

Project Report Appendices

The following section contains the appendices as listed in the South Dakota 2017 QL2 LiDAR Project Report.

Appendix A

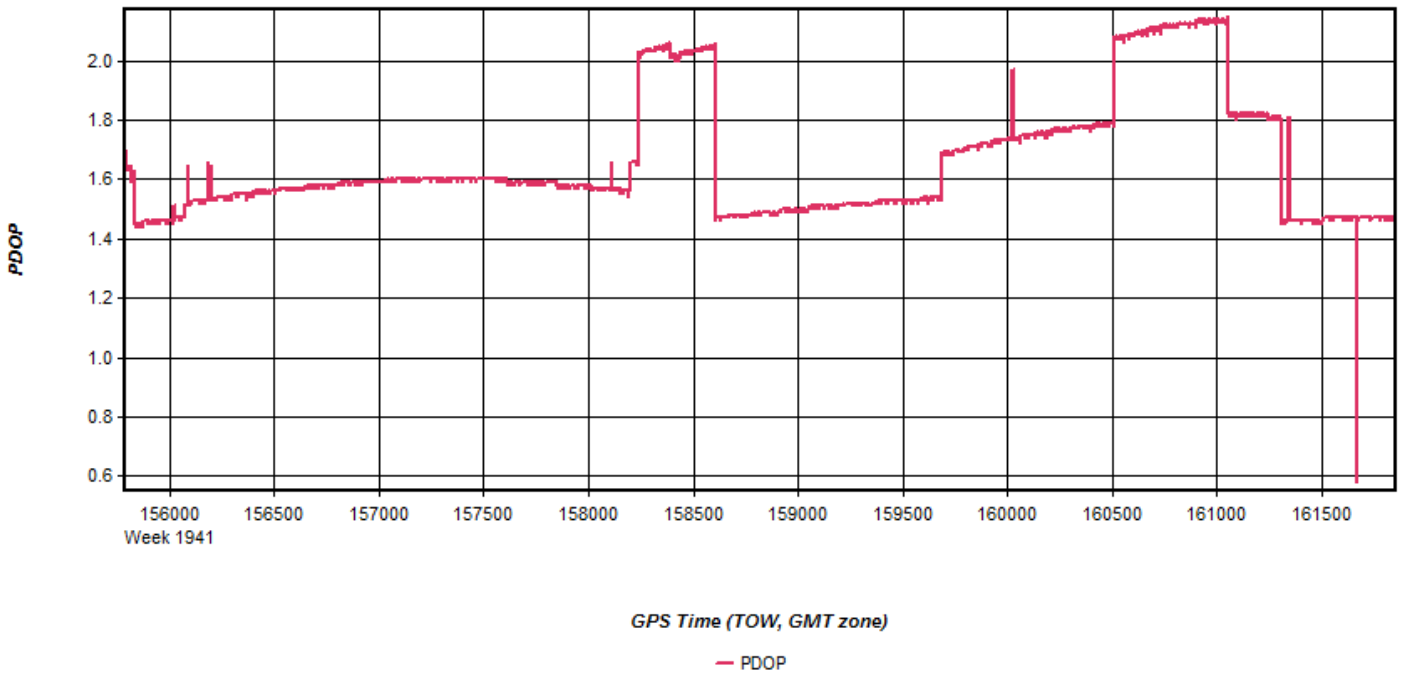
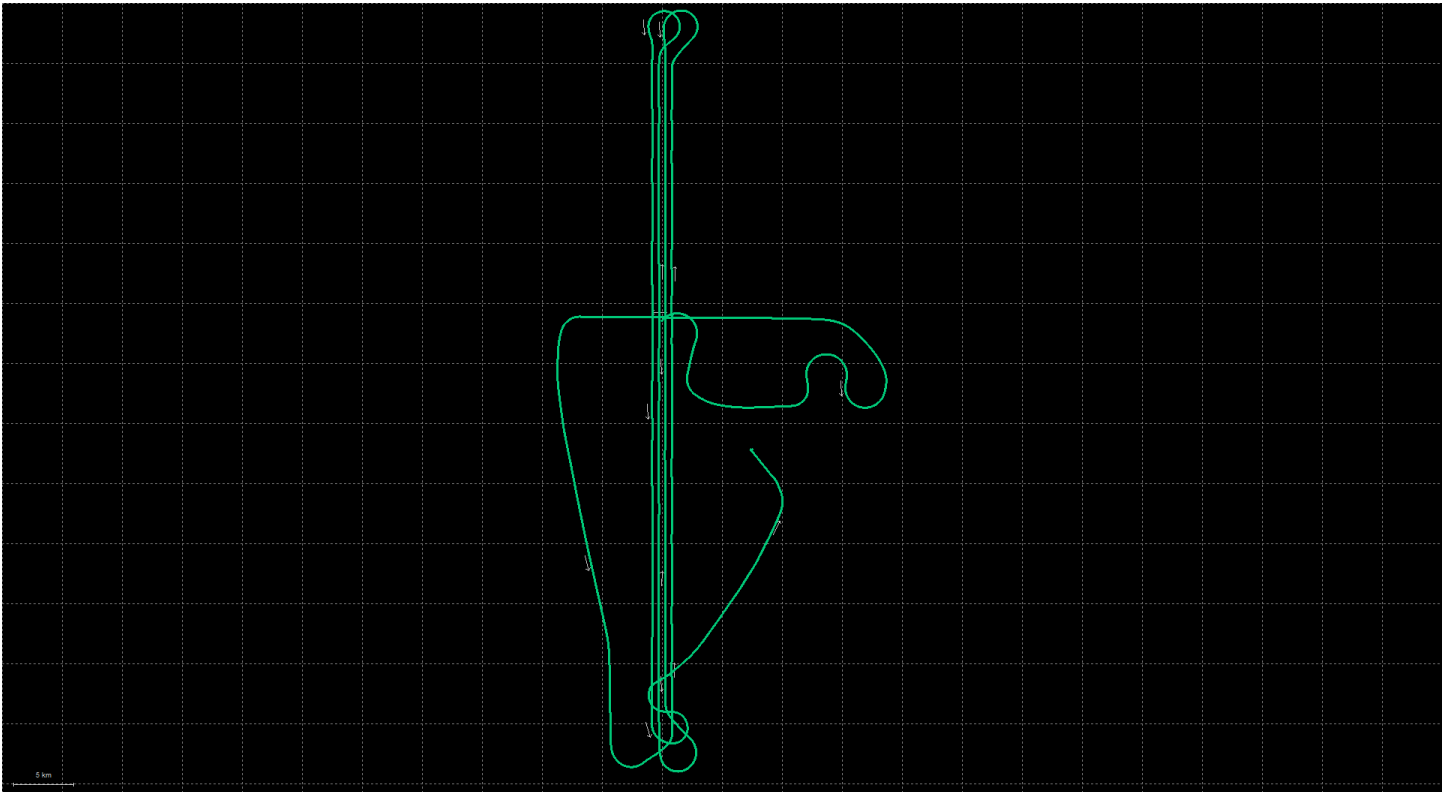
GPS/IMU Processing Statistics Flight Logs Base Station Logs

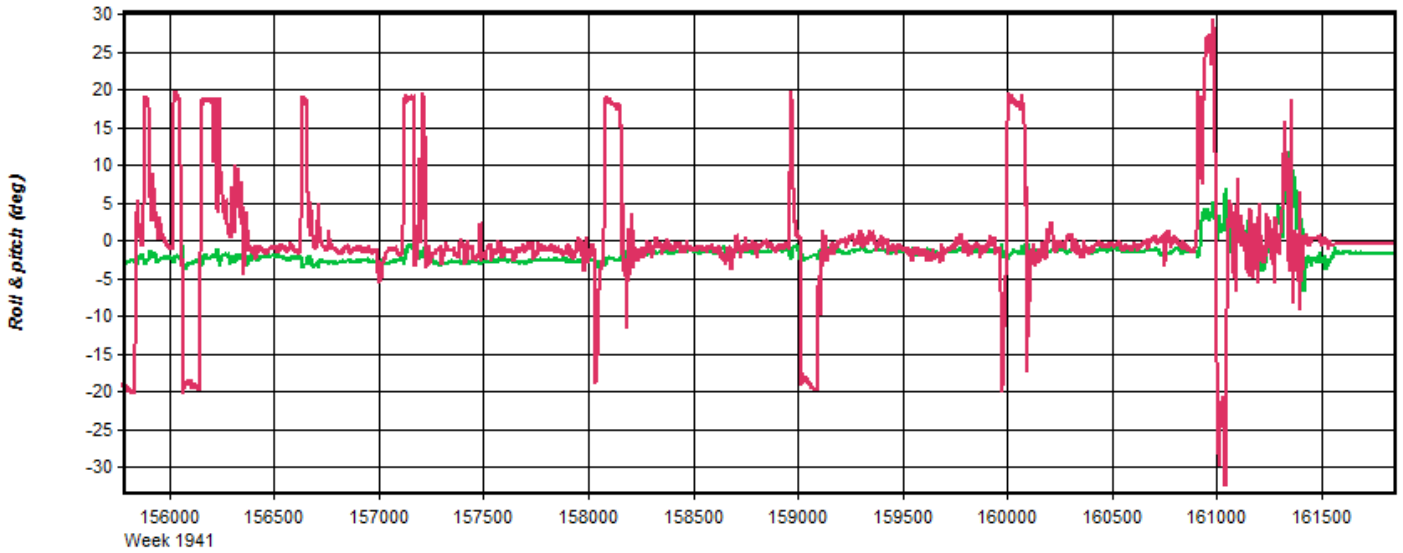
There were 80 total lifts. Flight-related data are found on the following pages.

March 20, 2017-B (604MD, SN8227).....	1
March 22, 2017-A (N915WC, SN8237).....	8
March 22, 2017-B (N915WC, SN8237).....	16
March 23, 2017-A (N915WC, SN8237).....	24
March 24, 2017-A (604MD, SN8227).....	32
March 24, 2017-A (N915WC, SN8237).....	40
March 25, 2017-A (604MD, SN8227).....	48
March 25, 2017-A (N915WC, SN8237).....	56
March 25, 2017-B (604MD, SN8227).....	64
March 26, 2017-A (N915WC, SN8237).....	72
March 31, 2017-A (604MD, SN8227).....	80
April 1, 2017-A (604MD, SN8227).....	88
April 1, 2017-A (N915WC, SN8237).....	96
April 1, 2017-B (N915WC, SN8237).....	104
April 2, 2017-A (604MD, SN8227).....	112
April 2, 2017-A (N915WC, SN8237).....	120
April 5, 2017-A (N246MP, SN8227).....	128
April 6, 2017-A (N246MP, SN8227).....	136
April 6, 2017-A (N916WC, SN8119).....	144
April 6, 2017-A (N915WC, SN8237).....	152
April 7, 2017-A (N246MP, SN8227).....	160
April 7, 2017-A (N73TM, SN7178).....	169
April 7, 2017-B (N73TM, SN7178).....	177
April 8, 2017-A (N246MP, SN8227).....	185
April 8, 2017-A (N262AS, SN7161).....	193
April 8, 2017-A (N73TM, SN7178).....	202
April 8, 2017-A (N915WC, SN8237).....	210
April 8, 2017-B (N246MP, SN8227).....	218
April 8, 2017-B (N262AS, SN7161).....	226
April 8, 2017-B (N915WC, SN8237).....	234
April 13, 2017-A (N246MP, SN8227).....	242
April 13, 2017-A (N73TM, SN7178).....	250
April 13, 2017-B (N246MP, SN8227).....	259
April 14, 2017-A (N246MP, SN8227).....	266
April 14, 2017-A (N73TM, SN7178).....	274
April 16, 2017-A (N246MP, SN8227).....	282
April 16, 2017-A (N915WC, SN8237).....	290
April 16, 2017-B (N246MP, SN8227).....	298
April 16, 2017-B (N915WC, SN8237).....	306

April 17, 2017-A (N246MP, SN8227).....314
 April 17, 2017-A (N915WC, SN8237)322
 April 18, 2017-A (N246MP, SN8227)330
 April 18, 2017-A (N915WC, SN8237).....338
 April 18, 2017-A (N916WC, SN8119)346
 April 18, 2017-B (N246MP, SN8227)354
 April 18, 2017-B (N915WC, SN8237).....362
 April 18, 2017-B (N916WC, SN8119)370
 April 22, 2017-A (N246MP, SN8227)378
 April 22, 2017-B (N246MP, SN8227)386
 April 27, 2017-A (N246MP, SN8227).....394
 April 27, 2017-A (N915WC, SN8237)402
 Nov. 5, 2017-A (CFFRY, SN1254)410
 Nov. 10, 2017-A (CFFRY, SN1254)416
 Nov. 10, 2017-A (CFKMA, SN1264).....421
 Nov. 11, 2017-A (CFFRY, SN1254).....426
 Nov. 11, 2017-A (CFKMA, SN1264).....431
 Nov. 12, 2017-A (CFFRY, SN1254).....436
 Nov. 12, 2017-A (CFKMA, SN1264).....441
 Nov. 13, 2017-A (CFFRY, SN1254).....447
 Nov. 13, 2017-A (CFKMA, SN1264).....452
 Nov. 14, 2017-A (CFFRY, SN0754).....457
 Nov. 14, 2017-B (CFKMA, SN1264).....462
 Nov. 15, 2017-A (CFKMA, SN0754)467
 Nov. 18, 2017-A (CFFRY, SN0754).....472
 Nov. 18, 2017-A (CFKMA, SN1264).....478
 Nov. 19, 2017-A (CFFRY, SN0754).....484
 Nov. 19, 2017-A (CFKMA, SN1264).....490
 Nov. 20, 2017-A (CFFRY, SN0754).....496
 Nov. 21, 2017-A (CFFRY, SN0754).....501
 Nov. 21, 2017-A (CFKMA, SN1264)506
 Nov. 22, 2017-A (CFFRY, SN0754).....512
 Nov. 23, 2017-A (CFFRY, SN0754).....517
 Nov. 23, 2017-A (CFKMA, SN1264)523
 Nov. 25, 2017-A (CFFRY, SN0754).....529
 Nov. 26, 2017-A (CFKMA, SN1264)535
 Nov. 26, 2017-A (CFFRY, SN0754).....540
 Nov. 27, 2017-A (CFFRY, SN0754)546
 Nov. 27, 2017-A (CFKMA, SN1264).....551
 Nov. 28, 2017-A (CFKMA, SN1264)557
 Dec. 15, 2017-A (CFFRY, SN0754).....563

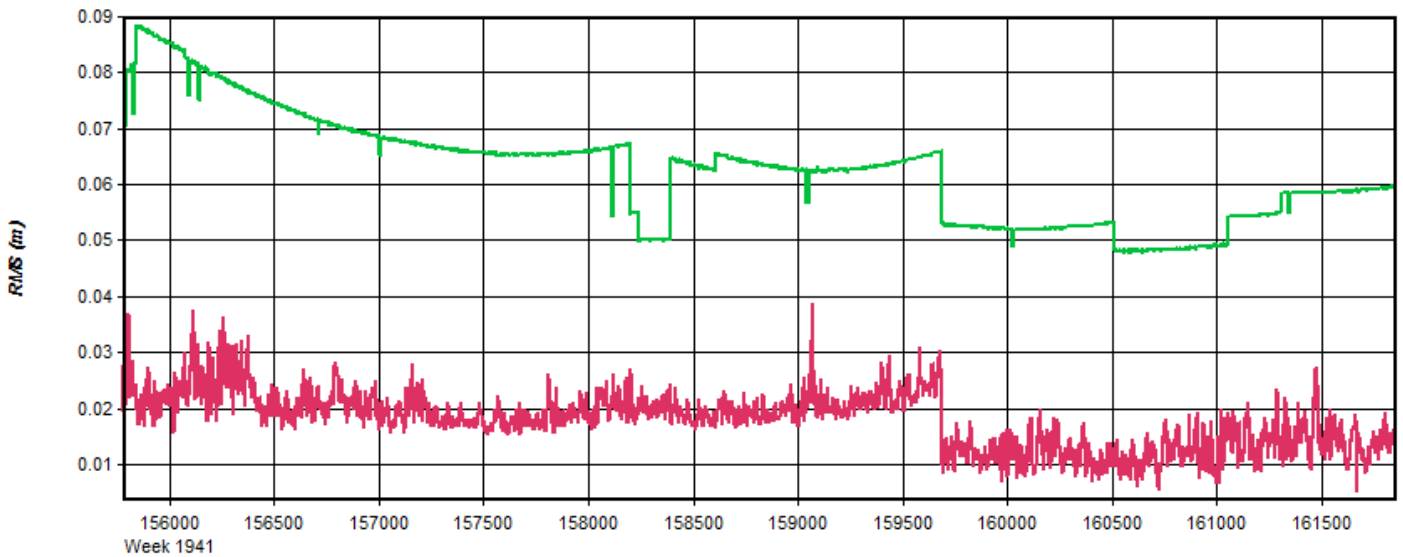
March 20, 2017-B (604MD, SN8227)





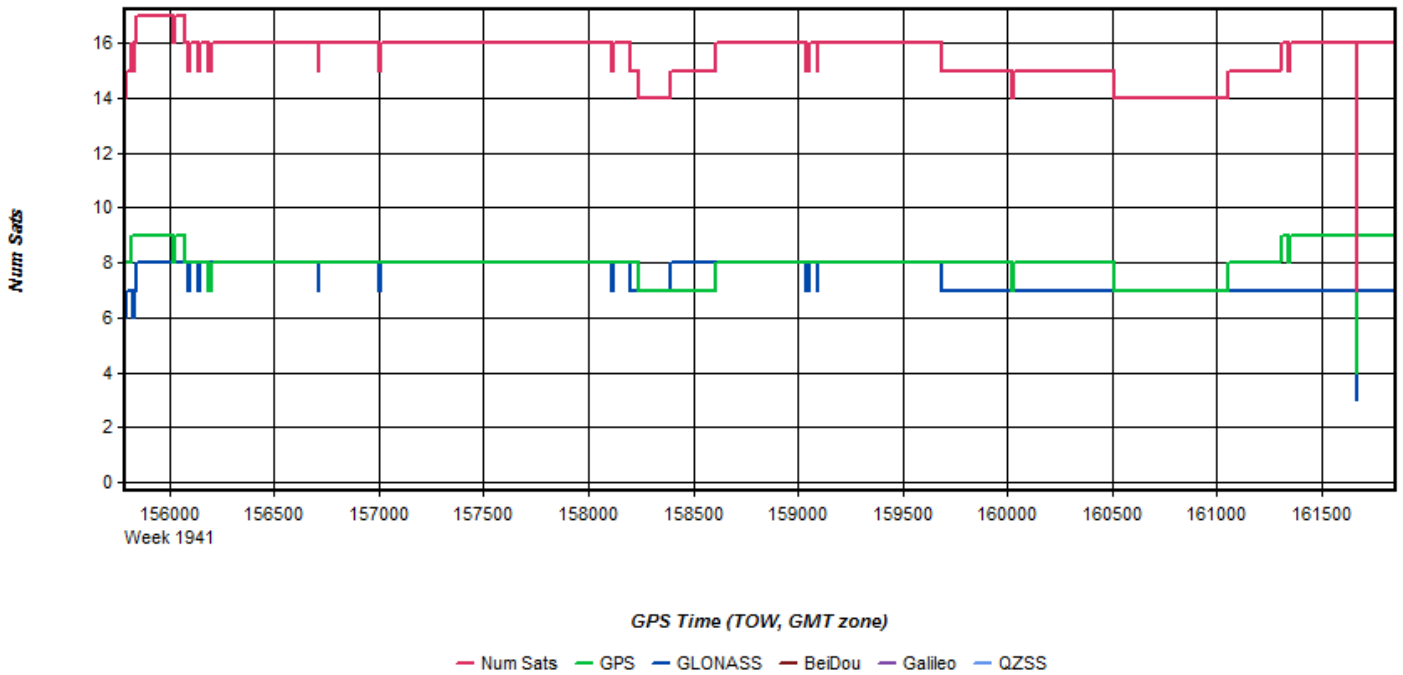
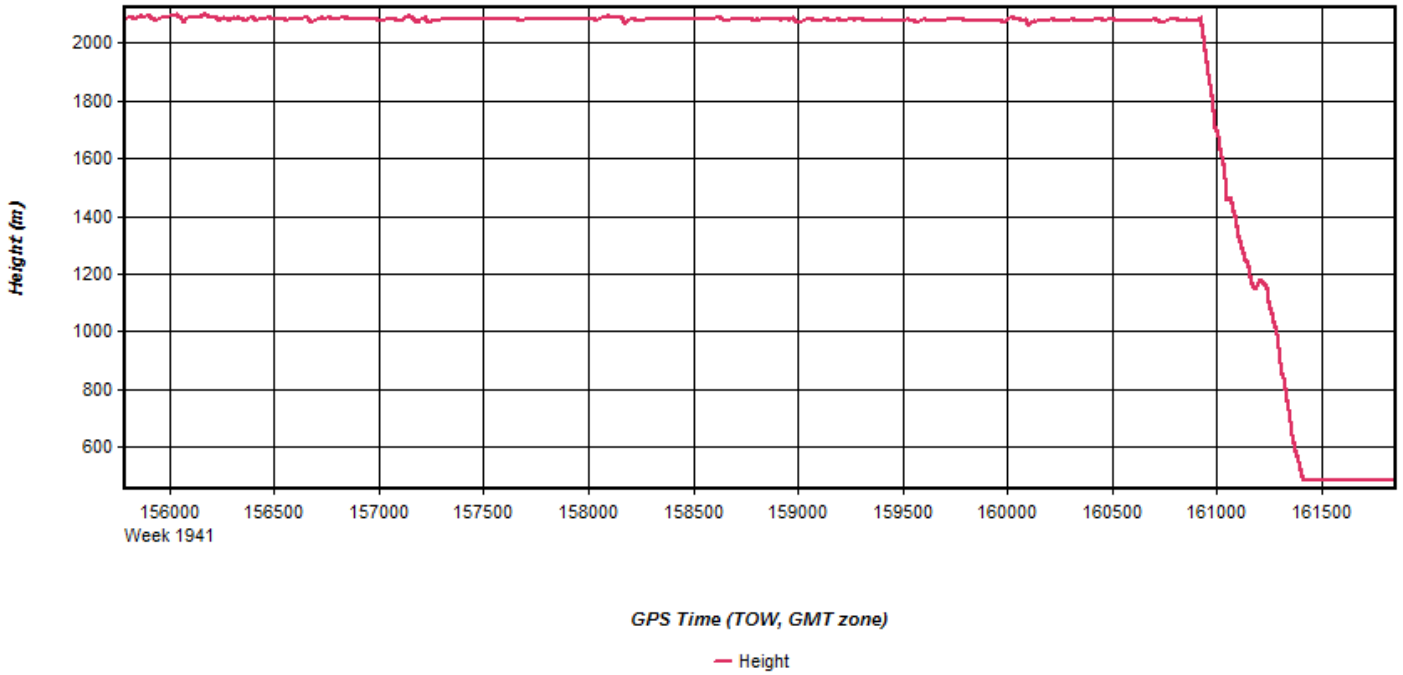
GPS Time (TOW, GMT zone)

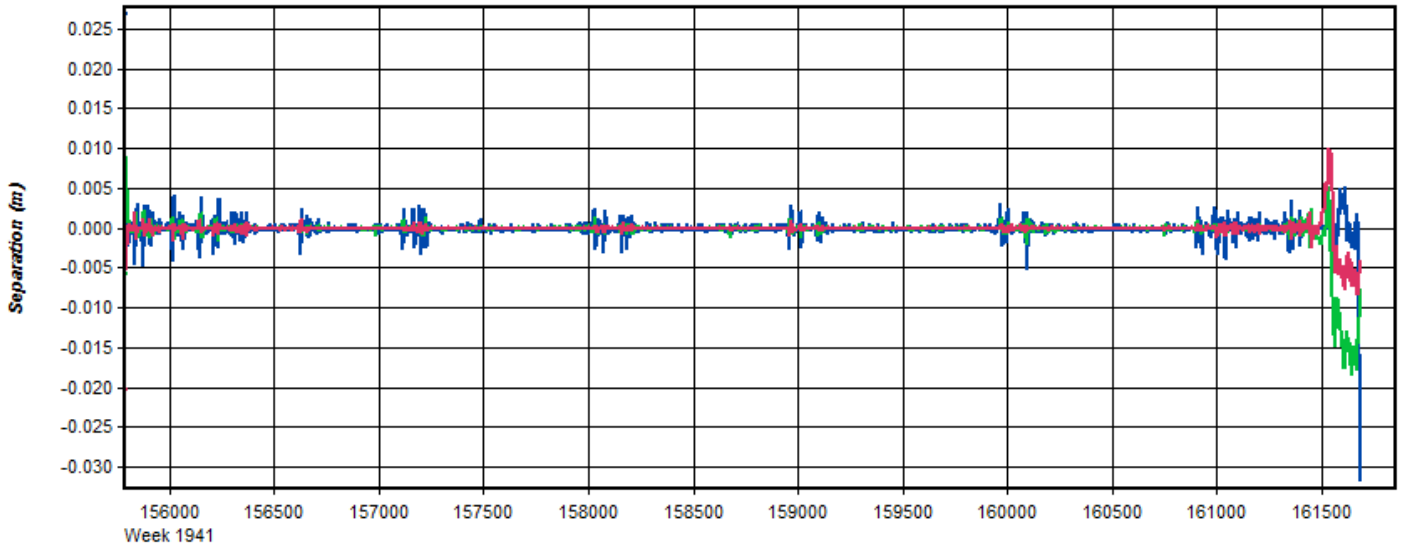
— Roll — Pitch



GPS Time (TOW, GMT zone)

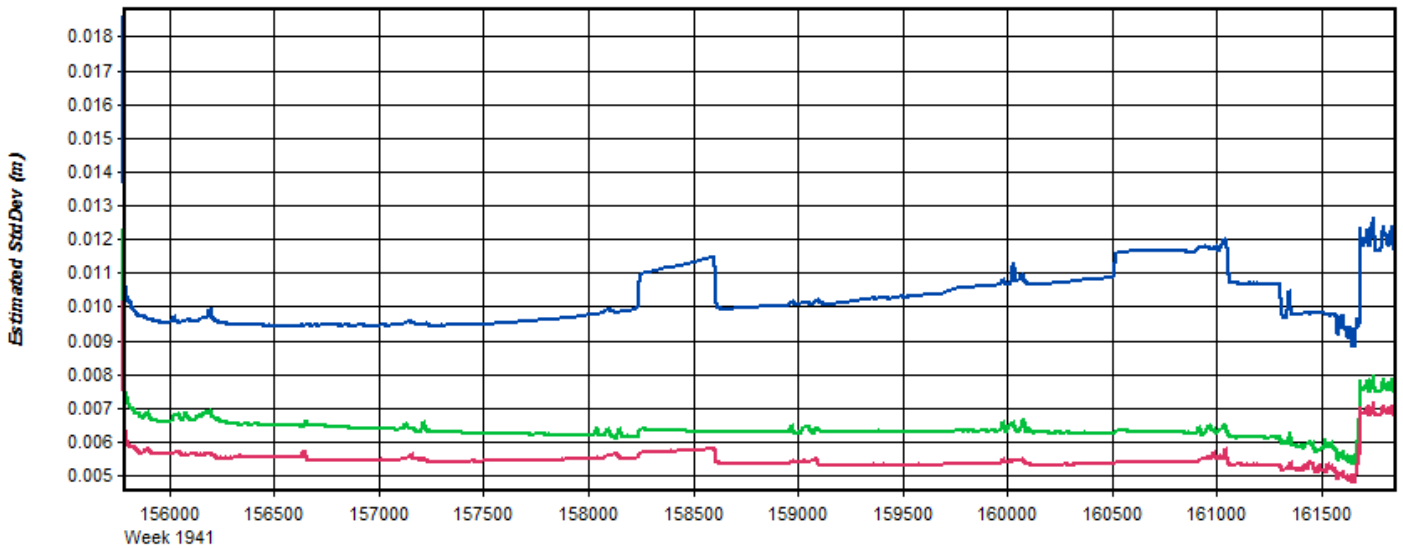
— RMS — SD





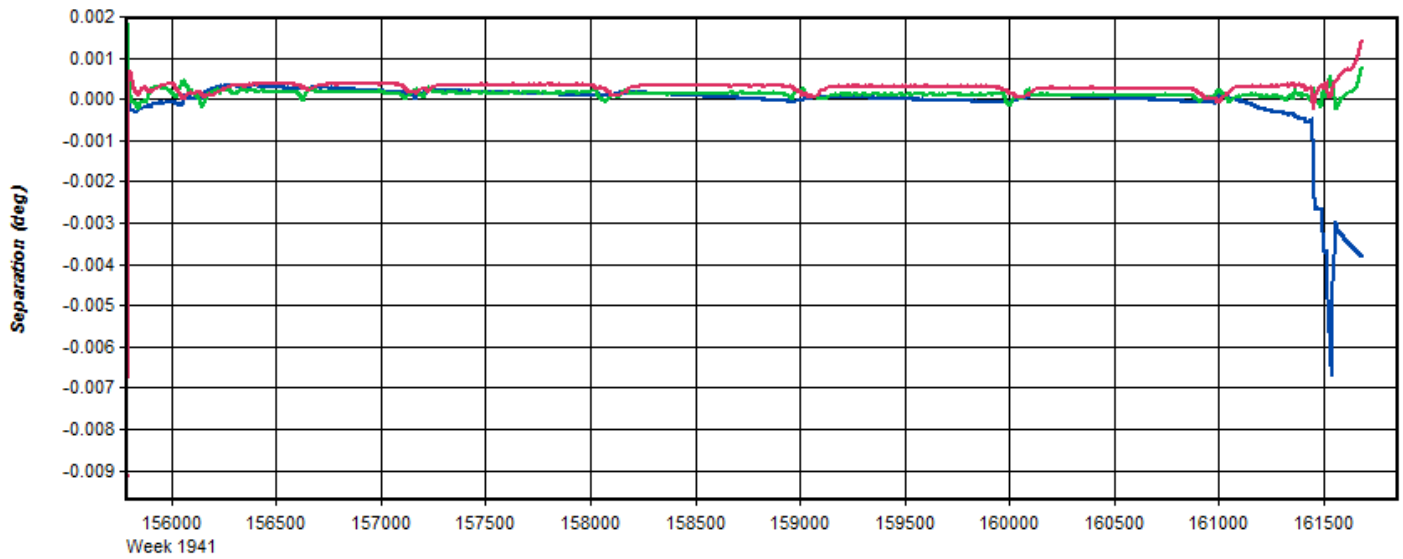
GPS Time (TOW, GMT zone)

— East — North — Up



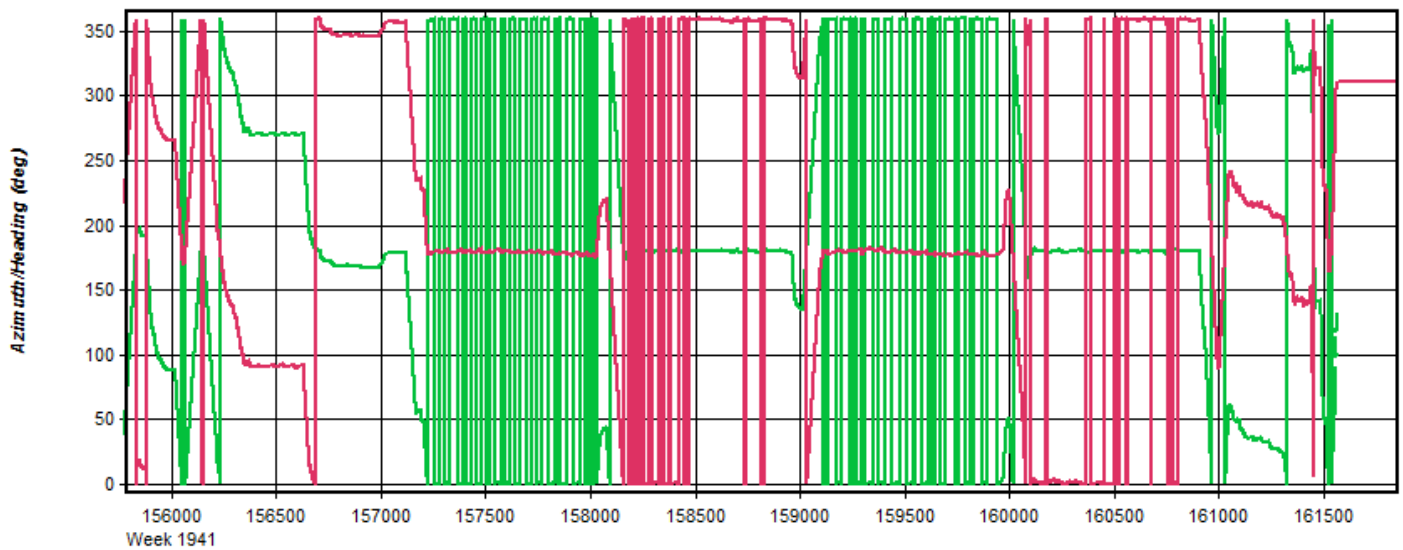
GPS Time (TOW, GMT zone)

— East — North — Height



GPS Time (TOW, GMT zone)

— Roll — Pitch — Heading/Az



GPS Time (TOW, GMT zone)

— Heading/Azimuth — GPS-COG

Flight Log

Arborea LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(Send this info to flight-log-distribution-list@quantumspatial.com)

Date: 3-20-2017
U.S. F.B.I. 19212

Project: 30420 SD
Flight Mgmt File:

Aircraft: Mavic Pro
End Hobby:
Pilot: Neilson
Co-Pilot:
Tech: Cox

Dep Apts: Dep Time (Local) (Z):
Total:
Tot Time Aloft:

COMS: Y / N Sta 1: Flyovers: Y / N If Y, times: Sta 1) Sta 2)
 Sta 2: Flyovers: Y / N If Y, times: Sta 1) Sta 2)

GPS Logs: Y / N Sta 1:
 Sta 2:

Gal Temp bag:	%	End:	%	OAT bag:	%	End:	%	Altimeter begin:	end:	Storage Number
Type	Alt AGL	Secal #	Alt APRL	Alt AGL	Alt APRL	Avg Terr Ht	Max Glided Power	Avg Pt Spacing FFSM	Log cat	End cat
FOV	Mp/A	Y / N	Pulses in Air	Pulses in Air	Pulse Rate				Log cat	End cat

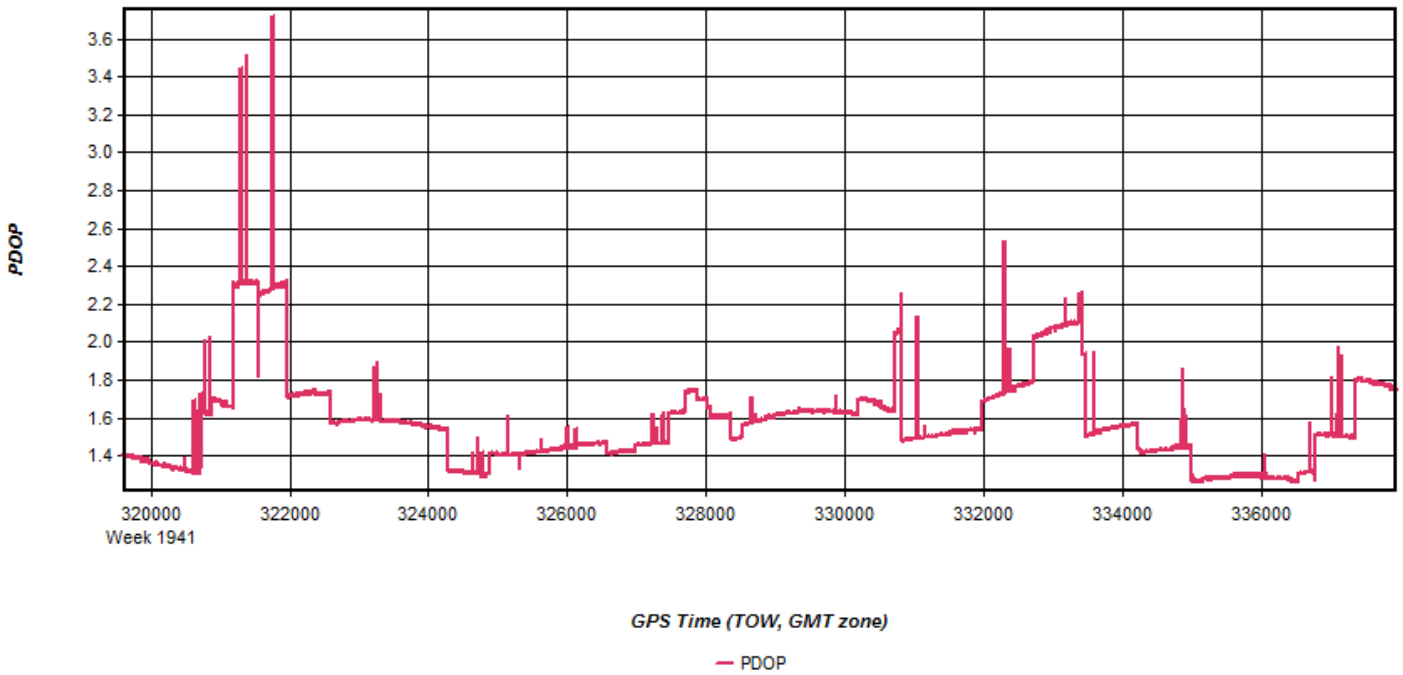
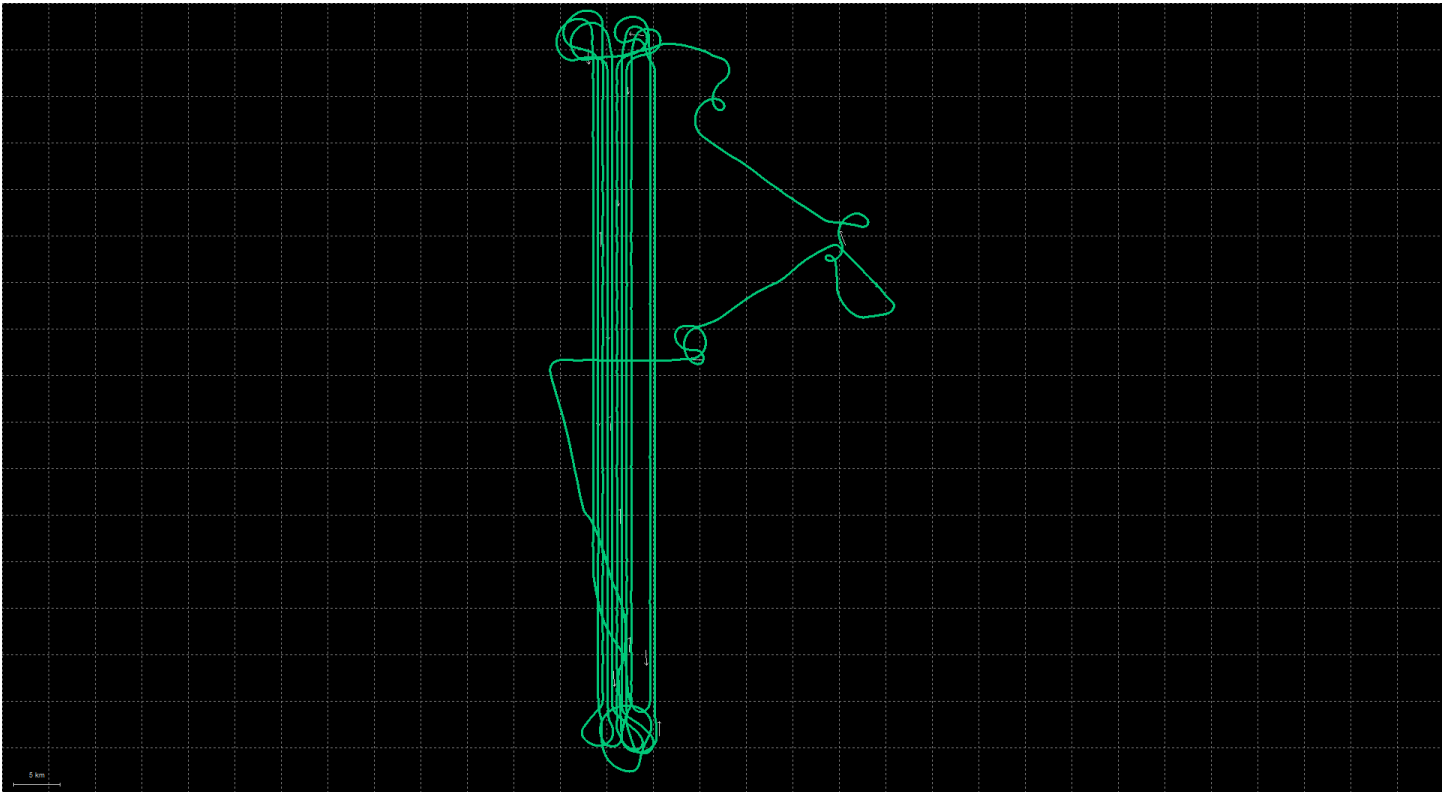
Line #	Hdg	Start (UTC)	End (UTC)	Col Spd	Roll (deg)	Pitch (deg)	Crab	Turb (ft/s)
284	354	2012	2025	128	12/18	683	0	0
283	174	2028	2040	135	12/10	689	0	0

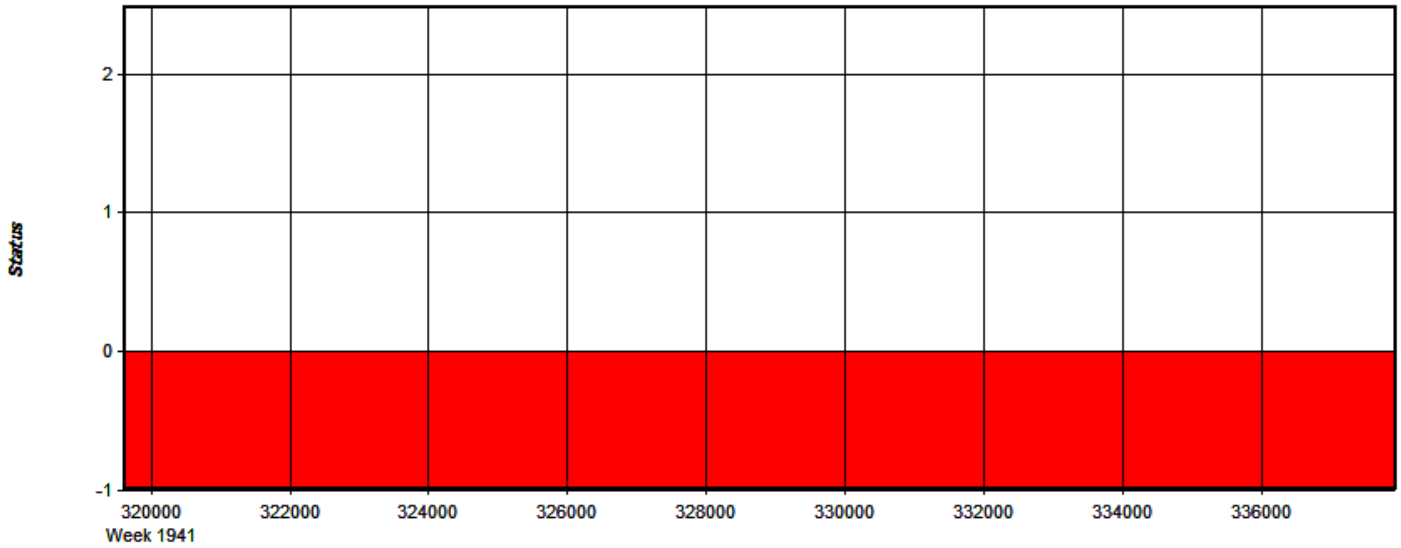
FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

Fig 8's 20:42
 Static Stop 20:52 - 20:57

Total Prof. Used:
Lines Recorded:
Lines Flown:
Online Time: 4:15
Map Time:
Notes:

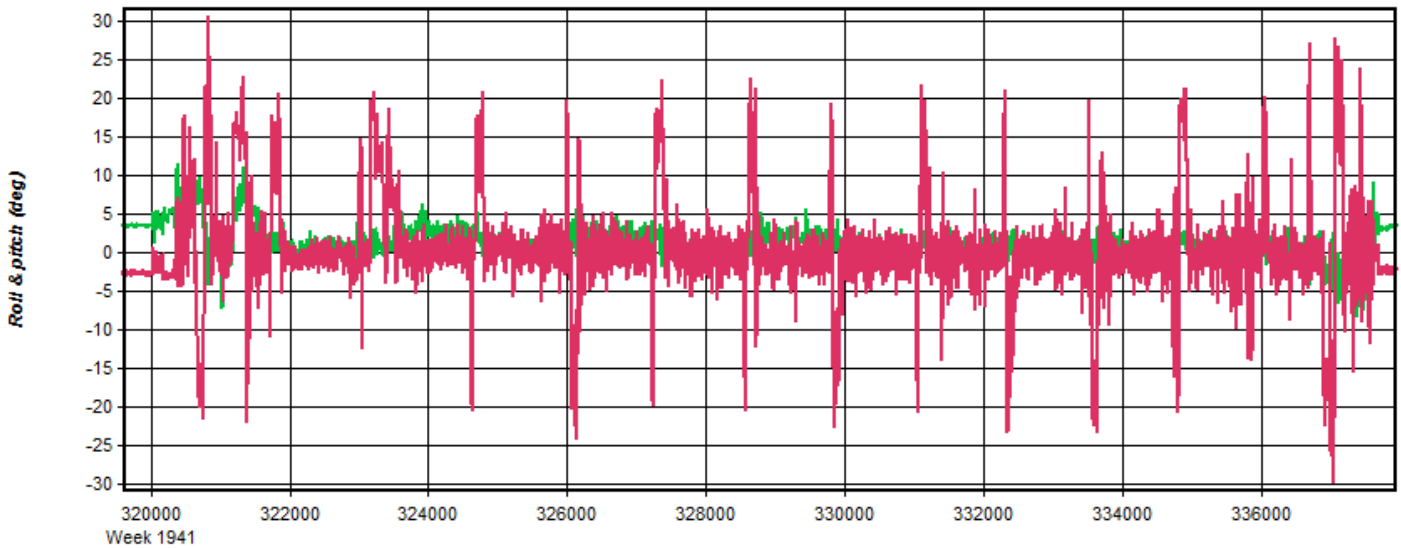
March 22, 2017-A (N915WC, SN8237)





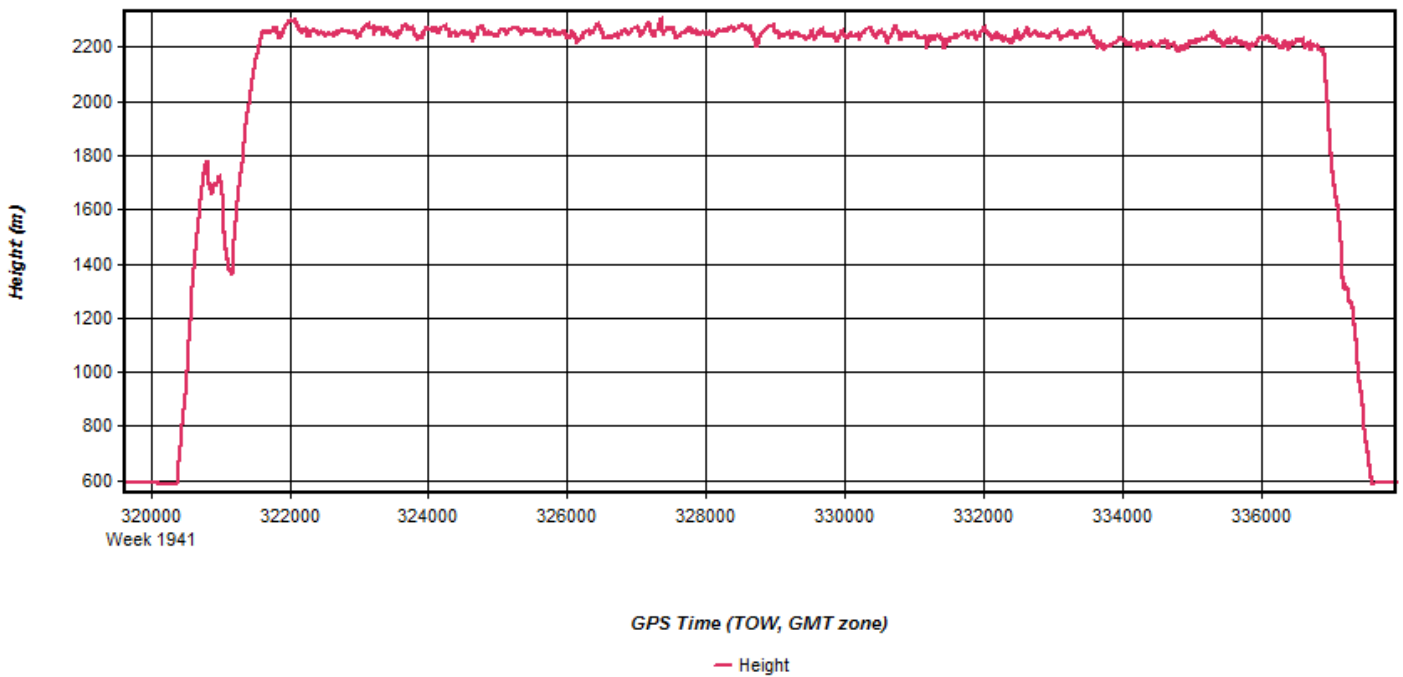
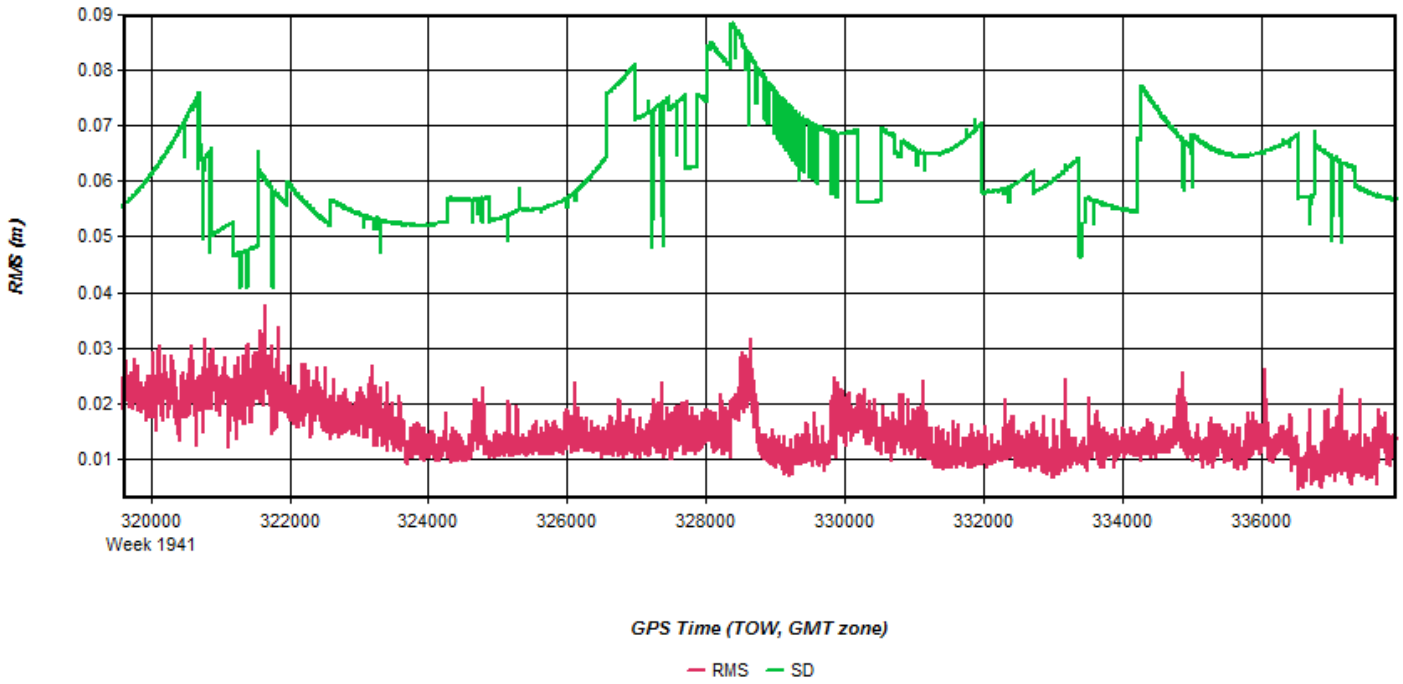
GPS Time (TOW, GMT zone)

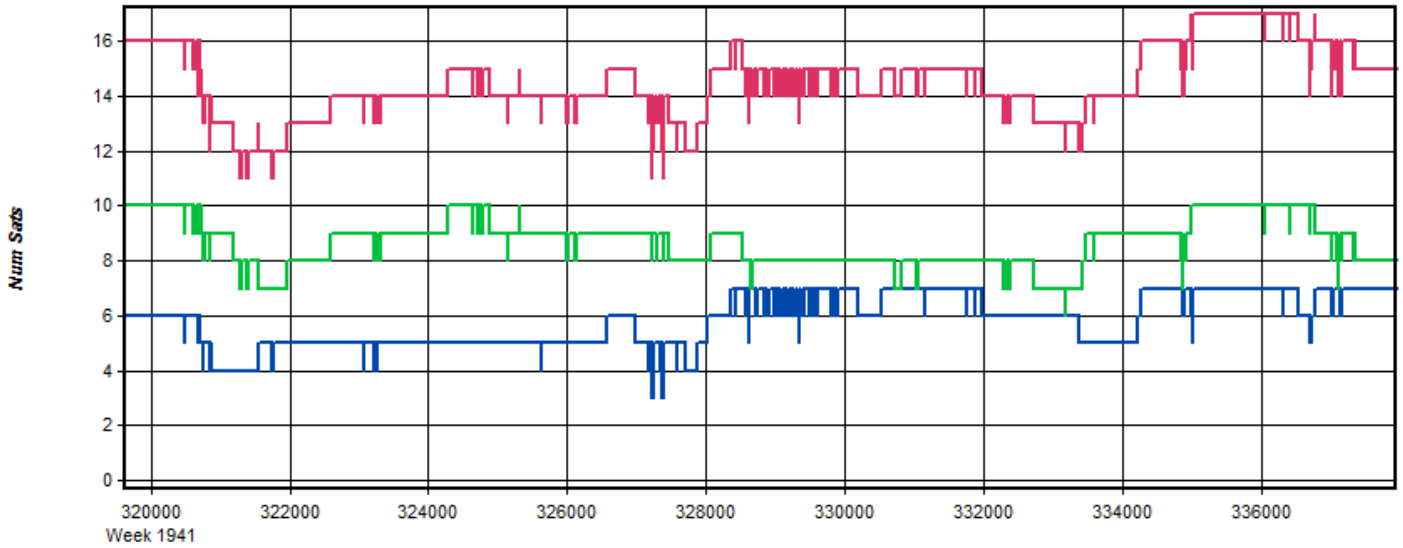
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

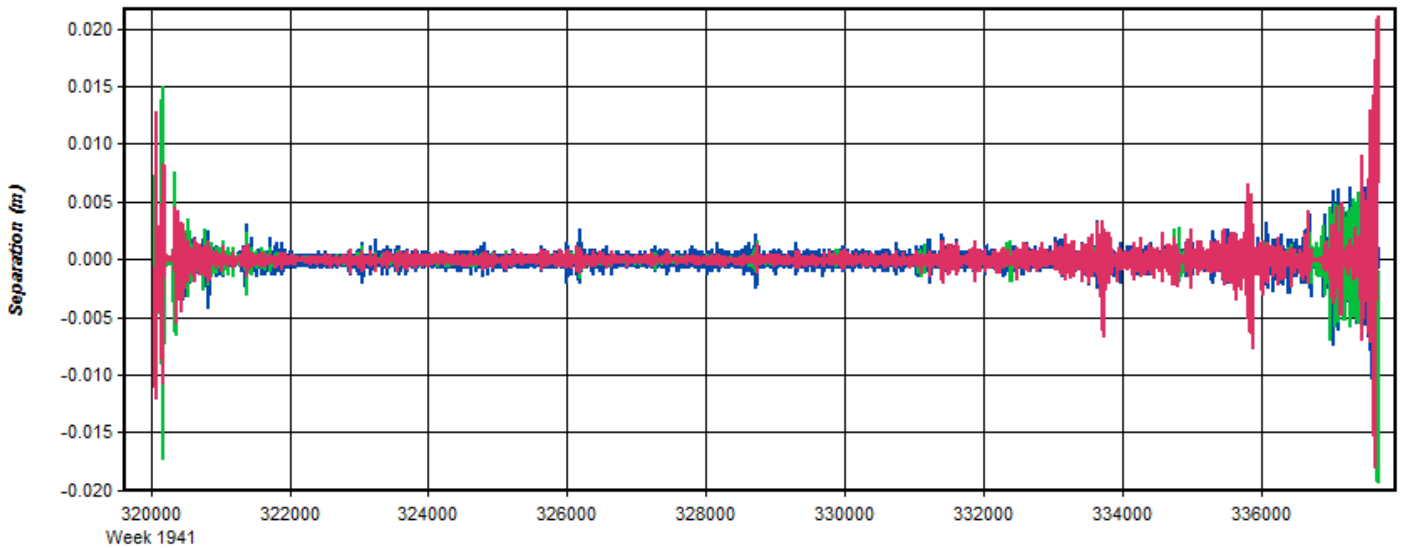
— Roll — Pitch





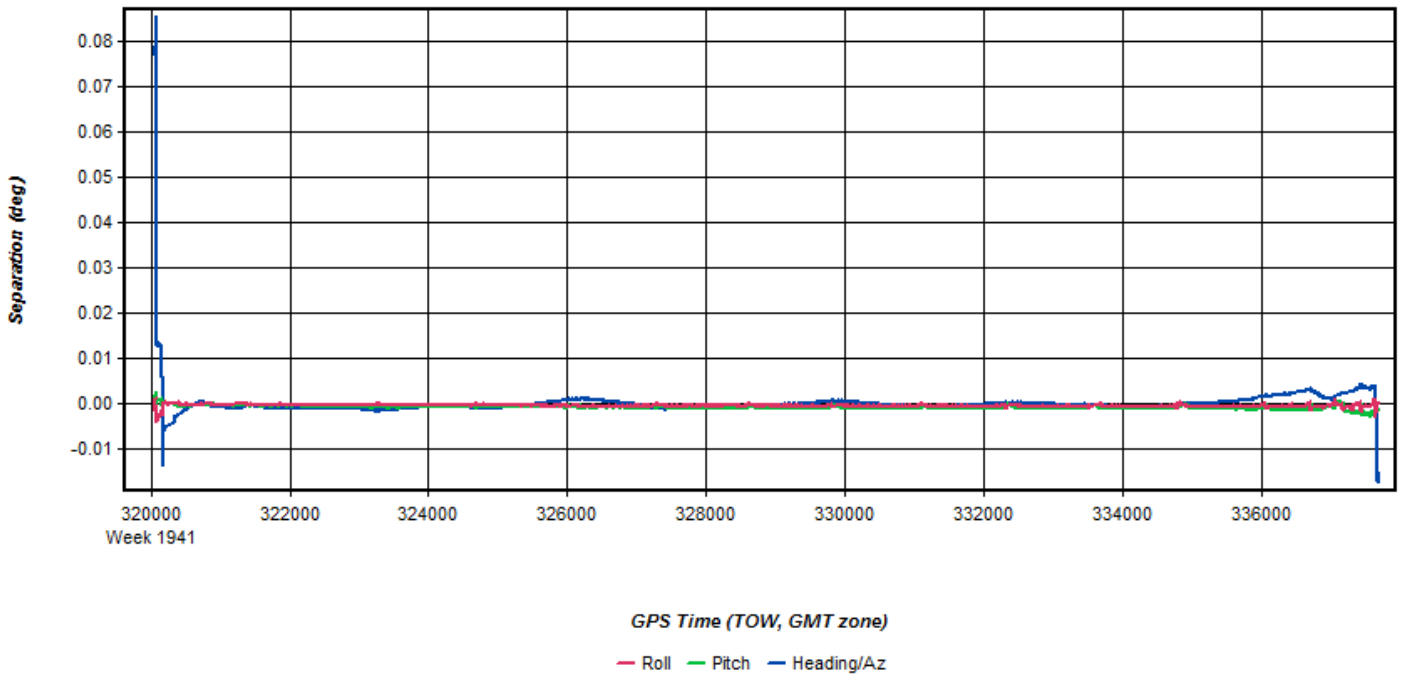
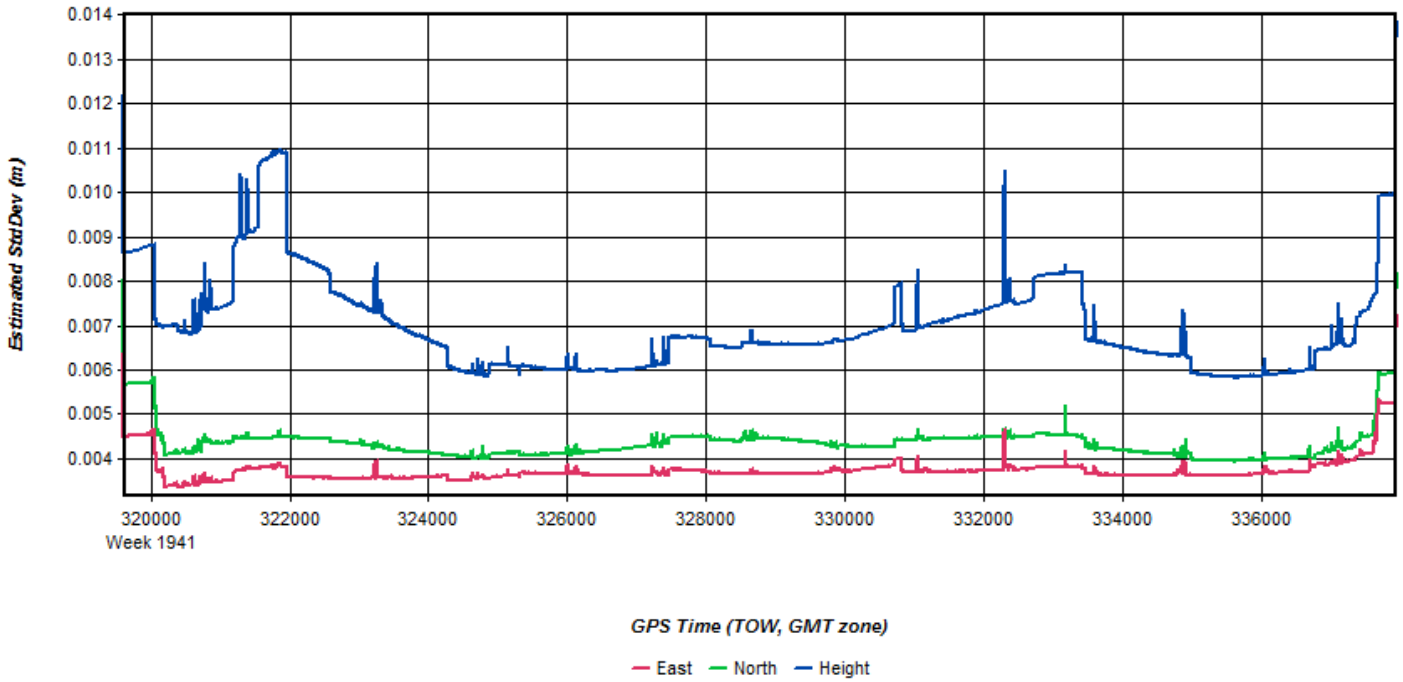
GPS Time (TOW, GMT zone)

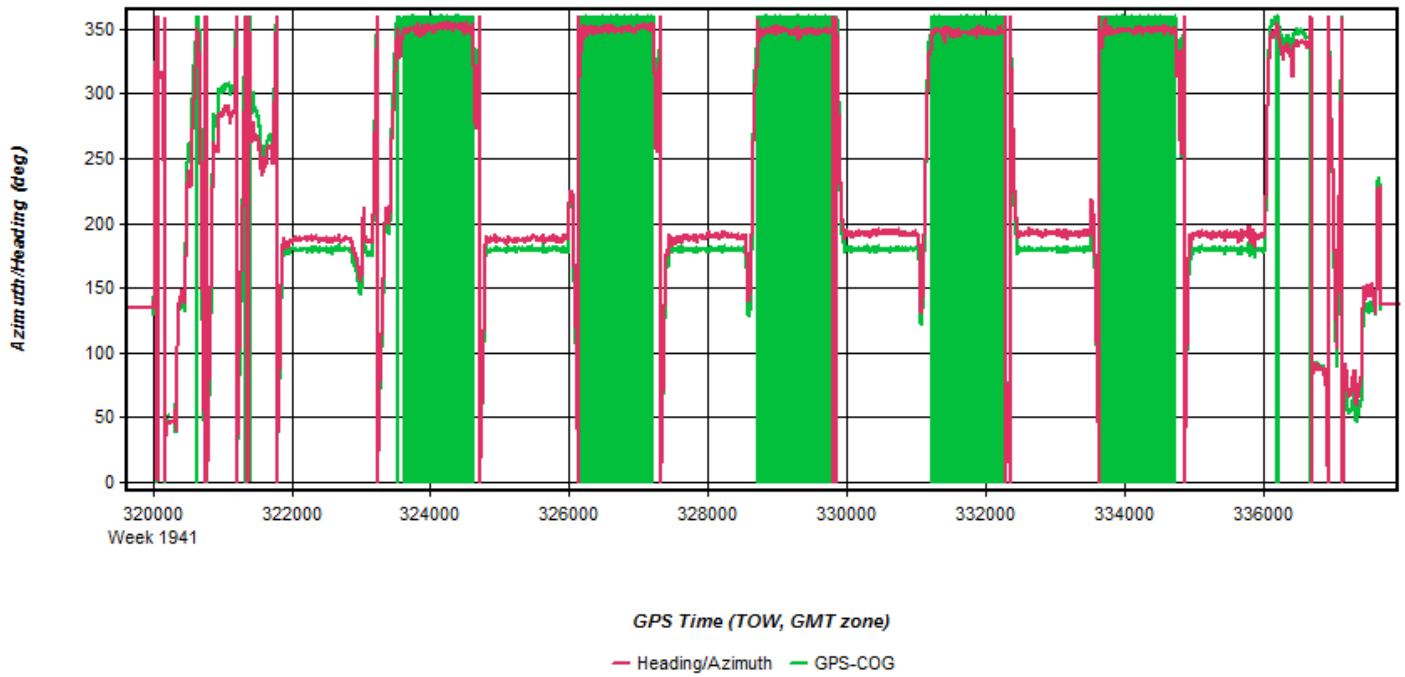
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



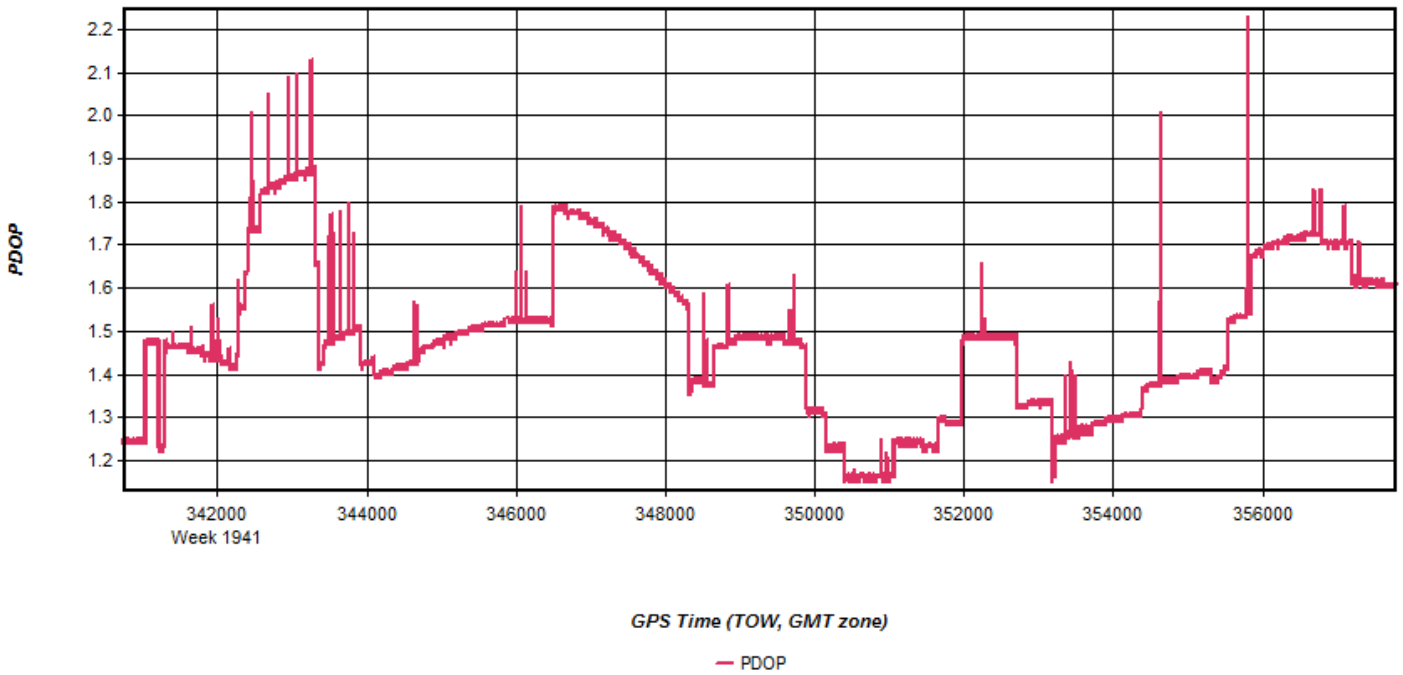
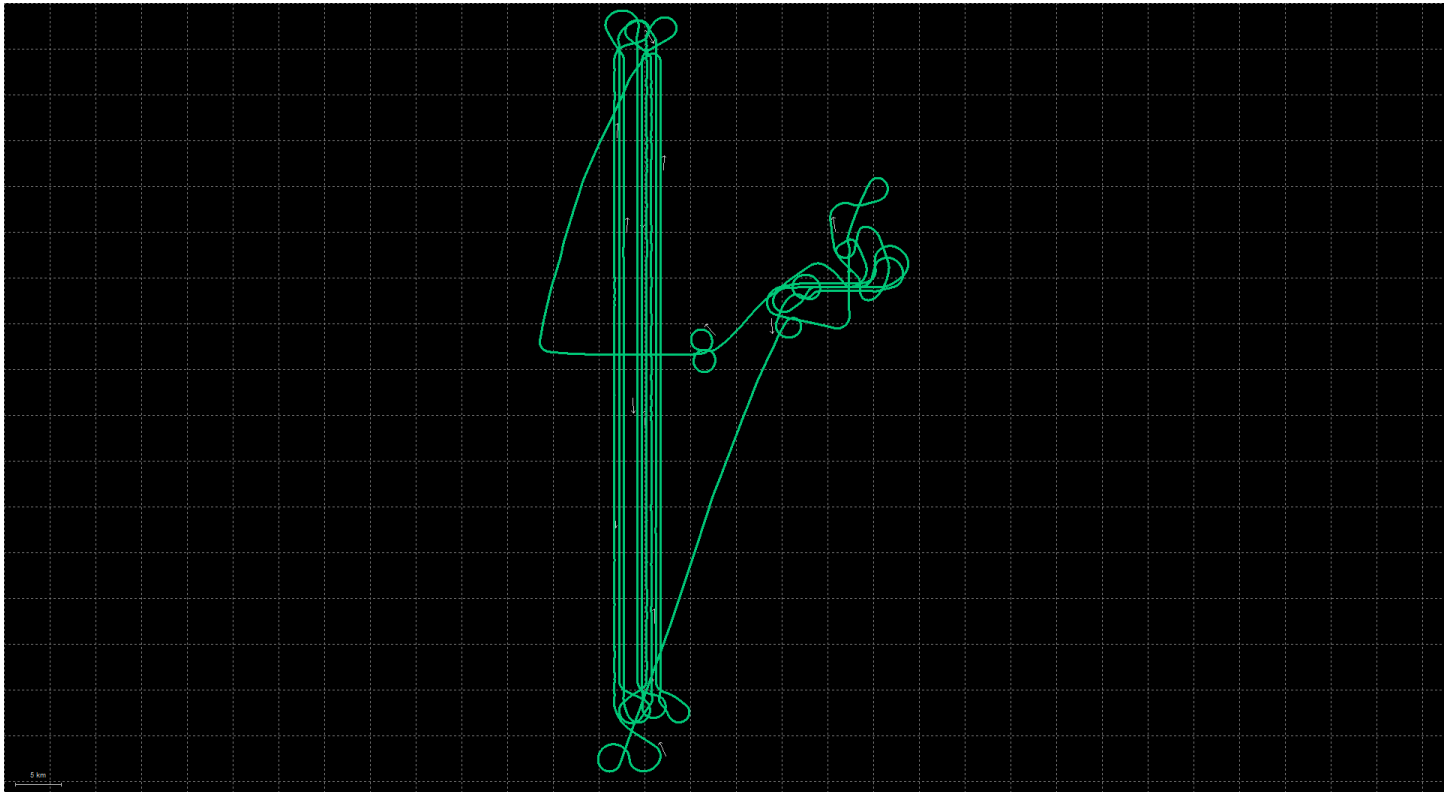
GPS Time (TOW, GMT zone)

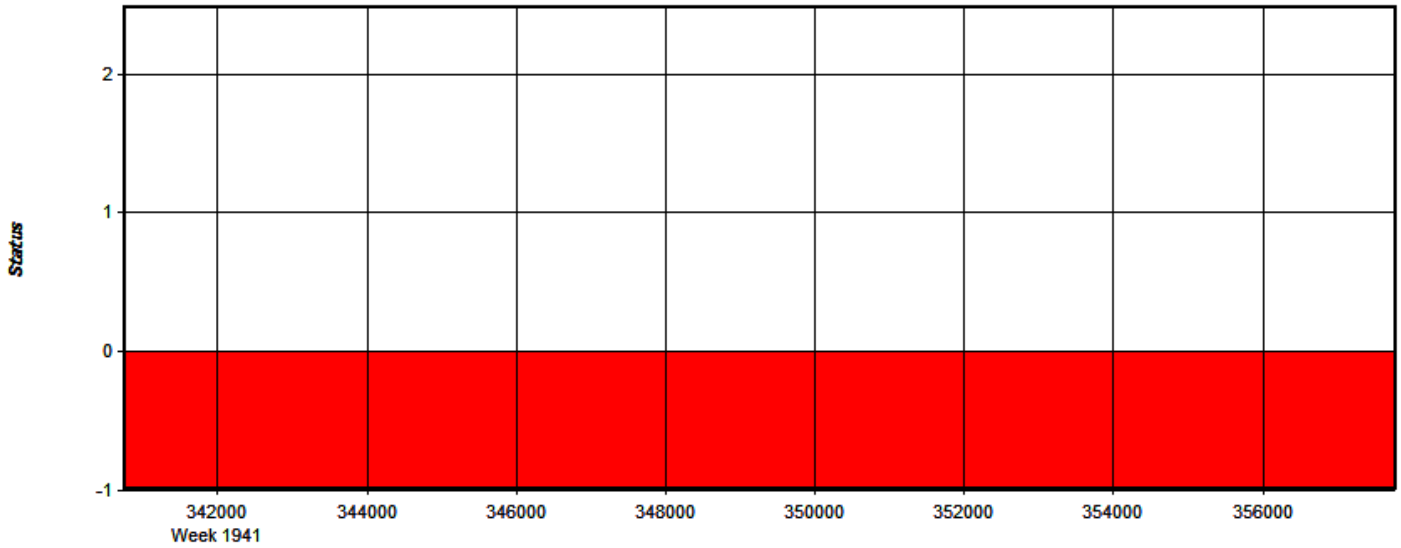
— East — North — Up





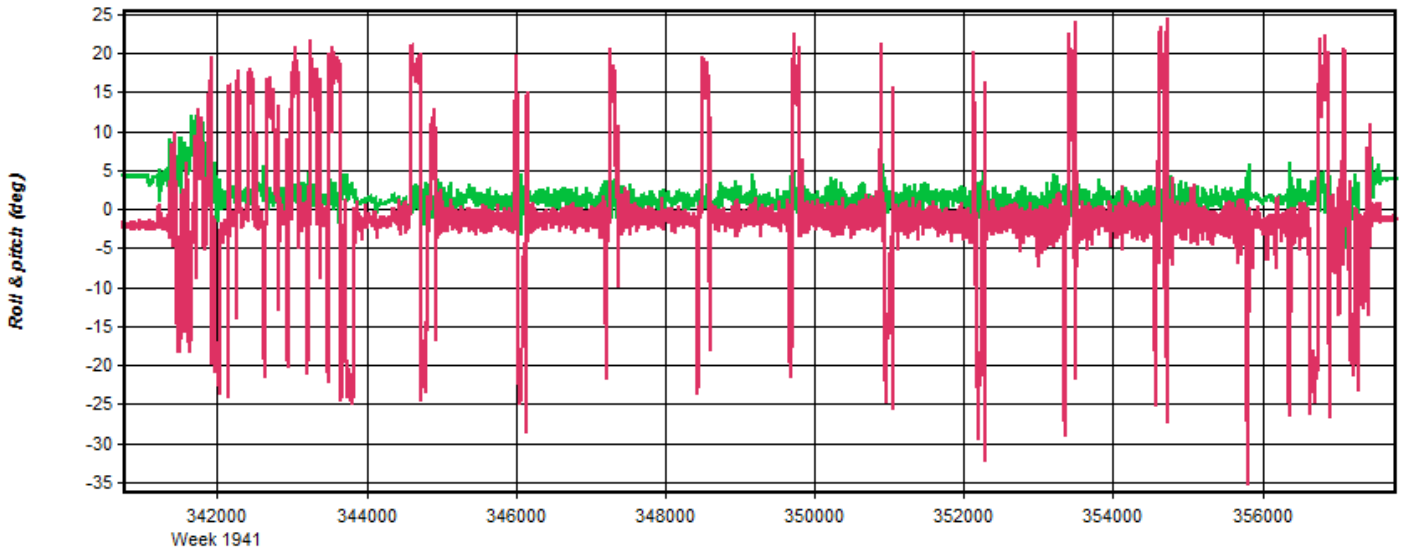
March 22, 2017-B (N915WC, SN8237)





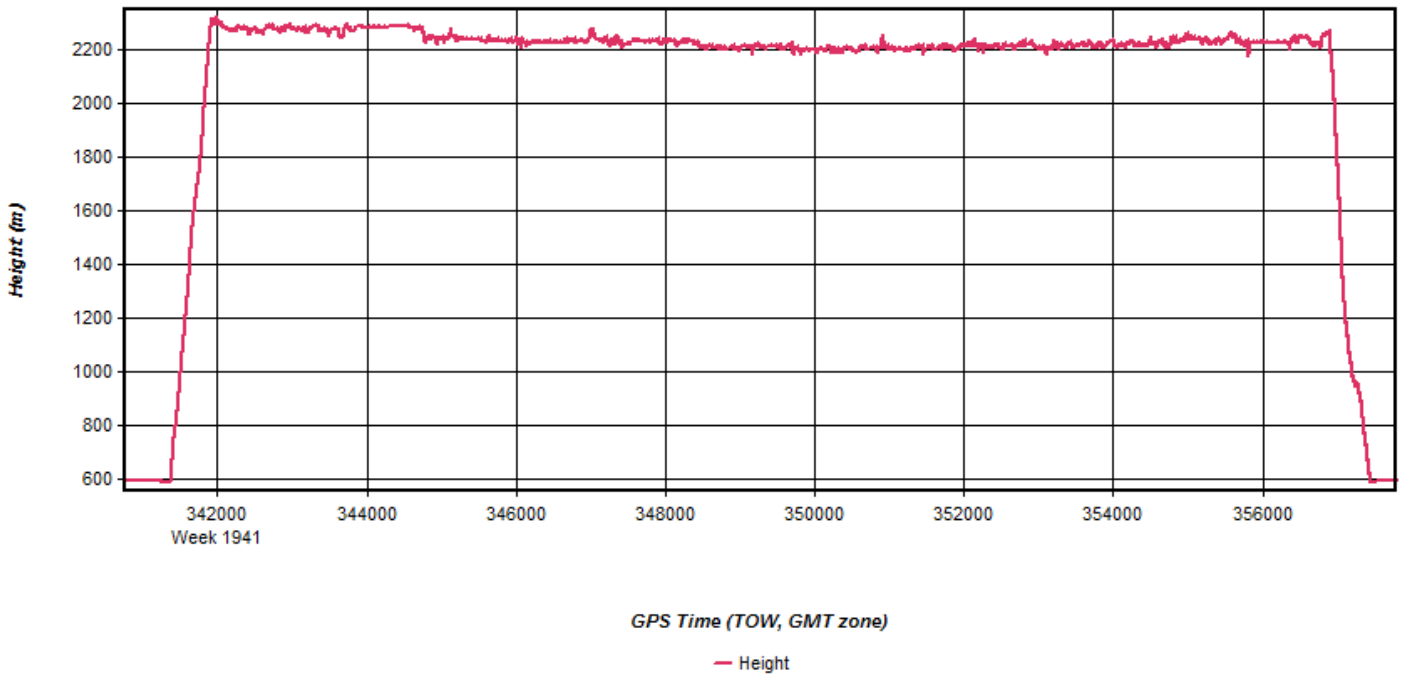
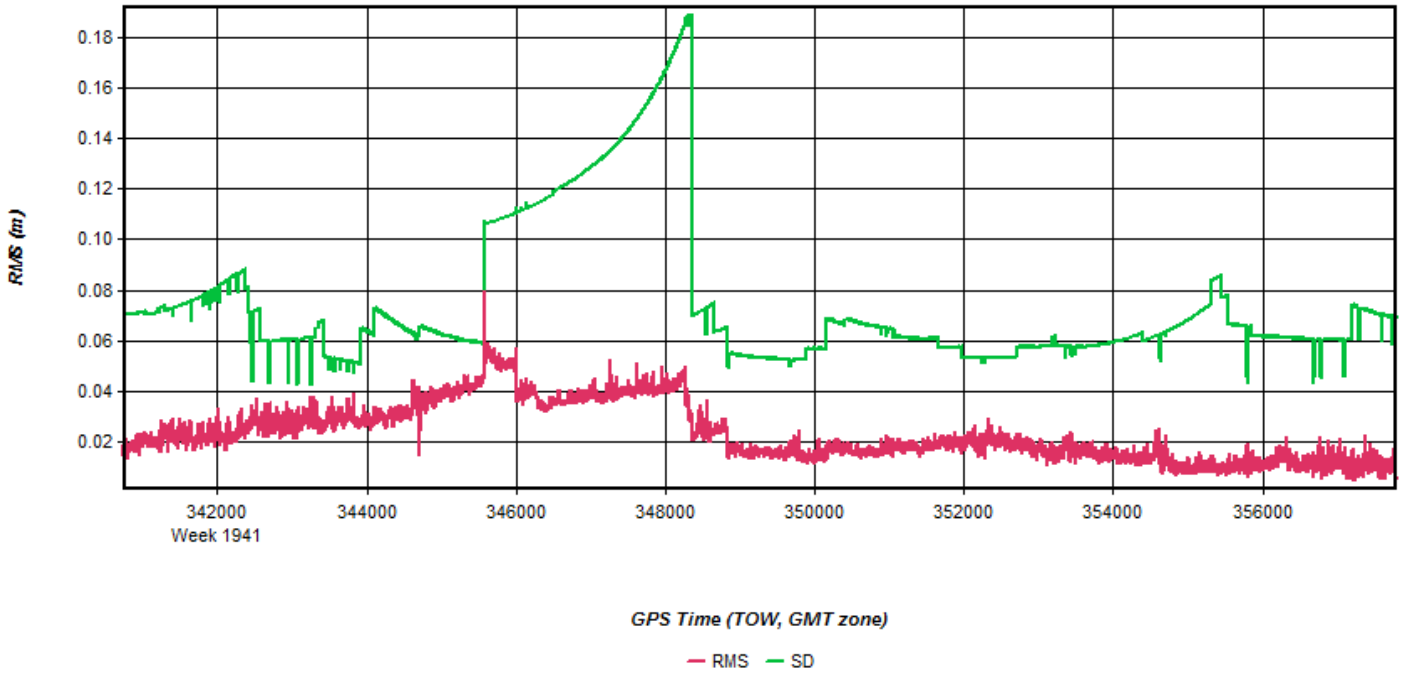
GPS Time (TOW, GMT zone)

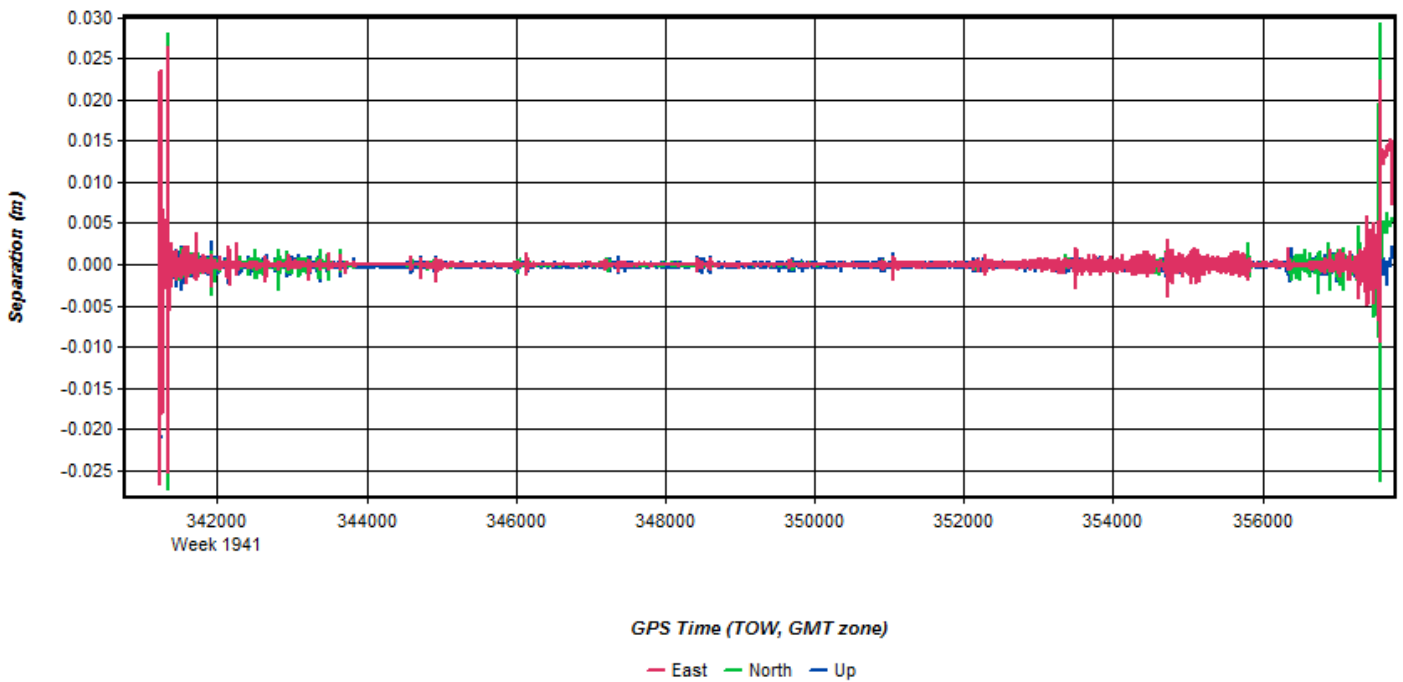
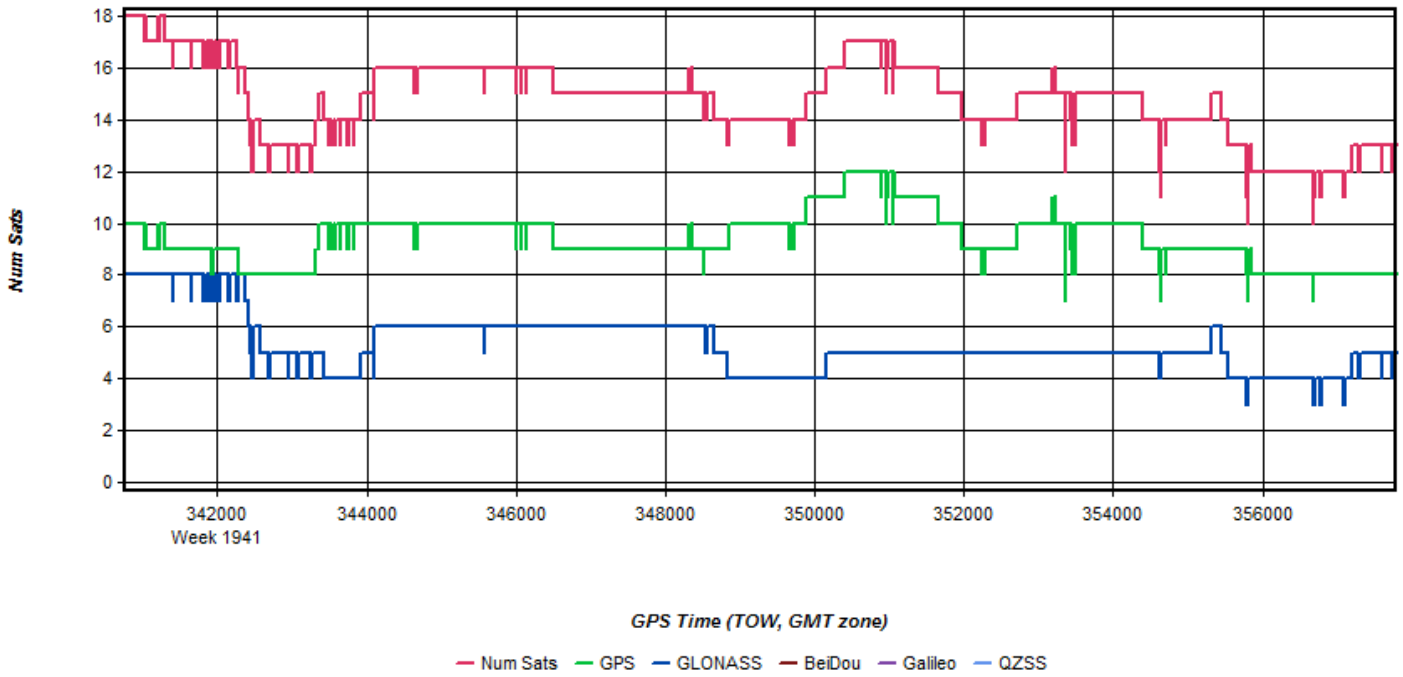
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

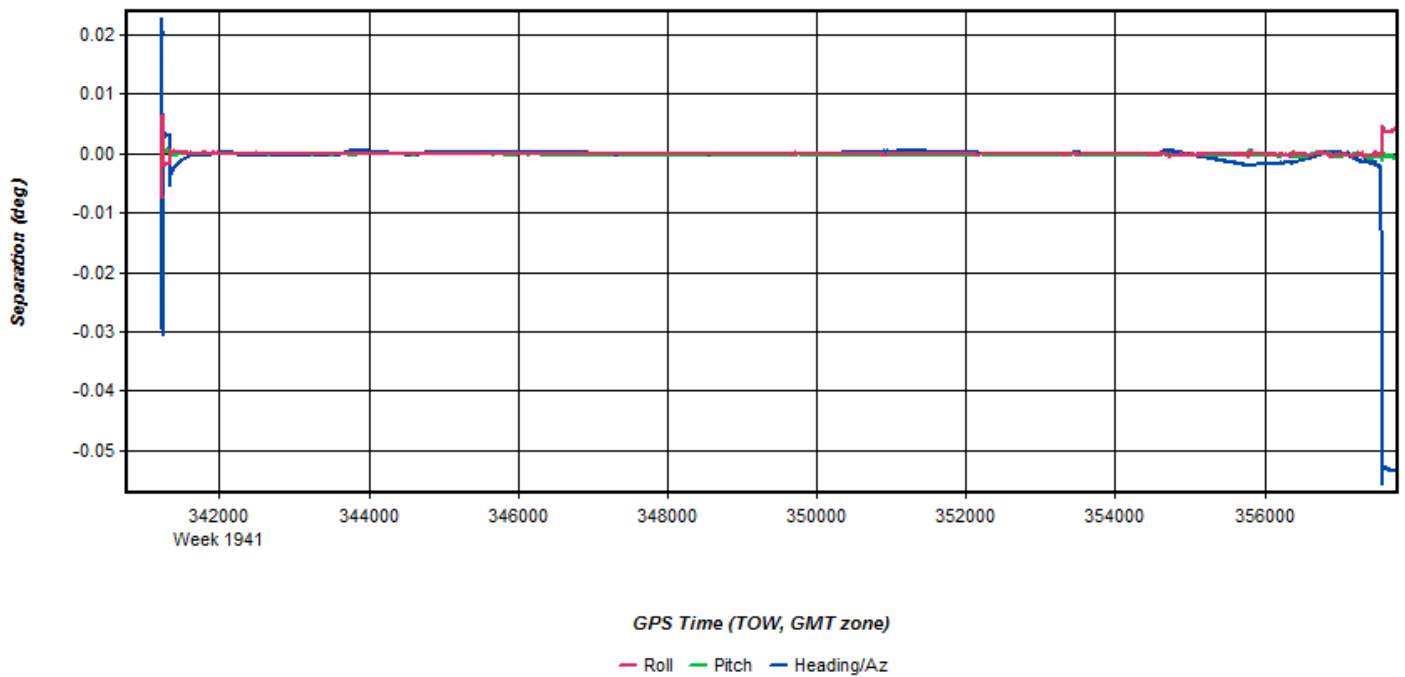
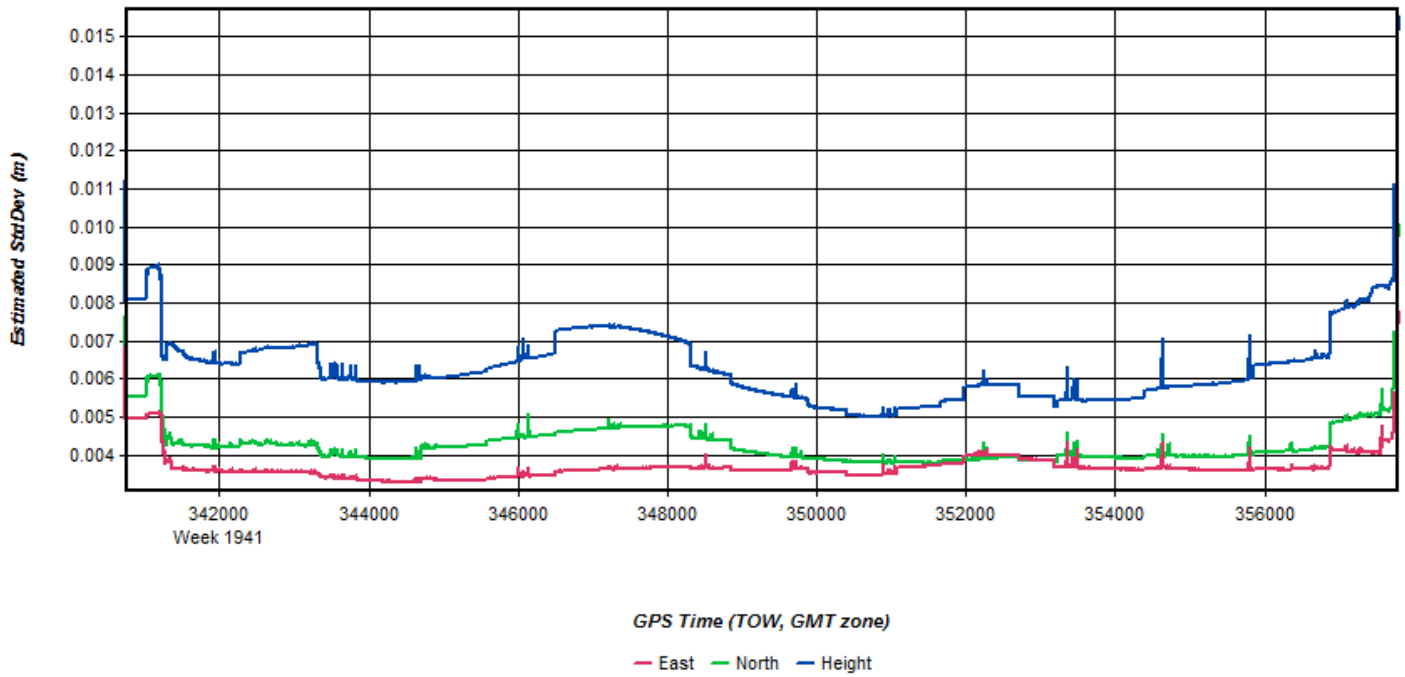


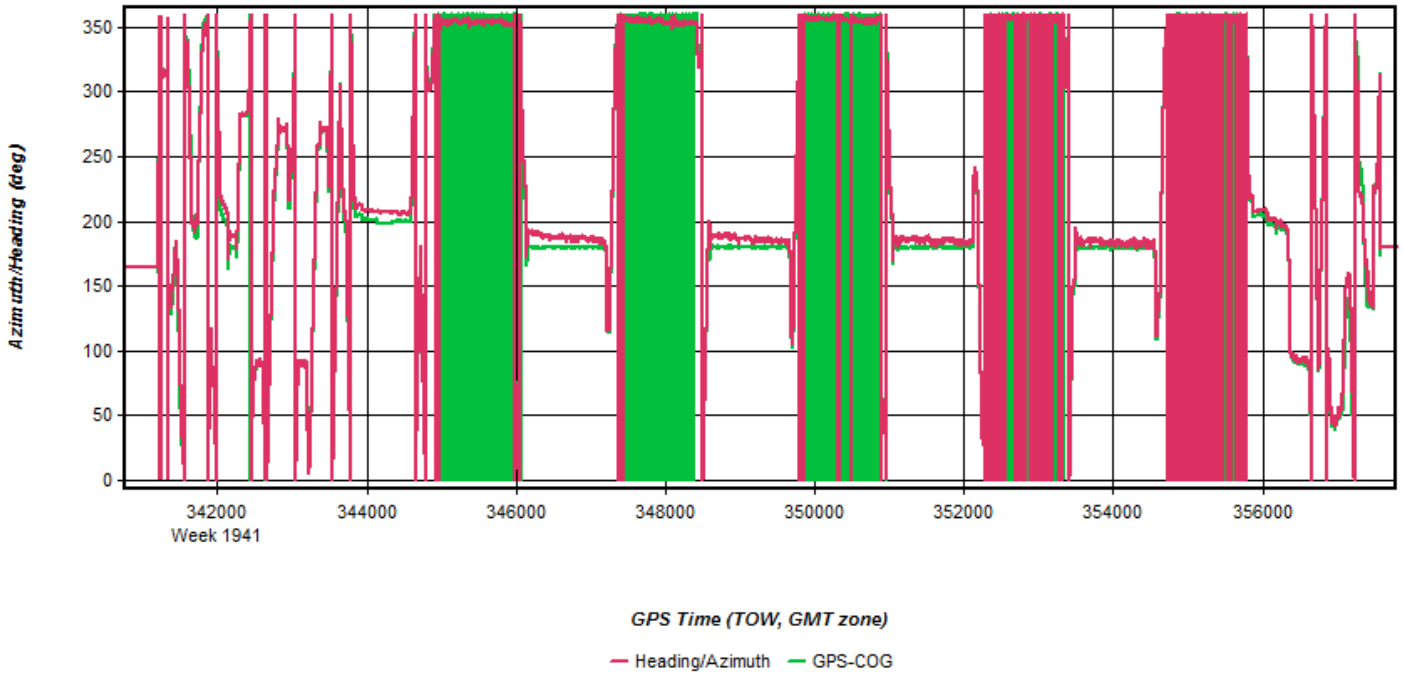
GPS Time (TOW, GMT zone)

— Roll — Pitch







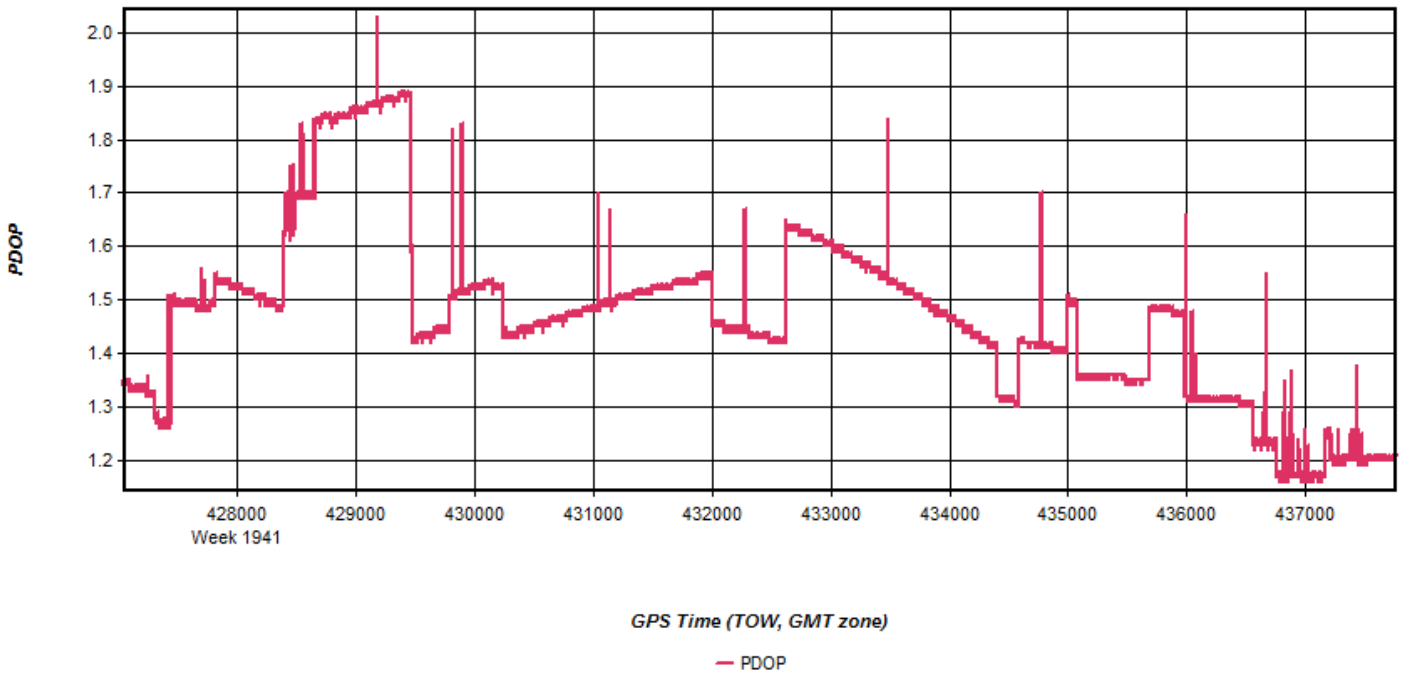
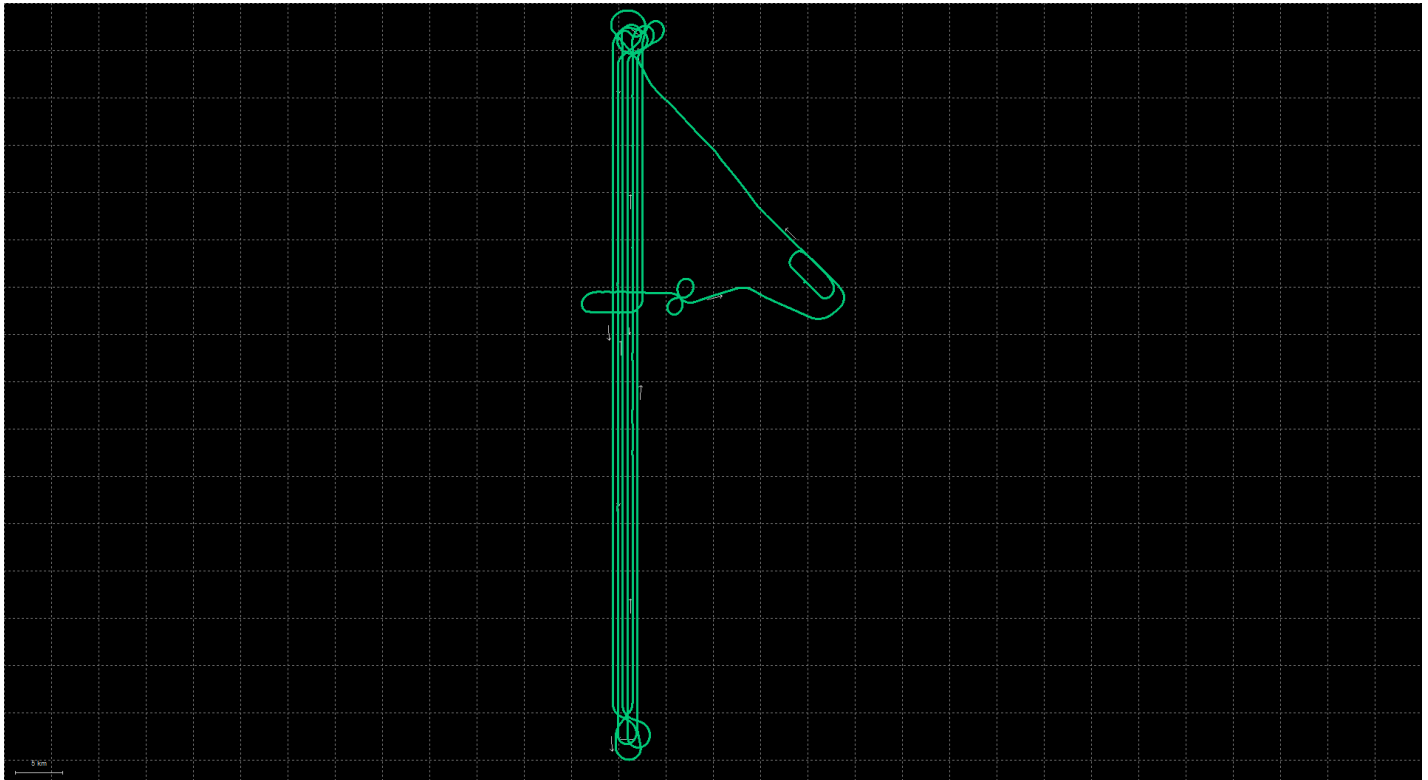


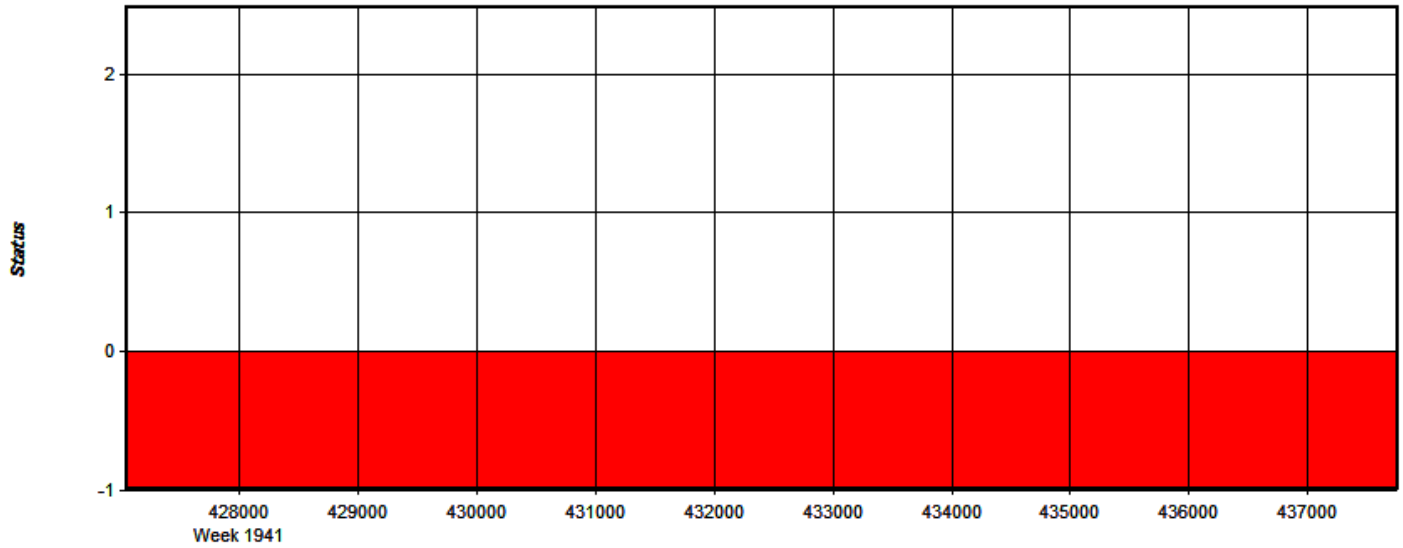
Flight Log

LIDAR

KeyW-Aeroptic LIDAR FLIGHT REPORT						
CREW: <u>Charles V/Don M</u> <small>mm/dd/yy</small>	AIRCRAFT: <u>NS15WC</u>	WEATHER:	Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc...		SSD Drive # SSD2 Space Rem.	
DATE: <u>3/22/2017</u>		GPS: Source: <u>Fwd</u>	LIDAR STARTUP CHECKS <input checked="checked" type="checkbox"/> Lens cleaned <input checked="checked" type="checkbox"/> All fpos uploaded <input checked="checked" type="checkbox"/> Pilot's screen functional <input checked="checked" type="checkbox"/> Compact flash drive space <input checked="checked" type="checkbox"/> SSDs have space <input checked="checked" type="checkbox"/> Startup beeps & IPAS recording Initials: <u>DM</u>		Camera System: <u>8237</u> fwd/aft Camera Location (Hole): <u>Fwd</u>	
LIDAR S/N: <u>8237</u>	Start-up Time: <u>13:24</u> Shut-down Time: <u>16:30</u> Location: <u>KCPF</u> Location: <u>KCPF</u>		Remarks:			
Job #	Location/ Site/Block	Line #	Flight Dir	Crab Angle	Remarks	
3DEP	1	Win_Cal1	S			
		Win_Cal2	E			
		Win_Cal3	W			
		Win_CalBR	E			
		Win_Cal4	W			
		1010	N			
		1011	S		winds 270 Deg @ 15 kts	
		1012	N			
		1015	S			
		1016	N			
		1017	S			
		1018	N			
		1019	S			
		1020	N		winds from 272 @ 7 kts	
		UL-X	E			

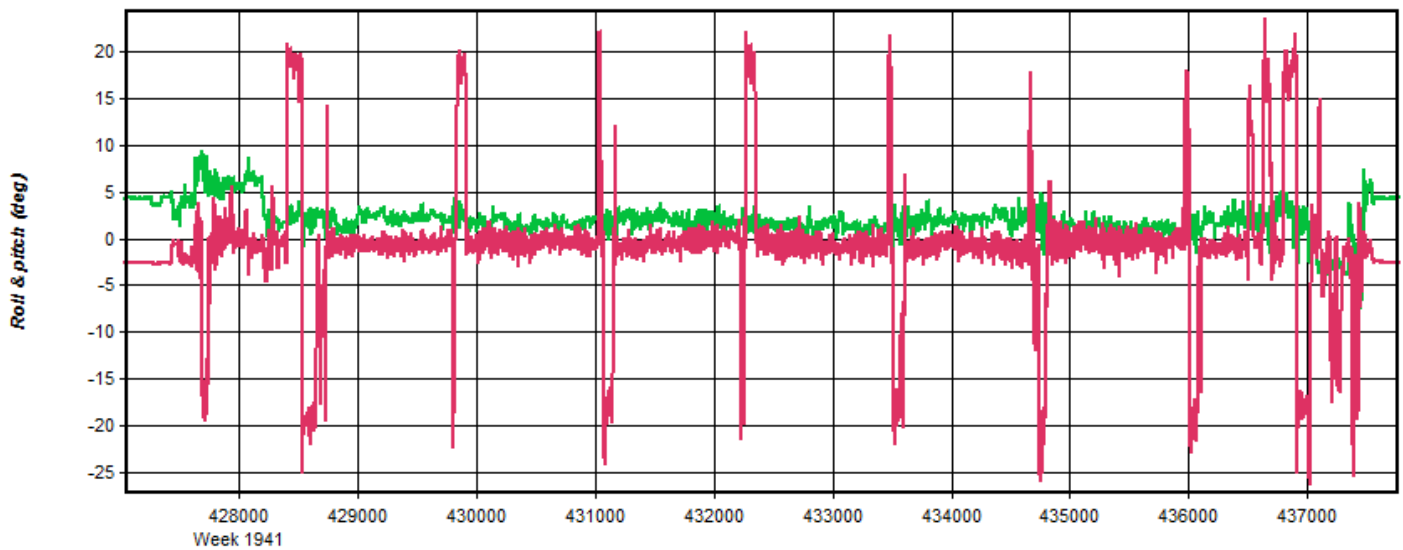
March 23, 2017-A (N915WC, SN8237)





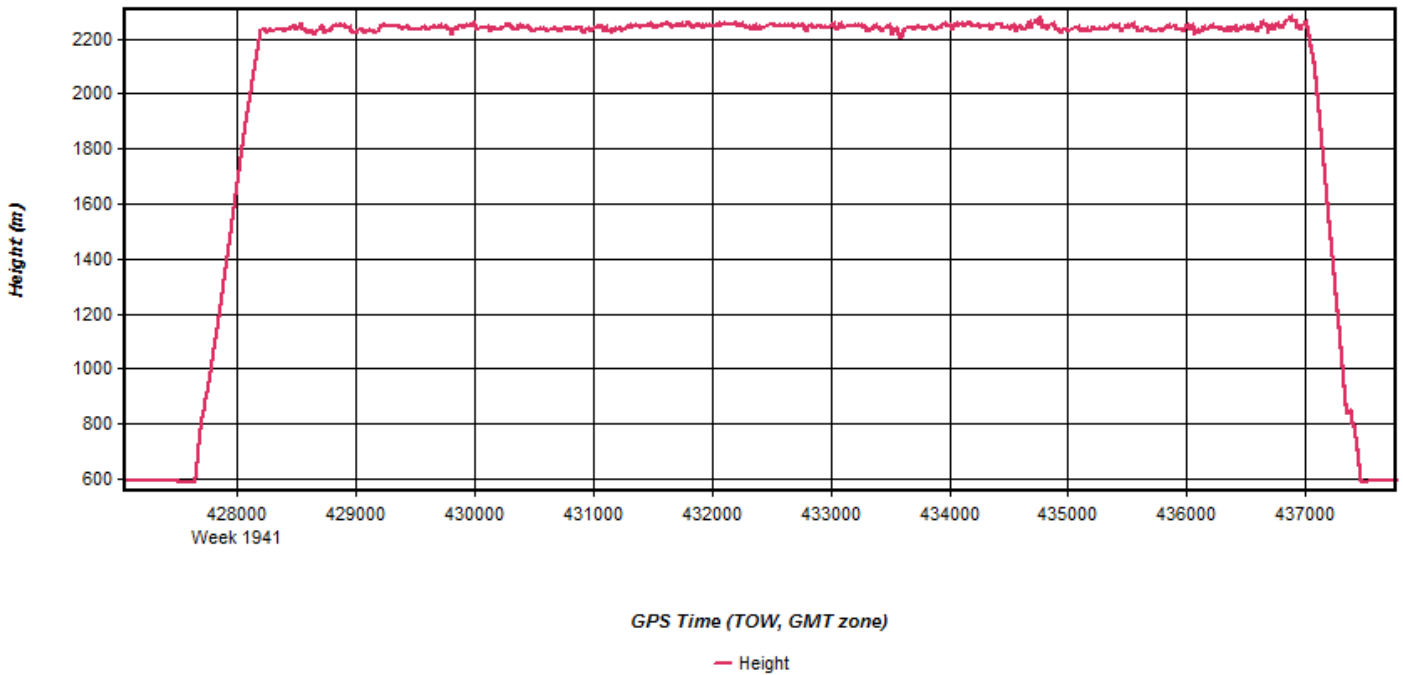
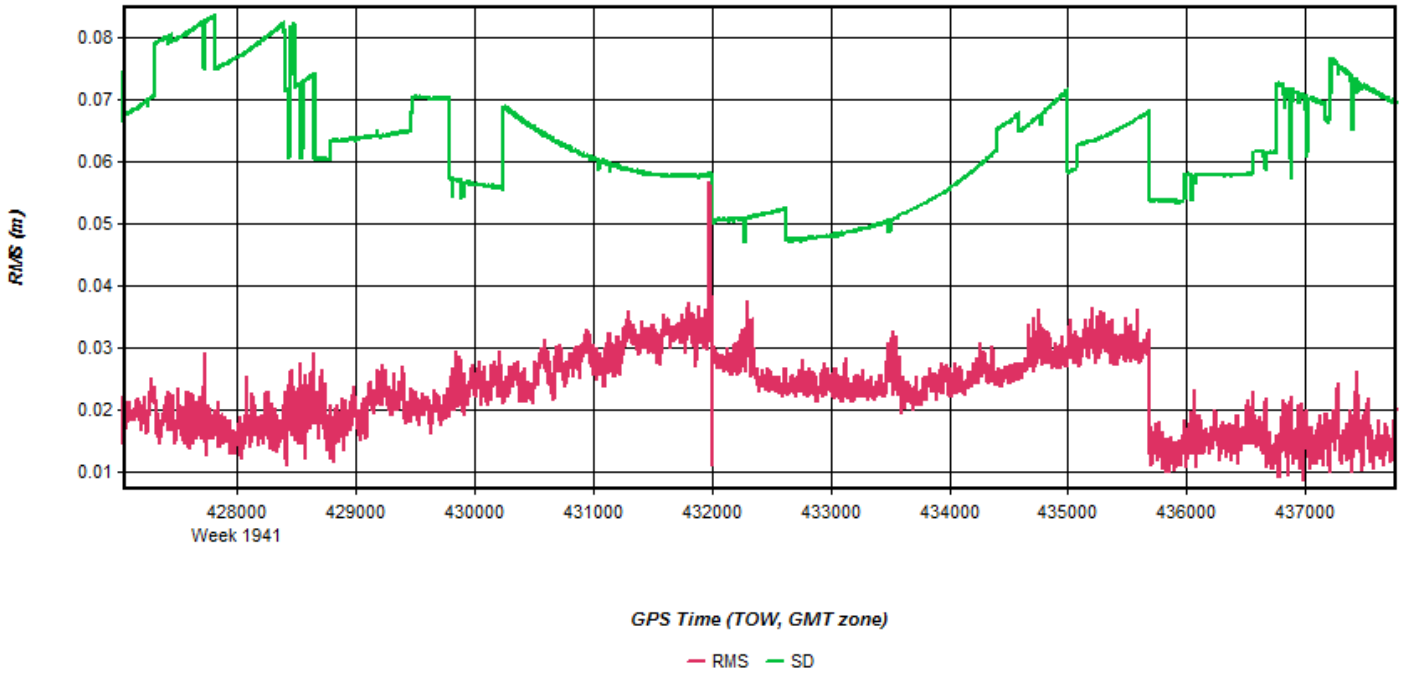
GPS Time (TOW, GMT zone)

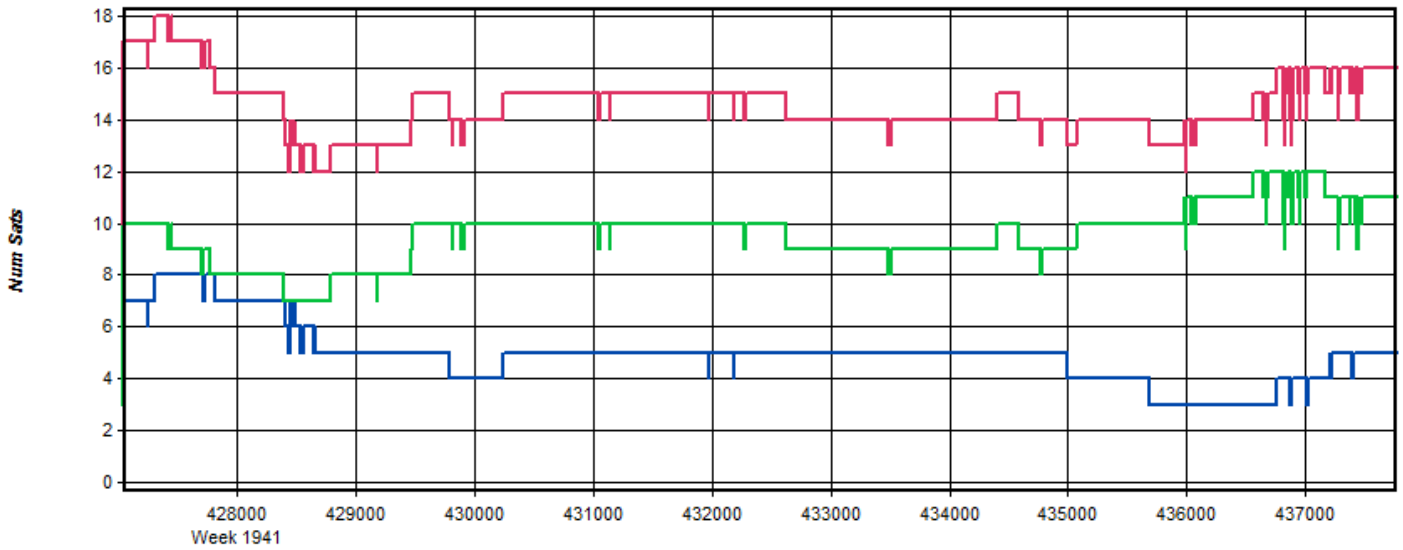
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

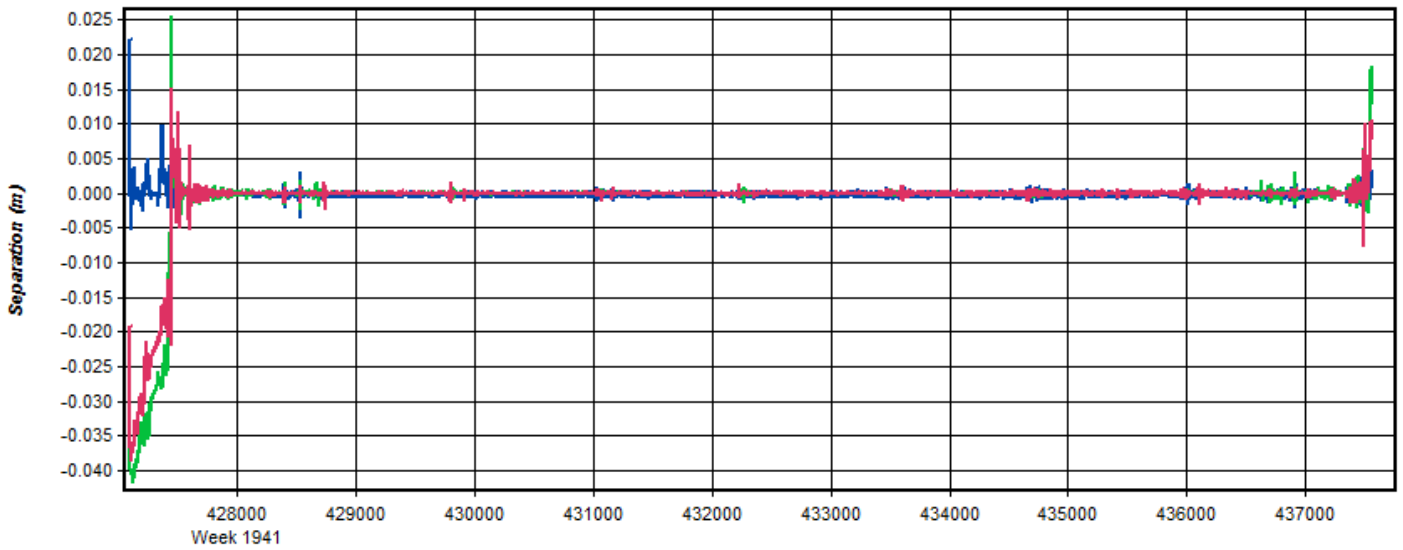
— Roll — Pitch





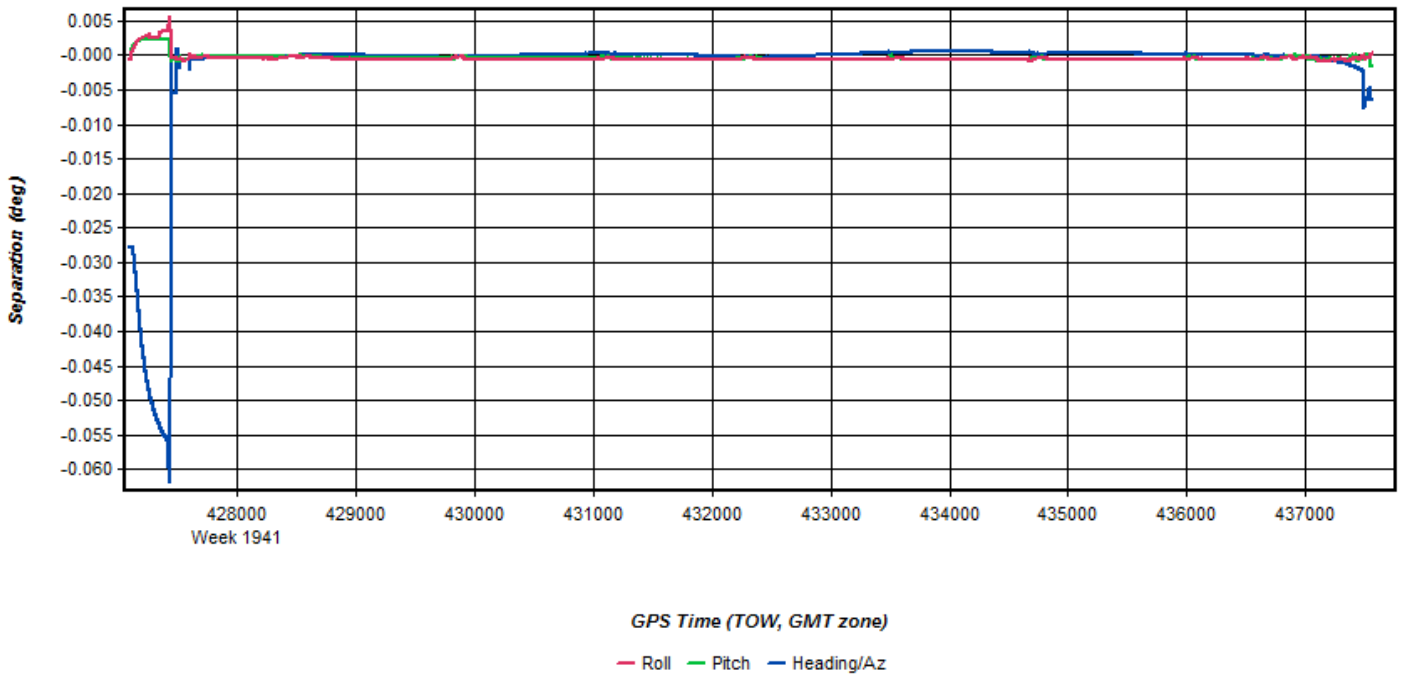
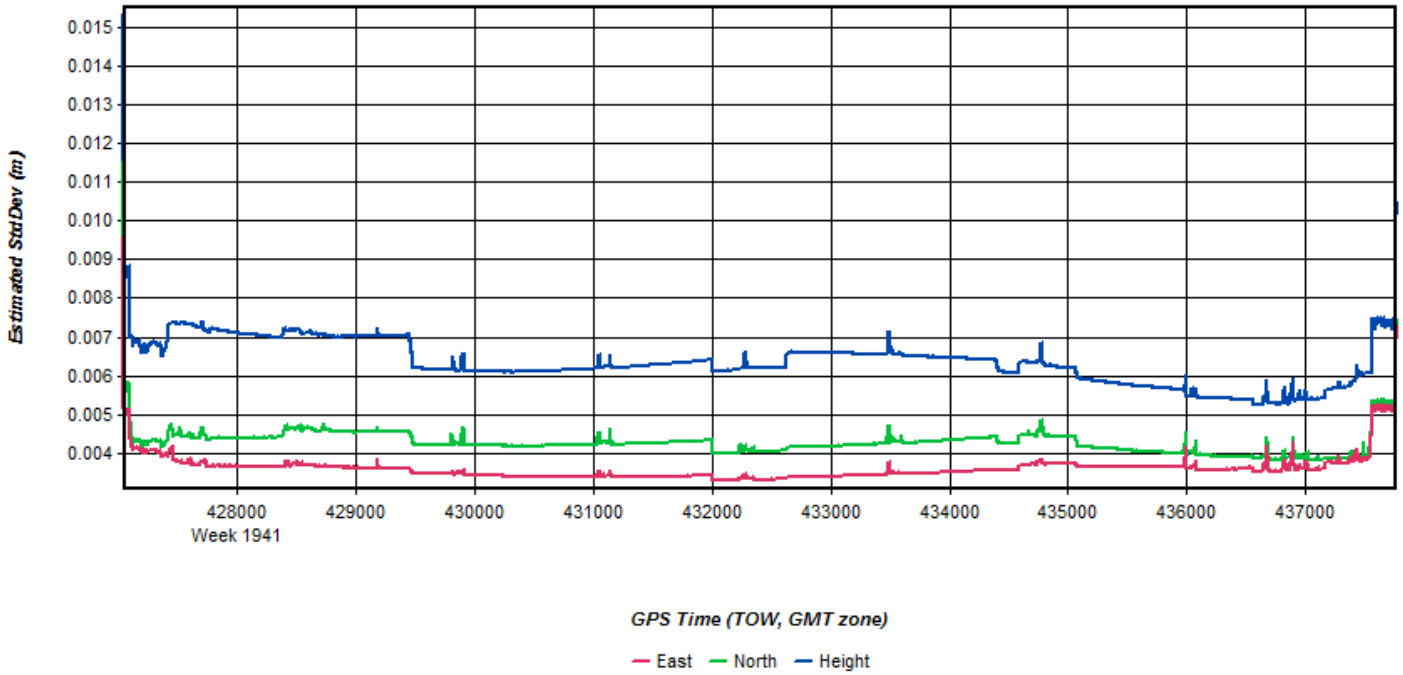
GPS Time (TOW, GMT zone)

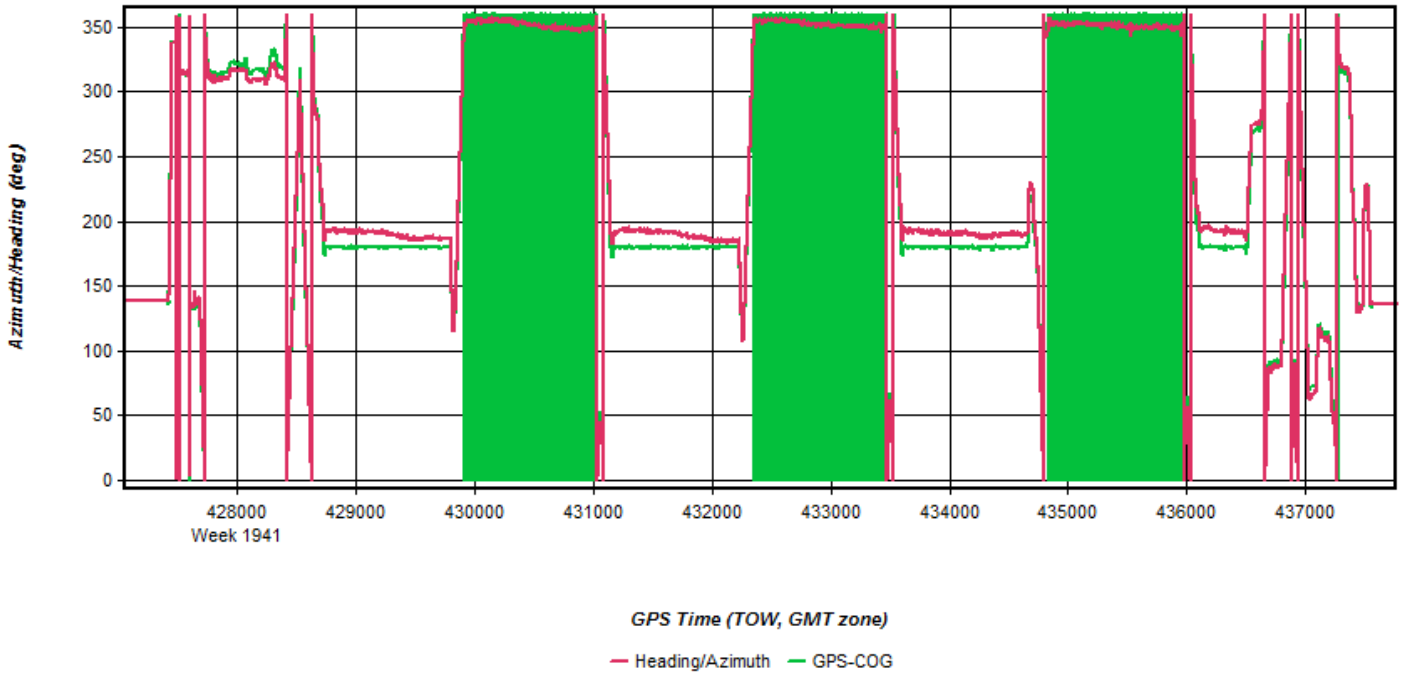
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up

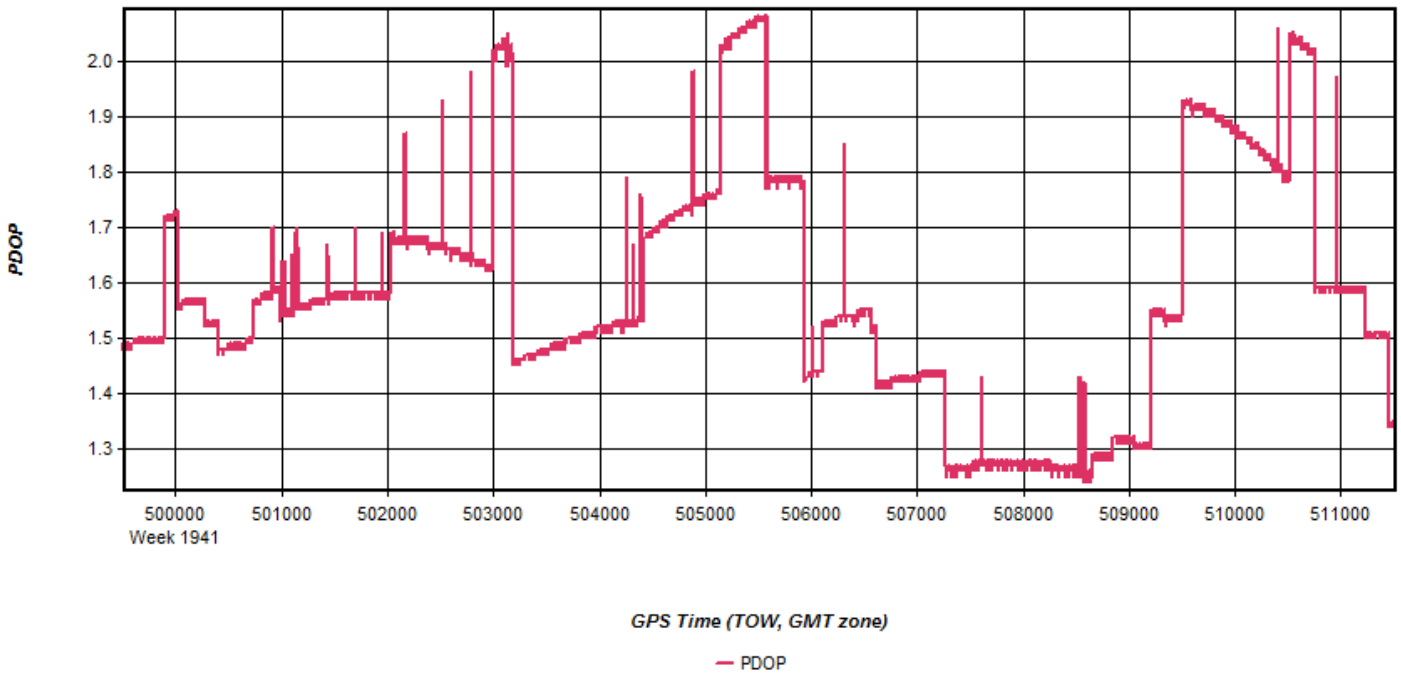
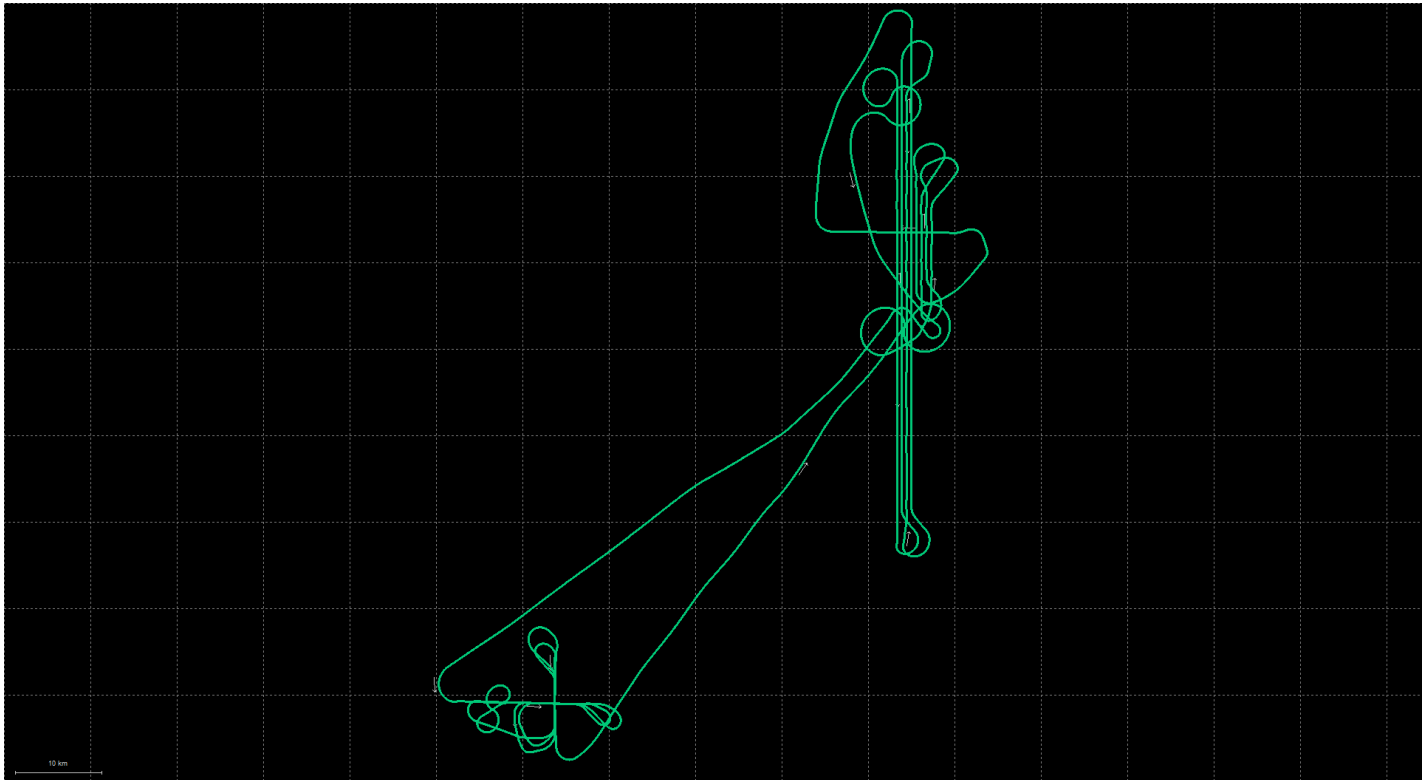


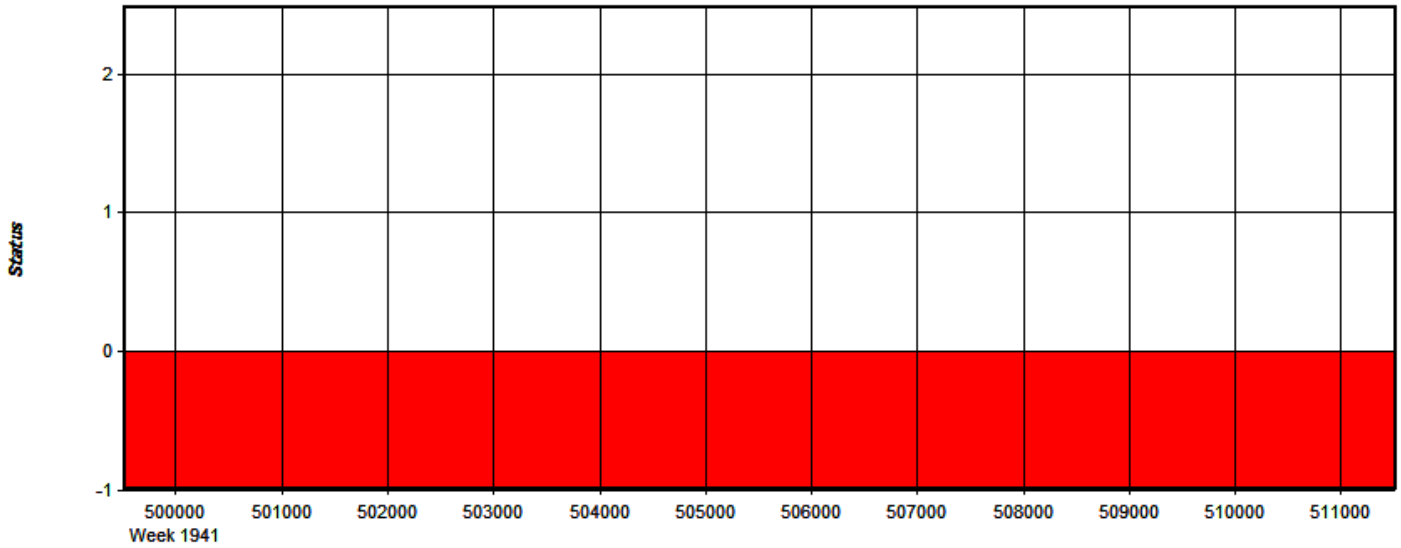


Flight Log

LIDAR					
KeyW-Aeroptics LIDAR FLIGHT REPORT					
Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc...					
CREW <small>PILOT/OPERATOR</small> Charles V/Don M	AIRCRAFT <small>TAIL NUMBER</small> N915WC	WEATHER			
DATE <small>MM/DD/YY</small> 3/23/2017	GPS <small>SOURCE</small> Fwd				
Camera System <small>LIDAR SW</small> 8237	Time <small>Start-up</small> 17:34	Location <small>KCIR</small>			
Camera Location (Hole) <small>Fwd/aft</small> Fwd	<small>Shut-down</small> 20:35	<small>KCIR</small>			
			LIDAR STARTUP CHECKS		
			<input type="checkbox"/> Lens cleaned		
			<input checked="" type="checkbox"/> All IPs uploaded		
			<input checked="" type="checkbox"/> Pilot's screen functional		
			<input checked="" type="checkbox"/> Compact flash drive space		
			<input checked="" type="checkbox"/> SSDs have space		
			<input checked="" type="checkbox"/> Startup beeps & IPAS recording		
			Initials: DM		
SSD					
Drive #					
SSD3					
Space Rem.					
Remarks					
Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	1021	S		
		1022	N		
		1023	S		winds 262 Deg @ 27 kts, 55 Deg F - Outside Temp @ -7400'
		1024	N		winds 289 Deg @ 17 kts
		1025	S		
		1026	N		
		1027	S		aborted 1/3 the way thru, due to Lightning, w storm approaching
		UL-X	E		ignore data on line 011929. Mistakenly hit manual recording

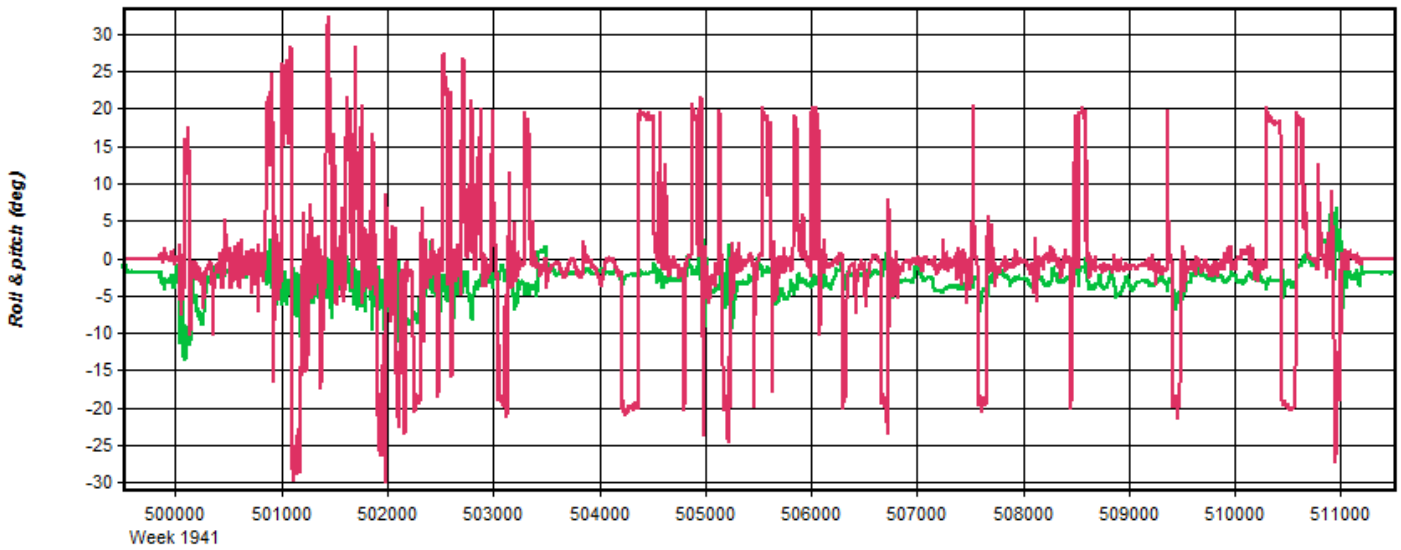
March 24, 2017-A (604MD, SN8227)





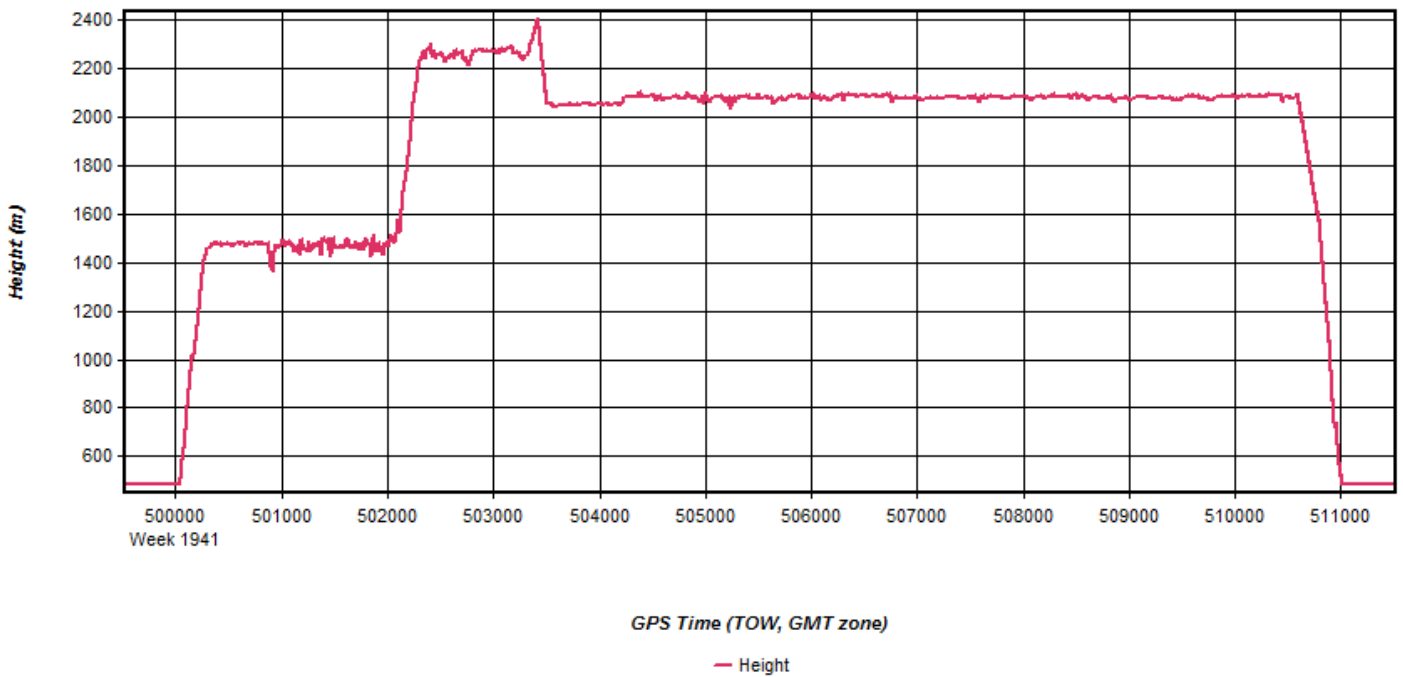
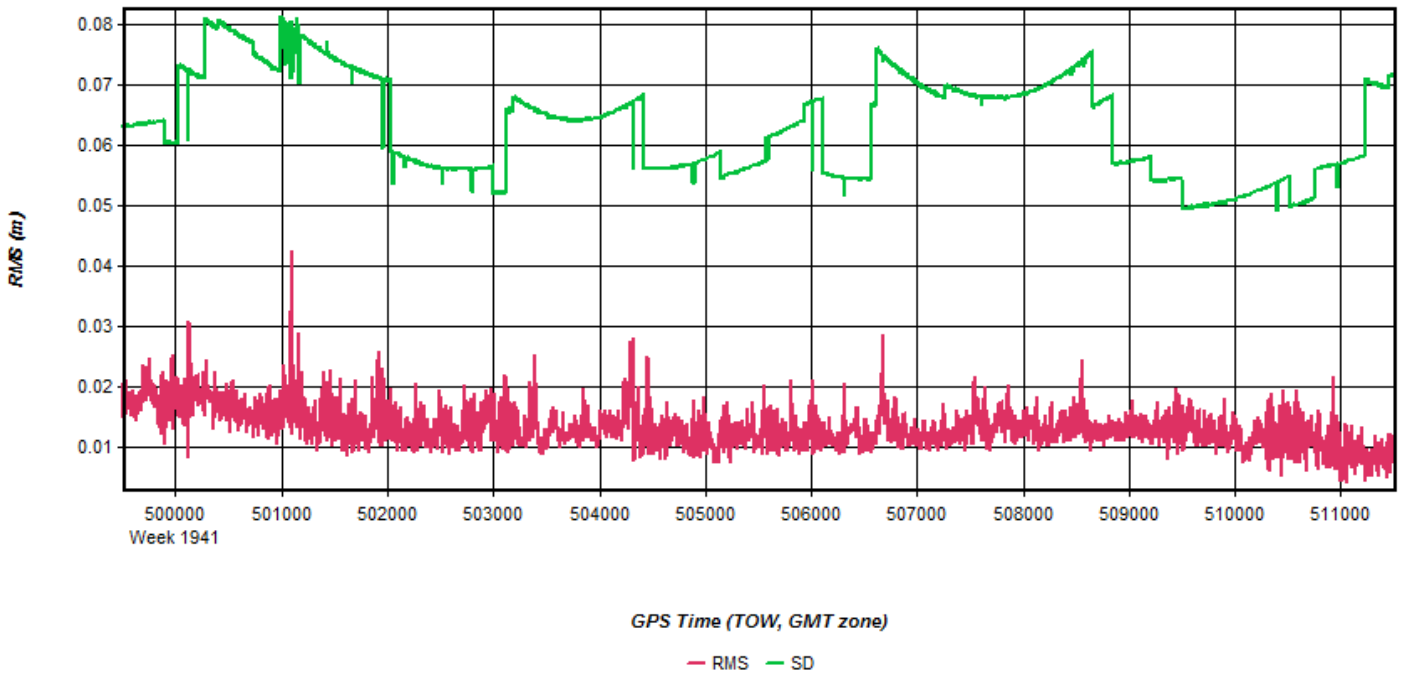
GPS Time (TOW, GMT zone)

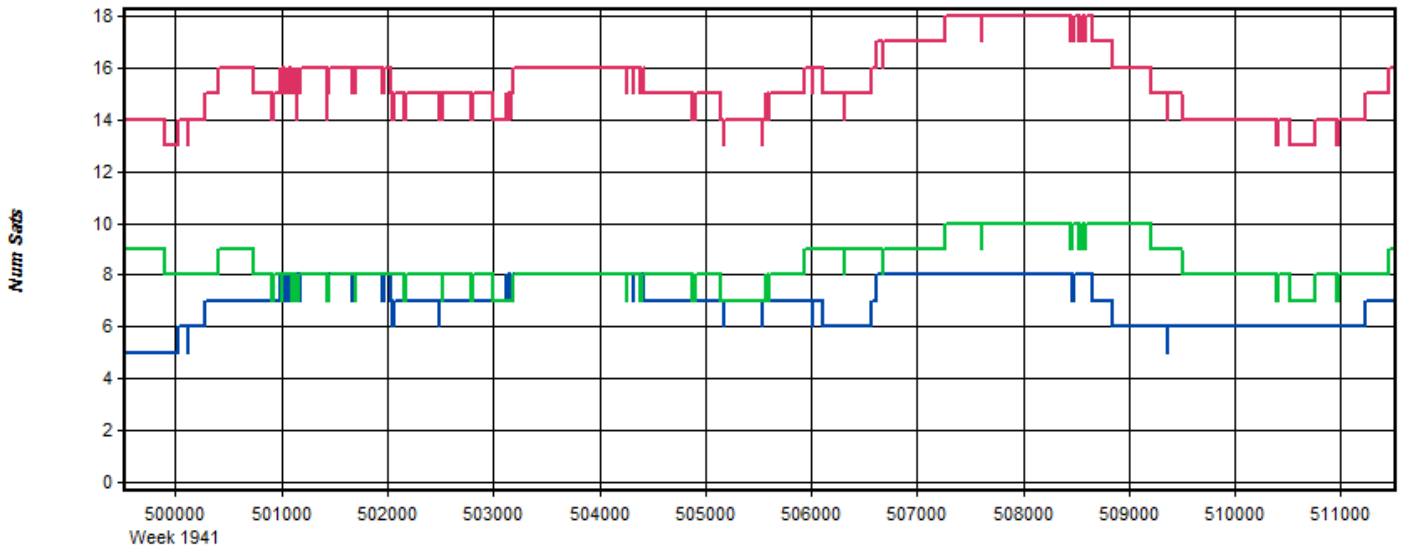
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

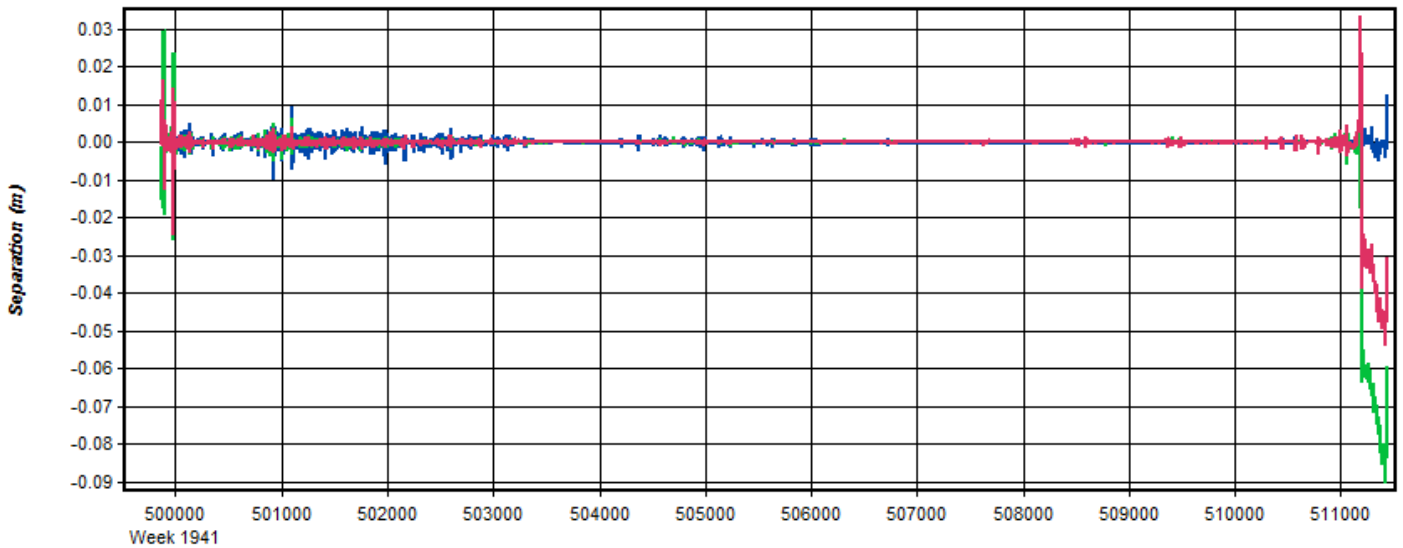
— Roll — Pitch





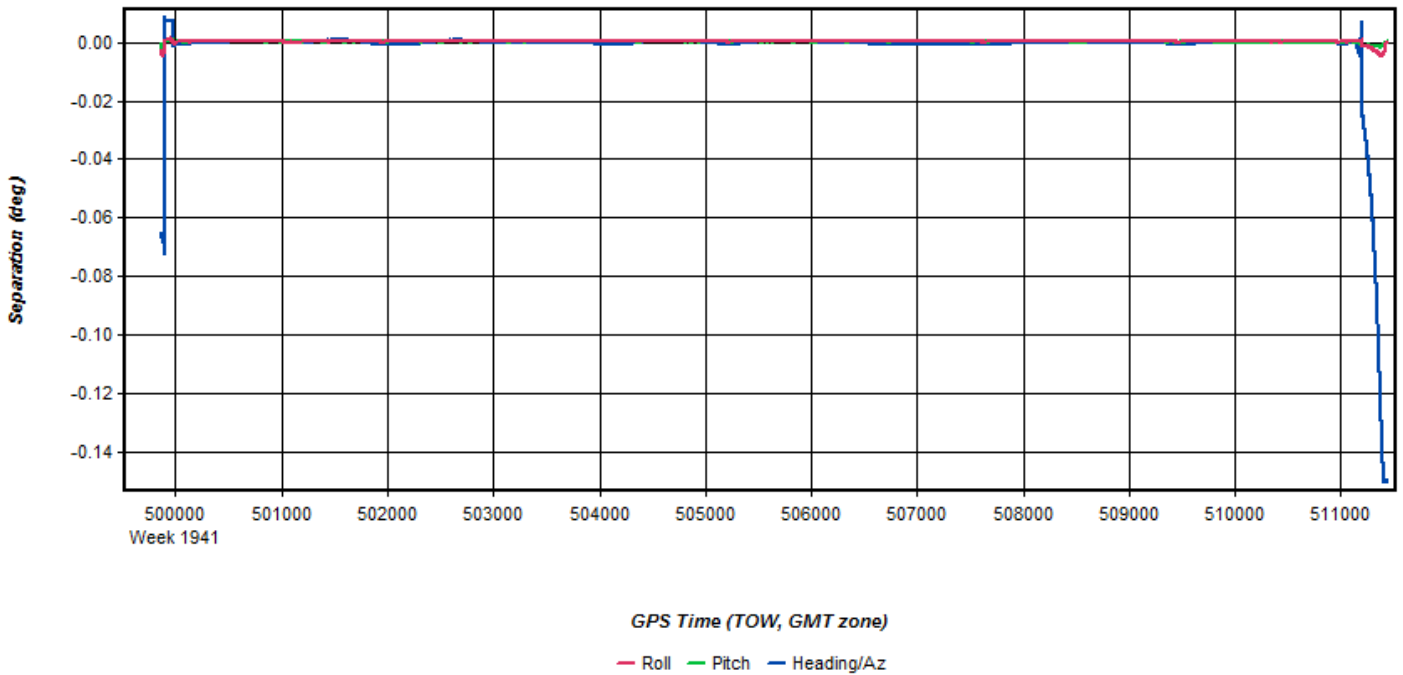
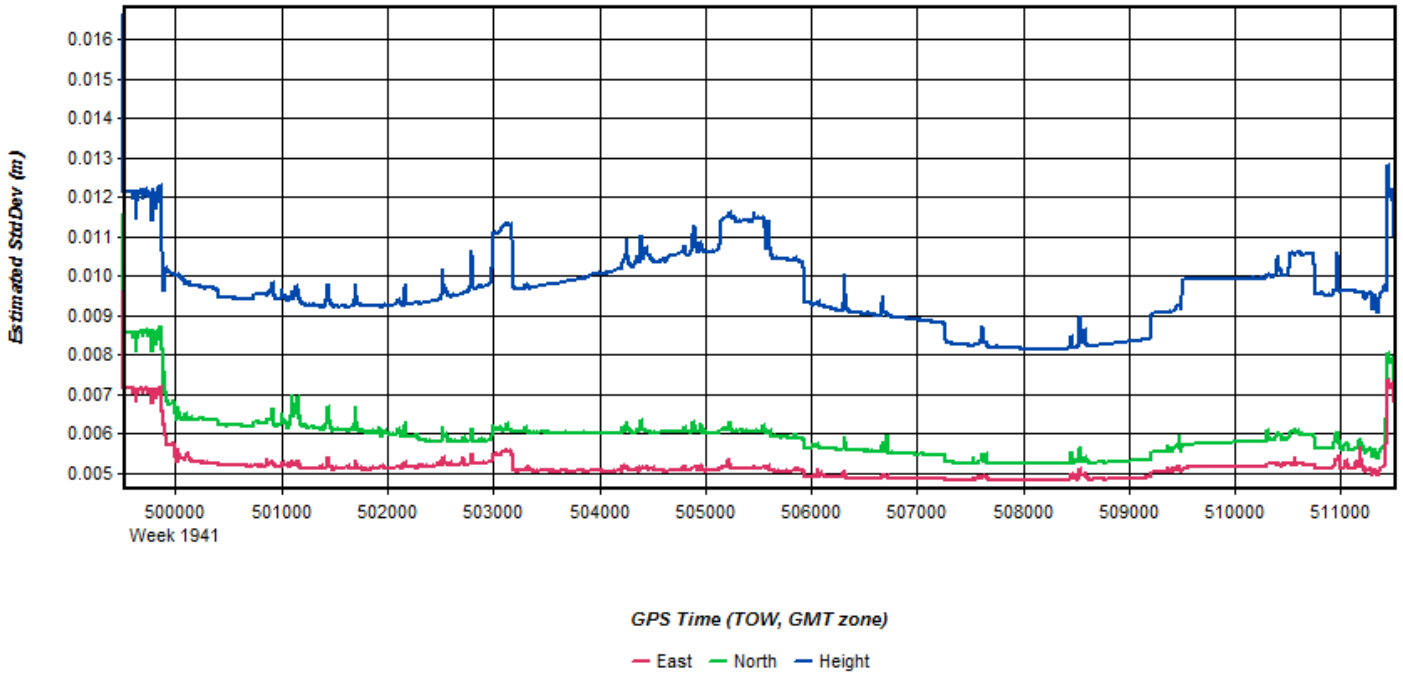
GPS Time (TOW, GMT zone)

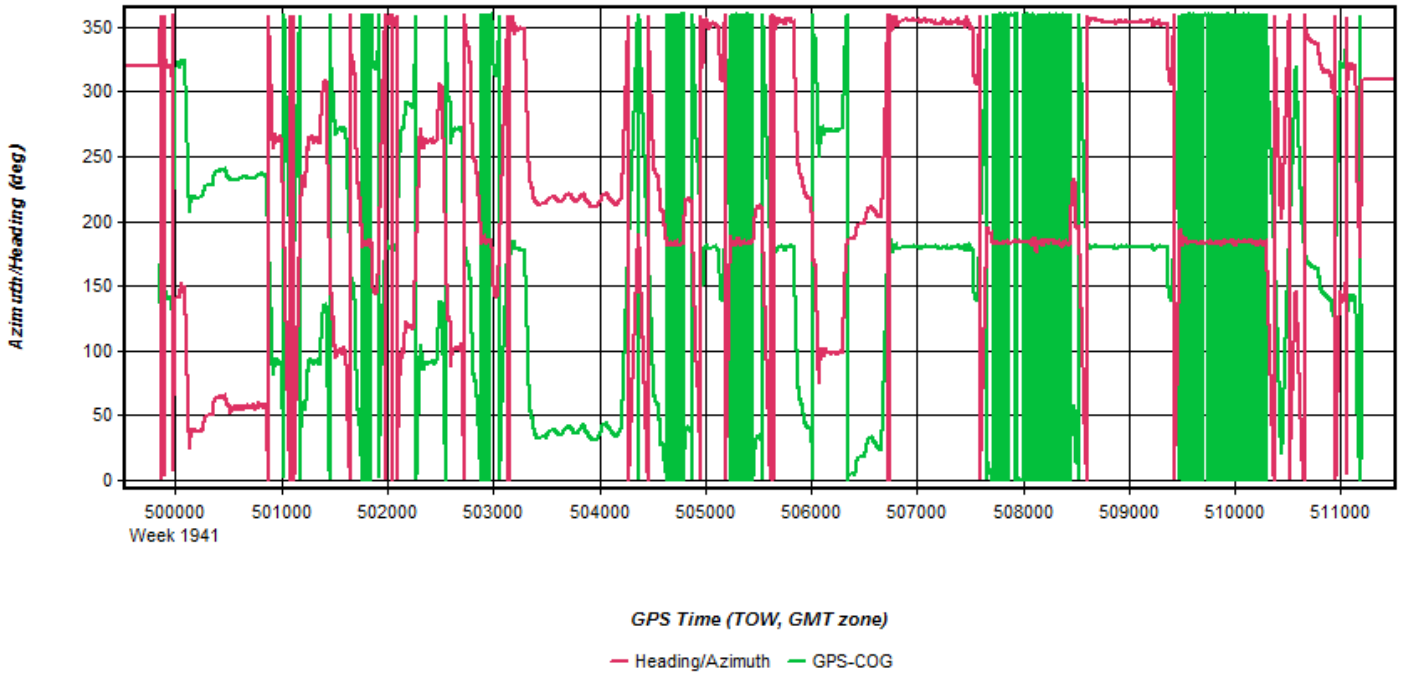
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Project: Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 3-29-2017
in COB I 79141

Project: NRCS SD. **Proj #:** 30420 **Flight Mgmt File:** 2017050-ALS80 **Tech:** COX

Aircraft: 604MP **Begin Hobbs:** 2008.2 **End Hobbs:** 2012.0 **Total:** **Pilot:** M/S/SON **Co-Pilot:** **Tot Time Aloft:**

Dep Apt: ~~FR949~~ **Dep Time (Local):** 1:53 (2) 18:53 **Arr Apt:** 9V9 **Arr Time (Local):** 4:55 (2) 21:55

CORE: Y / N **Sta 1:** **Sta 2:** **Flyovers:** Y / N **IF Y, times: Sta1)** **Sta2)**

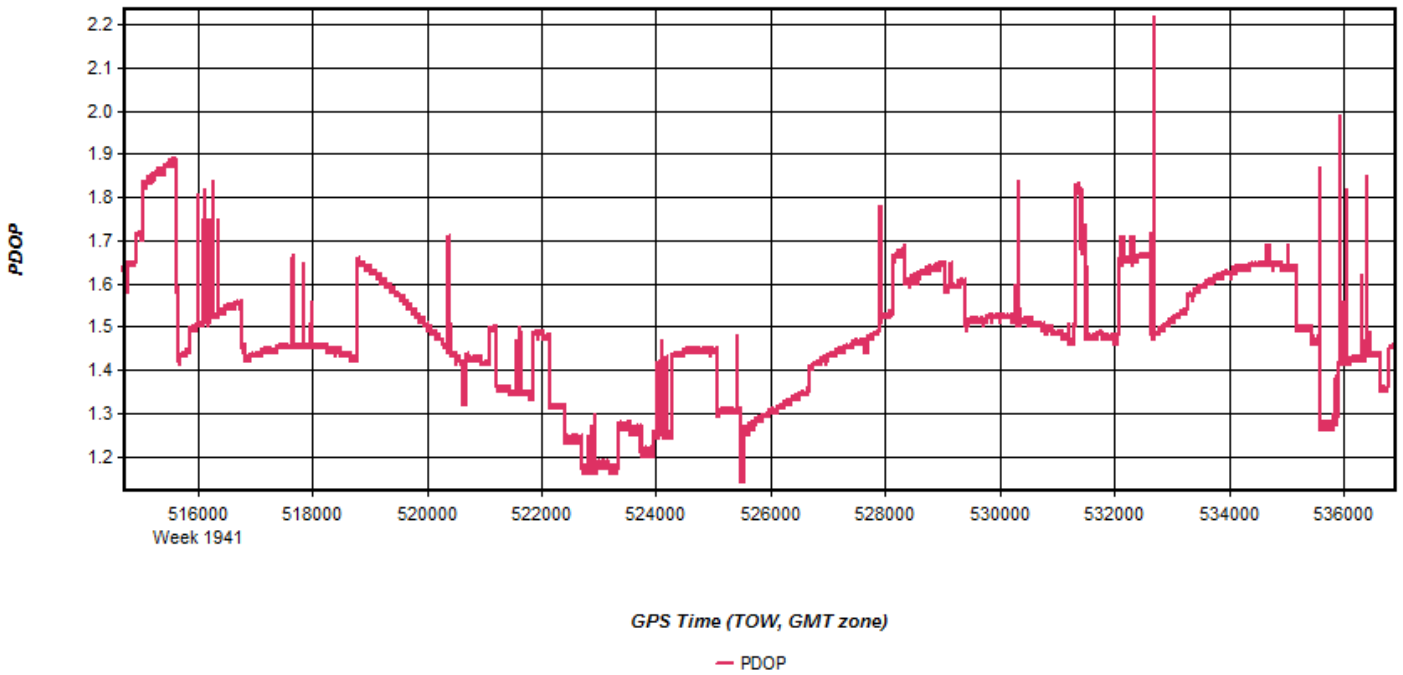
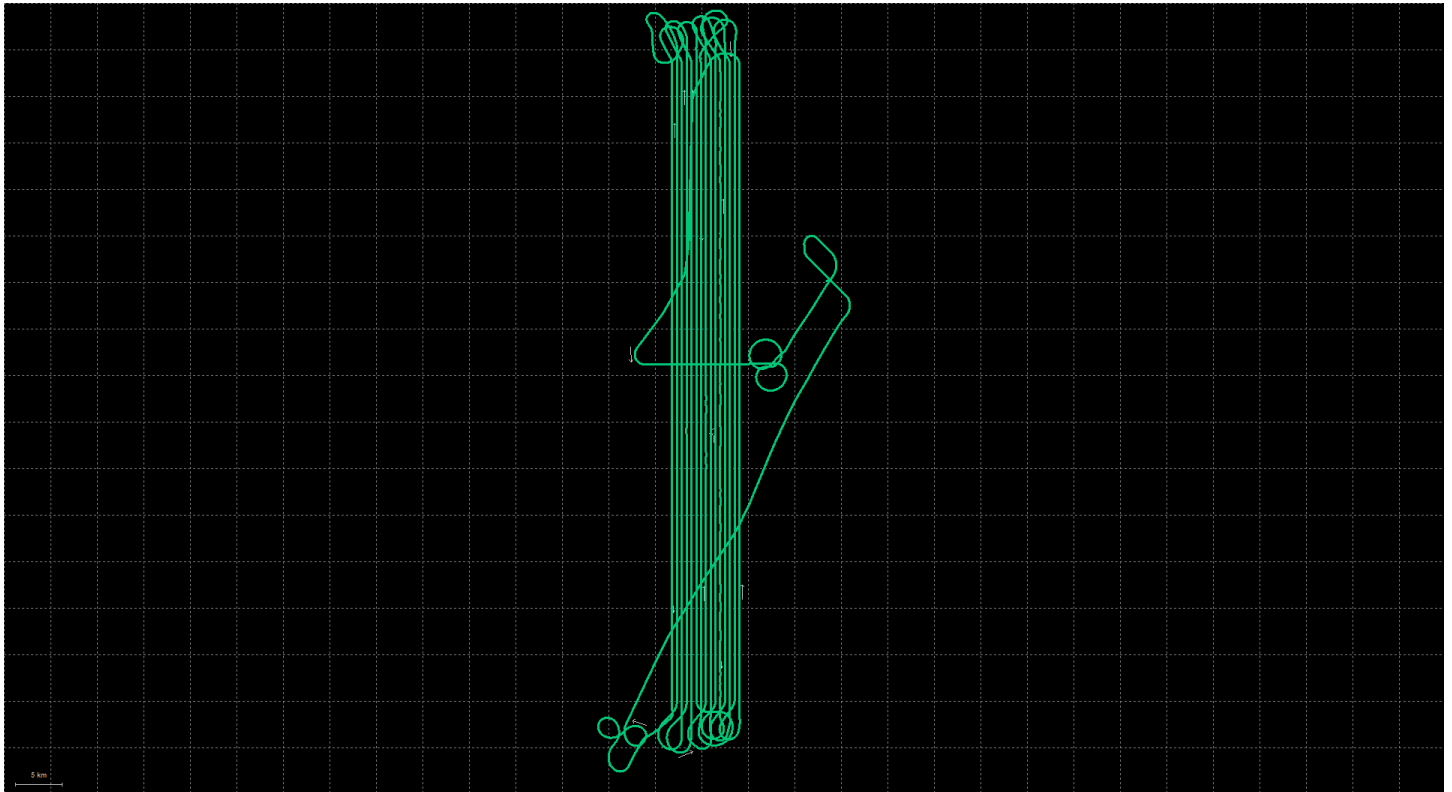
GPS Units: (Y) N **Sta 1:** 9V9 STAYC **Sta 2:** **Flyovers:** Y / N **IF Y, times: Sta1)** **Sta2)**

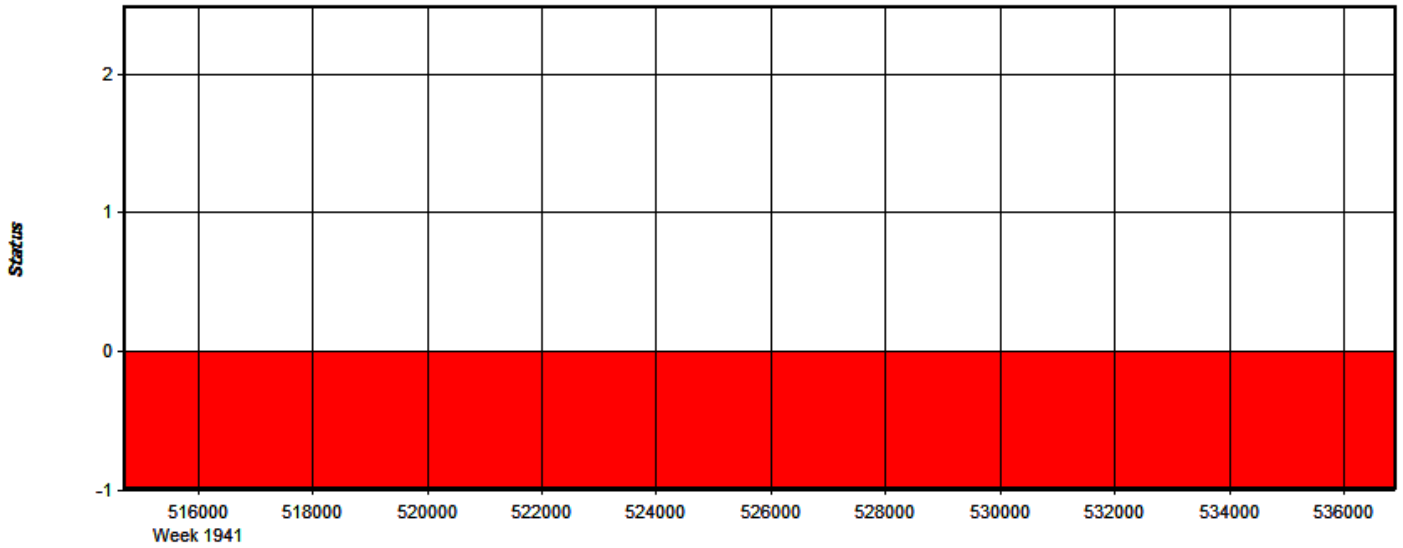
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOO/P/ASAS	GPS Altitude	Alt AGL	Alt AMSL	Pulse In Air	Crab	Turb (0-2)	°C		Altimeter begin:	end:	Max Gdspd	Avg Pk Spacing	Power	PPSM	Accurately
												End	End							
300	355	2011	2012	133	1.7/18	6836								3010	3010	130		100	2	7-11
299	175	2016	2018	143	1.2/19	6746														7-17
298	355	2021	2023	121	1.1/19	6825														2-4
297	175	2027	2030	126	1.1/20	6773														
304	265	2035	20:37	127	1.1/20	6814														
296	175	2047	2058	137	1.1/20	6817														
295	355	2101	2113	138	1.1/22	6837														
294	175	2117	2129	130	1.1/22	6832														
293	355	2132	21:44	126	1.1/22	6831														

FLIGHT LINE NOTES: - visibility, clouds, smoke, partial, etc.
 0 to 7 MIKS FEE X line
 5.40
 27:00 - 22:05
 Static Stop
 9V9 - PIR MOB
 20.04
 21.46

Total Proj Lines: 8 **Lines Flown:** 8 **Lines Remain:** 0 **Online Time:** 1:45 **Mob Time:** 2:30 **Notes:**

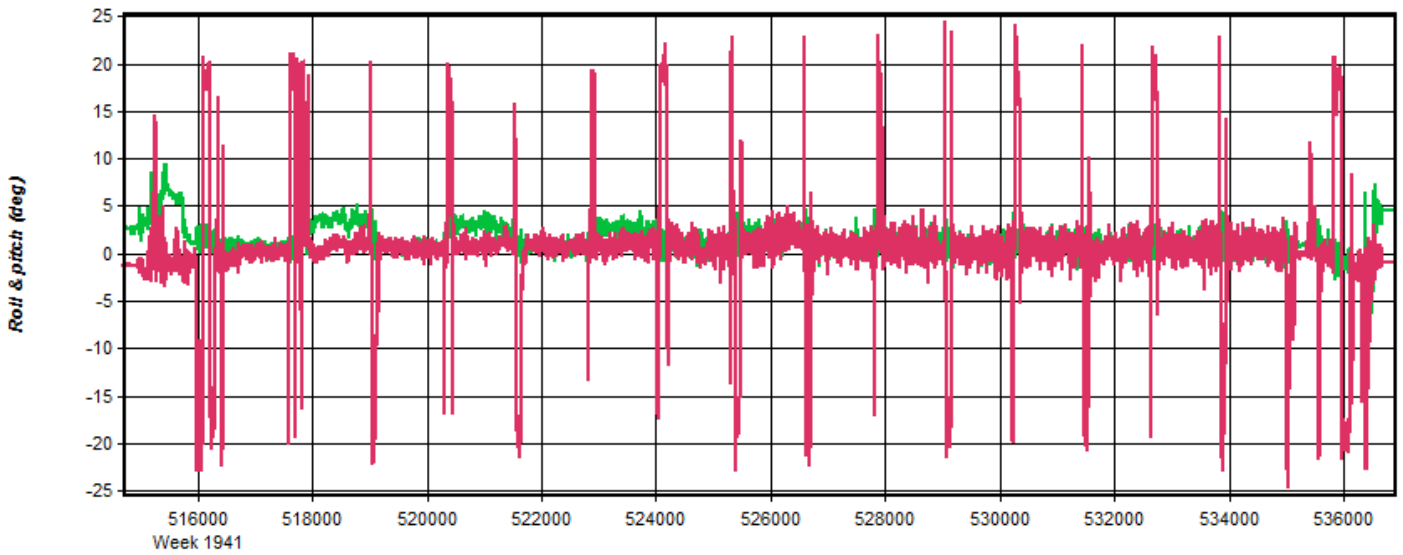
March 24, 2017-A (N915WC, SN8237)





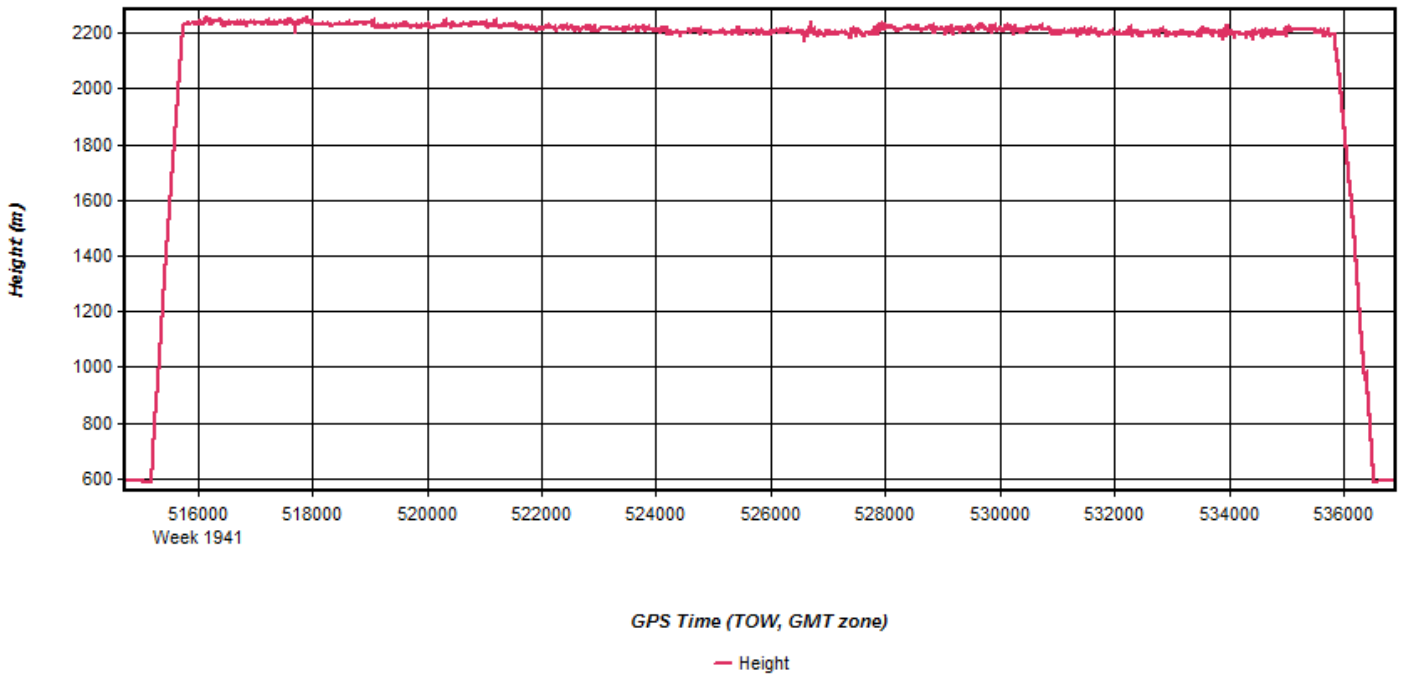
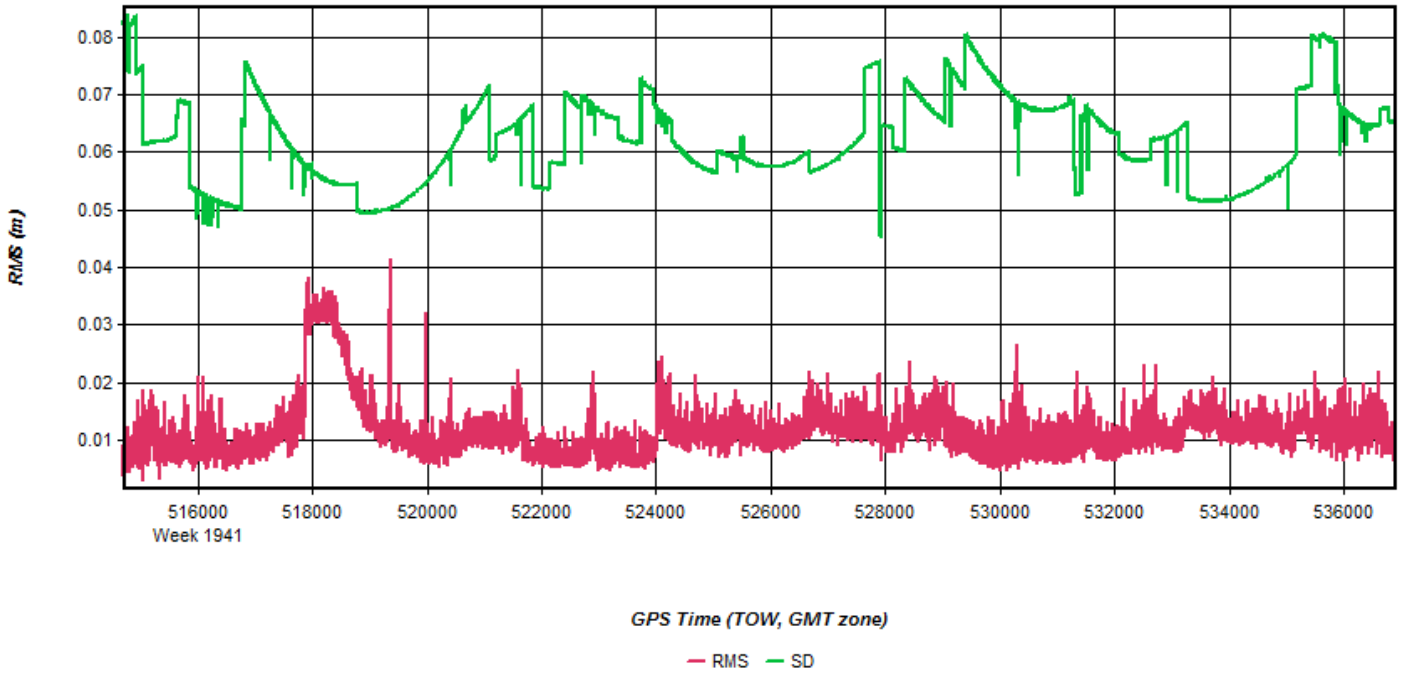
GPS Time (TOW, GMT zone)

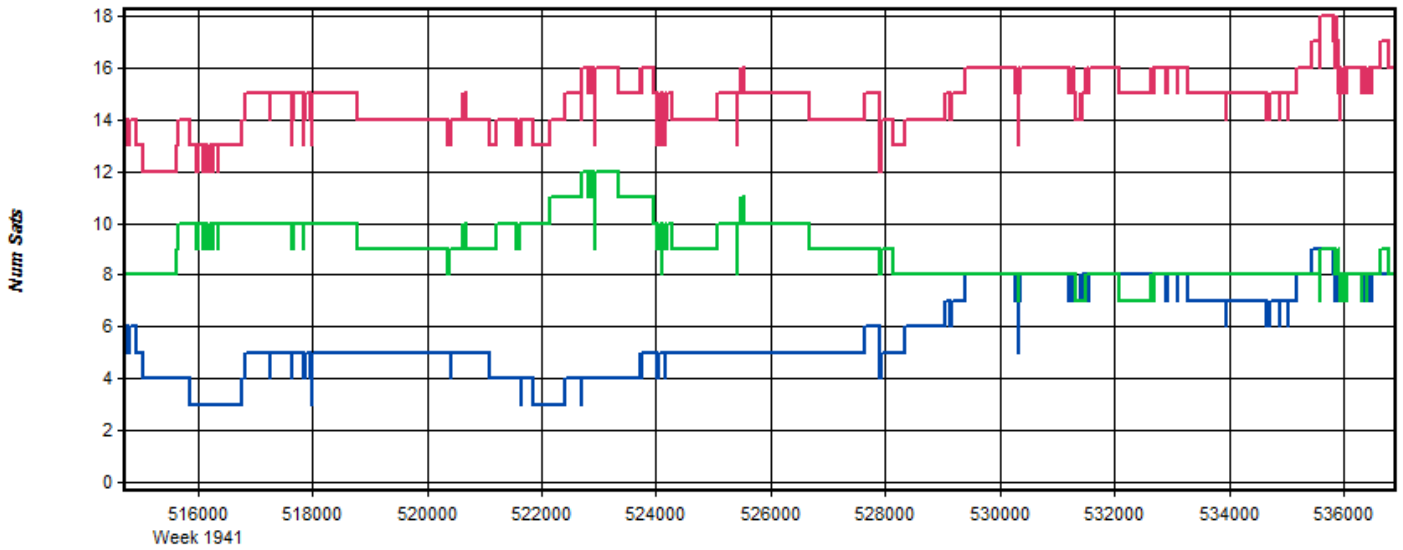
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

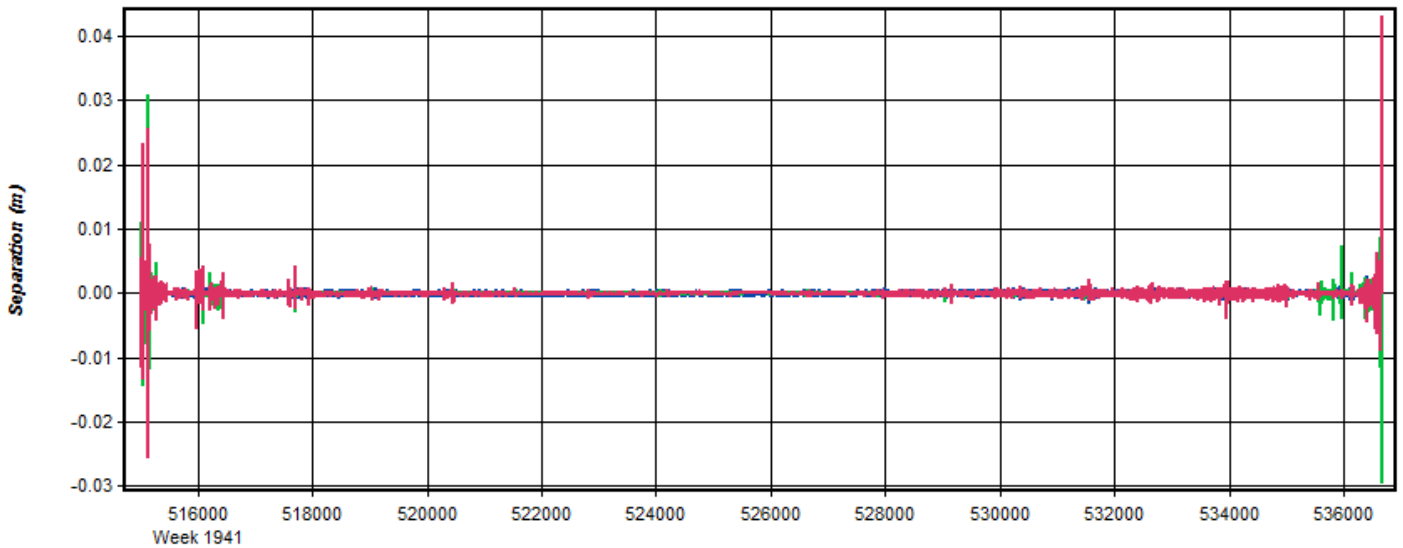
— Roll — Pitch





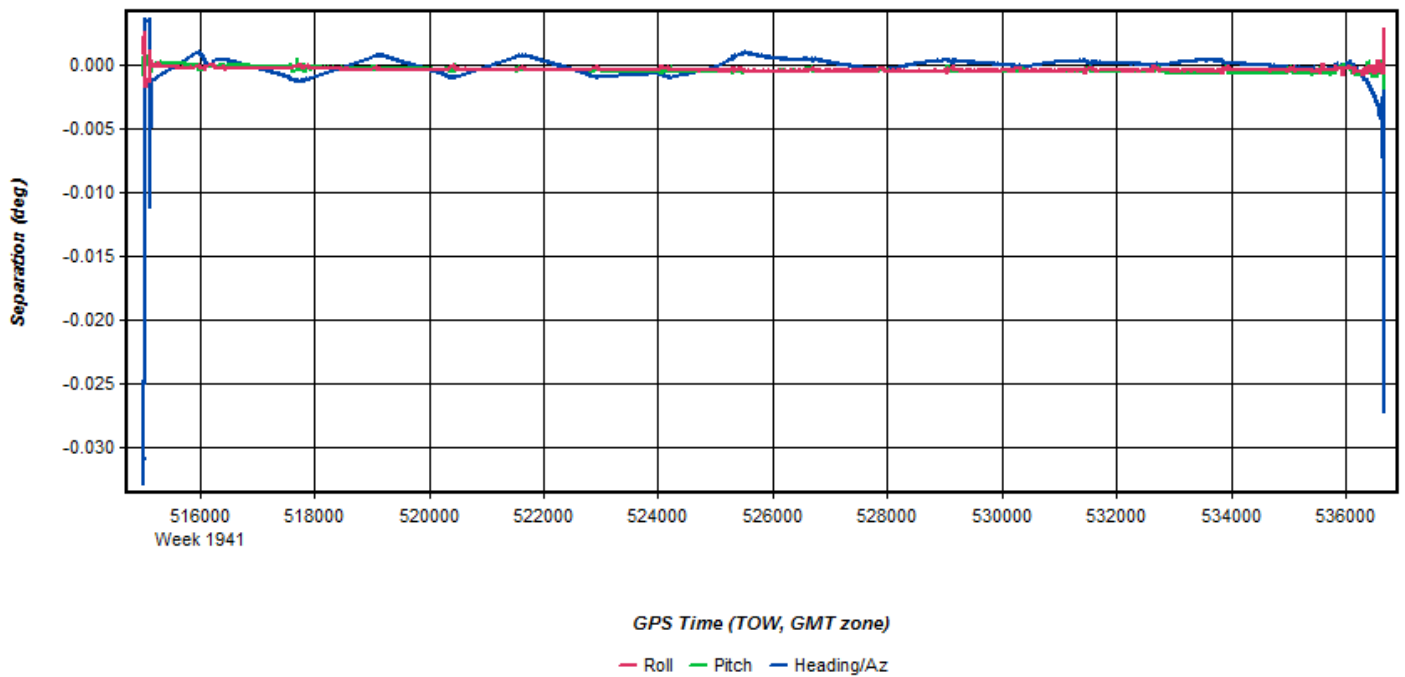
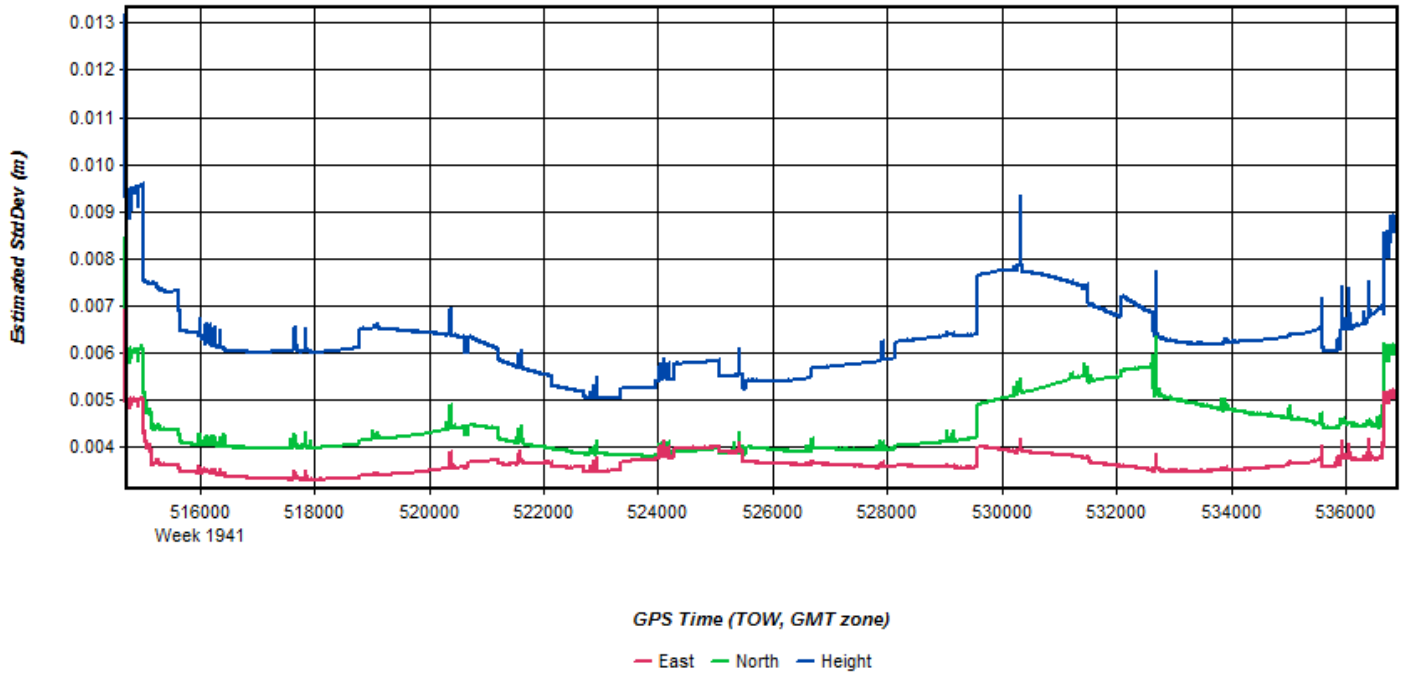
GPS Time (TOW, GMT zone)

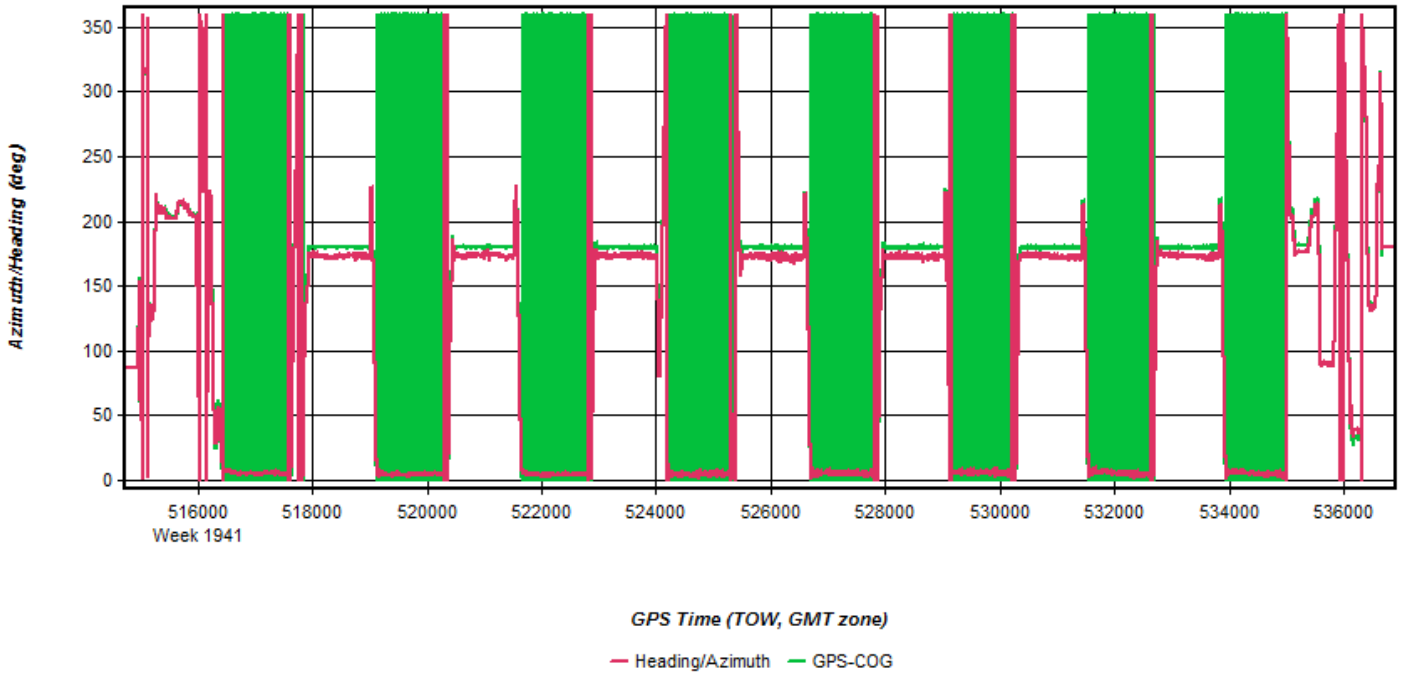
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



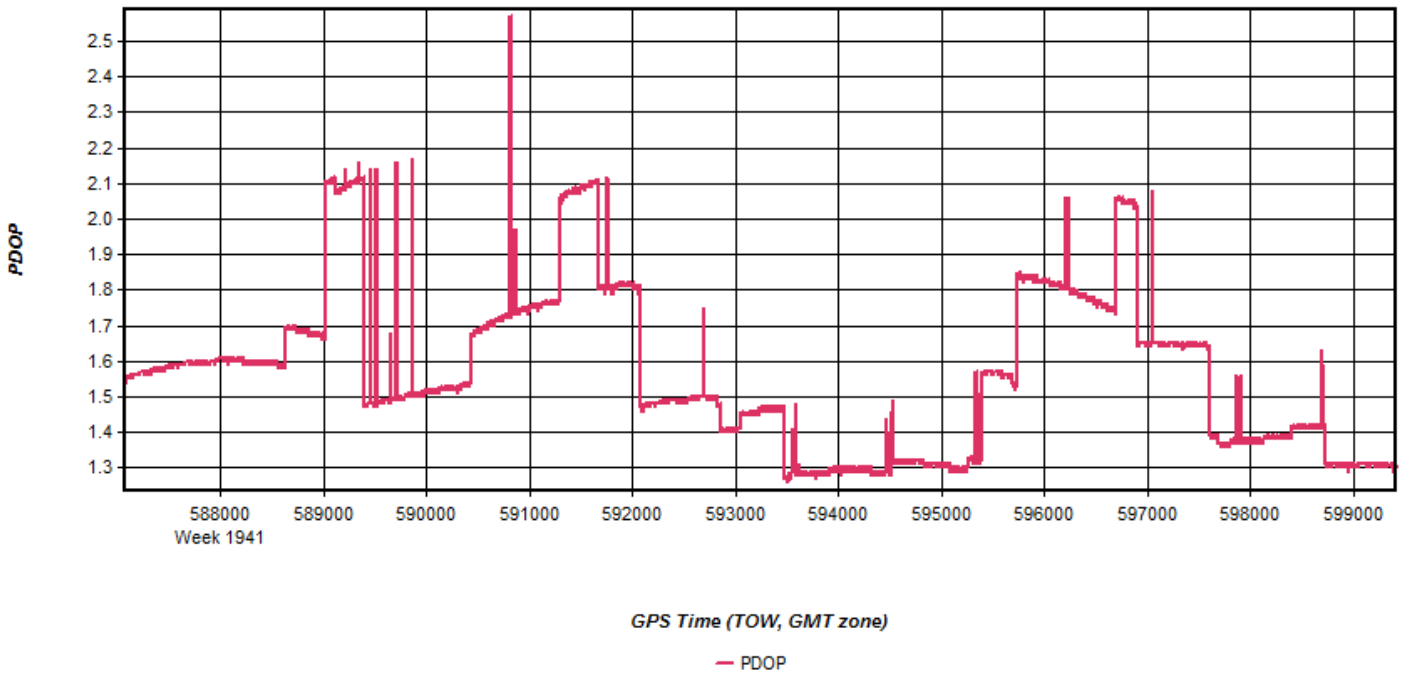
GPS Time (TOW, GMT zone)

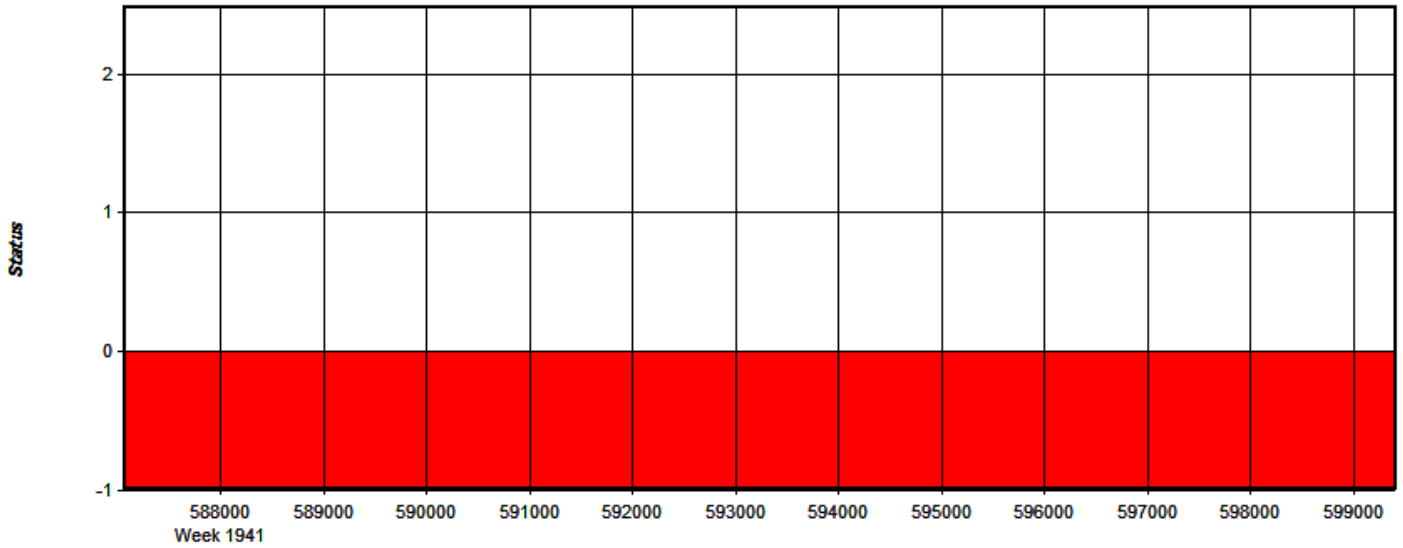
— East — North — Up





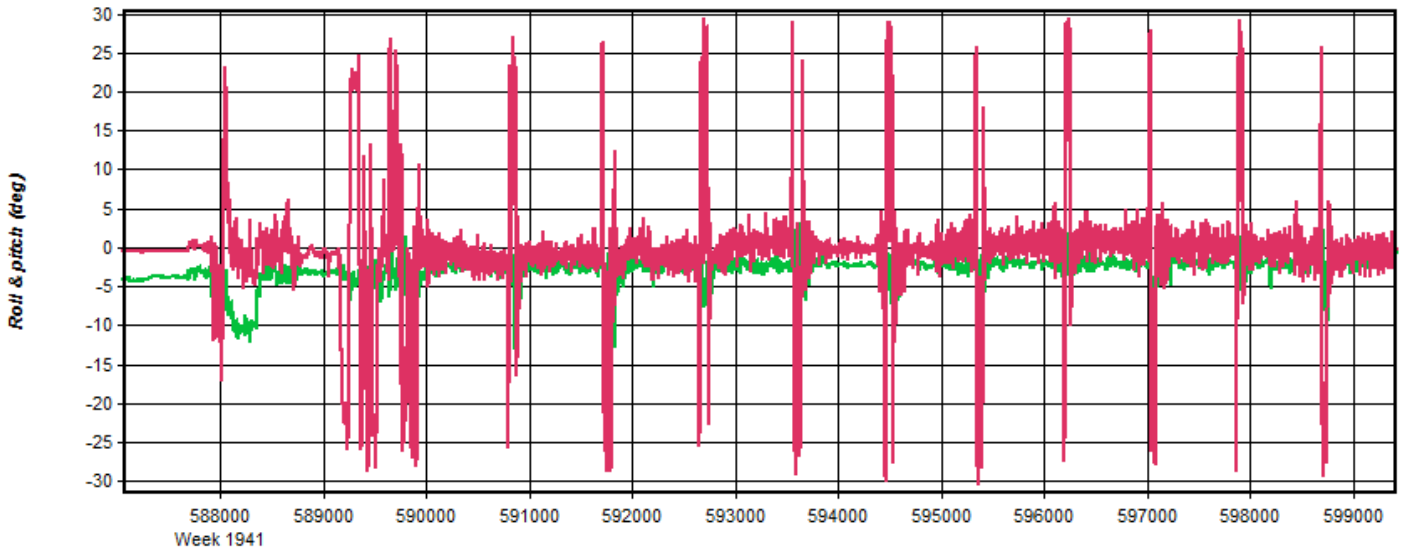
March 25, 2017-A (604MD, SN8227)





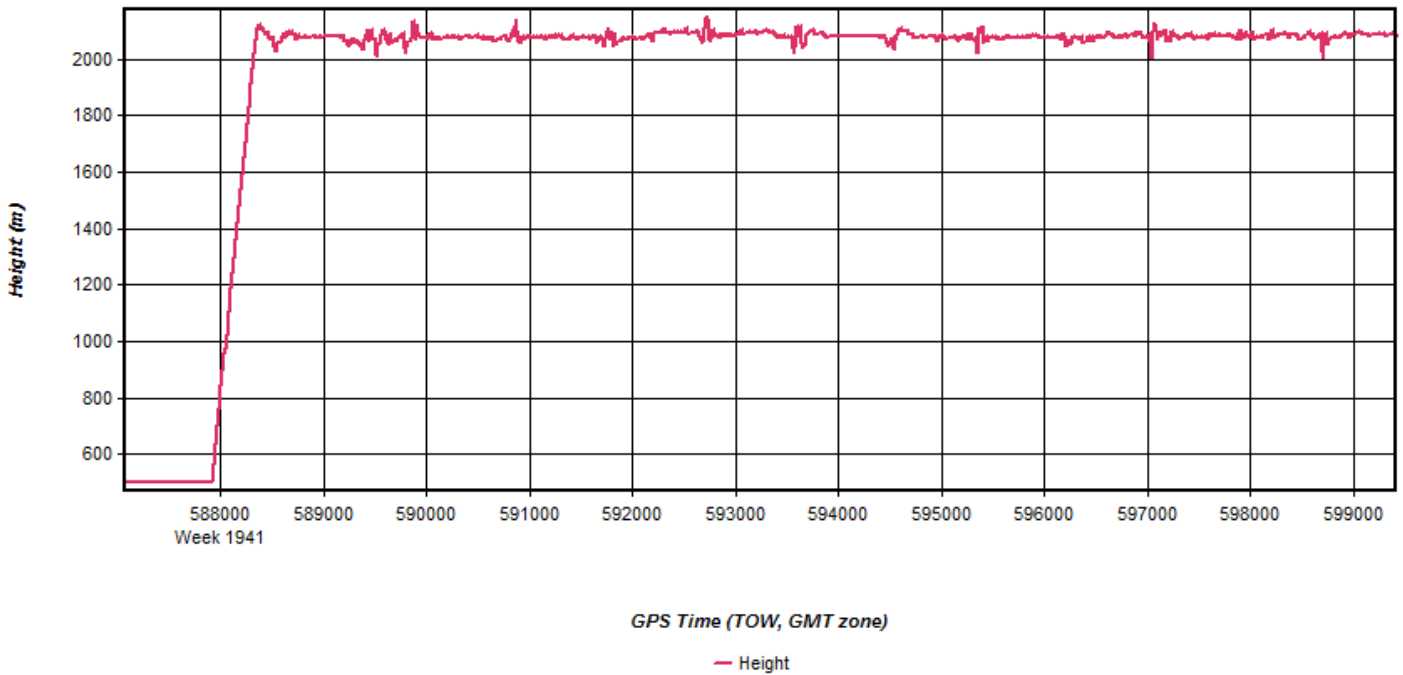
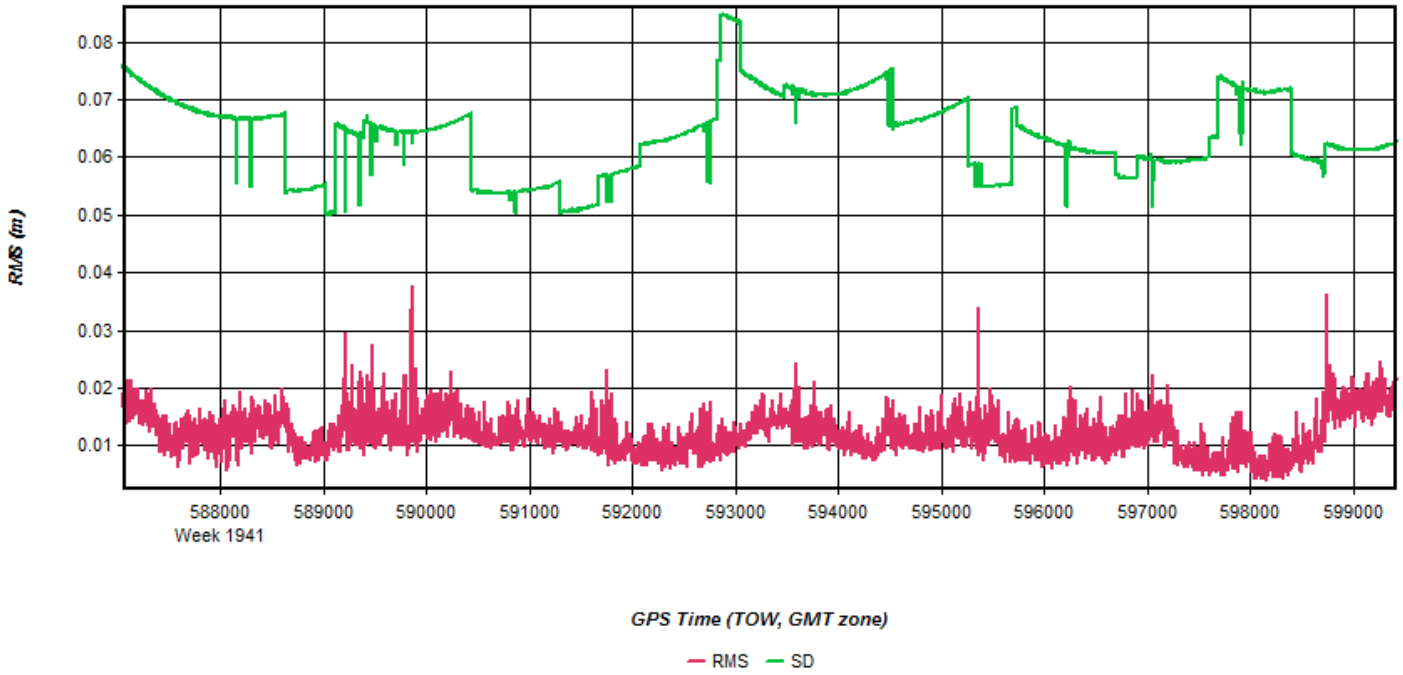
GPS Time (TOW, GMT zone)

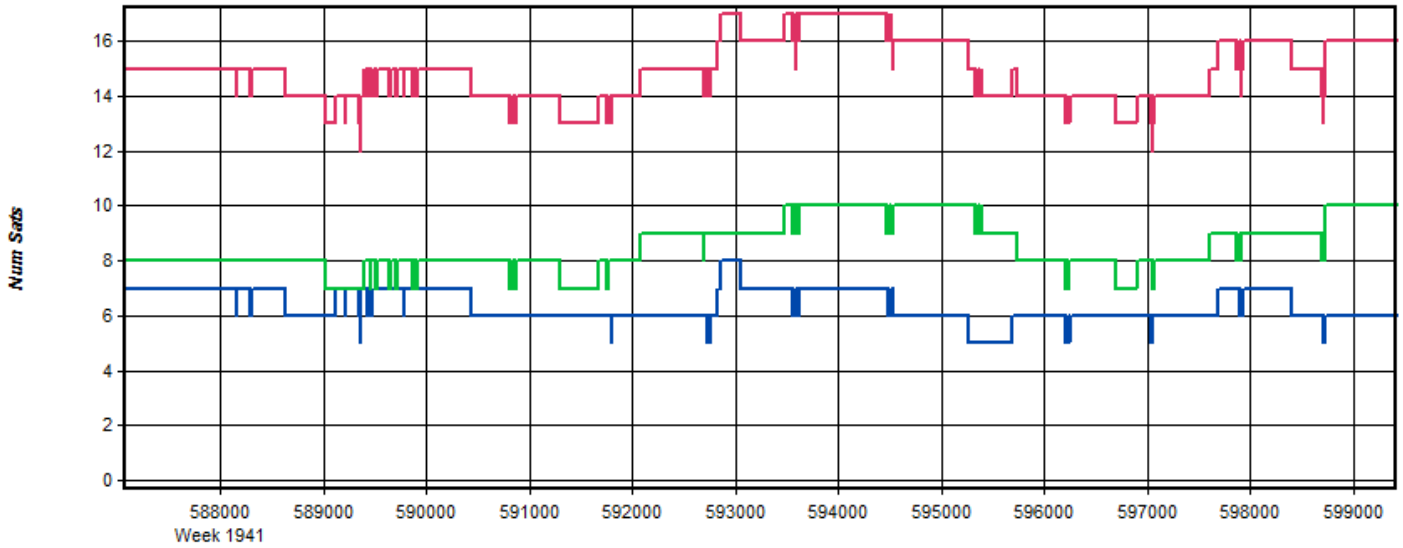
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

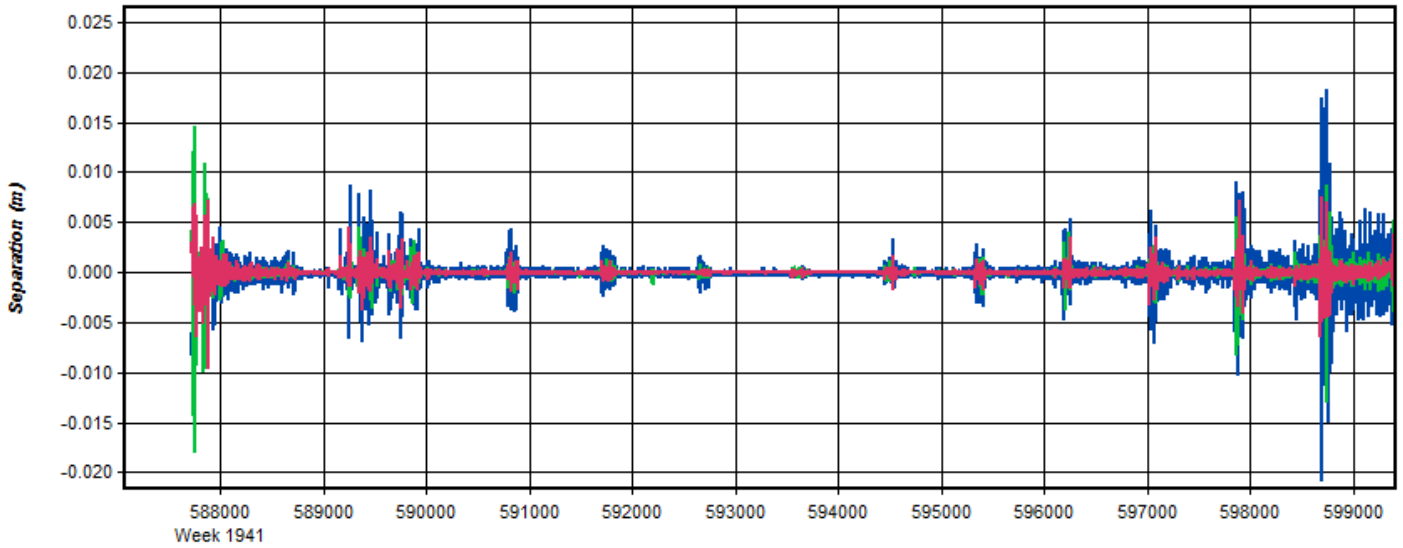
— Roll — Pitch





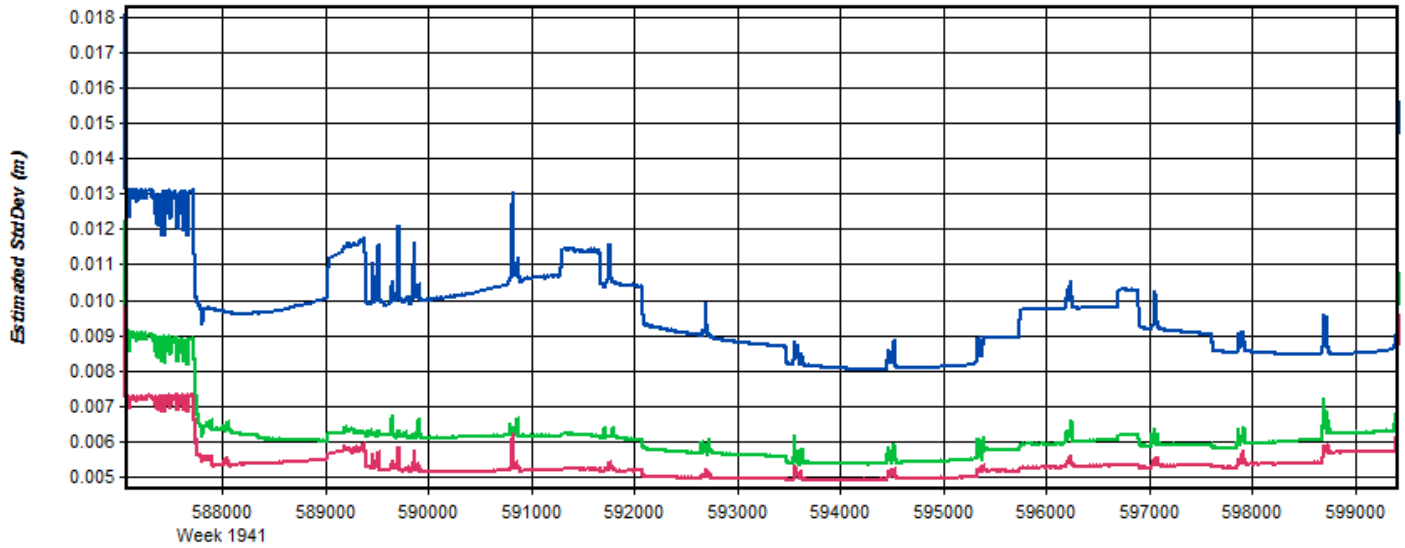
GPS Time (TOW, GMT zone)

— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



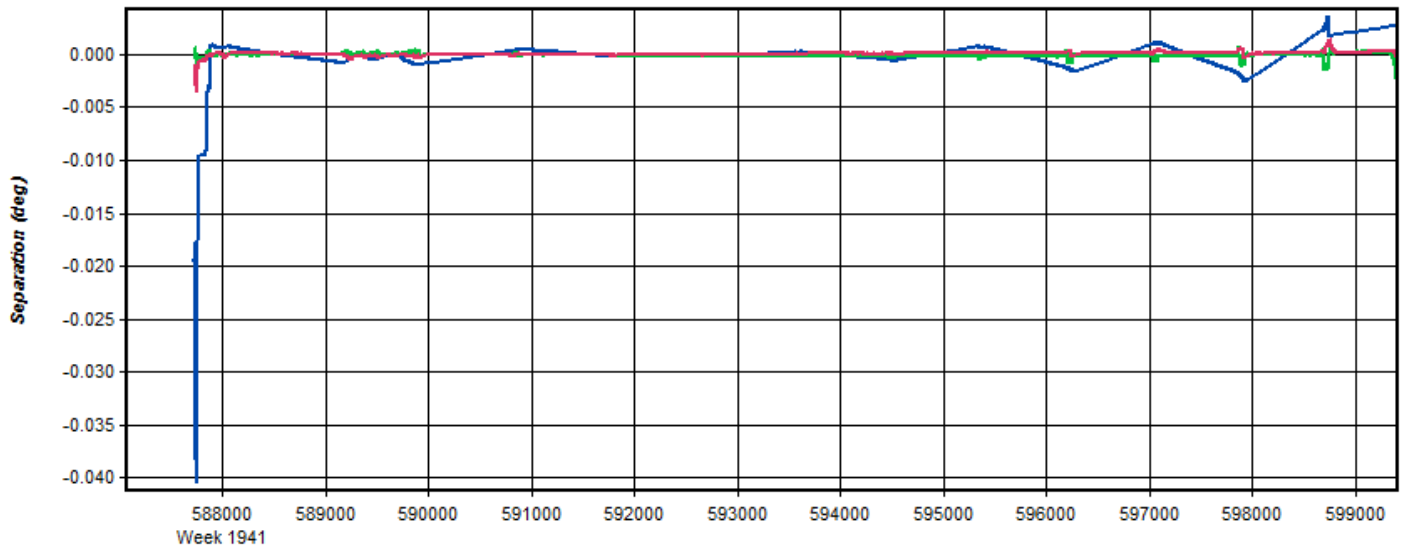
GPS Time (TOW, GMT zone)

— East — North — Up



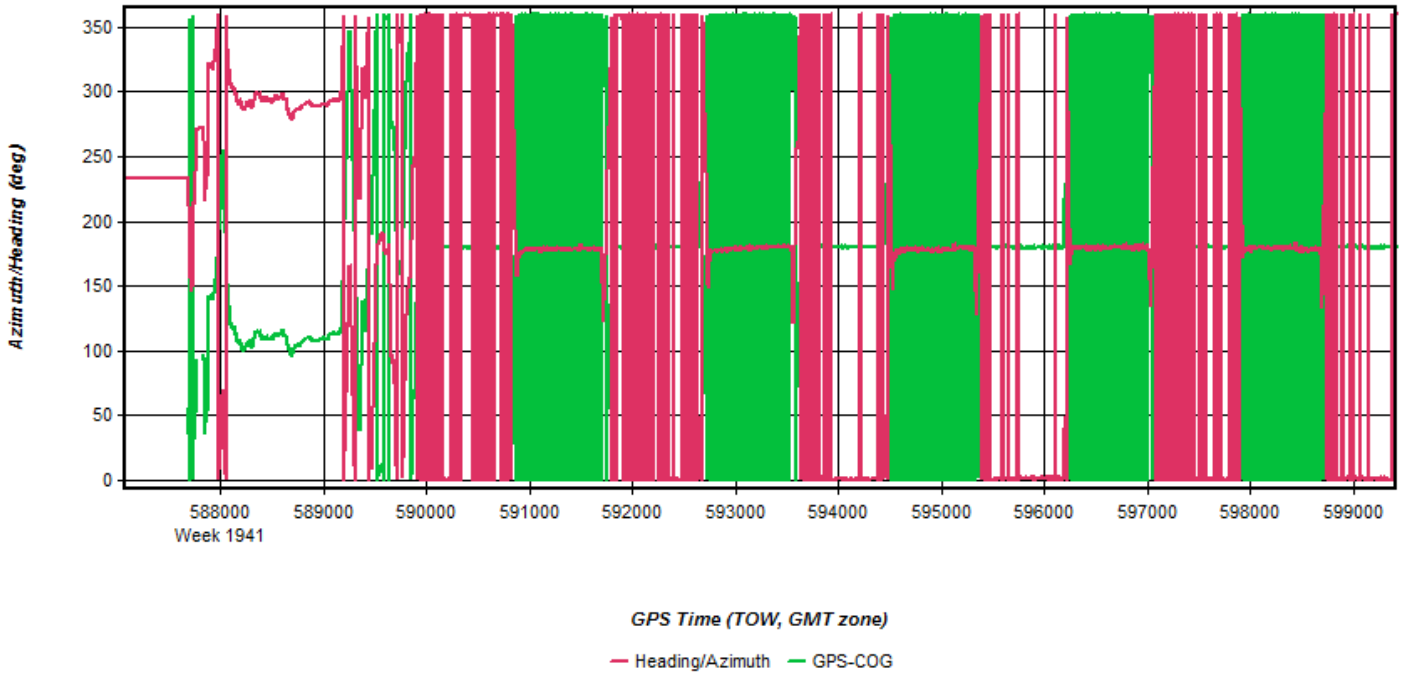
GPS Time (TOW, GMT zone)

— East — North — Height



GPS Time (TOW, GMT zone)

— Roll — Pitch — Heading/Az



Flight Log

Project: NRC S SD. **Proj #:** 30420 **Flight Mgmt File:** 30420-SD-ALS80 **Date:** 3/25/2017 **UIC:** 0 B C D E **Page:** 1 of 2

Aircraft: N604MD **Begin Hobbs:** 2012.0 **End Hobbs:** 2018.4 **Total:** 6.4 **Pilot:** Luckett **Co-Pilot:** Swinford **Tech:** Swinford

Dep Apt: KPIR **Dep Time (Ldt):** 2:15 **Air Apt:** **Air Time (Local):** **Tot Time Aloft:** 6.4

CORS: **Sta 1:** KPIR **Static** **Sta 2:** **Flyovers:** Y / N **If Y, times: Sta1)** **Sta2)**

GPS Unit: **Sta 1:** KPIR **Static** **Sta 2:** **Flyovers:** Y (N) **If Y, times: Sta1)** **Sta2)**

Gd Temp beg: 5 °C **End:** °C **OAT beg:** °C **End:** °C **Altimeter begin:** 2997 **end:**

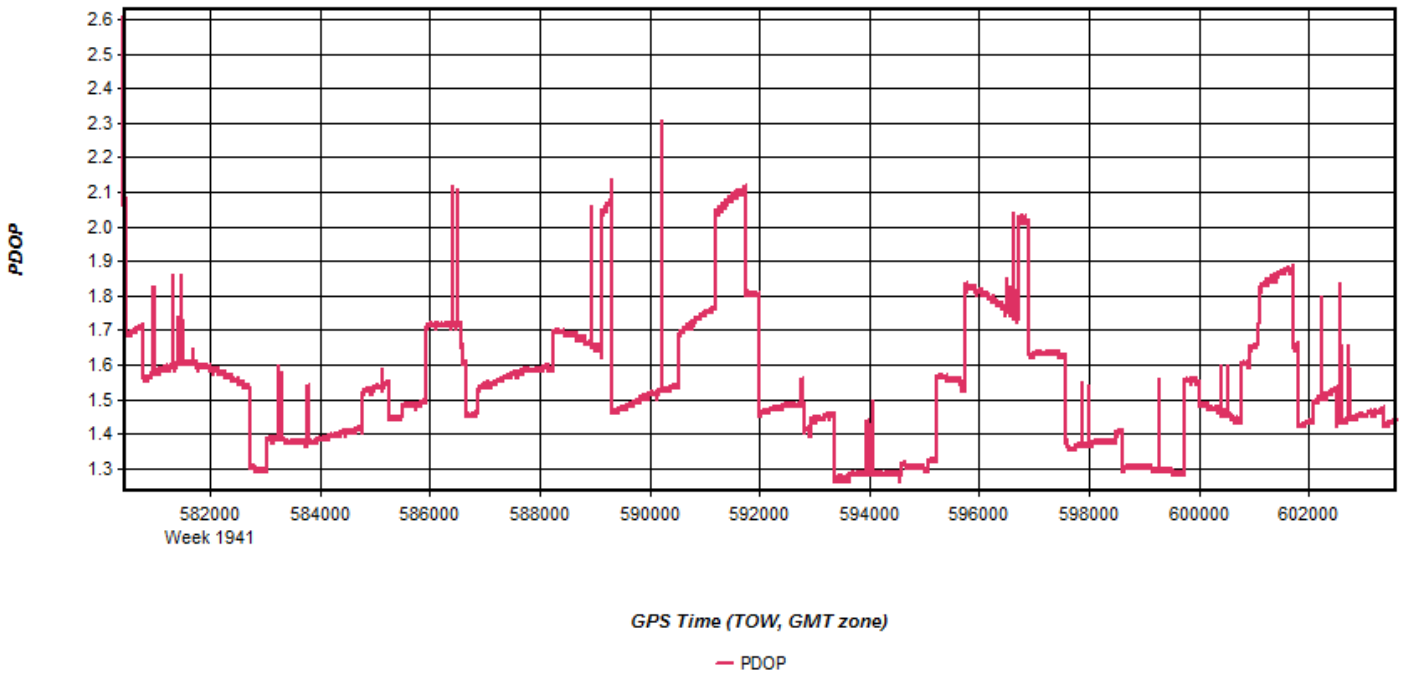
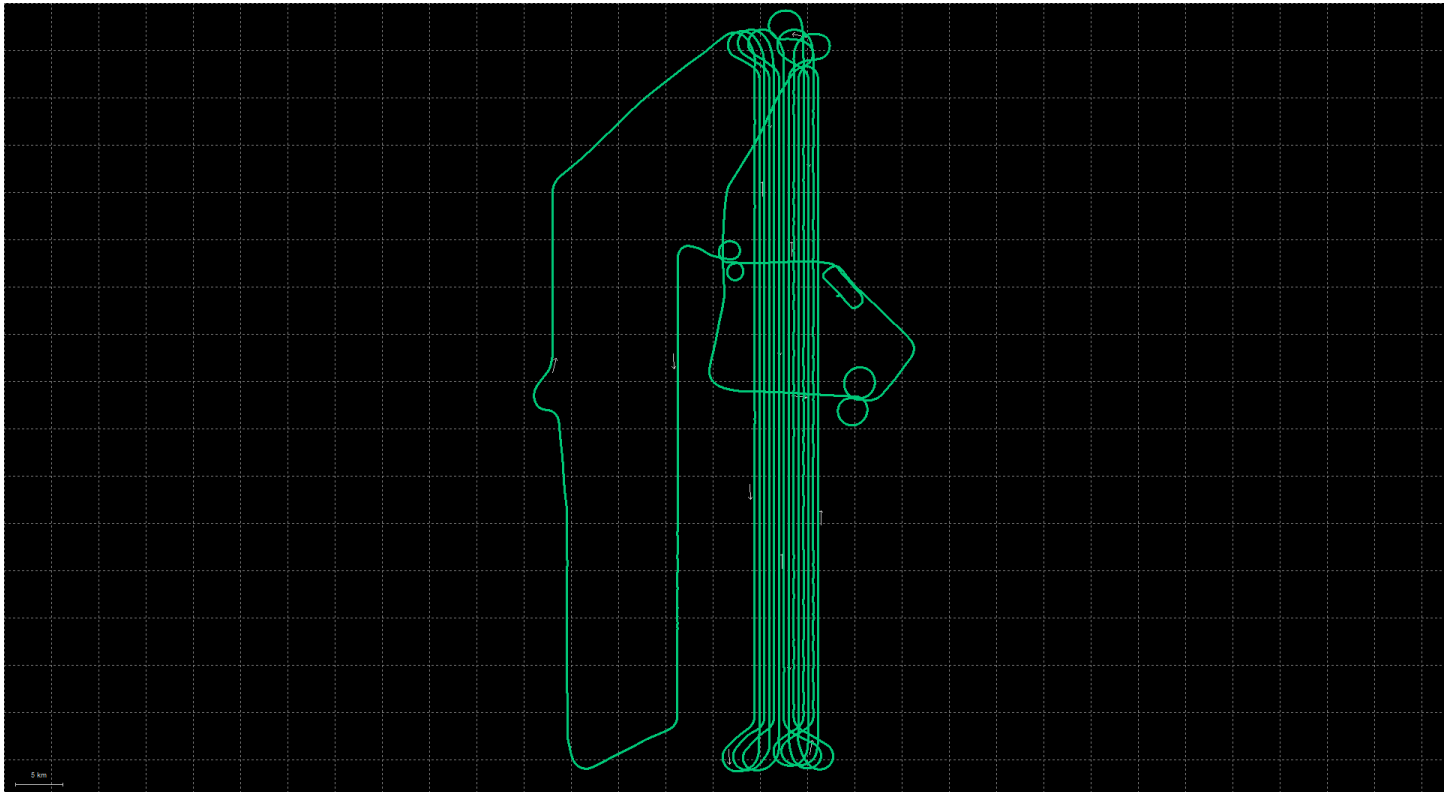
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	POOP/Sea	GPS Altitude	Turb (0..3)	Crab		Mag CB	End CB	Tot CB	Storage Namefile
								Alt AGL	Alt AMSL				
282	175	19:54	20:06	130	12/19	6800	0						585
283	355	20:08	20:21	127	13/18	6800	0						488
284	175	20:24	20:37	125	12/18	6800	0						97
285	355	20:39	20:52	131	12/19	6800	0						
286	175	20:54	21:07	130	11/21	6800	0						
287	355	21:09	21:22	128	11/20	6800	0						
288	175	21:24	21:36	131	12/20	6800	0						
289	355	21:39	21:50	133	11/18	6800	0						
290	175	21:52	22:03	133	11/19	6800	0						
291	355	22:06	22:18	138	12/20	6800	0						
292	175	22:21	—	135	11/21	6800	0						
292	175	22:54	23:06	134	12/19	6800	0						
281	355	23:10	23:23	130	10/21	6800	0						
280	175	23:24	23:37	130	12/19	6800	0						
279	355	23:39	23:53	126	12/19	6800	0						
278	175	00:06	00:19	131	12/18	6800	0						
277	355	00:21	00:34	128	11/16	6800	0						
276	175	00:37	00:49	129	11/20	6800	0						

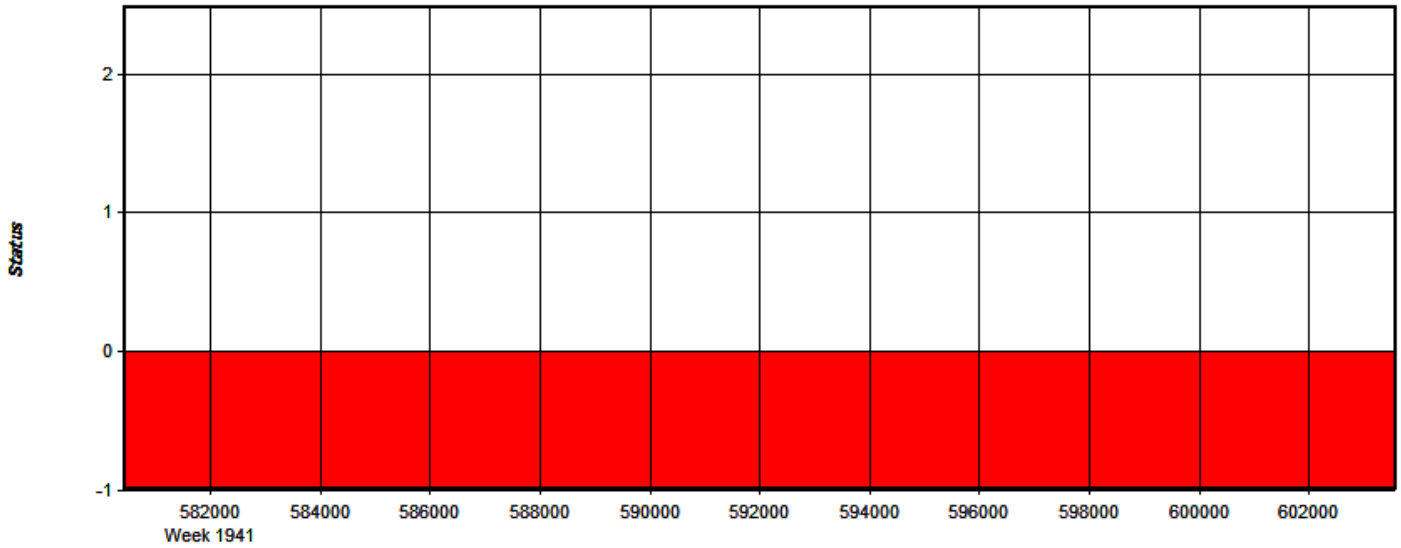
FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

0 FIG 8 @ 19:43 / OVER WATER ON NORTH END OF LINE (RIVER)
 0 LOW RETURNS ON NORTH END DUE TO WATER (RIVER)
 0 LOW RETURNS ON SOUTH + NORTH ENDS OVER RIVER
 0 SENSOR SHUT DOWN / REBOOT + RESTART LINE / NO TIE LINE
 0 FIG 8 @ 21:51
 0 CIRCLE TO KILL TIME FOR GPS MIDNIGHT
 0 FSE 23 MILES 51° BANK

Total Proj Lines:	Lines Flown:	Lines Remain:	Online Time:	Job Time:	Notes:
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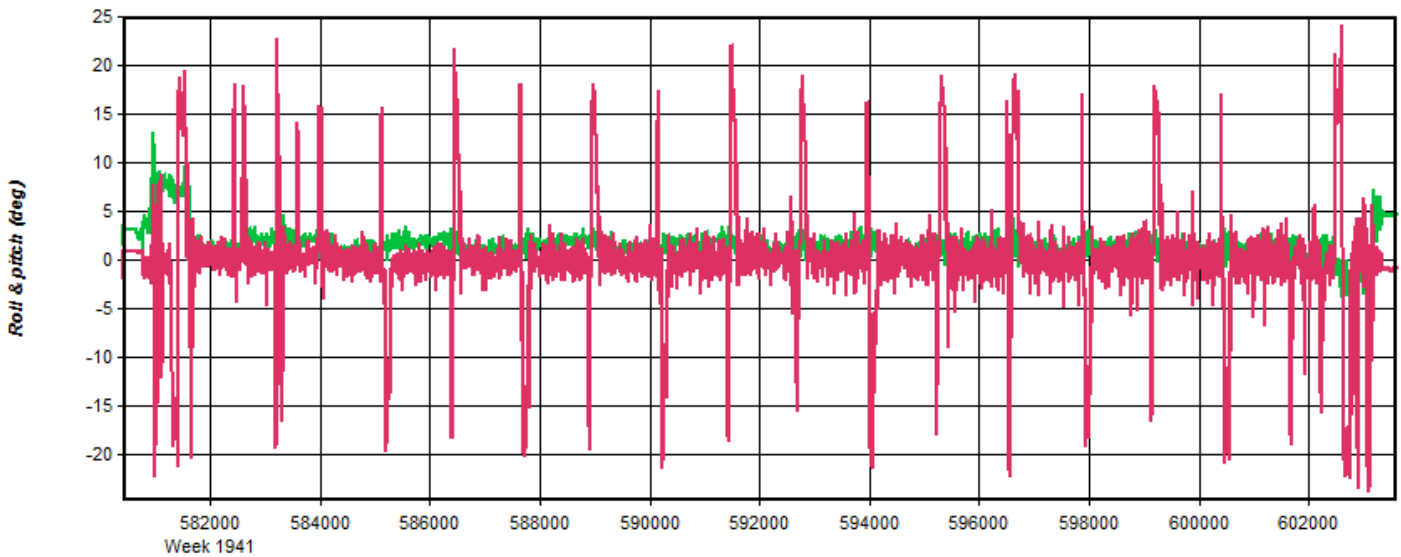
March 25, 2017-A (N915WC, SN8237)





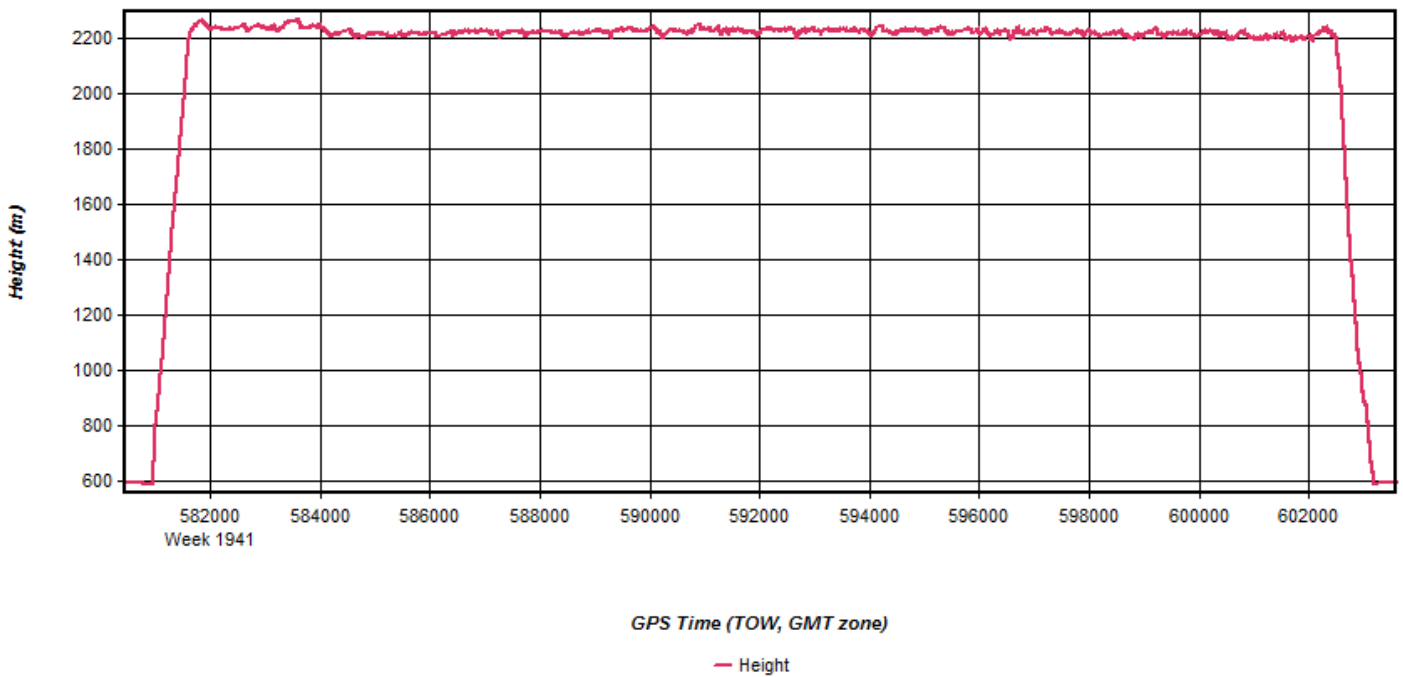
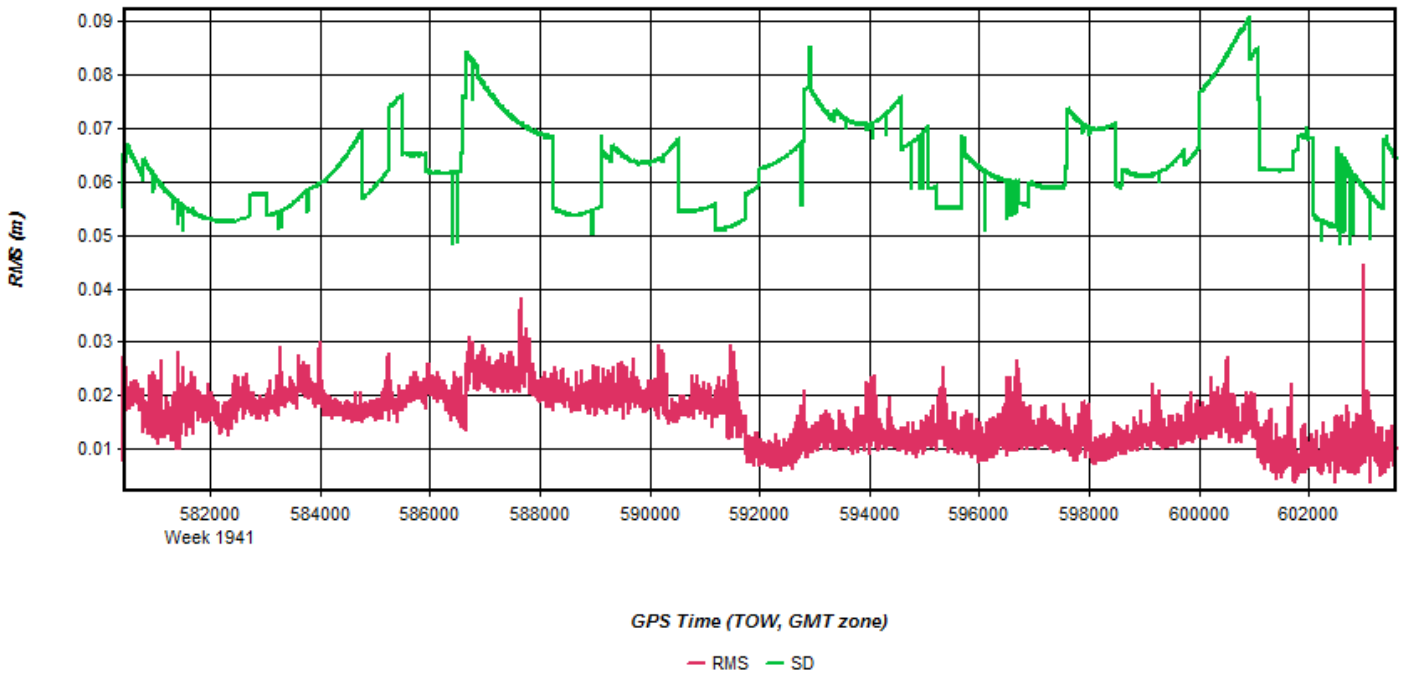
GPS Time (TOW, GMT zone)

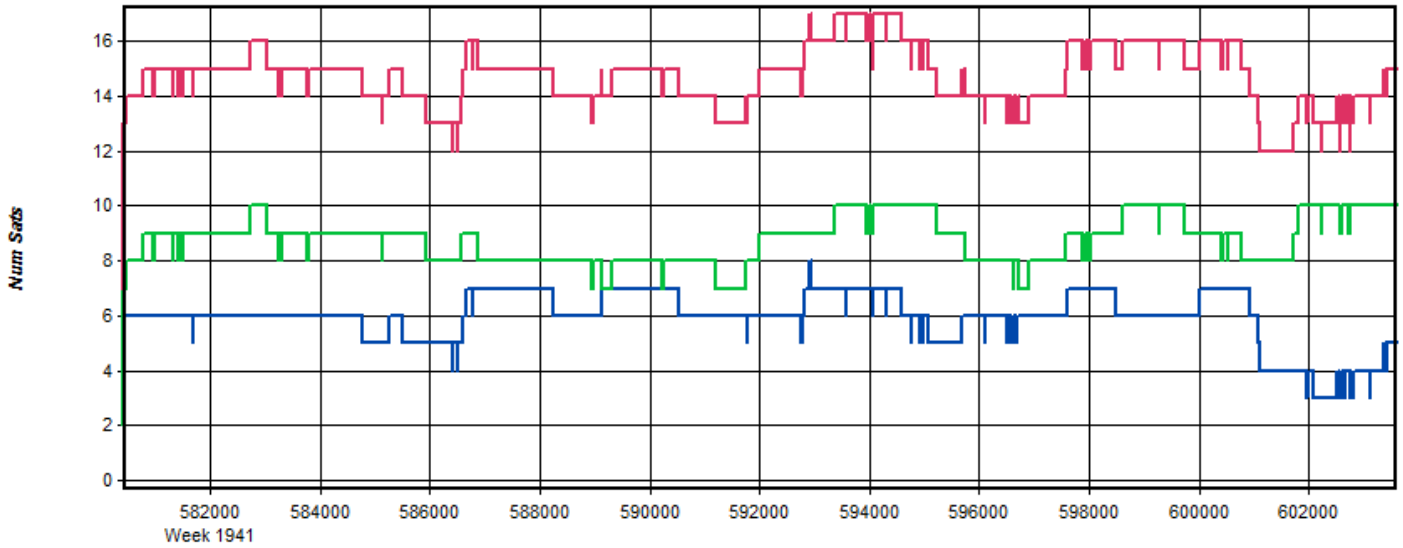
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

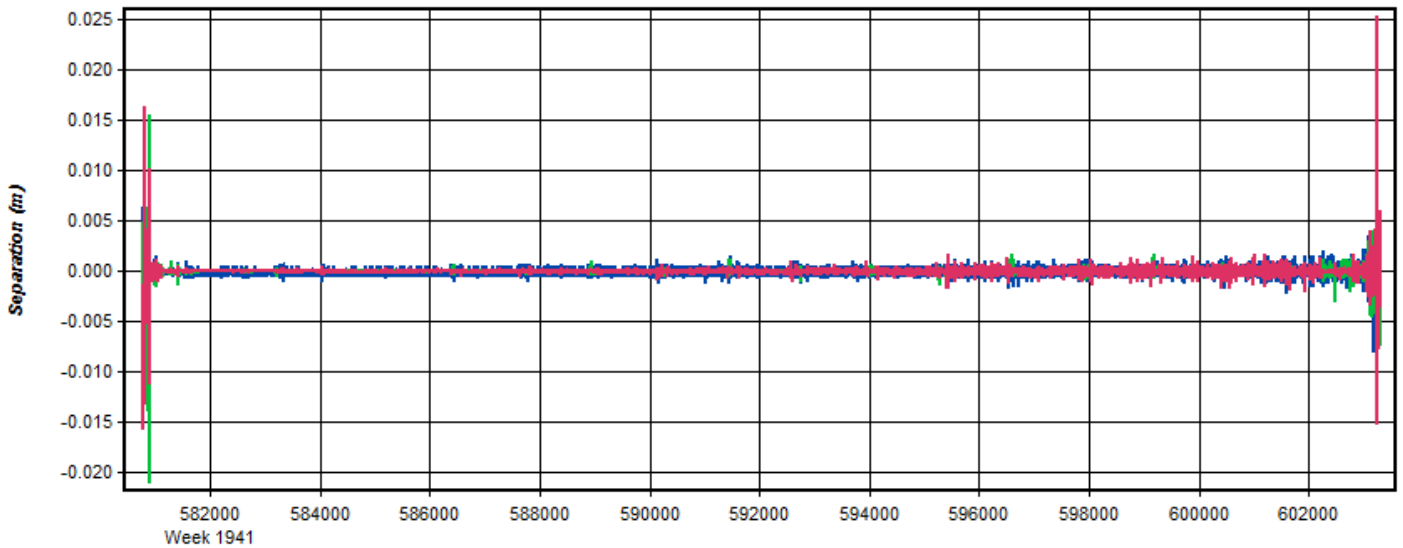
— Roll — Pitch





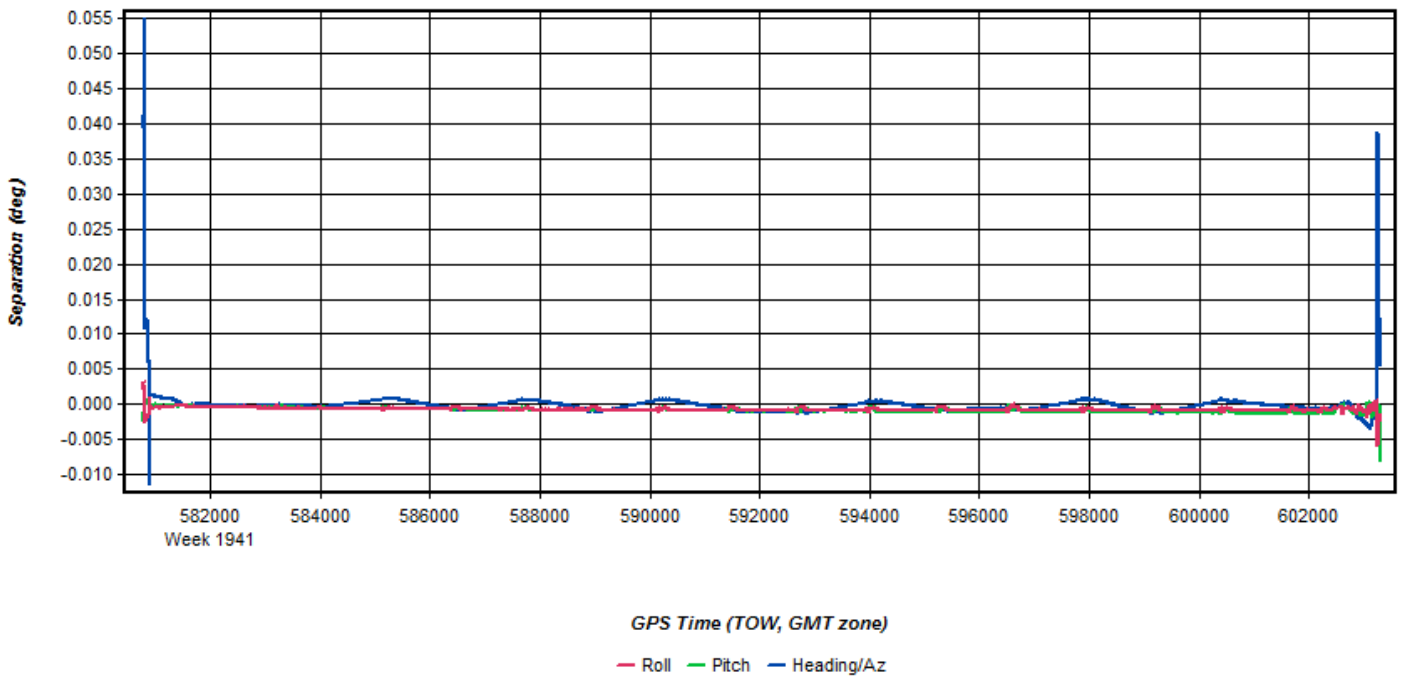
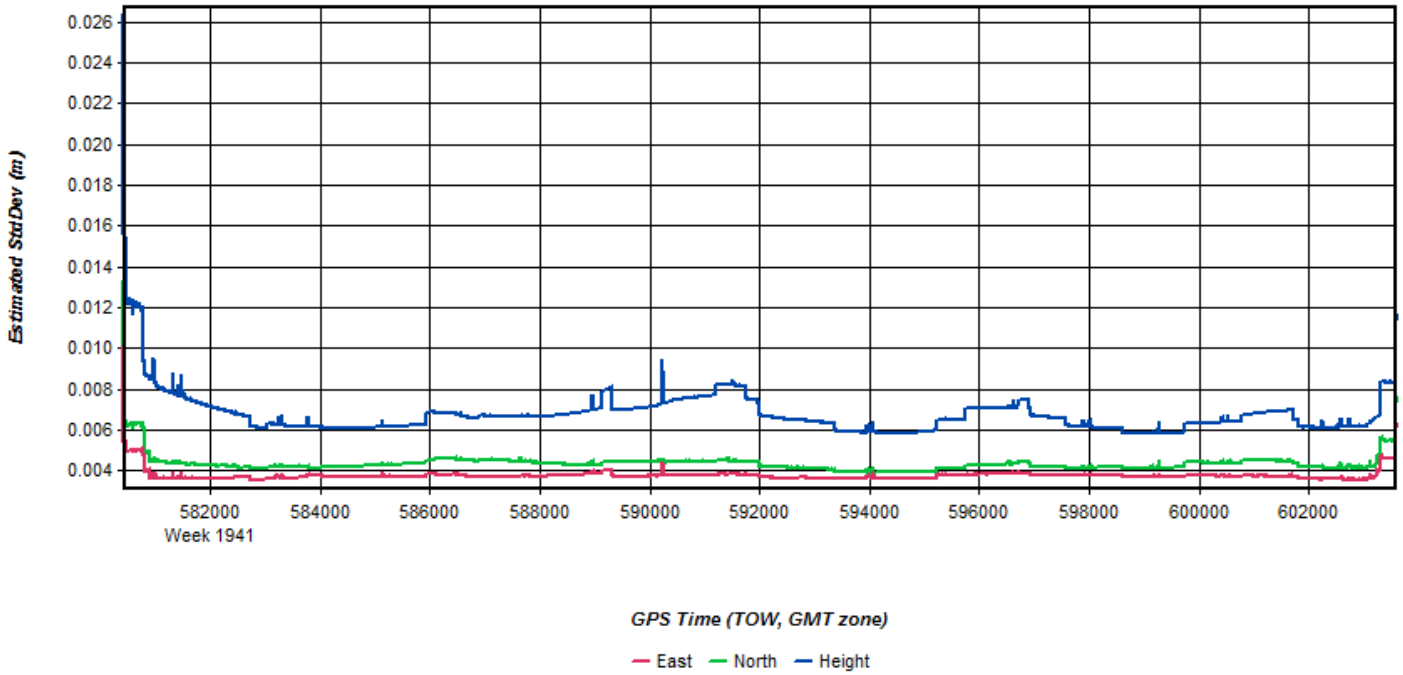
GPS Time (TOW, GMT zone)

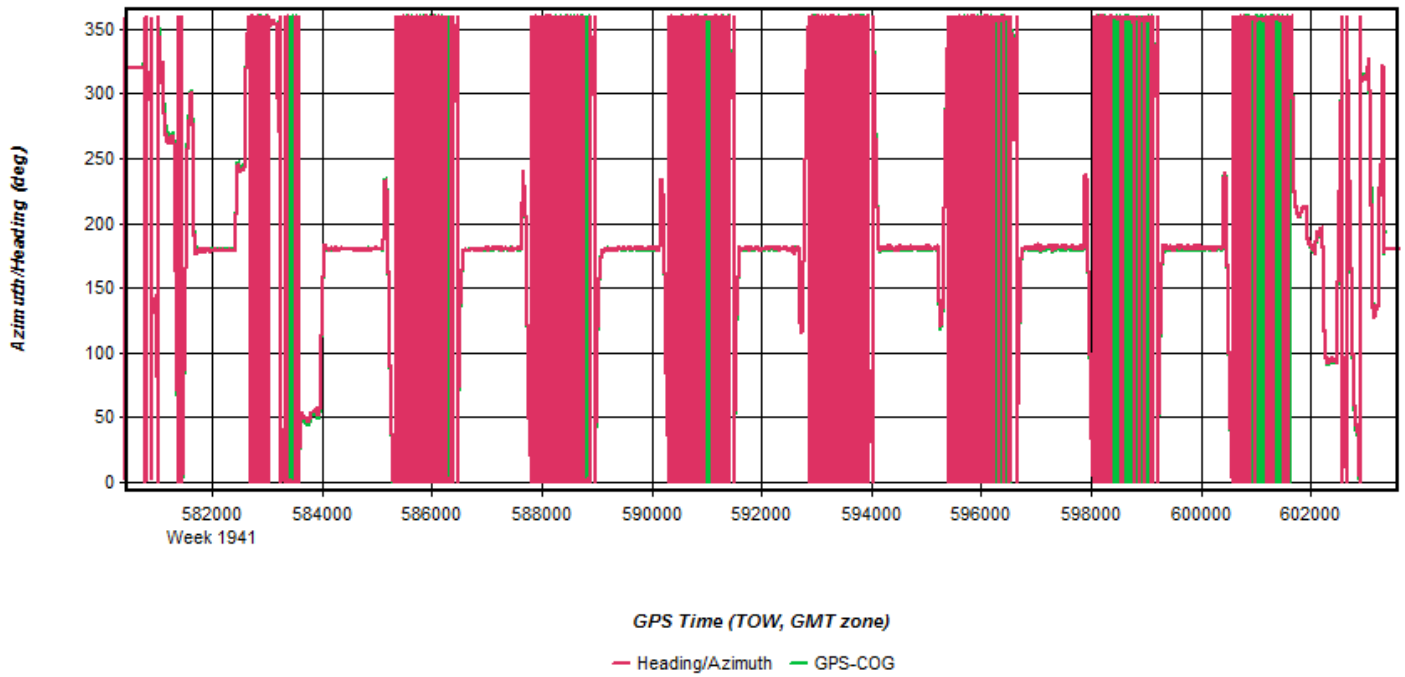
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR

KeyW-Aeroptic
LIDAR FLIGHT REPORT

Revision Feb. 2014

CREW Pilot/Operator: Sean T/Don M. Tail Number: N815WC AIRCRAFT: WEATHER: Clear

DATE 3/25/2017 GPS: Source: Fwd

Camera System LIDAR/S/N: 8237 Time: appr 12:10 Local Location: KCIR

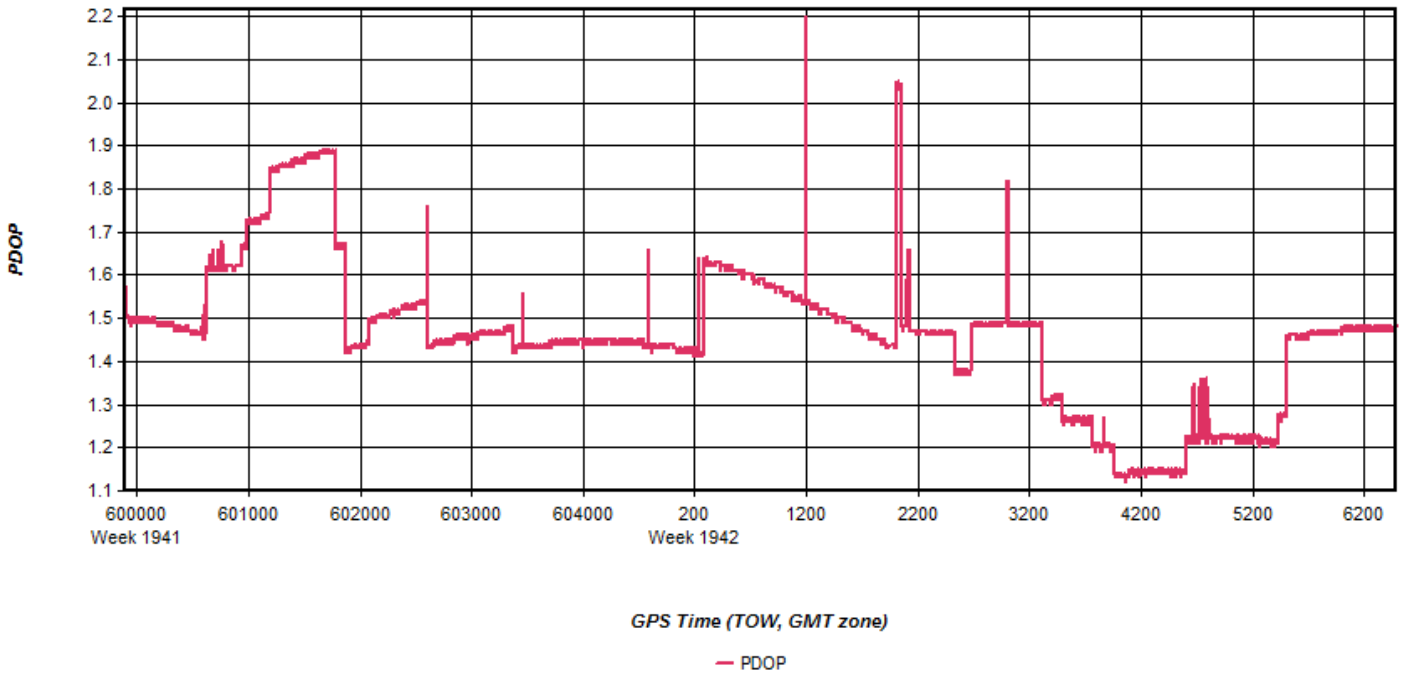
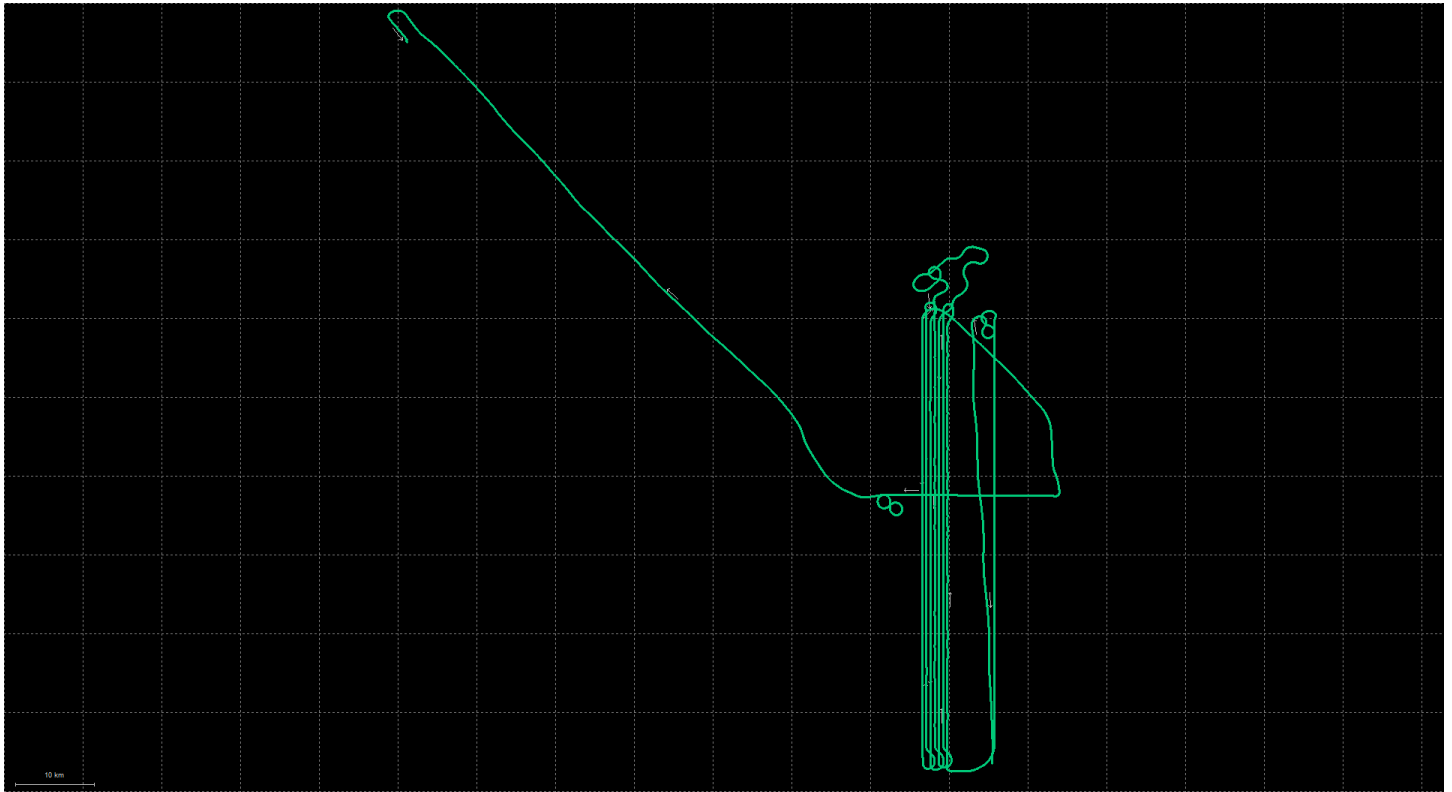
Camera Location (Hole) fwd/baft: Fwd Time: appr 18:40 Local Location: KCIR

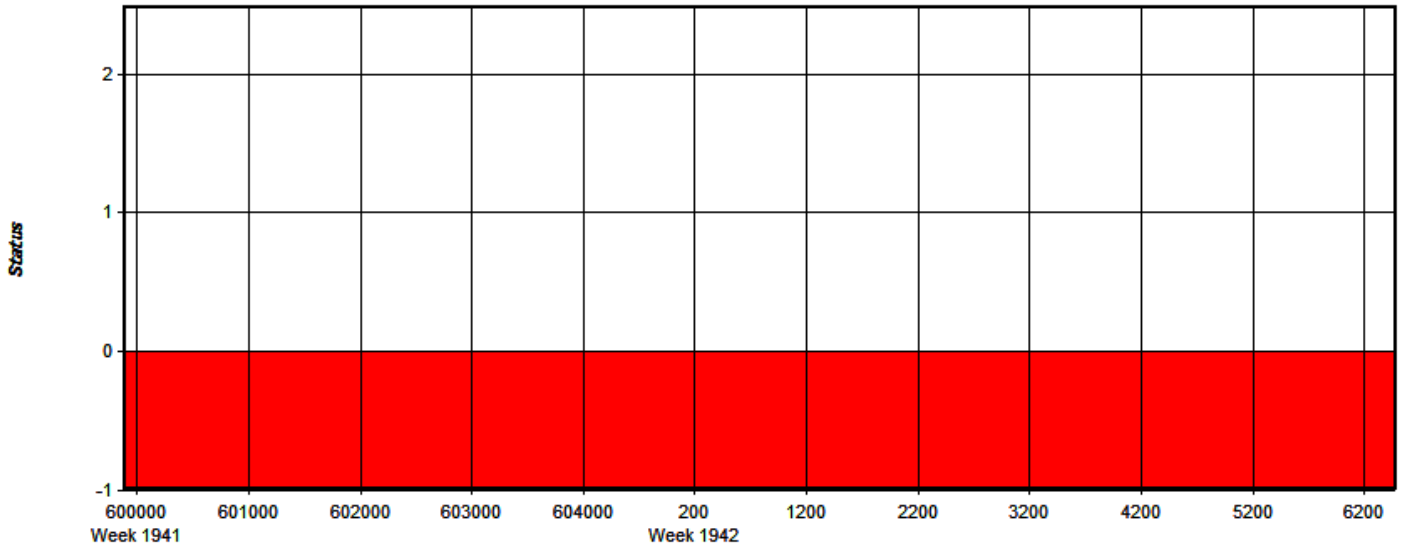
Start-up **Shut-down**

Job #	Location/ Site/Block	Line #	Flight Dir	Crab Angle	Remarks
3DEP	1	1027	S		FILL!
		1004	N		FILL!
		1001	N		FILL!
		1043	S		
		1044	N		
		1045	S		
		1046	N		
		1047	S		
		1048	N		
		1049	S		
		1050	N		
		1051	S		
		1052	N		
		1053	S		
		1054	N		
		1055	S		
		1056	N		
		UL-X	E		

LIDAR STARTUP CHECKS				SSD	
Lens cleaned	<input checked="" type="checkbox"/>	Drive #		Space Used @ Beginning	218
All fpts uploaded	<input checked="" type="checkbox"/>	SSD2		Space Used During Mission	900
Pilot's screen functional	<input checked="" type="checkbox"/>			Remaining Tot Space	
Compact flash drive space	<input checked="" type="checkbox"/>				
SSDs have space	<input checked="" type="checkbox"/>				
Startup beeps & IPAS recording	<input checked="" type="checkbox"/>				
Initials: DM					

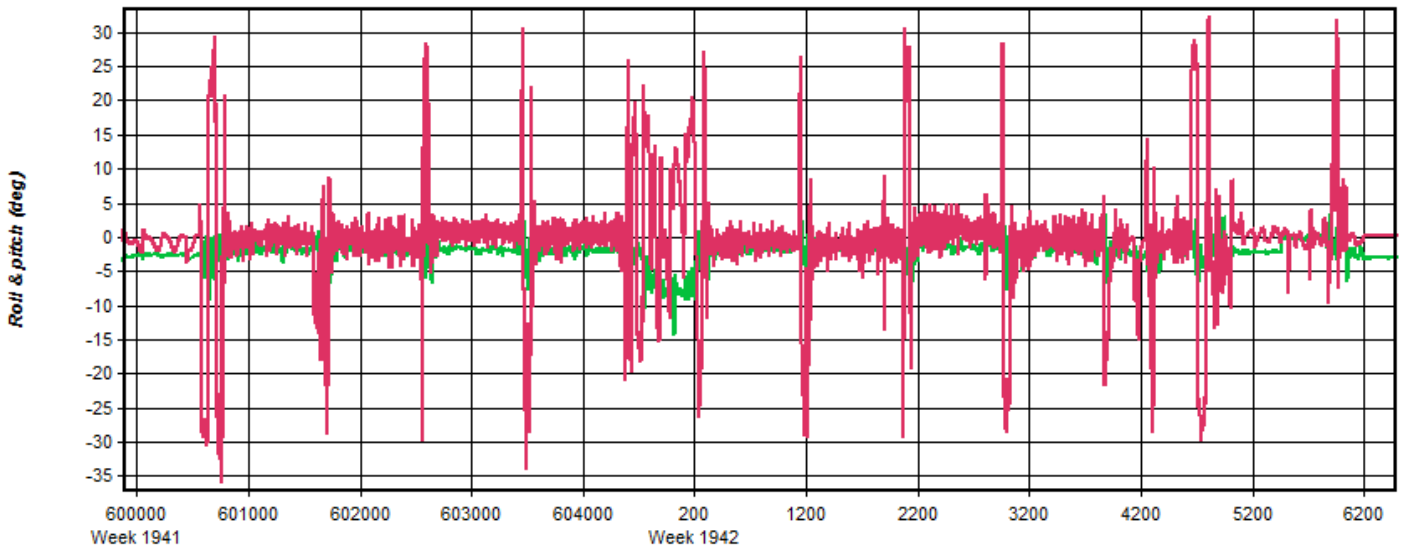
March 25, 2017-B (604MD, SN8227)





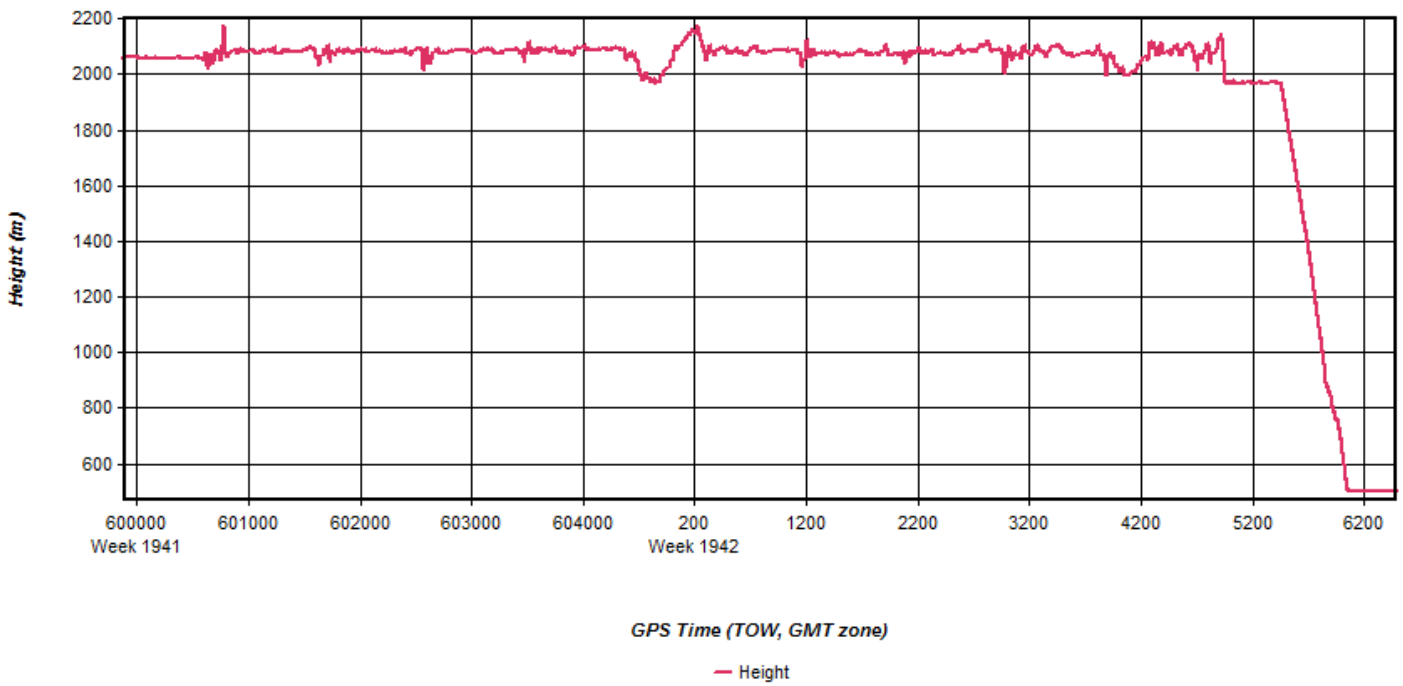
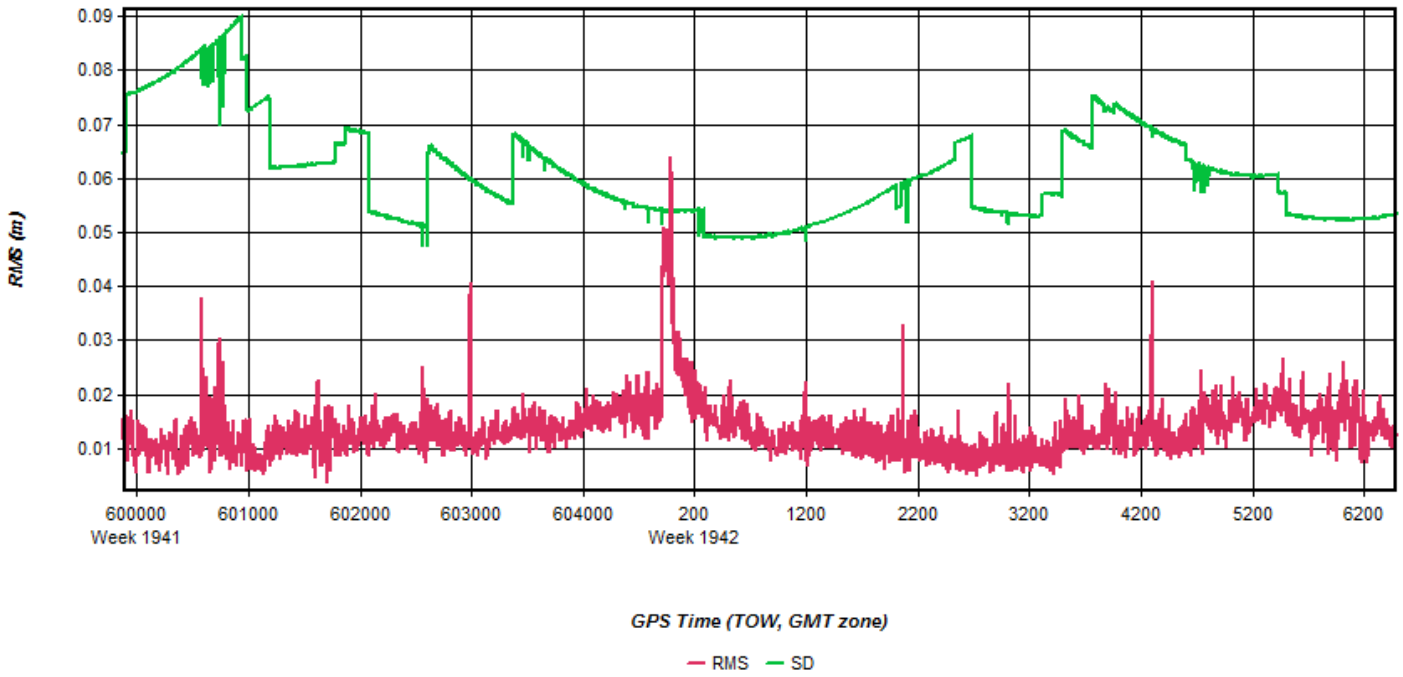
GPS Time (TOW, GMT zone)

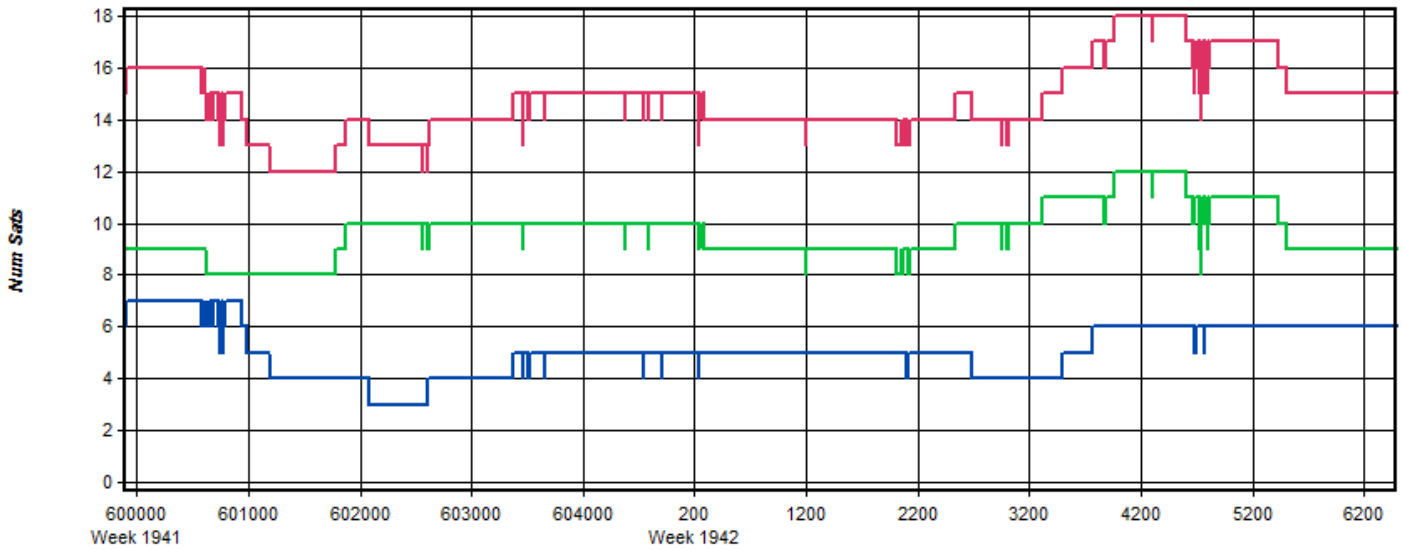
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

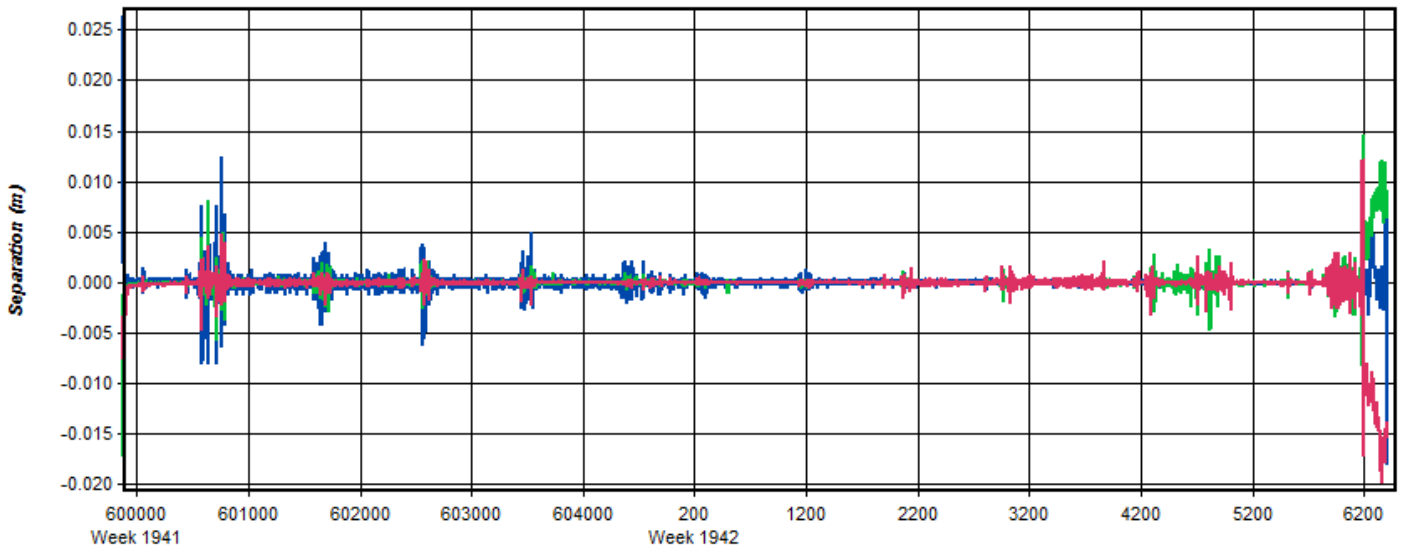
— Roll — Pitch





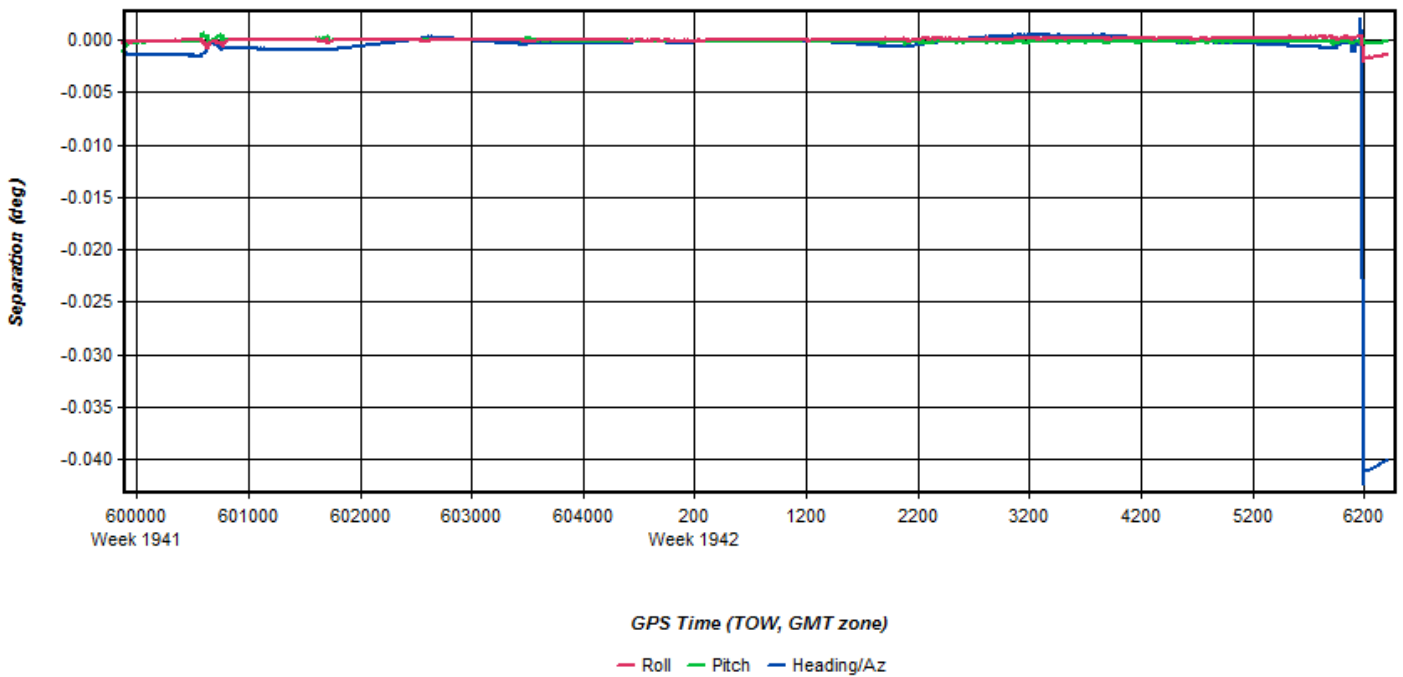
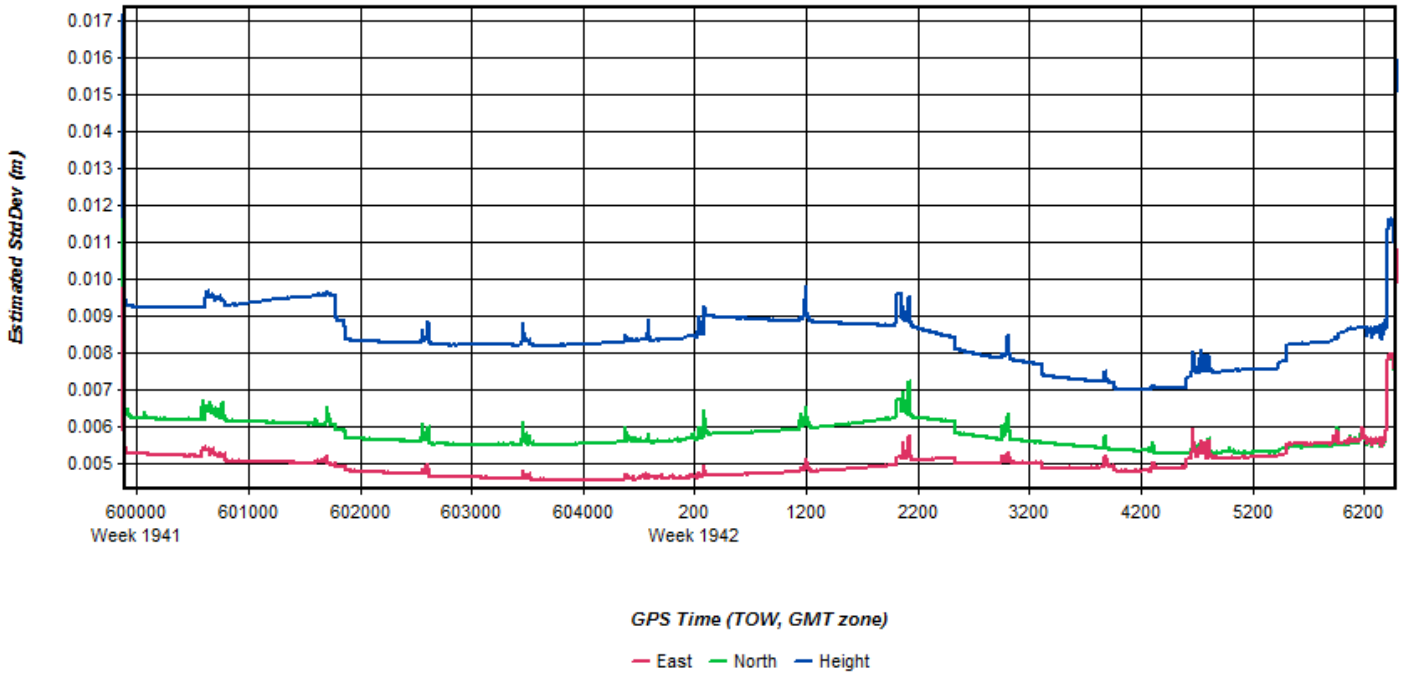
GPS Time (TOW, GMT zone)

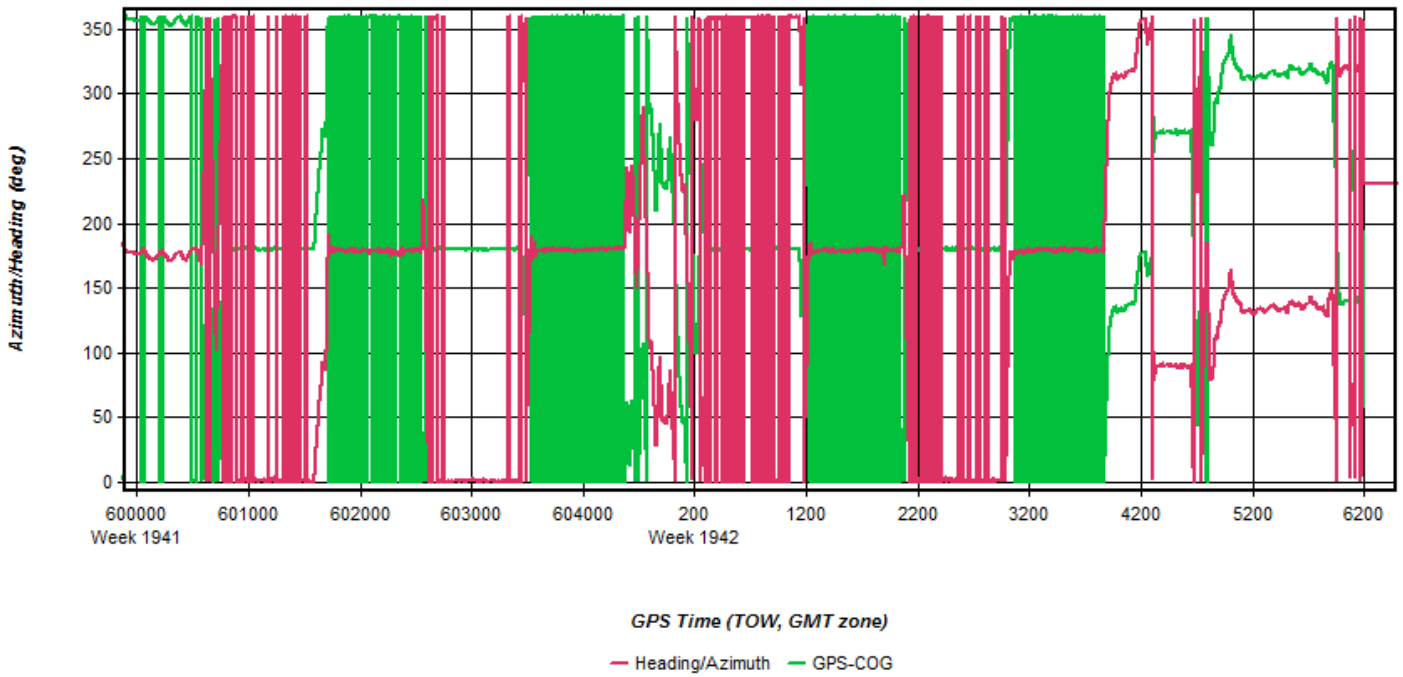
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Quantum Spatial Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 3/25/2017 LFE A B C D E Pg 2 of 2

Project: N R C S SD Proj #: 30420 Flight Mgmt File: 30420-SD-ALS80 Tech: SWINARD

Aircraft: N604MD Begin Hobbs: 2012.0 End Hobbs: 2018.4 Total: 6.4 Pilot: Luckett Co-Pilot:

Dep Apt: KPIR Dep Time (L-C): 2:15 Arr Apt: KPIR Arr Time (Local): 8:45 (PST): 19:01:45 Tot Time Aloft: 6.4

CORS: YIN Sta 1: KPIR Sta 2: Flyovers: Y 10 IF Y, times: Sta 1) Sta 2)

GPS Units: YIN Sta 1: KPIR Sta 2: Flyovers: Y 10 IF Y, times: Sta 1) Sta 2)

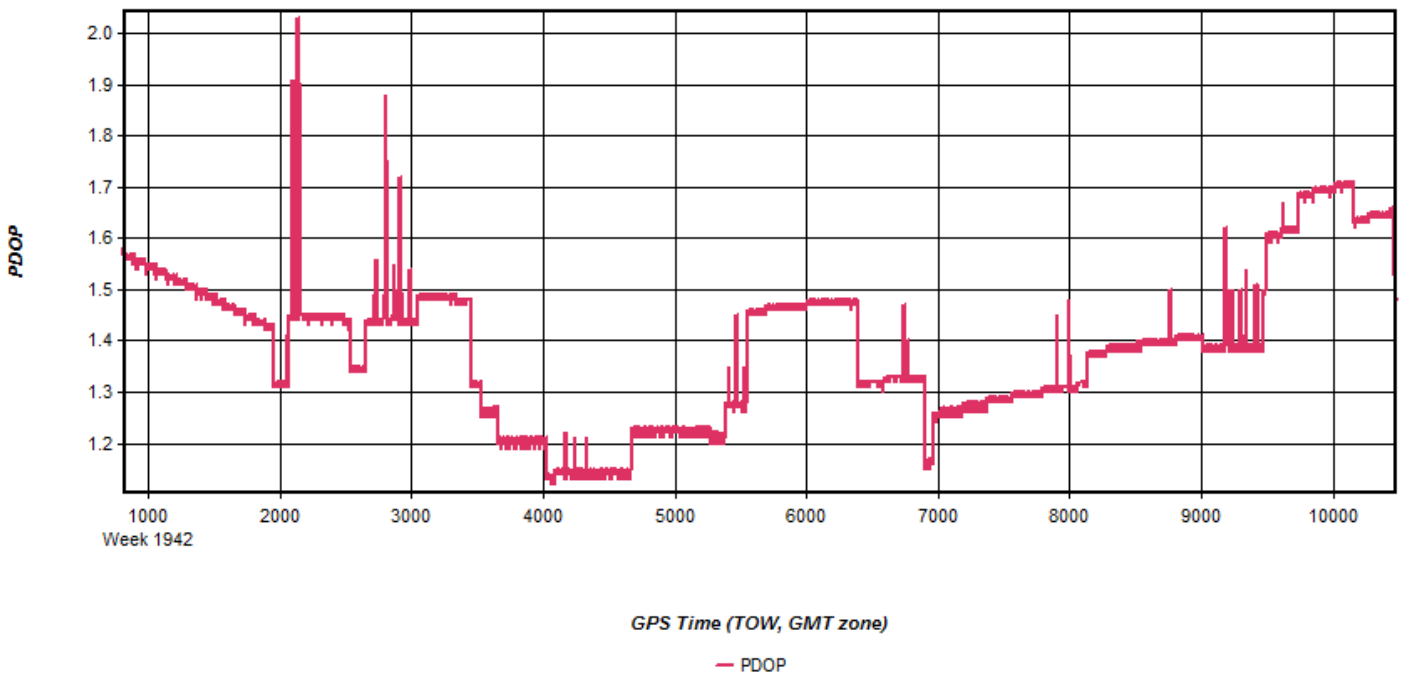
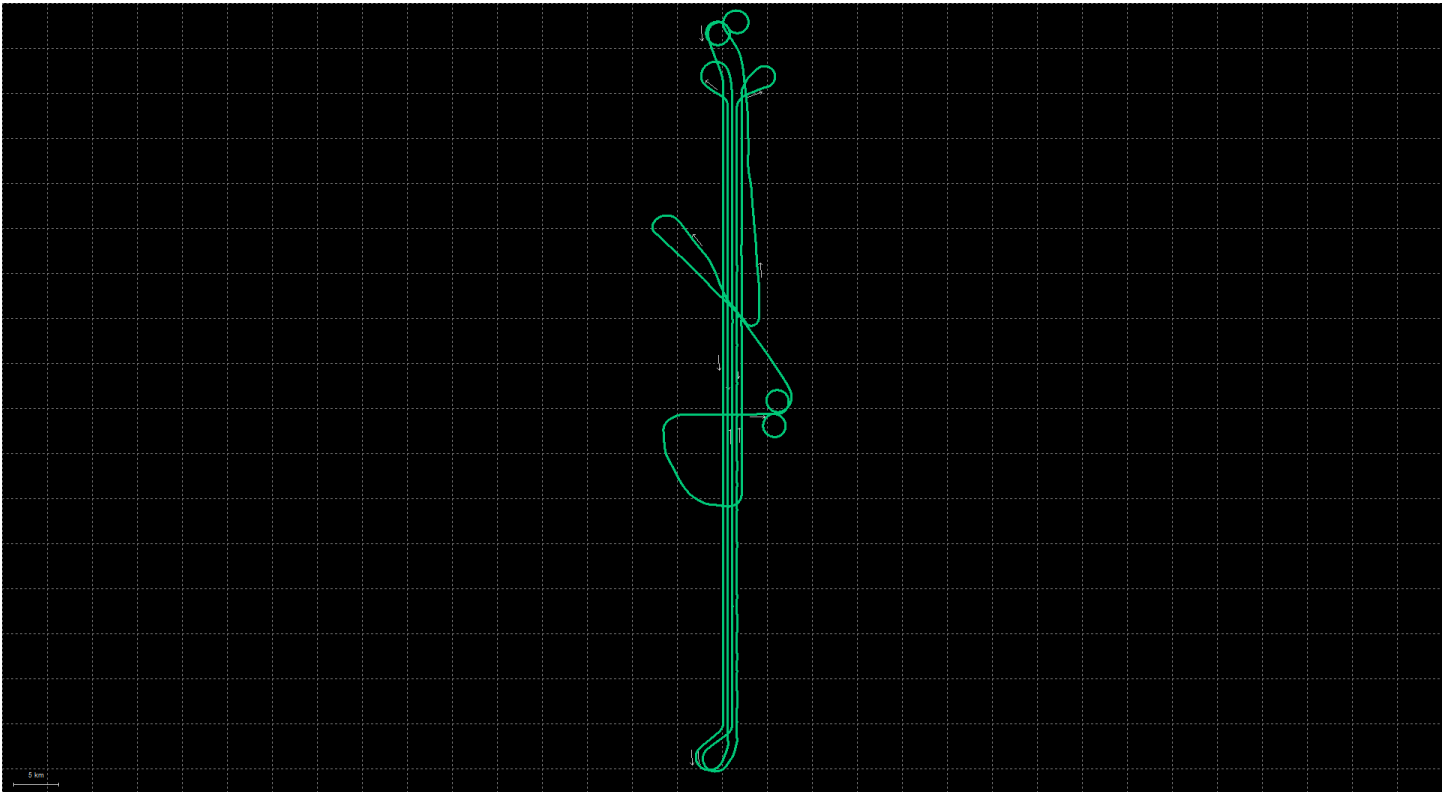
Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter beg: end: Avg Ft. Speeding PPSM

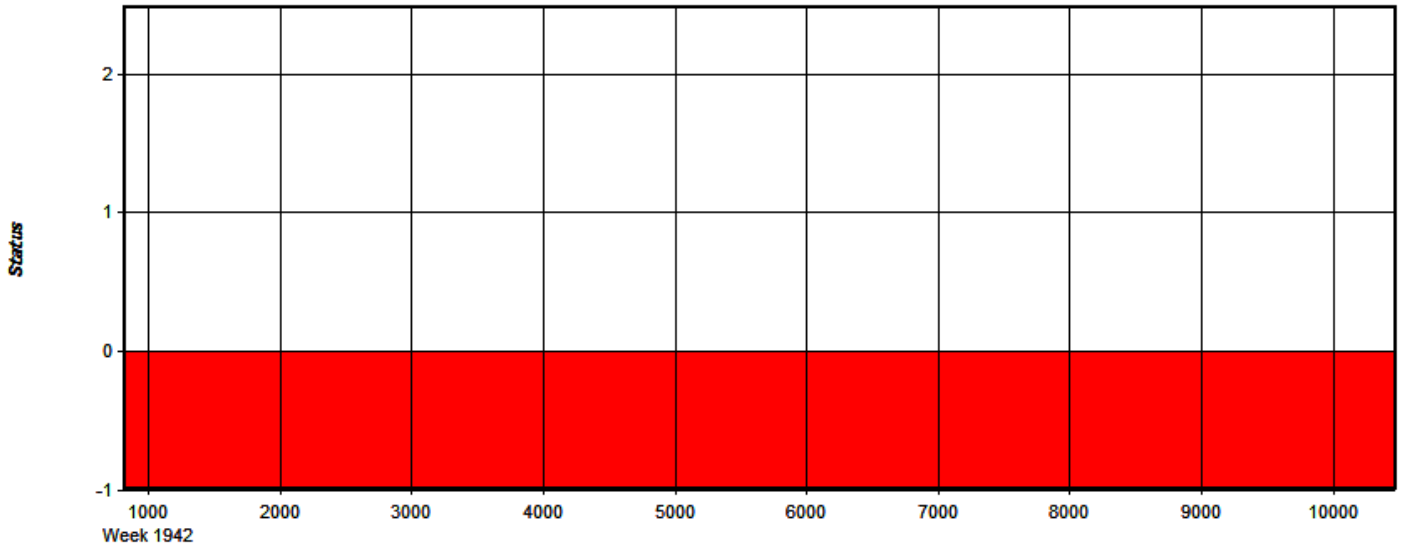
Type	ALS 80	Sens. #	8227	Alt. AGL	Alt. AFDL	Avg Terr. Ht	Max. Climb	Power
FOV	280	Scan Freq	48	MPIA	YIN	Pulse Rate	328	100

Line #	Hdg	Start UTC	End UTC	Gd Spd	PPM/s	GPS Altitude	Crab	Turb (0..9)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
275	355	00:52	01:04	127	10/23	6800	0	0	
304	265	01:12	01:17	131	11/21	6750	0	0	FEE 0-12. X-LINE / FIG 8 (2)

Total Proj Lines:	Lines Flown:	Lines Remain:	Online Time: 5.5	Job Time: 1.0	Notes:
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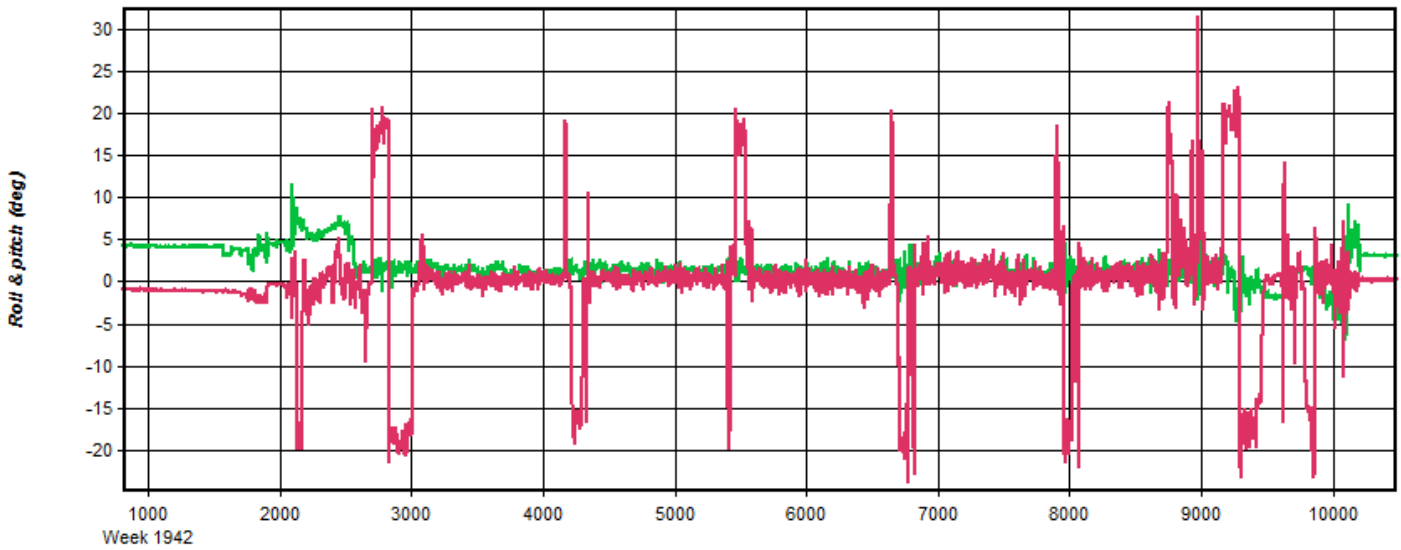
March 26, 2017-A (N915WC, SN8237)





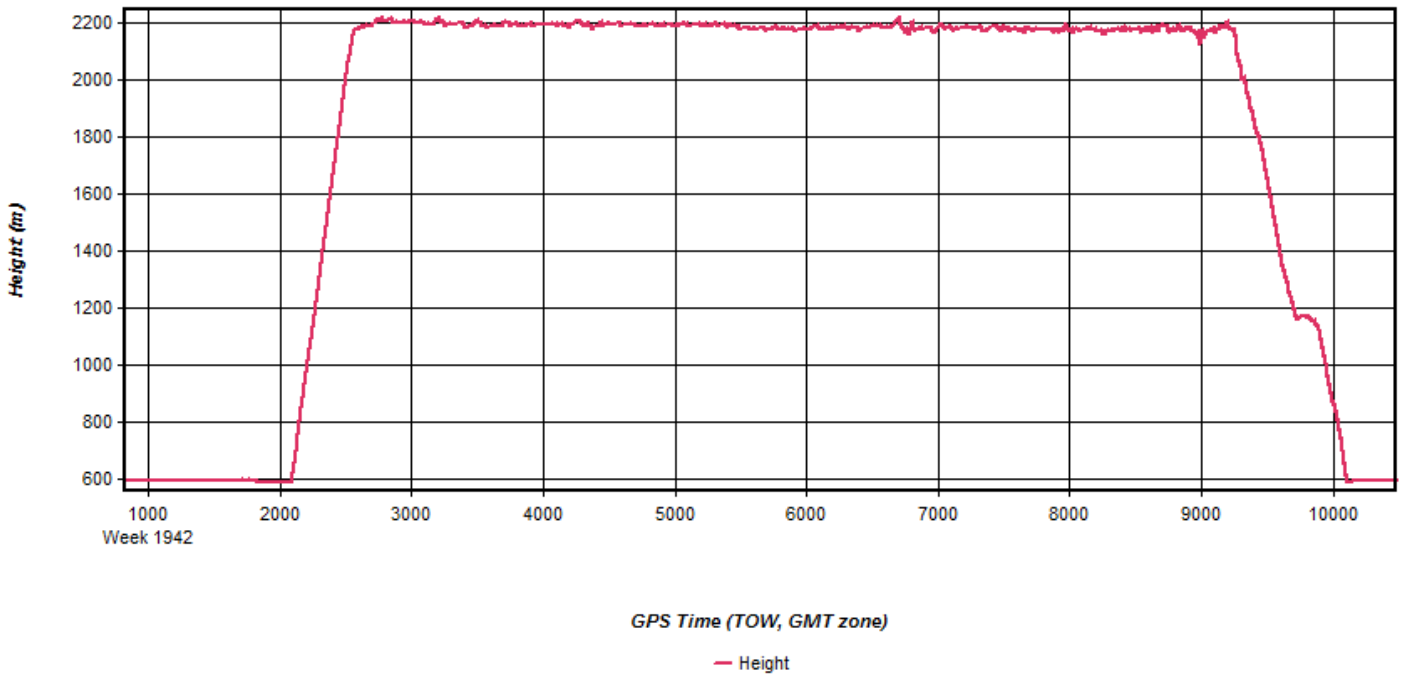
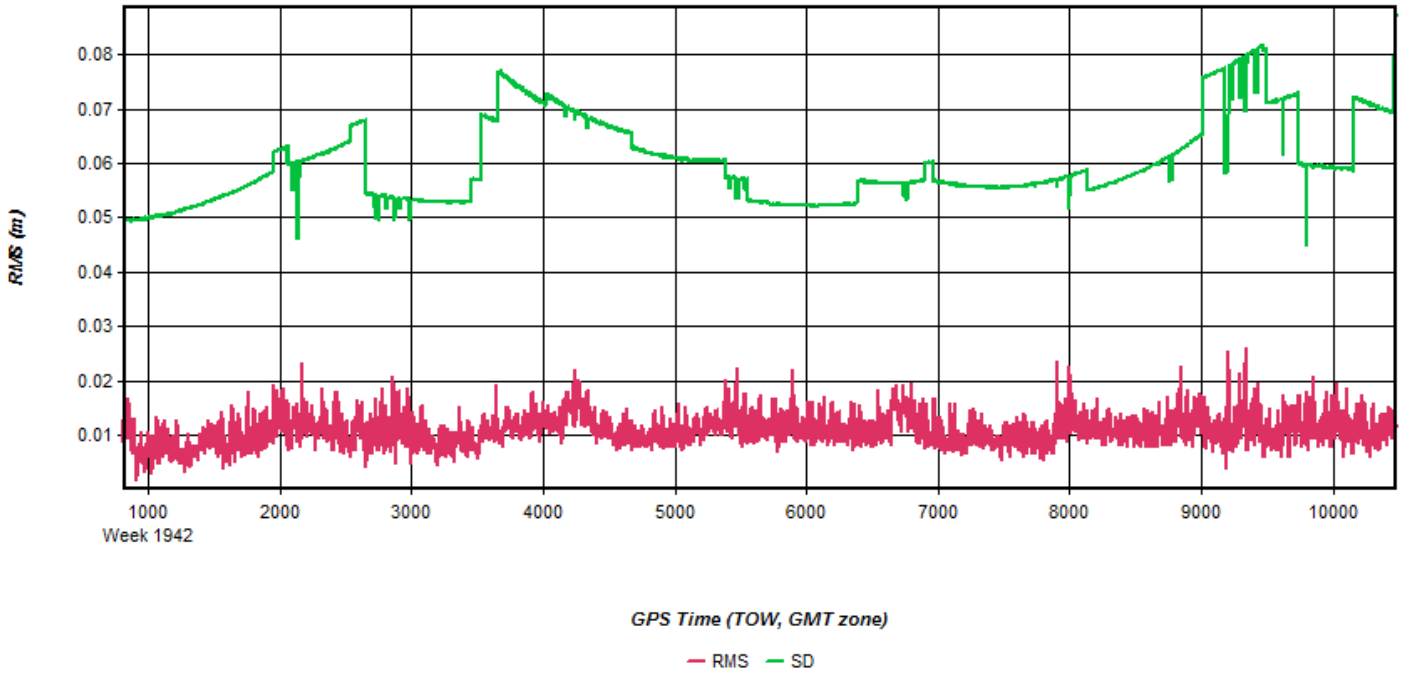
GPS Time (TOW, GMT zone)

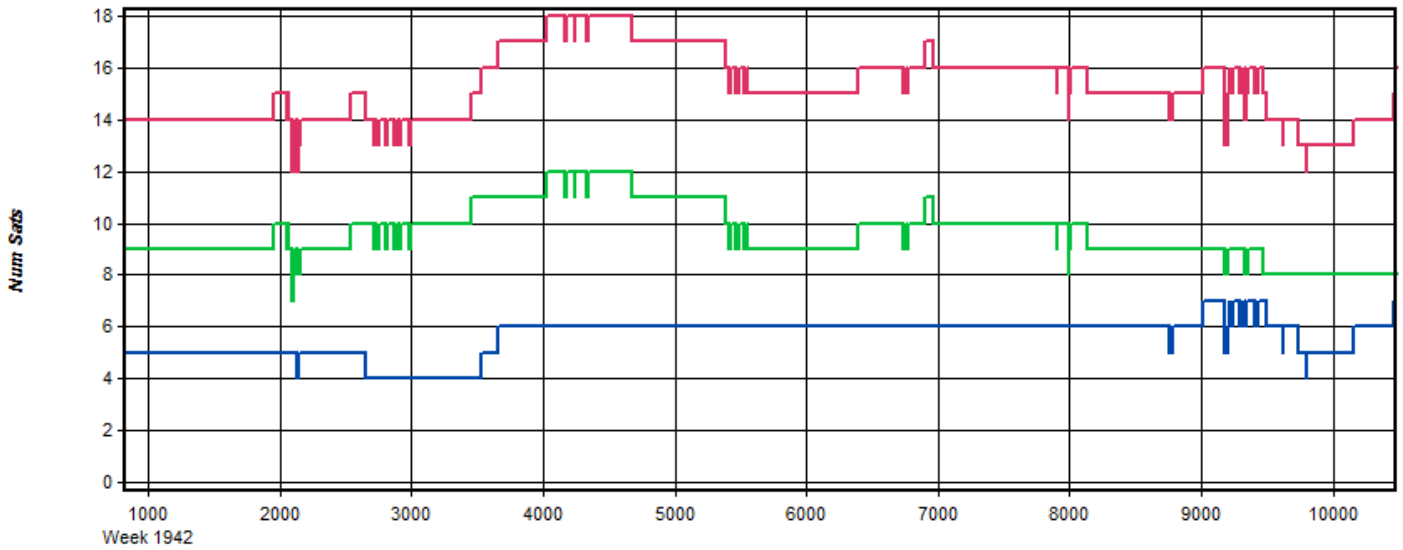
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

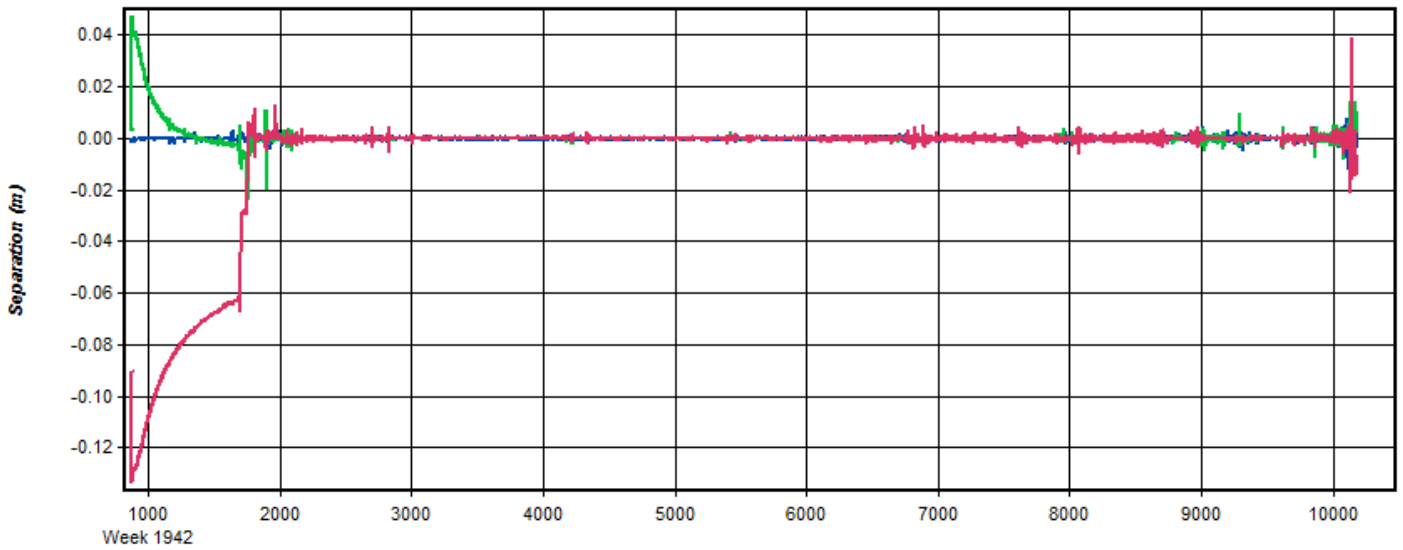
— Roll — Pitch





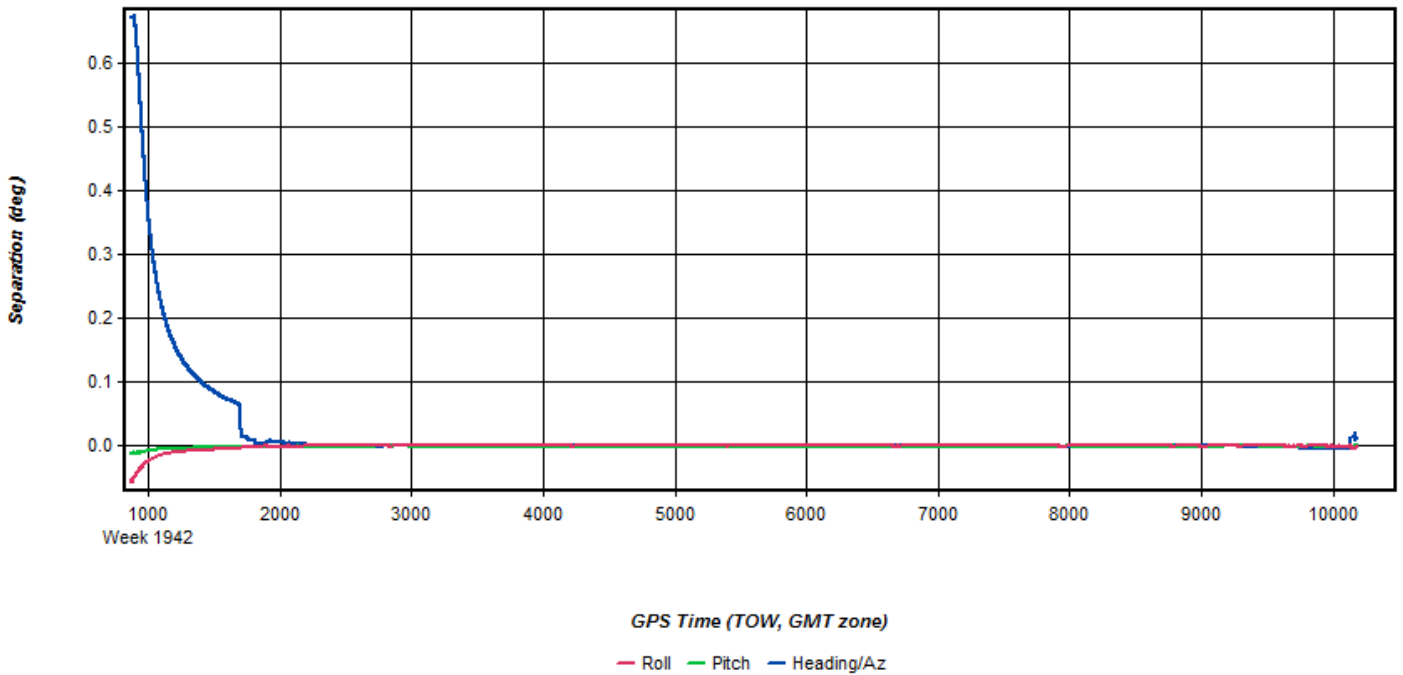
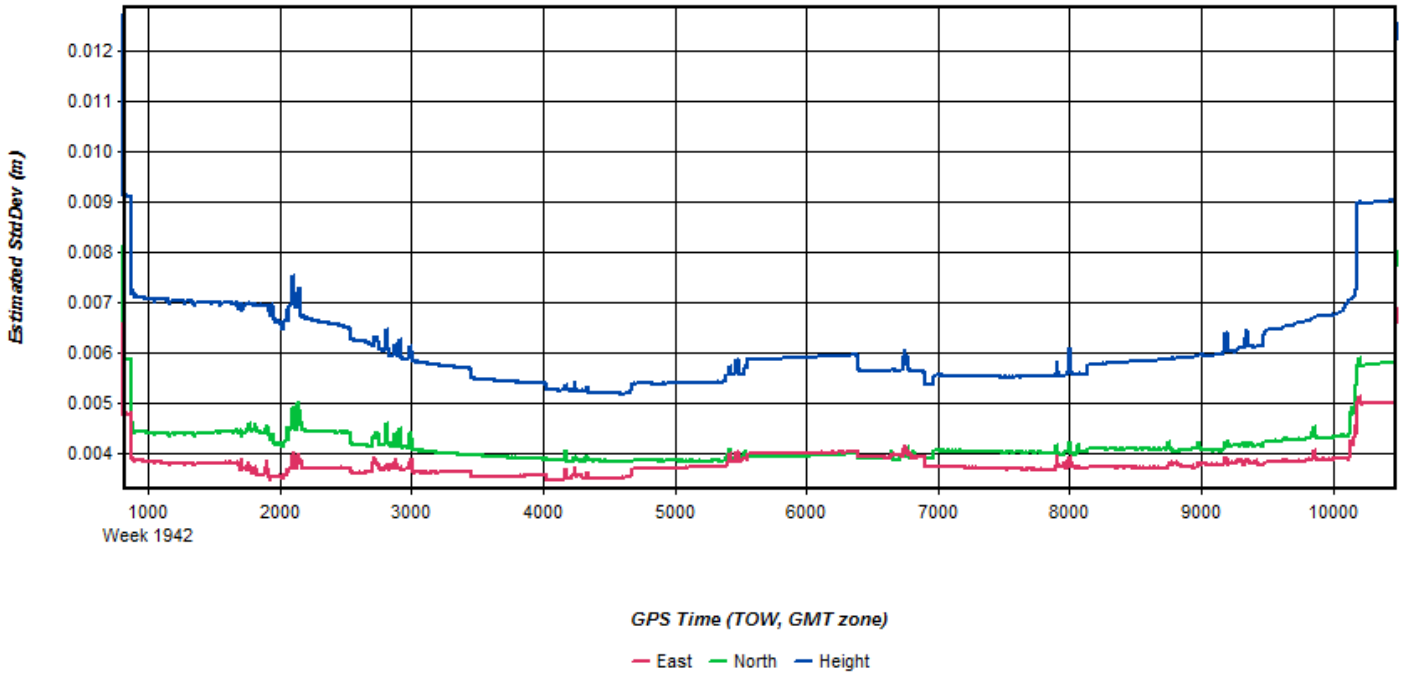
GPS Time (TOW, GMT zone)

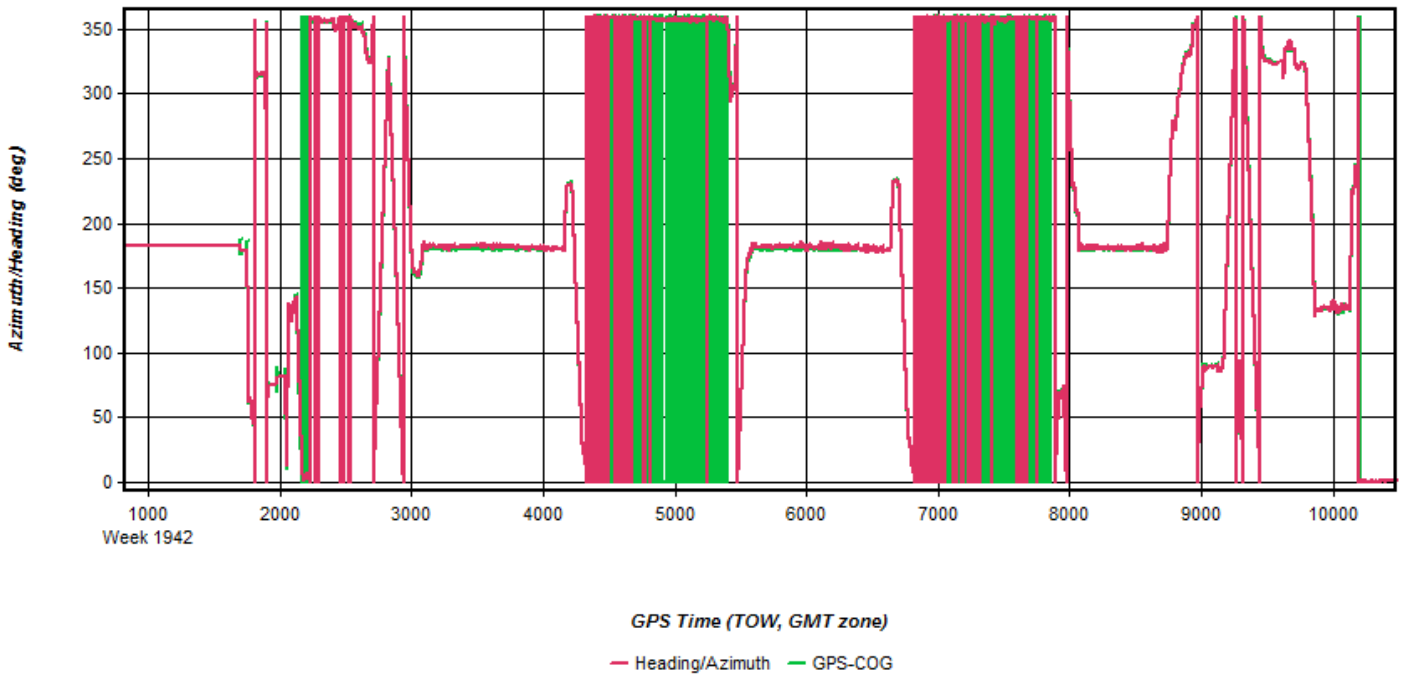
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



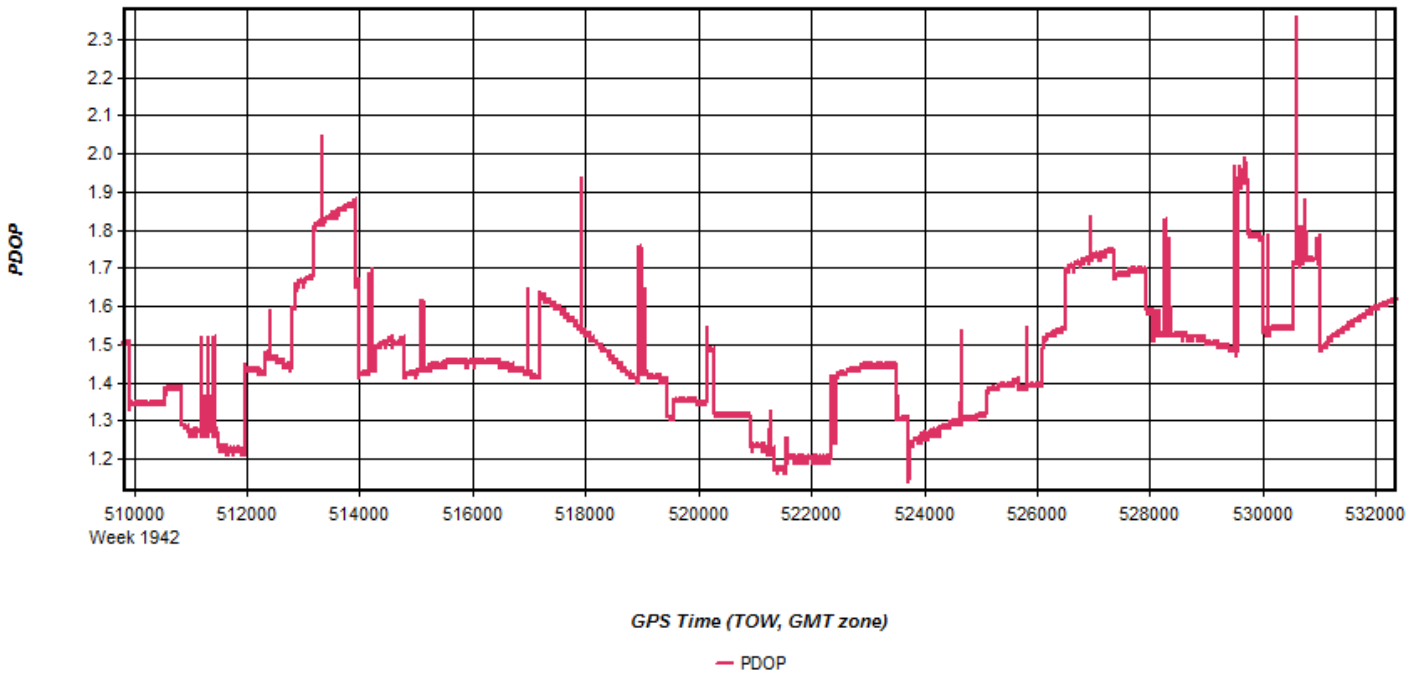
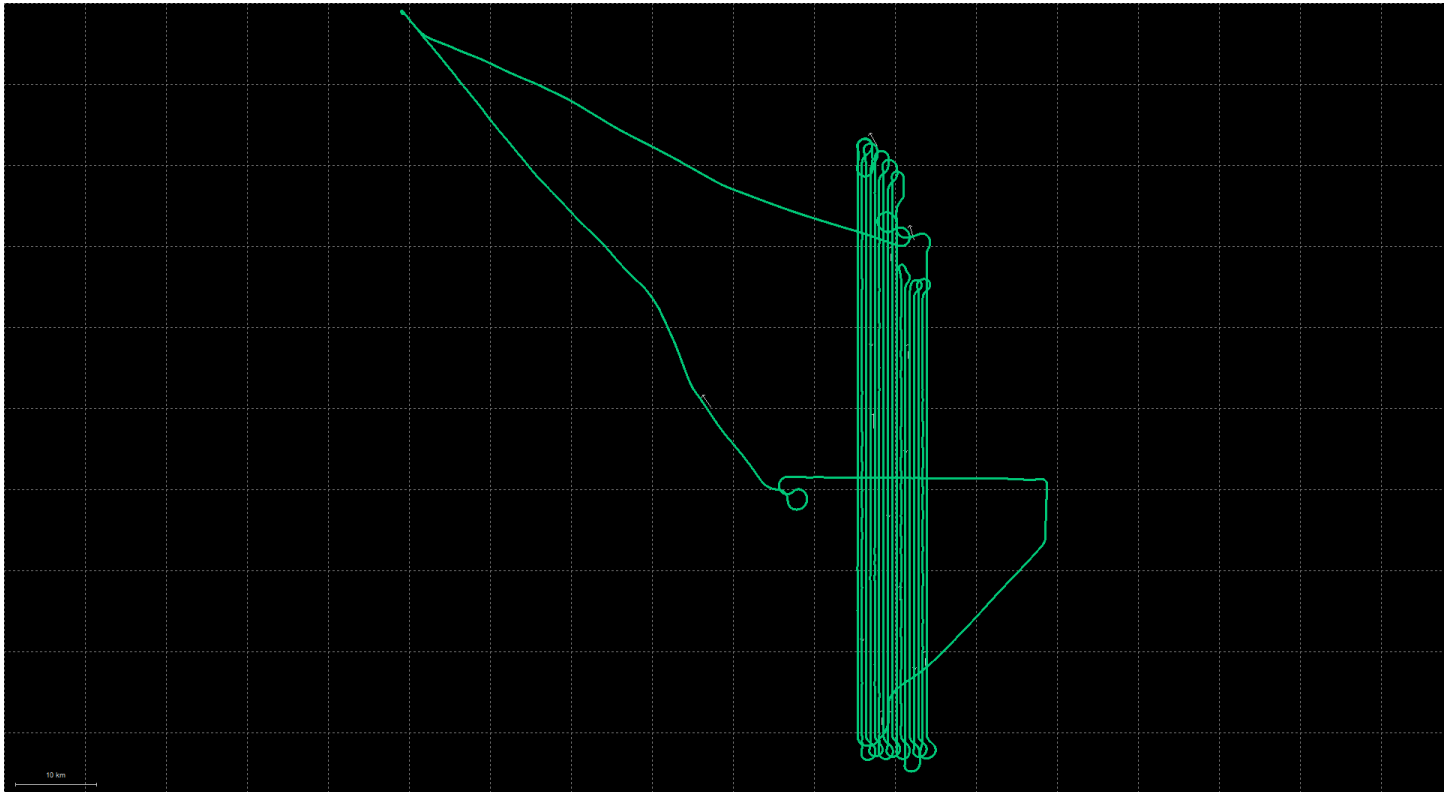
GPS Time (TOW, GMT zone)

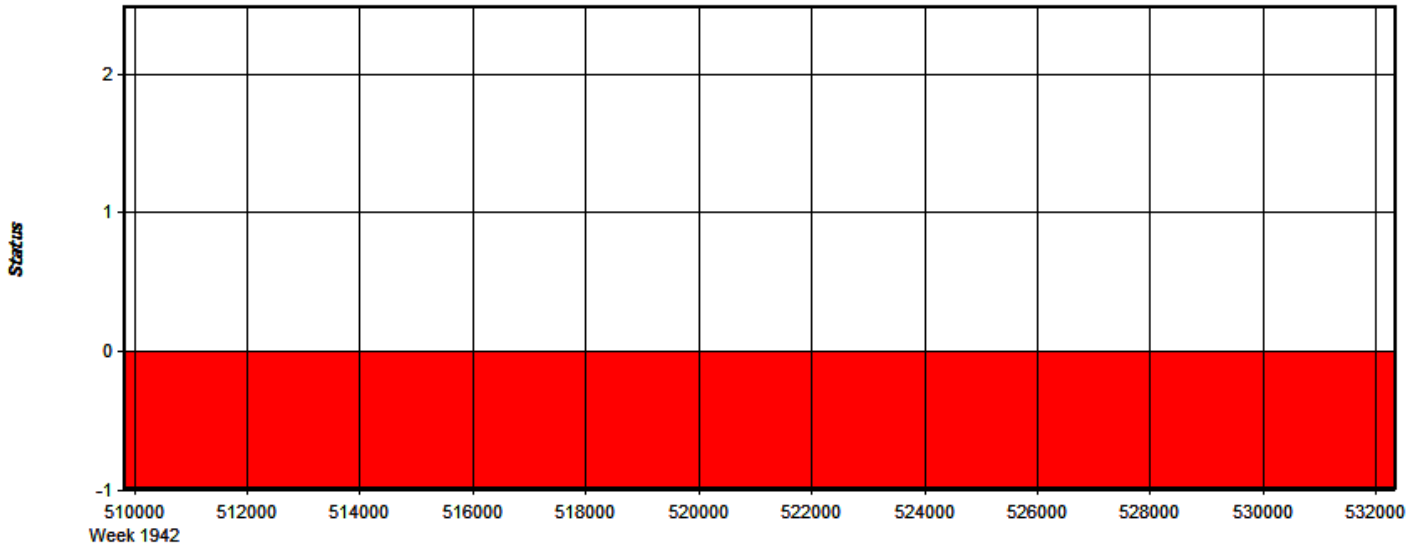
— East — North — Up





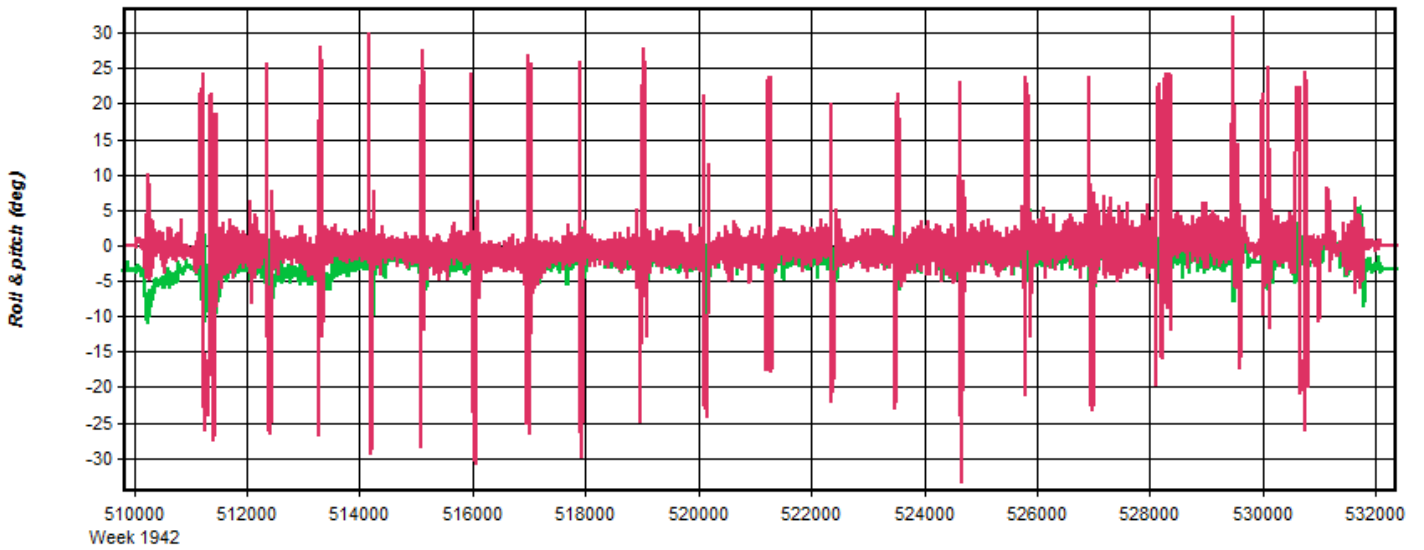
March 31, 2017-A (604MD, SN8227)





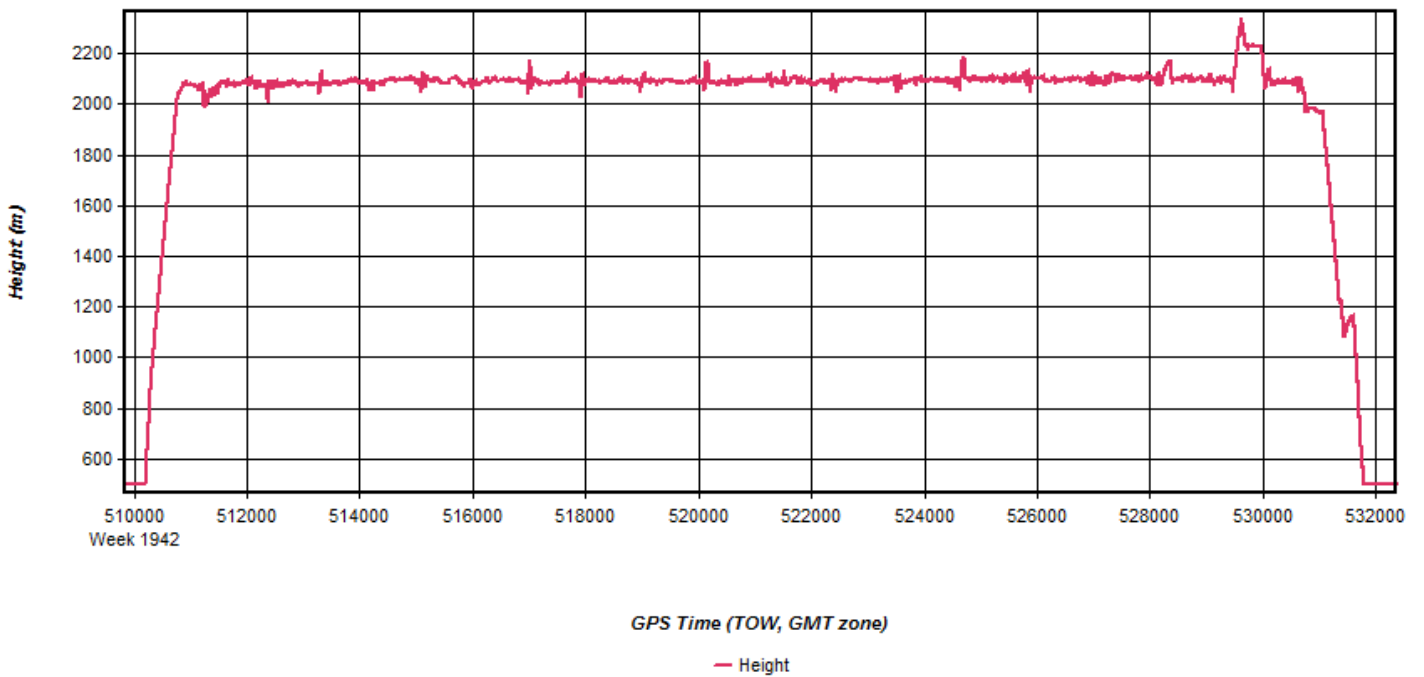
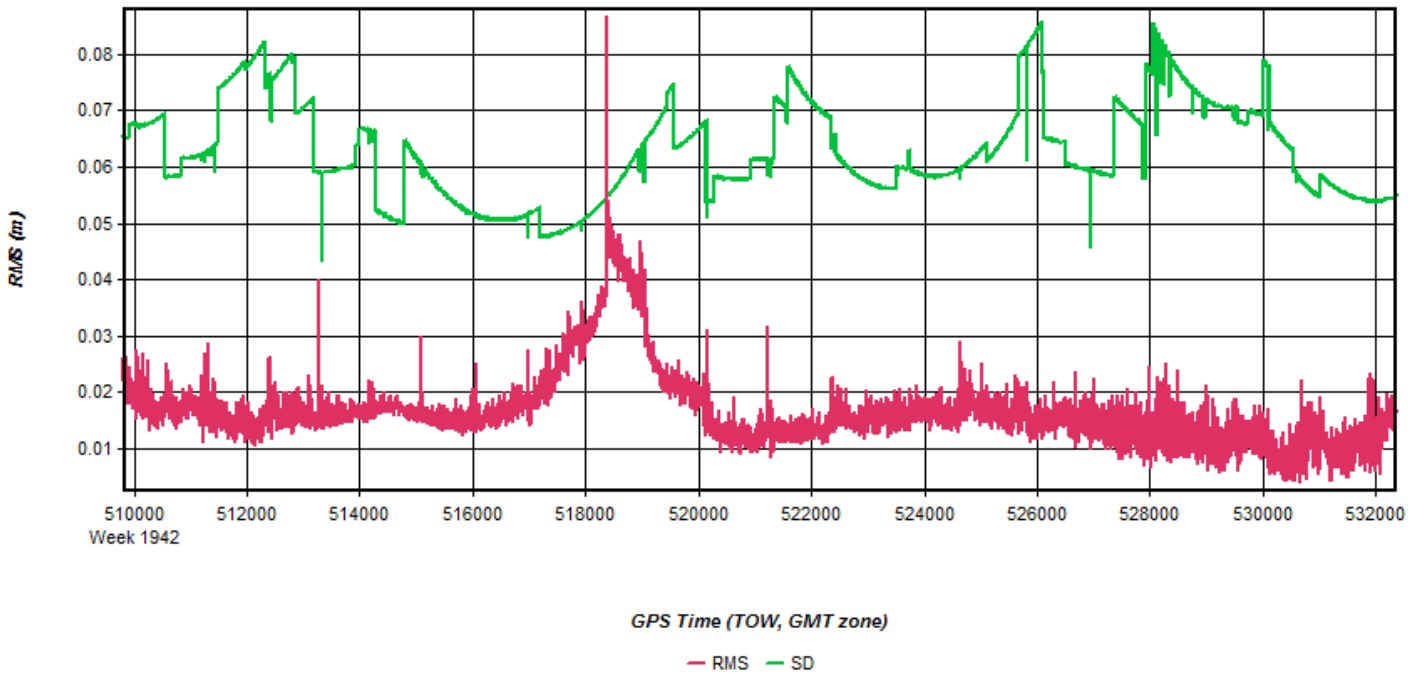
GPS Time (TOW, GMT zone)

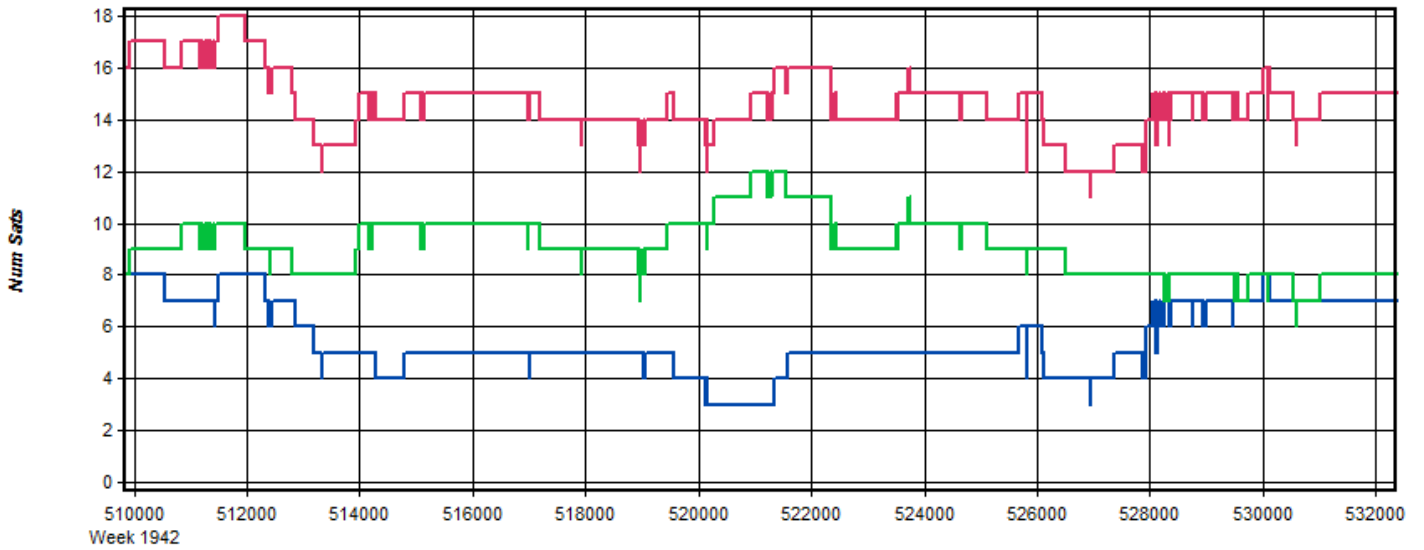
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

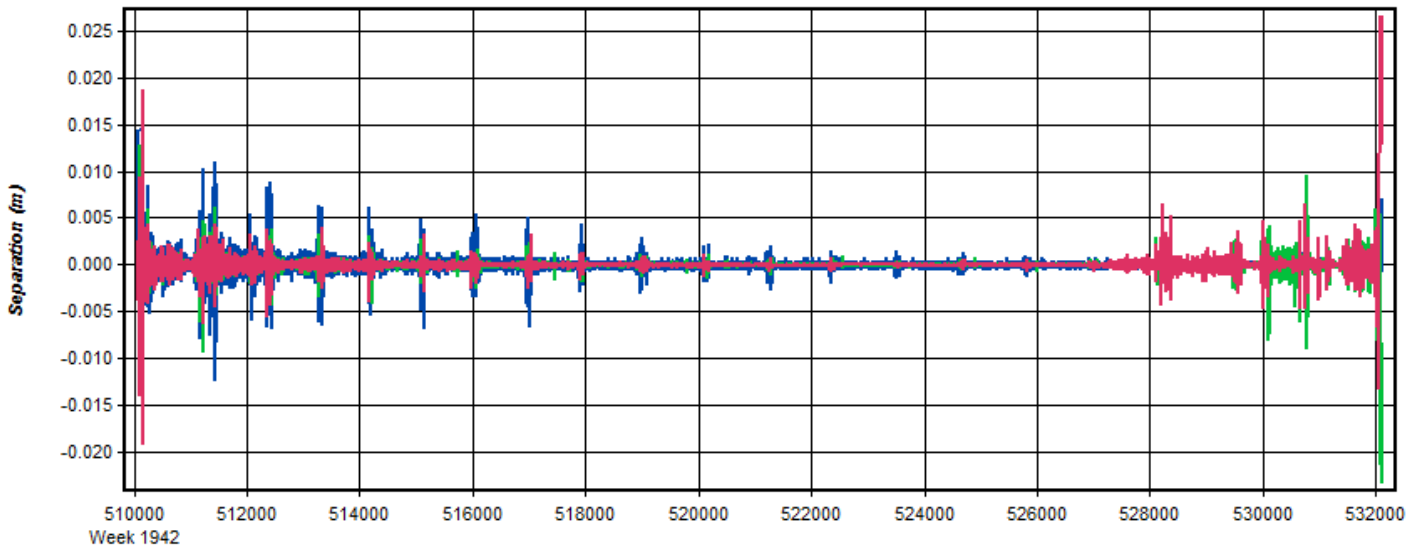
— Roll — Pitch





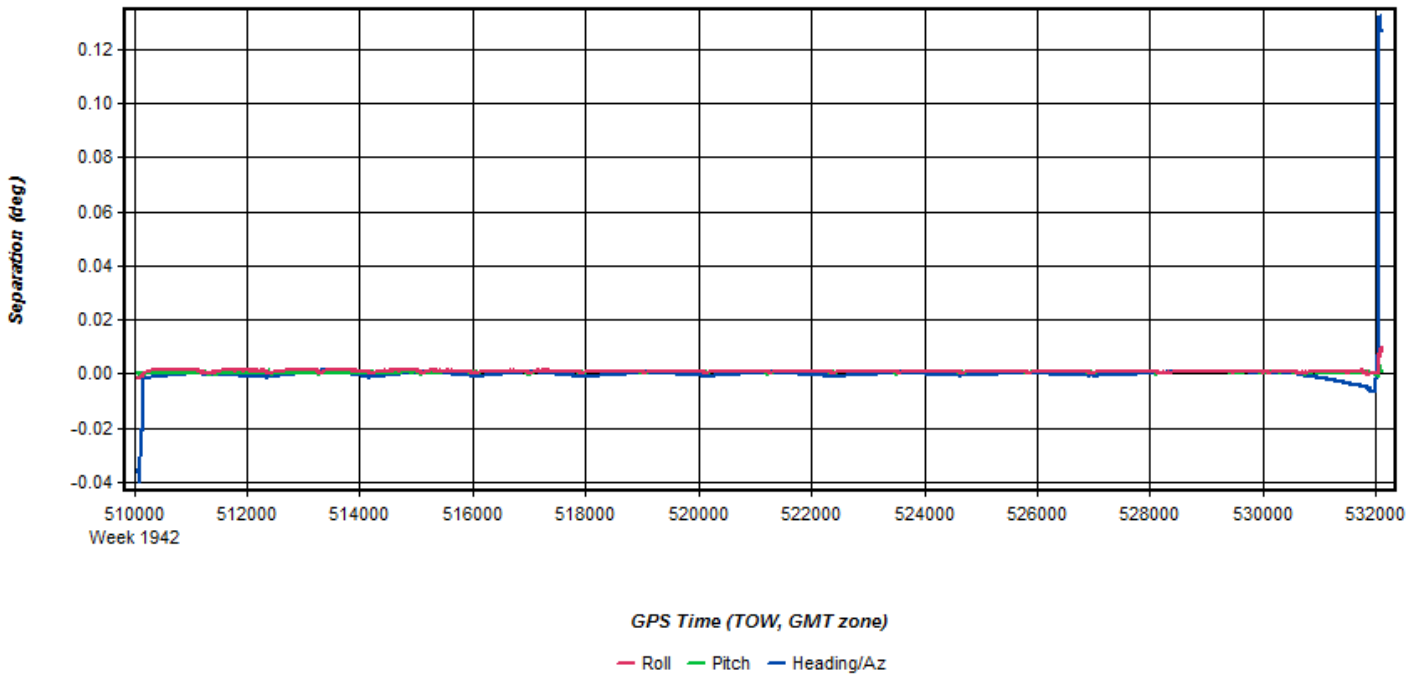
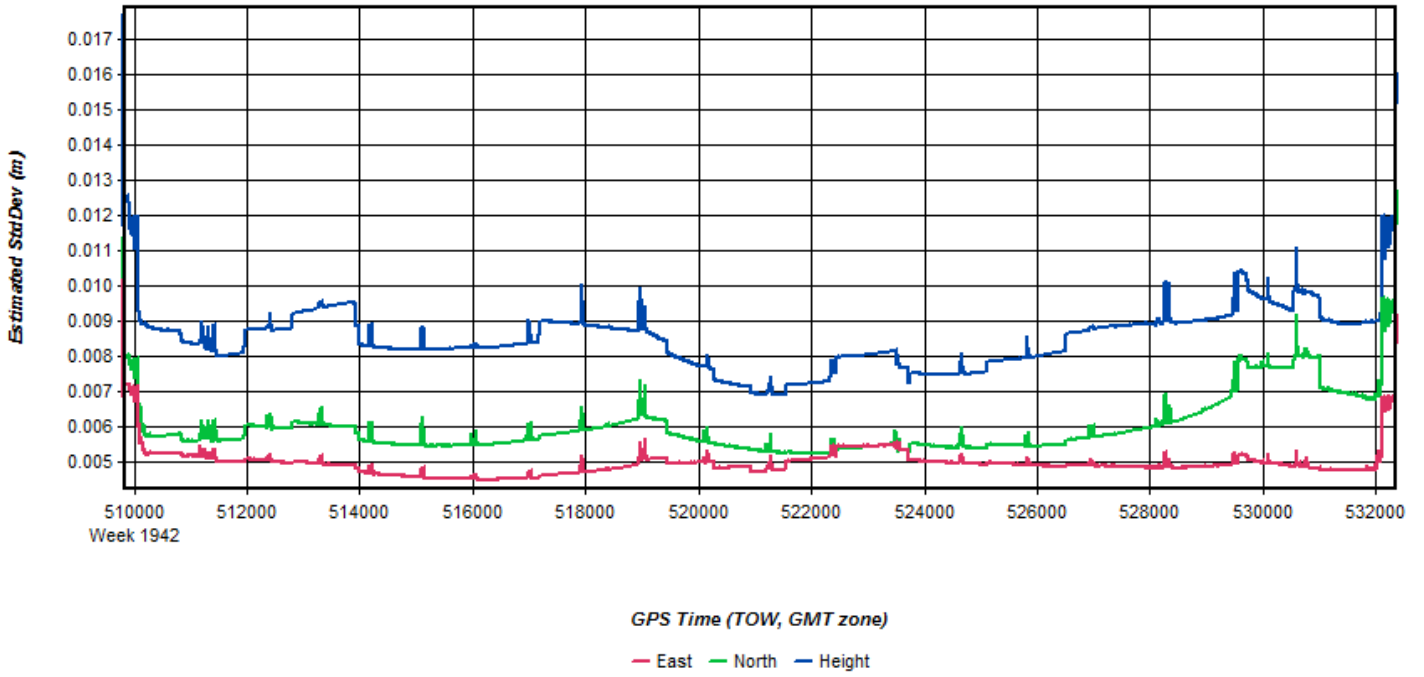
GPS Time (TOW, GMT zone)

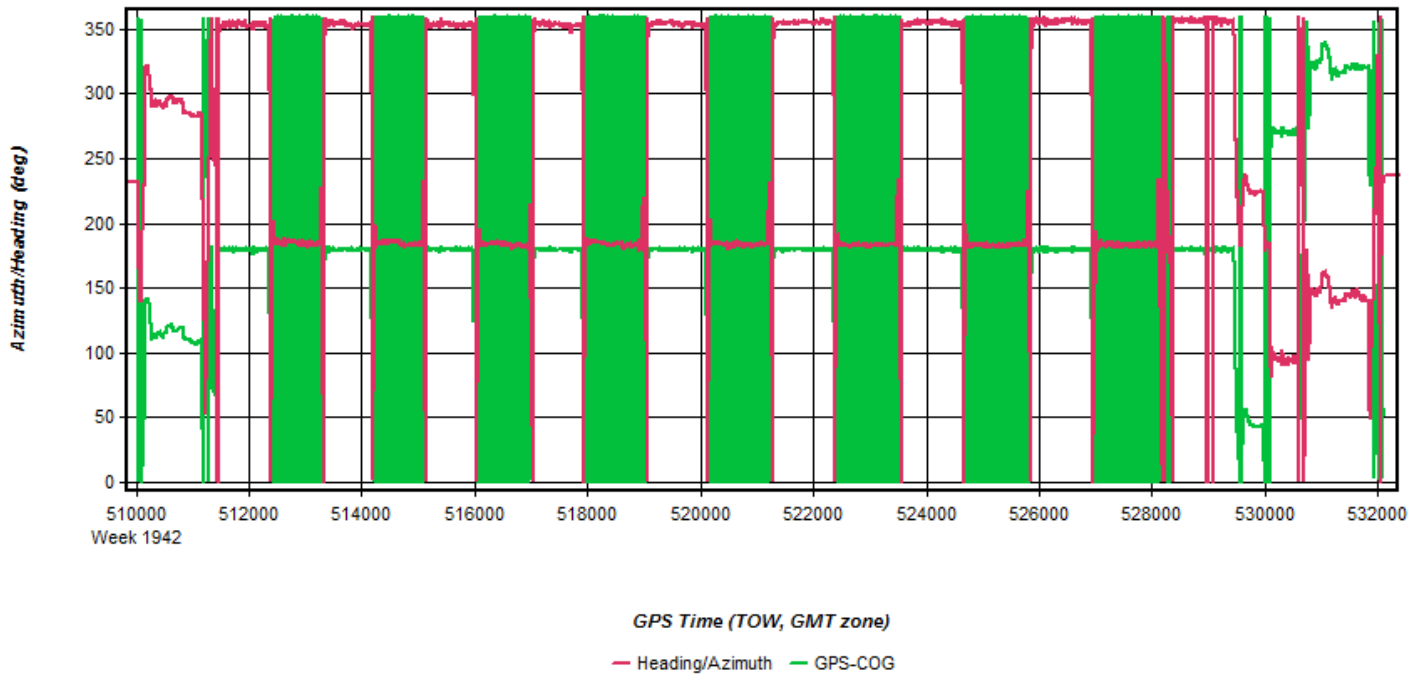
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Date: **03/31/2017**
Page 1 of 1

Project: **NRC5 SD.** Flight Mgmt File: **30420-5D-ALS80**

Aircraft: **N604MD** Begin Hobbs: **2019.1** End Hobbs: **2025.1** Total: **6.0** Pilot: **LUCKETT** Co-Pilot: **SWINFORD**

Dep Apt: **KPIR** Dep Time (Lcl): **4:30** (Z): **21:30** Arr Apt: **KPIR** Arr Time (Local): **10:30** (Z): **03:30** Tot Time Aloft: **6.0**

CORS: **01N** Sta 1: **01N** Sta 2: **01N** Flyovers: Y/N IF Y, times: Sta 1) **10** Sta 2) **0**

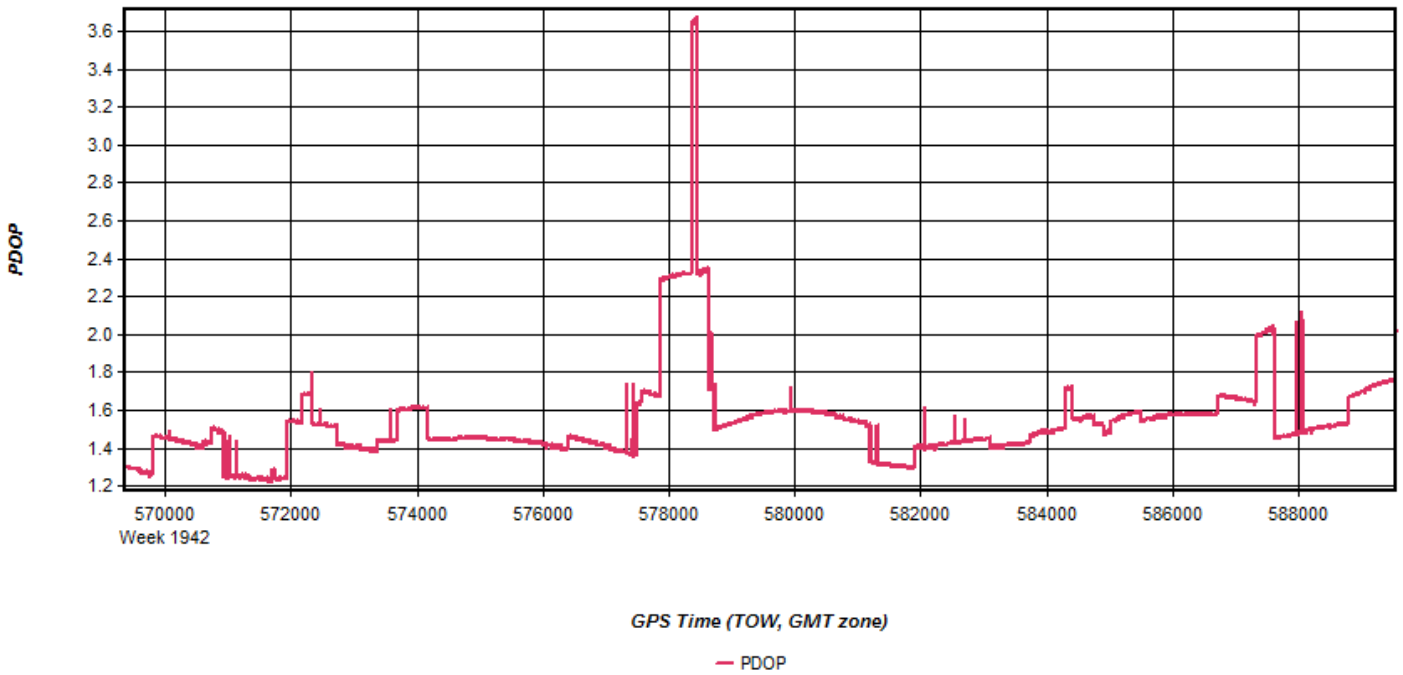
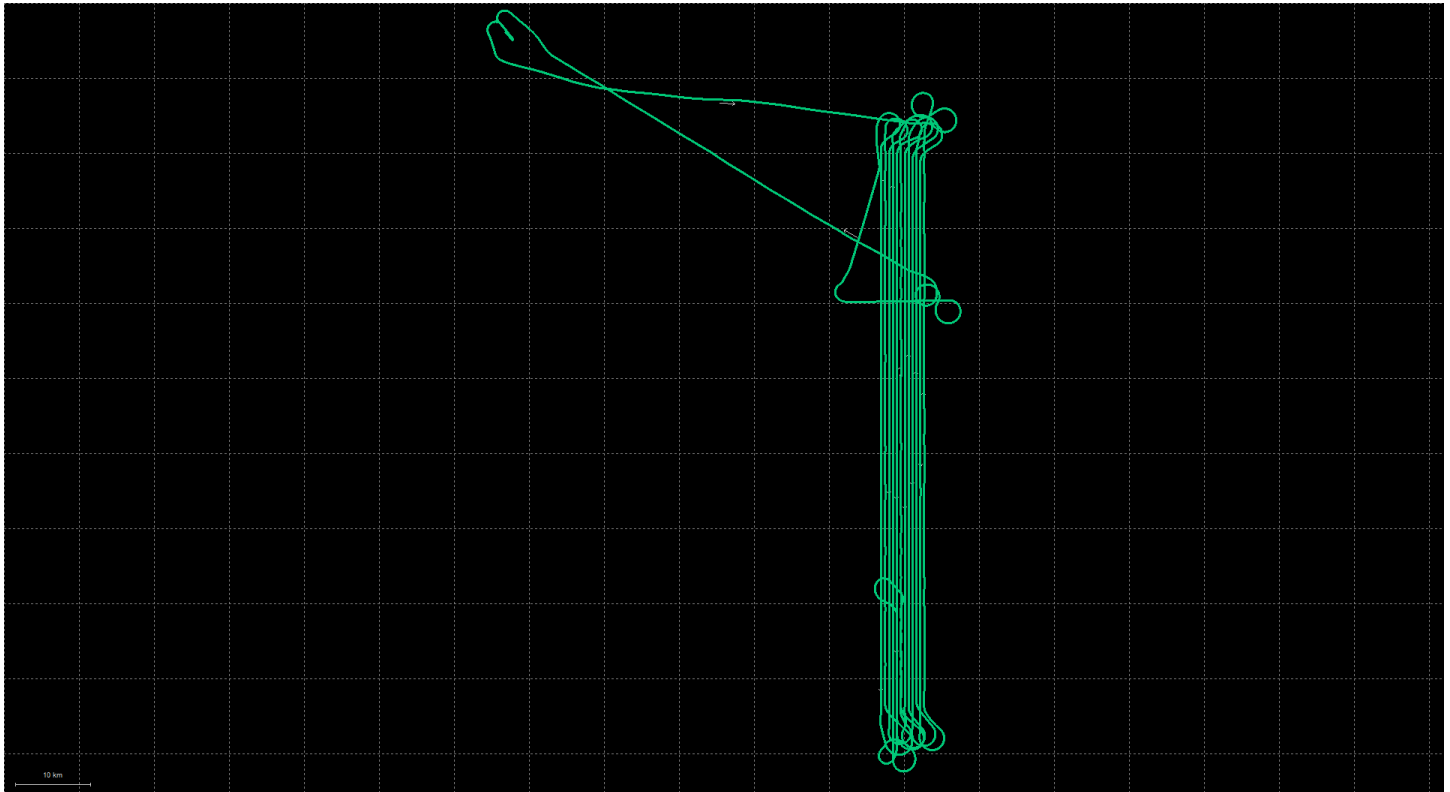
GPS Unit: **01N** Sta 1: **KPIR STATIC** Sta 2: **01N** Flyovers: Y/N IF Y, times: Sta 1) **10** Sta 2) **0**

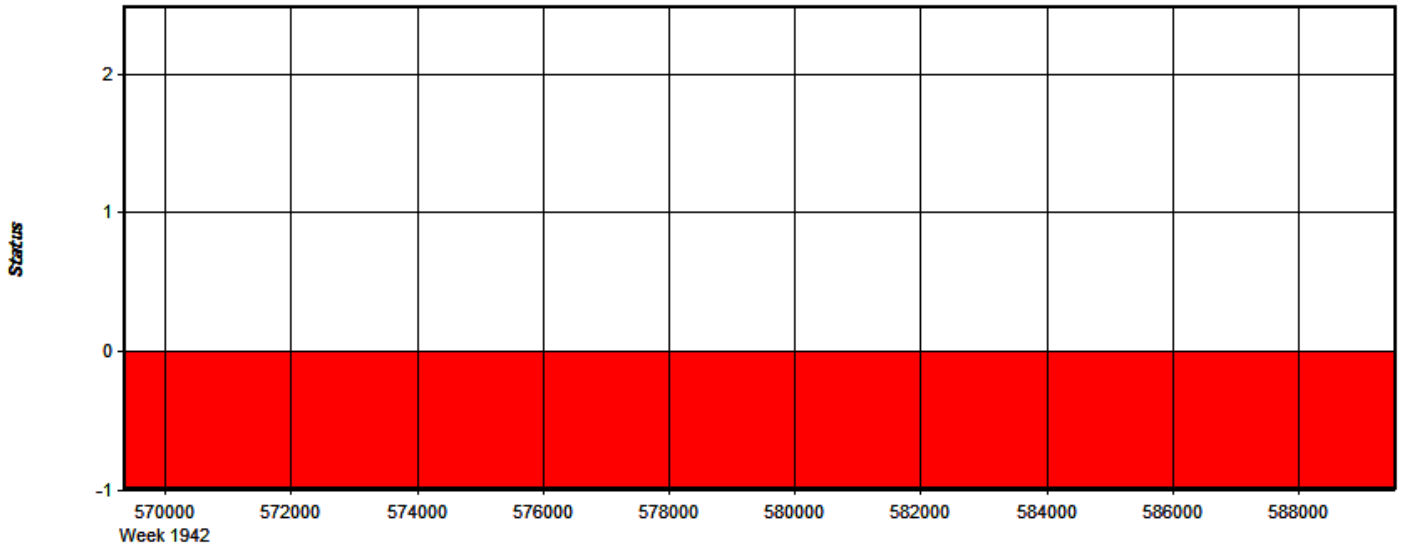
Gd Temp beg:	°C	End:	°C	OAT beg:	°C	End:	°C	Altimeter begin:	°C	end:	°C	Storage Name
Type: ALS 80		Serial: 8227		Alt: APSL		Alt: APSL		Avg Pt: 130		Avg Pt: 130		489
FOV: 28		Scan Freq: 48		MPIA: Y/N		Pulses In Air:		Max: 130		Spd: 100		
								Power: 100				

Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOV	GPS Altitude	Alt	Alt	Alt	Turb	Notes
274	175	22:06	22:19	131	10	22	6800	0	0	0	FIG 8 @ 22:02 / Low RETURNS OVER WATER
273	355	22:21	22:34	134	11	20	6800	0	0	0	
272	175	22:36	22:49	134	11	20	6800	0	0	0	
271	355	22:51	23:04	129	12	19	6800	0	0	0	
270	175	23:06	23:19	133	12	19	6800	0	0	0	
269	355	23:22	23:36	130	12	19	6800	0	0	0	EXIT FILE - SLOWING DOWN
268	175	23:38	23:51	131	14	17	6800	0	0	0	RELOADED FILE
267	355	23:53	00:09	134	13	16	6800	0	0	0	
266	175	00:11	00:28	130	11	18	6800	0	0	0	
265	355	00:30	00:46	133	11	20	6800	0	0	0	EXIT FILE
264	175	00:49	01:05	132	10	20	6800	0	0	0	RELOAD FILE
263	355	01:07	01:25	133	11	20	6800	0	0	0	
262	175	01:27	01:44	133	10	21	6800	0	0	0	
261	355	01:45	02:02	129	11	19	6800	0	0	0	
260	175	02:05	02:22	133	12	17	6800	0	0	0	
259	355	02:24	02:40	132	12	20	6800	0	0	0	
258	175	02:47	03:04	133	13	17	6800	0	0	0	RESTART LINE
304	265	03:16	03:23	128	13	19	6800	0	0	0	X-FLIGHT / FIG 8 @ 03:25

Total Proj Lines: **13** Lines Flown: **13** Lines Remain: **0** Online Time: **5:25** Mob Time: **75** Notes:

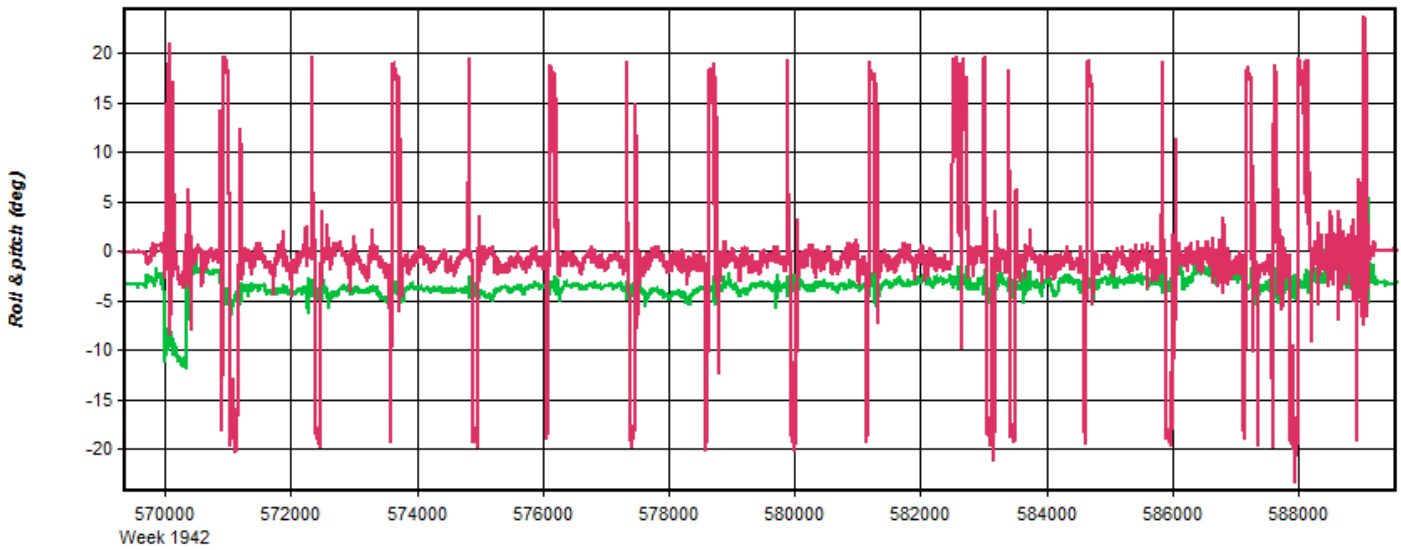
April 1, 2017-A (604MD, SN8227)





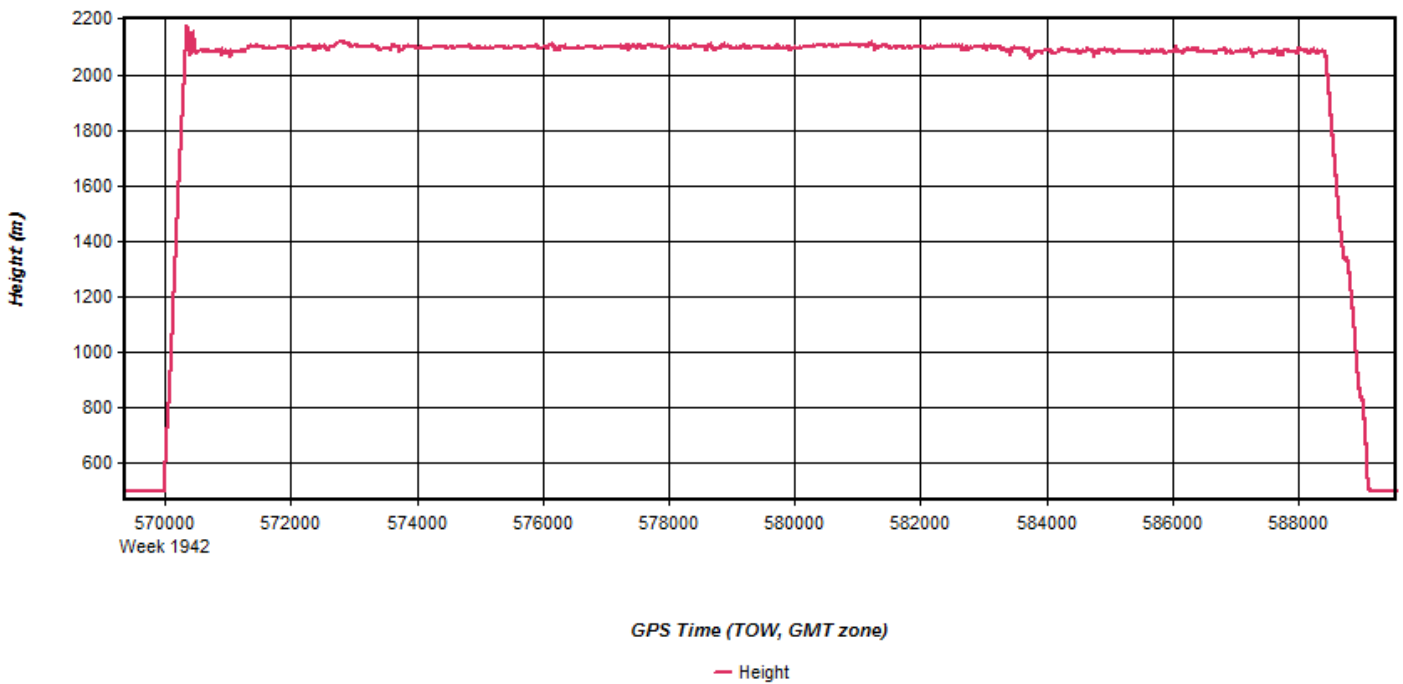
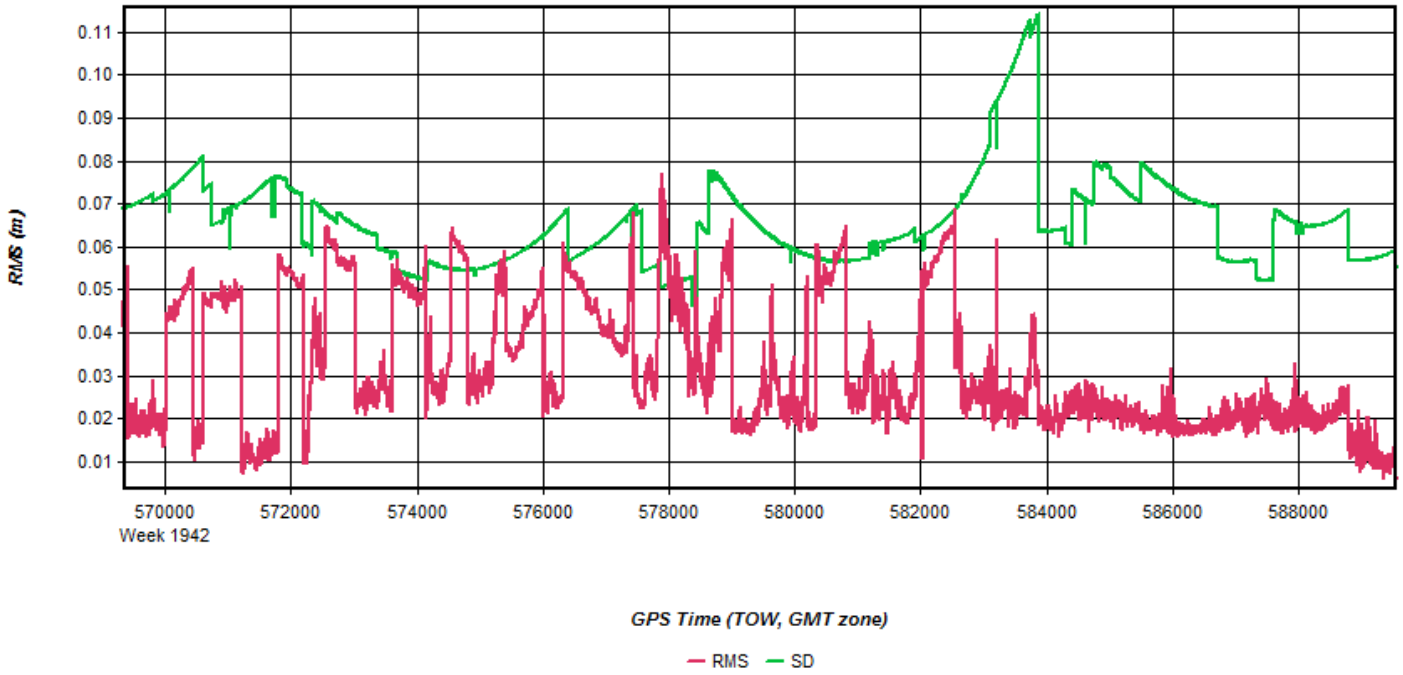
GPS Time (TOW, GMT zone)

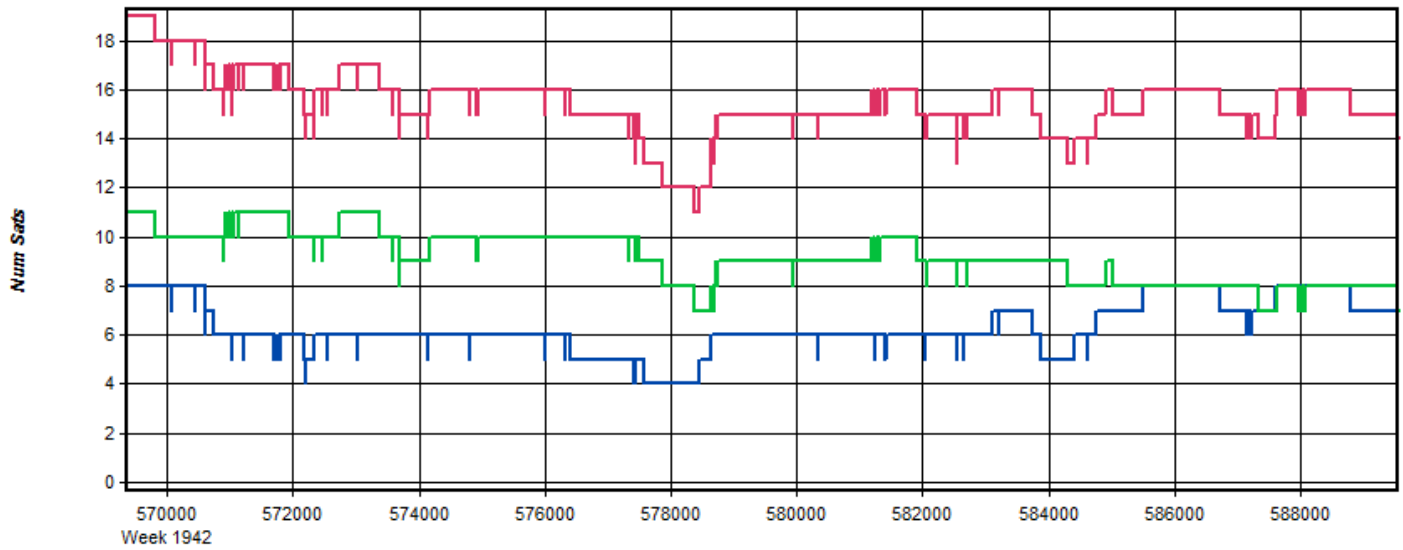
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

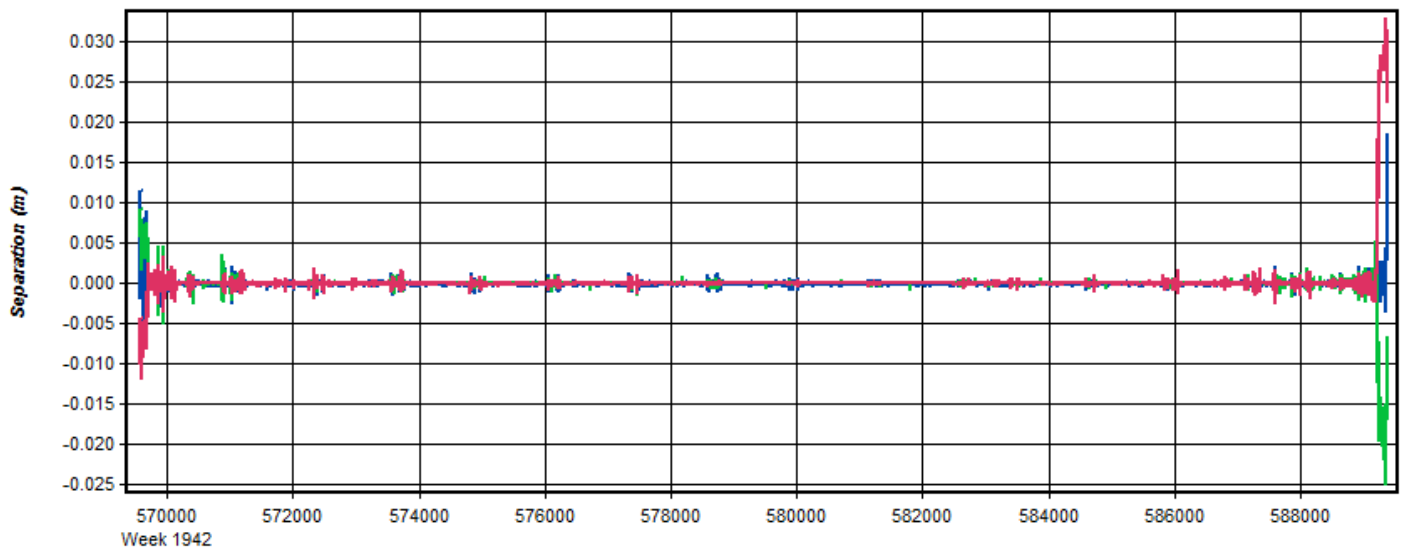
— Roll — Pitch





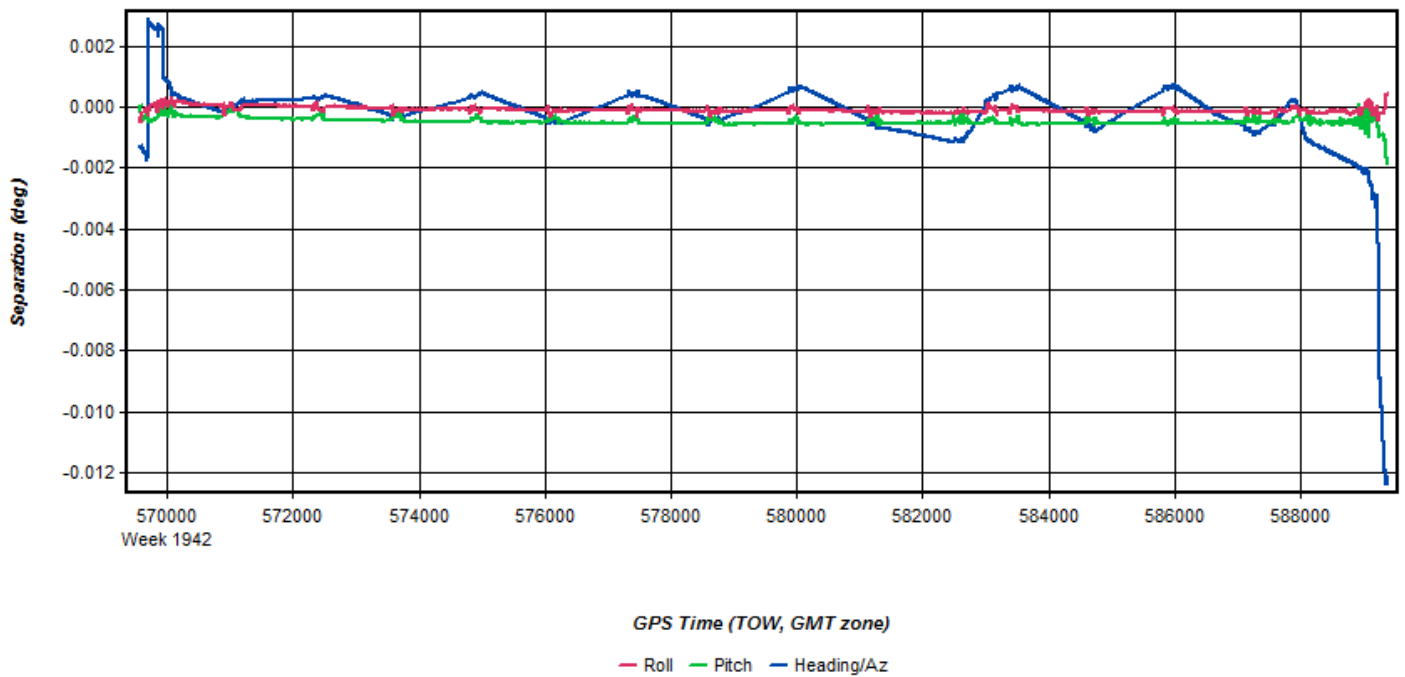
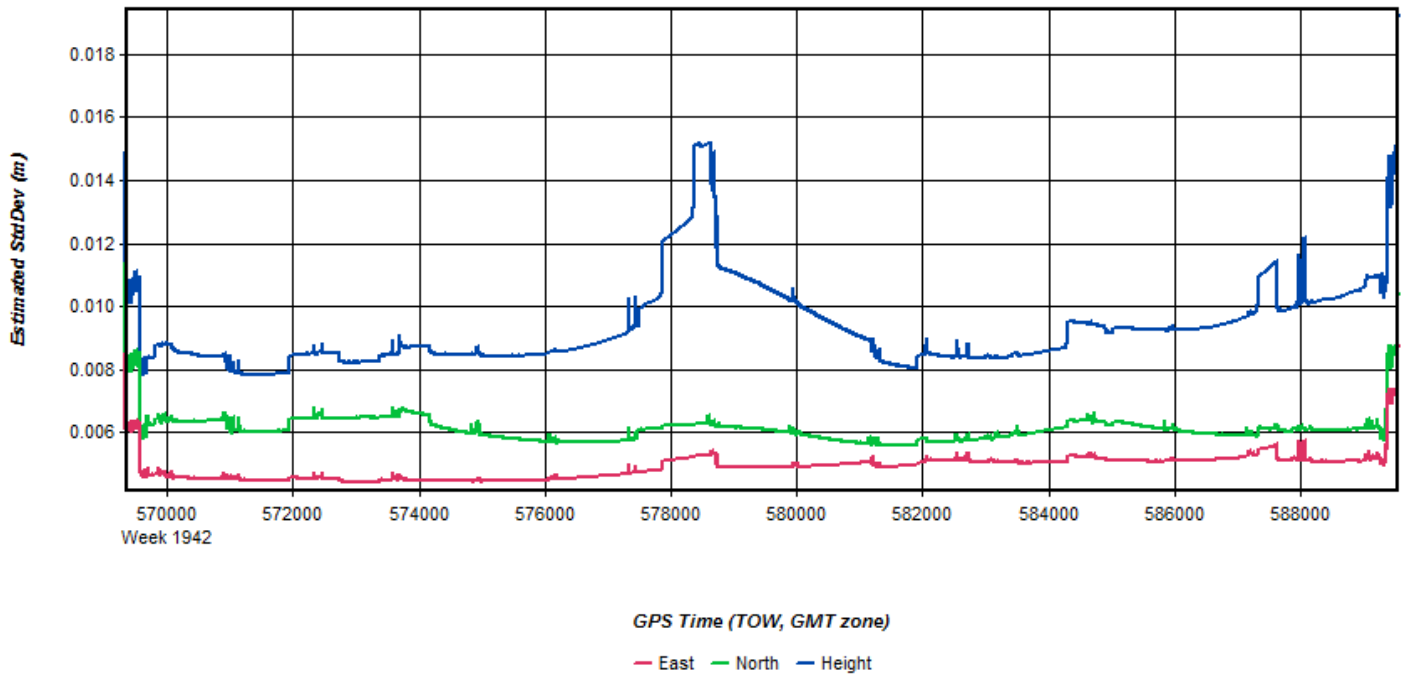
GPS Time (TOW, GMT zone)

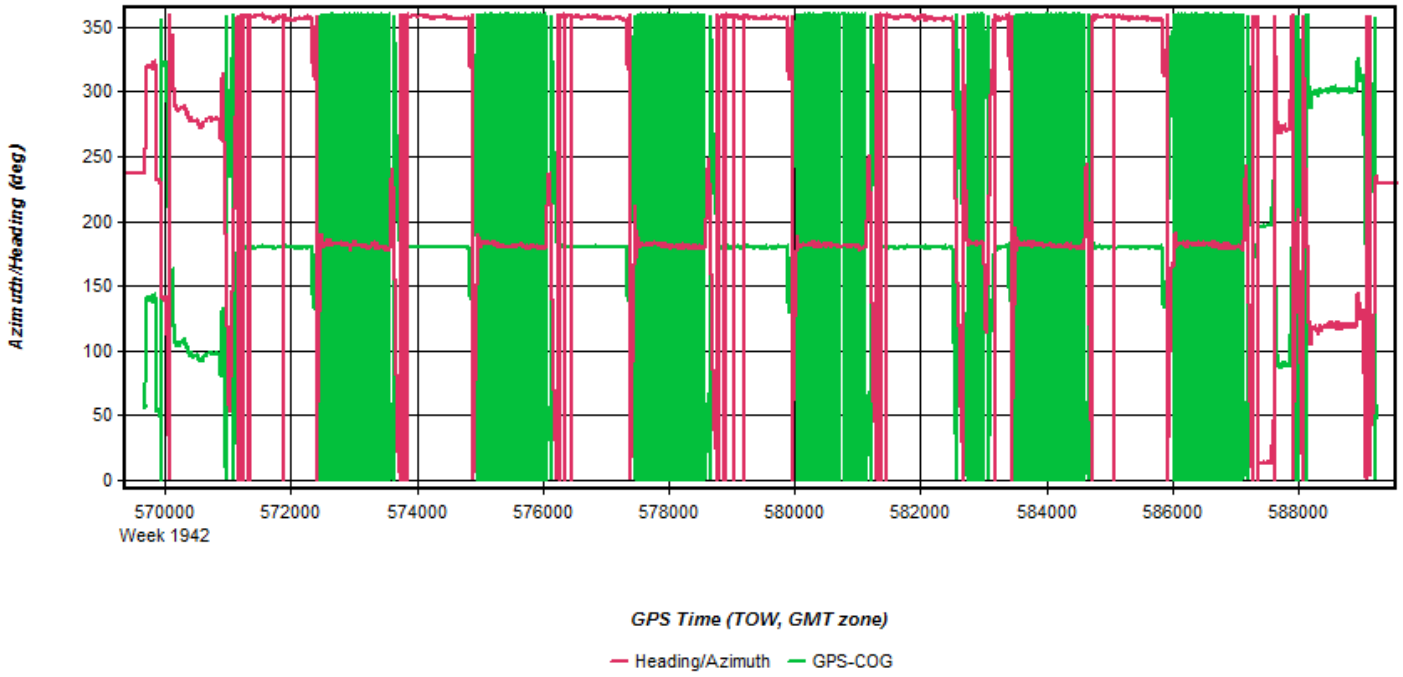
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Quantum Spatial Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
 (email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 4-1-2017
 UTM: A B C D E Pg 1 of 1

Project: NRCS SD Proj #: 30470 Flight Mgmt File: 30470-SD-AL580-8027 Tech: COX
 Aircraft: N604MD Begin Hobbs: 12025.1 End Hobbs: 12030.4 Total: Pilot: Nilsen Co-Pilot: _____

Dep Apt: PIR Dep Time (Local): 14:15 Arr Apt: PIR Arr Time (Local): 2:35 (Z): 19:35 Tot Time Aloft: 5:15
 COORS: Y / N Sta 1: _____ Sta 2: _____ Flyovers: Y / N IF Y, times: Sta 1) _____ Sta 2) _____

GPS Unit: (Y) N Sta 1: GADPFO Sta 2: _____ Flyovers: Y / N IF Y, times: Sta 1) _____ Sta 2) _____

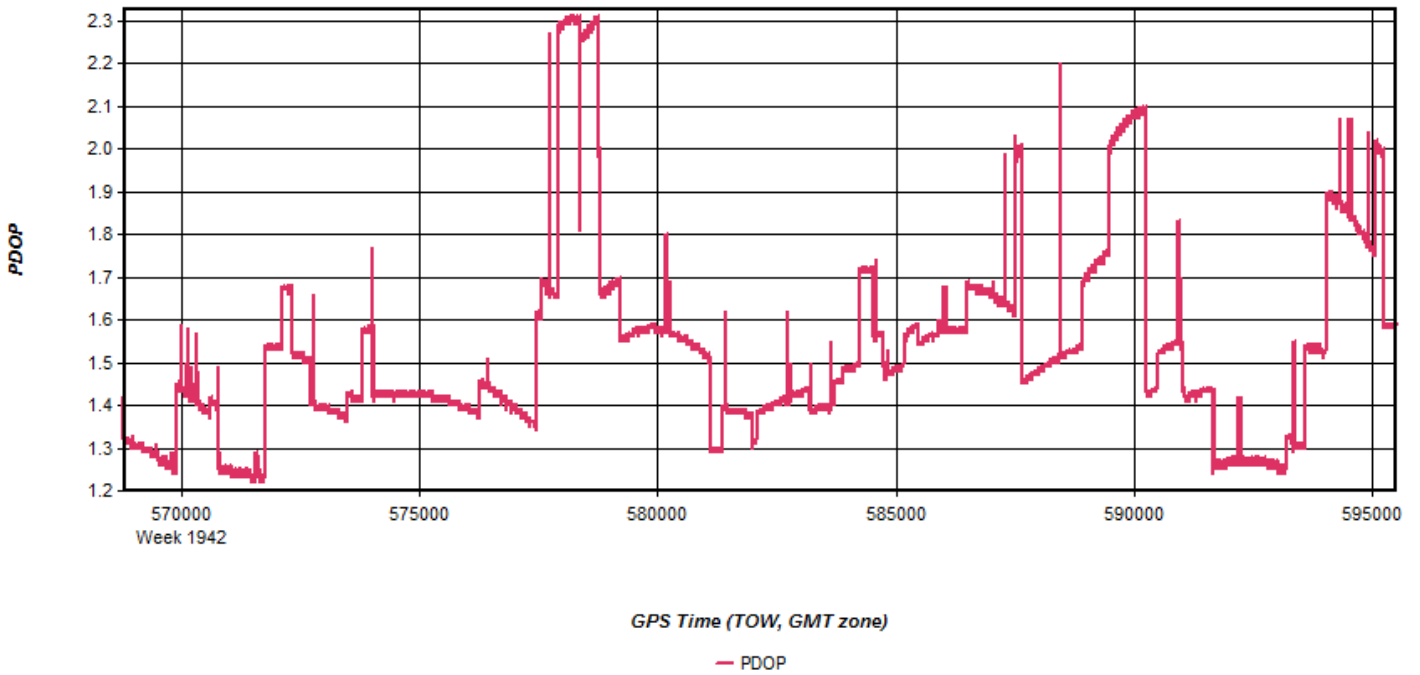
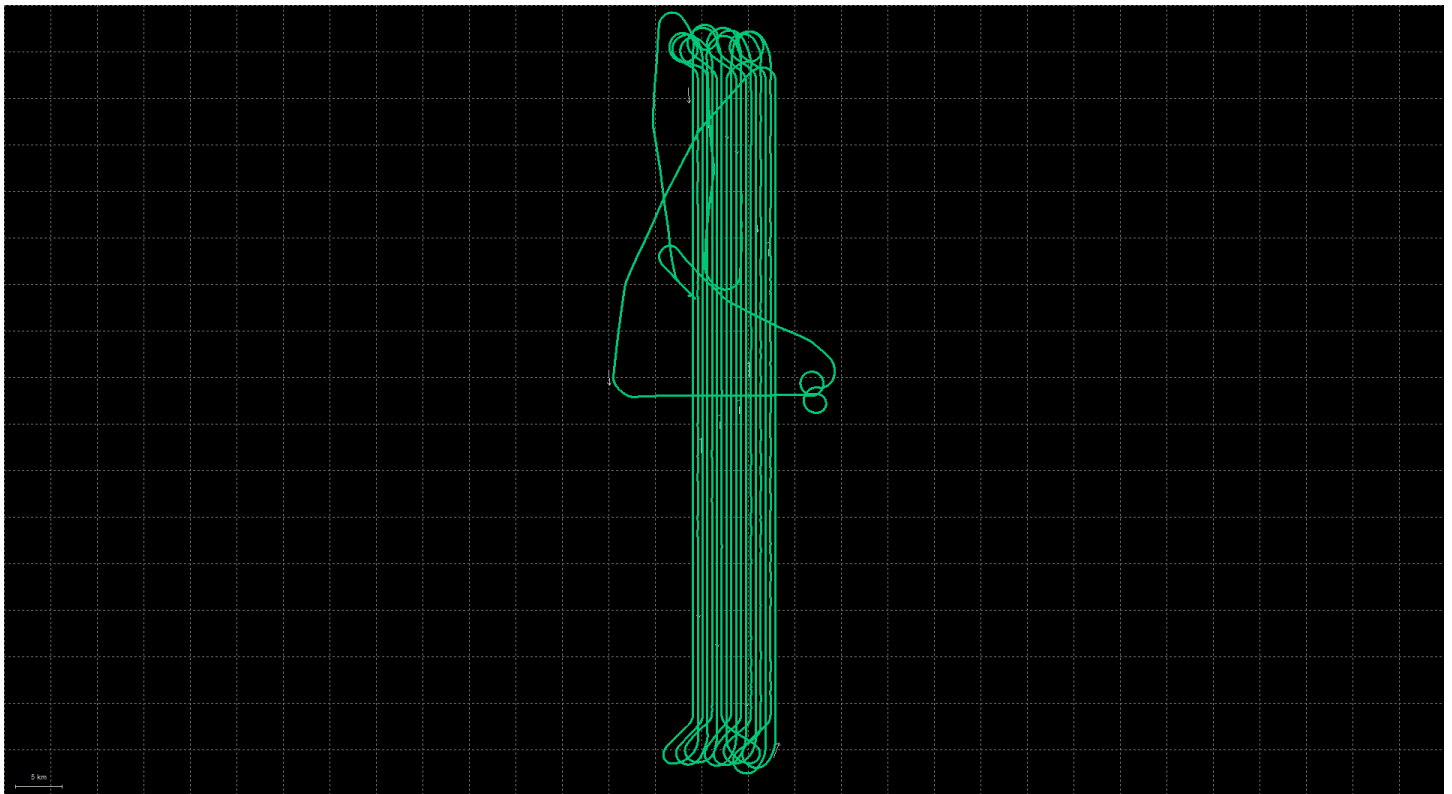
Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: 3012 end: _____

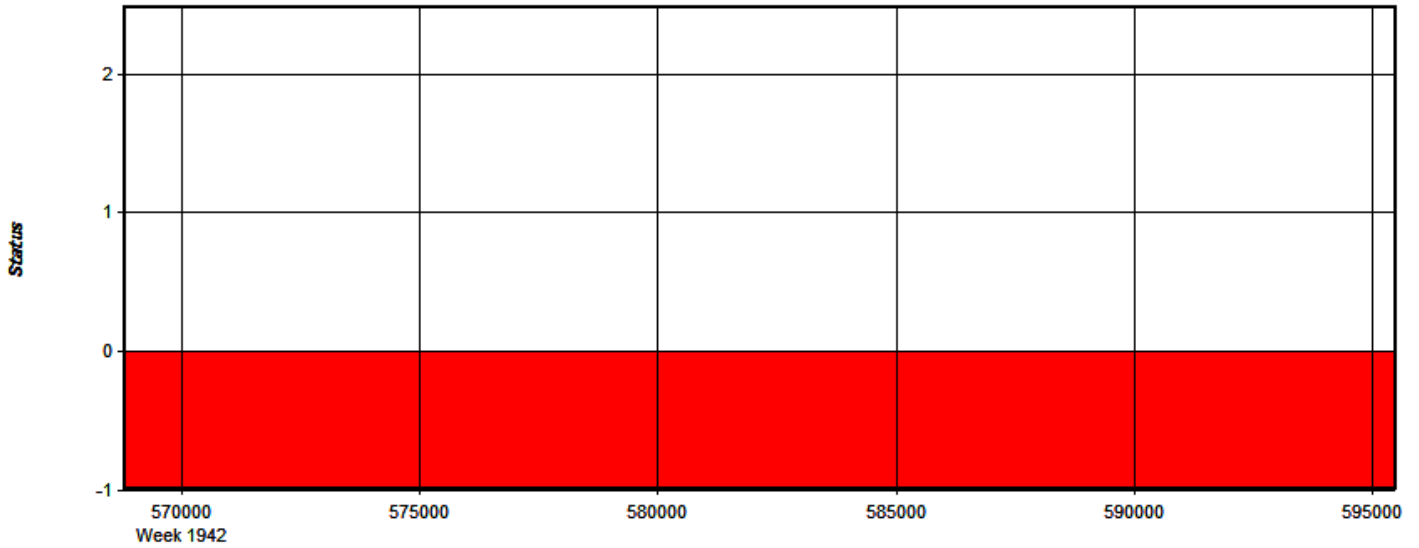
LIDAR	Type	Serial #	Alt AGL	MPIA	Y	N	Alt ANSL	Avg Terr Ht	Max Gdspd	Avg Pt Spacing	Power	Power PPSM	Mag Gd	End Gd	Test Gd	Storage (Nimble)
	TOV	28	8027	47.3			2	332	130	100%			745	623	122	1

Line #	Mag	Start (UTC)	End (UTC)	Gd Spd	GPS Altitude	Crab	Turb (0, 1, 4)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
257	174	14:41	1458	135	6864	0	0	Less than 10% Degr Overland
256	354	1502	1519	137	6878	0	0	Static Start
255	174	1522	1540	130	6857	0	0	1409 - 1414
254	354	1543	1600	134	6871	0	0	High Thin Scattered
253	174	1604	1621	129	6900	0	0	Fig 8's 14.34
252	354	1625	1642	133	6869	0	0	
251	174	1646	1704	136	6884	0	0	clds 0-4 FSE
250	354	1707	1725	134	6890	0	0	clds 1-3 FSE
249	174	1729	1746	130	6901	0	0	
248	354	1753	1756	130	6878	0	0	0 to 6 FSE
247	174	1806	1806	138	6900	0	0	Refit
246	354	1805	1822	135	6870	0	0	0 to 6 FSE
245	174	1826	1843	130	6819	0	0	3-4 FSE cld
244	354	1847	1905	135	6845	1	1	Fig 8's 19:20
243	174	1914	1917	130	6809	2	2	unplanned X 1 noc
242	354	1914	1917	130	6809	2	2	Static Stop
241	174	1914	1917	130	6809	2	2	19:40 - 19:41

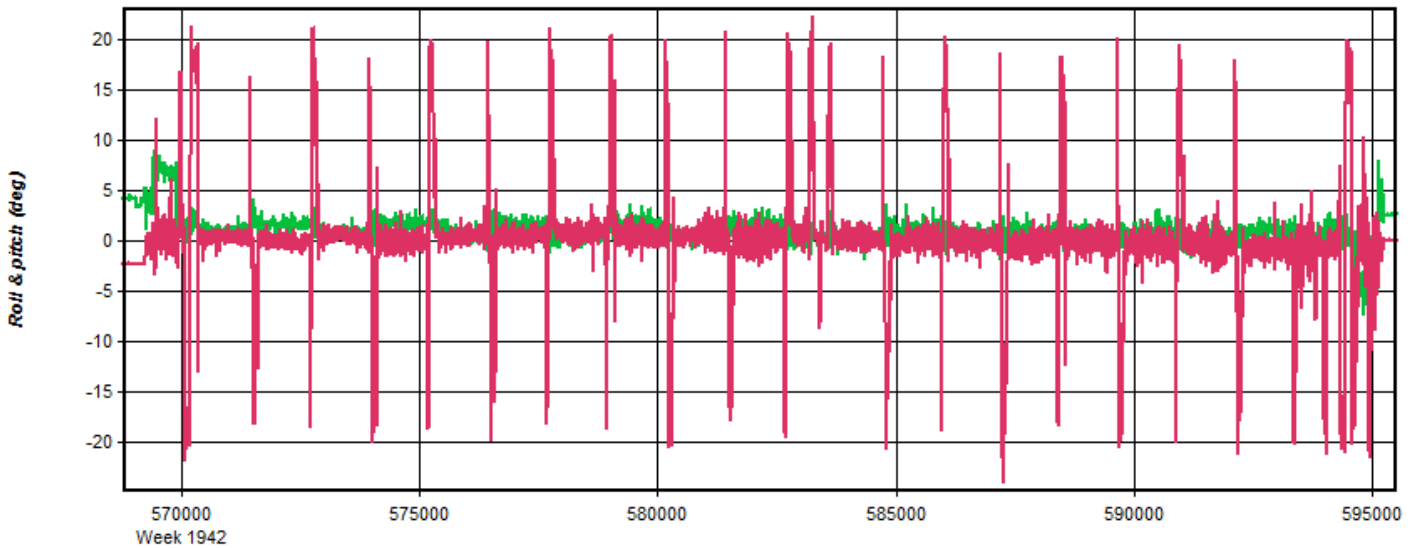
Total Proj Lines: _____ Lines Flown: 12 Lines Remain: _____ Online Time: 4:45 Mob Time: 30 Notes: _____

April 1, 2017-A (N915WC, SN8237)

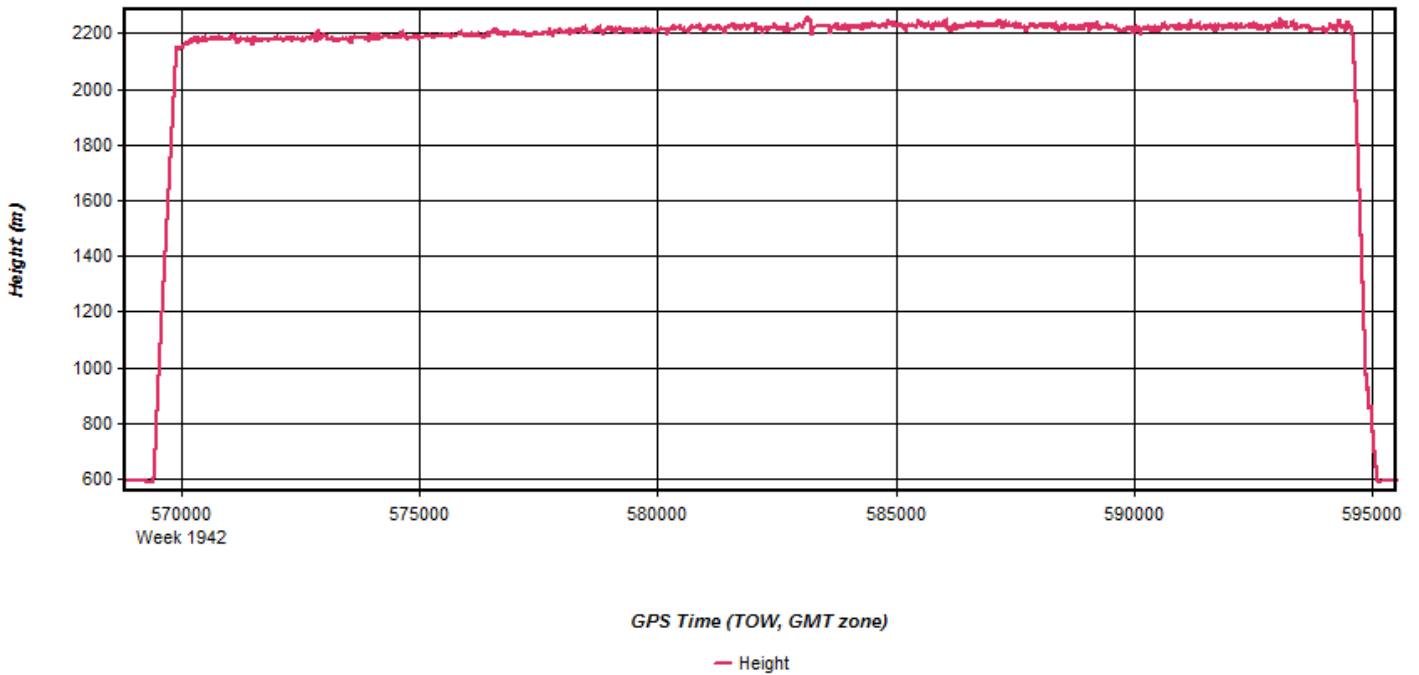
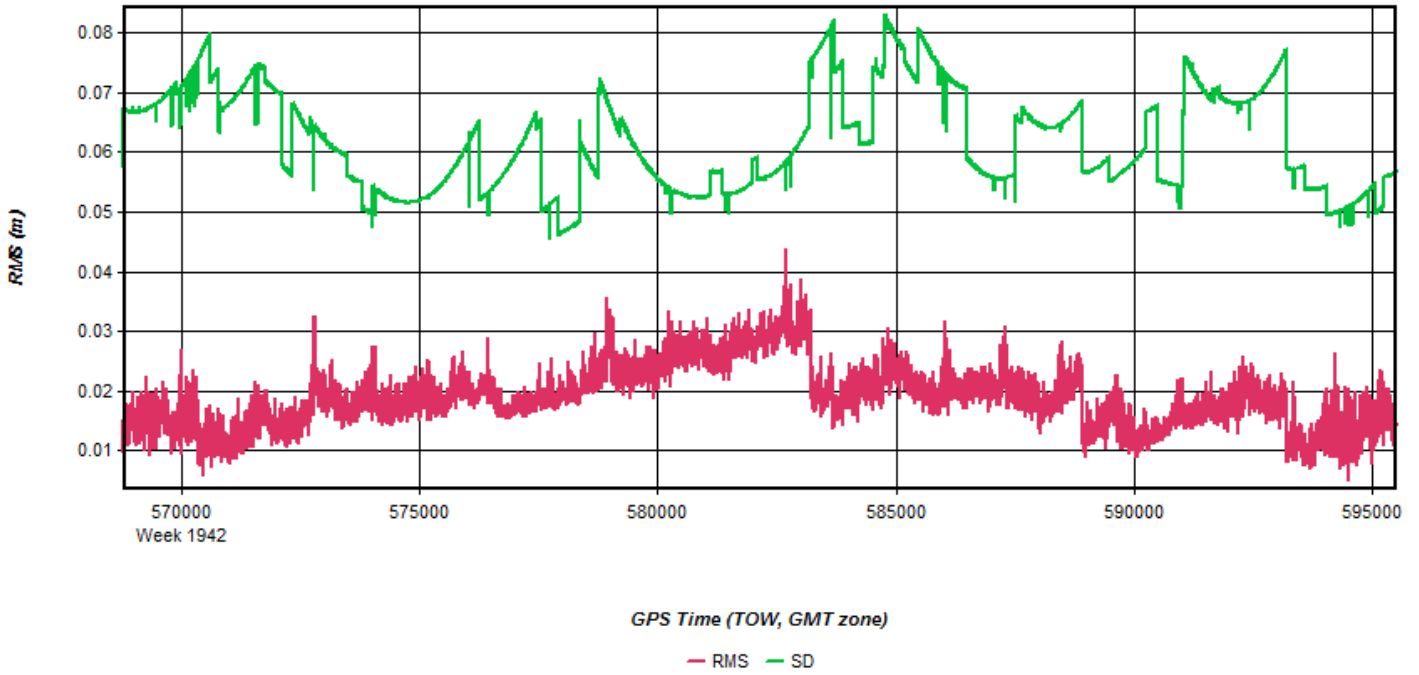


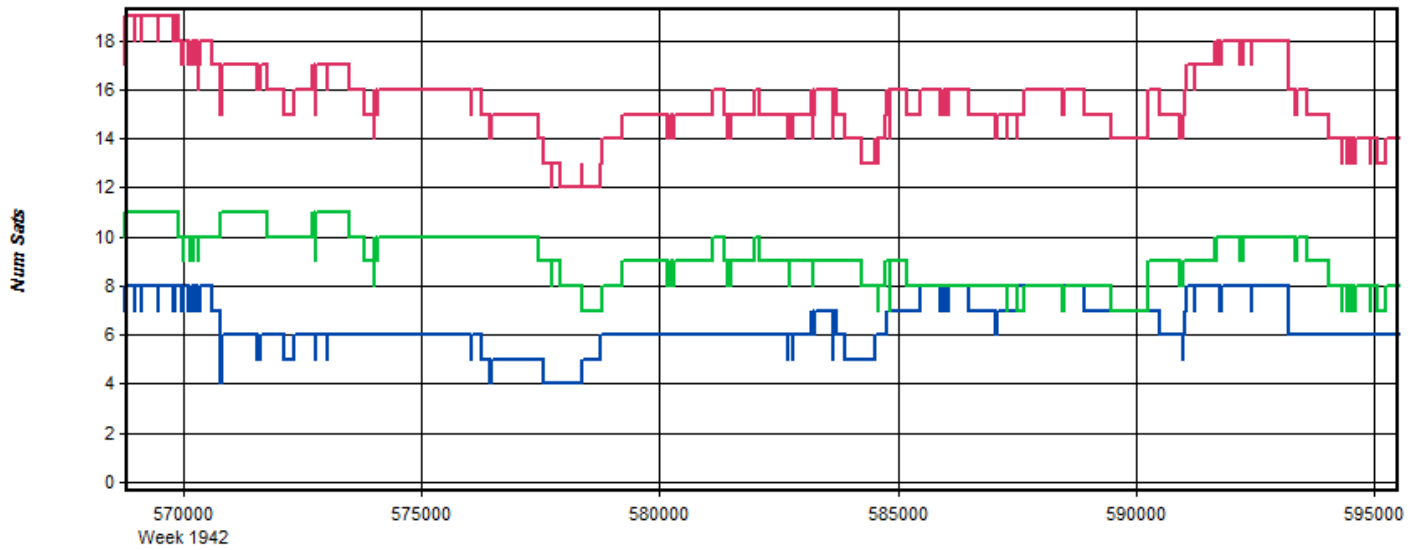


GPS Time (TOW, GMT zone)
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

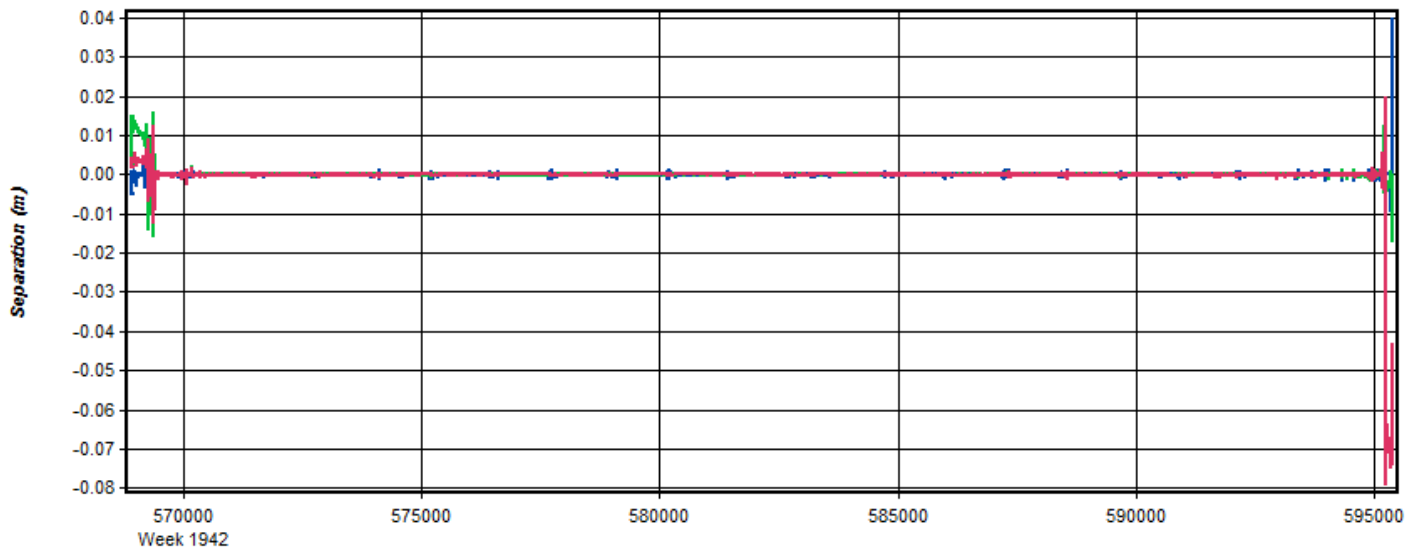


GPS Time (TOW, GMT zone)
— Roll — Pitch



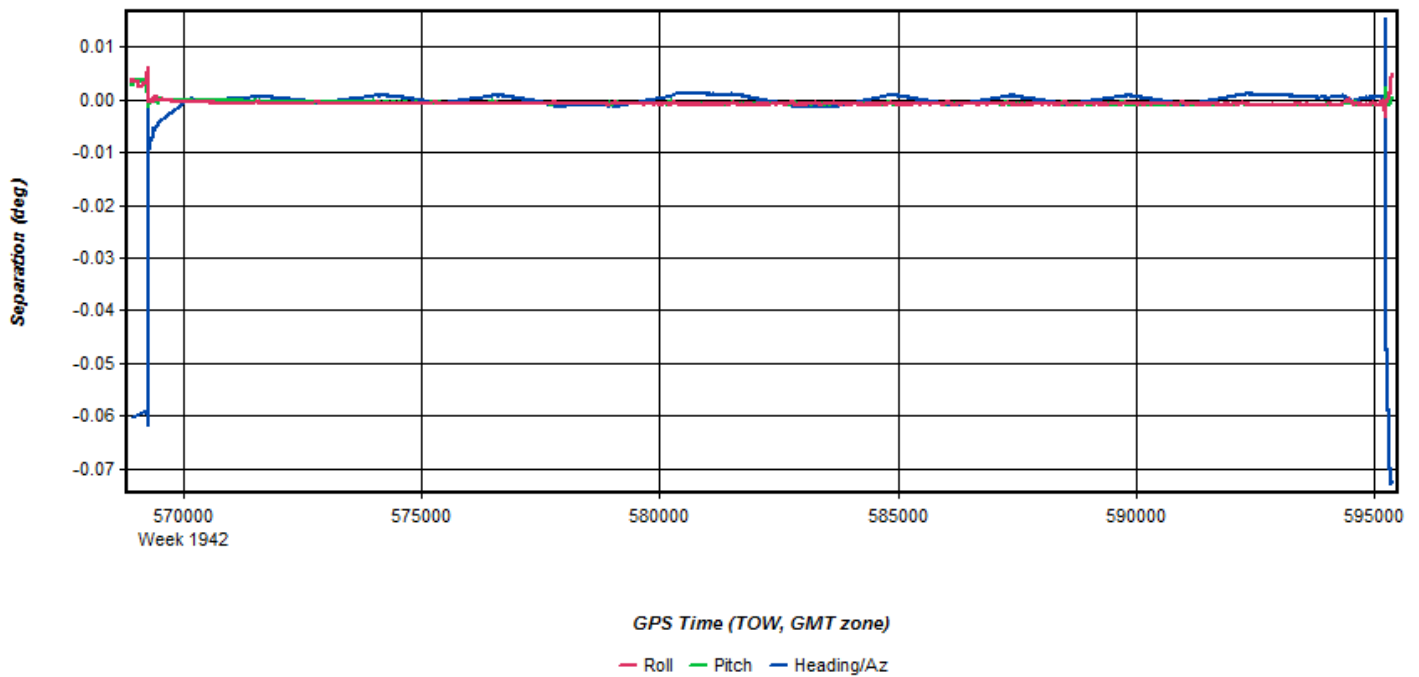
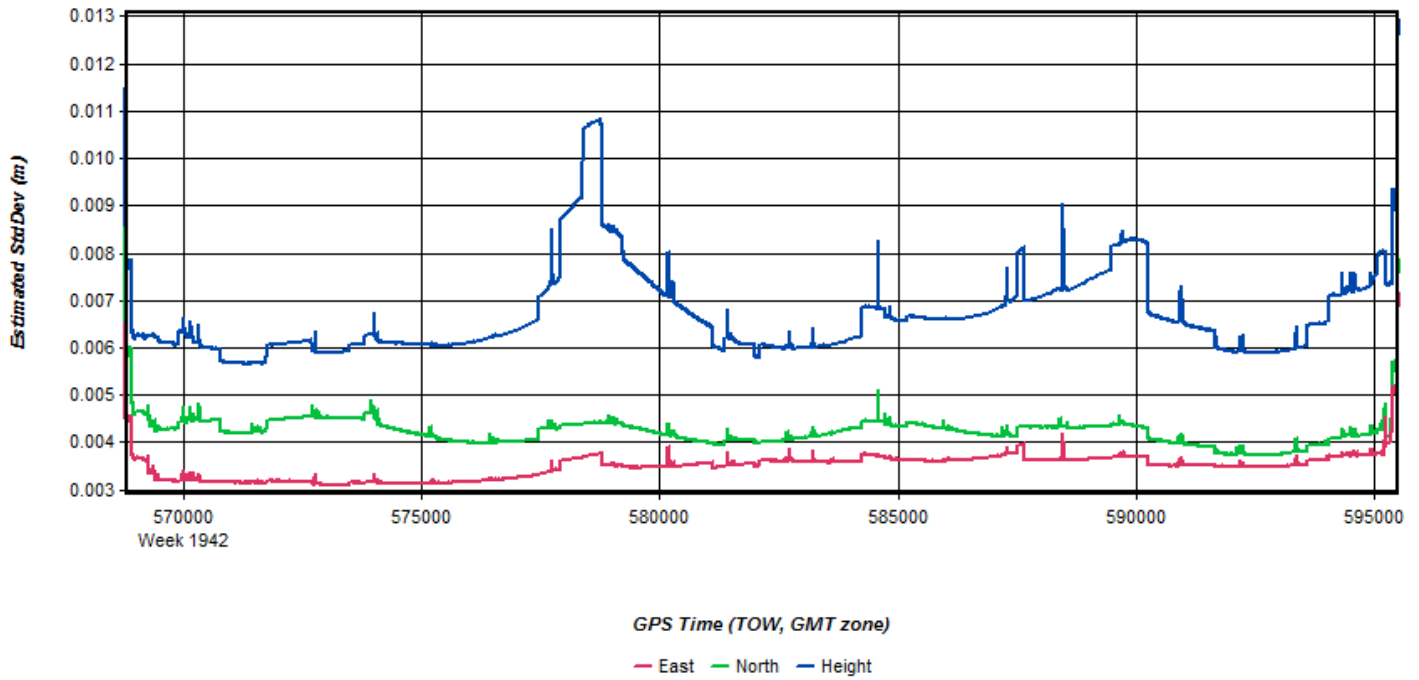


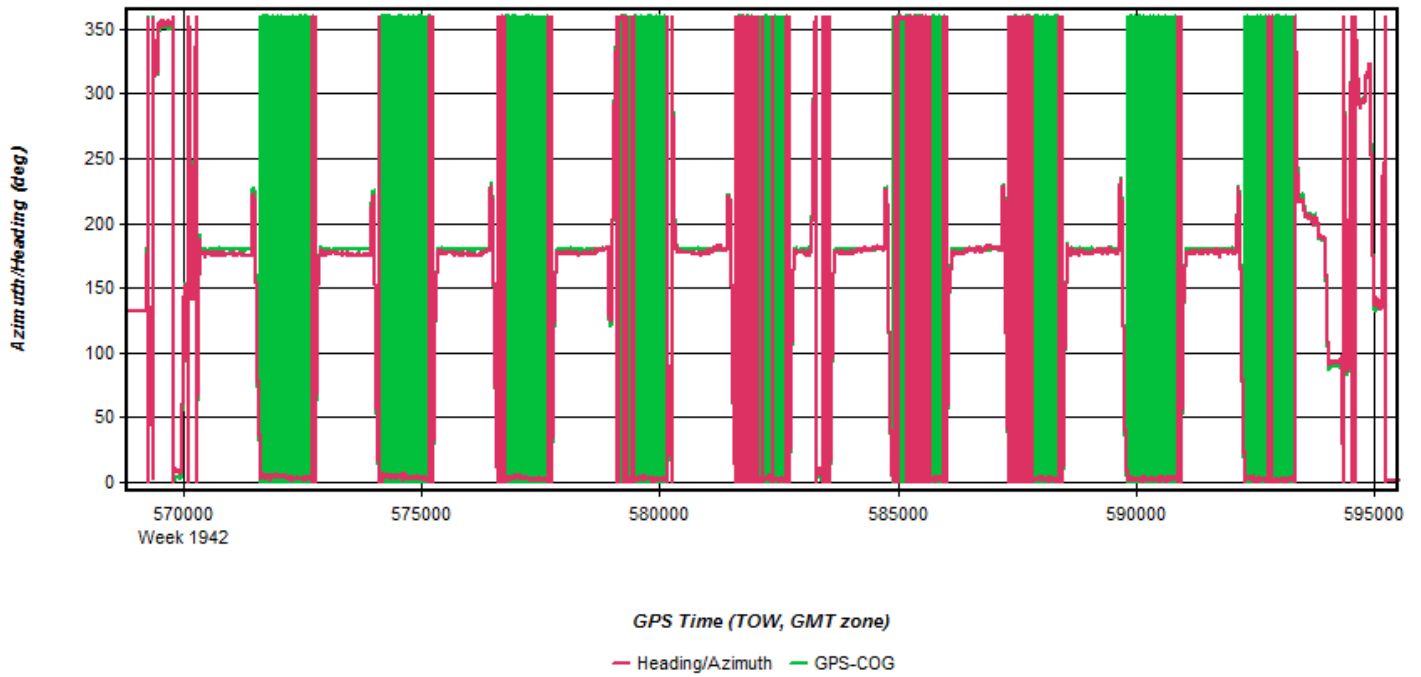
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



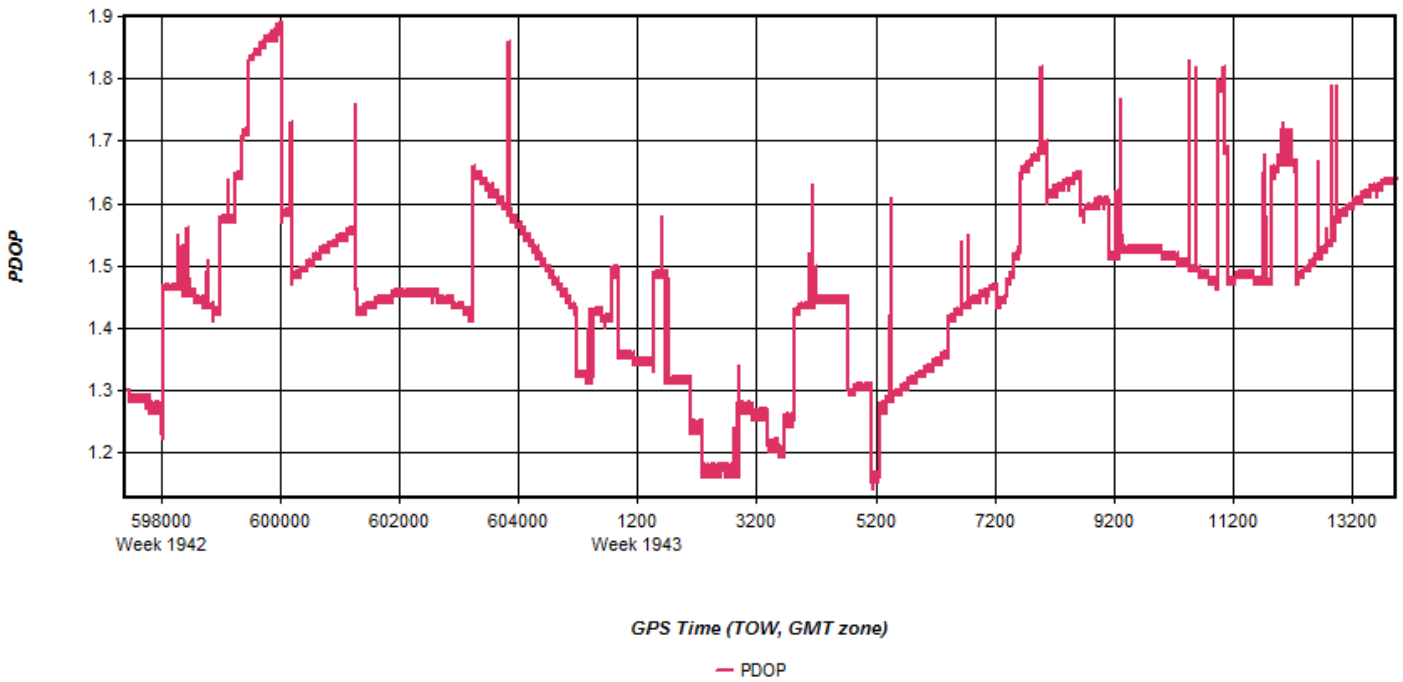
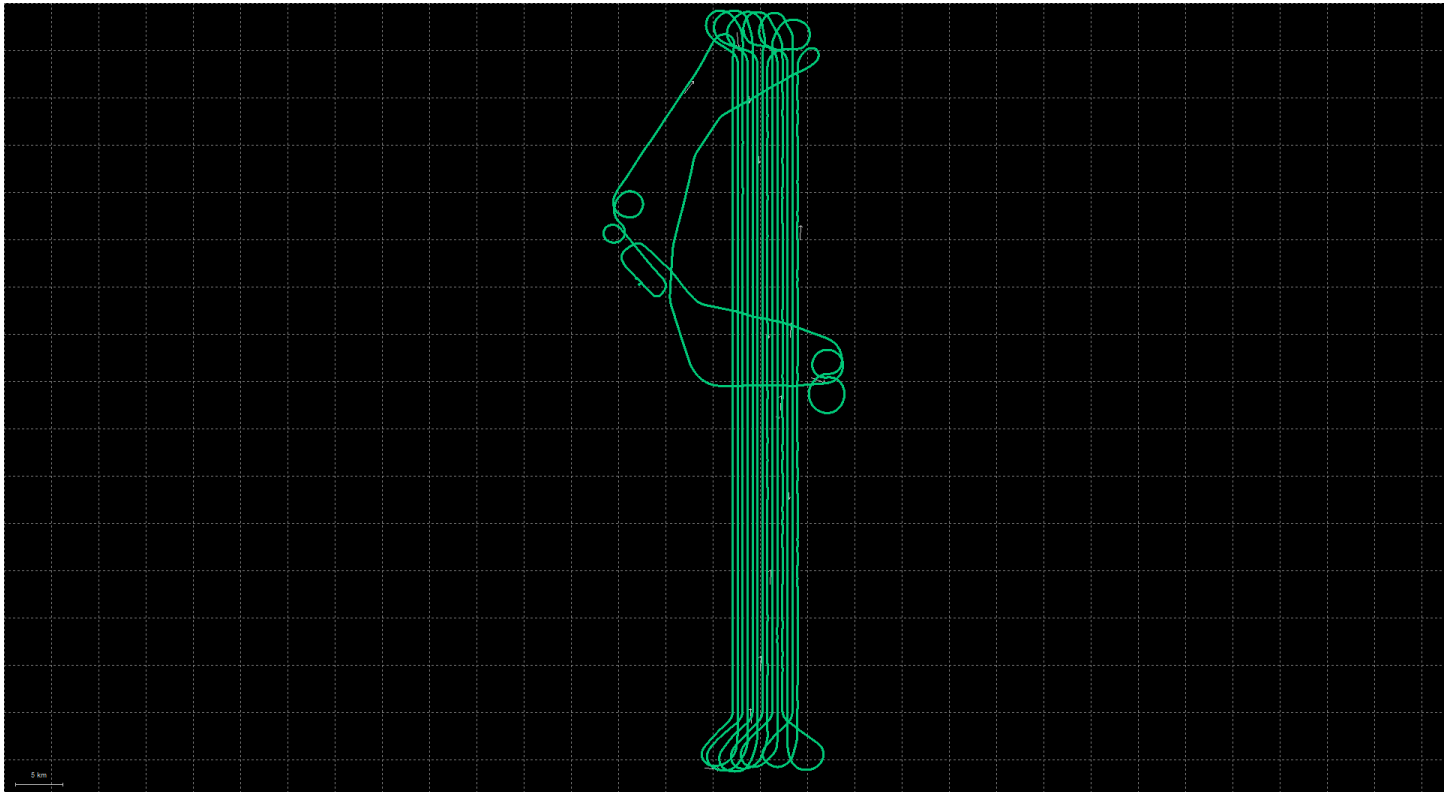
GPS Time (TOW, GMT zone)

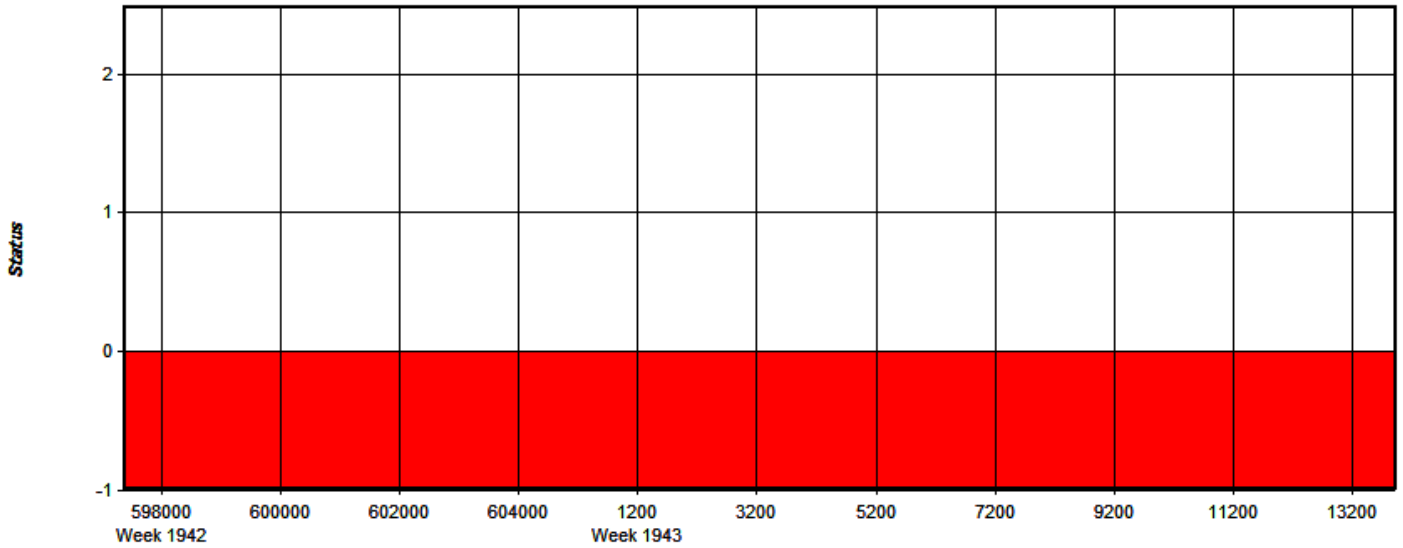
— East — North — Up



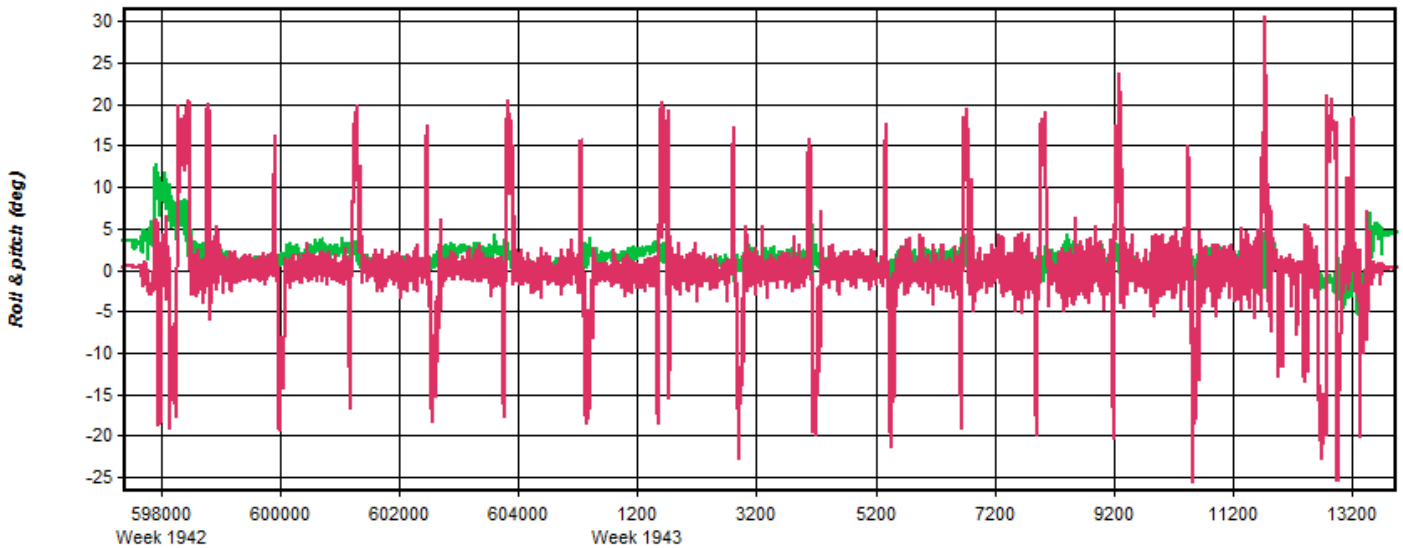


April 1, 2017-B (N915WC, SN8237)

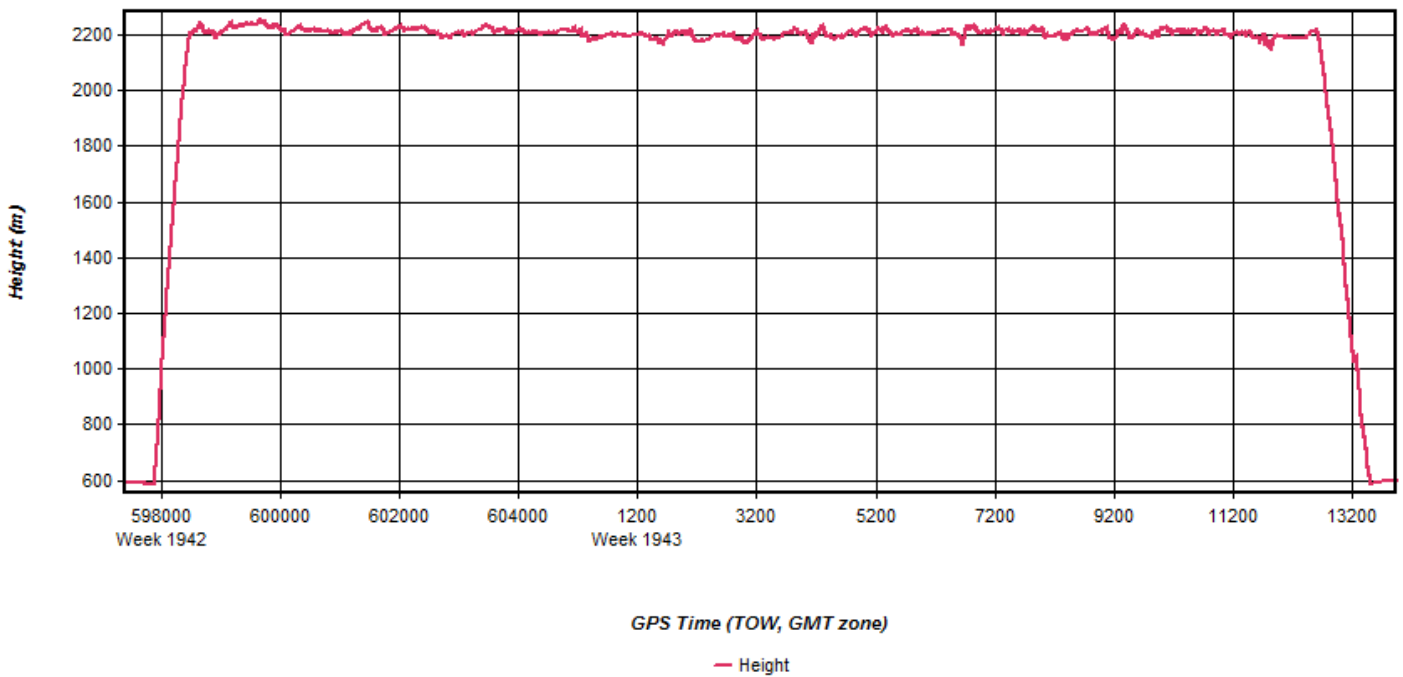
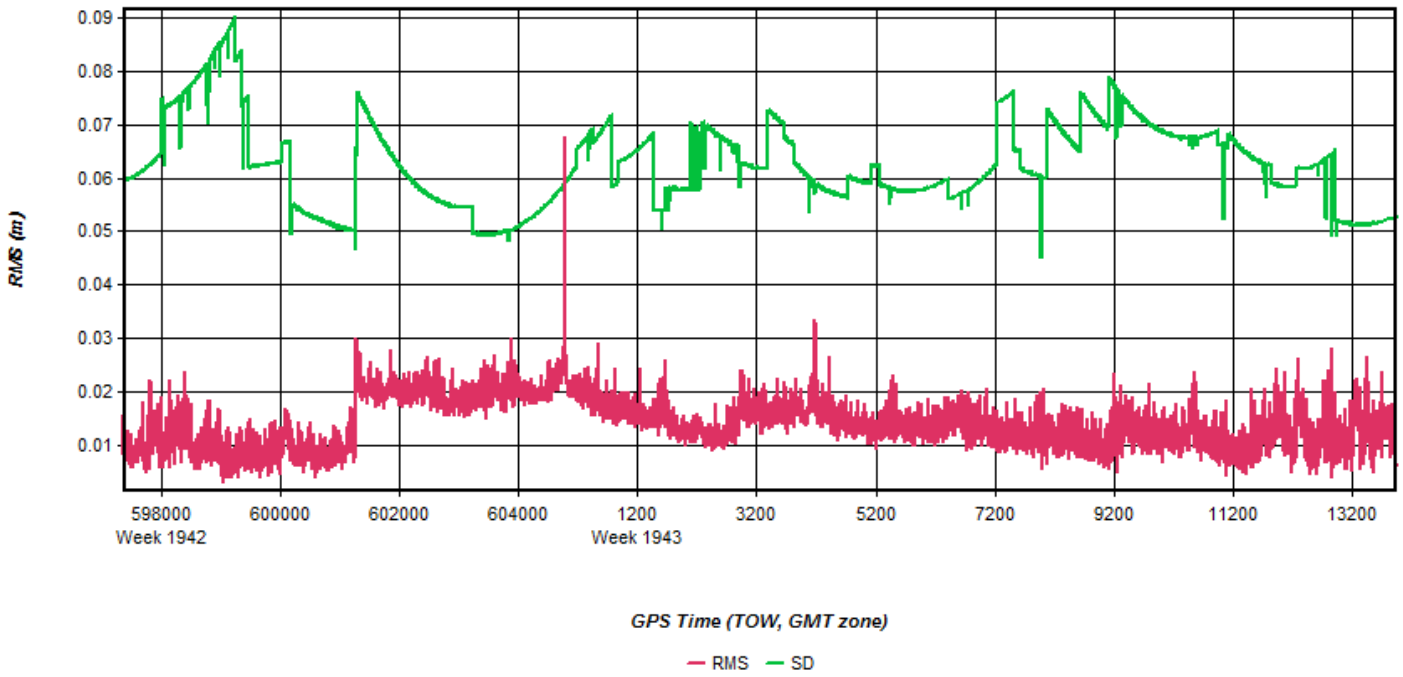


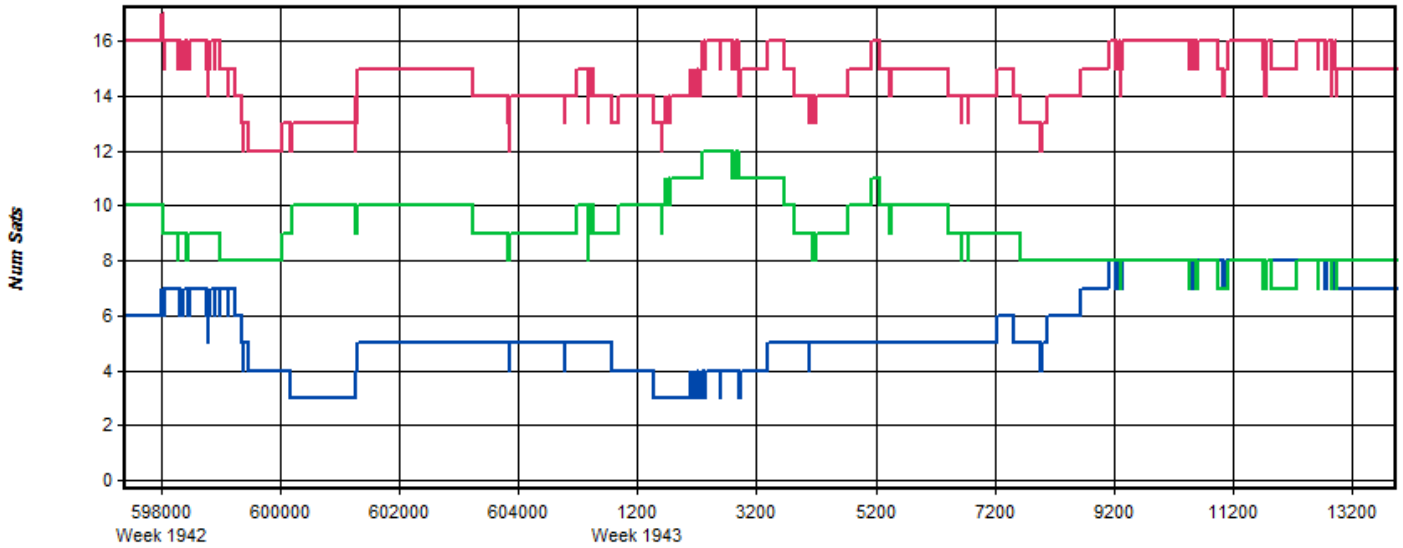


GPS Time (TOW, GMT zone)
 — Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



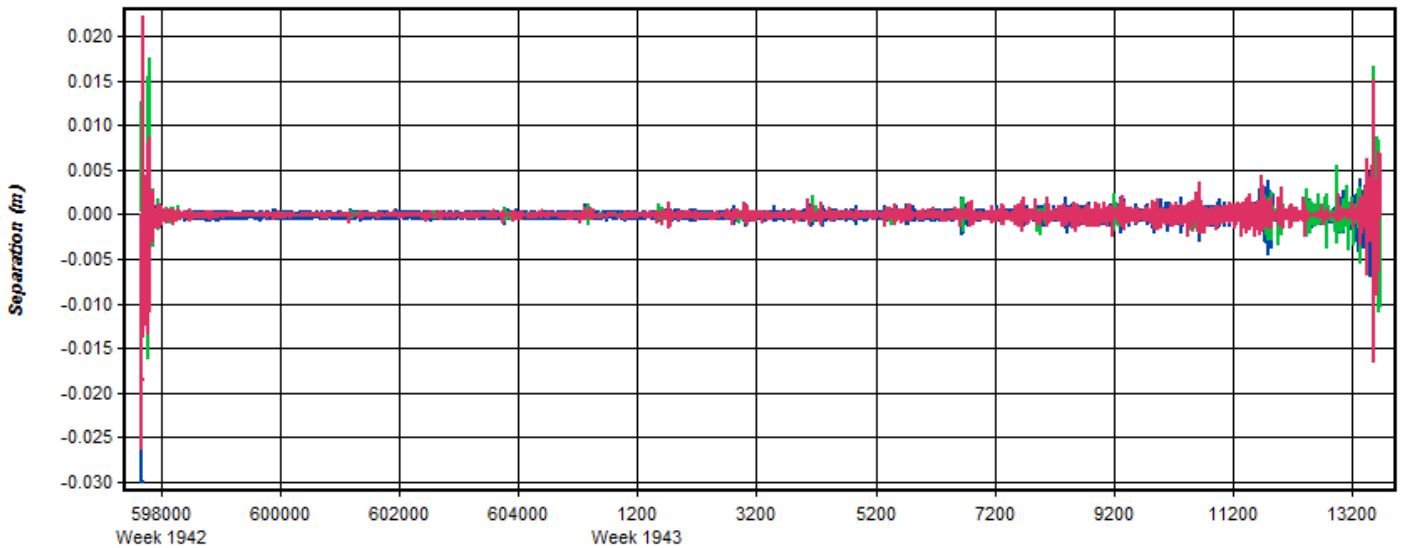
GPS Time (TOW, GMT zone)
 — Roll — Pitch





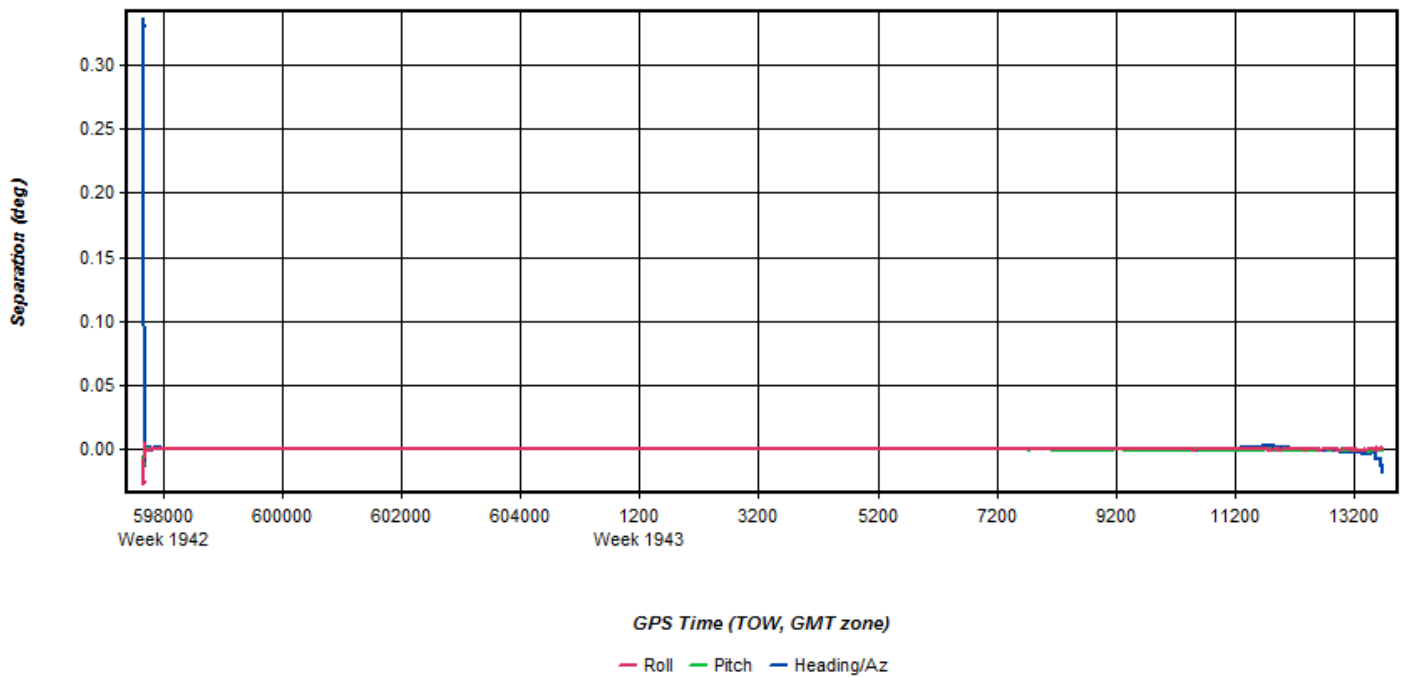
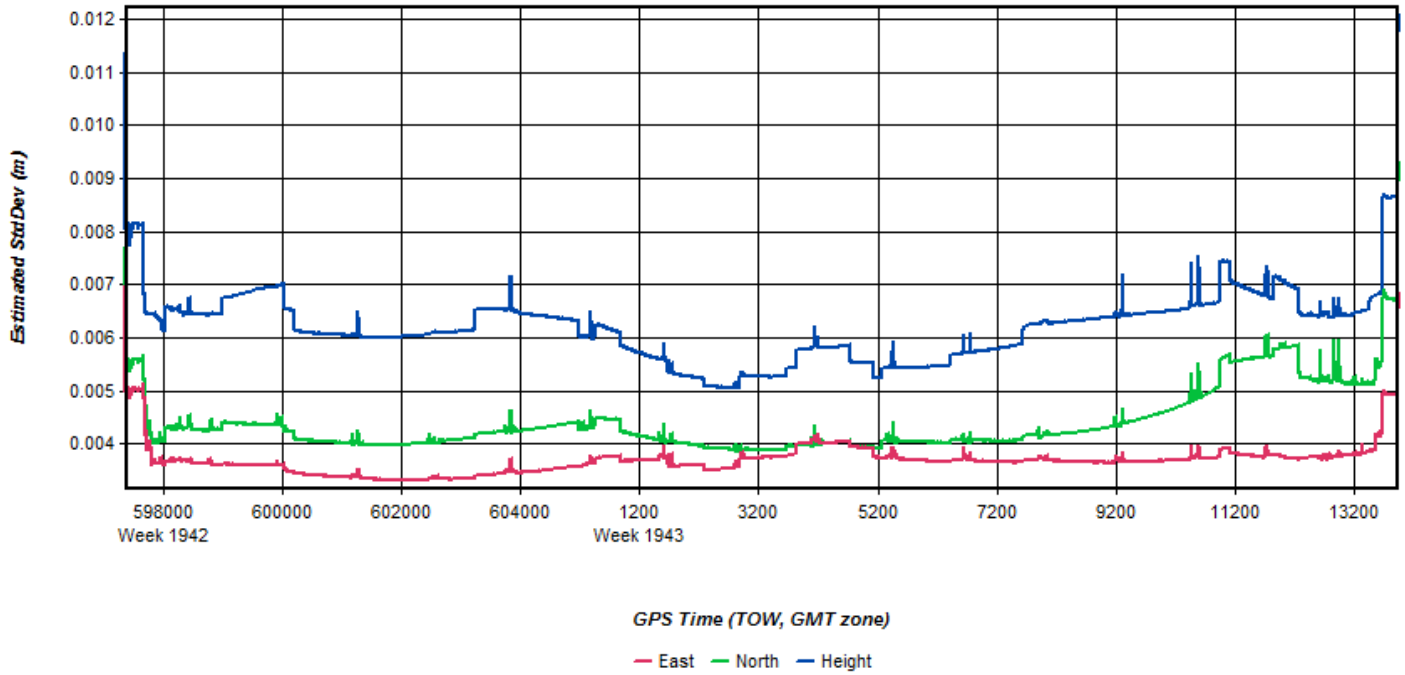
GPS Time (TOW, GMT zone)

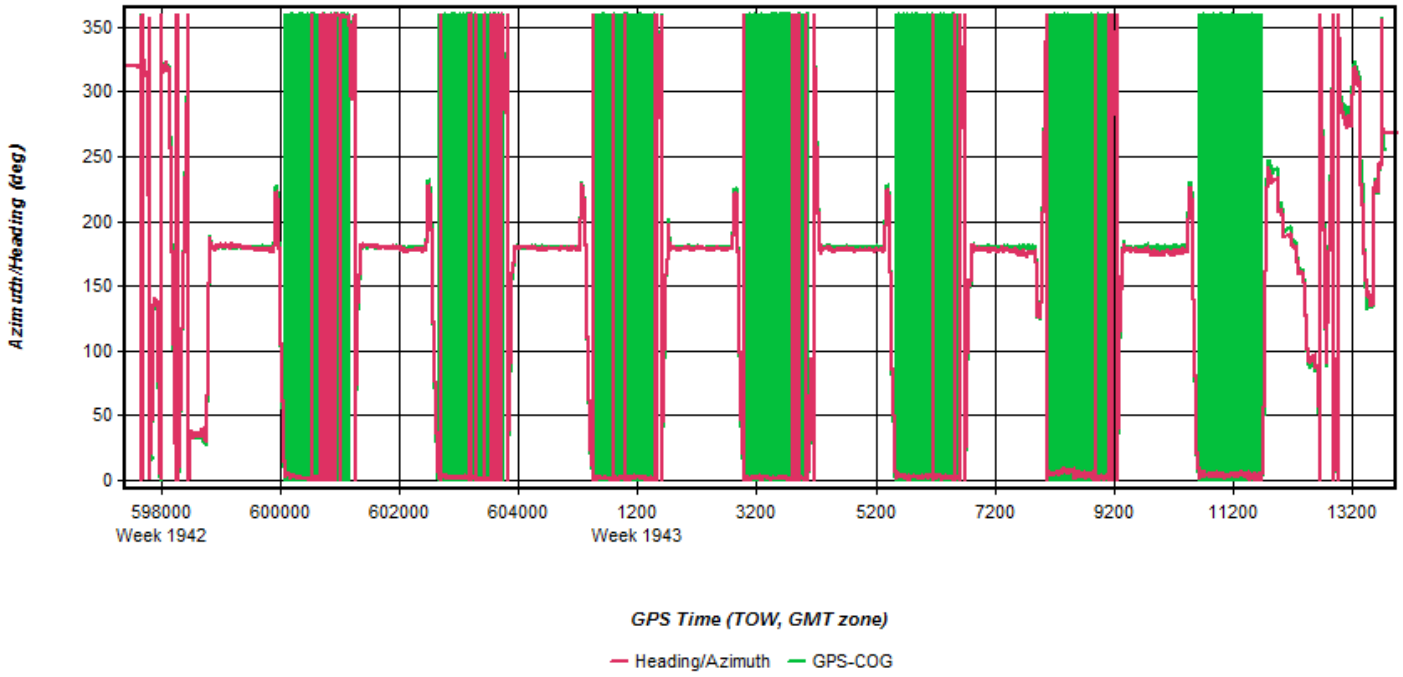
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR
KeyW - Aeroptic

LIDAR FLIGHT REPORT

Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc.
Clear with FOG building up

CREW mm/dd/yy Pilot/Operator

4/7/2017 Sean T

Tail Number N915WC **AIRCRAFT** _____

UTC DATE 4/7/2017

WEATHER _____

GPS Source Fwd

Camera System 8237

LIDAR S/N fwd/left Fwd

Start-up Time Location

appr 21:55 UTC KCIR

Shut-down Time Location

appr 03:52 UTC KCIR

LIDAR STARTUP CHECKS

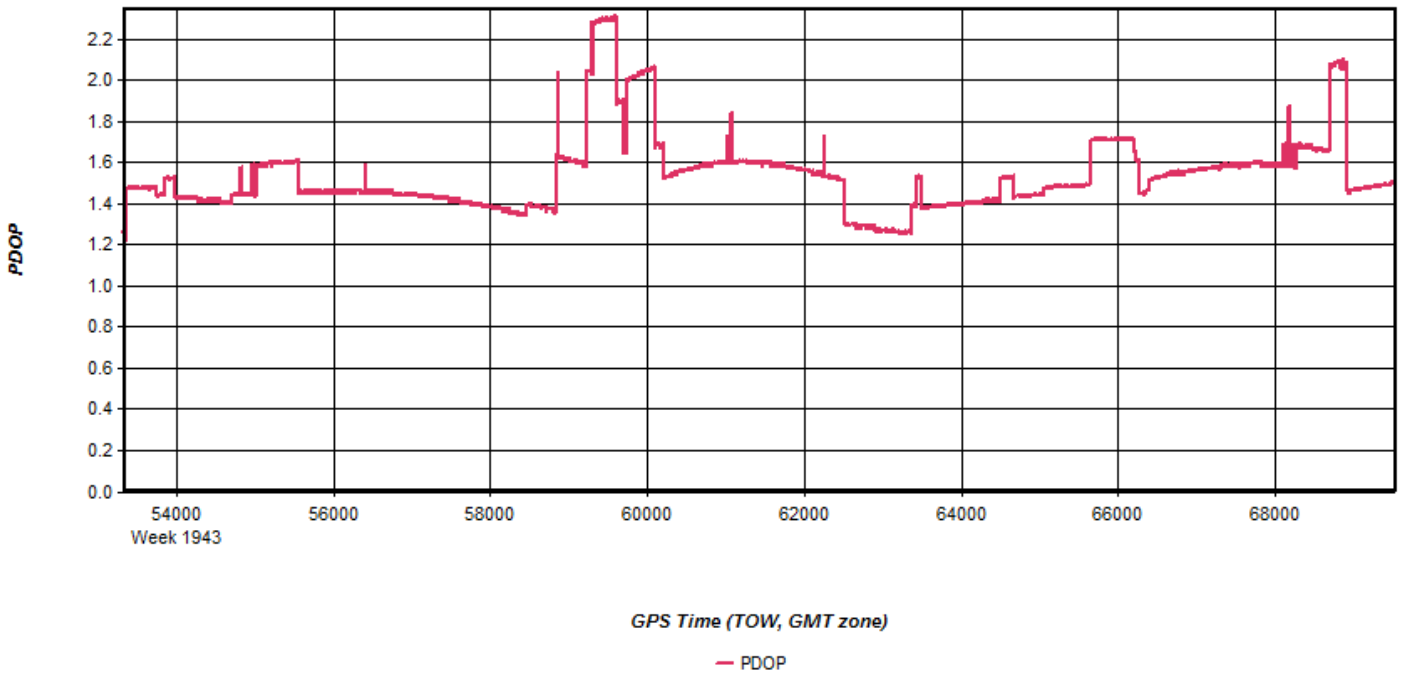
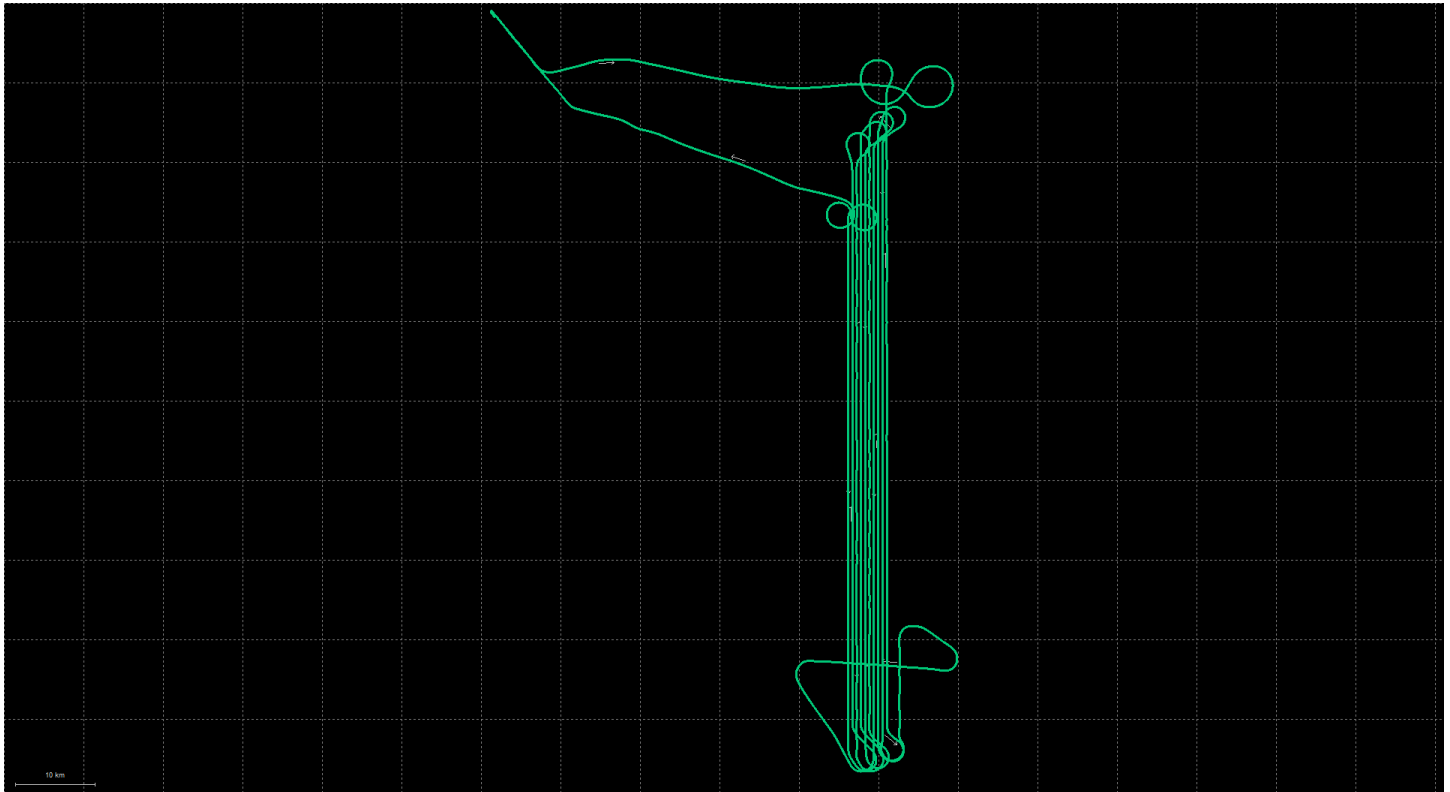
Lens cleaned	<input checked="" type="checkbox"/>
All fids uploaded	<input checked="" type="checkbox"/>
Pilot's screen functional	<input checked="" type="checkbox"/>
Compact flash drive space	<input checked="" type="checkbox"/>
SSDs have space	<input checked="" type="checkbox"/>
Startup beeps & IP-AS recording	<input checked="" type="checkbox"/>

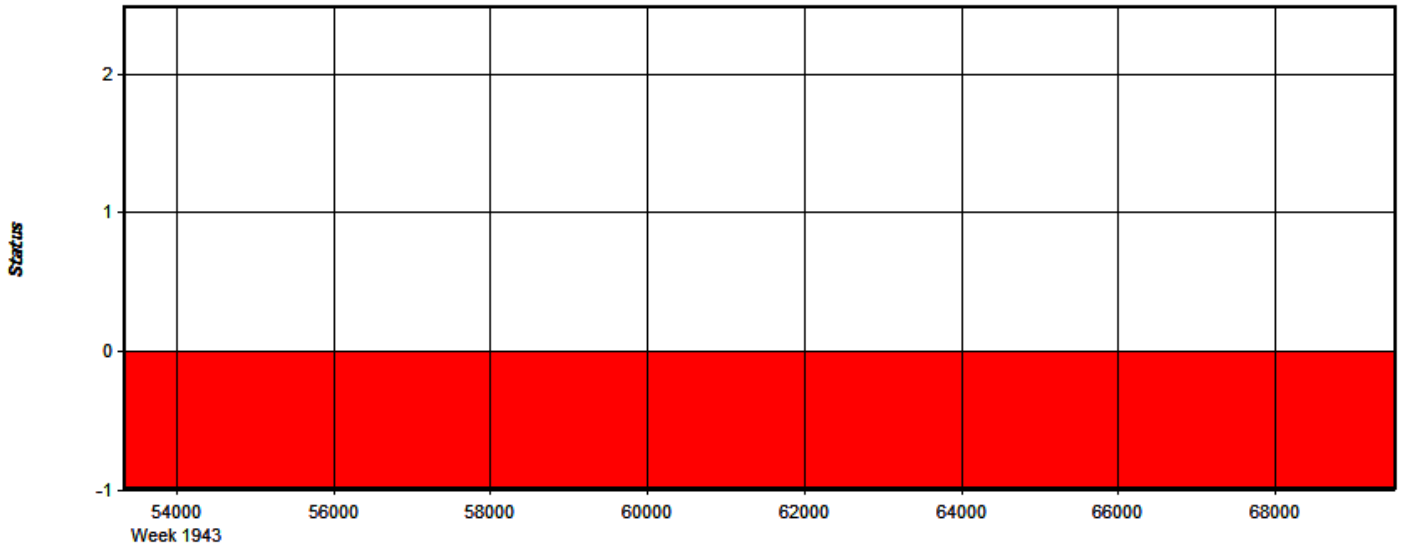
SSD

Drive #	SSD1	
@ Beginning	Space Used	Remaining
Space Used	1061	111
During Mission	111	950
Tot Space	111	950

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	1079	S		
		1080	N		
		1081	S		
		1082	N		
		1083	S		
		1084	N		
		1085	S		
		1086	N		
		1087	S		
		1088	N		
		1089	S		
		1090	N		
		1091	S		
		UL-X	E		

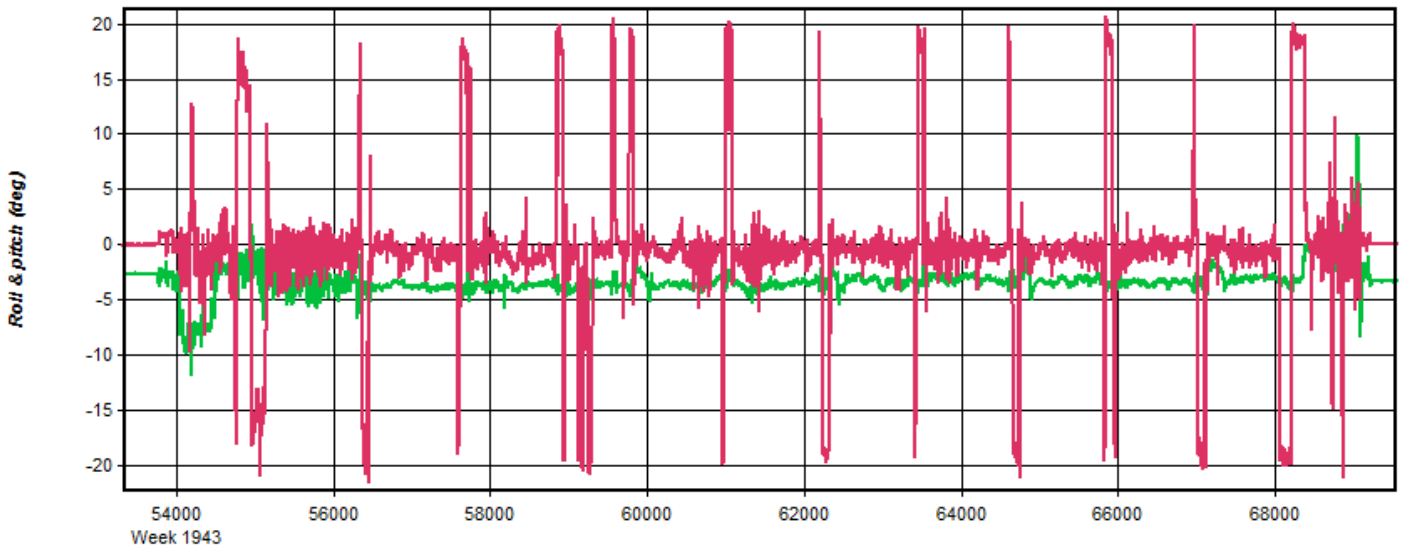
April 2, 2017-A (604MD, SN8227)





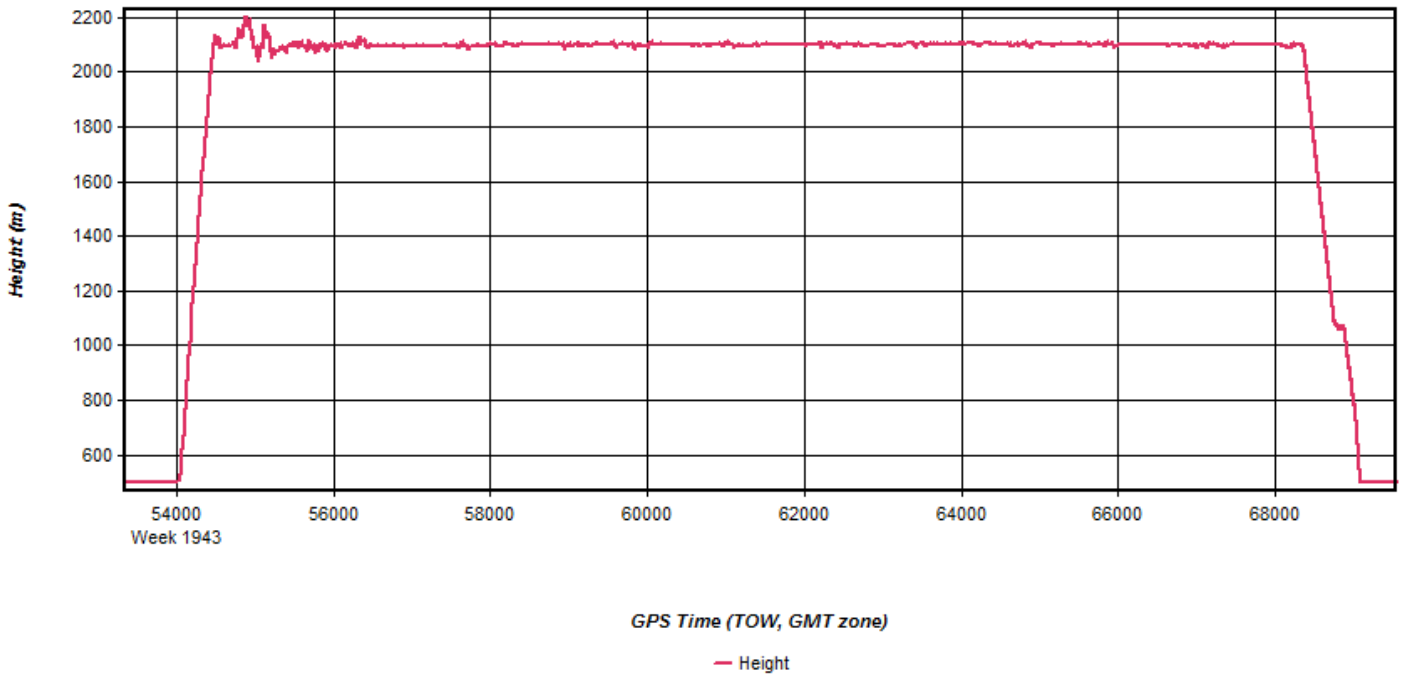
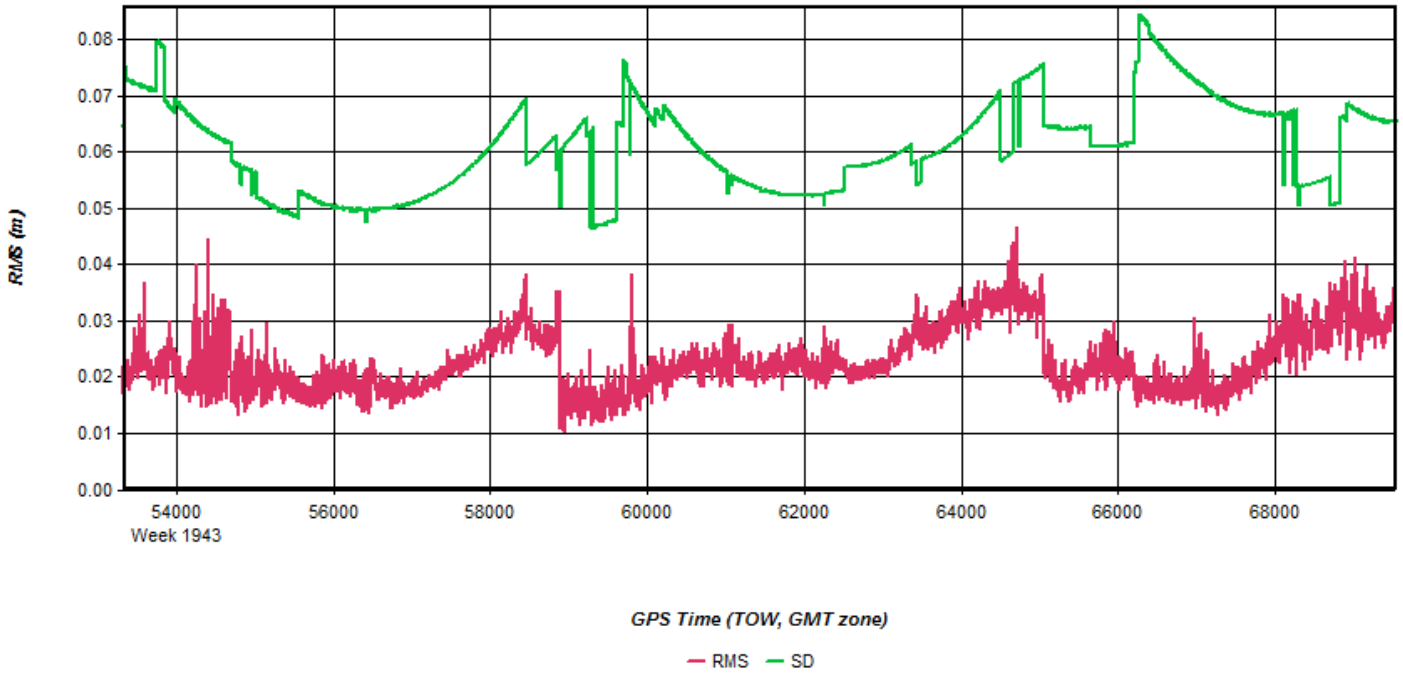
GPS Time (TOW, GMT zone)

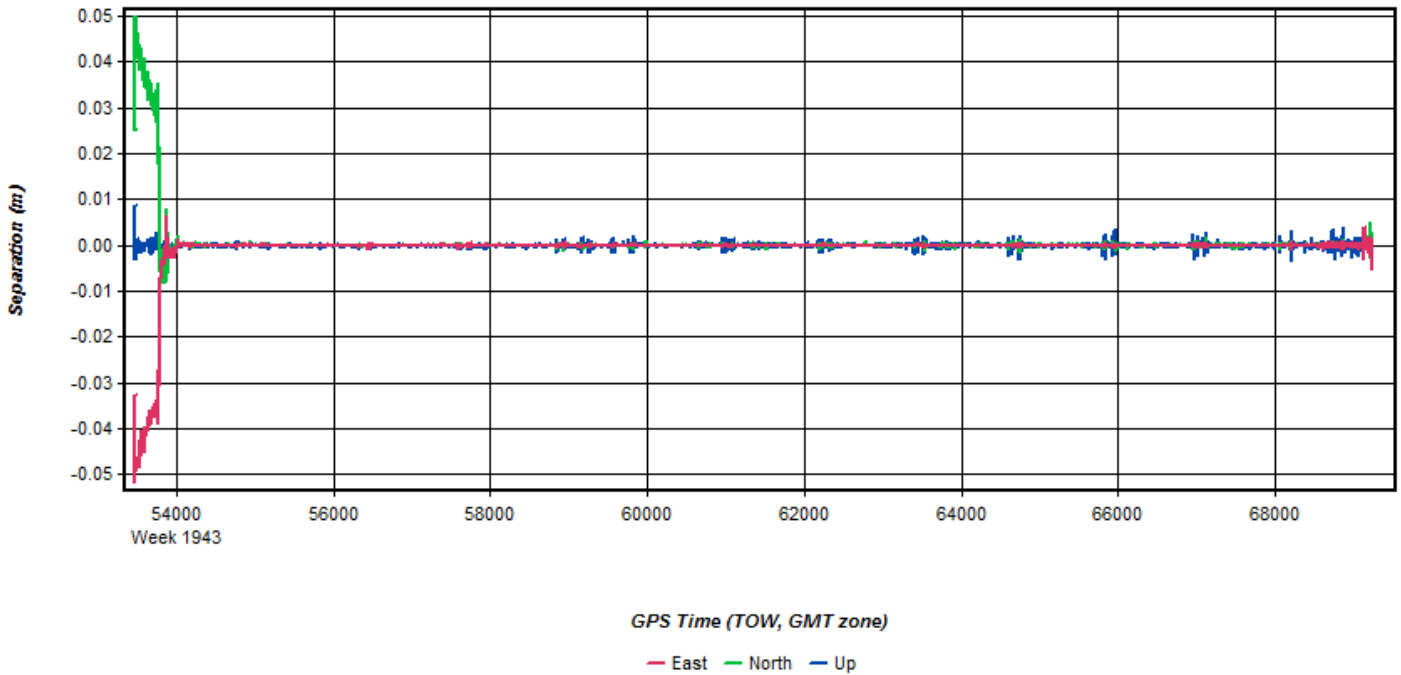
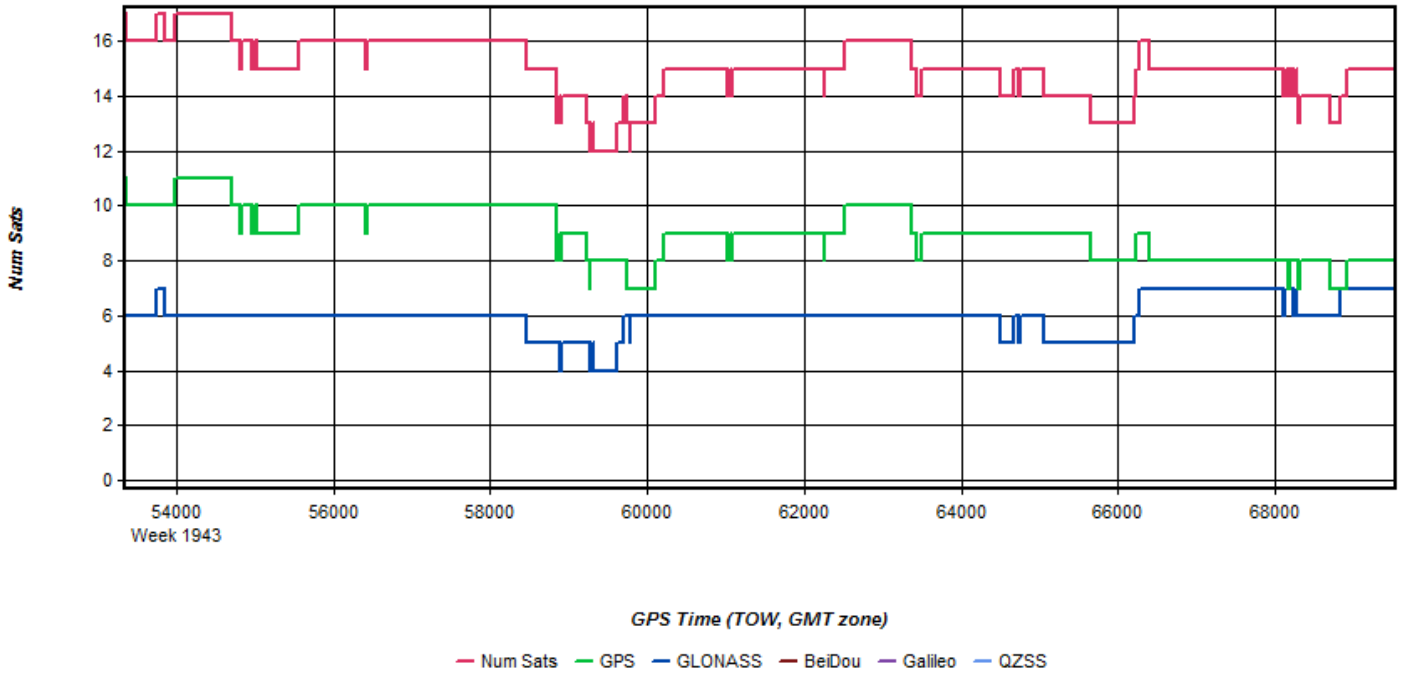
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

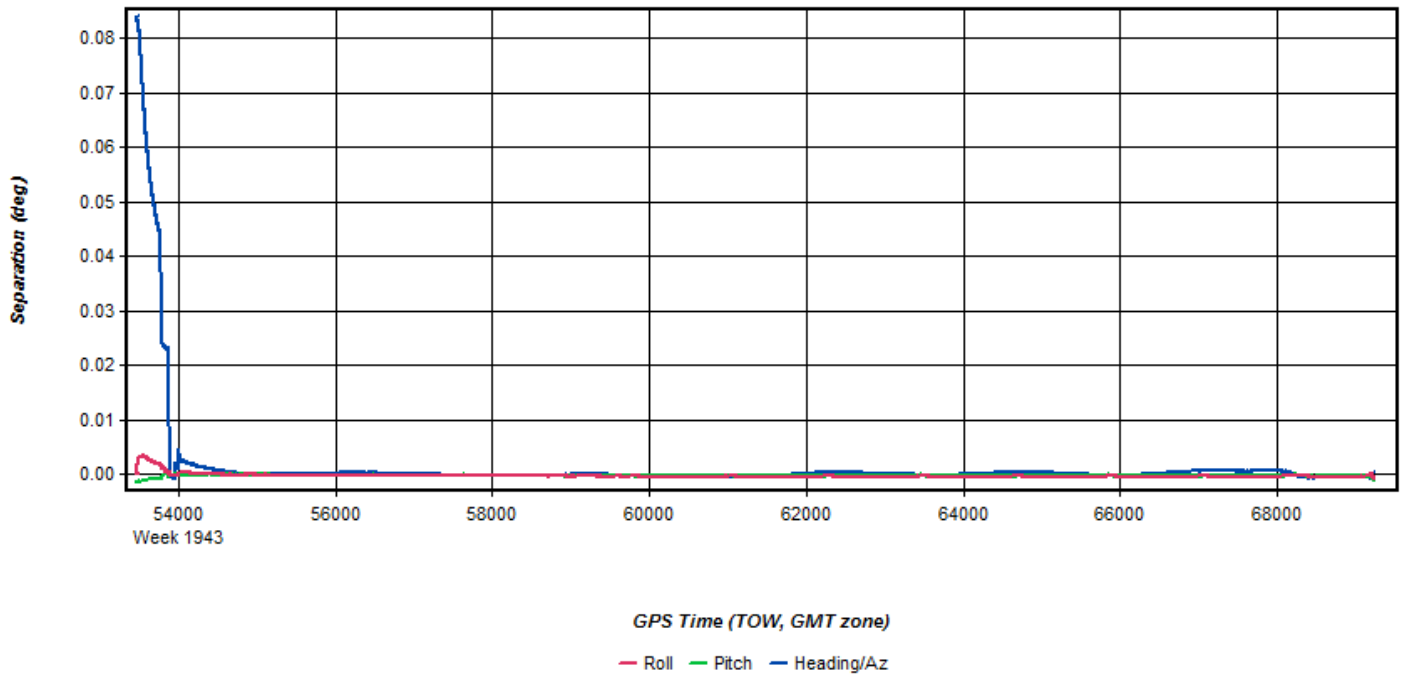
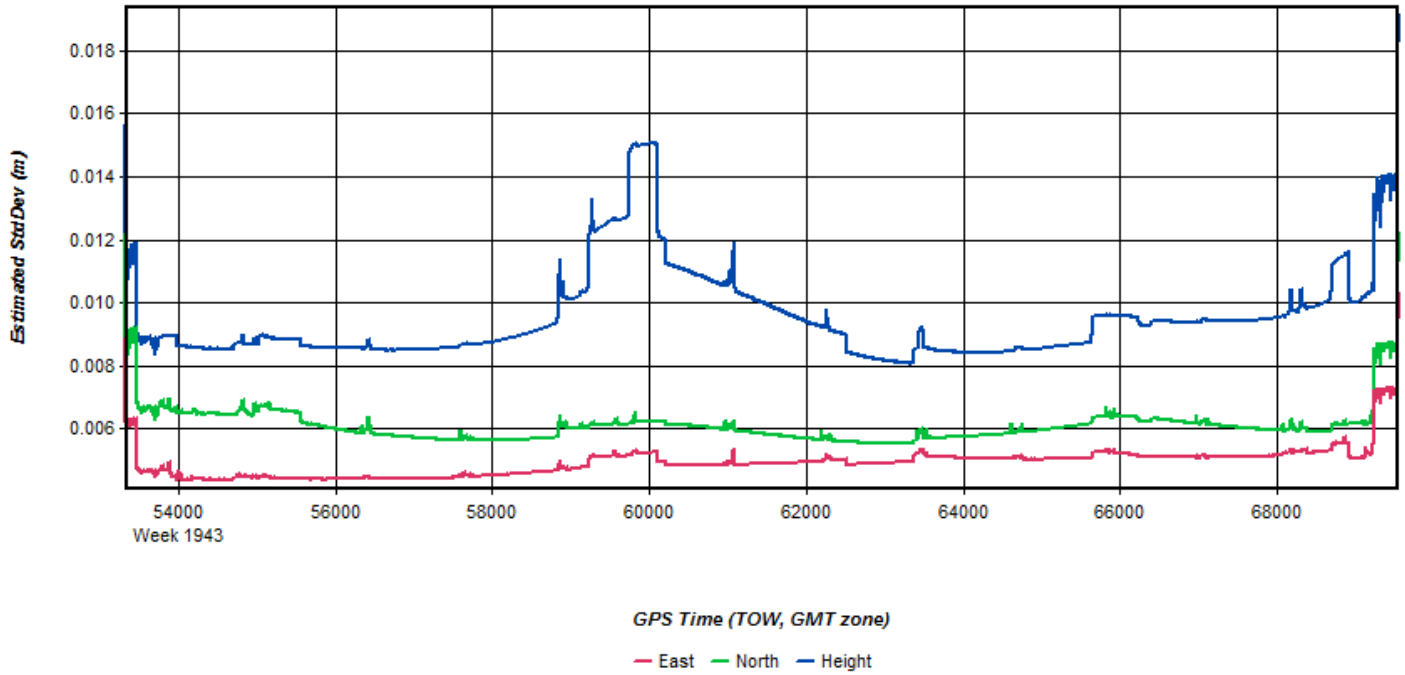


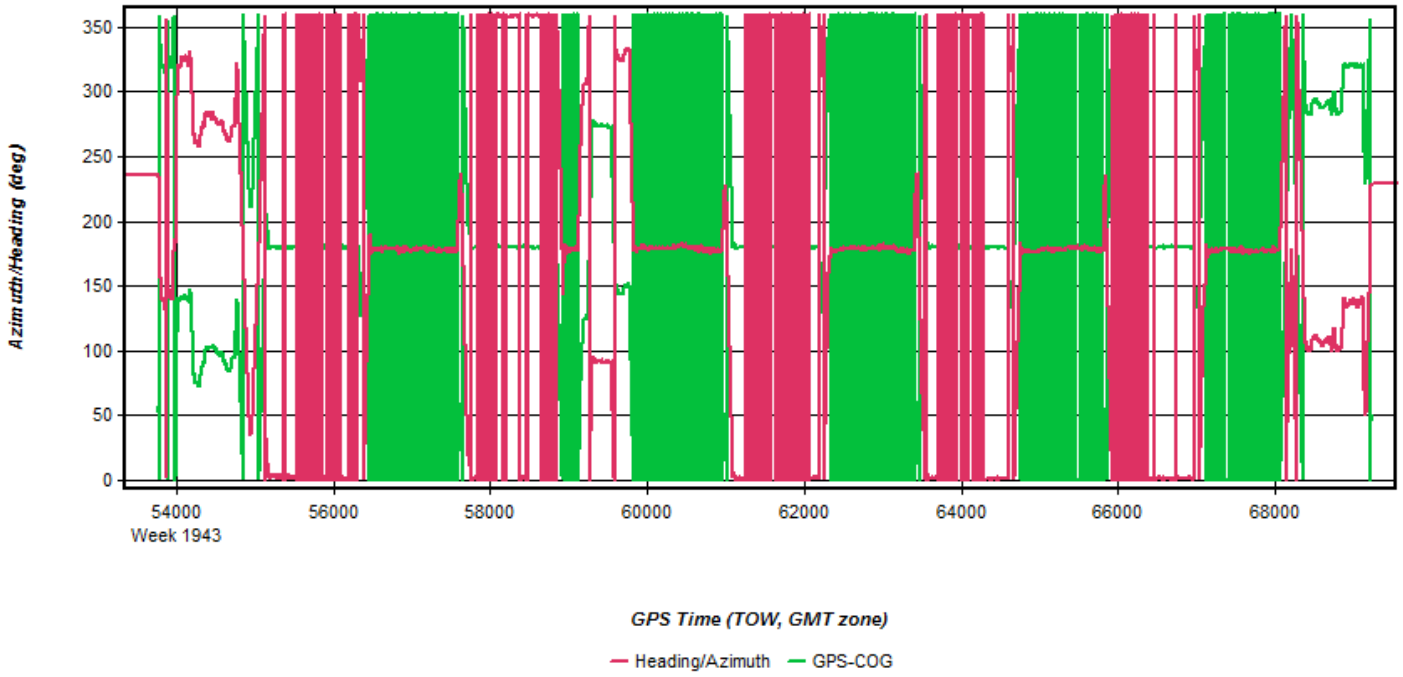
GPS Time (TOW, GMT zone)

— Roll — Pitch









Flight Log

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

(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 04/02/2017 Page 1 of 1

Project: NRCS SD Flight Mgmt File: 30420_SD-ALS80

Aircraft: Begin Hobbs: 2037.5 End Hobbs: 2039.4 Total: 1.9 Pilot: LUCKETT Co-Pilot: Tech: SPINKARD

Dep Apt: KPIR Arr Time (Local): 5:15 Tot Time Aloft: 1.9

CORS: WIN Sta 1: Sta 2:

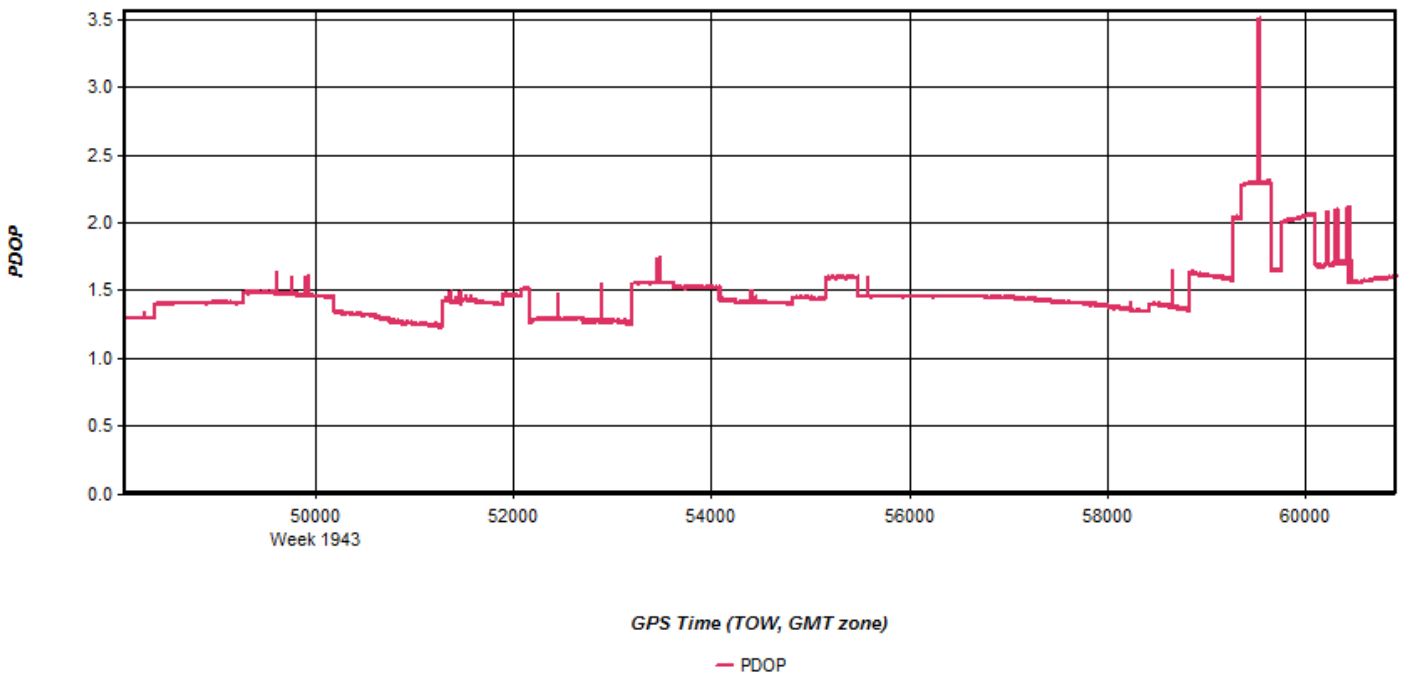
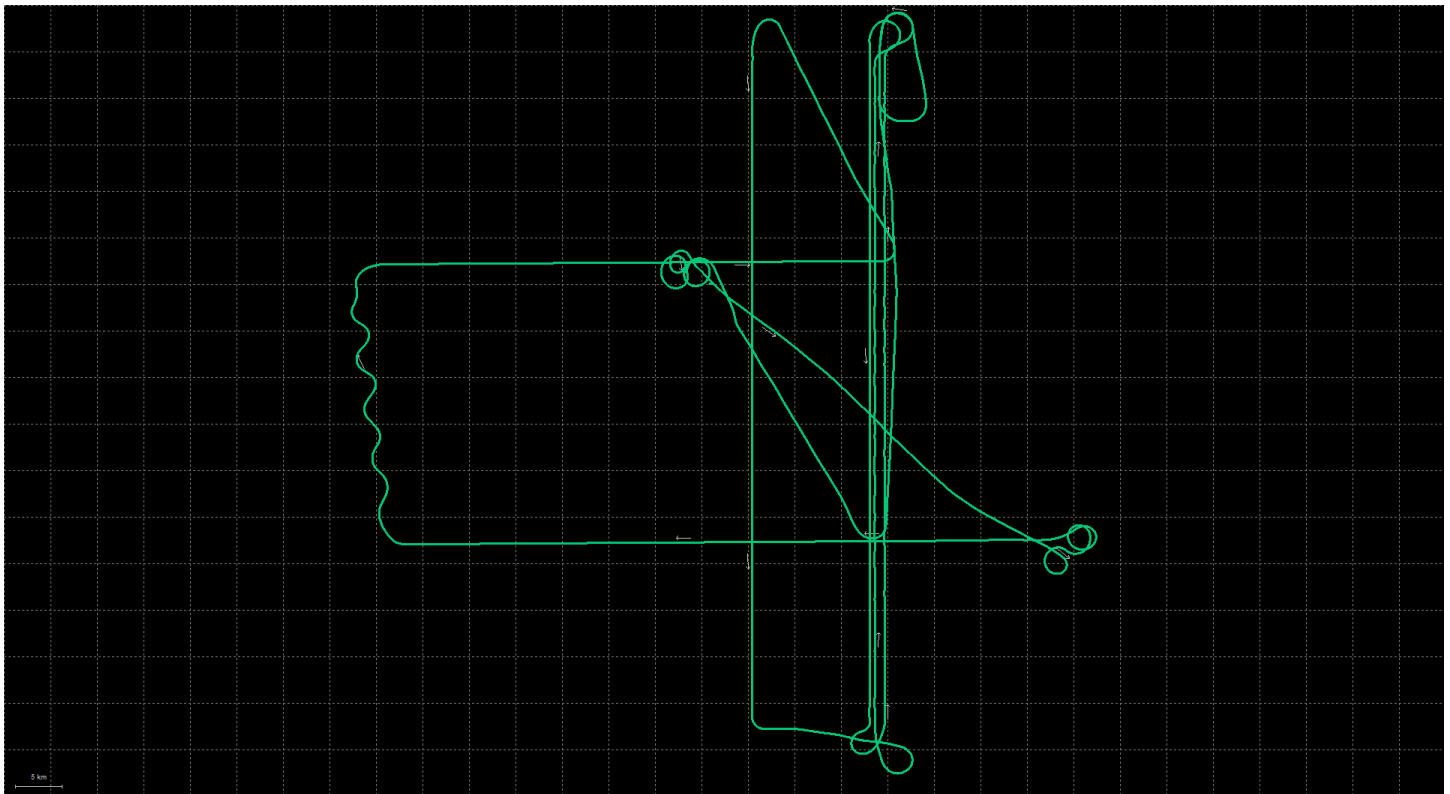
GPS Unit: WIN Sta 1: Sta 2:

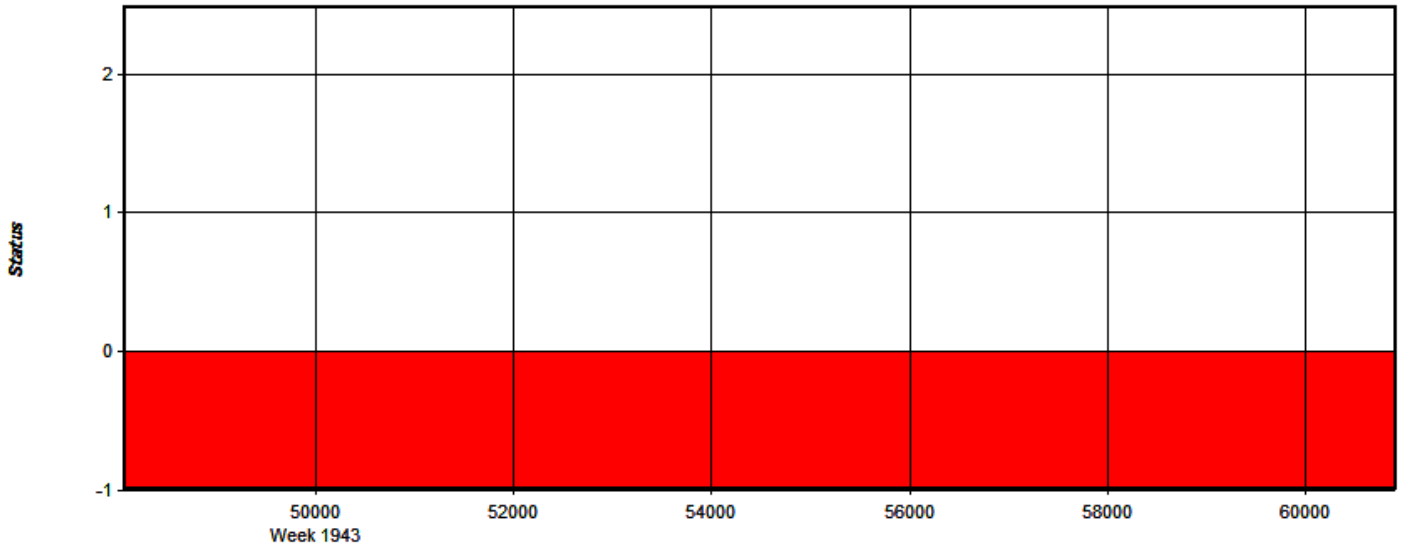
Gd Temp beg: °C End: °C OAT beg: °C End: °C

Type	ALS 80	Serial #	8227	Alt AGL	Alt AMSL	GPS Altitude	Crab	Turn (0..1)	Altimeter begin:			end:			Storage Number																																																																																																
									Max Gdspd	Avg Pt Spndng	Power	PPSM	PPSM	PPSM		PPSM																																																																																															
FOV	<u>28°</u>	Scan Freq	<u>48</u>	MpIA	Y	N									443																																																																																																
<table style="width: 100%; border-collapse: collapse;"> <tr> <th>Line #</th> <th>Hdg</th> <th>Start (UTC)</th> <th>End (UTC)</th> <th>Gd Spd</th> <th>Foot-cs</th> <th>GPS Altitude</th> <th>Crab</th> <th>Turn (0..1)</th> <th colspan="7">FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc</th> </tr> <tr> <td>235</td> <td>175</td> <td>20:38</td> <td>20:54</td> <td>125</td> <td>11/20</td> <td>6900</td> <td></td> <td>-</td> <td colspan="7"><u>FIG 8 @ 20:14 / LIGHT TURB.</u></td> </tr> <tr> <td>234</td> <td>355</td> <td>20:56</td> <td>21:12</td> <td>133</td> <td>13/18</td> <td>6900</td> <td></td> <td>-</td> <td colspan="7"></td> </tr> <tr> <td>233</td> <td>175</td> <td>21:14</td> <td>21:30</td> <td>128</td> <td>13/19</td> <td>6900</td> <td></td> <td>-</td> <td colspan="7"></td> </tr> <tr> <td>232</td> <td>355</td> <td>21:33</td> <td>21:49</td> <td>131</td> <td>13/21</td> <td>6900</td> <td></td> <td>-</td> <td colspan="7"></td> </tr> <tr> <td>X-FLT</td> <td>265</td> <td>21:54</td> <td>21:56</td> <td>126</td> <td>11/22</td> <td>6900</td> <td></td> <td>0</td> <td colspan="7"><u>X-FLIGHT UNPLANNED 7 MILES / FIG 8 @ 21:57</u></td> </tr> </table>																Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	Foot-cs	GPS Altitude	Crab	Turn (0..1)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc							235	175	20:38	20:54	125	11/20	6900		-	<u>FIG 8 @ 20:14 / LIGHT TURB.</u>							234	355	20:56	21:12	133	13/18	6900		-								233	175	21:14	21:30	128	13/19	6900		-								232	355	21:33	21:49	131	13/21	6900		-								X-FLT	265	21:54	21:56	126	11/22	6900		0	<u>X-FLIGHT UNPLANNED 7 MILES / FIG 8 @ 21:57</u>						
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	Foot-cs	GPS Altitude	Crab	Turn (0..1)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc																																																																																																						
235	175	20:38	20:54	125	11/20	6900		-	<u>FIG 8 @ 20:14 / LIGHT TURB.</u>																																																																																																						
234	355	20:56	21:12	133	13/18	6900		-																																																																																																							
233	175	21:14	21:30	128	13/19	6900		-																																																																																																							
232	355	21:33	21:49	131	13/21	6900		-																																																																																																							
X-FLT	265	21:54	21:56	126	11/22	6900		0	<u>X-FLIGHT UNPLANNED 7 MILES / FIG 8 @ 21:57</u>																																																																																																						

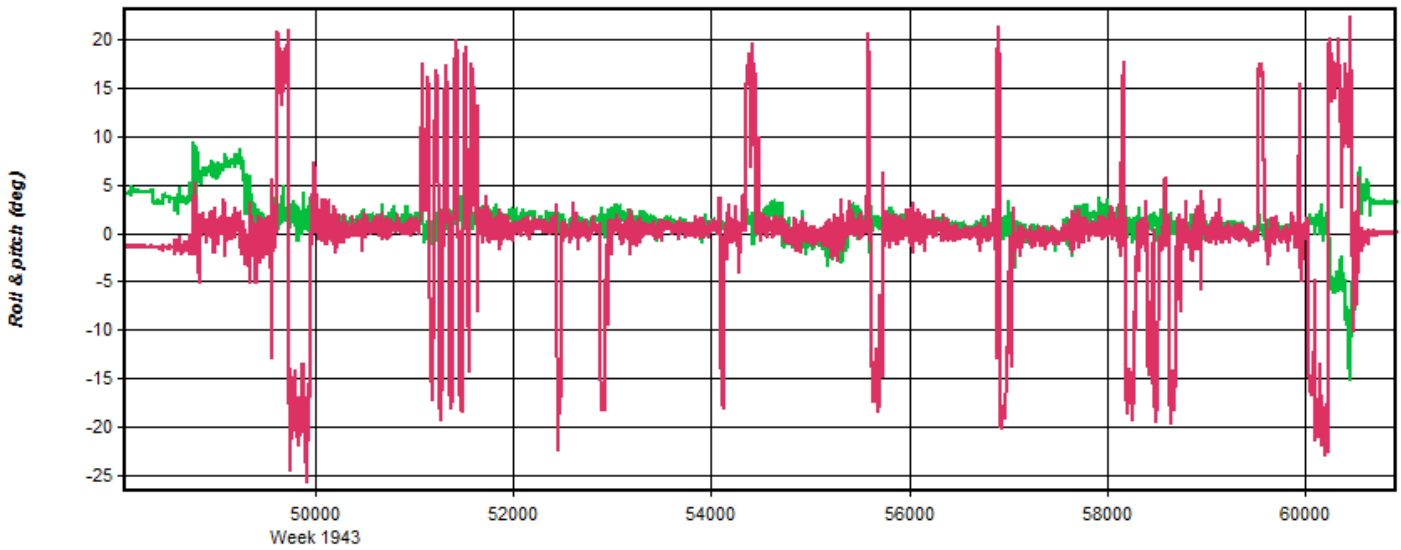
Total Prof Lines: _____ Lines Flown: _____ Lines Remain: _____ Online Time: 1.5 Mob Time: 1.5 Notes: _____

April 2, 2017-A (N915WC, SN8237)

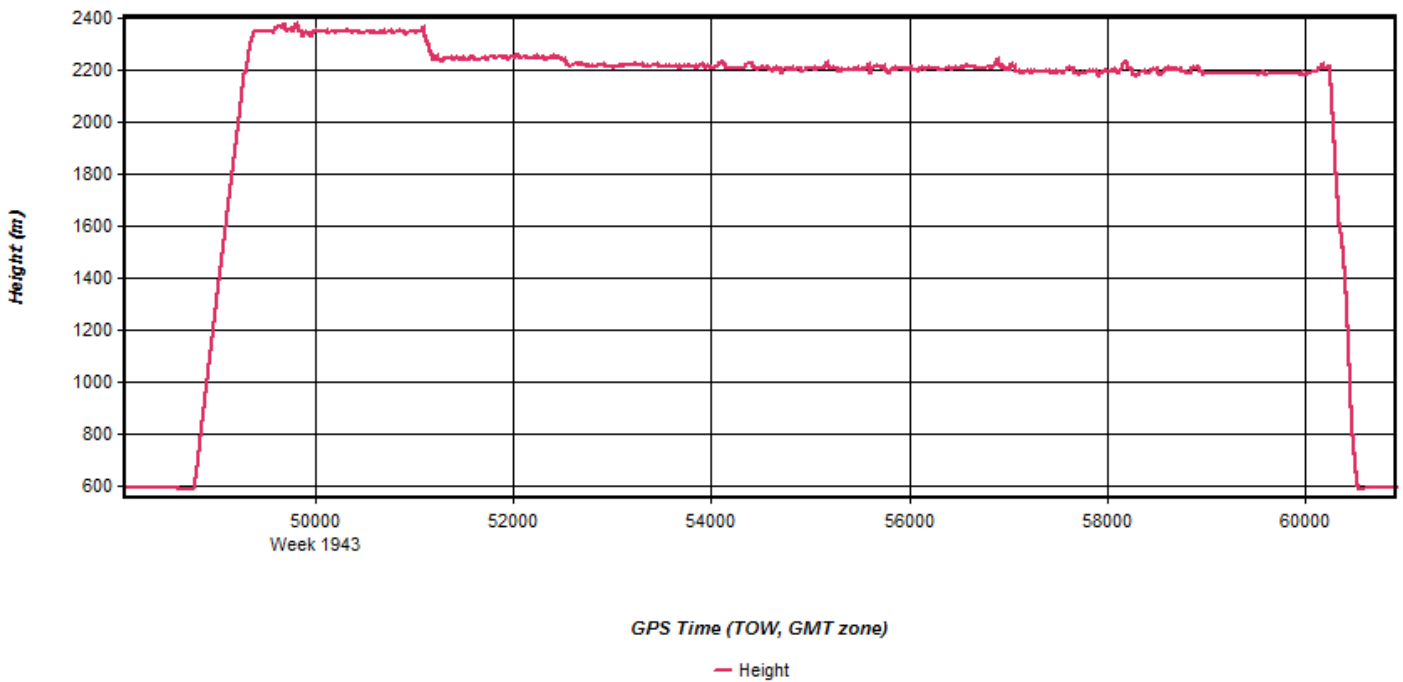
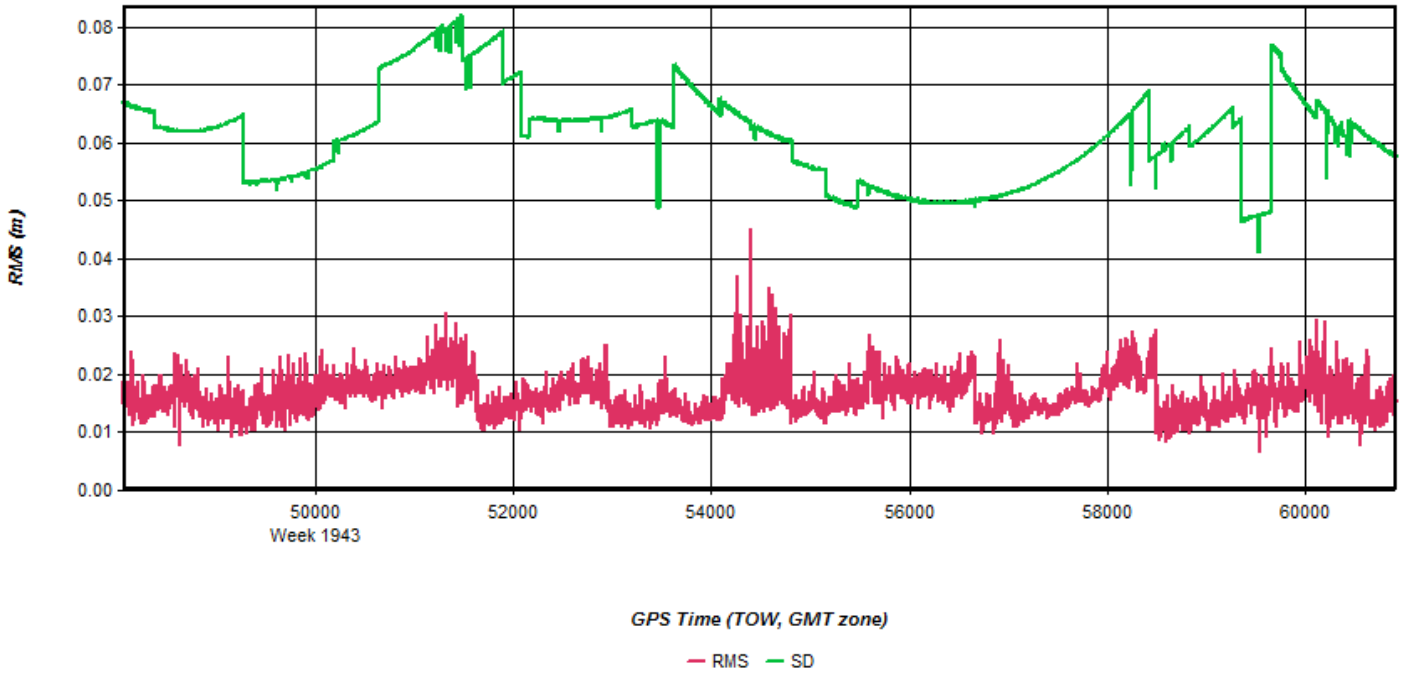


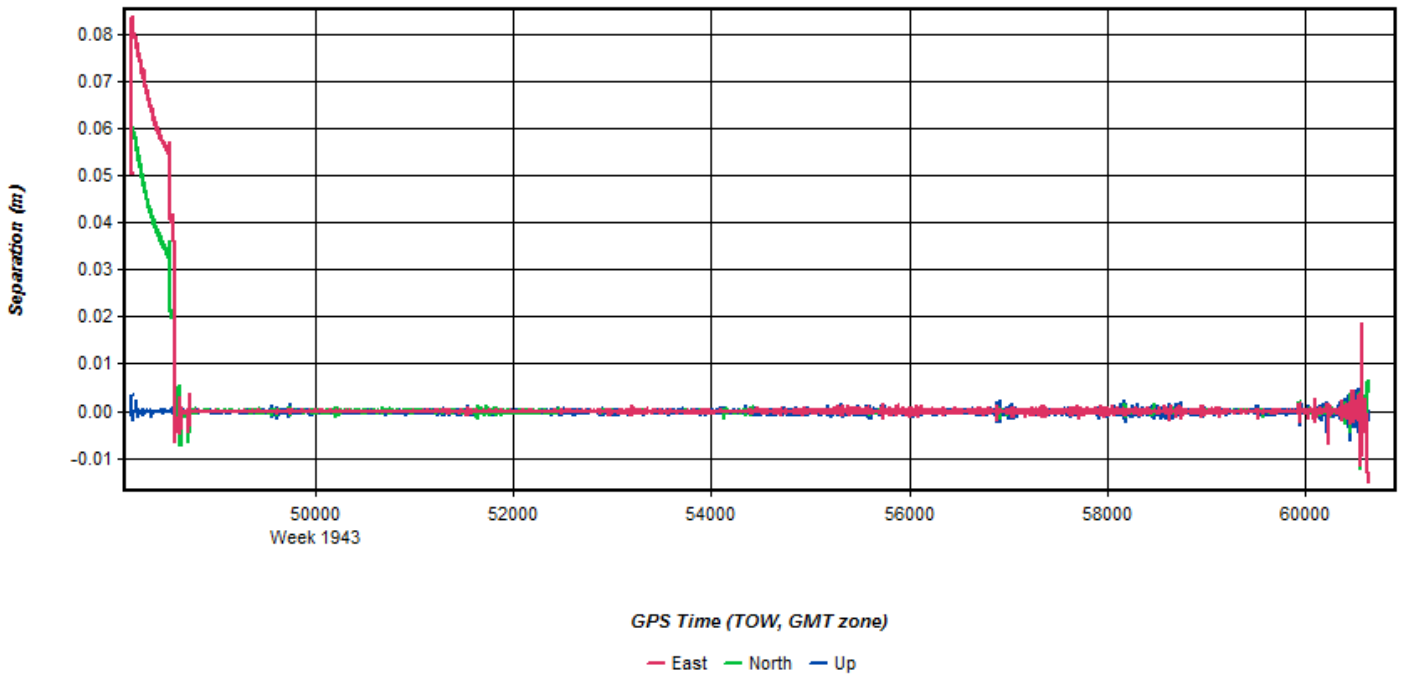
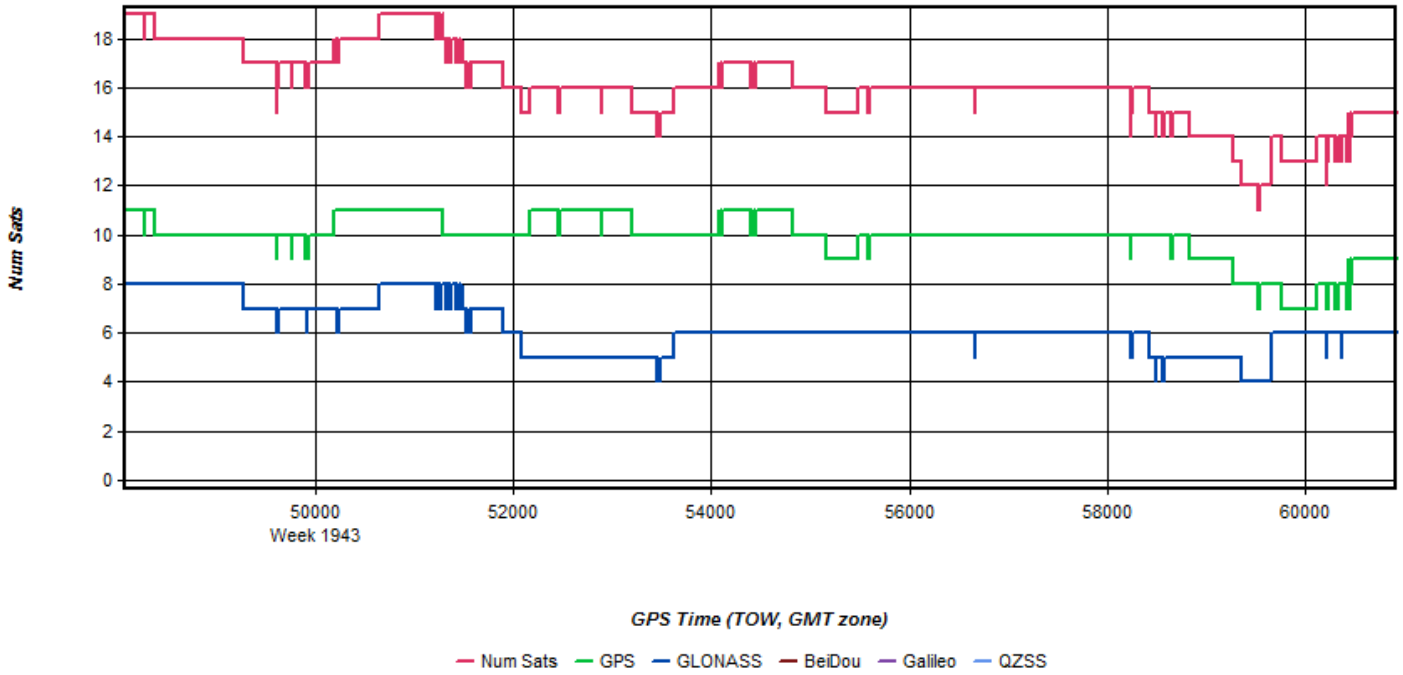


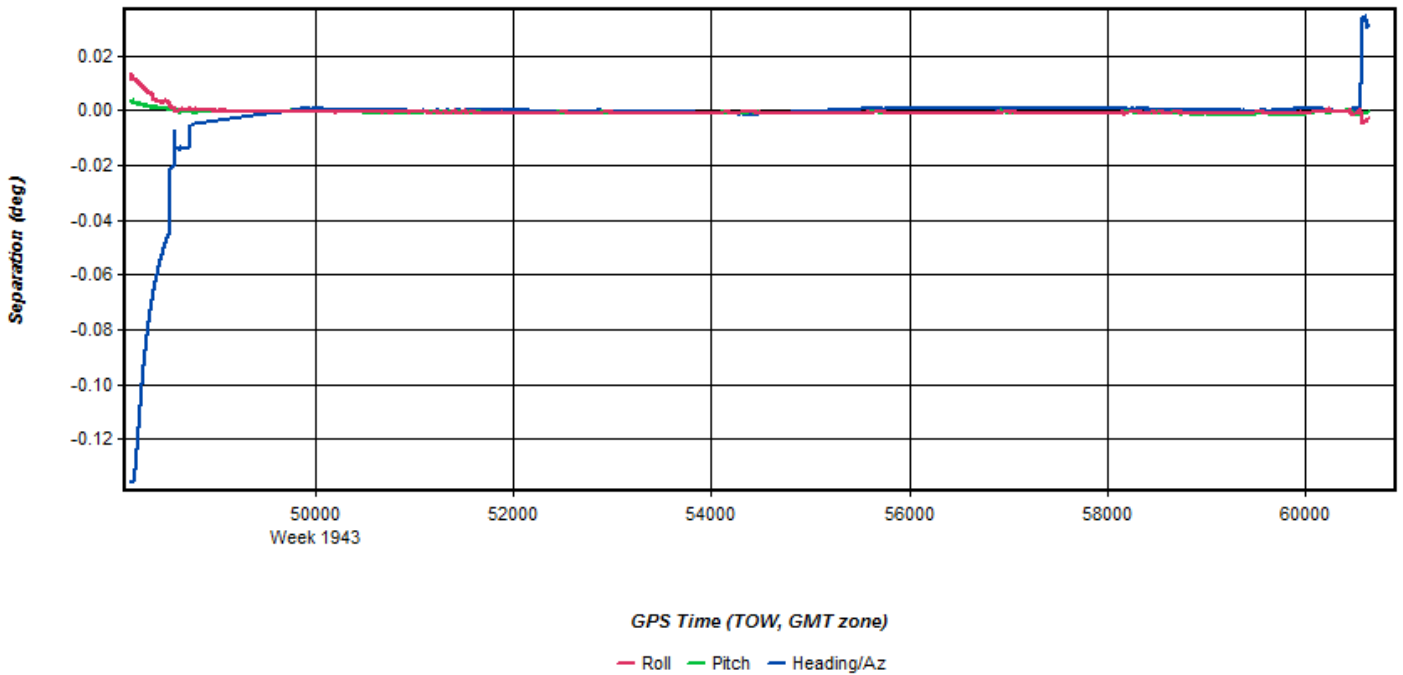
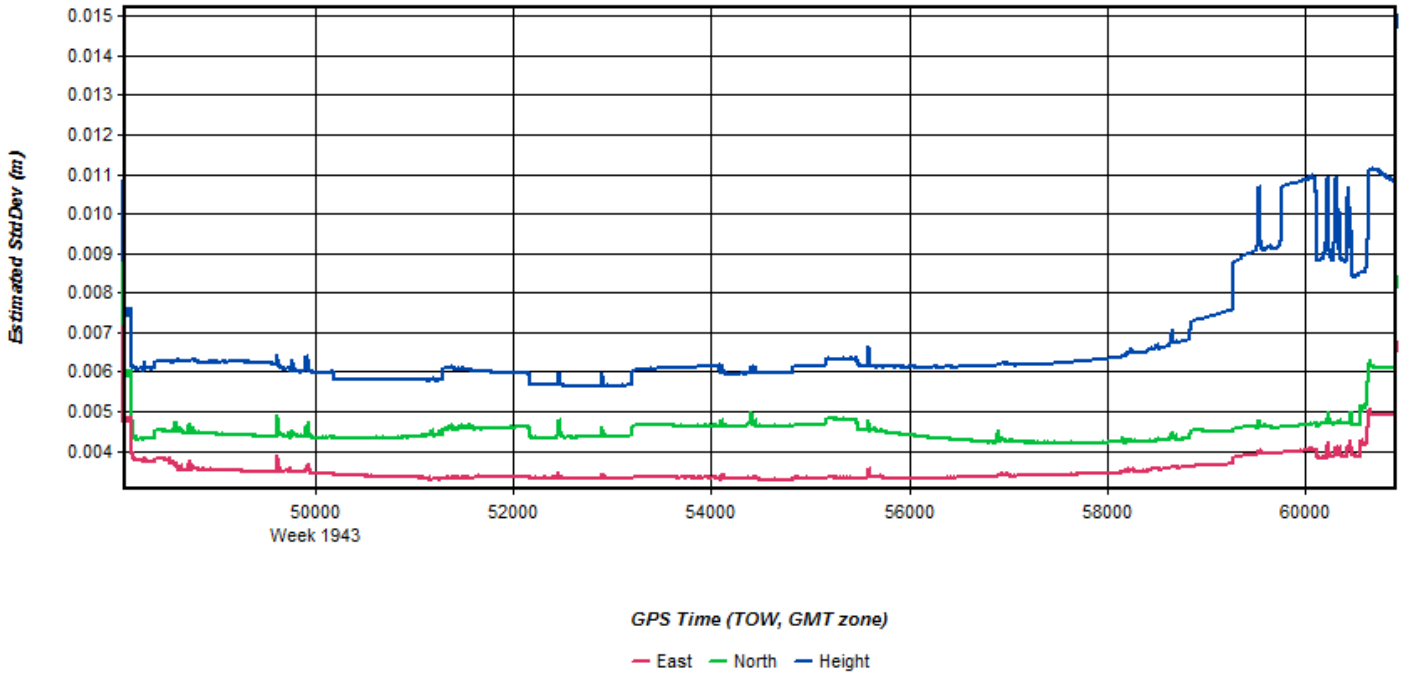
GPS Time (TOW, GMT zone)
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

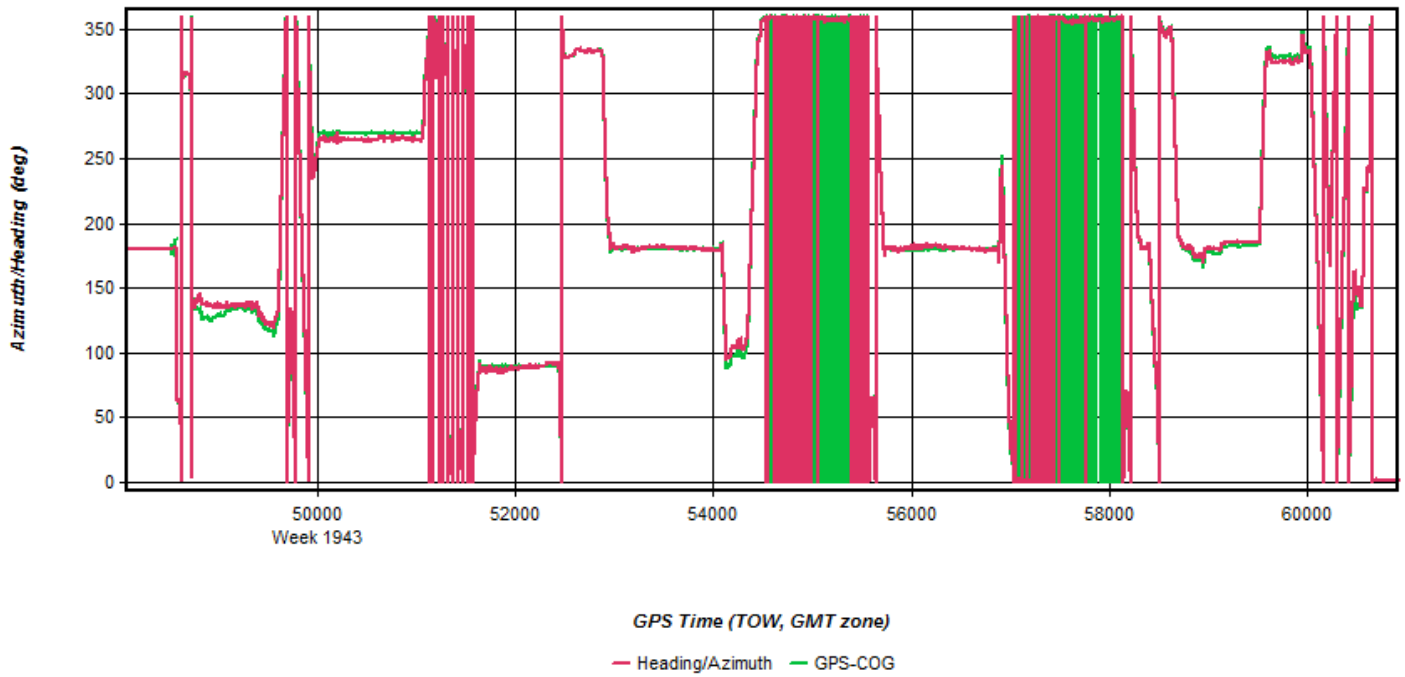


GPS Time (TOW, GMT zone)
— Roll — Pitch









Flight Log

LIDAR

KeyW -Aeroptic
LIDAR FLIGHT REPORT

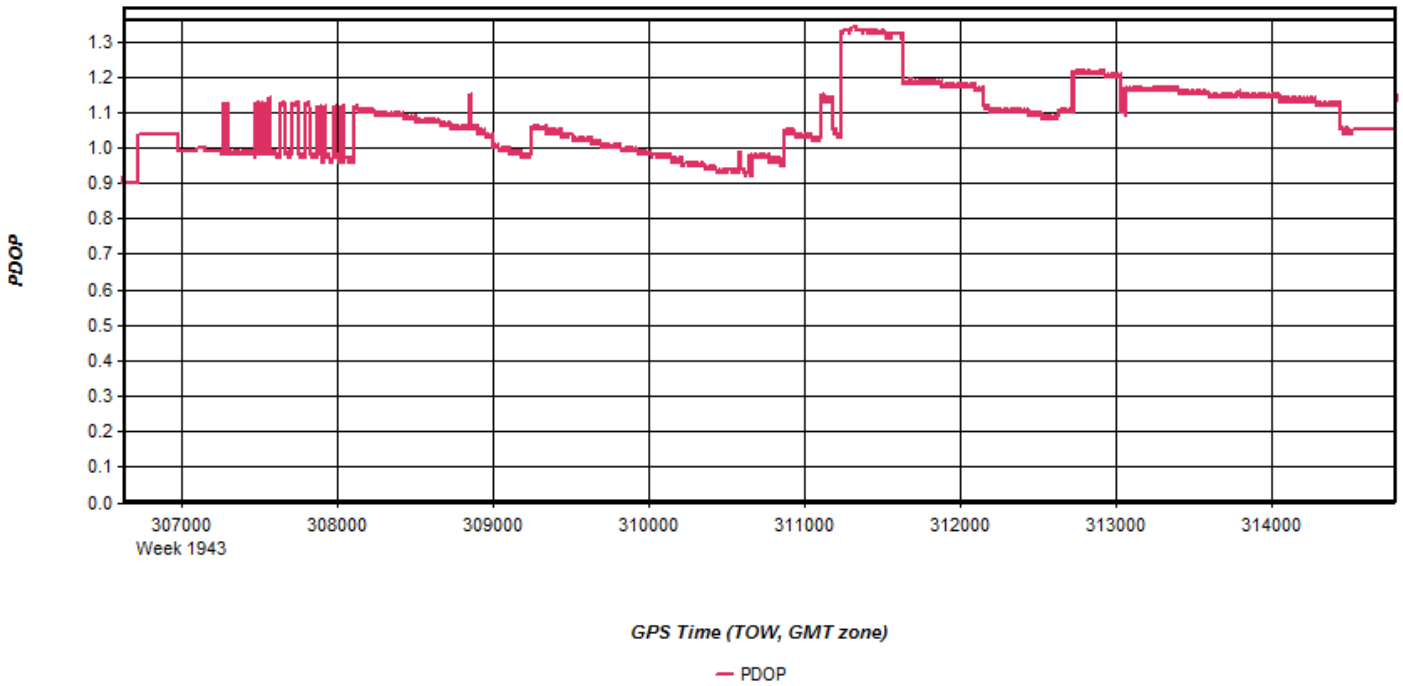
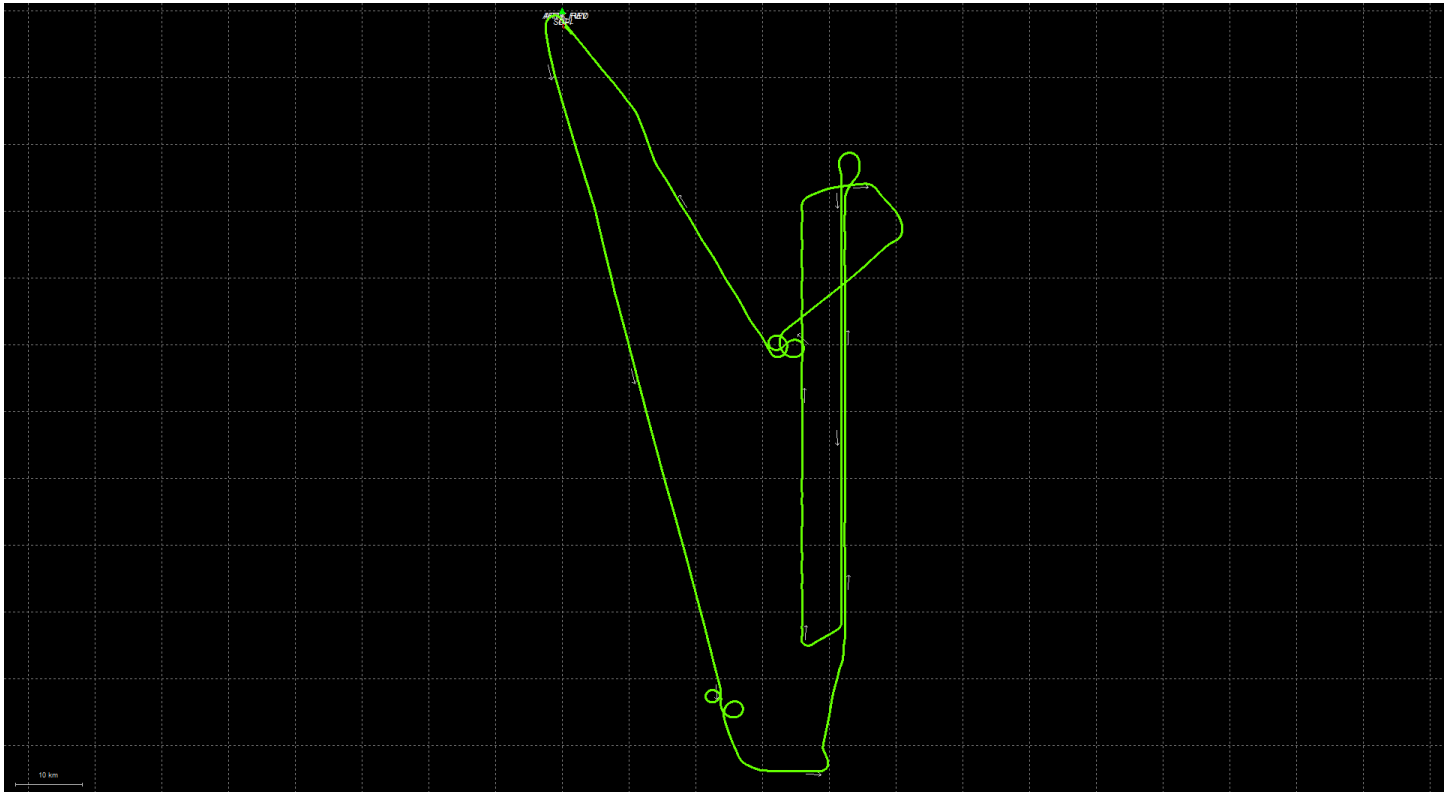
CREW	Pilot/Operator Sean T	AIRCRAFT	Tail Number N915WC	WEATHER Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc... Clear with FOG building up
UTC DATE	mm/dd/yyyy 4/2/2017	LIDAR S/N	8237	
Camera System	fmw/afw	Source	Fwd	
Camera Location (Hole)	Fwd	Time	Location Time appr 13:20 UTC appr 16:55 UTC next day	

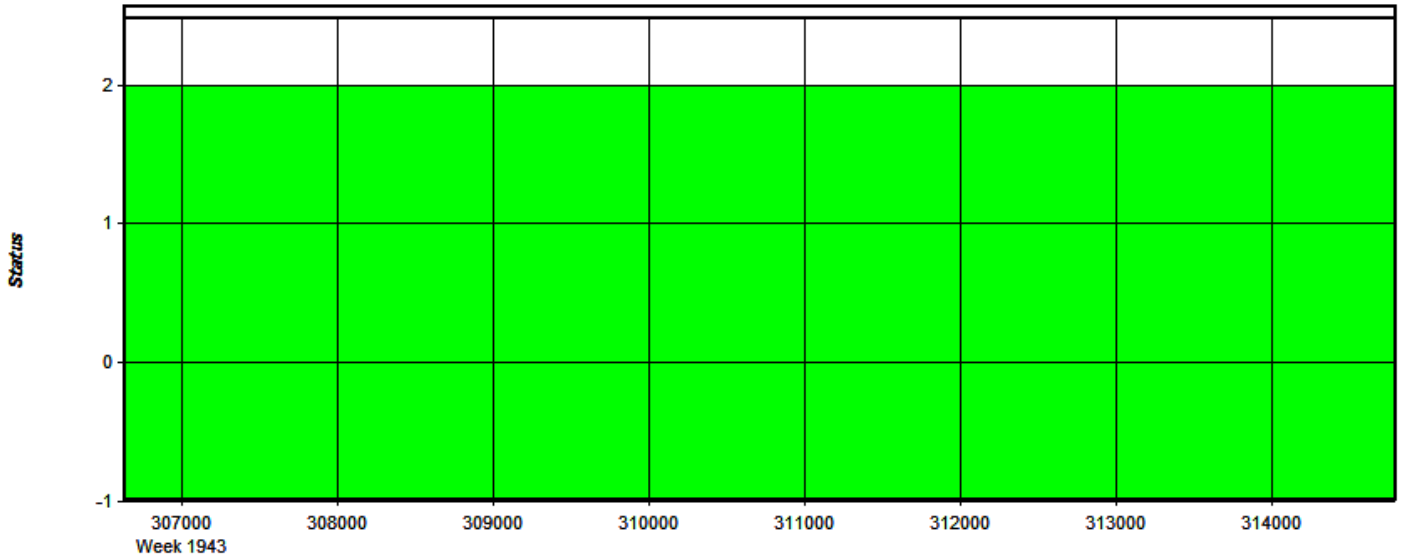
LIDAR STARTUP CHECKS	SSD
Lens cleaned <input checked="" type="checkbox"/>	Drive # SSD1
All fpts uploaded <input checked="" type="checkbox"/>	@ Beginning
Pilot's screen functional <input checked="" type="checkbox"/>	Space Used
Compact flash drive space <input checked="" type="checkbox"/>	Space Used
SSDs have space <input checked="" type="checkbox"/>	During Mission
Startup beeps & IPAS recording <input checked="" type="checkbox"/>	Tot Space
	unk 46 unk

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	X2B	W		
		X1A	E		
		1069	S		This is a Reply line
		1094	N		Clouds at the S-end
		1093	S		
		1096	N		
		1095	S		System Error. Unable to continue

Page 1

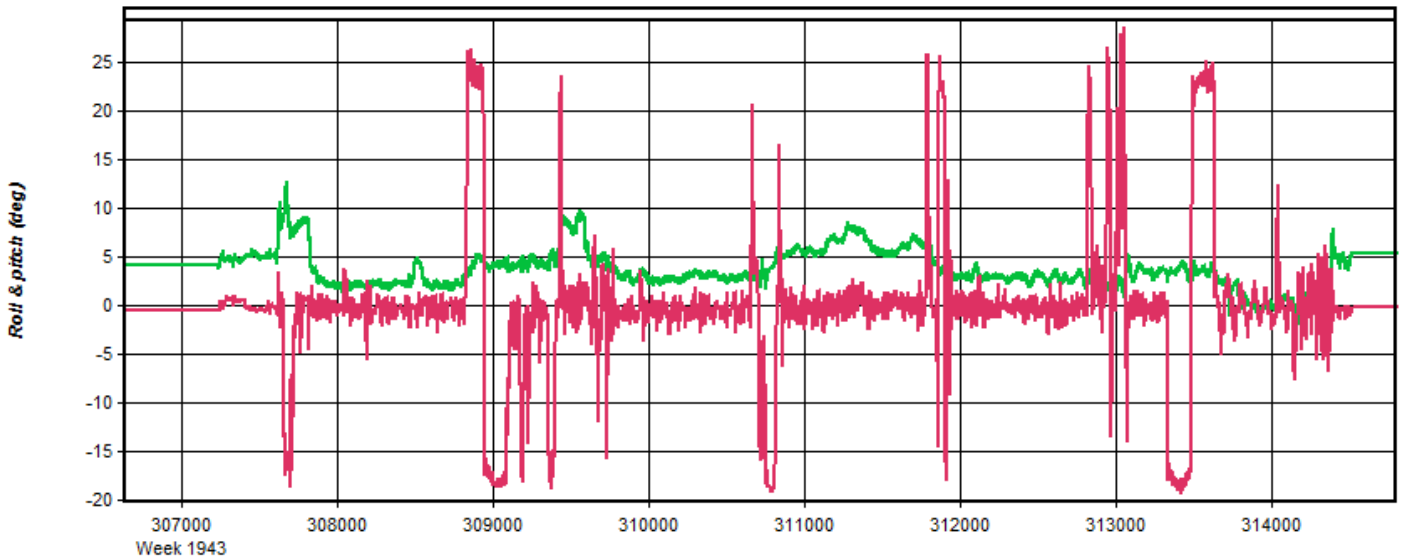
April 5, 2017-A (N246MP, SN8227)





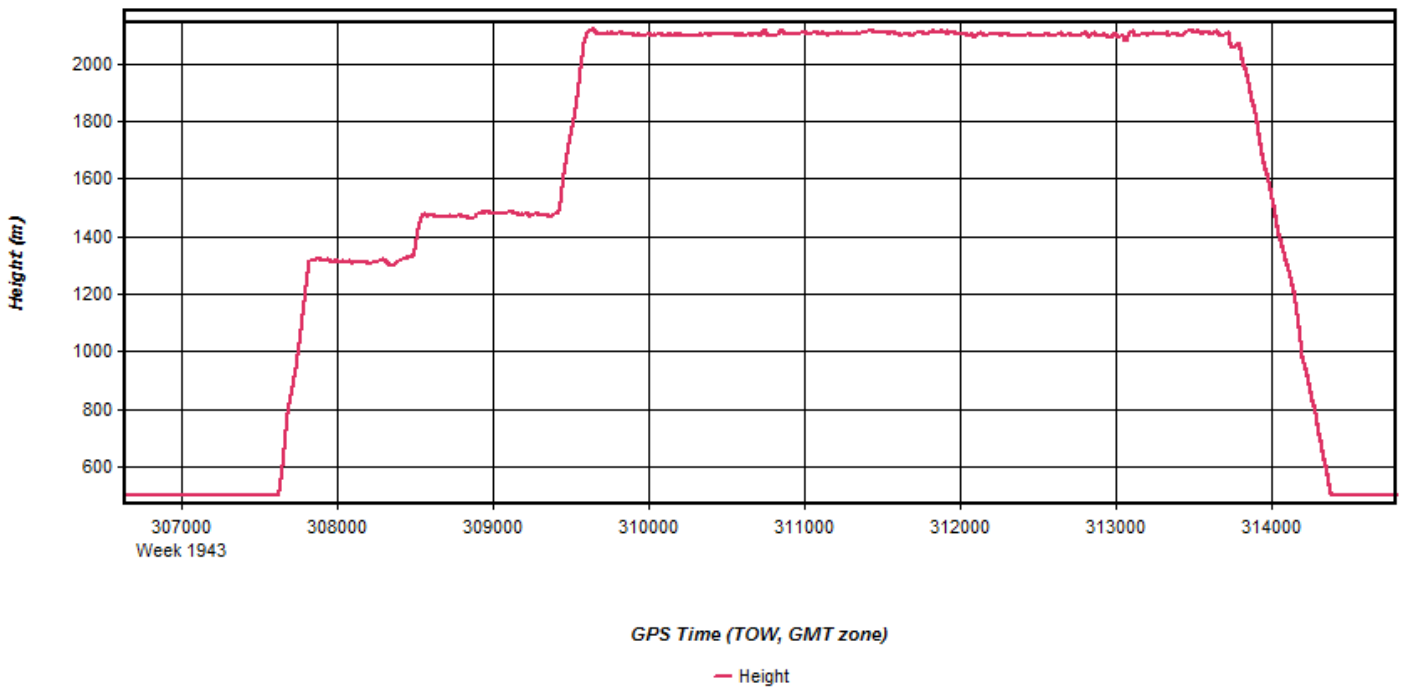
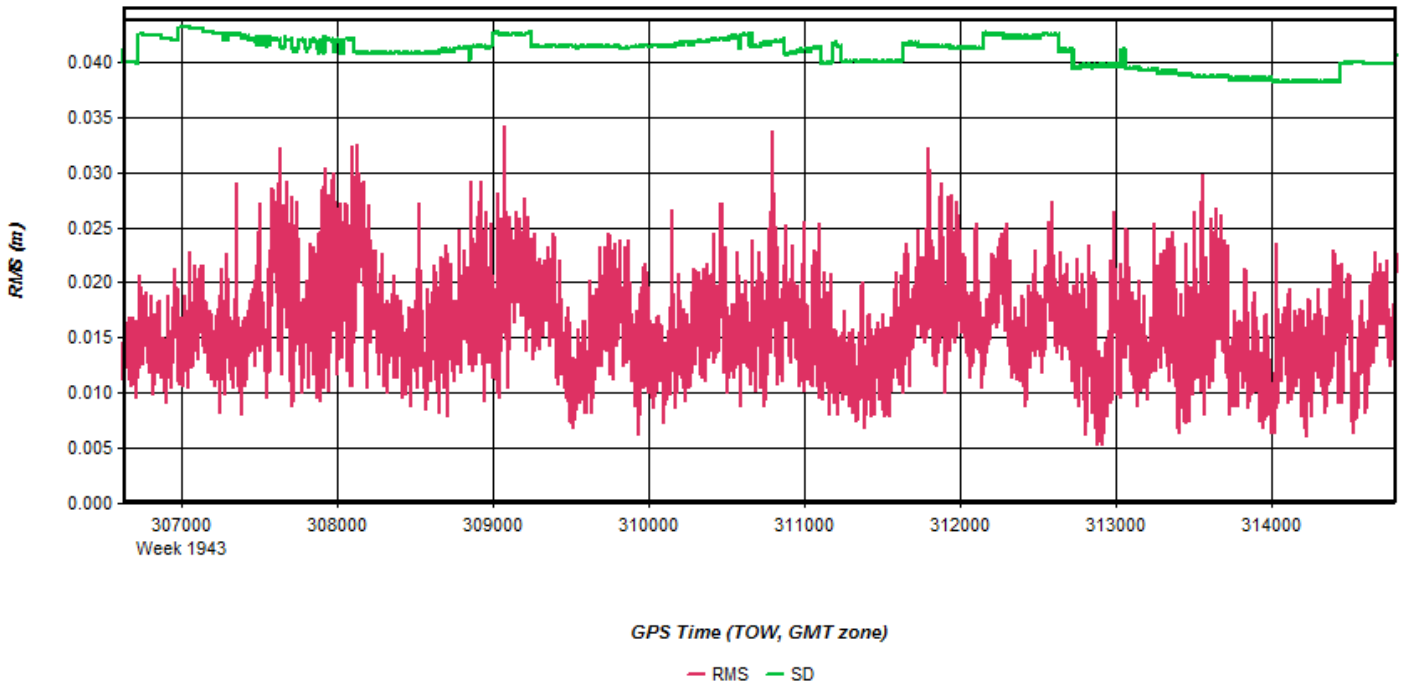
GPS Time (TOW, GMT zone)

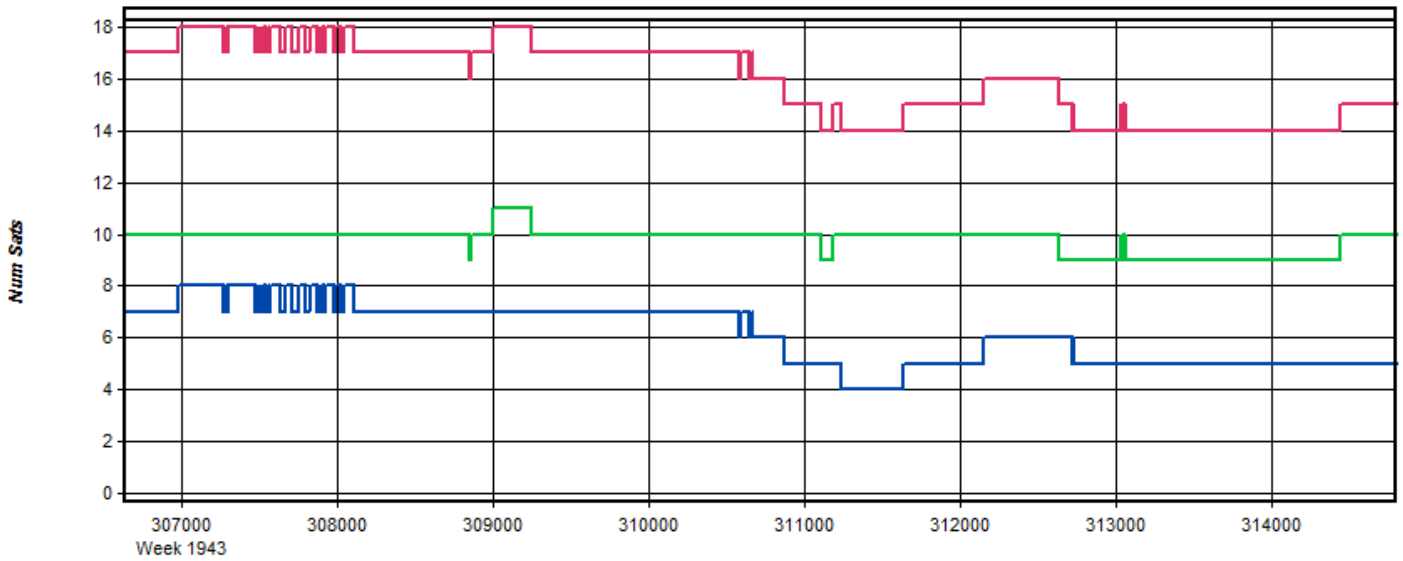
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

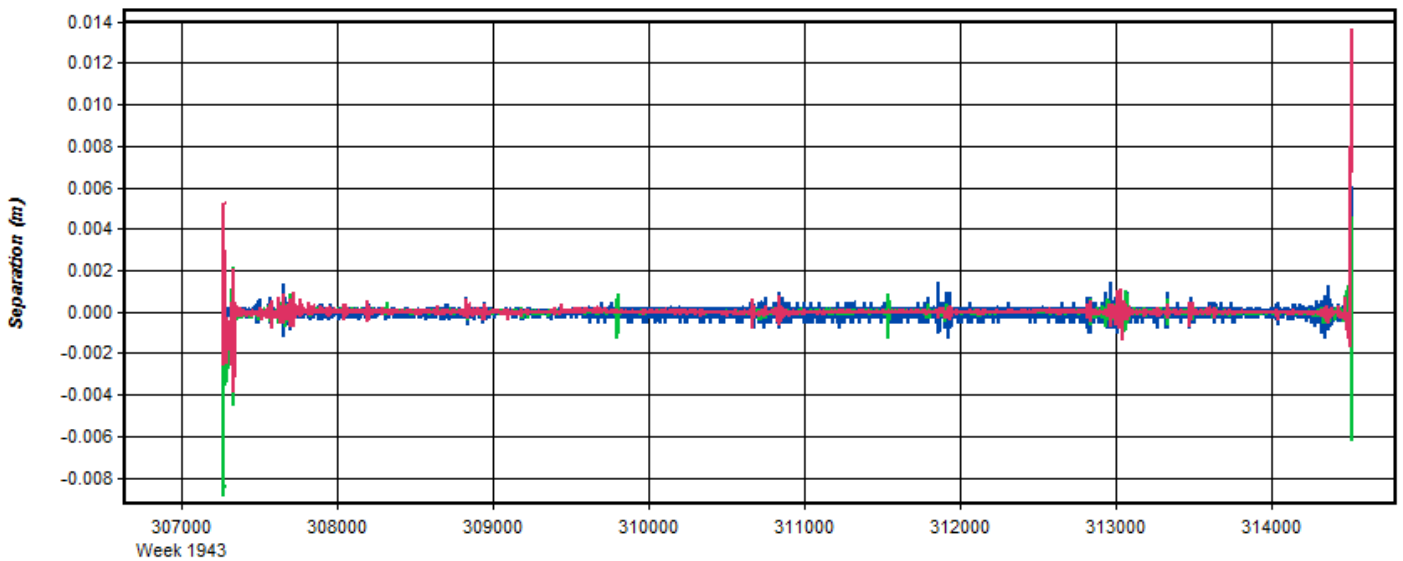
— Roll — Pitch





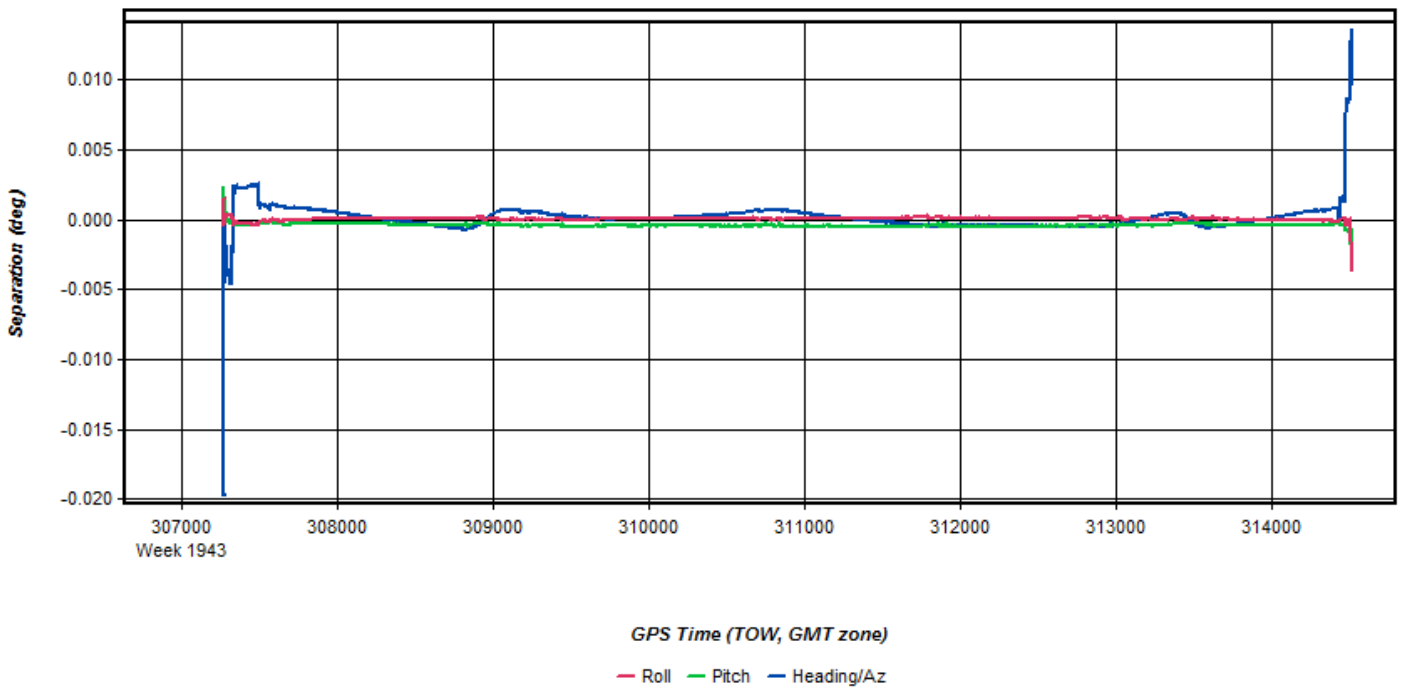
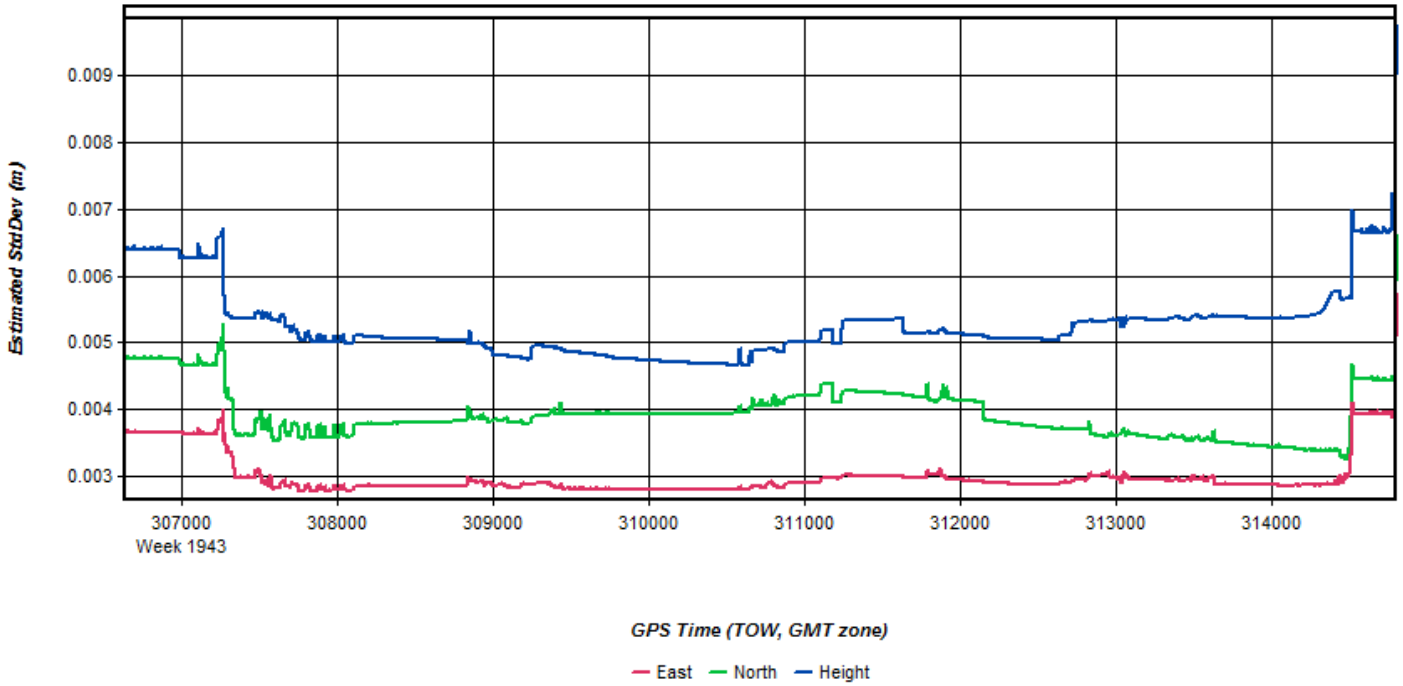
GPS Time (TOW, GMT zone)

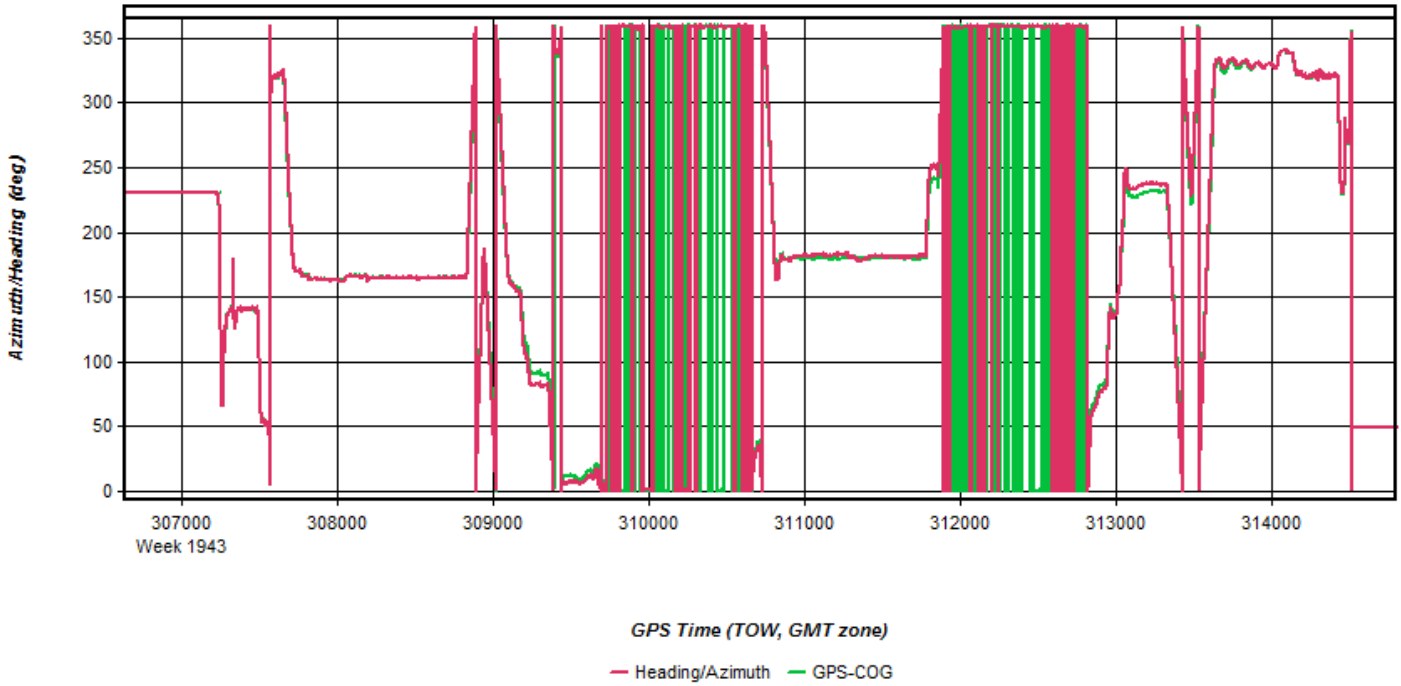
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Coordinate/Antenna Settings ? X

Master Remote

Base Station
 1: SDPI Name: SDPI Disabled
 File: F:\30420_South_Dakota\Mike_Cox_4-7-17\20170405_130856\sdpi

Coordinates
 Latitude: North 44 24 00.06331 Coord. options
 Longitude: West 100 17 41.89953 Save to Favorites
 Ellipsoidal height: 526.052 m
 Datum: WGS84 Proc Datum: WGS84
 Epoch: year

Antenna Height
 From station file: TRM57971.00, NONE View STA File
 Antenna profile: TRM57971.00 Info
 Measured height: 0.000 m
 ARP to L1 offset: 0.065 m
 Applied height: 0.065 m
 Measured to:
 ARP
 L1 Phase Centre
 Compute From Slant

OK Cancel

Flight Log

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email Log daily to flight_log_distribution_list@quantumspatial.com)

Date: 4-5-2017
 UIC: ABCDE Pg. 1 of 1

Project: NRCS SD
 Flight Mgmt File: 30420-SD-ALS80-S18207

Aircraft: 246MP Begin Hobbs: 1369.4 End Hobbs: 1371.3 Total: 1.9 Pilot: McDonalds Co-Pilot: Cox
 Tech: Cox

Dep Apt: PIR Dep Time (Lcl): 8:25 (Z): 13:25 Arr Apt: PIR Arr Time (Local): 10:20 (Z): 15:20 Tot Time Aloft: 2.0

CORS: Y/N Sta 1: Sta 2: Flyovers: Y/N IF Y, times: Sta 1 Sta 2

GPS Unit: N Sta 1: Gard Pro Sta 2: Flyovers: Y/N IF Y, times: Sta 1 Sta 2

Gd Temp beg: 3 °C End: °C OAT beg: °C End: °C Altimeter begin: 3017 end: 3010

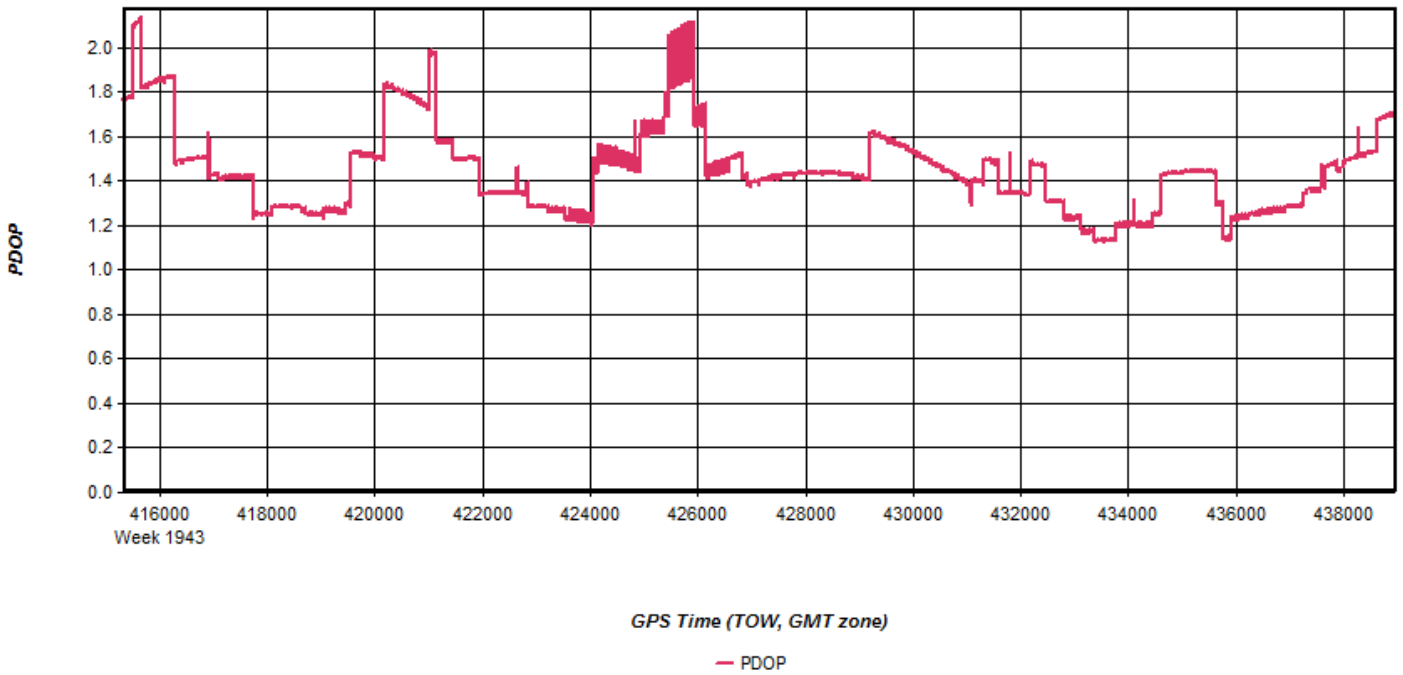
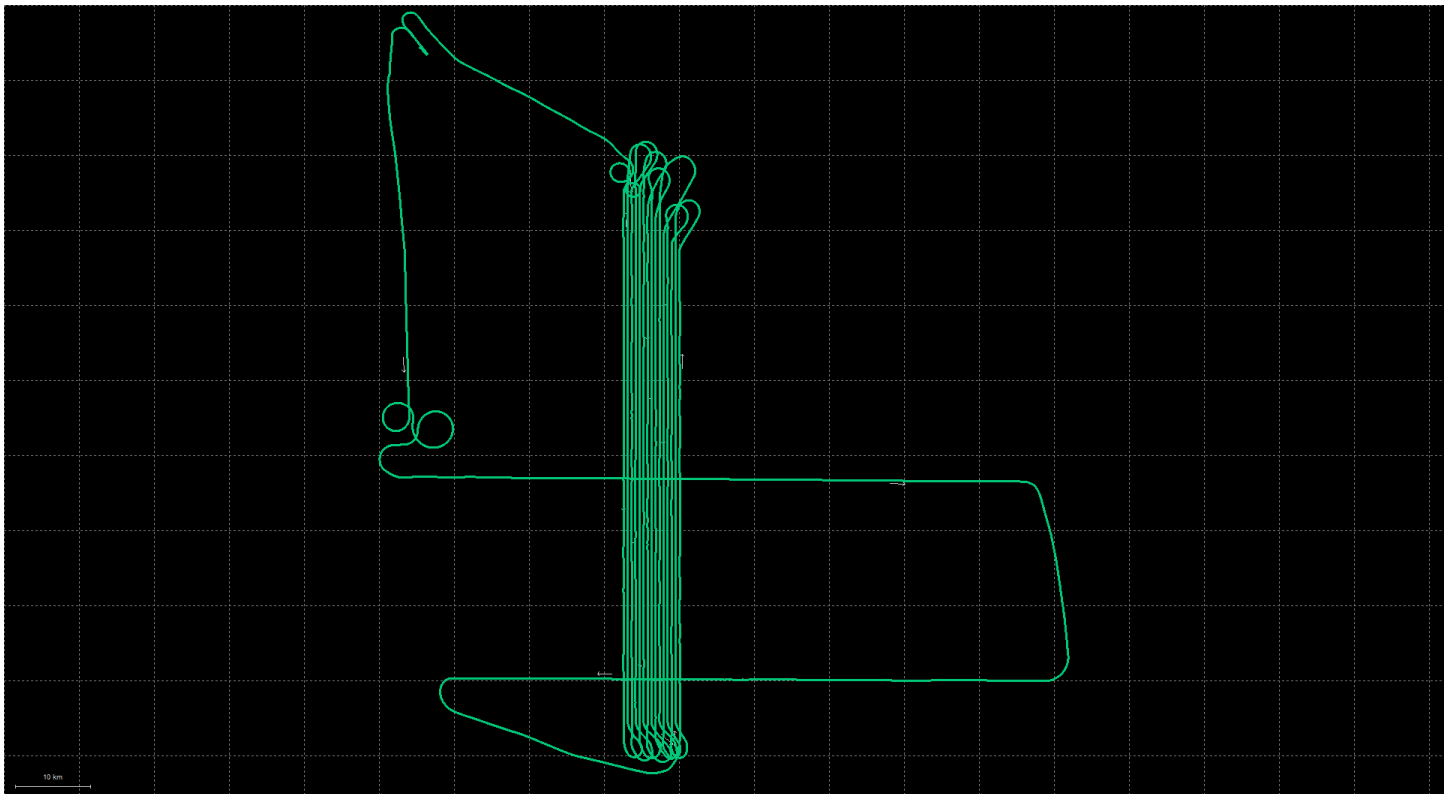
Type	Serial #	Alt AGL	Alt AMSL	Avg Terr Ht	Max Gdspd	Avg Pt Spacing	Storage Normal/P
LIDAR	ALS80	8227		130			1
FOV	20	47.3		332	Power 100%		545
							523
							22

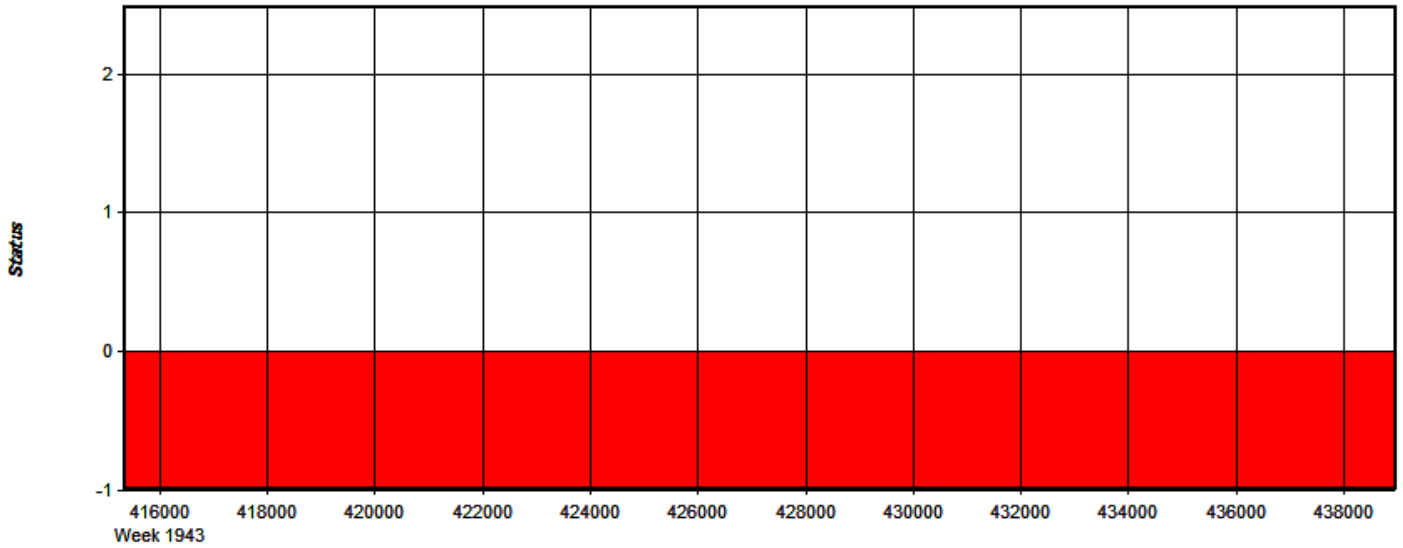
FLIGHT LINE NOTES - visibility, clouds, smoke, par tilt, etc.

Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOV/Slant	GPS Altitude	Turb (0-4)	Crab	Notes
231	354	1402	1417	125	1.72	6897	0	0	clds 36 Miles FSE Less than 10% Drops
230	174	1421	1436	139	1.92	6820	0	0	clds 37-36 15 FSE
219	354	1439	1453	132	1.90	6888	0	0	clds 0-6 - Abundant clds on line
0600	223	1457	1501	155	1.19	6881	0	0	unplanned X line
									Abort Lift Clids
									Flight 15:03
									Static Stop 15:27

Total Proj Lines: 3 Lines Flown: 3 Lines Remain: 0 Online Time: 1.0 Job Time: 1.0 Notes:

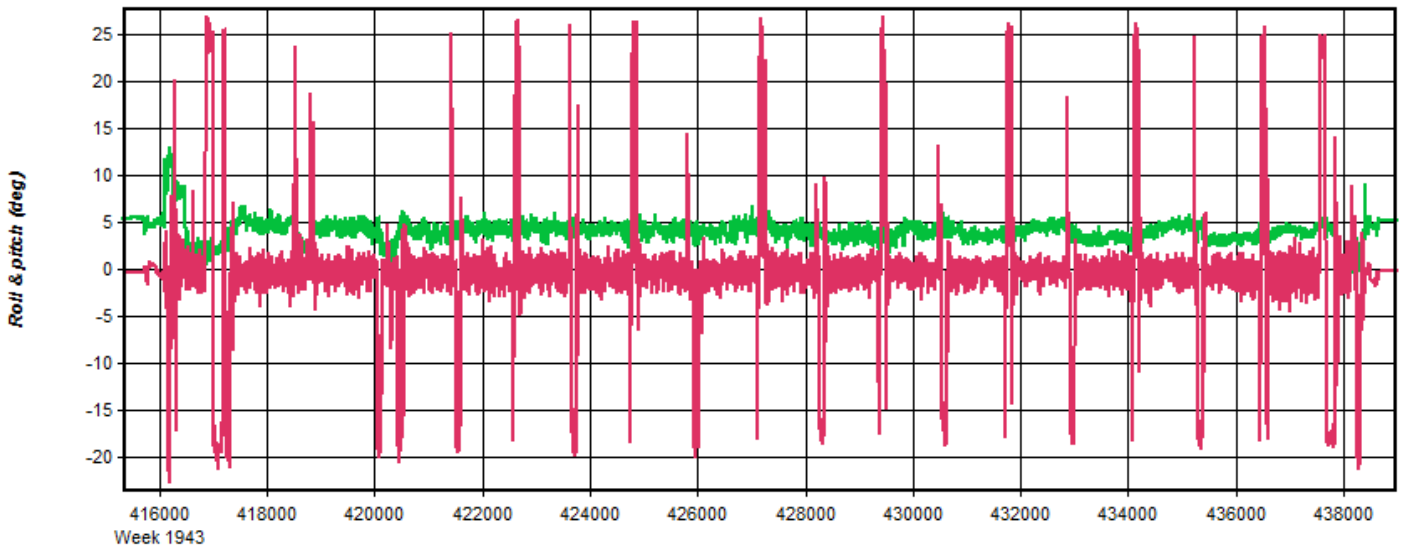
April 6, 2017-A (N246MP, SN8227)





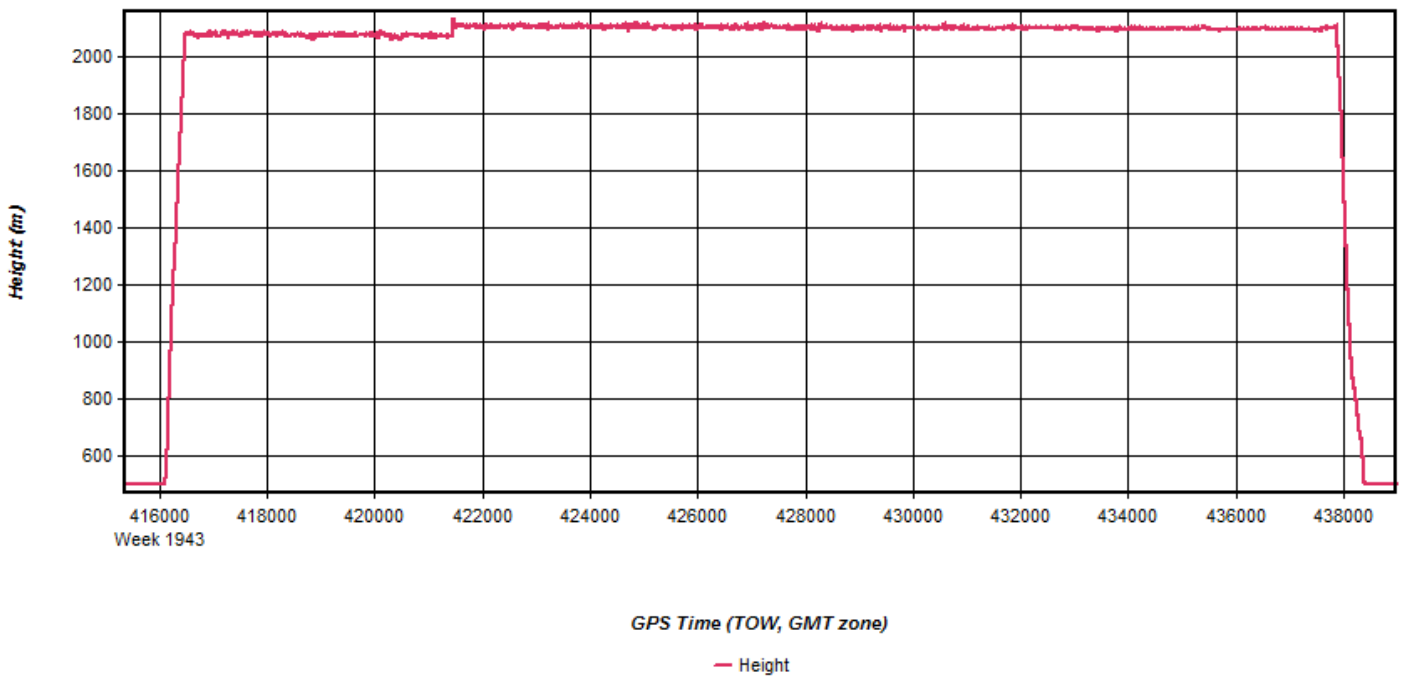
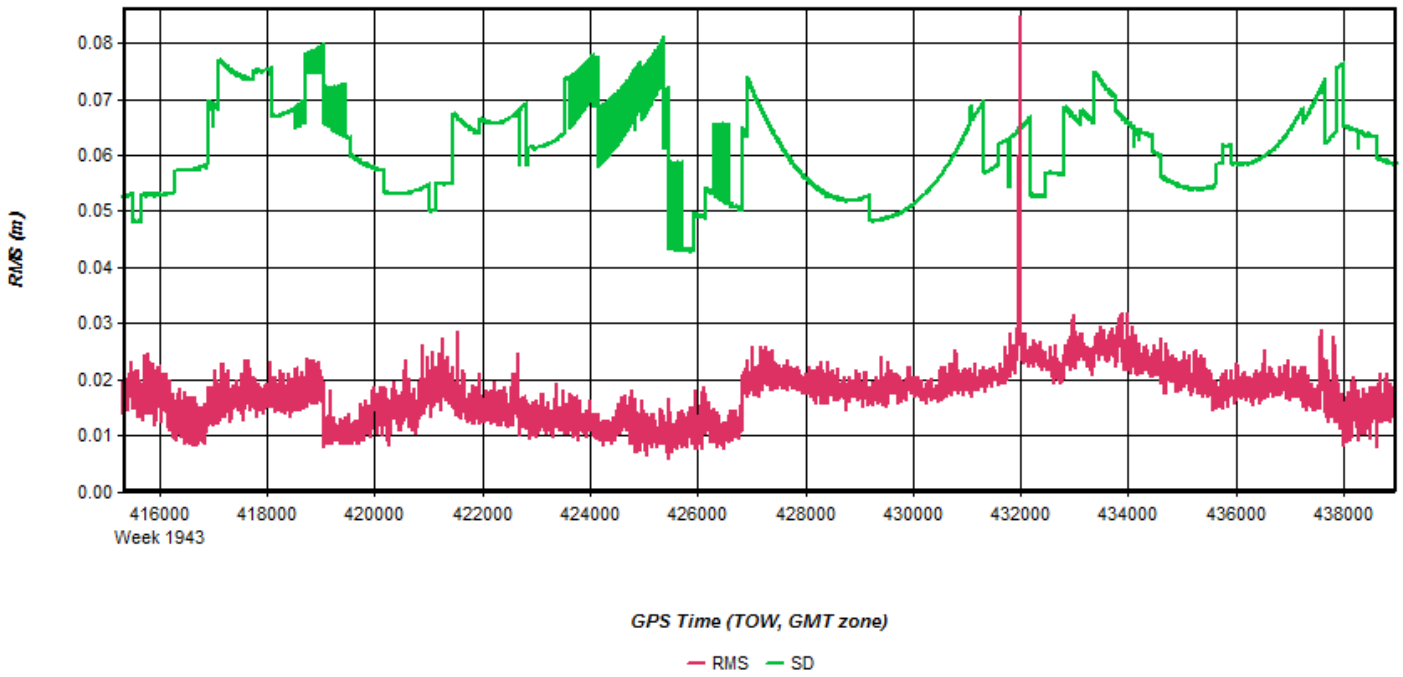
GPS Time (TOW, GMT zone)

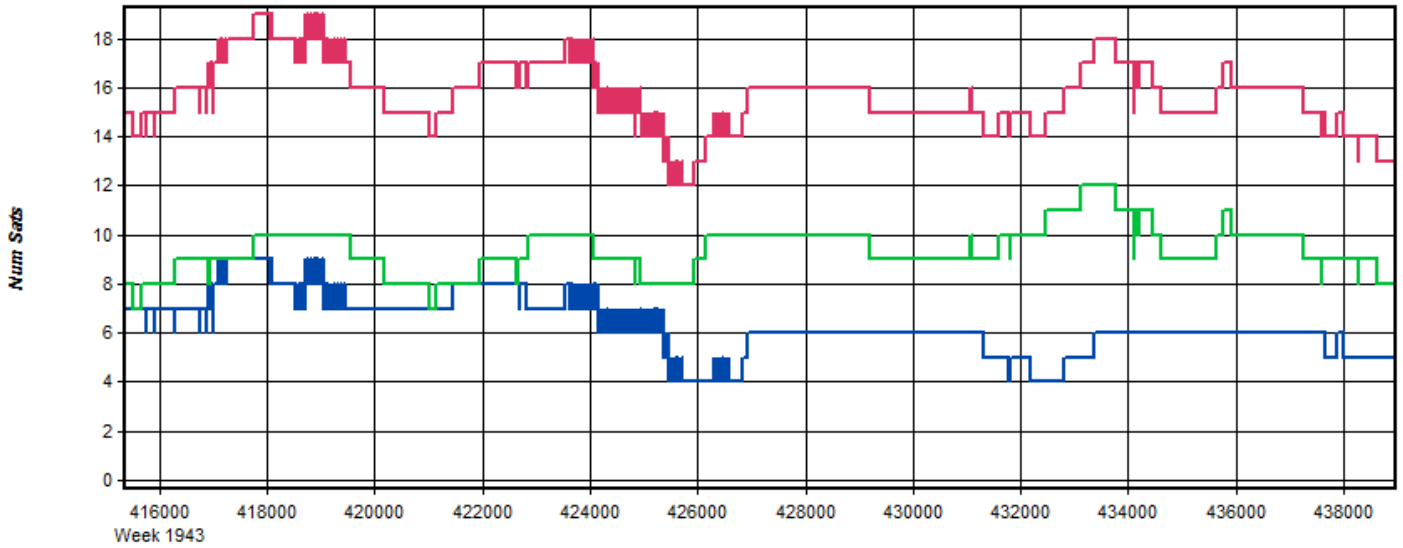
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

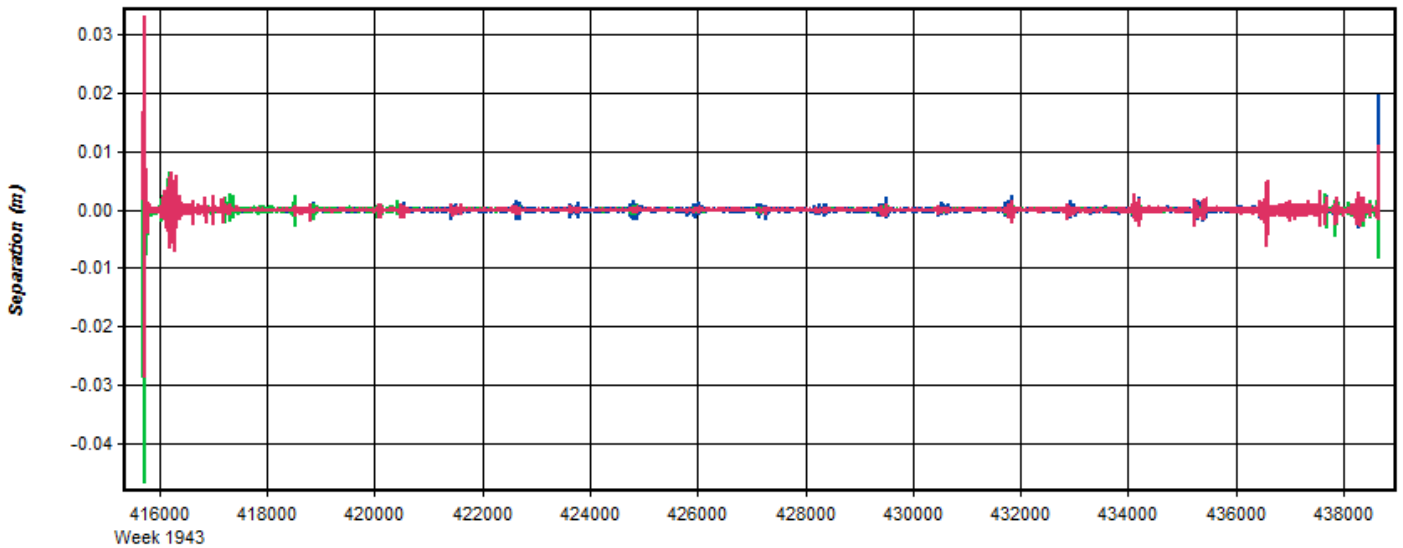
— Roll — Pitch





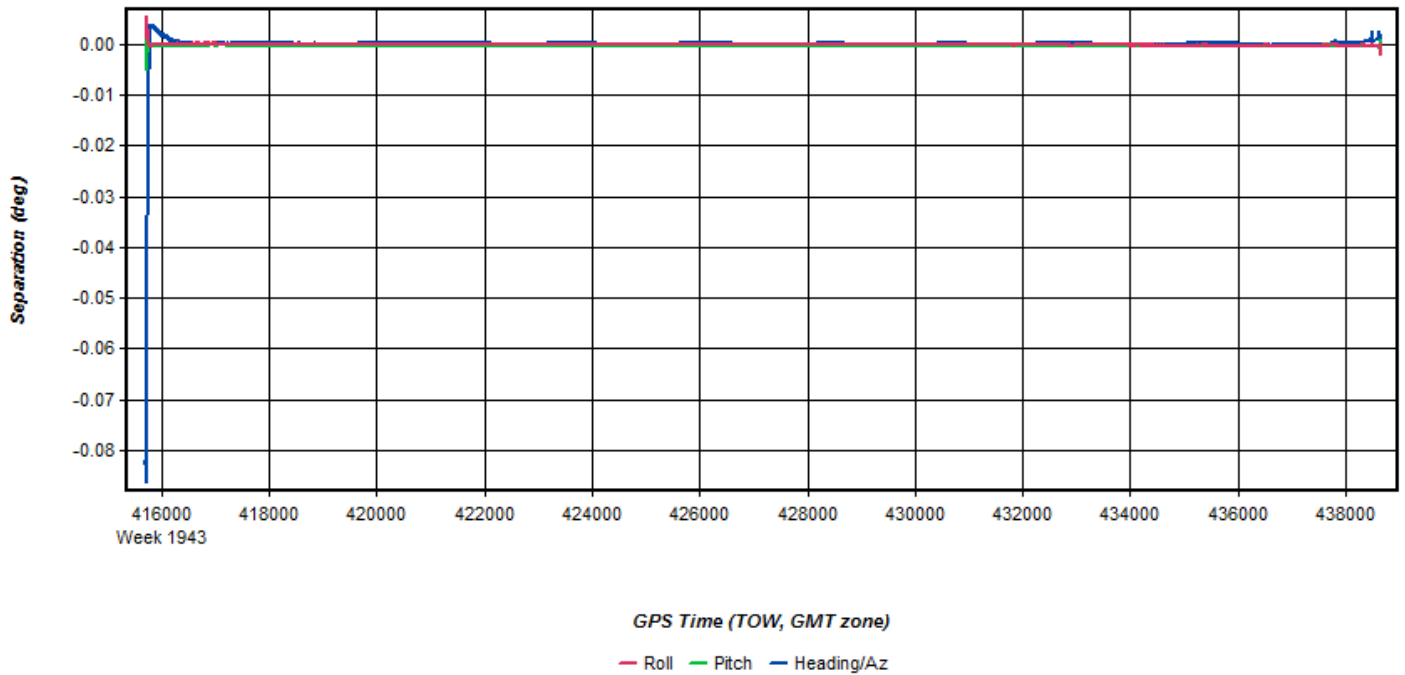
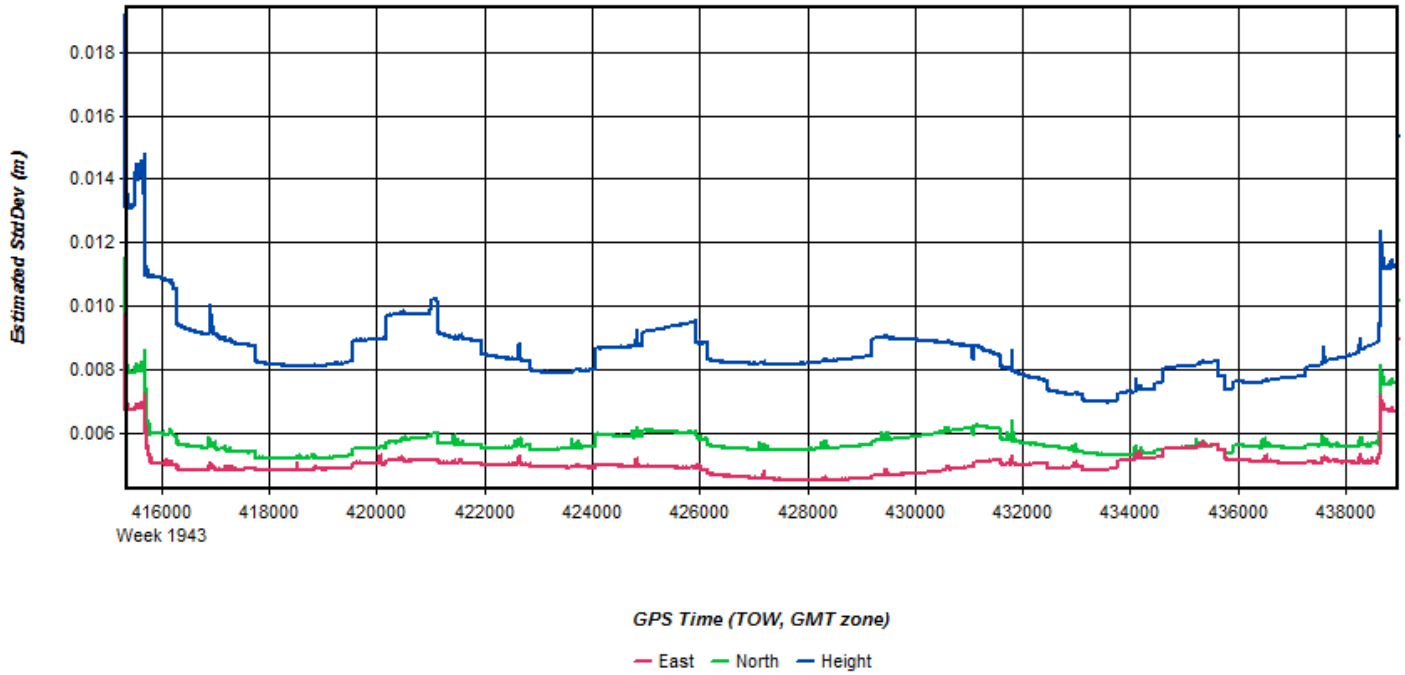
GPS Time (TOW, GMT zone)

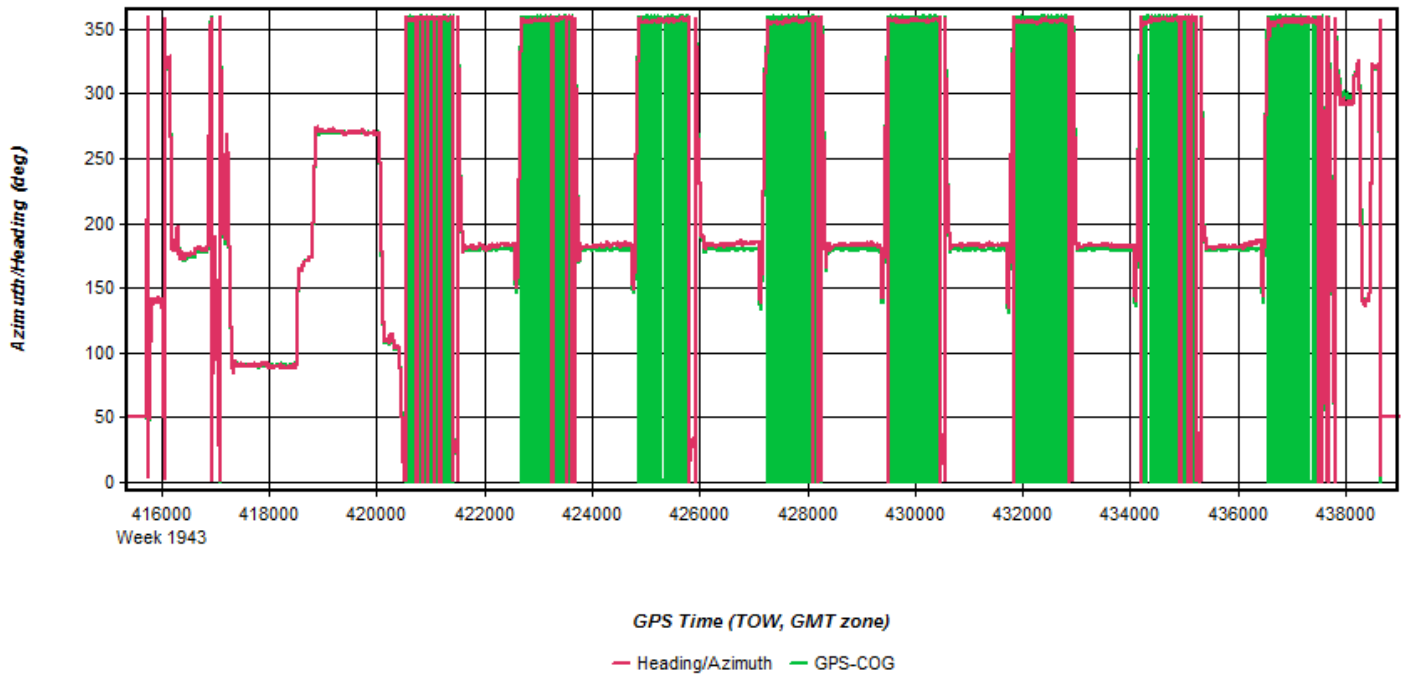
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email: Log daily to flight_log_distribution_list@quantumspatial.com)

Date: 4-6-2017
 UIC: (A) b c d e Pg. 1 of 1

Project: NRCS SD
 Flight Mgmt File: 30420-SD-AL580-SA8227

Aircraft: 246MF Begin Hobbs: 1371.3 End Hobbs: 1377.6 Total: Pilot: JONES Co-Pilot: Tech: COX

Dep Apt: PIR Dep Time (Local): 7:15 (Z): 12:15 Arr Apt: PIR Arr Time (Local): 1:35 (Z): 18:35 Tot Time Aloft: 6.3

CORS: Y / N Sta 1: Sta 2: Flyovers: Y / N IF Y, times: Sta 1) Sta 2)

GPS Unit: Good Pro Sta 1: Sta 2: Flyovers: Y / N IF Y, times: Sta 1) Sta 2)

Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: 3026 end:

Mag Gd	745
End Gd	647
Test Gd	98

Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOO/Pass	GRS Altitude	Crab	Turb (0..4)	Alt ANSL	Pulses In Air	Avg Terr Ht	Max Gdspd	Power	Avg Pt Spacing	IFSM	Average Number		
																Type	Serial #	Scan Freq
231	174	1355	14:10	134	1/19	6933		0										
230	354	1444	14:29	134	1/19	6903		0										
229	174	1432	1449	132	1/20	6941		0										
228	354	1452	1507	135	1/20	6879		0										
227	174	1511	1527	136	1/18	6879		0										
226	354	1529	1545	137	1/17	6889		0										
225	174	1548	1603	134	1/17	6896		0										
224	354	1607	1621	130	1/17	6903		0										
223	174	1625	1641	135	1/17	6983		0										
222	354	1643	1658	135	1/17	6907		0										
221	174	1702	1716	135	1/11	6903		0										
220	354	1719	1734	137	1/20	6905		0										
219	174	1738	1752	130	1/18	6921		0										
218	354	1757	1759	137	1/19	6941		0										
218	354	1805	18:20	137	1/20	6920		0										

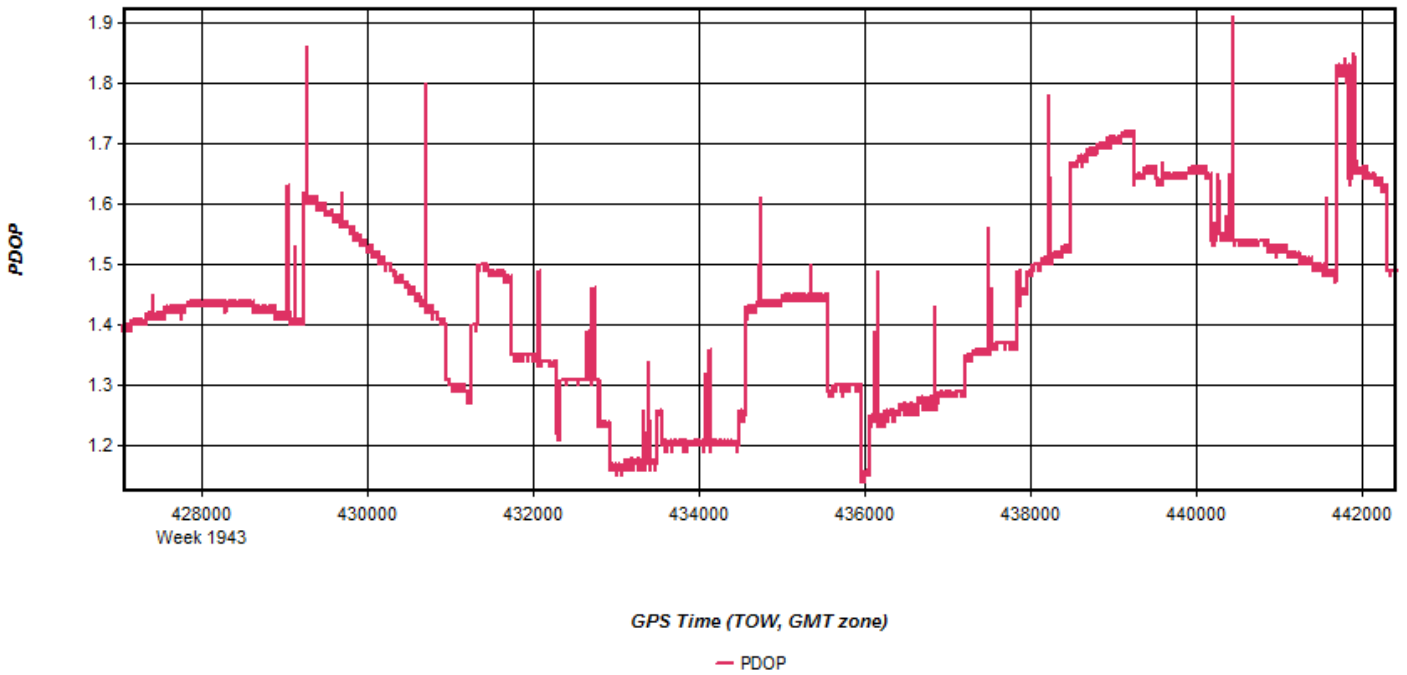
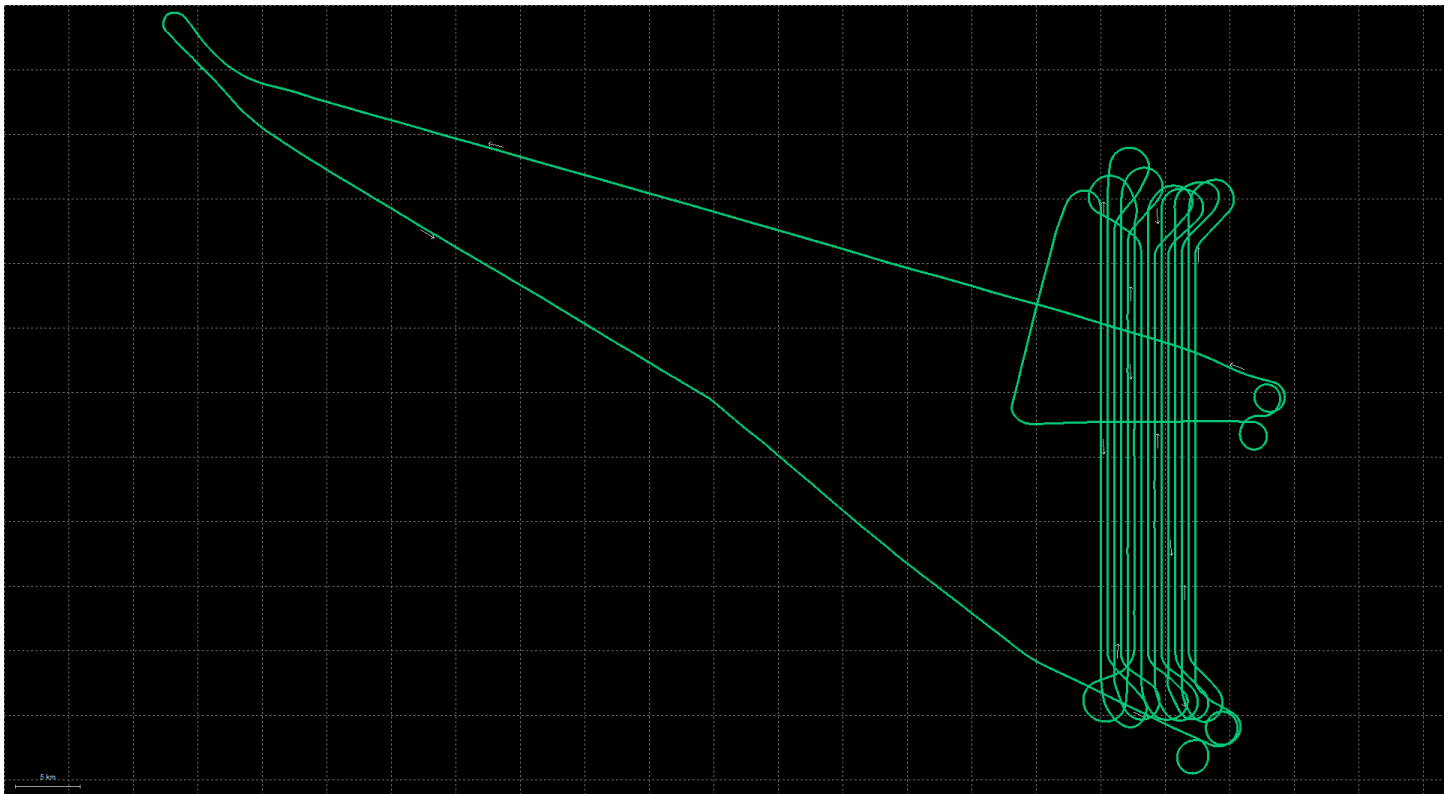
FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc

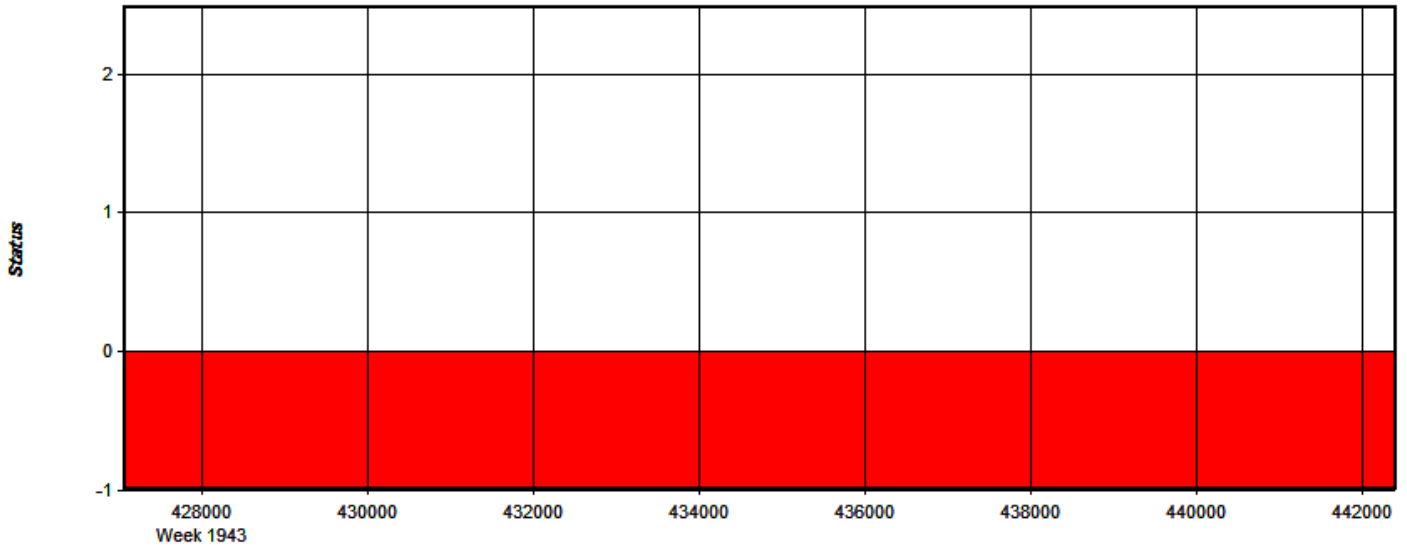
231-234 Clod 4-5 FSC Loss than 10% Drops over land
 235-238 Smooth Clear
 239-242 Unplanned X line
 243-246 Smooth Clear
 247-250 Static Stop
 251-254 18:37 - 18:42

Fig 8's 18:22

Total Proj Lines: Lines Flown: 14 Lines Remain: OnLine Time: 4:30 Mob Time: 1.0 Notes: 2.45 dx

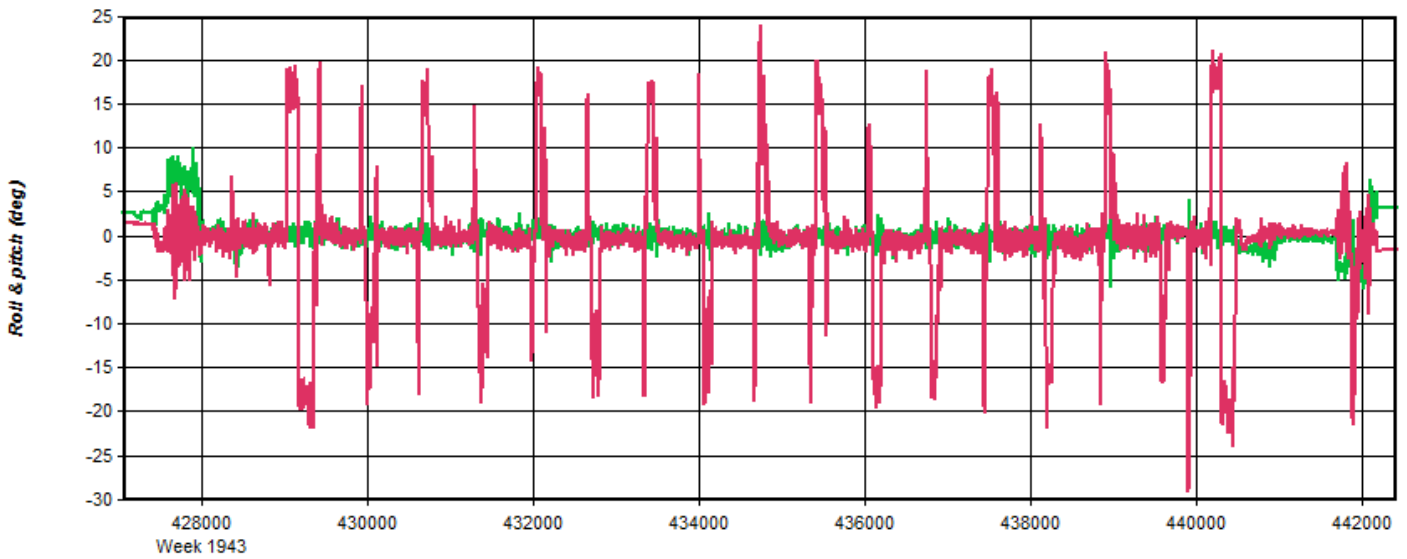
April 6, 2017-A (N916WC, SN8119)





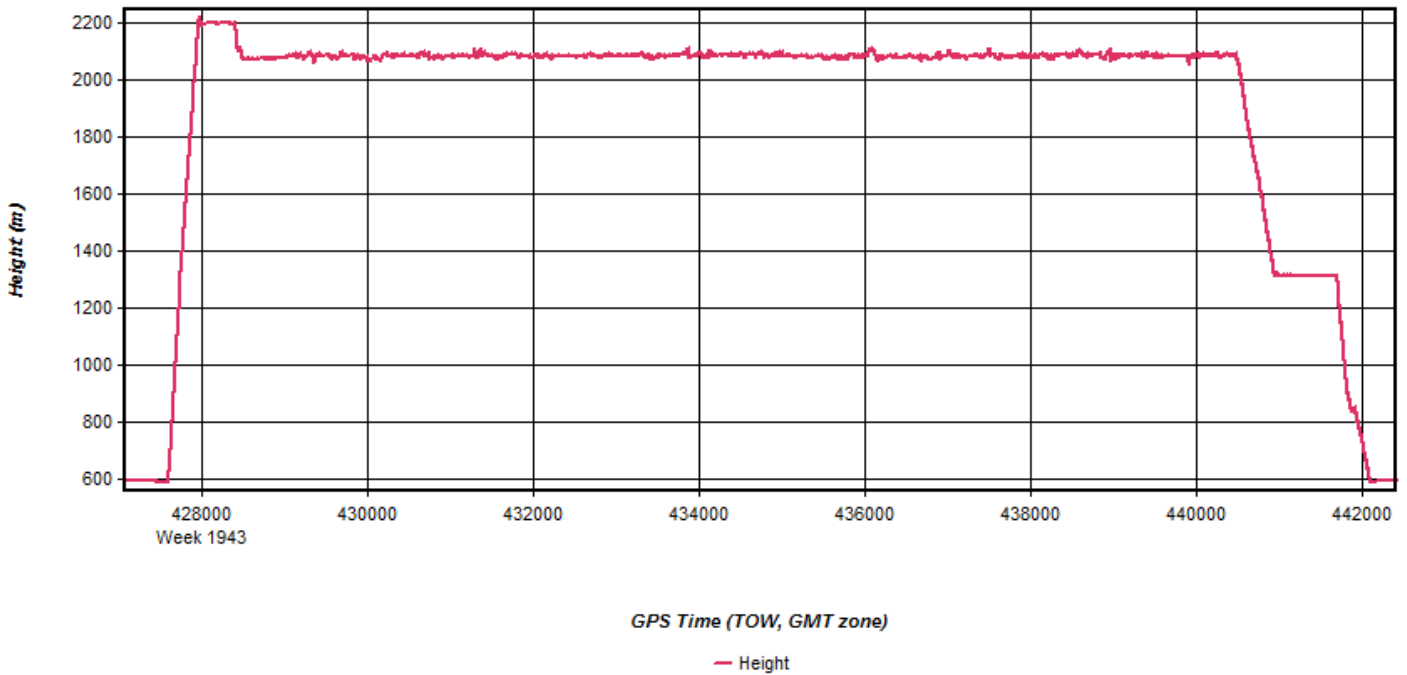
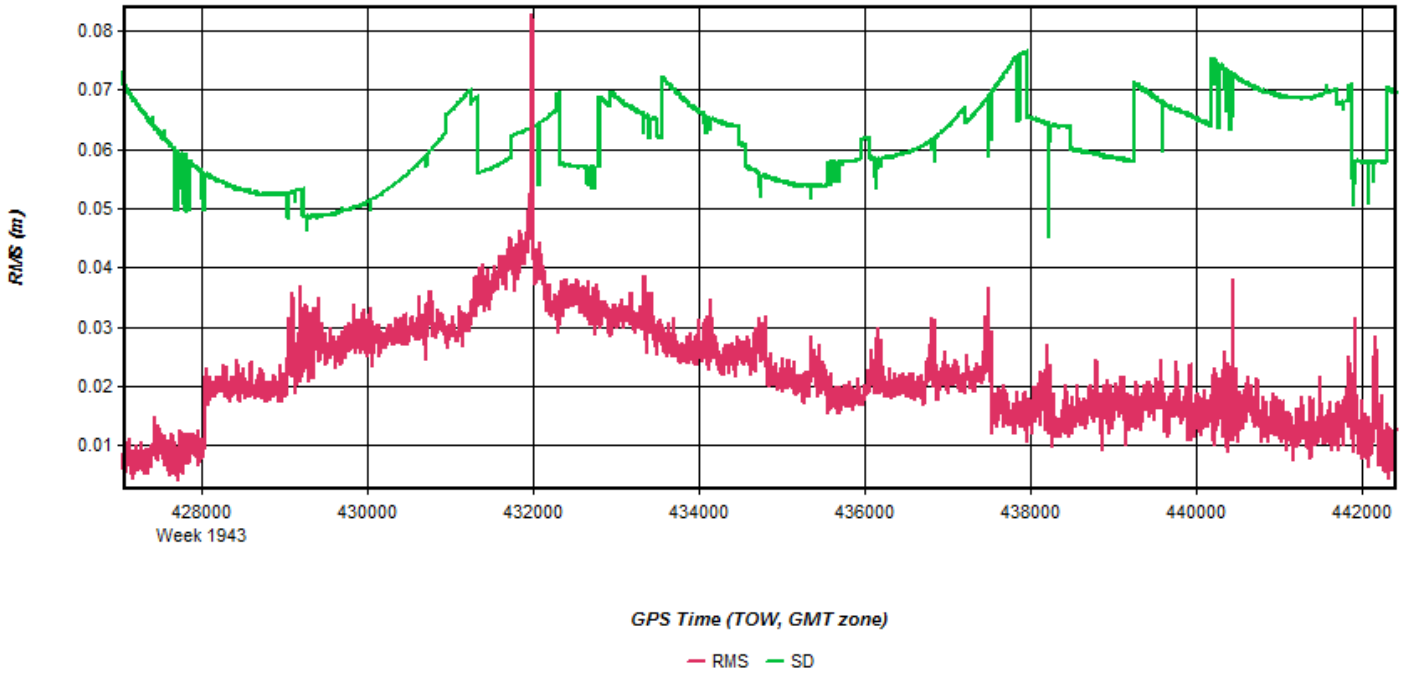
GPS Time (TOW, GMT zone)

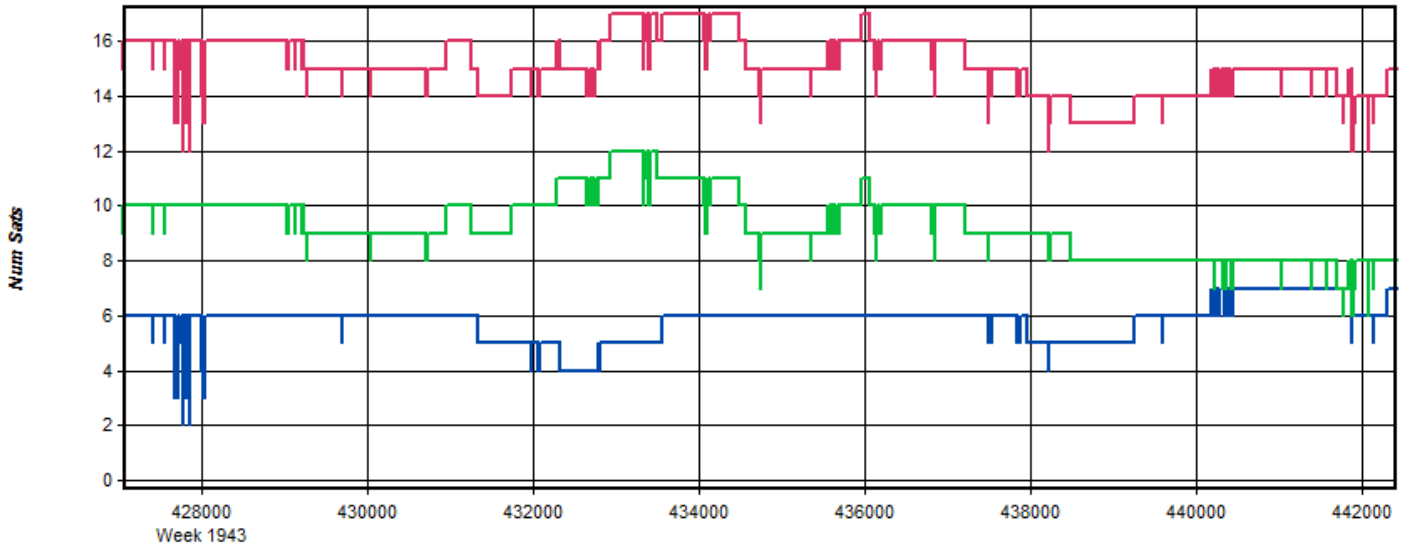
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

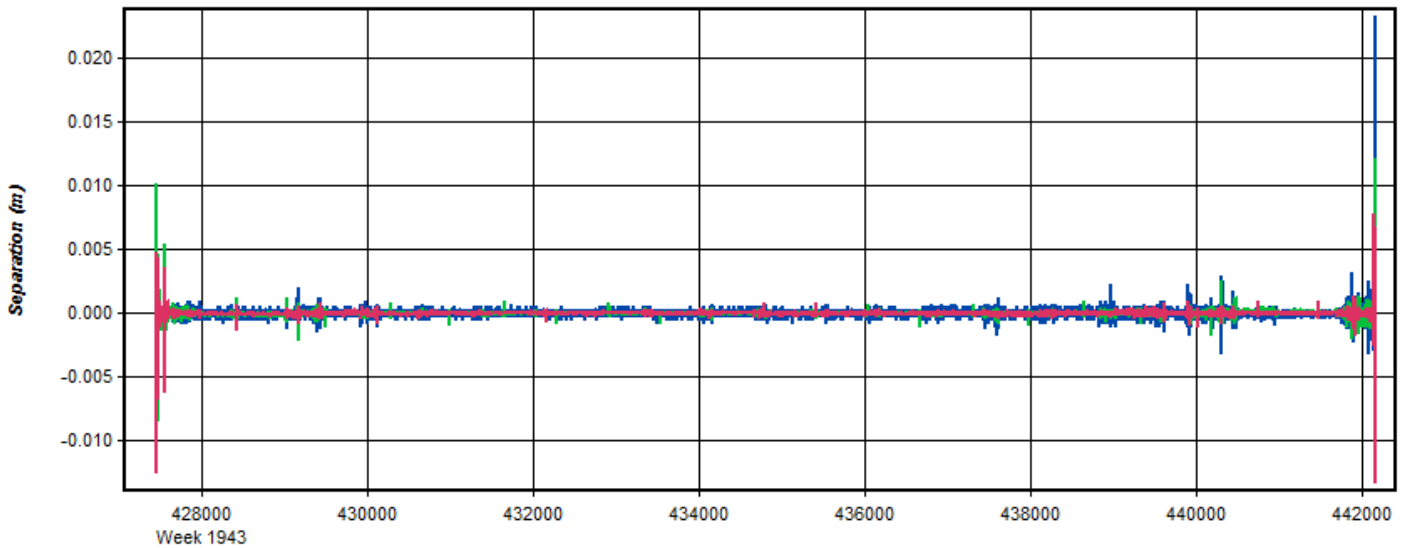
— Roll — Pitch





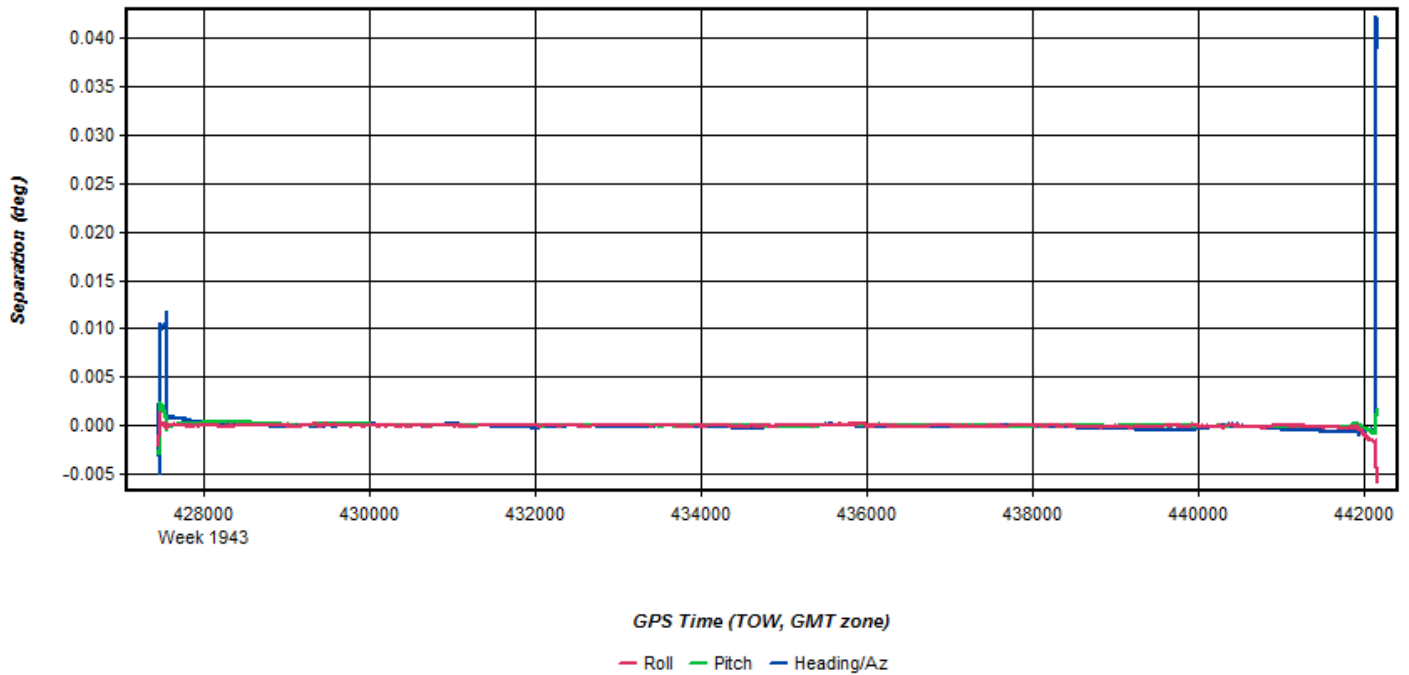
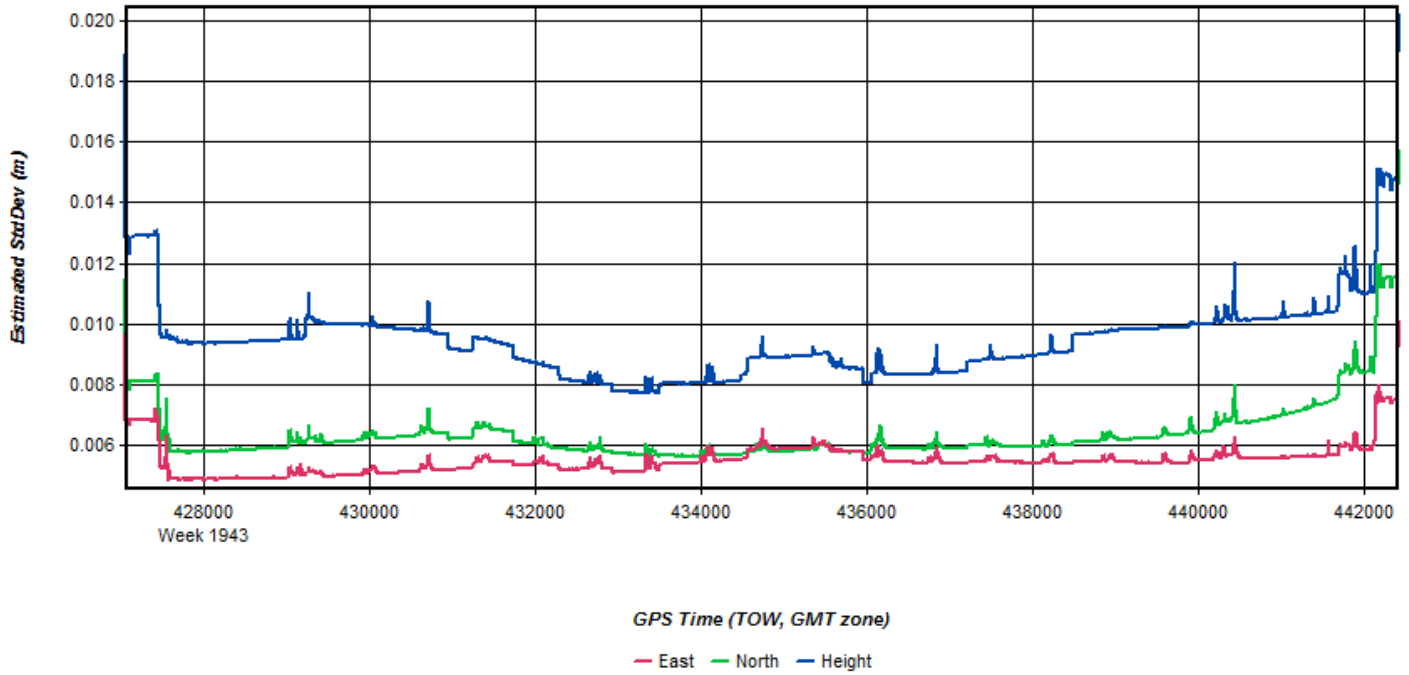
GPS Time (TOW, GMT zone)

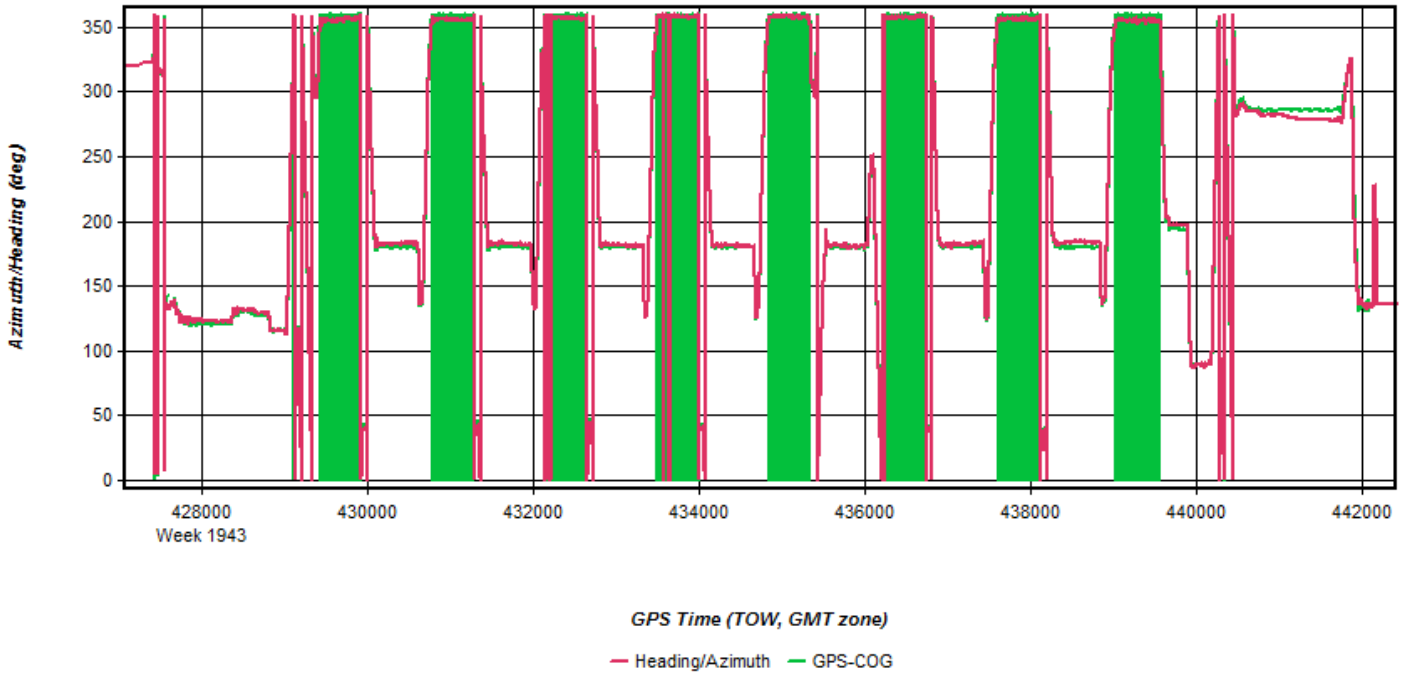
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up

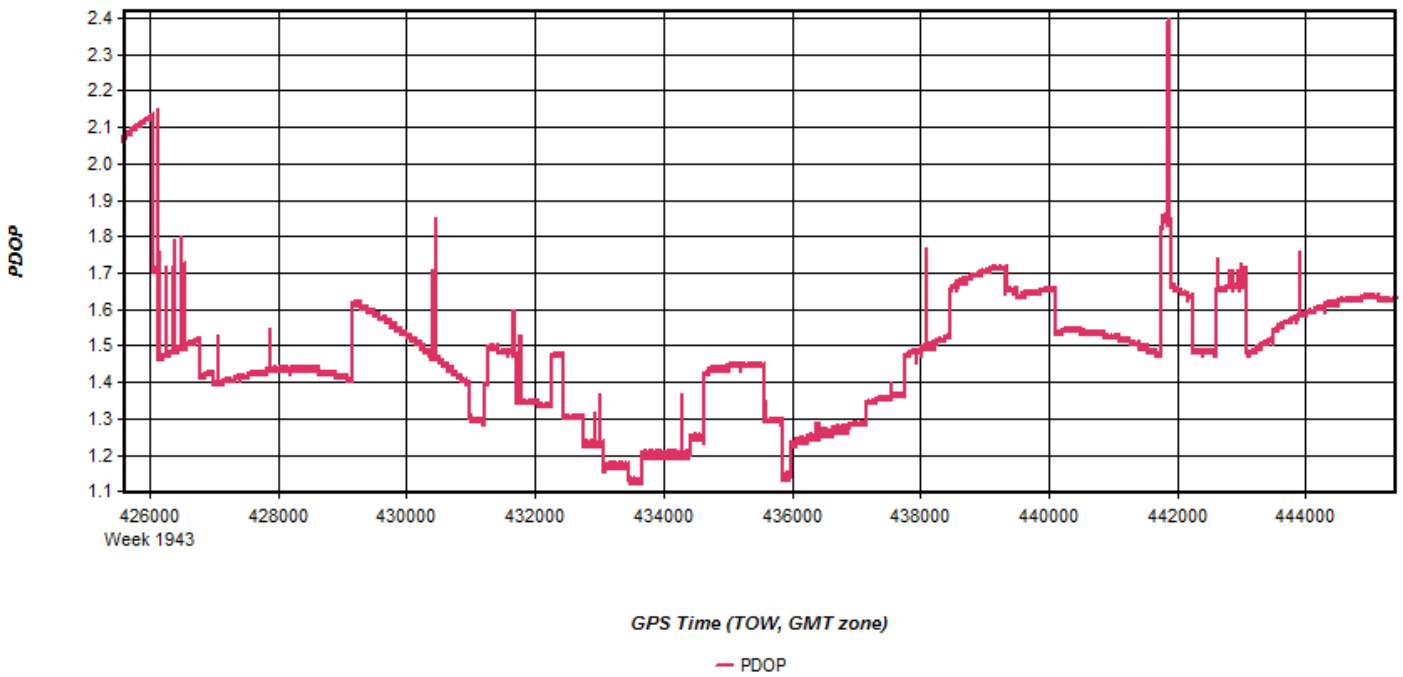
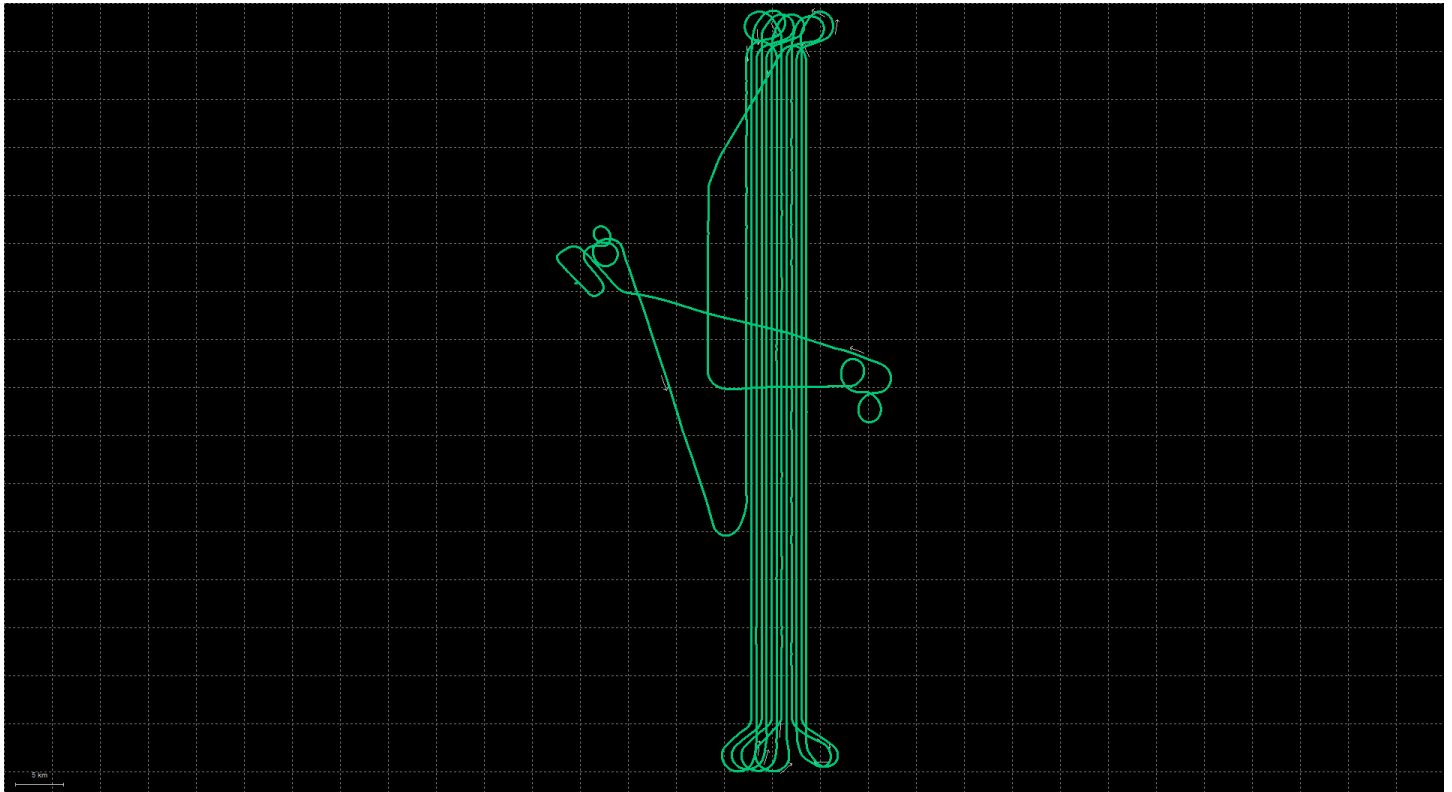


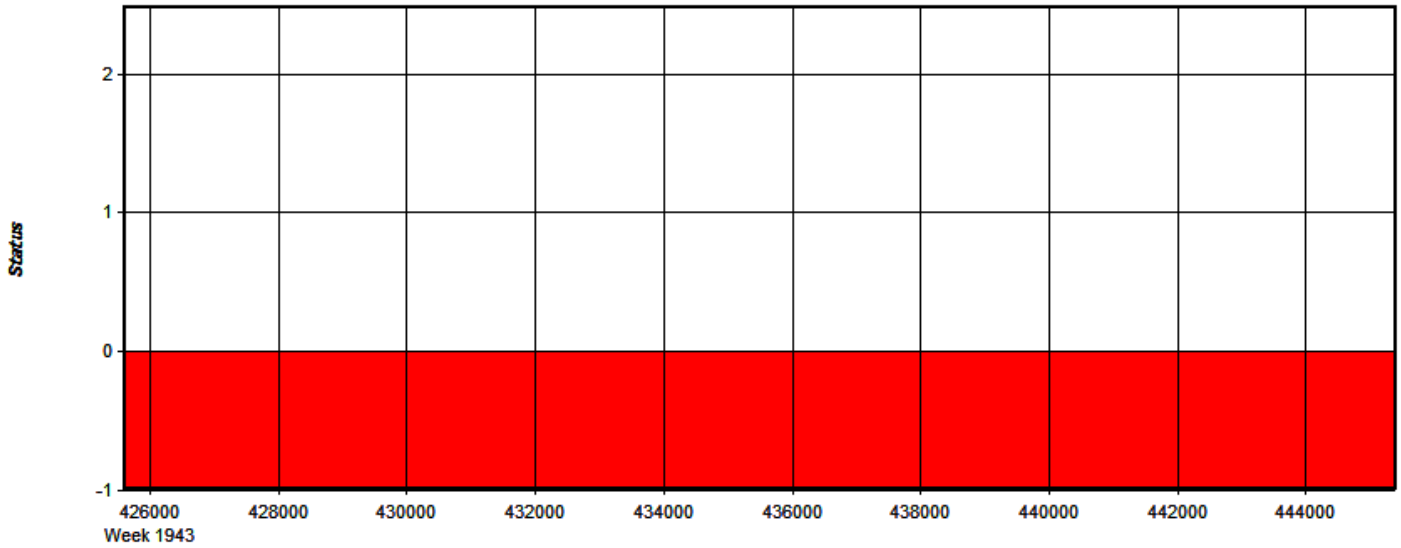


Flight Log

LIDAR					KeyW - Aeroptic LIDAR FLIGHT REPORT		
Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc... Clear with FOG building up							
CREW	Pilot/Operator Sean T mm/dd/yyyy	AIRCRAFT N916WC	GPS Source Fwd	WEATHER			
UTC DATE	4/6/2017	LIDAR S/N 8119	Time appr 22:37 UTC appr 02:54 UTC next day	Lens cleaned <input checked="" type="checkbox"/>	SSD	Space Used	Remaining
Camera System		fwd/left Fwd	Start-up	All Ipds uploaded <input checked="" type="checkbox"/>	Drive #	During Mission	Tot Space
Camera Location (Hole)			Shut-down	Pilot's screen functional <input checked="" type="checkbox"/>	@ Beginning	56	1020
				Compact flash drive space <input checked="" type="checkbox"/>	Space Used		
				SSDs have space <input checked="" type="checkbox"/>	0		
				Startup beeps & IPAS recording <input checked="" type="checkbox"/>			
Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks		
3DEP	1	2210	N				
		2209	S				
		2208	N				
		2207	S				
		2206	N				
		2205	S				
		2204	N				
		2203	S				
		2202	N				
		2201	S				
		2199	N				
		2198	S				
		2197	N				
		2196	S				
		UL-X	E				

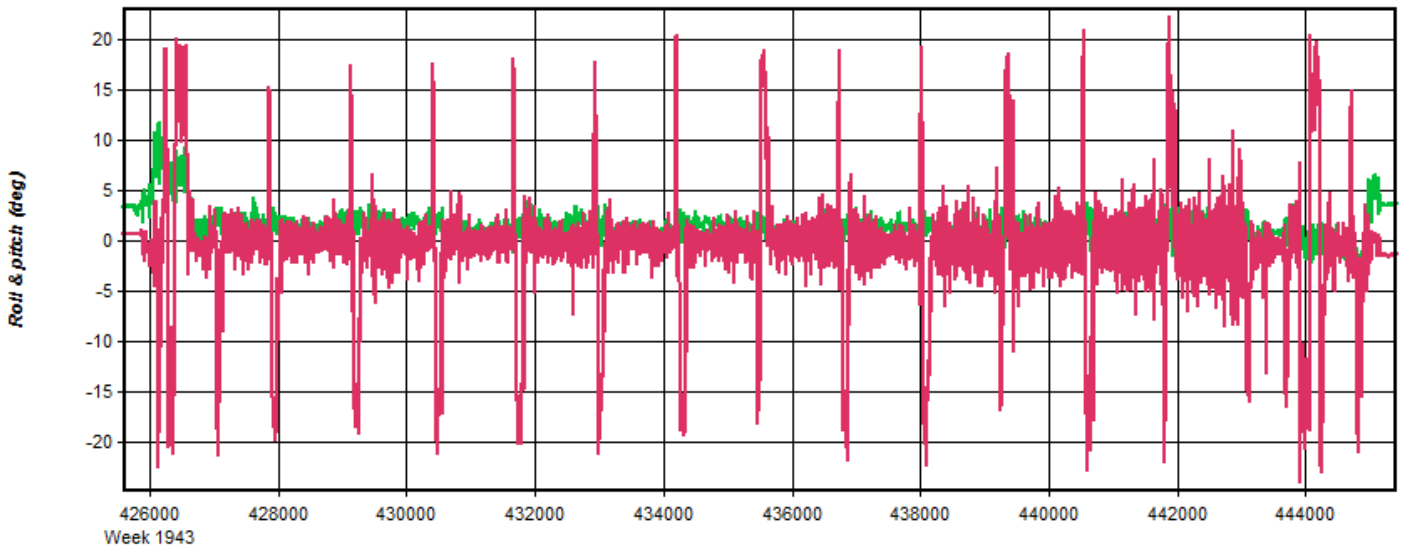
April 6, 2017-A (N915WC, SN8237)





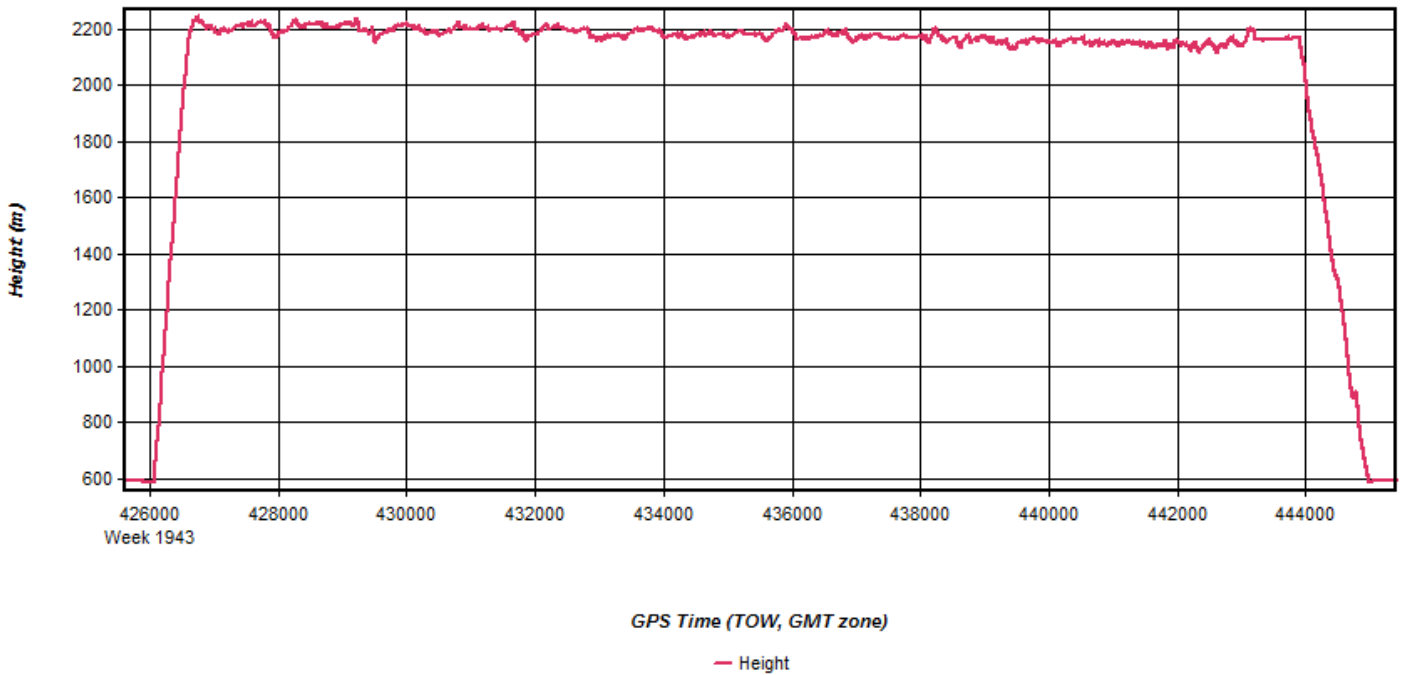
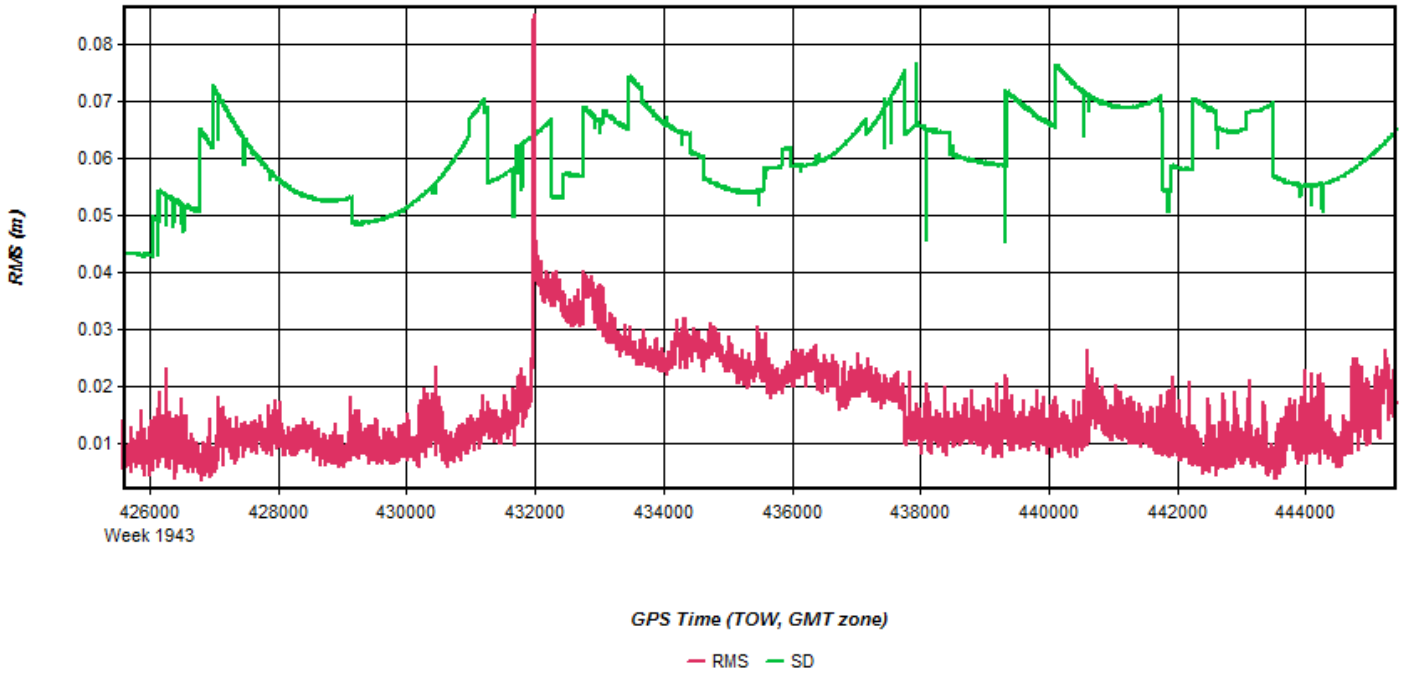
GPS Time (TOW, GMT zone)

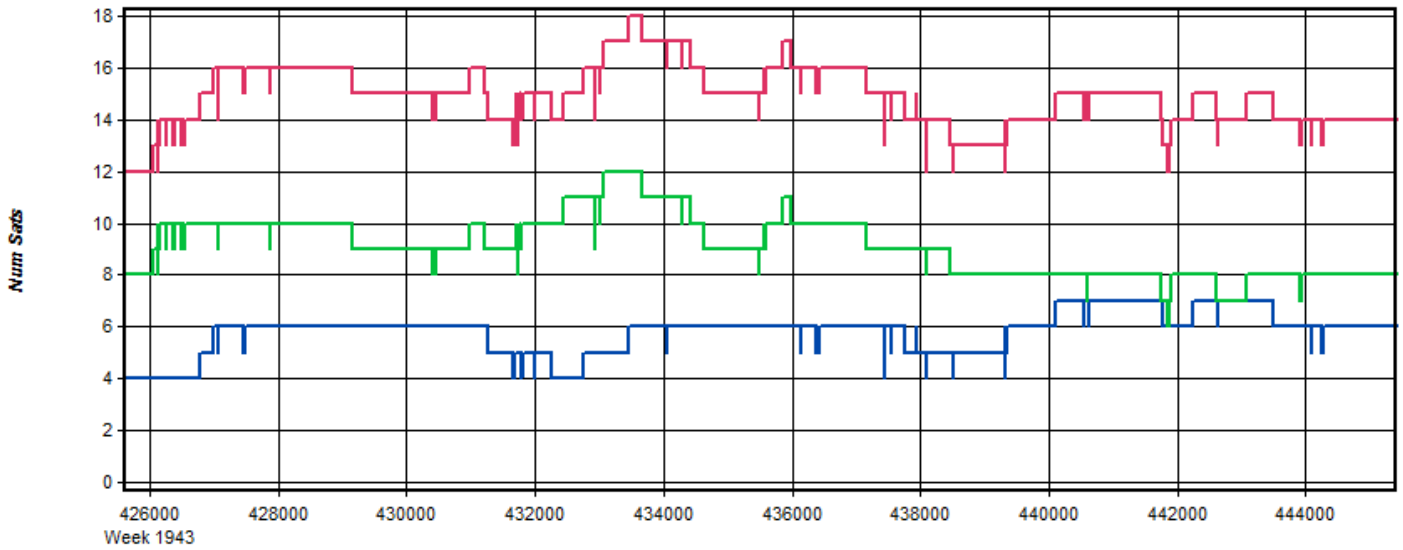
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

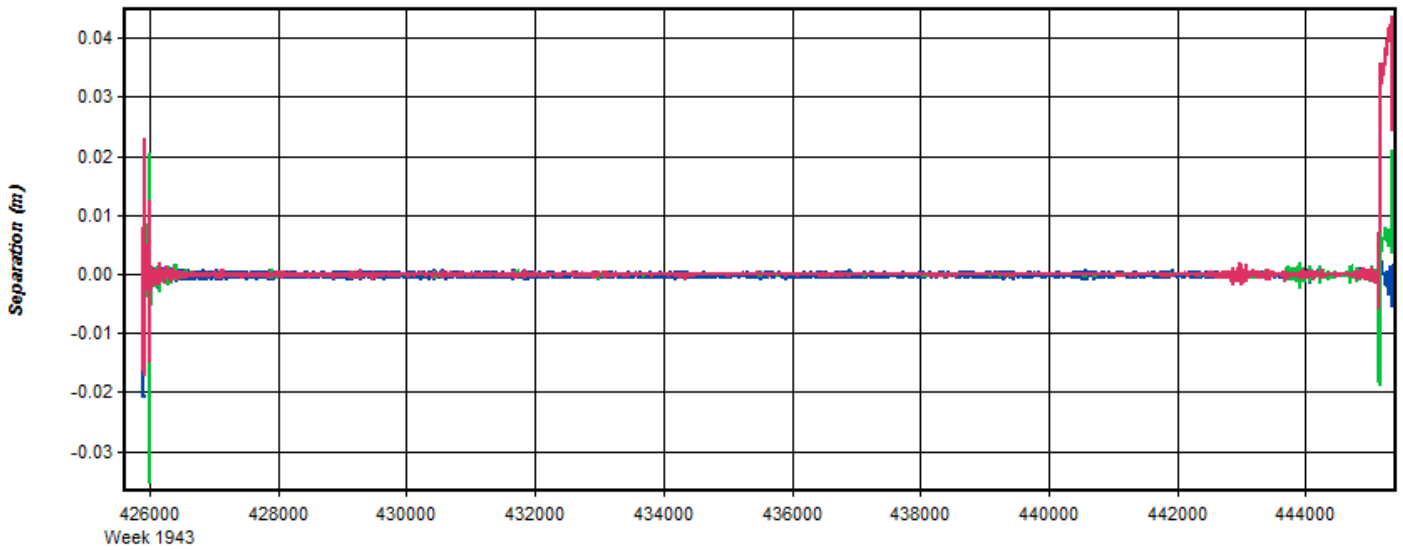
— Roll — Pitch





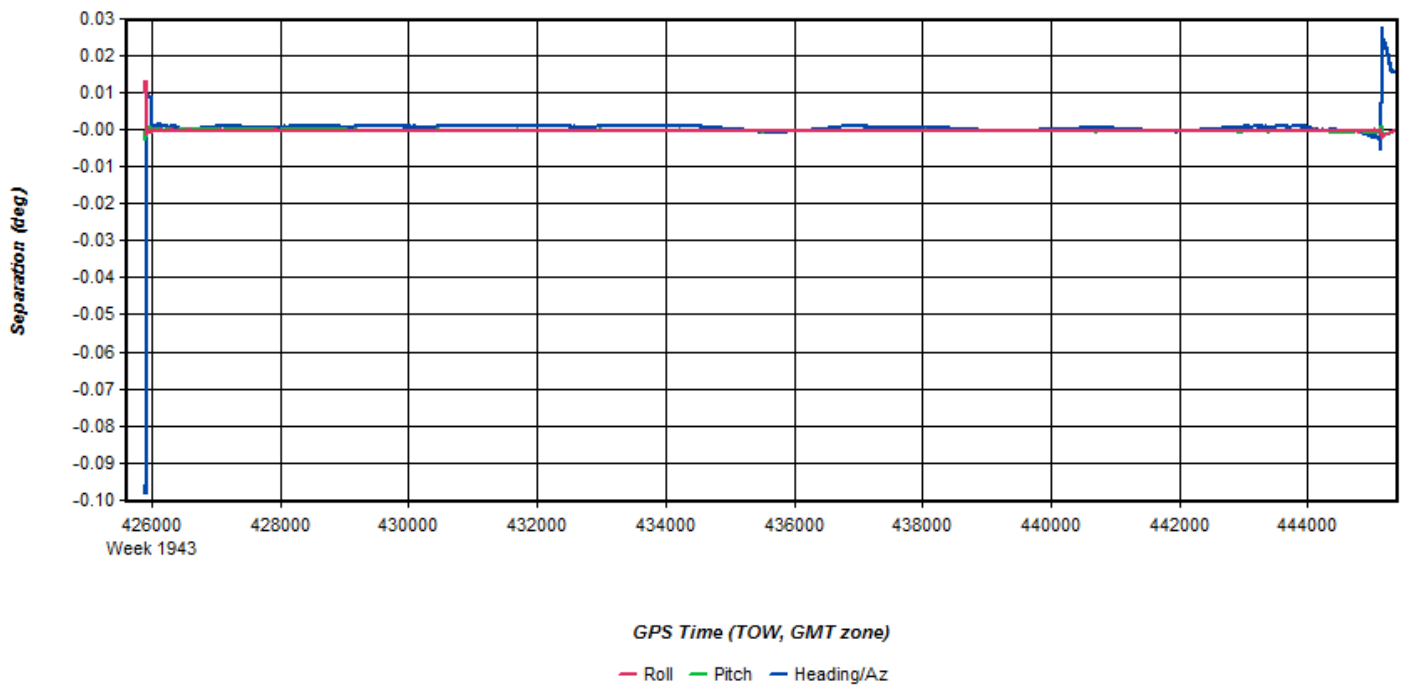
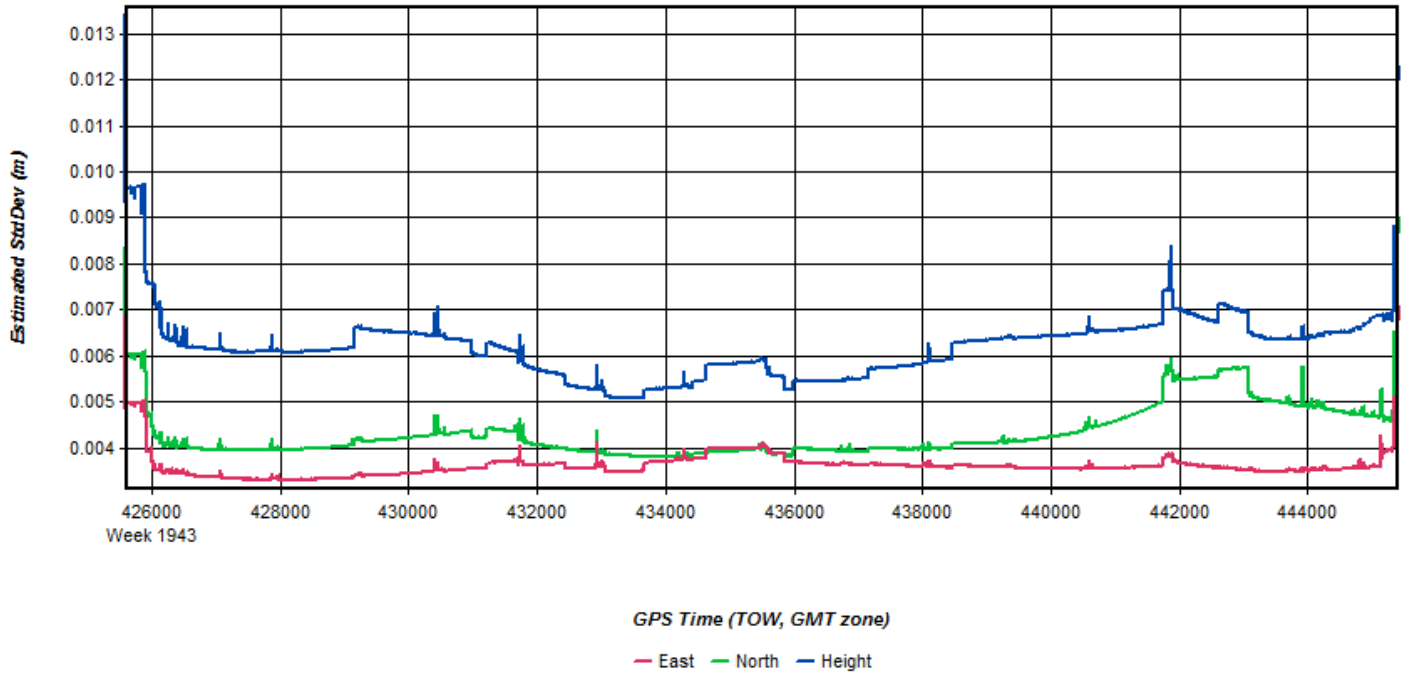
GPS Time (TOW, GMT zone)

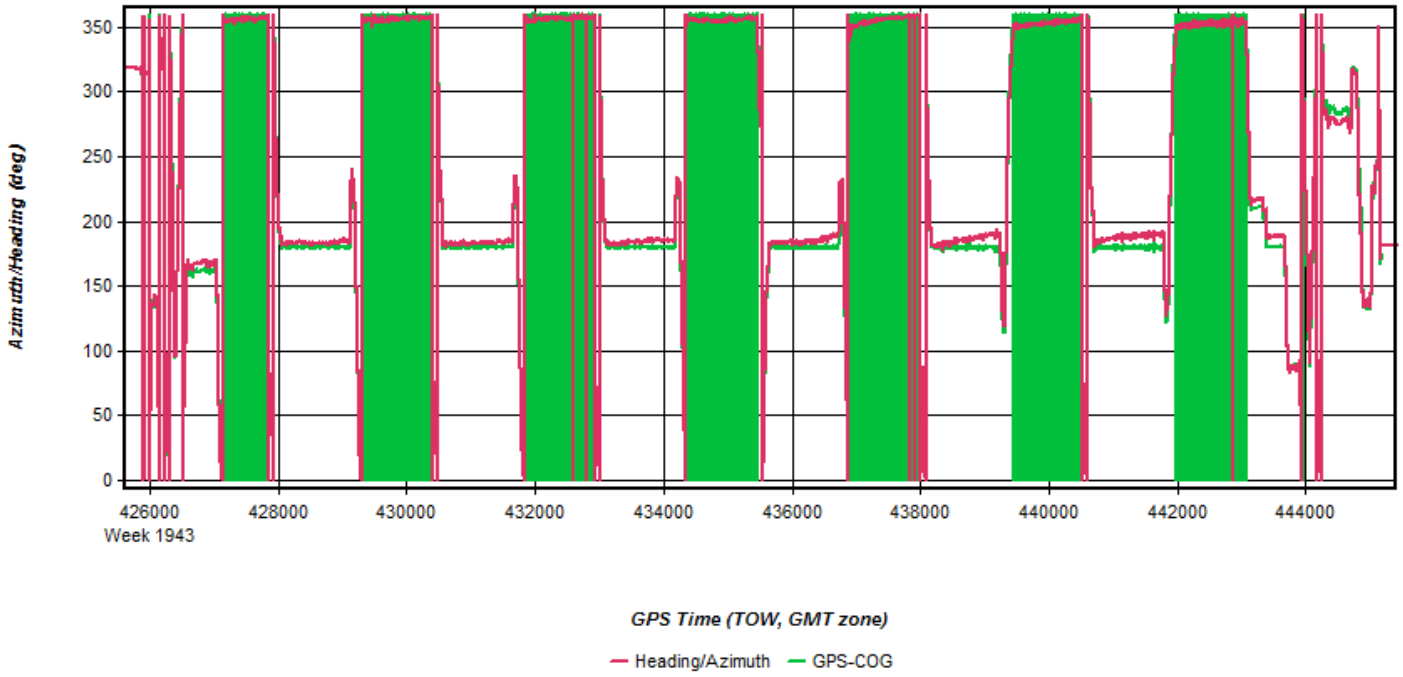
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



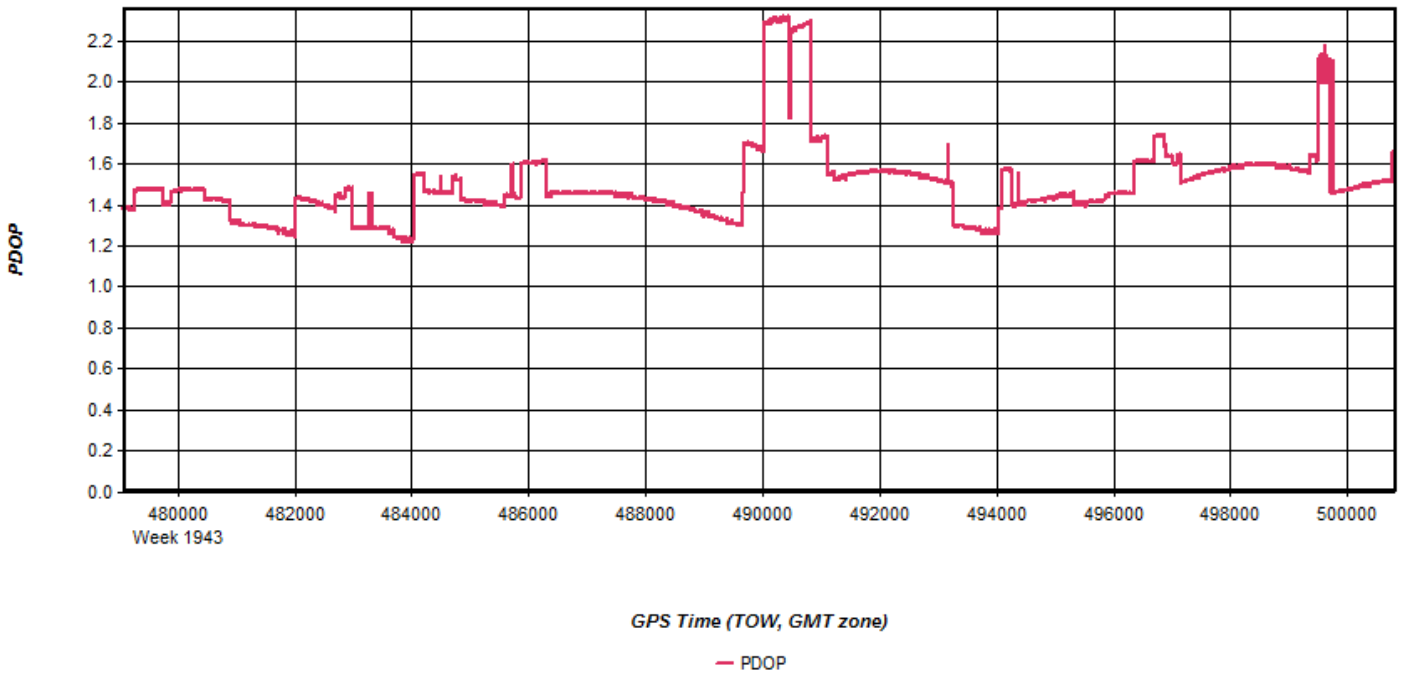
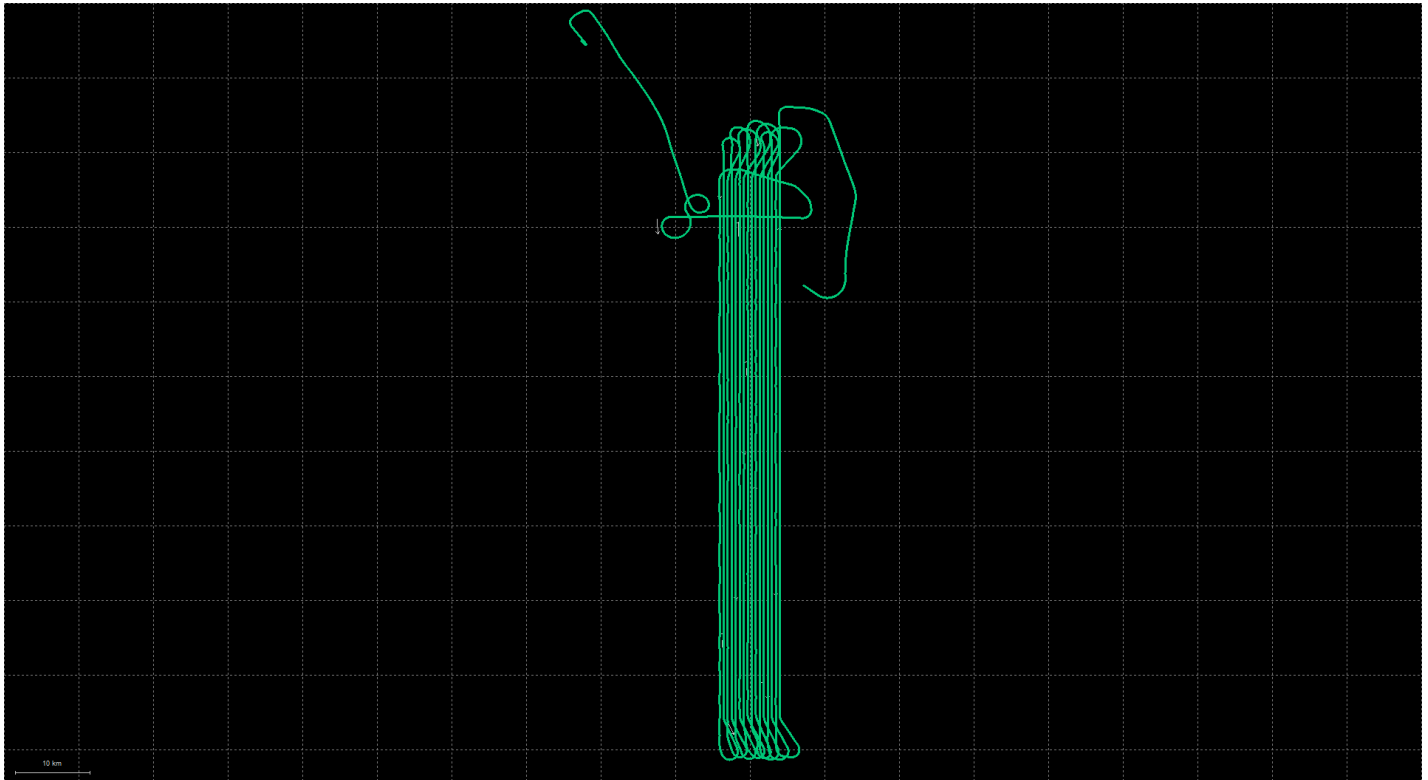
GPS Time (TOW, GMT zone)

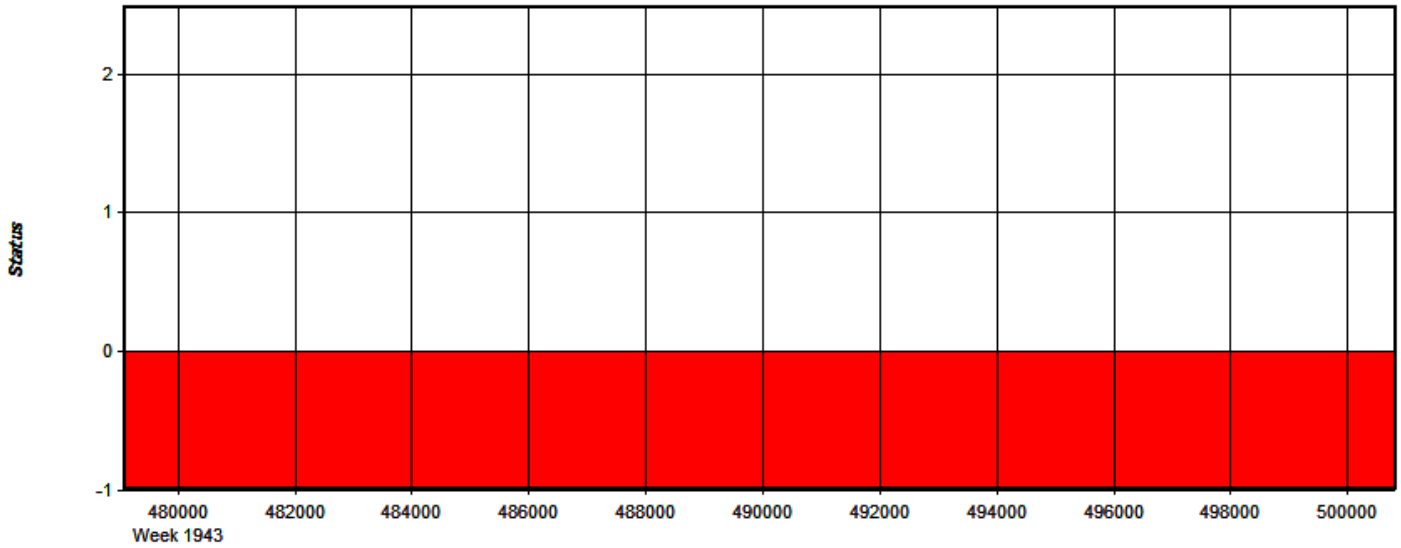
— East — North — Up



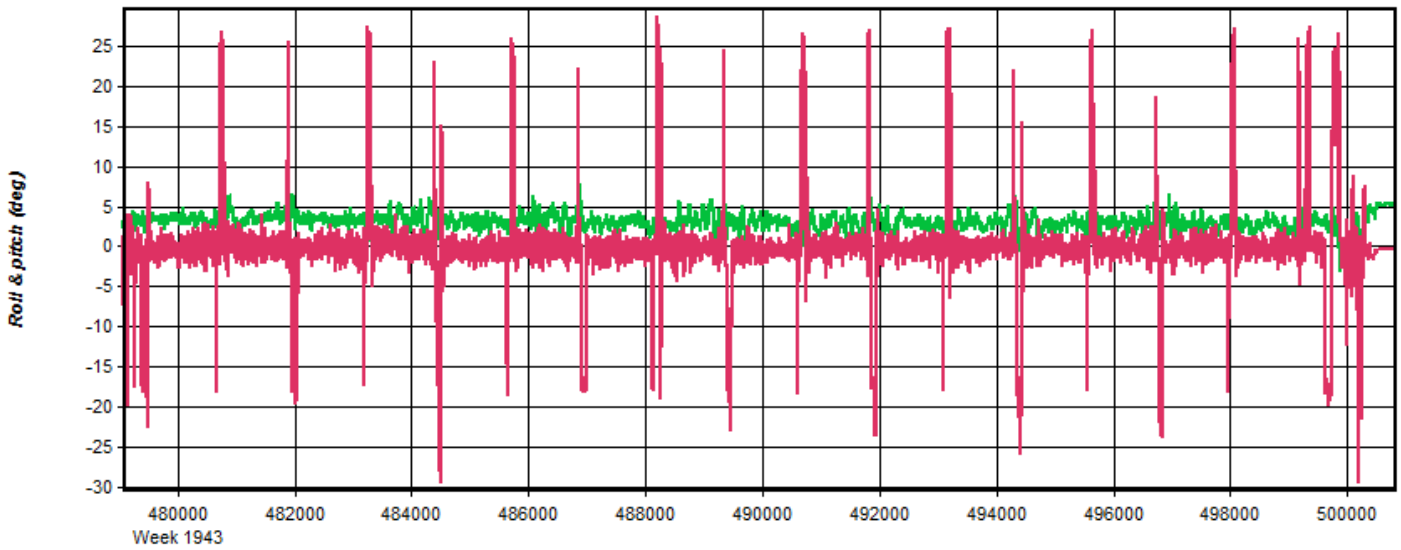


April 7, 2017-A (N246MP, SN8227)

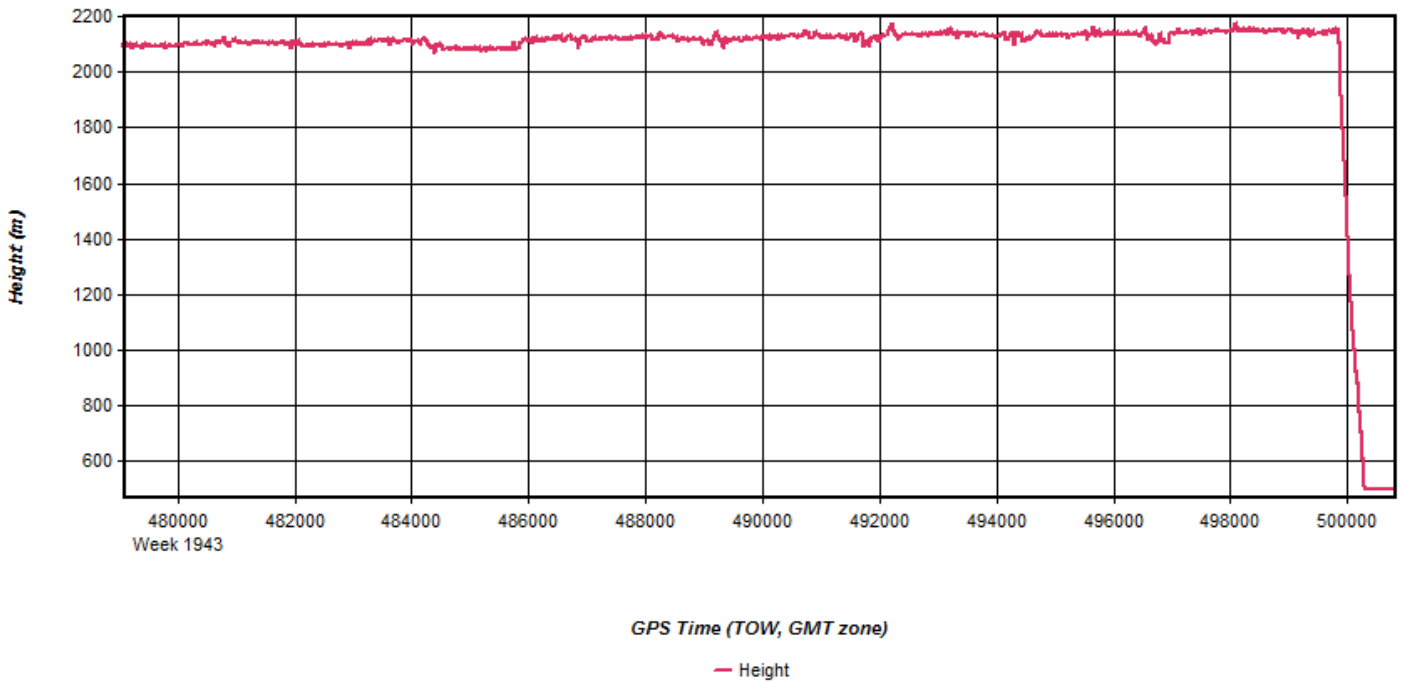
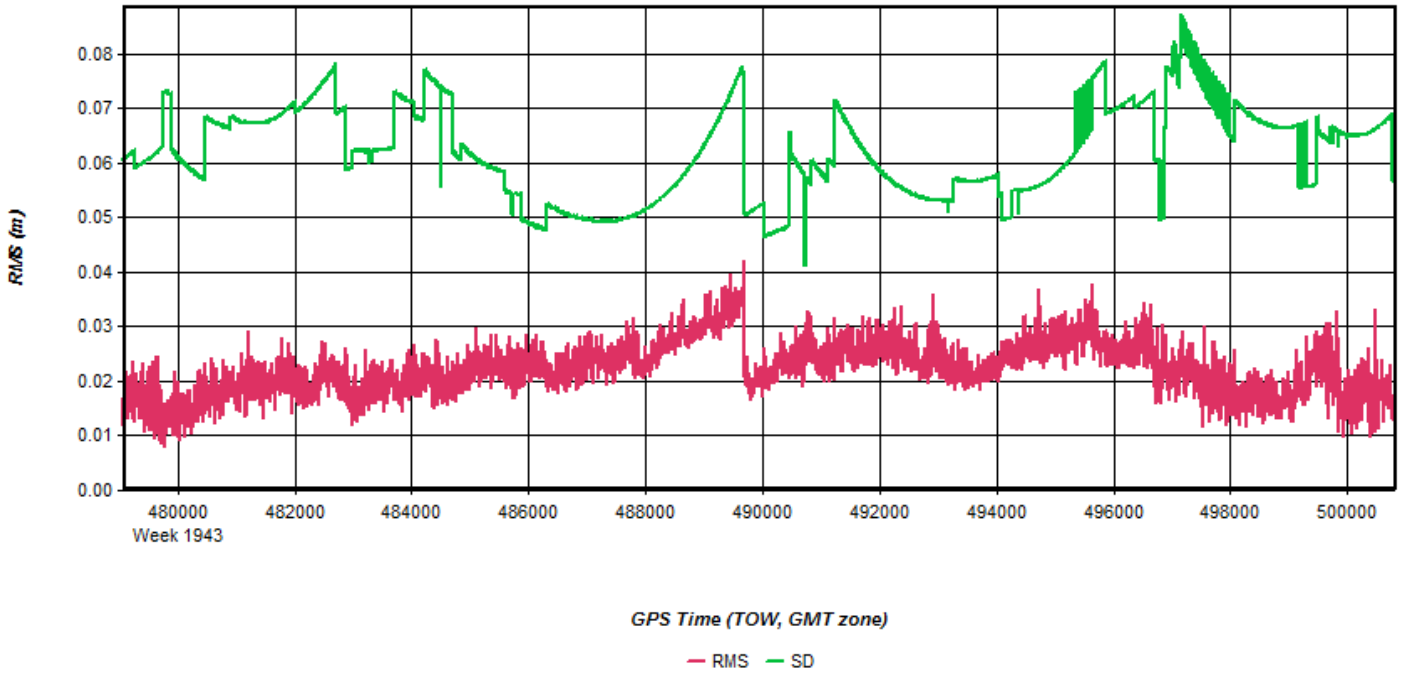


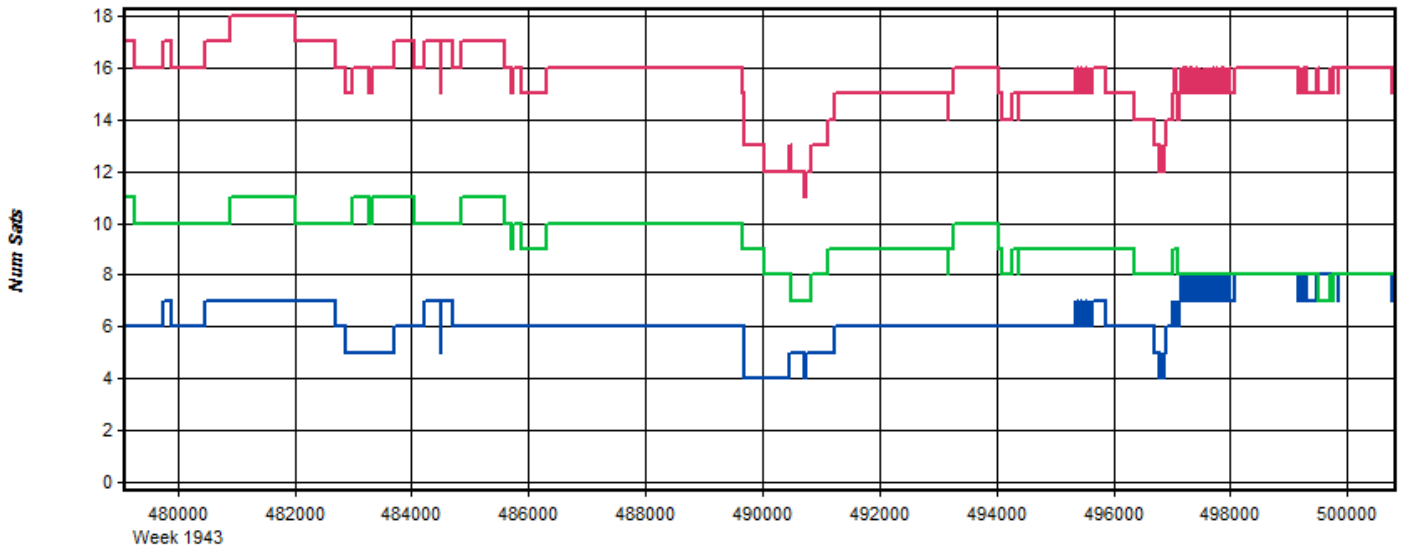


GPS Time (TOW, GMT zone)
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



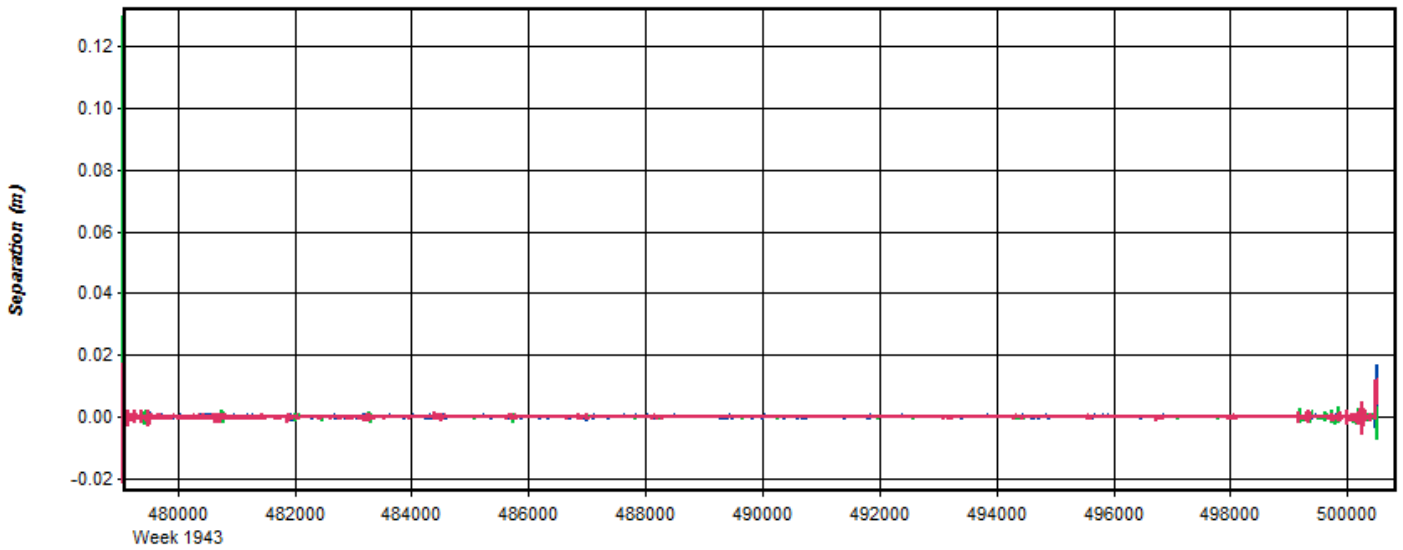
GPS Time (TOW, GMT zone)
— Roll — Pitch





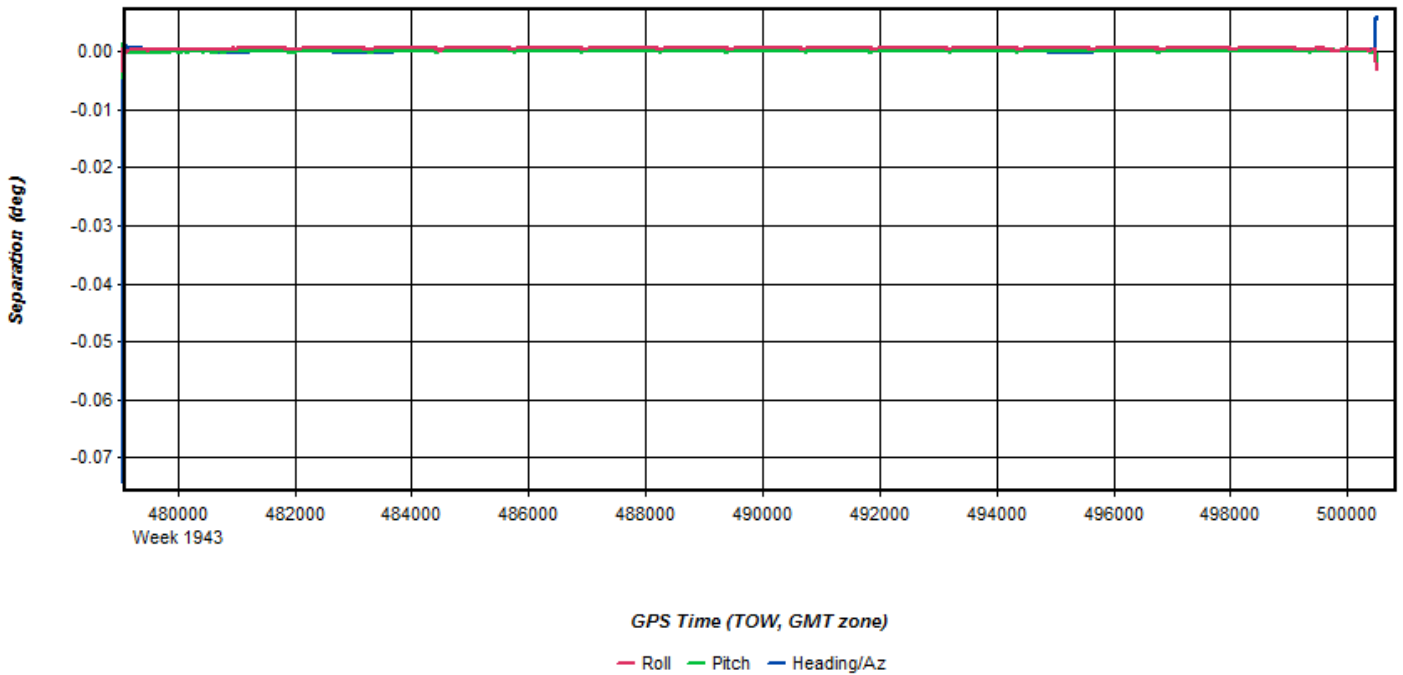
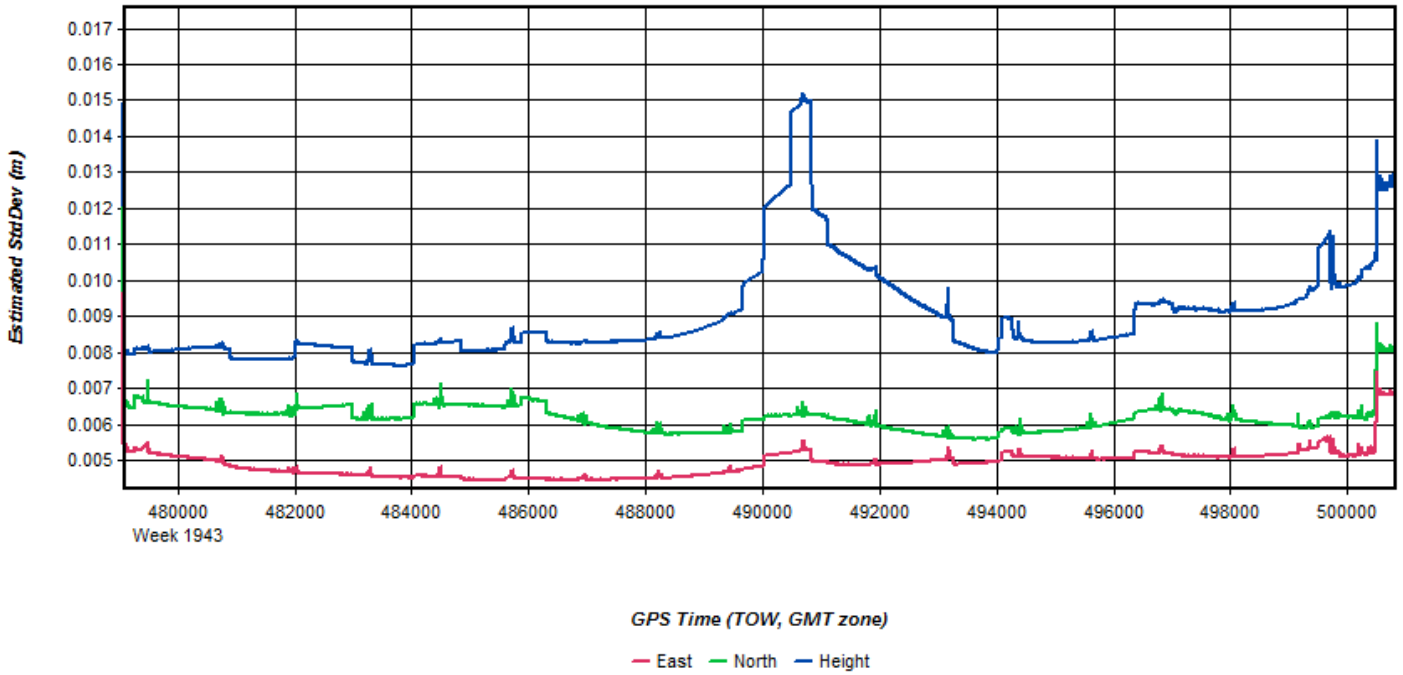
GPS Time (TOW, GMT zone)

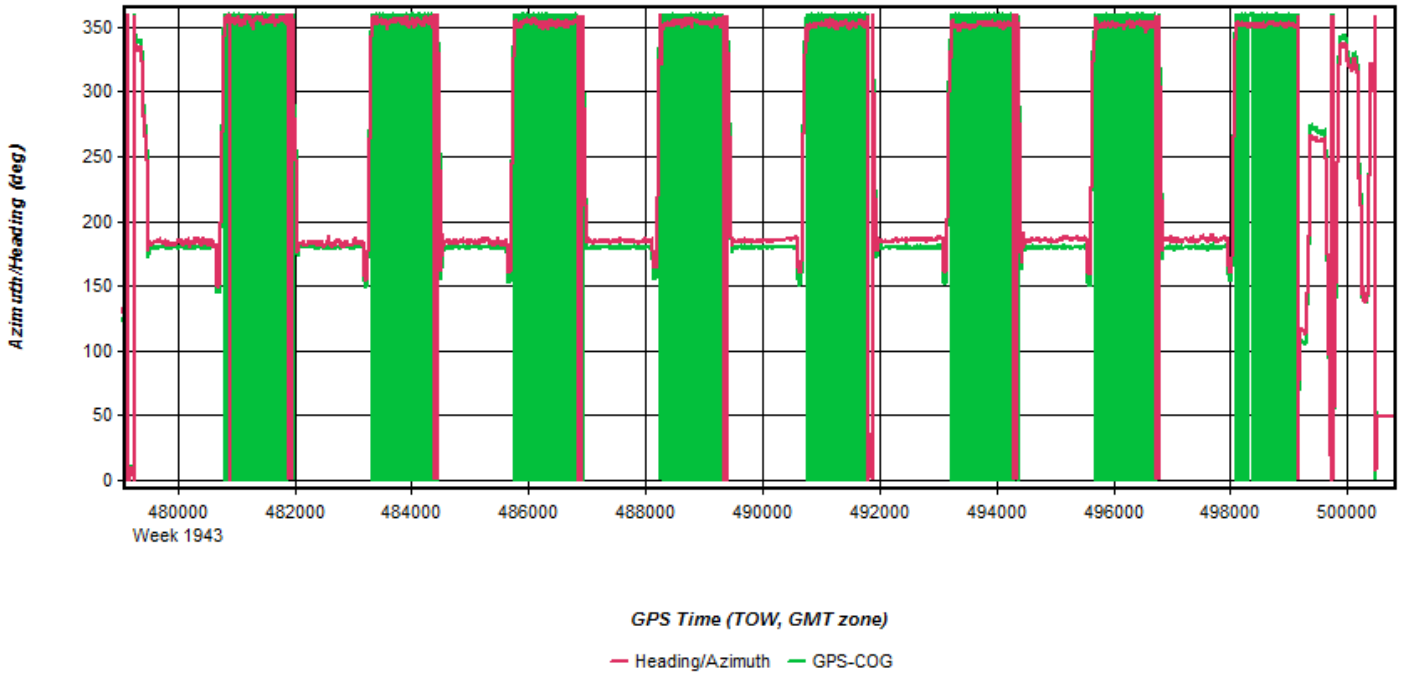
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Alborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc

Date: 4-7-2017
 Project: NRCS SD
 Flight Mgmt File: 30420-SD-ALS80-SN8227
 Aircraft: 246 MP Begin Hobbs: 1383.9 End Hobbs: 1390.7 Total: 6.8 Pilot: JONRS Co-Pilot: Tech: COX
 Dep Apt: PIR Dep Time (Ldt): 7:10 Arr Apt: PIR Arr Time (Local): 2:00 (Z) 19:00 Tot Time Aloft: 6.8
 CORS: Y / N Sta 1: Sta 2: Flyovers: Y / N # Y, times: Sta1) Sta2)
 GPS Unit: Garmin Sta 1: Gnd Pro Sta 2: Flyovers: Y / N # Y, times: Sta1) Sta2)
 Gd Temp beg: 0.5 °C End: °C OAT beg: °C End: °C Altimeter begin: 298.0 end: 296.5
 LIDAR Type: ALS80 Serial #: 8227 Alt AGL: 6900 Max Glagid: 130 Avg Pk Spacing: 1
 FOV: 2.8 Scan Freq: 47.3 Mpsia Y / N: Pulse Rate: 33.2 Power: 100

FLIGHT USE NOTES - stability, clouds, smoke part, etc.
 Static Start 12:03-12:08
 ALS Error - Fig 85 12:20
 System Restart
 System Restart
 Choppily Windy
 Figs 18:48
 Static Stop
 19:02 - 19:07

Line #	Hdg	Start/UTC	End/UTC	Alt Spd	Position	GPS Altitude	Crab	Task
202	174	17:25		134	1° 23'	6869		2
202	174	12:54		136	1° 21'	6870		2
202	174	13:13	1330	131	1° 23'	6881		2
201	354	13:34	1350	129	1° 23'	6885		2
200	174	13:55	1412	131	1° 21'	6882		2
199	354	14:48	1432	138	1° 23'	6945		2
198	174	14:36	1453	129	1° 22'	6847		2
197	345	14:56	1513	136	1° 20'	6857		2
196	174	15:17	1534	131	1° 18'	6977		2
195	354	15:38	1554	129	1° 17'	6969		2
194	174	15:59	1616	132	1° 18'	6962		2
193	354	16:19	1636	130	1° 18'	6967		2
192	174	16:40	1657	131	1° 18'	7000		2
191	354	17:01	1717	133	1° 18'	7044		2
190	174	17:21	1738	131	1° 20'	6958		2
189	354	17:42	1758	138	1° 19'	7061		2

Total Proj Lines: 16 Lines Remains: 0
 Offline Time: 6:15 High Time: 1:30 Notes:

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

(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 4-7-2017
 UIC: B C D E
 by: J. A. I.

Project: NRCS SD
 Flight Mgmt File: 30420-SD - AL580-SA8227
 Tech: COX

Aircraft: 246MP
 Begin Hobbs: 1383.9
 End Hobbs: 30420
 Pilot: Jones
 Co-Pilot:

Dep Apt: PIR
 Dep Time (Lcl): 7:10 (Z): 12:10
 Arr Apt: PIR
 Arr Time (Local): (Z):
 Tot Time Aloft:

CORS: Y / N Sta 1:
 Y / N Sta 2:

Flyovers: Y / N If Y, times: Sta 1
 Y / N If Y, times: Sta 2

Gd Temp beg: °C End: °C OAT beg: °C End: °C
 Alt: AMSL 6900
 Avg Terr: 130
 Max Gdspd: Power 100
 Pulse Rate: 332

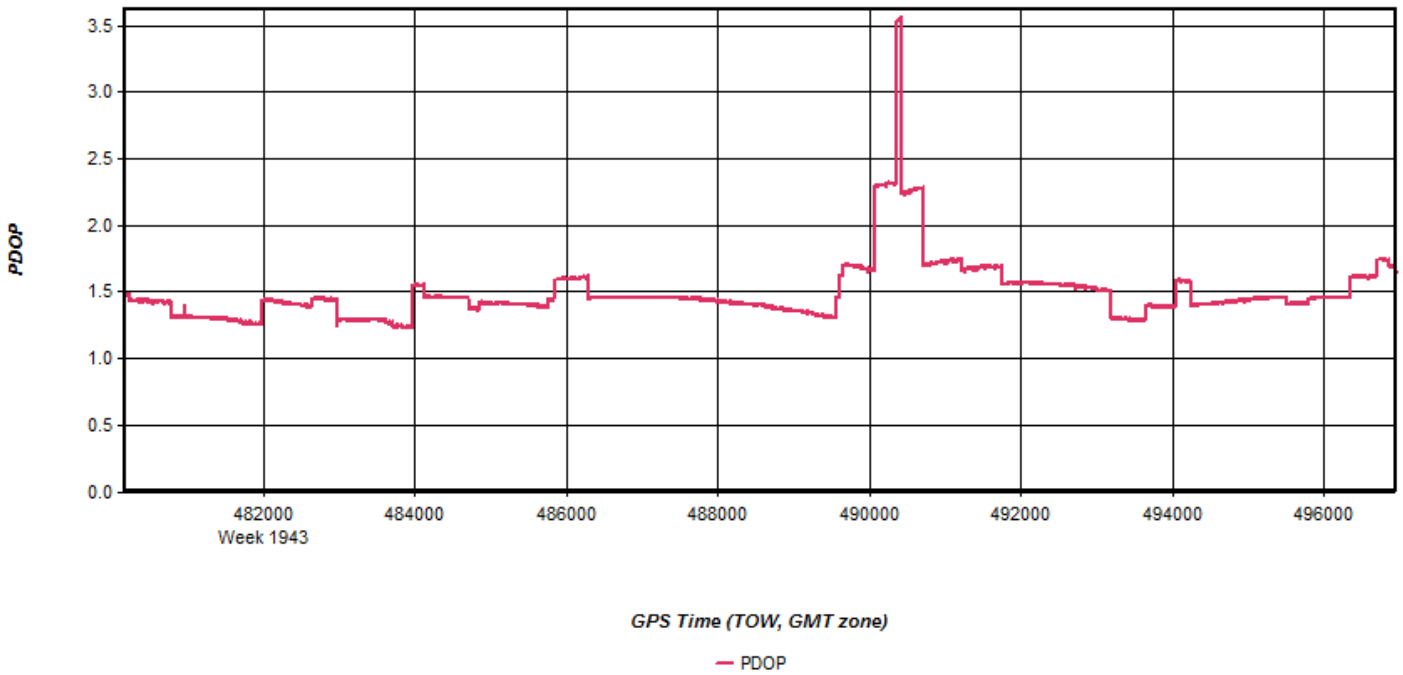
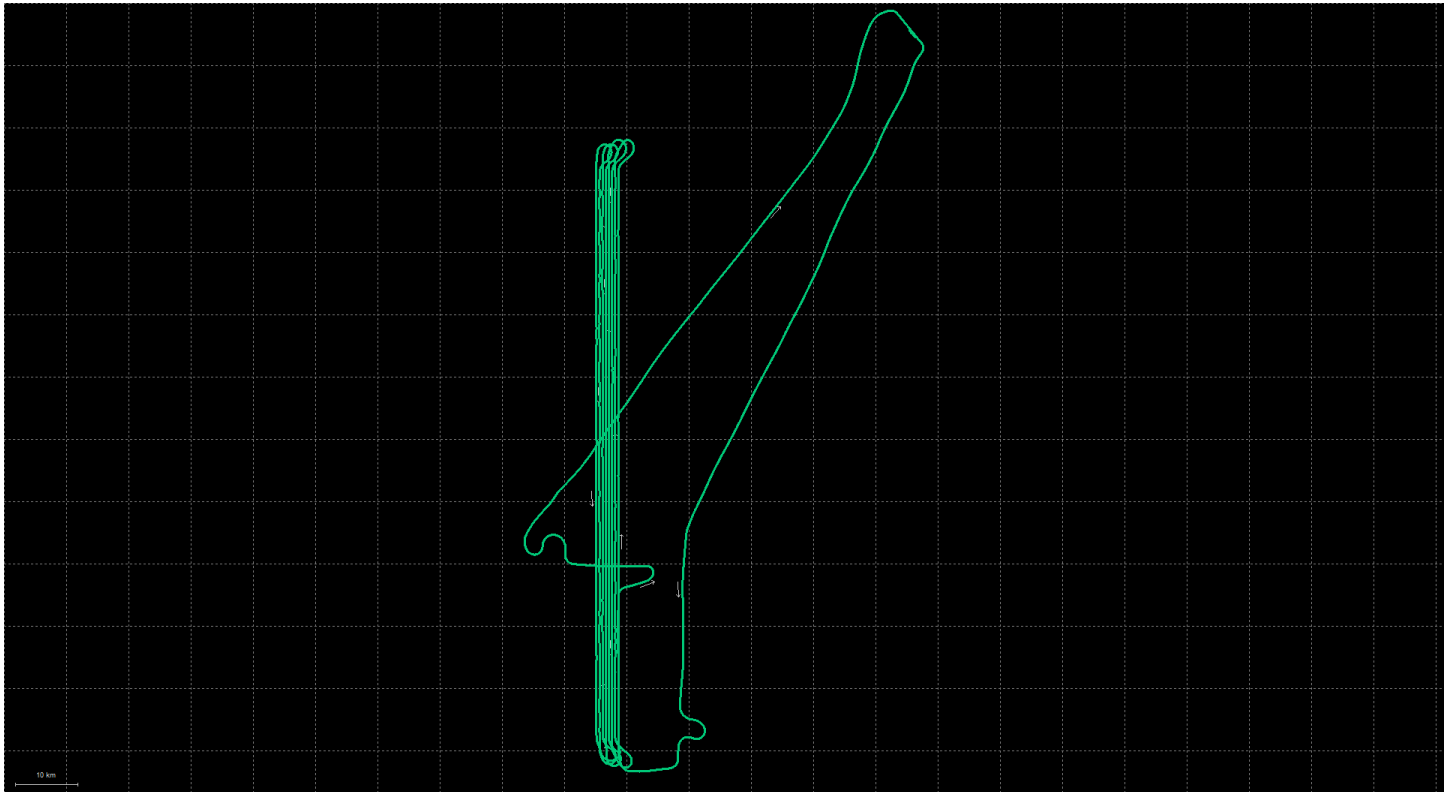
LIDAR
 Type: AL580
 Serial #: 8227
 Alt AGL: 47.3
 MplA Y / N
 Scan Freq: 20

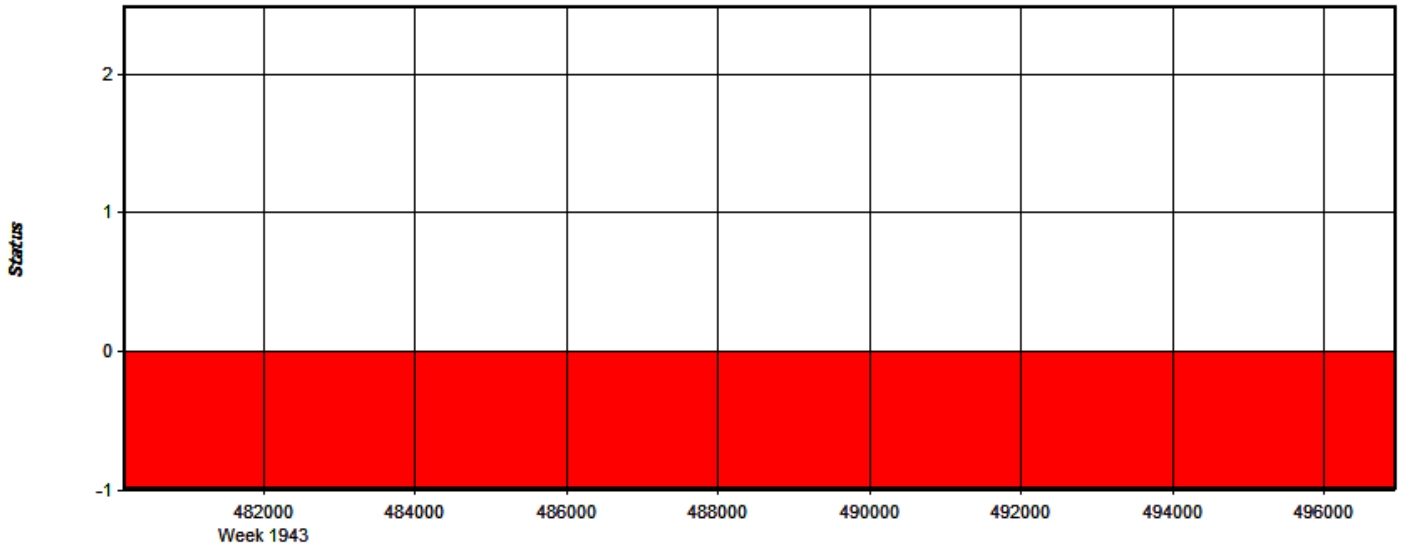
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	Pool/Stat	GPS Altitude	Crab	Turb (0..9)	Notes
188	174	1801	1819	132	1.19	6922	2	2	Choppy Windy
187	354	1822	1838	133	1.37	7044	2	2	unplanned X line
66001	266	1842	1846	134	1.190	7050	1	1	

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

Total Proj Lines: 16
 Lines Flown: 16
 Lines Remain: 0
 Online Time: 6:15
 Mob Time: 30
 Notes:

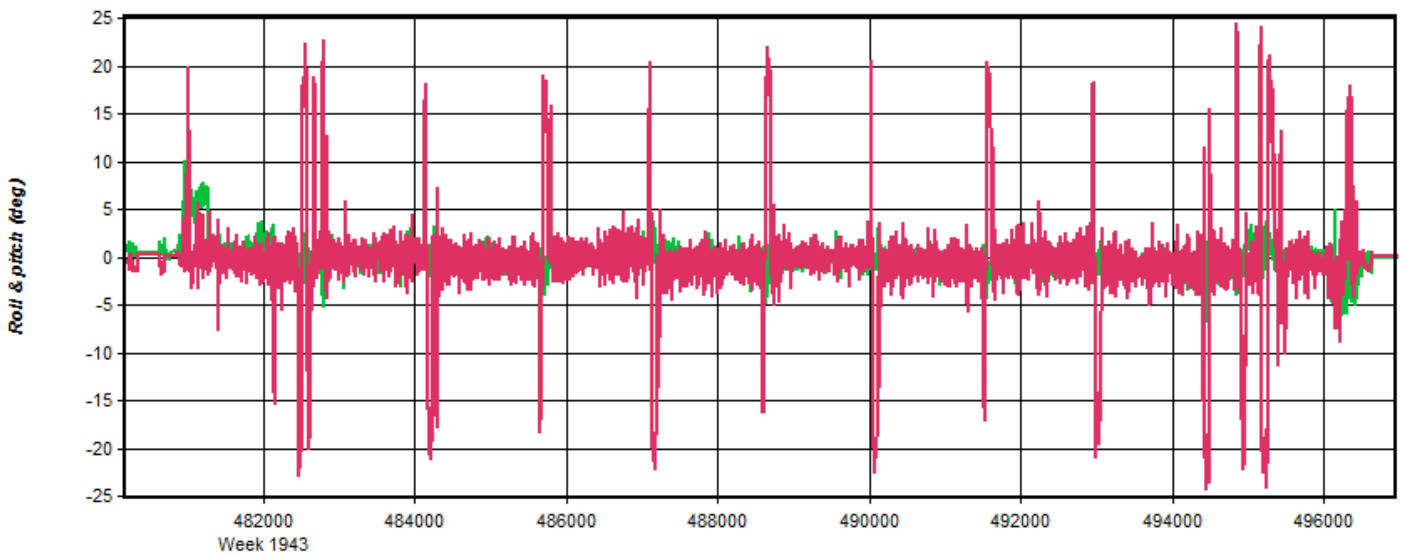
April 7, 2017-A (N73TM, SN7178)





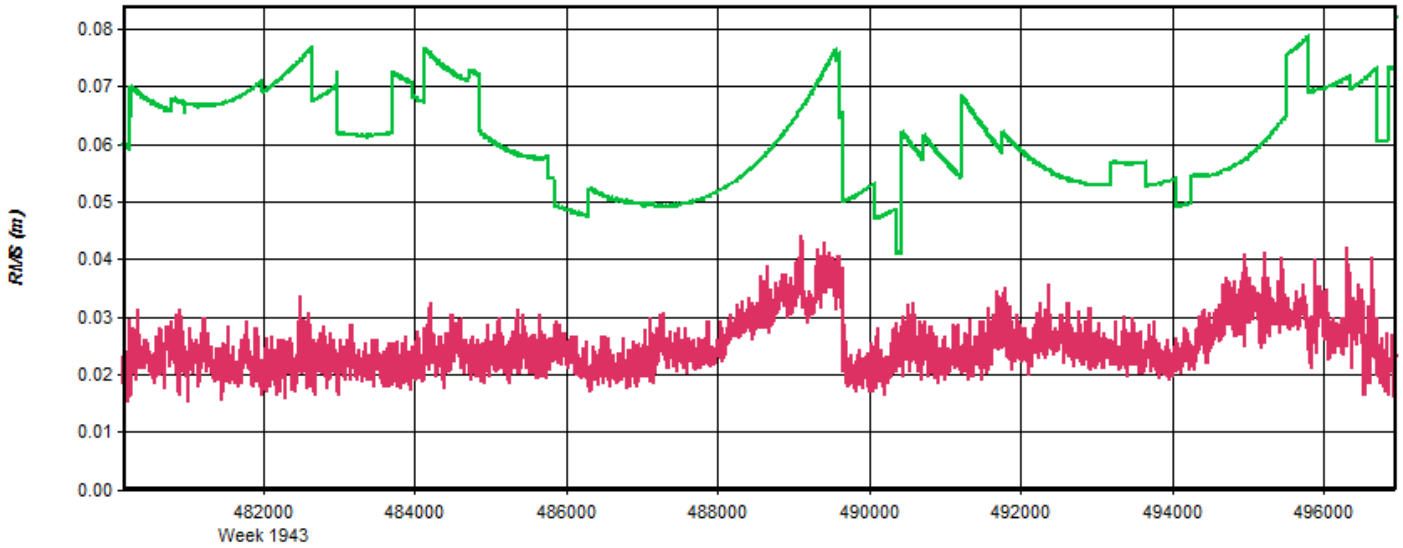
GPS Time (TOW, GMT zone)

— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



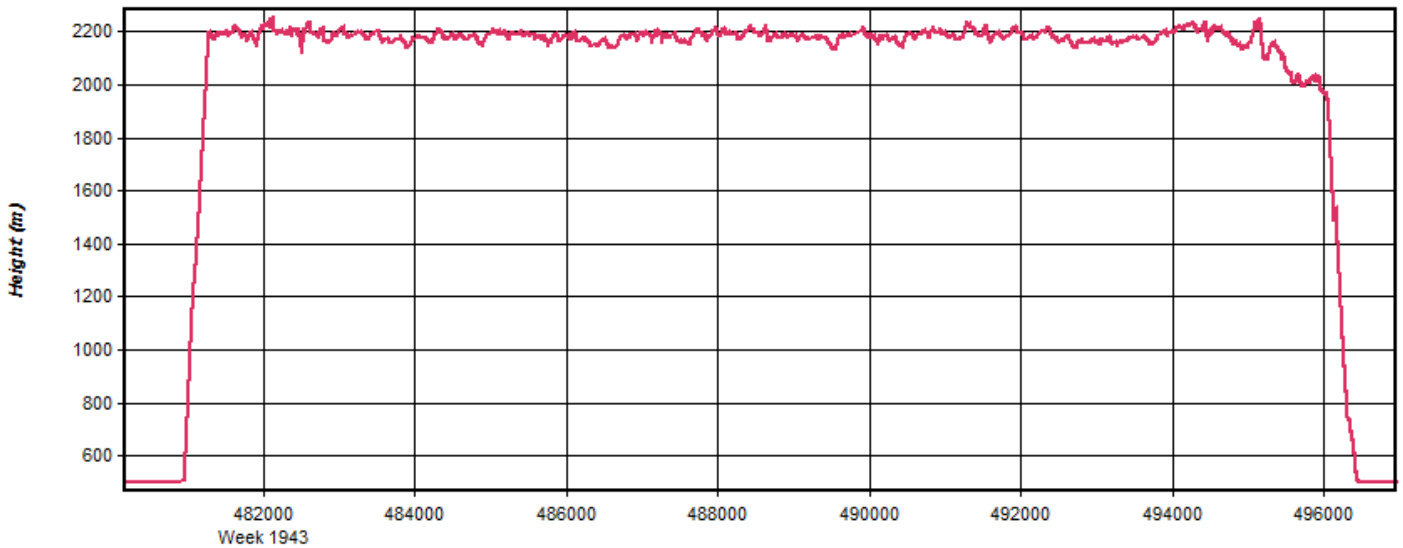
GPS Time (TOW, GMT zone)

— Roll — Pitch



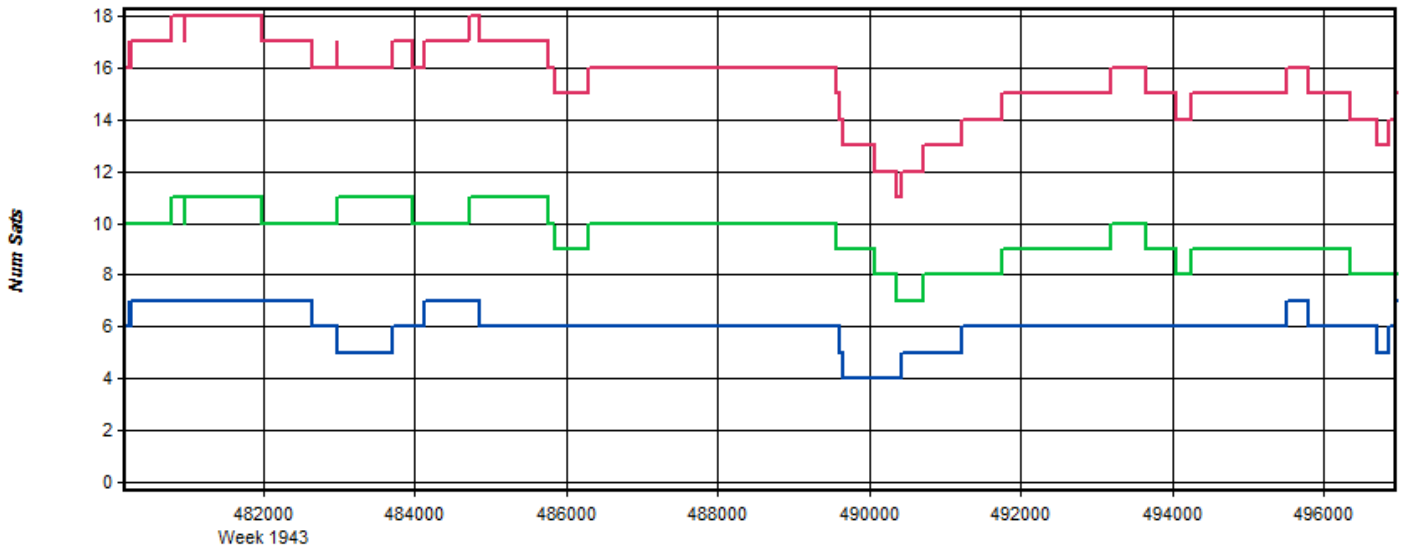
GPS Time (TOW, GMT zone)

— RMS — SD



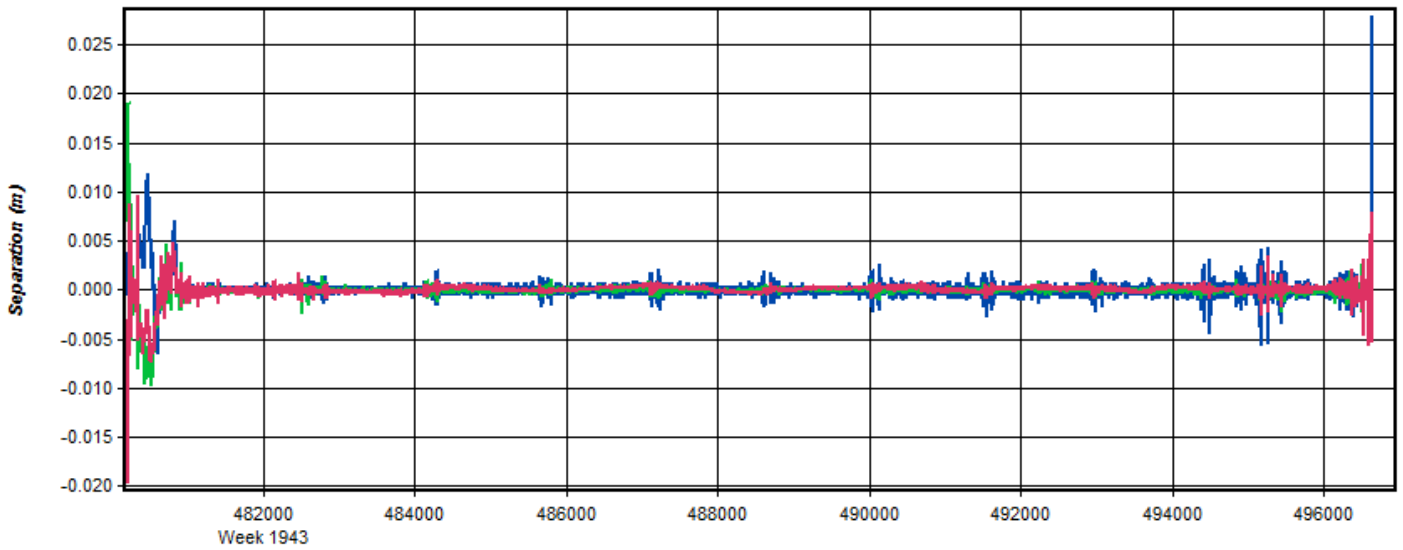
GPS Time (TOW, GMT zone)

— Height



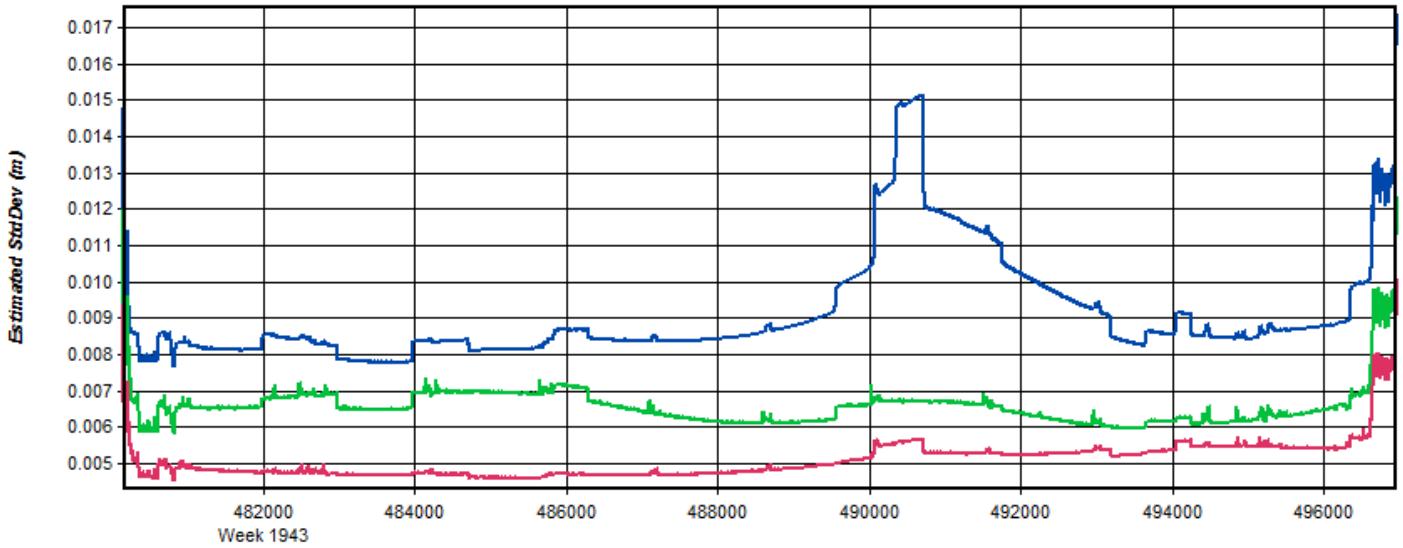
GPS Time (TOW, GMT zone)

— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS

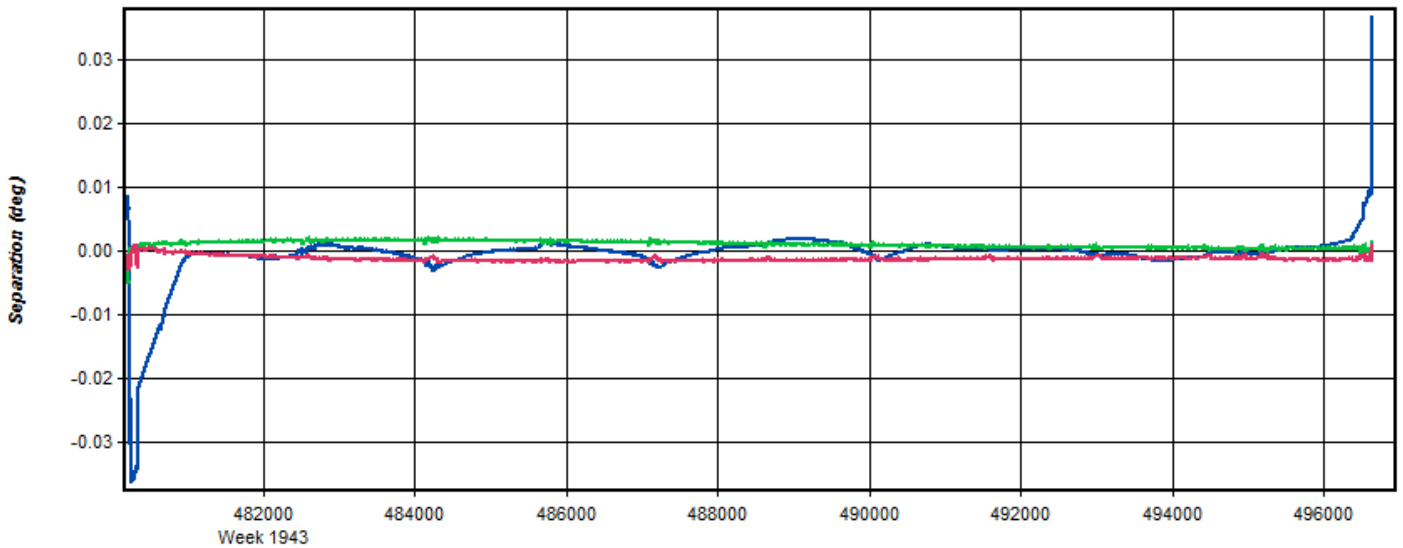


GPS Time (TOW, GMT zone)

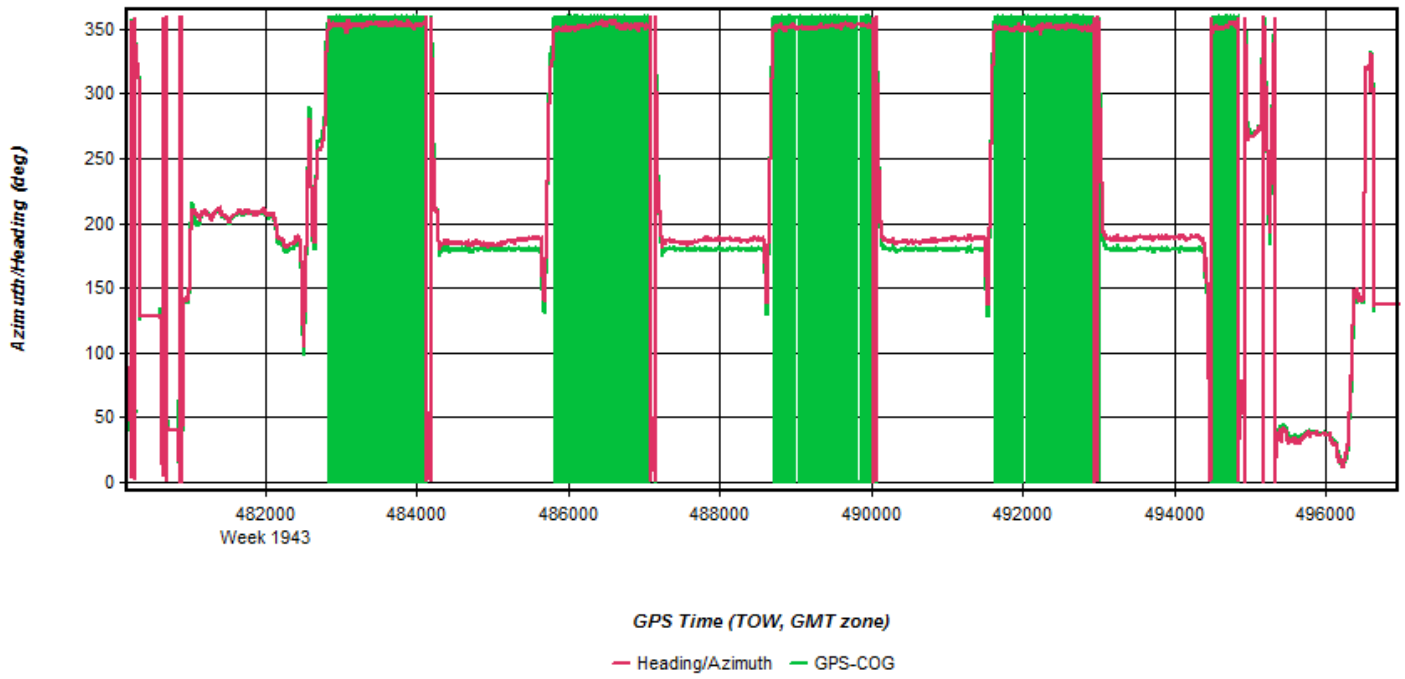
— East — North — Up



GPS Time (TOW, GMT zone)
— East — North — Height



GPS Time (TOW, GMT zone)
— Roll — Pitch — Heading/Az



Flight Log

Q Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc Date: 4/7/2017

(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: SD-USGS-LIDAR Proj #: 30420 Flight Mgmt File: 30420-SD-ALS70SP3

Aircraft: N73TM Begin Hobbs: 6622.2 End Hobbs: 6626.5 Total: 4.3 Pilot: John Durham Co-Pilot: Tech: Greg Turo

Dep Apt: KPIR Dep Time (Local): 8:32 (Z: 13:32) Arr Apt: KPIR Arr Time (Local): 12:54 (Z: 17:54) Tot Time Aloft: 3:22

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

GPS Unit: (Y) N Sta 1: SD-USGS-01 Sta 2: SD-USGS-02 Flyovers: (Y) N If Y, times: Sta1) 13:52 Sta2) 13:52 02

Gd Temp beg: 06 °C End: °C OAT beg: °C End: °C Altimeter begin: 29.85 end: 29.68

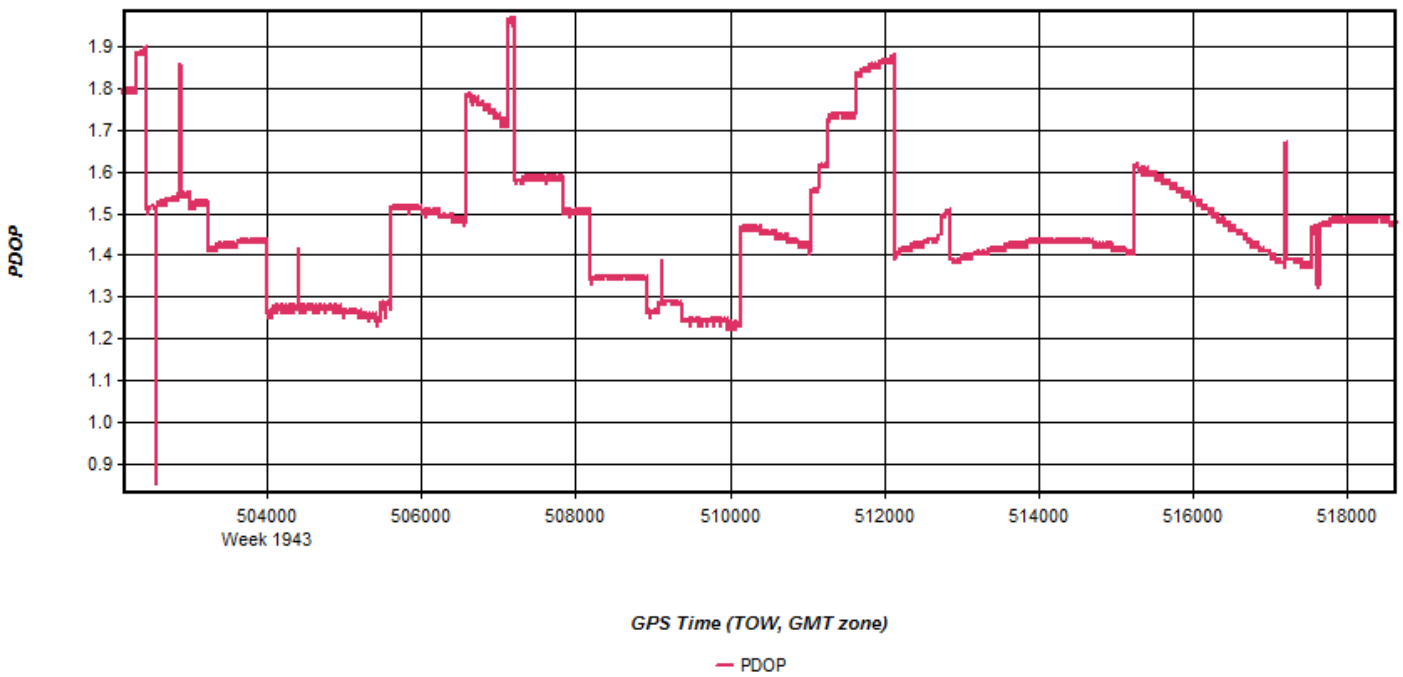
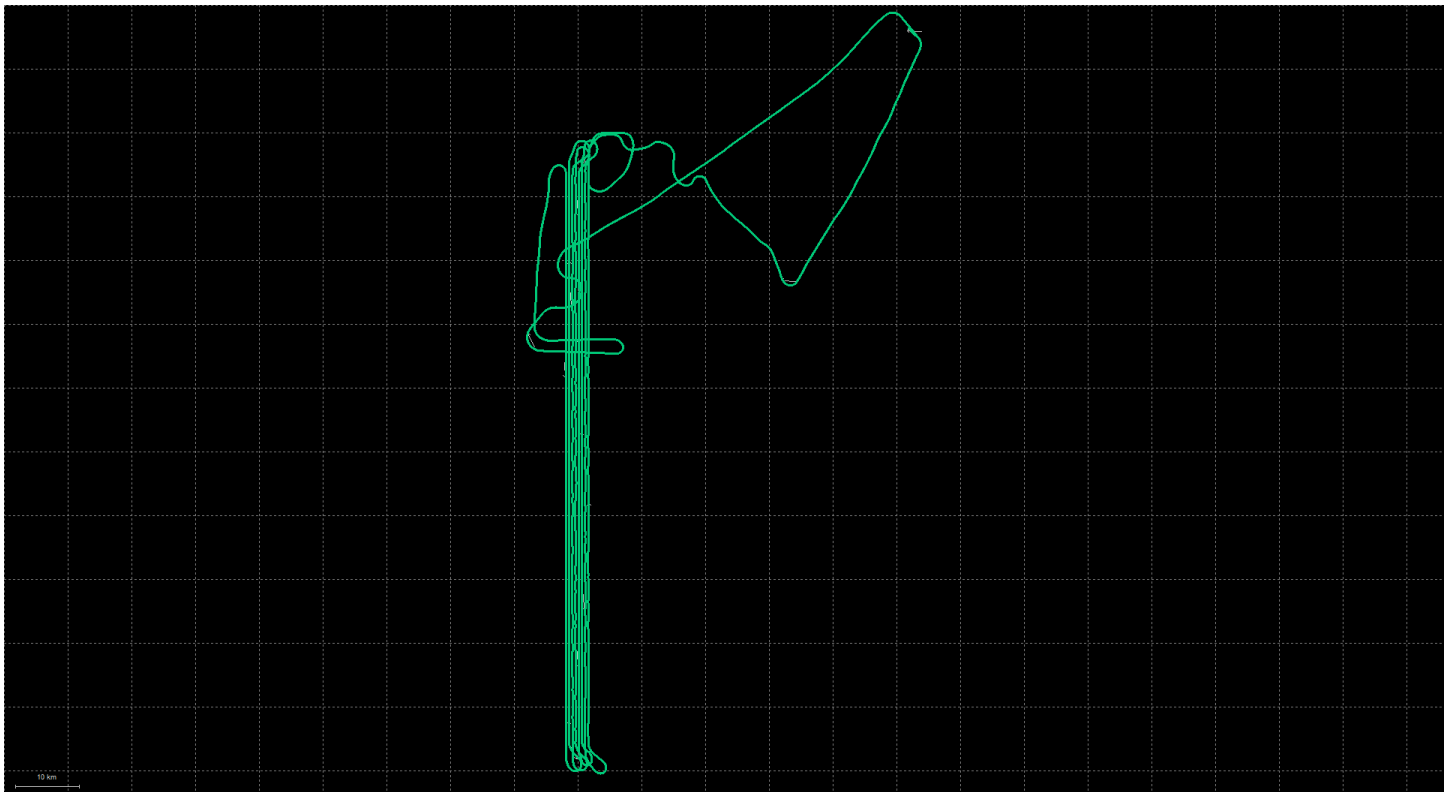
LIDAR	Type	ALS70	Serial #	7178	Alt AGL	3600	Alt AMSL	7200'	Avg Terr Ht	2600'	Plan Ceiling	130kts	Avg Pt Spacing		Mag	5	Storage Name/ID	SSD
	FOV	28°	Scan Freq	611 Hz	MplA	Y/N	Pulses In Air	2	Pulse Rate	328.6	Power	100%	PPSM	4	End of	85	Ter	03

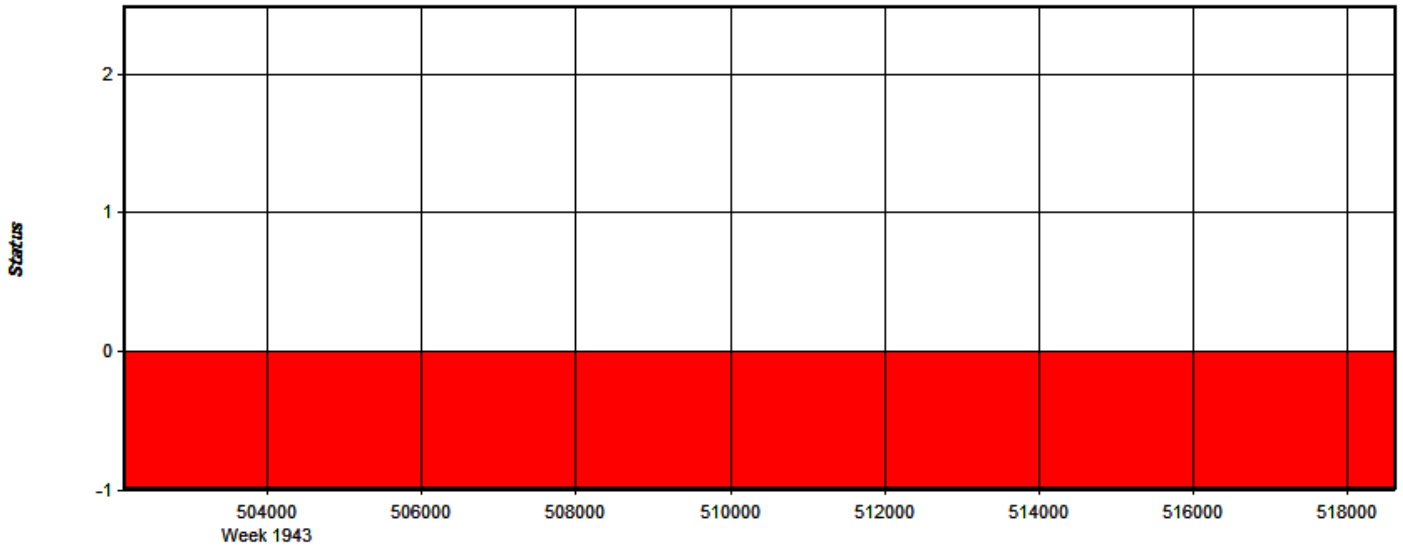
Line #	Hdg	Start (UTC)	End (UTC)	Od Spd	FOF/Fine	GPS Altitude	Crab	Yurb	Roll	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
		13:50	13:55	151		7300'				flyover of Base SD-USGS-01
		14:00	14:04							S turn
759-	N	14:08	14:29	135	1/20	7200'	0	0		no ranges shown in Flight Mode? 450' drift to west 9.5 nm FSE, 140kts end. 29kt tailwind
758-	S	14:32	14:54	123	1/20	7200'	0	0		
757-	N	14:57	15:18	126	1.1/20	7200'	0	0		
756-	S	15:21	15:47	130	1.2/17	7200'	0	0		ranges reappeared after disabling eye safety
755-	N	15:45	16:07	139	1.3/16	7200'	0	0		
754-	S	16:09	16:31	126	1/19	7200'	0	-		
753-	N	16:34	16:56	136	1.3/16	7200'	0	0		285' to west drift 25 nm FSE
752-	S	16:58	17:20	132	1.1/18	7200'	0	0		
759R	N	17:22	17:27	130	1.1/18	7200'	0	0		Roll of 1st 13 nm of south end
U2001	W	17:29	17:32	136		7300'				Laser is shutter warning contained w/ XTIE
		17:32	17:36							Closest S turn

Total Proj Lines: Lines Flown: 8 Lines Remains: Online Time: 2.6 Mob Time: .7 Notes: Flight line 1XX renamed to 7XX to designate ALS70 line

Scanned by CamScanner

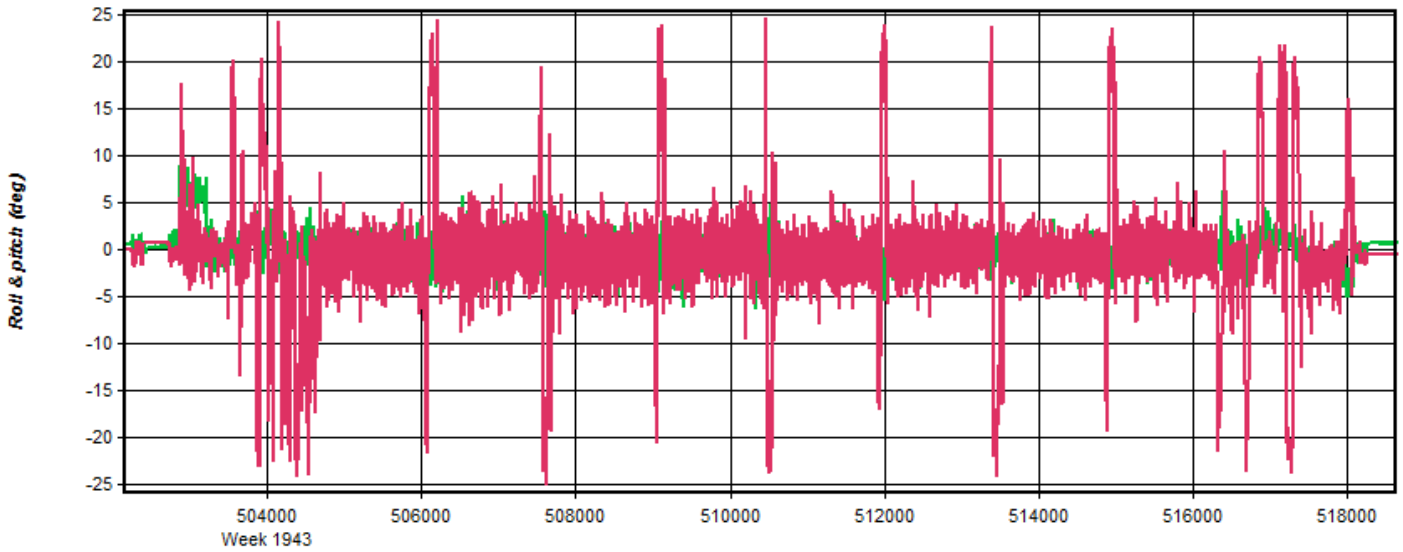
April 7, 2017-B (N73TM, SN7178)





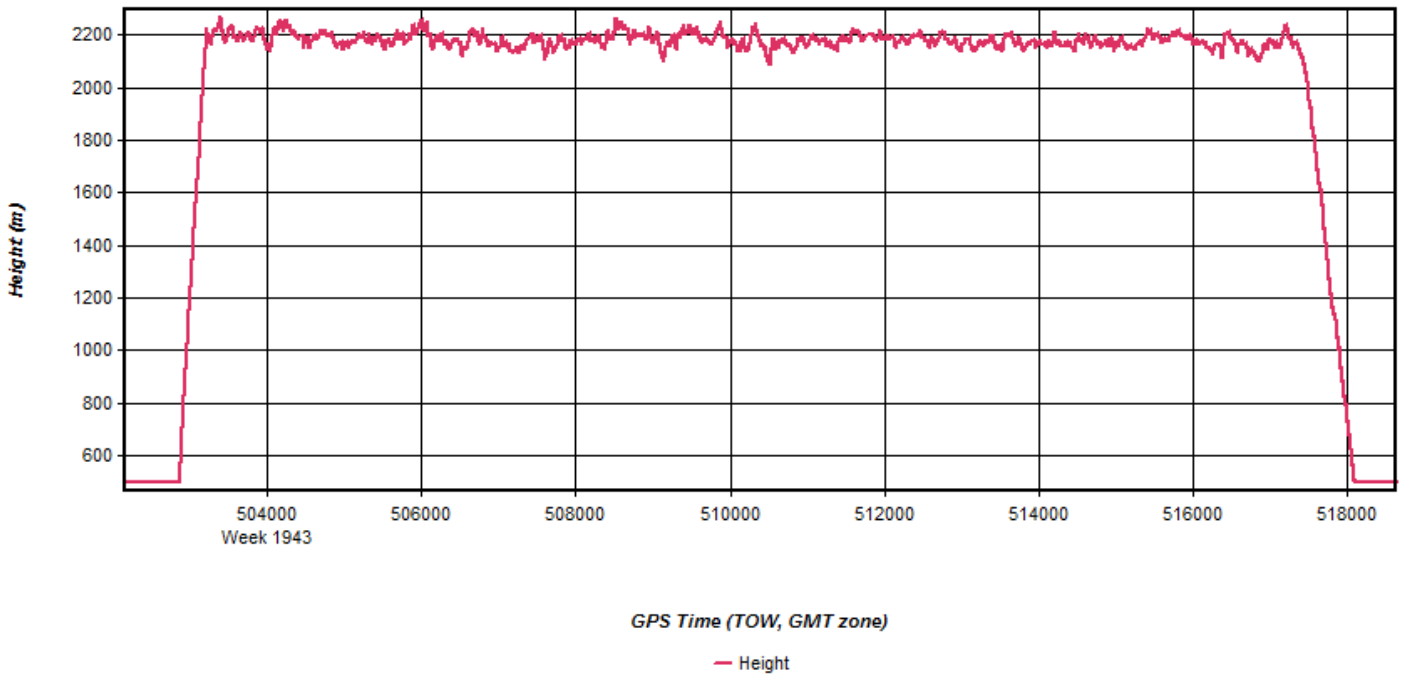
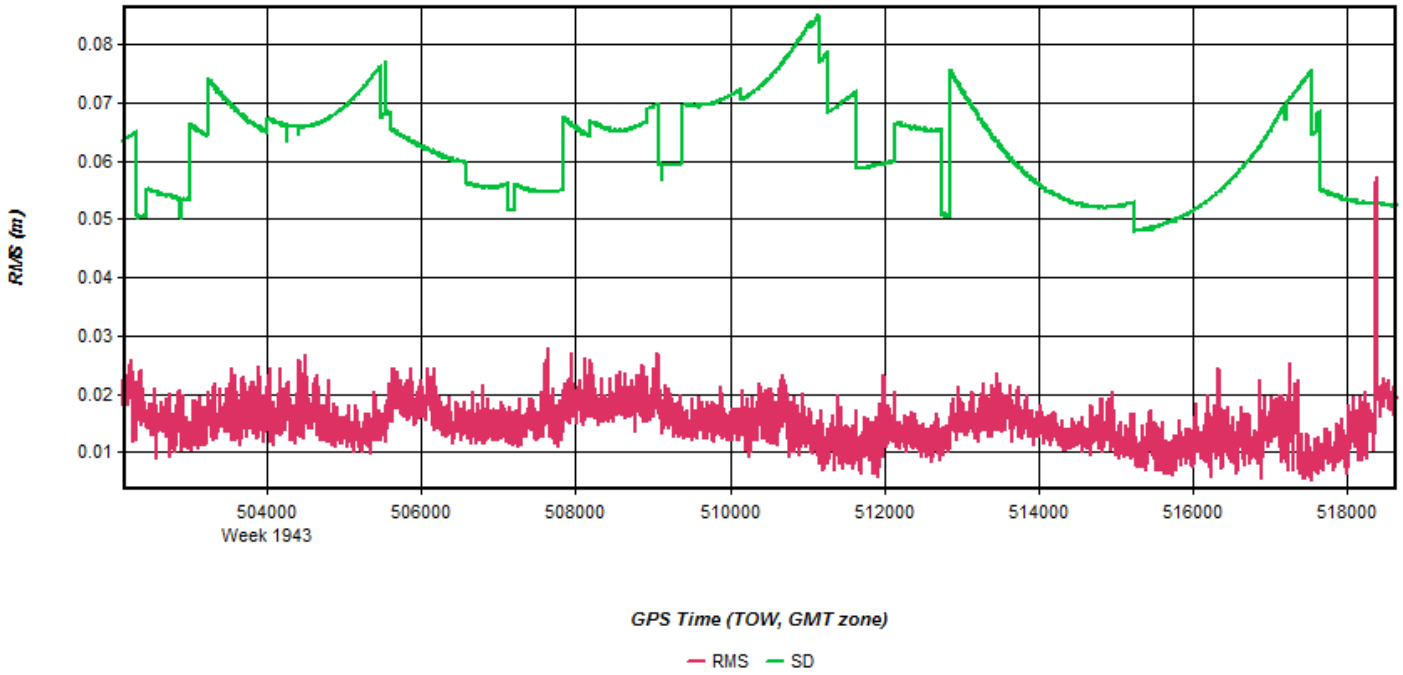
GPS Time (TOW, GMT zone)

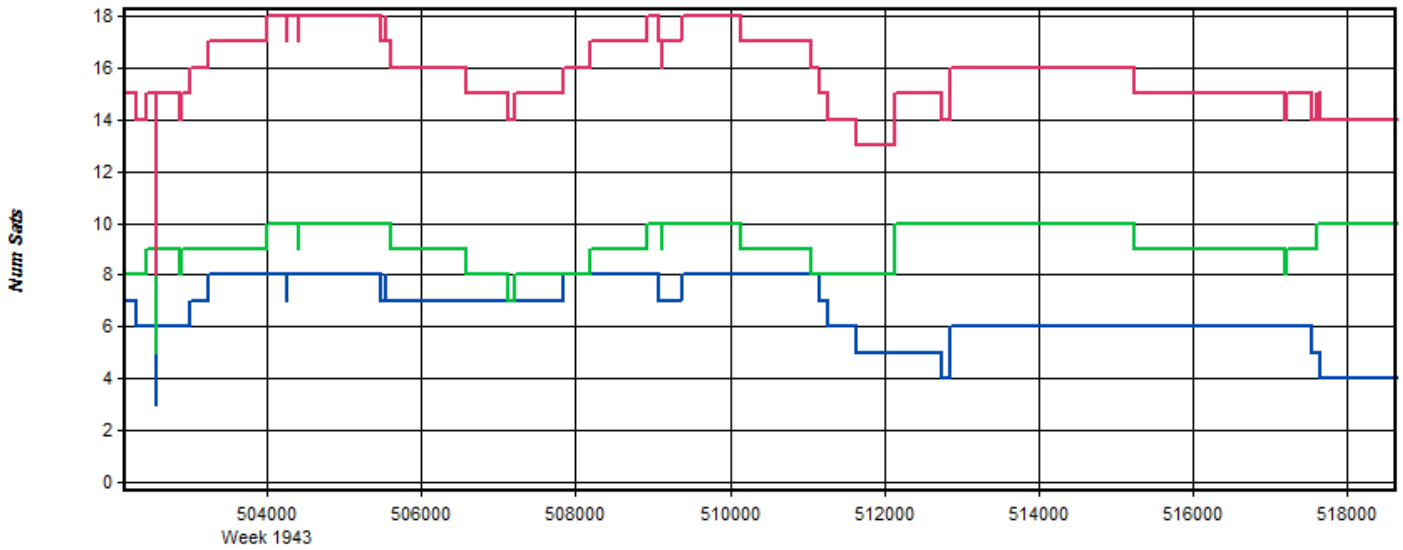
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



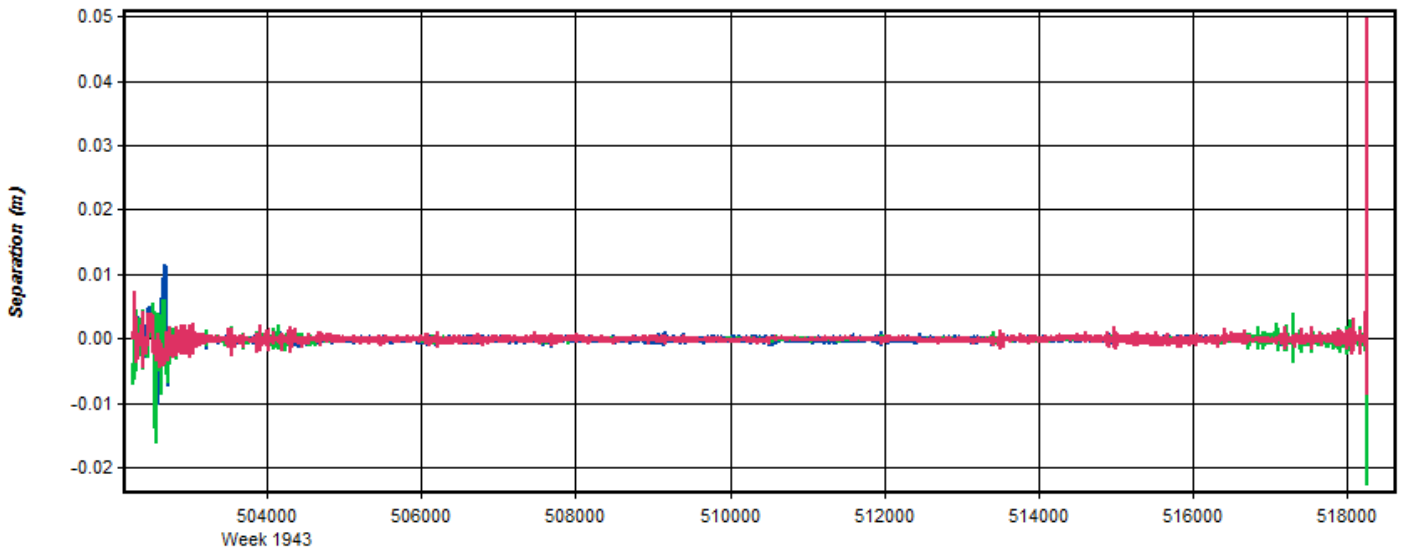
GPS Time (TOW, GMT zone)

— Roll — Pitch

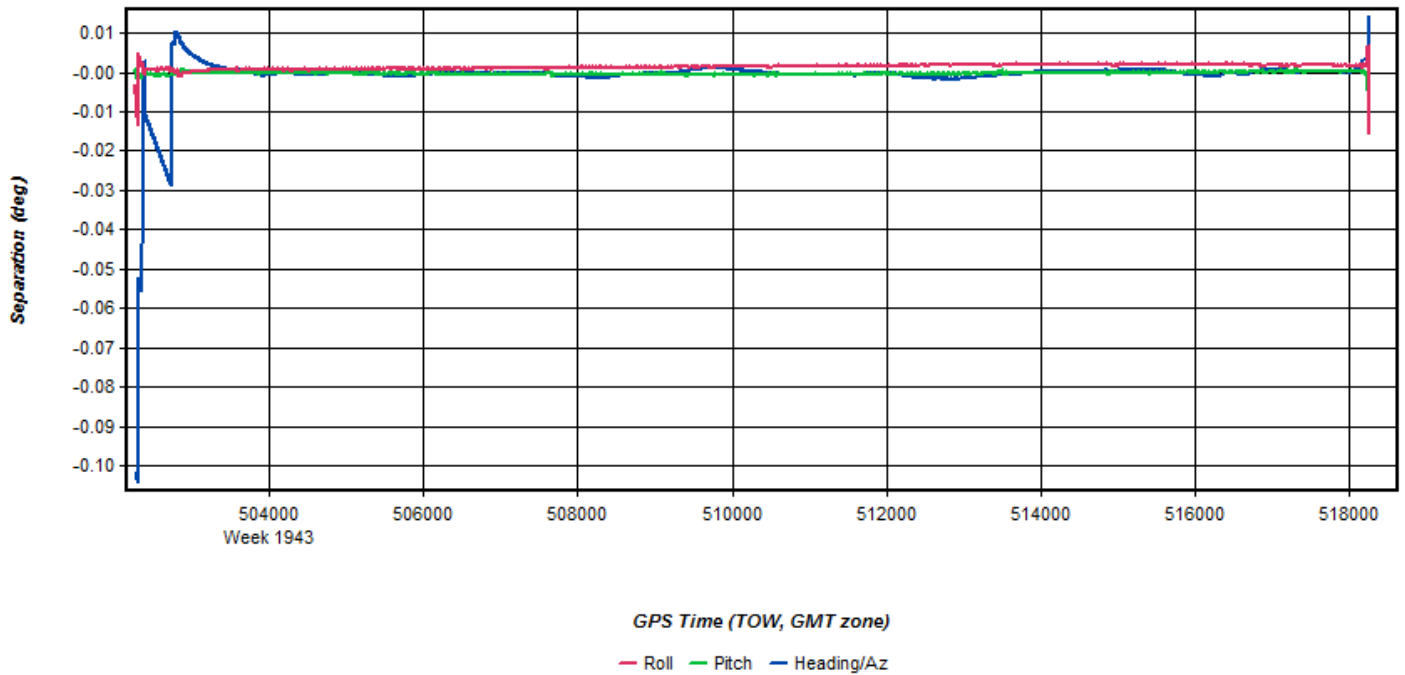
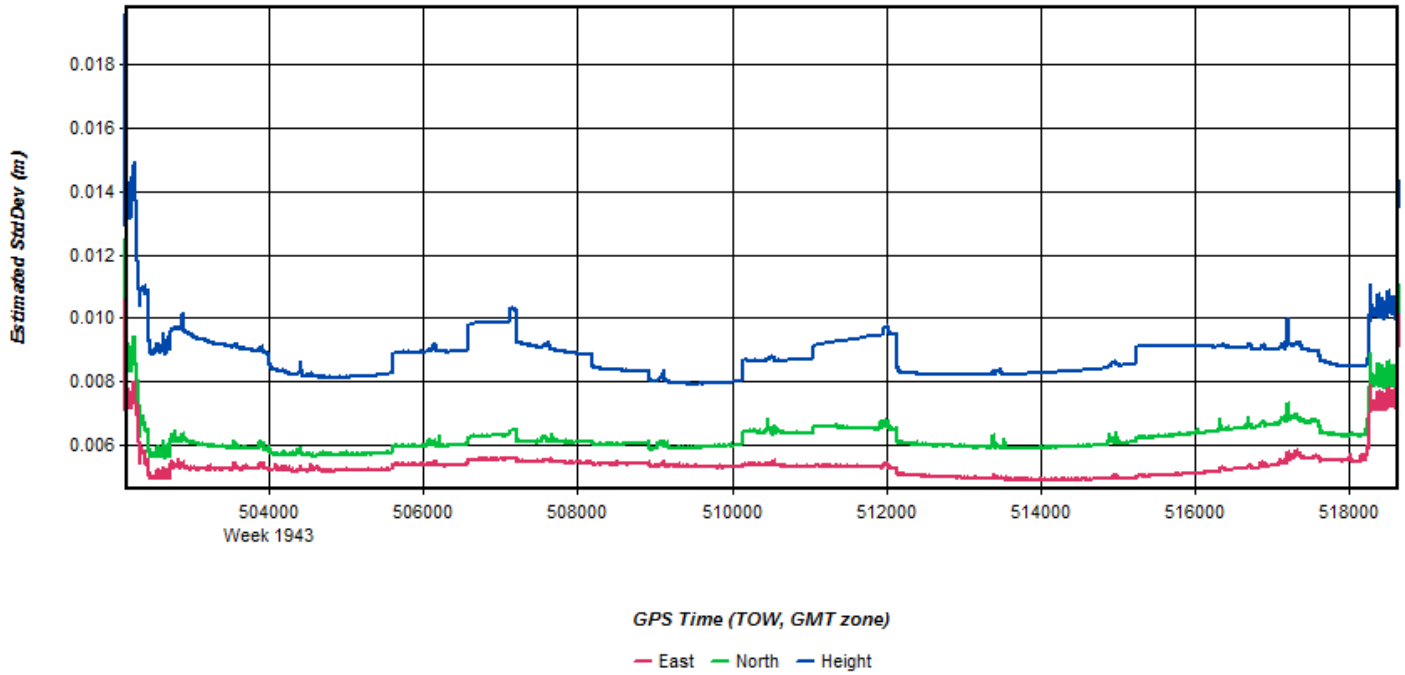


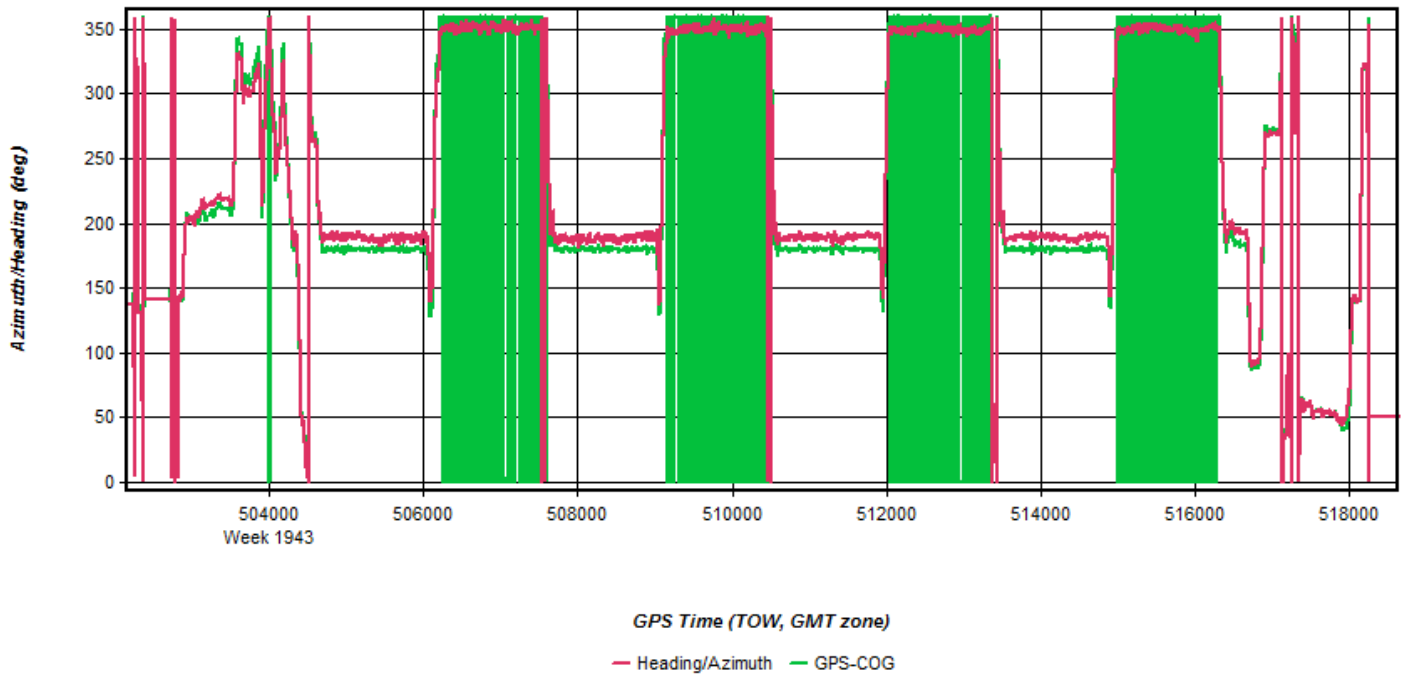


GPS Time (TOW, GMT zone)
 - Num Sats - GPS - GLONASS - BeiDou - Galileo - QZSS



GPS Time (TOW, GMT zone)
 - East - North - Up





Flight Log

Q Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc Date: 4/7/2017

(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: SD-USGS-LIDAR Proj #: 30420 Flight Mgmt File: 30420-SD-ALS70 SP3

Aircraft: P73TM Begin Hobbs: 66265 End Hobbs: 66307 Total: 4.2 Pilot: John Durham Co-Pilot: Tech: Geoff Lewis

Dep Apt: KPIR Dep Time (Local): 3:40 (Z): 19:40 Arr Apt: KPIR Arr Time (Local): (Z): 23:55 Tot Time Aloft:

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

GPS Unit: Y/N Sta 1: SD-USGS-01 Sta 2: SDUSGS-02 Flyovers: Y/N If Y, times: Sta1 Sta2

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

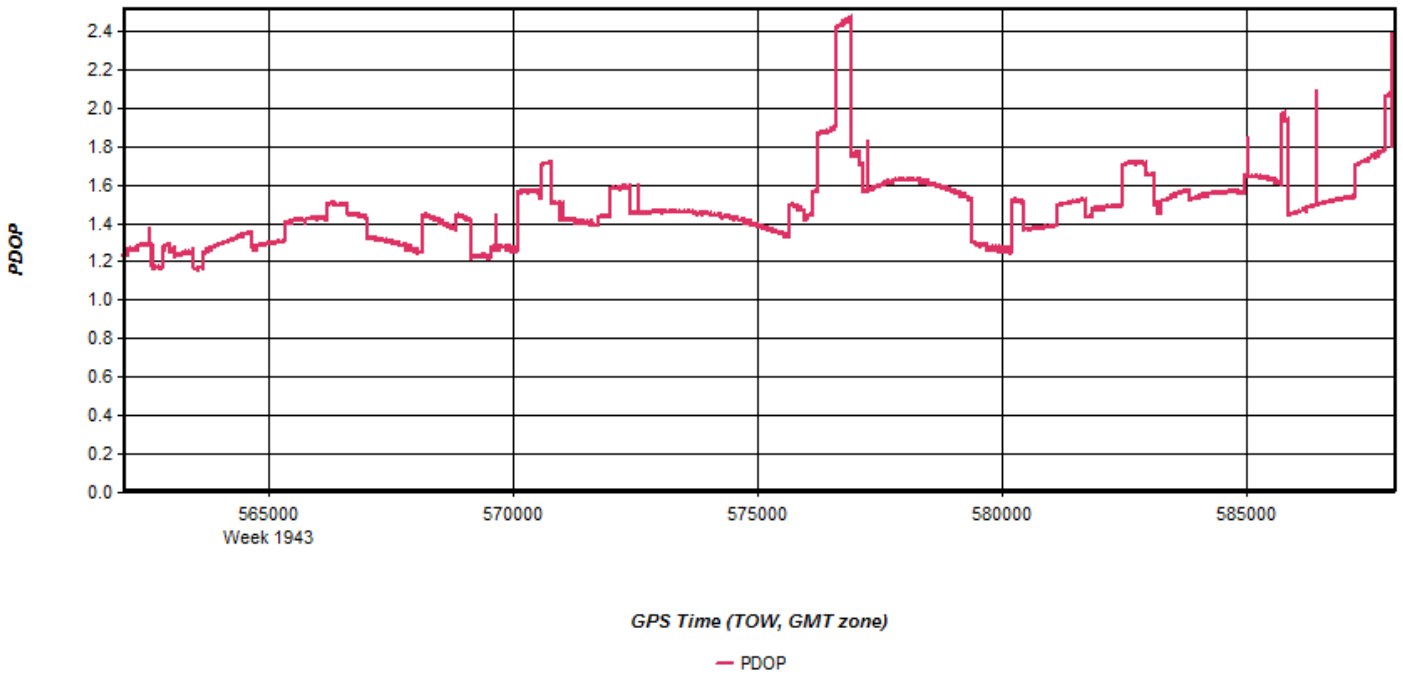
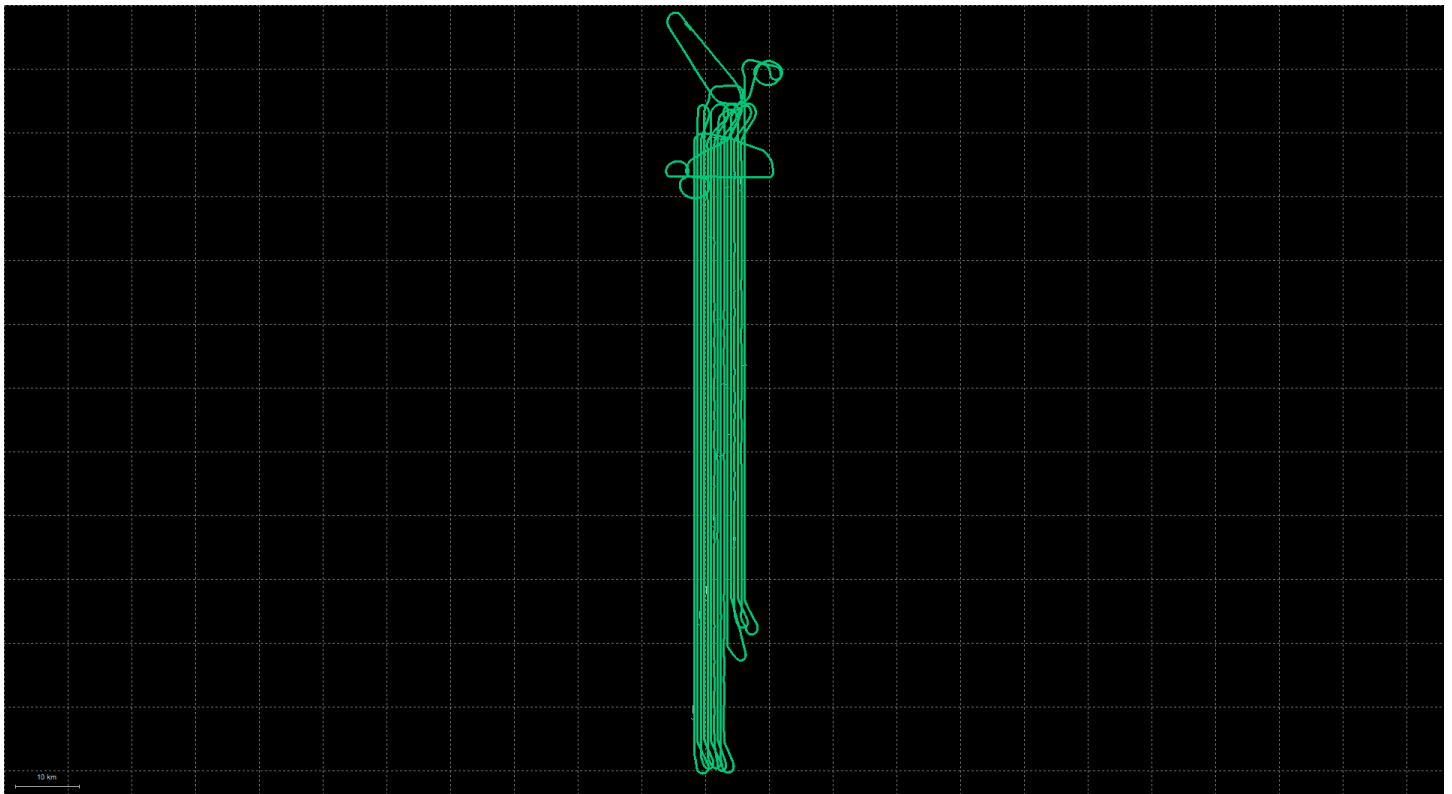
LIDAR	Type	ALS70	Serial #	7178	Alt. ACL	3600	Alt. APRL	7200	Avg Terr Pk	3600	Plan Cldptd	130	Avg PE Spading		Aug 85	Storage Mount
	POV	28°	Scan Freq	6.1 Hz	Mph (Y/N)		Pulse In Air	2	Pulse Rate	328.6	Power	100%	PPPM	-1	End 172	SSD03

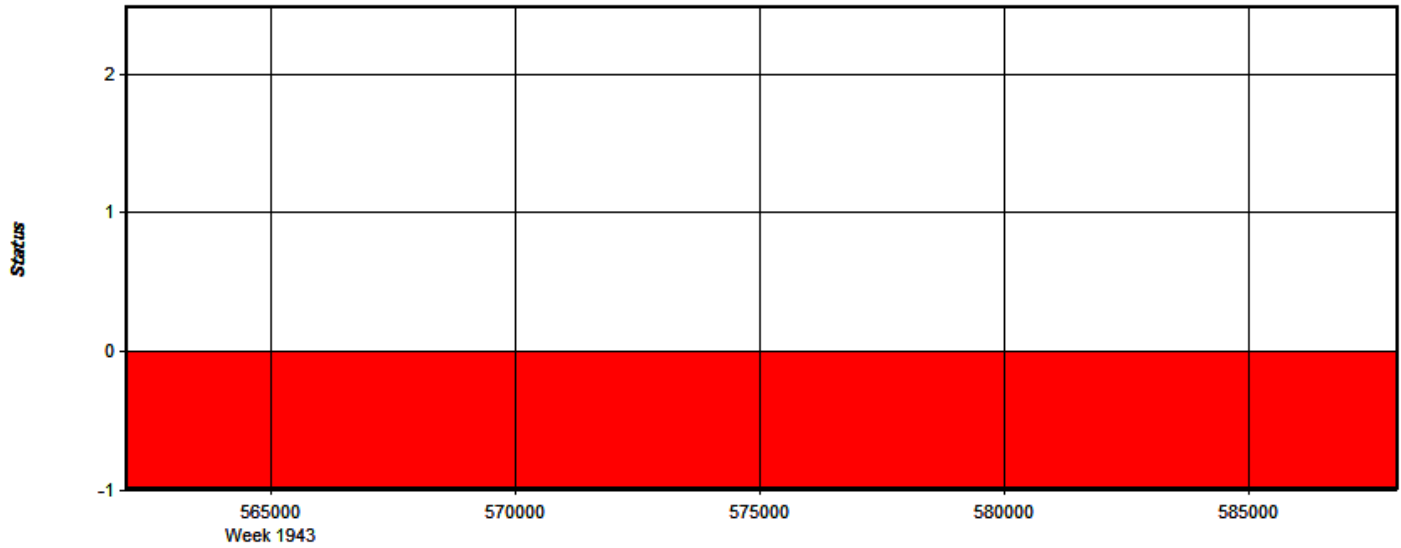
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOCF/line	GPS Altitude	Crsb	Turn	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc
		19:57	20:02					+	
751-	151	20:07							turn no ranges, disabling eye safety
751R-	151R	20:11	20:34	126	1.1/19	7200'	1°	+	still no ranges in FCMS, ranges appeared 11nm FSE
750-	150	20:37	20:59	137	1.1/18	7100'	1°	+	
749-	149	21:02	21:23	140	1.1/18	7200'	3°	+	
748-	148	21:27	21:47	133	1.1/19	7100'	2°	+	146 kts left - nm FNE
747-	147	21:50	22:12	130	1.2/17	7200'	1°	+	333' drift to east @ 30 NM FNE
746-	146	22:11	22:36	133	1.1/14	7200'	0°	-	
745-	145	22:59	23:01	131	1.2/13	7200'	1°	-	
744-	144	23:04	23:25	130	1.3/17	7100'	1°	-	
	UL001	E	23:32	23:33	157				a bit fast -> reflecting CROSS TIE
	UL002	W	23:35	23:38	122	1.2/16	7100'		X TIE
			23:39	23:43					Closest S Turn

Total Proj Lines: Lines Flown: 8 Lines Remain: Online Time: 3.7 Min Job Time: .5 Notes: flightlines lxx renamed to 7xx to designate ALS70 lines

Scanned by CamScanner

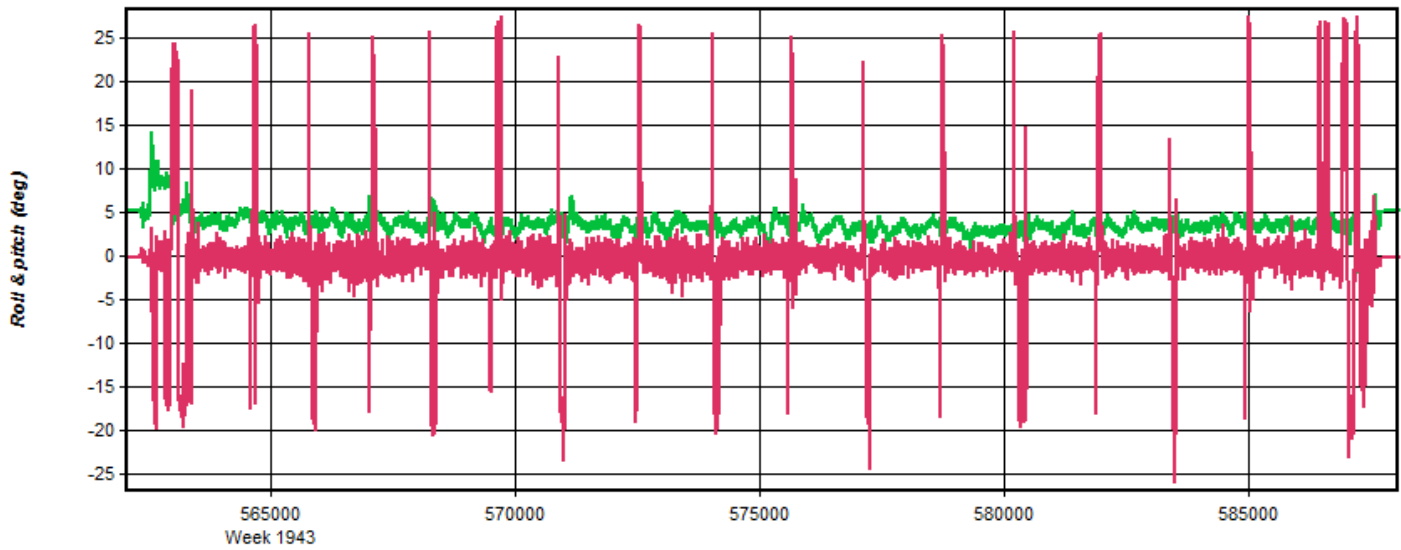
April 8, 2017-A (N246MP, SN8227)





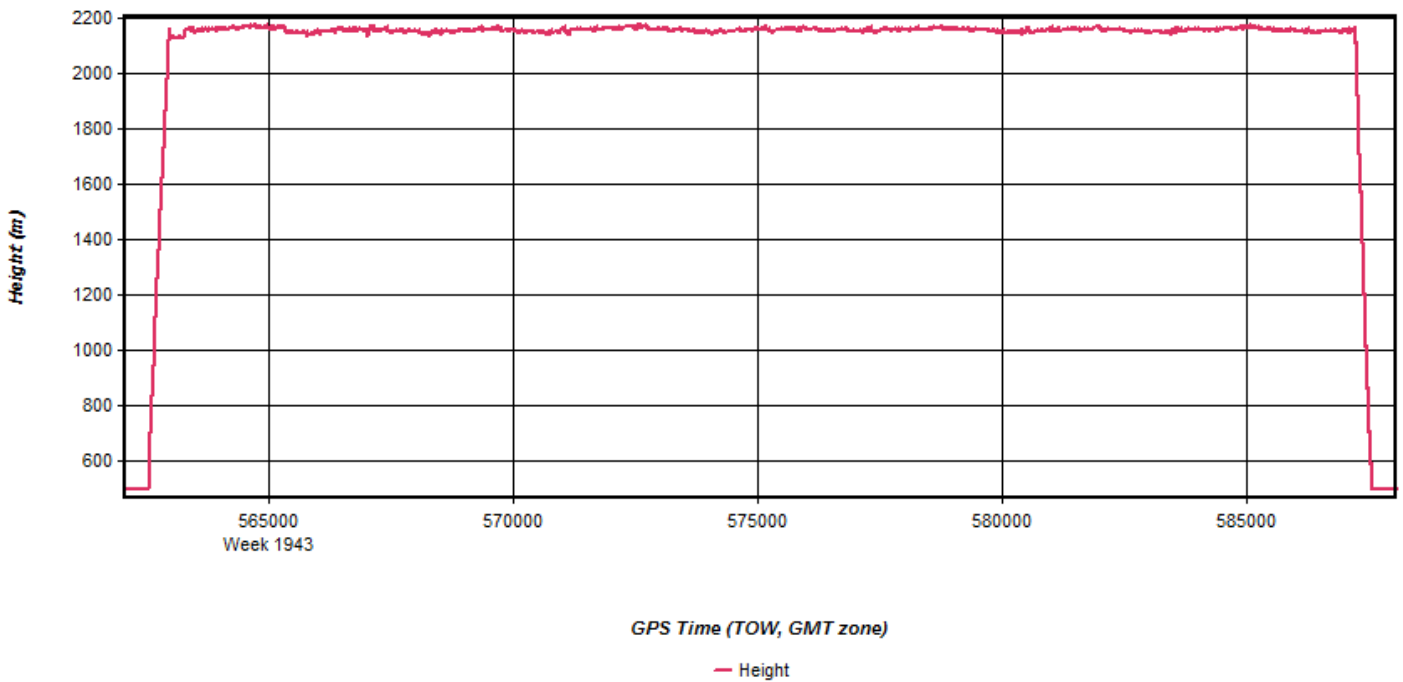
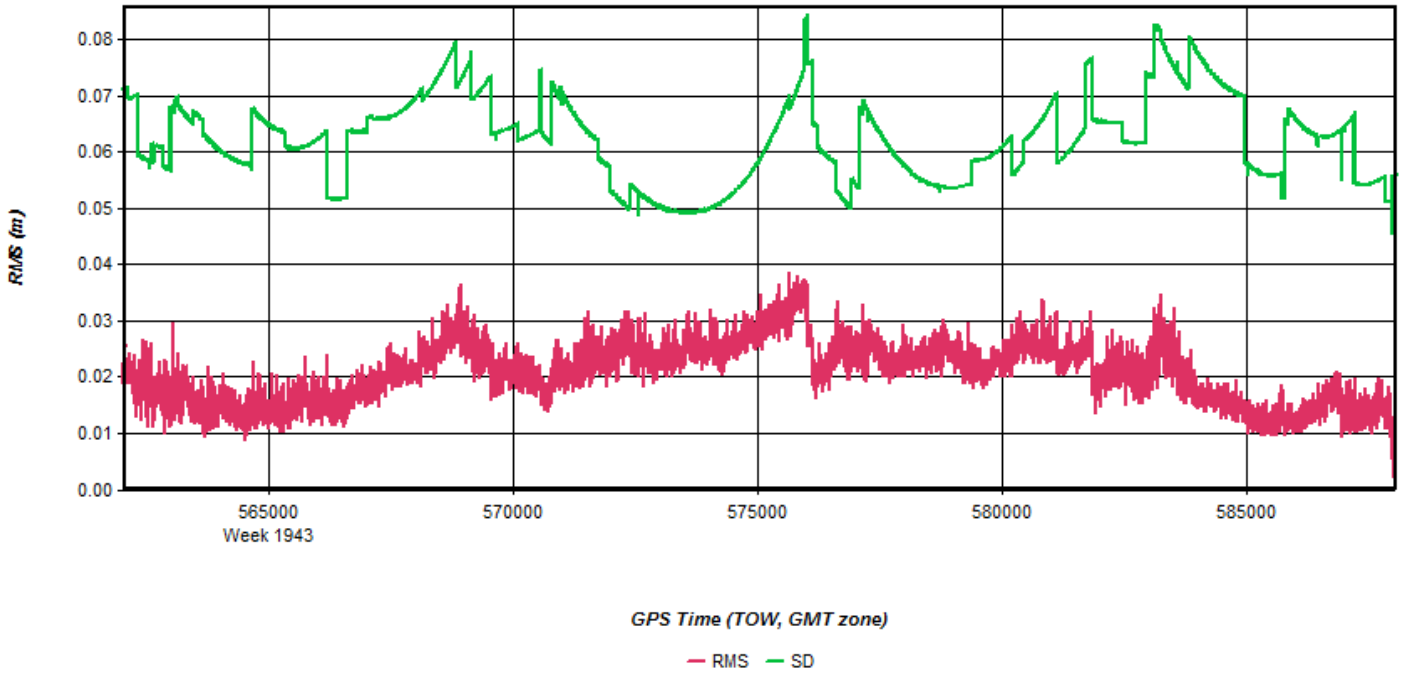
GPS Time (TOW, GMT zone)

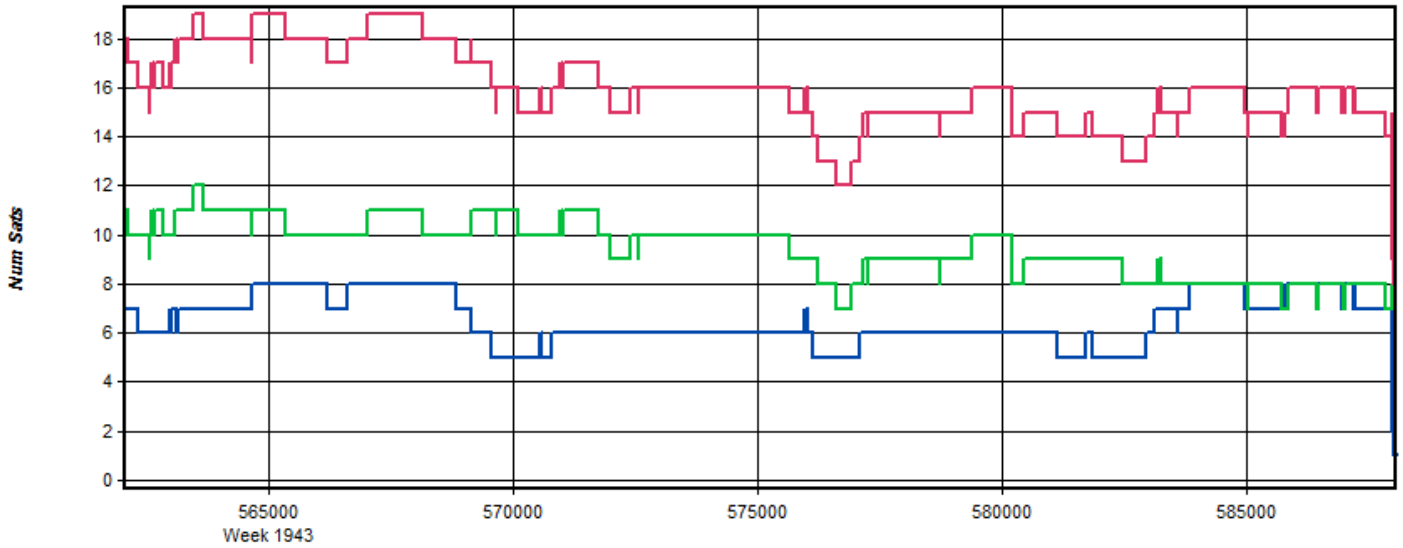
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

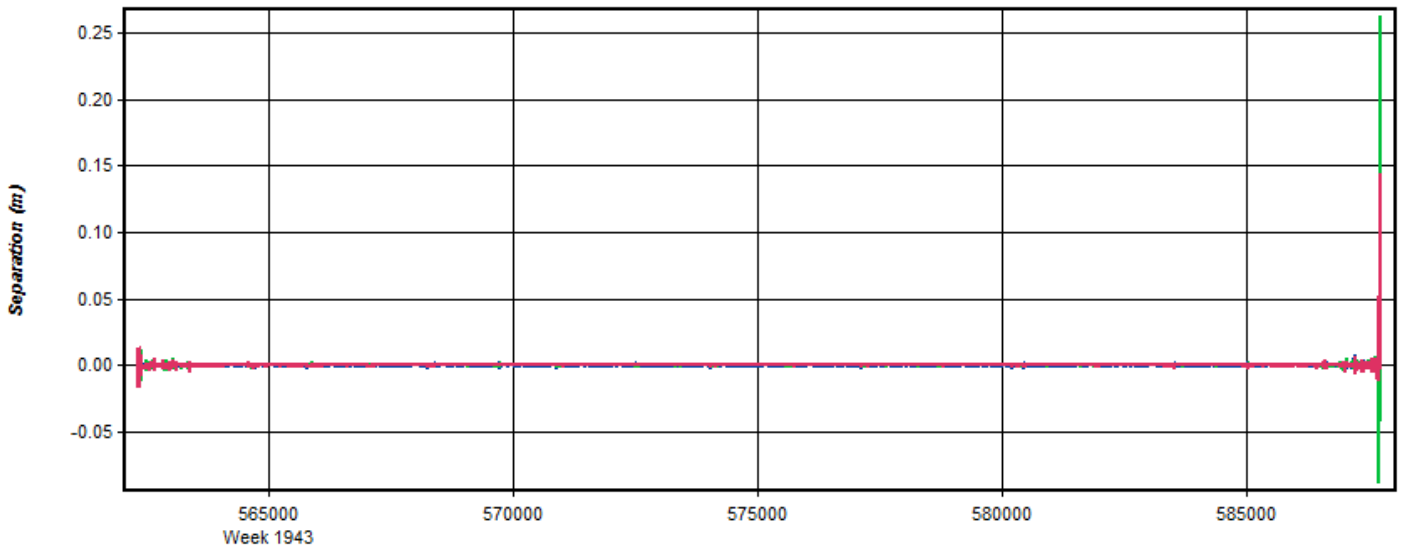
— Roll — Pitch





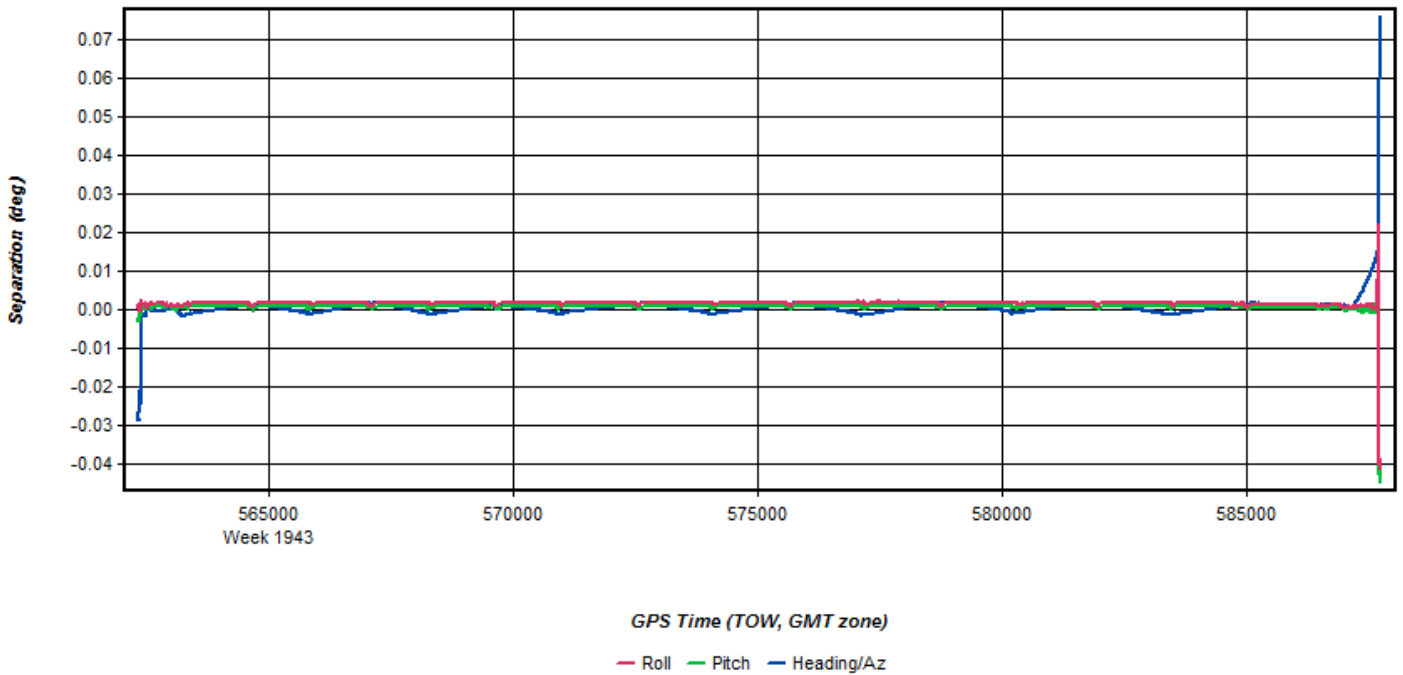
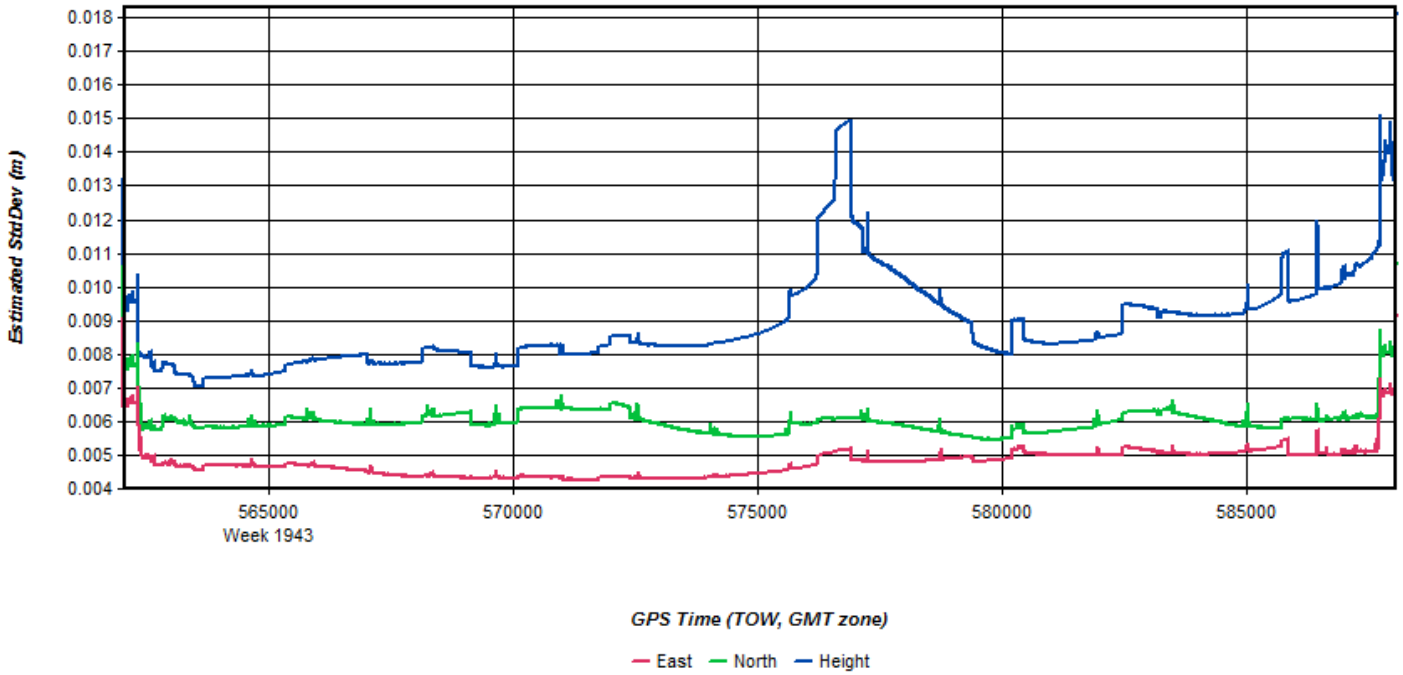
GPS Time (TOW, GMT zone)

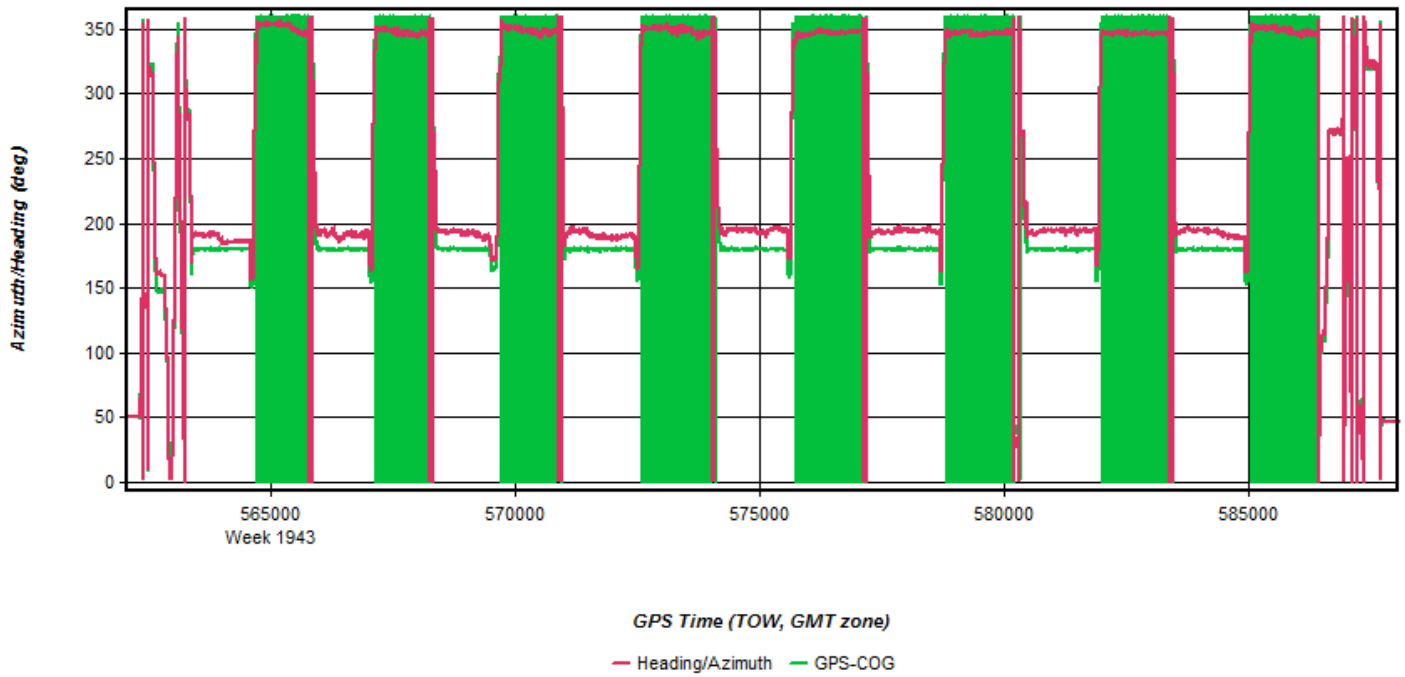
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up

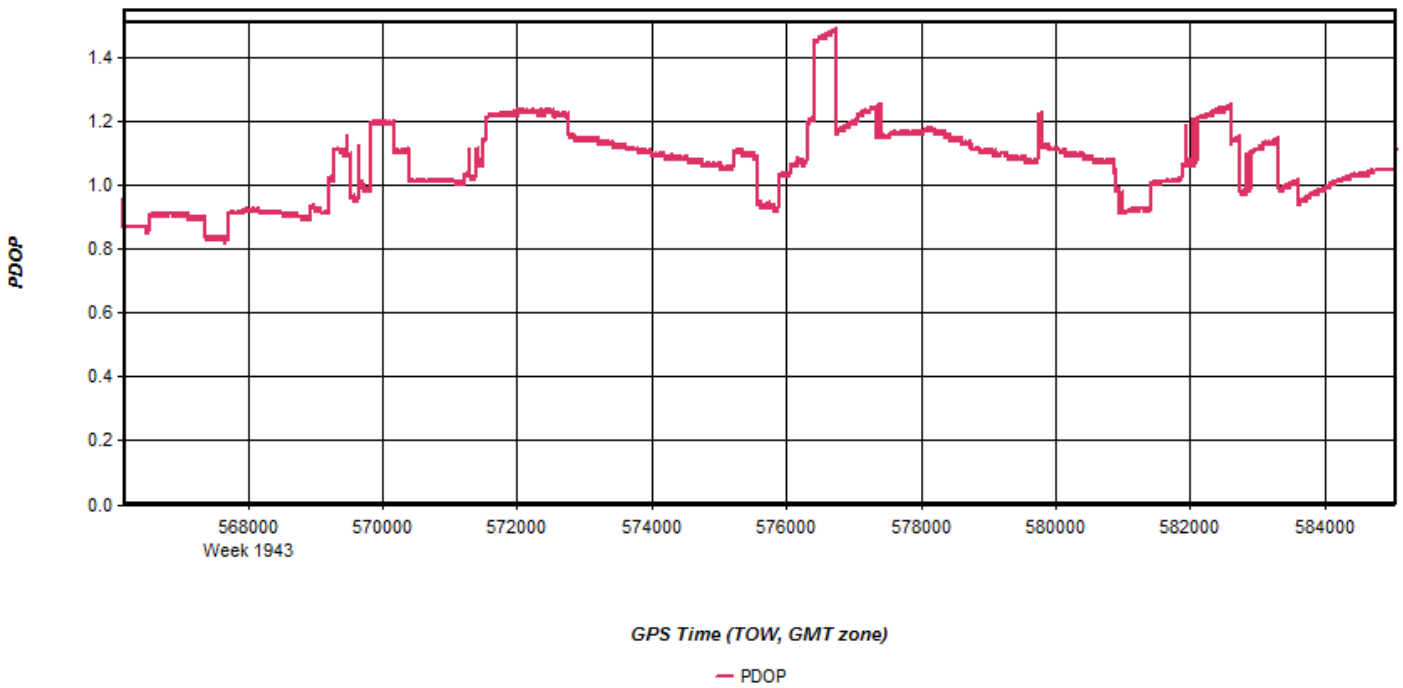
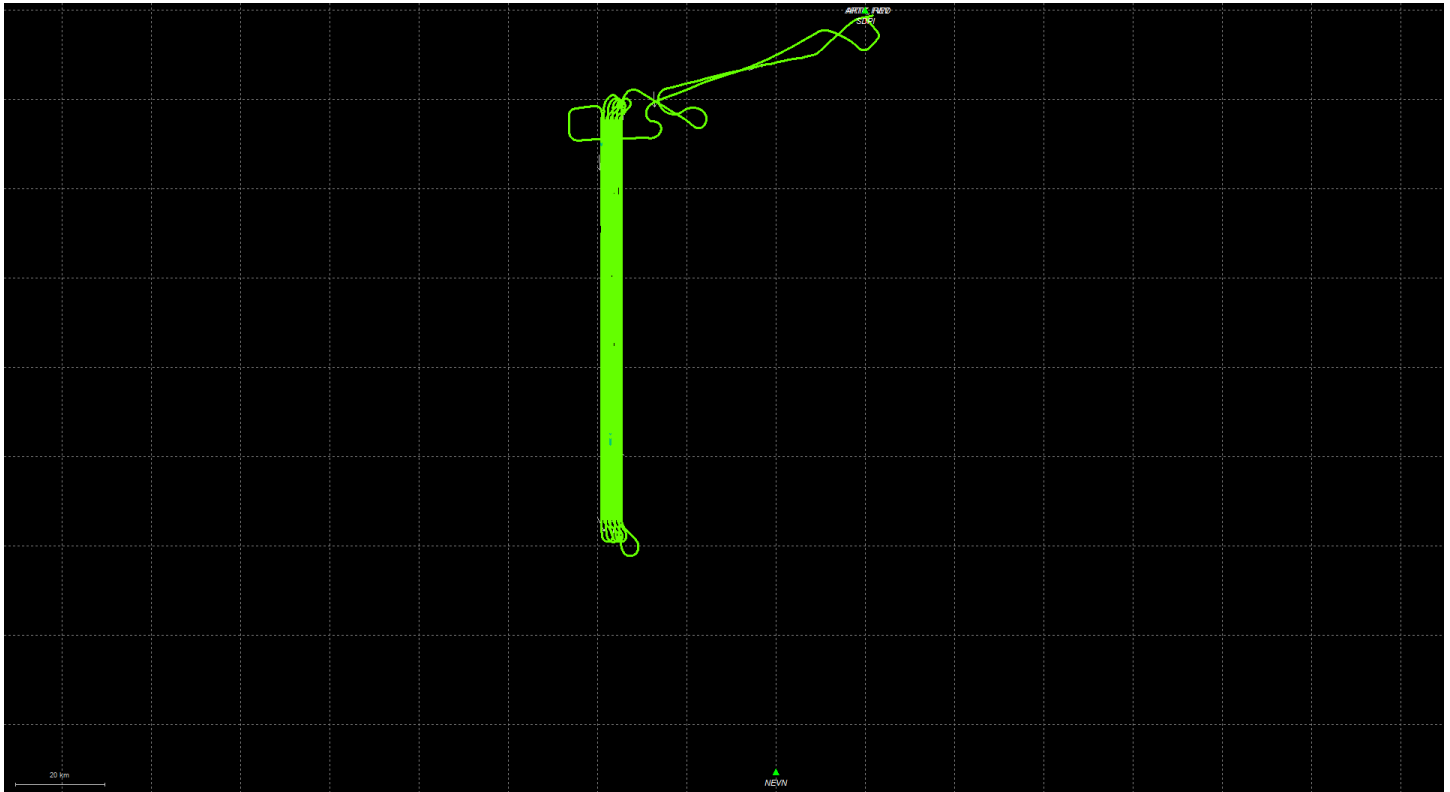


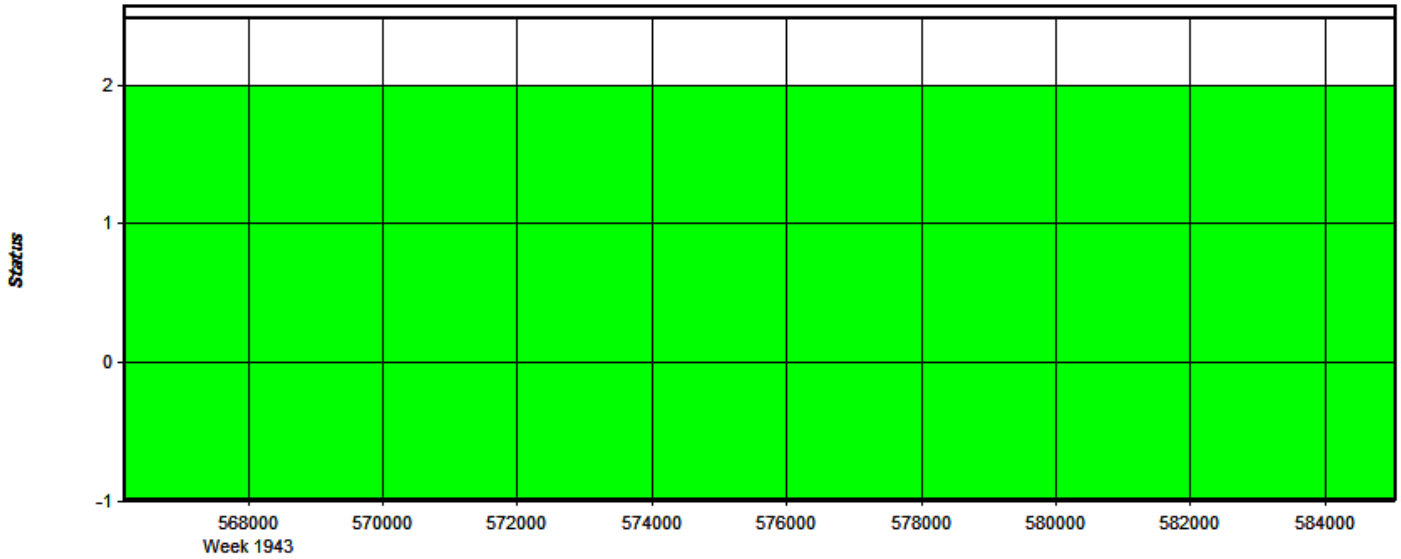


Flight Log

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc											
(email log entry to flight_log_distribution_list@quantumspatial.com)											
Project: NRCS SD		Flight Mgmt File: 30470-SD-ALS80-8227		Date: 4-8-2011		U/L: 0 b c d e		Pg. 1 of 1			
Aircraft: 246MP		Begin Hobbs: 1396.8		End Hobbs: 1403.8		Total: 7.0		Tech: COX			
Dep Apt: PIR		Dep Time (Loc): 7:15 (Z): 19:15		Arr Apt: PIR		Arr Time (Local): 7:15 (Z): 19:15		Tot Time Aloft: 7.0			
CORS: Y / N		Sta 1: Gred P80		Sta 2:		Flyovers: Y / N		IF Y, times: Sta 1			
GPS Unit: GN		Sta 1: Gred P80		Sta 2:		Flyovers: Y / N		IF Y, times: Sta 1			
Gd Temp beg: °C		End: 23 °C		OAT beg: °C		End: 29.54 °C		Altimeter begin: 2950 end: 2954			
Type: ALS80		Serial #: 8227		Alt: 6900		Avg Terr Ht: 130		Max Gd/Spd: 130			
FOV: 28		Scan Freq: 47.3		MplA Y / N		Pulse Rate: 332		Power: 100			
LIDAR		Alt: 6900		Avg Pt Spacing: 130		PPSM: 100		Mag Co: 522			
		Scan Freq: 47.3		Pulse Rate: 332		Power: 100		End Co: 373			
		MplA Y / N		Pulse Rate: 332		Power: 100		Tot Co: 149			
		Pulse Rate: 332		Power: 100		Storage (Normal): 1					
Line #	Mag	Start (UTC)	End (UTC)	Gd/Spd	Foot/Sec	GPS Altitude	Crab	Turb (ft./s)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.		
170	174	1232	1249	131	1.1/21	7092		0	Less than 10% Dregs		
169	354	1253	1333	138	1.1/21	7119		1	LHe Chop High Overcast		
168	174	1313	1330	135	1.2/21	7067		1			
167	354	1333	1350	133	1.1/21	7103		1			
166	174	1354	1411	135	1.1/21	7097		1			
165	354	1416	1431	132	1.1/24	7092		1			
164	174	1437	1501	121	1.1/21	7067		1			
163	354	1504	1526	141	1.1/18	7150		1			
162	174	1530	1552	137	1.1/18	7086		1			
161	354	1556	1618	122	1.1/18	7105		1			
160	174	1622	1644	135	1.3/16	7084		1			
159	354	1647	1709	124	1.2/17	7108		1			
158	174	1715	1737	133	1.9/20	7064		1			
157	354	1740	1802	129	1.3/18	7100		1			
156	174	1806	1828	136	1.1/18	7082		1			
155	354	1831	1853	136	1.2/18	7137		1			
1501	264	1857	1901	103	1.2/19	7080		1	uplanned X line		
Total Proj Lines:		Lines Flown: 16		Lines Remain:		Online Time: 6:30		Mob Time: 30		Notes:	
										Flight's 19.03	
										Static Stop	
										19.16 - 19.21	

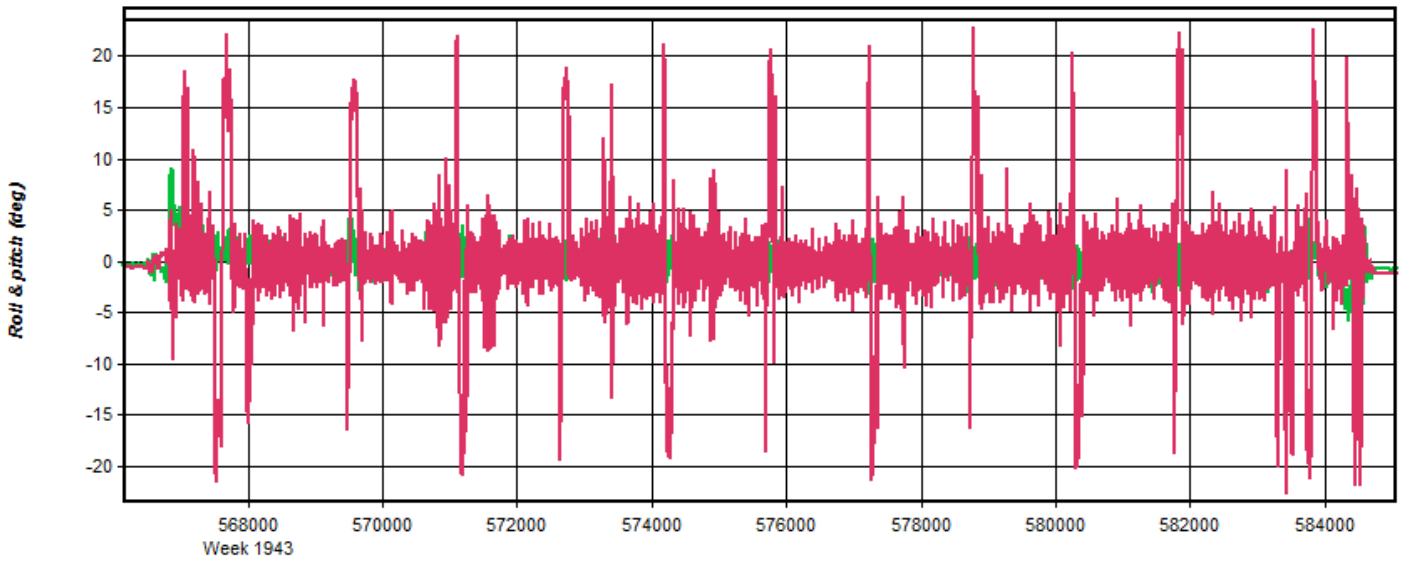
April 8, 2017-A (N262AS, SN7161)





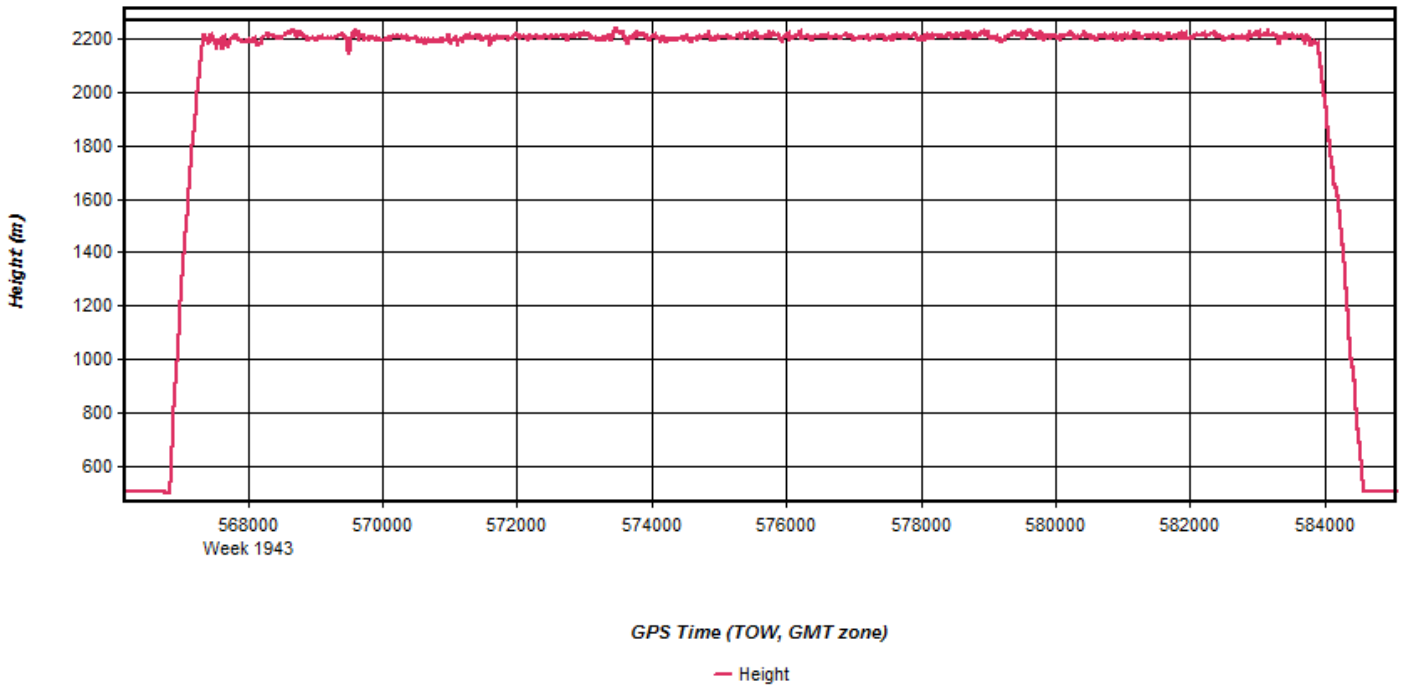
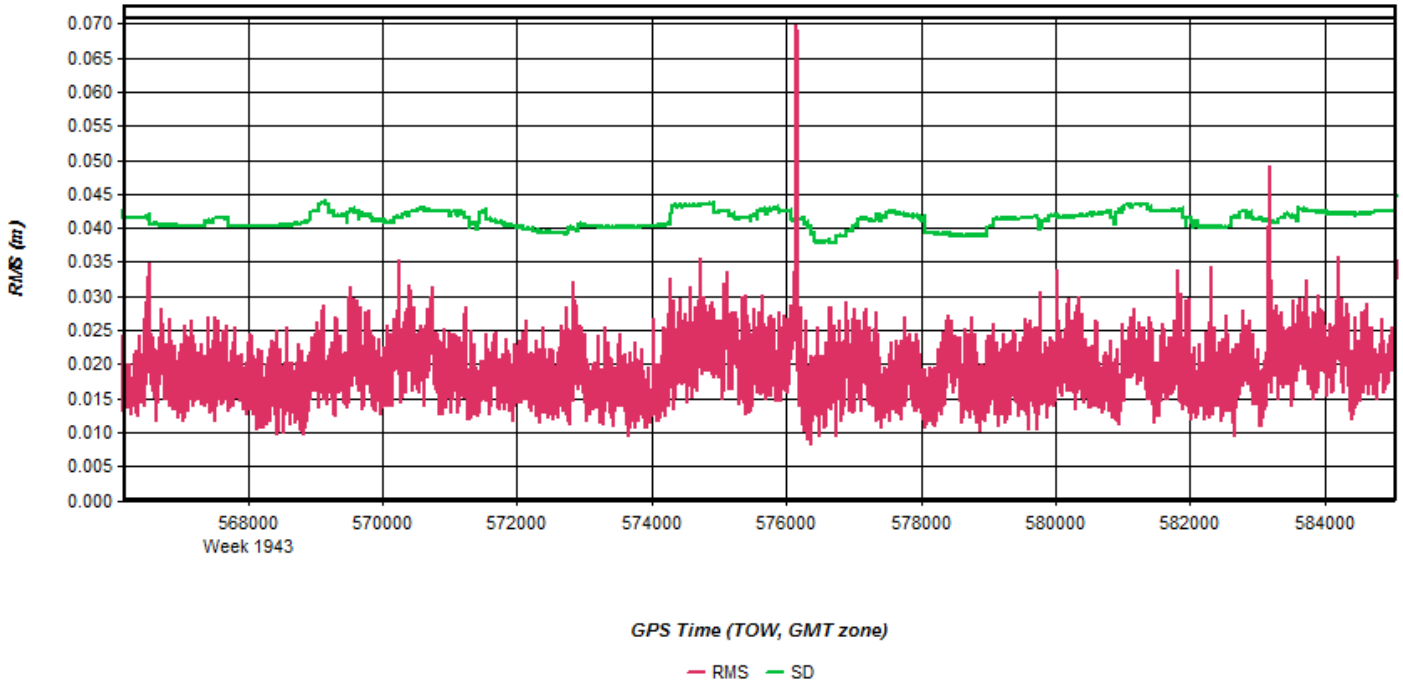
GPS Time (TOW, GMT zone)

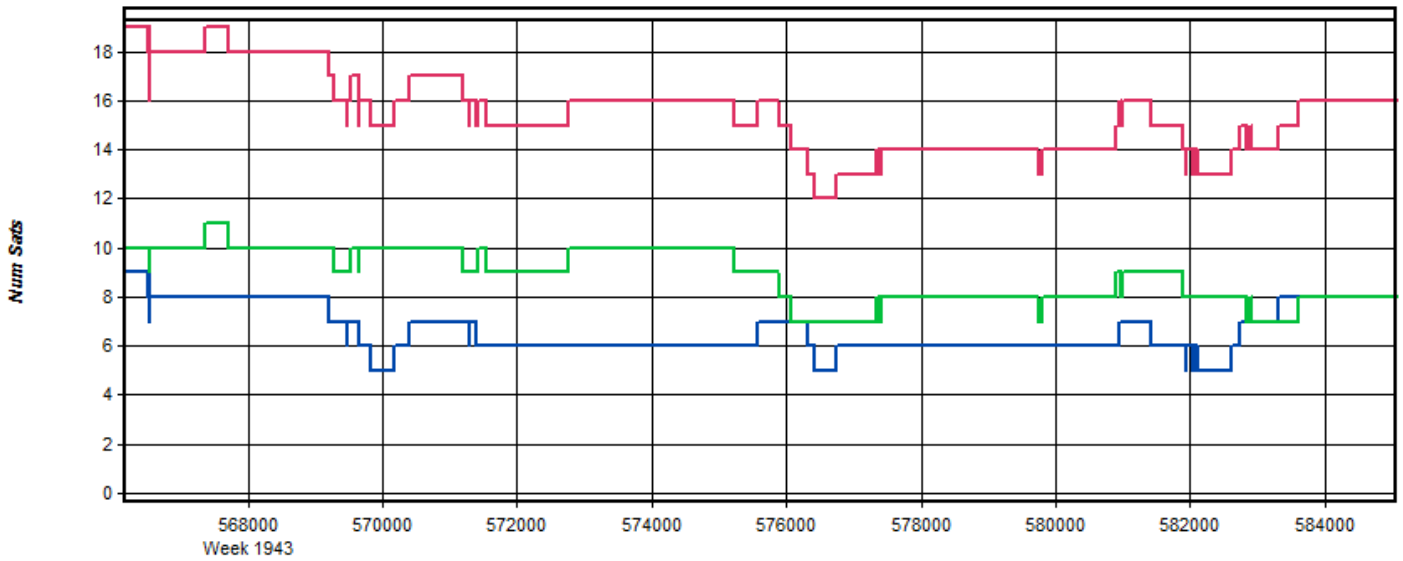
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

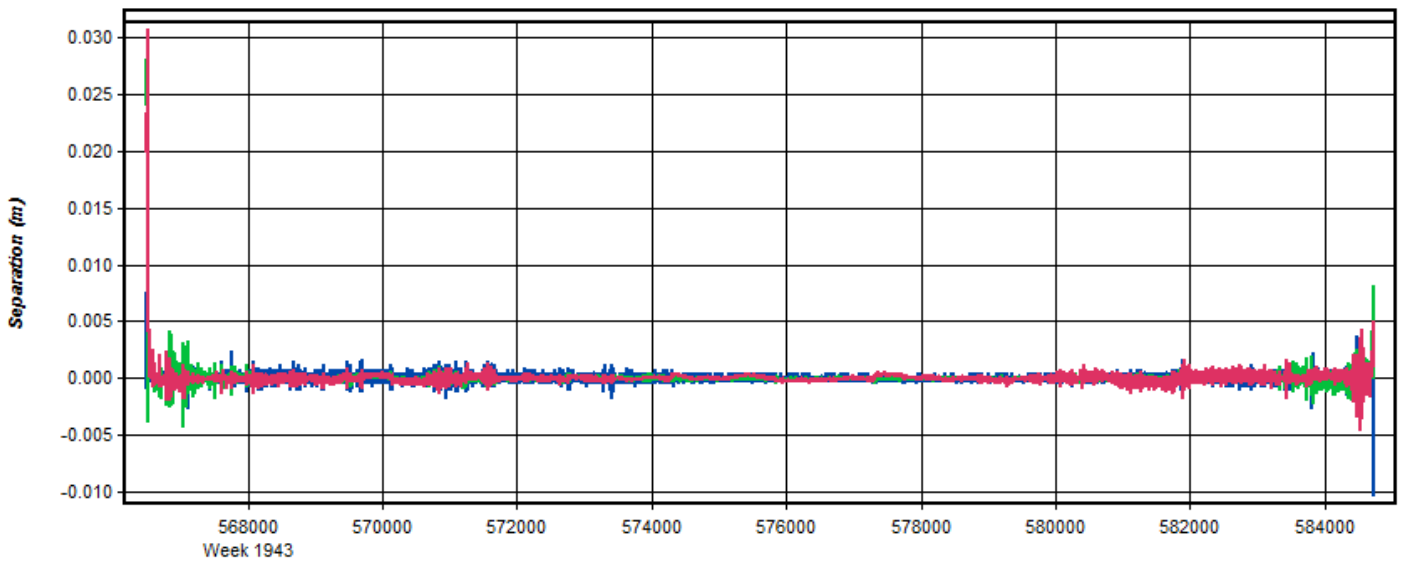
— Roll — Pitch





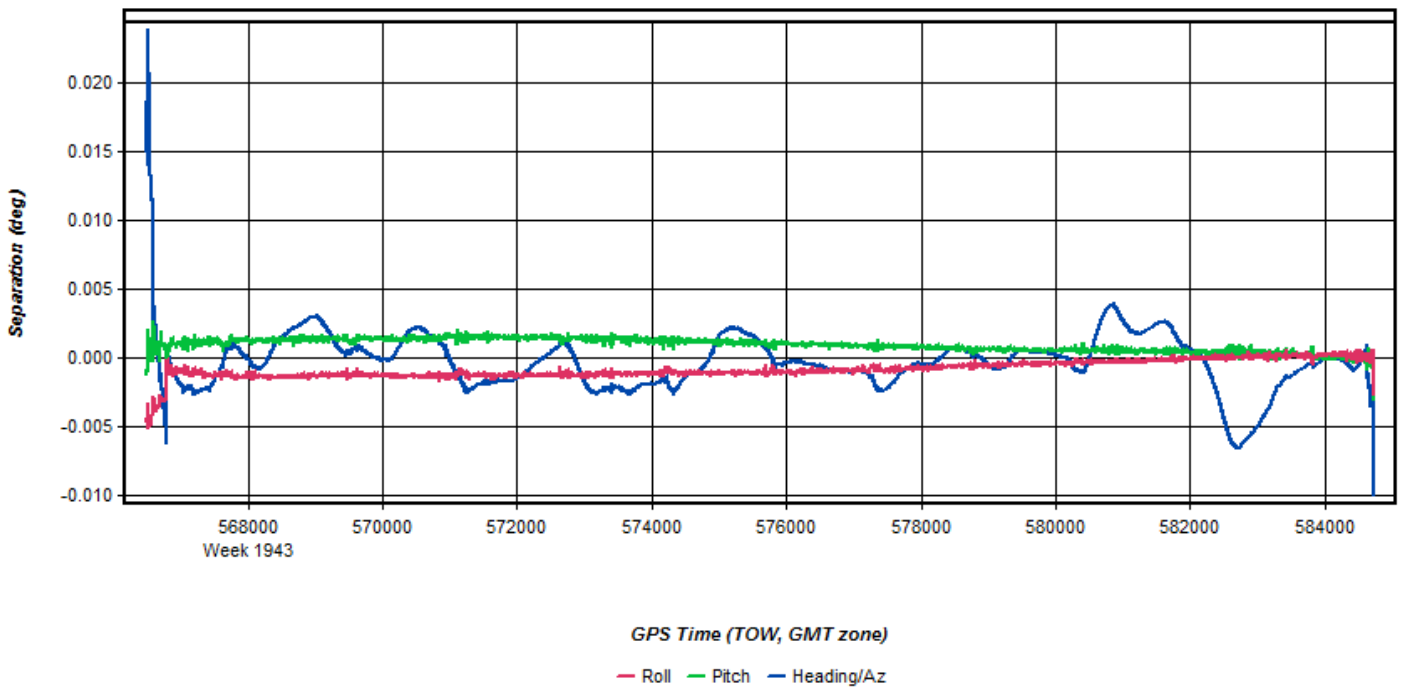
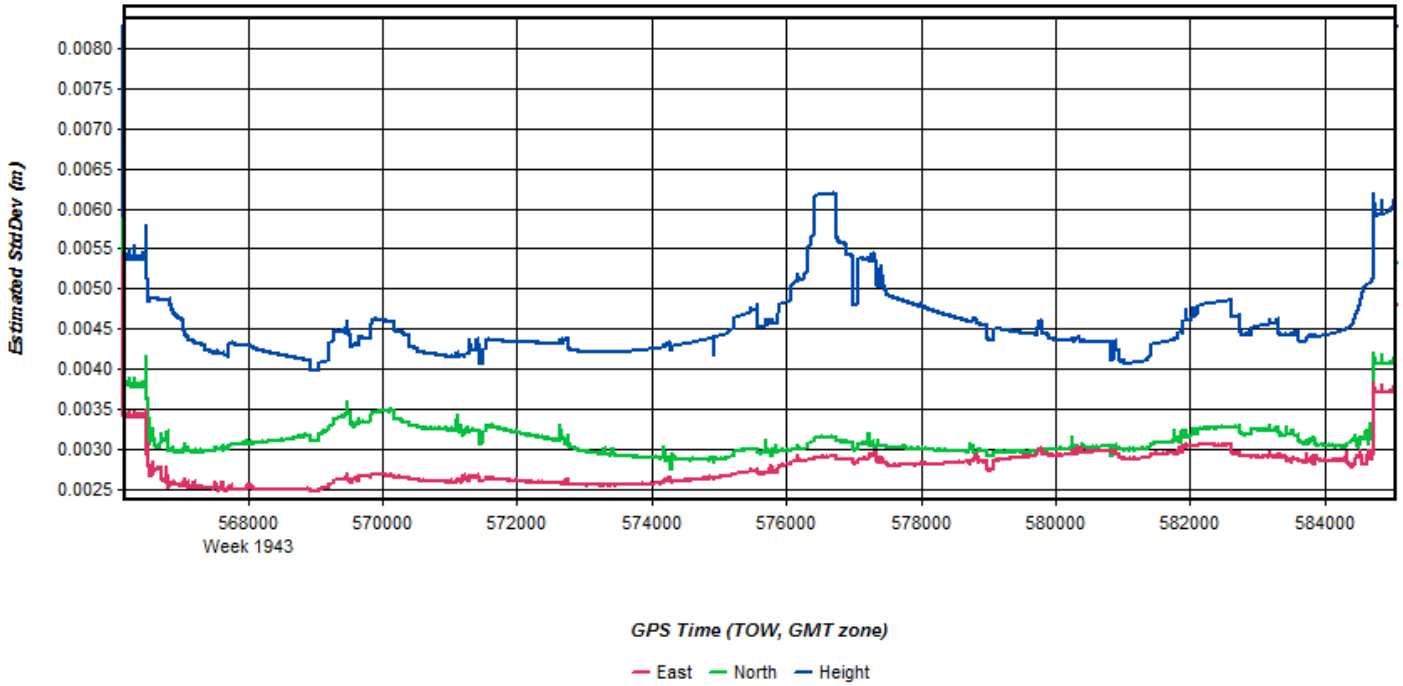
GPS Time (TOW, GMT zone)

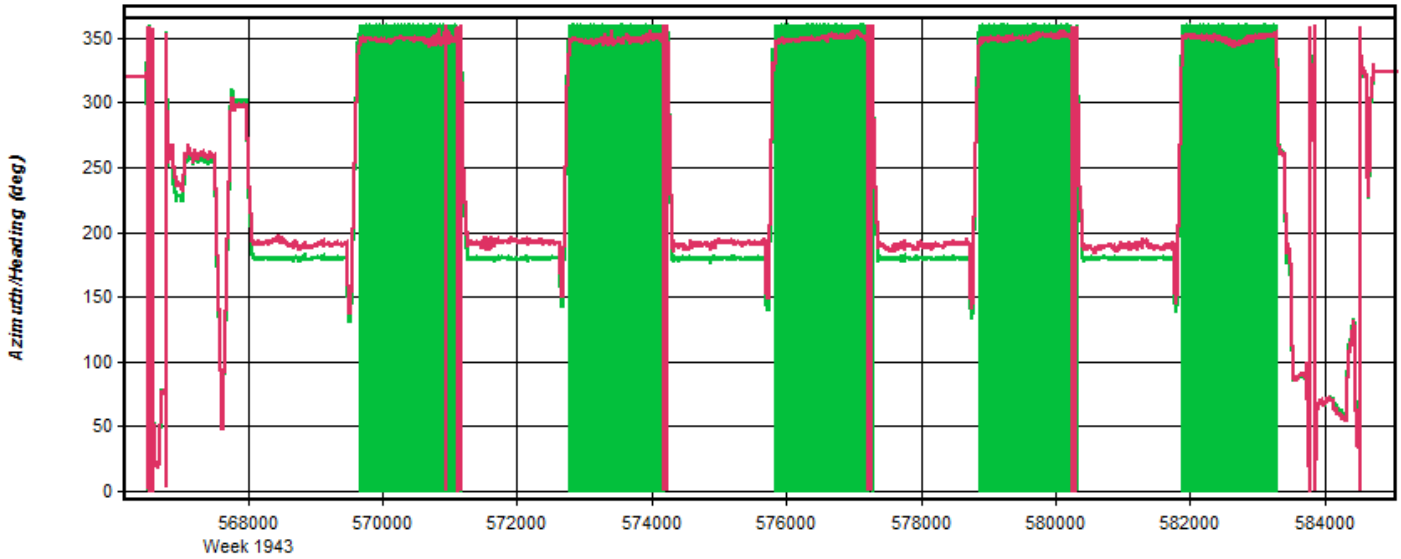
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





GPS Time (TOW, GMT zone)

— Heading/Azimuth — GPS-COG

Coordinate/Antenna Settings

Master Remote

Base Station
 2: NEVN Name: NEVN Disabled
 File: F:\Proc\Misc_Doug_Carey_4-11-17\30420_NRCS_SD\20170408_1

Coordinates
 Latitude: North 42 52 20.90880 Coord. options
 Longitude: West 100 32 37.14424 Save to Favorites
 Ellipsoidal height: 769.856 m
 Datum: WGS84 Proc Datum: WGS84
 Epoch: year

Antenna Height
 From station file: TRM57971.00, NONE View STA File
 Antenna profile: TRM57971.00 Info
 Measured height: 0.000 m
 ARP to L1 offset: 0.065 m
 Applied height: 0.065 m
 Measured to:
 ARP
 L1 Phase Centre
 Compute From Slant

OK Cancel

Coordinate/Antenna Settings ? X

Master Remote

Base Station
1: SDPI Name: SDPI Disabled
File: F:\Proc\Misc_Doug_Carey_4-11-17\30420_NRCS_SD\20170408_1

Coordinates
Latitude: North 44 24 00.06331 Coord. options
Longitude: West 100 17 41.89953 Save to Favorites
Ellipsoidal height: 526.052 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year

Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to:
 ARP
 L1 Phase Centre
Compute From Slant

OK Cancel

Flight Log

Date: 4-8-17
U/Lt: A B C D E Pg. 1 of 1

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email: Log.daily.to.flight_Log_distribution_list@quantumspatial.com)

Project: NRCS - SD Proj #: 30420 Flight Mgmt File: 20170408-131402

Aircraft: N262AS Begin Hobbs: 6525.9 End Hobbs: 6525.8 Total: 4.9 Pilot: Christopher Co-Pilot: FOLAK Tech: CAREY

Dep Apt: KPIR Dep Time (Lcl): 827 ZF: 1327 Arr Apt: KPIR Arr Time (Local): 1320 ZF: 1820 Tot Time Aloft: 4.9

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

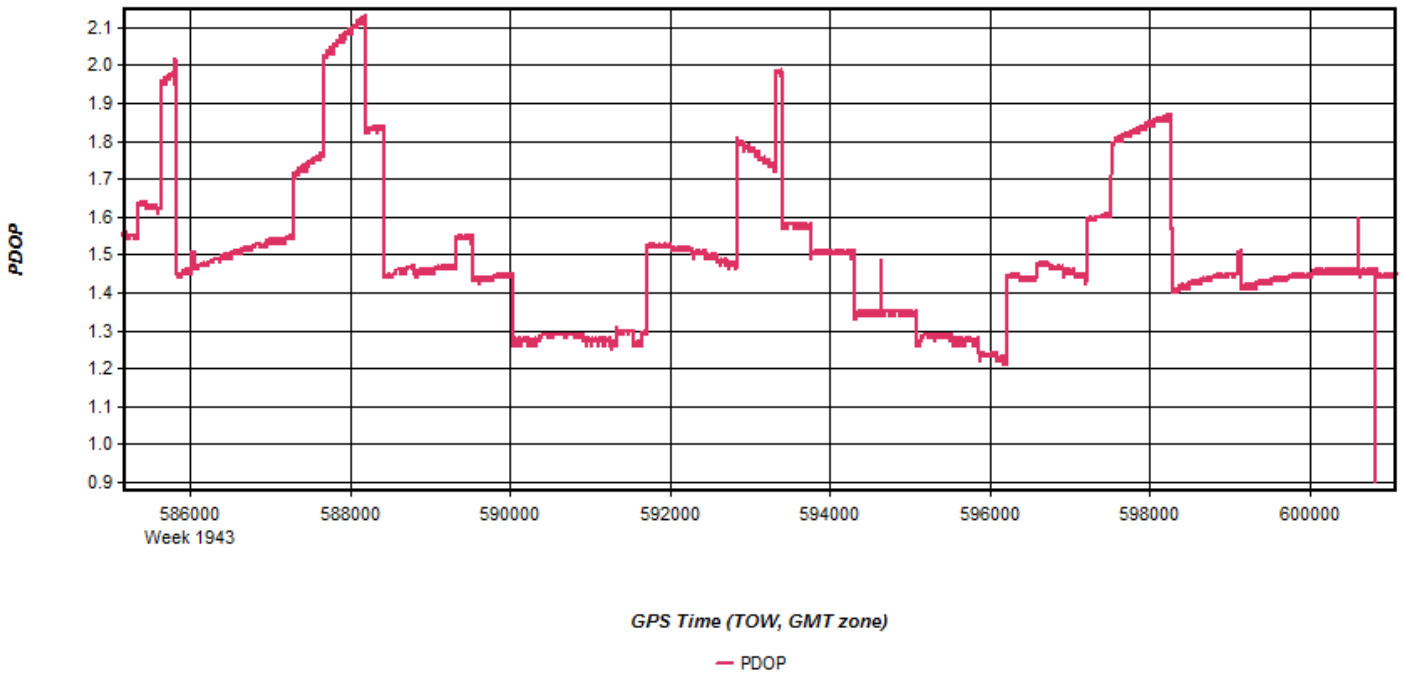
GPS Unit: (N) Sta 1: Sta 2: Flyovers: Y / N IF Y, times: Sta1 Sta2

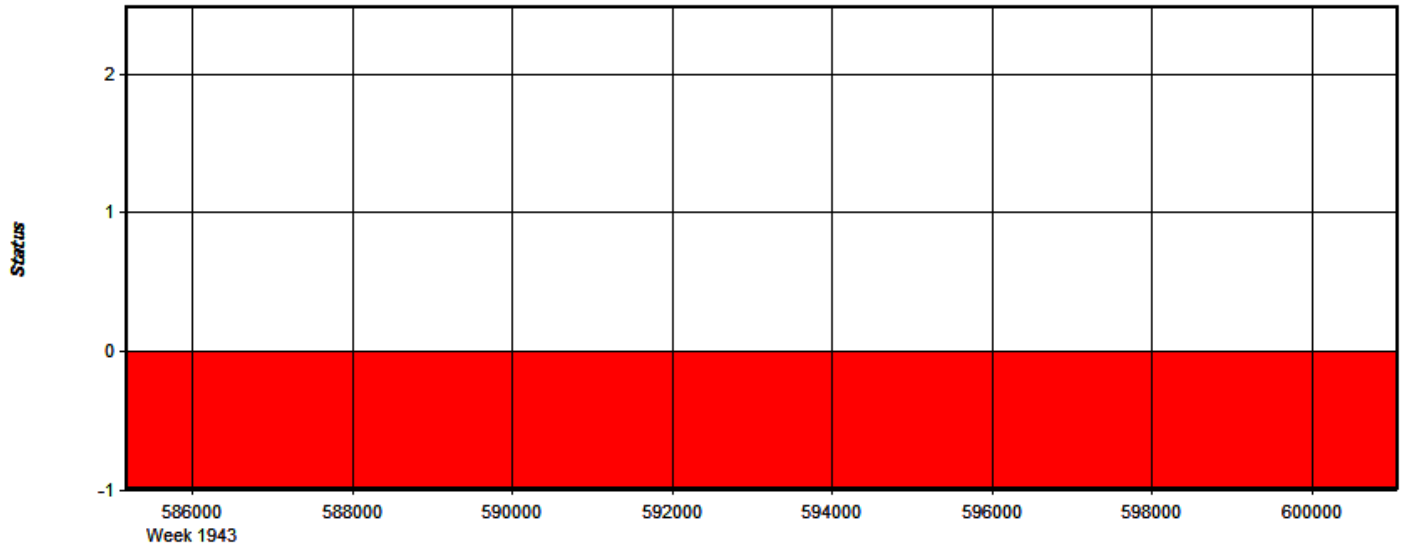
Gd Temp beg:		°C End:		°C OAT beg:		°C End:		°C Altimeter begin:		end:		Mag GB	
Type	Serial #	Alt AGL	Alt AMSL	Alt	Avg Temp	Max Gdspd	Avg Ft Spd	Power	PPSM	Mag GB	End GB	Tot GB	Storage Num/pt
LIDAR	AL570	7161	7241	7241	2507	130	130	100%		A			16
FOV	28	61.1	MPIA (N)	2	Pulse Rate	328.6							
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	Pool/Sec	GPS Altitude	Crab	Turb (0-1)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.				
743	174	1348	1417	130	1.1	7241			PIR -> S/F/G -> SITE				
742	354	1415	1438		1.1	7241			25K OVC				
741	174	1441	1503		1.1	7244			+ chop North end of line - last 16 mi / possibly Bad				
740	354	1506	1529		1.2	7244			+ chop Northern 16 mi				
739	174	1532	1554		1.2	7247			+ chop Northern 12 mi				
738	354	1557	1619		1.1	7254			chop Northern 12 mi				
737	174	1622	1645		1.3	7260			chop Northern 10 mi				
736	354	1648	1710		1.2	7264			chop Northern 12 mi				
735	174	1713	1735		1.1	7270			- chop Northern 10 mi				
734	354	1739	1800		1.2	7274			- chop 6 mi NE				
XFLT	90	1805	1807		1.2	7260			smoothie				
									XFLT - unplanned				

Total Prof Lines: Lines Flown: 10 Lines Remain: Online Time: 4:13 Job Time: 6 Notes:

Generated by CamScanner from intsig.com

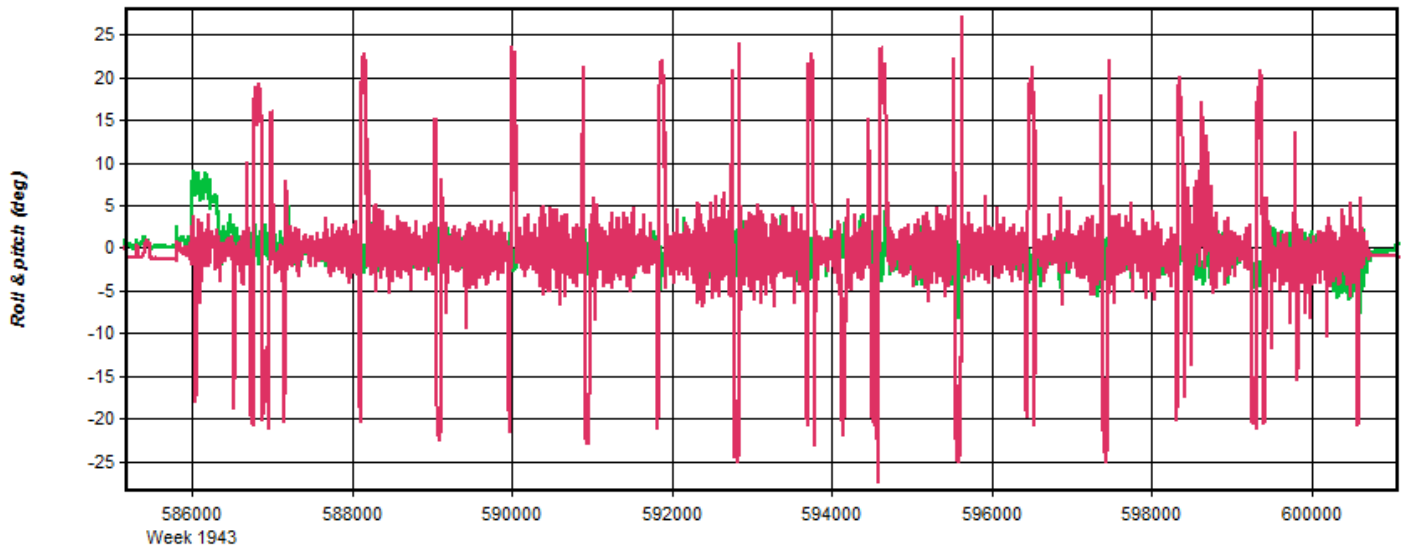
April 8, 2017-A (N73TM, SN7178)





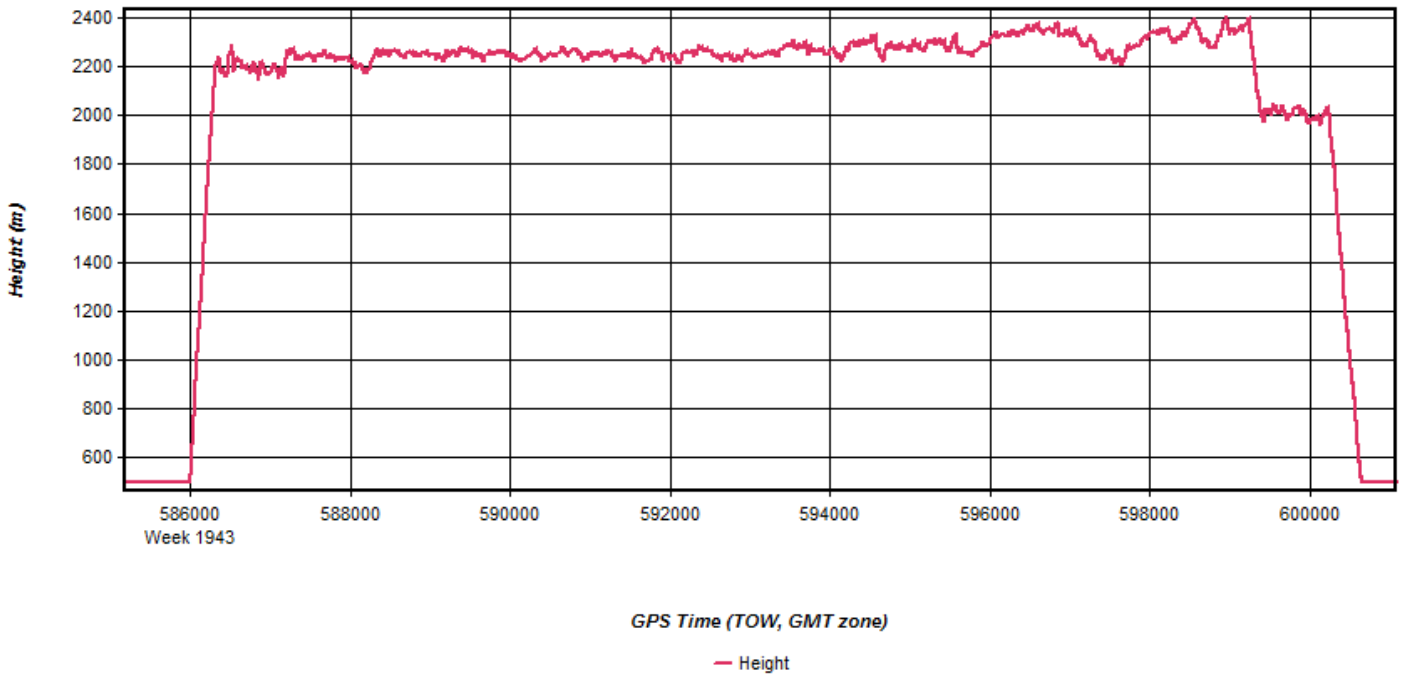
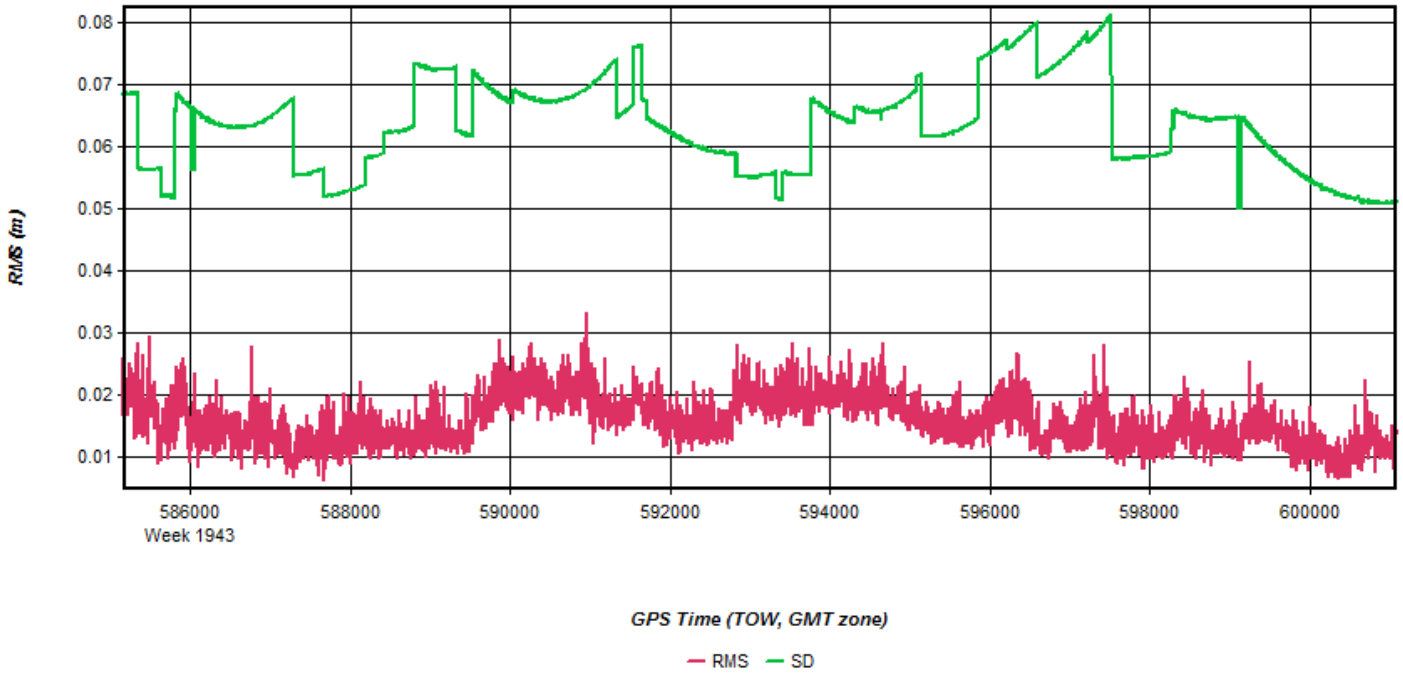
GPS Time (TOW, GMT zone)

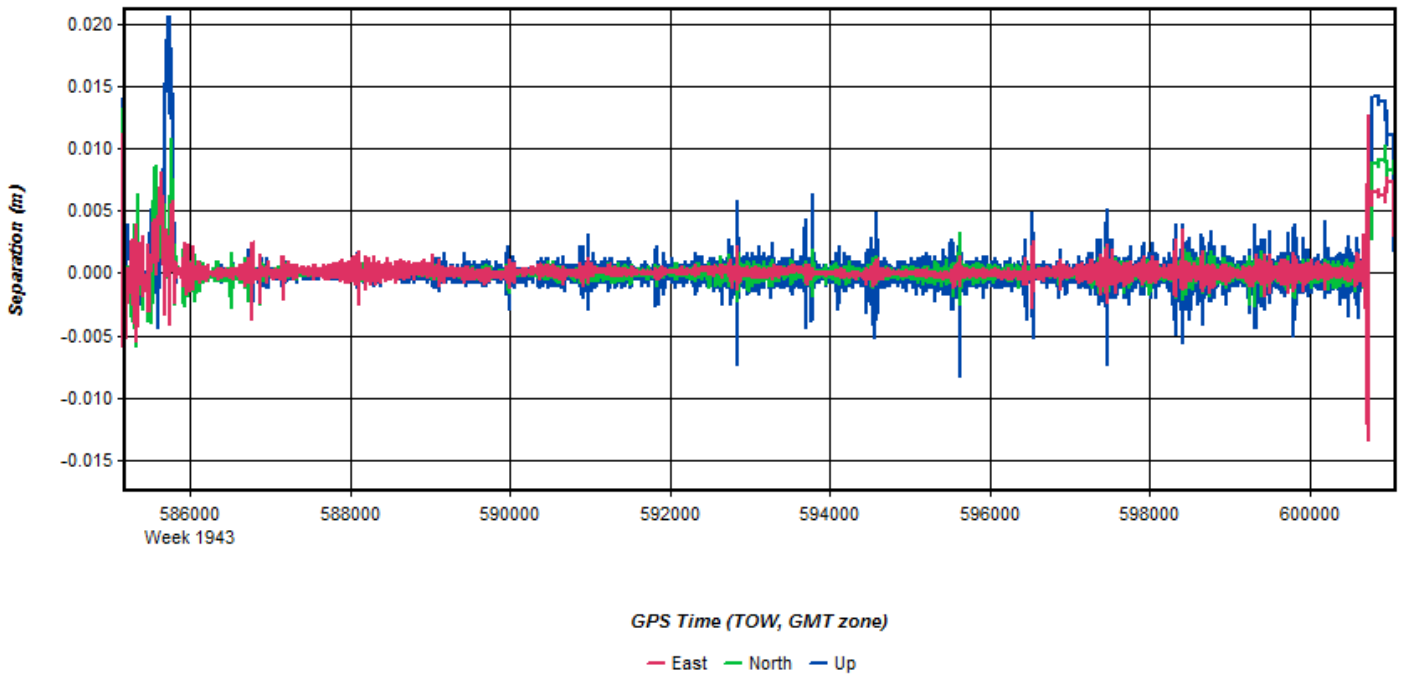
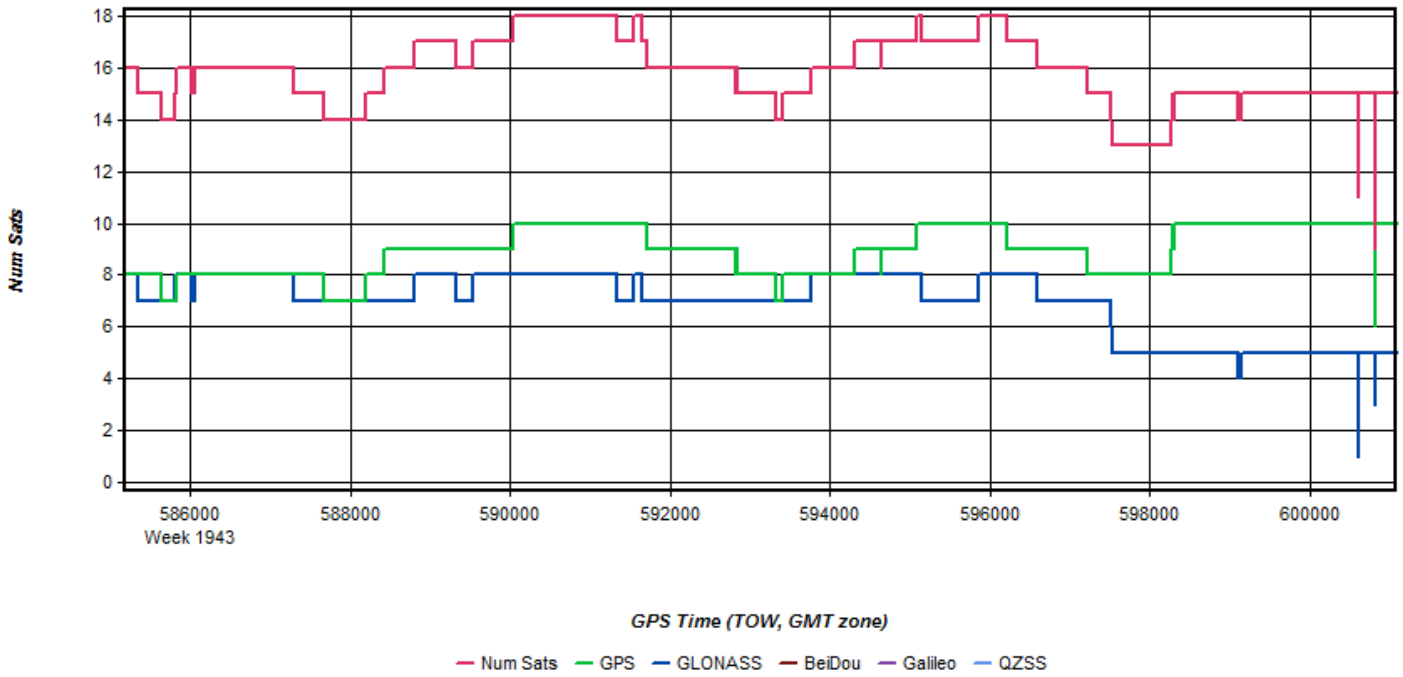
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

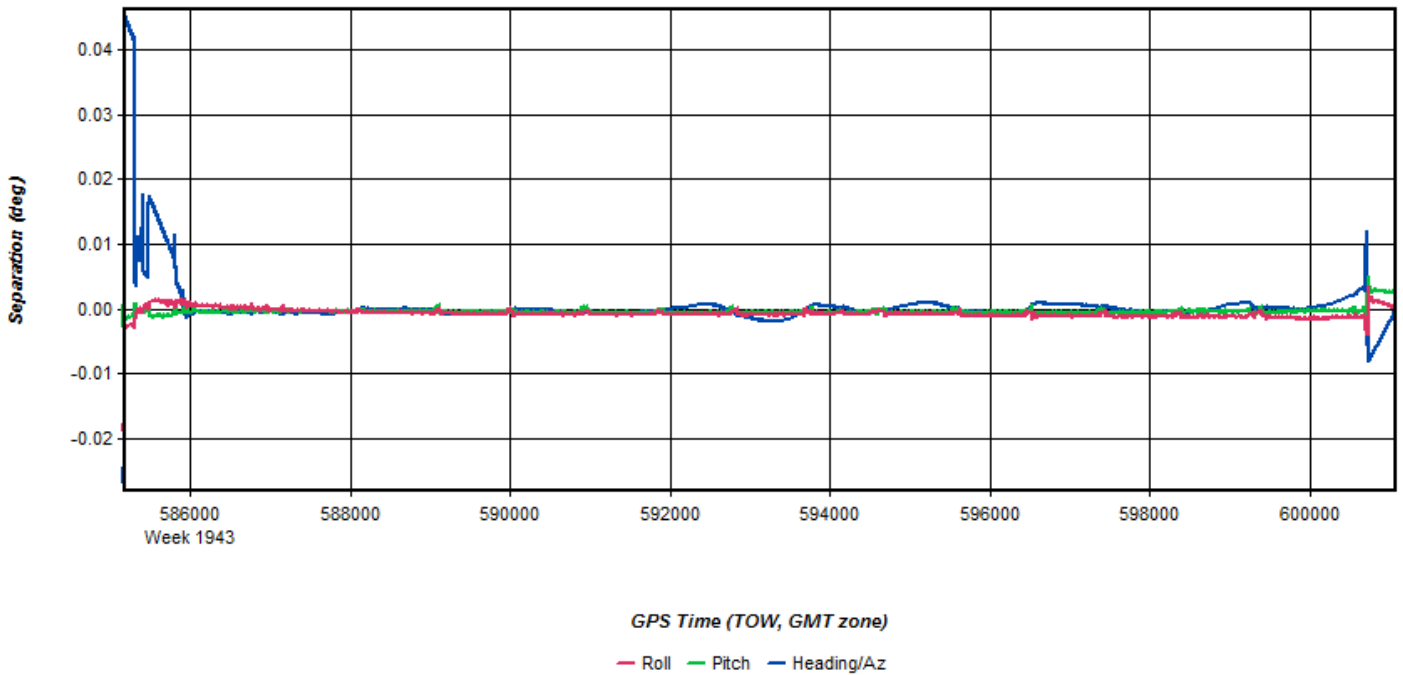
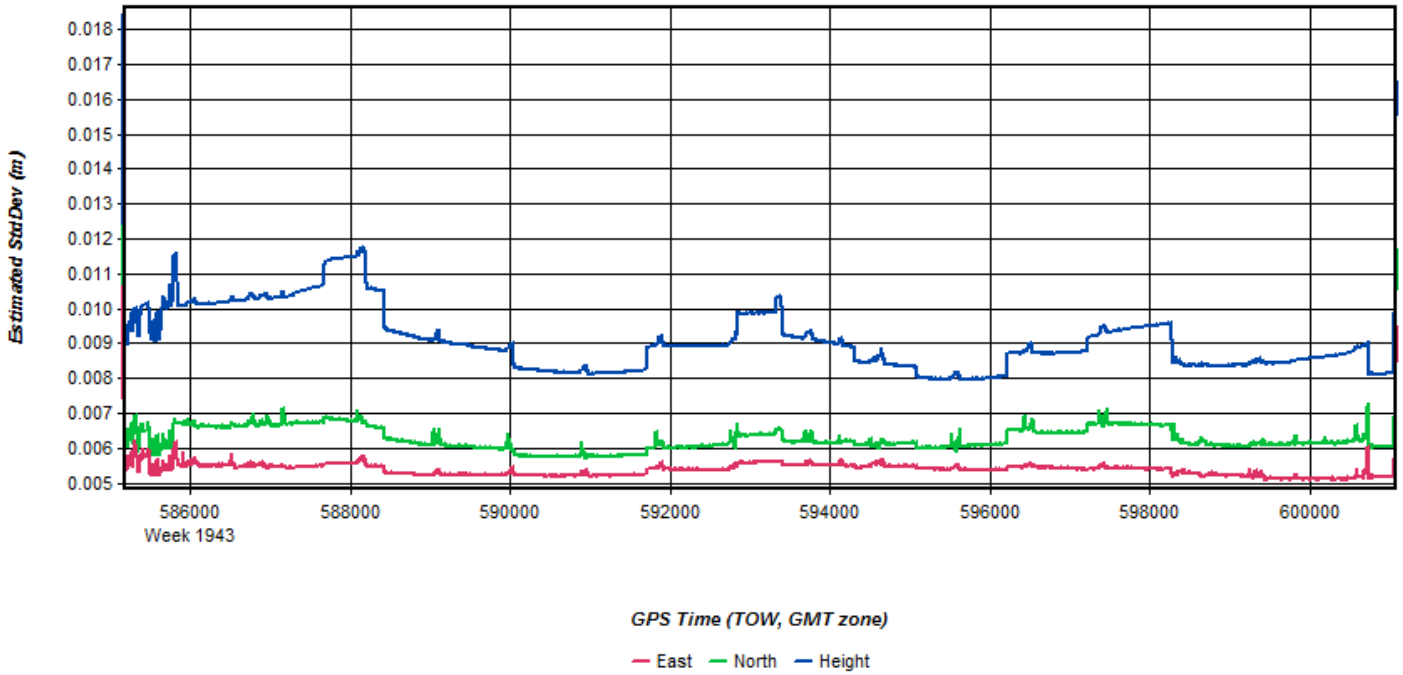


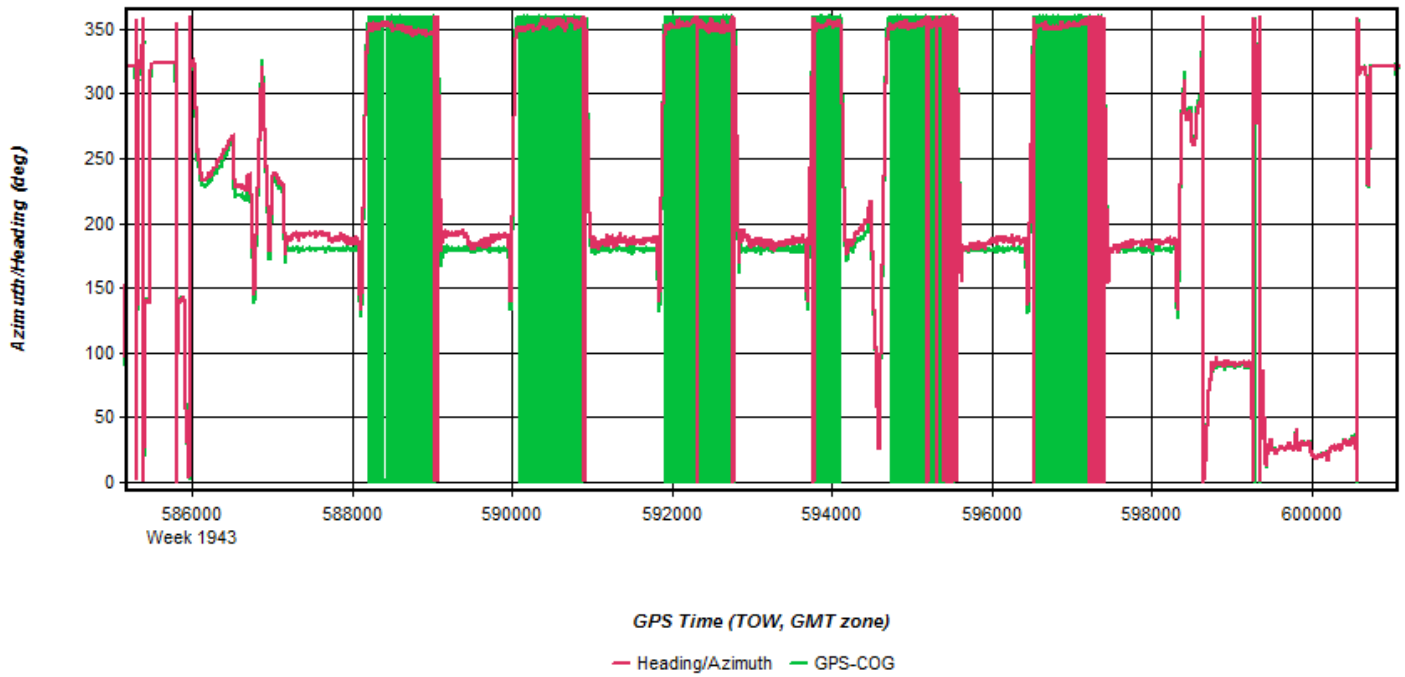
GPS Time (TOW, GMT zone)

— Roll — Pitch









Flight Log

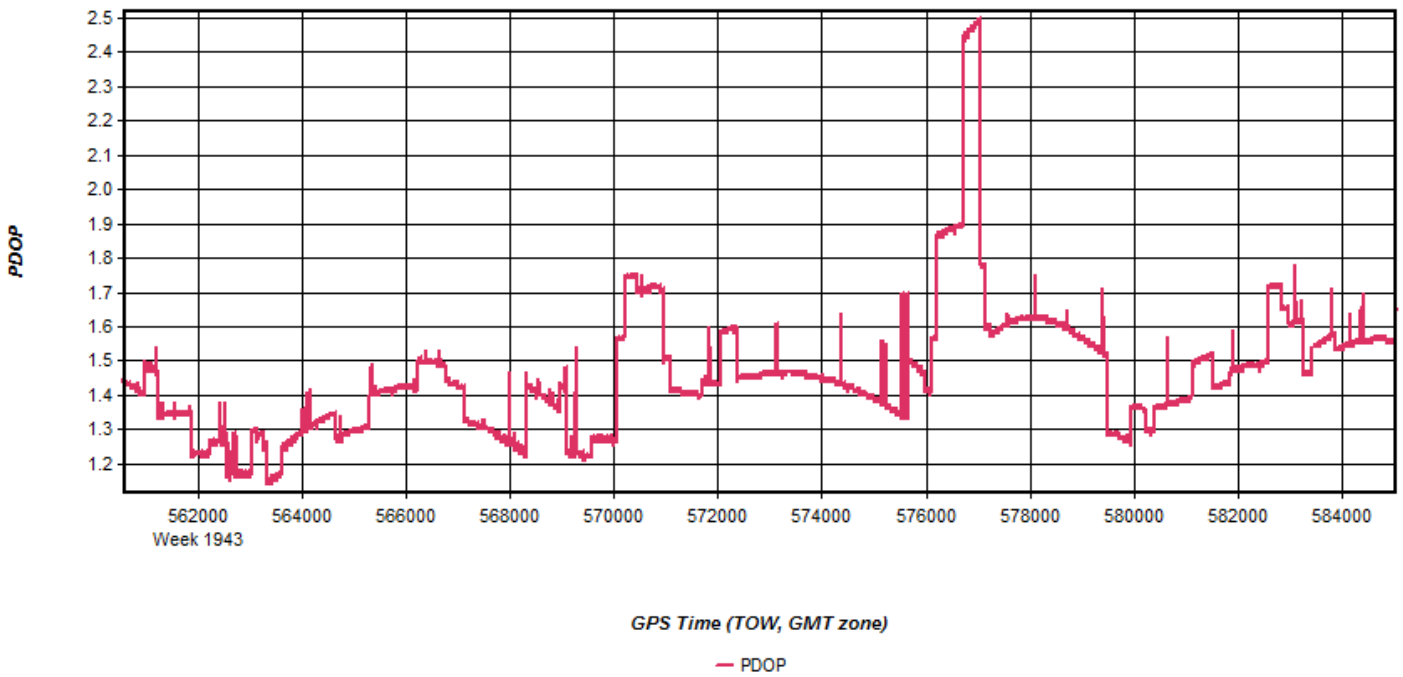
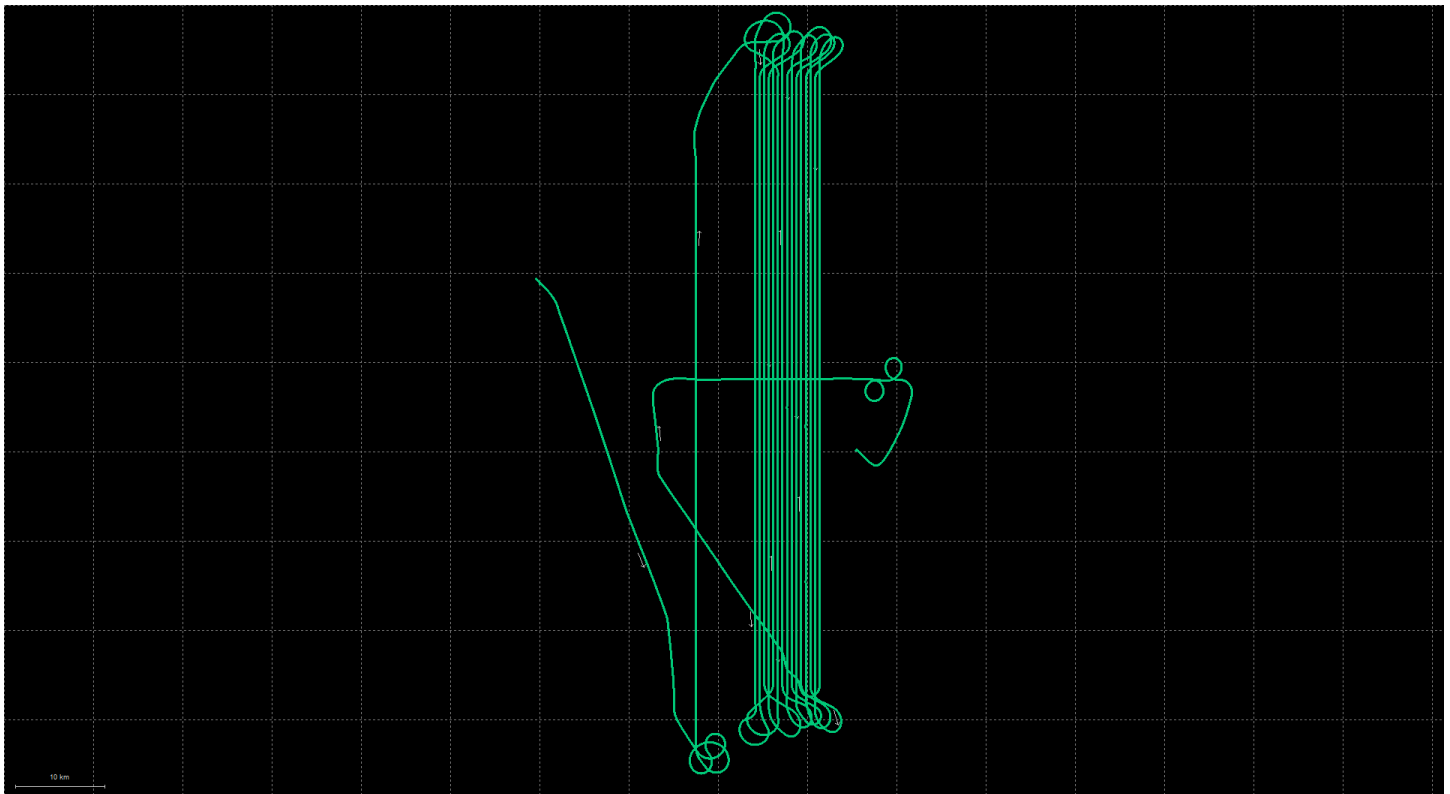
Quantum Spatial Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc Date: 4/8/2017

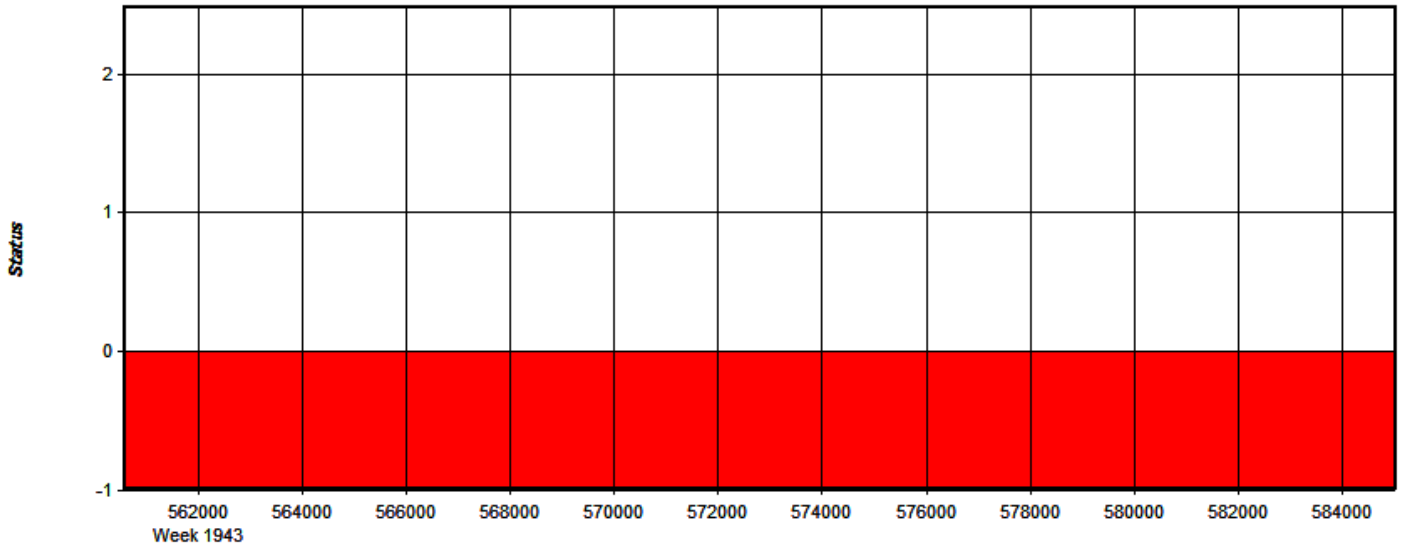
(email log data to flight_log_distribution_list@quantumspatial.com)

Project: NRCS_SD-LIDAR		Proj #: 30420		Flight Mgmt File: 30420-SD-ALS70SP3 (7xx)							
Aircraft: N73TM	Begin Hobbs: 66307	End Hobbs: 66348	Total: 4.1	Pilot: John Burham	Co-Pilot: Tech: Greg (TAS)						
Dep Apt: KPIR	Dep Time (Lcl): 1:45Z	18:45	Arr Apt: KPIR	Arr Time (Local): 5:51 (Z: 22:51)	Tot Time Aloft: 4:06						
CORS: Y/N		Sta 1:	Sta 2:	Flyovers: Y/N If Y, times: Sta1) Sta2)							
GPS Unit: Y/N		Sta 1: u965-SD-01	Sta 2: u965-SD-02	Flyovers: Y/N If Y, times: Sta1) Sta2)							
Gd Temp beg: °C		End: °C	OAT beg: °C	End: °C	Altimeter begin: end:						
LIDAR	Type: ALS70	Serial #: 7178	Alt AGL: 3200'	Alt AMSL: 7400'	Avg Terr. Ht: 4200'	Max Gdspd: 150	Avg Pct Spedng: 4	Reg CB: 172	Storage Name/ID: 7178		
	FOV: 28°	Scan Freq: 614z	MplA: Y/N	Pulsees in Air: 2	Pulse Rate: 3286	Power: 100%	PPPM: 4	End CB: 246	-5533		
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOV/Sec	GPS Altitude	Crs	Turb (ft/s)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.		
		18:57	19:03						Sturn		
725	S	19:08	19:21	135	1.2/17	7400'	1°	-	No 9. RI range readings		
724	N	19:23	19:37	135	1.2/17	7400'	1°	0	Eye Safety shut-off disabled		
723	S	19:39	19:53	137	1.2/18	7400'	1°	0			
722	N	19:55	20:08	132	1.1/20	7400'	2°	-			
721	S	20:10	20:23	130	1.1/19	7400'	1°	+	250' to west of Q to start		
720	N	20:25	20:37	127	1.2/18	7400'	1°	+	9. RI and Remenges appeared 10.0m FNE		
719	S	20:41	20:54	131	1.4/17	7400'	3°	+			
718	N	20:56	21:07	135	1.4/17				sensor recording stopped Midline? ; reflly		
718R	N	21:12	21:25	131	1.1/19	7500'	1°	-			
717	S	21:27	21:41	137	1.0/19	7450'	1°	+			
716	N	21:43	21:56	130	1.2/17	7500'	1°	-			
715	S	21:58	22:11	135	1.1/17	7400'	2°	+			
760	E	22:20	22:27	135	1.2/17	7700'	1°	0	CROSS TIE (planned)		
		22:27	22:30						Closest Sturn		
Total Proj Lines:		Lines Flown: 1		Lines Remain: 17		Online Time: 3:5		Mob Time: .6		Notes:	

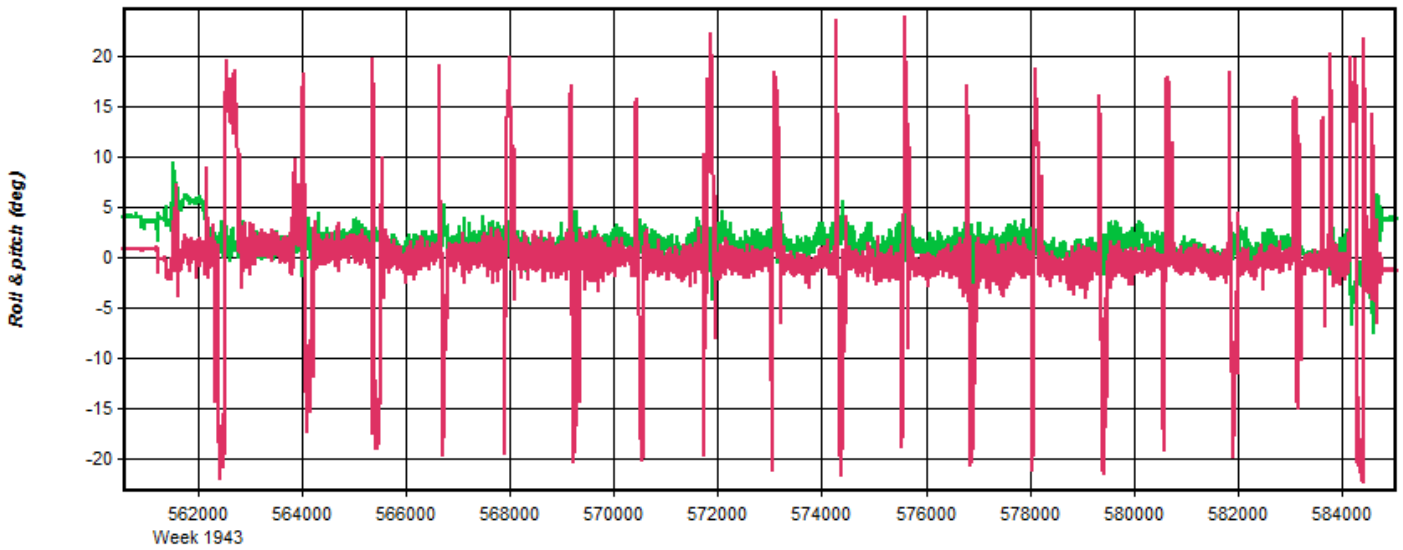
Scanned by CamScanner

April 8, 2017-A (N915WC, SN8237)

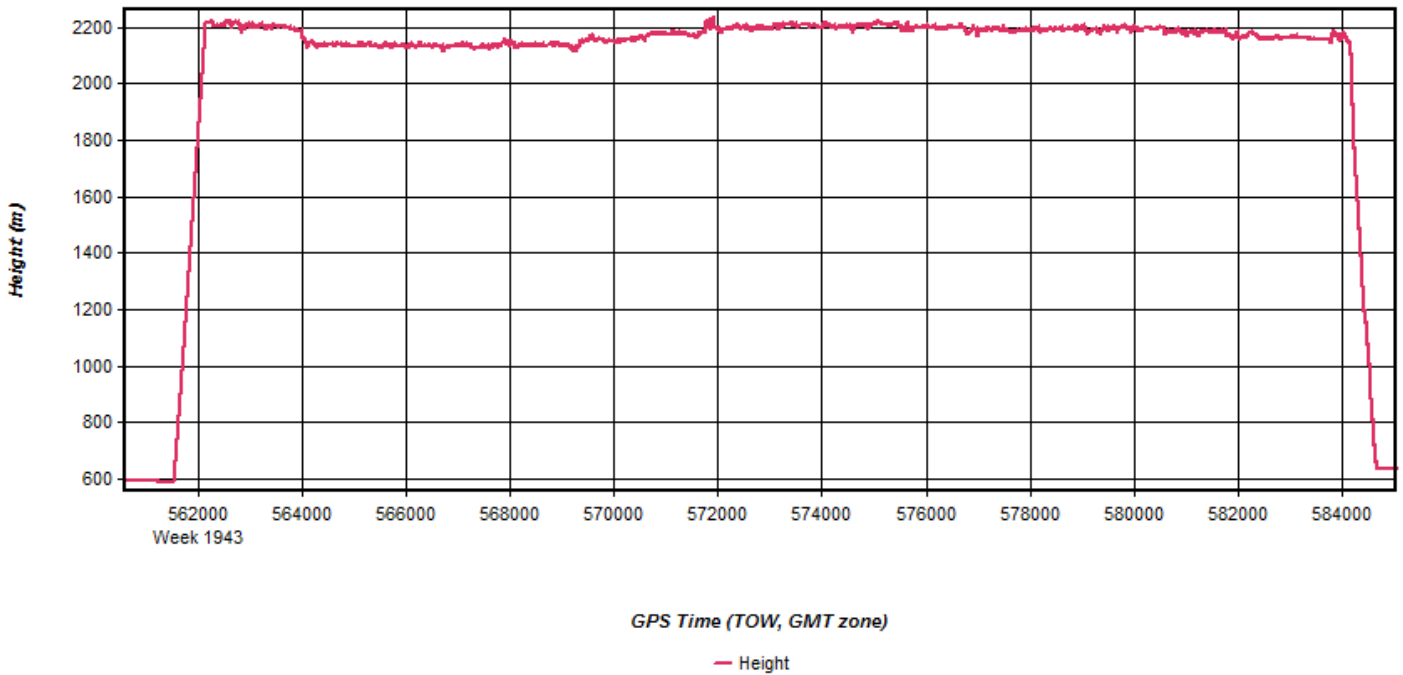
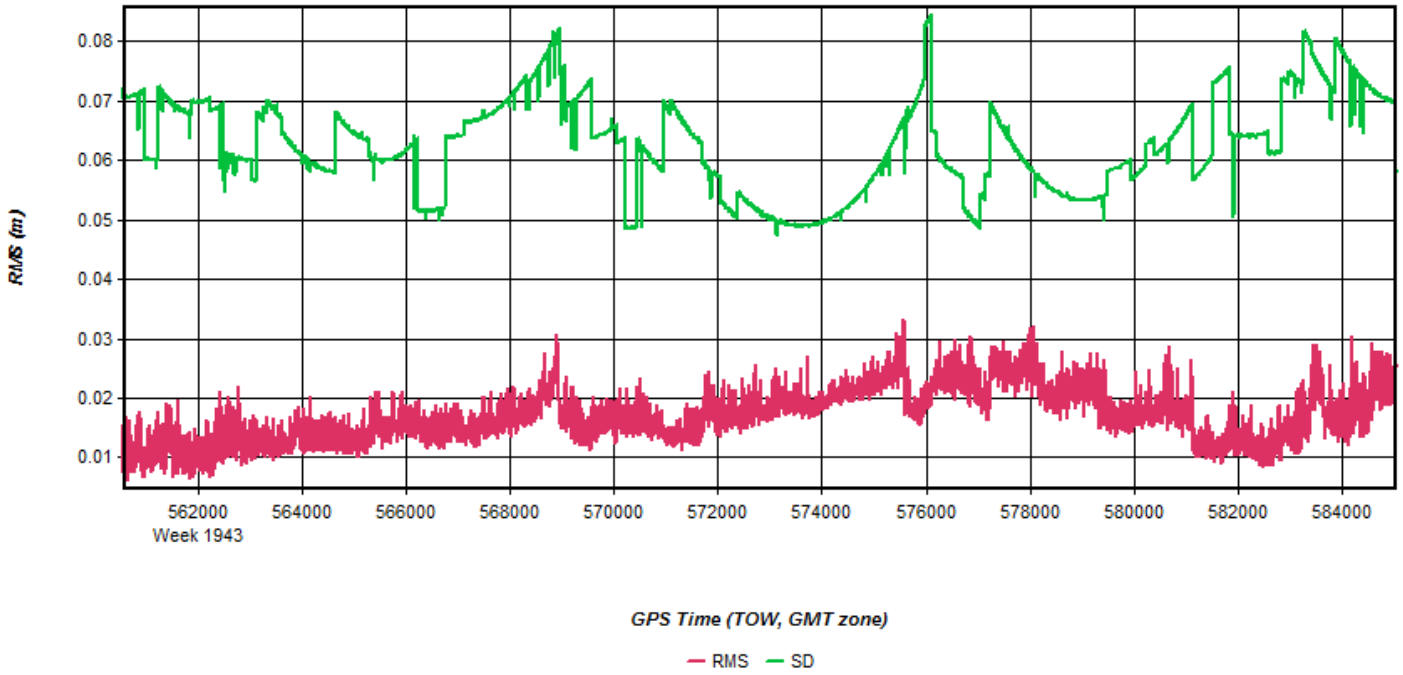


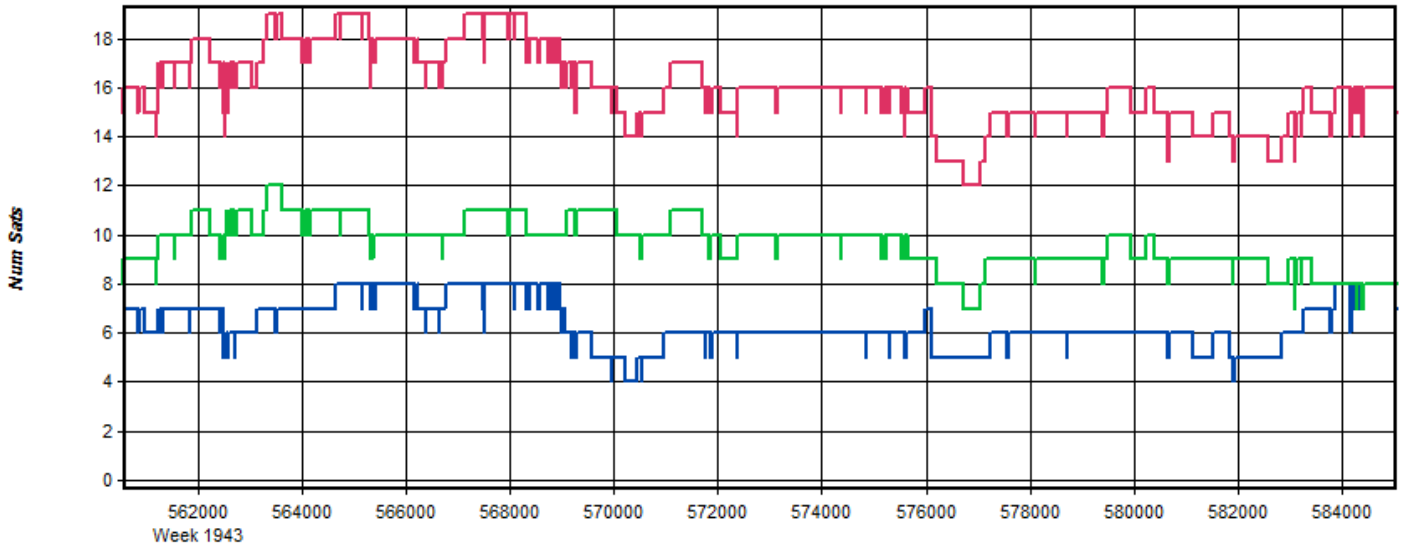


GPS Time (TOW, GMT zone)
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



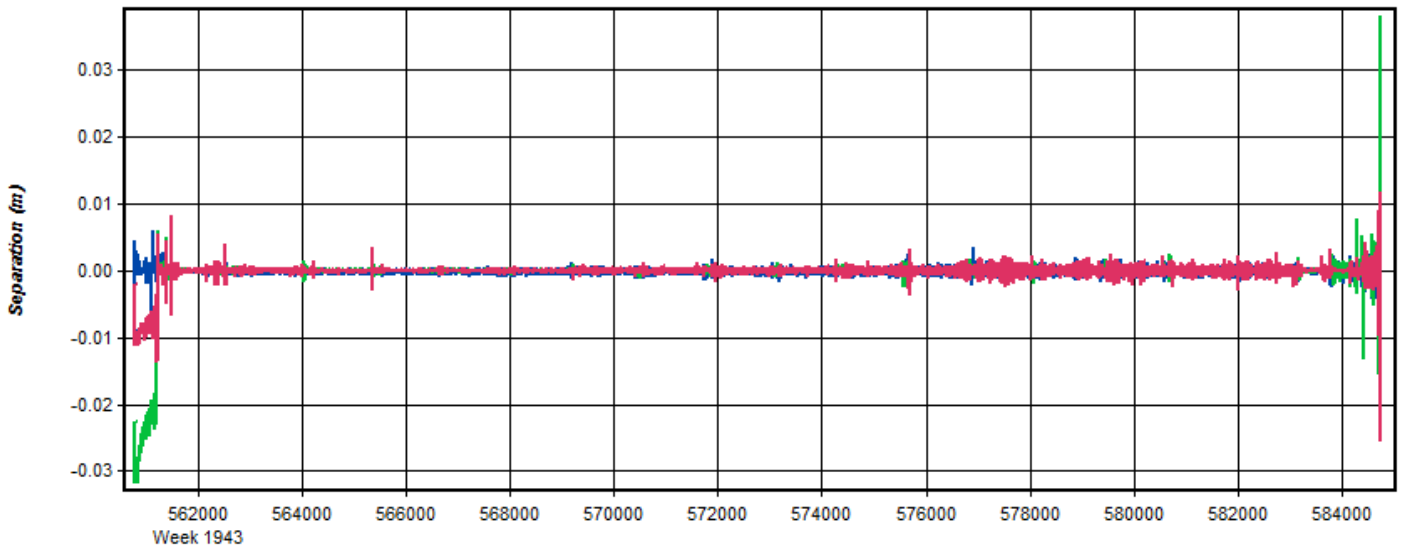
GPS Time (TOW, GMT zone)
— Roll — Pitch





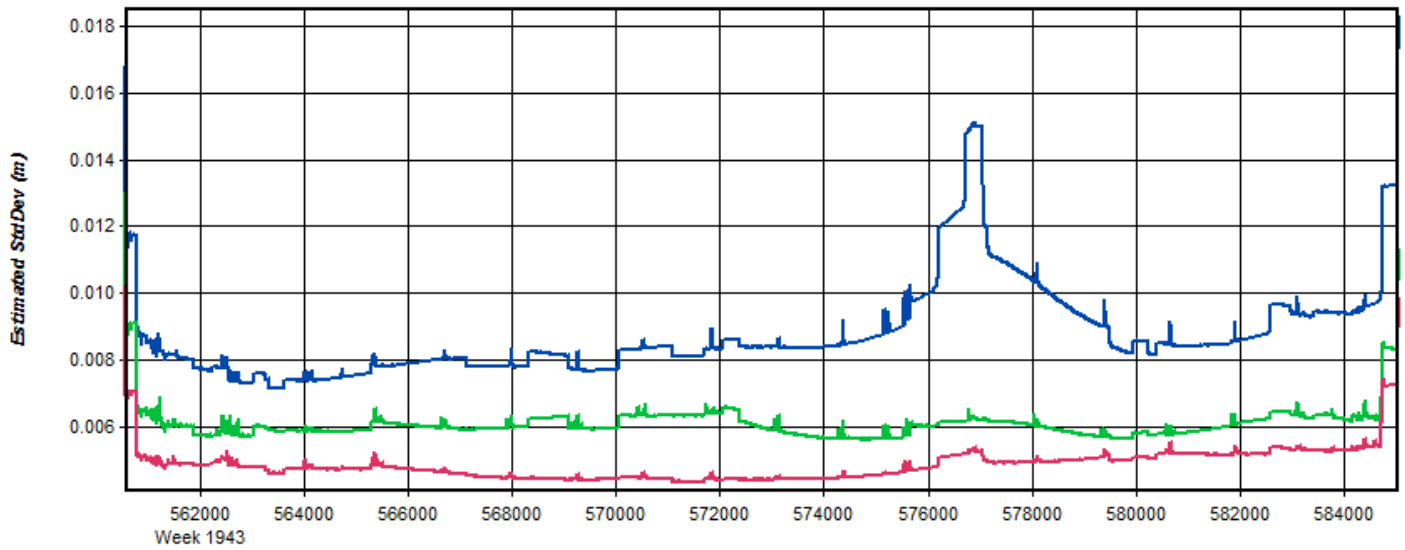
GPS Time (TOW, GMT zone)

— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS

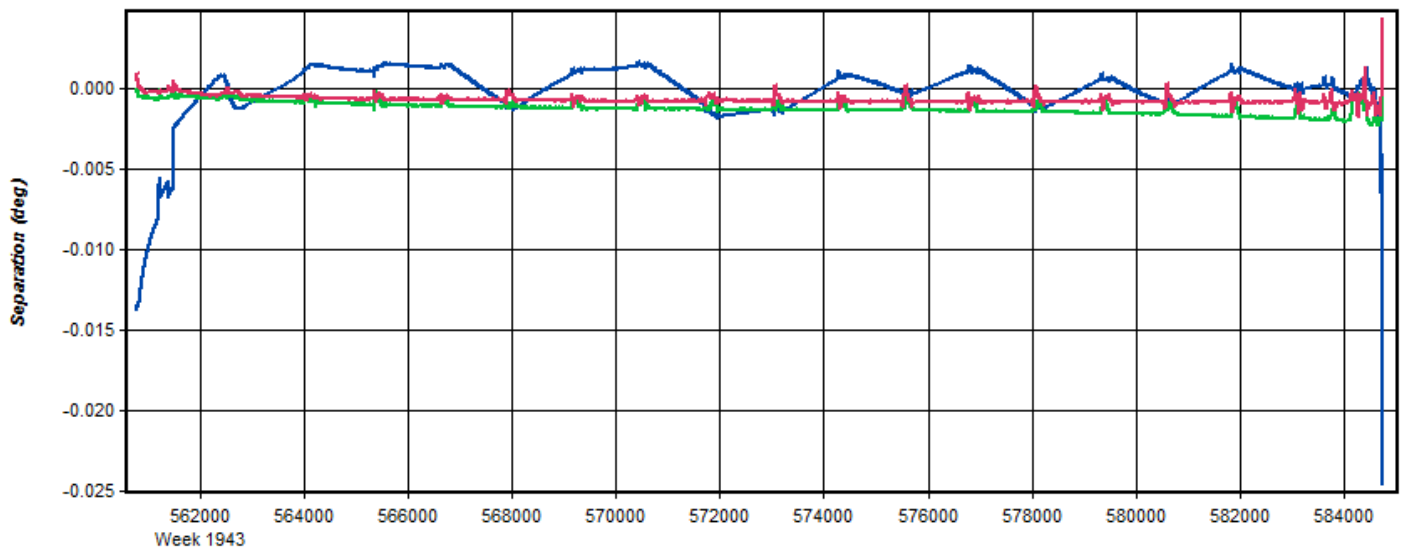


GPS Time (TOW, GMT zone)

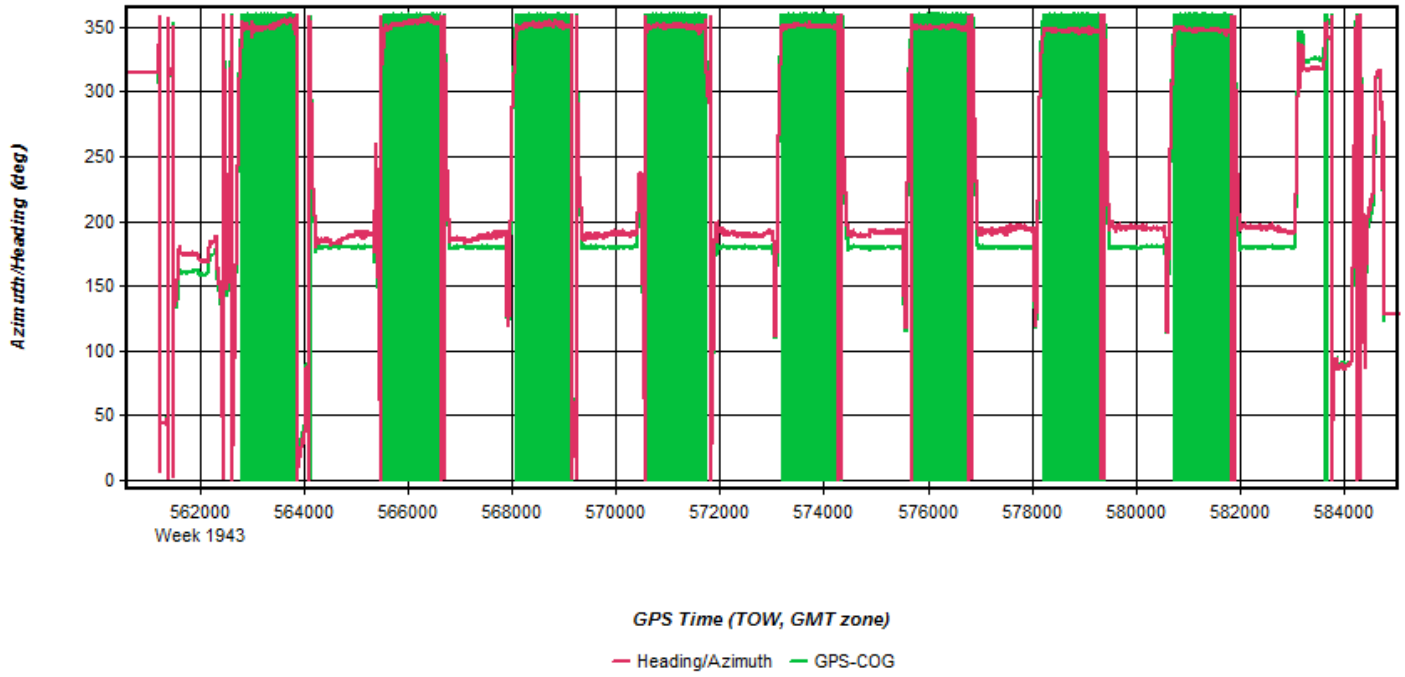
— East — North — Up



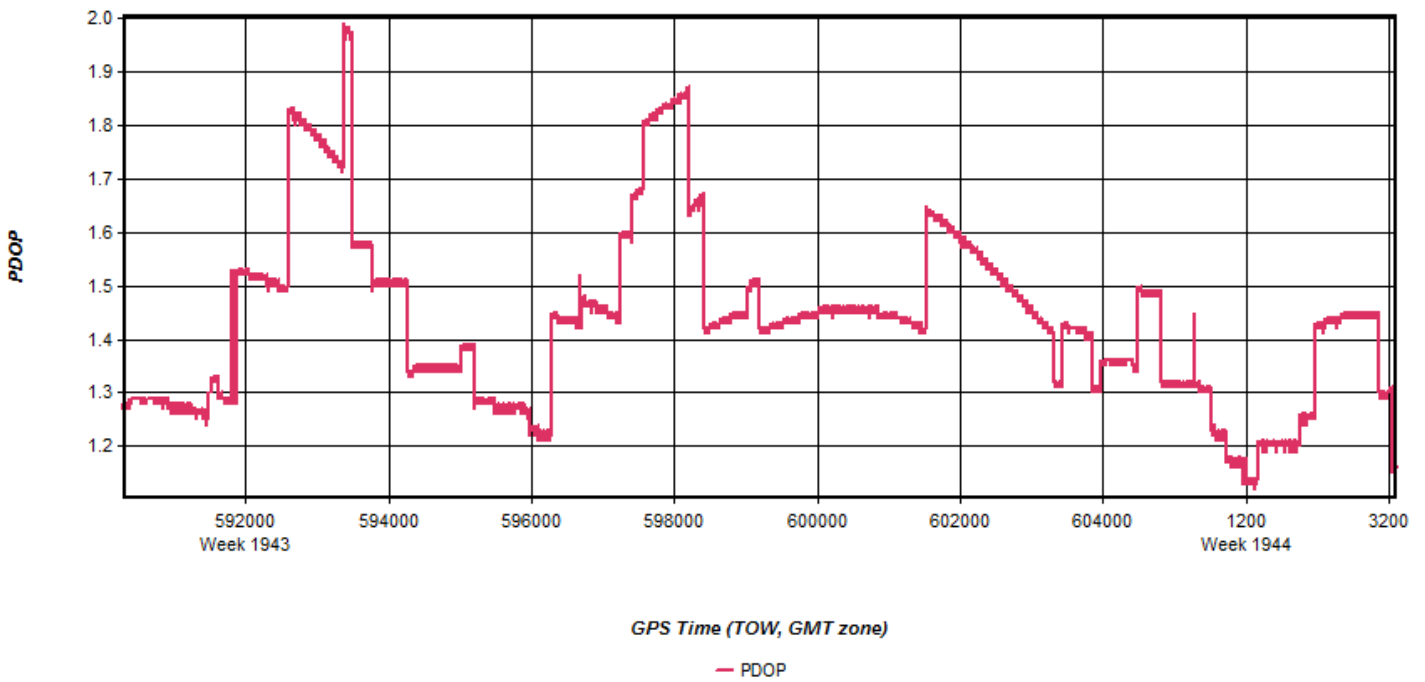
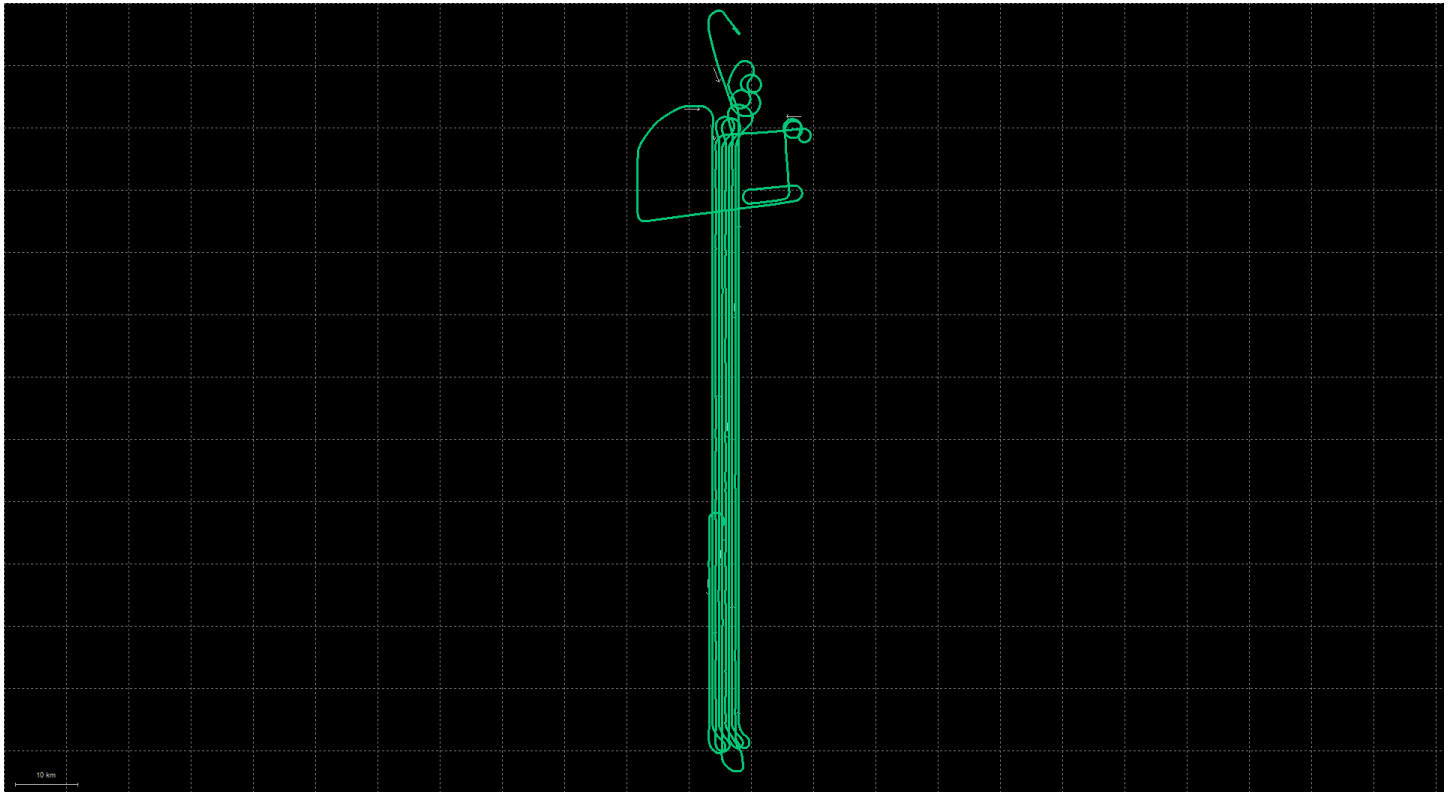
GPS Time (TOW, GMT zone)
— East — North — Height

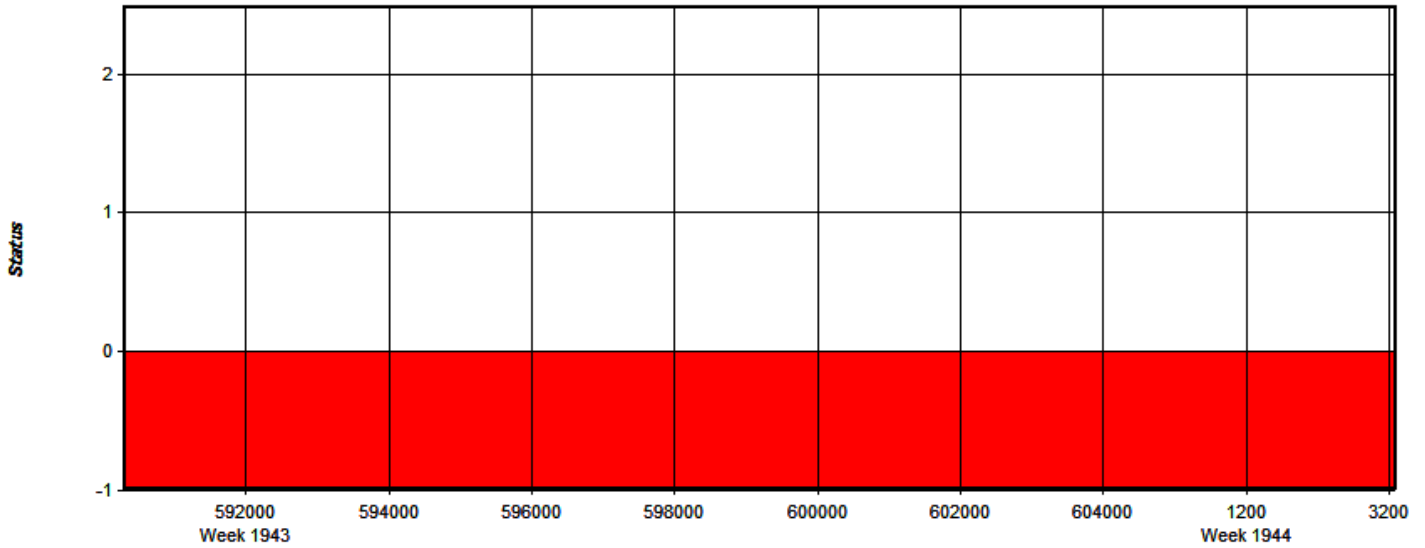


GPS Time (TOW, GMT zone)
— Roll — Pitch — Heading/Az

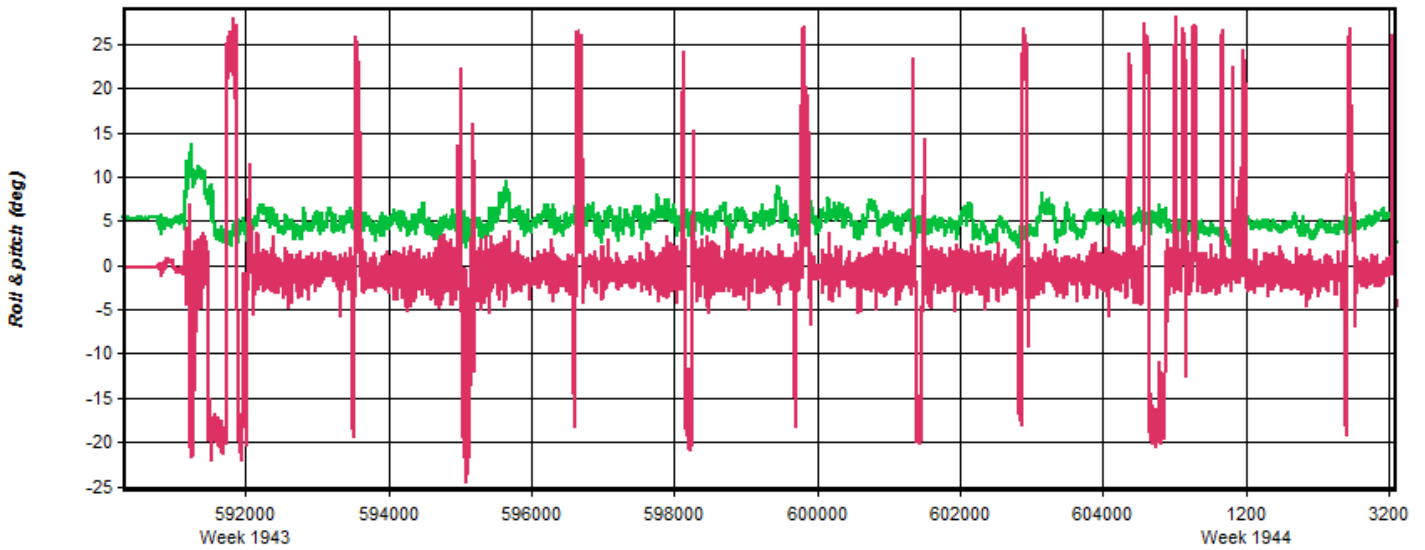


April 8, 2017-B (N246MP, SN8227)

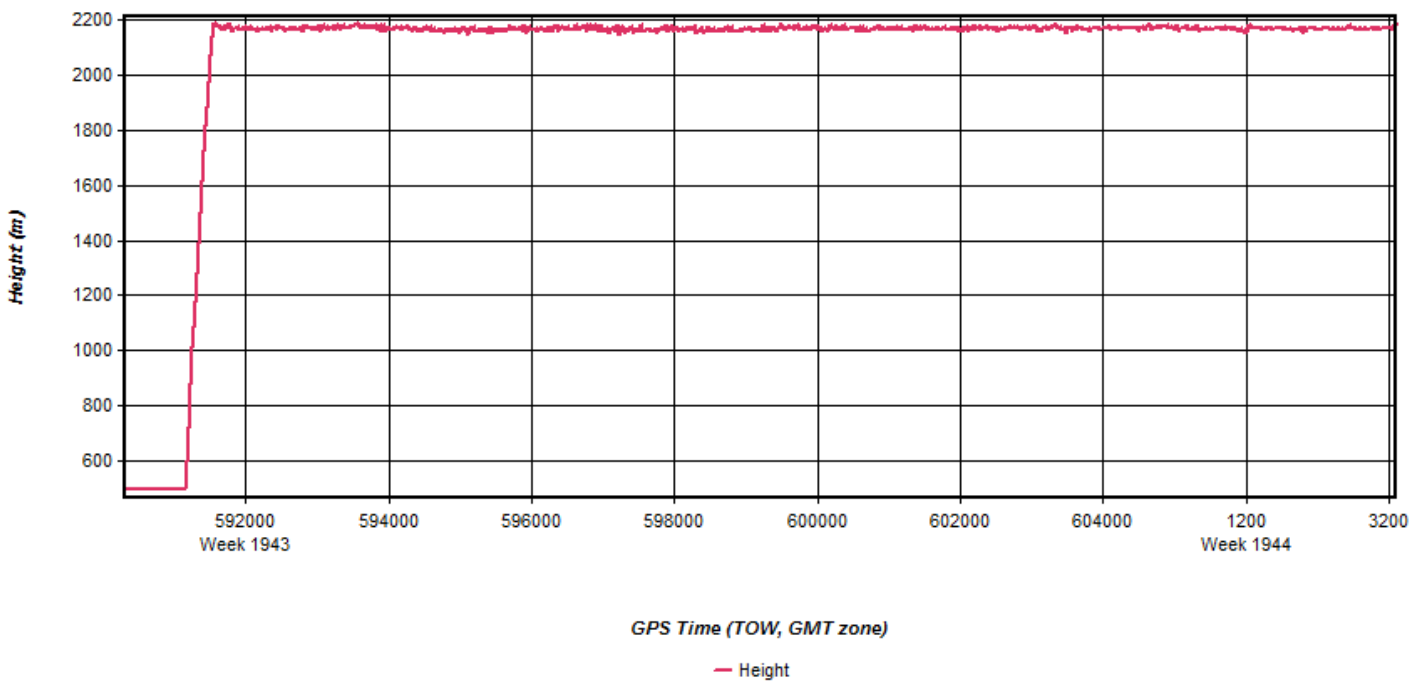
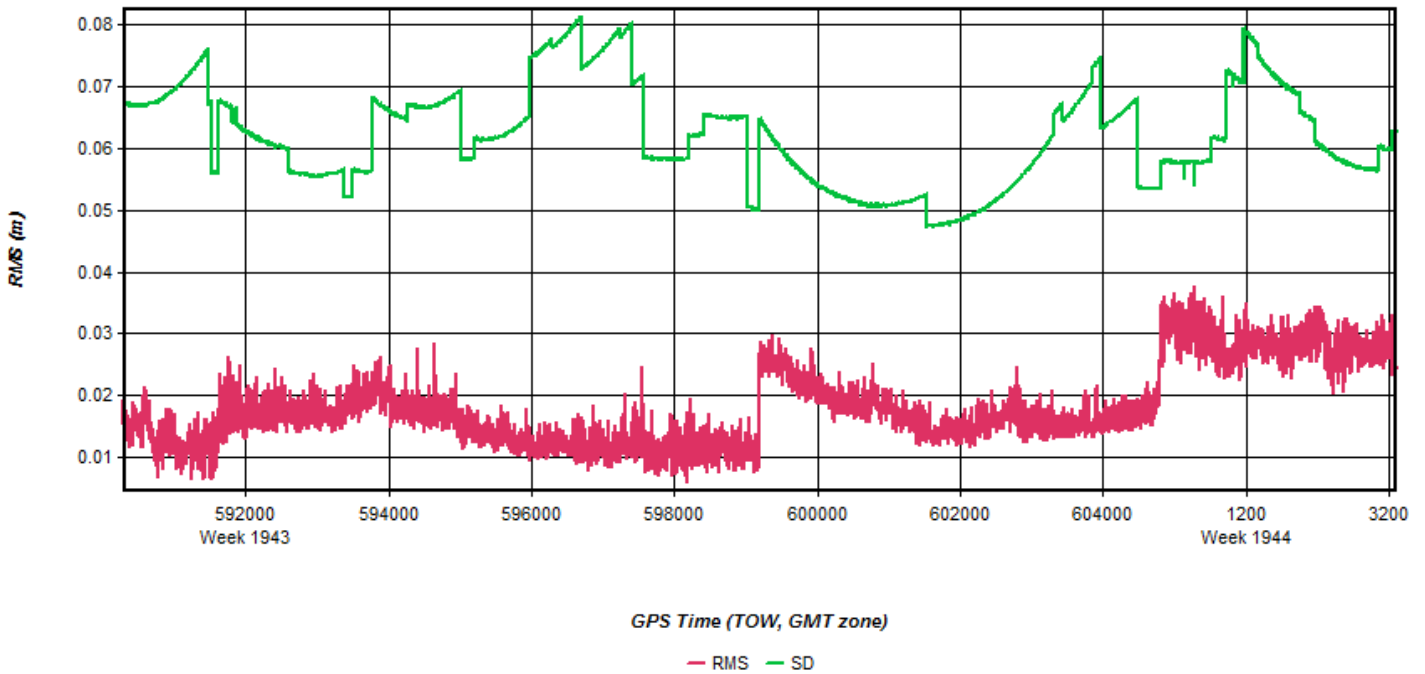


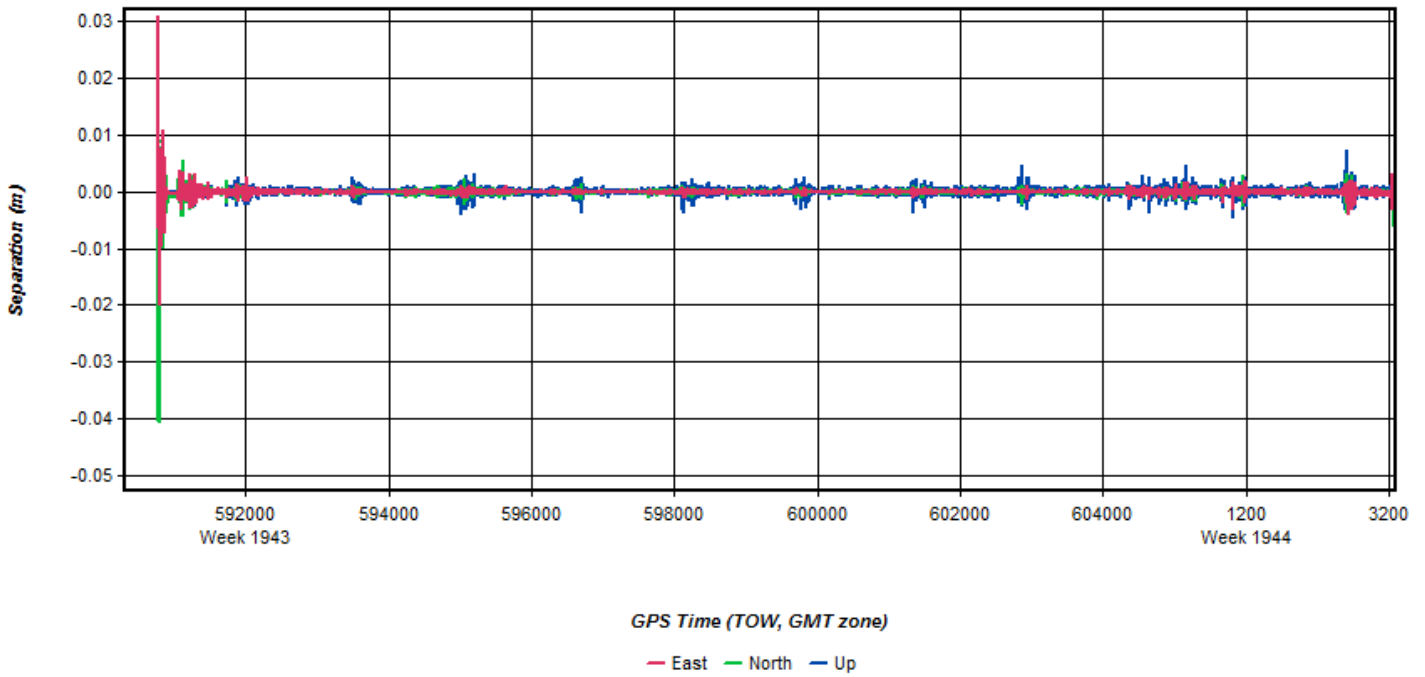
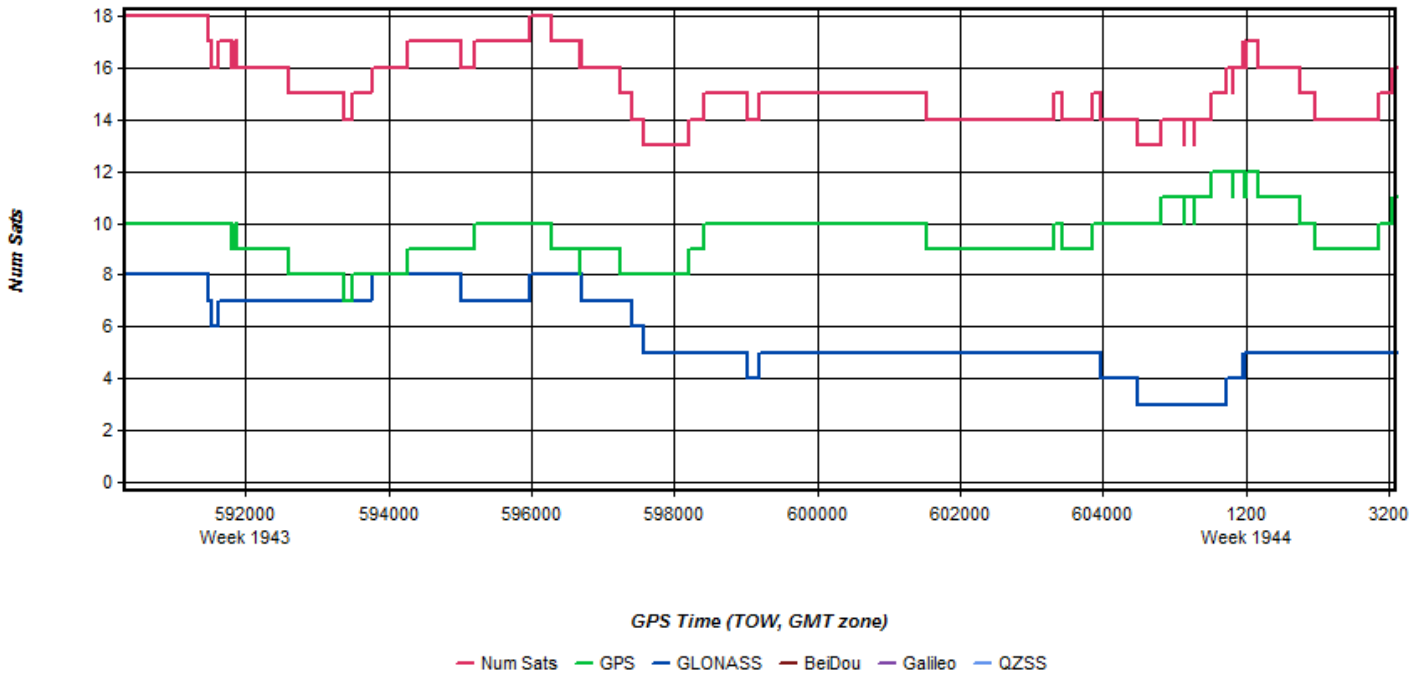


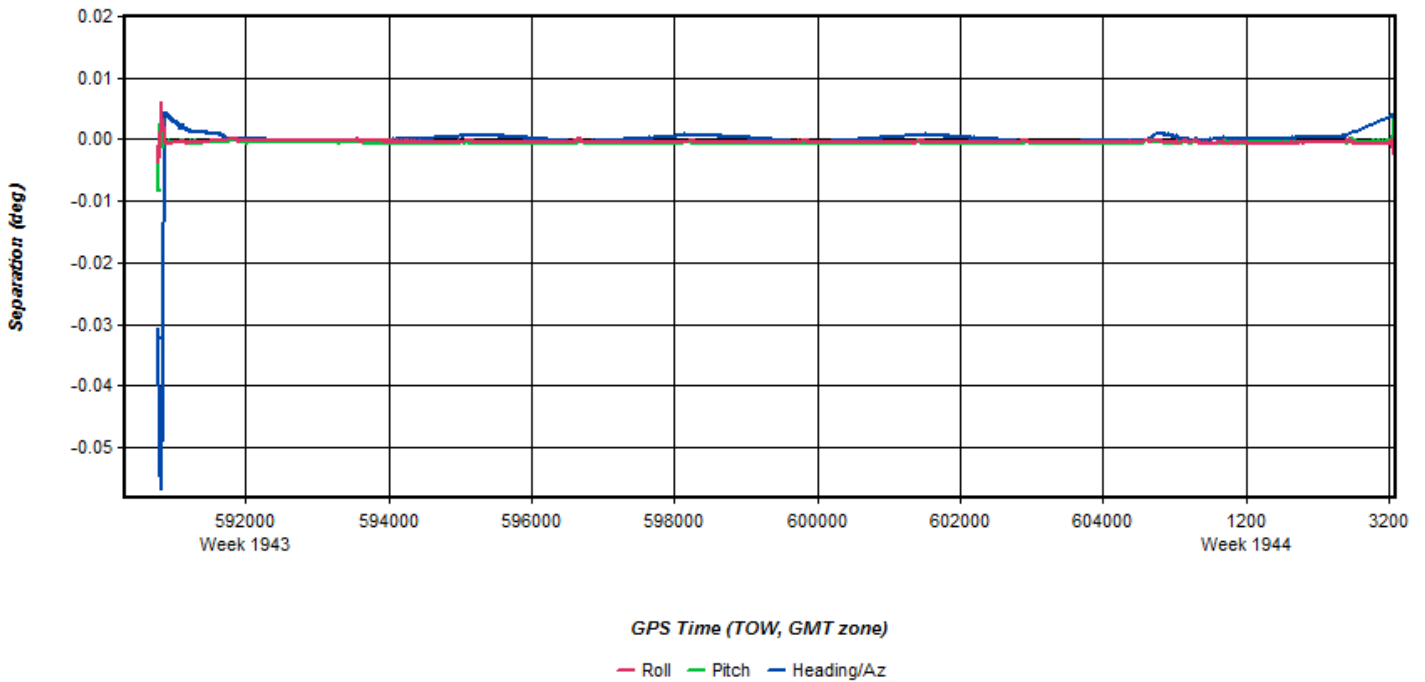
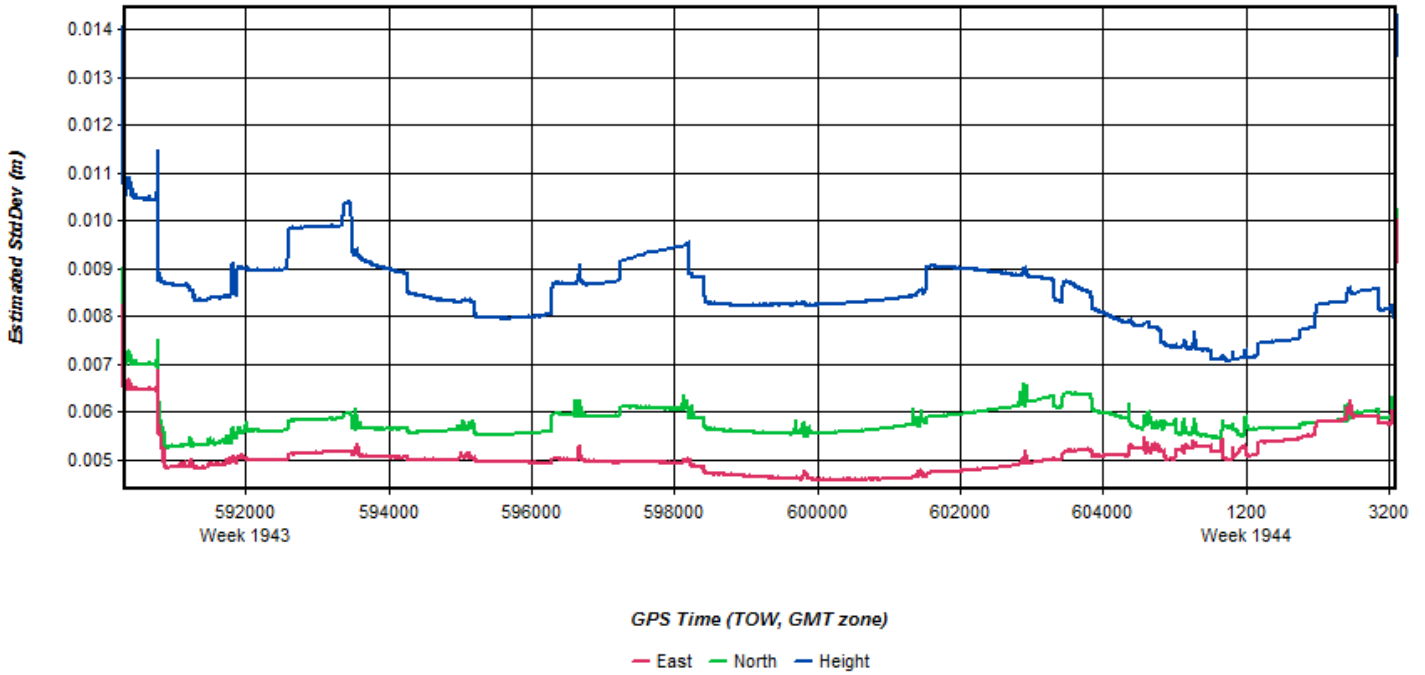
GPS Time (TOW, GMT zone)
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

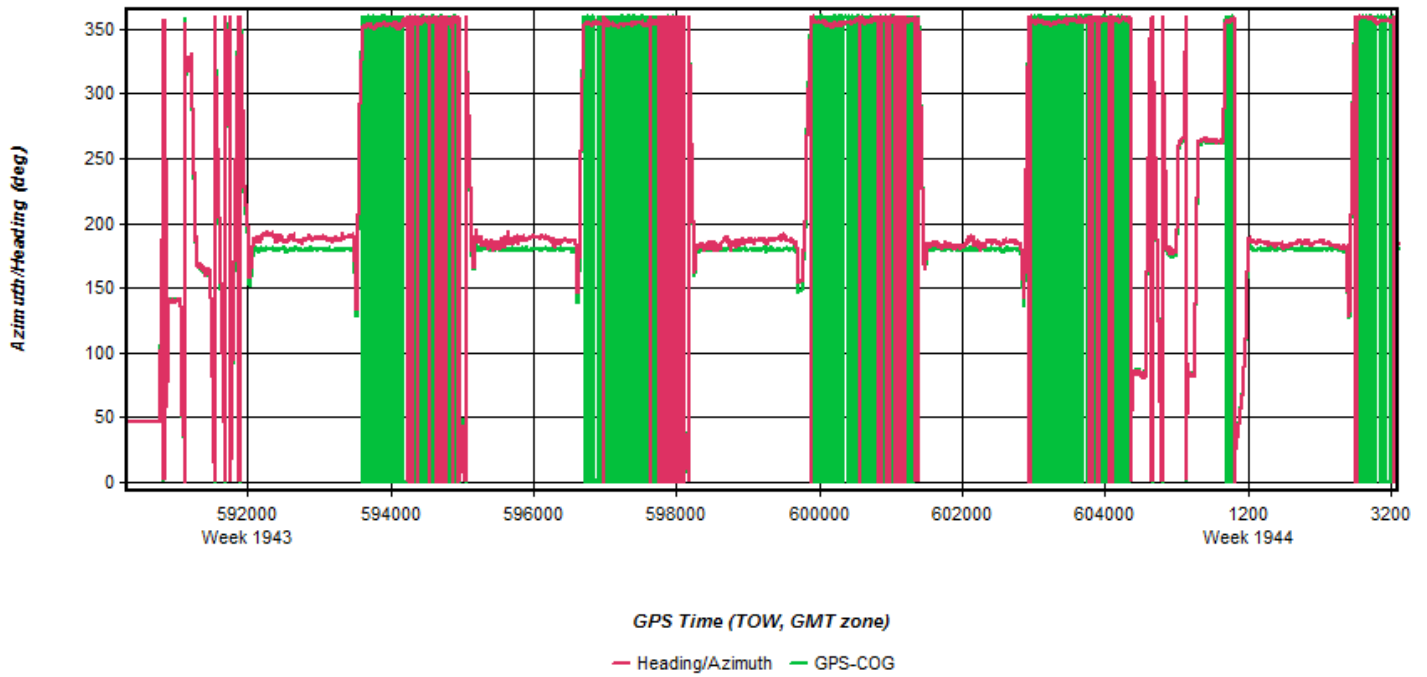


GPS Time (TOW, GMT zone)
— Roll — Pitch









Flight Log

Date: 04/08/2017
UIC: A D C D E Pg 1 of 1

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: **NRCS SD** Proj #: **30420** Flight Mgmt File: **30420_SD-ALS80** Tech: **SWINFORD**

Aircraft: **N246MP** Begin Hobbs: **1403.8** End Hobbs: **1409.7** Total: **5.9** Pilot: **McDONALD** Co-Pilot: **SWINFORD**

Dep Apt: **KPIR** Dep Time (Local): **3:10 PZ** Arr Apt: **KPIR** Arr Time (Local): **9:20 PZ** Tot Time Aloft: **5.9**

CORS: **ON** Sta 1: **Static 5min** Sta 2: **Static** Flyovers: **Y 10** IF Y, times: **Sta 1** **Sta 2**

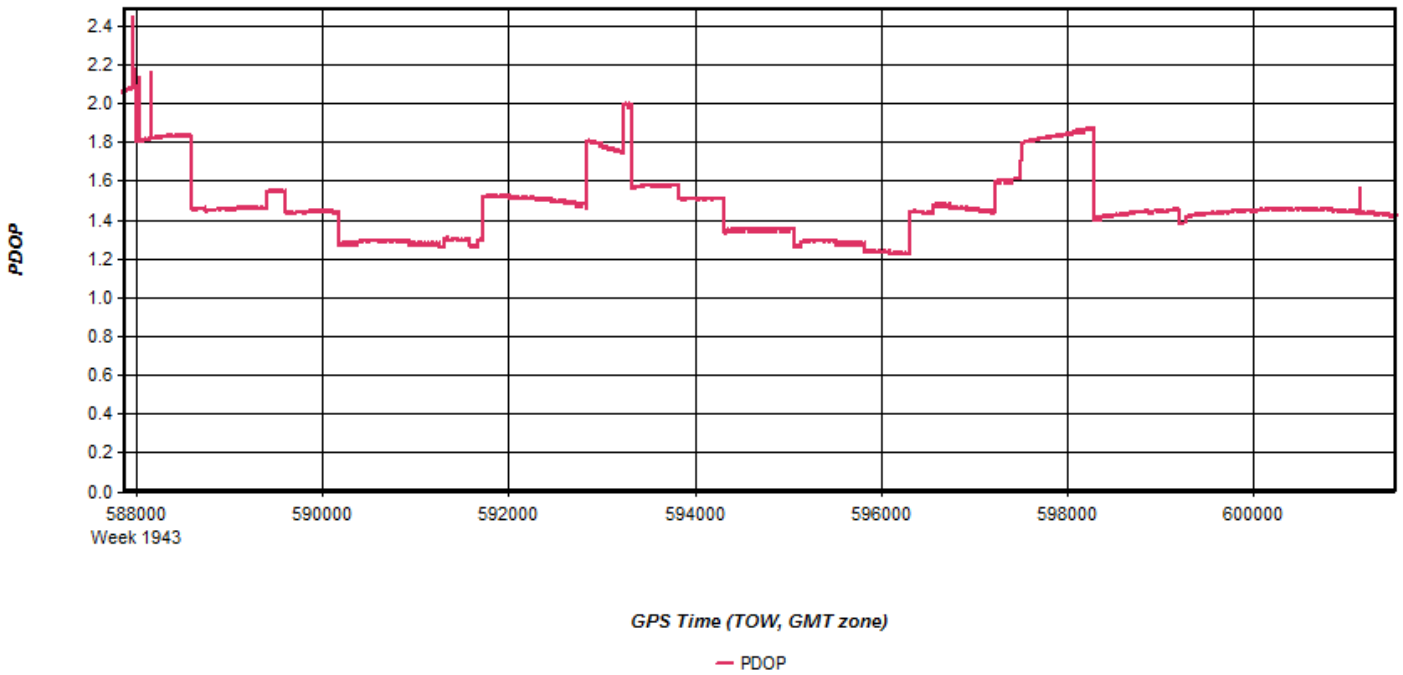
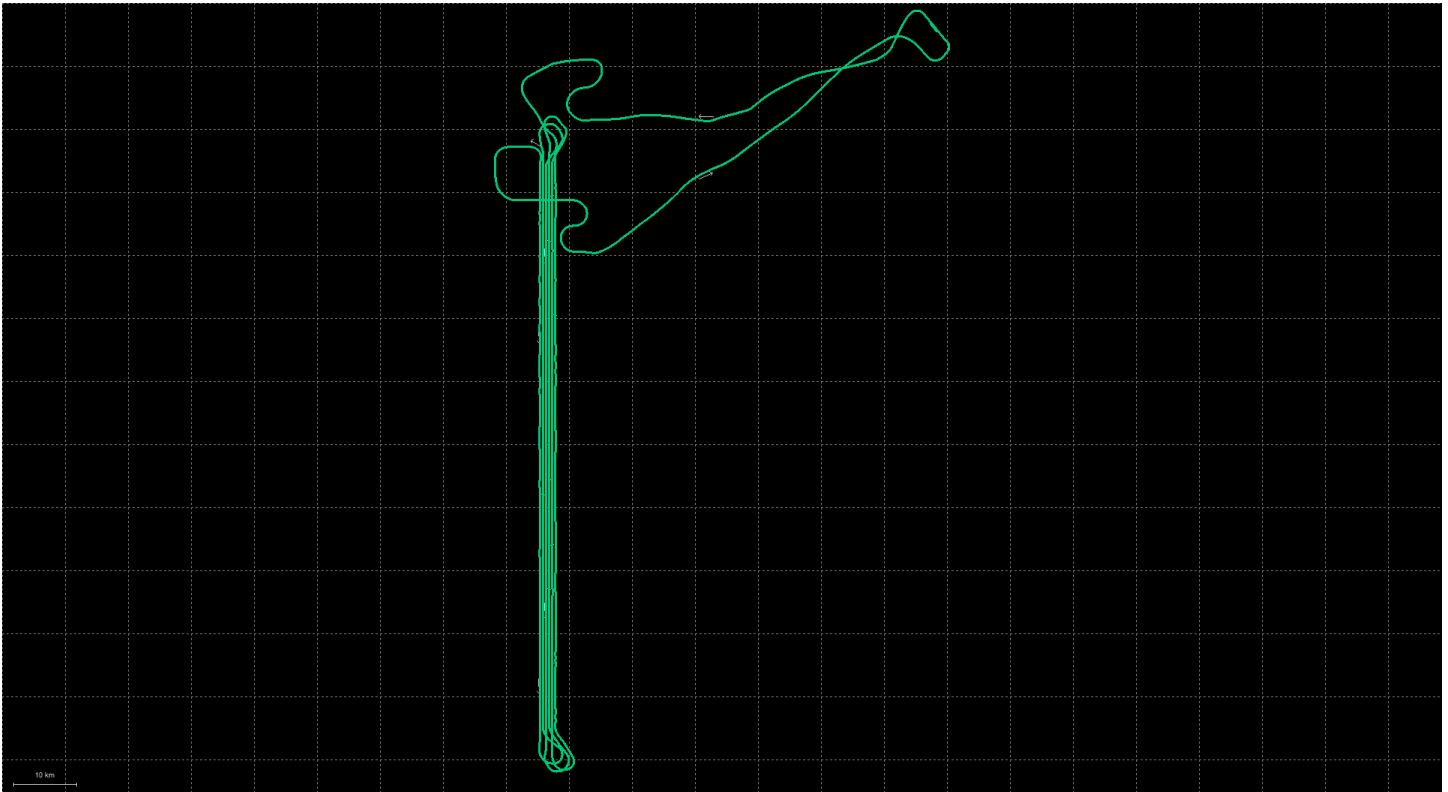
GPS Unit: **ON** Sta 1: **Static 5min** Sta 2: **Static** Flyovers: **Y 10** IF Y, times: **Sta 1** **Sta 2**

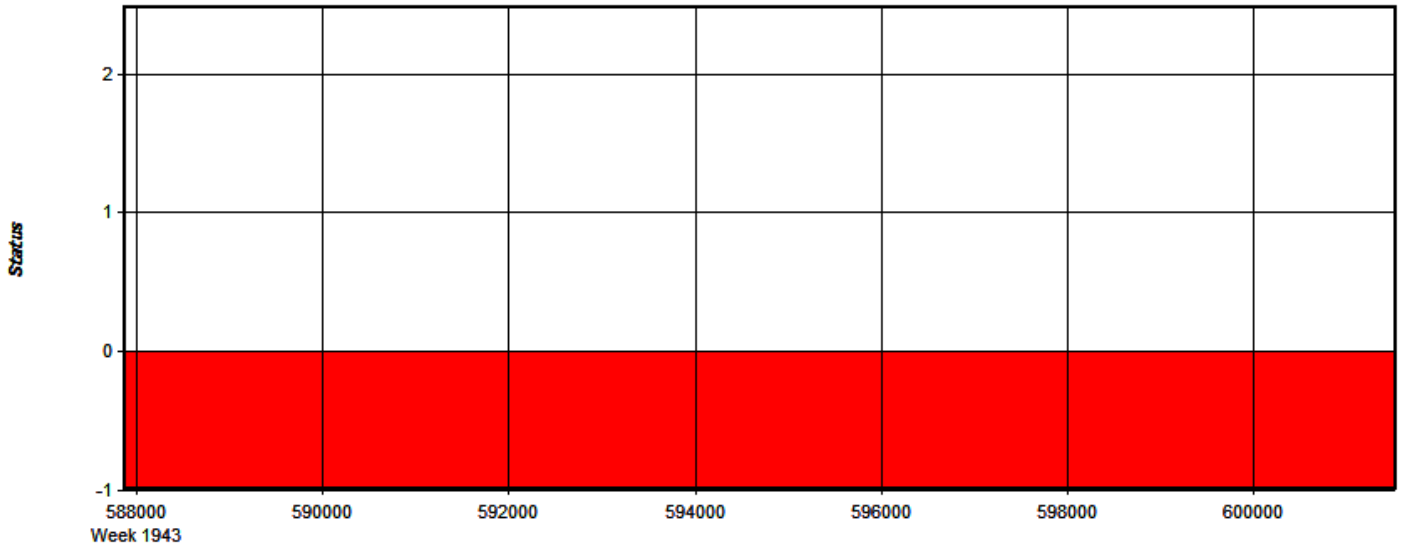
Gd Temp beg:		°C		End:		°C		OAT beg:		°C		End:		°C		Altimeter begin:		end:		Range Name	
Type	ALS 80	Serial #	8227	Alt AGL	Alt ANSL	Pulse Rate	328	Max Gdspd	130	Avg Ft Spacing	130	Power	100	IFPH	IFPH	IFPH	IFPH	IFPH	IFPH	IFPH	IFPH
FOV	28	Scan Freq	48	MpIA	Y	I	N	Pulse In Air	328	Pulse Rate	328	Power	100	IFPH	IFPH	IFPH	IFPH	IFPH	IFPH	IFPH	IFPH

Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	Alt AGL	Alt ANSL	Pulse Rate	MpIA	Y	I	N	Pulse In Air	GPS Altitude	Crab	Turb (0-3)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.					
154	175	20:30	20:51	131	1.2/20	7100	131	1.2/20	7100			131	7100		0	- FIG 8 @ 20:26 / VERY LIGHT TURB.					
153	355	20:54	21:16	136	1.2/18	7100	136	1.2/18	7100			136	7100		0	- LIGHT TURB. / CLOSE FILE					
152	175	21:20	21:43	131	1.1/21	7100	131	1.1/21	7100			131	7100		0	- LOAD FILE / LIGHT TURB.					
151	355	21:47	22:09	133	1.1/19	7100	133	1.1/19	7100			133	7100		0	- CLOSE FILE					
150	175	22:12	22:35	132	1.2/20	7100	132	1.2/20	7100			132	7100		0	- LOAD FILE					
149	355	22:38	23:02	135	1.2/19	7100	135	1.2/19	7100			135	7100		0	- CLOSE FILE					
148	175	23:06	23:27	137	1.2/18	7100	137	1.2/18	7100			137	7100		0	- Fly to East to get next GPS MIDNIGHT					
147	355	23:31	23:53	134	1.1/19	7100	134	1.1/19	7100			134	7100		0	- UNPLANNED X-FLIGHT / RESTART X-FLIGHT / CLOSE FILE					
X-FLY	265	00:08	00:14	133	1.0/21	7100	133	1.0/21	7100			133	7100		0	- LOAD FILE					
146	175	00:20	00:43	140	1.1/20	7100	140	1.1/20	7100			140	7100		0	- SENSOR ERROR (TM1B) SHUT DOWN + RESTART SYSTEM					
145	355	00:45	00:52	135	1.2/18	7100	135	1.2/18	7100			135	7100		0	- RESTART OVERLY SD04 / FIG 8 @ 01:26 / RAIN 40 FSE					
145	355	01:29	01:52	131	1.2/19	7100	131	1.2/19	7100			131	7100		0	- RETURNS DROPPED TO 80% LAST 15 MILES ON MEND					
																FIG 8 @ 01:53					

Total Proj Lines: _____ Lines Flown: _____ Lines Remain: _____ Online Time: **5:25** Job Time: **1:75** Notes: **20170408_195427 / 20170409_005822**

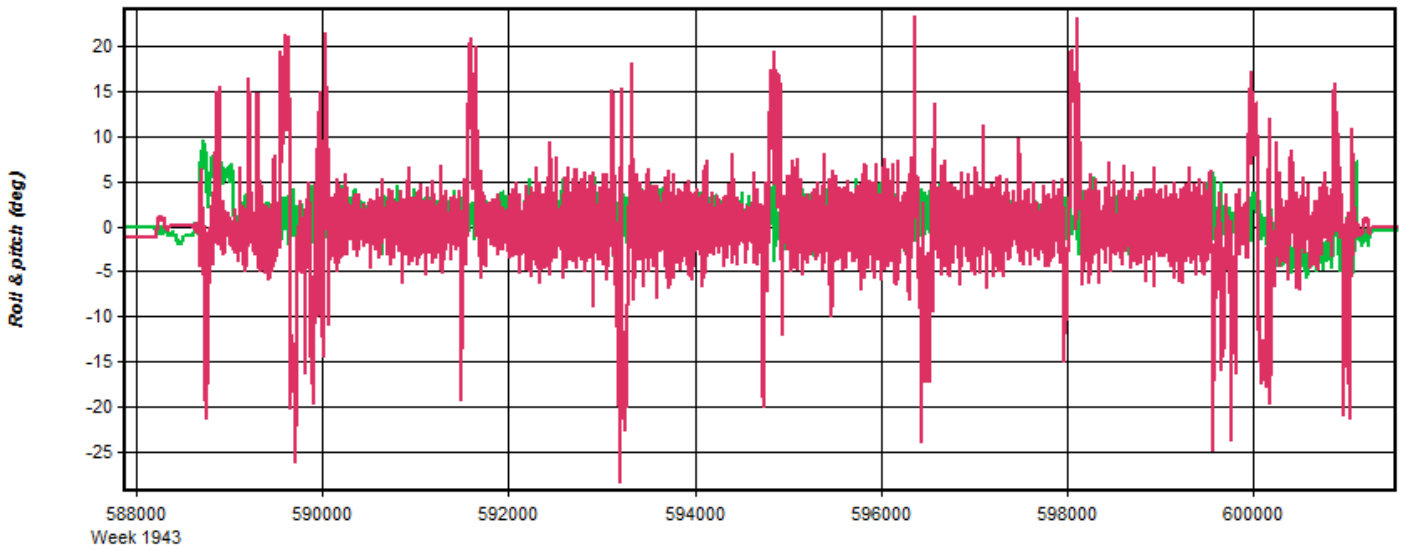
April 8, 2017-B (N262AS, SN7161)





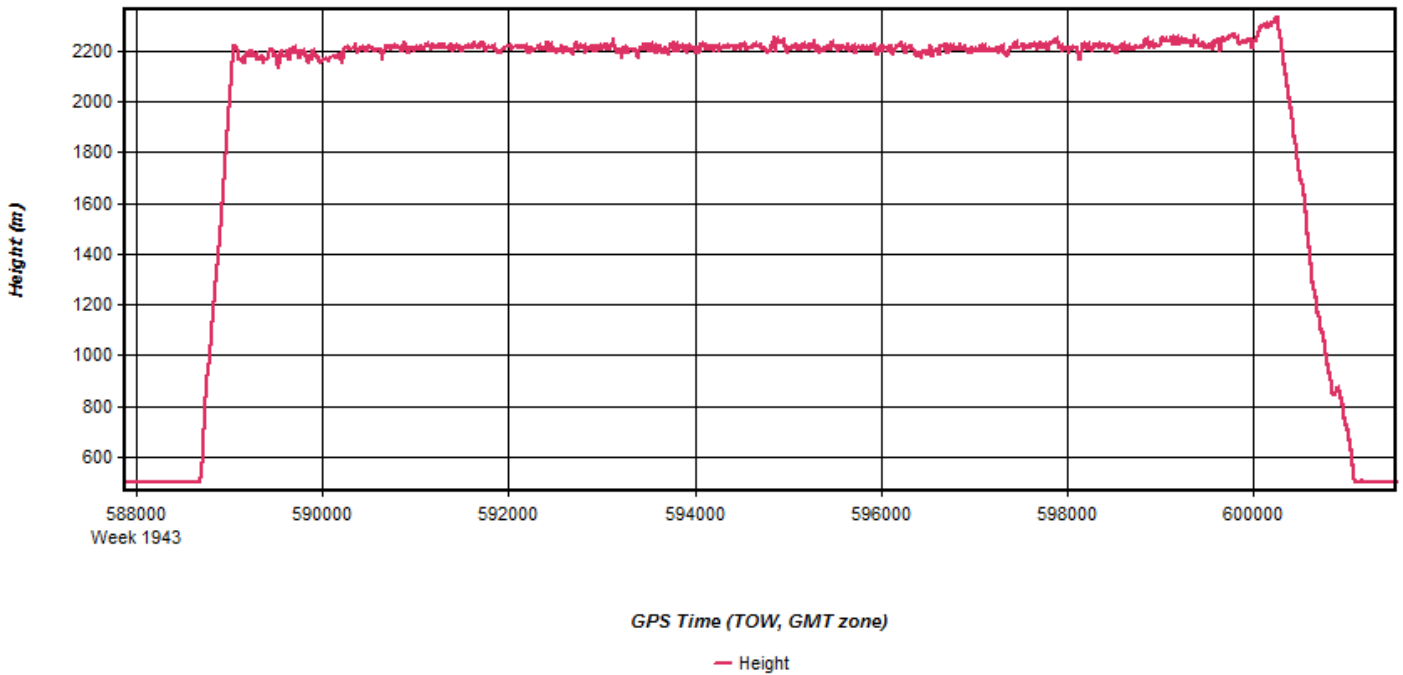
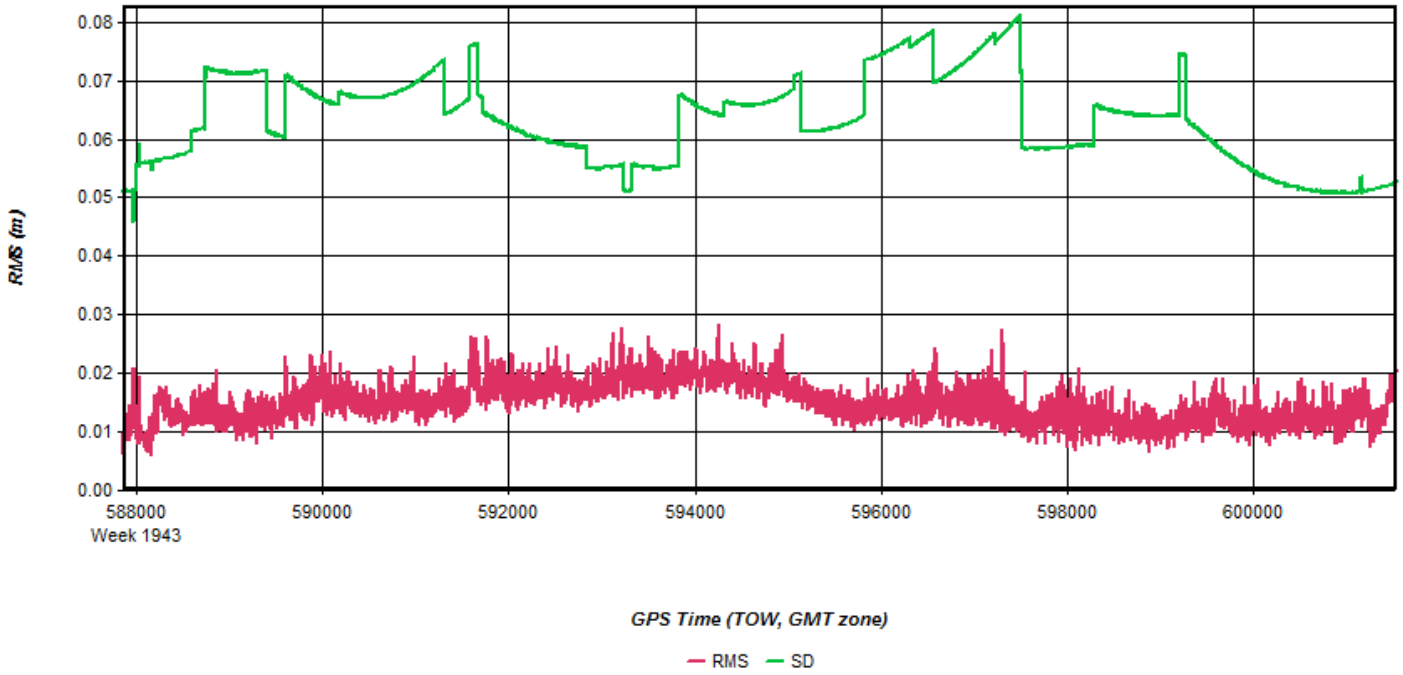
GPS Time (TOW, GMT zone)

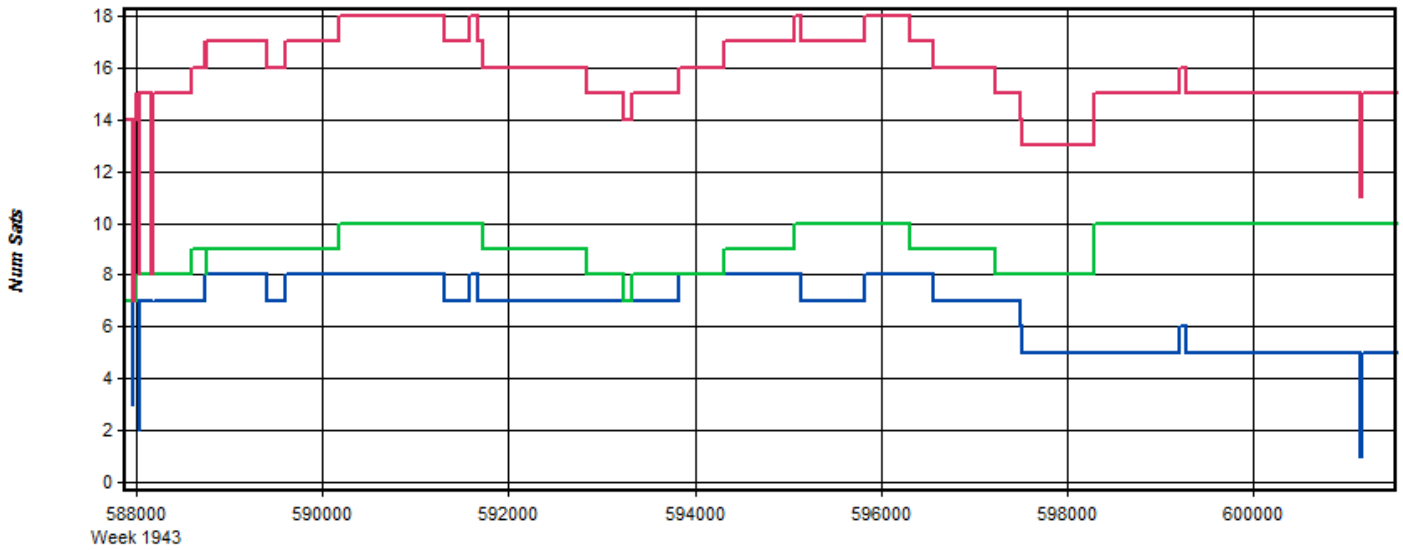
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

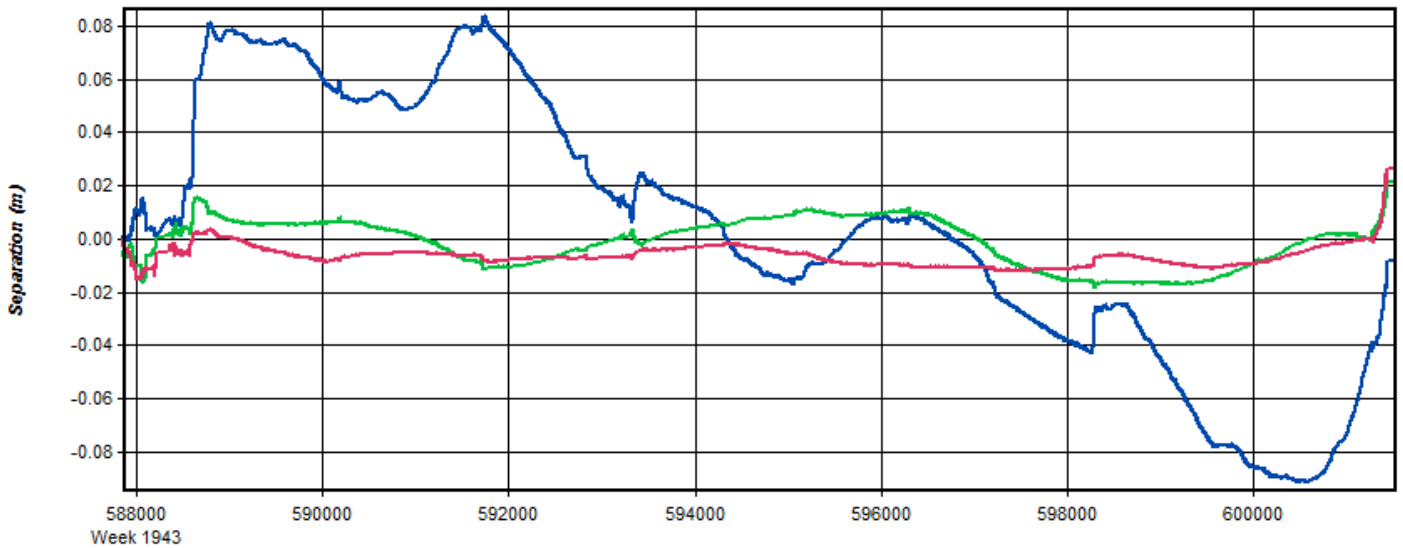
— Roll — Pitch





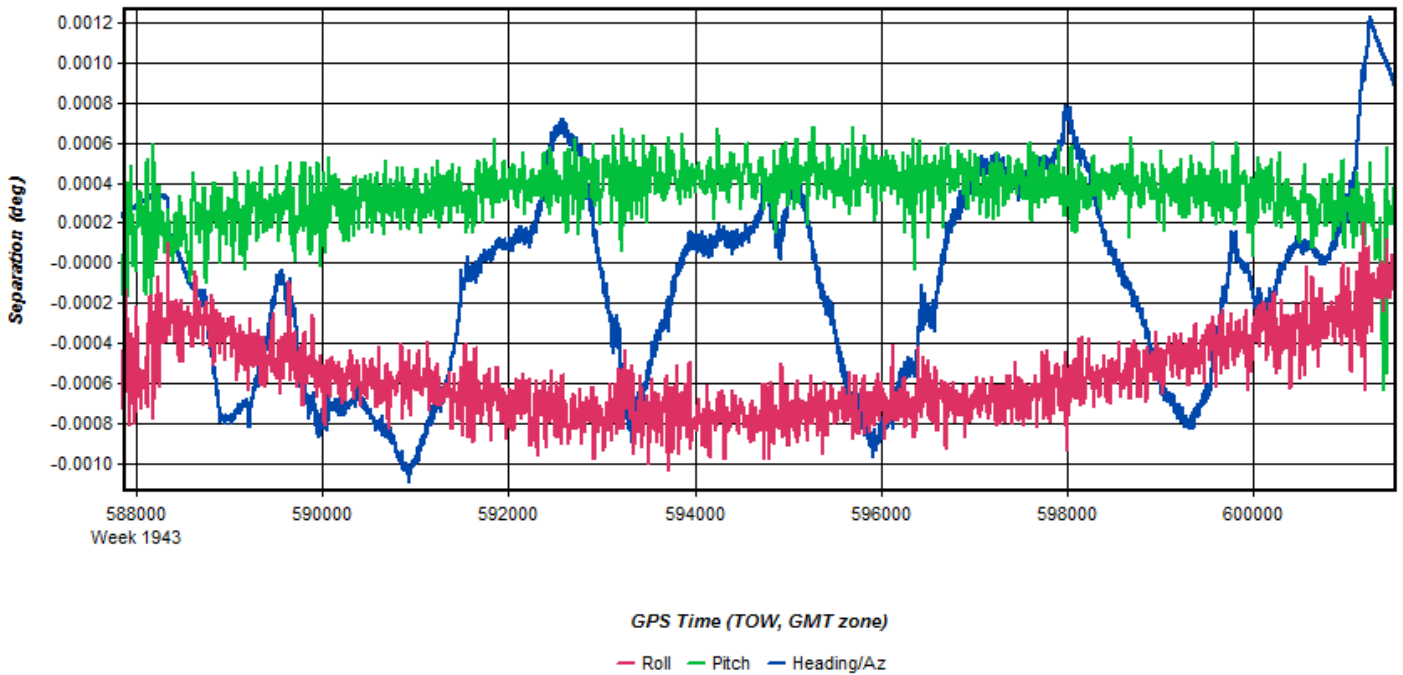
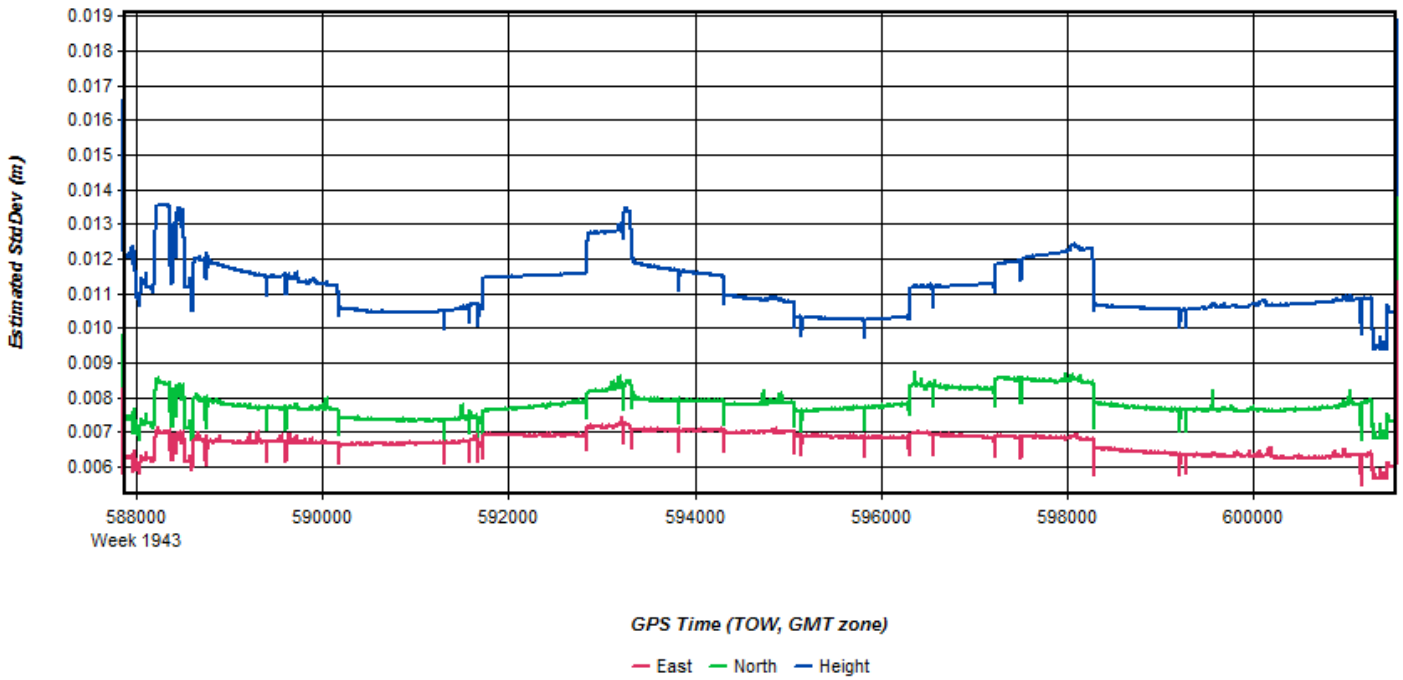
GPS Time (TOW, GMT zone)

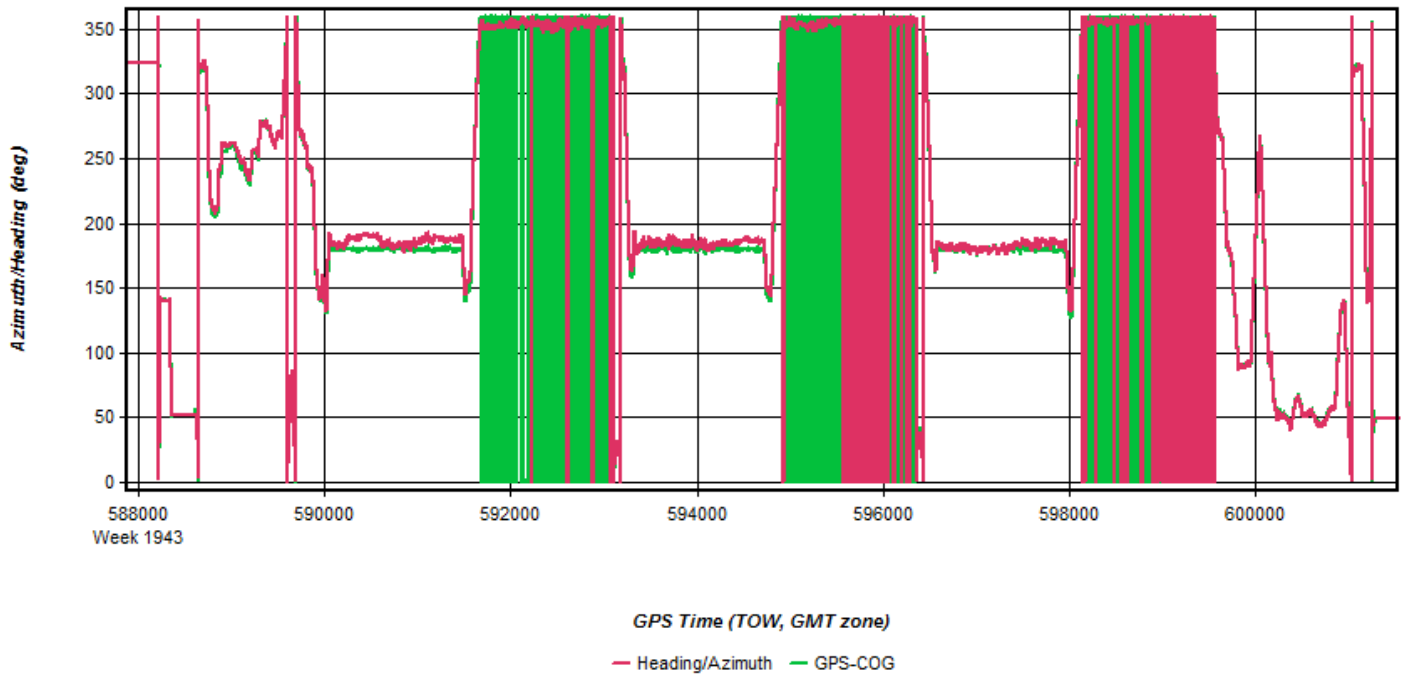
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Date: 4-8-17
Lift: A B C D E Pg. 1 of 1

Project: NRCS-SD Proj #: 30420 Flight Mgmt File: 20170408-191556
(email: Log daily to flight_log_distribution_list@quantumspatial.com)

Aircraft: N262AS Begin Hobbs: 6525.8 End Hobbs: 6529.3 Total: 3.5 Pilot: FOLAK Co-Pilot: christopher.Tech: CAREY

Dep Apt: KPIR Dep Time (Lcl): 1430(Z): 1930 Arr Apt: KPIR Arr Time (Local): 1800 (Z): 2300 Tot Time Aloft:

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

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

Gd Temp beg:	°C	End:	°C	OAT beg:	°C	End:	°C	Altimeter begin:	end:
Type	Alt AGL	Alt AMSL	Alt	Avg Temp	Mix	Max	Avg Pt		
FOV	Scan Freq	Scan	Pulses In Air	Rate	Power	PPHM			

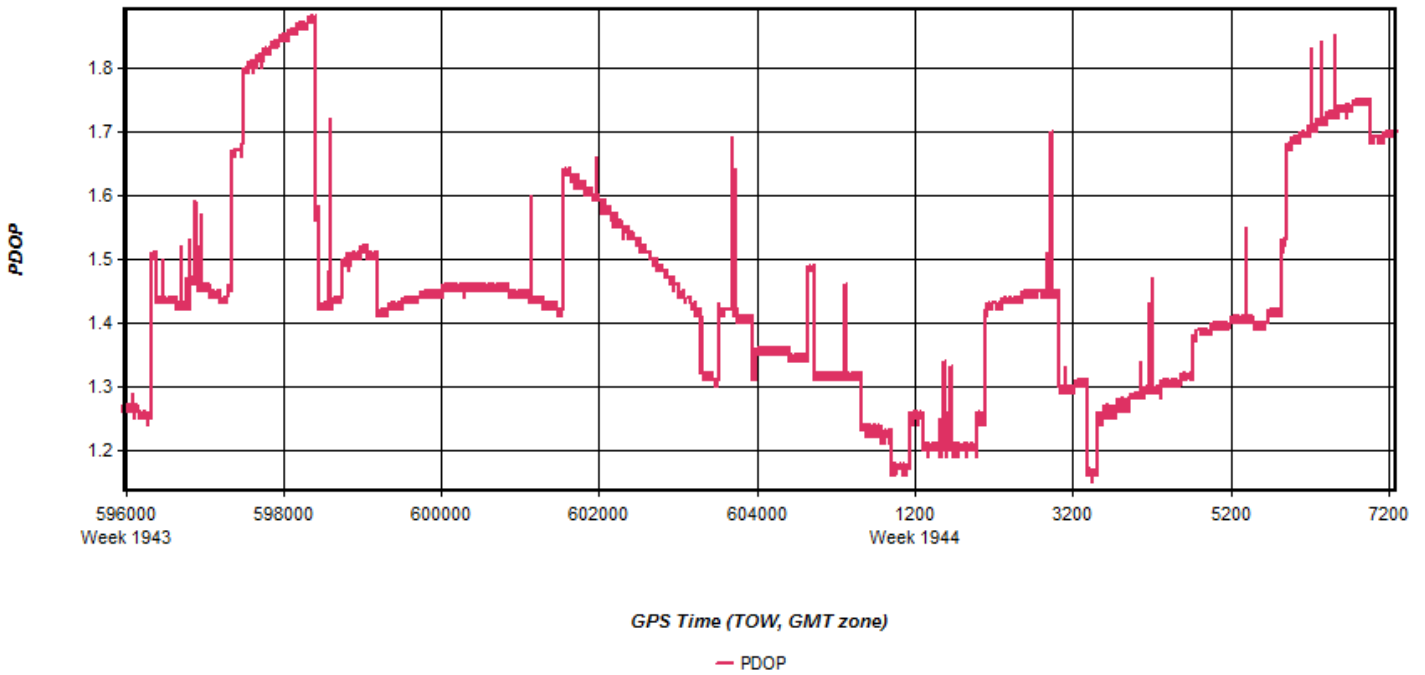
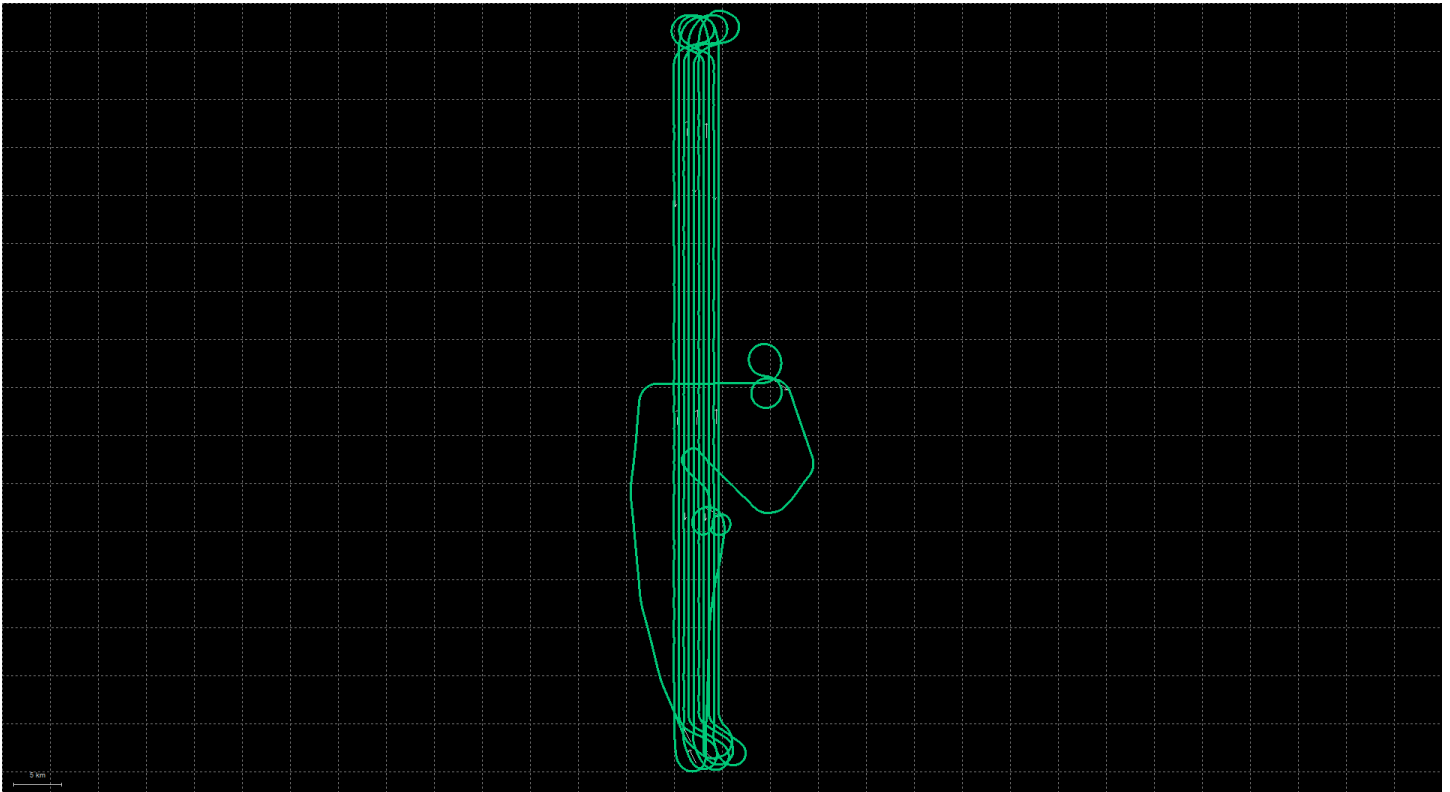
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	POOH/Sea	GPS Altitude	Crsb	Turb (0,-,+)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc
733	174	1954	2017	130	1.1	7277			KPIR → S/FIG → SITE
732	354	2021	2044		1.1	7280			2ok OVC - chop
731	174	2049	2111		1.2	7297			+ chop Northern 18 mi
730	354	2116	2139		1.1	7300			- chop Northern 20 mi
729	174	2143	2206		1.2	7300			chop
728	354	2209	2232		1.1	7306			XFLT - unplanned
XFLT		2237	2239		1.2	7400			S/FIG → KPIR

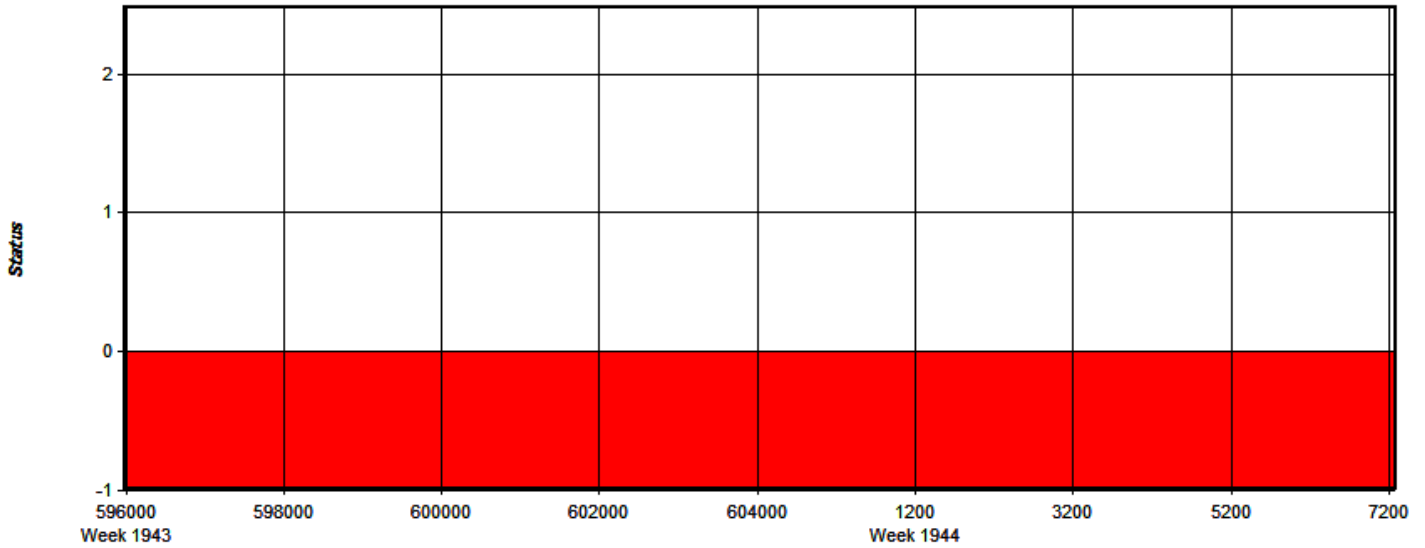
Storage Name/s: 16
Avg CR: 212
End CR: B
Tot CR:

Line # Flow: 6 Lines Remain: Online Time: 2.8 Mob Time: 1.7 Notes:

Generated by CamScanner from intsig.com

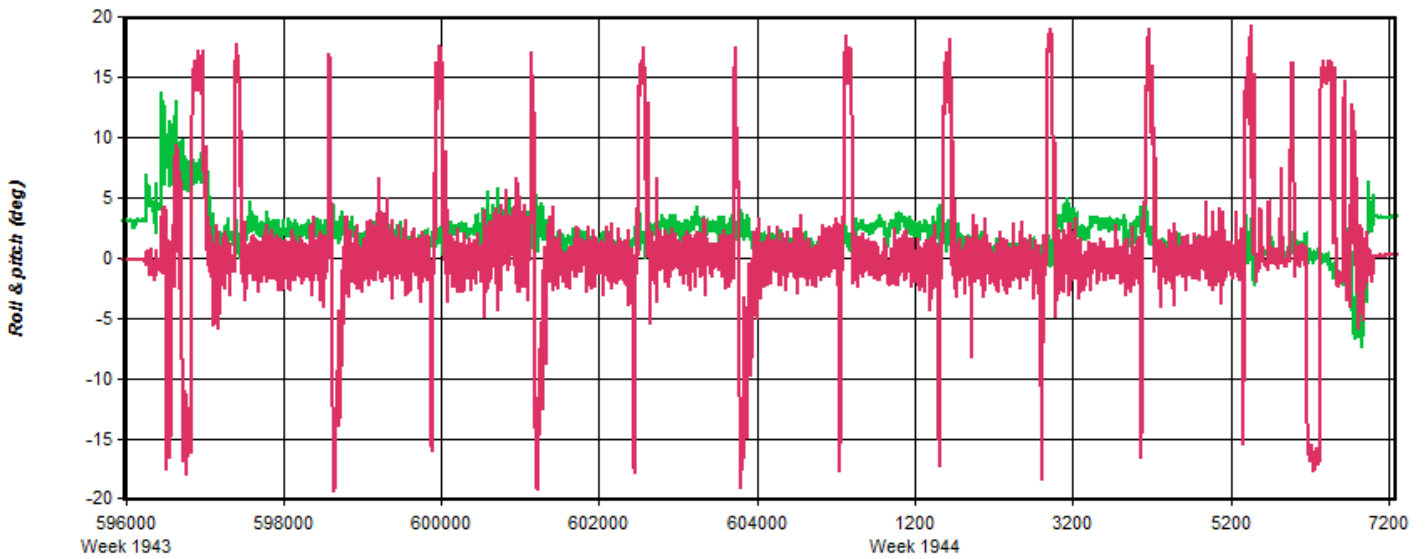
April 8, 2017-B (N915WC, SN8237)





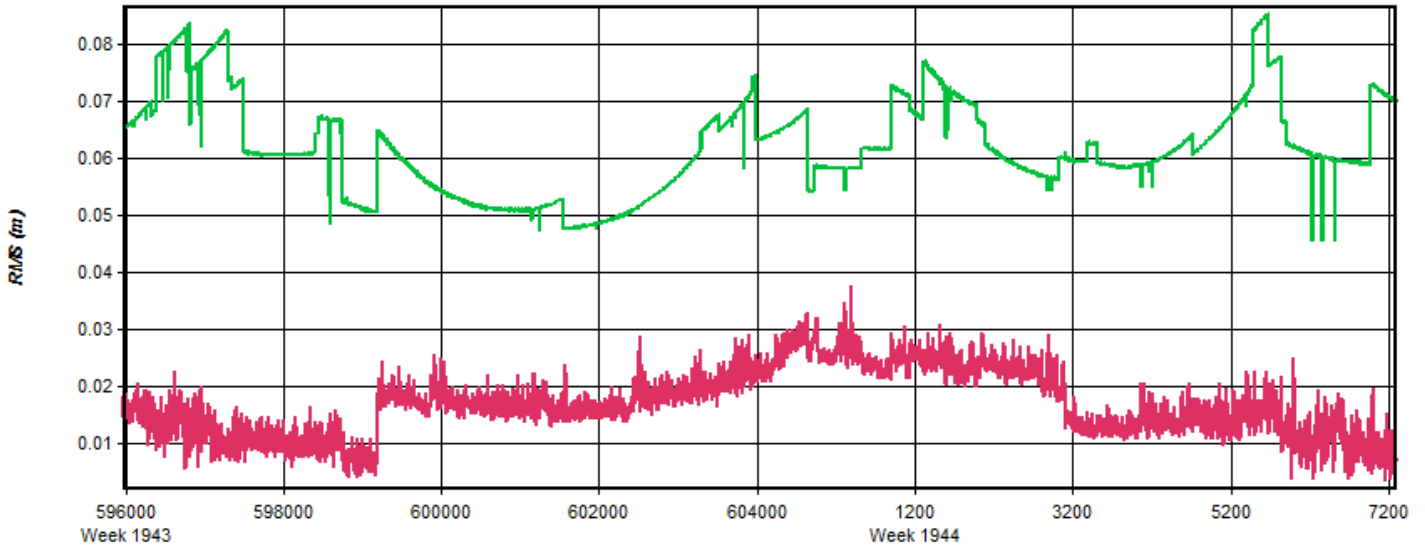
GPS Time (TOW, GMT zone)

— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



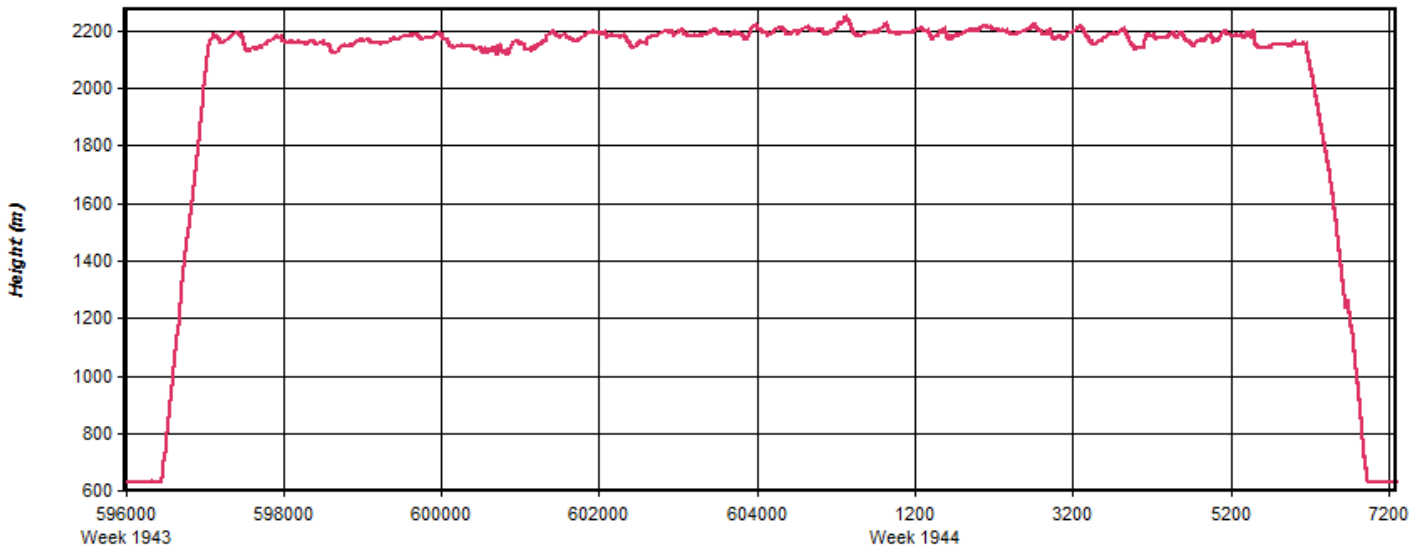
GPS Time (TOW, GMT zone)

— Roll — Pitch



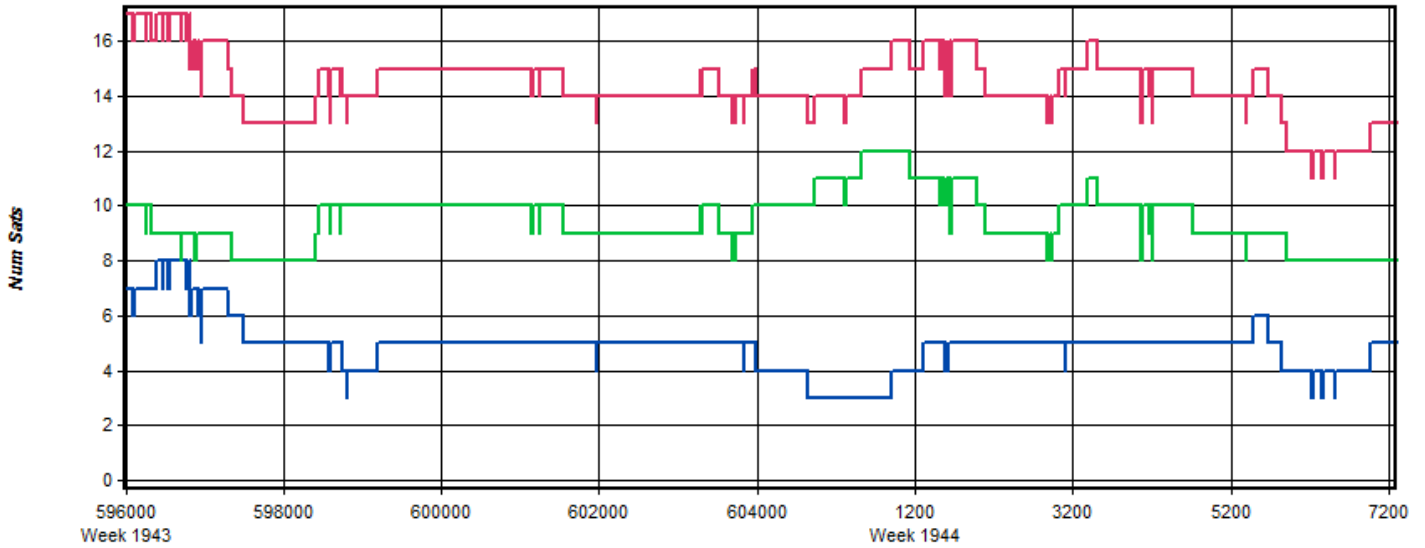
GPS Time (TOW, GMT zone)

— RMS — SD



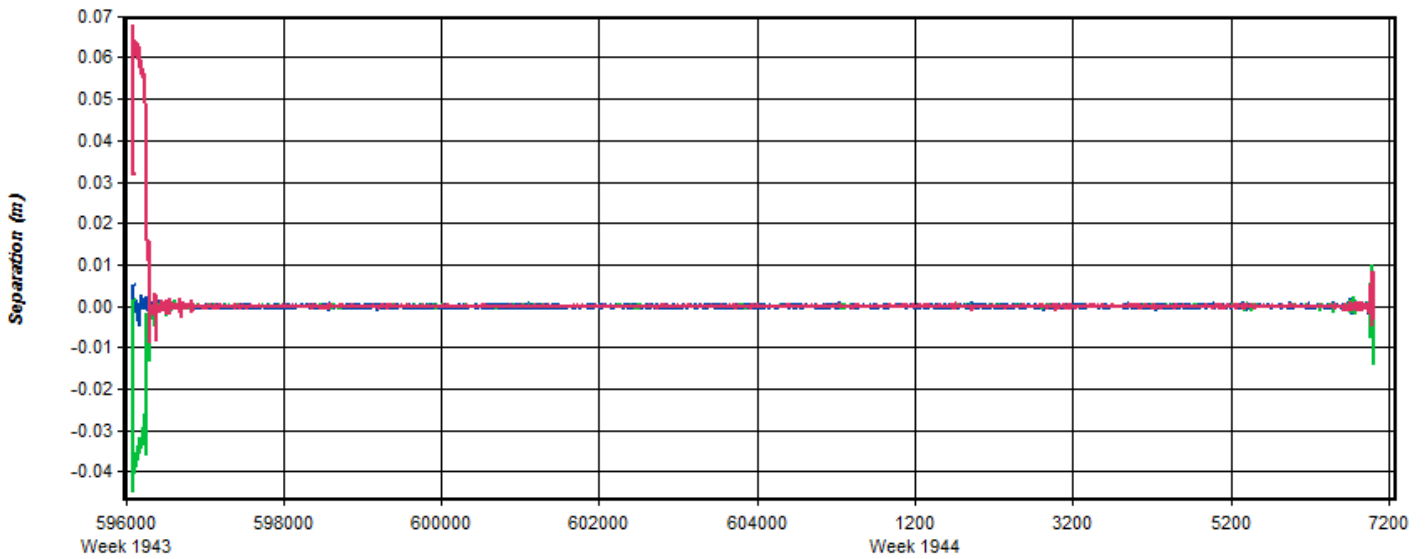
GPS Time (TOW, GMT zone)

— Height



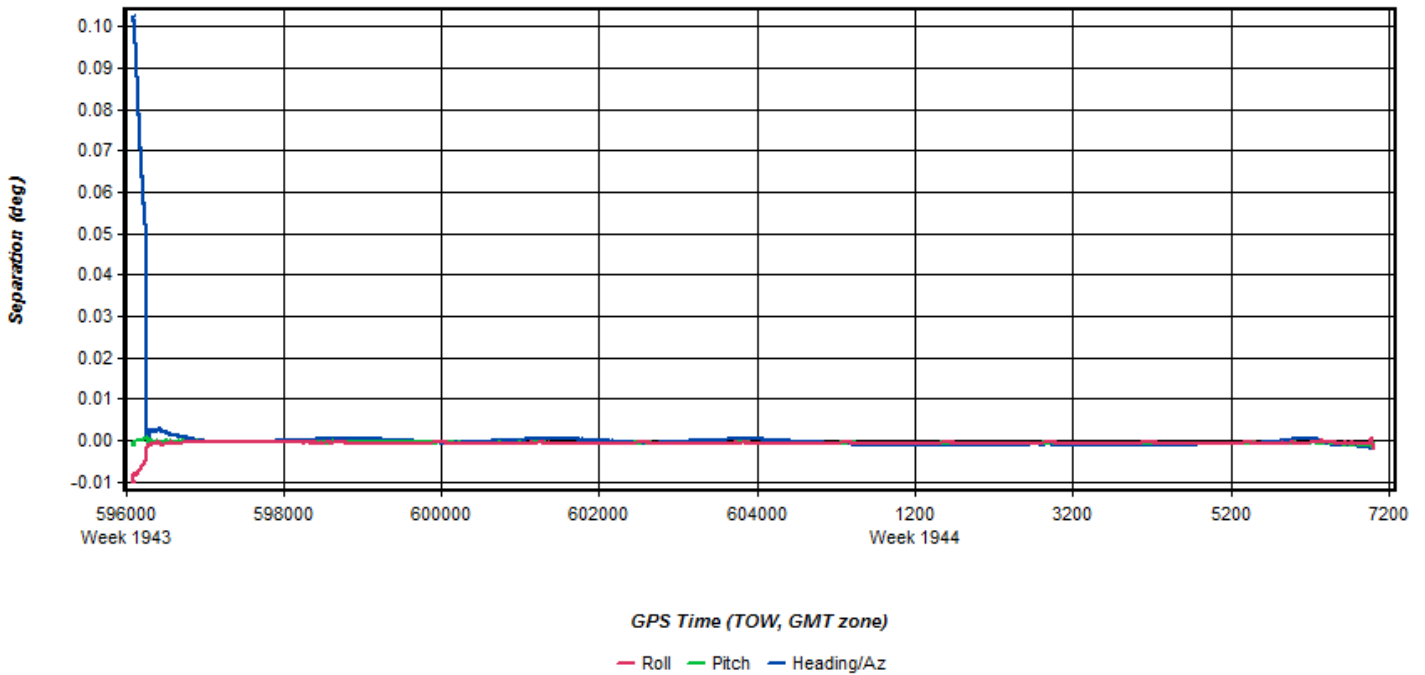
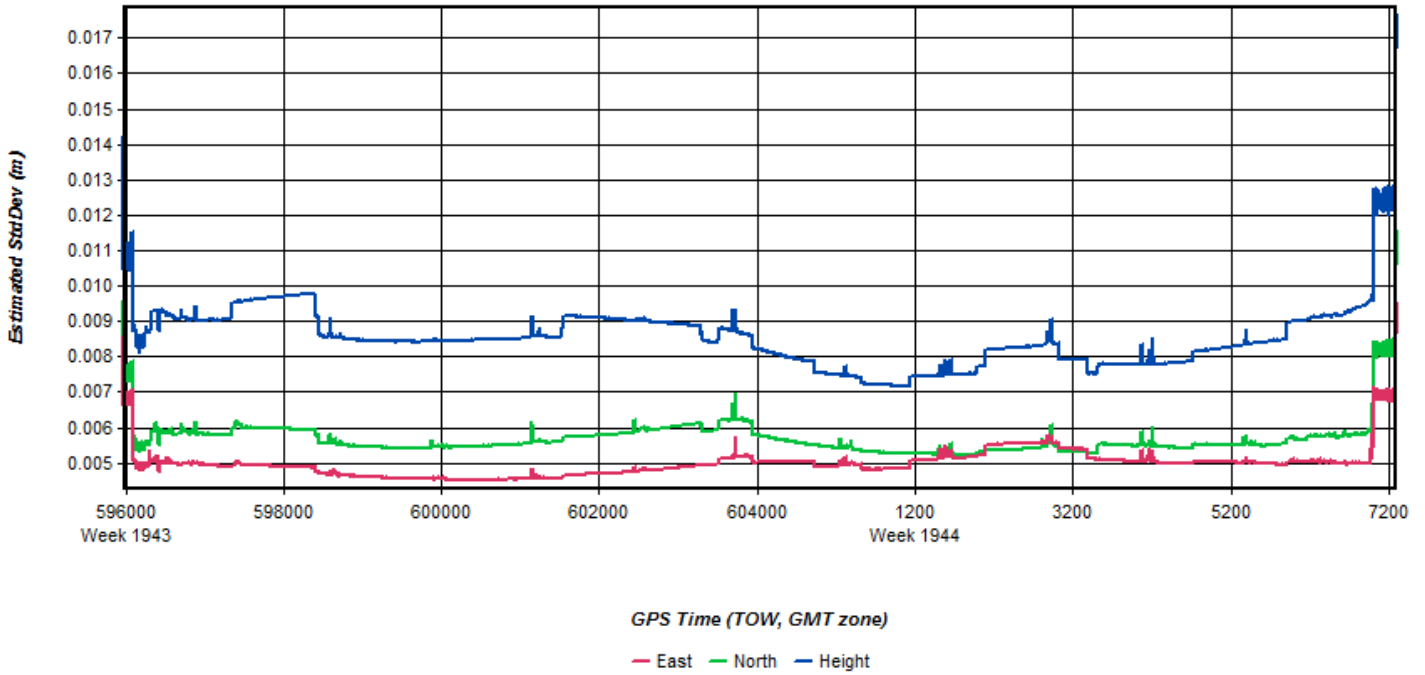
GPS Time (TOW, GMT zone)

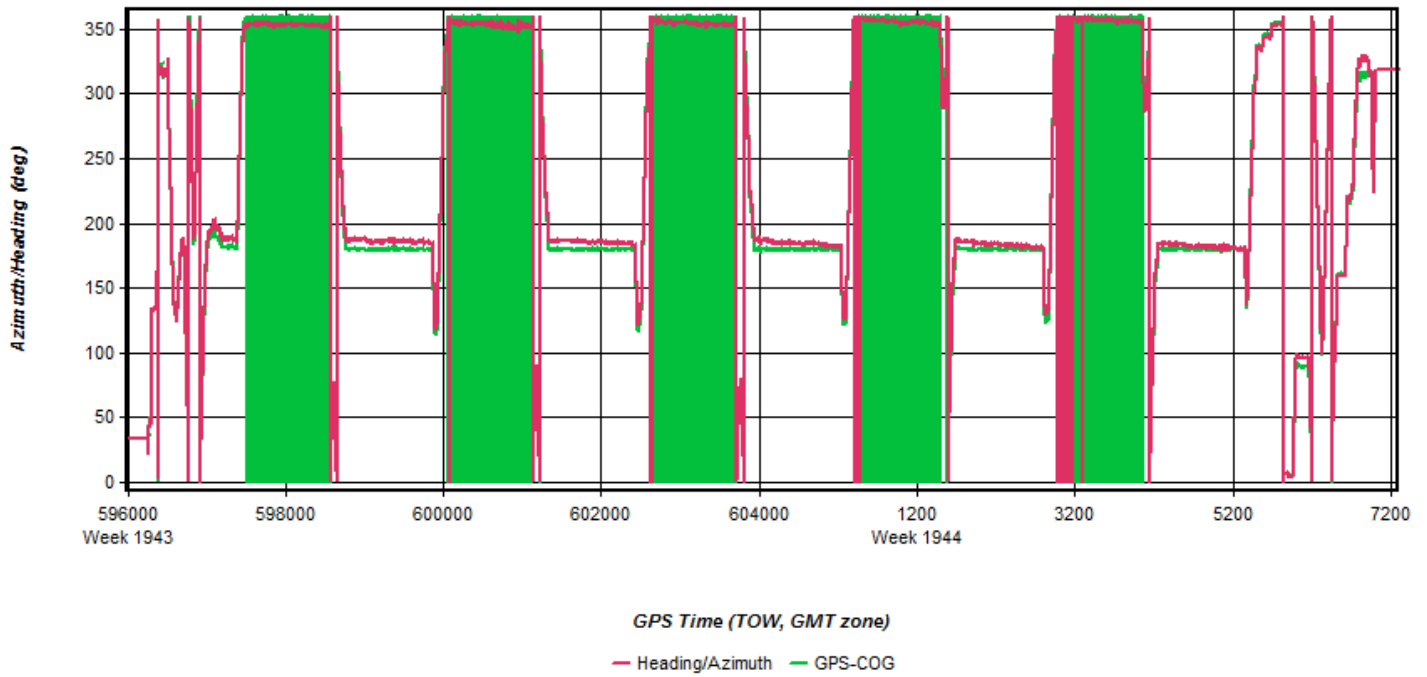
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up

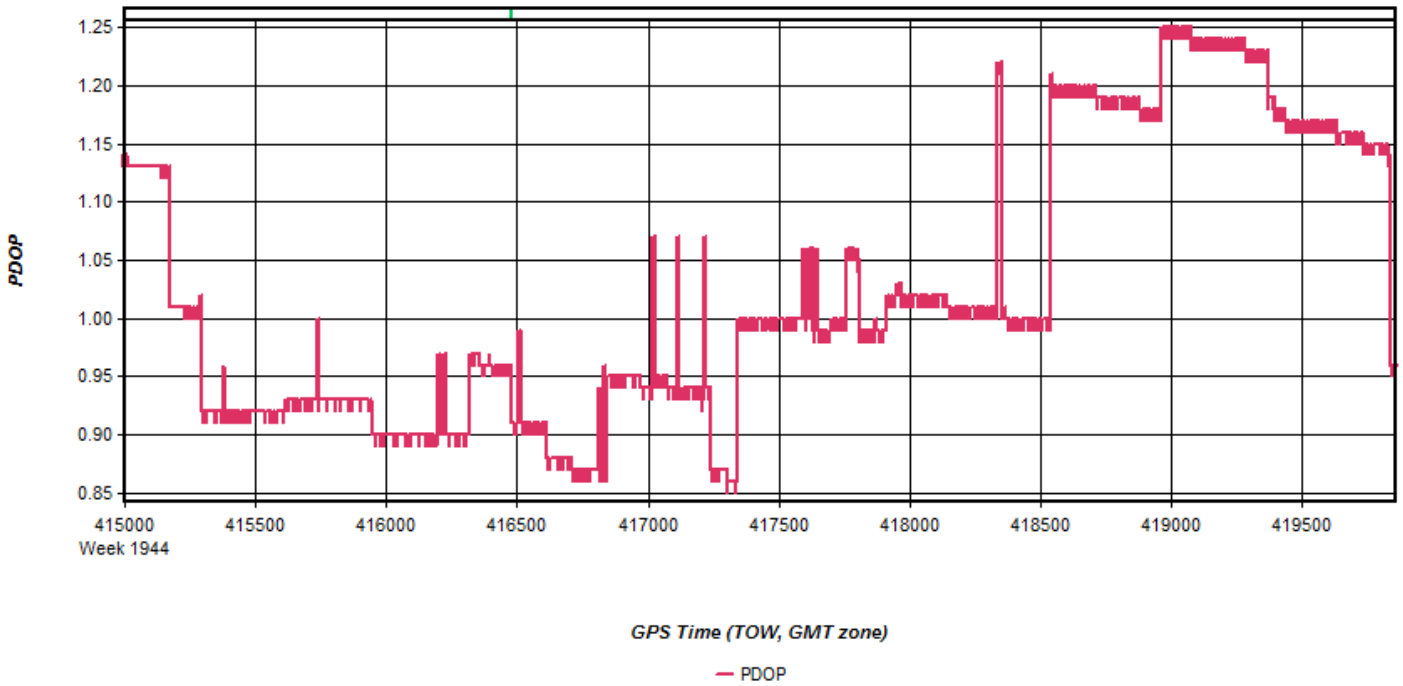
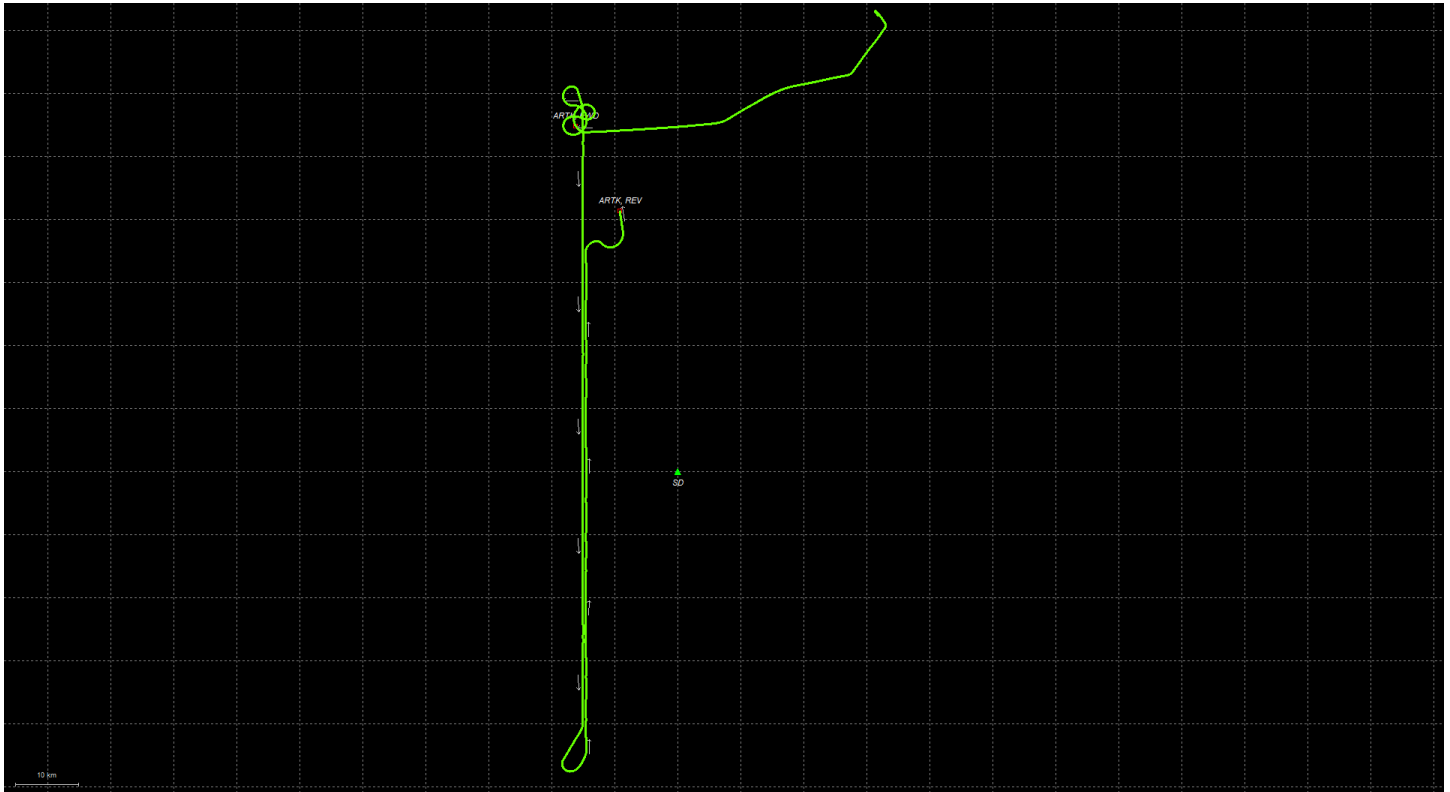


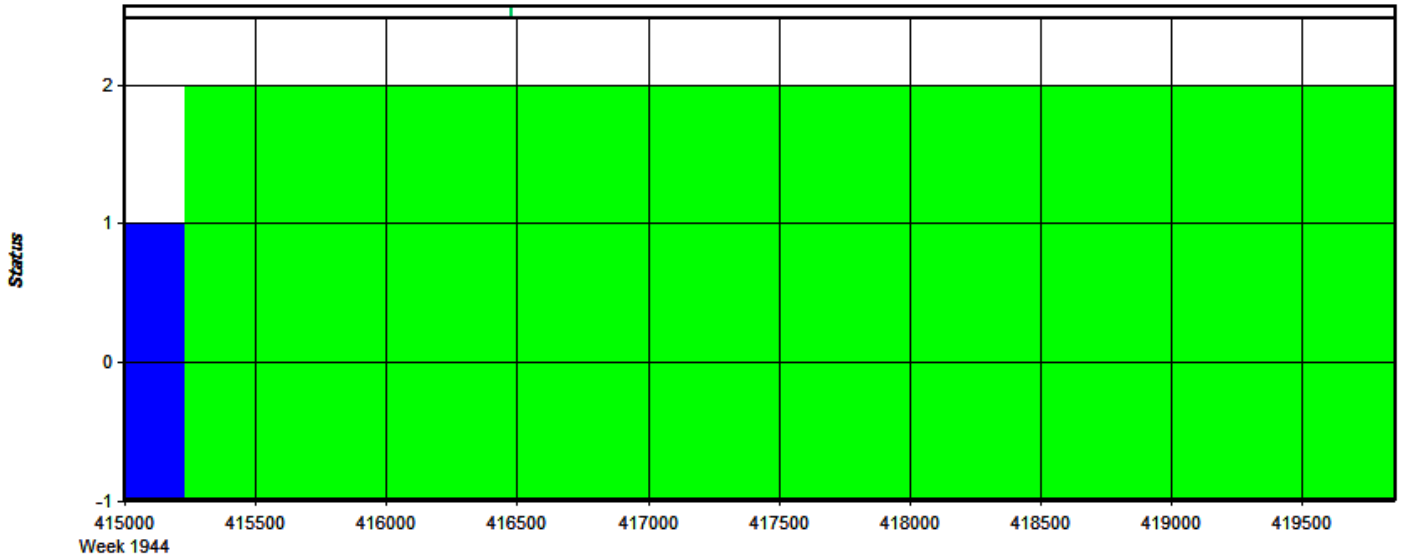


Flight Log

LIDAR									
KeyW - Aeroptic									
LIDAR FLIGHT REPORT									
<i>Revised Feb. 2014</i>	Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc.								
CREW	<input type="text" value="Sean T"/>	PILOT/OPERATOR	<input type="text" value="Sean T"/>	Tail Number	<input type="text" value="N915WC"/>	WEATHER	<input type="text" value="Clear"/>	SSD	<input type="text" value="0"/>
UTC DATE	<input type="text" value="4/8/2017"/>	GPS	<input type="text" value="Fwd"/>	SSD	<input type="text" value="0"/>	SSD			
Camera System	<input type="text" value="8237"/>	LIDAR S/N	<input type="text" value="fwd/left"/>	SSD1	<input type="text" value="unk"/>	Space Used @ Beginning	<input type="text" value="unk"/>	Space Used During Mission	<input type="text" value="unk"/>
Camera Location (Hole)	<input type="text" value="Fwd"/>	Start-up	<input type="text" value="Time: appr 21:30 UTC The next day"/>	Space Used Remaining Tot Space	<input type="text" value="unk"/>	Initials:			
Shut-down		<input type="text" value="K9D1"/>		LIDAR STARTUP CHECKS					
		<input type="text" value="K9D1"/>		<input checked="" type="checkbox"/> Lens cleaned <input checked="" type="checkbox"/> All IPs uploaded <input checked="" type="checkbox"/> Pilot's screen functional <input checked="" type="checkbox"/> Compact flash drive space <input checked="" type="checkbox"/> SSDs have space <input checked="" type="checkbox"/> Startup beeps & IPAS recording					
Remarks									
Job #	Location/ Site/Block	Line #	Flight Dir.	Crab	Angle				
3DEP	1	1122	N						
		1123	S						
		1124	N						
		1125	S						
		1126	N						
		1127	S						
		1128	N						
		1129	S						
		1130	N						
		1131	S						
		UL-E	E						

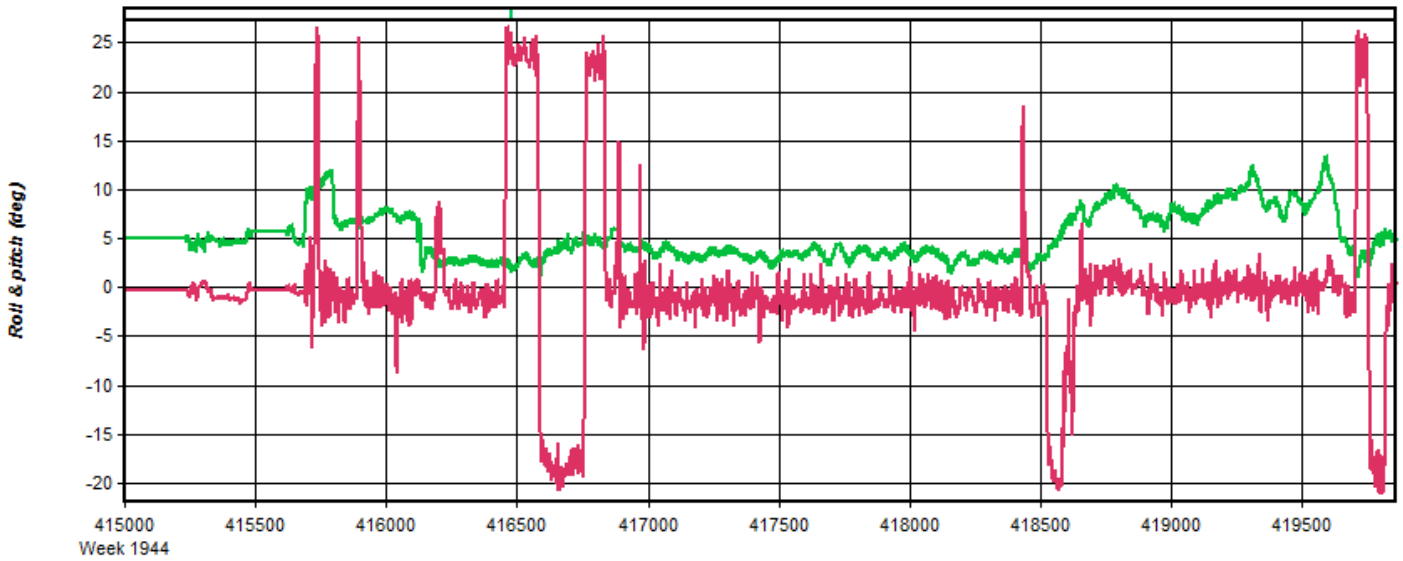
April 13, 2017-A (N246MP, SN8227)





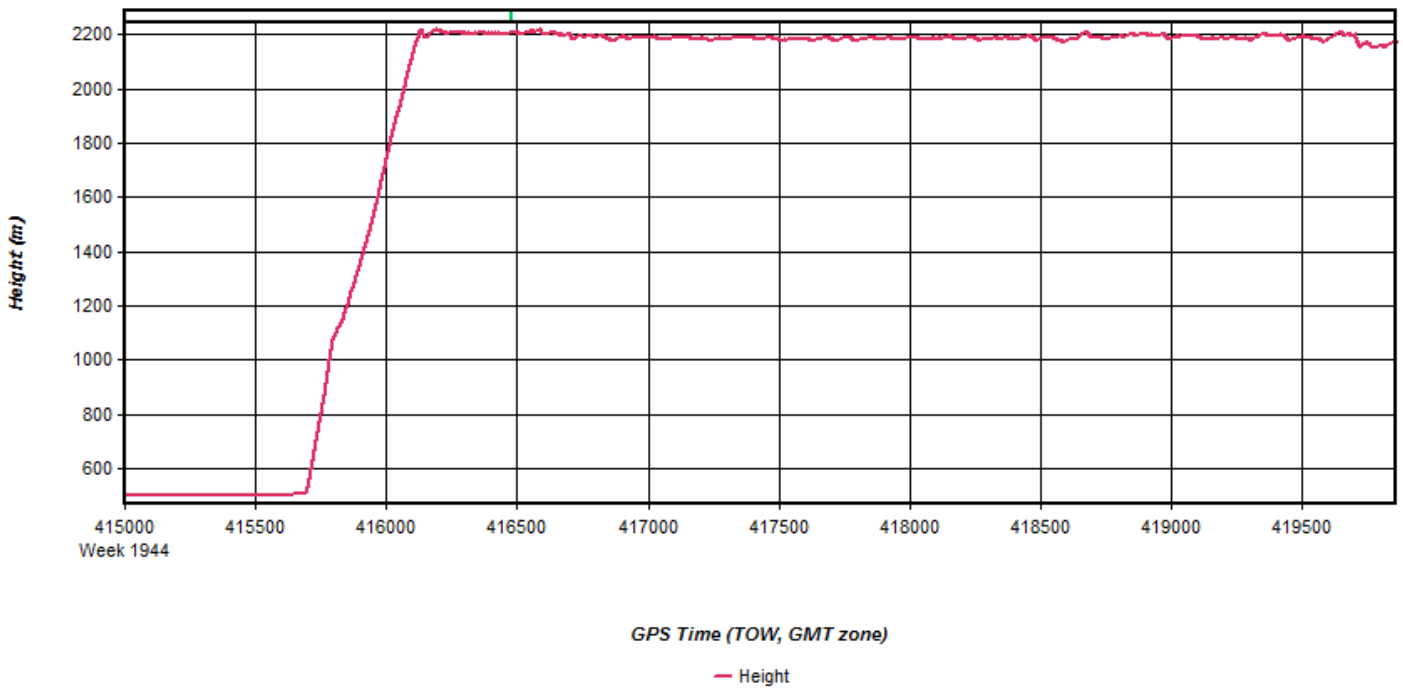
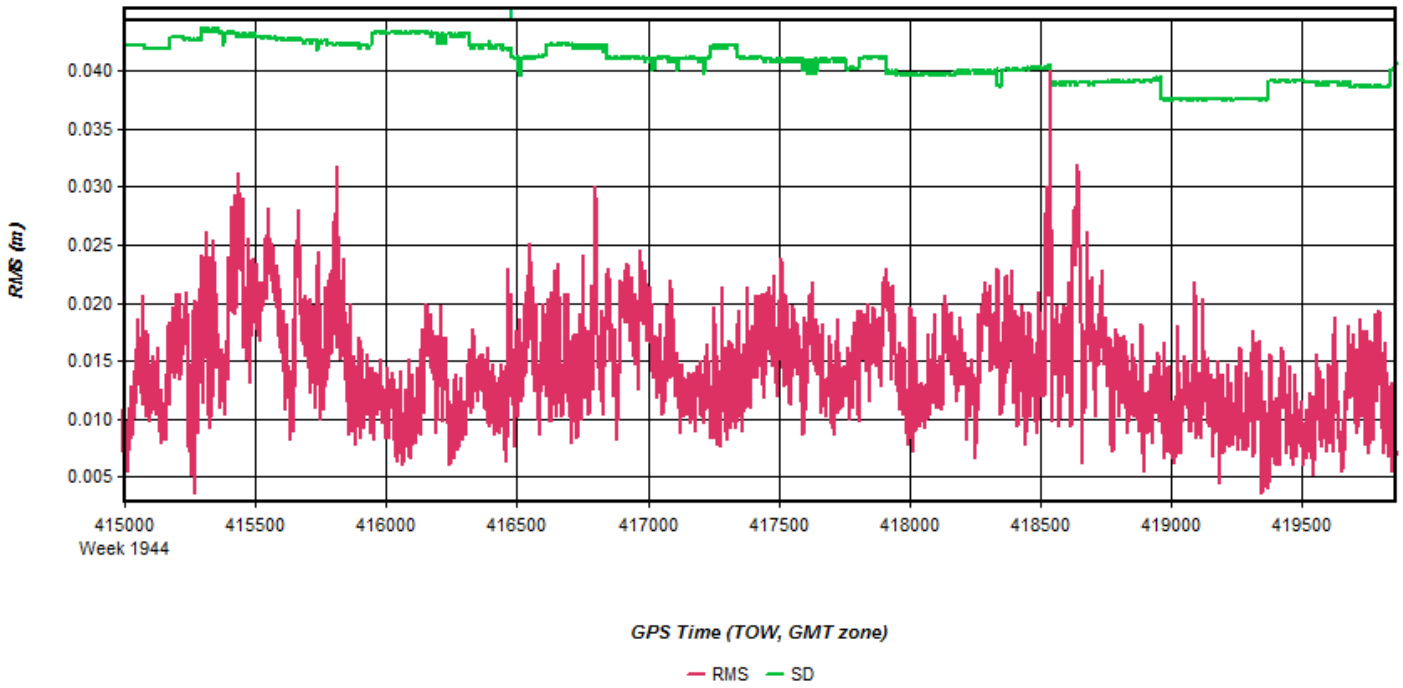
GPS Time (TOW, GMT zone)

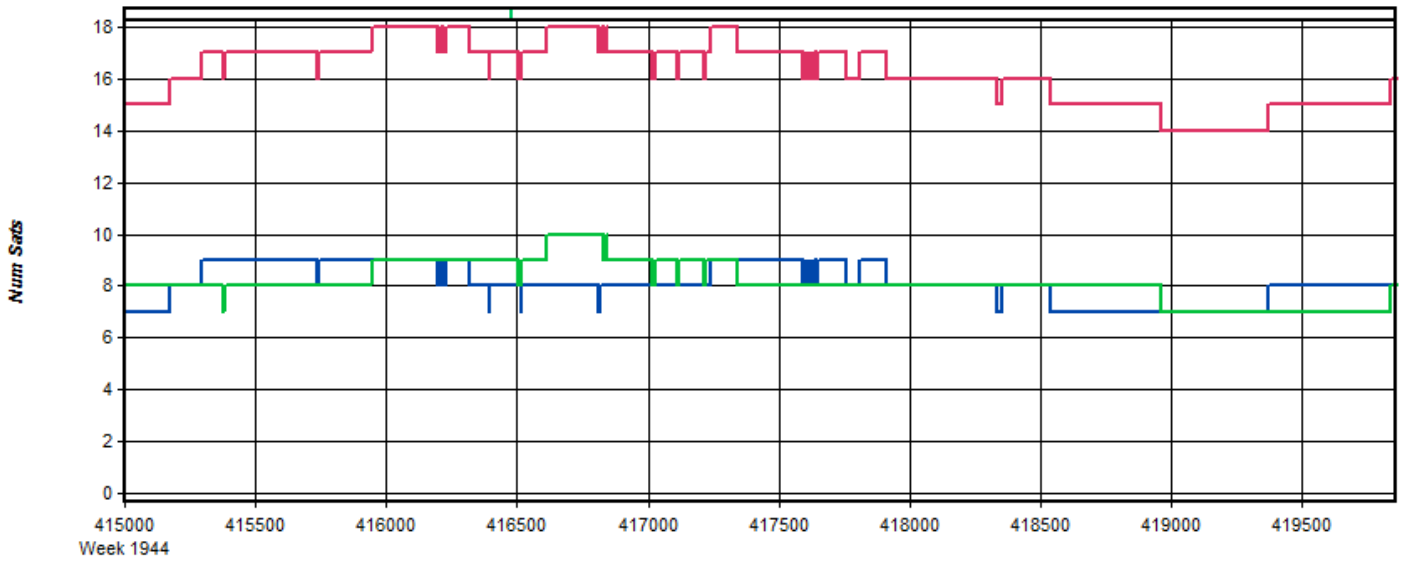
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

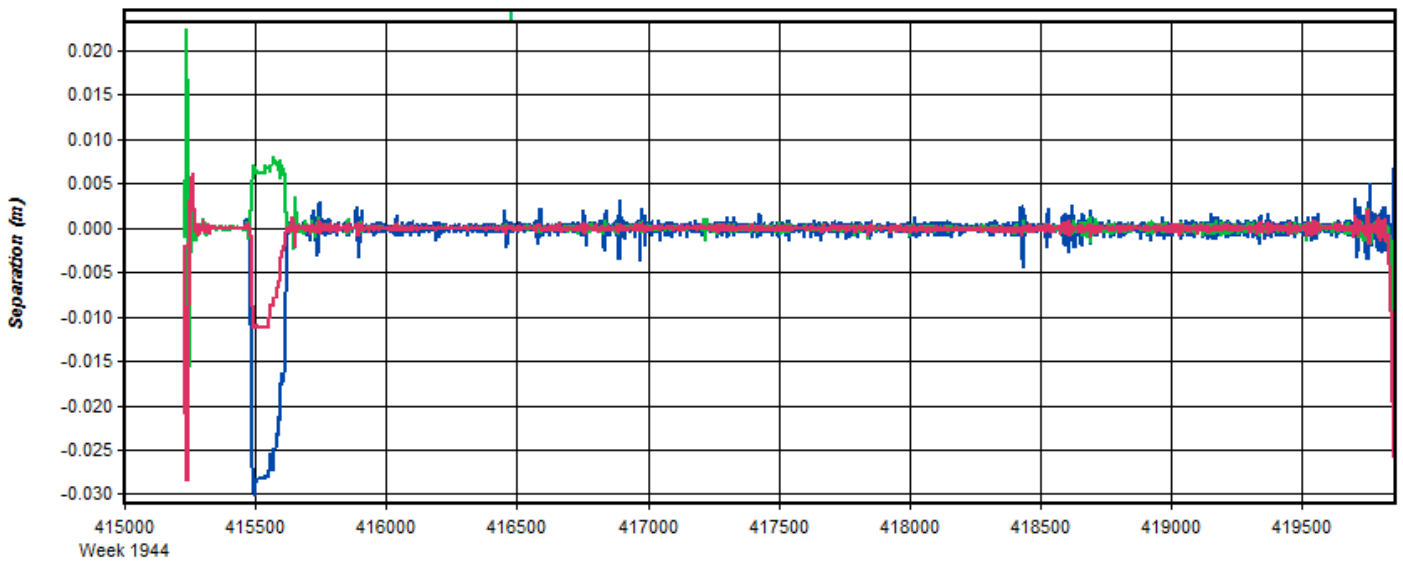
— Roll — Pitch





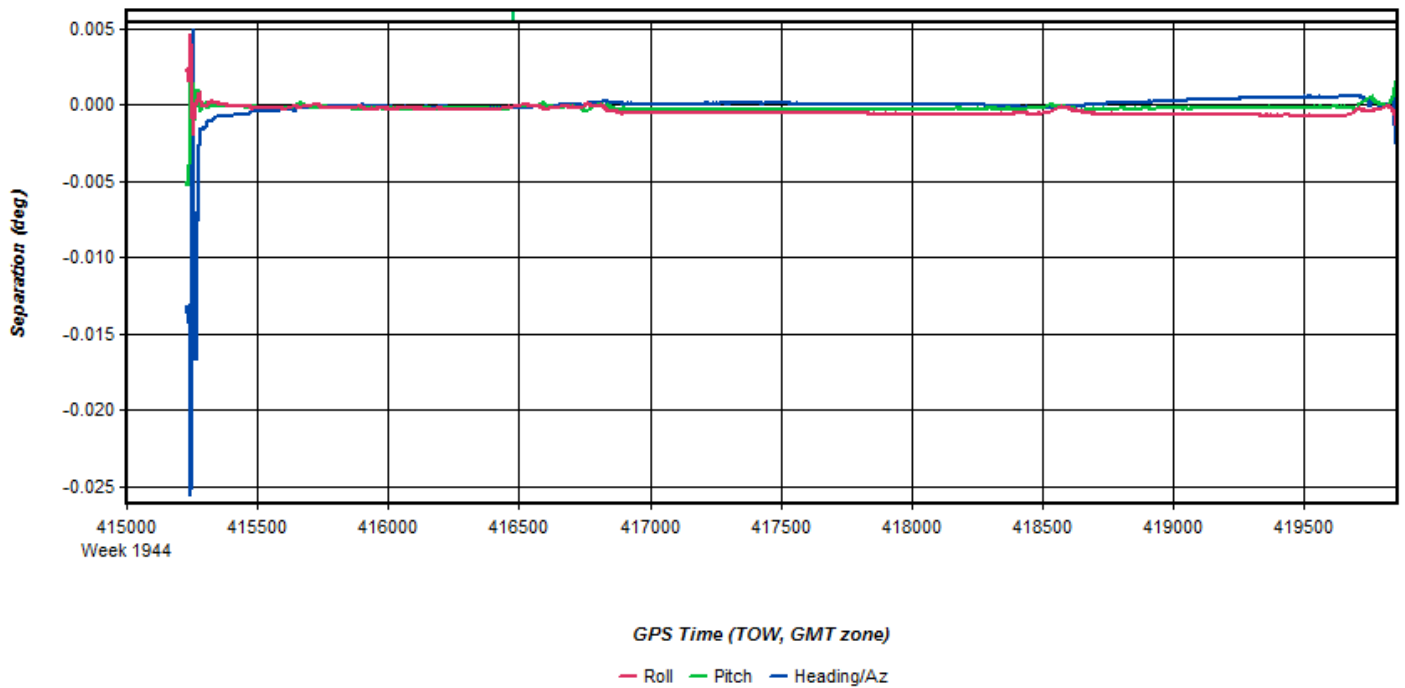
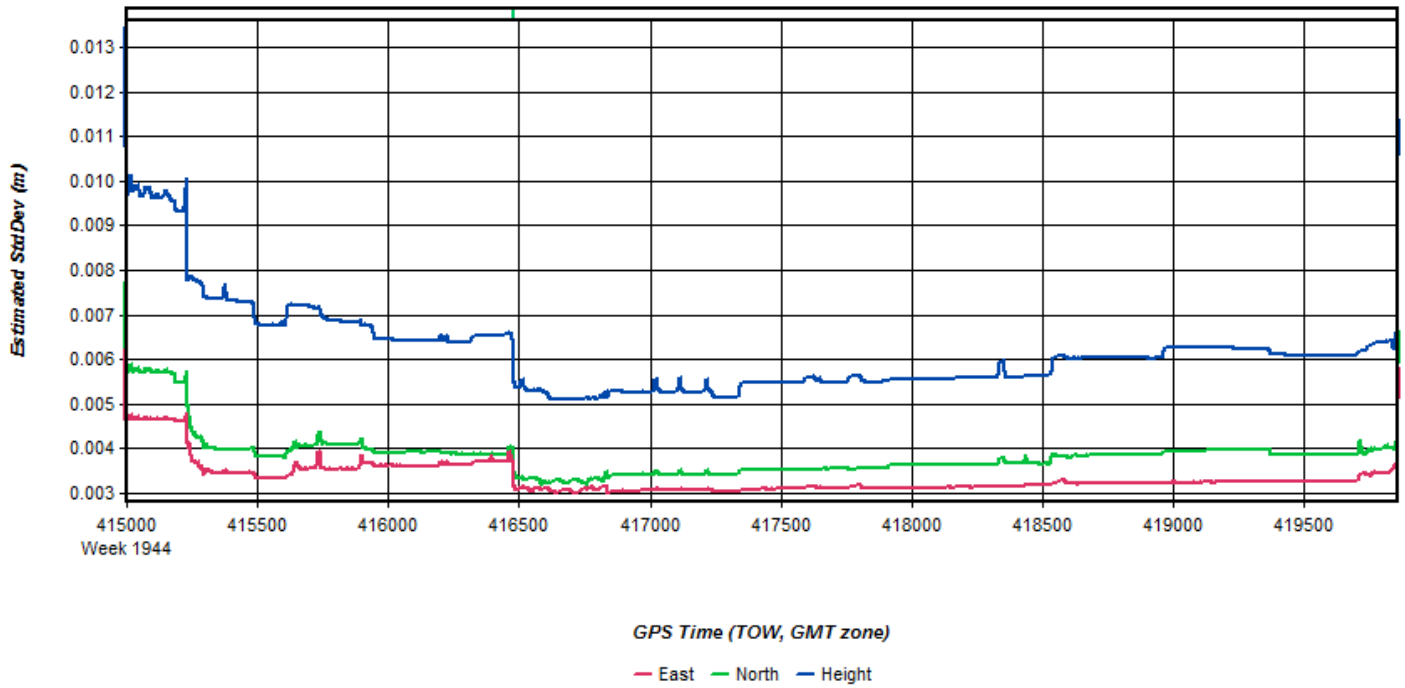
GPS Time (TOW, GMT zone)

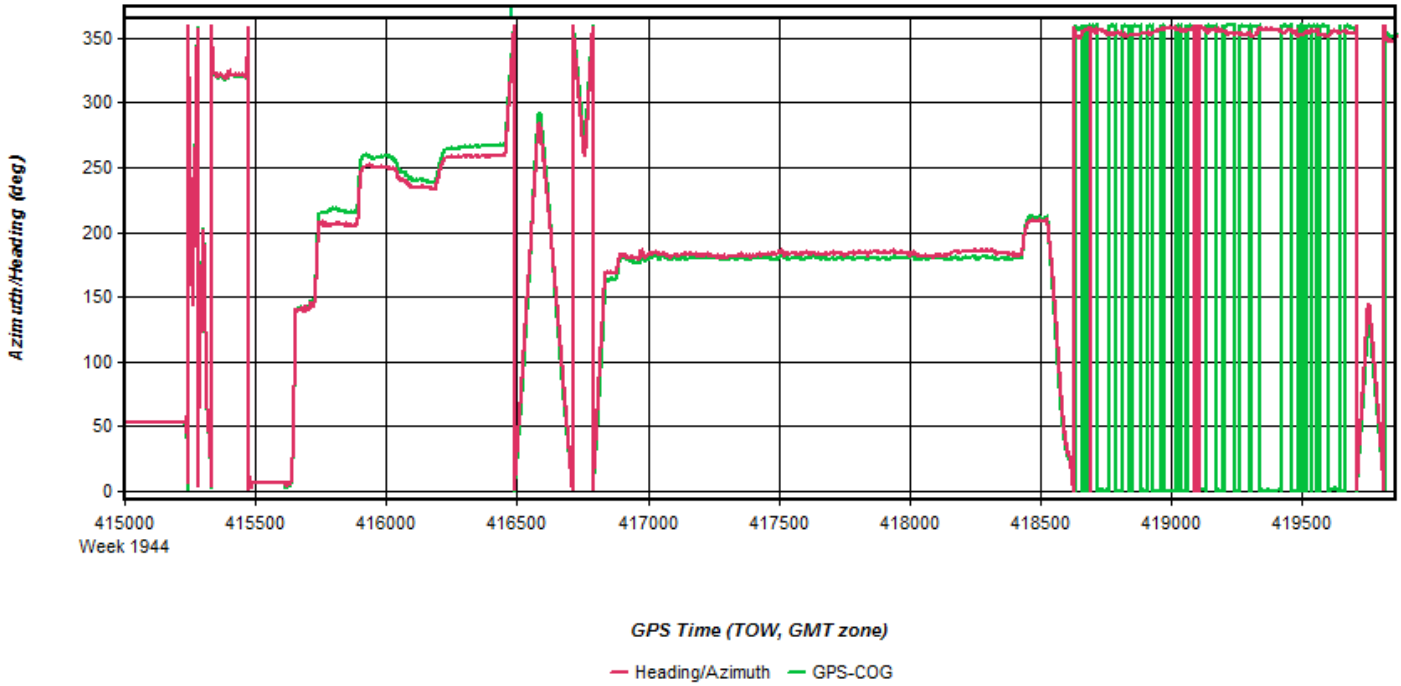
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Coordinate/Antenna Settings ? X

Master Remote

Base Station
 1: SD Name: SD Disabled
 File: F:\Proc\30420_SD_LIDAR\im_Swinford_4-17-17\04132017_A_B_

Coordinates
 Latitude: North 43 43 51.01200 Coord. options
 Longitude: West 100 40 56.56060 Save to Favorites
 Ellipsoidal height: 551.704 m
 Datum: WGS84 Proc Datum: WGS84
 Epoch: year

Antenna Height
 From station file: TRM55971.00, NONE View STA File
 Antenna profile: TRM55971.00 Info
 Measured height: 1.800 m
 ARP to L1 offset: 0.067 m
 Applied height: 1.867 m
 Measured to:
 ARP
 L1 Phase Centre
 Compute From Slant

OK Cancel

Flight Log

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

Date: 04/12/2017 Page 1 of 2

Project: NRCS SD Flight Mgmt File: 30420-SD-ALS80 Tech: SWINFORD

Aircraft: N246MP Begin Hobbs: 1410.9 End Hobbs: 1413.1 Total: 2.2 Pilot: McDONALD Co-Pilot: _____

Dep Apt: KPIR Dep Time (Lcl): 2:30 Dep Time (UTC): 19:30 Arr Apt: KPIR Arr Time (Local): 4:50 Arr Time (UTC): 21:50 Tot Time Aloft: 2.2

CORS: 0/1 N Sta 1: _____ Sta 2: _____ Flyovers: Y 1 N If Y, times: Sta 1 Sta 2: _____

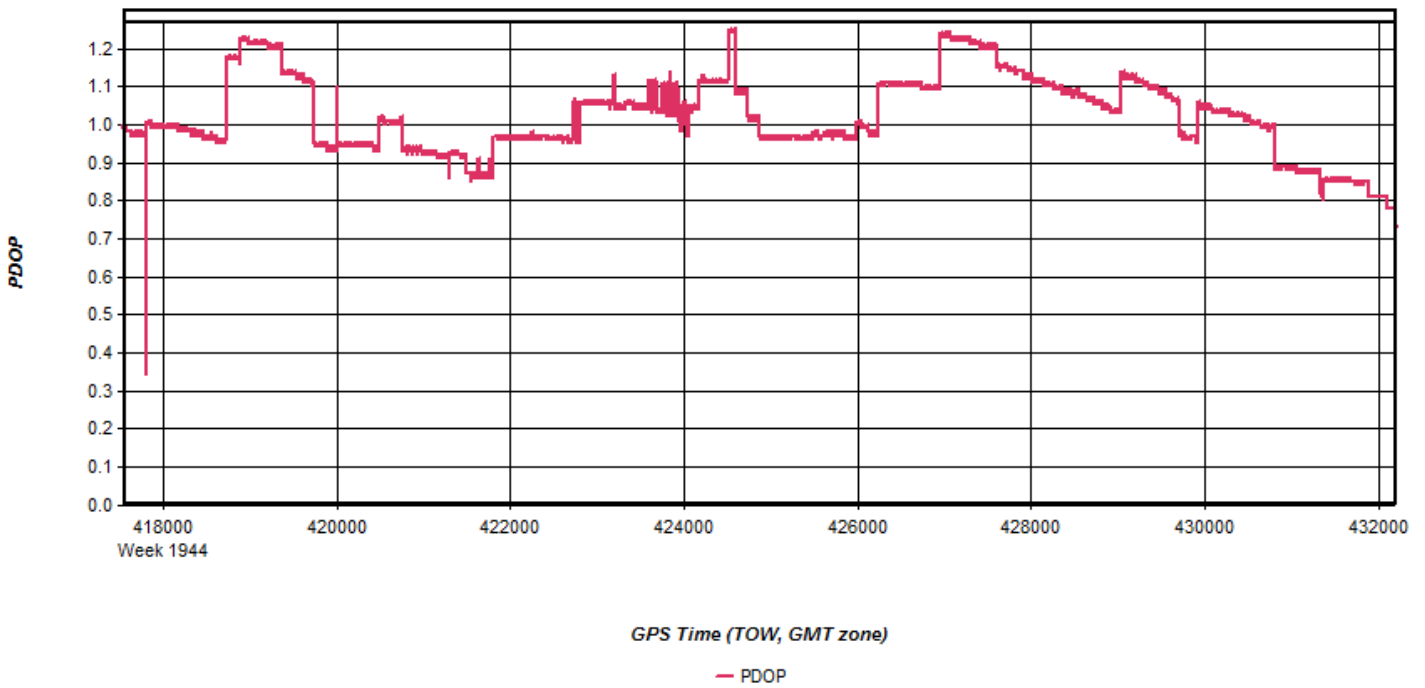
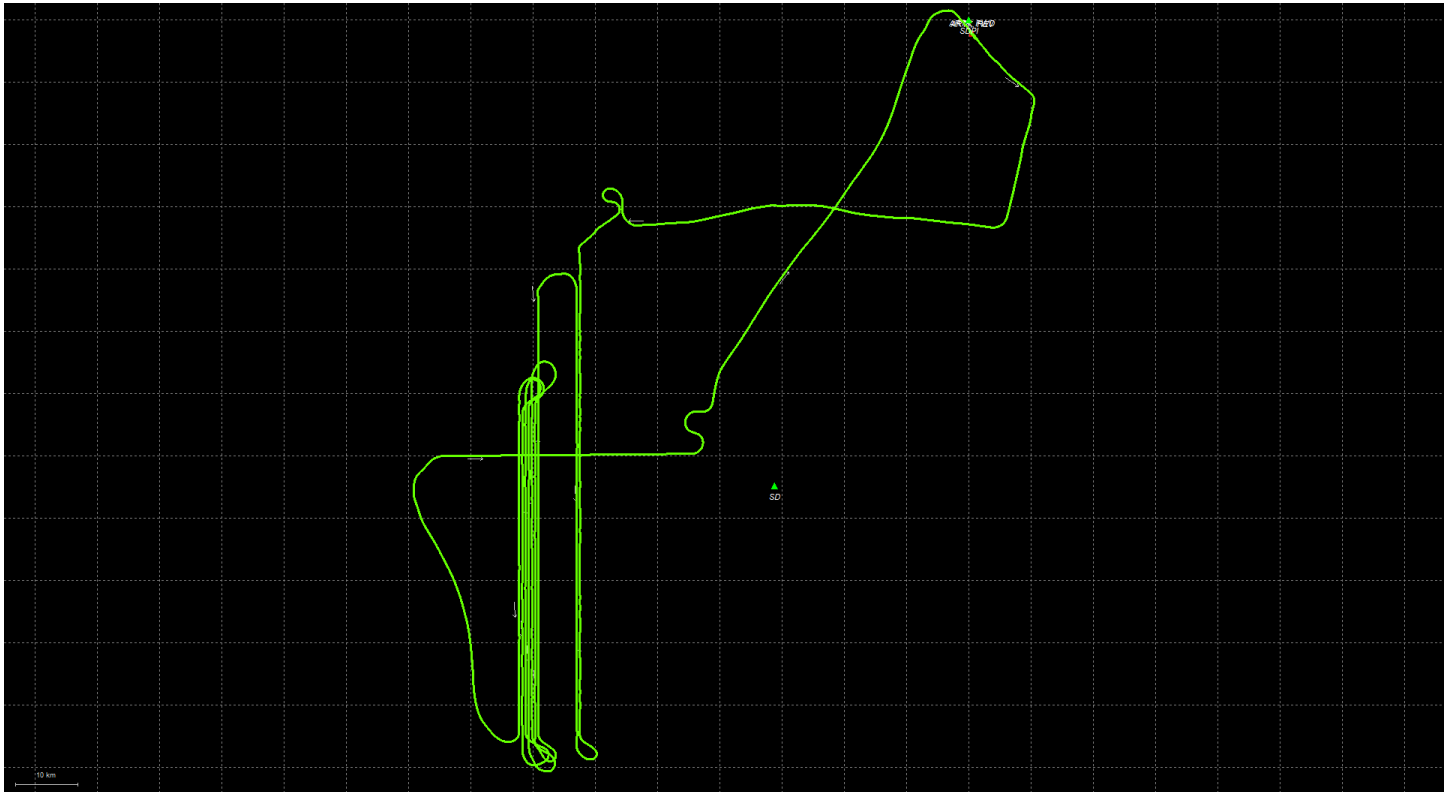
GPS Unit: 0/1 N Sta 1: Static 5 min. KPIR Sta 2: _____ Flyovers: Y 1 N If Y, times: Sta 1 Sta 2: _____

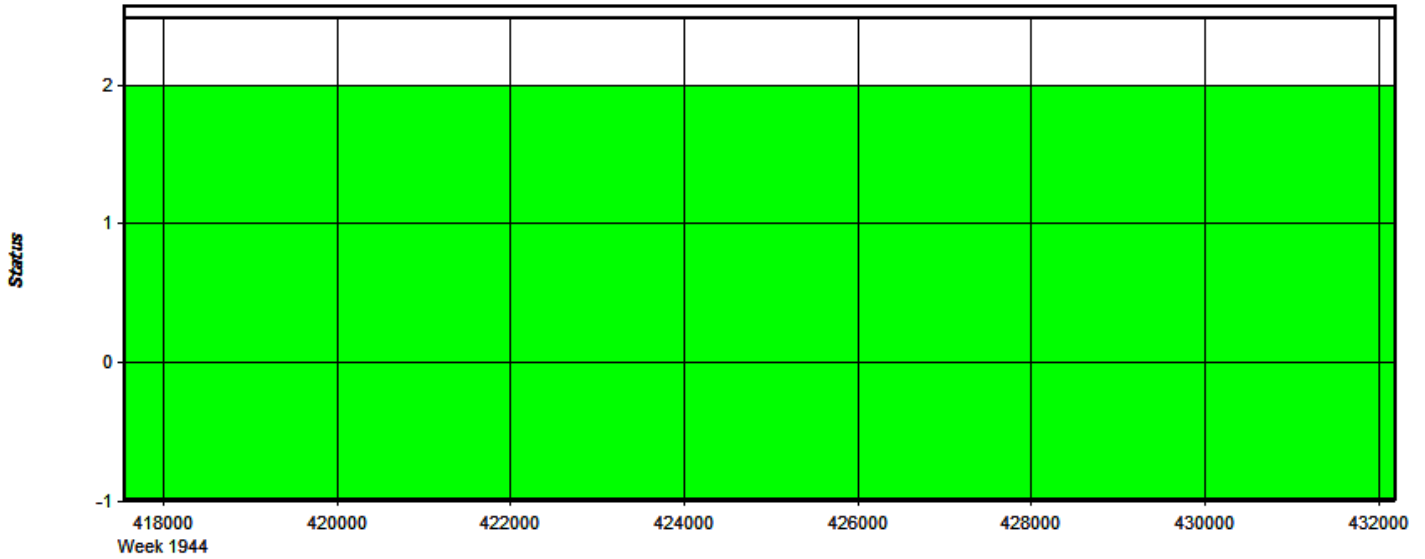
Gd Temp beg: _____ °C End: _____ °C OAT beg: _____ °C End: _____ °C Altimeter begin: _____ end: _____

LIDAR	Type	ALS 80	Serial #	8227	Alt AGL	Alt AMSL	Avg Ft Spacing	Max Gap	Power	PPM	Mag Cal	Storage Name
	FOV	20	Scan Freq	4B	MPIA	Y 1 N	Release Rate	328	100		End Cal	570
60	Hdg	Start (UTC)	End (UTC)	Gd Spd	Foot/Sec	GPS Altitude	Crab	Turn (0-3)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.			
61	174	19:50	20:14	122	10/24	7200		0	Fig 8 @ 1941			
61	354	20:18	---	140	11/22	7200		0	FSE 38 mi. SHUTDOWN SENSOR (IMB) / REBOOT / FCB			
61	354	21:11	---	---	---	7200		0	RESTART FSE 28 mi. / REBOOT / REBOOT / LAND			

Total Proj Lines: _____ Lines Flown: _____ Lines Remain: _____ Online Time: 1.0 Mob Time: 1.25 Notes: _____

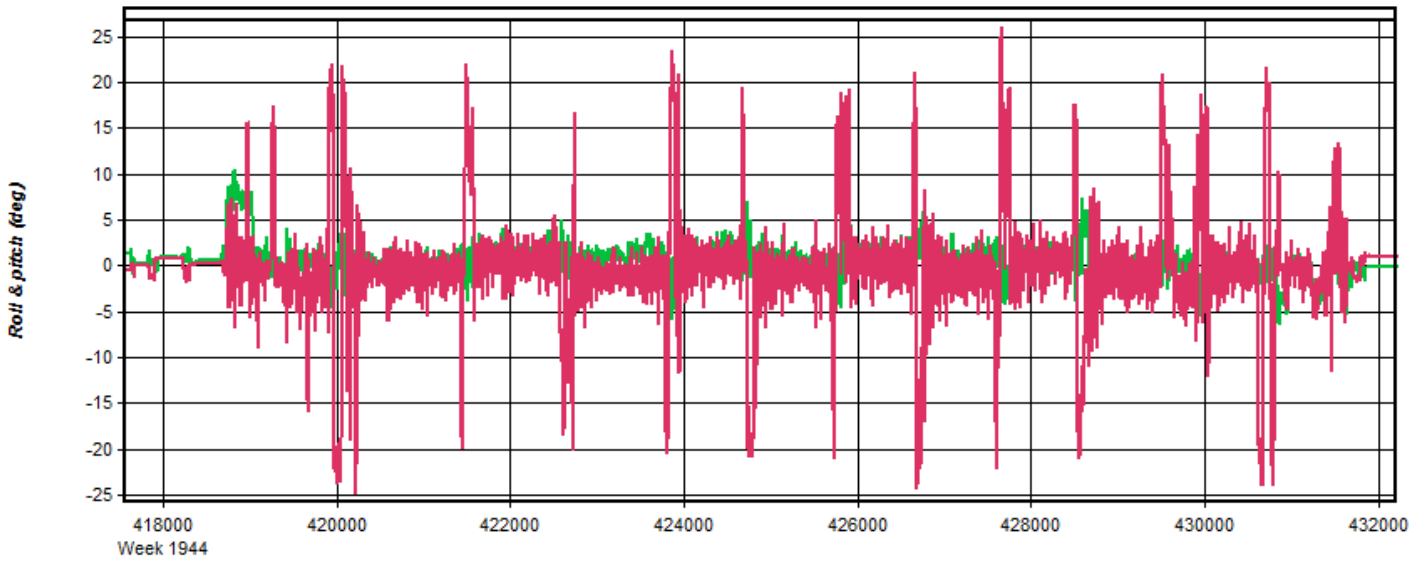
April 13, 2017-A (N73TM, SN7178)





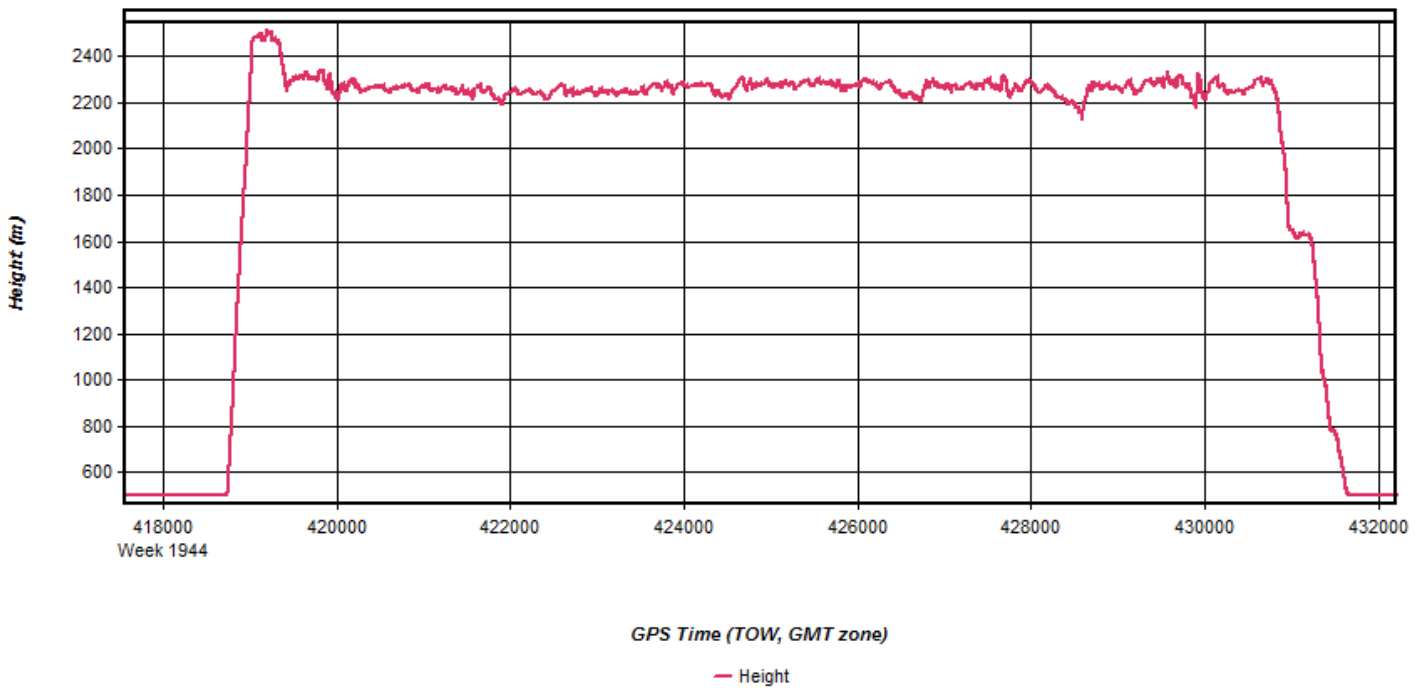
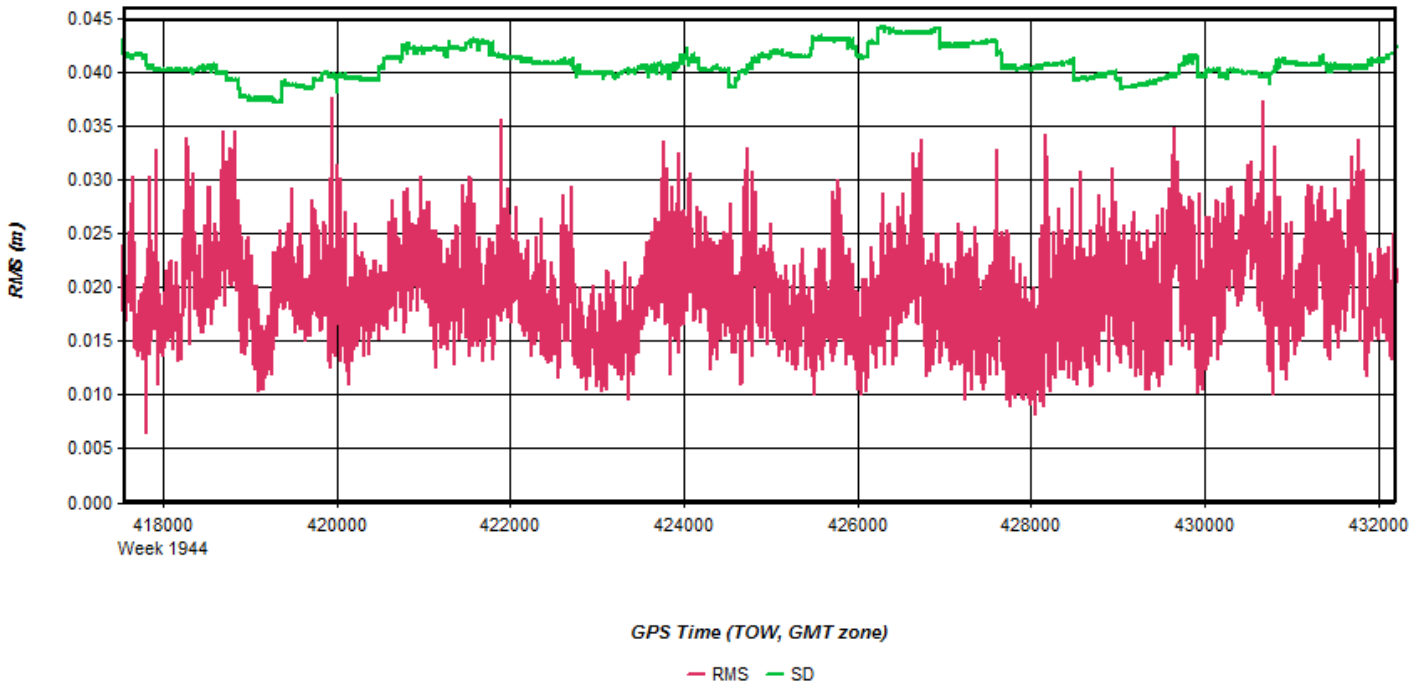
GPS Time (TOW, GMT zone)

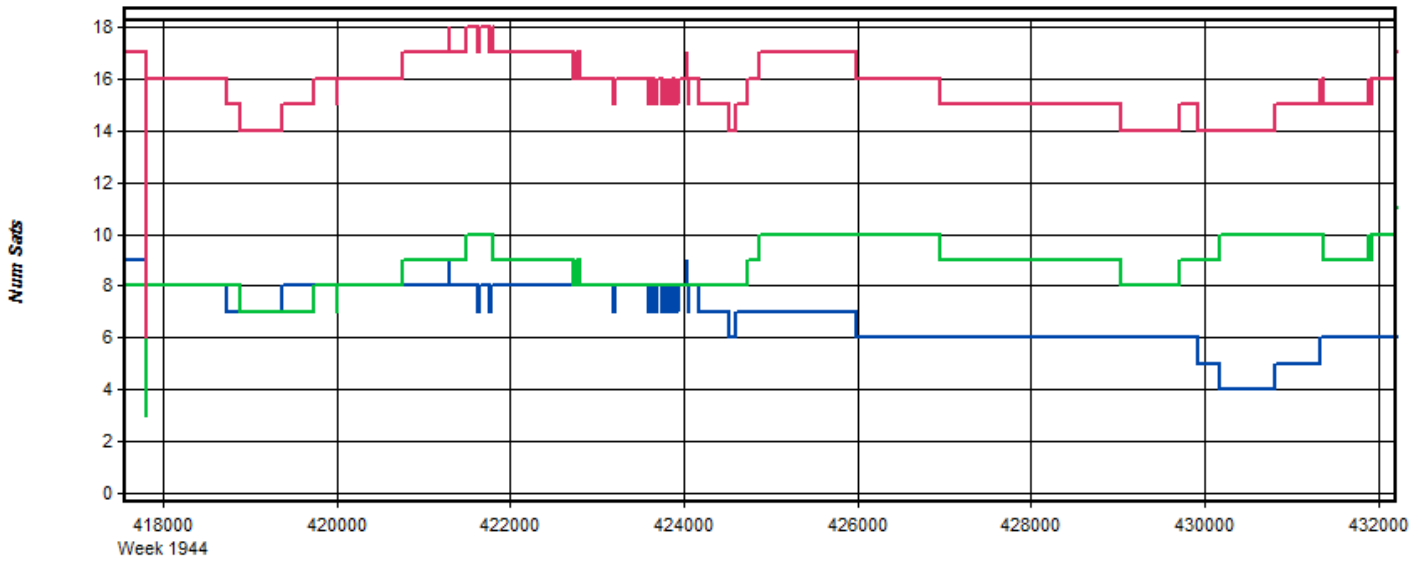
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

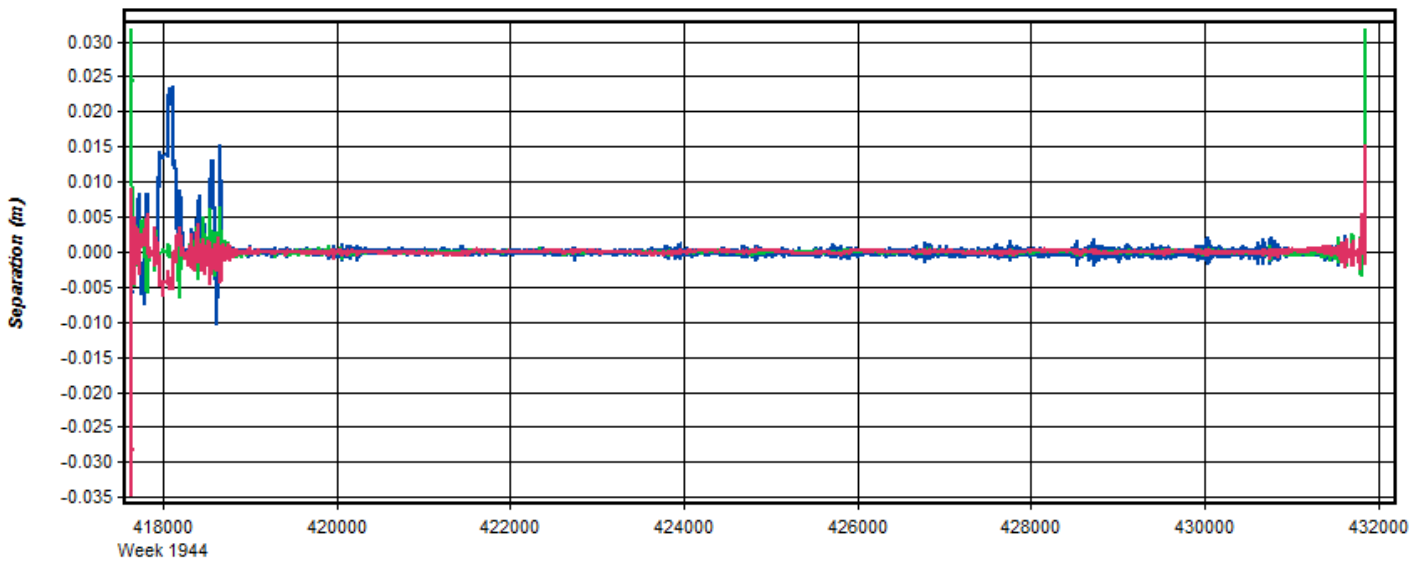
— Roll — Pitch





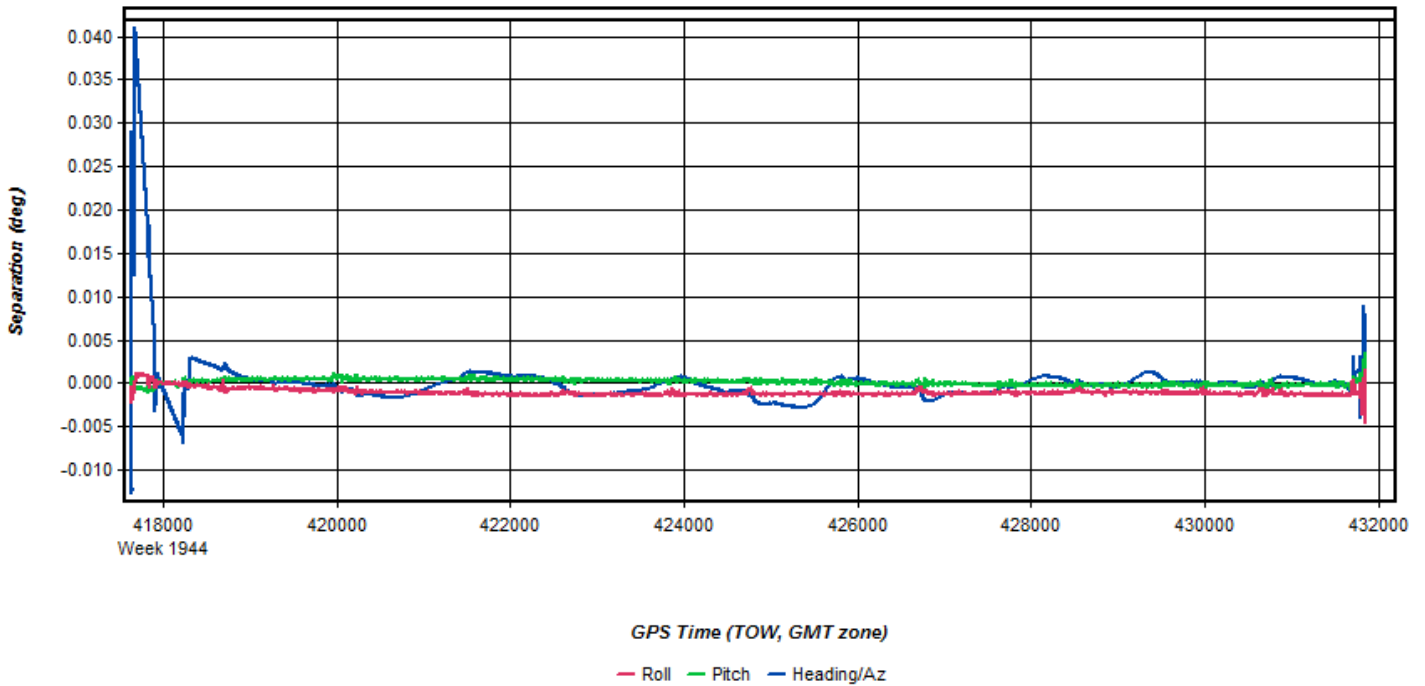
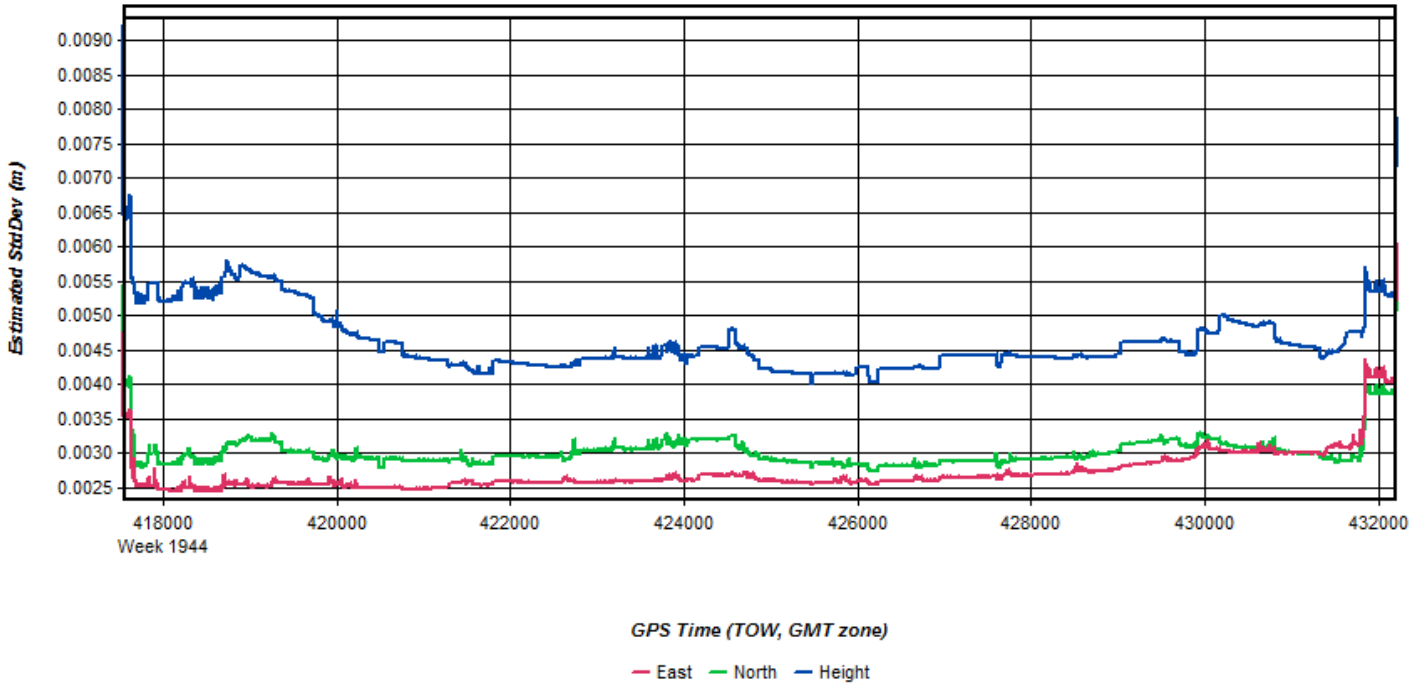
GPS Time (TOW, GMT zone)

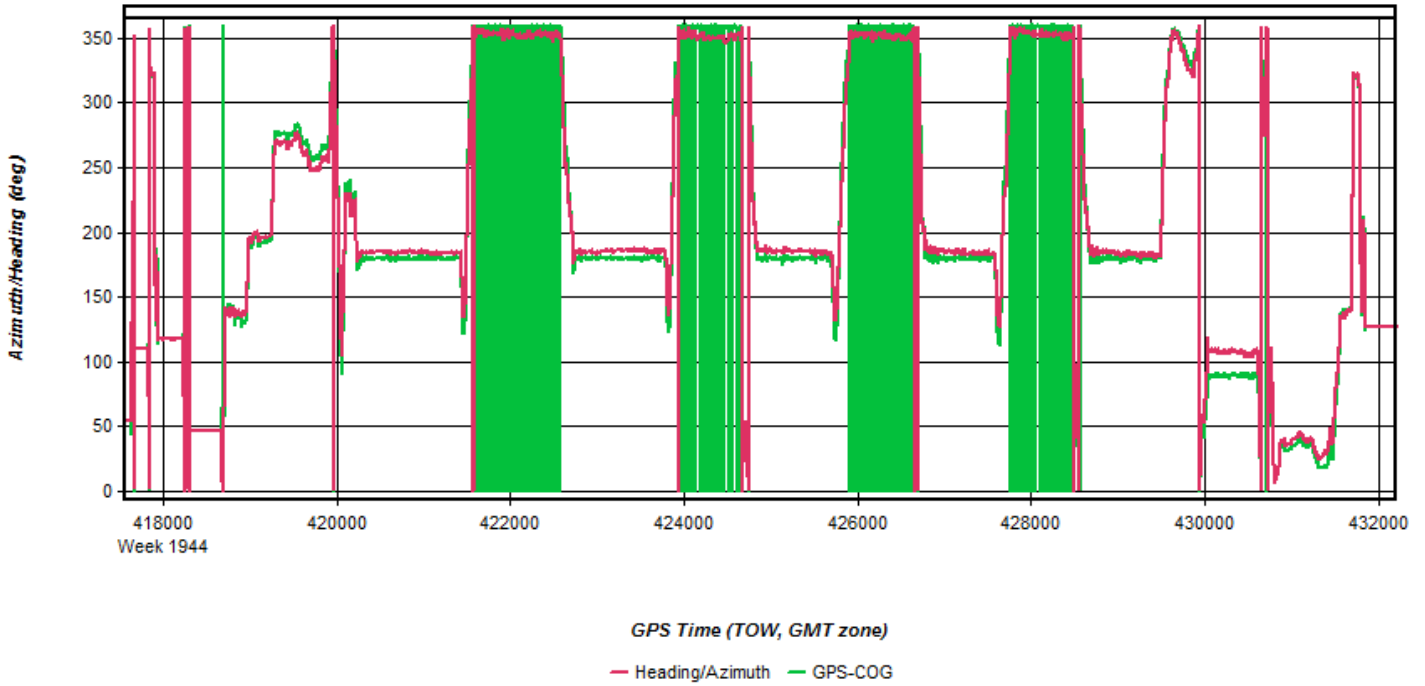
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Coordinate/Antenna Settings

Master Remote

Base Station
 2: SD Name: SD Disabled
 File: F:\Proc\30420_SD_LIDAR\Survey\Base_Data\JD103\11001030 (r)

Coordinates
 Latitude: North 43 43 51.01200 Coord. options
 Longitude: West 100 40 56.56060 Save to Favorites
 Ellipsoidal height: 551.704 m
 Datum: WGS84 Proc Datum: WGS84
 Epoch: year

Antenna Height
 From station file: TRM55971.00, NONE View STA File
 Antenna profile: TRM55971.00 Info
 Measured height: 1.800 m Measured to
 ARP to L1 offset: 0.067 m ARP
 Applied height: 1.867 m L1 Phase Centre

Coordinate/Antenna Settings ? X

Master Remote

Base Station
 1: SDPI Name: SDPI Disabled
 File: F:\Proc\30420_SD_LIDAR\Jim_Swinford_4-17-17\20170413_1956:

Coordinates
 Latitude: North 44 24 00.06331 Coord. options
 Longitude: West 100 17 41.89953 Save to Favorites
 Ellipsoidal height: 526.052 m
 Datum: WGS84 Proc Datum: WGS84
 Epoch: year

Antenna Height
 From station file: TRM57971.00, NONE View STA File
 Antenna profile: TRM57971.00 Info
 Measured height: 0.000 m
 ARP to L1 offset: 0.065 m
 Applied height: 0.065 m
 Measured to:
 ARP
 L1 Phase Centre
 Compute From Slant

OK Cancel

Flight Log

Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc Date: 4/13/2017

(email log daily to flight_log_distribution_list@quantumspatial.com)

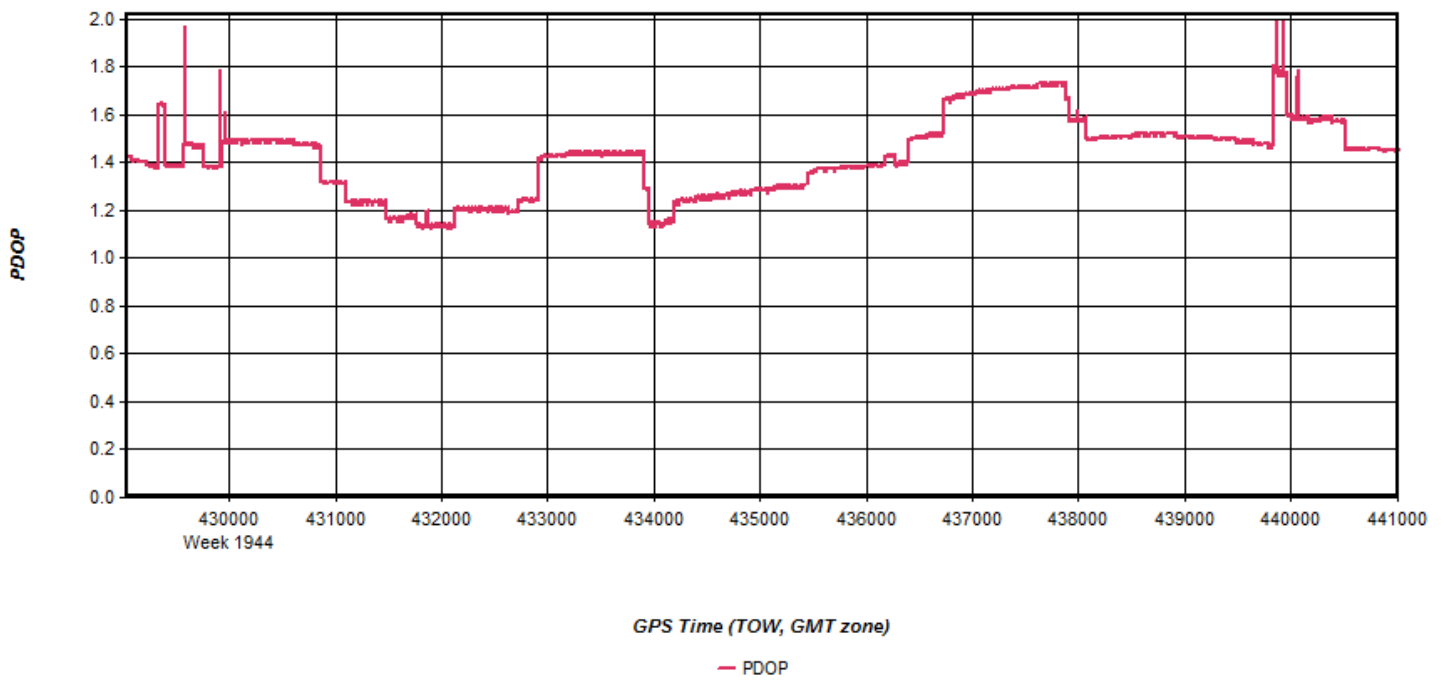
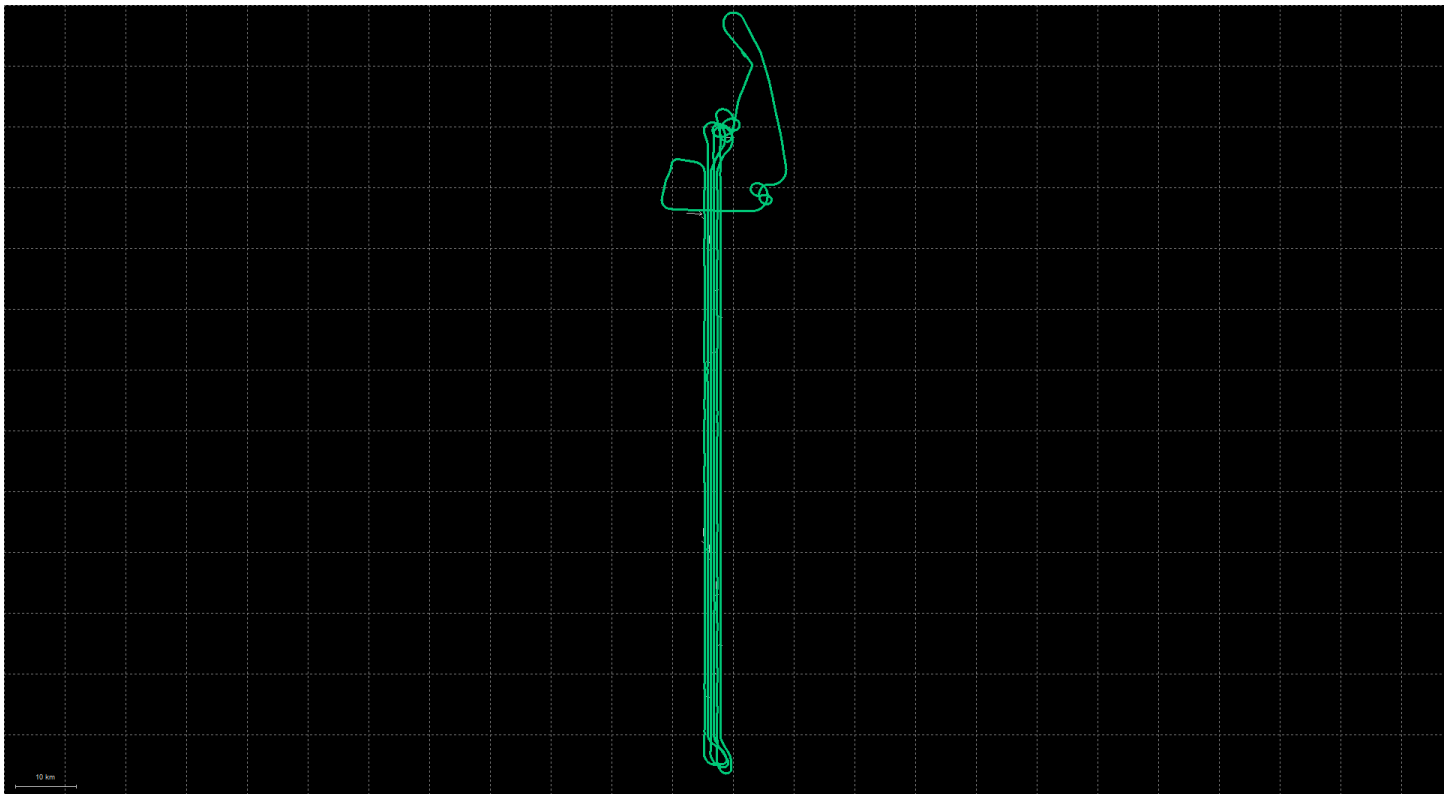
Project: NRCS_SD_LIDAR		Proj #: 30420		Flight Mgmt File: 30420_SD_ALS70SP3 (7xxx)	
Aircraft: N73TM	Begin Hobbs: 6634.8	End Hobbs: 6638.4	Total: 3.6	Pilot: John Barham	Co-Pilot: Tech: Gregory
Dep Apt: KPIR	Dep Time (Lcl): 3:18 (Z: 20:18)	Arr Apt: KPIR	Arr Time (Local): 6:56 (Z: 23:56)	Tot Time Aloft: 13:38	
CORs: Y/N		Sta 1:	Sta 2:	Flyovers: Y/N (If Y, times: Sta1) Sta2)	
GPS Unit: Y/N		Sta 1: USGS_SD.01	Sta 2: USGS_SD.02	Flyovers: Y/N (If Y, times: Sta1) Sta2)	
Gd Temp beg: °c		End: °c	OAT beg: °c	End: 13 °c	Altimeter begin: end: 27.95
LIDAR	Type: ALS 70	Serial #: 7178	Alt AGL: 5200'	Alt AMSL: 7500'	Avg Terr Ht: 2300'
	FOV: 28°	Scan Freq: 329kHz	MPIA: Y/N	Pulses In Air: 2	Pulse Rate: 611
				Max Gdspd: 130kts	Avg Pt Spacing: PPSM 4
				Power: 100%	
				Mag GA: 234	Storage Name: 7170
				End GA: 291	SSD.03
				Trk GA: 57	

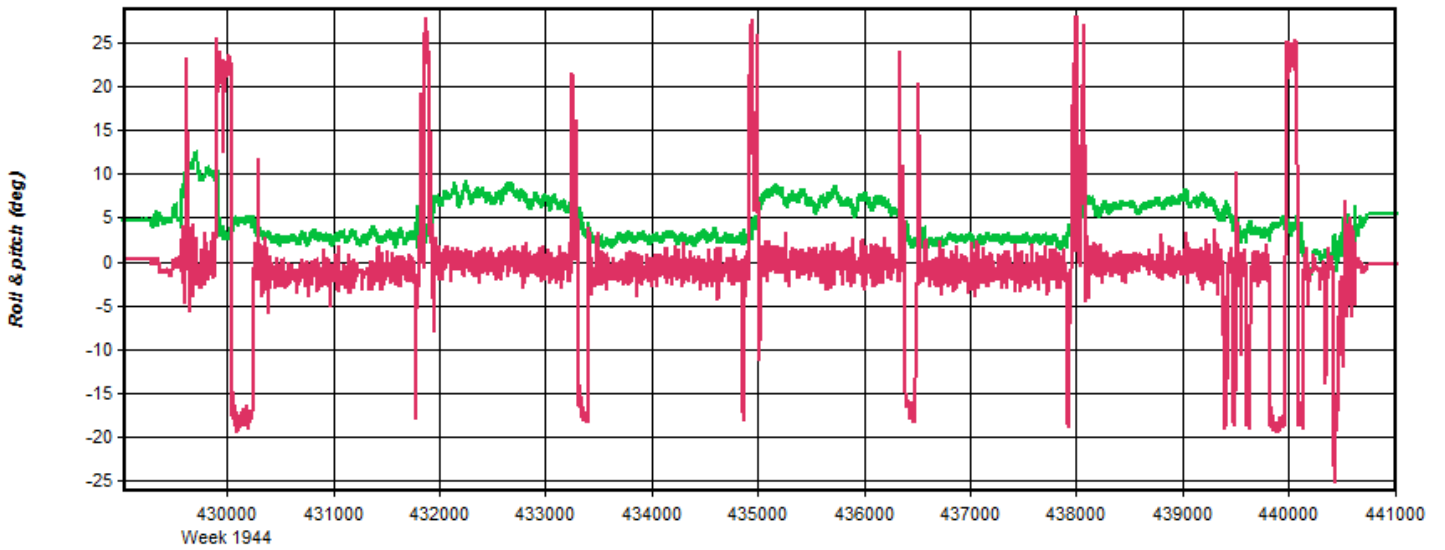
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOV/Sec	GPS Altitude	Crab	Turb (ft/s)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc
		20:38	20:42						opening sturn ; Hazy
727	S	20:46	21:04	122	1.1/18	7491'	1°	-	ranges did not appear until 7 NM FSE
726	N	21:07	21:23	142	1.1/19	7400'	1°	-	149 kts @ start ; 30 kts tailwind, 256 to west @ 5 NM FSE
714	S	21:29	21:43	130	1.2/17	7400'	1°	0	
713	N	21:46	21:57	142	1.2/20	7475'			151 kts @ start 35 kts tailwind ; Range gate warning @ end
712	S	21:32	22:15	126	1.2/19	7500'	1°	0	max range gate warning @ start of line
711	N	22:19	22:29	110	1.1/18	7500'	0	0	147 kts @ start ; 38 kts tailwind
710	S	22:34	22:46	131	1.1/18	7500'	0	0	
709	N	22:50	23:01	145	1.2/16	7500'	0	0	145 @ start, 40 kts tailwind
708	S	23:05	23:18	130	1.2/15	7500'	1°	0	
761	E	23:29	23:37	135	1/17	7450'	1°	-	Planned XITE ; max Range Gate @ end Close out Sturn RTB due to high winds from south
		23:37	23:39						

Total Proj Lines: _____ Lines Flown: 10 Lines Remain: 7 Online Time: 3.0 Mob Time: .6 Notes: Winds from south the further west lines were

Scanned by CamScanner

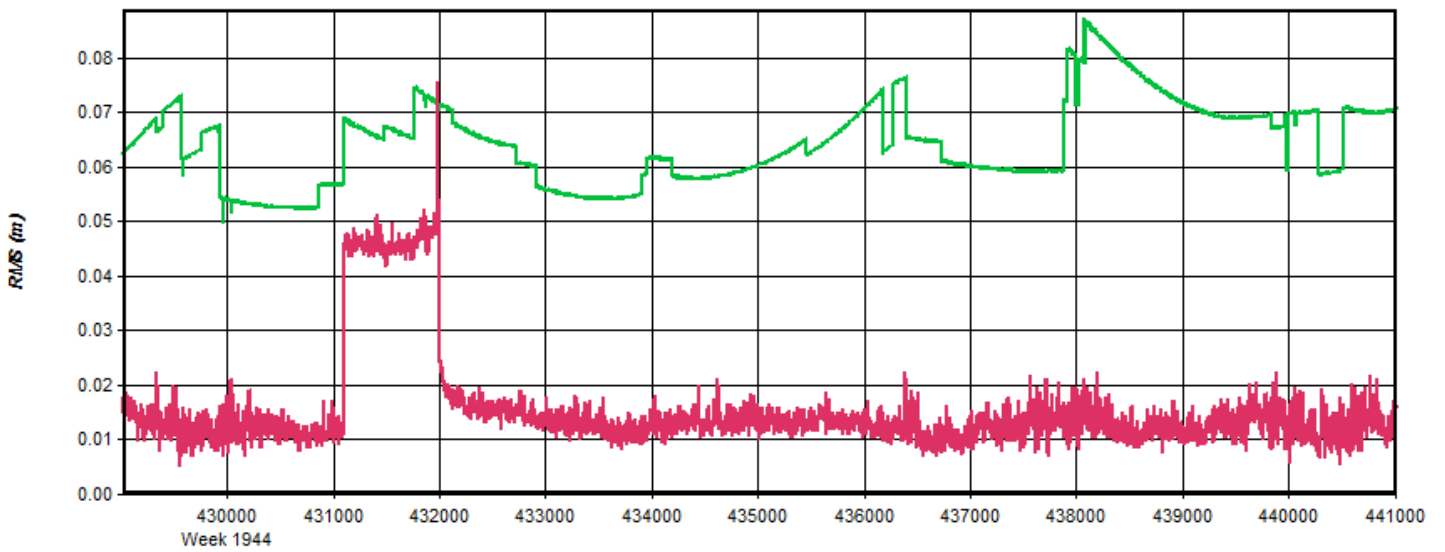
April 13, 2017-B (N246MP, SN8227)





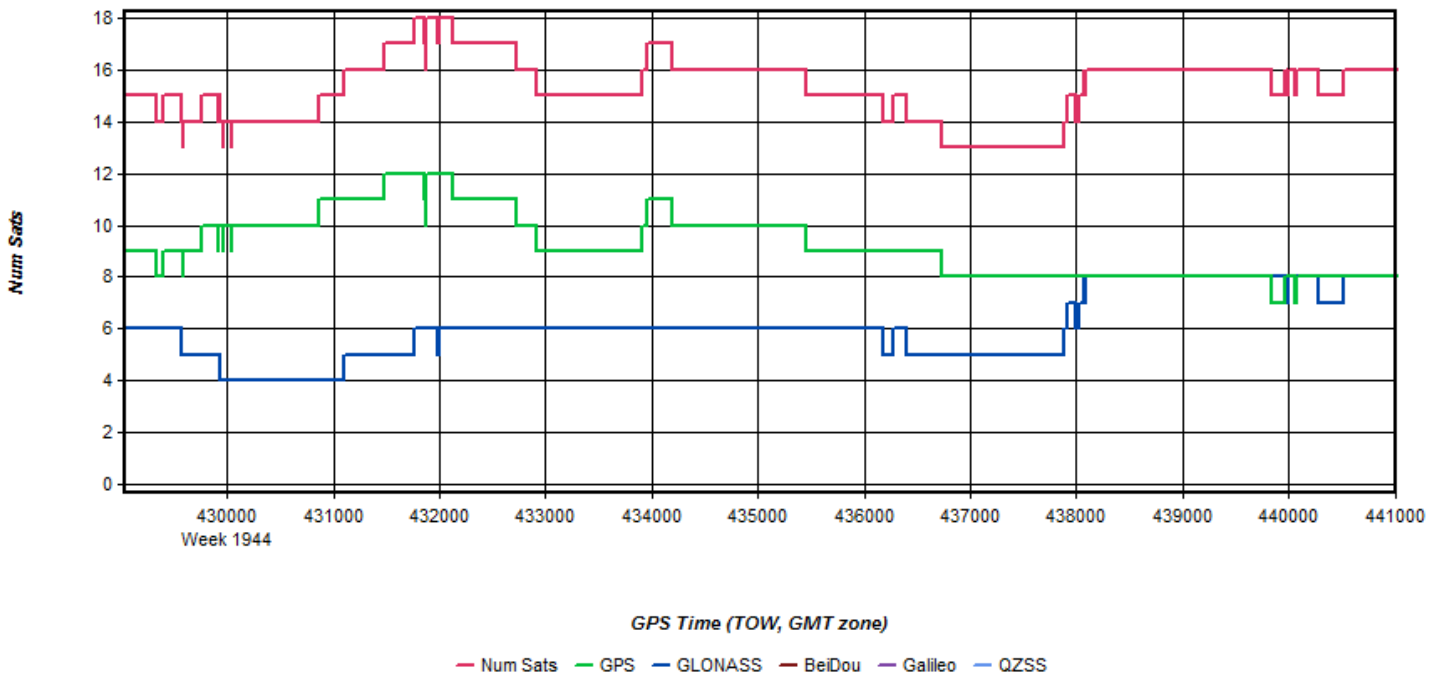
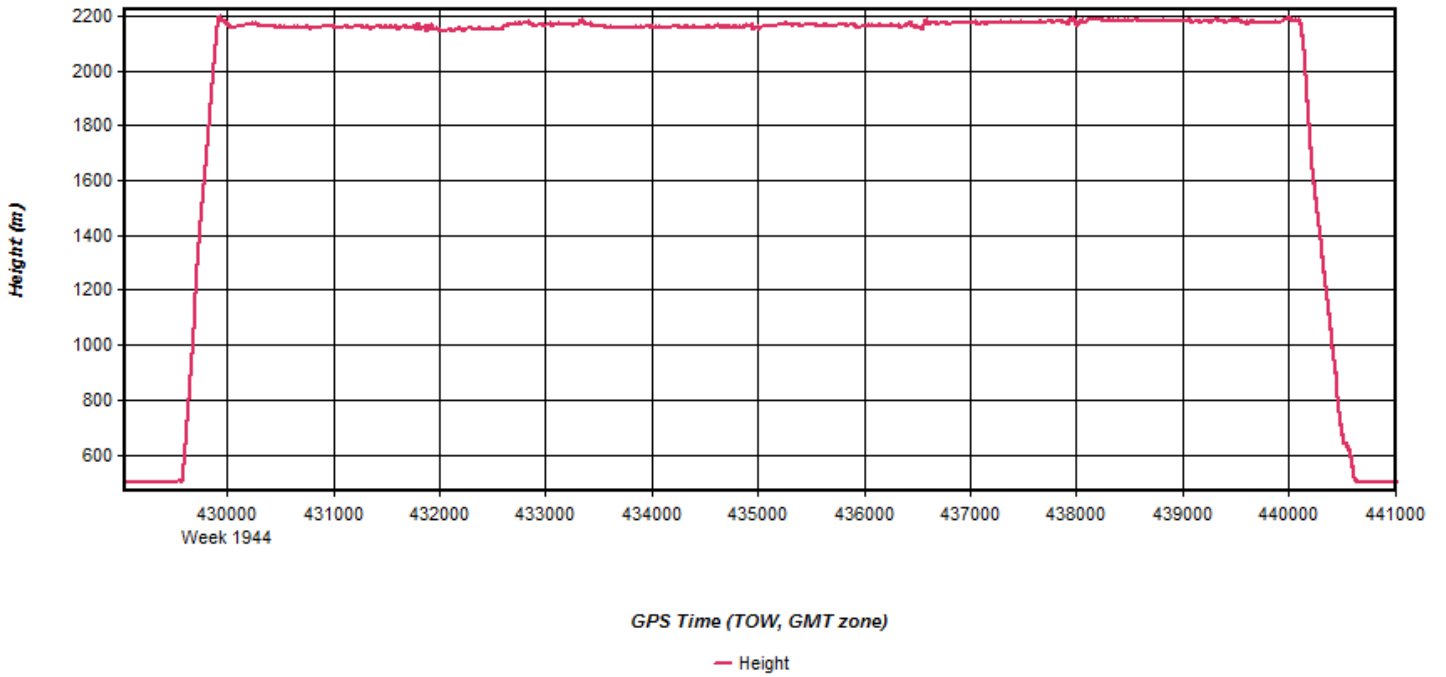
GPS Time (TOW, GMT zone)

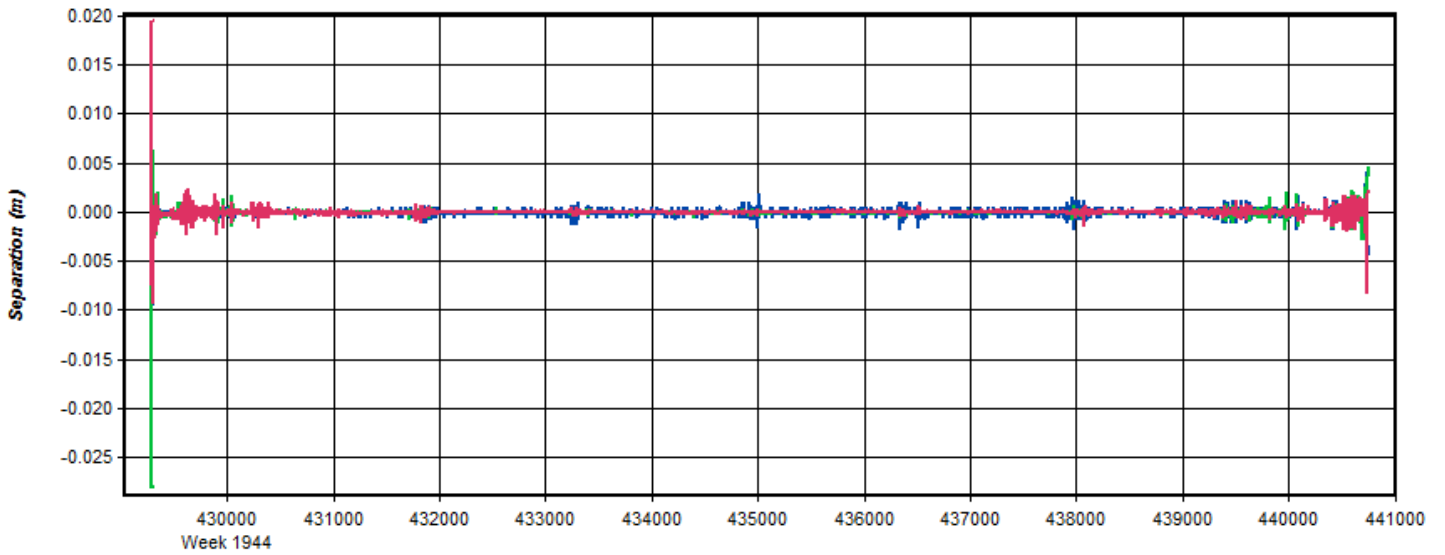
Roll Pitch



GPS Time (TOW, GMT zone)

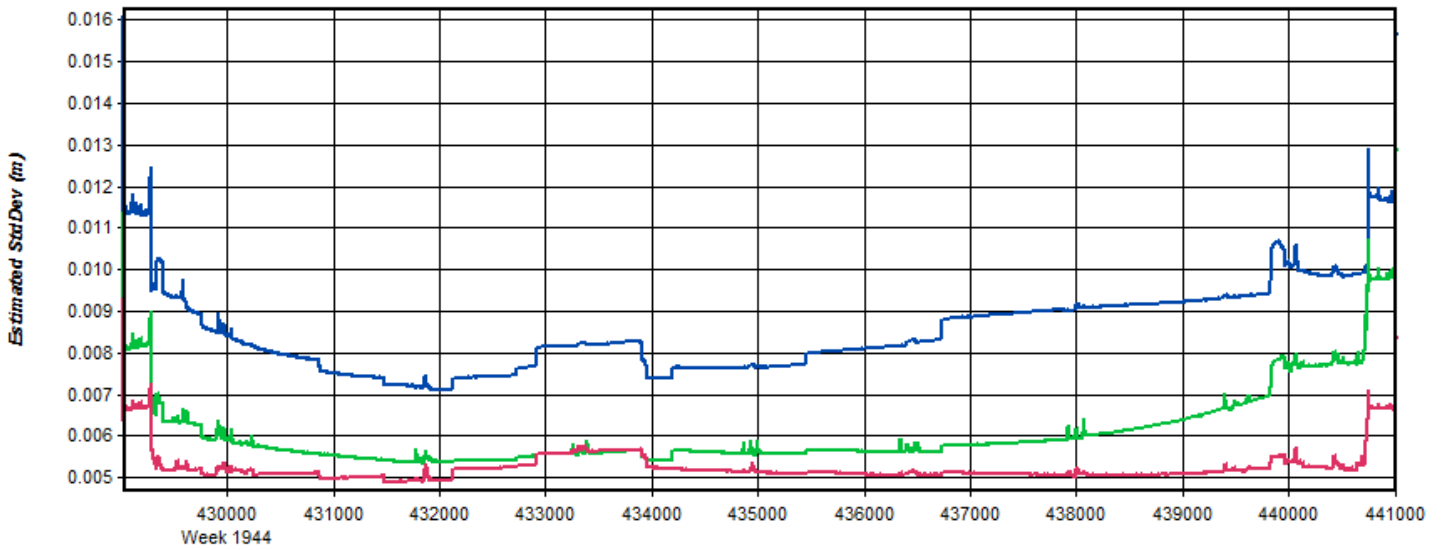
RMS SD





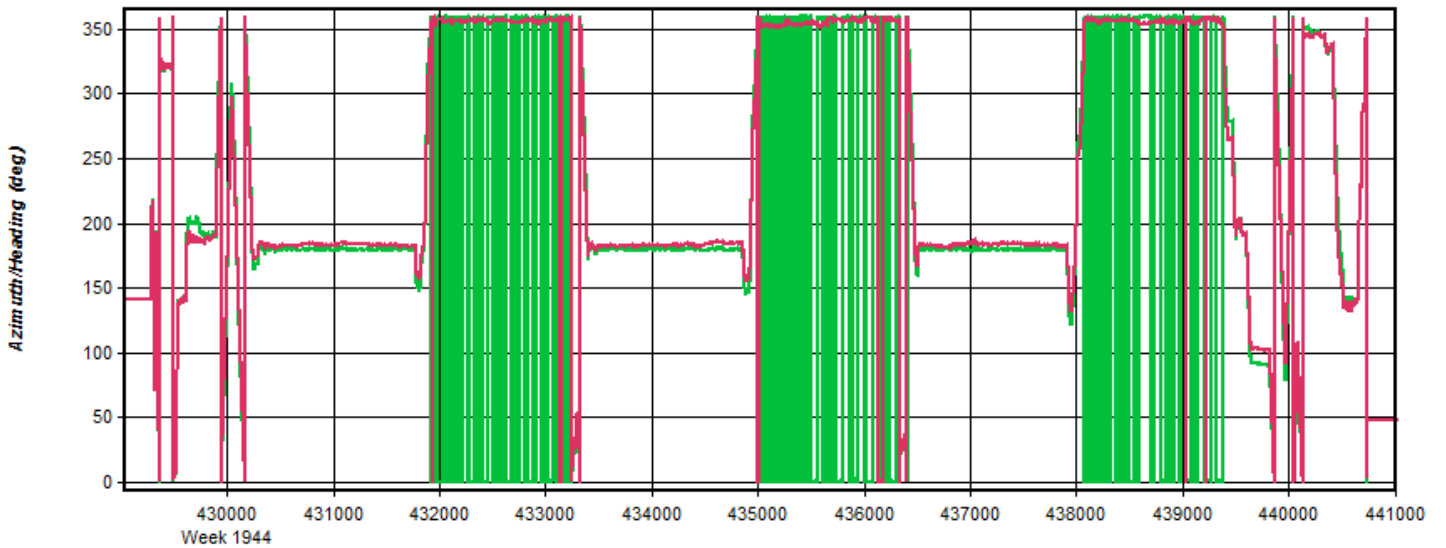
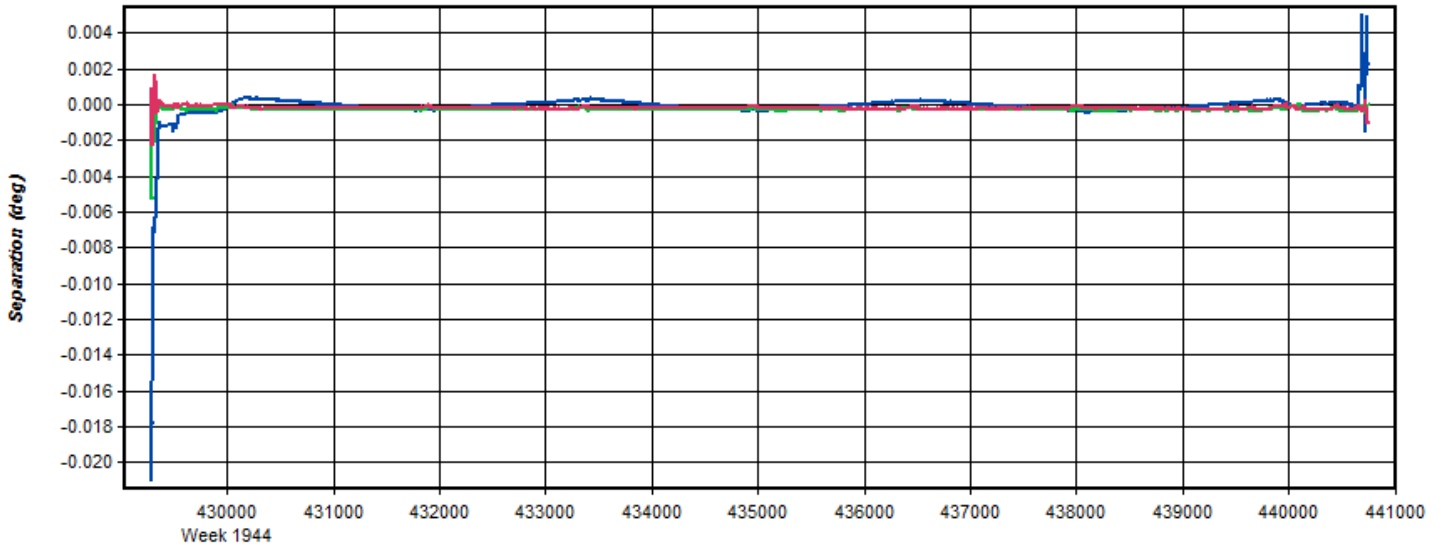
GPS Time (TOW, GMT zone)

— East — North — Up



GPS Time (TOW, GMT zone)

— East — North — Height



Flight Log

Date: 04/12/2017
LINE A B C D E Pg. 2 of 2

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Project: **NRCS SD** Proj #: **30420** Flight Mgmt File: **30420-SD-ALS80** Tech: **SWINFORD**

Aircraft: **N246MP** Begin Hobbs: **1413.1** End Hobbs: **1416.2** Total: **3.1** Pilot: **McDONALD** Co-Pilot:

Dep Apt: **KPIR** Dep Time (Local): **6:20** Air Apt: **KPIR** Arr Time (Local): **9:30** Tot Time Aloft: **3.1**

CORS: **01N** Sta 1: **STATIC 5 MIN. KPIR** Sta 2:

GPS Unit: **01N** Sta 1: **STATIC 5 MIN. KPIR** Sta 2:

Flyovers: Y **18** If Y, times: Sta 1) Sta 2)

Flyovers: Y **1N** If Y, times: Sta 1) Sta 2)

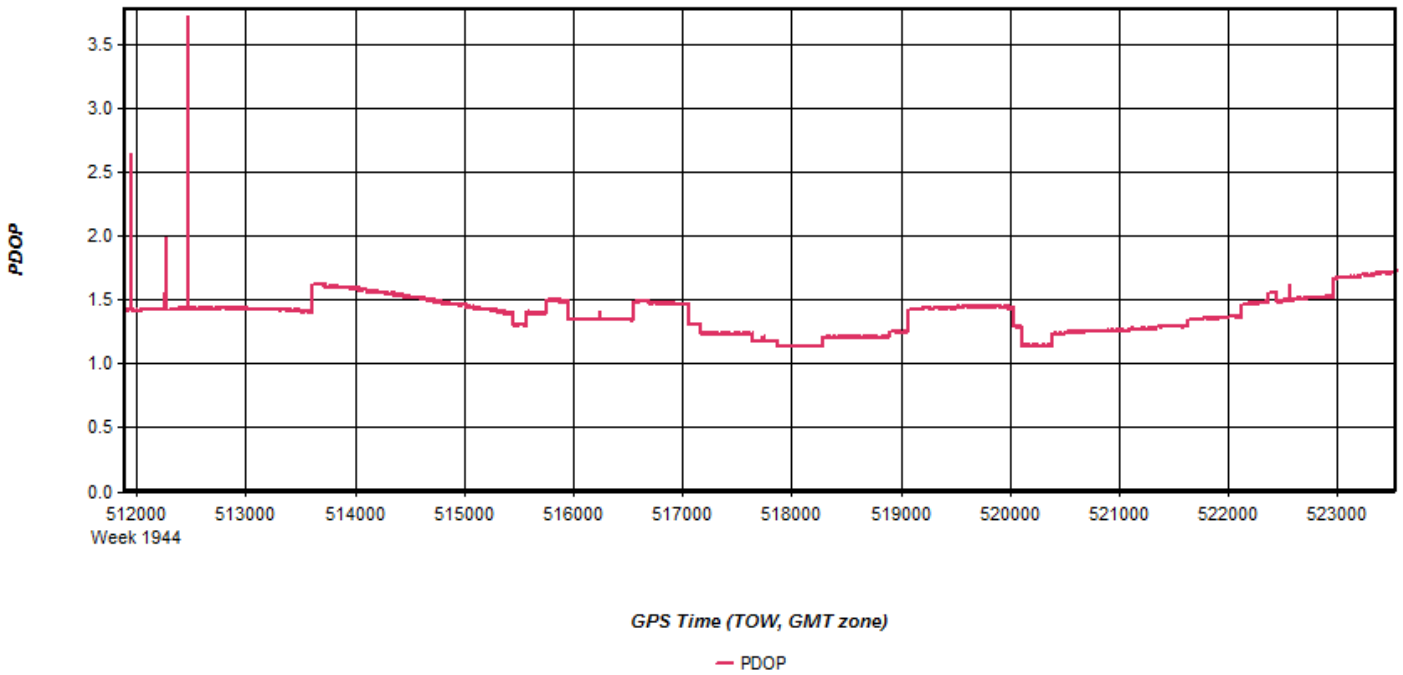
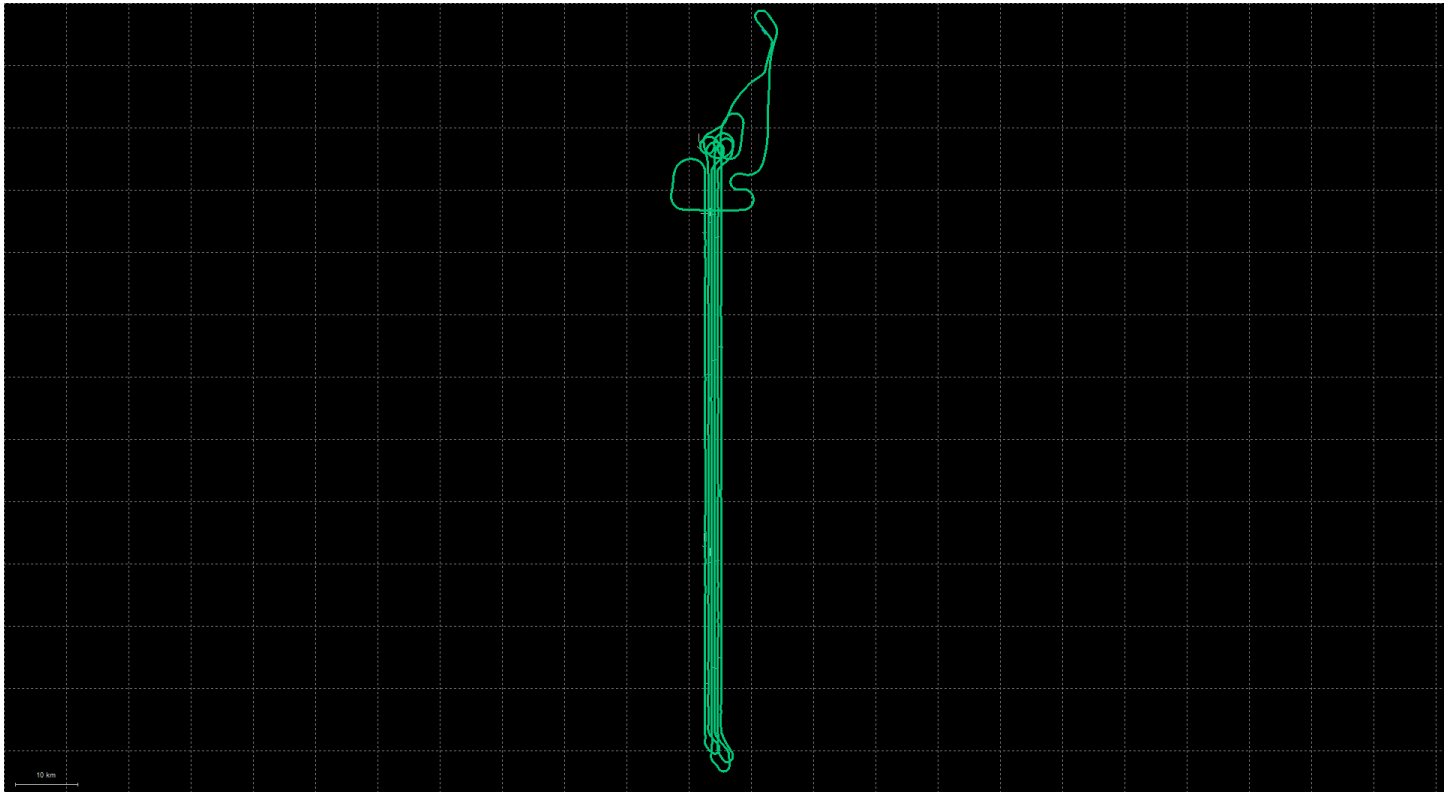
Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: end:

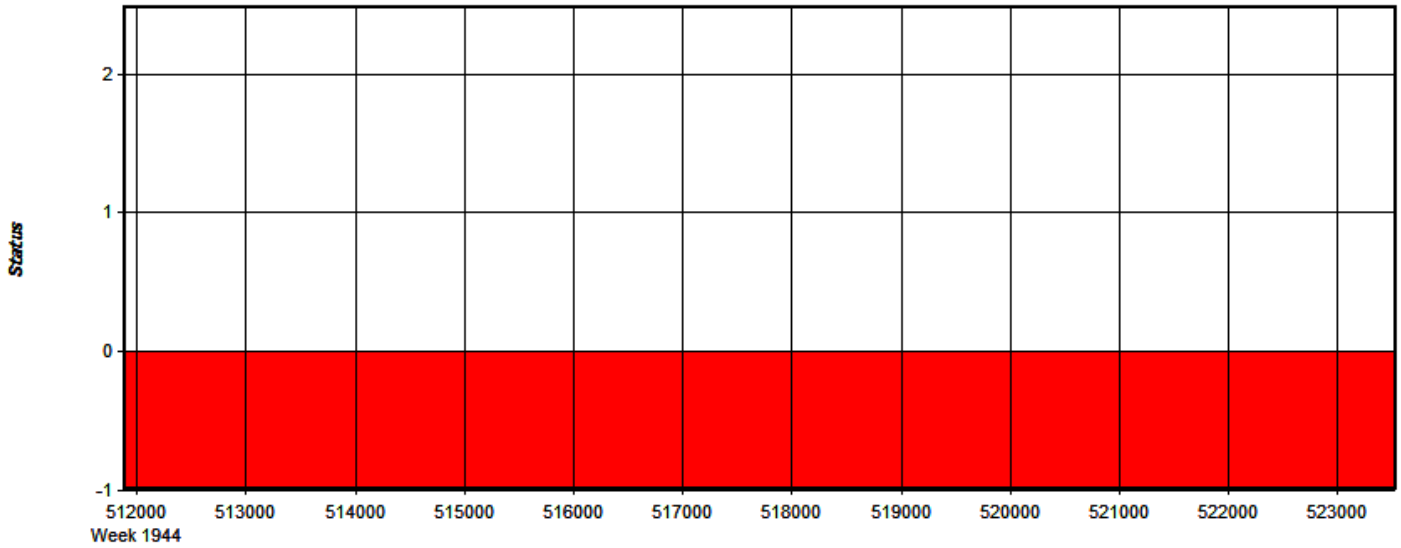
LIDAR	Type	Serial #	AVG TERR	Max	AVG FT	Storage
	FOV	Scan Freq	Rate	Glcpd	Speed	Name
	ALS80	8227	328	130	130	552
	28	48	Power	100	100	

Line #	Hdg	Start UTC	End UTC	Gd Spd	Foot-Sec	GPS Altitude	Crab	Turb	FLIGHT LINE NOTES - visibility, clouds, smoke, partic, etc
145	174	23:34	23:55	131	1020	7100	0	0	FIG 8@ 23:30
144	354	23:59	00:21	141	1020	7100	0	0	
143	174	00:25	00:47	127	1021	7100	0	0	
142	354	00:50	01:12	140	1121	7100	0	0	CLOSE FILE
141	174	01:16	01:39	135	1219	7100	0	0	REOPEN FILE
140	354	01:42	02:05	137	1217	7100	0	0	
X-FLT	85	02:07	02:11	143	1119	7100	0	0	FROM LINE 131 to 150 UNPLANNED LINE

Total Proj Lines: Lines Flown: Lines Remain: Online Time: **2.75** Mob Time: **.15** Notes:

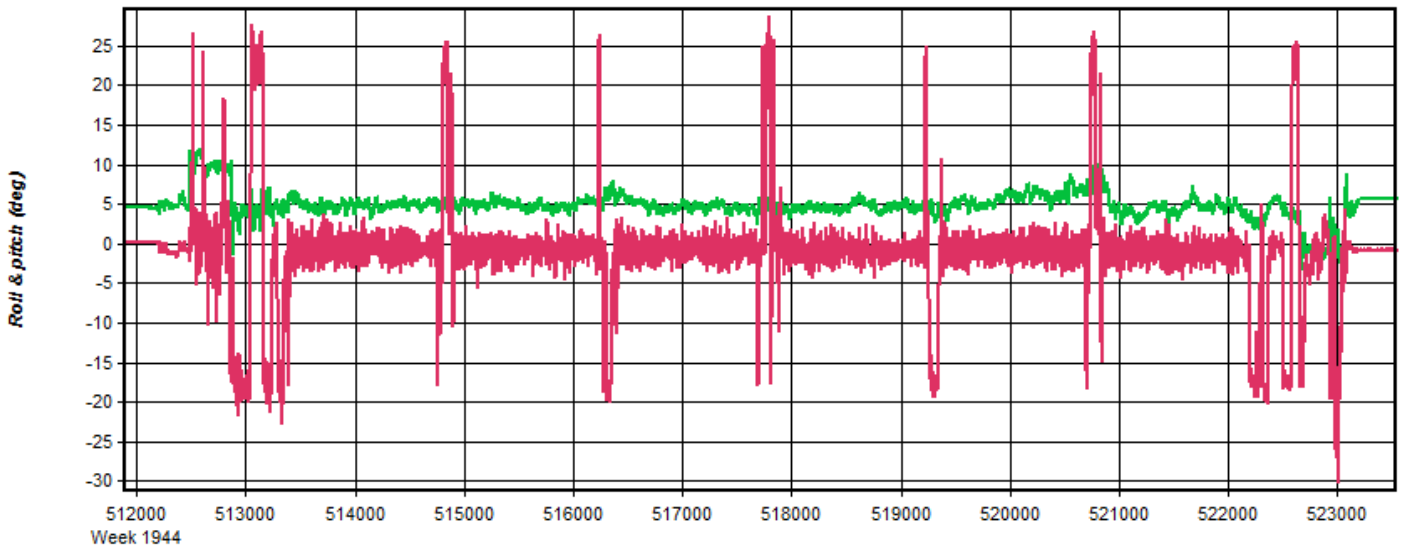
April 14, 2017-A (N246MP, SN8227)





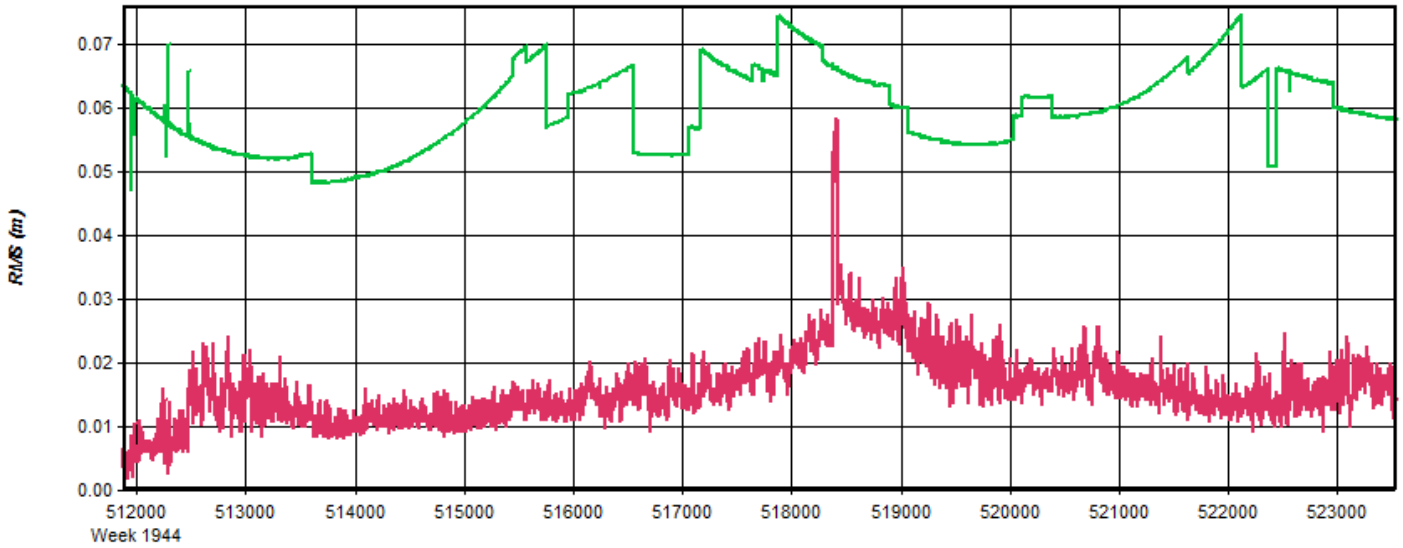
GPS Time (TOW, GMT zone)

— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



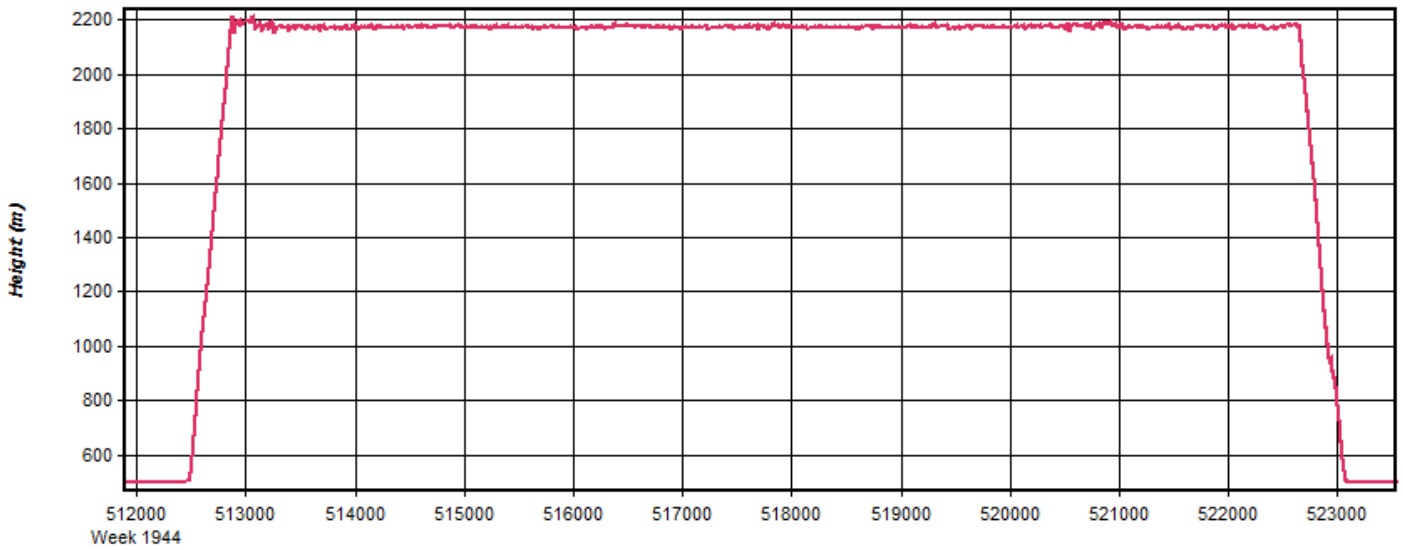
GPS Time (TOW, GMT zone)

— Roll — Pitch



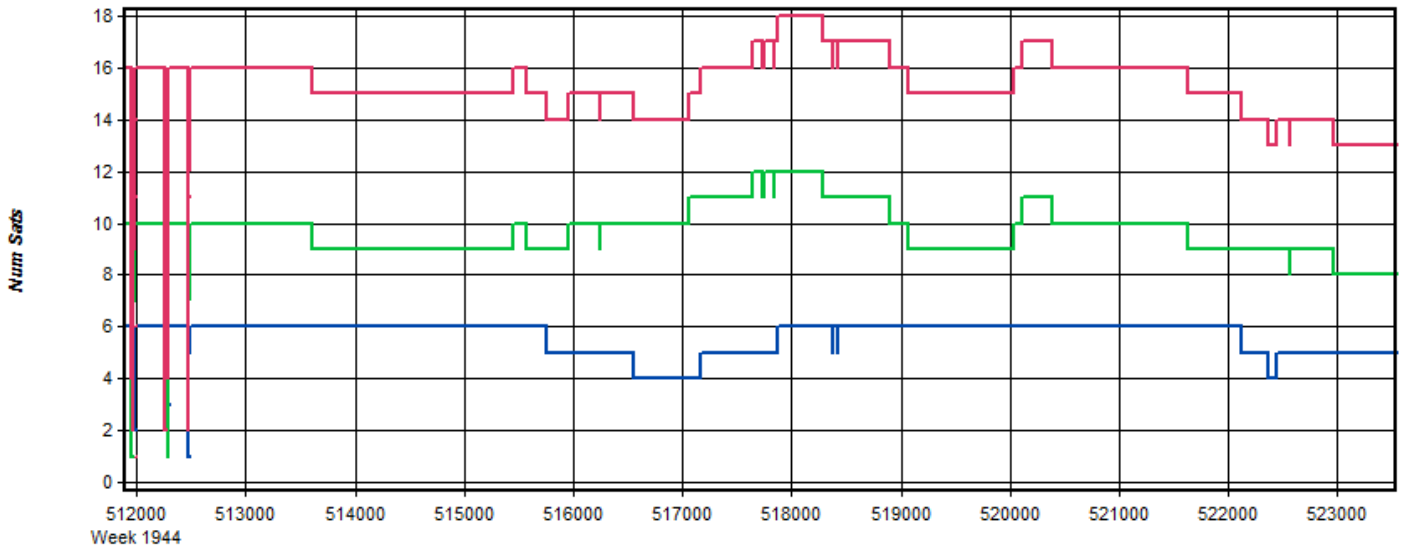
GPS Time (TOW, GMT zone)

— RMS — SD



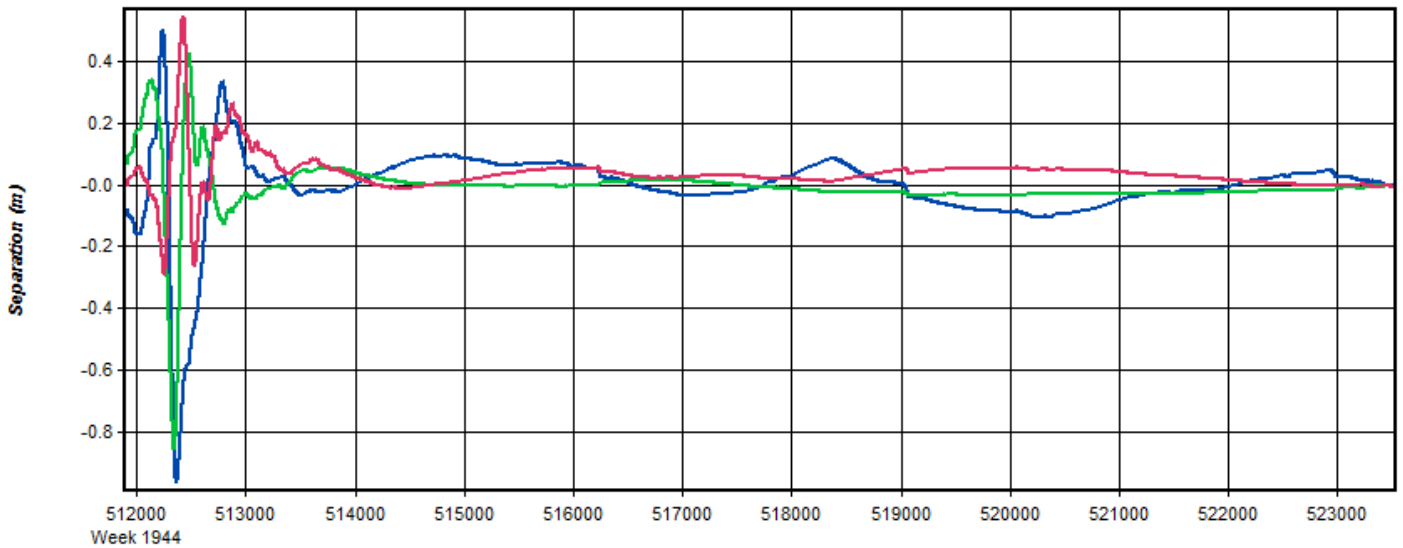
GPS Time (TOW, GMT zone)

— Height



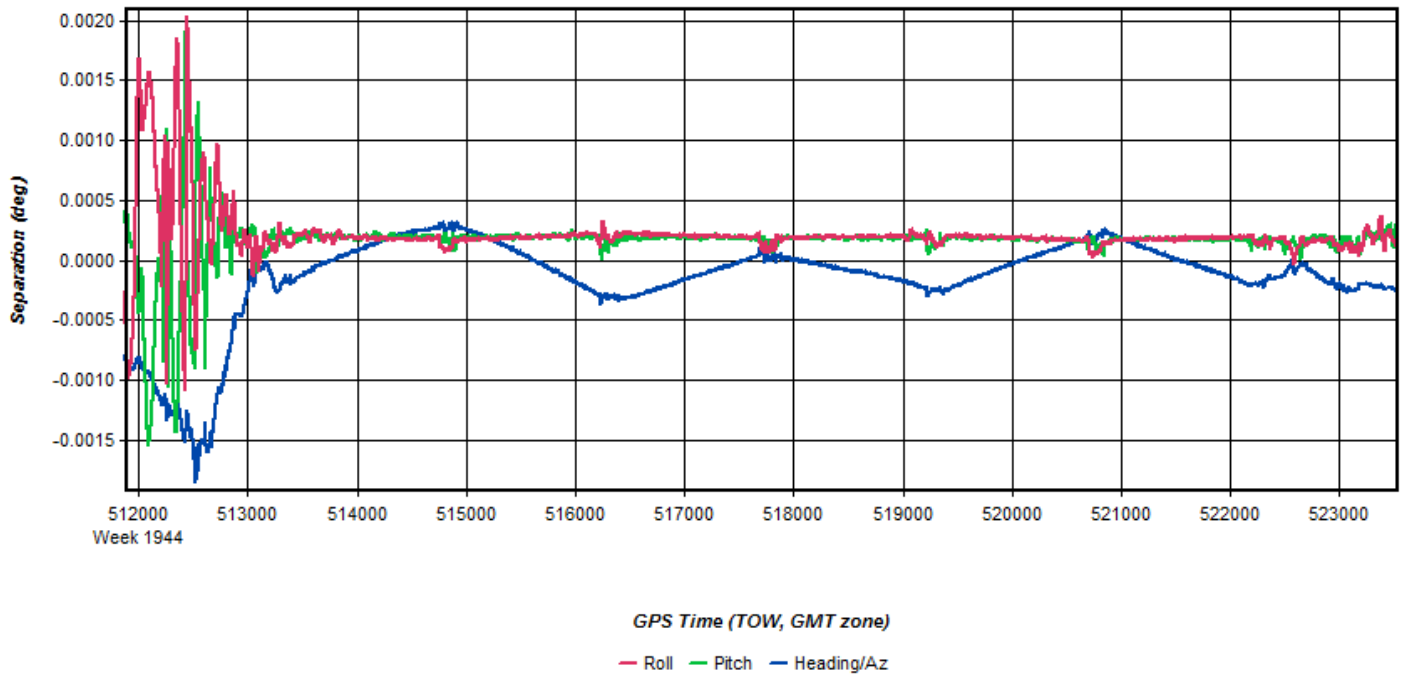
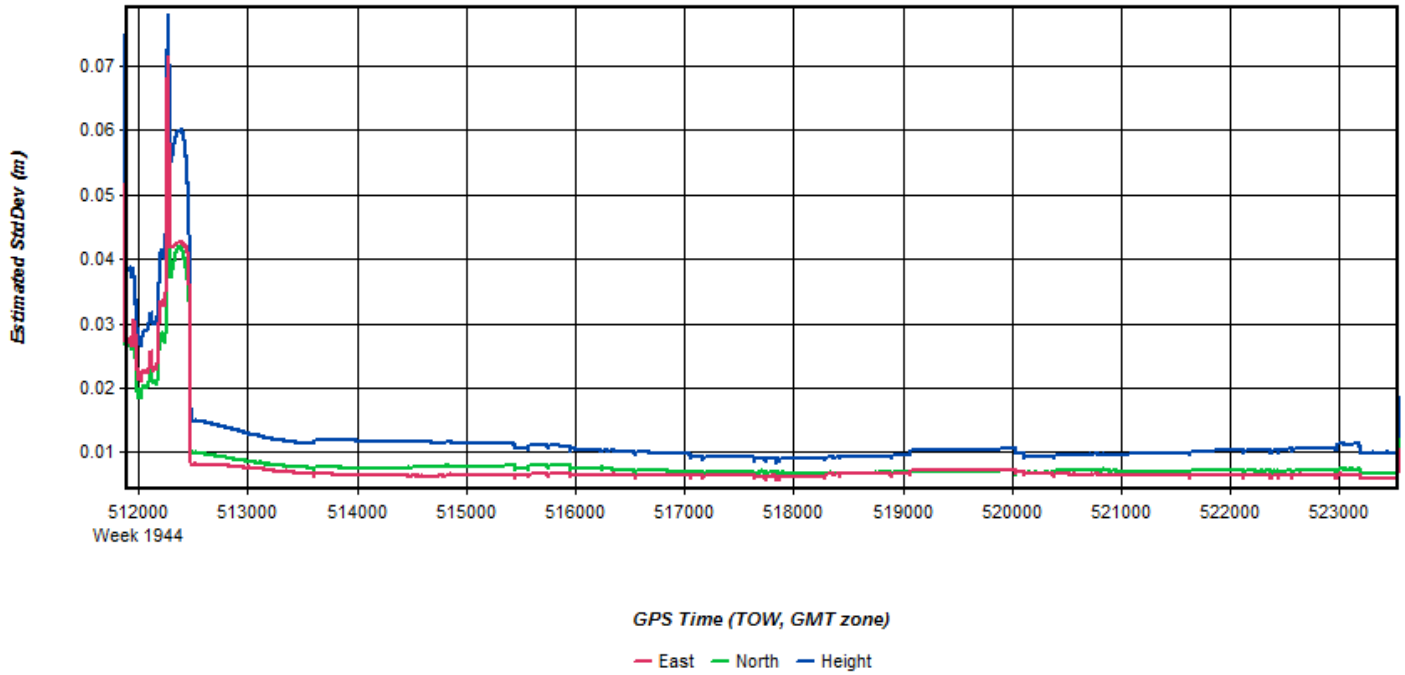
GPS Time (TOW, GMT zone)

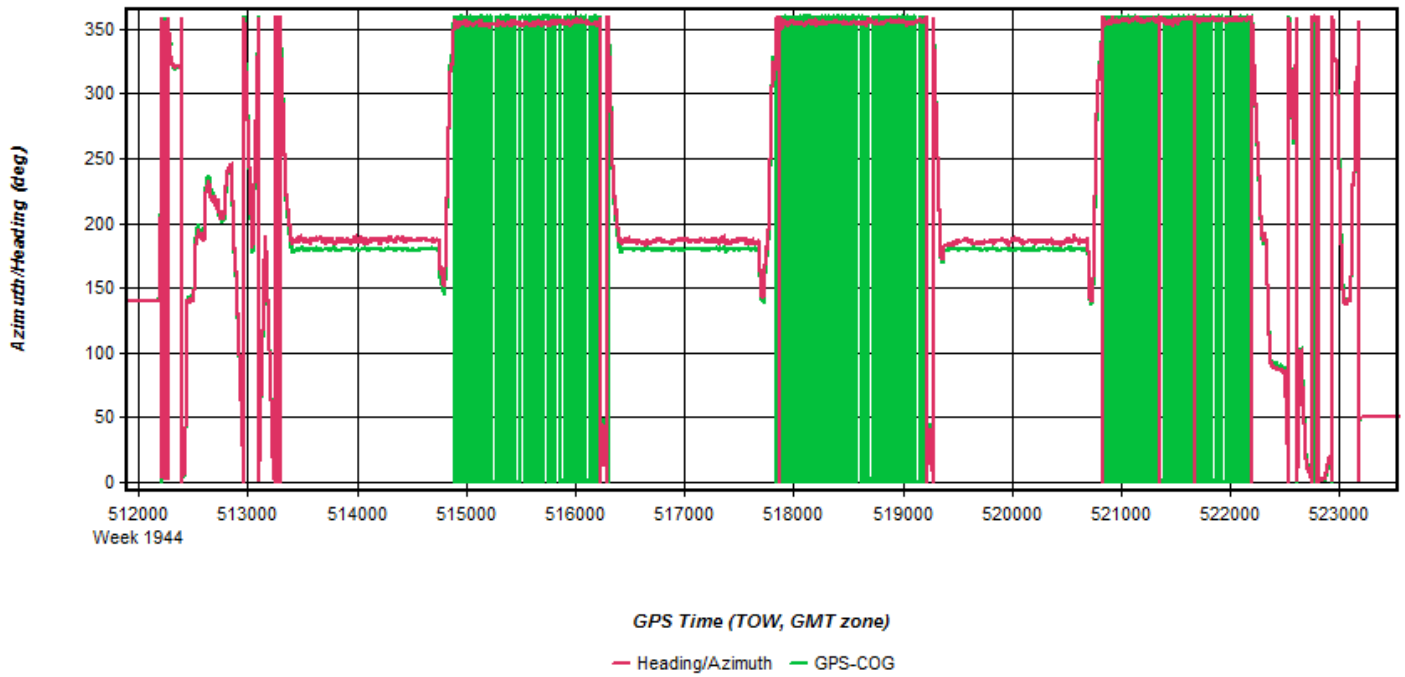
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Date: 04/14/2017 Pg 1 of 1

Project: **NRCs SD** Proj #: 30420 Flight Mgmt File: 30420_SD_ALS80 Tech: SWINFORJ

Aircraft: **N246MP** Begin Hobbs: 1416.2 Total: 3.0 Pilot: McDONALD Co-Pilot:

Dep Apt: **01N** Sta 1: 01N Sta 2: 01N Dep Time (Lof): 5:15 Arr Apt: KPRR Arr Time (Local): 8:20 Tot Time Aloft: 3.0

CORS: **01N** Sta 1: 01N Sta 2: 01N Flyovers: Y (N) If Y, times: Sta 1 Sta 2

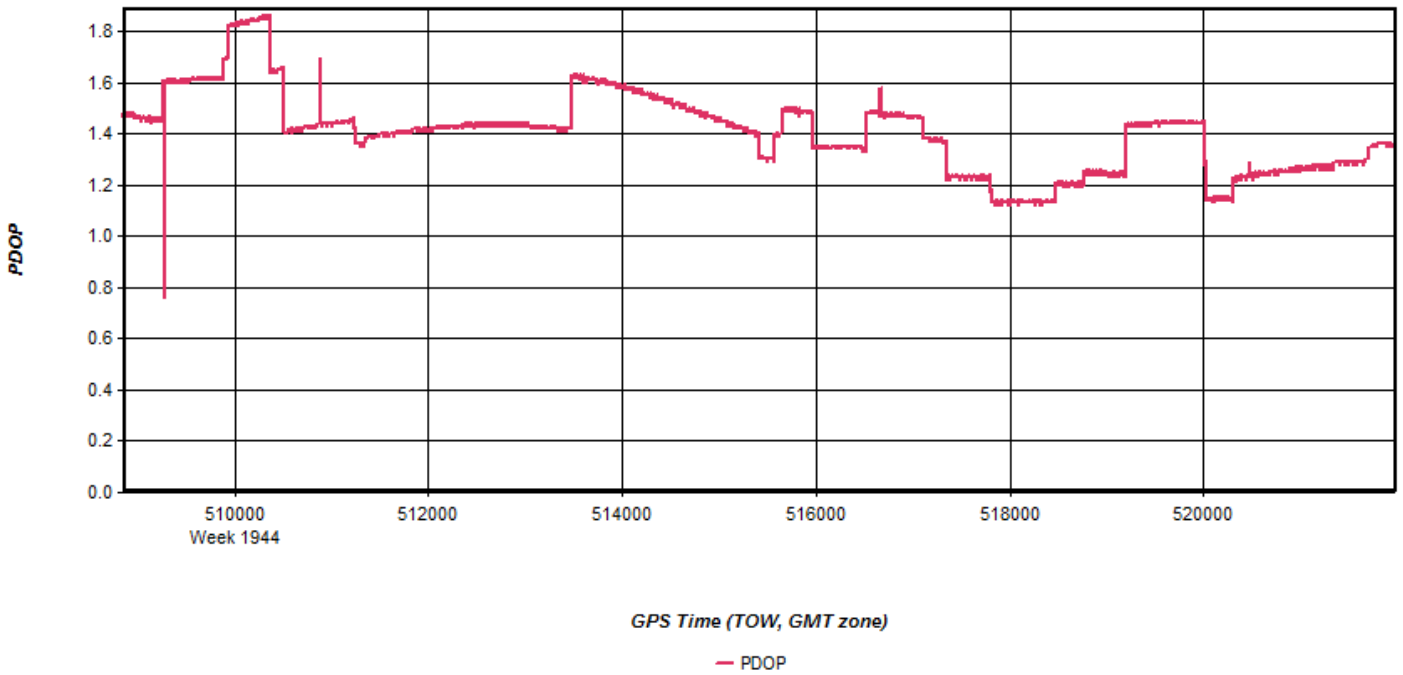
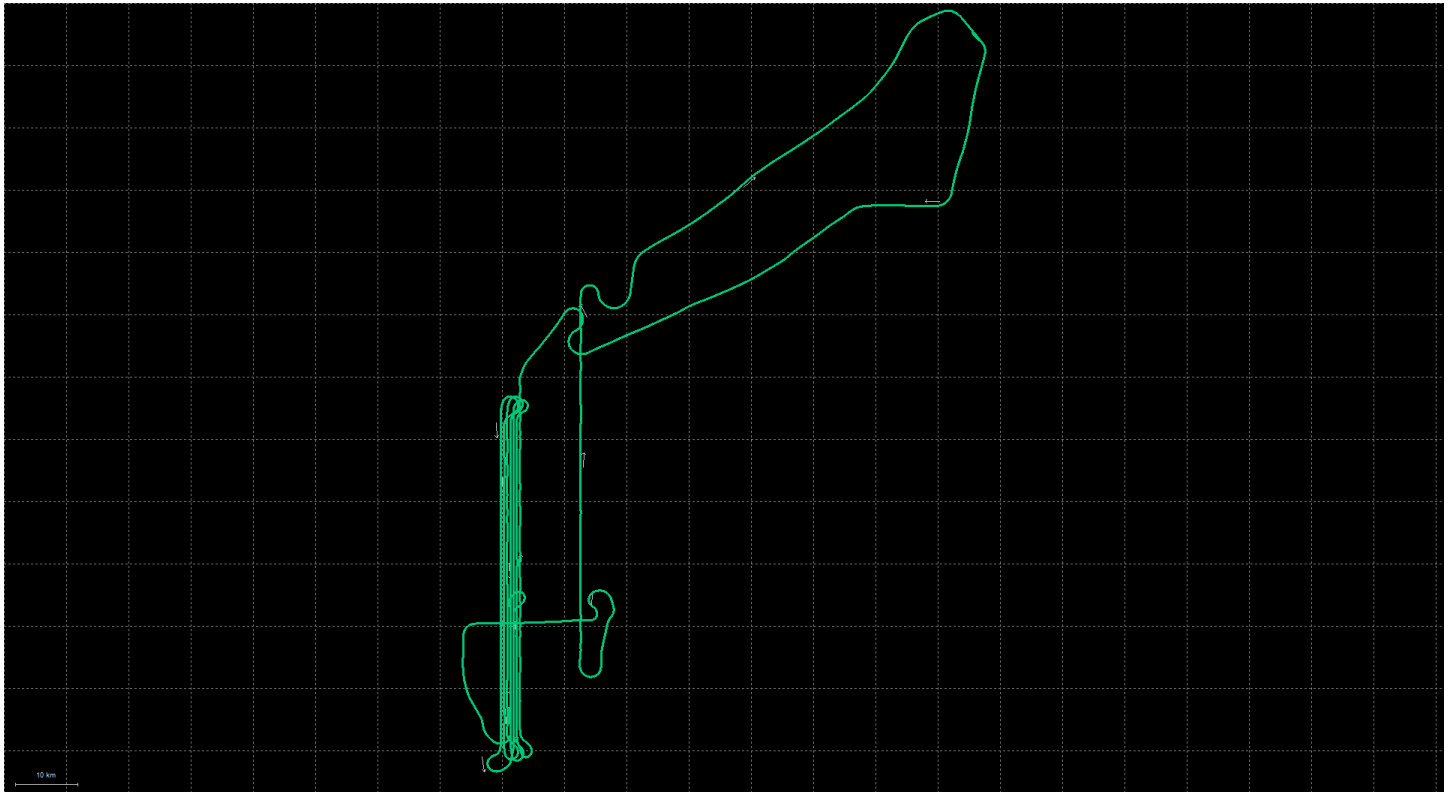
GPS Unit: **01N** Sta 1: Static 5MIN, KPRR Sta 2: Flyovers: Y (N) If Y, times: Sta 1 Sta 2

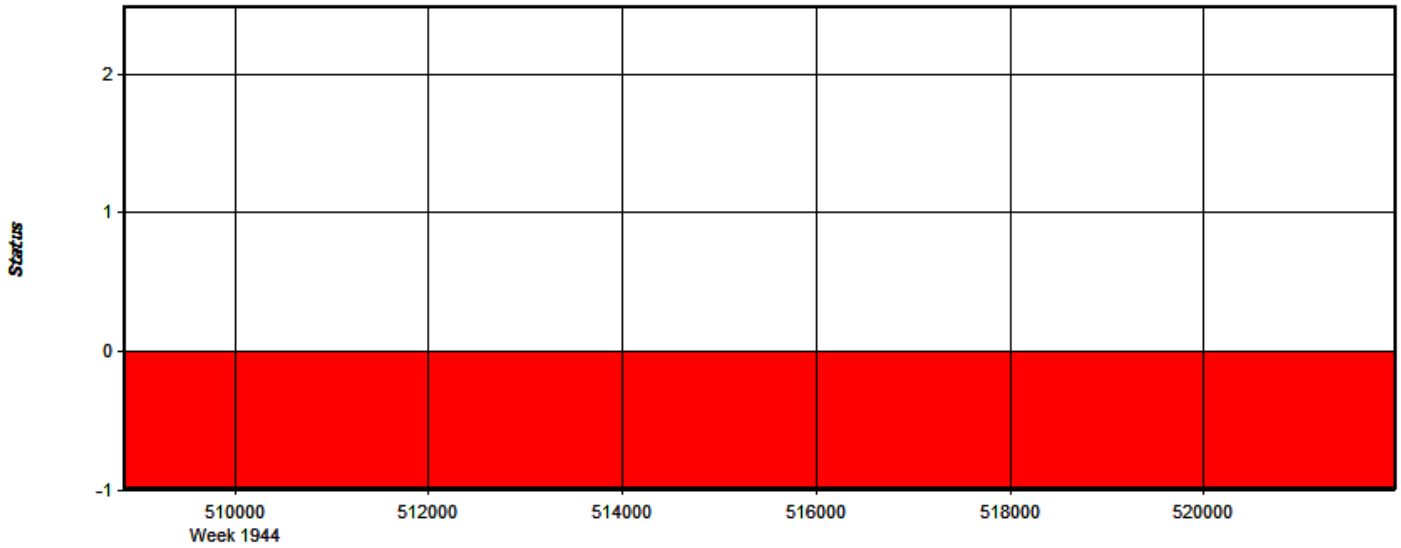
Gd Temp beg:	°C End:		°C End:		°C End:		°C Altimeter begin:		end:		Mag Cal	End Cal	Tot Cal
	Type	Serial #	Alt ANSL	Pulse In Air	Alt ANSL	Pulse In Air	Max Gdspd	Power	Avg Ft Spacing	PRM			
LIDAR	FOV	2-8	Scan Freq	48	MPIA	Y I N	Pulse Rate	328			492	432	60

Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	Alt	GPS Altitude	Crab	Turb (0..3)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
139	174	22:37	22:59	131	1.2/19	7100			FIG 8 @ 22:34
138	354	23:03	23:24	130	1.3/17	7100			
137	174	23:27	23:48	127	1.0/22	7100			CLOSED FILE
136	354	23:52	00:14	135	1.9/21	7100			OPEN FILE
135	174	00:18	00:39	126	1.0/21	7100			
134	354	00:42	01:03	130	1.1/20	7100			
X-RT	85	01:06	01:08	140	1.2/18	7100			UNPLANNED CROSS TIE FROM LINE 130 - 142

Total Prof Lines:	Lines Flown:	Lines Remain:	Online Time: 2.75	Job Time: 2.5	Notes:
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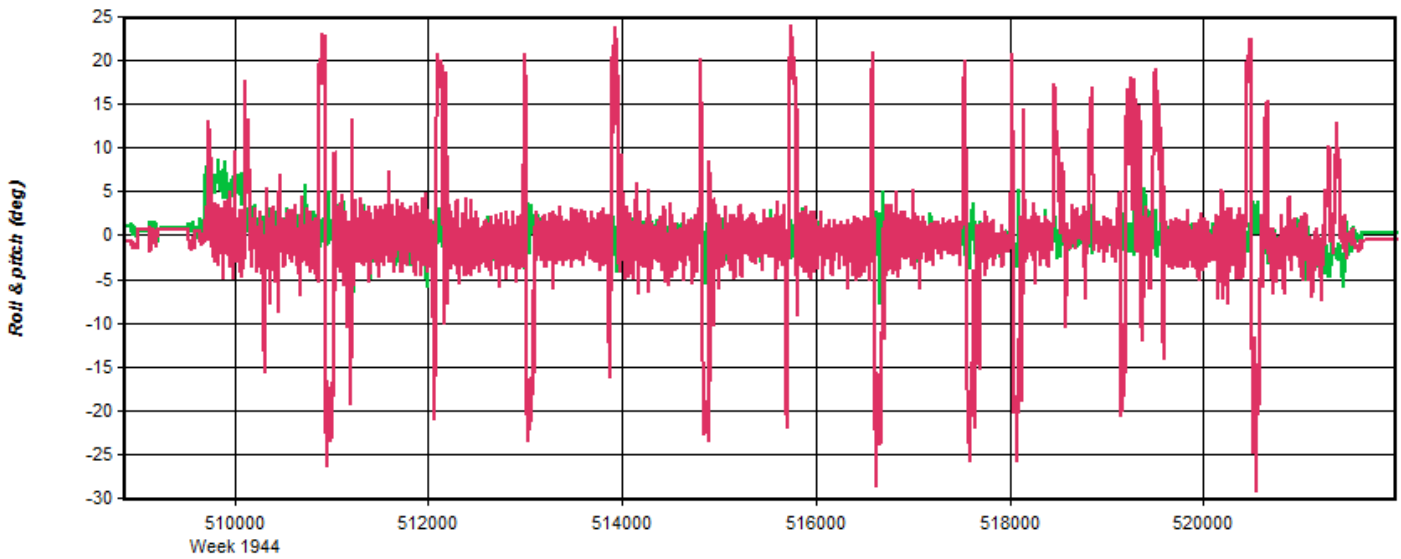
April 14, 2017-A (N73TM, SN7178)





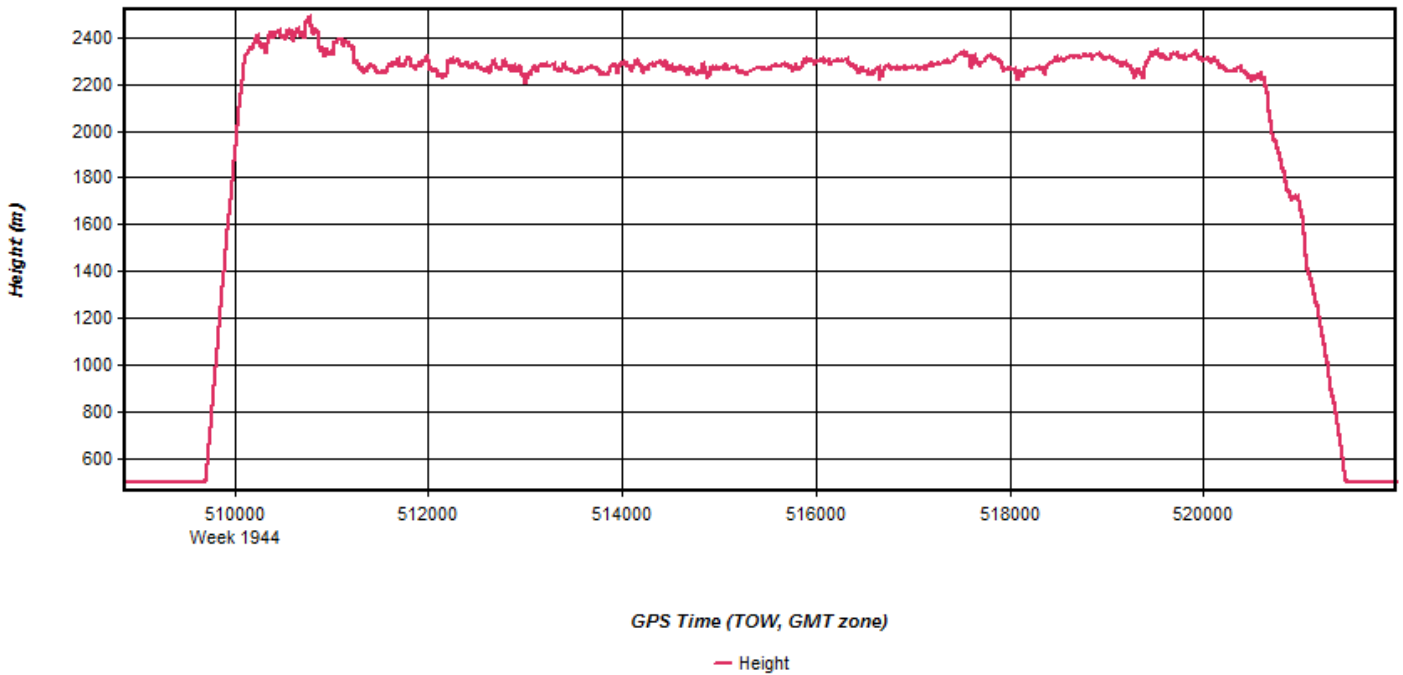
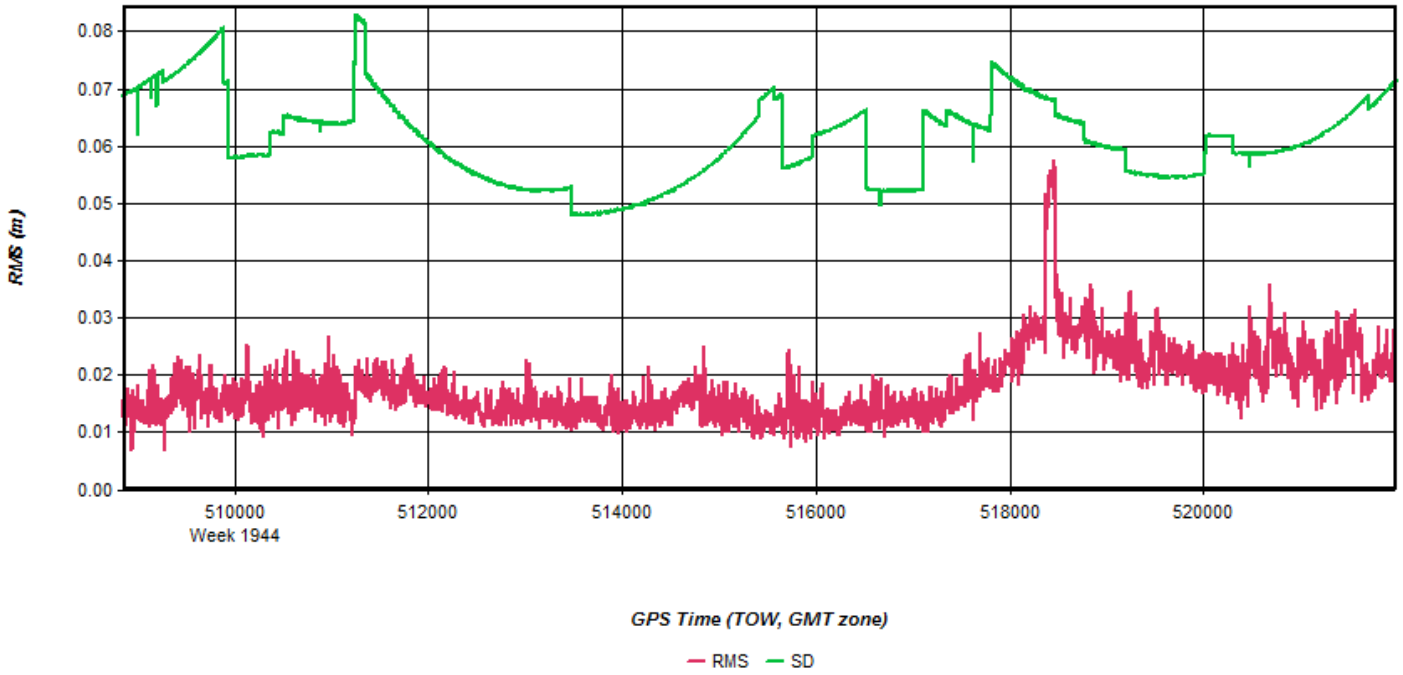
GPS Time (TOW, GMT zone)

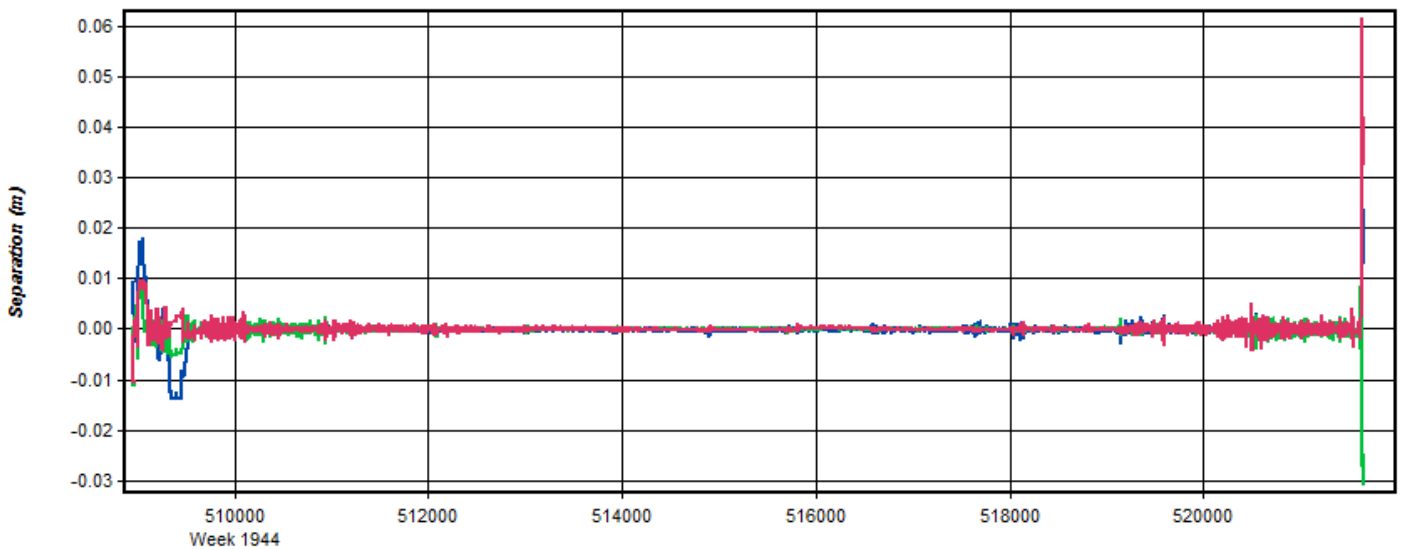
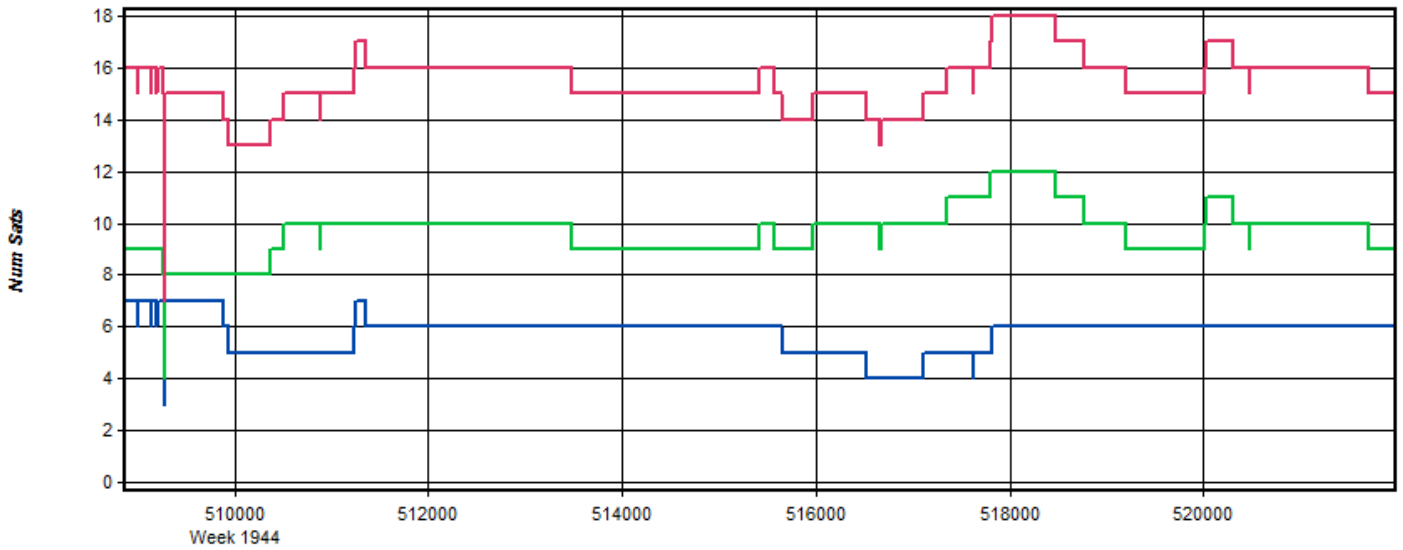
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

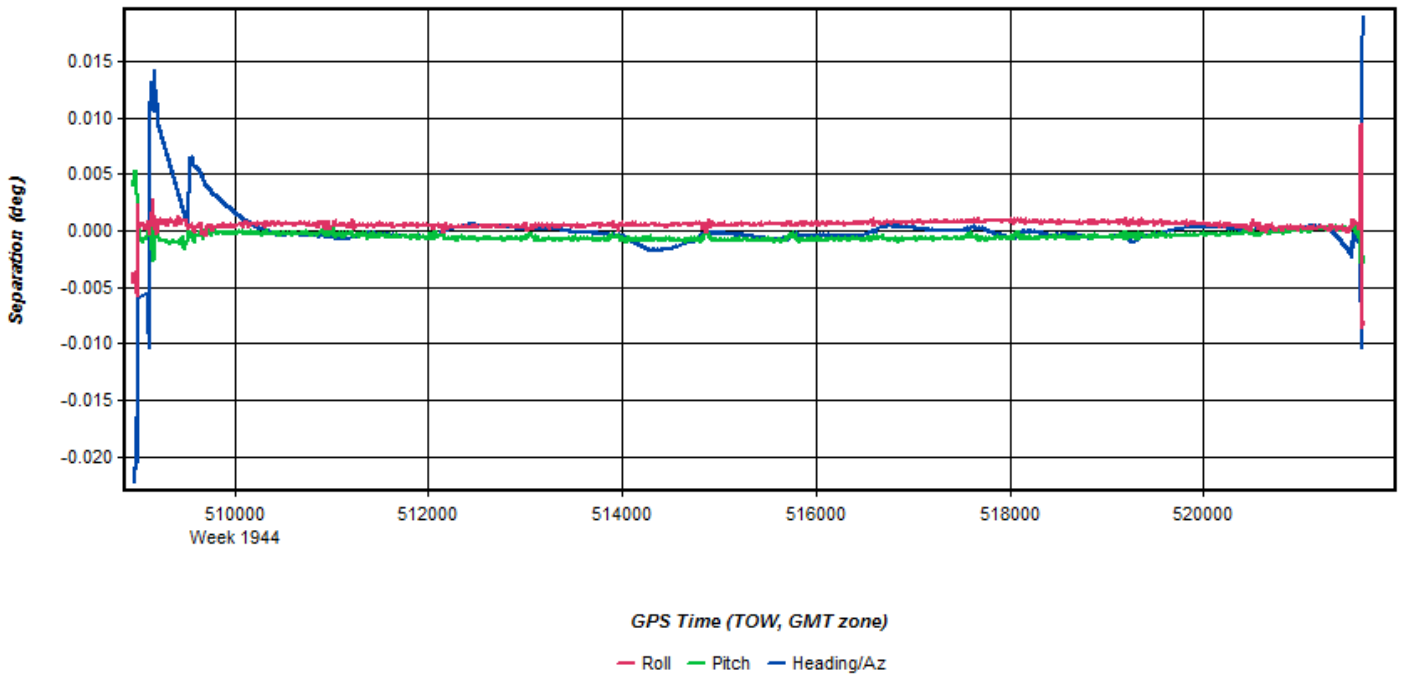
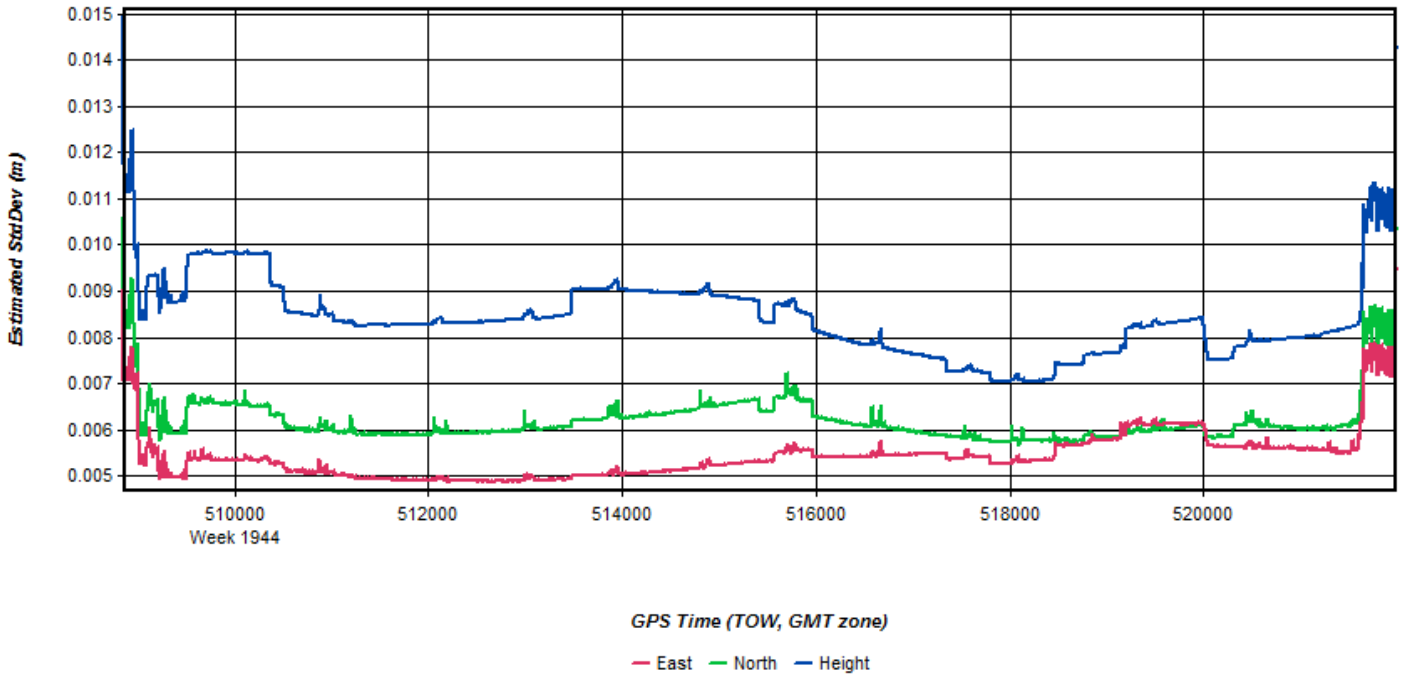


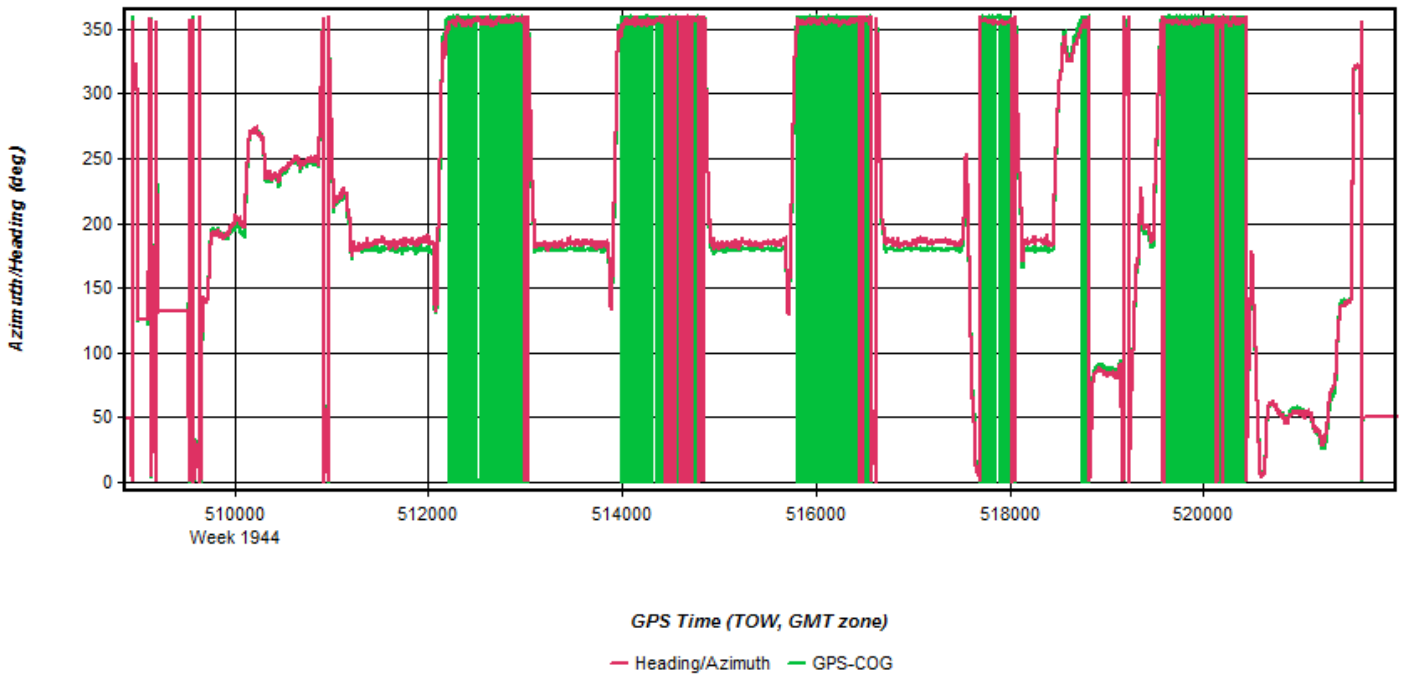
GPS Time (TOW, GMT zone)

— Roll — Pitch









Flight Log

21.18 up 01:01 off

Date: 4/14/2017

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

UNCLASSIFIED Pg 1 of 2

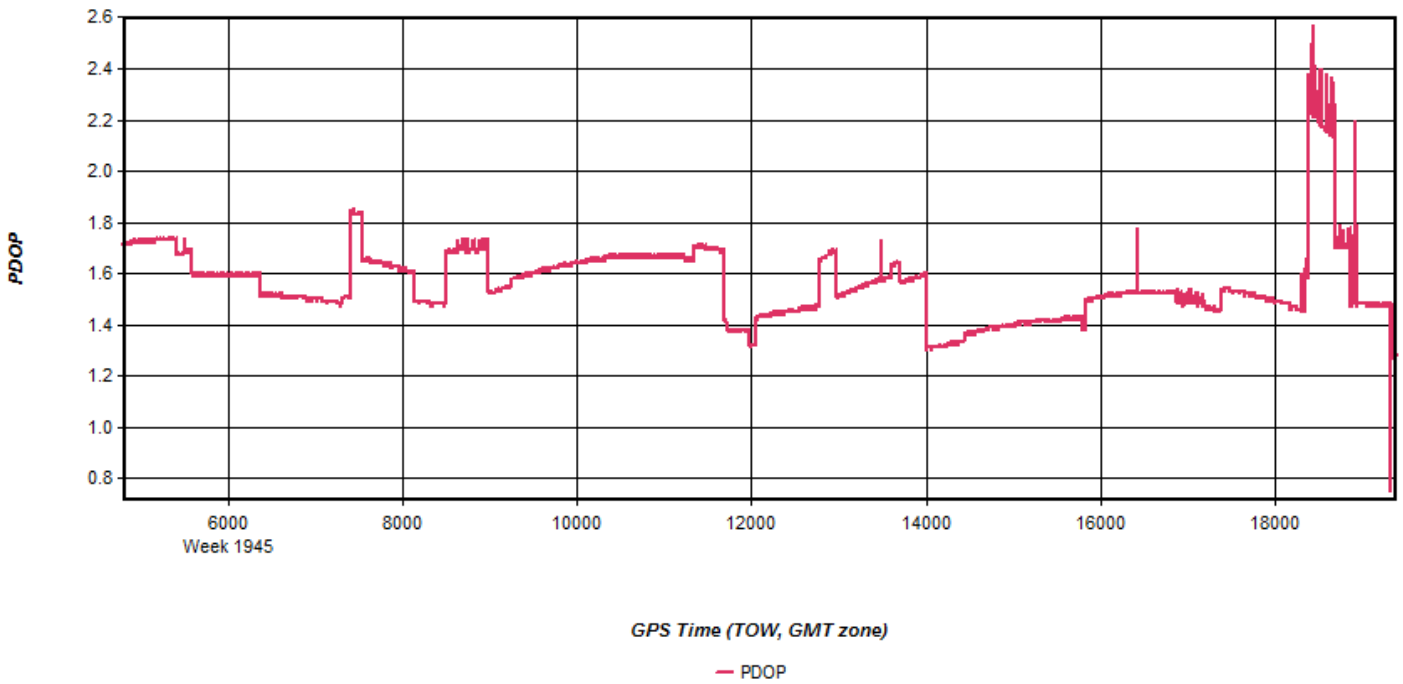
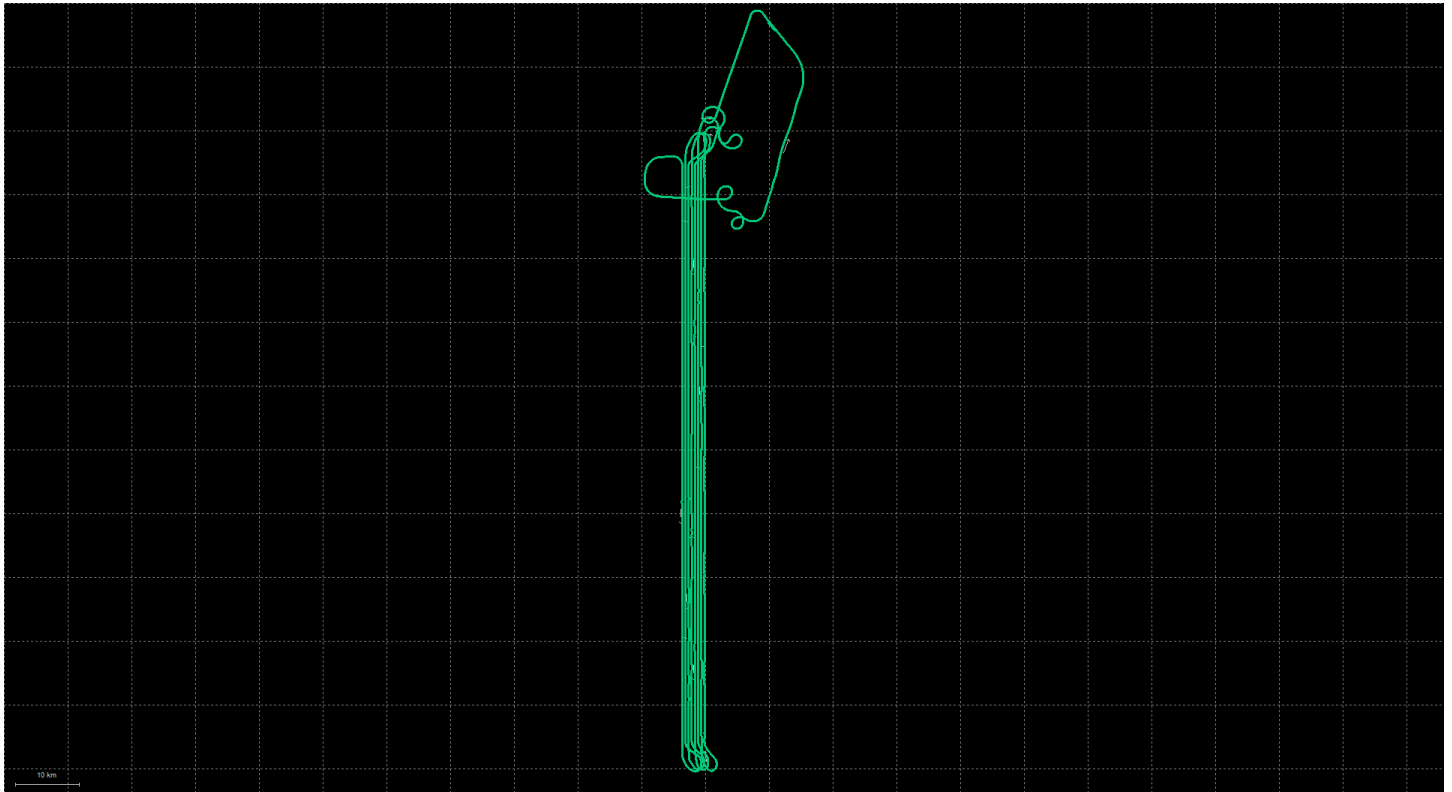
Project: NRC5-SD-LIDAR		Proj #: 30420	Flight Mgmt File: 30420-SD-ALS70SP3 (7x)	
Aircraft: N73TM	Begin Hobbs: 6638.7	End Hobbs: 6642.0	Total: 3.3	Pilot: John Parkman
Co-Pilot: Tech: Gary Tao	Dep Apt: KPIR	Dep Time (Lcl): 4:33 (Z): 21:33	Arr Apt: KPIR	Arr Time (Local): 7:53 (Z): 00:53
Tot Time Aloft: 3:20	CORs: Y (N) Sta 1: Sta 2: Flyovers: Y / N If Y, times: Sta1) Sta2)			
GPS Unit: (Y) N Sta 1: Sta 2: Flyovers: Y (N) If Y, times: Sta1) Sta2)				Gd Temp beg: °c End: °c OAT beg: °c End: 21 °c Altimeter begin: end: 29.64
LIDAR Type: ALS70	Serial #: 7178	Alt AGL: 5250'	Alt AMSL: 7500'	Avg Temp Ht: 2250'
FOV: 28°	Scan Freq: 329 kHz	MplA: (Y) N	Pulse Rate: 2	Max Gdspd: 130 kts
				Avg Pt Spacing: PPSM: 4
Req CB: 291	End CB: 342	Tot CB: 51	Storage Name: 7170	SD.03

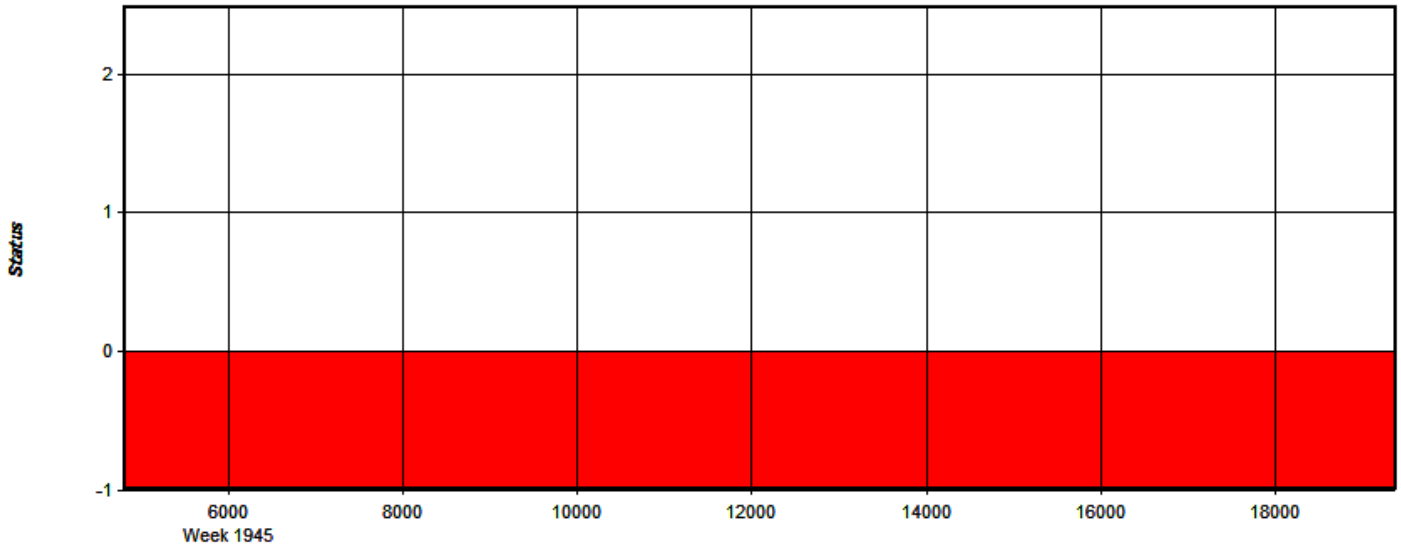
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	FOOF (kts)	GPS Altitude	Crab	Turb (ft/s)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
		21:54	21:57						Opening S - turn
707	S	21:01	22:14	13.5	1.2/1.8	7400	0	-	
706	N	22:16	22:27	13.5	1.2/1.8	7400	1°	-	Ranges appeared 11 NM FSE
705	S	22:32	22:43	13.1	1.2/1.8	7500	1°	-	a bit lower 5 NM FSE
704	N	22:47	23:00	13.0	1.3/1.6	7400	1°	-	210' to east of G 3 NM FSE
703	S	23:02	23:14	12.8	1.2/1.6	7450	1°	-	
702	N	23:17	23:29	13.0	1.1/1.6	7500	2°	-	
701	S	23:32	23:45	12.1	1/1.8	7500	1°	-	29° roll into line
705R	N	23:48	23:53	12.5	1/1.8	7600	1°	-	refly southern 10 NM for possible gap
704R	S	23:56	00:00	12.7	1/1.8	7500	2°	-	refly southern 10 NM
72001	E	00:07	00:12	13.0		7500			CROSS TIE
726R	N	00:20	00:34						Refly for drift off from yesterday, northern 34 NM
		00:34	00:36						Closeout turn
									* Low Voltage Power warning on landing *

Total Proj Lines: 61 Lines Flown: 7 Lines Remain: 54 Online Time: 2.7 Mob Time: .6 Notes:

Scanned by CamScanner

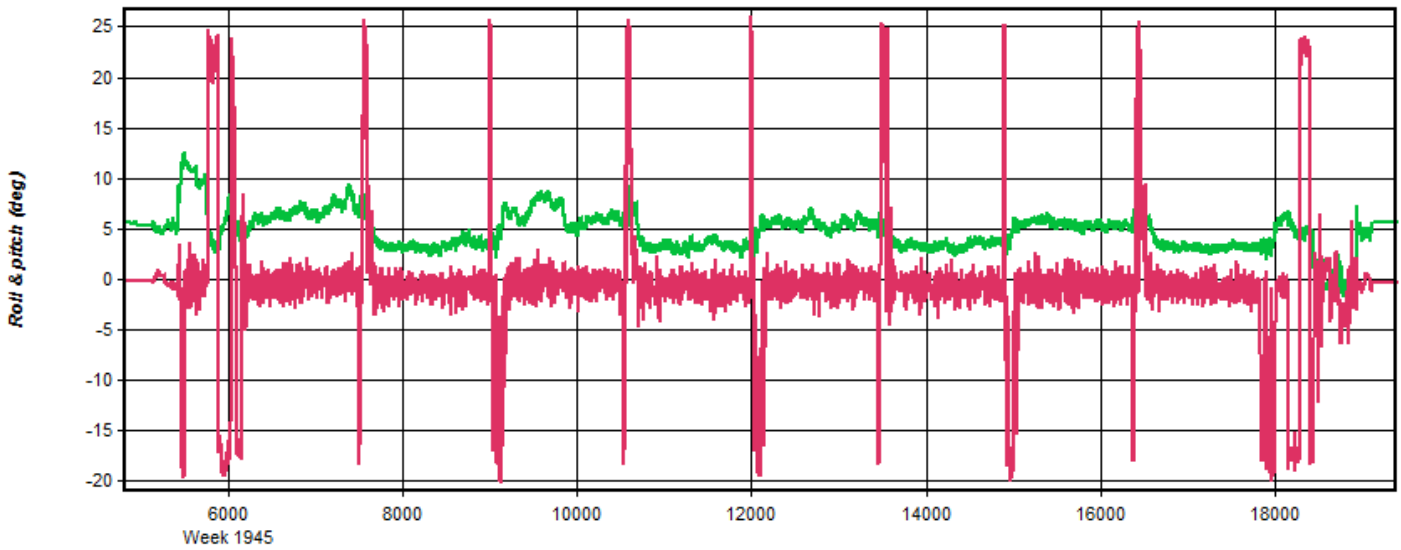
April 16, 2017-A (N246MP, SN8227)





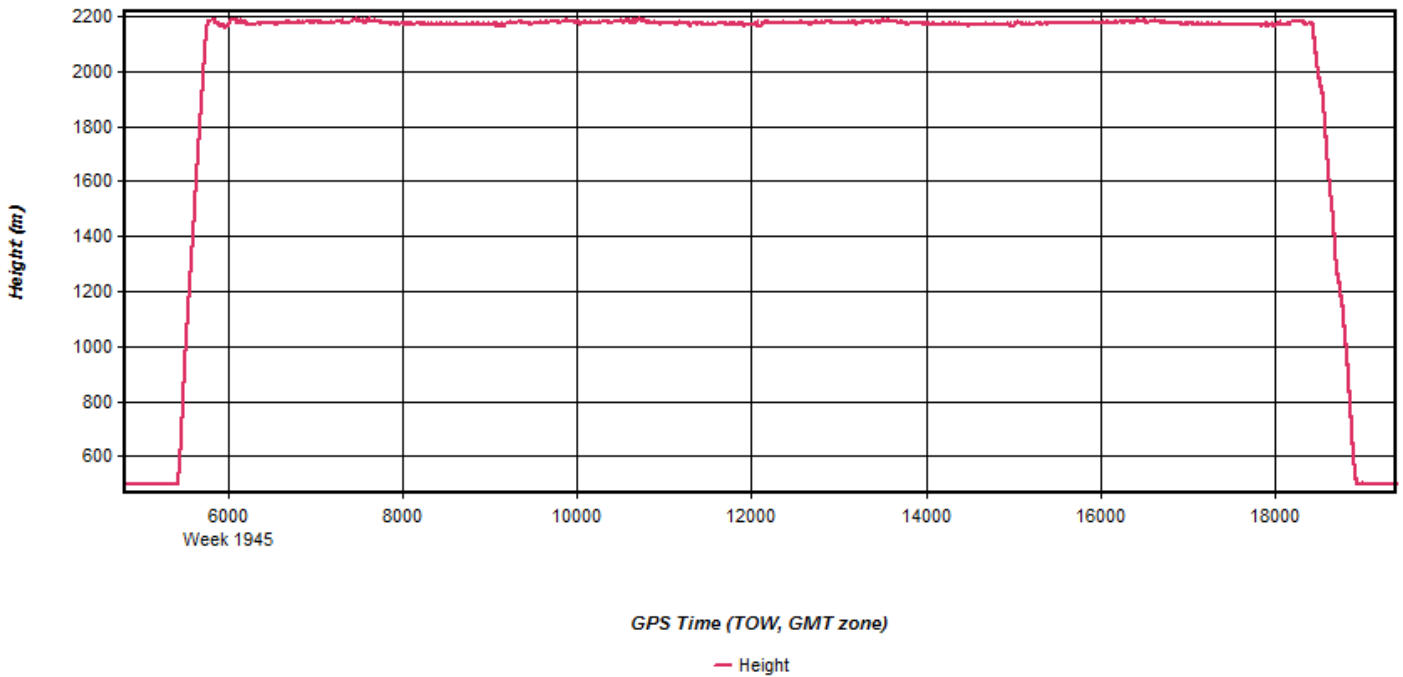
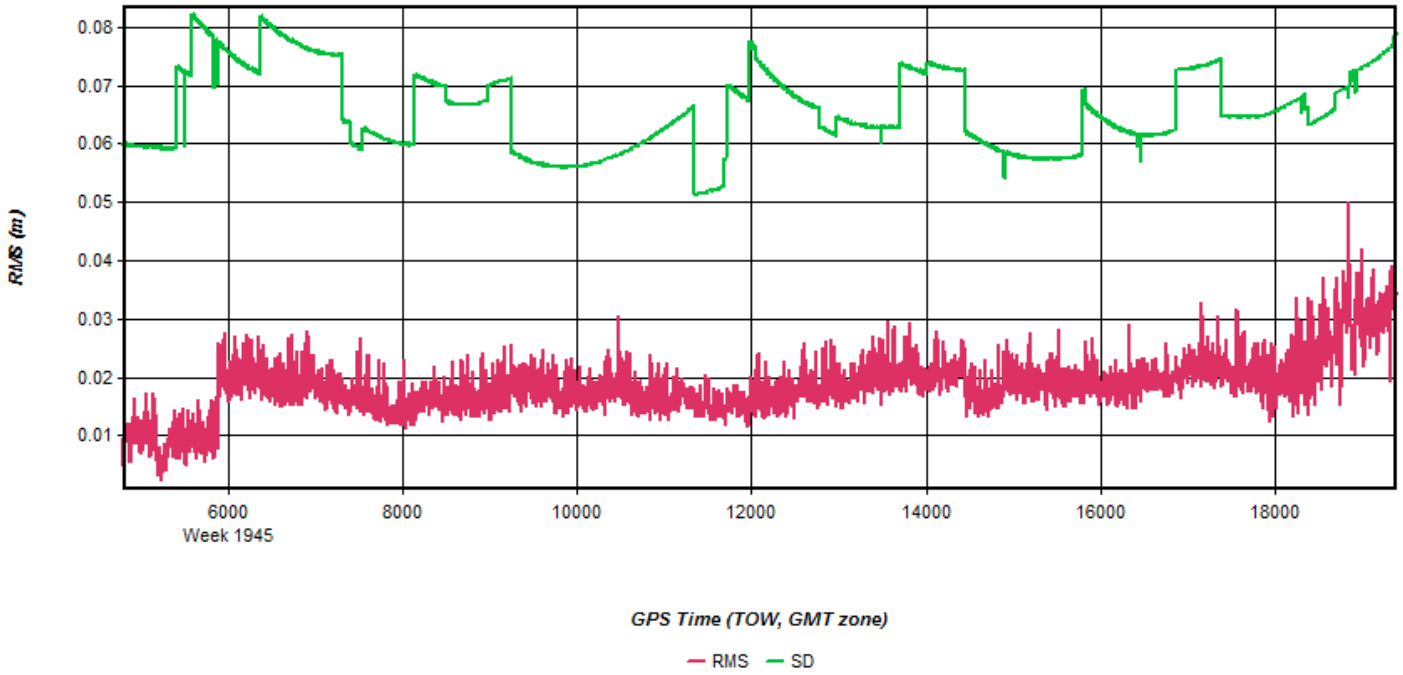
GPS Time (TOW, GMT zone)

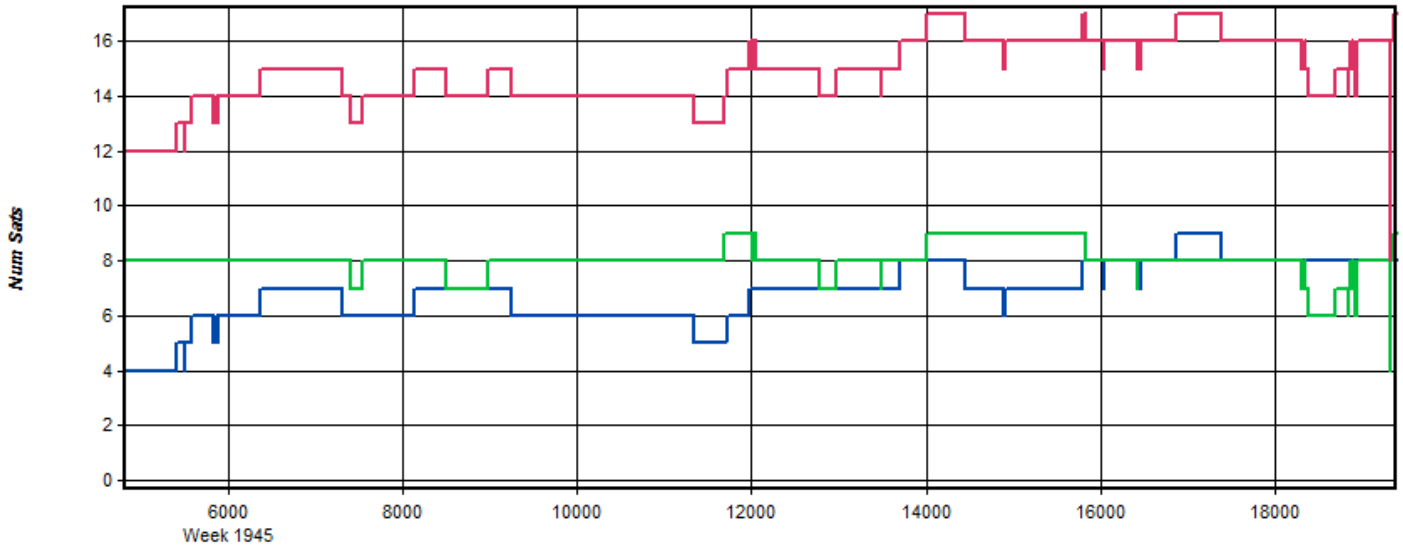
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

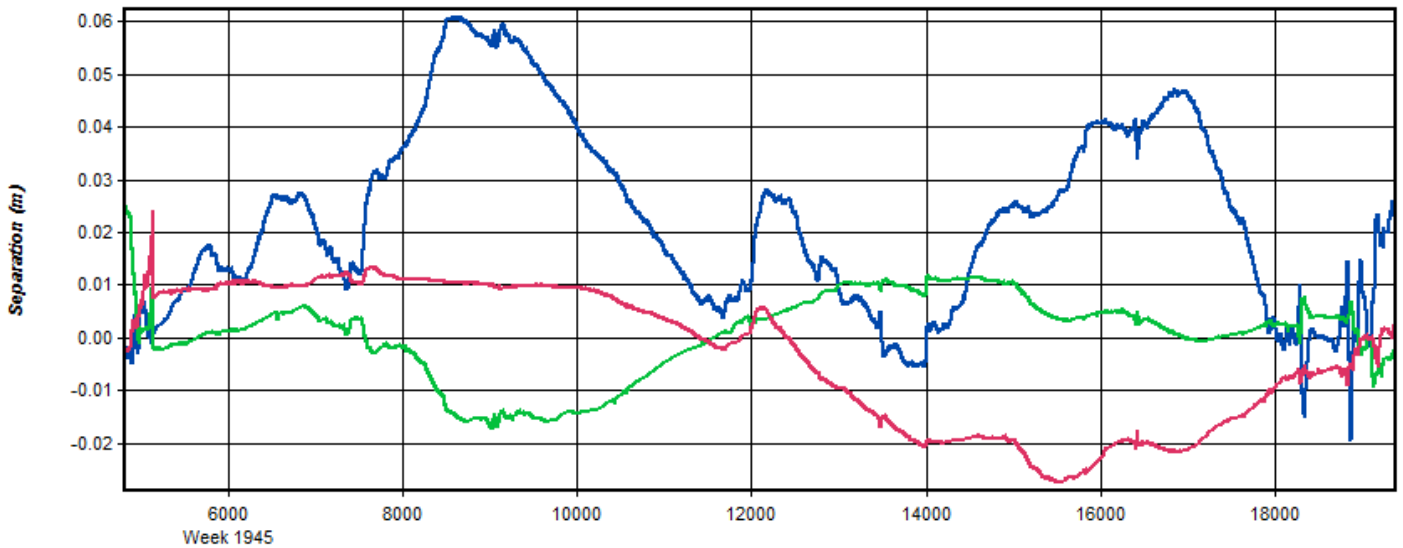
— Roll — Pitch





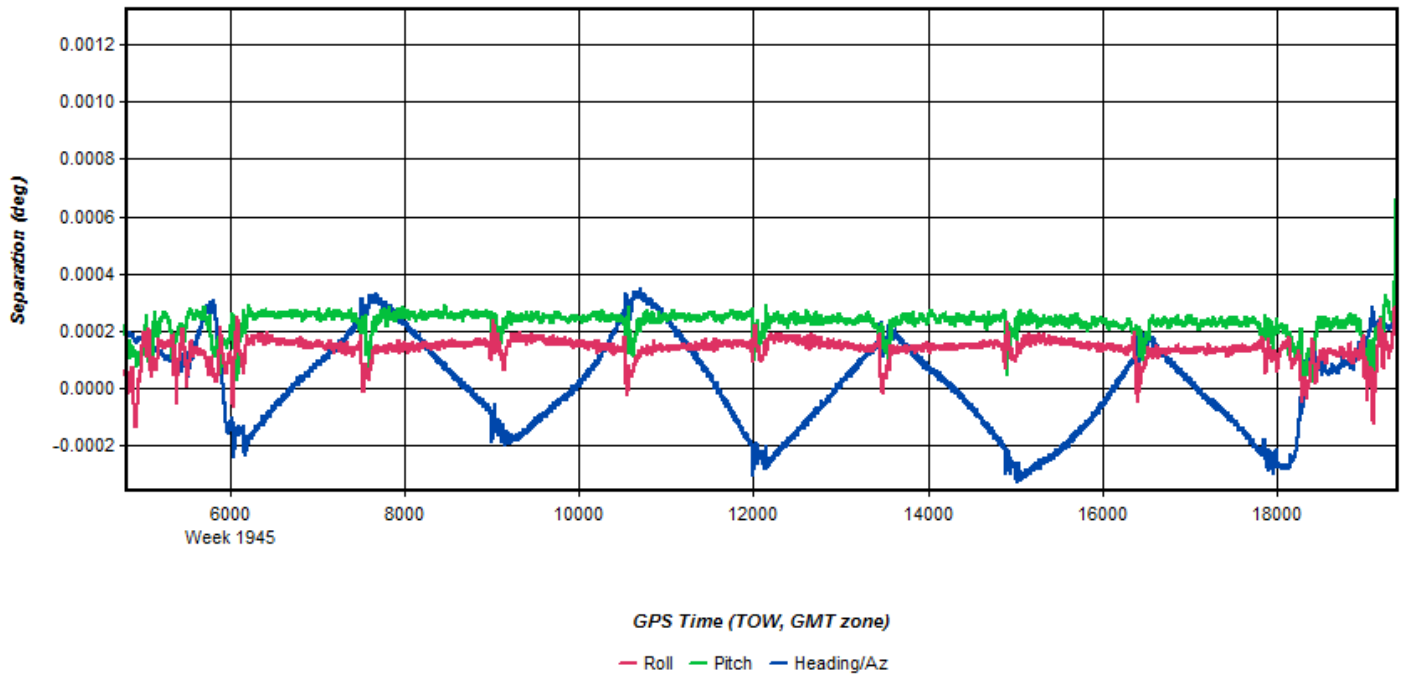
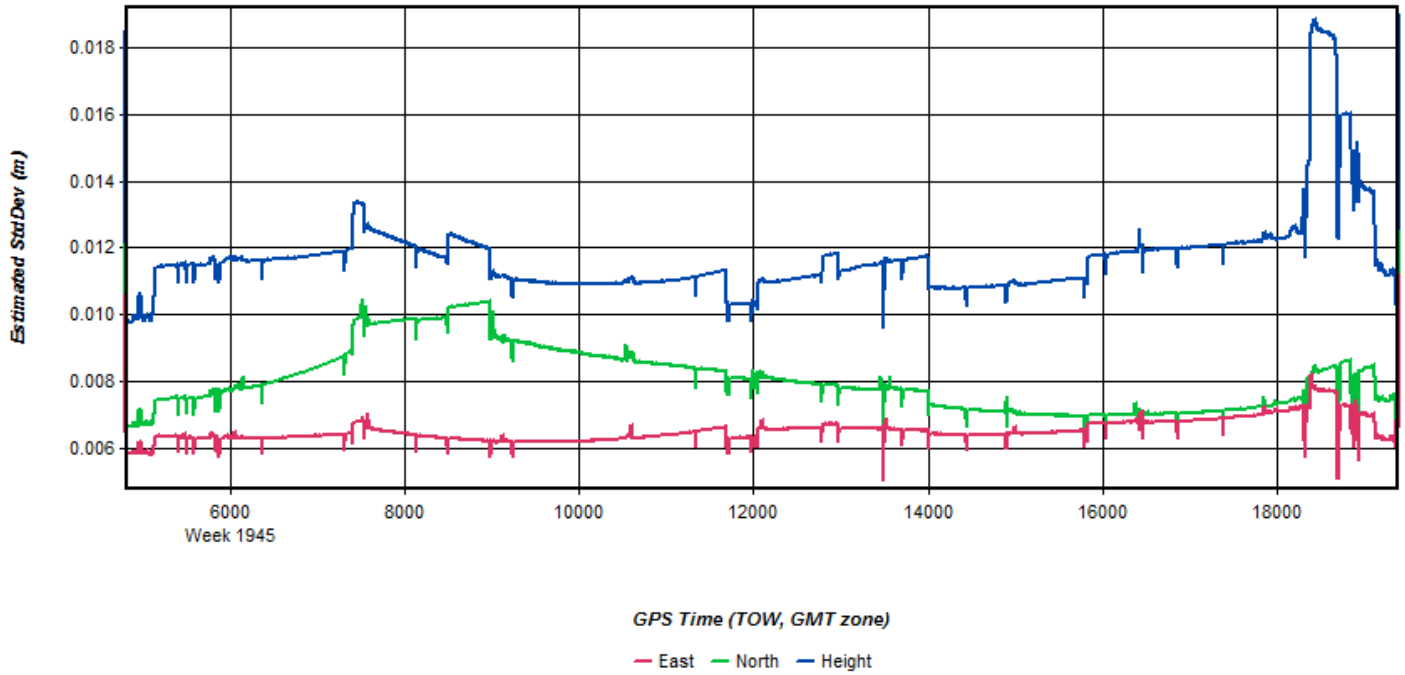
GPS Time (TOW, GMT zone)

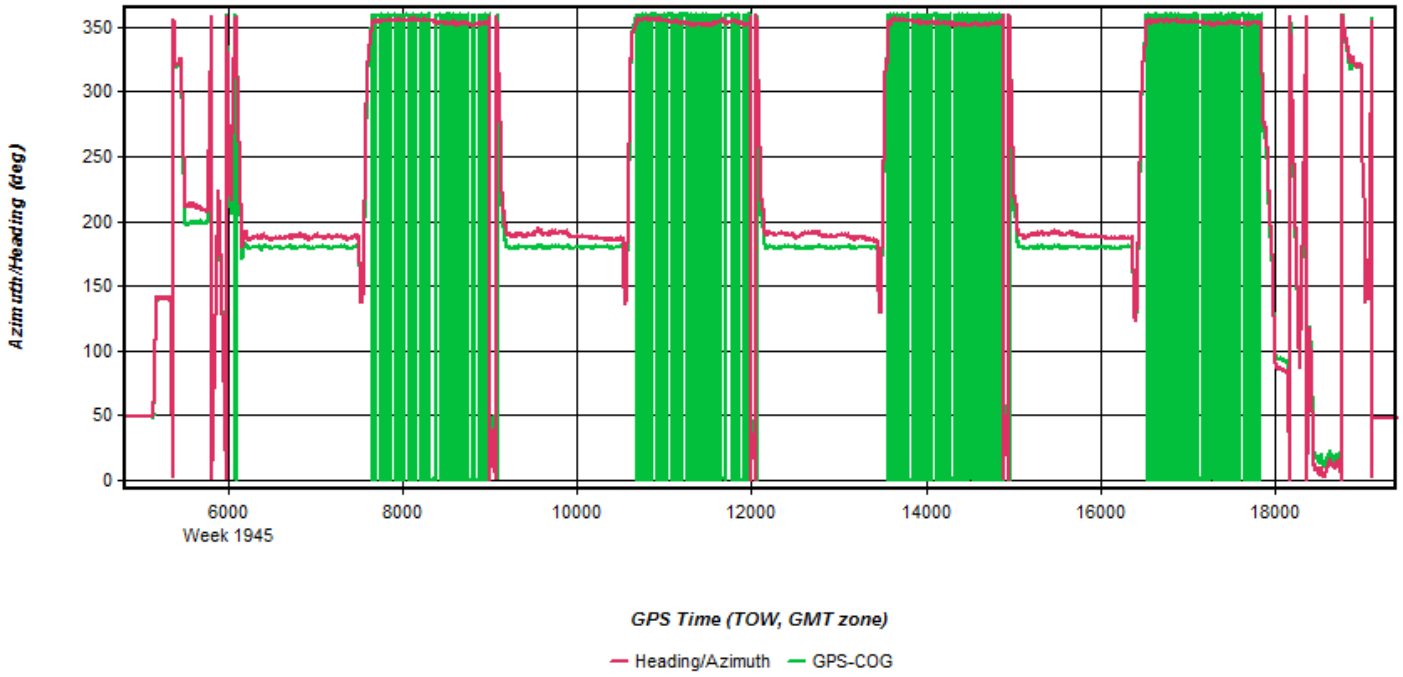
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Project: S. DAKOTA LIDAR **Date:** 4-16-17 **Page:** 1 of 1
(email Log daily to flight_log_distribution_list@quantumspatial.com)

Flight Mgmt File: 20170416_134946_142735

Aircraft: 246MP **Begin Hobbs:** 1424.2 **End Hobbs:** 1430.7 **Total:** 6.5 **Pilot:** DJONES **Co-Pilot:** Tech: M AUST

Dep Apt: PIR **Dep Time (Local):** 7:55 **Air Apt:** PIR **Air Time (Local):** [Z] **Tot Time Aloft:**

CORS: Y(N) **Sta 1:** GROUND PROS **Sta 2:**

GPS Unit: Y/N **Sta 1:** 1 & 2 BASES **Sta 2:**

Gd Temp beg: 4 °C **End:** 17 °C **OAT beg:** °C **End:** °C **Altimeter begin:** 3011 **end:** 3009

LIDAR	Type	Serial #	Alt AGL	Alt AMSL	GPS Altitude	POH/Sea	Gd Spd	End (UTC)	Scan Freq	Scan Rate	Pulse Rate	Power	PPSM	Storage			
														Max Gdspd	Avg Pt Spd	Storage Name	
	FOV	8227	7.2'								328	100		309			
125	S	1314	1335	128	1.1/20	7.2											
124	N	1328	1400	138	1.0/21	7.2											
123	S	1404	X	131	1.1/21	7.2											
123	N	1438	1500	136	1.2/18	7.2											
122	S	1503	1524	150	1.3/17	7.2											
121	N	1527	1549	136	1.2/17	7.2											
120	S	1553	1614	137	1.3/17	7.2											
119	N	1619	1639	133	1.1/19	7.2											
118	S	1643	1704	138	1.0/20	7.2											
117	N	1708	1729	145	1.2/18	7.2											
116	S	1733	1754	138	1.1/19	7.2											
115	N	1757	1819	131	1.2/19	7.2											
114	S	1822	1844	132	1.2/20	7.2											
113	N	1847	1909	134	1.1/21	7.2											
12001	E	1912	1914	165	1.2/21	7.2											

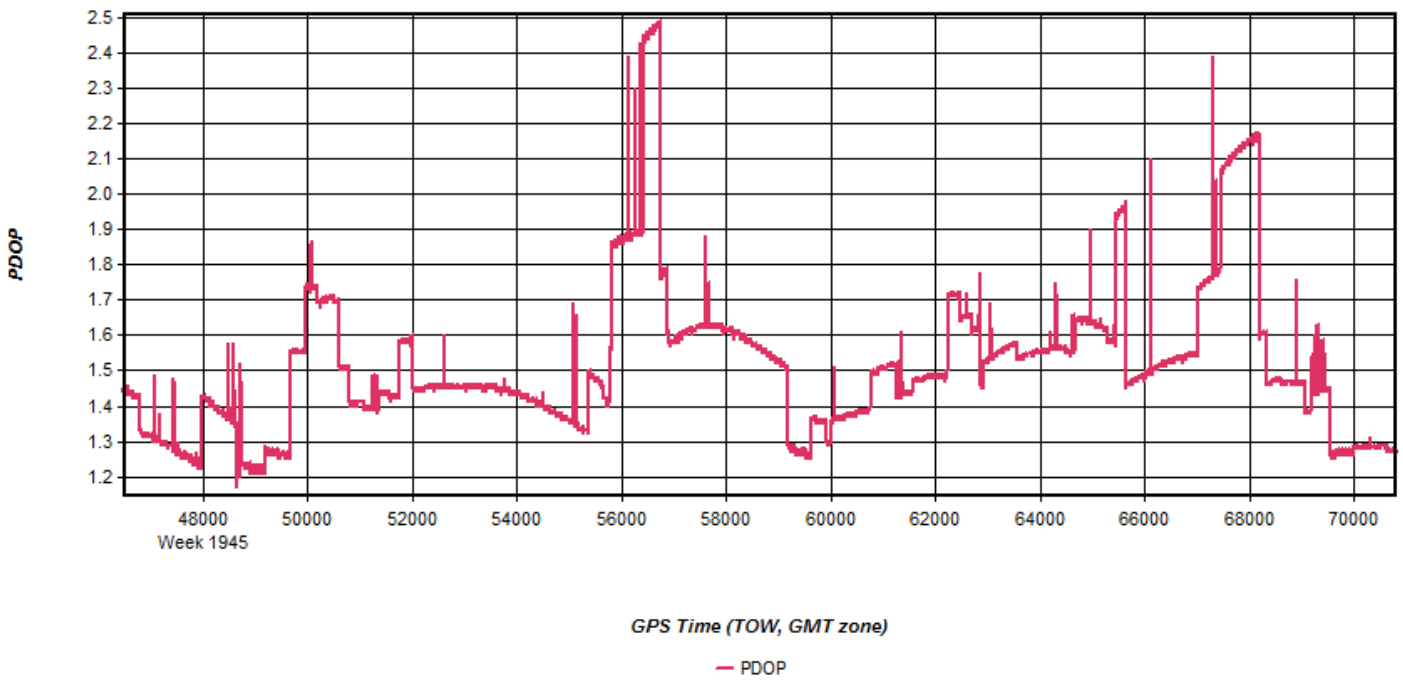
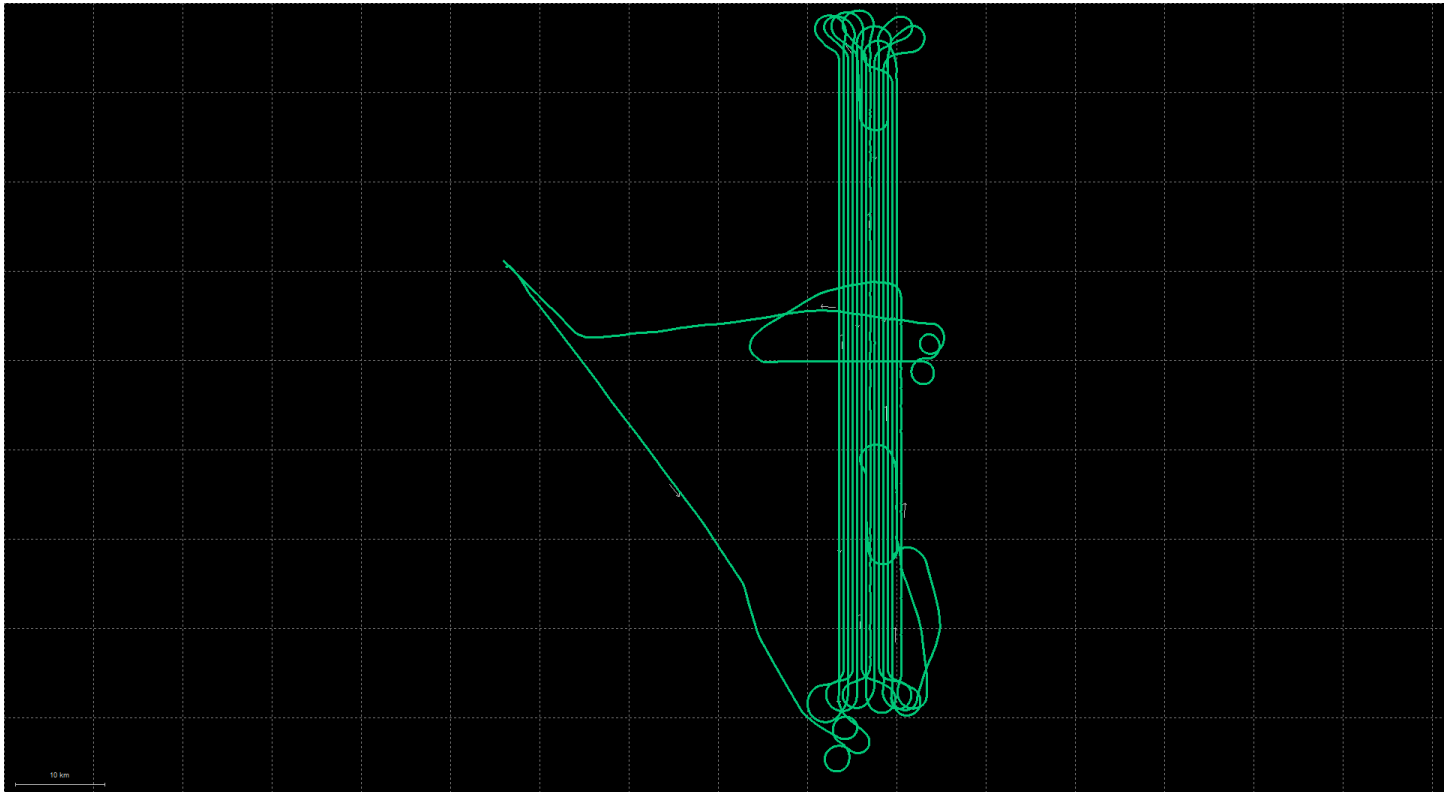
FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

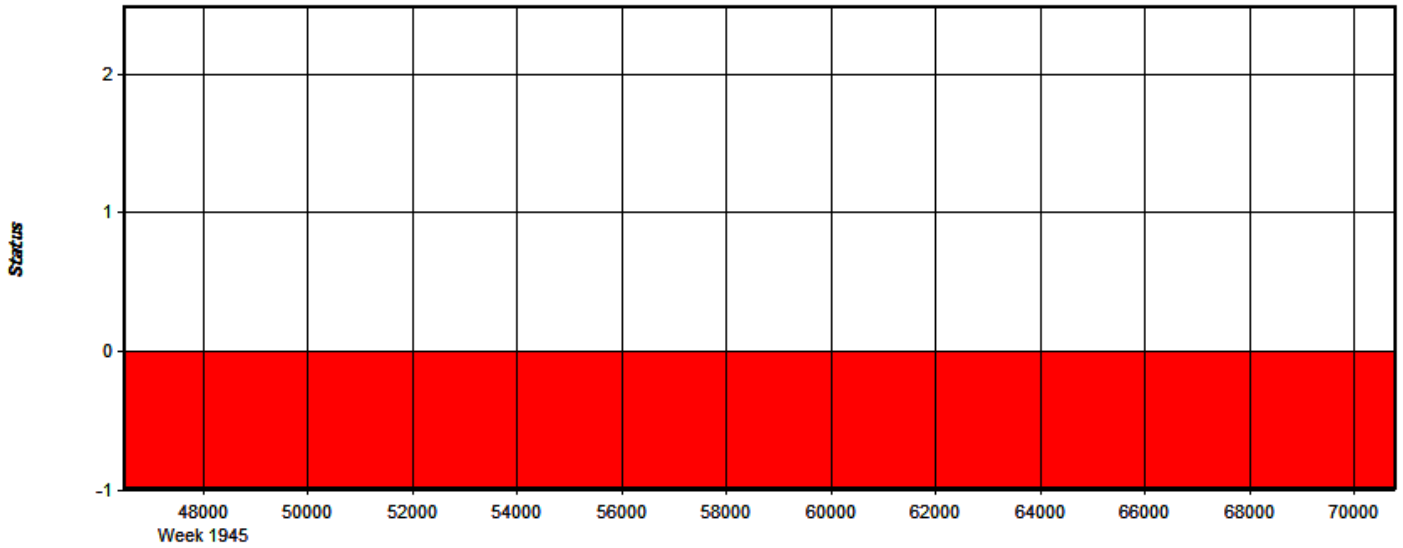
ERROR SYSTEM CONTROLLER NOT RECEIVED. A
 PROPER TIME RECOVERY MESSAGE (TM1B) - RESTART

MANUAL CROSSFLIGHT

Total Proj Lines: **Lines Flown:** **Lines Remains:** **Online Time:** 6 **Job Time:** .5 **Notes:**

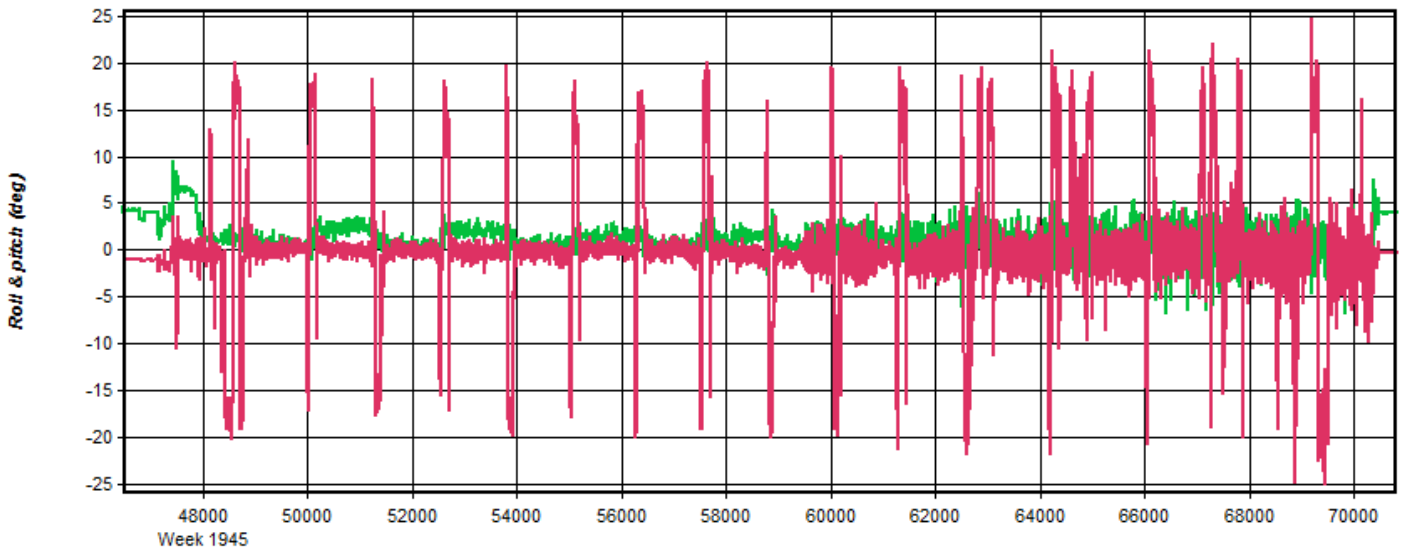
April 16, 2017-A (N915WC, SN8237)





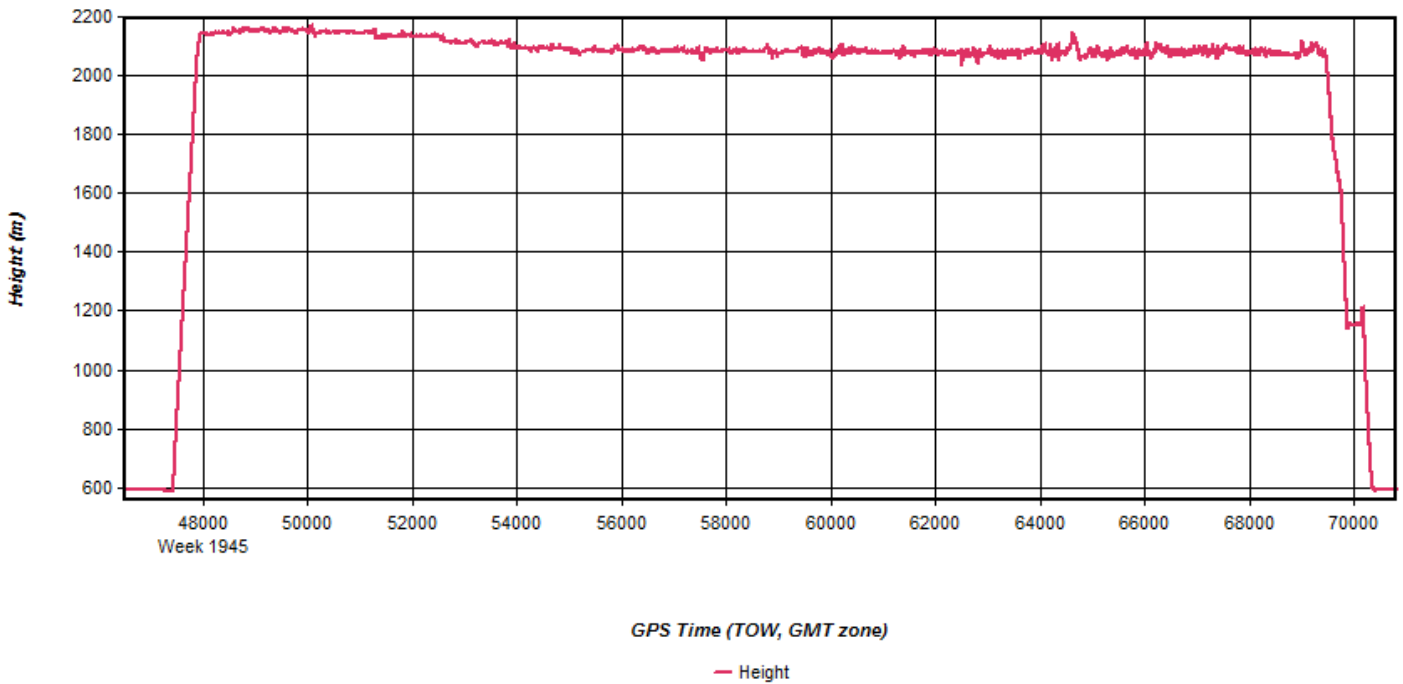
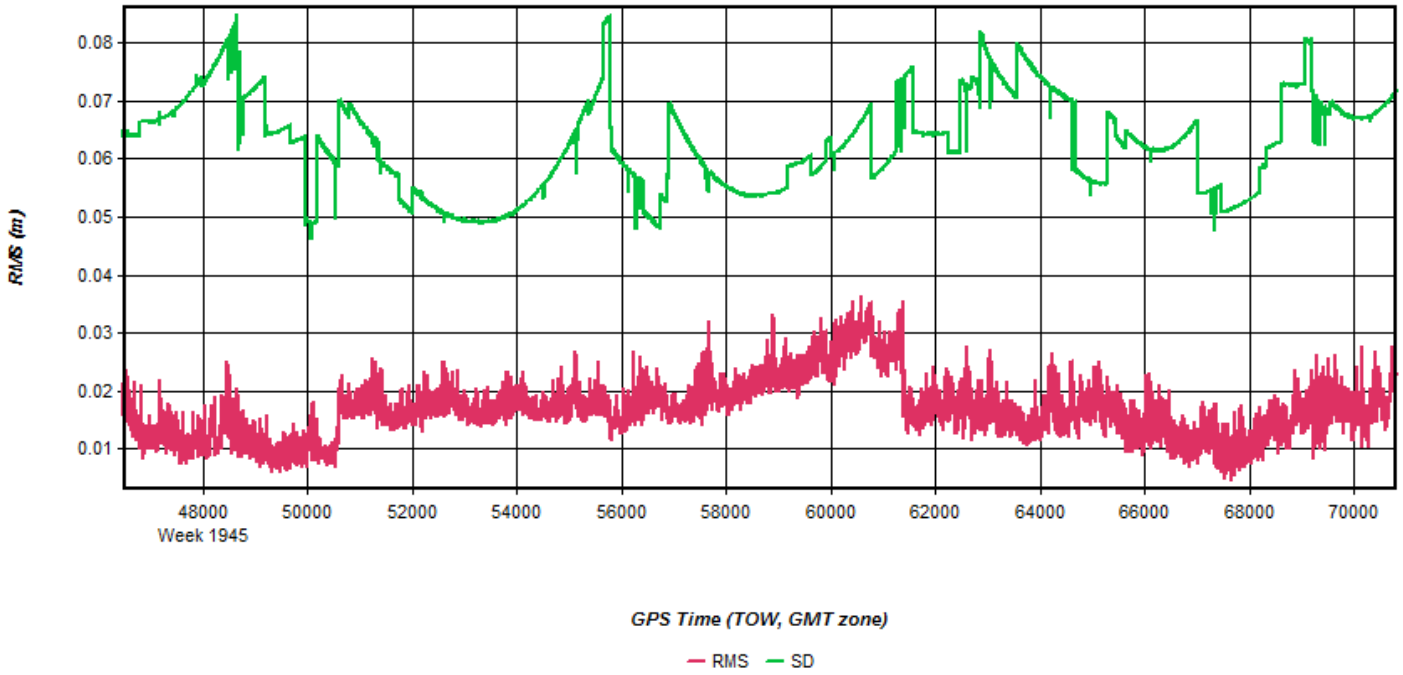
GPS Time (TOW, GMT zone)

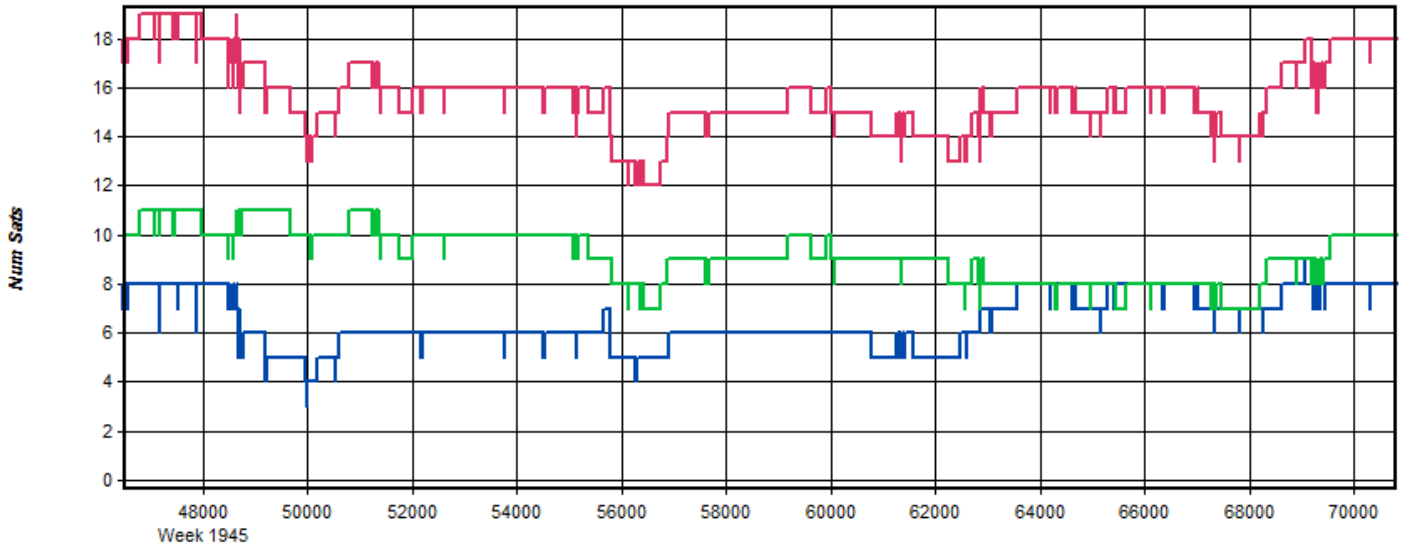
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

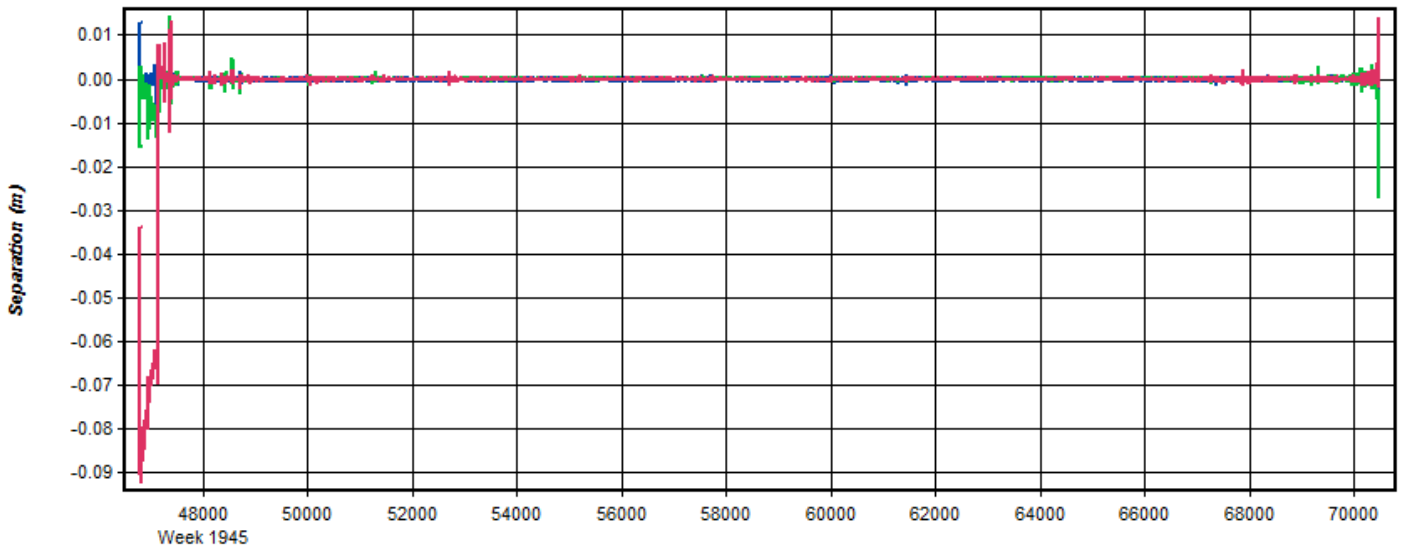
— Roll — Pitch





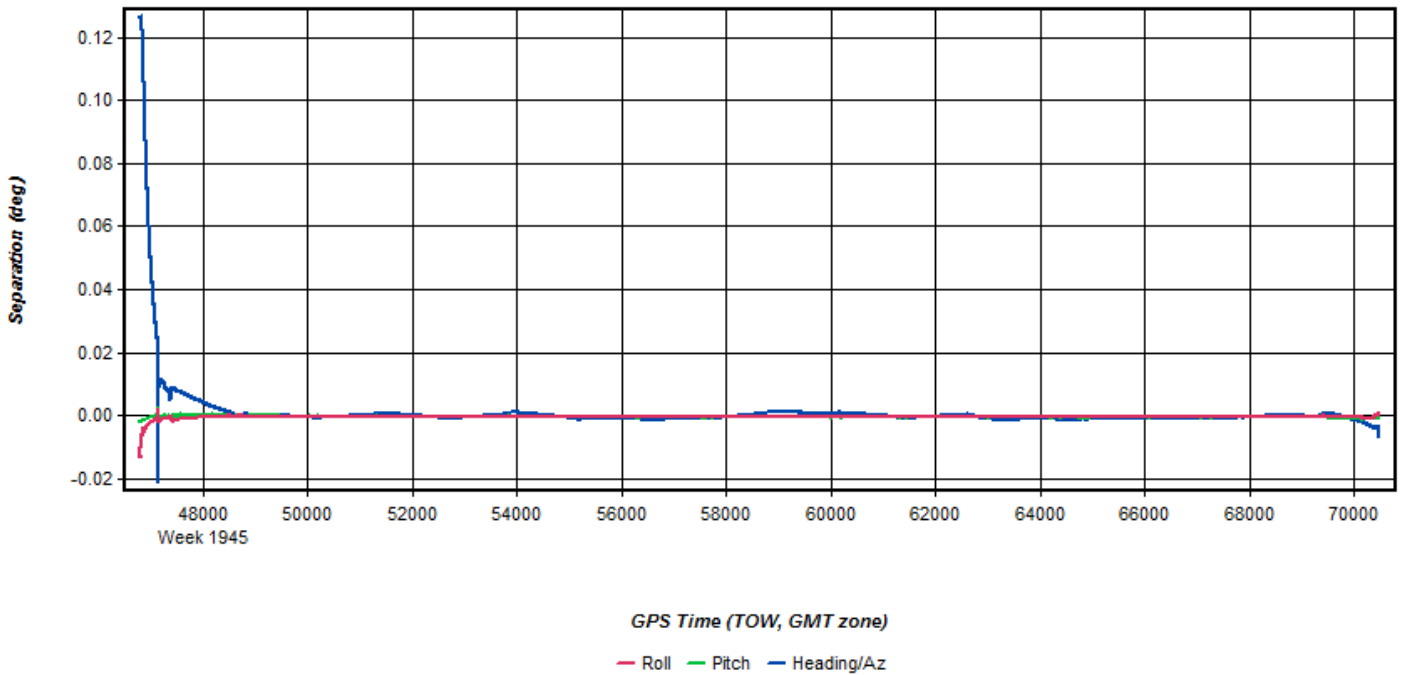
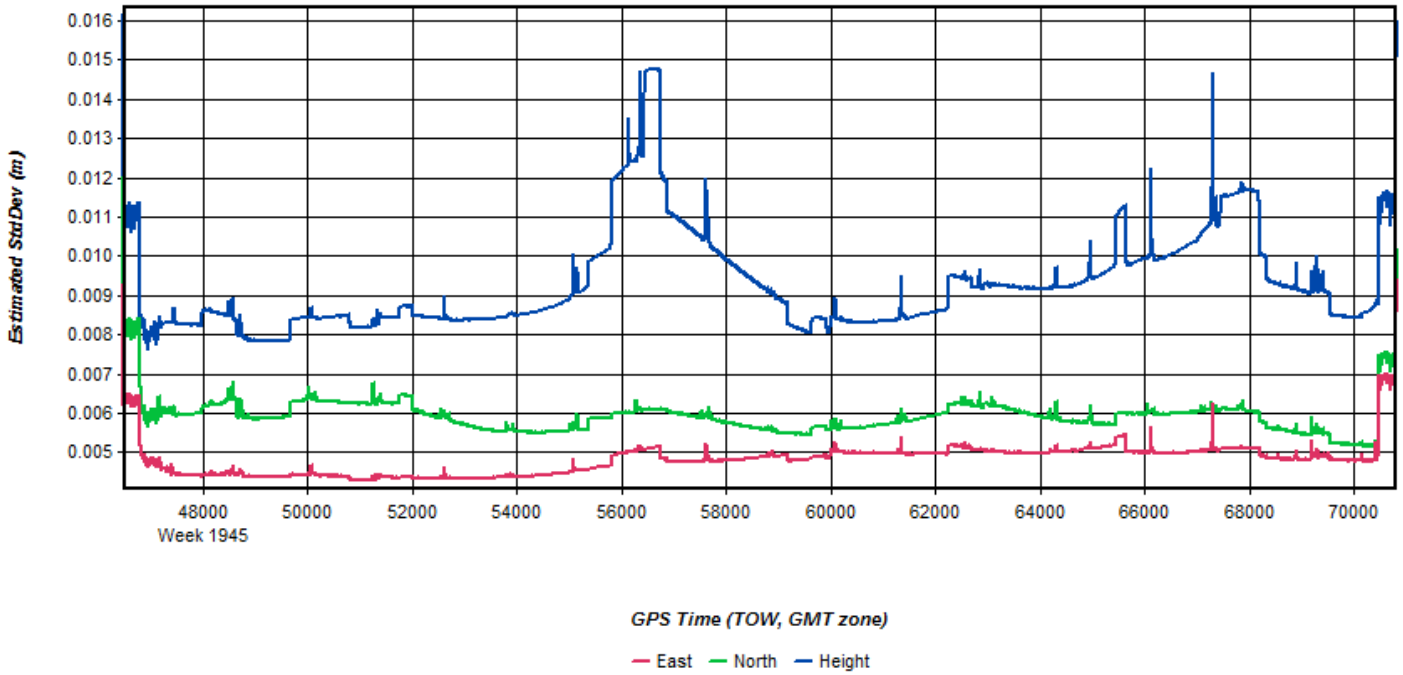
GPS Time (TOW, GMT zone)

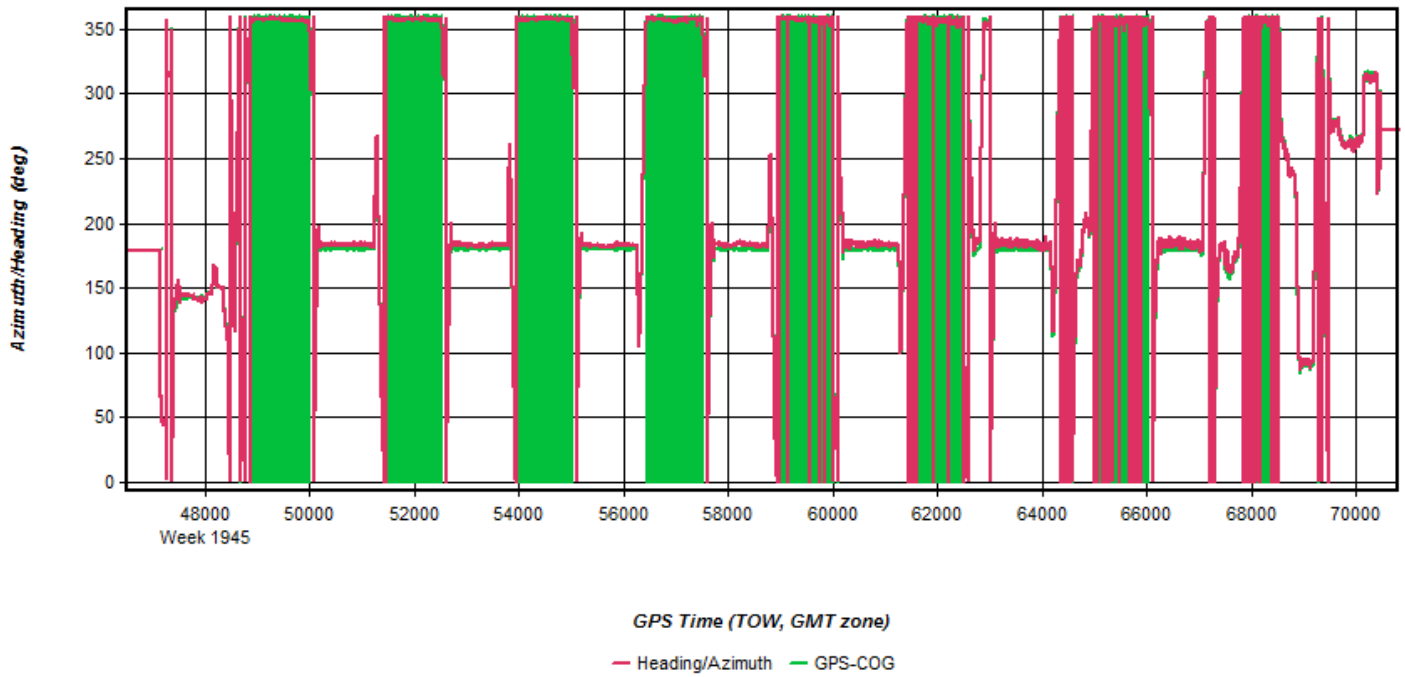
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



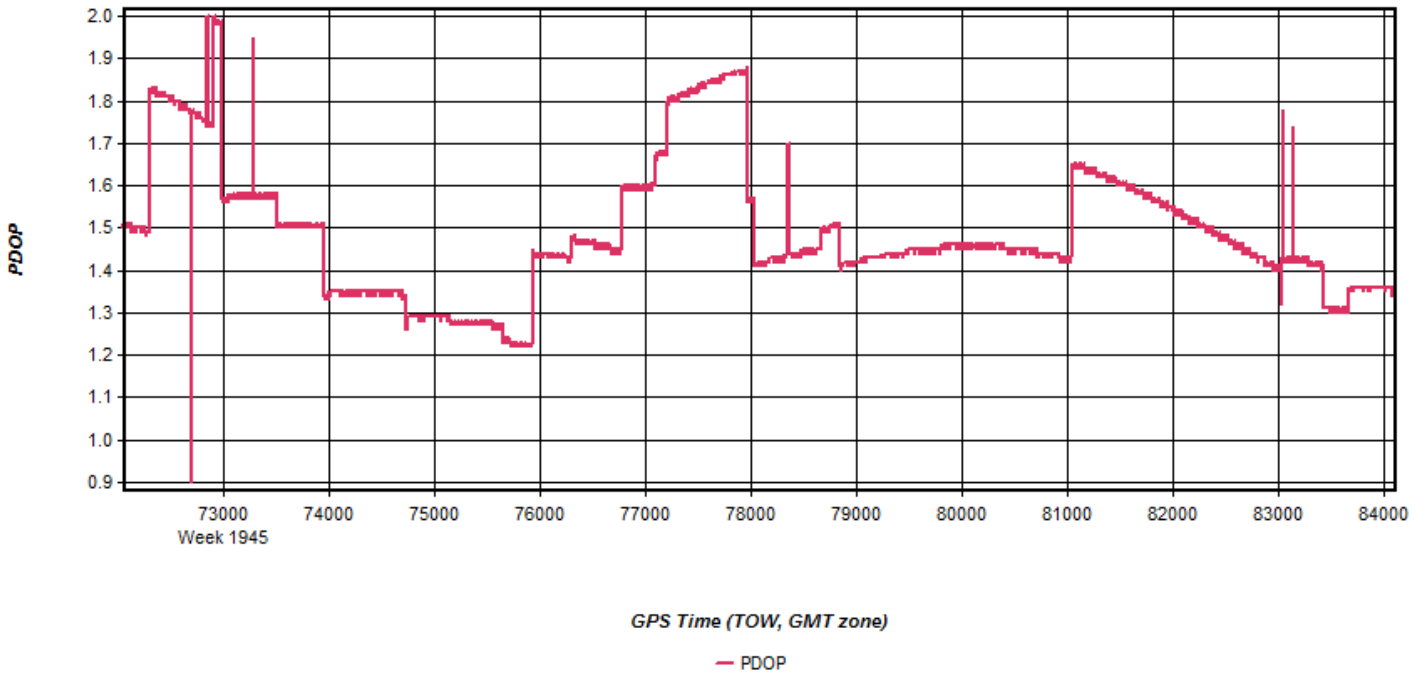
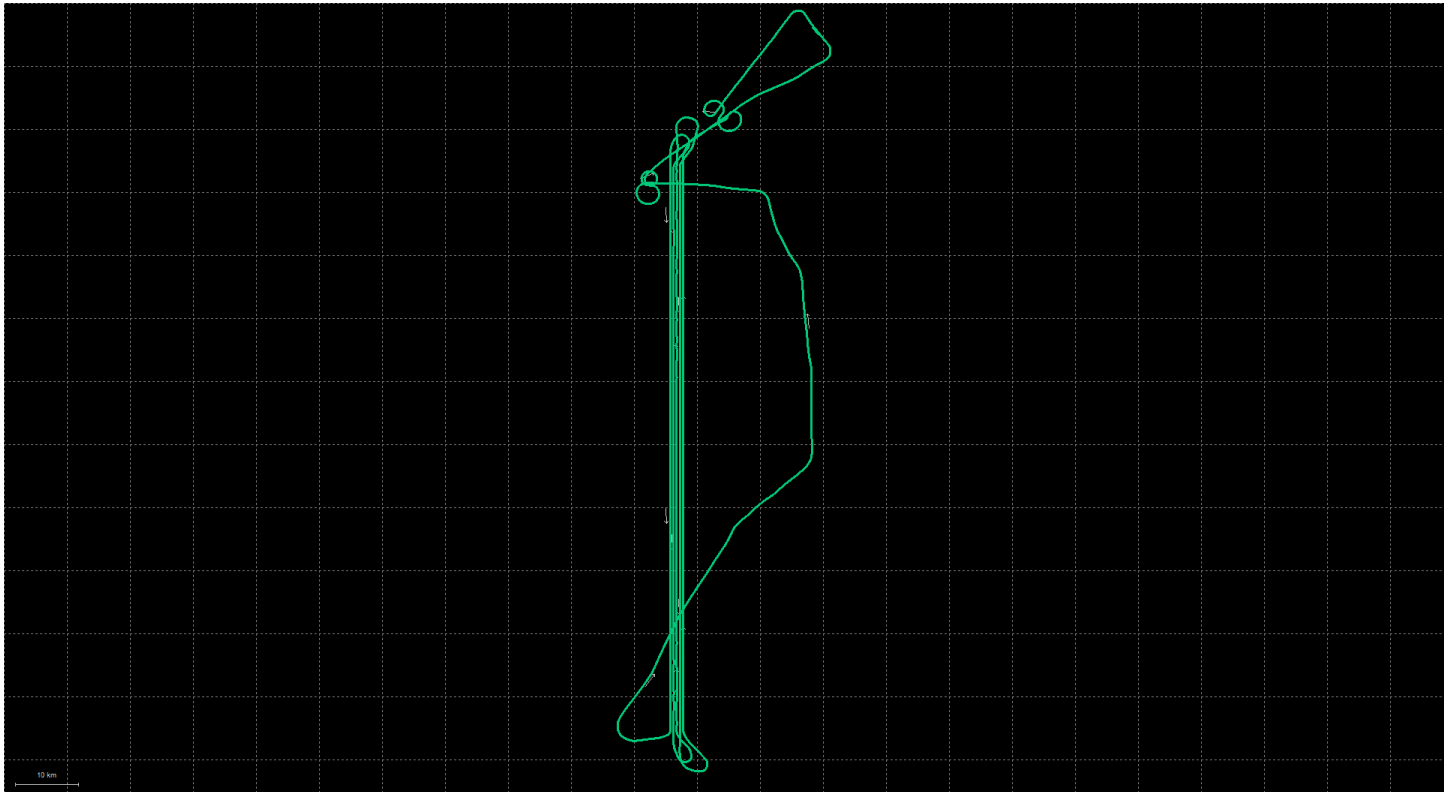
GPS Time (TOW, GMT zone)

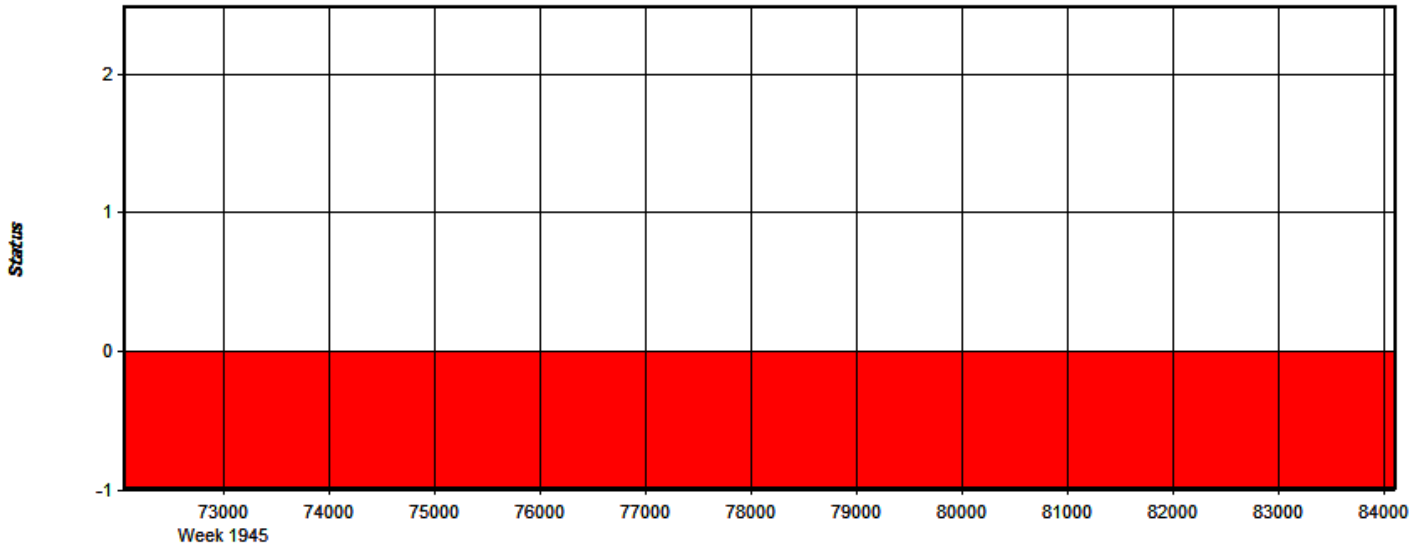
— East — North — Up





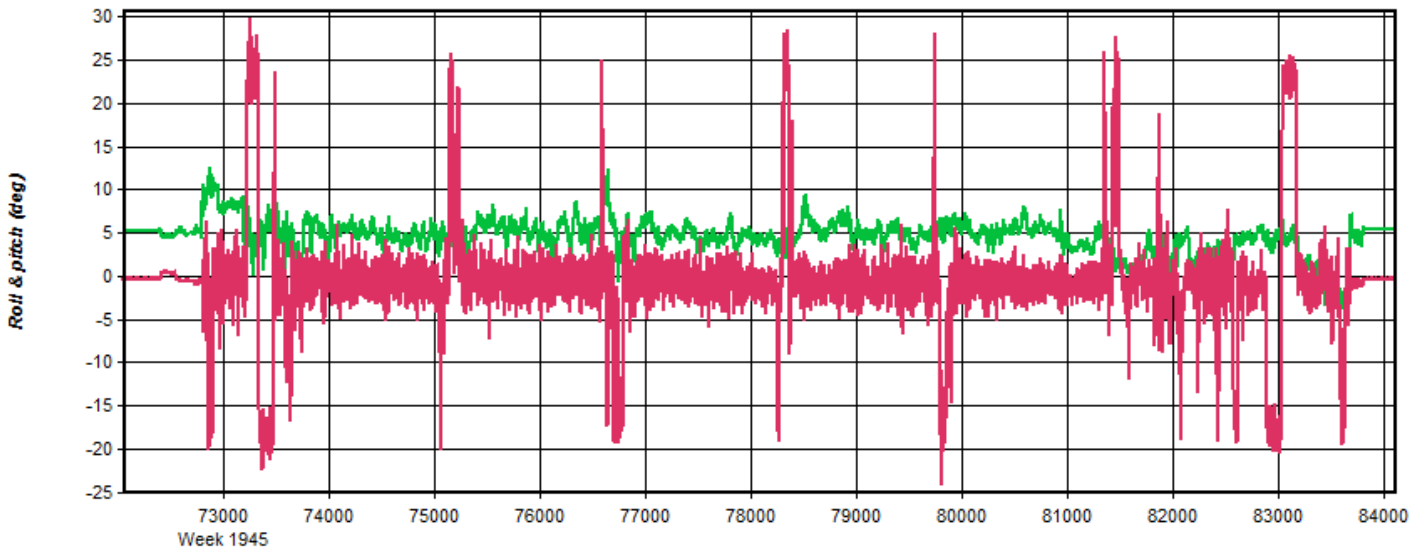
April 16, 2017-B (N246MP, SN8227)





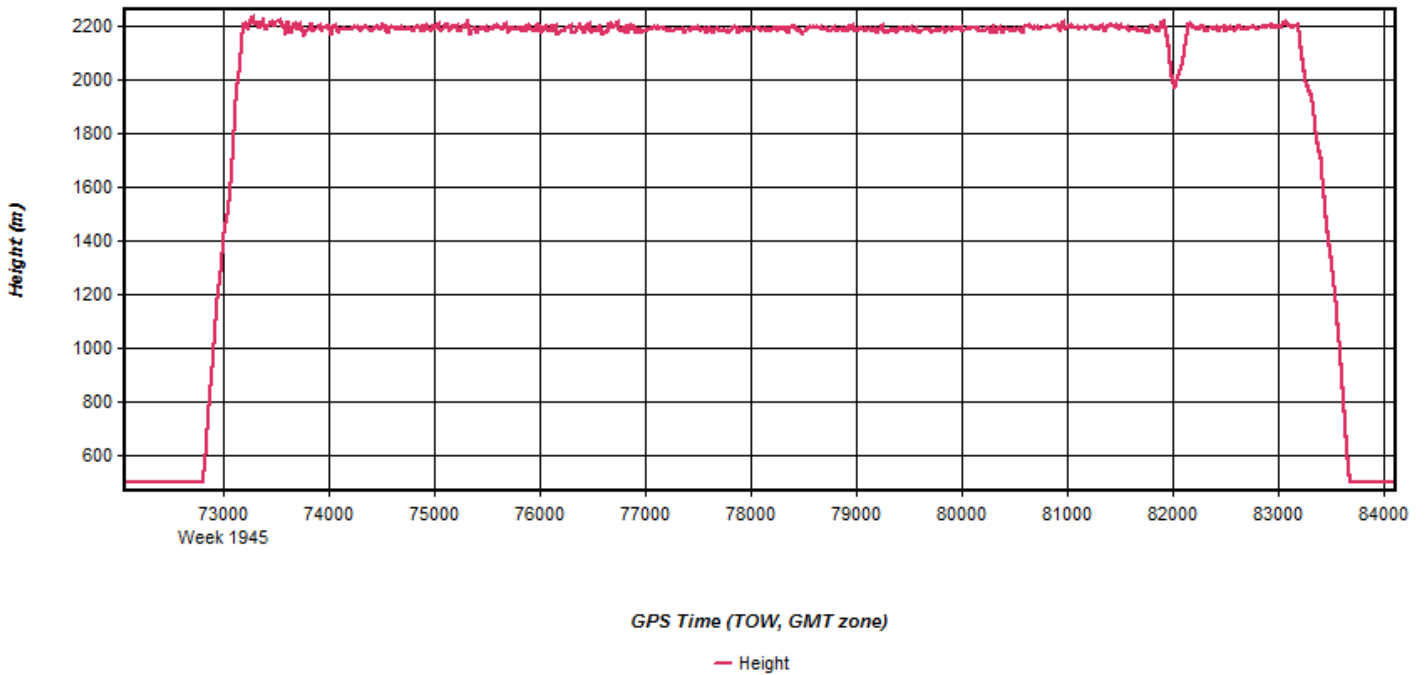
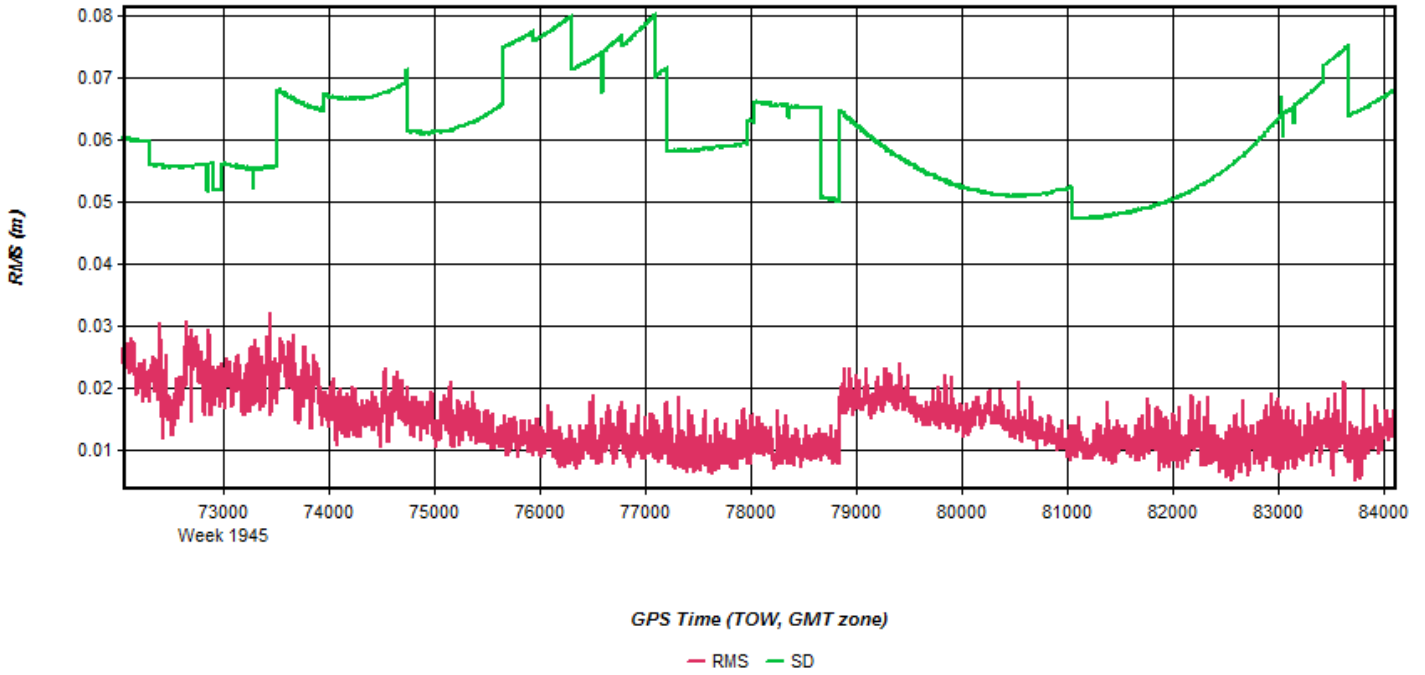
GPS Time (TOW, GMT zone)

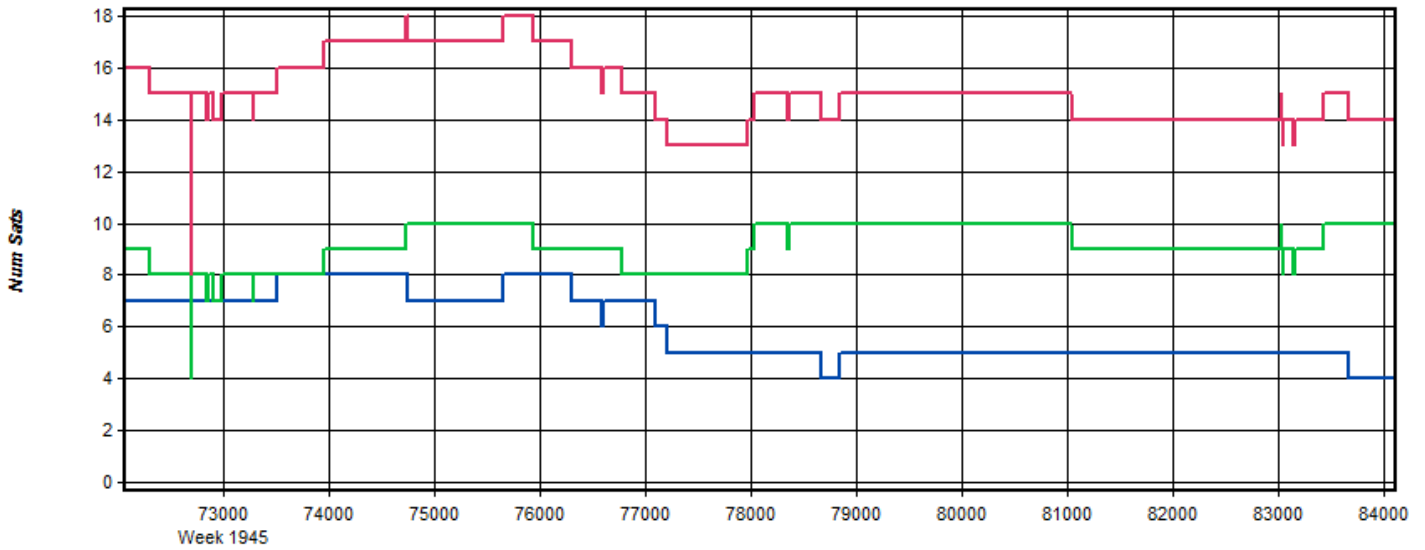
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

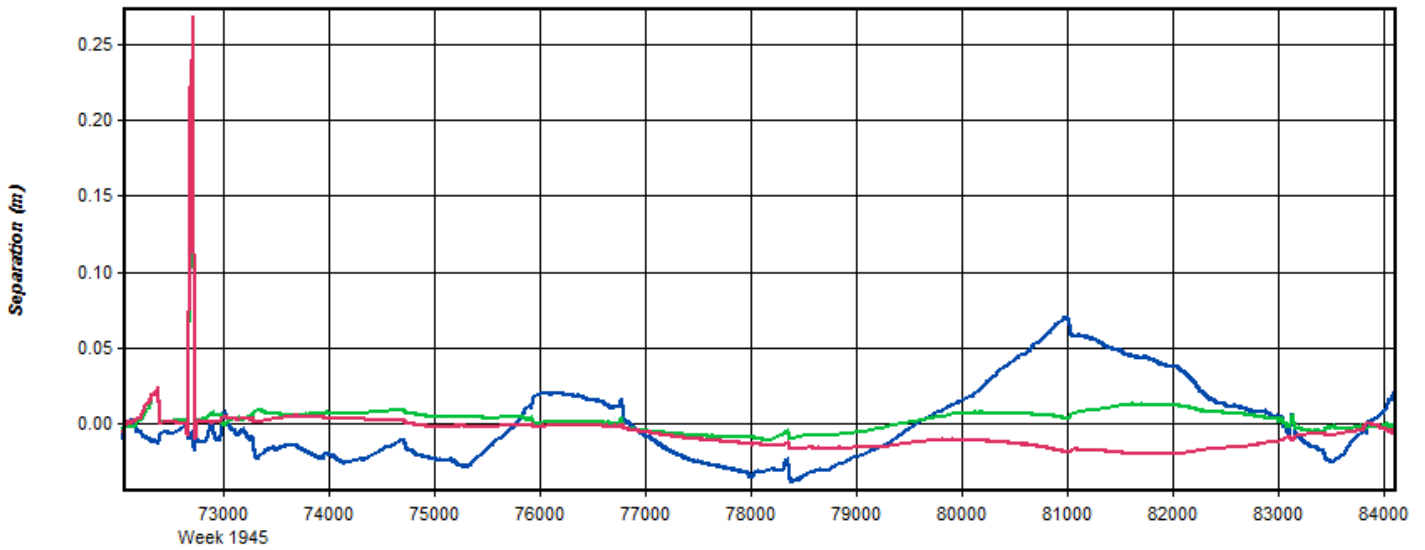
— Roll — Pitch





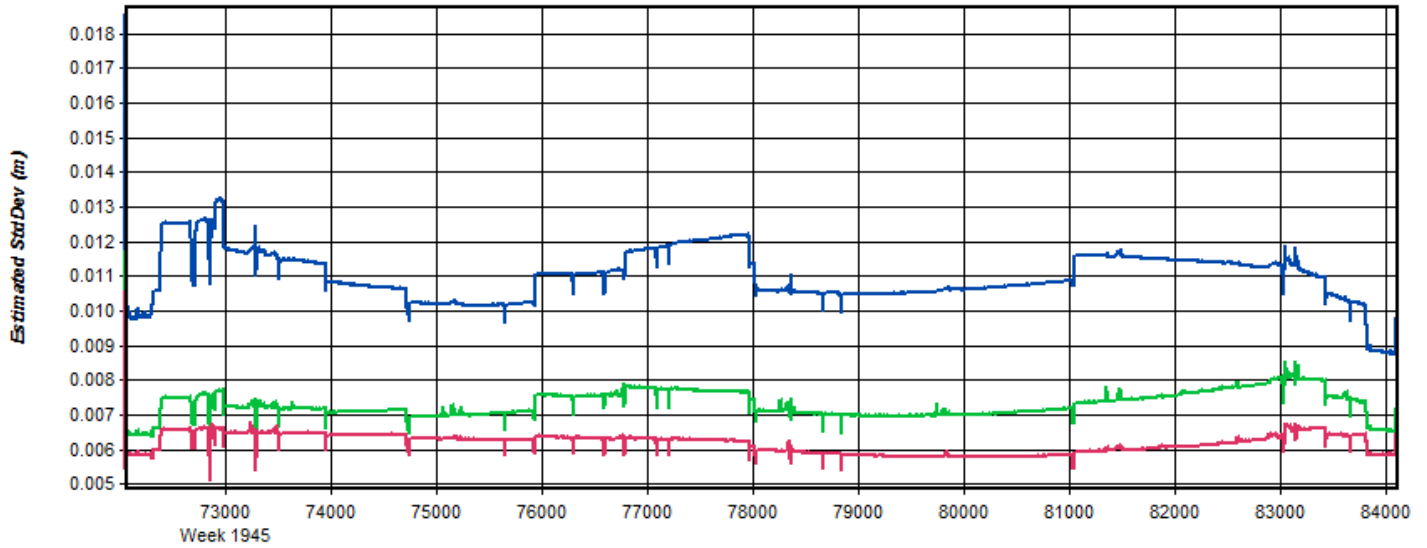
GPS Time (TOW, GMT zone)

— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



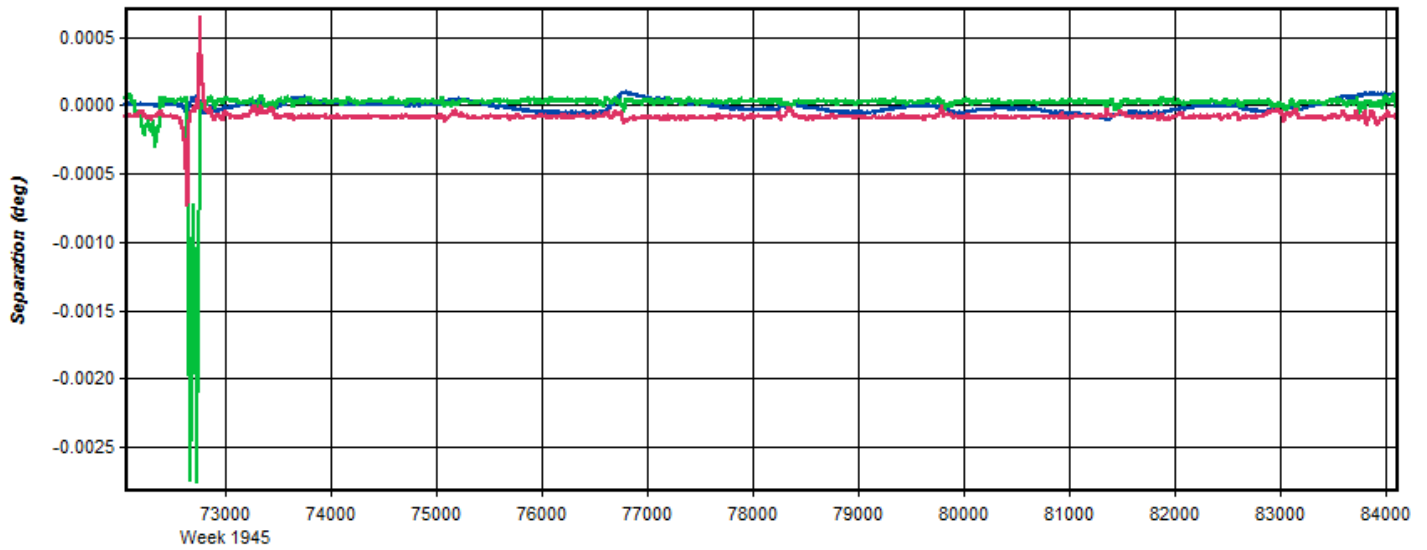
GPS Time (TOW, GMT zone)

— East — North — Up



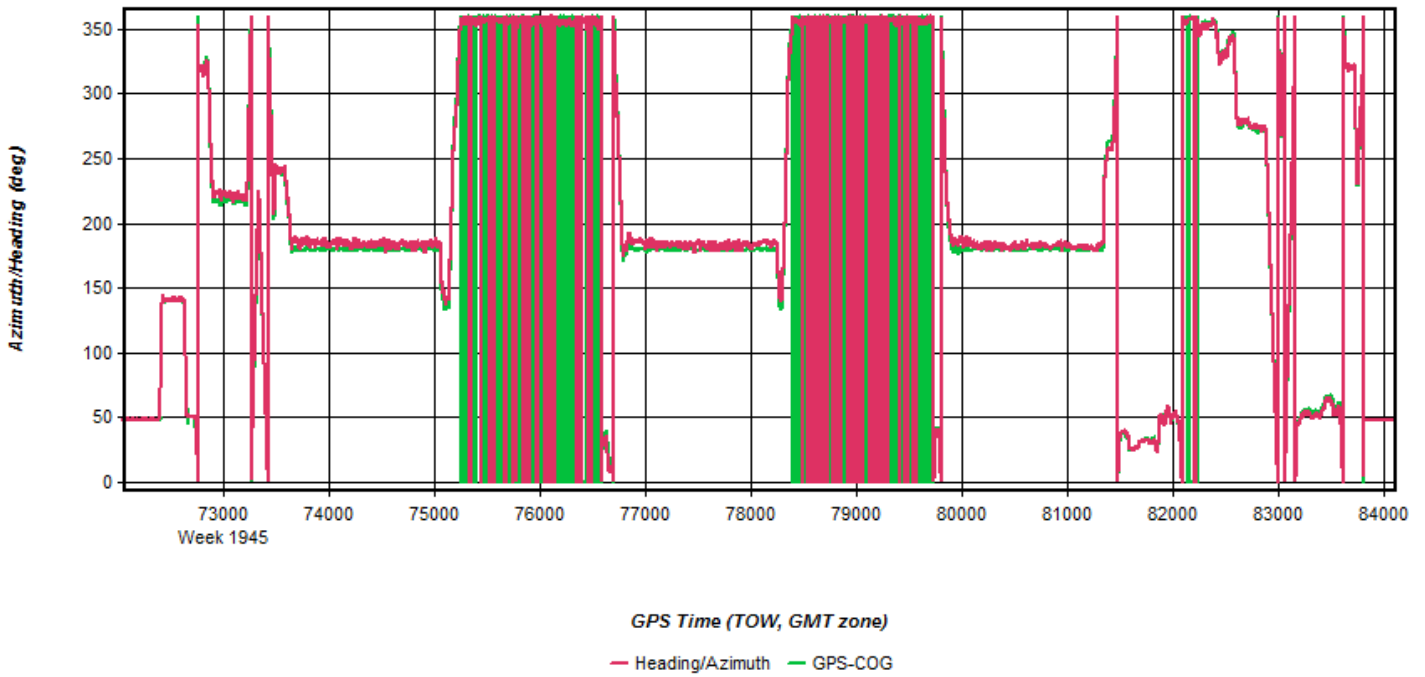
GPS Time (TOW, GMT zone)

— East — North — Height



GPS Time (TOW, GMT zone)

— Roll — Pitch — Heading/Az



Flight Log

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email Log daily to flight_log_distribution_list@quantumspatial.com)

Date: 7-16-17
UIC: 010601

Project: NRCS South Dakota LIDAR **Proj #:** 30420
Flight Mgmt Fla: 2017 04 16 195934

Aircraft: N24CMP **Begin Hobbs:** 1430.7 **End Hobbs:** 1433.7 **Total:** 3.0 **Pilot:** C McDonald **Co-Pilot:** Tech: JSWgn

Dep Apt: KPIR **Dep Time (Lcl):** 513 **Z:** 2013 **Arr Apt:** PIR **Arr Time (Local):** 1815 **Z:** 2315 **Tot Time Aloft:** 3.0

CORS: Y/N **Sta 1:** Sta 2: **Flyovers:** Y/N **# Y, times:** Sta1) Sta2)

GPS Unit: Y/N **Sta 1:** 1/2 EMP **Sta 2:** **Flyovers:** Y/N **# Y, times:** Sta1) Sta2)

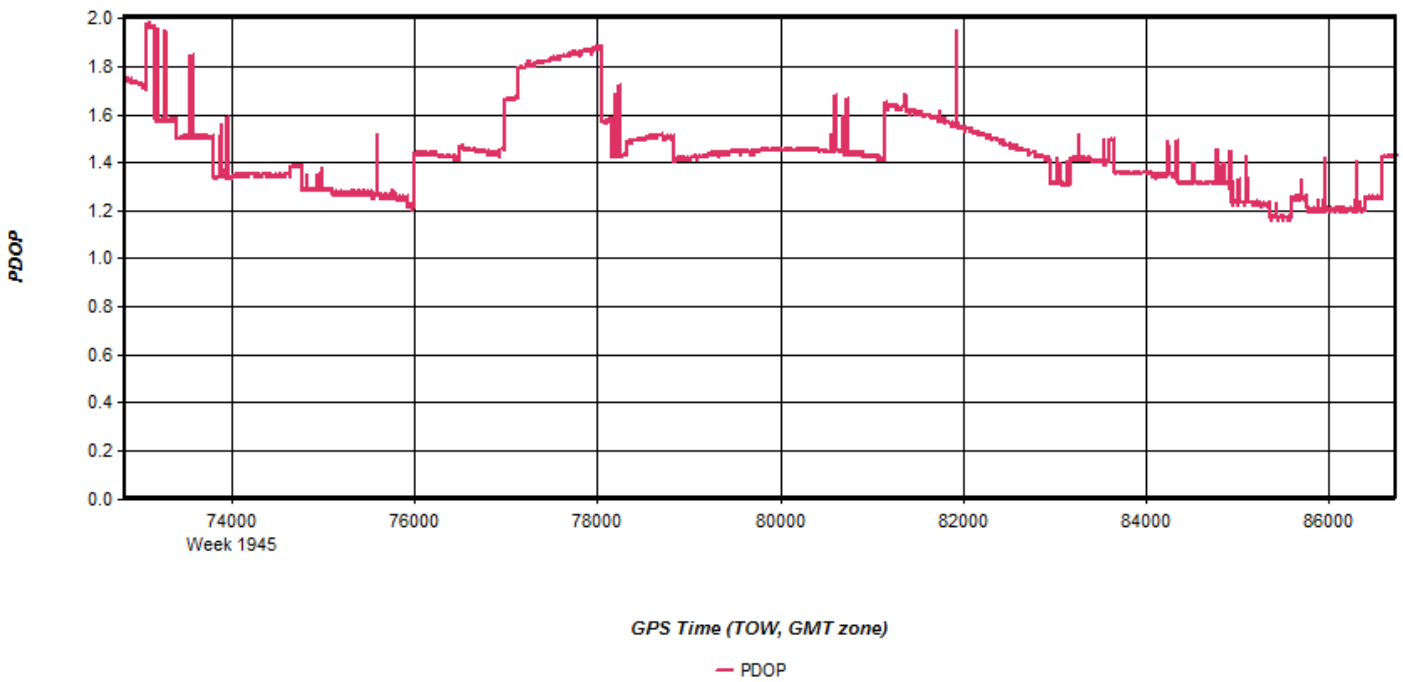
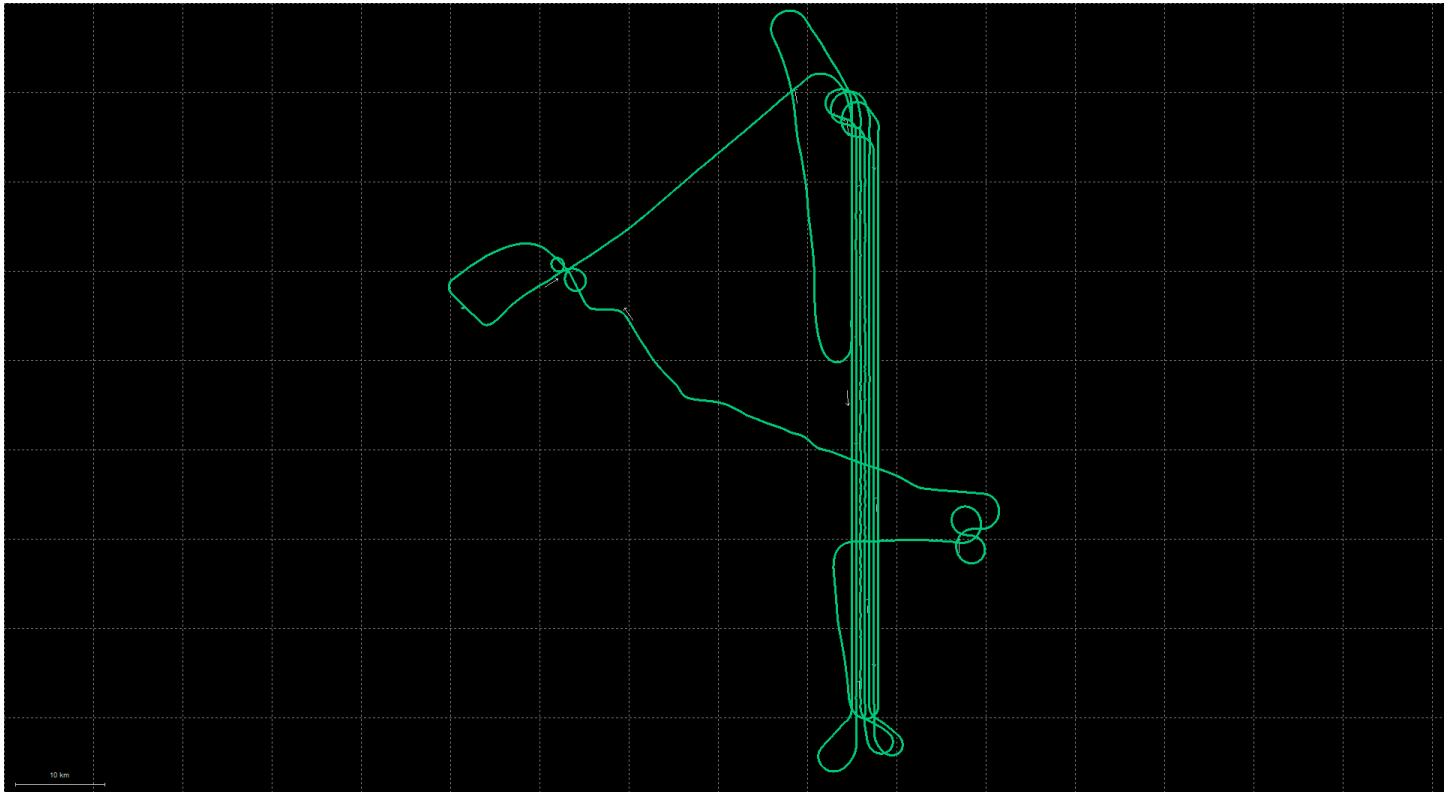
Gd Temp beg: 17 °C **End:** 16 °C **OAT beg:** 4 °C **End:** 3 °C **Altimeter begin:** 3008 **end:** 3005

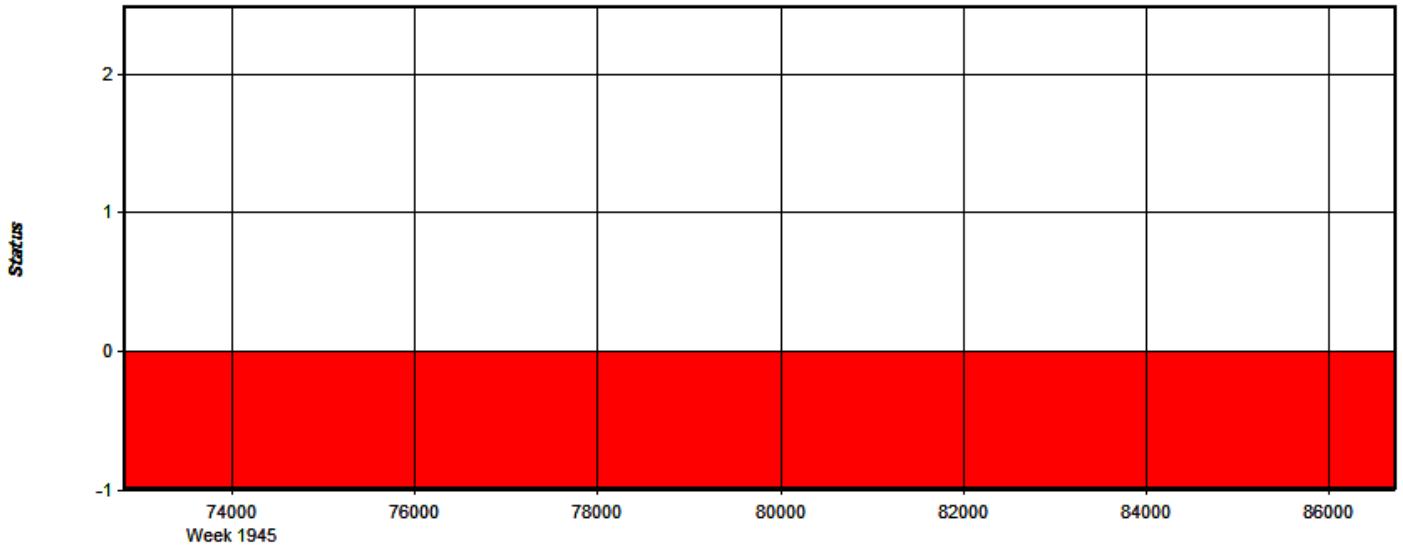
Type	Alt AGL	Alt AMSL	Avg Temp	Max	Avg Pt	Range	Power	Mag	Average
FOV	AGL	AMSL	ht	Glided	Spreading	Rate	Power	CB	Number
LIDAR	8227	7200	7200	2000		328kHz	100	352	2
FOV	48Hz	MPIA Y/N	Pulse	Rate	PPPM			299	53

Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	Pos/Time	GPS Altitude	Orb	Urb	Notes
112	174	2027	2050	120	7230	1.1/21		0/-	PIR - Fig 8's 2021-2025
111	354	2054	2116	136	1.1/22	7282		-/+	turbulence moderate
110	174	2121	2143	135	1.1/19	7230		-/+	turbulence
109	354	2146	2208	140	1.2/20	7209		-/+	"
108	174	2212	2235	120	1.2/16	7200		-/+	"
X Tie	270	2258	2300	130	1.3/18	7200		0/-	* cloud + rain 2.2 mi - PIR southern half unobtainable due to rain/sleeb snow/cloud Fig 8's (2300-2305) -> PIR

Summary: Hobb's = 3.0, Online Time = 2.1, Mob Time = 0.9

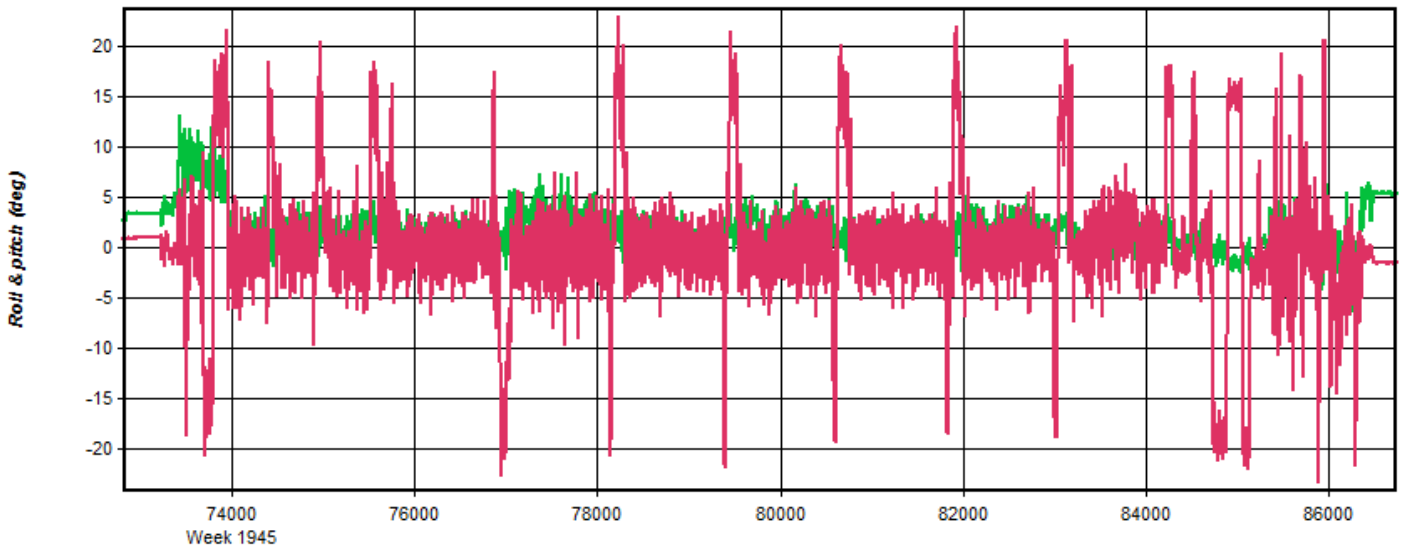
April 16, 2017-B (N915WC, SN8237)





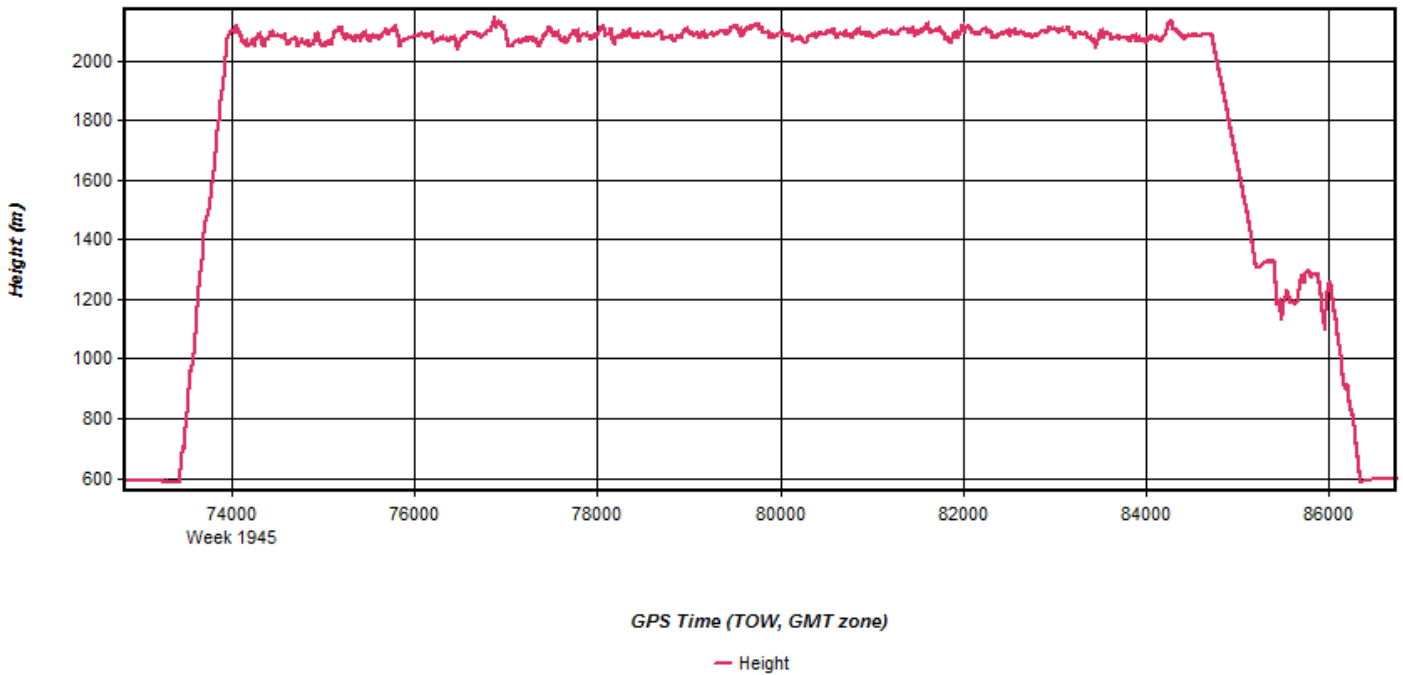
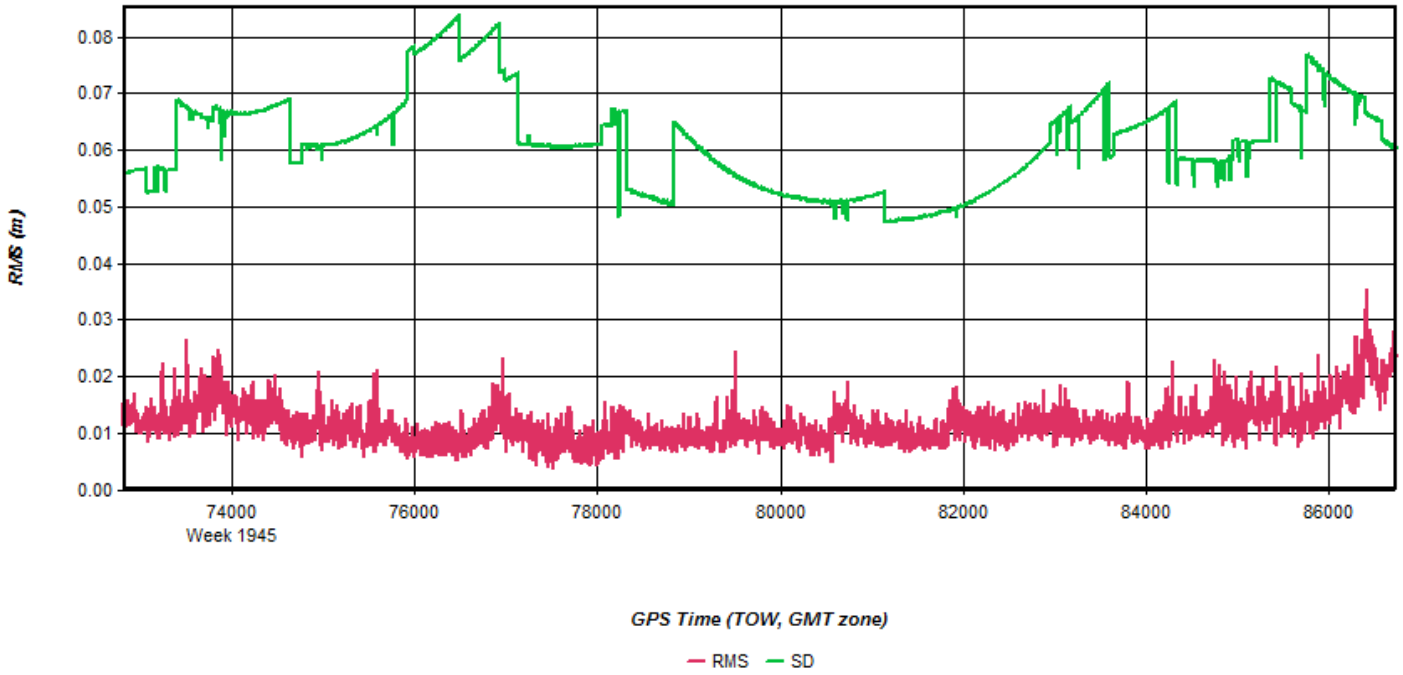
GPS Time (TOW, GMT zone)

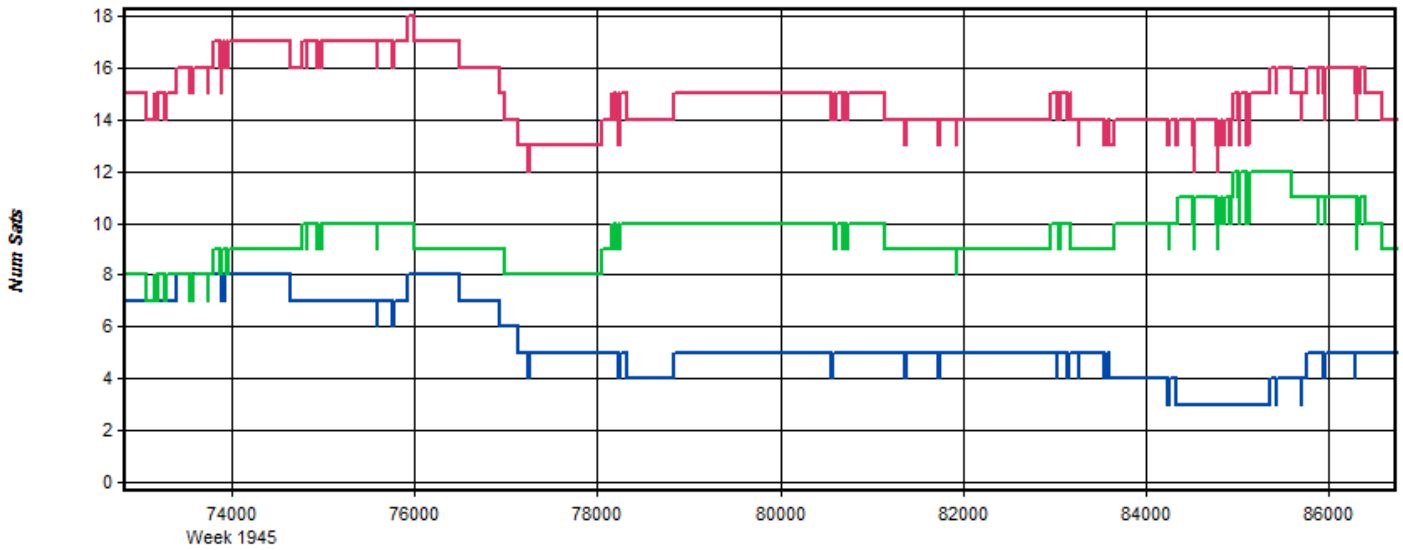
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

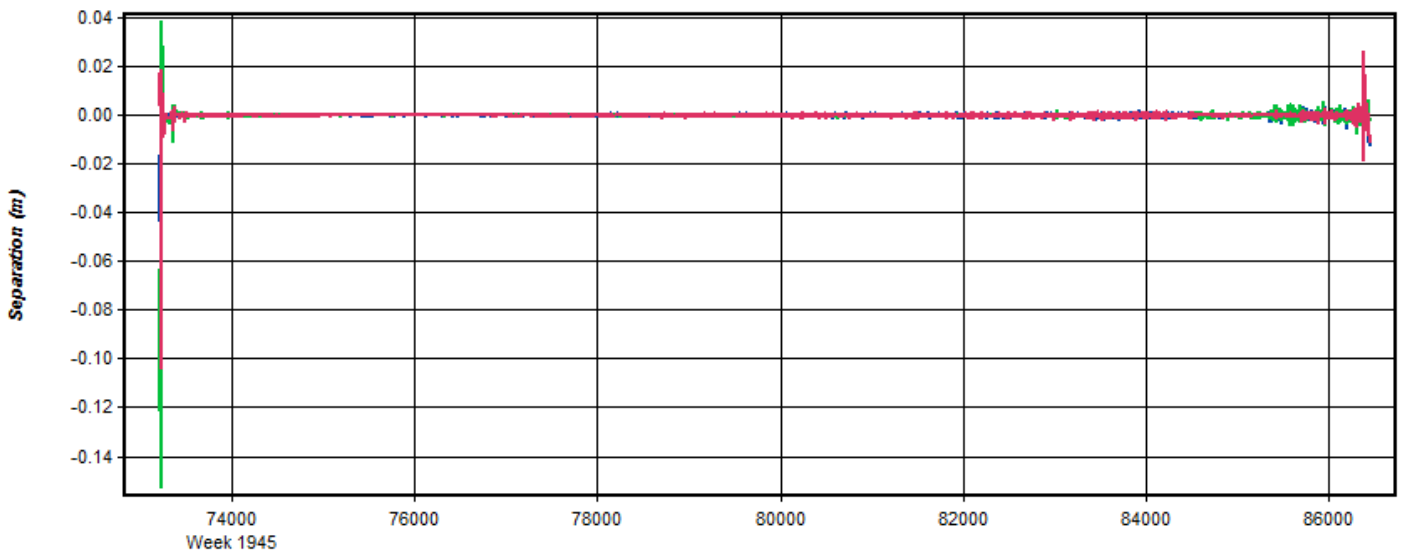
— Roll — Pitch





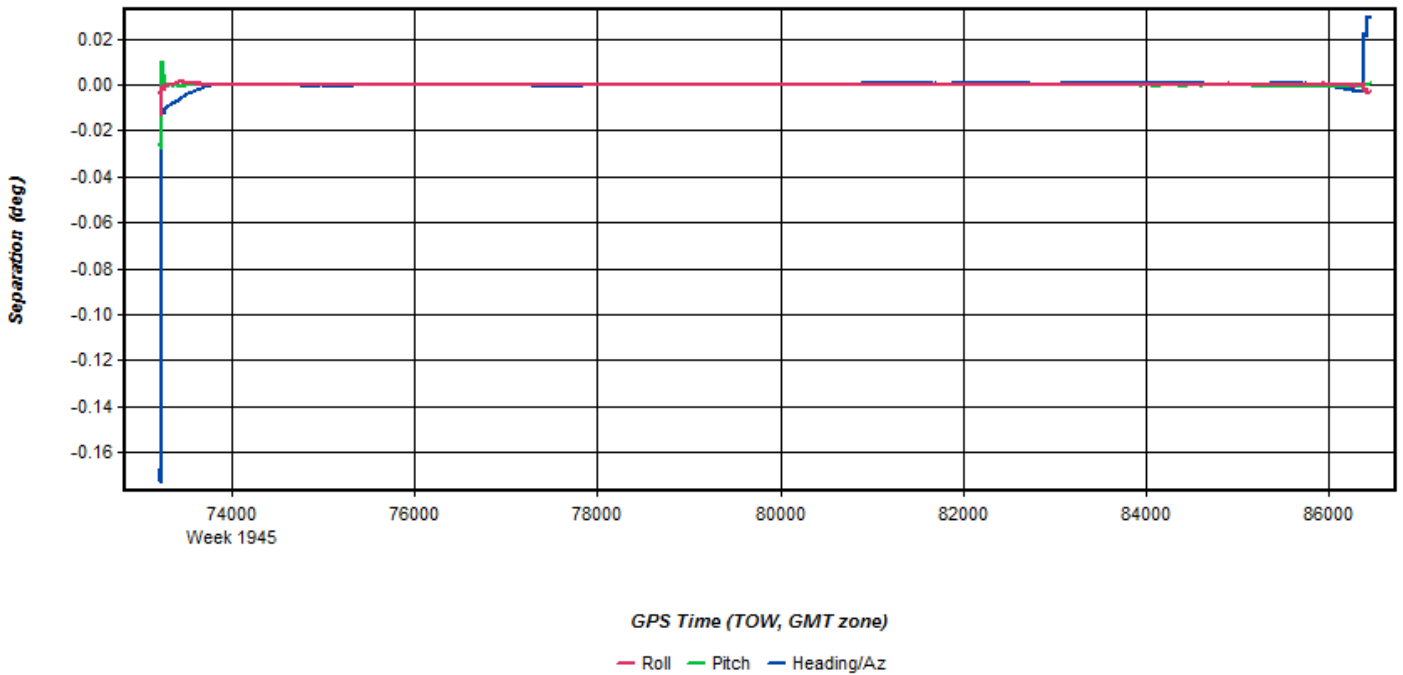
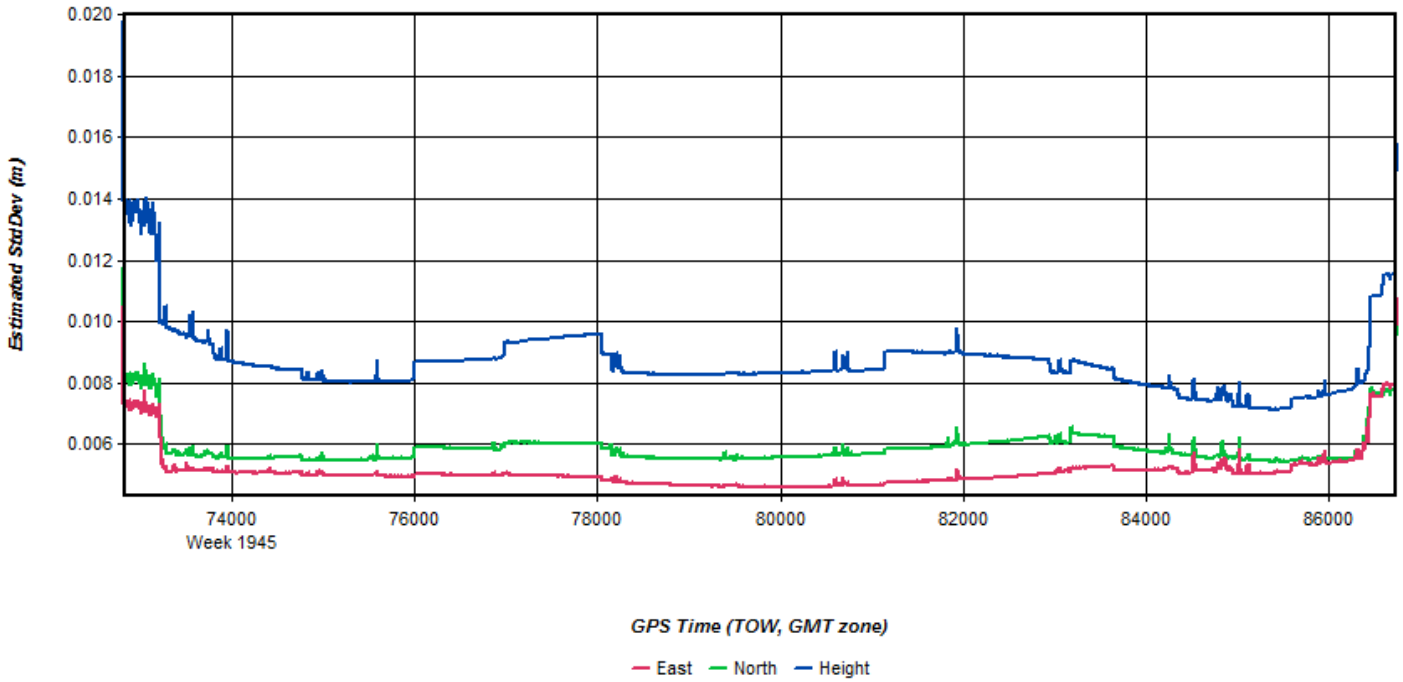
GPS Time (TOW, GMT zone)

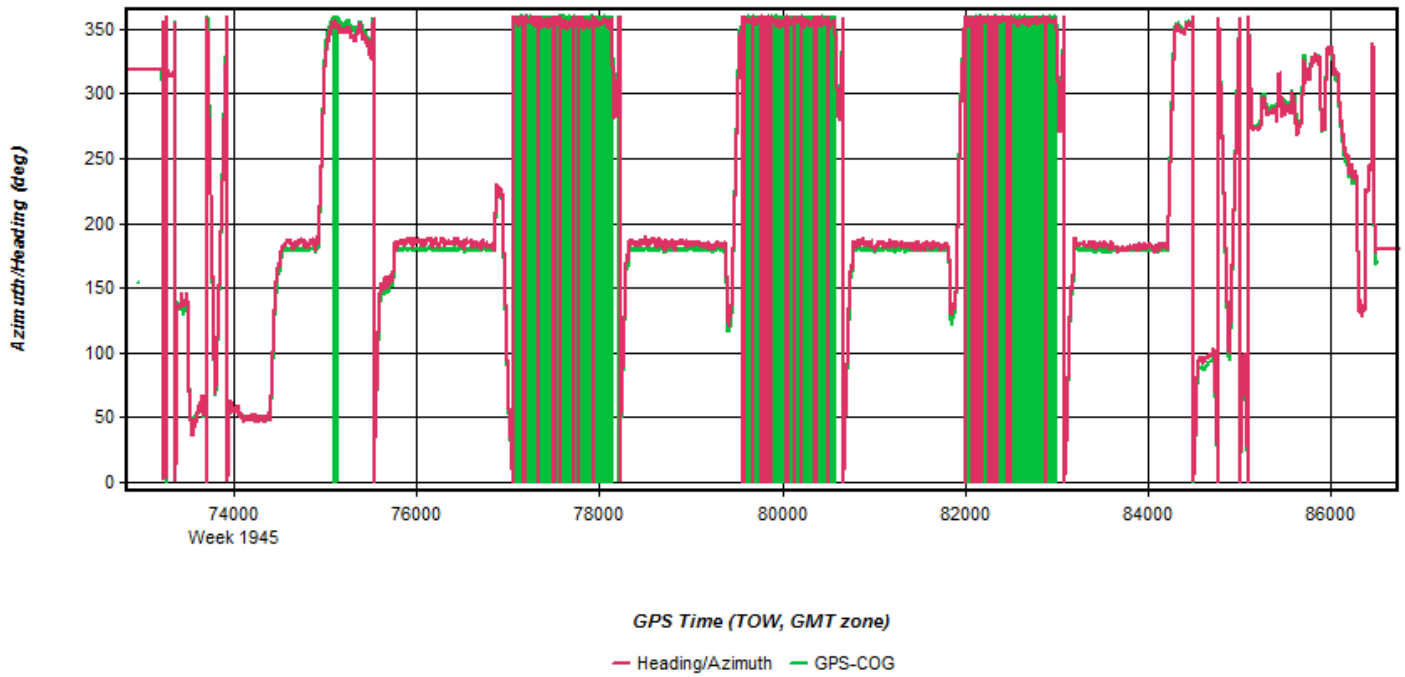
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR

KeyW - Aeroptic
LIDAR FLIGHT REPORT

Revised Feb. 2014

CREW AIRCRAFT WEATHER

UTIC DATE GPS Time Location

Camera System

Camera Location (Hole)

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	1145	S		
		1145	S		
		1146	N		
		1147	S		
		1148	N		
		1149	S		
		1150	N		
		1151	S		
		UL-E	E		

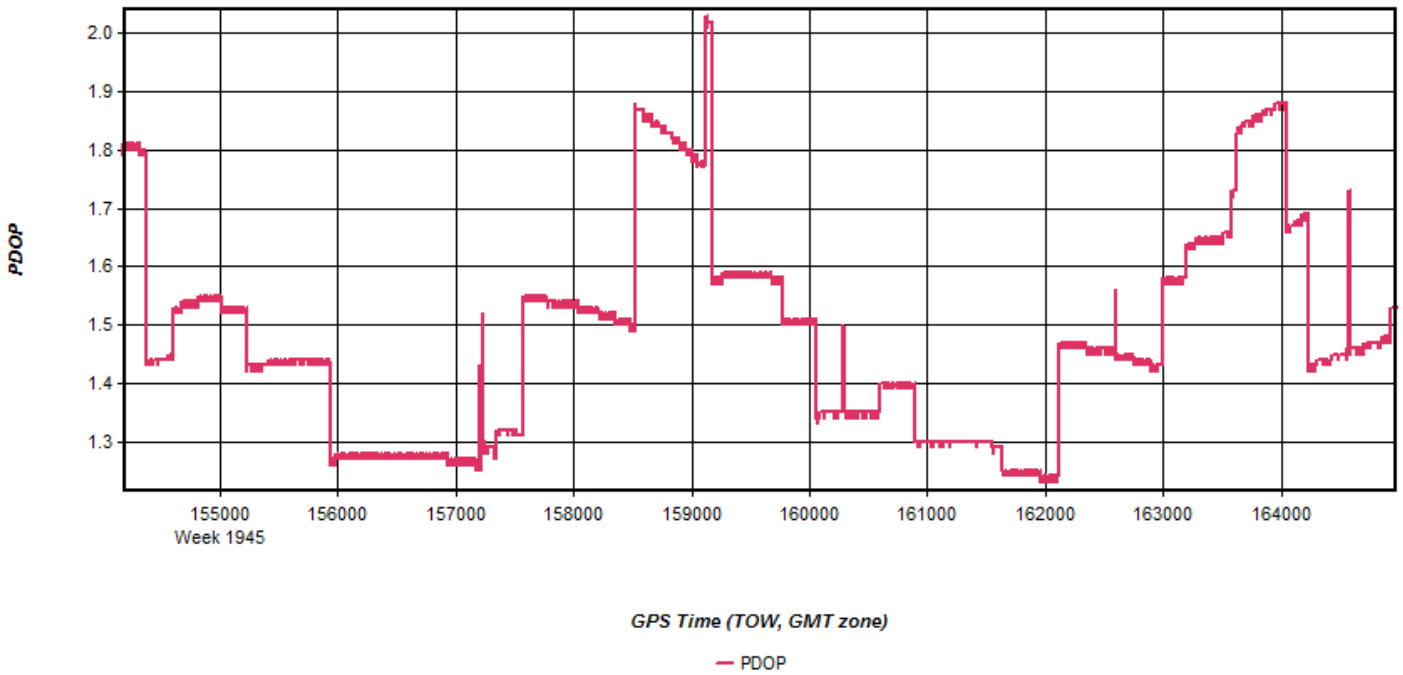
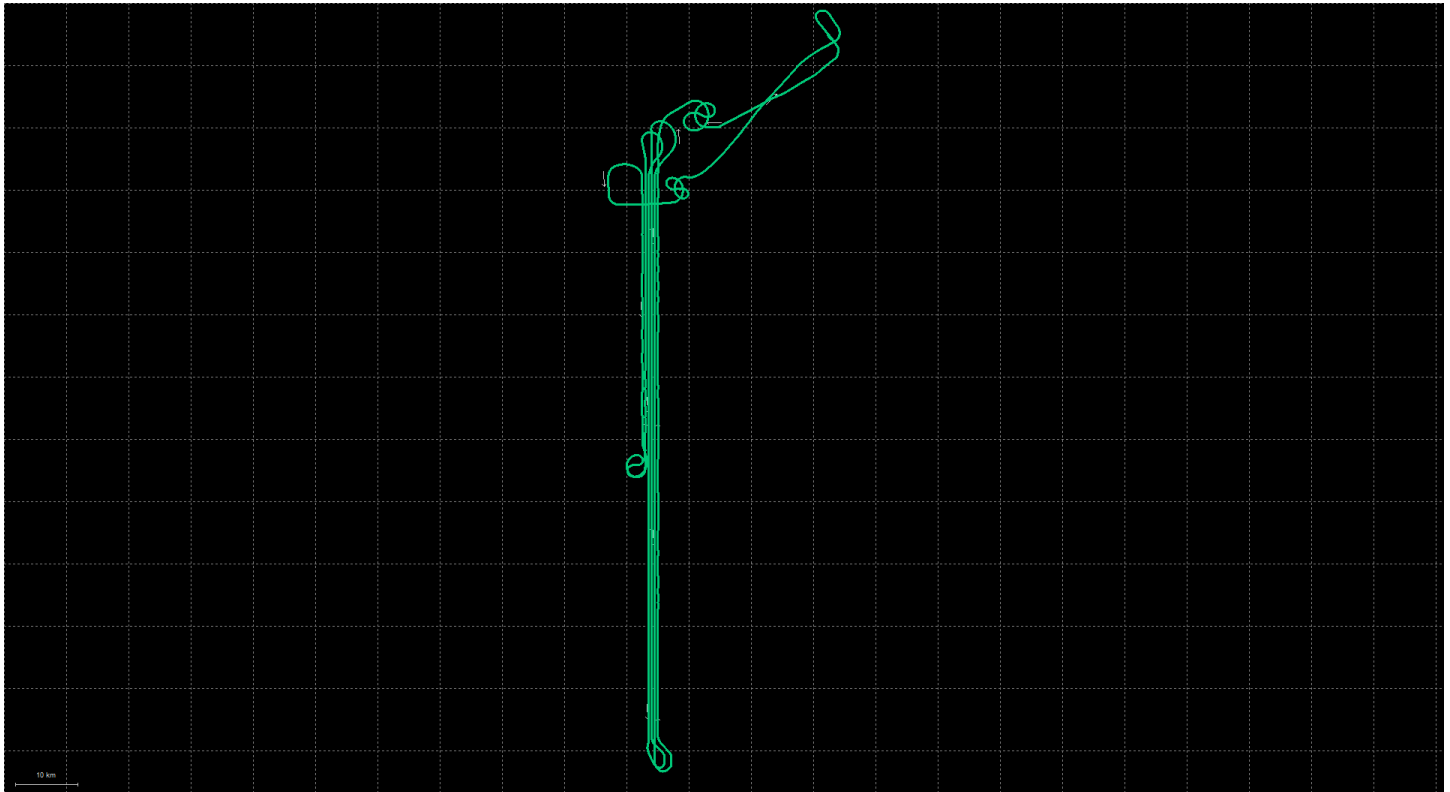
maybe some repeats in here!!!

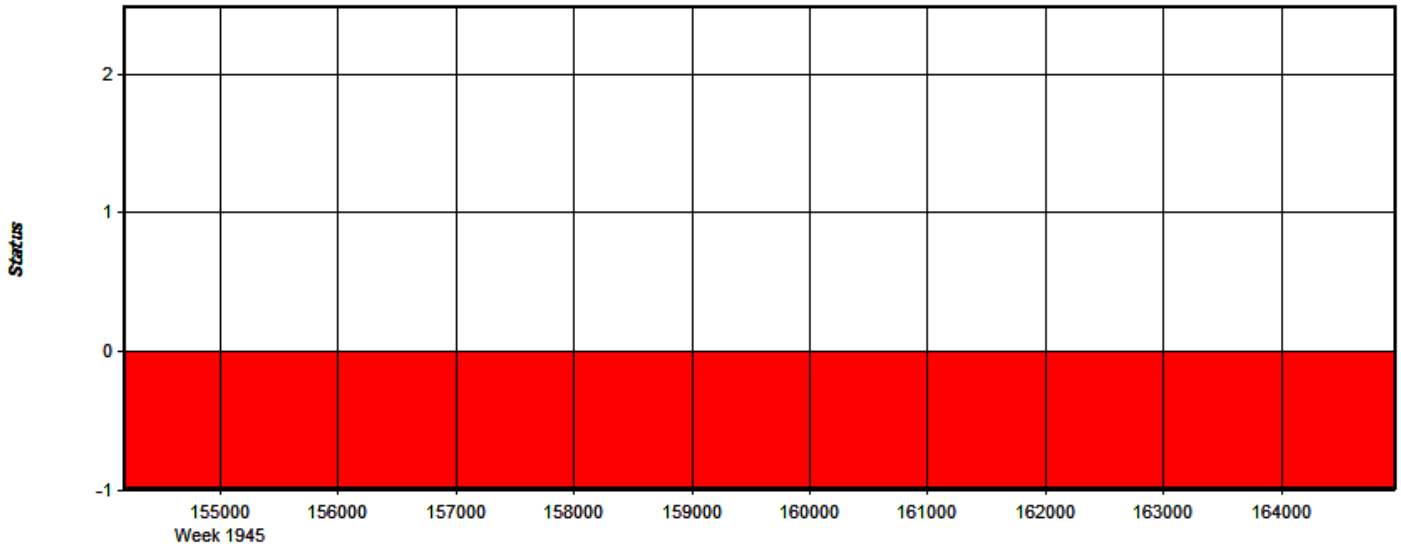
SSD		Space Used	Remaining
Drive #	SSD1	During Mission	unk
@ Beginning		Space Used	unk
Space Used			

Initials: _____

LIDAR STARTUP CHECKS	
Lens cleaned	<input checked="" type="checkbox"/>
All fids uploaded	<input checked="" type="checkbox"/>
Pilot's screen functional	<input checked="" type="checkbox"/>
Compact flash drive space	<input checked="" type="checkbox"/>
SSDs have space	<input checked="" type="checkbox"/>
Startup beeps & IPAS recording	<input checked="" type="checkbox"/>

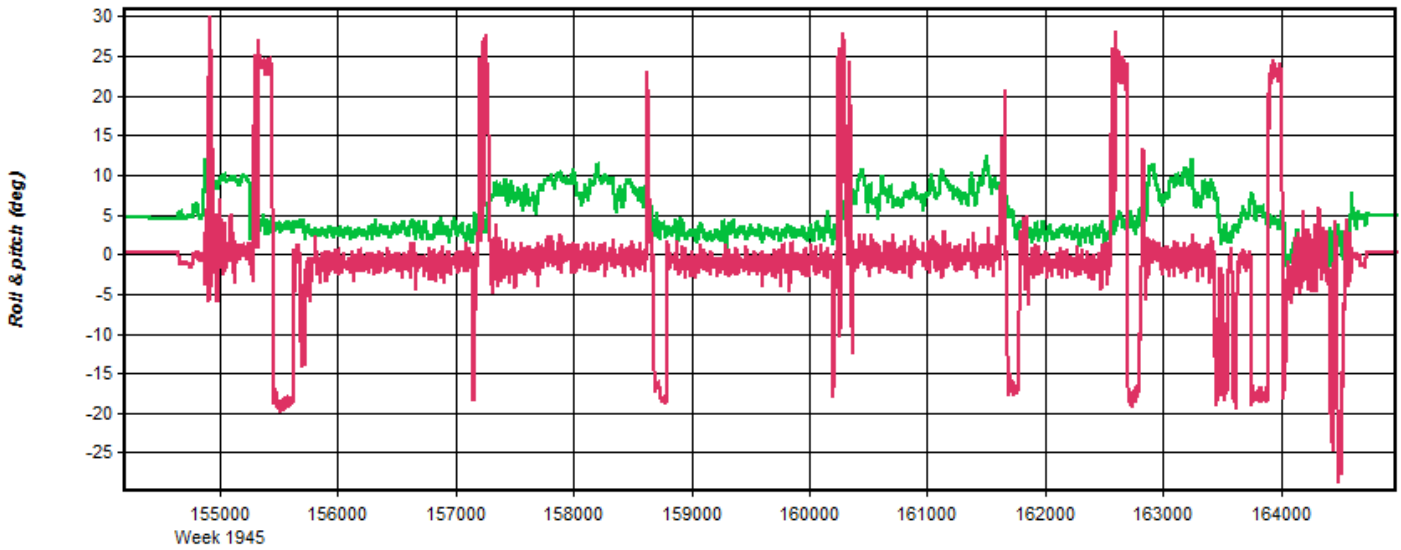
April 17, 2017-A (N246MP, SN8227)





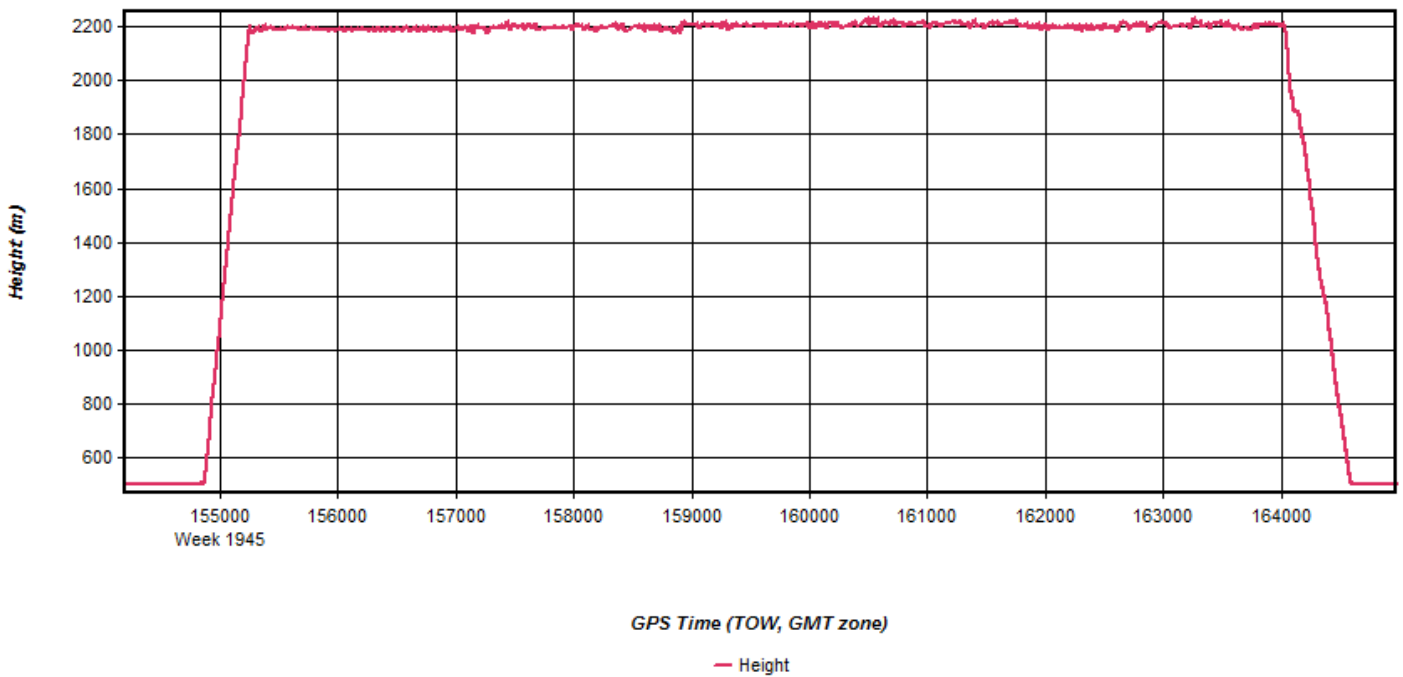
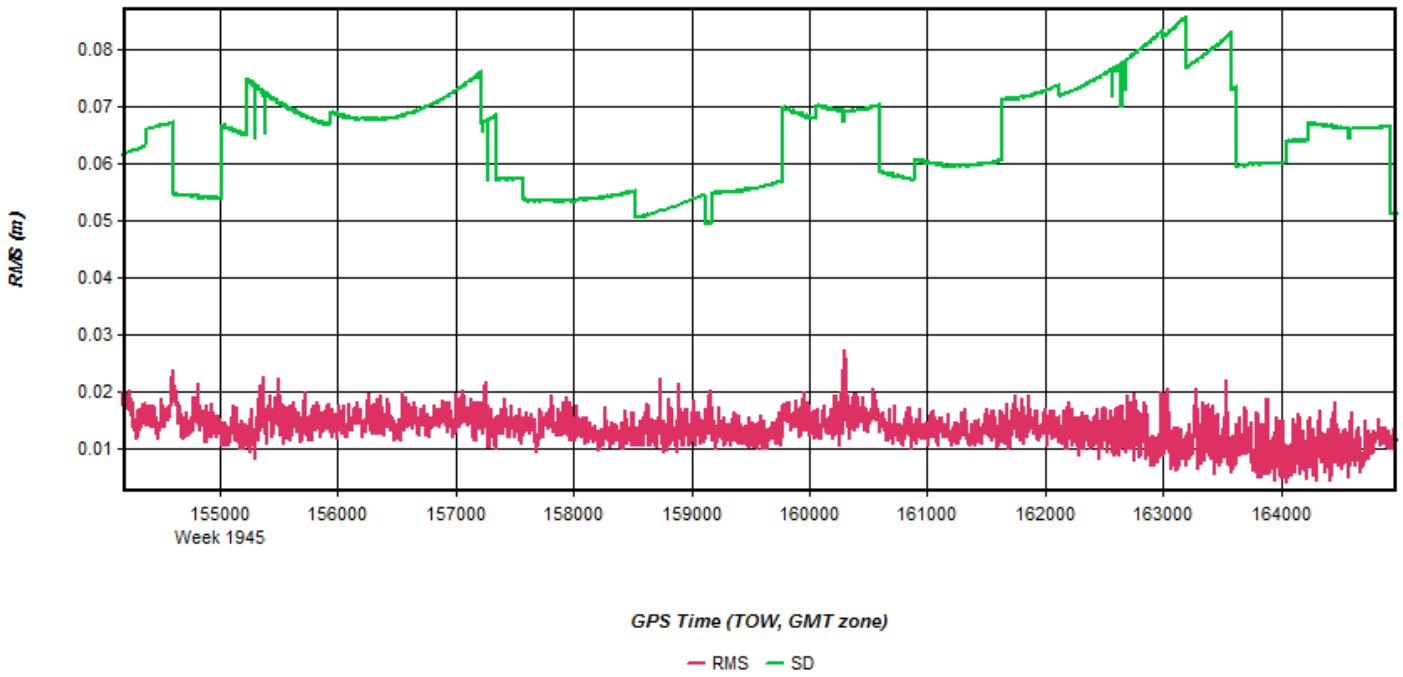
GPS Time (TOW, GMT zone)

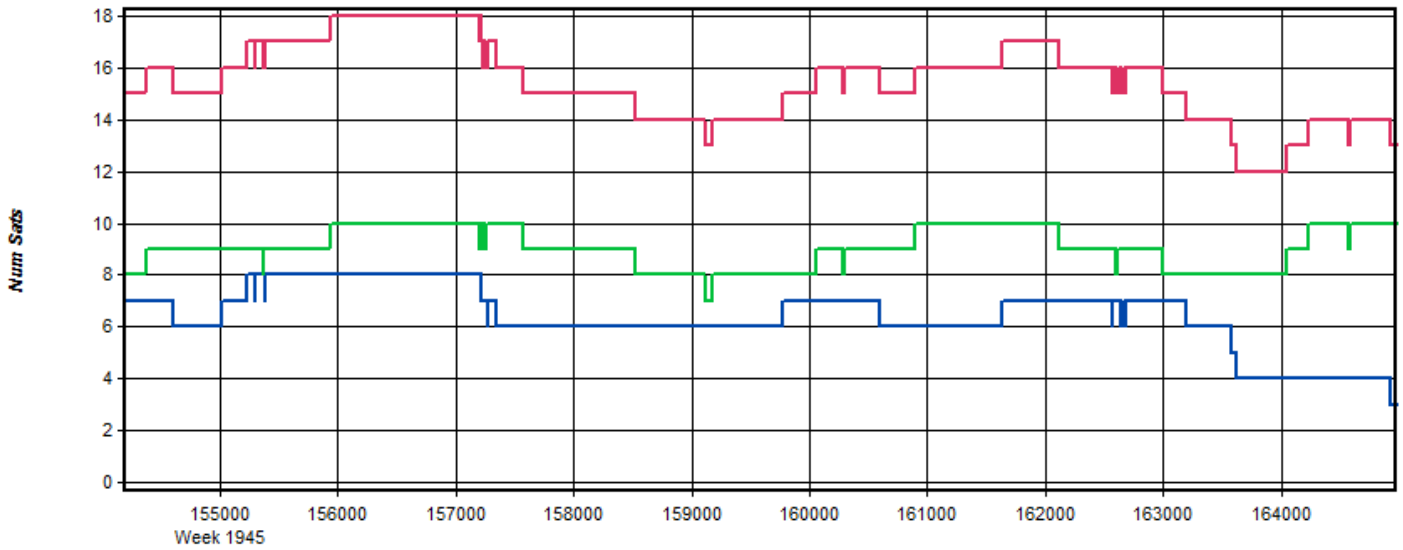
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

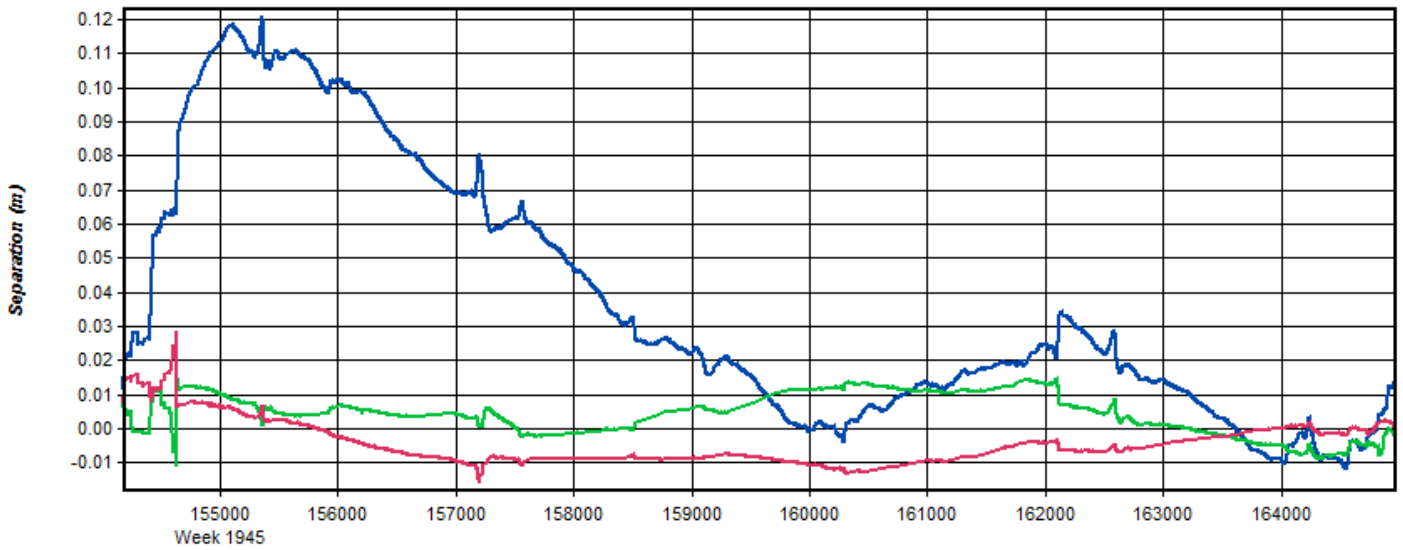
— Roll — Pitch





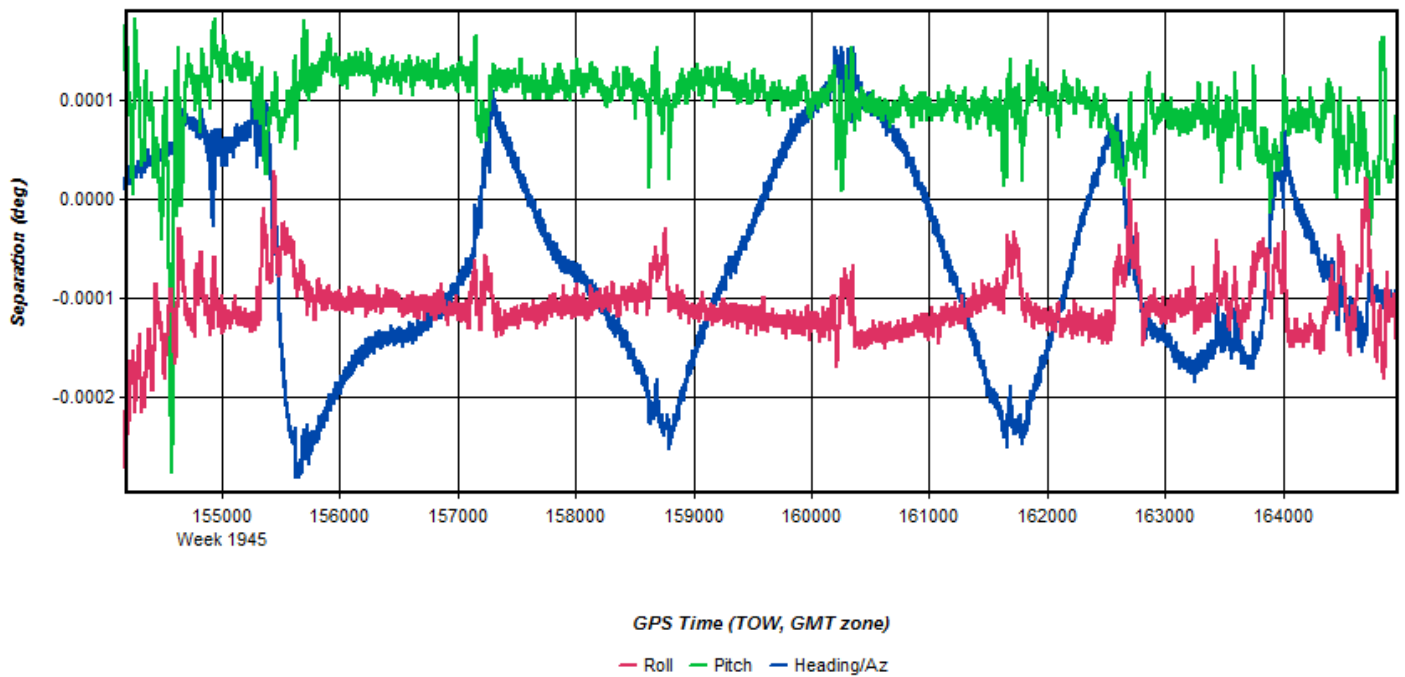
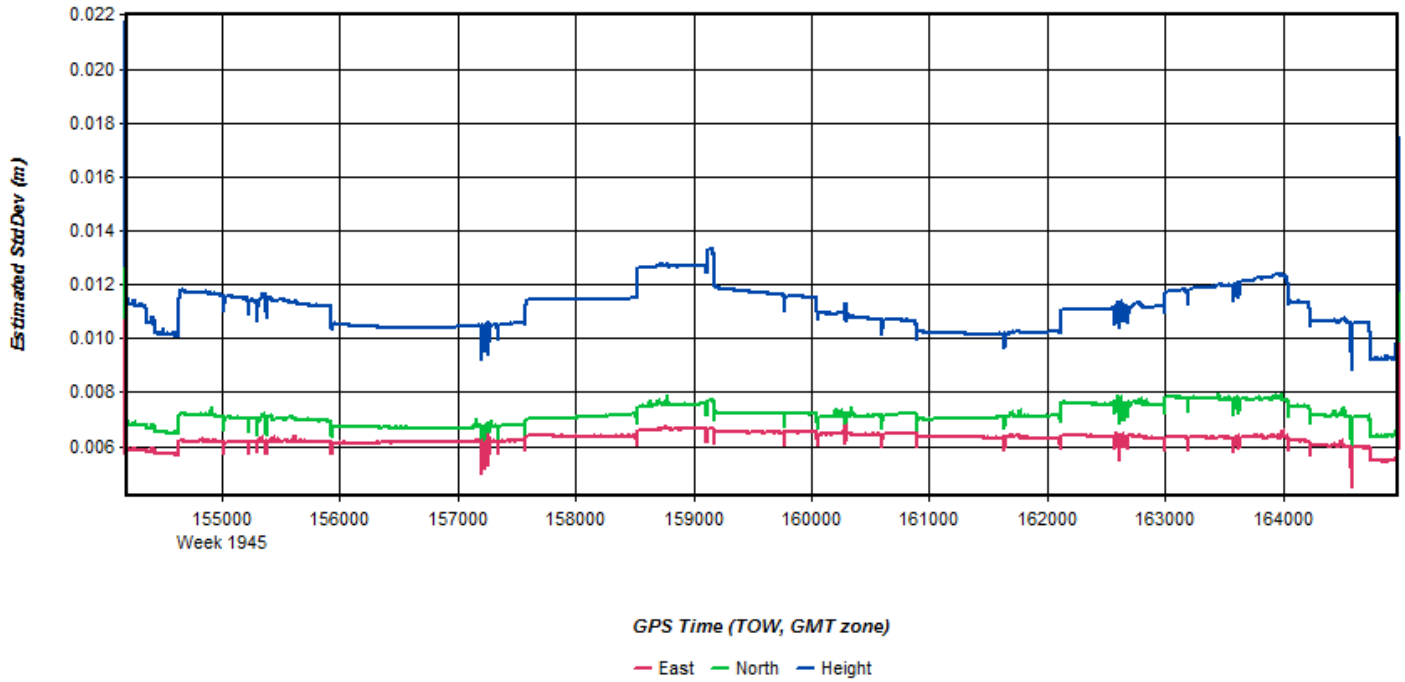
GPS Time (TOW, GMT zone)

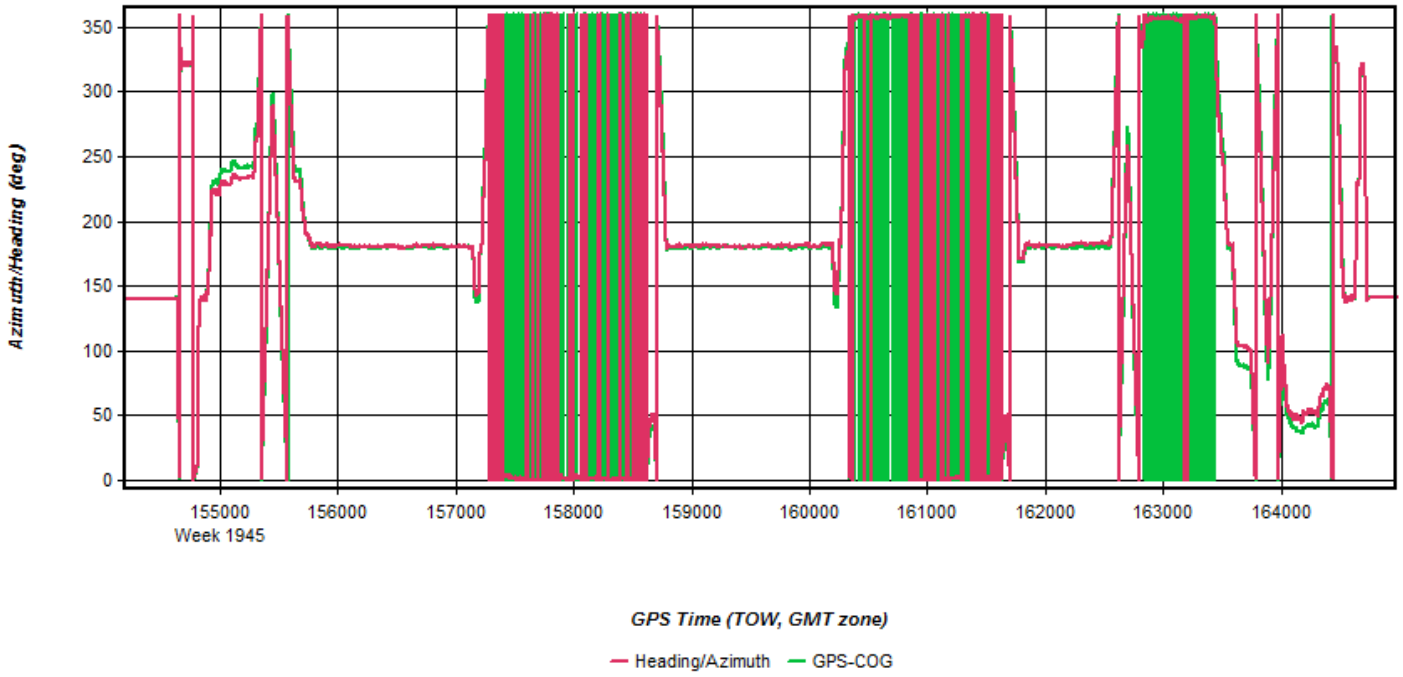
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log entry to flight_log_distribution_line@quantumspatial.com)

Date: 4-17-17 LIDAR Y/N Y

Project: South Dakota LIDAR Proj #: 30420 Flight Mgmt File: 20170417-184820 Tech: JSWah

Aircraft: M246MP Begin Hobbs: 1440.0 End Hobbs: 1442.7 Totals: 2.7 Pilot: Chedonald Co-Pilot: _____

Dep Apt: KPIR Dep Time (Lof): 2:00 (Z): 1900 Arr Apt: PIR Arr Time (Local): 2:43 (Z): _____ Tot Time Aloft: 2.7

CORRS: Y (N) Sta 1: _____ Sta 2: _____ Flyovers: Y (N) If Y, times: Sta1) _____ Sta2) _____

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

Gd Temp beg: 12 °C End: 5 °C OAT beg: _____ °C End: _____ °C Altimeter beg: 3007 end: _____

Type	Alt	Speed	Alt	Wind	Temp	Pressure	Power	Avg Pt	Alt	Wind	Temp	Pressure
FOV	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL
LIDAR	1580	8227	7200	7200	7200	7200	100	100	100	100	100	100
FOV	28	48	48	48	48	48	48	48	48	48	48	48

Line #	Hgt	Start (UTC)	End (UTC)	Alt	Speed	Alt	Wind	Temp	Pressure	Power	Avg Pt	Alt	Wind	Temp	Pressure
				ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL	ASL
98	174	1917	1938	130	1.1/23	7186	0	0	0	0	0	0	0	0	0
97	354	1942	2003	140	1.1/23	7220	0	0	0	0	0	0	0	0	0
96	174	2008	2029	125	1.1/22	7210	0	0	0	0	0	0	0	0	0
95	354	2032	2053	140	1.1/22	7247	0	0	0	0	0	0	0	0	0
94	174	2057	2108	124	1.1/23	7227	0	0	0	0	0	0	0	0	0
93	354	2114	2123	132	1.2/22	7169	0	0	0	0	0	0	0	0	0
Xtie	90	2126	2128	136	1.2/22	7244	0	0	0	0	0	0	0	0	0

PIR → Flight (1908-1913)

cloud 0-3 mi FSE

cloud 0-12 mi FSE

cloud 0-31 mi FSE / partial FSE flown started for dds

cloud free partial (partial line 31 mi - End)

unplanned cross fire (key 0-35 FSE)

fig's (2127-2134) clouded out

Return → KPIR

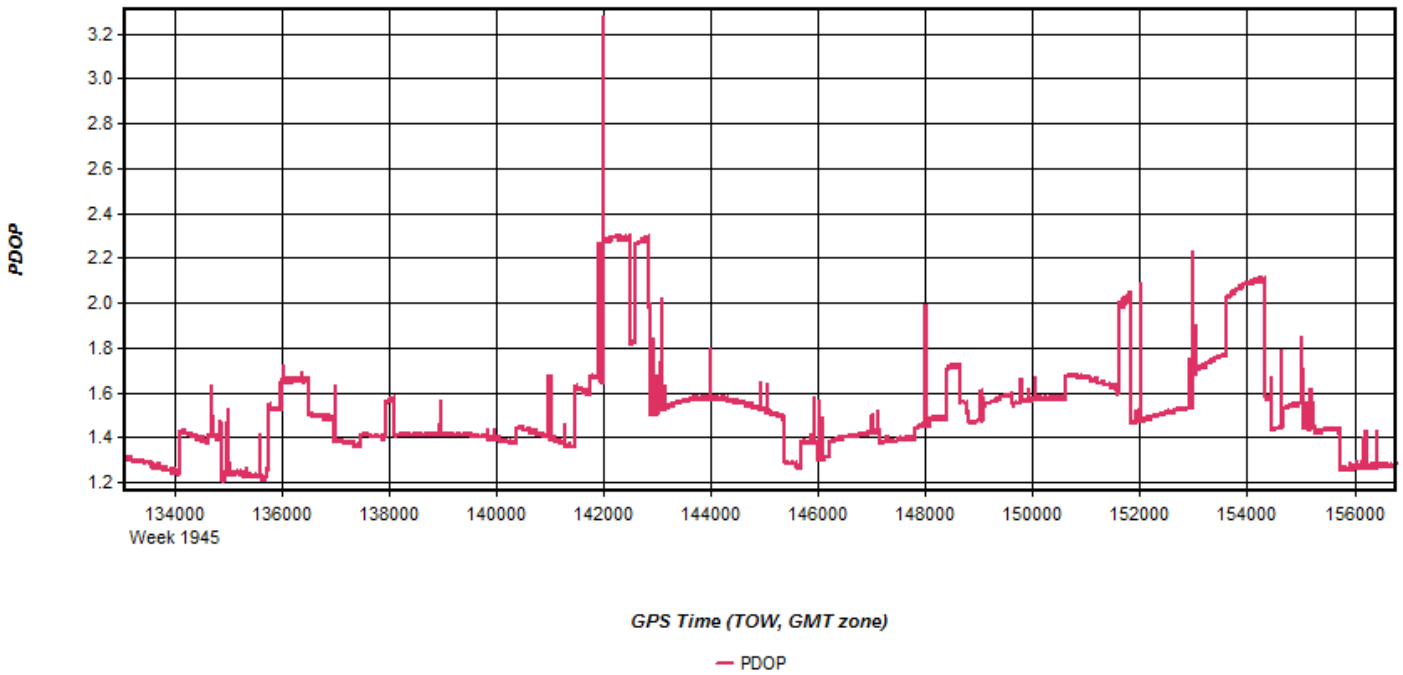
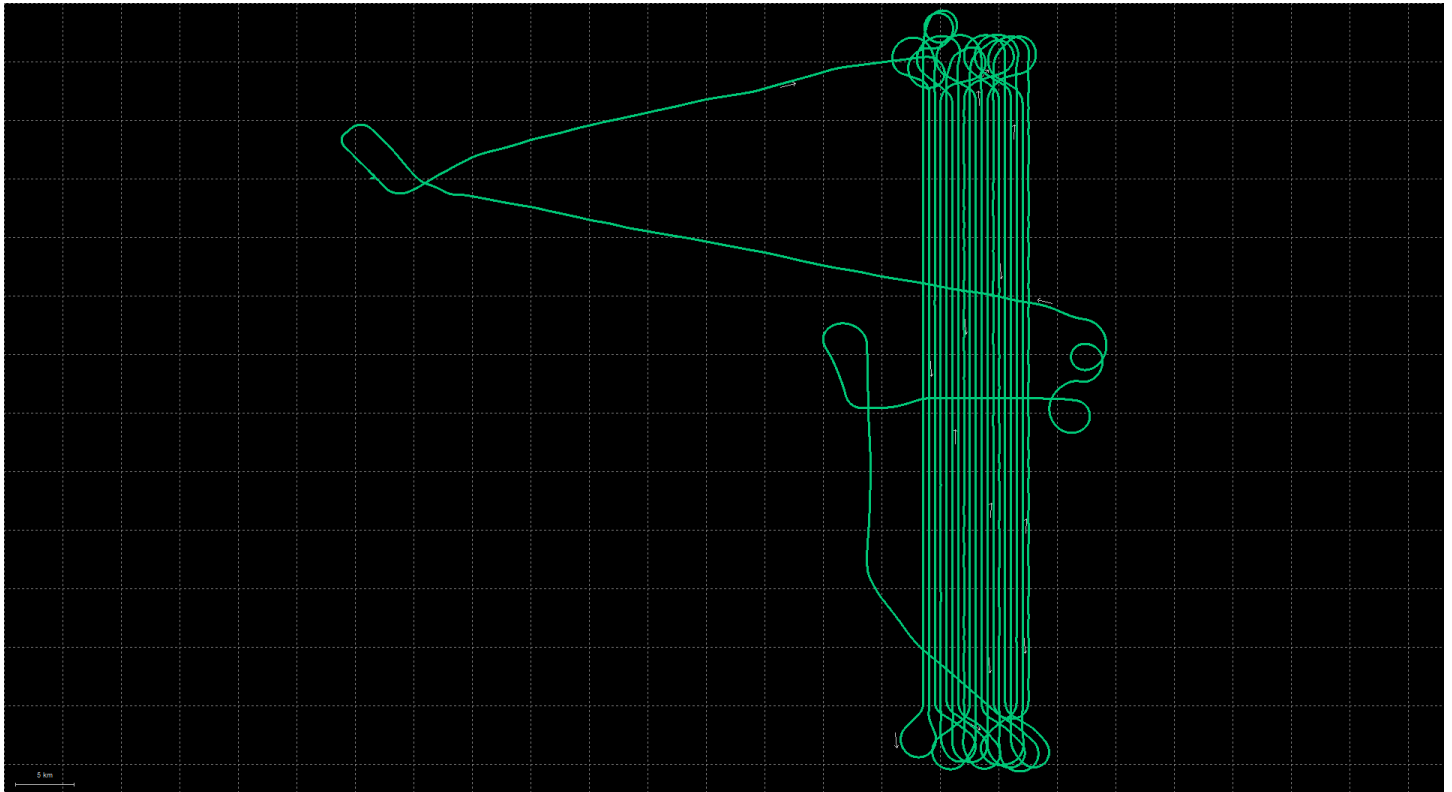
Holds = 2.7

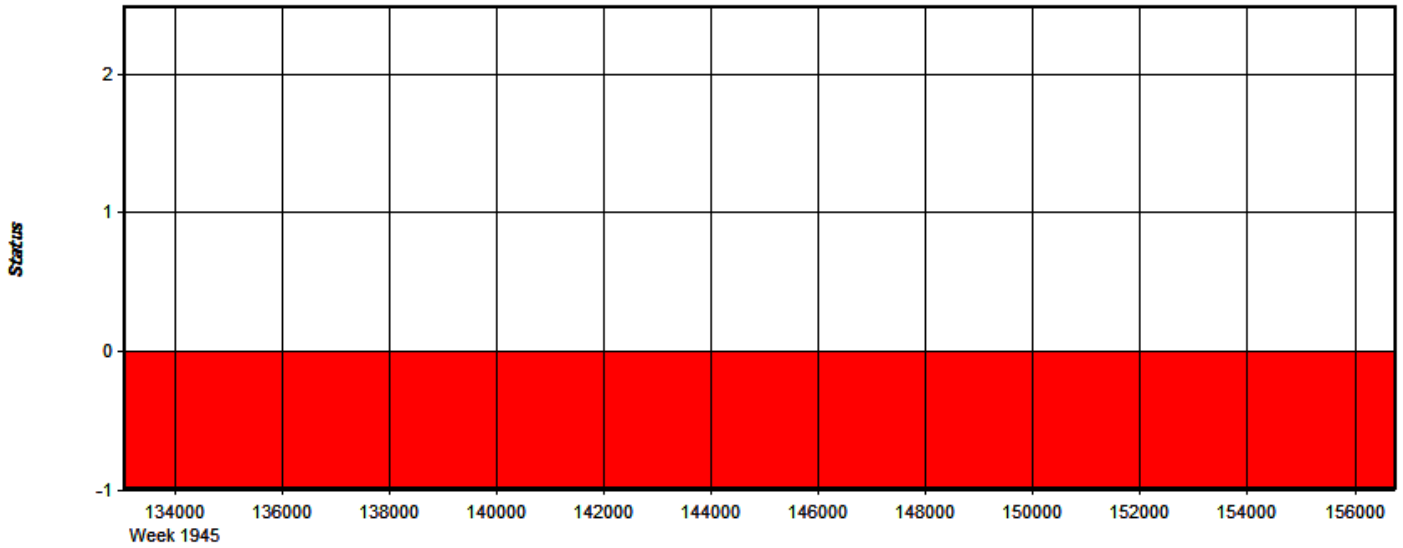
online = 2.2

mob = 0.5

Total Prof Lines: _____ Lines Flown: _____ Lines Remains: _____ Online Time: 2.2 Mob Time: 0.5 Notes: _____

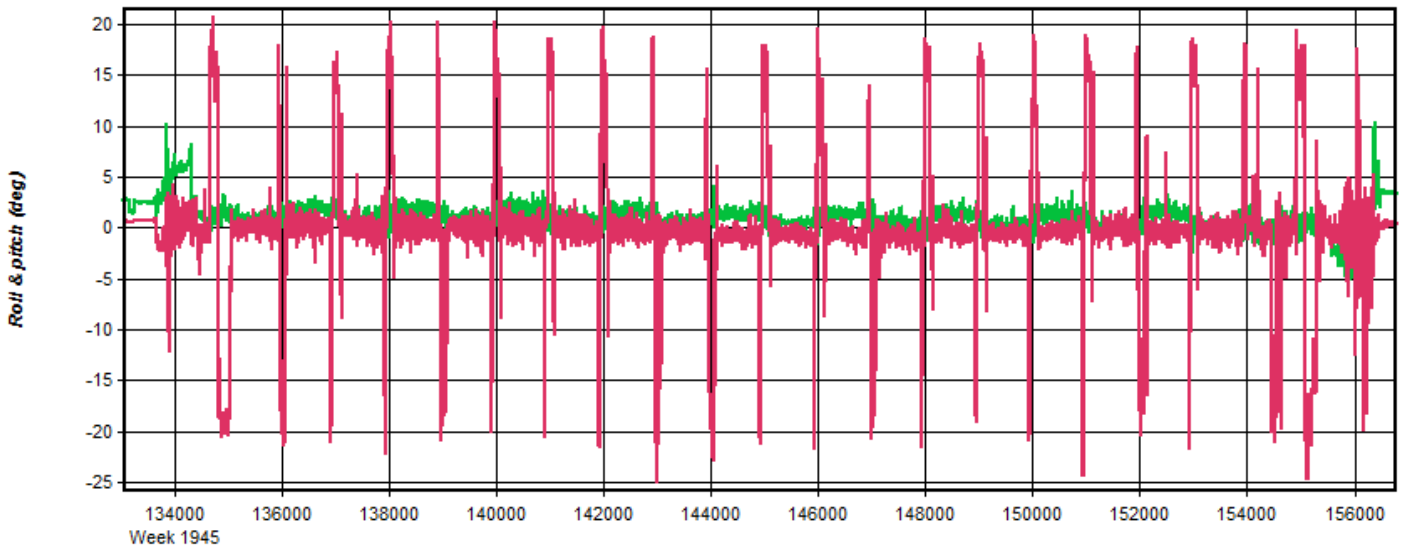
April 17, 2017-A (N915WC, SN8237)





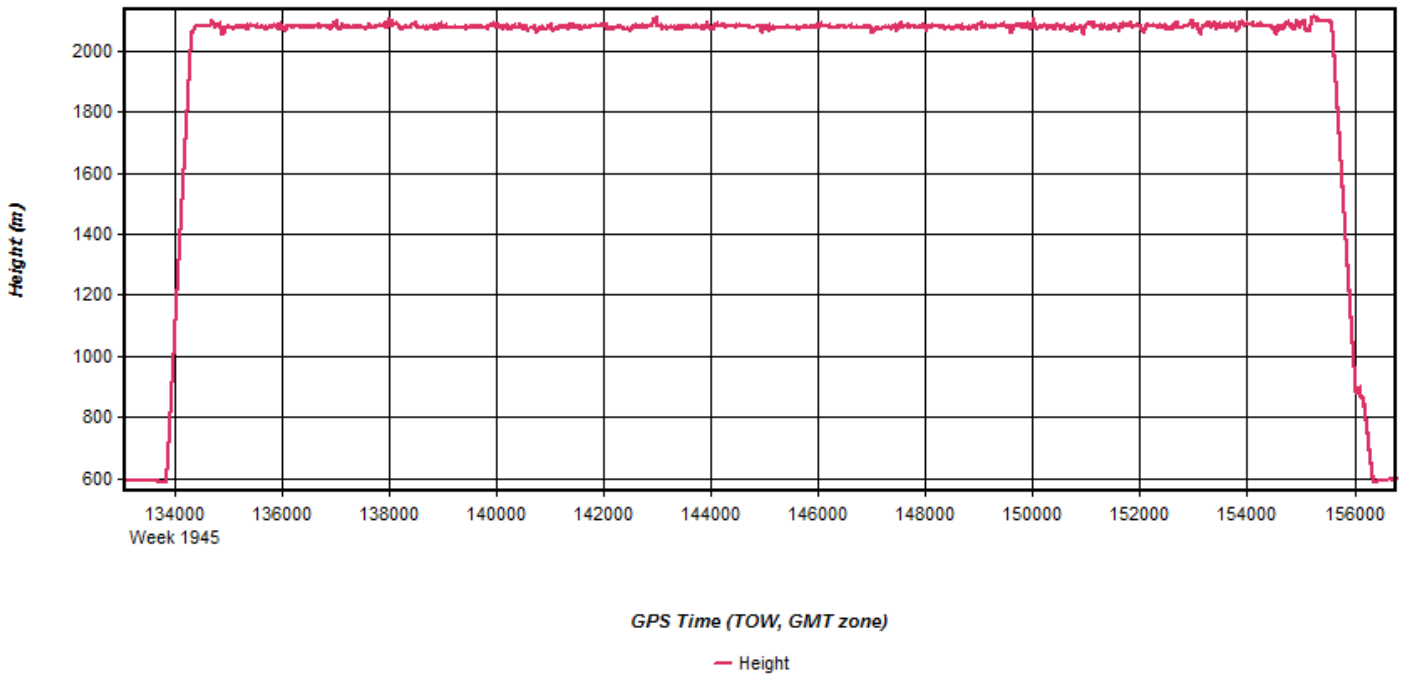
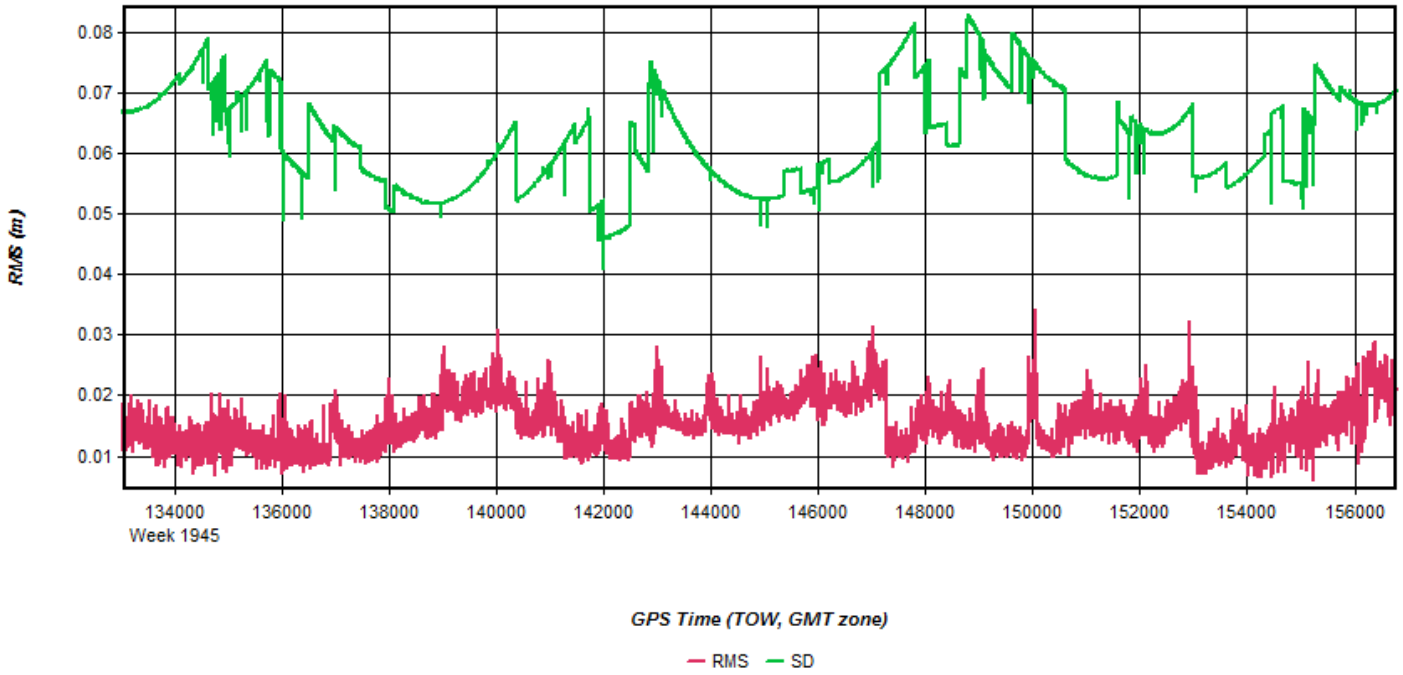
GPS Time (TOW, GMT zone)

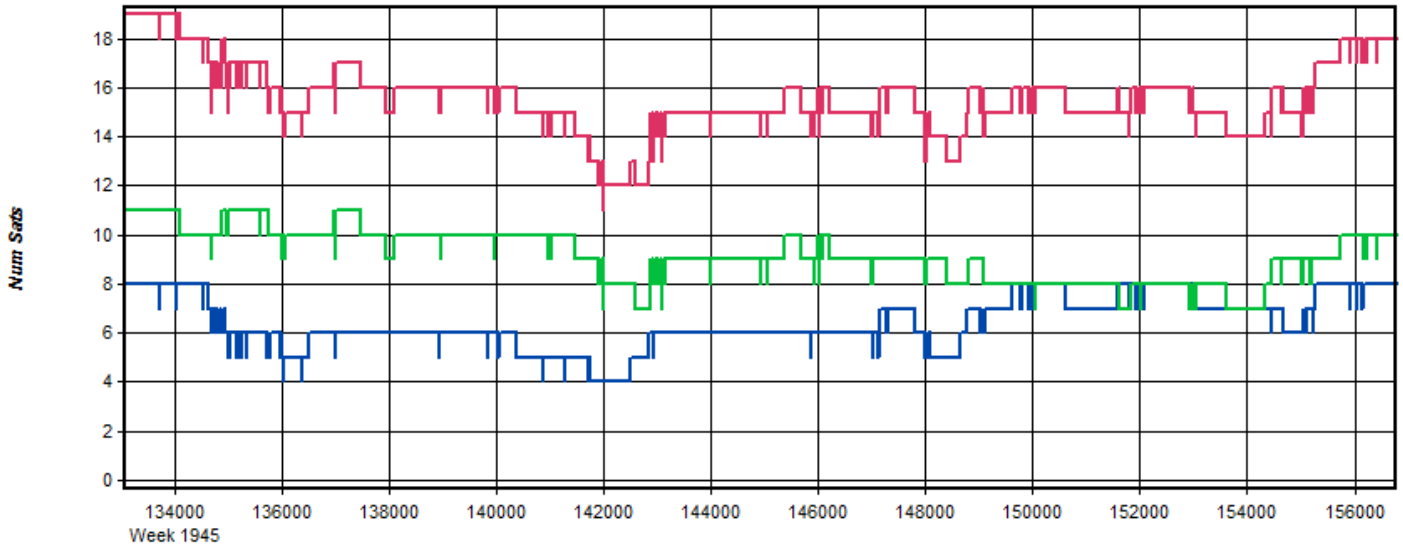
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

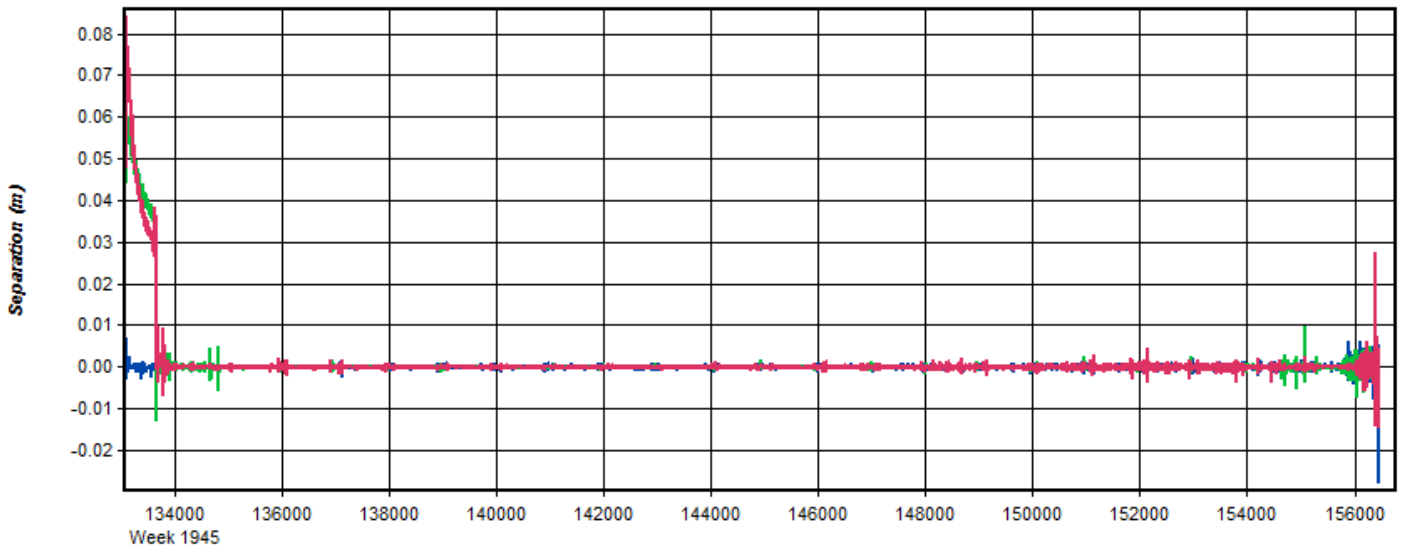
— Roll — Pitch





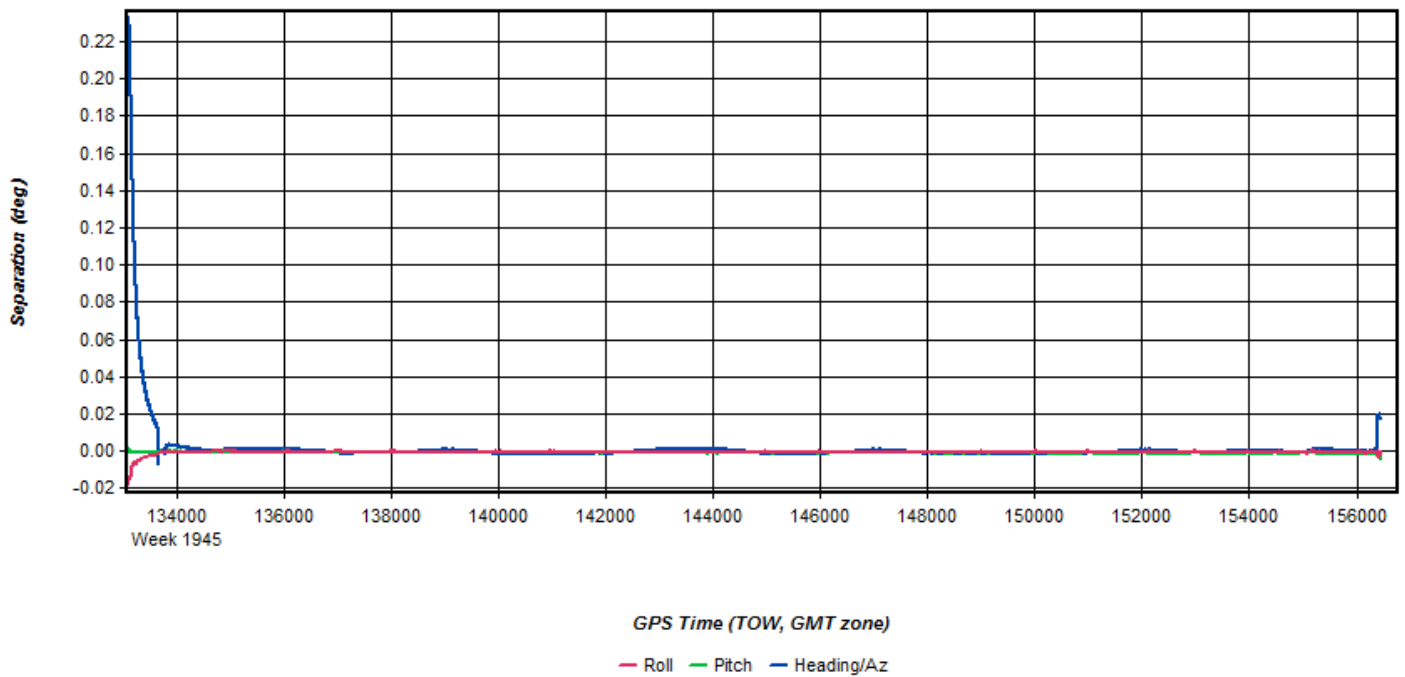
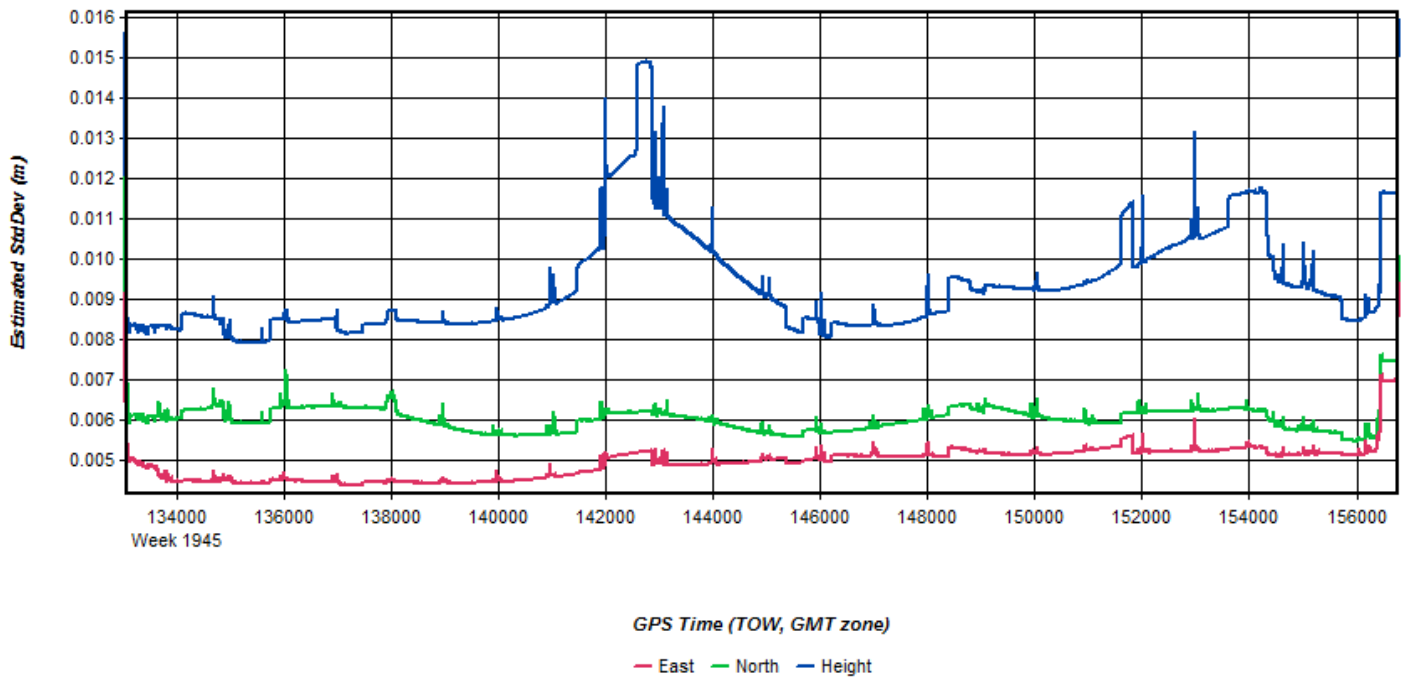
GPS Time (TOW, GMT zone)

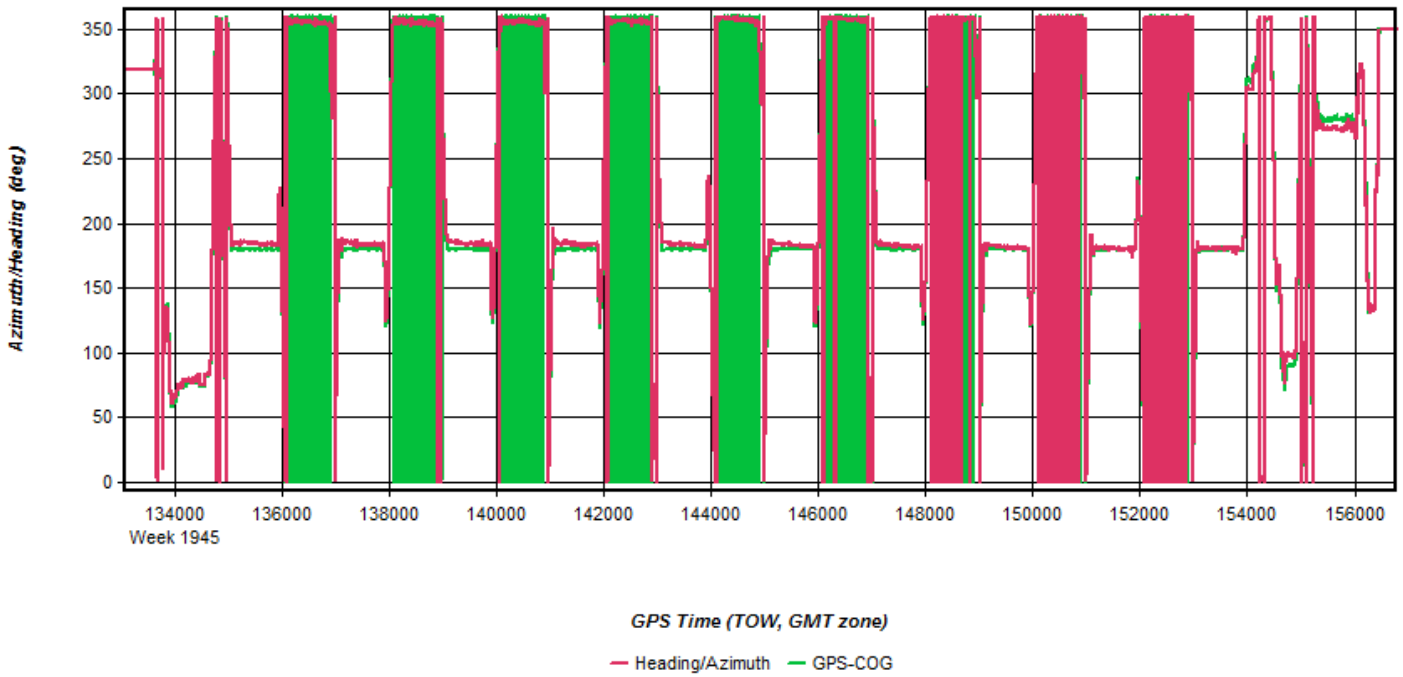
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR
KeyW - Aeroptic

CREW

UTC DATE

AIRCRAFT

GPS

Start-up

Shut-down

WEATHER

LIDAR STARTUP CHECKS

Lens cleaned

All fids uploaded

Pilot's screen functional

Compact flash drive space

SSDs have space

Startup beeps & IPAS recording

Initials:

SSD

Drive #

@ Beginning

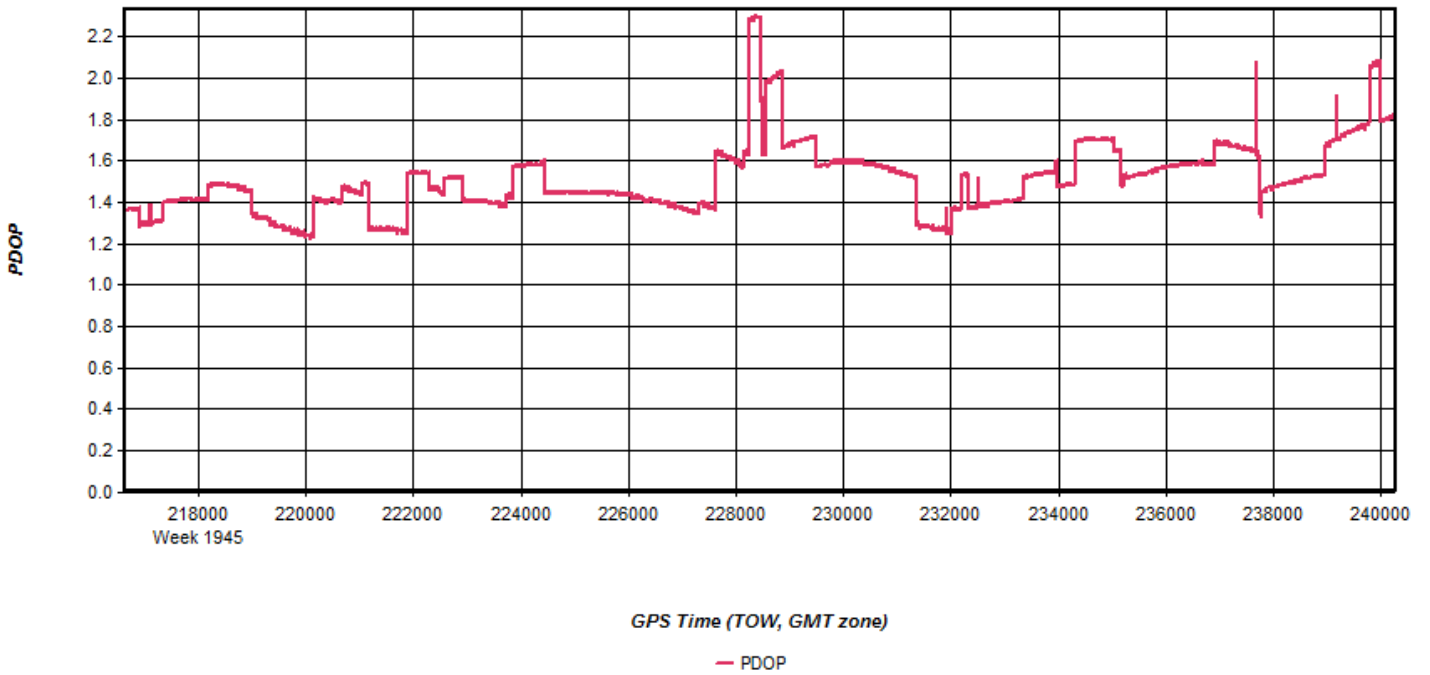
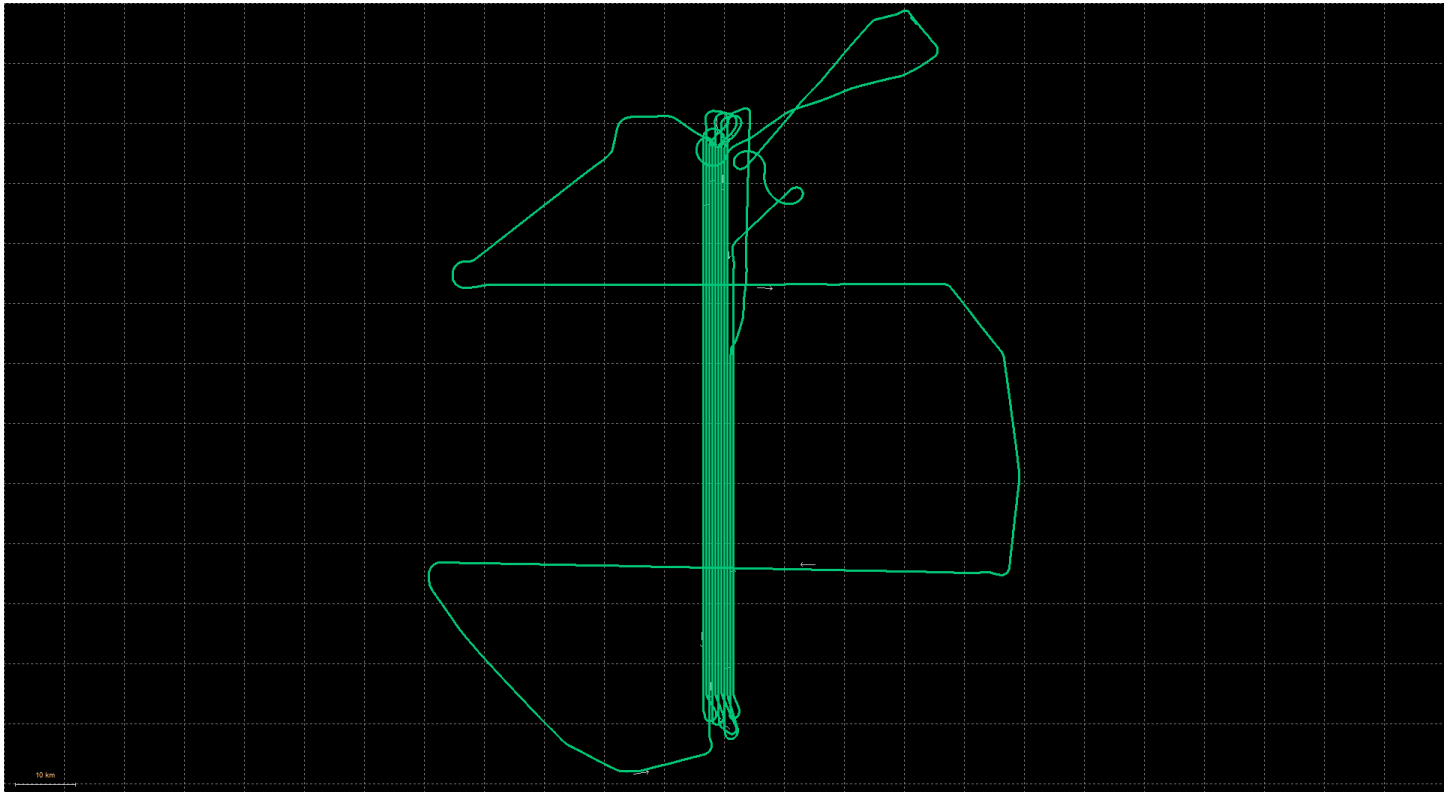
Space Used

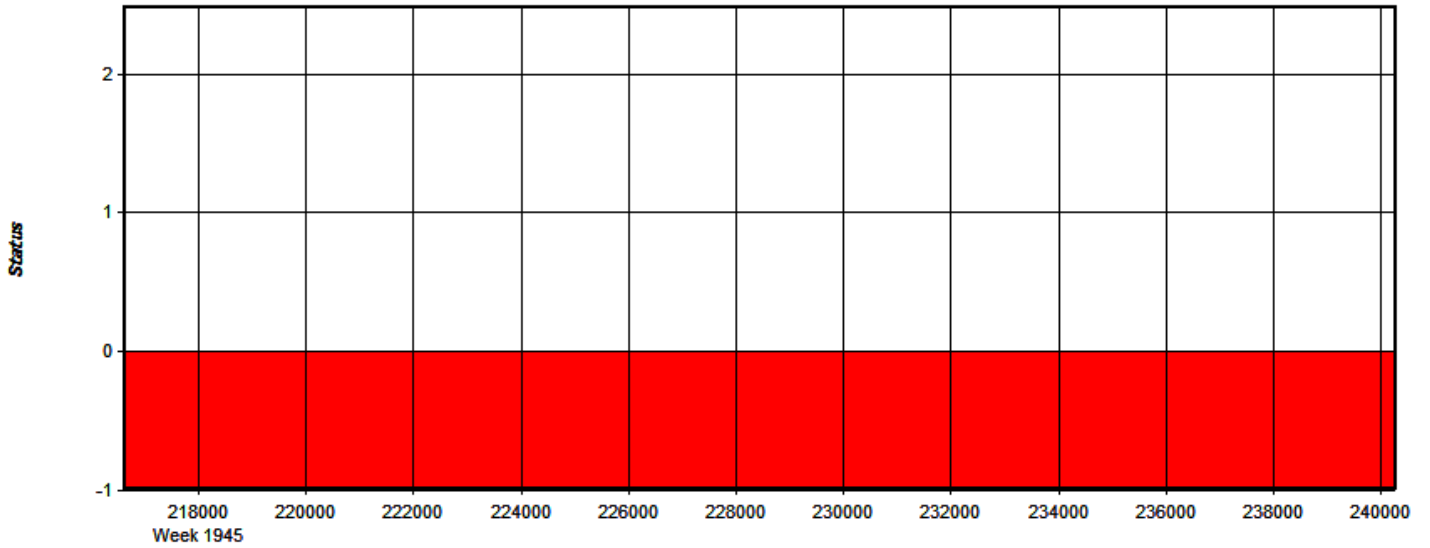
During Mission

Remaining Tot Space

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	1152	S		
		1153	N		
		1154	S		
		1155	N		
		1156	S		
		1157	N		
		1158	S		
		1159	N		
		1160	S		
		1161	N		
		1162	S		
		1163	N		
		1164	S		
		1165	N		
		1166	S		
		1167	N		
		1168	S		
		1169	N		
		1170	S		
		UL-E	E		

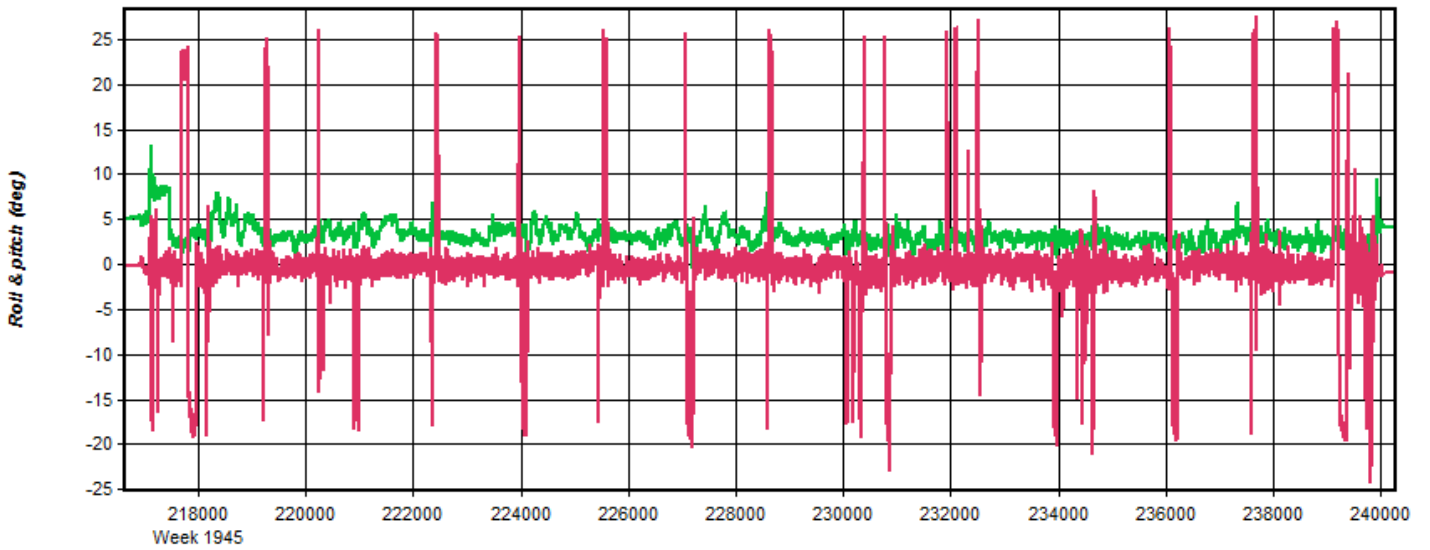
April 18, 2017-A (N246MP, SN8227)





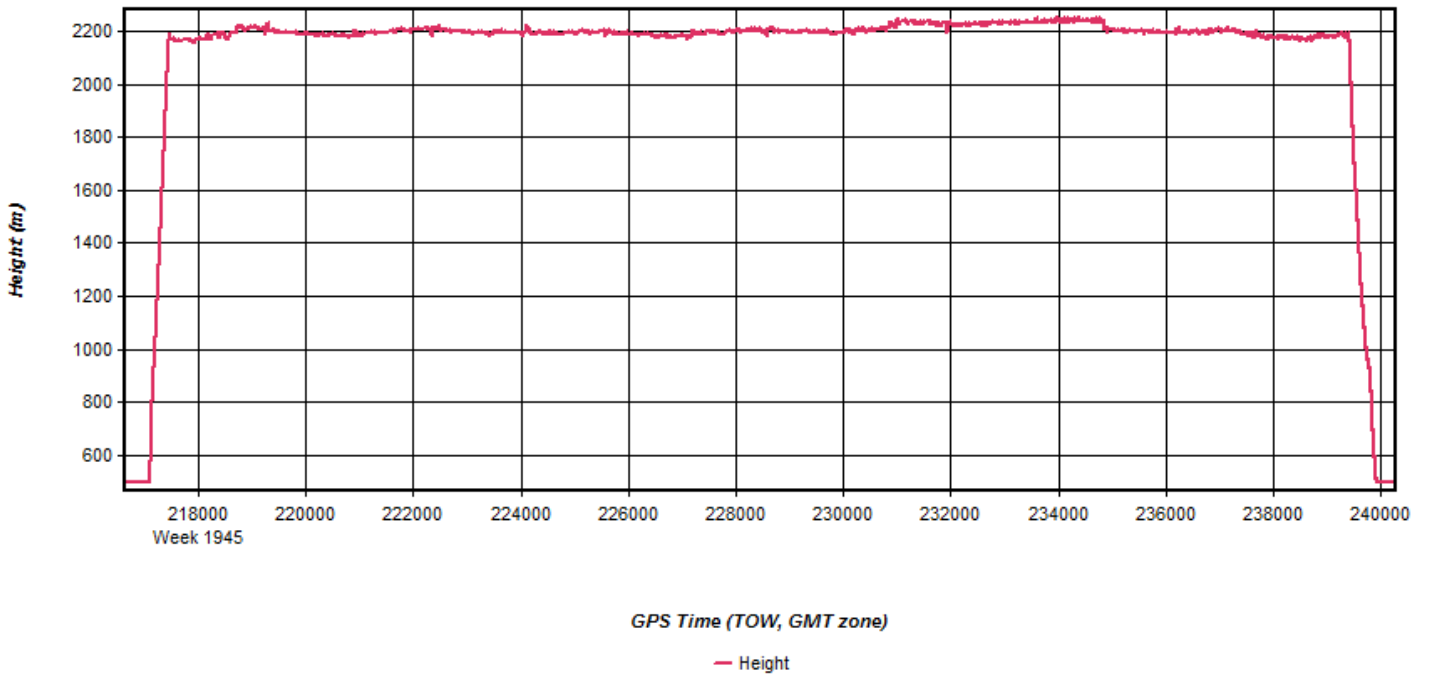
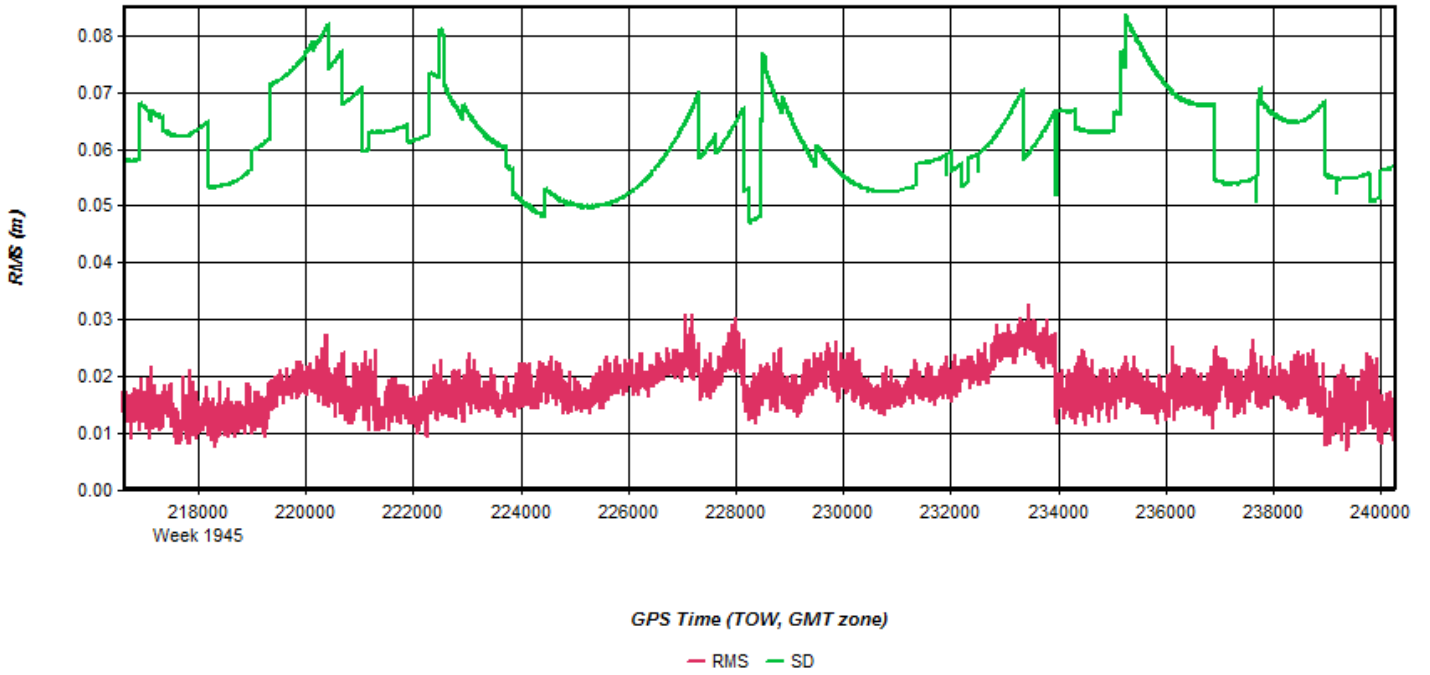
GPS Time (TOW, GMT zone)

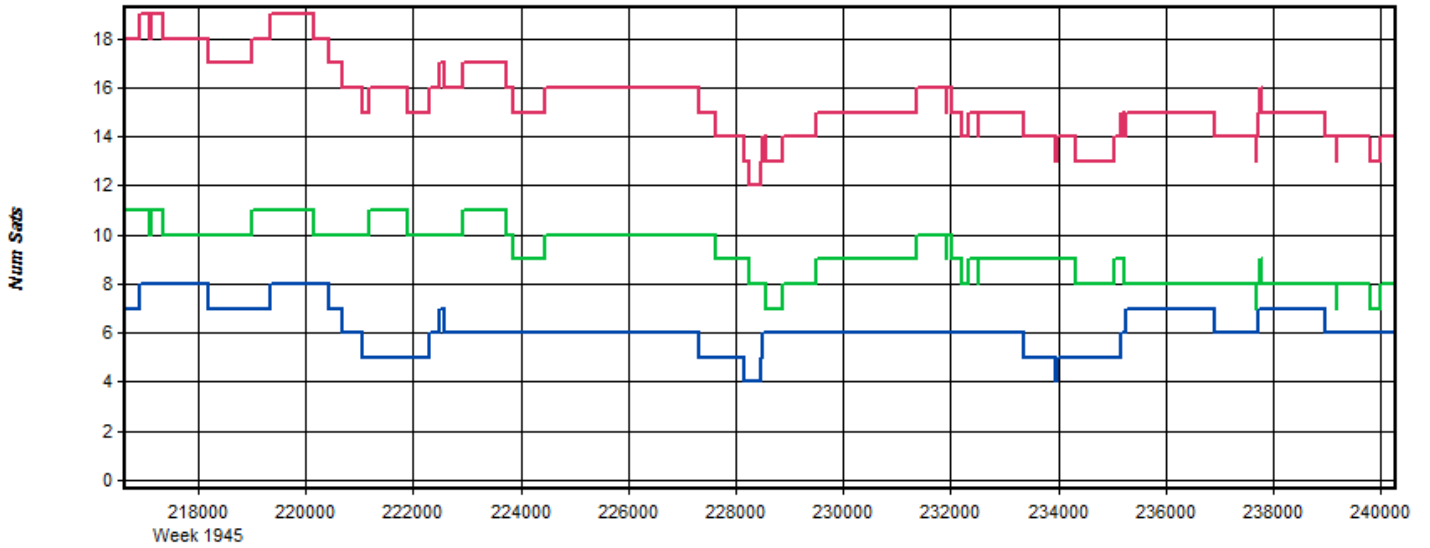
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

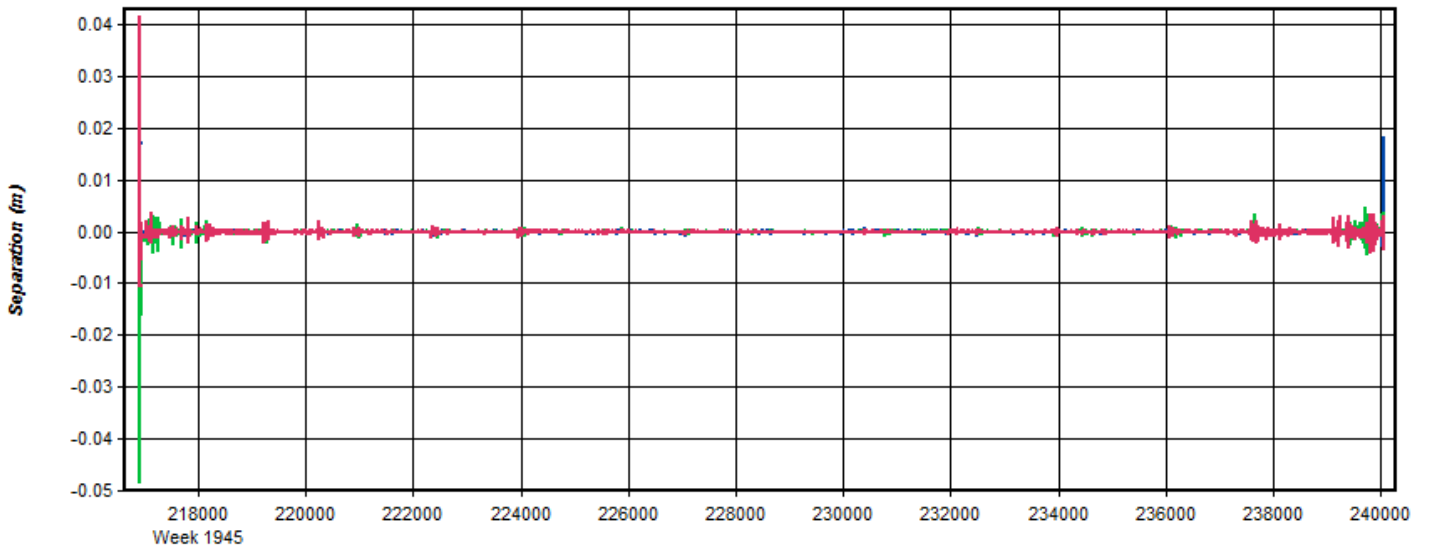
— Roll — Pitch





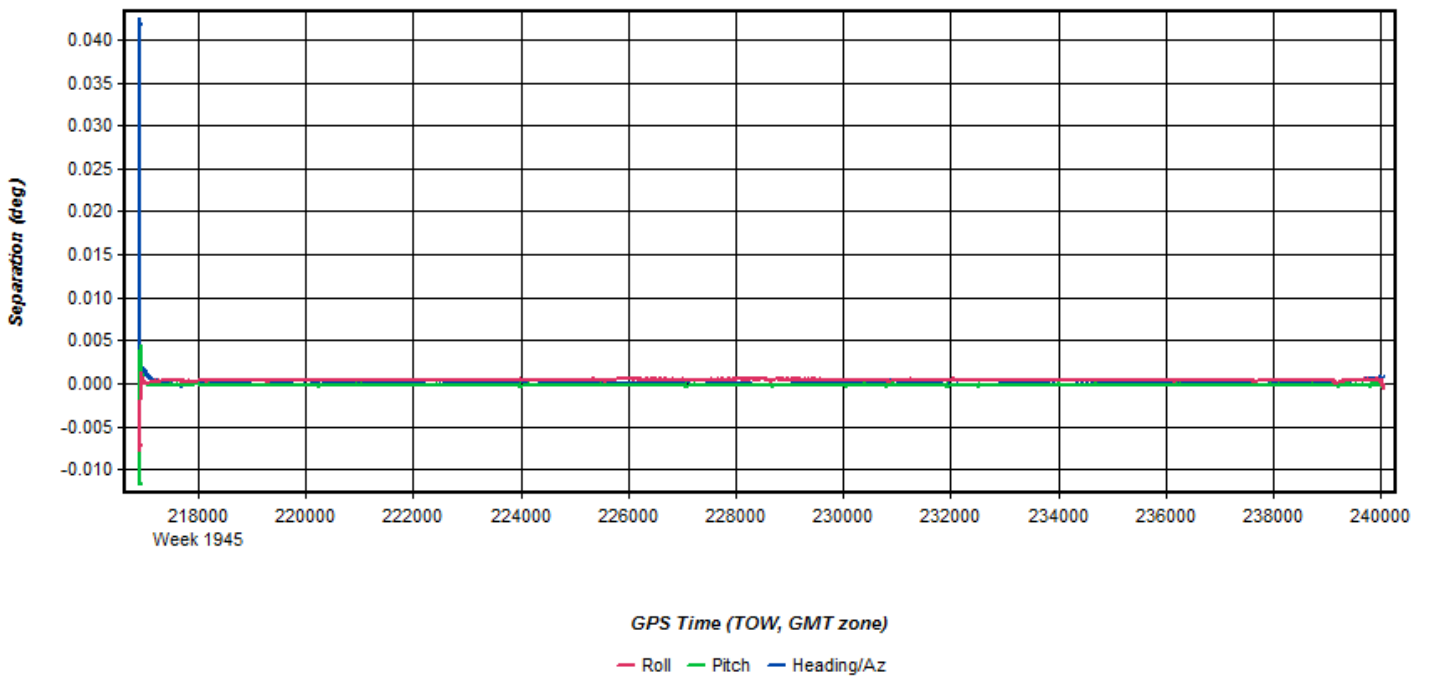
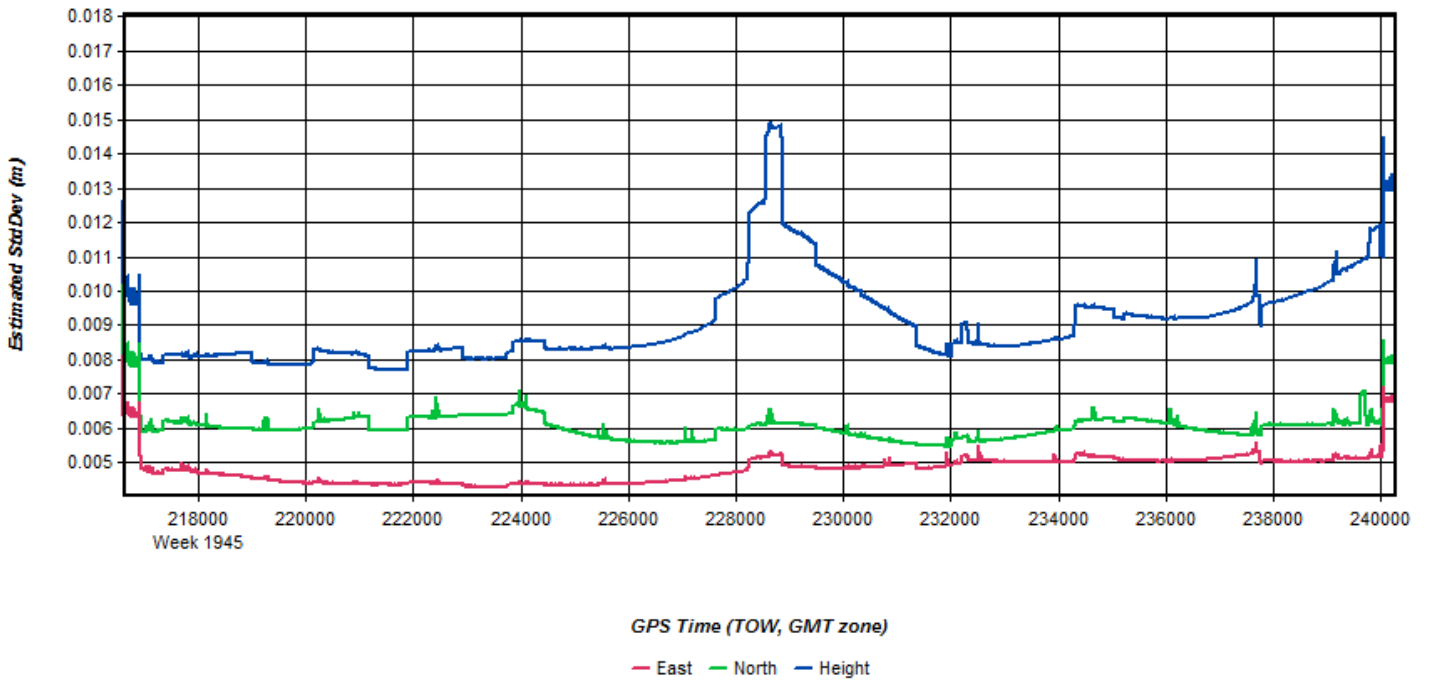
GPS Time (TOW, GMT zone)

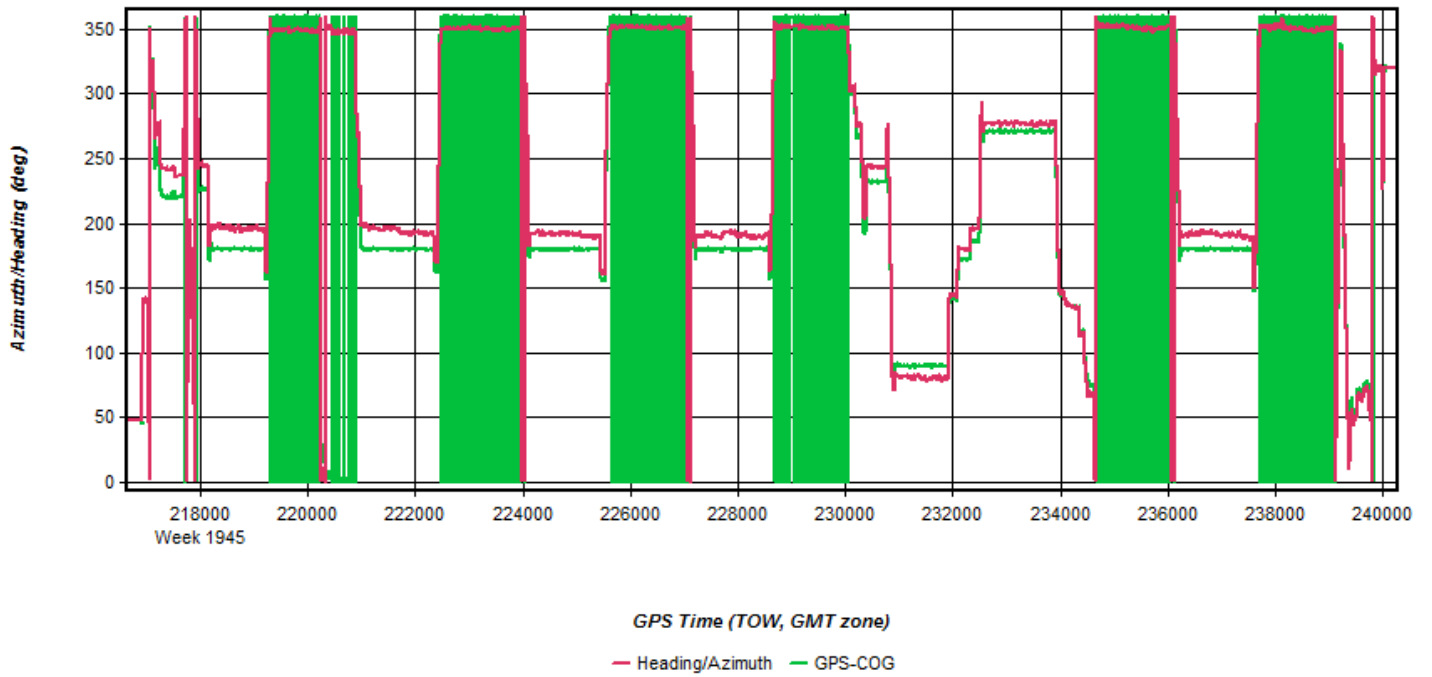
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Quantum Spatial Airborne LIDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email Log daily to flight_log_distribution_list@quantumspatial.com)

Date: 4-18-17 Pg. 1 of 1

Project: S. NAKSTA LIDAR Flight Mgmt File:

Aircraft: 24UMP Pilot: O JAMES Co-Pilot: Tech/M AJUST

Dep Apt: PIR Begin Hobbs: 442.7 Total: 6.4 Arr Time (Local): 140 Tot Time Aloft: 6.5

CORS: Y(N) Dep Time (Local): 7:15 Arr Apt: PIR Flyovers: Y/N If Y, times: Sta1) Sta2)

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

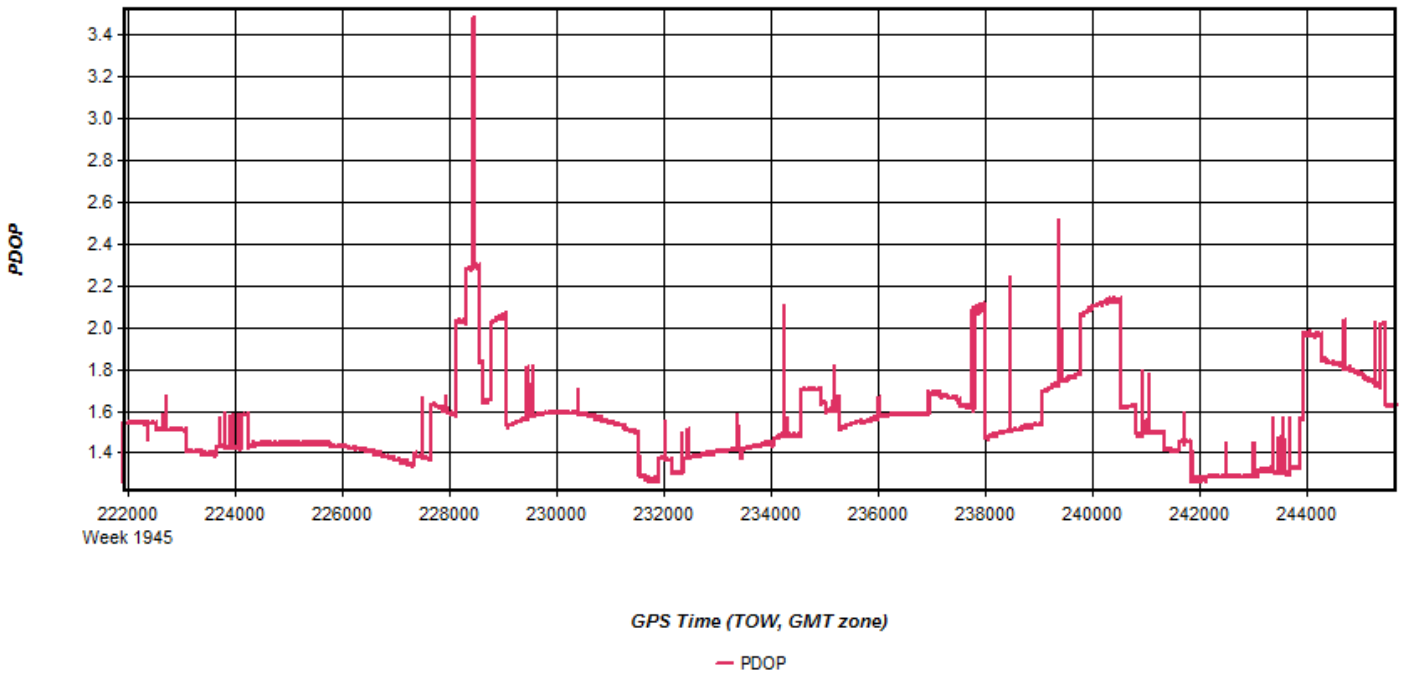
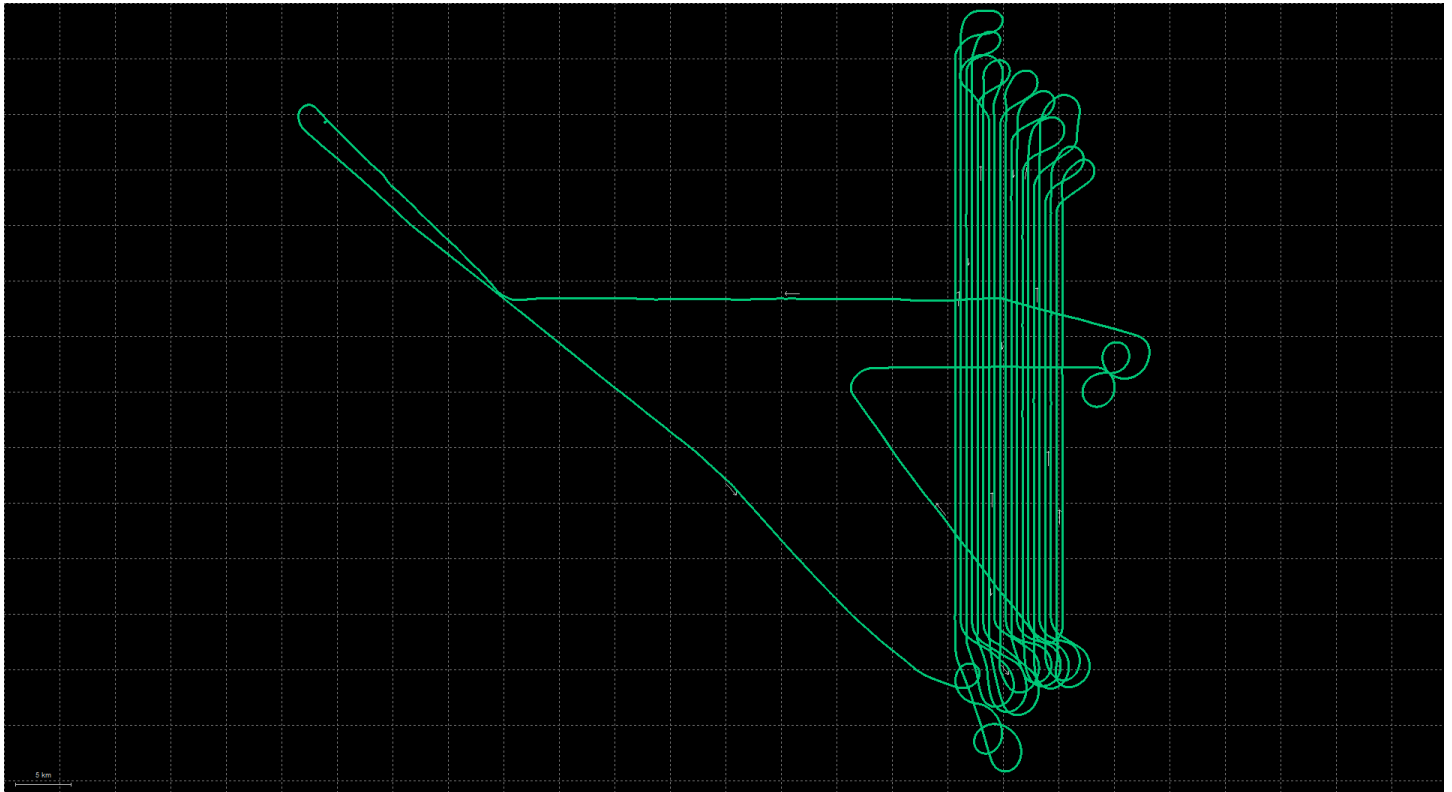
Gd Temp beg: 5 °C End: 13 °C OAT beg: 29.78 end: 29.93

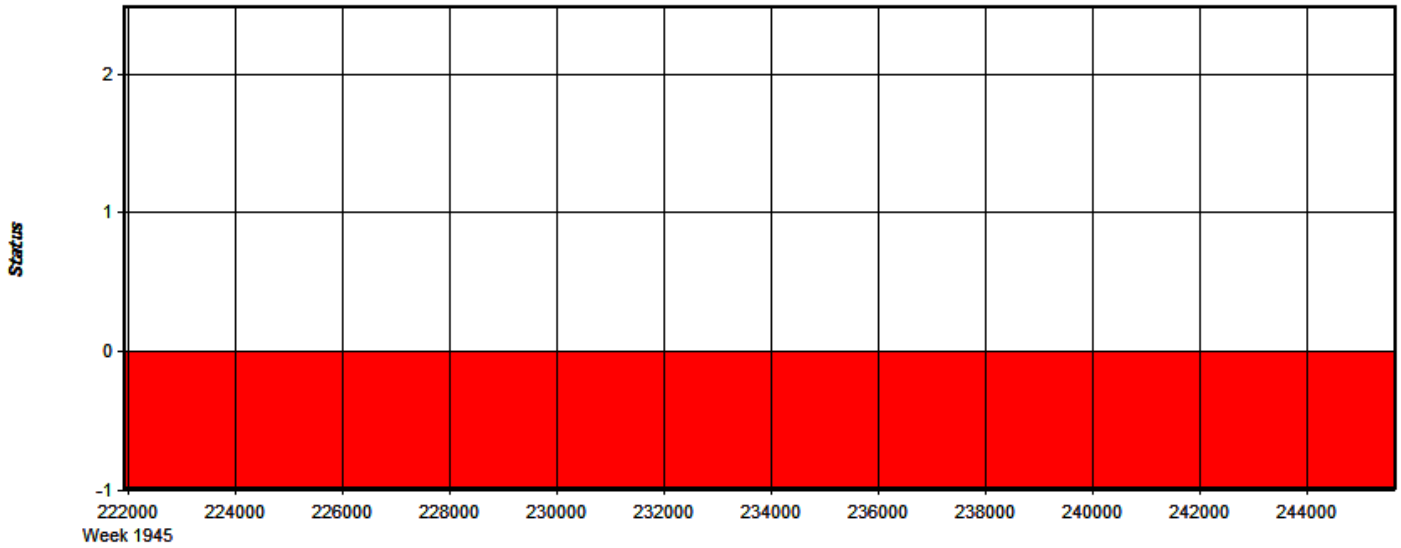
Type	FOV	ALS	Serial #	Scan Freq	Alt AGL	Alt AMSL	Pulse In Air	Mps	Y/N	Pulse Rate	Avg Terr Ht	Max Gdspd	Power	AVG Ft Spacing	PPSM	Mag Cal	End Cal	Yor Cal	Storage Name
S			1239	1253	142	11/22	7.2				0-24 FSE								
N			1252	1310	130	11/23	7.2				0-31 FSE								
S			1324	1345	131	10/22	7.2												
N			1349	1412	132	12/21	7.2												
S			1416	1437	141	10/22	7.2												
N			1441	1504	131	11/19	7.2												
S			1507	1529	142	11/18	7.2												
N			1532	1554	131	10/19	7.2												
E			1609	1626	144	11/19	7.3												
W			1636	1658	119	11/19	7.3												
N			1713	1733	132	11/20	7.2												
S			1738	1759	136	13/17	7.2												
N			1802	1824	129	11/20	7.2												

FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.
 WINDS 310 @ 50 kts
 CLOUD 44 MILES FSE, CLOUD 49 FSE
 PLANNED CROSSFLIGHT
 PLANNED CROSSFLIGHT
 CLOUDS 40 FSE

Total Proj Lines: _____ Lines Flown: _____ Lines Remain: _____
 Online Timer: 5:17.5 Mob Time: 1:7.5 Notes:

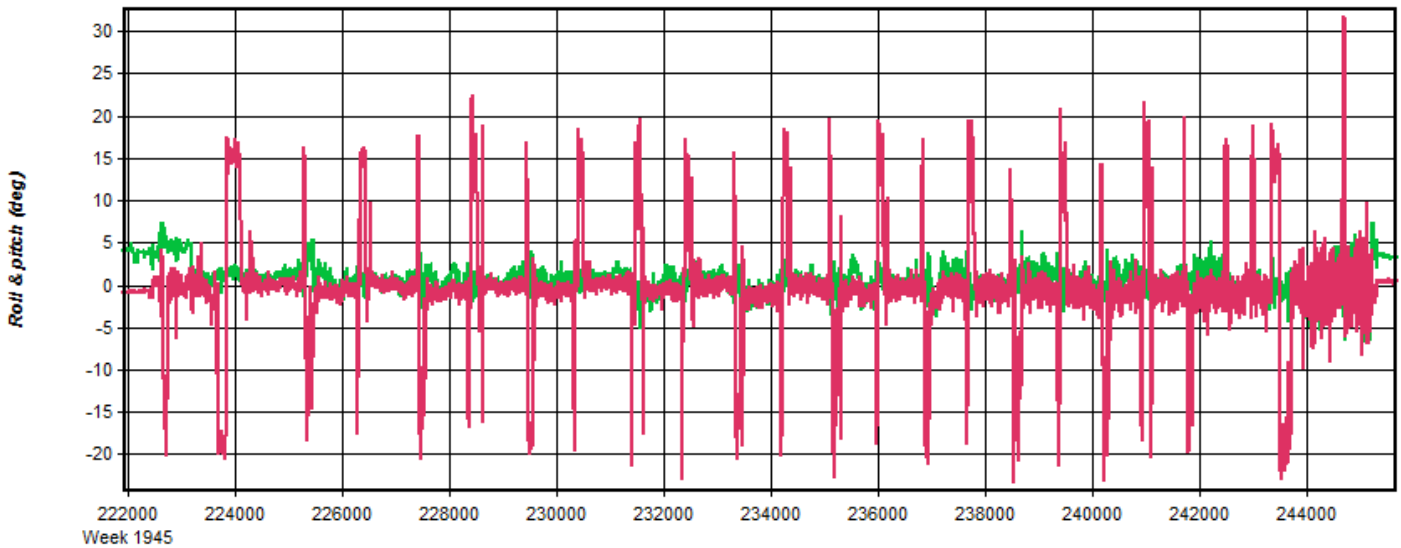
April 18, 2017-A (N915WC, SN8237)





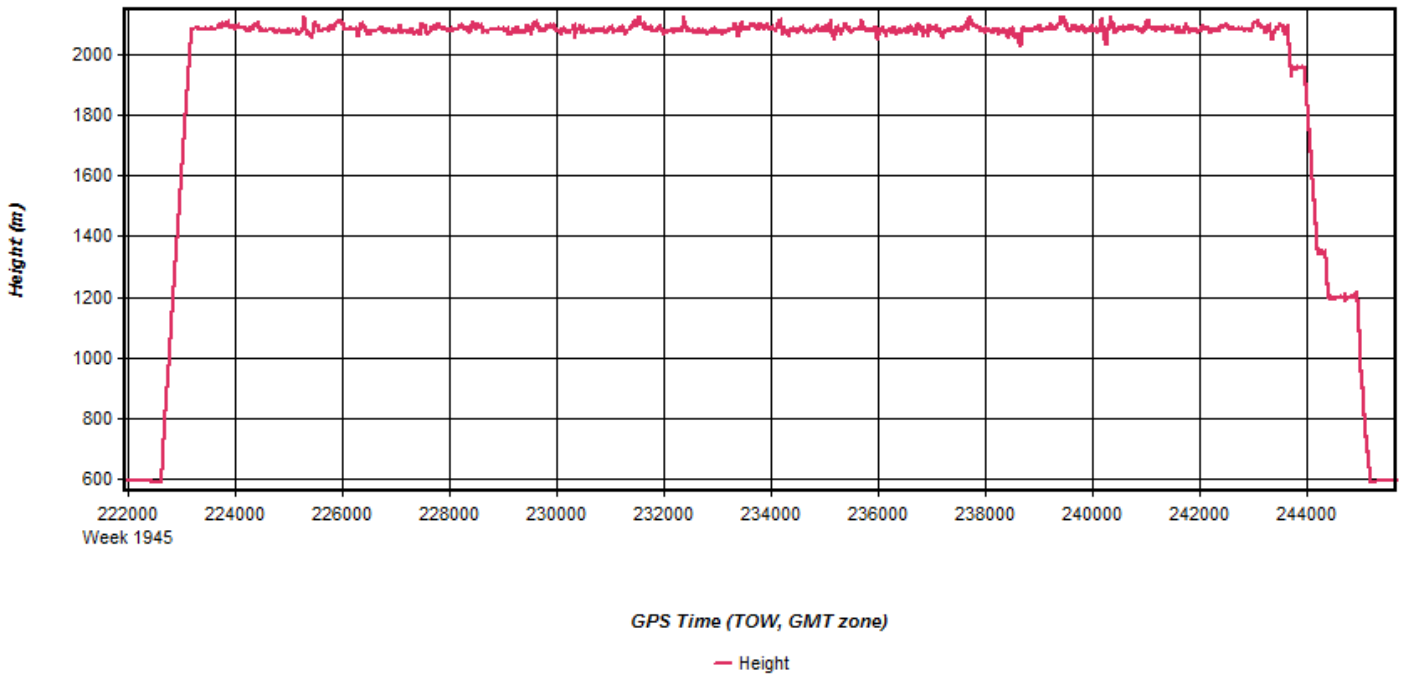
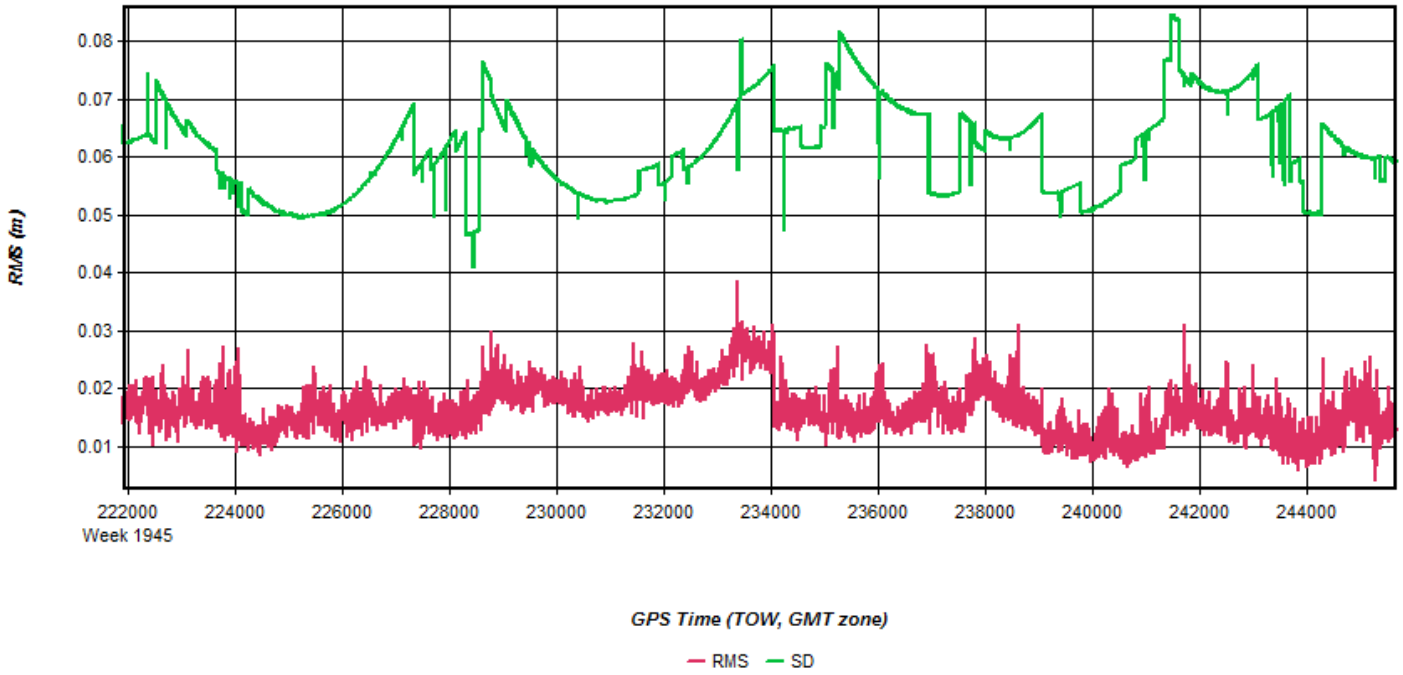
GPS Time (TOW, GMT zone)

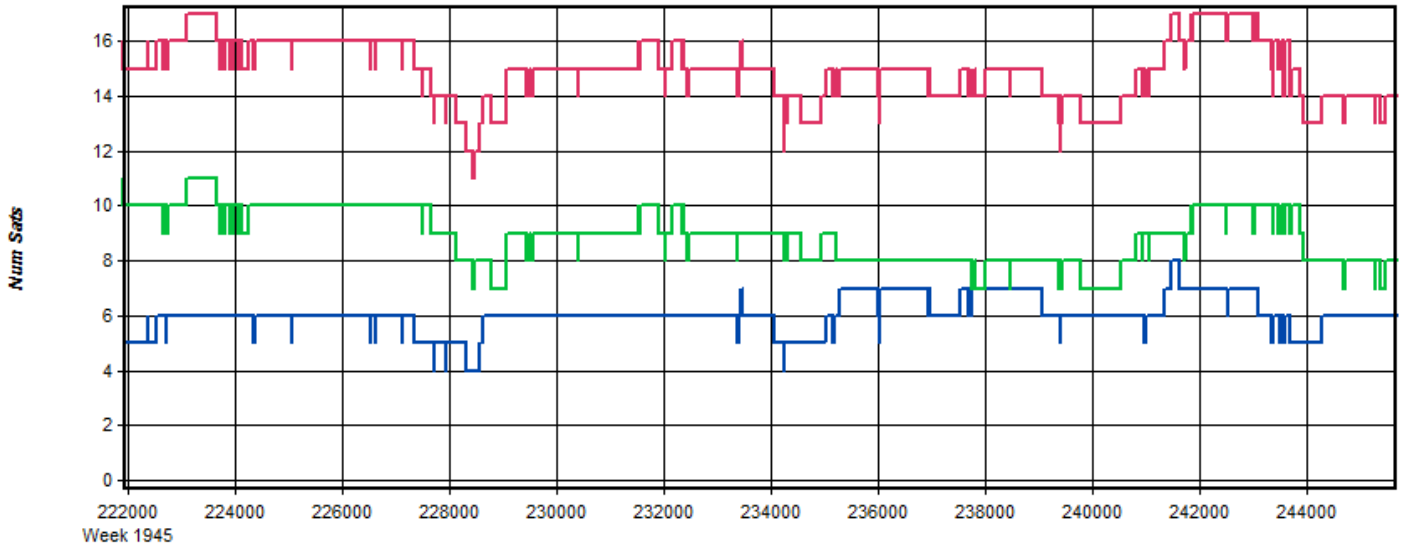
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

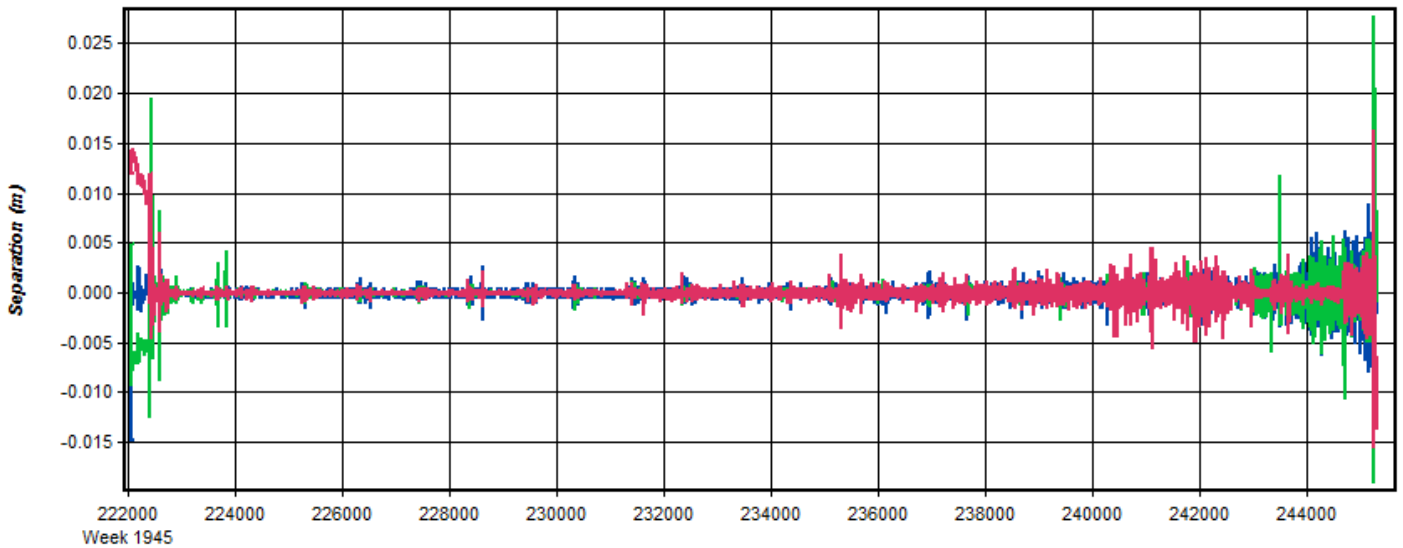
— Roll — Pitch





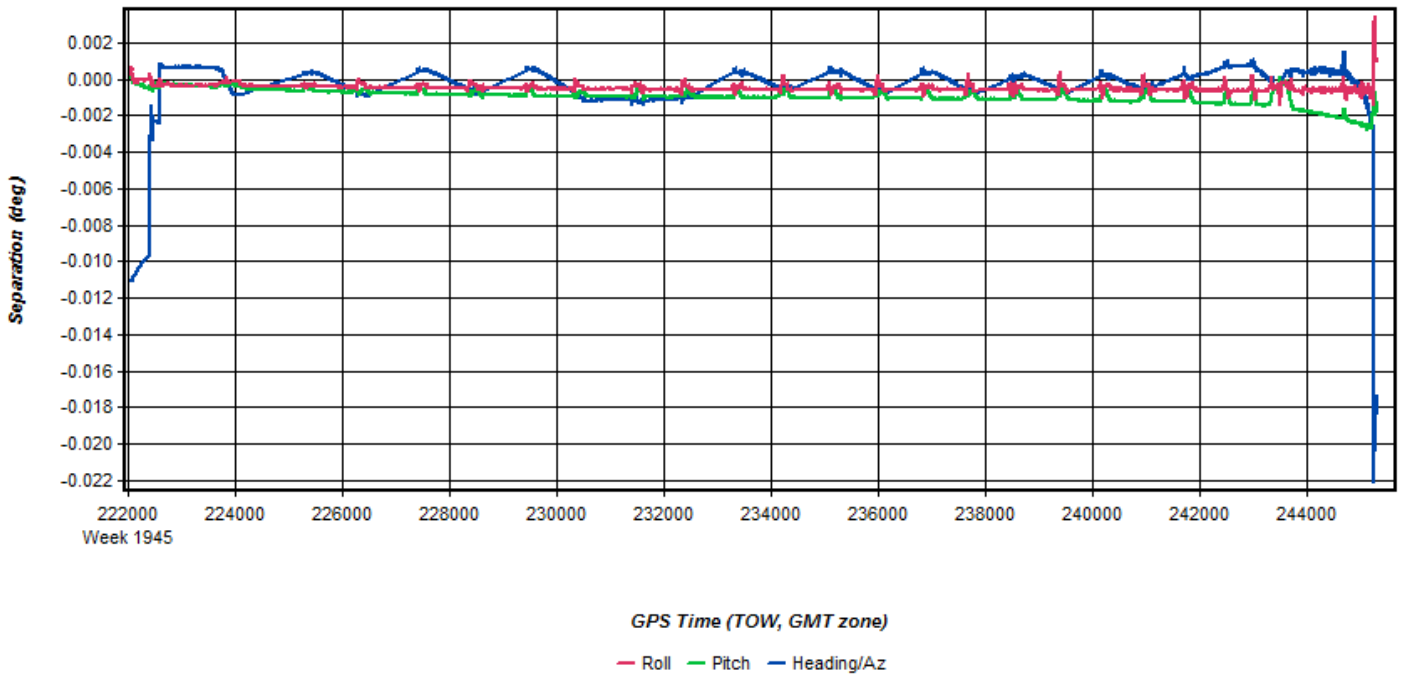
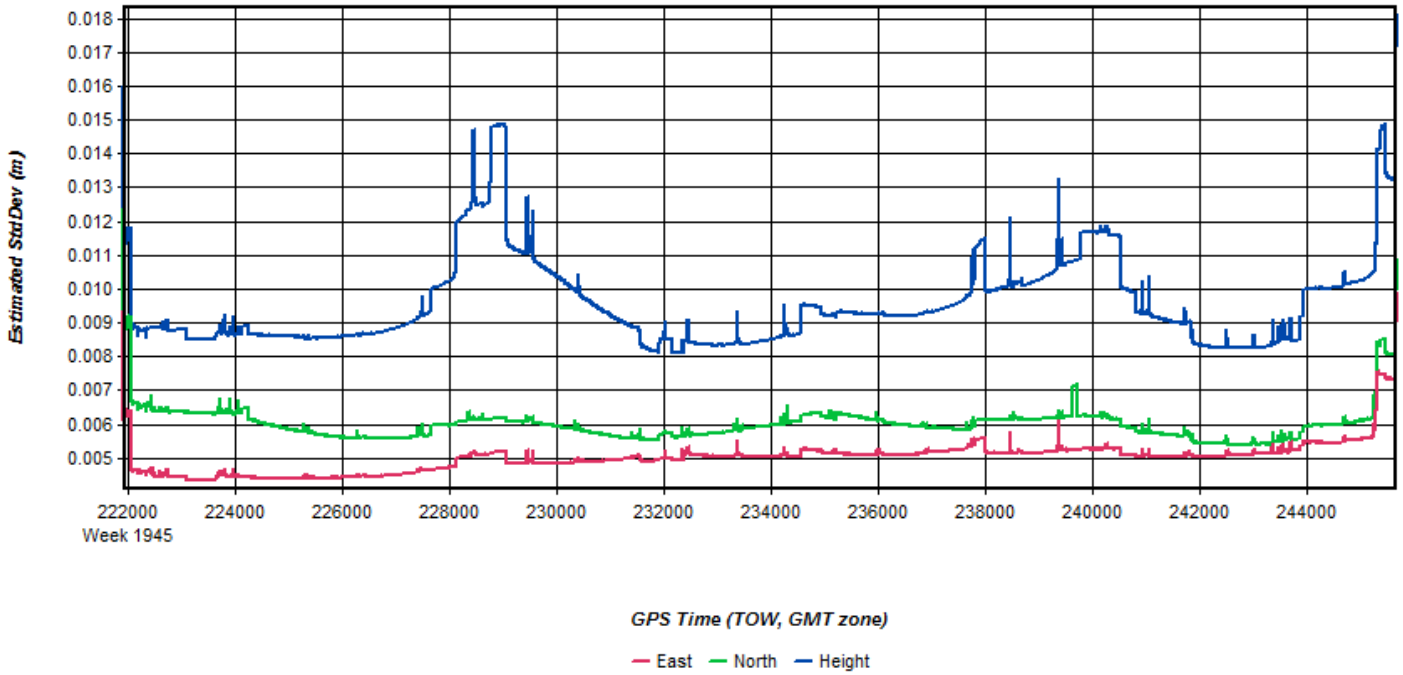
GPS Time (TOW, GMT zone)

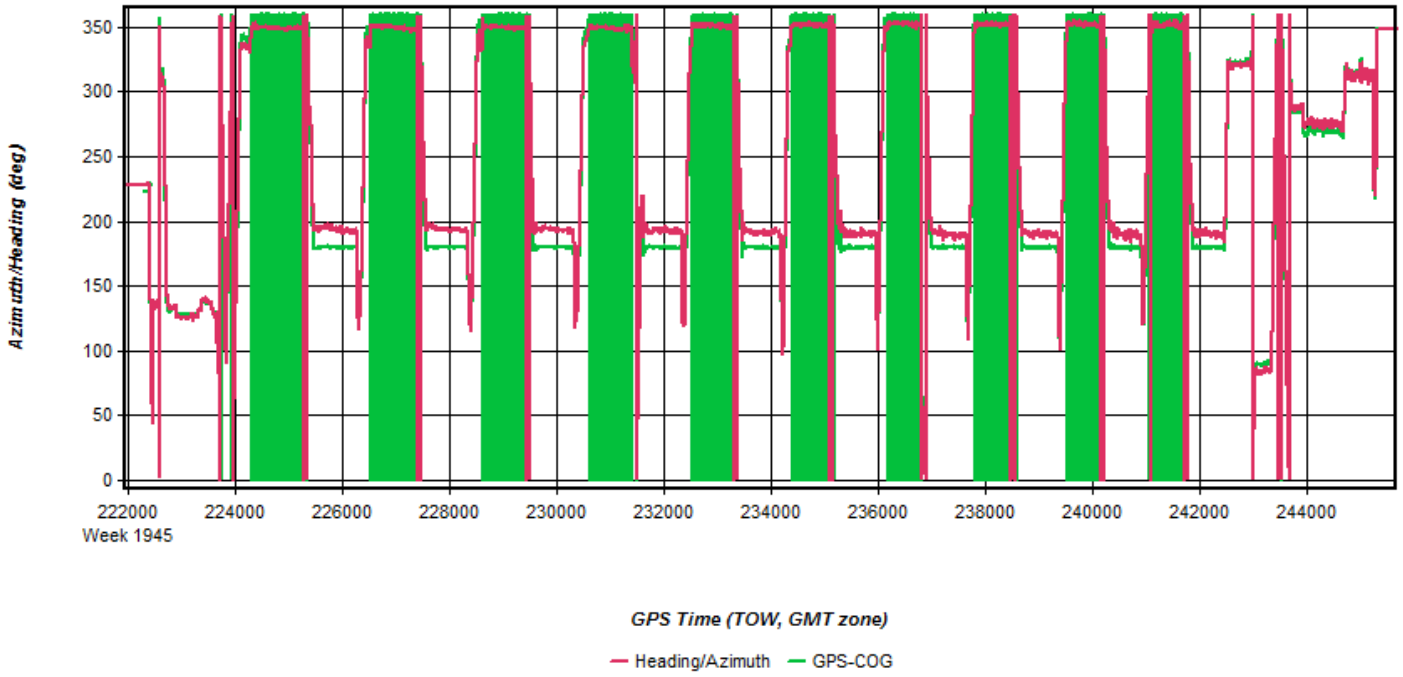
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR
KeyW - Aeroptic

CREW

UTC DATE

AIRCRAFT

GPS

WEATHER

Source

LIDAR S/N

Camera System

Camera Location (Hole)

LIDAR STARTUP CHECKS

Lens cleaned	<input checked="" type="checkbox"/>
All fids uploaded	<input checked="" type="checkbox"/>
Pilot's screen functional	<input checked="" type="checkbox"/>
Compact flash drive space	<input checked="" type="checkbox"/>
SSDs have space	<input checked="" type="checkbox"/>
Startup beeps & IPAS recording	<input checked="" type="checkbox"/>

Initials: _____

SSD

Drive #	SSD3
@ Beginning	Space Used
Space Used	During Mission
Remaining	Tot Space
unk	unk

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	1171	N		
		1172	S		
		1173	N		
		1174	S		
		1175	N		
		1176	S		
		1177	N		
		1178	S		
		1179	N		
		1180	S		
		1181	N		
		1182	S		
		1183	N		
		1184	S		
		1185	N		
		1186	S		
		1187	N		
		1188	S		
		1189	N		
		1190	S		
		UL-E	E		

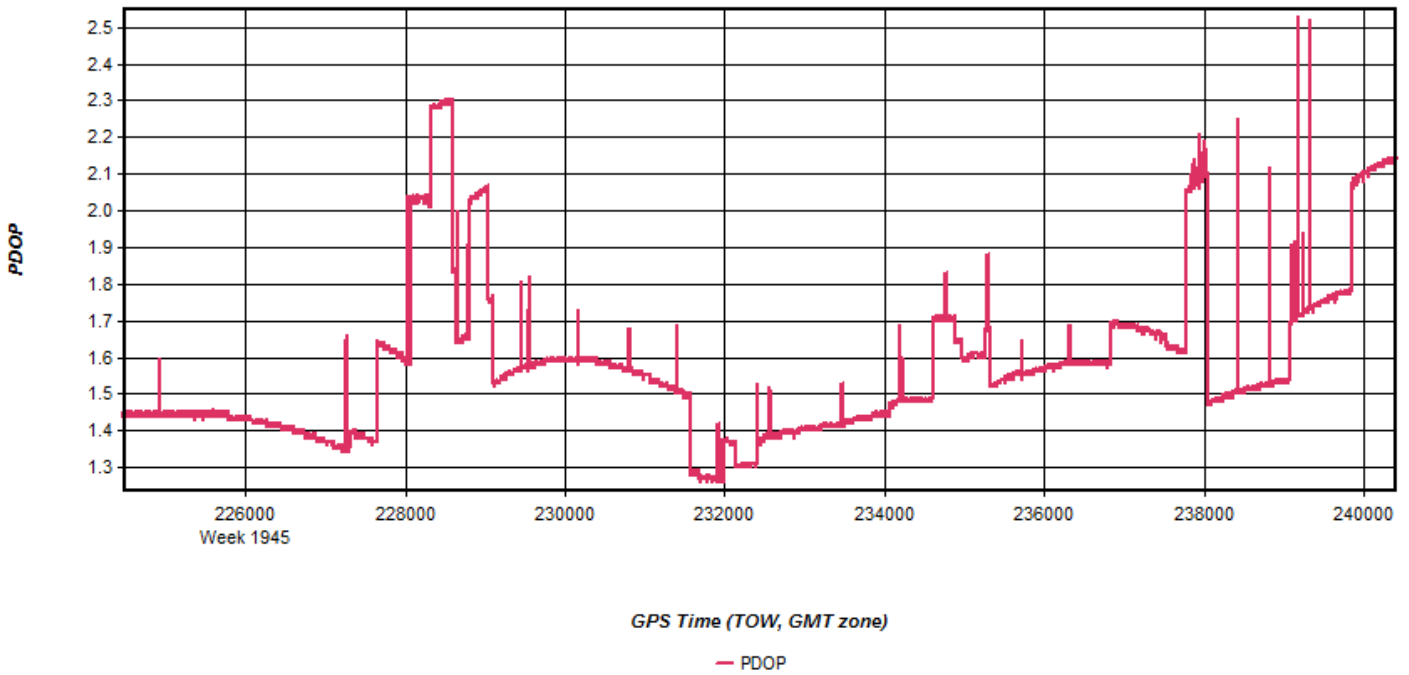
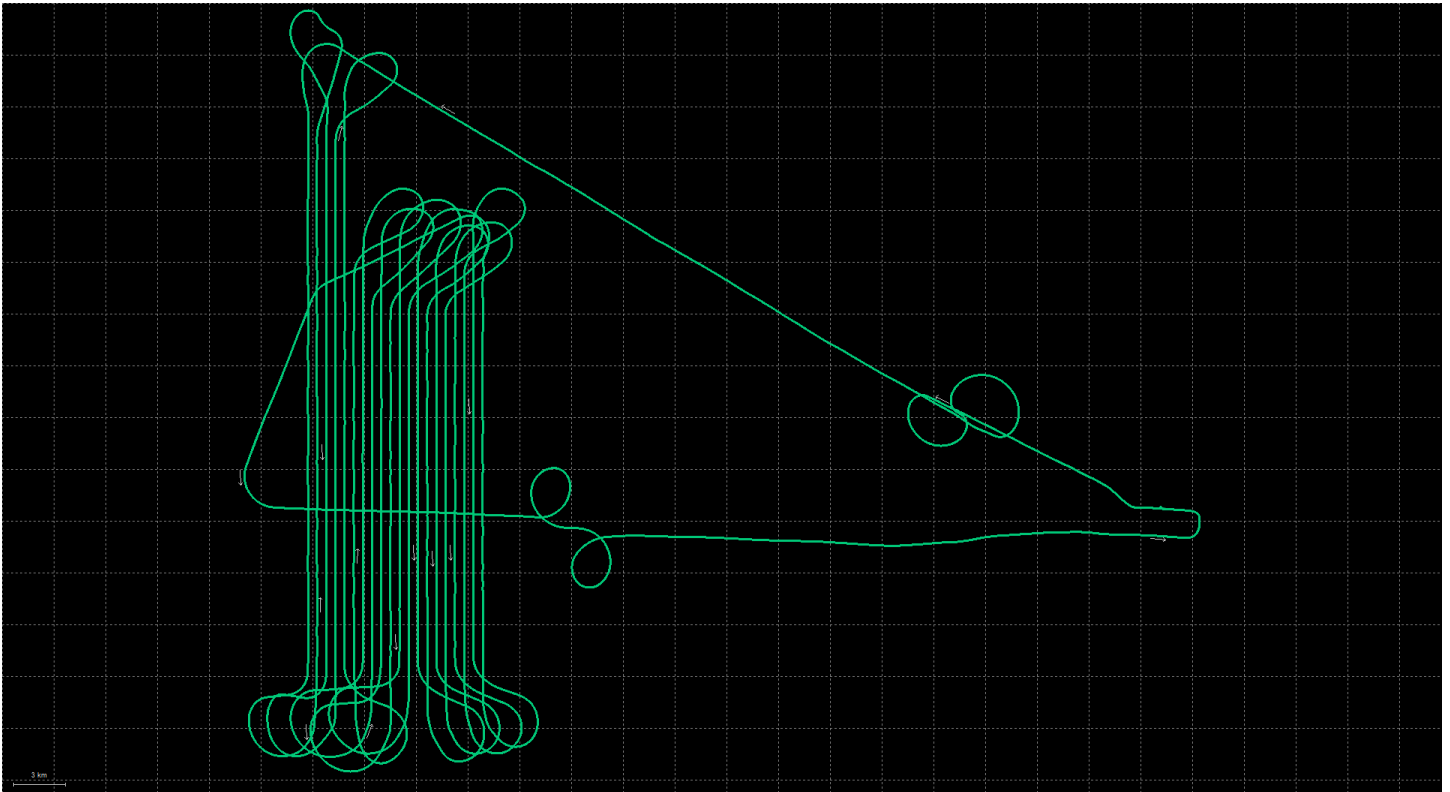
South Dakota 2017
 QL2 LiDAR Project

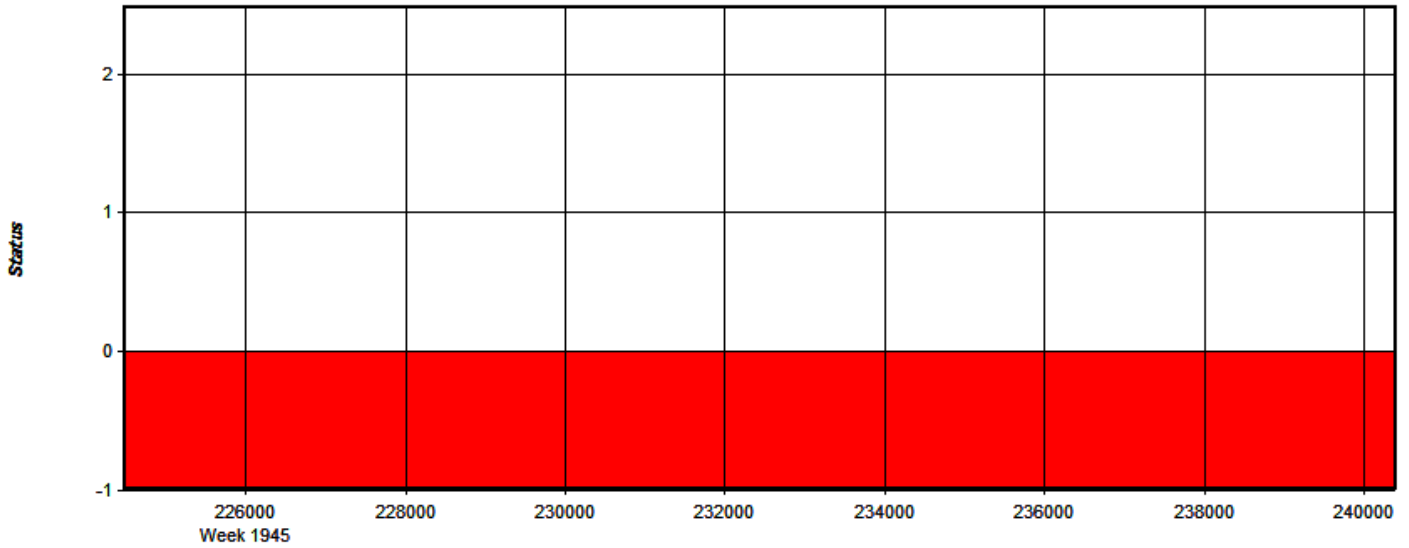
Page 345 of 567

May 30, 2018

Page 1

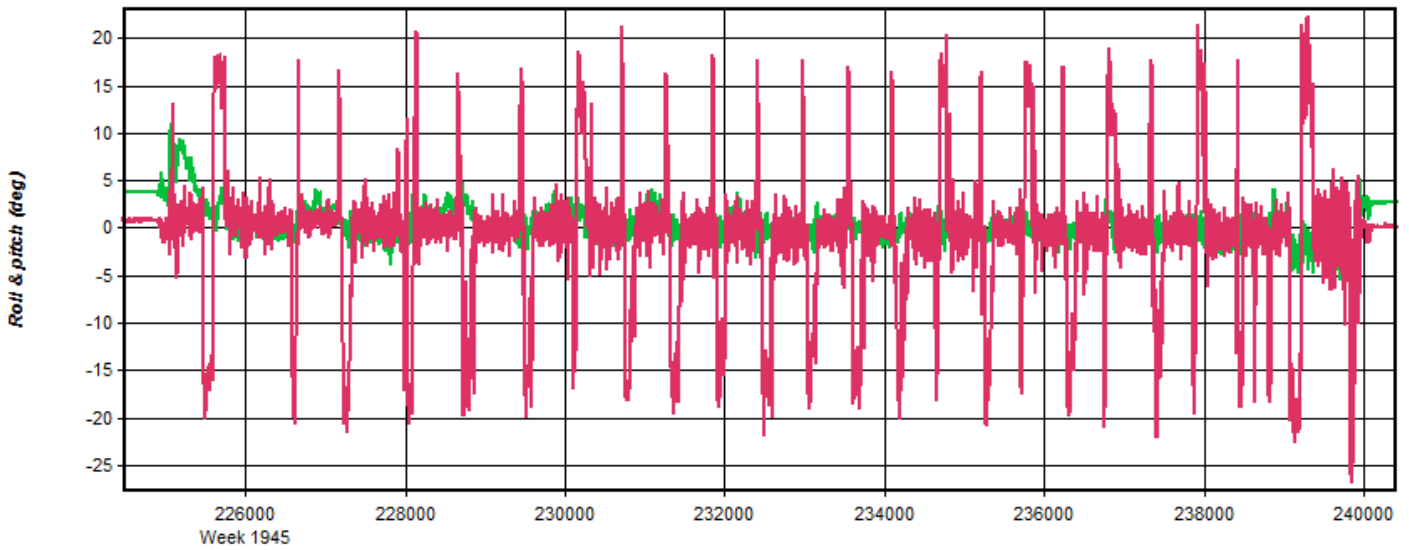
April 18, 2017-A (N916WC, SN8119)





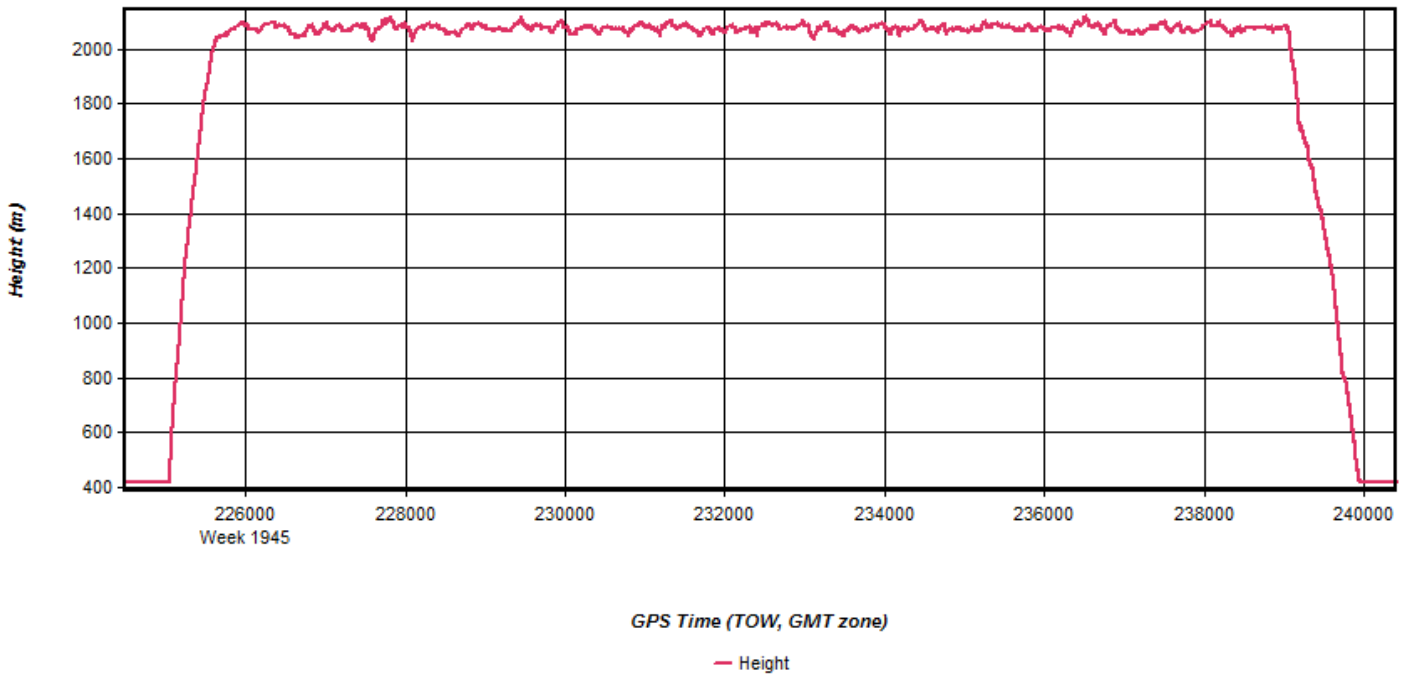
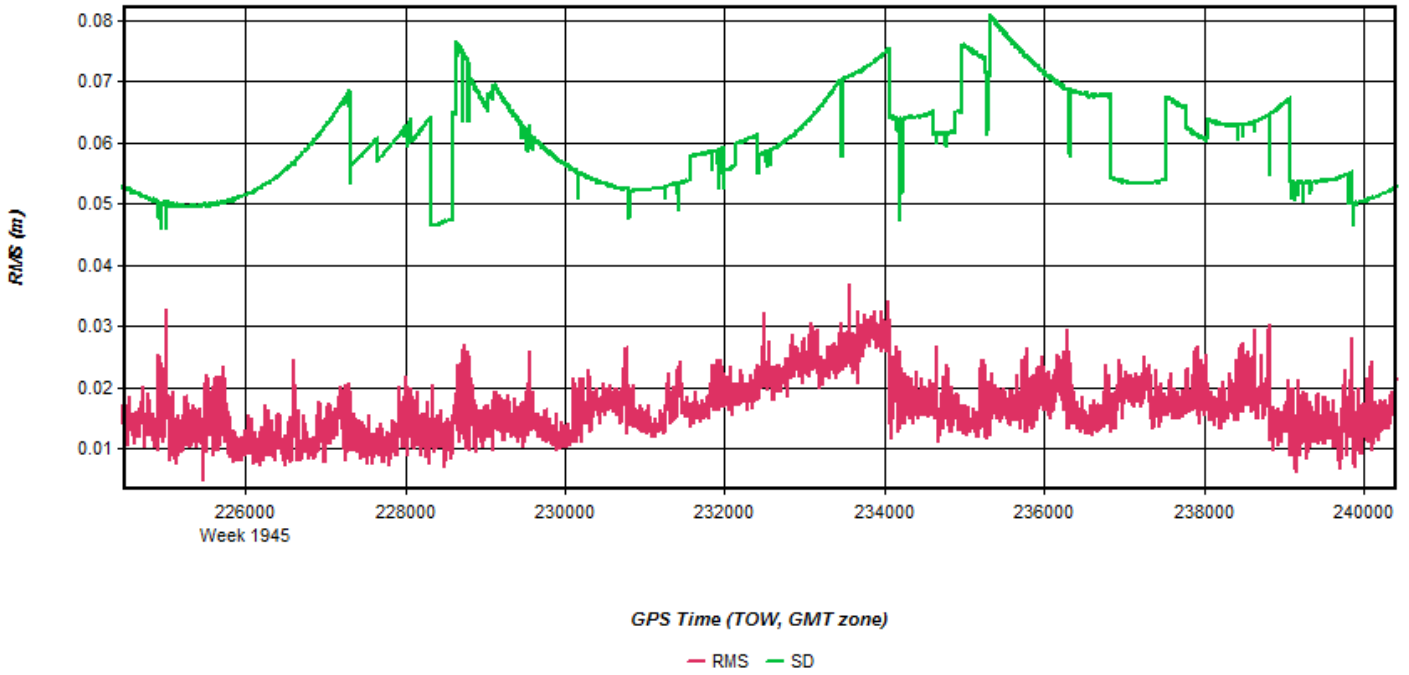
GPS Time (TOW, GMT zone)

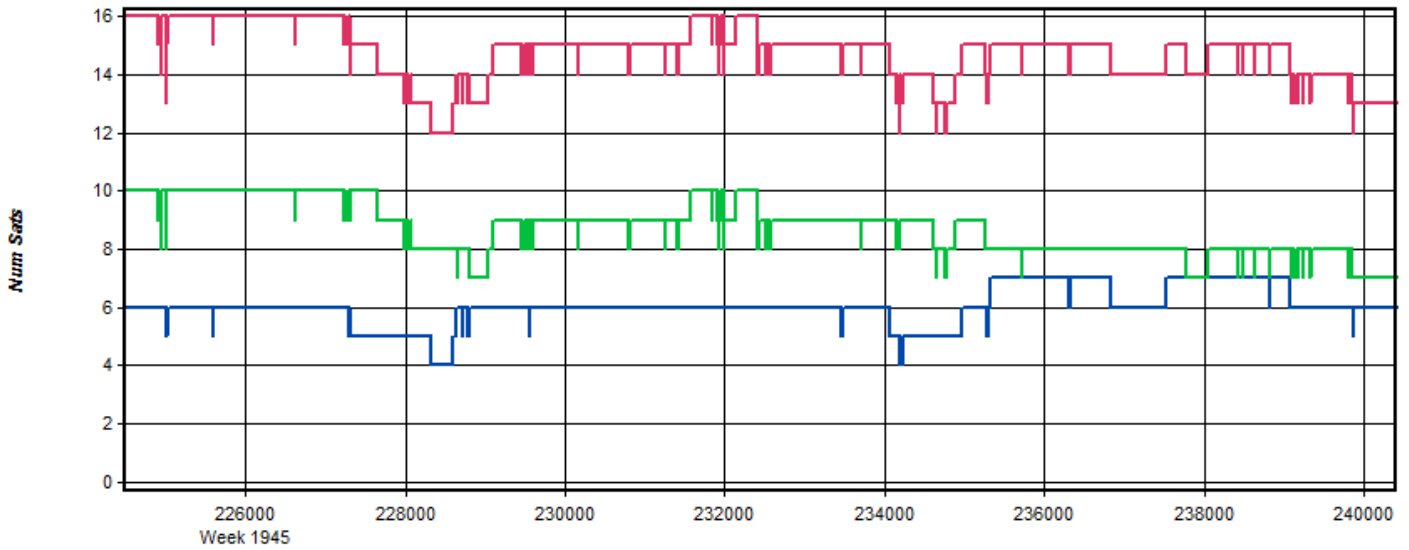
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

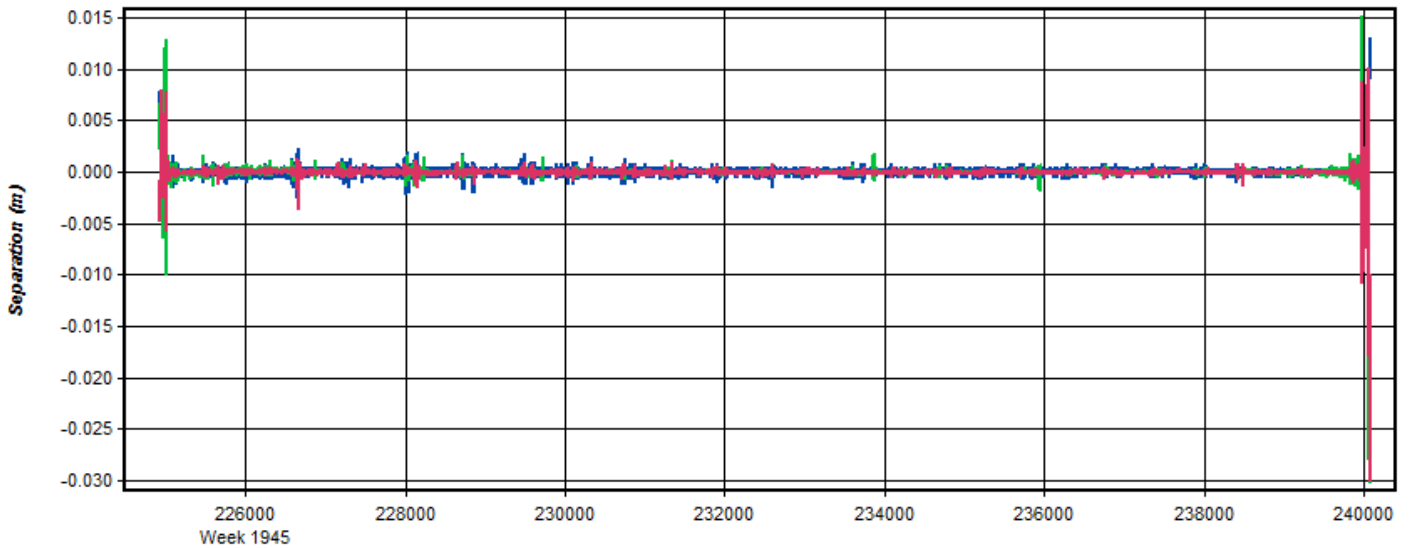
— Roll — Pitch





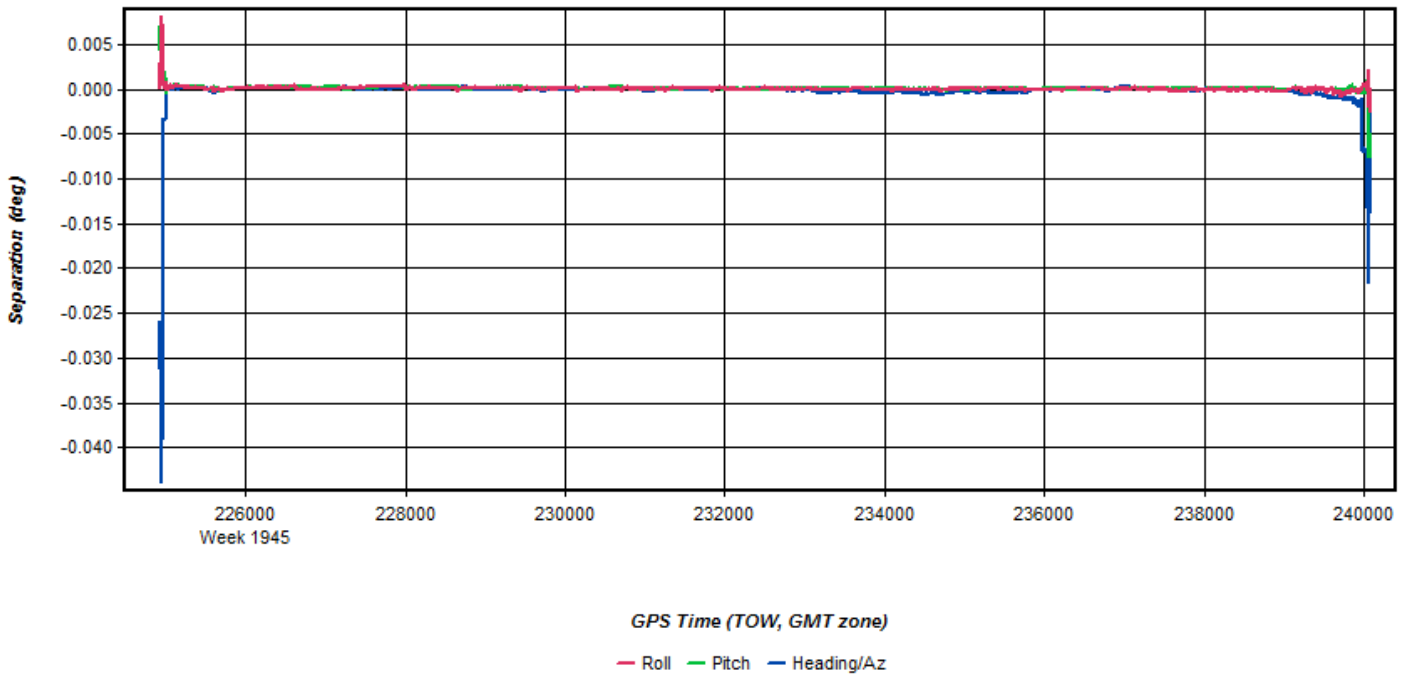
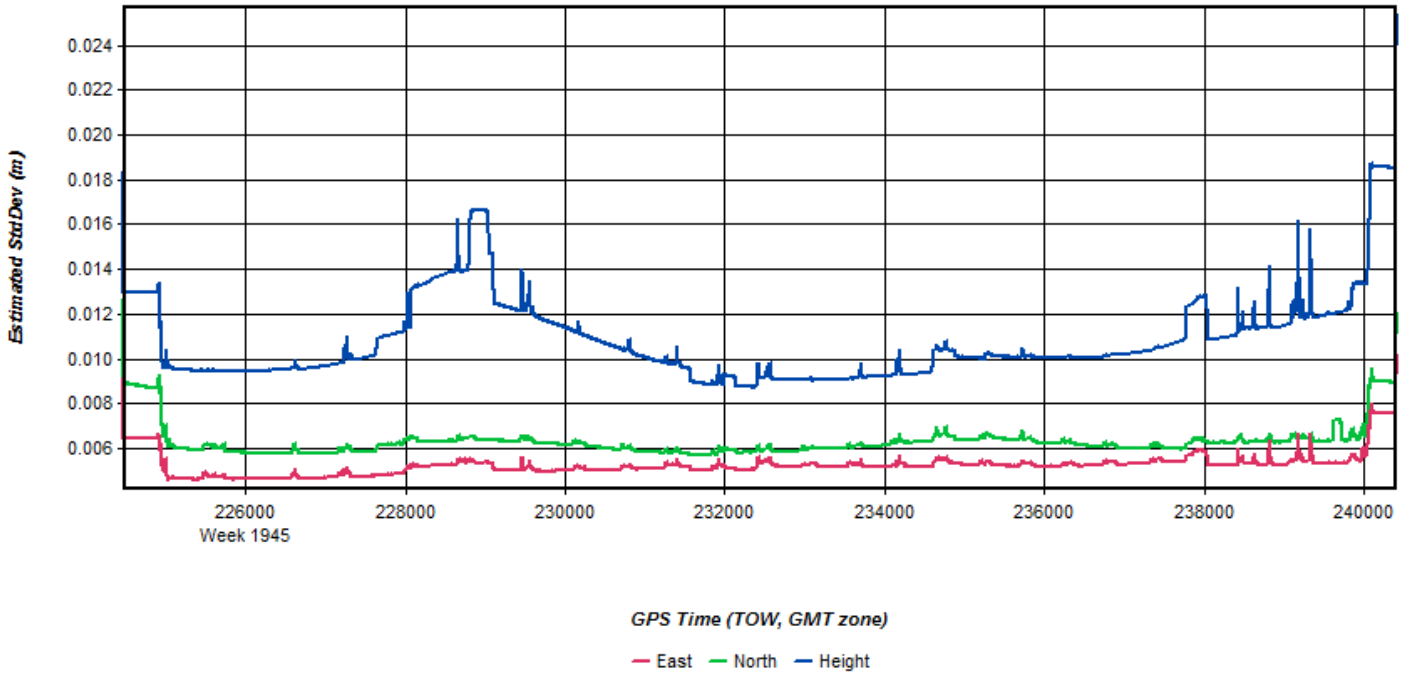
GPS Time (TOW, GMT zone)

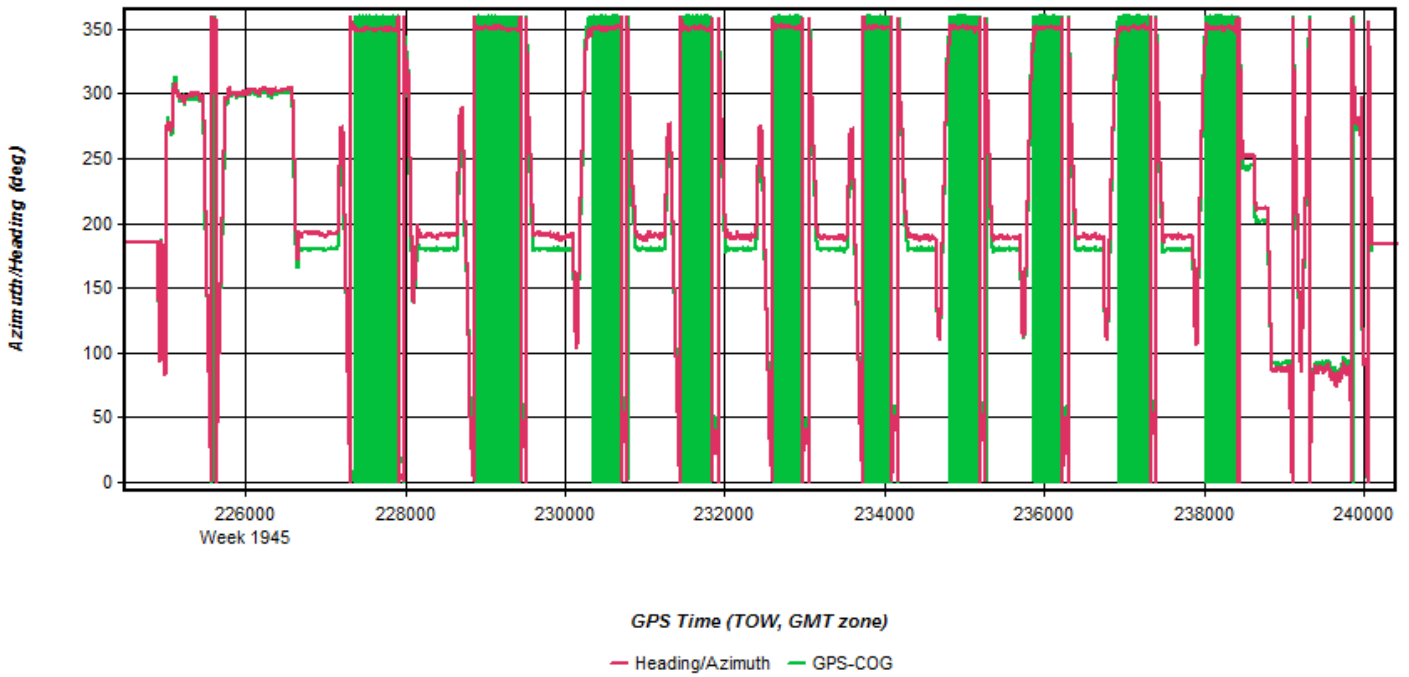
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR

KeyW - Aeroptic
LIDAR FLIGHT REPORT

Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc...
 Clear

CREW
UTC DATE

Pilot/Operator

Tail Number

AIRCRAFT

WEATHER

GPS

LIDAR S/N

Camera System

Camera Location (Hole)

LIDAR STARTUP CHECKS

Lens cleaned	<input checked="" type="checkbox"/>
All fids uploaded	<input checked="" type="checkbox"/>
Pilot's screen functional	<input checked="" type="checkbox"/>
Compact flash drive space	<input checked="" type="checkbox"/>
SSDs have space	<input checked="" type="checkbox"/>
Startup beeps & IPAS recording	<input checked="" type="checkbox"/>

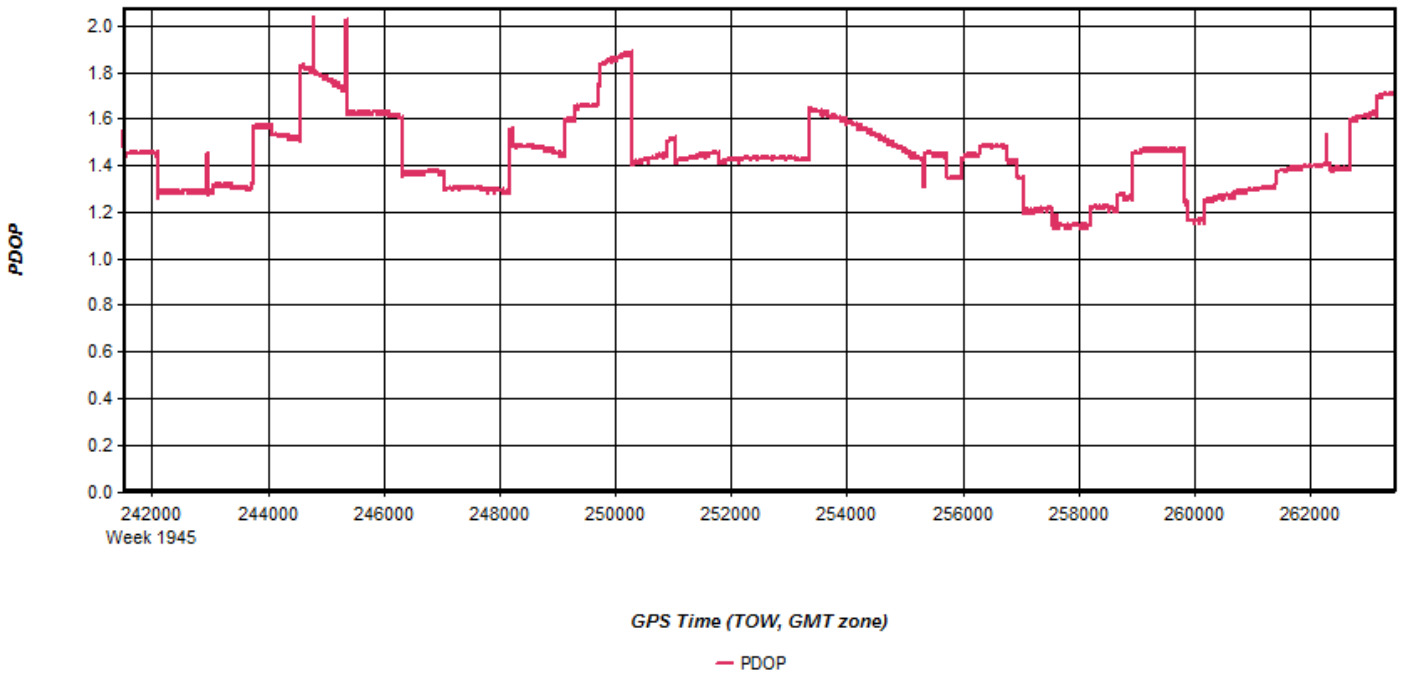
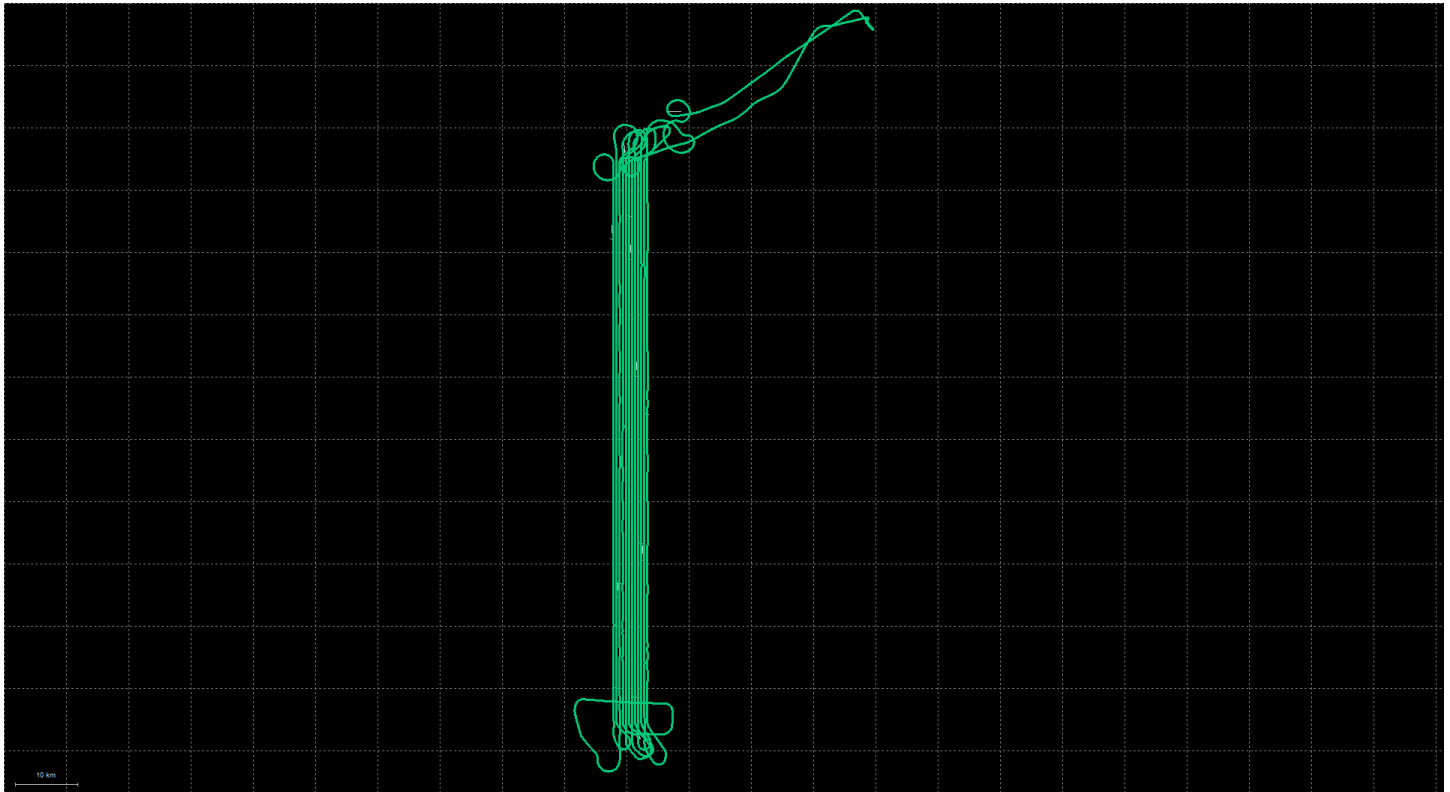
Initials: _____

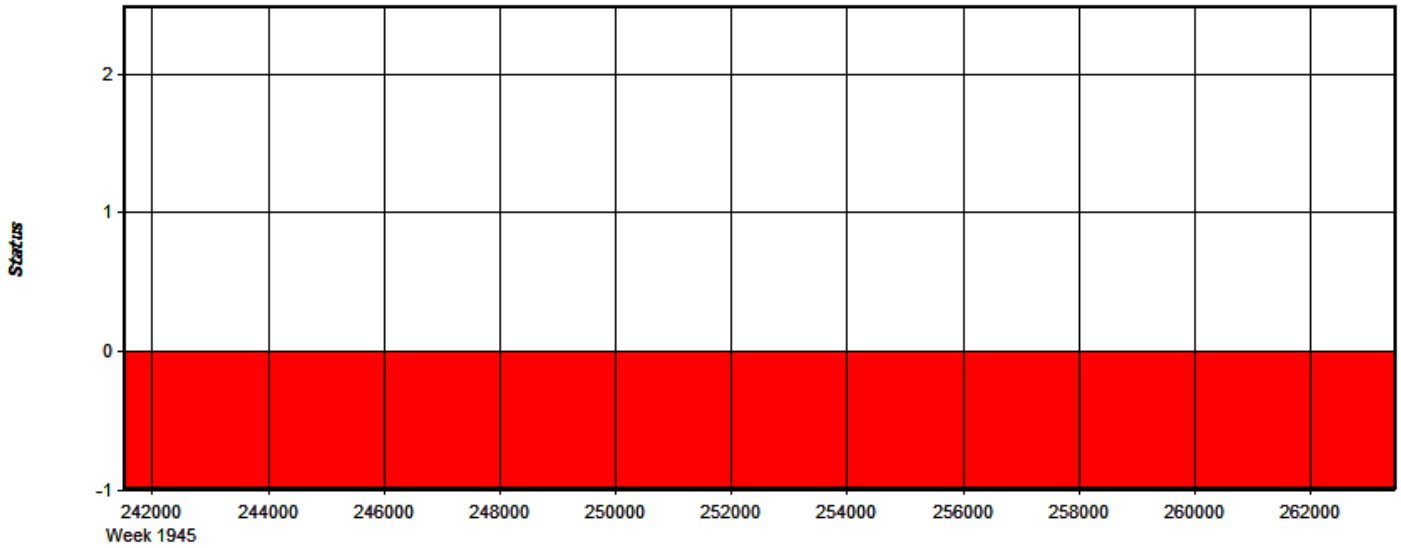
SSD

Drive #	
SSD1	
@ Beginning	Space Used
Space Used	During Mission
	Remaining
	Tot Space
	unk
	unk

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	2211	S		
		2212	N		
		2213	S		
		2214	N		
		2215	S		
		2216	N		
		2217	S		
		2218	N		
		2219	S		
		2220	N		
		2221	S		
		2222	N		
		2223	S		
		2224	N		
		2225	S		
		2226	N		
		2227	S		
		2228	N		
		2229	S		
		2230	N		
		UL-E	E		

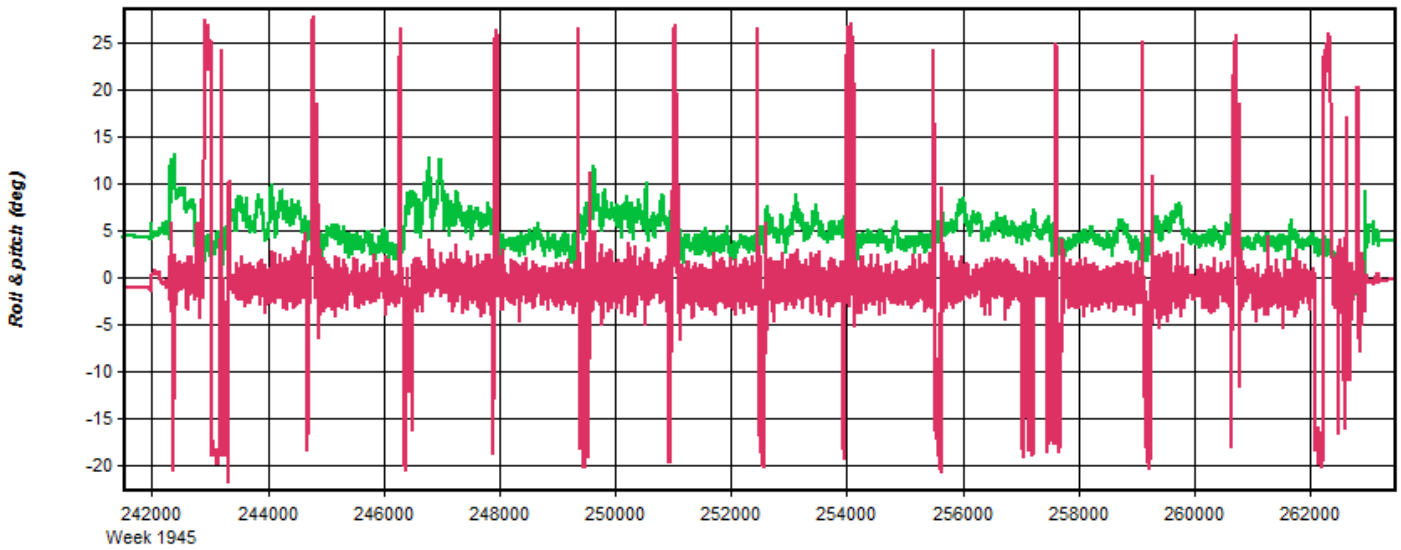
April 18, 2017-B (N246MP, SN8227)





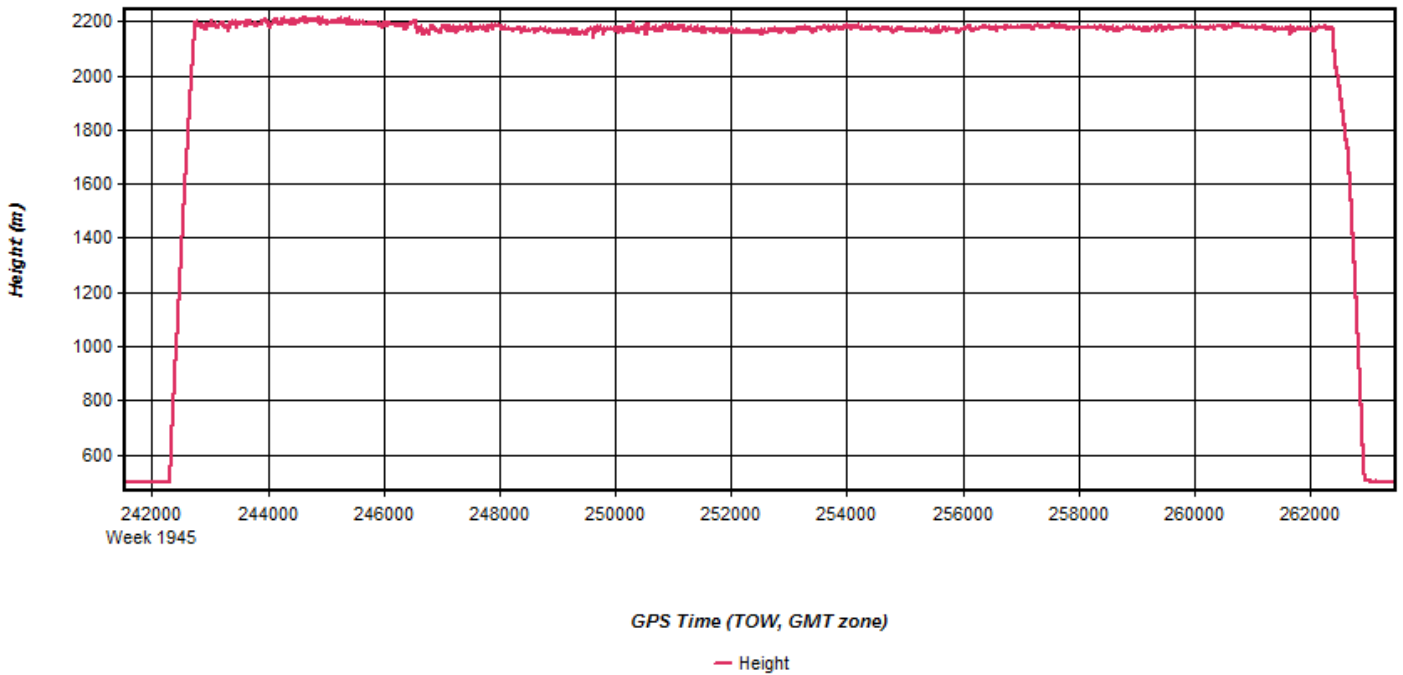
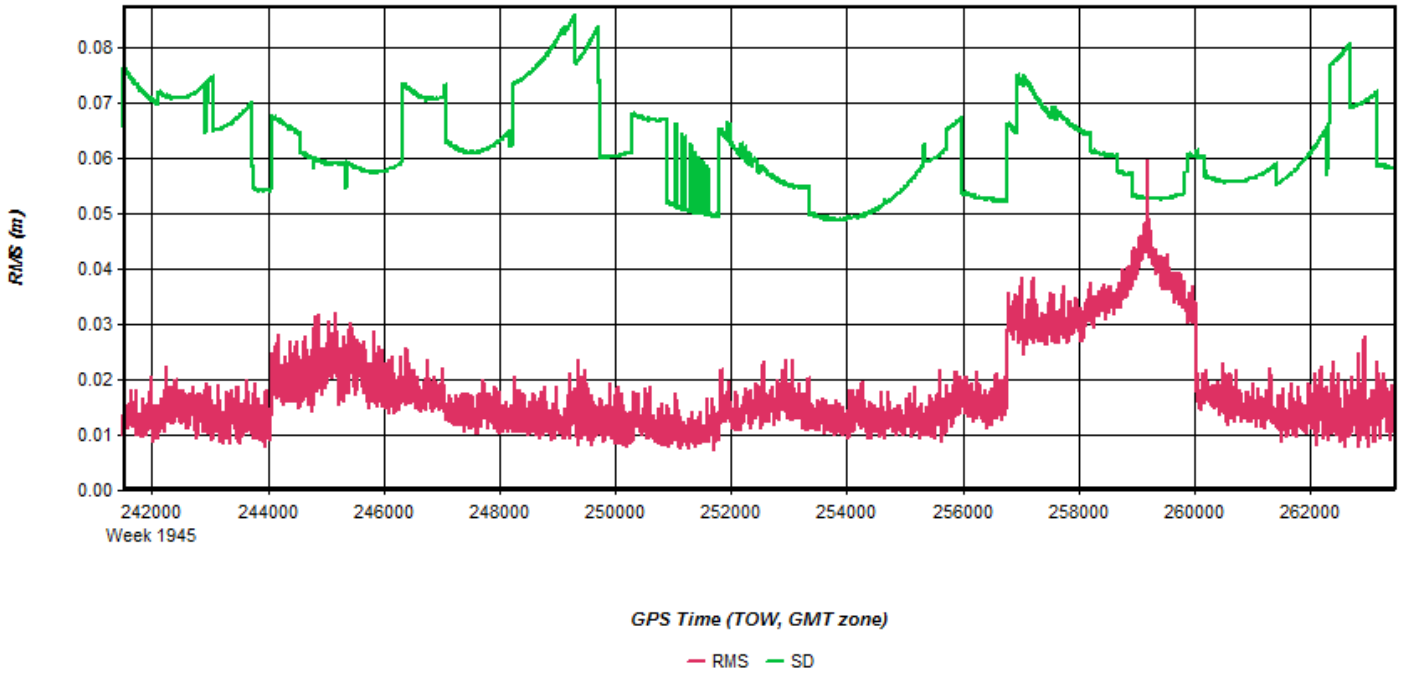
GPS Time (TOW, GMT zone)

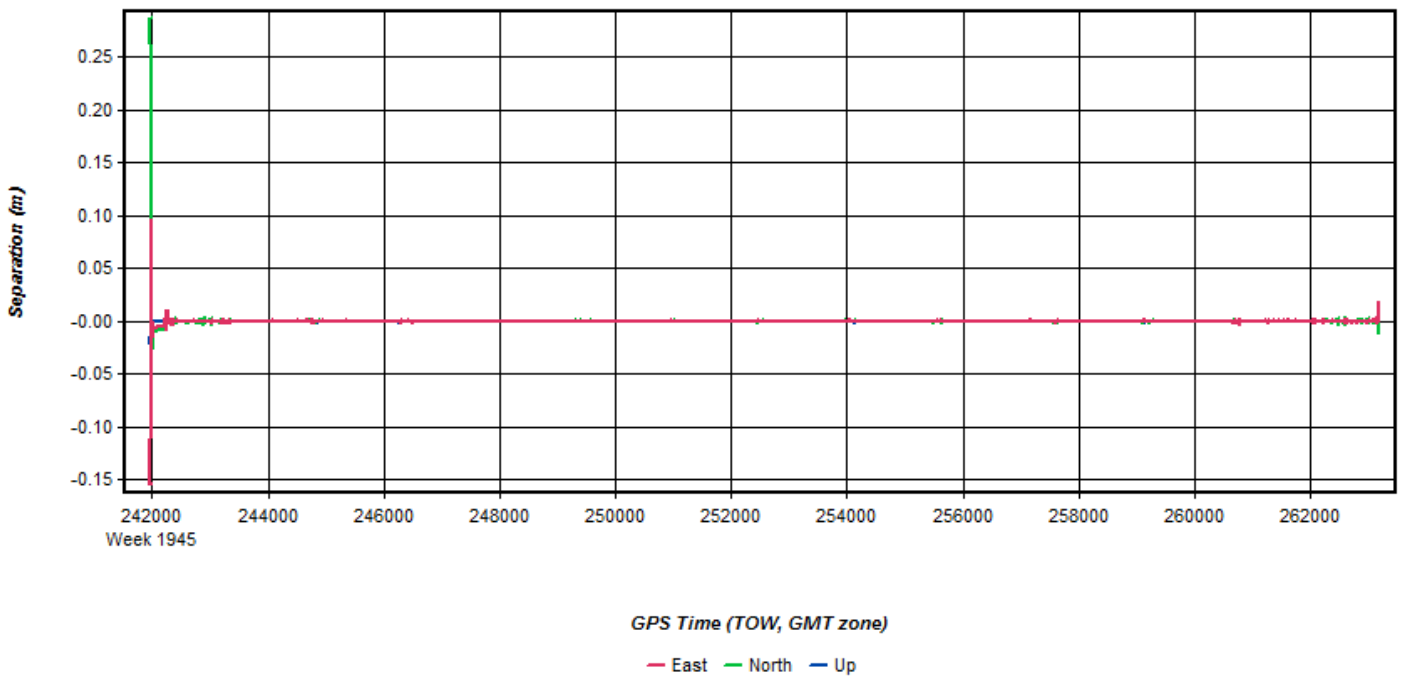
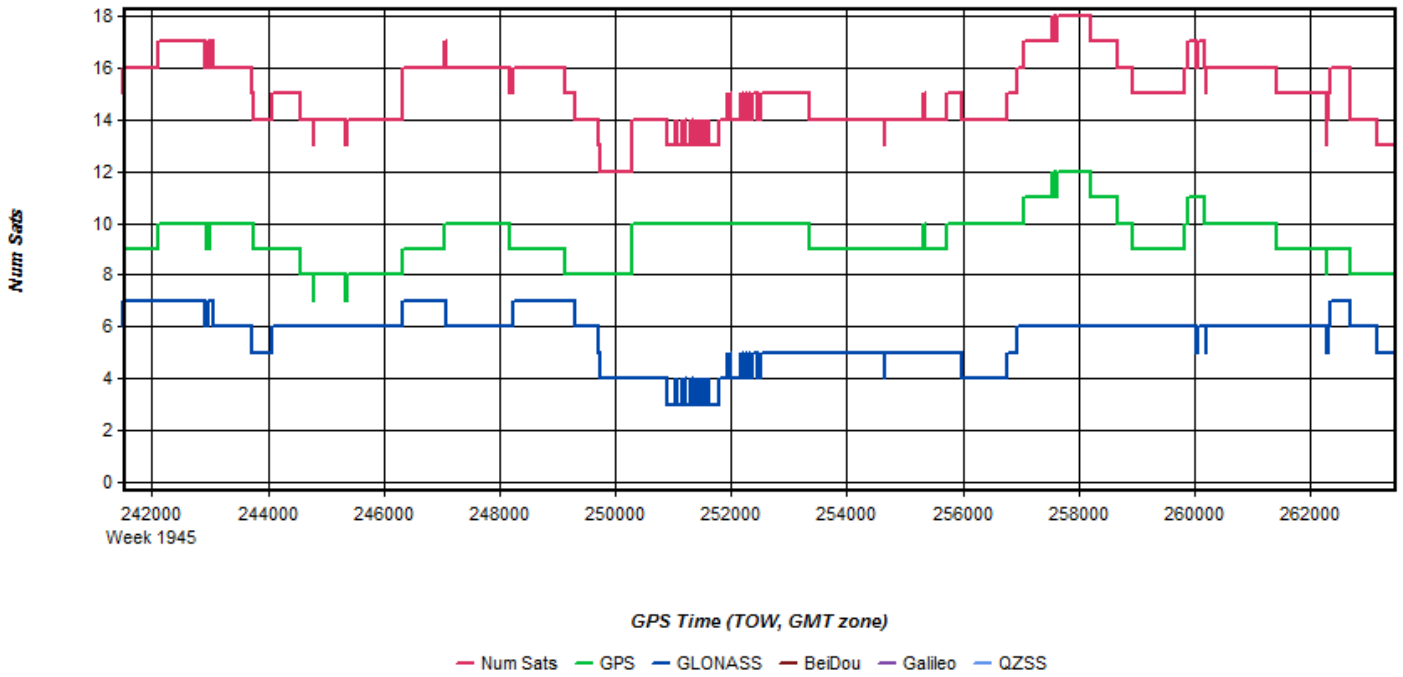
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

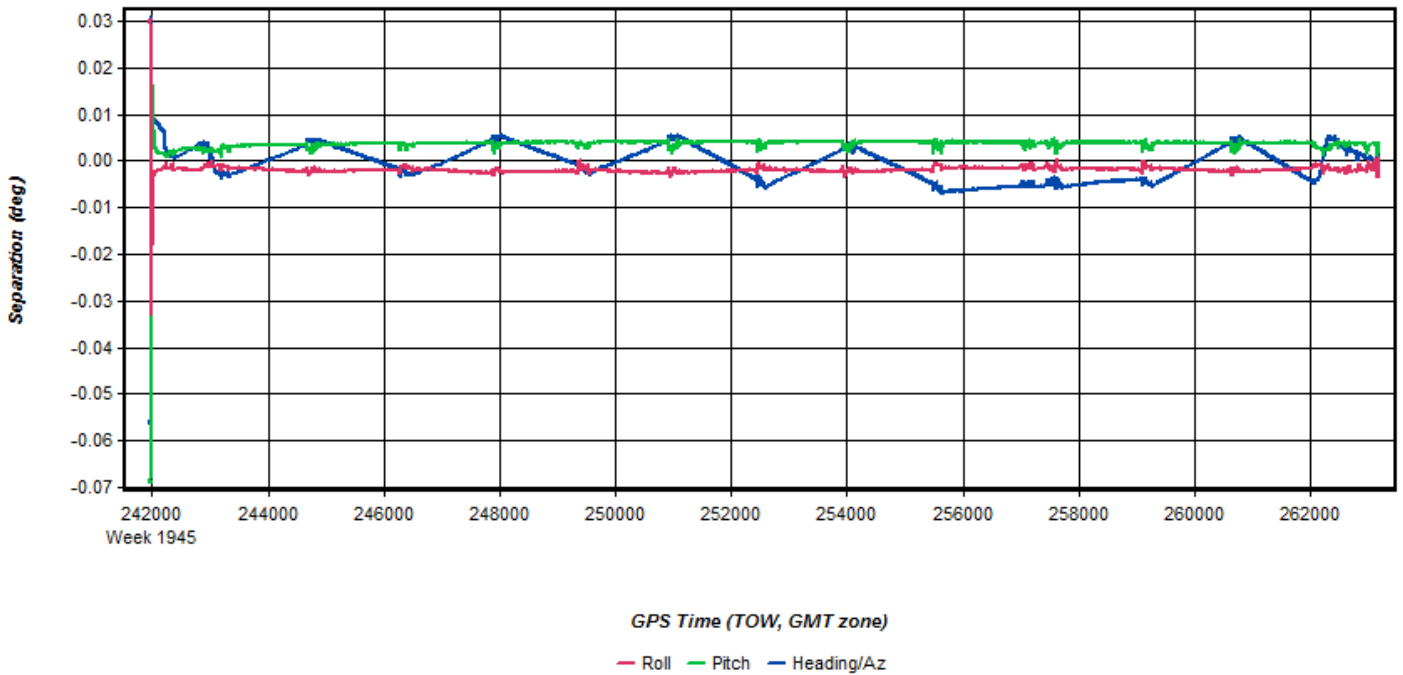
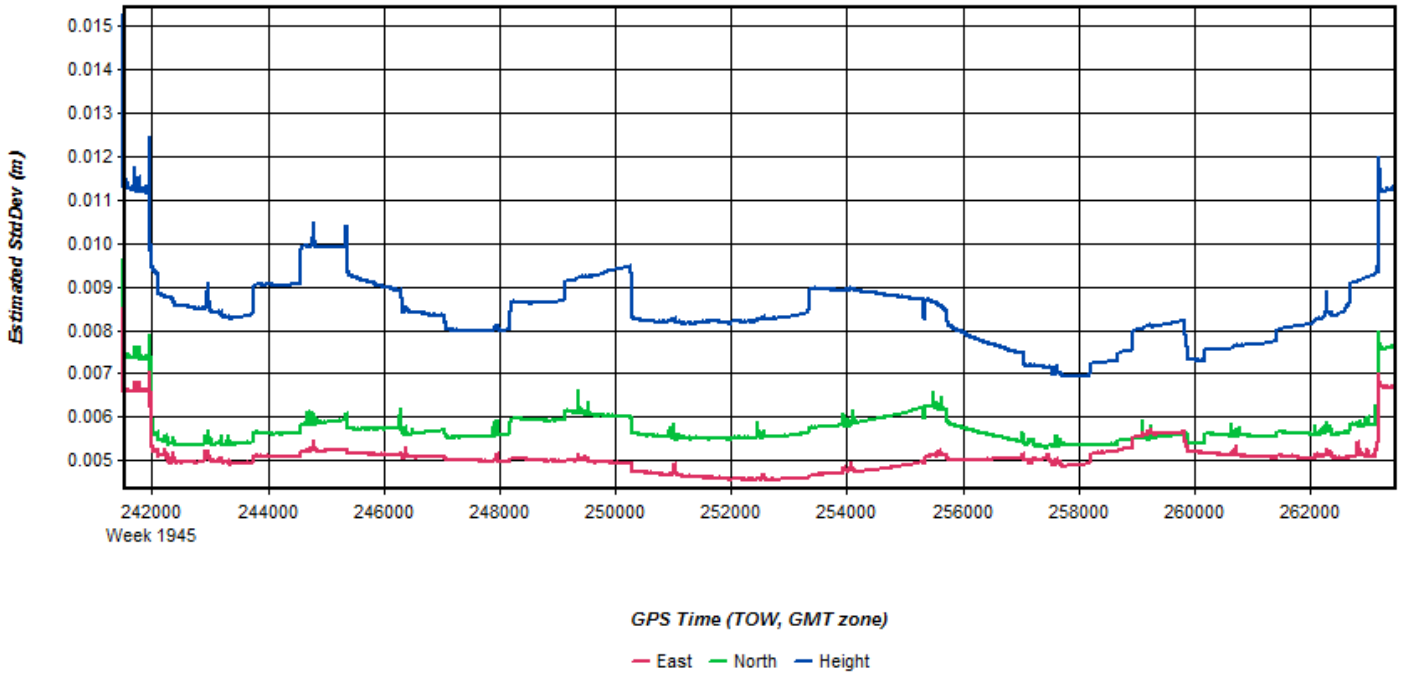


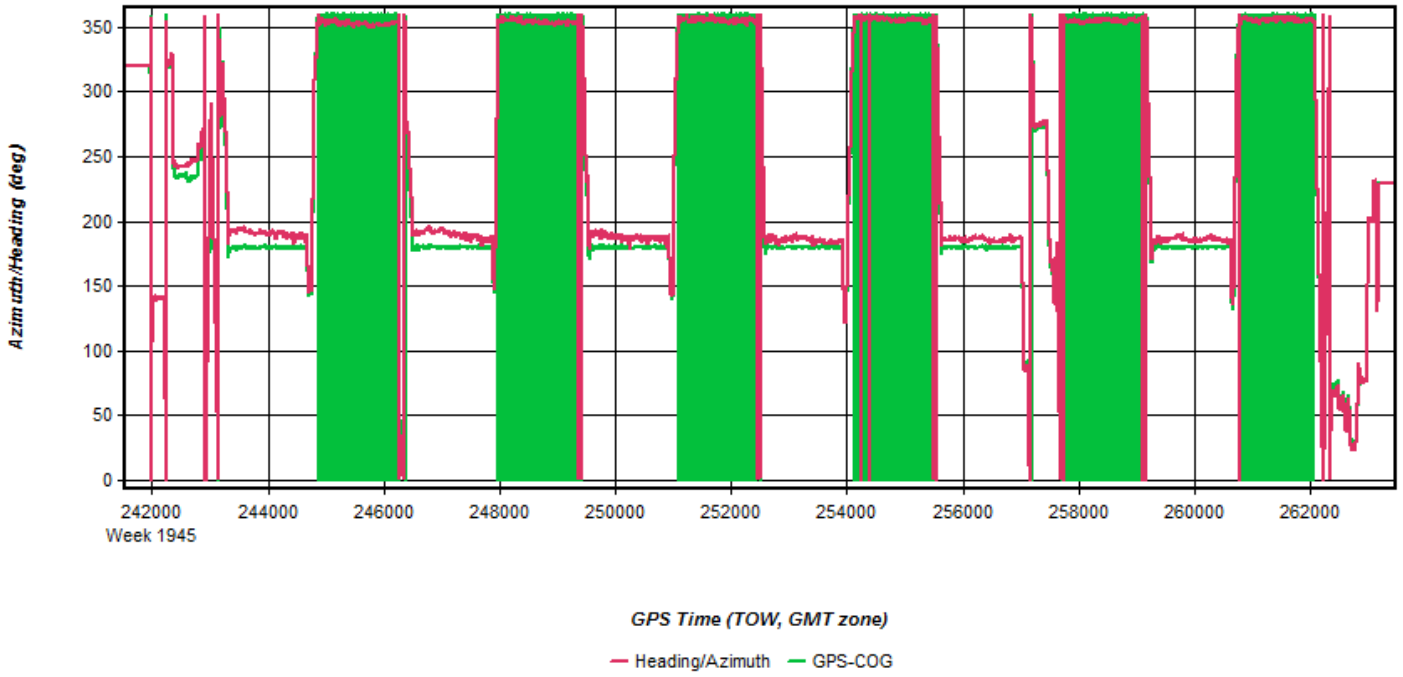
GPS Time (TOW, GMT zone)

— Roll — Pitch









Flight Log

Date: 4-18-17

Lit: A D C D E

Project: South Dakota LIDAR Proj #: 30420 Flight Mgmt File: 20170418-190257

Aircraft: N246MP Begin Hobbs: 1449.1 End Hobbs: 1454.8 Total: 5.7 Pilot: C McDonald Co-Pilot: Tech: JSwan

Dep Apt: KPIR Dep Time (Lcl): 215 (Z) Arr Apt: KPIR Arr Time (Local): 805 (Z) 0105 Tot Time Aloft: 5.7

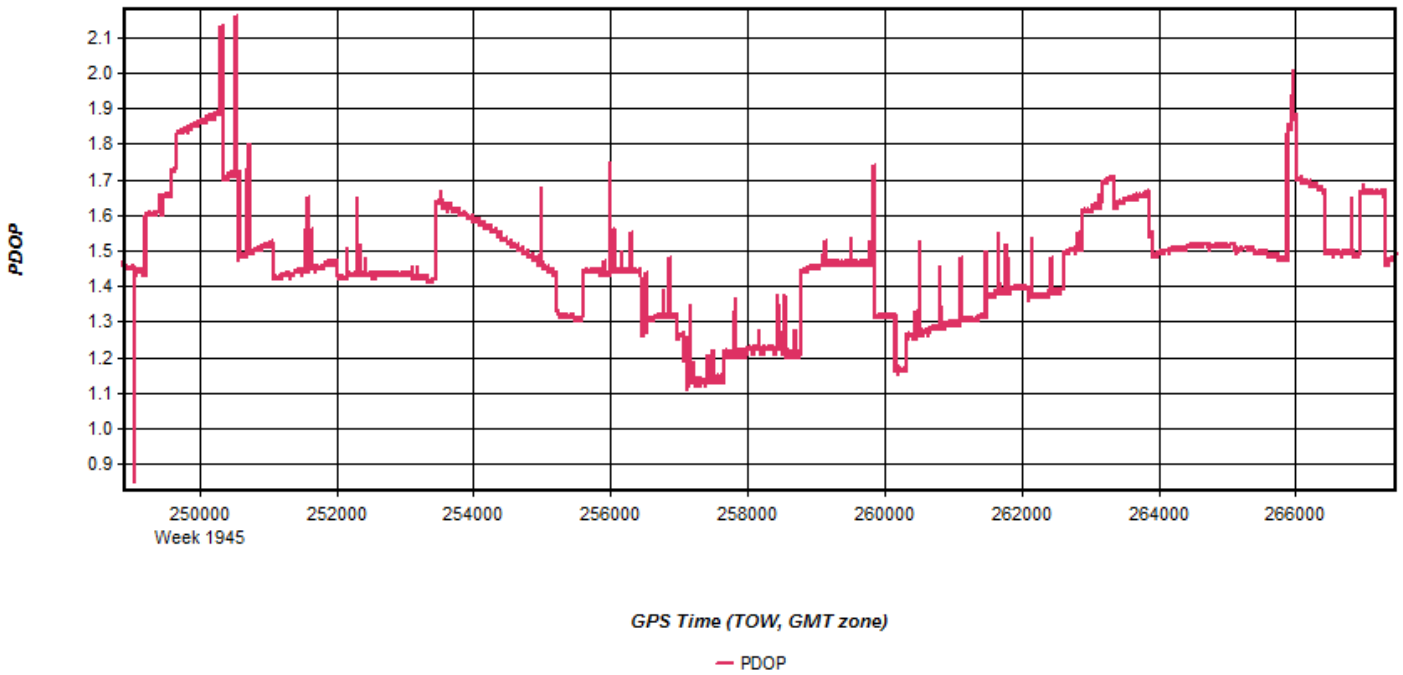
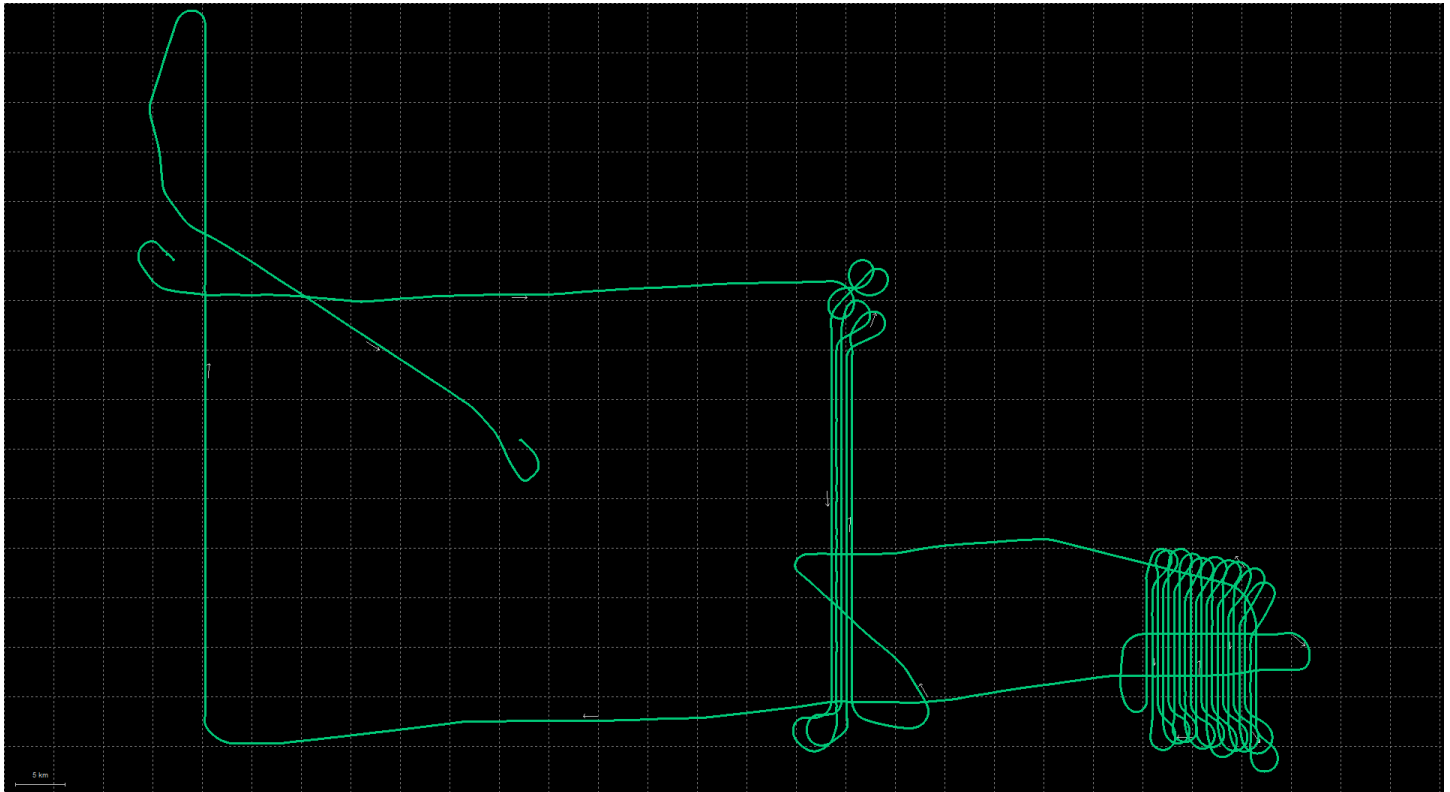
CORS: Y (N) Sta 1: 1/2 EMP Sta 2: Flyovers: Y / N if Y, times: Sta 1 Sta 2

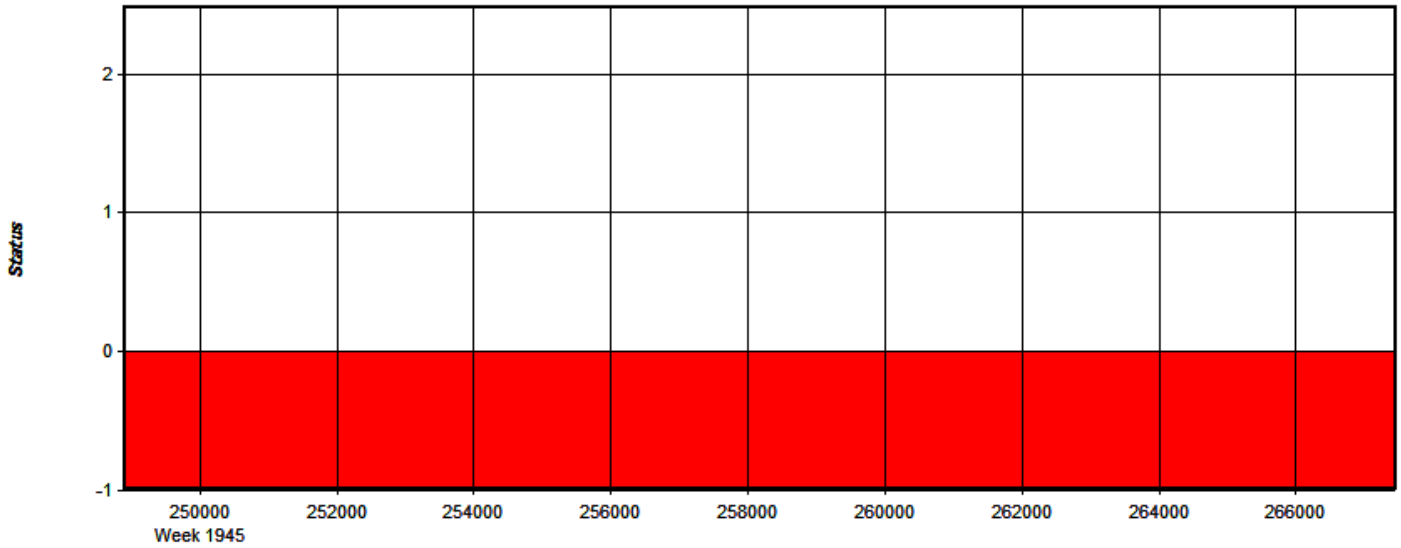
GPS Unit: Y (N) Sta 1: 1/2 EMP Sta 2: Flyovers: Y / (N) if Y, times: Sta 1 Sta 2

Gd Temp beg: 15 °C End: 47.2 °C OAT beg: 5 °C End: 4 °C Altimeter begin: 2992 end: 2991

LIDAR	Type	Alt ASX0	Serial #	Alt ADL	Mp/A	Y / N	Alt AMSL	7200	Avg Terr Ht	2000	Max Glpd	130	Avg Pt Spndng	End CB	250	End CB	128	Tot CB	132	Average Manure																																							
FOV	2.8	48	Scan Freq				Pulse in Air	328	Power	100	PPPM																																																
Line #	Hgt	Start (UTC)	End (UTC)	Gd Spd	POF/SEA	GPS Altitude	Crb	Top (0-5)	FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.																																																		
83	174	1936	1957	135	1.1/21	7181		0/-	PIR -> Fig 8's (1927 - 1932)																																																		
82	354	2001	2024	120	1.4/19	7200		0/-	cloud 50-56 mi FSE *																																																		
81	174	2028	2050	115	1.2/21	7130		0	100ft high @ start of line																																																		
80	341	2053	2115	134	1.1/22	7160		0/-																																																			
79	174	2119	2141	115	1.2/20	7110		0/-																																																			
78	354	2145	2206	126	1.2/19	7152		0/-																																																			
77	174	2210	2231	128	1.2/21	7105		0/-																																																			
76	354	2235	2257	136	1.4/17	7150		0/-																																																			
75	174	2300	2323	135	1.1/20	7148		0/-																																																			
Xtie W	2326	2330		126	1.0/22	7160		0/-	unplanned xtie then change plans to continue																																																		
74	354	2336	2357	135	1.0/21	7161		0/-																																																			
73	174	0001	0023	133	1.1/18	7125		0/-																																																			
72	354	0026	0047	135	1.1/22	7165		0	light rain on nose - Refly as able Abort *																																																		
									Fig 8's (0048 - 0053)																																																		
									PIR																																																		
									Hobbs = 5.7																																																		
									online = 5.2																																																		
									MOB = 0.5																																																		
Total Proj Lines:										Lines Flown:										Lines Remain:										Online Time: 5.2										Job Time: 0.5										Notes:									

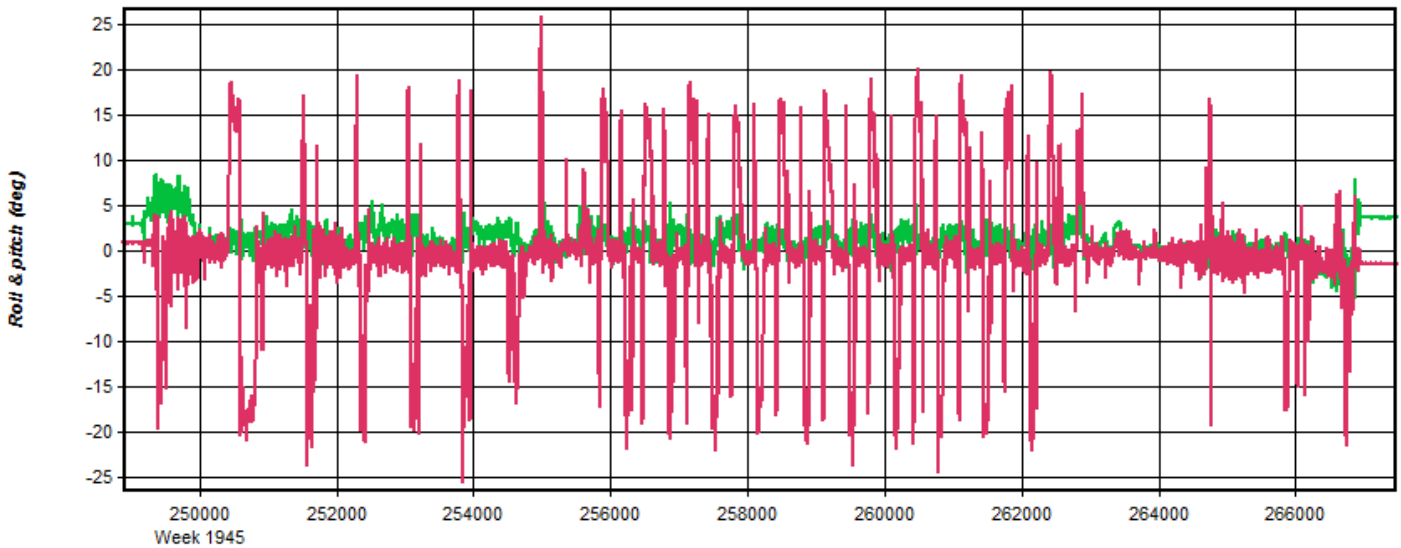
April 18, 2017-B (N915WC, SN8237)





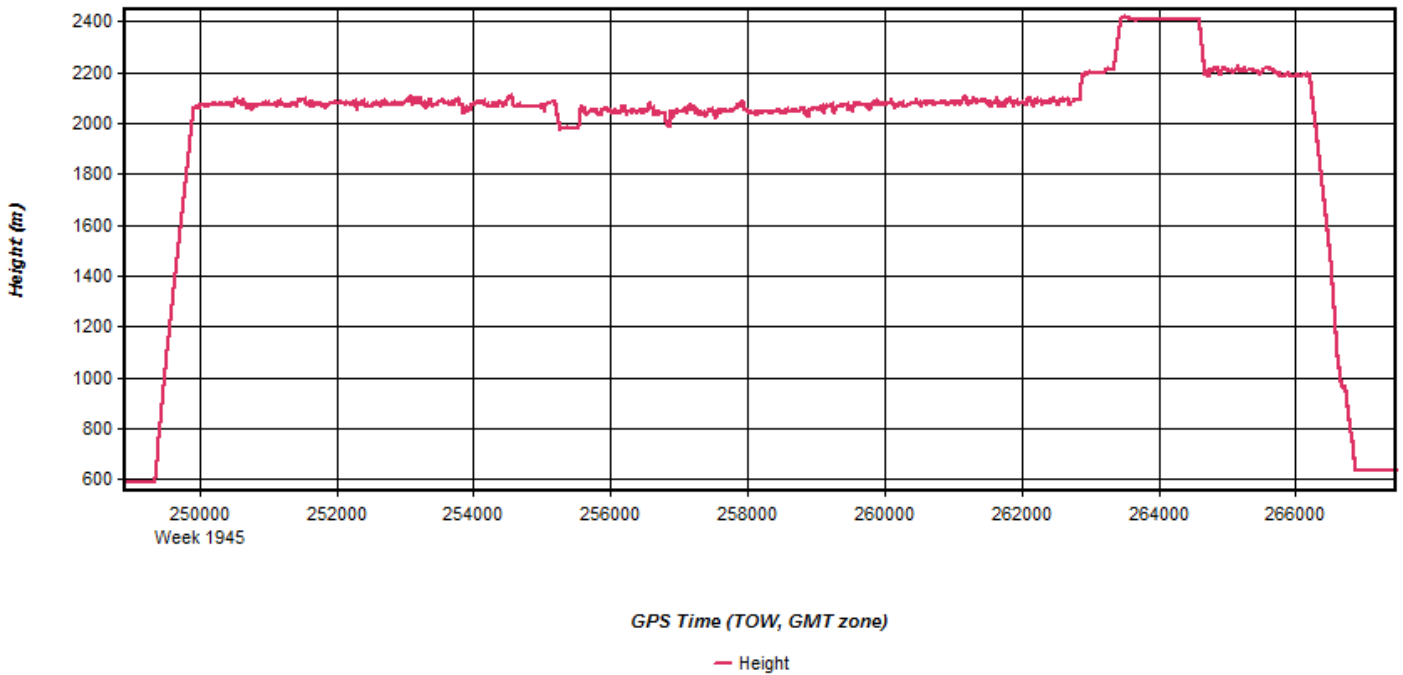
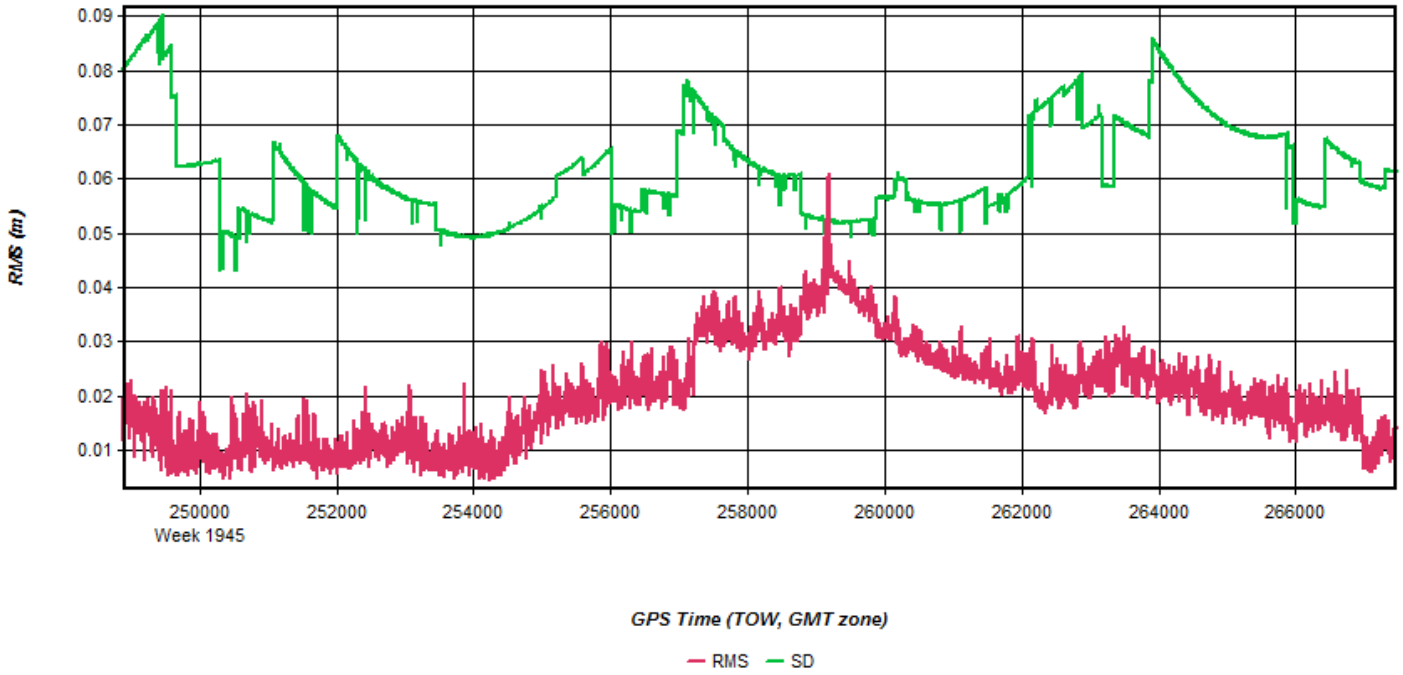
GPS Time (TOW, GMT zone)

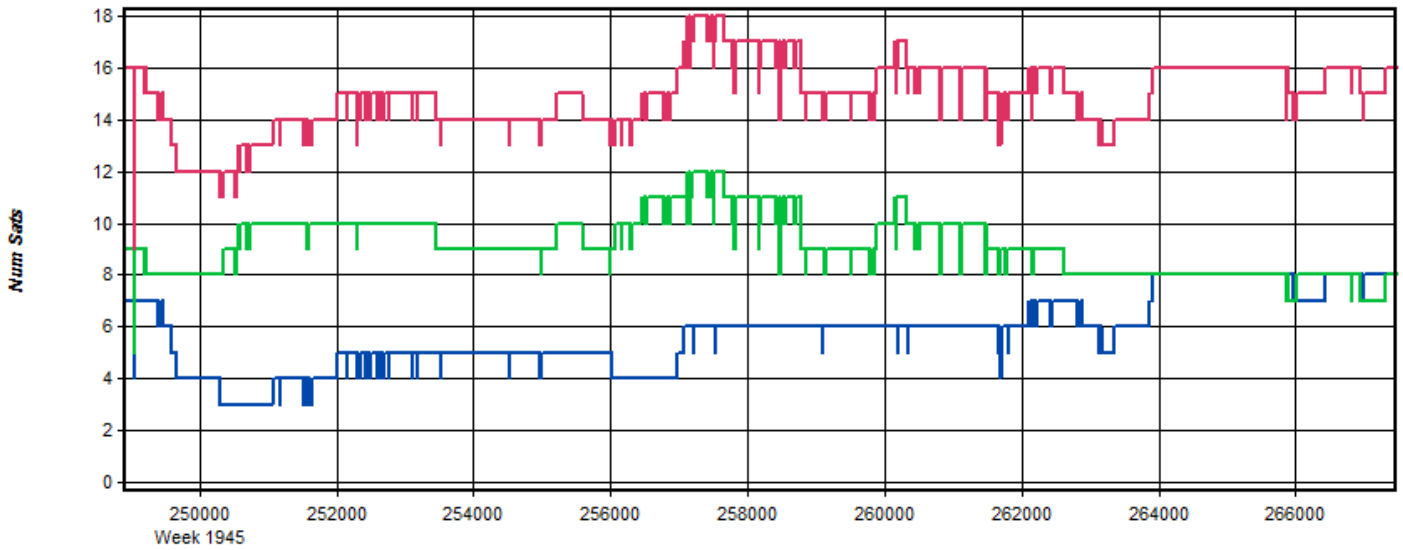
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

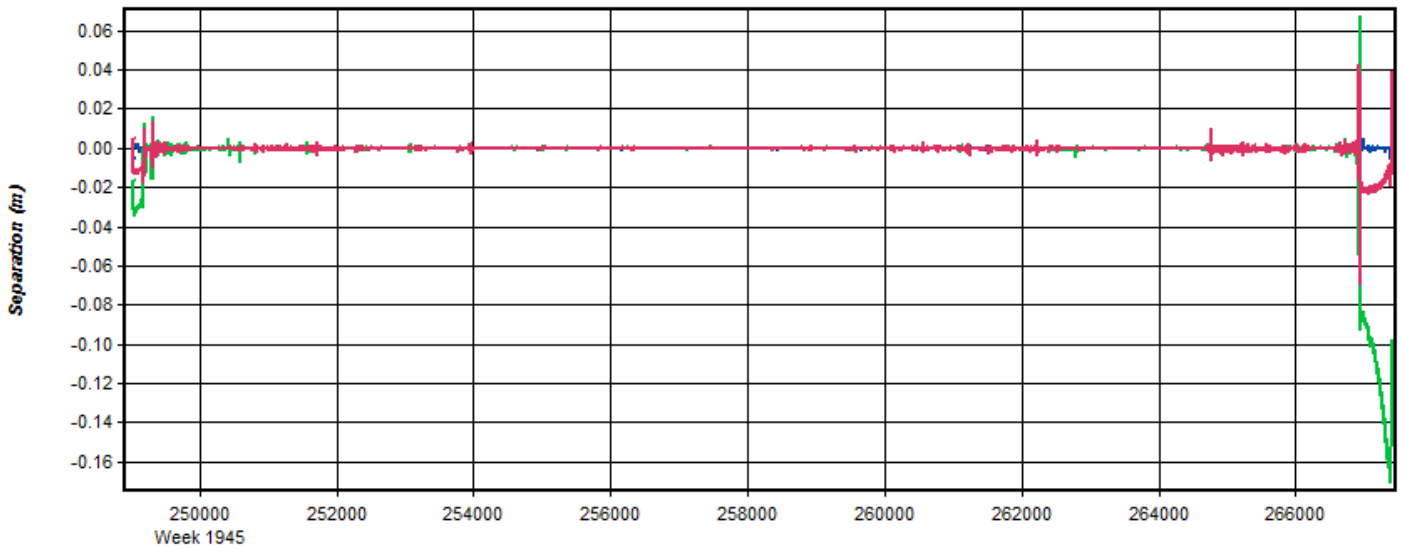
— Roll — Pitch





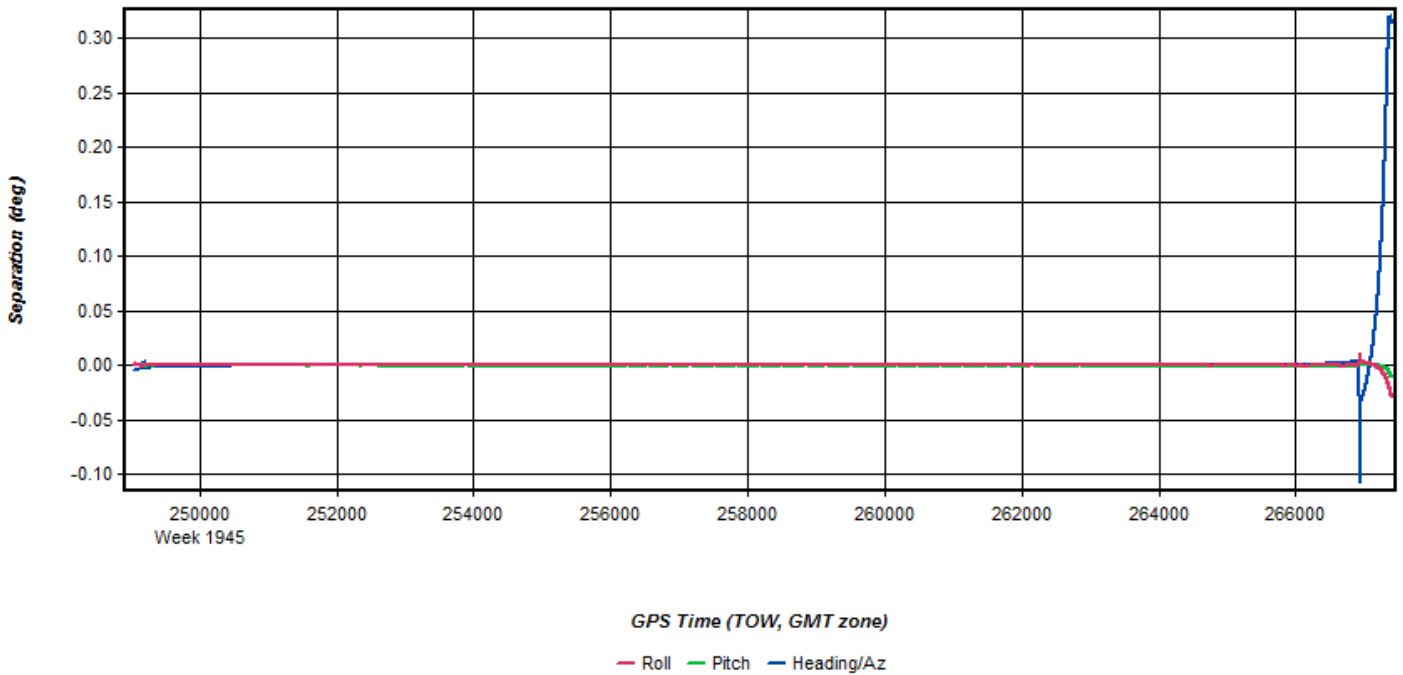
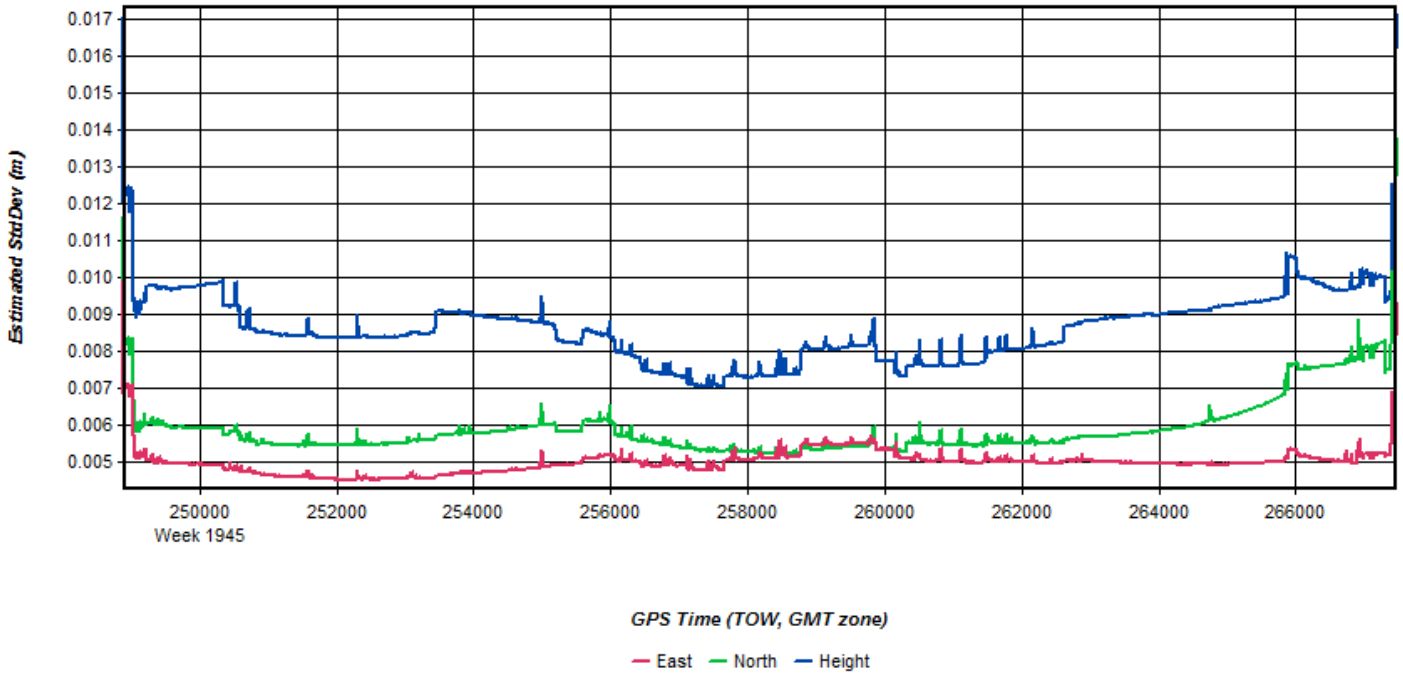
GPS Time (TOW, GMT zone)

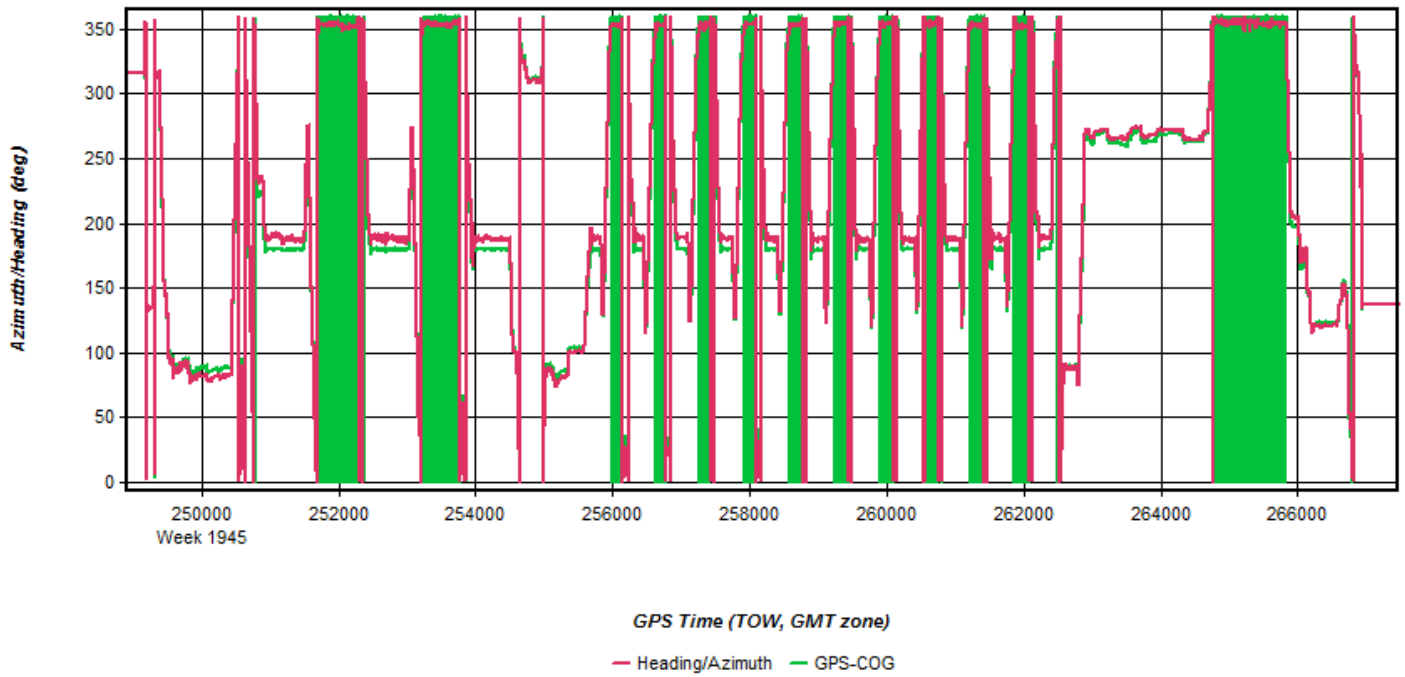
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR

KeyW -Aeroptix
LIDAR FLIGHT REPORT

Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc...

CREW

UTC DATE

AIRCRAFT

GPS

WEATHER

LIDAR S/N

Camera System

Camera Location (Hole)

SSD

Drive #	
SSD4	
@ Beginning	Space Used
Space Used	During Mission
	Remaining
	Tot Space
	unk
	unk

LIDAR STARTUP CHECKS

Lens cleaned	<input type="checkbox"/>
All fids uploaded	<input checked="" type="checkbox"/>
Pilot's screen functional	<input checked="" type="checkbox"/>
Compact flash drive space	<input checked="" type="checkbox"/>
SSDs have space	<input checked="" type="checkbox"/>
Startup beeps & IPAS recording	<input checked="" type="checkbox"/>

Initials: _____

Start-up **Time**

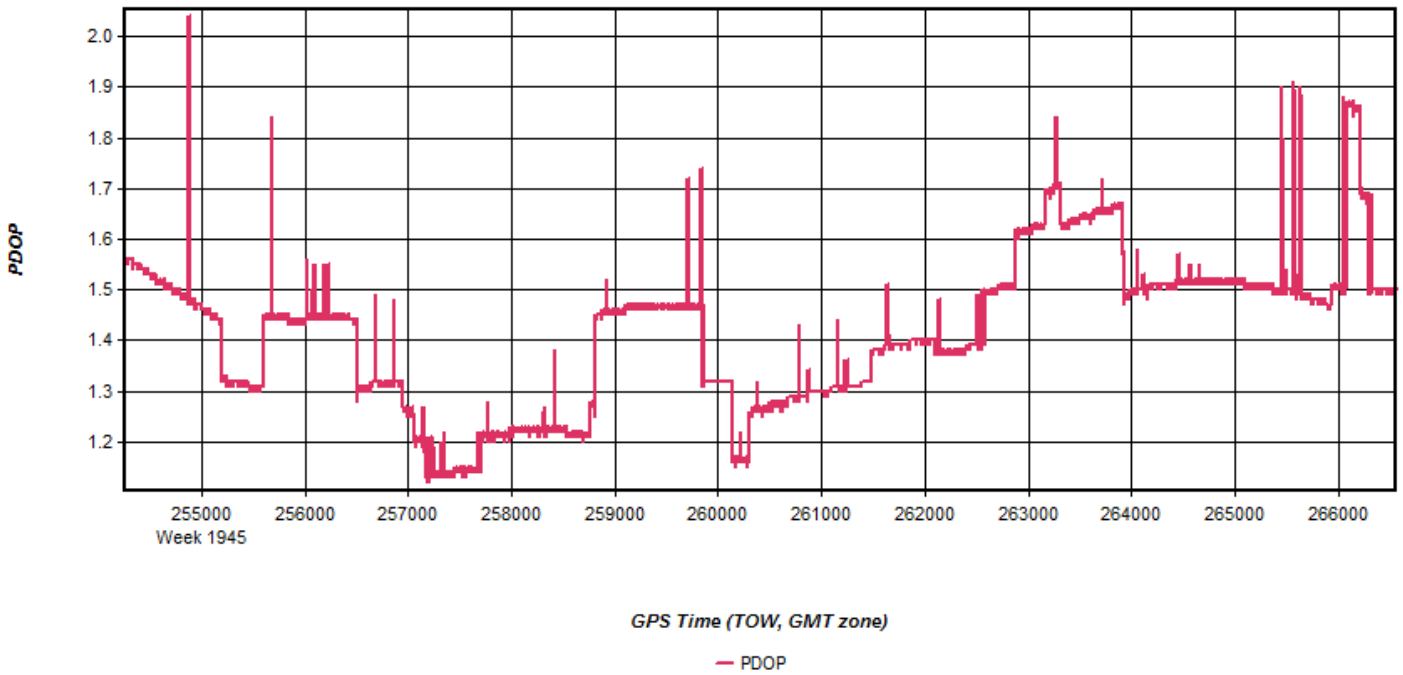
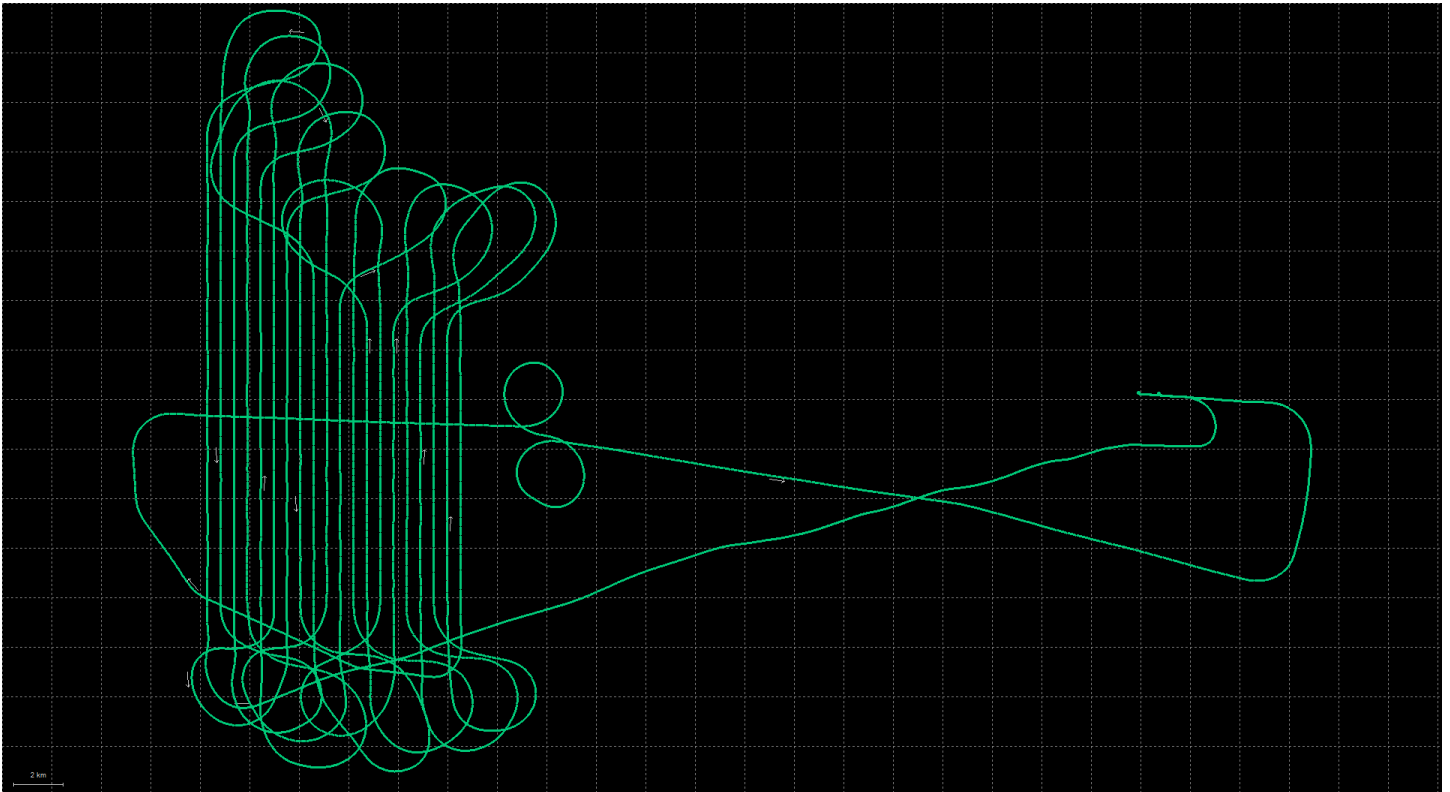
Shut-down **Time**

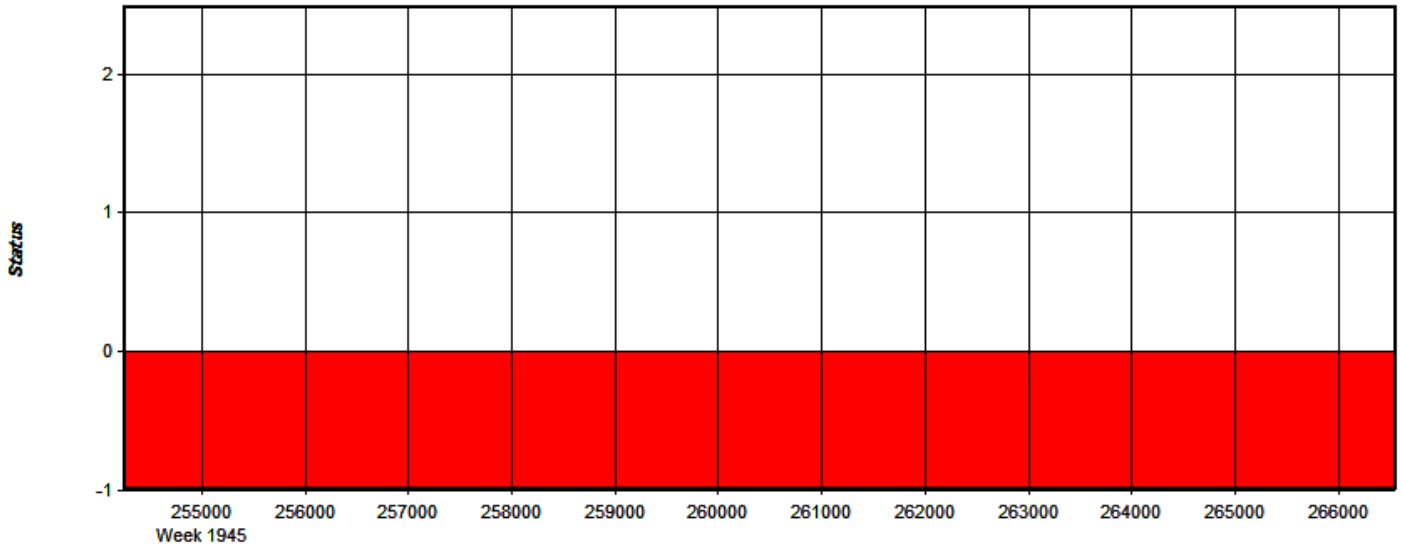
Source **Location**

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	1191	S		
		1192	N		
		1193	S		
		1194	N		
		1195	S		
		UL-E	E		
		1271	S		
		1270	N		
		1269	S		
		1268	N		
		1267	S		
		1266	N		
		1265	S		
		1264	N		
		1263	S		
		1262	N		
		1261	S		
		1260	N		
		1259	S		
		1258	N		
		1257	S		
		1256	N		
		1255	S		
		1254	N		
		1253	S		
		1252	N		
		1251	S		
		UL-2E	E		
		1068	N		

This is a repeat line - as Per Q

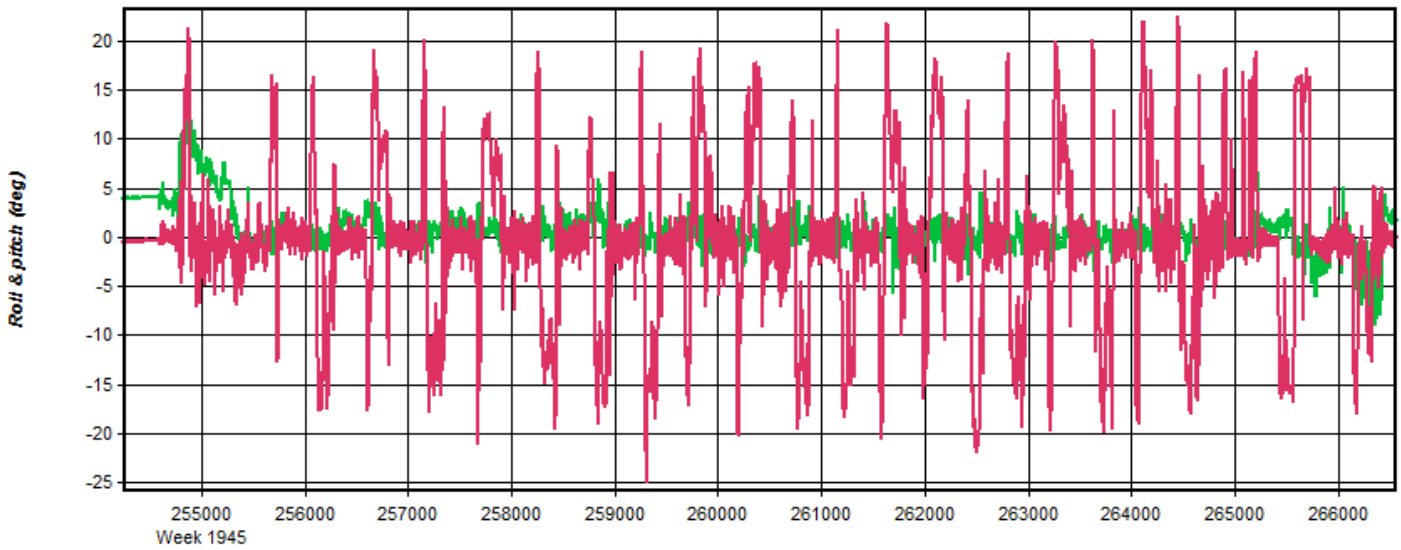
April 18, 2017-B (N916WC, SN8119)





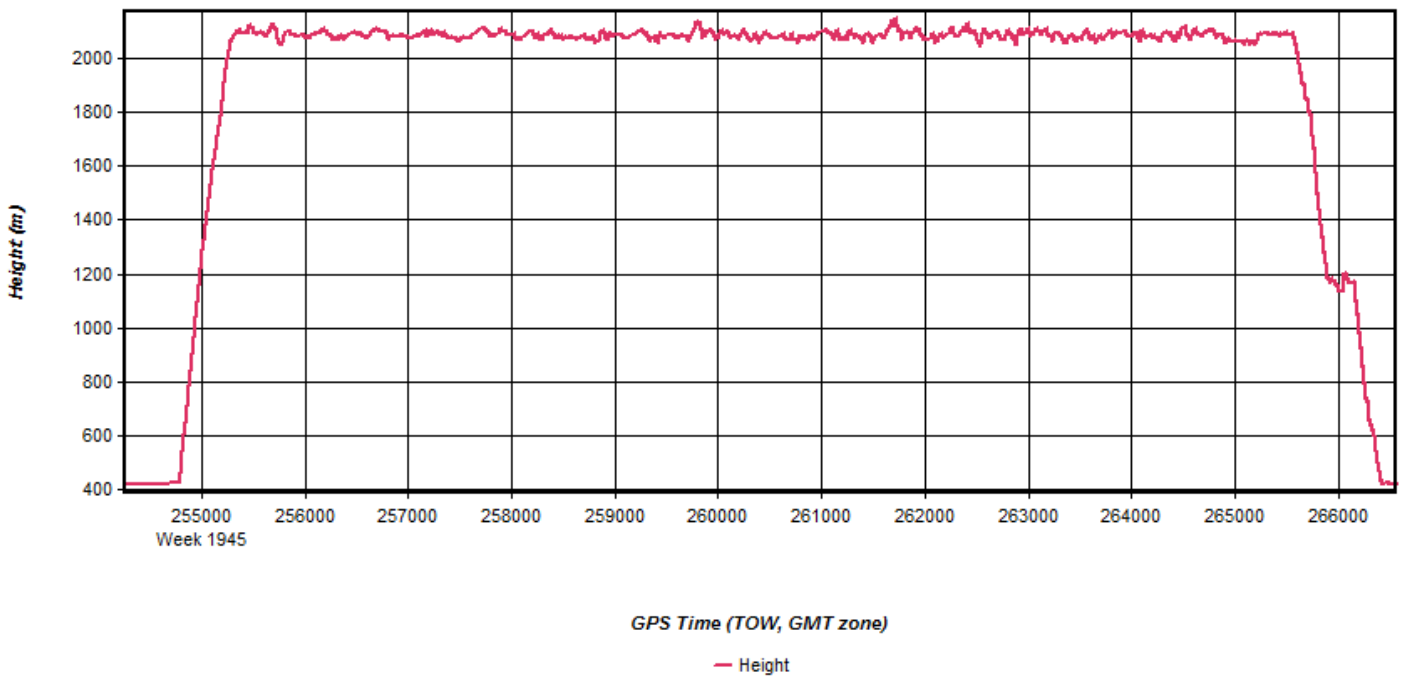
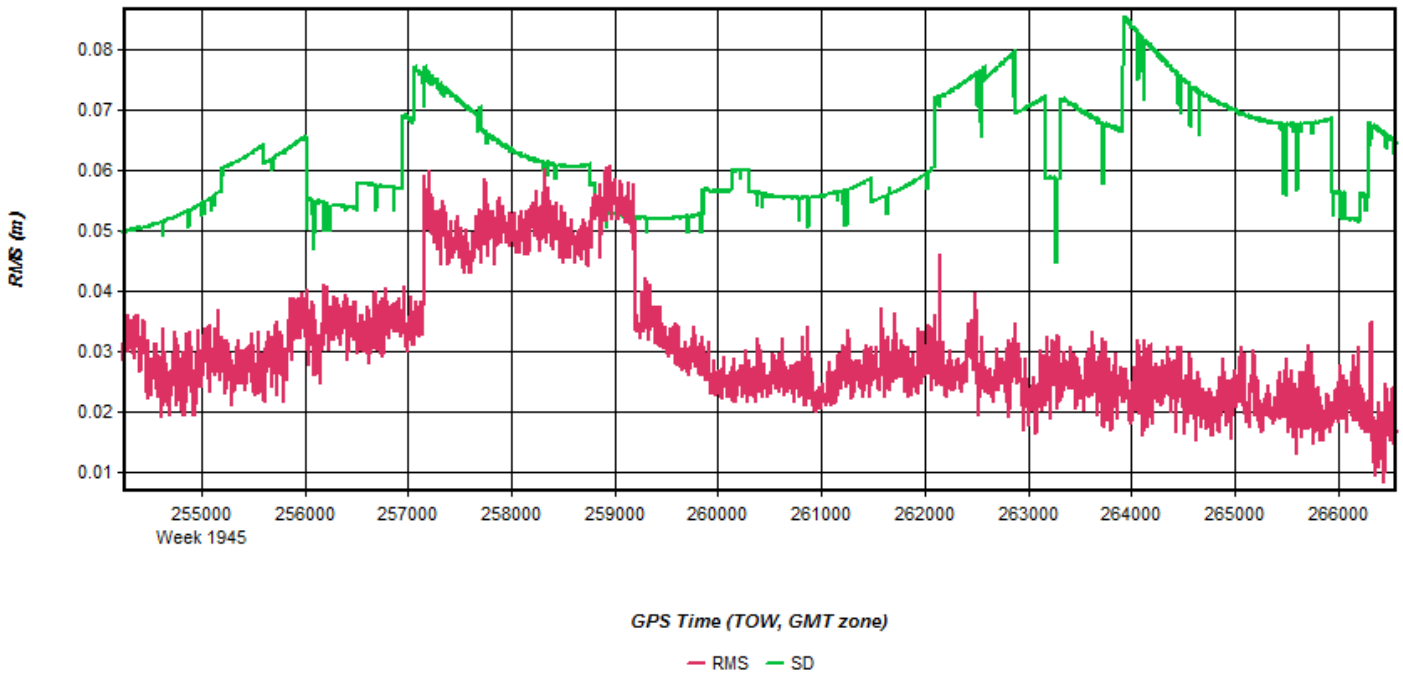
GPS Time (TOW, GMT zone)

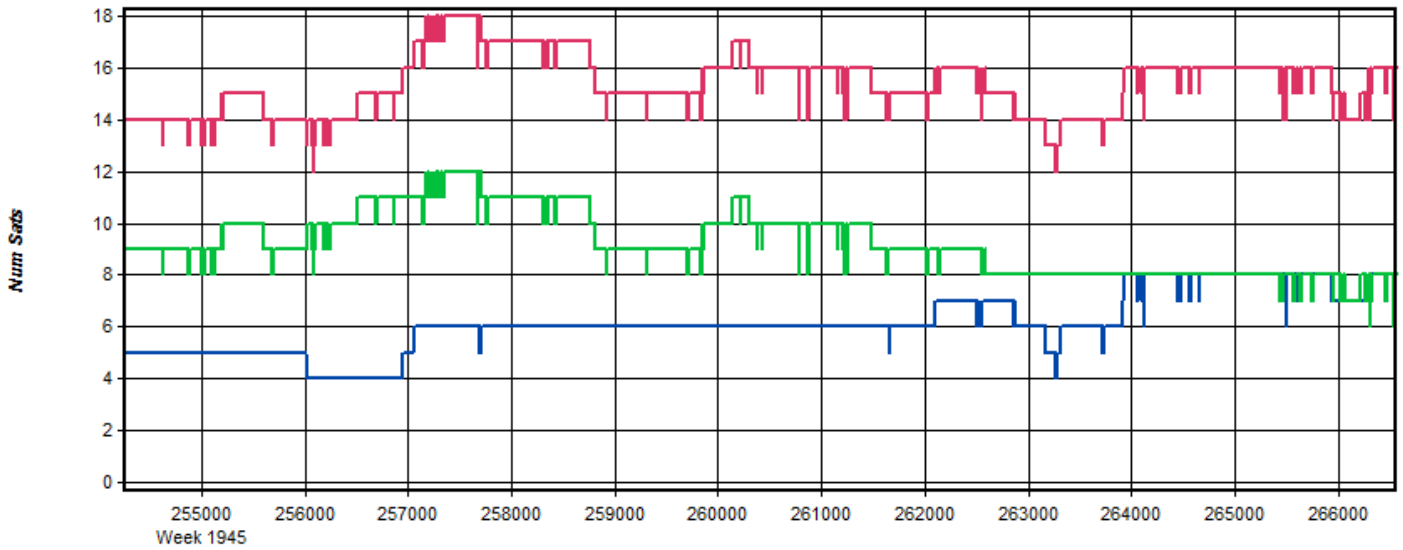
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

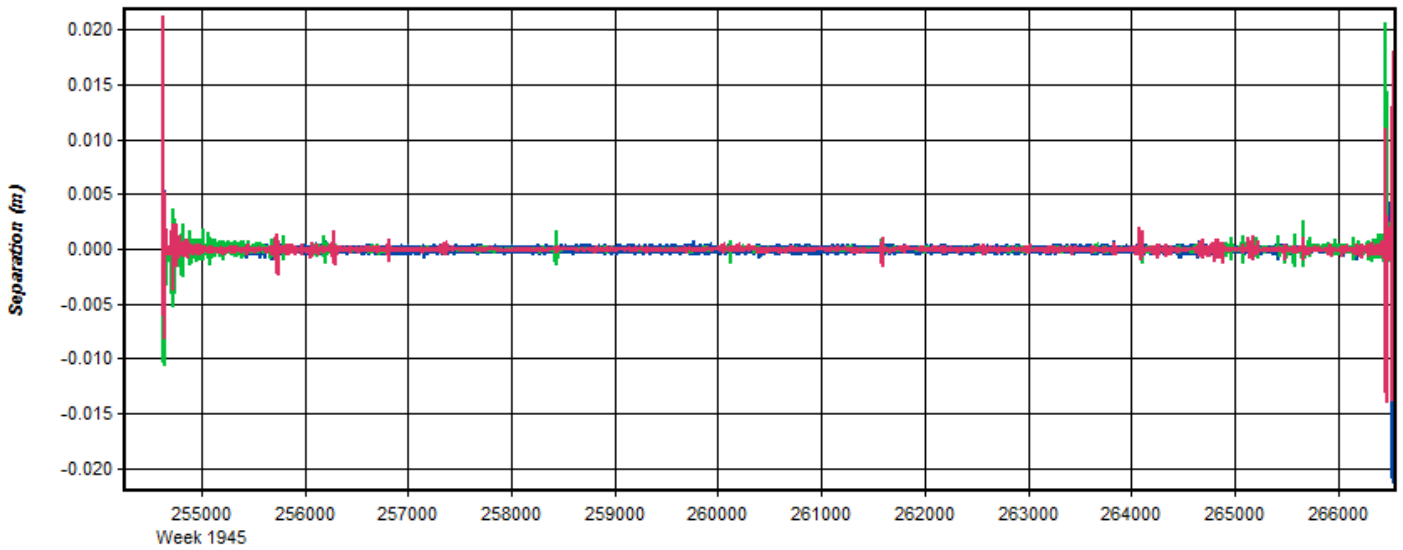
— Roll — Pitch





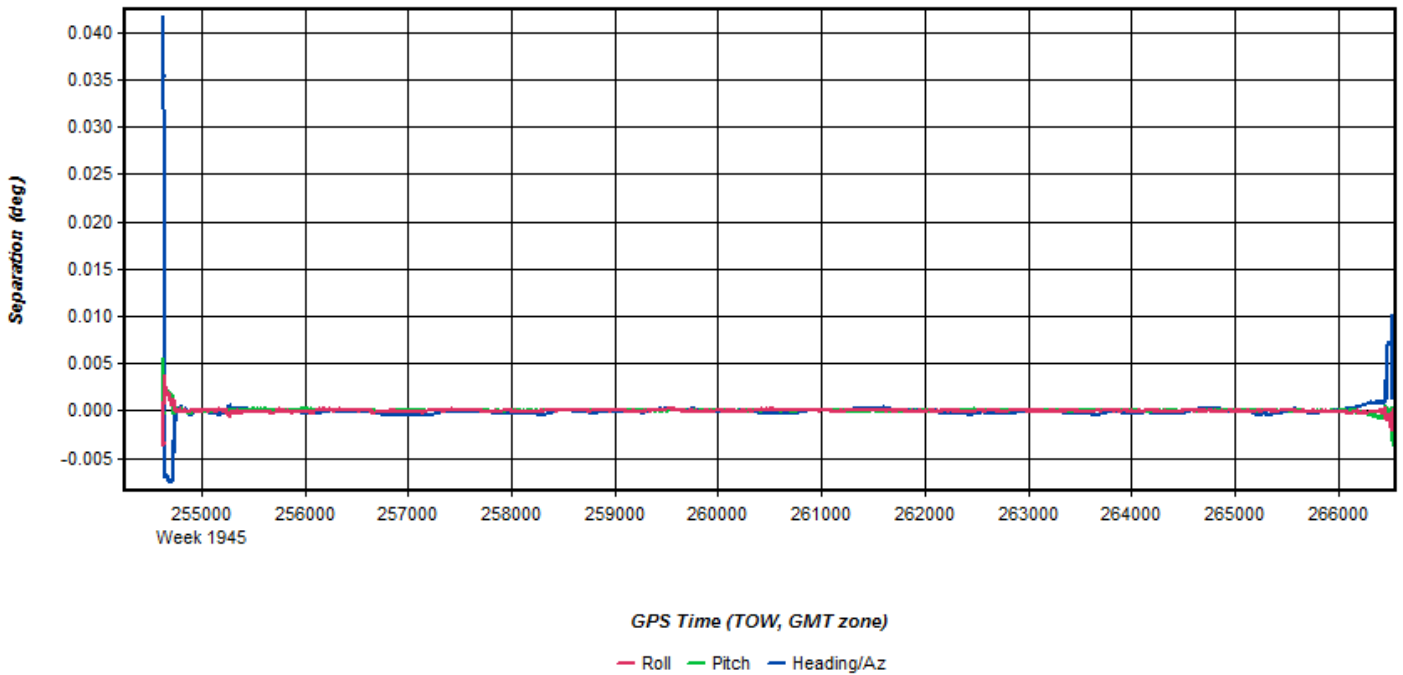
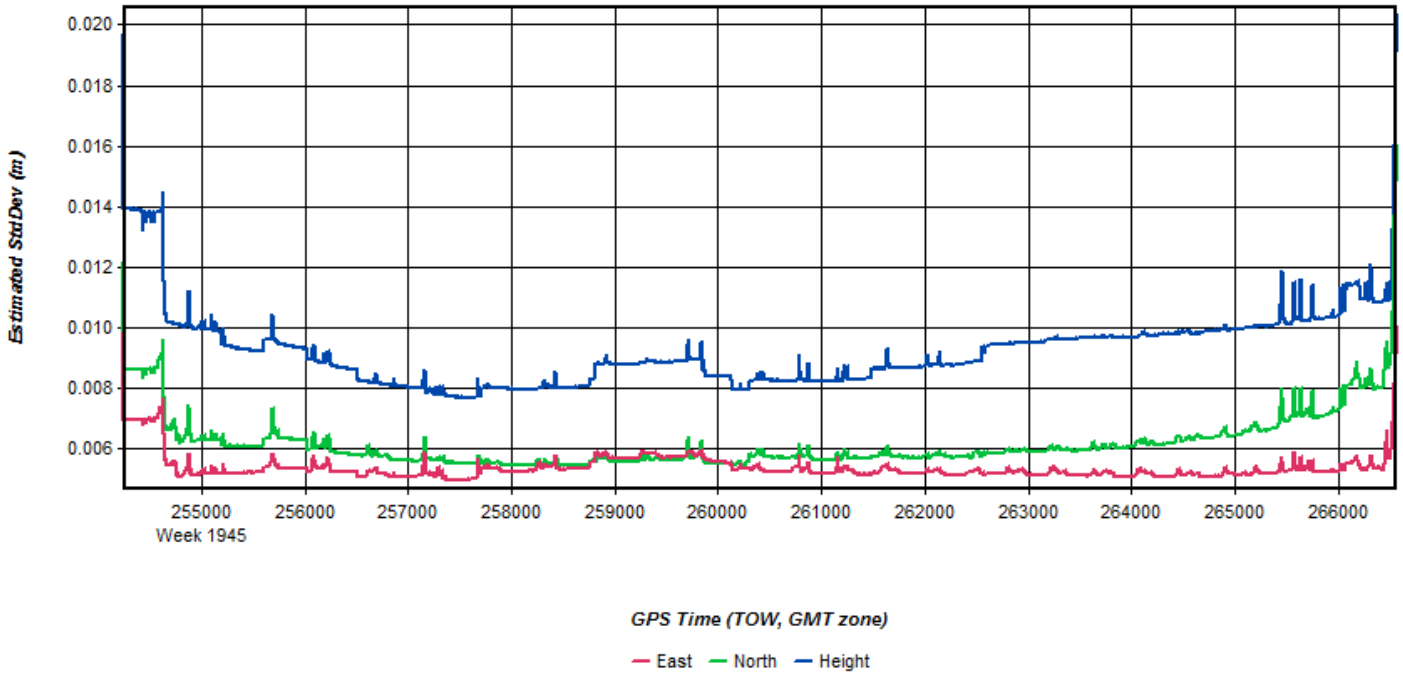
GPS Time (TOW, GMT zone)

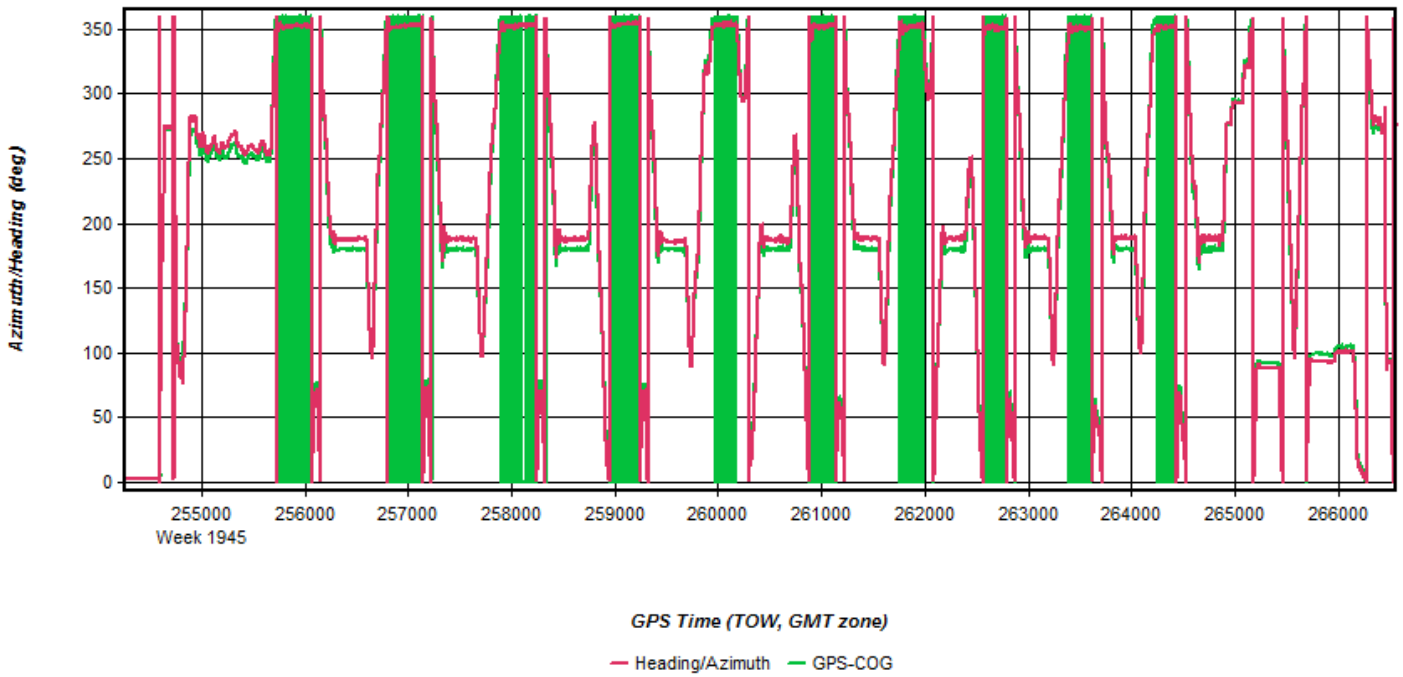
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

LIDAR
KeyW -AerOptic

CREW
mm/dd/yy

UTC DATE

AIRCRAFT

GPS

Start-up

Shut-down

WEATHER

LIDAR STARTUP CHECKS

Lens cleaned	<input checked="" type="checkbox"/>
All fids uploaded	<input checked="" type="checkbox"/>
Pilot's screen functional	<input checked="" type="checkbox"/>
Compact flash drive space	<input checked="" type="checkbox"/>
SSDs have space	<input checked="" type="checkbox"/>
Startup beeps & IPAS recording	<input checked="" type="checkbox"/>

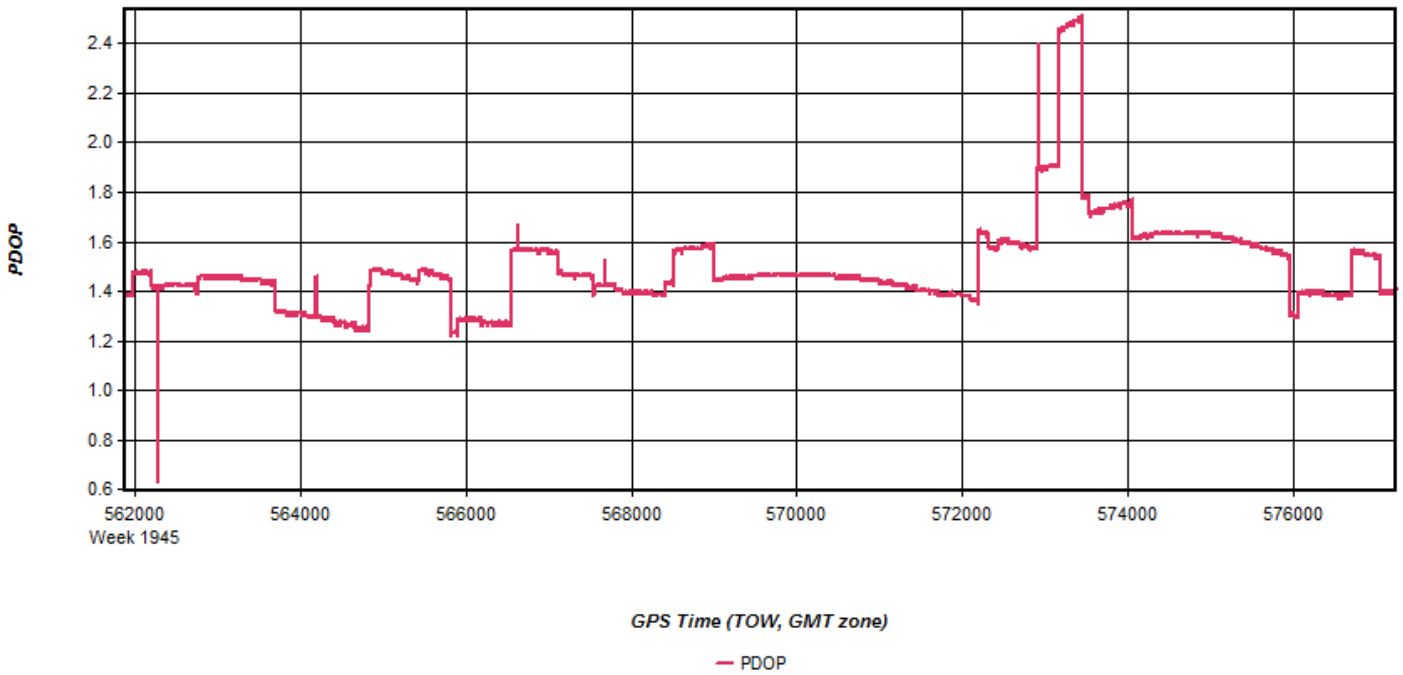
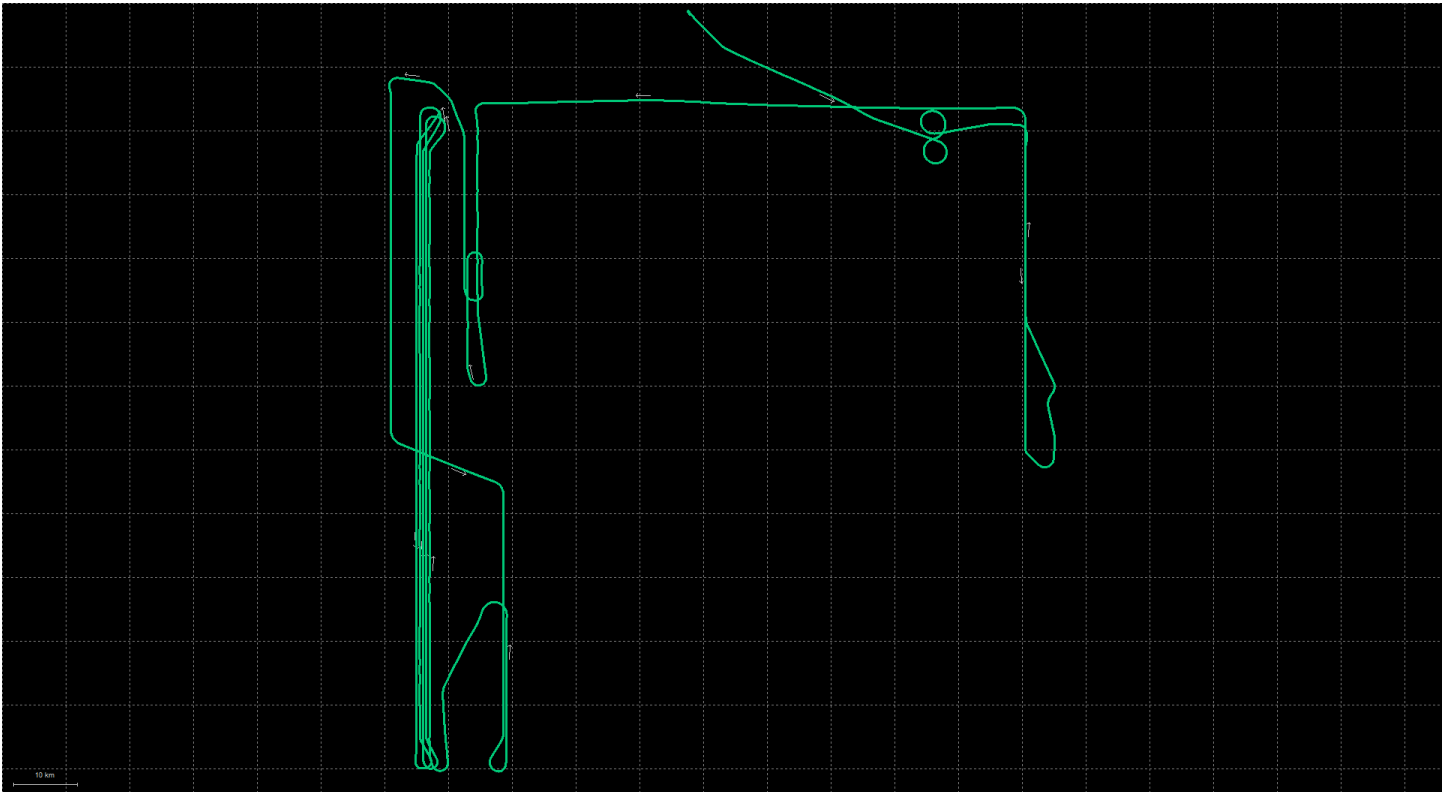
Initials: _____

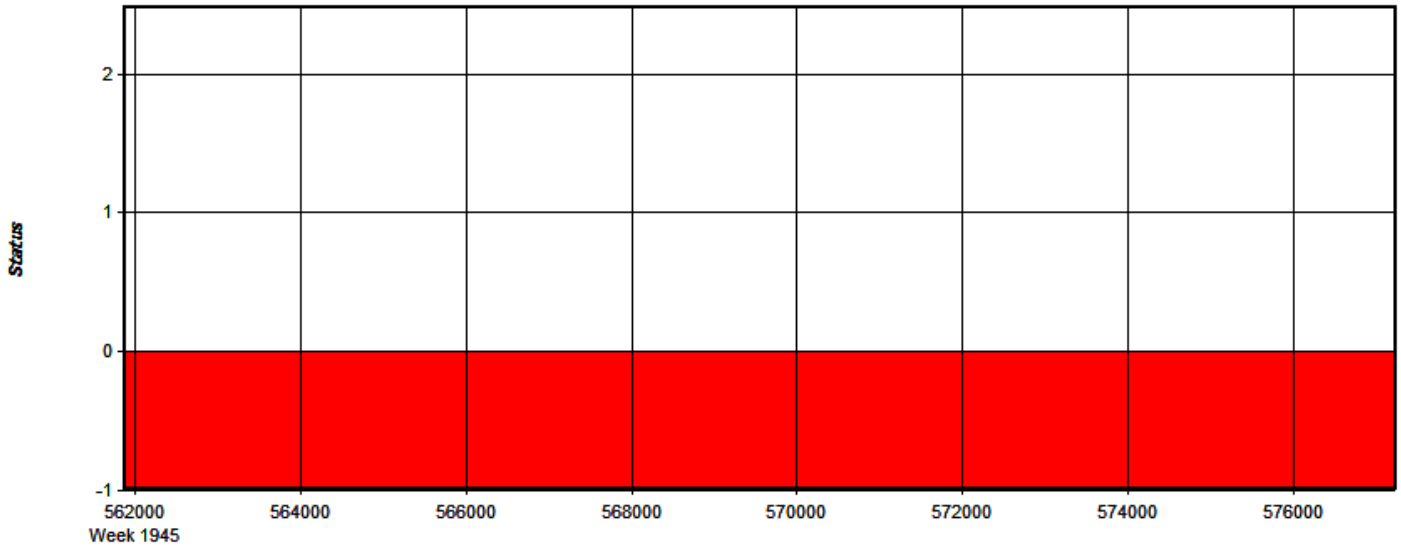
SSD

Drive #	SSD1
@ Beginning	Space Used
Space Used	During Mission
Remaining	Tot Space
unk	unk

Job #	Location/ Site/Block	Line #	Flight Dir.	Crab Angle	Remarks
3DEP	1	2231	N		
		2232	S		
		2233	N		
		2234	S		
		2235	N		
		2236	S		
		2237	N		
		2238	S		
		2239	N		
		2240	S		
		2241	N		
		2242	S		
		2243	N		
		2244	S		
		2245	N		
		2246	S		
		2247	N		
		2248	S		
		2249	N		
		2250	S		
		UL-E	E		

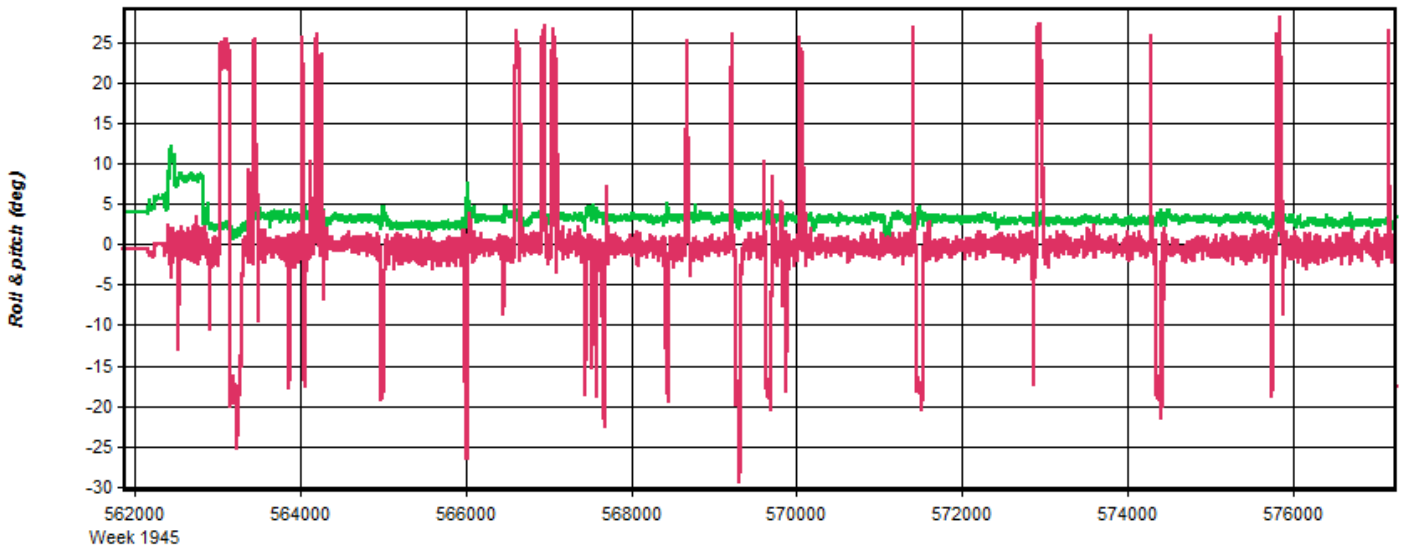
April 22, 2017-A (N246MP, SN8227)





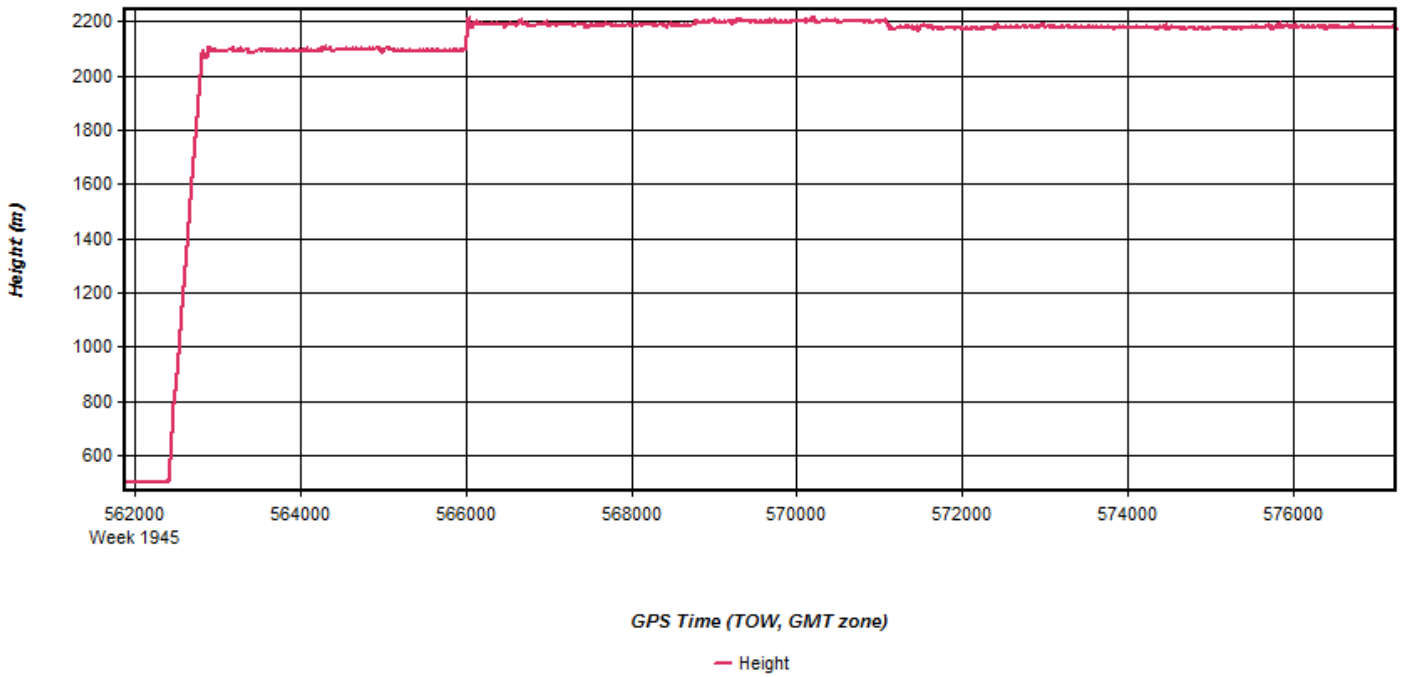
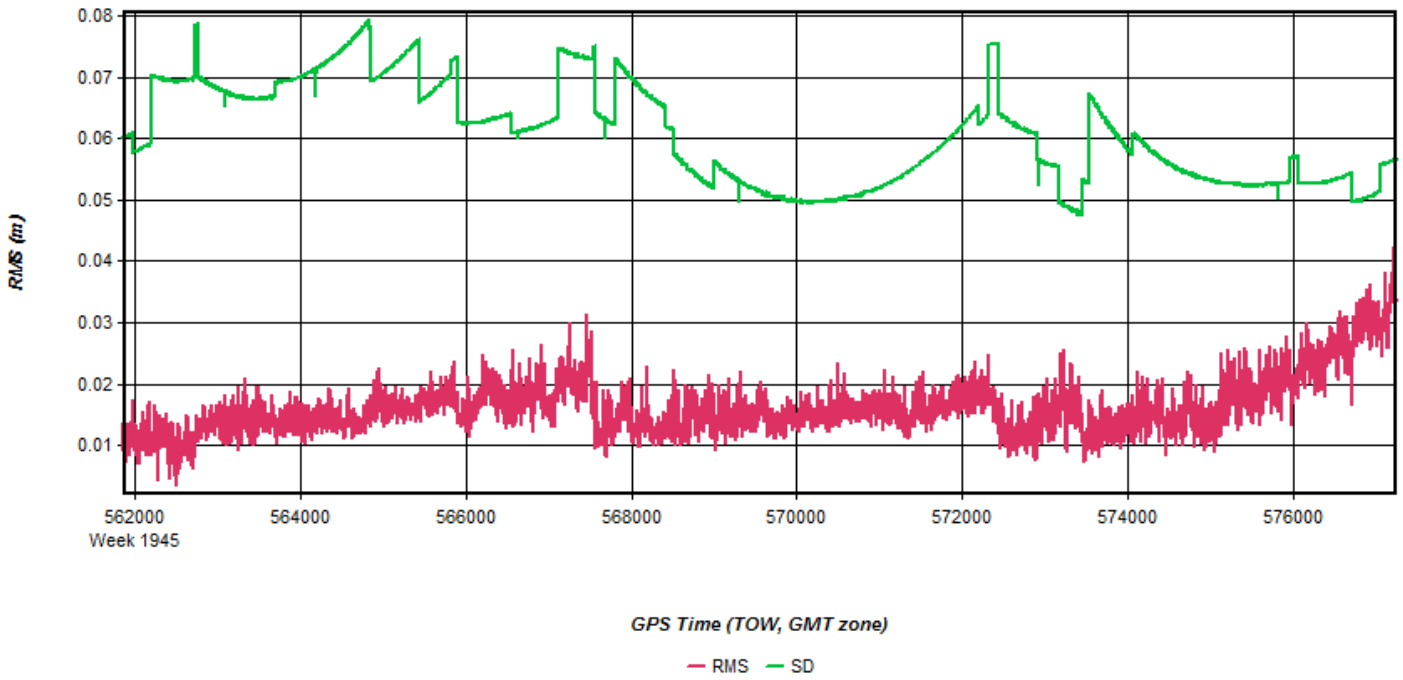
GPS Time (TOW, GMT zone)

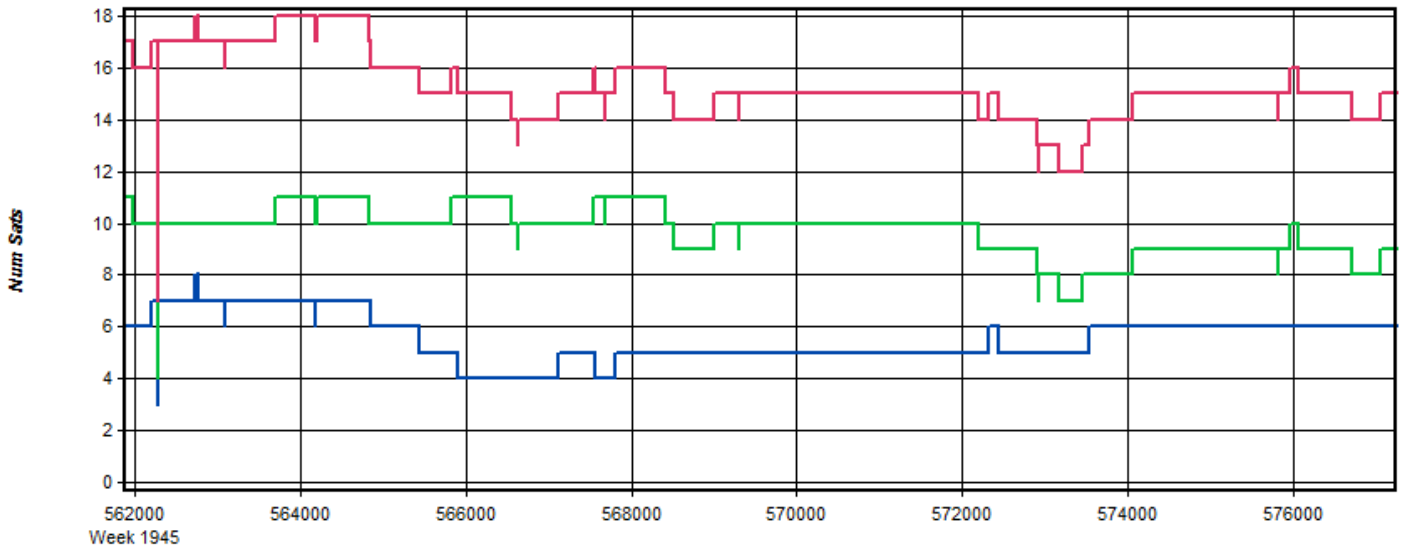
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

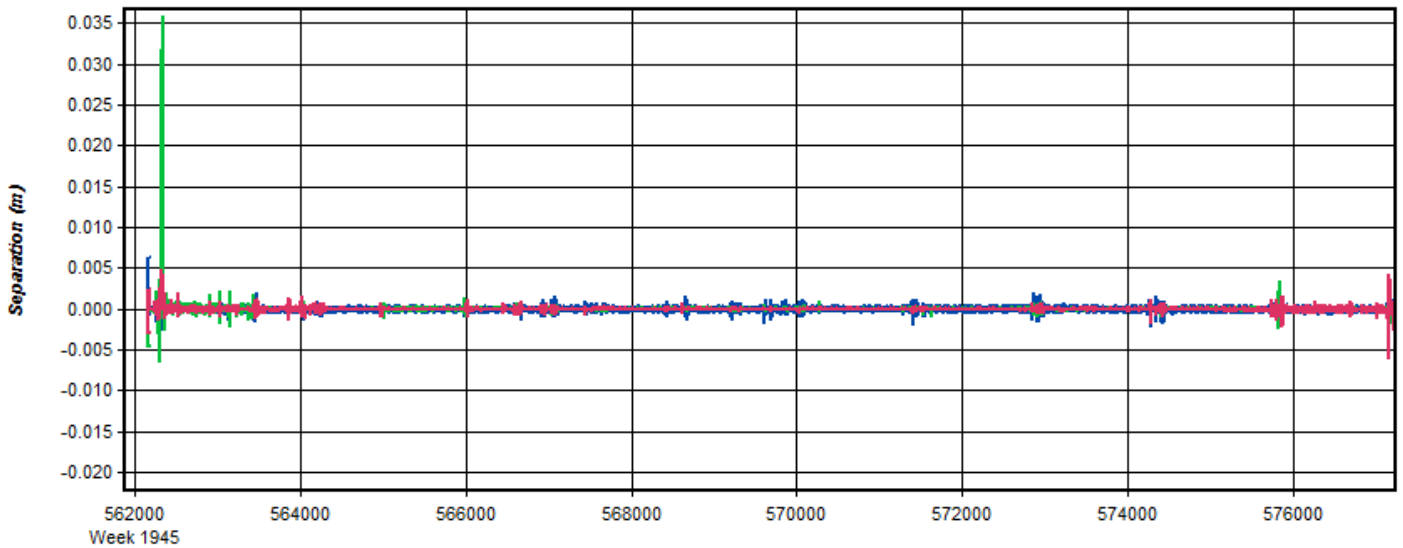
— Roll — Pitch





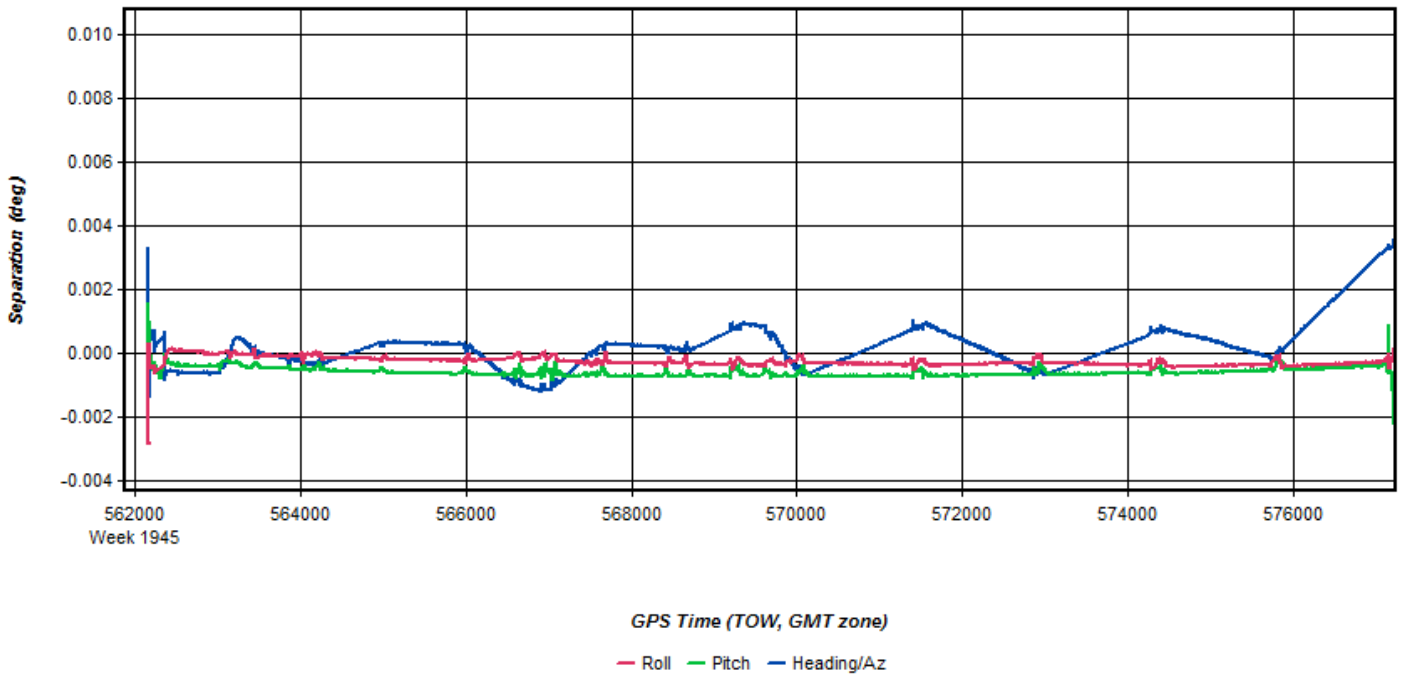
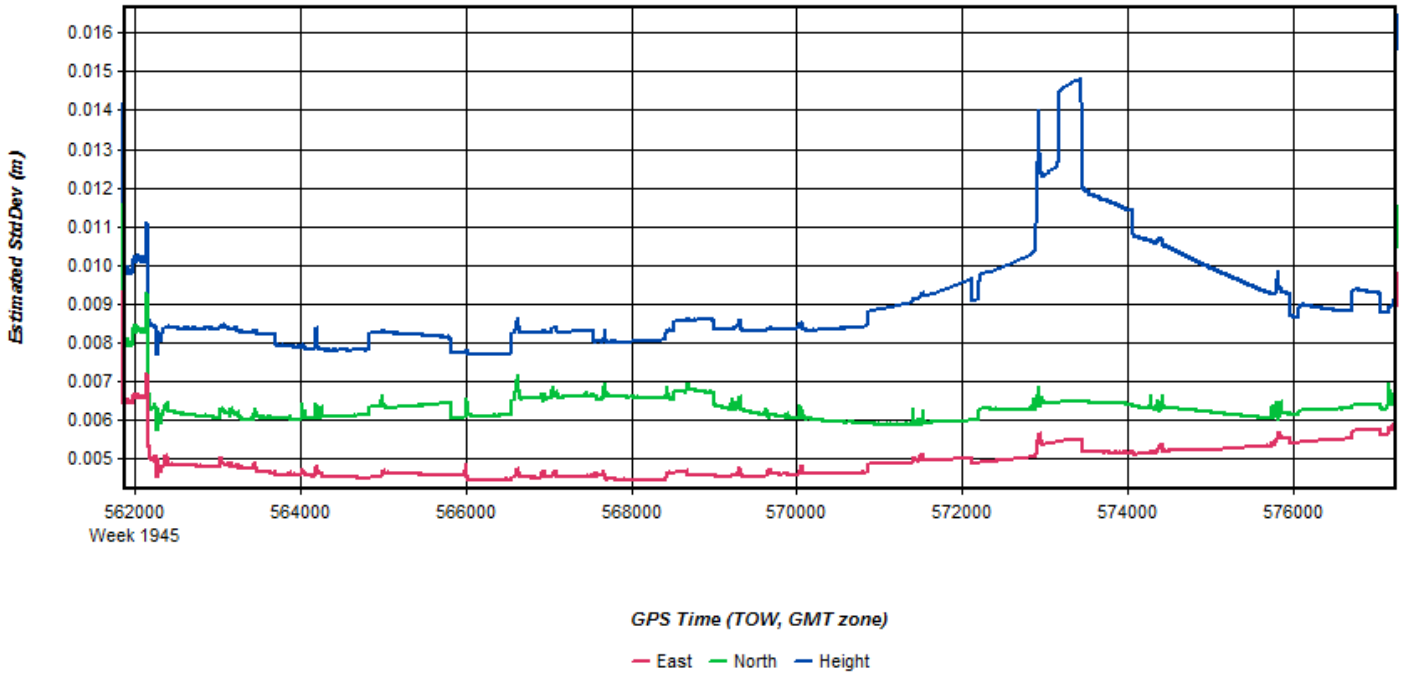
GPS Time (TOW, GMT zone)

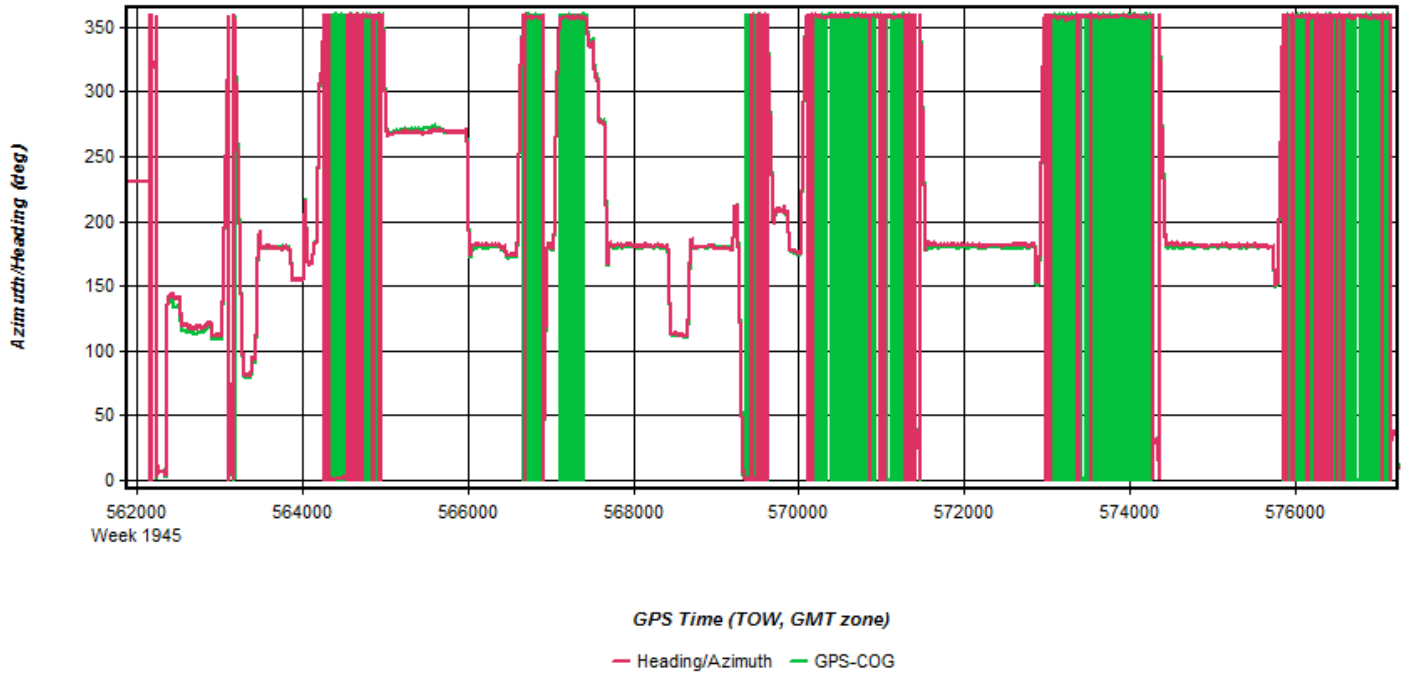
— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS



GPS Time (TOW, GMT zone)

— East — North — Up





Flight Log

Quantum Spatial Airborne LiDAR Data Collection Log Sheet :: Quantum Spatial, Inc
(email log daily to flight_log_distribution_list@quantumspatial.com)

Date: 4-22-17
 Ln: A B C D E Pg 1 of 1

Project: S DAKOTA LIDAR Prof #: 30420 Flight Mgmt File:
 Aircraft: 246MP Begin Hobbs: 1456.6 End Hobbs: 1462.8 Total: 6.2 Pilot: D JONES Co-Pilot: Tech: M AUST
 Dep Apt: PIR Dep Time (Local): 7:10 (Z): 13:10 Arr Apt: PIR Arr Time (Local): 13:17 (Z): 18:30 Tot Time Aloft:
 CORS: Y AND Sta 1: GP BASES Sta 2:
 GPS Unit: Y/N Sta 1: 132 Sta 2:
 Flyovers: Y/N If Y, times: Sta1) Sta2)
 Flyovers: Y/N If Y, times: Sta1) Sta2)
 Gd Temp beg: 0 °C End: 16 °C OAT beg: °C End: °C Altimeter begin: 3027 end: 3025

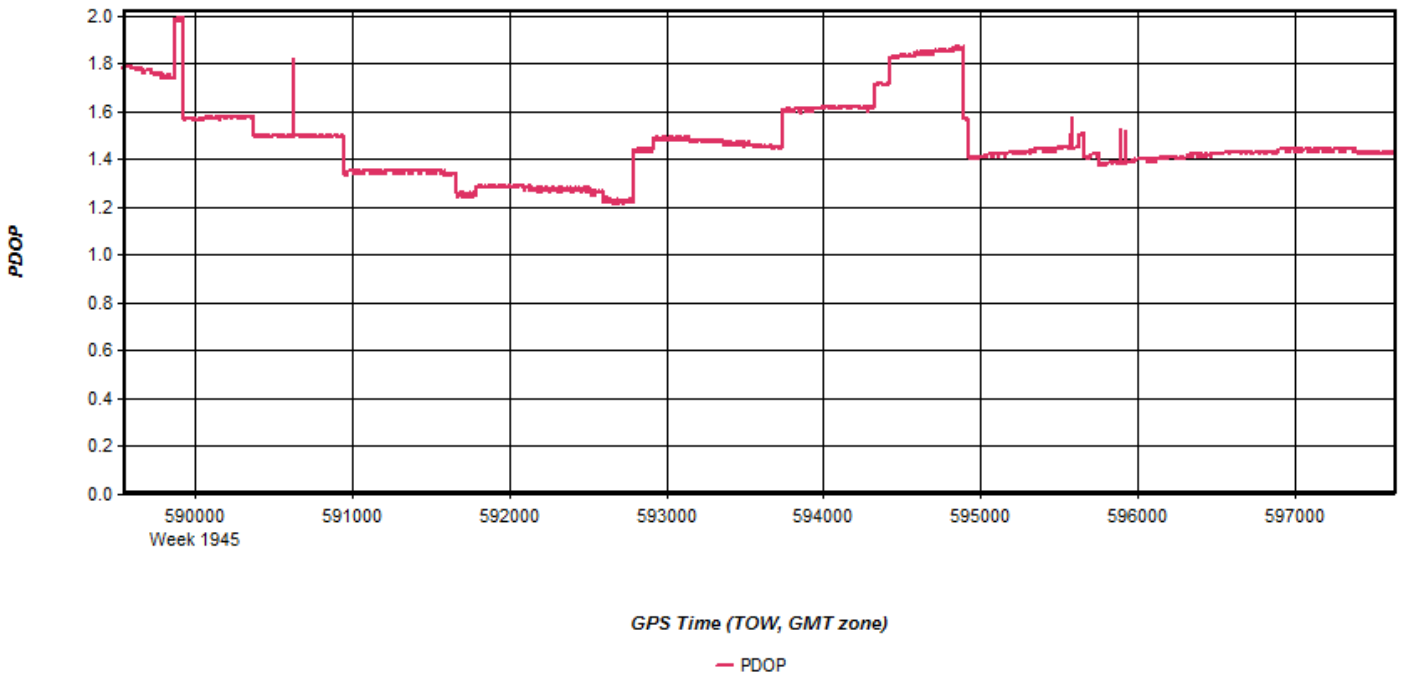
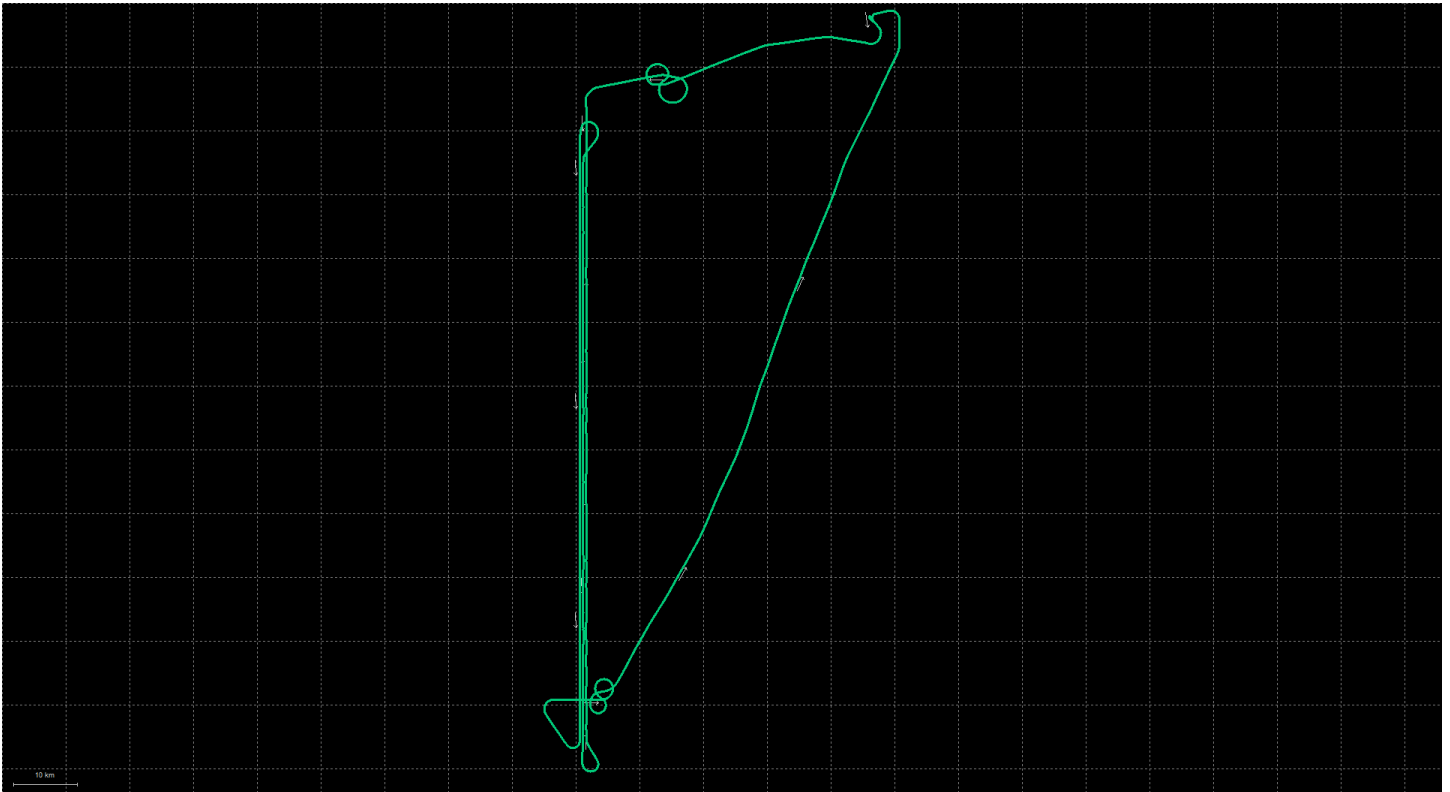
Line #	Type	Hdg	Start (UTC)	End (UTC)	Gd Spd	Alt AGL	Alt AMSL	Pulses In Air	Pulse Rate	Max Gdspd	Avg Pt Spacing	Power	PPSM	Storage Name
250	S	1233	1237	141	1.1/21	6.9	7.2	328	120					397
250	N	1245	1255	142	1.1/20	6.9								292
087	S	1315	1320	138	1.0/21	7.2								105
084	N	1325	1328	136	1.0/21	7.2								
083	N	1332	1336	138	1.1/21	7.2								
061	S	1343	1352	140	1.1/20	7.2								
095	S	1400	1406	139	1.0/20	7.2								
096	N	1409	1413	152	1.2/17	7.2								
072	N	1422	1443	147	1.2/17	7.2								
071	S	1446	1507	135	1.1/16	7.2								
070	N	1510	1530	139	1.0/18	7.2								
069	S	1534	1555	145	1.3/17	7.2								
068	N	1558	1619	145	1.1/18	7.2								
067	S	1632	1653	136	1.2/17	7.2								
068	N	1657	1720	141	1.0/20	7.2								
066	S	1723	1742	138	1.1/20	7.2								
065	N	1745	1806	144	1.1/19	7.2								
X-TIE	E	1809	18:11	135	1.2/18	7.1								

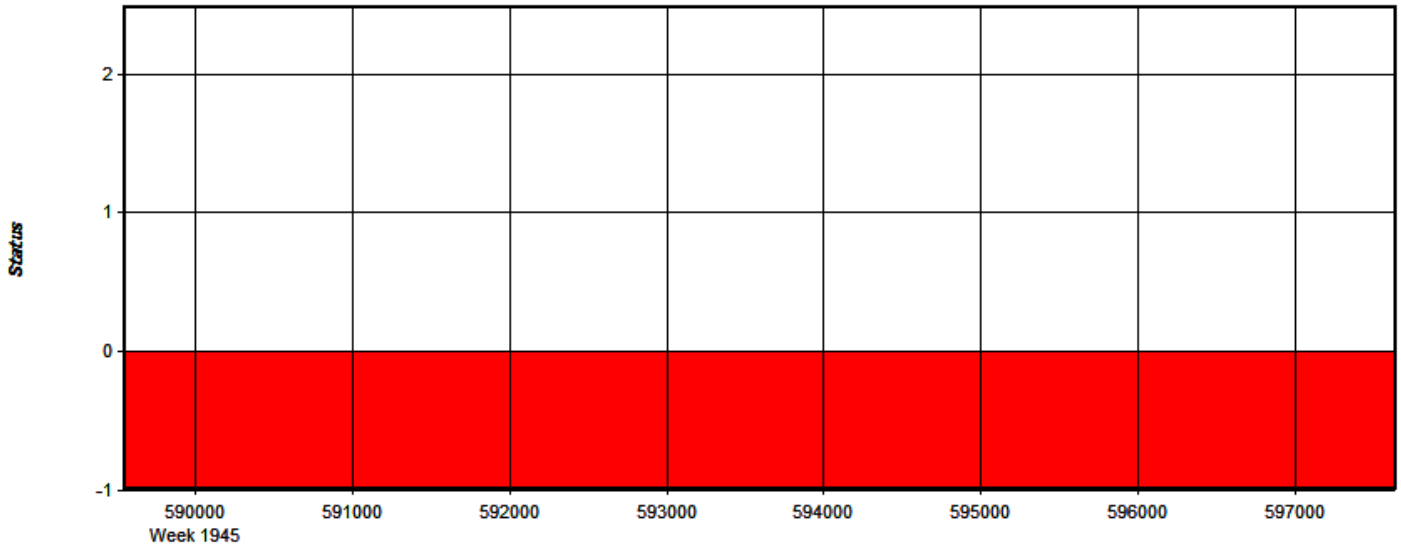
FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

RF 7-28 MI (N.END)
 RF N 28 MI
 RF 41-52 MI (N.END)
 RF 37-43 MI (N.END)
 RF 47-50 MI (N.END)
 PARTIAL N 22 MI
 RF 0-15 MI (S.END)
 RF 0-7 MI (S.END)
 RF
 RED ERROR IMU DATA MISSING - AT END OF LINE
 RF
 MANUAL CROSSFLIGHT

Total Proj Lines: _____ Lines Flown: _____ Lines Remaining: _____
 Online Time: 5:75 Mob Time: .5 Notes:

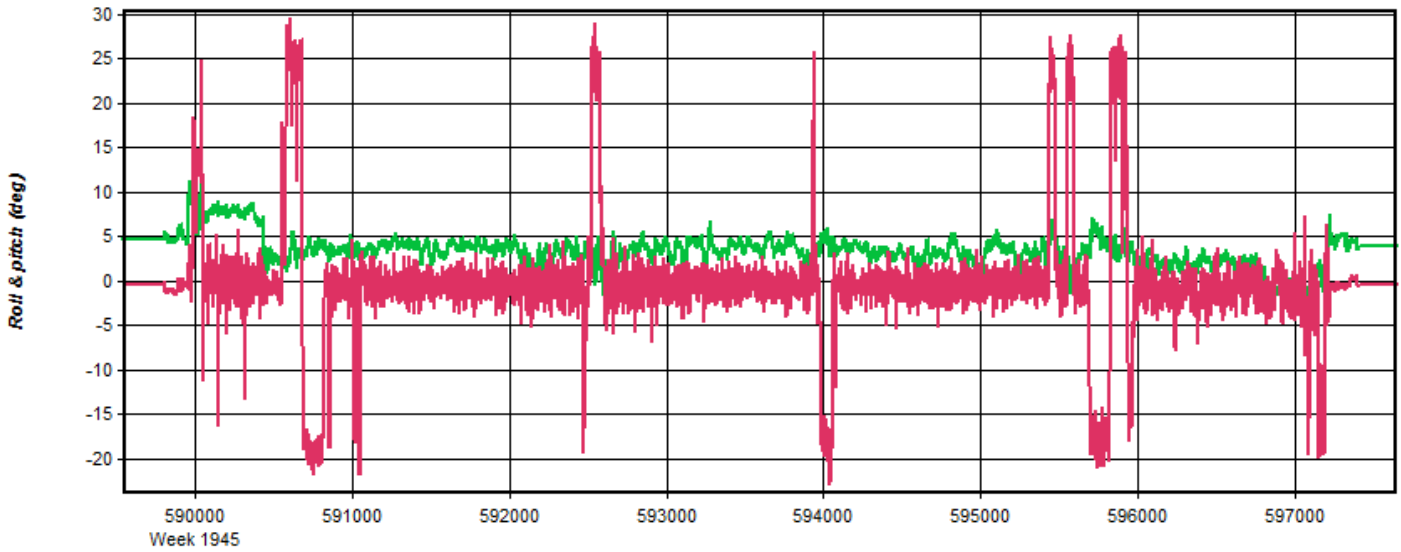
April 22, 2017-B (N246MP, SN8227)





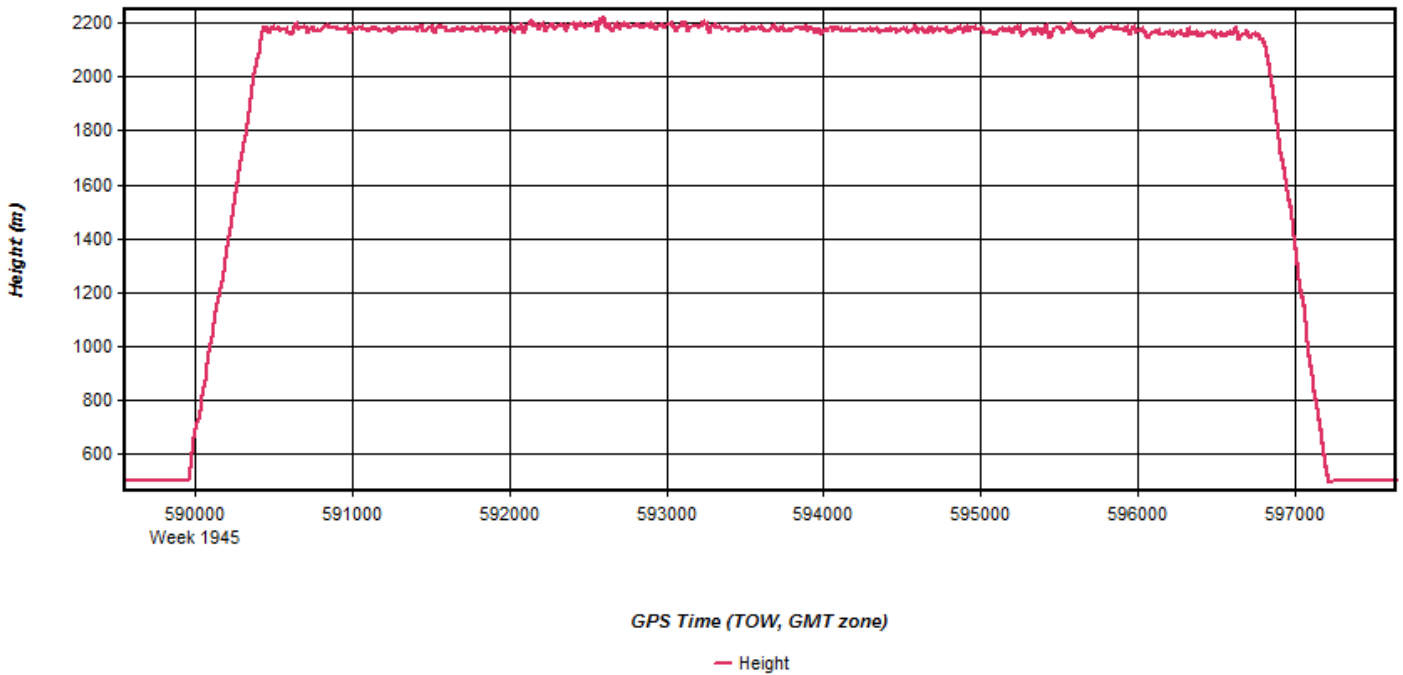
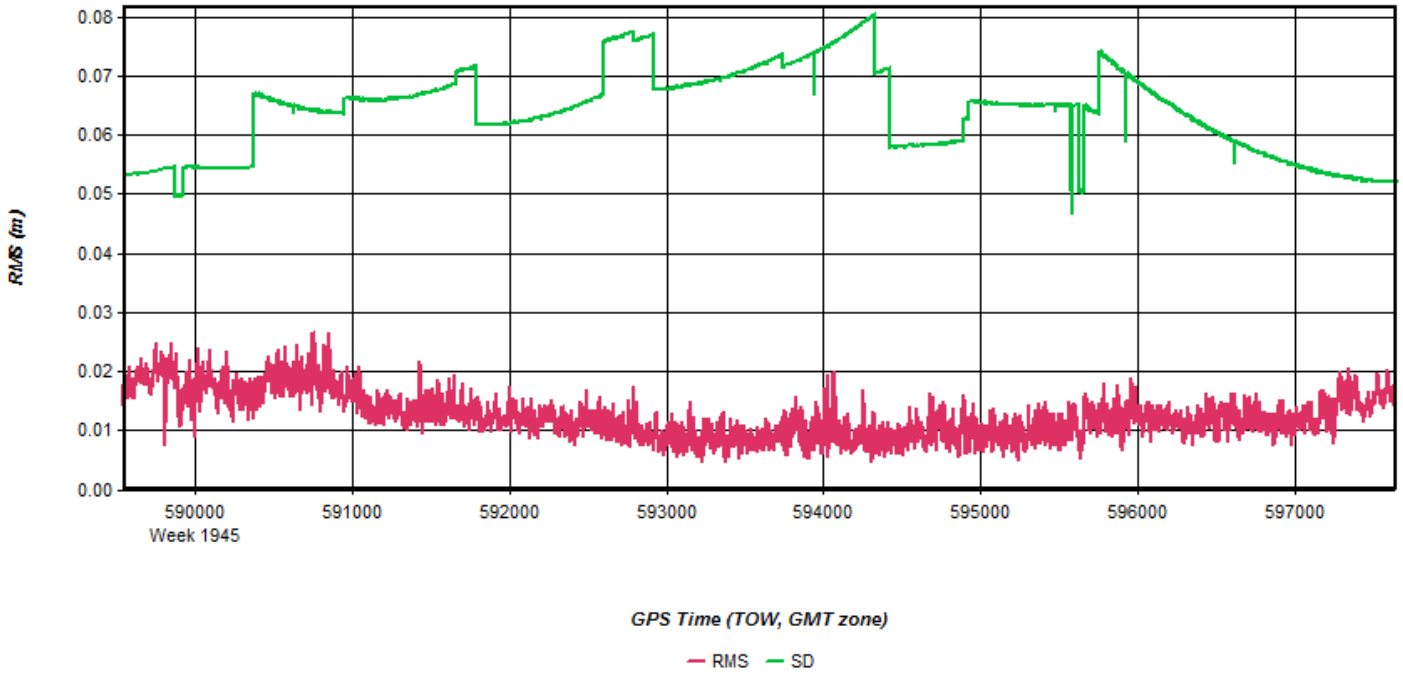
GPS Time (TOW, GMT zone)

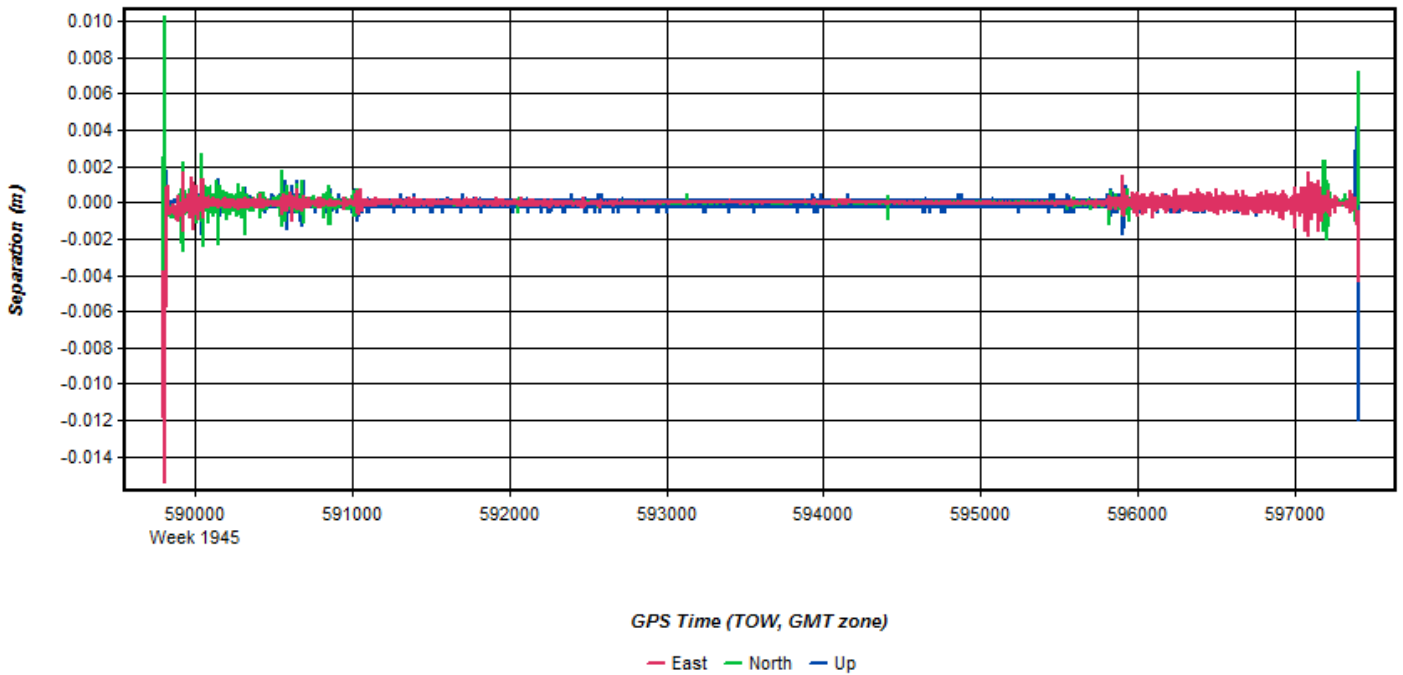
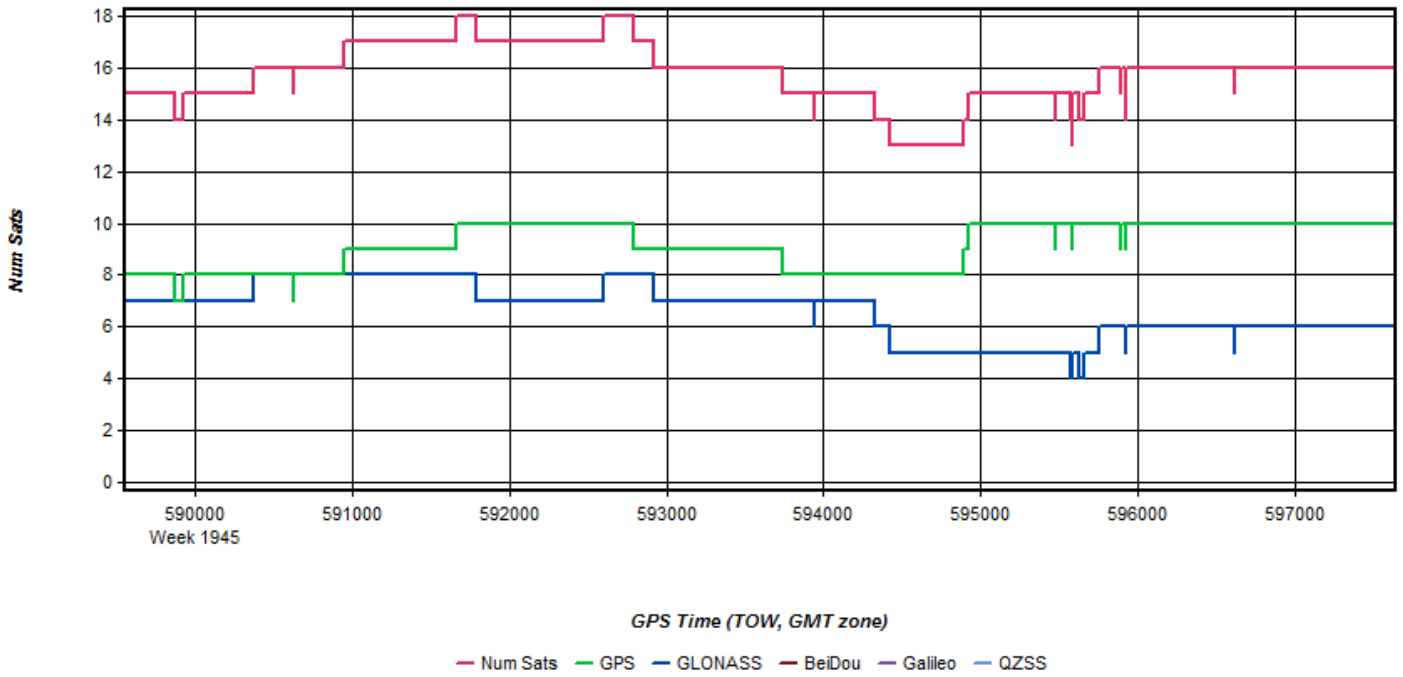
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)

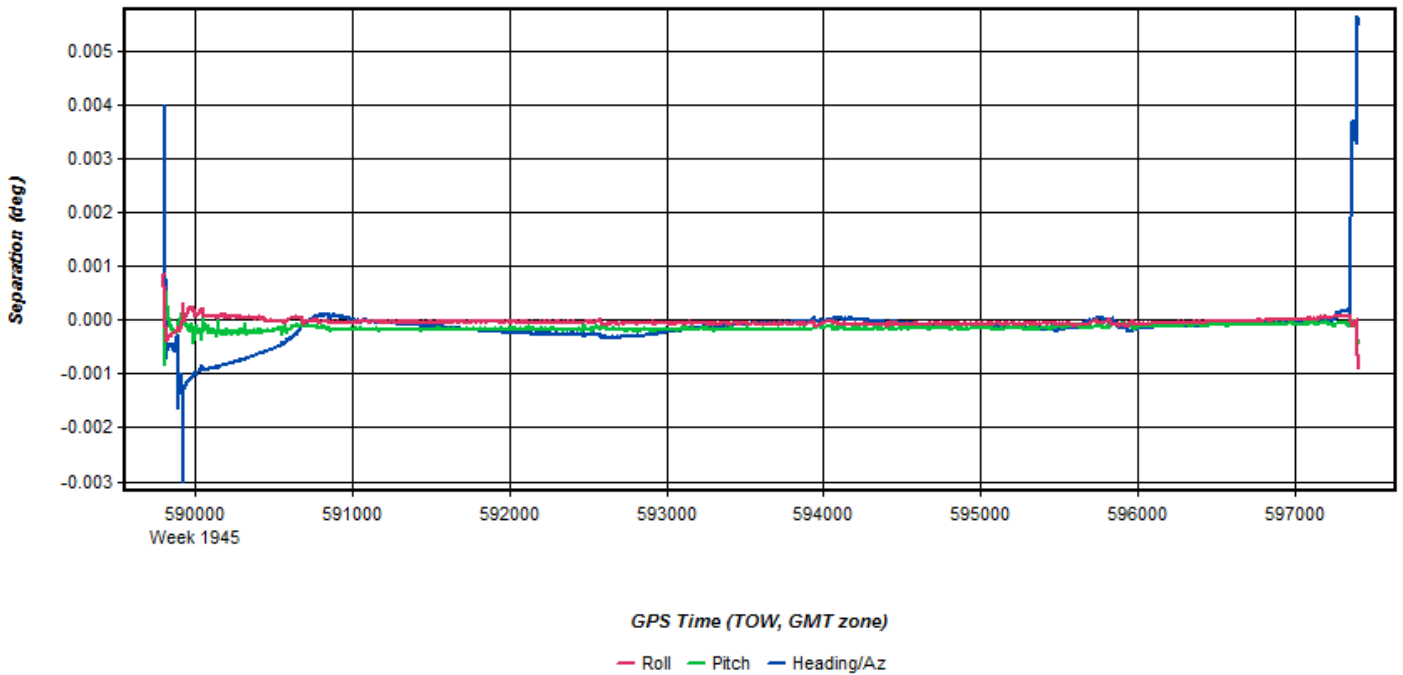
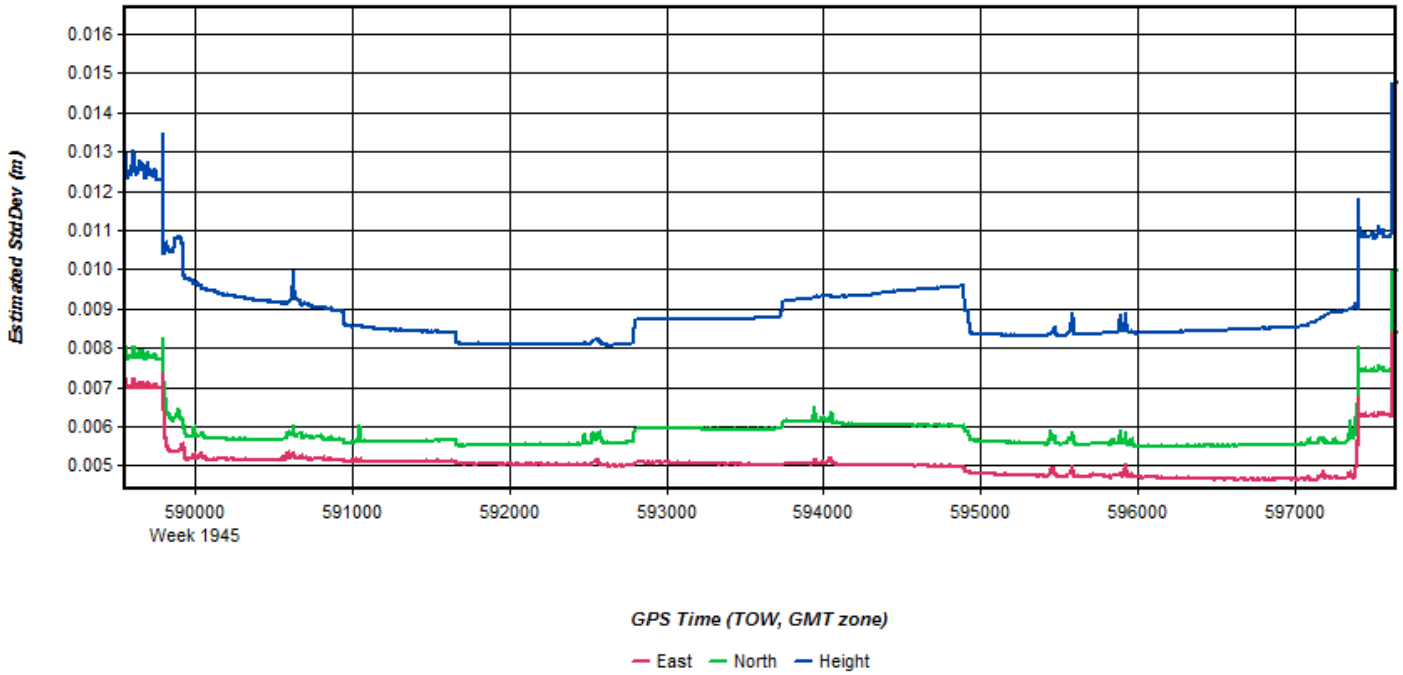


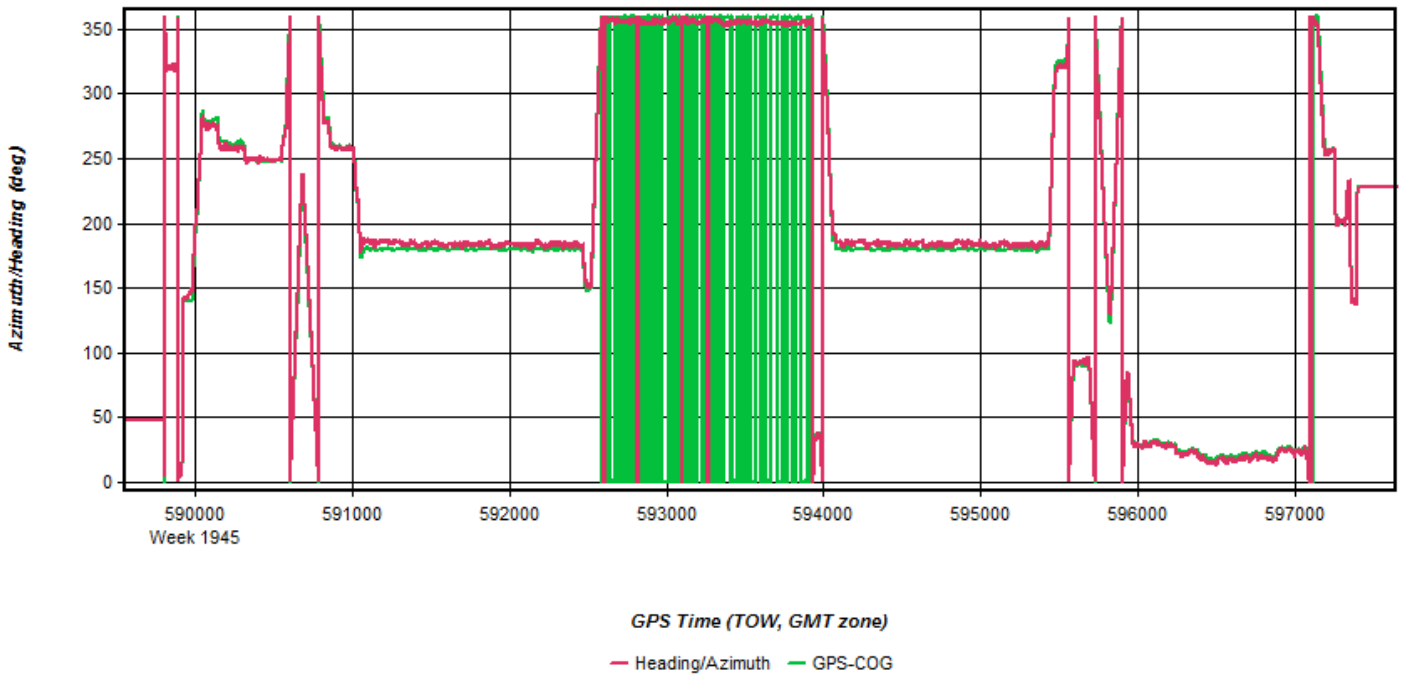
GPS Time (TOW, GMT zone)

— Roll — Pitch

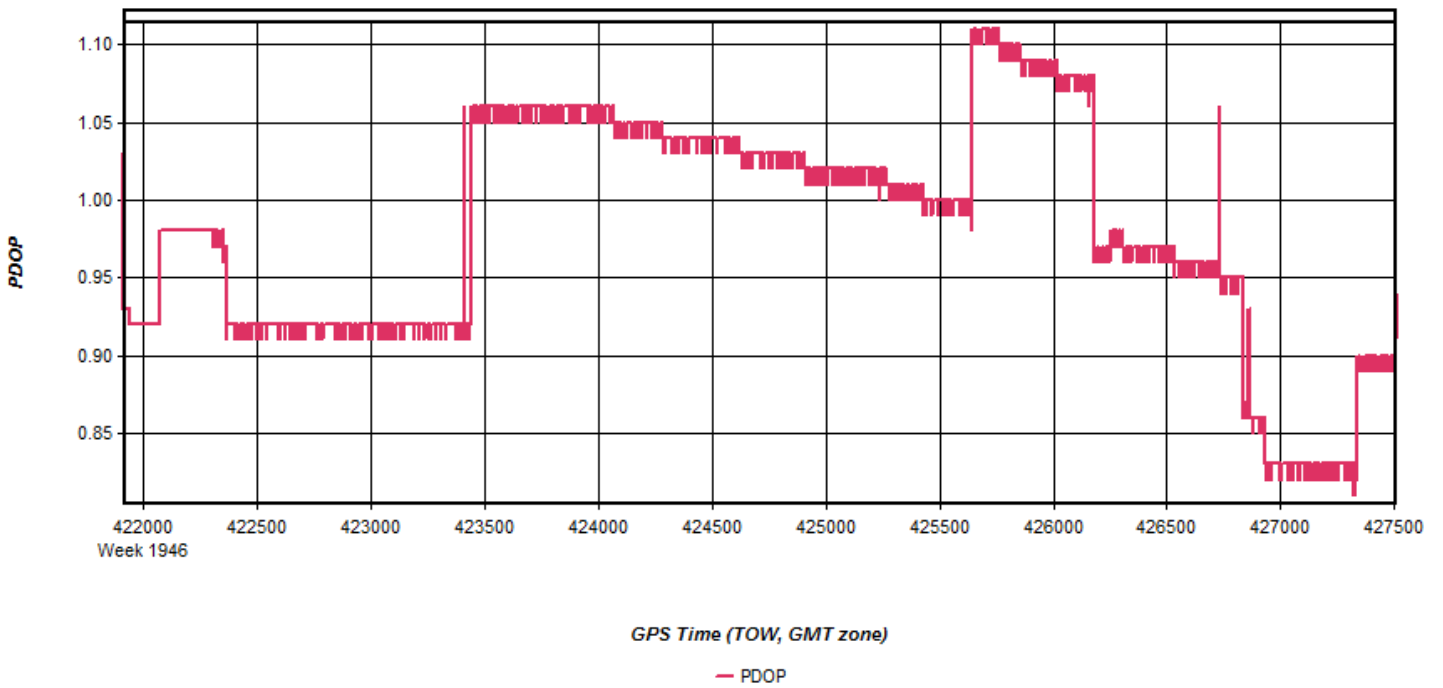


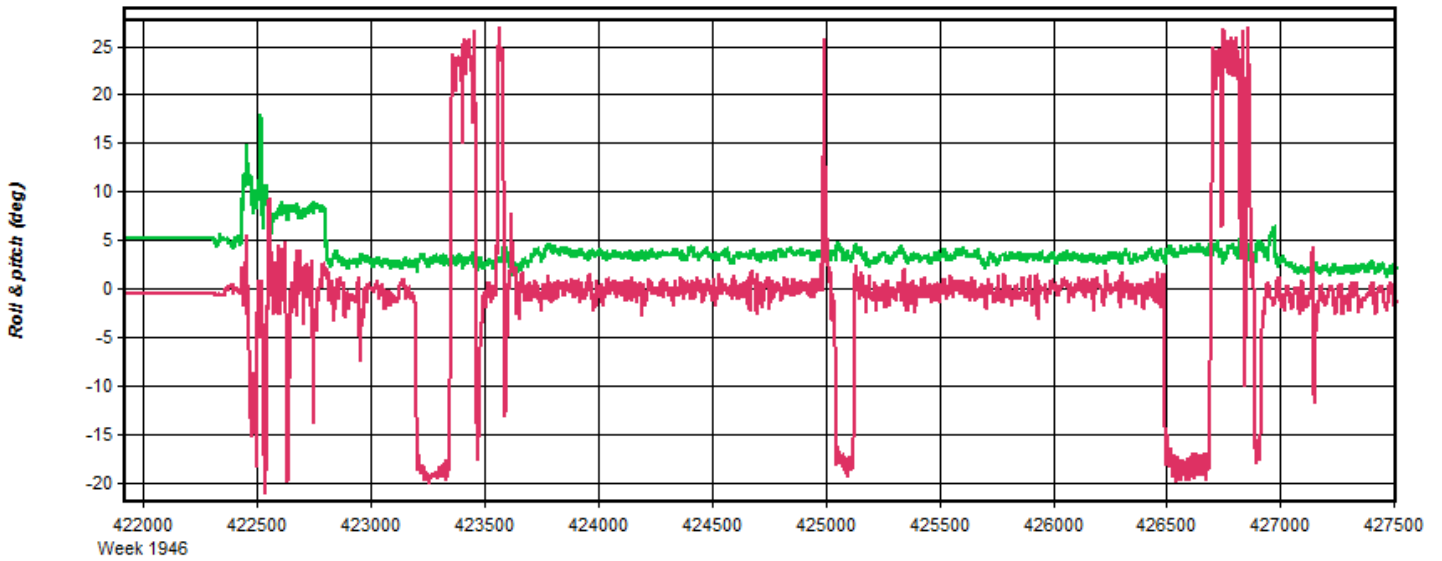






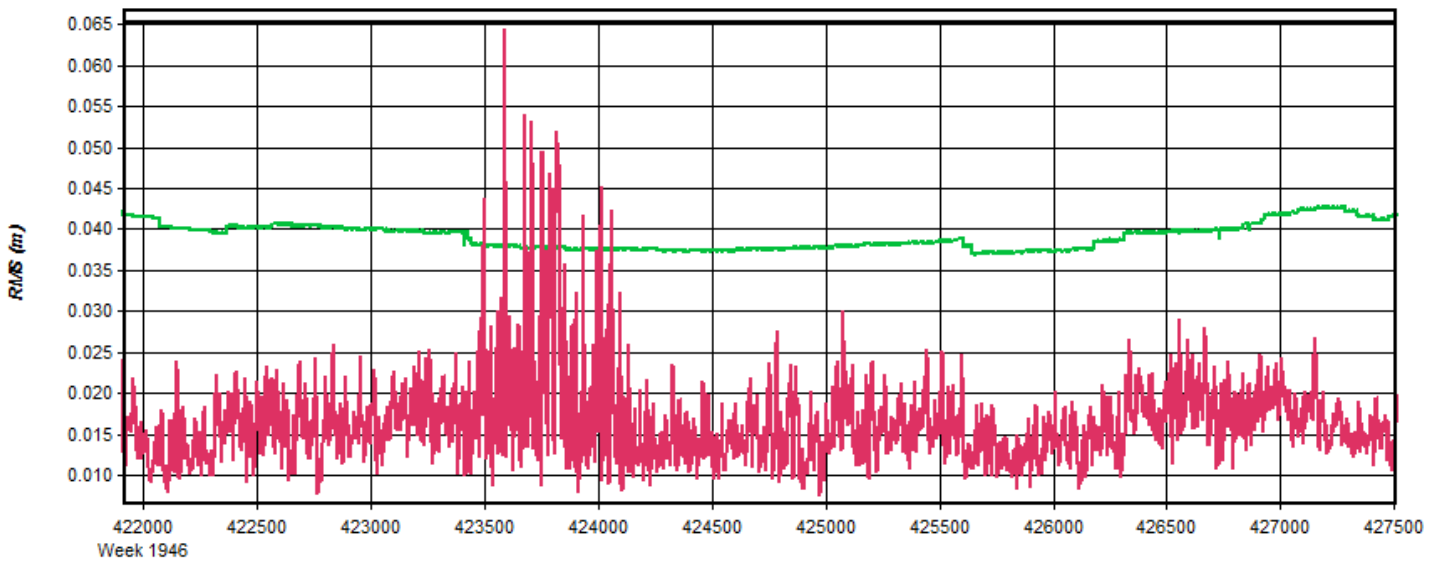
April 27, 2017-A (N246MP, SN8227)





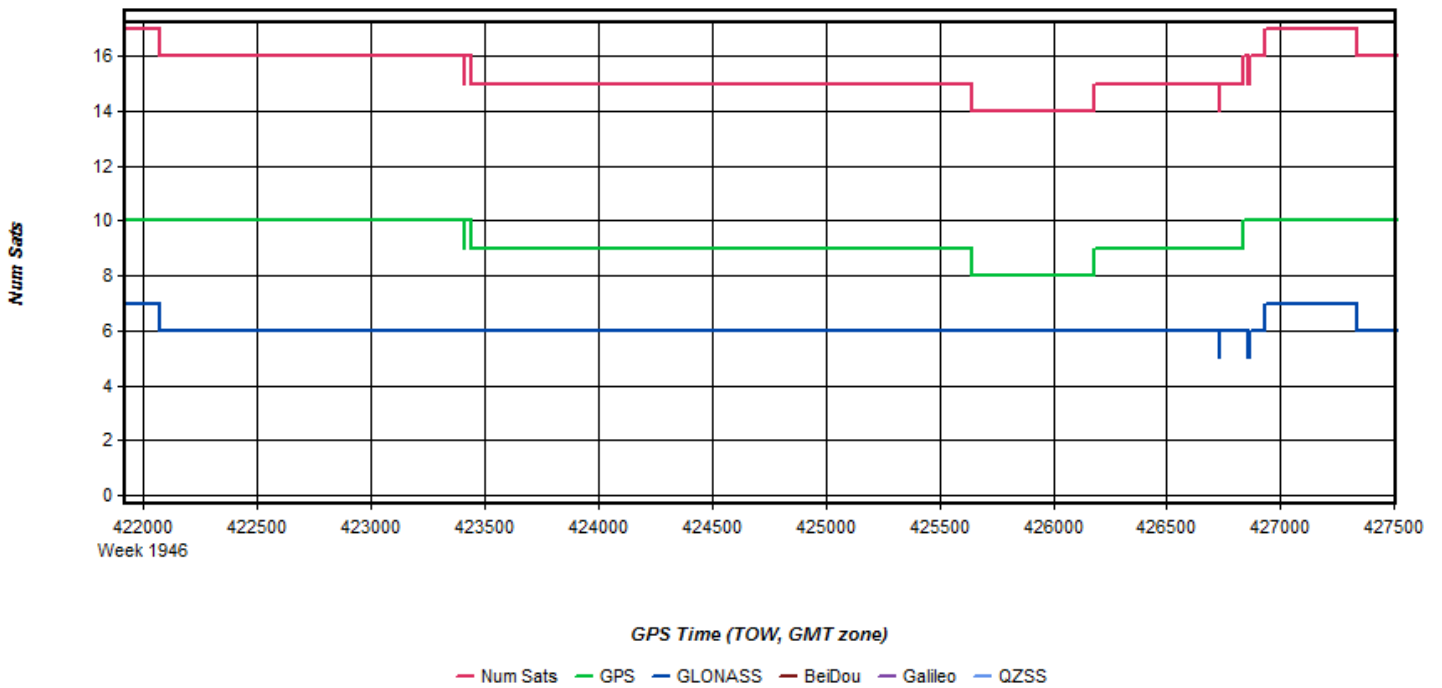
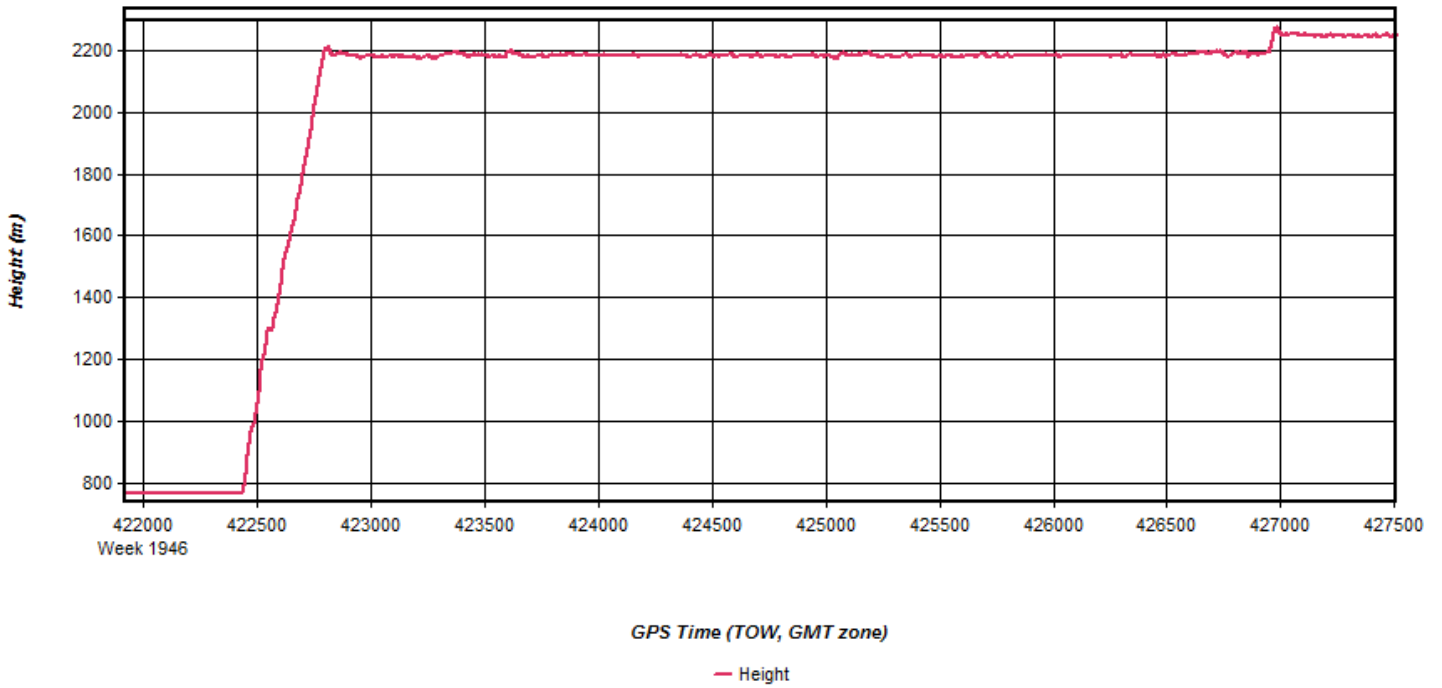
GPS Time (TOW, GMT zone)

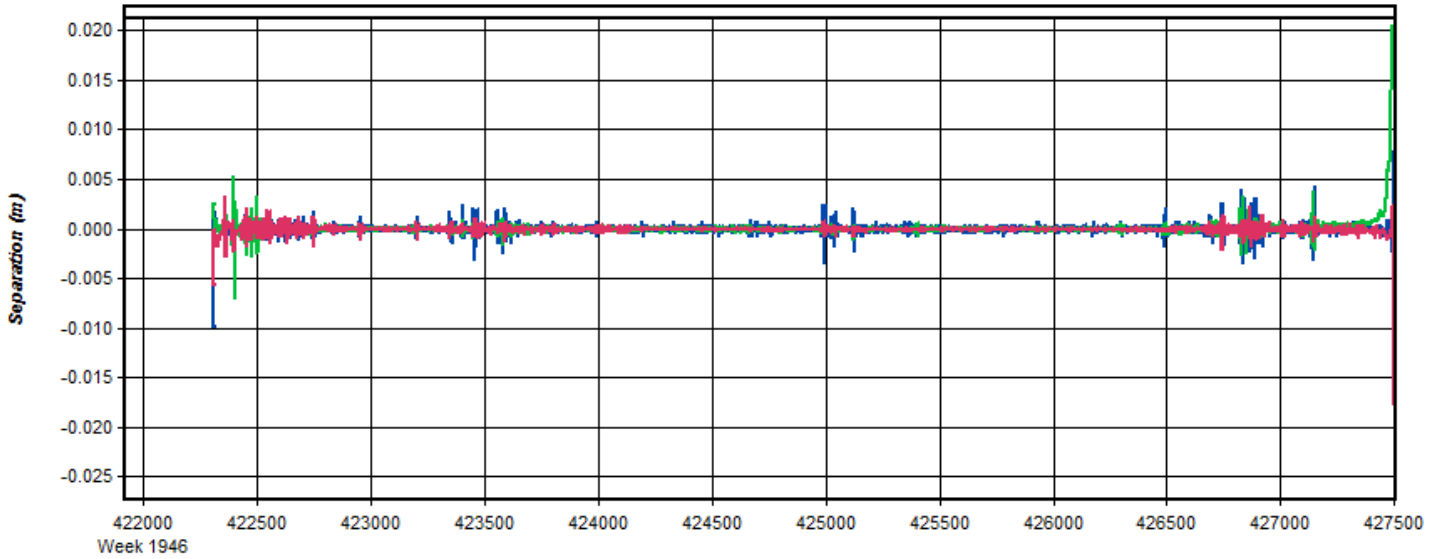
— Roll — Pitch



GPS Time (TOW, GMT zone)

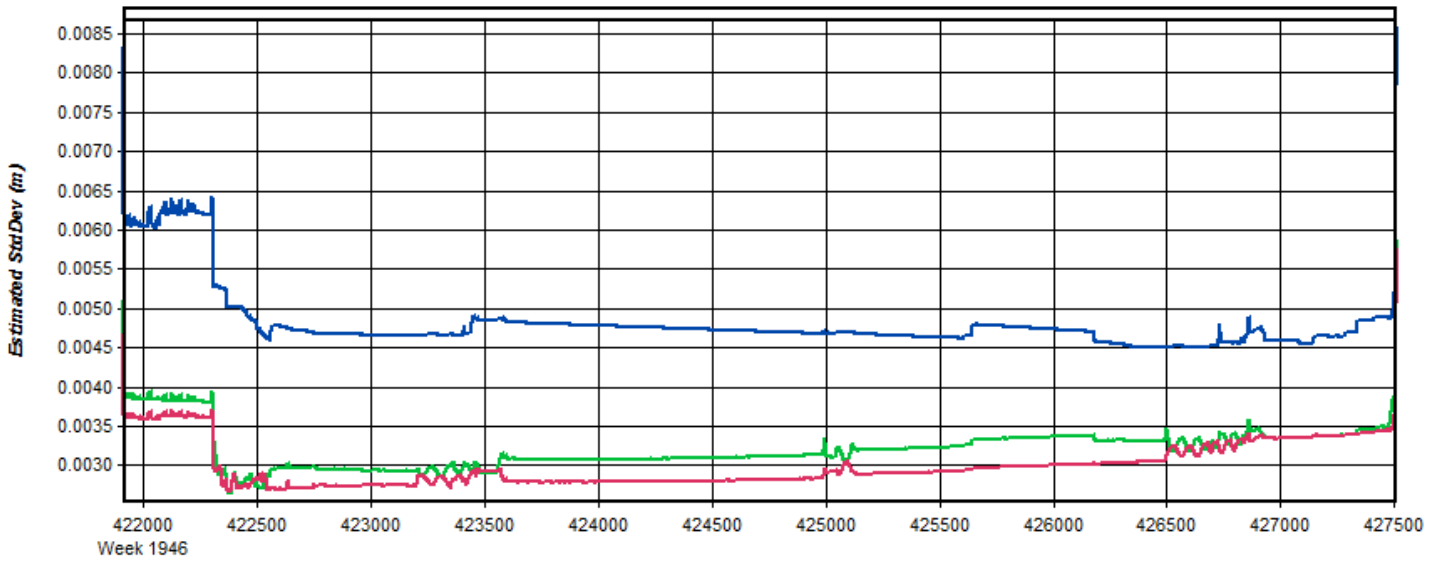
— RMS — SD





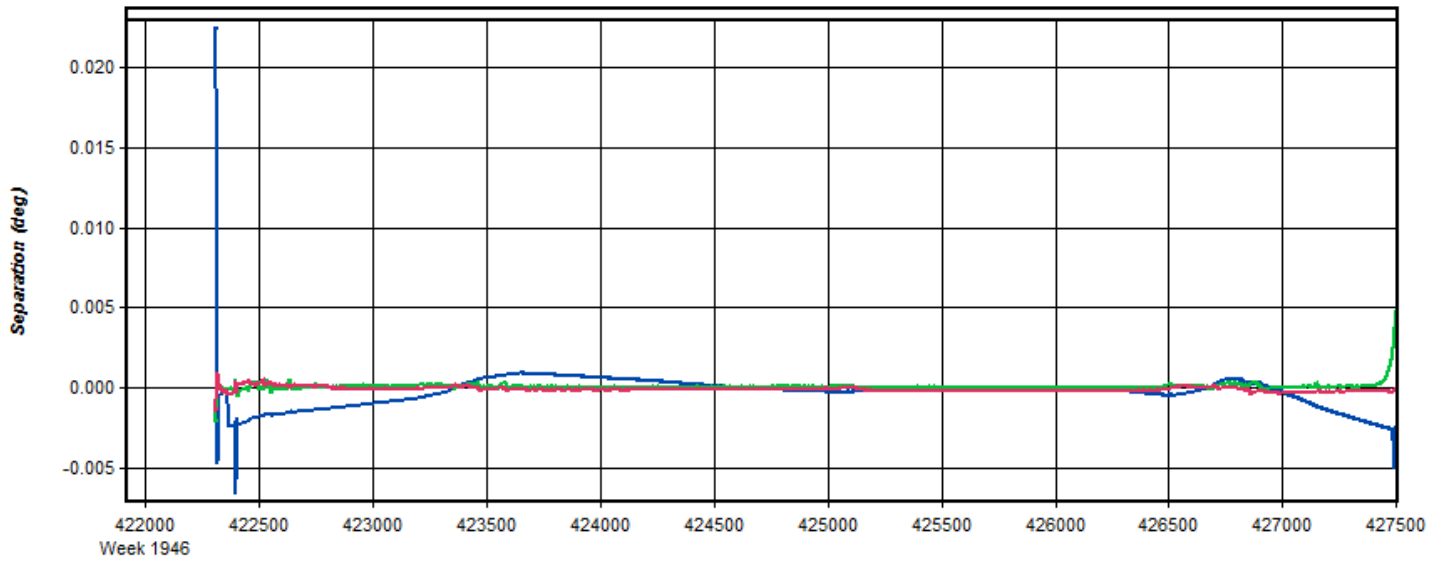
GPS Time (TOW, GMT zone)

— East — North — Up



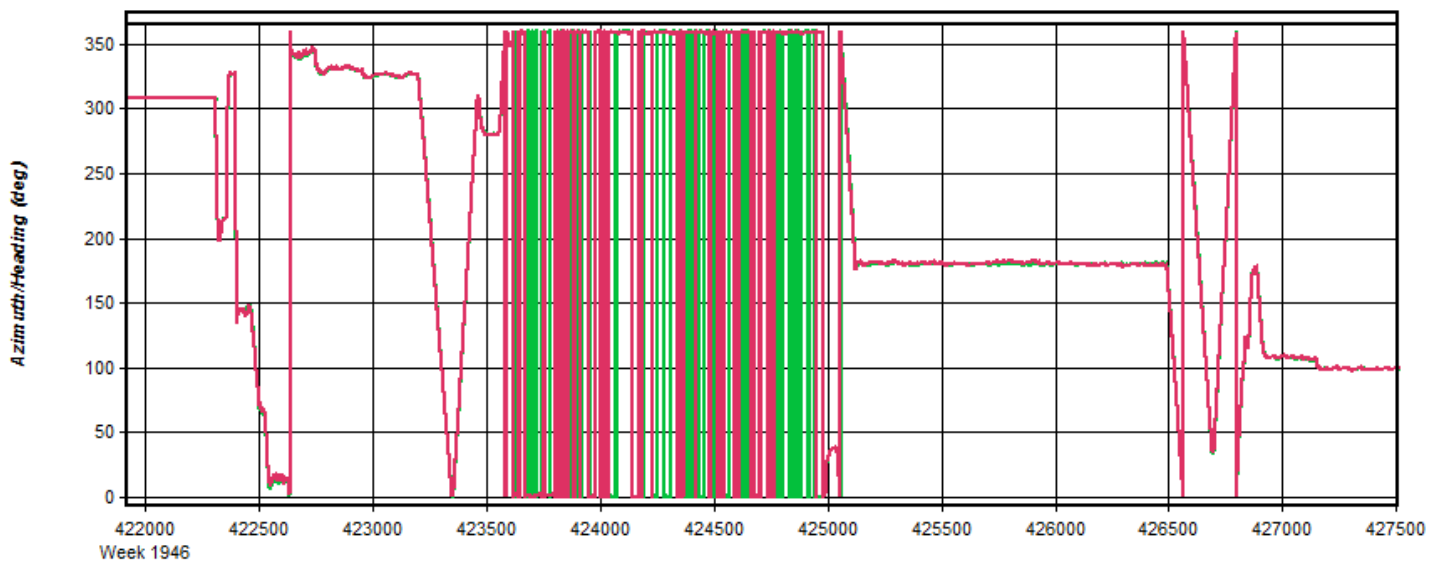
GPS Time (TOW, GMT zone)

— East — North — Height



GPS Time (TOW, GMT zone)

— Roll — Pitch — Heading/Az



GPS Time (TOW, GMT zone)

— Heading/Azimuth — GPS-COG

Coordinate/Antenna Settings ? X

Master Remote

Base Station
1: NEVN Name: NEVN Disabled
File: F:\Proc\30420_South_Dakota\Mike_Aust_5-1-17\04272017_30420

Coordinates
Latitude: North 42 52 20.90880 Coord. options
Longitude: West 100 32 37.14424 Save to Favorites
Ellipsoidal height: 769.856 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year

Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to:
 ARP
 L1 Phase Centre
Compute From Slant

OK Cancel

Coordinate/Antenna Settings ? X

Master Remote

Base Station
2: SDPI Name: SDPI Disabled
File: F:\Proc\30420_South_Dakota\Mike_Aust_5-1-17\04272017_30420

Coordinates
Latitude: North 44 24 00.06331 Coord. options
Longitude: West 100 17 41.89953 Save to Favorites
Ellipsoidal height: 526.052 m
Datum: WGS84 Proc Datum: WGS84
Epoch: year

Antenna Height
From station file: TRM57971.00, NONE View STA File
Antenna profile: TRM57971.00 Info
Measured height: 0.000 m
ARP to L1 offset: 0.065 m
Applied height: 0.065 m
Measured to:
 ARP
 L1 Phase Centre
Compute From Slant

OK Cancel

Flight Log

Project: S DAKOTA LIDAR

Aircraft: 246MP

Dep Apt: VTA

CORS: Y/N

GPS Unit: Y/N

Gd Temp beg: 1 °C

LIDAR: Type 1580, FOV 28

Date: 4-27-17

UTC: A C D E

Tech: M Alver

Co-Pilot: D Jones

Pilot: D Jones

Arr Apt: ML1

Arr Time (Local): 8:05PZ

Alt: 2963

Altimeter begin: 2963

Alt End: 7.2

Alt AMSL: 7.2

Alt AGL: 48

Scan Freq: 48

Scan Rate: 227

GPS Altitude: 7.2

GPS Altitude: 7.2

GPS Altitude: 7.2

Flight Mgmt File: 30420

Total Time Aloft: 3.7

End Hobbs: 1474.3

Dep Time (Local): 4:20 PZ

Arr Time (Local): 8:05 PZ

Alt: 2963

Altimeter begin: 2963

Alt End: 7.2

Alt AMSL: 7.2

Alt AGL: 48

Scan Freq: 48

Scan Rate: 227

GPS Altitude: 7.2

GPS Altitude: 7.2

GPS Altitude: 7.2

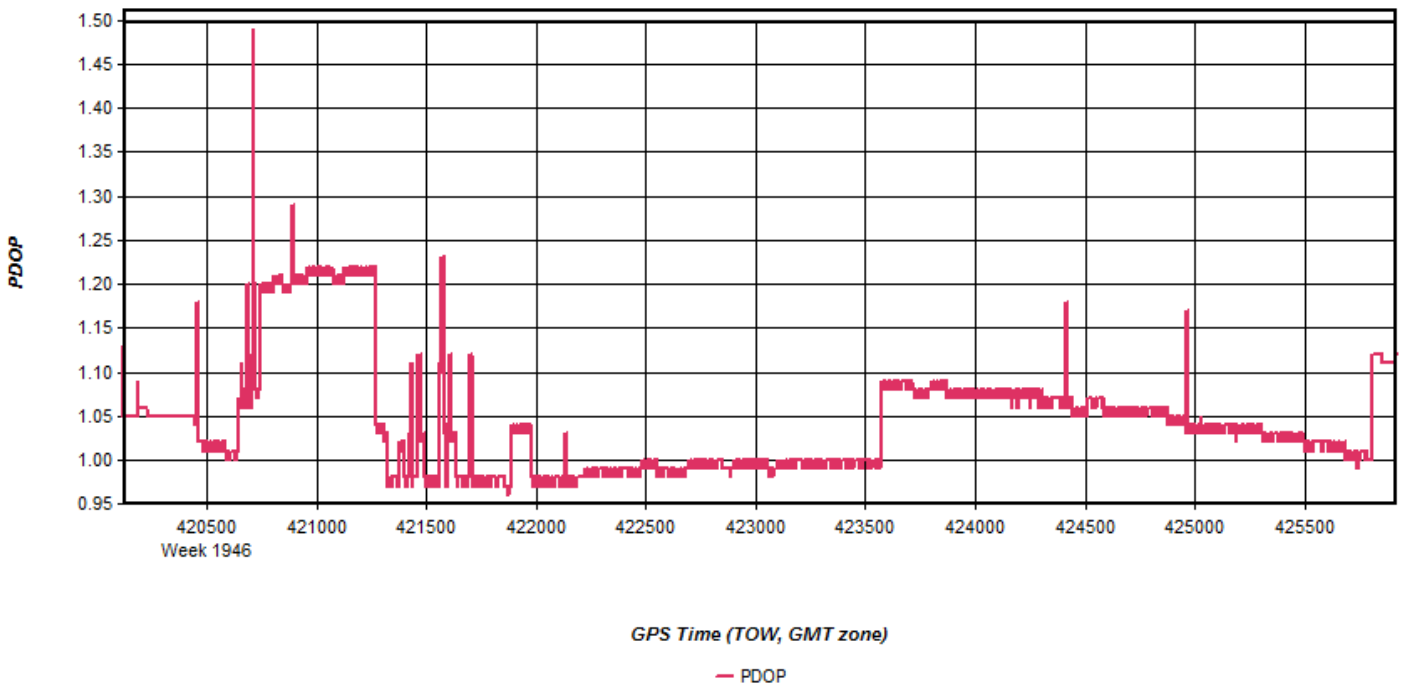
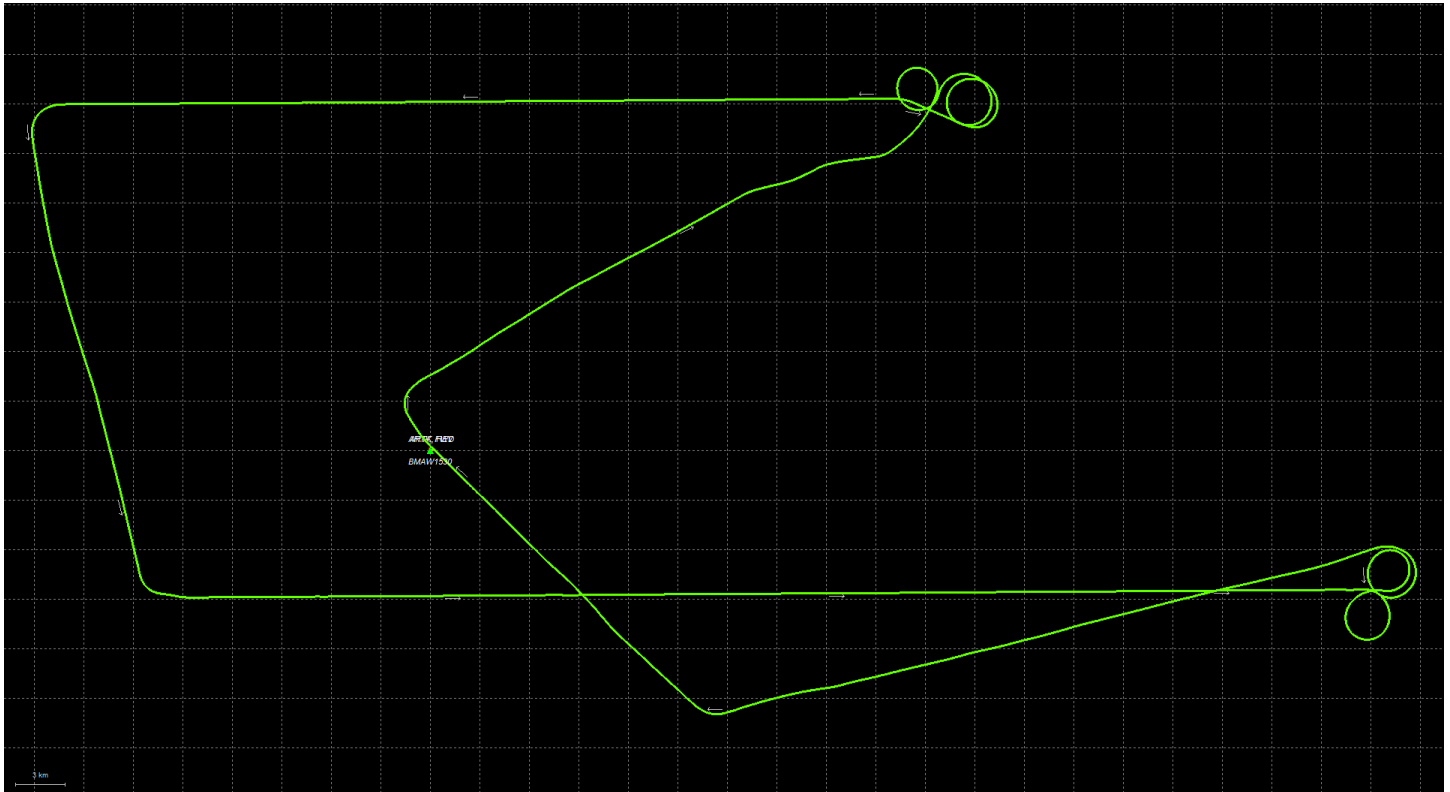
Line #	Hdg	Start (UTC)	End (UTC)	Gd Spd	1000ft/min	GPS Altitude	Crab	Turb	0-100
061	N	2112	2208	139	12/20	7.2			
062	S	2206	2227	140	14/17	7.2			

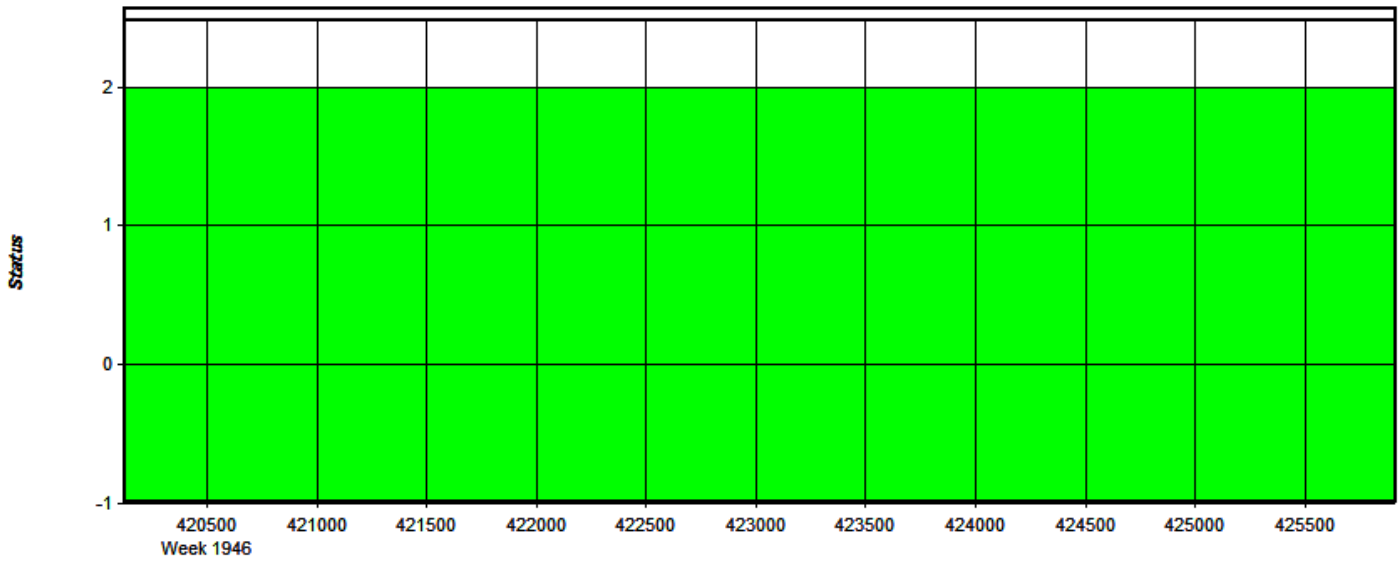
FLIGHT LINE NOTES - visibility, clouds, smoke, partial, etc.

RF

RF

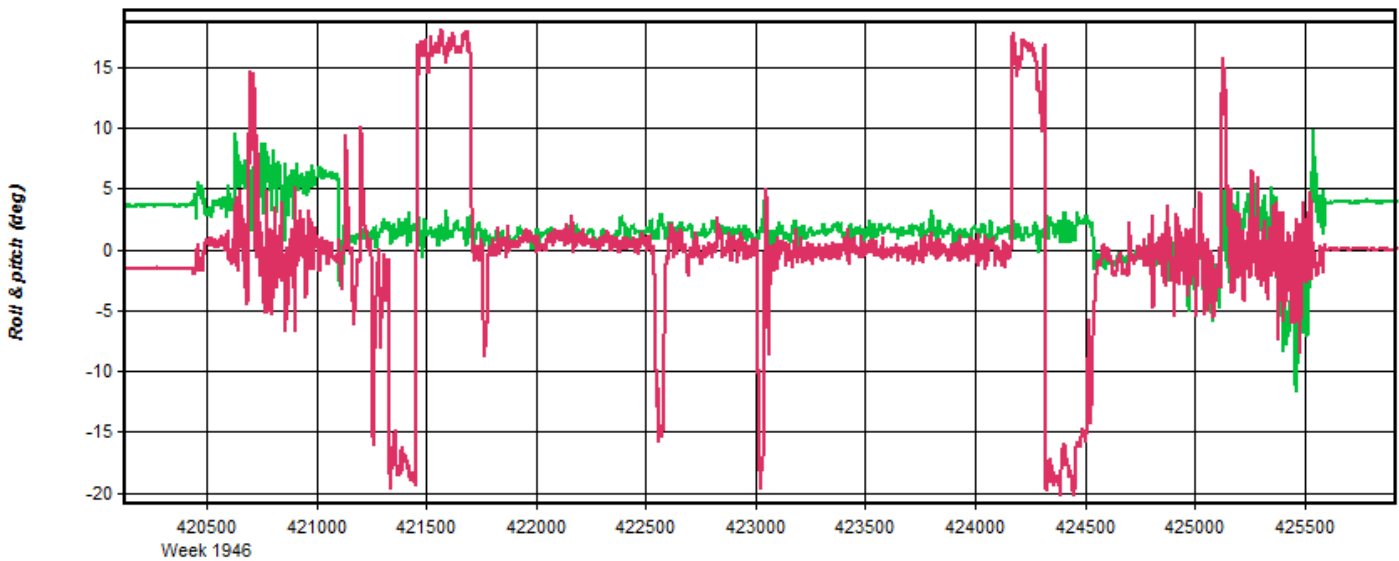
April 27, 2017-A (N915WC, SN8237)





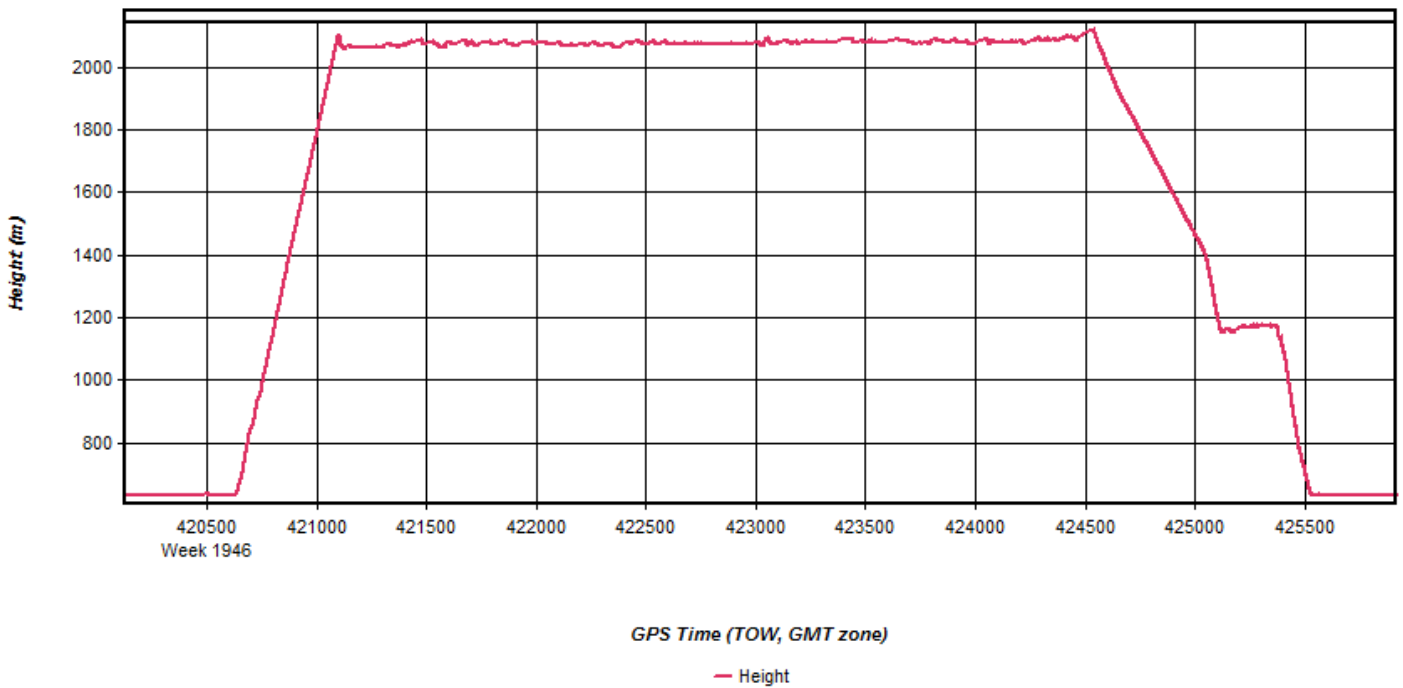
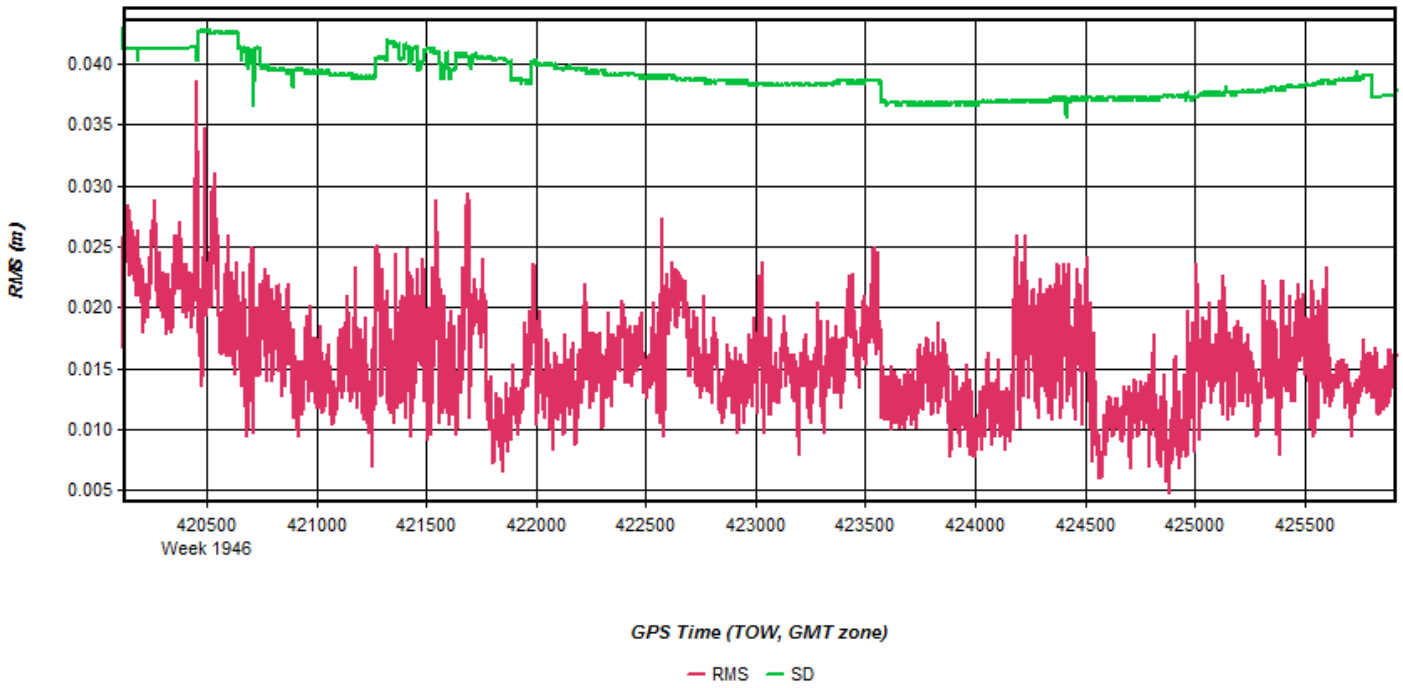
GPS Time (TOW, GMT zone)

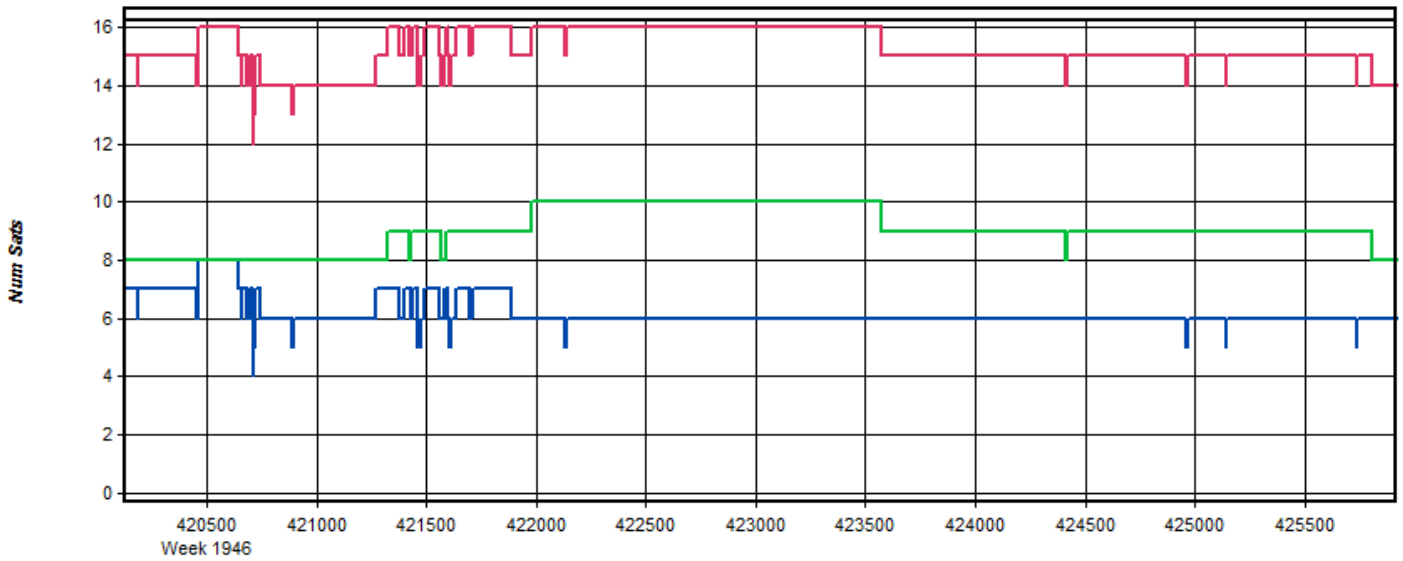
— Float — Forward Fixed — Reverse Fixed — Fixed (2 or more)



GPS Time (TOW, GMT zone)

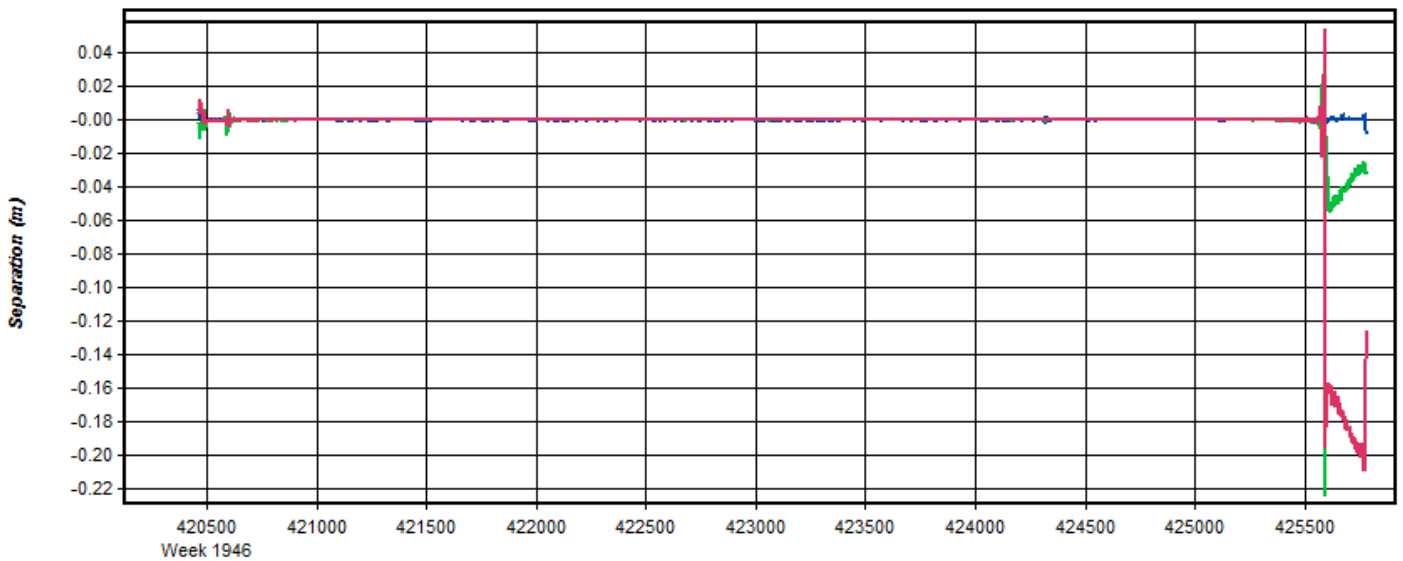
— Roll — Pitch





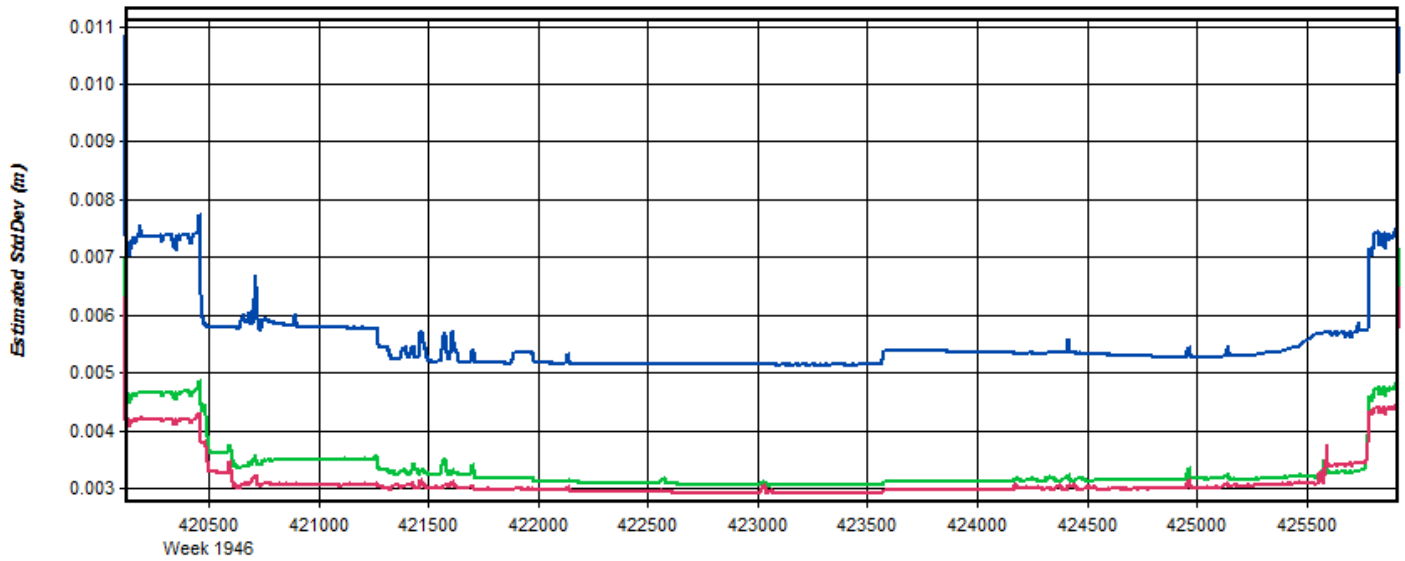
GPS Time (TOW, GMT zone)

— Num Sats — GPS — GLONASS — BeiDou — Galileo — QZSS

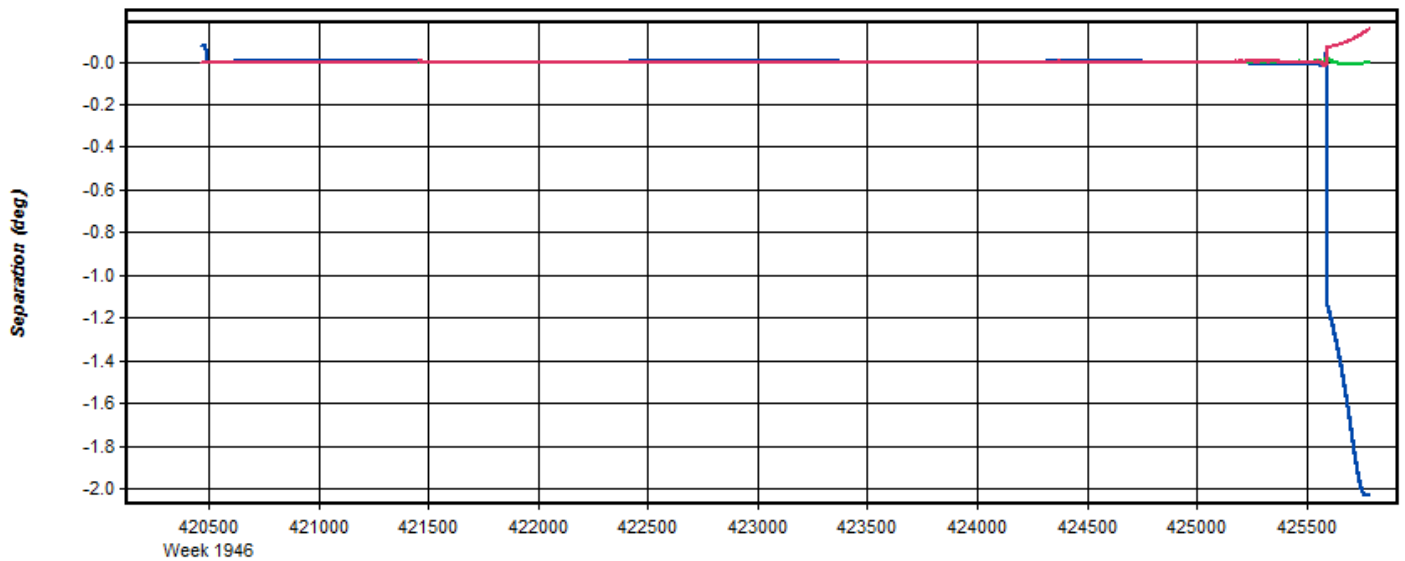


GPS Time (TOW, GMT zone)

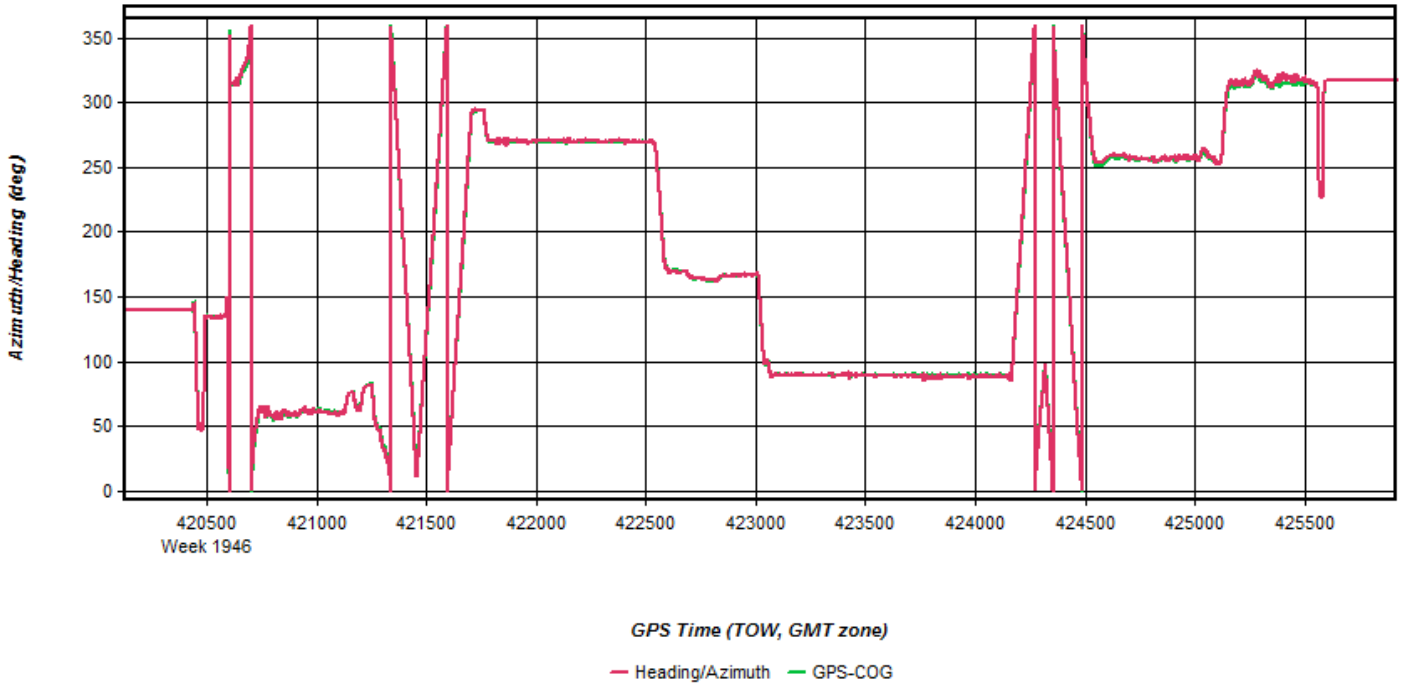
— East — North — Up



GPS Time (TOW, GMT zone)
— East — North — Height



GPS Time (TOW, GMT zone)
— Roll — Pitch — Heading/Az



Coordinate/Antenna Settings

Master Remote

Base Station
 1: BMAW1530 Name: BMAW1530 Disabled
 File: F:\Proc\30420_South_Dakota\Don_Marsh_5-4-17\20170427_2040

Coordinates
 Latitude: North 43 13 17.96752 Coord. options
 Longitude: West 99 24 25.06095 Save to Favorites
 Ellipsoidal height: 635.790 m
 Datum: WGS84 Proc Datum: WGS84
 Epoch: year

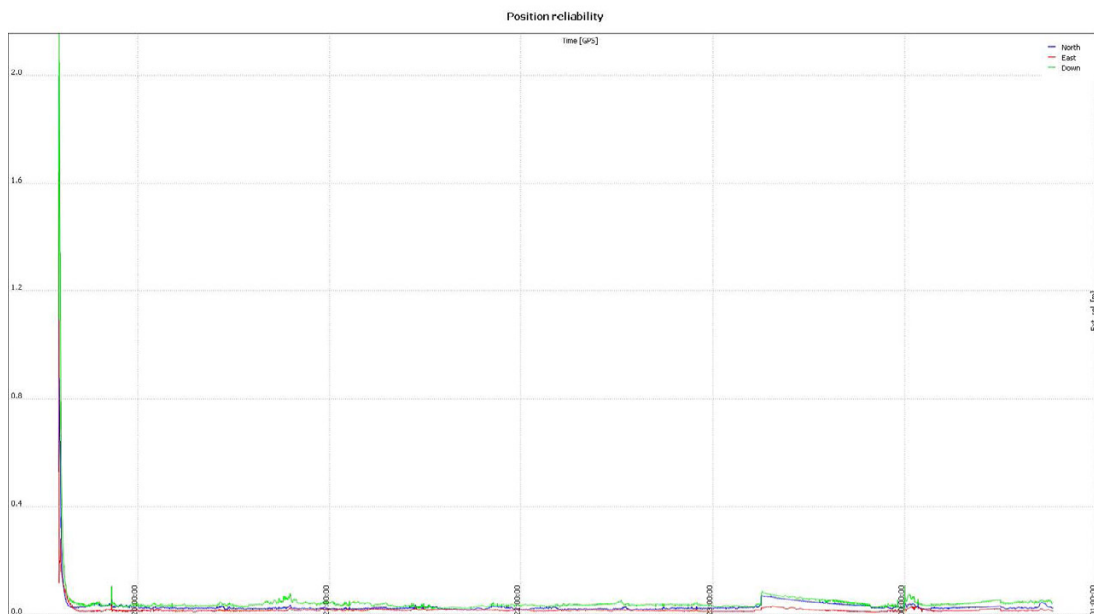
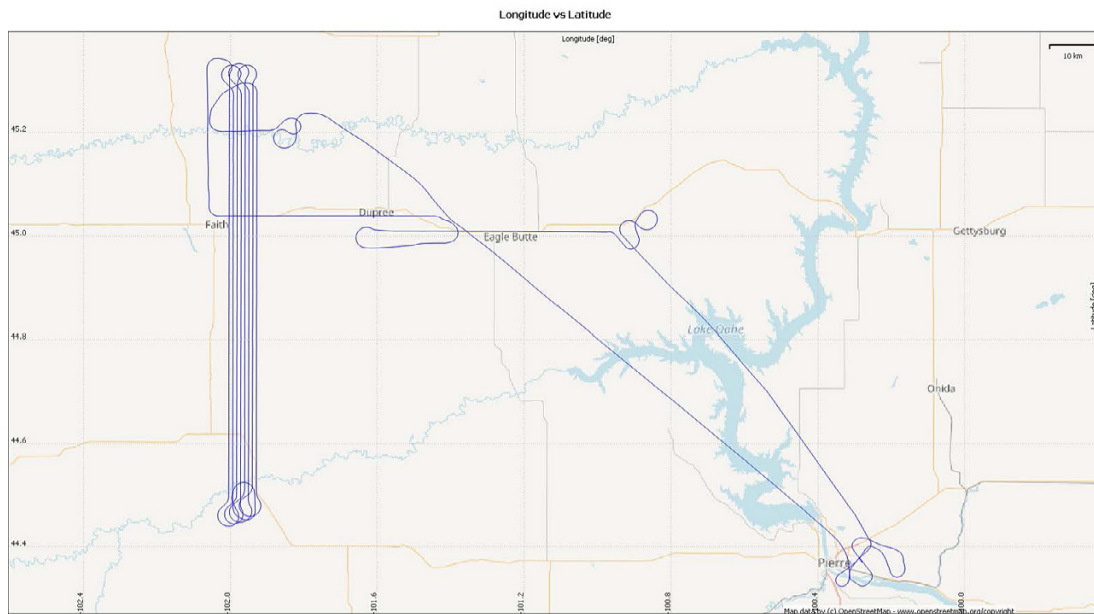
Antenna Height
 From station file: N/A View STA File
 Antenna profile: NOV703GGG.R2 Info
 Measured height: 0.000 m
 ARP to L1 offset: 0.061 m
 Applied height: 0.000 m
 Measured to
 ARP
 L1 Phase Centre
 Compute From Slant

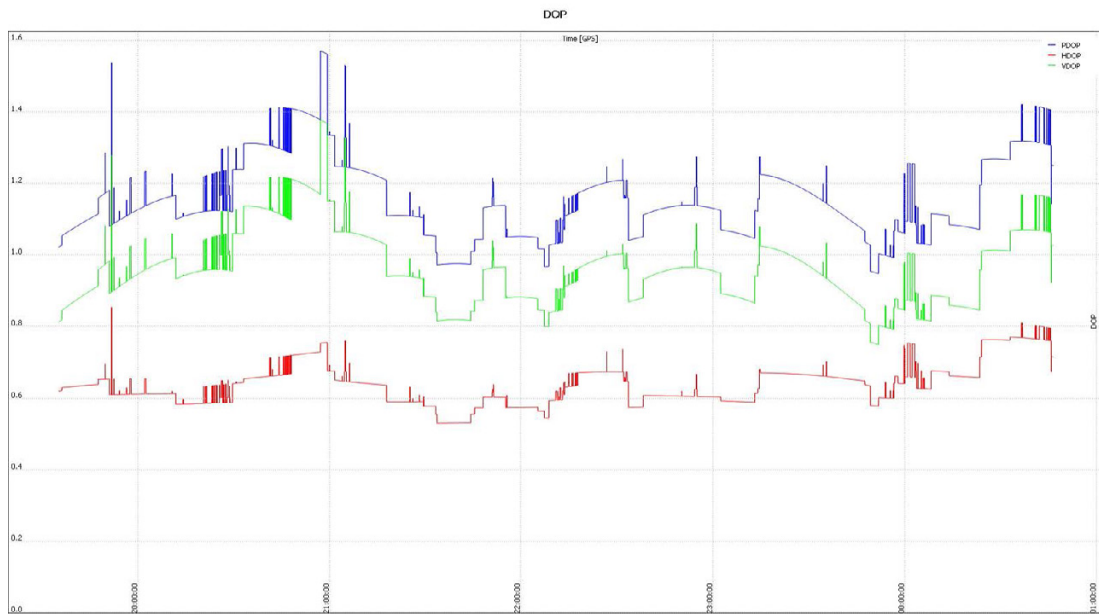
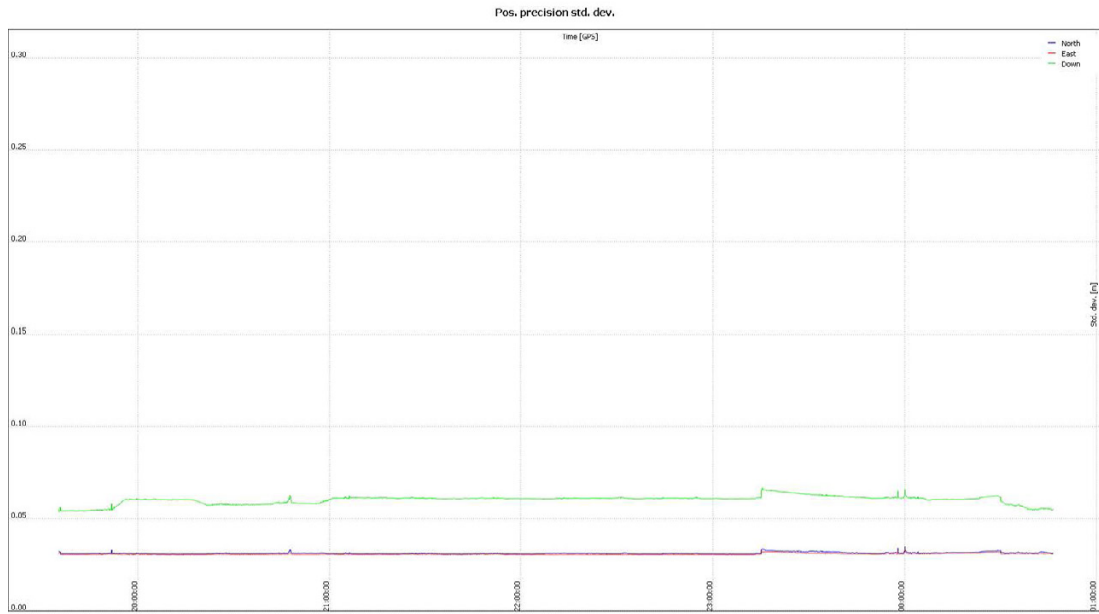
OK Cancel

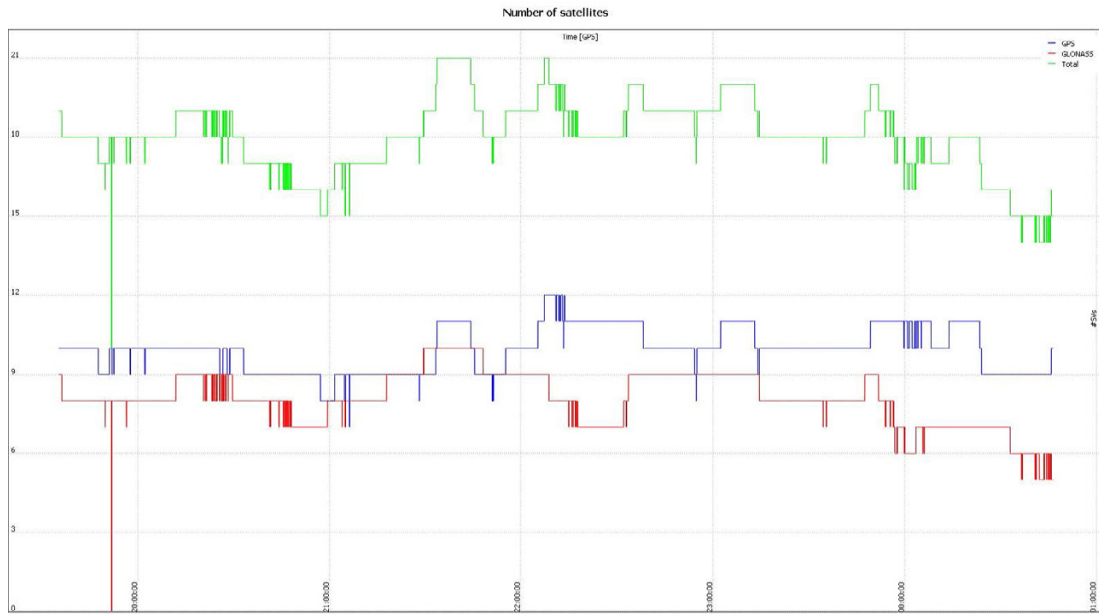
Flight Log

LIDAR KeyW -Aeioptic											
LIDAR FLIGHT REPORT											
Sky conditions, light conditions, horizon, shadowing, visibility/haze, cloud types, wind, turbulence, etc...											
CLEAR											
CREW <input type="text" value="mm/dd/yyyy"/> <input type="text" value="Charles"/>		Pilot/Operator <input type="text" value="Charles"/>		Tail Number <input type="text" value="N915WC"/>		AIRCRAFT <input type="text"/>		WEATHER <input type="text"/>		GPS <input type="text" value="Fwd"/>	
UTC DATE <input type="text" value="4/27/2017"/>		LIDAR S/N <input type="text" value="8237"/>		Camera System <input type="text" value="fwd/left"/>		Camera Location (Hole) <input type="text" value="Fwd"/>		Lens cleaned <input type="checkbox"/>		SSD	
Start-up <input type="text" value="Time: 21:00"/>		Shut-down <input type="text" value="Time: 22:00"/>		Location <input type="text" value="Gregory Flynn SD"/>		All fids uploaded <input checked="checked" type="checkbox"/>		@ Beginning Space Used <input type="text" value="unk"/>		Space Used Remaining Tor Space <input type="text" value="unk"/>	
Start-up beeps & IPAS recording <input type="checkbox"/>		SSDs have space <input checked="checked" type="checkbox"/>		Compact flash drive space <input checked="checked" type="checkbox"/>		Pilot's screen functional <input checked="checked" type="checkbox"/>		Initials: <input type="text"/>		During Mission <input type="text" value="unk"/>	
Remarks											
3DEP	1	X1B	W	X2A	E						

Nov. 5, 2017-A (CFFRY, SN1254)





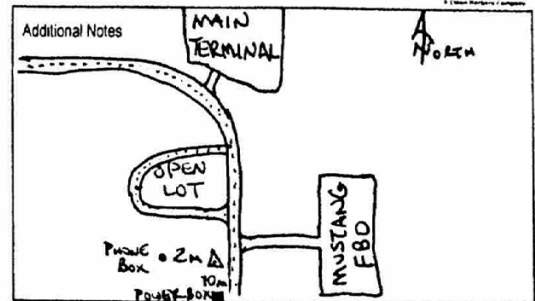


Flight Log



Station ID: **B-163**

Project	3125 Dewey ZIEBACH	Date	NOV. 5/17	Julian Day	309
Approx Coordinates WGS 84	N 44° 22' 41.0"		W 100° 17' 30.2"		
Description of Mark	NAIL, WASHER, FLAGGING.				
Location	PIERRE AIRPORT SOUTH DAKOTA ON WEST SIDE OF NORTH/SOUTH ROAD OPPOSITE MUSTANG FBO. 2 METERS EAST OF TELEPHONE BOX. 10 METERS NORTH OF POWER BOX				



GNSS Observation Session 1		
Rx Make / Model	TRIMBLE R8	s/n 2959
Antenna Model		s/n
Controller Model		s/n
Session Time	Start 18:48	Observer DT
GPS Local	End 00:54	
Antenna HI		Slant Height
		1 1.459
Slant Height Mean		2 1.458
Correction		3 1.458
		4 1.458
Phase Center		m
Data File		

GNSS Observation Session 2 <input type="checkbox"/> ECCENTRIC		
Rx Make / Model		s/n
Antenna Model		s/n
Controller Model		s/n
Session Time	Start	Observer
GPS Local	End	
Antenna HI		Slant Height
		1
Slant Height Mean		2
Correction		3
		4
Phase Center		m
Data File		

Trimble R8 Model 3 Measured to center of gasket on antenna	
Measured Slant Height	Correction to L1 Phase Center
0.799 - 0.987m	+0.026m
0.988 - 1.295m	+0.027m
1.298 - 1.883m	+0.028m

Trimble Zephyr Model 2 Measured to top of notch on antenna	
Measured Slant Height	Correction to L1 Phase Center
0.881 - 1.099m	+0.020m
1.100 - 1.464m	+0.021m
1.465 - 2.195m	+0.022m

Julian Day 309 Flight A

LIDAR Flight Log


Date NOV. 5 / 2017	Aircraft PA-31 C-FFRY
Project 3125_DeweyZiebach	Pilot D.Thibeault
Location PIERRE, SD KPIR	Operator D.Tarr
Mission Objective	

System Riegl Q1560
Unit 2221254
IMU Applanix AP50
GPS Rx Trimble
Scanner 1 Drive A1
Scanner 2 Drive A2

Additional Notes

 Temp -2°C
 Humidity 58%
 Altimeter 102.3
 Terrain Height 530m

-5° @ 6100' @ 21:20z

1929	Aircraft Block Time	1948	1951
Engine On 1929	Ramp Out 1848	Takeoff 1951	
Engine Off 1949	Ramp In 0039	Landing 0038	
Total 5.3 hrs	Total hrs	Total 4.8 hrs	

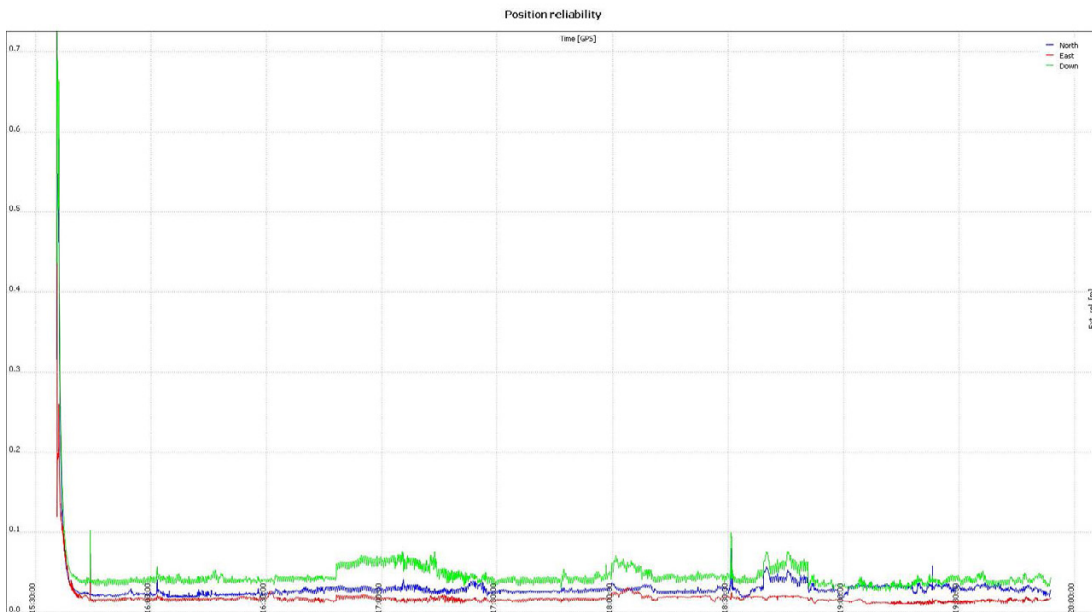
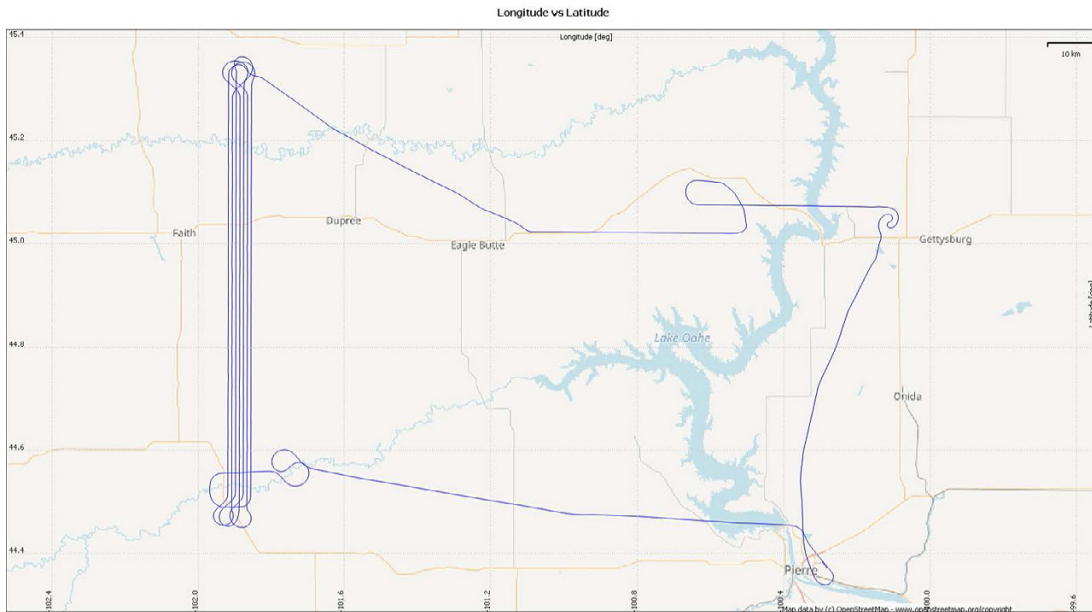
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

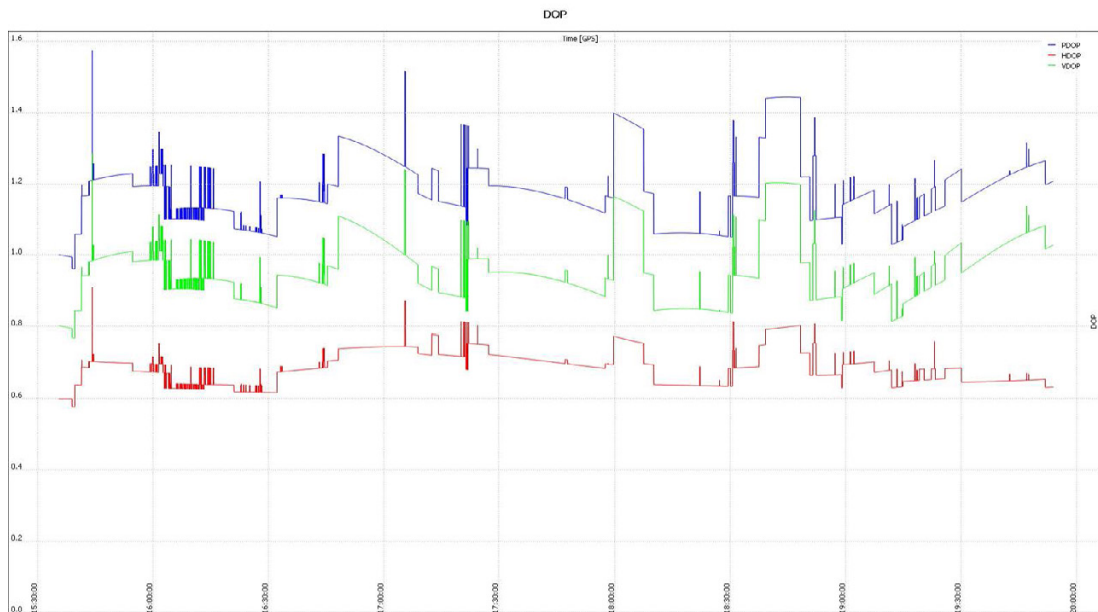
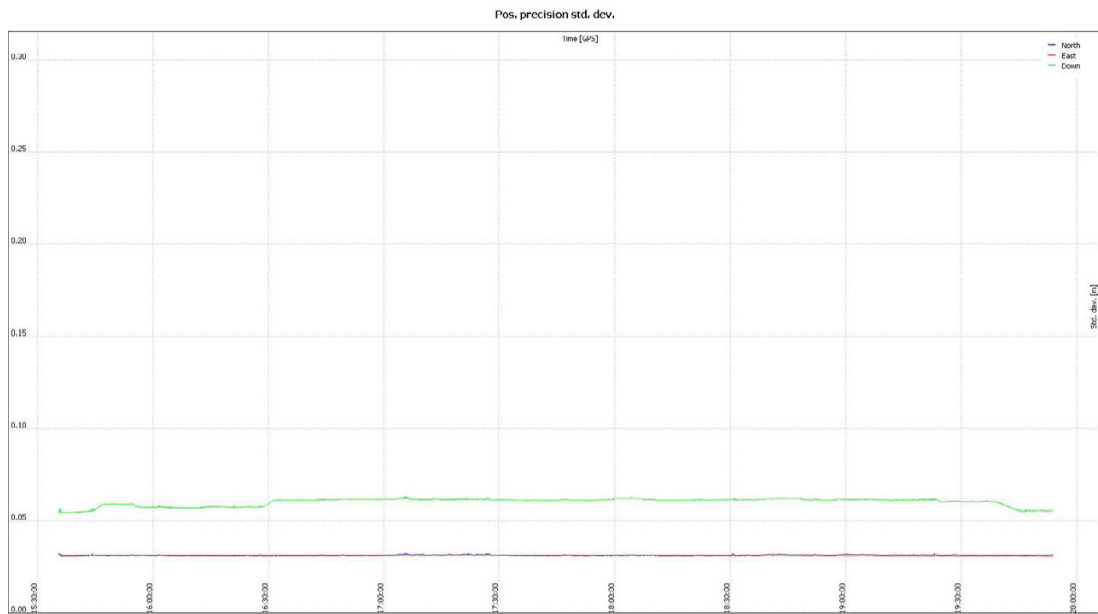
Static Alignment	GPS Time	
	Start	End
Pre Mission	1935	1940
Post Mission	0041	0046

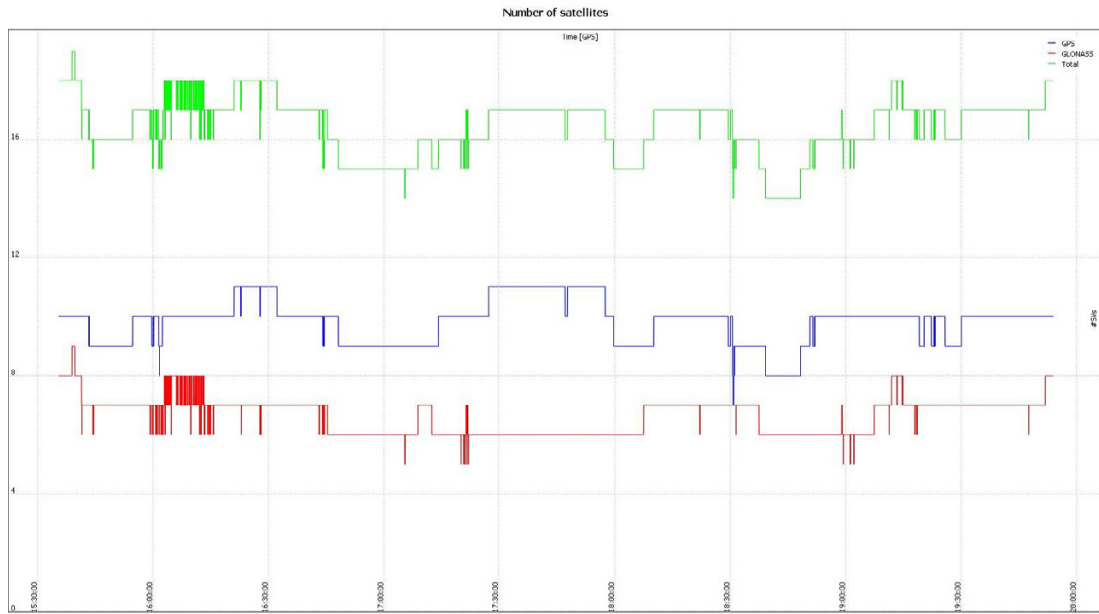
Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST		↗	5800	1956	1958			171105-195828	
Cal- KPIR	5417309 01	220	5800	1959	200033			-195939	NOT IN FLIGHT PLAN
Cal- KPIR	02	40	5800	2002	200430			-200259	FIRE D MANUALLY
∞		00	3700	2023	2029				
994	03	271	3700	2030	2039			171105-203052	XTIE
993	04	270	3900	2047	2050			-204750	XTIE
1	05	180	6100	2107	2124			-210710	
2		0	6100	2127	2128			-212759	OFFLINE RESTART
2	5417309 06	0	6100	2132	2149			-213215	
3	07	180	6100	2153	2210			-215305	
4	08	0	6100	2213	2230			-221359	
5	09	180	6100	2234	2251			-223413	
6	10	0	6100	2255	2312			-225517	
7	11	180	6100	2315	2332			-231537	
8	5417309 12	0	6100	2336	2353			-233613	
X-TIE (Ls 1-8)	13	90	6100	2357	2359			-235717	
∞		∞	6100	2359	0005				

Pg 1 of 2

Nov. 10, 2017-A (CFFRY, SN1254)







Flight Log

Julian Day 314	Flight A
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LIDAR Flight Log



Date Nov. 10 17	Aircraft PA-31 C-FFRY
Project 3125_DeweyZiebach	Pilot D.Thibeault
Location PIERRE SD KPIR	Operator D.Tarr
Mission Objective	

System Riegl Q1560
Unit 2221254
IMU Applanix AP50
GPS Rx Trimble
Scanner 1 Drive A ₁
Scanner 2 Drive A ₂

Additional Notes
Temp -4
Humidity 61%
Altimeter 1023.0
Terrain Height 530

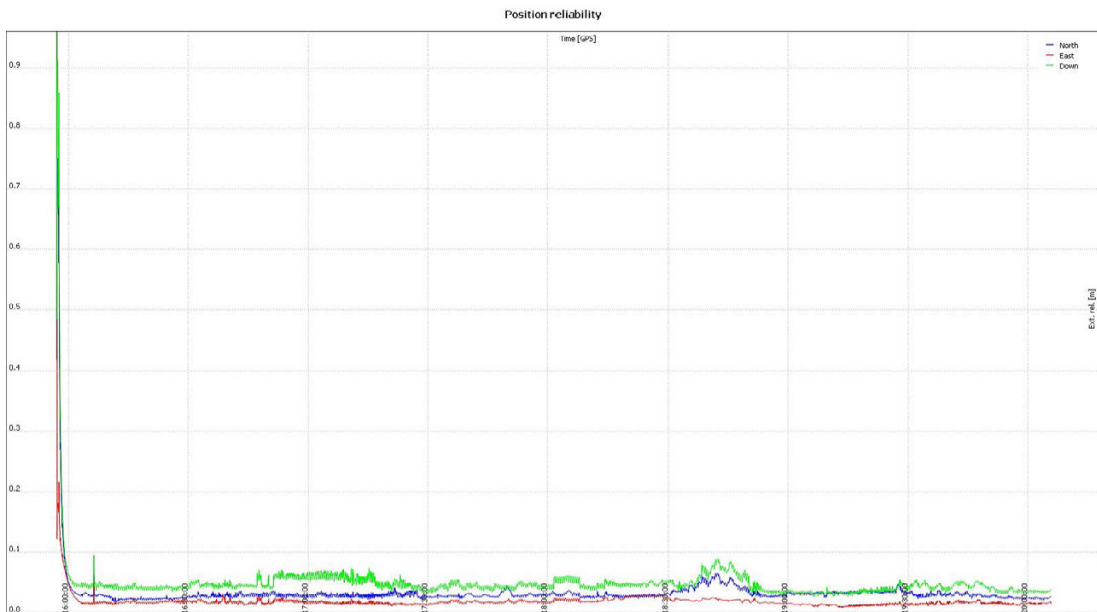
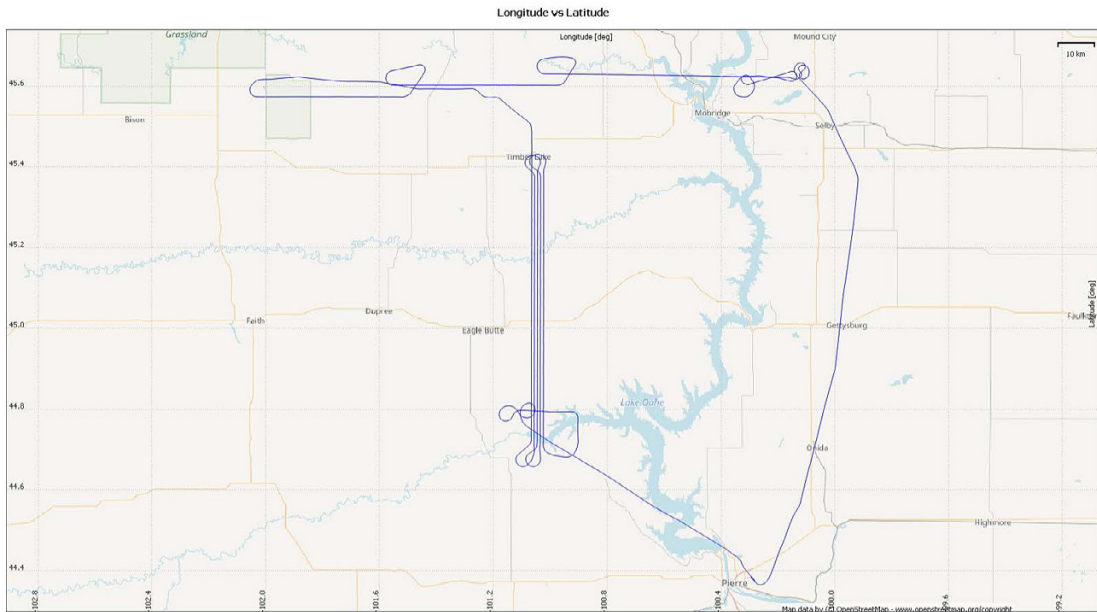
Aircraft Block Time		
Engine On 1513	Ramp Out 1539	Takeoff 1543
Engine Off 1957	Ramp In 1946	Landing 1945
Total 4.7 hrs	Total hrs	Total 4.0 hrs

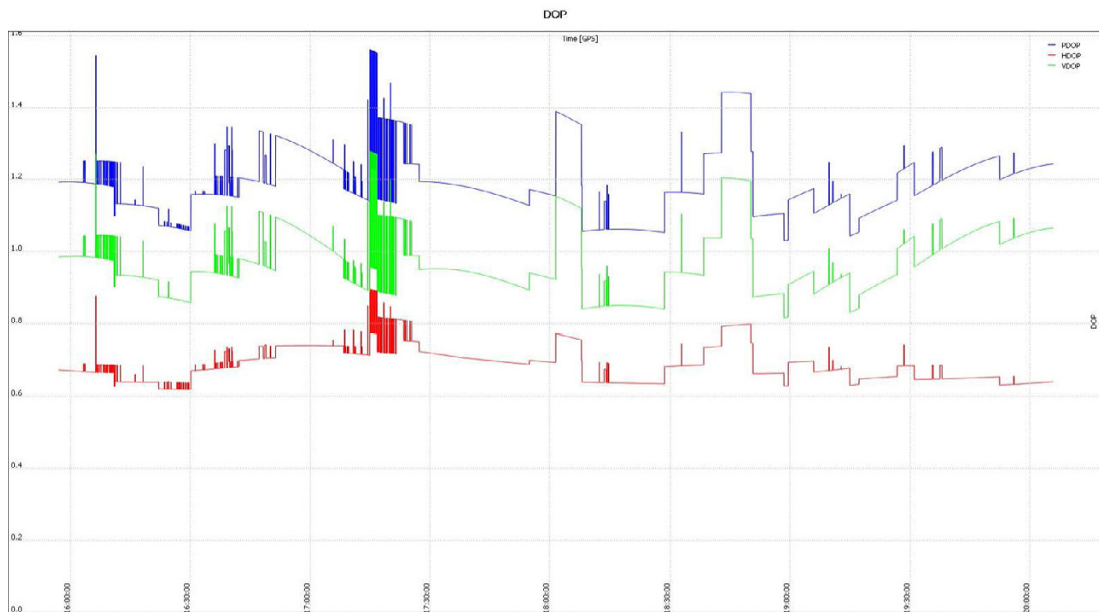
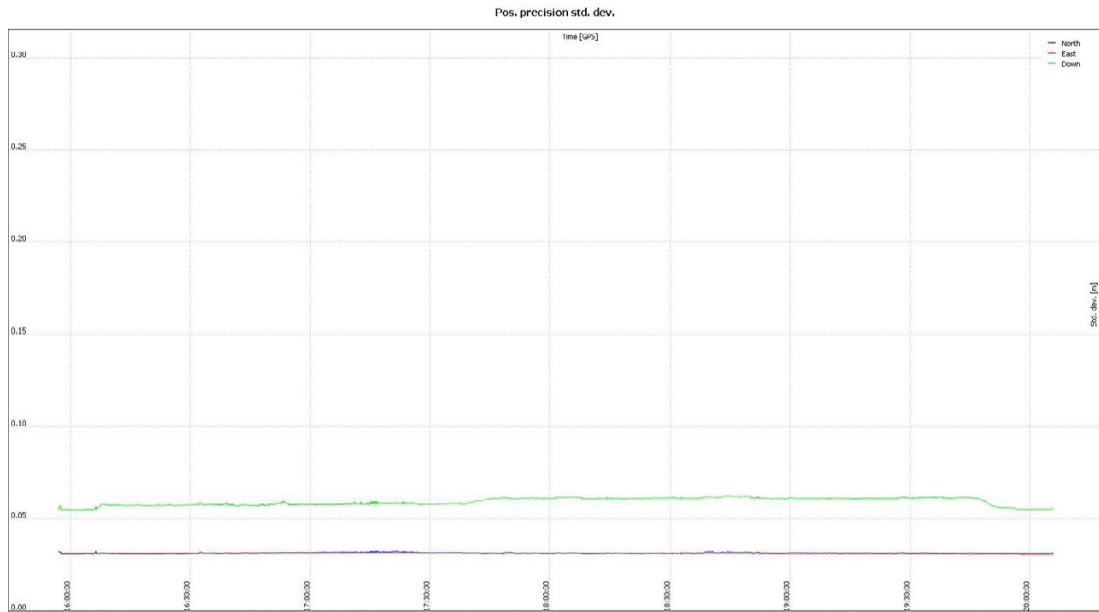
Mission Plan			
AGL Height 1300 m	Pulse Rate 800 KHz		
Target Speed 160 kts	Scan Rate 285 Hz		
Laser Current 25 %	FOV 60 Deg's		

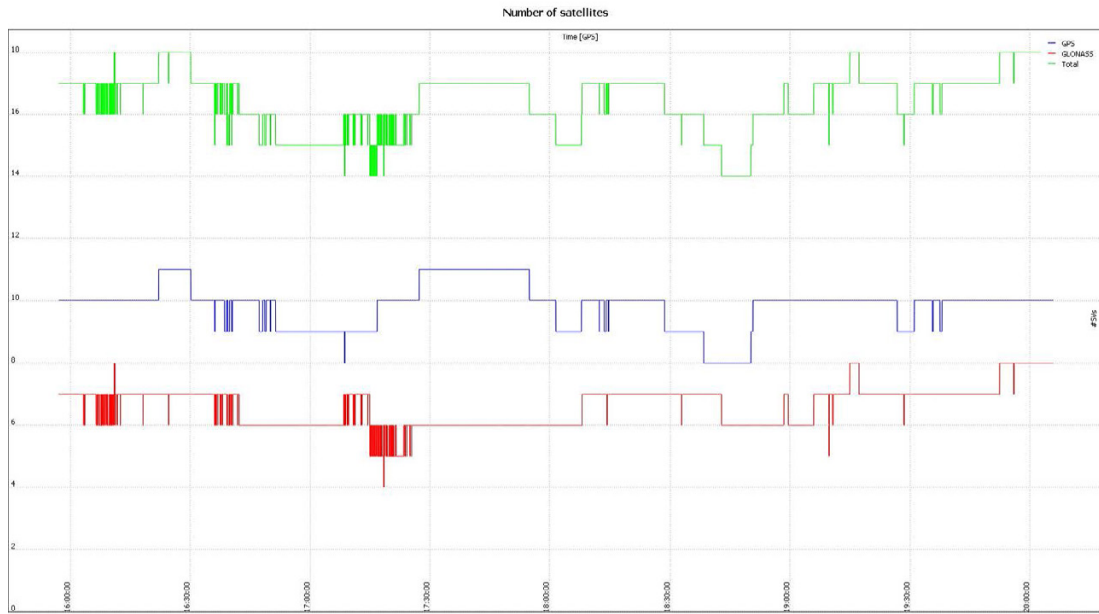
Static Alignment	GPS Time	
	Start	End
Pre Mission	1535	1540
Post Mission	1948	1953

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
∞		∞	3200	1559	1603				
996	5417314 01	270	3200	1605	1611			171110-160509	
995	02	270	3500	1619	1627			-161910	
9	03	180	6000	1645	1702			-164531	
10	04	0	6000	1706	1723			-170635	
11	05	180	6000	1728	1745			-172820	
12	06	0	6000	1748	1806			-174857	
13	07	180	6000	1810	1828			-181038	
14	08	0	6000	1831	1849			-183151	RAW FOR 20 sec.
15	09	180	6000	1853	1910	18:41 7:18 LEFT 19:00:30 10:45	27.4 RAW	-185319	RAW FOR 3min (19:03)
X-TIE LWS 7-1b	5417314 10	90	6000	1914	1916			-191428	
∞		∞	6000	1916	1923				

Nov. 10, 2017-A (CFKMA, SN1264)







Flight Log

6417314A

LIDAR Flight Log



Julian Day	A	Flight	314
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Date	NOV. 10 2017	Aircraft	PA-31 C-FKMA
Project	3125. DEWEY ZIEBACH	Pilot	M. Mc Q
Location	PIERRE S. D.	Operator	BW
Mission Objective			

System	Riegl Q1560
Unit	2221264
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes	
Temp	-3
Humidity	
Altimeter	30.06
Terrain Height	523

Aircraft Block Time					
Engine On	15:44	Ramp Out	16:02	Takeoff	16:06
Engine Off	20:08	Ramp In		Landing	19:56
Total	4.4 hrs	Total	hrs	Total	3.8 hrs

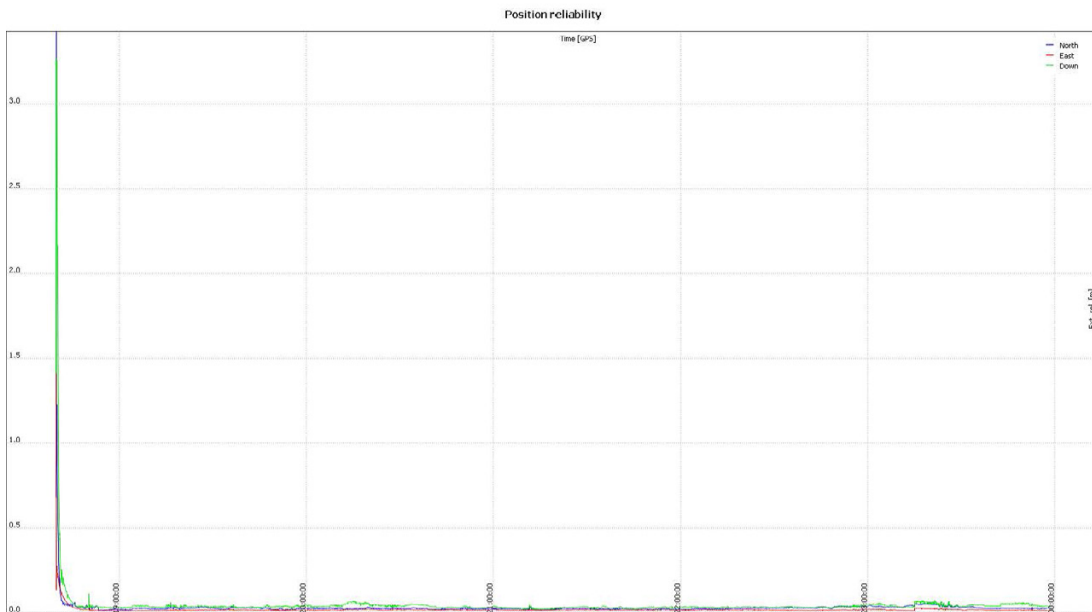
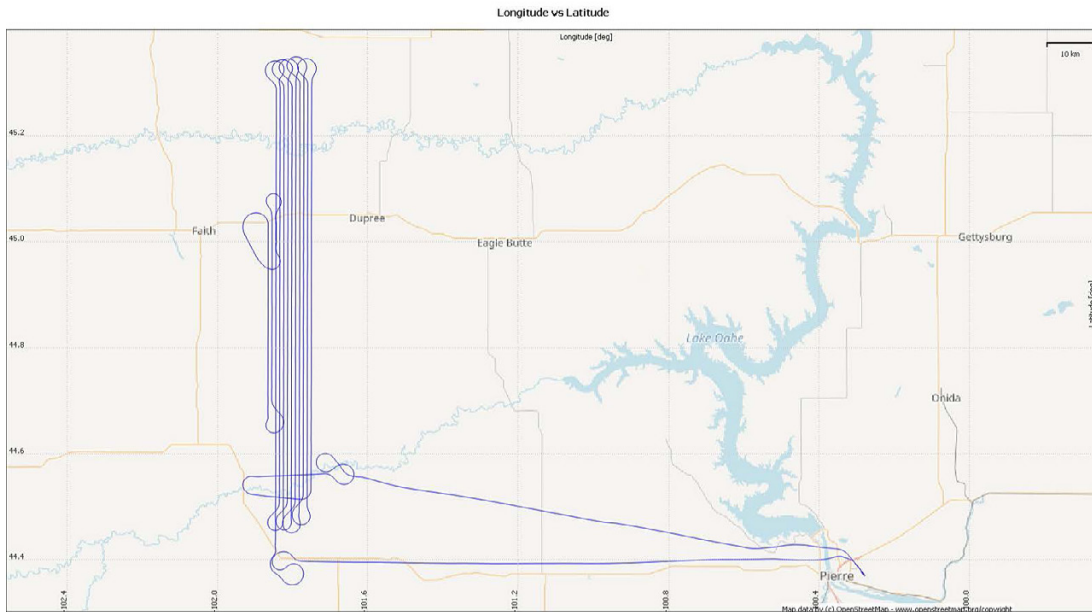
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

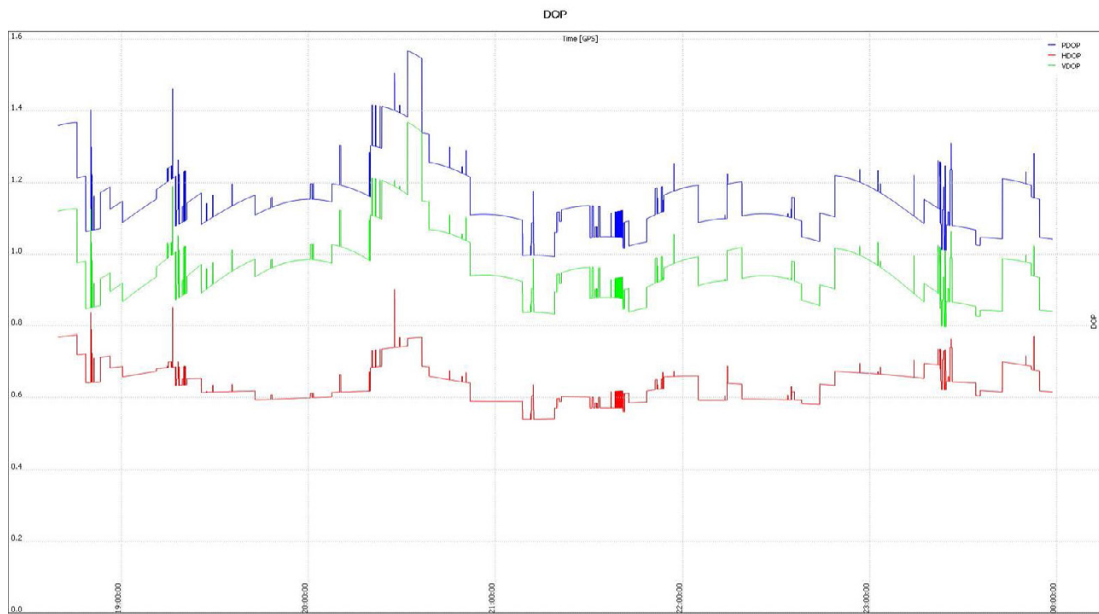
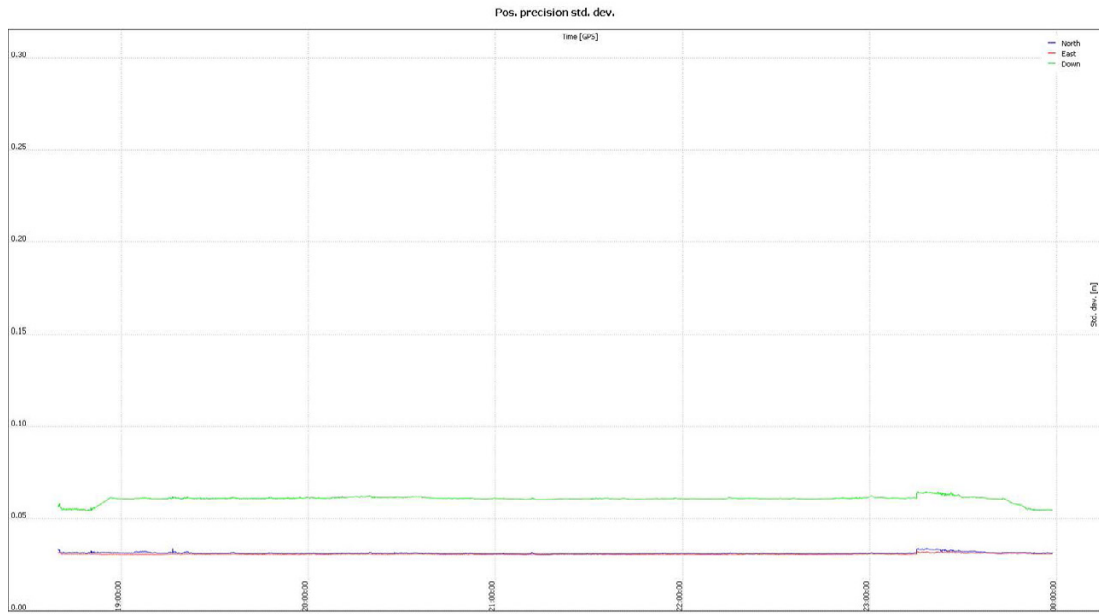
Static Alignment	GPS Time	
	Start	End
Pre Mission	15:56	16:01
Post Mission	19:59	20:04

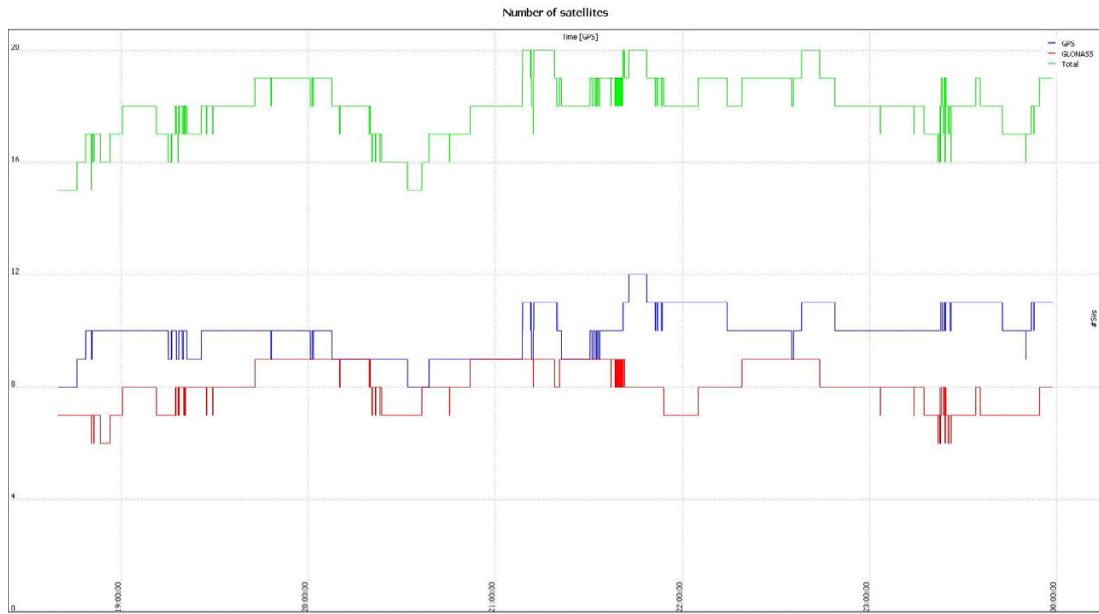
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST STRIP		✓		16:08	16:08			171110-160837	
FIGURE 8		↻		16:35	16:40				∞
999	6417314 01	270	3200'	16:56	17:07			165600	XTIE
998	02	270	3500'	17:12	17:22			171248	XTIE
997	03	270	3600'	17:28	17:36			172802	XTIE
91	04	180	5800'	17:56	18:11			175656	
92	05	0		18:15	18:30			181537	
93	06	180		18:34	18:49			183406	
94	07	0	↓	18:53	19:07			185304	WX MOVING IN!!
95	6417314 08	180	5800'	19:17	19:26			191123	✓
									NORTH IS AM RIGHT
									UNDER CLOUDS
									VIRGA TO WEST
XTIE	6417314 09	270	5800'	19:32	19:33			193202	
FIGURE 8		↻		19:34	19:40				∞

Pg 1 of 1

Nov. 11, 2017-A (CFFRY, SN1254)







Flight Log

Julian Day 315 Flight A

LIDAR Flight Log



Date	NOV. 11 2017	Aircraft	PA-31 C-FFRY
Project	3125_DeweyZiebach	Pilot	D.Thibeault
Location	Pierre SD KPIR	Operator	D.Tarr
Mission Objective			

System	Riegl Q1560
Unit	2221254
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B1
Scanner 2 Drive	B2

Additional Notes	
Temp	20°C
Humidity	77%
Altimeter	1019
Terrain Height	530

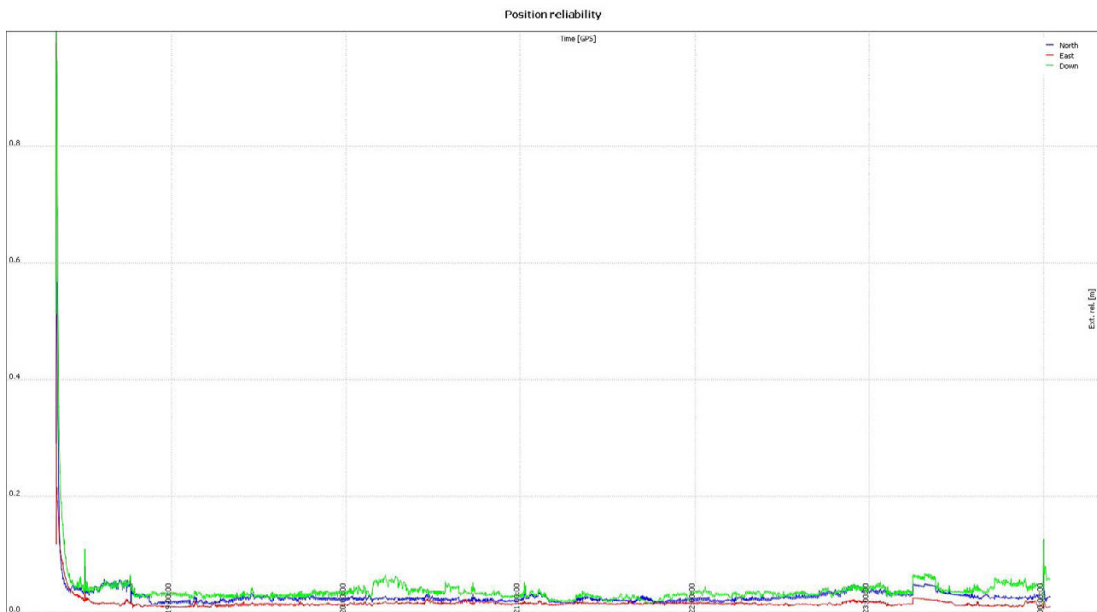
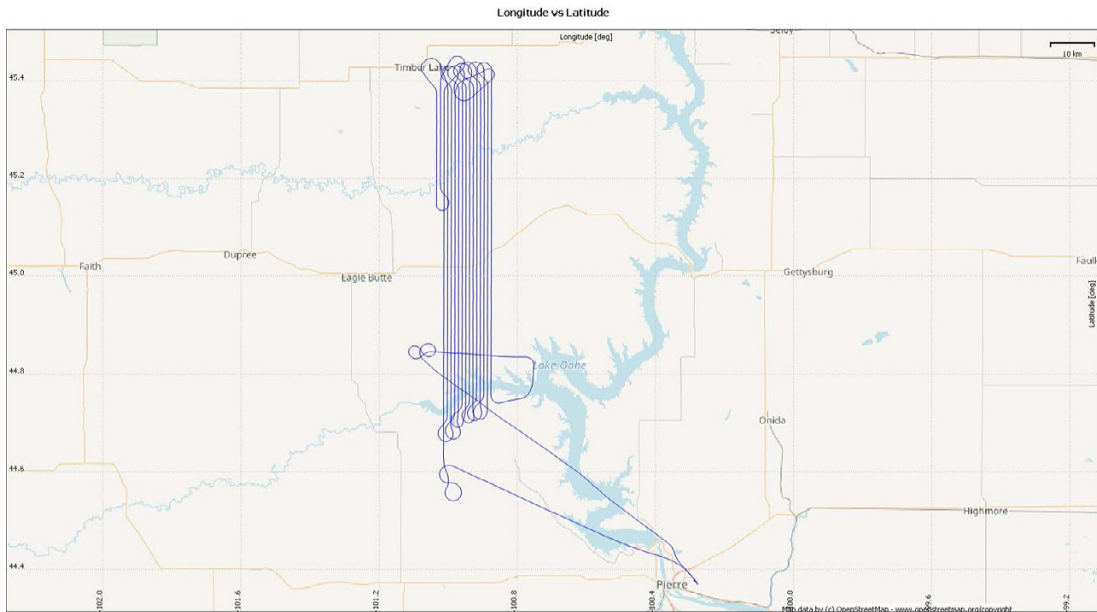
Aircraft Block Time		
Engine On	1835	Ramp Out 1847
Takeoff	1850	
Engine Off	0001	Ramp In 23:51
Landing	2350	
Total	5.5 hrs	Total 5.0 hrs

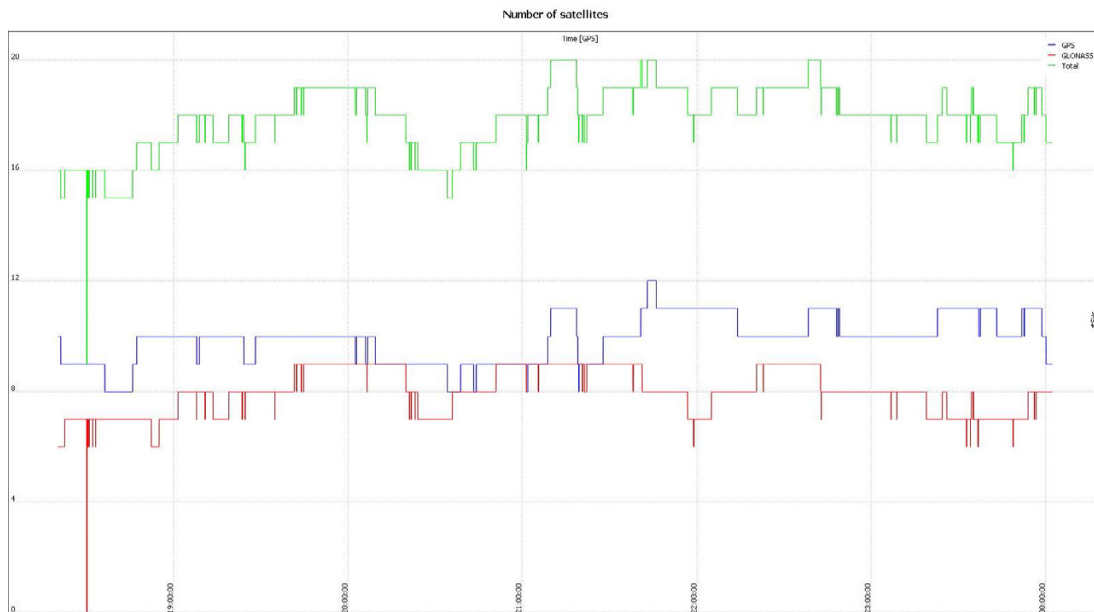
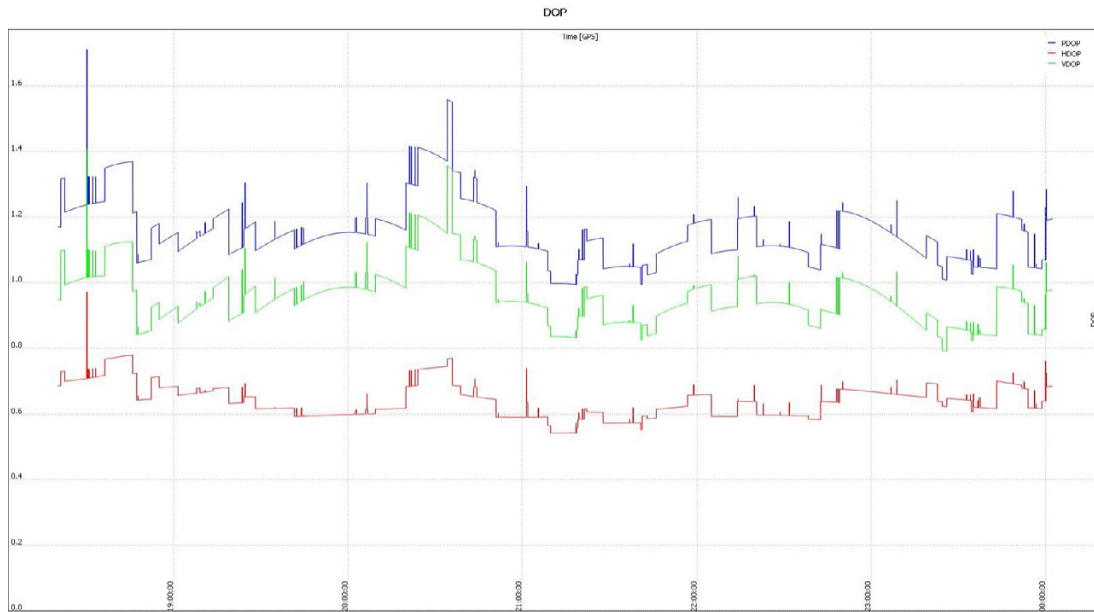
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 205 Hz
Laser Current	25 %	FOV	60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	1839	1844
Post Mission	2353	2358

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST	547315 - 01	268	6000	1856	1857			171111-185602	
∞		∞	6000	1914	1920				
16	547315 - 01	0	6000	1922	1934			171111-192254	
15	03	180	6000	1937	1945			-193743	REFLY BECAUSE OF MOISTURE @ 547314A
14	04	0	6000	1948	1955			-194844	
16	05	0	6000	2001	2007			171111-200121	
17	05	180	6000	2011	2028			-201111	
18	07	0	6000	2031	2049			-203141	
19	08	180	6000	2052	2109			-205234	
20	09	0	6000	2112	2130			-211251	
21	109	180	6000	2133	2150			-213335	
22	110	0	6000	2154	2212			-215422	
23	11	180	6000	2215	2232			-221518	
24	12	0	6000	2236	2253			-223606	
25	14	180	6000	2256	2313			-225648	
X-TIE (547315 - 15)		90	6000	2318	2320			-231811	
∞		∞	6000	2321	2326				

Nov. 11, 2017-A (CFKMA, SN1264)





Flight Log

LIDAR Flight Log

Julian Day 315 Flight A

Date	11/11/2017	Aircraft	PA-31 C-FKMA
Project	315 Dewey Ziebach	Pilot	M. McR
Location	Pierre SD	Operator	BE
Mission Objective	AOI 1		

System	Riegl Q1560
Unit	2221264
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes	
Temp	2°C
Humidity	83%
Allimeter	1019 mb
Terrain Height	525 m



AIRBORNE LIDAR ENGINEERING
A Clean Harbors Company

Aircraft Block Time			
Engine On	18:04	Ramp Out	18:27
Engine Off	20:04	Ramp In	23:53
Total	60 hrs	Total	5.4 hrs

Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

Static Alignment		GPS Time	
Pre Mission	18:20	Start	End
Post Mission	23:57	18:25	00:02

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST STRIP		N							TEST STRIP
FIGURE 8		N	18:42	18:47					"
96	641731501	0	5800'	18:50	19:05			171111-185014	"
95	02	180		19:09	19:14			190958	ref flying N 10 km
94	03	0		19:17	19:21			191732	"
97	04	180		19:25	19:42			192557	"
98	05	0		19:44	20:00			194456	"
99	Abort working	140		20:03	20:03			200310	transfer off line
100	06	180		20:08	20:23			200833	Aborted
101	07	0		20:26	20:41			202626	"
102	08	180		20:44	20:59			204435	"
103	09	0		21:02	21:17			210233	"
	641731510	180		21:20	21:36			211051	"

HAD TO RE-INITIALIZE SYSTEM

LIDAR Flight Log

Julian Day 315 Flight A

Date 11/11/2017
 Project 3125_DeweyZiebach
 Location Pierre SD
 Aircraft PA-31 C-FKMA
 Pilot M. McQuarry
 Operator B. Whiteley
 Mission Objective AOI 1

System Riegl Q1560
 Unit 2221264
 IMU Applanix AP50
 GPS Rx Trimble
 Scanner 1 Drive 0
 Scanner 2 Drive 1

Additional Notes
 Temp 2°C
 Humidity 83%
 Altimeter 1019mb
 Terrain Height 525m



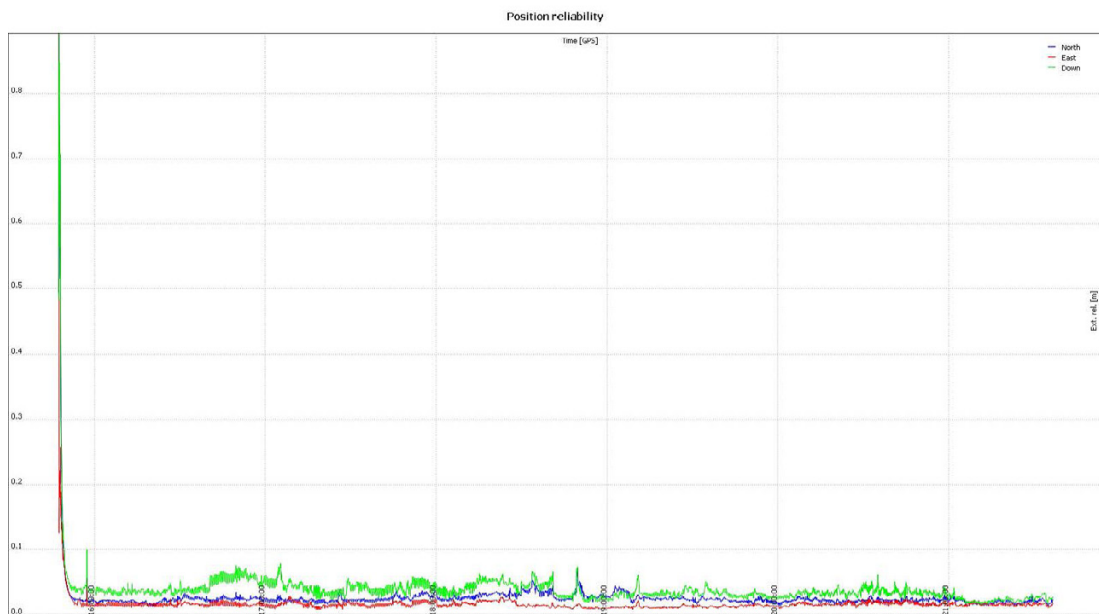
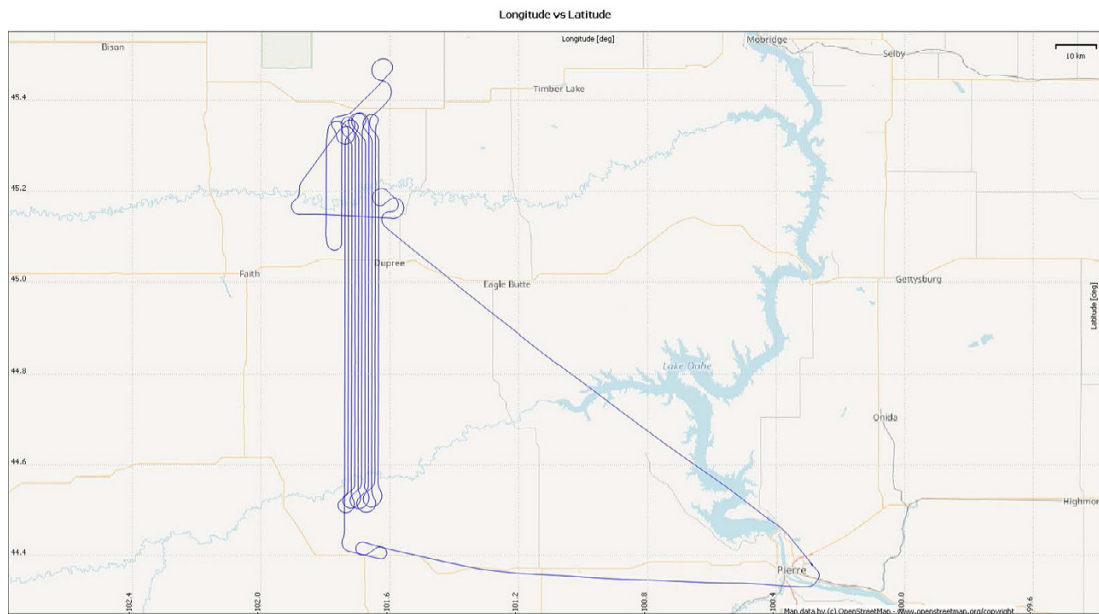
Aircraft Block Time		
Engine On	Ramp Out	Takeoff
18:04	18:27	18:29
Engine Off	Ramp In	Landing
06:04	23:52	23:53
Total	hrs	hrs

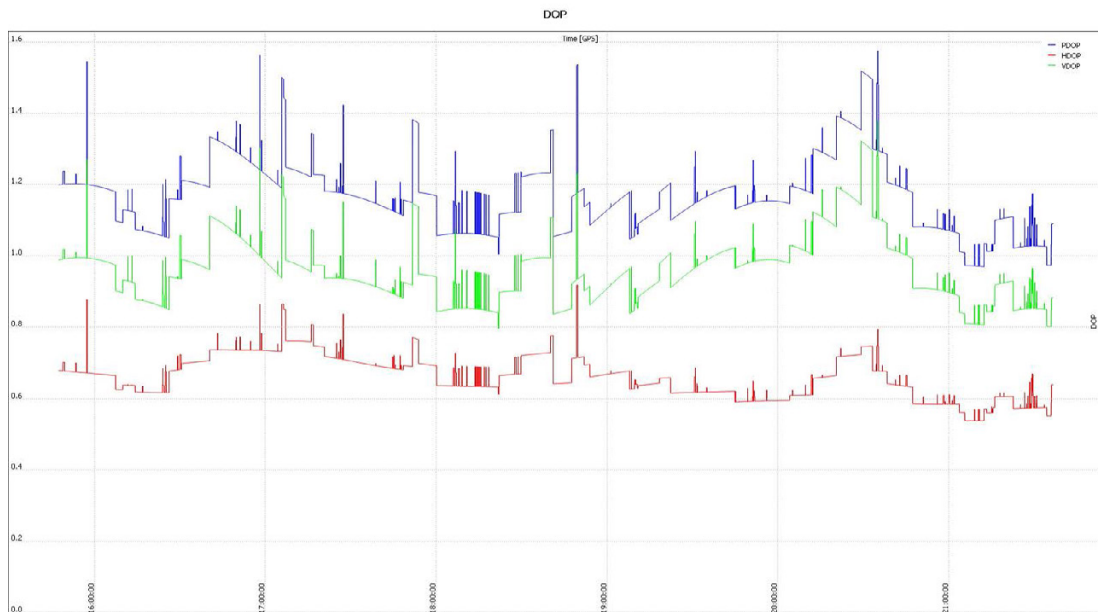
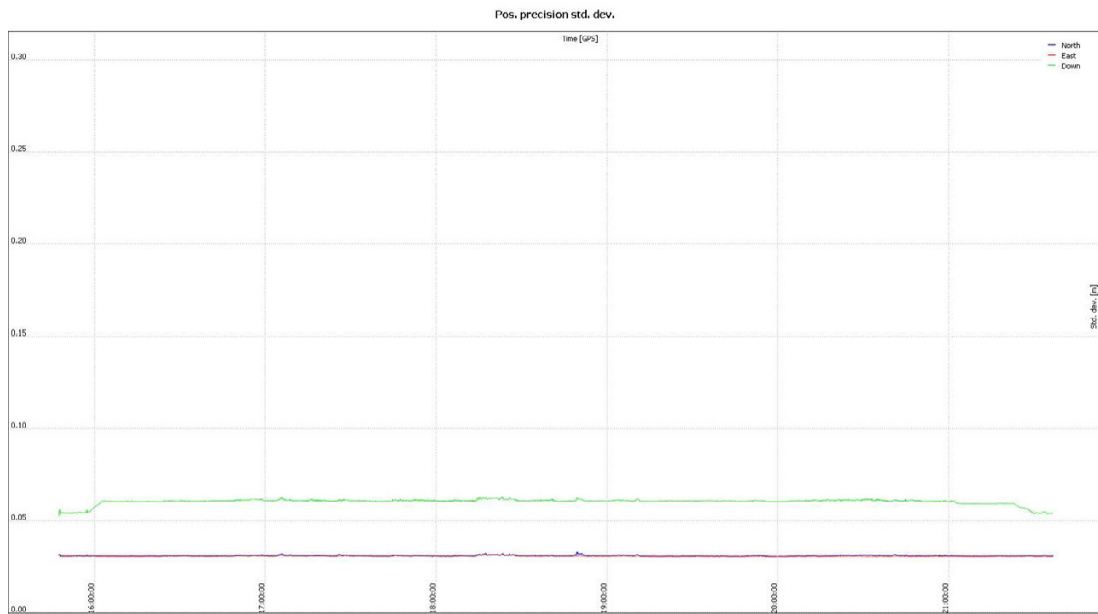
Mission Plan		
AGL Height	Pulse Rate	800 KHz
1300 m		
Target Speed	Scan Rate	237 Hz
160 kts		
Laser Current	FOV	60 Deg's
25 %		

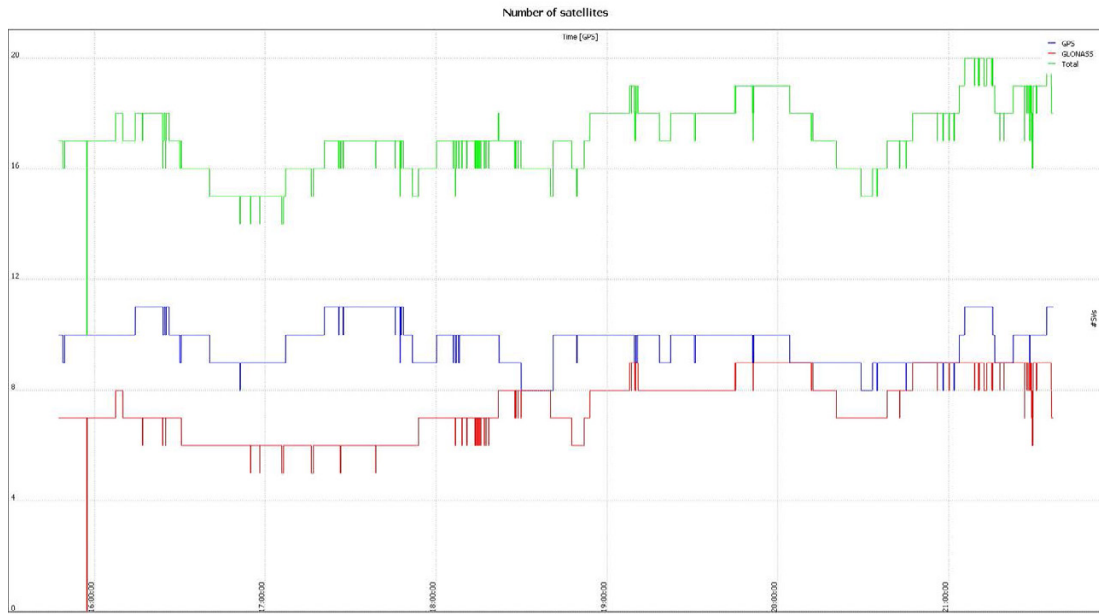
Static Alignment		GPS Time	
Pre Mission	End	Start	End
18:20	18:25	23:57	00:02
Post Mission			

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
104	6417315-11	0	5800'	21:39	21:54			171111-213924	
105	12	180		21:57	22:12			215726	
106	13	0		22:15	22:29			221511	
107	14	180		22:32	22:47			223257	
108	15	0		22:50	23:05			225031	
109	16	180		23:08	23:23			236817	
XTIE	17	270		23:28	23:32			232857	
∞				23:33	23:36				∞

Nov. 12, 2017-A (CFFRY, SN1254)







Flight Log

Julian Day 316 Flight A

LIDAR Flight Log



Date 10/12/2017	Aircraft PA-31 C-FFRY	System Riegl Q1560	Additional Notes Temp -2°C Humidity 94% Altimeter 1029 Terrain Height 530
Project 3125_DeweyZiebach	Pilot D.Thibeault	Unit 2221254	
Location Pierre SD KPIR	Operator D.Tarr	IMU Applanix AP50	
Mission Objective		GPS Rx Trimble	
		Scanner 1 Drive A1	
		Scanner 2 Drive A2	

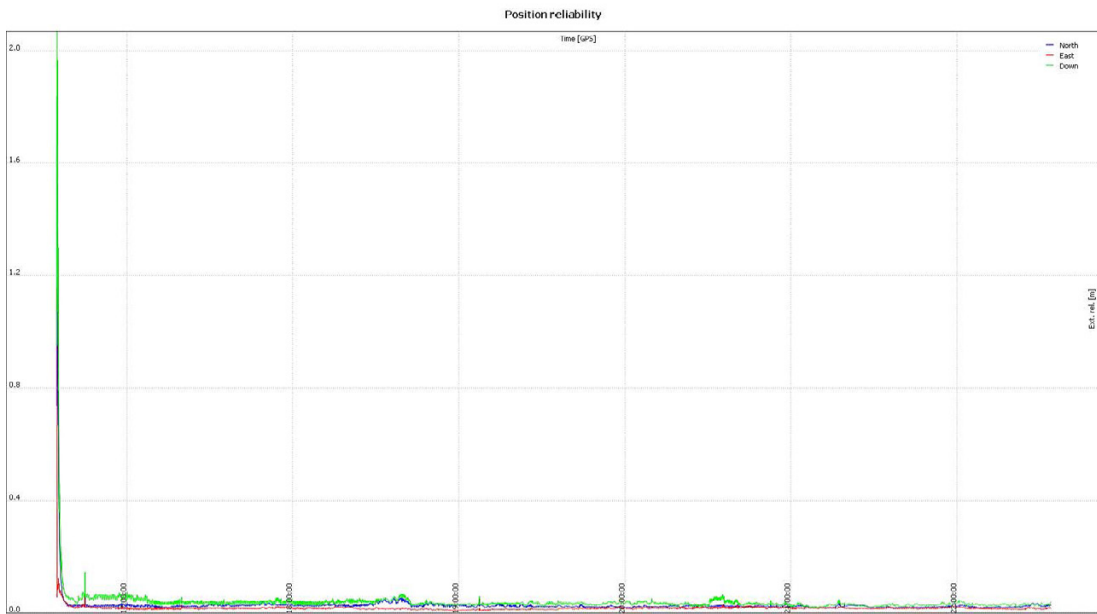
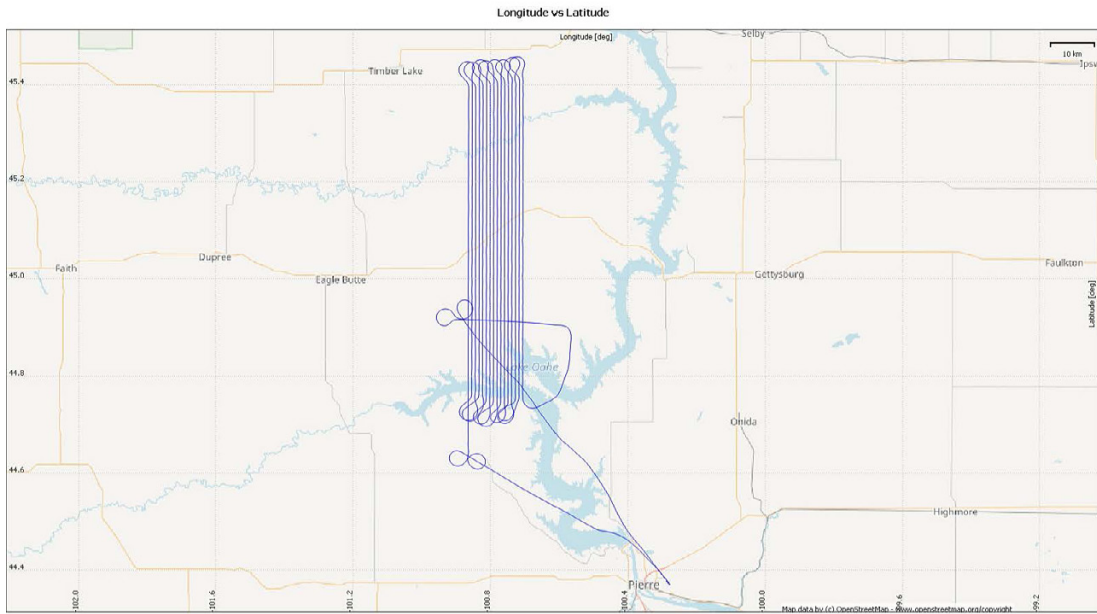
Aircraft Block Time		
Engine On 1539	Ramp Out 1553	Takeoff 1557
Engine Off 2140	Ramp In 2130	Landing 2129
Total 6.0 hrs	Total hrs	Total 5.6 hrs

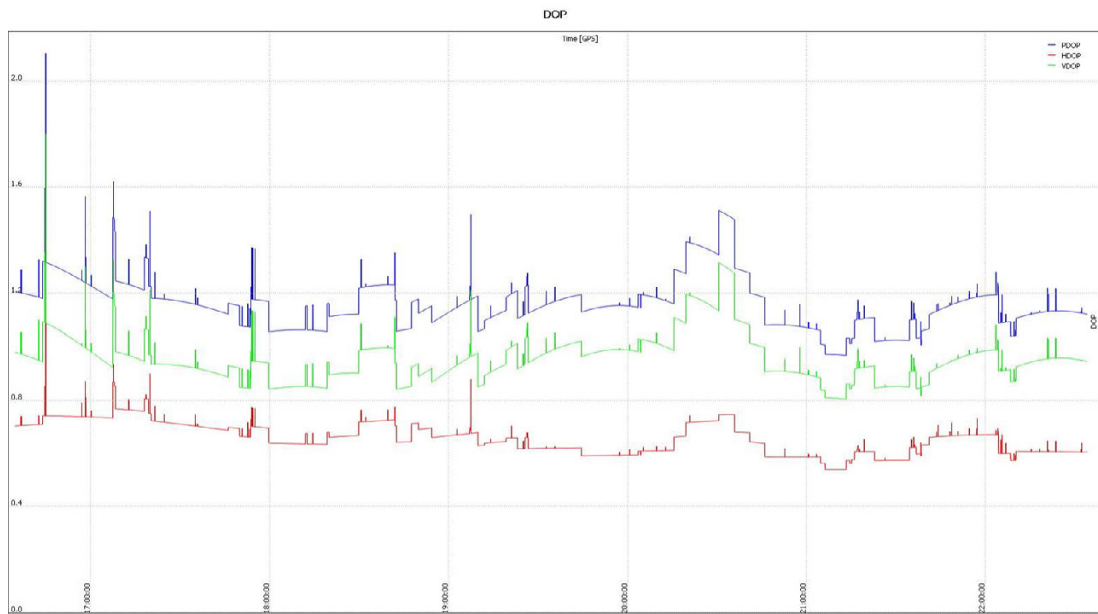
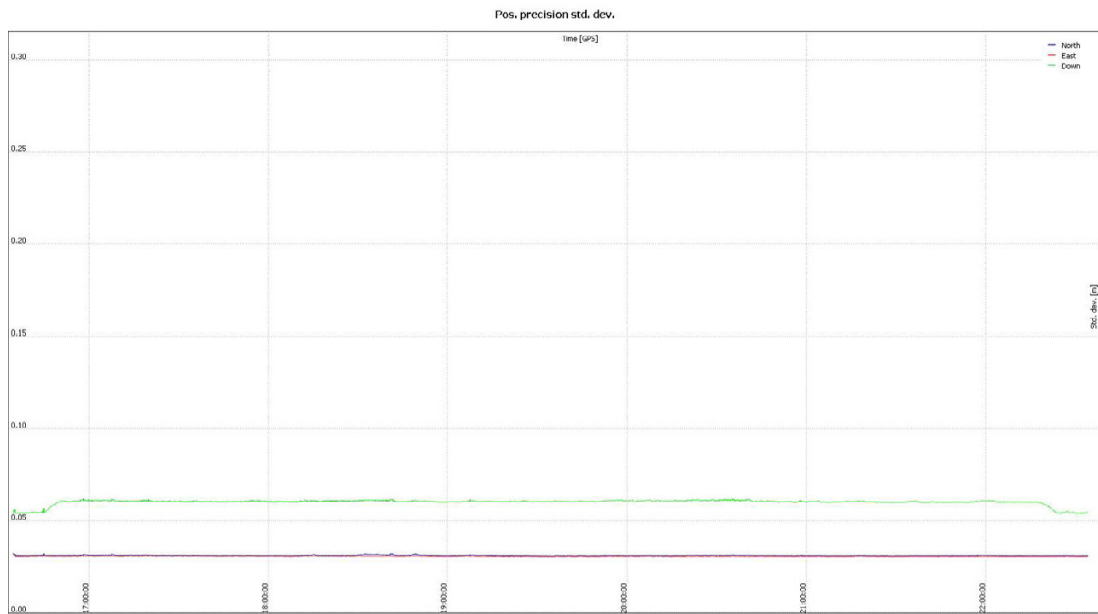
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

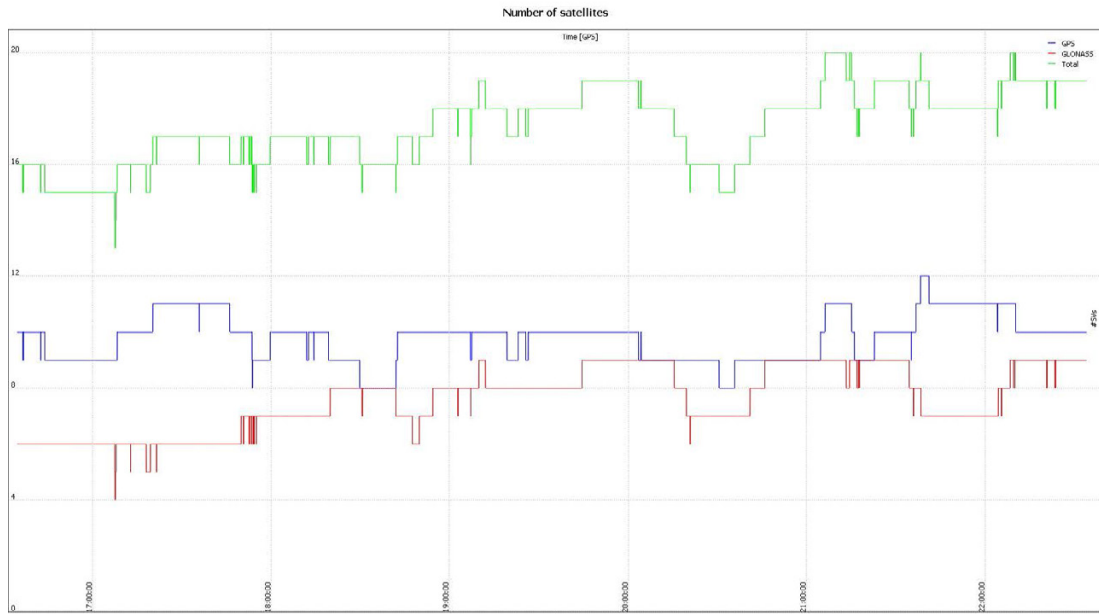
Static Alignment	GPS Time	
	Start	End
Pre Mission	1547	1552
Post Mission	2131	2136

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST		270	6000	1603	1604			17112-160302	
∞		∞	6000	162330	162830			—	
26	5417316-01	0	6000	1631	1648			17112-163157	
25	02 -02	180	6000	1652	1657			-165233	REC'D FOR SNOW PELLETS FROM 5417315A
27	03	180	6000	1706	1724			-170620	
28	04	0	6000	1727	1744			-172755	
29	05	180	6000	1747	1805			-174750	
30	06	0	6000	1808	1825			-180850	
31	07	180	6000	1829	1847			-182929	
32	08	0	6000	1850	1907			-185044	
33	09	180	6000	1911	1928			-191108	
34	10	0	5900	1932	1948			-193235	
35	11	180	5900	1952	2009			-195211	
36	12	180	5900	2013	2029			-201303	
37	13	180	5900	—	—	ABORT		-	SNAP SHOT CRASH
X-TIE ∞	13	95	5900	2051	2054			-205156	
		∞	∞	2055	2101				

Nov. 12, 2017-A (CFKMA, SN1264)








Flight Log

Julian Day 316 **Flight A**



AIRBORNE IMAGING
A Clean Harbors Company

<p>Additional Notes</p> <p>Temp -3°C Humidity 86% Altimeter 1029 hPa Terrain Height 525m</p>	<p>System Rlegl Q1560</p> <p>Unit 2221264</p> <p>IMU Applanix AP50</p> <p>GPS Rx Trimble</p> <p>Scanner 1 Drive 0</p> <p>Scanner 2 Drive 1</p>
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<p>Aircraft PA-31 C-FKMA</p> <p>Pilot M. McQuarry</p> <p>Operator B. Eisenbart</p> <p>Mission Objective</p>	<p>System Rlegl Q1560</p> <p>Unit 2221264</p> <p>IMU Applanix AP50</p> <p>GPS Rx Trimble</p> <p>Scanner 1 Drive 0</p> <p>Scanner 2 Drive 1</p>
---	--

<p>Engine On 16:33</p> <p>Engine Off 22:33</p> <p>Total 6.0 hrs</p>	<p>Ramp Out 16:41</p> <p>Ramp In 21:06</p> <p>Total 4.65 hrs</p>	<p>Takeoff 16:44</p> <p>Landing 22:14</p> <p>Total 5.5 hrs</p>
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<p>AGL Height 1300 m</p> <p>Target Speed 160 kts</p> <p>Laser Current 25 %</p>	<p>Mission Plan</p> <p>Pulse Rate 800 KHz</p> <p>Scan Rate 237 Hz</p> <p>FOV 60 Deg's</p>	<p>Static Alignment</p> <p>Pre Mission 16:36</p> <p>Post Mission 22:26</p>
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Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
Test Strip		N		16:37	16:37			171112-163635	
Test Strip		N		16:51	16:51			165131	∞
110	6417316.01	0	5800'	16:56	17:00			170321	
111	02	180		17:03	17:13			171950	
112	03	0		17:19	17:34			173432	173744
113	04	180		17:37	17:52			175522	
114	05	0		17:55	18:10			181400	
115	06	180		18:14	18:29			183152	
116	07	0		18:31	18:46			184948	
117	08	180		18:49	19:05			190811	
118	09	0		19:08	19:24			192725	
119	10	180		19:27	19:42			194543	
120	11	0		19:45	20:01			200404	
121	12	180	↓	20:04	20:19			202243	
				20:22	20:38				

Pg (of 2

LIDAR Flight Log

Julian Day 316 Flight A

Date 11/12/2017 Aircraft PA-31 C-FKMA
 Project 3125_DeweyZiebach Pilot M.McQuarry
 Location Pierre, SD Operator B.Eisenbart
 Mission Objective

System Riegl Q1560
 Unit 2221264
 IMU Applanix AP50
 GPS Rx Trimble
 Scanner 1 Drive 0
 Scanner 2 Drive 1

Additional Notes
 Temp -3°
 Humidity 86%
 Altimeter 10291 ft
 Terrain Height 525 ft



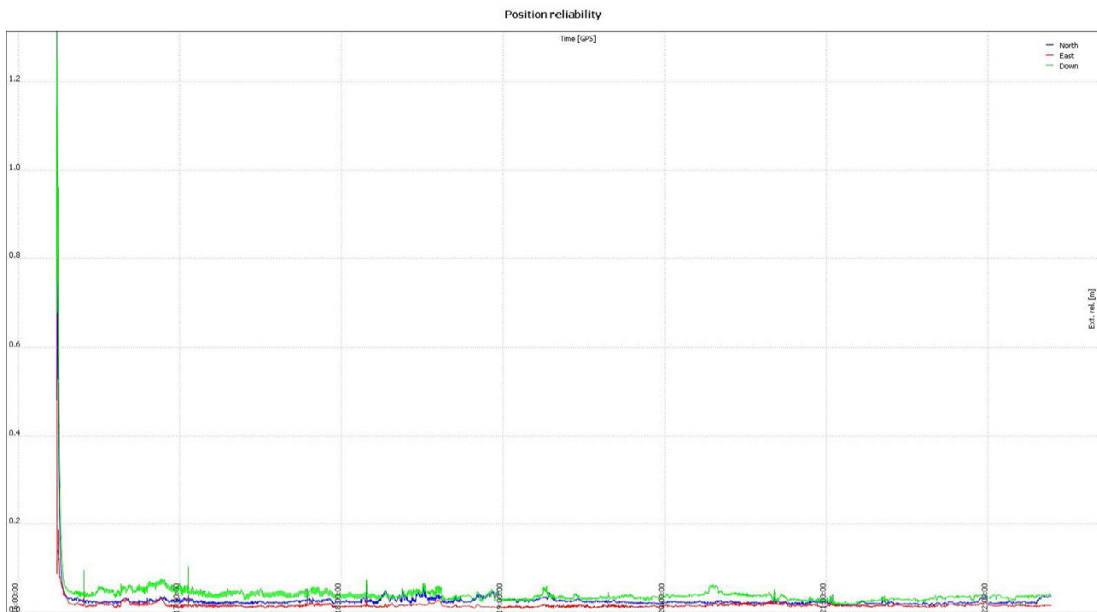
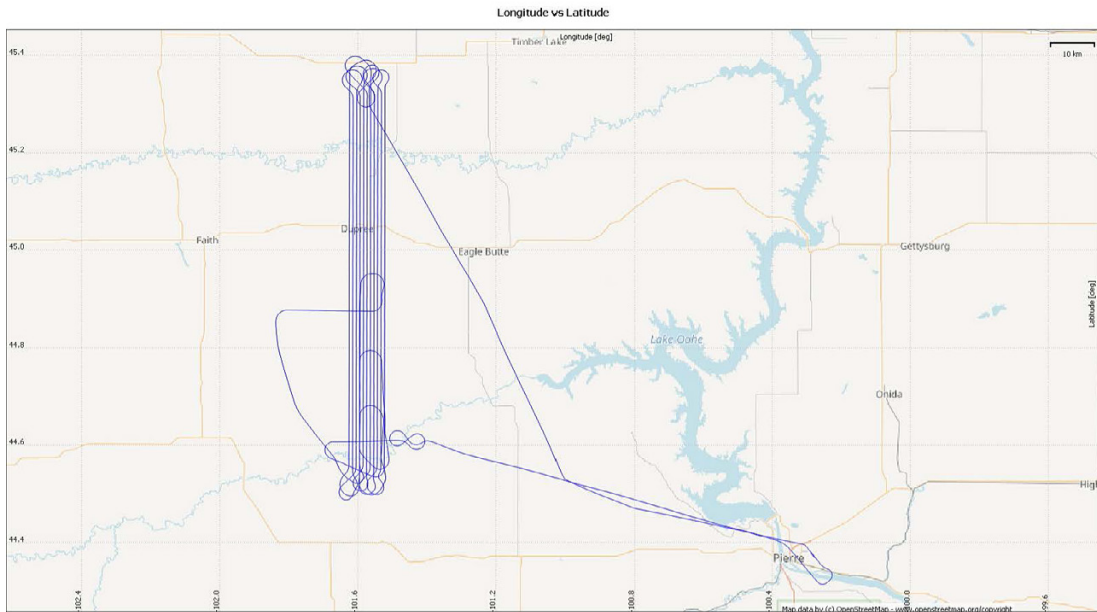
Aircraft Block Time		
Engine On	16:33	Ramp Out 16:41
Engine Off	22:33	Ramp In 22:15
Total	6 hrs	Total 5.5 hrs

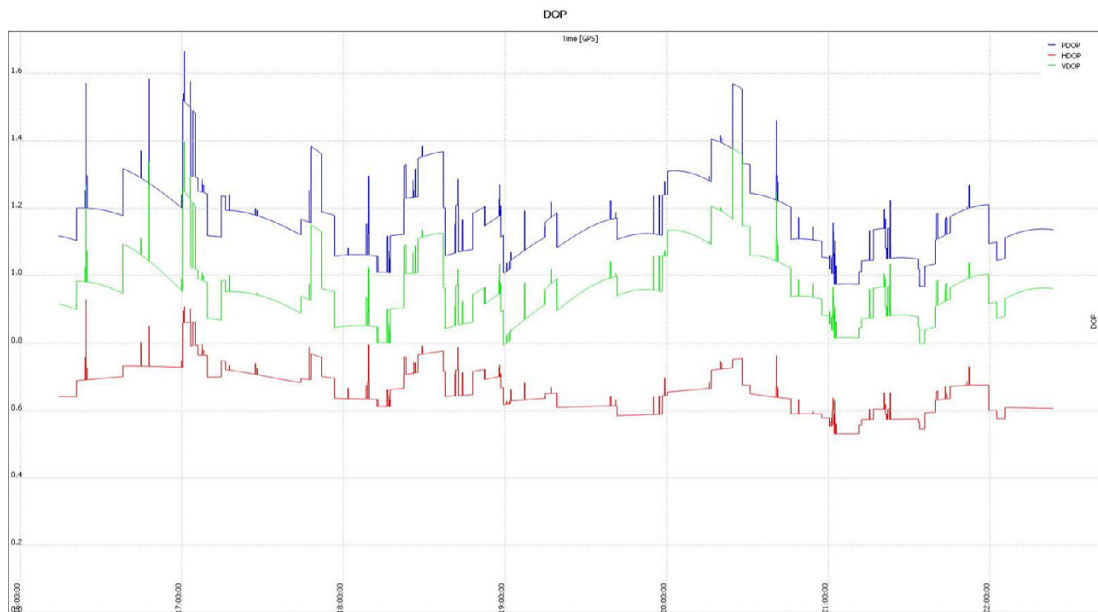
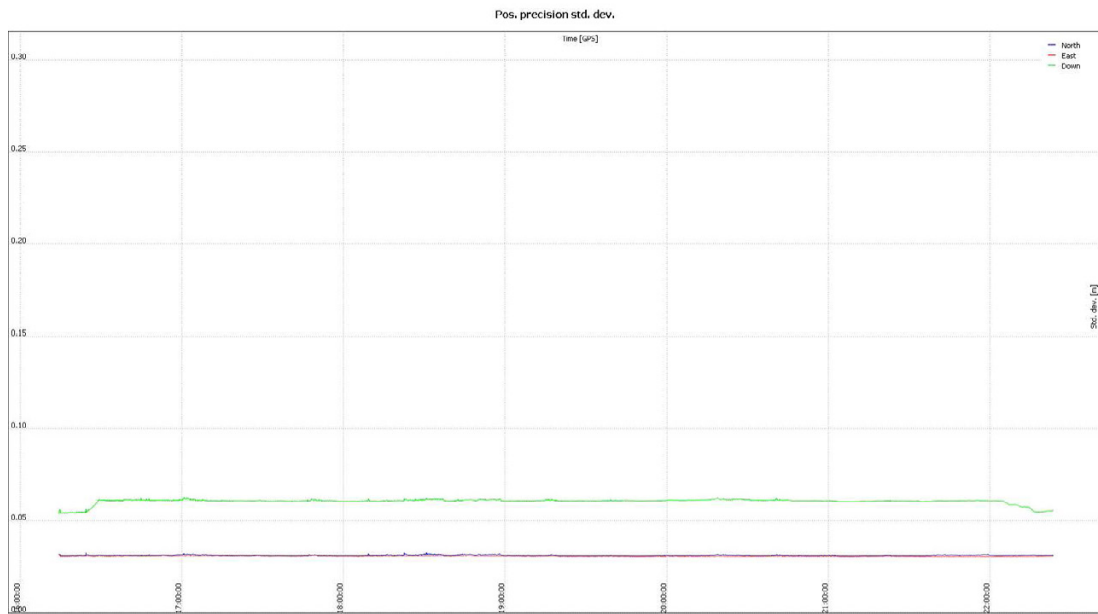
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

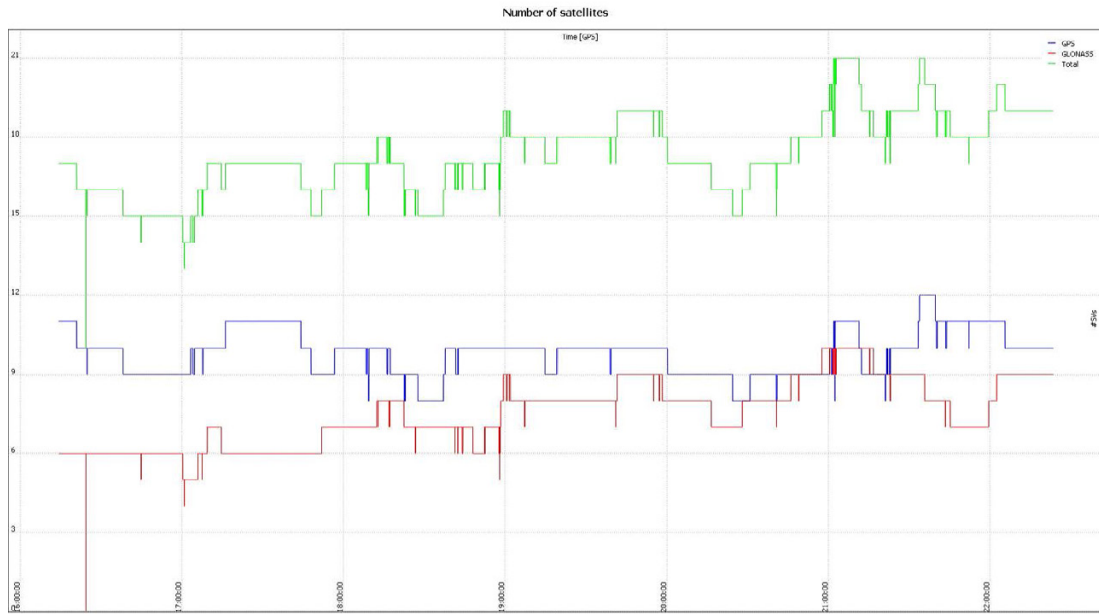
Static Alignment		GPS Time	
Pre Mission	16:36	Start	End
Post Mission	22:26	16:41	22:31

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	Time to End		
122	6417316-13	0	5800'	20:41	20:56			171112-204137	
123	14	180		20:59	21:15			209445	
124	15	0		21:18	21:34			211839	
125	16	180	↓	21:37	21:52			213702	
X-TIE	6417316-17	270		21:58	22:02			215845	X-TIE 260 Mph
figure 8		265		22:02	22:06				∞

Nov. 13, 2017-A (CFFRY, SN1254)







Flight Log

* LIVE TO FILES 04+05 USE BOTH BECAUSE WHEN I GOT THE PILOT DISPLAY WORKING, THE SCANNER DIDN'T AUTOMATICALLY FIRE SO I HAD TO START IT MANUALLY AND MISSED A BIT AT THE SOUTH END OF THE LINE

Julian Day 317 Flight A

LIDAR Flight Log



Date NOV. 13 2017	Aircraft PA-31 C-FFRY	System Riegl Q1560	Additional Notes
Project 3125_DeweyZiebach	Pilot D.Thibeault	Unit 2221254	Temp 4°C
Location PIERRE SD KPIR	Operator D.Tarr	IMU Applanix AP50	Humidity 81%
Mission Objective		GPS Rx Trimble	Altimeter 1019
		Scanner 1 Drive B1	Terrain Height 525
		Scanner 2 Drive B2	

Aircraft Block Time		
Engine On 16:10	Ramp Out 1620	Takeoff 1624
Engine Off 2227	Ramp In 2217	Landing 2216
Total 6.3 hrs	Total hrs	Total 5.9 hrs

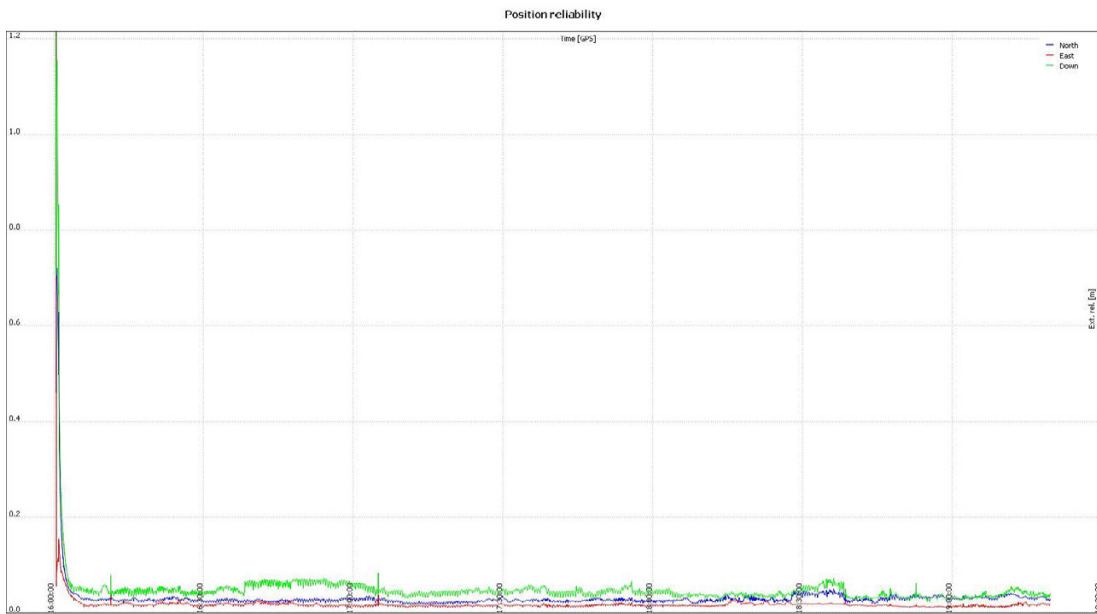
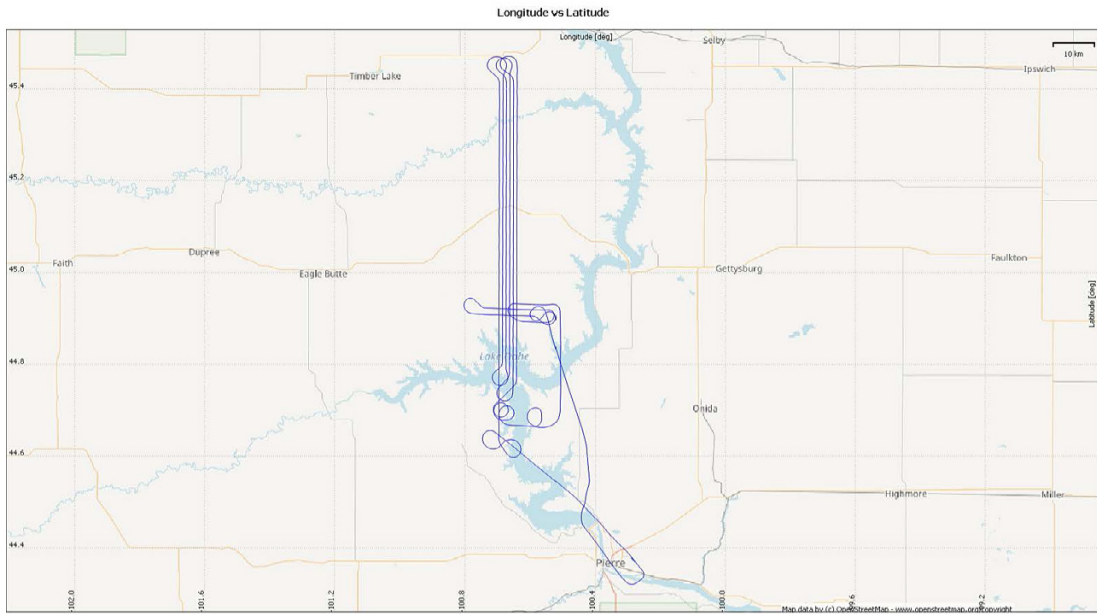
Mission Plan		
AGL Height 1300 m	Pulse Rate 800 KHz	
Target Speed 160 kts	Scan Rate 237 Hz	
Laser Current 25 %	FOV 60 Deg's	

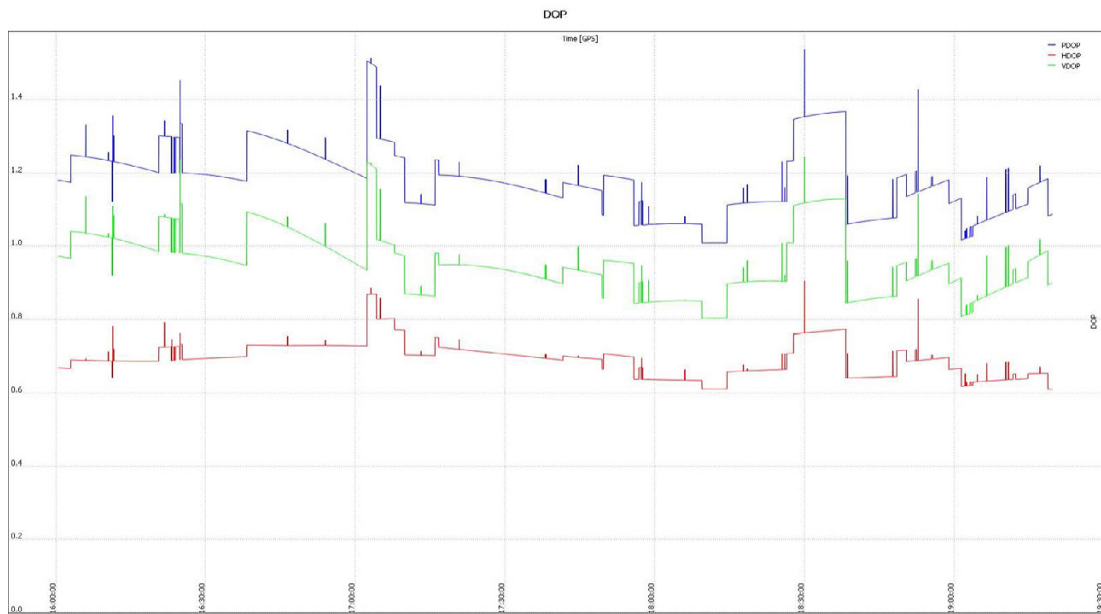
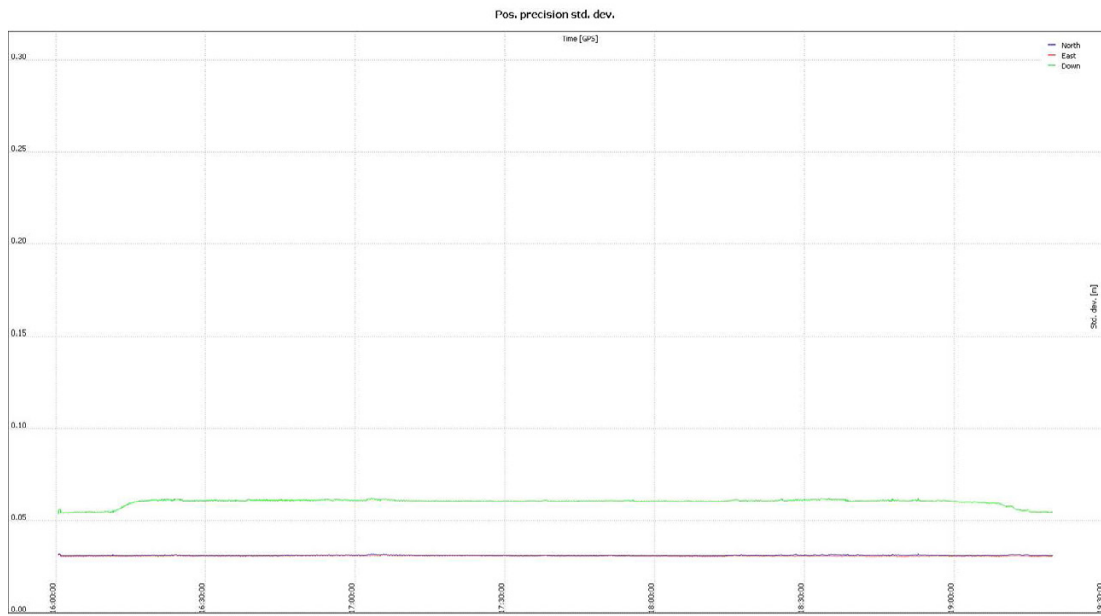
Static Alignment	GPS Time	
	Start	End
Pre Mission	1614	1619
Post Mission	2218	2223

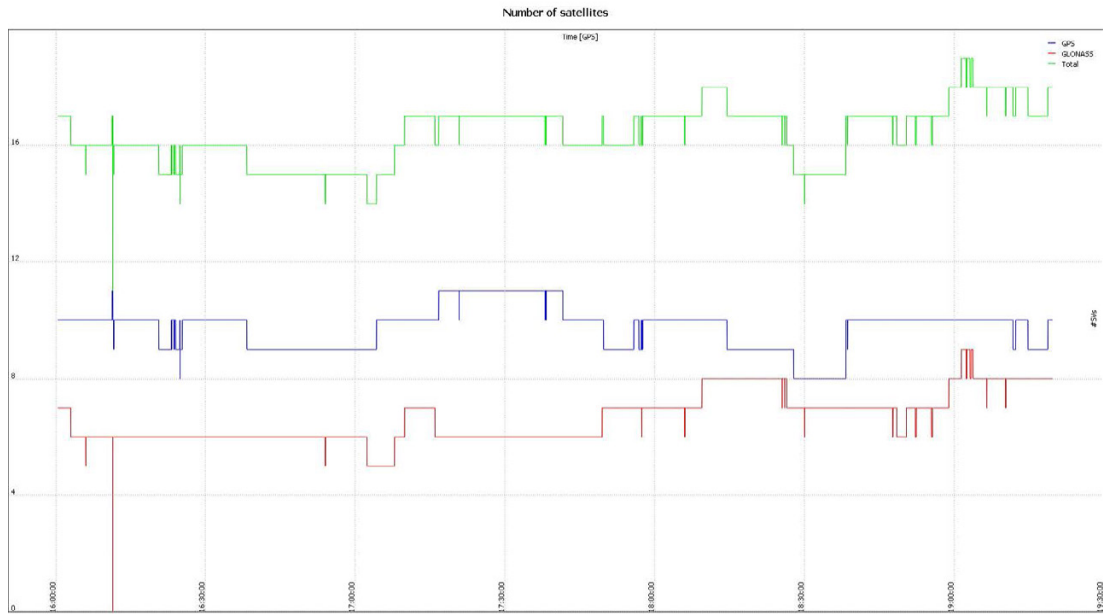
Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST		282	5900	1629	1631			17113-162956	
00		00	5900	1700	1706				
37	5417317A-01	180	5900	1708	1725			17113-170844	
38	02	0	5900	1728	1746			-172853	
39	03	180	5900	1749	1806			-174940	
40	04	0	5900	1810	1816	CRASH	FILED SOUTH	-181055	SMART SHOT ERROR
40 RE-TRY	DELETE	0	5900	1832	1841	CRASH	FILED SOUTH	-183252	START SCANNER MANUALLY
X-TIE W4423	DELETE	270	5900	1844	1845			-184411	X-TIE NOT NEEDED. GOT PILOT DISPLAY WORKING
40 RE-TRY		05	0	5900	1858			-185830	START SCANNER MANUALLY
41	06	180	5900	1919	1936			-191931	
42	07	0	5900	1939	1956			-193929	
43	08	180	5900	2001	2018			-200126	
44	09	0	5900	2021	2038			-202138	
45	10	180	5900	2042	2059			-204202	
46	11	0	5900	2102	2119			-210236	
47	12	180	5900	2122	2139			-212248	
X-TIE W4335-49		90	5900	2143	2146			-214356	
00		00	5900	2147	2153				

CHANGE CAMERA ERROR? (SAME ERROR)

Nov. 13, 2017-A (CFKMA, SN1264)







Flight Log

LIDAR Flight Log

Julian Day 317		Flight A	
Date	11/13/17	Aircraft	PA-31 C-FKMA
Project	3125_Dewey/Ziebach	Pilot	M. McQuarry
Location	Pierre SD	Operator	B. Eisenbart
Mission Objective			

System	Riegl Q1560
Unit	2221264
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes	
Temp	4° C
Humidity	80%
Altimeter	1019 mb
Terrain Height	525 m

Static Alignment	
Start	End
16:00	16:05
19:14	19:19



**AIRBORNE
IMAGING**
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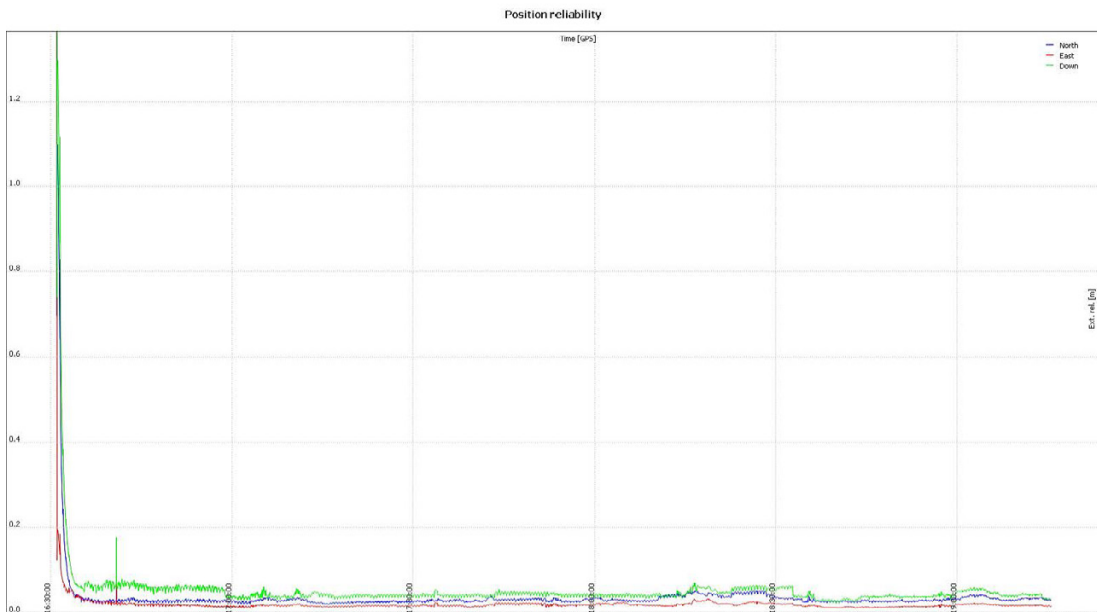
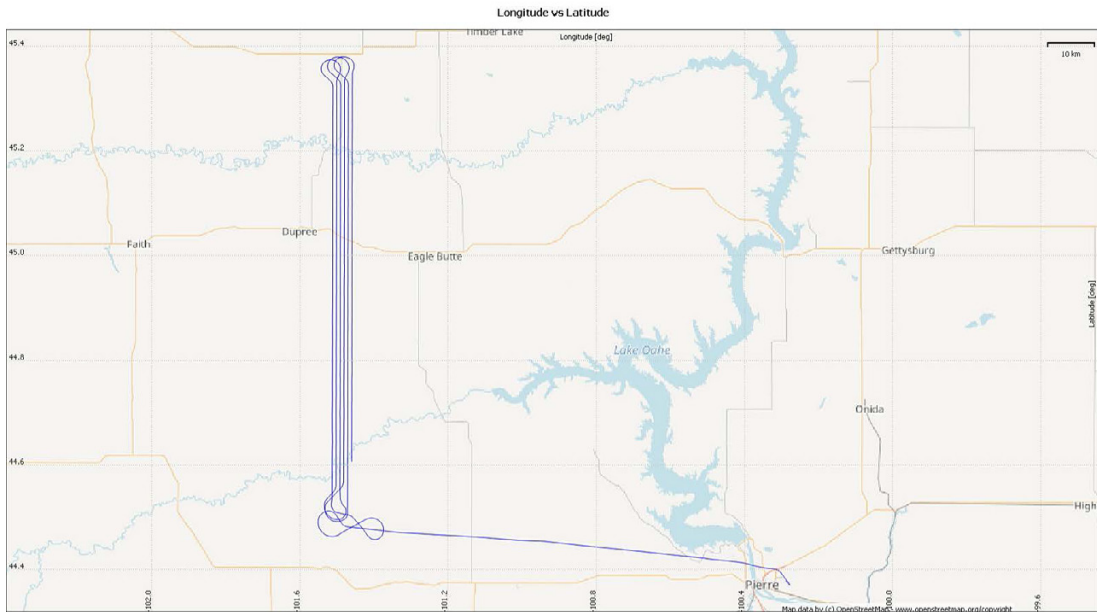
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

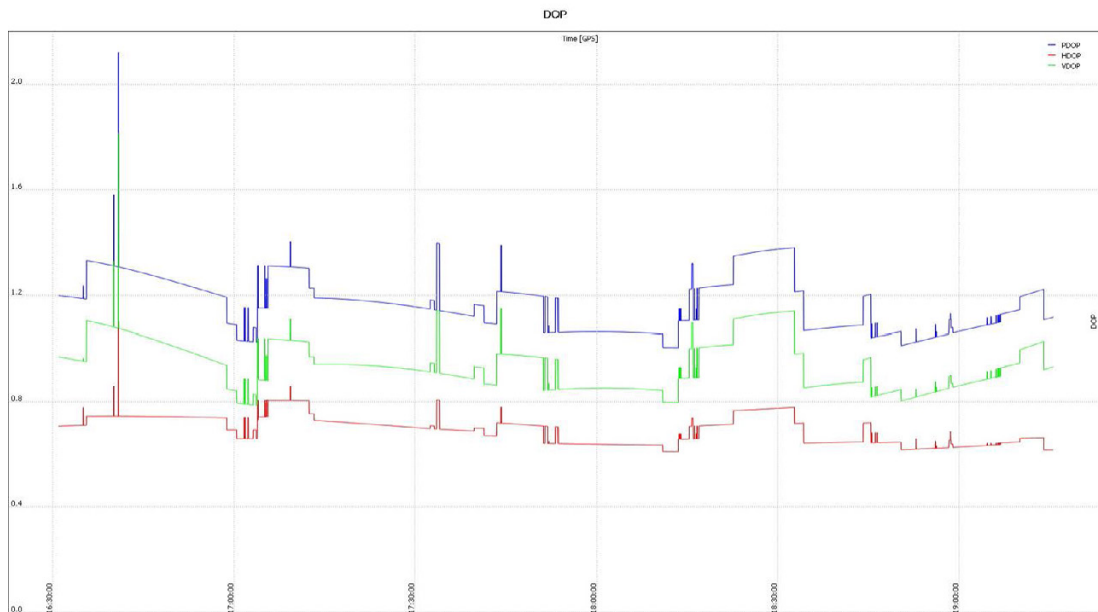
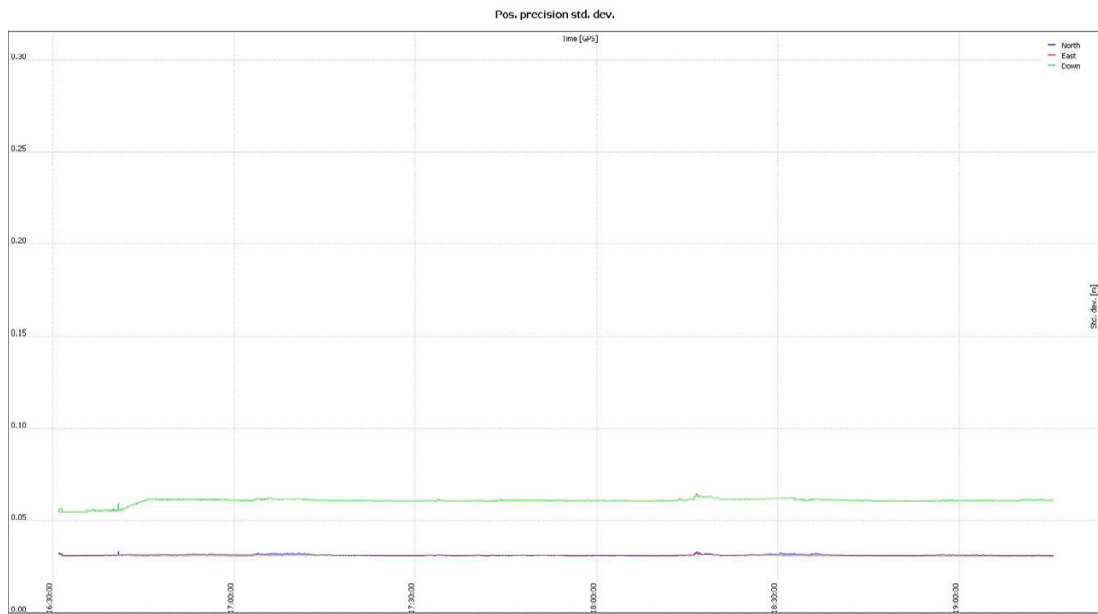
Aircraft Block Time					
Engine On	15:55	Ramp Out	16:08	Takeoff	16:10
Engine Off	19:20	Ramp In	19:14	Landing	19:13
Total	3:45 hrs	Total	3 hrs	Total	3 hrs

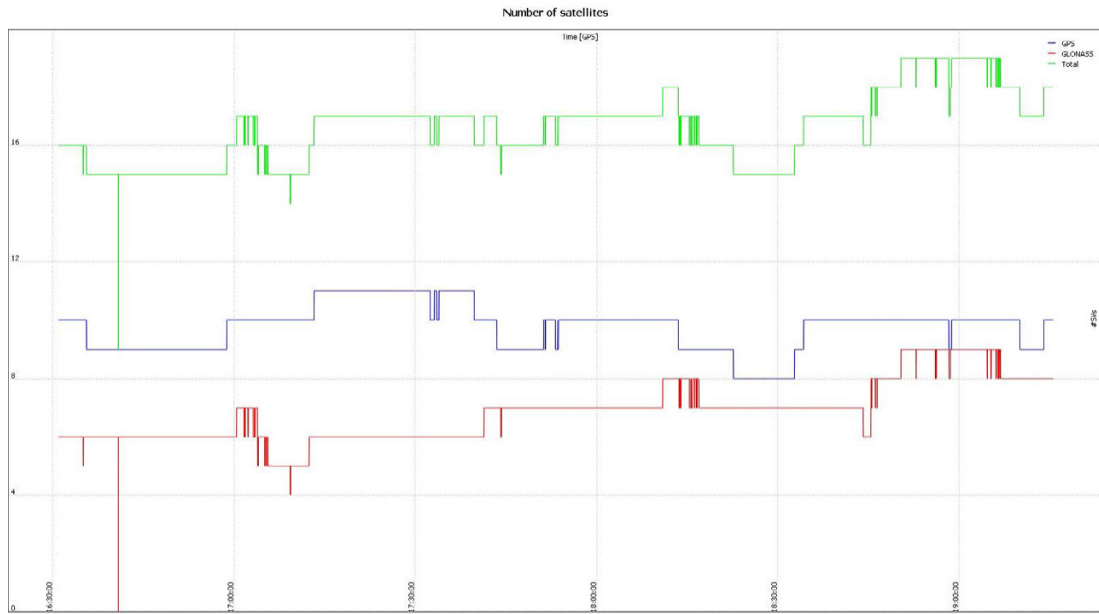
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
Test Strip		↙		16:15	16:15	16:26		17113-161514	
Figure 8		↻	5800'	16:21	16:26			163040	
126	6417317-01	0		16:48	17:02			164806	
127	02	180		17:05	17:19			170501	
128	03	0		17:22	17:36			172227	
129	04	180		17:40	17:55			174004	
130	05	0		17:58	18:14	18:08	11	175833	ch1 stopped working @ 18:08
131	06	180							could not execute X file
132	07	0							
133	08	180		18:50	18:54				

Pg of

Nov. 14, 2017-A (CFFRY, SN0754)







Flight Log

Julian Day 318 Flight A

LIDAR Flight Log



Date	Nov. 14/2017	Aircraft	C-FFRY
Project	3125 Dewey Ziebach	Pilot	D Thibeault
Location	Pierre SD KPIR	Operator	D. Tarr
Mission Objective			

System	Riegl Q1560
Unit	2220754
IMU	Applanix 8704
GPS Rx	Trimble
Scanner 1 Drive	A1
Scanner 2 Drive	A2

Additional Notes
Temp 3
Humidity 83%
Altimeter 1009
Terrain Height 525

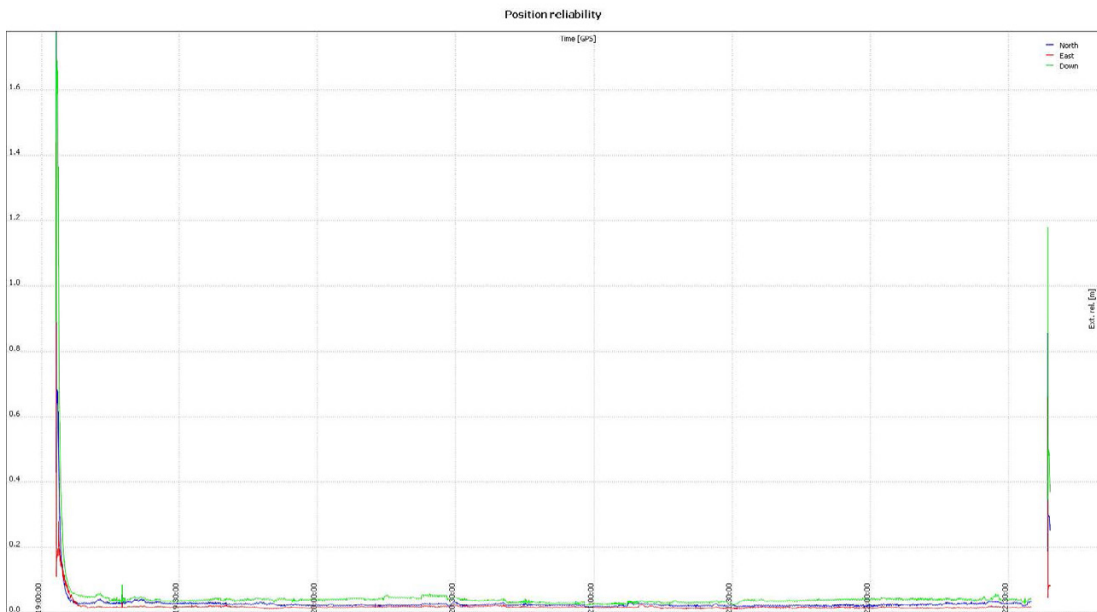
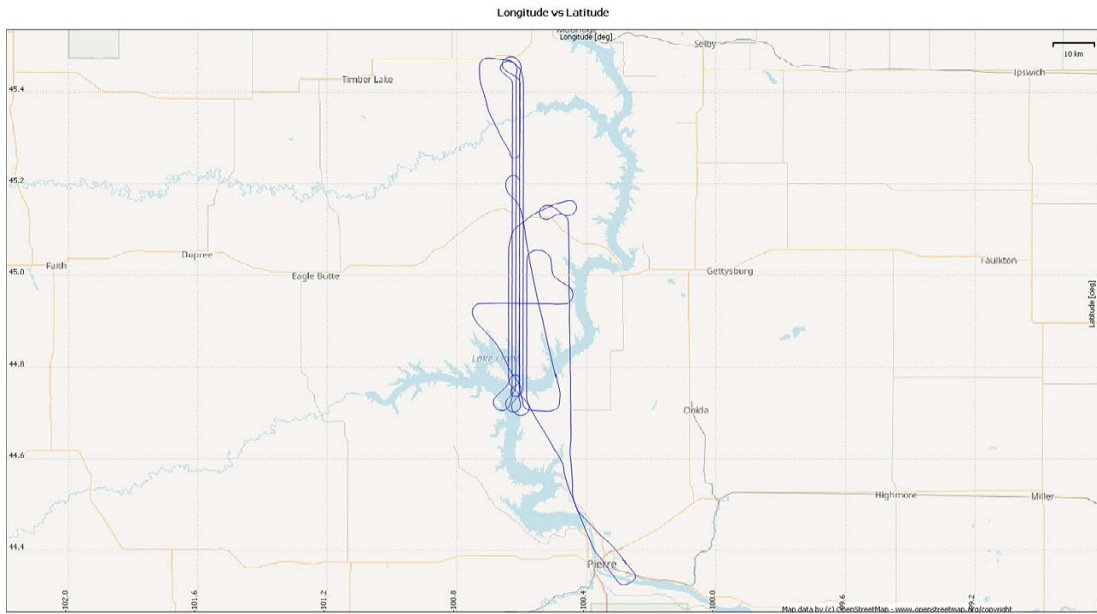
Aircraft Block Time		
Engine On	1626	Ramp Out
Engine Off	1951	Ramp In
Total	3.5 hrs	Total
Takeoff	1640	Landing
		1951
Total	3.2 hrs	

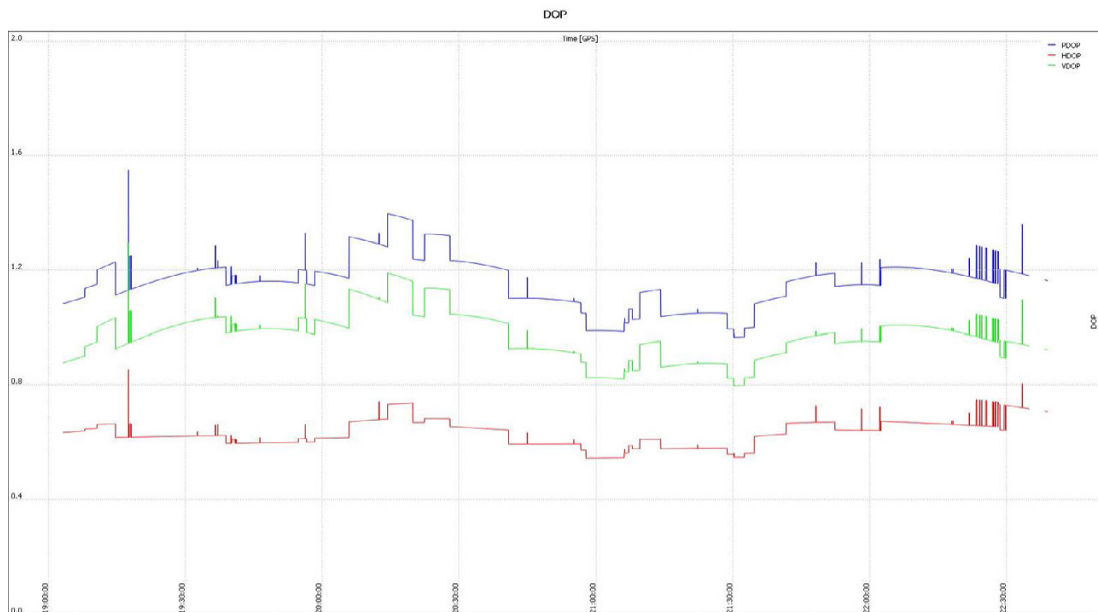
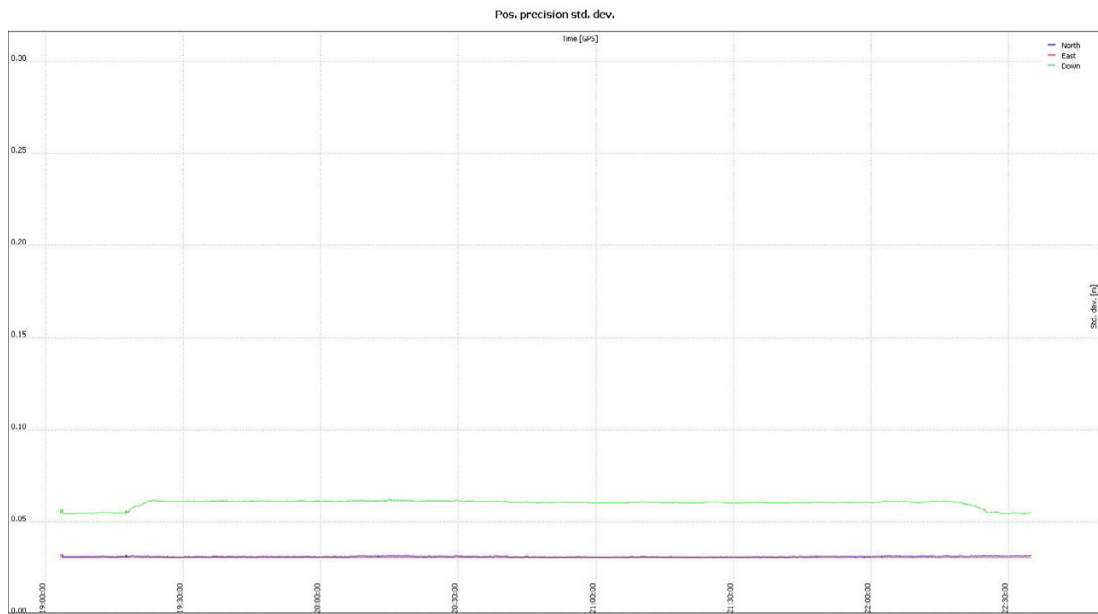
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

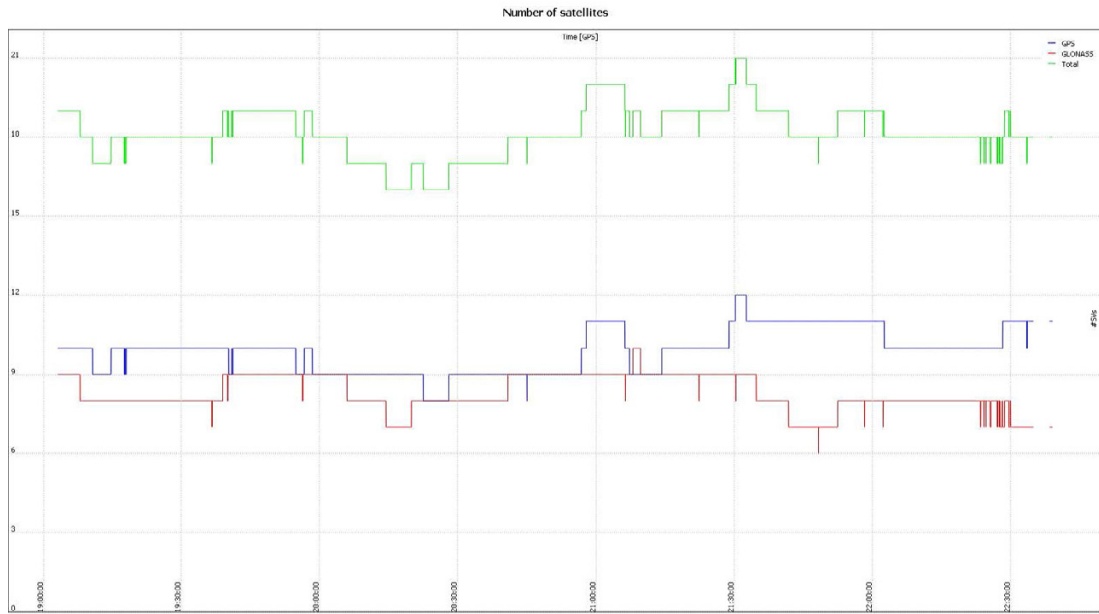
Static Alignment	GPS Time	
	Start	End
Pre Mission	1630	1635
Post Mission		

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST		275	5900	1646	1648			17114-164625	
00		∞	5900	170240	171000				
48	5417318A-01	0	5900	1712	1731			17114-171235	
49	02	180	5900	1734	1750			-173418	
50	03	0	5900	1755	1813			-175507	
51	04	180	5900	1816	1833			-181636	
52	05	0	5900	1838	1855			-183817	
53	06	180	5900	1859	1915	* SHUT DOWN WITH 1 MINUTE BEFORE		-185914	IMU TURNED RED
00		∞	5900	1915	1925?		END OF LINE*		Lost Pos Av

Nov. 14, 2017-B (CFKMA, SN1264)







Flight Log

LIDAR Flight Log

Julian Day 318 Flight B

Date	Nov 14, 2017	Aircraft	PA-31 C-FKMA
Project	3125_DeweyZiebach	Pilot	M. McQuarry
Location	Pierre SD	Operator	B. Eisenbart
Mission Objective			

System	Riegl Q1560
Unit	2221264
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes	
Temp	50 C
Humidity	68%
Altimeter	1009
Terrain Height	525'



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Aircraft Block Time			
Engine On	19:03	Ramp Out	19:14
Engine Off	22:35	Ramp In	22:26
Total	4.2 hrs	Total	3.1 hrs

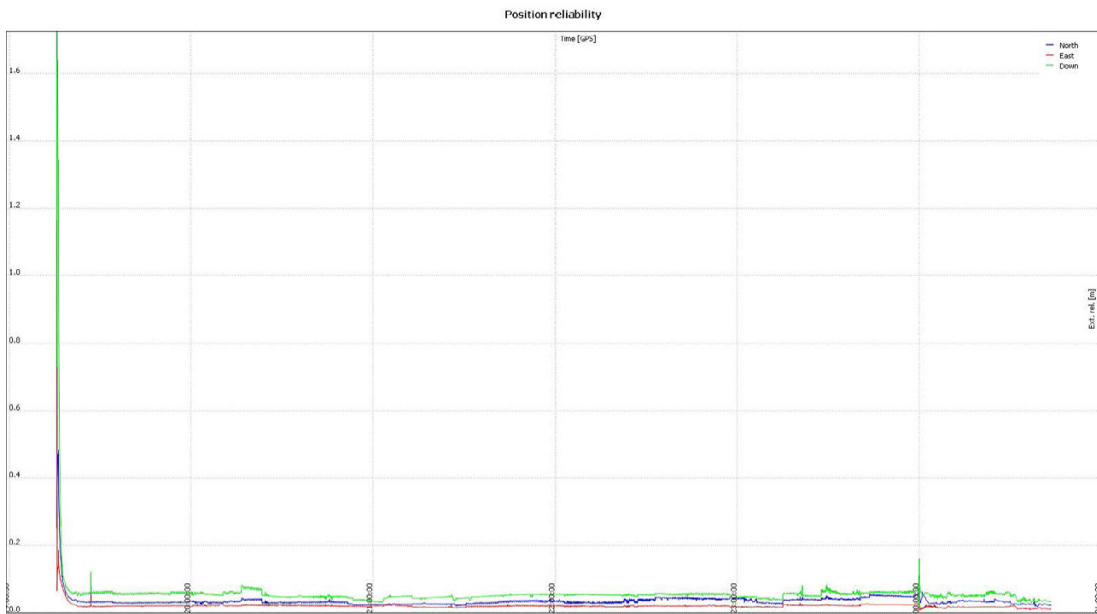
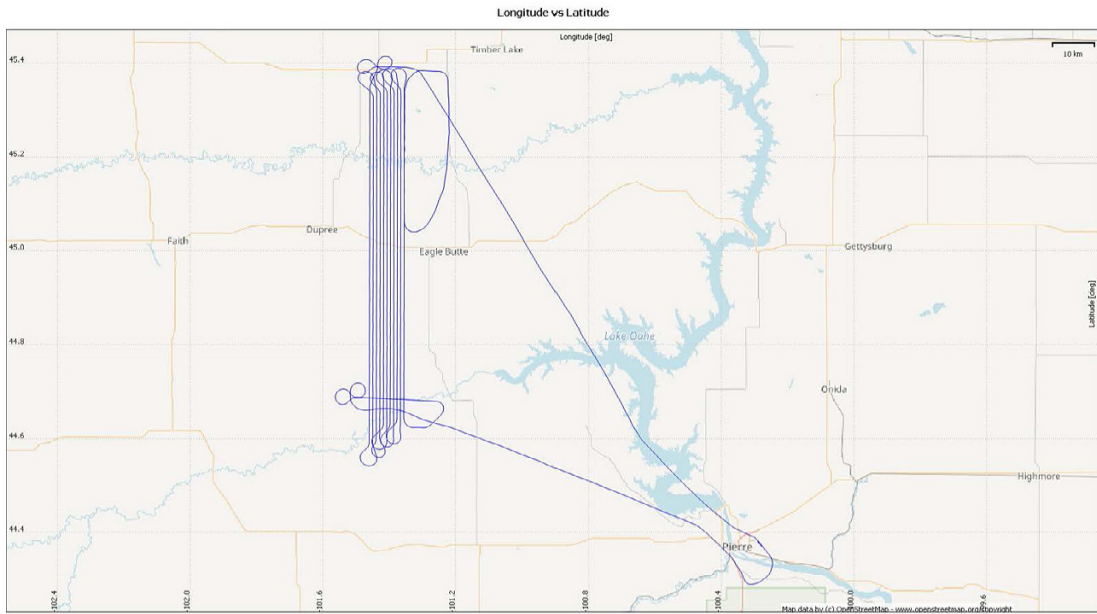
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

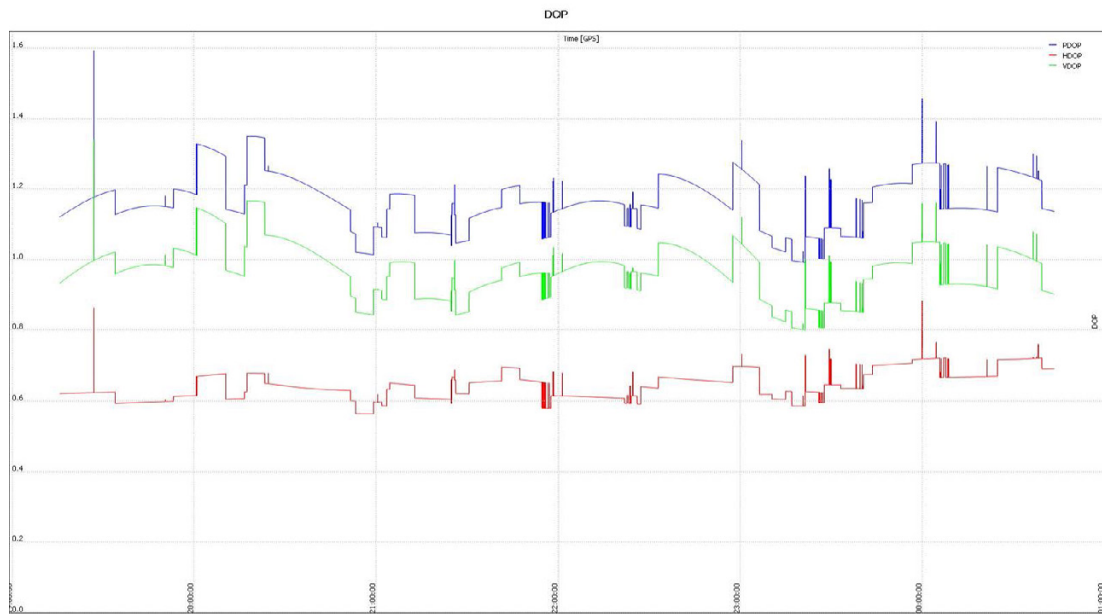
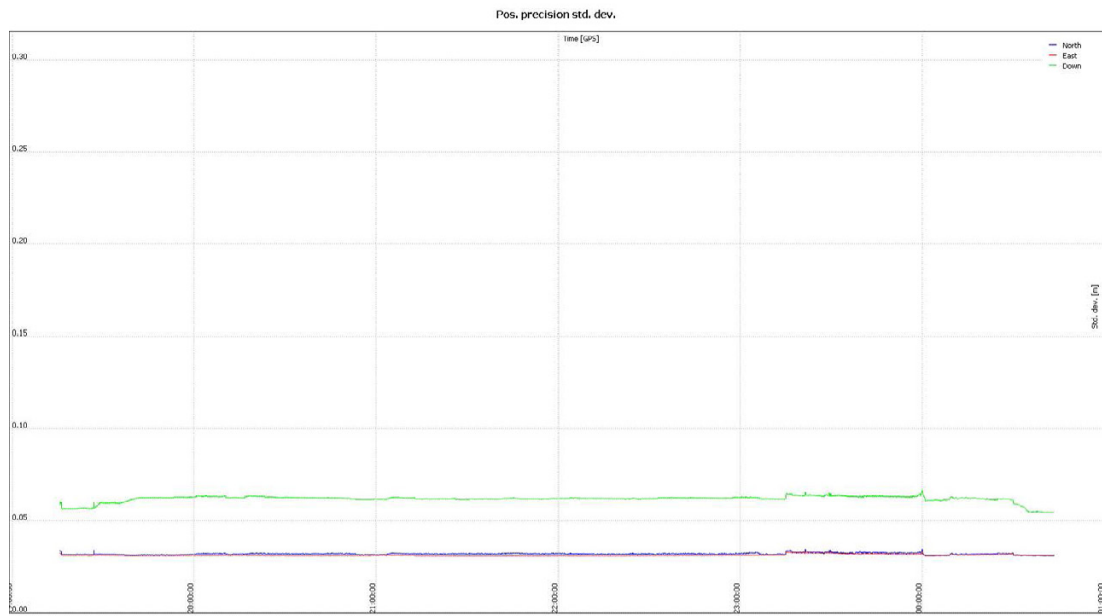
Static Alignment		GPS Time	
Pre Mission	19:08	Start	19:13
Post Mission	22:27	End	22:32

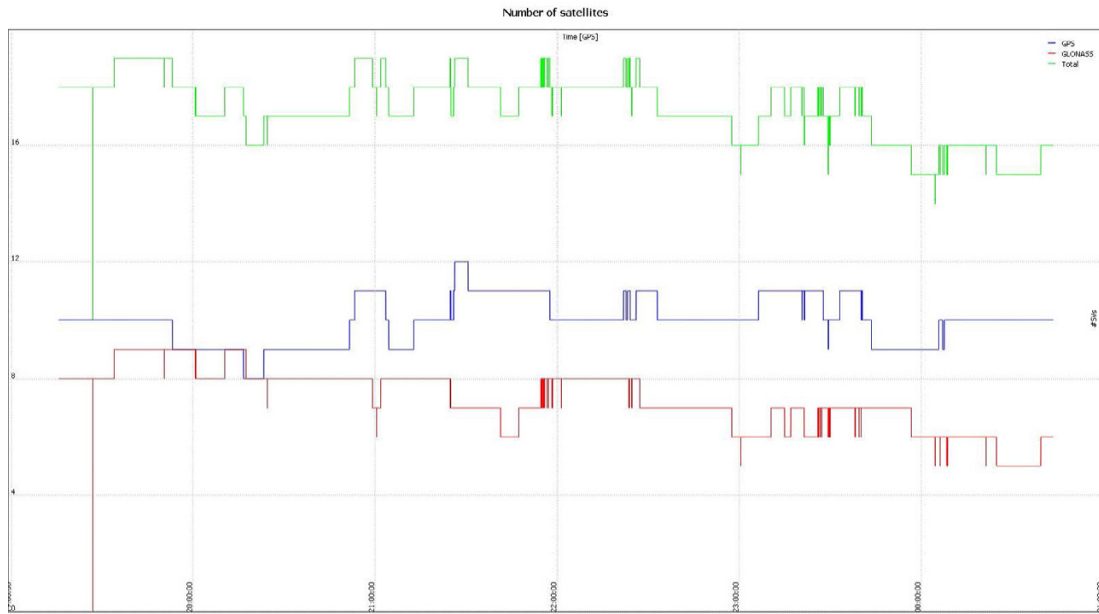
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted	Mission ID	Comments
				Start	End			
Test Strip		/		19:19	19:20		17114-19999	
∞		/		19:37	19:41			
131	6417318 01	180		19:45	19:52		194545	Fly S. 16.5 nm
132	02	0		19:56	20:11		195610	
133	03	180		20:14	20:30		201449	
134	04	0		20:33	20:44	18.5 nm	203340	ch2 laser current too high error
135	05	180		20:58	21:16			
134	06	0		21:17	21:21	5 nm	205831	reflew line
135	07	180		21:30	21:46		211746	encountered same current error
136	08	0		21:49	21:55	2.5 nm	213032	Fly N7 mile
X71E	09	270		22:02	22:05		214938	21:55 laser current too high error
∞				22:09	22:13		220200	

Pg of

Nov. 15, 2017-A (CFFRY, SN0754)







Flight Log

Julian Day 319	Flight A
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LIDAR Flight Log



Date NOV. 15 2017	Aircraft C-FFRY	System Riegl Q1560	Additional Notes Temp 0° Humidity 61' Altimeter 1023 Terrain Height 525
Project 3125 Dewey Ziebach	Pilot D. Thibeault	Unit 2220754	
Location PERRE SD KPIR	Operator D. Tarr	IMU Applanix 8704	
Mission Objective		GPS Rx Trimble	
		Scanner 1 Drive 2	
		Scanner 2 Drive 3	

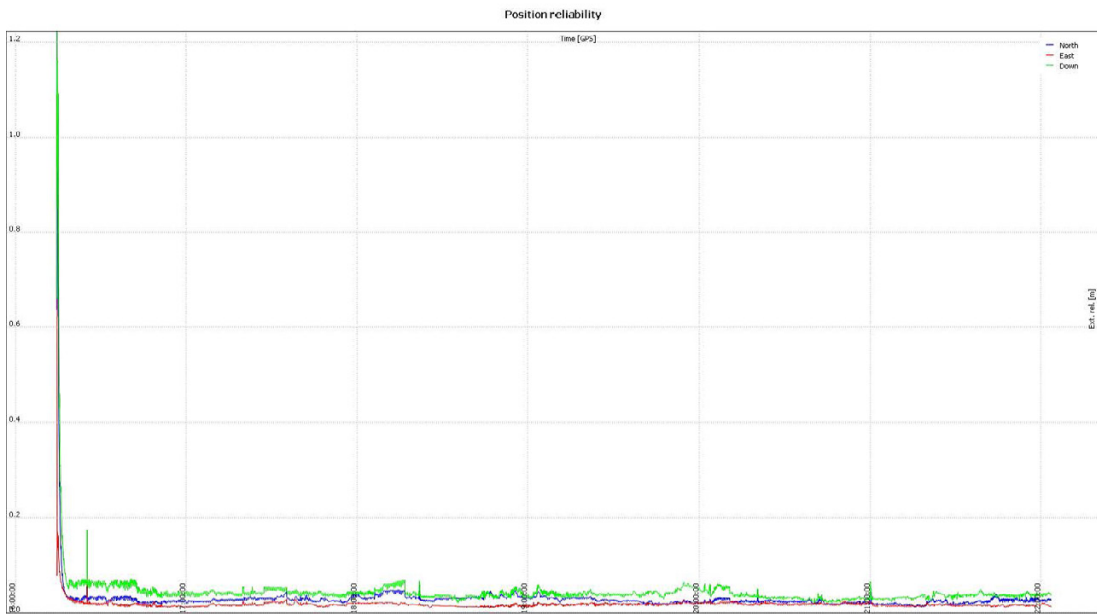
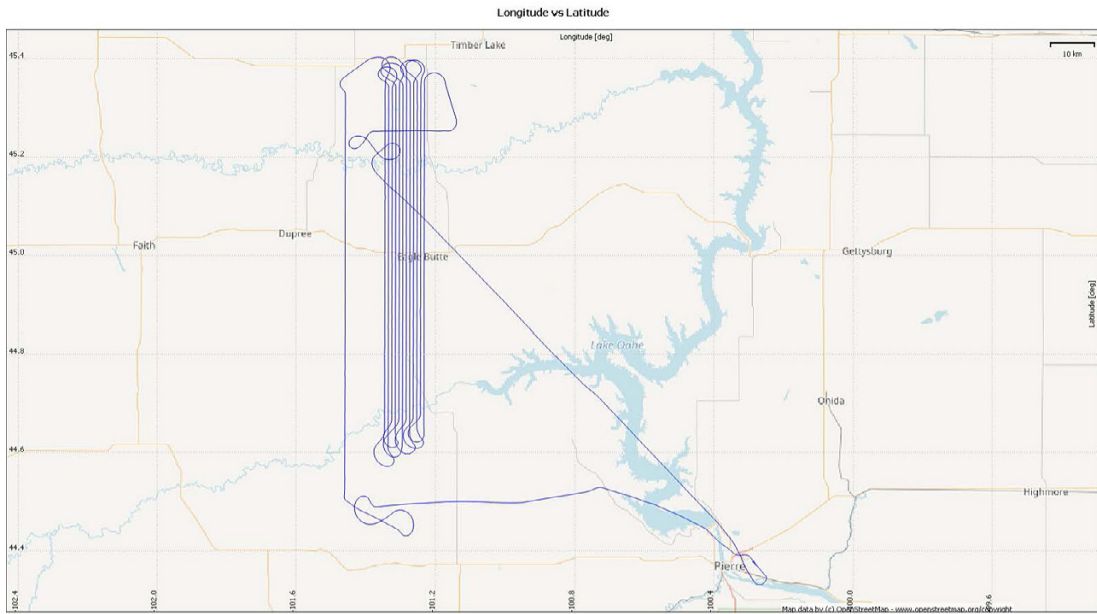
Aircraft Block Time		
Engine On 1906	Ramp Out 1922	Takeoff 1926
Engine Off 0046	Ramp In 0035	Landing 0034
Total 5.7 hrs	Total hrs	Total 5.1 hrs

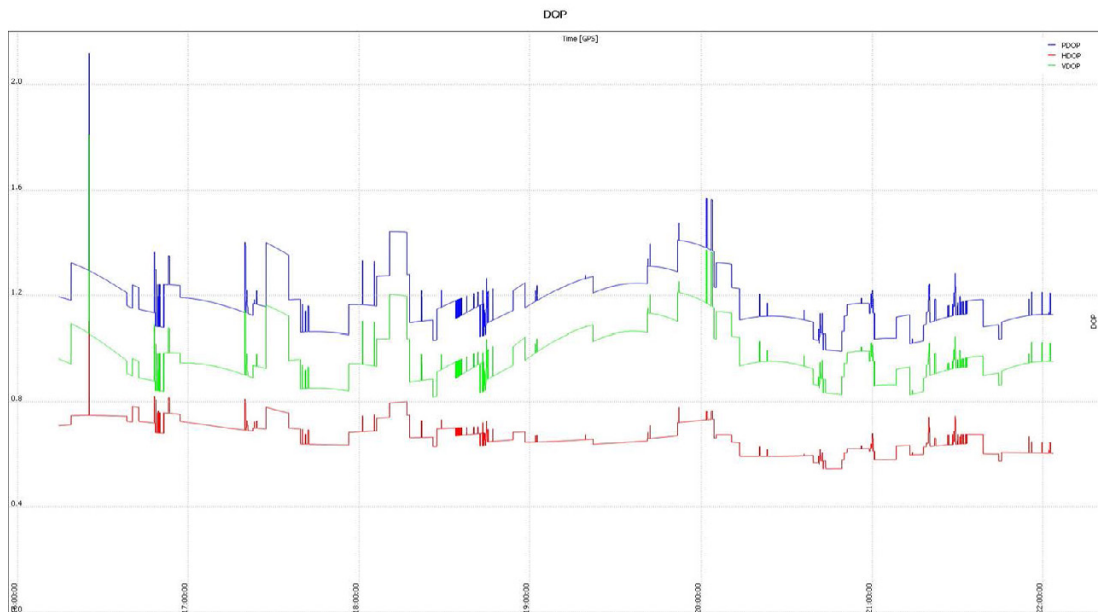
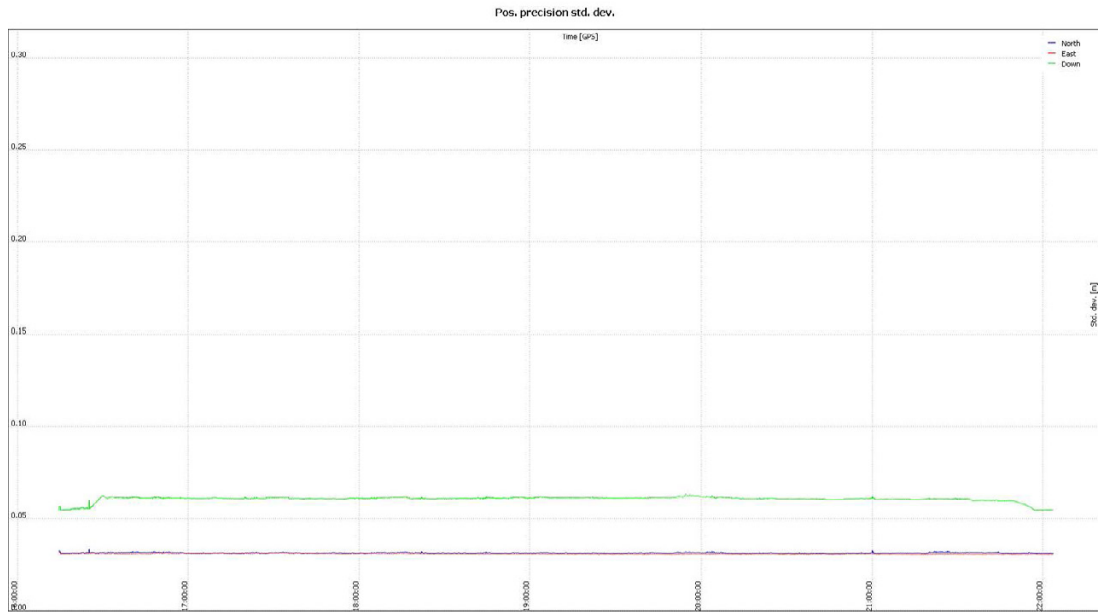
Mission Plan	
AGL Height 1300 m	Pulse Rate 800 KHz
Target Speed 160 kts	Scan Rate 237 Hz
Laser Current 25 %	FOV 60 Deg's

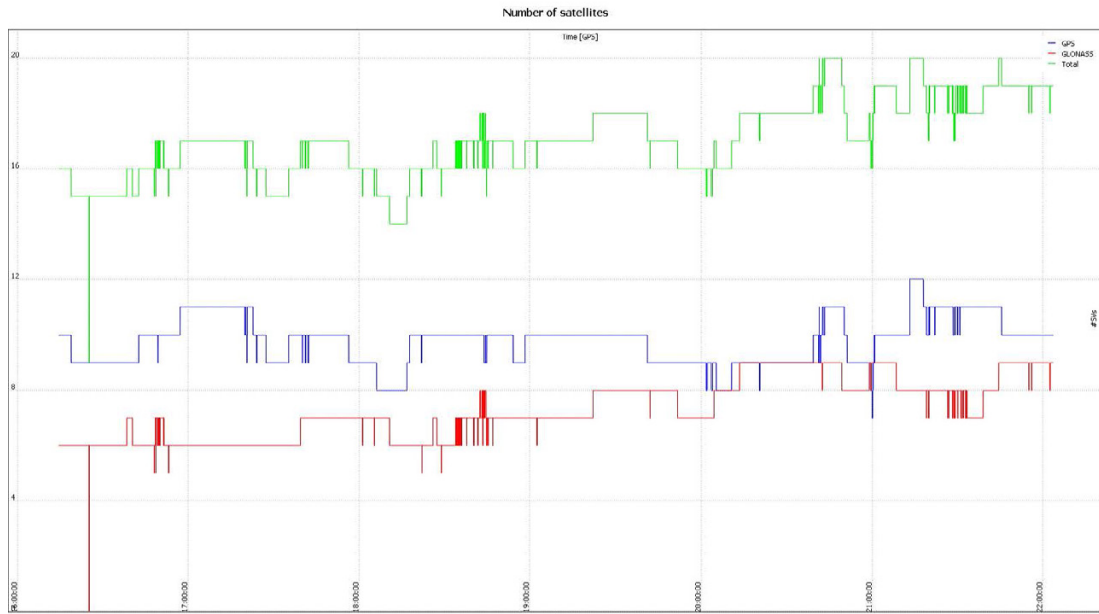
Static Alignment	GPS Time	
	Start	End
Pre Mission	1915	1920
Post Mission	0038	0043

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST		322	5900	1942	1945			17115-194256	
00		00	5900	2000	2005			---	
53	647319A	-01	180	5900	2006	2023		17115-200634	
54		02	0	5900	2026	2043		-202641	
55		03	180	5900	2047	2104		-204709	
56		04	0	5900	2107	2123		-210716	
57		05	180	5900	2126	2143		-212644	
58		06	0	5800	2146	2202		-214615	
59		07	180	5800	2205	2222		-220535	
60		08	0	5800	2225	2241		-222518	
61		09	180	5800	2244	2300		-224414	
62		10	0	5800	2303	2319		-230335	
63	RE00	180	5800	2322	2328	ABORTED?	26WA TOGO	-232228	? PILOT ADJUSTING SCREEN SHUT LINE OFF?
63		11	180	5800	2340	2356		-234031	
X-TIE W567-51		12	270	5800	0000	0004		-000004	
00		00	5800	0004	000930			---	

Nov. 18, 2017-A (CFFRY, SN0754)








Flight Log

Julian Day 322 Flight A

LIDAR Flight Log



Additional Notes
 Temp -1°C
 Humidity 81%
 Altimeter 1023 hPa
 Terrain Height 525 m

Date 18 Nov 2017
Project 3125_DeweyZiebach
Location Blackbook PIERRE SD
Mission Objective

Aircraft PA-31 C-FFRY
Pilot D.Thibault
Operator E.Rutledge

System Riegl Q1560
Unit 2220754
IMU Applix AP50
GPS Rx Trimble
Scanner 1 Drive 13-1
Scanner 2 Drive 13-2

Mission Plan

AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

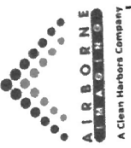
Aircraft Block Time

Engine On	16:02	Ramp Out	16:21	Takeoff	16:25
Engine Off	22:08	Ramp In	21:58	Landing	21:58
Total	6.1 hrs	Total	5.6 hrs		

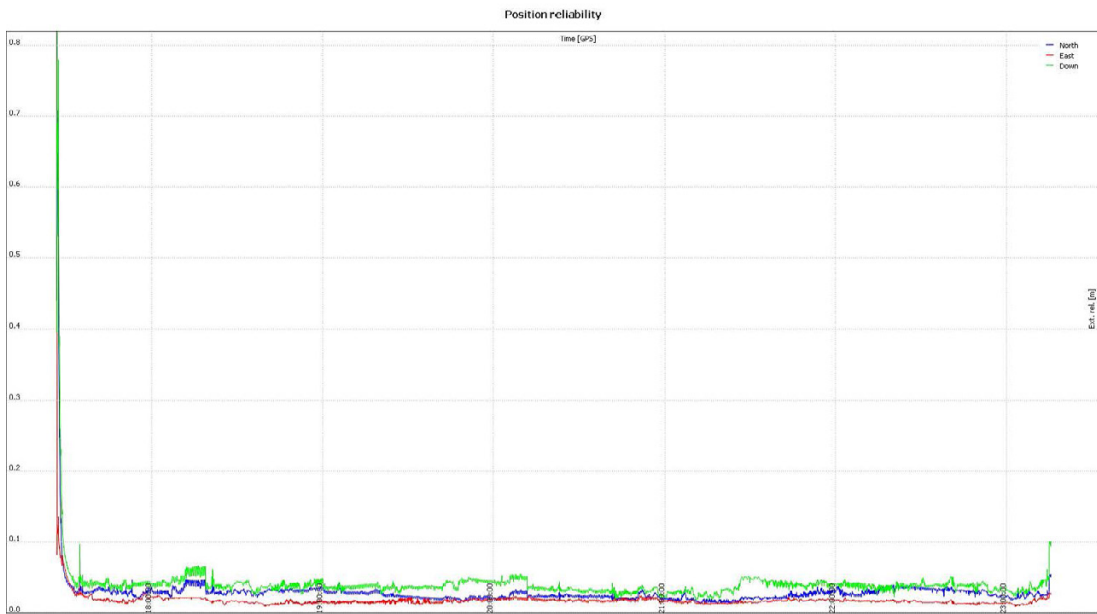
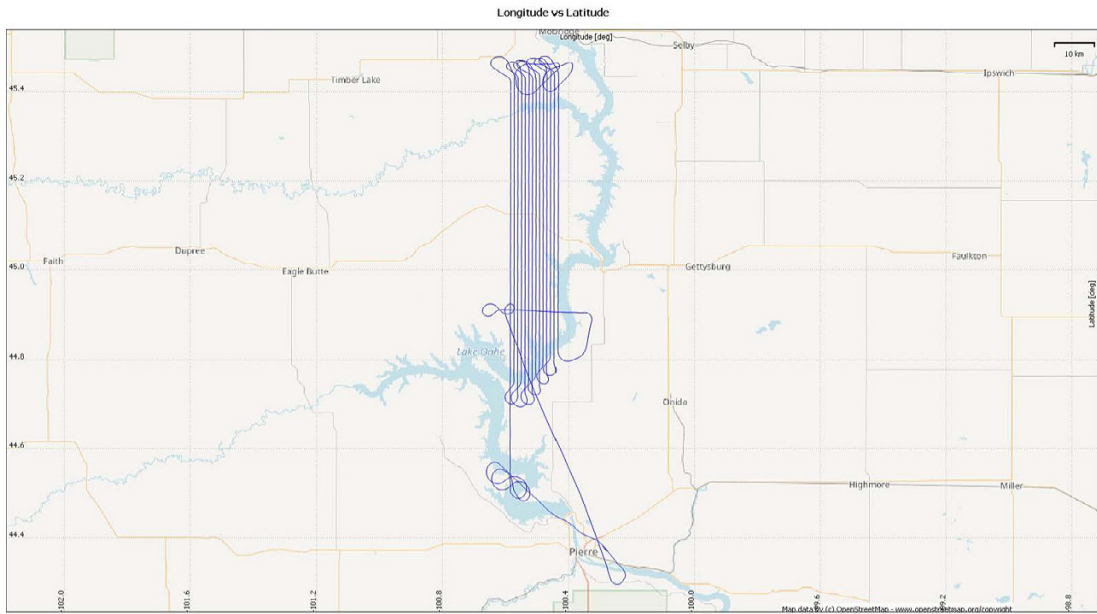
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	m to End		
TEST STRIP		G	N/A	16:29	16:33			17118_162912	
PPP B		G	N/A	16:47	16:54			N/A	
053		000.1°	5900'	16:59	17:20			165934	RE-FLIGHT FOR
064		180.1°	5800'	17:24	17:39			172411	6417319 A
065		000.1°	5800'	17:44	18:02			174446	
066		180.1°	5800'	18:05	18:18			180506	
067		000.1°	5800'	18:24	18:41			182400	
068		180.1°	5800'	18:44	18:59			184435	
069		000.1°	5800'	19:04	19:21			190938	
070		180.1°	5800'	19:25	19:39			192506	
071		000.1°	5800'	19:44	20:01			194412	
072		180.1°	5800'	20:04	20:19			200420	
073		000.1°	5800'	20:23	20:40			202323	
074		180.1°	5800'	20:43	20:57			204302	
075		000.1°	5800'	21:01	21:18			210141	

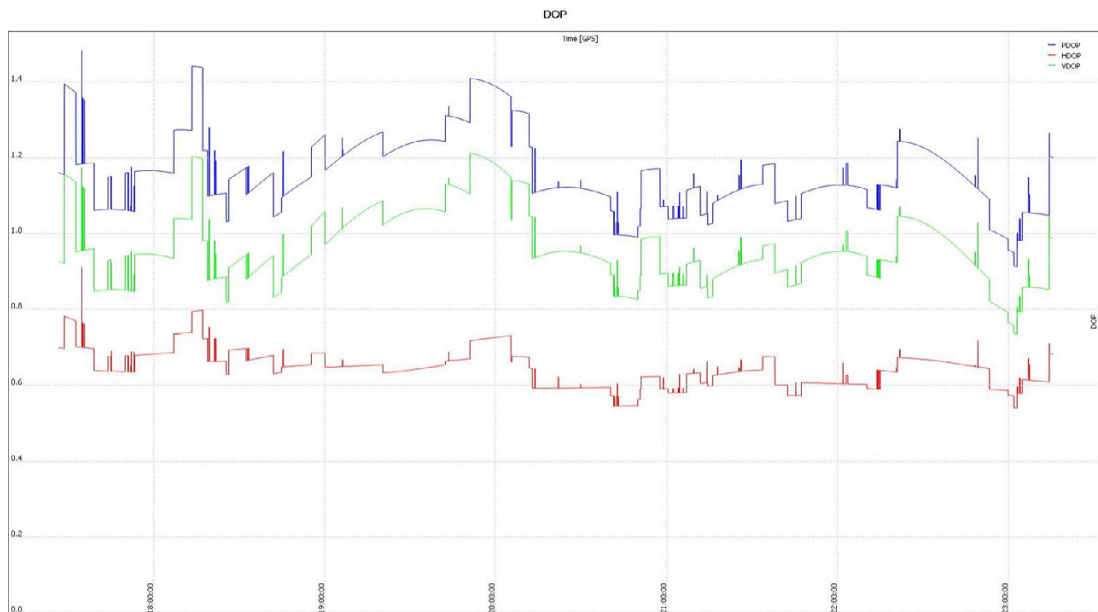
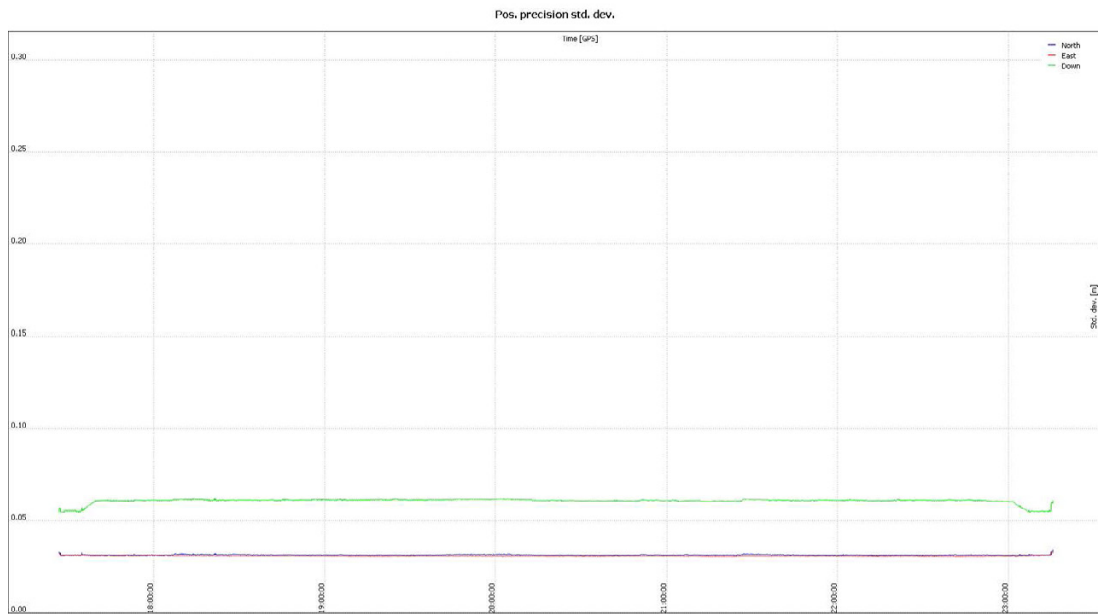
Pg / of 2

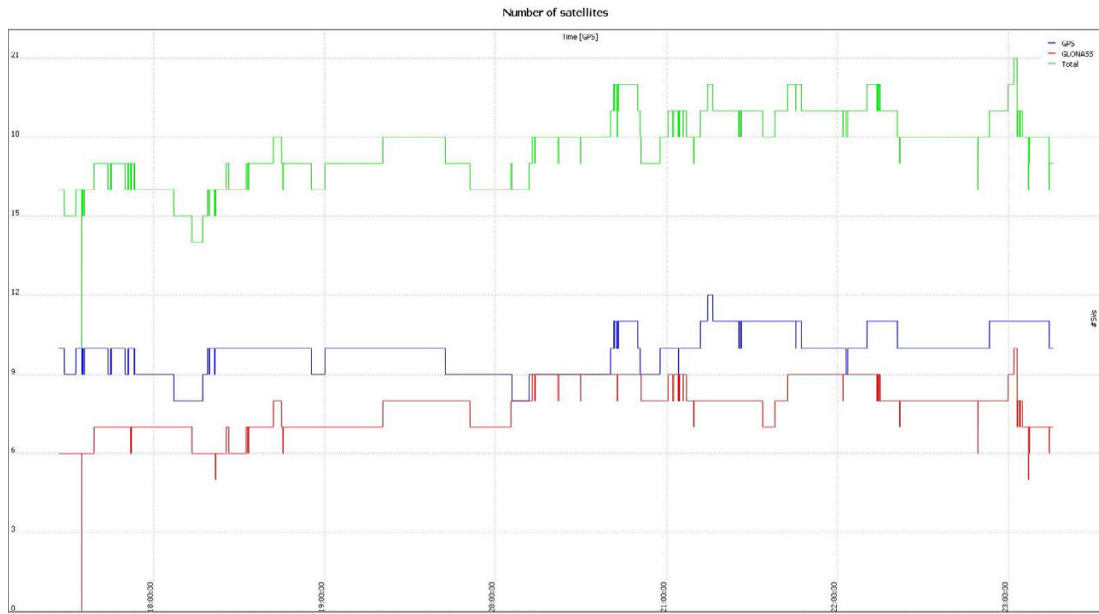
LIDAR Flight Log

Julian Day 322 Flight A	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="font-size: small;">Date</td><td>18-Aug-2017</td><td style="font-size: small;">Aircraft</td><td>PA-31 C-FFRY</td></tr> <tr><td style="font-size: small;">Project</td><td>3125_DeweyZiebach</td><td style="font-size: small;">Pilot</td><td>D.Thibeault</td></tr> <tr><td style="font-size: small;">Location</td><td>Gembrock Prairie S.D.</td><td style="font-size: small;">Operator</td><td>E.Rutledge</td></tr> <tr><td style="font-size: small;">Mission Objective</td><td colspan="3"></td></tr> </table>	Date	18-Aug-2017	Aircraft	PA-31 C-FFRY	Project	3125_DeweyZiebach	Pilot	D.Thibeault	Location	Gembrock Prairie S.D.	Operator	E.Rutledge	Mission Objective				<div style="text-align: center;">  </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="font-size: small;">System</td><td>Riegl Q1580</td></tr> <tr><td style="font-size: small;">Unit</td><td>2220754</td></tr> <tr><td style="font-size: small;">IMU</td><td>Applanix AP50</td></tr> <tr><td style="font-size: small;">GPS Rx</td><td>Trimble</td></tr> <tr><td style="font-size: small;">Scanner 1 Drive</td><td>B-1</td></tr> <tr><td style="font-size: small;">Scanner 2 Drive</td><td>B-2</td></tr> </table>	System	Riegl Q1580	Unit	2220754	IMU	Applanix AP50	GPS Rx	Trimble	Scanner 1 Drive	B-1	Scanner 2 Drive	B-2	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="font-size: small;">Additional Notes</td><td colspan="4"></td></tr> <tr><td style="font-size: small;">Temp</td><td></td><td style="font-size: small;">Humidity</td><td></td><td style="font-size: small;">Terrain Height</td></tr> <tr><td style="font-size: small;">Altimeter</td><td></td><td style="font-size: small;">Scanner 1</td><td></td><td style="font-size: small;">Scanner 2</td></tr> </table>	Additional Notes					Temp		Humidity		Terrain Height	Altimeter		Scanner 1		Scanner 2																																																																																																																																																								
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Nov. 18, 2017-A (CFKMA, SN1264)







Flight Log

LIDAR Flight Log

Julian Day 322	Flight A
Date Nov 18, 2017	Aircraft PA-31 C-FKMA
Project 3125_DeweyZiebach	Pilot M. McQuarry
Location Pierre SD	Operator B. Eisenbart
Mission Objective	
System Riegl Q1560	Unit 2221264
IMU Applanix AP50	GPS Rx Trimble
Scanner 1 Drive 0	Scanner 2 Drive 1

AIRBORNE
IMAGING
A Clean Harbors Company

Additional Notes
Temp -1°C
Humidity 67%
Altimeter 1022.4mb
Terrain Height 525m

Static Alignment		GPS Time	
Pre Mission	Post Mission	Start	End
17:26	23:11	17:31	23:16

Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	28.50%	FOV	60 Deg's

Aircraft Block Time			
Engine On	17:10	Ramp Out	17:34
Engine Off	23:20	Ramp In	23:07
Total	5.16 hrs	Total	5.5 hrs

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
Test Strip		/		17:38	17:38			171118-173806	
∞		↶		17:48	17:53				∞
136	6417322-01	0	5800'	17:59	18:17			175957	
137	02	180		18:20	18:20	18:20	39	182036	pilot missed line
137	03	180		18:27	18:43			182751	
138	04	0		18:47	19:03			184708	
139	05	180		19:06	19:22			190653	
140	06	0		19:25	19:42			192546	
141	07	180		19:45	20:00			194504	
142	08	0		20:03	20:20			200359	
143	09	180		20:24	20:40			202403	
144	10	0		20:43	21:00			204348	
145	11	180		21:03	21:03	21:03	35	210330	pilot missed line
145	12	180		21:09	21:24			210914	
146	13	0	√	21:27	21:43			212720	

Pg of

LIDAR Flight Log

Date	Aircraft	PA-31 C-FKMA
Project 3125_DeweyZiebach	Pilot	M. Moquary
Location	Pierre SD	
Mission Objective	Operator B. Eisenbart	
System	Riegl	Q1560
Unit	2221264	
IMU	Applanix AP50	
GPS Rx	Trimble	
Scanner 1 Drive	0	
Scanner 2 Drive	1	

Additional Notes Temp <i>-1°C</i> Humidity <i>67%</i> Altimeter <i>1022.4 mb</i> Terrain Height <i>525 m</i>	AIRBORNE IMAGING A Clean Harbors Company
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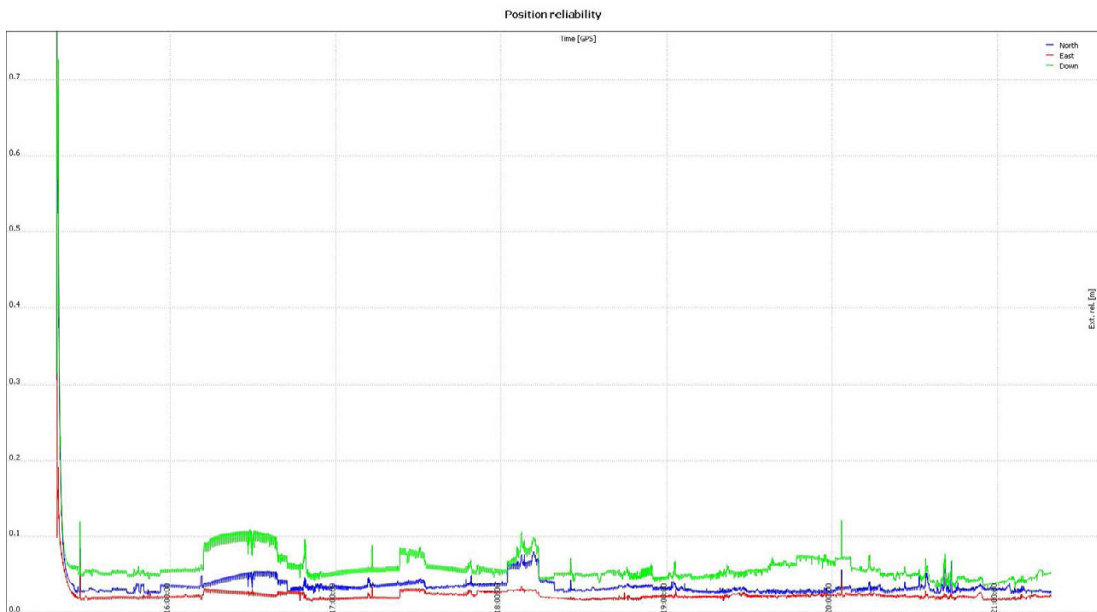
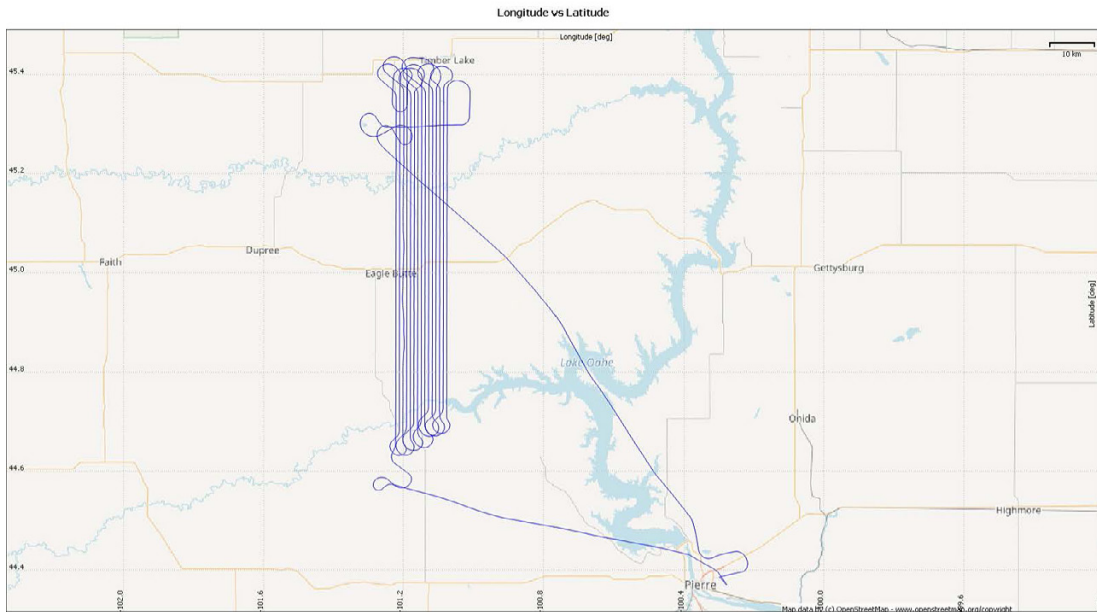
Aircraft Block Time			
Engine On	17:10	Ramp Out	17:31
Engine Off	25:20	Ramp In	23:10
Total	5.16 hrs	Total	5.5 hrs

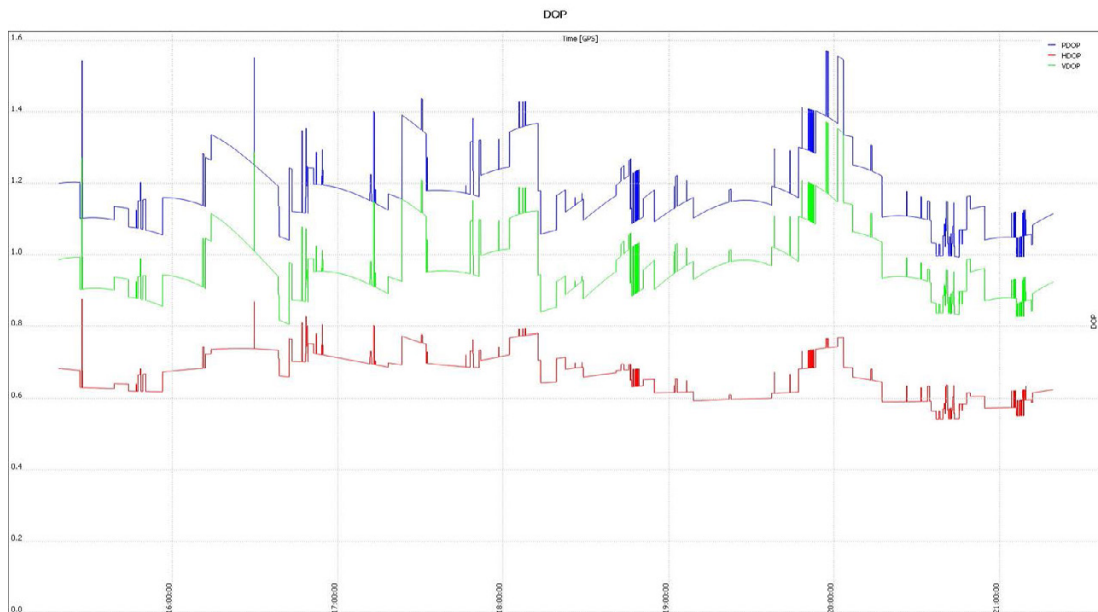
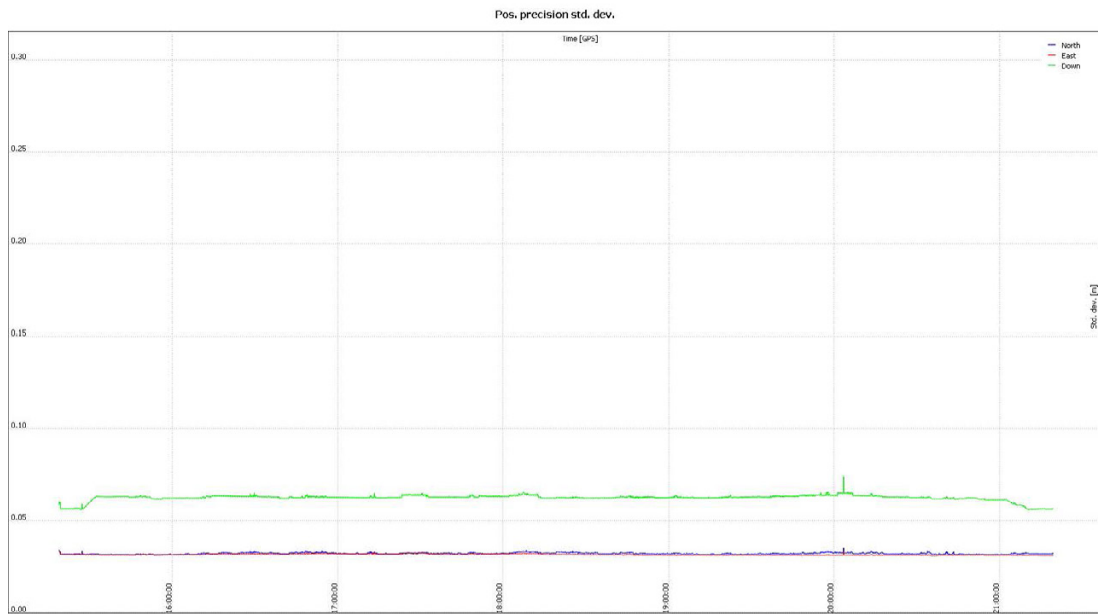
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

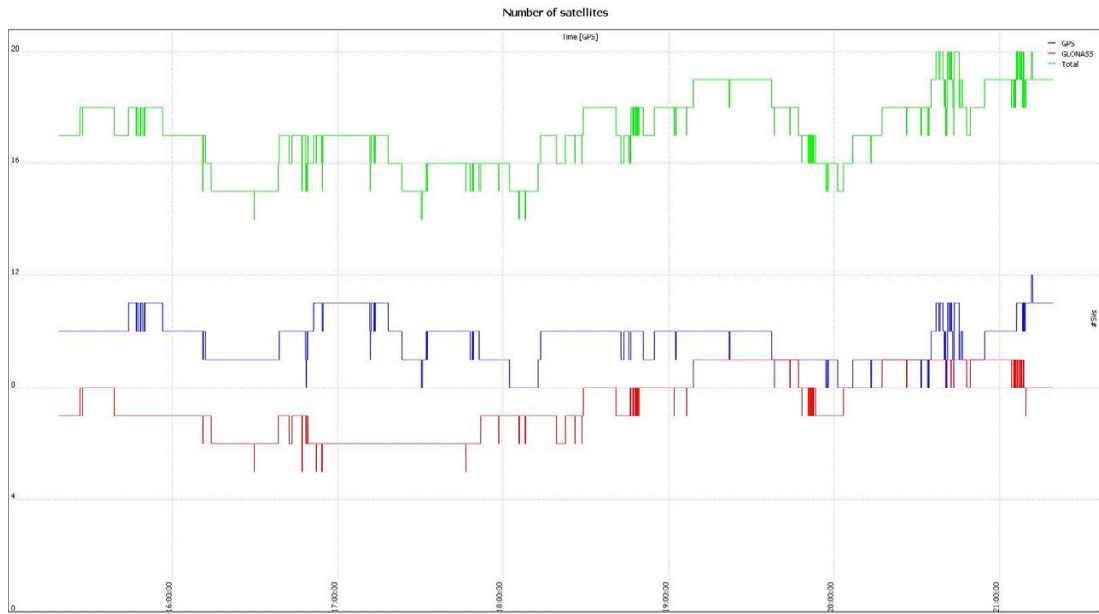
Static Alignment		GPS Time	
Pre Mission	17:26	Start	End
Post Mission	17:31		

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nm to End		
147	6417322-14	180	5800'	21:45	22:01			171116-214555	
148	15	0		22:04	22:19			220408	
149	16	180		22:22	22:37			222249	
X-TIME	17	278		22:42	22:45			224220	
∞		↗		22:46	22:50				∞

Nov. 19, 2017-A (CFFRY, SN0754)







Flight Log

Julian Day 323 Flight A

LIDAR Flight Log



Date 19-NOV-2017	Aircraft PA-31 C-FFRY
Project 3125_DeweyZiebach	Pilot D.Thibeault
Location Greenbriek PIERRE SD	Operator E.Rutledge
Mission Objective	

System Riegl Q1560
Unit 2220754
IMU Applanix AP50
GPS Rx Trimble
Scanner 1 Drive A-1
Scanner 2 Drive A-2

Additional Notes
Temp -1°C
Humidity 68%
Altimeter 1019 hPa
Terrain Height 525m

Aircraft Block Time		
Engine On 15:07	Ramp Out 15:23	Takeoff 15:27
Engine Off 21:22	Ramp In 21:14	Landing 21:12
Total 6.3 hrs	Total hrs	Total 5.8 hrs

Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	15:18	15:23
Post Mission	21:14	21:19

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST STRIP		G	N/A	15:30	15:35			171119_153050	
PPP B		G	5800'	15:46	15:51			N/A	
076		000.1°	5800'	15:53	16:08			155302	
077		180.1°	5800'	16:12	16:27			161245	
078		000.1°	5800'	16:30	16:46			163054	-TRACKER FROZE-
079		180.1°	5800'	16:55	17:10			165551	-TRACKER BACK-
080		000.1°	5800'	17:14	17:29			171400	
081		180.1°	5800'	17:32	17:46			173221	
082		000.1°	5800'	17:50	18:05			175026	
083		180.1°	5800'	18:09	18:23			180900	
084		000.1°	5800'	18:27	18:42			182710	
085		180.1°	5800'	18:46	19:00			184643	
086		000.1°	5800'	19:04	19:18			190411	
087		180.1°	5800'	19:22	19:36			192216	
088		000.1°	5800'	19:39	19:54			193949	

Pg 1 of 2

Julian Day 323 Flight A**LIDAR Flight Log**

Date	<u>19-Nov-2017</u>	Aircraft	<u>PA-31 C-FFRY</u>
Project	<u>3125_DeweyZiebach</u>	Pilot	<u>D.Thibeault</u>
Location	<u>Cranbrook PIERRE SD</u>	Operator	<u>E.Rutledge</u>
Mission Objective			

System	<u>Riegl Q1560</u>
Unit	<u>2220754</u>
IMU	<u>Applanix AP50</u>
GPS Rx	<u>Trimble</u>
Scanner 1 Drive	<u>A-1</u>
Scanner 2 Drive	<u>A-2</u>

Additional Notes
Temp
Humidity
Altimeter
Terrain Height



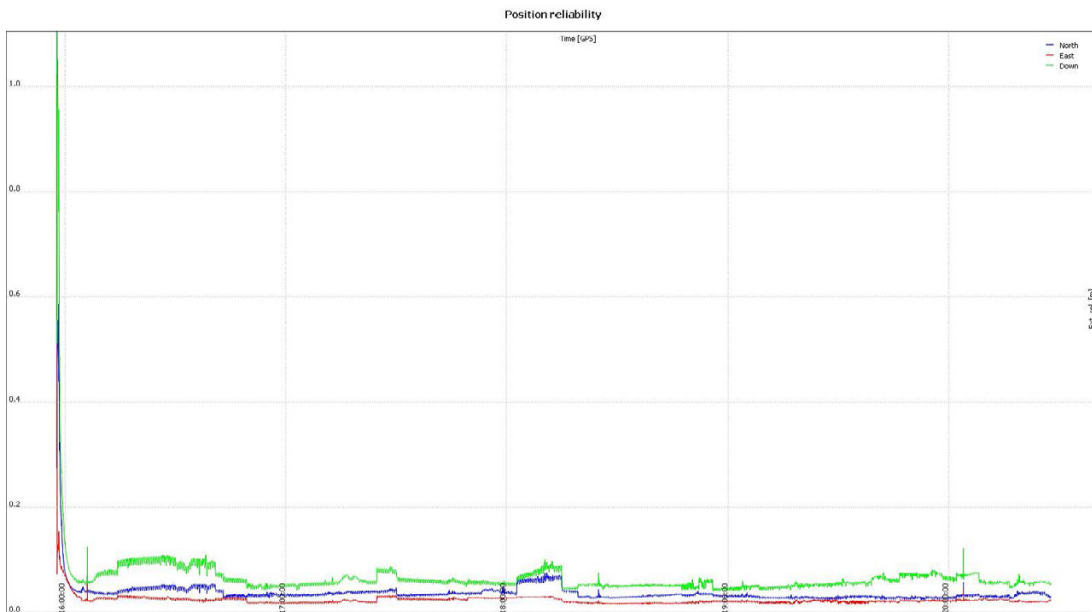
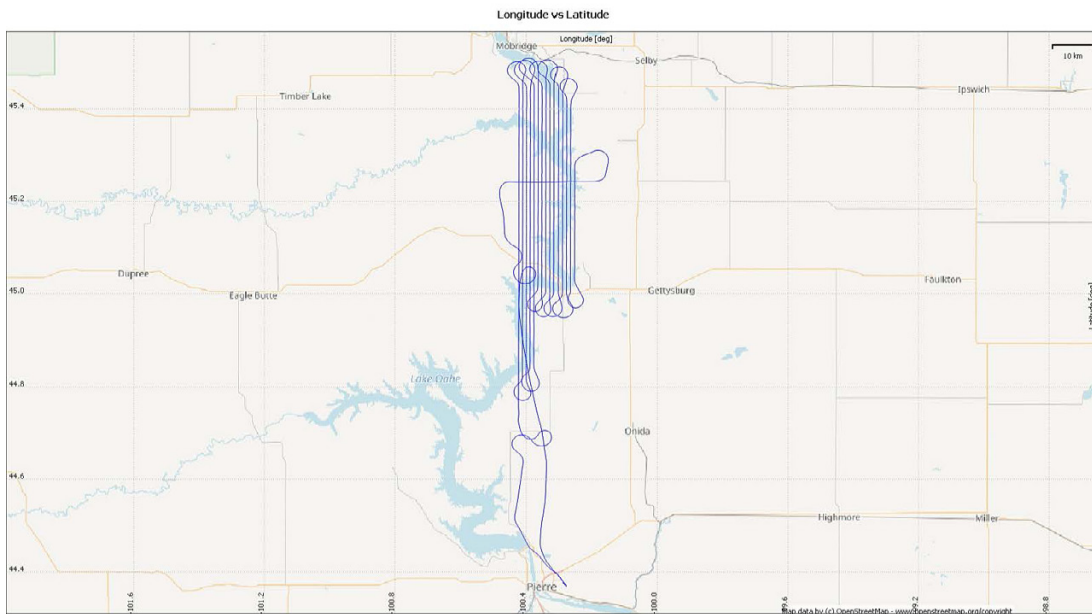
Aircraft Block Time		
Engine On <u>15:07</u>	Ramp Out <u>15:23</u>	Takeoff <u>15:26</u>
Engine Off <u>21:22</u>	Ramp In <u>21:14</u>	Landing <u>21:12</u>
Total <u>6.3</u> hrs	Total <u> </u> hrs	Total <u>5.8</u> hrs

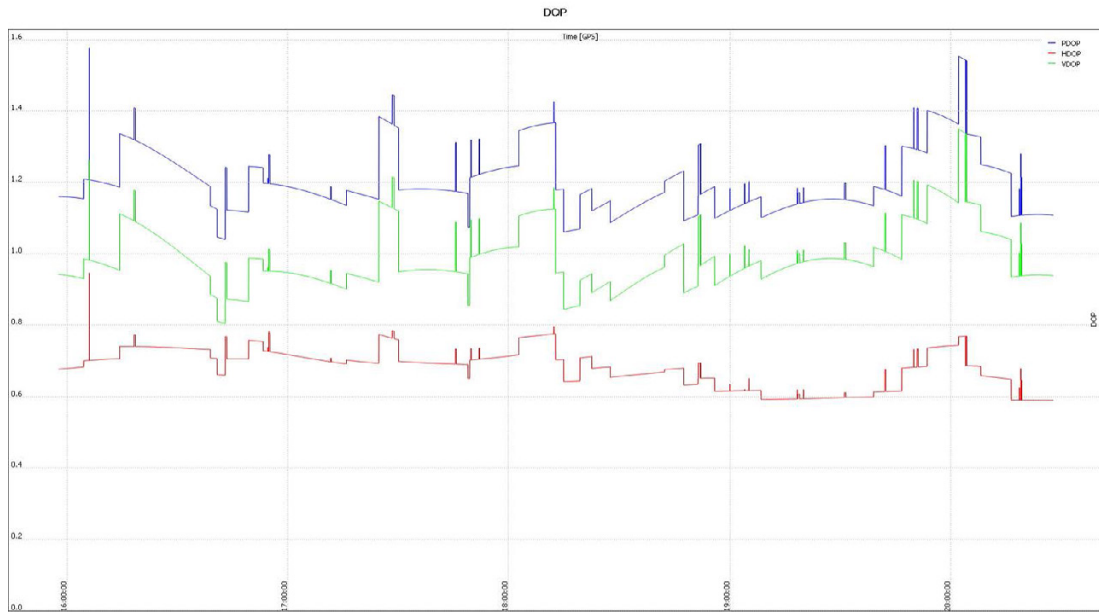
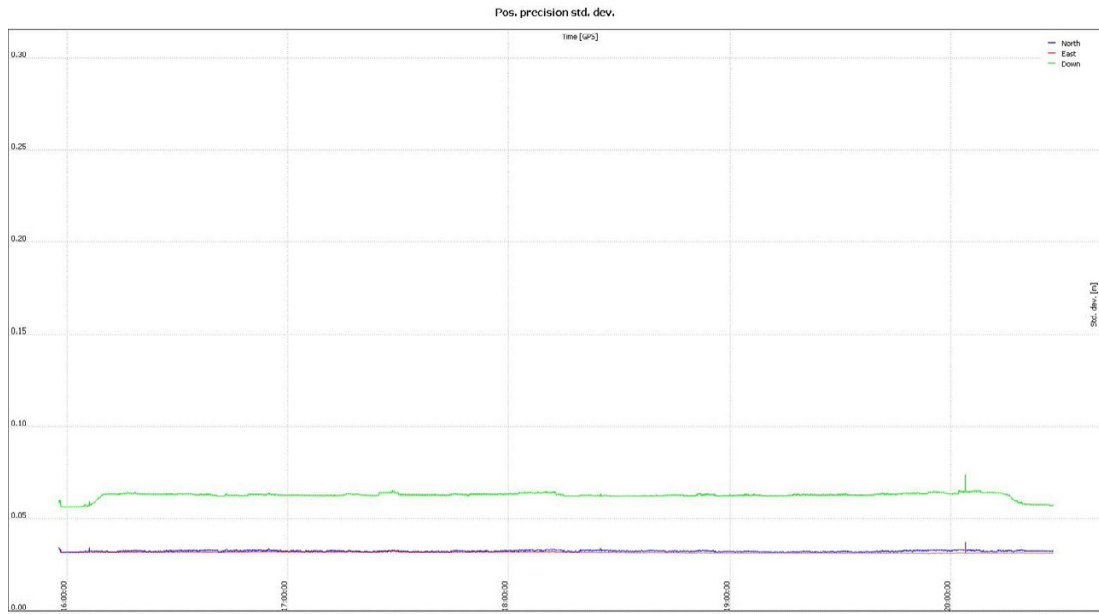
Mission Plan		
AGL Height	<u>1300</u> m	Pulse Rate <u>800</u> KHz
Target Speed	<u>160</u> kts	Scan Rate <u>237</u> Hz
Laser Current	<u>25</u> %	FOV <u>60</u> Deg's

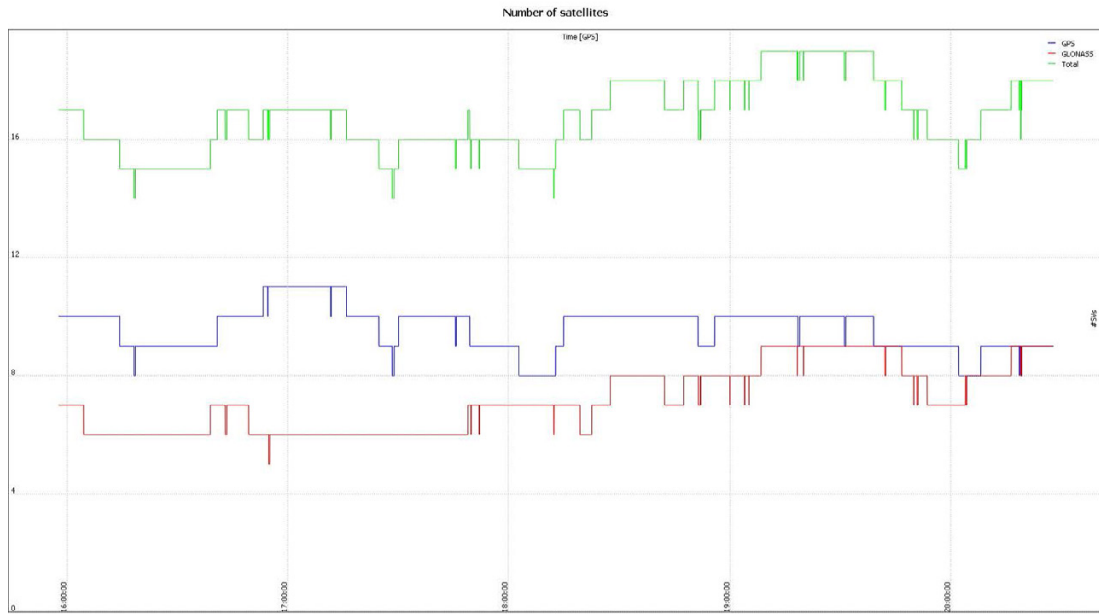
Static Alignment	GPS Time	
	Start	End
Pre Mission	<u>15:18</u>	<u>15:23</u>
Post Mission	<u>21:14</u>	<u>21:19</u>

Flight Line	LiDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
<u>089</u>		<u>180.1°</u>	<u>5800'</u>	<u>19:57</u>	<u>20:12</u>			<u>171119_195759</u>	
<u>090</u>		<u>000.1°</u>	<u>5800'</u>	<u>20:15</u>	<u>20:30</u>			<u>201525</u>	
<u>X-TIE</u>		<u>270° +/-</u>	<u>5800'</u>	<u>20:33</u>	<u>20:37</u>			<u>203337</u>	<u>X-TIE LINES-090-076</u>
<u>PPP8</u>		<u>G</u>	<u>5800'</u>	<u>20:37</u>	<u>20:44</u>			<u>N/A</u>	

Nov. 19, 2017-A (CFKMA, SN1264)







Flight Log

LIDAR Flight Log

Julian Day 323	Flight A
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Date	Nov 19, 2017	Aircraft	PA-31 C-FKMA
Project	3125_DeweyZiebach	Pilot	M.McQuarry
Location	Pierre S.D.	Operator	B.Eisenbart
Mission Objective			

System	Riegl Q1560
Unit	2221264
IMU	Applanix APS0
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes	
Temp	1°C
Humidity	67%
Altimeter	1017 fpm
Terrain Height	525



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Aircraft Block Time			
Engine On	15:48	Ramp Out	16:03
Engine Off	20:30	Ramp In	20:22
Total	4.7 hrs	Total	4.2 hrs


Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25.50%	FOV	60 Deg's

Static Alignment		GPS Time	
Pre Mission	15:57	Start	End
Post Mission	20:22	20:22	20:27

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
Test strip		/		16:09	16:09			171119-160929	
∞		↻		16:13	16:18				∞
150	6417323-01	0	5800'	16:22	16:35			162205	
151	02	180		16:39	16:52			163923	
152	03	0		16:56	17:10			165641	
153	04	180		17:13	17:27			171345	
154	05	0		17:30	17:43			173045	
155	06	180		17:47	17:57			174729	
156	07	0		18:00	18:09			180013	
157	08	180		18:13	18:23			181311	
158	09	0		18:26	18:36			182616	
159	10	180		18:39	18:50			183945	
160	11	0		18:53	19:03			185313	
161	12	180		19:06	19:16			190616	
162	13	0	↘	19:19	19:29			191922	

Pg of

Julian Day 323 Flight A



Date Nov 19, 2017 **Aircraft** PA-31 C-FKMA

Project 3125_DeweyZiebach **Pilot** M. McQuarry

Location Pierre SD **Operator** B. Eisenbart

Mission Objective

System Riegl Q1560

Unit 2221264

IMU Applanix AP50

GPS Rx Trimble

Scanner 1 Drive 0

Scanner 2 Drive 1

Additional Notes

Temp 1°C

Humidity 67%

Altitude 10117mb

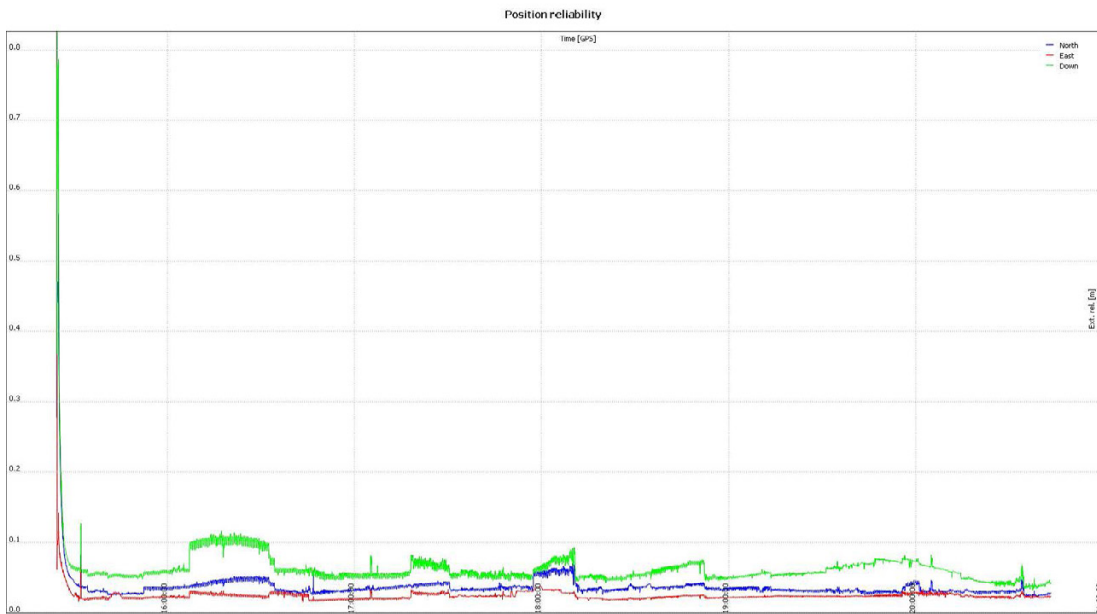
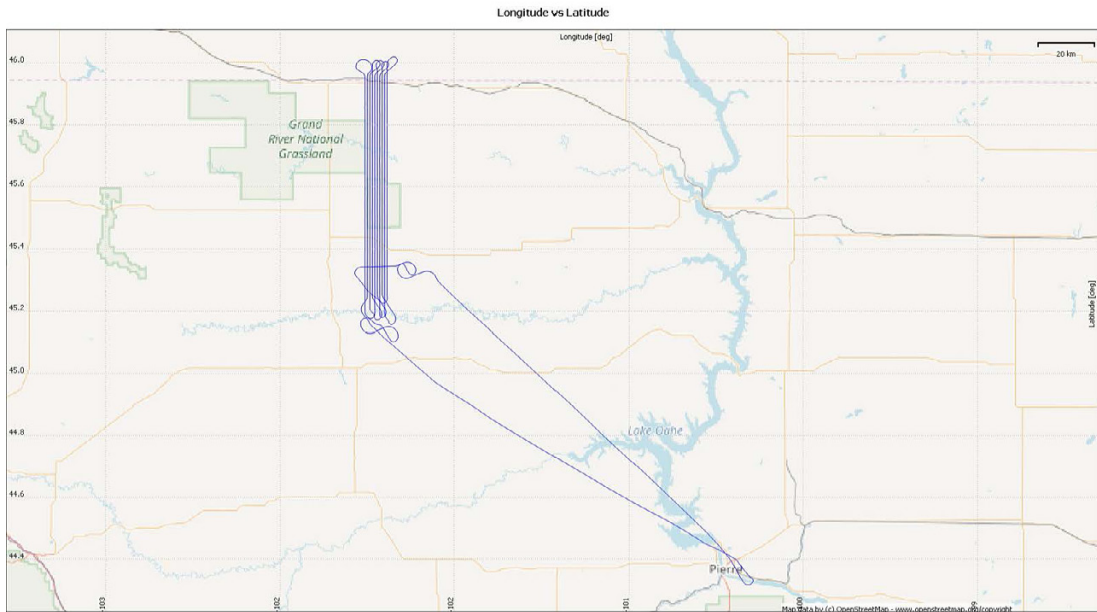
Terrain Height 525m

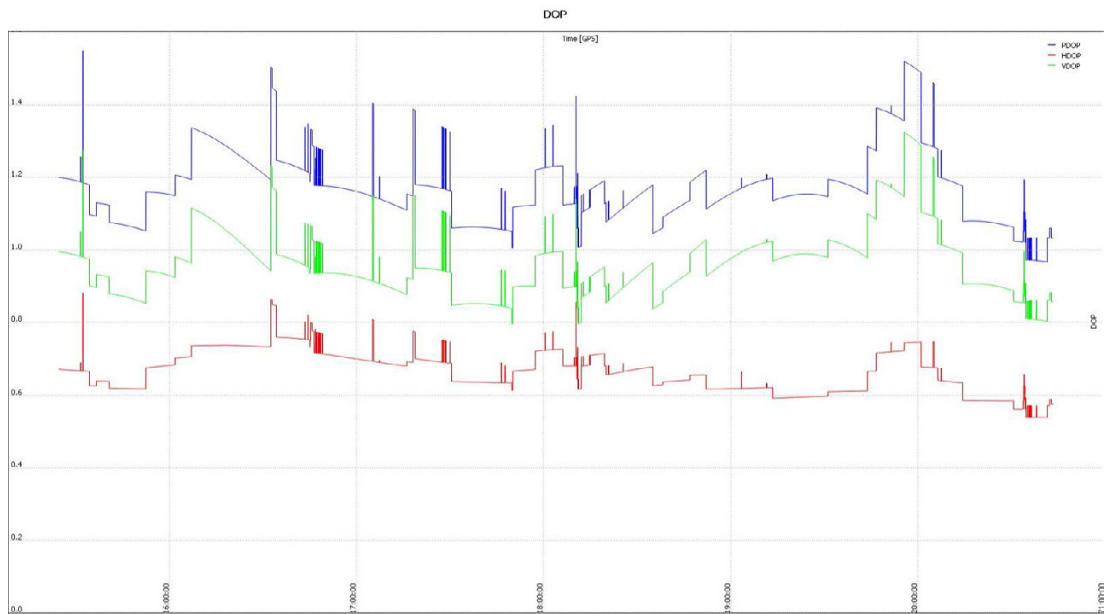
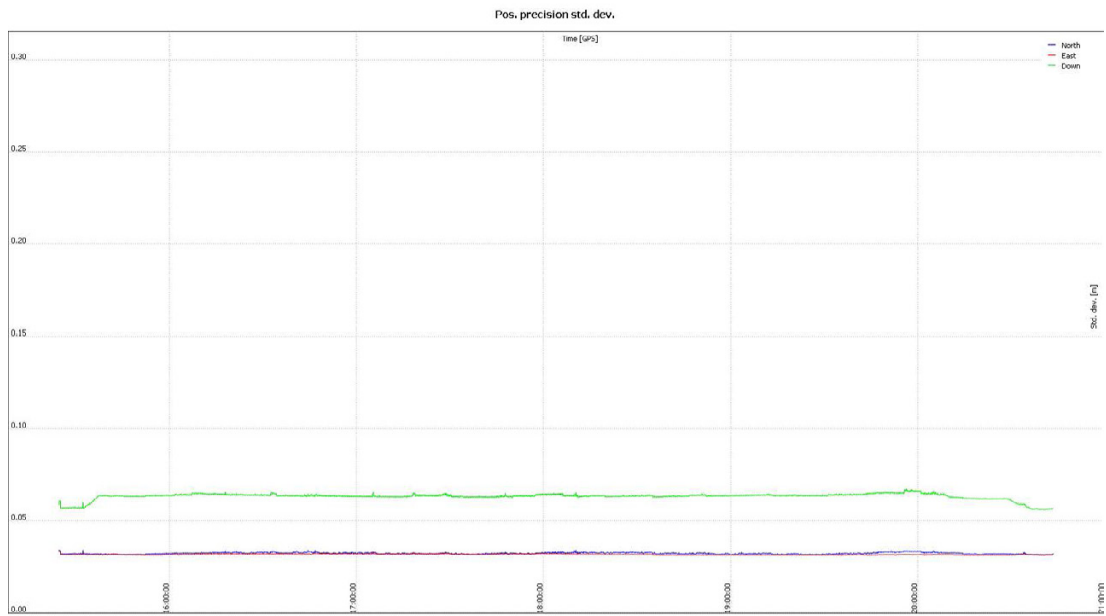
Aircraft Block Time			
Engine On	15:48	Ramp Out	16:03
Engine Off	20:30	Ramp In	20:22
Total	4.7 hrs	Total	4.7 hrs
Aircraft Block Time			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25.50%	FOV	60 Deg's

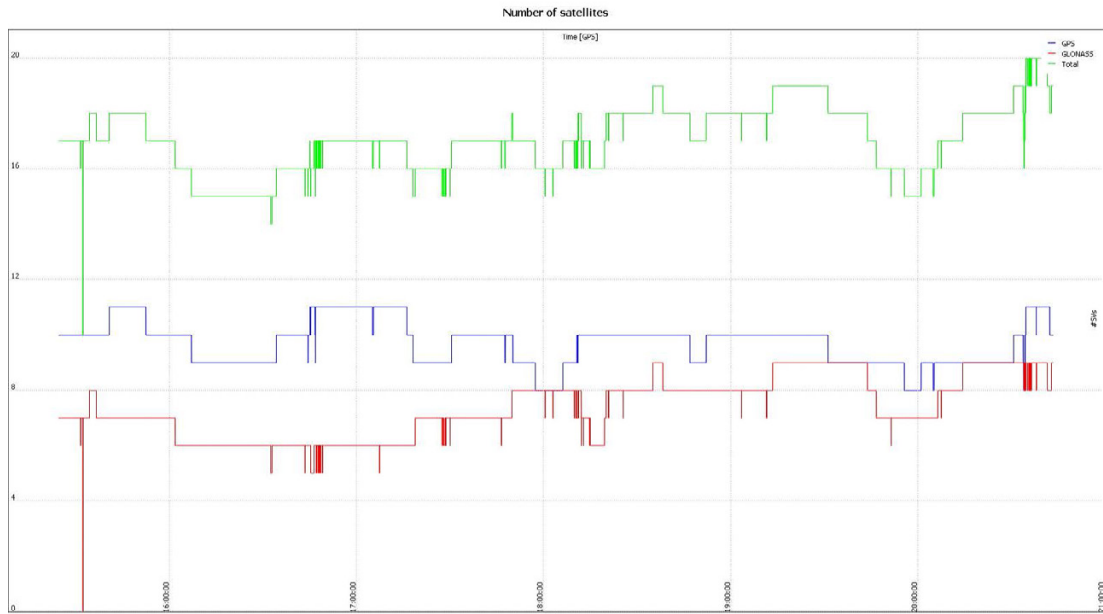
Static Alignment		GPS Time	
Pre Mission	15:57	Start	End
Post Mission	20:22	16:02	20:27

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
163	1417323-14	180	5800'	19:32	19:41			17119-193206	
164	15	0	5800'	19:47	19:49			194734	
X-TIE	16	273	5800'	19:53				195315	
∞		↗		20:00	20:04				∞

Nov. 20, 2017-A (CFFRY, SN0754)








Flight Log

LIDAR Flight Log



**AIRBORNE
LIDAR**
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Julian Day 324 Flight A

System Riegl Q1560
Unit 2220754
IMU Applix AP50
GPS Rx Trimble
Scanner 1 Drive 13-1
Scanner 2 Drive 13-2

Aircraft PA-31 C-FFRY
Pilot D.Thibault
Operator E.Rutledge

Additional Notes
Temp -1°C
Humidity 59%
Altimeter 1002 KPa
Terrain Height 525 m

Aircraft Block Time

Engine On 15:14	Ramp Out 15:29	Takeoff 15:31
Engine Off 20:44	Ramp In 20:38	Landing 20:36
Total 5.5 hrs	Total 5.1 hrs	Total 5.1 hrs

Mission Plan

AGL Height 1300 m	Pulse Rate 800 KHz
Target Speed 160 kts	Scan Rate 237 Hz
Laser Current 25 %	FOV 60 Deg's

Static Alignment

Pre Mission 15:24	End 15:29
Post Mission 20:38	20:43

Aircraft Block Time

Engine On 15:14	Ramp Out 15:29	Takeoff 15:31
Engine Off 20:44	Ramp In 20:38	Landing 20:36
Total 5.5 hrs	Total 5.1 hrs	Total 5.1 hrs

Mission Plan

AGL Height 1300 m	Pulse Rate 800 KHz
Target Speed 160 kts	Scan Rate 237 Hz
Laser Current 25 %	FOV 60 Deg's

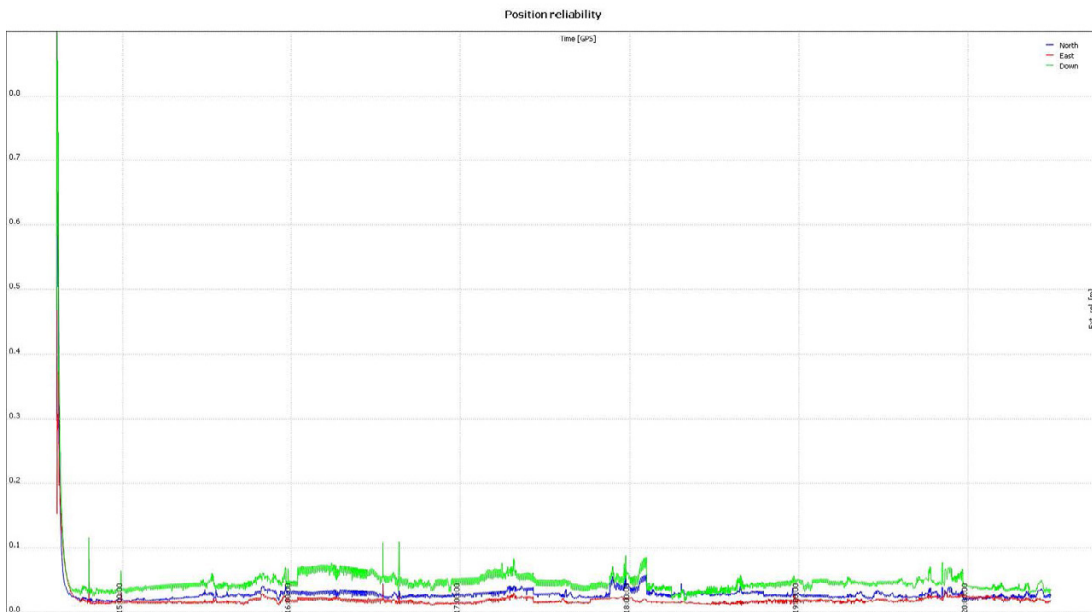
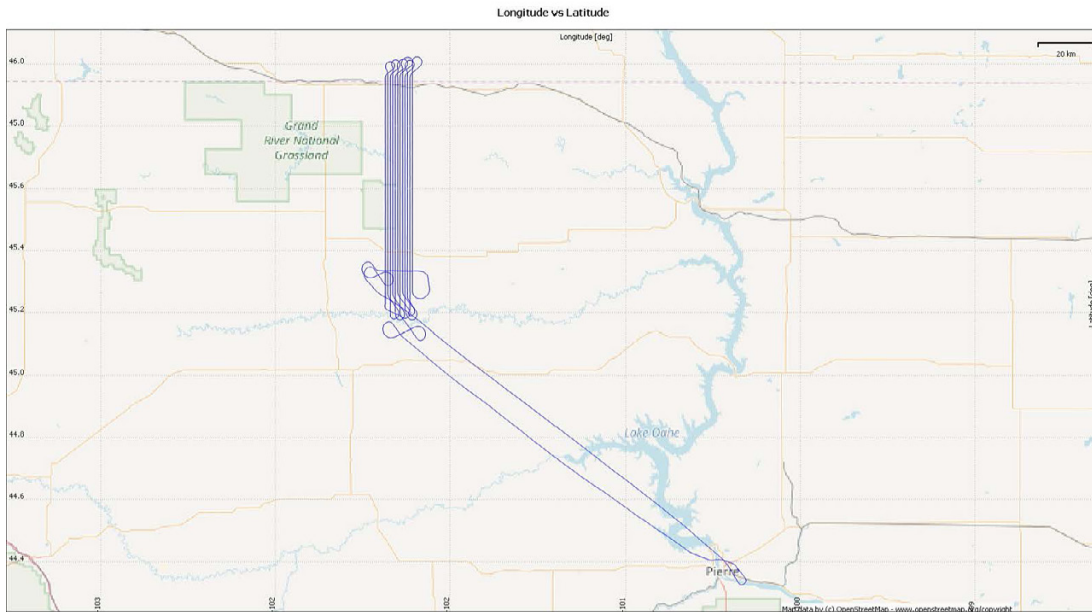
Static Alignment

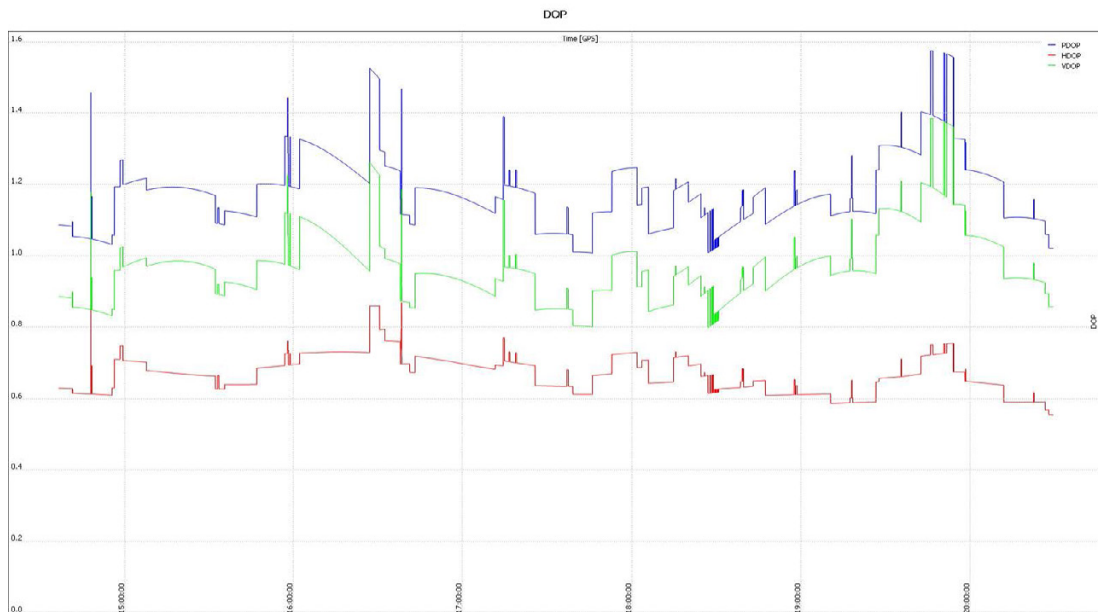
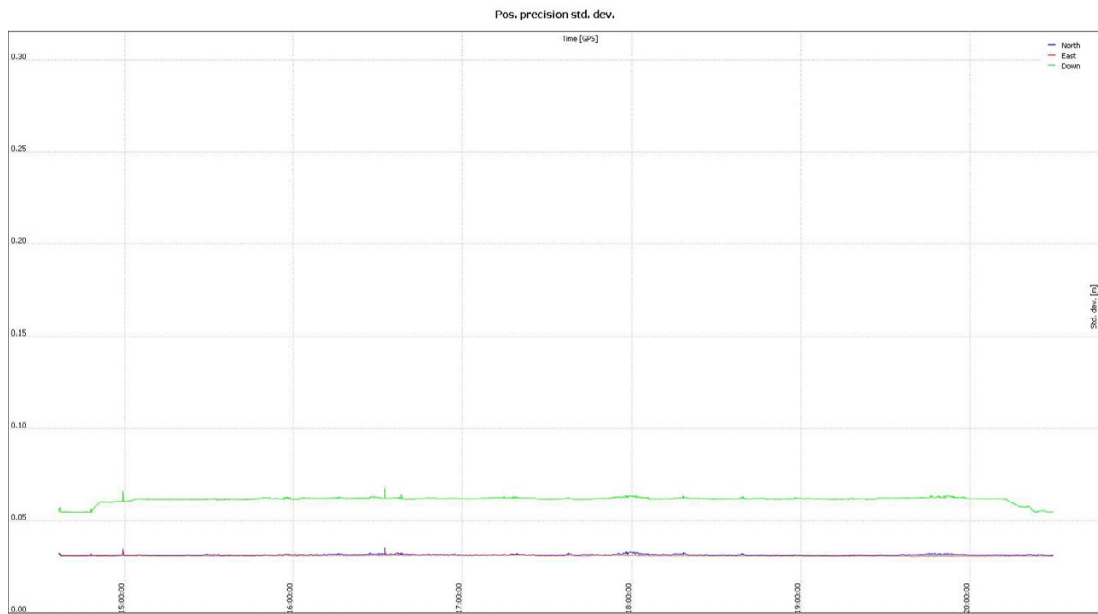
Pre Mission 15:24	End 15:29
Post Mission 20:38	20:43

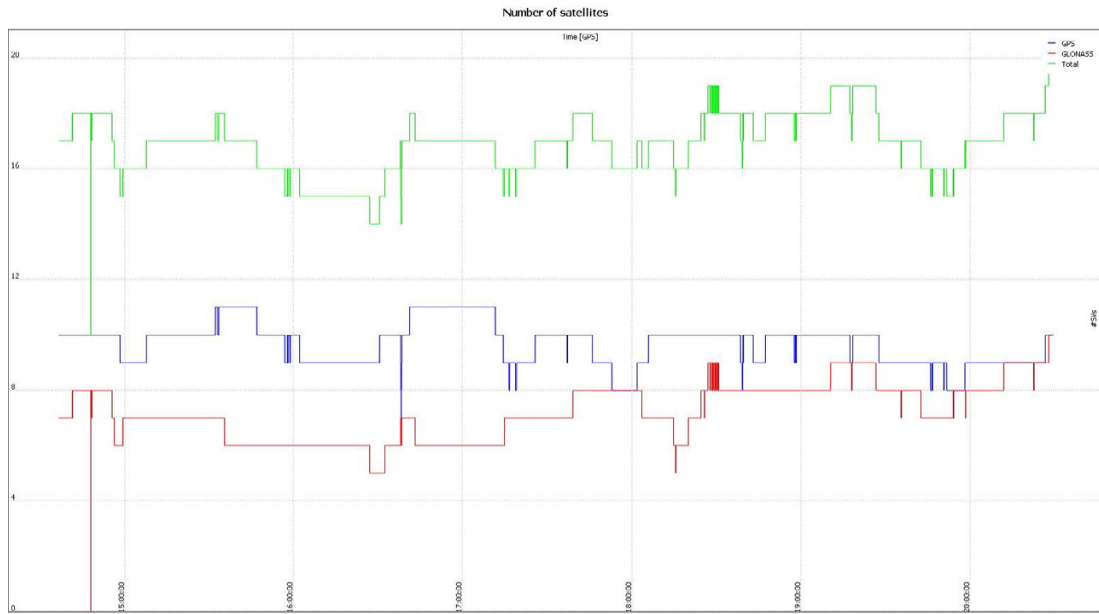
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted	Comments
				Start	End		
TEST STOP		G	N/A	15:36	15:40		17120, 153604
PPP 8		G	6300'	16:13	16:20		N/A
165		360.0°	6300'	16:23	16:42		162337
166		180.0°	6300'	16:46	17:02		164652
167		360.0°	6300'	17:07	17:26		170706
168		180.0°	6300'	17:29	17:44		172920
169		360.0°	6300'	17:49	18:08		174917
170		180.0°	6300'	18:11	18:27		181140
171		360.0°	6300'	18:31	18:50		183119
172		180.0°	6300'	18:53	19:08		185315
173		360.0°	6300'	19:14	19:33		191427
174		180.0°	6300'	19:37	19:52		193707
X-TIE		090+/-	6300'	19:58	20:00		195801 X-TIE LNS 165 → 174
PPP 8		G	6300'	20:00	20:06		N/A

Pg 1 of 1

Nov. 21, 2017-A (CFFRY, SN0754)







Flight Log

Julian Day 325 Flight A

Date	21-AUG-2017	Aircraft	PA-31 C-FFRY
Project	3125_DeweyZiebach	Pilot	D.Thibault
Location	Blackhawk Pierre S.D.	Operator	E.Rutledge
Mission Objective			

LIDAR Flight Log

System	Riegl Q1500
Unit	2220754
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	A-1
Scanner 2 Drive	A-2

Additional Notes

Temp -80C
Humidity 61%
Altitude 1026 hPa
Terrain Height 525 m

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TIME

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Aircraft Block Time			
Engine On	Ramp Out	Takeoff	
14:24	14:41	14:47	
20:32	20:24	20:22	
Total	6.1 hrs	Total	5.6 hrs

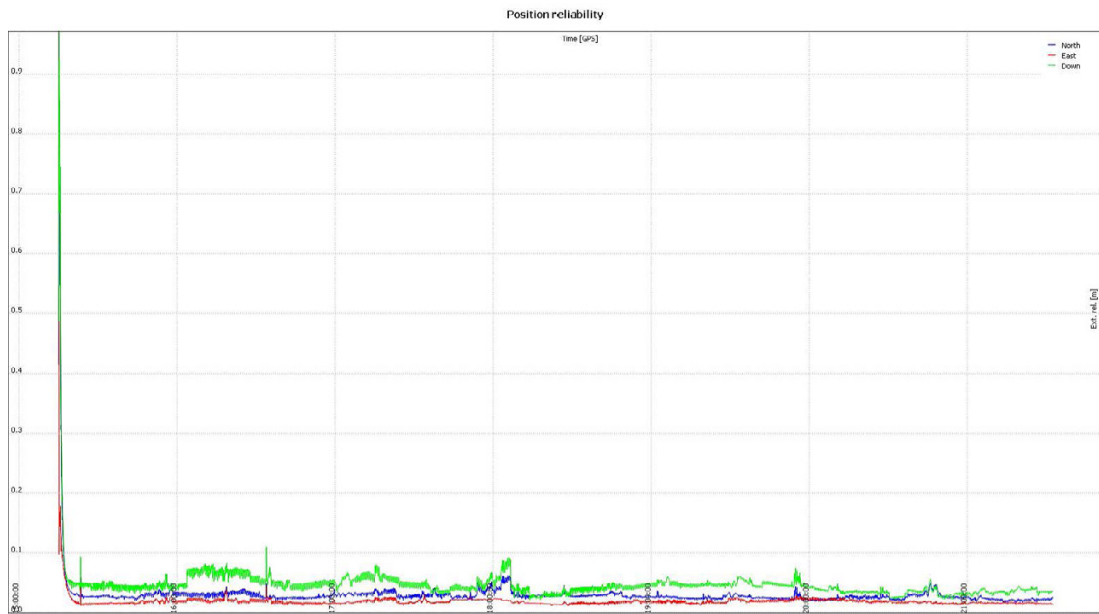
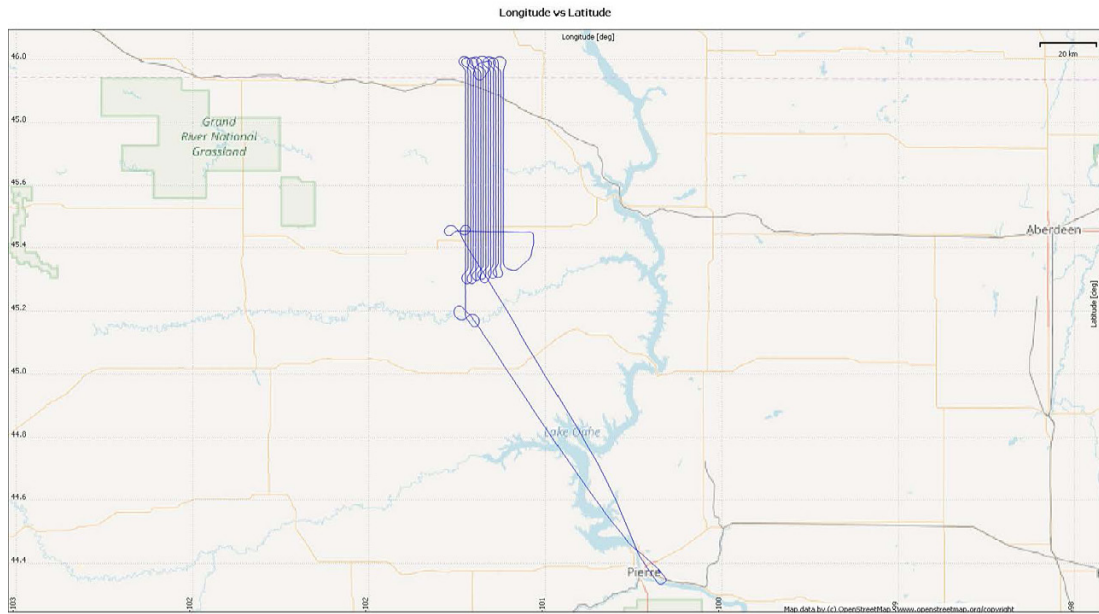
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

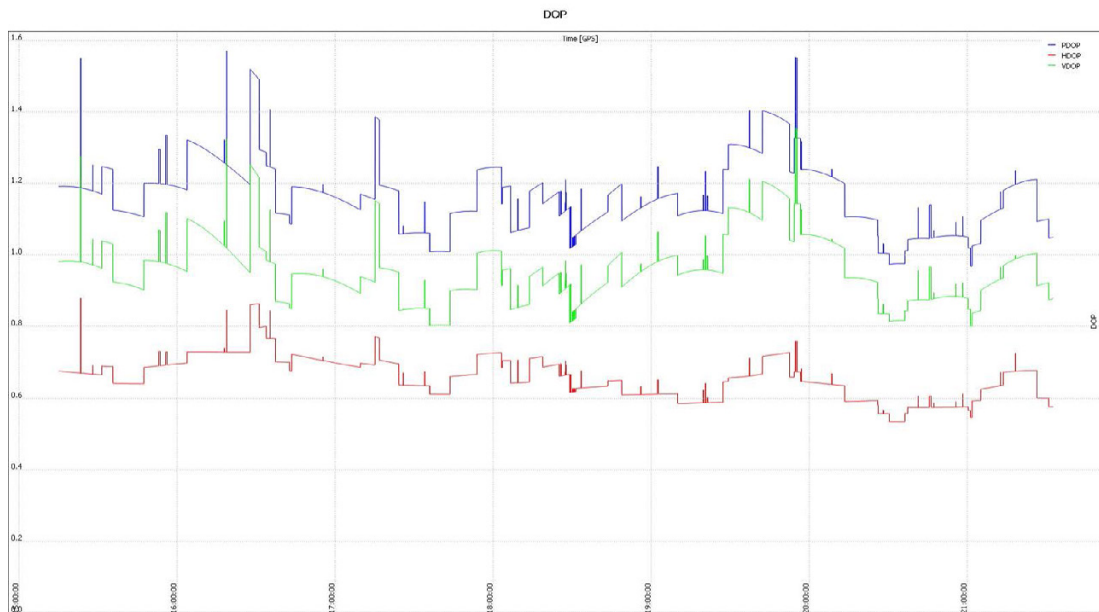
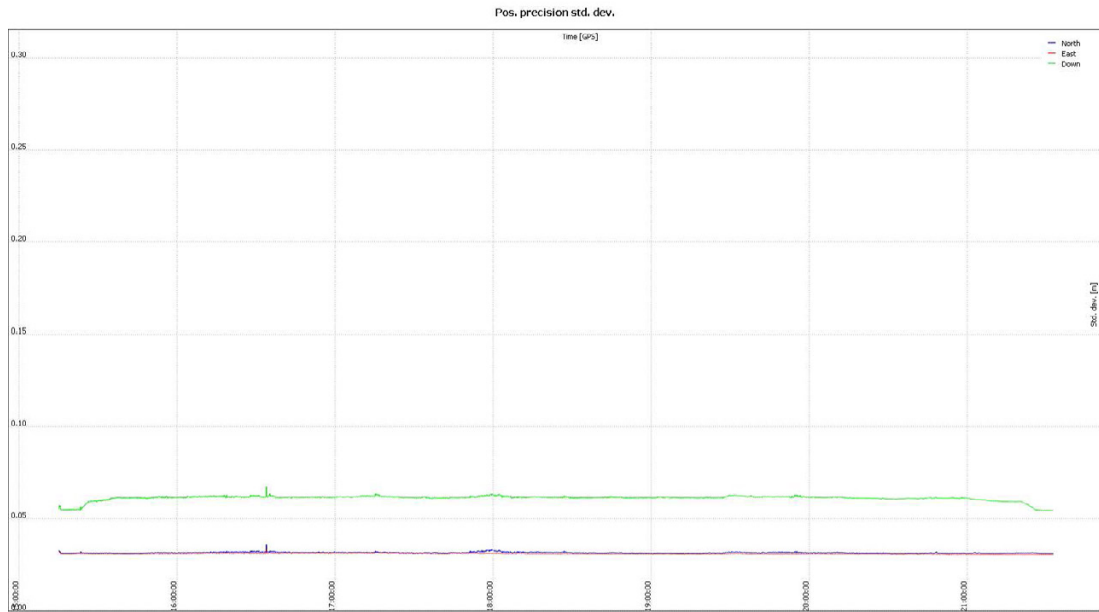
Static Alignment		GPS Time	
Pre Mission	14:36	Start	End
Post Mission	20:24	14:41	20:29

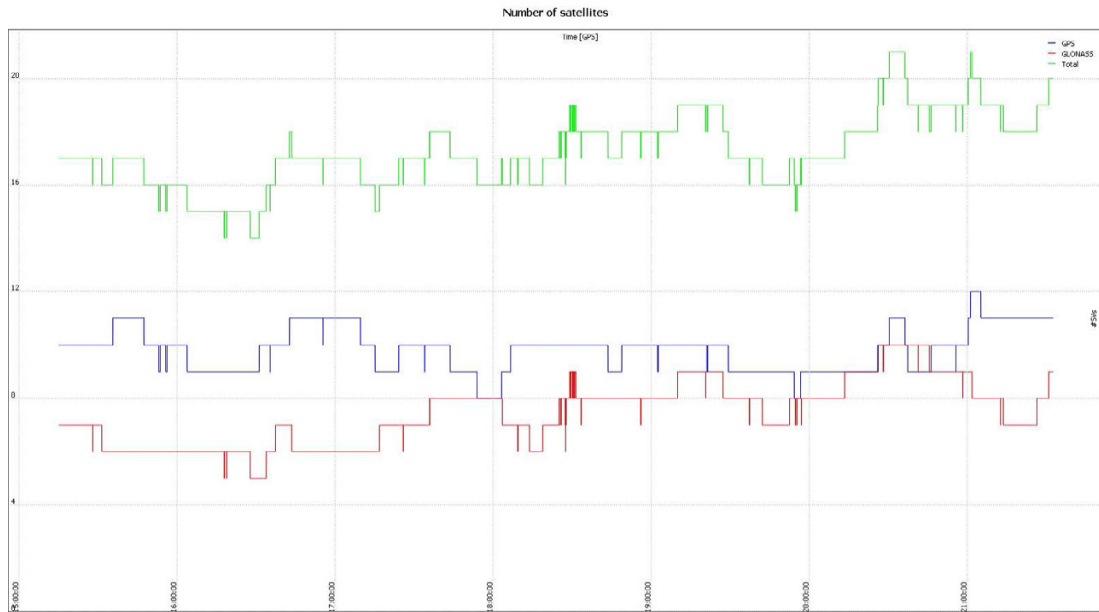
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted	Mission ID	Comments
				Start	End			
TEST STRIP		G	N/A	14:55	15:00		171121_45546	
PPP 8		G	6300'	15:26	15:34		N/A	
175		360.0°	6300'	15:38	15:55		153809	
176		180.0°	6300'	15:58	16:13		155845	
177		360.0°	6300'	16:18	16:35		161824	
178		180.0°	6300'	16:38	16:54		163857	
179		360.0°	6300'	16:58	17:16		165858	
180		180.0°	6300'	17:19	17:34		171927	
181		360.0°	6300'	17:39	17:56		173921	
182		180.0°	6200'	18:00	18:15		180011	
183		360.0°	6200'	18:20	18:36		182020	
184		180.0°	6200'	18:39	18:55		183958	
185		360.0°	6200'	18:59	19:15		185933	
186		180.0°	6200'	19:19	19:34		191935	
X-TIE		270.0°	6200'	19:37	19:41		193746	X-TIE LN5-186→175
PPP 8		G	6200'	19:41	19:48		N/A	

Pg / of

Nov. 21, 2017-A (CFKMA, SN1264)







Flight Log

Julian Day 325 Flight A	
Date Nov. 21, 2017 Project 3125_DeweyZiebach Location Pierre SD Mission Objective	Aircraft PA-31 C-FKMA Pilot M. Mcquarry Operator B. Eisenbart
System Riegl Q1560 Unit 2221264 IMU Applanix AP50 GPS Rx Trimble Scanner 1 Drive 0 Scanner 2 Drive 1	Additional Notes Temp -10°C Humidity 67% Altimeter 1029 m⁵ Terrain Height 525 m

LIDAR Flight Log



Aircraft Block Time			
Engine On	15:05	Ramp Out	15:20
Engine Off	21:40	Ramp In	21:27
Total	6:58	hrs	6
		hrs	6
		hrs	6

Mission Plan			
AGL Height	1300	m	Pulse Rate
Target Speed	160	kts	Scan Rate
Laser Current	28	%	FOV
			800
			237
			60
			Deg's

Static Alignment		GPS Time	
Pre Mission	15:14	Start	End
Post Mission	21:27	15:14	21:32

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
Test Strip		/	/	15:26	15:26			171121-152614	
PPP-8	6417325-01	↻	5800'	15:52	15:56				
240		0°		16:01	16:17			160138	
241	02	180°		16:20	16:33			162020	
242	03	0°		16:37	16:52			163705	
243	04	180°		16:55	16:55	16:55	34	165508	pilot missed entry
243	05	180°		17:00	17:14			170011	
244	06	0°		17:17	17:32			171734	
245	07	180°		17:35	17:49			173537	
246	08	0°		17:52	18:07			175244	
247	09	180°		18:11	18:25			181110	
248	10	0°		18:28	18:43			182822	
249	11	180°		18:46	19:00			184618	
250	12	0°		19:04	19:18			190407	
251	13	180°	↓	19:21	19:35			192136	

Pg of

LIDAR Flight Log

Julian Day 325 Flight A

Date	Nov. 21, 2017	Aircraft	PA-31 C-FKMA
Project	3125 DeweyZiebach	Pilot	M. McQuarry
Location	Pierre SD	Operator	B. Eisenbart
Mission Objective			

System	Riegl Q1560
Unit	2221264
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	0
Scanner 2 Drive	1

Additional Notes	
Temp	-10°C
Humidity	67%
Altimeter	1029 mb
Terrain Height	525 m



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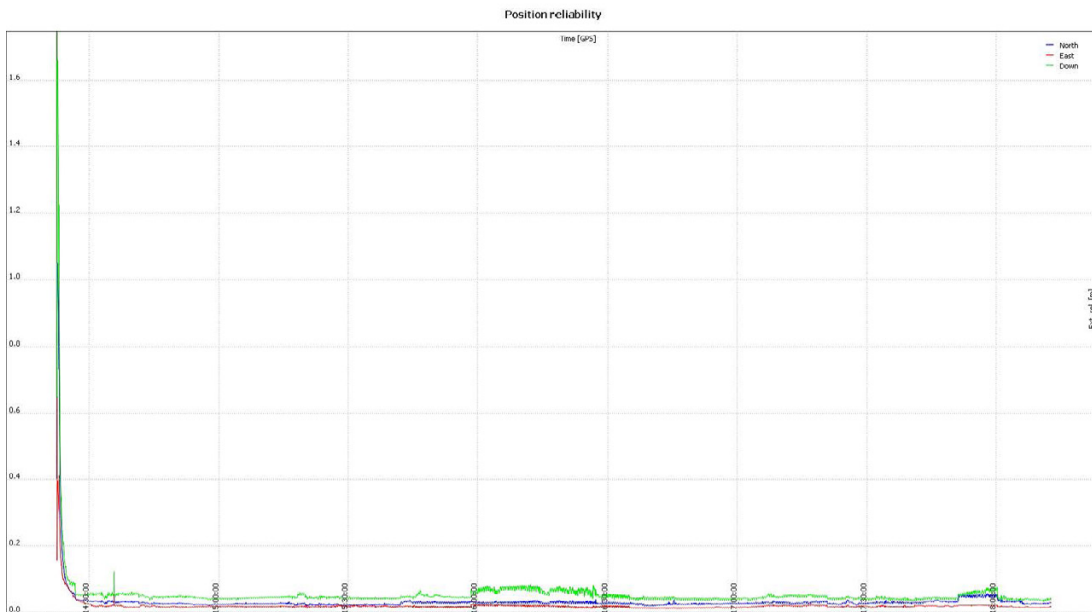
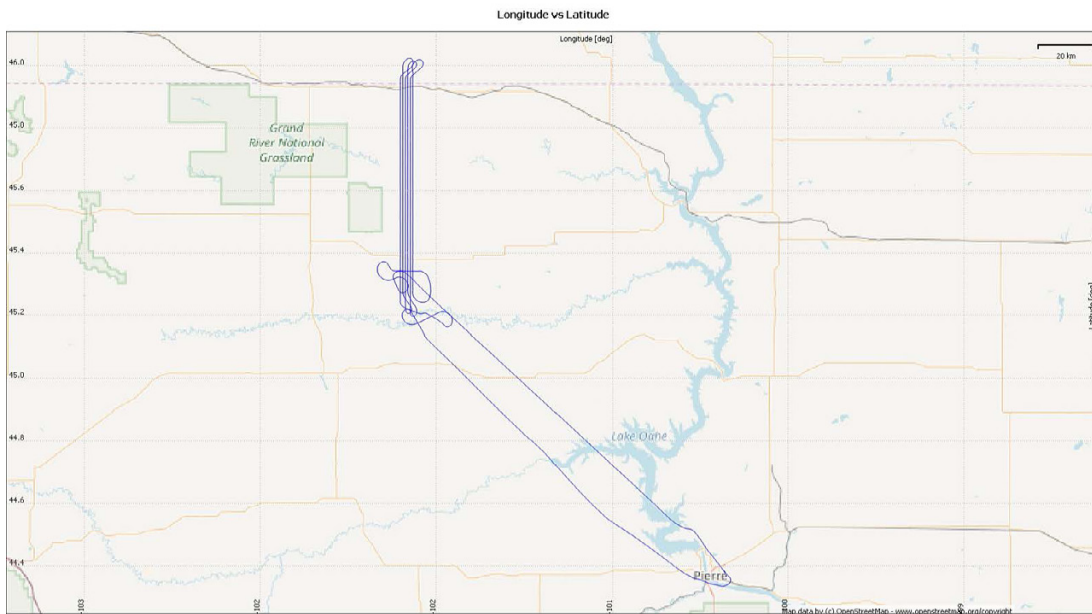
Aircraft Block Time			
Engine On	15:05	Ramp Out	15:20
Engine Off	21:40	Ramp In	21:27
Total	6:54	hrs	6
		hrs	6

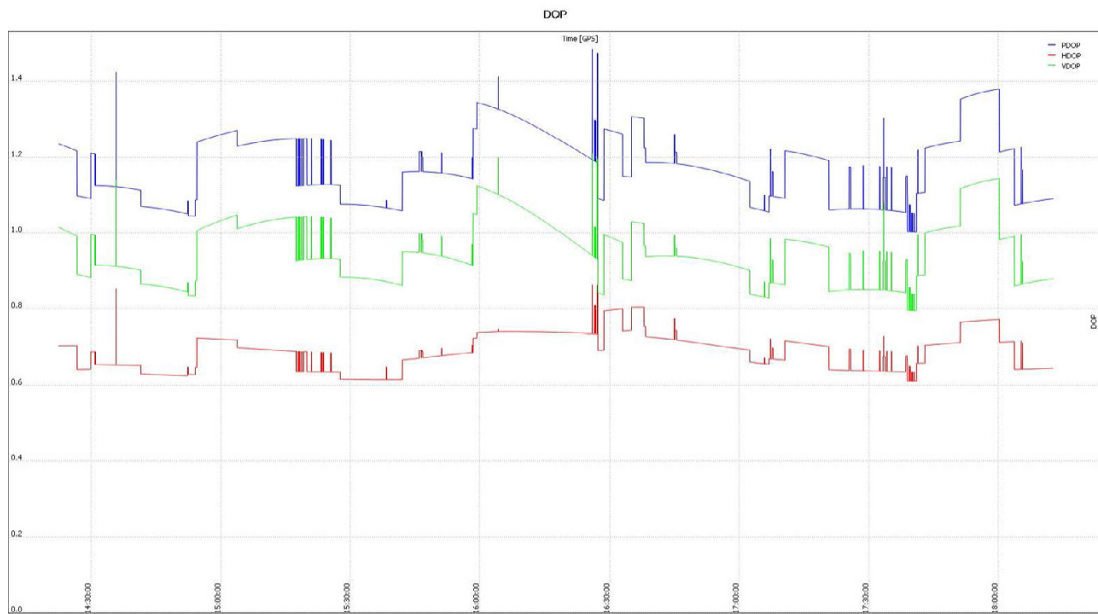
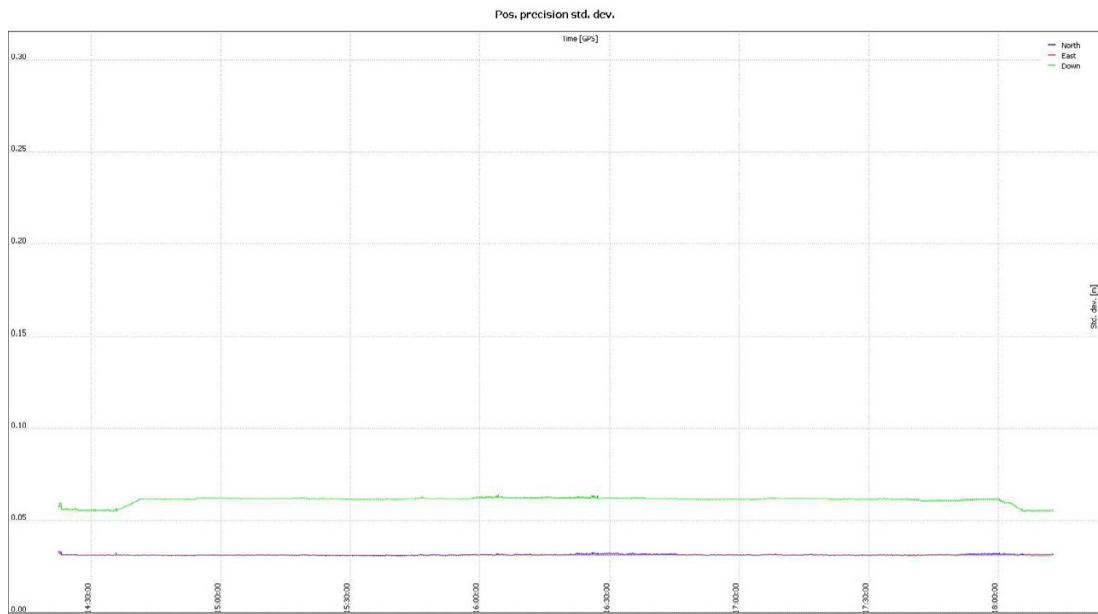
Mission Plan					
AGL Height	1300 m	Pulse Rate	800	KHz	
Target Speed	160	kts	Scan Rate	237	Hz
Laser Current	25	%	FOV	60	Deg's

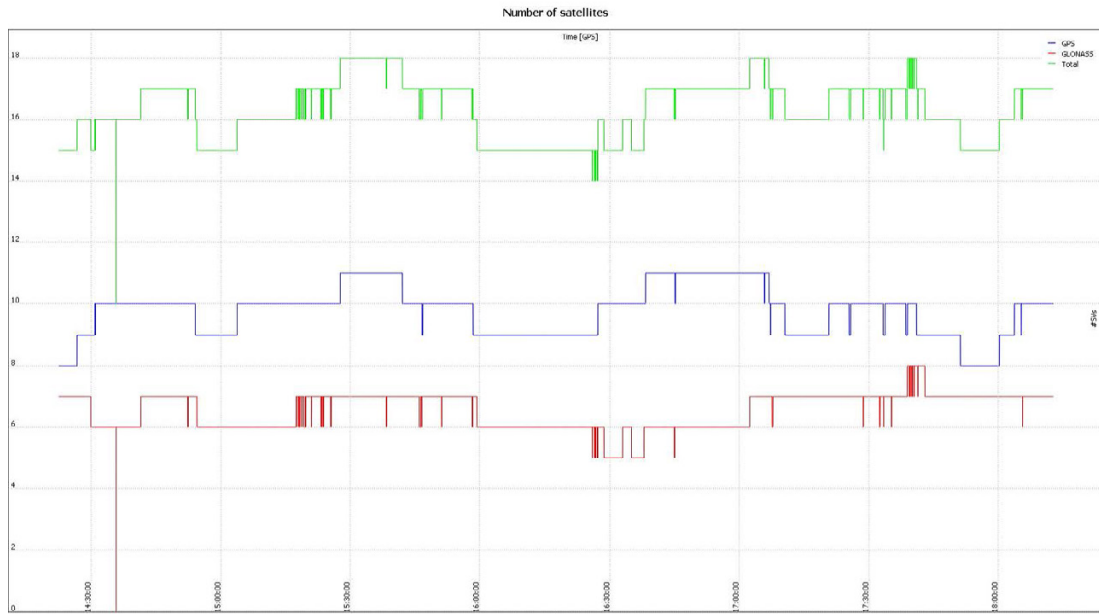
Static Alignment		GPS Time	
Pre Mission	15:14	Start	End
Post Mission	21:27	21:27	21:32

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
252	6417325-14	0°	5300'	19:38	19:53			171121-193936	
253	15	180°		19:55	20:07			195557	
254	16	0°		20:12	20:26			201241	
255	17	180°		20:29	20:43			202453	
K71E	18	275°		20:49	20:54			204954	
PPP-8		↗		20:54	20:59				∞


Nov. 22, 2017-A (CFFRY, SN0754)







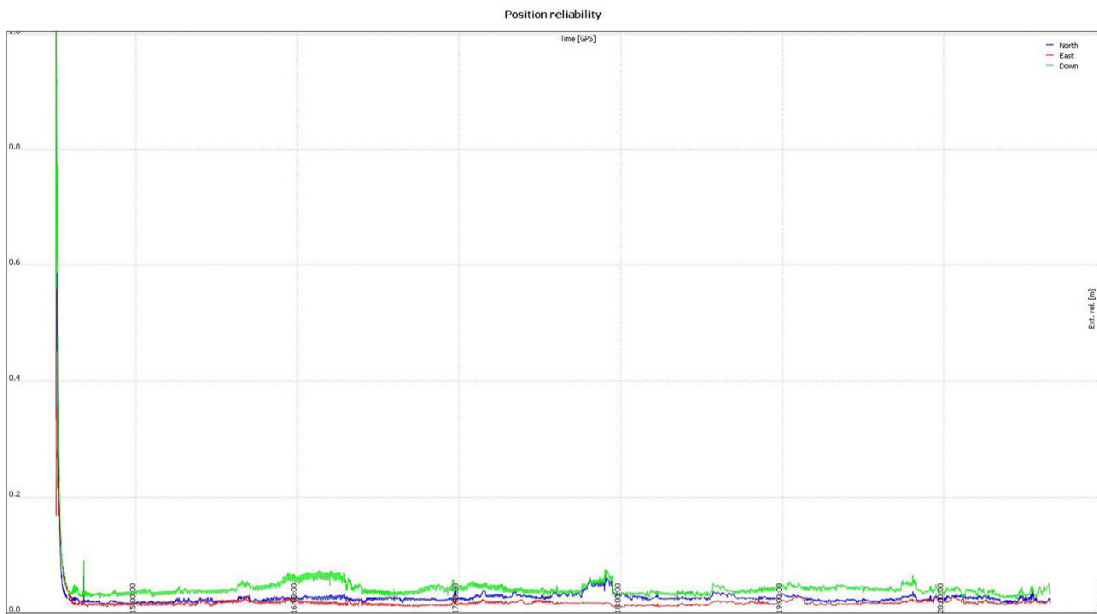
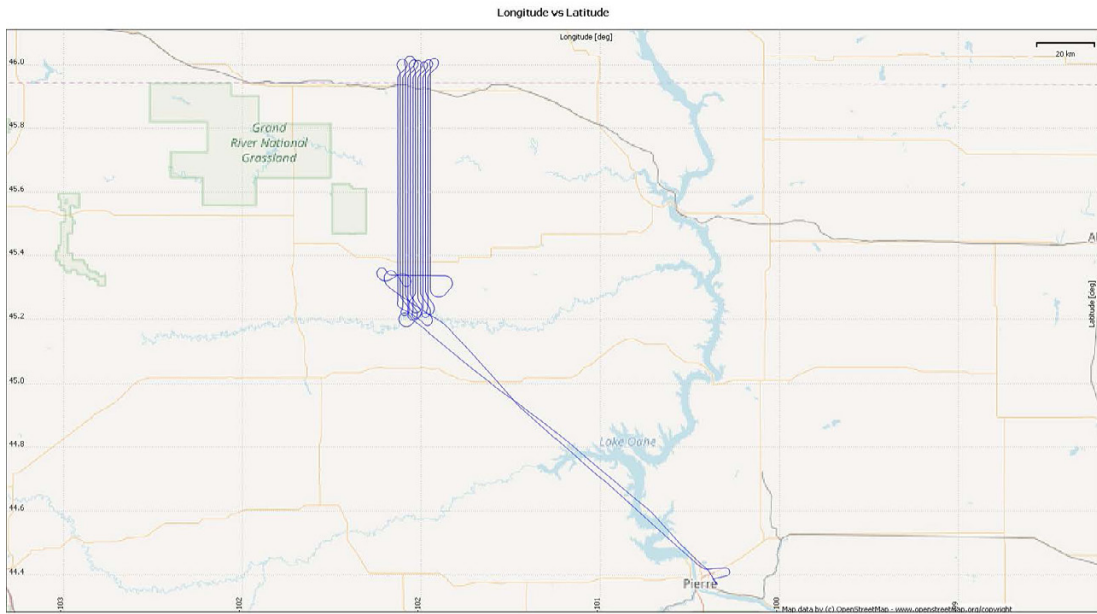
Flight Log

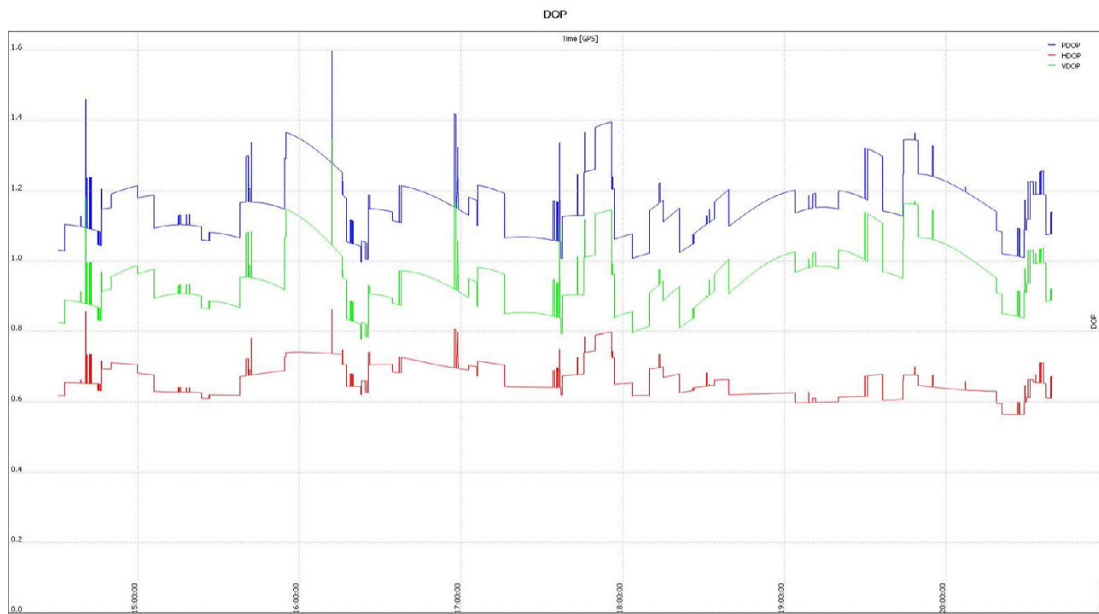
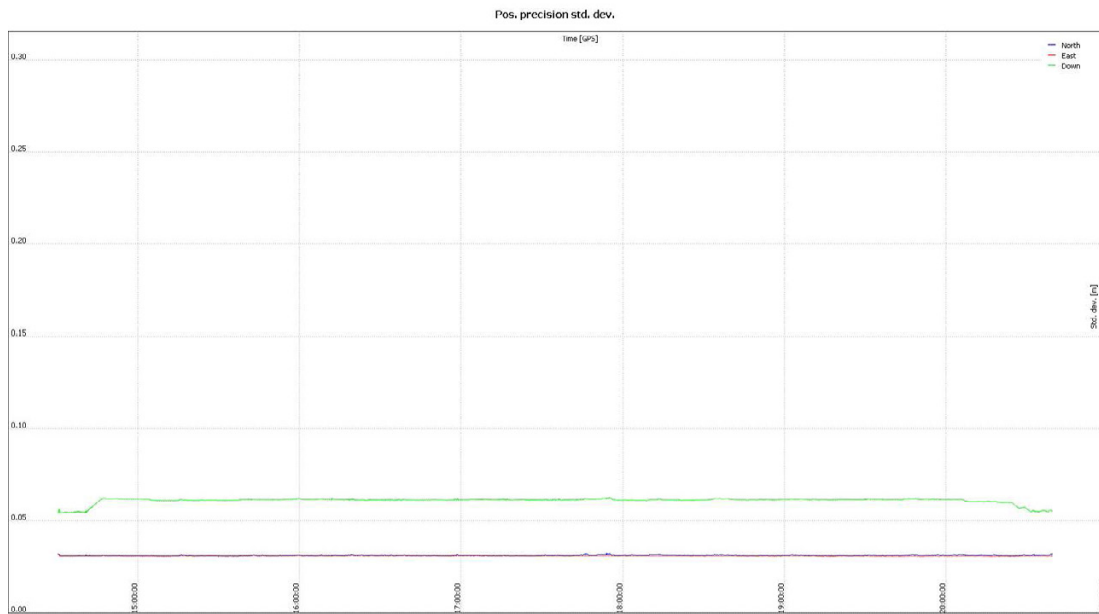
Julian Day 326		Flight #		LIDAR Flight Log				 AIRBORNE LASER SCANNING A Clean Harbors Company	
Date 22-Nov-2017		Aircraft PA-31 C-FFRY		System Riegl Q1560		Additional Notes			
Project 3125_DeweyZiebach		Pilot D.Thibeault		Unit 2220754		Temp -6°C			
Location Greenback FFFZ E.S.D.		Operator E.Rutledge		IMU Applanix AP50		Humidity 78%			
Mission Objective				GPS Rx Trimble		Altimeter 1019 hPa			
				Scanner 1 Drive B-1		Terrain Height 525 m			
				Scanner 2 Drive B-2					

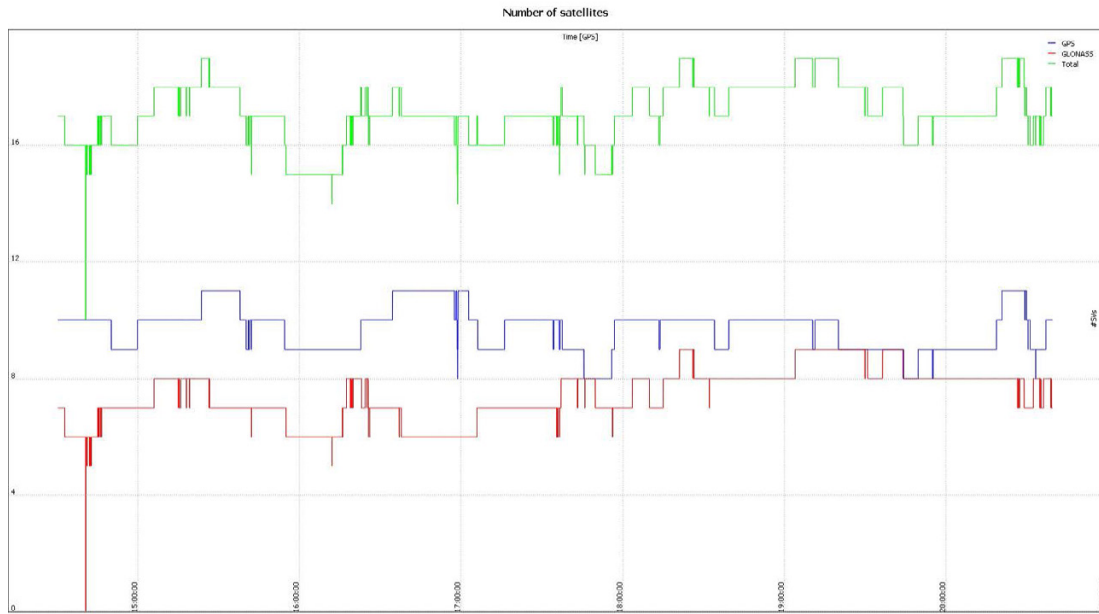
Aircraft Block Time			Mission Plan				Static Alignment		GPS Time	
Engine On 14:15	Ramp Out 14:30	Takeoff 14:35	AGL Height 1300 m	Pulse Rate 800 KHz					Start	End
Engine Off 18:14	Ramp In 18:07	Landing 18:05	Target Speed 160 kts	Scan Rate 237 Hz					Pre Mission 14:25	14:30
Total 4.0 hrs	Total hrs	Total 3.5 hrs	Laser Current 25 %	FOV 60 Deg's					Post Mission 18:07	18:12

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nml to End		
TEST STRIP		G	N/A	14:40	14:42			17122_144017	
PPP B		G	6200'	15:15	15:22			N/A	15:22:15.577
187		360.0°	6200'	15:26	15:43			152622	INS-GPS 1'S ERROR
188		180.0°	6200'	15:47	16:02			154730	15:22:20.147
189		360.0°	6200'	16:06	16:24			160625	INS-GPS 1'S OK
190		180.0°	6200'	16:27	16:42			162756	
191		360.0°	6200'	16:47	17:05			164702	
192		180.0°	6200'	17:09	17:23			170907	RAIN-RE-FLY/LINE
X-TIE		270° +/-	6200'	17:27	17:30			172739	X-TIE LNS 192-187
PPP B		G	6200'	17:30	17:38			N/A	ABORT MISSION FOR VIRGA & RAIN.

Nov. 23, 2017-A (CFFRY, SN0754)







Flight Log

Julian Day 327 Flight A

LIDAR Flight Log



Date	23-NOV-2017	Aircraft	PA-31 C-FFRY
Project	3125_DeweyZiebach	Pilot	D.Thibeault
Location	Wentworth PIERRE S.D.	Operator	E.Rutledge
Mission Objective			

System	Riegl Q1560
Unit	2220754
IMU	Applanix AP60
GPS Rx	Trimble
Scanner 1 Drive	A-1
Scanner 2 Drive	A-2

Additional Notes
 Temp +1°C
 Humidity 94%
 Altimeter 1016 hPa
 Terrain Height 525m

Aircraft Block Time			
Engine On	14:23	Takeoff	14:40
Engine Off	20:41	Ramp In	20:34
		Landing	20:31
Total	6.3 hrs	Total	5.9 hrs

Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 %	FOV	60 Deg's

Static Alignment	GPS Time	
	Start	End
Pre Mission	14:30	14:35
Post Mission	20:34	20:39

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST STRIP		G	N/A	14:45	14:47			17123149509	
PPP 8		G	6200'	15:15	15:20			N/A	
192		360.0°	6200'	15:22	15:38			152249	RE-FLIGHT FOR
193		180.0°	6200'	15:42	15:57			154221	5417326A
194		360.0°	6200'	16:00	16:16			160050	
195		180.0°	6200'	16:20	16:35			162037	
196		360.0°	6200'	16:39	16:56			163958	
197		180.0°	6200'	16:59	17:13			165919	
198		360.0°	6200'	17:18	17:33			171824	
199		180.0°	6200'	17:36	17:51			173657	
200		360.0°	6200'	17:55	18:11			175533	
201		180.0°	6200'	18:14	18:29			181422	
202		360.0°	6200'	18:33	18:49			183336	
203		180.0°	6100'	18:52	19:07			185249	
204		360.0°	6100'	19:11	19:27			191140	

Pg 1 of 2

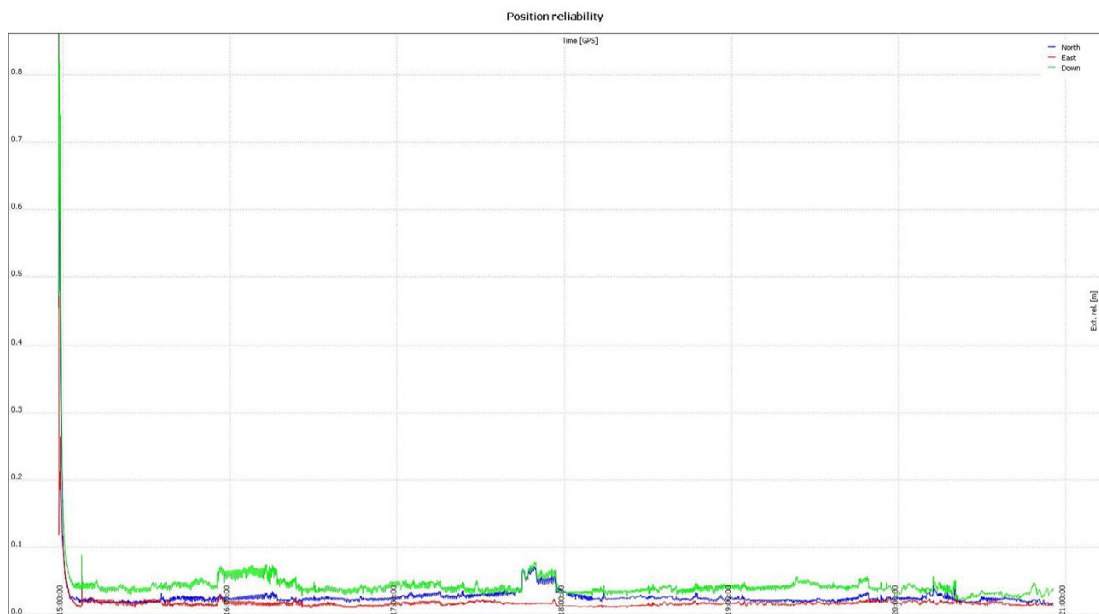
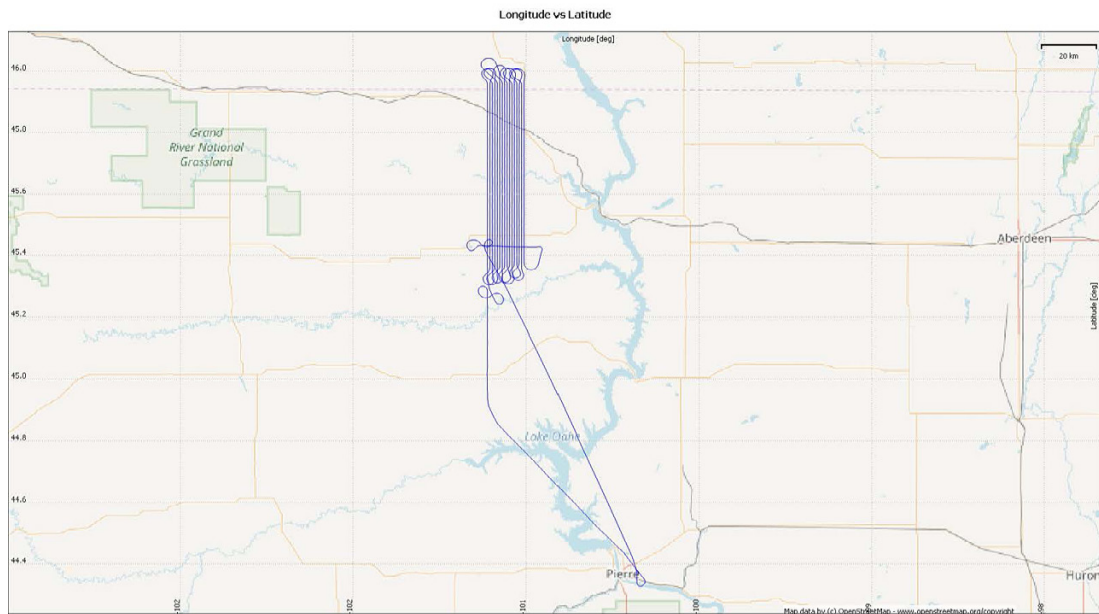
LIDAR Flight Log

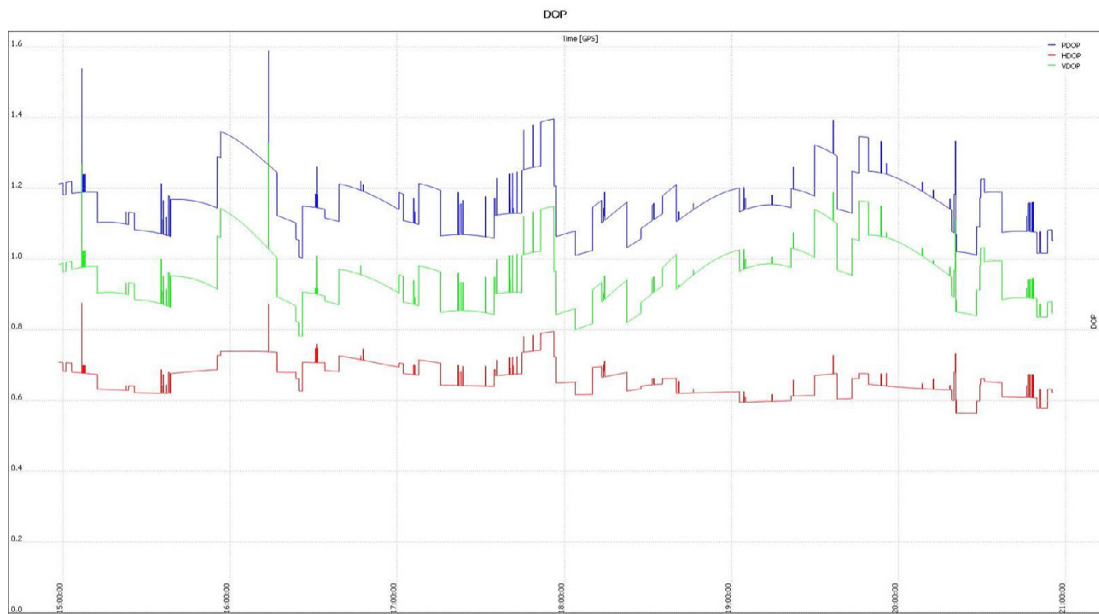
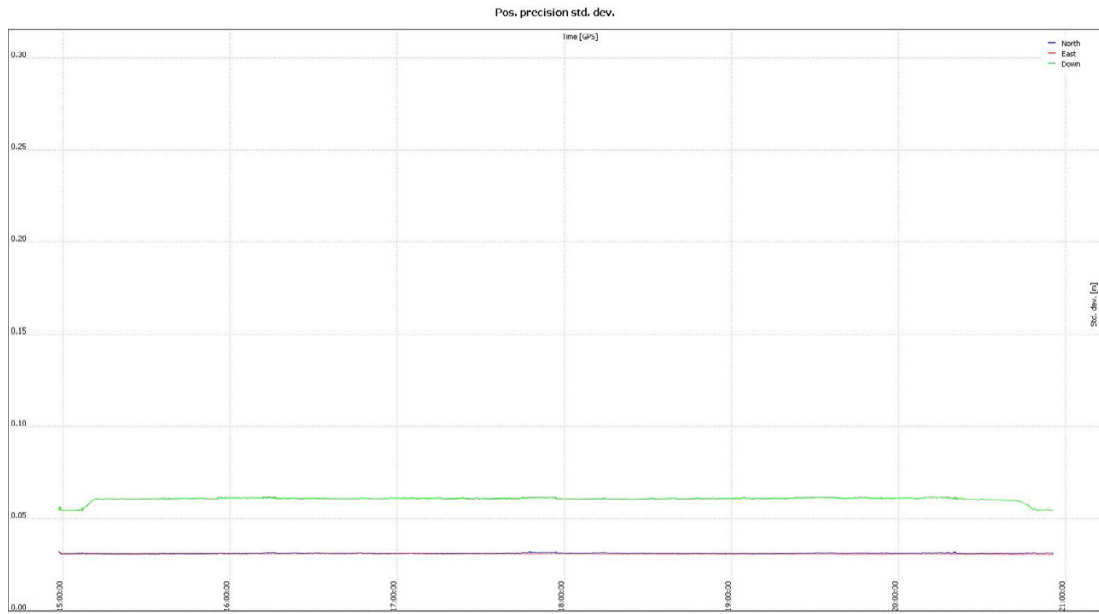
Julian Day 327	Flight A				
Date 23-Nov-2017	Aircraft PA-31 C-FFRY	System Riegl Q1580	Additional Notes		
Project 3125_DeweyZiebach	Pilot D.Thibault	Unit 2220754	Temp		
Location Cambreak PIERRE S.D.	Operator E.Rutledge	IMU Applix AP50	Humidity		
Mission Objective		GPS Rx Trimble	Altimeter		
		Scanner 1 Drive A-1	Terrain Height		
		Scanner 2 Drive A-2			

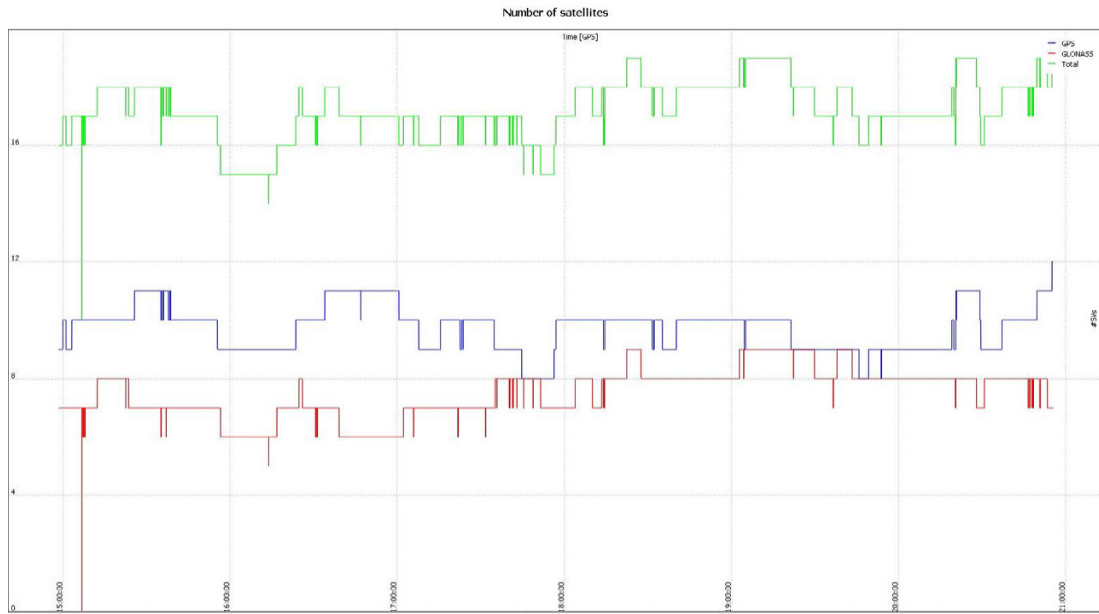
Aircraft Block Time			Mission Plan				Static Alignment		GPS Time	
Engine On 14:23	Ramp Out 14:35	Takeoff 14:40	AGL Height 1300 m	Pulse Rate 800 KHz			Pre Mission	Start 14:30	End 14:35	
Engine Off 20:41	Ramp in 20:34	Landing 20:31	Target Speed 180 kts	Scan Rate 237 Hz				Post Mission		
Total 6.3 hrs	Total hrs	Total 5.9 hrs	Laser Current 25 %	FOV 60 Deg's						

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
205		180.0°	6100°	19:31	19:45			17123_193120	
X-TIE		270° +/-	6100°	19:48	19:53			194845	X-TIE ANS-205-192
PPP B		G	6100°	19:53	19:59			N/A	

Nov. 23, 2017-A (CFKMA, SN1264)







Flight Log

LIDAR Flight Log

Julian Day 327 Flight A	Date <i>Nov. 23, 2017</i> Project 3125_DeweyZiebach Location <i>Pierre SD</i> Mission Objective	Aircraft PA-31 C-FKMA Pilot M. McQuarry Operator B. Eisenbart	System Riegl Q1560 Unit 2221264 IMU Applanix AP50 GPS Rx Trimble Scanner 1 Drive 0 Scanner 2 Drive 1
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Additional Notes
 Temp *-2.5° C*
 Humidity *100%*
 Altimeter *1013.7 m6*
 Terrain Height *525 m*

Static Alignment		GPS Time	
Start	End	Start	End
14:58	15:03	20:50	20:55

Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25.50 %	FOV	60 Deg's

Aircraft Block Time			
Engine On	14:55	Ramp Out	15:04
Engine Off	20:50	Ramp In	20:48
Total	6.1 hrs	Total	5.7 hrs

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
<i>Test Strip</i>		<i>NA</i>	<i>NA</i>	15:11	15:11			171123-151150	
<i>POP-8</i>		<i>↻</i>	<i>5900'</i>	15:34	15:38			<i>NA</i>	∞
256	6417327-01	0°		15:41	15:55			154126	
257	02	180°		15:58	16:11			155823	
258	03	0°		16:15	16:29			161502	
259	04	180°		16:32	16:45			163217	
260	05	0°		16:49	17:02			164906	
261	06	180°	↓	17:07	17:21			170750	
262	07	0°	5800'	17:24	17:38			172456	
263	08	180°		17:41	17:55			174143	
264	09	0°		17:58	18:11			175829	
265	10	180°		18:15	18:29			181506	
266	11	0°		18:32	18:45			183229	
267	12	140°	↓	18:49	19:02			184905	
268	13	0°		19:05	19:18			190524	

Pg of

LIDAR Flight Log

Julian Day 327 Flight A

 Date *Nov 23, 2017*
 Project 3125_DeweyZiebach
 Location *Pierre SD*
 Mission Objective

 System **Riegl Q1560**
 Unit **2221264**
 IMU **Applanix AP50**
 GPS Rx **Trimble**
 Scanner 1 Drive **0**
 Scanner 2 Drive **1**

 AIRBORNE
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 Additional Notes
 Temp *-2.5*
 Humidity *100%*
 Altimeter *1013.7*
 Terrain Height *525*

Aircraft Block Time		
Engine On	<i>14:55</i>	<i>15:04</i>
Engine Off	<i>21:00</i>	<i>20:50</i>
Total	<i>6.1</i>	<i>5.7</i>

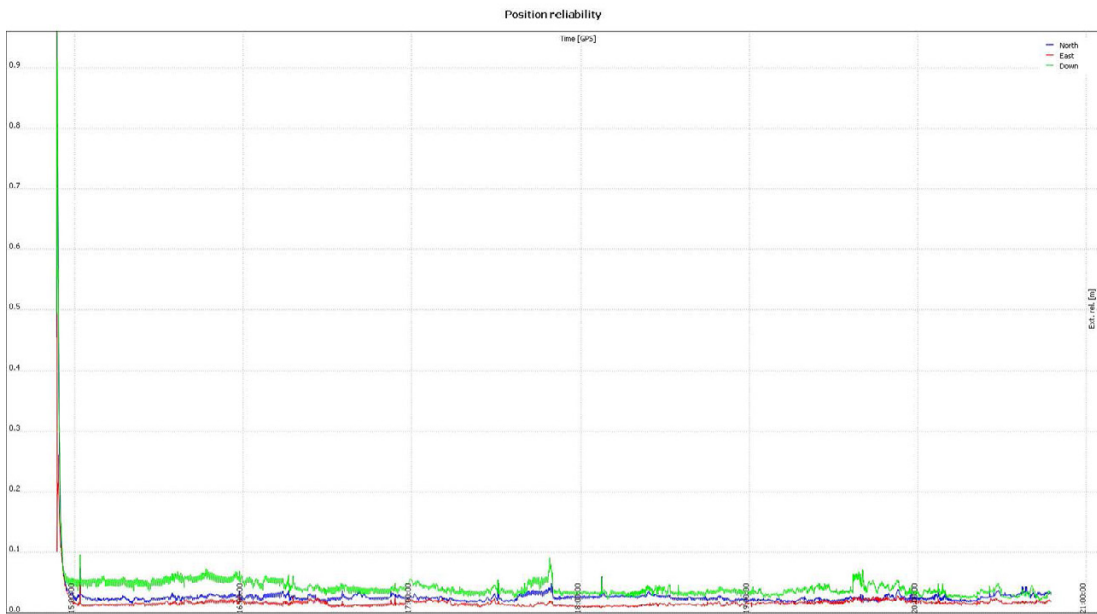
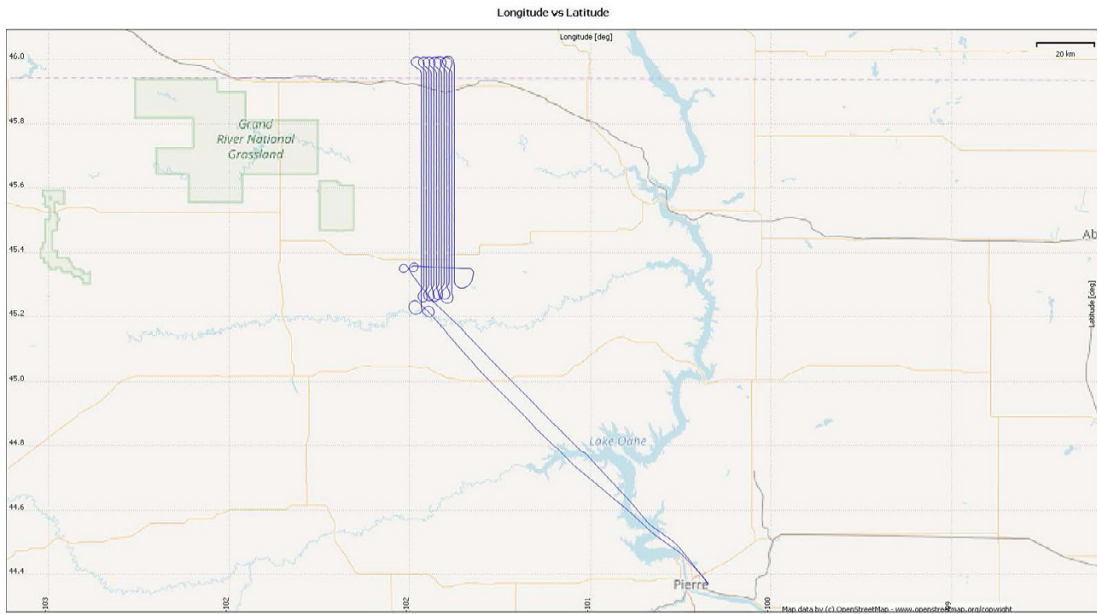
Mission Plan			
AGL Height	1300 m	Pulse Rate	800 KHz
Target Speed	160 kts	Scan Rate	237 Hz
Laser Current	25 50 %	FOV	60 Deg's

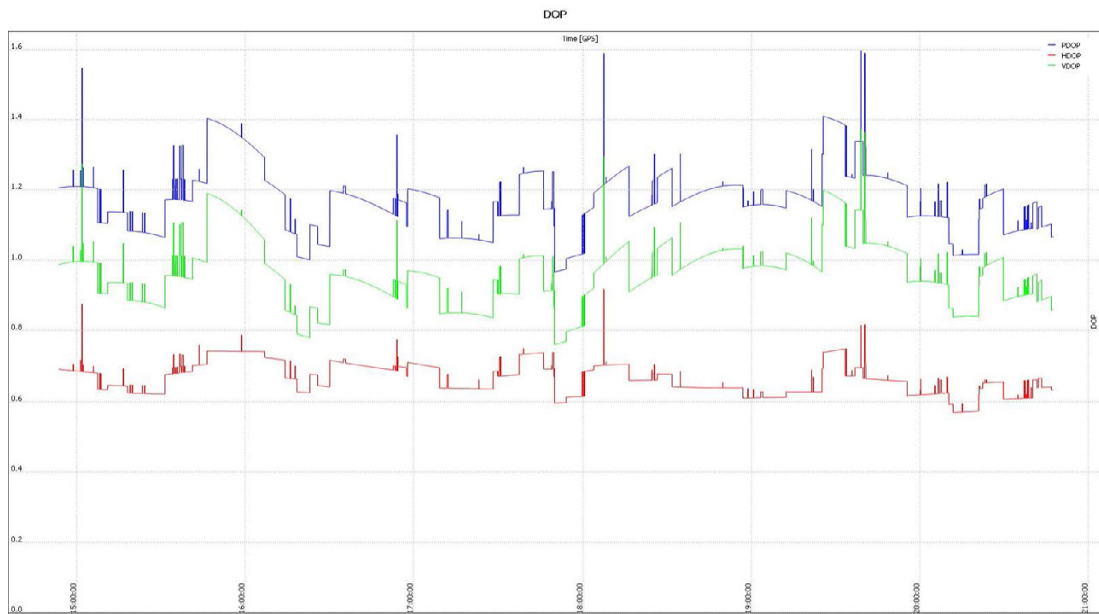
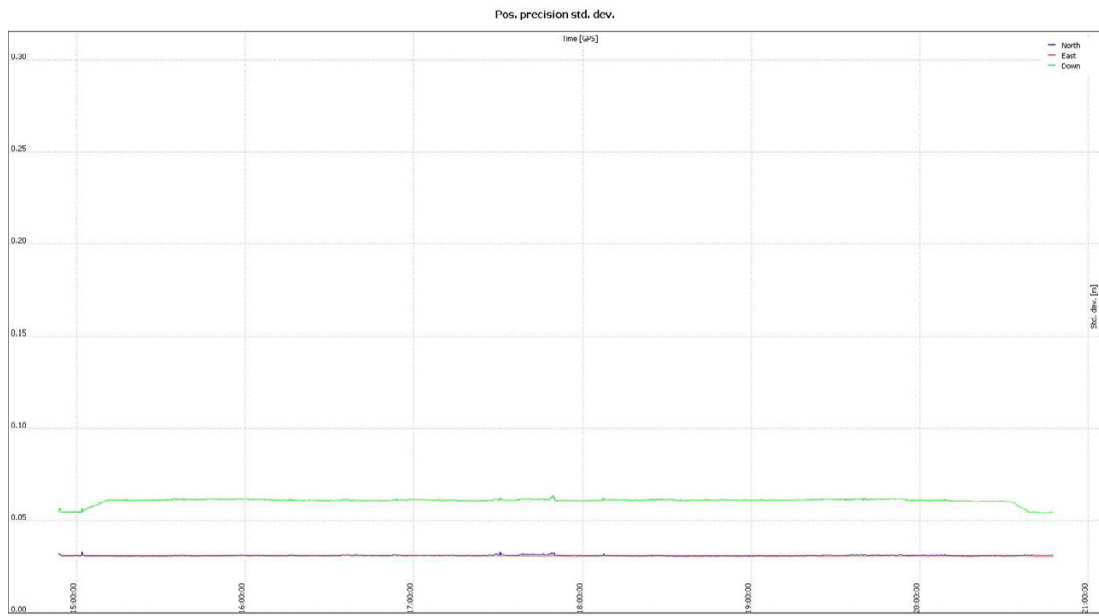
Static Alignment		GPS Time	
Pre Mission	<i>14:58</i>	Start	<i>15:03</i>
Post Mission	<i>20:50</i>	End	<i>20:55</i>

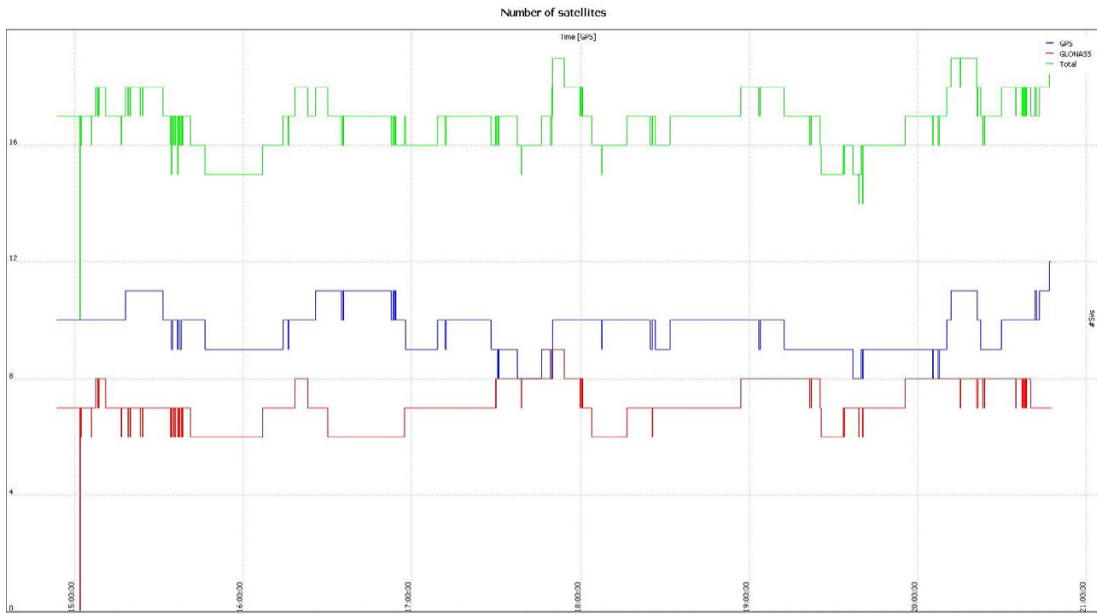
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
<i>269</i>	<i>6417327_14</i>	<i>180°</i>	<i>5800'</i>	<i>19:22</i>	<i>19:34</i>			<i>171123-192207</i>	
<i>270</i>	<i>15</i>	<i>0°</i>		<i>19:38</i>	<i>19:51</i>			<i>193813</i>	
<i>271</i>	<i>16</i>	<i>180°</i>		<i>19:55</i>	<i>20:08</i>			<i>195513</i>	
<i>X-TIE</i>	<i>17</i>	<i>274°</i>	<i>↓</i>	<i>20:12</i>	<i>20:16</i>			<i>201218</i>	
<i>PPP-8</i>		<i>↷</i>	<i>NA</i>	<i>20:16</i>	<i>20:21</i>			<i>NA</i>	<i>∞</i>

Pg of

Nov. 25, 2017-A (CFFRY, SN0754)







Flight Log

Julian Day 329 Flight A

LIDAR Flight Log



Date 25-Nov-2017	Aircraft PA-31 C-FFRY
Project 3125_DeweyZiebach	Pilot D.Thibeault
Location Greenbrook PIERRE S.D	Operator E.Rutledge
Mission Objective	

System Riegl Q1560
Unit 2220754
IMU Applanix AP50
GPS Rx Trimble
Scanner 1 Drive B-1
Scanner 2 Drive B-2

Temp 0°C
Humidity 84%
Altimeter 1023 hPa
Terrain Height 525 m

Aircraft Block Time		
Engine On 14:44	Ramp Out 14:58	Takeoff 15:01
Engine Off 20:49	Ramp In 20:42	Landing 20:38
Total 6.1 hrs	Total hrs	Total 5.6 hrs

Mission Plan			
AGL Height 1300 m	Pulse Rate 800 KHz	Target Speed 160 kts	Scan Rate 237 Hz
Laser Current 25 %	FOV 60 Deg's		

Static Alignment	GPS Time	
	Start	End
Pre Mission	14:53	14:58
Post Mission	20:42	20:47

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST STRIP		CN	N/A	15:09	15:11			171125150917	
PPP 8		CN	6100'	15:33	15:38			N/A	
206		360.0°	6100'	15:40	15:56			154033	
207		180.0°	6100'	15:59	16:14			153942	
208		360.0°	6100'	16:17	16:33			161748	
209		180.0°	6100'	16:36	16:51			163643	
210		360.0°	6100'	16:54	17:10			165439	
211		180.0°	6100'	17:13	17:28			171338	
212		360.0°	6100'	17:37	17:47			173204	
213		180.0°	6100'	17:50	18:05			175050	
214		360.0°	6100'	18:08	18:24			180856	
215		180.0°	6100'	18:27	18:42			182730	
216		360.0°	6100'	18:45	19:00			184556	
217		180.0°	6100'	19:04	19:19			190400	
218		360.0°	6100'	19:23	19:38			192322	

Julian Day 329 Flight A

LIDAR Flight Log



Date	25-Nov-2017	Aircraft	PA-31 C-FFRY
Project	3125_DeweyZiebach	Pilot	D.Thibeault
Location	Cambria PIERRE S.D	Operator	E.Rutledge
Mission Objective			

System	Rigl Q1560
Unit	2220754
IMU	Applanix AP50
GPS Rx	Trimble
Scanner 1 Drive	B-1
Scanner 2 Drive	B-2

Additional Notes	
Temp	
Humidity	
Altimeter	
Terrain Height	

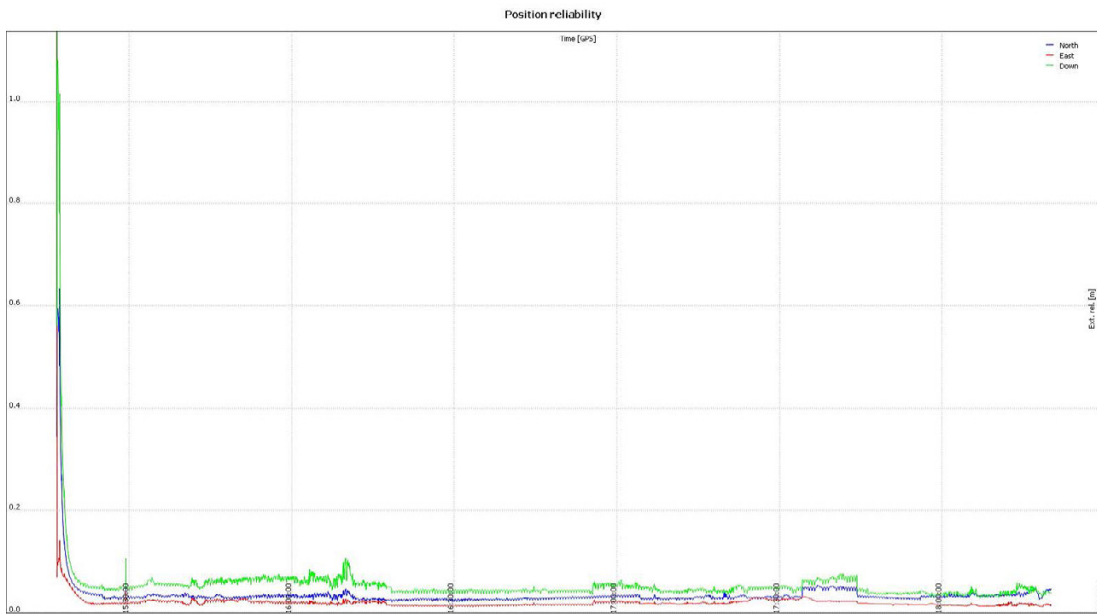
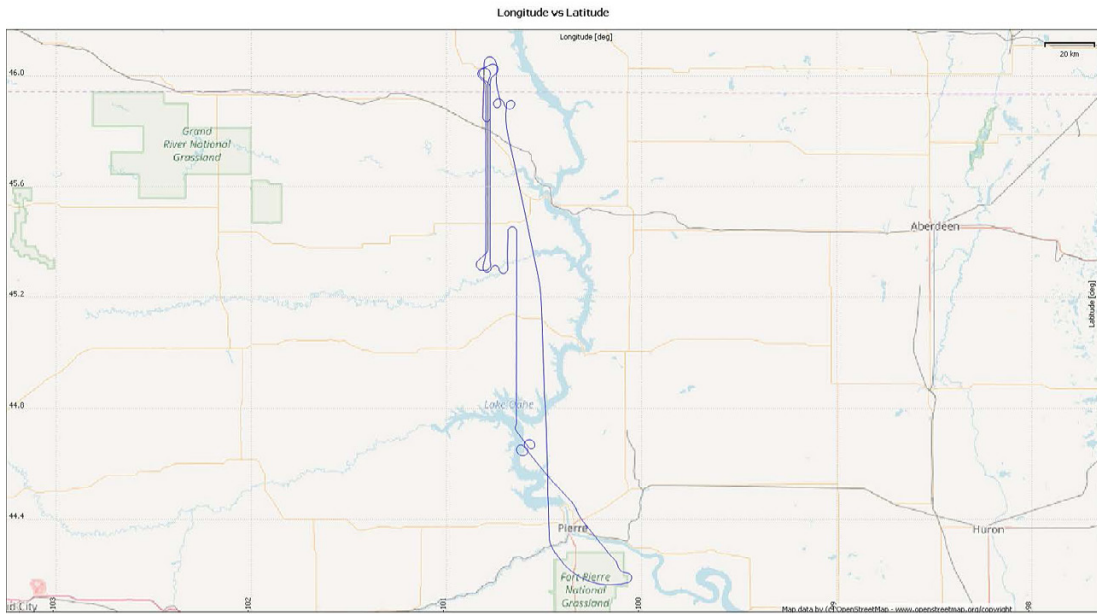
Aircraft Block Time		
Engine On	14:44	Ramp Out
		14:58
Takeoff	15:01	
Engine Off	20:49	Ramp In
		20:42
Landing	20:38	
Total	6.1 hrs	Total
		5.6 hrs

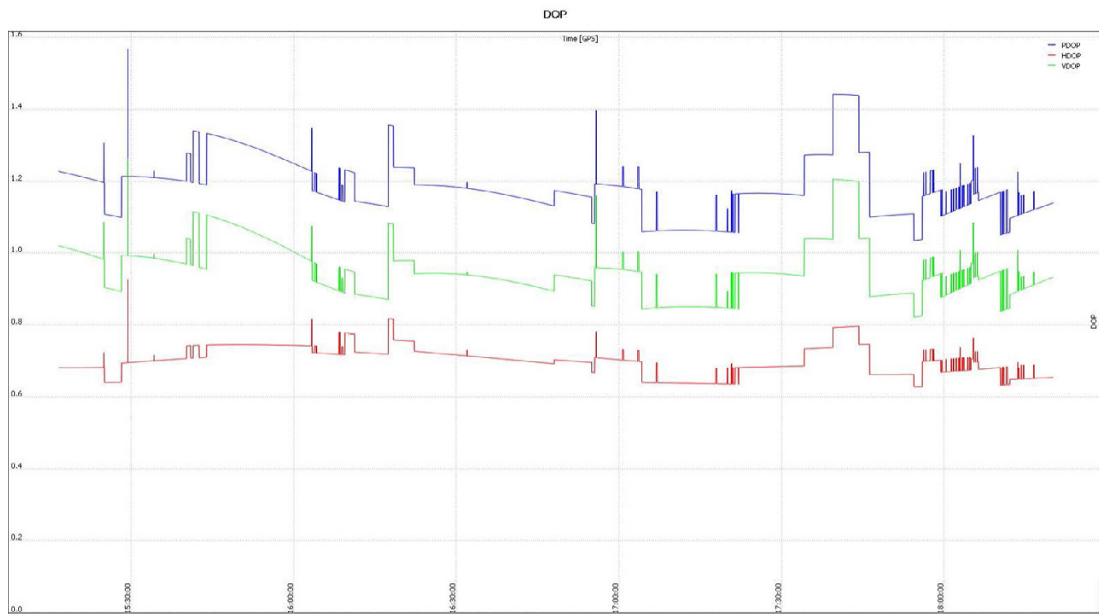
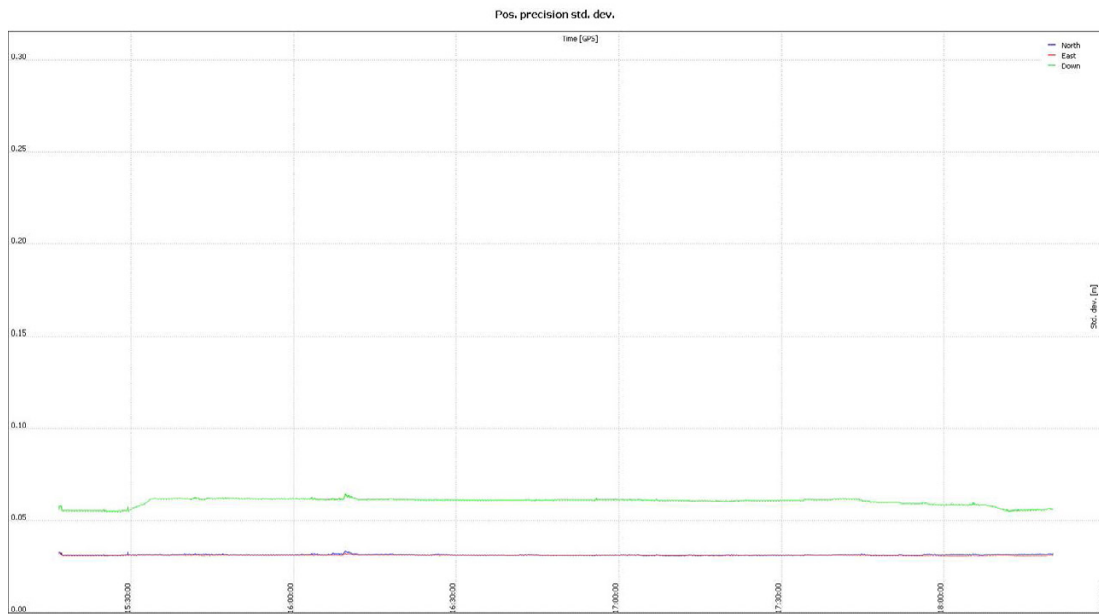
Mission Plan			
AGL Height	1300	m	Pulse Rate
			800 KHz
Target Speed	160	kts	Scan Rate
			237 Hz
Laser Current	25	%	FOV
			60 Deg's

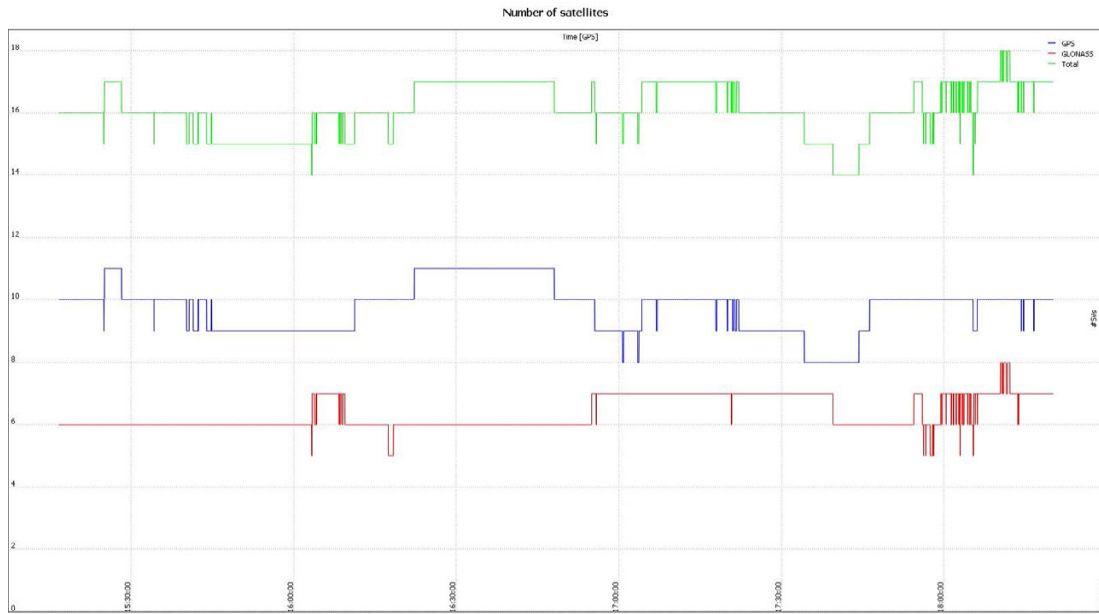
Static Alignment	GPS Time	
	Start	End
Pre Mission	14:52	14:58
Post Mission		

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
219		180.0°	6100'	19:41	19:56			171125_194141	
X-TIE		270° +/-	6100'	19:59	20:03			195939	X-TIE LN's 219 → 206
PPP B		C	6100'	20:03	20:09			N/A	

Nov. 26, 2017-A (CFKMA, SN1264)







Flight Log

LIDAR Flight Log

Julian Day 330	Flight A		
Date <i>Nov 26, 2017</i>	Aircraft <i>PA-31 C-FKMA</i>	System <i>Riegl Q1560</i>	Additional Notes Temp <i>2.8°C</i> Humidity <i>73%</i> Altimeter <i>1219.6mb</i> Terrain Height <i>525m</i>
Project <i>3125_DeweyZiebach</i>	Pilot <i>D. Anderson</i>	Unit <i>2221264</i>	
Location <i>Pierre SD</i>	Operator <i>B. Eisenbart</i>	IMU <i>Applanix AP50</i>	
Mission Objective		GPS Rx <i>Trimble</i>	
		Scanner 1 Drive <i>0</i>	
		Scanner 2 Drive <i>1</i>	

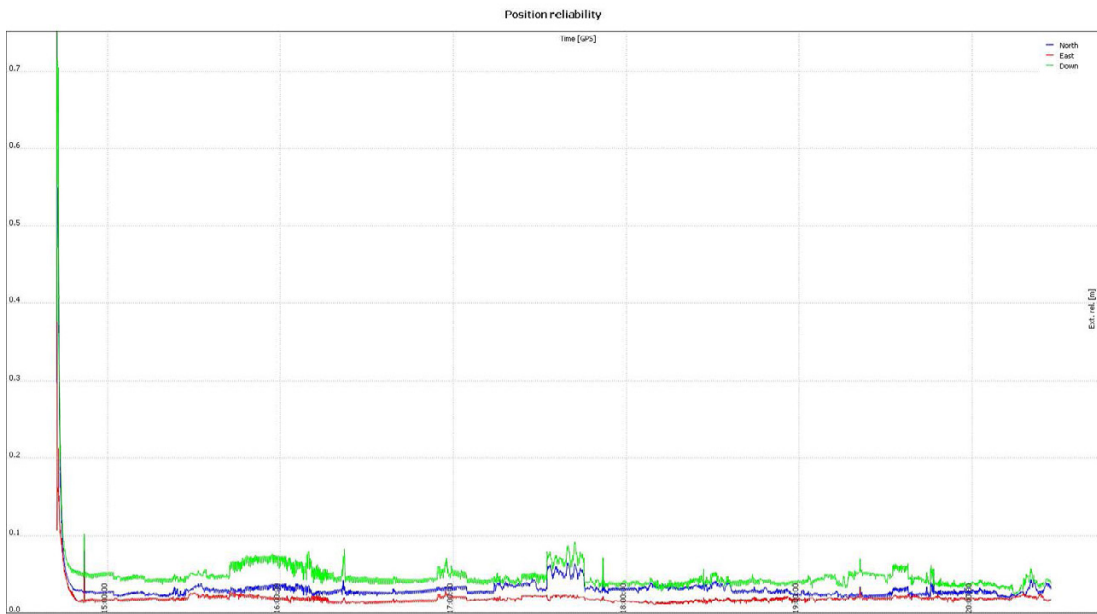
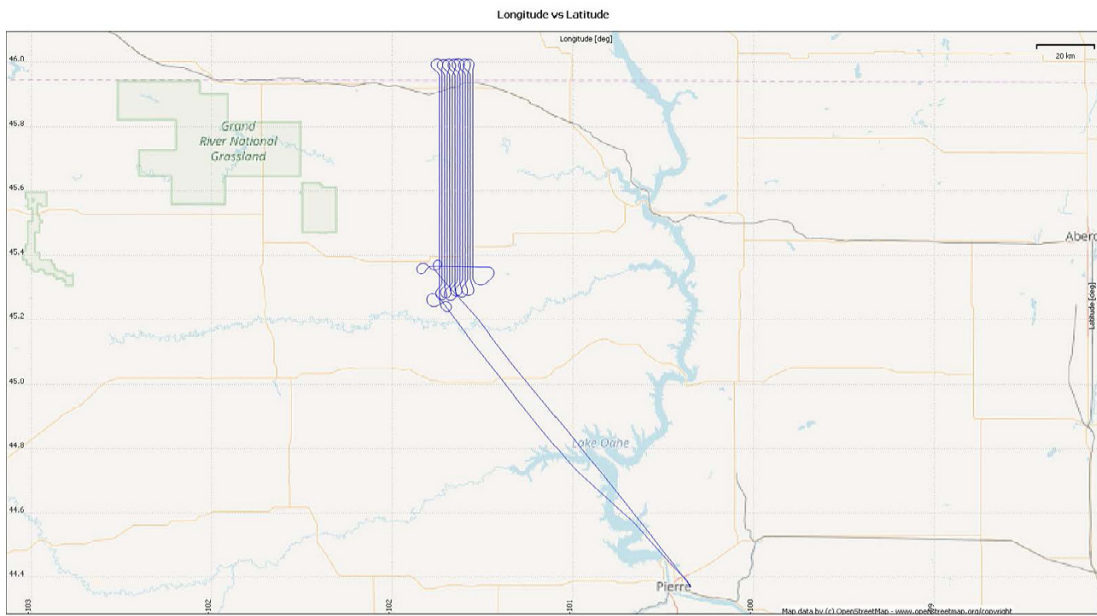


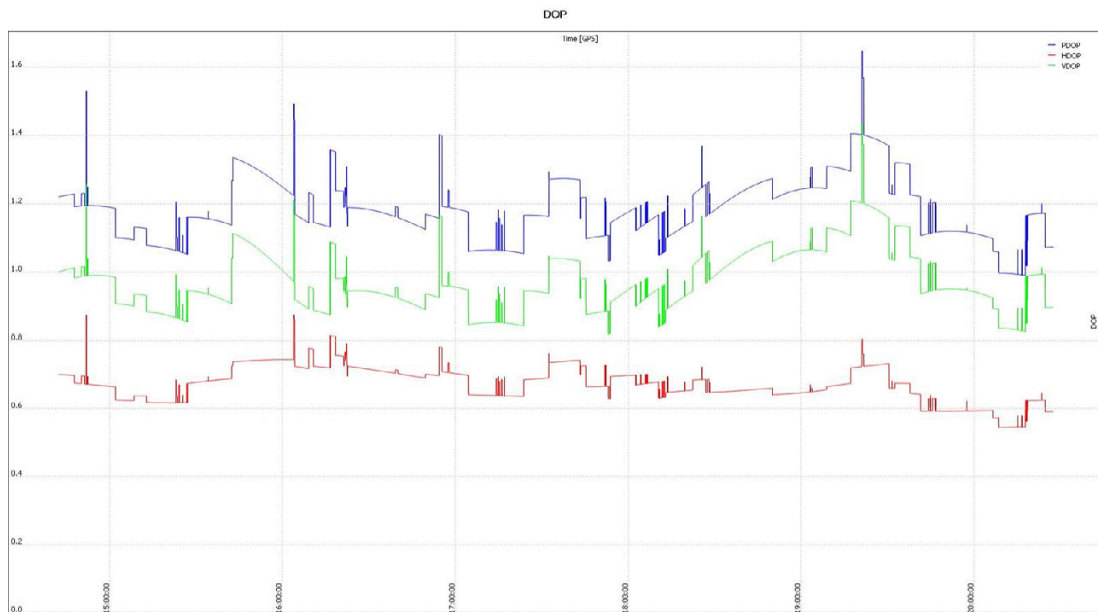
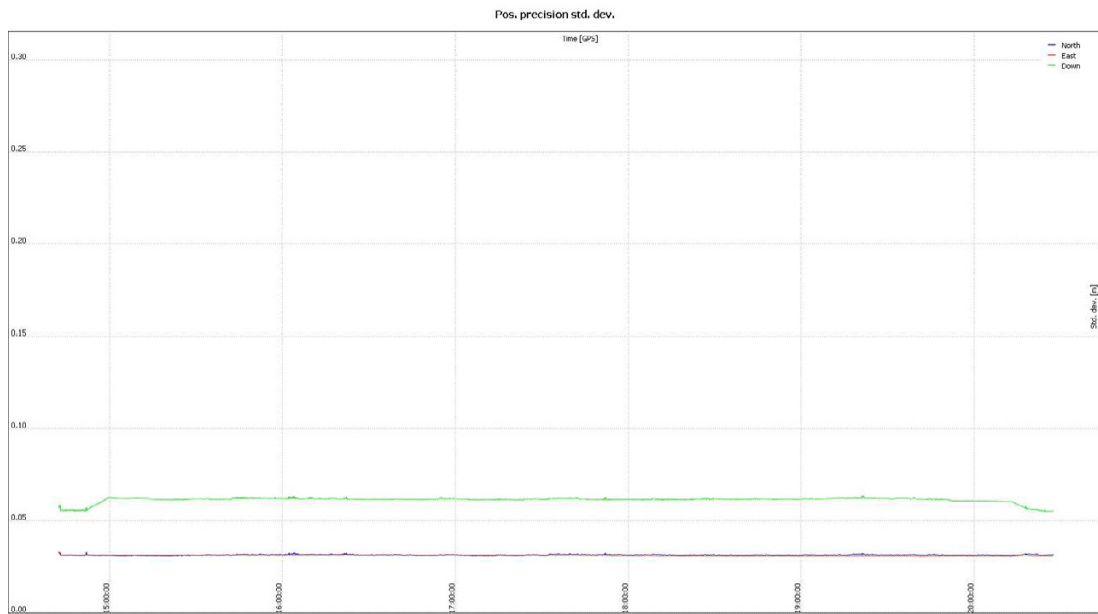
Aircraft Block Time				Mission Plan				GPS Time		
Engine On	15:12	Ramp Out	15:25	AGL Height	1300 m	Pulse Rate	800 KHz	Static Alignment	Start	End
Engine Off	18:21	Ramp In	18:13	Target Speed	160 kts	Scan Rate	237 Hz	Pre Mission	15:19	15:24
Total	2.8 hrs	Total	2.7 hrs	Laser Current	25 %	FOV	60 Deg's	Post Mission	18:14	18:19

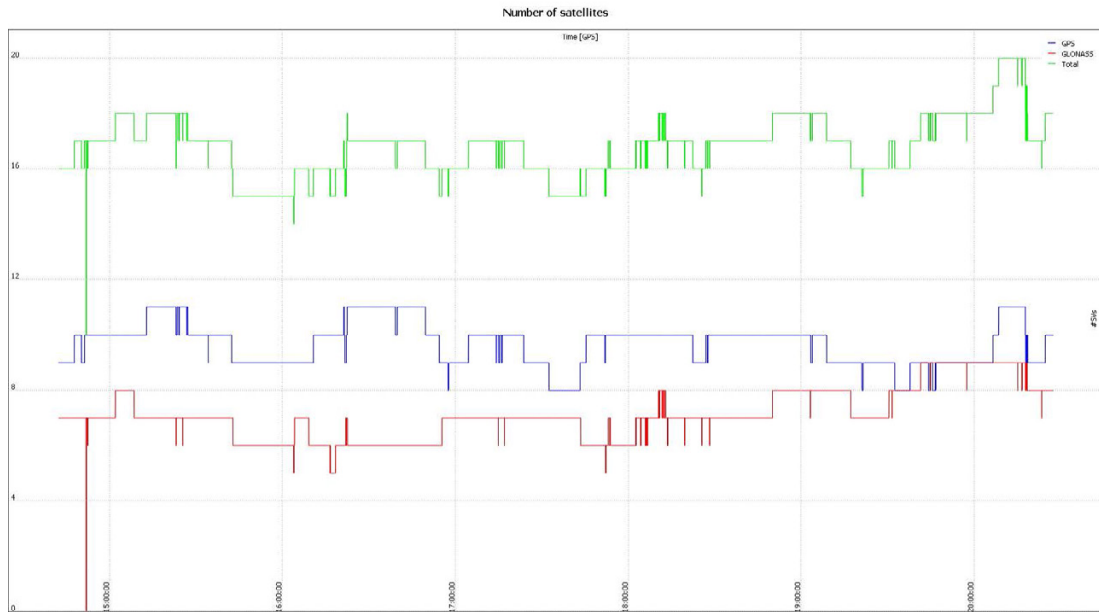
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
<i>test strip</i>		<i>N/A</i>	<i>N/A</i>	<i>15:33</i>	<i>15:33</i>			<i>171126-153354</i>	
<i>PPP-8</i>		<i>↗</i>	<i>5800'</i>	<i>15:39</i>	<i>15:44</i>			<i>N/A</i>	<i>∞</i>
<i>131</i>	<i>6417330-01</i>	<i>0°</i>		<i>15:47</i>	<i>16:02</i>			<i>154738</i>	
<i>PPP-8</i>		<i>↗</i>		<i>16:06</i>	<i>16:09</i>			<i>N/A</i>	<i>∞</i>
<i>272</i>	<i>02</i>	<i>0°</i>		<i>16:11</i>	<i>16:24</i>			<i>161152</i>	
<i>273</i>	<i>03</i>	<i>140°</i>		<i>16:28</i>	<i>16:41</i>	<i>16:36</i>	<i>18nm</i>	<i>162835</i>	<i>chl does not receive echoes</i>
<i>274</i>	<i>04</i>	<i>0°</i>		<i>16:45</i>	<i>16:57</i>	<i>16:57</i>	<i>2 nm</i>	<i>164555</i>	<i>chl does not receive echoes</i>
<i>274</i>	<i>05</i>	<i>180°</i>		<i>17:04</i>	<i>17:06</i>			<i>170407</i>	<i>reflew N-4 nm</i>
<i>PPP-8</i>		<i>↗</i>	<i>↓</i>	<i>17:16</i>	<i>17:21</i>			<i>N/A</i>	<i>∞</i>
									<i>TCP Port Error</i>
									<i>Aborted Mission</i>

Pg of


Nov. 26, 2017-A (CFFRY, SN0754)








Flight Log

Julian Day 330	Flight A	LIDAR Flight Log		 AIRBORNE IMAGING A Clean Harbors Company
Date 26-Nov-2017	Aircraft PA-31 C-FFRY	System Riegl Q1560	Additional Notes	
Project 3125_DeweyZiebach	Pilot D.Thibeault	Unit 2220754	Temp +3°C	
Location Oranbrook PIERRE S.D	Operator E.Rutledge	IMU Applinix AP50	Humidity 71%	
Mission Objective		GPS Rx Trimble	Altimeter 1019 hPa	
		Scanner 1 Drive A-1	Terrain Height 525 m	
		Scanner 2 Drive A-2		

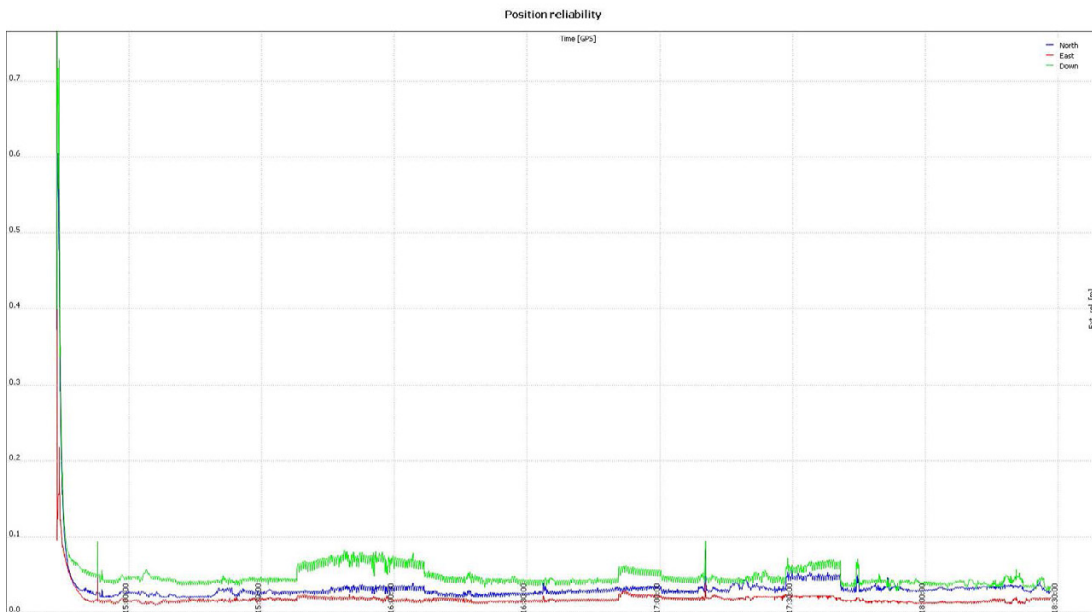
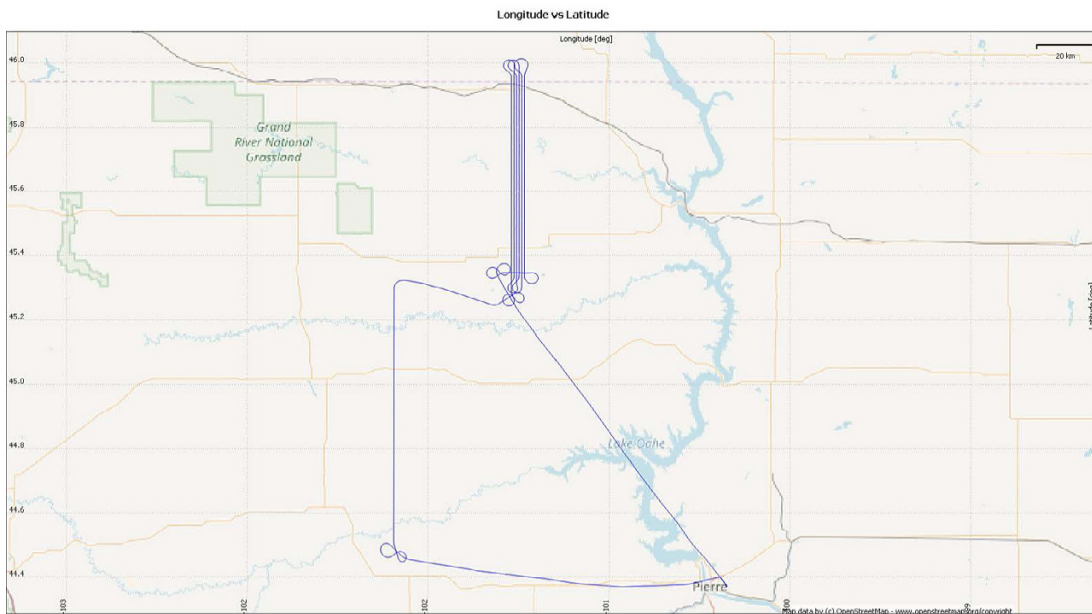
Aircraft Block Time			Mission Plan				Static Alignment		GPS Time	
Engine On 14:33	Ramp Out 14:47	Takeoff 14:51	AGL Height 1300 m	Pulse Rate 800 KHz	Target Speed 160 kts	Scan Rate 237 Hz	Pre Mission	Start 14:42	End 14:47	
Engine Off 20:30	Ramp In 20:22	Landing 20:18	Laser Current 25 %	FOV 60 Deg's			Post Mission	20:22	20:27	
Total 5.9 hrs	Total hrs	Total 5.5 hrs								

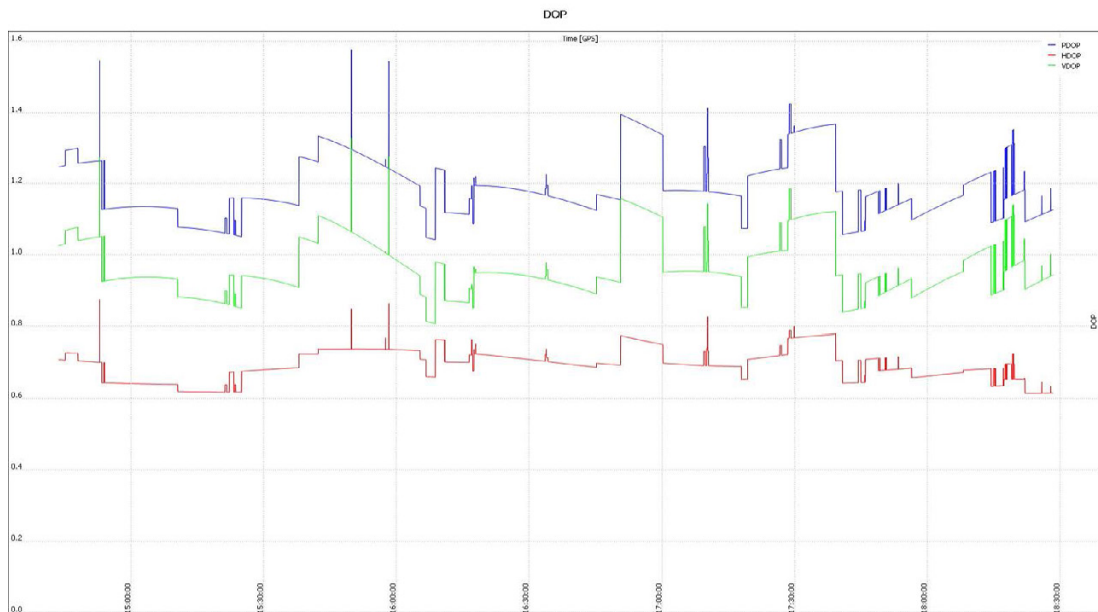
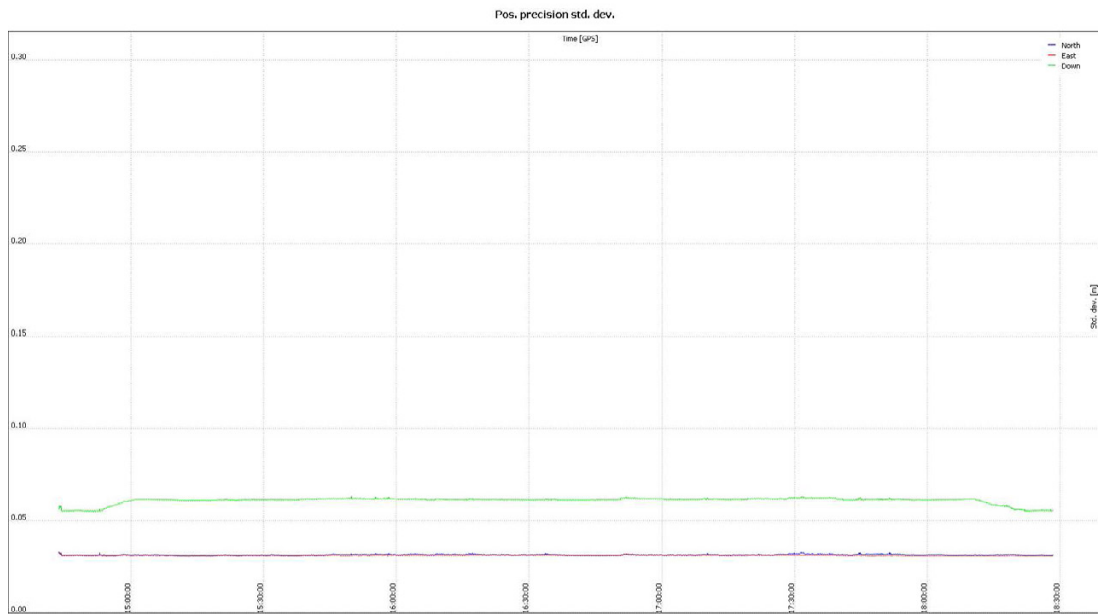
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmil to End		
TEST STRIP		G	N/A	15:00	15:02			171126150028	
PPP 8		G	6100'	15:22	15:27			N/A	
220		360.0°	6100'	15:28	15:43			152849	
221		180.0°	6100'	15:47	16:01			154700	
222		360.0°	6100'	16:05	16:20			160508	
223		180.0°	6100'	16:23	16:37			162331	
224		360.0°	6100'	16:41	16:56			164101	
225		180.0°	6100'	16:59	17:13			165912	
226		360.0°	6000'	17:17	17:32			171719	
227		180.0°	6000'	17:35	17:50			173518	
228		360.0°	6000'	17:53	18:07			175317	
229		180.0°	6000'	18:11	18:25			181114	
230		360.0°	6000'	18:28	18:43			182859	
231		180.0°	6000'	18:46	19:00			184628	
232		360.0°	6000'	19:04	19:18			190409	

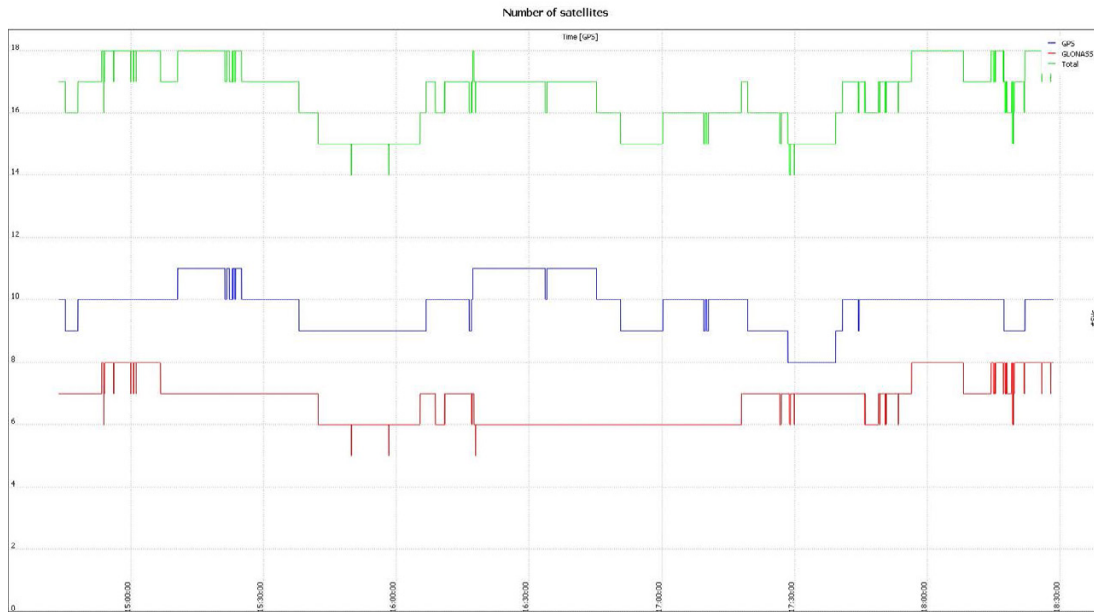
Julian Day	Flight	LIDAR Flight Log									
26	A	Date 26 April 2017		Aircraft PA-31 C-PPRY		System Riegl Q1560		<div style="text-align: right;">  <small>A Clean Harbors Company</small> </div> Additional Notes Temp Humidity Altimeter Terrain Height			
		Project 3126 Dewey Ziebach		Pilot D. Thibault		Unit 2220754					
		Location Gassman Field S.D.		Operator E. Rutledge		IMU Applinix AP80					
Mission Objective						GPS Rx Trimble					
						Scanner 1 Drive A-1					
						Scanner 2 Drive A-2					
Aircraft Block Time			Mission Plan			Static Alignment			GPS Time		
Engine On 19:35	Ramp Out 19:47	Takeoff 19:51	AGL Height 1300	m	Pulse Rate 800	KHz	Pre Mission	14:42	14:47	Post Mission	
Engine Off 20:32	Ramp In 20:42	Landing 20:15	Target Speed 160	kts	Scan Rate 237	Hz	Post Mission				
Total 5.9 hrs	Total hrs	Total 5.5 hrs	Laser Current 25	%	FOV 60	Deg's					
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments		
				Start	End	Time	nmi to End				
223		180.0°	6000'	19:22	19:36			171126192202			
X-TIERS		270 +/-	6000'	19:39	19:43			193907	X-TIERS 233=220		
PPP 8		G	6000'	19:43	19:49			N/A			

Pg 2 of 2

Nov. 27, 2017-A (CFFRY, SN0754)







Flight Log

LIDAR Flight Log

Julian Day 331	Flight A
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Date 27-Nov-2017	Aircraft PA-31 C-FFRY
Project 3125_DeweyZiebach	Pilot D.Thibeault
Location Eschbach PERRÉ S.D	Operator E.Rutledge
Mission Objective	

System Riegl Q1560
Unit 2220754
IMU Applinix AP50
GPS Rx Trimble
Scanner 1 Drive B-1
Scanner 2 Drive B-2

Additional Notes
Temp +4°C
Humidity 69%
Altimeter 999 hPa
Terrain Height 525 m



A Clean Harbors Company

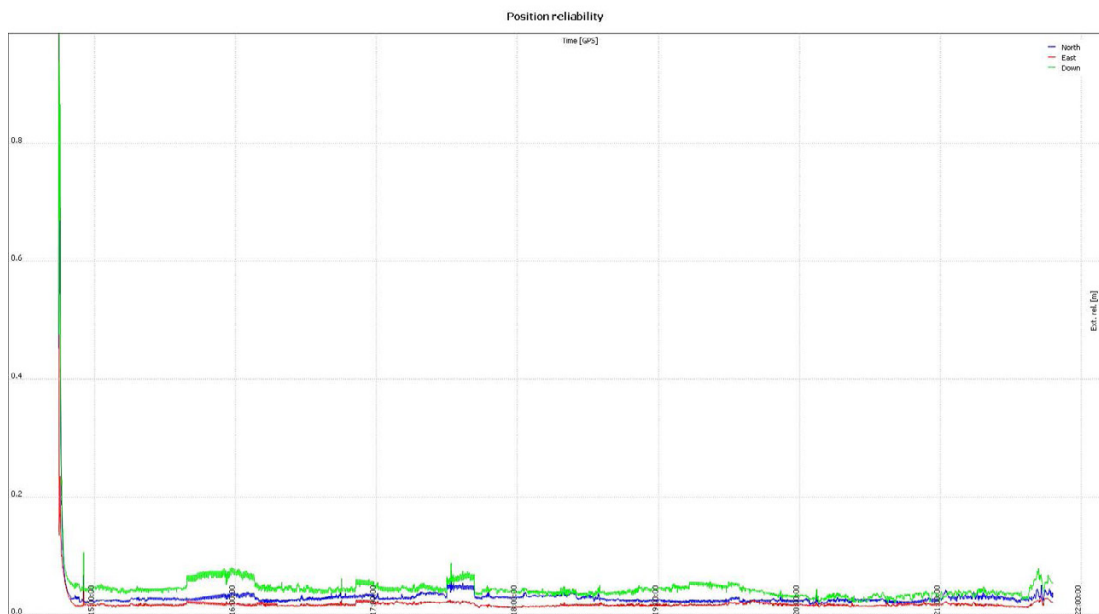
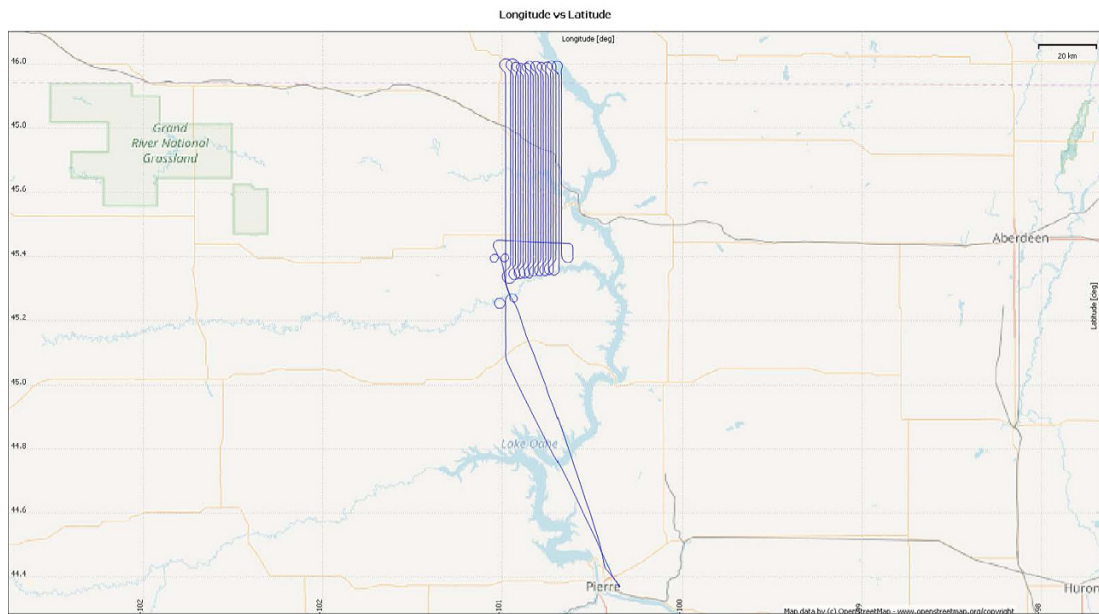
Aircraft Block Time			
Engine On 14:36	Ramp Out 14:48	Takeoff 14:52	
Engine Off 18:30	Ramp In 18:23	Landing 18:19	
Total 3.9 hrs		Total 3.5 hrs	

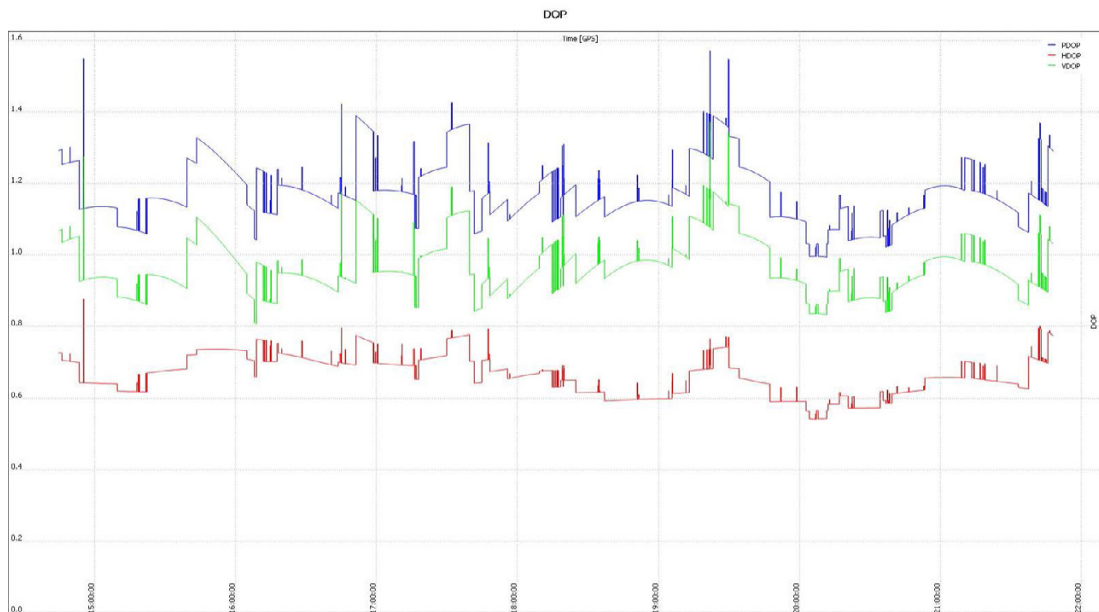
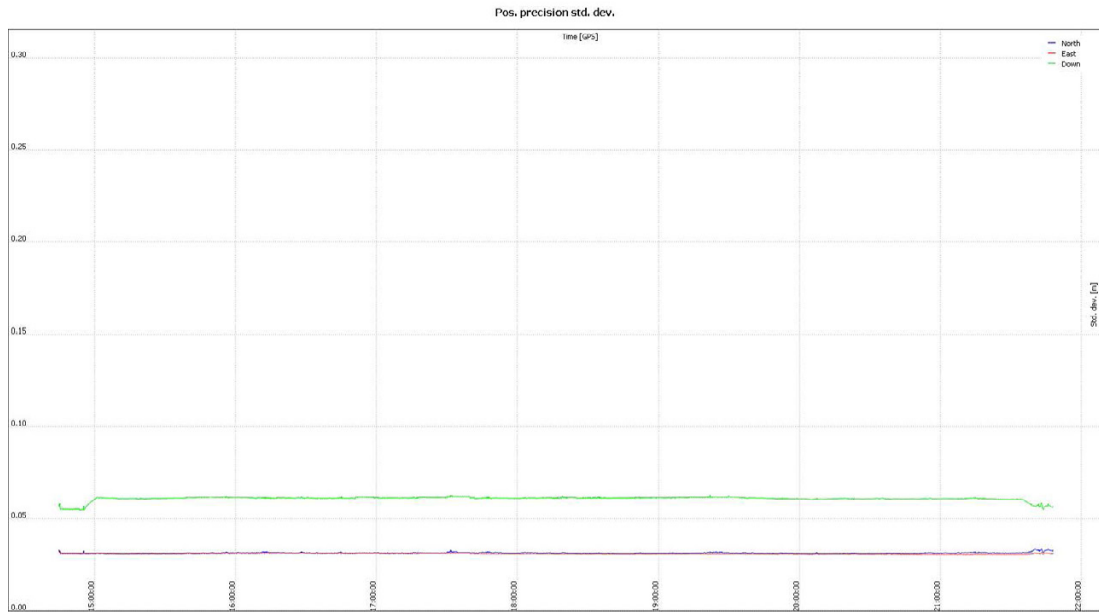
Mission Plan				
AGL Height	1300 m	Pulse Rate	800 KHz	
Target Speed	160 kts	Scan Rate	237 Hz	
Laser Current	25 %	FOV	60 Deg's	

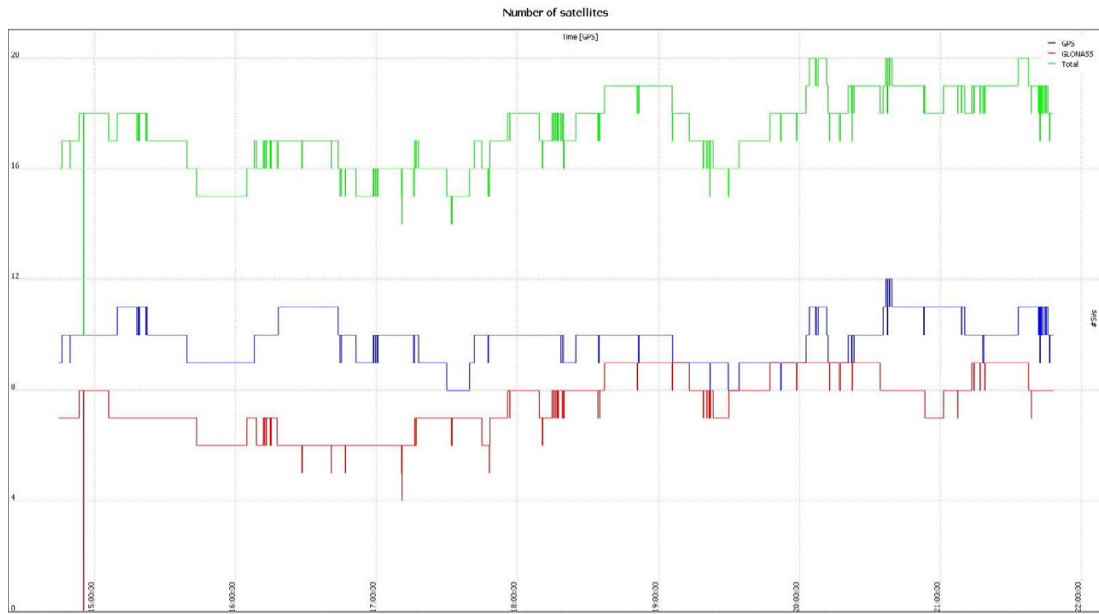
Static Alignment		GPS Time	
Pre Mission	Post Mission	Start	End
14:43	14:48	18:23	18:28

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
TEST STRIP		G	N/A	15:05	15:07			171127_150521	
PPP B		G	6000'	15:20	15:25			N/A	
025		000.1°	6000'	15:27	15:44			152704	RE-FLIGHT FOR
PPP B		G	6000'	15:54	15:59			N/A	5417315 A
234		360.0°	6000'	16:00	16:15			160013	
235		180.0°	6000'	16:18	16:32			161830	
236		360.0°	6000'	16:35	16:50			163542	
237		180.0°	6000'	16:53	17:08			165356	
238		360.0°	6000'	17:11	17:26			171122	
239		180.0°	6000'	17:29	17:43			172945	
X-TIE		270.71-	6000'	17:45	17:48			174547	X-TIE LN'S 239+234
PPP B		G	6000'	17:48	17:53			N/A	

Nov. 27, 2017-A (CFKMA, SN1264)







Flight Log

Julian Day 331 Flight A	
Date <i>Nov 27, 2017</i>	Aircraft PA-31 C-FKMA
Project <i>3125-DeweyZiebach</i>	Pilot <i>M-MeQuarry D. Anderson</i>
Location <i>Pierre SD</i>	Operator B. Eisenbart
Mission Objective	

System Riegl Q1580
Unit 2221264
IMU Applanix AP50
GPS Rx Trimble
Scanner 1 Drive 0
Scanner 2 Drive 1

Additional Notes
Temp 2.8°C
Humidity 79%
Altitude 999.6 m
Terrain Height 525m

AIRBORNE LIDAR SYSTEMS
A Clean Harbors Company

Aircraft Block Time			
Engine On <i>14:39</i>	Ramp Out <i>14:52</i>	Takeoff <i>14:54</i>	
Engine Off <i>21:51</i>	Ramp In <i>21:42</i>	Landing <i>21:40</i>	
Total 7.16 hrs	hrs	Total 6.76 hrs	hrs

Mission Plan			
AGL Height 1300 m	Pulse Rate 800 KHz		
Target Speed 160 kts	Scan Rate 237 Hz		
Laser Current 2550 %	FOV 60 Deg's		

Static Alignment		GPS Time	
Pre Mission	14:44	Start	End
Post Mission	21:42	21:47	21:47

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
<i>Test Strip</i>		<i>NA</i>	<i>NA</i>	<i>15:02</i>	<i>15:02</i>			<i>171127-150221</i>	
<i>PPP-b</i>		<i>↗</i>	<i>5800'</i>	<i>15:17</i>	<i>15:22</i>			<i>NA</i>	<i>∞</i>
273	<i>6417331-01</i>	0°		15:24	15:37			152434	
275	<i>02</i>	180°		15:40	15:53			154047	
276	<i>03</i>	0°		15:57	16:10			155725	
277	<i>04</i>	180°		16:13	16:26			161357	
278	<i>05</i>	0°		16:30	16:43			163002	
279	<i>06</i>	180°		16:45	16:58			164559	
280	<i>07</i>	0°		17:01	17:14			170149	
281	<i>08</i>	180°		17:17	17:29			171722	
282	<i>09</i>	0°		17:33	17:46			173305	
283	<i>10</i>	180°		17:48	18:01			174856	
284	<i>11</i>	0°		18:04	18:17			180440	
285	<i>12</i>	180°		18:20	18:32			182042	
286	<i>13</i>	0°		18:36	18:49			183606	

Pg of

LIDAR Flight Log

Julian Day 331	Flight A
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Date Nov 27, 2017	Aircraft PA-31 C-FKMA
Project 3125_DeweyZiebach	Pilot M. McQuary B. Anderson
Location Pierre SD	Operator B. Eisenbart
Mission Objective	

System Riegl Q1560	Unit 2221264
IMU Applianix AP50	GPS Rx Trimble
Scanner 1 Drive 0	Scanner 2 Drive 1

Additional Notes	Temp 2.8°C
Humidity 79%	Altimeter 999.6 mb
Terrain Height 525 m	



AIRBORNE
LIDAR IMAGING
A Clean Harbors Company

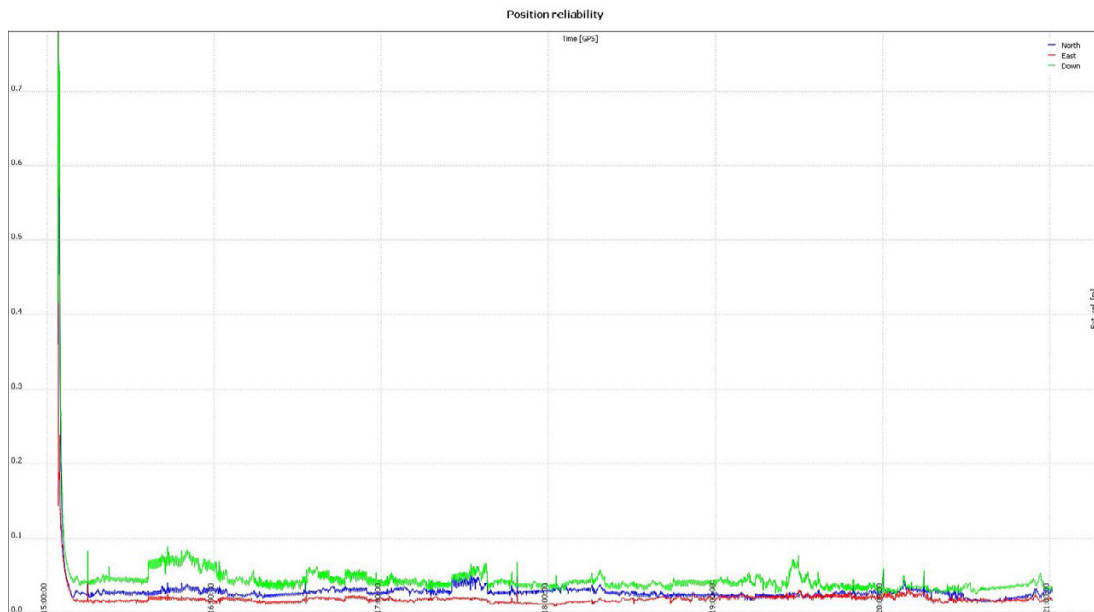
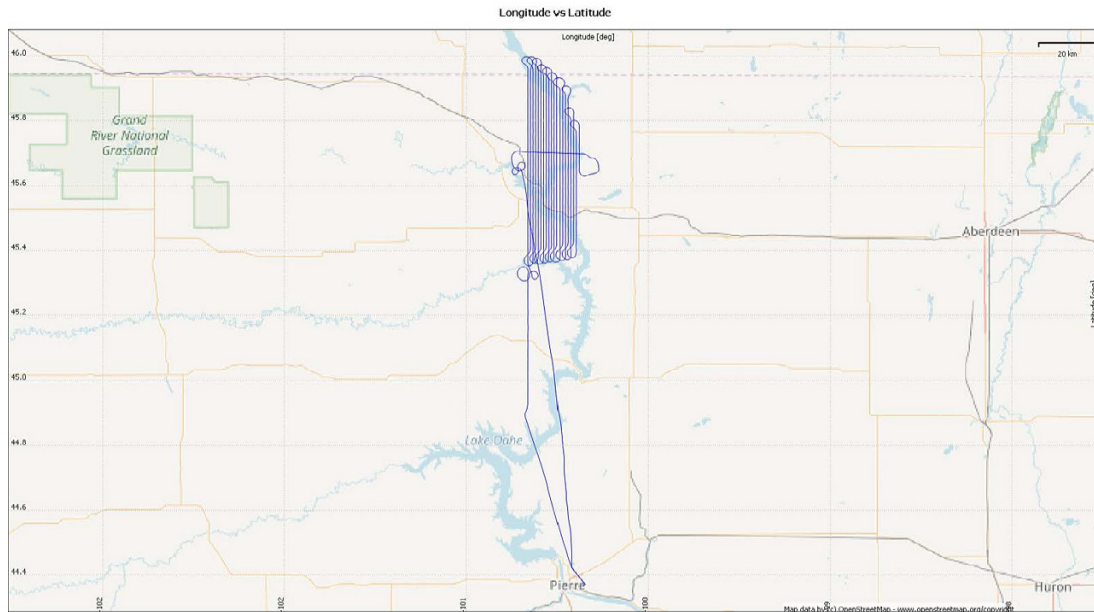
Aircraft Block Time			
Engine On	14:39	Ramp Out	14:52
Engine Off	21:51	Ramp In	21:42
Total	7:16	hrs	6:76
		hrs	hrs

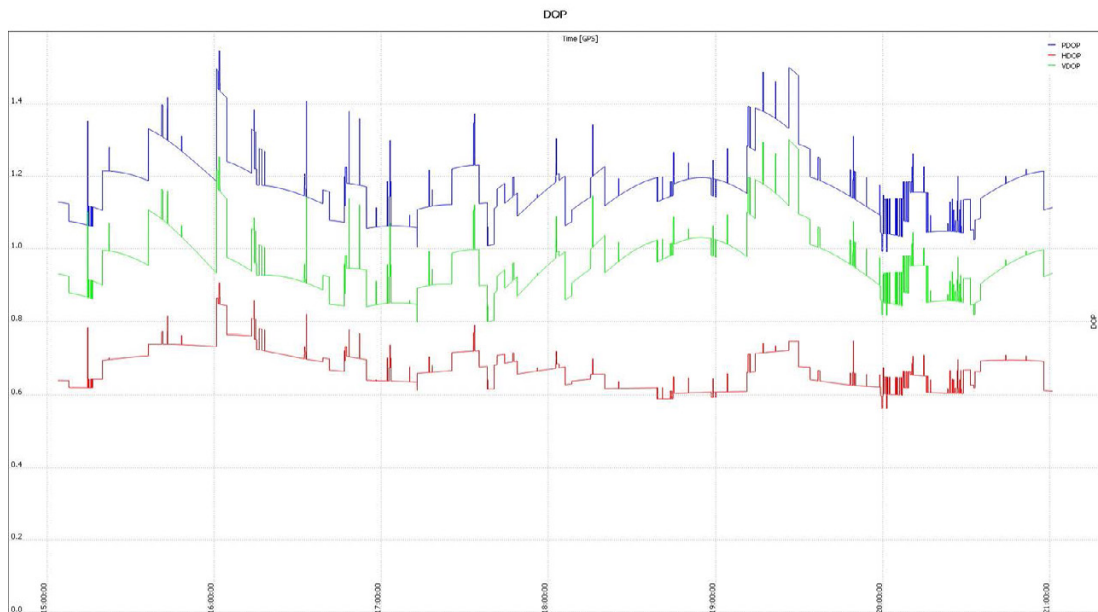
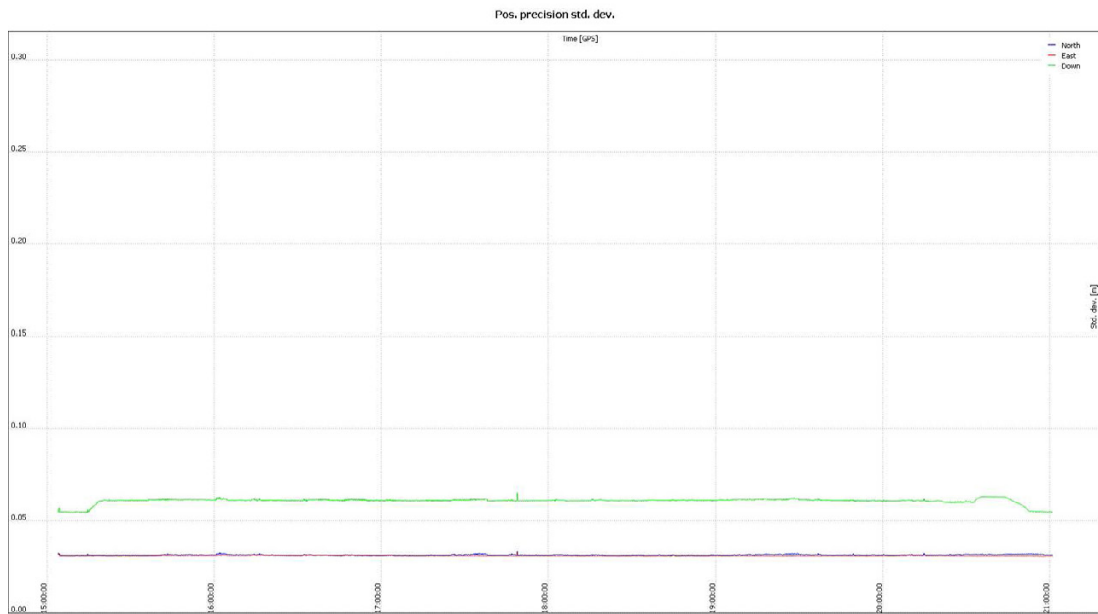
Mission Plan			
AGL Height	1300	m	Pulse Rate
Target Speed	160	mts	Scan Rate
Laser Current	25	%	FOV
			800
			237
			60
			Deg's

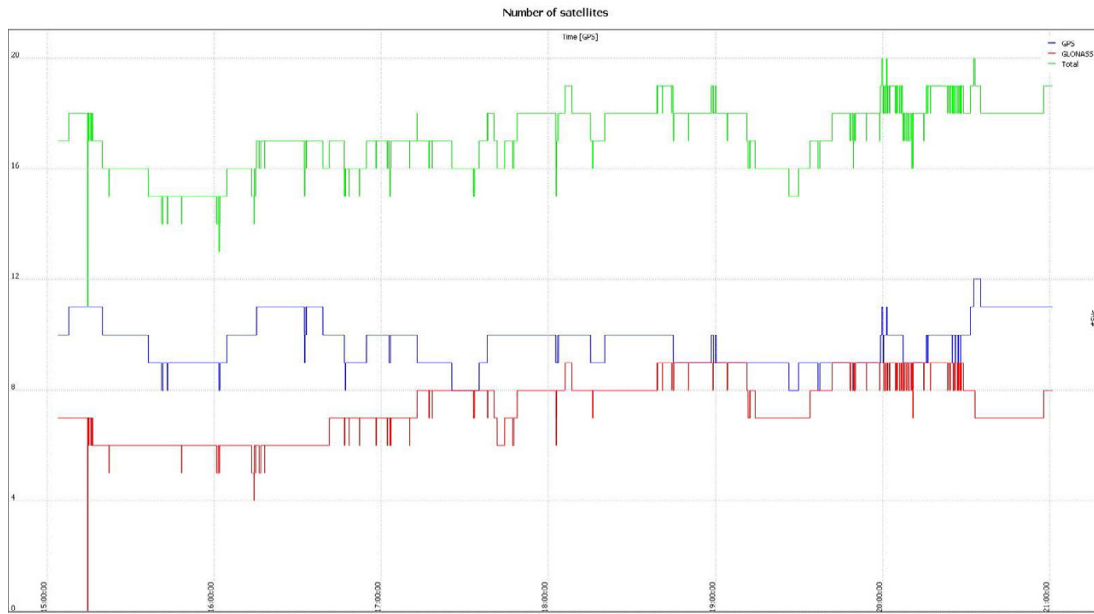
Static Alignment		GPS Time	
Pre Mission	14:44	Start	End
Post Mission	21:42		21:47

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
287	14	180°	5800'	18:51	19:04			17127-185158	
288	15	0°		19:07	19:19			190722	
289	16	180°		19:22	19:34			192245	
290	17	0°		19:38	19:50			193817	
291	18	180°		19:53	20:05			195328	
292	19	0°		20:08	20:21			200848	
293	20	180°		20:24	20:36			202407	
294	21	0°		20:39	20:51			203932	
295	22	180°		20:54	21:06			205430	
X-TIE	23	276°	↓	21:09	21:13			210915	
PPP-8		↗	NA	21:15	21:19			NA	∞

Nov. 28, 2017-A (CFKMA, SN1264)







Flight Log

LIDAR Flight Log

Julian Day 332	Flight A		
Date Nov 28, 2017	Aircraft PA-31 C-FKMA	System Riegl Q1560	Additional Notes Temp 3.1°C Humidity 57% Altimeter 1020.7 m Terrain Height 525 m
Project 3125_DeweyZiebach	Pilot D.Anderson	Unit 2221264	
Location Pierre SD	Operator B.Eisenbart	IMU Applianix AP50	
Mission Objective		GPS Rx Trimble	
		Scanner 1 Drive 0	
		Scanner 2 Drive 1	




Aircraft Block Time				Mission Plan				Static Alignment		GPS Time	
Engine On 14:57	Ramp Out 15:09	Takeoff 15:14		AGL Height 1300 m	Pulse Rate 800 KHz	Pre Mission 15:03	End 15:08	Post Mission 20:55	End 21:00		
Engine Off 21:02	Ramp In 20:53	Landing 20:52		Target Speed 160 kts	Scan Rate 237 Hz						
Total 6 hrs	Total hrs	Total 5.6 hrs		Laser Current 50 %	FOV 60 Deg's						

Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
Test Strip		NA	NA	15:20	15:20			171128-15203Z	
PPP-8	6417332-01	↗	5800'	15:40	15:45			NA	∞
296	02	0°		15:47	16:00			154705	
297	03	180°		16:03	16:14			160305	
298	04	0°		16:18	16:31			16816	
299	05	180°		16:33	16:45			163349	
300	06	0°		16:48	17:01			164847	
301	07	180°		17:04	17:15			170425	
302	08	0°		17:19	17:31			171918	
303	09	180°		17:34	17:45			173416	
304	10	0°		17:48	18:00			174842	
305	11	180°		18:03	18:14			180343	
306	12	0°		18:17	18:29			181745	
307	13	180°		18:32	18:42			183220	
308		0°		18:46				184612	

Pg of

LIDAR Flight Log

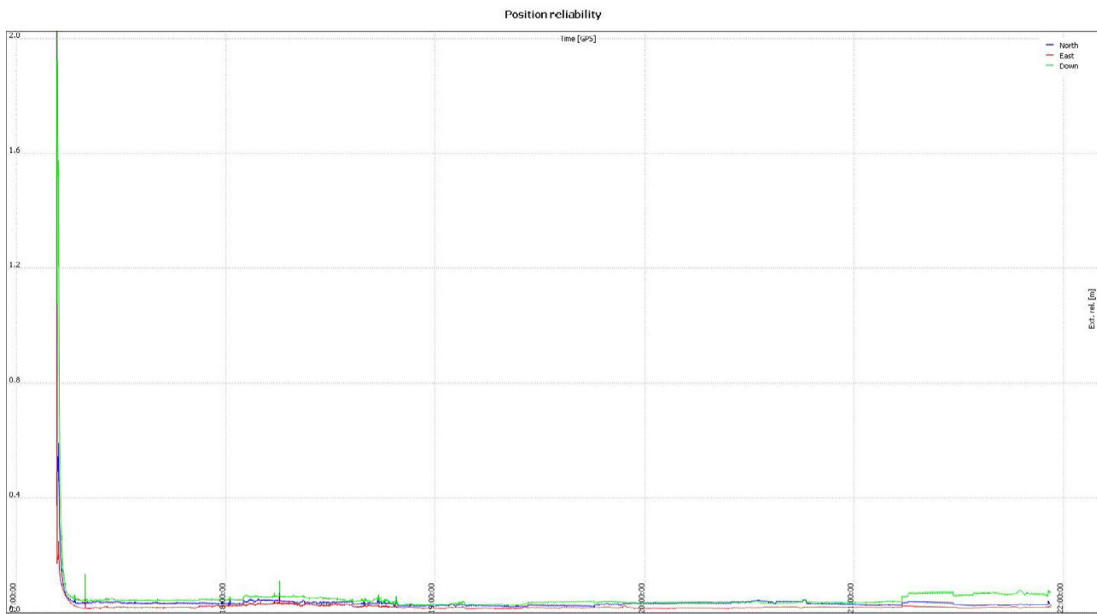
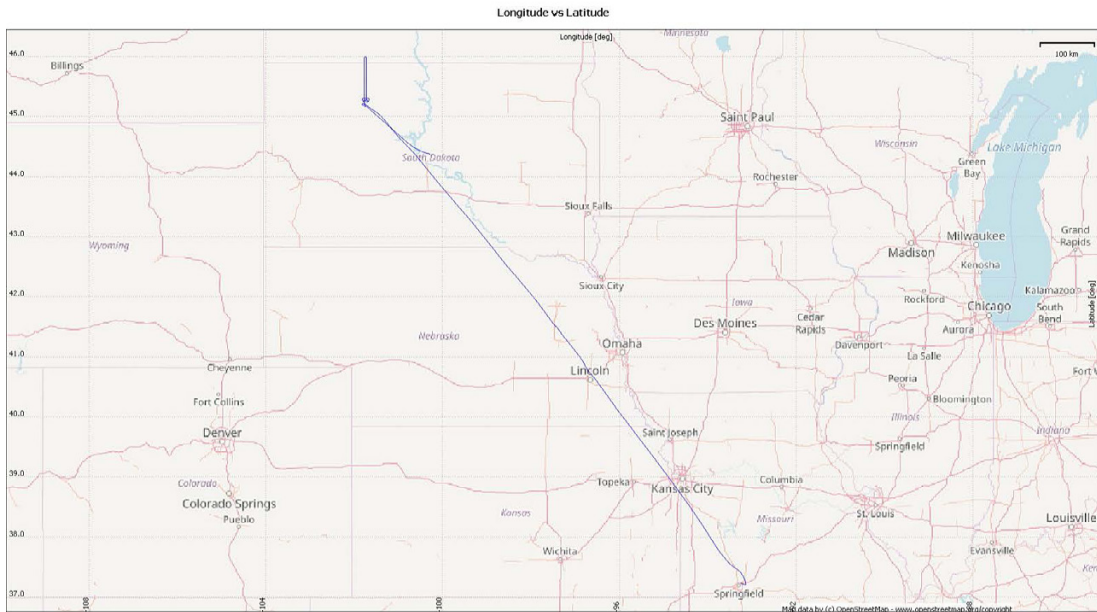
Julian Day 33Z Flight A			
Date Nov 28, 2017	Aircraft PA-31 C-FKMA	AIRBORNE IMAGING A Clean Harbors Company	
Project 3125_DeweyZiebach	Pilot D.Anderson	Additional Notes Temp 3.9°C Humidity 59% Altimeter 1020.7m Terrain Height 525	
Location Pierre SD	Operator B.Eisenbart		
Mission Objective			

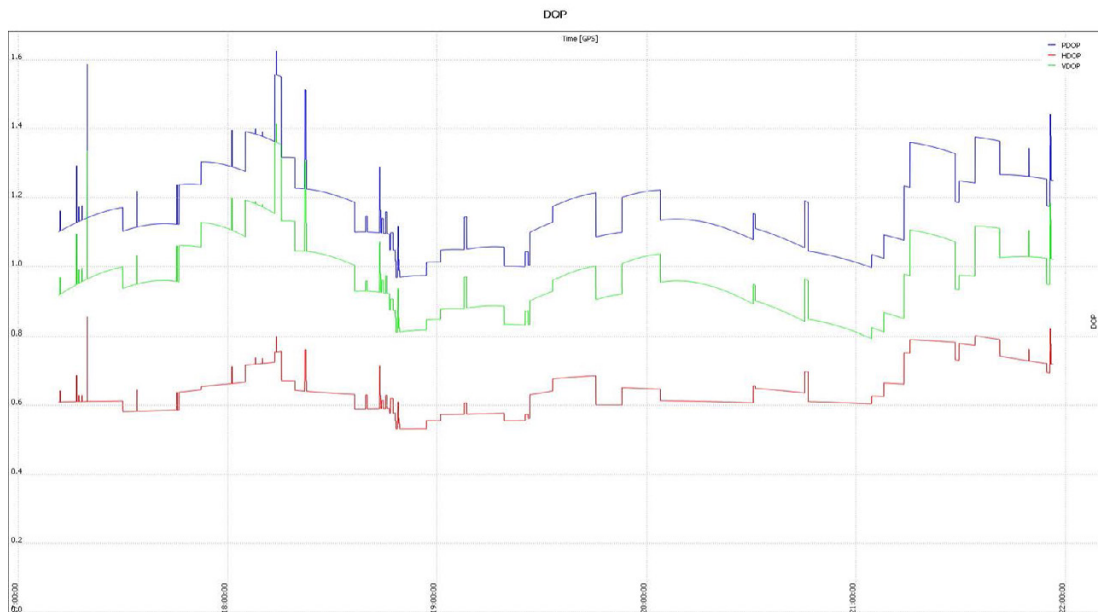
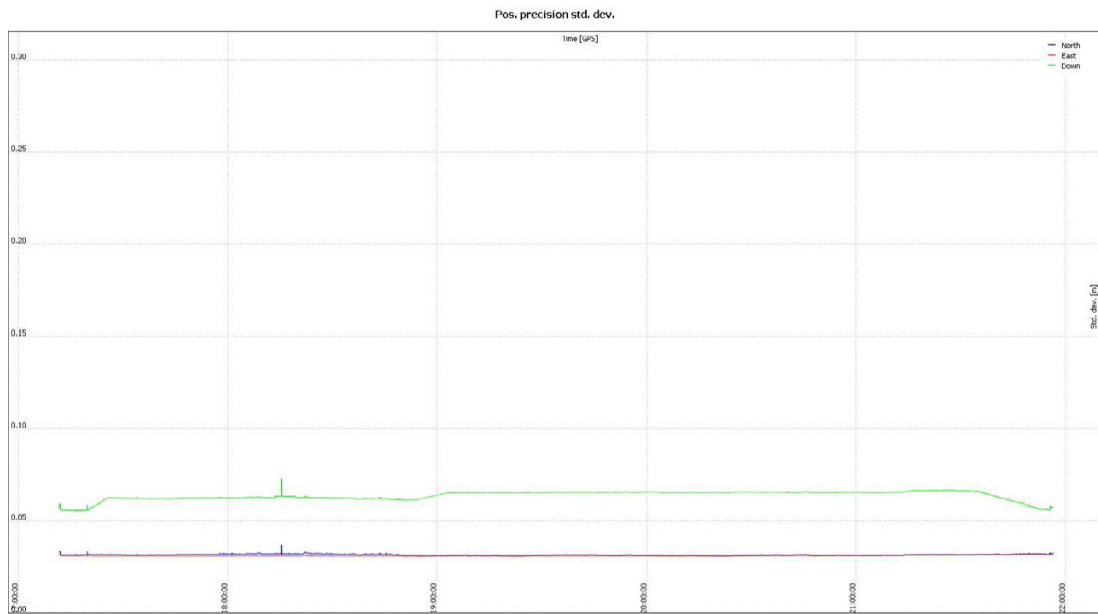
Aircraft Block Time			Mission Plan			GPS Time	
Engine On 14:57	Ramp Out 15:09	Takeoff 15:14	AGL Height 1300 m	Pulse Rate 800 KHz	Static Alignment	Start	End
Engine Off 21:02	Ramp In 20:53	Landing 20:52	Target Speed 160 kts	Scan Rate 237 Hz	Pre Mission	15:03	15:08
Total 6 hrs	Total 5.6 hrs	Total 5.6 hrs	Laser Current 50 %	FOV 60 Deg's	Post Mission	20:55	21:00

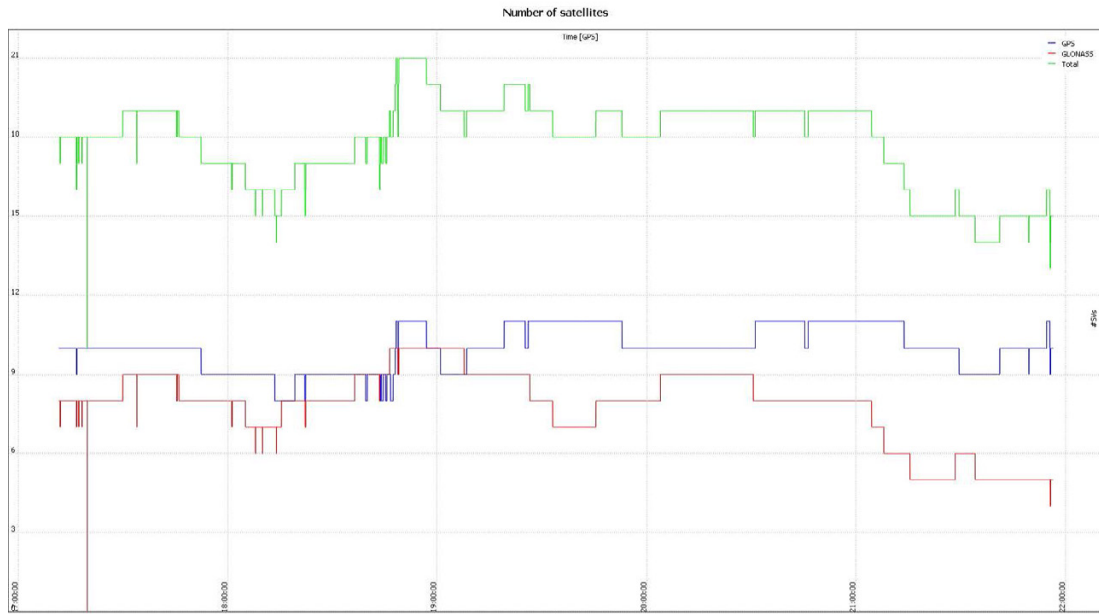
Flight Line	LIDAR File Name	Flight Direction	Flight Altitude	GPS Time		Line Aborted		Mission ID	Comments
				Start	End	Time	nmi to End		
309	6417332-14	180°	58.00'	19:00	19:10			171128-190004	
310	15	0°		19:13	19:23			191322	
311	16	180°		19:27	19:35			192718	moderate turbulence
312	17	0°		19:39	19:47			193908	"
313	18	180°		19:50	19:58			195058	"
314	19	0°		20:01	20:09			200155	"
315	20	180°		20:12	20:14			201213	"
X-TIE	21	275°		20:17	20:22			201750	"
PPP-8		27		20:23	20:27			NA	∞

Pg. of

Dec. 15, 2017-A (CFFRY, SN0754)







Appendix B

Survey Report

CompassData

Geodetic Survey Report

CDI Project Number and Name: 5216 Corson, Dewey, Ziebach Counties
CDI Quote # CDIQ 1200 (Dated 3/20/2017)
CDI POC: Philipp Hummel <phummel@compassdatainc.com>
Location of Survey: Corson, Dewey, Ziebach Counties, South Dakota
Date of Survey: July 2017

Customer: Quantum Spatial
Quantum Spatial POC: Joel Burroughs
Quantum Spatial Project Name: SD_FY17 NRCS LiDAR
Quantum Spatial Purchase Order # 1702
Quantum Spatial Purchase Order: 1702_Burroughs.PDF
Quantum Spatial PO Date: 04/05/2017

Contents

Datum Discussion and Requirements	2
Surveying Methods	2
Post-Processing Procedure	2
LiDAR Check Point Distribution	3

Datum Discussion and Requirements

Horizontal: NAD83(2011), UTM Zone 14, Meters

Vertical: NAVD88 (Geoid12B), Meters

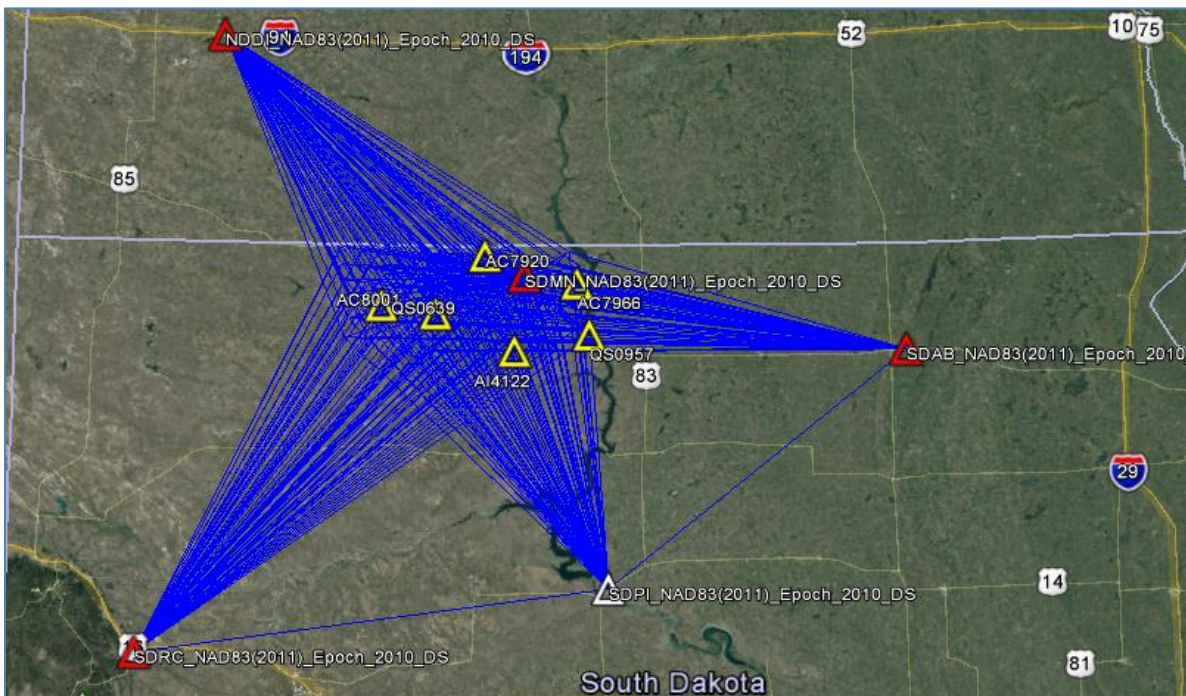
Surveying Methods

The static GPS observations result in the highest accuracy of the coordinates. Static GNSS observations were performed with a minimum of 45 minute collects with a Trimble R10 or Trimble R8 GNSS unit.

Post-Processing Procedure

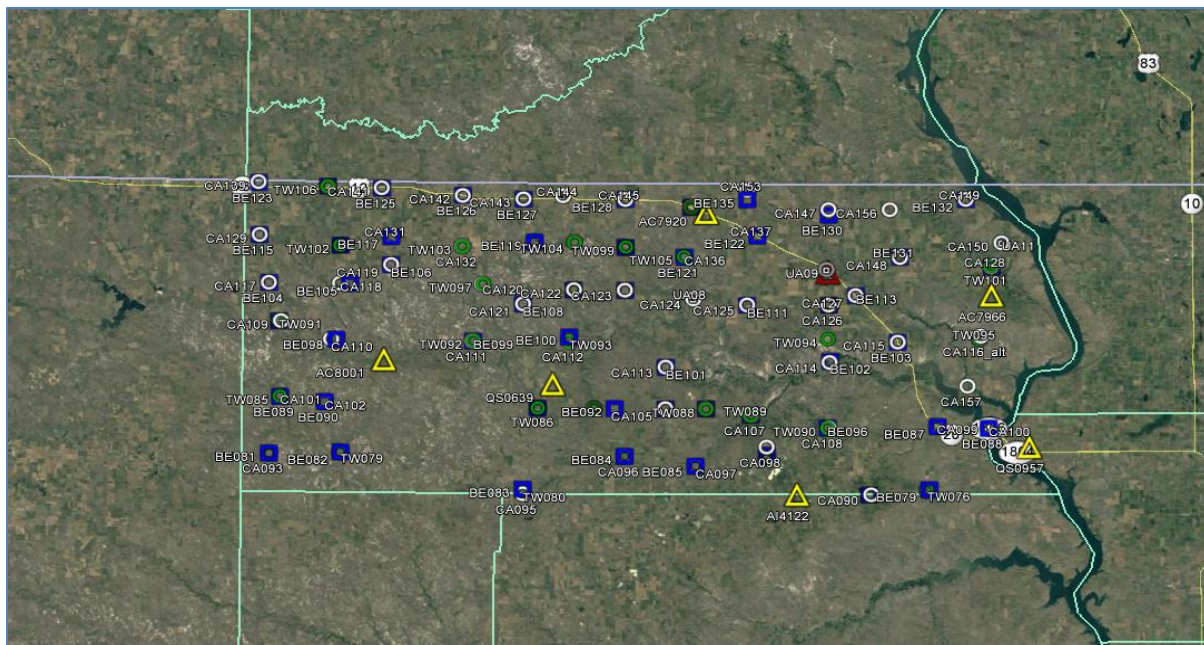
The static data collected in the field was combined with static GPS available from continuously operating base stations by the NGS. Then coordinates for the base stations were established by a network adjustment (Method of the Least Squares). In the following step the real-time observations on the GCPs were added to the fixed base stations; and in the final step the multiple observations on the GCPs were combined to the final coordinates. All processing was done with Trimble Business Center 3.7.

The network below shows the 4 Fixed Base Station (Red Triangles) and the 1 Floating Base Stations (White) in the network adjustment, as well passive NGS monuments used for quality control.



LiDAR Check Point Distribution

- White Circles represent Bare Earth measurements for Calibration
- Blue Squares represent Bare Earth measurements
- Green Circles represent measurements in vegetation like tall weeds
- Yellow Triangles – NGS Monuments





Technical Point of Contact:

Philipp Hummel, PLS, CFedS, CP

Technical Director

303.627.4058 Office

12353 E Easter Avenue

Centennial, Co 80112

www.compassdatainc.com

CompassData[®]

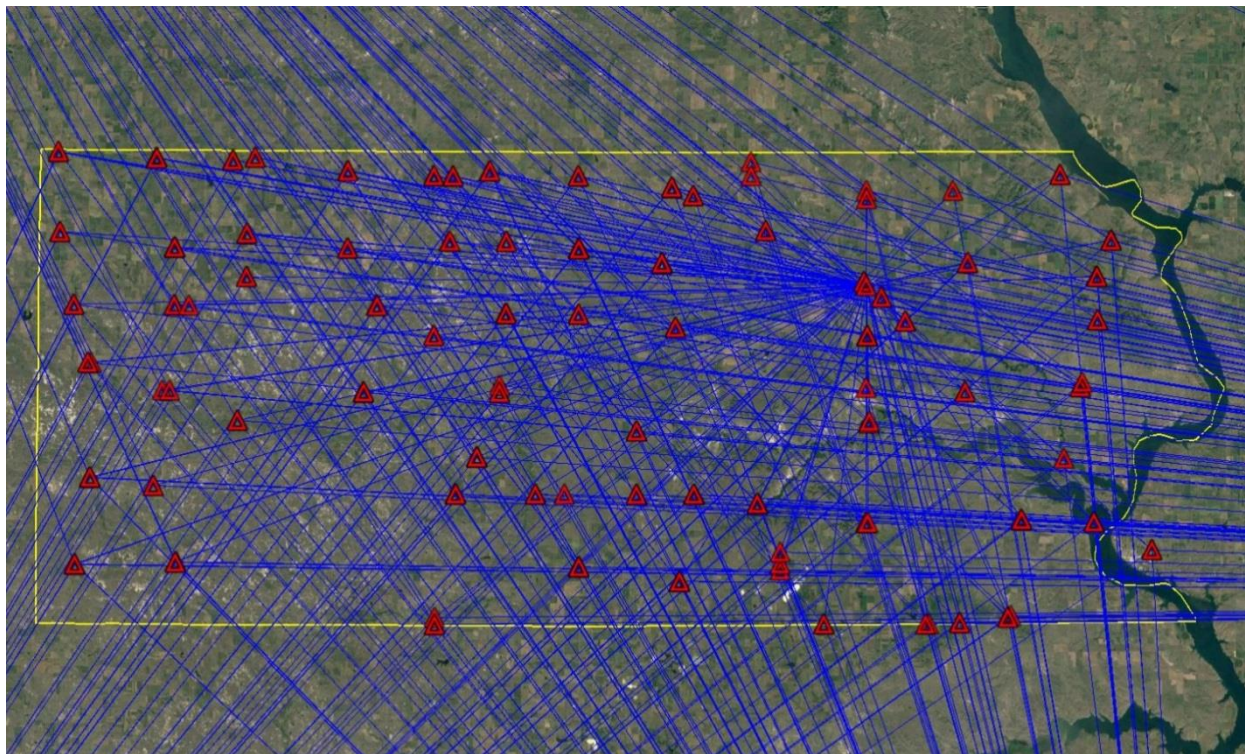
www.compassdatainc.com

Compass Data Inc

7074 S. Revere Parkway
Centennial, Colorado 80112
USA

www.compassdatainc.com
solutions@compassdatainc.com

Project File Data	Coordinate System
Name: 5216_Corson_v11.vce	Name: World wide/UTM
Size: 1 MB	Datum: NAD83(2011)
Modified: 11/8/2017 9:40:29 AM (UTC:-7)	Zone: 14 North
	Geoid: GEOID12B (Conus)



Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.005 m

Centering Error: 0.005 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2
Network Reference Factor: 1.00
Chi Square Test (95%): Passed
Precision Confidence Level: 95%
Degrees of Freedom: 1850

Post Processed Vector Statistics

Reference Factor: 1.00
Redundancy Number: 1850.00
A Priori Scalar: 1.24

Control Coordinate Comparisons

Values shown are control coordinates minus adjusted coordinates.

Point ID	Δ Easting (Meter)	Δ Northing (Meter)	Δ Height (Meter)
SDPI_NAD83(2011)_Epoch_2010_DS	-0.002	-0.006	0.005

Control Point Constraints

Point ID	Type	East σ (Meter)	North σ (Meter)	Height σ (Meter)
NDDI_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDAB_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDMN_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDRC_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
Fixed = 0.000001(Meter)				

Adjusted Grid Coordinates

Point ID	Easting Error (Meter)	Northing Error (Meter)	Elevation Error (Meter)
AC7873	0.008	0.009	0.010
AC7895	0.009	0.010	0.024
AC7920	0.008	0.008	0.009
AC7941	0.010	0.011	0.012
AC7966	0.010	0.011	0.015
AC7971	0.008	0.008	0.015
AC8001	0.008	0.010	0.010
AI4122	0.009	0.009	0.017

BE078	0.010	0.009	0.018
BE079	0.008	0.009	0.014
BE081	0.008	0.009	0.011
BE082	0.008	0.009	0.010
BE083	0.008	0.009	0.016
BE084	0.008	0.009	0.014
BE085	0.008	0.009	0.009
BE086	0.008	0.009	0.009
BE087	0.010	0.011	0.015
BE088	0.008	0.008	0.015
BE089	0.009	0.011	0.011
BE090	0.009	0.010	0.011
BE091	0.008	0.008	0.014
BE092	0.008	0.009	0.020
BE093	0.008	0.008	0.015
BE094	0.008	0.009	0.017
BE095	0.008	0.008	0.014
BE096	0.009	0.011	0.018
BE097	0.008	0.008	0.009
BE098	0.009	0.010	0.010
BE099	0.008	0.008	0.010

BE100	0.010	0.011	0.012
BE101	0.008	0.009	0.020
BE102	0.010	0.011	0.015
BE103	0.008	0.008	0.015
BE104	0.008	0.008	0.010
BE105	0.008	0.008	0.010
BE106	0.009	0.012	0.013
BE108	0.009	0.009	0.011
BE109	0.011	0.012	0.015
BE110	0.008	0.008	0.011
BE111	0.008	0.009	0.011
BE112	0.009	0.009	0.010
BE113	0.009	0.009	0.011
BE114	0.009	0.009	0.025
BE115	0.008	0.008	0.009
BE116	0.008	0.008	0.011
BE117	0.009	0.010	0.010
BE119	0.008	0.009	0.010
BE120	0.008	0.008	0.009
BE121	0.008	0.009	0.009
BE122	0.008	0.009	0.011

BE123	0.008	0.008	0.010
BE124	0.008	0.009	0.011
BE125	0.009	0.009	0.011
BE126	0.008	0.008	0.009
BE127	0.008	0.009	0.011
BE128	0.008	0.008	0.009
BE129	0.008	0.008	0.009
BE130	0.008	0.008	0.011
BE131	0.009	0.009	0.010
BE132	0.008	0.009	0.010
BE135	0.008	0.009	0.009
CA090	0.011	0.011	0.020
CA091	0.008	0.008	0.009
CA093	0.008	0.009	0.012
CA094	0.008	0.009	0.010
CA095	0.009	0.008	0.018
CA096	0.008	0.009	0.015
CA097	0.008	0.009	0.016
CA098	0.008	0.009	0.009
CA099	0.009	0.010	0.013
CA100	0.008	0.008	0.014

CA101	0.010	0.011	0.012
CA102	0.009	0.010	0.011
CA103	0.014	0.016	0.032
CA104	0.008	0.008	0.015
CA105	0.011	0.011	0.013
CA106	0.008	0.009	0.017
CA107	0.009	0.009	0.016
CA108	0.008	0.009	0.015
CA109	0.008	0.009	0.014
CA110	0.009	0.010	0.010
CA111	0.008	0.008	0.010
CA112	0.008	0.009	0.014
CA113	0.010	0.011	0.015
CA114	0.011	0.011	0.016
CA115	0.012	0.012	0.014
CA116	0.009	0.010	0.011
CA116 alt	0.009	0.010	0.022
CA117	0.008	0.008	0.010
CA118	0.008	0.008	0.010
CA119	0.008	0.009	0.011
CA120	0.008	0.010	0.010

CA121	0.009	0.009	0.010
CA122	0.008	0.008	0.016
CA123	0.008	0.008	0.010
CA124	0.008	0.009	0.011
CA125	0.010	0.011	0.034
CA126	0.009	0.009	0.010
CA127	0.008	0.009	0.010
CA128	0.011	0.011	0.014
CA129	0.008	0.008	0.009
CA130	0.008	0.008	0.011
CA131	0.009	0.010	0.010
CA132	0.011	0.012	0.013
CA133	0.008	0.009	0.010
CA134	0.010	0.011	0.012
CA135	0.008	0.008	0.009
CA136	0.008	0.009	0.009
CA137	0.008	0.008	0.010
CA138	0.008	0.008	0.009
CA139	0.008	0.008	0.011
CA140	0.008	0.009	0.010
CA141	0.008	0.008	0.011

CA142	0.008	0.008	0.009
CA143	0.008	0.009	0.011
CA144	0.008	0.009	0.009
CA145	0.008	0.008	0.009
CA146	0.009	0.010	0.010
CA147	0.008	0.008	0.011
CA148	0.009	0.010	0.011
CA149	0.008	0.008	0.010
CA150	0.010	0.010	0.013
CA153	0.008	0.009	0.009
CA156	0.010	0.011	0.013
CA157	0.009	0.009	0.011
Do Not Use BE100	0.008	0.009	0.015
Do Not Use BE102	0.010	0.011	0.012
Do Not Use BE107	0.008	0.009	0.014
Do Not Use BE109	0.010	0.011	0.012
Do Not Use BE118	0.013	0.014	0.021
Do Not Use CA149 Not in Checkin	0.009	0.013	0.014
Do Not Use TW081	0.008	0.008	0.017
Do Not Use TW088	0.008	0.008	0.013
Do Not Use TW088 Short	0.010	0.010	0.016

Do Not Use UA09 Shorter	0.014	0.013	0.016
QC0639 New	0.008	0.008	0.020
QS0639	0.013	0.014	0.017
QS0957	0.009	0.009	0.010
SDPI NAD83(2011) Epoch 2010 DS	0.002	0.002	0.003
TW076	0.008	0.008	0.013
TW078	0.009	0.009	0.010
TW079	0.009	0.009	0.010
TW080	0.008	0.009	0.015
TW081	0.010	0.011	0.014
TW082	0.008	0.008	0.014
TW083	0.008	0.009	0.018
TW084	0.009	0.011	0.011
TW085	0.009	0.009	0.011
TW086	0.008	0.008	0.015
TW087	0.008	0.008	0.015
TW088	0.010	0.010	0.015
TW089	0.010	0.010	0.012
TW090	0.008	0.008	0.016
TW091	0.008	0.008	0.010
TW092	0.008	0.009	0.010

TW093	0.008	0.008	0.014
TW094	0.009	0.010	0.012
TW095	0.008	0.008	0.013
TW096	0.008	0.010	0.010
TW097	0.008	0.008	0.011
TW098	0.008	0.008	0.014
TW099	0.008	0.008	0.009
TW100	0.009	0.010	0.011
TW101	0.009	0.010	0.013
TW102	0.008	0.008	0.010
TW103	0.008	0.008	0.009
TW104	0.010	0.011	0.012
TW105	0.008	0.008	0.010
TW106	0.008	0.008	0.010
TW107	0.008	0.008	0.009
UA08	0.008	0.009	0.011
UA09	0.010	0.010	0.012
UA10	0.008	0.009	0.009
UA11	0.010	0.010	0.013

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
AC7873	0.012	0.010	168°
AC7895	0.013	0.011	149°
AC7920	0.010	0.010	179°
AC7941	0.014	0.013	164°
AC7966	0.013	0.013	5°
AC7971	0.010	0.010	170°
AC8001	0.013	0.010	174°
AI4122	0.012	0.011	167°
BE078	0.012	0.012	125°
BE079	0.011	0.010	179°
BE081	0.011	0.010	1°
BE082	0.011	0.010	178°
BE083	0.012	0.010	175°
BE084	0.011	0.010	150°
BE085	0.011	0.010	168°
BE086	0.011	0.010	2°
BE087	0.014	0.012	167°
BE088	0.011	0.010	159°

BE089	0.015	0.010	147°
BE090	0.012	0.011	162°
BE091	0.010	0.010	10°
BE092	0.011	0.010	149°
BE093	0.011	0.010	127°
BE094	0.011	0.010	160°
BE095	0.011	0.010	160°
BE096	0.013	0.011	166°
BE097	0.011	0.010	2°
BE098	0.012	0.011	20°
BE099	0.010	0.010	8°
BE100	0.013	0.013	174°
BE101	0.011	0.010	152°
BE102	0.013	0.013	6°
BE103	0.010	0.010	7°
BE104	0.010	0.010	169°
BE105	0.010	0.010	177°
BE106	0.015	0.011	162°
BE108	0.012	0.011	173°
BE109	0.015	0.014	176°
BE110	0.010	0.010	168°

BE111	0.011	0.010	7°
BE112	0.011	0.011	5°
BE113	0.012	0.011	174°
BE114	0.012	0.010	142°
BE115	0.010	0.010	17°
BE116	0.010	0.010	174°
BE117	0.012	0.011	24°
BE119	0.011	0.010	180°
BE120	0.010	0.010	168°
BE121	0.011	0.010	174°
BE122	0.011	0.010	171°
BE123	0.010	0.010	161°
BE124	0.012	0.010	152°
BE125	0.011	0.011	10°
BE126	0.010	0.010	170°
BE127	0.011	0.010	166°
BE128	0.010	0.010	16°
BE129	0.011	0.010	164°
BE130	0.010	0.010	168°
BE131	0.012	0.011	172°
BE132	0.011	0.010	9°

BE135	0.011	0.010	175°
CA090	0.014	0.013	152°
CA091	0.010	0.010	7°
CA093	0.011	0.010	176°
CA094	0.012	0.010	176°
CA095	0.011	0.010	124°
CA096	0.011	0.010	144°
CA097	0.012	0.010	169°
CA098	0.011	0.010	179°
CA099	0.012	0.011	178°
CA100	0.010	0.010	164°
CA101	0.015	0.011	148°
CA102	0.012	0.011	160°
CA103	0.020	0.017	166°
CA104	0.011	0.010	142°
CA105	0.014	0.013	146°
CA106	0.011	0.010	157°
CA107	0.011	0.011	134°
CA108	0.011	0.010	175°
CA109	0.011	0.010	178°
CA110	0.012	0.011	23°

CA111	0.010	0.010	7°
CA112	0.011	0.010	155°
CA113	0.013	0.013	173°
CA114	0.014	0.013	107°
CA115	0.015	0.015	148°
CA116	0.012	0.011	161°
CA116_alt	0.013	0.010	164°
CA117	0.010	0.010	171°
CA118	0.011	0.010	8°
CA119	0.012	0.010	158°
CA120	0.013	0.010	168°
CA121	0.011	0.011	173°
CA122	0.011	0.010	164°
CA123	0.010	0.010	171°
CA124	0.011	0.010	159°
CA125	0.014	0.012	162°
CA126	0.011	0.011	16°
CA127	0.011	0.010	177°
CA128	0.014	0.013	143°
CA129	0.010	0.010	9°
CA130	0.010	0.010	177°

CA131	0.012	0.011	22°
CA132	0.015	0.013	39°
CA133	0.011	0.010	180°
CA134	0.013	0.013	6°
CA135	0.010	0.010	167°
CA136	0.011	0.010	172°
CA137	0.010	0.010	179°
CA138	0.011	0.010	162°
CA139	0.010	0.010	169°
CA140	0.011	0.010	154°
CA141	0.011	0.010	145°
CA142	0.010	0.010	176°
CA143	0.011	0.010	165°
CA144	0.011	0.010	19°
CA145	0.010	0.010	17°
CA146	0.012	0.011	164°
CA147	0.010	0.010	171°
CA148	0.012	0.012	15°
CA149	0.011	0.010	8°
CA150	0.013	0.013	5°
CA153	0.011	0.010	177°

CA156	0.014	0.013	161°
CA157	0.011	0.011	6°
Do Not Use BE100	0.011	0.010	156°
Do Not Use BE102	0.013	0.013	179°
Do Not Use BE107	0.012	0.010	166°
Do Not Use BE109	0.014	0.013	179°
Do Not Use BE118	0.018	0.016	161°
Do Not Use CA149 Not in Checkin	0.016	0.011	175°
Do Not Use TW081	0.011	0.010	158°
Do Not Use TW088	0.010	0.010	10°
Do Not Use TW088 Short	0.013	0.012	16°
Do Not Use UA09 Shorter	0.018	0.016	112°
QC0639 New	0.011	0.010	138°
QS0639	0.018	0.016	159°
QS0957	0.012	0.011	167°
SDPI NAD83(2011) Epoch 2010_DS	0.002	0.002	166°
TW076	0.011	0.010	169°
TW078	0.011	0.011	48°
TW079	0.012	0.011	5°
TW080	0.011	0.010	174°
TW081	0.013	0.013	165°

TW082	0.011	0.010	3°
TW083	0.011	0.010	160°
TW084	0.013	0.011	174°
TW085	0.011	0.011	159°
TW086	0.010	0.010	2°
TW087	0.011	0.010	138°
TW088	0.013	0.012	114°
TW089	0.013	0.013	2°
TW090	0.010	0.010	172°
TW091	0.010	0.010	8°
TW092	0.011	0.010	179°
TW093	0.010	0.010	152°
TW094	0.013	0.011	155°
TW095	0.010	0.010	9°
TW096	0.012	0.010	171°
TW097	0.010	0.010	177°
TW098	0.010	0.010	160°
TW099	0.010	0.010	16°
TW100	0.012	0.011	156°
TW101	0.012	0.011	161°
TW102	0.010	0.010	11°

TW103	0.010	0.010	9°
TW104	0.014	0.013	5°
TW105	0.010	0.010	3°
TW106	0.010	0.010	6°
TW107	0.010	0.010	167°
UA08	0.011	0.010	160°
UA09	0.013	0.011	129°
UA10	0.011	0.010	23°
UA11	0.013	0.013	1°

CompassData

Geodetic Survey Report

CDI Project Number and Name: 5216 Corson, Dewey, Ziebach Counties
CDI Quote # CDIQ 1200 (Dated 3/20/2017)
CDI POC: Philipp Hummel <phummel@compassdatainc.com>
Location of Survey: Corson, Dewey, Ziebach Counties, South Dakota
Date of Survey: September 2017

Customer: Quantum Spatial
Quantum Spatial POC: Joel Burroughs
Quantum Spatial Project Name: SD_FY17 NRCS LiDAR
Quantum Spatial Purchase Order # 1702
Quantum Spatial Purchase Order: 1702_Burroughs.PDF
Quantum Spatial PO Date: 04/05/2017

Contents

Datum Discussion and Requirements	2
Surveying Methods	2
Post-Processing Procedure	2
LiDAR QA Point Distribution.....	3

Datum Discussion and Requirements

Horizontal: NAD83(2011), UTM Zone 14, Meters

Vertical: NAVD88 (Geoid12B), Meters

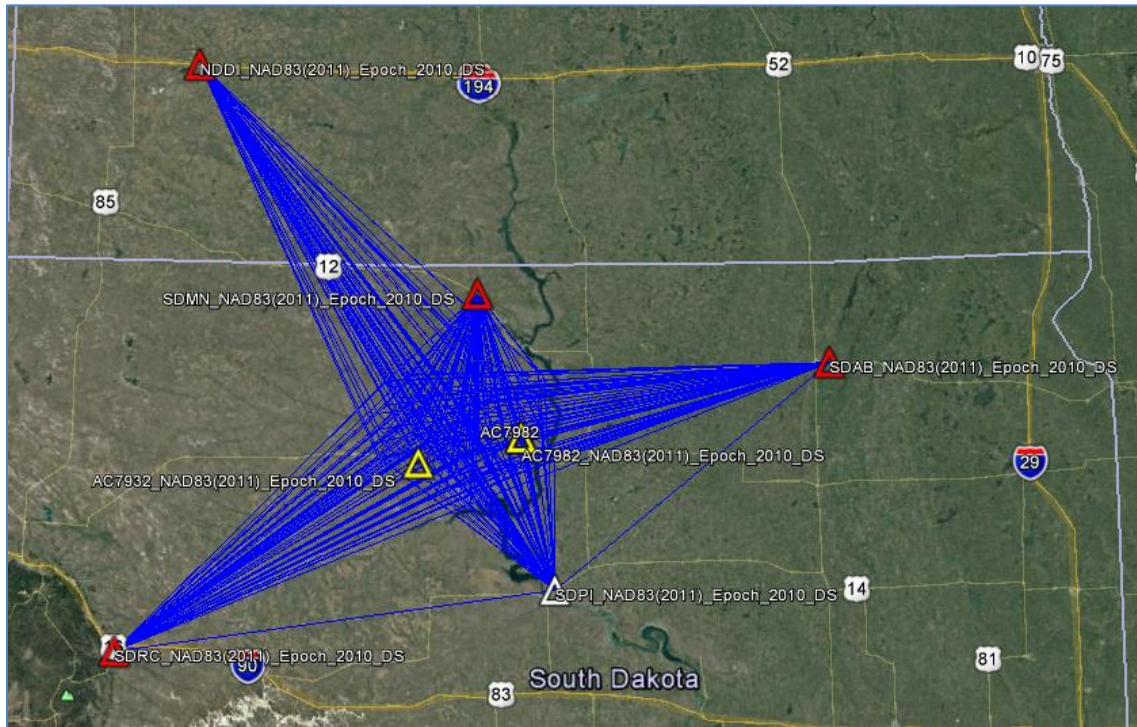
Surveying Methods

The static GPS observations result in the highest accuracy of the coordinates. Static GNSS observations were performed with a minimum of 45 minute collects with a Trimble R10 or Trimble R8 GNSS unit.

Post-Processing Procedure

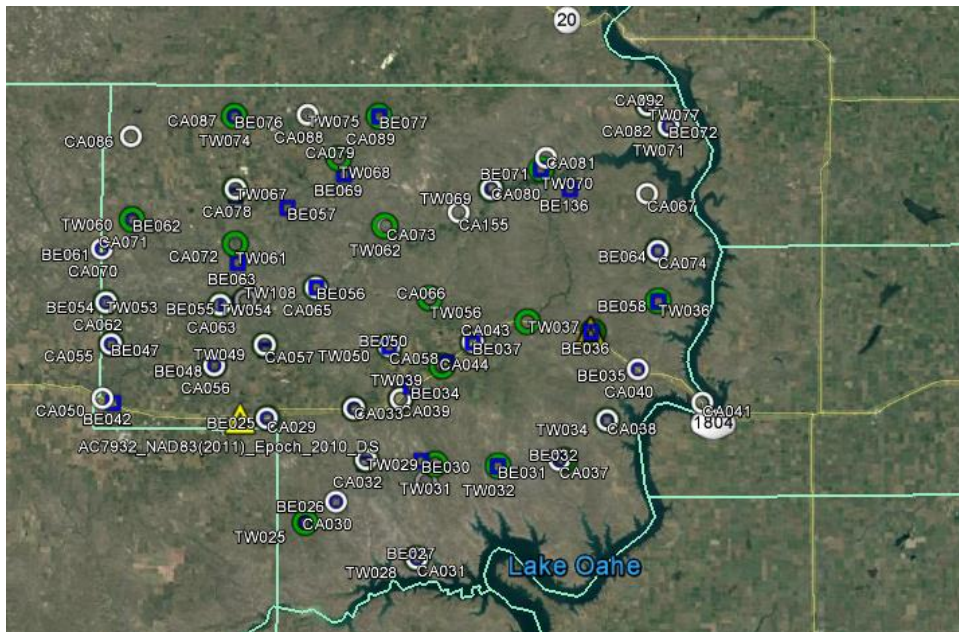
The static data collected in the field was combined with static GPS available from continuously operating base stations by the NGS. Then coordinates for the base stations were established by a network adjustment (Method of the Least Squares). In the following step the real-time observations on the GCPs were added to the fixed base stations; and in the final step the multiple observations on the GCPs were combined to the final coordinates. All processing was done with Trimble Business Center 3.7.

The network below shows the 4 Fixed Base Station (Red Triangles) and the 1 Floating Base Stations (White) in the network adjustment, as well passive NGS monuments used for quality control.



LiDAR QA Point Distribution

- White Circles represent Bare Earth measurements for Calibration
- Blue Squares represent Bare Earth measurements
- Green Circles represent measurements in vegetation like tall weeds
- Yellow Triangles – NGS Monuments





Technical Point of Contact:

Philipp Hummel, PLS, CFedS, CP

Technical Director

303.627.4058 Office

12353 E Easter Avenue

Centennial, Co 80112

www.compassdatainc.com



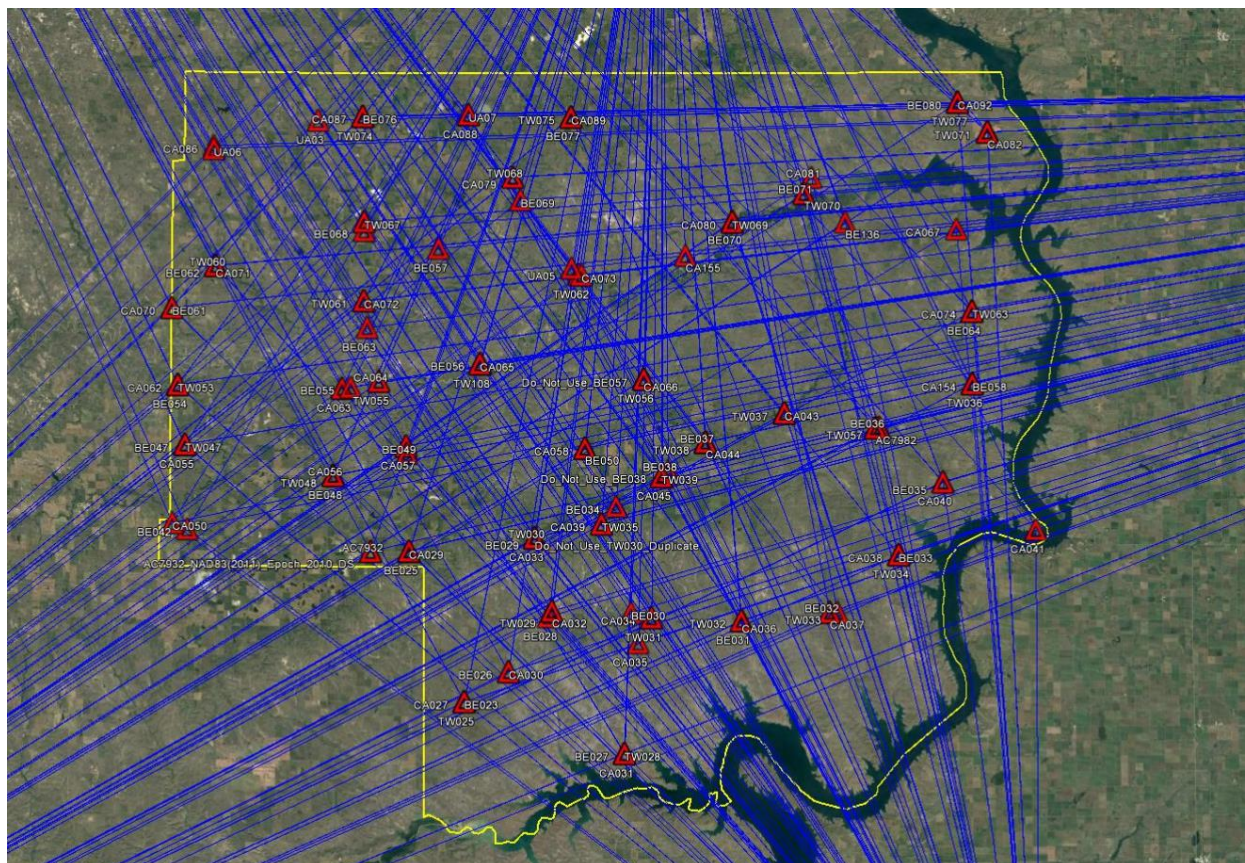
www.compassdatainc.com

Compass Data Inc

7074 S. Revere Parkway
Centennial, Colorado 80112
USA

www.compassdatainc.com
solutions@compassdatainc.com

Project File Data	Coordinate System
Name: 5216_Dewey_v8.vce	Name: World wide/UTM
Size: 954 KB	Datum: NAD83(2011)
Modified: 11/8/2017 2:11:24 PM (UTC:-7)	Zone: 14 North
	Geoid: GEOID12B (Conus)



Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.005 m

Centering Error: 0.005 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2
Network Reference Factor: 1.00
Chi Square Test (95%): Passed
Precision Confidence Level: 95%
Degrees of Freedom: 1445

Post Processed Vector Statistics

Reference Factor: 1.00
Redundancy Number: 1445.00
A Priori Scalar: 1.08

Control Coordinate Comparisons

Values shown are control coordinates minus adjusted coordinates.

Point ID	Δ Easting (Meter)	Δ Northing (Meter)	Δ Height (Meter)
SDPI_NAD83(2011)_Epoch_2010_DS	-0.001	-0.005	0.013

Control Point Constraints

Point ID	Type	East σ (Meter)	North σ (Meter)	Height σ (Meter)
NDDI_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDAB_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDMN_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDRC_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
Fixed = 0.000001(Meter)				

Adjusted Grid Coordinates

Point ID	Easting Error (Meter)	Northing Error (Meter)	Elevation Error (Meter)
AC7932	0.008	0.008	0.009
AC7982	0.009	0.010	0.011
BE023	0.007	0.007	0.013
BE025	0.008	0.008	0.009
BE026	0.008	0.008	0.014
BE027	0.007	0.007	0.009
BE028	0.008	0.008	0.015
BE029	0.007	0.007	0.013

BE030	0.007	0.007	0.012
BE031	0.008	0.009	0.015
BE032	0.007	0.007	0.013
BE033	0.008	0.008	0.011
BE034	0.007	0.007	0.010
BE035	0.009	0.009	0.010
BE036	0.011	0.011	0.014
BE037	0.005	0.005	0.006
BE038	0.008	0.008	0.009
BE042	0.007	0.008	0.015
BE047	0.009	0.009	0.011
BE048	0.007	0.007	0.008
BE049	0.007	0.007	0.014
BE050	0.008	0.008	0.017
BE054	0.007	0.007	0.012
BE055	0.010	0.012	0.028
BE056	0.007	0.007	0.015
BE057	0.007	0.007	0.008
BE058	0.009	0.010	0.013
BE061	0.007	0.008	0.013
BE062	0.007	0.007	0.012

BE063	0.007	0.007	0.012
BE064	0.008	0.008	0.009
BE068	0.007	0.008	0.010
BE069	0.008	0.008	0.009
BE070	0.007	0.007	0.008
BE071	0.008	0.009	0.010
BE072	0.009	0.009	0.012
BE076	0.006	0.007	0.009
BE077	0.007	0.008	0.008
BE080	0.008	0.008	0.009
BE136	0.005	0.006	0.007
CA027	0.007	0.008	0.013
CA029	0.007	0.008	0.014
CA030	0.007	0.007	0.013
CA031	0.008	0.008	0.009
CA032	0.007	0.007	0.013
CA033	0.007	0.008	0.019
CA034	0.007	0.007	0.011
CA035	0.009	0.009	0.010
CA036	0.008	0.009	0.016
CA037	0.007	0.007	0.013

CA038	0.008	0.008	0.010
CA039	0.007	0.008	0.013
CA040	0.009	0.009	0.011
CA041	0.008	0.008	0.010
CA042	0.009	0.010	0.011
CA043	0.008	0.008	0.009
CA044	0.007	0.007	0.008
CA045	0.008	0.009	0.017
CA050	0.007	0.008	0.014
CA055	0.007	0.007	0.016
CA056	0.008	0.008	0.018
CA057	0.007	0.007	0.014
CA058	0.008	0.008	0.016
CA062	0.007	0.007	0.012
CA063	0.009	0.012	0.017
CA064	0.008	0.008	0.009
CA065	0.007	0.007	0.014
CA066	0.009	0.010	0.011
CA067	0.008	0.009	0.010
CA070	0.009	0.009	0.010
CA071	0.007	0.007	0.013

CA072	0.007	0.007	0.009
CA073	0.007	0.007	0.012
CA074	0.008	0.008	0.010
CA078	0.007	0.007	0.008
CA079	0.007	0.007	0.009
CA080	0.007	0.007	0.008
CA081	0.007	0.008	0.008
CA082	0.008	0.008	0.010
CA086	0.007	0.007	0.008
CA087	0.007	0.007	0.008
CA088	0.007	0.008	0.008
CA089	0.007	0.008	0.008
CA092	0.007	0.008	0.009
CA154	0.008	0.009	0.012
CA155	0.007	0.008	0.013
Do Not Use BE038	0.008	0.008	0.015
Do Not Use BE057	0.008	0.008	0.009
Do Not Use CA044 Poor Feature	0.007	0.007	0.008
Do Not Use TW030 Duplicate	0.007	0.008	0.013
Do Not Use UA03 Poor placement	0.009	0.009	0.011
SDPI NAD83(2011) Epoch 2010 DS	0.002	0.002	0.003

TW025	0.007	0.007	0.014
TW027	0.008	0.008	0.010
TW028	0.008	0.008	0.009
TW029	0.007	0.007	0.019
TW030	0.007	0.007	0.018
TW031	0.007	0.007	0.011
TW032	0.007	0.008	0.014
TW033	0.007	0.007	0.012
TW034	0.009	0.009	0.010
TW035	0.007	0.007	0.016
TW036	0.008	0.009	0.010
TW037	0.008	0.008	0.009
TW038	0.007	0.008	0.013
TW039	0.007	0.008	0.014
TW047	0.007	0.007	0.013
TW048	0.007	0.008	0.009
TW049	0.007	0.007	0.016
TW050	0.007	0.008	0.013
TW053	0.013	0.013	0.020
TW054	0.010	0.012	0.031
TW055	0.007	0.007	0.011

TW056	0.005	0.005	0.007
TW057	0.009	0.011	0.012
TW060	0.009	0.010	0.020
TW061	0.007	0.007	0.010
TW062	0.007	0.007	0.012
TW063	0.010	0.010	0.011
TW067	0.007	0.007	0.008
TW068	0.007	0.007	0.009
TW069	0.008	0.008	0.009
TW070	0.007	0.008	0.009
TW071	0.008	0.008	0.009
TW074	0.006	0.007	0.007
TW075	0.005	0.006	0.006
TW077	0.007	0.007	0.008
TW108	0.007	0.007	0.014
UA03	0.007	0.008	0.008
UA05	0.007	0.008	0.014
UA06	0.007	0.007	0.008
UA07	0.007	0.008	0.008

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
AC7932	0.010	0.010	156°
AC7982	0.012	0.011	172°
BE023	0.009	0.009	173°
BE025	0.010	0.010	176°
BE026	0.010	0.010	10°
BE027	0.009	0.009	174°
BE028	0.010	0.009	145°
BE029	0.009	0.009	152°
BE030	0.009	0.009	169°
BE031	0.011	0.010	158°
BE032	0.009	0.009	164°
BE033	0.011	0.010	161°
BE034	0.009	0.009	177°
BE035	0.012	0.011	10°
BE036	0.014	0.013	179°
BE037	0.007	0.006	22°
BE038	0.010	0.010	2°
BE042	0.009	0.009	169°

BE047	0.011	0.011	160°
BE048	0.009	0.009	14°
BE049	0.009	0.009	157°
BE050	0.010	0.010	26°
BE054	0.009	0.009	28°
BE055	0.015	0.012	6°
BE056	0.009	0.009	155°
BE057	0.009	0.009	27°
BE058	0.012	0.011	176°
BE061	0.010	0.009	171°
BE062	0.009	0.009	17°
BE063	0.009	0.009	175°
BE064	0.010	0.010	9°
BE068	0.010	0.009	157°
BE069	0.011	0.010	160°
BE070	0.009	0.009	6°
BE071	0.011	0.010	175°
BE072	0.012	0.011	136°
BE076	0.008	0.008	172°
BE077	0.010	0.009	23°
BE080	0.010	0.010	172°

BE136	0.007	0.006	22°
CA027	0.009	0.009	174°
CA029	0.010	0.009	172°
CA030	0.009	0.009	33°
CA031	0.010	0.010	176°
CA032	0.009	0.009	157°
CA033	0.010	0.009	147°
CA034	0.009	0.009	8°
CA035	0.012	0.011	169°
CA036	0.011	0.010	158°
CA037	0.009	0.009	165°
CA038	0.010	0.010	166°
CA039	0.010	0.009	152°
CA040	0.012	0.011	14°
CA041	0.010	0.010	130°
CA042	0.012	0.011	178°
CA043	0.010	0.010	25°
CA044	0.009	0.009	164°
CA045	0.011	0.010	158°
CA050	0.009	0.009	174°
CA055	0.009	0.009	150°

CA056	0.010	0.010	21°
CA057	0.009	0.009	164°
CA058	0.010	0.010	179°
CA062	0.009	0.009	40°
CA063	0.015	0.011	174°
CA064	0.010	0.010	7°
CA065	0.009	0.009	144°
CA066	0.013	0.011	18°
CA067	0.011	0.010	151°
CA070	0.012	0.011	168°
CA071	0.009	0.009	25°
CA072	0.009	0.009	163°
CA073	0.009	0.009	173°
CA074	0.010	0.010	22°
CA078	0.009	0.009	176°
CA079	0.009	0.009	151°
CA080	0.009	0.009	168°
CA081	0.010	0.009	25°
CA082	0.010	0.010	160°
CA086	0.009	0.009	8°
CA087	0.009	0.009	6°

CA088	0.009	0.009	165°
CA089	0.010	0.009	24°
CA092	0.009	0.009	172°
CA154	0.011	0.010	4°
CA155	0.009	0.009	169°
Do Not Use BE038	0.011	0.010	164°
Do Not Use BE057	0.011	0.010	19°
Do Not Use CA044 Poor Feature	0.009	0.009	28°
Do Not Use TW030 Duplicate	0.010	0.009	151°
Do Not Use UA03 Poor placement	0.012	0.011	33°
SDPI NAD83(2011) Epoch 2010 DS	0.002	0.002	168°
TW025	0.009	0.009	157°
TW027	0.010	0.010	156°
TW028	0.010	0.010	172°
TW029	0.009	0.009	160°
TW030	0.009	0.009	158°
TW031	0.009	0.009	10°
TW032	0.010	0.009	179°
TW033	0.009	0.009	7°
TW034	0.012	0.011	172°
TW035	0.009	0.009	162°

TW036	0.012	0.010	172°
TW037	0.010	0.010	6°
TW038	0.010	0.009	3°
TW039	0.010	0.009	172°
TW047	0.009	0.009	158°
TW048	0.010	0.009	168°
TW049	0.009	0.009	160°
TW050	0.010	0.009	170°
TW053	0.020	0.012	138°
TW054	0.015	0.012	164°
TW055	0.009	0.009	15°
TW056	0.007	0.007	15°
TW057	0.013	0.011	177°
TW060	0.013	0.011	158°
TW061	0.009	0.009	159°
TW062	0.009	0.009	16°
TW063	0.013	0.012	157°
TW067	0.009	0.009	4°
TW068	0.009	0.009	155°
TW069	0.010	0.010	170°
TW070	0.010	0.009	174°

TW071	0.010	0.010	172°
TW074	0.008	0.008	167°
TW075	0.008	0.007	10°
TW077	0.009	0.009	167°
TW108	0.009	0.009	164°
UA03	0.010	0.009	172°
UA05	0.010	0.009	173°
UA06	0.009	0.009	179°
UA07	0.010	0.009	173°

CompassData

Geodetic Survey Report

CDI Project Number and Name: 5216 Corson, Dewey, Ziebach Counties
CDI Quote # CDIQ 1200 (Dated 3/20/2017)
CDI POC: Philipp Hummel <phummel@compassdatainc.com>
Location of Survey: Corson, Dewey, Ziebach Counties, South Dakota
Date of Survey: September 2017

Customer: Quantum Spatial
Quantum Spatial POC: Joel Burroughs
Quantum Spatial Project Name: SD_FY17 NRCS LiDAR
Quantum Spatial Purchase Order # 1702
Quantum Spatial Purchase Order: 1702_Burroughs.PDF
Quantum Spatial PO Date: 04/05/2017

Contents

Datum Discussion and Requirements	2
Surveying Methods	2
Post-Processing Procedure	2
LiDAR QA Point Distribution.....	3

Datum Discussion and Requirements

Horizontal: NAD83(2011), UTM Zone 14, Meters

Vertical: NAVD88 (Geoid12B), Meters

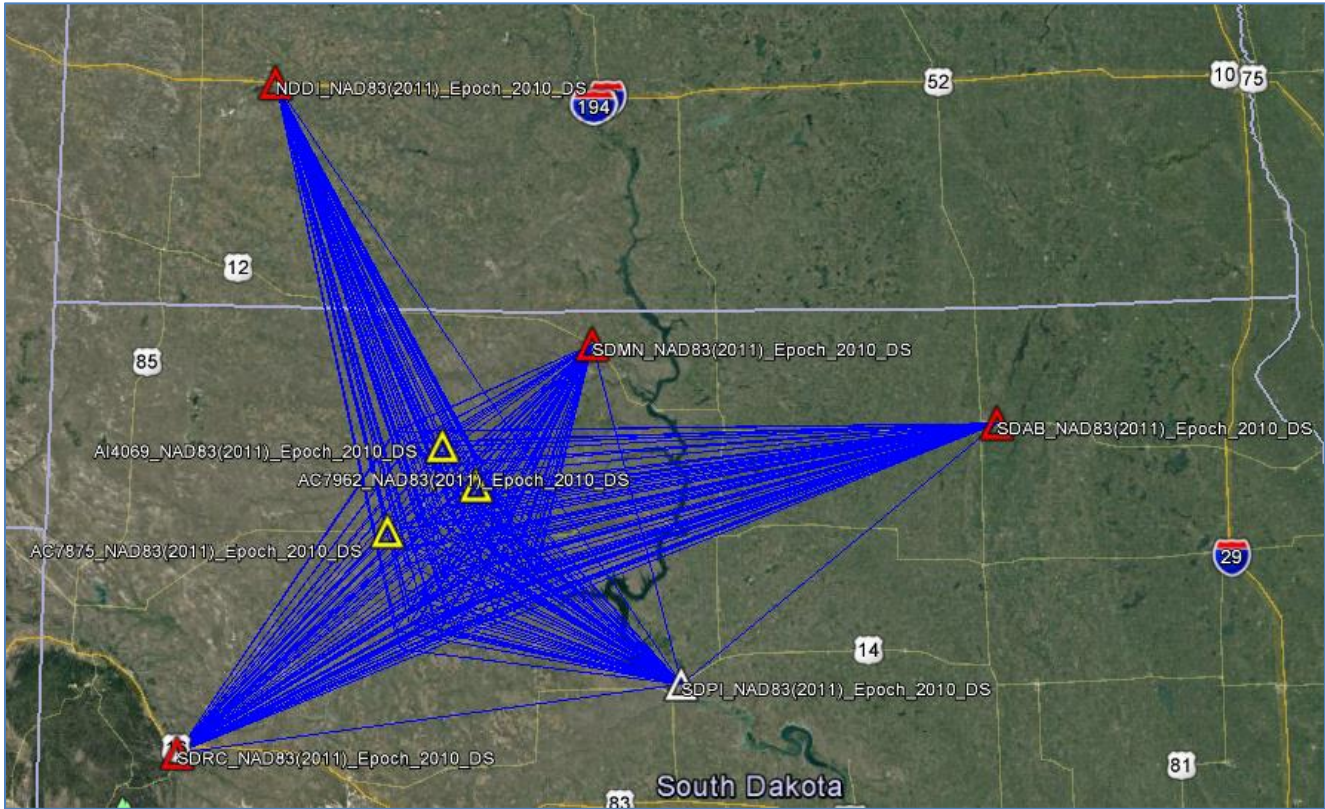
Surveying Methods

The static GPS observations result in the highest accuracy of the coordinates. Static GNSS observations were performed with a minimum of 45 minute collects with a Trimble R10 or Trimble R8 GNSS unit.

Post-Processing Procedure

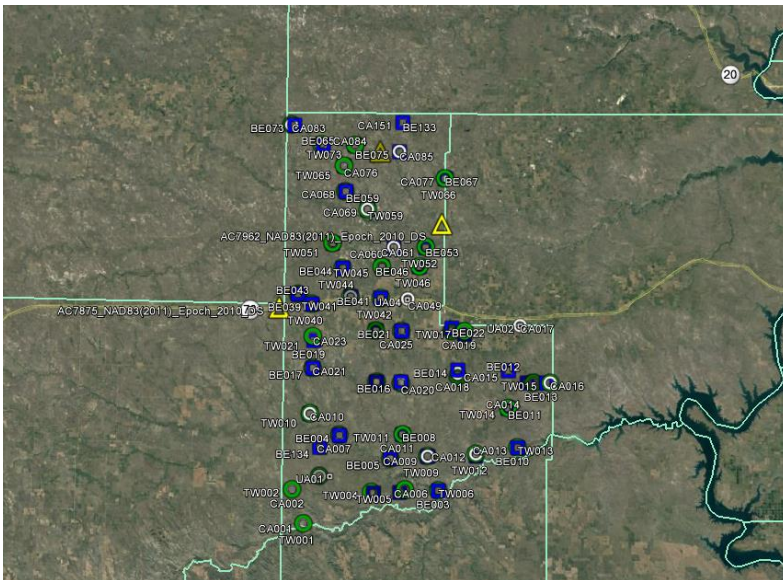
The static data collected in the field was combined with static GPS available from continuously operating base stations by the NGS. Then coordinates for the base stations were established by a network adjustment (Method of the Least Squares). In the following step the real-time observations on the GCPs were added to the fixed base stations; and in the final step the multiple observations on the GCPs were combined to the final coordinates. All processing was done with Trimble Business Center 3.7.

The network below shows the 4 Fixed Base Station (Red Triangles) and the 1 Floating Base Stations (White) in the network adjustment, as well passive NGS monuments used for quality control.



LiDAR QA Point Distribution

- White Circles represent Bare Earth measurements for Calibration
- Blue Squares represent Bare Earth measurements
- Green Circles represent measurements in vegetation like tall weeds
- Yellow Triangles – NGS Monuments





Technical Point of Contact:

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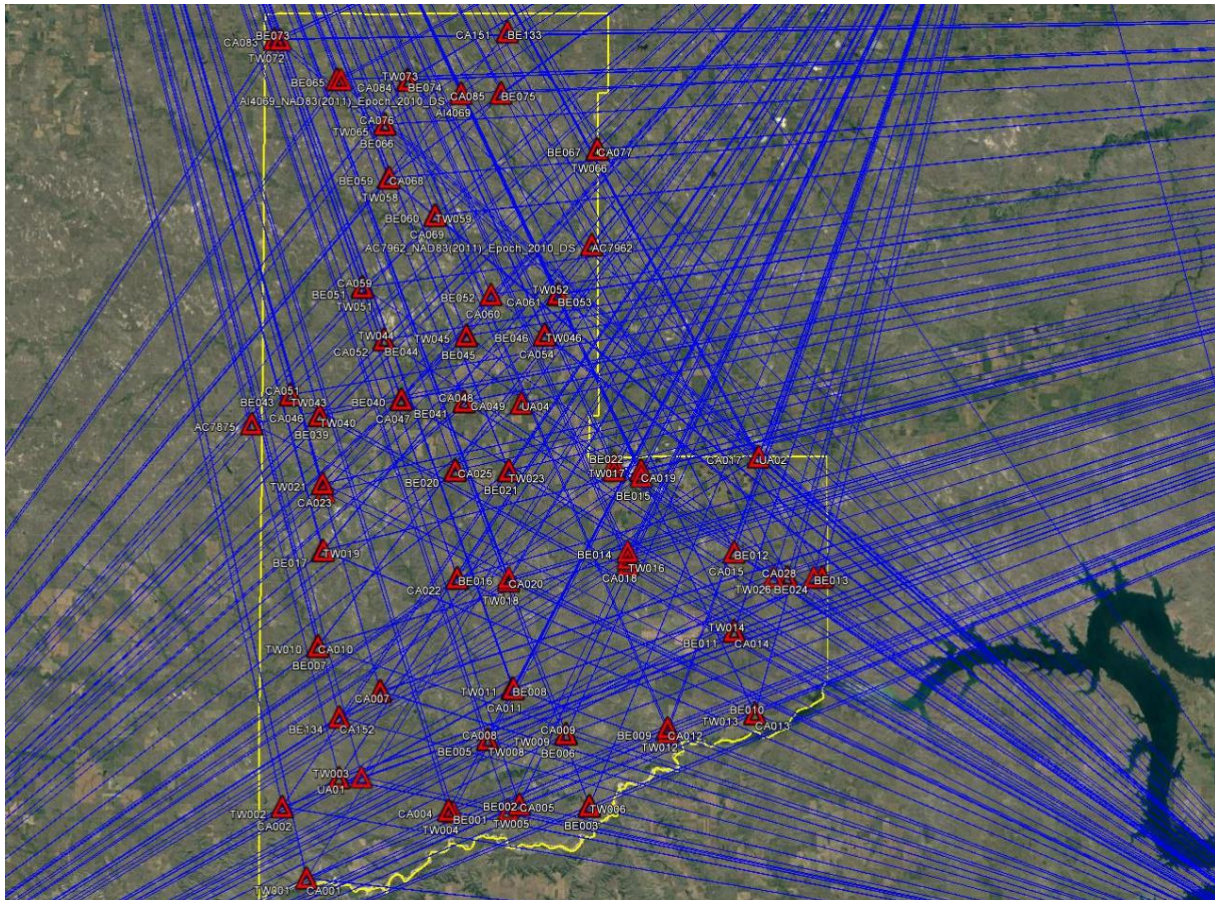
www.compassdatainc.com
solutions@compassdatainc.com

Project File Data

Name: 5216_Zeibach_v5.vce
Size: 1019 KB
Modified: 11/8/2017 1:35:41 PM (UTC:-7)

Coordinate System

Name: World wide/UTM
Datum: NAD83(2011)
Zone: 14 North
Geoid: GEOID12B (Conus)



Network Adjustment Report

Adjustment Settings

Set-Up Errors

GNSS

Error in Height of Antenna: 0.005 m

Centering Error: 0.005 m

Covariance Display

Horizontal:

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Three-Dimensional

Propagated Linear Error [E]: U.S.

Constant Term [C]: 0.000 m

Scale on Linear Error [S]: 1.960

Adjustment Statistics

Number of Iterations for Successful Adjustment: 2
Network Reference Factor: 1.00
Chi Square Test (95%): Passed
Precision Confidence Level: 95%
Degrees of Freedom: 1568

Post Processed Vector Statistics

Reference Factor: 1.00
Redundancy Number: 1568.00
A Priori Scalar: 1.32

Control Coordinate Comparisons

Values shown are control coordinates minus adjusted coordinates.

Point ID	Δ Easting (Meter)	Δ Northing (Meter)	Δ Height (Meter)
SDPI_NAD83(2011)_Epoch_2010_DS	-0.002	-0.004	0.006

Control Point Constraints

Point ID	Type	East σ (Meter)	North σ (Meter)	Height σ (Meter)
NDDI_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDAB_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDMN_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
SDRC_NAD83(2011)_Epoch_2010_DS	Global	Fixed	Fixed	Fixed
Fixed = 0.000001(Meter)				

Adjusted Grid Coordinates

Point ID	Easting Error (Meter)	Northing Error (Meter)	Elevation Error (Meter)
AC7875	0.009	0.009	0.011
AC7962	0.009	0.010	0.011
AI4069	0.009	0.009	0.011
ALT001	0.008	0.009	0.009
BE001	0.009	0.011	0.011
BE002	0.009	0.010	0.012
BE003	0.010	0.010	0.012
BE004	0.009	0.009	0.011

BE005	0.010	0.010	0.013
BE006	0.008	0.009	0.010
BE007	0.010	0.010	0.011
BE008	0.009	0.010	0.010
BE009	0.009	0.009	0.010
BE010	0.008	0.009	0.010
BE011	0.008	0.009	0.010
BE012	0.008	0.009	0.010
BE013	0.009	0.009	0.009
BE014	0.009	0.009	0.013
BE015	0.010	0.010	0.014
BE016	0.009	0.009	0.012
BE017	0.011	0.012	0.013
BE018	0.009	0.009	0.012
BE019	0.009	0.010	0.011
BE020	0.009	0.009	0.013
BE021	0.012	0.011	0.013
BE022	0.010	0.010	0.015
BE024	0.008	0.009	0.010
BE039	0.011	0.012	0.015
BE040	0.009	0.009	0.012

BE041	0.009	0.009	0.010
BE043	0.009	0.009	0.014
BE044	0.009	0.011	0.011
BE045	0.009	0.009	0.012
BE046	0.009	0.009	0.010
BE051	0.008	0.009	0.011
BE052	0.008	0.009	0.010
BE053	0.009	0.010	0.011
BE059	0.011	0.014	0.015
BE060	0.010	0.010	0.012
BE065	0.009	0.010	0.012
BE066	0.010	0.010	0.013
BE067	0.010	0.011	0.013
BE073	0.009	0.009	0.012
BE074	0.008	0.009	0.013
BE075	0.009	0.012	0.011
BE133	0.009	0.009	0.010
BE134	0.009	0.011	0.012
CA001	0.009	0.011	0.012
CA002	0.012	0.012	0.015
CA003	0.009	0.010	0.014

CA004	0.009	0.011	0.011
CA005	0.008	0.009	0.010
CA006	0.010	0.011	0.012
CA007	0.006	0.007	0.007
CA008	0.010	0.010	0.013
CA009	0.008	0.009	0.010
CA010	0.010	0.011	0.014
CA011	0.008	0.009	0.009
CA012	0.009	0.010	0.011
CA013	0.009	0.011	0.014
CA014	0.008	0.009	0.010
CA015	0.008	0.009	0.010
CA016	0.006	0.007	0.007
CA017	0.008	0.009	0.010
CA018	0.009	0.009	0.013
CA019	0.011	0.013	0.015
CA020	0.009	0.009	0.011
CA021	0.010	0.010	0.011
CA022	0.010	0.010	0.013
CA023	0.008	0.010	0.011
CA024	0.010	0.010	0.014

CA025	0.011	0.011	0.013
CA026	0.010	0.010	0.013
CA028	0.010	0.012	0.014
CA046	0.009	0.009	0.012
CA047	0.008	0.009	0.010
CA048	0.009	0.011	0.012
CA049	0.009	0.011	0.014
CA051	0.009	0.010	0.014
CA052	0.009	0.010	0.011
CA053	0.009	0.009	0.011
CA054	0.009	0.009	0.011
CA059	0.008	0.009	0.012
CA060	0.008	0.009	0.010
CA061	0.008	0.009	0.010
CA068	0.011	0.013	0.014
CA069	0.010	0.010	0.012
CA075	0.009	0.010	0.013
CA076	0.010	0.010	0.012
CA077	0.009	0.009	0.011
CA083	0.009	0.009	0.012
CA084	0.008	0.009	0.012

CA085	0.009	0.011	0.011
CA151	0.009	0.009	0.010
CA152	0.009	0.010	0.012
Do Not Use TW011	0.008	0.009	0.010
SDPI NAD83(2011) Epoch 2010_DS	0.002	0.002	0.003
TW001	0.009	0.010	0.011
TW002	0.012	0.012	0.017
TW003	0.010	0.012	0.015
TW004	0.010	0.010	0.014
TW005	0.009	0.010	0.011
TW006	0.010	0.010	0.012
TW007	0.010	0.010	0.012
TW008	0.010	0.010	0.014
TW009	0.008	0.009	0.010
TW010	0.010	0.011	0.014
TW011	0.008	0.009	0.010
TW012	0.009	0.009	0.009
TW013	0.008	0.009	0.009
TW014	0.009	0.010	0.011
TW015	0.009	0.011	0.011
TW016	0.012	0.012	0.014

TW017	0.011	0.013	0.016
TW018	0.009	0.009	0.012
TW019	0.008	0.009	0.010
TW020	0.009	0.009	0.011
TW021	0.011	0.011	0.013
TW022	0.009	0.010	0.012
TW023	0.010	0.010	0.012
TW024	0.010	0.010	0.012
TW026	0.008	0.009	0.010
TW040	0.009	0.009	0.012
TW041	0.009	0.009	0.010
TW042	0.007	0.009	0.011
TW043	0.009	0.009	0.011
TW044	0.008	0.010	0.011
TW045	0.009	0.009	0.012
TW046	0.008	0.009	0.010
TW051	0.008	0.009	0.011
TW052	0.009	0.009	0.010
TW058	0.010	0.012	0.016
TW059	0.010	0.010	0.013
TW064	0.009	0.009	0.014

TW065	0.010	0.011	0.016
TW066	0.008	0.009	0.011
TW072	0.009	0.009	0.015
TW073	0.009	0.009	0.011
UA01	0.010	0.010	0.012
UA02	0.008	0.010	0.010
UA04	0.009	0.010	0.012

Error Ellipse Components

Point ID	Semi-major axis (Meter)	Semi-minor axis (Meter)	Azimuth
AC7875	0.012	0.011	178°
AC7962	0.013	0.011	24°
AI4069	0.011	0.011	178°
ALT001	0.011	0.011	18°
BE001	0.013	0.011	176°
BE002	0.012	0.011	165°
BE003	0.013	0.012	167°
BE004	0.012	0.011	178°
BE005	0.012	0.012	163°
BE006	0.011	0.010	9°

BE007	0.012	0.012	32°
BE008	0.012	0.012	6°
BE009	0.012	0.011	6°
BE010	0.011	0.011	179°
BE011	0.011	0.011	12°
BE012	0.011	0.011	6°
BE013	0.012	0.011	21°
BE014	0.011	0.011	18°
BE015	0.013	0.011	126°
BE016	0.012	0.011	157°
BE017	0.015	0.014	162°
BE018	0.012	0.011	162°
BE019	0.012	0.011	2°
BE020	0.012	0.011	166°
BE021	0.016	0.013	121°
BE022	0.012	0.012	15°
BE024	0.011	0.011	168°
BE039	0.015	0.013	139°
BE040	0.011	0.011	22°
BE041	0.012	0.011	22°
BE043	0.012	0.011	166°

BE044	0.013	0.011	168°
BE045	0.012	0.011	40°
BE046	0.012	0.011	159°
BE051	0.011	0.011	2°
BE052	0.011	0.011	15°
BE053	0.012	0.011	1°
BE059	0.017	0.014	179°
BE060	0.013	0.012	34°
BE065	0.013	0.011	150°
BE066	0.013	0.012	13°
BE067	0.013	0.012	165°
BE073	0.011	0.011	118°
BE074	0.011	0.011	179°
BE075	0.015	0.011	170°
BE133	0.012	0.011	26°
BE134	0.014	0.011	154°
CA001	0.014	0.011	7°
CA002	0.015	0.015	179°
CA003	0.013	0.011	8°
CA004	0.013	0.011	175°
CA005	0.011	0.011	171°

CA006	0.013	0.012	159°
CA007	0.008	0.008	1°
CA008	0.012	0.012	165°
CA009	0.011	0.010	8°
CA010	0.014	0.013	2°
CA011	0.011	0.011	5°
CA012	0.012	0.011	178°
CA013	0.014	0.011	180°
CA014	0.011	0.011	15°
CA015	0.011	0.011	5°
CA016	0.009	0.007	24°
CA017	0.011	0.011	169°
CA018	0.011	0.011	6°
CA019	0.016	0.014	172°
CA020	0.011	0.011	163°
CA021	0.013	0.012	162°
CA022	0.013	0.012	151°
CA023	0.012	0.011	179°
CA024	0.012	0.012	175°
CA025	0.015	0.013	136°
CA026	0.012	0.012	148°

CA028	0.015	0.012	170°
CA046	0.012	0.011	158°
CA047	0.011	0.011	8°
CA048	0.013	0.011	7°
CA049	0.015	0.011	165°
CA051	0.012	0.012	0°
CA052	0.013	0.011	168°
CA053	0.011	0.011	38°
CA054	0.012	0.011	158°
CA059	0.011	0.011	178°
CA060	0.011	0.011	14°
CA061	0.012	0.011	2°
CA068	0.016	0.014	173°
CA069	0.012	0.012	2°
CA075	0.012	0.011	157°
CA076	0.013	0.012	12°
CA077	0.011	0.011	166°
CA083	0.011	0.011	84°
CA084	0.011	0.011	180°
CA085	0.014	0.011	171°
CA151	0.012	0.011	28°

CA152	0.013	0.011	153°
Do Not Use TW011	0.011	0.011	15°
SDPI NAD83(2011) Epoch 2010_DS	0.003	0.002	176°
TW001	0.012	0.012	3°
TW002	0.015	0.015	84°
TW003	0.015	0.012	10°
TW004	0.013	0.012	28°
TW005	0.012	0.012	8°
TW006	0.012	0.012	15°
TW007	0.012	0.012	171°
TW008	0.012	0.012	163°
TW009	0.011	0.011	177°
TW010	0.013	0.012	175°
TW011	0.011	0.011	6°
TW012	0.011	0.011	29°
TW013	0.011	0.011	23°
TW014	0.012	0.012	169°
TW015	0.013	0.011	8°
TW016	0.015	0.014	149°
TW017	0.016	0.014	177°
TW018	0.011	0.011	161°

TW019	0.011	0.011	5°
TW020	0.011	0.011	160°
TW021	0.014	0.014	8°
TW022	0.012	0.012	6°
TW023	0.012	0.012	26°
TW024	0.012	0.012	175°
TW026	0.011	0.011	164°
TW040	0.012	0.011	160°
TW041	0.011	0.011	8°
TW042	0.011	0.008	5°
TW043	0.011	0.011	142°
TW044	0.013	0.011	0°
TW045	0.012	0.011	148°
TW046	0.011	0.011	5°
TW051	0.012	0.011	4°
TW052	0.011	0.011	167°
TW058	0.015	0.012	160°
TW059	0.013	0.012	32°
TW064	0.011	0.011	27°
TW065	0.014	0.012	163°
TW066	0.011	0.011	1°

TW072	0.011	0.011	63°
TW073	0.011	0.011	24°
UA01	0.012	0.012	7°
UA02	0.012	0.010	172°
UA04	0.013	0.011	171°