



**COLLECTION REPORT – USGS LIDAR ACQUISITION**

**Pennsylvania – SANDY LiDAR**

**09 January 2015**

Prepared for

United States Geological Survey  
West 6th Ave. & Kipling Street  
DFC Bldg. 810  
Lakewood, CO 80225  
303.202.4419

Prepared by

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Fugro EarthData was tasked with planning, acquiring, processing, and producing derivative products of LiDAR data collected at a nominal pulse spacing (NPS) of 0.7 meters, including overlap, for an Area of Interest (AOI) covering the entire counties of York and Lancaster in south-eastern Pennsylvania. The AOI covers approximately 1,899 square miles. A 100-meter buffer was added to the AOI covering approximately 1,917 square miles; all products will be generated to the limit of this buffered boundary.

LiDAR data, and derivative products produced in compliance with the task order will be based on the “**U.S. Geological Survey National Geospatial Program LiDAR Base Specification Version 1.0**”. In addition to the Specification Requirements, the task order will meet NEEA QL2.

All acquisition occurred during leaf off conditions between November 25 and December 27, 2014 by Fugro’s approved ID/IQ subcontractor, Richard Crouse & Associates, Inc. (RC&A).

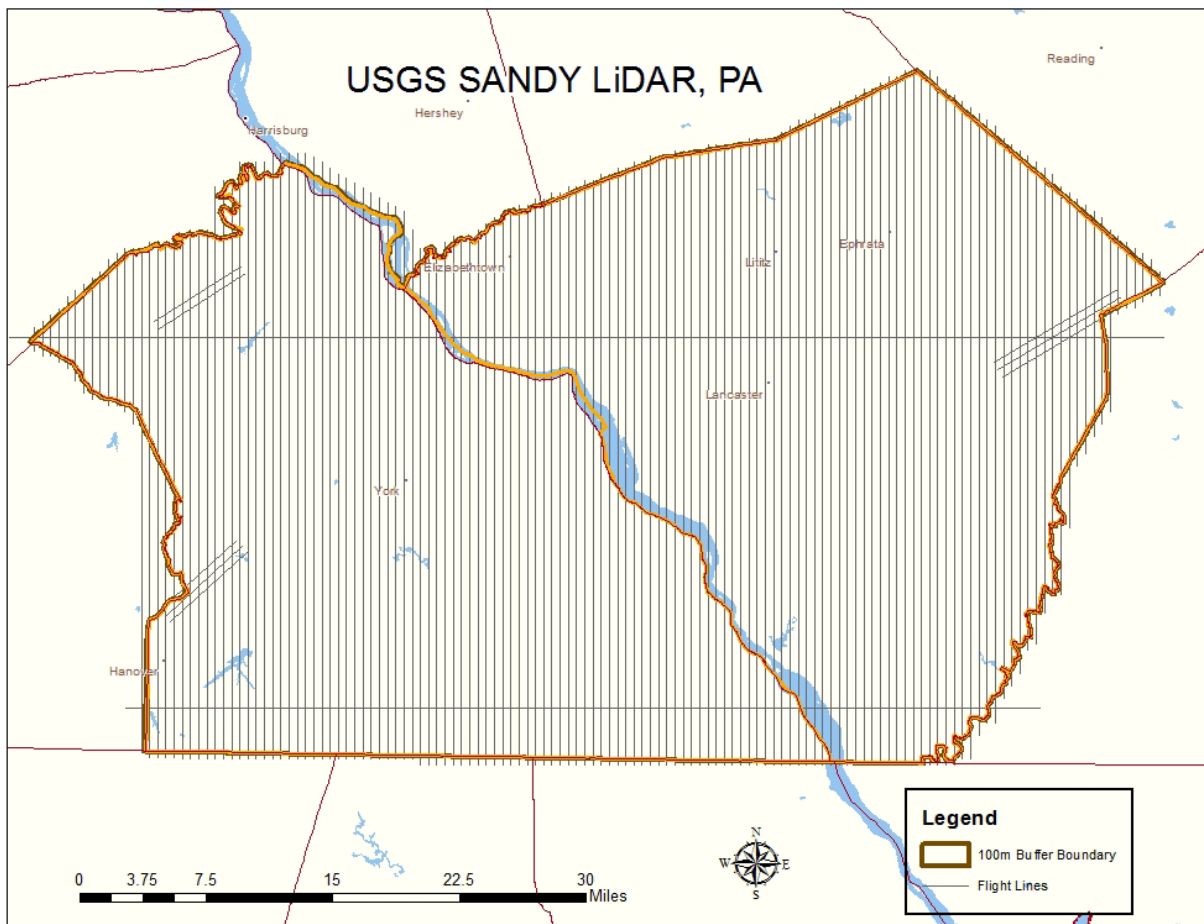


Figure 1: Flight plan

The following is detail on the LiDAR acquisition covering the Pennsylvania – SANDY LiDAR buffered boundary.

<b>Collections:</b>	11
<b>Collection Dates:</b>	November 25 <sup>th</sup> - December 27 <sup>th</sup> , 2014
<b>Field of View (FOV):</b>	60 degrees
<b>Average Point Density (planned):</b>	2 pts/m <sup>2</sup>
<b>Flight Level(s) AMT:</b>	3179 ft, 3180 ft
<b>Sensor Type:</b>	Riegl Q-680i
<b>Sensor Serial Number(s):</b>	863

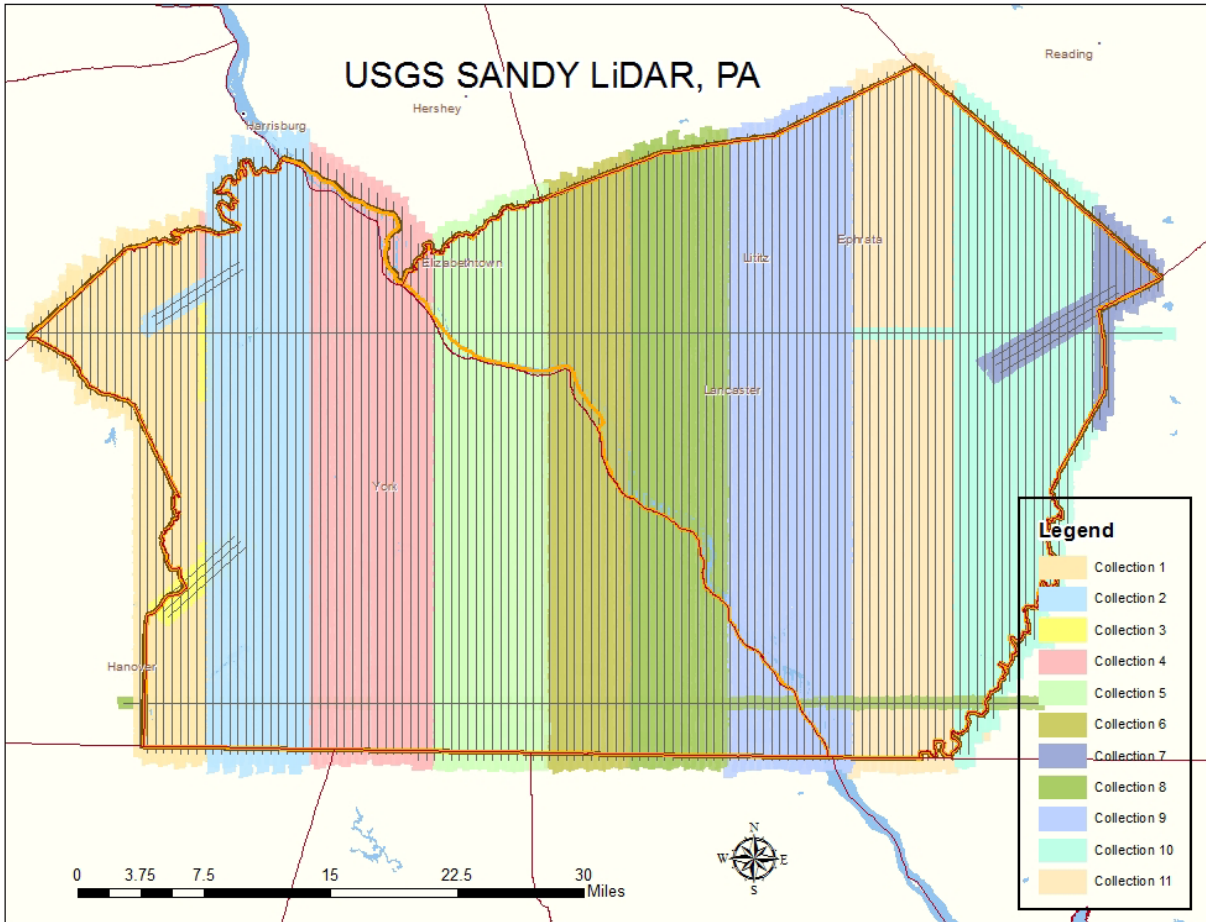


Figure 2: Executed Flight Trajectories

All acquired LiDAR data was QC'd and accepted for processing.

Below are the acquisition logs and GPS plots from all collections covering the Pennsylvania – SANDY LiDAR buffered boundary.

**Acquisition and Processing details ----- Collection 1 (November 25, 2014)**

Log:

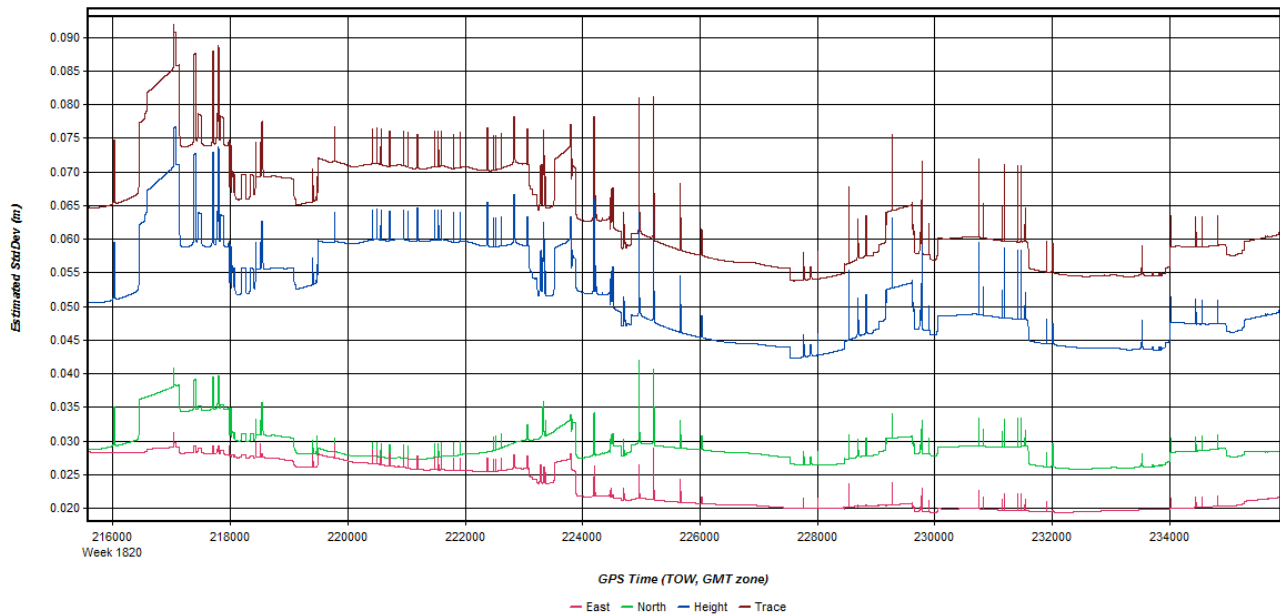
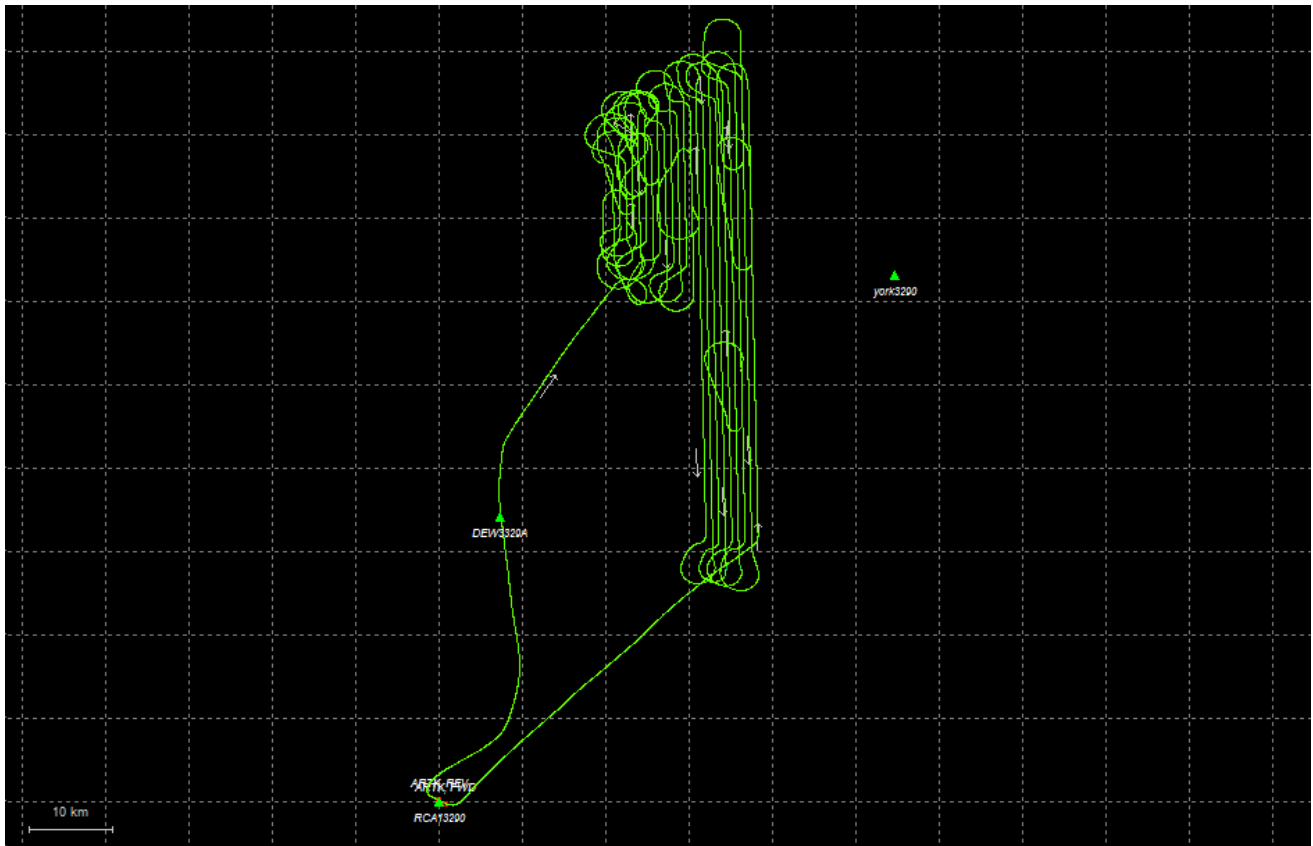


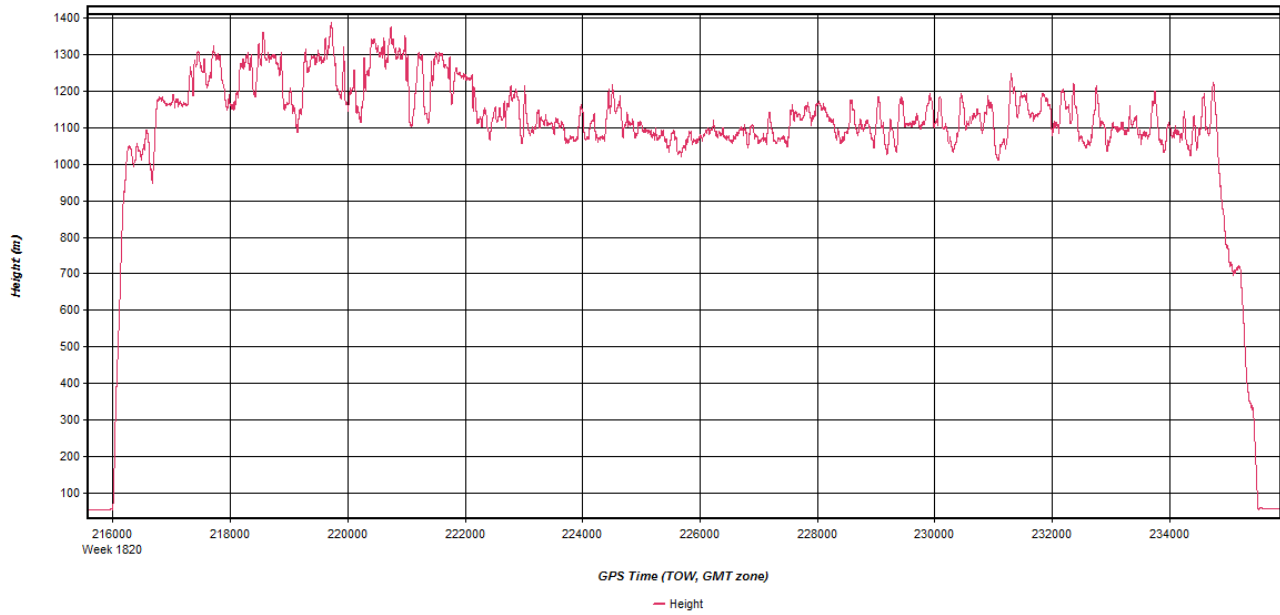
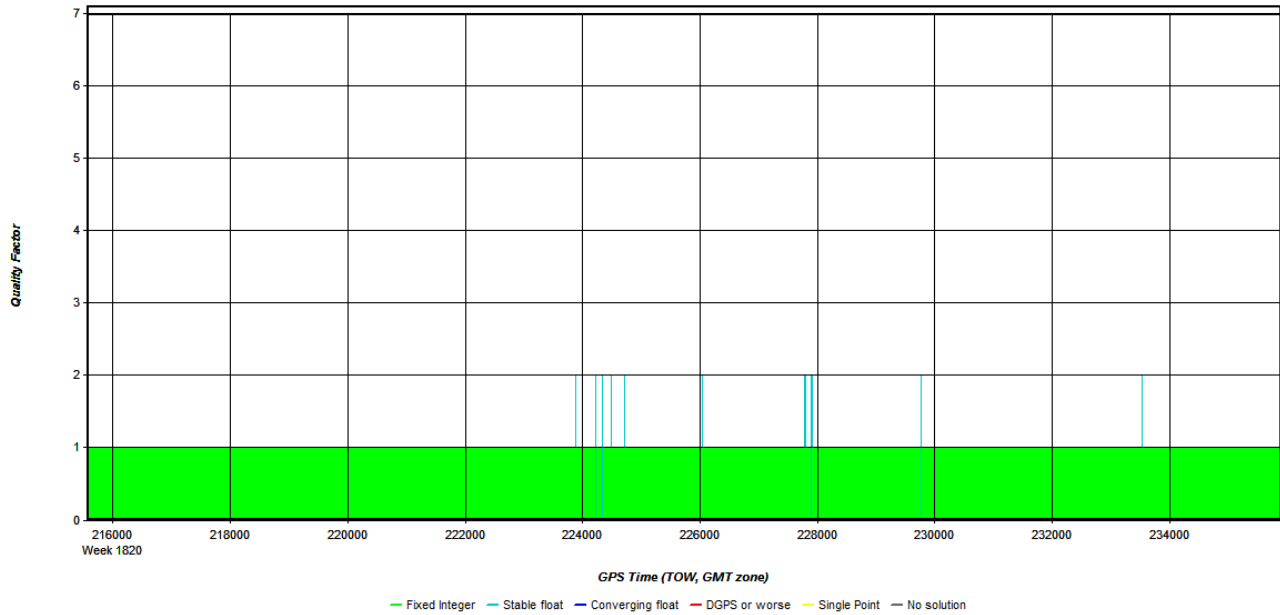
14.5	Lift Begin			Lift End			Flt	Flt	Hobbs	Activity
	Airport	Chocks	Hobbs	Airport	Chocks	Hobbs				
1	KFDK		3400.7	KFDK		3406.2			5.5	
2										
3										

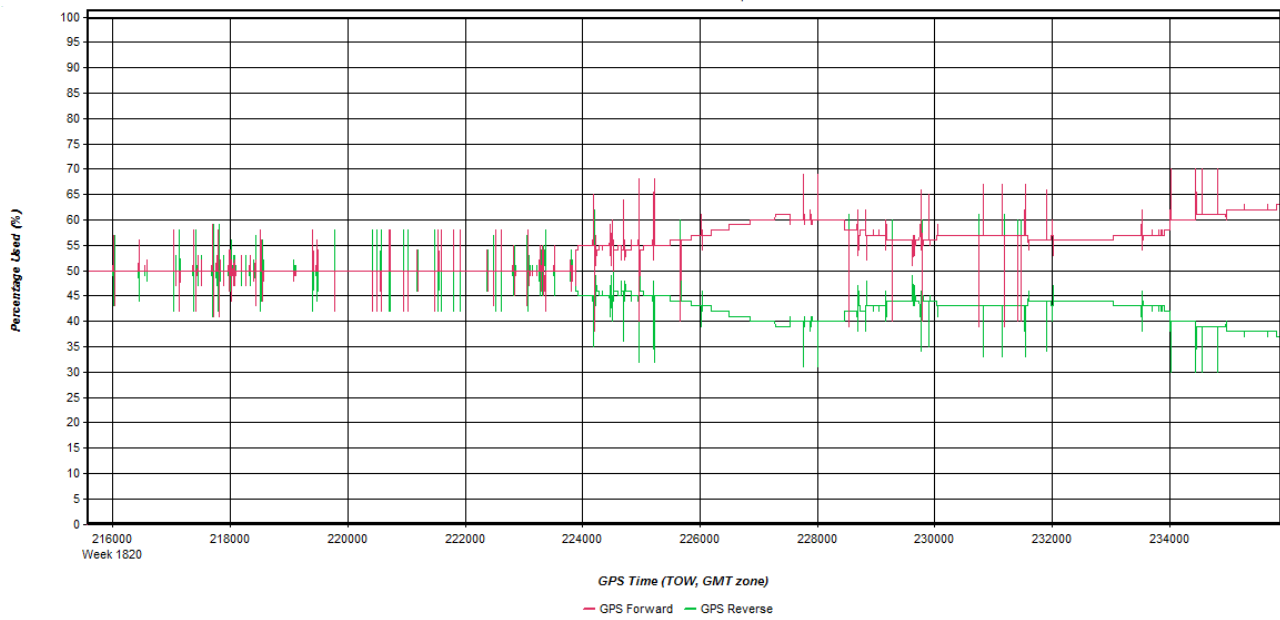
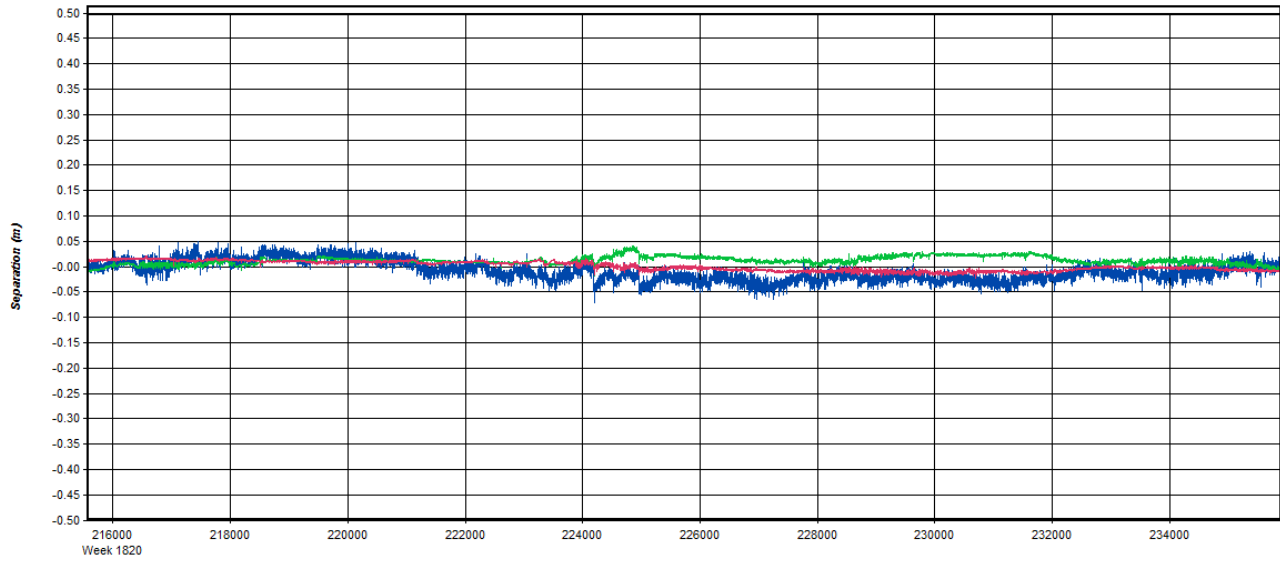
**Q 680i**  
**Flight Log**

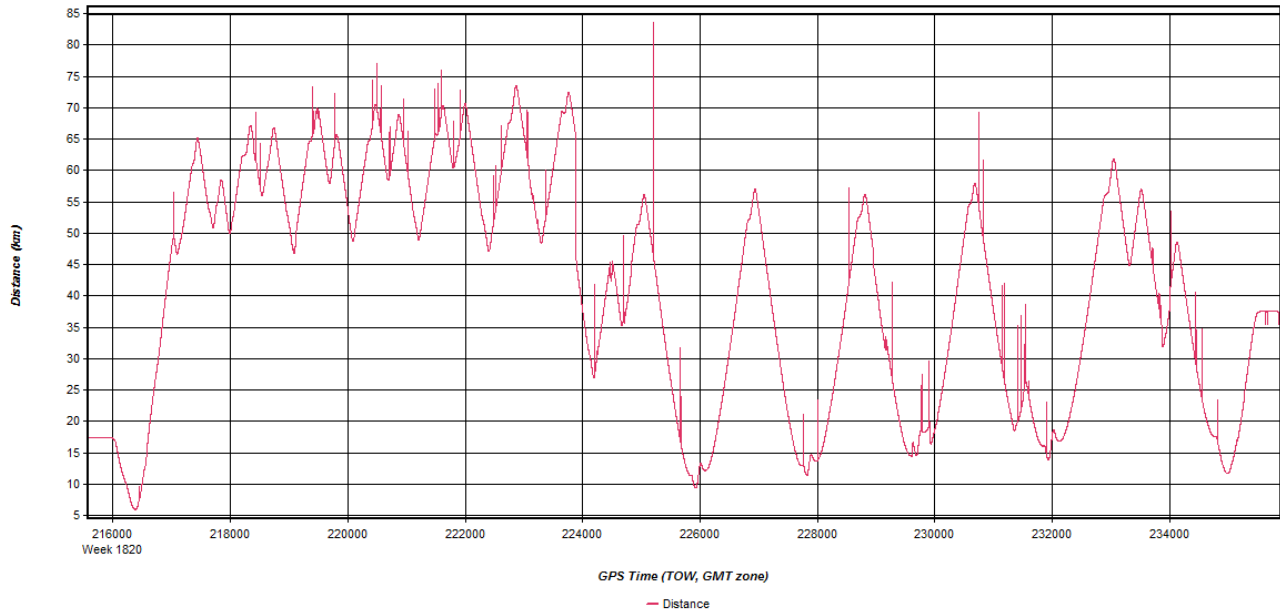
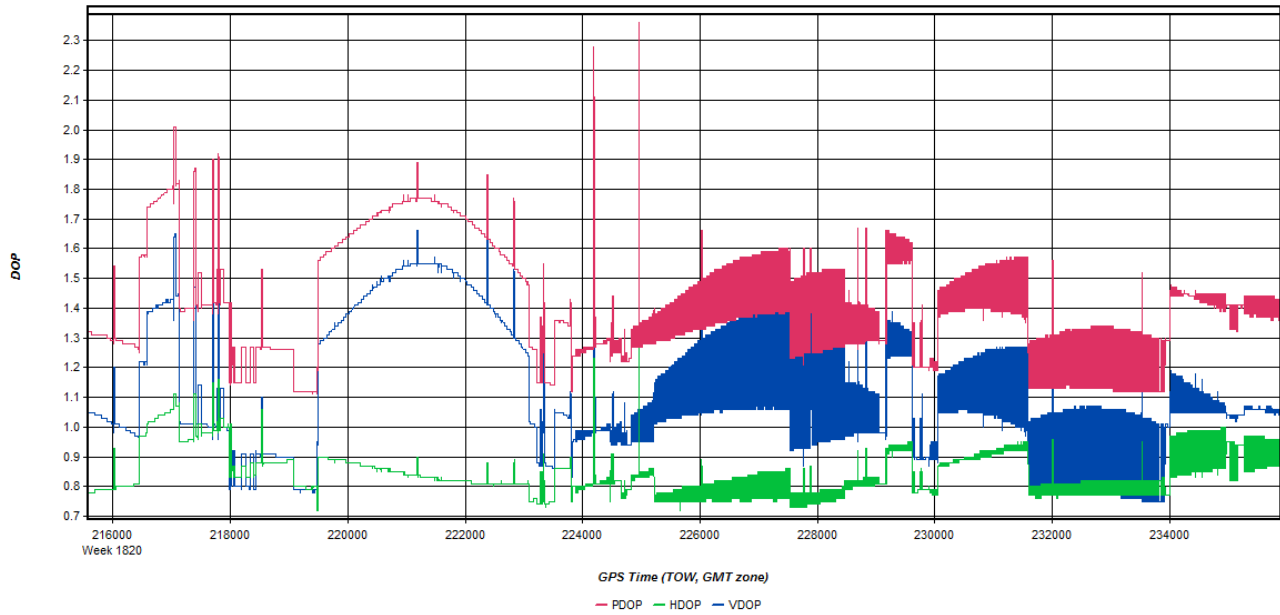
FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C			Min Range'	Data Logger Drives	
22.14001100	USGS PA SANDY				T. Pangborn		863	LN-200	29.0			2018	07 and 08	
Flight Date	GPS Day	Lift	System	Pilot		Sun*	Solar Times (UTC)		Flying Temp °C			Max Range'	Download Drive	
25-Nov-14	14-329	1	R680i	D. Ewing		na	na		29.0			3888		
Mission ID (yyymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	MTA	mi/WPT	AltM Setting	Humidity @ Alt	Shipping Track	
141125_863_14001100_01	N63868	KFDK	Track	-5	3179	140	60	250000	2		30.03			
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename	Operator	Data			
Area	Flight #	Wpt	Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOP
	FGI	RCA	From	To	Begin	End	Dir	(GPS)	(knots)	Rate				
											Overfly DEW3 CORS			
	1				12:20:00	12:21:00	N	3,930	140	109.0	Drive 07			1.2
	2				12:25:00	12:26:00	S	4,230	140	109.0	Redo			1.17
	3				12:29:00	12:30:00	N	4,330	140	109.0	Abort - Too High			1.15
	3				12:34:00	12:36:00	N	4,330	140	109.0				1.14
	4				12:40:00	12:41:00	S	4,330	140	109.0	Abort - Too High			1.14
	4				12:46:00	12:47:00	S	4,330	140	109.0				1.11
	5				12:52:00	12:53:00	N	4,330	140	109.0	Redo - Off Altitude			1.15
	5				12:59:00	13:00:00	S	4,330	140	109.0	Re-flight of Line - Abort			1.15
	2				13:04:00	13:05:00	S	4,230	140	109.0				1.17
	5				13:09:00	13:10:00	N	4,330	140	109.0				1.22
	6				13:16:00	13:16:00	S	4,330	140	109.0	Abort - Too High			1.27
	6				13:22:00	13:23:00	S	4,330	140	109.0	Ok - Gap?			1.27
	7				13:27:00	13:30:00	N	4,330	140	109.0	Ok - Gap Adjacent to Previous Gap?			1.23
	8				13:34:00	13:36:00	S	4,130	140	109.0	Abort - Too High			1.2
	8				13:40:00	13:42:00	S	4,130	140	109.0				1.17
	9				13:48:00	13:49:00	N	4,180	140	109.0				1.17
	10				13:55:00	13:58:00	S	3,880	140	109.0				1.04
	11				14:02:00	14:07:00	N	3,580	135	109.0				1.06
	12				14:09:00	14:14:00	S	3,580	135	109.0				0.98
	13				14:17:00	14:20:00	N	3,580	135	109.0	Abort - Redo Small Section			1.09
	13				14:25:00	14:28:00	N	3,580	135	109.0				1.09
	14				14:32:00	14:42:00	S	3,646	140	109.0				1.1
	15				14:47:00	14:59:00	N	3,587	140	109.0				1.01
	16				15:03:00	15:15:00	S	3,590	140	109.0				1.08
	17				15:18:00	15:31:00	N	3,780	140	109.0				1.07
	18				15:34:00	15:46:00	S	3,780	140	109.0				1.02
	19				15:50:00	16:02:00	N	3,730	140	109.0				1.1
	20				16:05:00	16:15:00	S	3,830	140	109.0	Abort - Redo Small Section			1.28
	20				16:20:00	16:24:00	S	3,830	140	109.0				1.27
	21				16:27:00	16:40:00	N	3,730	135	109.0				1.25
	21				16:45:00	16:49:00	S	3,730	140	109.0	Calibration Line - South Bound			1.15
	22				16:52:00	16:57:00	S	3,644	140	109.0	Drive Filled Up			1.15
	22				17:02:00	17:13:00	S	3,641	140	109.0	Drive 08			1.13
											Land at KFDK			

**Trajectory and GPS Plots:**

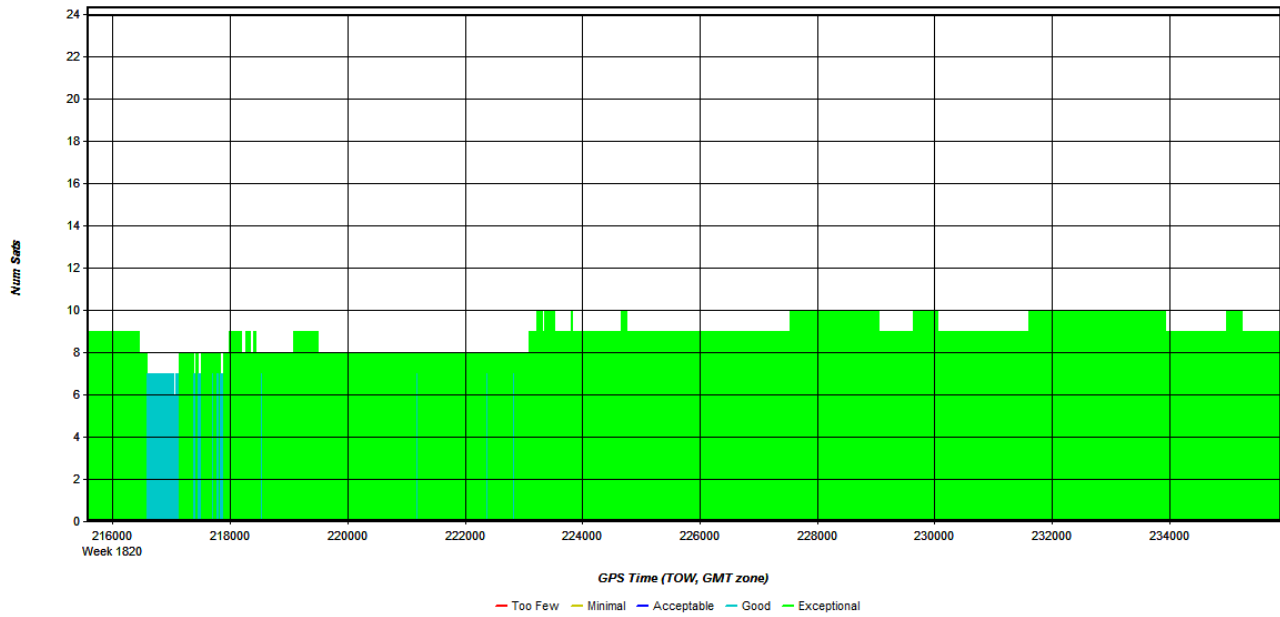
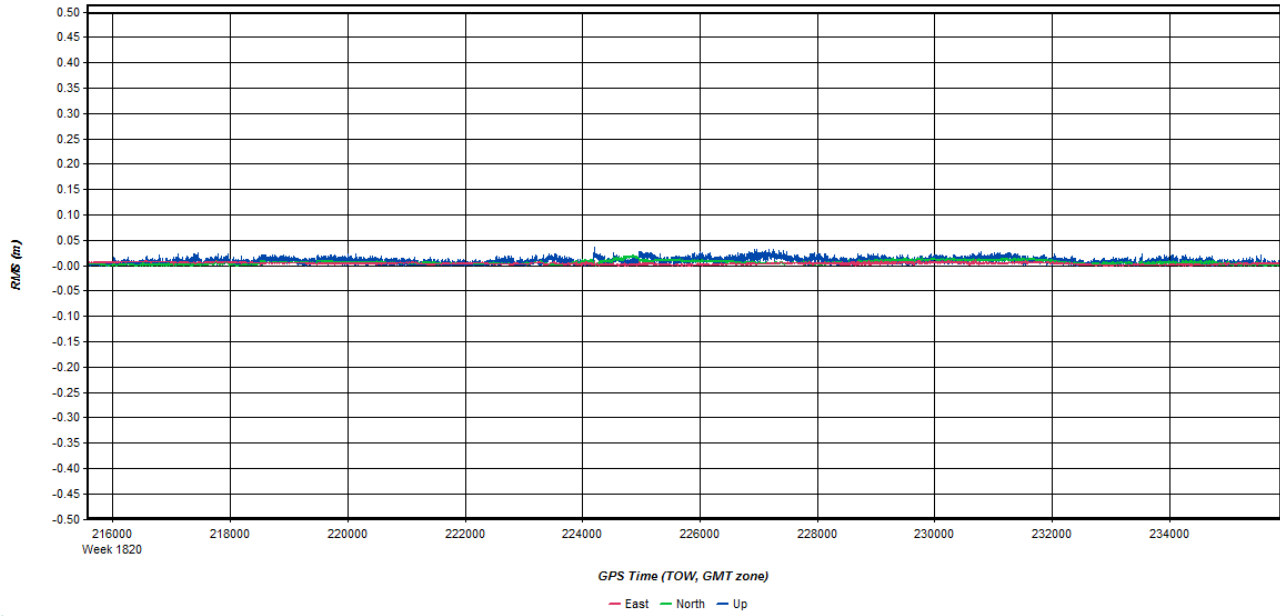














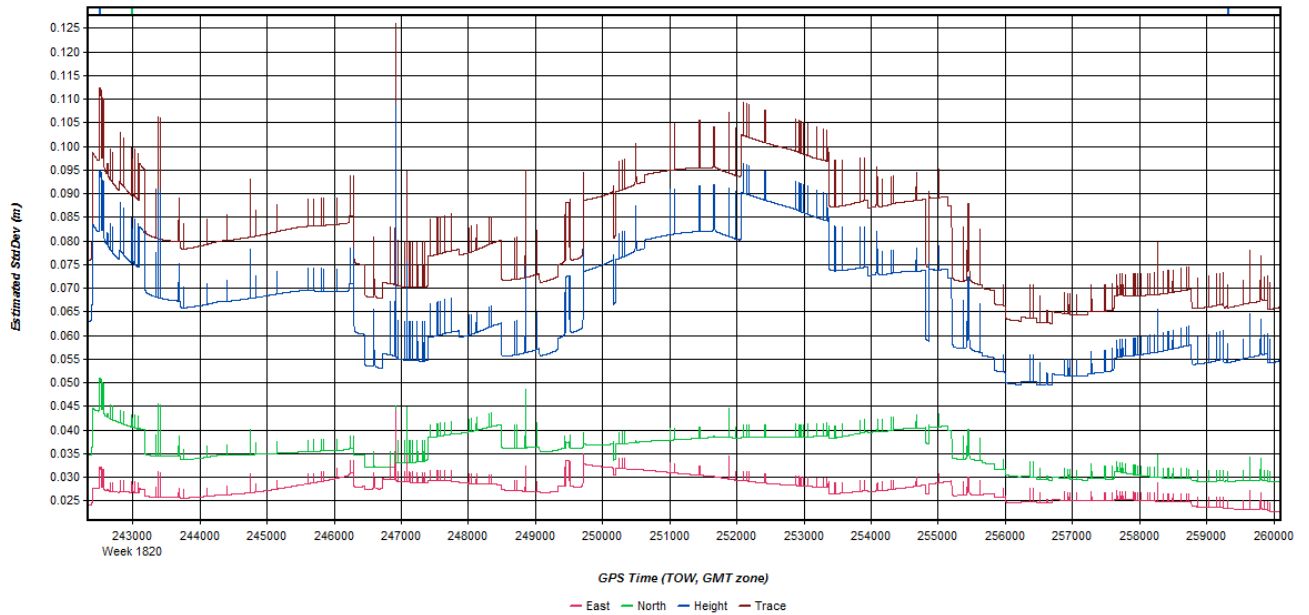
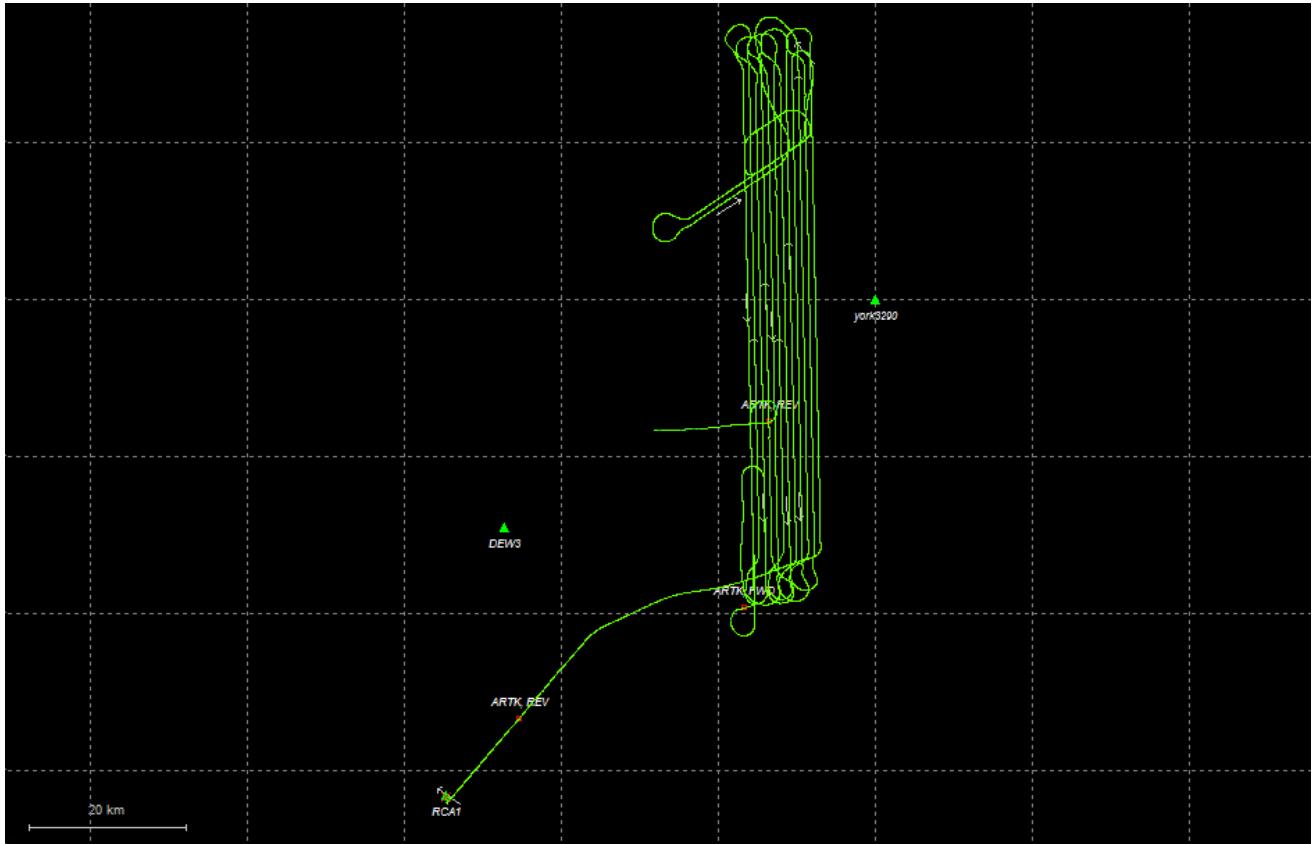
Acquisition and Processing details ----- Collection 2 (November 25, 2014)

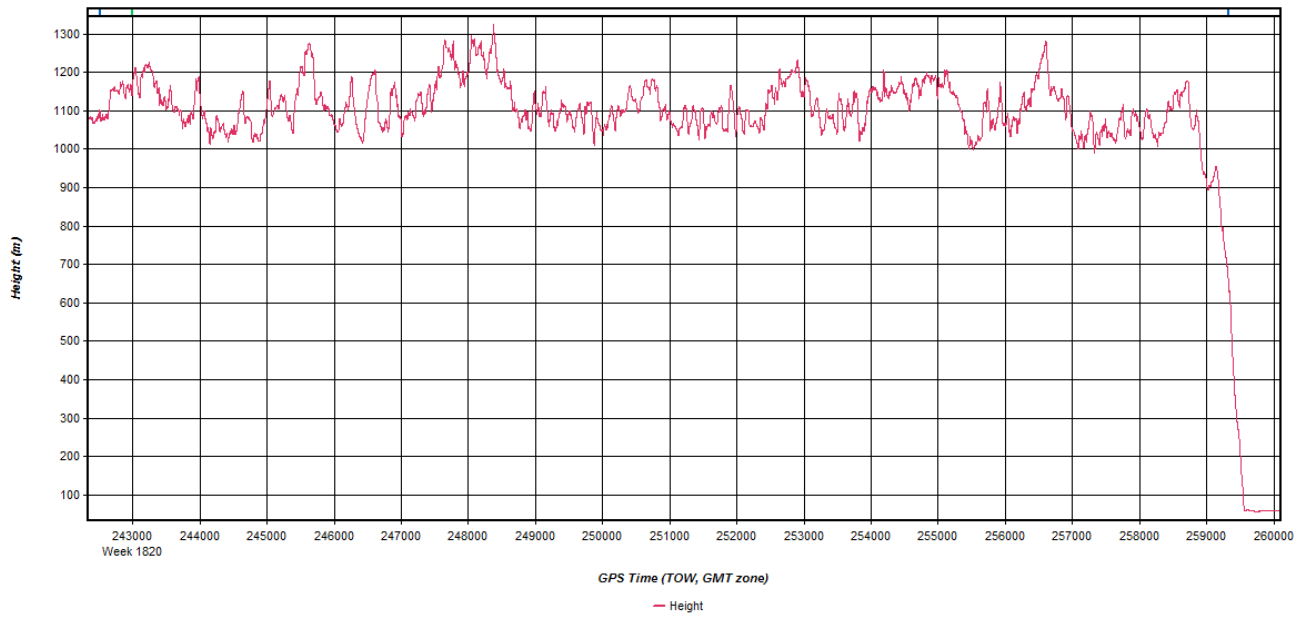
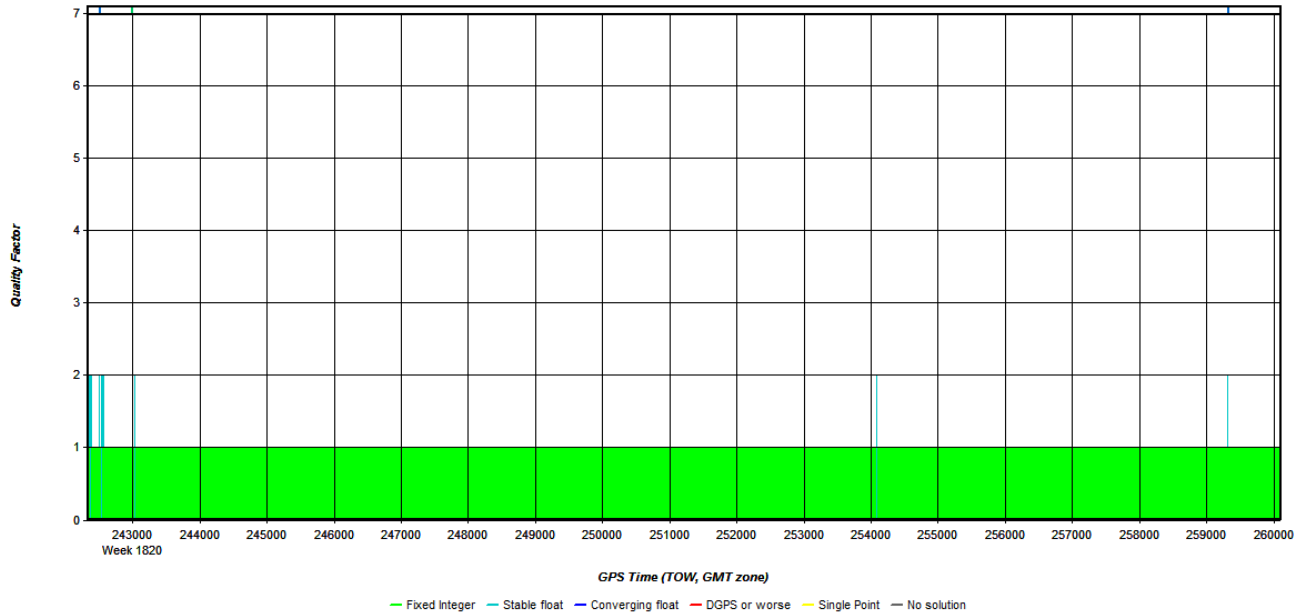
Log:

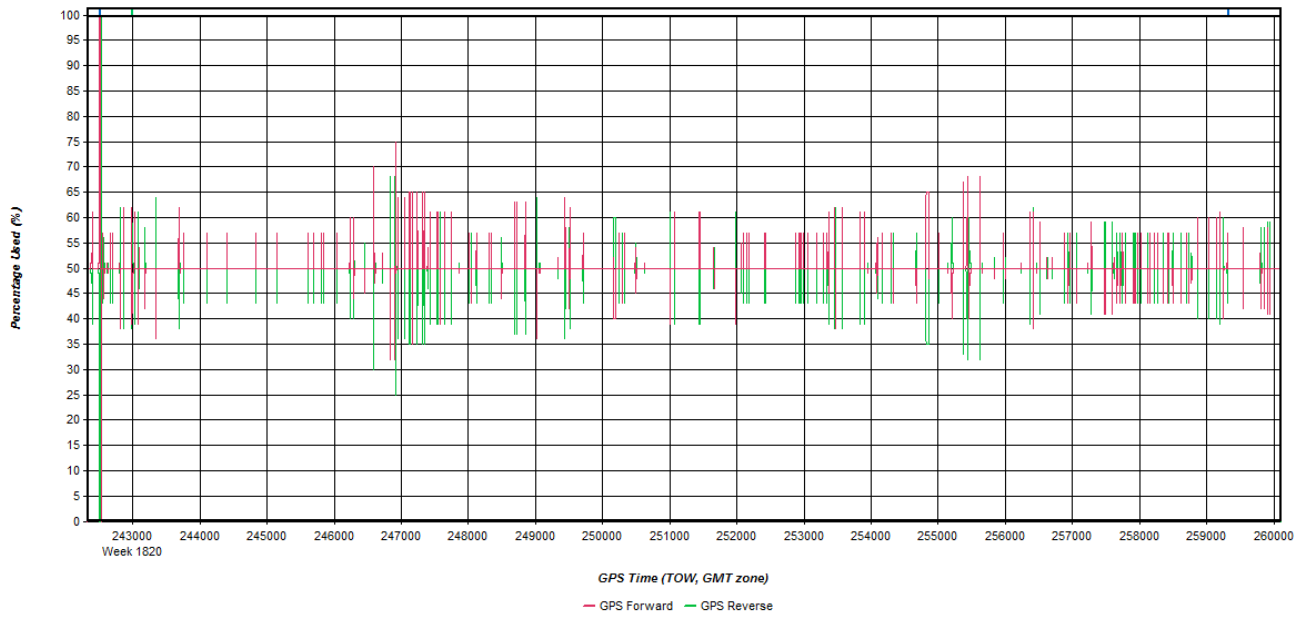
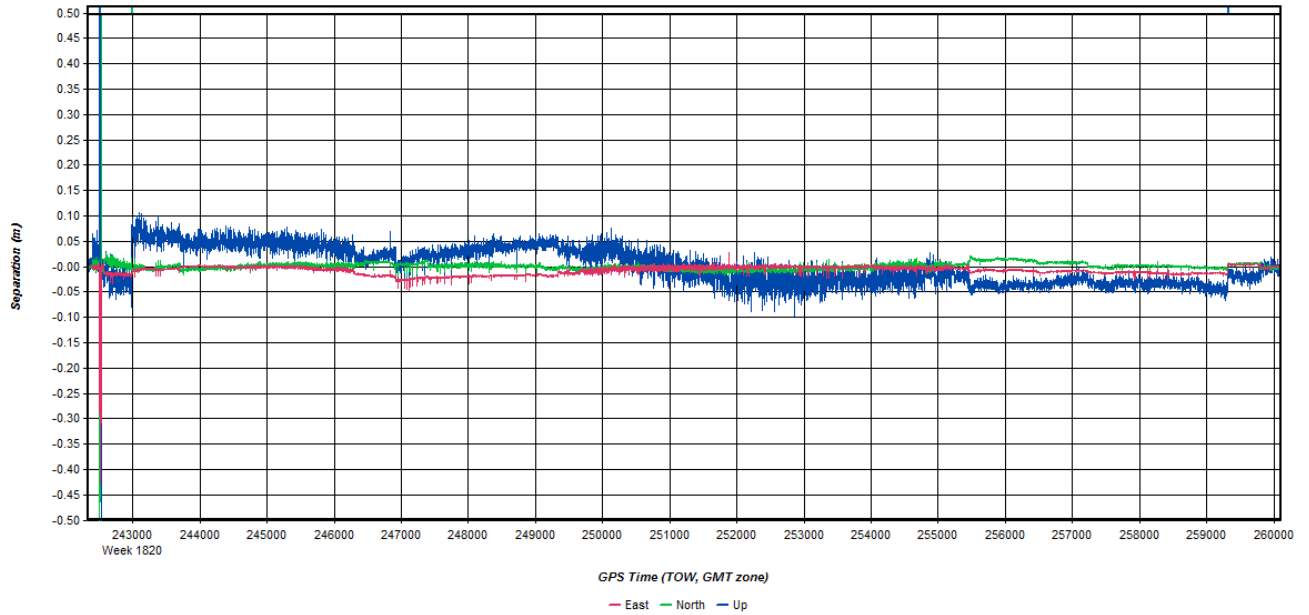
RC&A Richard Crouse & Associates		14.5			Lift Begin			Lift End			Flt		Flt		Hobbs		Activity	
		Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs	0900-Production							
1		KFDK		3406.2	KFDK		3411.2				5.0							
2																		
3																		
FGI Job #		Project Name			Operator		Unit	IMU	Ground Temp °C		Mn Range		Data Logger Drives					
22.14001100		USGS PA SANDY			B. Ruwet		863	LN-200	29.0		2018		04 and 05					
Flight Date		GPS Day	Lift	System	Pilot		Sun*	Solar Times (UTC)		Flying Temp °C		Max Range		Download Drive				
25-Nov-14		14-329	2	R680I	M. Torres		na	na		29.0		3888						
Mission ID (ymmdd_Sen_Job_Lift)		Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	MTA	km/WPT	Altm Setting	Humidity @ Alt	Shipping Track				
141125_863_14001100_02		N63868	KFDK	Track	-5	3179	140	60	250000	2		30.03	57					
Base 1 ID		Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data			
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions			SVs	PDOP	
	FGI	RCA	From	To	Begin	End	Start	End										Dir
													Overfly DEW2 CORS					
		23					19:25:00	19:27:00	S	3,639	140	109.0	HD0 - Drive 4 - Calibration Line				1.00	
		23					19:33:00	19:48:00	N	3,639	140	109.0					1.23	
		24					19:52:00	20:08:00	S	3,495	140	109.0					1.16	
		25					20:12:00	20:26:00	N	3,505	140	109.0	South end too high - Refly south end				1.17	
		26					20:30:00	20:46:00	S	3,570	140	109.0					1.11	
		25					20:50:00	20:52:00	N	3,505	140	109.0	South end OK				1.06	
		27					20:59:00	21:15:00	N	3,572	140	109.0					1.16	
		28					21:18:00	21:34:00	S	3,498	140	109.0					1.05	
		29					21:37:00	21:52:00	N	3,630	140	109.0					1.27	
		30					21:55:00	22:11:00	S	3,630	140	109.0					1.19	
		31					22:15:00	22:31:00	N	3,498	140	109.0					1.25	
		141					22:35:00	22:35:00	SW	3,839	140	109.0	Too High - Refly				-	
		141					22:42:00	22:45:00	SW	3,839	140	109.0					1.02	
		142					22:49:00	22:52:00	NE	3,980	140	109.0					1.05	
		32					22:58:00	23:14:00	S	3,469	140	109.0	HD1 - Drive 5				1.04	
		33					23:17:00	23:32:00	N	3,465	140	109.0					0.95	
		34					23:35:00	23:51:00	S	3,465	140	109.0					1.06	

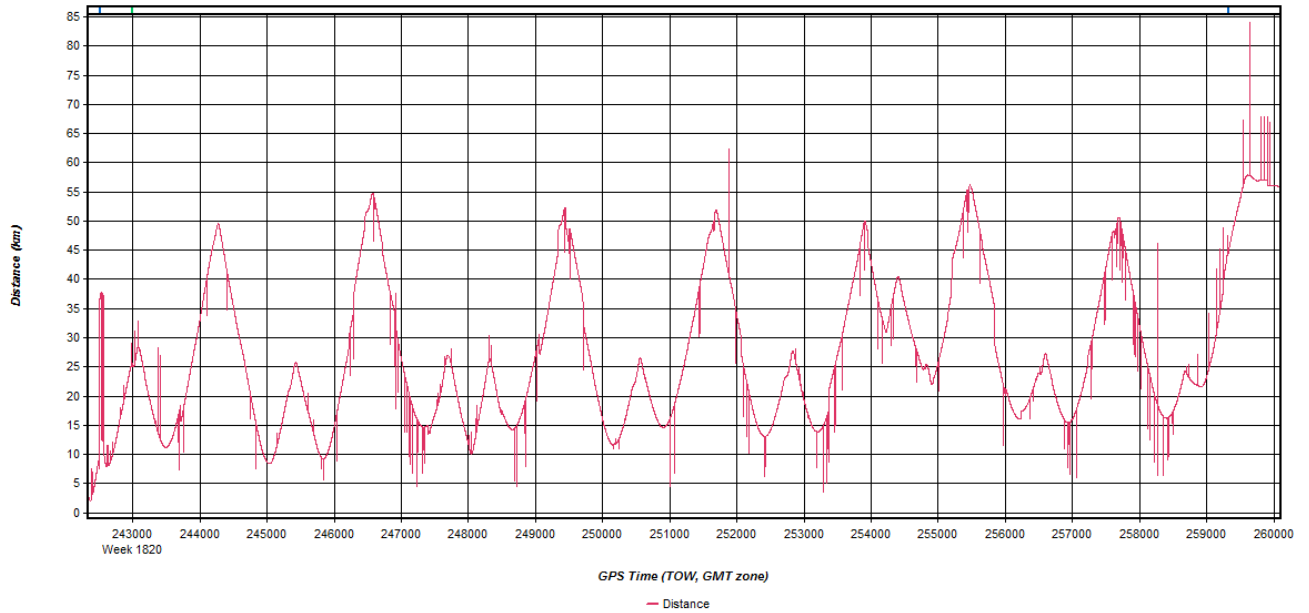
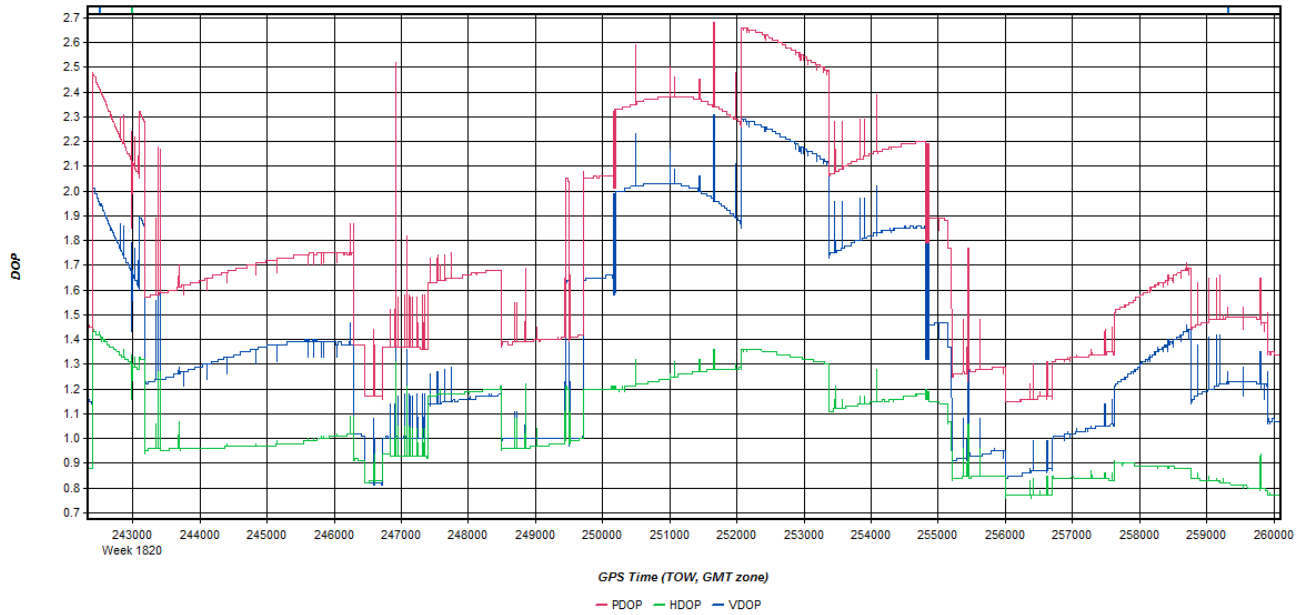
**Q 680i  
Flight Log**

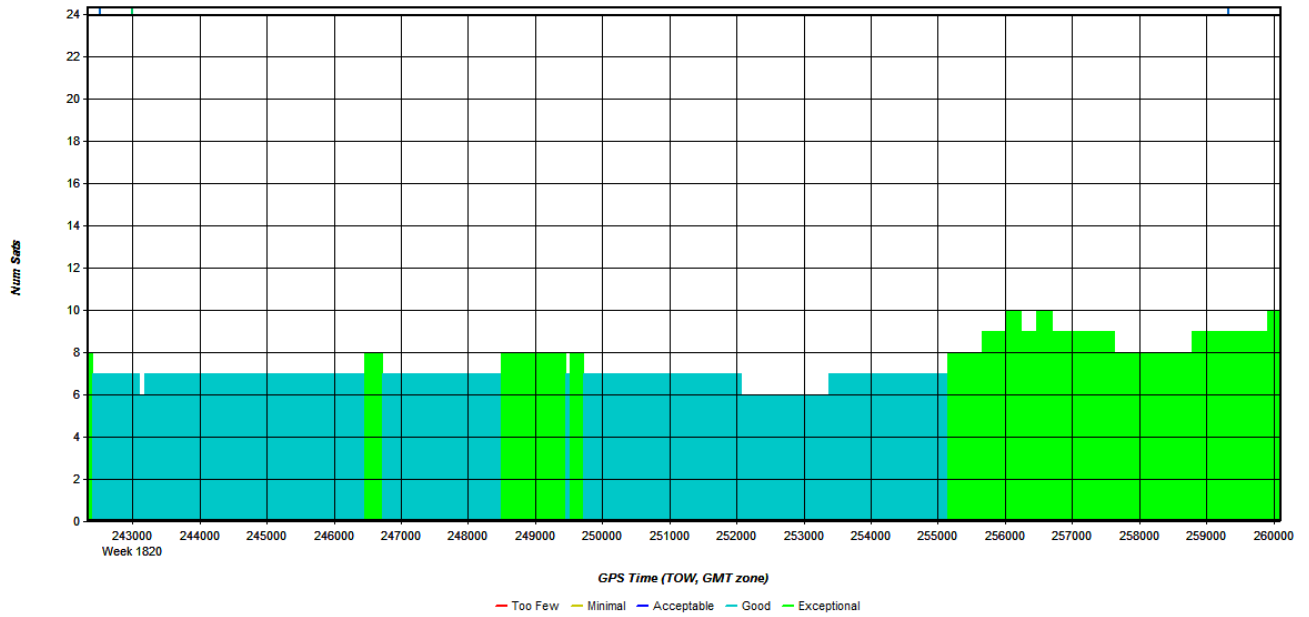
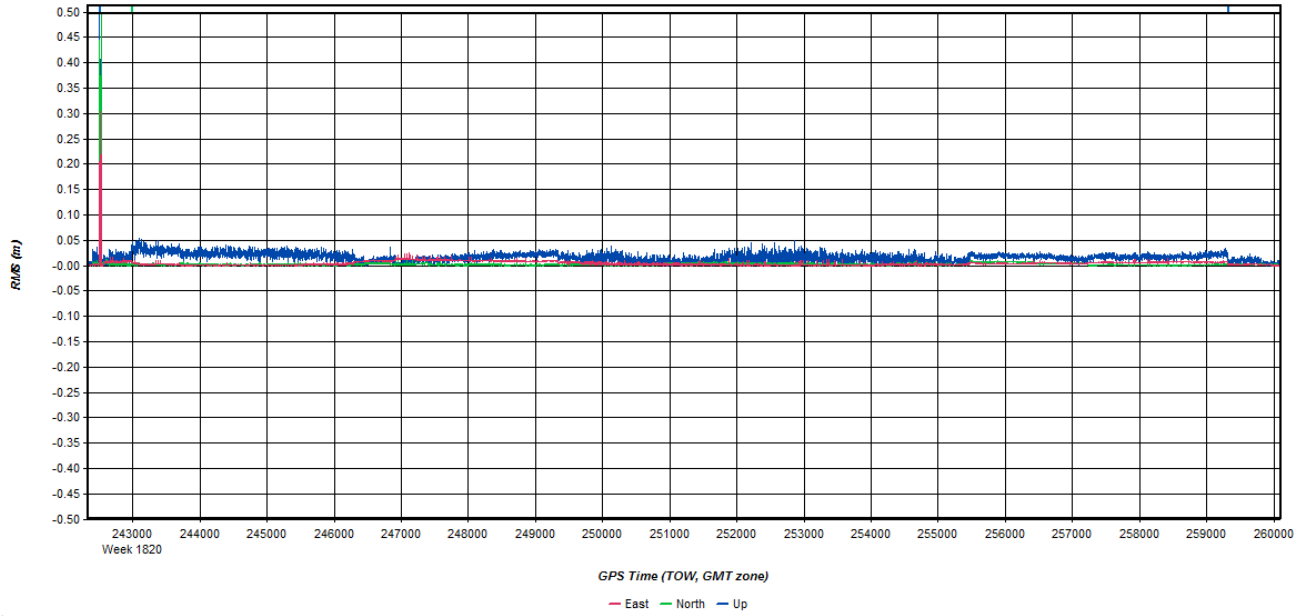
Trajectory and GPS Plots:











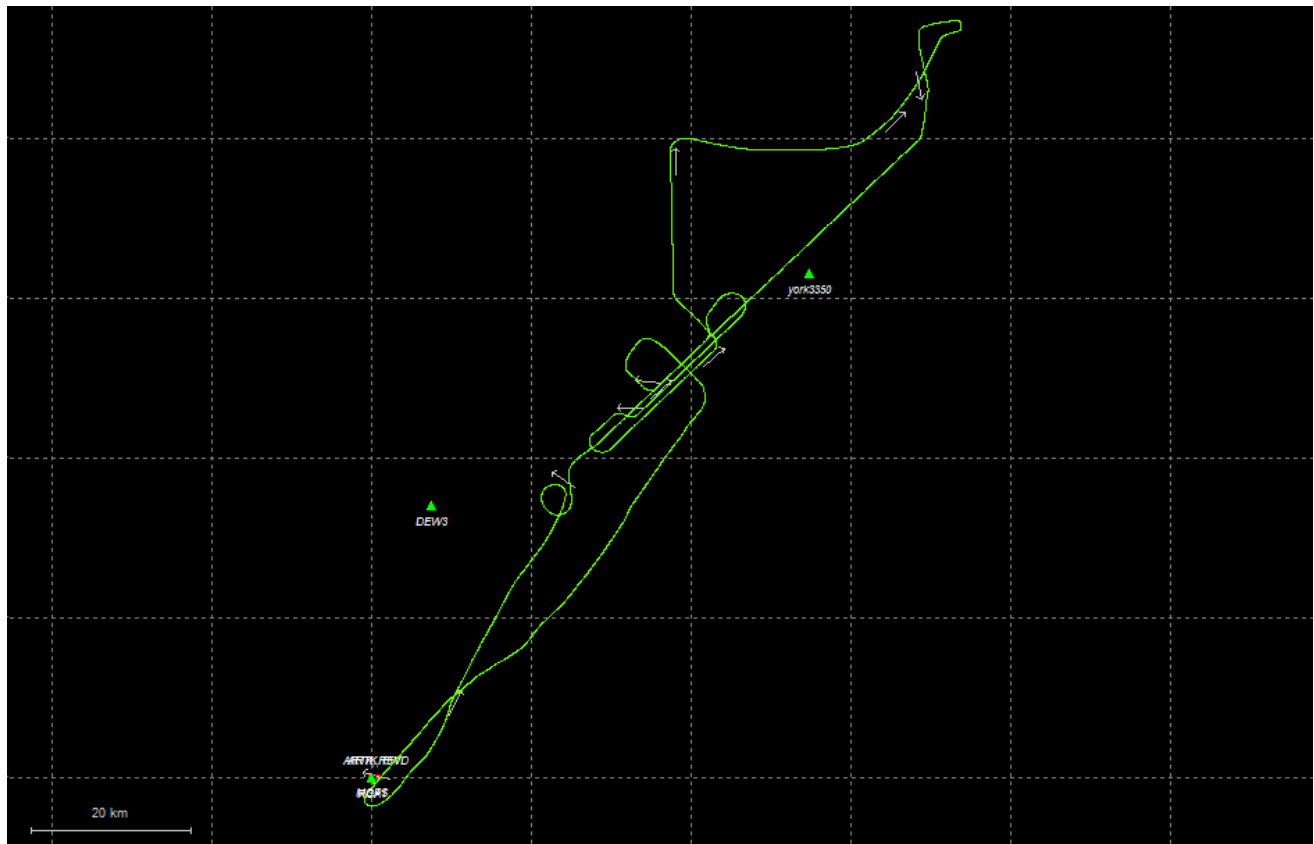
Acquisition and Processing details ----- Collection 3 (December 1, 2014)

Log:

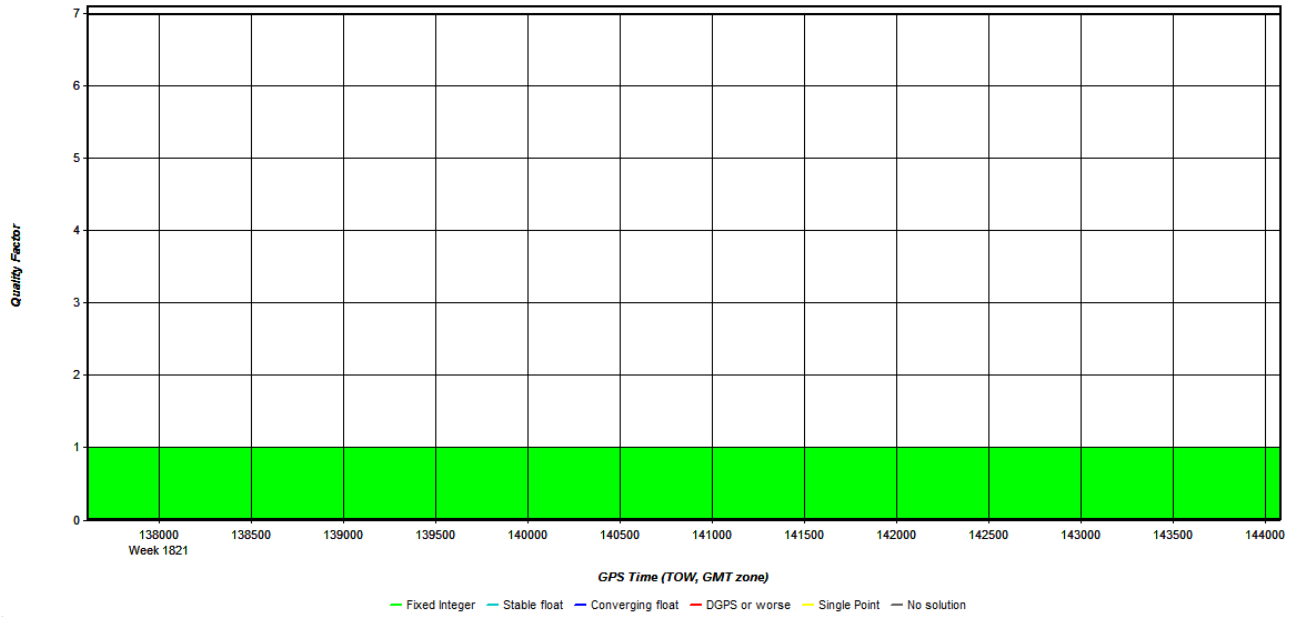
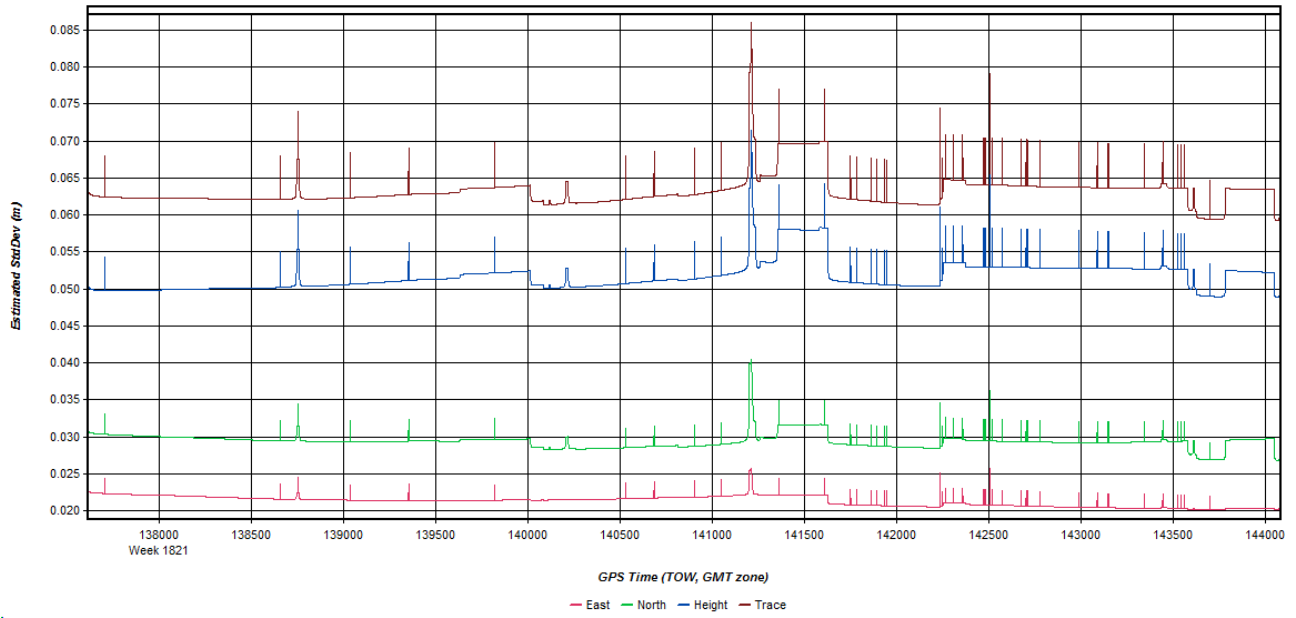
RC&A Richard Crouse & Associates		14.5										Lift Begin		Lift End			Fit	Fit	Hobbs	Activity
		1	KFDK	Chocks	3413.5	KFDK	Chocks	3415.1	Duration	Hrs	Hrs	1.6								
FGI Job #		Project Name			Operator		Unit	IMU		Ground Temp °C	Min Range'	Data Logger Drives								
22.14001100		USGS PA SANDY			T. Pangborn		863	LN-200		36.0	2018	04								
Flight Date		GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)		Flying Temp °C	Max Range'	Download Drive								
1-Dec-14		14-335	1	R680i	R. Sheehan		N/A	N/A		36.0	3888									
Mission ID (yymmdd_Sen_Job_Lift)		Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	MTA	km/WPT	Altm Setting	Humidity @ Alt	Shipping Track						
141201_863_14001100_03		N63868	KFDK	Track	-5	3179	140	60	250000	2	30.24	75								
Base 1 ID		Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)	Stop Time (UTC)	GPS Filename	Operator	Data										
Area	Flight #		Wpt		Distance		UTC		Fit Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOP					
	FGI	RCA	From	To	Begin	End	Start	End												
		143					14:38:00	14:41:00	NE	3,951	135	109.0			1.07					
		144					14:45:00	14:49:00	SW	3,730	115	109.0			1.1					
		145					14:53:00	14:56:00	NE	3,730	135	109.0			1.04					
		22					15:00:00	15:03:00	N	3,641	135	109.0	Calibration line northbound / Abort - Rain		1.02					
		143					15:28:00	15:31:00	SW	3,951	120	109.0	Calibration line southwestbound		1					
							15:34:00	15:35:00	SE	3,860	147	109.0	Calibration cross line		1.09					
													Returned to KFDK due to rain / low clouds / snow on ground							

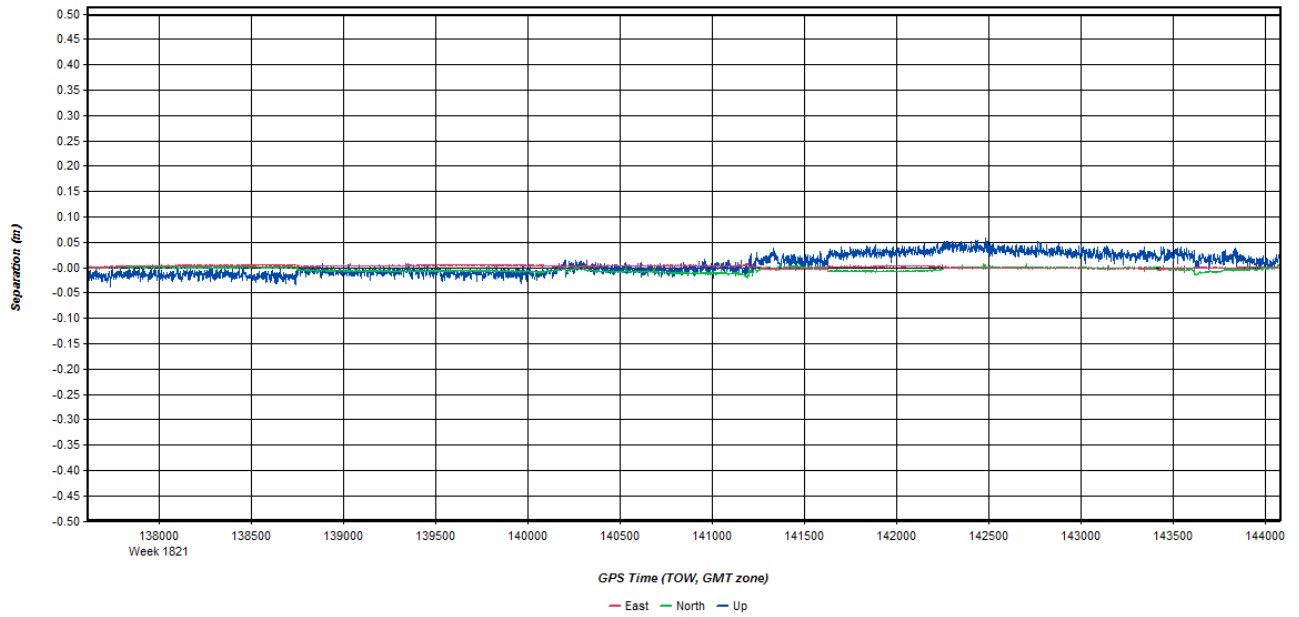
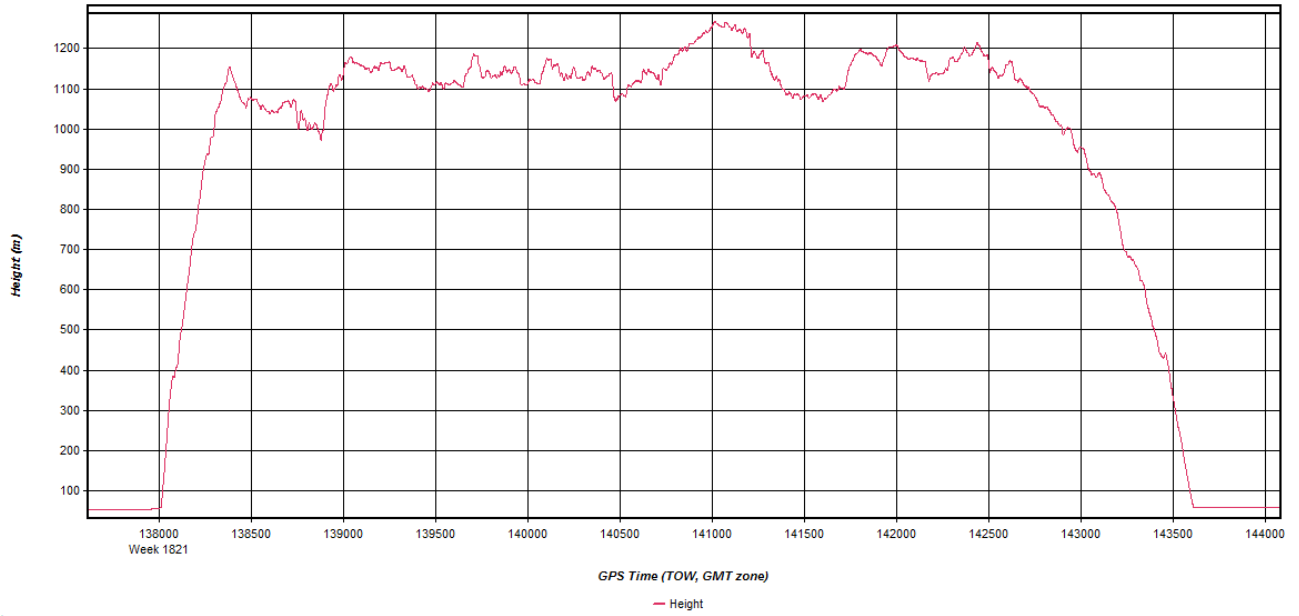
**Q 680i  
Flight Log**

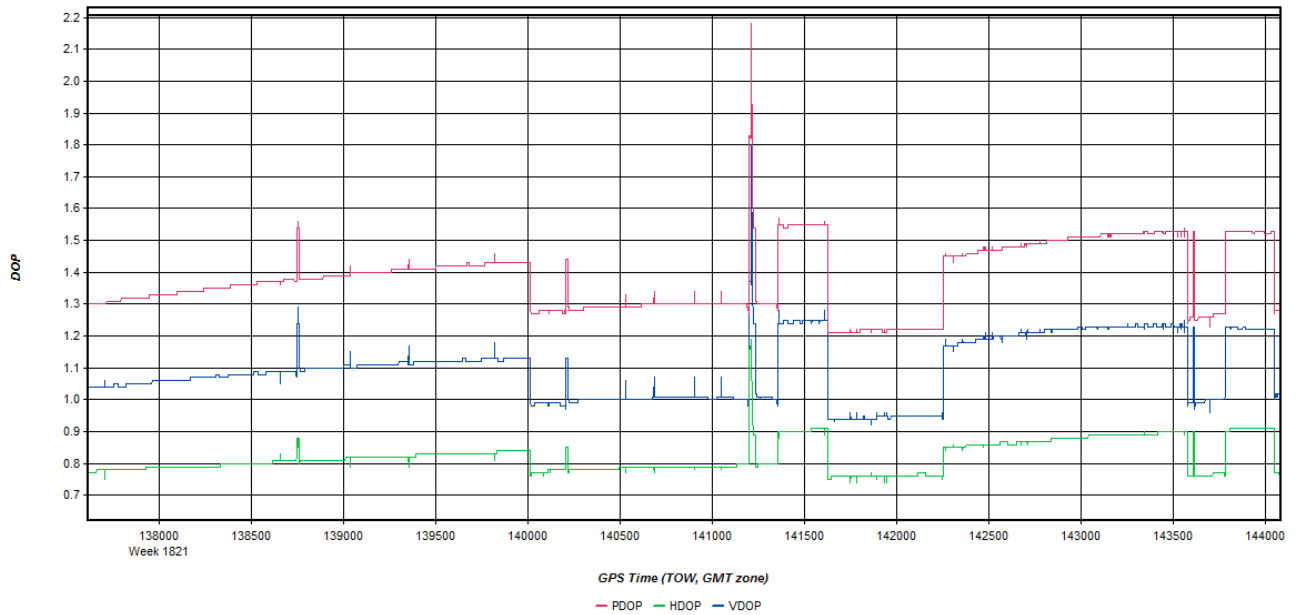
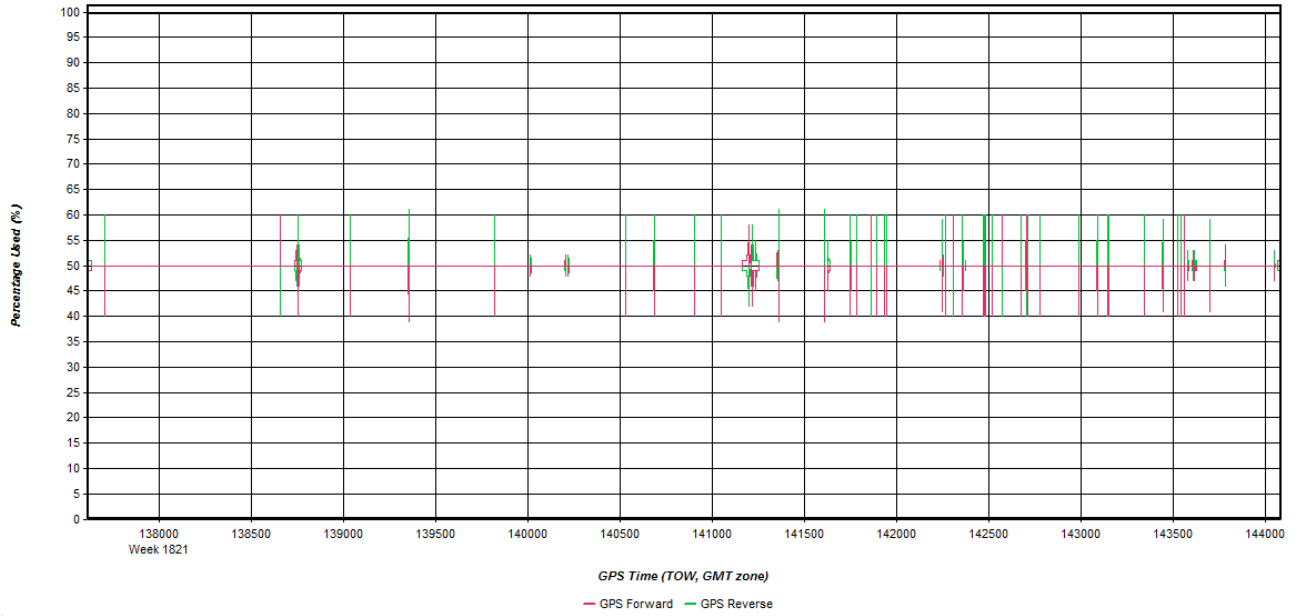
Trajectory and GPS Plots:

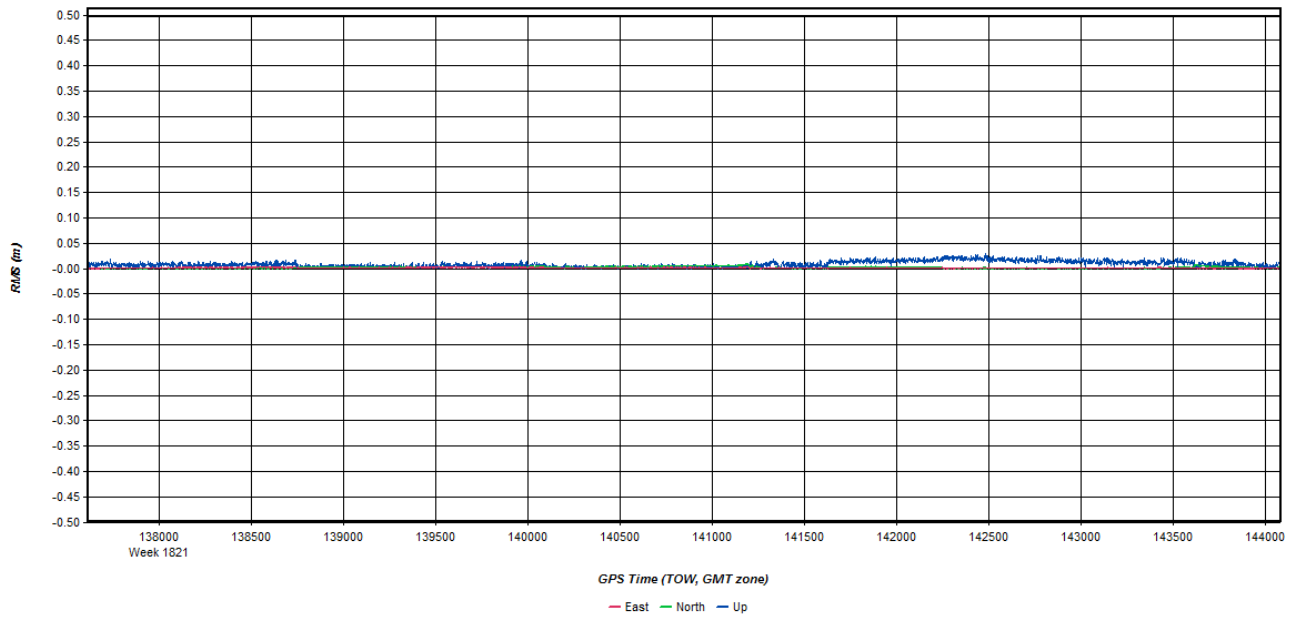
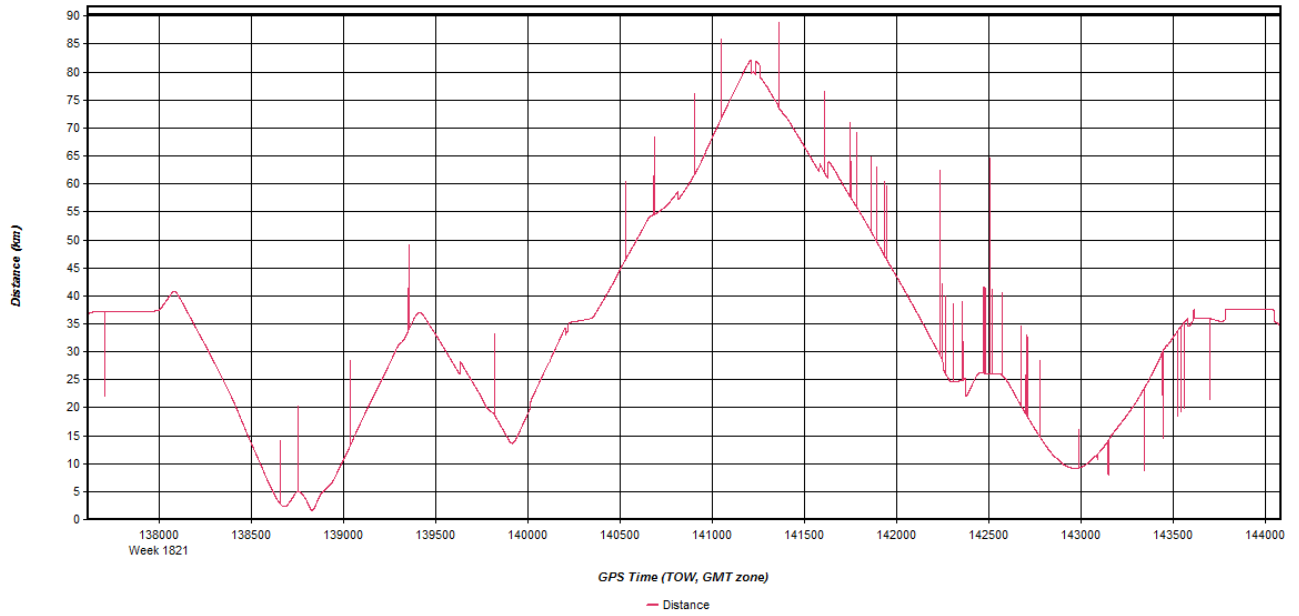


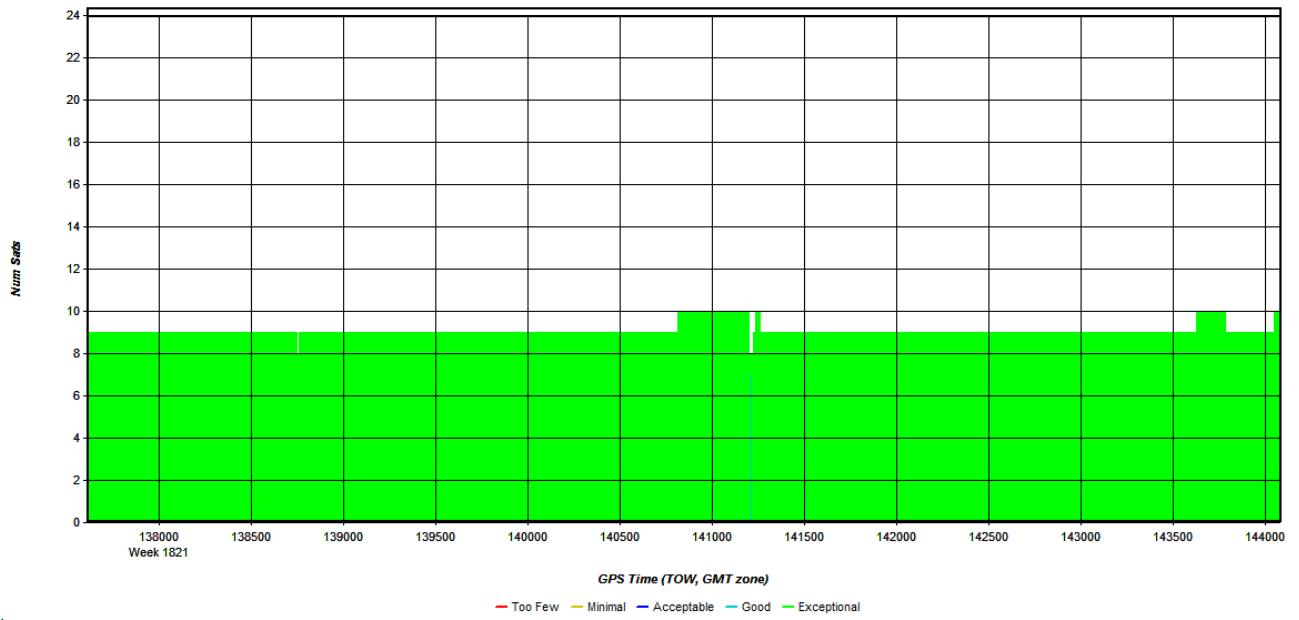














Acquisition and Processing details ----- Collection 4 (December 4, 2014)

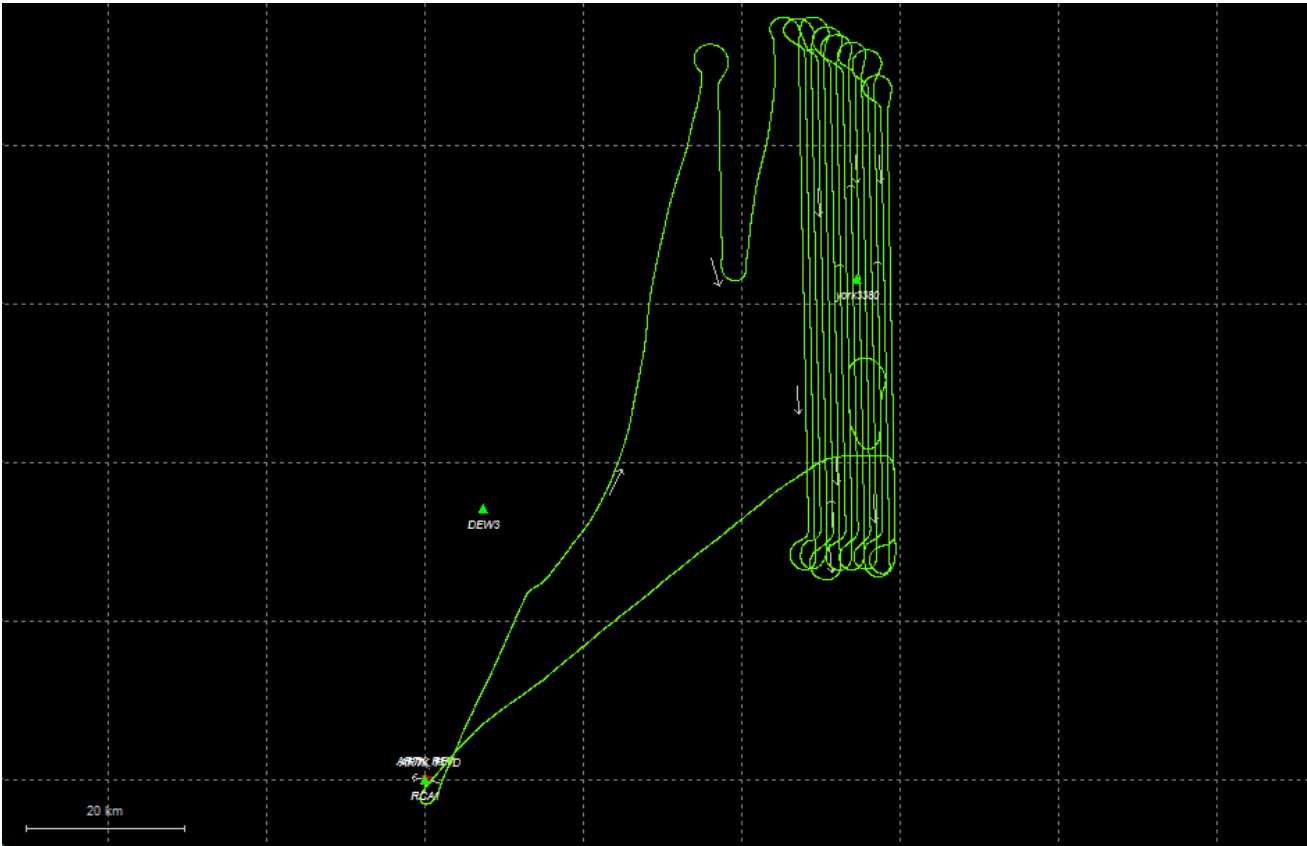
Log:

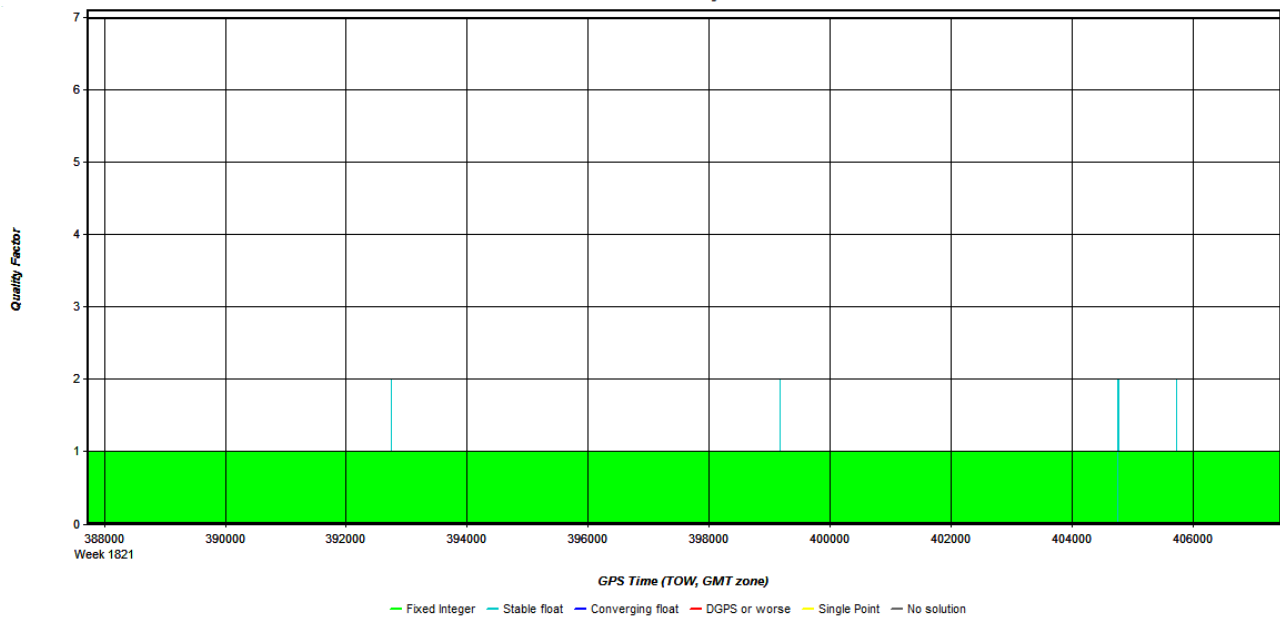
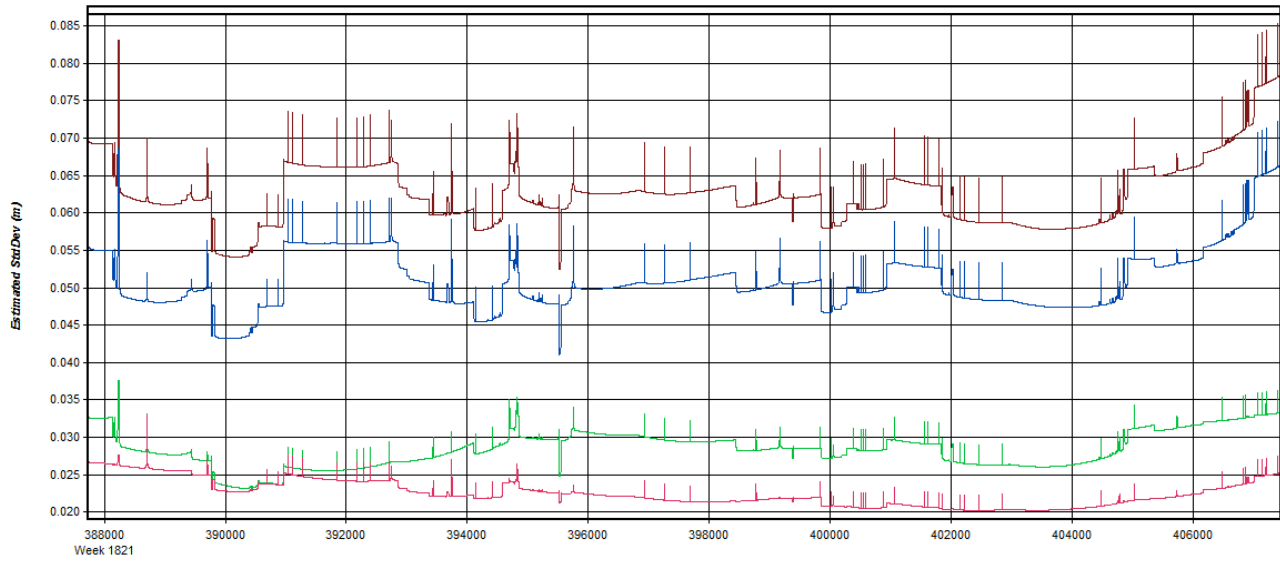
RC&A Richard Crouse & Associates		14.5			Lift Begin			Lift End			Flt		Flt Hobbs		Activity	
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs								
1		3415.1			3420.3							5.2				
2																
3																

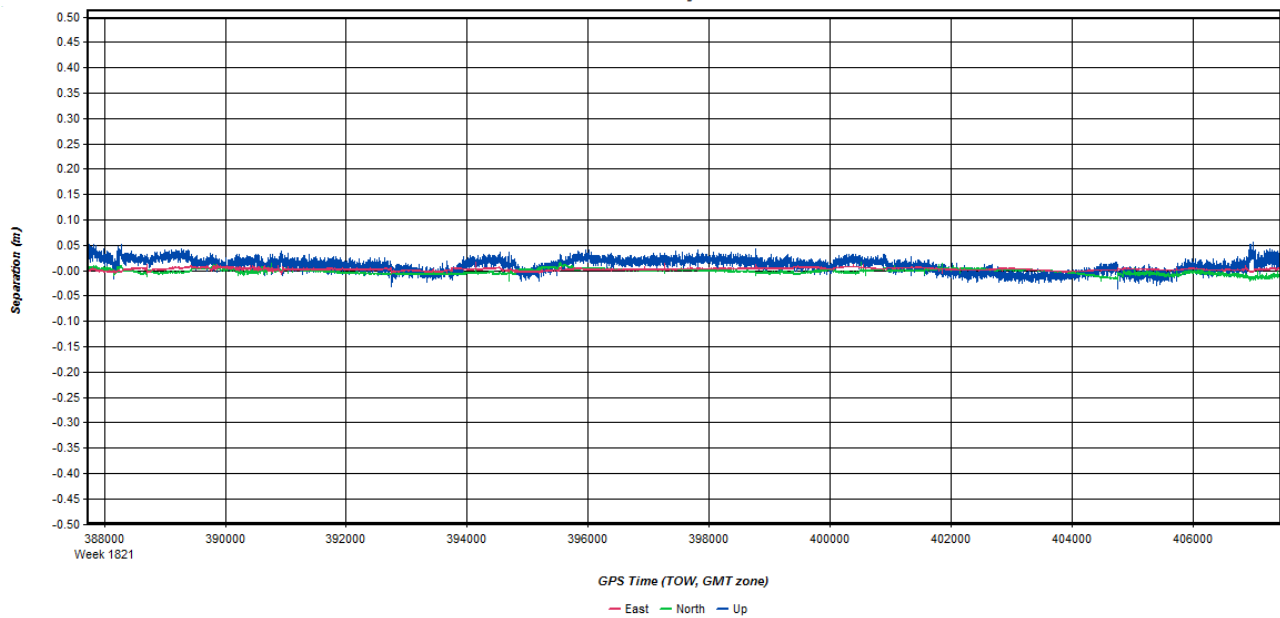
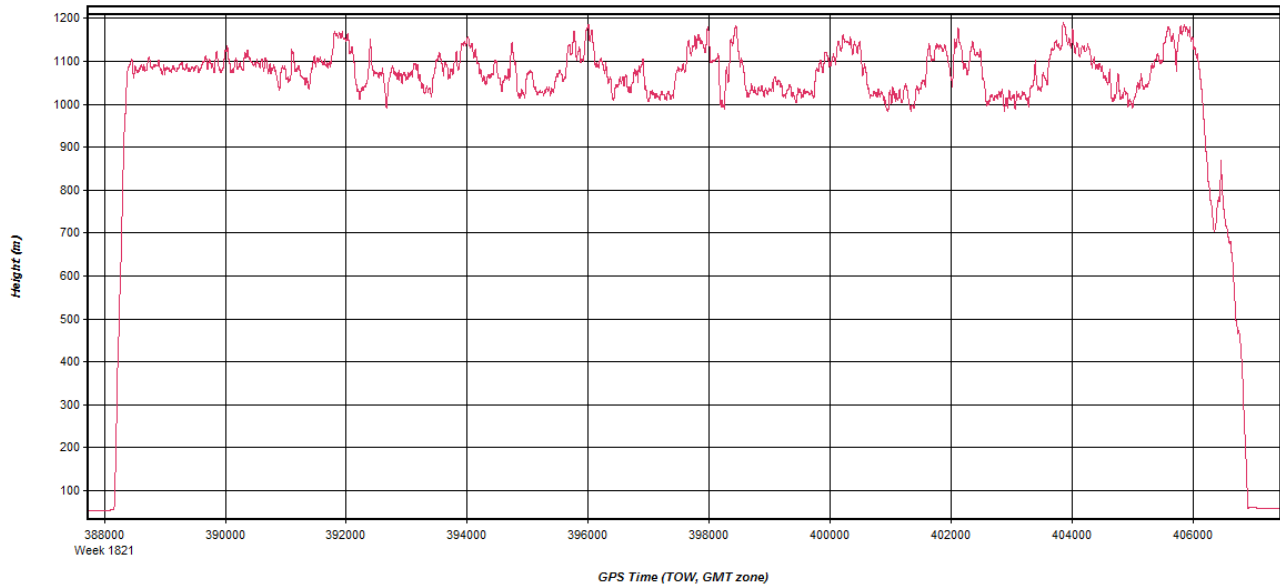
<b>22.14001100</b>		<b>USGS PA SANDY</b>			<b>T. Pangborn</b>		<b>863</b>	<b>LN-200</b>				Ground Temp °C	Mn Range'	Data Logger Drives	
Flight Date	GPS Day	Lift	System	Plot	Sun°	Solar Times (UTC)						Flying Temp °C	Max Range'	Down load Drive	
<b>4-Dec-14</b>	<b>14-338</b>	<b>1</b>	<b>R680I</b>	<b>D. Ewing</b>	<b>N/A</b>	<b>N/A</b>						<b>18.0</b>	<b>2018</b>	<b>4 &amp; 5</b>	
Mission ID (ymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	MTA	km/WPT	Altm Setting	Humidity @ Alt	Shipping Track		
<b>141204_863_14001100_04</b>	<b>N63868</b>	<b>FDK</b>	<b>Track</b>	<b>-5</b>	<b>3180</b>	<b>140</b>	<b>60</b>	<b>250000</b>	<b>2</b>	<b>30.42</b>		<b>68</b>			
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)	Stop Time (UTC)	GPS Filename		Operator		Data				
Area	Flight #	Wpt	Distance	UTC		Flt Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions				SVs	PDOP
	22			Start	End					Line 22 reflight of northern section					1.07
	35			12:17:00	12:22:00	S	3,641	135	109.0						1.3
	36			12:33:00	12:46:00	S	3,630	135	109.0						1.2
	37			12:50:00	13:04:00	N	3,554	140	109.0						1.09
	38			13:07:00	13:20:00	S	3,580	135	109.0						1
	39			13:24:00	13:37:00	N	3,630	135	109.0						1.16
	40			13:41:00	13:54:00	S	3,462	140	109.0						1.1
	41			13:58:00	14:11:00	N	3,462	140	109.0						1.22
	42			14:15:00	14:27:00	S	3,430	140	109.0						1.07
	42			14:31:00	14:35:00	N	3,449	135	109.0	Aborted halfway due to traffic					1.04
	43			14:41:00	14:49:00	N	3,449	135	109.0	Picked up line from stopping point					0.98
	44			14:53:00	15:06:00	S	3,456	140	109.0						0.99
	45			15:09:00	15:22:00	N	3,452	140	109.0						1.26
	46			15:25:00	15:38:00	S	3,449	140	109.0						1.31
	47			15:41:00	15:54:00	N	3,446	135	109.0						1.35
	48			15:57:00	16:09:00	S	3,439	140	109.0						1.28
	49			16:13:00	16:25:00	N	3,429	140	109.0						1.19
	49			16:28:00	16:41:00	S	3,426	140	109.0						1.15
	49			16:43:00	16:45:00	N	3,426	144	109.0	Calibration line north					1.15
				16:46:00	16:47:00	W	3,600	140	109.0	Calibration line west					1.14

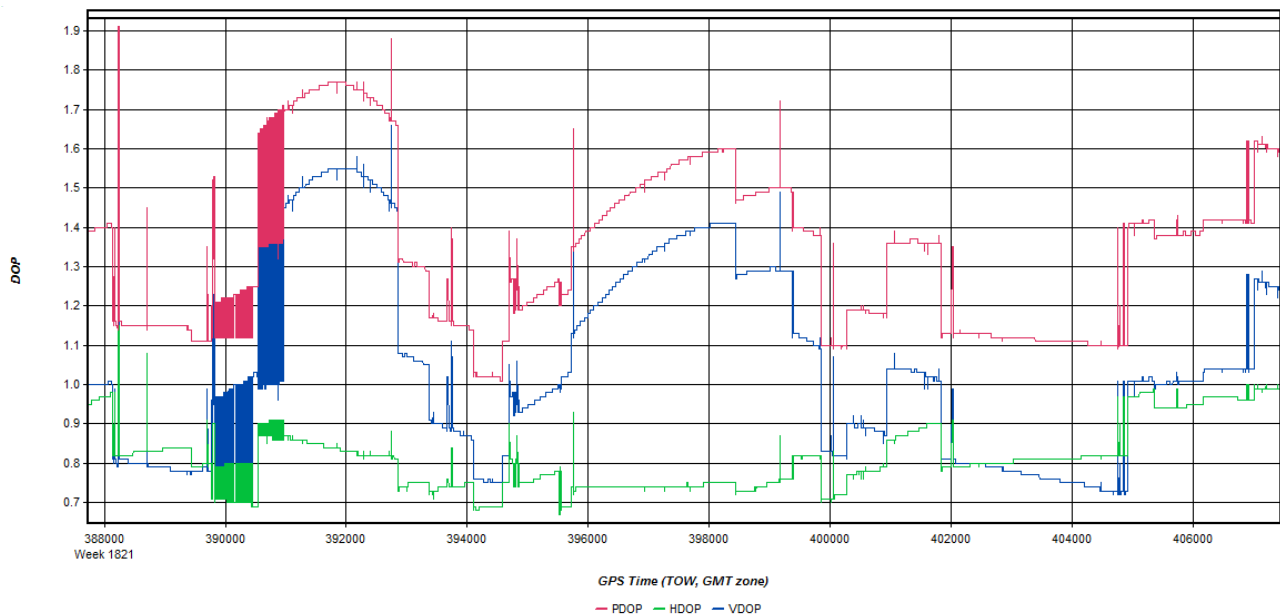
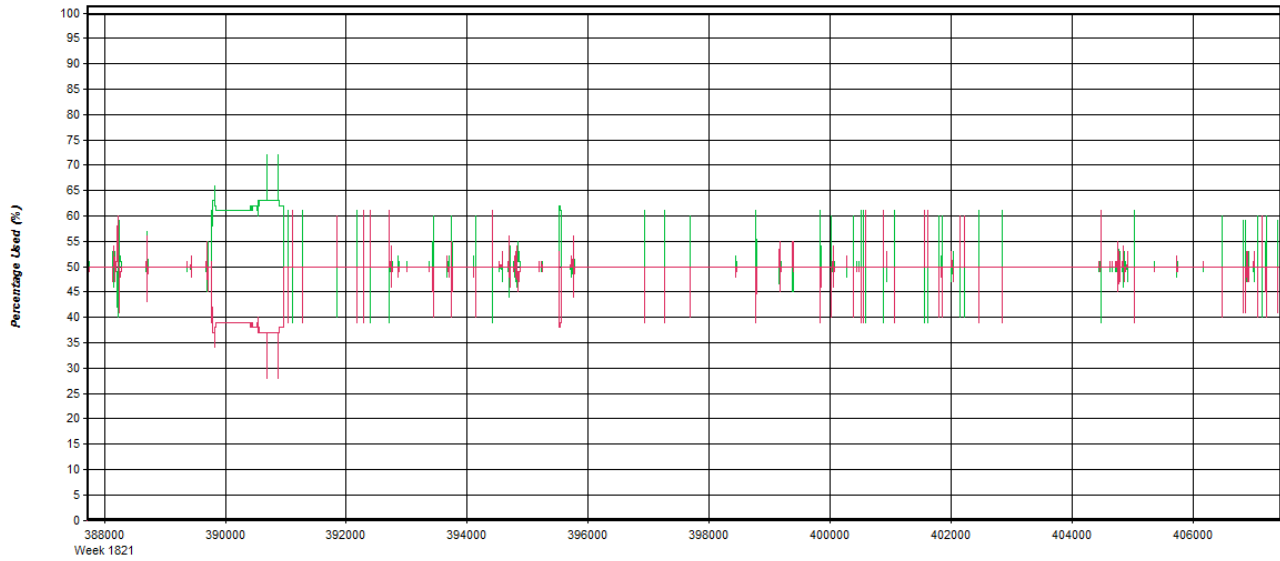
Trajectory and GPS Plots:

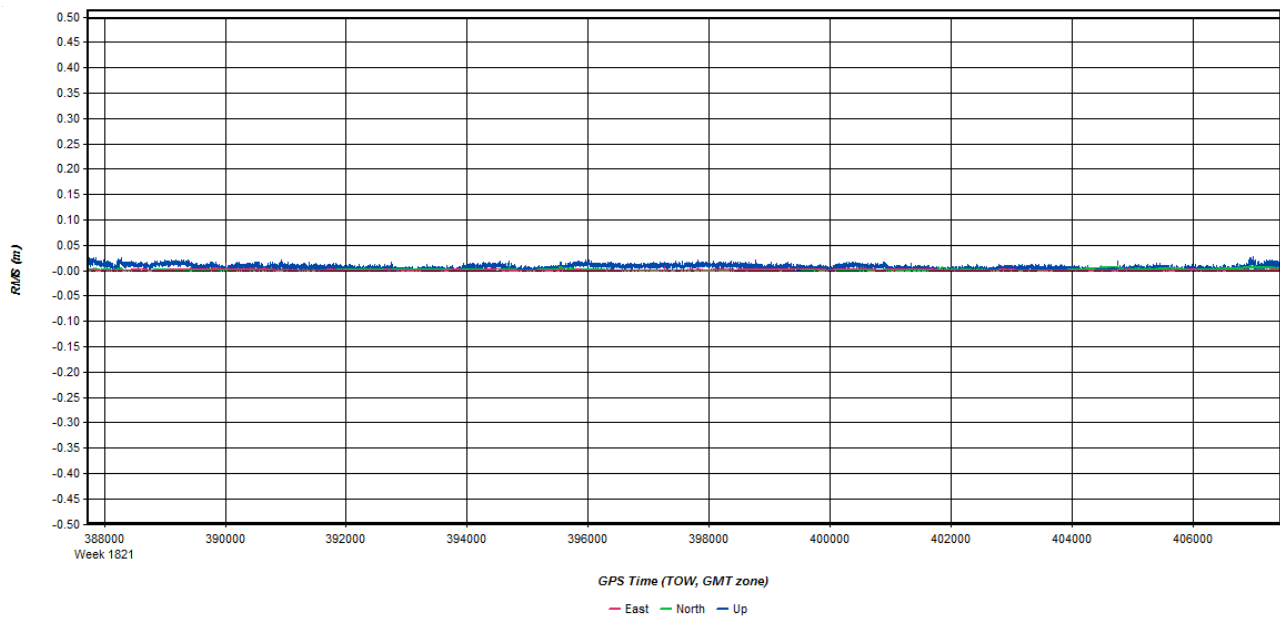
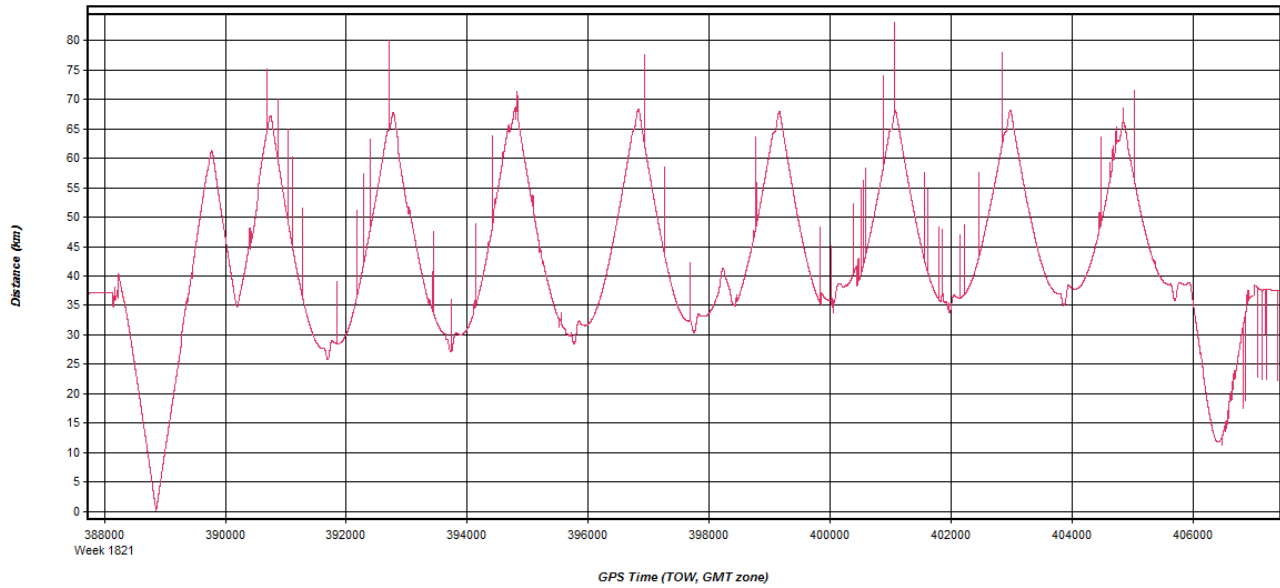


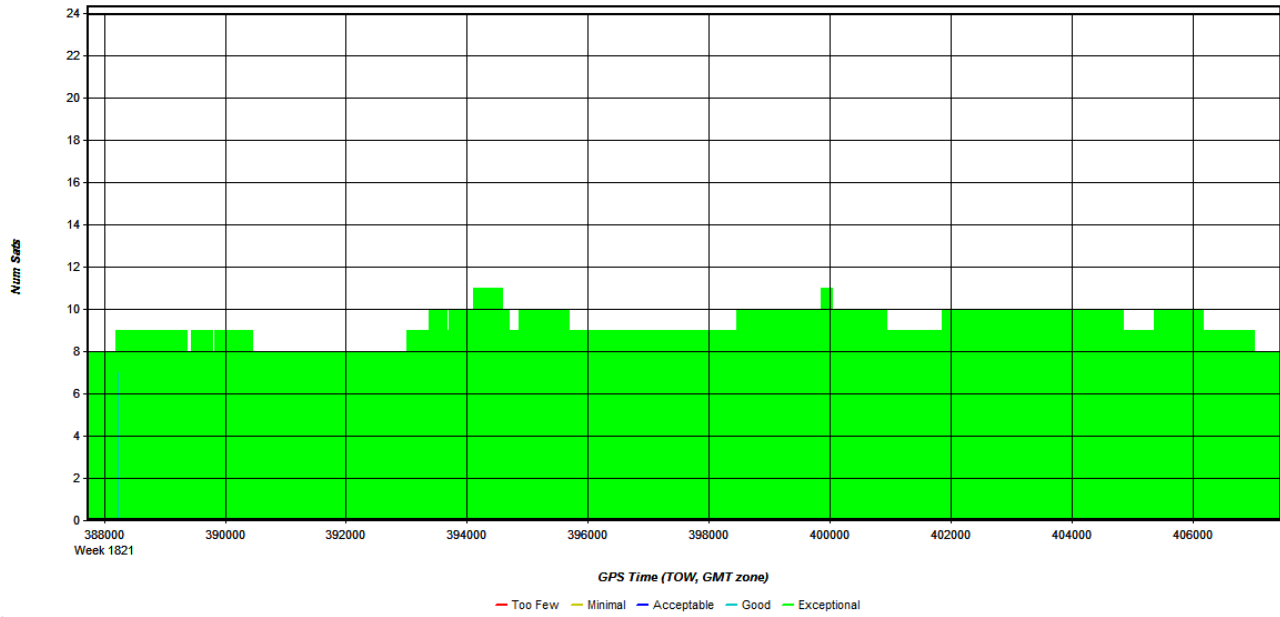














**Acquisition and Processing details ----- Collection 5 (December 4, 2014)**

Log:

RC&A Richard Crouse & Associates		14.5			Lift Begin			Lift End			Fit		Fit		Hobbs		Activity
		Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs							
1				3420.3			3425.3								5.0		
2																	
3																	

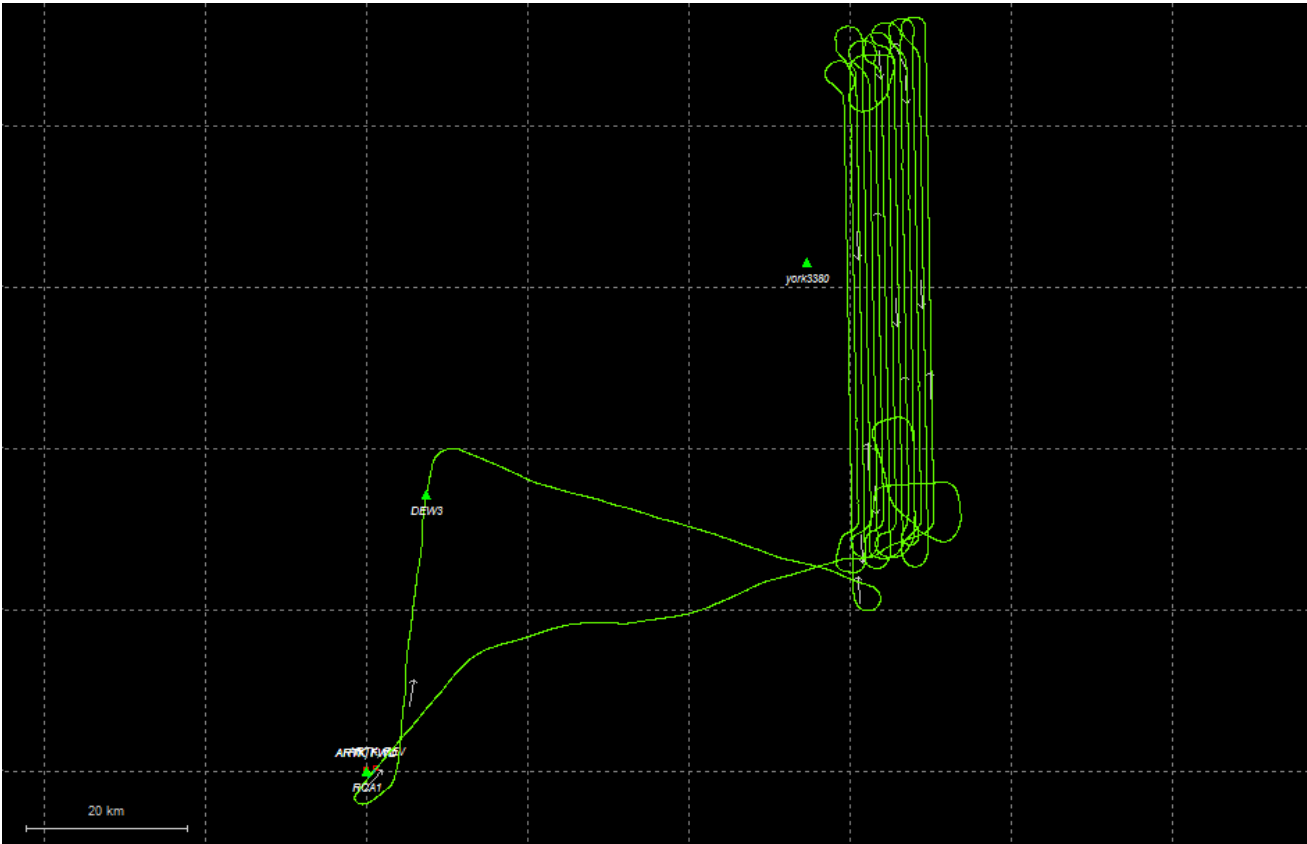
  

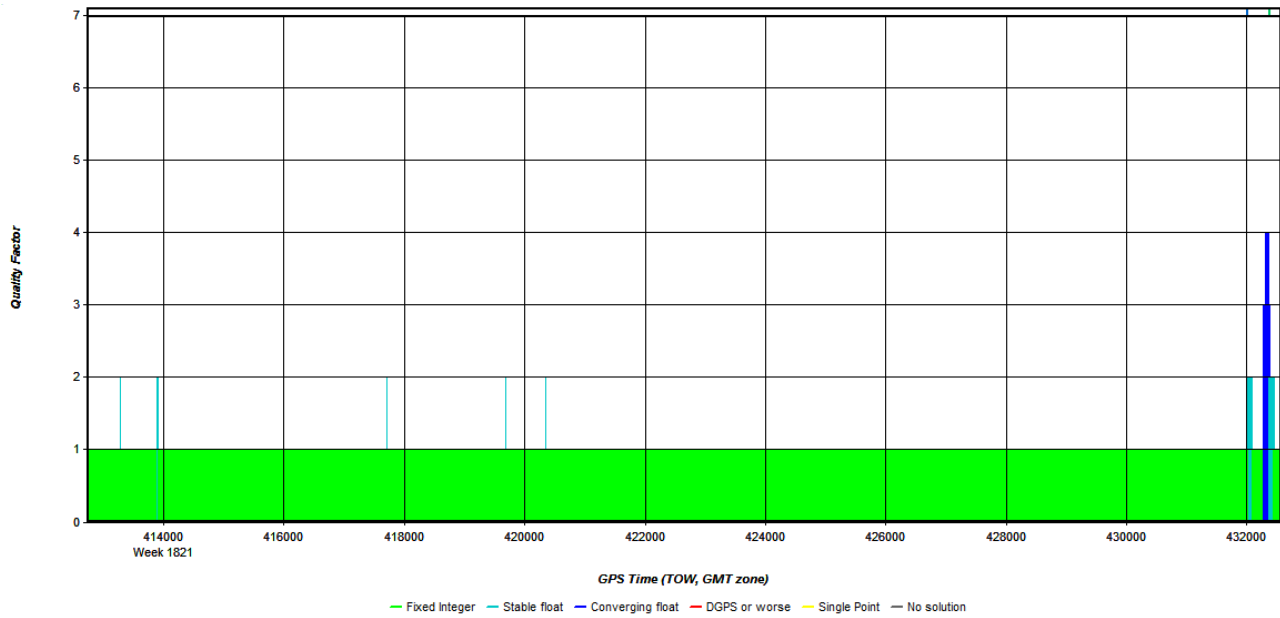
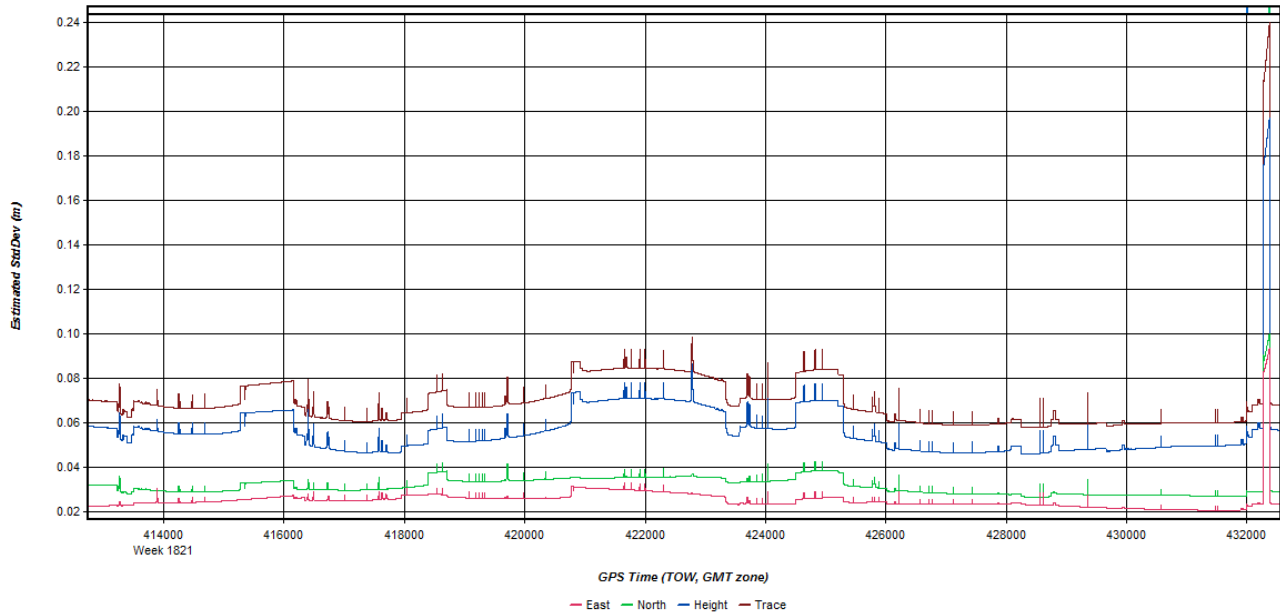
<b>22.14001100</b>		<b>USGS PA SANDY</b>			<b>B. Ruwet</b>		<b>863</b>		<b>LN-200</b>		<b>18.0</b>		<b>2018</b>		<b>7 &amp; 8</b>												
<b>4-Dec-14</b>		<b>14-338</b>		<b>2</b>		<b>R680I</b>		<b>M. Torres</b>		<b>N/A</b>		<b>N/A</b>		<b>18.0</b>		<b>3888</b>											
Mission ID (ymmdd_Sen_Job_Lift)		Aircraft		Airport ID		FMS		UTC		AMT (ft)		Speed		FOV		Scan Rate (Hz)		MTA		km/WPT		Altm Setting		Humidity @ Alt		Shipping Track	
<b>141204_863_14001100_05</b>		<b>N63868</b>		<b>FDK</b>		<b>Track</b>		<b>-5</b>		<b>3180</b>		<b>140</b>		<b>60</b>		<b>250000</b>		<b>2</b>		<b>30.42</b>		<b>68</b>					
Base 1 ID		Location		Rec ID		Ant ID		ARP (m)		Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data									

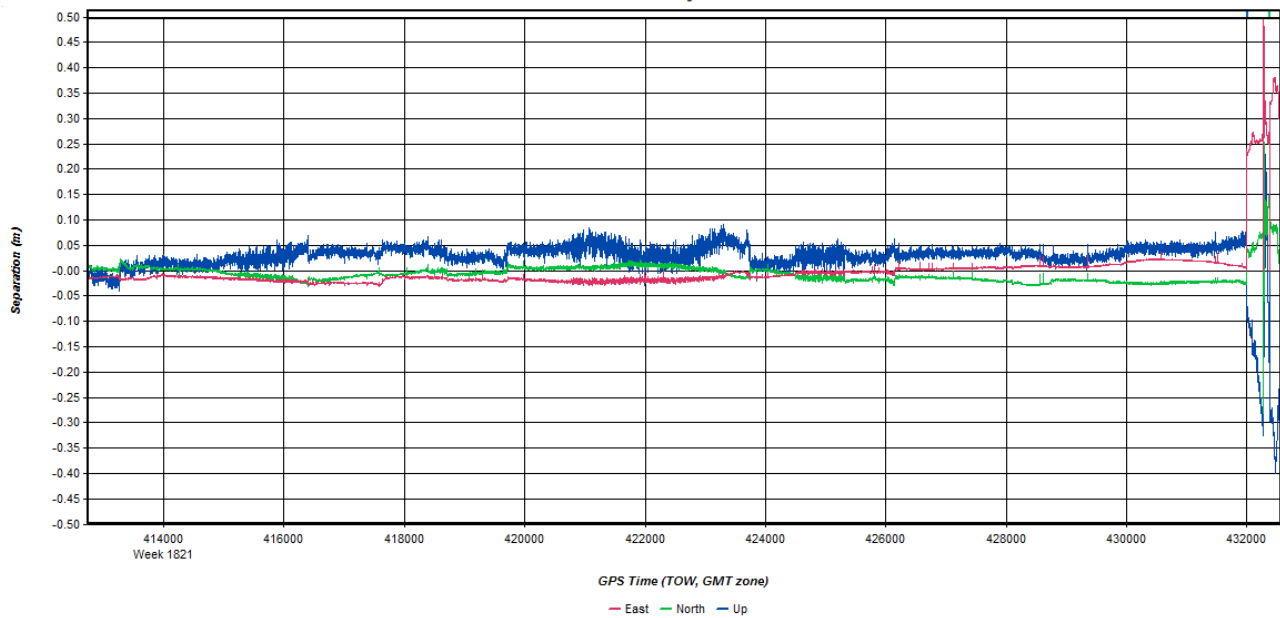
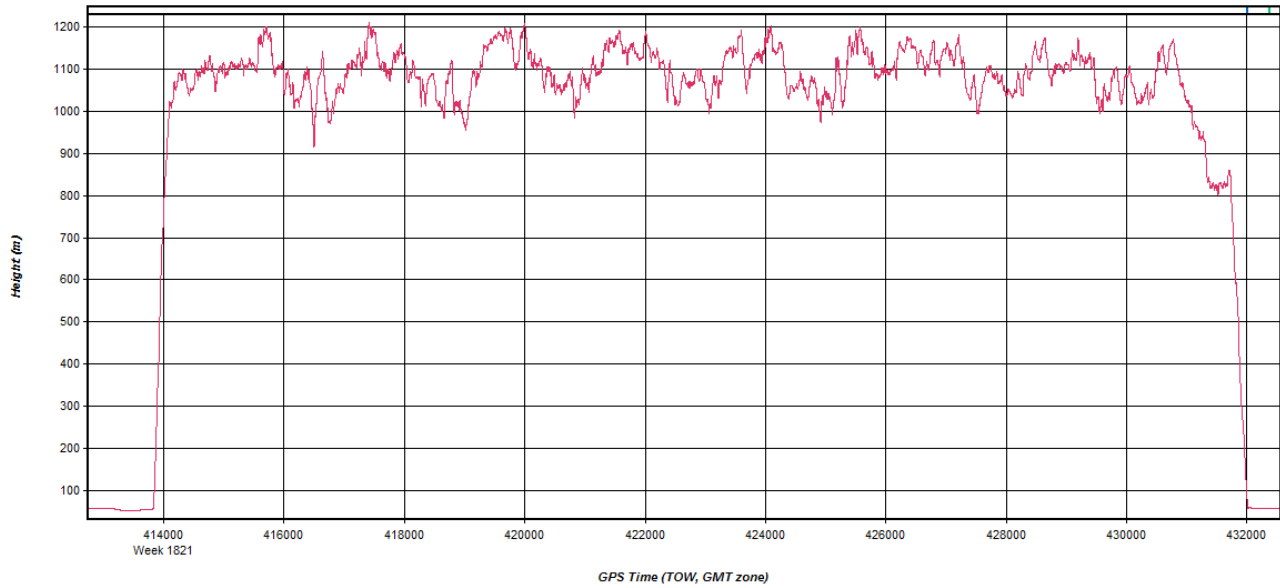
  

Area	Flight #	Wpt	Distance		UTC		Fit	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOP
			From	To	Begin	End							
											Overfly DEW3 CORS		
	50						N	3,420	130	109.0			1.1
	51						S	3,420	125	109.0			1.15
	52						N	3,416	125	109.0			1.04
	53						S	3,416	135	109.0			1.15
	54						N	3,580	130	109.0			1.1
	55						S	3,630	140	109.0			1.31
	56						N	3,580	125	109.0			1.23
	57						S	3,680	140	109.0			1.19
	58						N	3,630	130	109.0			1.13
	59						S	3,630	130	109.0			1.05
	60						S	3,629	130	109.0	Calibration line		1.05
	-						W	3,600	130	109.0	Cross line calibration - perpendicular		1.05
	60						N	3,629	135	109.0			0.97
	61						S	3,630	130	109.0			1.01
	62						N	3,630	130	109.0			1.22
	63						S	3,630	140	109.0			1.28

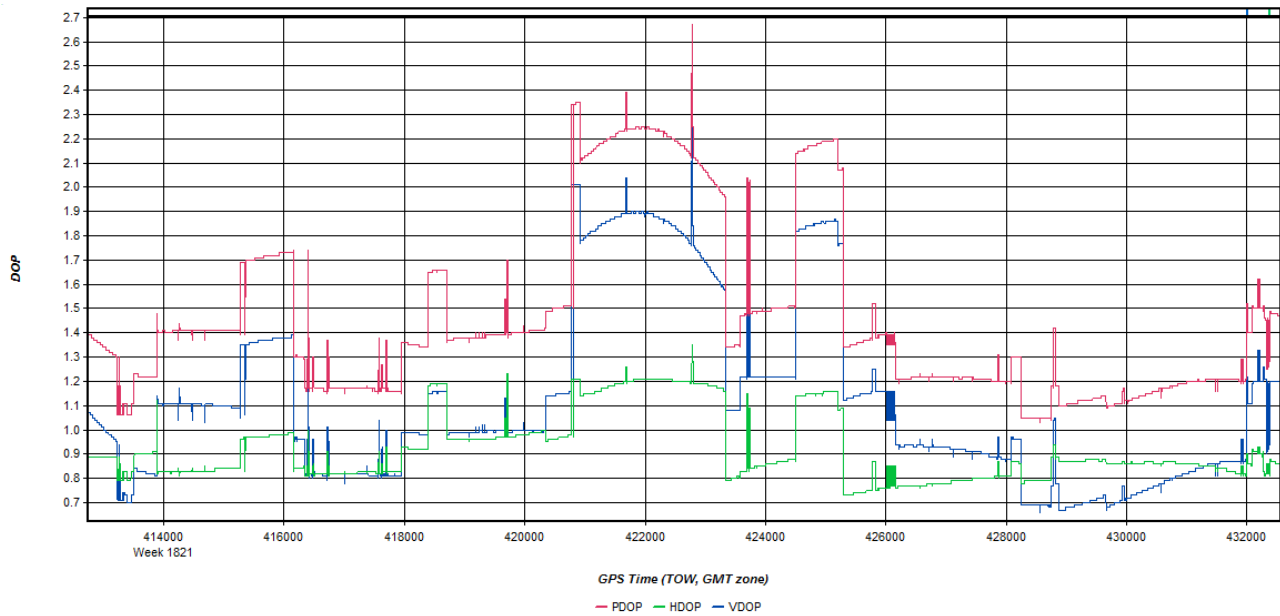
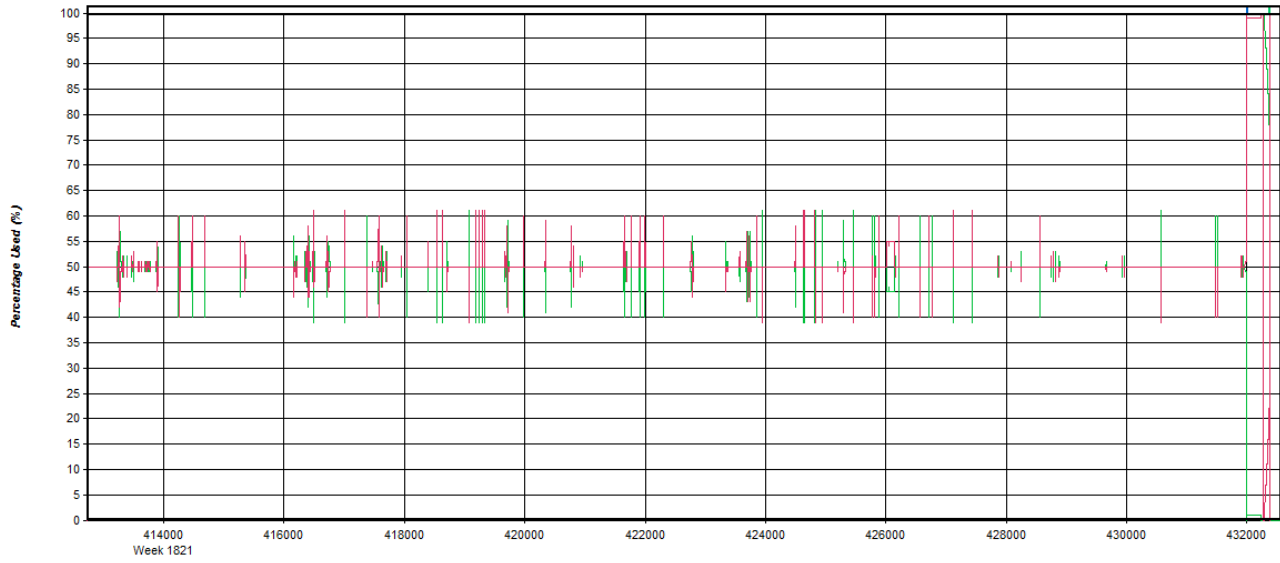
Trajectory and GPS Plots:

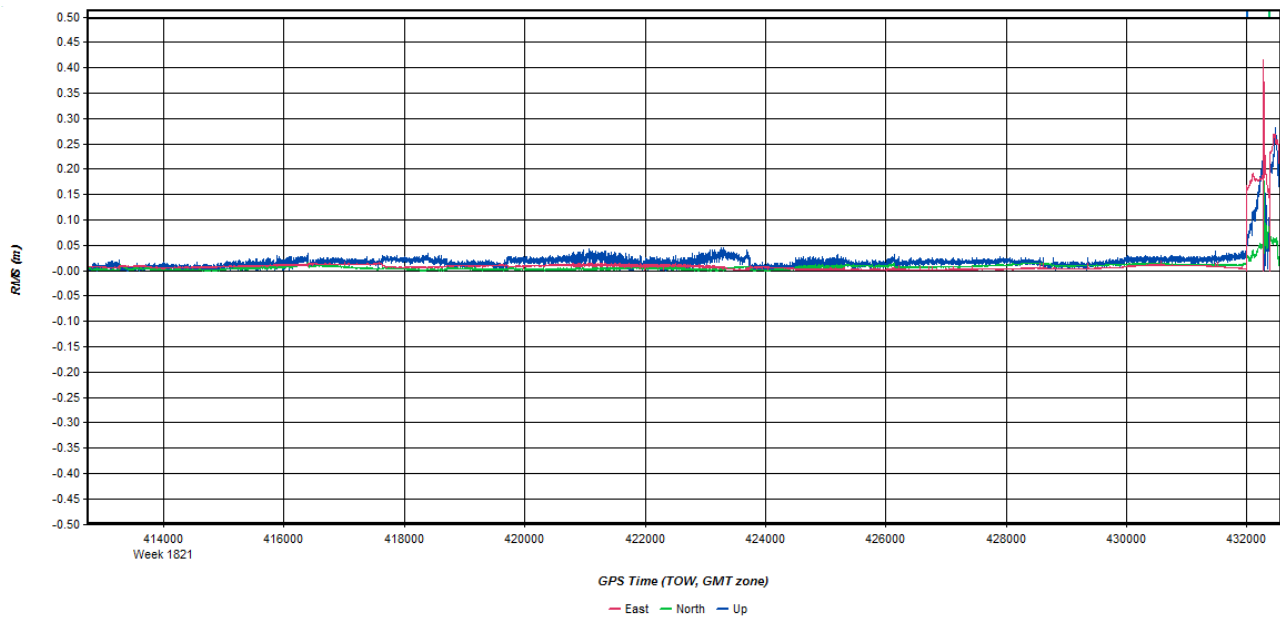
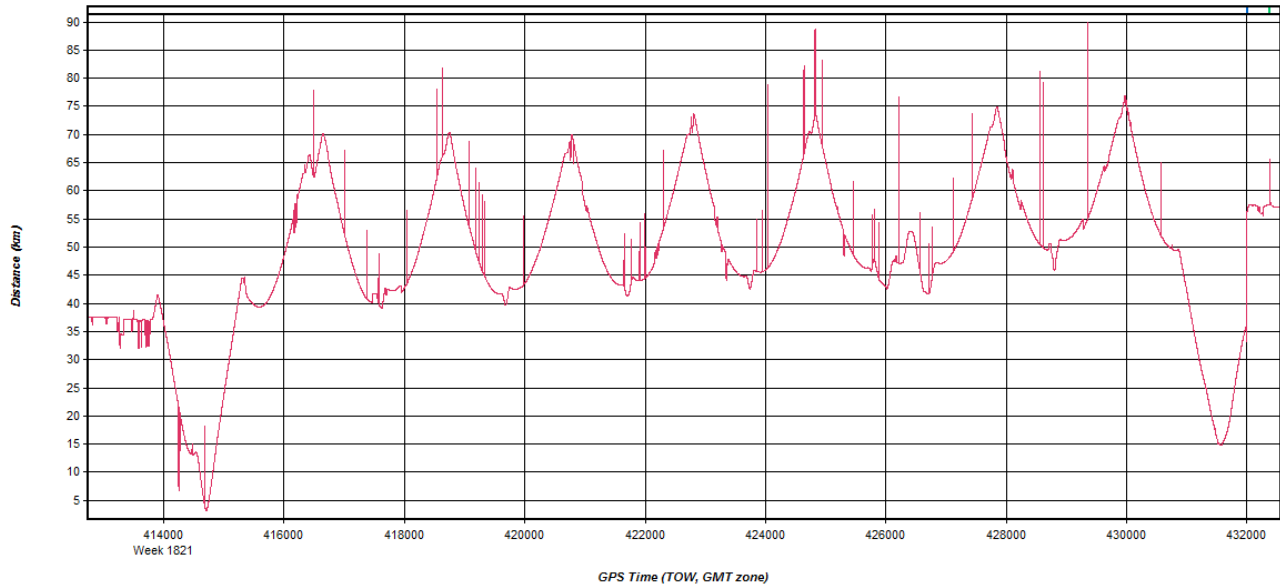


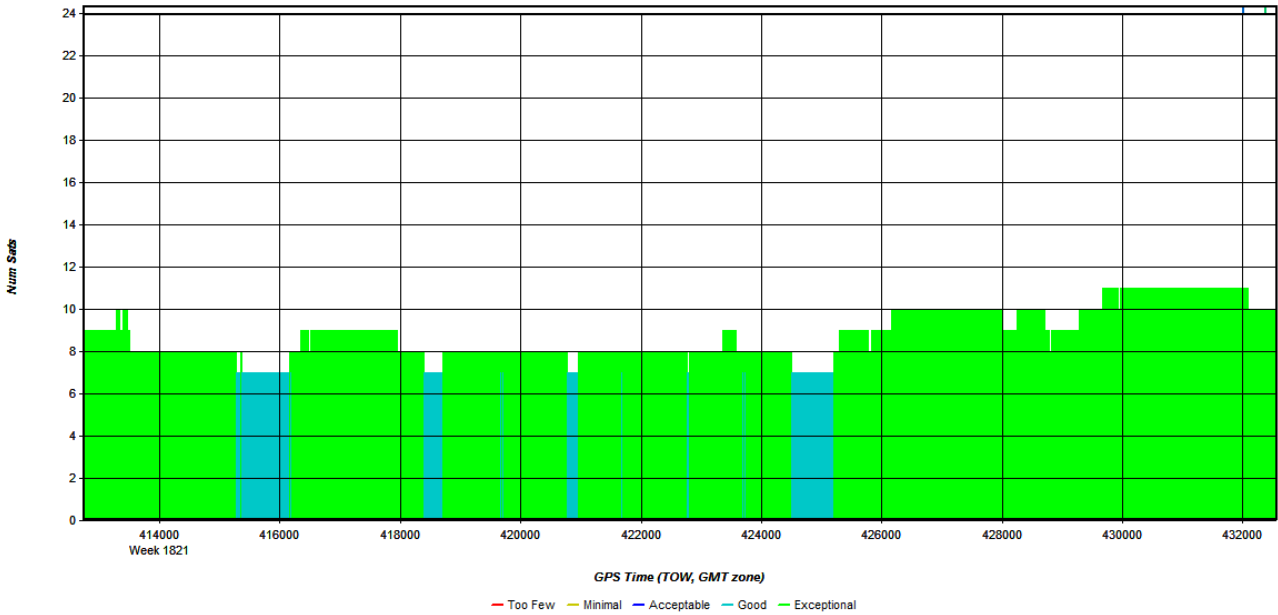












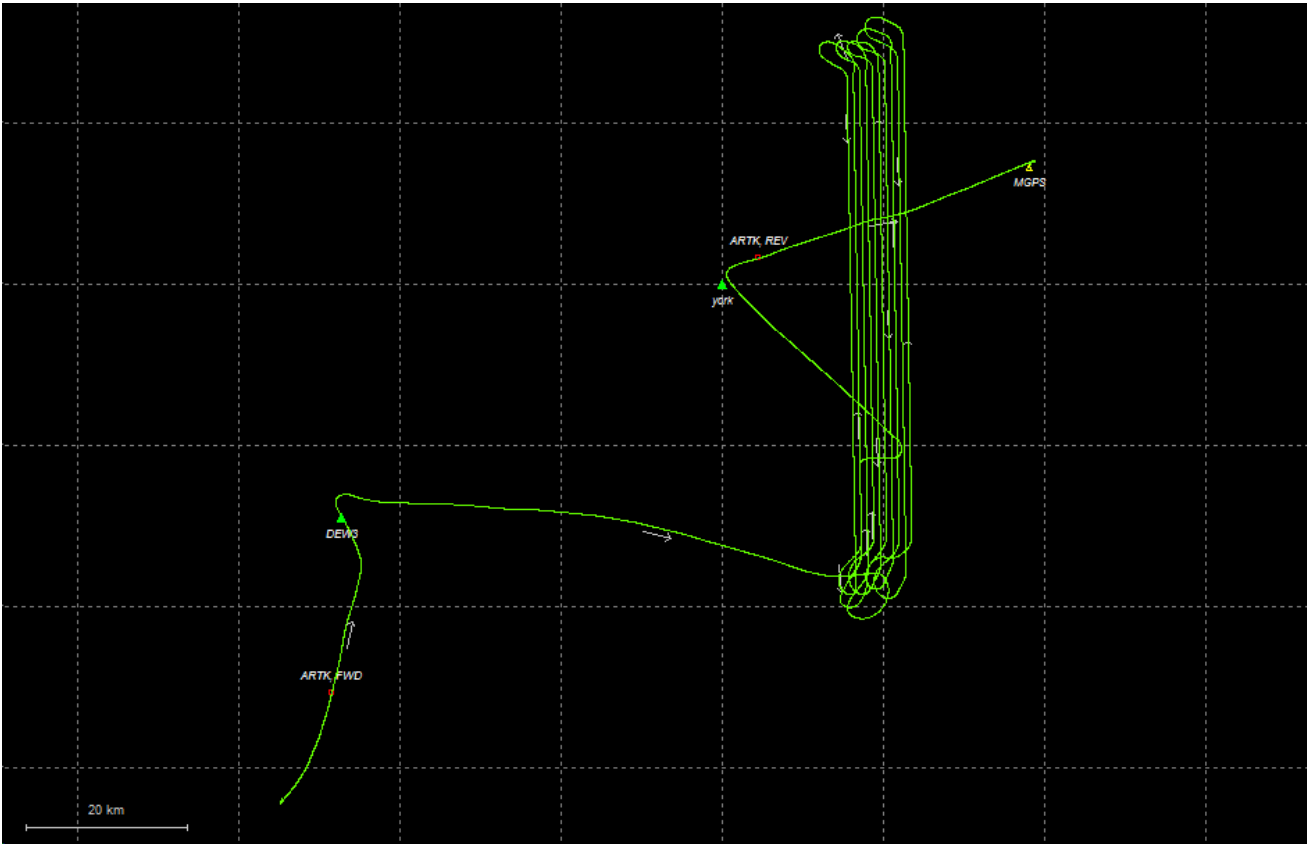


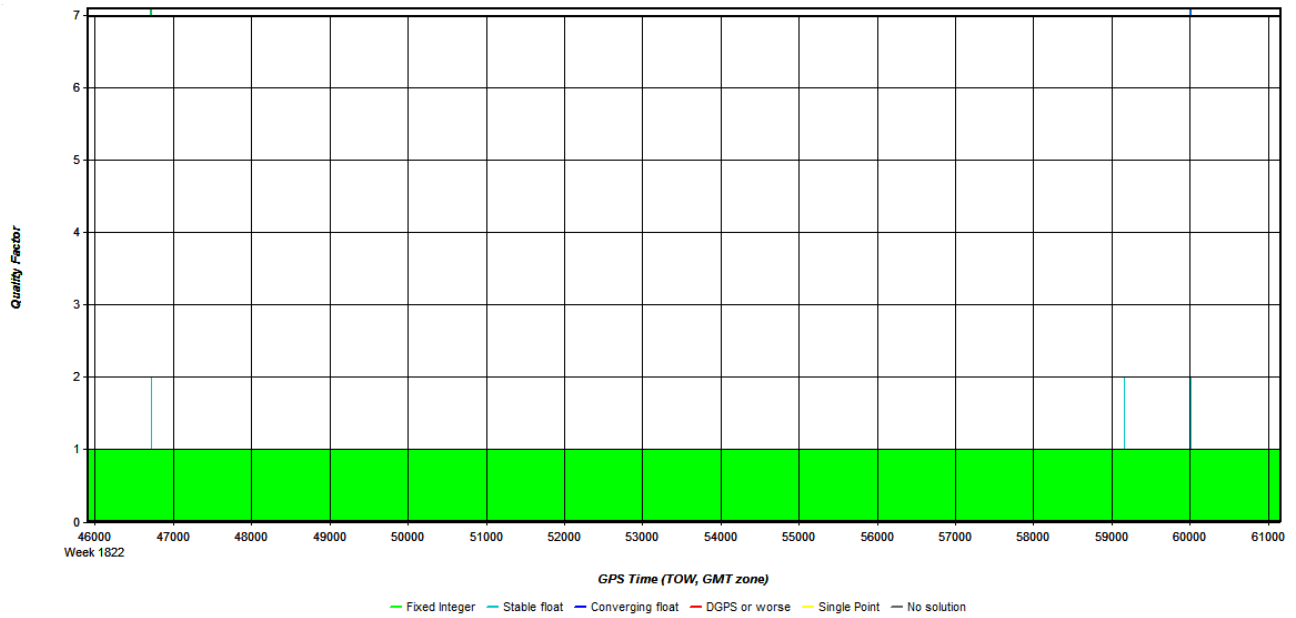
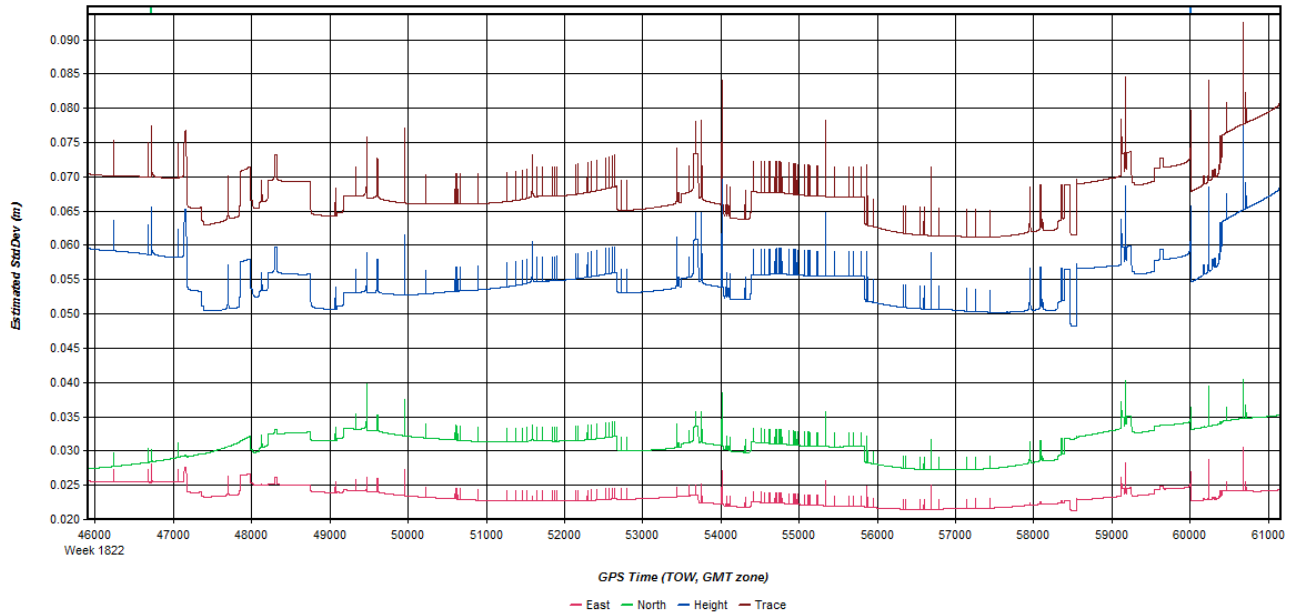
Acquisition and Processing details ----- Collection 6 (December 7, 2014)

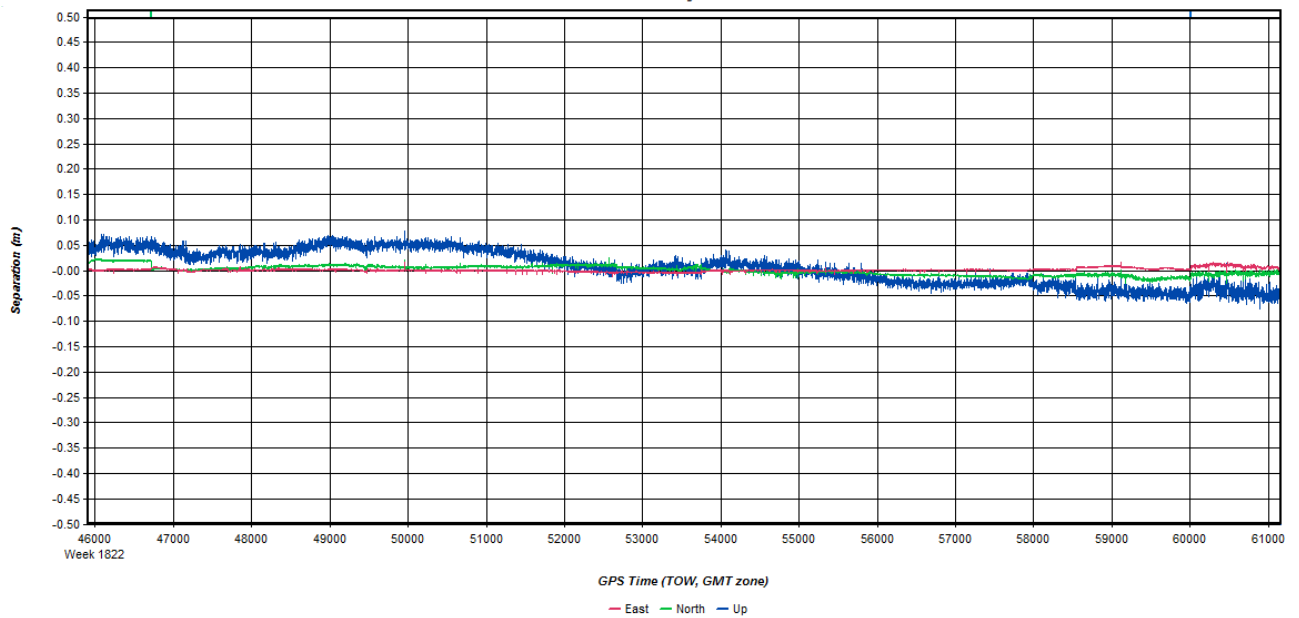
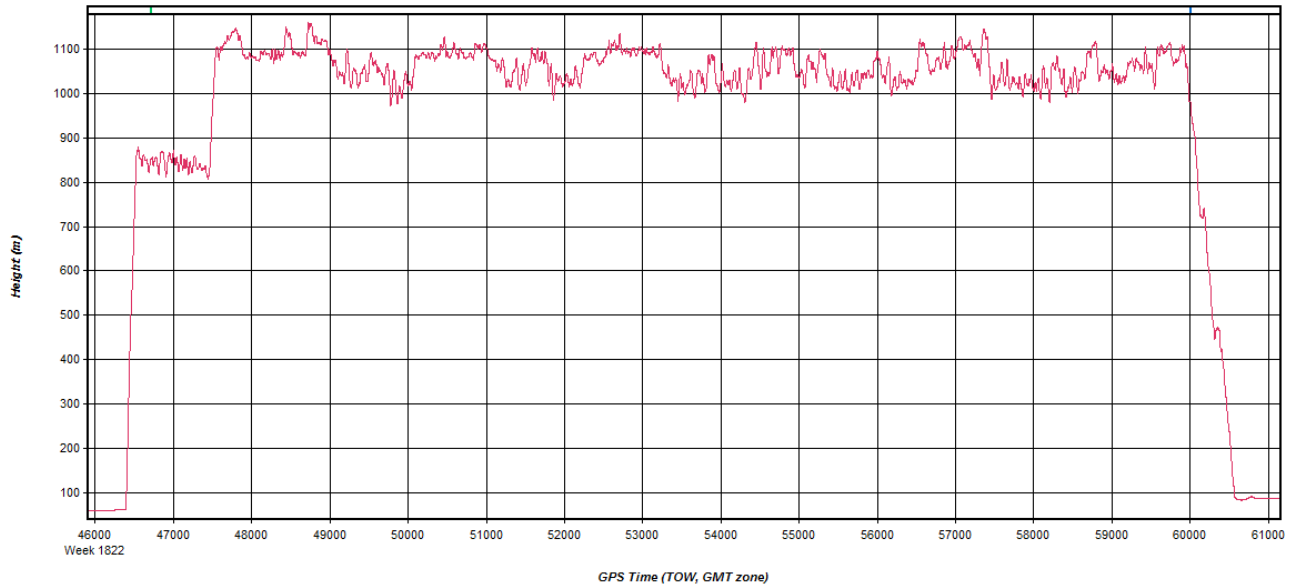
Log:

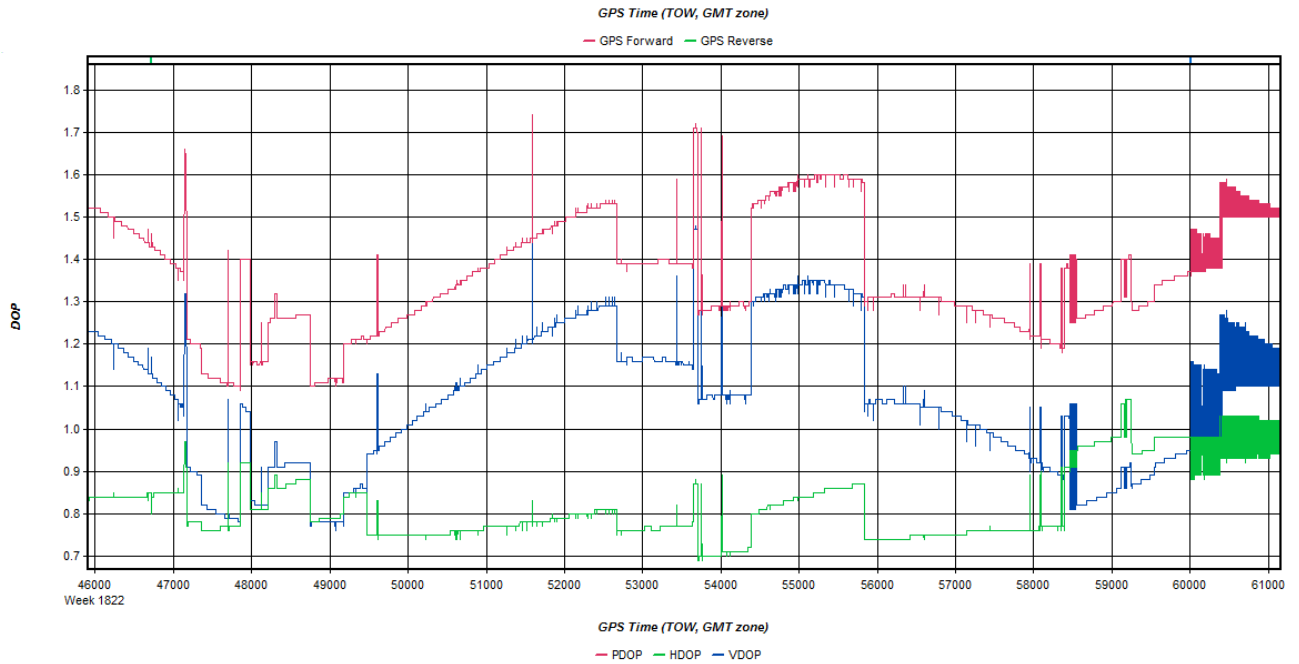
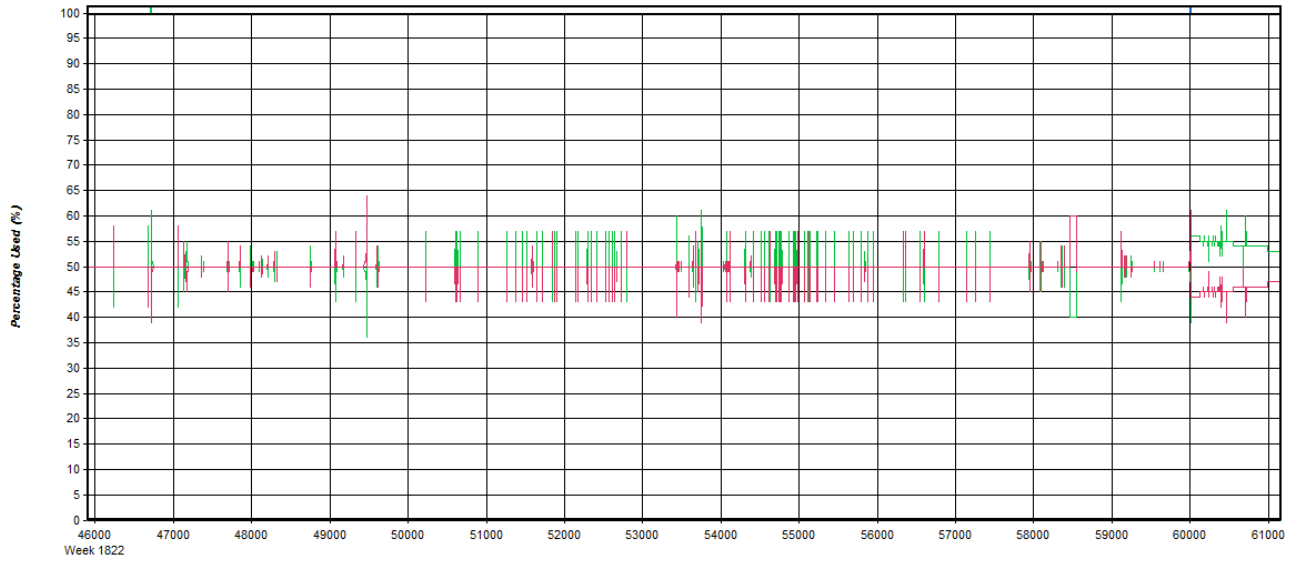
		14.5	Lift Begin			Lift End			Flt		Flt		Hobbs														
			Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs	Activity															
		1	KFDK		3425.3	KLNS		3429.1			3.8	0900-Production															
		2	KLNS		3429.1	KFDK		3431.1			2.0	0900-Production															
		3																									
FGI Job #		Project Name				Operator		Unit		IMU		Ground Temp °C		Mn Range'		Data Logger Drives											
22.14001100		USGS PA SANDY				T. Pangborn		863		LN-200		17.0		2018		Drives 1 and 2											
Flight Date		GPS Day		Lift		System		Pilot		Solar Times (UTC)		Flying Temp °C		Max Range'		Down load Drive											
7-Dec-14		14-341		6		R680I		D. Ewing		N/A		17.0		3888													
Mssion ID (ymmdd_Sen_Job_Lift)		Aircraft		Airport ID		FMS		UTC		AMT (ft)		Speed		FOV		Scan Rate (Hz)		MTA		km/WPT		Altm Setting		Humidity @ Alt		Shipping Track	
141207_863_14001100_06		N63868		KFDK		Track		-5		3180		140		60		250000		2		30.49		55					
Base 1 ID		Location				Rec ID		Ant ID		ARP (m)		Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data							
Area		Flight #		Wpt		Distance		UTC		Flt		Altitude		Speed		Scan		Comments and Conditions				SVs		PDOP			
		FGI   RCA		From   To		Begin   End		Start   End		Dir		(GPS)		(knots)		Rate											
								13:28:00   13:43:00		N		3,630		123		109.0		Overfly DEW3 CORS									
		64						13:46:00   13:49:00		S		3,580		140		109.0								1.0			
		65						14:03:00   14:18:00		N		3,630		120		109.0								1.09			
		66						14:22:00   14:34:00		S		3,630		140		109.0								1.04			
		67						14:39:00   14:54:00		N		3,680		130		109.0								1.01			
		68						14:57:00   15:10:00		S		3,630		138		109.0								1.09			
		69						15:14:00   15:29:00		N		3,680		120		109.0								1.23			
		70						15:32:00   15:45:00		S		3,680		140		109.0								1.25			
		71						15:50:00   16:04:00		N		3,730		125		109.0								1.22			
		72						16:08:00   16:22:00		S		3,680		140		109.0								1.14			
		73						16:28:00   16:29:00		N		3,580		128		109.0		Calibration Line North						1.11			
		65						16:30:00   16:30:00		E		3,600		115		109.0		Calibration Cross Line						1.09			
																		Overfly KC11 Cors/Land at LNS									

Trajectory and GPS Plots:

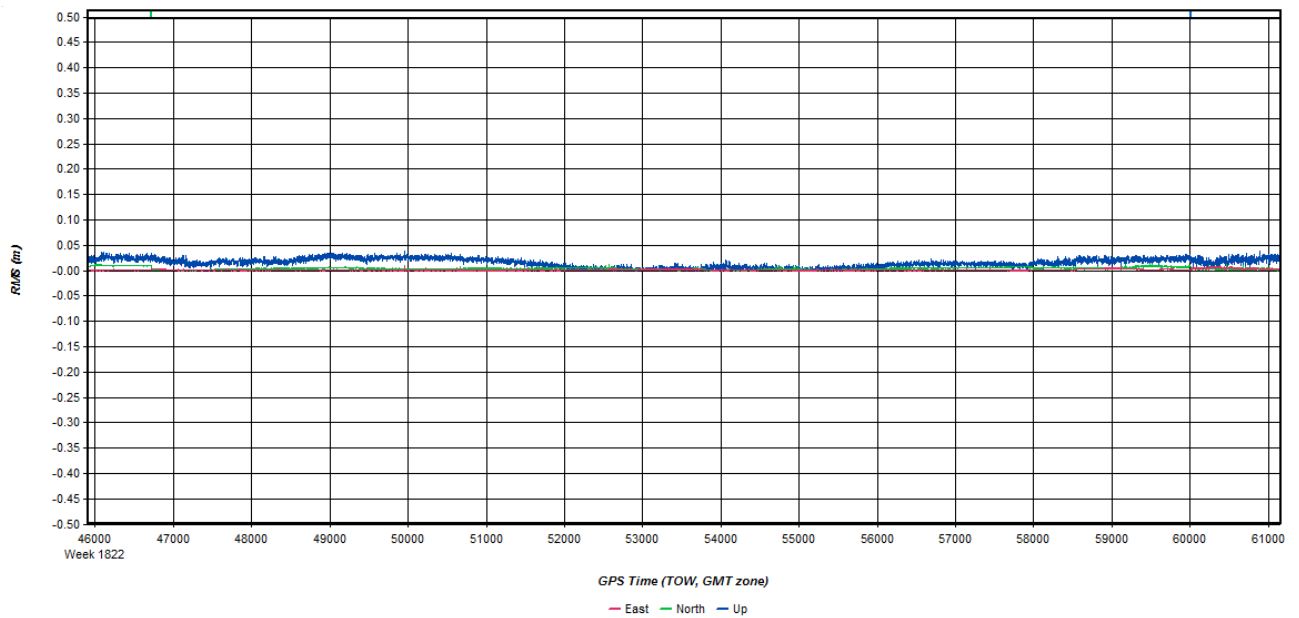
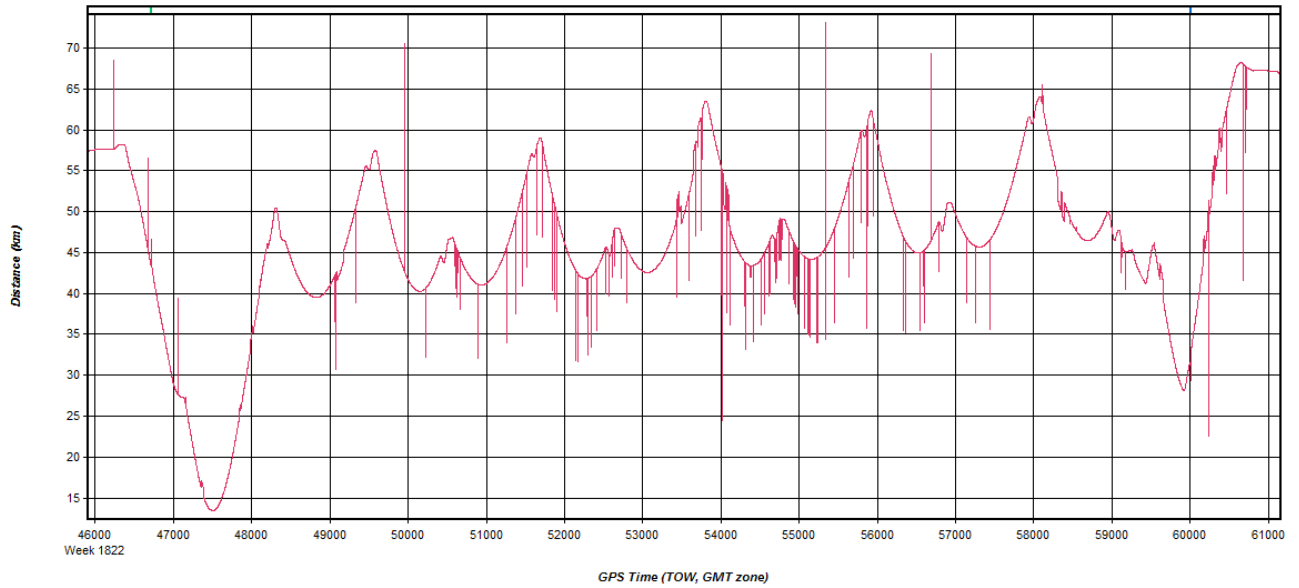


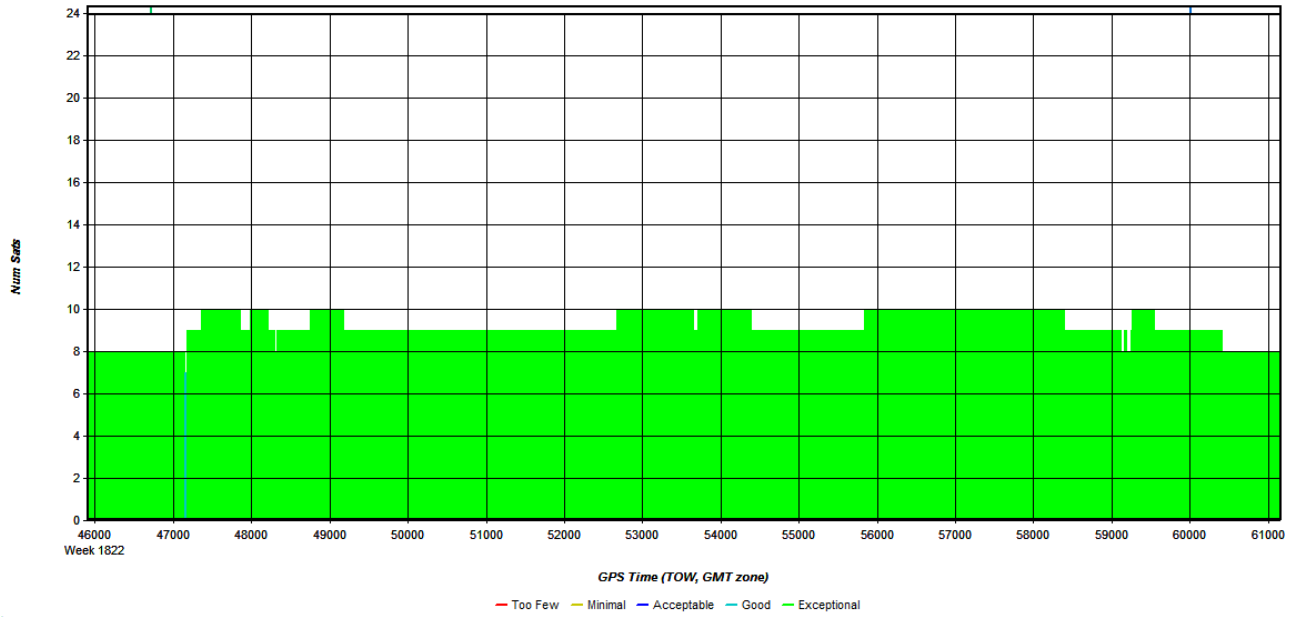














Acquisition and Processing details ----- Collection 7 (December 7, 2014)

Log:

RC&A Richard Crouse & Associates		14.5		Lift Begin			Lift End			Flt		Flt Hobbs		Activity	
		Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs					
1		KFDK		3425.3	KLNS		3429.1				3.8	0900-Production			
2		KLNS		3429.1	KFDK		3431.1				2.0	0900-Production			
3															

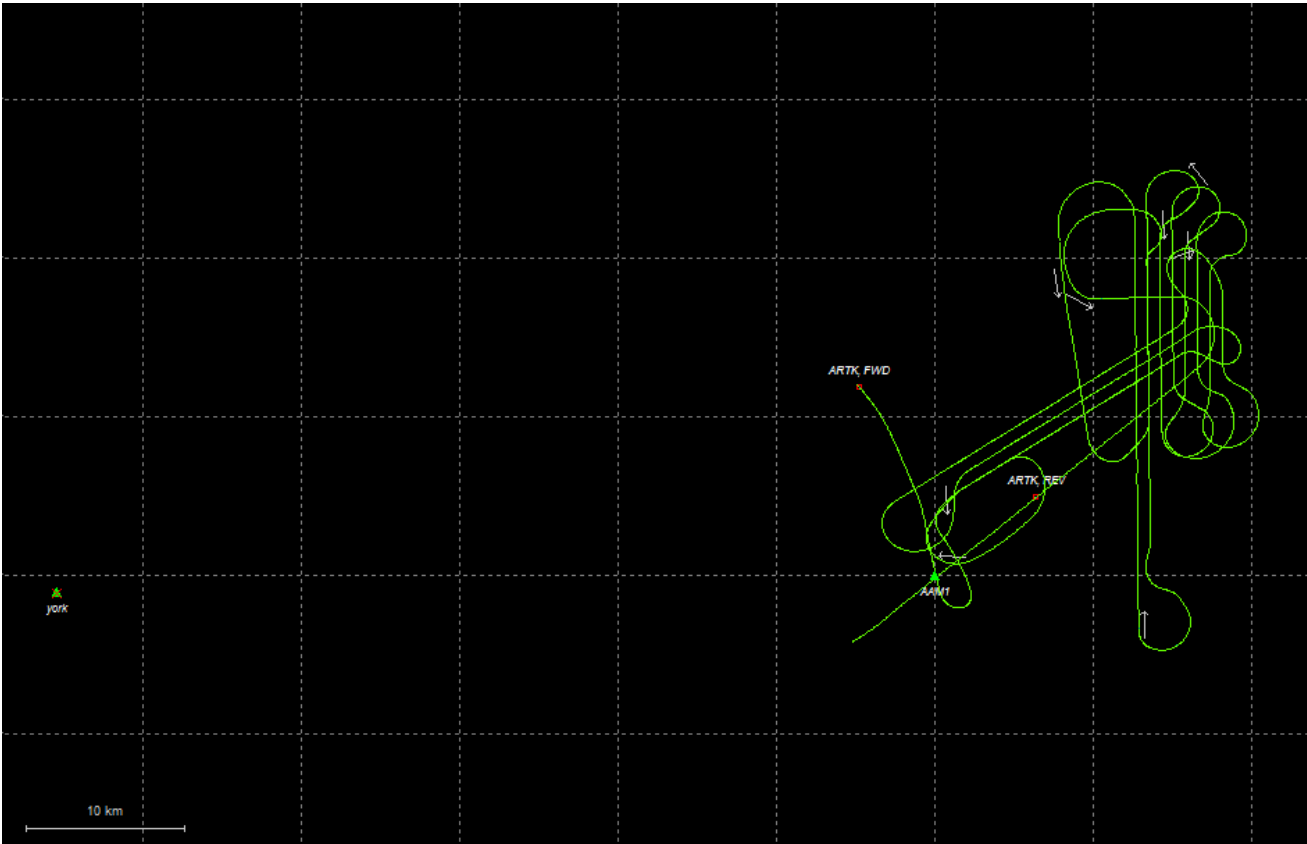
  

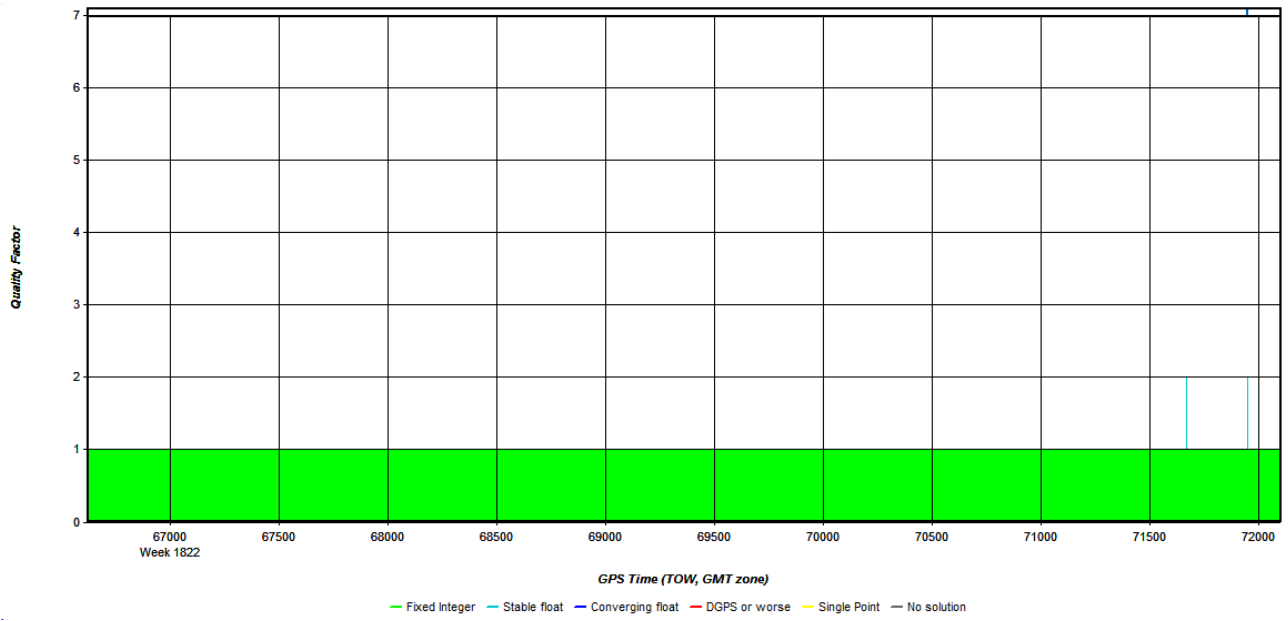
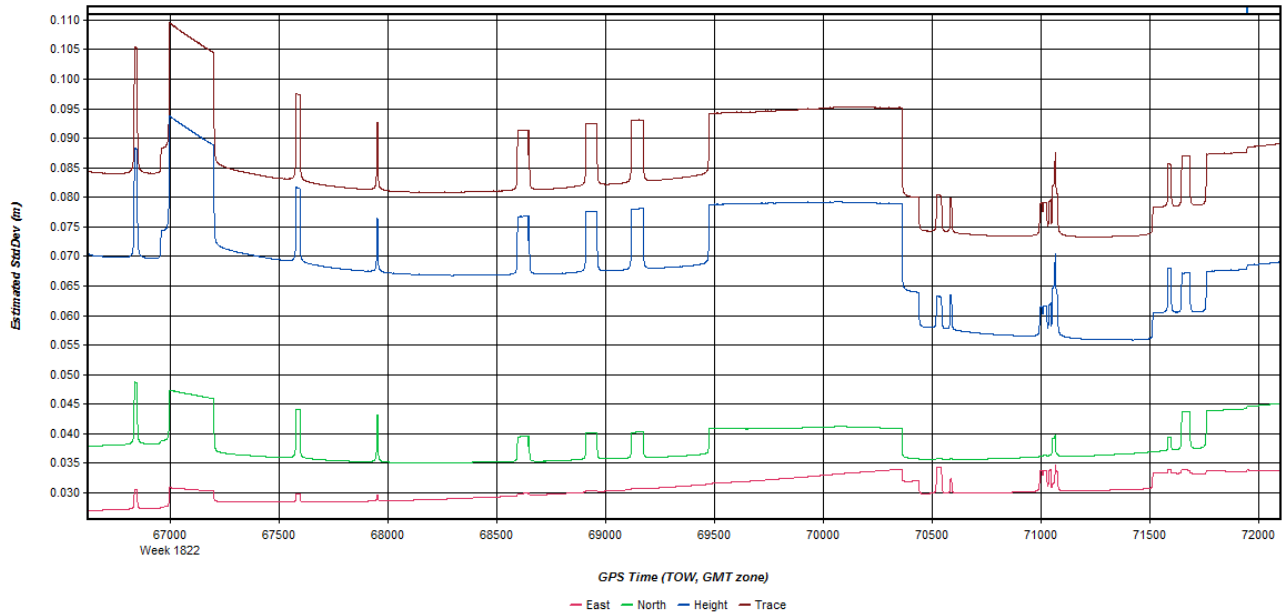
FGI Job # <b>22.14001100</b>		Project Name <b>USGS PA SANDY</b>			Operator <b>T. Pangborn</b>		Unit <b>863</b>	IMU <b>LN-200</b>	Ground Temp °C <b>17.0</b>		Mn Range' <b>2018</b>	Data Logger Drives <b>Drives 1 and 2</b>		
Flight Date <b>7-Dec-14</b>		GPS Day <b>14-341</b>	Lift <b>7</b>	System <b>R680i</b>	Pilot <b>D. Ewing</b>		Sun° <b>N/A</b>	Solar Times (UTC) <b>N/A</b>		Flying Temp °C <b>17.0</b>	Max Range' <b>3888</b>	Dow nload Drive		
Mssion ID (ymmdd_Sen_Job_Lift) <b>141207_863_14001100_07</b>		Aircraft <b>N63868</b>	Airport ID <b>KFDK</b>	FMS <b>Track</b>	UTC <b>-5</b>	AMT (ft) <b>3180</b>	Speed <b>140</b>	FOV <b>60</b>	Scan Rate (Hz) <b>250000</b>	MTA <b>2</b>	km/WPT <b>30.49</b>	Altrn Setting <b>55</b>	Humidity @ Alt	Shipping Track
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data

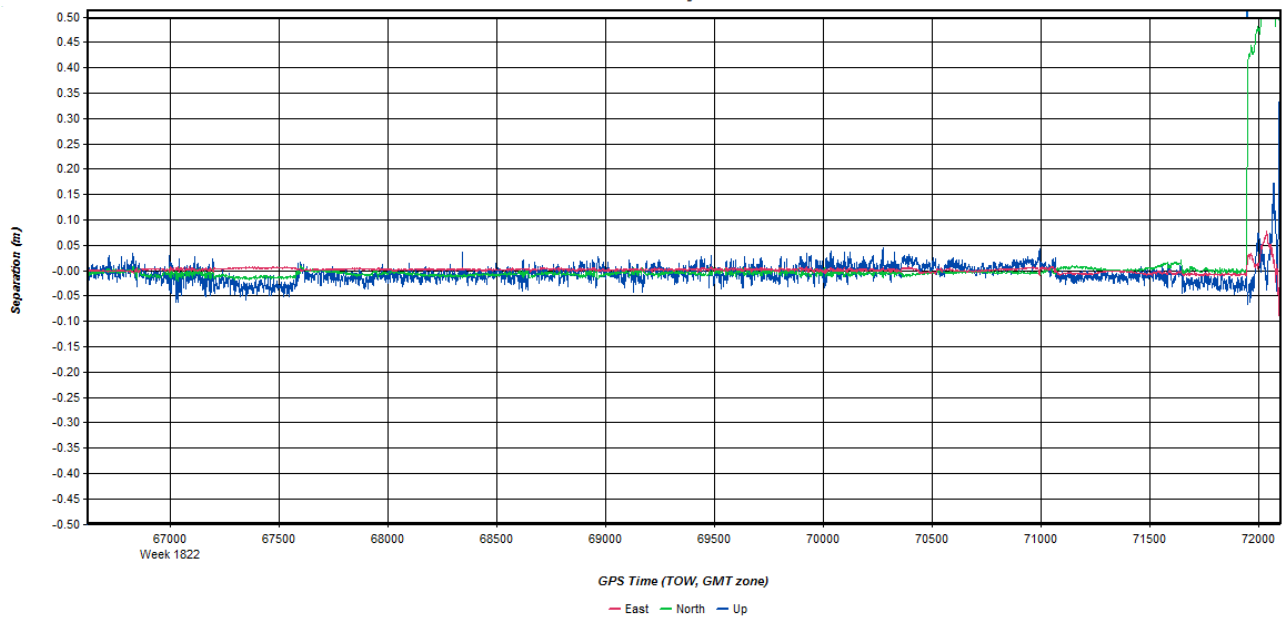
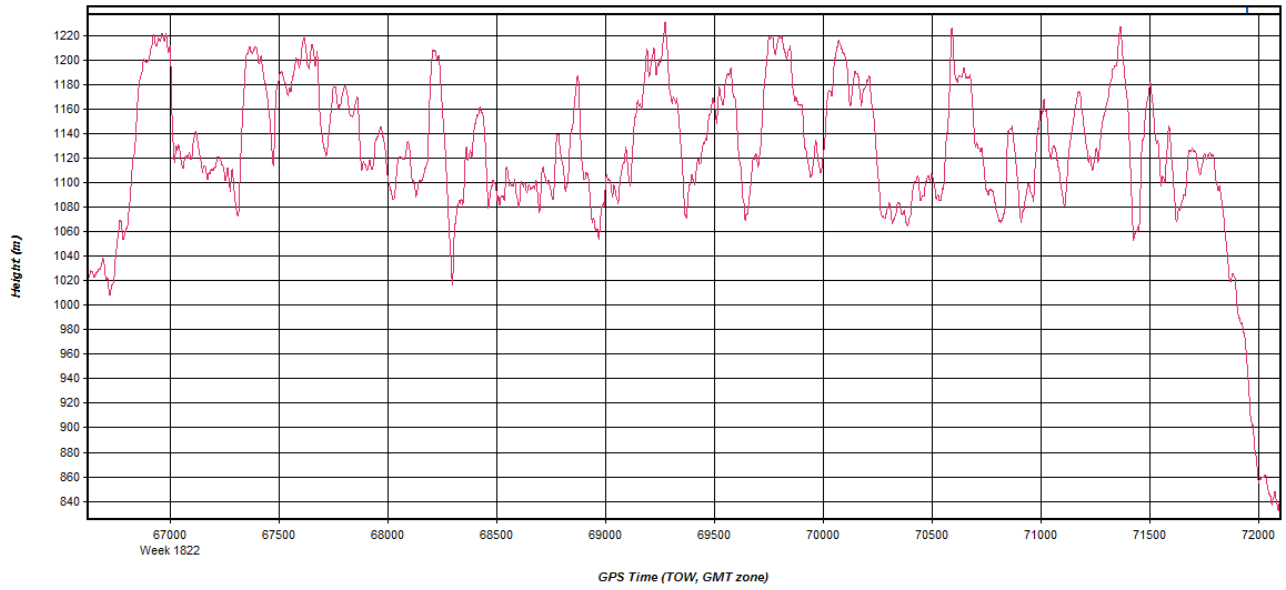
  

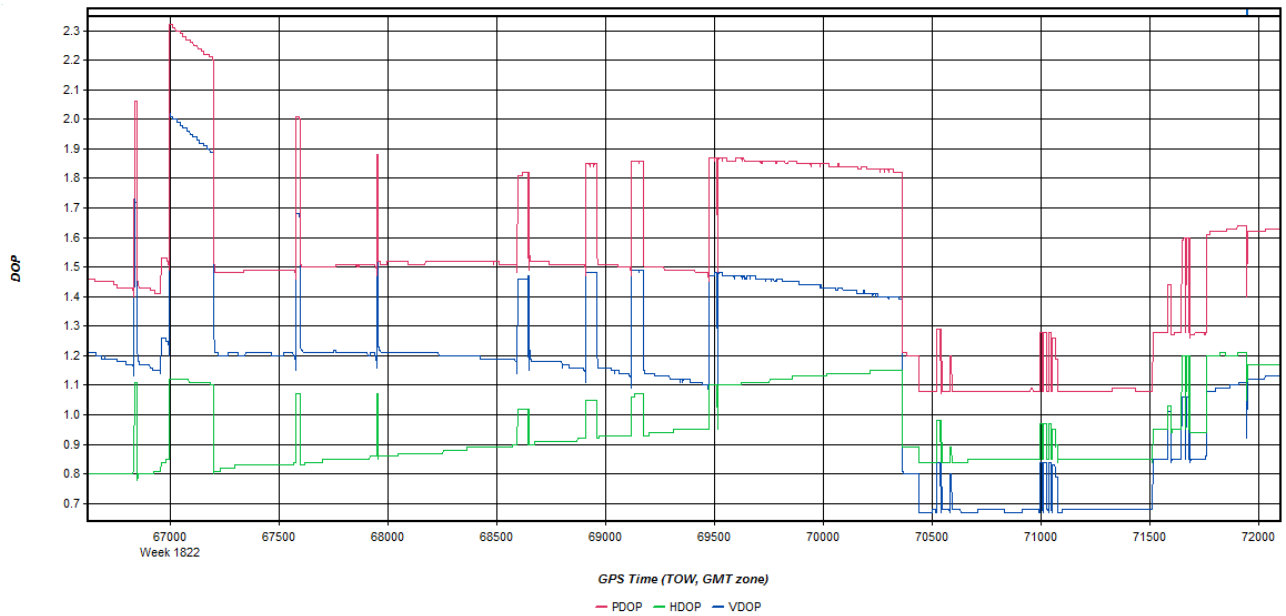
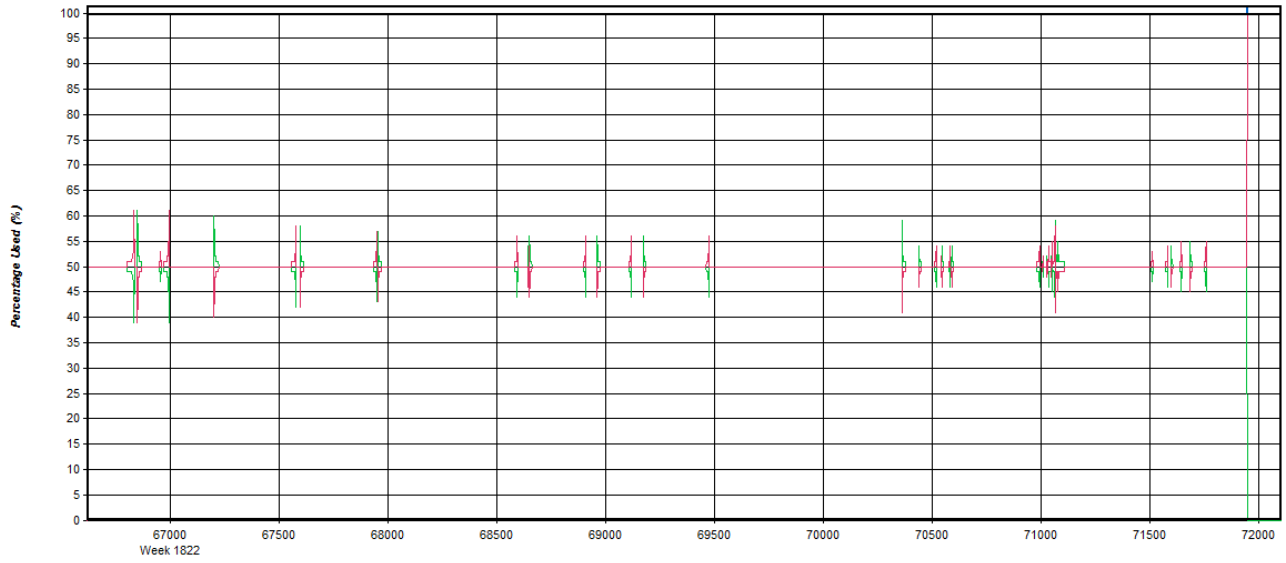
Area	Flight #		Wpt		Distance		UTC		Flt Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOP
	FGI	RCA	From	To	Begin	End	Start	End							
													Overfly AAM1 Cors		1.12
		148					18:36:00	18:36:00	NE	4,045	115	109.0	Abort - Too High		1.0
		148					18:40:00	18:44:00	NE	4,045	115	109.0			1.07
		147					18:47:00	18:51:00	SW	4,030	140	109.0			1.16
		146					18:54:00	18:59:00	NE	3,630	115	109.0			1.14
		138					19:01:00	19:02:00	S	3,680	140	109.0			1.13
		137					19:05:00	19:07:00	N	3,666	135	109.0			1.13
		136					19:09:00	19:11:00	S	3,659	145	109.0			1.13
		135					19:14:00	19:16:00	N	3,999	130	109.0			1.16
		134					19:18:00	19:20:00	S	4,022	140	109.0			1.21
		133					19:23:00	19:26:00	N	4,035	135	109.0			1.23
		132					19:28:00	19:34:00	S	4,079	140	109.0			1.22
		131					19:37:00	19:42:00	N	3,980	130	109.0			1.23
		132					19:49:00	19:51:00	N	4,079	130	109.0	Calibration Line North		1.24
		*					19:54:00	19:55:00	E	4,000	130	109.0	Calibration Cross Line		1.24
													Overfly AAM1 Cors/Land at FDK		

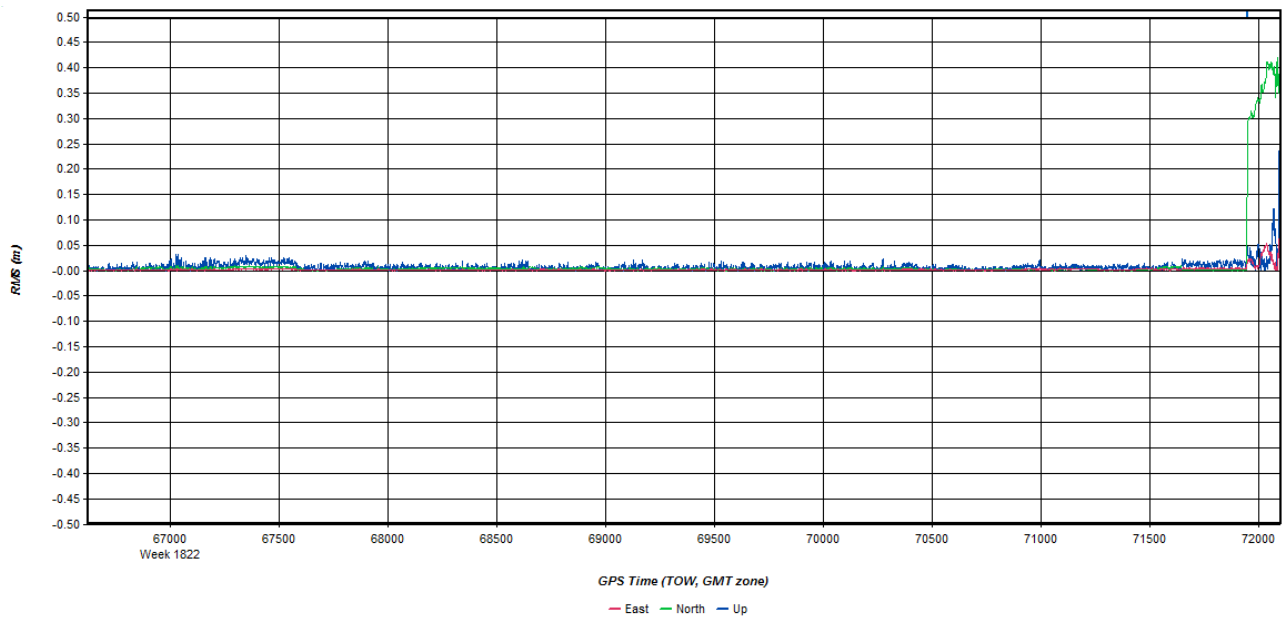
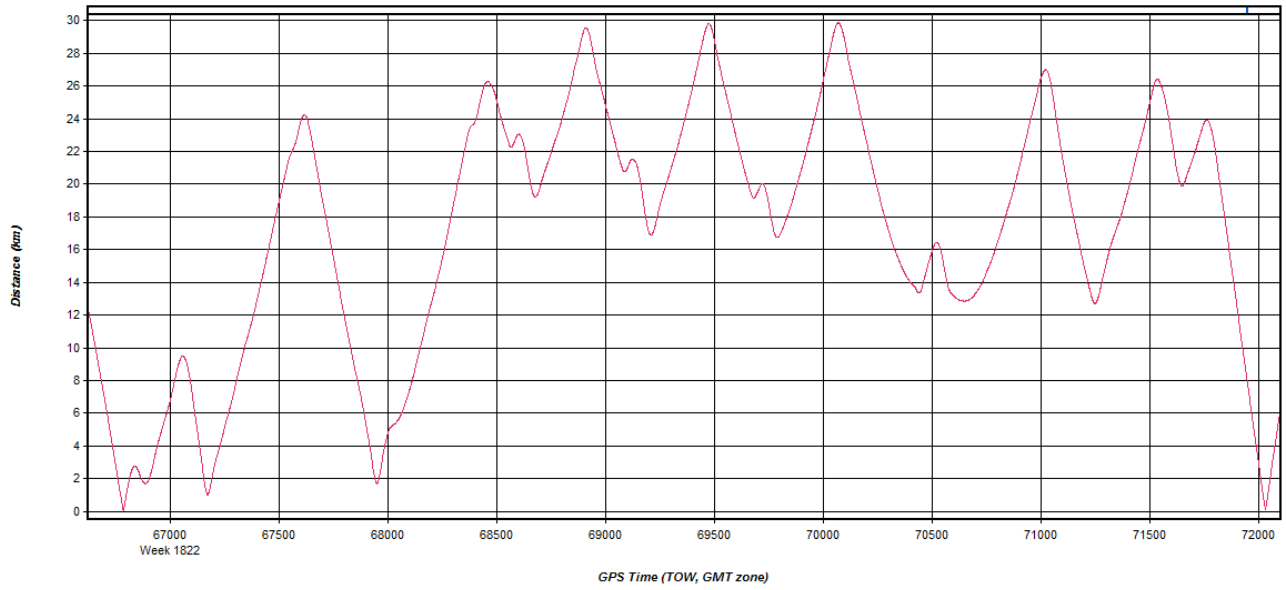
Trajectory and GPS Plots:



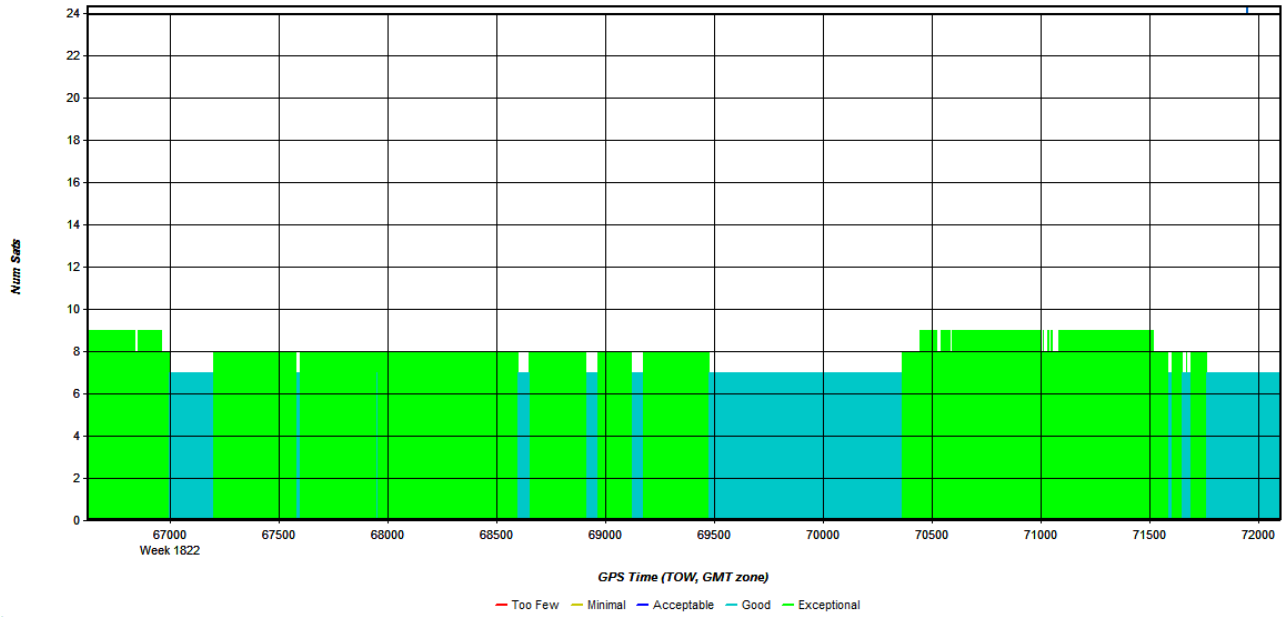












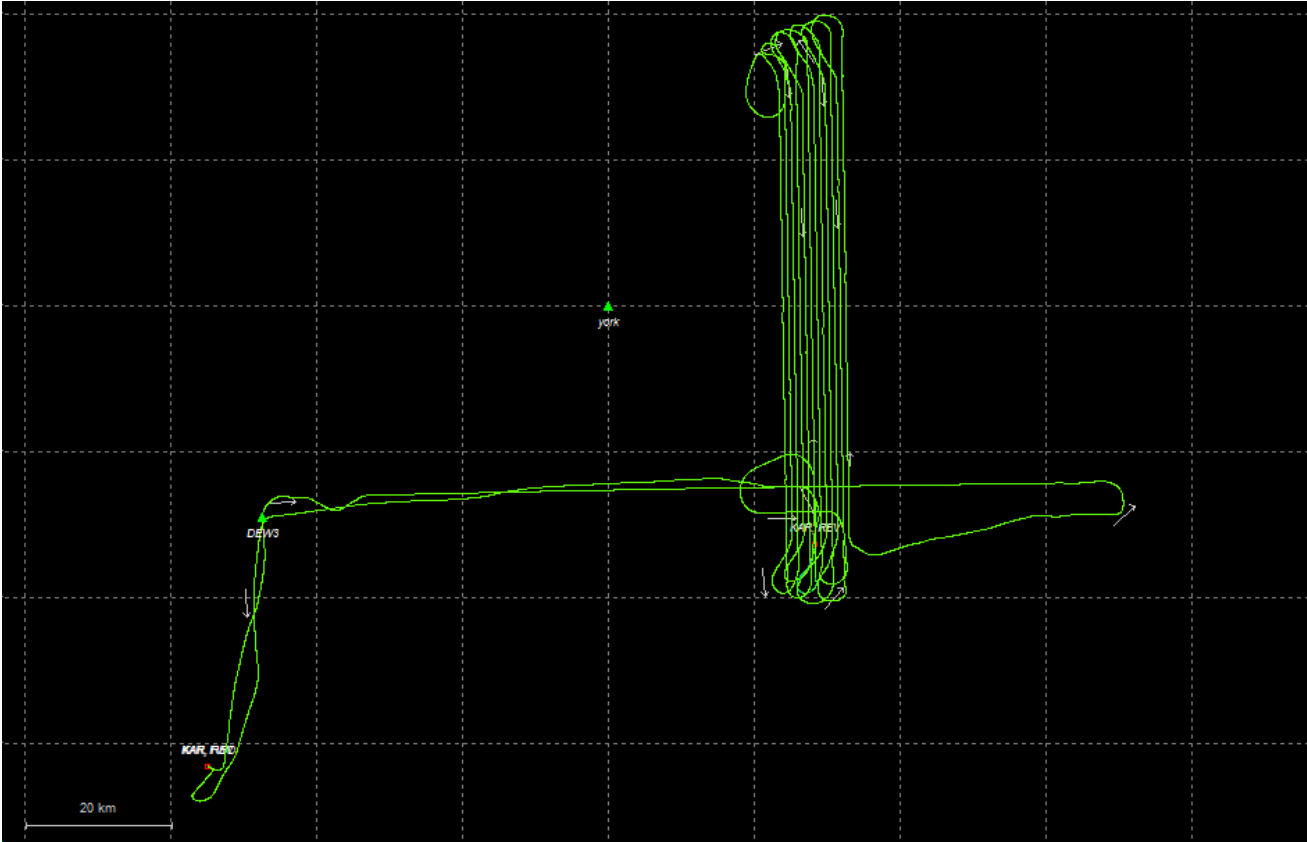


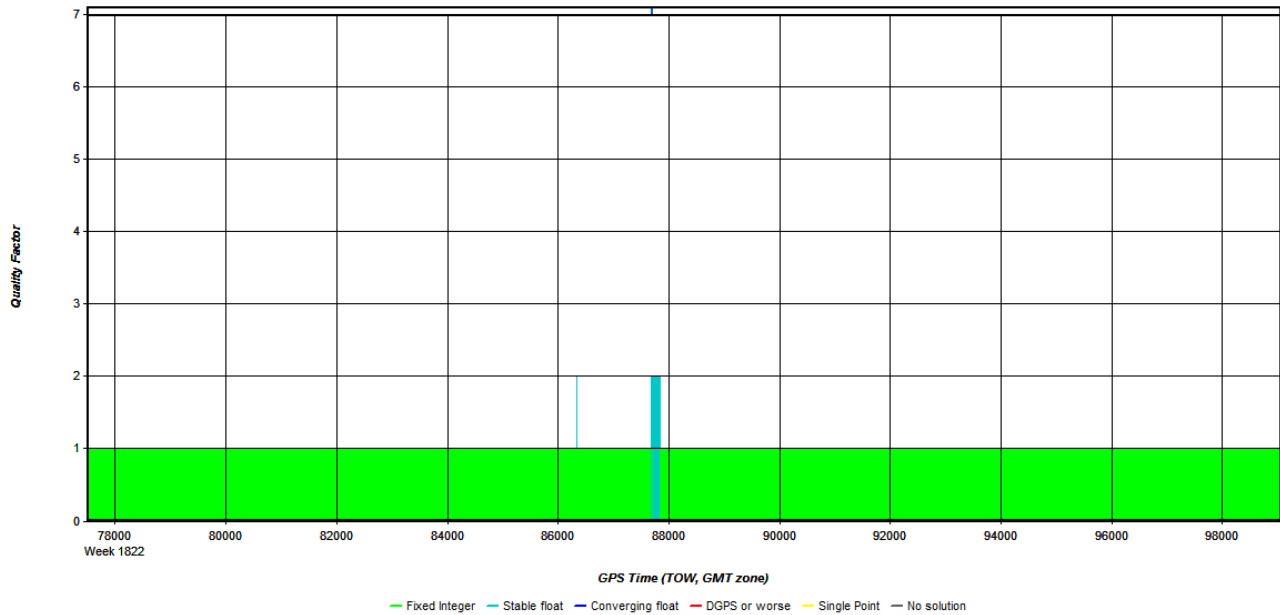
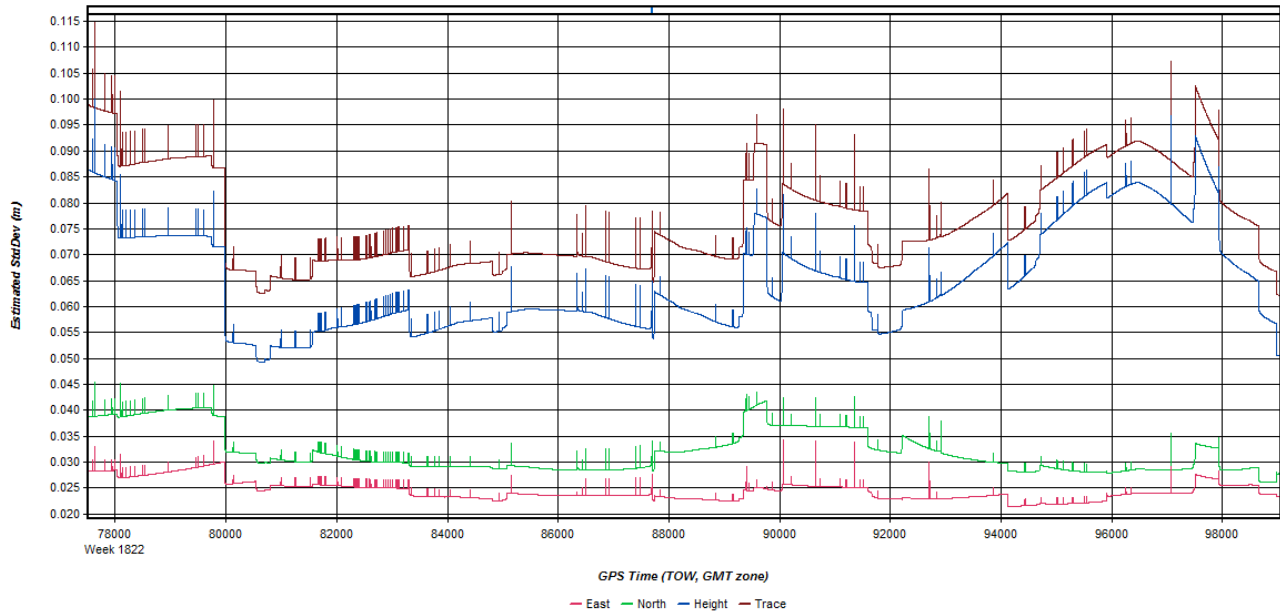
Acquisition and Processing details ----- Collection 8 (December 7, 2014)

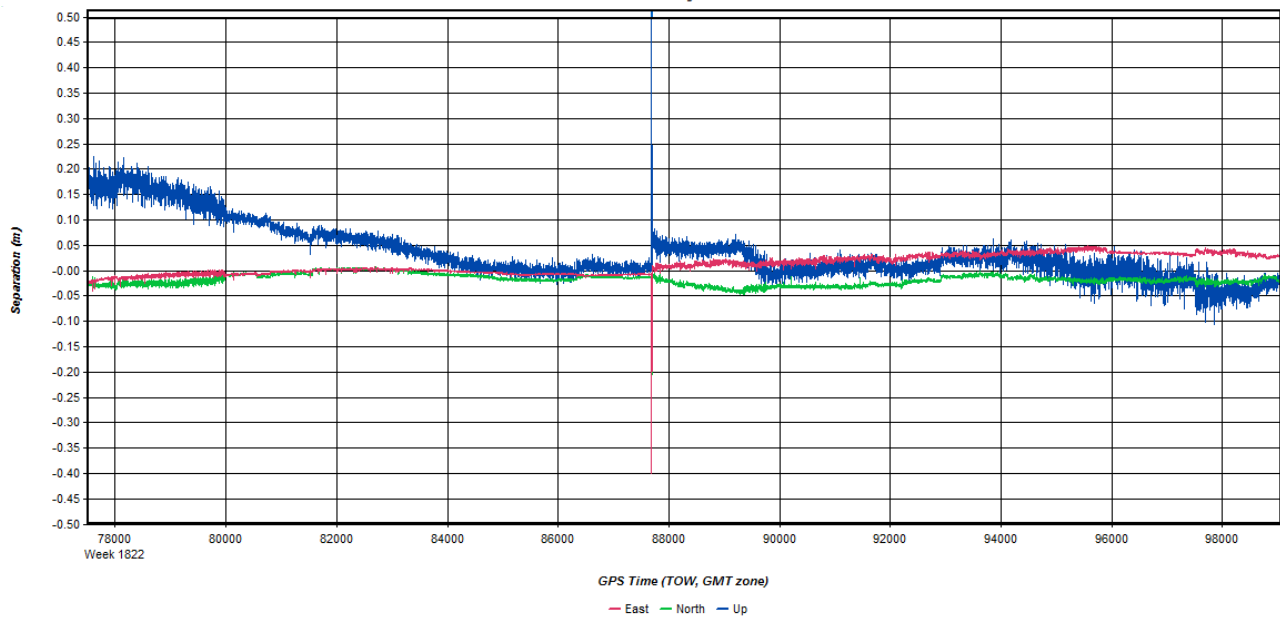
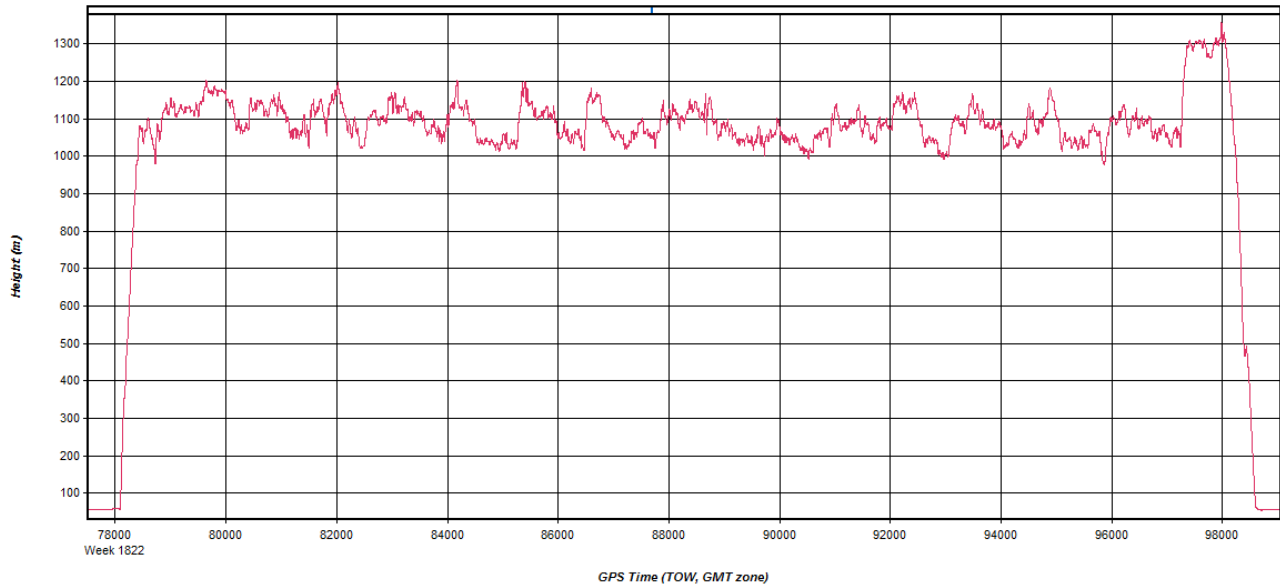
Log:

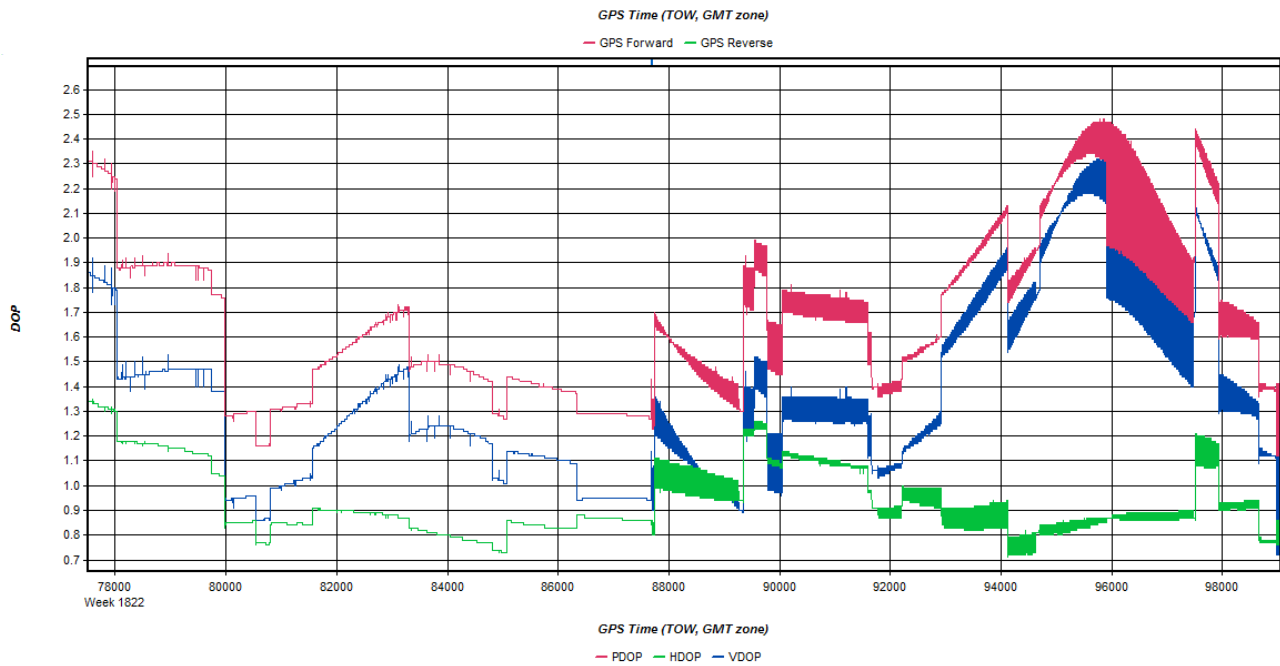
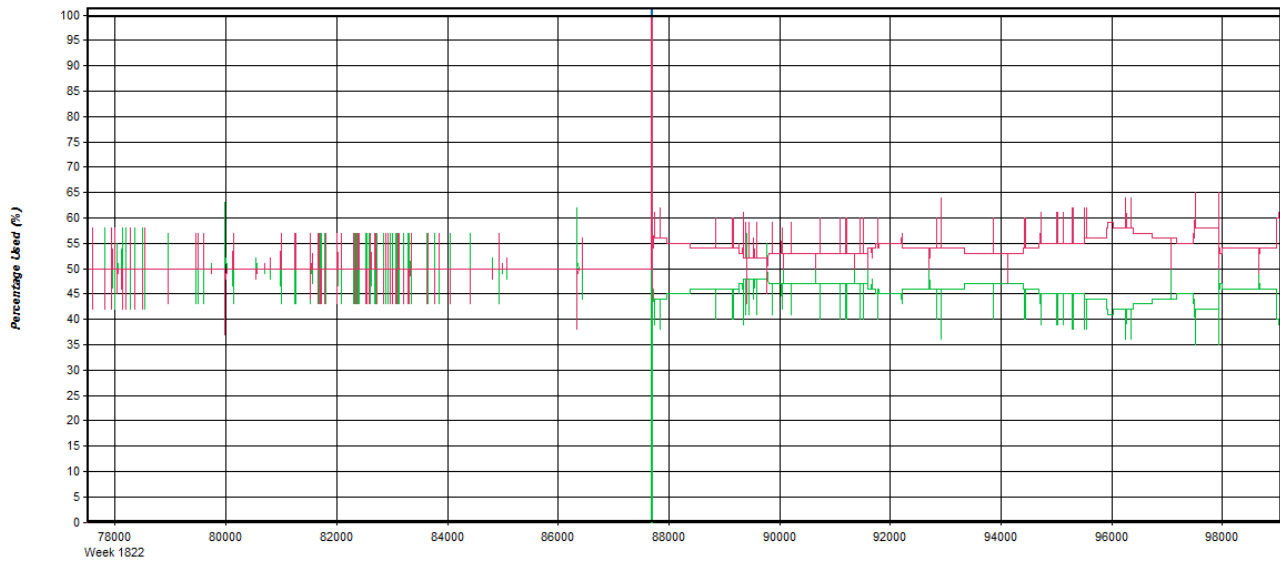
		14.5		Lift Begin			Lift End			Flt		Flt Hobbs															
				Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs	Activity														
		1		FDK		3431.1	FDK		3436.8			5.7	0900-Production														
		2																									
3																											
FGI Job #		Project Name			Operator		Unit		IMU		Ground Temp °C		Mn Range'		Data Logger Drives												
22.14001100		USGS PA SANDY			R. Lomahan		863		LN-200		17.0		2018		9 and 6												
Flight Date		GPS Day		Lift	System		Pilot		Solar Times (UTC)		Flying Temp °C		Max Range'		Down load Drive												
7-Dec-14		14-341		8	R680I		G. Fleck		N/A		17.0		3888														
Mission ID (ymmdd_Sen_Job_Lift)		Aircraft		Airport ID		FMS		UTC		AMT (ft)		Speed		FOV		Scan Rate (Hz)		MTA		km/WPT		Altm Setting		Humidity @ Alt		Shipping Track	
141207_863_14001100_08		N63868		FDK		Track		-5		3180		140		60		250000		2		1.300		30.49		55			
Base 1 ID		Location		Rec ID		Ant ID		ARP (m)		Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data									
Area		Flight #		Wpt		Distance		UTC		Flt		Altitude		Speed		Scan		Rate		Comments and Conditions		SVs		PDOP			
		FGI		RCA		From		To		Begin		End		Start		End		Dir		(GPS)		(knots)					
		140								21:59:00		22:15:00		E		3,730		103		109.0		Overfly DEW3 CORS					
		74								22:21:00		22:37:00		N		3,630		125		109.0		Drive #9					
		75								22:46:00		23:01:00		S		3,730		137		109.0		Thin sidelap over the river					
		76								23:05:00		23:20:00		N		3,680		127		109.0							
		77								23:25:00		23:40:00		S		3,730		130		109.0							
		78								23:44:00		00:00:00		N		3,680		125		109.0							
		79								00:05:00		00:22:00		S		3,730		136		109.0							
		79								00:25:00		00:27:00		N		3,730		128		109.0		calibration line					
		*								00:32:00		00:34:00		E		3,730		110		109.0		calibration line/cross line					
		80								00:38:00		00:53:00		N		3,600		130		109.0							
		81								00:59:00		01:13:00		S		3,500		134		109.0							
		82								01:19:00		01:34:00		N		3,630		132		109.0							
		83								01:39:00		01:55:00		S		3,880		137		109.0							
		84								02:00:00		02:14:00		N		3,600		136		109.0							
		85								02:20:00		02:36:00		S		3,700		128		109.0		Thin sidelap on North end					
		140								02:49:00		02:59:00		W		3,730		137		109.0							
																						Overfly DEW3 CORS					

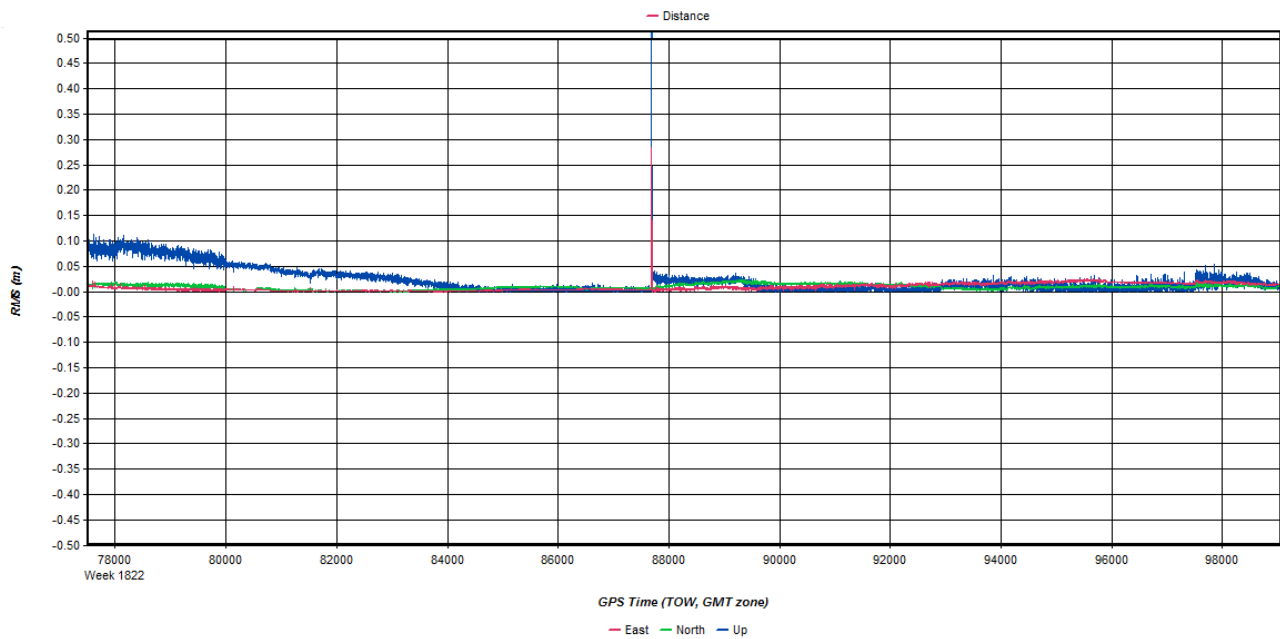
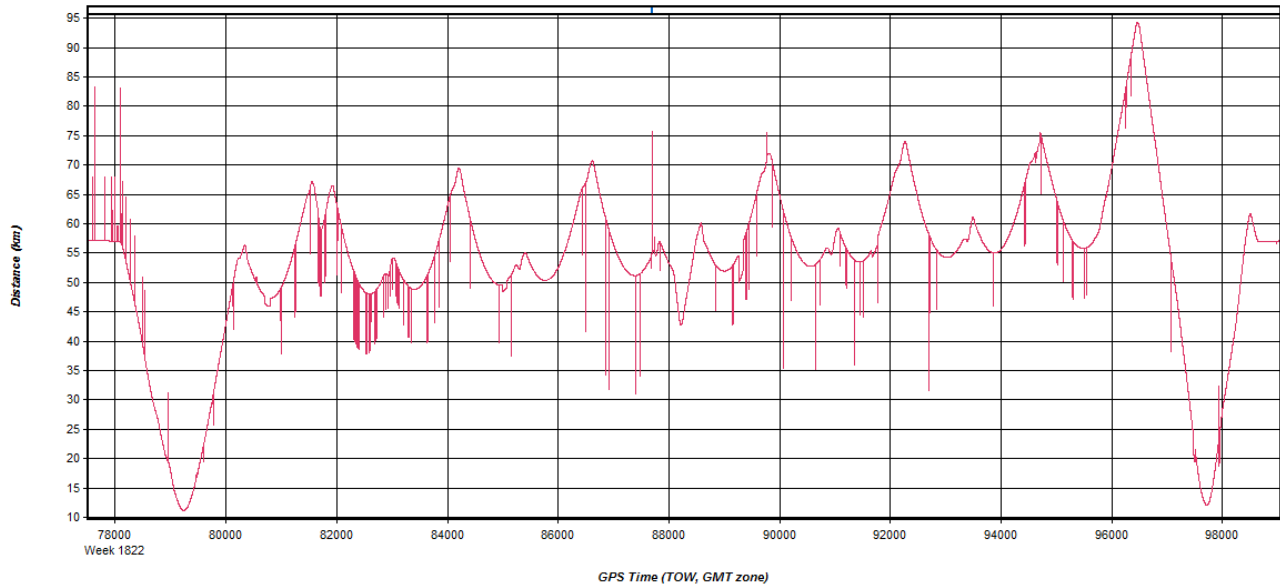
Trajectory and GPS Plots:

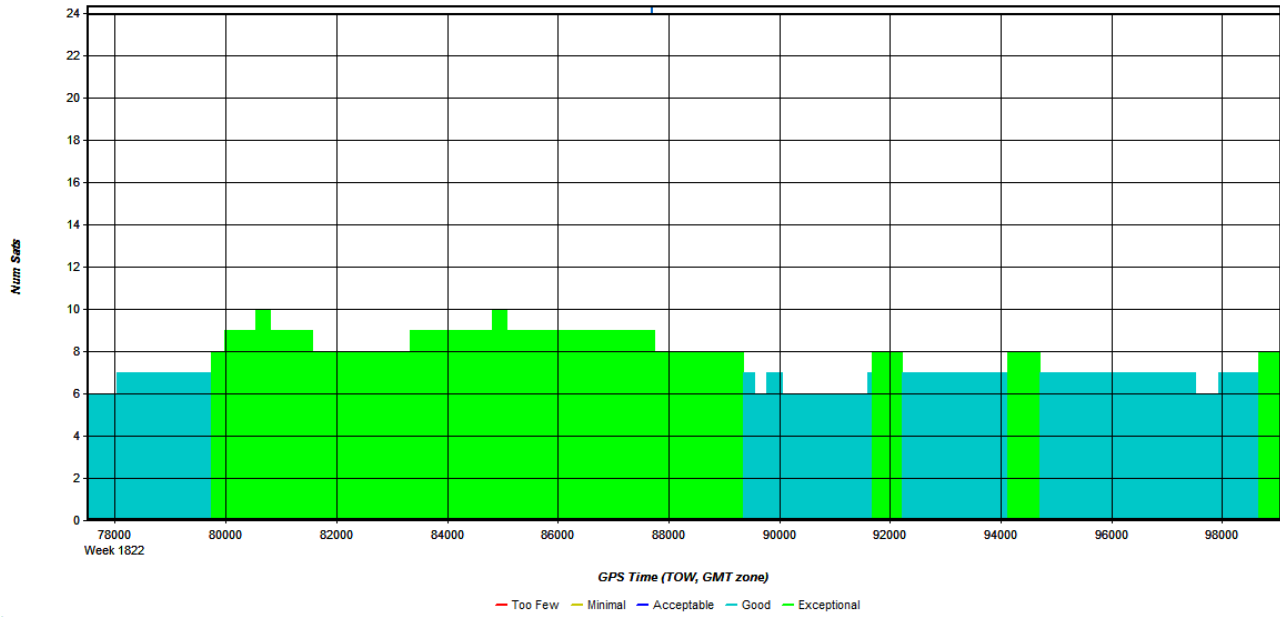














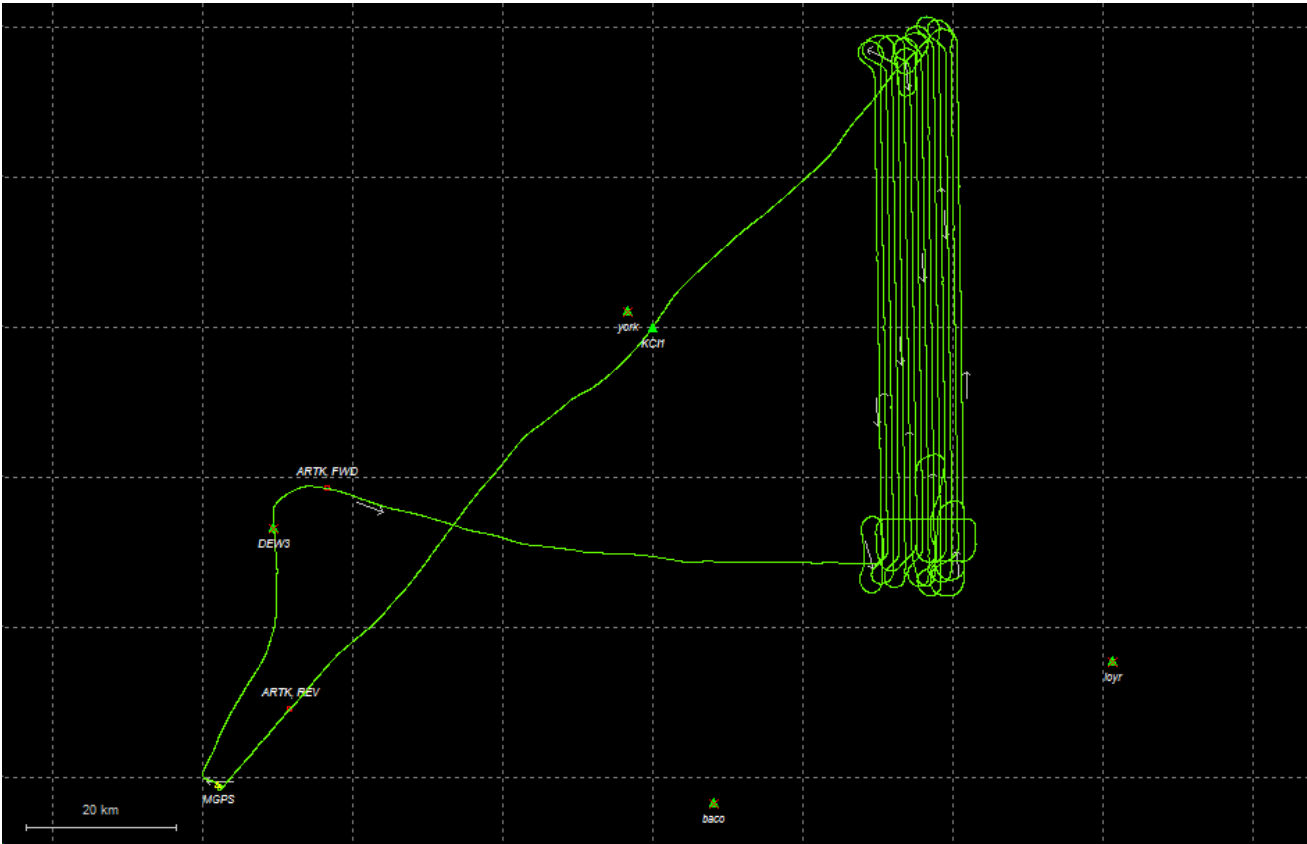


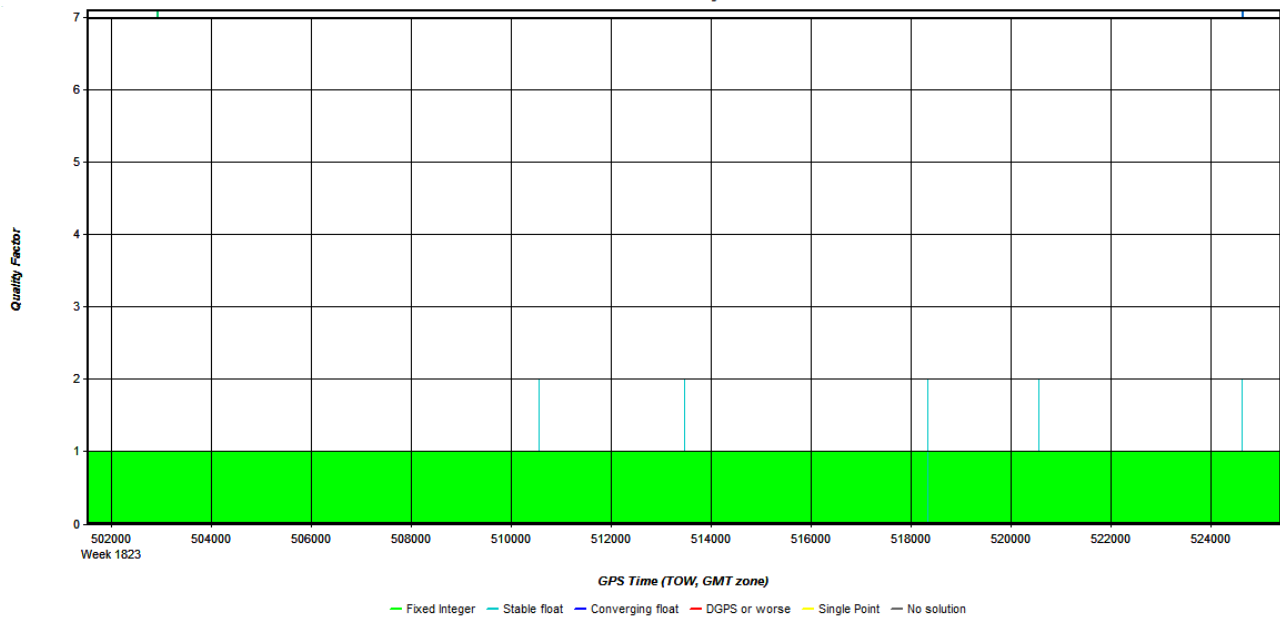
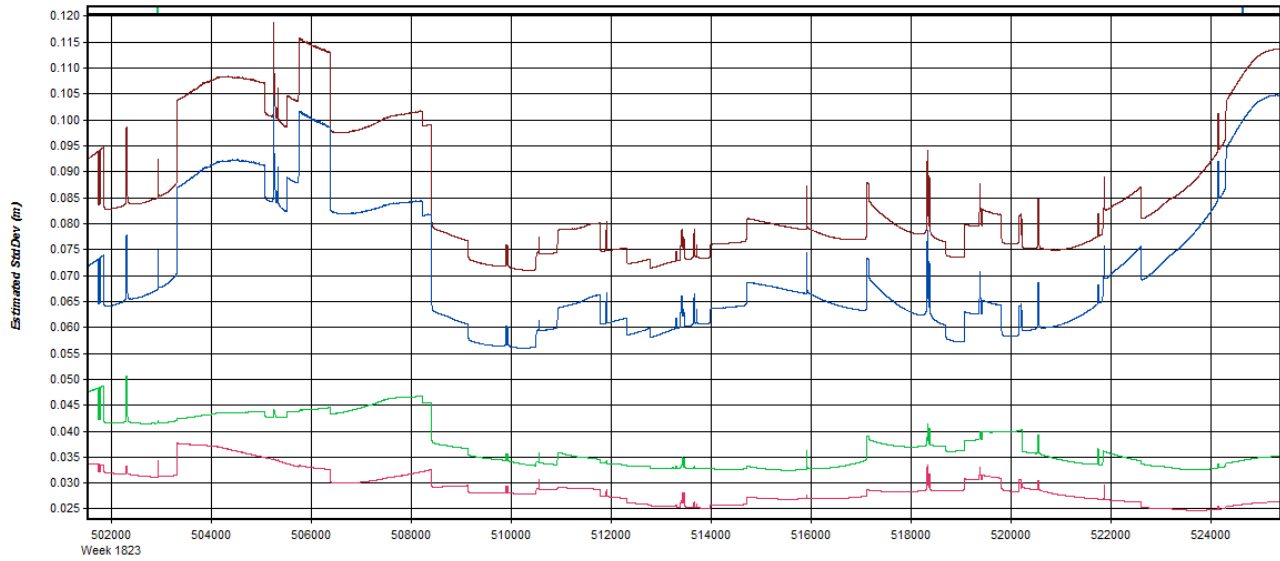
Acquisition and Processing details ----- Collection 9 (December 19, 2014)

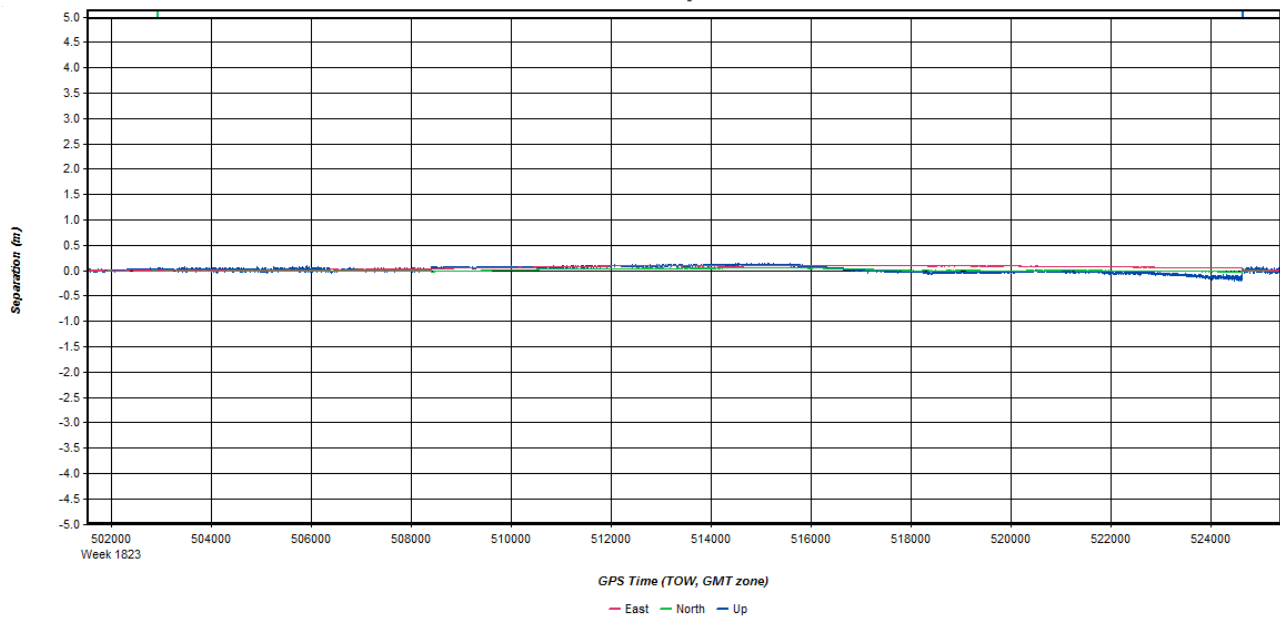
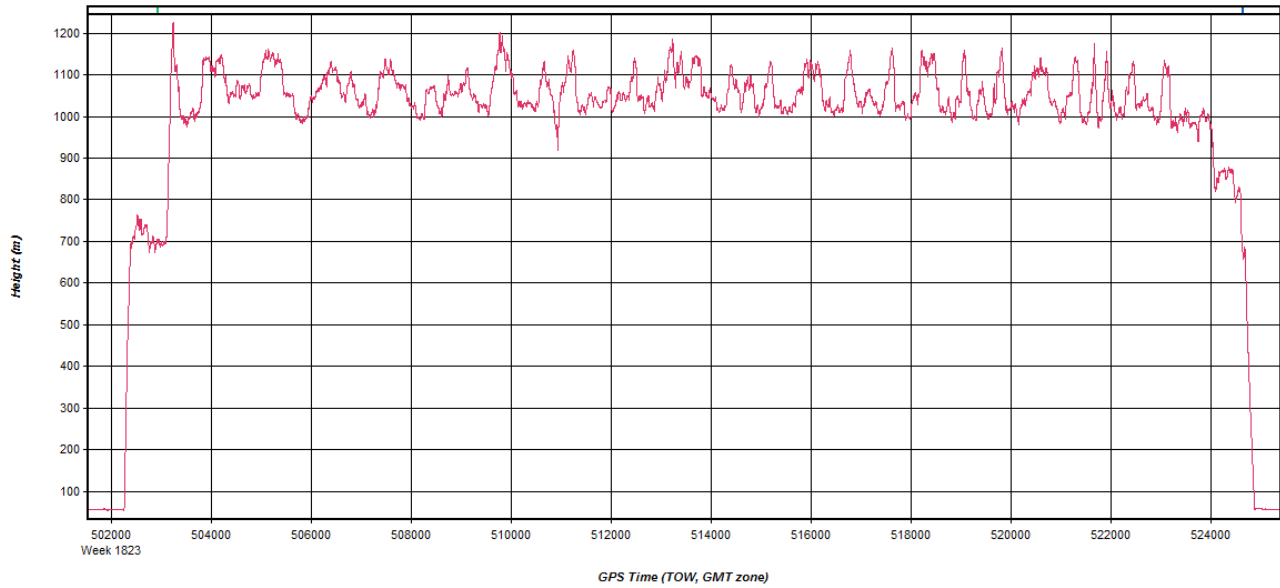
Log:

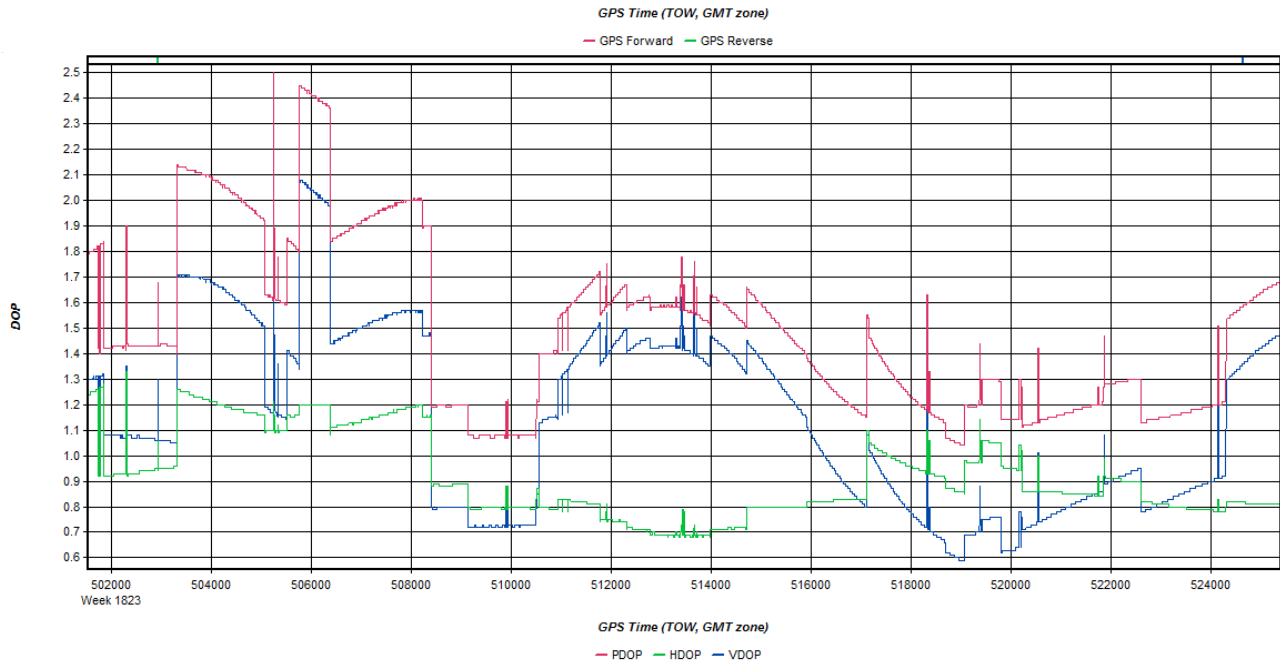
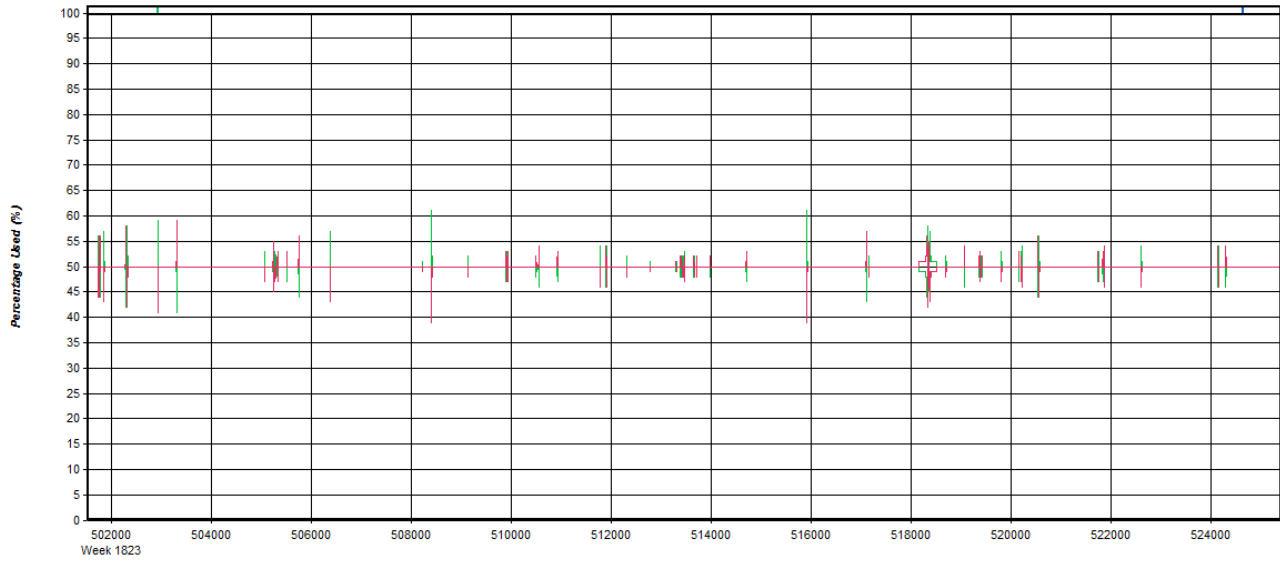
		14.5		Lift Begin			Lift End			Fit		Fit		Hobbs													
		1		Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs	Activity														
		2		KFDK		3445.5	KFDK		3451.7				6.2														
		3																									
FGI Job #		Project Name				Operator		Unit		IMU		Ground Temp °C		Mn Range'		Data Logger Drives											
22.14001100		USGS PA SANDY				B. Ruwet		863		LN-200		16.0		2018		04 & 02											
Flight Date		GPS Day		Lift		System		Pilot		Sun°		Solar Times (UTC)		Flying Temp °C		Max Range'		Dow nload Drive									
19-Dec-14		14-353		12		R680i		C. Hollingshead		n/a		n/a		16.0		3888											
Mission ID (ymmdd_Sen_Job_Lift)		Aircraft		Airport ID		FMS		UTC		AMT (ft)		Speed		FOV		Scan Rate (Hz)		MTA		km/WPT		Altm Setting		Humidity @ Alt		Shipping Track	
141219_863_14001100_09		N63868		KFDK		Track		-5		3179		140		60		250000		2		30.15		64					
Base 1 ID		Location		Rec ID		Ant ID		ARP (m)		Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data									
Area		Flight #		Wpt		Distance		UTC		Fit		Altitude		Speed		Scan Rate		Comments and Conditions		SVs		PDOP					
		FGI		RCA		From		To		Begin		End		Start		End		Dir		(GPS)		(knots)					
		86								20:03:00		20:19:00		N		3,780		130		109.0		Overfly DEW3 CORS					
		87								20:22:00		20:37:00		S		3,780		125		109.0		HDO=Drive #4		1.3			
		88								20:40:00		20:57:00		N		3,780		125		109.0				1.14			
		89								21:00:00		21:16:00		S		3,780		140		109.0				1.05			
		90								21:19:00		21:36:00		N		3,816		125		109.0				1.04			
		91								21:38:00		21:54:00		S		3,913		140		109.0				0.92			
		92								22:02:00		22:04:00		S		3,917		135		109.0		Calibration line (line #92)		1.01			
		-								22:08:00		22:11:00		W		3,600		110		109.0		Cross through calibration line		1.06			
		92								22:14:00		22:31:00		N		3,917		140		109.0				1.23			
		93								22:37:00		22:38:00		S		3,905		140		109.0		no good-no side lap= re-fly		1.28			
		93								22:41:00		22:57:00		S		3,905		140		109.0				1.22			
		94								23:00:00		23:16:00		N		3,920		125		109.0				1.18			
		95								23:21:00		23:36:00		S		3,946		140		109.0				1.01			
		96								23:40:00		23:57:00		N		3,880		130		109.0				1.05			
		97								00:00:00		00:15:00		S		3,946		140		109.0				1.03			
		98								00:17:00		00:34:00		N		3,807		130		109.0				1.12			
		99								00:36:00		00:52:00		S		3,810		140		109.0				1.22			
		100								00:56:00		00:57:00		N		3,830		130		109.0		no good-start was off= re-fly		1.26			
		100								01:01:00		01:18:00		N		3,830		130		109.0				1.25			
																						Overfly KCL1 CORS					

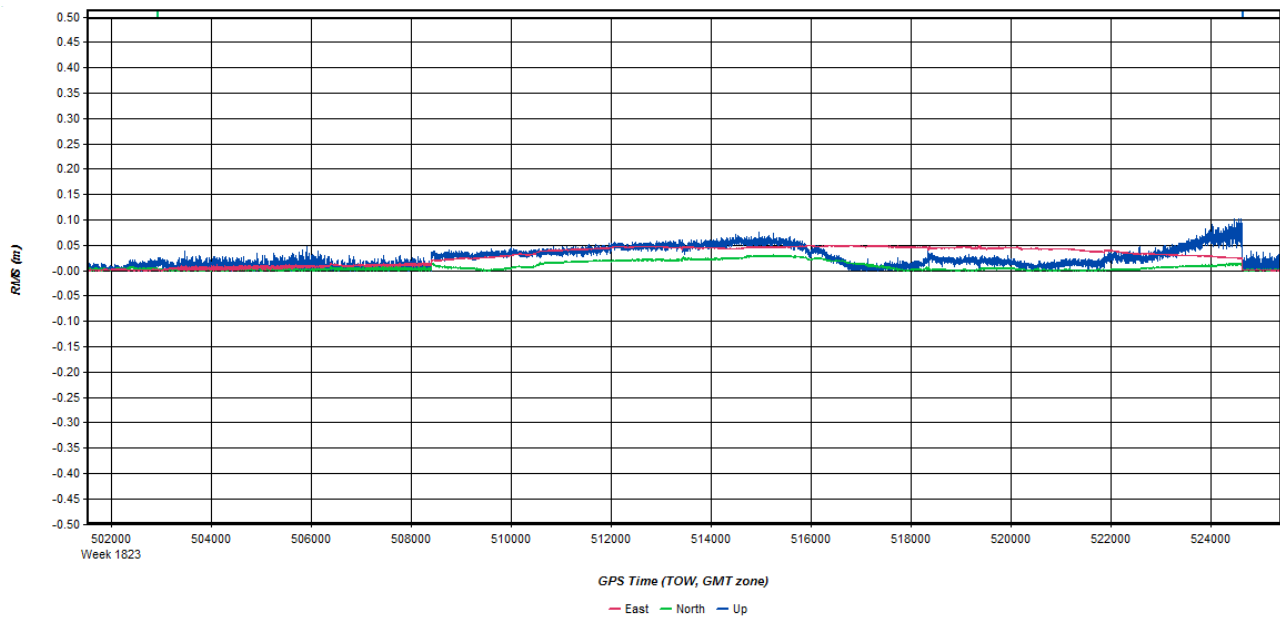
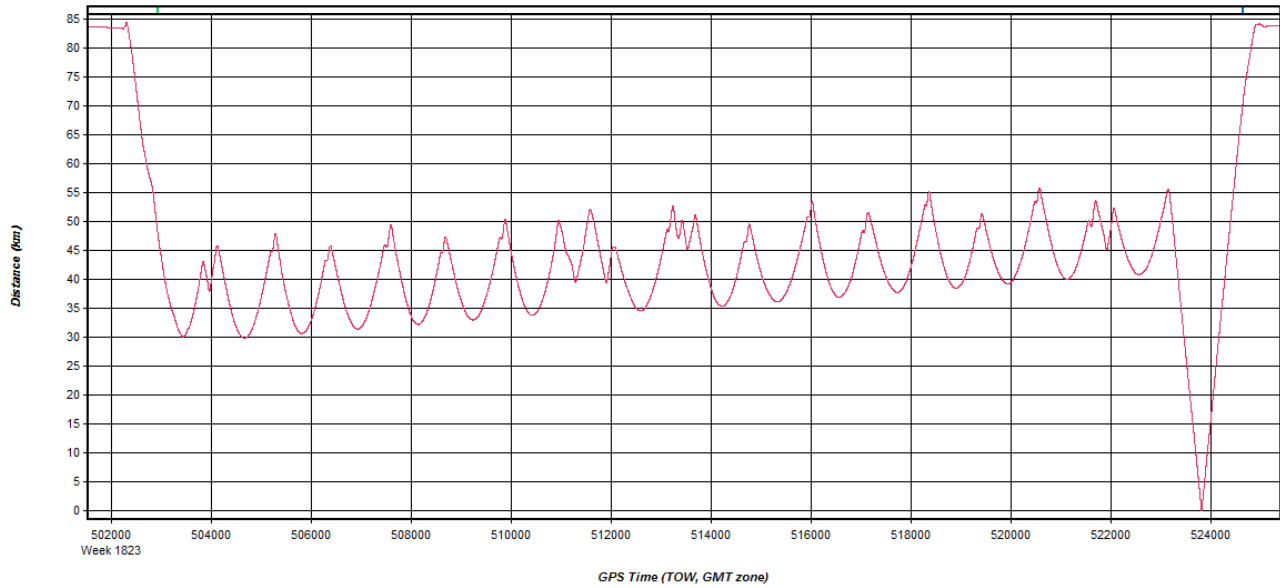
Trajectory and GPS Plots:

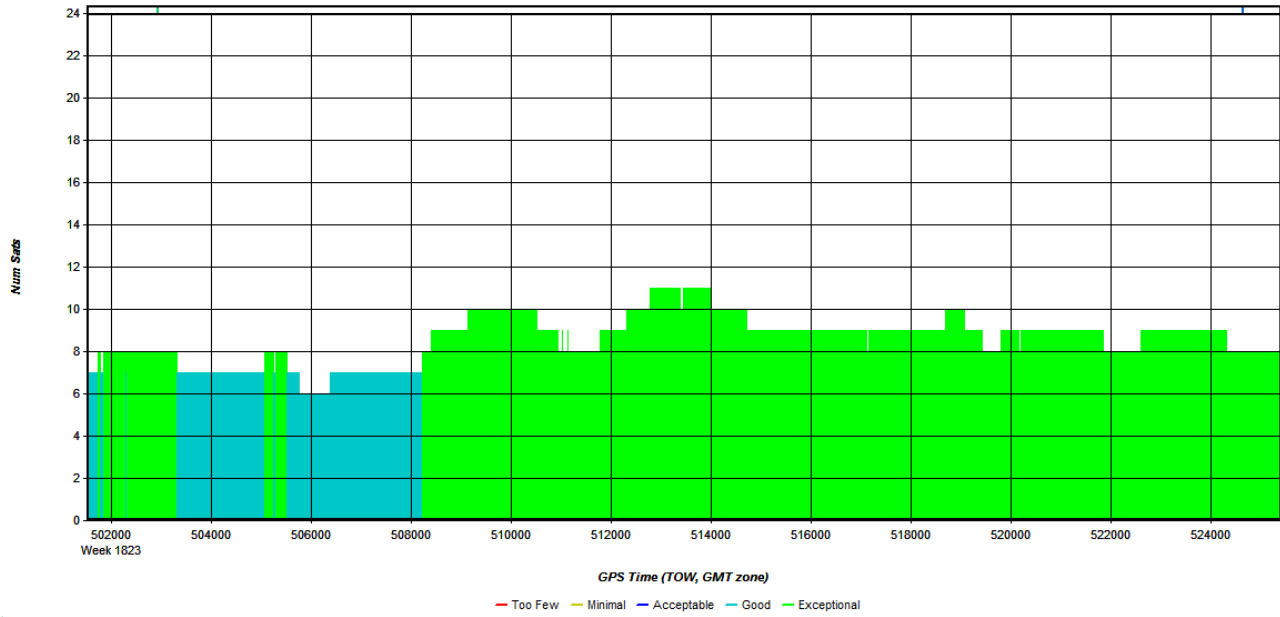














**Acquisition and Processing details ----- Collection 10 (December 26, 2014)**

Log:

RC&A Richard Crouse & Associates		14.5			Lift Begin			Lift End			Fit		Fit		Hobbs		Activity
		Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs	Hrs	Hrs					
1	KFDK			3453.8	KFDK			3460.2									<b>Q 680i Flight Log</b>
2																	
3																	

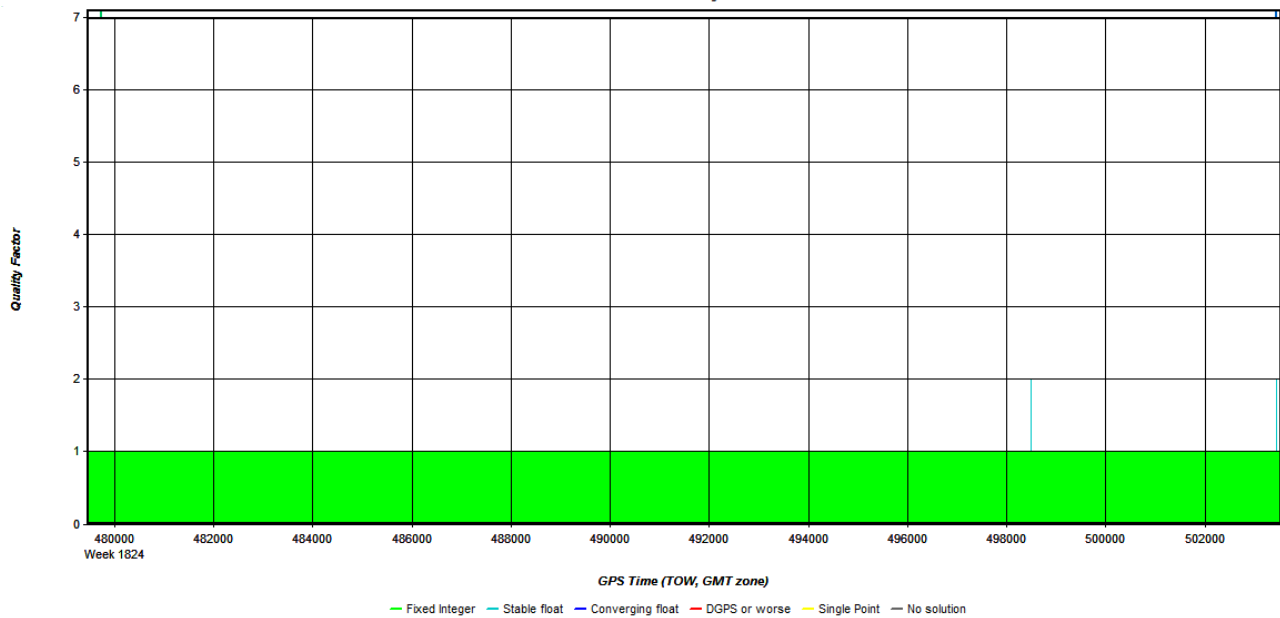
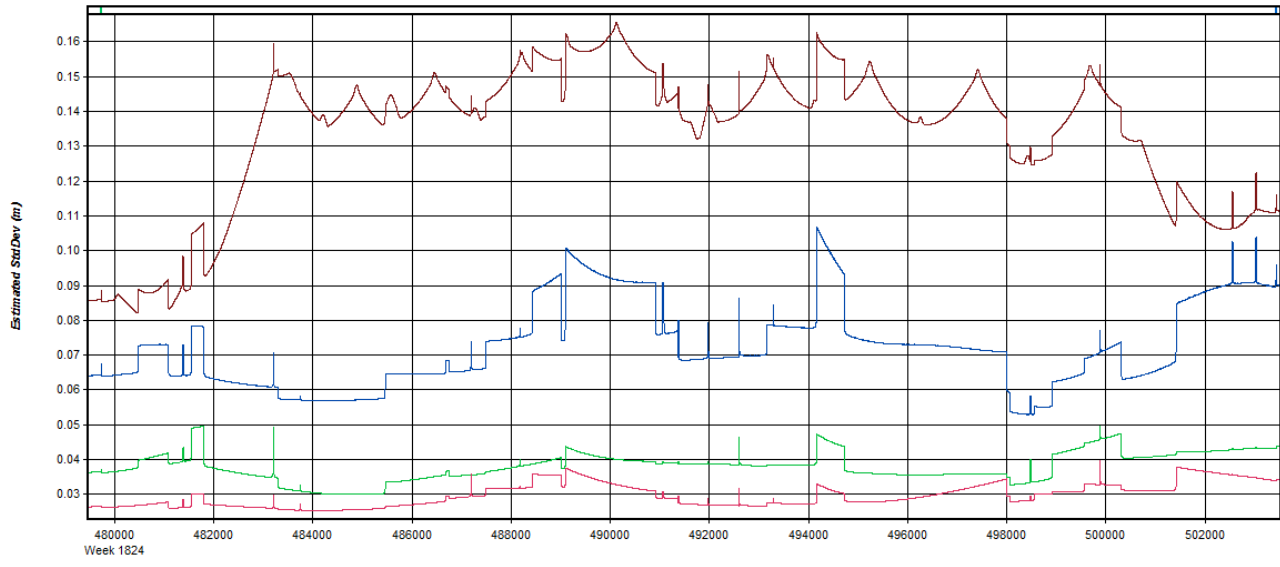
FGI Job #	Project Name			Operator		Unit	#MU	Ground Temp °C		Mn Range'	Data Logger Drives		
22.14001100	USGA PA SANDY			B. RUWET		863	LN-200	20.0		2018	06 and 07		
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)		Flying Temp °C	Max Range'	Download Drive		
26-Dec-14	14-360	10	R680i	R. SHEEHAN		na	na		20.0	3888			
Mission ID (yyymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	MTA	km/WPT	AltM Setting	Humidity @ Alt	Shipping Track
141226_863_14001100_10	N63868	KFDK	Track	-5	3179	140	60	250000	2		30.26	73	
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data

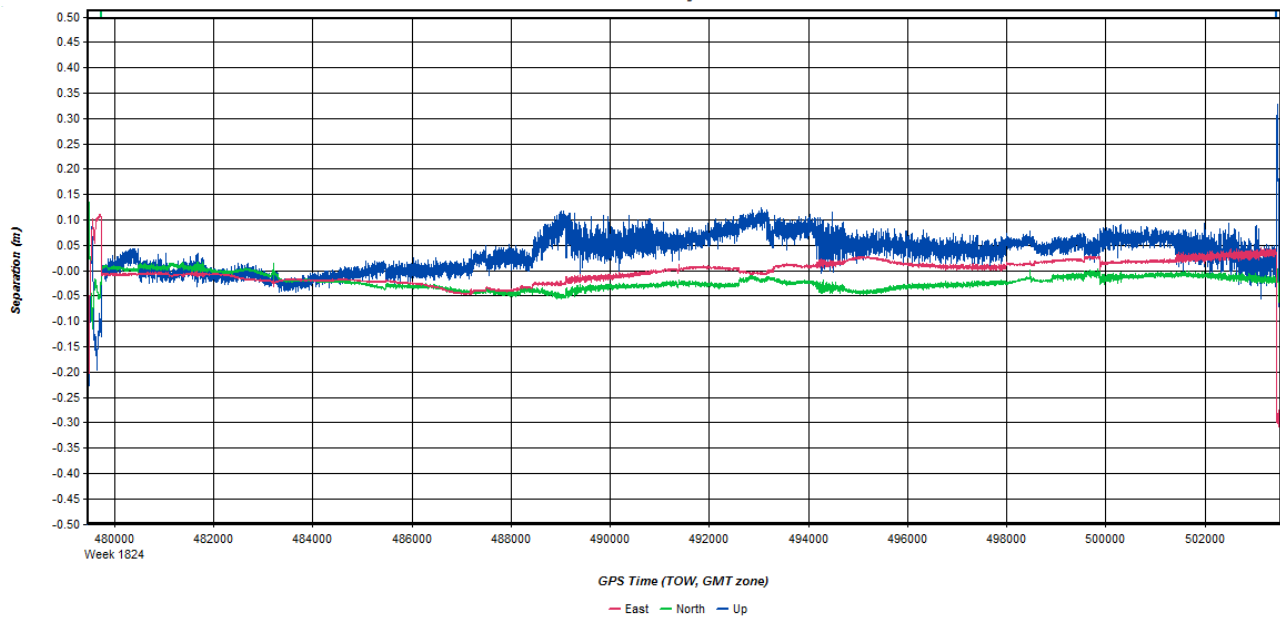
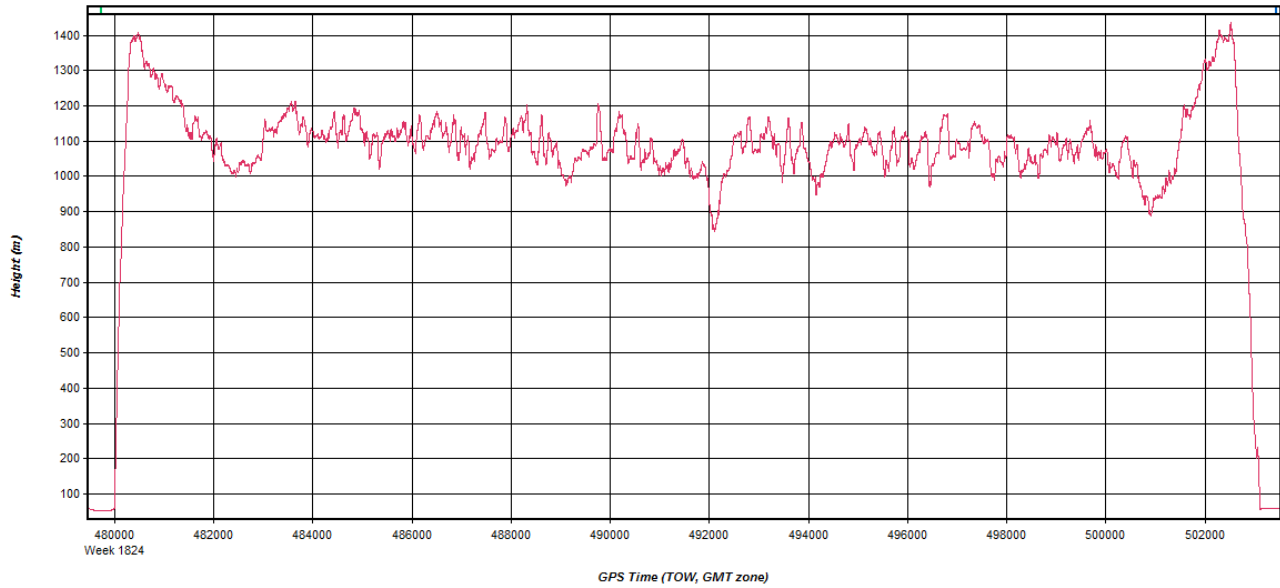
  

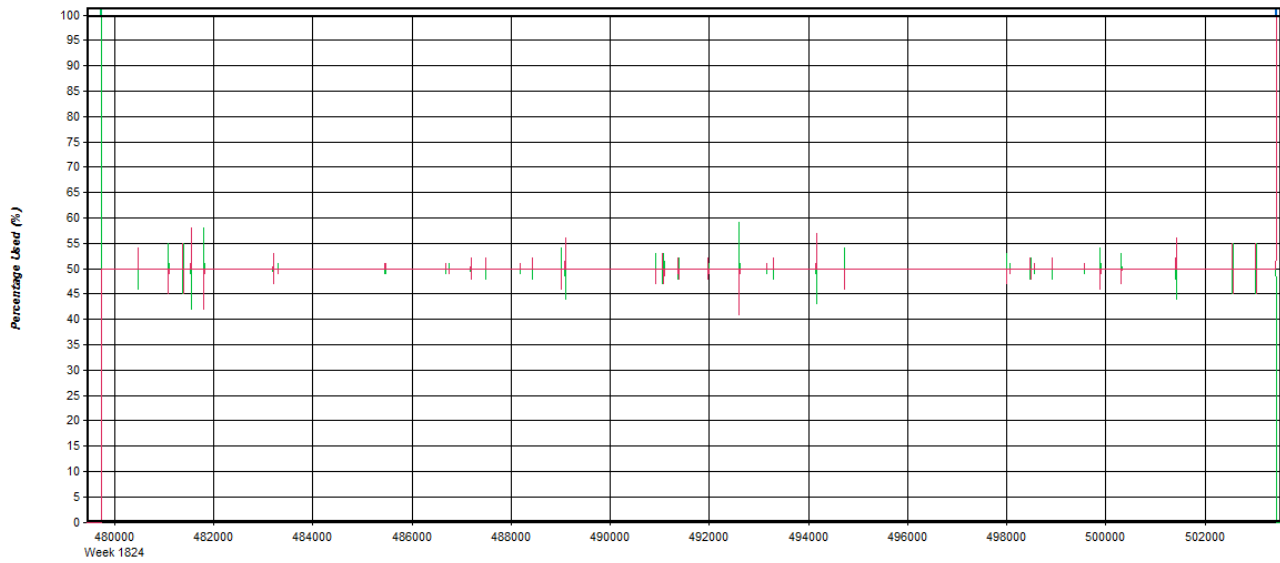
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOP
	FGI	RCA	From	To	Begin	End	Start	End							
													Overfly DEW3 CORS		
		139					13:45:00	14:13:00	E	3,730	135	109.0	HD0=Drive #6, LIDAR Run #163		
		130					14:22:00	14:28:00	S	3,833	135	109.0			
		129					14:32:00	14:39:00	N	3,885	125	109.0			
		128					14:43:00	14:50:00	S	3,759	140	109.0			
		127					14:57:00	15:05:00	N	3,874	135	109.0			
		126					15:09:00	15:19:00	S	3,912	135	109.0			
		125					15:24:00	15:35:00	N	3,958	130	109.0			
		124					15:38:00	15:49:00	S	3,985	140	109.0			
		123					15:54:00	16:07:00	N	3,954	125	109.0			
		122					16:10:00	16:22:00	S	3,931	140	109.0			
		121					16:31:00	16:32:00	S	3,823	140	109.0	Calibration Line		
		-					16:37:00	16:38:00	E	3,823	140	109.0	Perpendicular Line Through		
		121					16:43:00	16:57:00	N	3,823	120	109.0			
		120					17:00:00	17:13:00	S	3,943	140	109.0			
		119					17:17:00	17:31:00	N	3,830	130	109.0	HD1=Drive #7		
		118					17:35:00	17:49:00	S	3,930	140	109.0			
		117					17:52:00	18:08:00	N	3,907	135	109.0			
		116					18:11:00	18:25:00	S	3,836	140	109.0			
		115					18:28:00	18:45:00	N	3,889	125	109.0			
		114					18:49:00	19:04:00	S	3,880	140	109.0			
													Overfly DEW3 CORS		

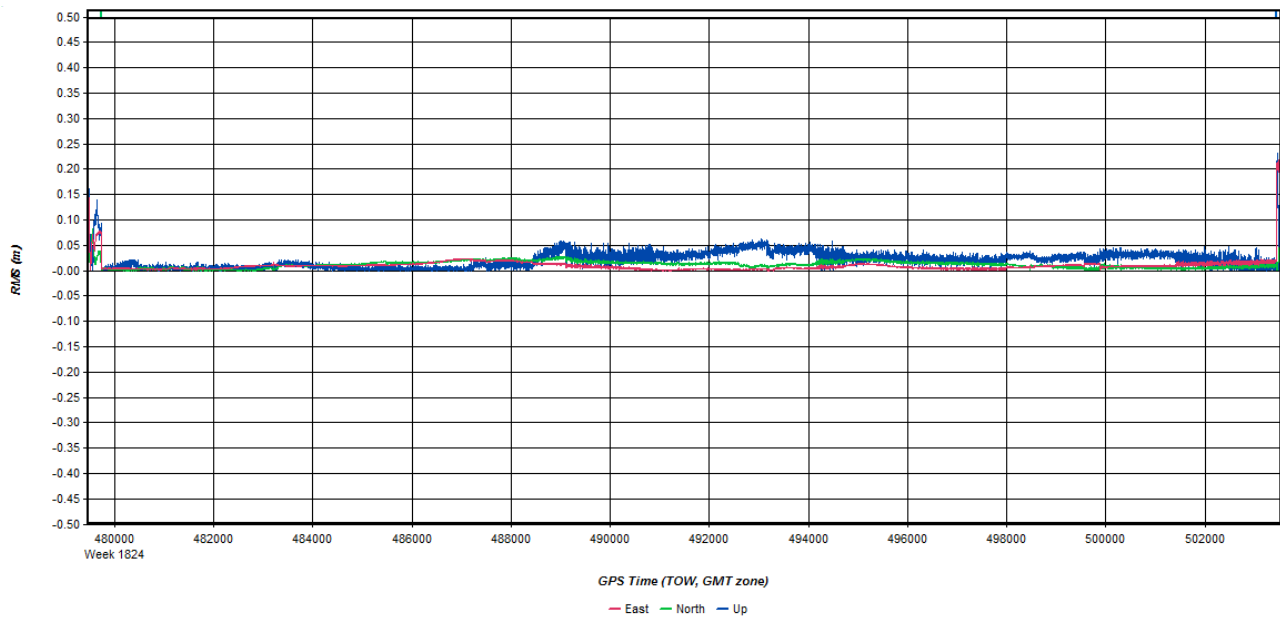
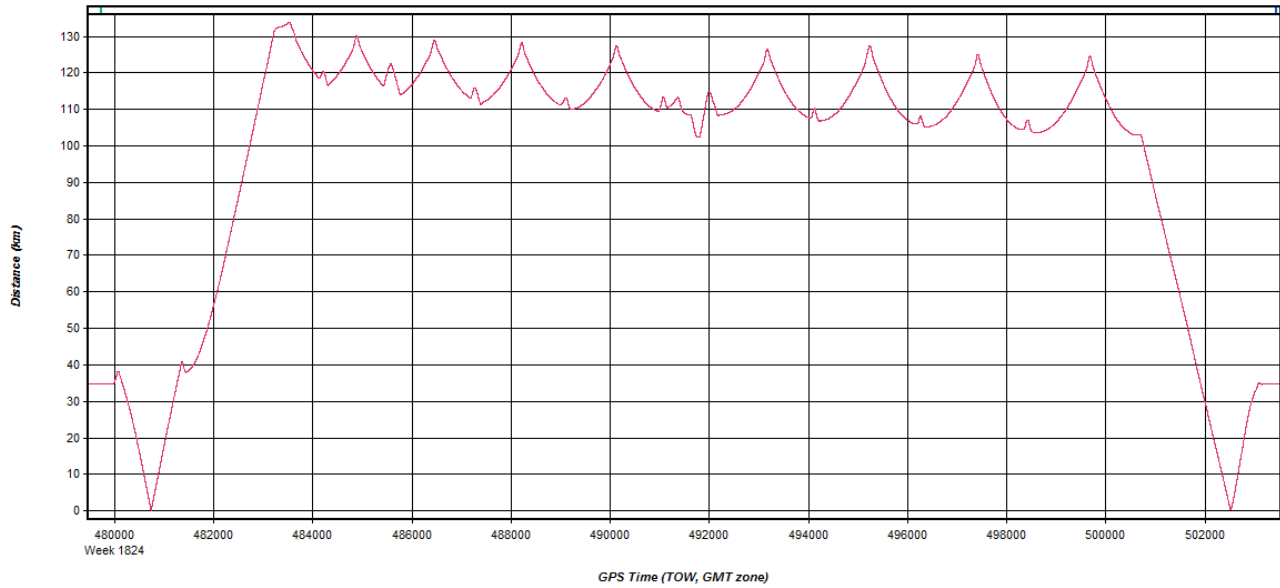


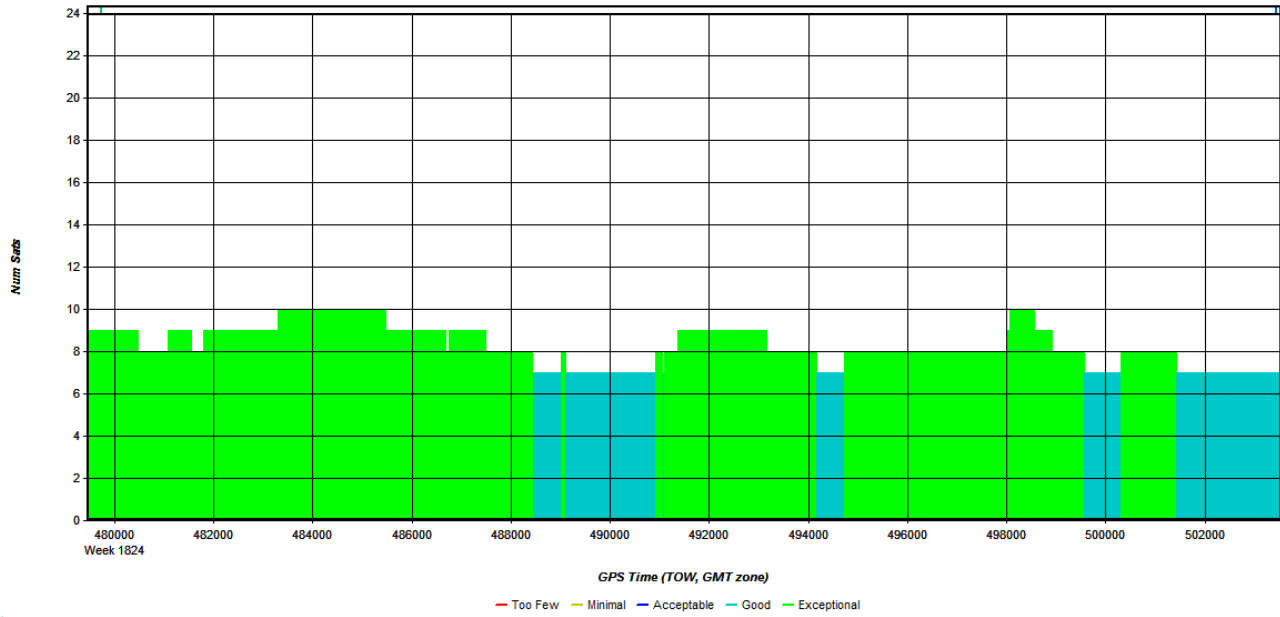














Acquisition and Processing details ----- Collection 11 (December 27, 2014)

Log:

RC&A Richard Crouse & Associates		14.5			Lift Begin			Lift End			Fit		Fit		Hobbs		Activity	
		Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs								
1		KFDK		3460.2	KFDK		3466.0											
2																		
3																		

FGI Job # <b>22.14001100</b>		Project Name <b>USGA PA SANDY</b>				Operator <b>B. RUWET</b>		Unit <b>863</b>		IMU <b>LN-200</b>		Ground Temp °C <b>25.0</b>		Min Range <b>2018</b>		Data Logger Drives <b>06 and 07</b>											
Flight Date <b>27-Dec-14</b>		GPS Day <b>14-361</b>		Lift <b>11</b>		System <b>R680i</b>		Pilot <b>C. Hollingshead</b>		Sun <b>na</b>		Solar Times (UTC) <b>na</b>		Flying Temp °C <b>25.0</b>		Max Range <b>3888</b>		Download Drive									
Mission ID (ymmdd_Sen_Job_Lift) <b>141227_863_14001100_11</b>		Aircraft <b>N63868</b>		Airport ID <b>KFDK</b>		FMS <b>Track</b>		UTC <b>-5</b>		AMT (ft) <b>3179</b>		Speed <b>140</b>		FOV <b>60</b>		Scan Rate (Hz) <b>250000</b>		MTA <b>2</b>		km/WPT <b>30.21</b>		Altm Setting <b>70</b>		Humidity @ Alt		Shipping Track	
Base 1 ID		Location		Rec ID		Ant ID		ARP (m)		Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data									

Area	Flight #		Wpt		Distance		UTC		Fit	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOP
	FGI	RCA	From	To	Begin	End	Start	End							
													Overfly DEW3 CORS		
		101					14:06:00	14:22:00	N	4,008	135	109.0	HD0=Drive #4, LIDAR Run 183		
		102					14:26:00	14:42:00	S	3,980	135	109.0			
		103					14:46:00	15:01:00	N	3,930	140	109.0			
		104					15:04:00	15:21:00	S	3,980	140	109.0			
		105					15:24:00	15:40:00	N	3,830	140	109.0			
		106					15:43:00	15:59:00	S	3,930	140	109.0			
		107					16:03:00	16:19:00	N	3,930	140	109.0			
		108					16:22:00	16:38:00	S	3,830	140	109.0			
		109					16:42:00	16:58:00	N	4,030	140	109.0			
		110					17:02:00	17:03:00	S	3,980	-	109.0	Redo-Off Line in the Beginning		
		110					17:08:00	17:24:00	S	3,980	140	109.0			
		111					17:33:00	17:34:00	S	3,880	135	109.0	Calibration Line		
		-					17:38:00	17:40:00	W	3,880	130	109.0	Perpendicular Line Through		
		111					17:44:00	17:59:00	N	3,880	140	109.0			
		112					18:03:00	18:19:00	S	3,930	135	109.0	Re-fly small section in middle of line to get required sidelap		
		113					18:22:00	18:37:00	N	3,880	140	109.0			
		112					18:46:00	18:49:00	S	3,930	140	109.0	Partial Line to achieve required sidelap (from above)		
													Overfly AAM1 CORS		

Trajectory and GPS Plots:

