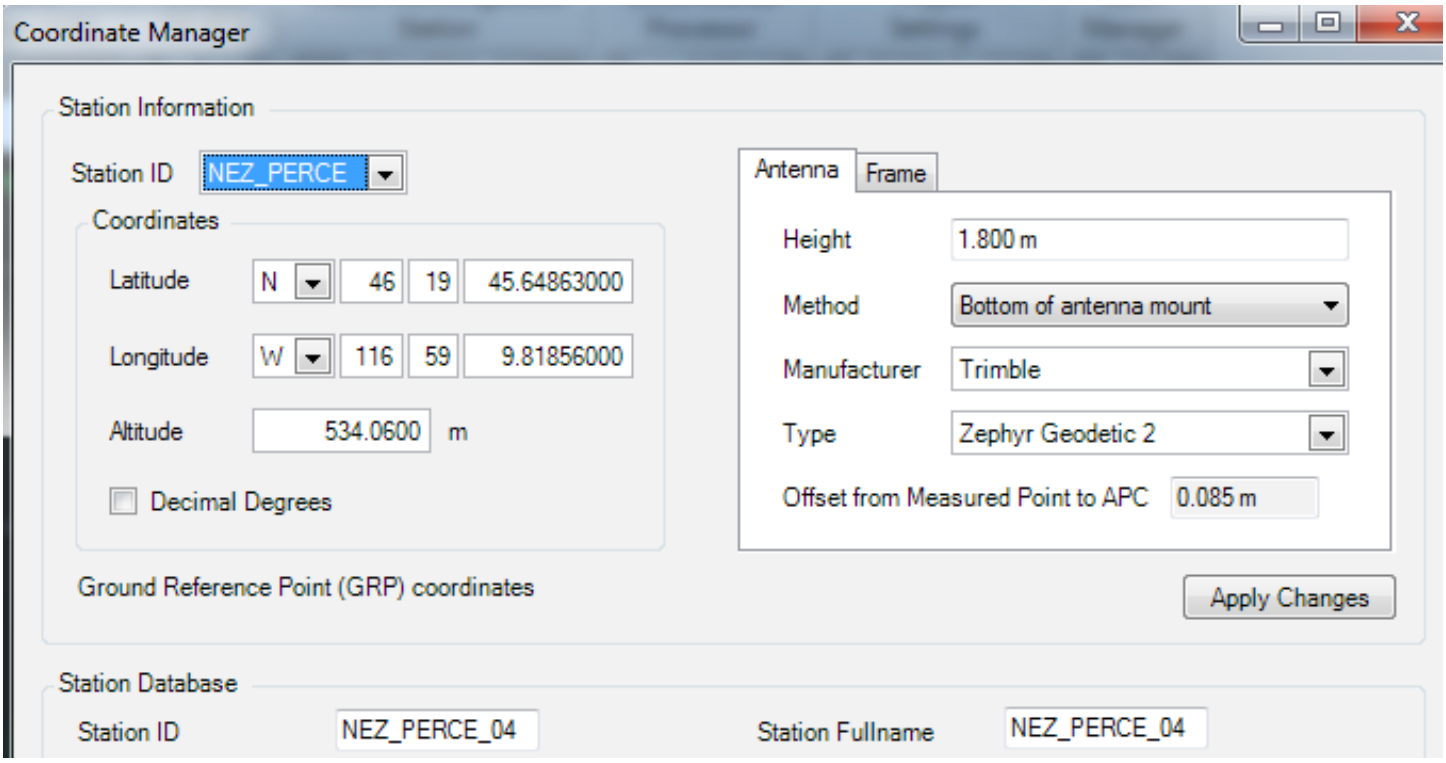
East Position Error RMS (m)
Down Position Error RMS (m)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Coordinates
Latitude
N
46
19
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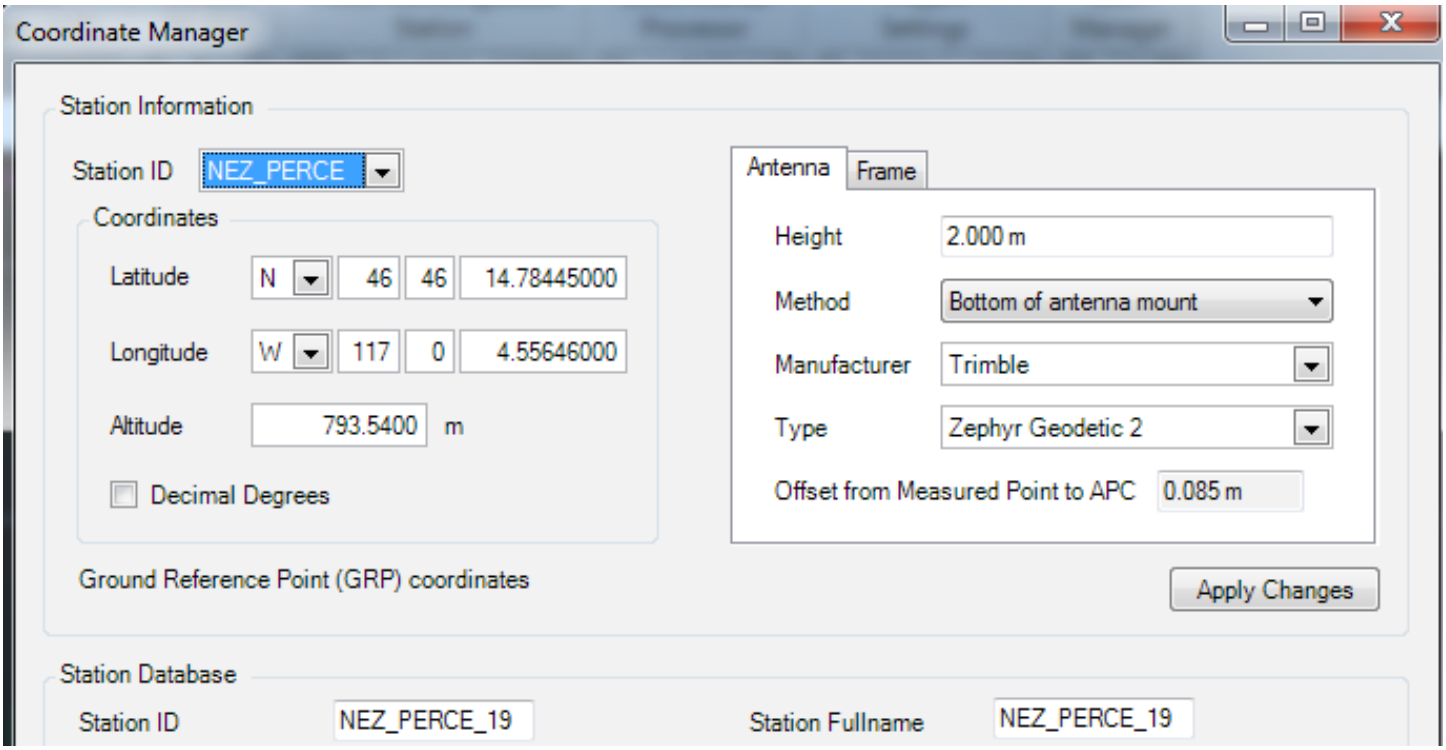
Longitude
W
116
59
9.81856000
Altitude
534.0600
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_04
Station Fullname
NEZ_PERCE_04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Station Information
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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_19
Station Fullname
NEZ_PERCE_19

Flight Log

Julian Day 317	Flight A

LIDAR Flight Log

Date Nov. 12 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective: Mission Aborted due to Rain.	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes @ 1600Z KLWS
Wind: 350° (N) @ 3knts
Temp: 10°C 82%RH
Pressure: 1015 hPa
Clouds: scattered 12000
Visibility: 16.1 km

17:20 → engine surge on roll.

Aircraft Block Time		
Engine On 1707	Ramp Out	Takeoff 1728
Engine Off 2009	Ramp In	Landing 2002
Total 3.0 hrs	Total hrs	Total 2.6 hrs

Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	1711	1716
Post Mission	2003	2007

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments (Time Stamp: 161112 –)
TEST		~	7300'	173510	173542			
150		360		174053	174804			AOI 08 Q1 @ 1900m
149		180		175122	175836			
148		360		180138	180823			
147		180		181115	181819			
146		360		182115	182750			
X-TIE		270		183106	183222			AOI 08 Lines 146-150
128		180		183956	184554			
127		360		184847	185427			
126		180		185753	190314			
125		360		190541	191120			
124		180		191405	192005			
123		360		192242	192821			
122		180	7300'	193111	193707			N. Rain - reflew 317B
121		360	7200'	193951	194534			N 7nmi Rain - reflew 317B

Pg 1 of 2

Julian Day 317	Flight A

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov 12 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes
Wind:
Temp:
Pressure:
Clouds:
Visibility:

Aircraft Block Time		
Engine On 1707	Ramp Out	Takeoff 1728
Engine Off 2009	Ramp In	Landing 2002
Total hrs	Total hrs	Total hrs

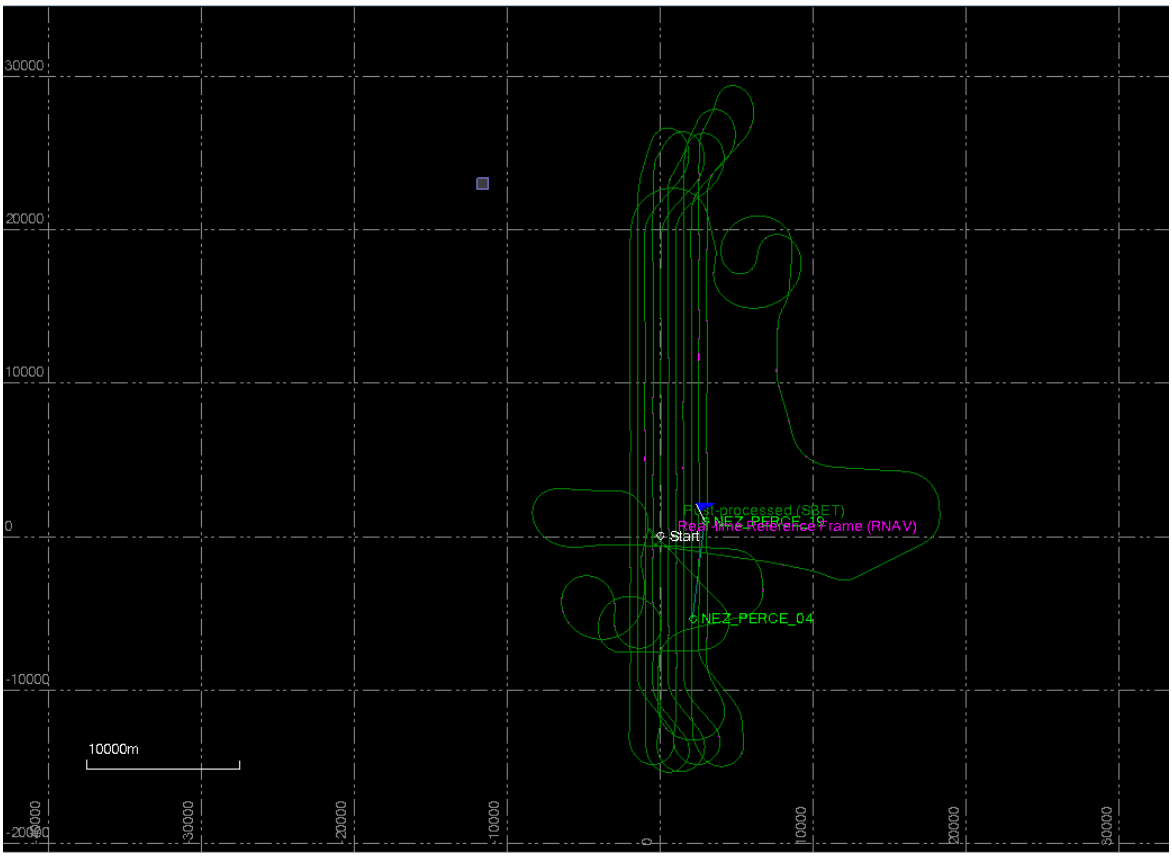
Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	1711	1716
Post Mission	2003	2007

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Comments
				Start	End	Time	nmi to End	Time Stamp: 161112 –
X-TIE		90	7200'	193951	195058			XTIE attempt - Rain
X-TIE		270	7200'	195412	195548			XTIE Lines 121-128
	Mission Aborted due to Rain on North side							

Pg 2 of 2

Nov 12, 2016-B (C-FFRY, SN2221256)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20000
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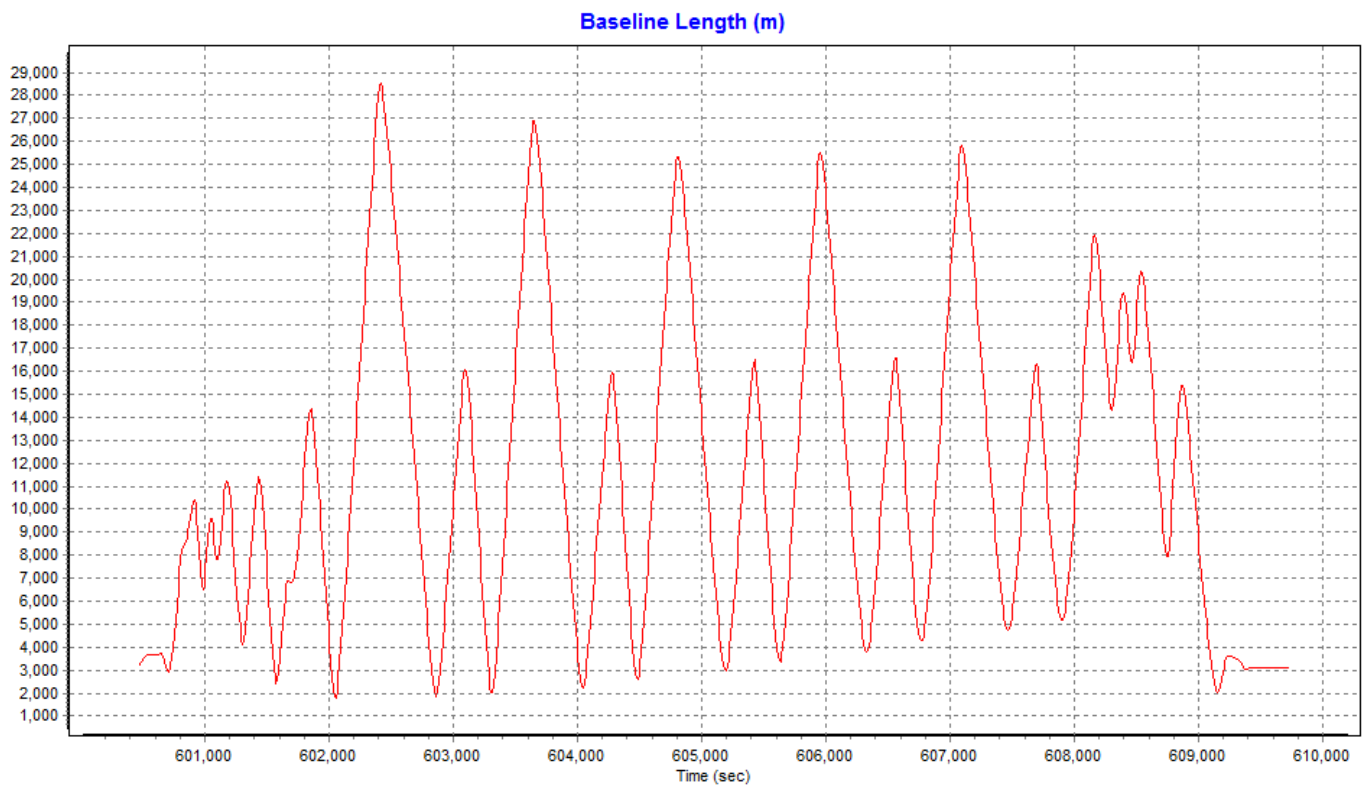
0
-10000
-20000
10000m
Post-processed (SBET)
NEZ_PERCE_16
Real-time Reference Frame (RNAV)
Start
NEZ_PERCE_04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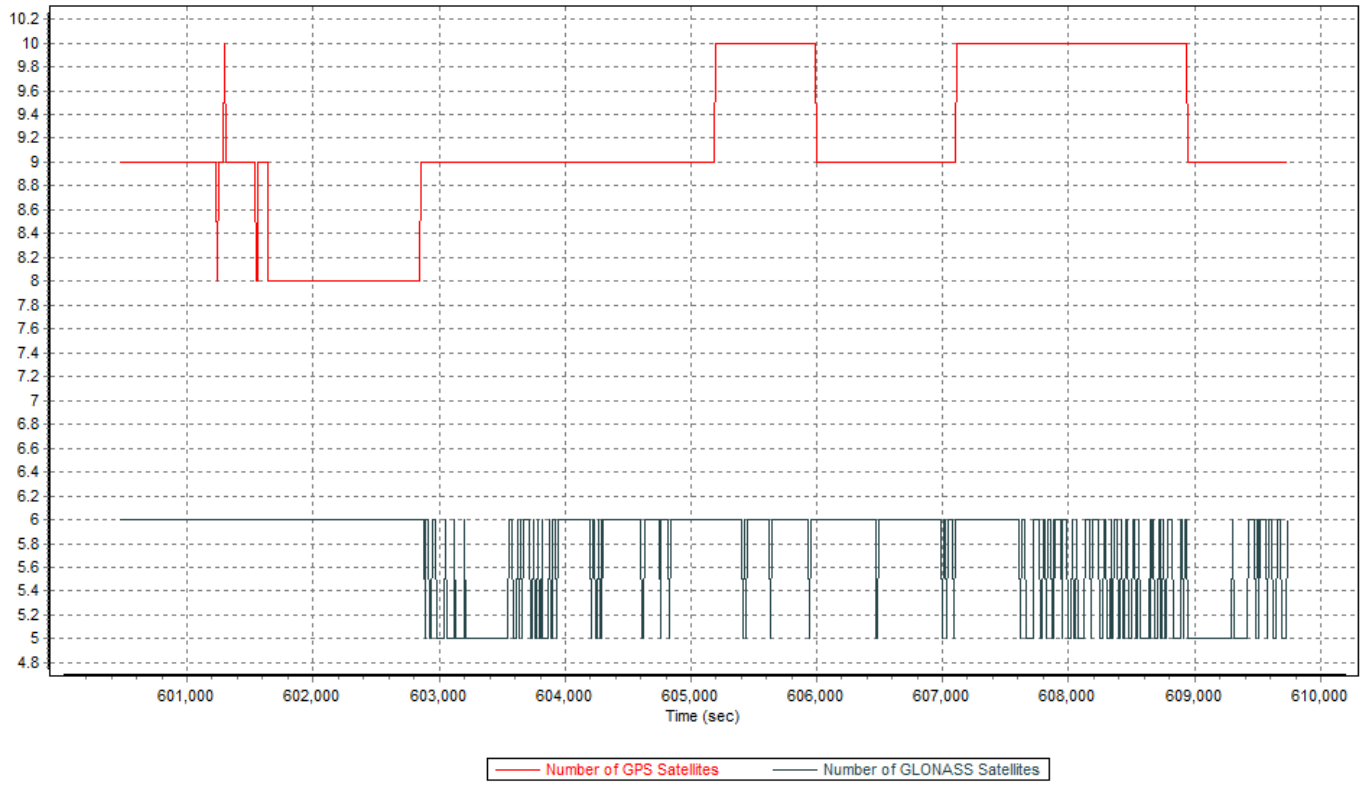
609,000
610,000
Time (sec)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8.8
8.6
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6.8
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5.4
5.2
5
4.8
601,000
602,000
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604,000
605,000
606,000
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608,000
609,000
610,000
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.58
1.56
1.54
1.52
1.5
1.48
1.46
1.44
1.42
1.4
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1.36
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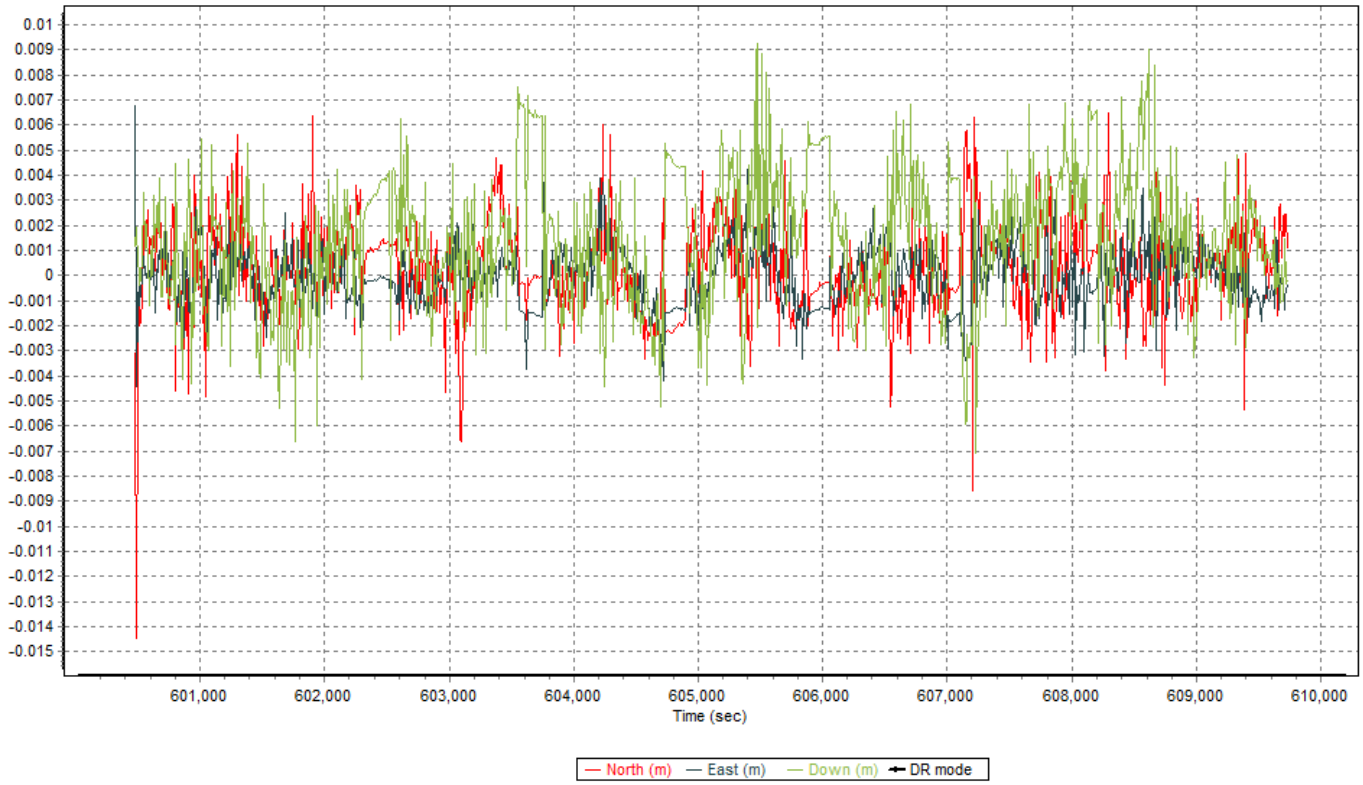
Time (sec)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0.004
0.003
0.002
0.001
0
-0.001
-0.002
-0.003
-0.004
-0.005
-0.006
-0.007
-0.008
-0.009
-0.01
-0.011
-0.012
-0.013
-0.014
-0.015
601,000
602,000
603,000
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607,000
608,000
609,000
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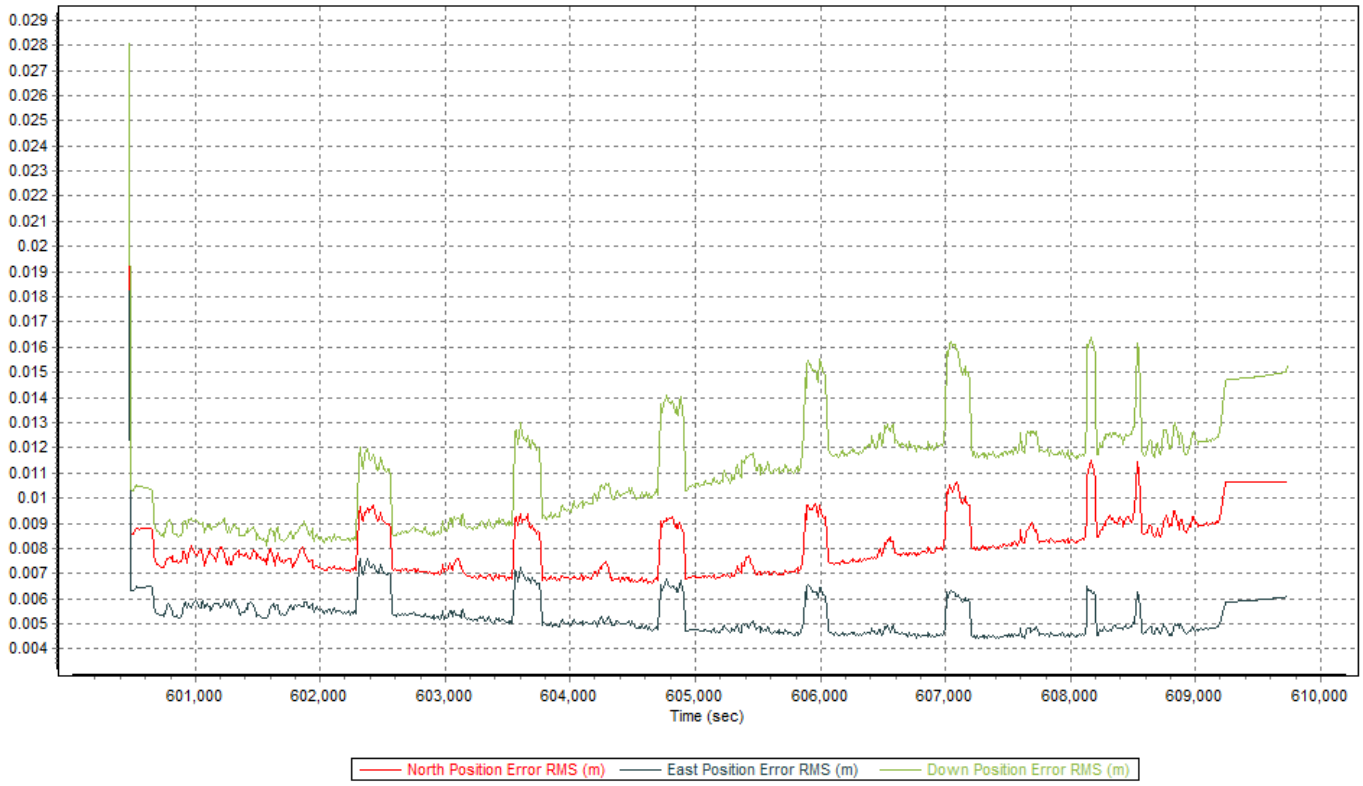
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
601,000
602,000
603,000
604,000
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606,000
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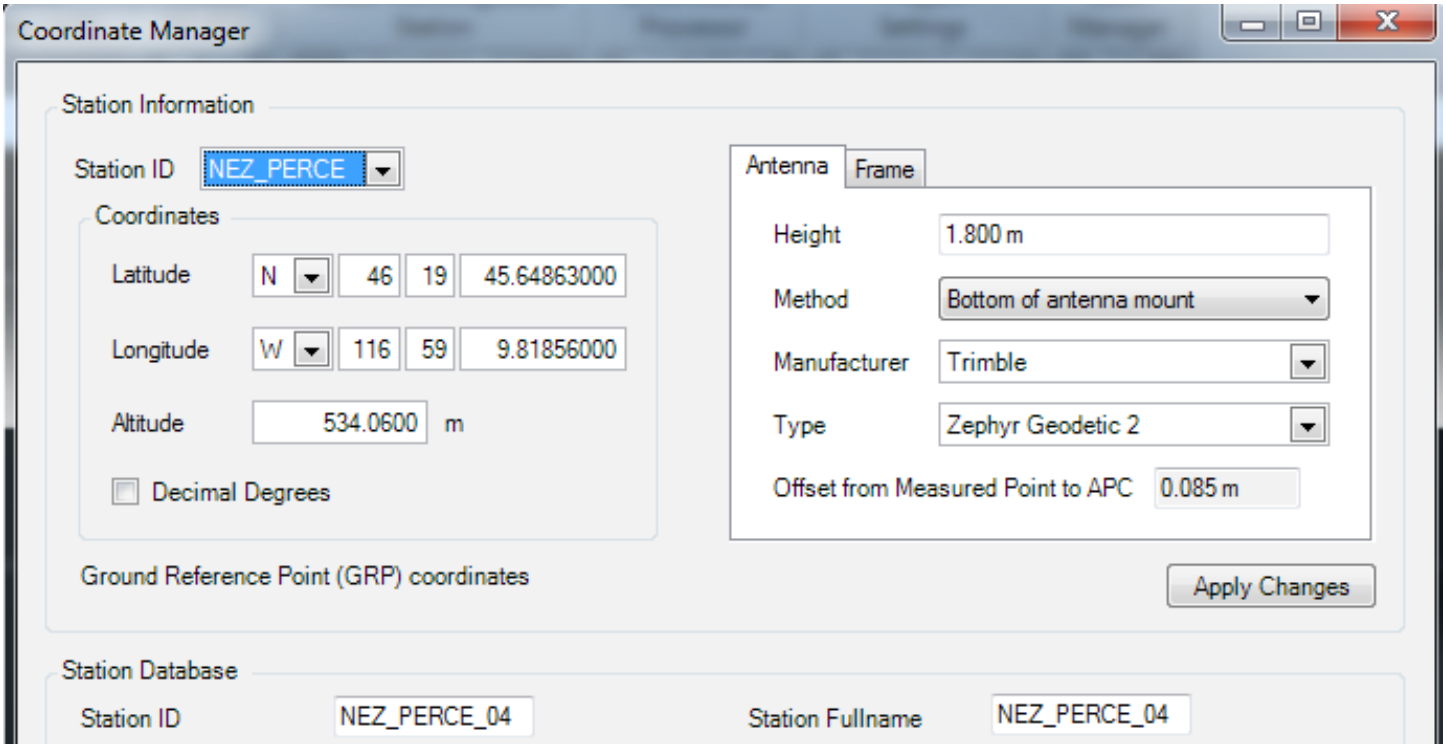
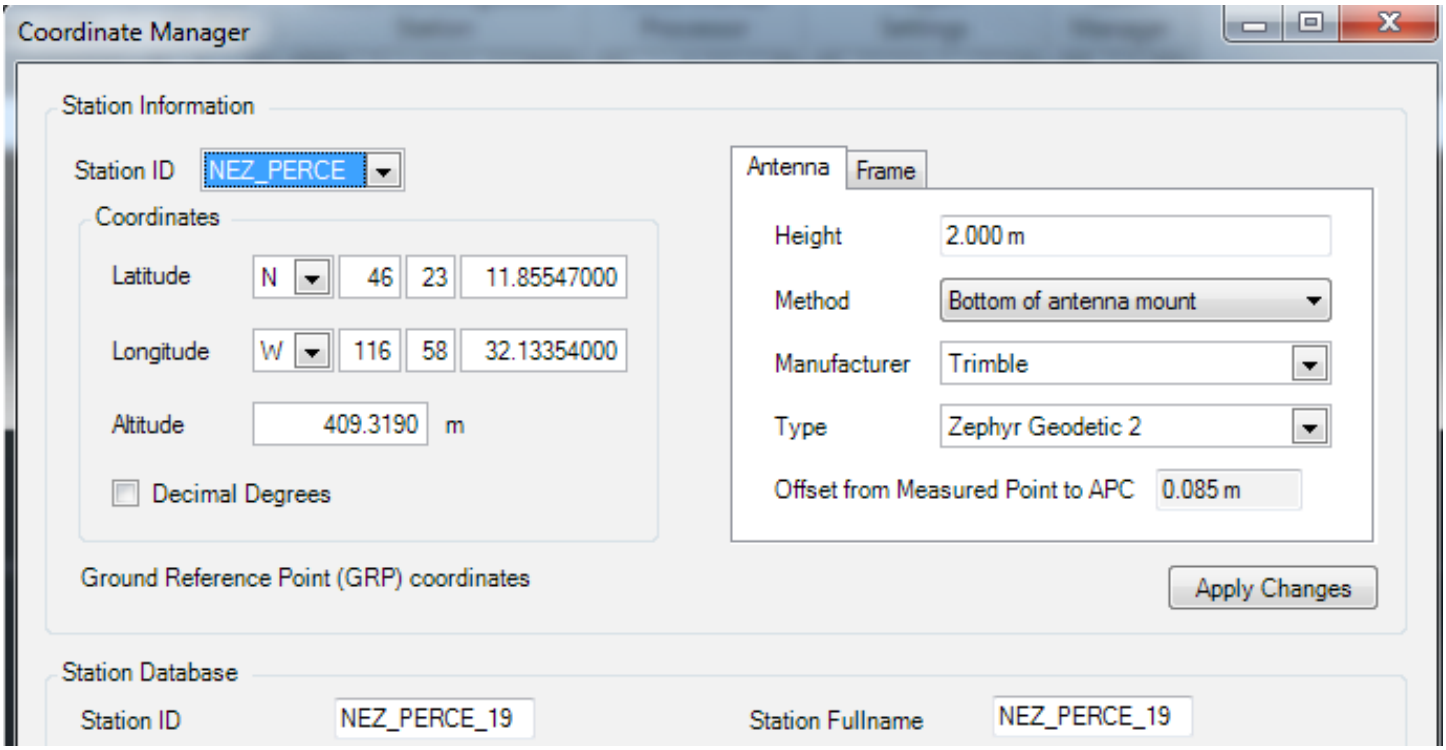
608,000
609,000
610,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
19
45.64863000
Longitude
W
116
59
9.81856000
Altitude
534.0600
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_04
Station Fullname
NEZ_PERCE_04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Longitude
W
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Altitude
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m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_19
Station Fullname
NEZ_PERCE_19

Flight Log

LIDAR Flight Log

AIRBORNE IMAGING
A Clean Harbors Company

Julian Day 317	Flight B

Date NOV. 12 2016	Aircraft PA-31 C-FFRY
Project 3119_ NEZ PERCE	Pilot B HARRITY
Location LEWISTON	Operator B. Whiteley
Mission Objective: BLOCK QL1 AOI 08	

System	Riegl Q1560
Unit	2221256
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes
Temp 15°
Humidity 64%
Altimeter 1016
Terrain Height 438
30.02

Aircraft Block Time		
Engine On 22 37	Ramp Out 22 50	Takeoff 22 51
Engine Off 01 24	Ramp In	Landing 01 13
Total 2.8 hrs	Total hrs	Total 2.4 hrs

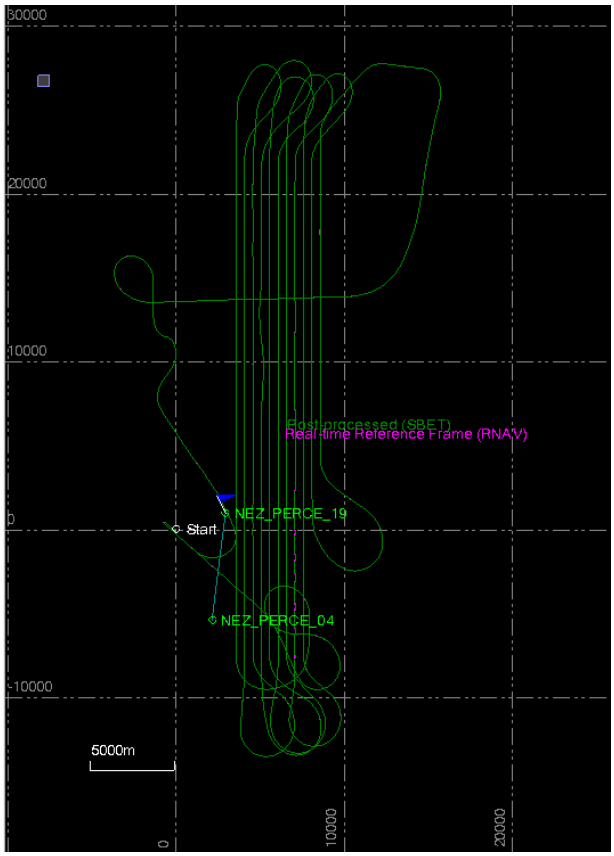
Mission Plan			
AGL Height	1900 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

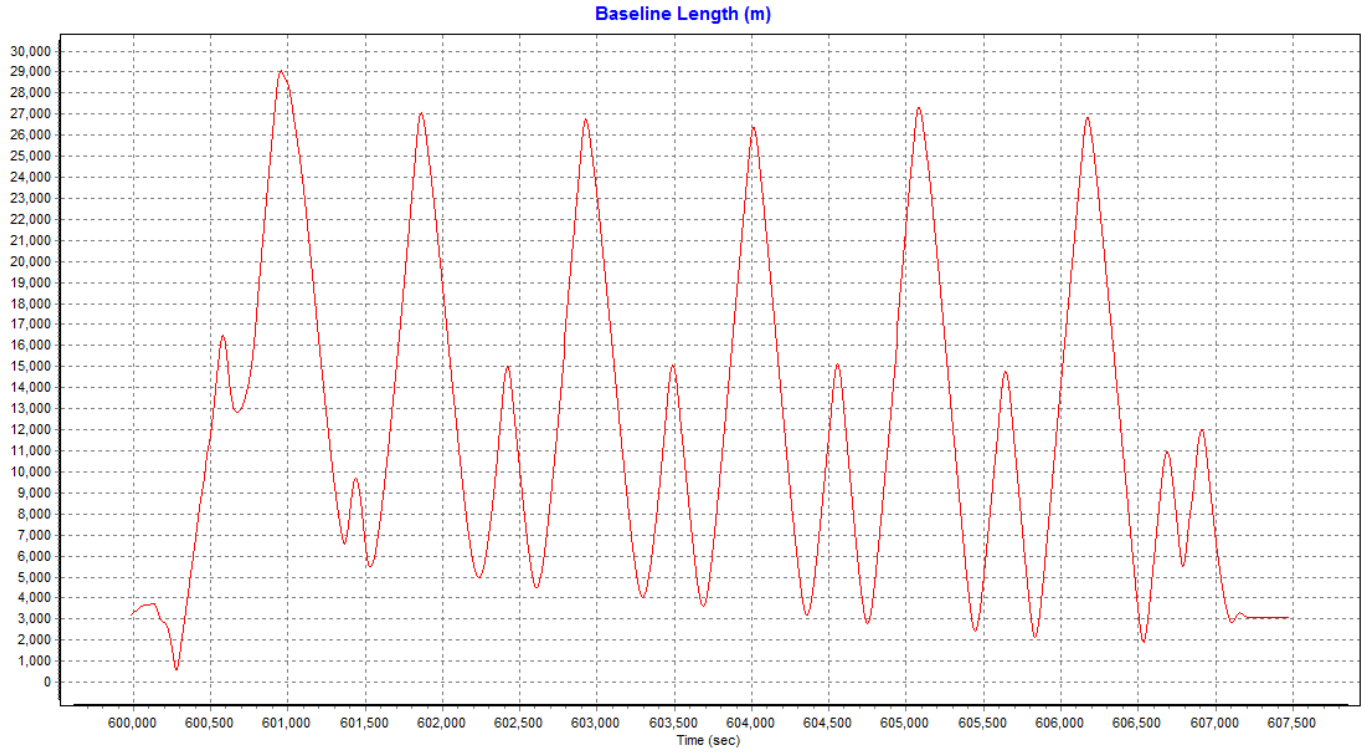
Static Alignment	GPS Time Start	GPS Time End
Pre Mission	22 41	22 46
Post Mission	01 17	01 22

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Mission ID	Comments
FIGURE 8				22:55	23:00				
XTIE	5416 317 14	90	7200'	23:05	23:06			161112-230507	XTIE LN'S 101 → 111 W-E.
111	15	0		23:12	23:18			231228	
110	16	180		23:22	23:29			232237	
109_REMOVE				23:29	23:30				WENT THROUGH IP
109	17	0		23:33	23:39			233303	
108	18	180		23:42	23:49			234258	
107	19	0		23:52	23:58			235238	
106	20	180		00:02	00:08			000208	
105	21	0		00:11	00:17			001147	
104	22	180		00:21	00:27			002112	
103	23	0		00:30	00:36			003042	
102	24	180		00:40	00:46			004013	
101	5416 317 25	0	7200'	00:49	00:55			004939	
FIGURE 8		↷		00:58	01:03				CLOSE OFF SURVEY

Pg 1 of

Nov 12, 2016-B (N-44RL, SN2220764)


30000
20000
10000
0
-10000
Post-processed (SBET)
Real-time Reference Frame (RNAV)
NEZ_PERCE_19
Start
NEZ_PERCE_04
5000m
0
10000
20000


Baseline Length (m)
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12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
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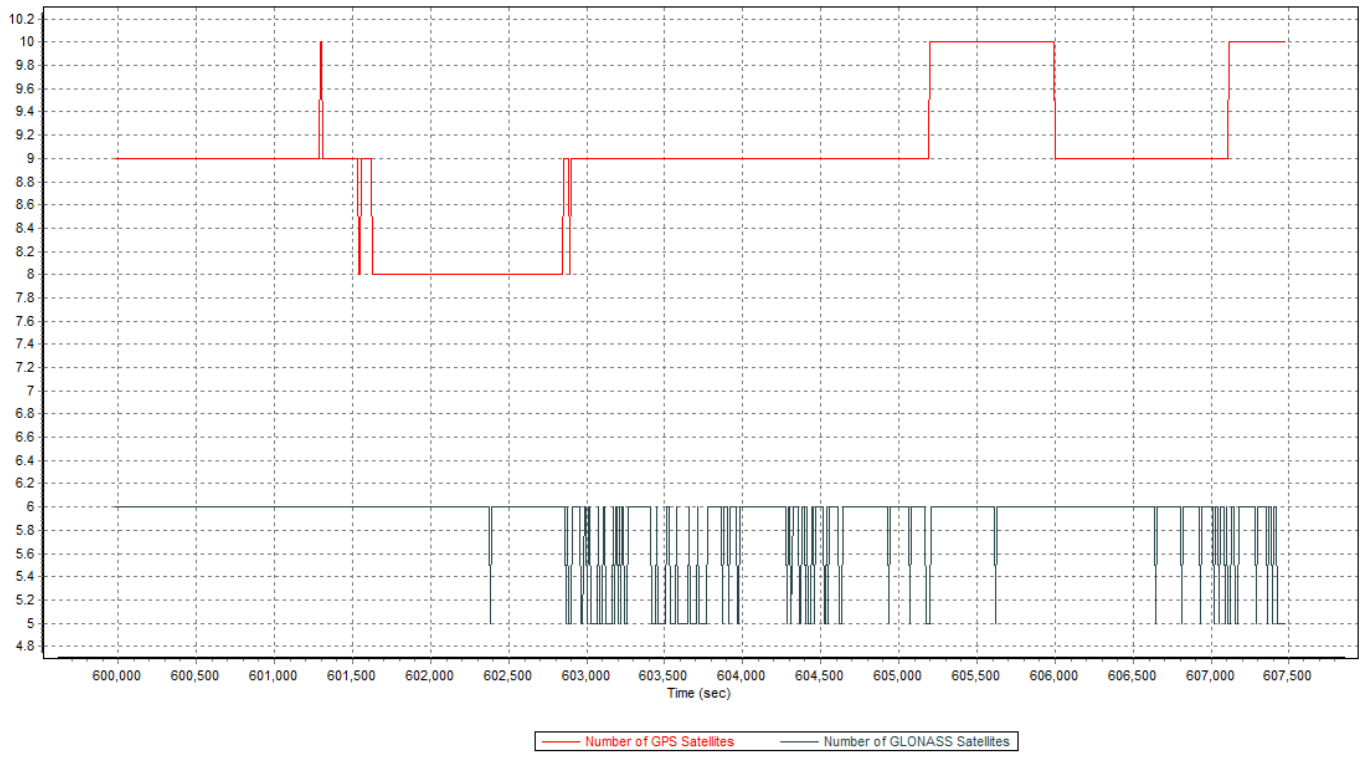
Time (sec)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9.6
9.4
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7.8
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7.4
7.2
7
6.8
6.6
6.4
6.2
6
5.8
5.6
5.4
5.2
5
4.8
600,000
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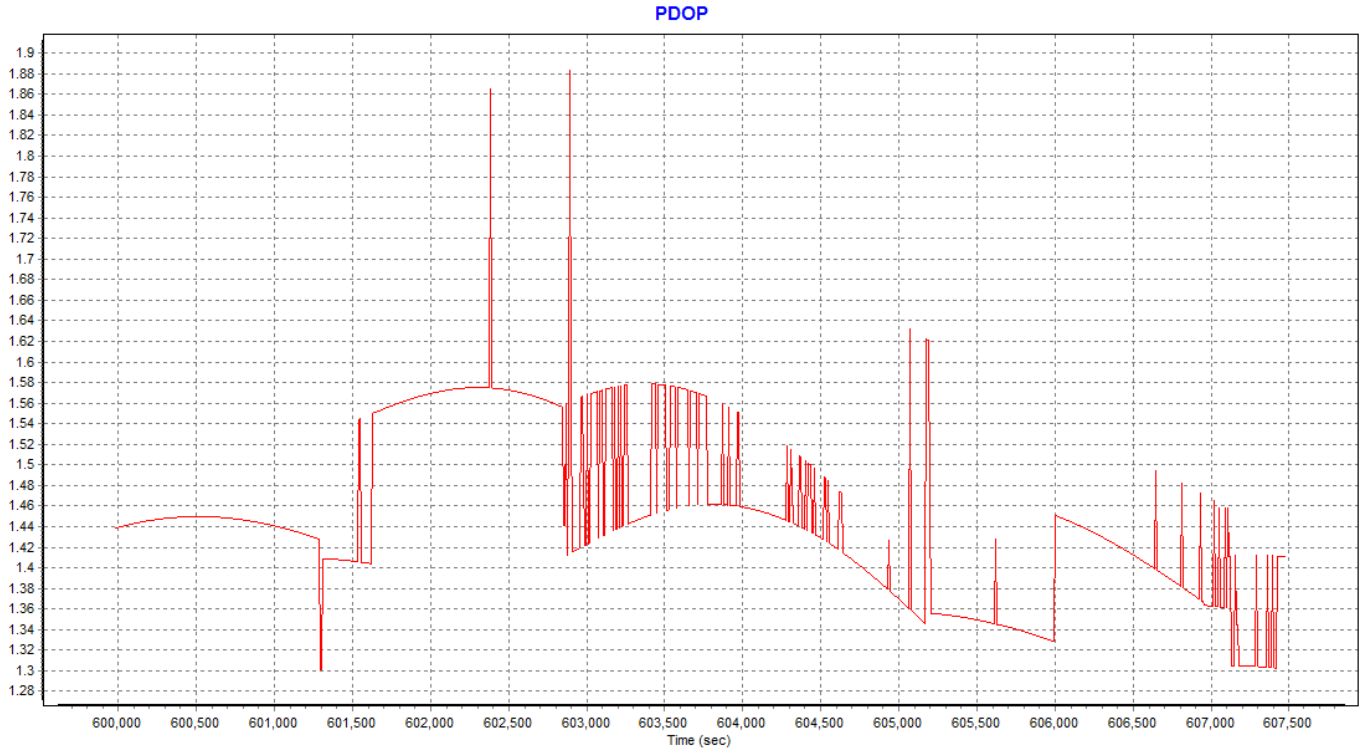
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites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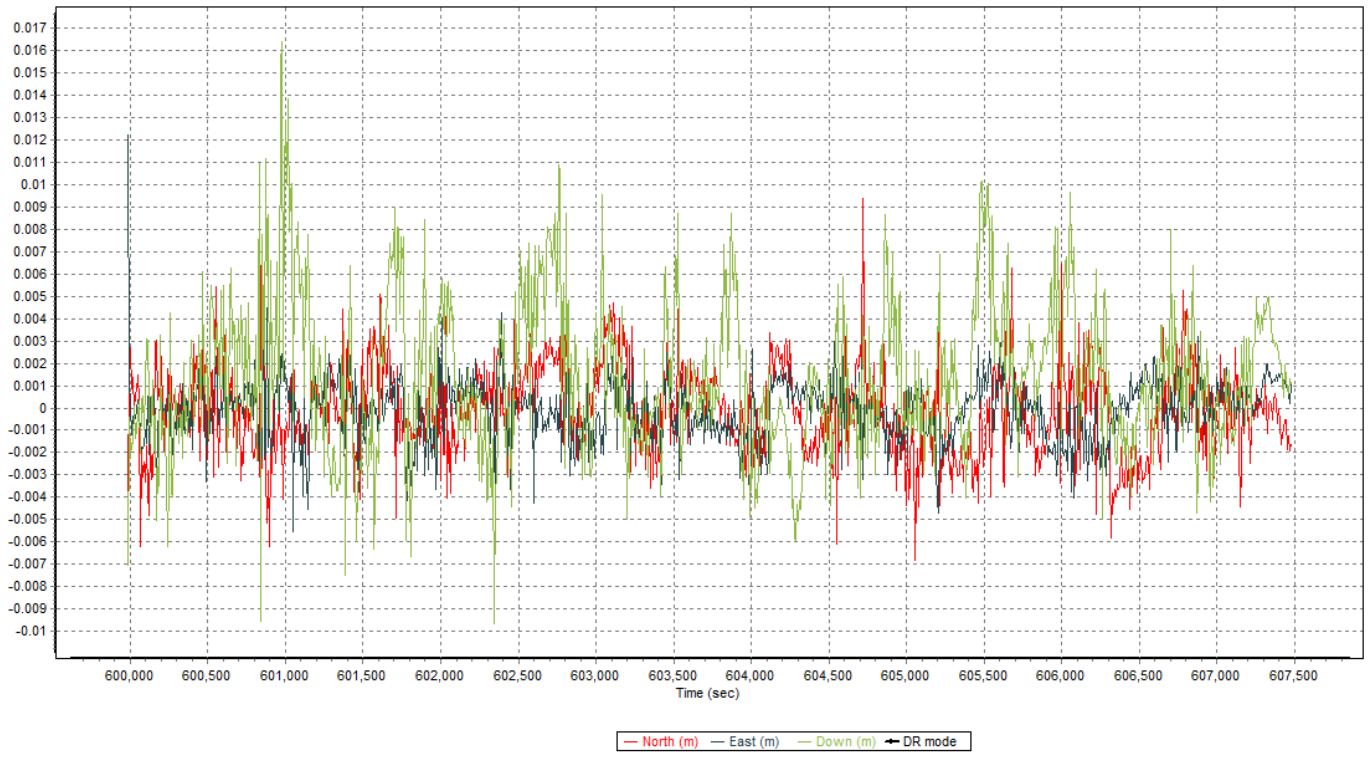
Time (sec)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0
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-0.002
-0.003
-0.004
-0.005
-0.006
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-0.009
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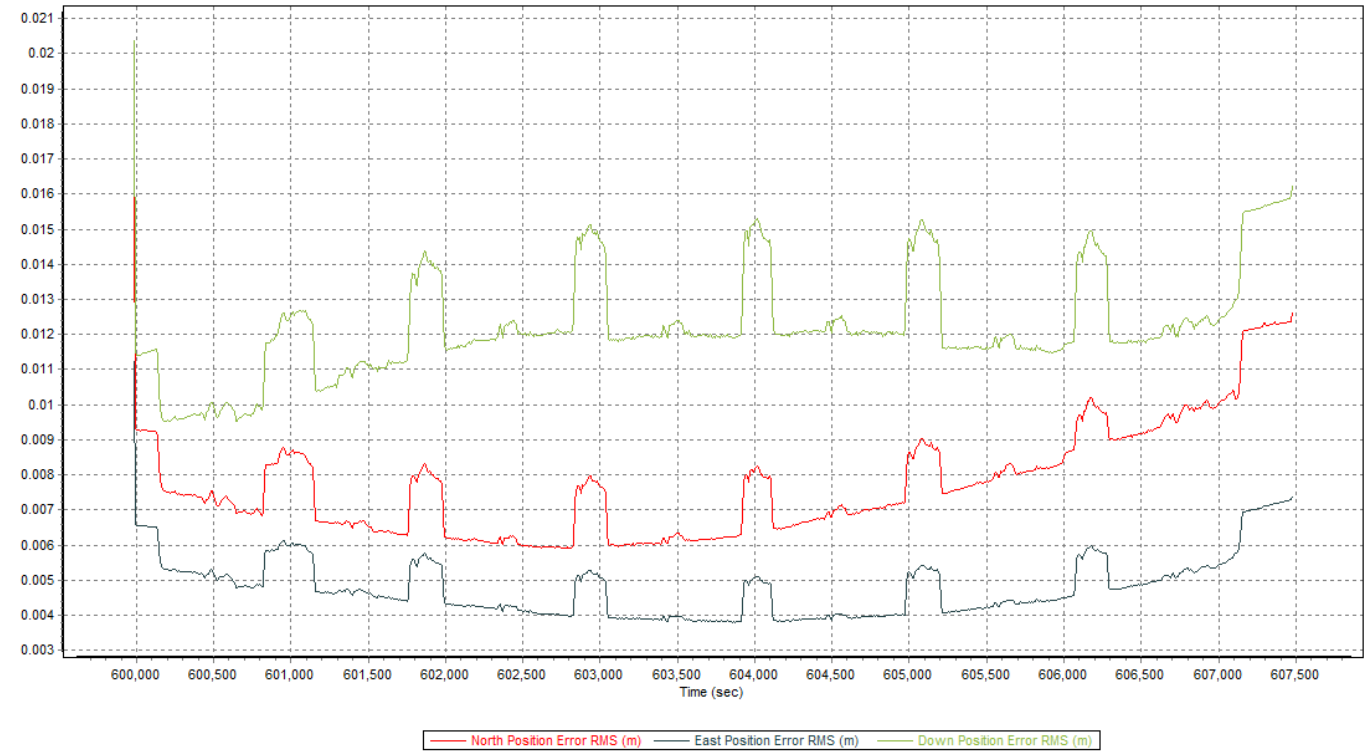
Time (sec)
North (m)
East (m)
Down (m)
DR mode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0.004
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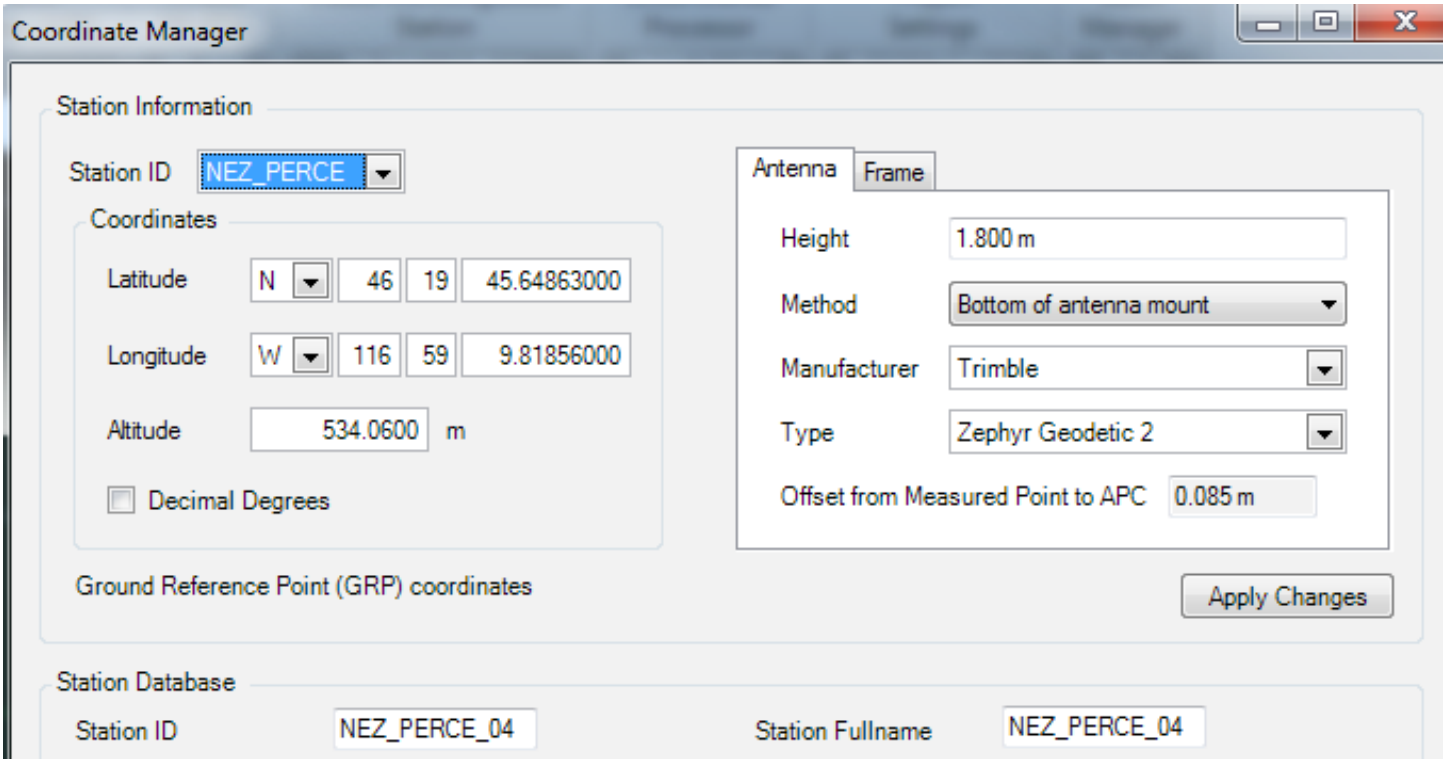
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
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NEZ_PERCE
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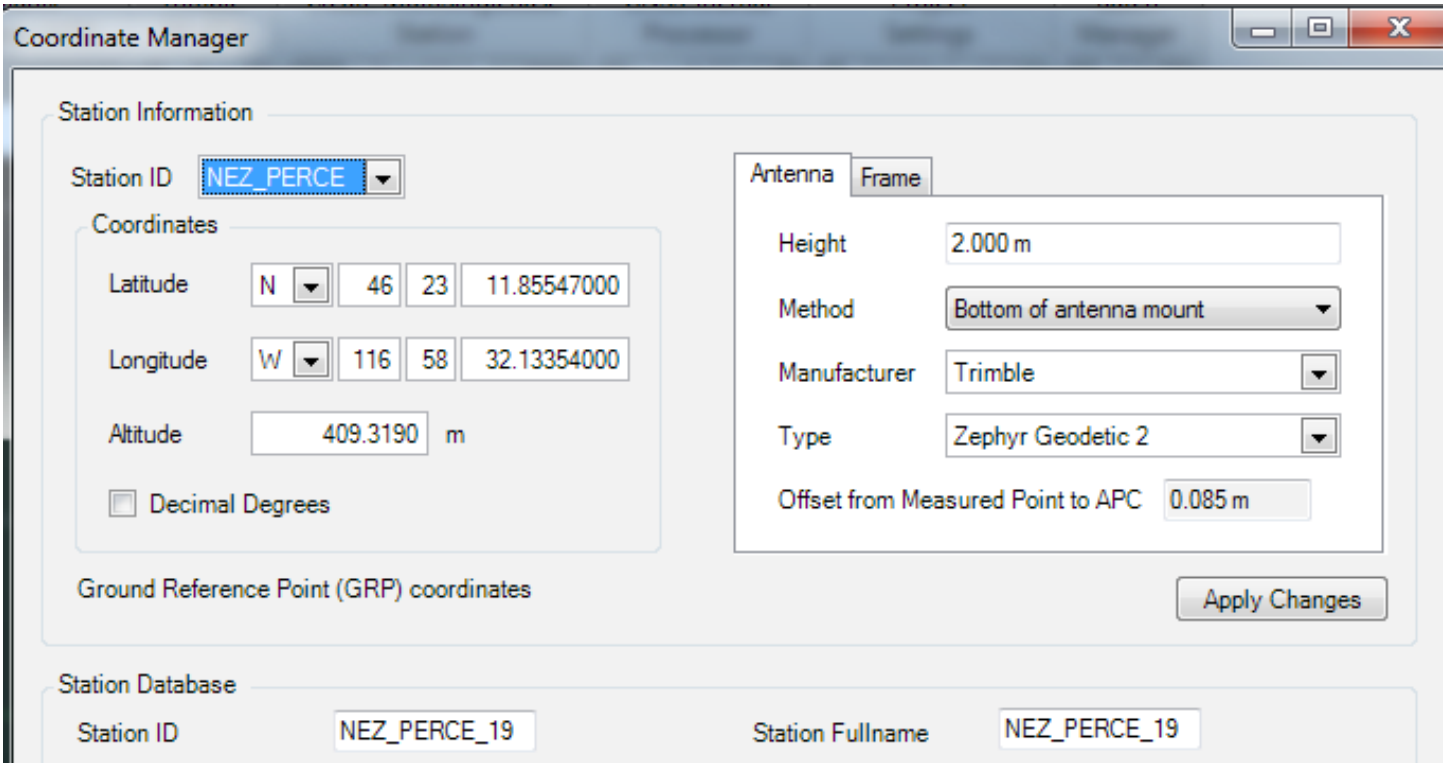
Longitude
W
116
59
9.81856000
Altitude
534.0600
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_04
Station Fullname
NEZ_PERCE_04


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
23
11.85547000
Longitude
W
116
58
32.13354000
Altitude
409.3190
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
2.000 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_19
Station Fullname
NEZ_PERCE_19

Flight Log

Stop @ line 12.

122

Julian Day 317	Flight * B

LIDAR Flight Log

AIRBORNE IMAGING

Date Nov 12 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R. Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective	

System	Riegl Q1560
Unit	2220764
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	
Scanner 2 Drive	

Additional Notes 14:00Z @ LWS
Wind: 200° (SSW) @ 5 knts
Temp: 15° 67%
Pressure: 1016 hPa
Clouds: broken 9000
Visibility: 16.1km

Aircraft Block Time		
Engine On 2232	Ramp Out	Takeoff 2242
Engine Off 0049	Ramp In	Landing 0038
Total 2.3 hrs	Total hrs	Total hrs

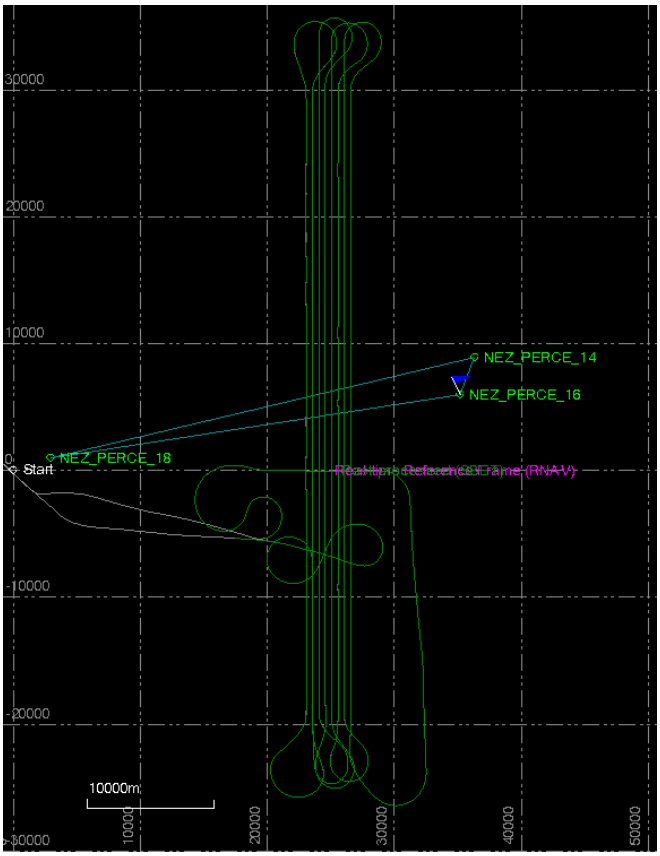
Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

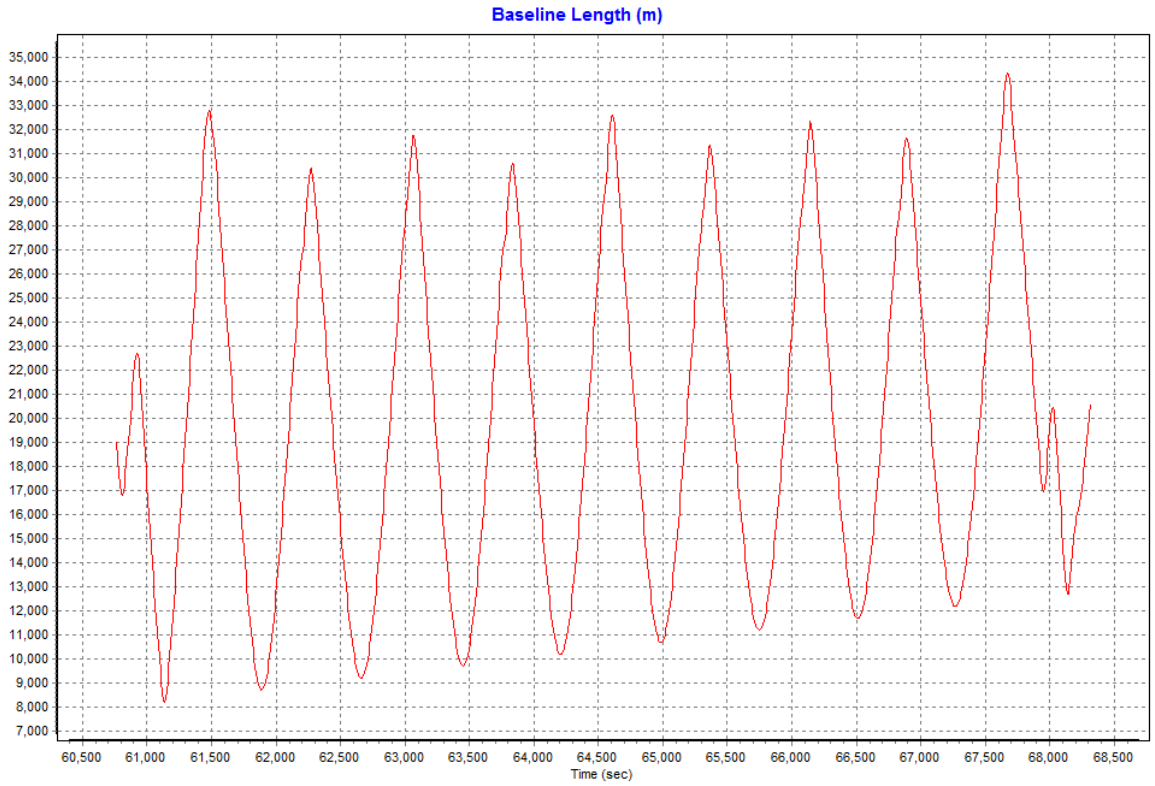
Static Alignment	GPS Time	
	Start	End
Pre Mission	2234	2239
Post Mission	0040	0044

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 161112 –
XTIE		90	7300'	225050	225239			x TIE 112 – 122
122		180	7300'	225853	230231			North ½
121		360	7200'	230604	230940			North ½
120		180	7200	231247	231857			
119		360	7200'	232148	232731			
118		180	7200'	233032	233642			
117		360	7200'	233948	234533			
116		180	7200'	234819	235417			
* 115		360	7200'	235727	000335			-Snapshot P.D. frozen. line OK ↳ no need for a restart
114		180	7200'	000636	001229			161113 –
113		360	7200'	001536	002123			
112		180	7200'	002434	003033			

Pg 1 of 1

Nov 13, 2016-A (N-44RL, SN2220764)


30000
20000
10000
0
-10000
-20000
-30000
10000
20000
30000
40000
50000
NEZ_PERCE_14
NEZ_PERCE_16
NEZ_PERCE_18
Start
Real-time Reference Frame (RNAV)
10000m


Baseline Length (m)
35,000
34,000
33,000
32,000
31,000
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
60,500
61,000
61,500
62,000
62,500
63,000
63,500
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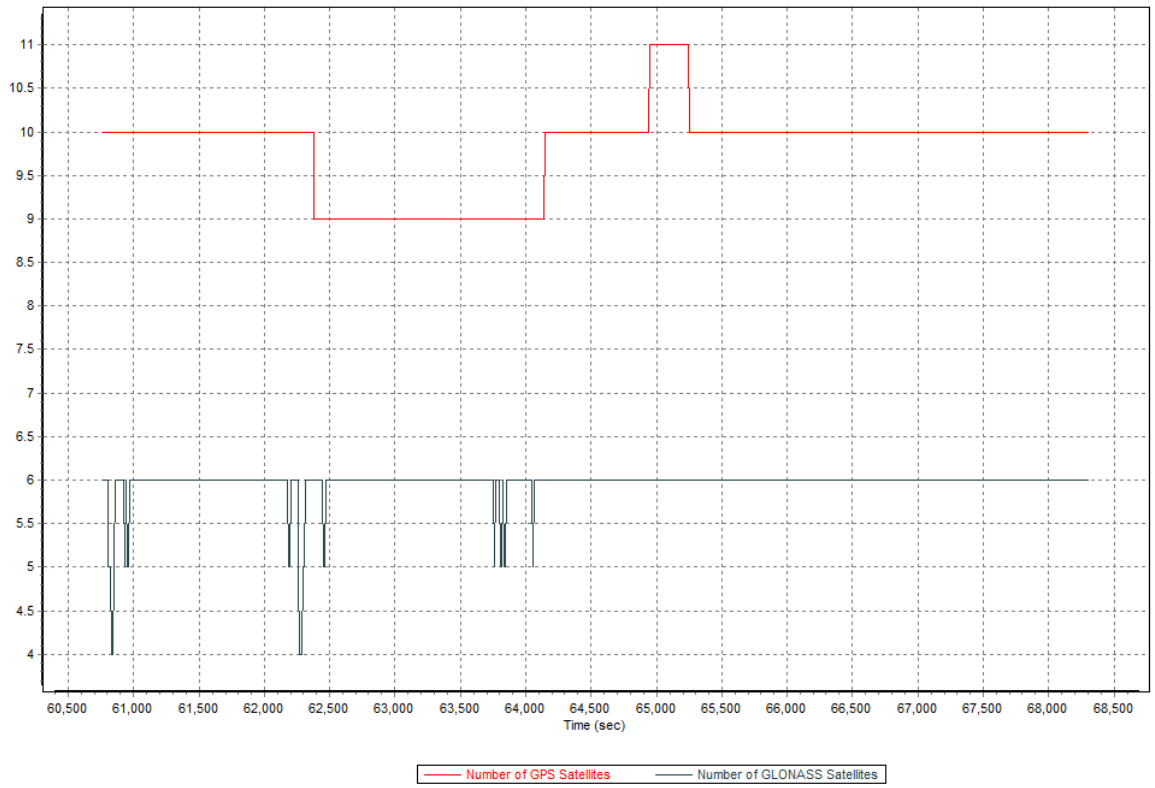
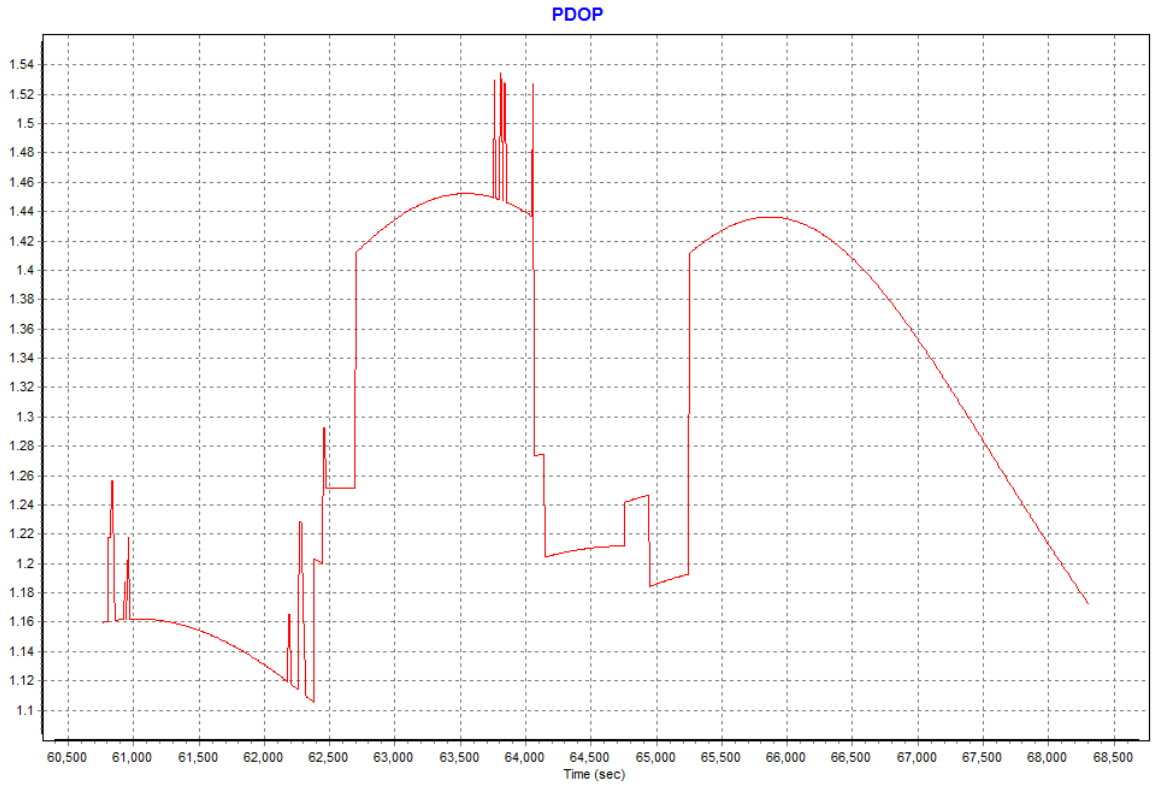
65,000
65,500
66,000
66,500
67,000
67,500
68,000
68,500
Time (sec)


11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
60,500
61,000
61,500
62,000
62,500
63,000
63,500
64,000
64,500
65,000
65,500
66,000
66,500
67,000
67,500
68,000
68,500
Time (sec)
Number of GPS Satellites
Number of GLONASS Satellites


PDOP
1.54
1.52
1.5
1.48
1.46
1.44
1.42
1.4
1.38
1.36
1.34
1.32
1.3
1.28
1.26
1.24
1.22
1.2
1.18
1.16
1.14
1.12
1.1
60,500
61,000
61,500
62,000
62,500
63,000
63,500
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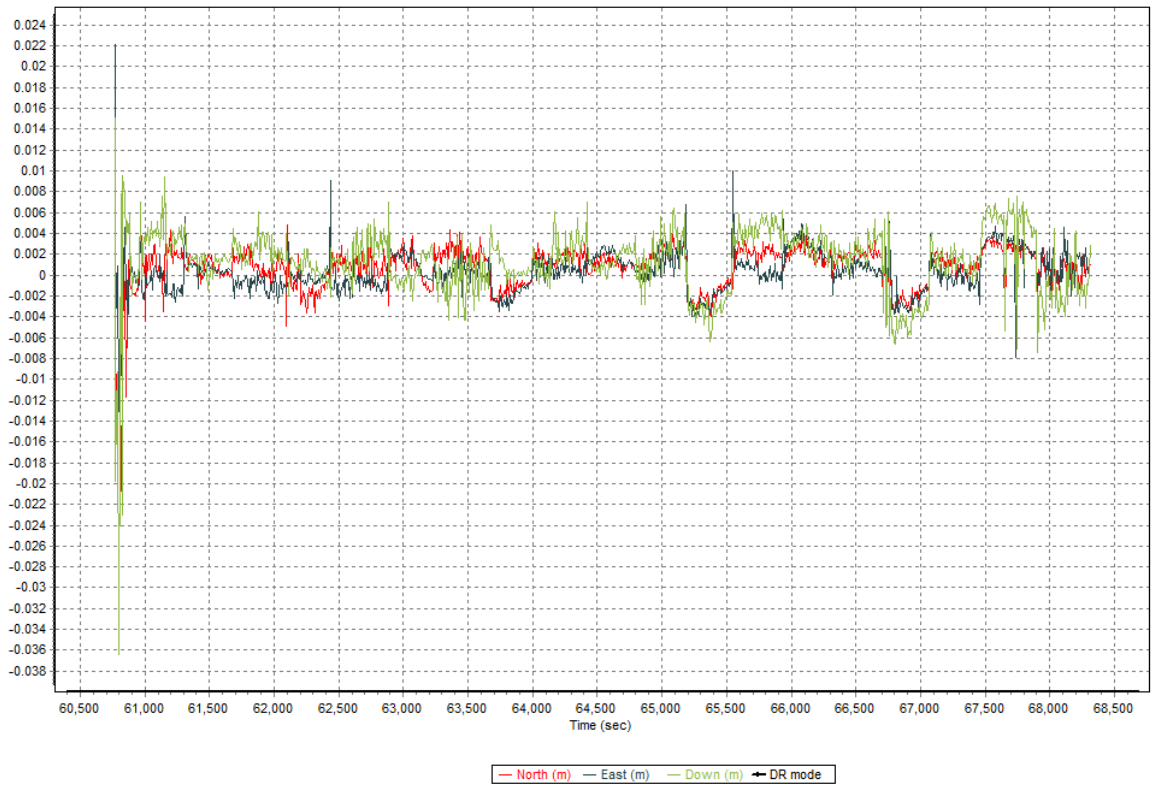
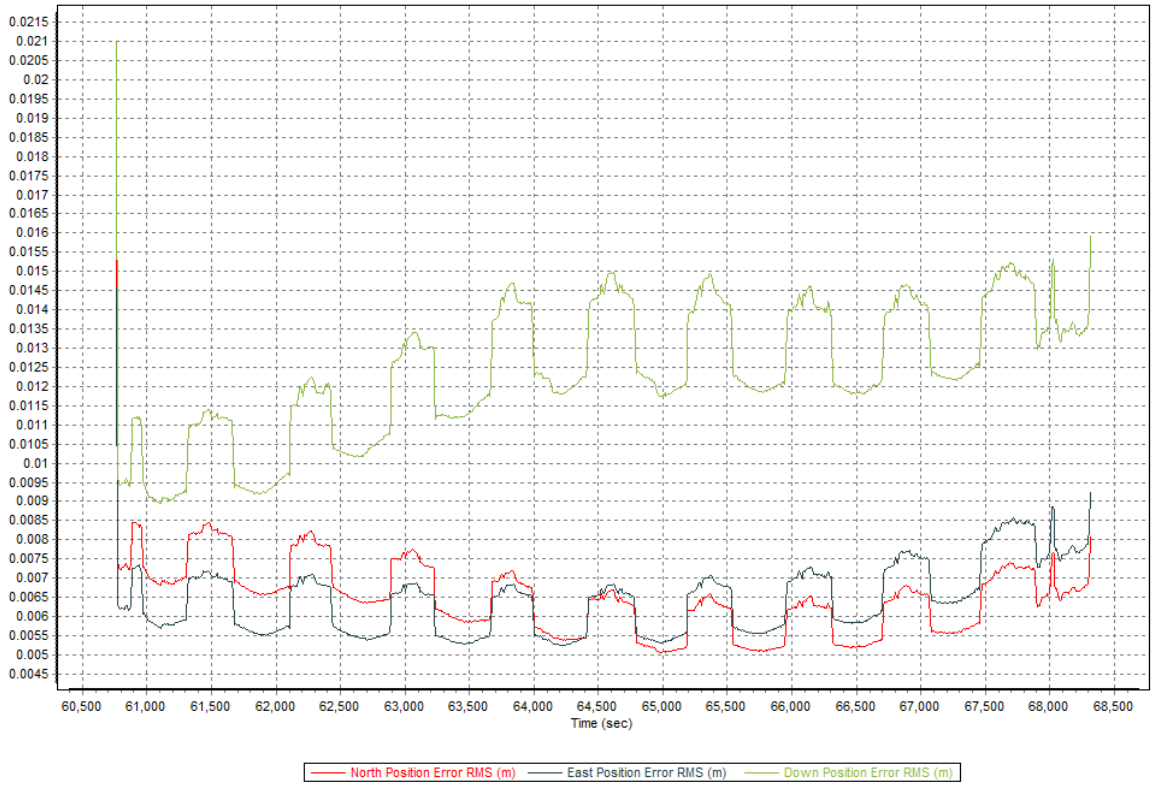
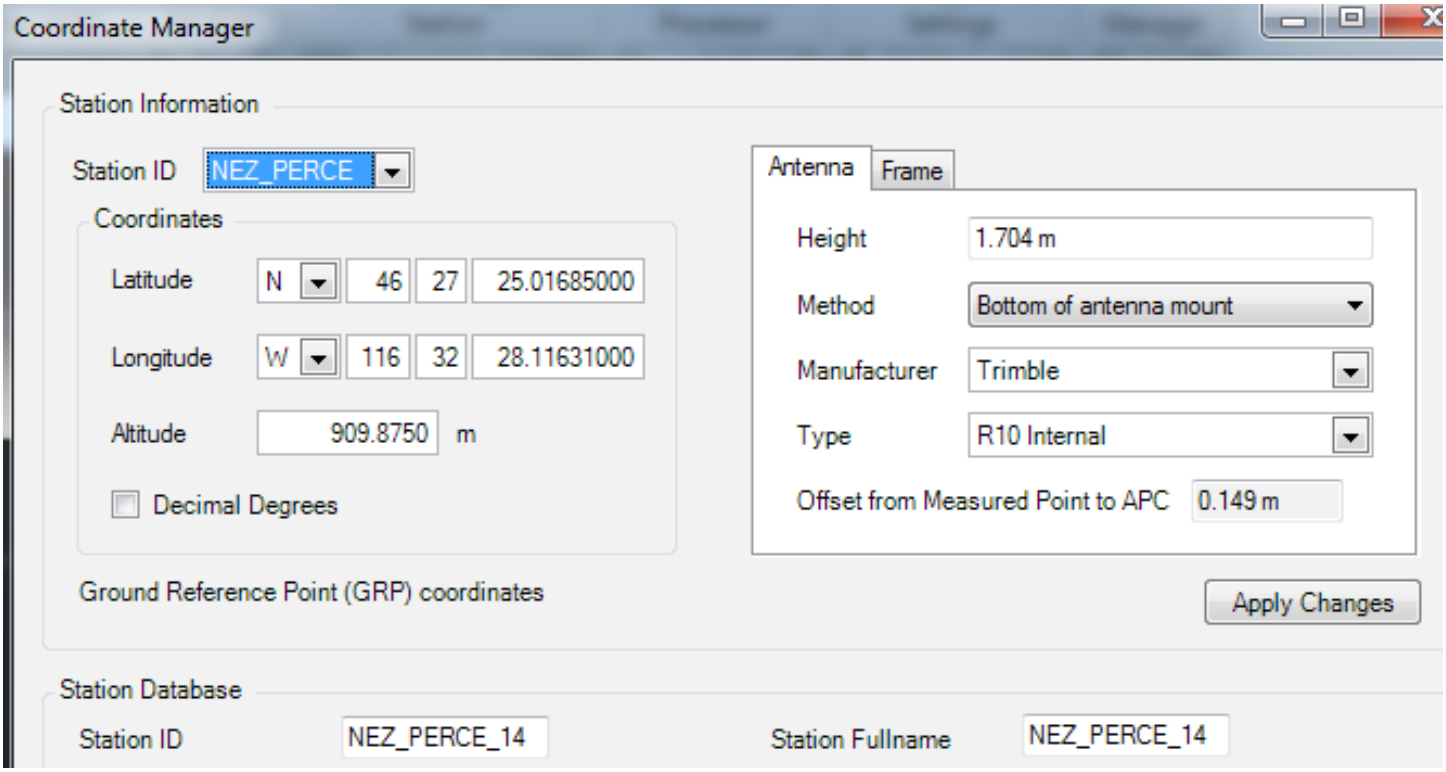
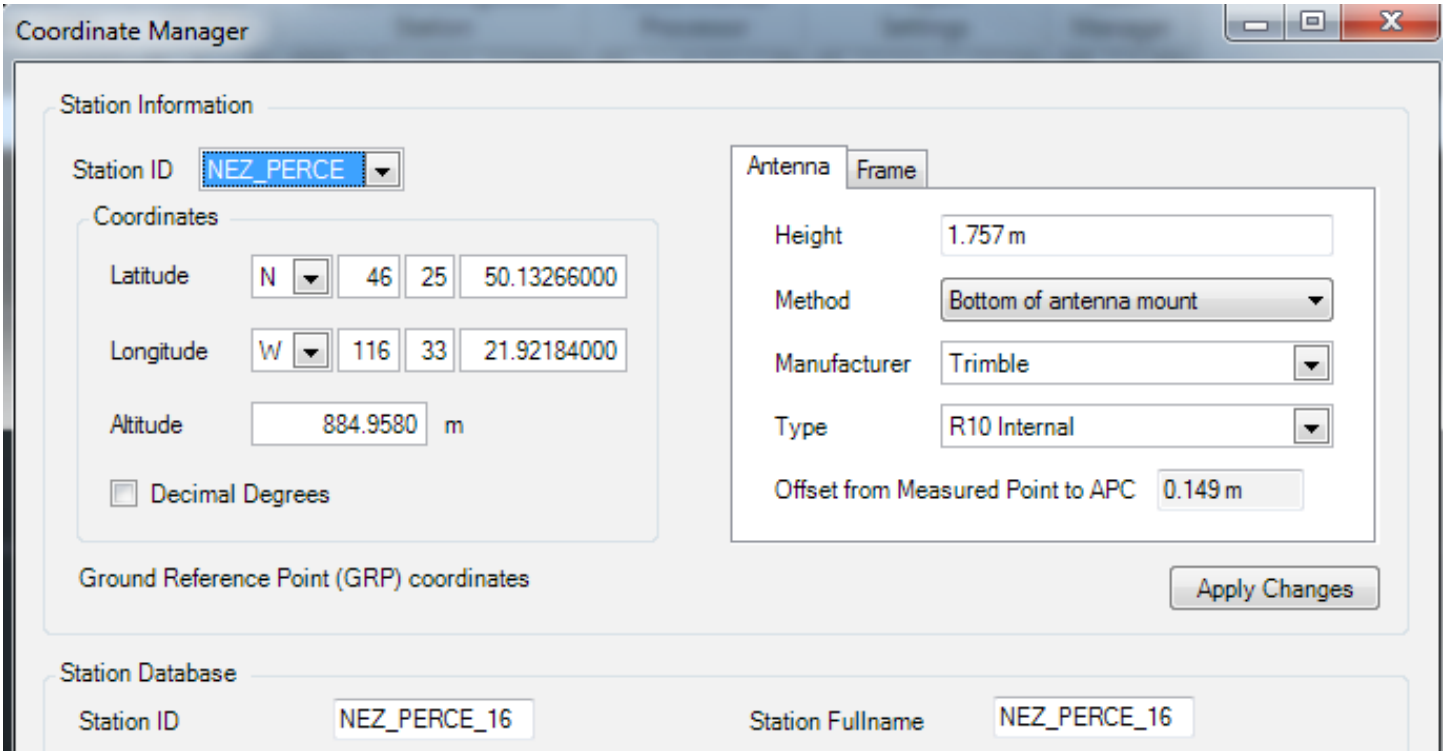
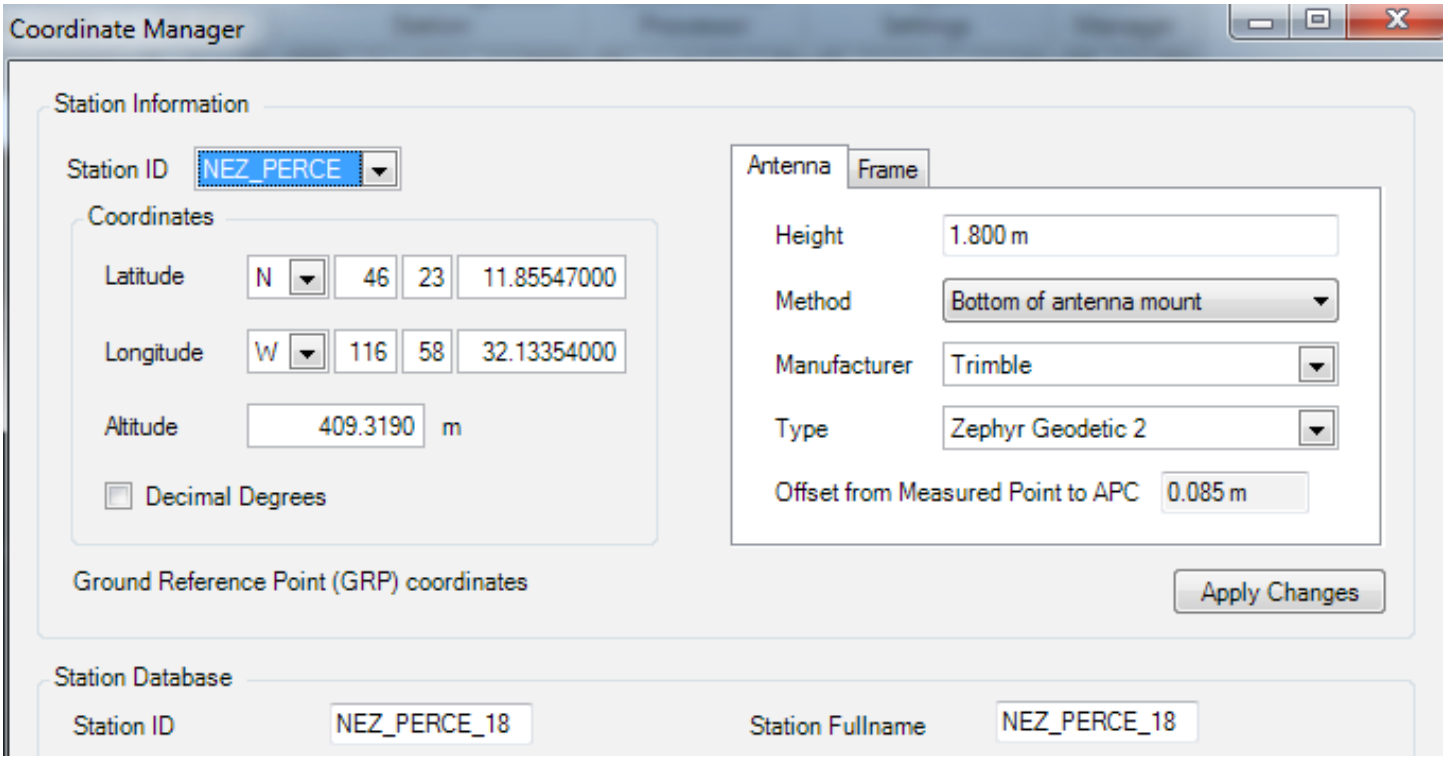
65,000
65,500
66,000
66,500
67,000
67,500
68,000
68,500
Time (sec)


0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
-0.002
-0.004
-0.006
-0.008
-0.01
-0.012
-0.014
-0.016
-0.018
-0.02
-0.022
-0.024
-0.026
-0.028
-0.03
-0.032
-0.034
-0.036
-0.038
60,500 61,000 61,500 62,000 62,500 63,000 63,500 64,000 64,500 65,000 65,500 66,000 66,500 67,000 67,500 68,000 68,500
Time (sec)
North (m)
East (m)
Down (m)
DR mode


0.0215
0.021
0.0205
0.02
0.0195
0.019
0.0185
0.018
0.0175
0.017
0.0165
0.016
0.0155
0.015
0.0145
0.014
0.0135
0.013
0.0125
0.012
0.0115
0.011
0.0105
0.01
0.0095
0.009
0.0085
0.008
0.0075
0.007
0.0065
0.006
0.0055
0.005
0.0045
60,500 61,000 61,500 62,000 62,500 63,000 63,500 64,000 64,500 65,000 65,500 66,000 66,500 67,000 67,500 68,000 68,500
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
27
25.01685000
Longitude
W
116
32
28.11631000
Altitude
909.8750
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.704 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_14
Station Fullname
NEZ_PERCE_14


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
25
50.13266000
Longitude
W
116
33
21.92184000
Altitude
884.9580
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.757 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
R10 Internal
Offset from Measured Point to APC
0.149 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_16
Station Fullname
NEZ_PERCE_16


Coordinate Manager
Station Information
Station ID
NEZ_PERCE
Coordinates
Latitude
N
46
23
11.85547000
Longitude
W
116
58
32.13354000
Altitude
409.3190
m
Decimal Degrees
Ground Reference Point (GRP) coordinates
Antenna
Frame
Height
1.800 m
Method
Bottom of antenna mount
Manufacturer
Trimble
Type
Zephyr Geodetic 2
Offset from Measured Point to APC
0.085 m
Apply Changes
Station Database
Station ID
NEZ_PERCE_18
Station Fullname
NEZ_PERCE_18

Flight Log

Julian Day 318	Flight A

LIDAR Flight Log

Date Nov 13 2016	Aircraft N-44RL
Project 3119_NezPerce	Pilot R Adams
Location Lewiston, Idaho	Operator A. Fox
Mission Objective Block 08 QL Lines 151-158	

System	Riegl Q1560
Unit	2226~~4~~64
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	2
Scanner 2 Drive	3

Additional Notes 1600Z @ KLWS
Wind: 120° (ESE) @ 3knts
Temp: 7°C 81%
Pressure: 1023 kPa
Clouds: clear
Visibility: 16.1 km.

Aircraft Block Time		
Engine On 1637	Ramp Out	Takeoff 1646
Engine Off 1912	Ramp In	Landing 1903
Total 2.6 hrs	Total hrs	Total 2.3 hrs

Mission Plan			
AGL Height	1900 m	Laser Pulse Rate	800 Hz
Target Speed	160 kts	Scan Rate	195 Hz
Laser Current	50 %	FOV	60 Deg's

Static Alignment	GPS Time Start	GPS Time End
Pre Mission	1639	1643
Post Mission	19:04	19.08

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time Start	GPS Time End	Line Aborted Time	Line Aborted nmi to End	Comments Time Stamp: 161112 –
XTIE		90	7300'	165645	165920			
158		360		170626	171614			
157		180		171916	172936			
156		360		173219	174217			
155		180		174515	175511			
154		360		175805	180744			
153		180		181054	182052			
152		360		182335	183313			Clouds low (below) near S end.
151		180		183616	184611			
152		360		184944	185148			Reflly S end for clouds/heights.
				DONE !!				

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Appendix B

Survey Report

July 25, 2017

Survey Report of LiDAR Calibration & Quality Control Points

ID_Nez Perce LiDAR_2016_B16
USGS Contract: G16PC00016
USGS Task Order: G16PD01221

Presented to:

Presented By:

Control Survey Report

ID_Nez Perce LiDAR_2016_B16
USGS Contract: G16PC00016
USGS Task Order: G16PD01221

USGS/NGTOC
1400 Independence Road
Rolla, Missouri 65401
For
LiDAR Calibration & Quality Control Points

I. Survey Report Summary

II. Final Coordinate Listing

III. Data Log Sheets

I. Survey Report Summary

USGS Nez Perce Survey Report 3DEP Collection

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 269 Non-Vegetated Vertical Assessment (NVA) and 188 Vegetated Vertical Assessment (VVA) points are required for this project area.

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 VVA Class # of Points:
Bare Earth: 54
Urban Area: 30
Tall Weeds/Crops: 25
Forested: 28

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 aforementioned 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.

Field Survey Methodology:

Date Range: October 27, 2016 – November 23, 2016

Field crews used Trimble R7, R8 and R10 dual frequency GNSS receivers as base stations and rovers.

GNSS Methodology:

Survey control established by QSI is observed for a minimum of one two-hour session and one four-hour session. At the beginning of every session the tripod and antenna are reset, resulting in two different antenna heights. Our Trimble GNSS base stations are dual frequency running at 1Hz. All control has been run through NGS OPUS projects.

A combination of Fast Static, PPK and RTK surveying methods were used during this project. The fast static GPS method consisted of collecting a minimum 15 minutes of static data. The data was downloaded and baselines processed and analyzed using Trimble Business Center processing software.

Overall Project Accuracy Statement:

All point coordinates have been reported in the North American Datum of 1983 (NAD83 2011). Universal Transverse Mercator Zone 11 (UTM11) coordinates in meters for all points. All elevations are relative to the North American Vertical Datum of 1988 (NAVD 88) which were derived using the Geoid 12B model and are reported in meters.

<u>Calibration QC Points</u>
Average Horizontal RMSE is 0.019 meter.
Average Elevation RMSE is 0.023 meter.
Average 3 dimensional RMSE is 0.021 meter.

<u>NVA Points</u>
Average Horizontal RMSE is 0.007 meter.
Average Elevation RMSE is 0.011 meter.
Average 3 dimensional RMSE is 0.009 meter.

<u>VVA Points</u>
Average Horizontal RMSE is 0.011 meter.
Average Elevation RMSE is 0.014 meter.
Average 3 dimensional RMSE is 0.012 meter.

II. Final Coordinate Listing

28324 Idaho Nez Perce
NAD83 (2011) UTM Zone 11 NAVD88 Meters

UTM Coordinates
NVA

Point	Easting	Northing	Elevation	Type
BE01	498325.313	5174929.142	793.326	BARE_EARTH
BE02	496524.857	5175402.168	771.805	BARE_EARTH
BE03	508105.761	5195960.22	769.904	BARE_EARTH
BE04	485611.798	5175605.976	712.266	BARE_EARTH
BE05	516099.217	5111796.926	1478.688	BARE_EARTH
BE06	527277.421	5162348.97	372.458	BARE_EARTH
BE07	530718.127	5174374.091	831.893	BARE_EARTH
BE08	541489.174	5175366.402	883.817	BARE_EARTH
BE09	543298.814	5157009.212	913.084	BARE_EARTH
BE10	535834.109	5190205.07	910.819	BARE_EARTH
BE11	527113.154	5186538.16	841.902	BARE_EARTH
BE12	541440.206	5180027.017	803.025	BARE_EARTH
BE13	546025.244	5189419.189	870.981	BARE_EARTH
BE14	542372.197	5187046.926	872.753	BARE_EARTH
BE15	545769.51	5190842.184	873.995	BARE_EARTH
BE16	555460.927	5157846.766	497.835	BARE_EARTH
BE17	531808.224	5182430.323	836.378	BARE_EARTH
BE18	538342.606	5169515.884	848.021	BARE_EARTH
BE19	524187.608	5178847.543	833.126	BARE_EARTH
BE20	528693.777	5178294.154	853.103	BARE_EARTH
BE21	551024.889	5019108.254	687.035	BARE_EARTH
BE22	550817.234	5021026.058	671.485	BARE_EARTH
BE23	550159.913	5023541.869	620.551	BARE_EARTH
BE24	555034.182	5056966.38	477.948	BARE_EARTH
BE25	567478.399	5085284.25	1074.819	BARE_EARTH
BE26	569509.384	5086702.903	1029.912	BARE_EARTH
BE27	572277.239	5084292.877	1055.319	BARE_EARTH
BE28	573517.786	5084593.539	1041.098	BARE_EARTH
BE29	574674.293	5085351.997	1015.598	BARE_EARTH
BE30	621045.31	5075985.576	1206.536	BARE_EARTH
BE31	604651.627	5074033.197	1072	BARE_EARTH
BE31	604651.627	5074033.197	1072	BARE_EARTH
BE32	591672.577	5074402.166	822.062	BARE_EARTH
BE33	578129.003	5076641.071	677.816	BARE_EARTH
BE34	606607.145	5082126.507	1198.914	BARE_EARTH
BE35	578980.461	5103479.519	407.604	BARE_EARTH
BE36	580282.898	5093092.338	478.76	BARE_EARTH
BE37	575582.238	5120019.762	361.935	BARE_EARTH
BE38	589115.983	5120956.078	960.126	BARE_EARTH
BE039	581811.69	5137178.536	928.492	BARE_EARTH

BE40	522282.693	5157013.226	319.572	BARE_EARTH
BE41	512026.818	5104729.513	1617.565	BARE_EARTH
BE042	534679.059	5140020.354	966.098	BARE_EARTH
BE042	554915.122	5145922.14	923.033	BARE_EARTH
BE043	577218.565	5133077.764	945.84	BARE_EARTH
BE44	588954.223	5145970.068	1036.182	BARE_EARTH
BE45	573771.736	5152198.347	977.153	BARE_EARTH
BE046	586013.759	5133313.761	942.747	BARE_EARTH
BE047	556340.207	5138566.998	919.797	BARE_EARTH
BE48	563427.261	5153082.359	639.413	BARE_EARTH
BE49	525233.743	5135704.474	503.698	BARE_EARTH
BE050	535790.594	5143308.473	928.688	BARE_EARTH
BE51	520837.634	5149351.764	257.765	BARE_EARTH
BE053	535232.878	5144916.004	926.661	BARE_EARTH
UA01	498427.39	5174894.862	794.35	URBAN
UA02	496197.286	5175671.715	770.528	URBAN
UA03	507788.546	5196211.482	792.279	URBAN
UA04	485573.849	5175855.967	710.373	URBAN
UA005	496900.949	5146735.147	809.328	URBAN
UA06	527269.239	5162360.195	372.407	URBAN
UA07	533643.646	5182660.109	880.926	URBAN
UA08	541498.358	5180142.667	805.817	URBAN
UA09	543078.601	5188115.531	897.097	URBAN
UA10	550828.837	5021008.2	672.235	URBAN
UA11	551060.215	5019139.039	691.707	URBAN
UA12	554323.715	5035405.013	519.258	URBAN
UA13	555225.83	5056531.999	478.48	URBAN
UA14	567505.996	5085311.854	1073.652	URBAN
UA15	621035.436	5075970.031	1206.556	URBAN
UA16	580283.821	5093113.101	477.857	URBAN
UA17	575568.108	5120061.691	363.405	URBAN
UA018	581635.491	5136317.741	916.358	URBAN
UA19	522217.958	5157061.552	320.795	URBAN
UA019	514968.658	5138741.572	296.107	URBAN
UA021	534084.392	5144912.186	881.372	URBAN
UA022	533732.846	5150913.701	281.385	URBAN
UA23	556469.826	5149061.063	348.176	URBAN
UA24	505490.218	5134807.824	477.834	URBAN
UA025	556527.456	5139804.228	927.111	URBAN
UA26	525260.992	5135706.29	504.2	URBAN
UA27	540787.941	5120887.827	1136.004	URBAN
UA28	520943.507	5149353.587	259.461	URBAN
UA029	534561.601	5143301.829	902.601	URBAN
UA30	535119.188	5130206.889	1076.501	URBAN

VVA

FO01	498246.243	5174819.342	795.479	FOREST
FO03	508093.538	5196004.555	767.794	FOREST
FO05	533530.141	5183068.608	865.805	FOREST
FO06	541445.884	5180163.276	806.406	FOREST
FO07	547354.514	5184486.901	849.321	FOREST
FO08	545765.909	5190867.046	873.793	FOREST
FO09	531478.929	5181685.87	819.164	FOREST
FO10	553716.126	5030268.396	544.437	FOREST
FO11	555191.046	5056614.087	470.154	FOREST
FO12	572317.524	5084659.207	1022.547	FOREST
FO13	553533.722	5042631.64	509.58	FOREST
FO14	606635.06	5082069.142	1198.861	FOREST
FO15	580111.081	5093619.232	472.536	FOREST
FO16	535317.761	5130161.952	1075.217	FOREST
FO17	589138.79	5120942.125	962.167	FOREST
FO18	516128.45	5111763.562	1477.517	FOREST
FO018	515014.06	5138708.96	295.821	FOREST
FO20	512045.569	5104773.639	1616.831	EVER_FOR
FO20	522278.127	5157066.175	319.297	FOREST
FO021	533731.479	5150897.27	281.231	FOREST
FO22	588961.792	5145988.48	1036.191	FOREST
FO23	582540.213	5154546.428	1010.576	FOREST
FO25	525294.536	5135701.861	504.262	FOREST
FO26	540785.309	5120863.363	1137.723	FOREST
FO27	520921.569	5149342.962	258.873	FOREST
FR003	496920.952	5146715.935	808.593	URBAN
FR004	555729.514	5138610.9	912.395	FOREST
FR024	578189.176	5133074.397	958.773	FOREST
SH01	496339.713	5175467.276	772.386	SHRUB
SH02	483789.489	5178014.235	726.925	SHRUB
SH03	516089.947	5111760.548	1479.877	SHRUB
SH04	527123.484	5186567.238	841.987	SHRUB
SH05	577231.241	5133333.271	956.741	SHRUB
SH06	546012.466	5189411.543	870.011	SHRUB
SH07	545582.962	5191694.019	875.612	SHRUB
SH08	524207.33	5178849.006	835.172	SHRUB
SH09	551127.401	5020093.056	672.296	SHRUB
SH10	550059.304	5023141.852	626.185	SHRUB
SH11	554296.065	5035554.881	509.797	SHRUB
SH12	555144.984	5056695.995	465.189	SHRUB
SH13	591624.857	5074468.334	820.519	SHRUB
TG01	531485.05	5182100.085	827.917	TALL_GRASS
TG02	508836.801	5196305.392	790.211	TALL_GRASS
TG03	483402.099	5178183.56	729.404	TALL_GRASS
TG04	516398.09	5111795.002	1464.325	GRASS

TG06	530733.634	5174381.672	830.916	TALL_GRASS
TG07	541521.757	5175379.531	883.541	TALL_GRASS
TG08	535837.203	5190192.07	910.029	TALL_GRASS
TG09	541517.087	5179782.125	809.358	TALL_GRASS
TG10	541784.449	5185814.904	865.547	TALL_GRASS
TG011	534692.356	5144894.96	918.05	TALL_GRASS
TG011	554849.189	5145816.444	921	TALL_GRASS
TG12	538347.797	5169591.347	844.885	TALL_GRASS
TG13	528545.217	5178298.242	839.768	TALL_GRASS
TG14	567894.185	5087715.26	1010.046	TALL_GRASS
TG15	573511.286	5084588.448	1041.128	TALL_GRASS
TG16	604668.283	5074057.45	1072.451	TALL_GRASS
TG16	604668.283	5074057.45	1072.451	TALL_GRASS
TG17	550824.941	5021002.01	672.576	TALL_GRASS
TG18	606635.795	5082128.376	1198.603	TALL_GRASS
TG019	581798.481	5137187.738	928.2	TALL_GRASS
TG20	575549.541	5120058.232	362.752	TALL_GRASS
TG21	589047.036	5120922.956	961.904	TALL_GRASS
TG22	512012.469	5104715.319	1616.785	TALL_GRASS
TG023	556341.299	5138555.901	919.749	TALL_GRASS
TG024	577804.237	5132934.69	957.733	TALL_GRASS

III. Log Data Sheets

Point ID	BE01
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
5174929.142	498325.313	793.326

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/11/2016
RMSE Hz	0.006
RMSE Z	0.009
GPS Method	RTK

PHOTOS:

Point ID	BE02
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
496524.857	5175402.168	771.805

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	BE03
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
508105.761	5195960.22	769.904

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	BE04
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
485611.798	5175605.976	712.266

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	BE05
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
516099.217	5111796.926	1478.688

Operator	Colin Wait/Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/29/2016
RMSE Hz	0.017
RMSE Z	0.019
GPS Method	RTK

PHOTOS:

Point ID	BE06
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
527277.421	5162348.97	372.458

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/22/2016
RMSE Hz	0.003
RMSE Z	0.004
GPS Method	FS

PHOTOS:

Point ID	BE07
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
530718.127	5174374.091	831.893

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	BE08
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
541489.174	5175366.402	883.817

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	BE09
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
543298.814	5157009.212	913.084

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/22/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE10
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
535834.109	5190205.07	910.819

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	BE11
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
527113.154	5186538.16	841.902

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.006
RMSE Z	0.010
GPS Method	RTK

PHOTOS:

Point ID	BE12
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
541440.206	5180027.017	803.025

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE13
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
546025.244	5189419.189	870.981

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/08/2016
RMSE Hz	0.010
RMSE Z	0.016
GPS Method	RTK

PHOTOS:

Point ID	BE14
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
542372.197	5187046.926	872.753

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/08/2016
RMSE Hz	0.005
RMSE Z	0.009
GPS Method	RTK

PHOTOS:

Point ID	BE15
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
545769.51	5190842.184	873.995

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	BE16
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
555460.927	5157846.766	497.835

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/15/2016
RMSE Hz	0.004
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	BE17
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
531808.224	5182430.323	836.378

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.007
RMSE Z	0.010
GPS Method	RTK

PHOTOS:

Point ID	BE18
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
538342.606	5169515.884	848.021

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.007
RMSE Z	0.012
GPS Method	RTK

PHOTOS:

Point ID	BE19
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
524187.608	5178847.543	833.126

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE20
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
528693.777	5178294.154	853.103

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.005
RMSE Z	0.009
GPS Method	RTK

PHOTOS:

Point ID	BE21
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
551024.889	5019108.254	687.035

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.016
RMSE Z	0.024
GPS Method	RTK

PHOTOS:

Point ID	BE22
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
550817.234	5021026.058	671.485

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.013
RMSE Z	0.016
GPS Method	RTK

PHOTOS:

Point ID	BE23
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
550159.913	5023541.869	620.551

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.016
RMSE Z	0.021
GPS Method	RTK

PHOTOS:

Point ID	BE24
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
555034.182	5056966.38	477.948

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE25
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
567478.399	5085284.25	1074.819

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.003
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	BE26
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
569509.384	5086702.903	1029.912

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE27
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
572277.239	5084292.877	1055.319

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/31/2016
RMSE Hz	0.015
RMSE Z	0.019
GPS Method	RTK

PHOTOS:

Point ID	BE28
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
573517.786	5084593.539	1041.098

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/31/2016
RMSE Hz	0.014
RMSE Z	0.015
GPS Method	RTK

PHOTOS:

Point ID	BE29
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
574674.293	5085351.997	1015.598

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/31/2016
RMSE Hz	0.014
RMSE Z	0.014
GPS Method	RTK

PHOTOS:

Point ID	BE30
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
621045.31	5075985.576	1206.536

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE31
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
604651.627	5074033.197	1072

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/05/2016
RMSE Hz	0.021
RMSE Z	0.032
GPS Method	RTK

PHOTOS:

Point ID	BE32
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
591672.577	5074402.166	822.062

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/05/2016
RMSE Hz	0.013
RMSE Z	0.014
GPS Method	FS

PHOTOS:

Point ID	BE33
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
578129.003	5076641.071	677.816

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.010
GPS Method	FS

PHOTOS:

Point ID	BE34
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
606607.145	5082126.507	1198.914

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.010
GPS Method	FS

PHOTOS:

Point ID	BE35
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
578980.461	5103479.519	407.604

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE36
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
580282.898	5093092.338	478.76

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	BE37
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
575582.238	5120019.762	361.935

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE38
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
589115.983	5120956.078	960.126

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE39
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
581811.69	5137178.536	928.492

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/07/2016
RMSE Hz	0.019
RMSE Z	0.021
GPS Method	RTK

PHOTOS:

Point ID	BE40
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
522282.693	5157013.226	319.572

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	BE41
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
512026.818	5104729.513	1617.565

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/27/2016
RMSE Hz	0.017
RMSE Z	0.020
GPS Method	RTK

PHOTOS:

Point ID	BE42
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/10/2016
RMSE Hz	
RMSE Z	
GPS Method	RTK

PHOTOS:

Point ID	BE43
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
577218.565	5133077.764	945.84

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/06/2016
RMSE Hz	0.016
RMSE Z	0.019
GPS Method	RTK

PHOTOS:

Point ID	BE44
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
588954.223	5145970.068	1036.182

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.004
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	BE45
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
573771.736	5152198.347	977.153

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.003
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	BE46
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
586013.759	5133313.761	942.747

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/07/2016
RMSE Hz	0.014
RMSE Z	0.017
GPS Method	RTK

PHOTOS:

Point ID	BE47
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
556340.207	5138566.998	919.797

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/09/2016
RMSE Hz	0.006
RMSE Z	0.009
GPS Method	RTK

PHOTOS:

Point ID	BE48
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
563427.261	5153082.359	639.413

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.005
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	BE49
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
525233.743	5135704.474	503.698

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	BE50
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
535790.594	5143308.473	928.688

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/12/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	BE51
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
520837.634	5149351.764	257.765

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	BE53
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
535232.878	5144916.004	926.661

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/12/2016
RMSE Hz	0.006
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	UA01
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
498427.39	5174894.862	794.35

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/11/2016
RMSE Hz	0.003
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	UA02
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
496197.286	5175671.715	770.528

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	UA03
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
507788.546	5196211.482	792.279

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.003
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	UA04
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
485573.849	5175855.967	710.373

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.003
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	UA005
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
496900.949	5146735.147	809.328

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/13/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	UA06
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
527269.239	5162360.195	372.407

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/22/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	UA07
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
533643.646	5182660.109	880.926

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.007
RMSE Z	0.010
GPS Method	RTK

PHOTOS:

Point ID	UA08
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
541498.358	5180142.667	805.817

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.005
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	UA09
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
543078.601	5188115.531	897.097

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/08/2016
RMSE Hz	0.006
RMSE Z	0.009
GPS Method	RTK

PHOTOS:

Point ID	UA10
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
550828.837	5021008.2	672.235

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.013
RMSE Z	0.016
GPS Method	RTK

PHOTOS:

Point ID	UA11
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
551060.215	5019139.039	691.707

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.016
RMSE Z	0.025
GPS Method	RTK

PHOTOS:

Point ID	UA12
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
554323.715	5035405.013	519.258

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.004
RMSE Z	0.010
GPS Method	FS

PHOTOS:

Point ID	UA13
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
555225.83	5056531.999	478.48

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	UA14
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
567505.996	5085311.854	1073.652

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.003
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	UA15
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
621035.436	5075970.031	1206.556

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	UA16
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
580283.821	5093113.101	477.857

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	UA17
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
575568.108	5120061.691	363.405

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	UA018
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
581635.491	5136317.741	916.358

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/07/2016
RMSE Hz	0.016
RMSE Z	0.020
GPS Method	RTK

PHOTOS:

Point ID	UA019
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
514968.658	5138741.572	296.107

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/13/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	UA20
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
522217.958	5157061.552	320.795

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	UA021
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
534084.392	5144912.186	881.372

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/12/2016
RMSE Hz	0.007
RMSE Z	0.012
GPS Method	RTK

PHOTOS:

Point ID	UA022
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
534084.392	5144912.186	881.372

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/13/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	UA23
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
556469.826	5149061.063	348.176

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/15/2016
RMSE Hz	0.004
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	UA24
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
505490.218	5134807.824	477.834

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.006
RMSE Z	0.009
GPS Method	FS

PHOTOS:

Point ID	UA025
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
556527.456	5139804.228	927.111

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/09/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	UA26
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
525260.992	5135706.29	504.2

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	UA27
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
540787.941	5120887.827	1136.004

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.003
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	UA28
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
520943.507	5149353.587	259.461

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	UA029
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
534561.601	5143301.829	902.601

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/11/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	UA30
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
535119.188	5130206.889	1076.501

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/22/2016
RMSE Hz	0.006
RMSE Z	0.009
GPS Method	FS

PHOTOS:

Point ID	TG22
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
512012.469	5104715.319	1616.785

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/27/2016
RMSE Hz	0.009
RMSE Z	0.015
GPS Method	RTK

PHOTOS:

Point ID	FO03
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
508093.5	5196004.56	767.794

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.005
RMSE Z	0.011
GPS Method	FS

PHOTOS:

Point ID	FR004
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
555729.514	5138610.9	912.395

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/09/2016
RMSE Hz	0.009
RMSE Z	0.015
GPS Method	RTK

PHOTOS:

Point ID	FO05
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
533530.141	5183068.608	865.805

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.007
RMSE Z	0.010
GPS Method	RTK

PHOTOS:

Point ID	FO06
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
541445.884	5180163.276	806.406

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	FO07
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
547354.514	5184486.901	849.321

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	FO08
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
545765.909	5190867.046	873.793

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	FO09
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
531478.929	5181685.87	819.164

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.008
RMSE Z	0.013
GPS Method	RTK

PHOTOS:

Point ID	FO10
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
553716.126	5030268.396	544.437

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.006
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	FO11
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
555191.046	5056614.087	470.154

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	FO12
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
572317.524	5084659.207	1022.547

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	FO13
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
553533.722	5042631.64	509.58

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.004
RMSE Z	0.009
GPS Method	FS

PHOTOS:

Point ID	FO14
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
606635.06	5082069.142	1198.861

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.005
RMSE Z	0.012
GPS Method	FS

PHOTOS:

Point ID	FO15
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
580111.081	5093619.232	472.536

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	FO16
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
535317.761	5130161.952	1075.217

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/22/2016
RMSE Hz	0.005
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	FO17
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
589138.79	5120942.125	962.167

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	FO018
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
516128.5	5111764	1477.517

Operator	Colin Wait/Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/29/2016
RMSE Hz	0.003
RMSE Z	0.007
GPS Method	RTK

PHOTOS:

Point ID	FO18
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
516128.45	5111763.562	1477.517

Operator	Colin Wait/Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/29/2016
RMSE Hz	0.027
RMSE Z	0.032
GPS Method	RTK

PHOTOS:

Point ID	FO20
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
512045.569	5104773.639	1616.831

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	FO20
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
522278.127	5157066.175	319.297

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/27/2016
RMSE Hz	0.022
RMSE Z	0.026
GPS Method	RTK

PHOTOS:

Point ID	FO21
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
533731.479	5150897.27	281.231

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/13/2016
RMSE Hz	0.007
RMSE Z	0.013
GPS Method	FS

PHOTOS:

Point ID	FO22
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
588961.792	5145988.48	1036.191

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	FO23
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
582540.213	5154546.428	1010.576

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	FO24
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
525294.536	5135701.861	504.262

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/06/2016
RMSE Hz	0.024
RMSE Z	0.025
GPS Method	RTK

PHOTOS:

Point ID	FO25
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
578189.176	5133074.397	958.773

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	FO26
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
540785.309	5120863.363	1137.723

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.009
RMSE Z	0.010
GPS Method	FS

PHOTOS:

Point ID	FO27
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
520921.569	5149342.962	258.873

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/14/2016
RMSE Hz	0.004
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	FR003
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
496921	5146715.94	808.593

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/13/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	SH01
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
496339.713	5175467.276	772.386

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	SH02
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
483789.489	5178014.235	726.925

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.004
RMSE Z	0.005
GPS Method	FS

PHOTOS:

Point ID	SH03
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
516089.947	5111760.548	1479.877

Operator	Colin Wait/Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/29/2016
RMSE Hz	0.018
RMSE Z	0.024
GPS Method	RTK

PHOTOS:

Point ID	SH04
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
527123.484	5186567.238	841.987

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.006
RMSE Z	0.010
GPS Method	RTK

PHOTOS:

Point ID	SH005
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
577231.241	5133333.271	956.741

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/06/2016
RMSE Hz	0.013
RMSE Z	0.019
GPS Method	RTK

PHOTOS:

Point ID	SH06
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
546012.466	5189411.543	870.011

Operator	Lucas Retimann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/08/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	SH07
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
545582.962	5191694.019	875.612

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	SH08
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
524207.33	5178849.006	835.172

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	SH09
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
551127.401	5020093.056	672.296

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.017
RMSE Z	0.022
GPS Method	RTK

PHOTOS:

Point ID	SH10
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

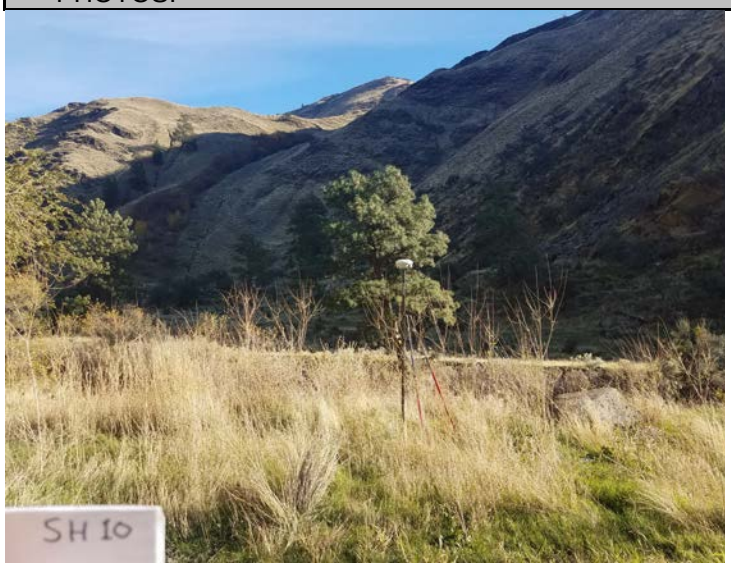
Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
550059.304	5023141.852	626.185

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.020
RMSE Z	0.022
GPS Method	RTK

PHOTOS:



Point ID	SH11
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
554296.065	5035554.881	509.797

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.005
RMSE Z	0.009
GPS Method	FS

PHOTOS:

Point ID	SH12
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
555144.984	5056695.995	465.189

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/21/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	SH13
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/07/2016
RMSE Hz	0.011
RMSE Z	0.015
GPS Method	FS

PHOTOS:

Point ID	TG01
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
531485.05	5182100.085	827.917

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/09/2016
RMSE Hz	0.006
RMSE Z	0.010
GPS Method	RTK

PHOTOS:

Point ID	TG02
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
508836.801	5196305.392	790.211

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	TG03
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
483402.099	5178183.56	729.404

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/16/2016
RMSE Hz	0.003
RMSE Z	0.006
GPS Method	FS

PHOTOS:

Point ID	TG04
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
516398.09	5111795.002	1464.325

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/30/2016
RMSE Hz	0.016
RMSE Z	0.020
GPS Method	RTK

PHOTOS:

Point ID	TG05
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/12/2016
RMSE Hz	
RMSE Z	
GPS Method	RTK

PHOTOS:

Point ID	TG06
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
530733.634	5174381.672	830.916

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	TG07
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
541521.757	5175379.531	883.541

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	TG08
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
535837.203	5190192.07	910.029

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	TG09
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
541517.087	5179782.125	809.358

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/18/2016
RMSE Hz	0.004
RMSE Z	0.008
GPS Method	FS

PHOTOS:

Point ID	TG10
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

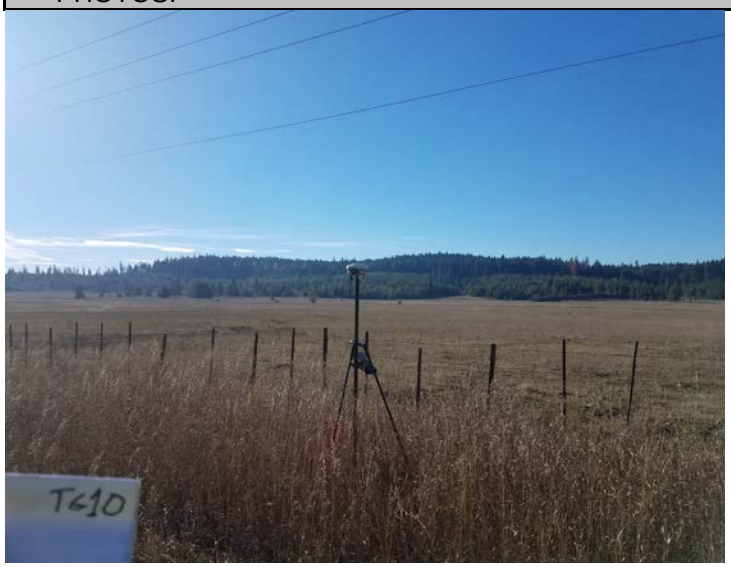
Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
531485.05	5182100.085	827.917

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/08/2016
RMSE Hz	0.006
RMSE Z	0.010
GPS Method	RTK

PHOTOS:



Point ID	TG11
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
534692.4	5144894.96	918.05

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/10/2016
RMSE Hz	0.006
RMSE Z	0.009
GPS Method	RTK

PHOTOS:

Point ID	TG11
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
554849.2	5145816.44	921.00

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/10/2016
RMSE Hz	0.006
RMSE Z	0.010
GPS Method	RTK

PHOTOS:

Point ID	TG12
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
538347.797	5169591.347	844.885

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.007
RMSE Z	0.012
GPS Method	RTK

PHOTOS:

Point ID	TG13
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
528545.217	5178298.242	839.768

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/17/2016
RMSE Hz	0.005
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	TG14
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
567894.185	5087715.26	1010.046

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/30/2016
RMSE Hz	0.013
RMSE Z	0.018
GPS Method	RTK

PHOTOS:

Point ID	TG15
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
573511.286	5084588.448	1041.128

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/31/2016
RMSE Hz	0.018
RMSE Z	0.021
GPS Method	RTK

PHOTOS:

Point ID	TG16
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
5074057.45	604668.283	1072.451

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/05/2016
RMSE Hz	0.022
RMSE Z	0.035
GPS Method	RTK

PHOTOS:

Point ID	TG17
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
550824.941	5021002.01	672.576

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/03/2016
RMSE Hz	0.013
RMSE Z	0.016
GPS Method	RTK

PHOTOS:

Point ID	TG18
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
606635.795	5082128.376	1198.603

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/20/2016
RMSE Hz	0.004
RMSE Z	0.010
GPS Method	FS

PHOTOS:

Point ID	TG019
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
581798.481	5137187.738	928.2

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/07/2016
RMSE Hz	0.018
RMSE Z	0.023
GPS Method	RTK

PHOTOS:

Point ID	TG20
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
575549.541	5120058.232	362.752

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.003
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	TG21
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
589047.036	5120922.956	961.904

Operator	Eric McPherren
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/19/2016
RMSE Hz	0.003
RMSE Z	0.007
GPS Method	FS

PHOTOS:

Point ID	TG22
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
512012.469	5104715.319	1616.785

Operator	Lucas Rietmann
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	10/27/2016
RMSE Hz	0.013
RMSE Z	0.015
GPS Method	RTK

PHOTOS:

Point ID	TG023
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
556341.299	5138555.901	919.749

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/09/2016
RMSE Hz	0.006
RMSE Z	0.008
GPS Method	RTK

PHOTOS:

Point ID	TG24
Project No.	28324
Project Name	Nez Perce USGS
State	ID

	Aerial Target
	LiDAR Ground Control
X	LiDAR QC Point
	New Control

Coordinate System
NAD83(2011)
UTM 11
NAVD88, Geoid 12B

Northing	Easting	Elevation
577804.237	5132934.69	957.733

Operator	Colin Wait
Receiver Model	Trimble R8
Receiver S/N	N/A
Antenna Height	2.0

Date (MM-DD-YYYY)	11/06/2016
RMSE Hz	0.017
RMSE Z	0.020
GPS Method	RTK

PHOTOS: