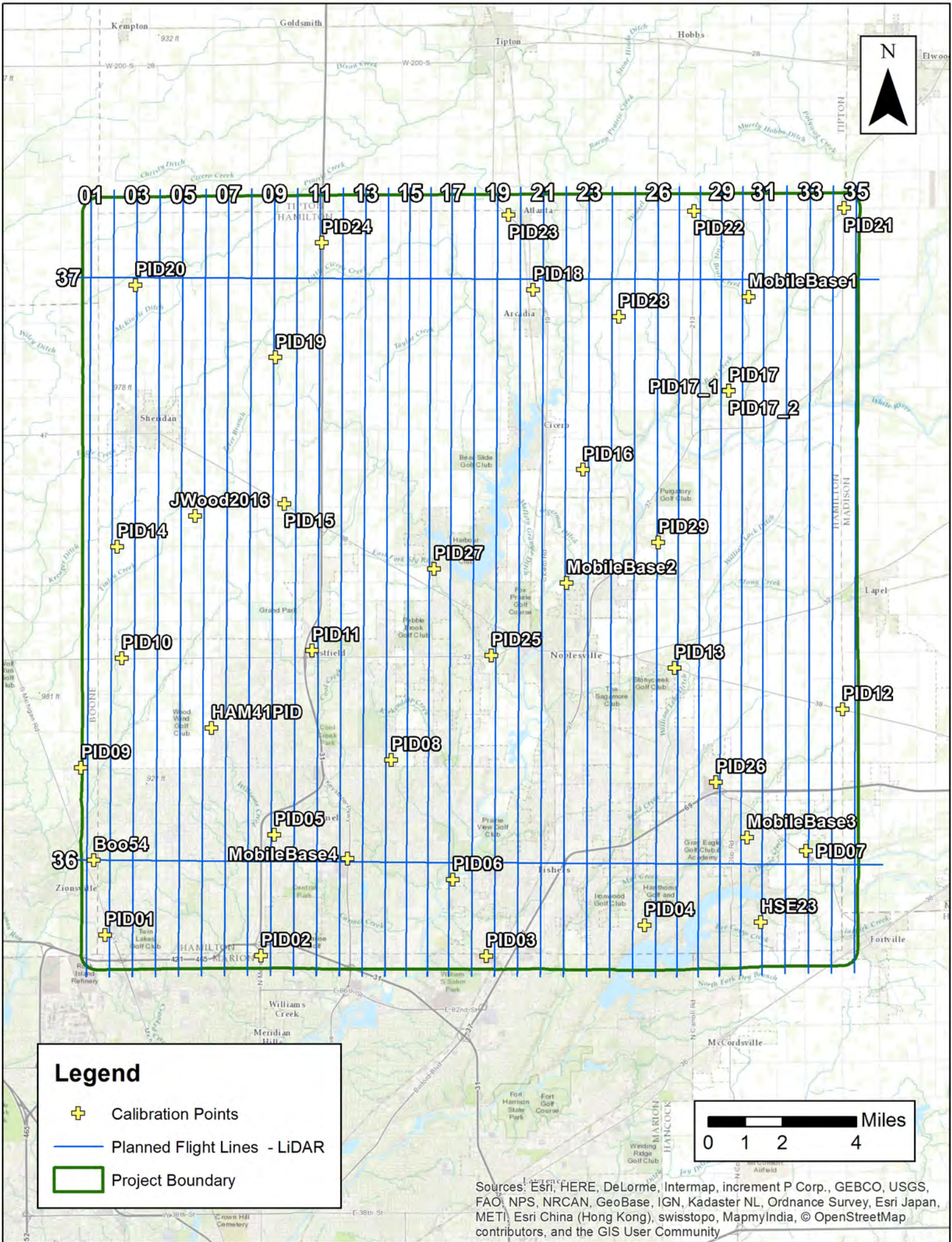


## Project Report Appendices

The following section contains the appendices as listed in the Hamilton County, IN Digital Orthoimagery, LiDAR, and Planimetrics Project Report.

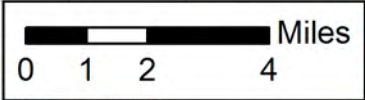
## Appendix A

# LiDAR Flight Map



### Legend

- + Calibration Points
- Planned Flight Lines - LiDAR
- Project Boundary

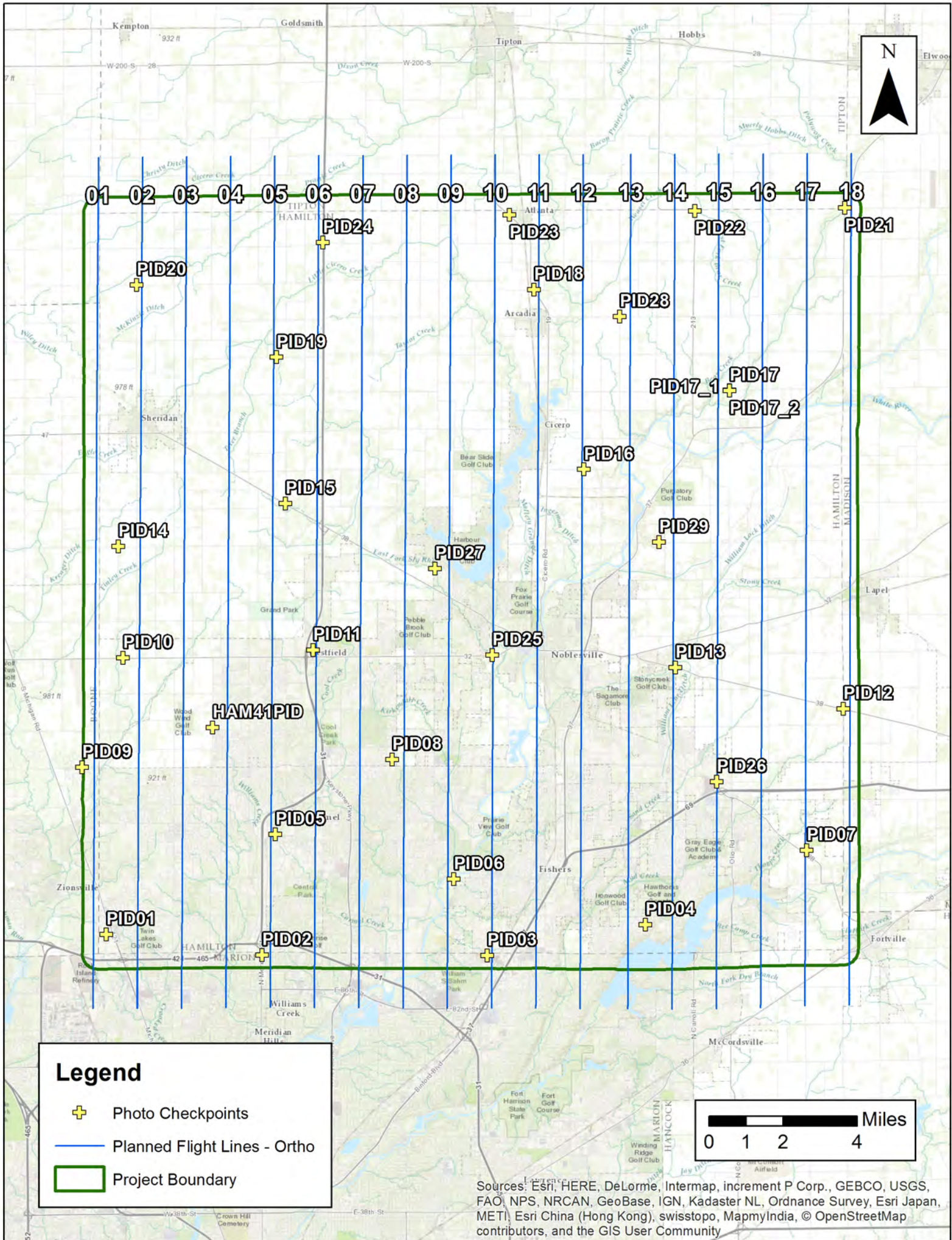


Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

## Appendix B

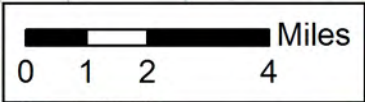
# Imagery Flight Map





### Legend

- + Photo Checkpoints
- Planned Flight Lines - Ortho
- Project Boundary



Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

## Appendix C

# Camera Calibration Report



# Leica ADS100 Calibration Certificate



<i>This certificate is valid for</i>	Sensor Head	Serial Number	Control Unit	Serial Number
	<b>SH100</b>	<b>10542</b>	<b>CC33</b>	<b>33509</b>
<i>Calibration certificate issued on</i>	IMU	Serial Number	Inspector	
	<b>CUS6</b>	<b>56073751</b>	<i>M. Adigüzel</i> <b>Muzaffer Adigüzel</b>	

*Certificate and calibration data ID* **807905\_10542\_160215-1**  
*Document Code* **807905**

Leica Geosystems AG  
Heinrich-Wild-Strasse  
9435 Heerbrugg  
Switzerland

- when it has to be **right**

**Leica**  
Geosystems

## Components

Component	Device	Type	Serial Number
SH100 # 10542	Lens system	DO65	0053
	Beam Splitter	Standard	2014-0033
	Focal Plate Module (FPM)	FPM	11072014-021
	Inertial Measurement Unit	CUS6 - uIRS	56073751
CC33 # 33509	Positioning system incl. GPS/GLONASS	SPAN	BMAW14350053J

## Nominal FPM layout of tested system

### Reference line positions

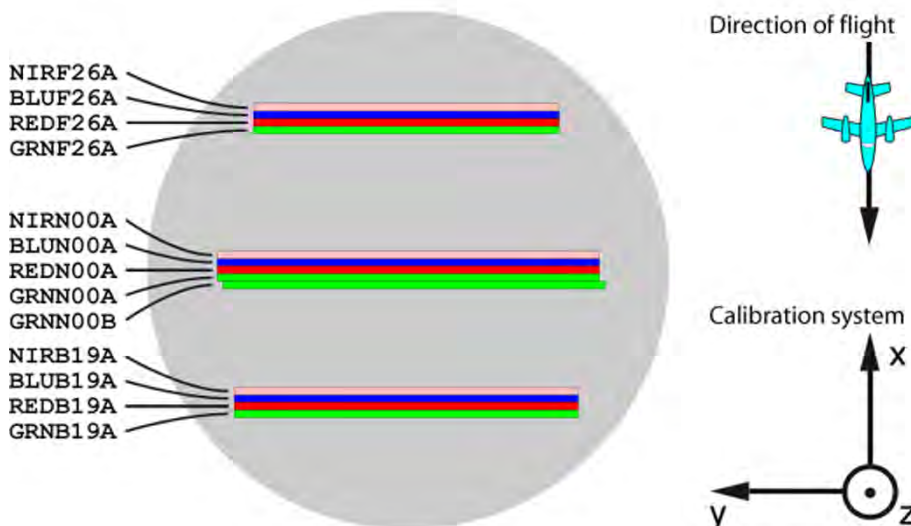
Line	X [mm]	Y [mm] Pixel 1	Y [mm] center of line	Y[mm] Pixel 20064	Usable length [pixels]
GRNF26A	30.0000	-50.1575	0.0000	50.1575	16000
GRNN00A	0.0000	-50.1575	0.0000	50.1575	20012
GRNB19A	-22.0000	-50.1575	0.0000	50.1575	18330

### Positions of other lines, relative to reference line

Line	Reference	$\Delta X$ [mm]	$\Delta Y$ [mm]
GRNN00B	GRNN00A	0.0025	0.0025
BLUxxxA	GRNxxxA	0.0000	0.0000
REDxxxA	GRNxxxA	0.0000	0.0025
NIRxxxA	GRNxxxA	0.0000	0.0025

### View from top of Sensor Head

ADS100  
FPM Layout SH100 Sensor Head





## Calibration process

### Adjustment and calibration of optical systems in optical laboratory


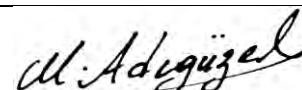
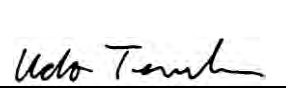
	Passed	Date	Inspector
<i>DSNU (Dark Signal Non Uniformity)</i>	<b>ok</b>	<b>09.02.2016</b>	Bernhard Riedl
<i>PRNU (Photo Response Non Uniformity)</i>	<b>ok</b>	<b>09.02.2016</b>	Bernhard Riedl
<i>Image sharpness</i>	<b>ok</b>	<b>09.02.2016</b>	Bernhard Riedl
<i>Best image plane</i>	<b>ok</b>	<b>09.02.2016</b>	Bernhard Riedl
<i>Relative geometry of staggered and multispectral lines</i>	<b>ok</b>	<b>09.02.2016</b>	Udo Tempelmann

### Flight and data processing

	Passed	Date	Inspector
<i>Test flight</i>	<b>ok</b>	<b>10.02.2016</b>	Deniz Arslan
<i>GNSS and IMU data processing</i>	<b>ok</b>	<b>12.02.2016</b>	Muzaffer Adigüzel
<i>IMU accelerometer biases</i>	<b>ok</b>	<b>12.02.2016</b>	Muzaffer Adigüzel
<i>IMU latency</i>	<b>ok</b>	<b>12.02.2016</b>	Muzaffer Adigüzel
<i>Image data processing</i>	<b>ok</b>	<b>12.02.2016</b>	Muzaffer Adigüzel
<i>Geometry of reference lines</i>	<b>ok</b>	<b>15.02.2016</b>	Muzaffer Adigüzel

## Inspection

### Inspectors

<i>Name</i>	<b>Bernhard Riedl</b>	<b>15.02.2016</b>	
<i>Position</i>	ADS Production Manager		
<i>Name</i>	<b>Muzaffer Adigüzel</b>	<b>15.02.2016</b>	
<i>Position</i>	ADS Support Engineer		
<i>Name</i>	<b>Udo Tempelmann</b>	<b>15.02.2016</b>	
<i>Position</i>	Manager System Engineering		

## Maintenance

<i>Last date of service</i>	
<i>Recommendations</i>	

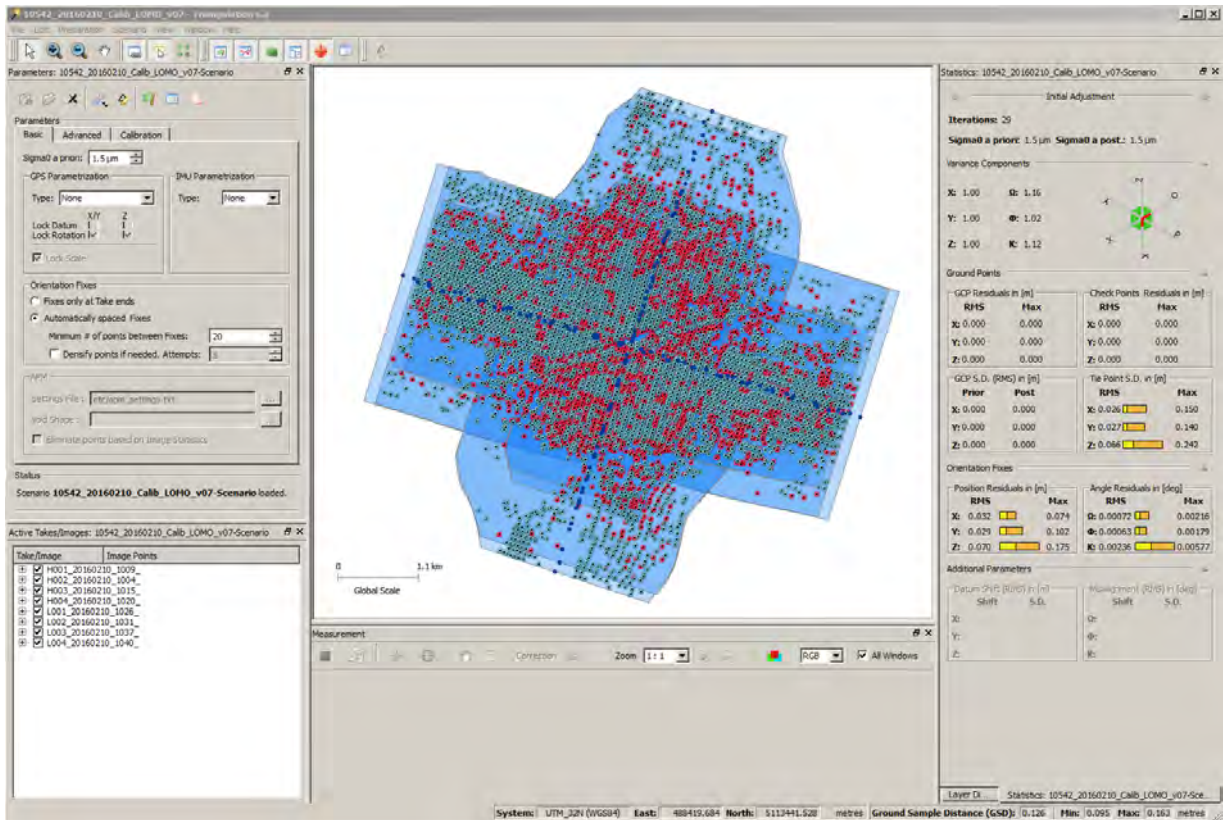
## Results of geometrical calibration

Calibrated apparent pixel coordinates for all sensor lines are contained on the calibration file attached to this certificate. File: 10542\_160215-1.zip

### Stereo lines

A-lines	GRNN00A	GRNF26A	GRNB19A
Calibration method	Estimation of additional parameters in simultaneous bundle adjustment		
Sigma naught of bundle adjustment	1.5 micron		
Mean local redundancy	> 0.5		
Accuracy of calibrated apparent pixel coordinates	±1.0 micron		

Final bundle adjustment result:



### ***IMU misalignment***

Misalignment results in [deg]:	$\omega =$	-0.00699	$\pm 0.00019$
	$\phi =$	-0.01475	$\pm 0.00019$
	$\kappa =$	0.04511	$\pm 0.00024$

### ***Staggered green and multispectral lines***

Staggered green	GRNN00B
Multispectral	BLUN00A REDN00A NIRN00A BLUF26A REDF26A NIRF26A BLUB19A REDB19A NIRB19A
Calibration method	Offsets to GRNN00A GRNF26A GRNB19A by sub-pixel correlation on image pairs of vertical and horizontal bar patterns, taken with defined rotation speed in the goniometer.
Accuracy of offsets to the green reference band:	$\pm 0.1$ micron



## Appendix D

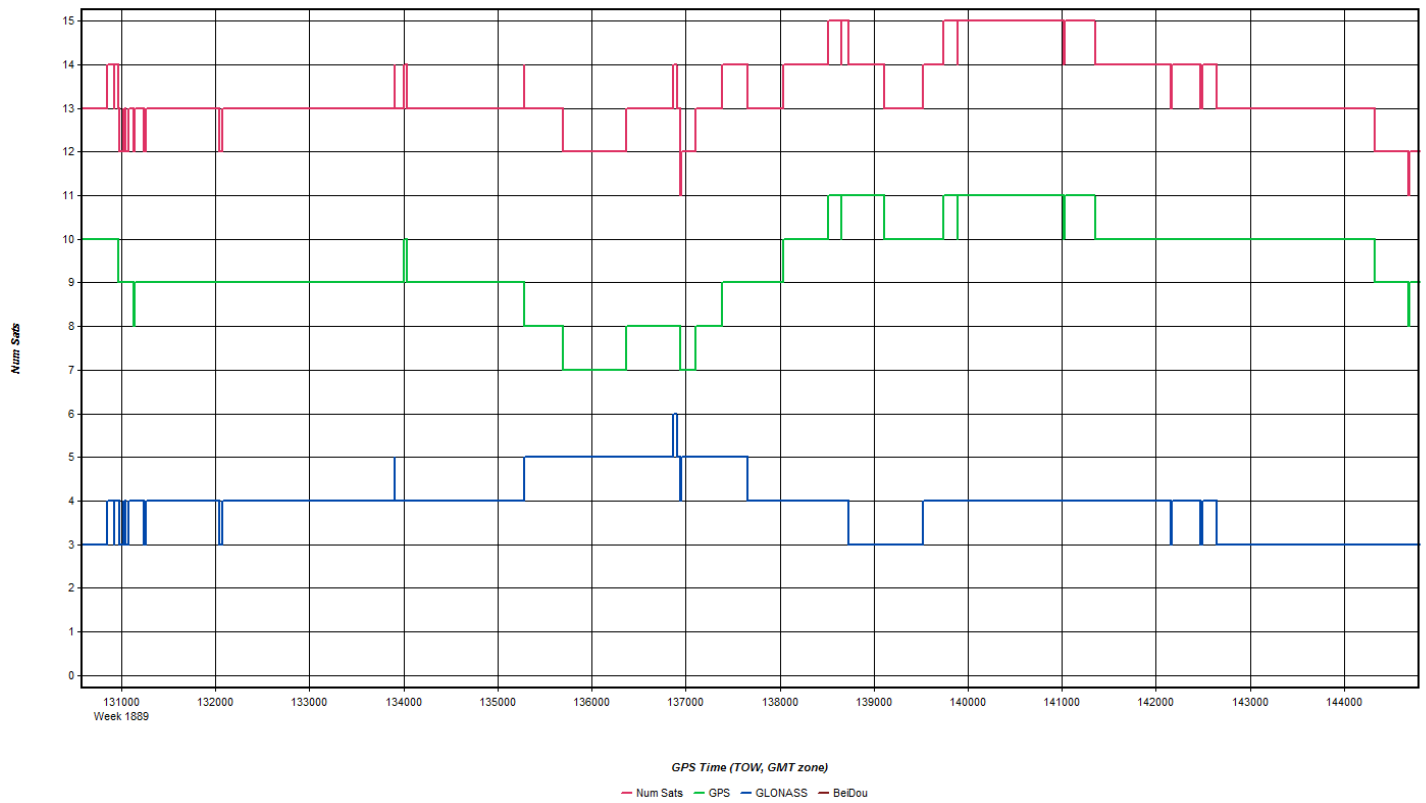
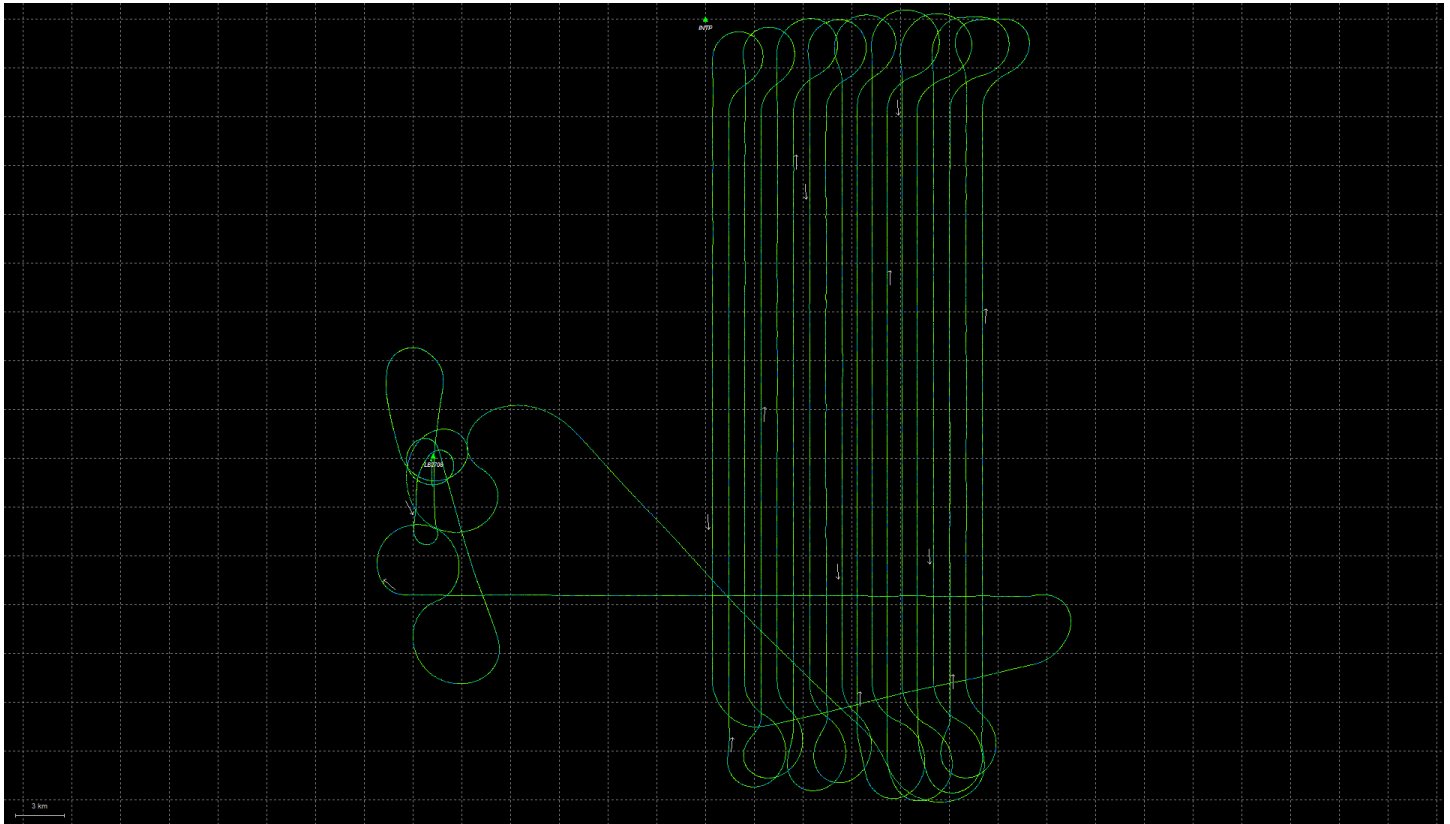
# GPS/IMU Processing Statistics Flight Logs

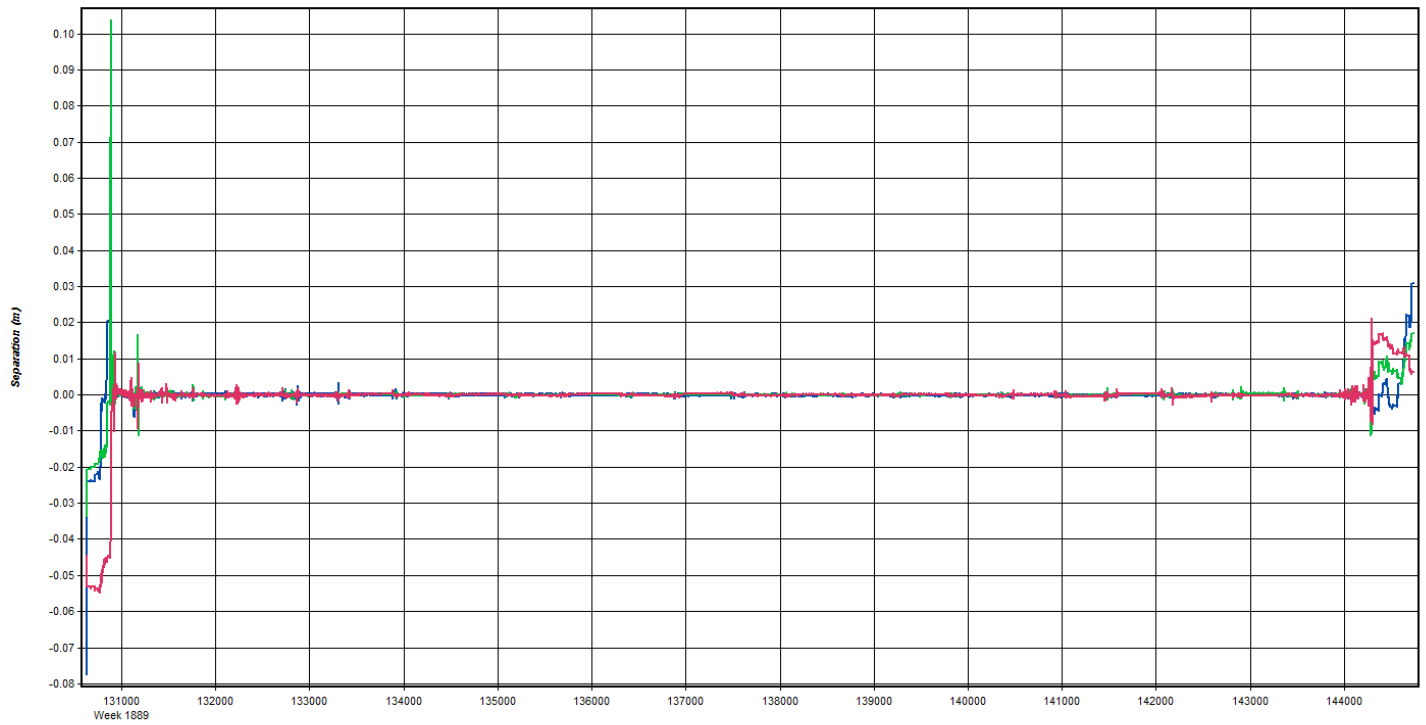
There were two total lifts. Graph reports generated from processing software and flight logs are found on the following pages.

<b>Mar 21, 2016-A (N73TM, SN7178) .....</b>	<b>2</b>
<b>Flight Log .....</b>	<b>10</b>
<b>Mar 22, 2016-A (N73TM, SN7178) .....</b>	<b>11</b>

# Mar 21, 2016-A (N73TM, SN7178)

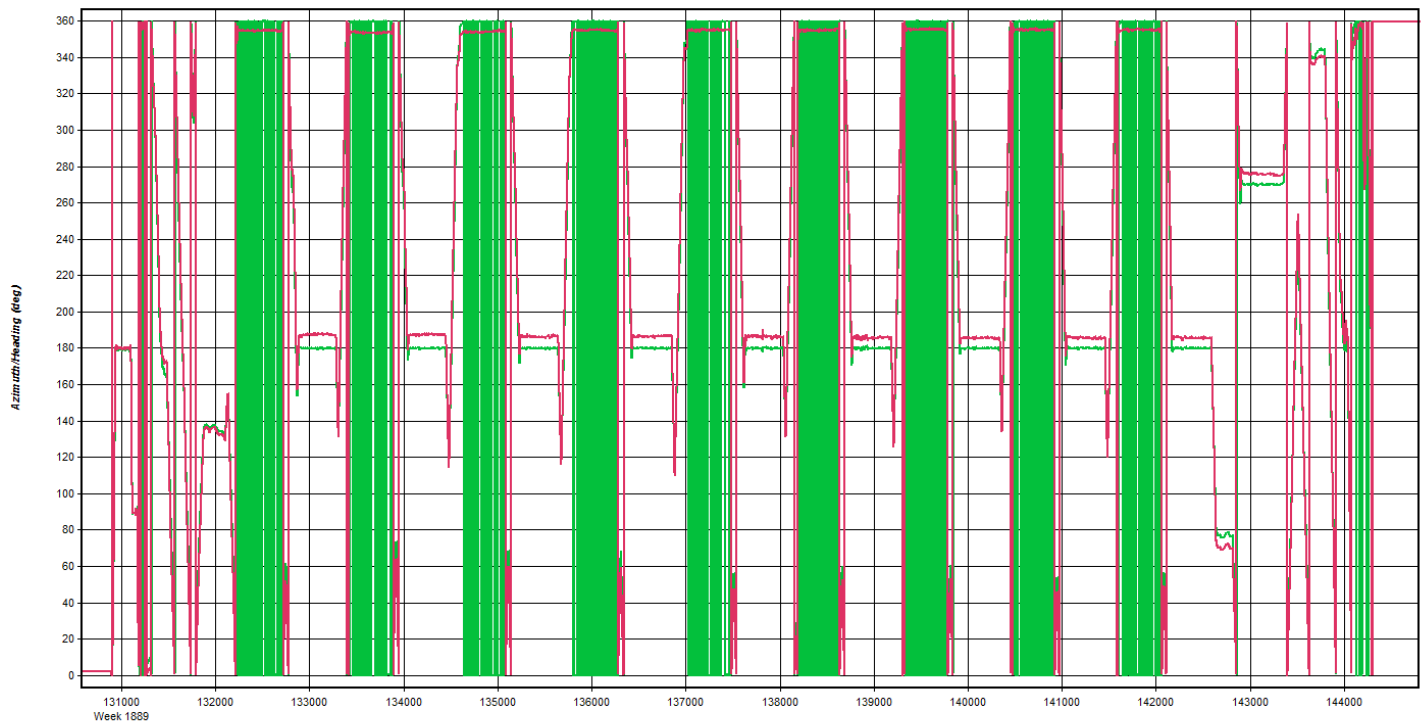






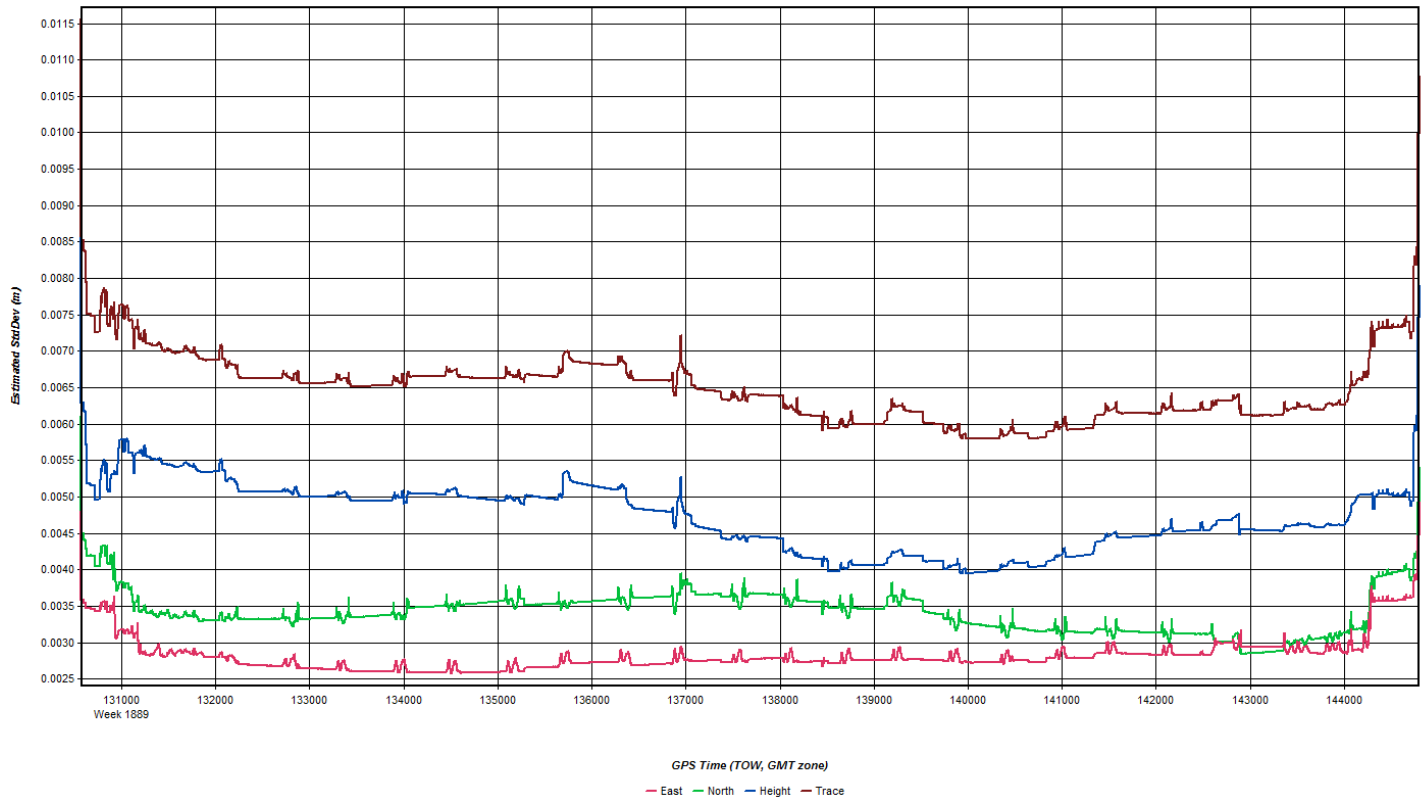
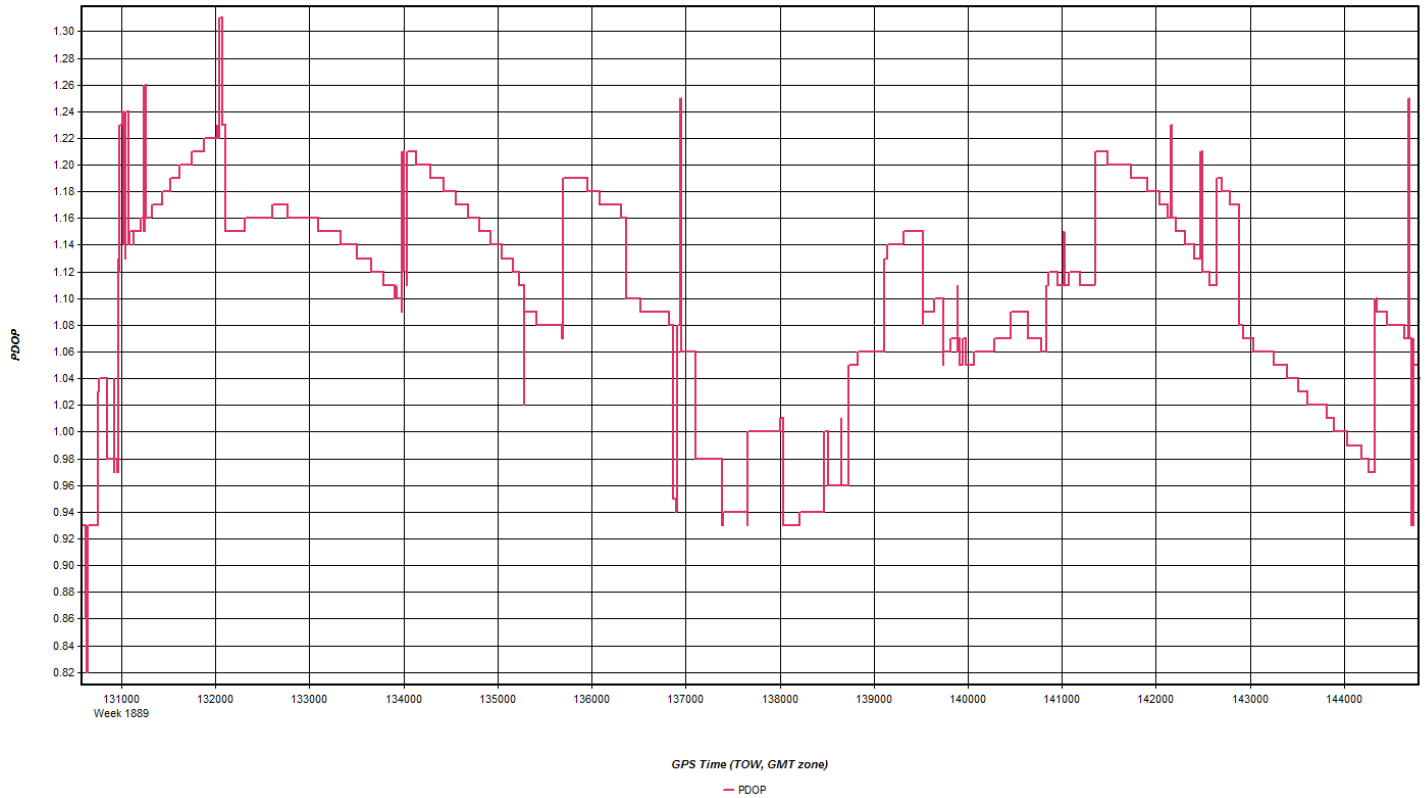
GPS Time (TOW, GMT zone)

— East — North — Up

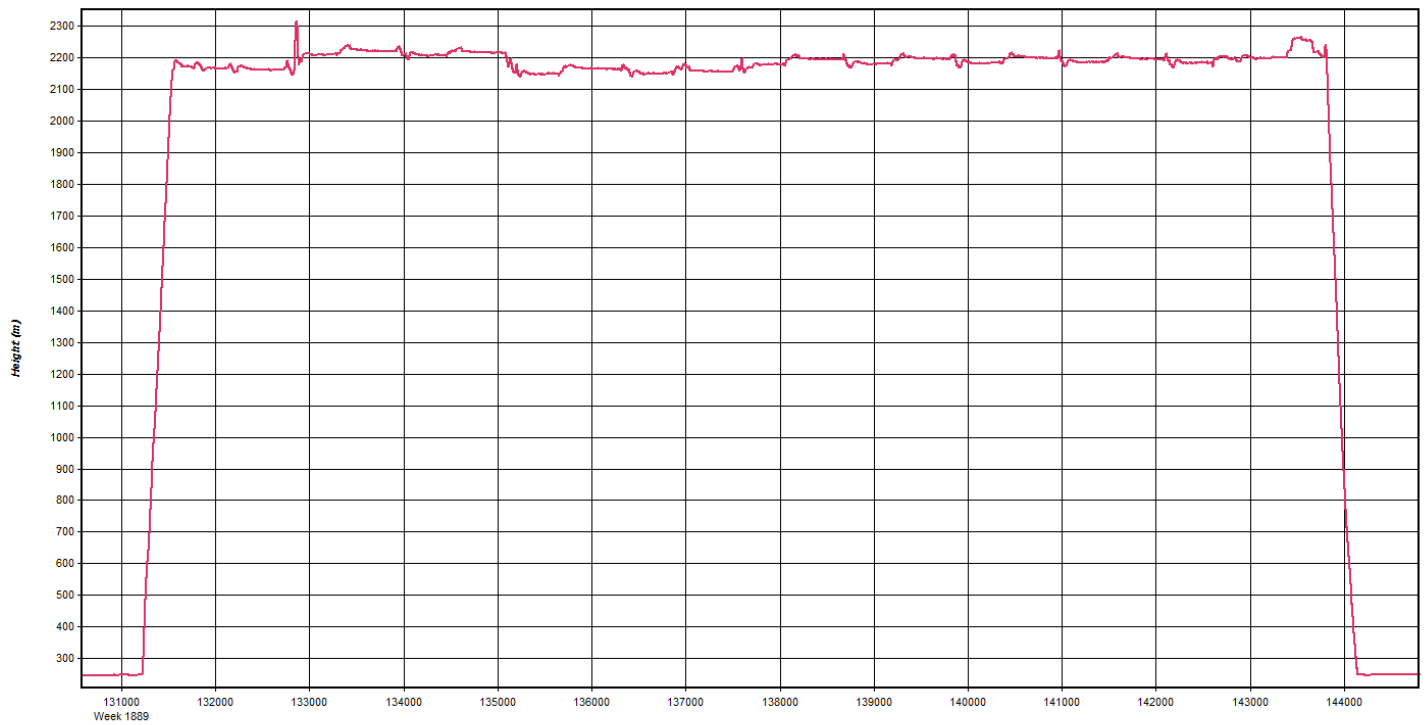
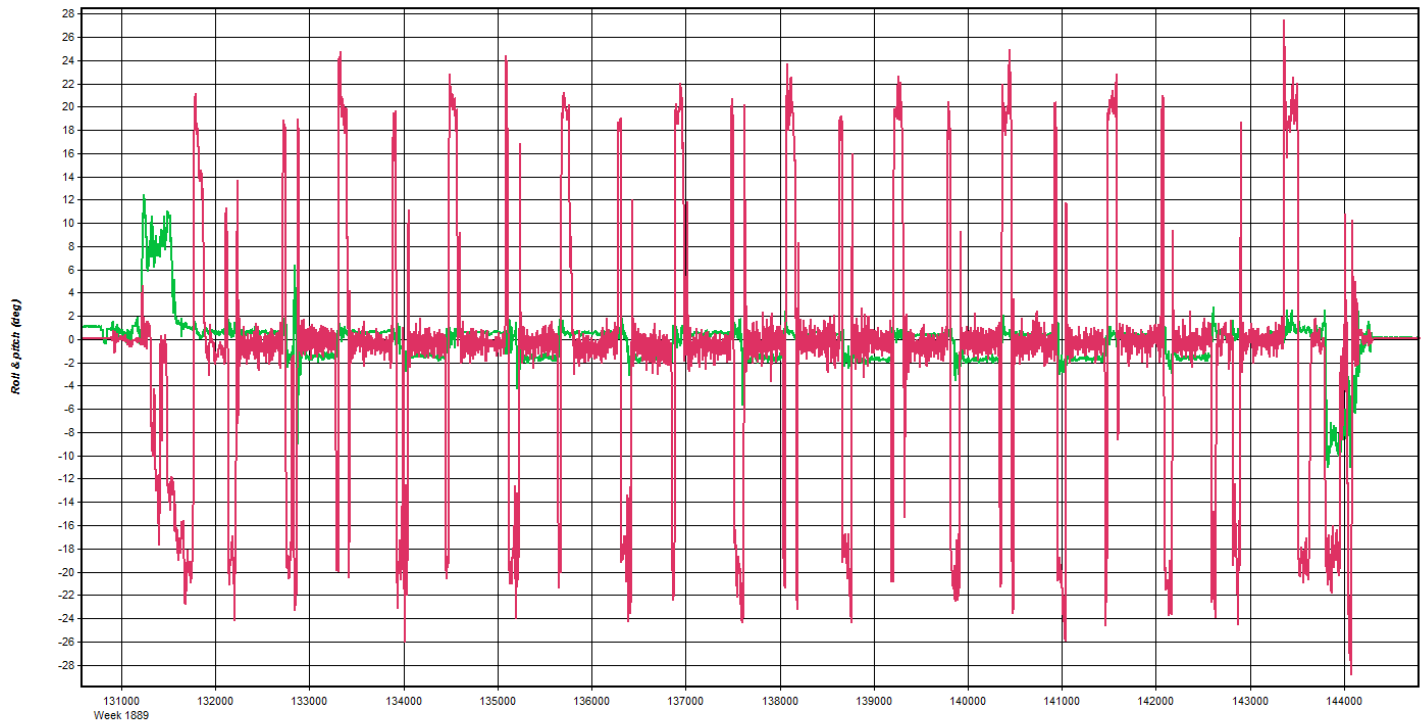


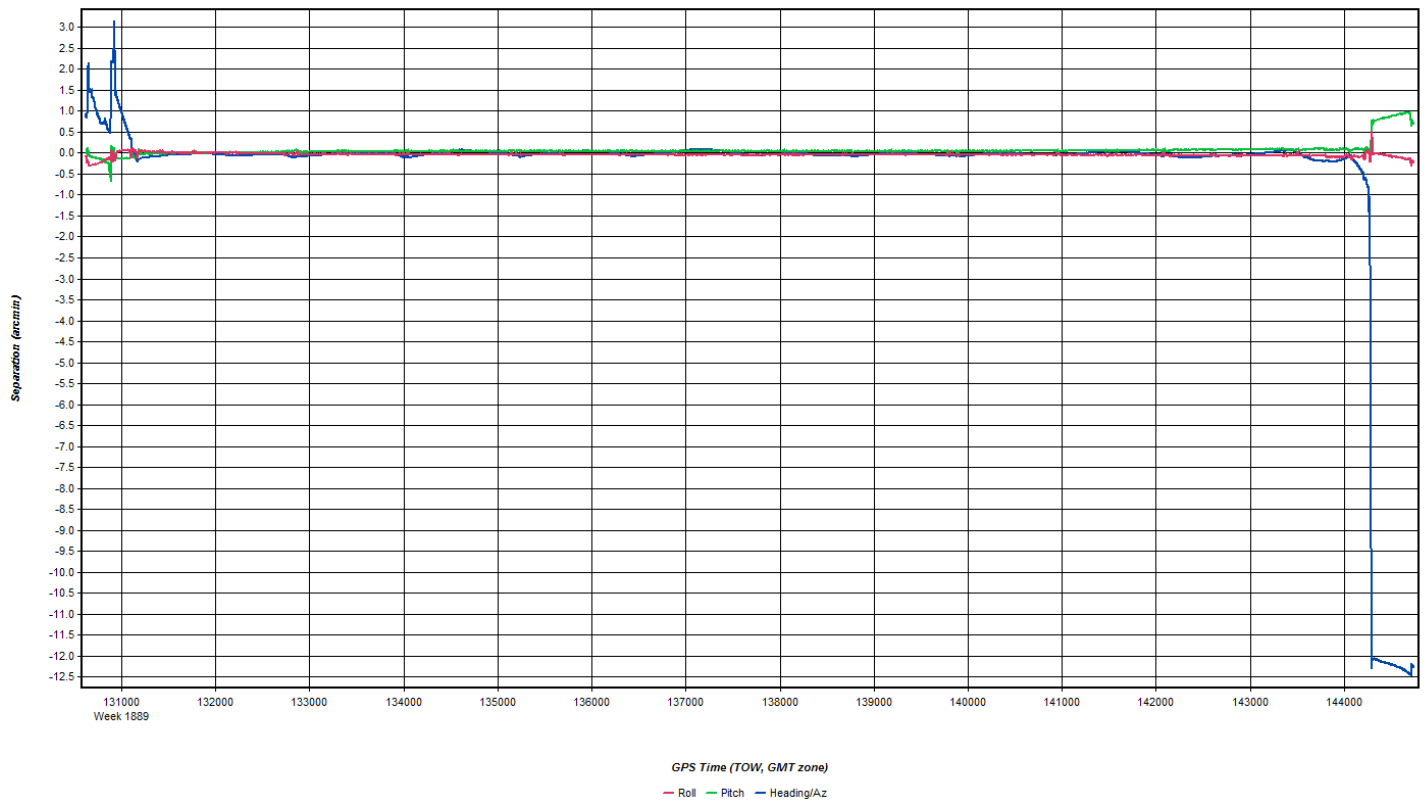
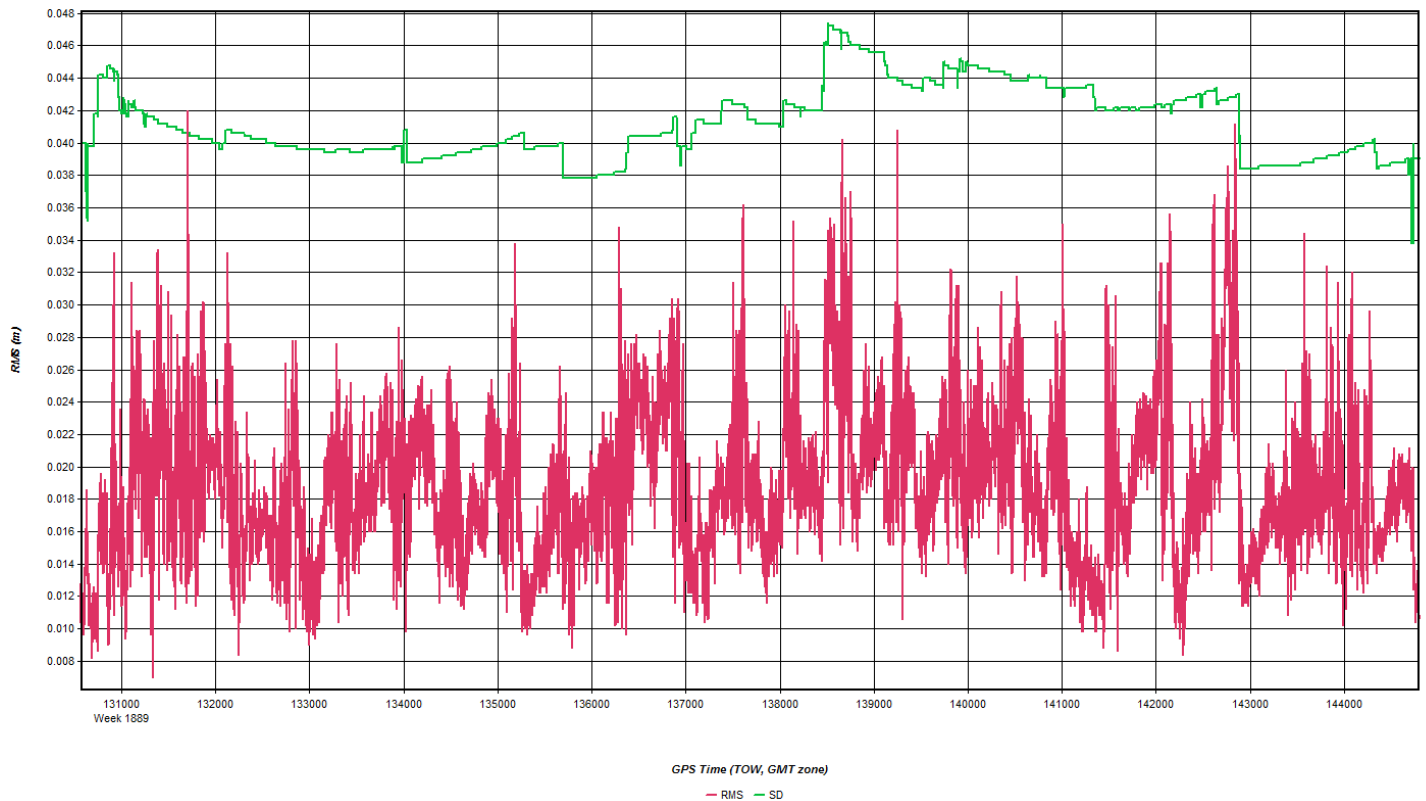
GPS Time (TOW, GMT zone)

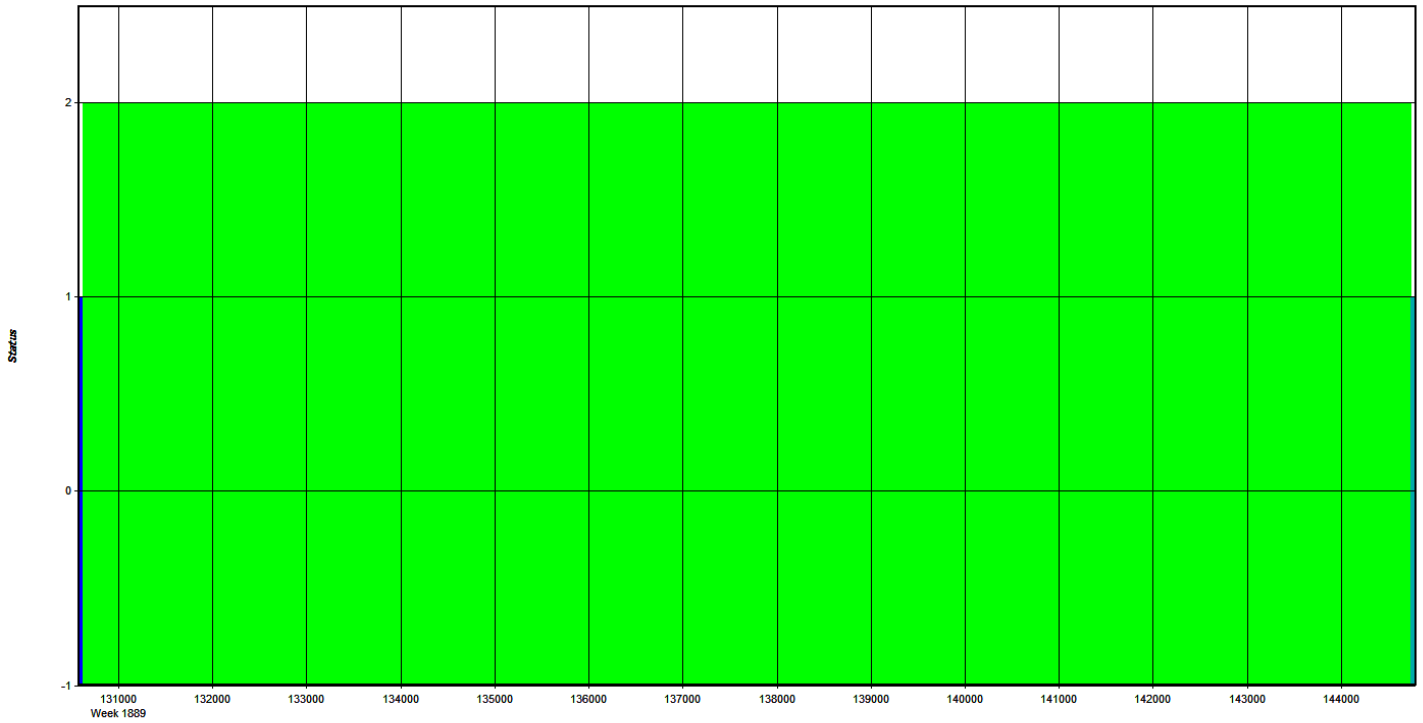
— Heading/Azimuth — GPS-COG











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

**Coordinate/Antenna Settings**

Master Remote

Base Station  
 1: INTP Name: INTP  Disabled  
 File: F:\Proc\28170\_HamiltonCo\IN\160321A-7178\intp0810.gpb

Coordinates  
 Latitude: North 40 16 49.30690   
 Longitude: West 86 03 19.84556   
 Ellipsoidal height: 236.736 m   
 Datum: WGS84

Antenna Height  
 From station file: LEIAX1202GG, NONE   
 Antenna profile: LEIAX1202GG   
 Measured height: 0.000 m  
 ARP to L1 offset: 0.063 m  
 Applied height: 0.063 m  
 Measured to:  
 ARP  
 L1 Phase Centre

Coordinate/Antenna Settings

Master Remote

Base Station  
2: LB2708 Name: LB2708  Disabled  
File: F:\Proc\28170\_HamiltonCo\IN\160321A-7178\GPSbase\0008081

Coordinates  
Latitude: North 40 02 22.76753 Compute from PPP  
Longitude: West 86 15 06.33550 Enter Grid Values  
Ellipsoidal height: 246.920 m Enter MSL Height  
Datum: WGS84 Datum Options  
Select From Favorites Add To Favorites Use Average Position

Antenna Height  
From station file: N/A View STA File  
Antenna profile: NOV702GG Info  
Measured height: 1.500 m  
ARP to L1 offset: 0.067 m  
Applied height: 1.567 m  
Measured to  
 ARP  
 L1 Phase Centre  
Compute From Slant

OK Cancel

# Flight Log

**Project:** HAMILTON CO., INDIANA  
**Date:** MARCH 21st, 2016  
 (email: log daily to flight\_log\_distribution\_list@quantumspatial.com) (20160321-121319) Pg 1 of 1

**Flight Mgmt File:** HAMILTON COUNTY  
**Tech:** P. HRABAK

**Altcraft:** N73TM  
**Pilot:** J. BILLINGTON  
**Co-Pilot:** -

**Dep Apt:** KTYQ  
**Arr Apt:** KTYQ  
**Arr Time (Local):** 12:02 (Z): 16:02  
**Tot Time Aloft:** 3:36

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

**GPS Unit:** (Y) N Sta 1: "TEREX"(SAS) 101798 Sta 2: -  
**Flyovers:** Y / (N) IF Y, times: Sta1) (STATIC) Sta2) -

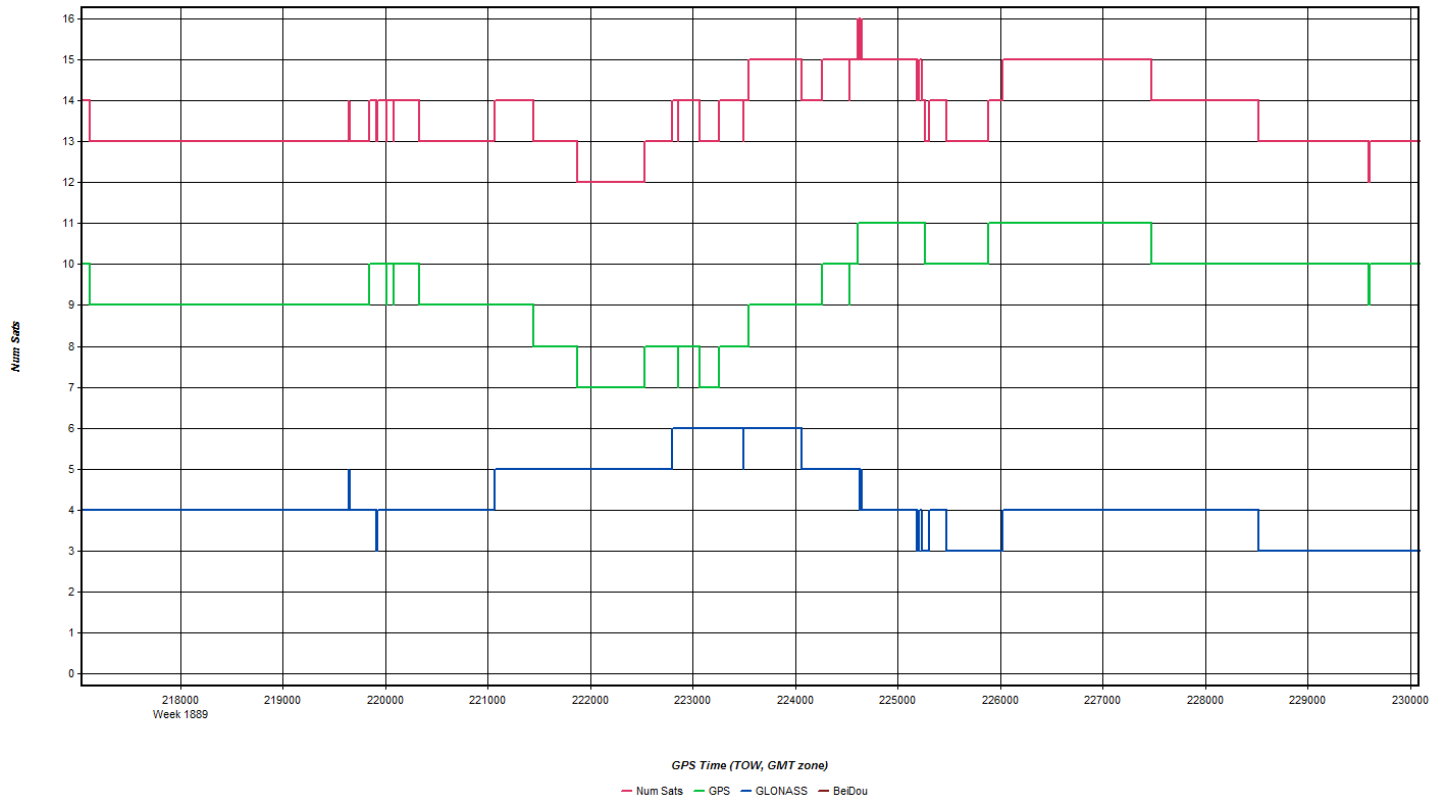
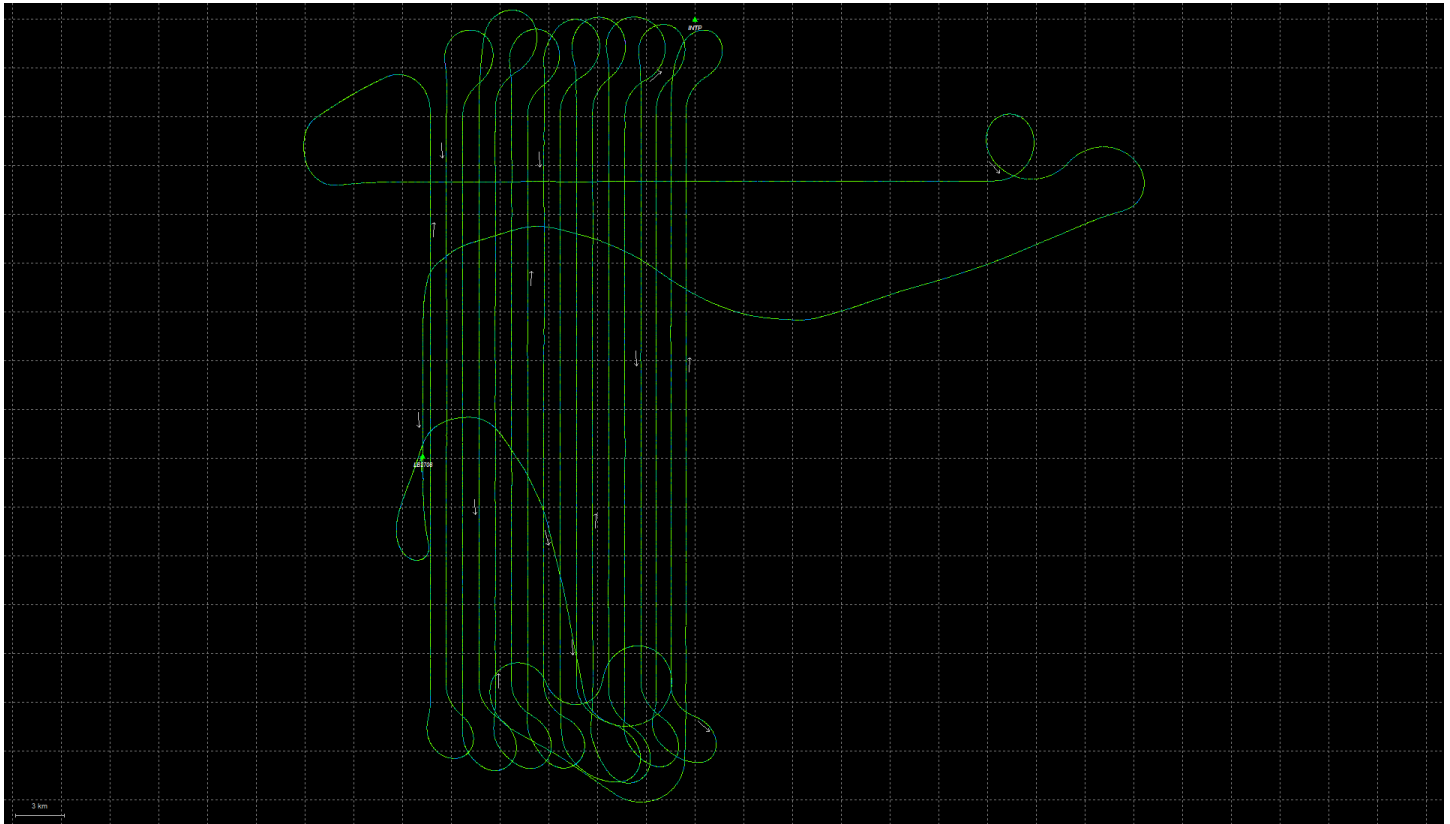
**Gd Temp beg:** -02 °C End: +05 °C OAT beg: 06 °C End: -06 °C Altimeter beg: 30.17" end: 30.21"  
**Alt:** AMSL 6400' AGL 7178' MSL 7270' Avg Terr: 880' Max Gdspd: 170 kt. Spacing: ?  
**Power:** 100% IFSM: ?

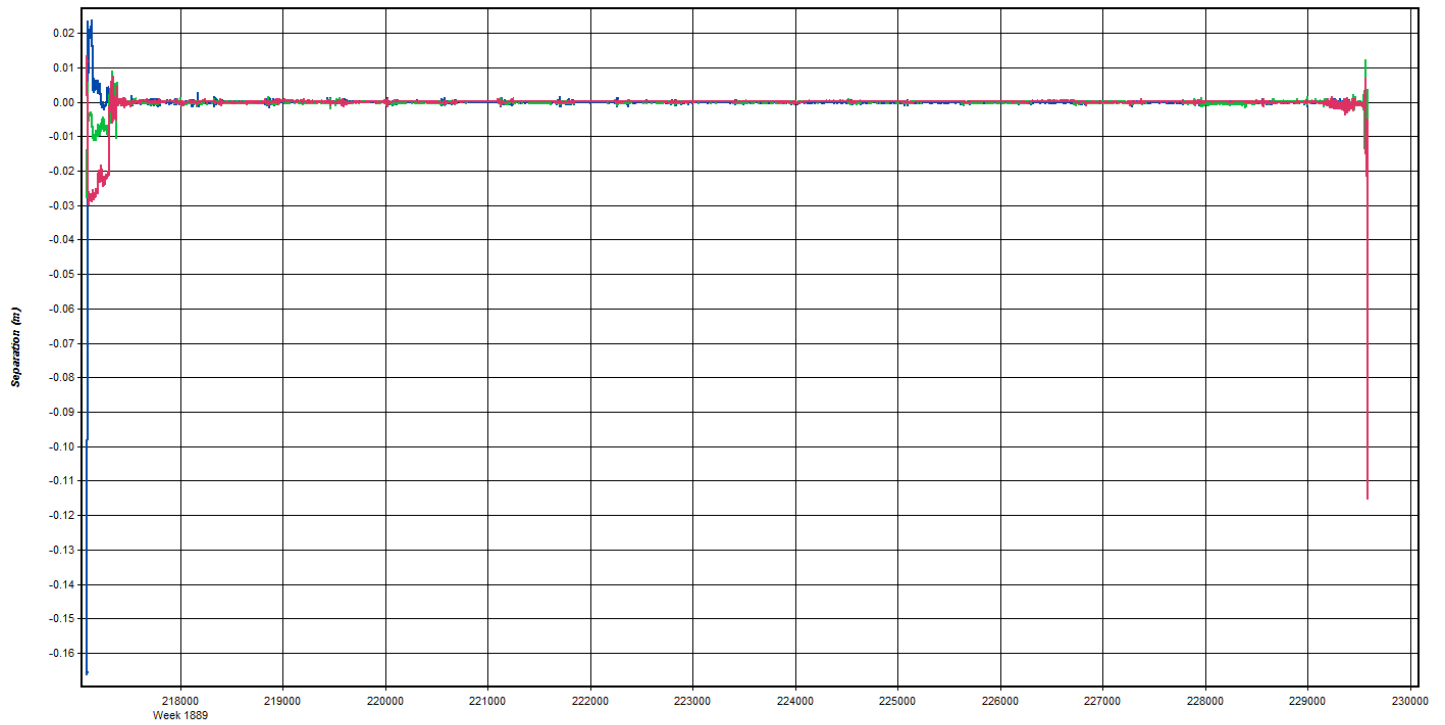
Line #	Hdg	Start (UTC)	End (UTC)	GdSpd	POB/Alt	GPS Altitude	Turb (0-1)	Crab	Remarks
035	N	12:44	12:51	155 kts	1.3/18	7120'	5°	0	-h-z, skc above & below,
034	S	12:55	13:01	180 kts	1.2/18	7200'	7°	0	-h-z, skc above & below, 30 kt. tailwind
033	N	13:04	13:11	155 kts	1.2/18	7300'	6°	0	-h-z, skc above & below
032	S	13:14	13:20	180 kts	1.3/17	7250'	8°	0	-h-z, skc above & below, 30 kt. tailwind
031	N	13:23	13:31	155 kts	1.2/18	7250'	7°	0	-h-z, skc above & below
030	S	13:34	13:40	180 kts	1.3/18	7080'	7°	0	-h-z, skc above & below, 30 kt. tailwind
029	N	13:43	13:50	155 kts	1.1/18	7100'	6°	0	-h-z, skc above & below
028	S	13:54	14:00	175 kts	1.0/20	7070'	7°	0	-h-z, skc above & below, 30 kt. quartering tailwind
027	N	14:04	14:11	160 kts	1.0/18	7080'	5°	0	-h-z, skc above & below
026	S	14:13	14:20	175 kts	1.0/19	7150'	7°	0	-h-z, skc above & below, 30 kt. quartering tailwind
025	N	14:23	14:30	160 kts	1.0/18	7200'	4°	0	-h-z, skc above & below
024	S	14:33	14:39	175 kts	1.1/17	7180'	5°	0	-h-z, skc above & below, 30 kt. quartering tailwind
023	N	14:42	14:49	160 kts	1.0/20	7220'	5°	0	-h-z, skc above & below
022	S	14:52	14:58	175 kts	1.1/18	7180'	5°	0	-h-z, skc above & below, 25 kt. quartering tailwind
021	N	15:01	15:08	160 kts	1.2/18	7240'	4°	0	-h-z, skc above & below
020	S	15:11	15:17	175 kts	1.1/18	7180'	6°	0	-h-z, skc above & below, 25 kt. quartering tailwind
019	N	15:20	15:27	160 kts	1.1/18	7220'	4°	0	-h-z, skc above & below
018	S	15:29	15:36	175 kts	1.3/17	7180'	7°	0	-h-z, clear above, few below nearby, 25 kt. quartering tailwind

**Total Proj Lines:** 37  
**Lines Flown:** 19  
**Lines Remain:** 18  
**Online Time:** 3:05  
**Mob Time:** 0:31  
**Notes:** 20160321-121319 & -121542  
 (ARMED FOR FUEL)

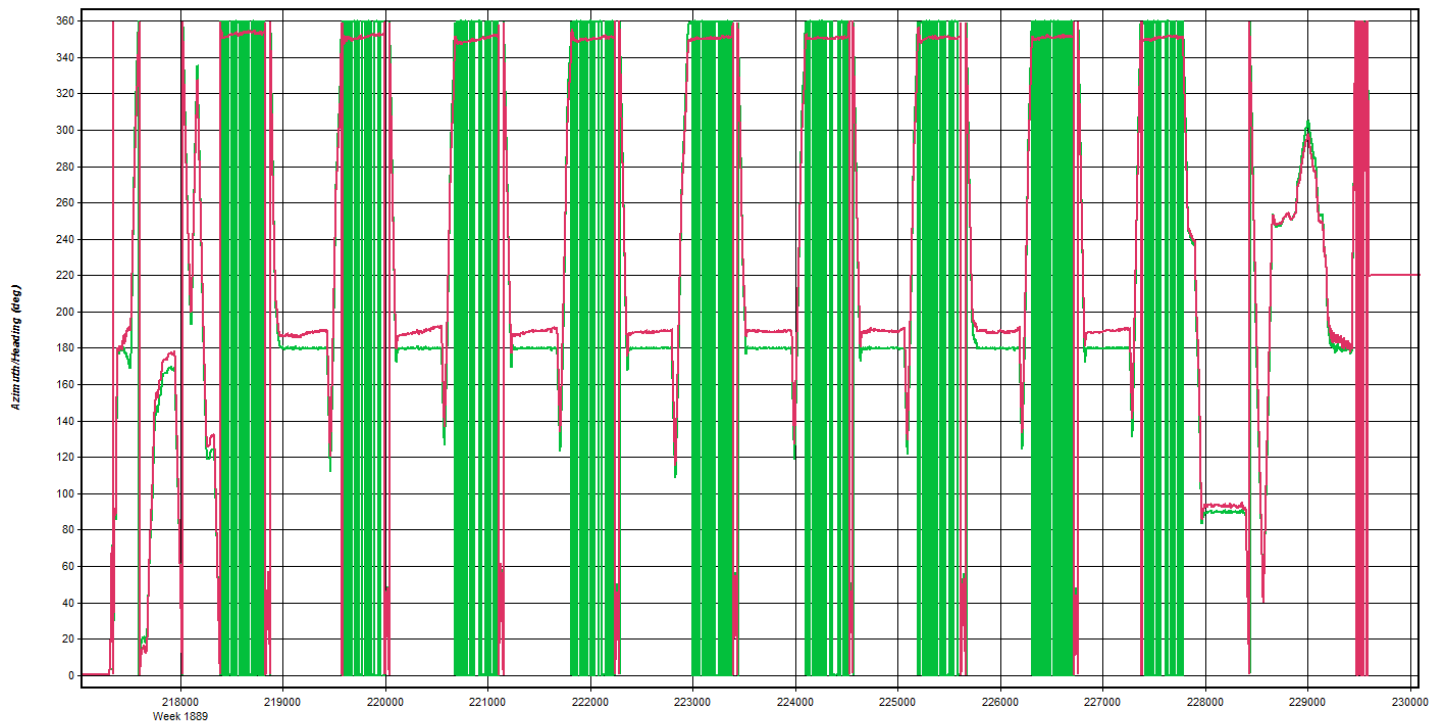
# Mar 22, 2016-A (N73TM, SN7178)



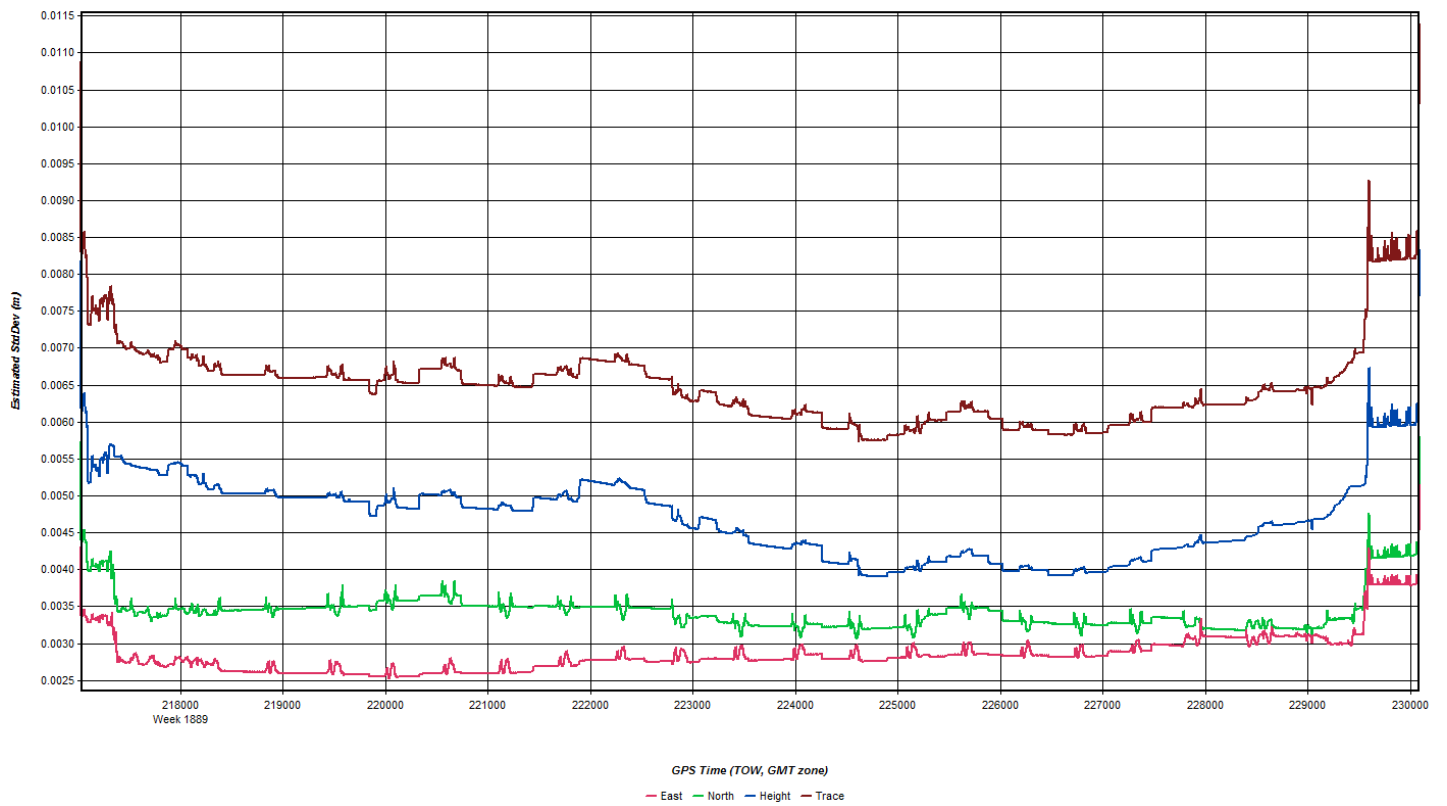


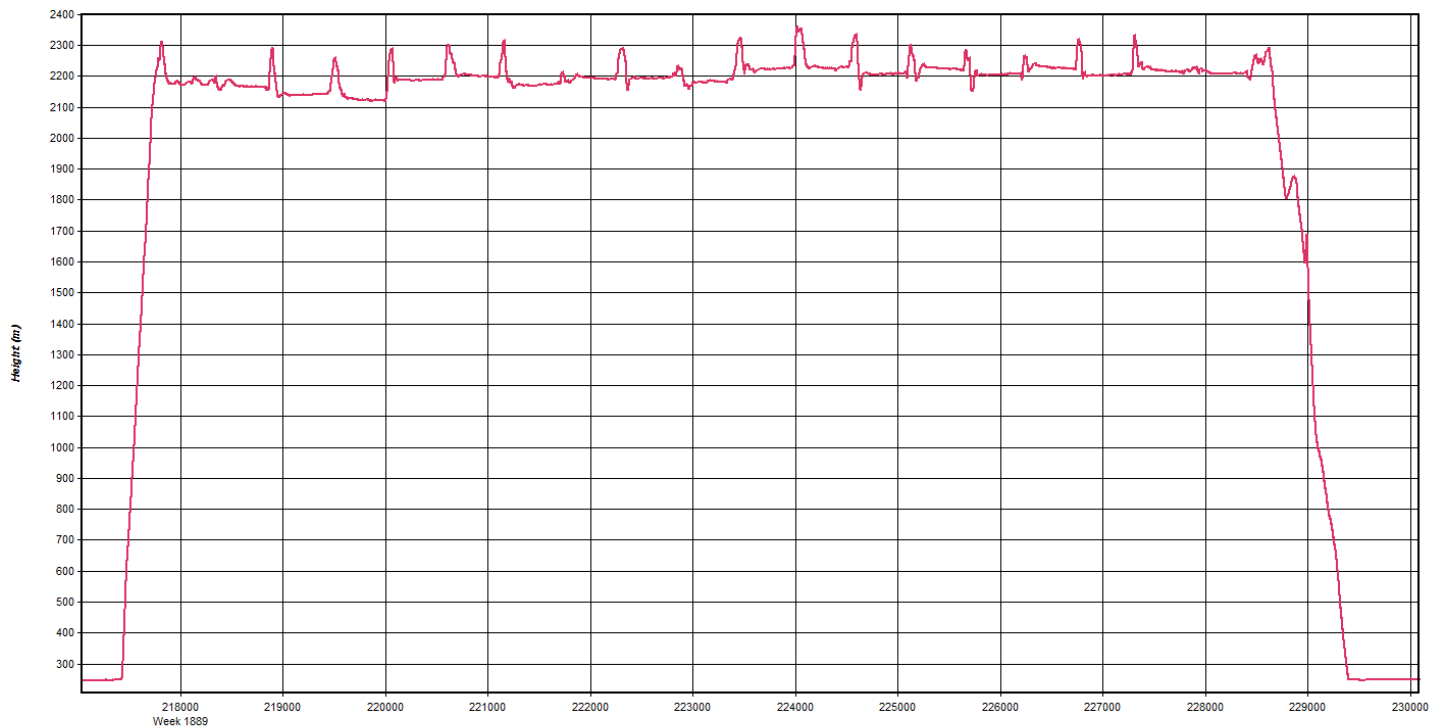
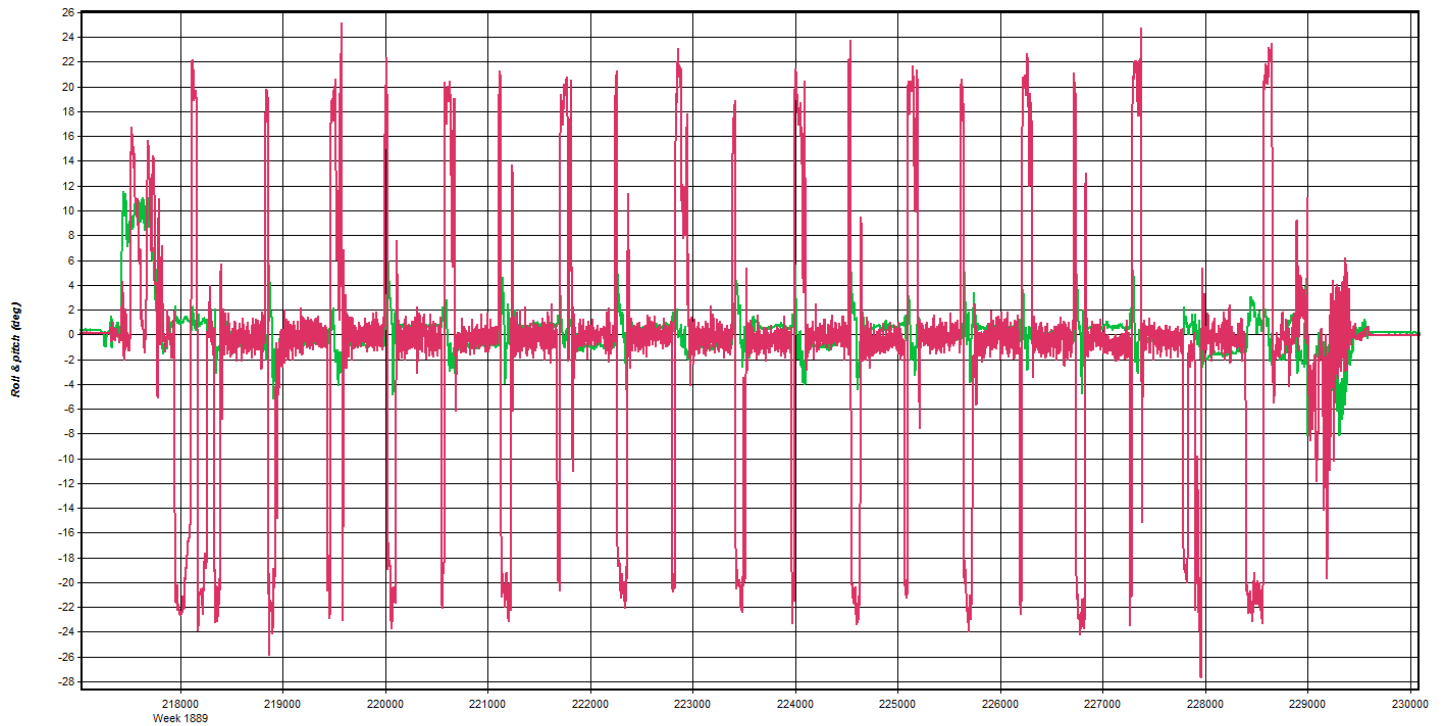


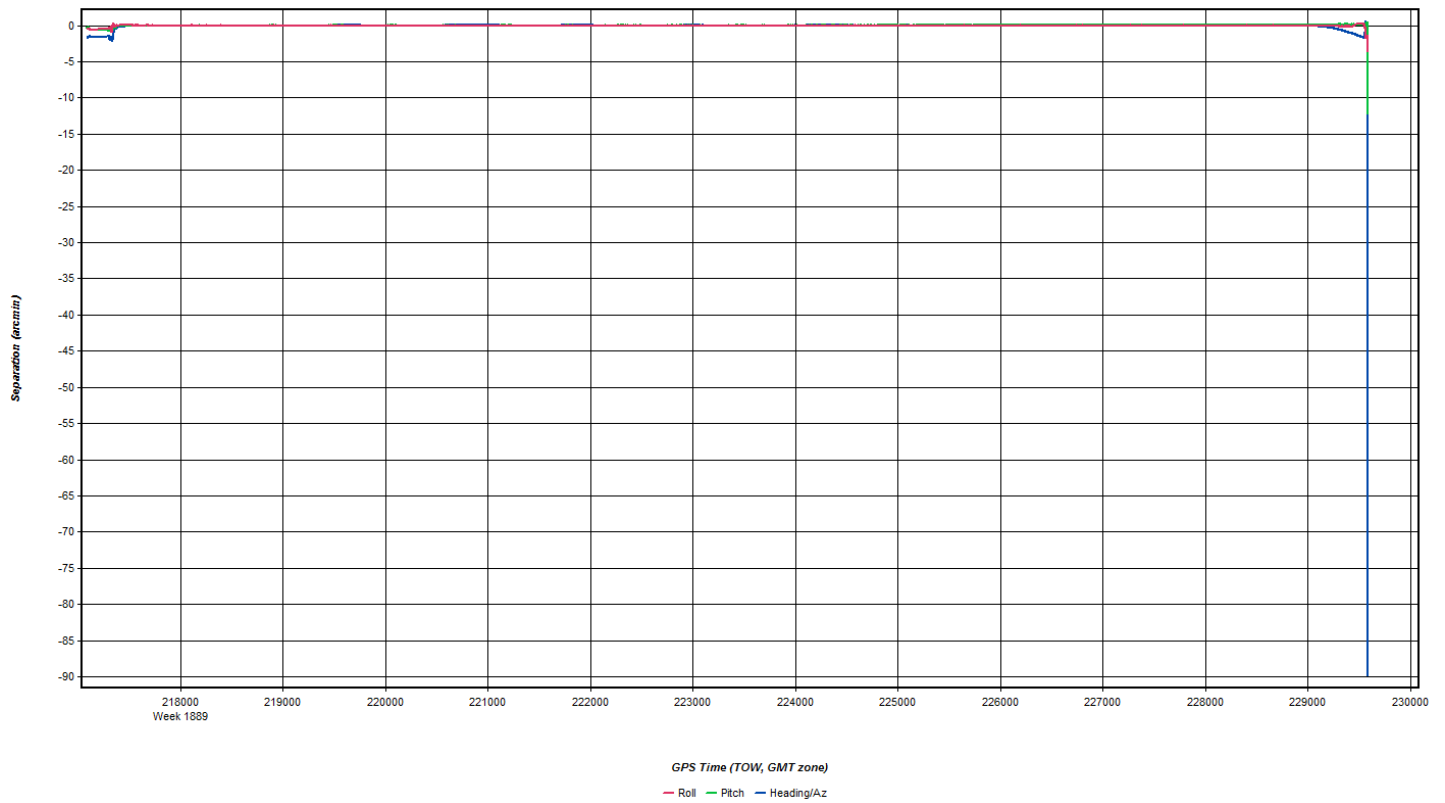
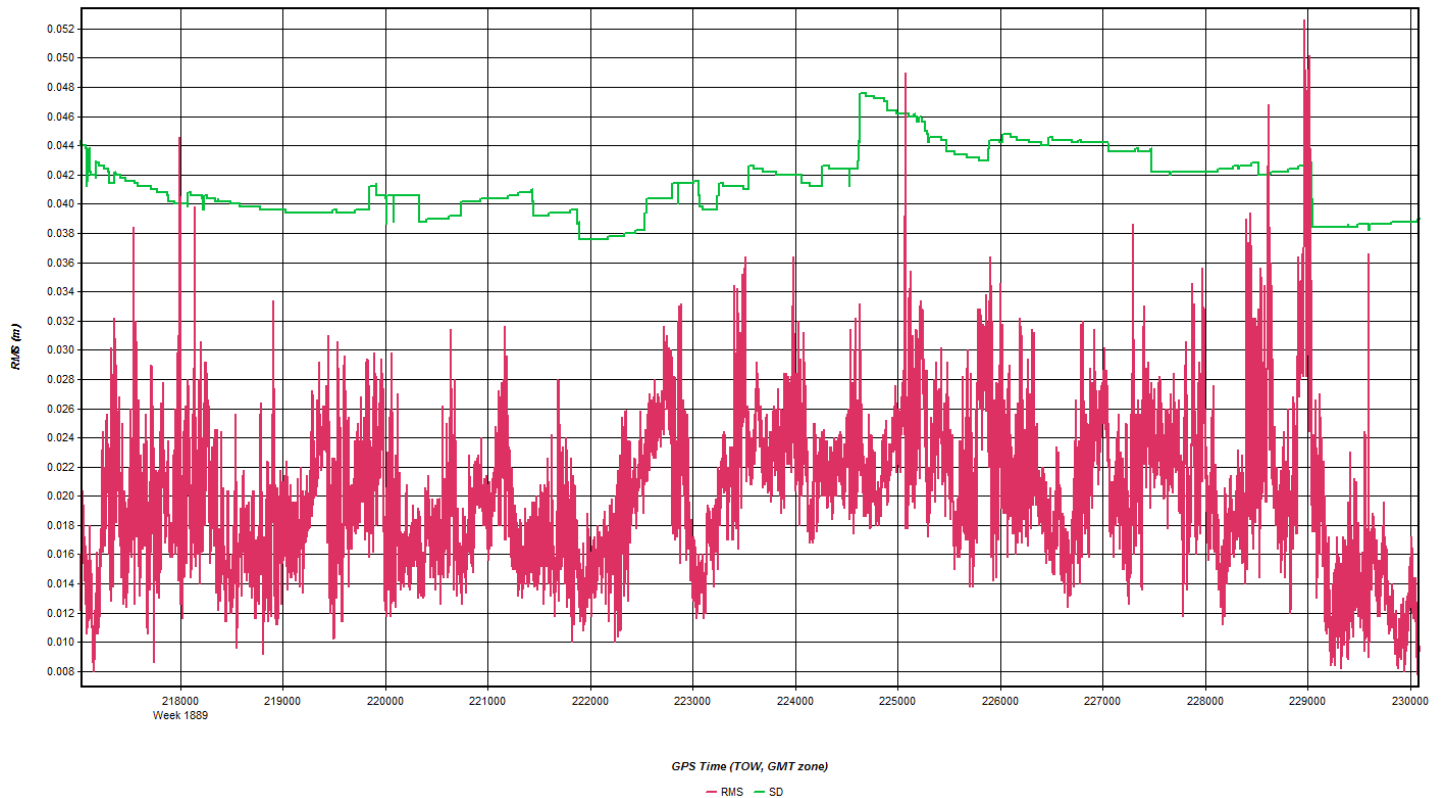
GPS Time (TOW, GMT zone)  
— East — North — Up

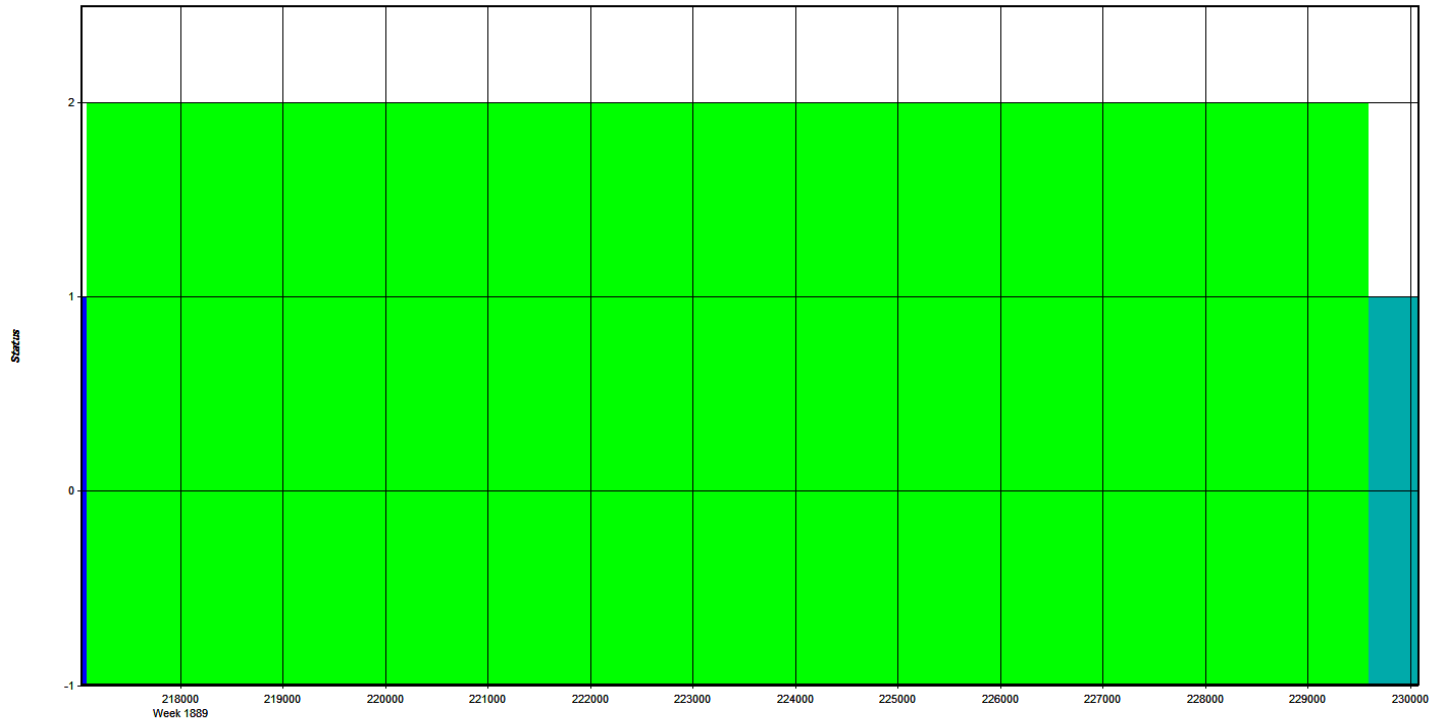


GPS Time (TOW, GMT zone)  
— Heading/Azimuth — GPS-COG









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

Coordinate/Antenna Settings

Master Remote

Base Station  
 1: INTP Name: INTP  Disabled  
 File: F:\Proc\28170\_HamiltonCo\IN\0079\160322a-7178\intp0820.gpb

Coordinates  
 Latitude: North 40 16 49.30690 Compute from PPP  
 Longitude: West 86 03 19.84556 Enter Grid Values  
 Ellipsoidal height: 236.736 m Enter MSL Height  
 Datum: WGS84 Datum Options  
 Select From Favorites Add To Favorites Use Average Position

Antenna Height  
 From station file: LEIAX1202GG, NONE View STA File  
 Antenna profile: LEIAX1202GG Info  
 Measured height: 0.000 m Measured to  
 ARP to L1 offset: 0.063 m  ARP  
 Applied height: 0.063 m  L1 Phase Centre  
 Compute From Slant

OK Cancel



Coordinate/Antenna Settings

Master Remote

Base Station  
2: LB2708 Name: LB2708  Disabled  
File: F:\Proc\28170\_HamiltonCo\IN\0079\160322a-7178\GPSbase\000

Coordinates  
Latitude: North 40 02 22.76753 Compute from PPP  
Longitude: West 86 15 06.33550 Enter Grid Values  
Ellipsoidal height: 246.920 m Enter MSL Height  
Datum: WGS84 Datum Options  
Select From Favorites Add To Favorites Use Average Position

Antenna Height  
From station file: N/A View STA File  
Antenna profile: NOV702GG Info

Measured height: 1.500 m  
ARP to L1 offset: 0.067 m  
Applied height: 1.567 m

Measured to  
 ARP  
 L1 Phase Centre  
Compute From Slant

OK Cancel

## Appendix E

# Imagery Flight Logs

There were three total lifts. Flight logs are found on the following pages.

Mar 21, 2016-A (N7266Z, SN10548) .....	2
Flight Log .....	3
Mar 22, 2016-A (N7266Z, SN10548) .....	4
Flight Log .....	5
Mar 22, 2016-B (N7266Z, SN10548).....	6
Flight Log .....	7

# Mar 21, 2016-A (N7266Z, SN10548)

# Flight Log

Scanned by CamScanner

**Quantum Spatial** **Airborne Camera Data Collection Log Sheet :: Quantum Spatial, Inc**

Project: HAMILTON COUNTY, IN (email log daily to flight\_log\_distribution\_list@quantumspatial.com) **Date:** 3-21-16 **Page 1 of 1**

Alt: 2100 **U.S.C.D.E.**

Project #: 25170 Flight Mgmt File: HAMILTON004

Altitude: N72662 Begin Hobbs: 3725 End Hobbs: 3782 Total: 31 Pilot: MAYMON Co-Pilot: - Tech: M005Y

Dep Apt: FFT Dep Time (Ldt): 0930 (Z): 1330 Arr Apt: HY Arr Time (Local): [Z] Tot Time Aloft:

CORR: 0/N Sta 1: IND (HAMILTON) Sta 2: 1425 Sta2)

GPS Unit: Y/N Sta 1: 1608 Sta 2: 1608 Sta2)

Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: 3019 end: 3019 Mic: GO End of Day: 450

Line #	Hdg	Start UTC	End UTC	Serial #	°C	End: °C	Alt: AMSL	Alt: AGL	Indy #Sats	Gd Spd	Sur*	IT / Freq	WAV / SS	ECOM / BO	Imagery / Planned	Events
18	360	1446	1457	93	110	2/10	6725	10.5	0							
17	180	1500	1508		150	19/11	6820	7.5	0							
16	340	1512	1523		110	19/11	6700	10.1	0							
15	180	1527	1535		150	17/12	6650	7.4	0							
14	360	1538	1549		115	18/12	6620	9.9	0							
13	190	1553	1601		150	18/11	6600	9.7	0							

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

- Small ground ISS captured BY AIRBUS A380  
- Small ground HD captured BY AIRBUS A380

Total Prof Lines: 18 Lines Flown: 6 Lines Remain: 12 Online Time: 1:25 Mob Time: 1:25 Notes:

Mar 22, 2016-A  
(N7266Z, SN10548)





Mar 22, 2016-B  
(N7266Z, SN10548)

# Flight Log

Scanned by CamScanner

**Albome Camera Data Collection Log Sheet :: Quantum Spatial, Inc**  
(email log only to flight\_log\_distribution\_list@quantumspatial.com)

Date: 3-22-16  
 UR: A B C D E Pg 1 of 1

Project: H4: LTOJ 20, Jr  
 Flight Mgmt File: HAMPTON COOL ASSTG

Aircraft: N72663 Begin Hobbs: 3731.6 End Hobbs: 3734.2 Total: 2.6 Pilot: MATHIAS Co-Pilot: - Tech: MOUDY

Dep Apt: TZR Dep Time (Ldt): 1435 (Z): 1835 Arr Apt: FFT Arr Time (Local): 1705 (Z): 2105 Tot Time Aloft: -

CORSE: O/N Sta 1: Tipton (JUMP) Sta 2: Flyovers: Y/N # Y, times: Sta 1) 1856 Sta 2) -

GPS Unit: Y/N Sta 1: Flyovers: Y/N # Y, times: Sta 1) 1455 Sta 2) -

Gd Temp beg: °C End: °C OAT beg: °C End: °C Altimeter begin: end: Max OAT 961 End OB 1246

CAMERA Type: D250n Serial #: 10548 ALT: 6750' ALE: APRIL 5950' Avg Terr 794 Max Oatp: -

Line #	Hgt	Start ALT/G	End ALT/G	Surf	Gd Spd	FOON Altitude	GPS Altitude	RTI Temp	UVAU %	ECOM %	Events
9	150	1900	1902	48	106	1811	6650	10.9	0	0	-MILES 13-17 FSE
4	180	1907	1914	100	100	1910	6840	11.3	0	0	-SOUTHWARD 12 MILES
3	360	1917	1926	135	135	1912	6830	9.0	0	0	-RELEIGH
2	180	1929	1940	100	100	1912	6850	10.7	0	0	-COMPLETES PHOTOS
1	360	1943	1952	135	135	1913	6840	9.8	0	0	

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

Total Proj Lines: 5 Lines Flown: 5 Lines Remains: 0 Online Time: 1.0 Job Time: -

## Appendix F

# Aerotriangulation Report

# Hamilton Co. IN 2016

## Aerial Triangulation Report

Prepared for

**Hamilton Co. IN**

Quantum Spatial, Inc. Project No. 28170

July 29, 2016

Produced By:

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523 Wellington Way, Suite 375  
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### Table of Contents

1.0	Project Details .....	2
2.0	Aerial Photography.....	2

3.0	Control.....	2
4.0	Aerial Triangulation Measurement.....	3
5.0	Aerial Triangulation Adjustment .....	4
6.0	Aerial Triangulation Results .....	4
6.1	Least Squares Ground Residuals.....	5
7.0	Control and Tie Point Problems .....	5
8.0	Delivery Data/Materials .....	5
9.0	Aerotriangulation Approval.....	5
9.1	Aerotriangulation Results Summary .....	5

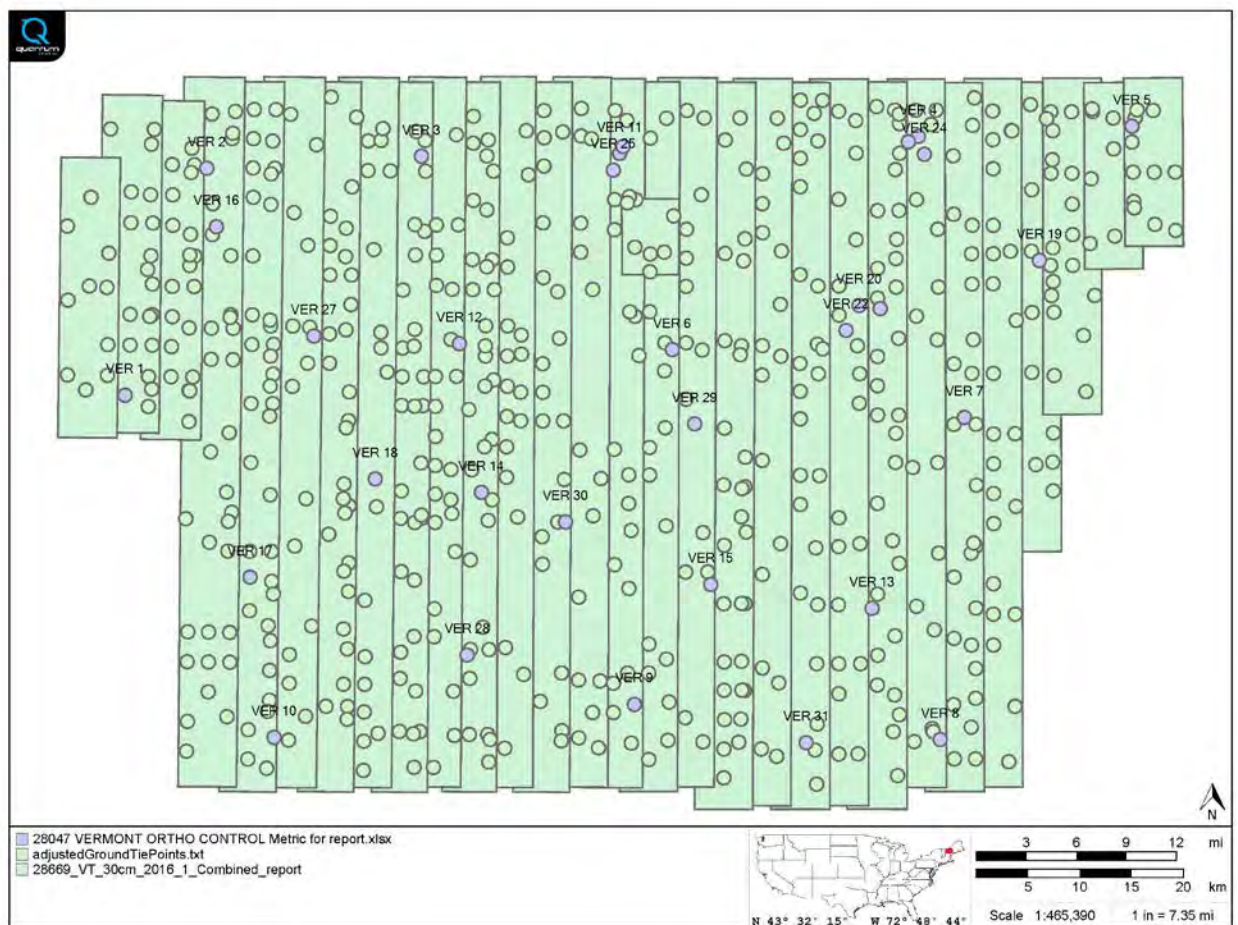


## 1.0 Project Details

The scope of this project consists of providing 4 band color aerial photography, aerial triangulation, color digital orthos.

## 2.0 Aerial Photography

A total of 29 flight lines of RGB photography, consisting of 903 Nautical Miles of Imagery, were taken at an altitude of 12,750 feet above ground level. The photography was obtained on April 13th and 14th, 2016 using an Leica ADS100 pushbroom sensor (serial number 10547) having a focal length of 62.5mm.



## 3.0 Control

The ground control was established by Quantum Spatial, Inc. using GPS technology. Please refer to the ground control report for more specific detail. The X, Y, Z coordinates of each photo center is included in the final AT adjustment. A total of 32 photo identification

control points were used. The location of the control points are shown on the photo center diagram.

All statistical data for the control points are given in the Aerial Triangulation section.

#### Ground Control Points

<b>Point ID</b>	<b>X</b>	<b>Y</b>	<b>Z</b>
HAM41PID	183372.707	1736478.857	915.191
PID01	168205.391	1706936.328	889.588
PID02	190409.876	1704002.174	827.201
PID03	222525.291	1703936.568	810.971
PID04	245089.688	1708332.844	818.267
PID05	192297.707	1721244.330	863.511
PID06	217741.696	1714870.715	740.261
PID07	268079.226	1718960.696	849.460
PID08	208962.250	1731892.660	821.016
PID09	164780.326	1730792.829	891.371
PID10	170589.648	1746410.062	915.387
PID11	197699.781	1747530.492	893.678
PID12	273322.585	1739112.554	867.013
PID13	249346.061	1745008.578	777.931
PID14	169897.178	1762277.063	944.102
PID15	193758.054	1768425.589	927.930
PID16	236332.524	1773261.287	810.733
PID17	257086.440	1784512.499	815.309
PID17_1	257097.154	1784537.695	816.058
PID17_2	257101.680	1784510.802	815.173
PID18	229180.348	1798905.419	863.006
PID19	192500.372	1789264.994	910.613
PID20	172551.979	1799556.048	935.106
PID21	273536.651	1810541.960	830.982
PID22	252161.430	1810134.547	857.122
PID23	225721.567	1809562.294	863.538
PID24	199098.745	1805609.361	911.692
PID25	223244.080	1746787.390	788.357
PID26	255271.964	1728727.465	830.638
PID27	215063.622	1759131.751	832.238
PID28	241398.186	1795061.952	849.468
PID29	247049.935	1762898.235	807.976

## 4.0 Aerial Triangulation Measurement

The measurement of the pass points, flight ties and control data was performed on Leica XPRO Triangulation software, automated aerotriangulation system. Pass points were selected automatically using a sophisticated auto correlation algorithm.

## 5.0 Aerial Triangulation Adjustment

The adjustment of the measurements was performed using a robust aerotriangulation software package on softcopy photogrammetric workstations. The final adjustment of the block was accomplished by using a rigorous simultaneous least squares bundle adjustment. The general procedure is to remove all blunders from the data using automatic blunder detection. The bundle adjustment is then run with minimal ground control to test the photogrammetric measurements for consistency. Next, the full ground control data set, including the ABGPS data, is added to the adjustment holding the horizontal control very loose and the vertical control very tight. Since horizontal control errors can affect the vertical control but not vice-versa, we can detect errors in the vertical control. The horizontal control is then tightened and the effect on the vertical control and the photogrammetric residuals are inspected. The final adjustment makes sure that all of the measurements are in balance with each other and properly represent the actual conditions.

## 6.0 Aerial Triangulation Results

The aerial triangulation results are given in three sections: airborne GPS (ABGPS), photogrammetric measurements, and ground control. The following parameters were used during the A/T data reduction:

Parameters

Parameter	X/Omega	Y/Phi	Z/Kappa	XY
RMS Control	0.176	0.165	0.155	
RMS Check				
RMS Limits	1.000	1.000	1.000	
Max Ground Residual	0.386	0.416	0.373	
Residual Limits	2.000	2.000	2.000	
Mean Std Dev Object	0.111	0.101	0.150	
RMS Photo Position	-0.048	-0.036	0.043	
RMS Photo Attitude	0.02414	0.02395	0.04488	
Mean Std Dev Photo Position	0.057	0.056	0.062	
Mean Std Dev Photo Attitude	0.0033	0.0019	0.0010	

Key Statistics

Sigma: 1.6 um  
Number of iterations: 20

Solution Successful.

Current Count

Control Points Used: 31  
Check Points Used: 0  
Image Points Used: 739

### 6.1 Least Squares Ground Residuals

The observations in a simultaneous block adjustment are the photo or model points, and the ground control. The least squares residual for an observation is how much the measured value is moved during the adjustment.

## 7.0 Control and Tie Point Problems

None

## 8.0 Delivery Data/Materials

- 28047\_CTL.txt-Control
- 28047AT\_Report.doc-A/T report

## 9.0 Aerotriangulation Approval

### 9.1 Aerotriangulation Results Summary

The aerial triangulation results are summarized in the following table:

Parameter	Results
Sigma Naught	1.6
Number of Images	29
Total Points	31
Image Measurements	739
Control Points	31 Horz/Vert Photo ID Point
Ground Control RMSE's	X 0.176 meters Y 0.165 meters Z 0.155 meters

