



COLLECTION REPORT – USGS LIDAR ACQUISITION

**FEMA Region 6 – Arkansas QL2 LiDAR
Lower Black Watershed – Blocks NEL & NEU**

4 February 2015

Prepared for

United States Geological Survey
1400 Independence Road
Rolla, MO 65401
573.308.3756

Prepared by

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Fugro 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 three Areas of Interest (AOIs) in Arkansas; Washington County, Jefferson County, and the Lower Black Watershed in Arkansas and Missouri. The AOIs cover approximately 3,381 square miles. A 100-meter buffer was added to the AOIs covering approximately 3,414 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 January 5th and January 24th, 2015 by Fugro and Fugro’s approved ID/IQ subcontractor, Richard Crouse & Associates, Inc. (RC&A).

The following is detail on the LiDAR acquisition covering the FEMA Region 6 – Arkansas QL2 LiDAR buffered boundary for the Lower Black Watershed, blocks NEL & NEU.

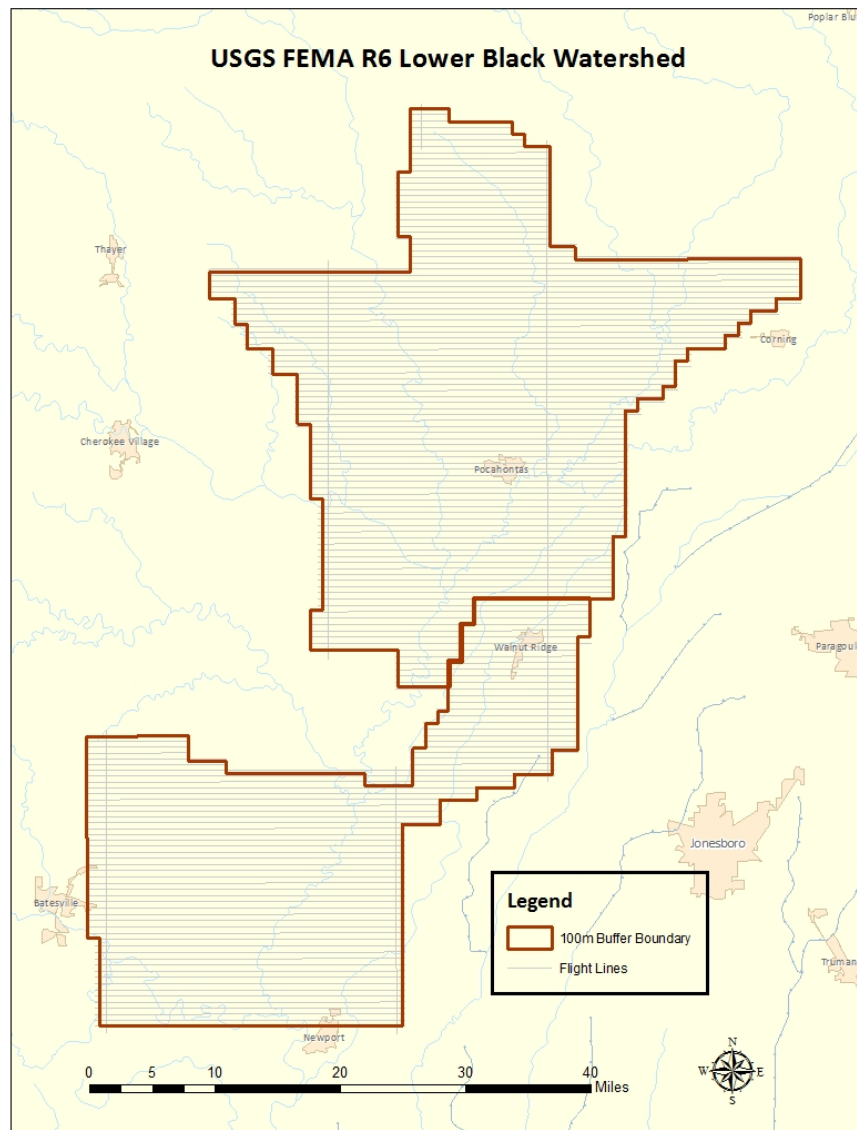


Figure 1: Flight plan

Collections: 18
Collection Dates: January 14th - January 24th, 2015
Field of View (FOV): 60 degrees
Average Point Density (planned): 2 pts/m²
Flight Level(s) AMT: 3179 ft, 3180 ft
Sensor Type: Riegl Q-680i
Sensor Serial Number(s): 165

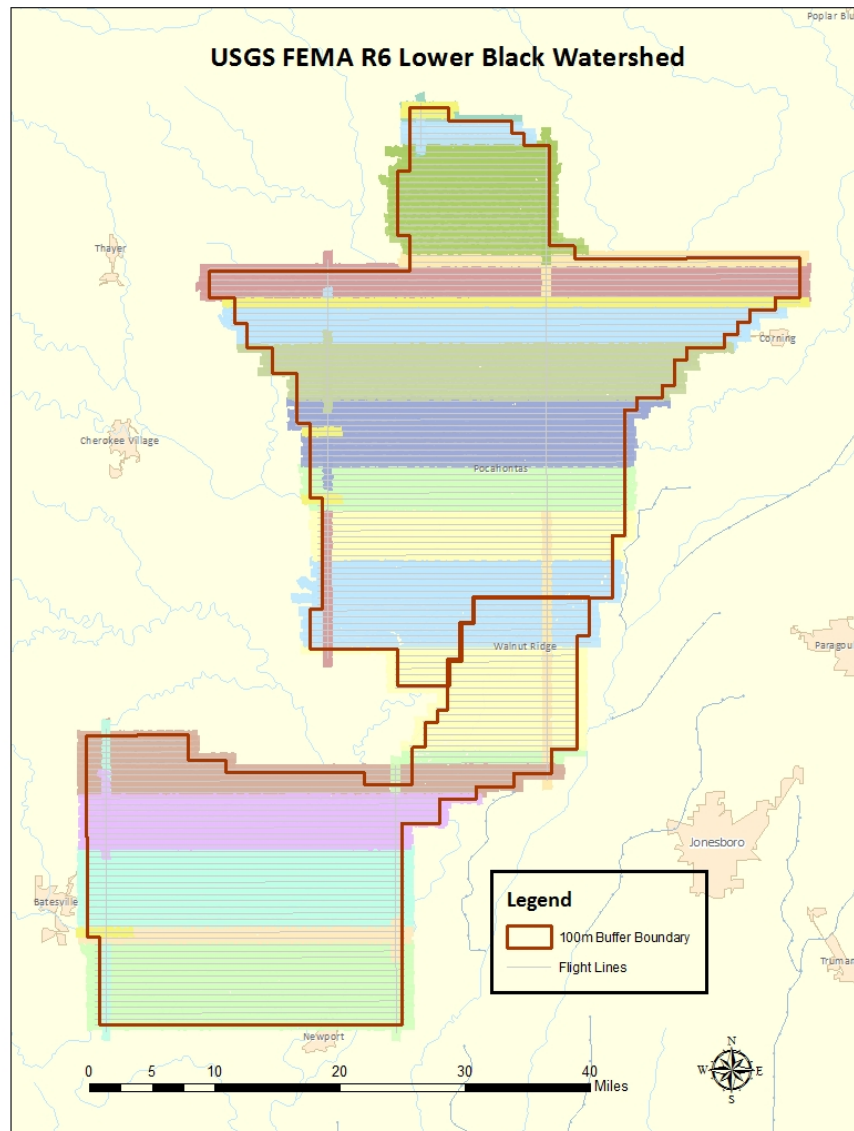


Figure 2: Executed Collection Footprints

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

Below are the acquisition logs and GPS plots from all collections covering the FEMA Region 6 – Arkansas QL2 LiDAR buffered boundary for the Lower Black Watershed, blocks NEL & NEU.



Acquisition and Processing details ----- Collection 11 (January 14, 2015)

Log:



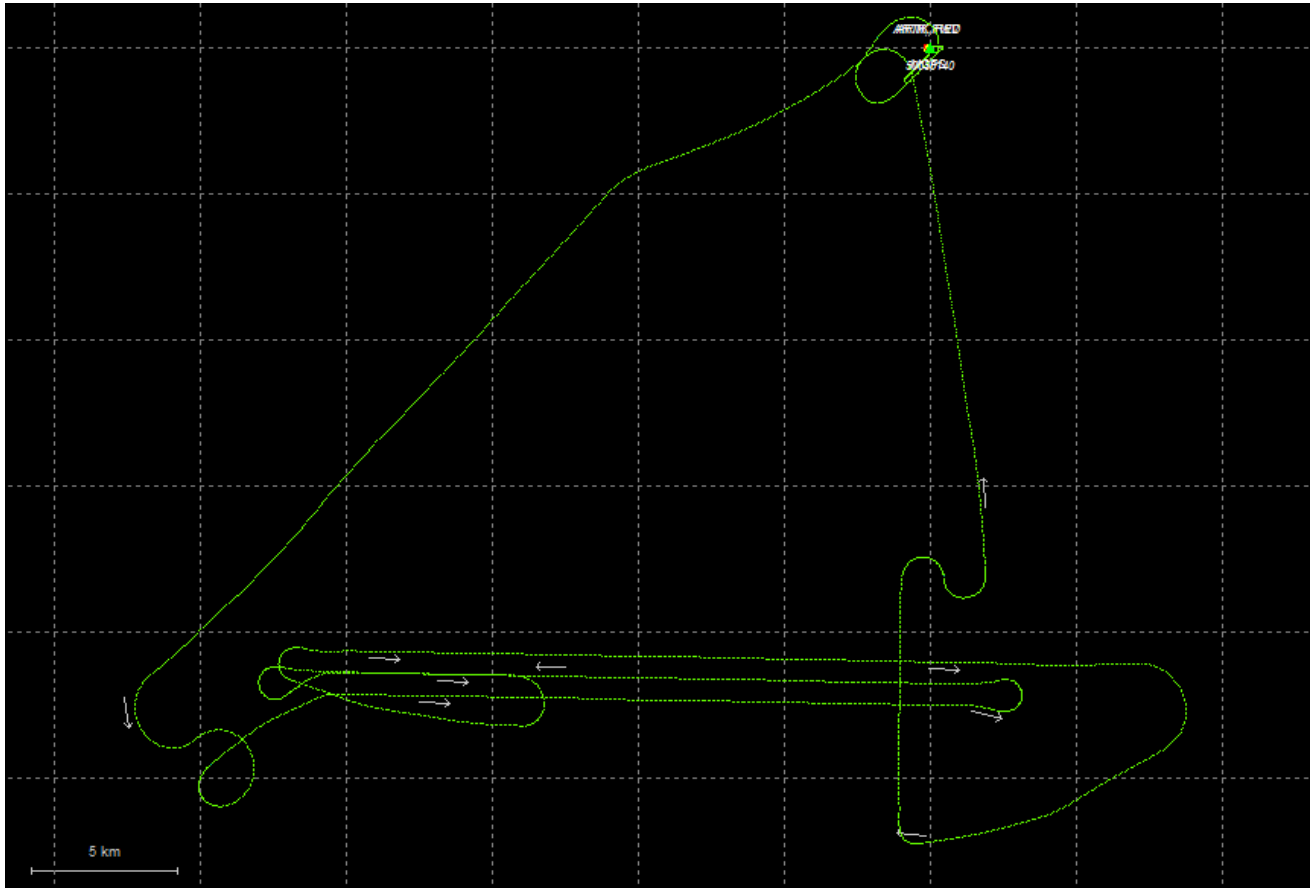
Fugro Geospatial, Inc.

**Q680i
Flight Log**

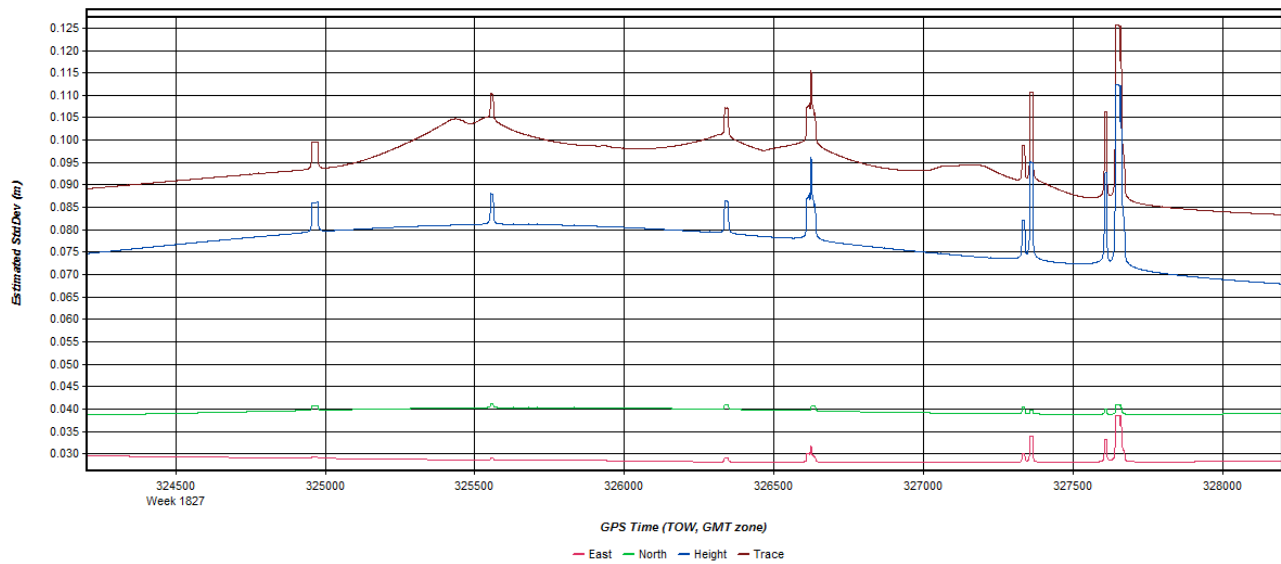
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	17:26	9396.1	KARG	19:10	9398.0	1:44	1.75	1.9	0900-Production
2										
3										

FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives				
22.14006900	FEMA Region6 AR LiDar				Chris Acuna		165	FMU-300	-	-	2018	DR60-4				
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)	Pulse Rate	Flying Temp °C		Max Range'	Download Drive				
14-Jan-15	15-014	11	R680i	Larry Stewart		-	-	250 KHZ	-	-7.0 -7.0	3888	EP500#31				
Mission ID (yymmdd_Sen_Job_Lift)		Aircraft	Airport ID	FMS	UTC	Alt (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Alt/Setting	Humidity @ Alt	Shipping Track		
150114_165_14006900_11		N62912	KARG	CCNS 6	-6	3200	150	60	110	2	0.364	30.40 30.35	60	8771 0698 5486		
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data			
5083	KARG		PF001	PF001	1.805	-		-		-		-	-			
Area	Flight #		Wpt		Distance		UTC		Fit	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate				
							18:05:25	18:10:25					5 min gnd static alignment at KARG		8	1.2
							18:23:00	18:25:00					S-Turn in flight alignment		8	1.4
NEL-BIK	50		1	33	0	11.6	18:26:00	18:31:00	88	3,354	145				8	1.4
NEL-BIK	51		33	1	11.6	0	18:32:00	18:37:00	269	3,296	143				8	1.4
NEL-BIK	51		1	7	0	2.2	18:39:00	18:48:00	88	3,290	141		Calibration		8	1.2
NEL-BIK	52		1	38	0	13.5	18:44:00	18:49:00	89	3,303	145				8	1.2
NEU-BIK	83		1	10	0	1.5	18:53:00	18:54:00	360	3,131	141		Crossing Line		8	1.3
							18:55:00	18:56:00					S-Turn post in flight alignment		8	1.3
							19:03:43	19:08:43					5 min post gnd static alignment at KARG			
													Mission ended for what seemed			

Trajectory and GPS Plots:

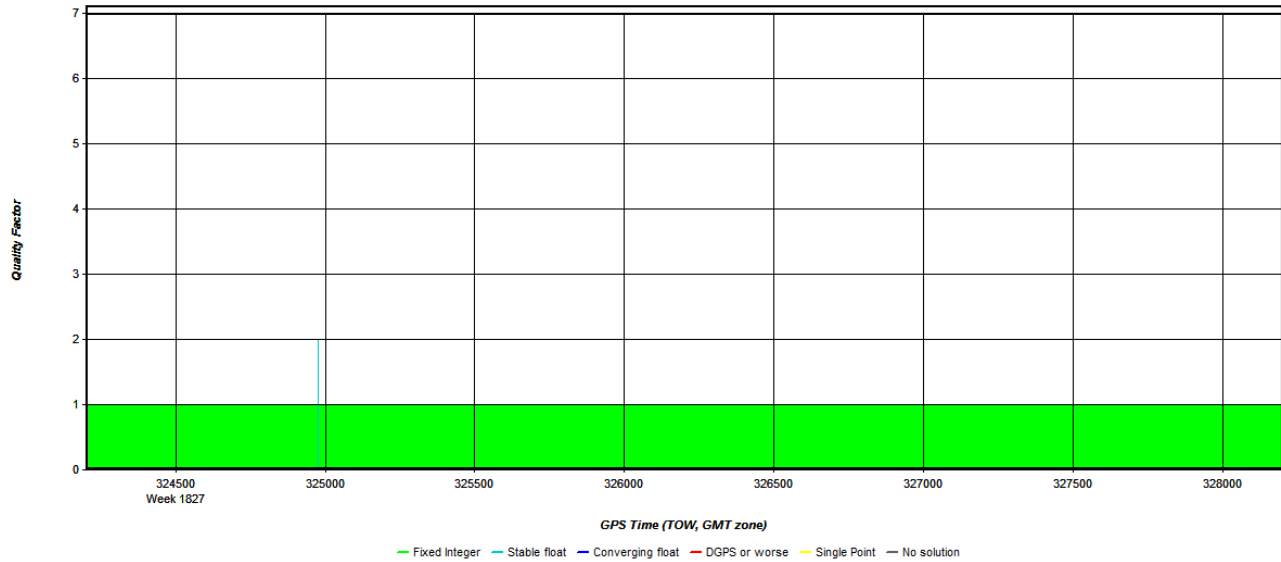


Estimated Accuracy

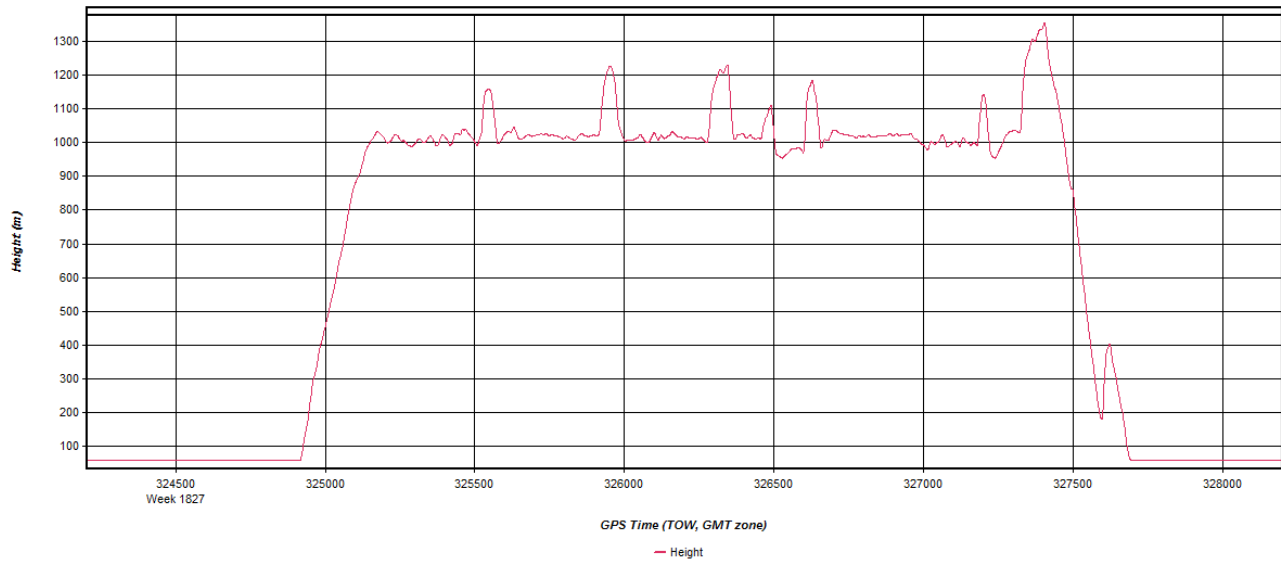




Quality Factor

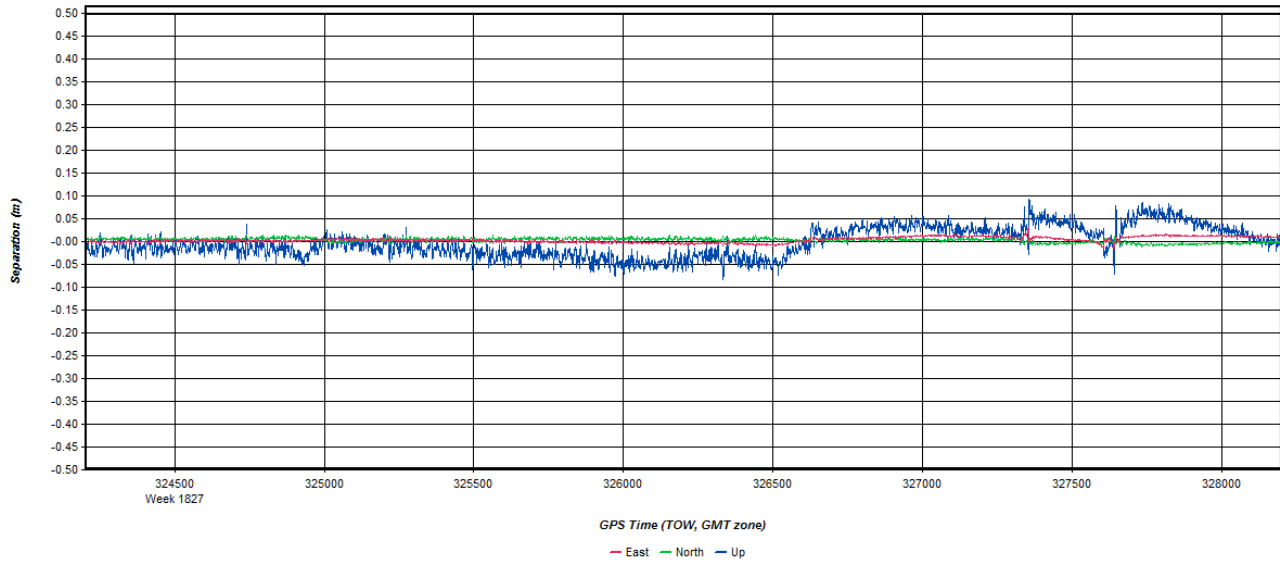


Height

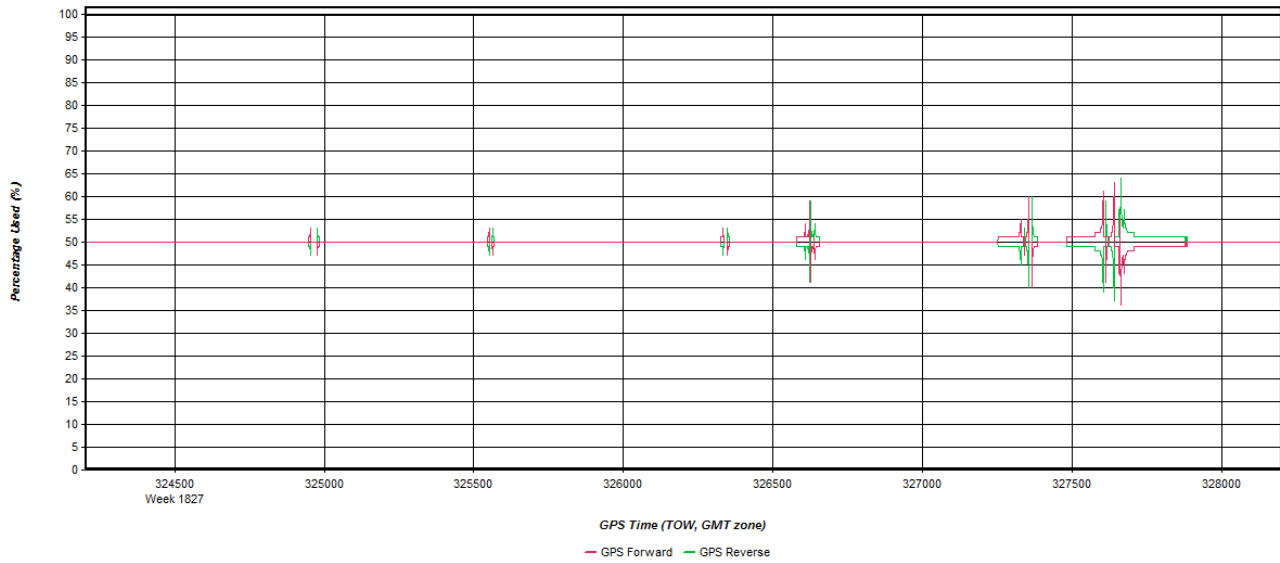




Combined Forward/Reverse Separation

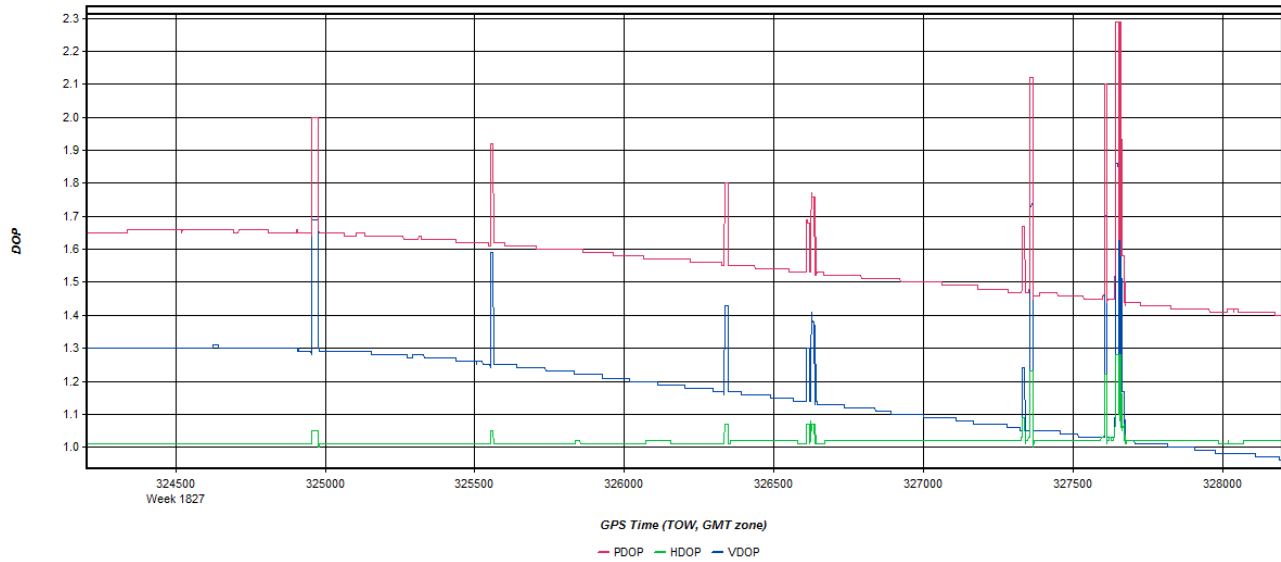


Combined Forward/Reverse Weighting

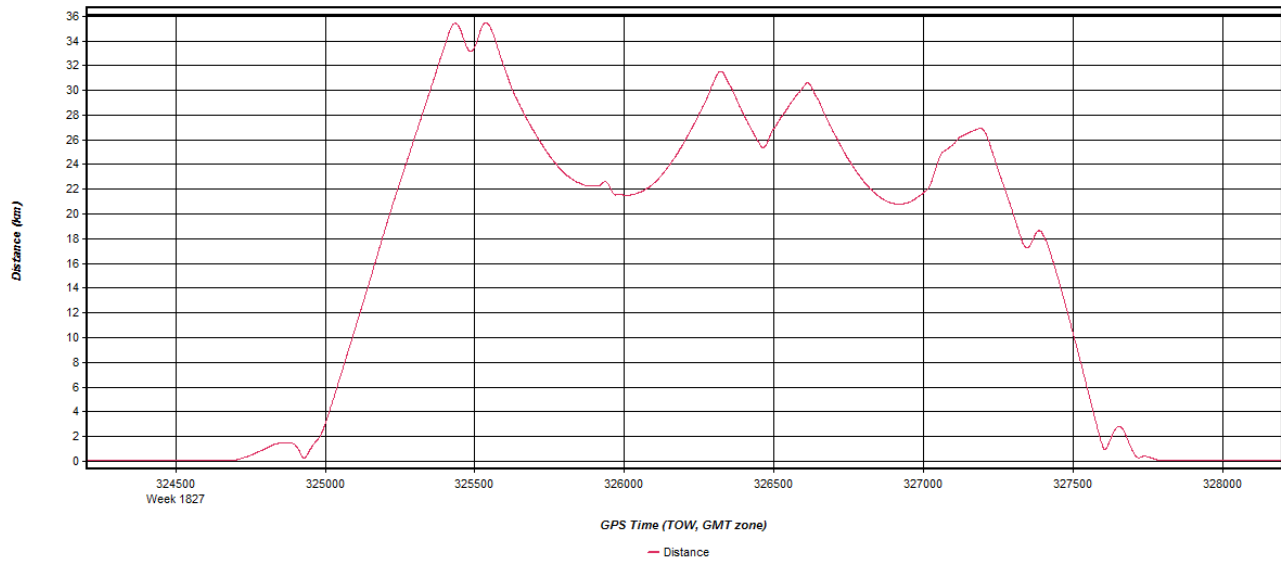




PDOP

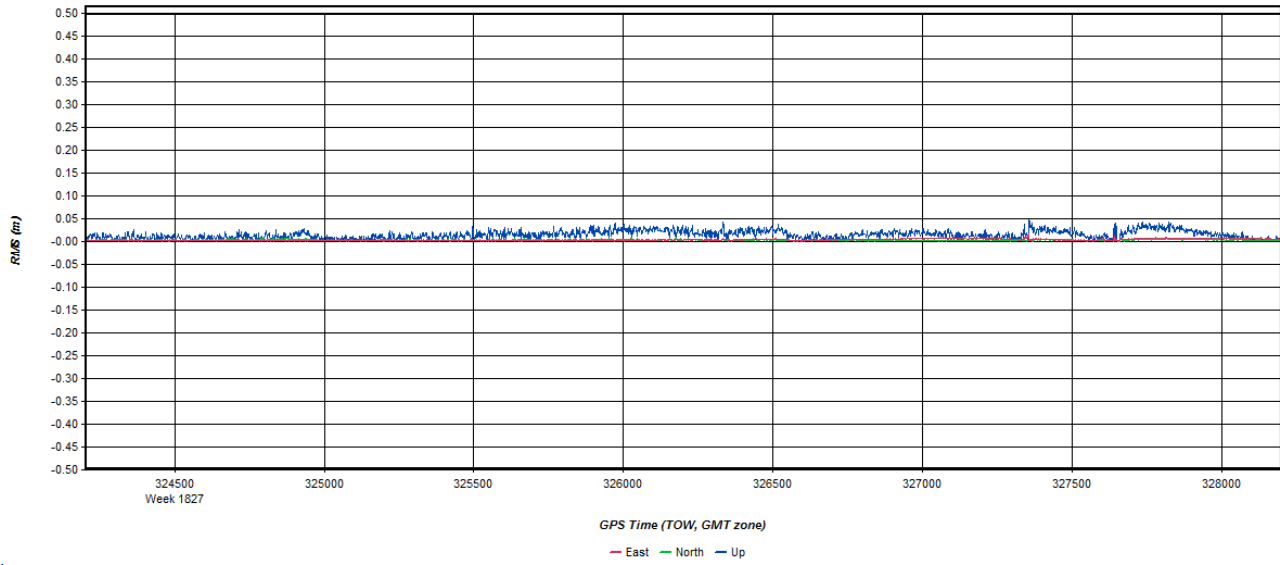


Distance from Base

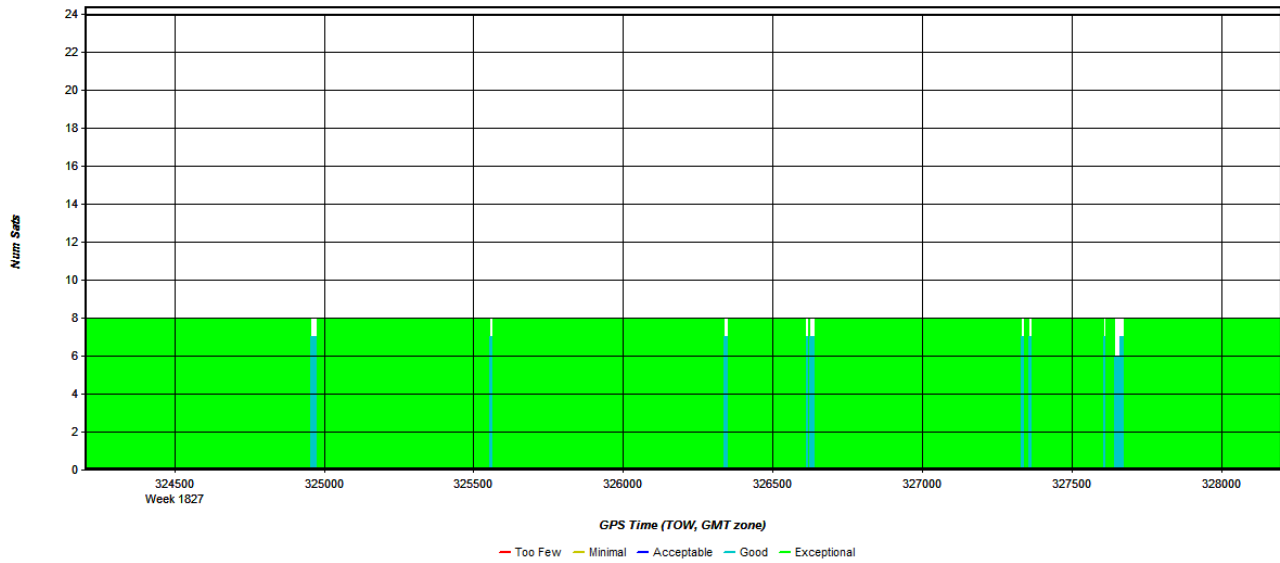




Combined RMS



SVs





Acquisition and Processing details ----- Collection 12 (January 14, 2015)

Log:



Fugro Geospatial, Inc.

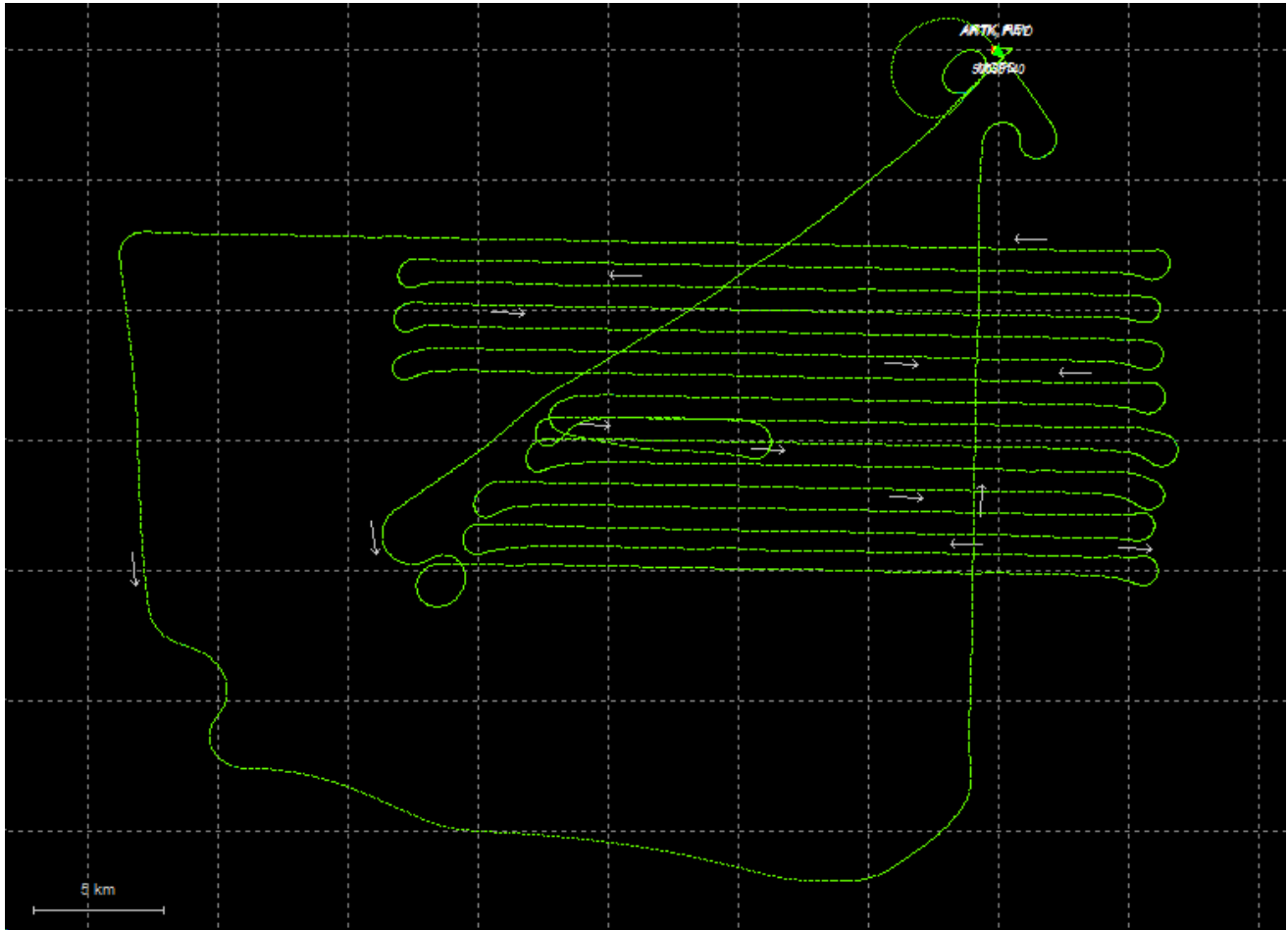


**Q680i
Flight Log**

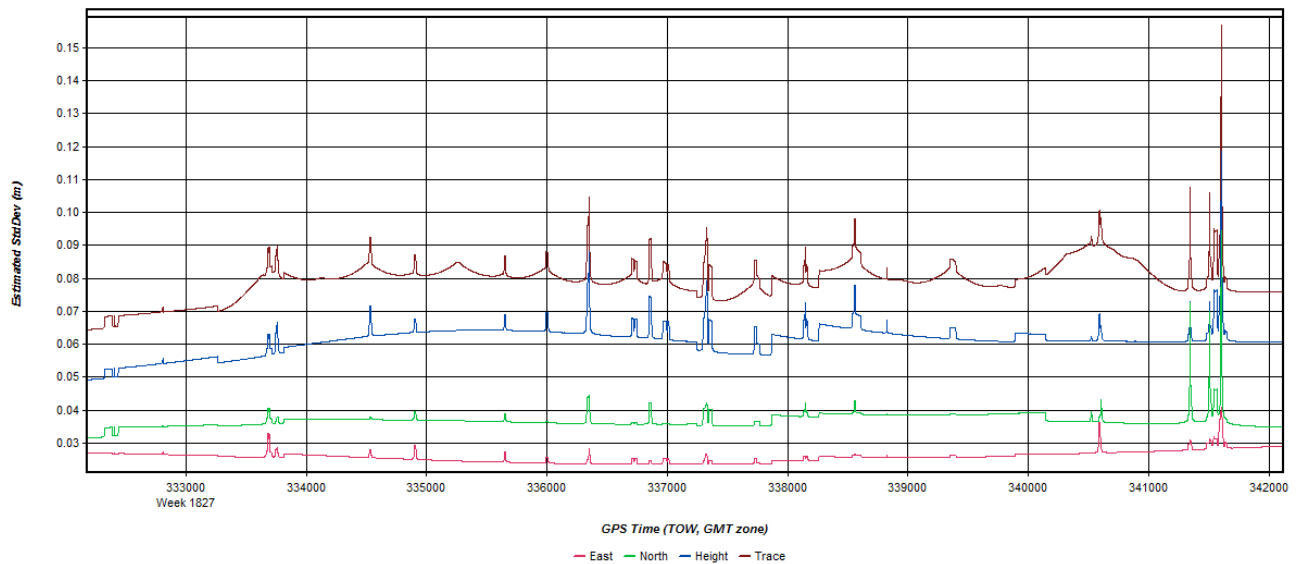
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	20:11	9398.0	KARG	23:02	9400.8	2:51	2.75	2.8	0900-Production
2										
3										

FGI Job #	Project Name			Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives					
22.14006900	FEMA Region6 AR LiDar			Chris Acuna		165	FMU-300	1.0	1.0	2018	DR60-7					
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)	Pulse Rate	Flying Temp °C		Max Range'	Download Drive				
14-Jan-15	15-014	12	R680i	Larry Stuart		-	-	250 KHZ	-2.0	0.0	3888	EP500#31				
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMr (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	AltM Setting	Humidity @ Alt	Shipping Track			
150114_165_14006900_12	N62912	KARG	CCNS 6	-6	3200	150	60	110	2	0.364	30.33	30.31	52	8771 0698 5486		
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data				
5083	KARG	PF001	PF001	1.805	-		-		-		-	-				
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOF
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate				
							20:19:20	20:24:20					5 min gnd static alignment at KARG		13	1.0
							20:39:00	20:41:00					S-Turn in flight alignment		11	1.1
NEL-Bik	53		1	38	0	13.5	20:42:00	20:48:00	89	3,412	142				11	1.1
NEL-Bik	54		35	1	12.4	0	20:49:00	20:54:00	270	3,268	142				11	1.2
NEL-Bik	55		1	35	0	12.4	20:55:00	21:00:00	92	3,388	146				10	1.3
NEL-Bik	56		35	1	12.4	0	21:01:00	21:06:00	269	3,341	143				10	1.3
NEL-Bik	57		1	35	0	12.4	21:08:00	21:13:00	90	3,315	146				10	1.2
NEL-Bik	58		32	1	11.3	0	21:14:00	21:18:00	271	3,290	145				10	1.2
NEL-Bik	59		1	32	0	11.3	21:20:00	21:24:00	90	3,400	149				10	1.1
NEL-Bik	60		30	1	10.6	0	21:26:00	21:30:00	268	3,357	148				10	1.0
NEL-Bik	60		1	7	0	2.2	21:32:00	21:33:00	89	3,465	150		Calibration Line		11	1.0
NEL-Bik	61		1	30	0	10.6	21:36:00	21:40:00	90	3,394	149				11	1.0
NEL-Bik	62		41	1	14.6	0	21:42:00	21:47:00	270	3,340	145				11	1.0
NEL-Bik	63		1	41	0	14.6	21:49:00	21:54:00	92	3,340	147				11	1.0
NEL-Bik	64		41	1	14.6	0	21:55:00	22:01:00	270	3,424	149				11	1.0
NEL-Bik	65		1	41	0	14.6	22:02:00	22:08:00	92	3,340	149				10	1.0
NEL-Bik	66		41	1	14.6	0	22:09:00	22:15:00	272	3,325	147				9	1.1
NEL-Bik	67		1	41	0	14.6	22:16:00	22:22:00	89	3,402	149				9	1.3
NEL-Bik	68		60	1	21.5	0	22:23:00	22:31:00	270	3,370	147				10	1.2
NEU_Bik	83		1	35			22:42:00	22:47:00	1	3,295	148		Crossing Line		9	1.2
							22:47:00	22:49:00					S-Turn post in flight alignment		10	1.1
							22:55:30	23:00:30					5 min post gnd static alignment at KARG			

Trajectory and GPS Plots:

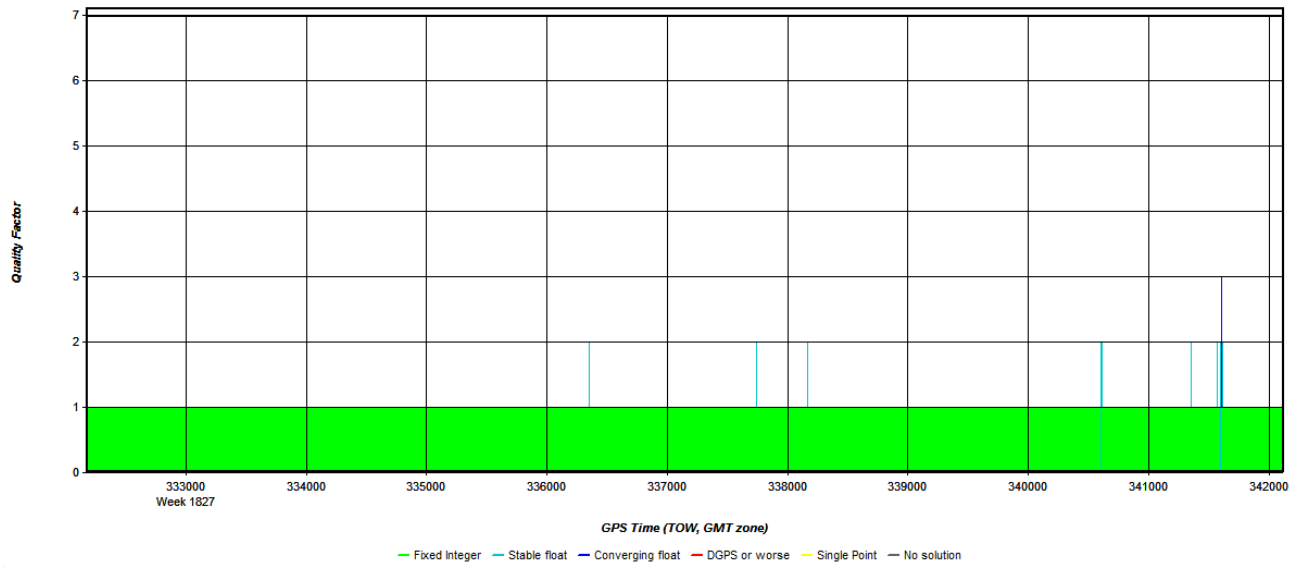


Estimated Accuracy

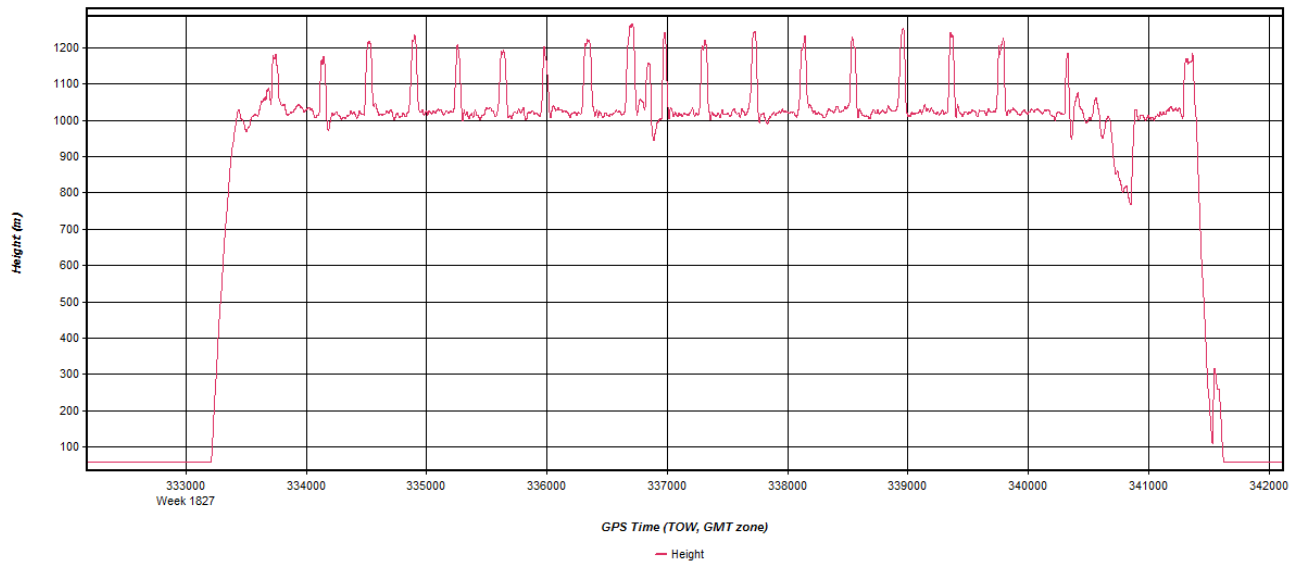




Quality Factor

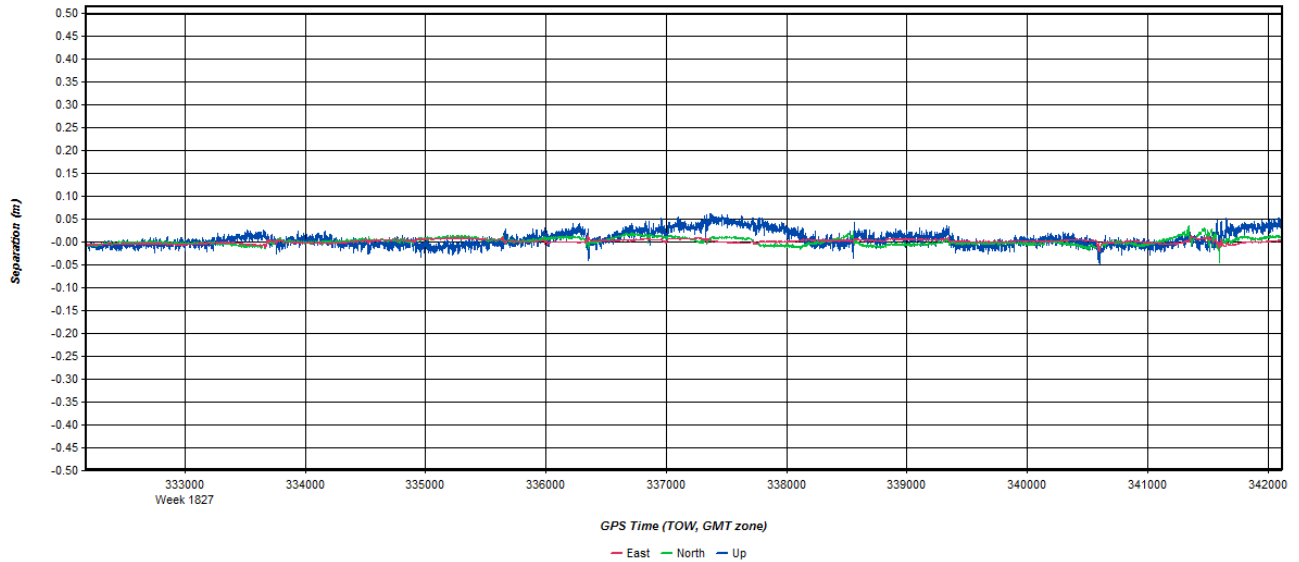


Height

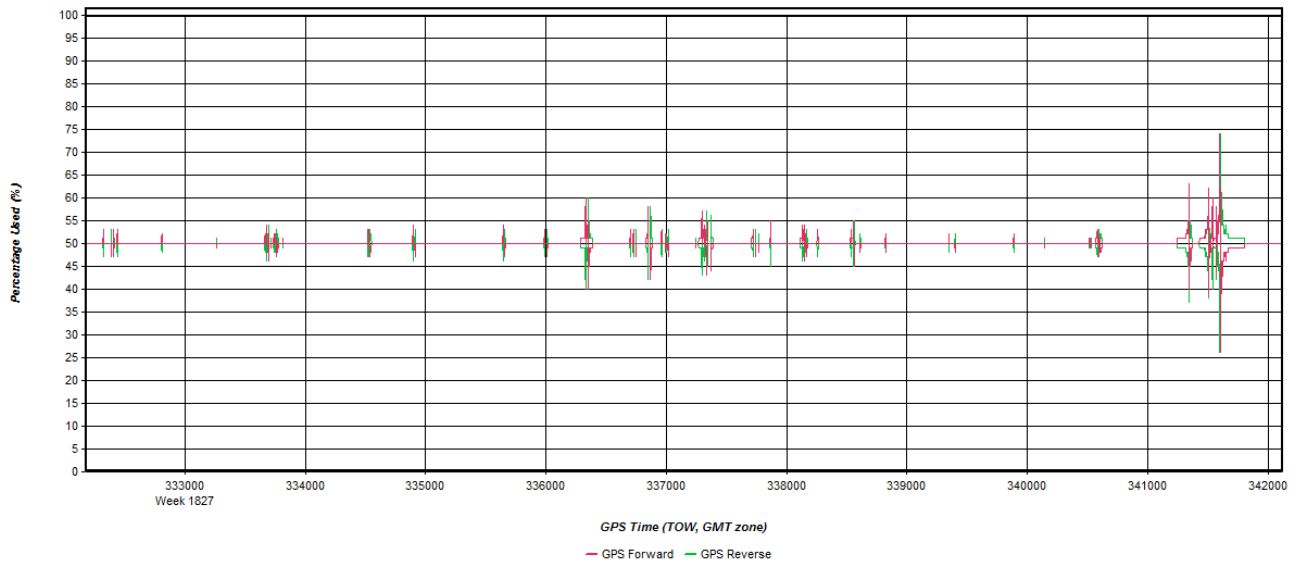




Combined Forward/Reverse Separation

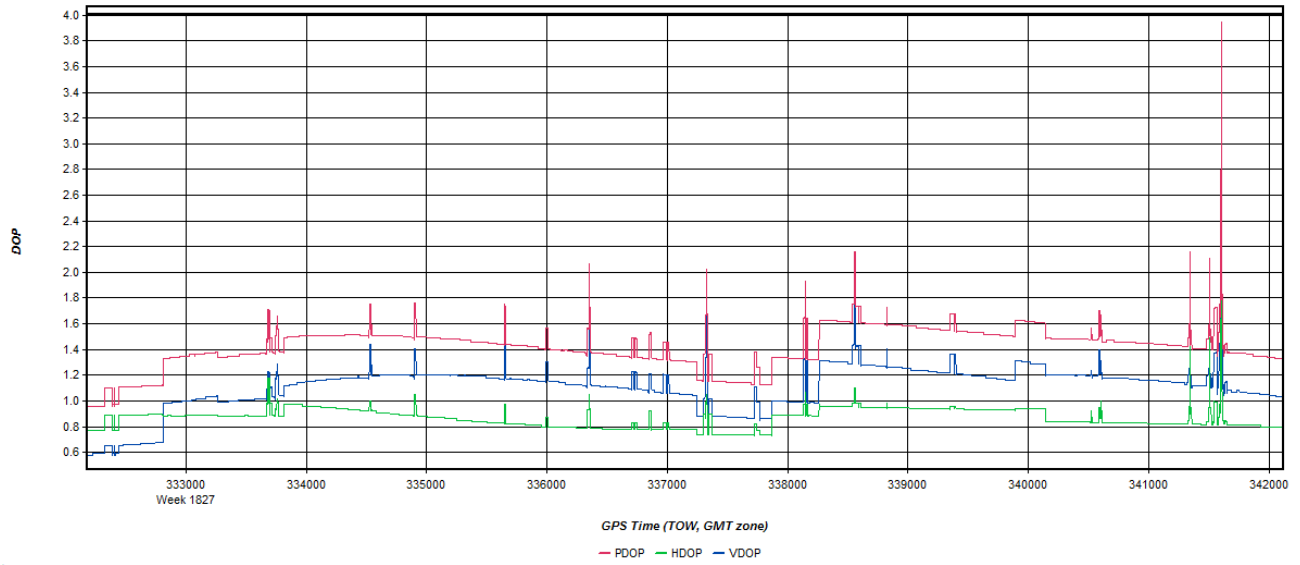


Combined Forward/Reverse Weighting

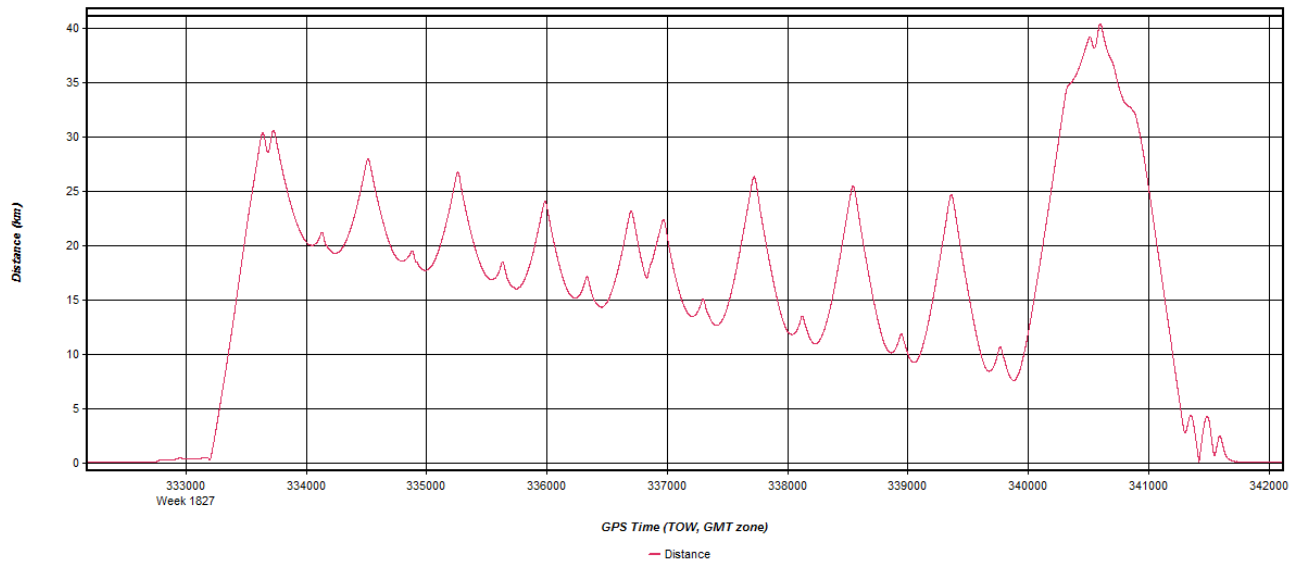




PDOP

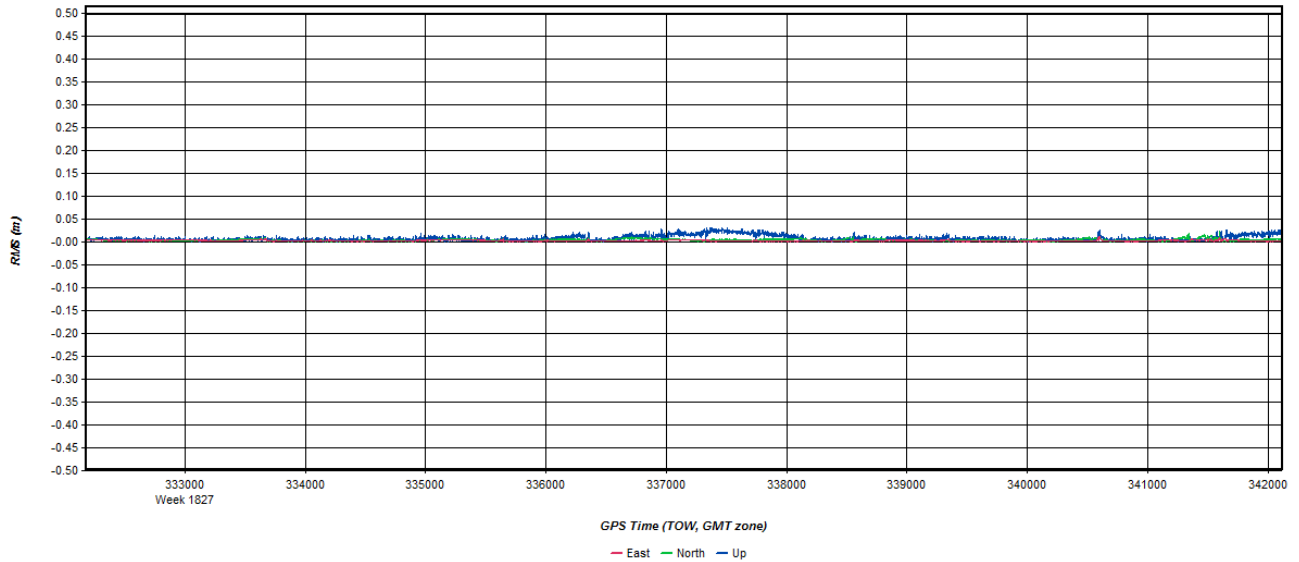


Distance from Base

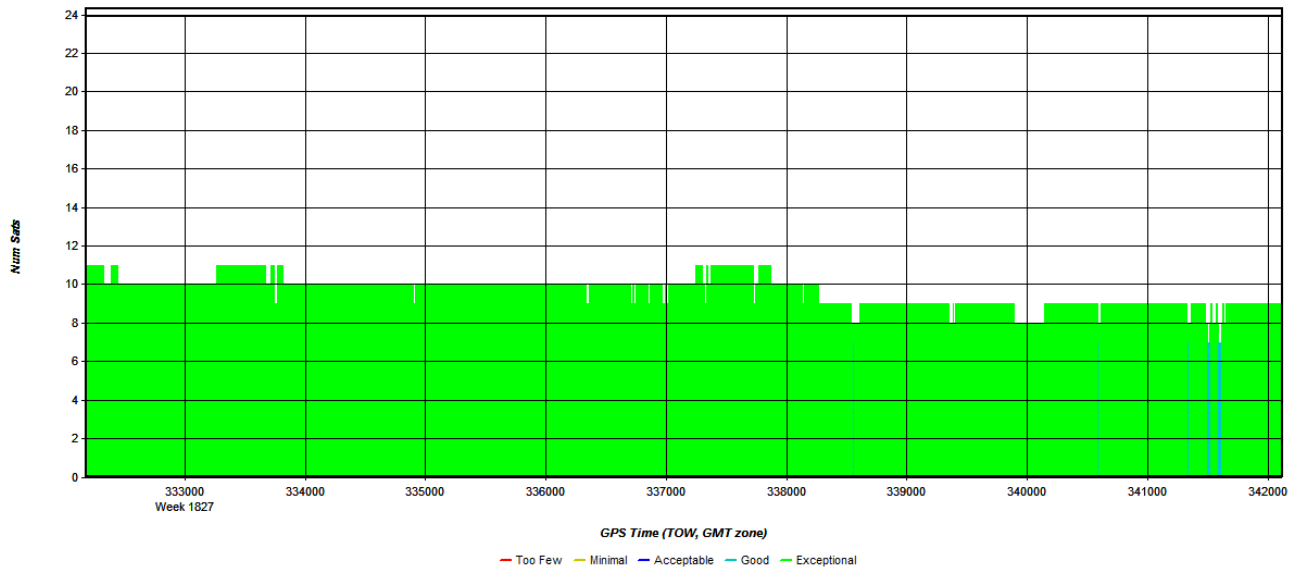




Combined RMS



SVs





Acquisition and Processing details ----- Collection 13 (January 14, 2015)

Log:



Fugro Geospatial, Inc.

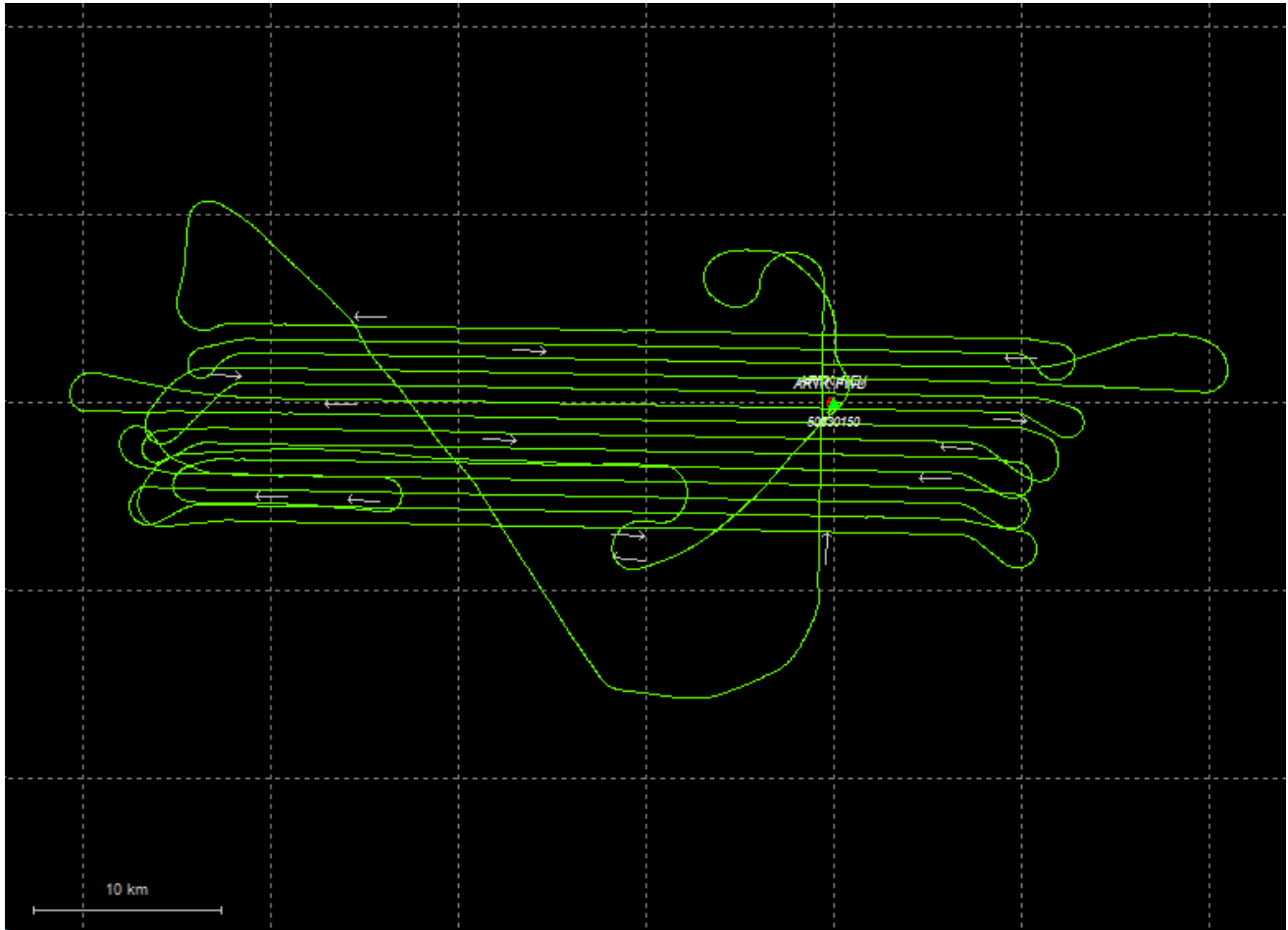
	Lift Begin			Lift End			Fit Duration	Fit Hrs	Hobbs Hrs	Activity
	Airport	Chocks	Hobbs	Airport	Chocks	Hobbs				
1	KARG	0:15	9401.2	KARG	4:30	9404.7	4:15	4.25	3.5	0900-Production
2										
3										



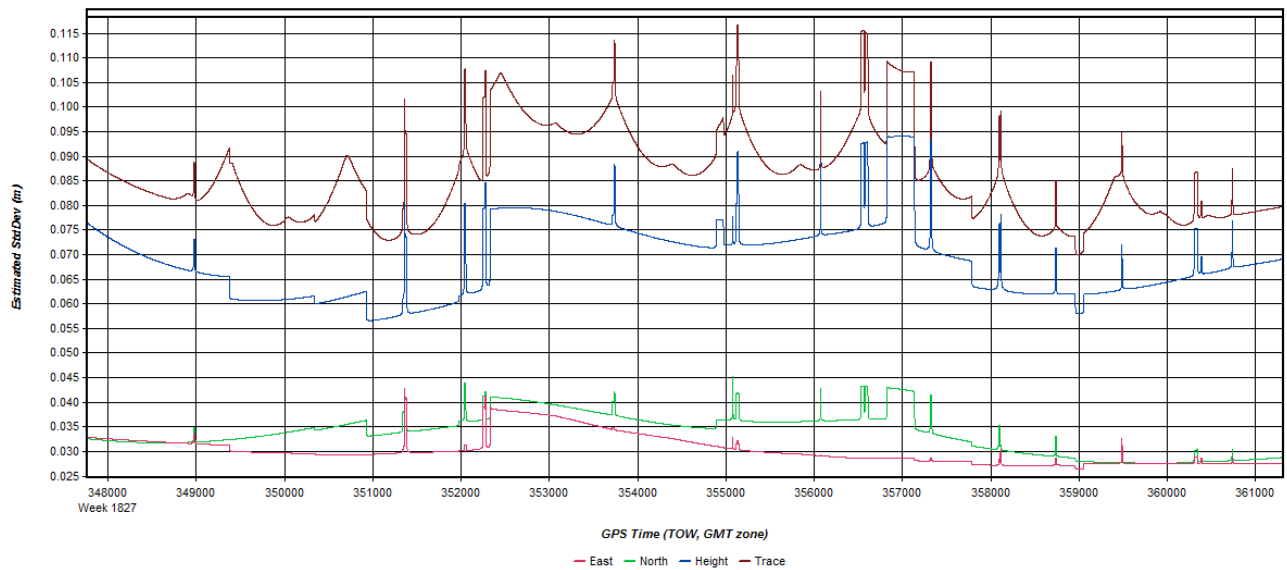
**Q680i
Flight Log**

FGI Job #	Project Name			Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives				
22.14006900	FEMA AR			Greg Sliwinski		165	FMU-300	0.0	-2.0	2018	DR680-5 8 9				
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)		Flying Temp °C		Max Range'	Download Drive			
14-Jan-15	15-014	13	R680i	Roman Rosa					250khz		3888				
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Altitude Setting	Humidity @ Alt	Shipping Track		
150114_165_14006900_13	N62912	KARG	CCNS 6	-6	3200	150	60	110	2	0.364	30.34	30.30	58		
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data		
	Walnut Ridge		PF01	PF01	1.805	14-Jan-15 00:00						Greg Sliwinski	With AB		
Area	Flight #	Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOF
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate			
							0:37:00	0:42:00					ground static	9	1.2
								0:57:00					s turn	9	1.1
NEL	69		1	63	0	22.6	1:04:00	1:12:00	E	3,260	150			9	1.2
	70		63	1	22.6	0	1:15:00	1:23:00	W	3,300	140			10	1.1
	71		1	63	0	22.6	1:26:00	1:35:00	E	3,270	148			11	1
	72		63	1	22.6	0	1:37:00	1:45:00	W	3,315	130			11	1
	72		1	10	0	3.3	1:48:00	1:50:00	E	3,420	150		CALIBRATION	11	1
	73		1	63	0	22.6	1:54:00	2:03:00	E	3,355	146			10	1.1
	74		63	1	22.6	0	2:05:00	2:14:00	W	3,320	137			9	1.1
	75		1	61	0	21.8	2:16:00	2:24:00	E	3,320	150			9	1.3
	76		66	1	23.7	0	2:26:00	2:37:00	W	3,355	139			10	1.2
NEU	1		1	66	0	23.7	2:40:00	2:49:00	E	3,340	148			10	1.1
	2		66	1	23.7	0	2:52:00	3:01:00	W	3,465	136			9	1.2
	3		1	66	0	23.7	3:03:00	3:12:00	E	3,390	150			10	1.1
	4		66	1	23.7	0	3:18:00	3:27:00	W	3,345	148			10	1.1
	5		1	66	0	23.7	3:29:00	3:38:00	E	3,360	150			10	1.1
	6		66	1	23.7	0	3:41:00	3:49:00	W	3,355	144			11	1
	83		28	54	9.8	19.3	4:00:00	4:04:00	N	3,420	145		CALIBRATION	10	1.1
							4:04:00	4:07:00					S TURN	10	1.1
							4:16:00	4:21:00					GROUND STATIC	11	1.1

Trajectory and GPS Plots:

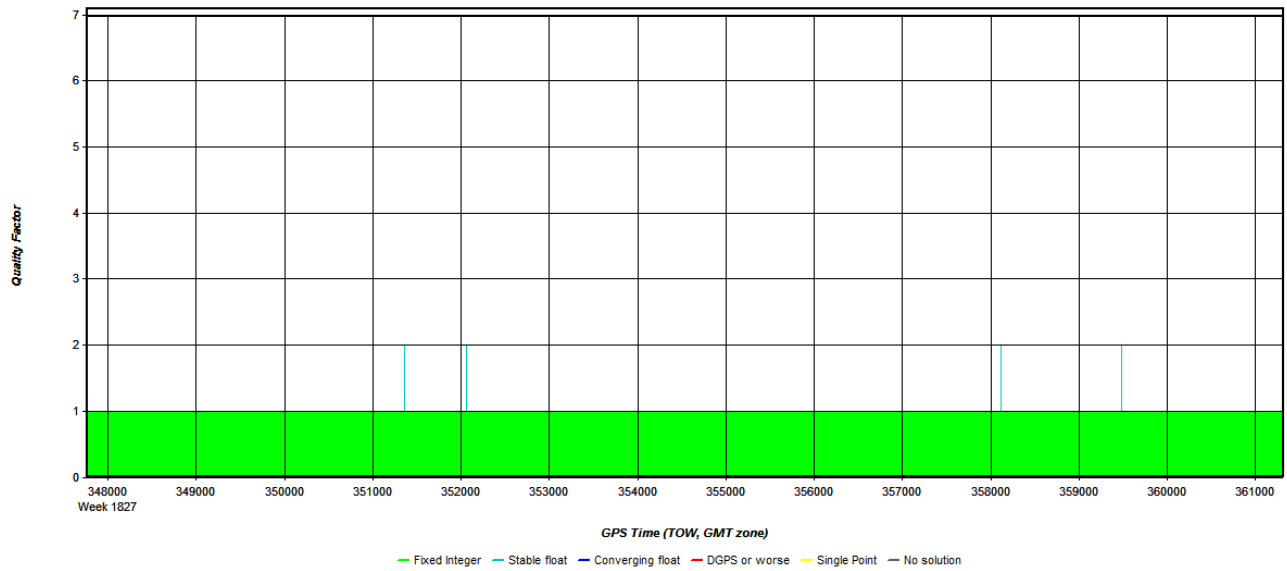


Estimated Accuracy

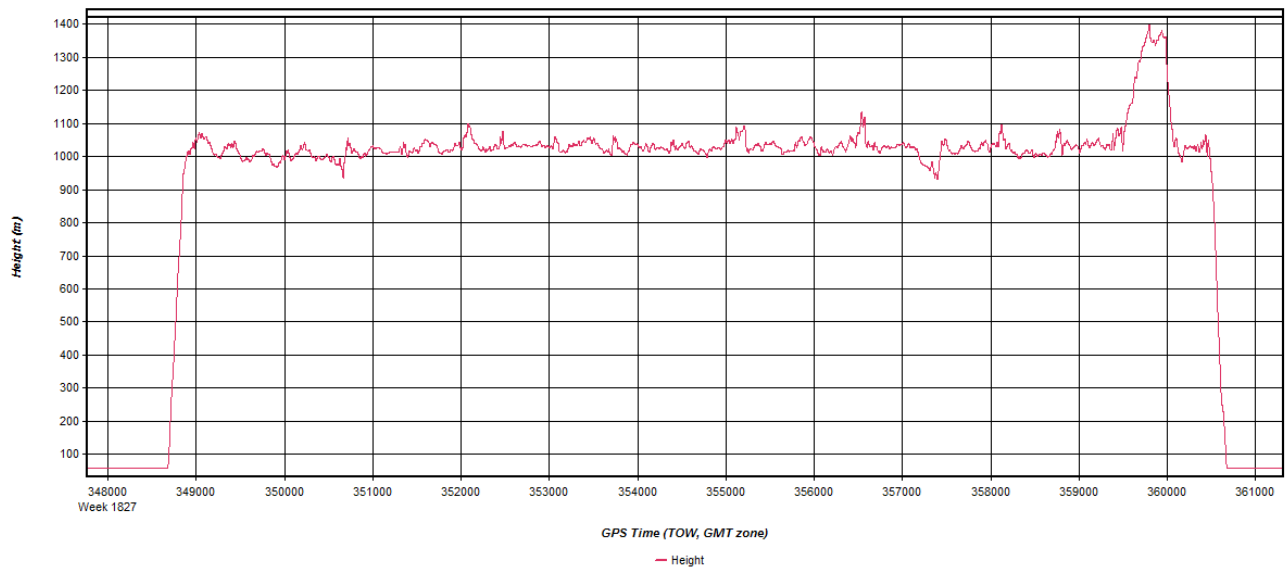




Quality Factor

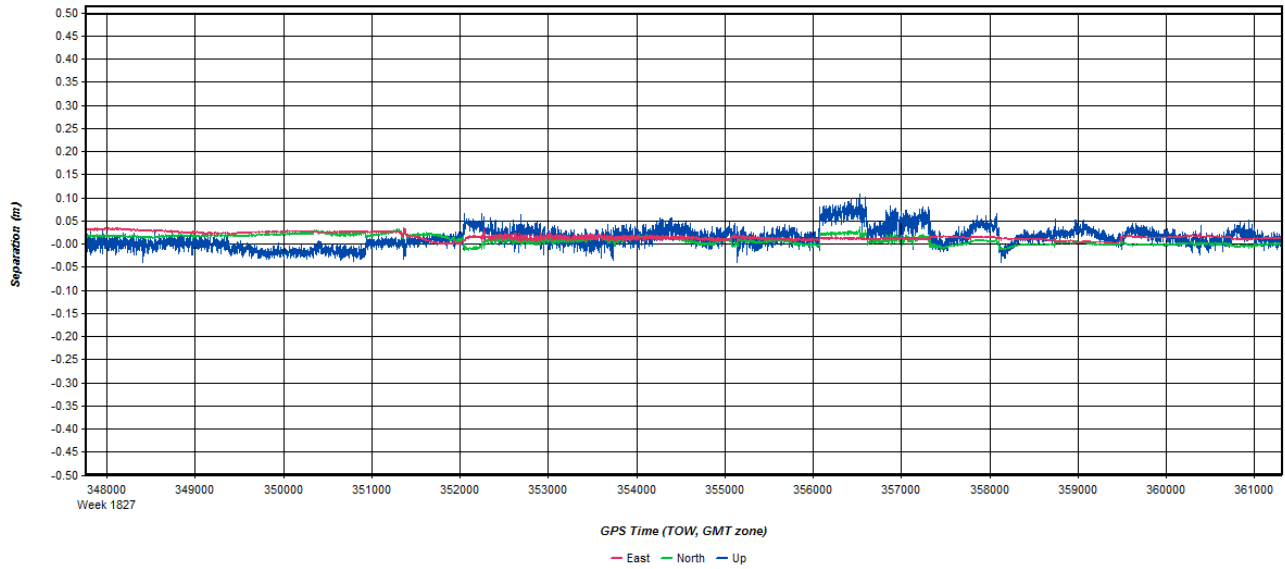


Height

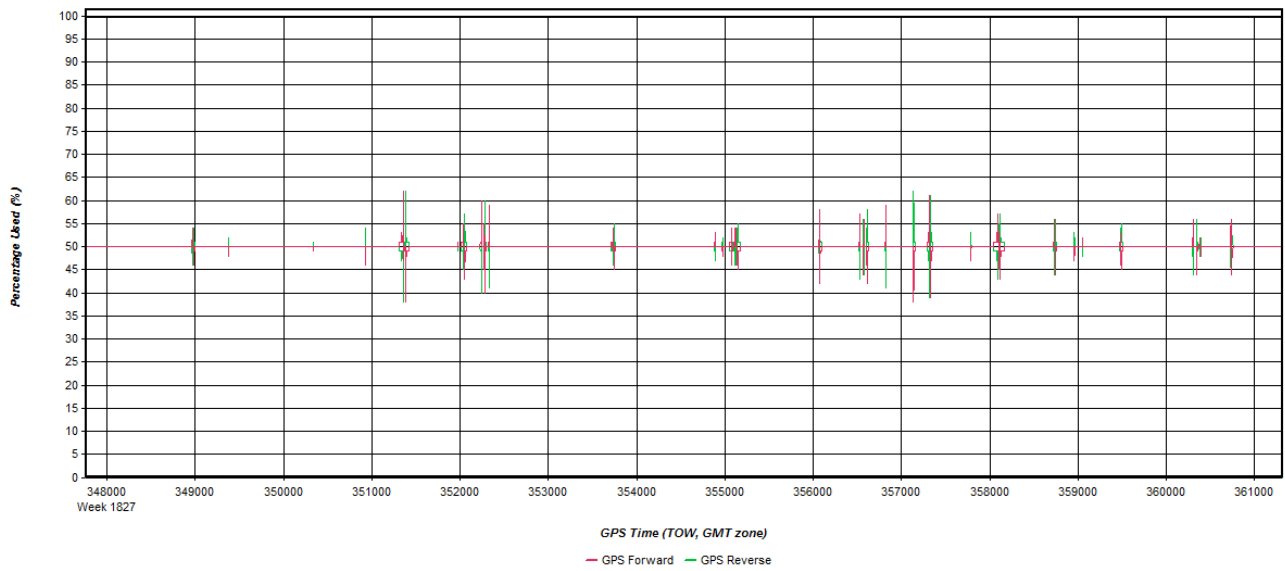




Combined Forward/Reverse Separation

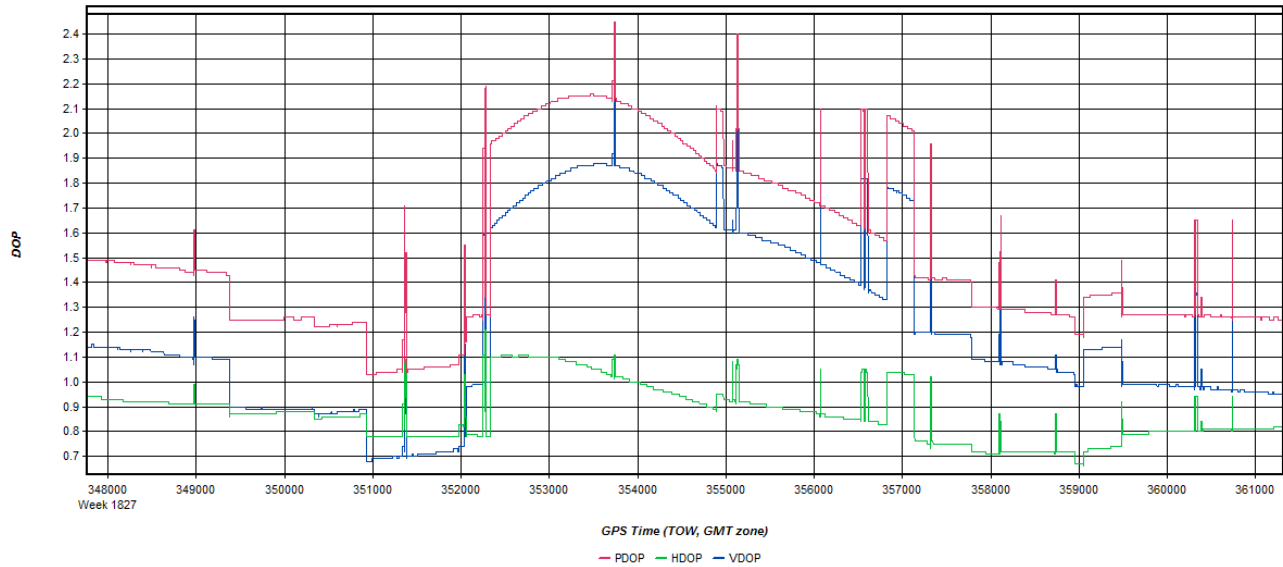


Combined Forward/Reverse Weighting

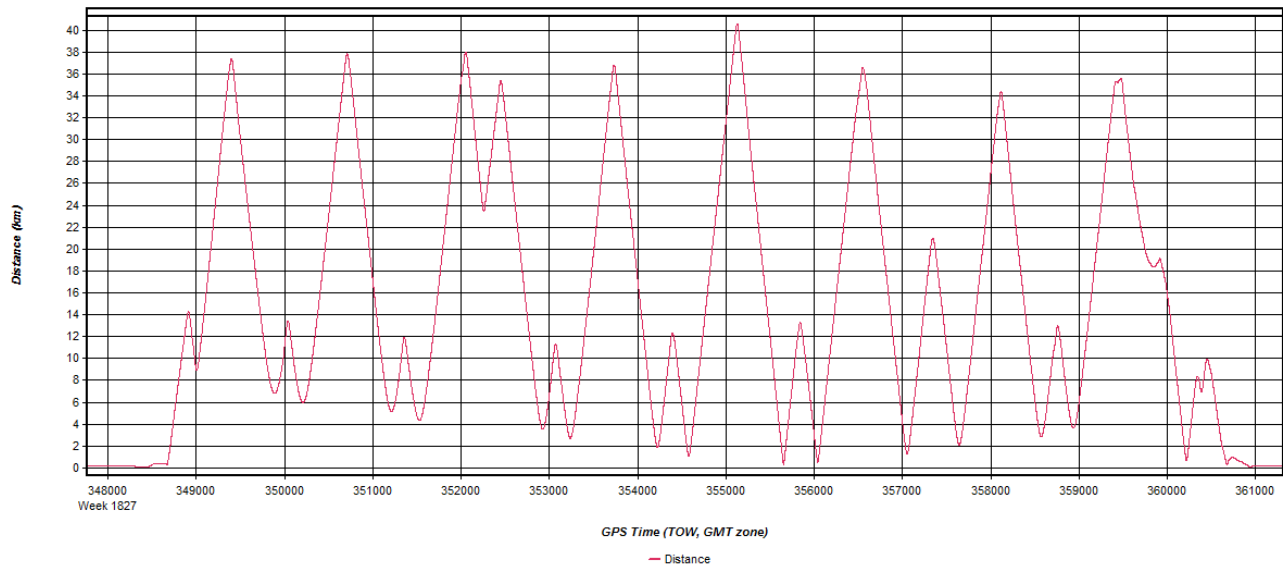




PDOP

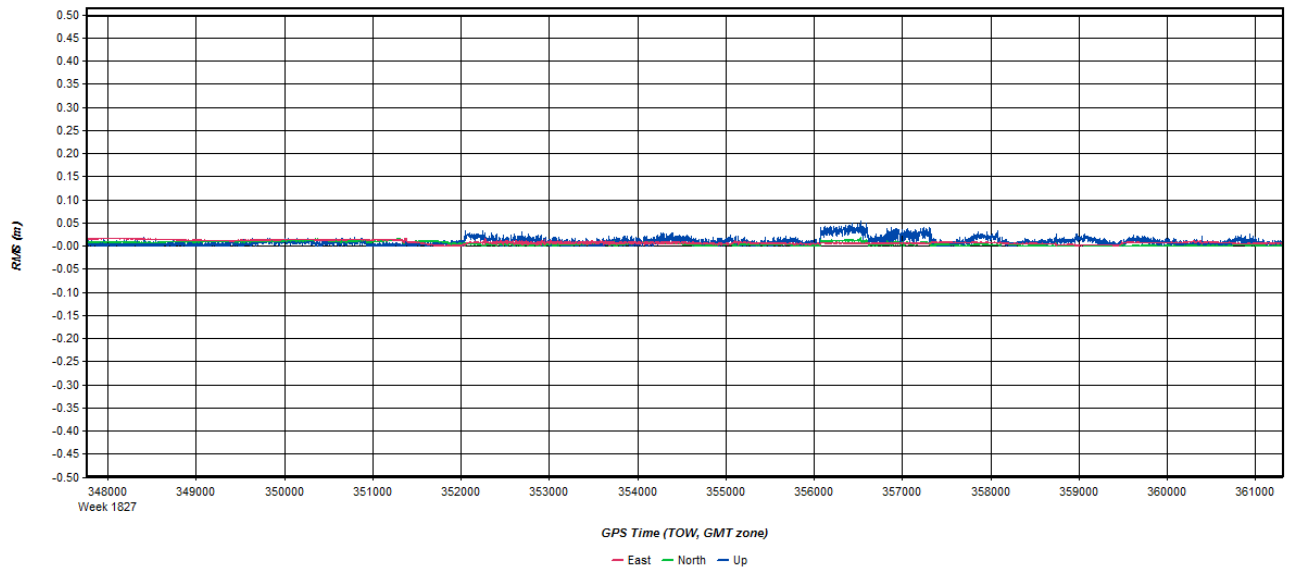


Distance from Base

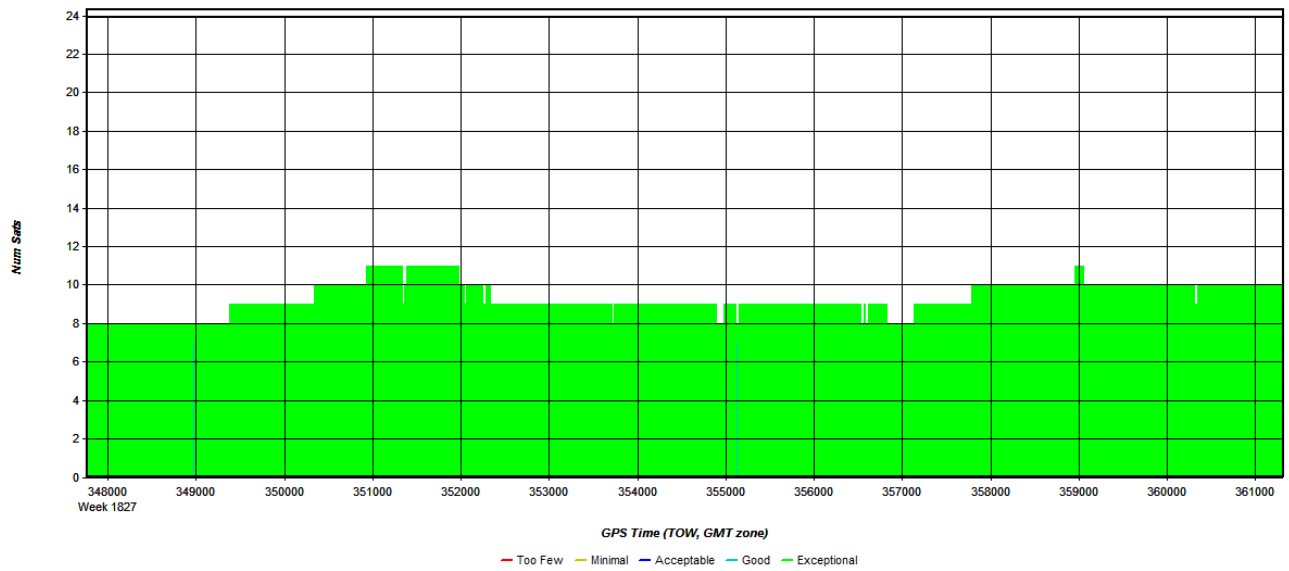




Combined RMS



SVs





Acquisition and Processing details ----- Collection 14 (January 14, 2015)

Log:



Fugro Geospatial, Inc.

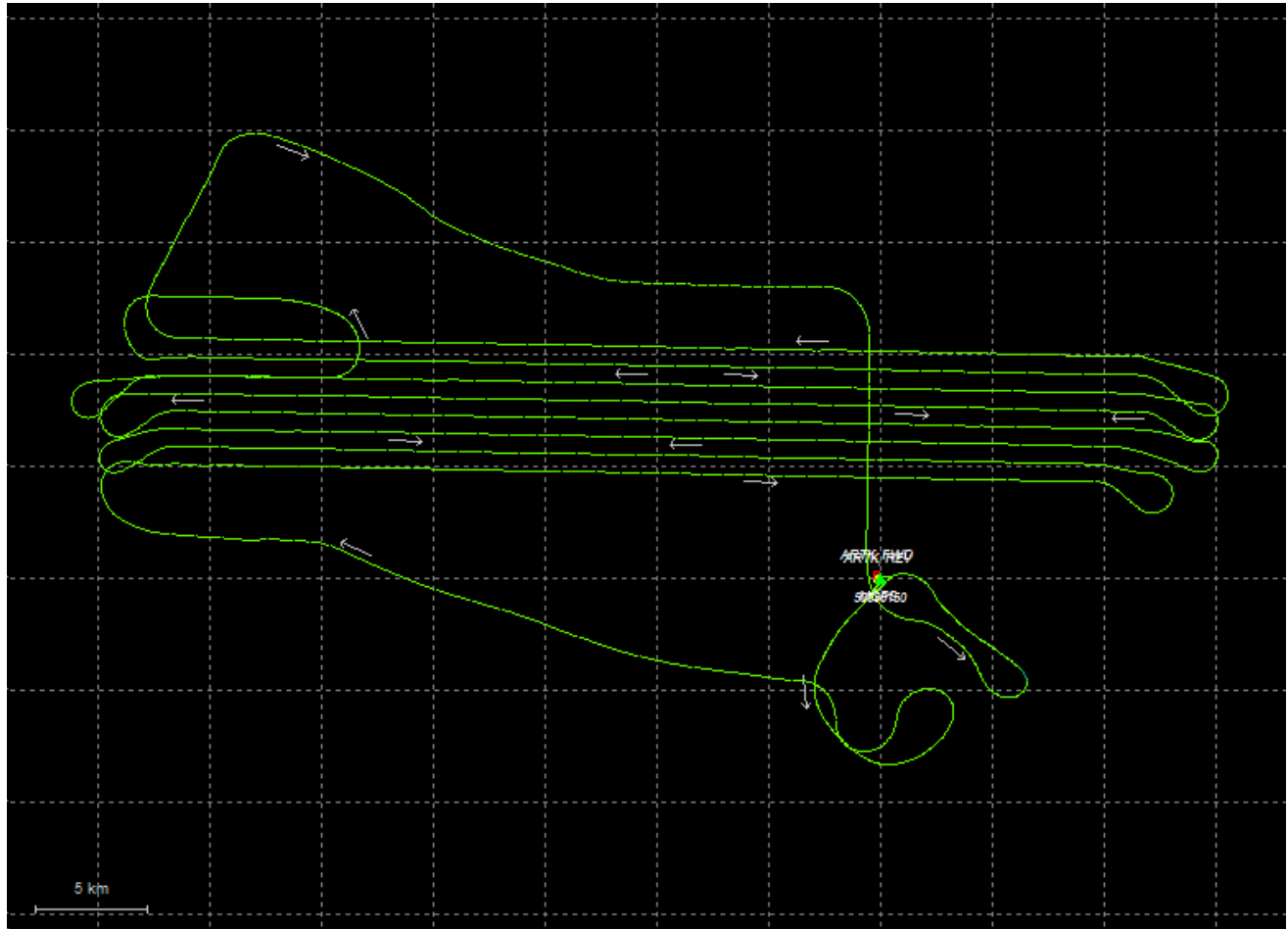


**Q680i
Flight Log**

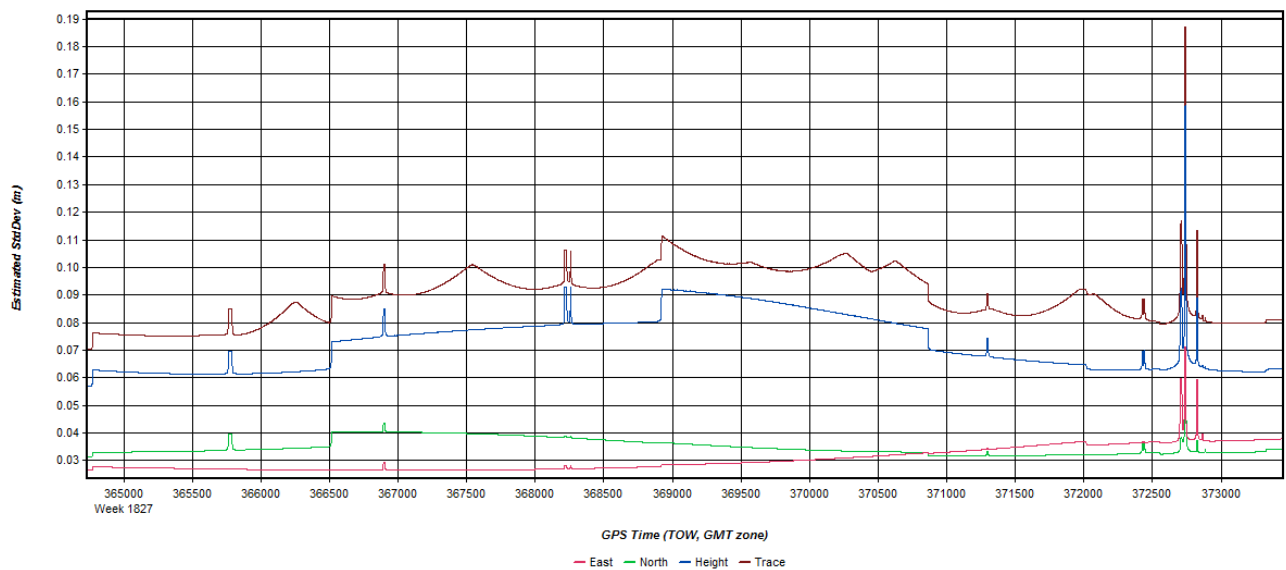
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	5:15	9404.7	KARG	8:00	9407.1	2:45	2.75	2.4	0900-Production
2										
3										

FGI Job # 22.14006900	Project Name FEMA AR		Operator Greg Sliwinski		Unit 165	IMU FMU-300	Ground Temp °C -1.0		Mn Range' 2018	Data Logger Drives DR680-5 8 9					
Flight Date 14-Jan-15	GPS Day 15-014	Lift 14	System R680i	Pilot Roman Rosa	Sun°	Solar Times (UTC)	Flying Temp °C 0.0 0.0		Max Range' 3888	Download Drive					
Mission ID (yymmdd_Sen_Job_Lift) 150114_165_14006900_14		Aircraft N62912	Airport ID KARG	FMS CCNS 6	UTC -6	Alt (ft) 3200	Speed 150	FOV 60	Scan Rate (Hz) 110	M/A 2	km/WPT 0.364	Alt Setting 30.31	Humidity @ Alt 76	Shipping Track	
Base 1 ID	Location Walnut Ridge		Rec ID PF01	Ant ID PF01	ARP (m) 1.805	Start Time (UTC) 14-Jan-15 00:00		Stop Time (UTC)	GPS Filename		Operator Greg Sliwinski	Data With AB			
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End							
							5:21:00	5:26:00					ground static	11	1
							5:34:00	5:37:00					s turn	10	1.2
NEU	7		1	66	0	23.7	5:45:00	5:53:00	E	3,450	150			10	1.2
	8		66	1	23.7	0	5:55:00	6:04:00	W	3,385	142			10	1.1
	9		1	66	0	23.7	6:06:00	6:15:00	E	3,320	146			9	1.1
	10		69	1	24.8	0	6:17:00	6:26:00	W	3,315	138			9	1.4
	11		1	69	0	24.8	6:29:00	6:38:00	E	3,310	149			9	1.4
	12		69	1	24.8	0	6:40:00	6:49:00	W	3,260	144			8	1.6
	12		1	10	0	3.3	6:51:00	6:53:00	E	3,310	142		CALIBRATION	9	1.3
	13		1	69	0	24.8	6:57:00	7:07:00	E	3,295	135			10	1.1
	14		69	1	24.8	0	7:10:00	7:18:00	W	3,300	150			11	1
	83						7:24:00	7:29:00	S	3,230	150			11	1
							7:29:00	7:32:00					S TURN	11	1
							7:38:00	7:43:00					GROUND STATIC	12	1.1

Trajectory and GPS Plots:

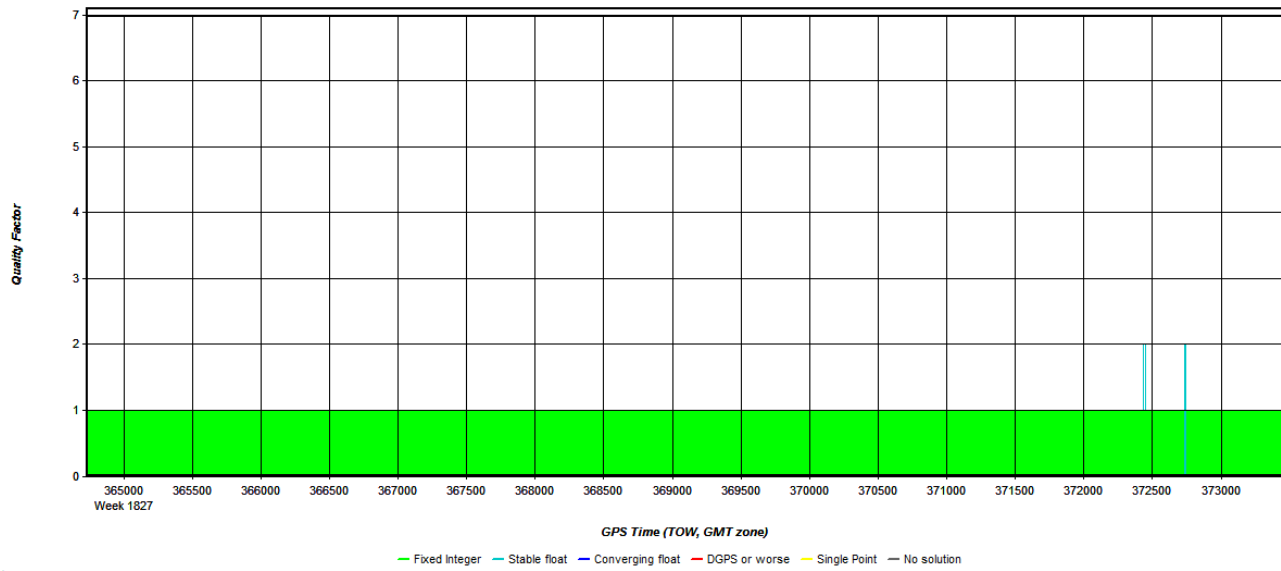


Estimated Accuracy

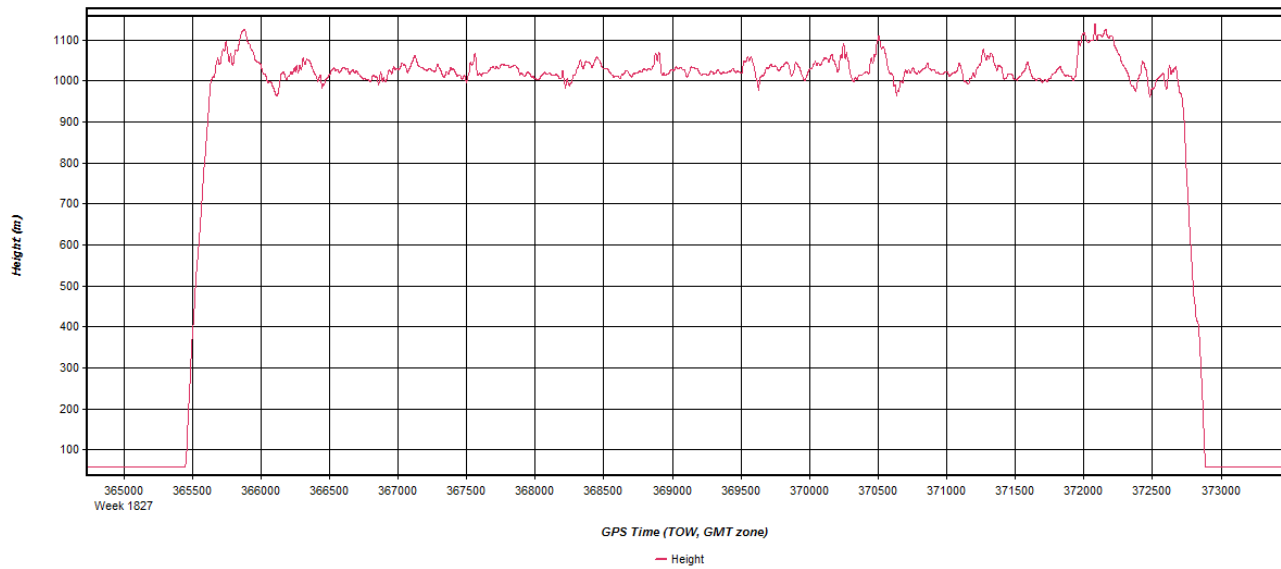




Quality Factor

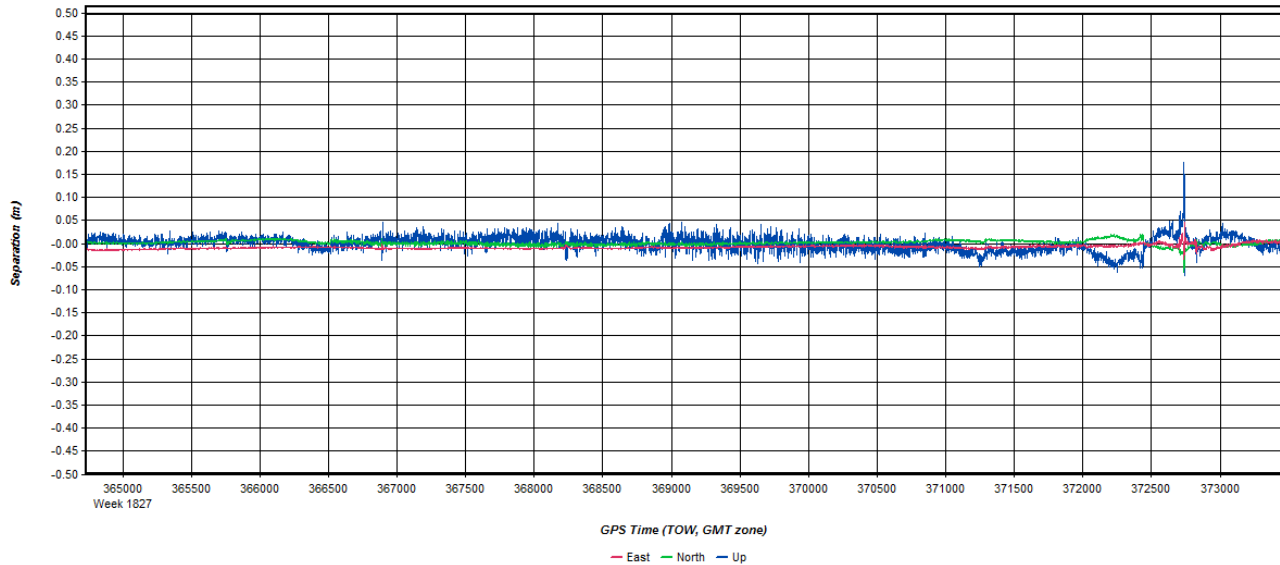


Height

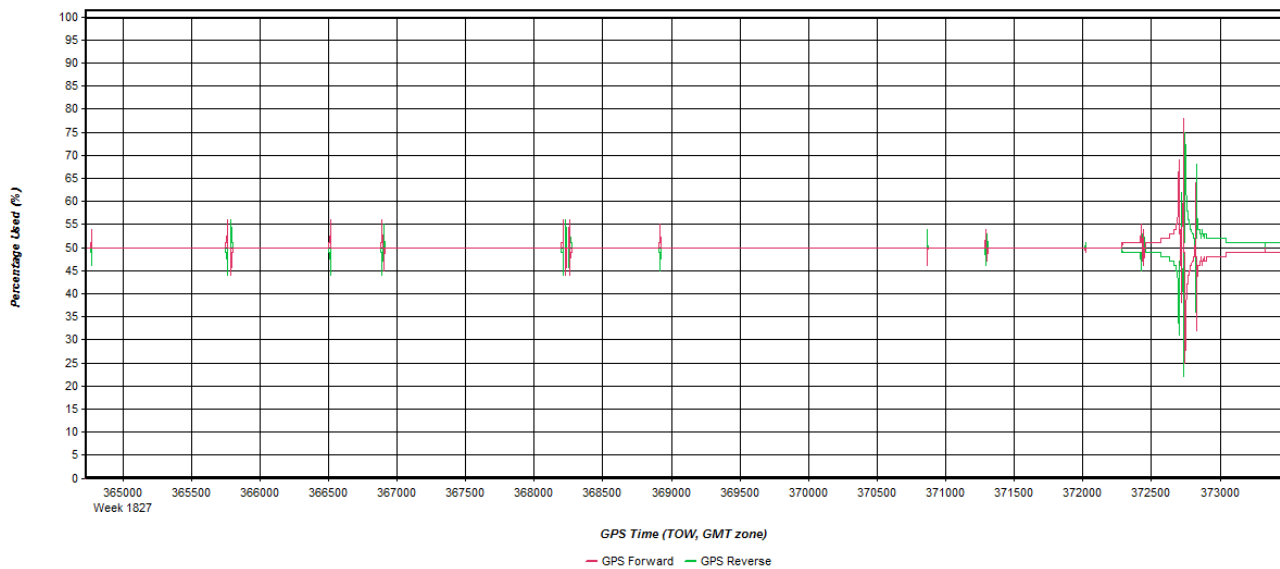




Combined Forward/Reverse Separation

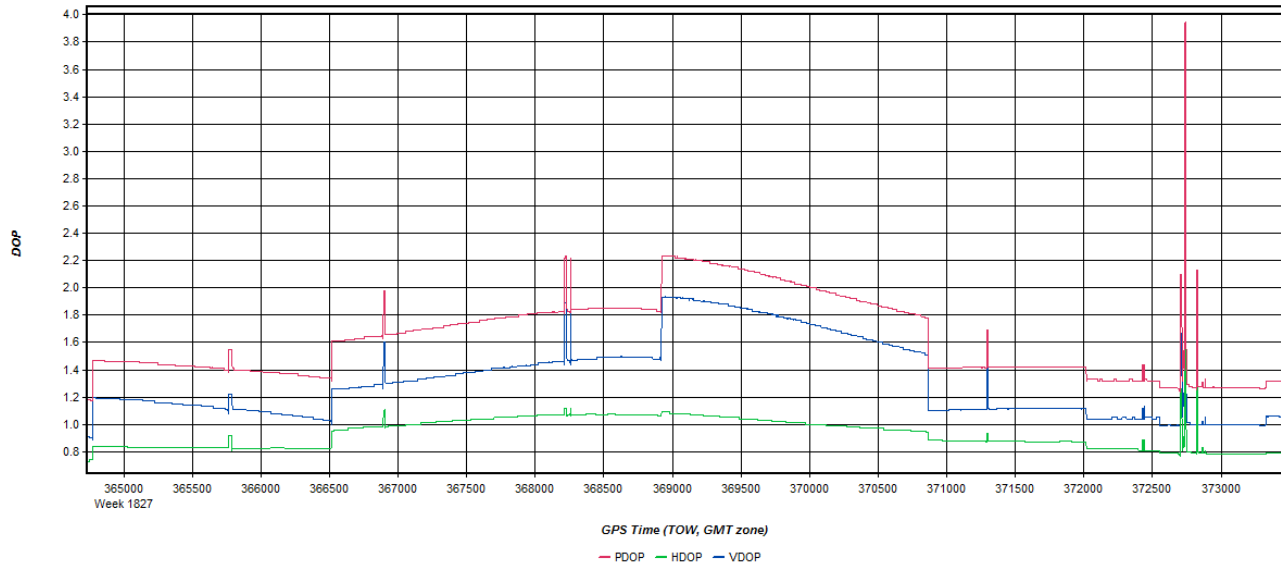


Combined Forward/Reverse Weighting

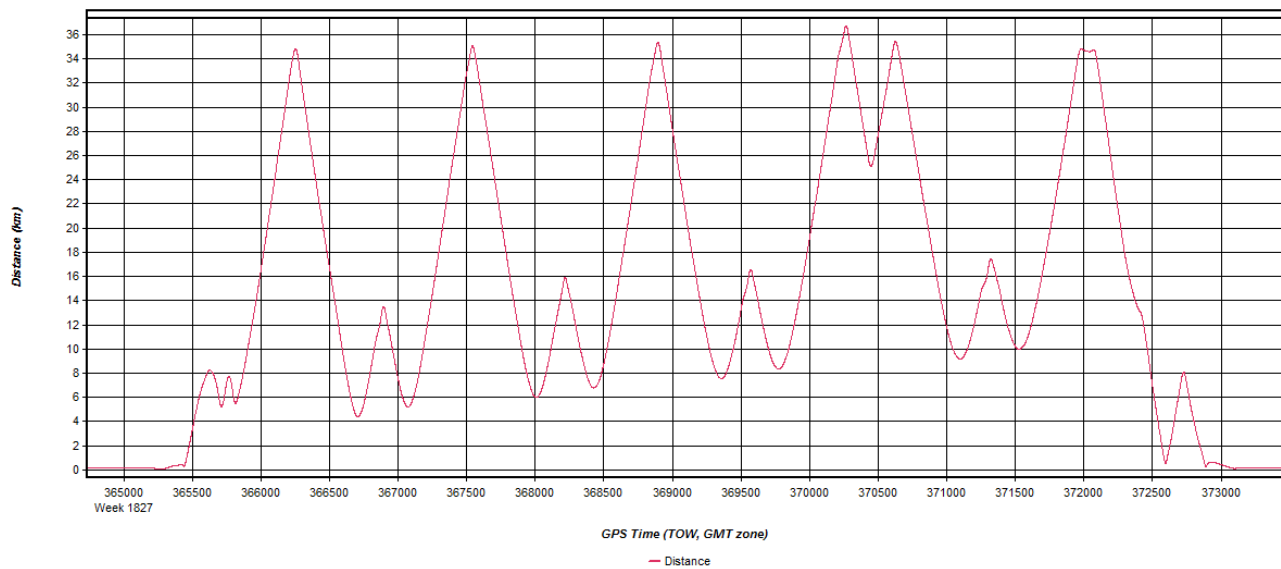




PDOP

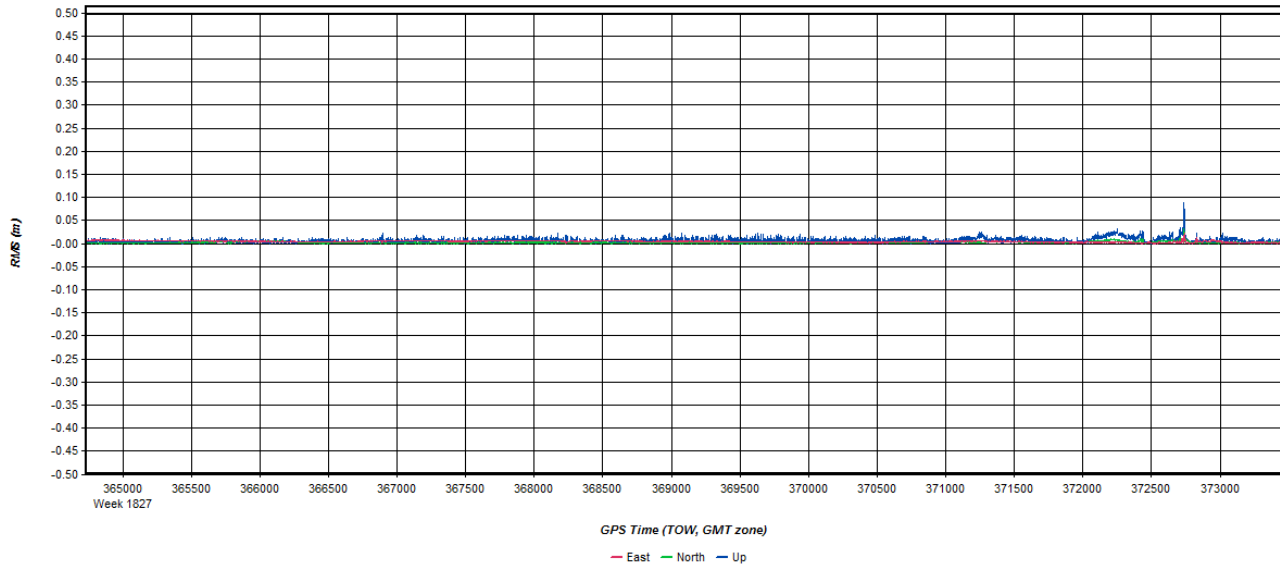


Distance from Base

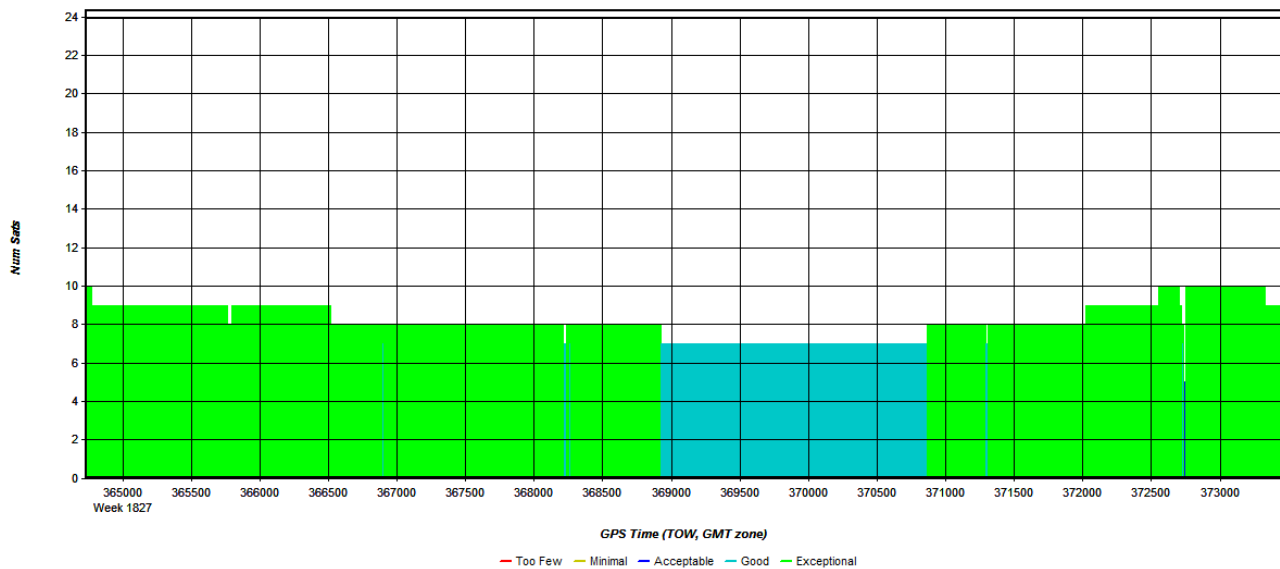




Combined RMS



SVs





Acquisition and Processing details ----- Collection 16 (January 16, 2015)

Log:



Fugro Geospatial, Inc.

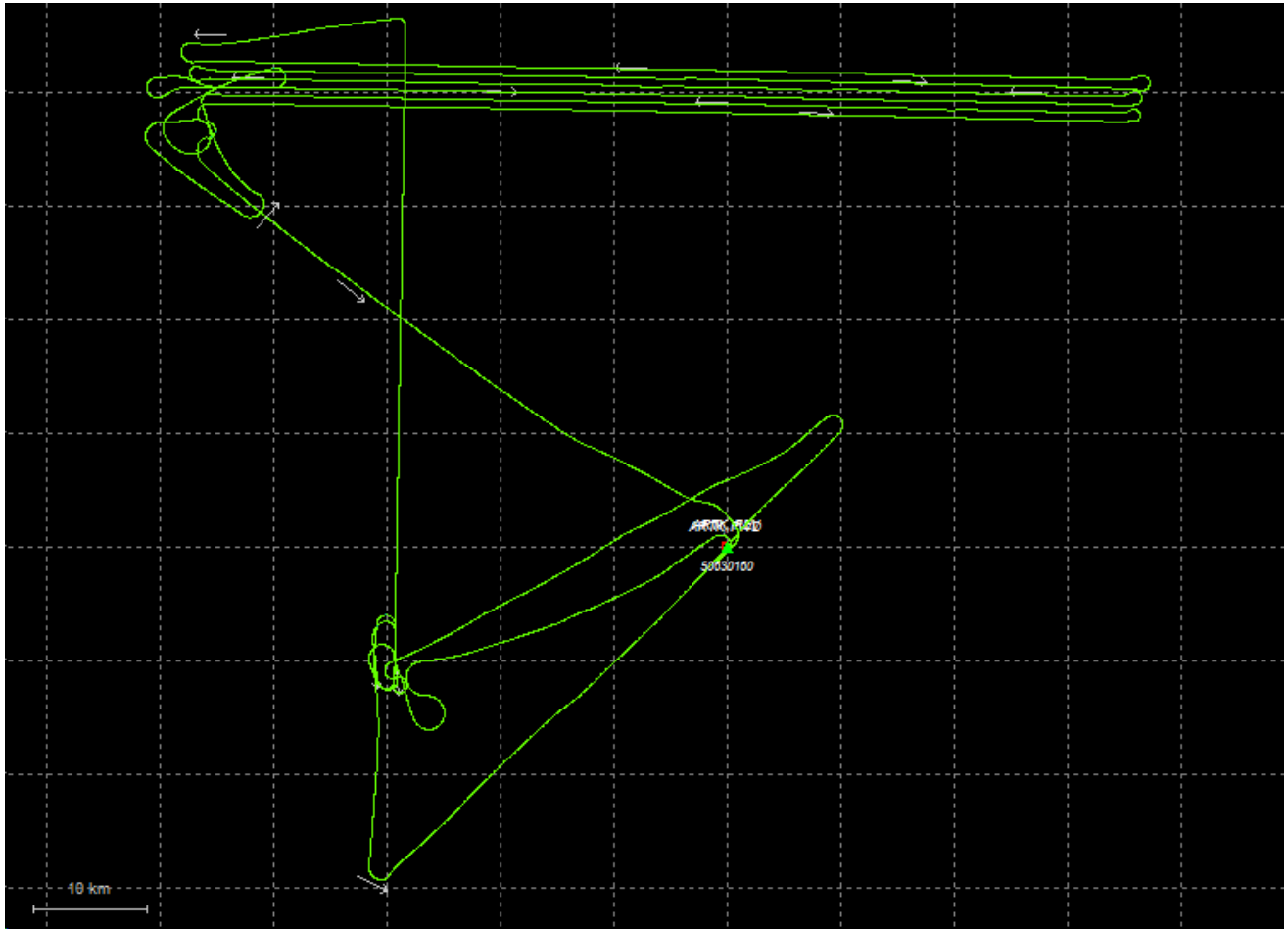


**Q680i
Flight Log**

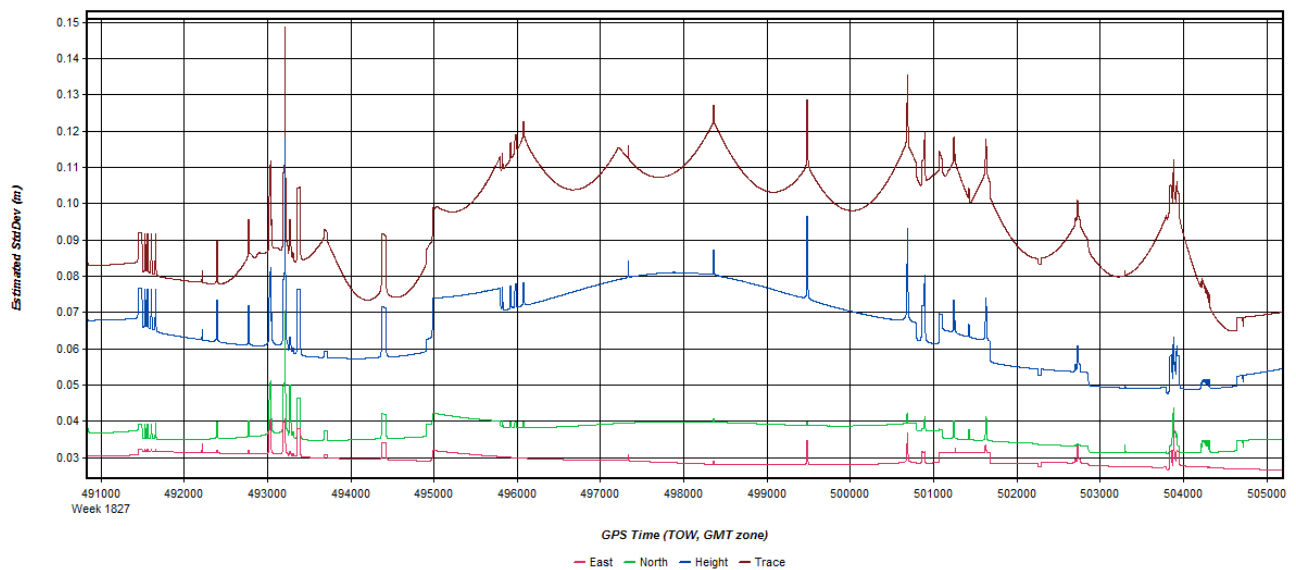
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	16:15	9411.6	KARG	20:20	9415.8	4:05	4.00	4.2	0900-Production
2										
3										

FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives				
22.14006900	FEMA Region6 AR LiDar				Chris Acuna		165	FMU-300	4.0 11.0		2018	DR680-6				
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)	Pulse Rate	Flying Temp °C		Max Range'	Download Drive				
16-Jan-15	15-016	16	R680i	Larry Stewart		-	-	250 KHZ	2.0 2.0		3888	EP750#23				
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	AltM Setting	Humidity @ Alt	Shipping Track			
150116_165_14006900_16	N62912	KARG	CCNS 6	-6	3200	150	60	110	2	0.364	30.28	30.18	65	8771 0698 5523		
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)	Stop Time (UTC)	GPS Filename	Operator		Data						
5083	KARG	PF001	PF001	1.805	-	-	-	-		Shipped						
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate				
							16:35:00	16:40:00					5 min gnd static alignment at KARG		9	1.4
							16:52:00	16:54:00					S-Turn in flight alignment			
NEU_Blk	82		1	89	0	32	17:31:00	17:42:00	359	3,349	137		Crossing Line		9	1.0
NEU_Blk	55		1	131	0	47.3	17:48:00	18:06:00	91	3,381	142				8	1.2
NEU_Blk	54		131	1	47.3	0	18:07:00	18:25:00	271	3,385	140				8	1.2
NEU_Blk	53		1	131	0	47.3	18:26:00	18:43:00	90	3,379	146				8	1.2
NEU_Blk	52		131	1	47.3	0	18:45:00	19:02:00	271	3,306	139		Lt turb wpt 36,		8	1.3
NEU_Blk	52		1	7	0	2.2	19:05:00	19:06:00	90	3,482	149		Calibration Line		10	1.0
NEU_Blk	51		1	131	0	47.3	19:20:00	19:37:00	91	3,399	149		7th CCNS crash on this lift (4 in row on this line). Lt turb wpt 16		10	1.0
NEU_Blk	50		131	1	47.3	0	19:39:00	19:56:00	270	3,373	147		Lt turb wpt 60 to 57, & 33 to 31		12	0.8
							19:56:00	19:58:00					S-Turn post in flight alignment		11	1.0
							20:13:00	21:18:00					5 min post gnd static alignment at KARG		12	

Trajectory and GPS Plots:

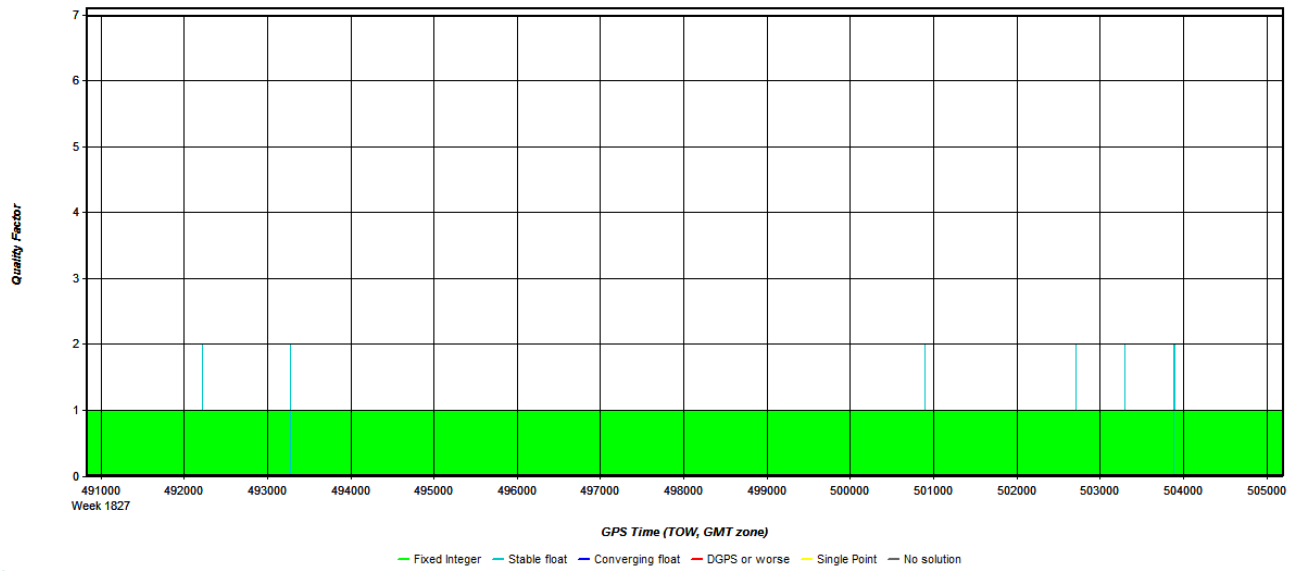


Estimated Accuracy

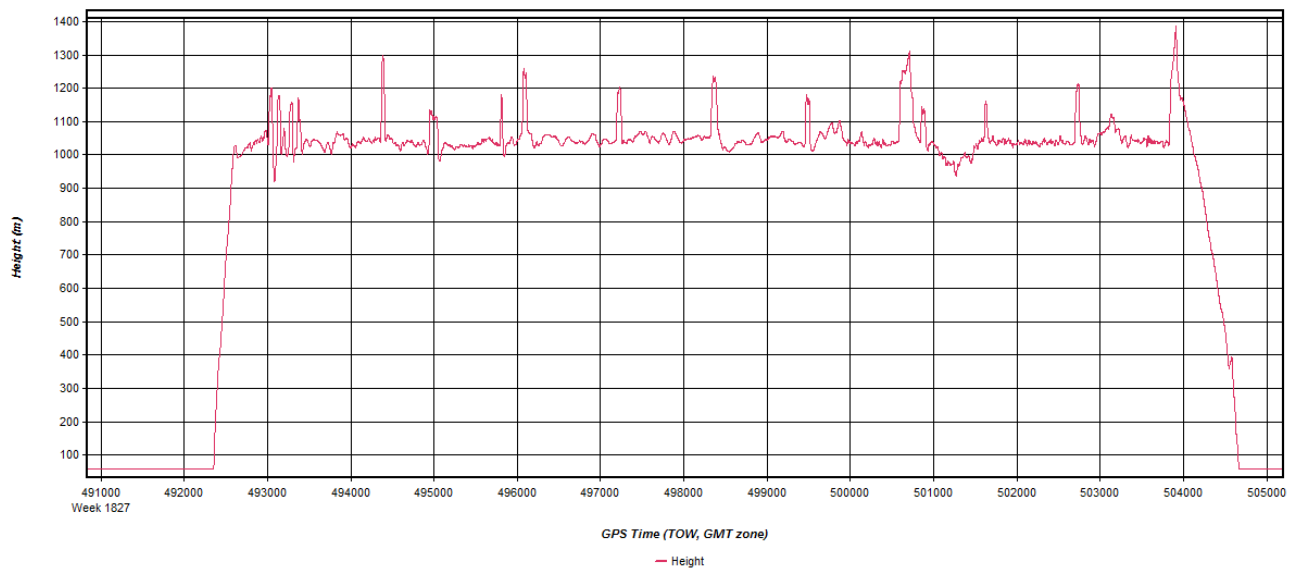




Quality Factor

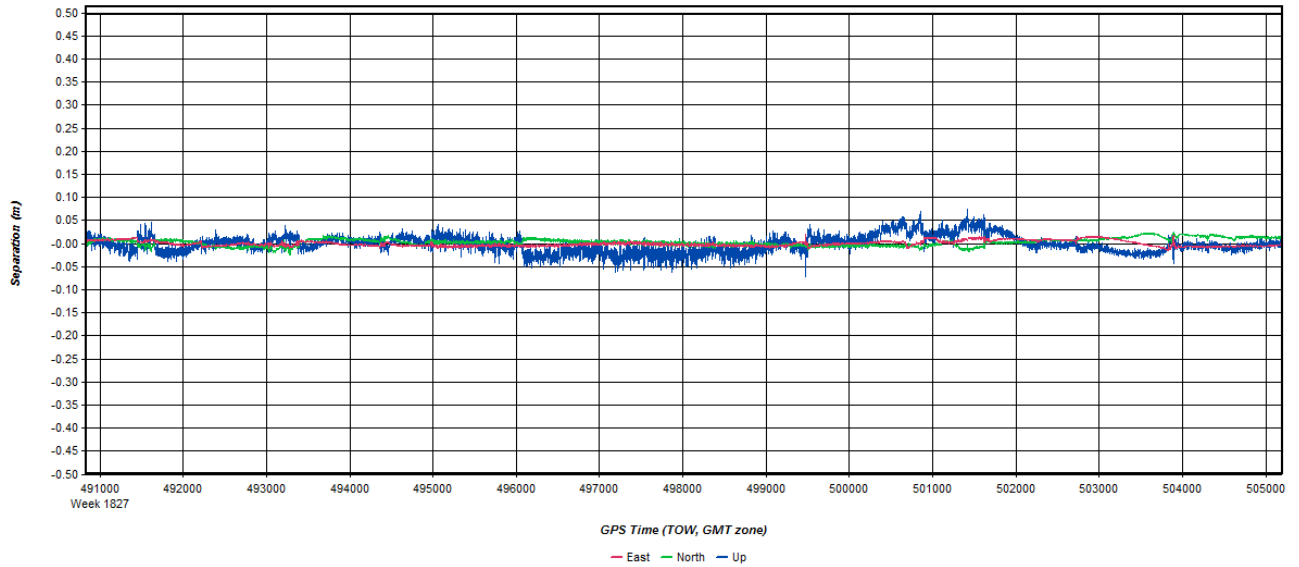


Height





Combined Forward/Reverse Separation

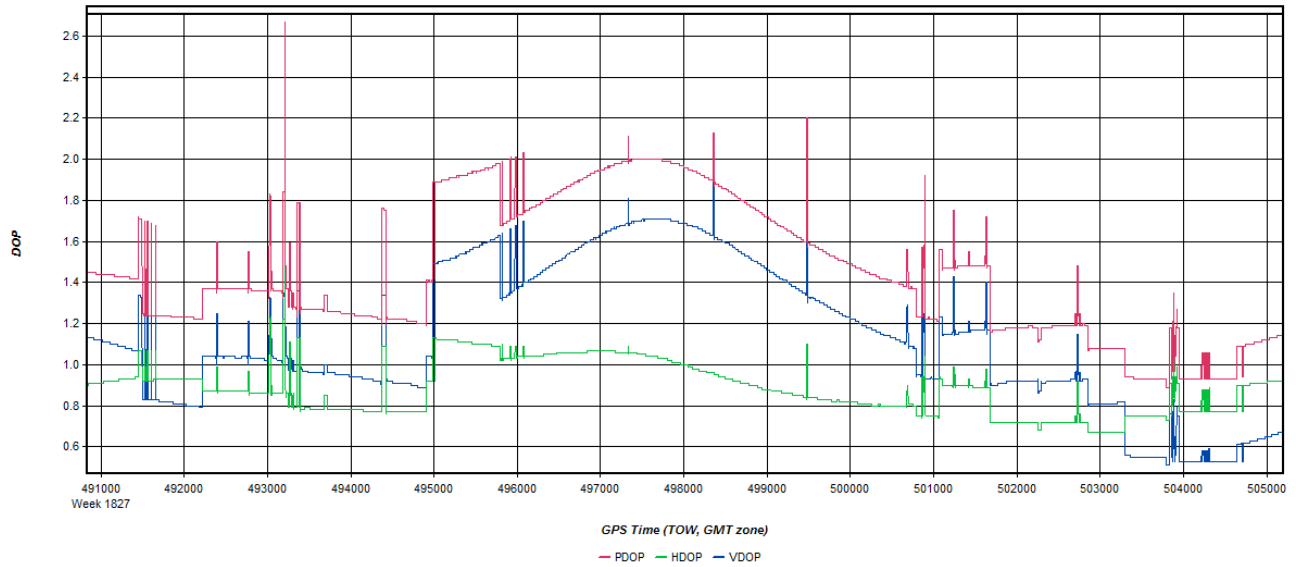


Combined Forward/Reverse Weighting

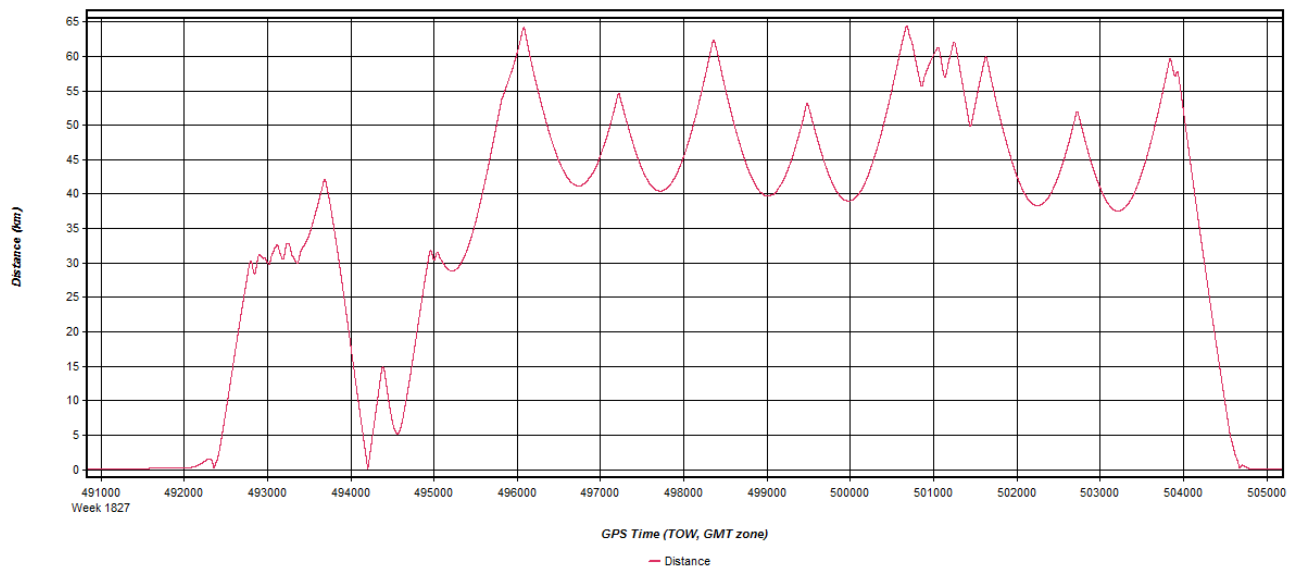




PDOP

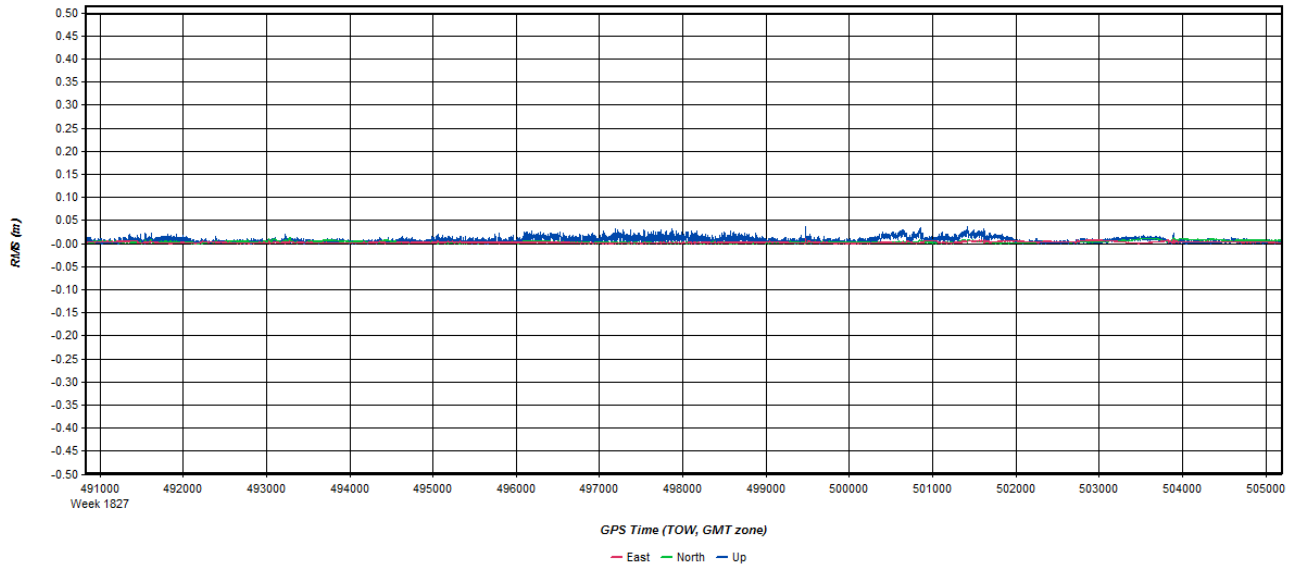


Distance from Base

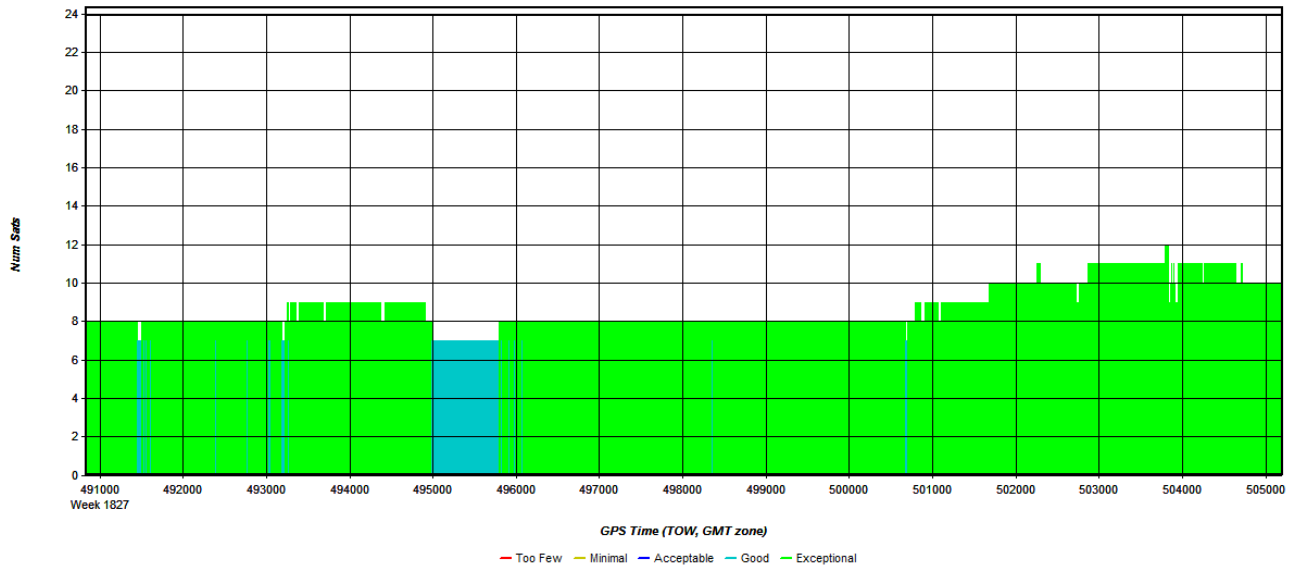




Combined RMS



SVs





Acquisition and Processing details ----- Collection 17 (January 16, 2015)

Log:



Fugro Geospatial, Inc.

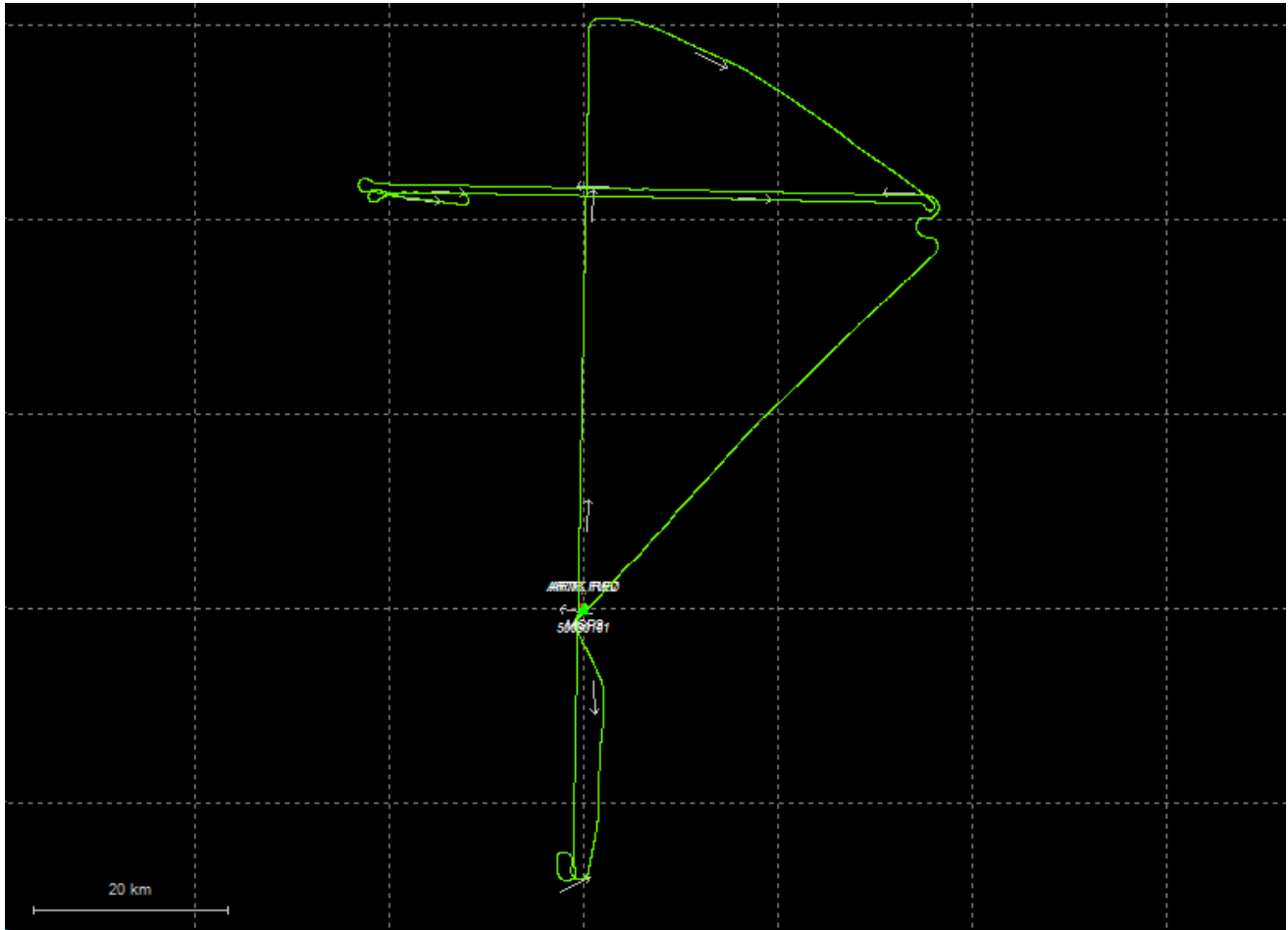


**Q680i
Flight Log**

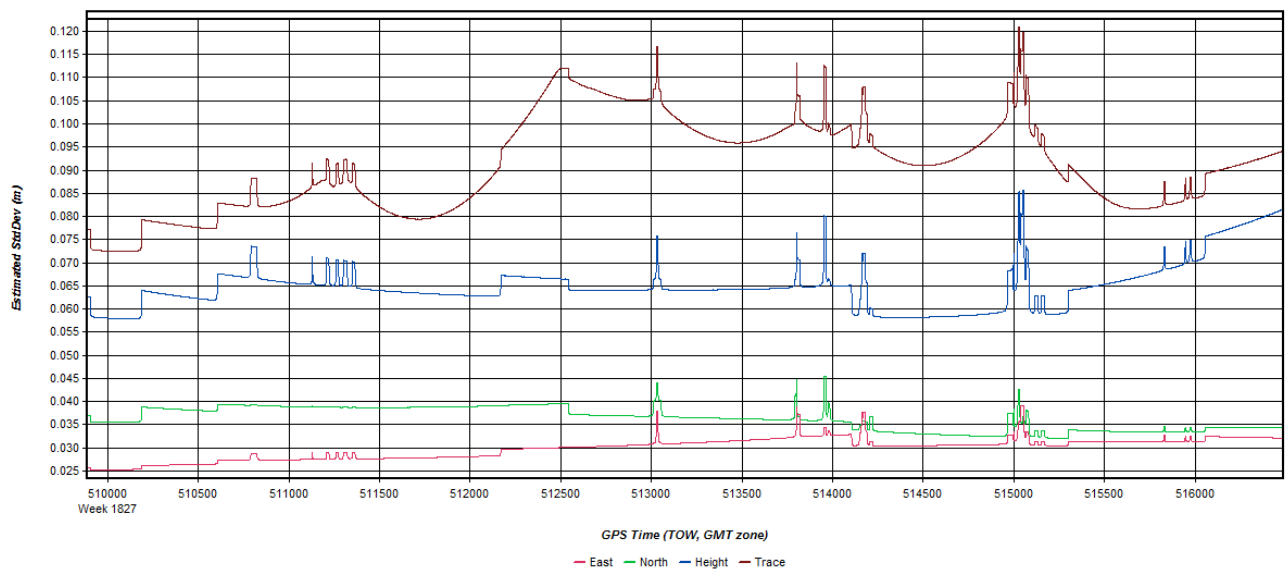
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	21:33	9415.8	KARG	23:28	9417.7	1:55	2.00	1.9	0900-Production
2										
3										

FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives				
22.14006900	FEMA Region6 AR LiDar				Chris Acuna		165	FMU-300	-	11.0 7.0	2018	DR680-4				
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)	Pulse Rate	Flying Temp °C		Max Range'	Download Drive				
16-Jan-15	15-016	17	R680i	Larry Stewart		-	-	250 KHZ	2.0 2.0		3888	EP750#23				
Mission ID (yymmdd_Sen_Job_Lift)		Aircraft	Airport ID	FMS	UTC	Alt (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Altitude Setting	Humidity @ Alt	Shipping Track		
150116_165_14006900_17		N62912	KARG	CCNS 6	-6	3200	150	60	110	2	0.364	30.17 30.15	50	8771 0698 5523		
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data			
5083	KARG		PF001	PF001	1.805	-		-		-		-	Shipped			
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate				
							21:42:00	21:47:00					5 min gnd static alignment at KARG		11	1.0
							21:59:00	22:01:00					S-Turn in flight alignment		9	1.1
NEU_Blk	83		1	142	0	51.3	22:02:00	22:20:00	359	3,354	148				9	1.1
NEU_Blk	56		87	1	31.3	0	22:30:00	22:42:00	271	3,422	148				9	1.2
NEU_Blk	56		1	7	0	2.2	22:44:00	22:45:00	90	3,535	145		Calibration Line		10	1.1
NEU_Blk	57		1	87	0	31.3	22:50:00	23:02:00	90	3,407	139				10	1.1
							23:02:00	23:04:00					S-Turn post in flight alignment		11	1.0
							23:21:00	23:26:00					5 min post static alignment at KARG			

Trajectory and GPS Plots:

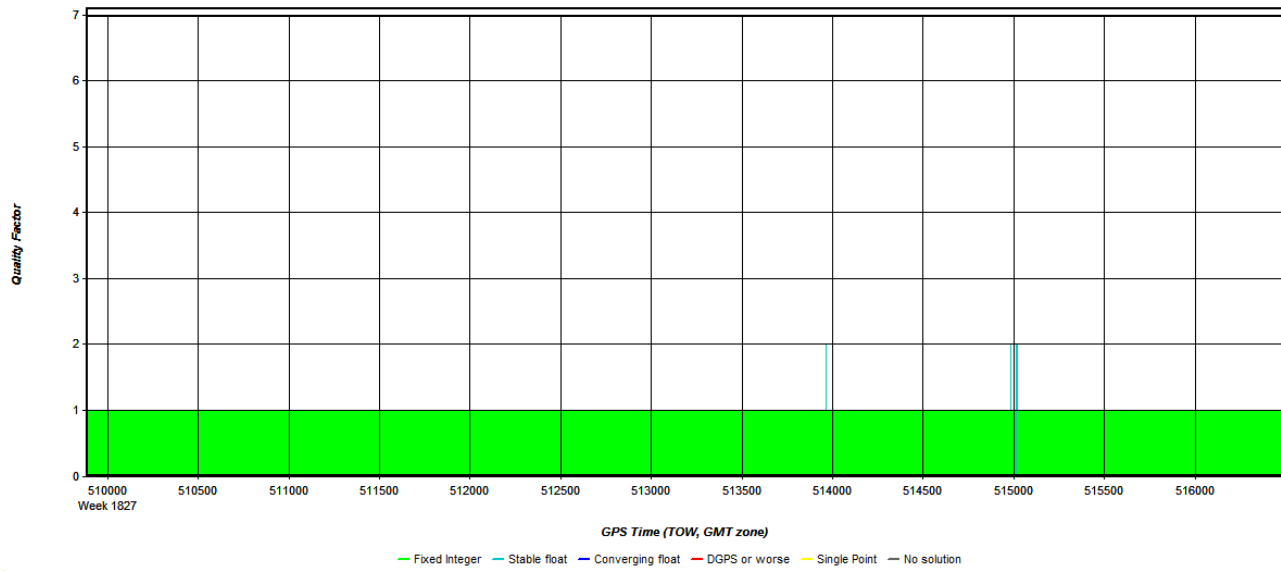


Estimated Accuracy

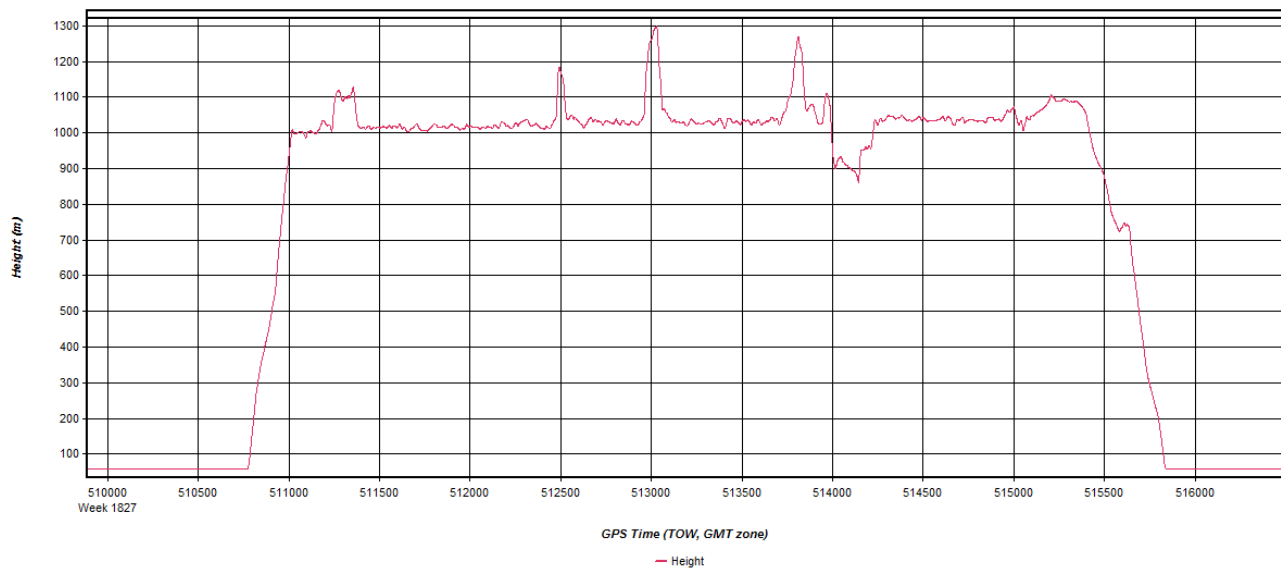




Quality Factor

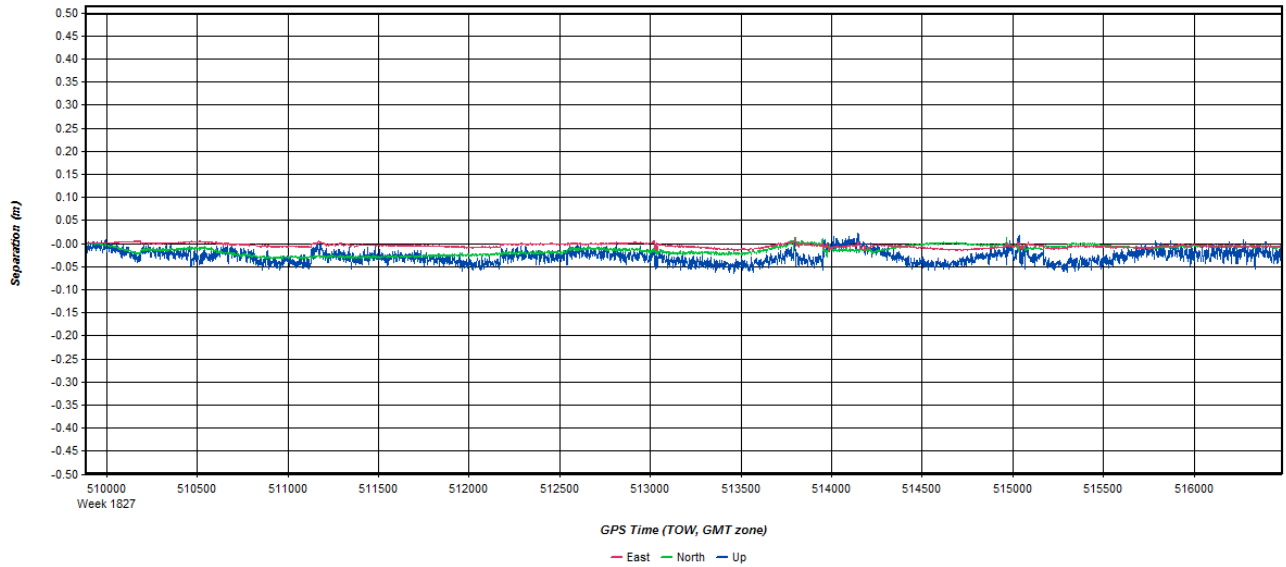


Height

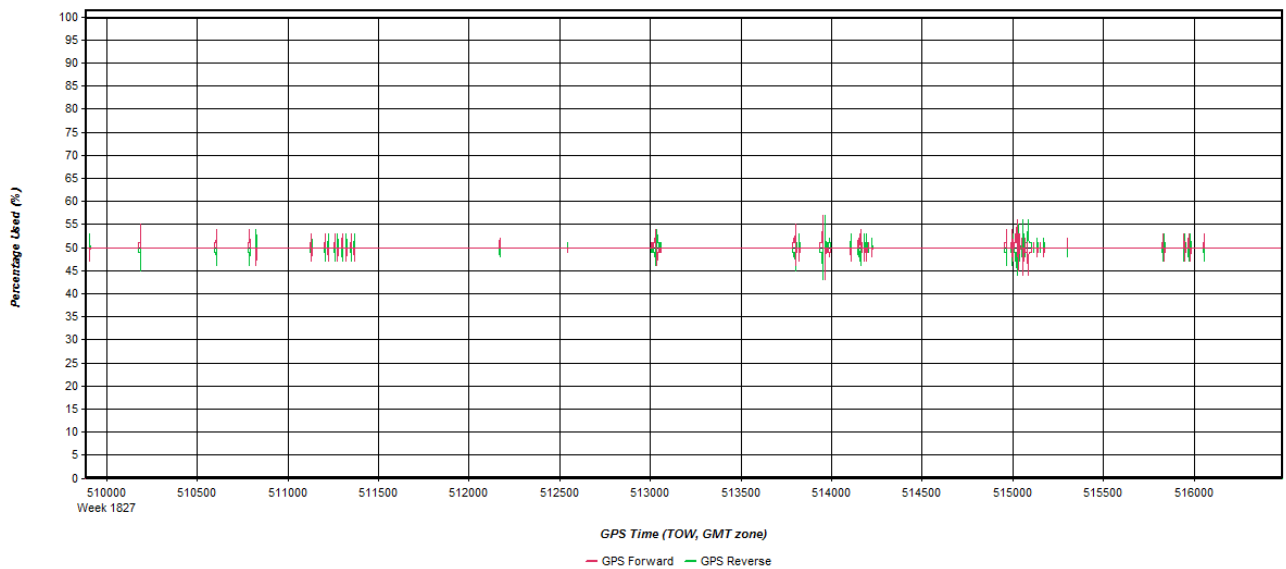




Combined Forward/Reverse Separation

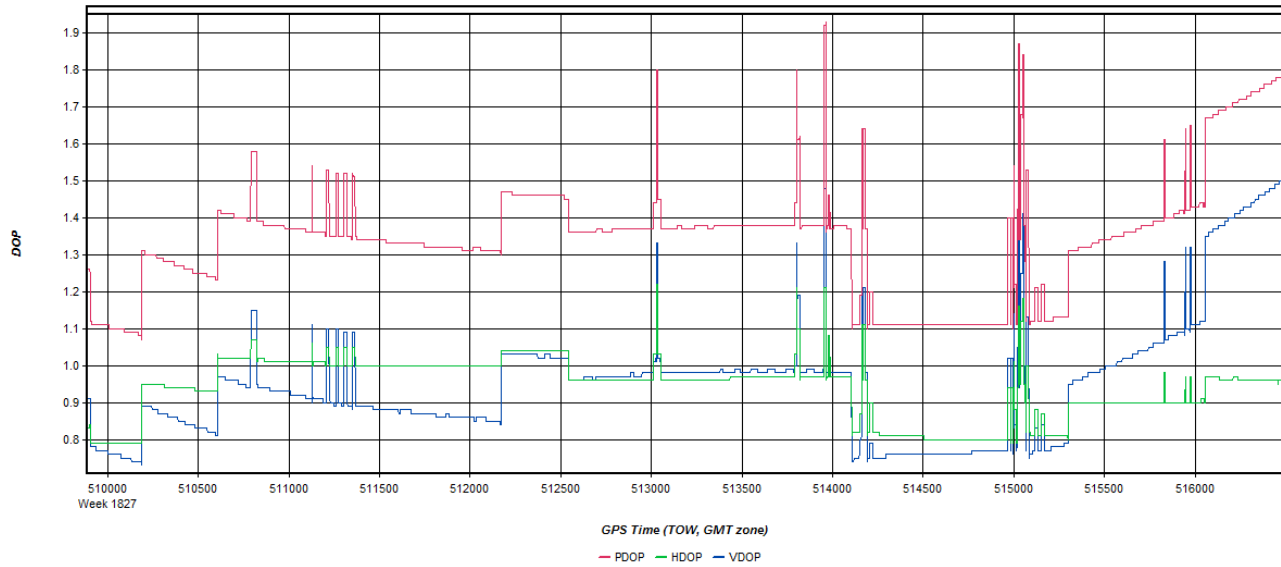


Combined Forward/Reverse Weighting

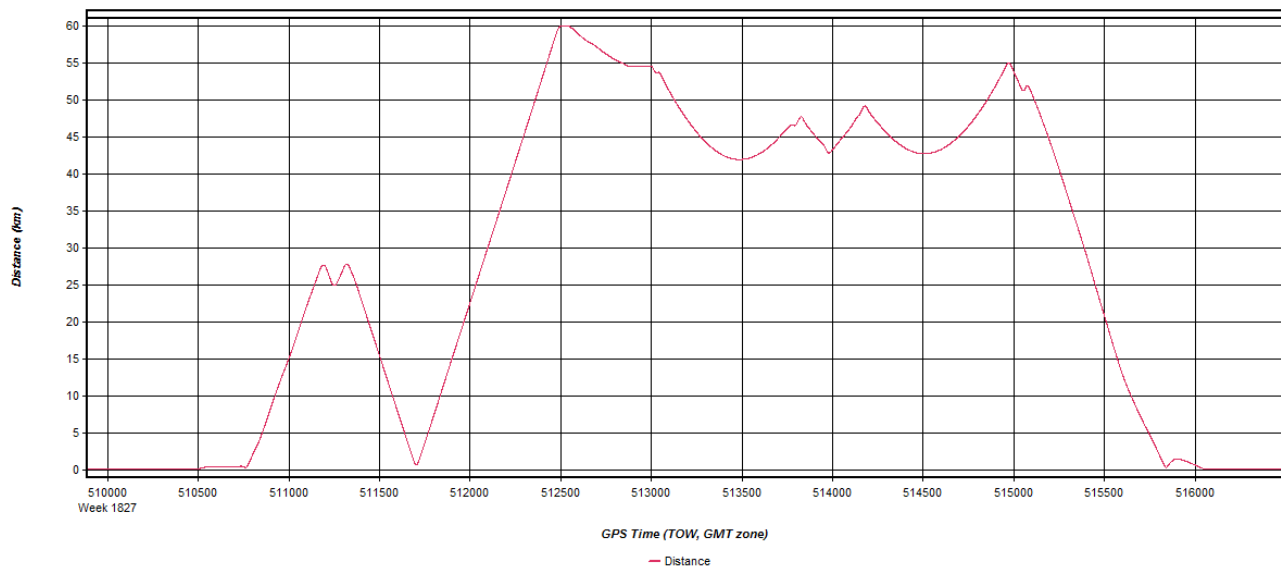




PDOP

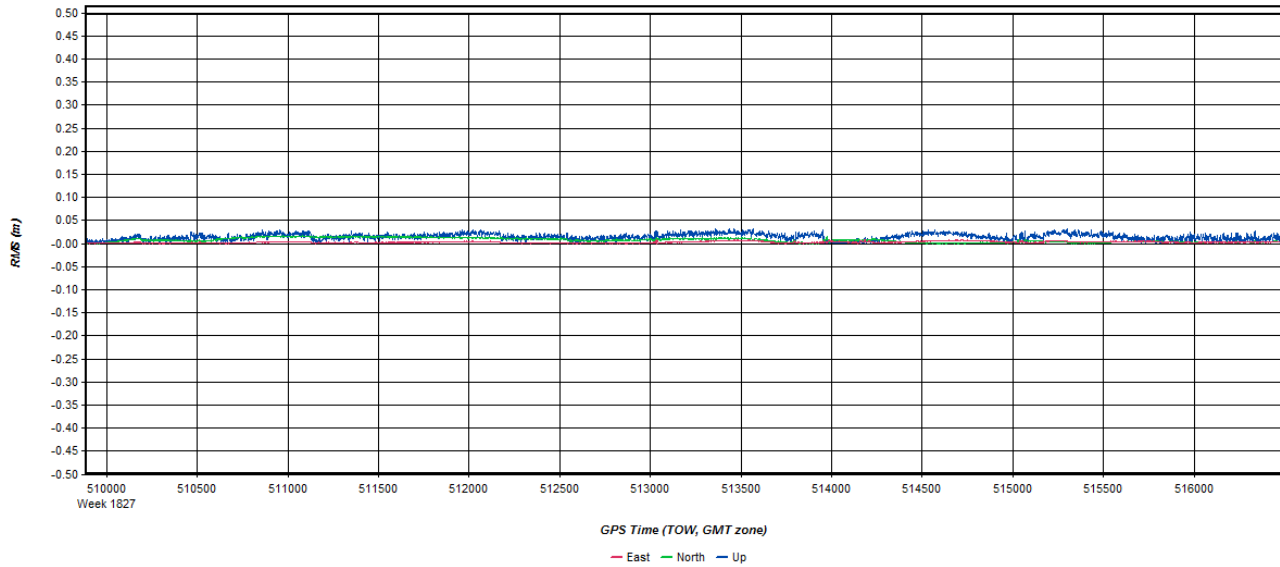


Distance from Base

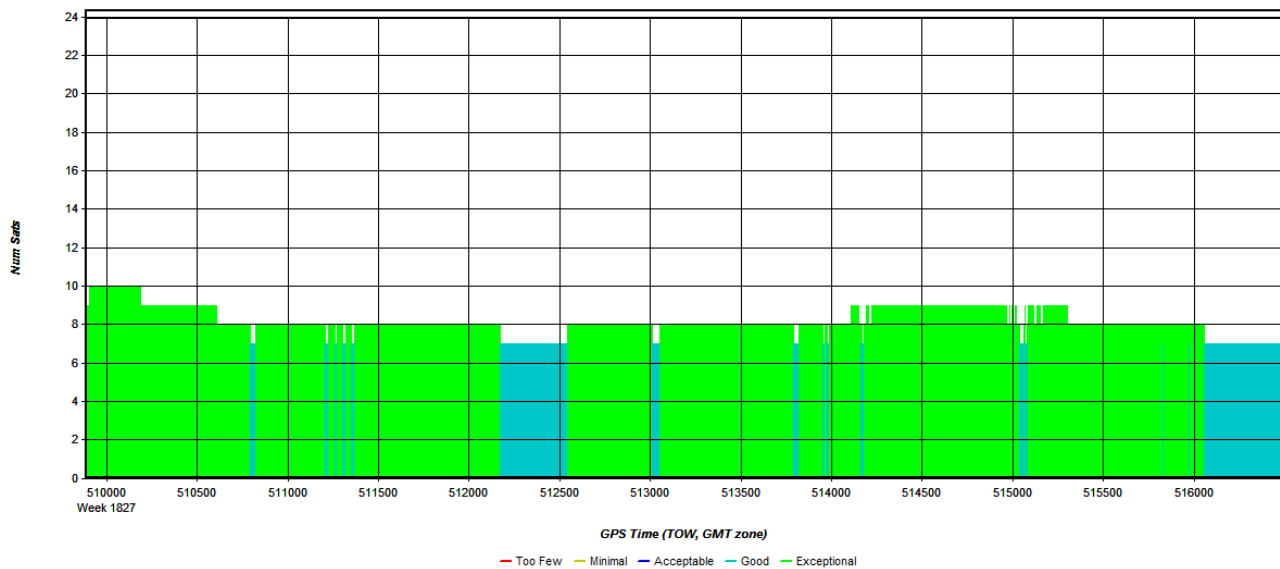




Combined RMS



SVs





Acquisition and Processing details ----- Collection 18 (January 16, 2015)

Log:



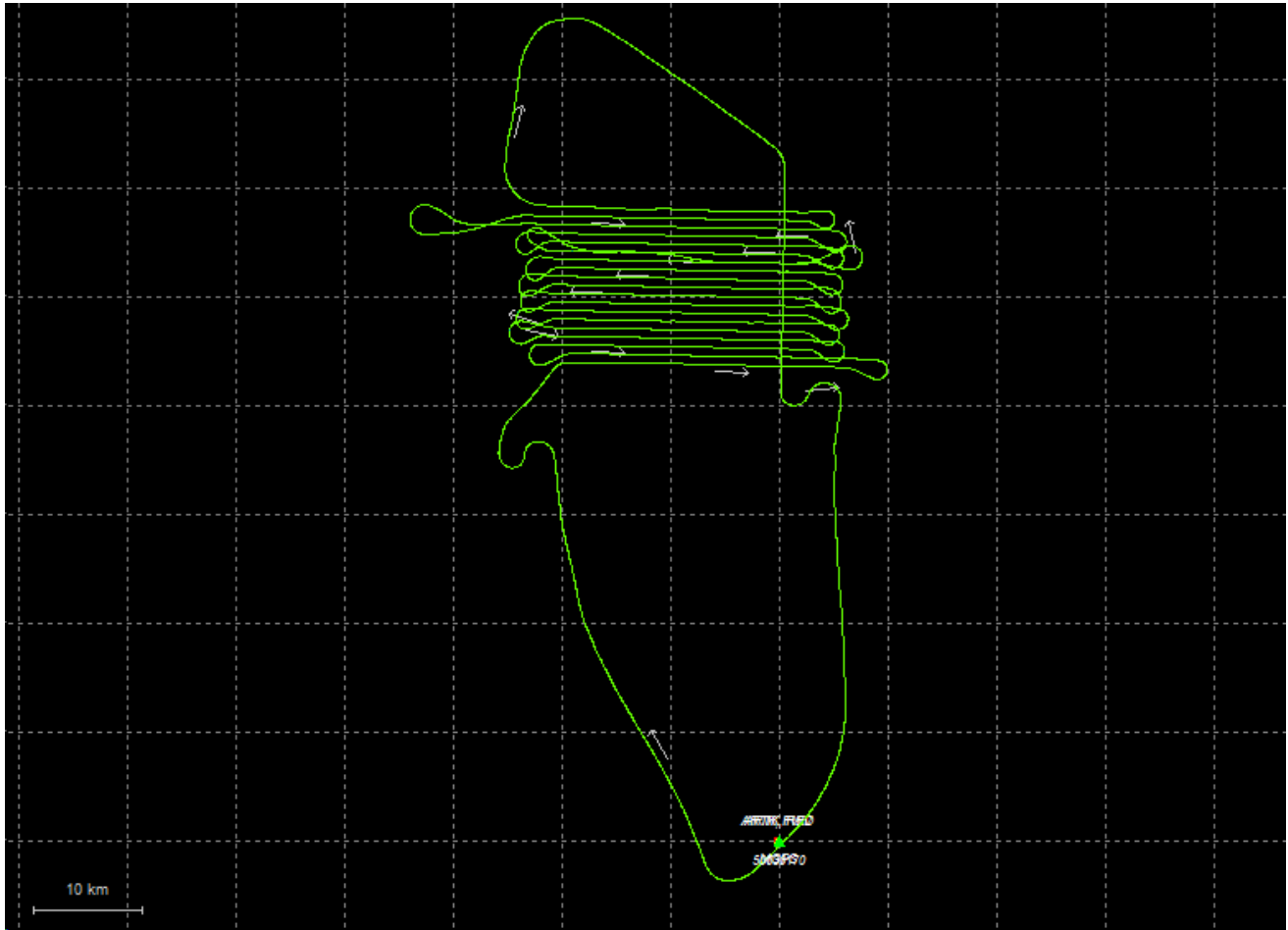
Fugro Geospatial, Inc.

	Lift Begin			Lift End			Fit Duration	Fit Hrs	Hobbs Hrs	Activity
	Airport	Chocks	Hobbs	Airport	Chocks	Hobbs				
1	KARG	0:30	9417.8	KARG	4:15	9421.1	3:45	3.75	3.3	0900-Production
2										
3										

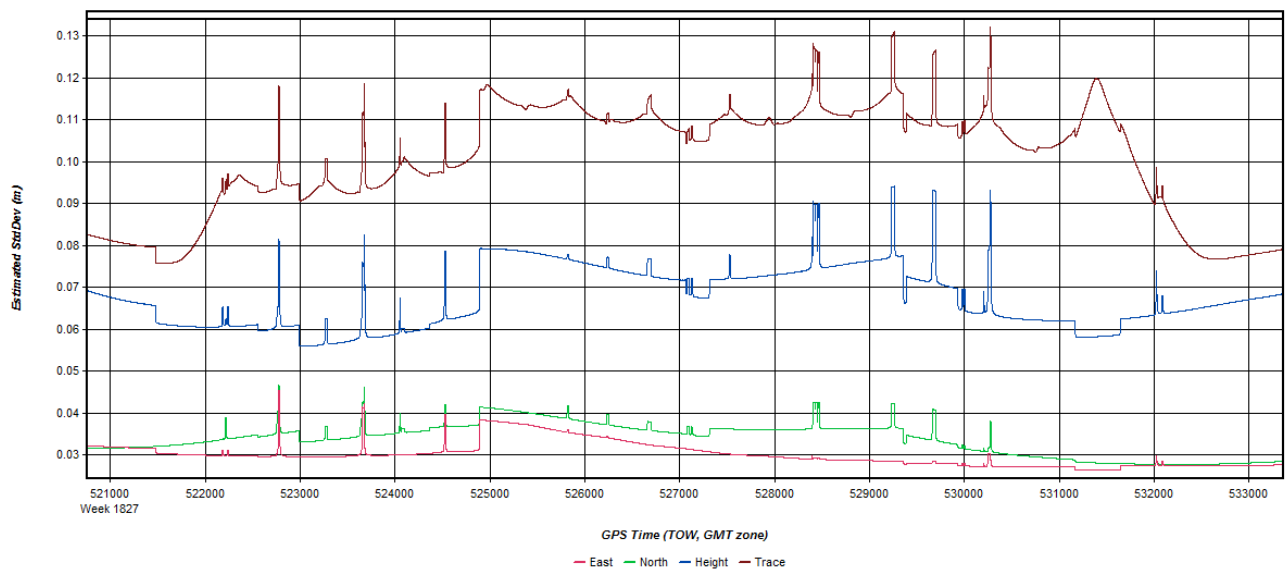
**Q680i
Flight Log**

FGI Job #	Project Name			Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives					
22.14006900	FEMA AR			Greg Sliwinski		165	FMU-300	3.0		2018	DR680-9 7 3					
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)		Flying Temp °C	Max Range'	Download Drive					
16-Jan-15	15-016	18	R680i	Roman Rosa					3.0	3888						
Mission ID (yyymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMr (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	AltM Setting	Humidity @ Alt	Shipping Track			
150116_165_14006900_18	N62912	KARG	CCNS 6	-6	3200	150	60	110	2	0.364	30.17	82				
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data			
	Walnut Ridge		PF01	PF01	1.805	16-Jan-15 00:15						Greg Sliwinski	With AB			
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End								
							20:41:00	20:46:00					GROUND STATIC		9	1.1
							1:02:00	1:04:00					S TURN		9	1.2
NEU	58		1	38	0	13.5	1:06:00	1:11:00	E	3,290	143				10	1.2
	59		38	1	13.5	0	1:13:00	1:19:00	W	3,455	127				11	1
	60		1	35	0	12.4	1:21:00	1:26:00	E	3,390	144				11	0.9
	61		35	1	12.4	0	1:28:00	1:33:00	W	3,430	140				11	0.9
	62		1	35	0	12.4	1:35:00	1:40:00	E	3,390	137				11	1
	63		35	1	12.4	0	1:42:00	1:48:00	W	3,555	125				11	1
	64		1	35	0	12.4	1:50:00	1:54:00	E	3,425	137				10	10
	65		35	1	12.4	0	10:56:00	2:02:00	W	3,520	135				9	1.1
	66		1	35	0	12.4	2:04:00	2:09:00	E	3,515	145				9	1.3
	67		35	1	12.4	0	2:11:00	2:16:00	W	3,425	141				9	1.4
	68		1	35	0	12.4	2:18:00	2:23:00	E	3,570	149				10	1.3
	69		35	1	12.4	0	2:25:00	2:30:00	W	3,620	133				10	1.2
	70		1	35	0	12.4	2:32:00	2:37:00	E	3,570	141				9	1.2
	70		35	25	12.4	8.7	2:40:00	2:42:00	W	3,600	149		CALIBRATION		9	1.2
	71		1	35	0	12.4	2:47:00	2:52:00	E	3,485	142				9	1.2
	72		32	1	11.3	0	2:54:00	2:58:00	W	3,650	140				9	1.3
	73		1	32	0	11.3	3:02:00	3:06:00	E	3,565	144				10	1.1
	74		32	1	11.3	0	3:08:00	3:13:00	W	3,695	140				11	1
	75		1	32	0	11.3	3:20:00	3:24:00	E	3,515	150				10	1.1
	83		142	114	51.3	41.1	3:41:00	3:46:00	S	3,355	133				11	0.9
							3:46:00	3:48:00					S TURN		11	0.9

Trajectory and GPS Plots:

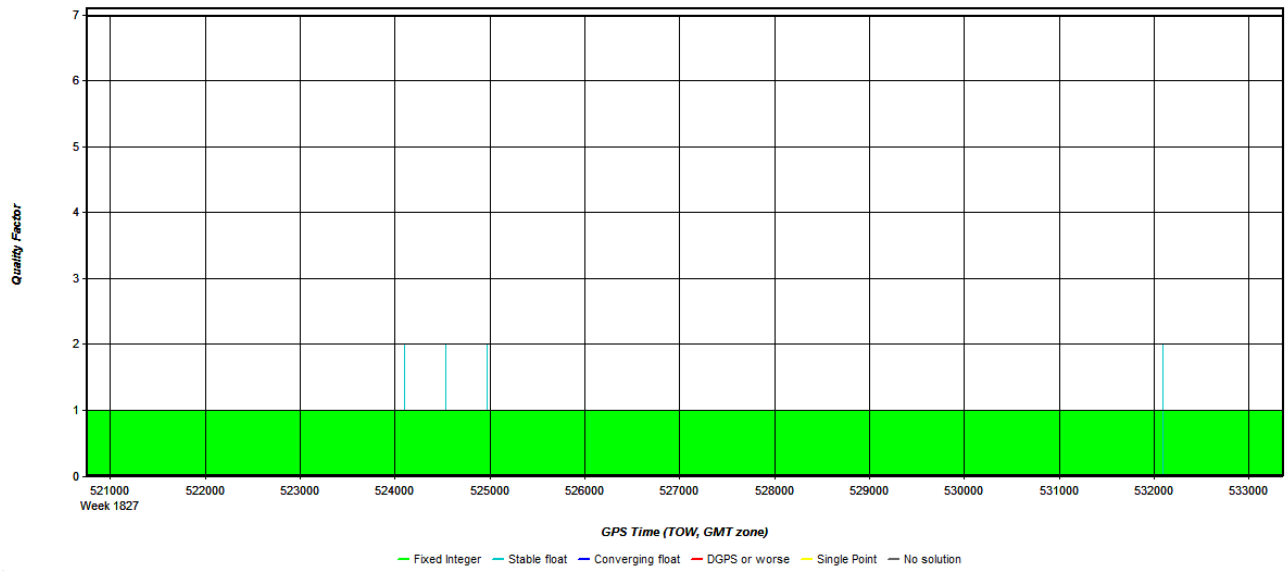


Estimated Accuracy

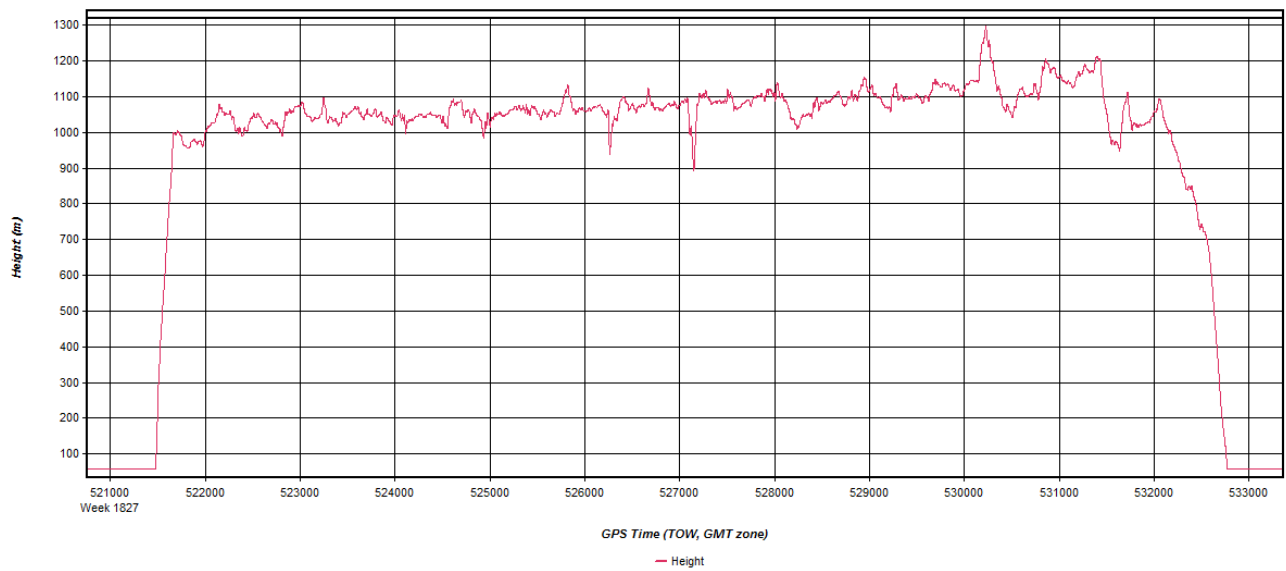




Quality Factor

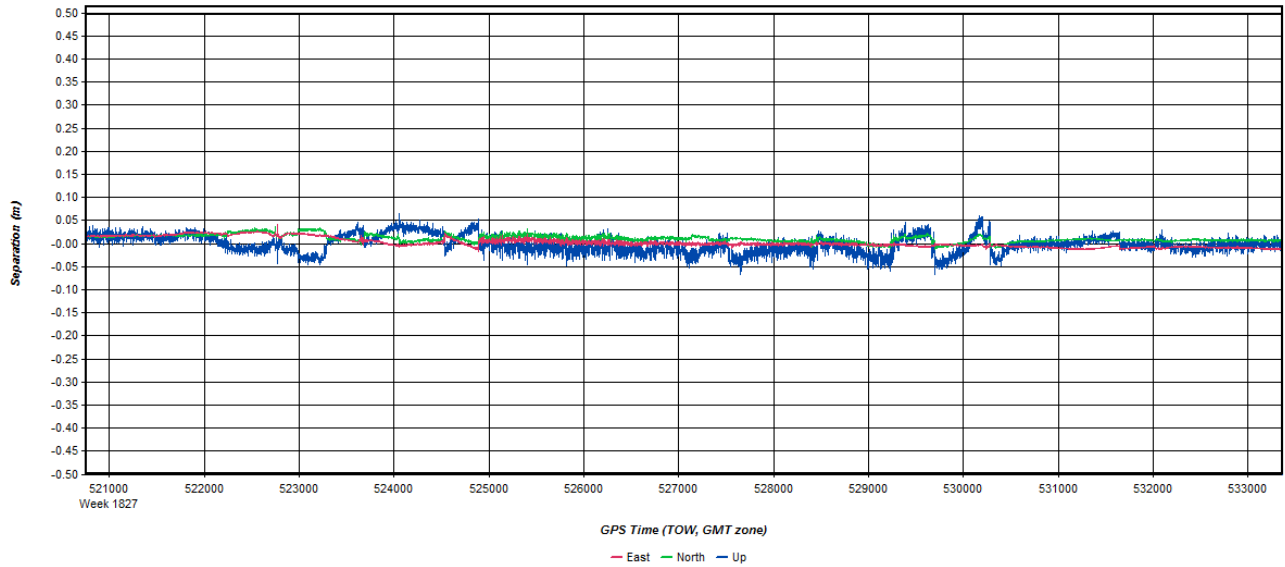


Height

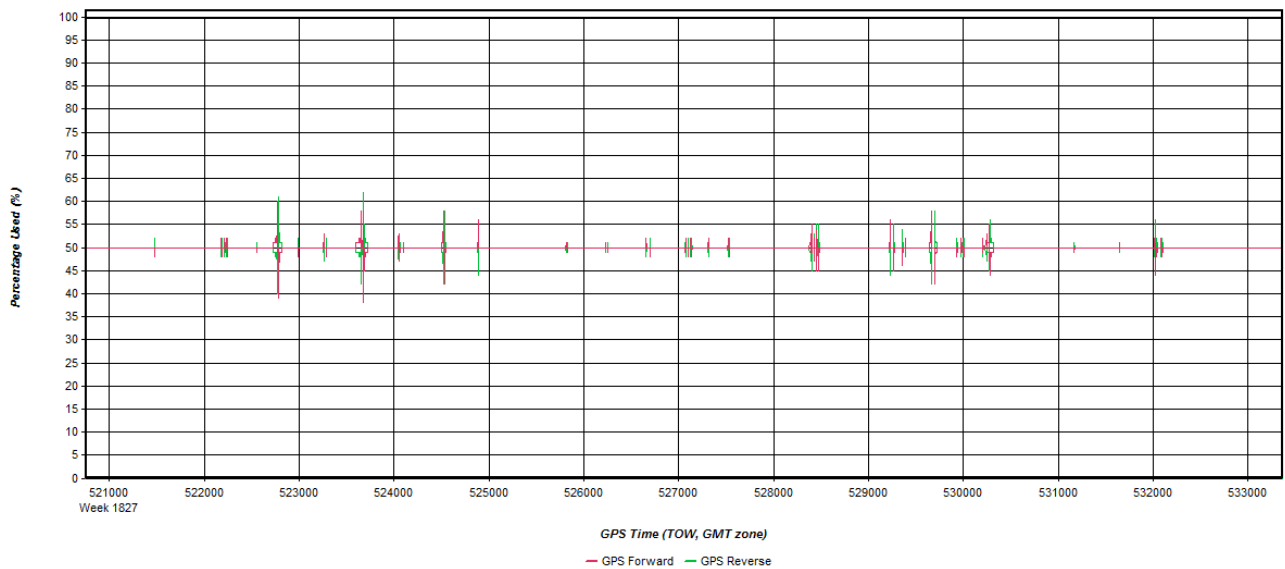




Combined Forward/Reverse Separation

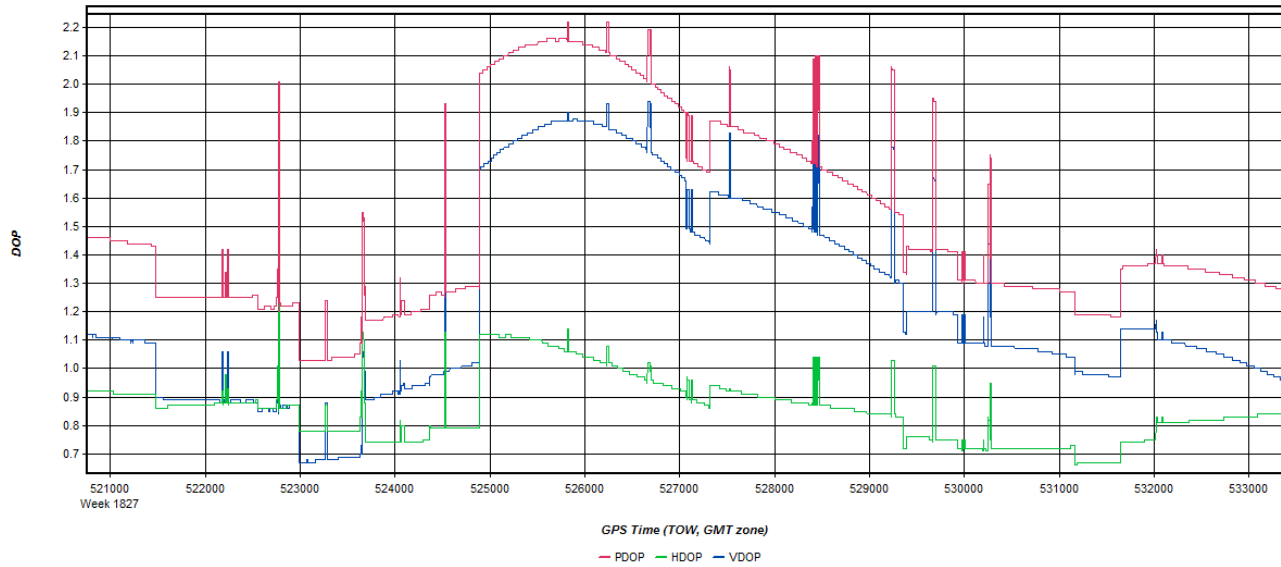


Combined Forward/Reverse Weighting

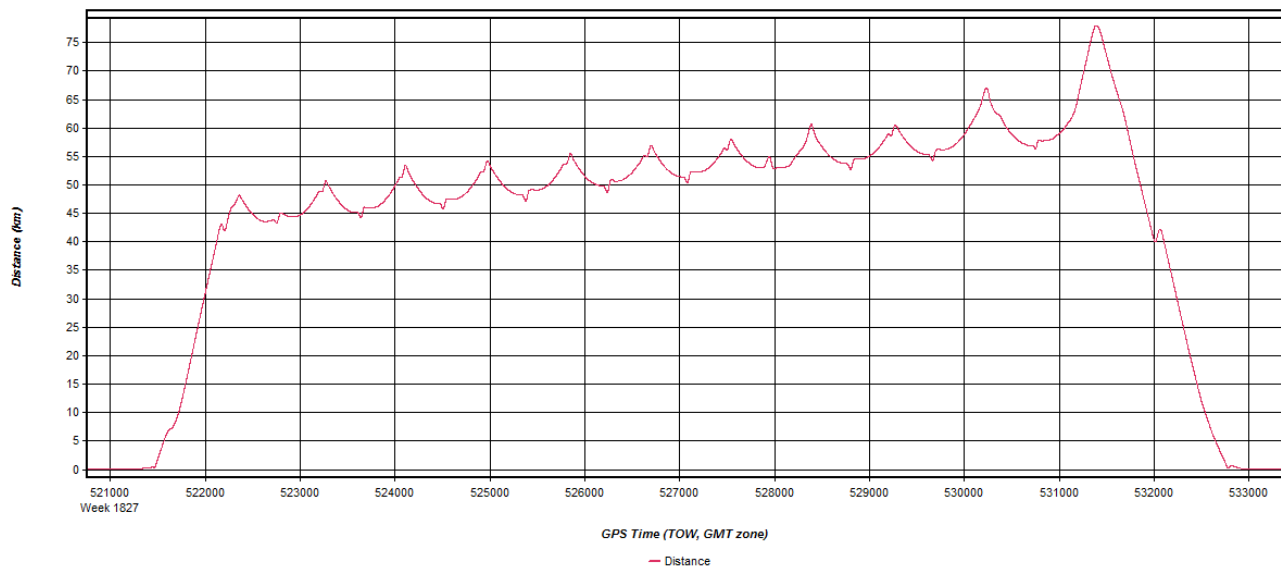




PDOP

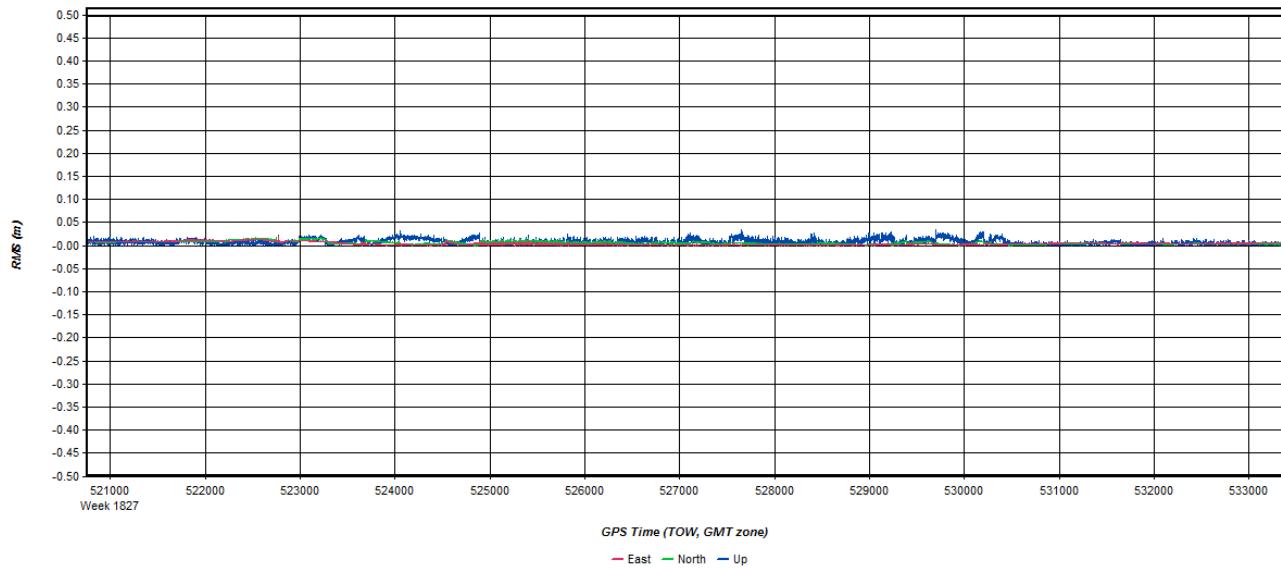


Distance from Base

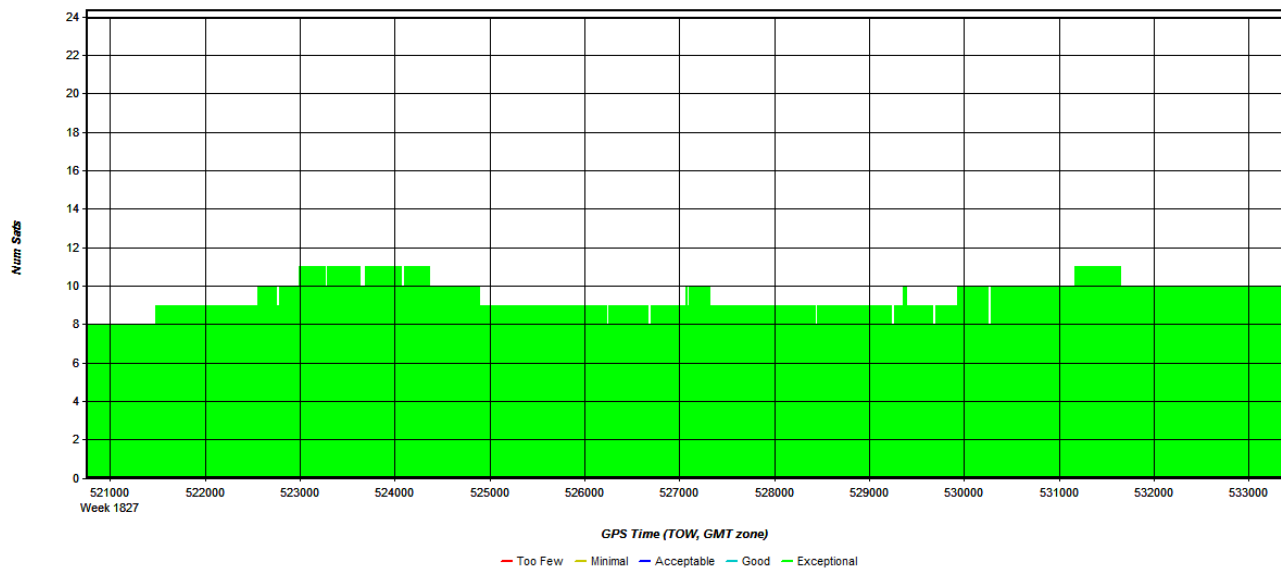




Combined RMS



SVs





Acquisition and Processing details ----- Collection 19 (January 17, 2015)

Log:



Fugro Geospatial, Inc.



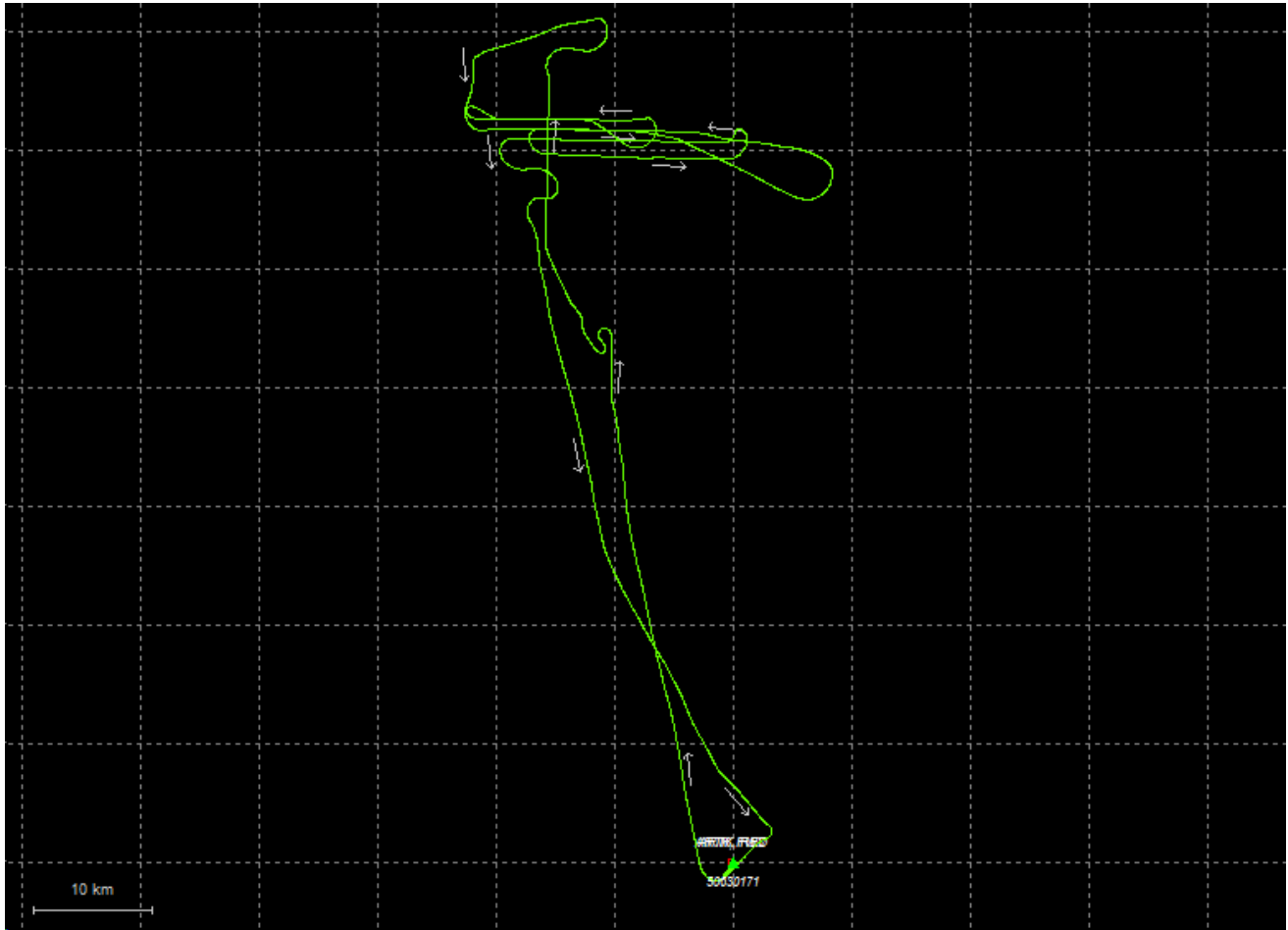
**Q680i
Flight Log**

Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	17:32	9417.7	KARG	19:25	9423.3	1:53	2.00	5.6	0900-Production
2										
3										

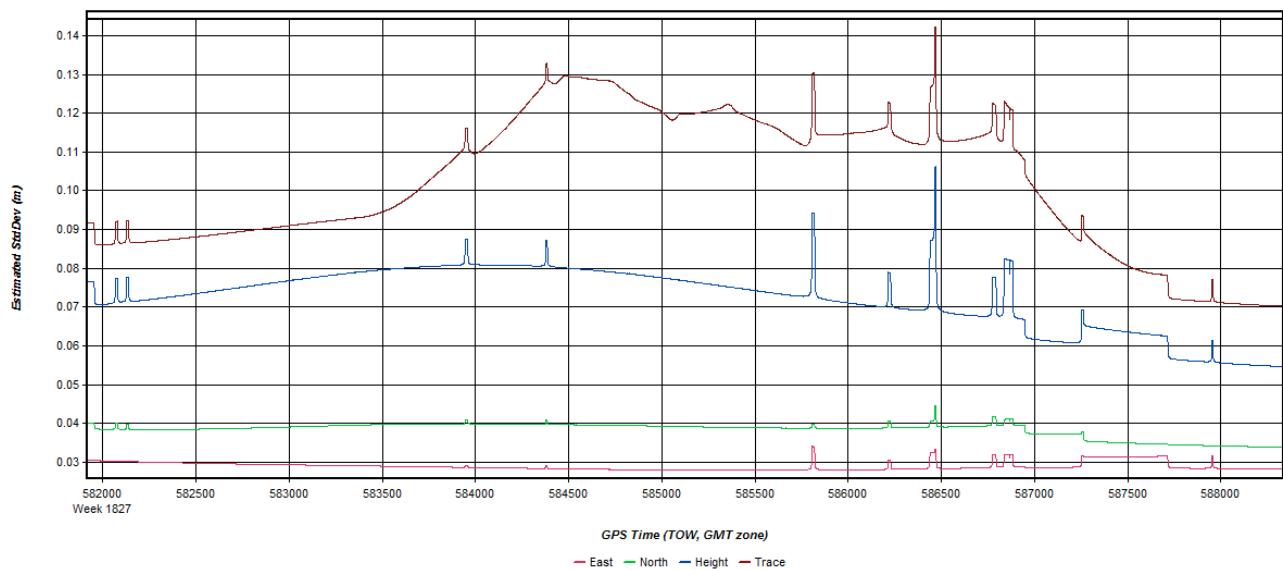
FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives		
22.14006900	FEMA Region6 AR LiDar				Chris Acuna		165	FMU-300	9.0	13.0	2018	DR680-1		
Flight Date	GPS Day	Lift	System	Pilot		Sun*	Solar Times (UTC)	Pulse Rate	Flying Temp °C		Max Range'	Download Drive		
17-Jan-15	15-017	19	R680i	Larry Stewart		-	-	250 KHZ	3.0	5.0	3888	EP500#83		
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	Alt (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Altitude Setting	Humidity @ Alt	Shipping Track	
150117_165_14006900_19	N62912	KARG	CCNS 7	-6	3200	150	60	110	2	0.364	29.99	29.92	62	8771 0698 5524
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)	Stop Time (UTC)	GPS Filename		Operator		Data			
5083	KARG	PF01	PF001	1.805	-	-	G5063B15.017		Chris Acuna		Shipped			

Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End							
							17:51:00	17:56:00					5 min gnd static alignment at KARG	8	1.2
							18:11:00	18:31:00					S-Turn in flight alignment	8	1.4
NEU_Blk	84		1	12	0	4	18:16:00	18:18:00	1	3,934	146		Crossing Line, Lt turb	8	1.4
NEU_Blk	81		10	1	3.3	0	18:32:00	18:34:00	269	3,750	134		Lt to Mod turb	8	1.2
NEU_Blk	80		1	10	0	3.3	18:37:00	18:38:00	91	3,722	145		Lt turb	8	1.2
NEU_Blk	80		10	3	3.3	0	18:48:00	18:49:00	269	3,845	126		Calibration Line, Lt turb	8	1.2
NEU_Blk	79		24	1	8.4	0	18:55:00	18:59:00	272	3,749	128		Lt turb	9	1.1
							18:59:00	19:01:00					S-Turn post in flight alignment	8	1.1
							19:19:00	19:24:00					5 min post gnd static alignment at KARG	11	1.0

Trajectory and GPS Plots:

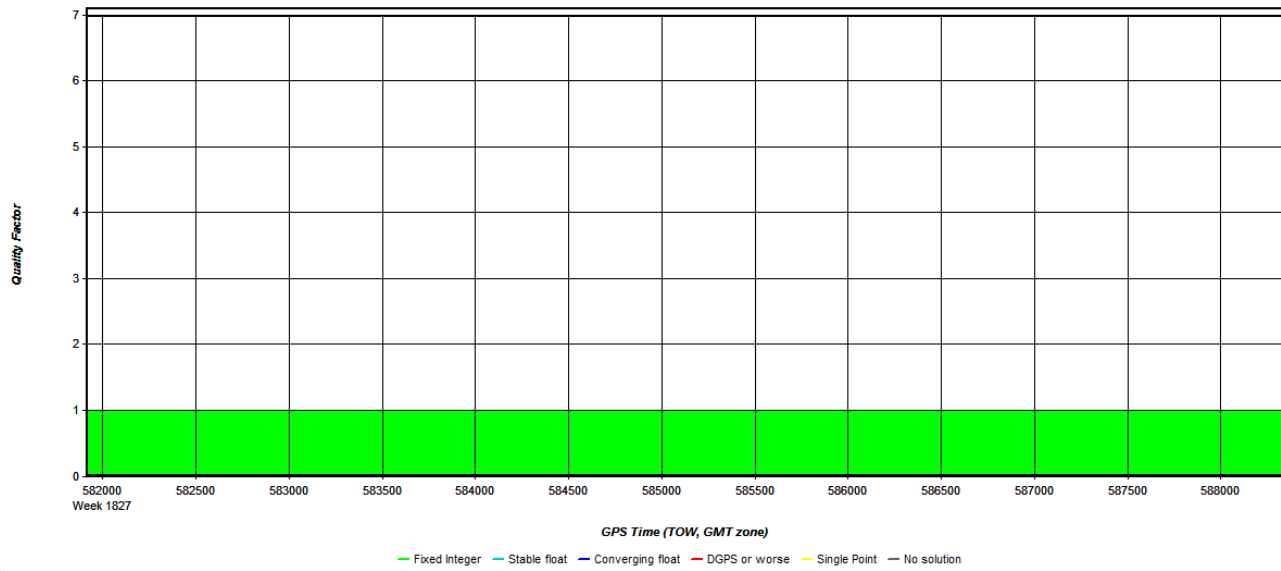


Estimated Accuracy

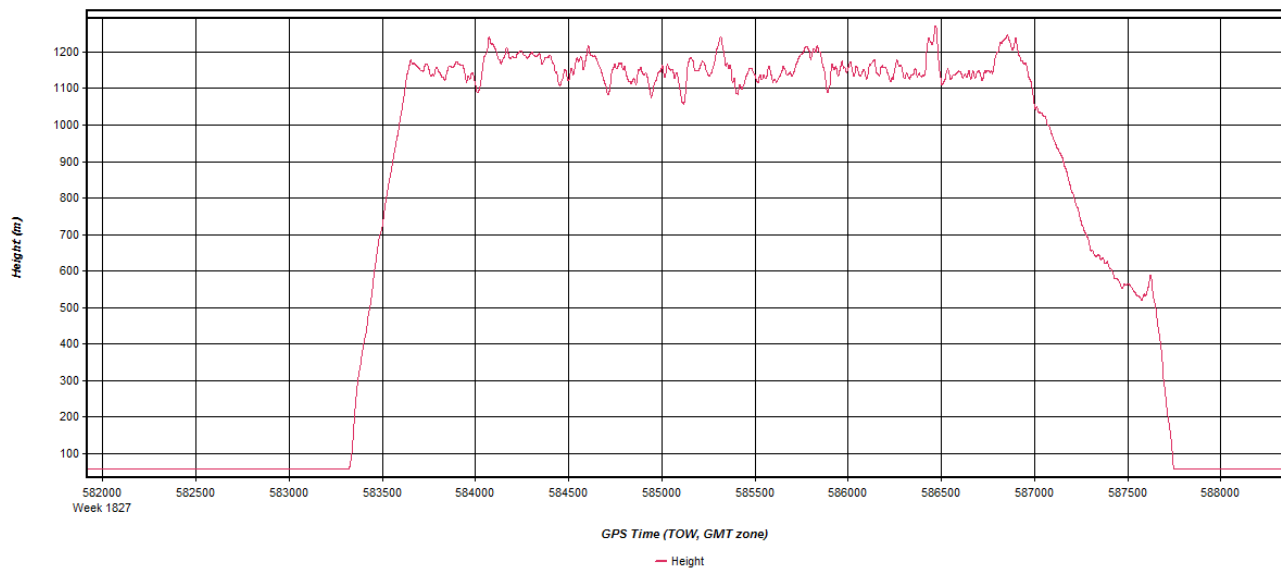




Quality Factor

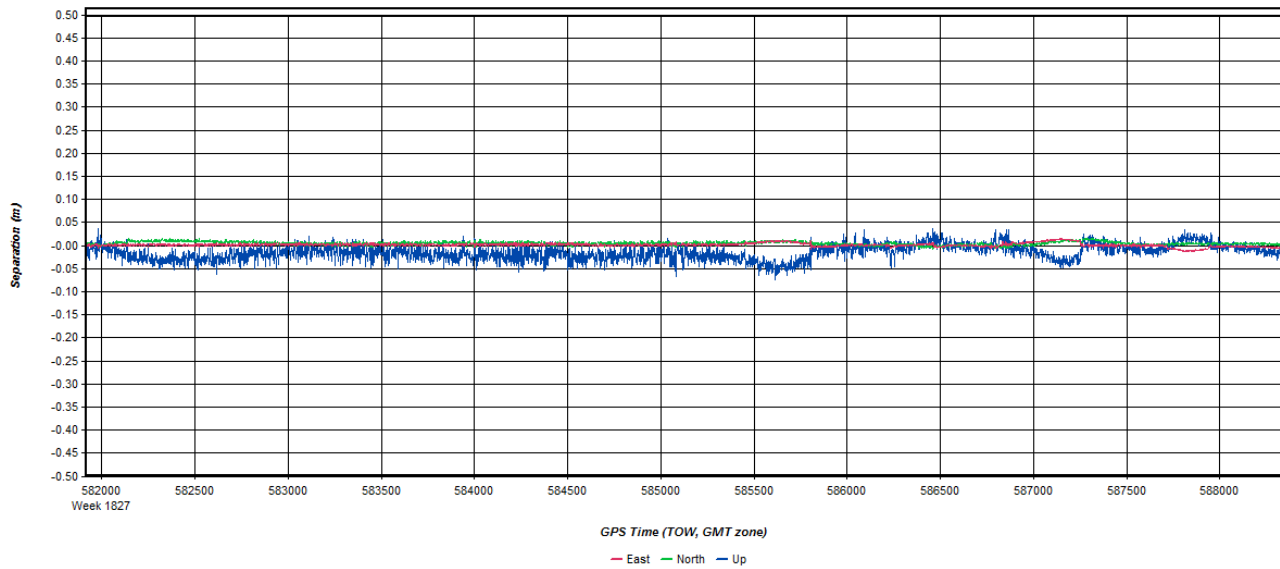


Height

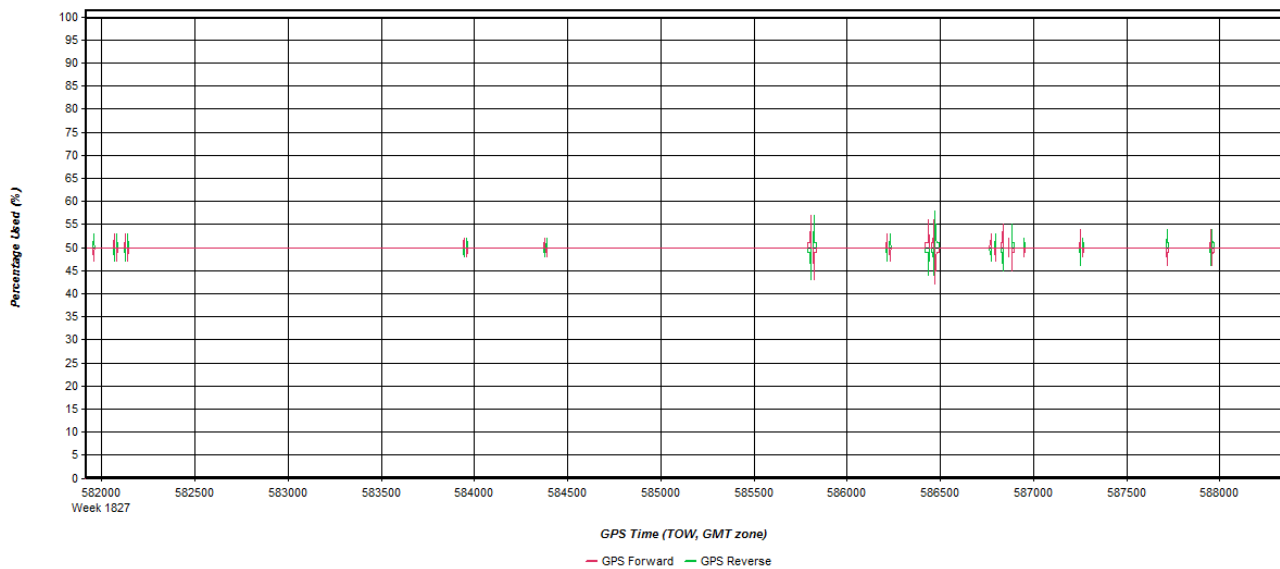




Combined Forward/Reverse Separation

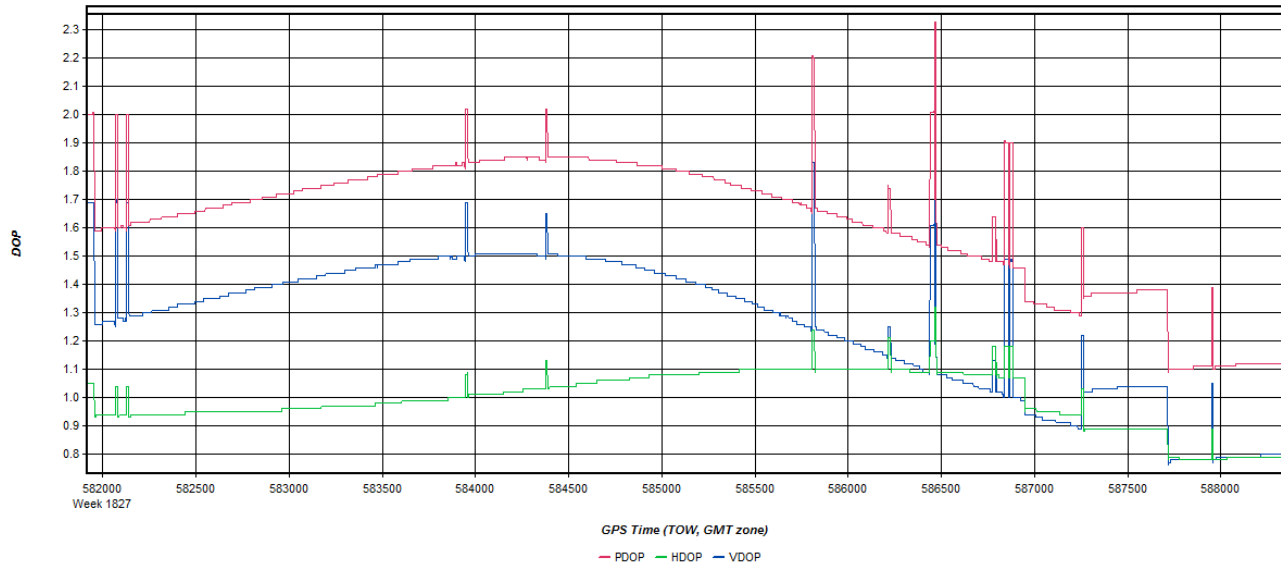


Combined Forward/Reverse Weighting

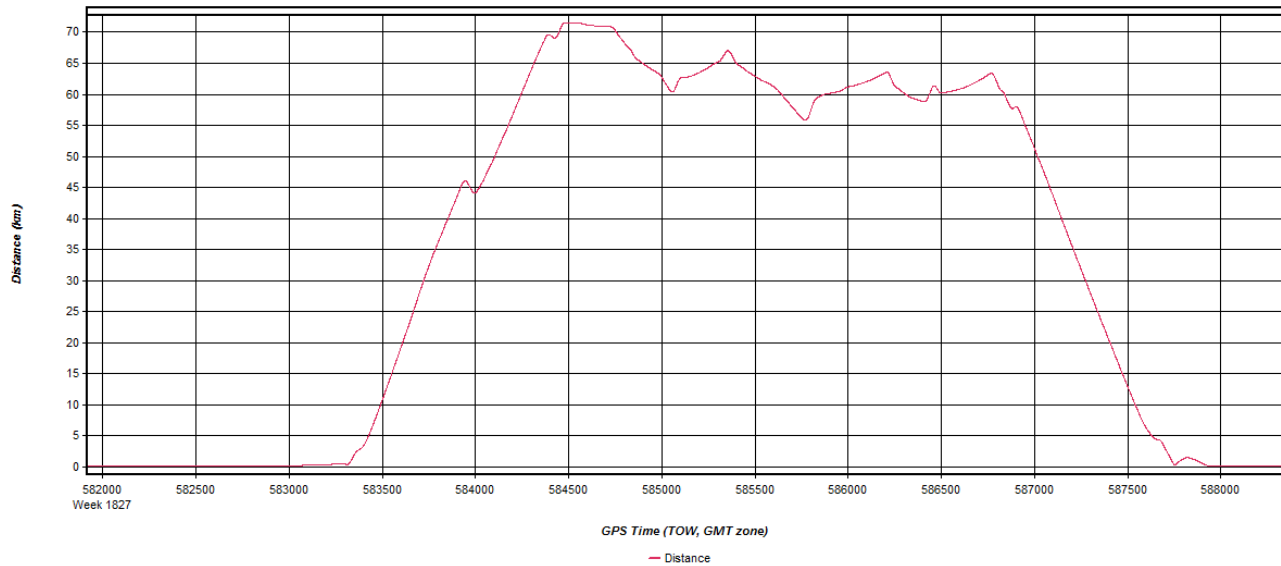




PDOP

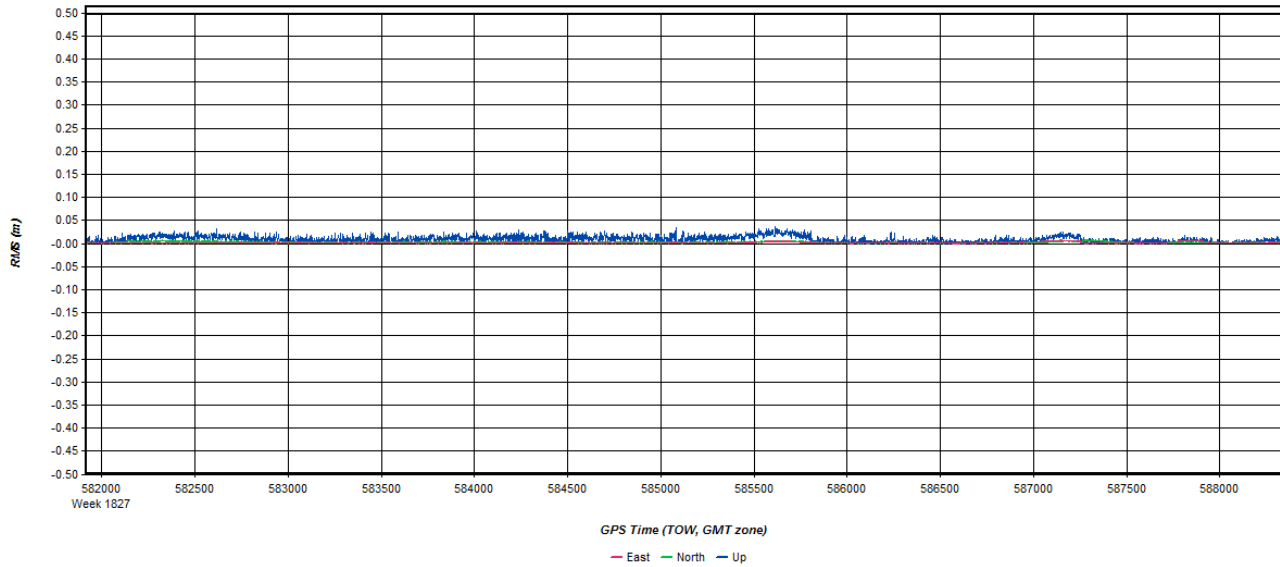


Distance from Base

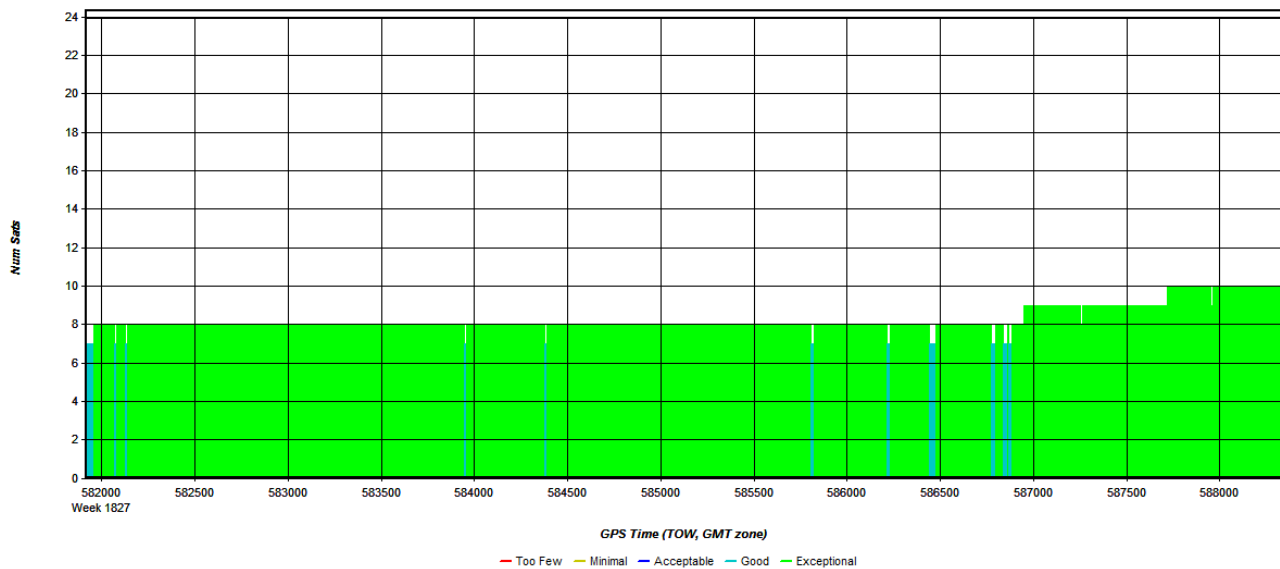




Combined RMS



SVs





Acquisition and Processing details ----- Collection 20 (January 18, 2015)

Log:



Fugro Geospatial, Inc.

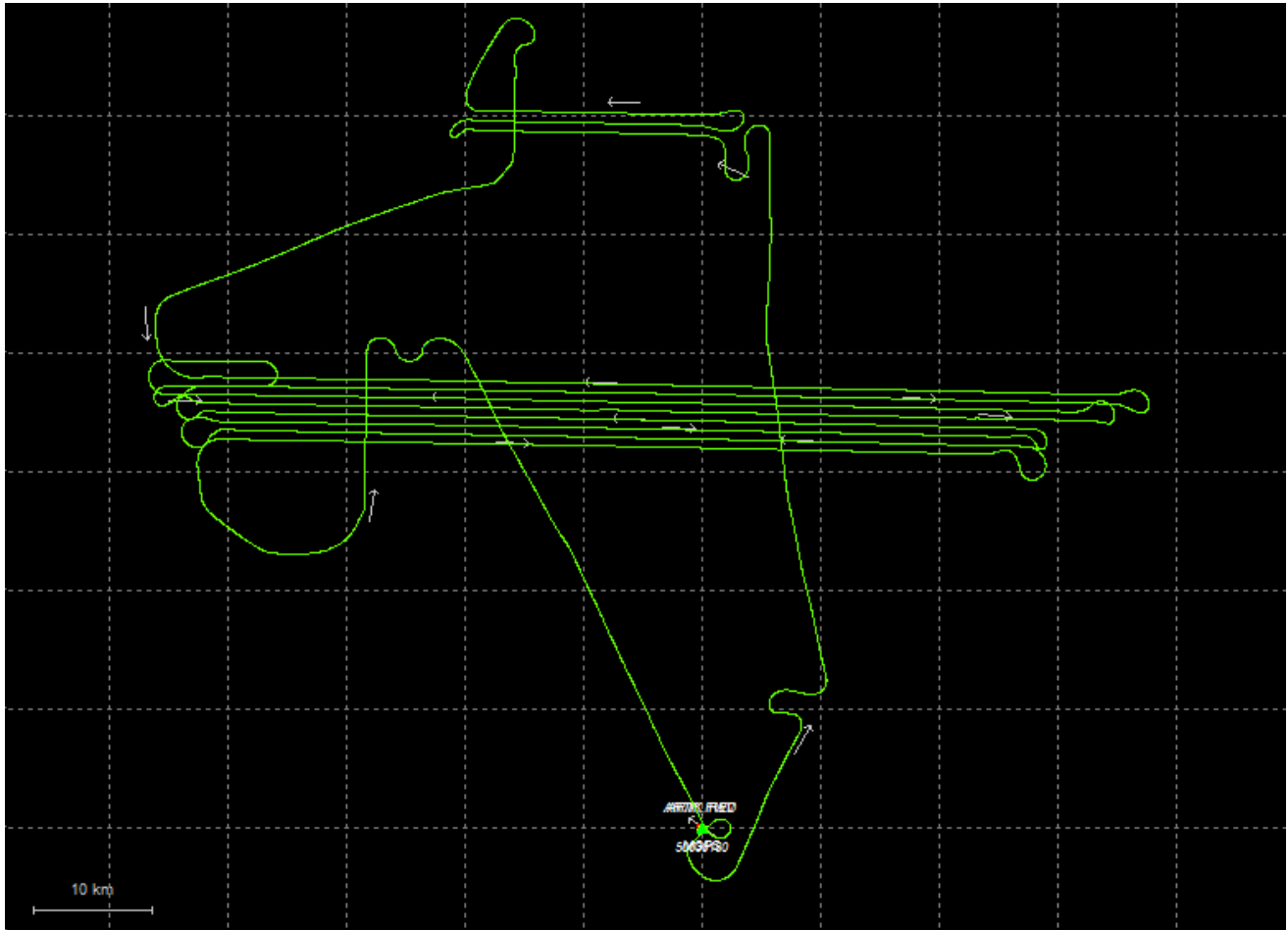


**Q680i
Flight Log**

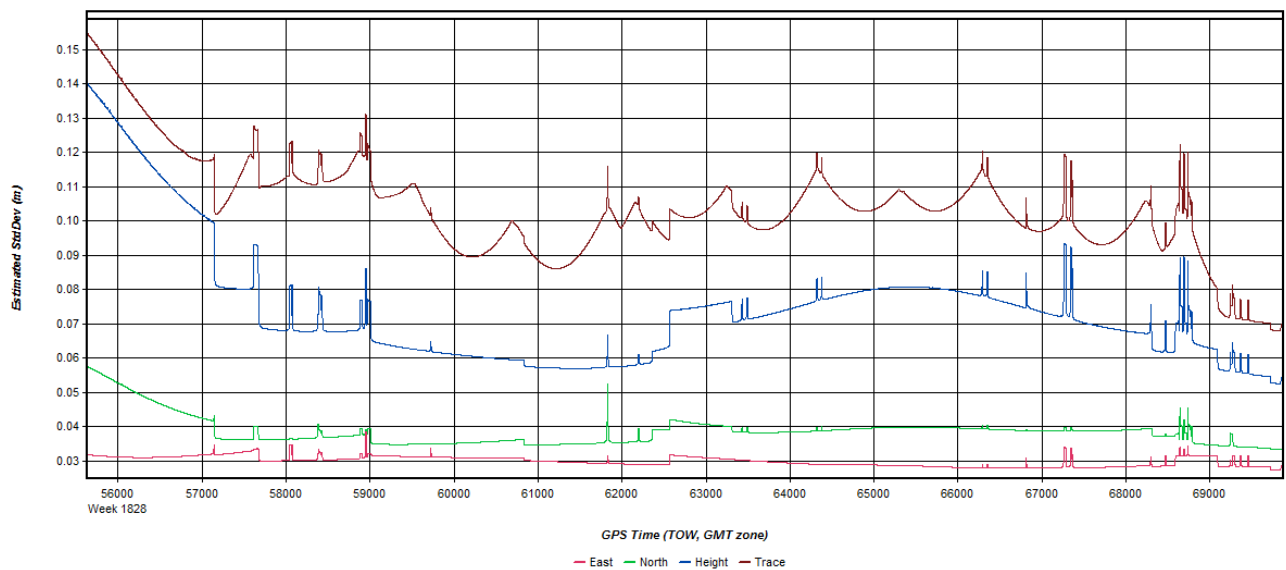
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	15:20	9423.3	KARG	19:25	9427.4	4:05	4.00	4.1	0900-Production
2										
3										

FGI Job #	Project Name			Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives					
22.14006900	FEMA Region6 AR LiDar			Chris Acuna		165	FMU-300	7.0	17.0	2018	DR680-4 & -7					
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)	Pulse Rate		Flying Temp °C	Max Range'	Download Drive				
18-Jan-15	15-018	20	R680i	Larry Stewart		-	-	250 KHz		2.0	4.0	3888	EP500#83			
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	Alt (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Altitude Setting	Humidity @ Alt	Shipping Track			
150118_165_14006900_20	N62912	KARG	CCNS 7	-6	3200	150	60	110	2	0.364	30.16	30.00	53	8771 0698 5534		
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)	Stop Time (UTC)	GPS Filename		Operator		Data					
5083	KARG	PF01	PF001	1.805	-	-	G5063A15.018		Chris Acuna		Shipped					
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate				
							15:30:00	15:35:00					5 min gnd static alignment at KARG		7	1.5
							15:59:00	16:00:00					S-Turn in flight alignment		8	1.1
NEU_Blk	76		27	1	9.5	0	16:02:00	16:06:00	272	3,237	143				8	1.1
NEU_Blk	77		1	27	0	9.5	16:08:00	16:11:00	91	3,828	141				8	1.2
NEU_Blk	78		24	1	8.4	0	16:14:00	16:18:00	272	3,727	138				9	1.1
NEU_Blk	84		10	1	3.3	0	16:22:00	16:24:00	181	3,877	137		Crossing Line		9	1.1
NEU_Blk	49		1	126	0	45.5	16:33:00	16:50:00	89	3,396	142				8	1.1
NEU_Blk	48		121	1	43.7	0	16:53:00	17:09:00	270	3,399	147				9	1.1
NEU_Blk	48		1	7	0	2.2	17:11:00	17:12:00	90	3,637	150		Calibration Line		9	0.9
NEU_Blk	47		1	121	0	43.7	17:17:00	17:33:00	91	3,400	145				9	0.9
NEU_Blk	46		115	1	41.5	0	17:35:00	17:51:00	270	3,391	146		Lt turb wpt 94 continues west, Lt turb wpt 29 west		8	1.1
NEU_Blk	45		1	115	0	41.5	17:52:00	18:07:00	92	3,525	146				8	1.3
NEU_Blk	44		110	1	39.7	0	18:09:00	18:23:00	269	3,410	134		Lt turb wpt 98 continous west.		8	1.4
NEU_Blk	43		1	110	0	39.7	18:25:00	18:40:00	92	3,742	148		Lt turb		8	1.2
NEU_Blk	42		107	1	38.6	0	18:42:00	18:56:00	271	3,513	149		Lt turb		8	1.2
NEU_Blk	82		65				19:01:00	19:03:00	359	3,435	149		Crossing Line, Lt to Mod turb		11	0.9
							19:03:00	19:05:00					S-Turn post in flight alignment		10	1.0
							19:17:00						5 min post gnd static alignment at KARG			

Trajectory and GPS Plots:

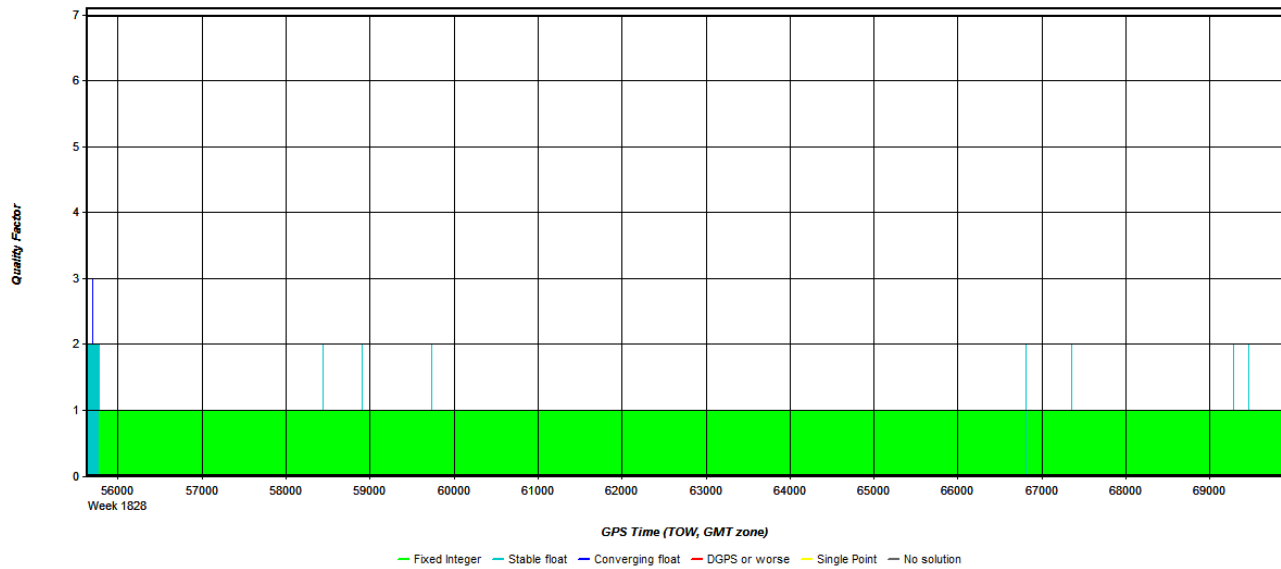


Estimated Accuracy

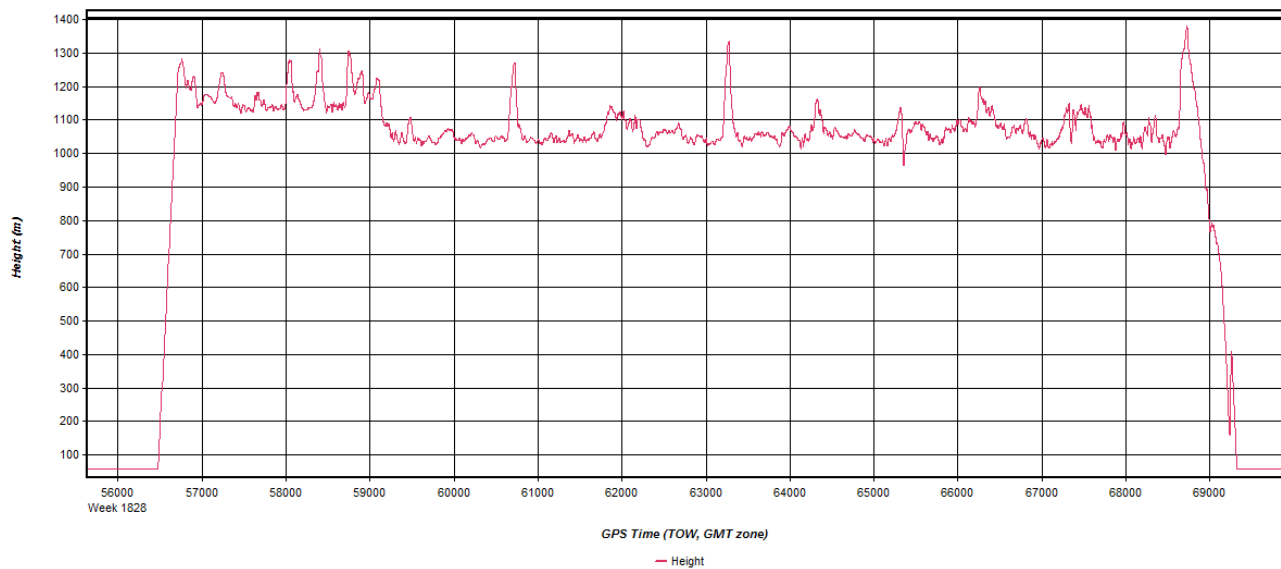




Quality Factor

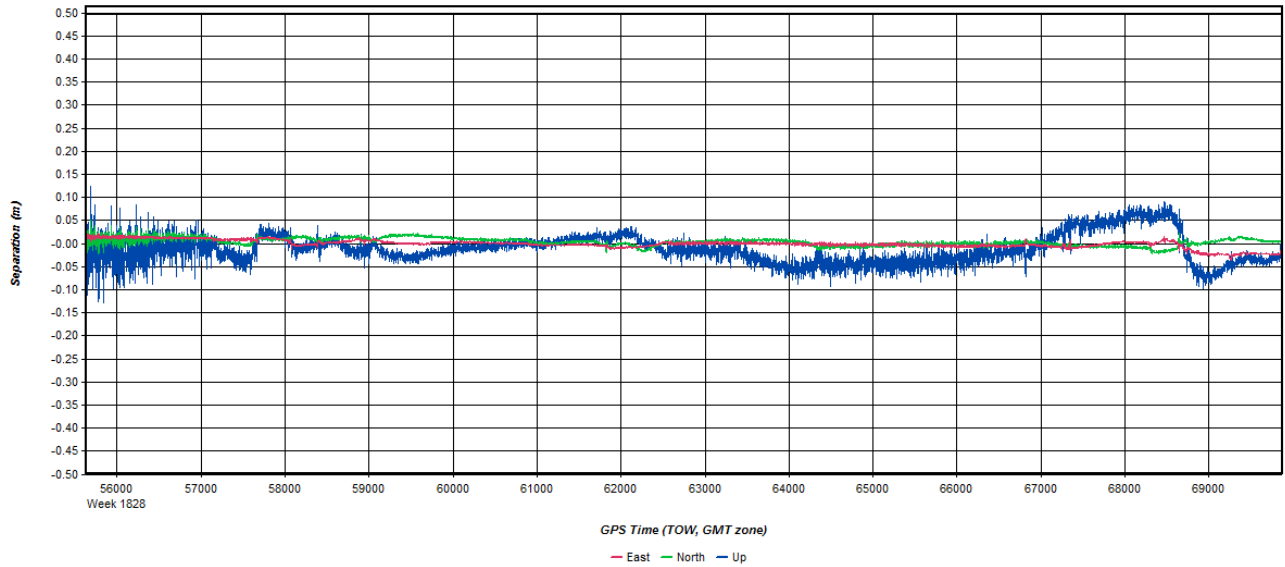


Height

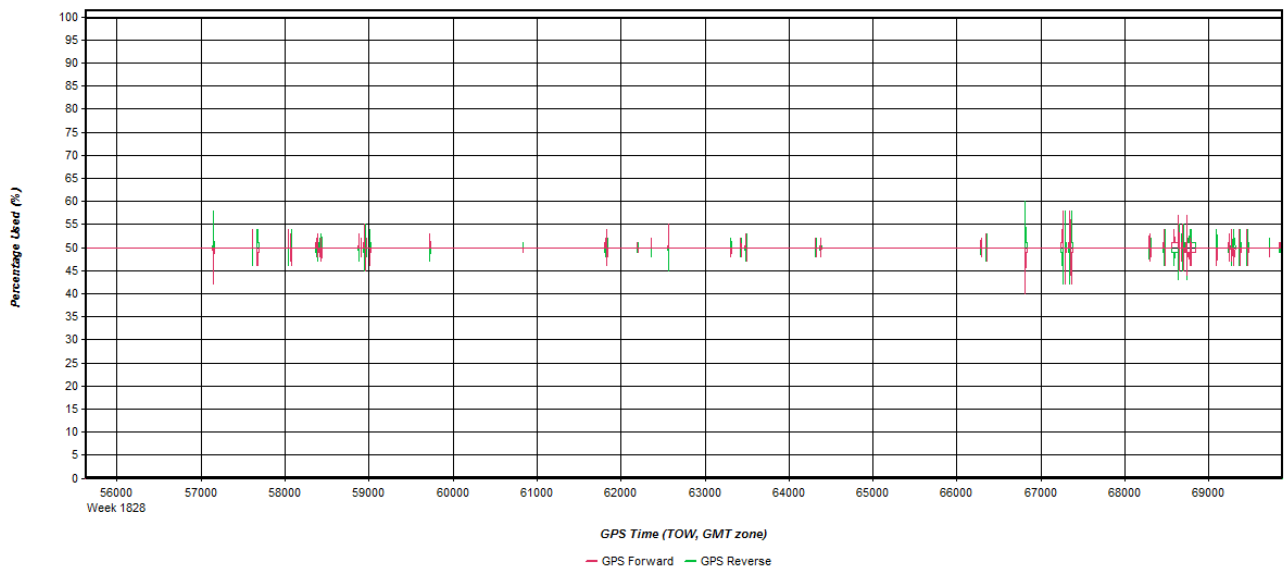




Combined Forward/Reverse Separation

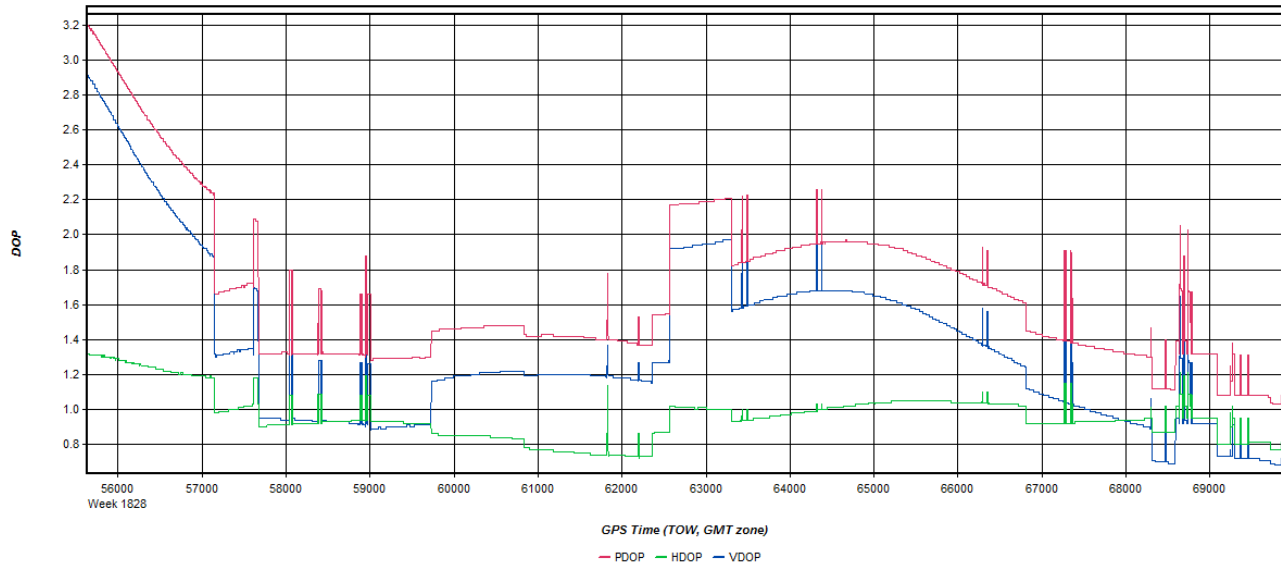


Combined Forward/Reverse Weighting

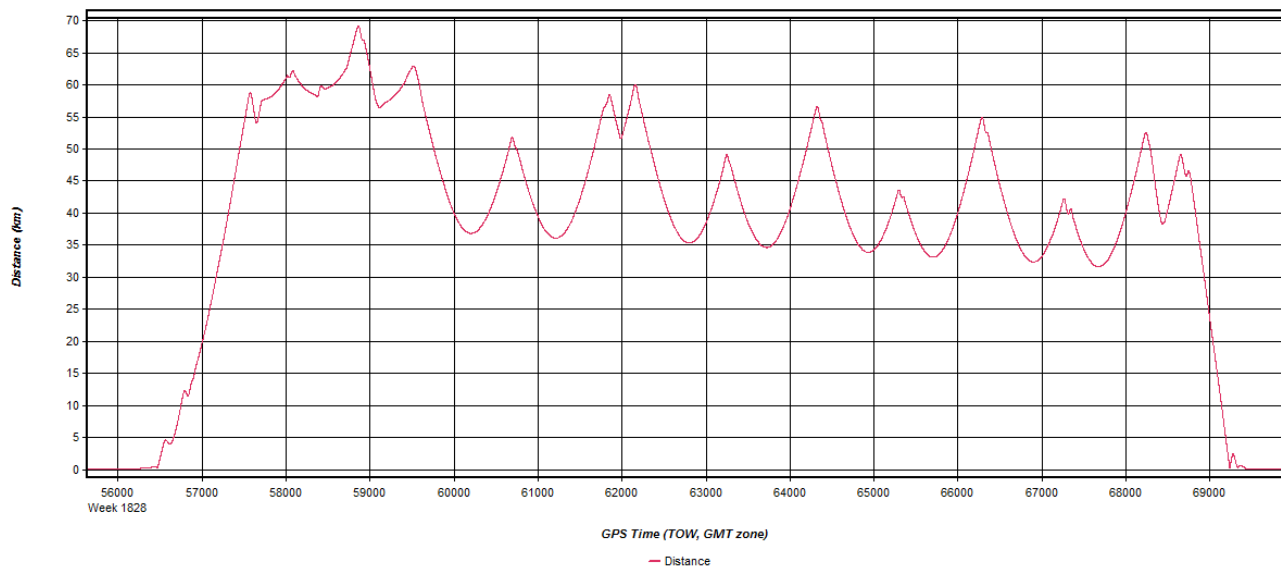




PDOP

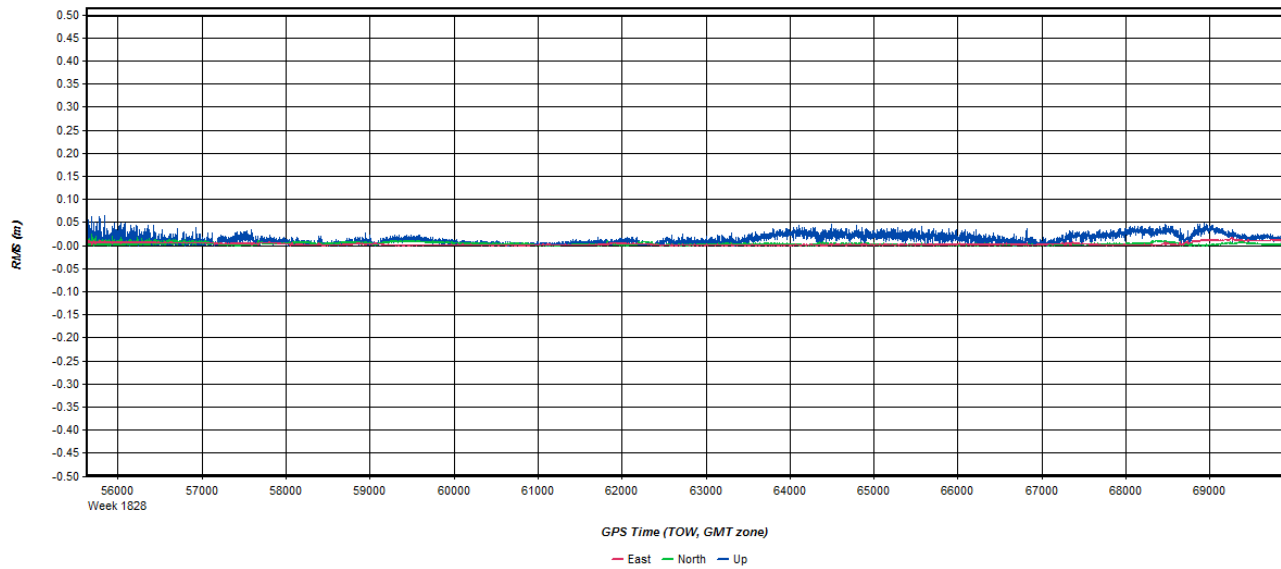


Distance from Base

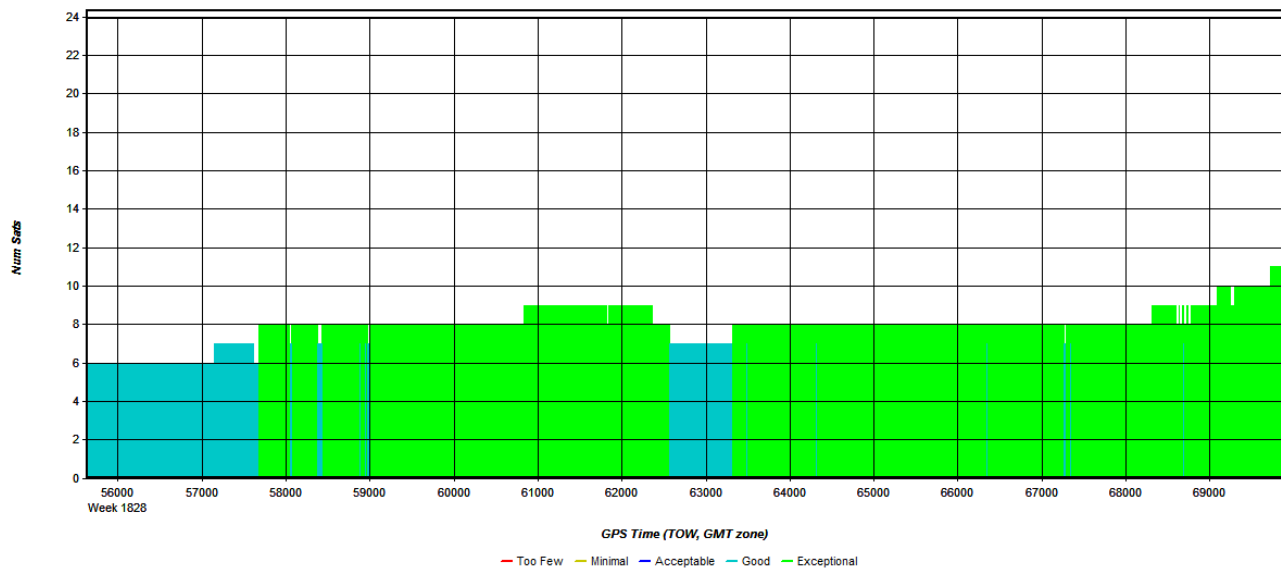




Combined RMS



SVs





Acquisition and Processing details ----- Collection 21 (January 18, 2015)

Log:



Fugro Geospatial, Inc.

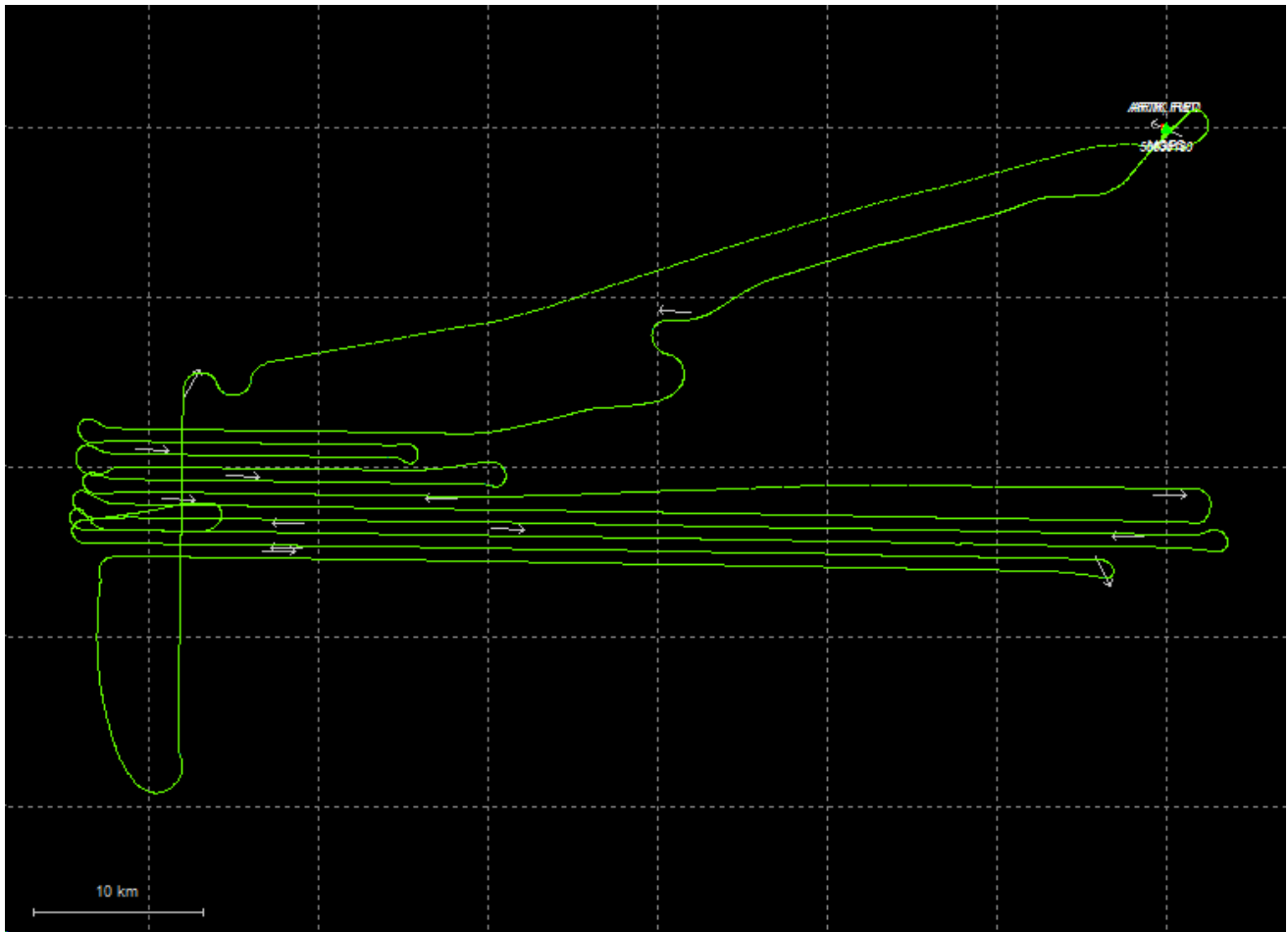


**Q680i
Flight Log**

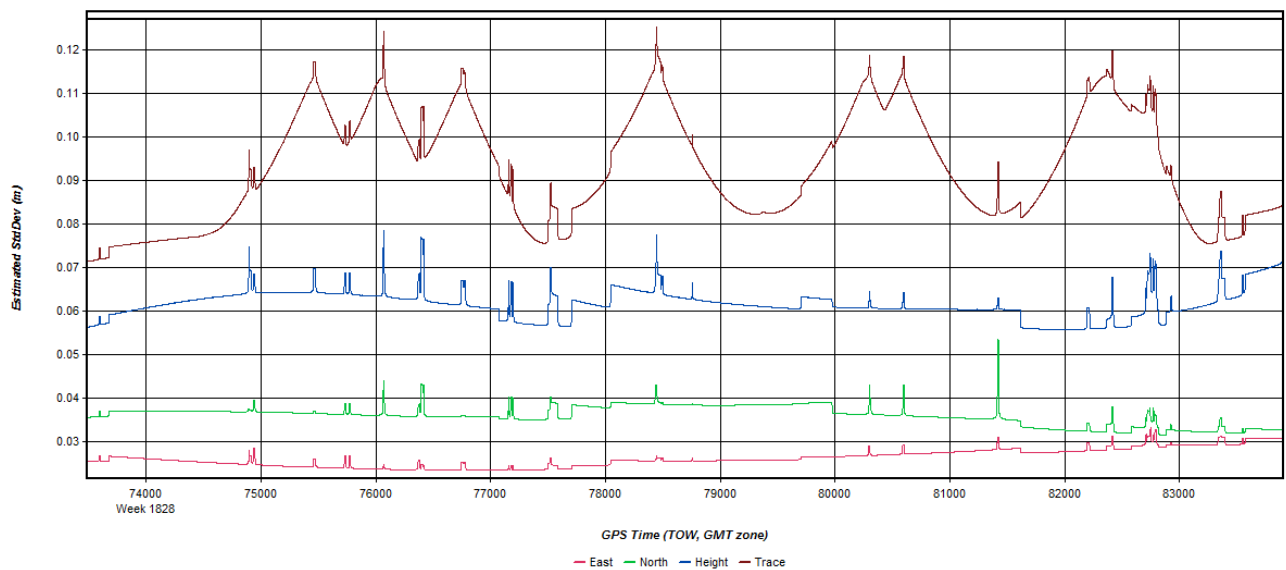
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	20:20	9427.4	KARG	23:18	9430.3	2:58	3.00	2.9	0900-Production
2										
3										

FGI Job #	Project Name			Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives					
22.14006900	FEMA Region6 AR LiDar			Chris Acuna		165	FMU-300	16.0	12.0	2018	DR680-5					
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)	Pulse Rate		Flying Temp °C	Max Range'	Download Drive				
18-Jan-15	15-018	21	R680i	Larry Stewart		-	-	250 KHZ		4.0	5.0	3888	EP500#83			
Mission ID (yymmdd_Sen_Job_Lift)		Aircraft	Airport ID	FMS	UTC	Alt (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Alt Setting	Humidity @ Alt	Shipping Track		
150118_165_14006900_21		N62912	KARG	CCNS 7	-6	3200	150	60	110	2	0.364	30.06	30.03	30	8771 0698 5534	
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator		Data		
5083	KARG		PF01	PF001	1.805	-		-		G5063A15.018		Chris Acuna		With AB		
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOF
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate				
							20:28:00	20:33:00					5 min gnd static alignment at KARG		11	1.1
							20:47:00	20:49:00					S-Turn in flight alignment			
NEL_Blk	49		24	1	8.4	0	20:53:00	20:56:00	270	3,366	150				10	1.2
NEL_Blk	48		1	24	0	8.4	20:58:00	21:01:00	90	3,609	142				10	1.2
NEL_Blk	47		24	1	8.4	0	21:02:00	21:06:00	269	3,312	144				10	1.2
NEL_Blk	46		1	24	0	8.4	21:07:00	21:11:00	89	3,501	141				10	1.0
NEL_Blk	45		32	1	11.3	0	21:13:00	21:18:00	270	3,636	148				10	1.1
NEL_Blk	44		1	32	0	11.3	21:19:00	21:24:00	88	3,275	142				11	1.0
NEL_Blk	43		104	1	37.5	0	21:32:00	21:46:00	272	3,336	145				11	1.0
NEL_Blk	42		1	104	0	37.5	21:47:00	22:01:00	90	3,500	147				10	1.0
NEL_Blk	41		95	1	34.2	0	22:04:00	22:16:00	269	3,380	145				9	1.3
NEL_Blk	41		1	7	0	2.2	22:18:00	22:19:00	89	3,513	148		Calibration Line		10	1.2
NEL_Blk	40		1	95	0	34.2	22:23:00	22:36:00	90	3,472	149				10	1.9
NEL_Blk	39		87	1	31.3	0	22:38:00	22:49:00	270	3,434	147				10	1.1
NEL_Blk	77		36	68	12.7	24.4	22:53:00	22:58:00	360	3,328	138				11	1.0
							22:58:00	22:59:00					S-Turn post in flight alignment		10	0.9
							23:12:00	23:17:00					5 min post gnd static alignment at KARG		10	1.0

Trajectory and GPS Plots:

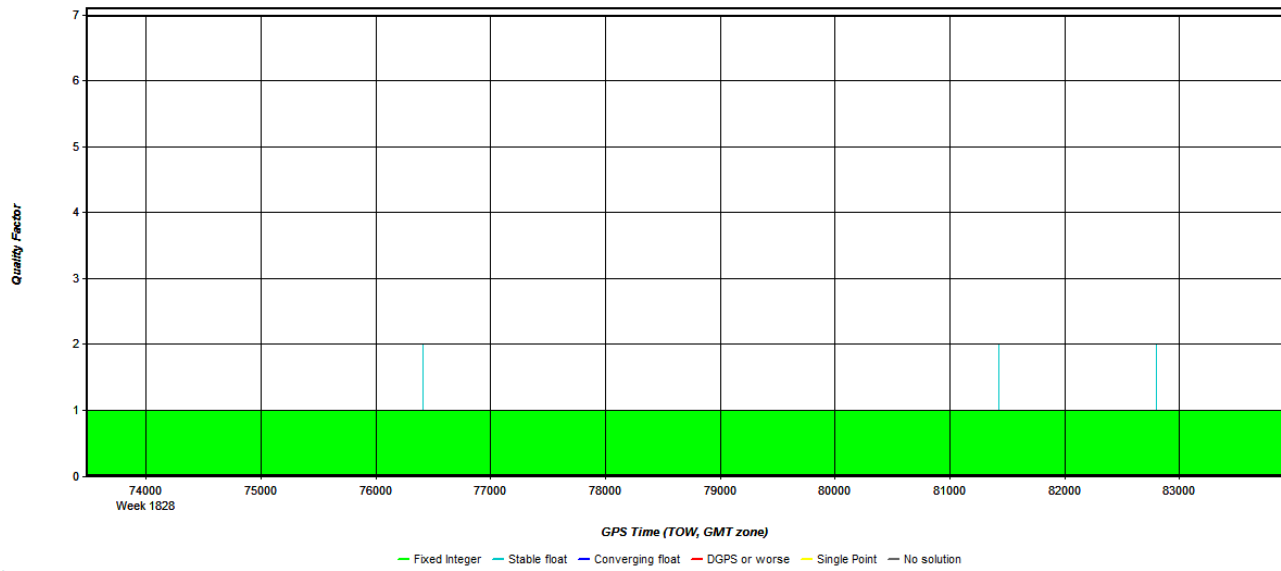


Estimated Accuracy

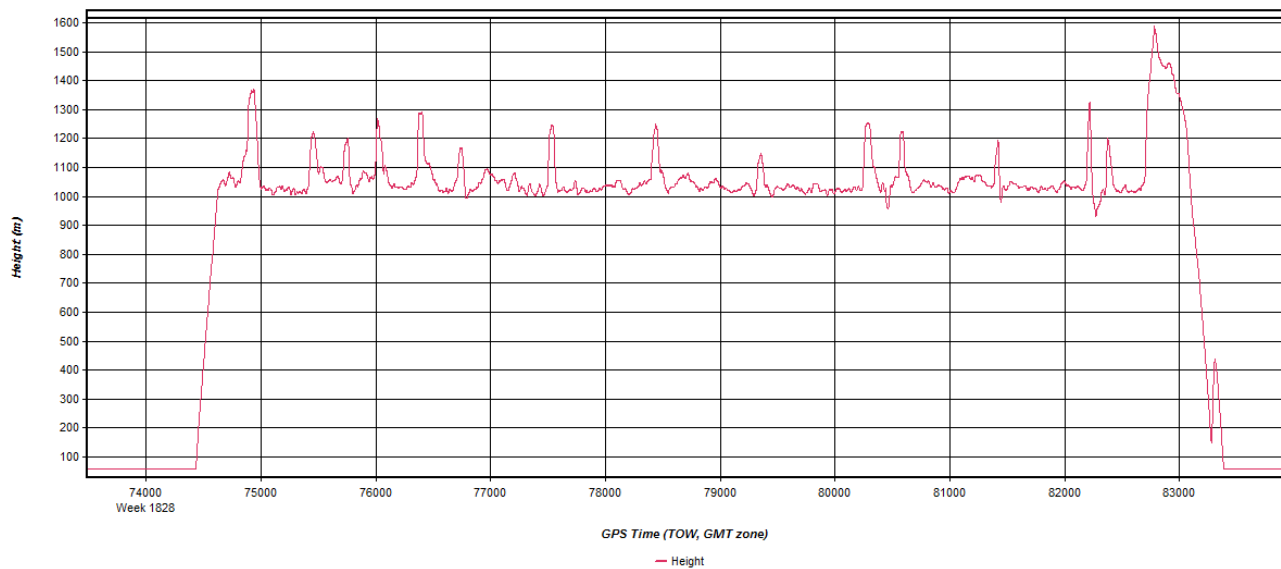




Quality Factor

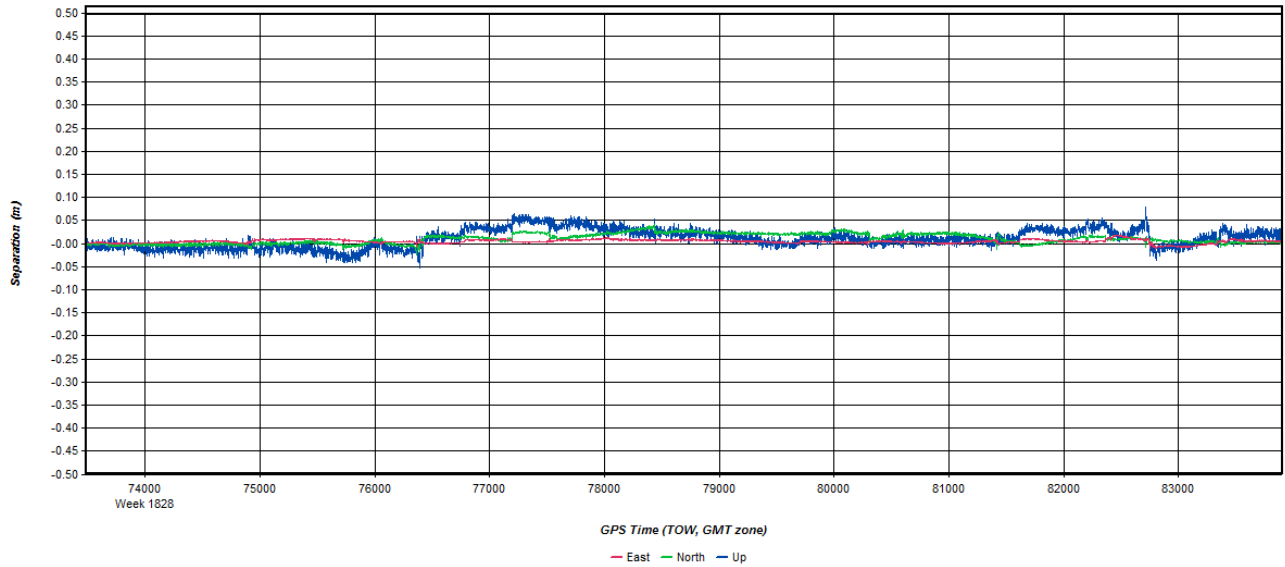


Height

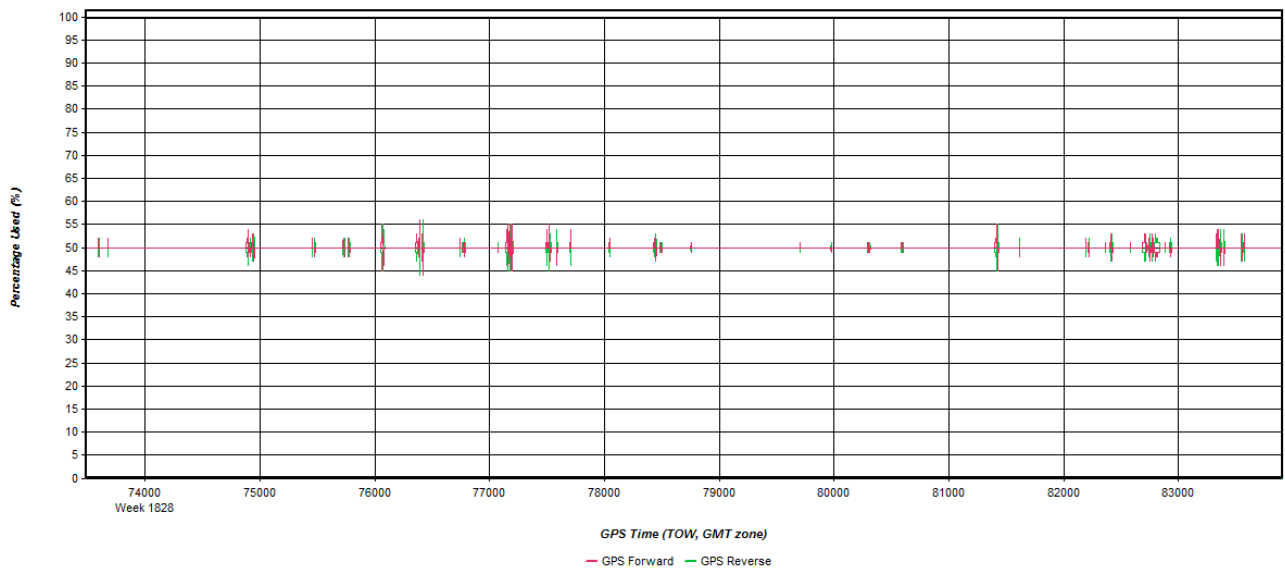




Combined Forward/Reverse Separation

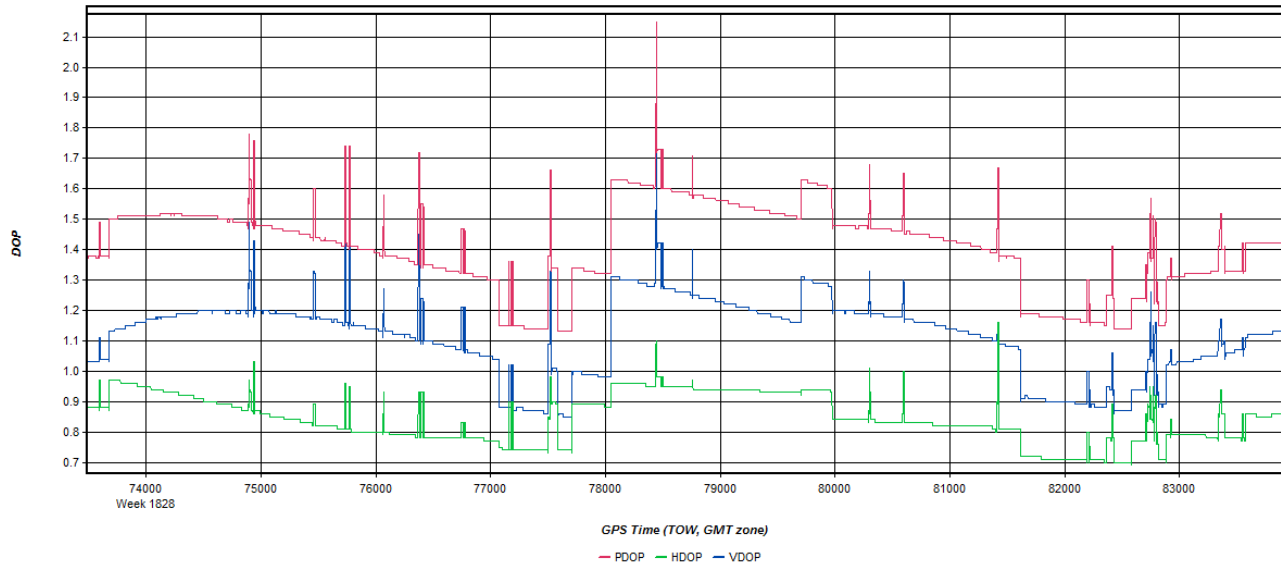


Combined Forward/Reverse Weighting

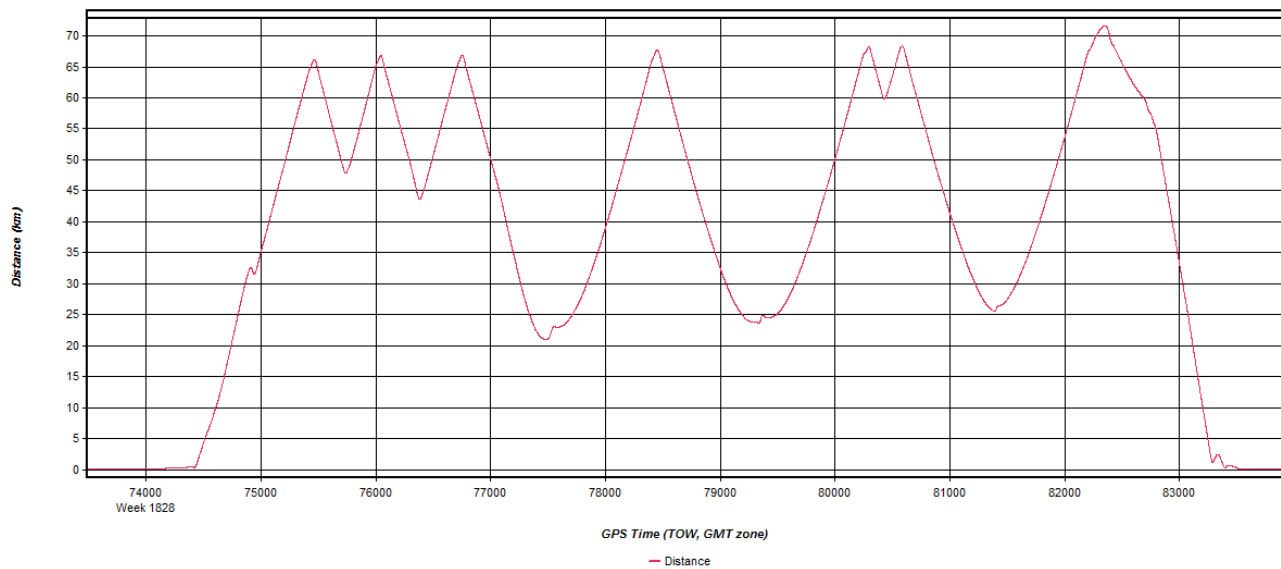




PDOP

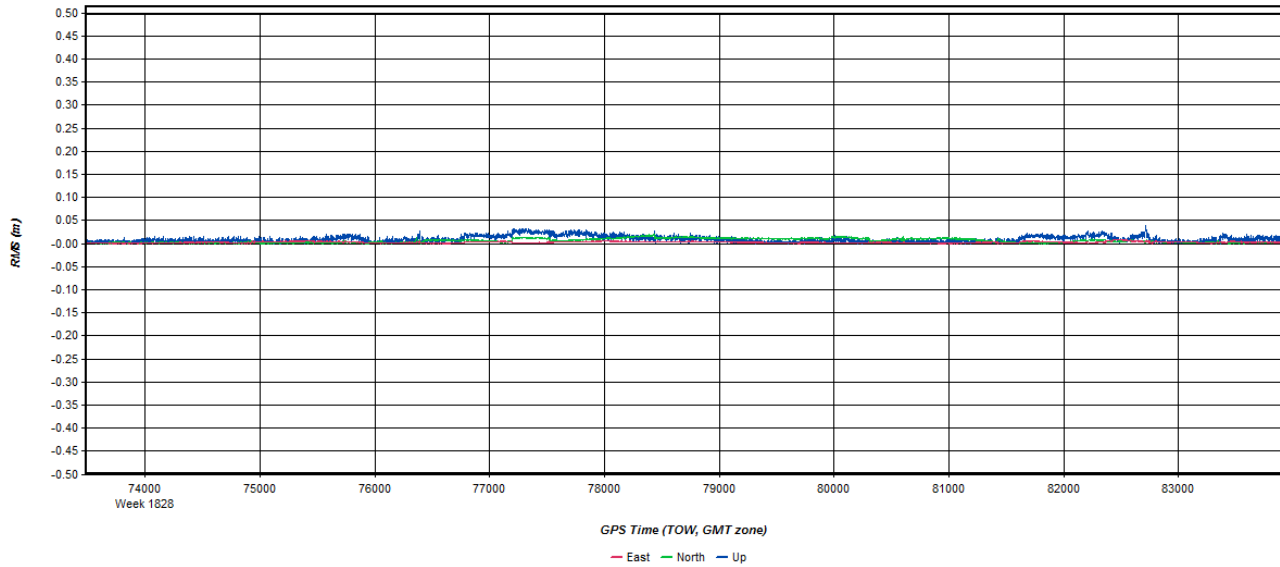


Distance from Base

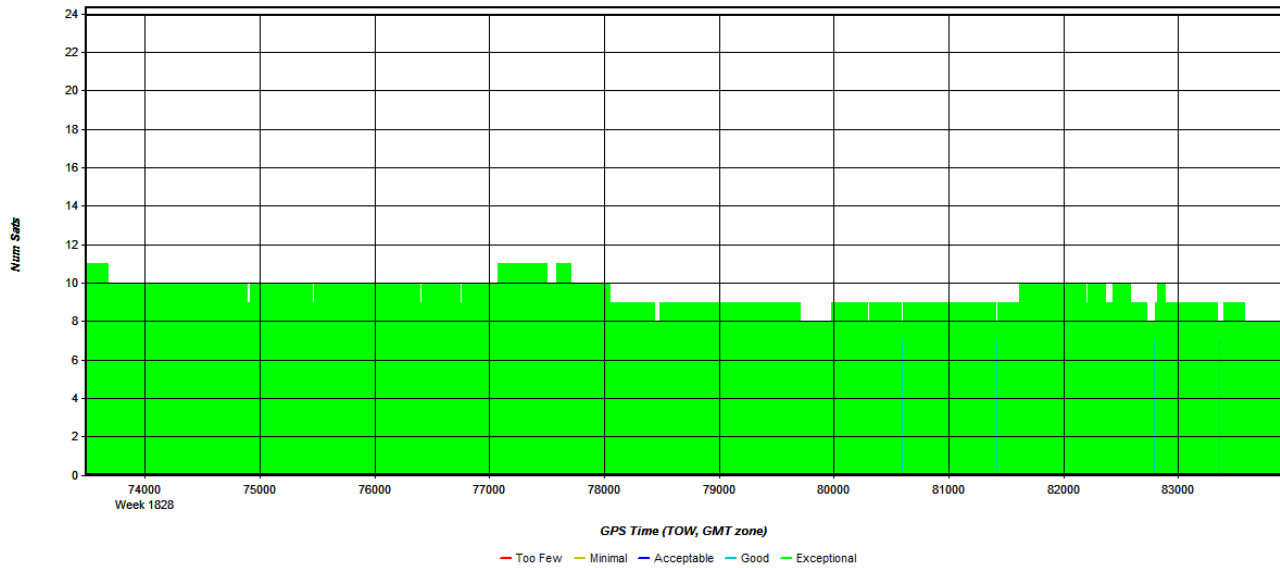




Combined RMS



SVs





Acquisition and Processing details ----- Collection 22 (January 18, 2015)

Log:



Fugro Geospatial, Inc.

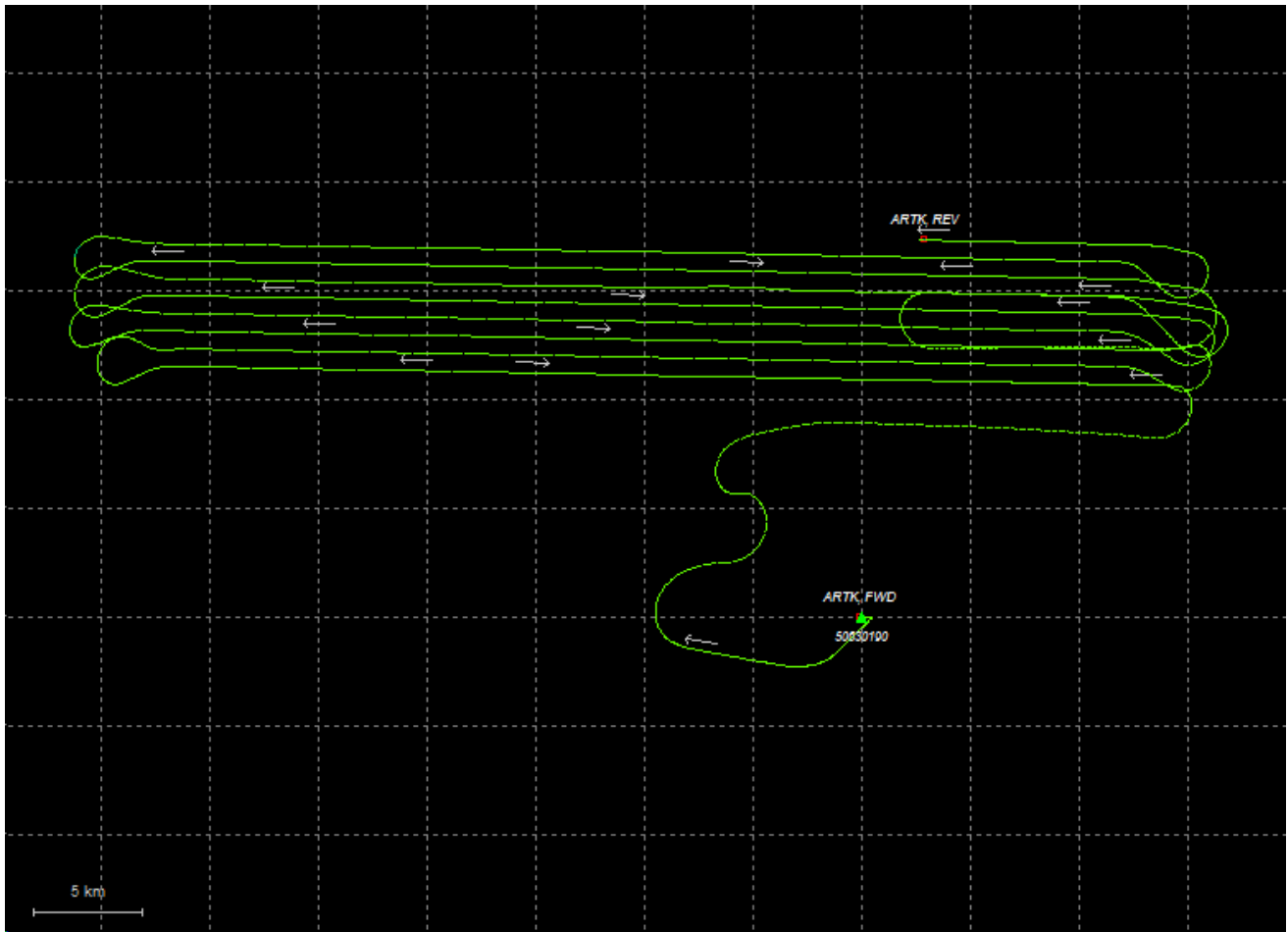


**Q680i
Flight Log**

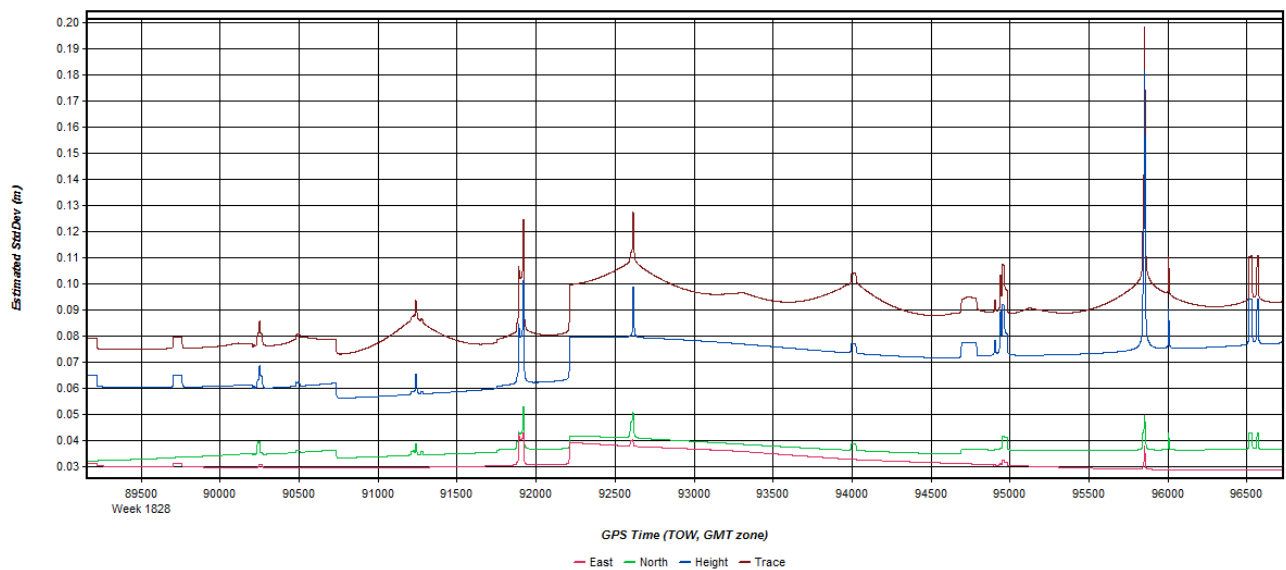
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	0:30	9430.5	KARG	3:15	9432.9	2:45	2.75	2.4	0900-Production
2										
3										

FGI Job # 22.14006900	Project Name FEMA AR		Operator Greg Sliwinski		Unit 165	IMU FMU-300	Ground Temp °C 8.0 5.0		Mn Range' 2018	Data Logger Drives DR680-2						
Flight Date 18-Jan-15	GPS Day 15-018	Lift 22	System R680i	Pilot Roman Rosa	Sun°	Solar Times (UTC)	Flying Temp °C 7.0 7.0		Max Range' 3888	Download Drive						
Mission ID (yymmdd_Sen_Job_Lift) 150118_165_14006900_22		Aircraft N62912	Airport ID KARG	FMS CCNS 7	UTC -6	Alt (ft) 3200	Speed 150	FOV 60	Scan Rate (Hz) 110	M/A 2	km/WPT 0.364	Alt Setting 30.05 30.19	Humidity @ Alt 69	Shipping Track		
Base 1 ID 5083	Location Walnut Ridge		Rec ID PF01	Ant ID PF01	ARP (m) 1.805	Start Time (UTC) 18-Jan-15 00:15		Stop Time (UTC)	GPS Filename G5063B15.018		Operator Greg Sliwinski	Data With AB				
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End								
							0:48:00	0:53:00					GROUND STATIC		9	1.2
							1:02:00	1:04:00					S TURN		11	1.0
NEU	15		69	1	24.8	0	1:09:00	1:19:00	W	3,320	124				11	1
	16		1	71	0	25.5	1:21:00	1:30:00	E	3,375	150				11	1
	17		71	1	25.5	0	1:32:00	1:42:00	W	3,470	139				11	1
	18		1	71	0	25.5	1:44:00	1:53:00	E	3,300	150				10	1.1
	19		71	1	25.5	0	1:55:00	2:05:00	W	3,441	137				9	1.1
	20		1	71	0	25.5	2:07:00	2:17:00	E	3,330	150				9	1.3
	20		71	61	25.5	21.8	2:20:00	2:21:00	W	3,350	149		CALIBRATION		10	1.1
	21		71	1	25.5	0	2:25:00	2:36:00	W	3,300	115				10	1.1
							3:10:00	3:15:00					GROUND STATIC		10	1

Trajectory and GPS Plots:

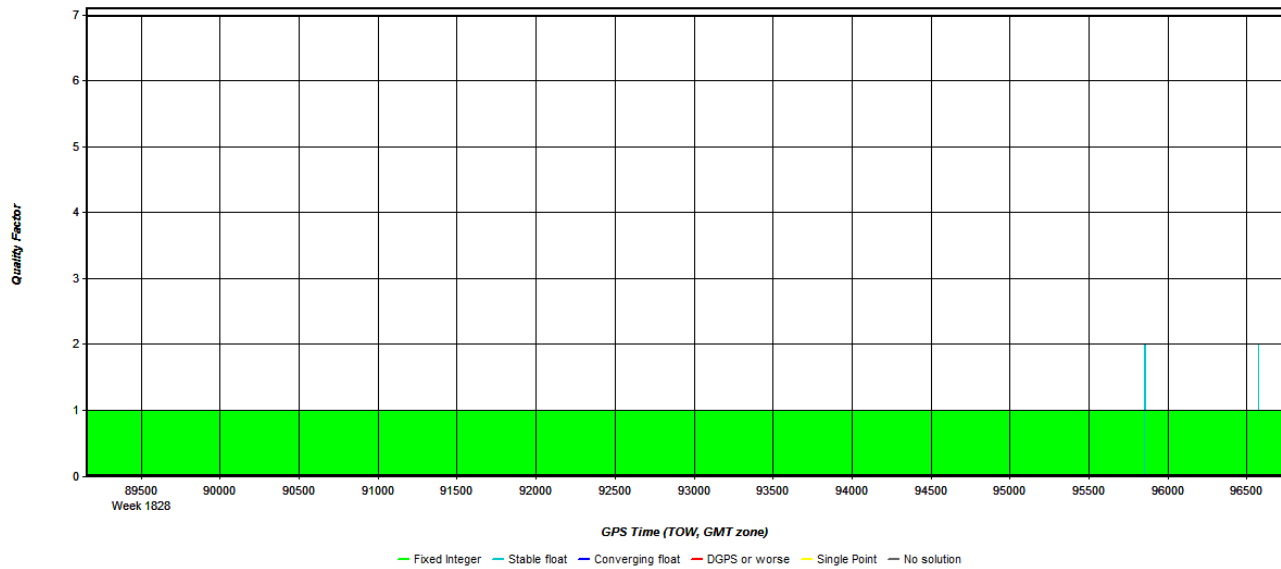


Estimated Accuracy

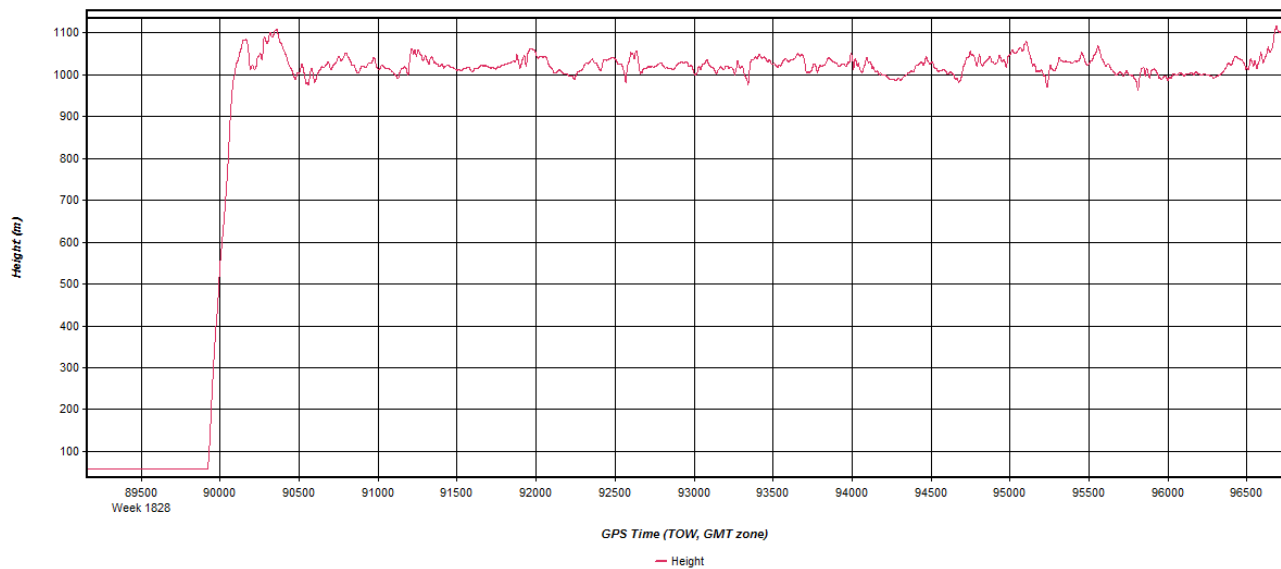




Quality Factor

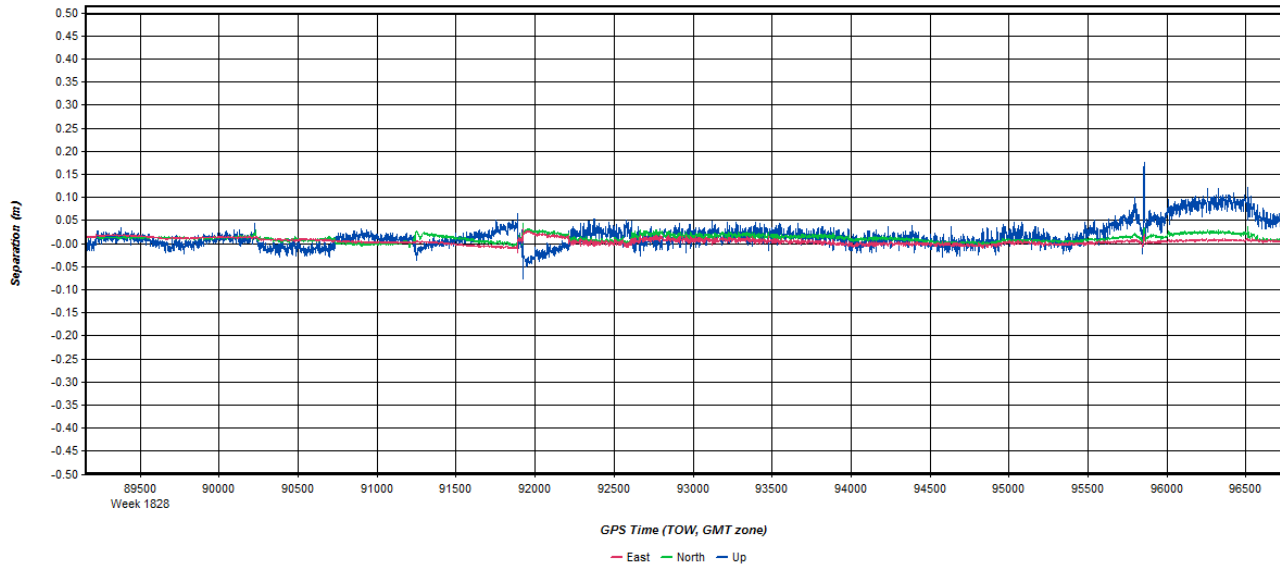


Height

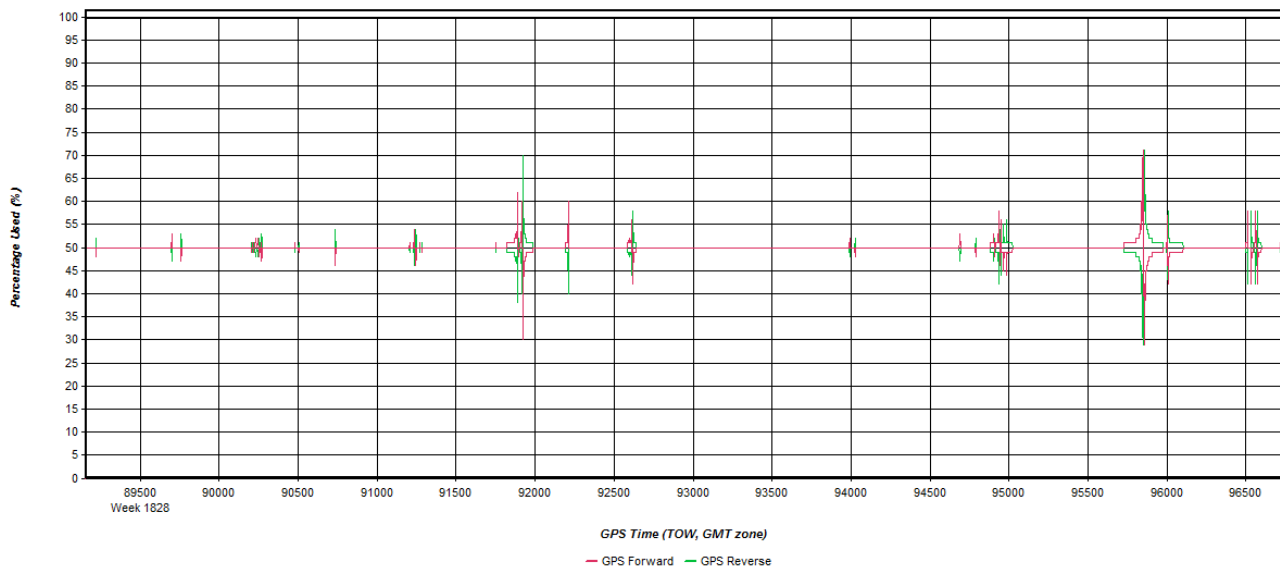




Combined Forward/Reverse Separation

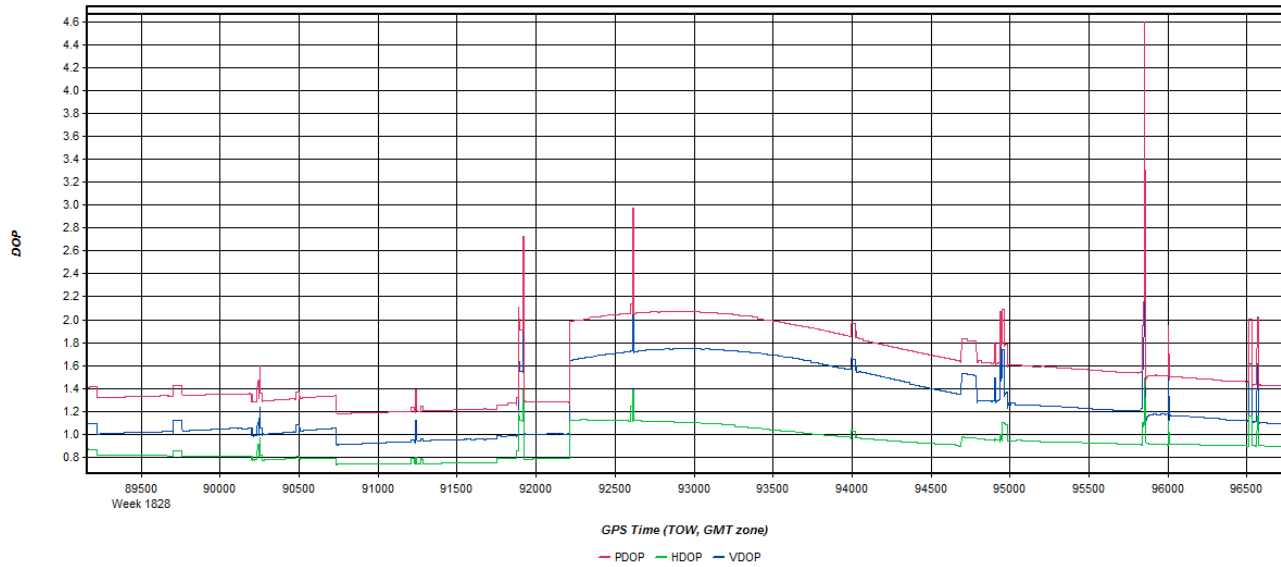


Combined Forward/Reverse Weighting

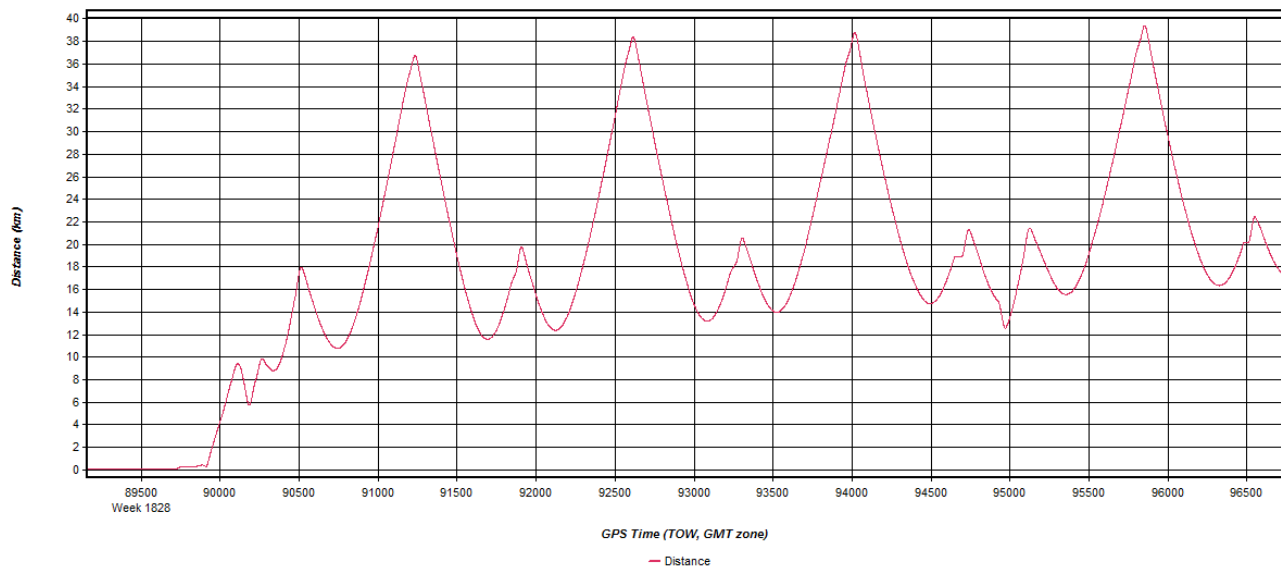




PDOP

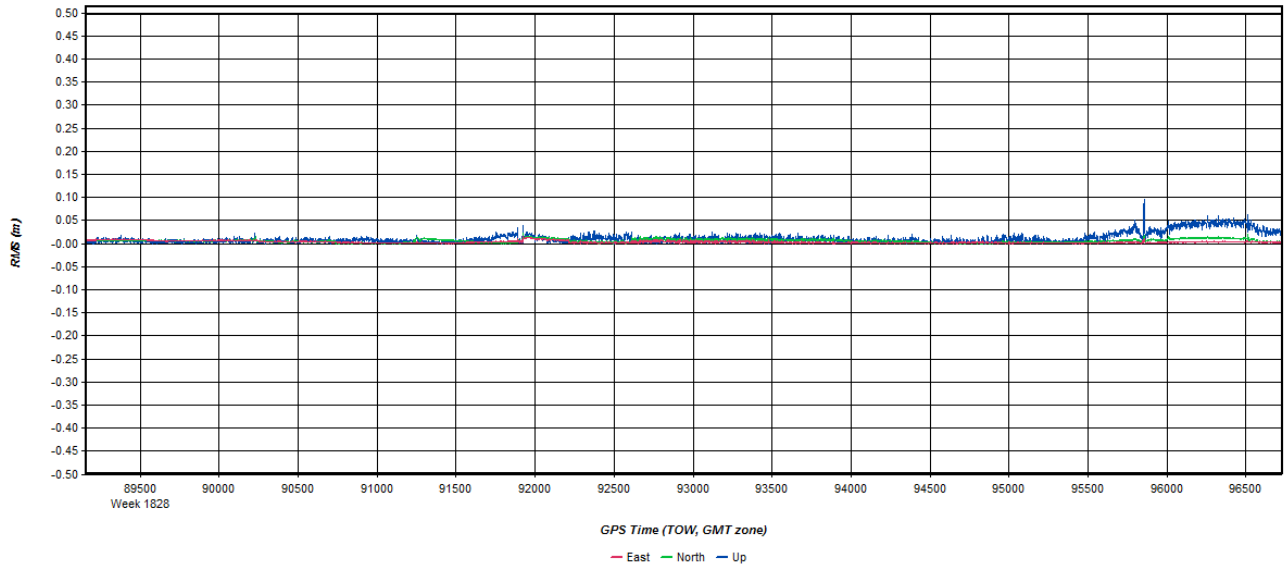


Distance from Base

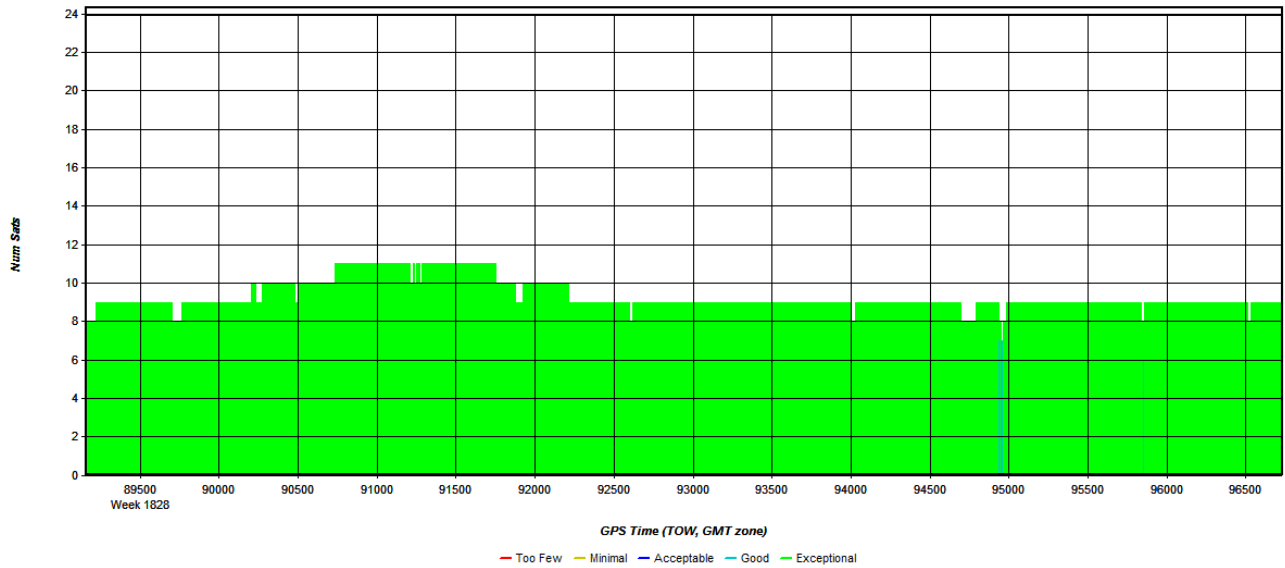




Combined RMS



SVs





Acquisition and Processing details ----- Collection 23 (January 18, 2015)

Log:



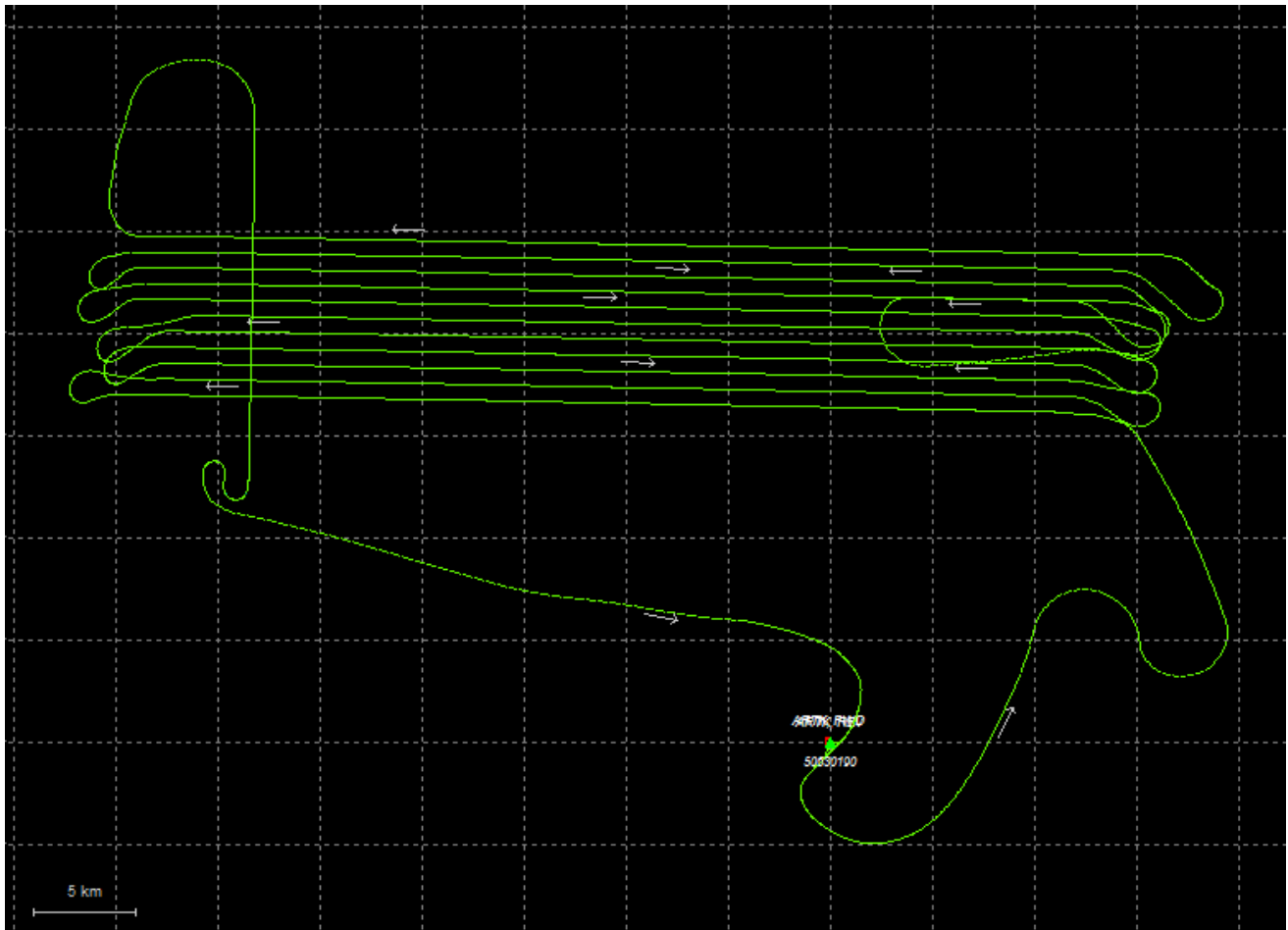
Fugro Geospatial, Inc.

0	Lift Begin			Lift End			Fit Duration	Fit Hrs	Hobbs Hrs	Activity
	Airport	Chocks	Hobbs	Airport	Chocks	Hobbs				
1	KARG	3:50	9432.9	KARG	7:20	9436.1	3:30	3.50	3.2	0900-Production
2										
3										

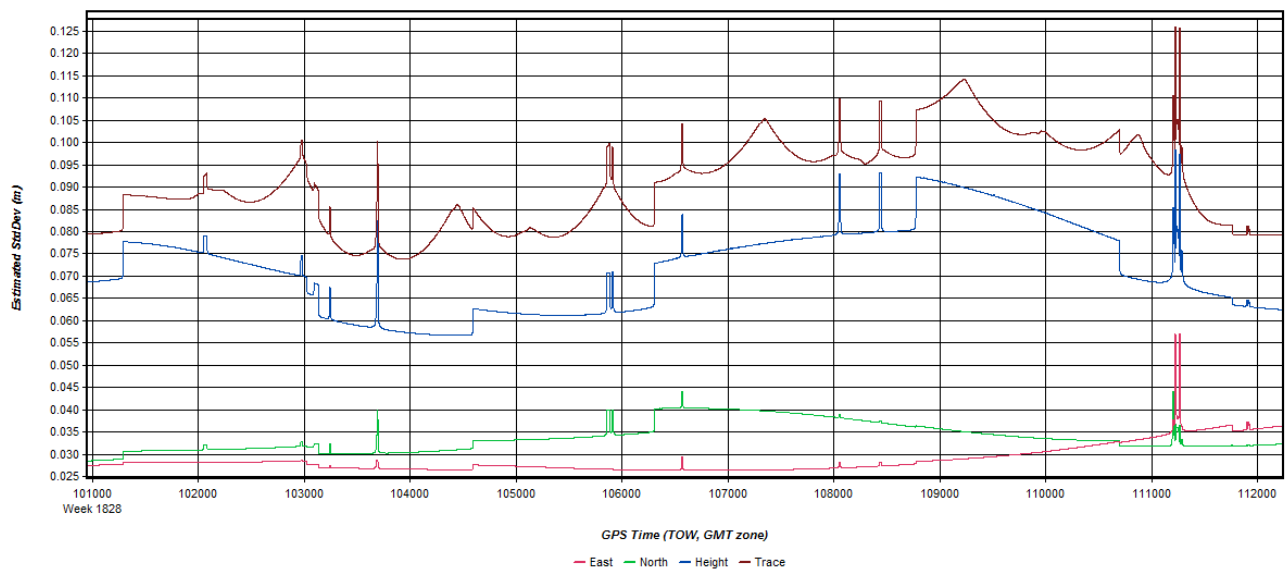
**Q680i
Flight Log**

FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives				
22.14006900	FEMA AR				Greg Sliwinski		165	FMU-300	8.0		2018	DR680-8				
Flight Date	GPS Day	Lift	System	Pilot		Sun*	Solar Times (UTC)		Flying Temp °C		Max Range'	Download Drive				
18-Jan-15	15-018	23	R680i	Roman Rosa					250khz 10.0 10.0		3888					
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Altitude Setting	Humidity @ Alt	Shipping Track			
150118_165_14006900_23	N62912	KARG	CCNS 7	-6	3200	150	60	110	2	0.364	30.05	69				
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data			
5083	Walnut Ridge		PF01	PF01	1.805	18-Jan-15 00:15				G5063B15.018		Greg Sliwinski	With AB			
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End								
							4:05:00	4:10:00					GROUND STATIC		11	1.1
							4:18:00	4:21:00					STURN		11	1.1
NEU	22		71	1	25.5	0	4:24:00	4:34:00	W	3,335	133				10	1.2
	23		1	71	0	25.5	4:37:00	4:46:00	E	3,390	149				12	1
	24		71	1	25.5	0	4:49:00	4:59:00	W	3,245	128				11	1.1
	25		1	71	0	25.5	5:01:00	5:10:00	E	3,245	150				11	1
	26		71	1	25.5	0	5:13:00	5:22:00	W	3,360	135				10	1.1
	27		1	71	0	25.5	5:25:00	5:34:00	E	3,295	150				10	1.2
	28		74	1	26.6	0	5:37:00	5:47:00	W	3,460	137				10	1.1
	29		1	74	0	26.6	5:49:00	5:59:00	E	3,455	150				9	1.1
	29		74	64	26.6	22.9	6:02:00	6:03:00	W	3,410	140		CALIBRATION		9	1.4
	30		77	1	27.7	0	6:08:00	6:18:00	W	3,410	133				9	1.4
	31		1	77	0	27.7	6:21:00	6:31:00	E	3,430	154				8	1.6
	32		82	1	29.5	0	6:33:00	6:45:00	W	3,460	135				8	1.5
	82						6:49:00	6:52:00	S	3,400	138		CROSSLINE		11	1
							6:53:00	6:54:00					STURN		11	1
							7:05:00	7:10:00					GROUND STATIC		11	1

Trajectory and GPS Plots:

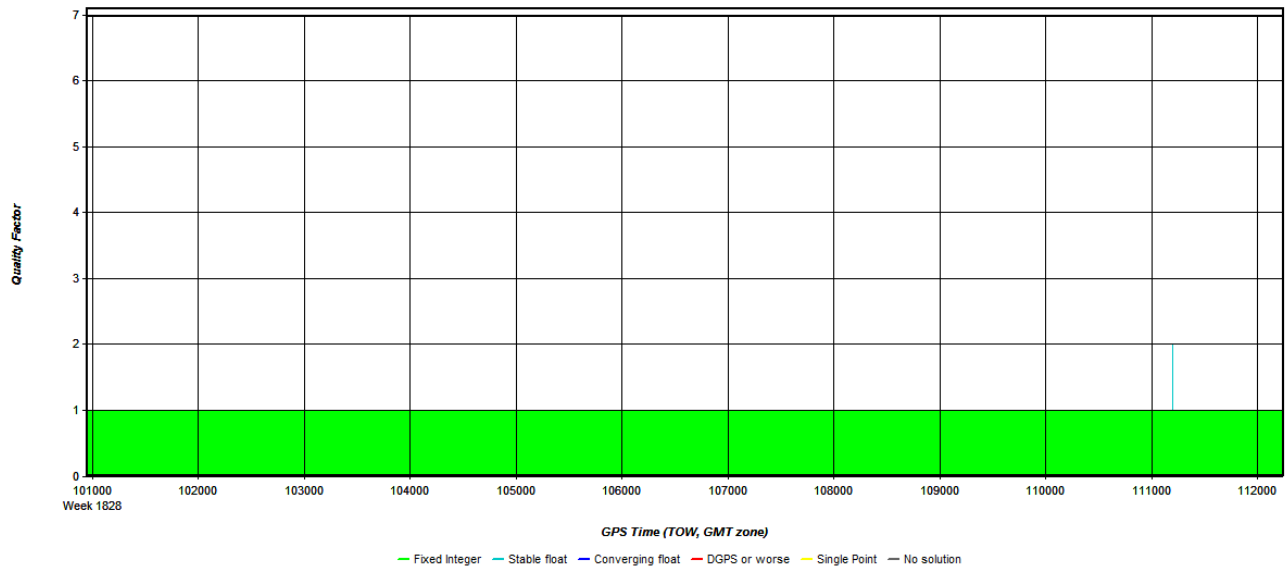


Estimated Accuracy

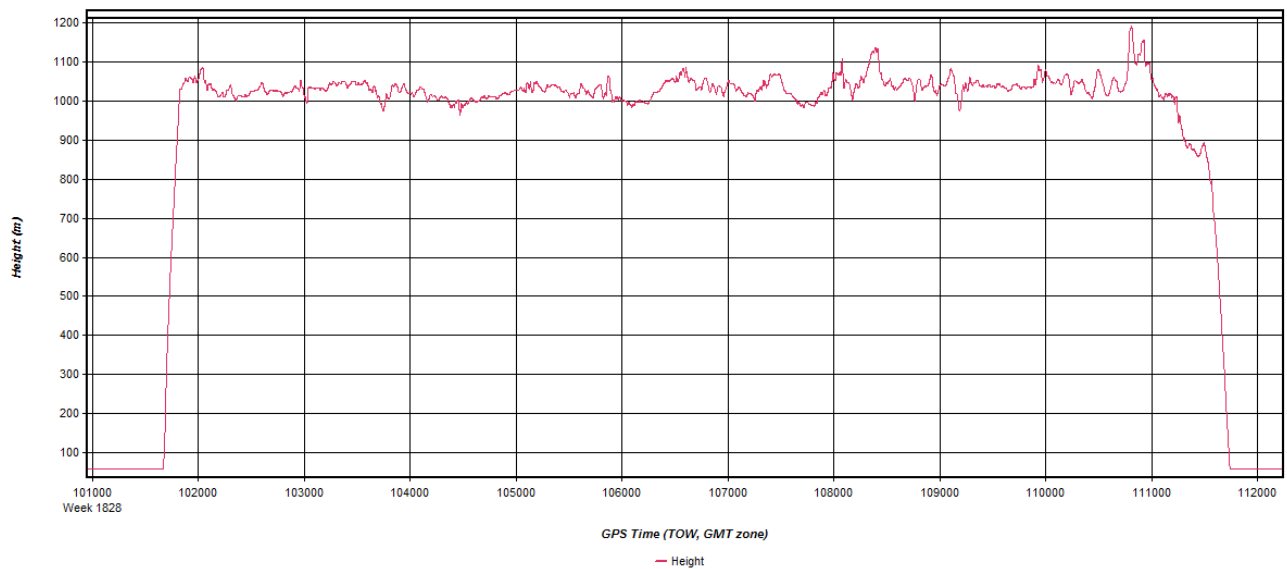




Quality Factor

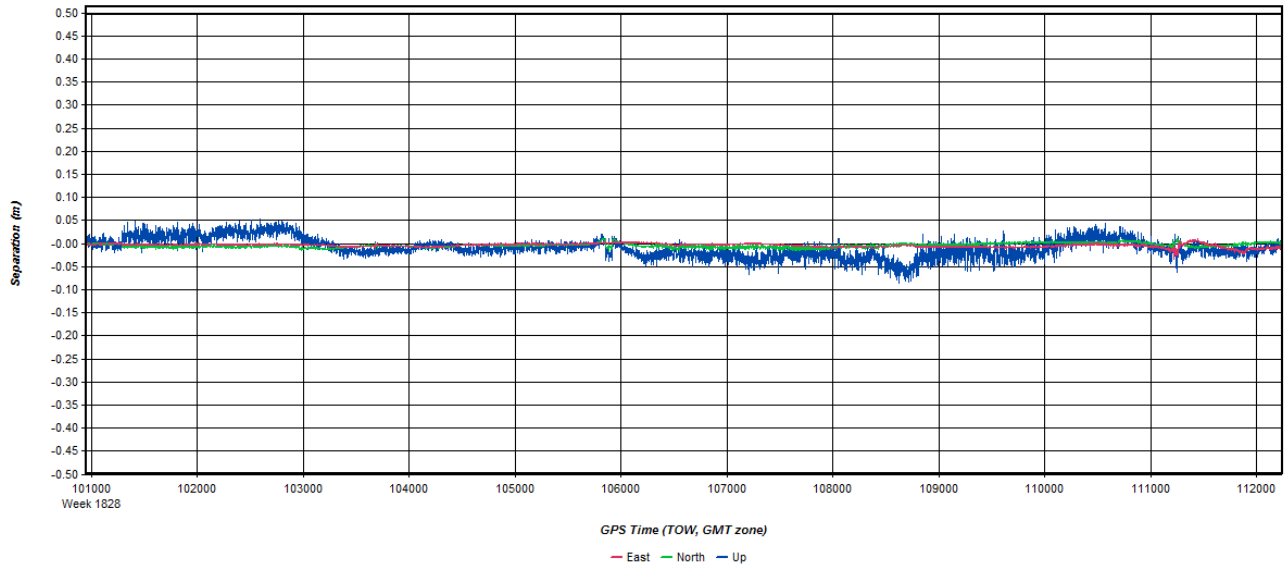


Height

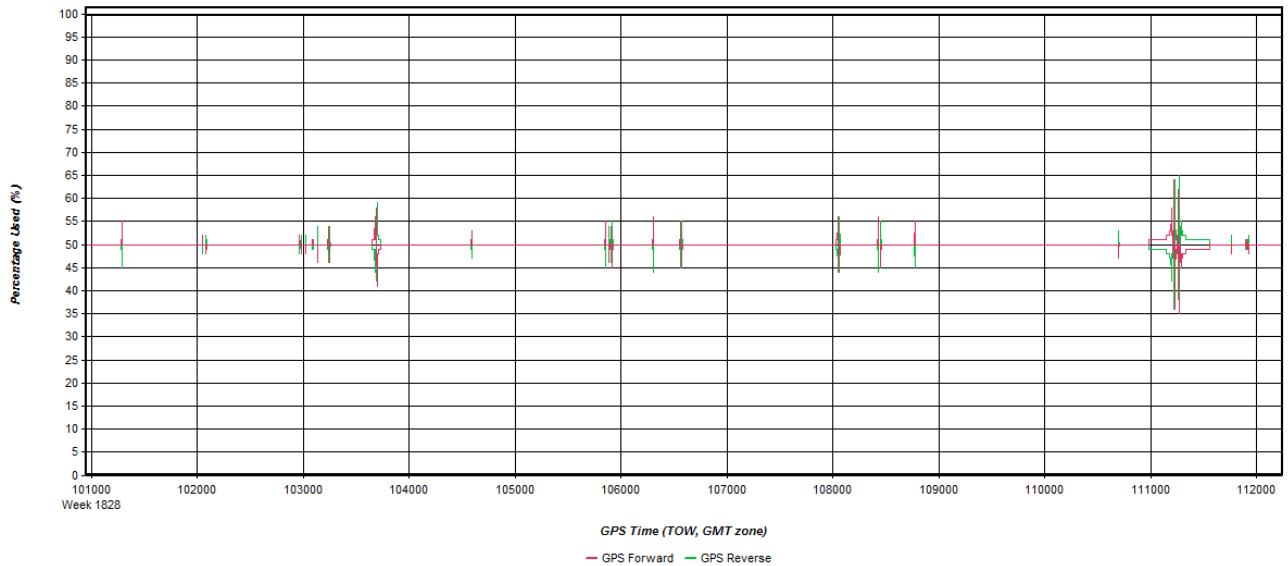




Combined Forward/Reverse Separation

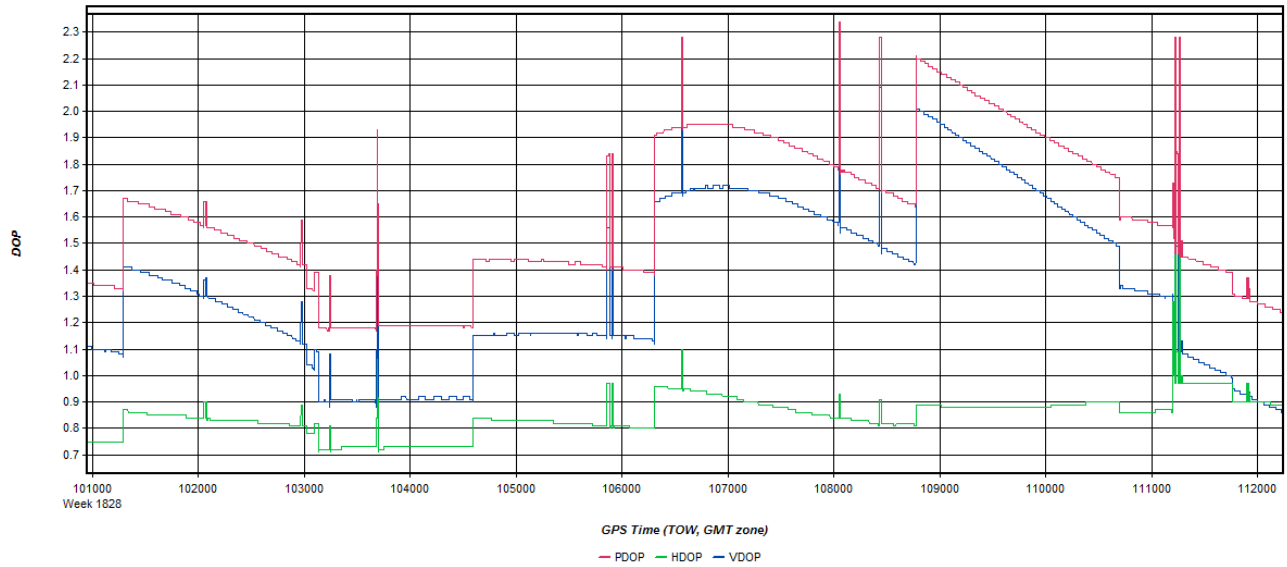


Combined Forward/Reverse Weighting

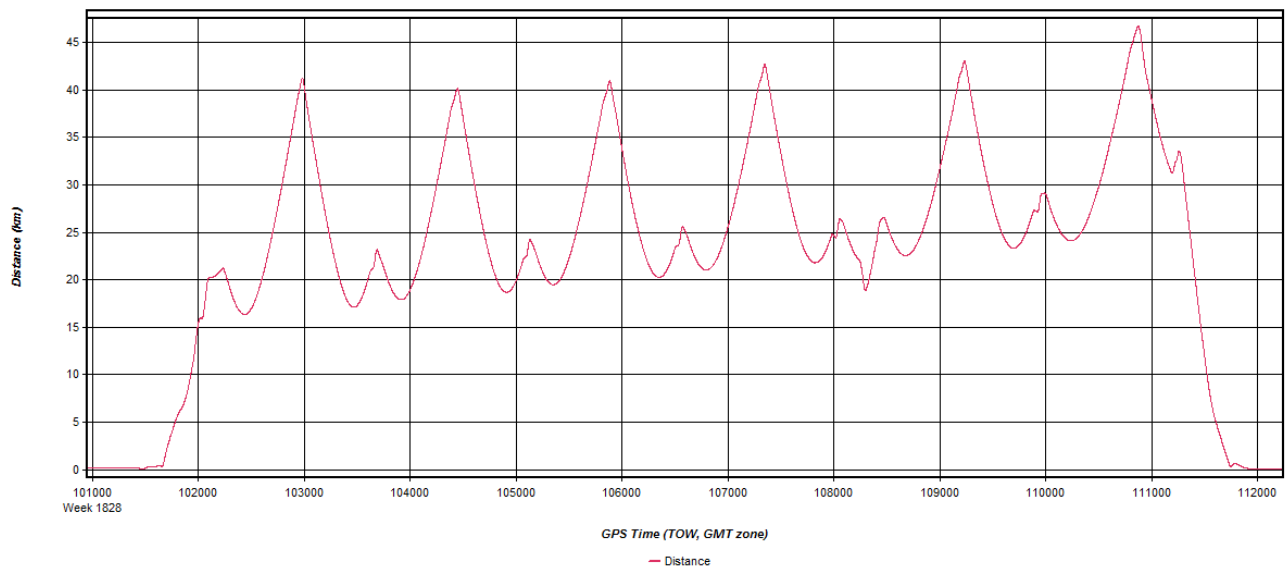




PDOP

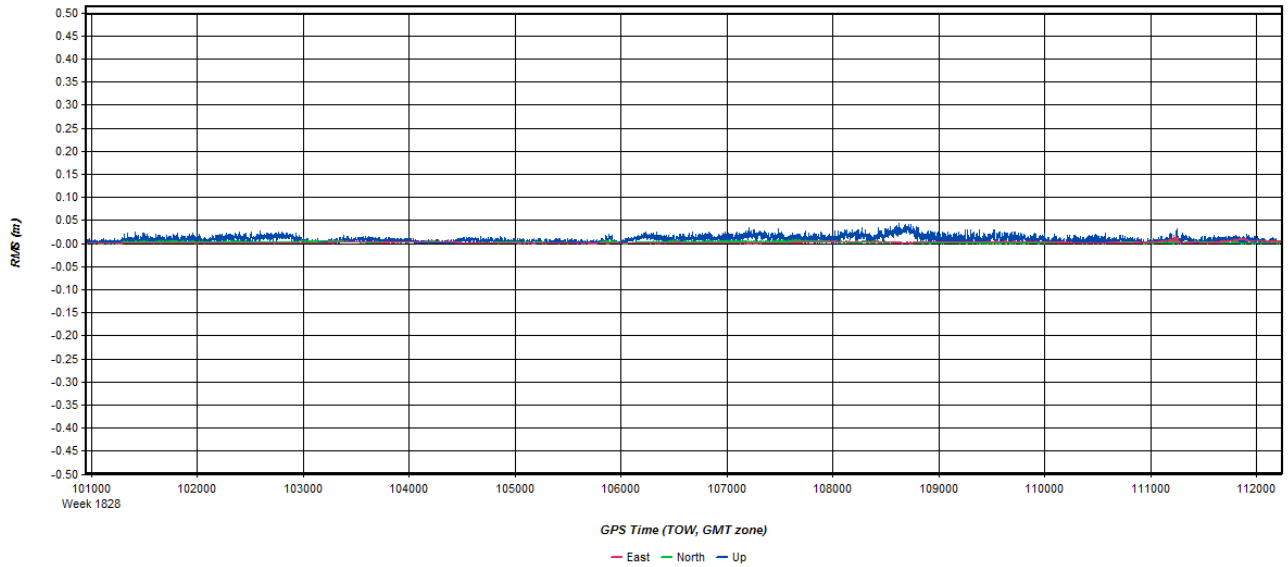


Distance from Base

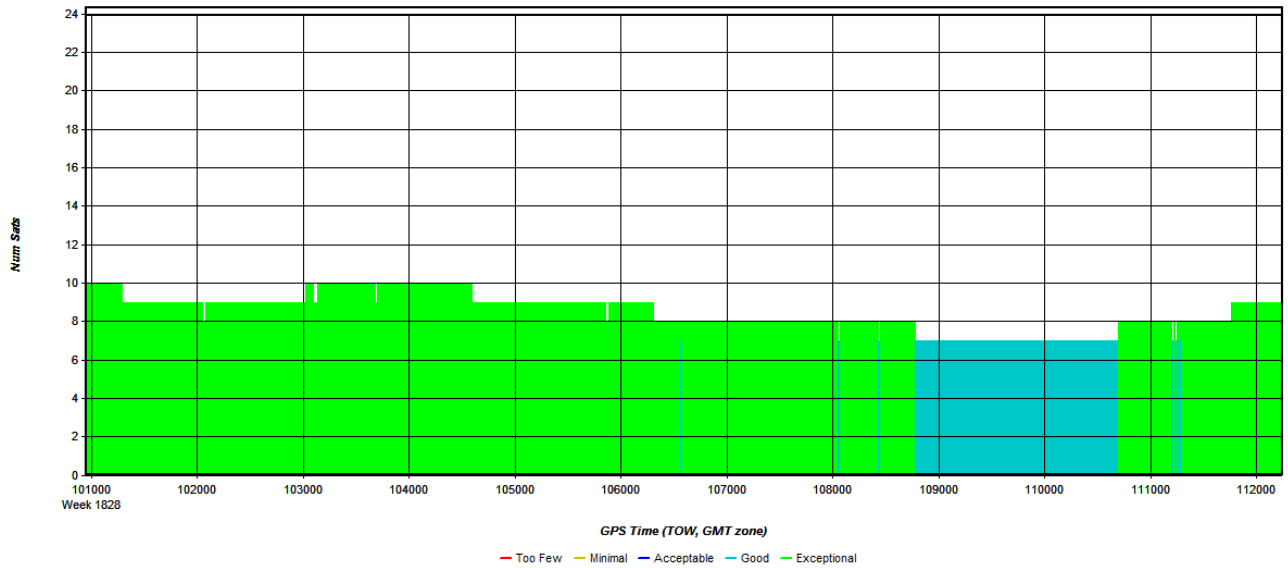




Combined RMS



SVs





Acquisition and Processing details ----- Collection 24 (January 19, 2015)

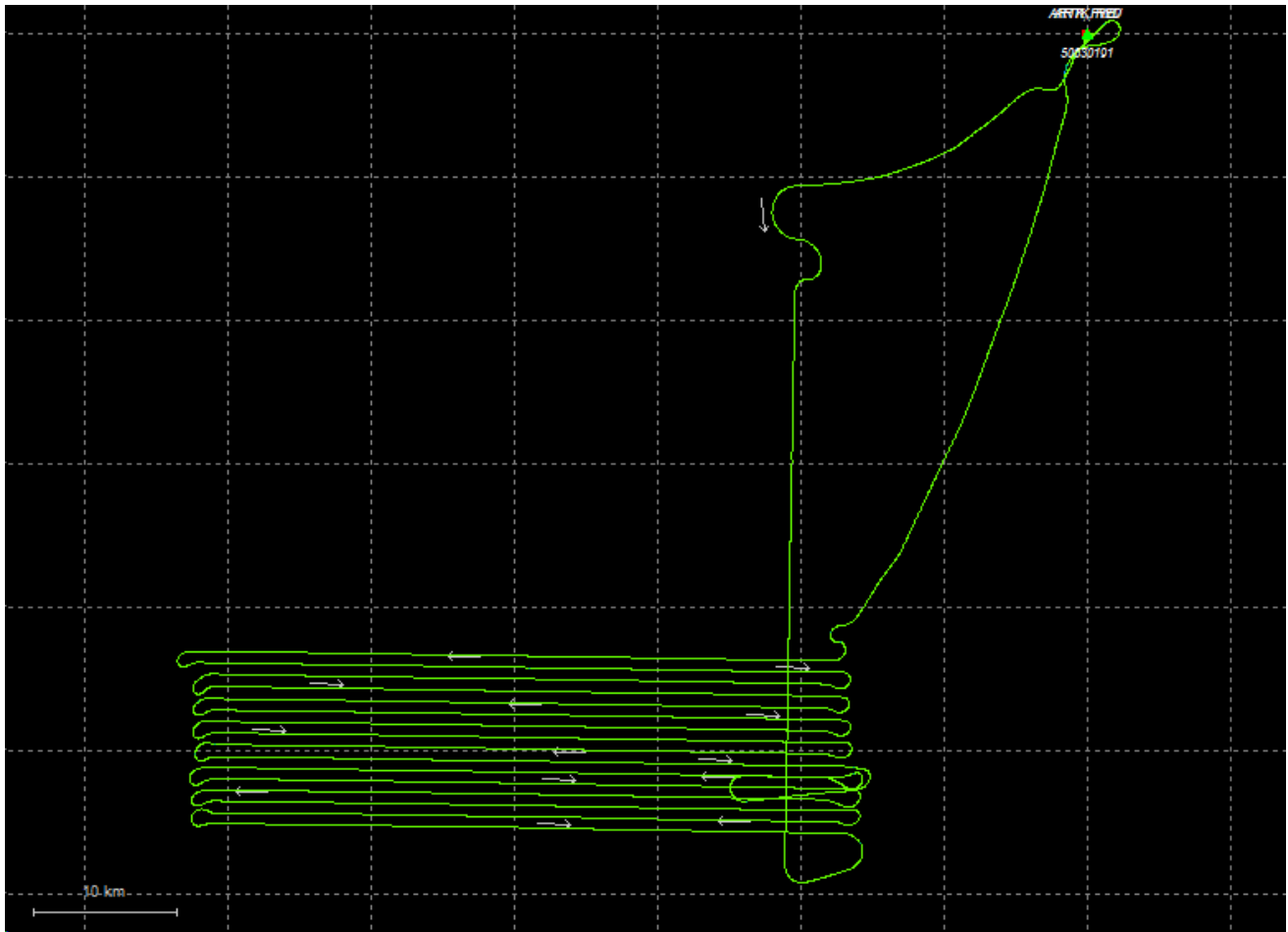
Log:

Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	15:09	9436.1	KARG	19:02	9440.0	3:53	4.00	3.9	0900-Production
2										
3										

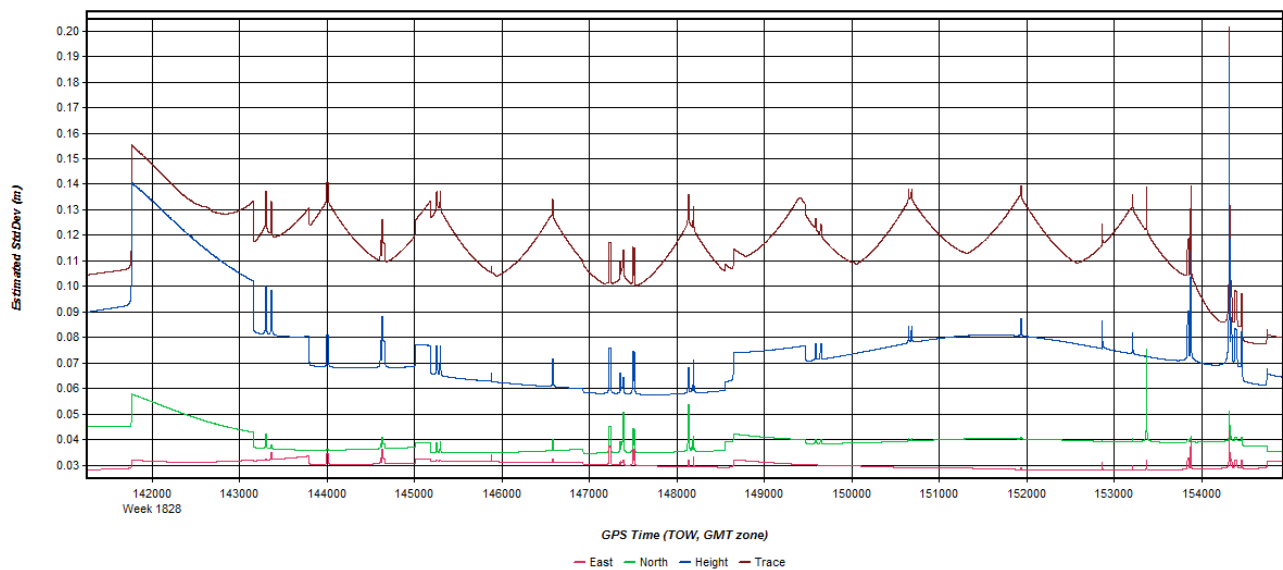
Fugro Geospatial, Inc.		Q680i Flight Log					
FGI Job #	Project Name	Operator	Unit	IMU	Ground Temp °C	Mn Range'	Data Logger Drives
22.14006900	FEMA Region6 AR LiDar	Chris Acuna	165	FMU-300	11.0 16.0	2018	DR680-5 & -6
Flight Date	GPS Day	Lift	System	Pilot	Sun*	Solar Times (UTC)	Pulse Rate
19-Jan-15	15-019	24	R680i	Larry Stewart	-	-	250 KHZ
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMr (ft)	Speed	FOV
150119_165_14006900_24	N62912	KARG	CCNS 7	-6	3200	150	60
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)	Stop Time (UTC)	GPS Filename
5083	KARG	PF01	PF001	1.805	19-Jan-15 14:36	19-Jan-15 23:40	G5063B15.019
							Operator
							Chris Acuna
							Data
							With AB

Area	Flight #	Client	Wpt	Distance	UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions	SVs	PDOF		
					Start	End									
											5 min gnd static alignment at KARG	7	1.4		
											S-Turn in flight alignment	7	1.2		
NEL_Blk	78		60	1	21.5	0		15:39:00	15:47:00	180	3,348	149		7	1.2
NEL_Blk	1		69	1	24.8	0		15:50:00	15:59:00	270	3,317	142		8	1.1
NEL_Blk	2		1	69	0	24.8		16:00:00	16:09:00	86	3,512	149		8	1.1
NEL_Blk	3		69	1	24.8	0		16:11:00	16:20:00	270	3,360	148		9	1.1
NEL_Blk	4		1	69	0	24.8		16:21:00	16:30:00	90	3,236	147		9	1.1
NEL_Blk	5		69	1	24.8	0		16:32:00	16:41:00	271	3,361	143		8	1.2
NEL_Blk	6		1	69	0	24.8		16:43:00	16:52:00	90	3,288	146		9	1.1
NEL_Blk	6		69	63	24.8	22.6		16:54:00	16:55:00	271	3,405	149	Calibration Line	9	1.1
NEL_Blk	7		69	1	24.8	0		16:58:00	17:08:00	270	3,342	143		9	1.1
NEL_Blk	8		1	69	0	24.8		17:09:00	17:18:00	91	3,452	147		9	1.0
NEL_Blk	9		69	1	24.8	0		17:20:00	17:29:00	270	3,302	146		8	1.1
NEL_Blk	10		1	69	0	24.8		17:30:00	17:39:00	91	3,309	147		8	1.1
NEL_Blk	11		69	1	24.8	0		17:41:00	17:50:00	270	3,320	146		8	1.2
NEL_Blk	12		1	69	0	24.8		17:51:00	18:00:00	90	3,576	148		8	1.4
NEL_Blk	13		69	1	24.8	0		18:02:00	18:11:00	269	3,447	149		8	1.4
NEL_Blk	14		1	69	0	24.8		18:12:00	18:21:00	88	3,309	144		8	1.2
NEL_Blk	15		71	1	25.5	0		18:23:00	18:32:00	270	3,344	145		8	1.2
NEL_Blk	16		1	71	0	25.5		18:33:00	18:43:00	91	3,427	145		8	1.2
								18:43:00	18:44:00					8	1.3
								18:55:00	19:00:00						

Trajectory and GPS Plots:

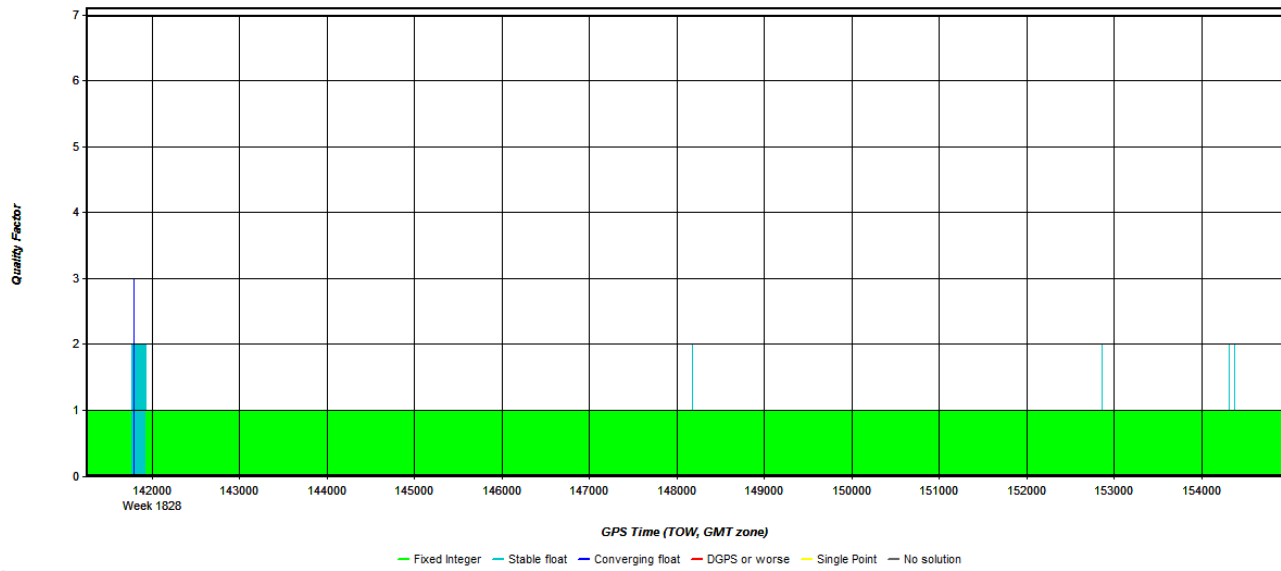


Estimated Accuracy

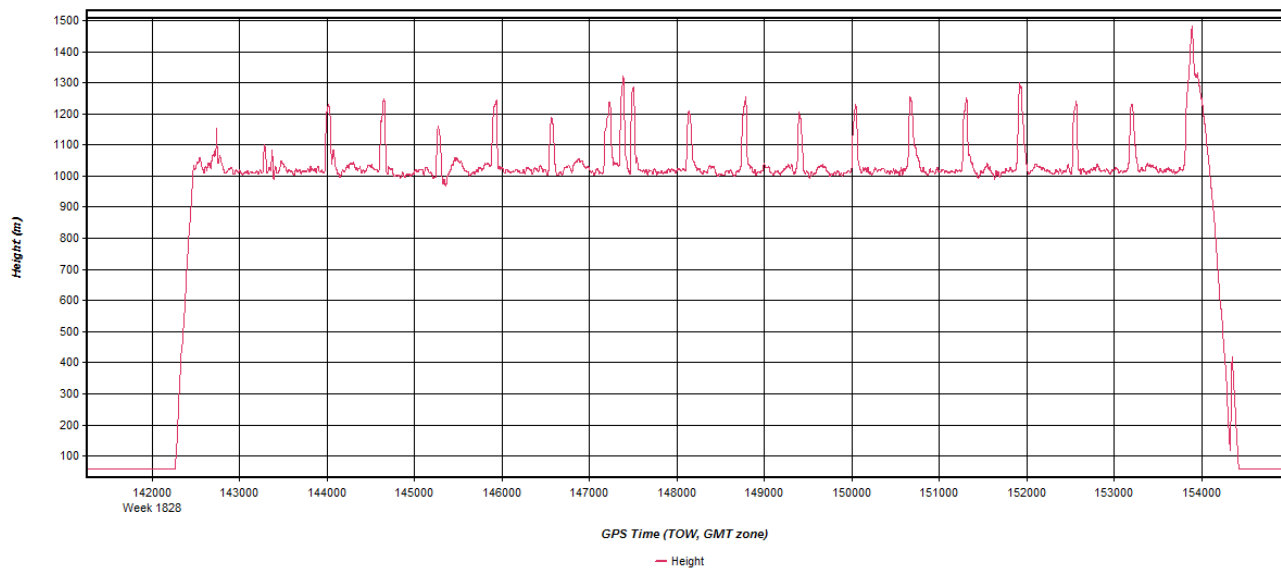




Quality Factor

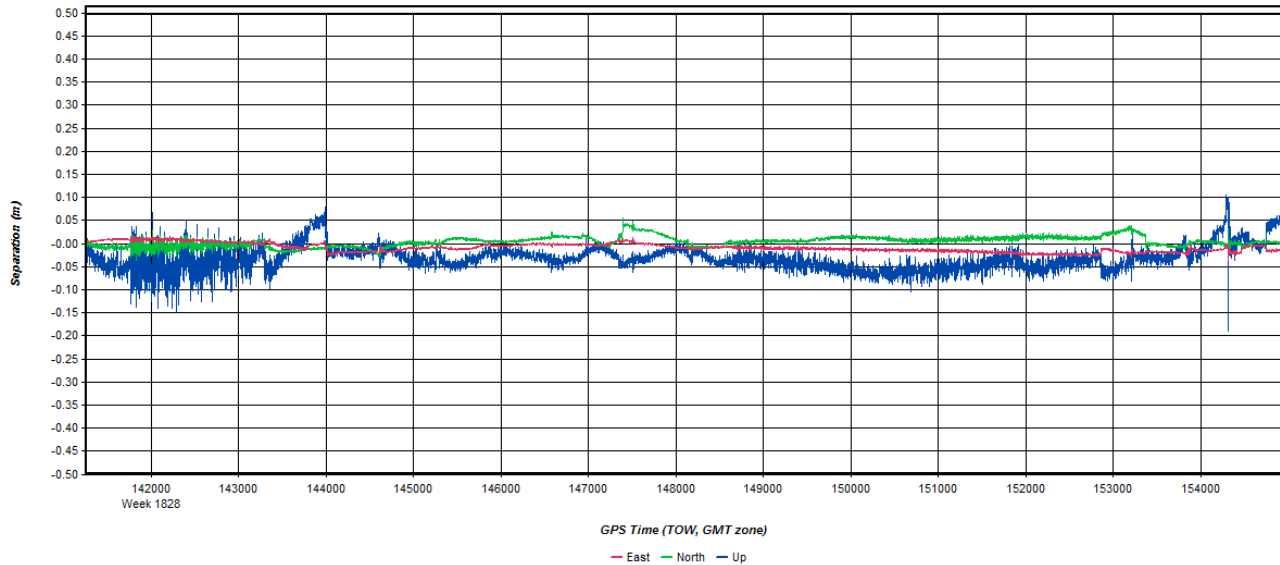


Height

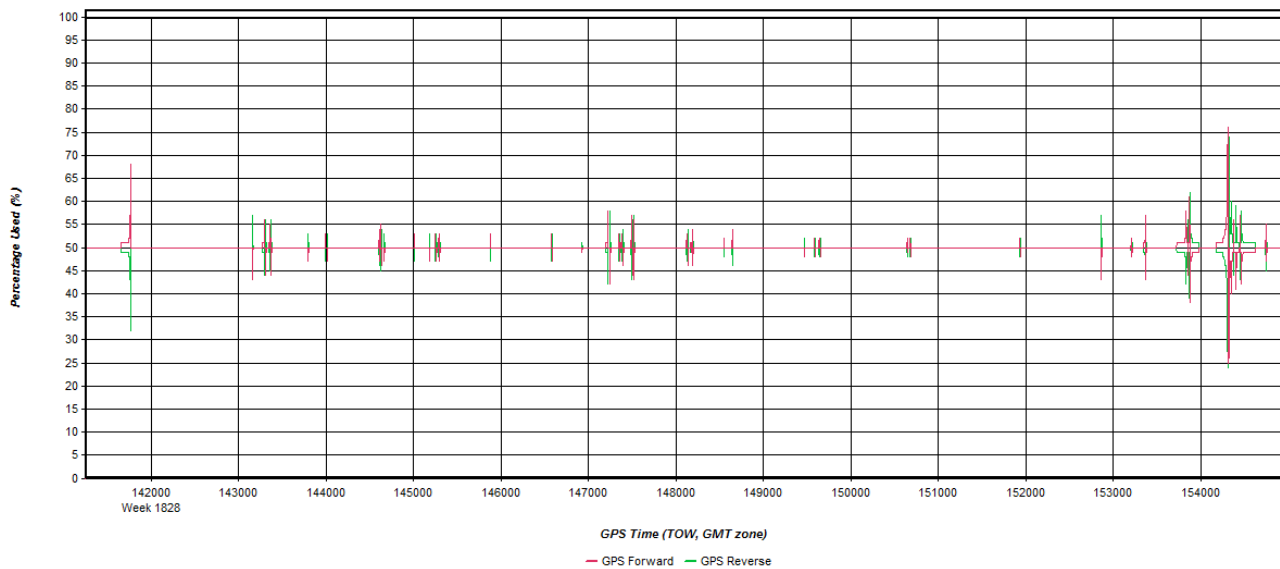




Combined Forward/Reverse Separation

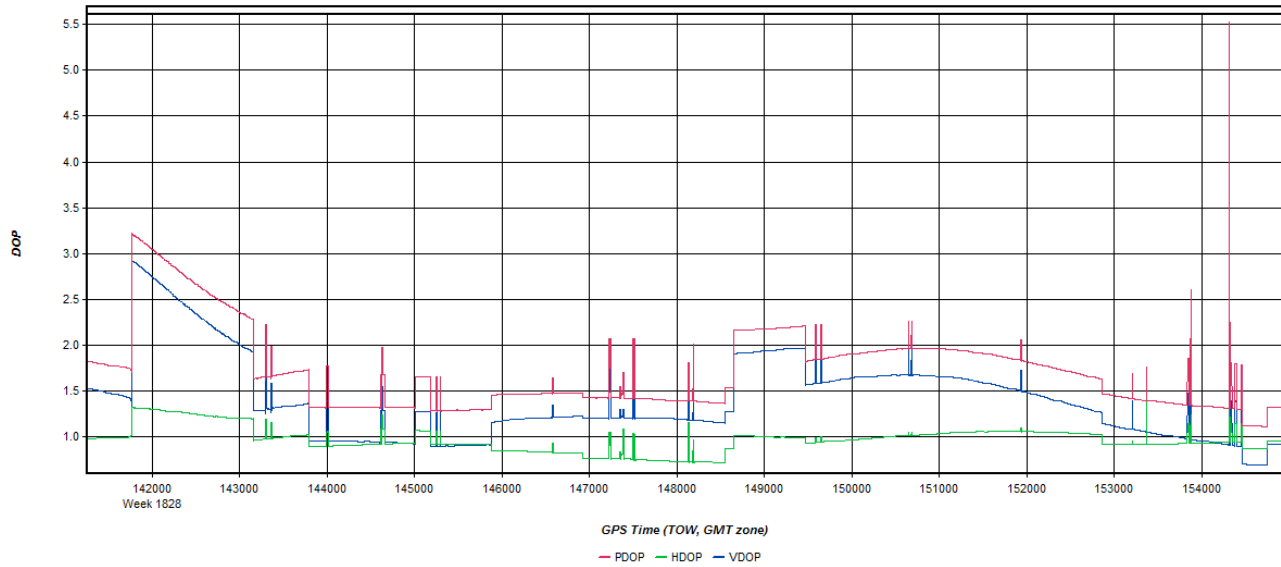


Combined Forward/Reverse Weighting

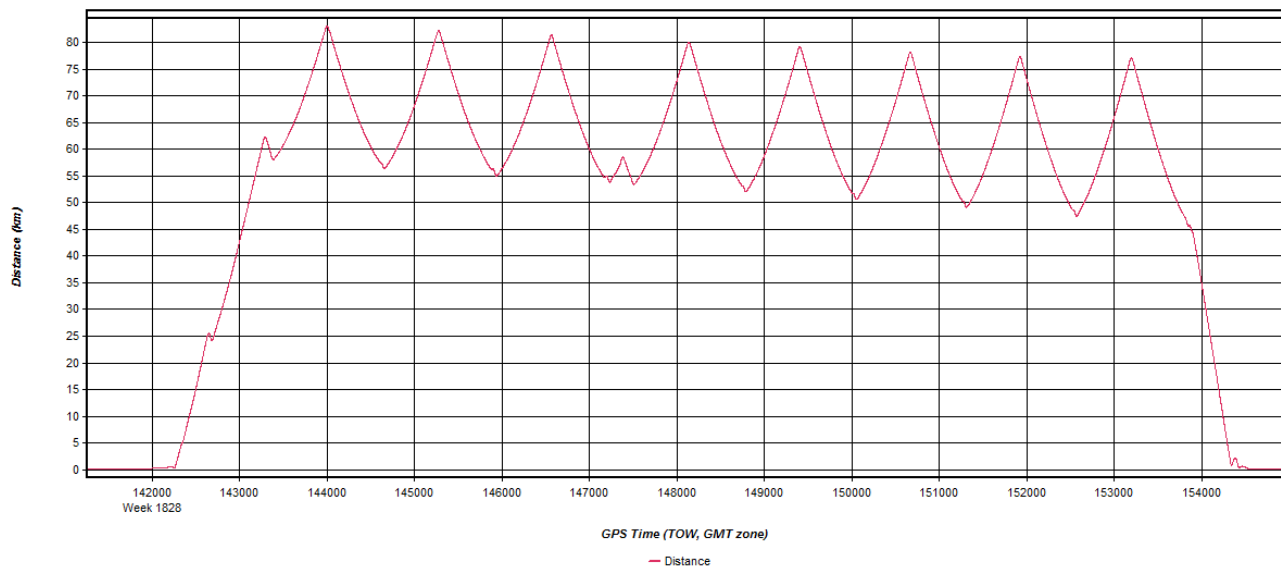




PDOP

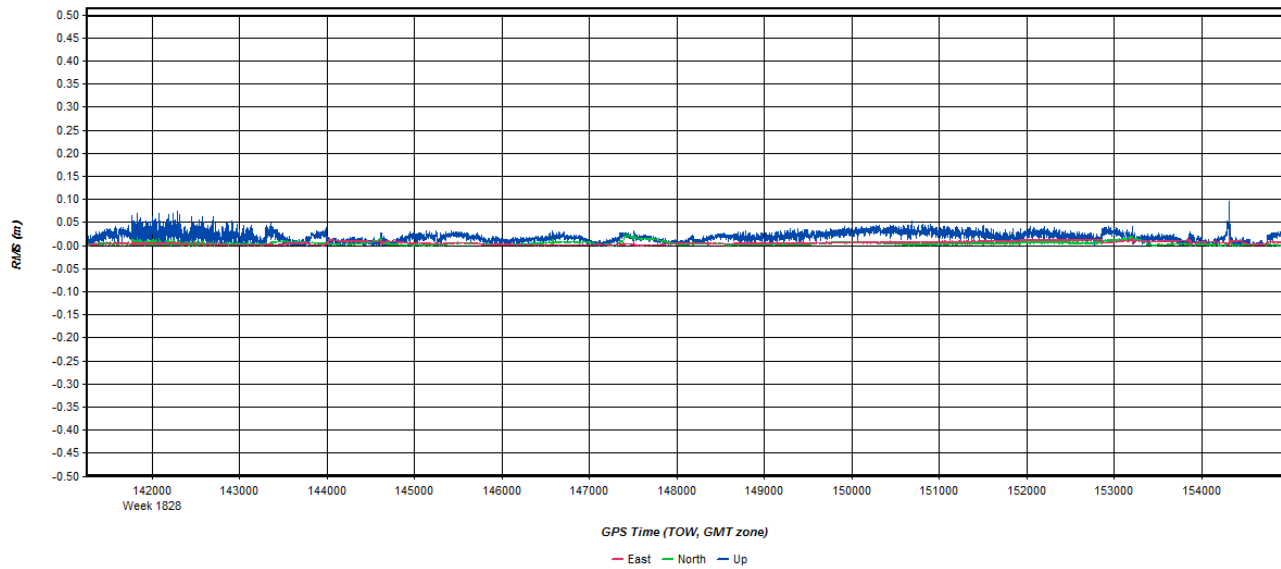


Distance from Base

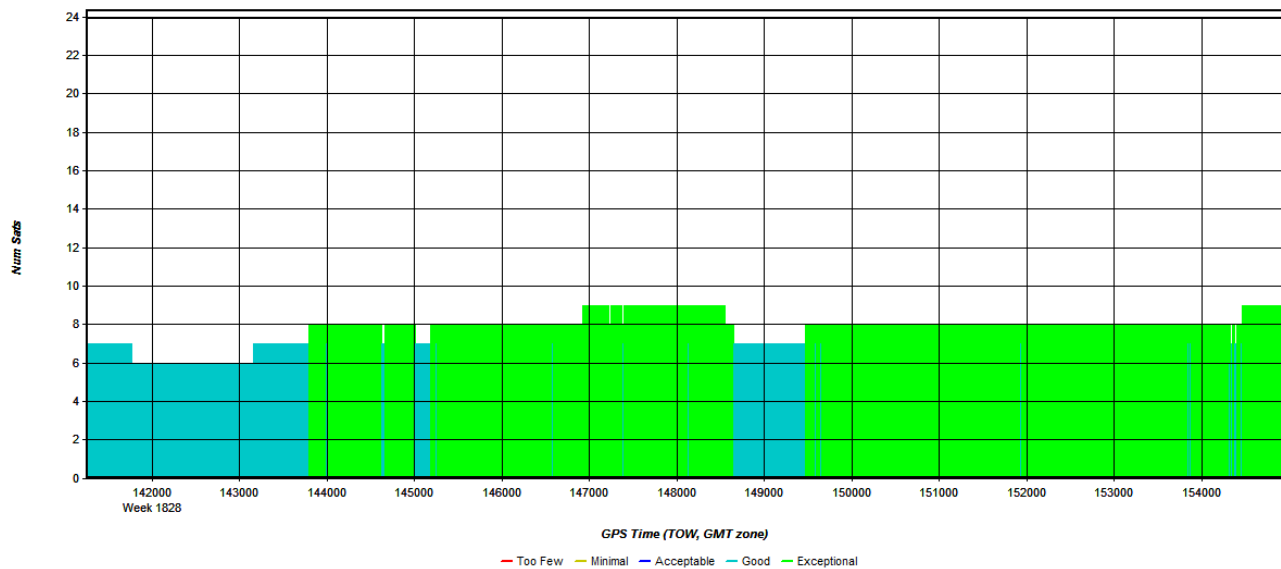




Combined RMS



SVs





Acquisition and Processing details ----- Collection 25 (January 19, 2015)

Log:



Fugro Geospatial, Inc.



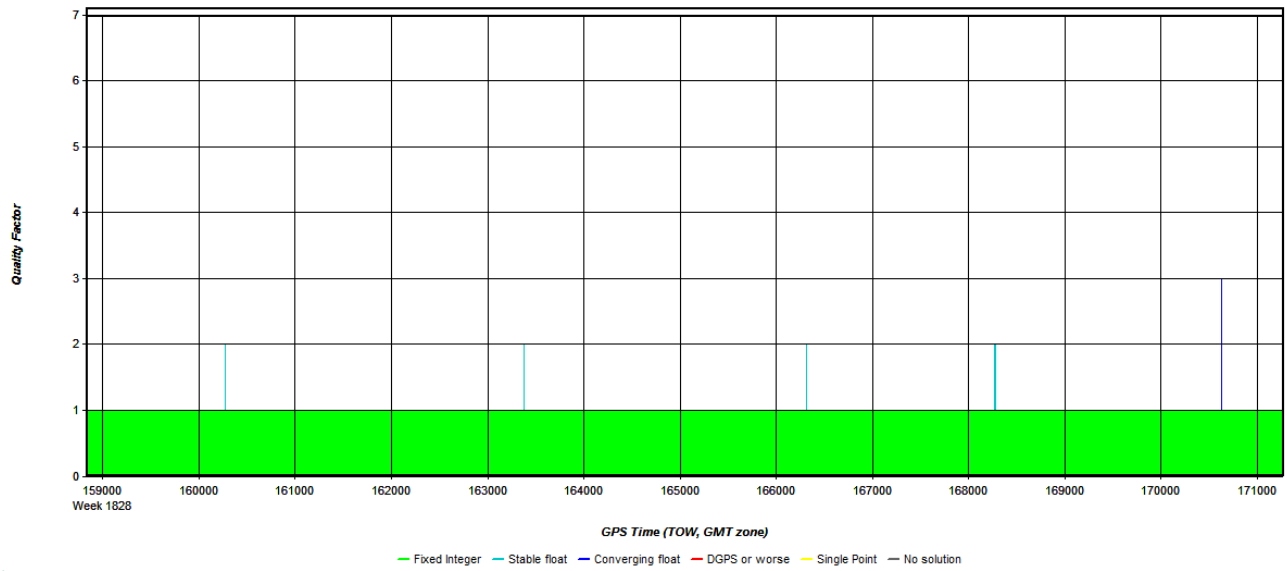
**Q680i
Flight Log**

Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	20:01	9440.0	KARG	23:34	9443.6	3:33	3.50	3.6	0900-Production
2										
3										

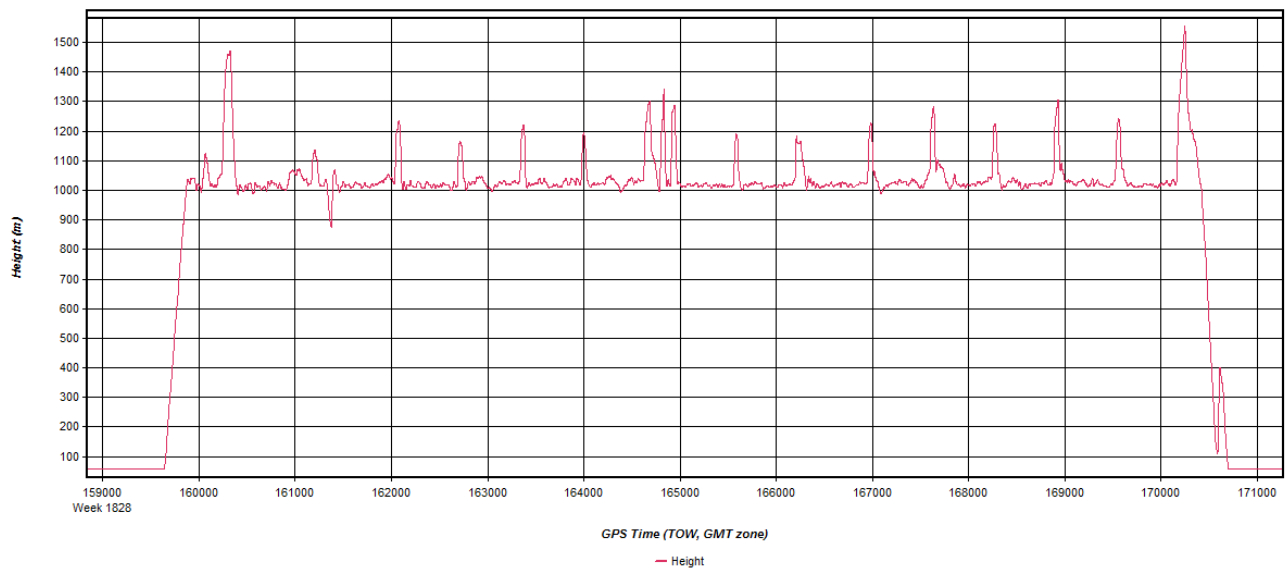
FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives			
22.14006900	FEMA Region6 AR LiDar				Chris Acuna		165	FMU-300	18.0	11.0	2018	DR680-3 & -7			
Flight Date	GPS Day	Lift	System	Pilot		Sun*	Solar Times (UTC)	Pulse Rate	Flying Temp °C		Max Range'	Download Drive			
19-Jan-15	15-019	25	R680i	Larry Stewart		-	-	250 KHZ	10.0	10.0	3888	EP750#77			
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	Alt (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	Altitude Setting	Humidity @ Alt	Shipping Track		
150119_165_14006900_25	N62912	KARG	CCNS 7	-6	3200	150	60	110	2	0.364	29.92	29.90	32	8771 0698 5545	
Base 1 ID	Location	Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data			
5083	KARG	PF01	PF001	1.805	19-Jan-15 14:36		19-Jan-15 23:40		G5063B15.019		Chris Acuna	With AB			
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions	SVs	PDOF
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate			
							20:10:00	20:15:00					5 min gnd static alignment at KARG	11	1.1
							20:30:00	20:31:00					S-Turn in flight alignment	11	1.1
NEL_Blk	77		68	1	24.4	0	20:36:00	20:45:00	180	3,277	148		Crossing Line; Lt turb wpt 46	10	1.3
NEL_Blk	17		1	17	0	5.8	20:50:00	21:00:00	89	3,318	134			10	1.2
NEL_Blk	18		71	1	25.5	0	21:01:00	21:11:00	270	3,317	147			10	1.1
NEL_Blk	19		1	71	0	25.5	21:12:00	21:21:00	90	3,286	142			11	1.0
NEL_Blk	20		71	1	25.5	0	21:23:00	21:32:00	271	3,351	146			11	1.0
NEL_Blk	21		1	71	0	25.5	21:33:00	21:43:00	90	3,277	149			10	1.0
NEL_Blk	21		71	64	25.5	22.9	21:44:00	21:46:00	271	3,417	148		Calibration Line	10	1.0
NEL_Blk	22		71	1	25.5	0	21:49:00	21:58:00	271	3,325	147			9	1.1
NEL_Blk	23		1	71	0	25.5	22:00:00	22:09:00	89	3,275	143			9	1.3
NEL_Blk	24		71	1	25.5	0	22:12:00	22:22:00	270	3,317	149			10	1.2
NEL_Blk	25		1	71	0	25.5	22:23:00	22:33:00	90	3,238	148			9	1.2
NEL_Blk	26		71	1	25.5	0	22:34:00	22:43:00	270	3,525	149			10	1.1
NEL_Blk	27		1	71	0	25.5	22:45:00	22:54:00	91	3,300	149			10	1.0
NEL_Blk	28		71	1	25.5	0	22:55:00	23:04:00	269	3,374	147			11	0.9
NEL_Blk	29		1	71	0	25.5	23:06:00	23:15:00	90	3,319	148			11	0.9
							23:15:00	23:17:00					S-Turn post in flight alignment	9	1.1
							23:27:00	23:32:00					5 min post gnd static alignment at KARG	8	1.1



Quality Factor

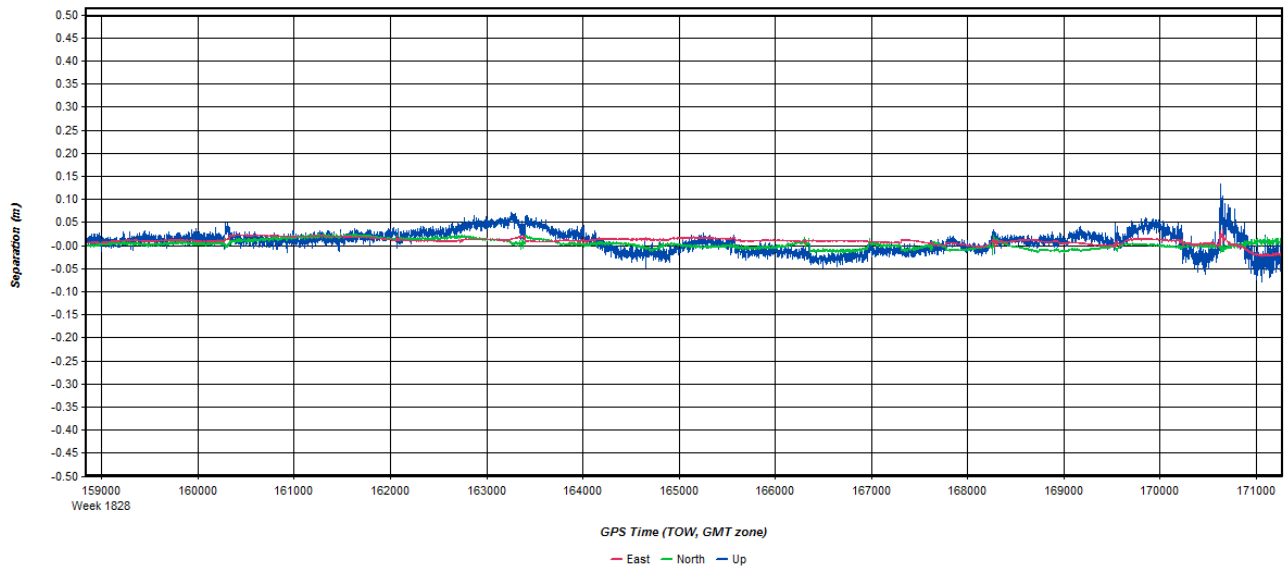


Height

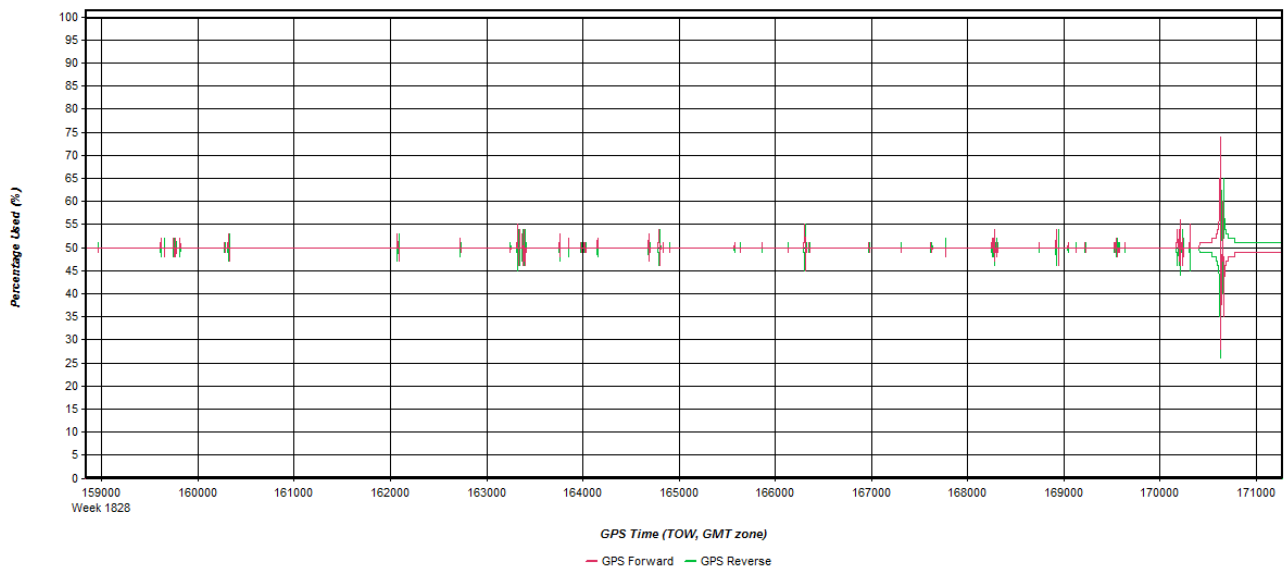




Combined Forward/Reverse Separation

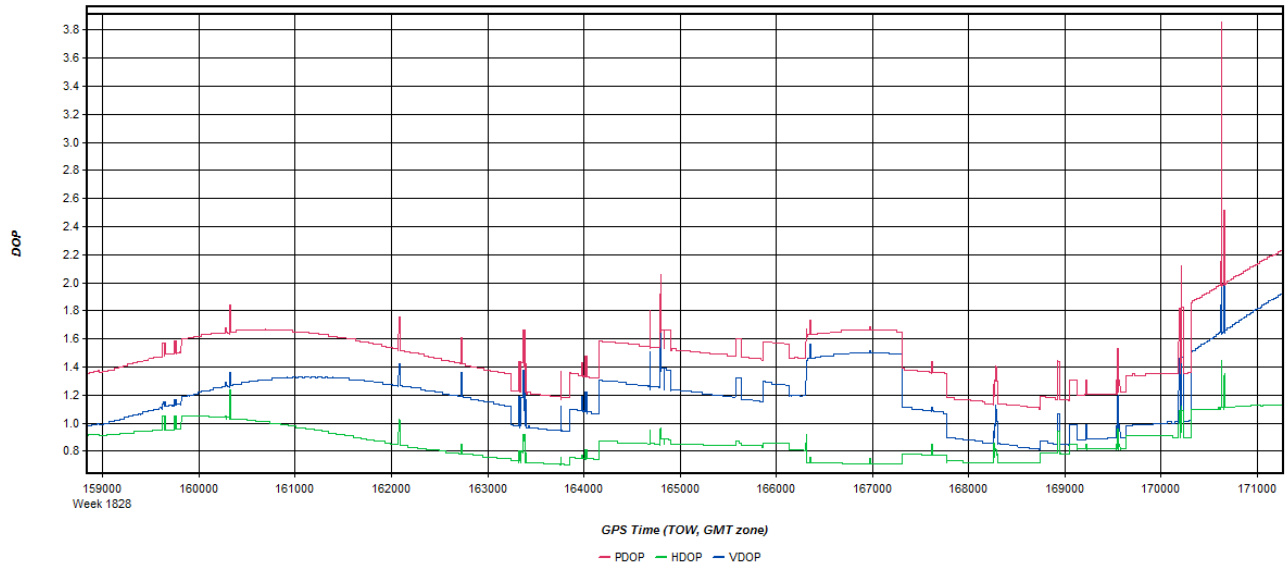


Combined Forward/Reverse Weighting

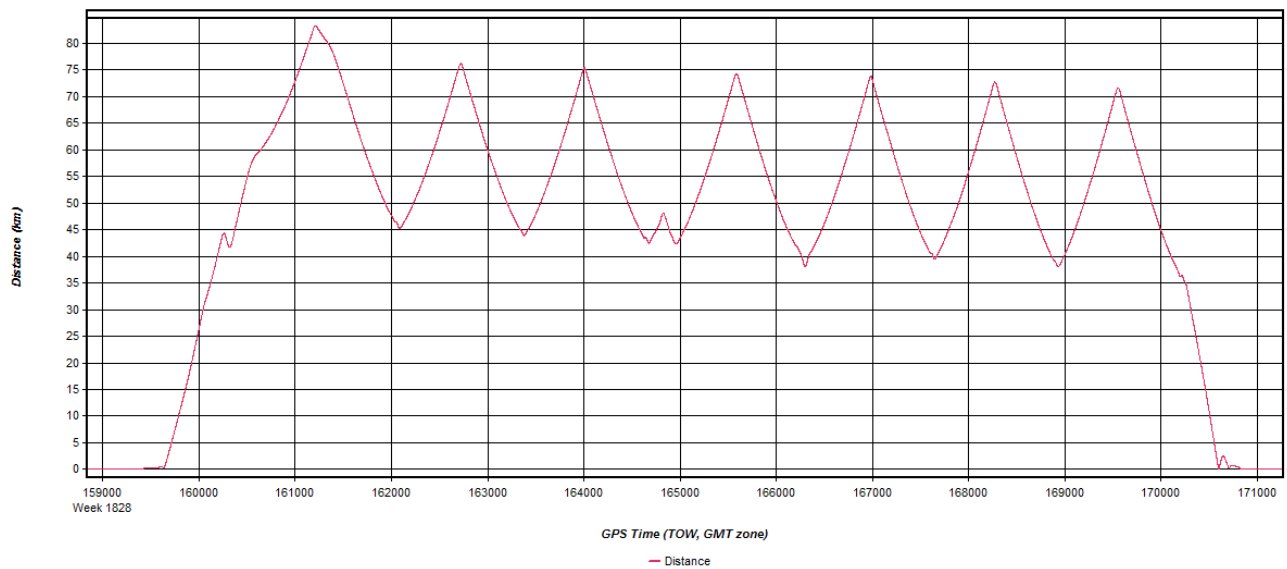




PDOP

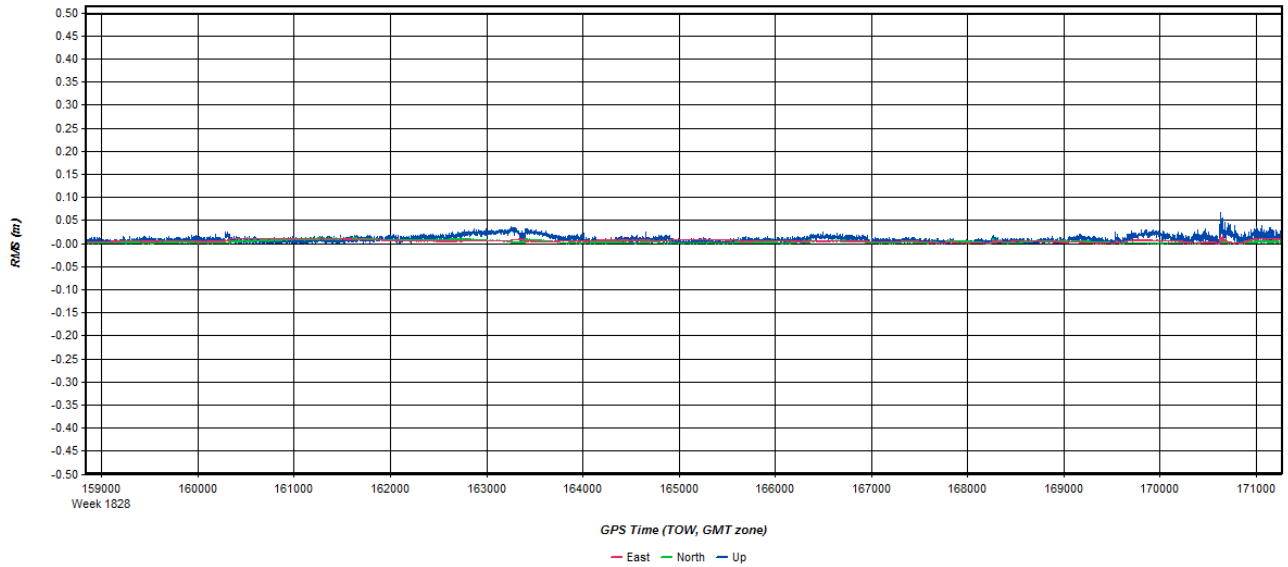


Distance from Base

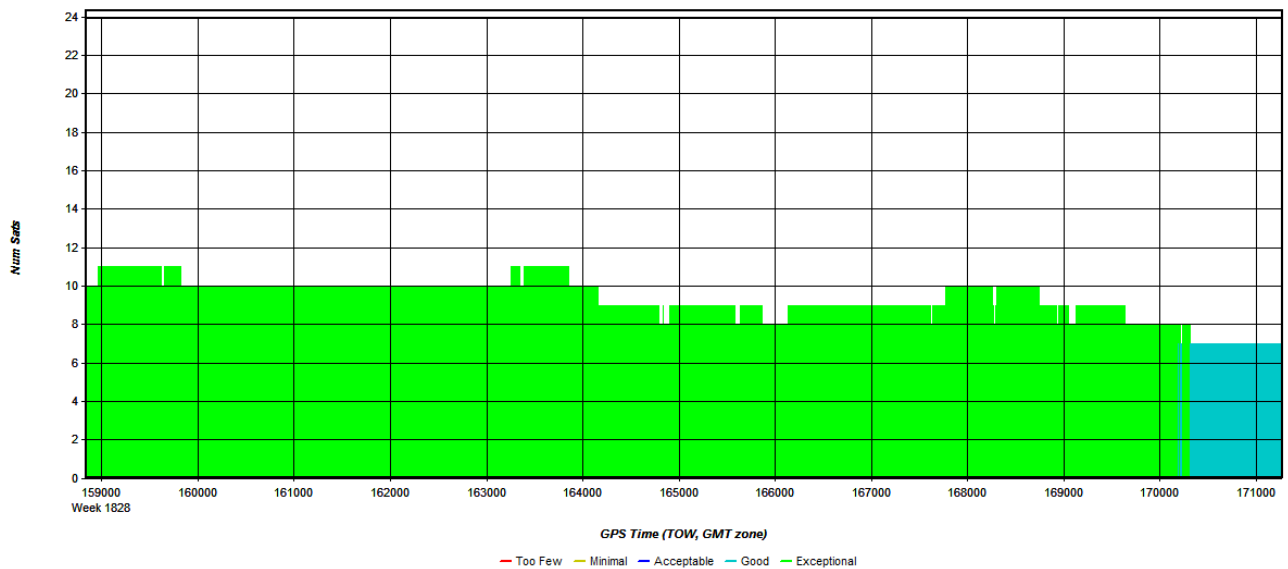




Combined RMS



SVs





Acquisition and Processing details ----- Collection 26 (January 19, 2015)

Log:



Fugro Geospatial, Inc.

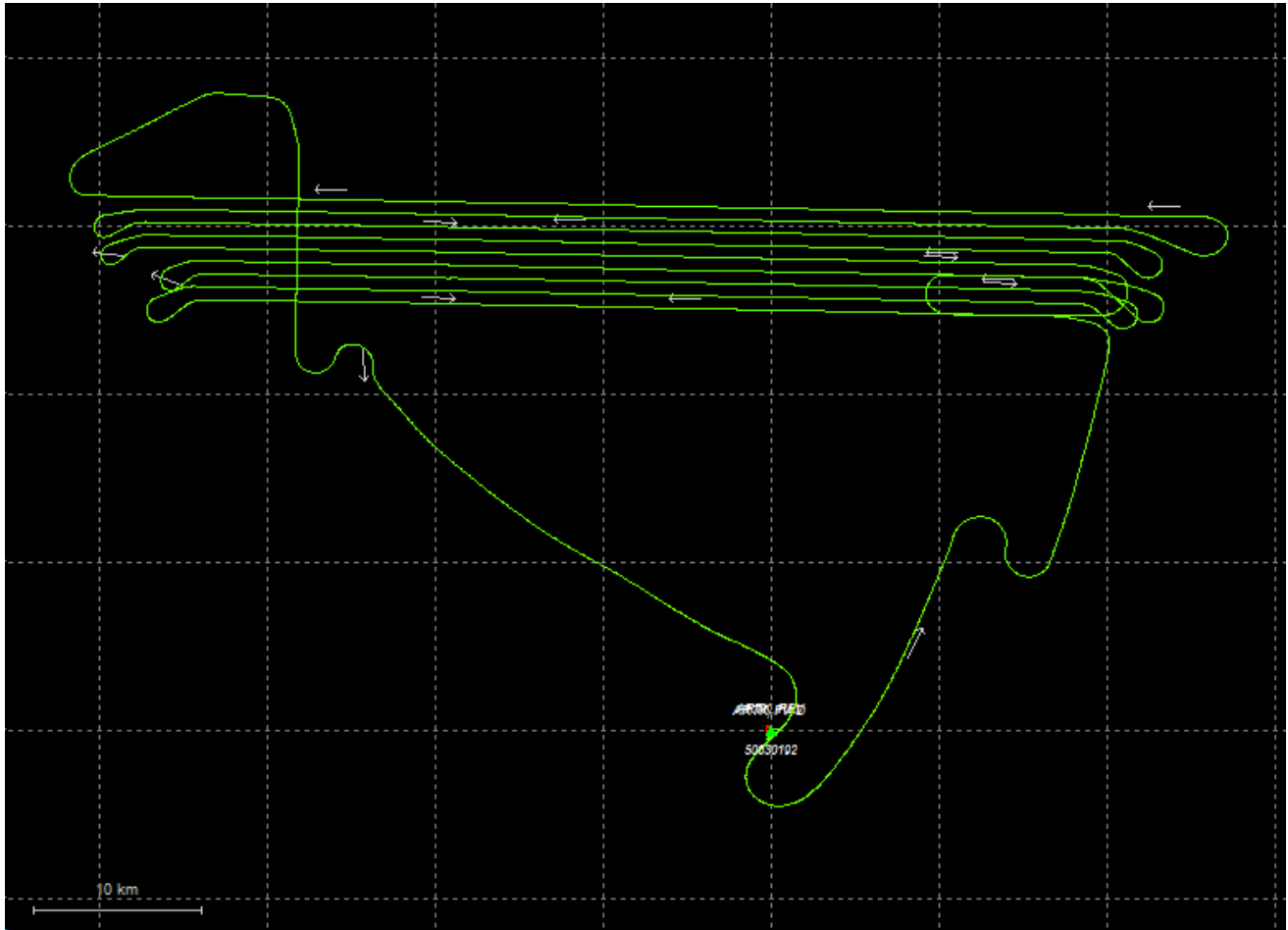


**Q680i
Flight Log**

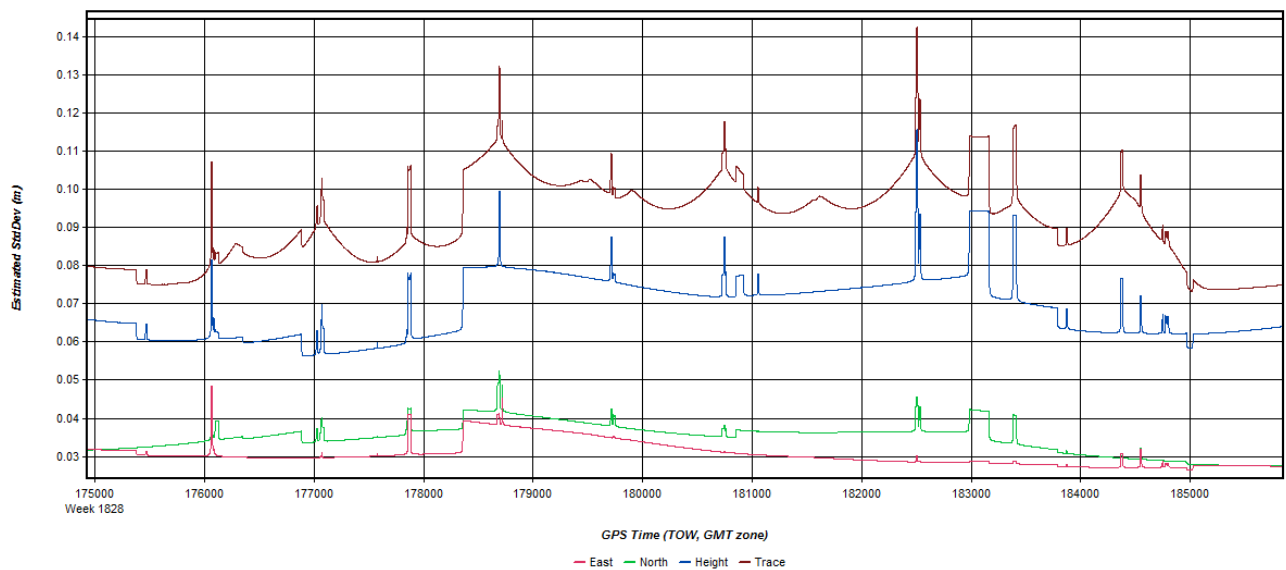
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	0:30	9443.5	KARG	3:45	9446.7	3:15	3.25	3.2	0900-Production
2										
3										

FGI Job # 22.14006900	Project Name FEMA AR		Operator Greg Sliwinski		Unit 165	IMU FMU-300	Ground Temp °C 9.0 6.0		Mn Range' 2018	Data Logger Drives DR680-9						
Flight Date 19-Jan-15	GPS Day 15-019	Lift 26	System R680i	Pilot Roman Rosa	Sun°	Solar Times (UTC)	Flying Temp °C 5.0 5.0		Max Range' 3888	Download Drive						
Mission ID (yymmdd_Sen_Job_Lift) 150119_165_14006900_26		Aircraft N62912	Airport ID KARG	FMS CCNS 7	UTC -6	Alt (ft) 3200	Speed 150	FOV 60	Scan Rate (Hz) 110	M/A 2	km/WPT 0.364	Alt Setting 29.90 29.93	Humidity @ Alt 70	Shipping Track		
Base 1 ID 5083	Location Walnut Ridge		Rec ID PF01	Ant ID PF01	ARP (m) 1.805	Start Time (UTC) 19-Jan-15 00:15		Stop Time (UTC) 20 Jan 15 724		GPS Filename G5063B15.019		Operator Greg Sliwinski	Data With AB			
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End								
							0:29:00	0:34:00					GROUND STATIC		9	1.2
							24:53:00	0:55:00					STURN		10	1.1
NEU	33		82	1	29.5	0	0:58:00	1:09:00	W	3,405	138				11	1
	34		1	85	0	30.6	1:11:00	1:22:00	E	3,270	144				11	0.9
	35		85	1	30.6	0	1:25:00	1:36:00	W	3,360	137				11	1
	36		1	85	0	30.6	1:38:00	1:49:00	E	3,270	143				10	1.1
	36		85	75	30.6	26.9	1:53:00	1:54:00	W	3,330	142		CALIBRATION		9	1.4
	37		91	1	32.8	0	1:58:00	2:10:00	W	3,310	144				9	1.4
	38		1	94	0	33.9	2:12:00	2:25:00	E	3,435	143				10	1.2
	39		94	1	33.9	0	2:27:00	2:40:00	W	3,460	134				9	1.2
	40		1	94	0	33.9	2:42:00	2:54:00	E	3,380	150				10	1.1
	41		107	1	38.6	0	2:57:00	3:13:00	W	3,480	135				11	1
	82		72	54	25.8	19.3	3:16:00	3:18:00	S	3,390	149		CROSSLINE		11	1
							3:18:00	3:20:00					STURN		11	1
							3:31:00	3:36:00					GROUND STATIC		11	1

Trajectory and GPS Plots:

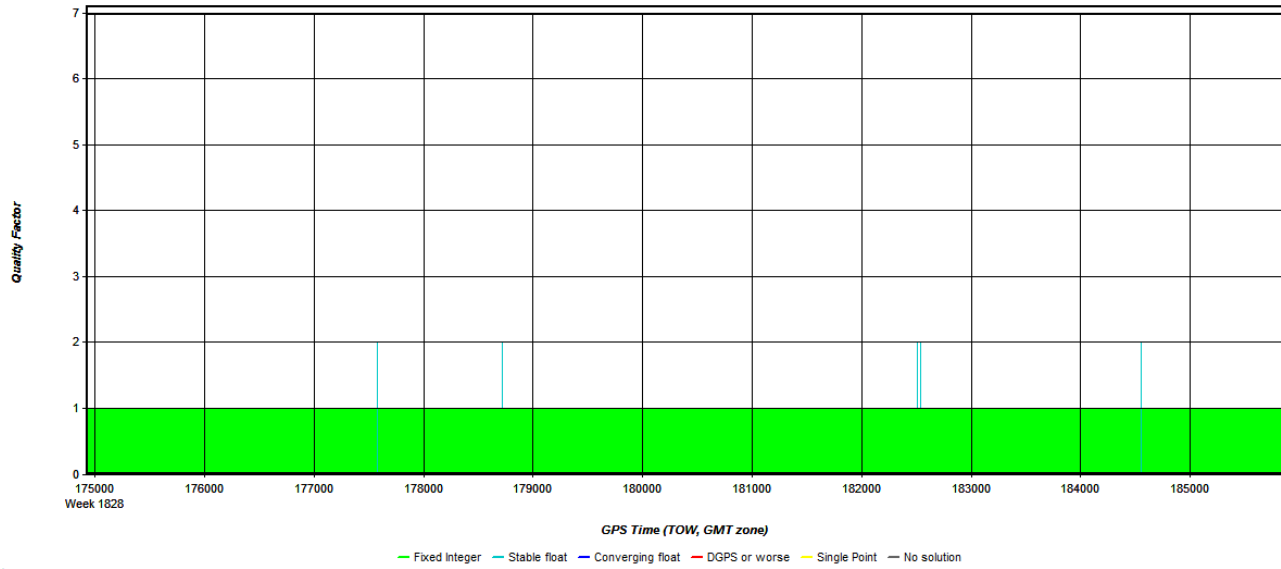


Estimated Accuracy

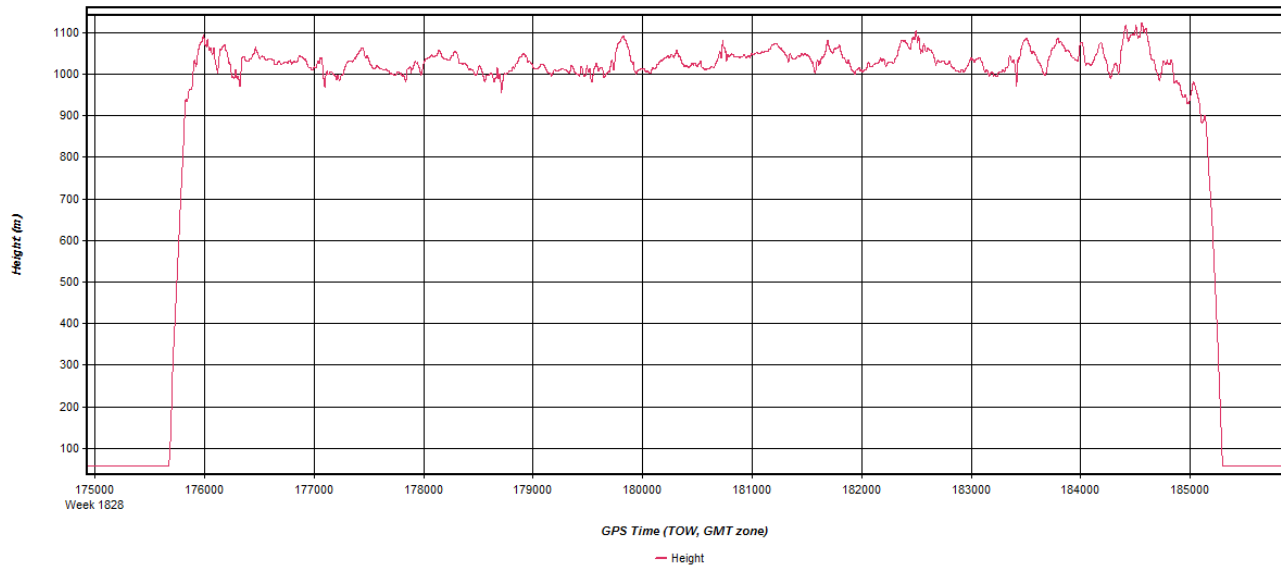




Quality Factor

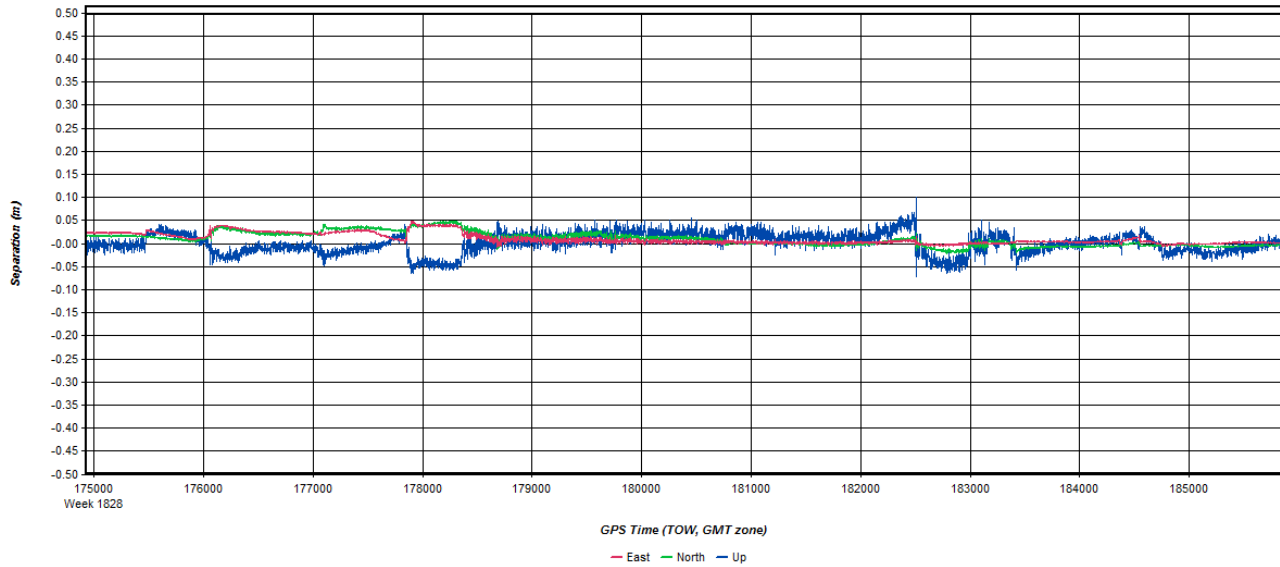


Height





Combined Forward/Reverse Separation

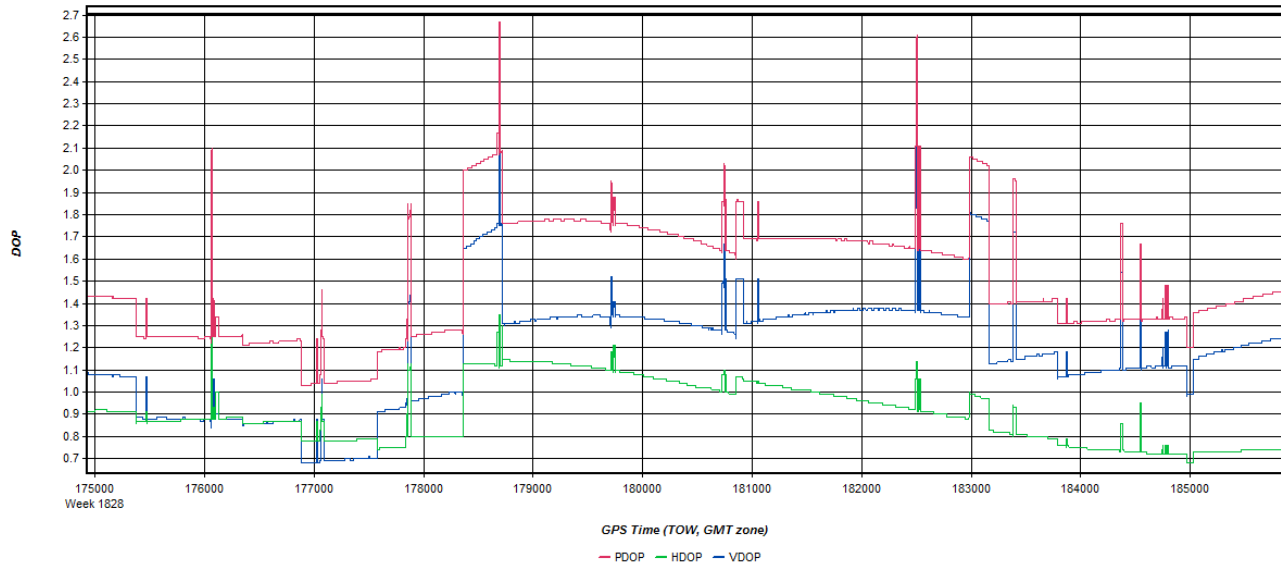


Combined Forward/Reverse Weighting

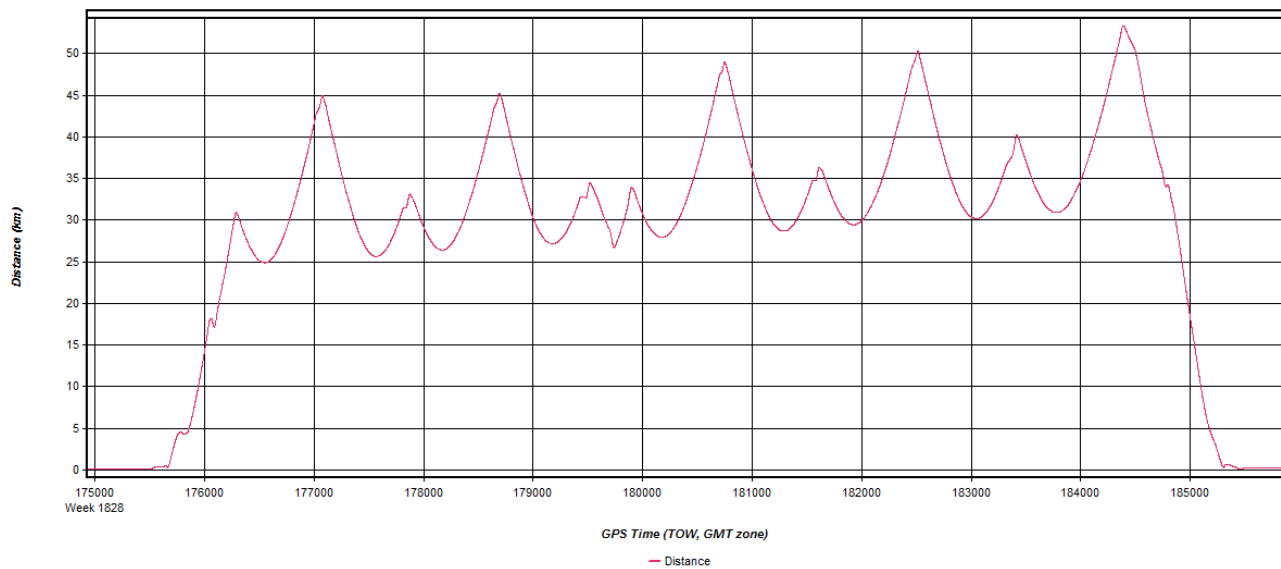




PDOP

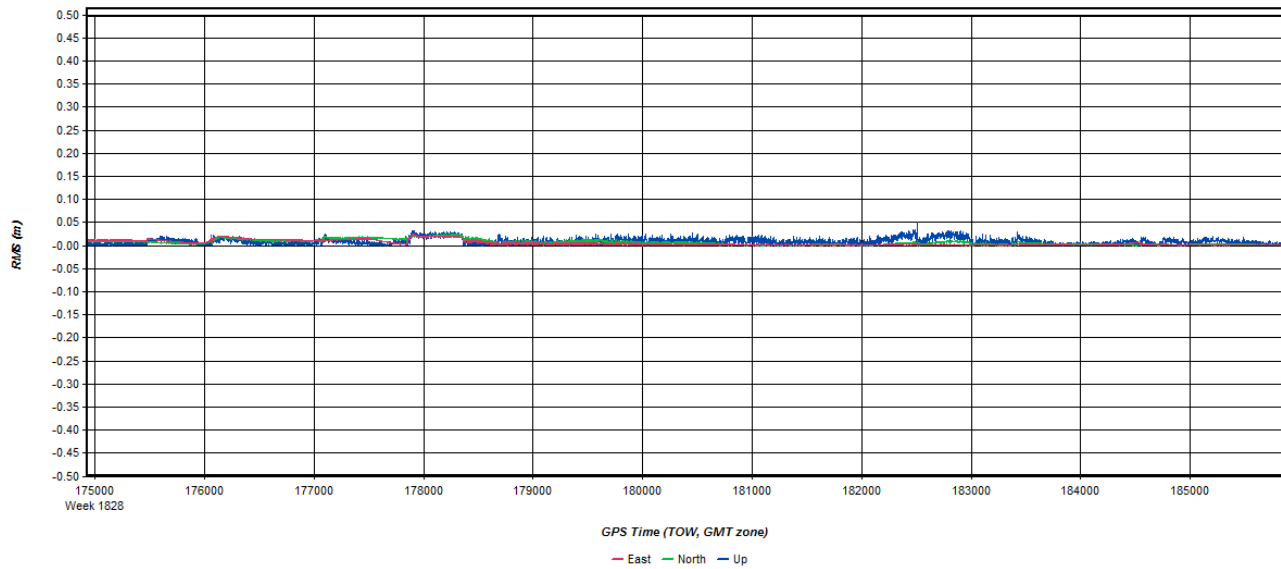


Distance from Base

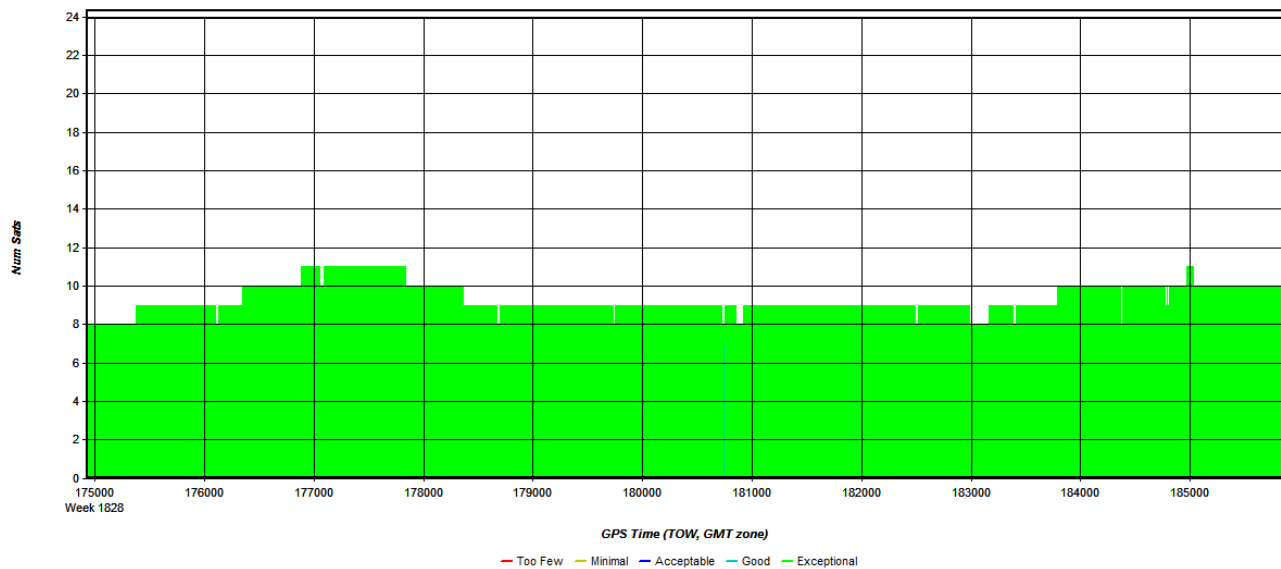




Combined RMS



SVs





Acquisition and Processing details ----- Collection 27 (January 19, 2015)

Log:



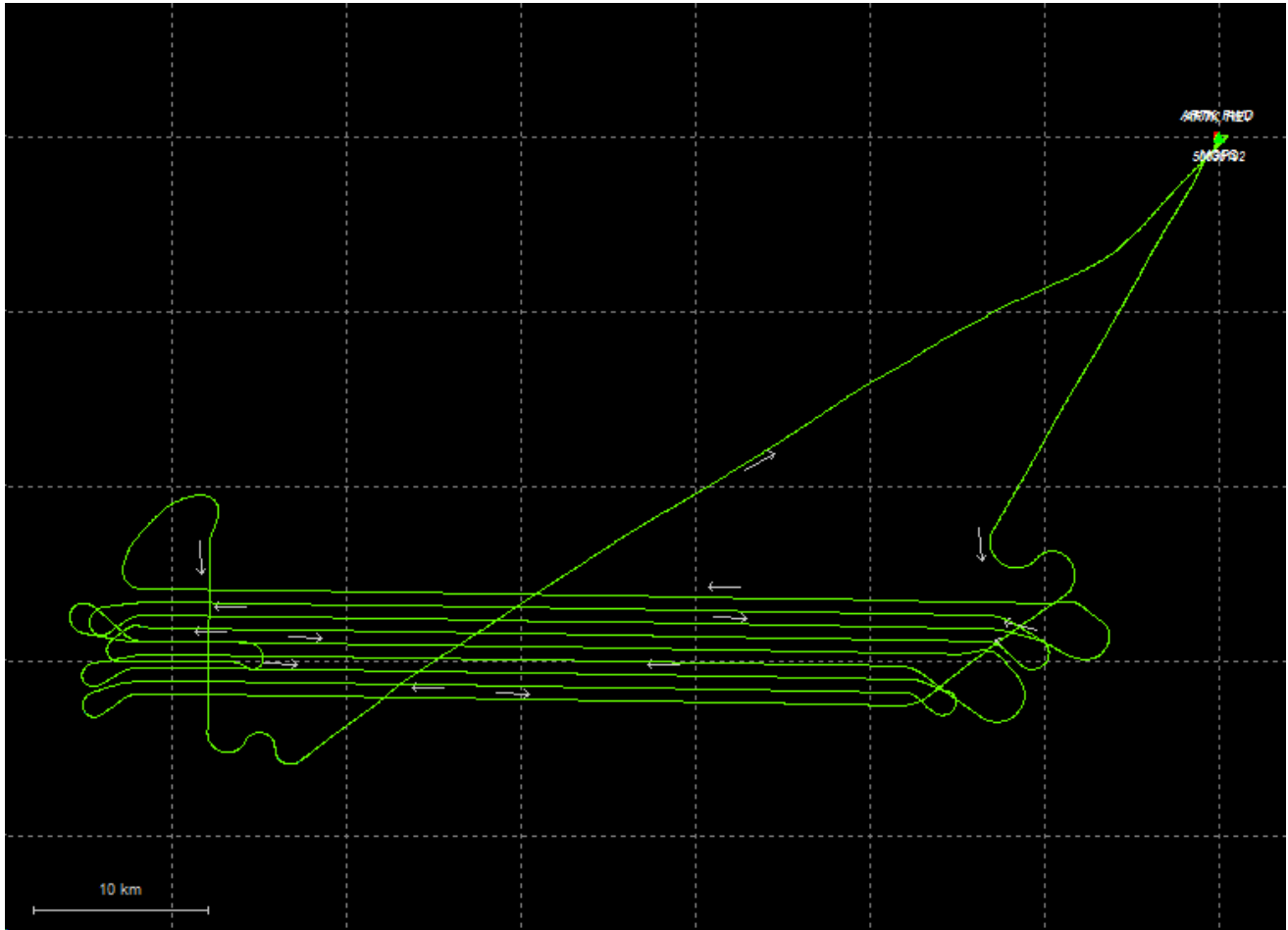
Fugro Geospatial, Inc.

	Lift Begin			Lift End			Fit Duration	Fit Hrs	Hobbs Hrs	Activity
	Airport	Chocks	Hobbs	Airport	Chocks	Hobbs				
1	KARG	4:10	9446.7	KARG	7:20	9449.7	3:10	3.25	3.0	0900-Production
2										
3										

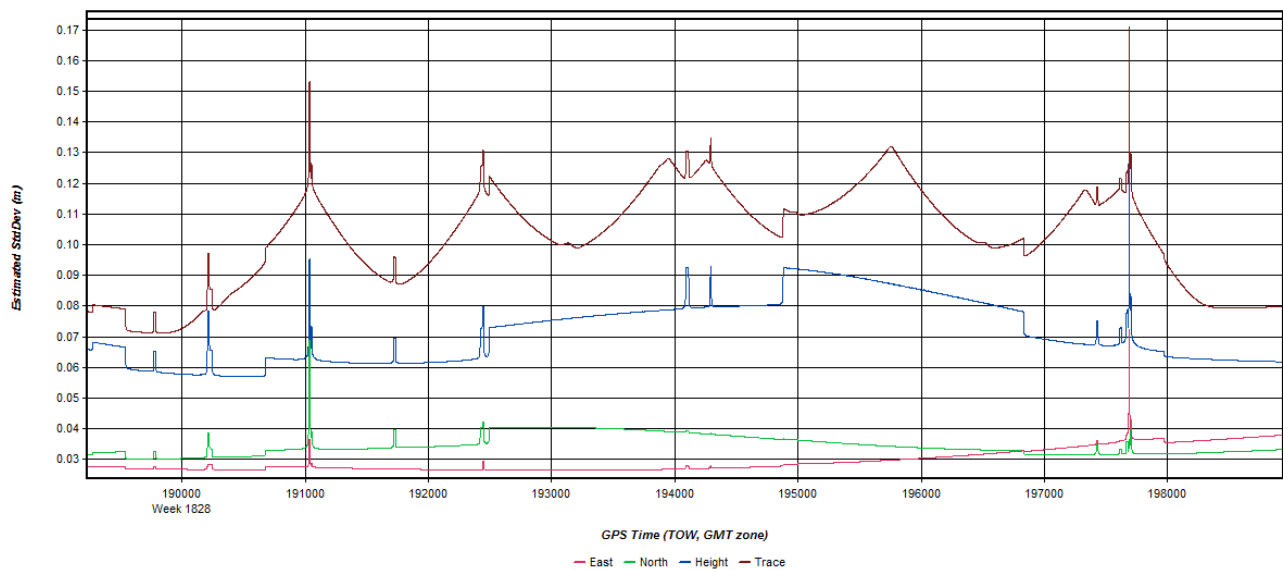
**Q680i
Flight Log**

FGI Job #	Project Name				Operator		Unit	IMU	Ground Temp °C		Mn Range'	Data Logger Drives				
22.14006900	FEMA AR				Greg Sliwinski		165	FMU-300	5.0	4.0	2018	DR680-8				
Flight Date	GPS Day	Lift	System	Pilot		Sun°	Solar Times (UTC)		Flying Temp °C		Max Range'	Download Drive				
19-Jan-15	15-019	27	R680i	Roman Rosa					250khz		3888					
Mission ID (yymmdd_Sen_Job_Lift)	Aircraft	Airport ID	FMS	UTC	AMT (ft)	Speed	FOV	Scan Rate (Hz)	M/A	km/WPT	AltM Setting	Humidity @ Alt	Shipping Track			
150119_165_14006900_27	N62912	KARG	CCNS 7	-6	3200	150	60	110	2	0.364	29.90	29.80	76			
Base 1 ID	Location		Rec ID	Ant ID	ARP (m)	Start Time (UTC)		Stop Time (UTC)		GPS Filename		Operator	Data			
5083	Walnut Ridge		PF01	PF01	1.805	19-Jan-15 00:15		20 JAN 15 724		G5063B15.019		Greg Sliwinski	With AB			
Area	Flight #		Wpt		Distance		UTC		Flt	Altitude	Speed	Scan	Comments and Conditions		SVs	PDOF
	FGI	Client	From	To	Begin	End	Start	End	Dir	(GPS)	(knots)	Rate				
							4:33:00	4:38:00					GROUND STATIC		12	1.1
							4:48:00	4:51:00					STURN		11	1.1
NEL	30		71	1	25.5	0	4:53:00	5:02:00	W	3,320	147				11	1
	31		1	71	0	25.5	5:05:00	5:14:00	E	3,395	147				10	1.1
	32		71	1	25.5	0	5:16:00	5:25:00	W	3,420	124				10	1.3
	33		1	71	0	25.5	5:27:00	5:37:00	E	3,520	144				10	1.2
	34		79	1	28.4	0	5:40:00	5:50:00	W	3,465	142				9	1.3
	34		1	8	0	2.5	5:53:00	5:54:00	E	3,360	146		CALIBRATION		9	1.4
	35		1	79	0	28.4	5:58:00	6:08:00	E	3,335	146				9	1.4
	36		79	1	28.4	0	6:10:00	6:21:00	W	3,360	140				9	1.4
	37		1	79	0	28.4	6:23:00	6:33:00	E	3,475	150				8	1.5
	38		87	1	31.3	0	6:36:00	6:48:00	W	3,340	143				10	1.1
	77		57	39	20.4	13.8	6:50:00	6:53:00	S	3,435	150		CROSS LINE		11	1
							6:53:00	6:54:00					STURN		11	1
							7:10:00	7:15:00					GROUND STATIC			

Trajectory and GPS Plots:

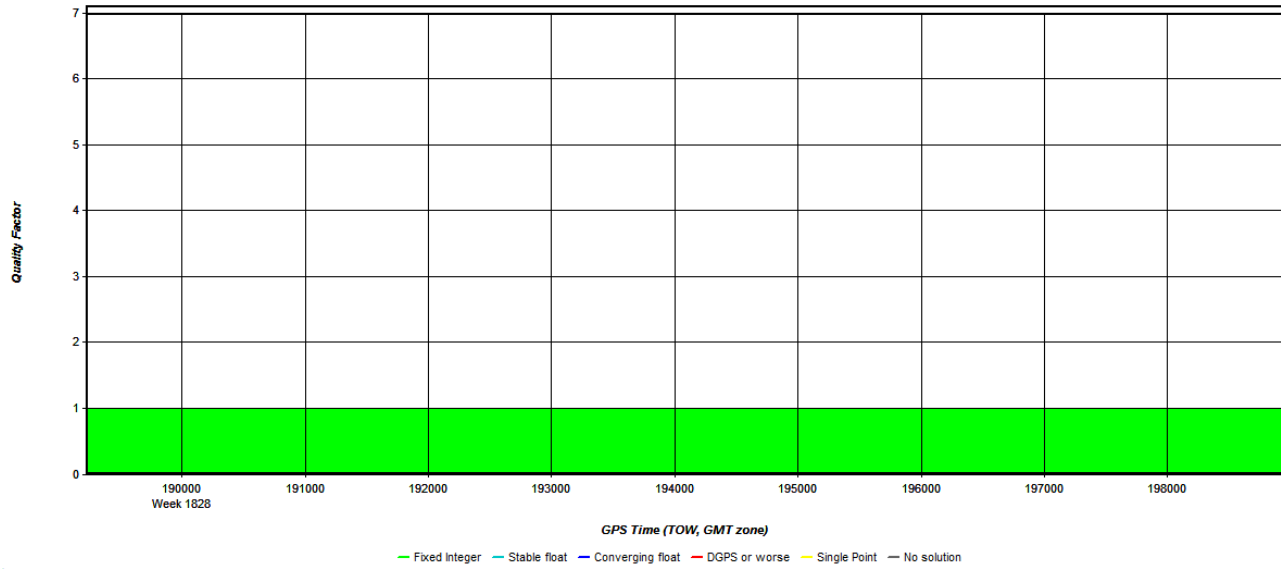


Estimated Accuracy

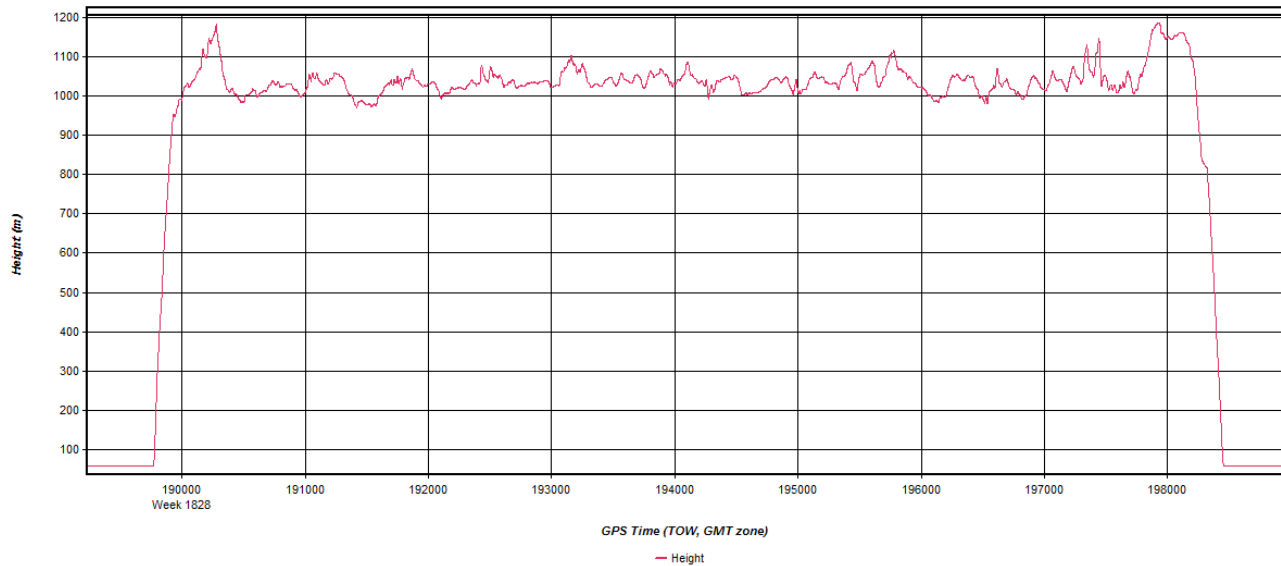




Quality Factor

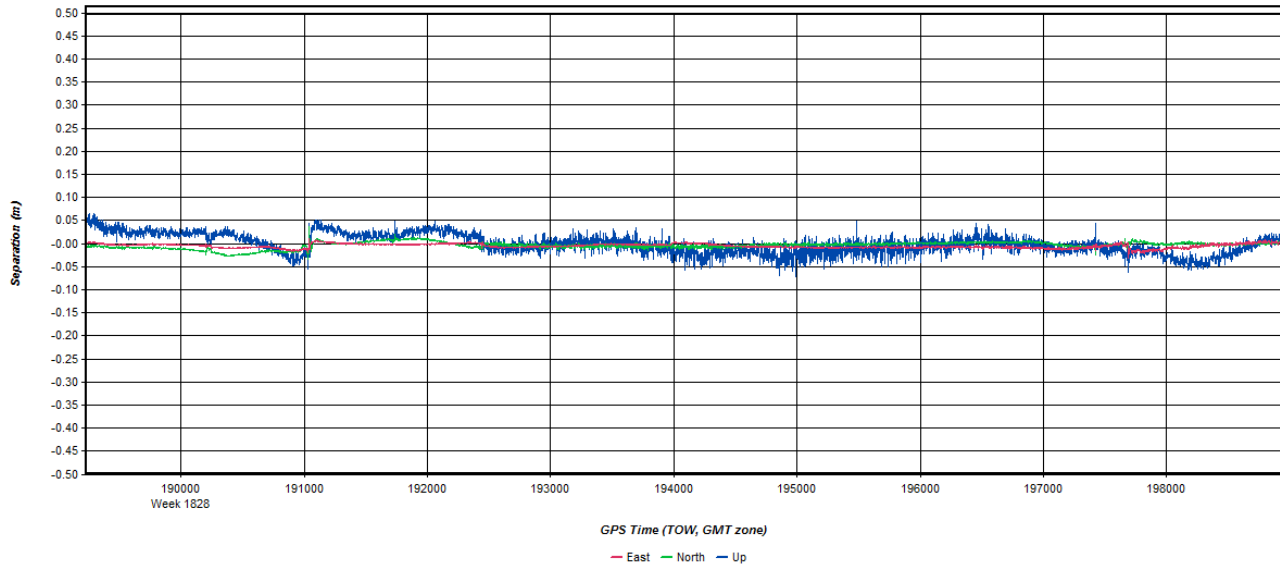


Height





Combined Forward/Reverse Separation

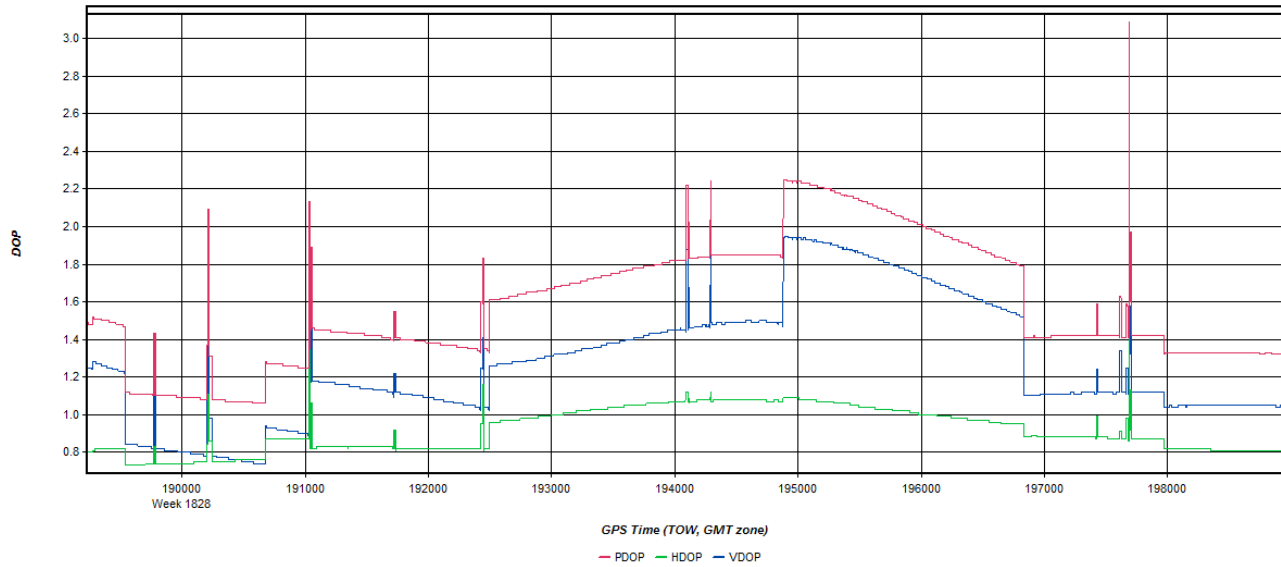


Combined Forward/Reverse Weighting

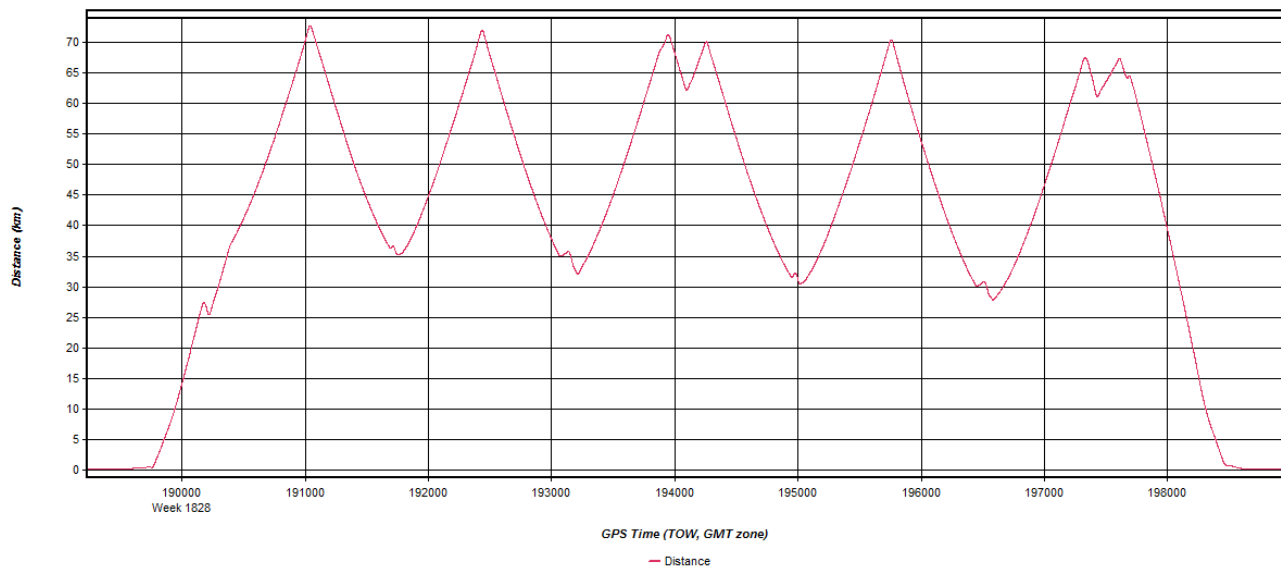




PDOP

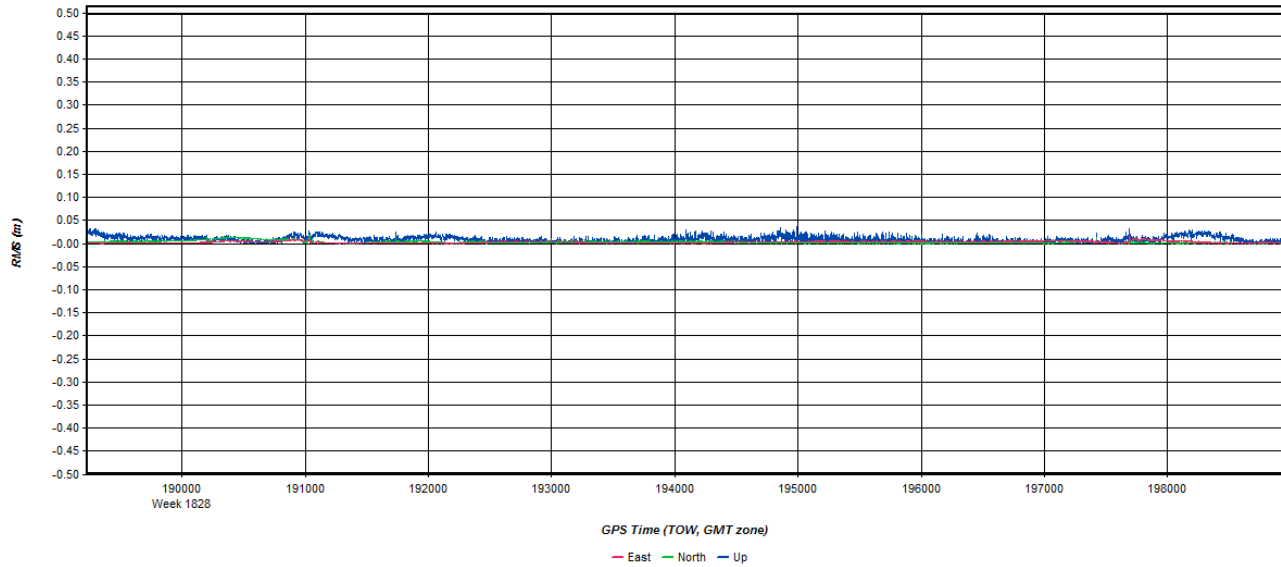


Distance from Base

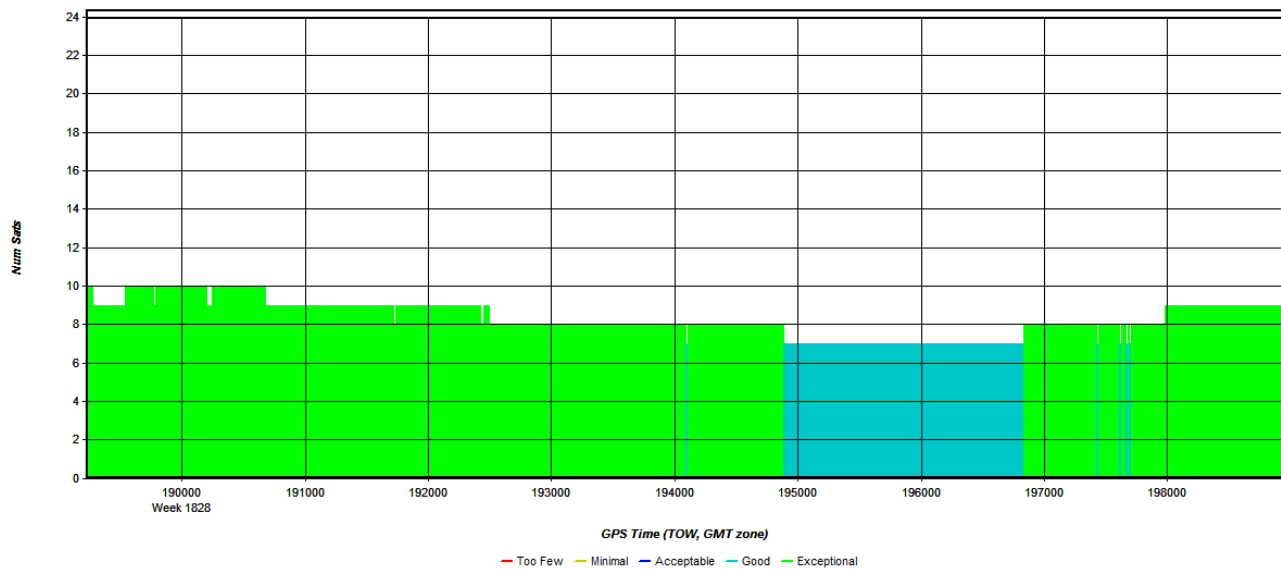




Combined RMS



SVs





Acquisition and Processing details ----- Collection 28 (January 21, 2015)

Log:



Fugro Geospatial, Inc.

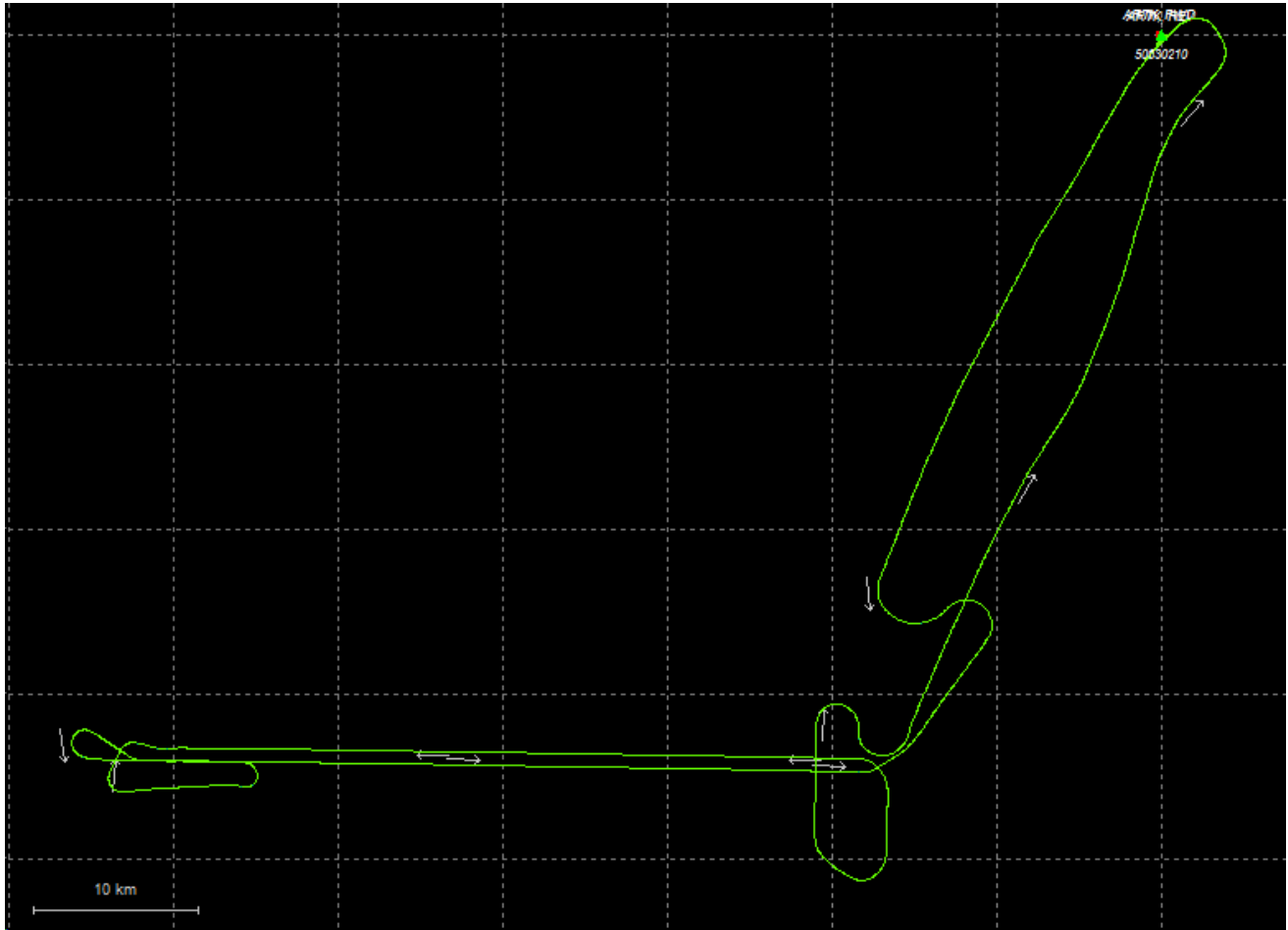


**Q680i
Flight Log**

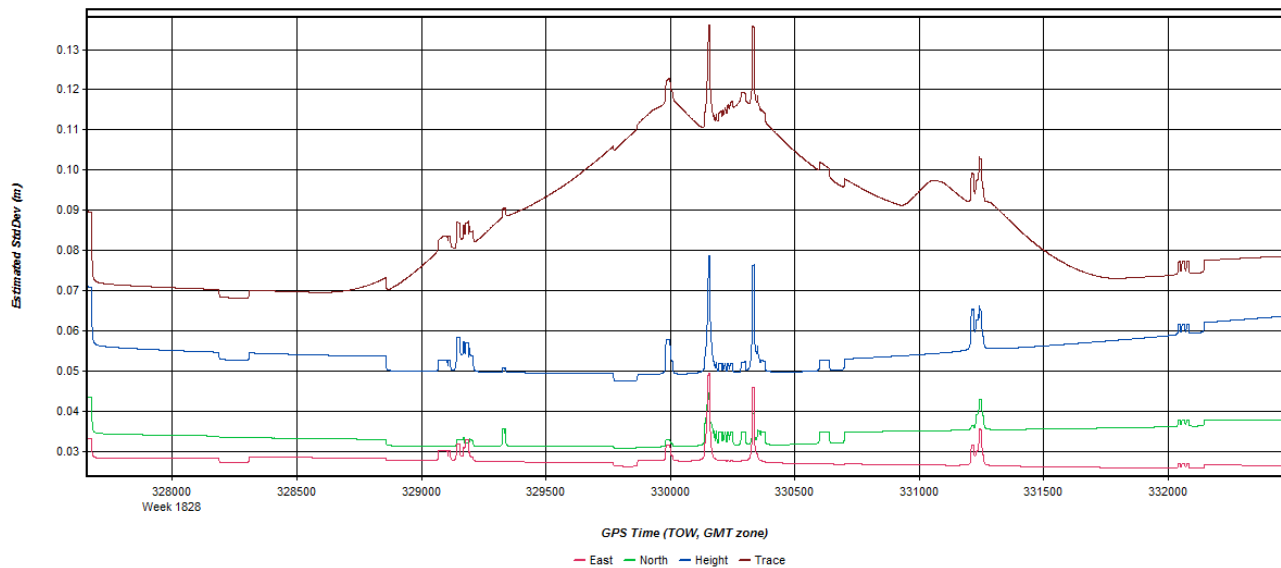
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	18:45	9450.5	KARG	20:30	9451.7	1:45	1.75	1.2	0900-Production
2										
3										

FGI Job # 22.14006900	Project Name FEMA AR			Operator Greg Sliwinski		Unit 165	IMU FMU-300	Ground Temp °C 14.0 14.0		Mn Range' 2018	Data Logger Drives DR680-9					
Flight Date 21-Jan-15	GPS Day 15-021	Lift 28	System R680i	Pilot Roman Rosa		Sun°	Solar Times (UTC)	Flying Temp °C 0.0 0.0		Max Range' 3888	Download Drive ep500#86					
Mission ID (yymmdd_Sen_Job_Lift) 150121_165_14006900_28		Aircraft N62912	Airport ID KARG	FMS CCNS 7	UTC -6	Alt (ft) 3200	Speed 150	FOV 60	Scan Rate (Hz) 110	M/A 2	km/WPT 0.364	Alt Setting 30.20	Humidity @ Alt 30.20	Shipping Track 36		
Base 1 ID 5083	Location Walnut Ridge		Rec ID PF01	Ant ID PF01	ARP (m) 1.805	Start Time (UTC) 21-Jan-15 18:45		Stop Time (UTC) 21 Jan 15 2040		GPS Filename G5063B15.021		Operator Greg Sliwinski	Data With AB			
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End								
							19:08:00	19:13:00					GROUND STATIC		11	1
							19:24:00	19:26:00					STURN		13	0.9
NEL	15		71	1	25.5	0	19:28:00	19:38:00	W	3,375	150		REFLIGHT		12	0.9
	15		1	8	0	2.5	19:40:00	19:41:00	E	3,325	150		CALIBRATION		12	1
	16		1	71	0	25.5	19:45:00	19:55:00	E	3,445	145		REFLIGHT		12	1
	78		18	27	6.2	9.5	19:58:00	19:59:00	N	3,320	140		CROSS LINE		12	1
							19:59:00	20:01:00					STURN		11	1.1
							20:15:00	20:20:00					GROUND STATIC		11	1.1

Trajectory and GPS Plots:

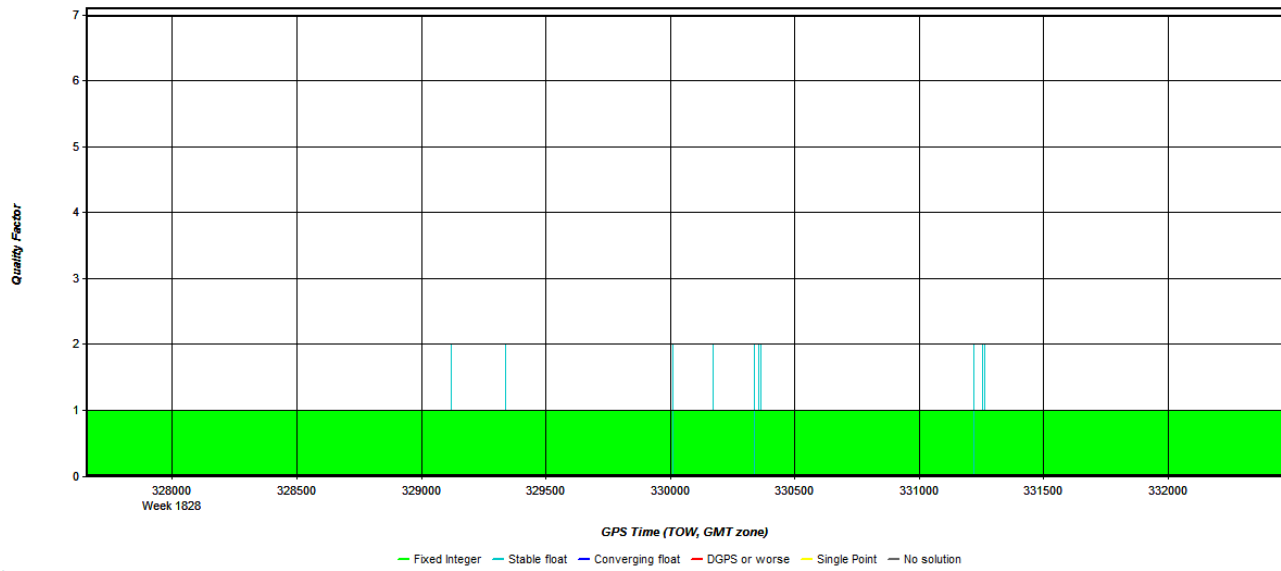


Estimated Accuracy

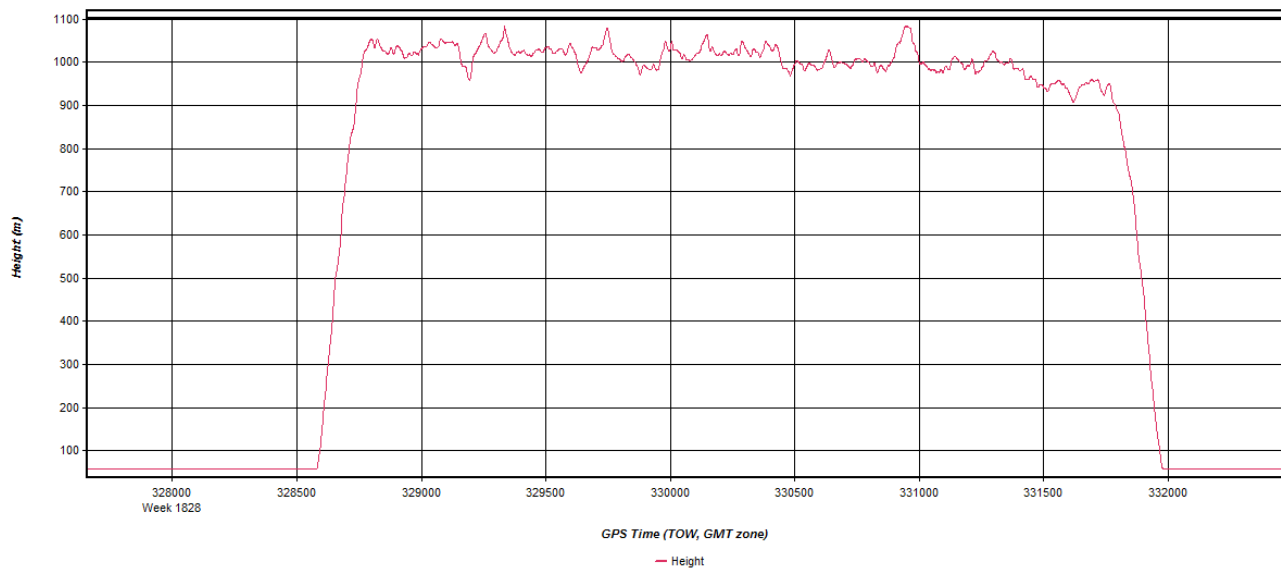




Quality Factor

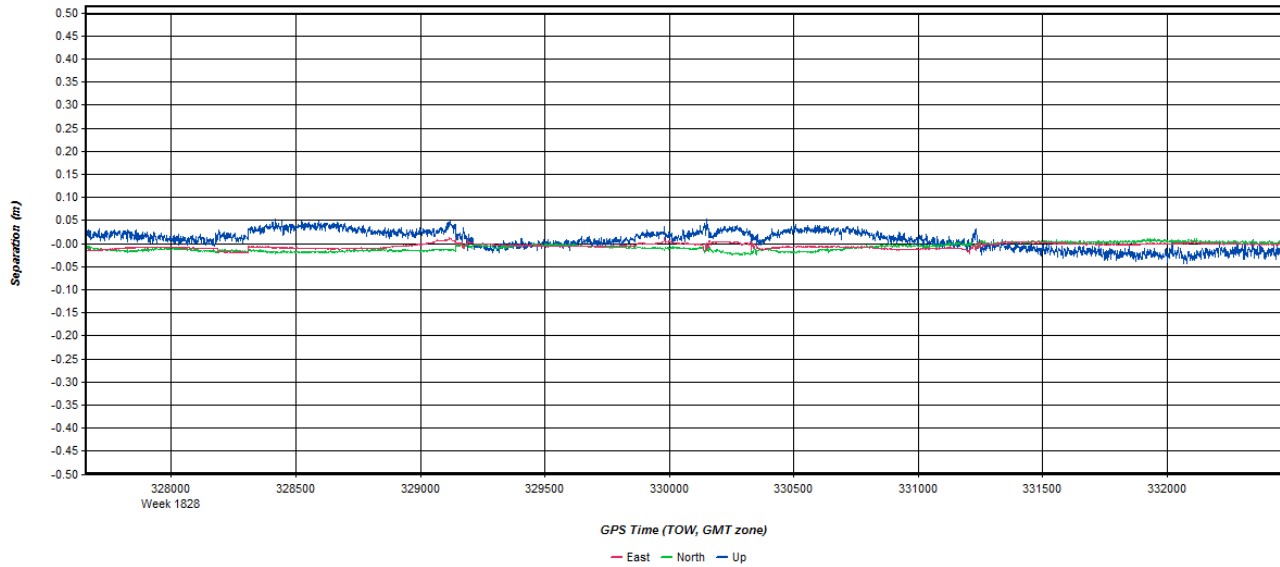


Height

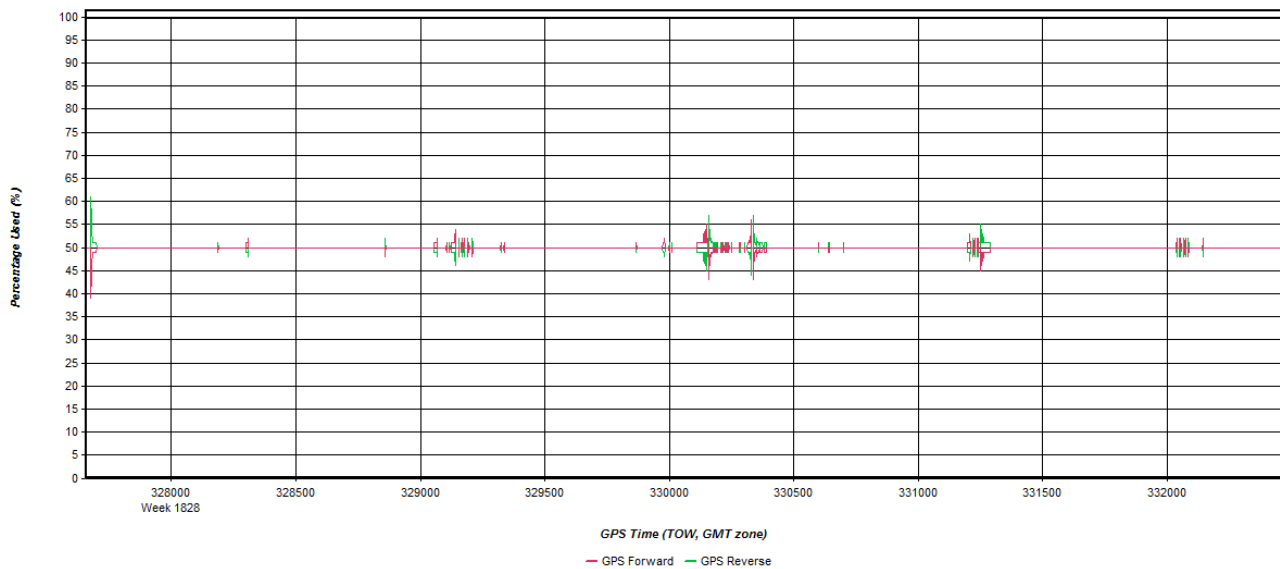




Combined Forward/Reverse Separation

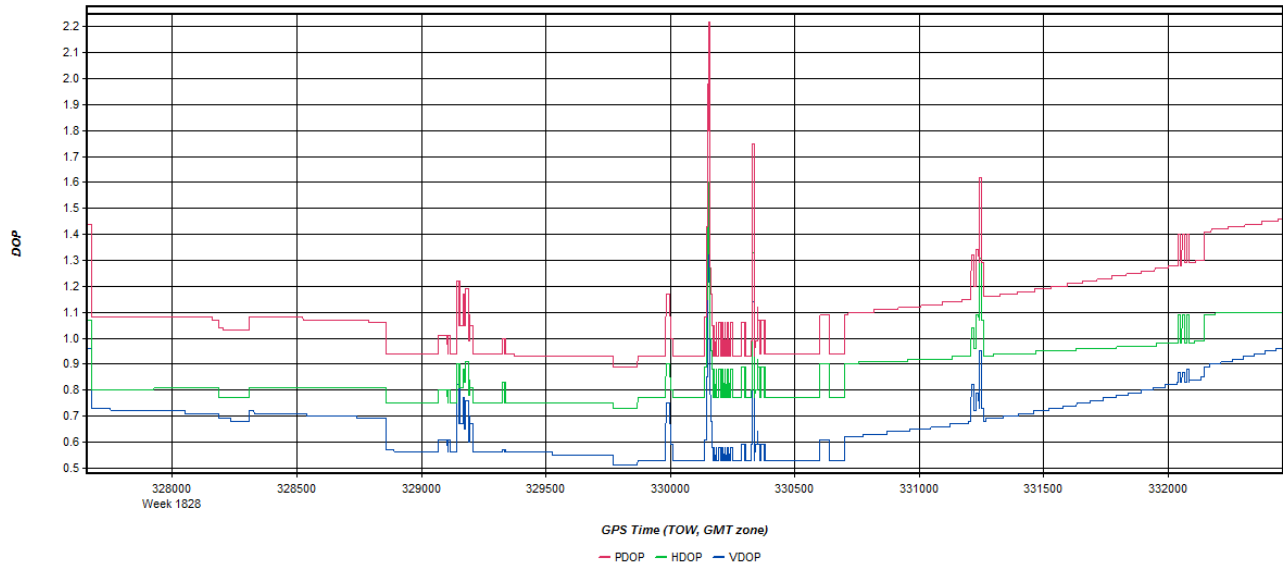


Combined Forward/Reverse Weighting

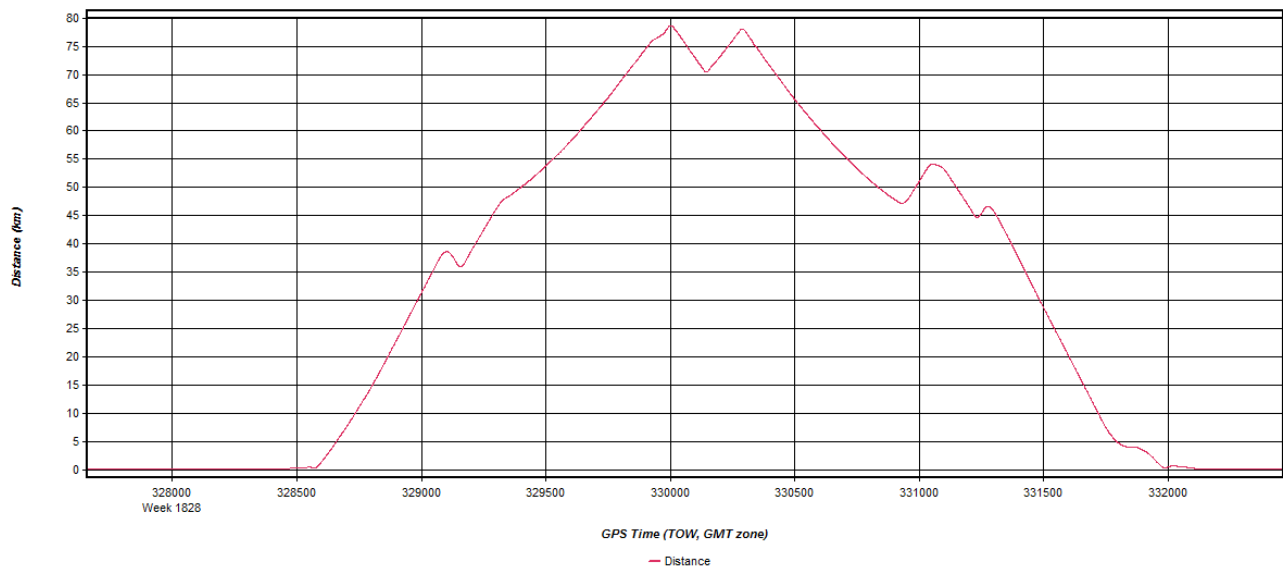




PDOP

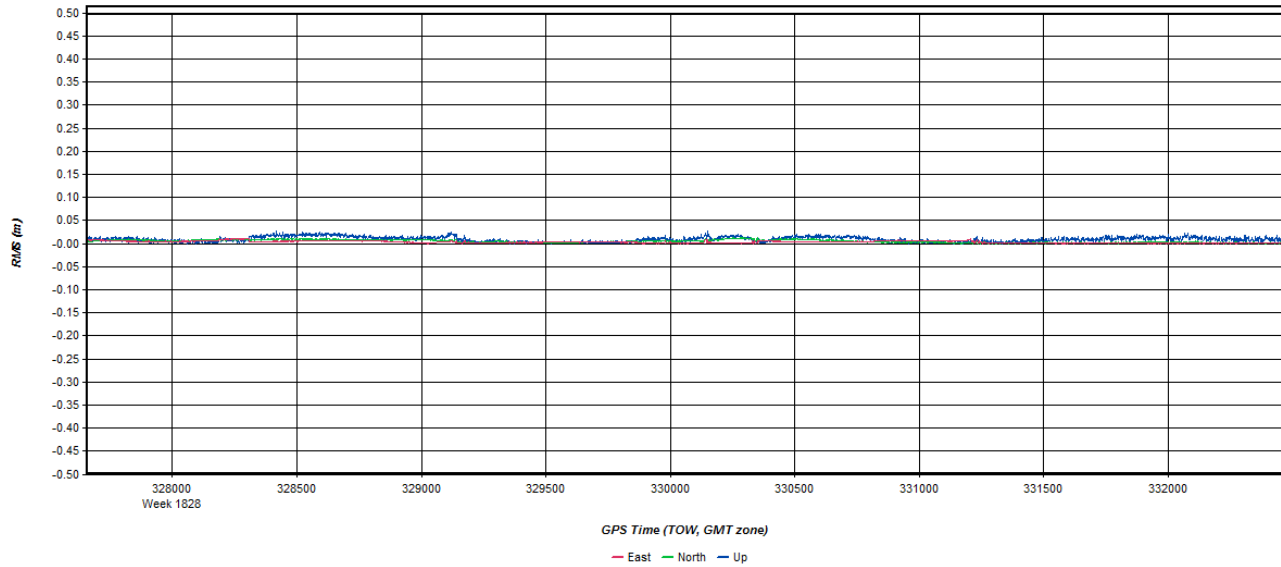


Distance from Base

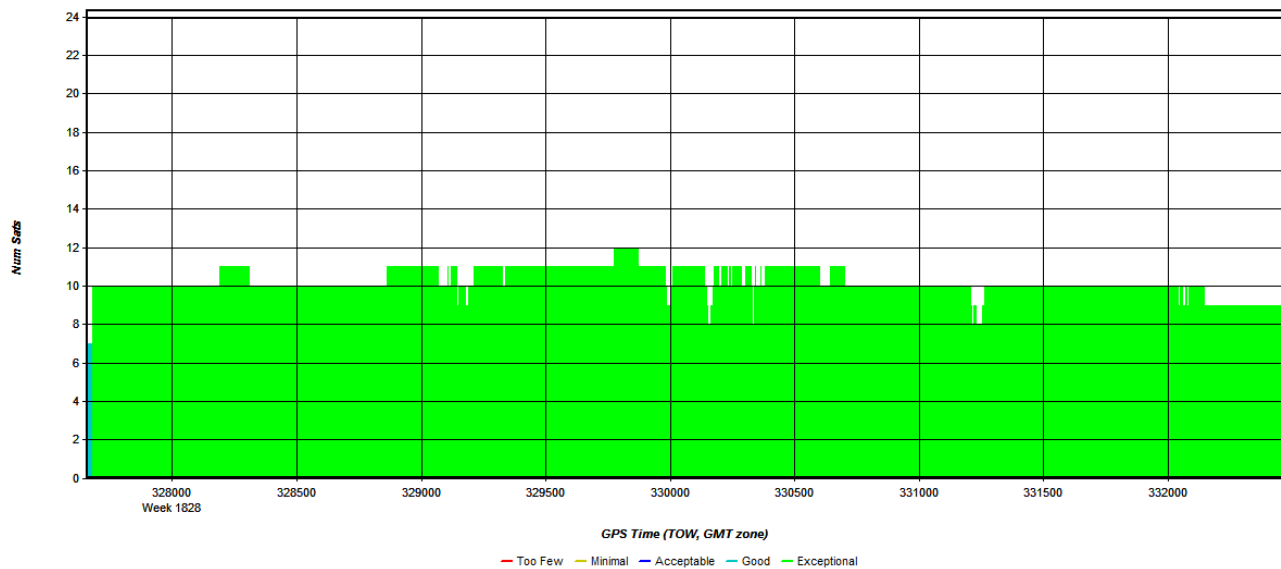




Combined RMS



SVs





Acquisition and Processing details ----- Collection 30 (January 24, 2015)

Log:



Fugro Geospatial, Inc.

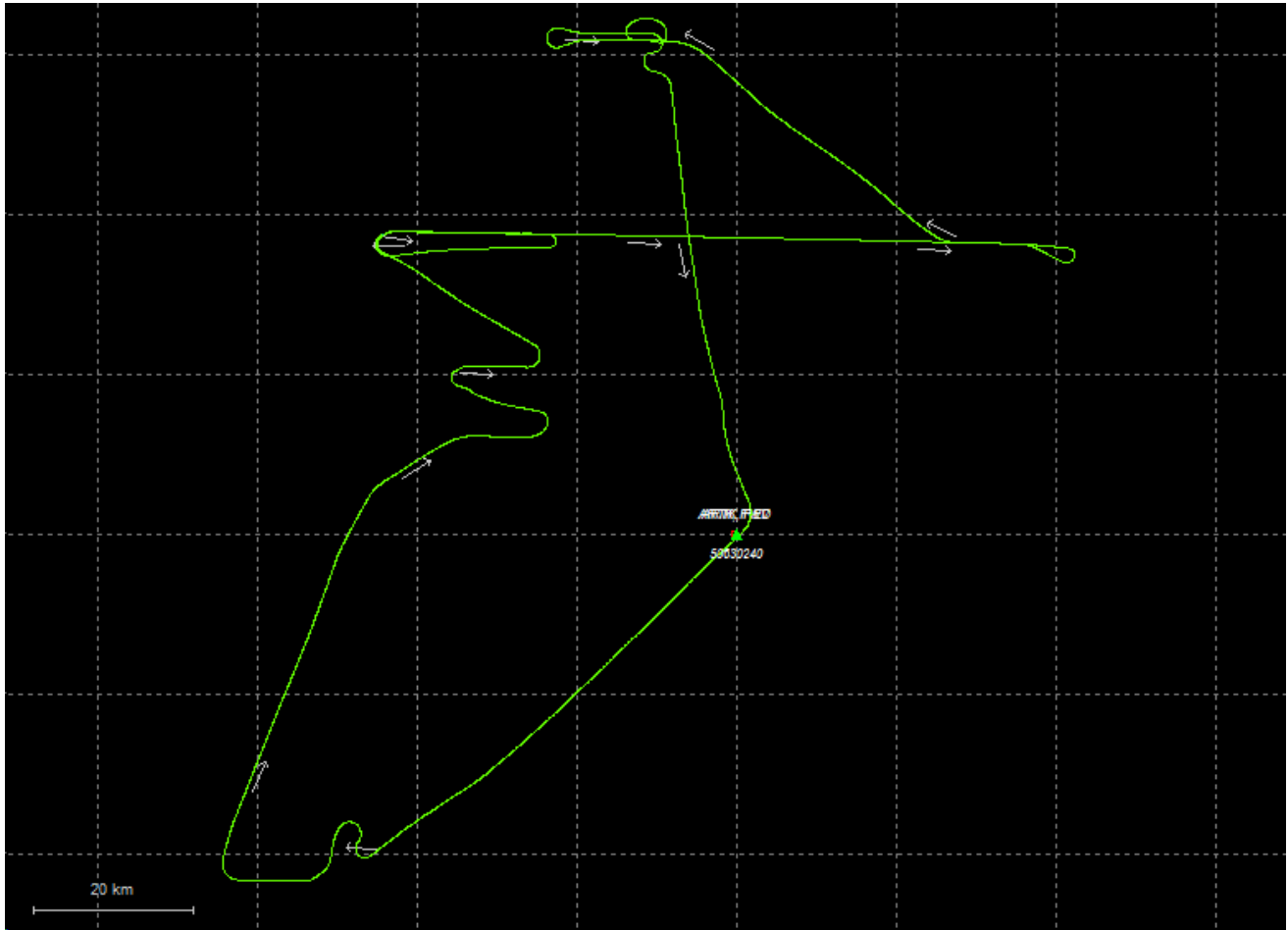


**Q680i
Flight Log**

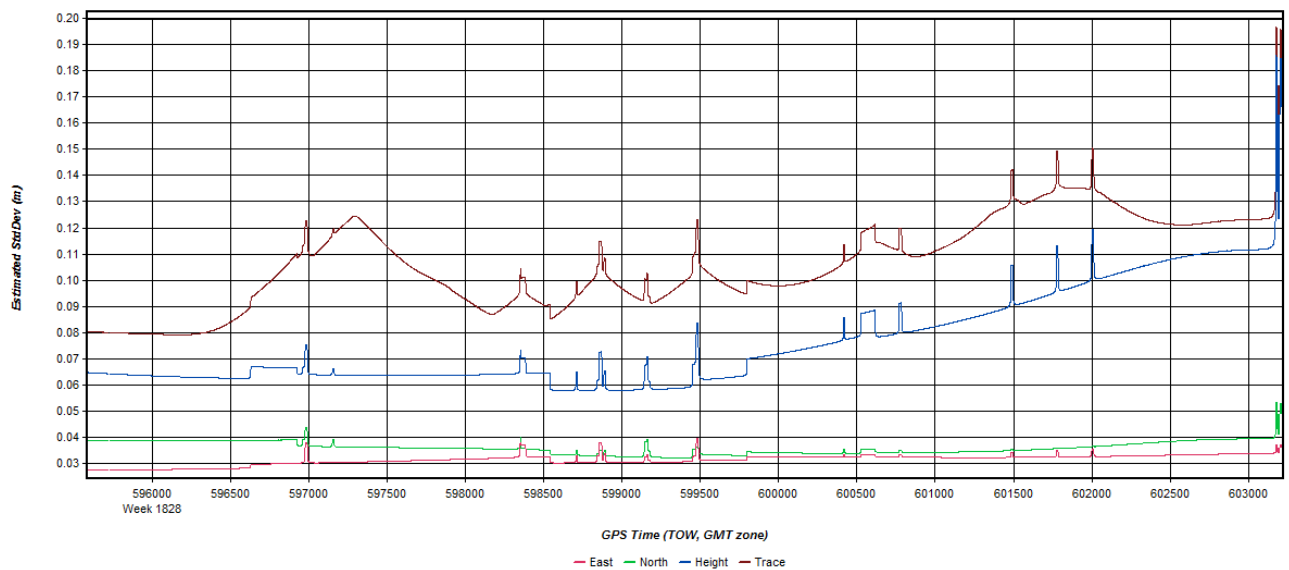
Lift Begin		Lift End			Fit	Fit	Hobbs	Activity		
Airport	Chocks	Hobbs	Airport	Chocks	Hobbs	Duration	Hrs	Hrs		
1	KARG	21:15	9454.3	KARG	23:40	9456.4	2:25	2.50	2.1	0900-Production
2										
3										

FGI Job # 22.14006900	Project Name FEMA AR		Operator Greg Sliwinski		Unit 165	IMU FMU-300	Ground Temp °C 15.0 15.0		Mn Range' 2018	Data Logger Drives DR680-6						
Flight Date 24-Jan-15	GPS Day 15-024	Lift 30	System R680i	Pilot Roman Rosa	Sun°	Solar Times (UTC)	Flying Temp °C 5.0 5.0		Max Range' 3888	Download Drive EP1TB#10						
Mission ID (yymmdd_Sen_Job_Lift) 150124_165_14006900_30		Aircraft N62912	Airport ID KARG	FMS CCNS 7	UTC -6	Alt (ft) 3200	Speed 150	FOV 60	Scan Rate (Hz) 110	M/A 2	km/WPT 0.364	AltM Setting 29.90 29.90	Humidity @ Alt 31	Shipping Track		
Base 1 ID 5083	Location Walnut Ridge		Rec ID PF01	Ant ID PF01	ARP (m) 1.805	Start Time (UTC) 24-Jan-15 16:45		Stop Time (UTC) 24 Jan 15 2345		GPS Filename G5063B15.024		Operator Greg Sliwinski	Data With AB			
Area	Flight #		Wpt		Distance		UTC		Dir	Altitude (GPS)	Speed (knots)	Scan Rate	Comments and Conditions		SVs	PDOP
	FGI	Client	From	To	Begin	End	Start	End								
							21:27:00	21:32:00					GROUND STATIC		9	1.3
							21:49:00	21:51:00					S TURN		9	1.2
NEL_BLK	16		6	1	1.8	0	21:52:00	21:54:00	W	3,440	150				10	1.1
NEU_BLK	16		1	6	0	1.8	22:07:00	22:08:00	E	3,360	144				10	1.1
	27		1	6	0	1.8	22:13:00	22:14:00	E	3,290	143				10	1.1
	49		1	126	0	45.5	22:21:00	22:26:00	E	3,510	150		LINE ABORTED		10	1
	49		1	126	0	45.5	22:31:00	22:48:00	E	3,355	150				10	1
	49		126	118	45.5	42.6	22:51:00	22:53:00	W	3,300	150		CALIBRATION		9	1.1
	80		10	1	3.3	0	23:06:00	23:07:00	W	3,780	148				9	1
	81		1	10	0	3.3	23:10:00	23:11:00	E	3,840	150				8	1.1
							23:11:00	23:13:00					S TURN		8	1.1
							23:28:00						GROUND STATIC			

Trajectory and GPS Plots:

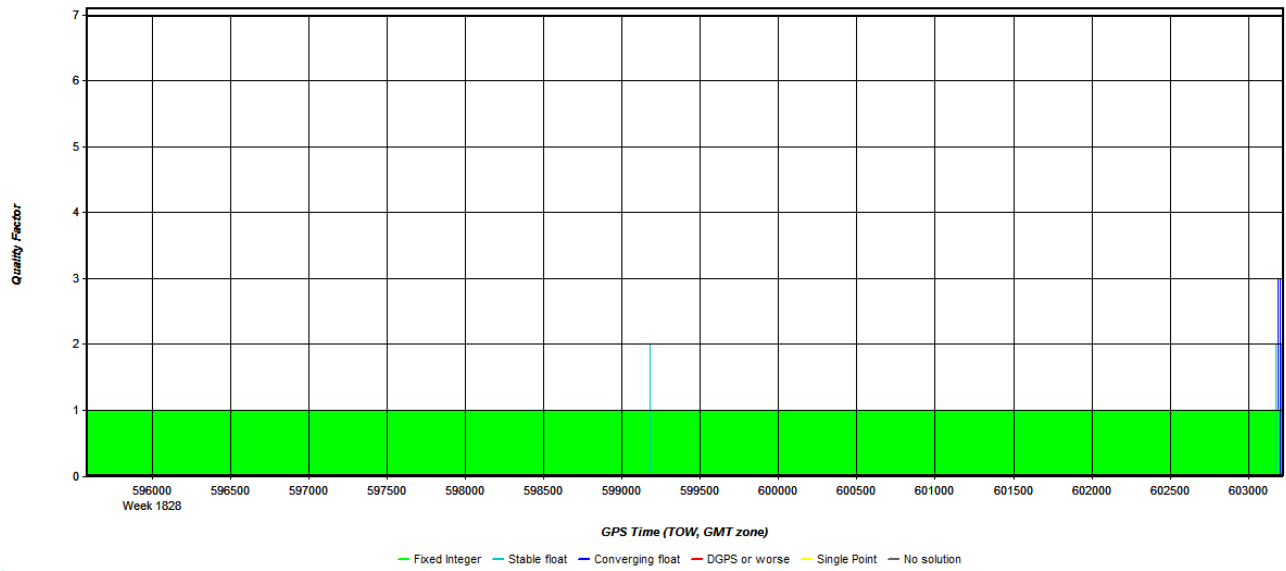


Estimated Accuracy

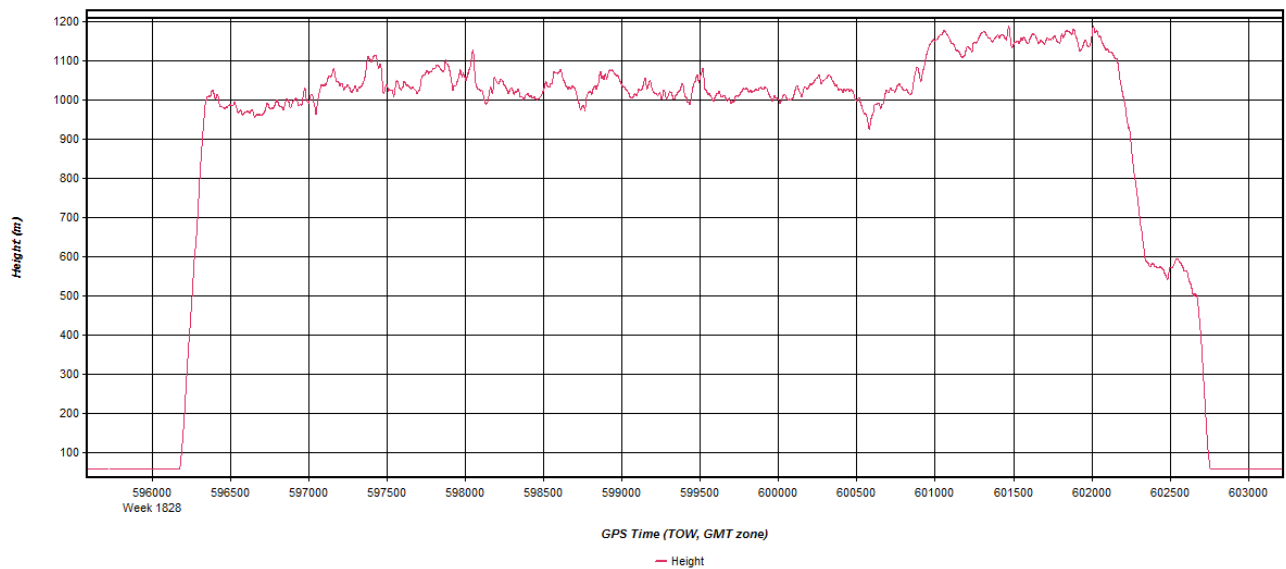




Quality Factor

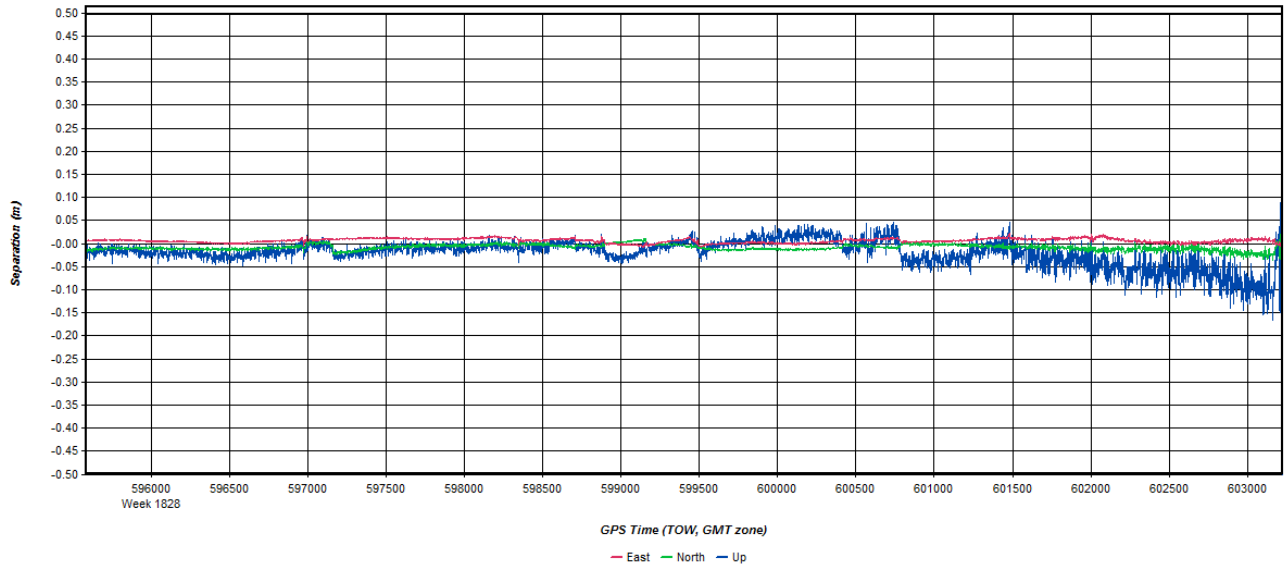


Height

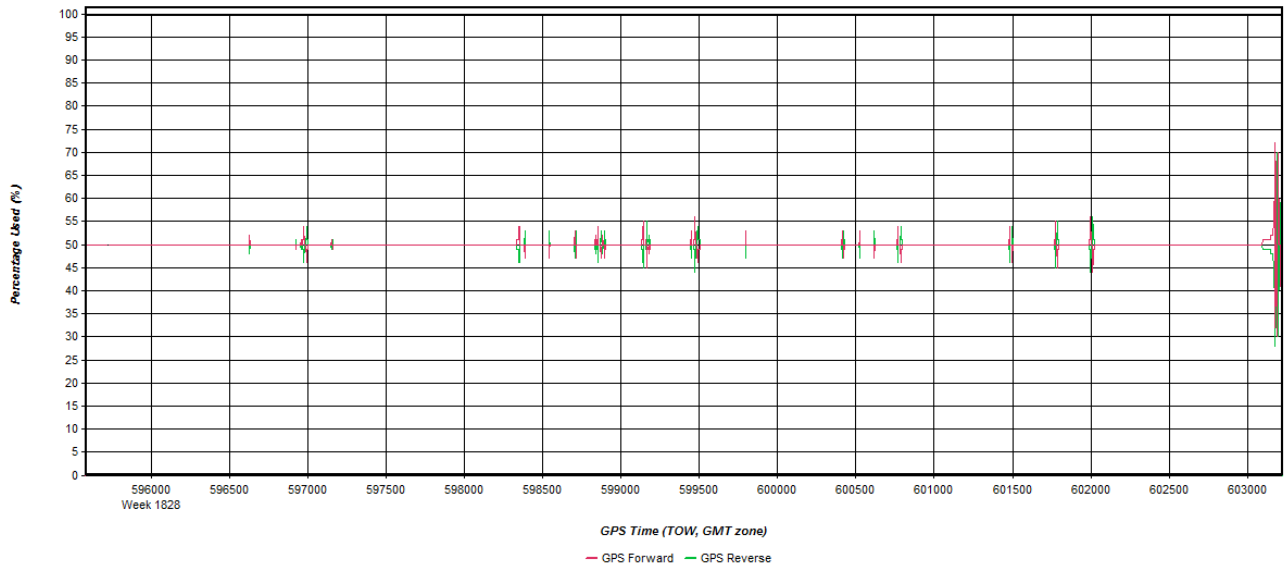




Combined Forward/Reverse Separation

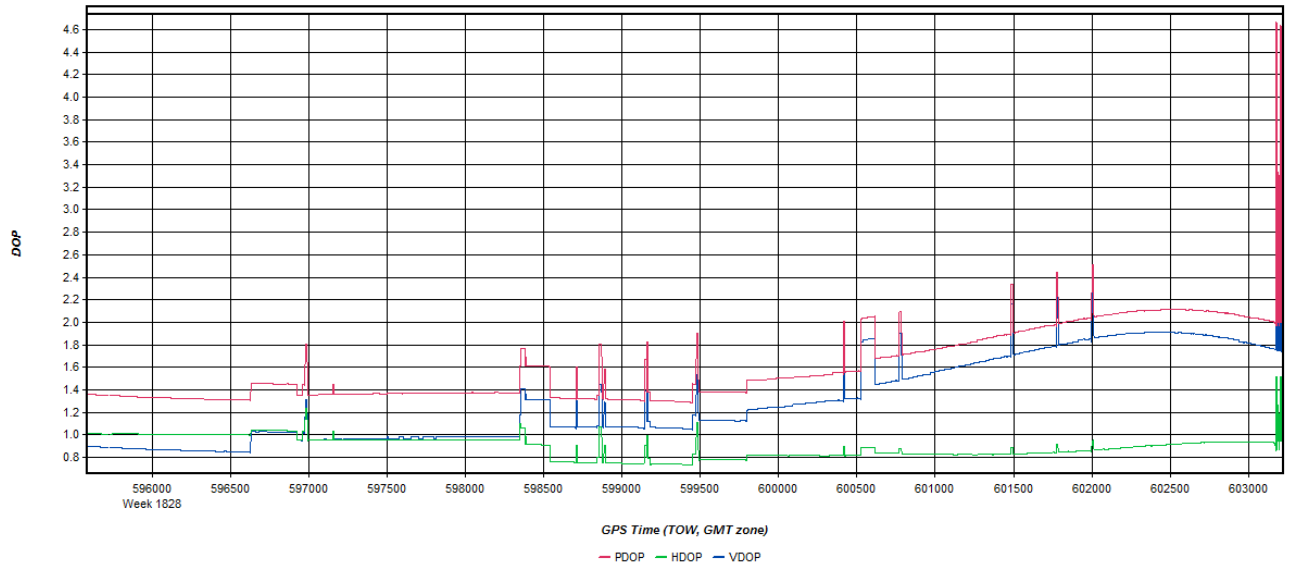


Combined Forward/Reverse Weighting

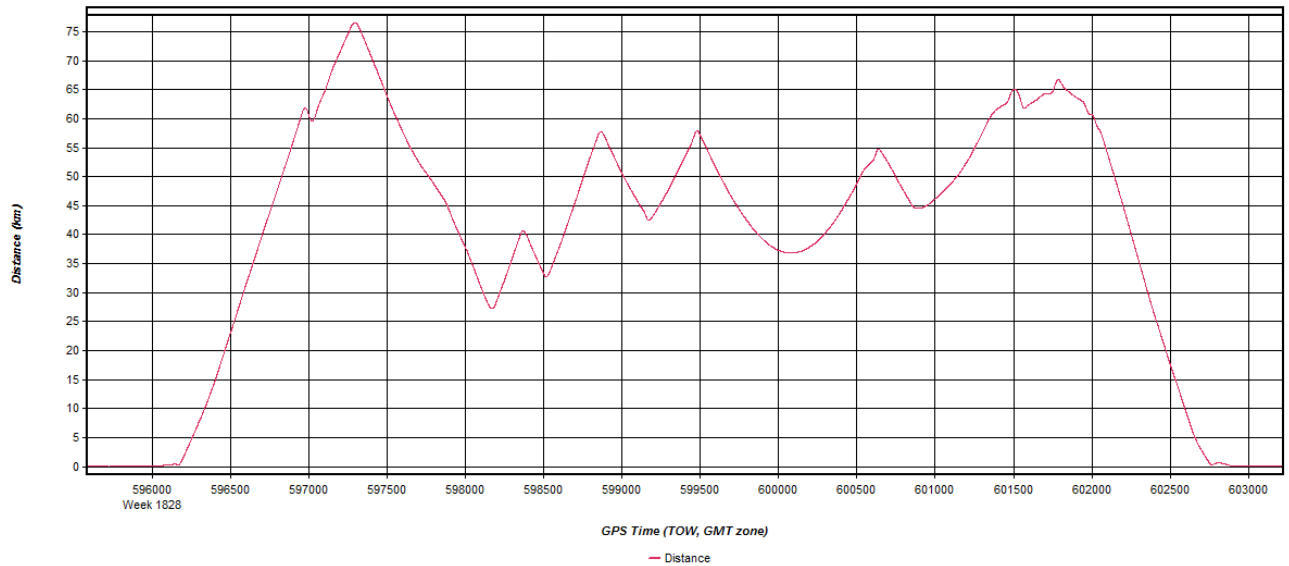




PDOP

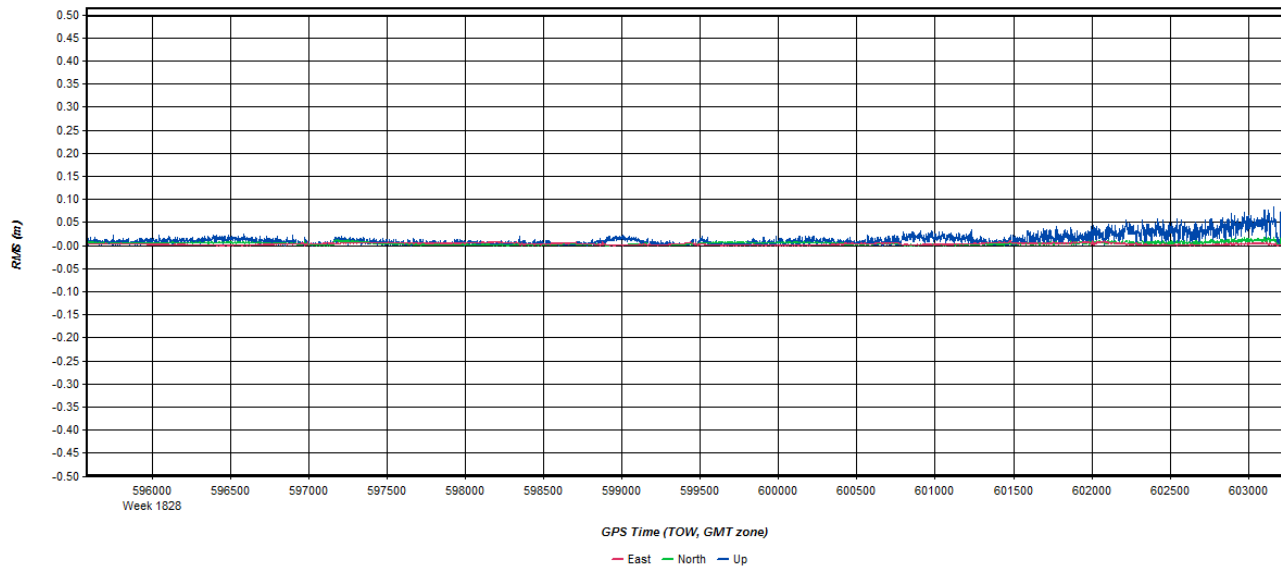


Distance from Base





Combined RMS



SVs

