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Acquisition and Processing Report For

Matanuska-Susitna Borough

350 East Dahlia Avenue

Palmer, Alaska 99645

LiDAR Collection Matanuska-Susitna Borough, Alaska

Prepared by

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AeroMetric Project No. 6110401

Table of Contents

Matanuska-Susitna Borough

LiDAR Collection Matanuska-Susitna Borough

AeroMetric Project No. 6110401

1 INTRODUCTION

This report contains a summary of the LiDAR data acquisition and processing in the vicinity of the Matanuska and Susitna River valleys in Alaska. Data collection includes the cities of Wasilla, Palmer, and Houston; plus the communities of Butte, Sutton, Chickaloon, Knik, Meadow Lakes, Big Lake, Willow, Talkeetna, and Trapper Creek.

1.1 Contact Info

Questions regarding the technical aspects of this report should be addressed to:

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1.2 Purpose

The Matanuska-Susitna (Mat-Su) Borough had a requirement for high resolution LiDAR data for mapping and analysis applications. Data was to be of sufficient quality and vertical accuracy to meet USGS, NDEP, and FEMA standards and to be placed into the National Elevation Dataset. Pursuant to this end, data acquisition and processing was to be done in accordance with the specifications outlined in the USGS National Geospatial Program (NGP) LiDAR Guidelines and Base specifications v13.

Aero-Metric, Inc. (AeroMetric) acquired LiDAR data for an area that comprises approximately 3,680 square miles. This acquisition was carried out to satisfy the need for high resolution elevation data in the region. AeroMetric's Optech Gemini and Leica ALS70 LiDAR systems were used in the collection of data for this project.

1.3 Project Locations

The project area extends from the mouth of the Susitna River, and follows the river north past Talkeetna, to the proposed Watana dam site, then follows the river eastward to approximately 21 miles west-northwest of Tyrone Lake. From the mouth of the Susitna River the project extends northeast to Palmer, then follows the Knik River southeast until it terminates at the Knik Glacier, and follows the Matanuska River northeast, past the Matanuska Glacier to approximately 1.7 miles northeast of Trail Lake.

This area encompasses the cities of Wasilla, Palmer, and Houston; plus the communities of Butte, Sutton, Chickaloon, Knik, Meadow Lakes, Big Lake, Willow, Talkeetna, and Trapper Creek; the termini of the Matanuska and Knik glaciers; the Point MacKenzie/Port MacKenzie area; as well as the Hatcher Pass area.

The project area of interest was defined and supplied by the Mat-Su Borough in early 2011, and modified to include the dock at Port Mackenzie.

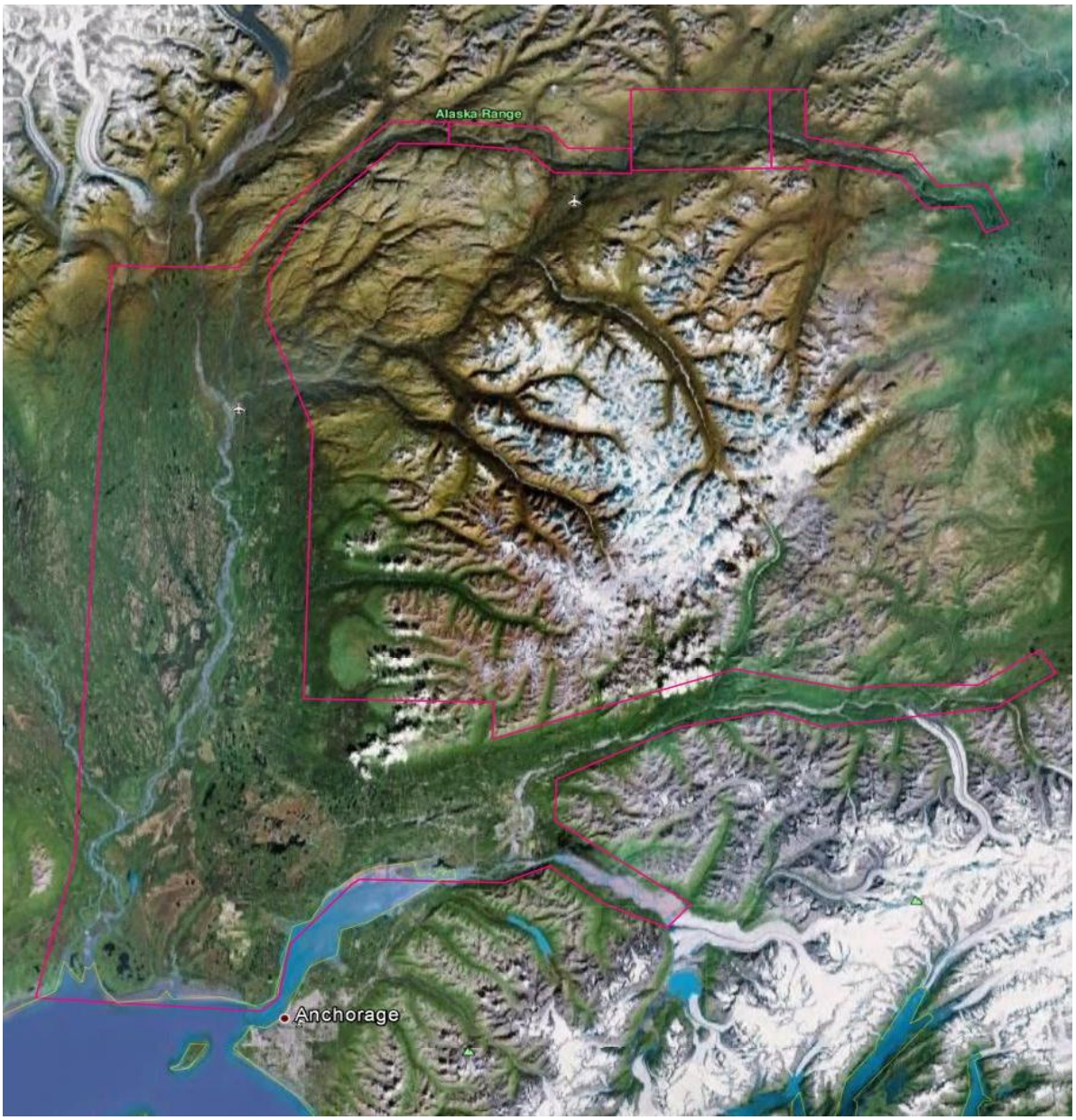


Figure 1.1 - Red Outline Approximately Delineates Project Area of Interest (Imagery Source: Google Earth)

1.4 Time Period

LiDAR project planning was carried out in early 2011 and concluded in August 2012.

LiDAR data acquisition was completed between May 11th, 2011 and August 29th, 2012. Data was acquired in 82 flights. Particular flight mission dates can be found in the individual flight logs in Section 7.

Ground control check point surveys were completed between March 30th and August 18th, 2011 by Lounsbury and Associates, Inc. (Lounsbury) specifically for this project.

1.5 Project Scope

Data collection was accomplished with aircraft operated by AeroMetric utilizing an Optech Gemini and a Leica ALS70 airborne LiDAR system. Flights were performed at a nominal altitude of 1400 to 2000 meters above terrain with data collected to produce a data set with an overall nominal point spacing of 0.6 meters, based on a per-swath 1 meter nominal point spacing.

The data was to be calibrated such that all systematic errors were accounted for. The project required bare-earth, vegetation, building, bridge, major transmission line and water classification. Hydro-enforcement was required for flat and level water bodies of 1 acre or greater surface area, inland rivers and streams with a width of 100 feet or greater, as well as 19 specified streams regardless of width, for the production of contours and digital elevation models (DEM). Buildings with a roof "footprint" of greater than 400 square feet were to be located and outlined.

Per USGS National Geospatial Program (NGP) LiDAR Guidelines and Base specifications v13, the unclassified LiDAR data was to conform to a Fundamental Vertical Accuracy of 24.5 cm at 95 percent confidence level in open terrain using $RMSE_z$ x 1.96. The Supplemental and Consolidated Vertical Accuracy of the other land coverage classes was to conform to 36.3 cm at 95th percentile.

The horizontal accuracy of the data was to be compiled to meet 0.5 meters RMSE.

The accuracy as compiled, tested and published in this report has met vertical accuracy requirements as specified by the client. Section 5.6 of this report contains results of the vertical accuracy evaluation as tested against DEMs derived from the LiDAR data set. An Excel file with survey point data compared with LiDAR data and vertical differences will accompany this report. File name: Final_Project_Wide_Vertical_Accuracy_Assessment.xlsx

1.6 Project Spatial Reference System

The specific spatial reference system for this delivery is as follows:

Horizontal Datum:	North American Datum 1983 (CORS96 Epoch 2003.0)
Vertical Datum:	North American Vertical Datum 1988 (GEOID09)
Projection:	Alaska State Plane Zone 4
Measurement Units:	U.S. Survey Feet

2 GEODETIC CONTROL

Control surveys and were completed by Lounsbury and Associates, Inc between March 30 and August 18, 2011. A portion of these survey activities was dedicated to establishing control points to be occupied by GPS ground stations during LiDAR acquisition. The Survey report, control summaries, and survey certification from Lounsbury are included in this submittal under the Project_Survey_Control directory.

3 LiDAR ACQUISITION AND PROCEDURES

3.1 Acquisition Time Period

LiDAR data acquisition and Airborne GPS control surveys were completed between May 11th, 2011 and August 29th, 2012. Eighty-two flight missions were required to cover the project area.

3.2 LiDAR Planning

The LiDAR data for this project was collected with AeroMetric's Optech Gemini LiDAR systems (Serial Numbers 03SEN145 and 07SEN201) and Leica ALS70 LiDAR system (Serial Number 7161). Flight planning and acquisition was completed using Optech's ALTM-NAV v. 5.95 and Leica's FPES v. 10.2.10.5.

The LiDAR collection was planned to achieve a 0.60 meter nominal point spacing throughout the project area. This is based on a nominal point spacing of 1 meter within each swath, with the final spacing being the result of overlapping swaths. See the following tables for details.

Flying Height (Above mean sea level)	Between 1400 and 2000 meters
Laser Pulse Rate	70 kHz
Mirror Scan Rate Frequency	40 Hz
Scan Angle (degrees)	34°
Side Lap	50%
Ground Speed	150 kts
Nominal Point Spacing/meter	0.6 m

Figure 3.1 - Acquisition details for the project acquisition flights utilizing Optech Gemini sensor.

Flying Height (Above mean sea level)	Between 1400 and 2000 meters
Laser Pulse Rate	163.6 kHz
Mirror Scan Rate Frequency	41 Hz
Scan Angle (degrees)	32°
Side Lap	Between 50 and 55%
Ground Speed	160 kts
Nominal Point Spacing/meter	0.6 m

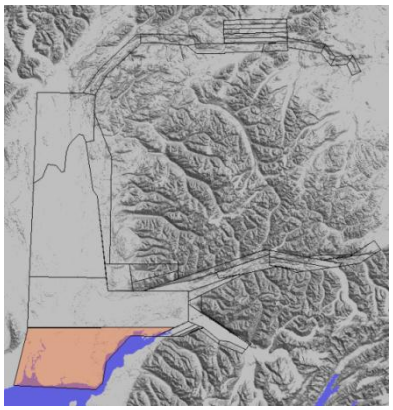
Figure 3.2 - Acquisition details for the project acquisition flights utilizing the Leica ALS70 sensor.

The project area was divided into fourteen distinct areas, described below, due to factors such as anticipated snow melt, terrain conditions, and tidal restrictions. The lower elevation areas were anticipated to be snow free before areas of higher terrain. These areas were isolated in order to maximize flying during the short period of minimal snow and leaves. As collection progressed, areas to the north and of higher elevation were acquired as ground conditions allowed. The following sections will detail the flight planning process for this project, divided by flight area.

South Tidal Area

- Dates of Acquisition: May 10-12, 2011
- Number of Planned Lines: 88
- Line Miles: 2682

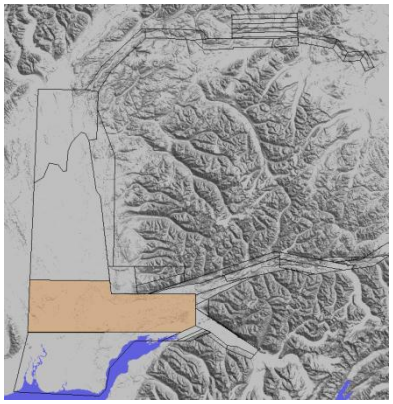
This area is located in the southern portion of the project. This area was one of the first areas to be snow free, and the leaf free window was short. Flight lines were oriented in an east-west direction in order to minimize stair stepping between adjacent flight lines acquired during a single mission (due to tidal changes).



South Non-Tidal Area

- Dates of Acquisition: May 10-13, 2011
- Number of Planned Lines: 75
- Line Miles: 3266

This area is located to the north of the South Tidal Area. It encompassed the majority of the developed area of the project. Like the South Tidal area, it was snow free early during the collection season. The block did not include the Lazy Mountain Area, due to safety considerations during off-line turn arounds.



Knik River Tidal (Acquired May 12, 2011)

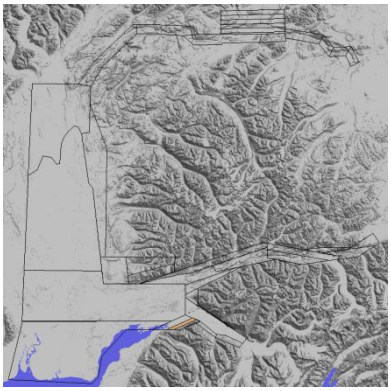
- Date of Acquisition: May 12, 2011
- Number of Planned Lines: 18
- Line Miles: 97

This area is located to the east of the South Tidal Area. It isolated due to tidal influence on the Knik River and its orientation allowed the flight lines to be parallel to the surrounding terrain.

Knik River Non-Tidal

- Date of Acquisition: May 10, 2011
- Number of Planned Lines: 5
- Line Miles: 44

This area is located adjacent to the Knik River Tidal area. Its orientation also allowed the flight lines to be parallel to the surrounding terrain.

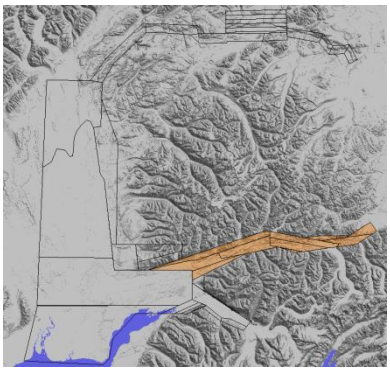


Knik Valley Area

- Dates of Acquisition: May 10 – August 29, 2011
- Number of Planned Lines: 82
- Line Miles: 456

This area is located along the Knik River Valley and Pioneer Peak. The blocks allow for flight line orientation which maximizes data acquisition and minimizes risk due to terrain proximity. A portion of these areas were acquired on August 29, 2011, due to snow being present in the data collected in the spring.

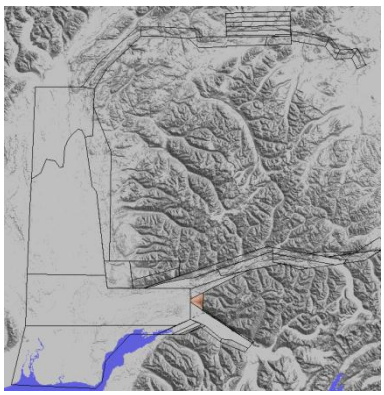
Matanuska Valley Area



- Dates of Acquisition: May 13 – August 29, 2011
- Number of Planned Lines: 239
- Line Miles: 2863

This area is located along the Matanuska River Valley. The blocks allow for flight line orientation which maximizes data acquisition and minimizes risk due to terrain proximity. The major challenge of data collection in this area was timing snow and leaf free acquisition. The northern side of the valley was ready for acquisition earlier than the southern side due to solar heating of the south facing slopes.

Lazy Mountain Area

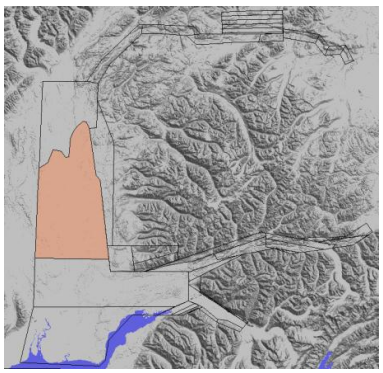


- Date of Acquisition: May 24, 2011
- Number of Planned Lines: 31
- Line Miles: 117

This area is located at the foot of Lazy Mountain. Due the Matanuska and Knik River Valleys' configuration, there remained a small triangle of data remaining to be collected. This area could not be collected with the South Non-Tidal block due to the surrounding mountain peaks posing a potential hazard to flying. The flight lines were arranged in a north-south direction, and decreased in spacing as the terrain elevation increased.

Central Area

- Dates of Acquisition: May 17-25, 2011
- Number of Planned Lines: 113
- Line Miles: 3761

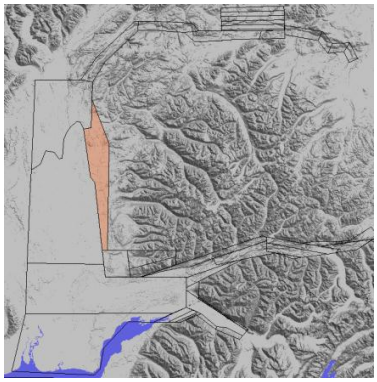


This area is located along the Susitna River. The maximum elevation in this area is approximately 610 feet, with the majority of the area less than 300 feet. It was selected due to its low elevations, which would yield an earlier acquisition date.

The flight lines were oriented north-south, and were not extended further north due to increases in elevation and the desire to keep the flight line length to less than 20 minutes. Lines which take longer than 20 minutes tend to show an increase in IMU drift, causing decreases in data accuracy.

East Central Area

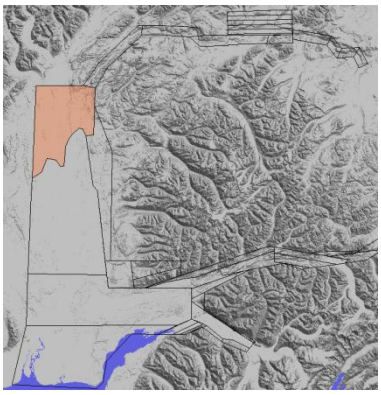
- Dates of Acquisition: May 26-27, 2011
- Number of Planned Lines: 41
- Line Miles: 1109



This area is located along the eastern side of the Susitna River Valley. The area was isolated due to its slightly higher elevation compared to the adjoining Central Area, allowing for later acquisition due to snow conditions.

North Area

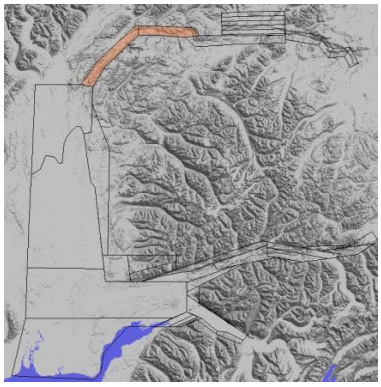
- Dates of Acquisition: May 30 – June 17, 2011
- Number of Planned Lines: 97
- Line Miles: 1975



The North area was isolated due to its expected snow melt time to be later than the central regions due to elevation and latitude. Snow conditions were monitored in this primarily undeveloped area (particularly in the western portions) during the acquisition of the Central areas.

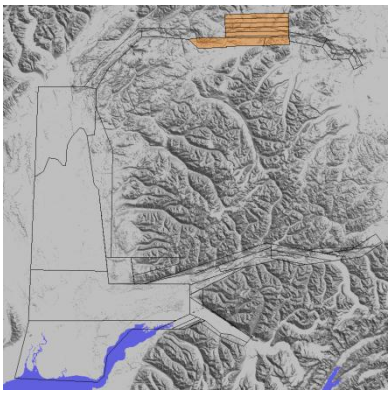
Curry and Devil's Canyon

- Dates of Acquisition: June 17-24, 2011
- Number of Planned Lines: 72
- Line Miles: 1235



This area is comprised of the Susitna River between the proposed Watana Dam site and the North Block. This area, along with the remainder of the Upper Susitna River areas, posed challenges due to late snow melt, steep canyon walls, and lack of weather reporting.

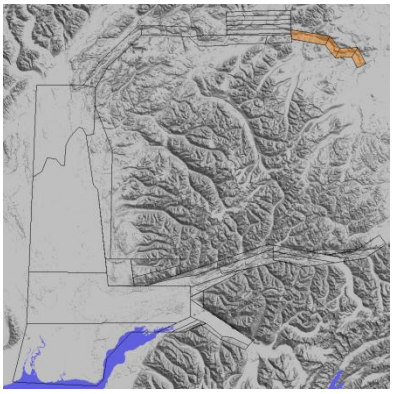
Watana Dam Site



- Dates of Acquisition: June 24- October 12, 2011
- Number of Planned Lines: 128
- Line Miles: 2182

This area is comprised of eight (8) sub-areas. The areas were selected based on ground elevation and the flying height was adjusted accordingly.

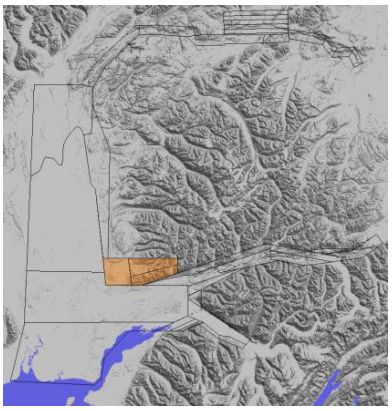
Upper Susitna



- Dates of Acquisition: August 16 - October 12, 2011
- Number of Planned Lines: 115
- Line Miles: 634

The Upper Susitna is the most remote area of the project. The area was subdivided into four (4) sub-areas in order to best follow the river channel and the surrounding terrain.

Hatcher Pass



- 2011 Dates of Acquisition:
- May 26 – 27, 2011
- August 12 - October 12, 2011
- Number of Lines Acquired: 116
- Line Miles: 1002

- 2012 Dates of Acquisition: August 22 – 29, 2012
- Number of Planned Lines: 47
- Line Miles: 721

Hatcher Pass was subdivided into three (3) blocks. The westernmost block was acquired using a north-south flight pattern and was acquired in the May of 2011 with the Optech Gemini. The two other blocks were flown in August of 2012 with the Leica ALS-70. It was flown in an east-west flight pattern, in order to compensate for varying terrain elevations. The snow-free timeframe in Hatcher Pass was very brief.

3.3 LiDAR Acquisition

A total of eighty-two flight missions were required to complete the project area. The missions were flown using the parameters discussed in section 3.2 of this report. Section 7 contains the flight logs.

Airborne GPS and IMU position and trajectory data of the LiDAR sensors were also acquired during the time of flight.

Missions were typically four to five hours long. Before take-off, the LiDAR system and the Airborne GPS and IMU system were initialized for a period of five minutes and in operation after landing for another five minutes. The missions acquired data according to the planned flight lines and included a minimum of one (usually two) cross flights. The cross flights were flown perpendicular to the planned flight lines and their data used in the in-situ calibration of the sensor.

3.4 LiDAR GNSS Ground Control

During the 2011 LiDAR acquisition, twelve GNSS ground control stations were operated to provide position data during flights. These base stations were to setup to collect L1 and L2 GPS frequencies at a rate of 2 Hz. The location of the stations allowed for 97% of the project area to have a base station within 30 km of the aircraft during acquisition. Ten (10) stations were road accessible. The station located in the Watana Dam area, as well as the station further northeast along the Susitna River were accessed via helicopter.

Lounsbury was responsible for establishing and operating these control stations. During data acquisition, AeroMetric's flight operations coordinated with Lounsbury's ground operations regarding base station activities mission timing.

The 2012 LiDAR acquisition consisted of 3 missions, all of which were processed using the Continuously Operating Reference Station (CORS) ZAN1, which is operated by the FAA and is located on Joint Base Elmendorf-Richardson (JBER). All lines flown during this time were within 75 km of ZAN1, and the processing results were adequate for use in this project (see RMSE plots in section 8 of this report).

During data processing, it was apparent some of the GNSS data from the ground stations produced insufficient positional accuracy in some missions. This was determined through examination of solution separation plots, which provide a representation of a differential GNSS solution's consistency during data acquisition. Typically accepted solutions will have an overall separation that falls within the <10 cm threshold.

These low accuracy solutions may be the result of any number of variables, including but not limited to satellite constellation geometry, location of aircraft turns, and atmospheric anomalies caused by solar activity or otherwise. AeroMetric used TerraPos, a processing package by Frontier Geomatics, Inc. to provide a Precise Point Position (PPP) solution for these missions. TerraPos utilizes precise GNSS orbit data and other relevant ephemerides to compute positions without the use of base stations. Please see section 5.1 for further details of the TerraPos processing method.

Eleven LiDAR missions were processed utilizing TerraPos. These were flown between August 16, 2011 and October 12, 2011, and are listed here:

August	September	October	
M081611A	M090911A	M100411A	M100511A
M082611A		M100911A	M101011A
M082911A		M101111A	M101111B
		M101211A	

AeroMetric has been utilizing TerraPos on LiDAR projects for the past 3 years as an alternative GPS solution tool. There have been numerous occasions were noisy or otherwise problematic GPS solutions were resolved to usable state via TerraPos processing. In some cases entire projects have been completed using TerraPos only, with very positive results.

In order to confirm that the TerraPos solutions used on this project had no adverse effects on the LiDAR data, the point cloud data from the TerraPos missions was thoroughly compared to adjacent data to verify fit and data cleanliness. Finding no swath-to-swath discrepancies or other positional errors during these tests, the data was deemed suitable for use.

4 QUALITY CONTROL SURVEYS

Field surveys for this project were performed by Lounsbury between March 30th and August 18th, 2011. More than 11,000 RTK-GPS road profile check points were recorded during the course of these survey activities. These check points were used to compute and adjust any vertical biases in the LiDAR data.

Additionally, check points were collected in various land coverage categories throughout the project area to be used to evaluate the vertical accuracy of the airborne LiDAR data. Coverage categories included “barren” terrain, wetlands, urban regions, shrubbery, and forested areas. These check points were provided to AeroMetric for use in its internal QC of the LiDAR data. For further details regarding these check points and the GPS road profiles discussed above, please see the Project_Survey_Control directory.

For the purposes of additional quality control and data verification, Lounsbury was hired to provide similarly categorized check points directly to the Mat-Su Borough. These points were neither provided to nor used by AeroMetric for the calibration or adjustment of this project, but were used by a third-party to compute the vertical accuracy values in section 5.7 of this report. Details of this survey data can be found in the Checkpoint_Survey_MSB_Acquired directory.

AeroMetric collected additional survey check points during the October of 2012. All appropriate check points from the Lounsbury and AeroMetric survey activities were used in the vertical accuracy assessments completed for this project. Details regarding the AeroMetric survey activities can be found in the Checkpoint_Survey_Vendor_Addendum directory.

More information about these check point surveys and the results of the vertical accuracy assessment are discussed in sections 5.6 and 5.7 of this report.

5 FINAL LiDAR PROCESSING

5.1 ABGPS and IMU Processing

Airborne GPS

Applanix – POSGPS

Utilizing carrier phase ambiguity resolution on the fly (i.e., without initialization), the solution to sub-decimeter kinematic positioning without the operational constraint of static initialization as used in semi-kinematic or stop-and-go positioning was utilized for the airborne GPS post-processing.

The processing technique used by Applanix, Inc. for achieving the desired accuracy is Kinematic Ambiguity Resolution (KAR). KAR searches for ambiguities and uses a special method to evaluate the relative quality of each intersection (RMS). The quality indicator is used to evaluate the

accuracy of the solution for each processing computation. In addition to the quality indicator, the software will compute separation plots between any two solutions, which will ultimately determine the acceptance of the airborne GPS post processing.

TerraPos

TerraPos represents a state-of-the-art solution to Precise Point Positioning (PPP). TerraPos has been implemented to be fully compliant with data and products from leading international organizations, e.g. the International Earth Rotation and Reference Systems Service (IERS) and the International GNSS Service (IGS). TerraPos thus allows kinematic positioning with sub decimeter accuracy within the globally consistent and long-term stable reference frames maintained by the IERS.

In the PPP solution the carrier phase biases are estimated as real numbers (a so-called "float solution"). This confirms that the precision of the solution benefits from an increased data rate using an increased number of observations. However, this gain is ultimately limited by the time correlated errors in the observations that include but not limited to multipath and residual satellite clock errors. The data requires both dual-frequency code and carrier phase observations and uses respective ionosphere-free linear combinations. Doppler observations are also included in the computation for all kinematic profiles which assists the algorithm in the pre-processing to aid cycle slip detection and also helps to improve the position estimates.

Inertial Data

The post-processing of inertial and aiding sensor data (i.e. airborne GPS post processed data) is to compute an optimally blended navigation solution. The Kalman filter-based aided inertial navigation algorithm generates an accurate (in the sense of least-square error) navigation solution that will retain the best characteristics of the processed input data. An example of inertial/GPS sensor blending is the following: inertial data is smooth in the short term. However, a free- inertial navigation solution has errors that grow without bound with time. A GPS navigation solution exhibits short-term noise but has errors that are bounded. This optimally blended navigation solution will retain the best features of both, i.e. the blended navigation solution has errors that are smooth and bounded. The resultant processing generates the following data:

- Position: Latitude, Longitude, Altitude
- Velocity: North, East, and Down components
- Attitude: roll, pitch, true heading
- Acceleration: x, y, z components
- Angular rates: x, y, z components

The Applanix software, version 4.4, was used to determine both the ABGPS trajectory and the blending of inertial data. The airborne GPS and blending of inertial and GPS post-processing were completed in multiple steps.

1. The collected data was transferred from the field data collectors to the main computer. Data was saved under the project number and separated between LiDAR mission dates. Inside each mission date, a sub-directory was created with the aircraft's tail number and an A or B suffix was attached for the time of when the data was collected. Inside the tail number sub-directory, five sub-directories were also created EO, GPS, IMU, PROC, and RAW.

2. The aircraft raw data (IMU and GPS data combined) was run through a data extractor program. This separated the IMU and GPS data. In addition to the extracting of data, it provided the analyst the first statistics on the overall flight. The program was POSPac (POS post-processing PACkage).

3. Executing POSGPS program to derive accurate GPS positions for all flights: Applanix POSGPS

The software utilized for the data collected was PosGPS, a kinematic on- the-fly (OTF) processing software package. Post processing of the data is computed from each base station (Note: only base stations within the flying area were used) in both a forward and backward direction. This provides the analyst the ability to Quality Check (QC) the post processing, since different ambiguities are determined from different base stations and also with the same data from different directions.

The trajectory separation program is designed to display the time of week that the airborne or roving antenna traveled, and compute the differences found between processing runs. Processed data can be compared between a forward/reverse solution from one base station, a reverse solution from one base station and a forward solution from the second base station, etc. For the Applanix POSGPS processing, this is considered the final QC check for the given mission. If wrong ambiguities were found with one or both runs, the analyst would see disagreements from the trajectory plot, and re-processing would continue until an agreement was determined.

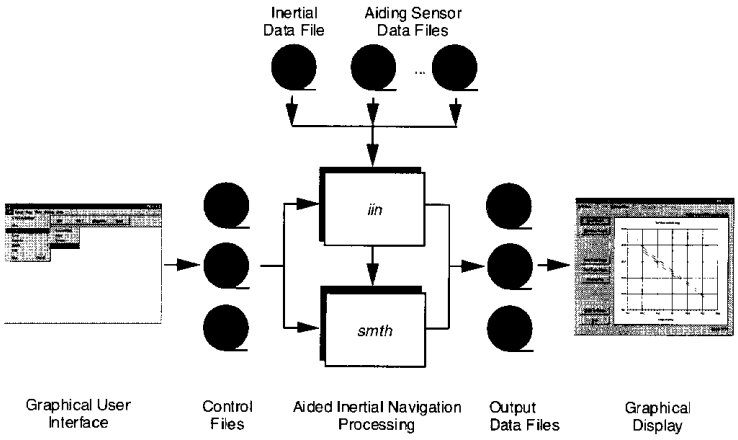
Once the analyst accepts a forward and reverse processing solution, the trajectory plot is analyzed and the combined solution is stored in a file format acceptable for the IMU post processor.

Please see Section 8 of the control report for the final accepted trajectory plots.

4. When the processed trajectory (either through POSGPS) data was accepted after quality control analysis, the combined solution is stored in a file format acceptable for the IMU post processor (i.e. POSProc).

5. Execute POS Proc. POS Proc comprises a set of individual processing interface tools that execute and provide the following functions:

The diagram below shows the organization of these tools, and is a function of the POSProc processing components.



Integrated Inertial Navigation (iin) Module.

The name *iin* is a contraction of Integrated Inertial Navigation. *iin* reads inertial data and aiding data from data files specified in a processing environment file and computes the aided inertial navigation solution. The inertial data comes from a strapdown IMU. *iin* outputs the navigation data between start and end times at a data rate as specified in the environment file. *iin* also outputs Kalman filter

data for analysis of estimation error statistics and smoother data that the smoothing program *smth* uses to improve the navigation solution accuracy.

iin implements a full strapdown inertial navigator that solves Newton's equation of motion on the earth using inertial data from a strapdown IMU. The inertial navigator implements coning and sculling compensation to handle potential problems caused by vibration of the IMU.

Smoother Module (*smth*).

smth is a companion processing module to *iin*. *smth* is comprised of two individual functions that run in sequence. *smth* first runs the *smoother function* and then runs the *navigation correction function*.

The *smth* smoother function performs backwards-in-time processing of the forwards-in-time blended navigation solution and Kalman filter data generated by *iin* to compute smoothed error estimates. *smth* implements a modified Bryson-Frazier smoothing algorithm specifically designed for use with the *iin* Kalman filter. The resulting smoothed strapdown navigator error estimates at a given time point are the optimal estimates based on all input data before and after the given time point. In this sense, *smth* makes use of all available information in the input data. *smth* writes the smoothed error estimates and their RMS estimation errors to output data files.

The *smth* navigation correction function implements a feed forward error correction mechanism similar to that in the *iin* strapdown navigation solution using the smoothed strapdown navigation errors. s*mth* reads in the smoothed error estimates and with these, corrects the strapdown navigation data. The resulting navigation solution is called a Best Estimate of Trajectory (BET), and is the best obtainable estimate of vehicle trajectory with the available inertial and aiding sensor data.

The above mentioned modules provide the analyst the following statistics to ensure that the most optimal solution was achieved: a log of the *iin* processing, the Kalman filter Measurement Residuals, Smoothed RMS Estimation Errors, and Smoothed Sensor Errors and RMS.

5.2 LiDAR "Point Cloud" Processing

The ABGPS/IMU post processed data along with the LiDAR raw measurements were processed using Leica's ALS Post-Processor v. 2.74. software and Optech's DashMap v. 5.2. These software packages were used to match the raw LiDAR measurements with the computed ABGPS/IMU positions and attitudes of the LiDAR sensor. The result was a "point cloud" of LiDAR measured points referenced to the ground control system, formatted as LAS 1.2 files per flightline.

5.3 LiDAR CALIBRATION

Introduction

The purpose of the LiDAR system calibration is to refine the system parameters in order for the post-processing software to produce a "point cloud" that best fits the actual ground. The following report outlines the calibration techniques employed for this project.

Calibration Procedures

AreoMetric routinely performs two types of calibrations on its airborne LiDAR system. The first

calibration, system calibration, is performed whenever the LiDAR system is installed in the aircraft. This calibration is performed to define the system parameters affected by the physical misalignment of the system versus aircraft. The second calibration, in-situ calibration, is performed for each mission using that missions data. This calibration is performed to refine the system parameters that are affected by the on site conditions as needed.

System Calibration

The system calibration is performed by collecting data over a known test site that incorporates a flat surface and a large, flat roofed building. A ground survey is completed to define the flat surface and the building corners. The processed LiDAR data and ground survey data is input into TerraSolid's TerraMatch software to determine the systematic errors. The system parameters are then corrected according to the determined errors and used in the processing of future LiDAR acquisition missions

In-situ Calibration

The in-situ calibration is performed as needed using the mission's data. This calibration is performed to refine the system parameters that are affected by the on site conditions.

For each mission, LiDAR data for at least one cross flight is acquired over the mission's acquisition site. The processed data of the cross flight is compared to the perpendicular flight lines using either the Optech's or Leica's proprietary software or TerraSolid's TerraMatch software to determine if any systematic errors are present. In this calibration, the data of individual flight lines are compared against each other and their systematic errors are corrected in the final processed data.

5.4 LiDAR Processing

The LAS files were then imported, verified, and parsed into manageable, tiled grids using GeoCue version 7.0.34.0 (GeoCue). GeoCue allows for ease of data management and process tracking.

After the data has been processed and calibrated a relative accuracy assessment is performed analyzing the flightline to flightline vertical alignment. GeoCue is utilized to create images indicating elevation differences that provide a visual interpretation of how well flight lines match, and are a useful tool in determining either the success or need to re-evaluate the in-situ calibration procedure..

Areas containing dense vegetation coverage or inundation from water will show a greater elevation offset then is actually present in the ground data. This is due to these regions having a high number of returns from vegetation or non-ground objects and fewer returns from the ground, relative to open ground areas, causing the elevation offset to be exaggerated in areas of heavy vegetation. It is generally understood that flightlines should match tightly in areas of open, moderate terrain, and will not match as well in steeper terrain due to less predictable angles of pulse return.

AeroMetric also reviews sample tiles to ensure that the desired point density has been met. Proprietary software is used to complete this task. According to USGS National Geospatial Program (NGP) LiDAR Guidelines and Base specifications v13, a grid with cell size of 2 times the nominal post spacing is overlaid onto the LiDAR data. A passing tile has at least one point within a minimum of 90% of the resultant cells. This assessment was carried out using first return LiDAR data points only.

Once both the accuracy between swaths and data density are accepted an automated classification algorithm is performed using TerraSolid's TerraScan, version 012.017 (TerraScan). This will produce the majority of the bare-earth datasets.

The remainder of the data was classified using manual classification techniques. The majority of the manual editing involved changing points initially misclassified as ground (class 2) to unclassified (class 1). Erroneous low points, high points, including clouds are classified to class 7. Additional, project-specific classes were utilized and are listed and discussed in section 5.8 of this report.

5.5 Breakline Acquisition

For this project, river and lake features were digitized in Bentley's MicroStation v 8.05.02.27 (MicroStation) while the point cloud data was loaded using TerraScan. The lake breakline features were set to the lowest elevation along the shoreline. This project called for the flattening of lakes whose area was equal to or greater than 1 acre, rivers with a nominal width of 100' or greater, and 19 other streams and rivers specified in the contract, regardless of width.

The river features requiring hydro-flattening were collected as "double-line drainages", meaning that breaklines were acquired on either side of the water body. Then, using "XBars", or crossing lines at a fixed elevation, the river breakline features were draped to proper elevations. Setting XBars along the length of a river at fixed intervals of elevation change ensures downstream flow. Additional XBars can be set between intervals to fix the draping of island features and other abnormalities.

Additionally, "single-line" breakline features were collected along streams whose width did not fall within the "double-line" collection criteria. These features were collected to be used as a horizontal reference only, and were not draped to local elevation data.

Once all breakline features were collected, lidar points near the surface within the breaklines were classified as water, which keeps them from being used in the generation of deliverable products such as contours and DEMs. This process was done to satisfy the hydro-flattening requirements for this project.

5.6 Vertical Bias Adjustment

The LiDAR data was compared with and adjusted to the collected GPS road profiles discussed in section 4 of this report using both TerraScan and in-house statistical analysis tools. This was done to eliminate any 'vertical biases' that may be present within the calibrated LiDAR data set. Once the data was vertically adjusted, the vertical accuracy was computed as discussed in the next section.

5.7 Vertical Accuracy Assessment

The USGS requires that vertical accuracy be assessed, at a minimum, as follows:

LiDAR point cloud data is to be assessed independently of derivative products. Calibrated, unclassified LiDAR point cloud data is to be used to generate a Triangulated Irregular Network (TIN), whose elevations will be compared with survey check points in open areas of moderate terrain. The results of this comparison are to achieve a Fundamental Vertical Accuracy (FVA) of no greater than 24.5 cm ACC_z at a 95% confidence level, which is defined as being $RMSE_z$ * 1.96 per NDEP / ASPRS guidelines.

Derivative DEMs are to use the same guidelines in determining their FVA, but must also comply with the following additional requirements. Each land cover type occupying 10 percent or more of the total project area must be tested an reported with a Supplemental Vertical Accuracy (SVA). Each SVA should have a target $RMSE_z$ of 36.3 cm or less at the 95th percentile. Finally, the DEMs must have a Consolidated Vertical Accuracy (CVA) of 36.3 cm or less at the 95th percentile. This statistic is computed using all check points in all categories.

Further details on USGS LiDAR specifications can be retrieved from lidar.cr.usgs.gov.

Utilizing the above guidelines, this project's unclassified point cloud data achieved an FVA of 13.7 cm. This assessment was carried out using Spatial Information Solution's Topo Analyst. All calibrated, unclassified LiDAR point cloud data for this project was compared to all "barren" earth category check points from each of the three surveys listed in section 4 of this report. The resultant report is included with this delivery as the document MatSu_Unclassified_Point_Cloud_FVA.pdf.

Further accuracy assessments were carried out by a third-party utilizing DEMs generated from bare-earth classified LiDAR data. Full, categorized point listings and statistics can be found in the accompanying Excel file, Final_Project_Wide_Vertical_Accuracy_Assessment.xlsx. A summary of the DEM accuracies and number of check points used to compute said values is included here.

```
FVA         Barren            18.2 cm    (275) checkpoints
SVA         Forest            39.9 cm    (52) checkpoints
SVA         Shrub             53.3 cm    (54) checkpoints
SVA         Developed         27.5 cm    (58) checkpoints
SVA         Wetlands          48.3 cm    (49) checkpoints
CVA         All Categories    35.1 cm    (488) checkpoints
```

Omitted Control Points

After completing the vertical accuracy assessment of the surveyed check points versus the LiDAR surface it was observed that there were a number of outlier points with vertical differences of greater than one foot. All of the points greater than 1.5' difference were examined to determine the source of the difference. In several cases it was found that there were discrepancies in the antenna height logged in the field book versus the value used in the RINEX file.

In some other cases the placement of the surveyed point did not meet the placement criteria for checkpoints set forth in the NDEP "Guidelines for Digital Elevation Data" v1.0. The points listed below were omitted from the final vertical accuracy assessment.

Point ID	Reason for Omission
8016	Antenna height error
9007	Collected in standing water
9019	No field notes or documentation available
3-655	Antenna height error & positioned on terrain slope change
4-953	Antenna height error
4-955	Antenna height error
4-959	Antenna height error & collected in standing water
4-960	Antenna height error & collected in standing water
32-604	Terrain slope exceeds 20% grade
32-605	Terrain slope exceeds 20% grade
32-606	Terrain slope exceeds 20% grade
32-612	Error exceeds 3x the standard deviation (3 sigma) of the error

5.8 LiDAR Data Delivery

All deliverables listed below use the following spatial reference per the project specifications:

Horizontal Datum:	NAD83 (CORS96 Epoch 2003.0)
Coordinate System:	Alaska State Plane Zone 4
Vertical Datum:	NAVD88 (GEOID09)
Project Units:	US Survey Feet

Boundaries – Provided in ESRI shapefile format, in the following categories:

a) LiDAR and Imagery Boundary
b) Project Block Boundaries
c) Project Tile Layout (full and quarter-tile)

LiDAR Flightline Footprints – Provided in ESRI shapefile format.

Unclassified Point Cloud Data – Provided in LAS 1.2 format with absolute GPS timestamps and georeference tags in file headers; 1 file per swath.

Classified Point Cloud Data – Provided in LAS 1.2 format with absolute GPS timestamps and georeference tags in file headers. Delivery is tiled in accordance with the quarter-tile index layout and follows the provided classification scheme of:

Point Class	Classification Description
1	Processed, but unclassified
2	Bare-earth ground
3	Low Vegetation (between 1 and 6 feet above ground surface)
4	Medium Vegetation (between 6 and 15 feet above ground surface)
5	High Vegetation (greater than 15 feet above ground surface)
6	Buildings
7	Error Points
8	Contour Keypoints
9	Water
10	Ignored Ground (Breakline Proximity)
11	Major Transmission Lines
13	Noise (unclassified data 1 foot or less above ground)
14	Bridge decks
18	May 24, 2011 data from the Matanuska Glacier withheld from ground/vegetation classification due to movement
19	May 31, 2011 data from the Matanuska Glacier withheld from ground/vegetation classification due to movement
26	May 13, 2011 data from the Knik Glacier withheld from ground/vegetation classification due to movement
27	May 24, 2011 data from the Knik Glacier withheld from ground/vegetation classification due to movement
28	August 26, 2011 data from the Knik Glacier withheld from ground/vegetation classification due to movement

Bare Earth Digital Elevation Models – Provided in GeoTiff format in accordance with the full tile index. DEM resolution is 3.2808 feet.

First-Return Digital Surface Models – Provided in GeoTiff format in accordance with the full tile index. DSM resolution is 3.2808 feet.

Bare Earth Hillshades – Provided in 8-bit grayscale GeoTiff format, displays surface relief in the DEM deliverables in accordance with the full tile index. Hillshade resolution is 3.2808 feet.

First-Return Hillshades – Provided in 8-bit grayscale GeoTiff format, displays surface relief in the DSM deliverables in accordance with the full tile index. Hillshade resolution is 3.2808 feet.

Intensity Imagery – Provided in 8-bit grayscale GeoTiff format in accordance with the quarter-tile index. Resolution is 3.2808 feet.

Building Footprints – Provided in ESRI shapefile format, per project block.

Contours – Provided in the following formats:

ESRI Shapefiles - provided at 2-foot intervals and tiled in accordance with the quarter-tile layout.

AutoCAD DXF Files - provided at 2-foot intervals and tiled in accordance with the quarter-tile layout.

Breaklines – Provided in ESRI Shapefile format, in the following categories:

Double Line Hydro – Rivers and streams with a nominal width of 100 feet or greater, plus an additional 19 specified streams regardless of width. Both sides of the shoreline and islands within the shore were digitized as 3D polylines (Polyline Z) and utilized in the hydro-flattening of the Bare Earth DEMs.

Lakes – Lakes with a surface area of 1 acre or greater. Digitized as 3D polygons (Polygon Z) and utilized in the hydro-flattening of the Bare Earth DEMs.

Single Line Hydro – Centerlines of streams less than with a nominal width of less than 100 feet or not otherwised selected for double-line digitization. Digitized as 2D polylines for reference purposes only, not utilized in the hydro-flattening of the Bare Earth DEMs.

Acquisition, Processing, QA/QC and Survey Reports – Provided as this document, outlining acquisition, processing, and QC procedures, and all other relevant project information, as well as all other documents referenced herein.

5.9 Deliverable Generation Methodology

Raw Point Cloud Data – Generated from calibrated LAS data; data was extracted to “strips” by flight ID with all points classified as Code 0 using TerraScan. Georeference tags and Adjusted GPS Timestamps were added to files using proprietary in-house software.

Classified Point Cloud Data – Generated in GeoCue, classified in TerraScan. Georeference tags and Adjusted GPS Timestamps were added to files using proprietary in-house software.

Bare Earth DEMs – Generated from classified LAS data and breaklines utilizing QCoherent’s LP360 and TerraScan. Proper NODATA values assigned using USGS Image Toolbox v 1.5 in ArcGIS. Proper spatial reference tags assigned utilizing Geospatial Data Abstraction Library (GDAL).

First-Return DSMs – Generated from from first returns in LAS data utilizing QCoherent's LP360 and TerraScan. Proper NODATA values assigned using USGS Image Toolbox v 1.5 in ArcGIS. Proper spatial reference tags assigned utilizing Geospatial Data Abstraction Library (GDAL).

Bare Earth Hillshades – Generated from Bare Earth DEMs using Global Mapper v 13.

First-Return Hillshades – Generated from First-Return DSMs using Global Mapper v 13.

Intensity Imagery – Generated from LAS data utilizing TerraScan. Output in 8-bit gray scale GeoTiff format.

Building Footprints – Automated classification of buildings performed using TerraScan. Manual cleanup of building classification was then carried out within point cloud data using TerraScan or LP360. Building footprints were digitized automatically using the LP360 building extraction feature. Footprints cleaned up manually using ArcGIS.

Contours – Classified LAS data was run through a "contour keypoints" routine with settings appropriate for the generation of the desired contour interval. The resultant keypoints were used to generate contours at that interval in ESRI Shapefile format using proprietary in-house software.

Breaklines – All linework digitized in MicroStation. Double-line hydro features were draped utilizing crossing lines (or "XBars") set at elevation based on the LAS data to insure proper flow and hydro-flattening. Lake features were draped to the lowest LiDAR elevation along the shoreline. Single-line hydro features digitized for reference purposes only and are not set at any elevation. All files converted to ESRI Shapefile format using Global Mapper v 13.

5.10 Conditions Affecting Final Data

The project area includes coastal zones subject to changing water levels due to tidal variations. Therefore, breaklines on water edges may shift where neighboring flightlines meet as hydro-breaklines are placed according to the conditions present at the time of data collection.

The logistical challenges of acquiring this scale of project in the state of Alaska are an ever-present consideration. Original requirements for the project called for leaf-off and snow-free conditions. While every effort was made to conform to these requirements, some data may have been acquired outside of them in order to conclude the project in a timely and reasonable fashion.

Areas of high elevation included in the project may have snowpack present throughout the year.

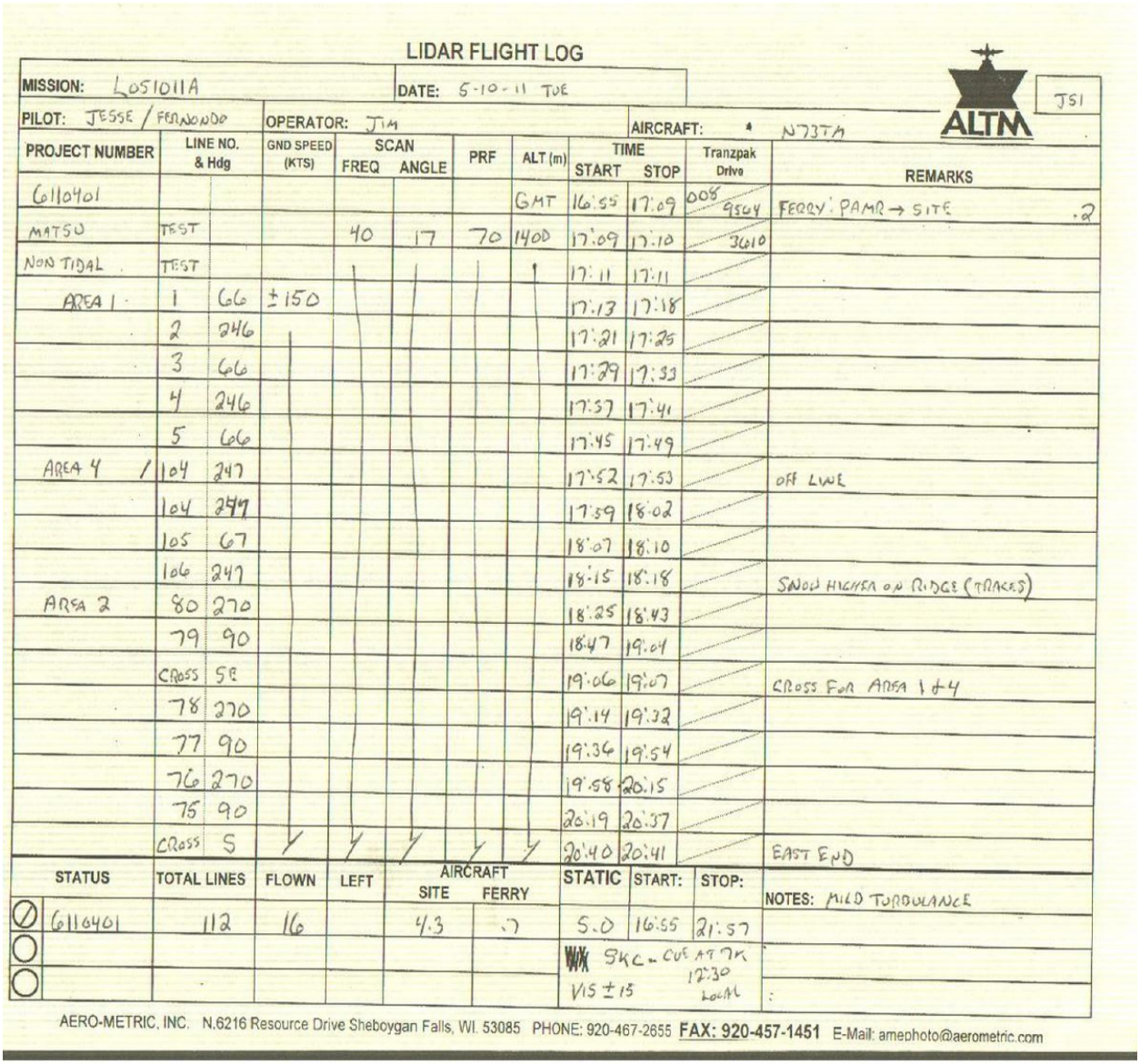
6 CONCLUSION

The LiDAR data and derivative products discussed in this report were processed and produced in accordance with provided guidelines and established practices. The accuracy criteria set forward by the Borough and other Government / Industry standards have been demonstrated to be met throughout this report and it's supporting documents. As such, the resultant data and derivative products satisfy the request and needs of the Mat-Su Borough, and may be considered useful and reliable to additional end users upon distribution.

7 FLIGHT LOGS

AeroMetric names its flight missions beginning with a sensor identifier, followed by the date, and ending with a mission identifier. The sensor identifiers are as follows: M = Optech Gemini #03SEN145, L = Optech Gemini #07SEN201, and V = Leica ALS70 #7161. The mission identifier is simply sequential, so an "A" is used for the first flight per sensor per day, "B" for the second, and so on.

May 2011 Logs



LIDAR FLIGHT LOG

MISSION: LOS1011A DATE: 5-10-11 TUE JS1

PILOT: JESSE / FERNANDO OPERATOR: JIM AIRCRAFT: 4 N73TA

PROJECT NUMBER	LINE NO. & Hdg		GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive	REMARKS
6110401							GMT	16:55	17:09	008 9564	FERRY: PAMR → SITE .2
MAT5U	TEST			40	17	70	1400	17:09	17:10	3610	
NON TIDAL	TEST							17:11	17:11		
AREA 1	1	66	±150					17:13	17:18		
	2	246						17:21	17:25		
	3	66						17:29	17:33		
	4	246						17:37	17:41		
	5	66						17:45	17:49		
AREA 4	104	247						17:52	17:53		OFF LINE
	104	247						17:59	18:02		
	105	67						18:07	18:10		
	106	247						18:15	18:18		SNOW HIGHER ON RIDGE (TRACES)
AREA 2	80	270						18:25	18:43		
	79	90						18:47	19:04		
	CROSS	58						19:06	19:07		CROSS FOR AREA 1 & 4
	78	270						19:14	19:32		
	77	90						19:36	19:54		
	76	270						19:58	20:15		
	75	90						20:19	20:37		
	CROSS	5	↓	↓	↓	↓	↓	20:40	20:41		EAST END

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY
∅ 6110401	112	16		4.3	.7
○					
○					

STATIC	START:	STOP:
5.0	16:55	21:57

WX SKC - CVS AT 7K 17:30 LOCAL
VIS ±15

NOTES: MILD TURBULANCE

AERO-METRIC, INC. N.6216 Resource Drive Sheboygan Falls, WI. 53085 PHONE: 920-467-2655 FAX: 920-457-1451 E-Mail: amephoto@aerometric.com

Anchorage
Anchorage, Alaska, 99501
Toll Free 1-866-247-6277
Fax (907) 274-3265

LIDAR MISSION LOG

AIRCRAFT 7516Q	PILOT Robbie	ALTM TYPE
DATE 5/10/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M051011A	
PAGE NO. of	HARDDRIVE 0134	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	0950	190.5	0945-0948 static
South	Land MRI	1345	194.4	1342-1347 static
Mat-Su				
Non-Tide				
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.9							

Anchorage Toll Free 1-866-247-6277 Fax (907) 274-3265

LIDAR MISSION LOG

AIRCRAFT 7516Q	PILOT MORTHORPE	ALTM TYPE
DATE 5/10/11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG M05101IB, C	
PAGE NO. of	HARDDRIVE 1111 / 0191	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		194.4	STATIC 1458 - 15:01 M05101IB
	LAND MRI	33-51	200.0	STATIC 20:39 - 20:41
6110401	T/O MRI		200.0	STATIC 21:19 - 21:22 M05101IC
	LAND MRI	52-56	801.7	STATIC 23:09 - 23:12
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	5.6							
6110401	1.7							

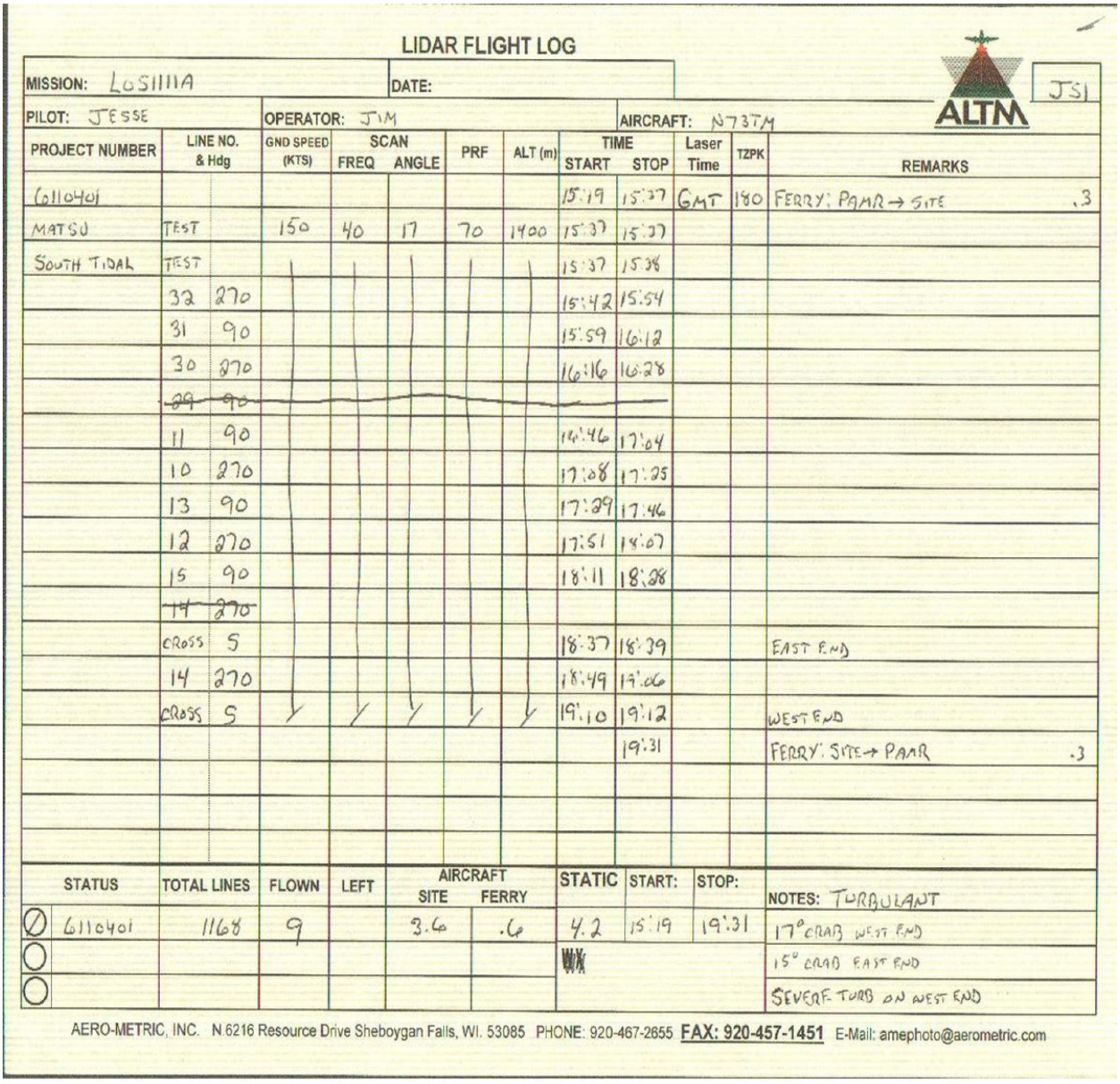
L051011B Paper Log Unavailable - Digital Log Included Here

V:\NAS5100N_backups\tier2\lidar\6110401_Matsu\Airborne_Data\Preliminary\L051011B\Airborne_Info\5-10-2011@23-20-condensed.txt Saturday, February 02, 2013 3:51 PM

```
tida
           Flight Log
-----------------------------
Project Number: 6110401
S/N           : 07SEN201
Airport       : MRI
Mission       : L051011B
Date          : May 10, 2011
Julian Day    : 130

           Statistics
-----------------------------
Laser Time    : 00:47:14
```

START	STOP	LINE#	ALT	PRF	FREQ	ANGLE	MP	DIV	RC	HDG	Plan File
23:35:39.255	23:35:57.455	97	1305	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
23:36:29.455	23:36:43.355	97	1365	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
23:39:23.755	23:40:05.456	97	1361	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
23:45:47.756	23:47:43.557	97	1351	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
23:50:56.457	23:52:13.857	97	1421	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
00:01:05.059	00:02:59.959	97	1388	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
00:11:25.96	00:15:31.961	96	1413	70	40.00	17.00	NAR	ON	OFF	90.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
00:20:05.962	00:26:11.863	95	1416	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
00:30:09.663	00:30:27.163	94	1425	70	40.00	17.00	NAR	ON	OFF	90.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
00:35:07.664	00:43:17.565	94	1411	70	40.00	17.00	NAR	ON	OFF	90.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
00:47:38.966	00:57:50.667	93	1429	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
01:01:48.067	01:12:03.769	92	1413	70	40.00	17.00	NAR	ON	OFF	90.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln
01:15:28.669	01:17:51.27	91	1413	70	40.00	17.00	NAR	ON	OFF	270.00	South_KnikRiverSouth_KnikRiverValley_Tidal.pln



LIDAR FLIGHT LOG

ALTM

JSI

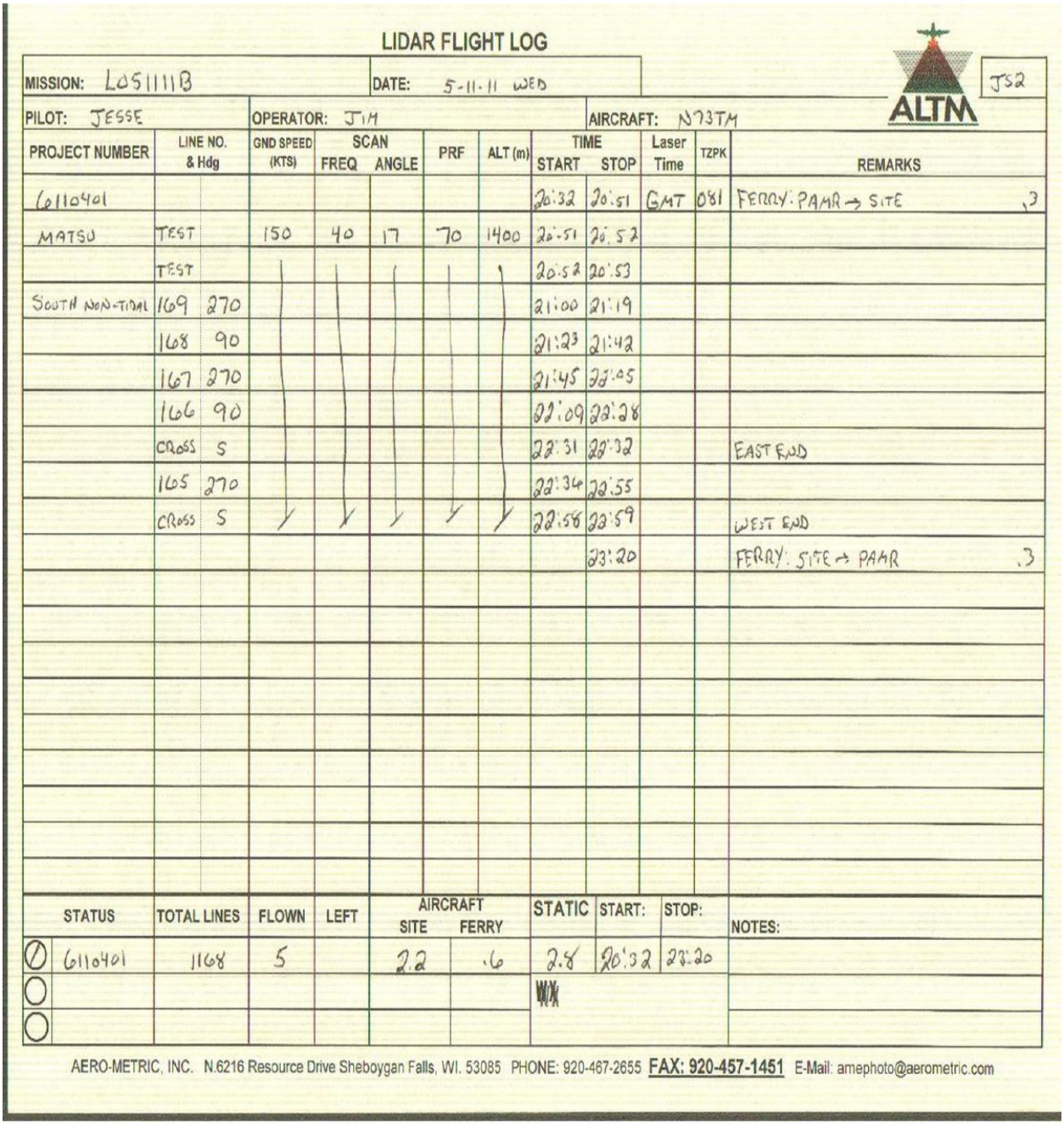
MISSION: LOSIIIA DATE:

PILOT: JESSE OPERATOR: JIM AIRCRAFT: N737M

PROJECT NUMBER	LINE NO. & Hdg		GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401								15:19	15:37	GMT	180	FERRY: PAMR → SITE .3
MATSU	TEST		150	40	17	70	1400	15:37	15:37			
SOUTH TIDAL	TEST							15:37	15:38			
	32	270						15:42	15:54			
	31	90						15:59	16:12			
	30	270						16:16	16:28			
	~~29~~	~~90~~										
	11	90						16:46	17:04			
	10	270						17:08	17:25			
	13	90						17:29	17:46			
	12	270						17:51	18:07			
	15	90						18:11	18:28			
	~~14~~	~~270~~										
	CROSS	5						18:37	18:39			EAST END
	14	270						18:49	19:06			
	CROSS	5						19:10	19:12			WEST END
									19:31			FERRY: SITE → PAMR .3

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES: TURBULANT
∅ 6110401	1168	9		3.6	.6	4.2	15:19	19:31	17° CRAB WEST END
○						WX			15° CRAB EAST END
○									SEVERE TURB ON WEST END

AERO-METRIC, INC. N.6216 Resource Drive Sheboygan Falls, WI. 53085 PHONE: 920-467-2655 **FAX: 920-457-1451** E-Mail: amephoto@aerometric.com



LIDAR FLIGHT LOG

ALTM

JS2

MISSION: L051111B DATE: 5-11-11 WED

PILOT: JESSE OPERATOR: JIM AIRCRAFT: N73TM

PROJECT NUMBER	LINE NO. & Hdg		GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401								20:32	20:51	GMT	08I	FERRY: PAMR → SITE .3
MATSU	TEST		150	40	17	70	1400	20:51	20:52			
	TEST							20:52	20:53			
SOUTH NON-TIDAL	169	270						21:00	21:19			
	168	90						21:23	21:42			
	167	270						21:45	22:05			
	166	90						22:09	22:28			
	CROSS	S						22:31	22:32			EAST END
	165	270						22:34	22:55			
	CROSS	S	↓	↓	↓	↓	↓	22:58	22:59			WEST END
									23:20			FERRY: SITE → PAMR .3

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
⓪ 6110401	1168	5		2.2	.6	2.8	20:32	23:20	
○						WX			
○									

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LIDAR MISSION LOG

AIRCRAFT 16Q	PILOT Robbie	ALTM TYPE
DATE 5/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG MCS/111A-B	
PAGE NO. of	HARDDRIVE 184	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	0600	201.7	ALTM not responding
Mat-Su	Land MRI	0647	202.3	.6 ferry
south tidal				
	T/O MRI	0752	202.3	0748-0751 static 3.1 site
A	Land MRI	1054	205.4	1057-1100 static lines 76-87
		Z		
	T/O MRI	1118	205.4	1118-1121 static " 117-122
B	Land MRI	1310	207.2	
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.1	.6						
	1.9							

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LIDAR MISSION LOG

AIRCRAFT 160	PILOT FERNANDO / MORTHORPE	ALTM TYPE
DATE 5-11-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG MOSIIIIC, D	
PAGE NO. of	HARDDRIVE 0134, 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
G110401	T/O MRI		207.2	STATIC 14:48 - 14:51 (0134) NON-TIDAL
MOSIIIIC	LAND MRI	(160-164)	210.6	STATIC 18:22 - 18:25 (0134) NON-TIDAL
G110401	T/O MRI		210.6	STATIC 19:15 - 19:18 (0181) TIDAL
MOSIIIID	LAND MRI	(57-70)	214.7	STATIC 23:28 - 23:31 (0181) TIDAL
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
G110401	3.4							
G110401	4.0							

LIDAR FLIGHT LOG

ALTM JS1

MISSION: L0512IIA DATE: 5-12-11 THUR

PILOT: JESSE OPERATOR: JIM AIRCRAFT: N73TM

PROJECT NUMBER	LINE NO. & Hdg		GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive	REMARKS
6110401								13:57	14:13	008	FERRY: PAMR .2
MAT SU	TEST		150	40	17	70	1400	14:13	14:14		
	TEST							14:14	14:14		
	CROSS	N						14:17	14:19		EAST END
SOUTH NON TIDAL	159	270						14:26	14:45		
	CROSS	S						14:48	14:49		WEST END
SOUTH TIDAL	29	90						14:54	15:07		
	28	270						15:11	15:23		
	27	90						15:28	15:40		
	26	270						15:44	15:56		
	25	90						16:01	16:13		
	24	270						16:17	16:29		
	23	90						16:35	16:47		
	22	270						16:53	17:08		
	21	90						17:14	17:29		
	CROSS	S						17:35	17:36		EAST END
	20	270						17:44	18:00		
	CROSS	S	↓	↓	↓	↓	↓	18:03	18:04		WEST END
									18:24		FERRY: SITE → PAMR .3

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
⊘ 6110401	1168	11		9.9	.5	4.4	13:57	18:24	TURBULENT
○						WX			
○									

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LIDAR FLIGHT LOG

MISSION: L051211B DATE: 5-12-11 THUR JS2

PILOT: JESSE OPERATOR: JIM AIRCRAFT: N73TM

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive	REMARKS
6110401							18:52	19:06	008	FERRY: PAMR → SITE .2
MATSU	TEST	150	40	17	70	1400	19:06	19:07		
	TEST						19:07	19:07		
SOUTH TIDAL	19 270						19:11	19:26		
	18 90						19:30	19:46		
	17 270						19:50	20:05		
	CROSS S						20:08	20:09		WEST END
	16 90						20:14	20:30		
	CROSS S						20:33	20:34		EAST END
								20:54		FERRY: SITE → PAMR .3

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
⊘ 6110401	1168	4		1.5	.5	2.0	18:52	20:54	
○						WX			
○									

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LIDAR MISSION LOG

5855

AIRCRAFT 206	PILOT Matthew	ALTM TYPE
DATE 5/12/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M05121IA	
PAGE NO. of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	0700	214.7	71-75, 123-128
Mat-Sus	Land MRI	1200	219.7	
Tidal, S. Non ID				
				Laser ON time 03:09:56
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	5.0							

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LIDAR MISSION LOG

AIRCRAFT 16Q	PILOT MCSHENEE	ALTM TYPE
DATE 5-12-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG MOS1211B	
PAGE NO. of	HARDDRIVE 081,	LASER ON TIME 4:06 MIN

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
G110401	T/O MRI	35:08	219.7	STATIC 15:05 - 15:08 NON-TIDAL / TIDAL
	LAND MRI	21:00	225.7	STATIC 21:03 - 21:06
				LASER ON TIME 4:06 MIN

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
G110401	6.0	/

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

AIRCRAFT	PILOT Nick	ALTM TYPE
DATE 5/12/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG L051211C	
PAGE NO. of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	2214	3670.7	2202-2207 Static
MatSu	Land MRI	0024	3672.9	0027-0032 Static
				Lines 137-140 completed

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	2.2	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

AIRCRAFT 73TM	PILOT Nick	ALTM TYPE
DATE 5/13/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG LOS1311 A + B	
PAGE NO. of	HARDDRIVE 008	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	1347	3672.9	1343-1348 Static
Mat Su	Land MRI	1727	3676.5	1729-1732 Static
				Lines 129-136 completed
				Laser on time: 02:22:08
	T/O MRI	1827	3676.5	1824-1827 Static
	Land MRI	2056	3679.0	2057-2100 Static
				Lines 221-236 completed
				Laser on time: 01:08:35
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.6	
6110401	2.5	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

3:5 93

LIDAR FLIGHT LOG

ALTM JS1

MISSION: L0513IIC DATE: 5-13-11 FRIDAY THE 13TH

PILOT: JESSE OPERATOR: JIM AIRCRAFT: N73TM

PROJECT NUMBER	LINE NO. & Hdg		GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive	REMARKS
6110401							GMT	21:58	22:17	180	FERRY: PAMR → SITE .3
MATSU	TST		150	40	17	70	1400	22:17	22:18		
	TST							22:18	22:18		
SUTTON	237	73						22:24	22:30		
	238	253						22:34	22:40		
	239	73						22:44	22:50		
	240	253						22:54	23:00		
	241	73						23:03	23:09		
	242	253						23:13	23:19		
	243	73						23:22	23:28		
	244	253						23:32	23:39		
	252	73						23:44	23:48		
	253	253						23:52	23:57		
	254	73						00:01	00:05		
	255	253						00:09	00:13		
	256	73						00:17	00:21		
	257	253						00:25	00:29		
	258	73						00:31	00:34		
	CROSS	NW						00:36	00:37		
	259	253	↓	↓	↓	↓	↓	00:39	00:41		

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
∅ 6110401	1168	16		2.6	1.9	4.5	21:58	02:13	
○						WX			
○									

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LIDAR FLIGHT LOG

MISSION: L0513lic DATE: 5-13-11 FRI

PILOT: JESSE OPERATOR: JIM AIRCRAFT: N73TM

ALTM

JSQ

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive	REMARKS
6111401	CROSS NW	150	40	17	70	1400	00:48	00:49	18°	WEST END
MAT SU	CROSS NW	↓	↓	↓	↓	↓	00:53	00:54		EAST END
SUTTON								02:13		FERRY: SITE → PAAR 1.6

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
○									
○						WX			
○									

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LIDAR MISSION LOG

42.25
5045 27.50

AIRCRAFT 16Q	PILOT Haim/Fernando	ALTM TYPE
DATE 5/13	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG MOS1311A-B	
PAGE NO. of	HARDDRIVE 0184?, 1111 Bmission	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	0545	305.7	141-146 lines
Mat-Su	Land MRI	0840	[redacted]308.6	
South Non-TA				
Knik Rvr Vly	T/O MRI	1047	228.5	line 178-189 Knik
		1427	232.1	
				Laser ON time 01:51:43
				01:52:42
				03:44:25
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	2.9	
	3.6	
	6.5	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

M051311C Paper Log Unavailable - Digital Log Included Here

V:\NAS5100N_backupsfile\29dar\6110401_MatsuAirborne_Data\Preliminary\M051311C\Airborne_Info\5-13-2011@15-46-condensed.txt Saturday, February 02, 2013 3:55 PM

Flight Log

Project Number: 6110401
S/N : 03SEN145
Airport : MRI
Mission : M051311C
Data : May 13, 2011
Julian Day : 133

Statistics

Laser Time : 00:56:37

START	STOP	LINE#	ALT	PRF	FREQ	ANGLE	MP	DIV	RC	HDG	Plan File
00:02:45.353	00:03:06.652	190	1420	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
00:03:37.052	00:03:55.851	190	1414	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
00:07:12.948	00:08:24.346	190	1399	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
00:14:06.639	00:21:34.63	190	1435	70	40.00	17.00	NAR	ON	OFF	125.00	6110401_MatSu_V1.pln
00:25:24.626	00:32:06.518	191	1401	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
00:34:45.215	00:40:49.808	192	1411	70	40.00	17.00	NAR	ON	OFF	125.00	6110401_MatSu_V1.pln
00:43:21.705	00:49:03.098	193	1377	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
00:51:45.395	00:57:24.488	194	1413	70	40.00	17.00	NAR	ON	OFF	125.00	6110401_MatSu_V1.pln
01:00:09.785	01:05:25.079	195	1389	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
01:07:44.976	01:13:02.969	196	1400	70	40.00	17.00	NAR	ON	OFF	125.00	6110401_MatSu_V1.pln
01:15:17.067	01:20:01.161	197	1403	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
01:22:14.558	01:27:07.953	198	1427	70	40.00	17.00	NAR	ON	OFF	125.00	6110401_MatSu_V1.pln
01:31:30.247	01:32:34.246	199	1368	70	40.00	17.00	NAR	ON	OFF	305.00	6110401_MatSu_V1.pln
01:34:45.043	01:35:28.742	200	1402	70	40.00	17.00	NAR	ON	OFF	125.00	6110401_MatSu_V1.pln
01:38:33.739	01:39:46.237	200	1387	70	40.00	17.00	NAR	ON	OFF	125.00	6110401_MatSu_V1.pln
01:44:43.831	01:45:31.23	210	1374	70	40.00	17.00	NAR	ON	OFF	65.02	6110401_MatSu_V1.pln

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LIDAR MISSION LOG

AIRCRAFT 8WW	PILOT Haim	ALTM TYPE
DATE 5/17/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M051711A	
PAGE NO. of	HARDDRIVE 184	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
~~CALIBRATION~~ ↑	T/O MRI		2013.2	static 10:35-10:38 Palmer Lidar Callibration
6080103	end callibration		2015.6	Laser ON 00:25:16
6110401			2015.6	starting Mat-Su central
Mat-Su	Land MRI		2016.9	
				~~MRI~~ -
				Laser ON- 00 35.19 Mat-Su

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6080103	2.4	
6110401	1.3	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

AIRCRAFT N66R	PILOT CZECHOWICZ	ALTM TYPE
DATE 5-18-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG L051811A	
PAGE NO. 1 of 1	HARDDRIVE 184	

PROJECT NO.	LOCATION	TIME	HOBBS	GPS TIME REMARKS
6110401	T/O MRI		1767.1	~~[illegible]~~
	LAND MRI		1767.9	
	T/O MRI		1767.9	STATIC 17:011 - 17:04
	LAND MRI		1771.1	STATIC 30:29 - 20:32
				LASER ON TIME; 1:49:51
				600-587
	.8 .1			

ATMOSPHERE C PC OC HAZE — WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.0	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

L051811B Paper Log Unavailable - Digital Log Included Here

V:\NAS5100N_backups\lidar2\lidar\6110401_MatsuAirborne_Data\Preliminary\L051811B\Airborne_Info\5-18-2011@16-1-condensed.txt Saturday, February 02, 2013 2:53 PM

Flight Log

Project Number: 6110401
S/N : 07SEN201
Airport : MRI
Mission : L051811B
Data : May 18, 2011
Julian Day : 138

Statistics

Laser Time : 00:53:35

START	STOP	LINE#	ALT	PRF	FREQ	ANGLE	MP	DIV	RC	HDG	Plan File
00:13:06.796	00:13:33.897	1	1346	70	38.00	20.00	NAR	ON	OFF	111.08	6080103_Lidar_Calibration_Palmer_Airport_V2.pln
00:16:12.097	00:16:43.497	1	1442	70	38.00	20.00	NAR	OFF	OFF	111.08	6080103_Lidar_Calibration_Palmer_Airport_V2.pln
00:22:32.098	00:23:34.198	1	1416	70	38.00	20.00	NAR	OFF	OFF	111.08	6080103_Lidar_Calibration_Palmer_Airport_V2.pln
00:27:12.098	00:28:00.398	2	1477	70	38.00	20.00	NAR	OFF	OFF	281.49	6080103_Lidar_Calibration_Palmer_Airport_V2.pln
00:31:34.198	00:32:25.398	3	1425	70	38.00	20.00	NAR	OFF	OFF	217.65	6080103_Lidar_Calibration_Palmer_Airport_V2.pln
00:40:00.199	00:46:10.399	245	1496	70	40.00	17.00	NAR	ON	OFF	73.01	6110401_MatSu_V1.pln
00:49:25.399	00:56:14.399	246	1471	70	40.00	17.00	NAR	ON	OFF	253.01	6110401_MatSu_V1.pln
00:59:24.6	01:05:59.9	247	1439	70	40.00	17.00	NAR	ON	OFF	73.01	6110401_MatSu_V1.pln
01:08:33.8	01:15:38.1	248	1521	70	40.00	17.00	NAR	ON	OFF	253.01	6110401_MatSu_V1.pln
01:18:22.9	01:25:26.9	249	1496	70	40.00	17.00	NAR	ON	OFF	73.01	6110401_MatSu_V1.pln
01:28:18.9	01:35:40.5	250	1495	70	40.00	17.00	NAR	ON	OFF	253.01	6110401_MatSu_V1.pln
01:38:12.9	01:45:20.5	251	1448	70	40.00	17.00	NAR	ON	OFF	73.01	6110401_MatSu_V1.pln
01:48:38.2	01:49:45.9	251	1470	70	40.00	17.00	NAR	ON	OFF	73.01	6110401_MatSu_V1.pln
01:53:57.6	01:55:13.5	251	1499	70	40.00	17.00	NAR	ON	OFF	73.01	6110401_MatSu_V1.pln

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LIDAR MISSION LOG

AIRCRAFT 8WW	PILOT Glen	ALTM TYPE
DATE 5/18/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG MOS1811A	
PAGE NO. of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	0632	2016.9	Central Area / static 06:27-0630
Mat-Su	Land MRI	1225	2022.8	
				Laser ON 04:10:58
				Lines 529-536

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	5.9	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

AIRCRAFT 898 WW	PILOT	ALTM TYPE
DATE 5/18/11	OPERATOR	BASE STATIONS
JULIAN DAY	STRIPLOG M051811B	
PAGE NO. of	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	2220	2022.8	Static 2215-2218
Mat-Su	Land MRI	0012	2024.6	Static 0013-0016
				Lines 537-540 flown
				Laser on time: 00:54:45

ATMOSPHERE C PC OC HAZE — WX REMARKS snowing on south end

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	1.8	0

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT CZECHOWICZ	ALTM TYPE
DATE 5-19-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG L0519 11A	
PAGE NO. of	HARDDRIVE 1/1/1	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
~~6110401~~	TO MRI		1773.4	STATIC 14:49 - 14:43
6110401	LAND MRI		1775.1	STATIC 1641 - 16:44
				LASER ON TIME 00:44:31
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	1.7	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG 12:35

AIRCRAFT 8WW	PILOT Glen	ALTM TYPE
DATE 5/19	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M051911A	
PAGE NO. of	HARDDRIVE 0134	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MR1	0640	2024.6	Central Area
Mat-Su	Land MR1	0810	2026.1	
				Laser ON - 00:37:35
ATMOSPHERE C PC OC HAZE		WX REMARKS Rained out		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	1.5							

M052011A Paper Log Unavailable - Digital Log Included Here

Flight Log

Project Number: 6110401
S/N : 03SEN145
Airport : MRI
Mission : M052011A
Date : May 20, 2011
Julian Day : 140

Statistics

Laser Time : 01:54:13

START	STOP	LINE#	ALT	PRF	FREQ	ANGLE	MP	DIV	RC	HDG	Plan File
15:24:17.955	15:24:37.555	541	1430	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
15:25:07.555	15:25:26.854	541	1426	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
15:28:08.552	15:29:38.65	541	1412	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
15:35:54.444	15:47:59.332	541	1423	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
15:53:46.926	16:06:36.512	542	1433	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
16:10:34.108	16:22:40.794	543	1439	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
16:28:23.388	16:29:19.586	543	1444	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
16:45:16.868	16:46:27.666	606	1443	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
16:50:29.861	16:51:42.06	606	1449	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
16:55:34.655	16:57:16.653	605	1403	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
17:01:14.249	17:03:32.346	604	1422	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
17:07:38.741	17:10:28.837	603	1450	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
17:14:22.233	17:17:45.429	602	1416	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
17:21:44.224	17:25:32.119	601	1422	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
17:31:58.711	17:33:09.01	606	1428	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
17:37:55.804	17:39:08.902	586	1432	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
17:44:36.795	17:55:35.281	586	1448	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
18:00:05.676	18:11:15.161	585	1414	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
18:15:12.256	18:26:08.042	584	1454	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
18:30:22.736	18:41:49.921	583	1430	70	40.00	17.00	NAR	ON	OFF	174.00	Default.pln
18:46:07.015	18:56:59.201	582	1456	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln
19:03:20.892	19:04:22.991	582	1429	70	40.00	17.00	NAR	ON	OFF	354.00	Default.pln

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LIDAR MISSION LOG

AIRCRAFT N166R	PILOT CZECHOWICZ	ALTM TYPE
DATE 5-21-11	OPERATOR PALE	BASE STATIONS
JULIAN DAY	STRIPLOG L052111A	
PAGE NO. of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	TO/MRI		1775.1	STATIC 15:07 - 15:10
	LAND / MRI		1779.7	STATIC 19:40 - 19:43
				LASER TIME; 3:06:48
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.6							

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LIDAR MISSION LOG

AIRCRAFT OWW	PILOT Haim	ALTM TYPE
DATE 5/21/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M052111A	
PAGE NO. of	HARDDRIVE 008	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O FAI	1238	2035.4	Static 12:32-12:35 Central Area 1.0
Mat-Su	start project		2036.4	
	Land MRI		2038.3	
	Land FAI		2039.5	lines 544-548
				Laser ON time 01:06:44

ATMOSPHERE C PC OC HAZE

WX REMARKS Ran into snow/rain on almost all lines

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	1.9	2.8

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

4.30

L052111B Paper Log Unavailable - Digital Log Included Here

Flight Log

Project Number: 6110401
S/N : 07SEN201
Airport : MRI
Mission : L052111B
Date : May 21, 2011
Julian Day : 141

Statistics

Laser Time : 01:05:10

START	STOP	LINE#	ALT	PRF	FREQ	ANGLE	MP	DIV	RC	HDG	Plan File
21:48:00.945	21:48:16.345	554	1466	70	40.00	17.00	NAR	ON	OFF	354.00	6110401_MatSu_V1.pln
21:48:38.145	21:49:47.645	554	1435	70	40.00	17.00	NAR	ON	OFF	354.00	6110401_MatSu_V1.pln
21:55:07.946	22:07:25.148	554	1458	70	40.00	17.00	NAR	ON	OFF	354.00	6110401_MatSu_V1.pln
22:10:07.148	22:23:01.048	555	1448	70	40.00	17.00	NAR	ON	OFF	174.00	6110401_MatSu_V1.pln
22:25:34.649	22:37:57.349	556	1450	70	40.00	17.00	NAR	ON	OFF	354.00	6110401_MatSu_V1.pln
22:40:41.449	22:53:40.249	557	1451	70	40.00	17.00	NAR	ON	OFF	174.00	6110401_MatSu_V1.pln
22:56:09.149	23:08:38.849	558	1449	70	40.00	17.00	NAR	ON	OFF	354.00	6110401_MatSu_V1.pln
23:12:45.149	23:13:49.549	558	1455	70	40.00	17.00	NAR	ON	OFF	354.00	6110401_MatSu_V1.pln

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LIDAR MISSION LOG

AIRCRAFT N66R	PILOT Robbie	ALTM TYPE
DATE 5/23/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG L052311 A	
PAGE NO. 1 of 1	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401			1783.3	Static 22:47-2250
MatSu		2252		T/O MRI
		0529	1789.9	Land MRI
				Static 0532-0535
				Lines 210-220 260-290 completed
				Laser on time: 03:53:26
ATMOSPHERE C PC OC HAZE		WX REMARKS clear		

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	6.6	0

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

LIDAR FLIGHT LOG ~~DSEMD~~ ~~[illegible]~~

(518 - 505)

ALTM

MISSION: LOS 2411A DATE: 5-24-11

PILOT: CZECHOWICZ OPERATOR: PACE AIRCRAFT: 6GR

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401		150	40	17	70	4700				008	T/O MRI 89.9 14:40:14:43
											LAND MRI 95.0 19:48:19:52
											LASER TIME: 03:45:11

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
○ 6110401				5.1					
○						WX			
○									

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Robbie	ALTM TYPE
DATE 5/24/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG L052411B	
PAGE NO. 1 of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401			1795.0	Static 2146-2149
Mat Su		2153		T/O MRI
				ALTM was freezing. Restart ALTM
				and reflew 205+206
				Eyesafe altitude shut off laser when over
				mtn. restart line 205
		0432	1801.6	Land MRI
				Static 0434-0437
				Lines 205-209 425-455 465-493
				Laser On Time: 02:47:38

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	6.6	0

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

44:55
4:18

AIRCRAFT 6WW	PILOT Haim / Glen	ALTM TYPE
DATE 5/24	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M052411A/B	
PAGE NO. of	HARDDRIVE 0181/081	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O FAI	0755	2048.3	static 0744-0749
Mat-Su	Land MRI	1245	2053.1	Central, Matnuska River
				static 1242-1245
				Laser ON 02:08:43
				559-568 306-310
6110401	T/O MRI	1430	2058.3	Central 494-504, Buffalo 291-294
Mat-Su	Land MRI	2000	2058.5	
				Laser ON 03:02:59

ATMOSPHERE C PC OC HAZE — WX REMARKS clear

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.8	
6110401	5.2	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

59:30

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LIDAR MISSION LOG 311-318 549-553, 522-528

AIRCRAFT NGGR	PILOT CZECHOWICZ	ALTM TYPE
DATE 5-25-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG 0181	
PAGE NO. of	HARDDRIVE	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MR1		1801.6	STATIC 14:43 - 14:47
	LAND MR1		1807.5	STATIC 20:43 - 20:47
				LOTJ 03:38:24
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	5.9	✓						

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Robbie	ALTM TYPE
DATE 5/25/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG LOS2511B	
PAGE NO. 1 of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	Mat Su		1807.5	Static 2151-2154
		2156		T/O MRI
		0222		Land MRI
			1811.9	Static 0224-0227
				Lines 295-305 456-464 completed
				Laser on time: 02:25:17

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.4	0

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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607 - 615, 519 - 523 **LIDAR MISSION LOG**

AIRCRAFT N6GR	PILOT CZECHOWICZ	ALTM TYPE
DATE 5-26-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG	
PAGE NO. of	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1811.9	STATIC ✓ ✓
	LAND MRI		1816.4	STATIC 19:31 - 19:34
				LOT; 01:49:54
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.6							

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Robbie	ALTM TYPE
DATE 5/26/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG LOS2611B	
PAGE NO. 1 of 1	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	MatSu		1816.4	Static 2136-2139
		2140		T/O MRI
		0022		Land MRI
			1819.1	Static 0025-0028
				Lines 1064-1080 completed
				Laser on time: 01:07:06
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	2.7	0

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG 1047-1052, 622, 623

AIRCRAFT N6CR	PILOT CZECHOWICZ	ALTM TYPE
DATE 5-27-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG	
PAGE NO. of	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1819.1	
	LAND MRI		1822.1	STATIC 17:52 - 17:55
				LOT: 01:36:27
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.0							

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620, 621, 624, 625

LIDAR MISSION LOG

21C

AIRCRAFT N66R	PILOT FERNANDO	ALTM TYPE
DATE 5-27-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG	
PAGE NO. of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1822.1	STATIC 18:47 - 18:50
			1824.2	STATIC 21:05 - 21:08
				(LOT; 01;08;06)
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	2.1							

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LIDAR MISSION LOG

AIRCRAFT 66R	PILOT Robbie	ALTM TYPE
DATE 5/27/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG L0527 11C	
PAGE NO. | of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	Mat Su		1824.2	Static 2150-2153
		2153		T/O MRI
		0452		Land MRI
			1831.2	Static 0454-0457
				Lines 616-619 626-647 1033-1046
				Laser on time: 04:32:49
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	7.0	0						

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648-663 Cr ETE

LIDAR MISSION LOG

AIRCRAFT 6ER	PILOT CZECHOWICZ	ALTM TYPE
DATE 5-30-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG	
PAGE NO. of	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1831.2	STATIC 15:39 - 15:42
	LAND MRI		1835.6	STATIC 20:08 - 20:11
				LOT: 02:44:19
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.4							

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Robbie	ALTM TYPE
DATE 5/30/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG L053011B	
PAGE NO. 1 of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	Mat Su	[redacted]	1835.6	Static 2130-2133
		2134		T/O MRI
		0104		Land MRI
			1839.1	Static 0106-0109
				Lines 363-393 complete
				Laser on time: 01:21:56

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FLIGHT TIME FERRY
6110401	3.5	0

PROJECT NO.	FLIGHT TIME SITE	FLIGHT TIME FERRY

PROJECT NO.	FLIGHT TIME SITE	FLIGHT TIME FERRY

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LIDAR MISSION LOG

AIRCRAFT BWN	PILOT WENGER	ALTM TYPE GEMINI
DATE 5/30/11	OPERATOR WADS	BASE STATIONS AMO3 + REMOTE SITES
JULIAN DAY 150	STRIPLOG M0530114.TXT	
PAGE NO. 1 of 1	HARDDRIVE	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	MERRILL FIELD		20873	START/STATIC/T-0
				FLT'S PASSES 664 - 679 FLOWN
			20918	LAND/STATIC/SHUTDOWN
				L.O.T. = 02:31:01

ATMOSPHERE (C) PC OC (HAZE)

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.5	—

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

AIRCRAFT 66R	PILOT Colaci	ALTM TYPE
DATE 053111	OPERATOR Iverson Croffet	BASE STATIONS
JULIAN DAY	STRIPLOG L053111A	
PAGE NO. 1 of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	Take OFF MRI	10:06	1839.1	Lidar On Time 1:13:25
	Land MRI	13:17	1842.3	
				324 - 331 Lines
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.2							

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LIDAR MISSION LOG

AIRCRAFT 66R	PILOT Robbie	ALTM TYPE
DATE 5/31/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG L053111B	
PAGE NO. 1 of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	Mat Su		1842.3	Static 2152-2155
		2158		T/O MRI
		0117		Land MRI
			1845.6	Static 0118-0121
				Lines 394-424 complete
				Laser on time: 01:14:46
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.3	0						

M053111A Paper Log Unavailable - Digital Log Included Here

Flight Log

Project Number: 6110401
S/N : 03SEN145
Airport : MRI
Mission : M053111A
Date : May 31, 2011
Julian Day : 151

Statistics

Laser Time : 03:17:38

START	STOP	LINE#	ALT	PRF	FREQ	ANGLE	MP	DIV	RC	HDG	Plan File
17:35:25.745	17:35:49.145	680	1498	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
17:36:11.844	17:36:41.544	680	1497	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
17:50:05.529	17:53:08.626	680	1498	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
17:59:23.619	18:08:37.809	680	1505	70	40.00	17.00	NAR	ON	OFF	182.00	6110401_MatSu_V1.pln
18:12:41.004	18:21:18.894	681	1516	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
18:25:15.489	18:34:25.878	682	1485	70	40.00	17.00	NAR	ON	OFF	182.00	6110401_MatSu_V1.pln
18:38:17.973	18:46:56.163	683	1455	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
18:50:47.558	19:00:03.146	684	1473	70	40.00	17.00	NAR	ON	OFF	182.00	6110401_MatSu_V1.pln
19:03:58.741	19:13:50.428	685	1476	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
19:18:45.721	19:27:57.409	686	1497	70	40.00	17.00	NAR	ON	OFF	182.00	6110401_MatSu_V1.pln
19:32:00.903	19:40:47.191	687	1477	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
19:45:08.585	19:54:35.572	688	1506	70	40.00	17.00	NAR	ON	OFF	182.00	6110401_MatSu_V1.pln
19:58:25.367	20:07:14.454	689	1483	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
20:11:35.348	20:21:09.634	690	1494	70	40.00	17.00	NAR	ON	OFF	182.00	6110401_MatSu_V1.pln
20:24:59.029	20:33:57.016	691	1493	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
20:38:11.11	20:47:49.996	692	1482	70	40.00	17.00	NAR	ON	OFF	182.00	6110401_MatSu_V1.pln
20:52:12.689	21:01:15.176	693	1486	70	40.00	17.00	NAR	ON	OFF	2.00	6110401_MatSu_V1.pln
21:05:42.97	21:15:45.855	694	1497	70	40.00	17.00	NAR	ON	OFF	182.00	

21:19:27.55	21:28:25.037	695	1487	70	40.00	17.00	NAR	ON	OFF	2.00
6110401_MatSu_V1.pln										
21:32:23.431	21:42:33.516	696	1488	70	40.00	17.00	NAR	ON	OFF	182.00
6110401_MatSu_V1.pln										
21:46:23.21	21:55:24.297	697	1472	70	40.00	17.00	NAR	ON	OFF	2.00
6110401_MatSu_V1.pln										
21:59:35.691	22:09:16.376	698	1483	70	40.00	17.00	NAR	ON	OFF	182.00
6110401_MatSu_V1.pln										
22:12:50.671	22:21:15.259	699	1492	70	40.00	17.00	NAR	ON	OFF	2.00
6110401_MatSu_V1.pln										
22:25:28.552	22:33:35.34	700	1464	70	40.00	17.00	NAR	ON	OFF	182.00
6110401_MatSu_V1.pln										
22:37:25.235	22:39:42.731	700	1474	70	40.00	17.00	NAR	ON	OFF	2.00
6110401_MatSu_V1.pln										

June 2011 Logs

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LIDAR MISSION LOG

AIRCRAFT 6 6R	PILOT Colaci	ALTM TYPE
DATE 060111	OPERATOR Iverson, Croffut	BASE STATIONS
JULIAN DAY	STRIPLOG L060111A	
PAGE NO. 1 of 1	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401		7:37	1845.6	Take OFF MRI
		11:03	1849.1	Land MRI
				Laser on Time 1:18:36
				Lines 734 - 744 Flown
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.5							

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LIDAR MISSION LOG

AIRCRAFT dWW	PILOT Haim	ALTM TYPE
DATE 6/1/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M060111A	
PAGE NO. of	HARDDRIVE 008	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MR1	1215	2097.6	
	Land MR1	1315	2098.5	
ATMOSPHERE C PC OC HAZE		WX REMARKS Rain		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	.9	.9						

12.26

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LIDAR MISSION LOG

AIRCRAFT 66R	PILOT Fernando	ALTM TYPE
DATE 6/7/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG L060711A	
PAGE NO. of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	0625	1850.6	North Area
Mat-Su	Land MRI	11	1855.5	Lines 701-722
				Laser ON time 02:11:47
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.9							

10 20

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Robbie	ALTM TYPE
DATE 6/17/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M061711A	
PAGE NO. of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110201	T/O MRI		1861.3	1.4
LMS	Land FAI		1862.7	Laser 00:07:54
			18636	off site 1.1
6110401	ON site		1864.7	North Area Laser 01:10:47
Mat-Su			1867.1	Lines 723-733
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110201	.9	2.5						
6110401	2.4							

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Lines 760-775

LIDAR MISSION LOG

AIRCRAFT N66R	PILOT CZECHOWICZ	ALTM TYPE
DATE 06-17-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG	
PAGE NO. 1 of 1	HARDDRIVE 180	GPS TIME

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1867.1	STATIC 1:10 - 1:13
	LAND MRI		1871.4	STATIC 5:36 - 5:39
				LOT; 2:20:33
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.3							

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT CZECHOWICZ	ALTM TYPE
DATE 06-18-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG	
PAGE NO. 1 of 1	HARDDRIVE 1111	GPS TIME

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MR1	2.0	1877.0	STATIC 1:17 - 1:20
	LAND TRA		1879.0	STATIC 3:23 - 3:26
	T/O TRA	.6	1879.0	✓
	LAND MR1		1879.6	
		~~2.6~~		
				LOT: 00:43:13
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	2.6							

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1930

LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Robbie	ALTM TYPE
DATE 6/19/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M061911A	
PAGE NO. of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1879.6	Curry Area
Mat-Su	Land MRI		1883.8	Lines 745-759, 776-783
				Laser ON time 01:50:34
ATMOSPHERE C PC (OC) HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.2							

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LIDAR MISSION LOG

AIRCRAFT N66R	PILOT CZECHOWICZ	ALTM TYPE
DATE 6-23-11	OPERATOR PACE	BASE STATIONS
JULIAN DAY	STRIPLOG	
PAGE NO. 1 of 1	HARDDRIVE 0181	GPS TIME

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1885.4	STATIC 21:13 - 21:17
	LAND MRI		1888.2	STATIC 00:12 - 00:15
				LOT; 00:57:45
				LINES 801-808
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	2.8							

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LIDAR MISSION LOG

AIRCRAFT 66R	PILOT Robbie	ALTM TYPE
DATE 6/24/11	OPERATOR Brent	BASE STATIONS
JULIAN DAY	STRIPLOG M062411A+B	
PAGE NO. | of	HARDDRIVE 180 + 184	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	Mat-Su		1888.2	Static 1631-1636
		1636		T/O MRI
		2032		Land Talkeetna
			1892.1	Static 2034-2037
				Static 2249-2252
		2055		T/O Talkeetna
		0037		Land MRI
			1893.8	Static 0038-0041
				LOT: 02:11:43

ATMOSPHERE C PC OC HAZE | WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	3.9	0						
6110401	1.7							

August 2011 Logs

LIDAR FLIGHT LOG

MISSION: M0811 11 A DATE: 8/11/11

PILOT: McSheehy OPERATOR: Kramer AIRCRAFT: 6GR

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401							1920	1923		180	Static
							1924				T/O MRI 1990.1
							2342				Land MRI 1994.4
							2344	2347			Static

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
○ 6110401		23		4.3	0		1920	2347	Lines 340-362
○						WX			LOT: 01:50:10
○									

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LIDAR MISSION LOG

AIRCRAFT 60R	PILOT Bobbie	ALTM TYPE
DATE 8/12/11	OPERATOR Jess	BASE STATIONS Remote
JULIAN DAY	STRIPLOG M081211A	
PAGE NO. of	HARDDRIVE 184	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		1994.4	Lines 332-339 Hicks Creek
Mat-Su	Land MRI		1999.3	1107-1135 Independence Mine
				Laser ON-02:29:59
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.9							

LIDAR FLIGHT LOG

MISSION: 316llA DATE: 8/16/11

PILOT: Morthorpe OPERATOR: ~~Pat~~ Croffut AIRCRAFT: b6TR

PROJECT NUMBER	LINE NO. & Hdg		GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive	REMARKS
6110401	1081	E									T/O MR1 2002.2
Matsu	1082	W									Independence Mine
	1083	E									
	1084	W									1081-1091
	1085	E									
	1086	W									
	1087	E									
	1088	W									
	1089	E									
	1090	W									x-flt N
	1091	E									x-flt S
	~~1074~~ 940	E →									Upper Susitna 1
	947	E									940-947
	849	W →									South Dam Site
	841	W									841-849
											Laser ON time
											02:47:17
											Land MR1 2008.8

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
○ 6110401		28		6.6					
○						WX			
○									

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LIDAR MISSION LOG

AIRCRAFT 66R	PILOT Nick	ALTM TYPE
DATE 8/26/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M08261 1A	
PAGE NO. of	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O FAI		2020.5	
Mat-Su	Land MRL		2024.5	
	Land FAI		2025.9	00:52:17
				00:10:32
				01:02:49 Laser ON time
				963-972, 949-953
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO. 8/26	FLIGHT TIME SITE	FERRY
6110401	4.0	1.4

PROJECT NO. 8/27	FLIGHT TIME SITE	FERRY
6090817		5.1

PROJECT NO. 8/28	FLIGHT TIME SITE	FERRY
6100609		1.3

8/25 1.4 ferry to FAI

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Morthorpe	ALTM TYPE
DATE 8/29/11	OPERATOR Jessica	BASE STATIONS Remote
JULIAN DAY	STRIPLOG M082911A	
PAGE NO. of	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI	11:05	2032.3	Lines 954-962, 973-987, 1011-1018
Mat-Su	Land MRI	1710	2038.0	Knik Valley RSHs 2,3,12-13
				Laser on 01:49:56
				00:04:08
				01:54:04

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	5.7	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

September 2011 Logs

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LIDAR MISSION LOG

AIRCRAFT 16Q	PILOT Steve	ALTM TYPE
DATE 9/9/11	OPERATOR Jessica	BASE STATIONS
JULIAN DAY	STRIPLOG M090911A	
PAGE NO. of	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
	T/O MRI		101.7	
	Land FAI		102.9	
6110401	T/O FAI		102.9	2.6 site
	Land TKA		105.5	
	T/O TKA		105.5	1.0
	Land MRI		106.5	
				Laser ON time
				00:40:37
ATMOSPHERE C PC OC HAZE		WX REMARKS		

PROJECT NO. 9/7	FLIGHT TIME SITE	FERRY	PROJECT NO. 9/9	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6080610		1.2	6110401	2.6	1.0			

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(9)

LIDAR MISSION LOG

AIRCRAFT 16Q	PILOT [illegible]	ALTM TYPE
DATE 9/11	OPERATOR Jessica	BASE STATIONS Remote
JULIAN DAY	STRIPLOG M091111A	
PAGE NO. of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		106.5	Buffalo-Chickaloon Reflights
Mat-Su	Land MRI		109.4	00:37:24 Laser ON

ATMOSPHERE C PC OC HAZE | WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FLIGHT TIME FERRY	PROJECT NO.	FLIGHT TIME SITE	FLIGHT TIME FERRY	PROJECT NO.	FLIGHT TIME SITE	FLIGHT TIME FERRY
6110401	2.9							

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LIDAR MISSION LOG

AIRCRAFT 62R	PILOT Glen	ALTM TYPE
DATE 9/27	OPERATOR Jess	BASE STATIONS
JULIAN DAY	STRIPLOG M092711A	
PAGE NO. of	HARDDRIVE 1111	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		81.7	Mat-Su Dam Revision
Mat-Su	Land MRI		86.6	Lines 6-16, 87-95
				Laser ON time 02:00:58

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	4.9	

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

October 2011 Logs

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LIDAR MISSION LOG

AIRCRAFT 56R	PILOT Hunter	ALTM TYPE
DATE 10/4/11	OPERATOR Kramer	BASE STATIONS
JULIAN DAY	STRIPLOG M100411A	
PAGE NO. 1 of	HARDDRIVE 0181	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
				Static 900-903
6110401	MatSu	903	2111.8	T/O MRI
		1506	2117.9	Land [redacted] Talkeetna
				Static 1507-1510
		1556		T/O Talkeetna
		1621	2118.3	Land MRI
				Static 1727-1730
		1731		T/O MRI
		1814	2119.0	Land MRI
				Static 1815-1818
				L.O.T. 02:53:40 MatSu Dam
				Lines 17-40 complete
				L.O.T 00:06:57
				Lines 1-4 complete MatSu Tidal Reflight

ATMOSPHERE C PC OC (HAZE) WX REMARKS overcast @ about 7000 ft

PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	6.1	0.4
6110401	0.7	0

PROJECT NO.	FLIGHT TIME SITE	FERRY

PROJECT NO.	FLIGHT TIME SITE	FERRY

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LIDAR MISSION LOG

AIRCRAFT 66R	PILOT Hunter	ALTM TYPE
DATE 10/5/11	OPERATOR Kramer	BASE STATIONS
JULIAN DAY	STRIPLOG M1005 11A	
PAGE NO. 1 of 1	HARDDRIVE 180	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
				~~Static 530-533~~
		835	2119.0	T/O MRI
		1031	2121.0	Land Talkeetna
				Static 1032-1035
6110401	MatSu Dam Revision	1038		T/O Talkeetna
		1314	2123.6	Land Talkeetna
				Static 1316-1319
		1340	2124.1	T/O Talkeetna
				Land MRI
				LOT: 01:06:05
				Lines 41-49 complete

ATMOSPHERE C PC OC HAZE

WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
~~6110901~~	~~2.6~~	~~2.5~~						

MISSION: M' 2911A M10091IA+B DATE: 10/9/11

PILOT: Vogt OPERATOR: Kramer AIRCRAFT: 66R

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive	REMARKS
6110401							924	927	1111	Static
Mat-Su							928			T/O MRI 2126.7
Dam Site							1437			Land Talkeetna 2131.9
							1440	1443		Static
							1559	1602		Static
							1603			T/O Talkeetna
							1904			Land MRI 2134.9
							1904	1907		Static

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:
○ 6110401		27		5.2			924	1443
○ 6110401		10		3.0			1559	1907
○								

NOTES: L.O.T.: 02:12:52
Lines 55-61 + 67-86
L.O.T: 01:14:43
Lines: 50-54 + 62-66

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LIDAR FLIGHT L[illegible]

ALTM

MISSION: Mobile A+B DATE: 10/10/11

PILOT: Vajt OPERATOR: Kramer AIRCRAFT: 66R

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401							954	957		180	Static
MatSu							959				T/O MRI 2134.9
							1516				Land Talkeetna
							1517	1520			Static 2140.2
6110401							1706	1709			Static
Hatcher Gaps							1710				T/O Talkeetna
							1850				Land MRI 2141.9
							1851	1854			Static

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES: L.O.T.: 01:32:23
○ 6110401		37		53			954	1520	Lines 988-1010 1019-1032
○ 6110401		9		1.7		WX	1706	1854	L.O.T.: 00:27:01
○									Lines 62 + 64-71

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LIDAR FLIGHT L

MISSION: [redacted] M1011111A DATE: 10/11/11

PILOT: Ron OPERATOR: Jessica AIRCRAFT: 66R

ALTM

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Tranzpak Drive ← 184	REMARKS
6110401							2141.9 hobbs			T/O MRI .5 ferry
	& Lines 821-832						2142.4			Land TKA
	Amission LASER ON						2145.7			TKA 3.3 site
		01:51:25					2148.0			TKA + 2.3 5.6
							2148.4			Land MRI
	B mission laser ON									
		01:11:10								
		Lines 833-840								
		Total Laser ON								
		03:02:35								

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
○ 6110401				5.6	.9				
○						WX			
○									

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LIDAR MISSION LOG

AIRCRAFT 6GR	PILOT Vogt	ALTM TYPE
DATE 10/12/11	OPERATOR Croftut	BASE STATIONS
JULIAN DAY	STRIPLOG M101211A-B	
PAGE NO. of	HARDDRIVE 0184	

PROJECT NO.	LOCATION	TIME	HOBBS	REMARKS
6110401	T/O MRI		2148.4	.5
	TKA		2148.9	2.7 Upper River Reflights
	TKA		2151.6	Hatcher Pass Gaps
	Land MRI		2154.8	3.2
				Laser ON total
				01:40:25

ATMOSPHERE C PC OC HAZE — WX REMARKS

PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY	PROJECT NO.	FLIGHT TIME SITE	FERRY
6110401	5.9	.5						

August 2012 Logs

LIDAR FLIGHT LOG

MISSION: 20120822 – 155840 DATE: 8/22/12

PILOT: MCNEIL OPERATOR: PESTRIKOFF AIRCRAFT: 2TB

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401							7:46				TERRA POS
HATCHERS	121 NE	157	41	32	164	6200	8:22	8:26			1703.1 HOBBS 1704.5
	120 SW	147				6206	8:30	8:36			~~8041~~
	119 NE	161				6200	8:39	8:45			
	118 SW	164				6300	8:46	8:54			
	117 NE	165				6300	8:57	9:02			
	108 SW	164				6900	9:08	9:15			

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
	47	6	41	1.6	0.4				
						WX			

0828 – 155118 **LIDAR FLIGHT LO**

MISSION: ~~120828 – 164920~~ DATE: 08-28-13

PILOT: MCNEIL OPERATOR: PACE AIRCRAFT: 812TB 32 MB

PROJECT NUMBER	LINE NO. & Hdg		GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401 HATCHERS								UTC	UTC		018	AUX GPS @ 8:00
								16:00	/			DEPART MRI
(122)	001	N	165	164	32	41	7215	16:27	16:29			360's – SW END OF PROJ.
(123)	002	S	158				7220	16:32	16:37			1704.5
(124)	003	N	162				7215	16:40	16:46			
(125)	004	S	163				7220	16:49	16:56			
(126)	005	N	160				7250	16:58	17:04			
(127)	006	S	165				7270	17:07	17:13			
(128)	007	N	160				7280	17:16	17:22			
(129)	008	S	162				7280	1724	1730			
(130)	009	N	160				7300	1733	1739			
(131)	010	S	165				7300	1742	1749			
(132)	011	N	160				7280	17:51	17:57			
(133)	012	S	165				7295	18:01	18:07			
(134)	013	N	160				7270	18:10	18:16			
(135)	014	S	162				7300	18:19	1824			
(136)	015	N	158				7300	18:27	1834			CLOUD @ NE SECTION OF LINE,
(116)	032	S	155				6400	18:37	18:43			
(115)	021	N	158				6415	18:46	18:51			AUX GPS @ 11:30
X-FLIGHT		N	160	↓	↓	↓	6420	18:55	18:58			360°S / LAND MRI 1707.7

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
6110401	/	17	/	2.7	.5				
						WX			

LIDAR FLIGHT LOG

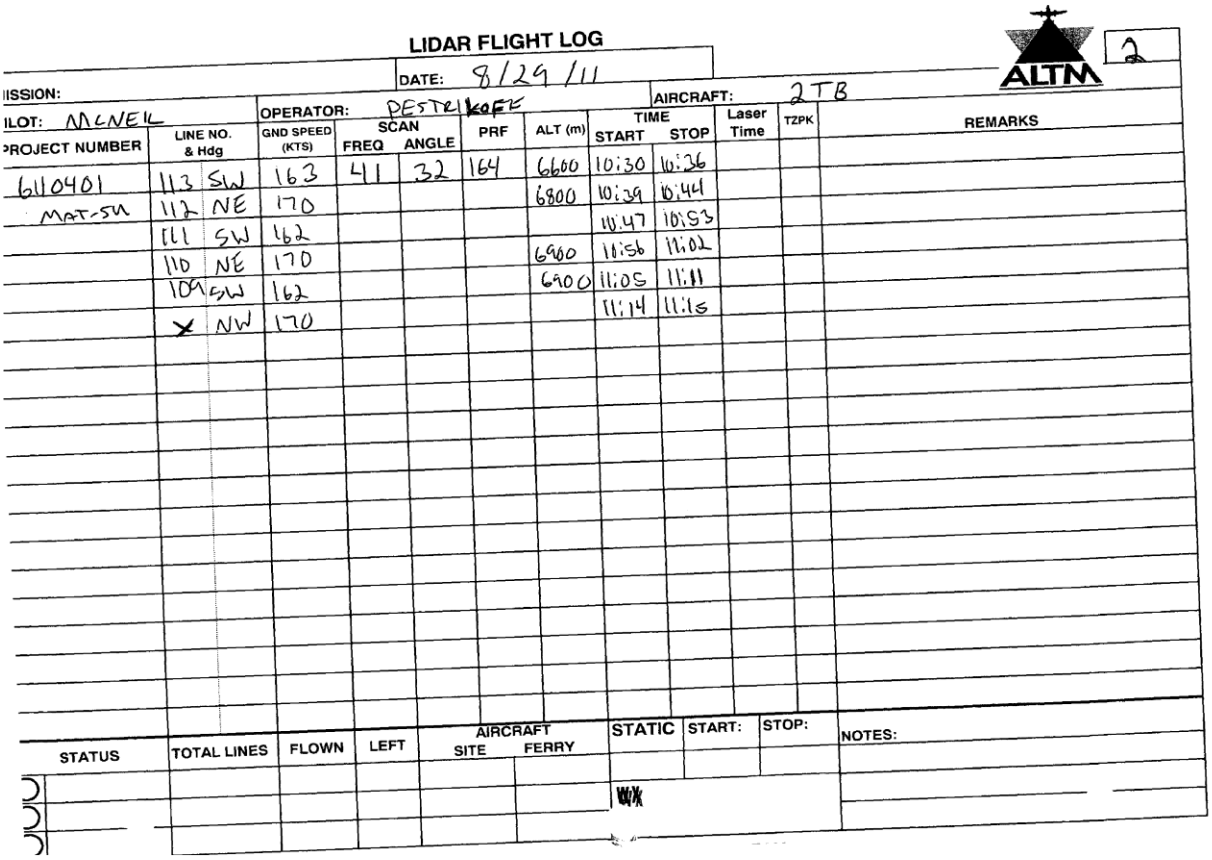
ALTM 1

MISSION: 20120829-152204 DATE: 8/29/12

PILOT: MCNEIL OPERATOR: DESTRIOFK AIRCRAFT: 2TB

PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
6110401							9:20				TERRA POS
MAT-SU	137 NE	170	41	32	164	7400	7:46	7:52			1707.7 HOBBS 1711.8
	138 SW	154				7400	7:56	8:02			
	139 NE	163				7300	8:05	8:11			
	140 SW	158					8:13	8:19			
	141 NE	165					8:22	8:29			
	107 SW	157				6900	8:30	8:36			
	106 NE	164				6900	8:39	8:45			
	105 SW	161				7000	8:48	8:54			
	104 NE	161					8:57	9:02			
	103 SW	162					9:05	9:11			
	102 NE	170					9:13	9:19			
	101 SW	164				7100	9:22	9:28			
	100 NE	172					9:30	9:36			
	99 SW	164					9:39	9:45			
	98 NE	171					9:47	9:53			
	97 SW	165				7200	9:56	10:02			
	96 NE	174					10:05	10:10			
	95 SW	160					10:13	10:19			
	114 NE	170				6500	10:22	10:27			

STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
○	24	24	0	3.5	0.6				
○						WX			
○									



LIDAR FLIGHT LOG

ALTM 2

MISSION:

DATE: 8/29/11

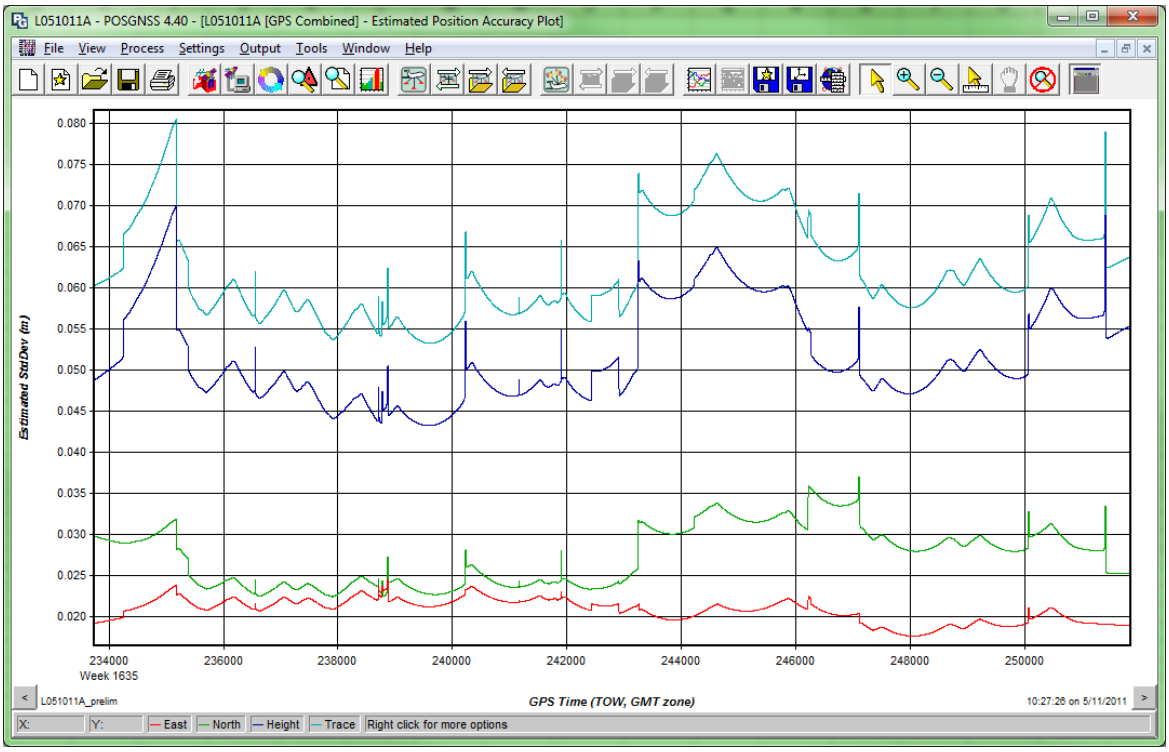
PILOT: MCNEIL OPERATOR: PESTRIKOFF AIRCRAFT: 2TB

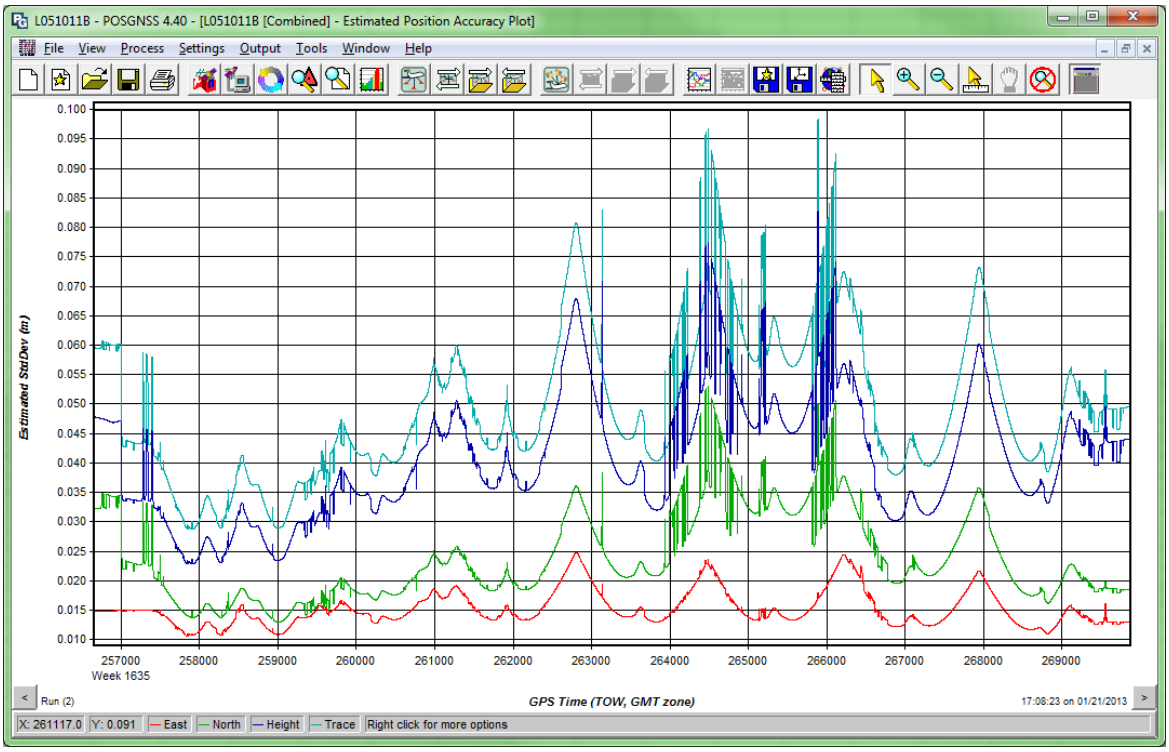
PROJECT NUMBER	LINE NO. & Hdg	GND SPEED (KTS)	SCAN FREQ	SCAN ANGLE	PRF	ALT (m)	TIME START	TIME STOP	Laser Time	TZPK	REMARKS
611041	113 SW	163	41	32	164	6600	10:30	10:36			
MAT-SU	112 NE	170				6800	10:39	10:44			
	111 SW	162					10:47	10:53			
	110 NE	170				6980	10:56	11:02			
	109 SW	162				6900	11:05	11:11			
	X NW	170					11:14	11:15			

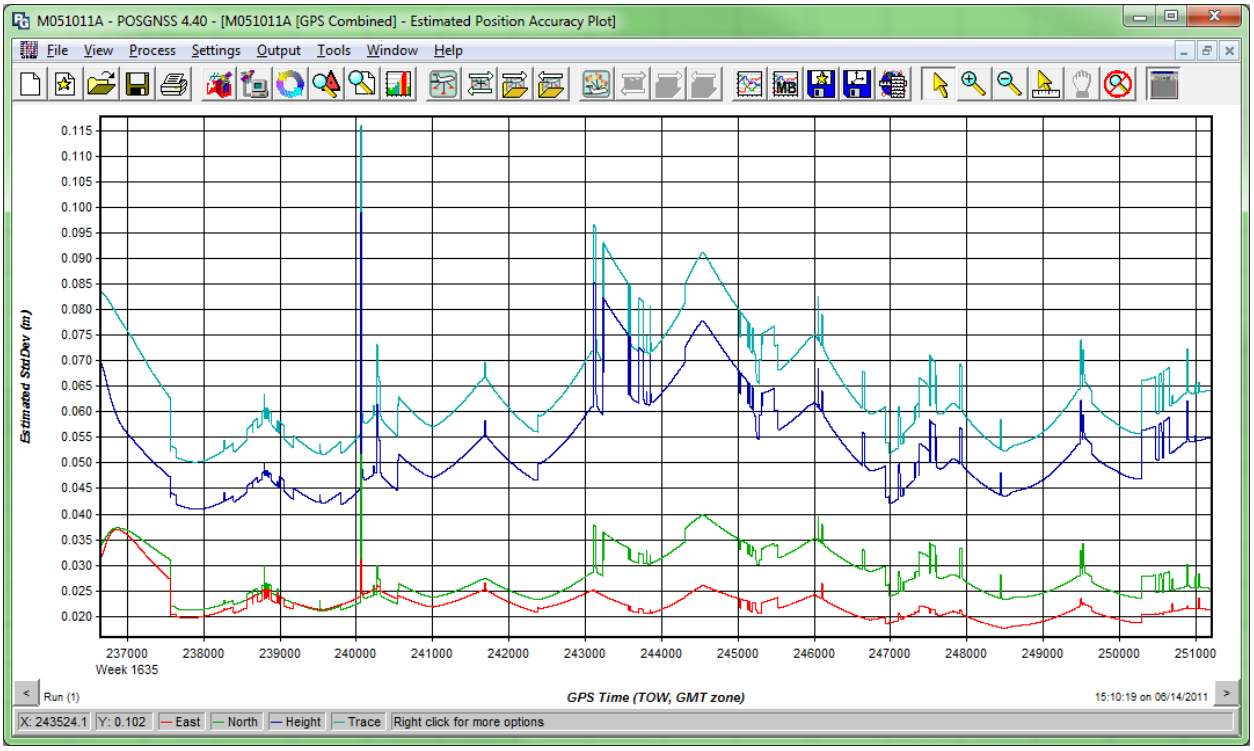
STATUS	TOTAL LINES	FLOWN	LEFT	AIRCRAFT SITE	AIRCRAFT FERRY	STATIC	START:	STOP:	NOTES:
						WX			

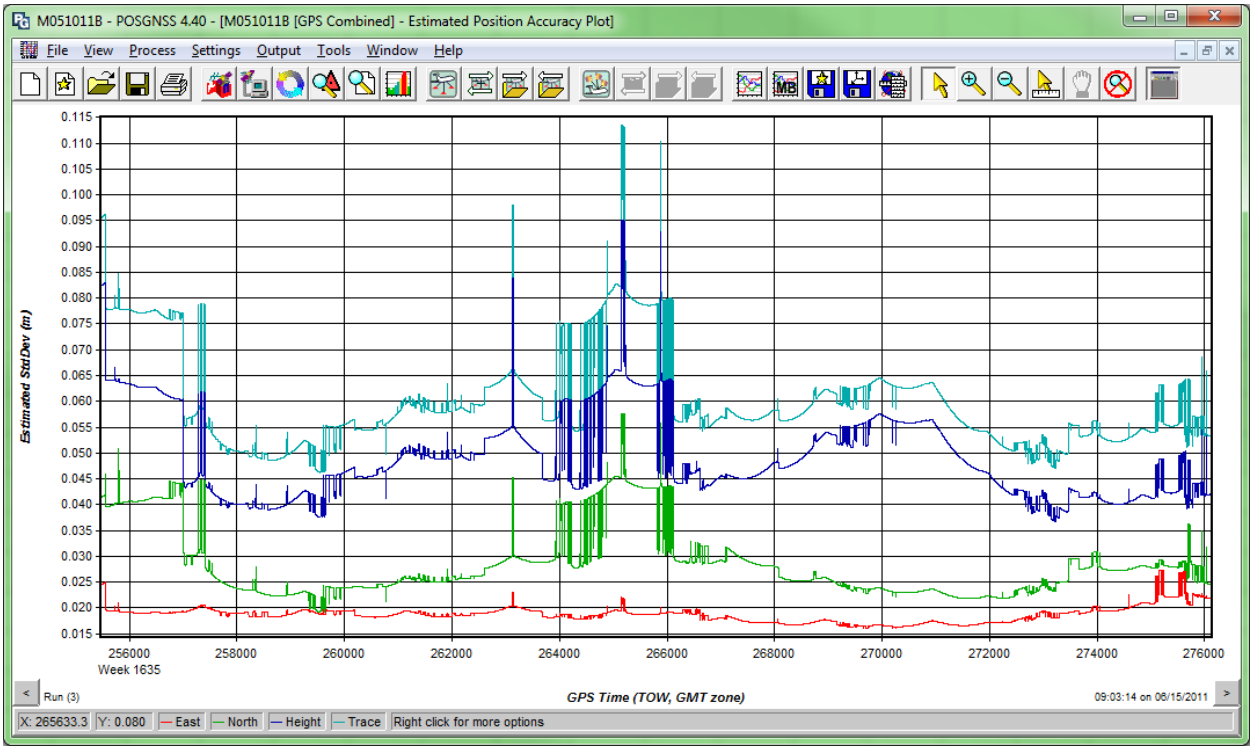
8 LiDAR GPS PROCESSING RMSE PLOTS

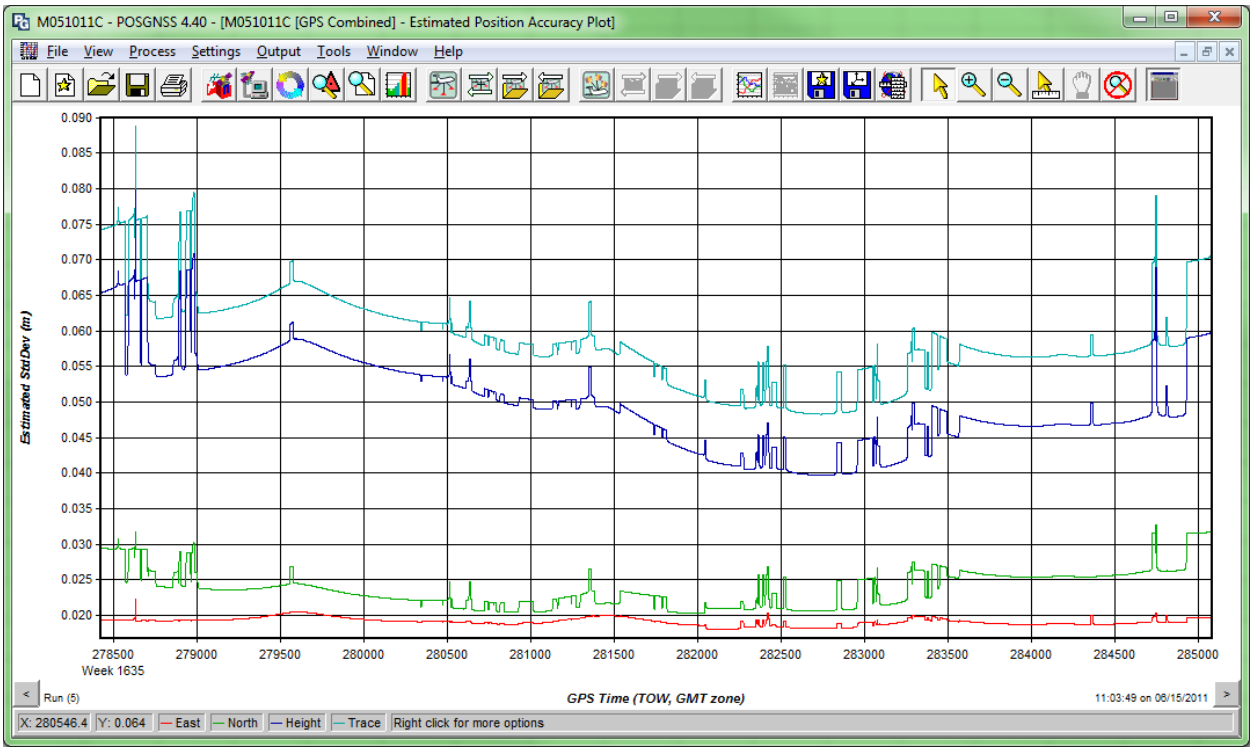
May 10 2011 Plots



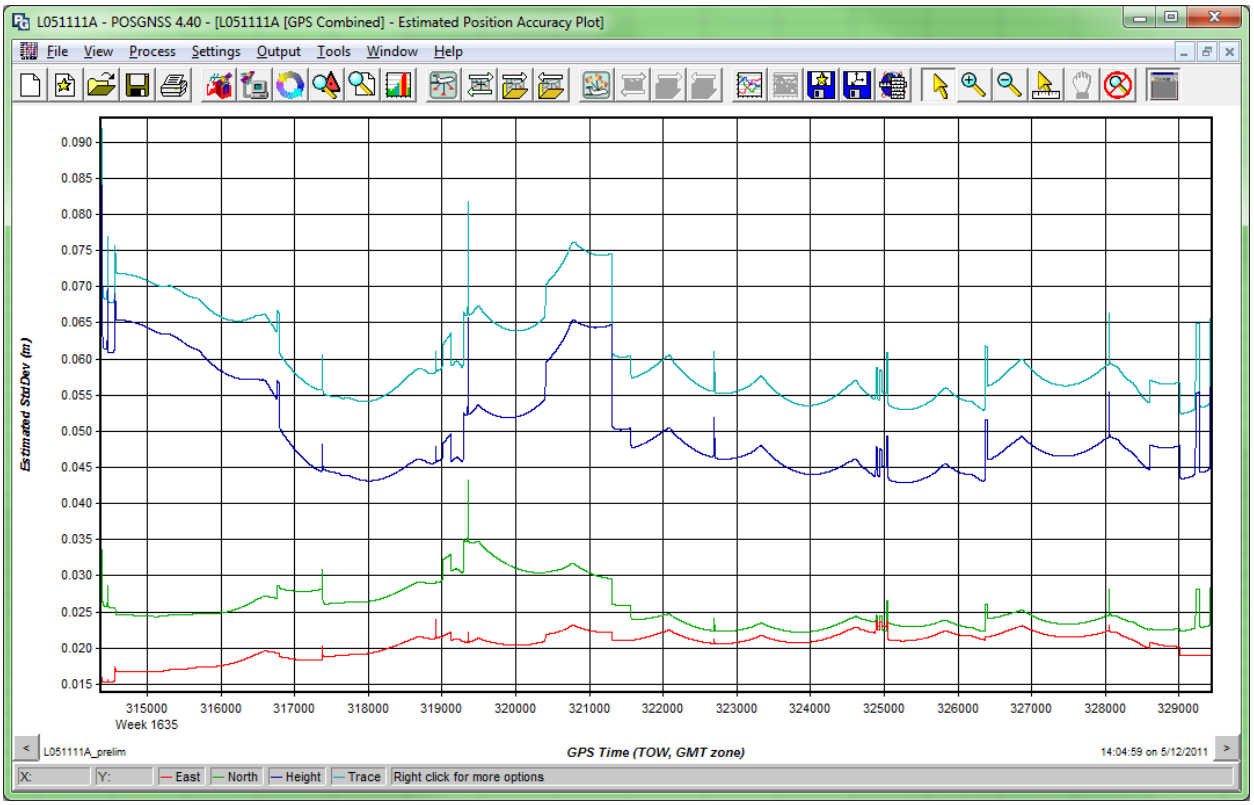


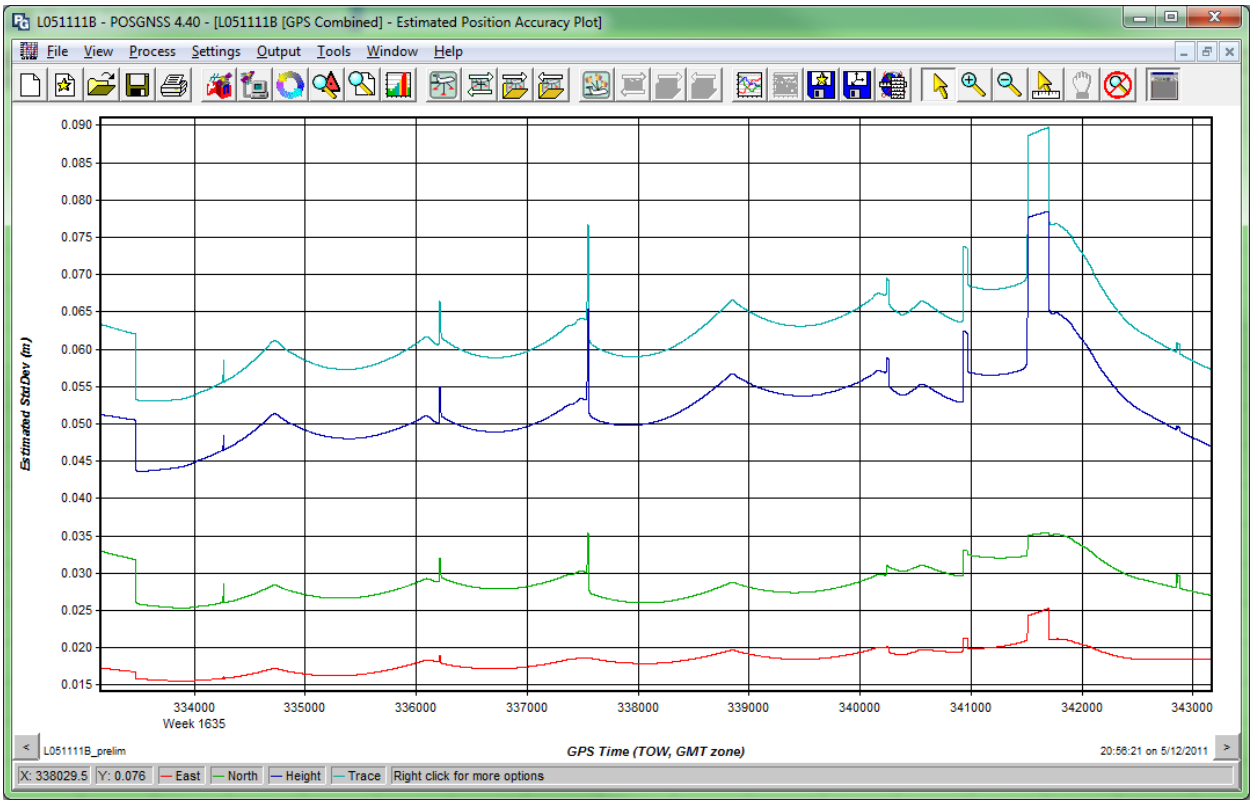

M051011A - POSGNSS 4.40 - [M051011A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.115 0.110 0.105 0.100 0.095 0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020
237000 238000 239000 240000 241000 242000 243000 244000 245000 246000 247000 248000 249000 250000 251000
Week 1635
Run (1)
GPS Time (TOW, GMT zone)
15:10:19 on 06/14/2011
X: 243524.1 Y: 0.102 East North Height Trace Right click for more options

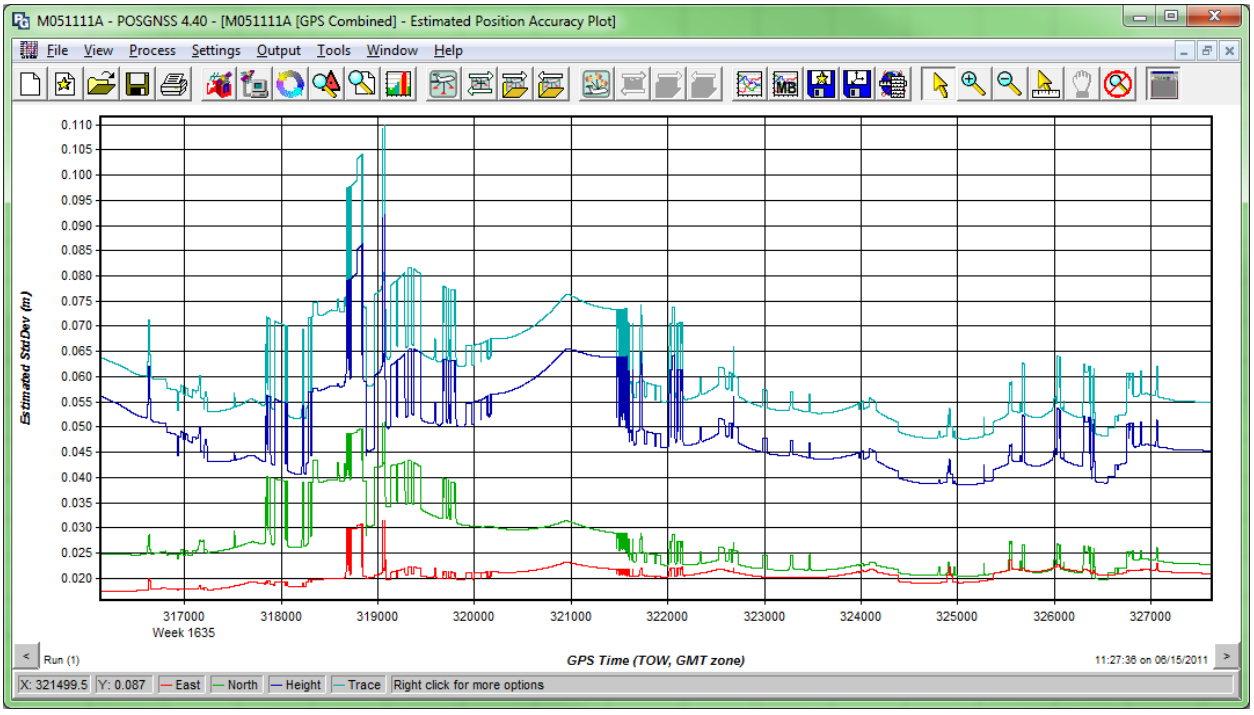

M051011B - POSGNSS 4.40 - [M051011B [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.115 0.110 0.105 0.100 0.095 0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020 0.015
256000 258000 260000 262000 264000 266000 268000 270000 272000 274000 276000
Week 1635
Run (3)
GPS Time (TOW, GMT zone)
09:03:14 on 06/15/2011
X: 265633.3 Y: 0.080 East North Height Trace Right click for more options

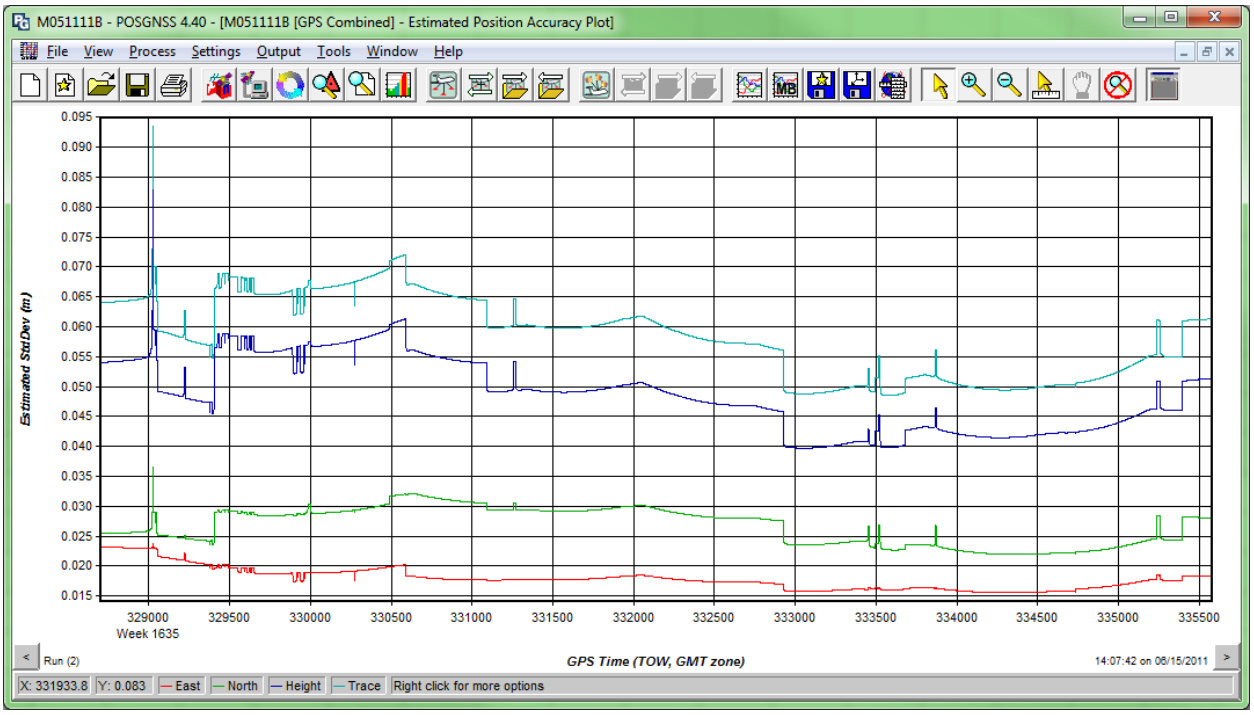

M051011C - POSGNSS 4.40 - [M051011C [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
278500
279000
279500
280000
280500
281000
281500
282000
282500
283000
283500
284000
284500
285000
Week 1635
Run (5)
GPS Time (TOW, GMT zone)
11:03:49 on 06/15/2011
X: 280546.4
Y: 0.064
East
North
Height
Trace
Right click for more options

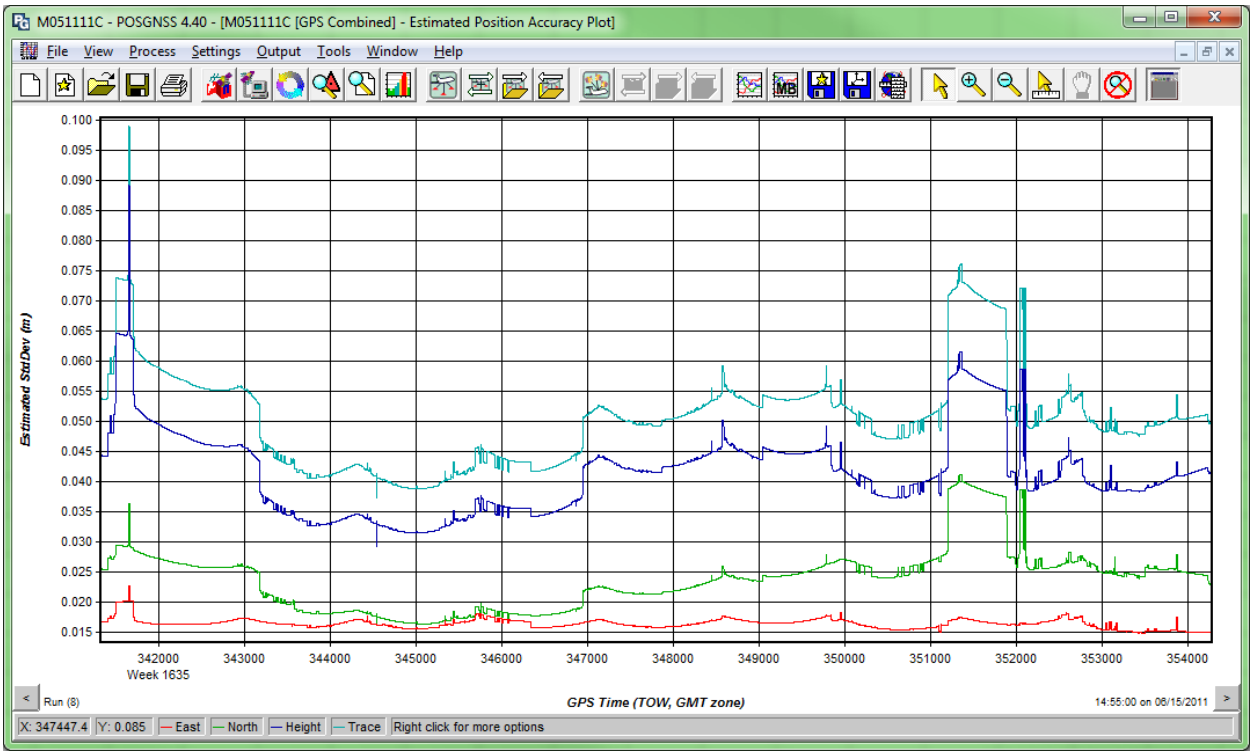
May 11 2011 Plots

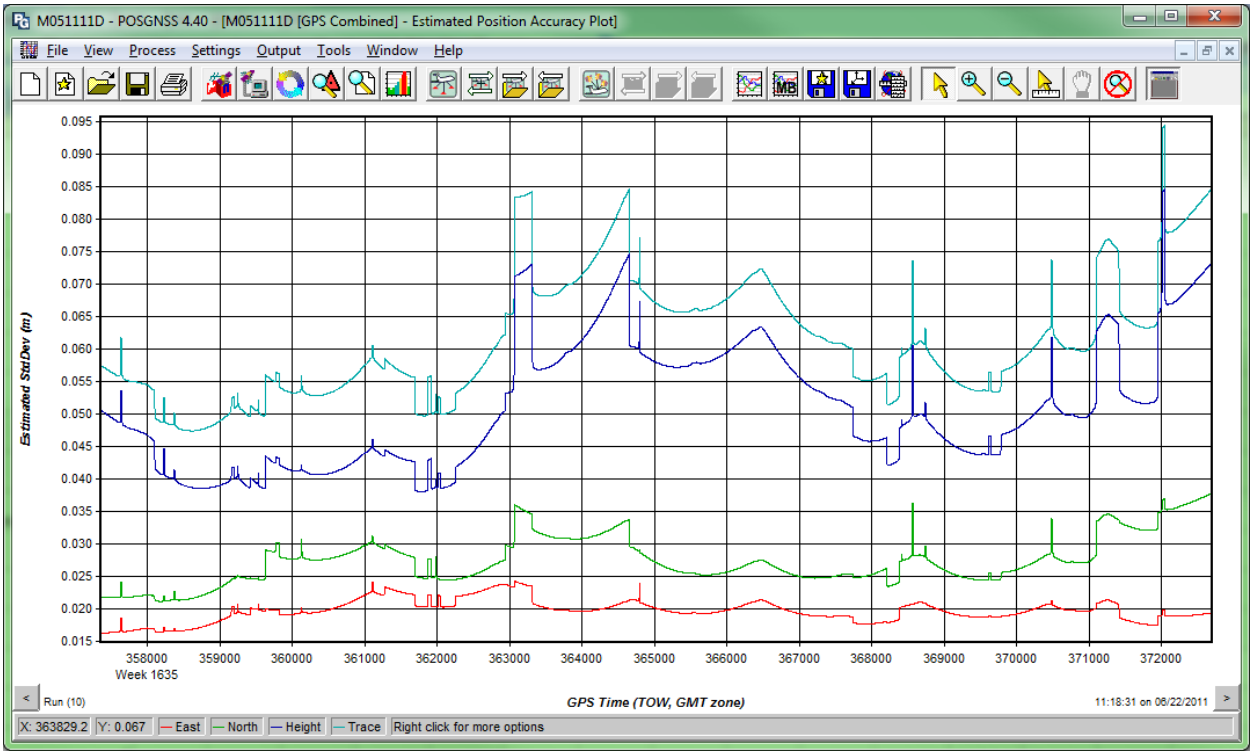




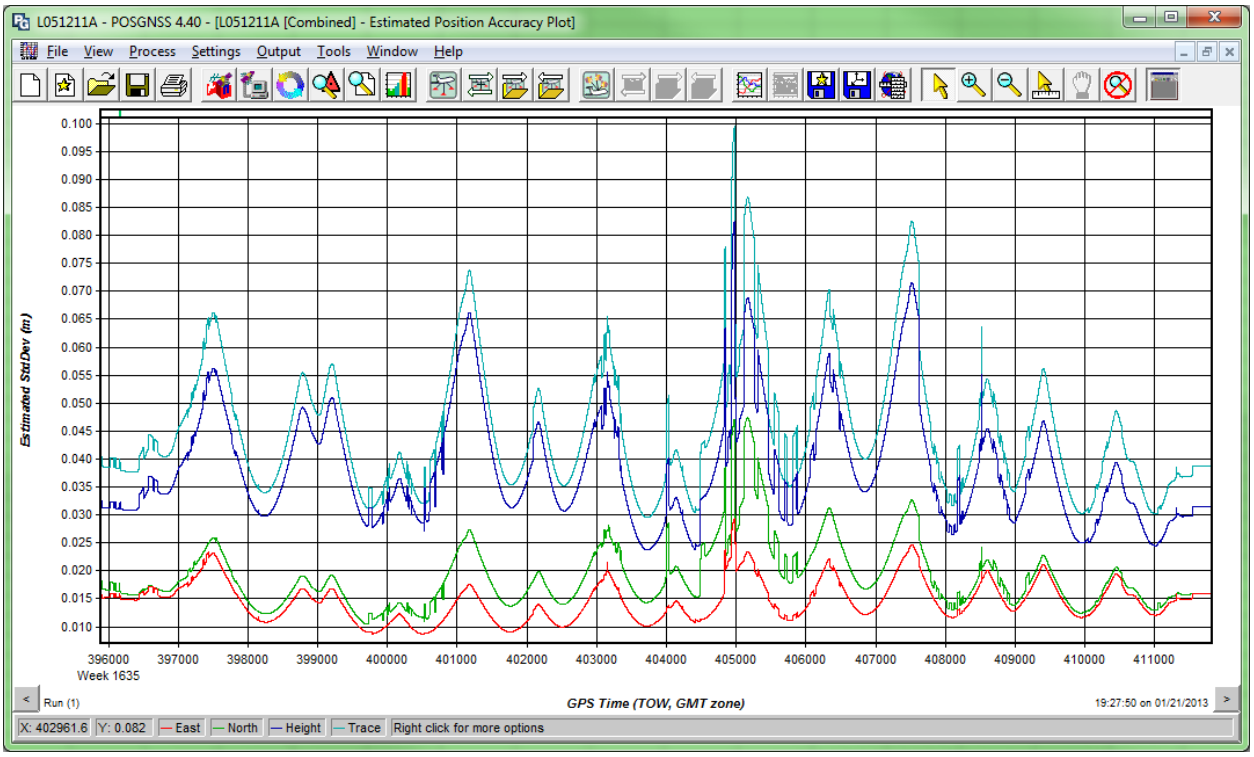

M051111A - POSGNSS 4.40 - [M051111A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.110 0.105 0.100 0.095 0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020
317000 318000 319000 320000 321000 322000 323000 324000 325000 326000 327000
Week 1635
Run (1)
GPS Time (TOW, GMT zone)
11:27:36 on 06/15/2011
X: 321499.5 Y: 0.087 East North Height Trace Right click for more options

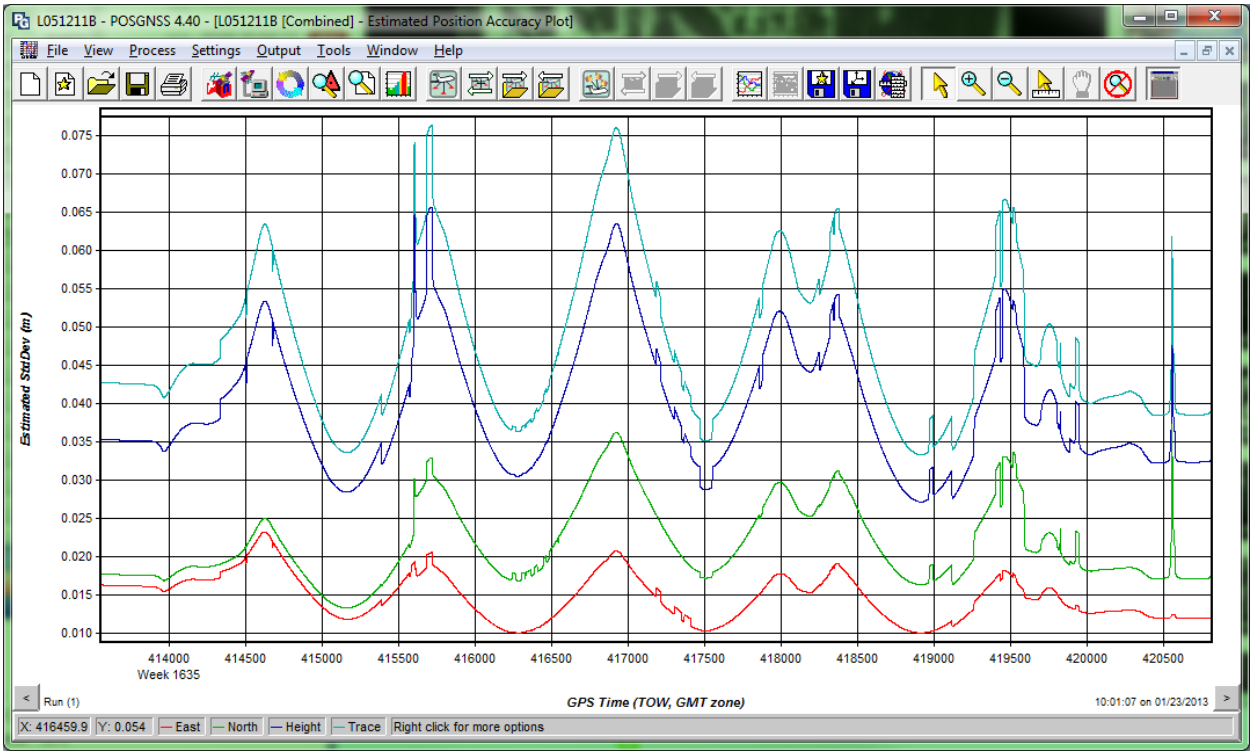

M051111B - POSGNSS 4.40 - [M051111B [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.095 0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020 0.015
329000 329500 330000 330500 331000 331500 332000 332500 333000 333500 334000 334500 335000 335500
Week 1635
Run (2)
GPS Time (TOW, GMT zone)
14:07:42 on 06/15/2011
X: 331933.8 Y: 0.083 East North Height Trace Right click for more options

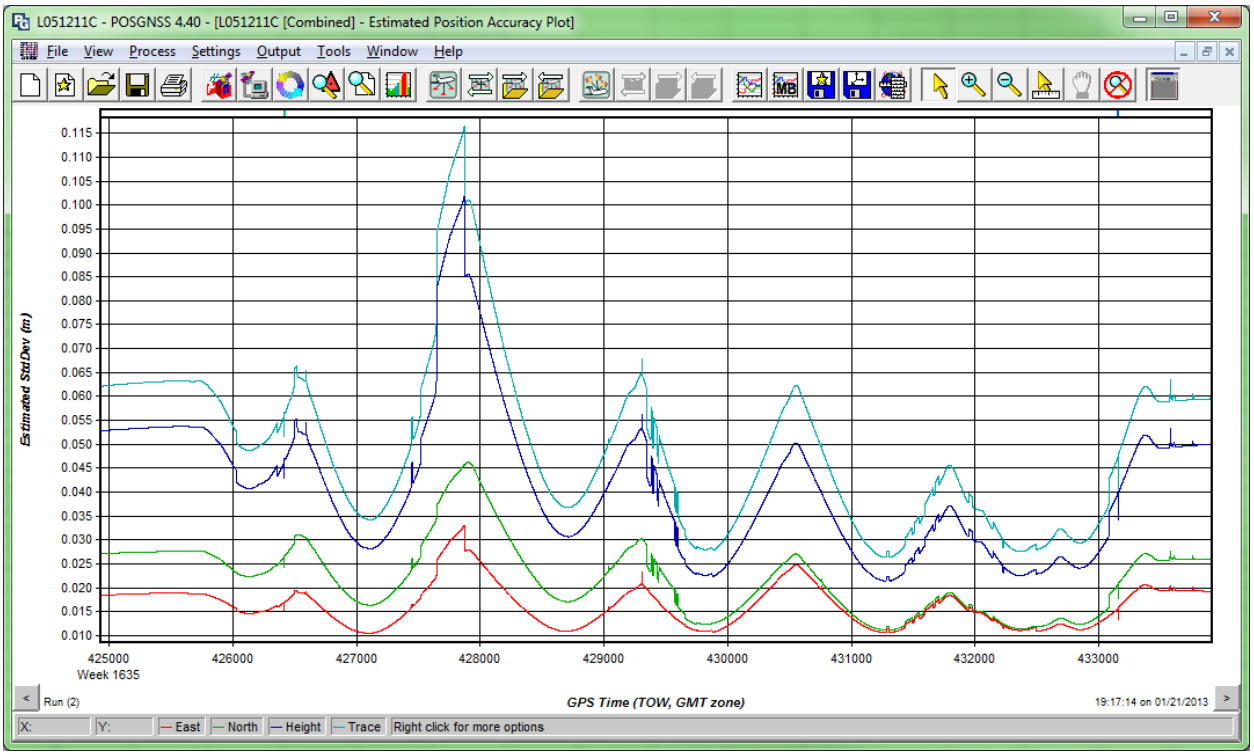

M051111C - POSGNSS 4.40 - [M051111C [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.100 0.095 0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020 0.015
342000 343000 344000 345000 346000 347000 348000 349000 350000 351000 352000 353000 354000
Week 1635
Run (8)
GPS Time (TOW, GMT zone)
14:55:00 on 06/15/2011
X: 347447.4 Y: 0.085 East North Height Trace Right click for more options

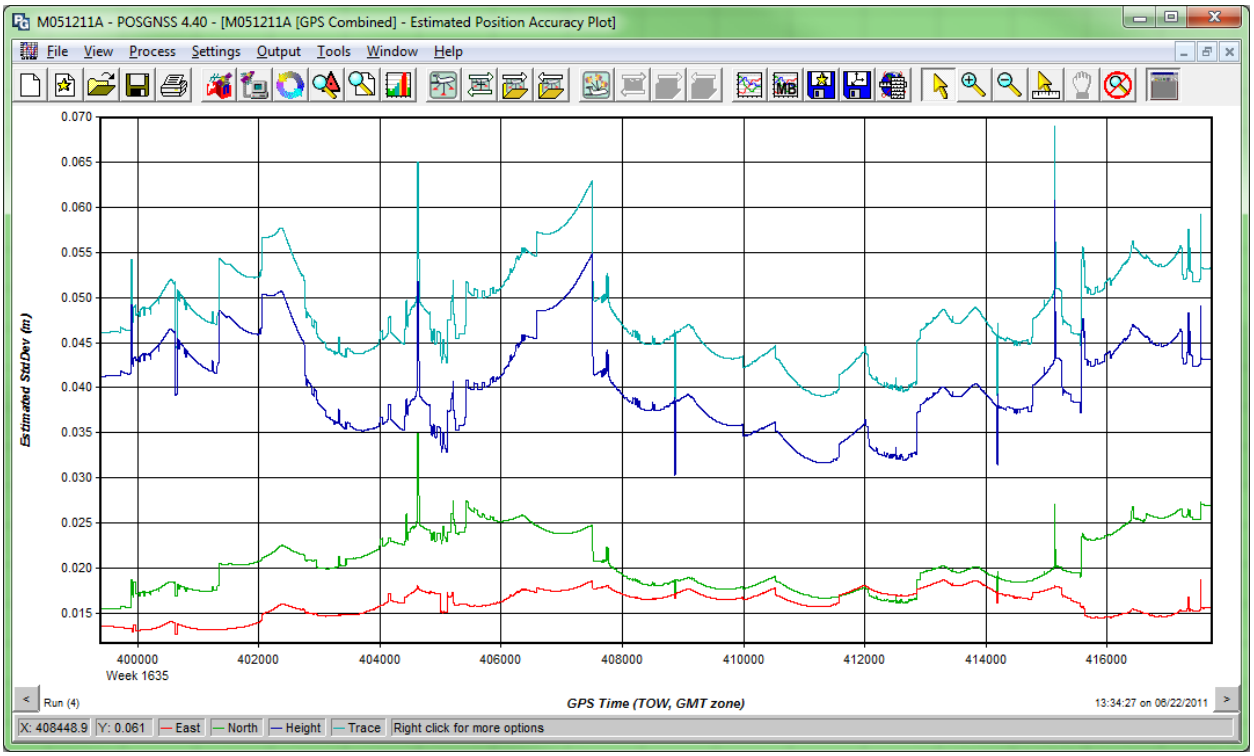

M051111D - POSGNSS 4.40 - [M051111D [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.095 0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020 0.015
358000 359000 360000 361000 362000 363000 364000 365000 366000 367000 368000 369000 370000 371000 372000
Week 1635
Run (10)
GPS Time (TOW, GMT zone)
11:18:31 on 06/22/2011
X: 363829.2 Y: 0.067 East North Height Trace Right click for more options

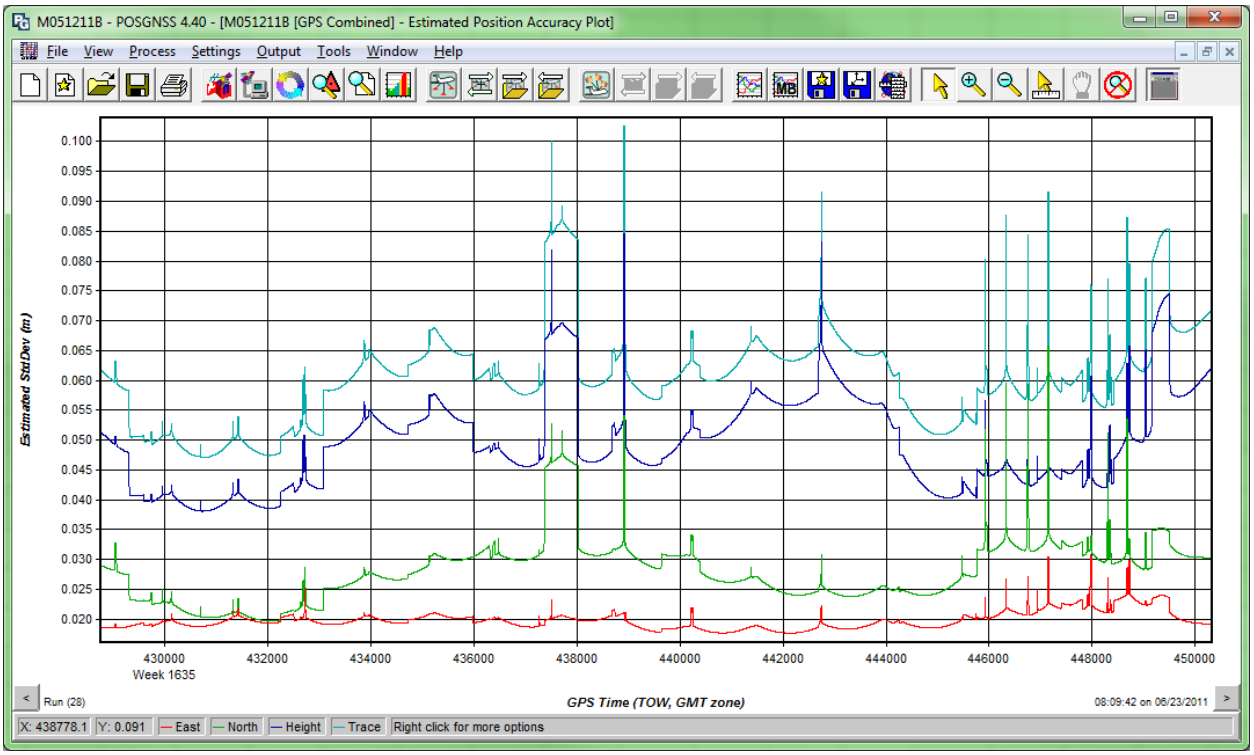
May 12 2011 Plots



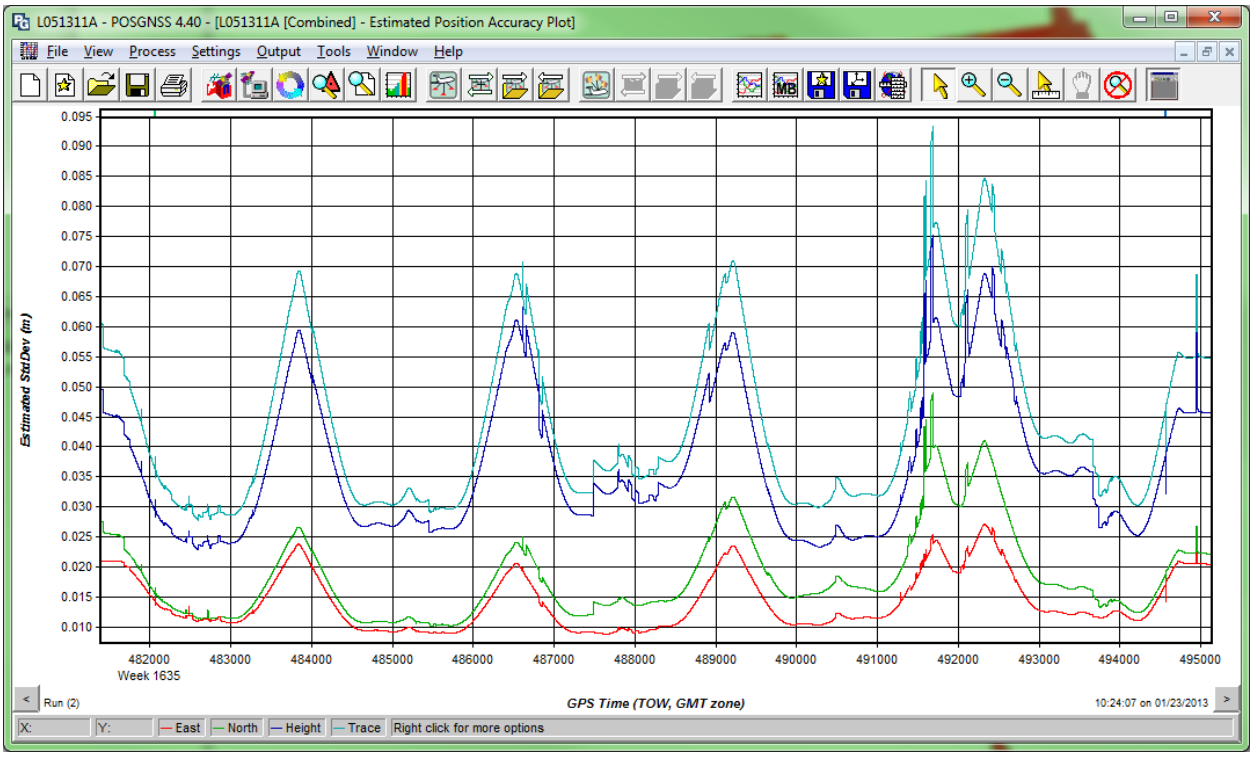


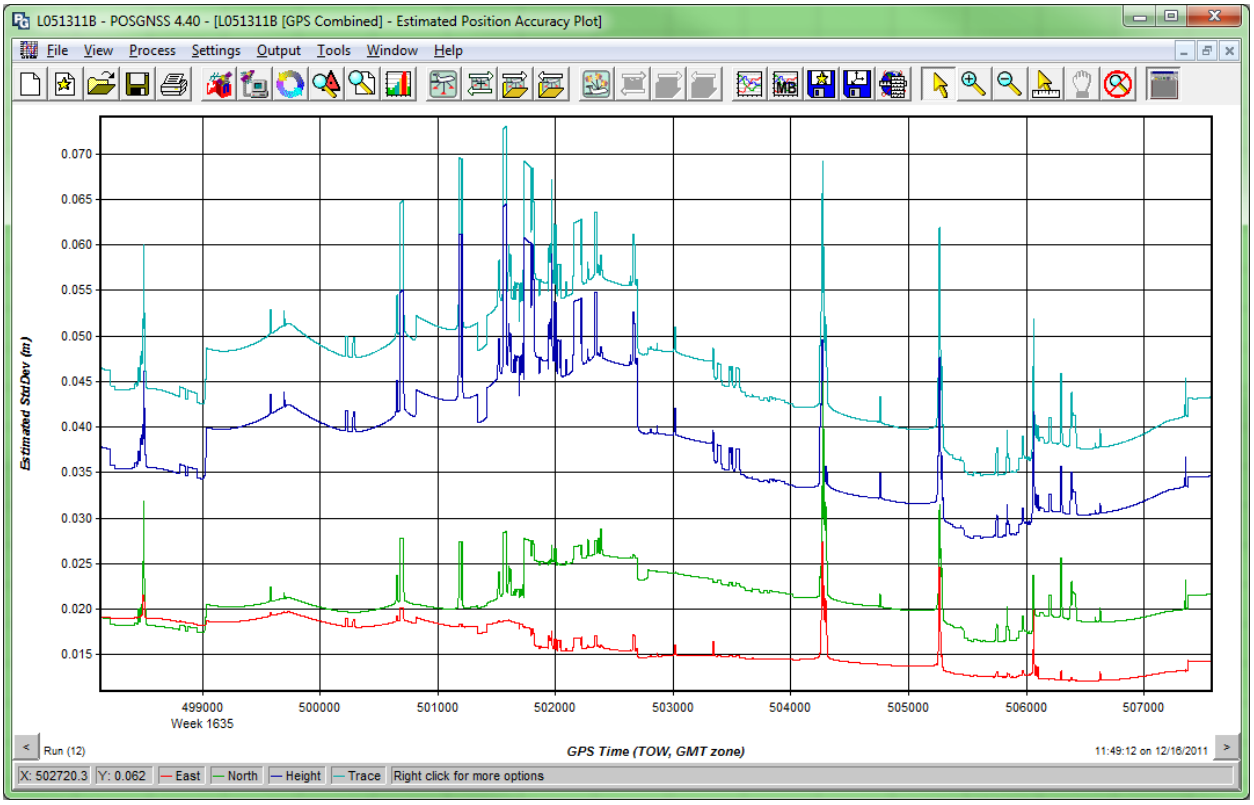

L051211C - POSGNSS 4.40 - [L051211C [Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.115
0.110
0.105
0.100
0.095
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
425000
Week 1635
426000
427000
428000
429000
430000
431000
432000
433000
Run (2)
GPS Time (TOW, GMT zone)
19:17:14 on 01/21/2013
X:
Y:
East
North
Height
Trace
Right click for more options

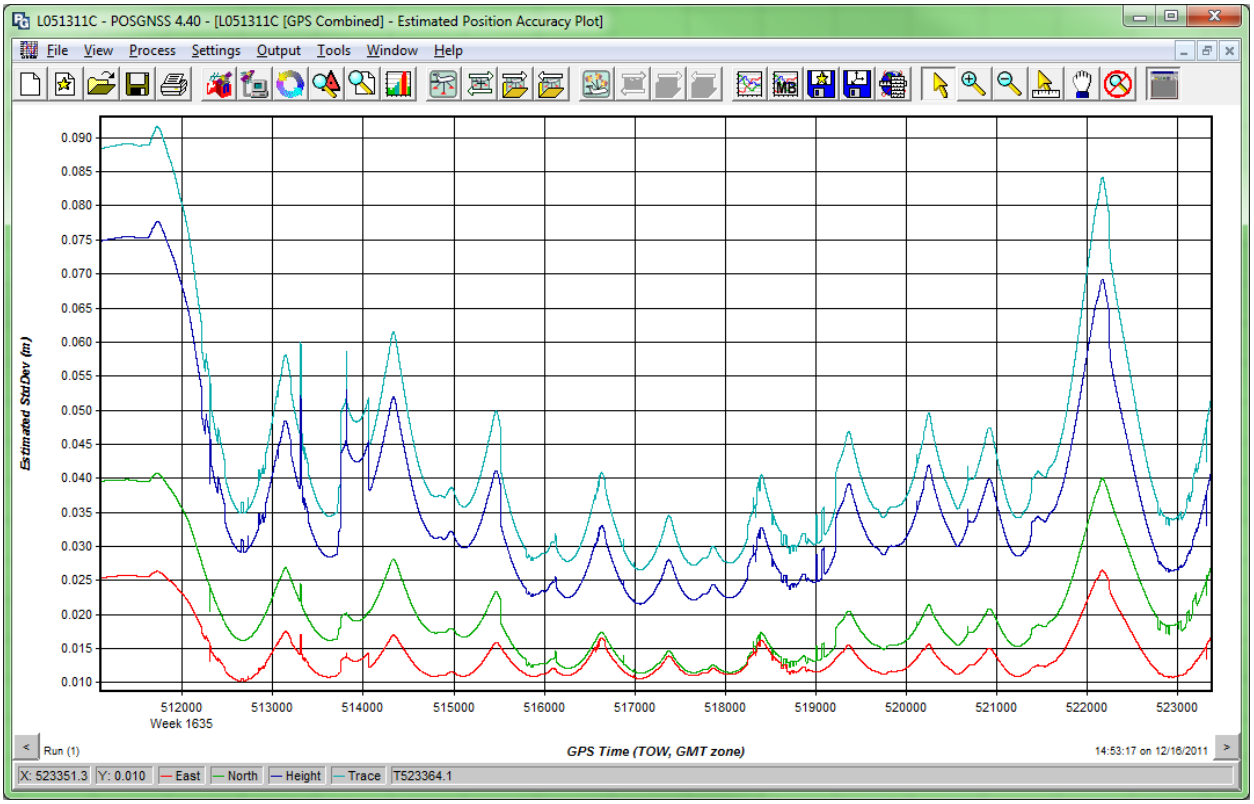

M051211A - POSGNSS 4.40 - [M051211A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
400000
Week 1635
402000
404000
406000
408000
410000
412000
414000
416000
Run (4)
GPS Time (TOW, GMT zone)
13:34:27 on 06/22/2011
X: 408448.9
Y: 0.061
East
North
Height
Trace
Right click for more options

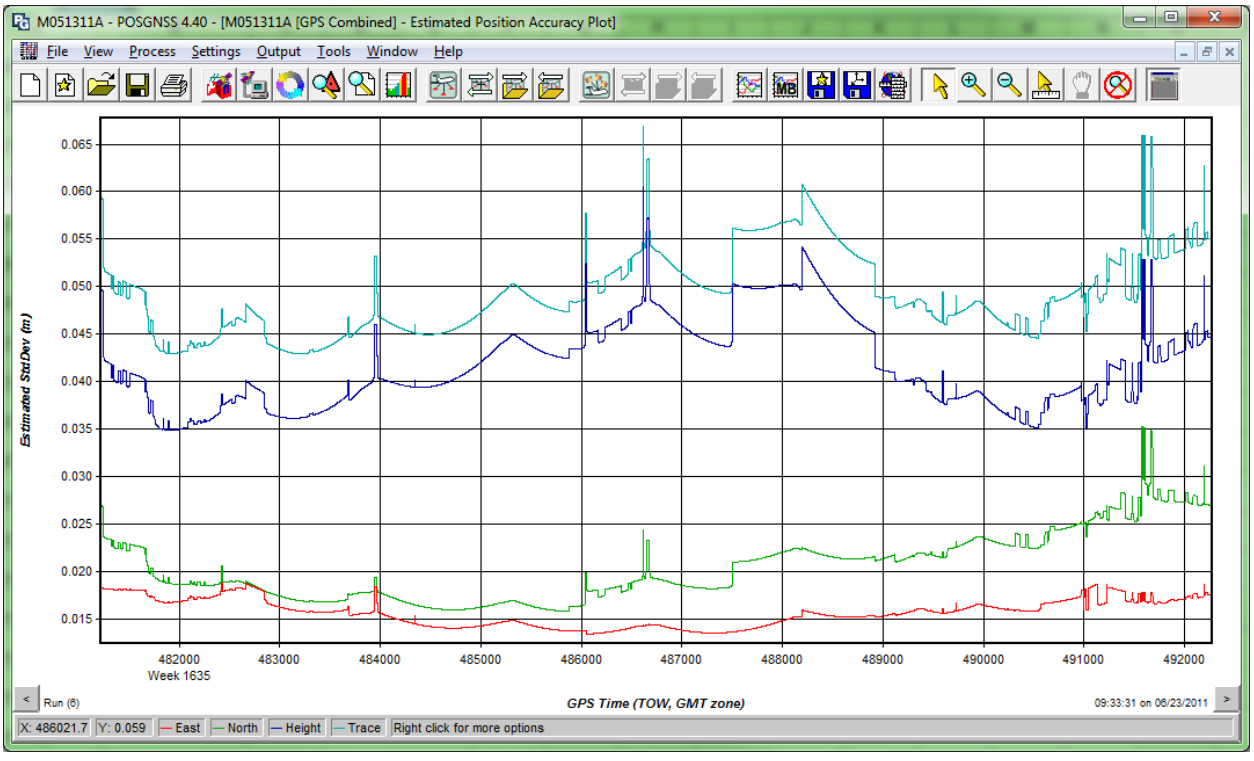

M051211B - POSGNSS 4.40 - [M051211B [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.100
0.095
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
430000
Week 1635
432000
434000
436000
438000
440000
442000
444000
446000
448000
450000
Run (28)
GPS Time (TOW, GMT zone)
08:09:42 on 06/23/2011
X: 438778.1
Y: 0.091
East
North
Height
Trace
Right click for more options

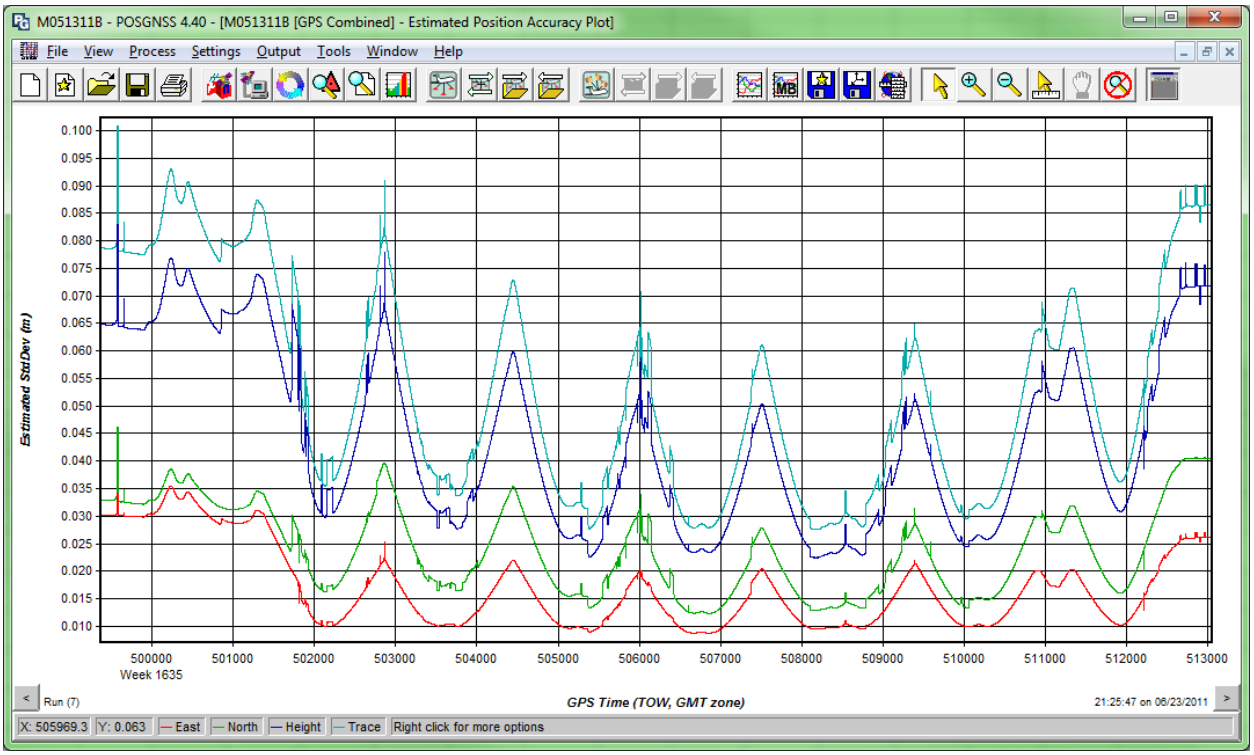
May 13 2011 Plots

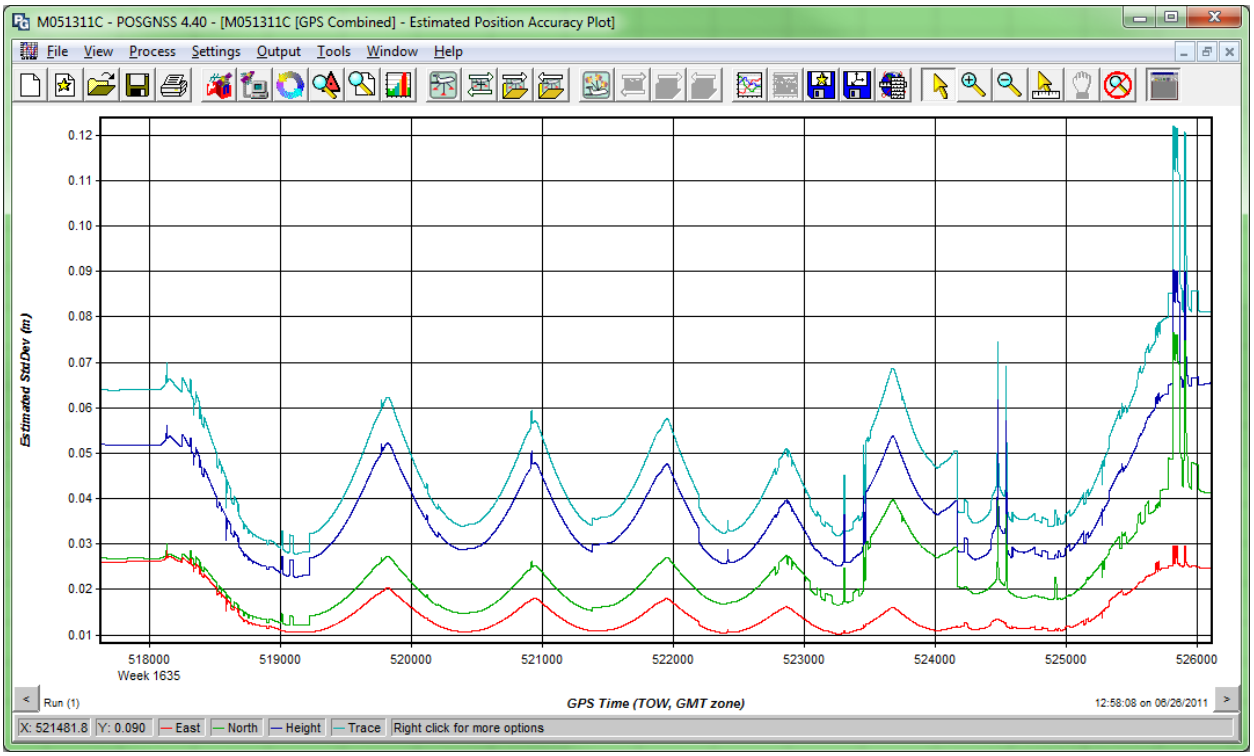




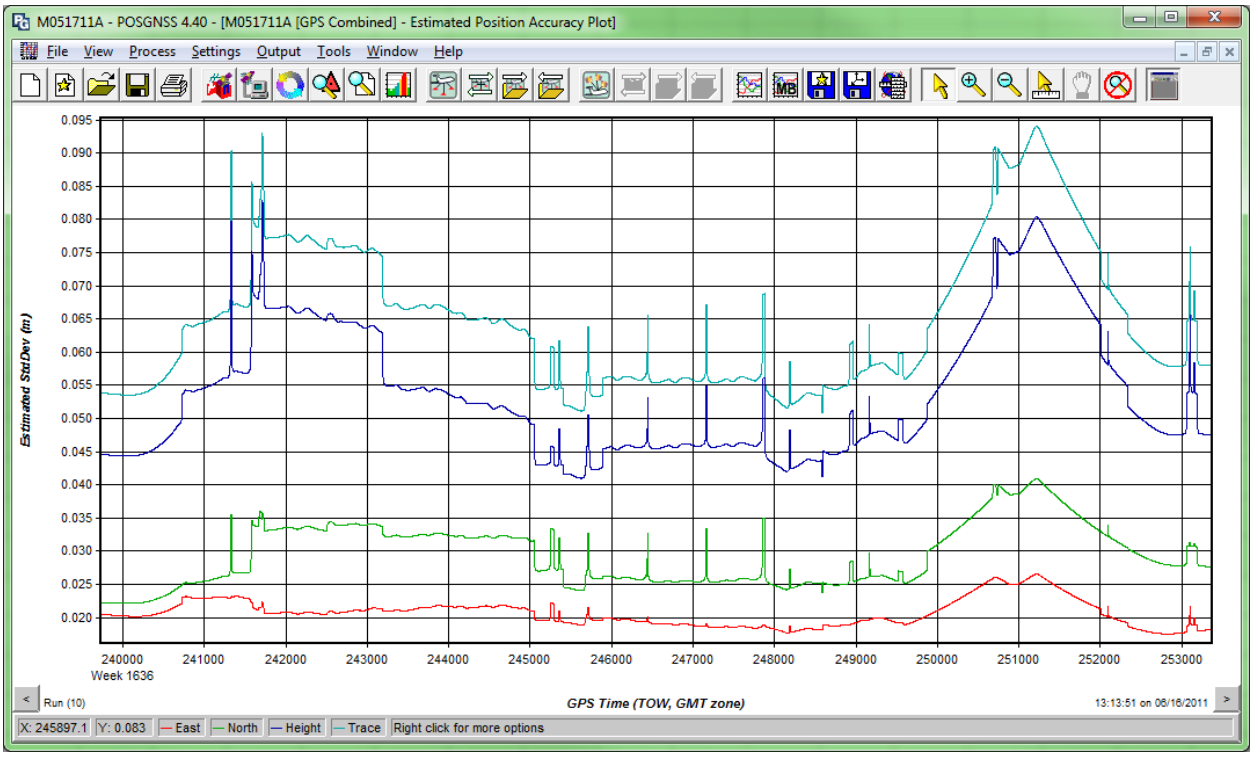

L051311C - POSGNSS 4.40 - [L051311C [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
512000
Week 1635
513000
514000
515000
516000
517000
518000
519000
520000
521000
522000
523000
Run (1)
GPS Time (TOW, GMT zone)
14:53:17 on 12/16/2011
X: 523351.3 Y: 0.010 East North Height Trace T523364.1


M051311A - POSGNSS 4.40 - [M051311A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
482000
Week 1635
483000
484000
485000
486000
487000
488000
489000
490000
491000
492000
Run (6)
GPS Time (TOW, GMT zone)
09:33:31 on 06/23/2011
X: 486021.7 Y: 0.059 East North Height Trace Right click for more options

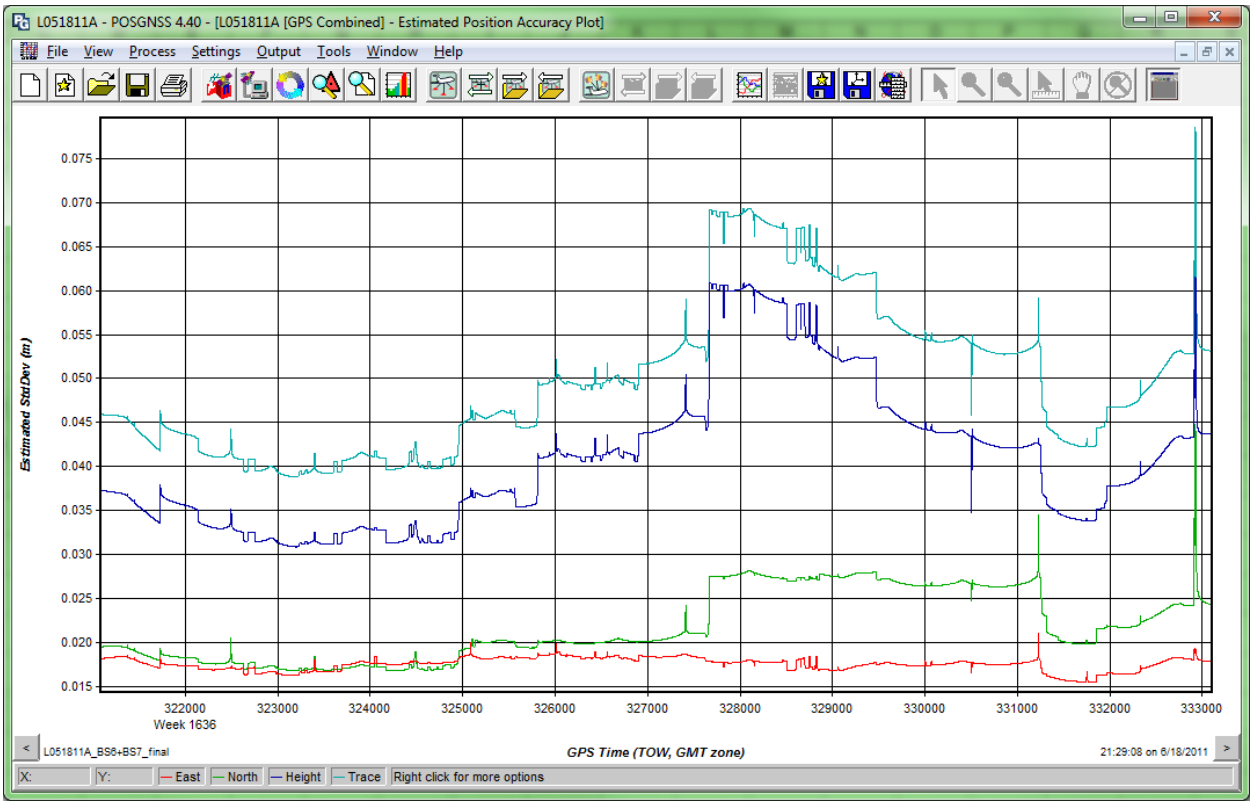

M051311B - POSGNSS 4.40 - [M051311B [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.100
0.095
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
500000
Week 1635
501000
502000
503000
504000
505000
506000
507000
508000
509000
510000
511000
512000
513000
Run (7)
GPS Time (TOW, GMT zone)
21:25:47 on 06/23/2011
X: 505969.3
Y: 0.063
East
North
Height
Trace
Right click for more options

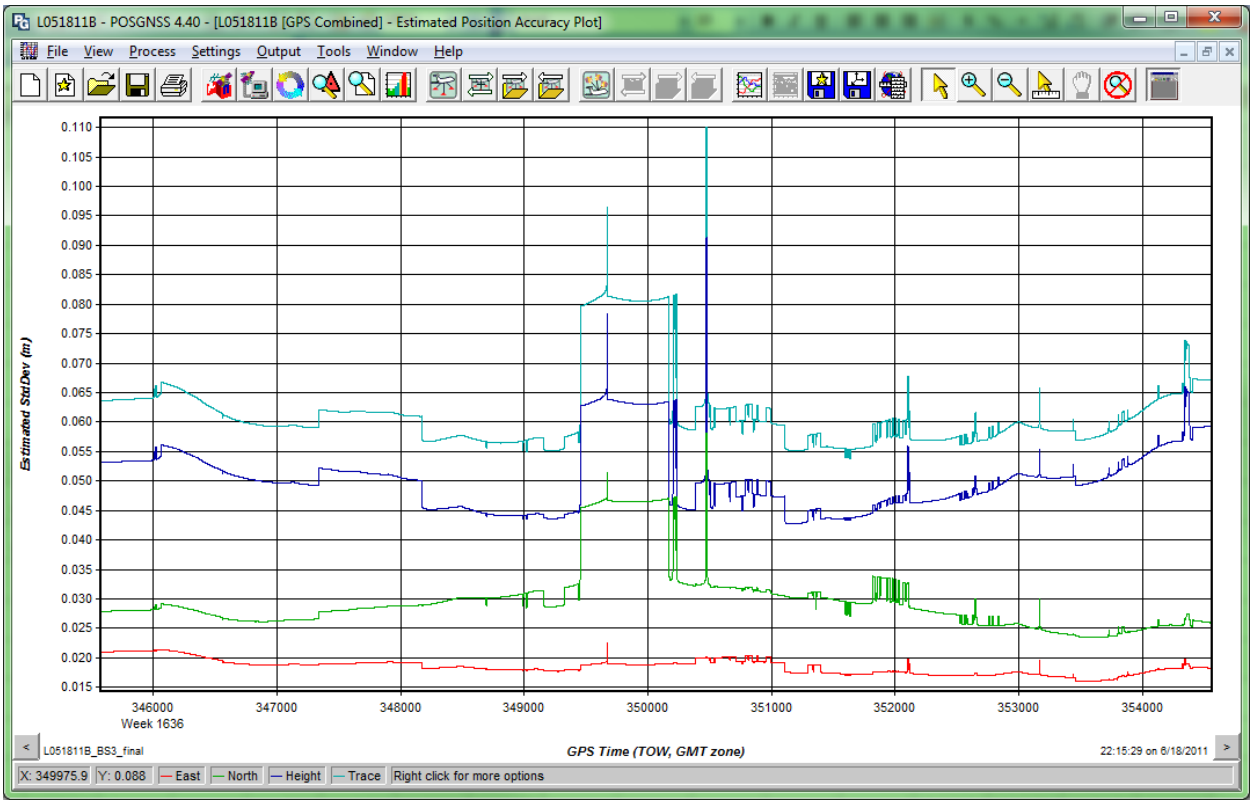

M051311C - POSGNSS 4.40 - [M051311C [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
518000
Week 1635
519000
520000
521000
522000
523000
524000
525000
526000
Run (1)
GPS Time (TOW, GMT zone)
12:58:08 on 06/26/2011
X: 521481.8
Y: 0.090
East
North
Height
Trace
Right click for more options

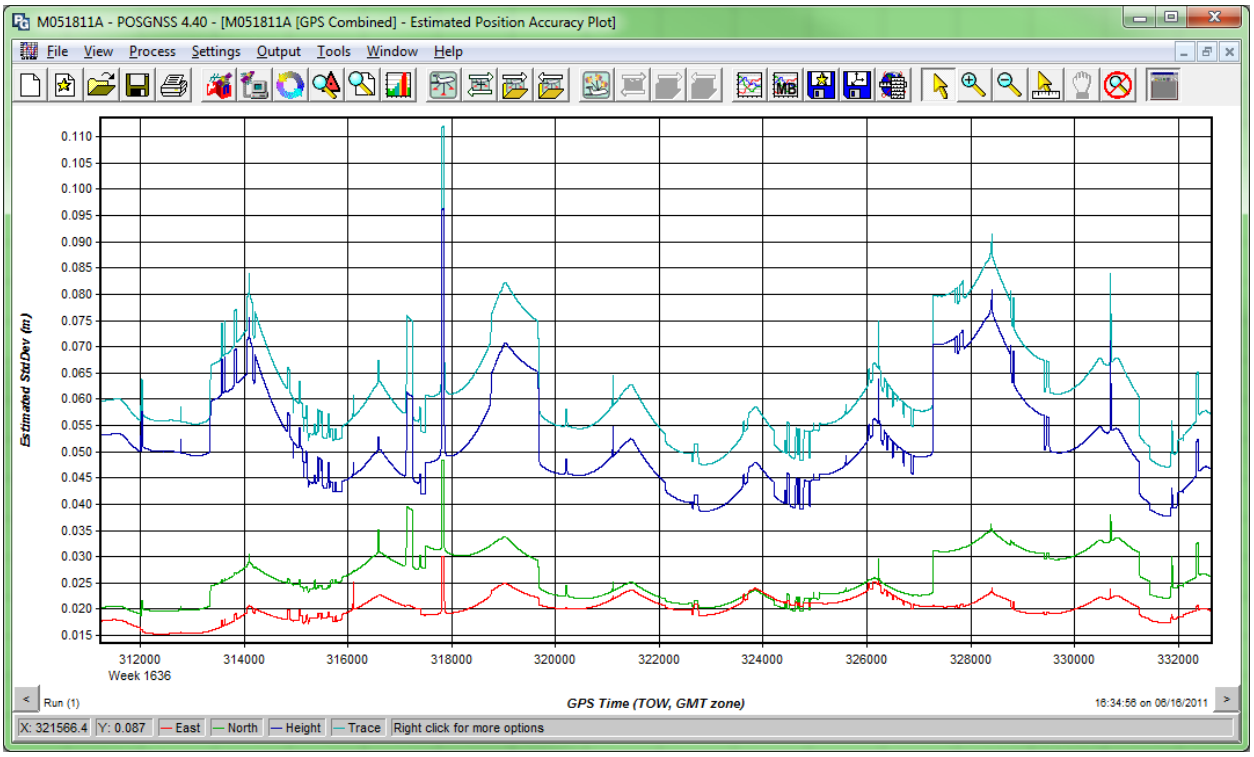
May 17 2011 Plot

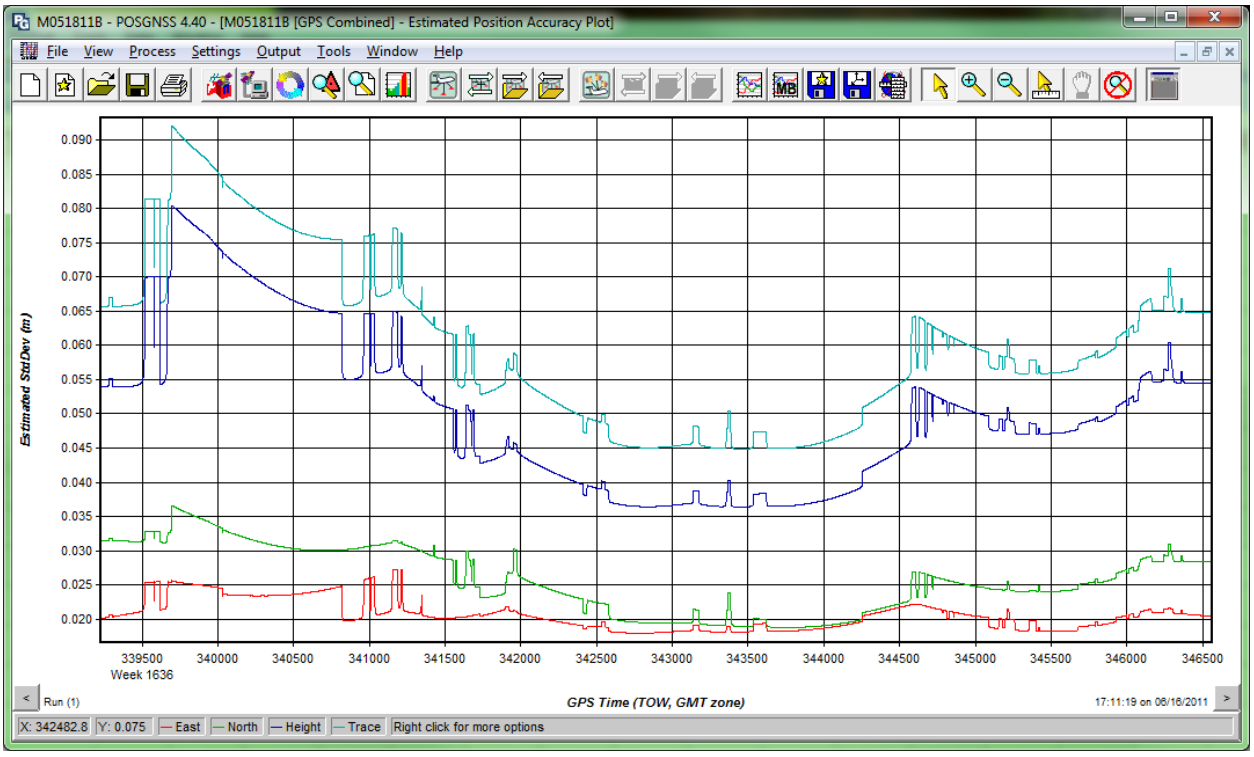


May 18 2011 Plots

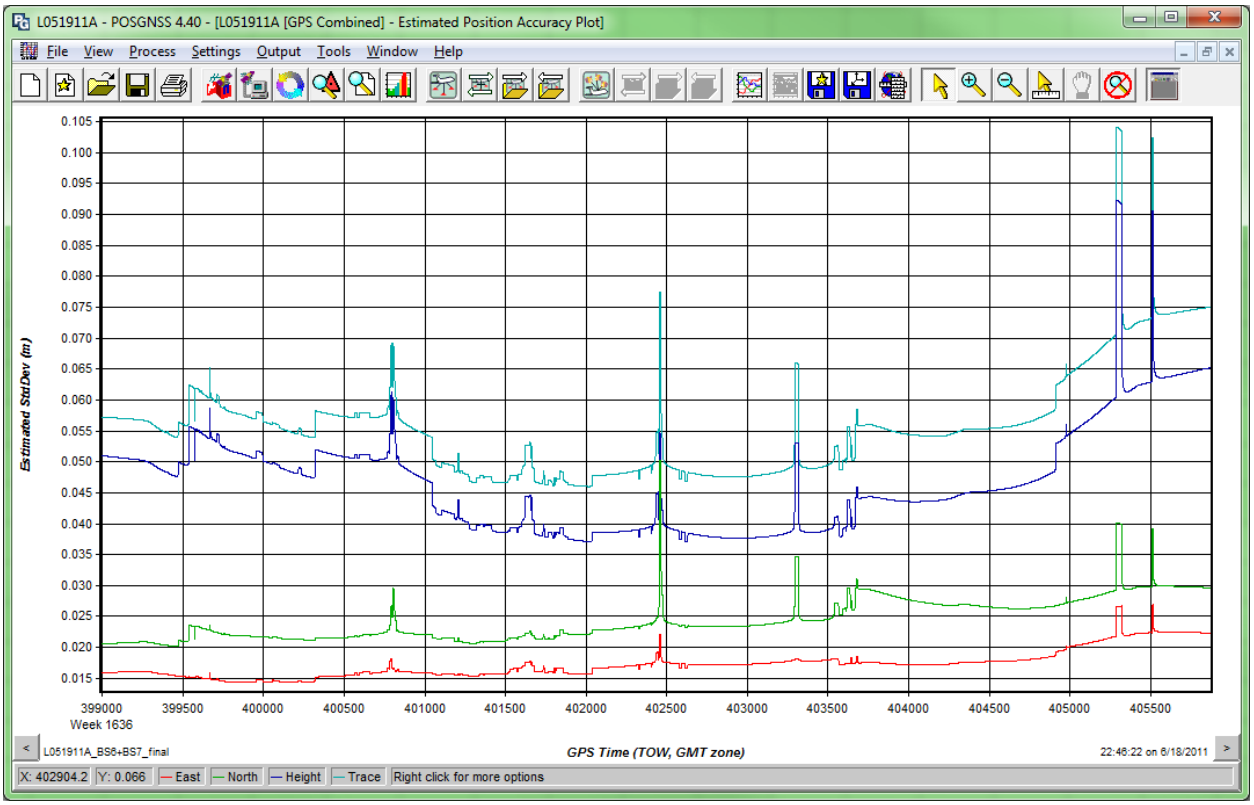


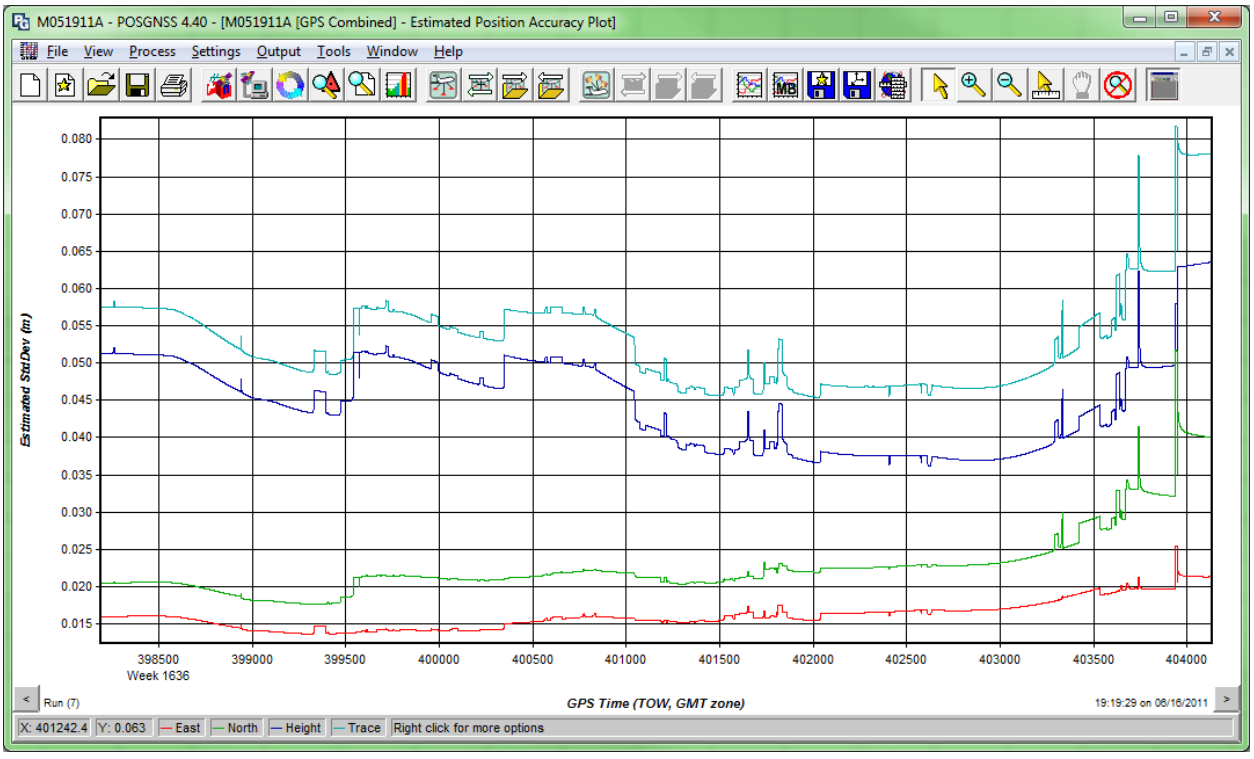



M051811A - POSGNSS 4.40 - [M051811A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.110 0.105 0.100 0.095 0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020 0.015
312000 314000 316000 318000 320000 322000 324000 326000 328000 330000 332000
Week 1636
Run (1)
GPS Time (TOW, GMT zone)
16:34:56 on 06/16/2011
X: 321566.4 Y: 0.087 East North Height Trace Right click for more options

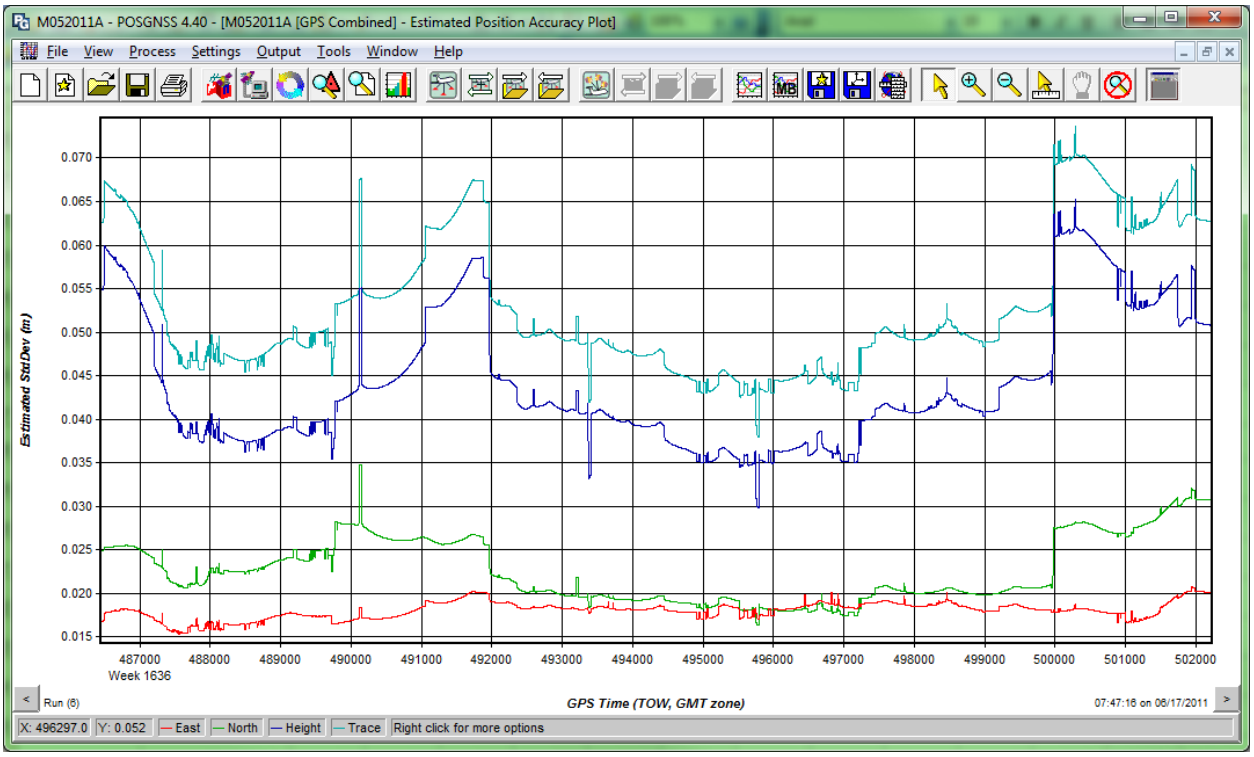

M051811B - POSGNSS 4.40 - [M051811B [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.090 0.085 0.080 0.075 0.070 0.065 0.060 0.055 0.050 0.045 0.040 0.035 0.030 0.025 0.020
339500 340000 340500 341000 341500 342000 342500 343000 343500 344000 344500 345000 345500 346000 346500
Week 1636
Run (1)
GPS Time (TOW, GMT zone)
17:11:19 on 06/16/2011
X: 342482.8 Y: 0.075 East North Height Trace Right click for more options

May 19 2011 Plots

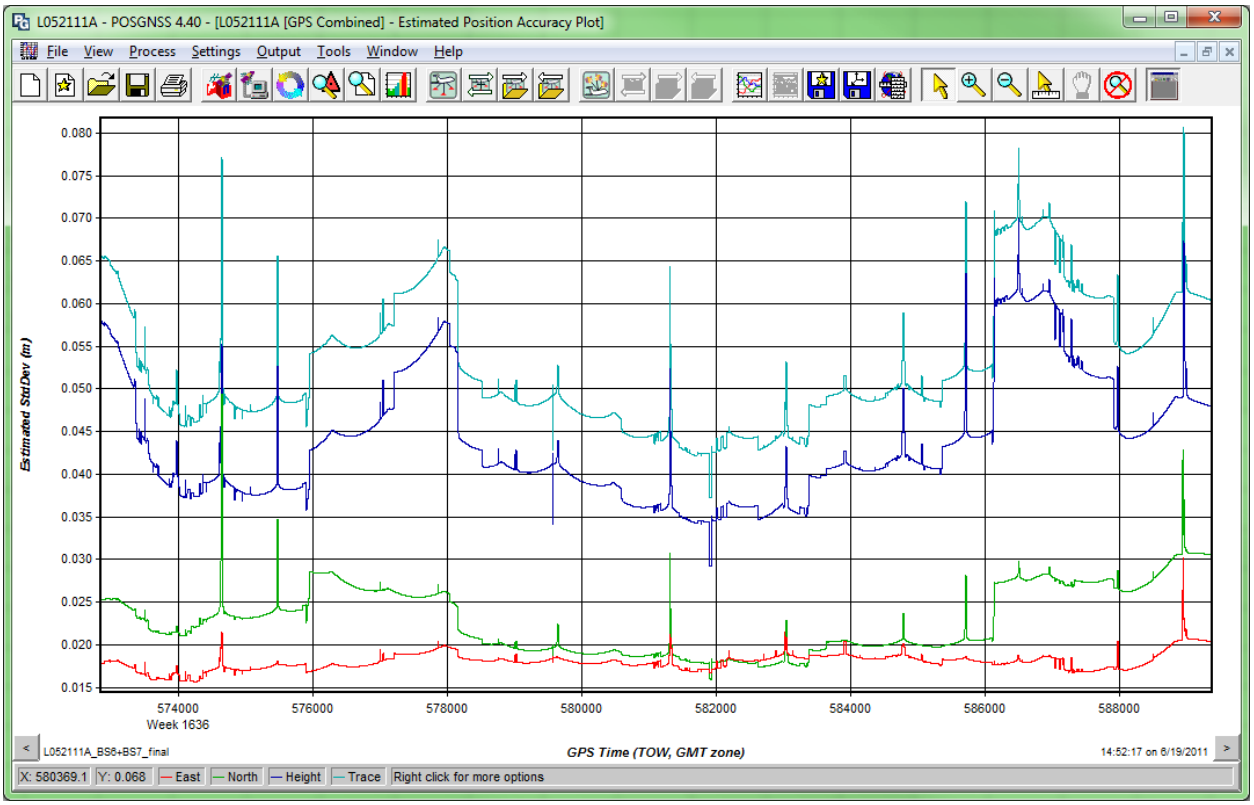


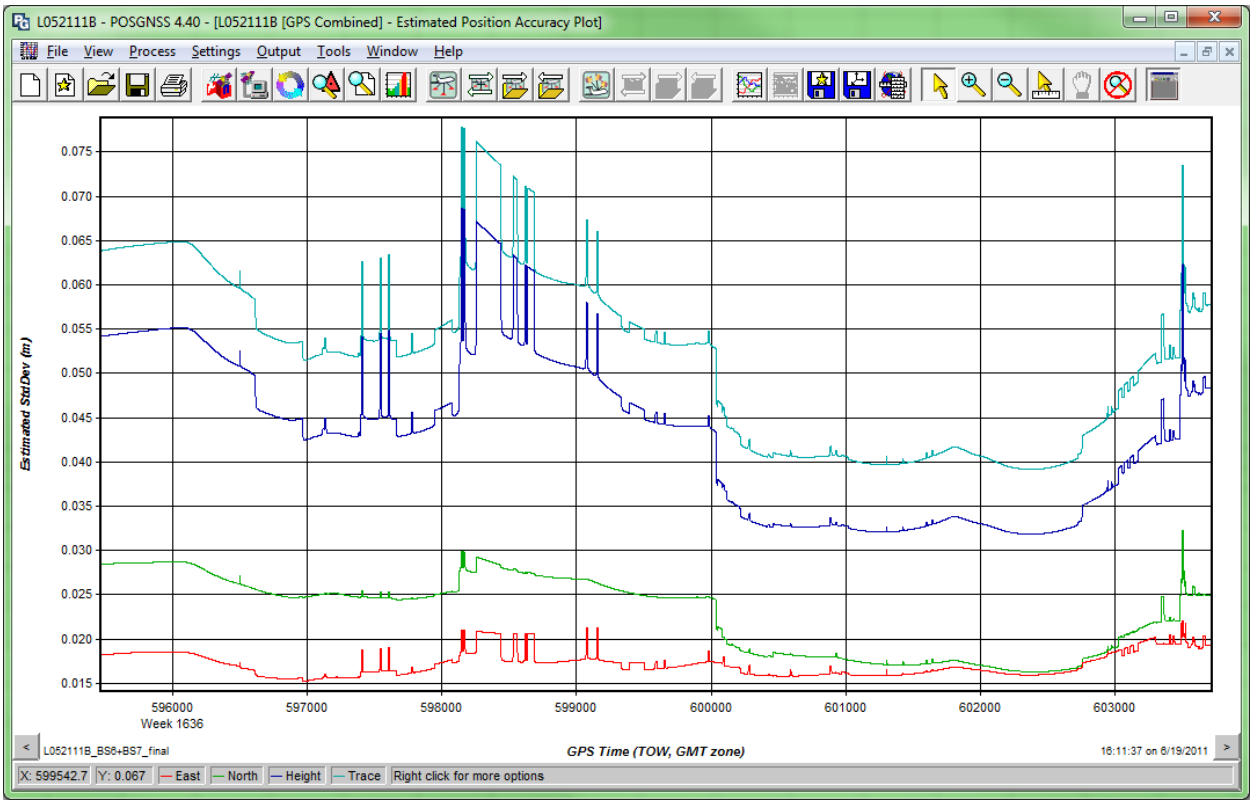


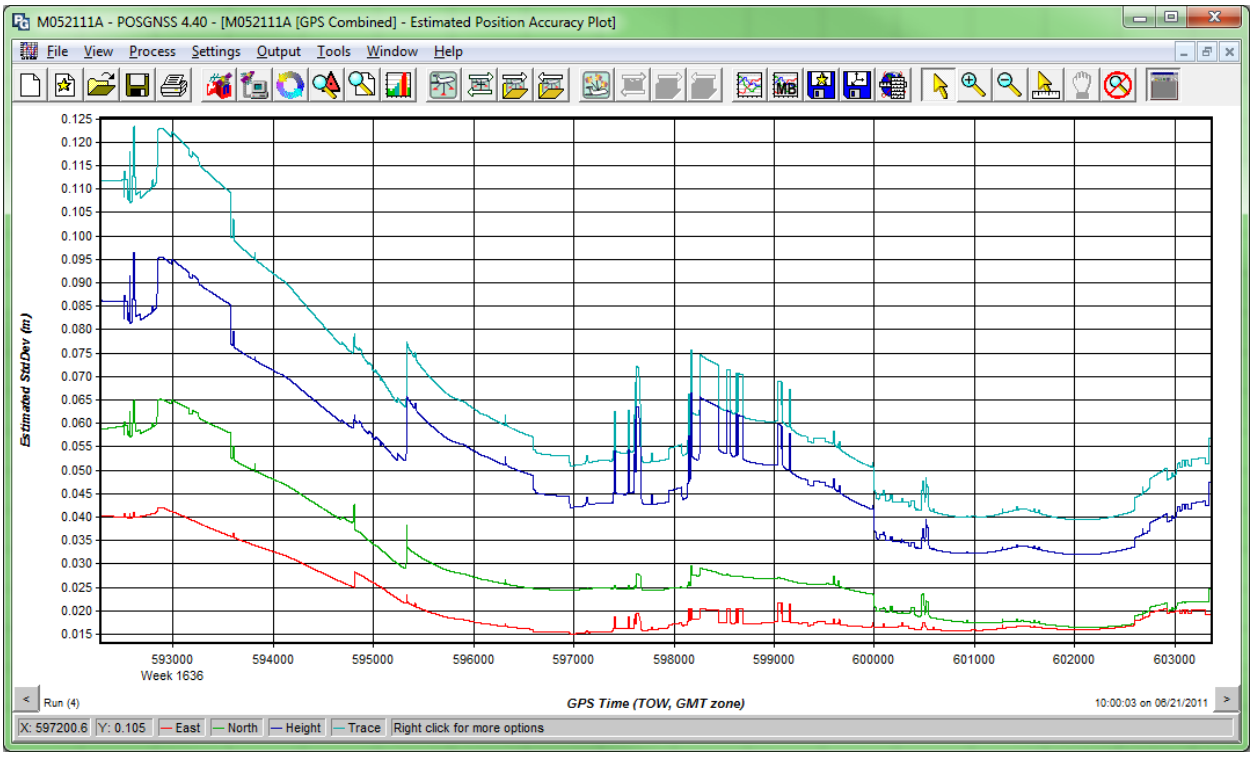
May 20 2011 Plot



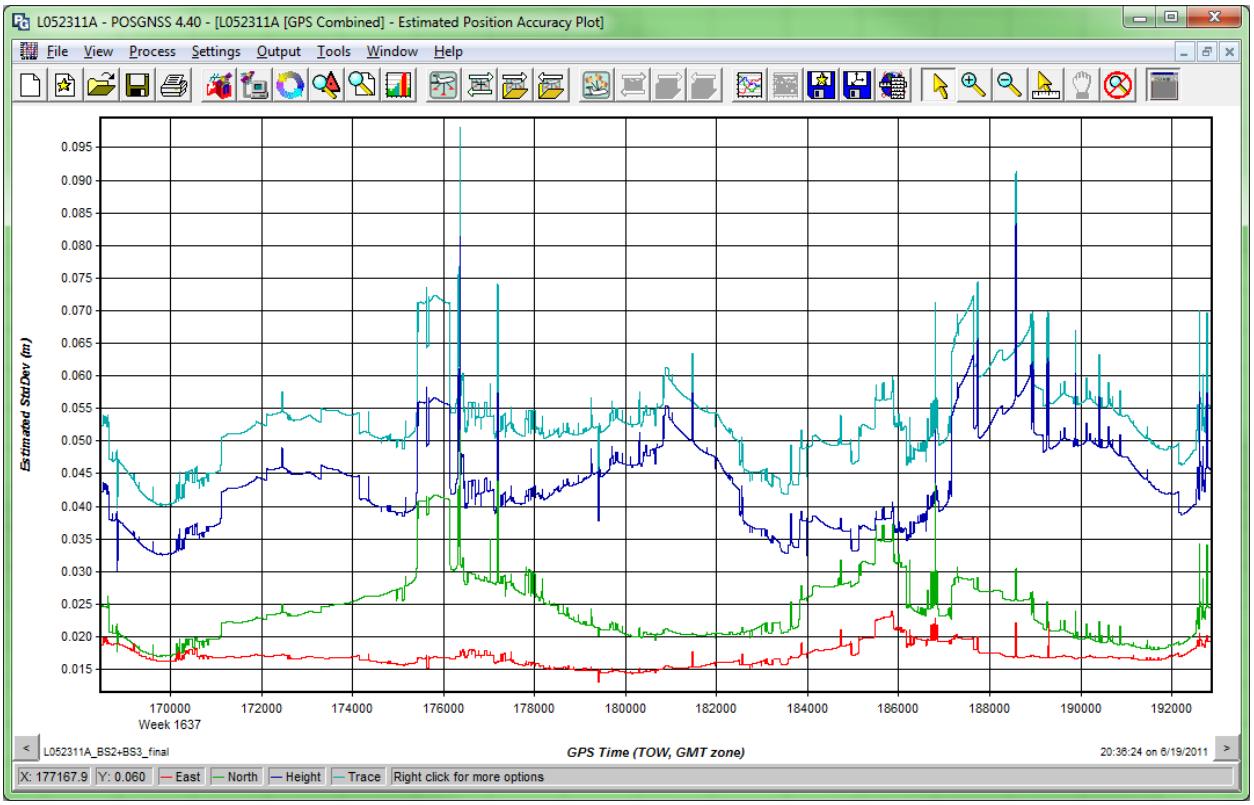
May 21 2011 Plots



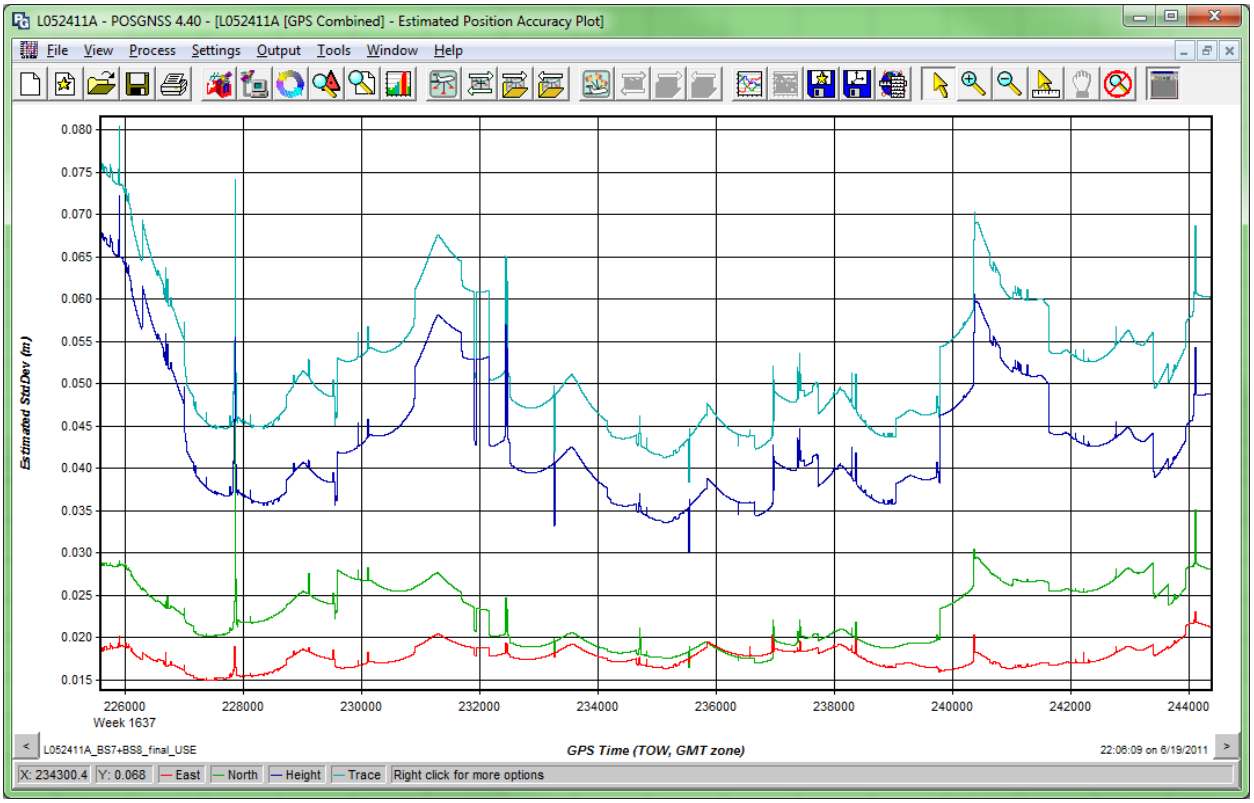


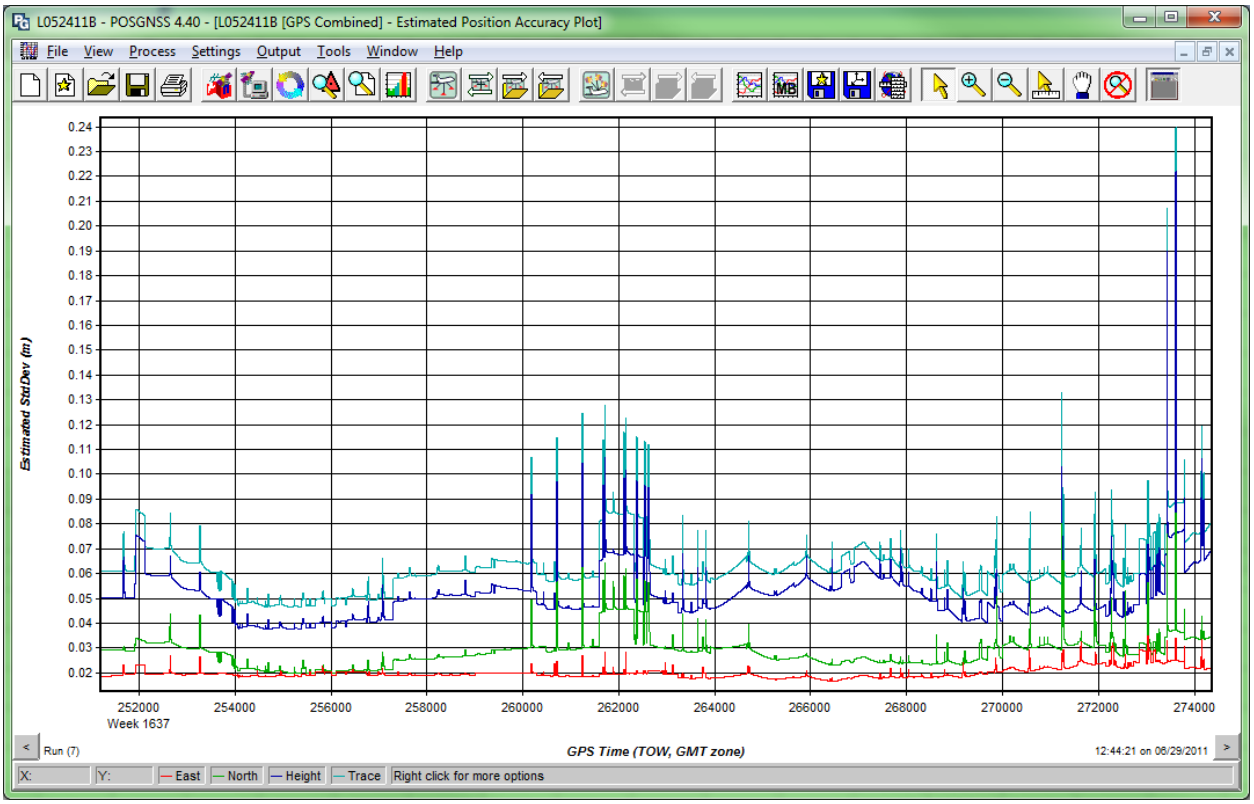

M052111A - POSGNSS 4.40 - [M052111A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.125
0.120
0.115
0.110
0.105
0.100
0.095
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
593000
Week 1636
594000
595000
596000
597000
598000
599000
600000
601000
602000
603000
Run (4)
GPS Time (TOW, GMT zone)
10:00:03 on 06/21/2011
X: 597200.6
Y: 0.105
East
North
Height
Trace
Right click for more options

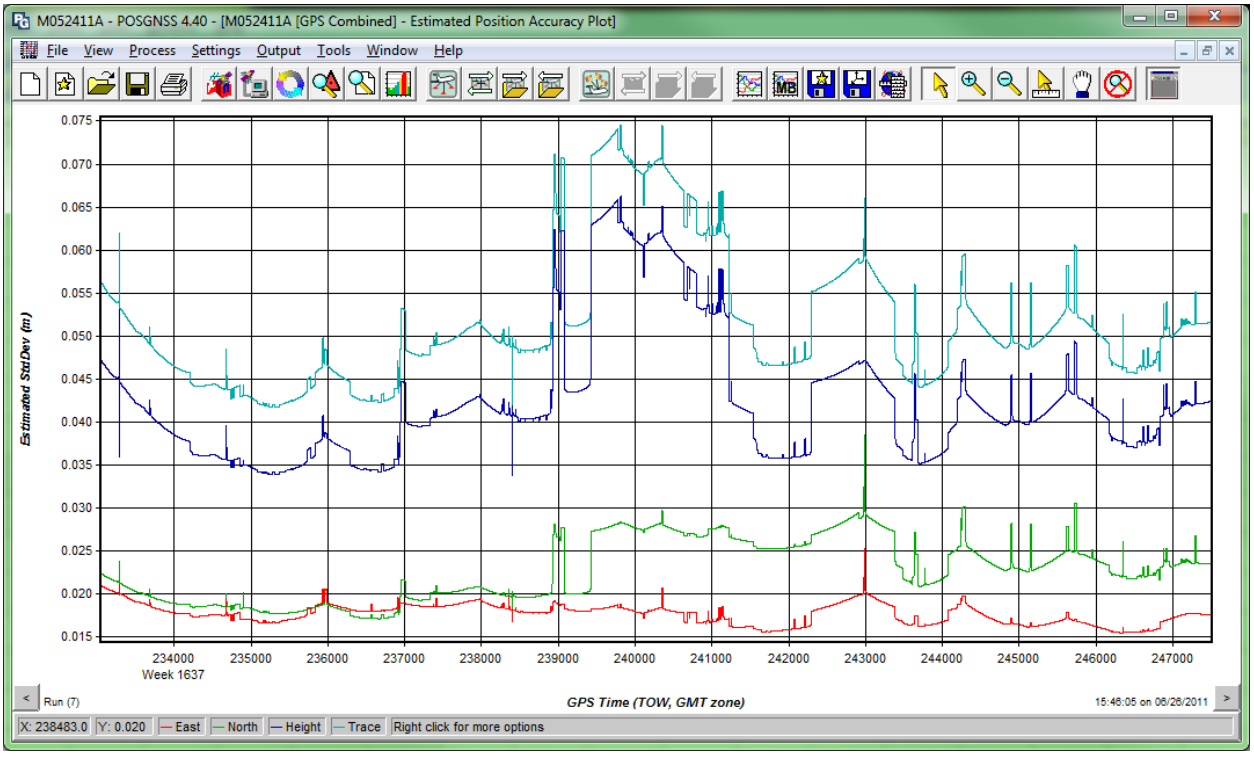
May 23 2011 Plot

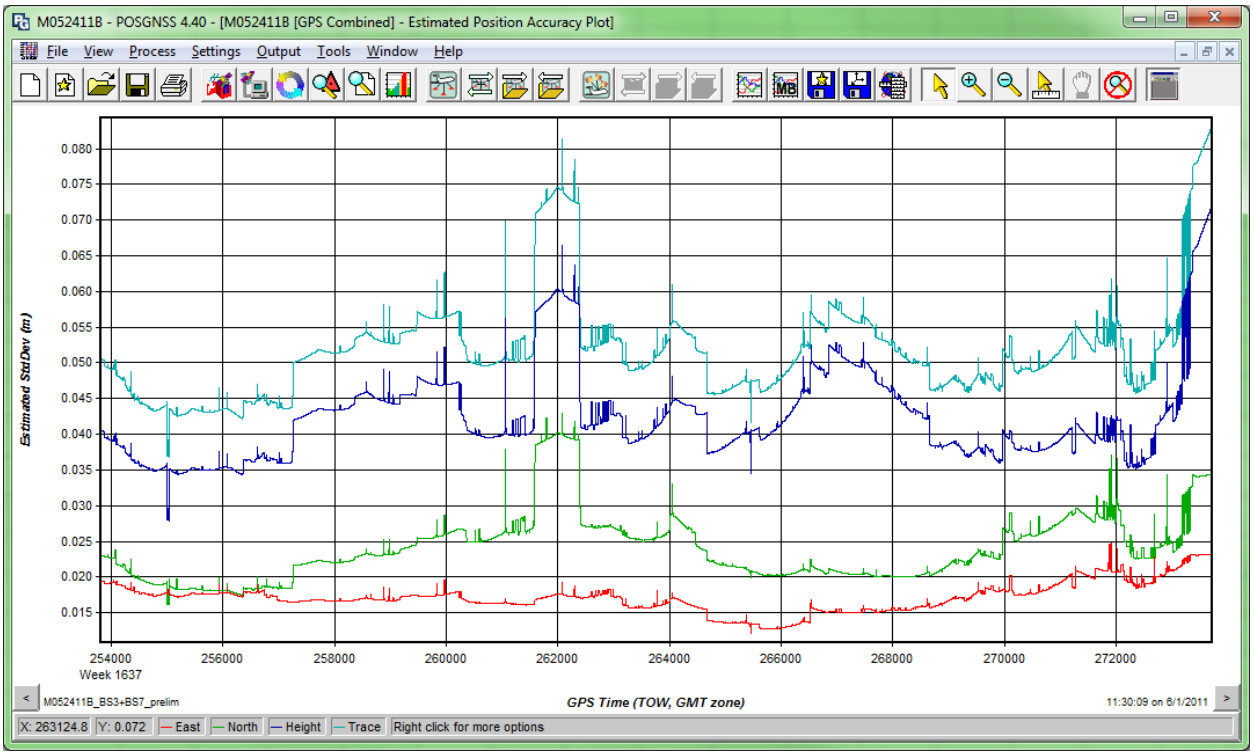


May 24 2011 Plots

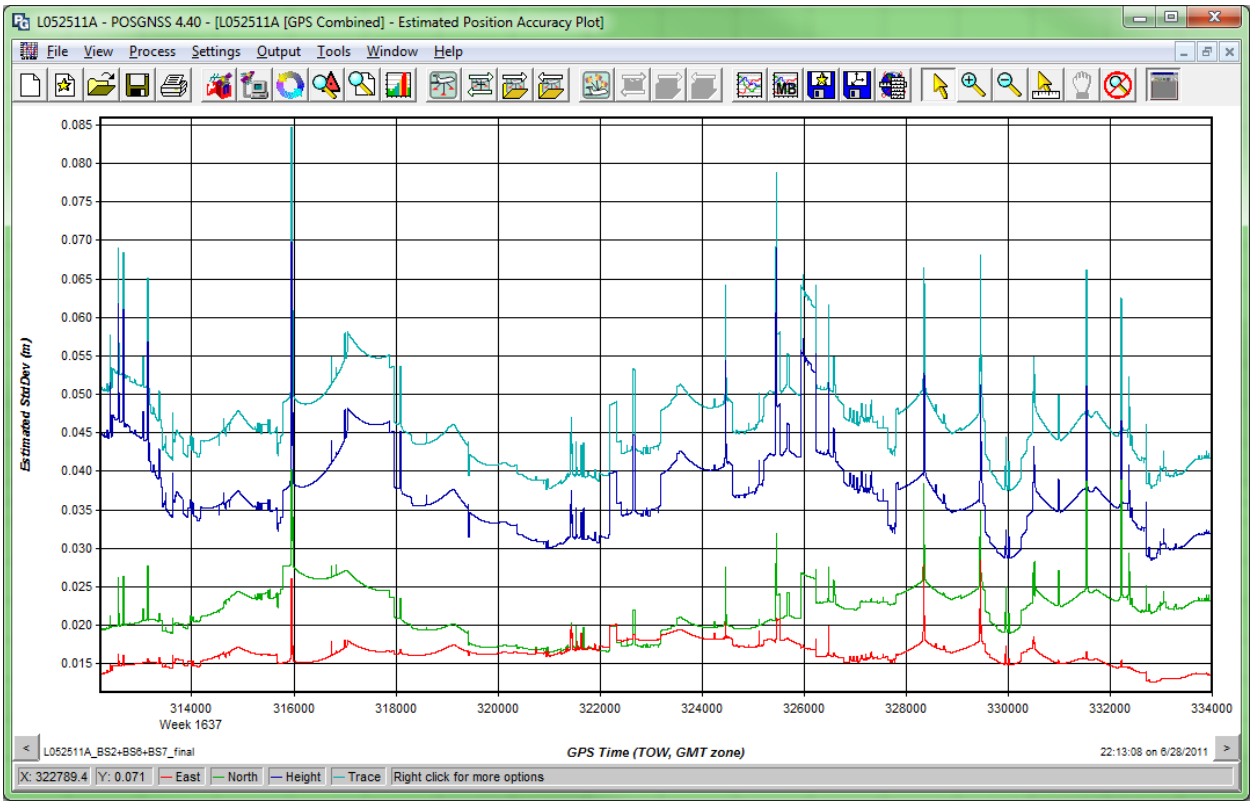


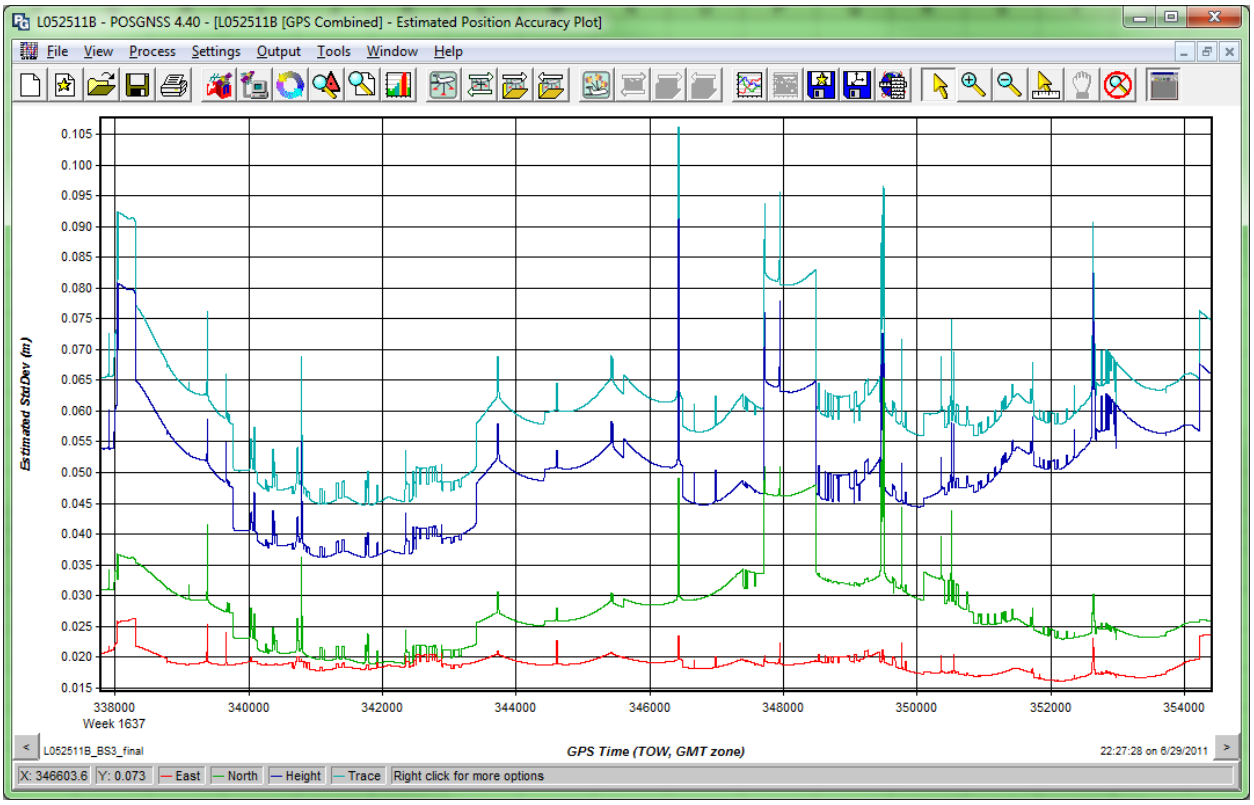



M052411A - POSGNSS 4.40 - [M052411A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
234000
Week 1637
235000
236000
237000
238000
239000
240000
241000
242000
243000
244000
245000
246000
247000
Run (7)
GPS Time (TOW, GMT zone)
15:46:05 on 06/26/2011
X: 238483.0 Y: 0.020 East North Height Trace Right click for more options

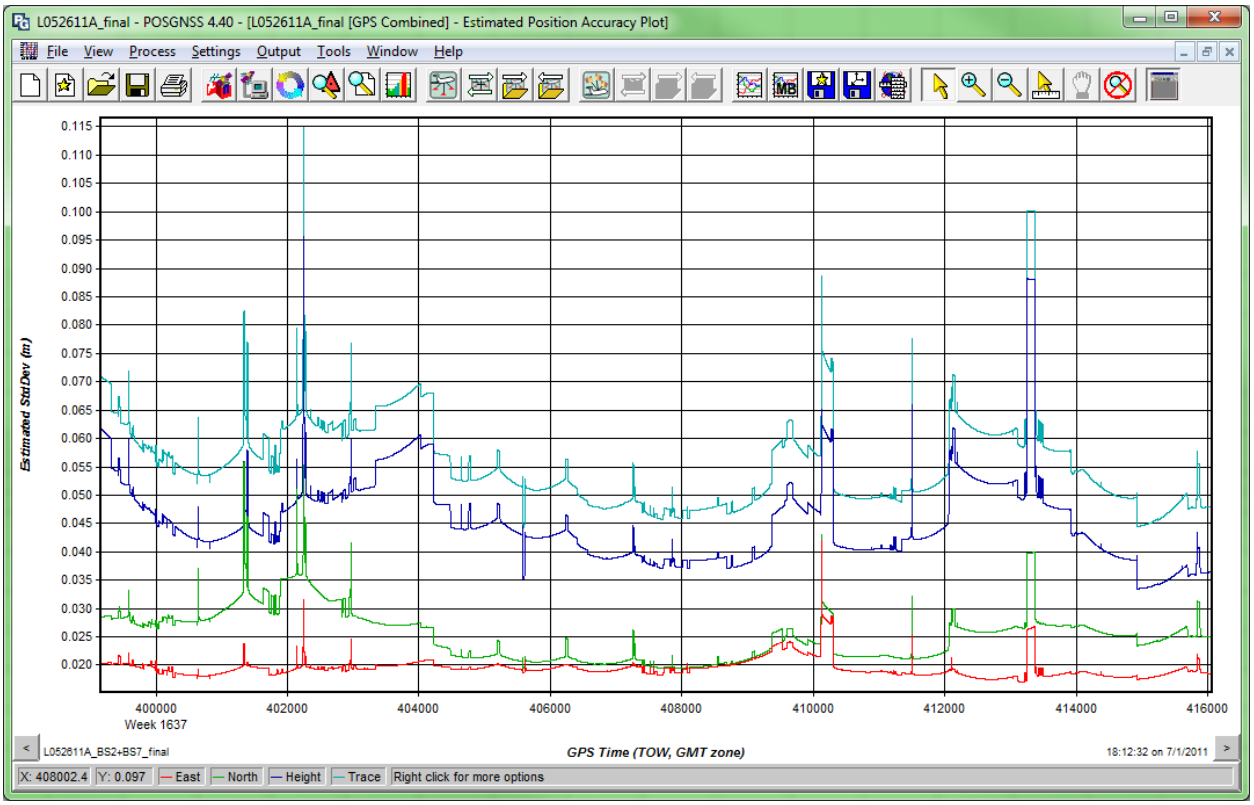

M052411B - POSGNSS 4.40 - [M052411B [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
254000
Week 1637
256000
258000
260000
262000
264000
266000
268000
270000
272000
M052411B_BS3+BS7_prelim
GPS Time (TOW, GMT zone)
11:30:09 on 8/1/2011
X: 263124.8 Y: 0.072 East North Height Trace Right click for more options

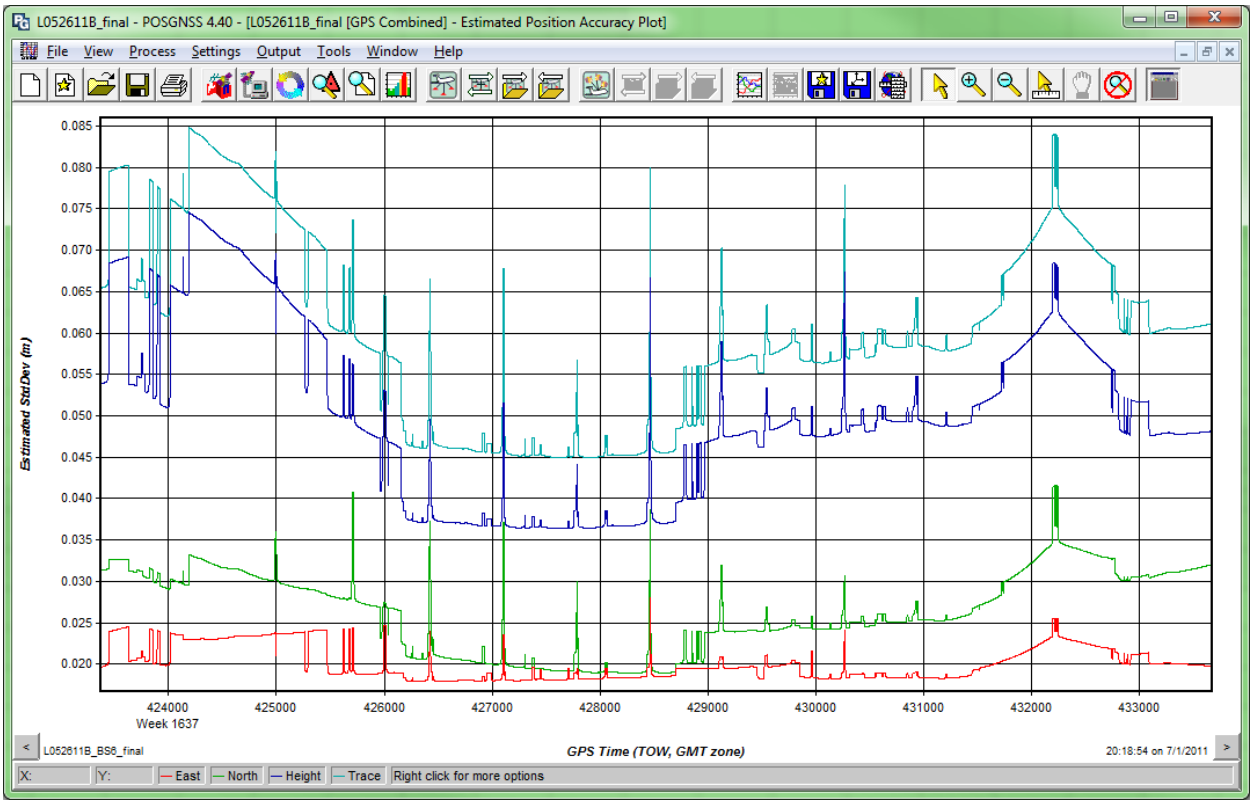
May 25 2011 Plots



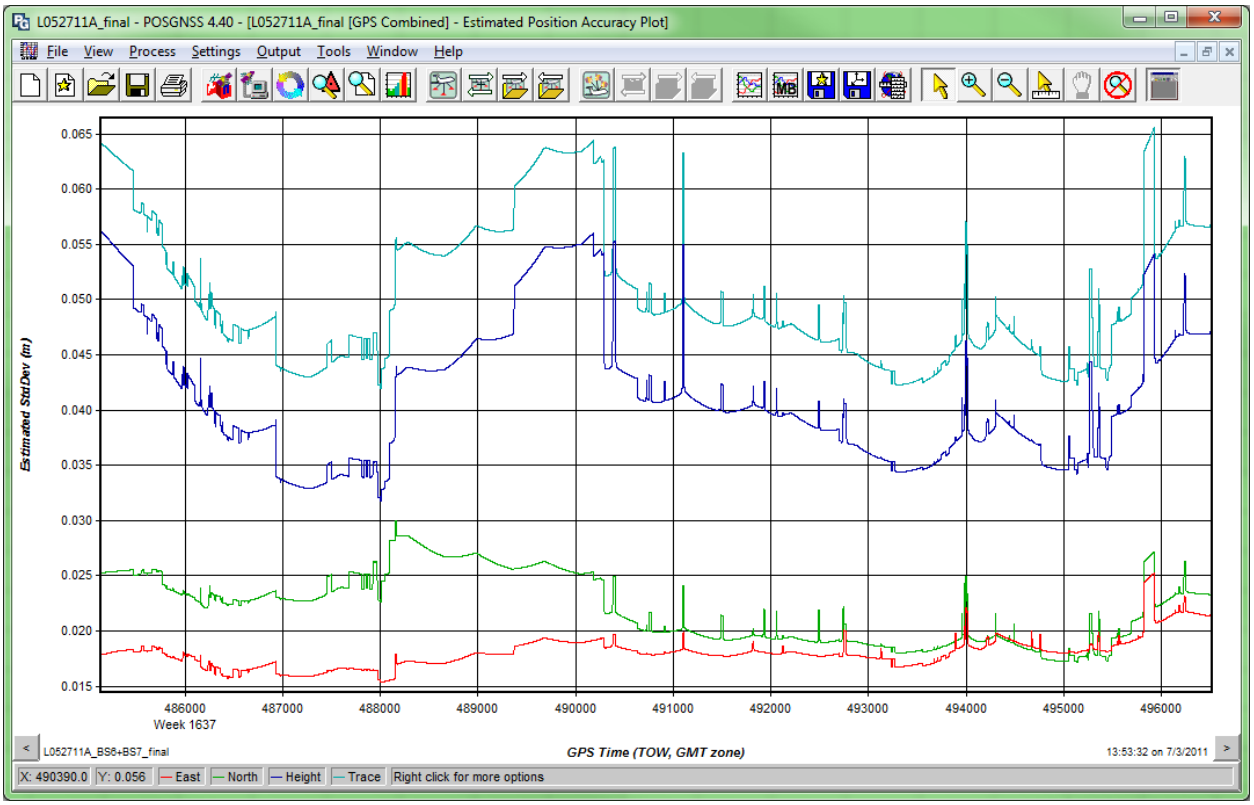


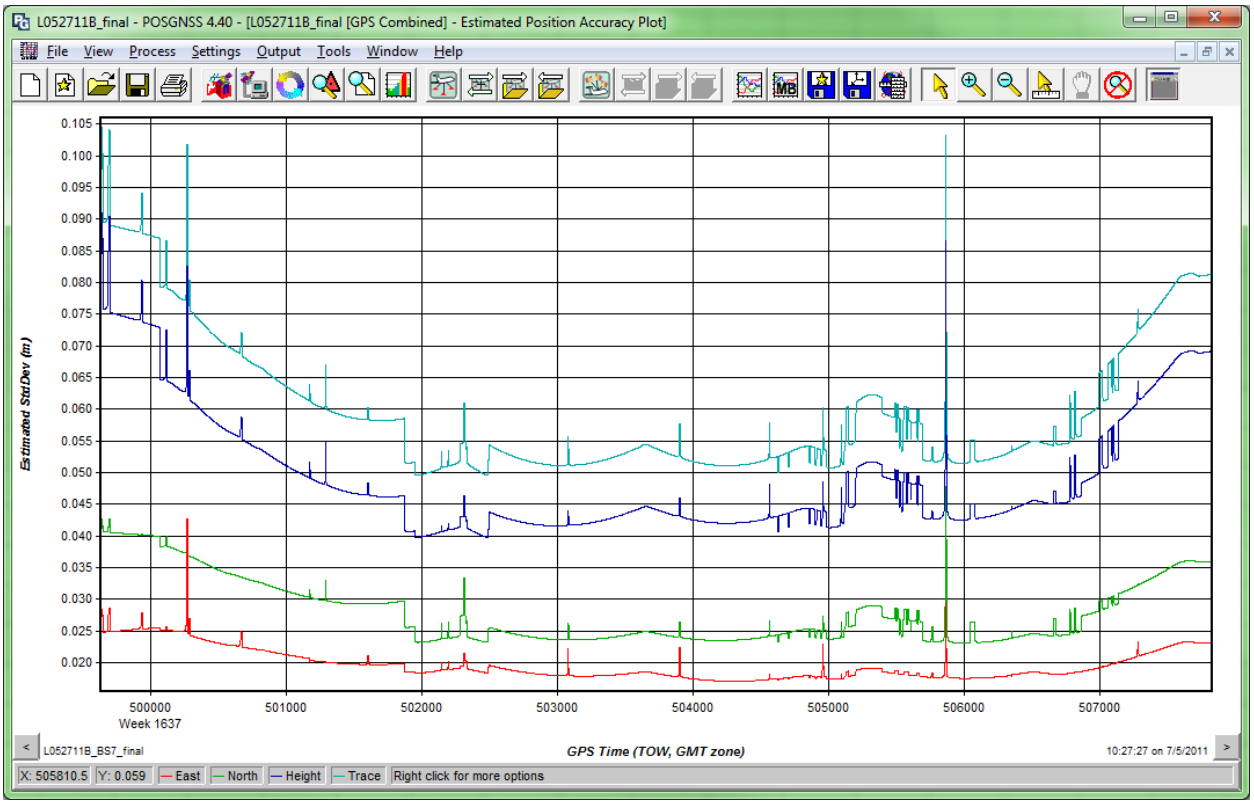
May 26 2011 Plots

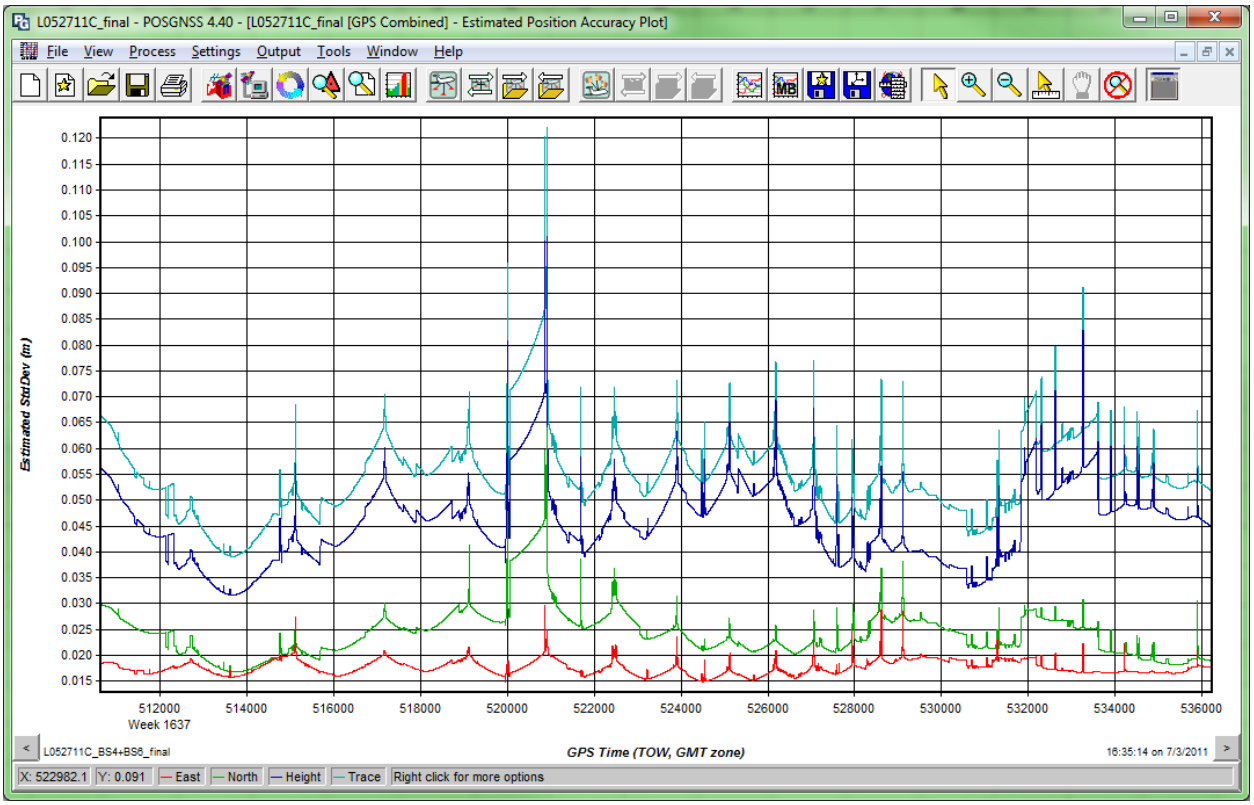




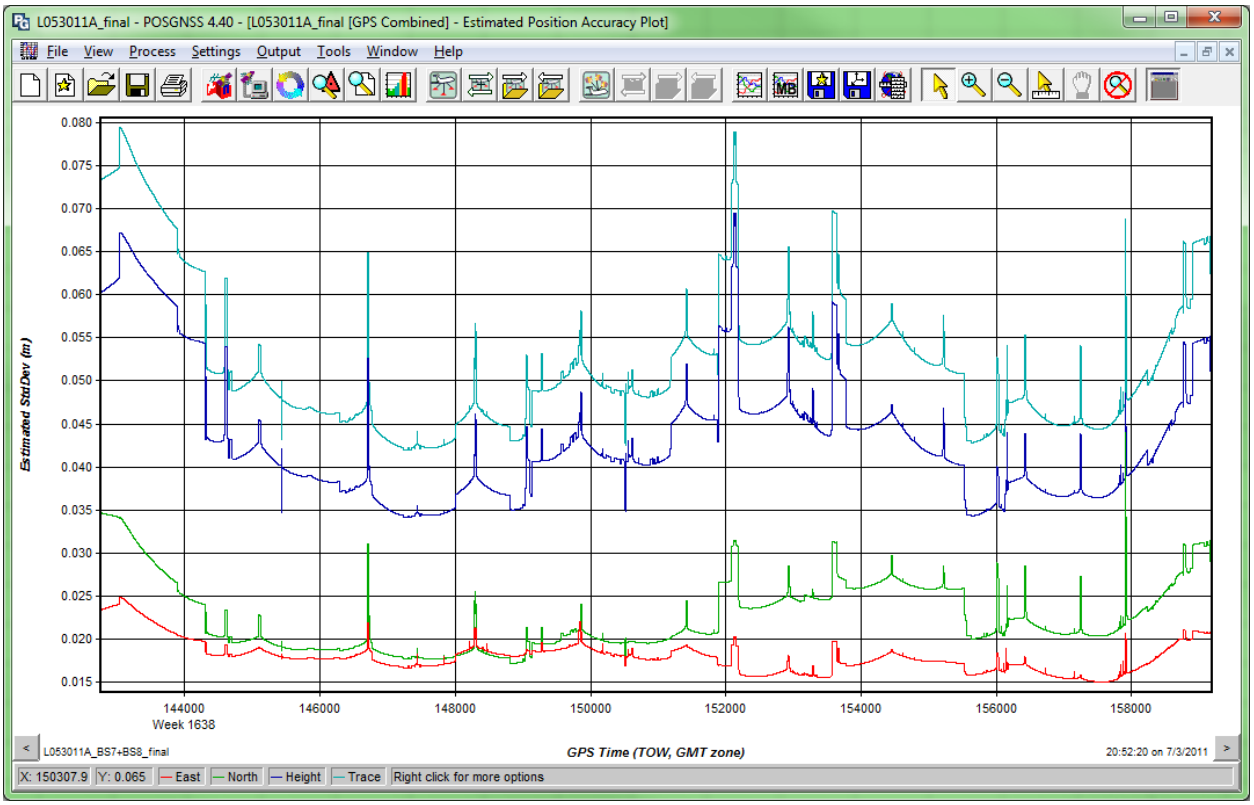
May 27 2011 Plots

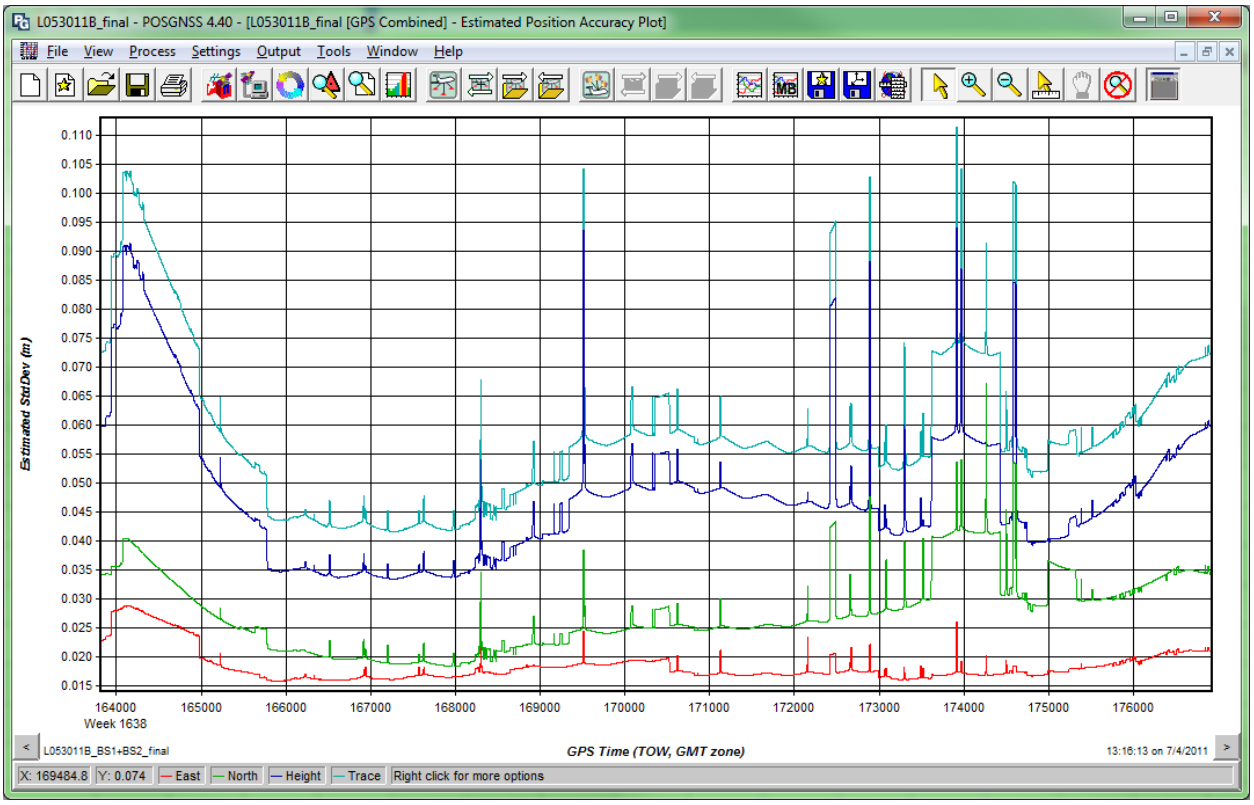


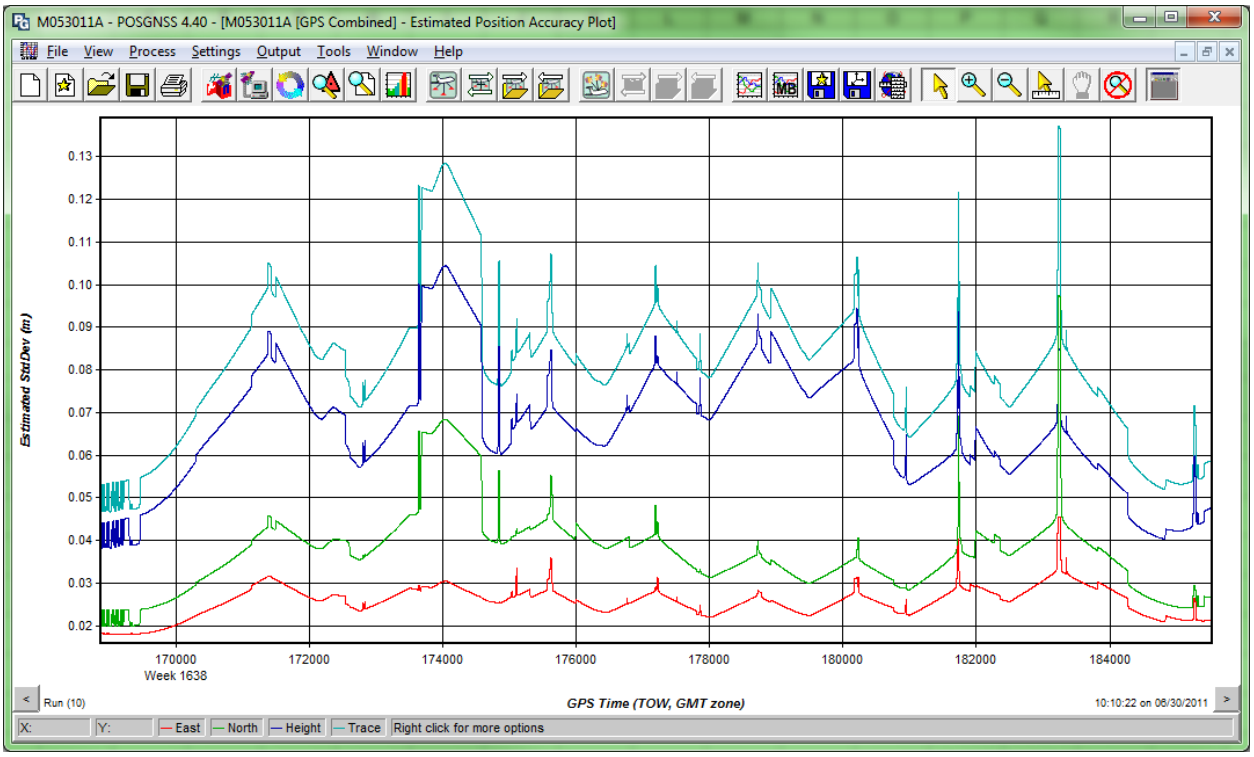



L052711C_final - POSGNSS 4.40 - [L052711C_final [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.120
0.115
0.110
0.105
0.100
0.095
0.090
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
512000
Week 1637
514000
516000
518000
520000
522000
524000
526000
528000
530000
532000
534000
536000
L052711C_BS4+BS8_final
GPS Time (TOW, GMT zone)
16:35:14 on 7/3/2011
X: 522982.1
Y: 0.091
East
North
Height
Trace
Right click for more options

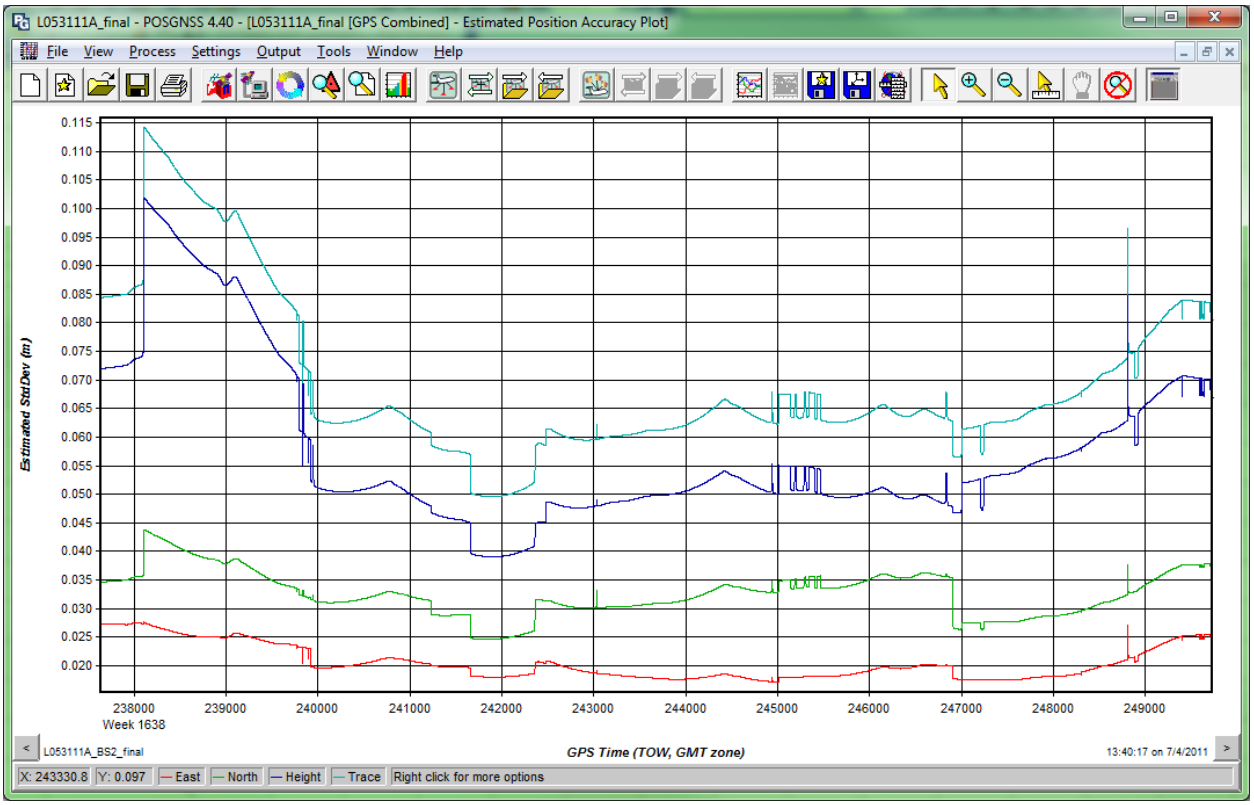
May 30 2011 Plots

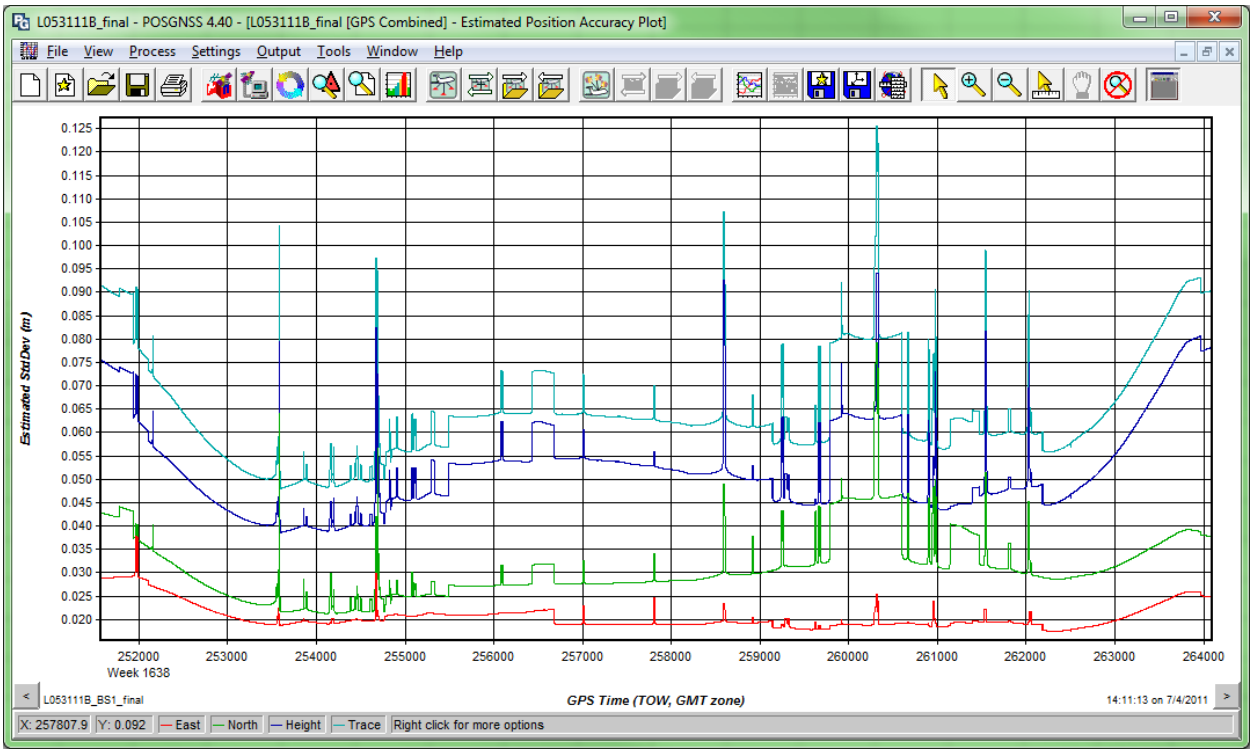


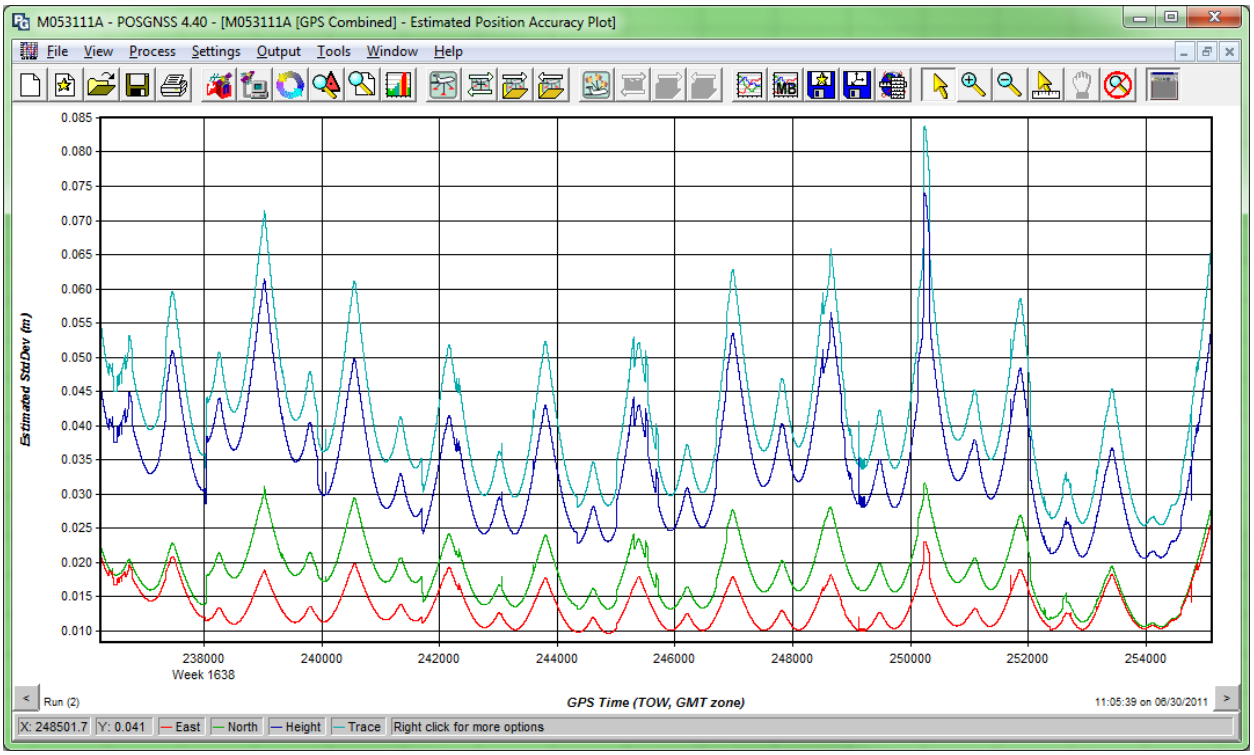



M053011A - POSGNSS 4.40 - [M053011A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
170000
Week 1638
172000
174000
176000
178000
180000
182000
184000
Run (10)
GPS Time (TOW, GMT zone)
10:10:22 on 06/30/2011
X:
Y:
East
North
Height
Trace
Right click for more options

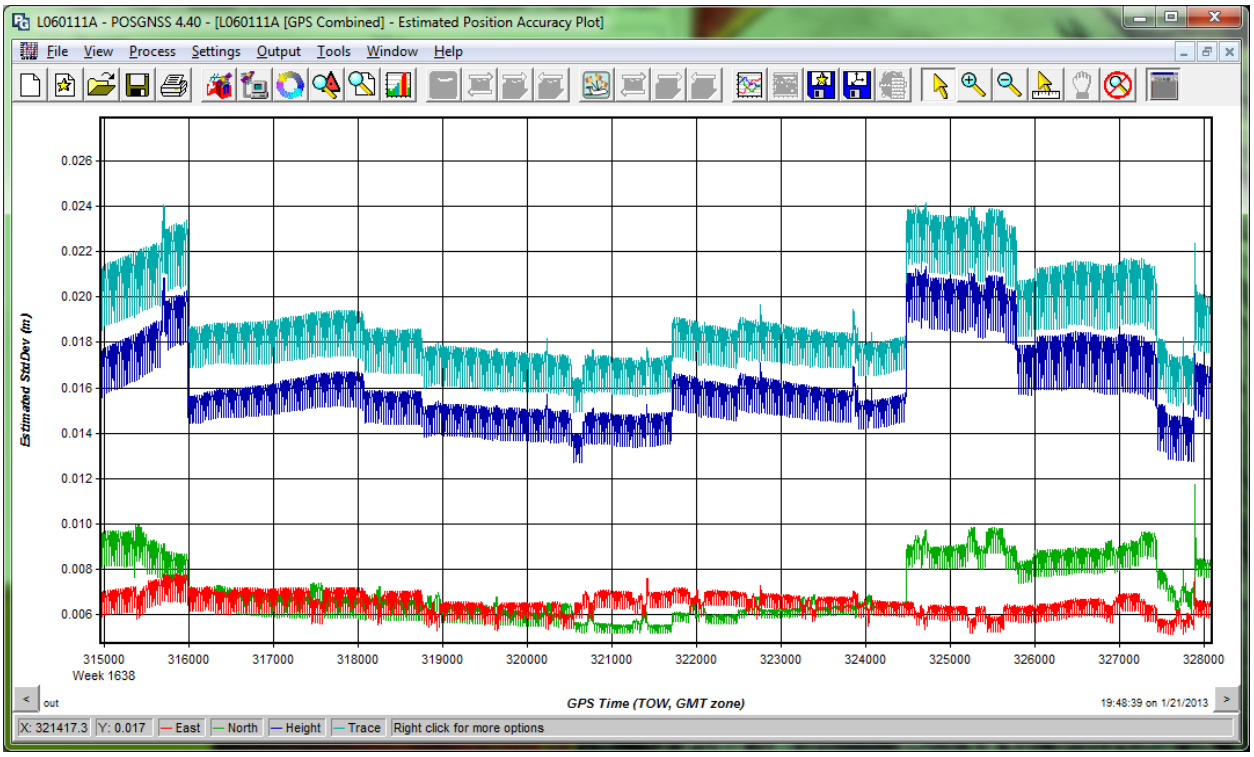
May 31 2011 Plot



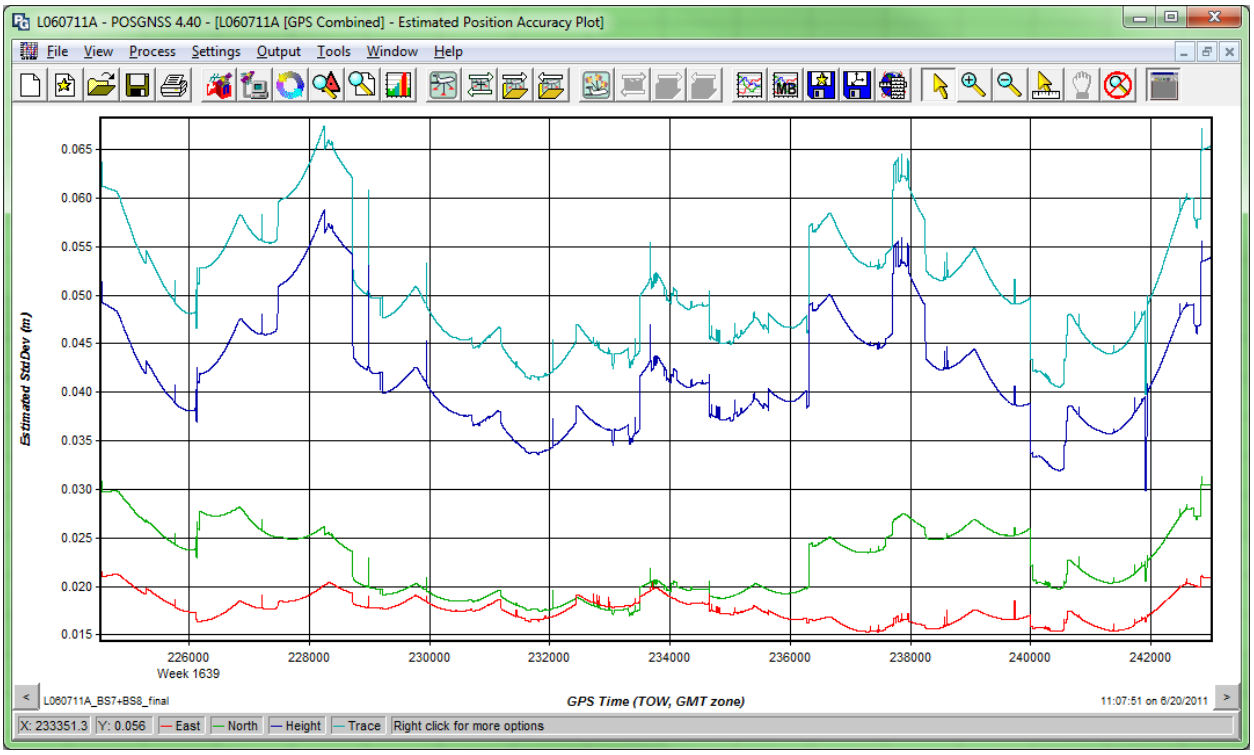



M053111A - POSGNSS 4.40 - [M053111A [GPS Combined] - Estimated Position Accuracy Plot]
File View Process Settings Output Tools Window Help
Estimated StdDev (m)
0.085
0.080
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
238000
Week 1638
240000
242000
244000
246000
248000
250000
252000
254000
Run (2)
GPS Time (TOW, GMT zone)
11:05:39 on 06/30/2011
X: 248501.7
Y: 0.041
East
North
Height
Trace
Right click for more options

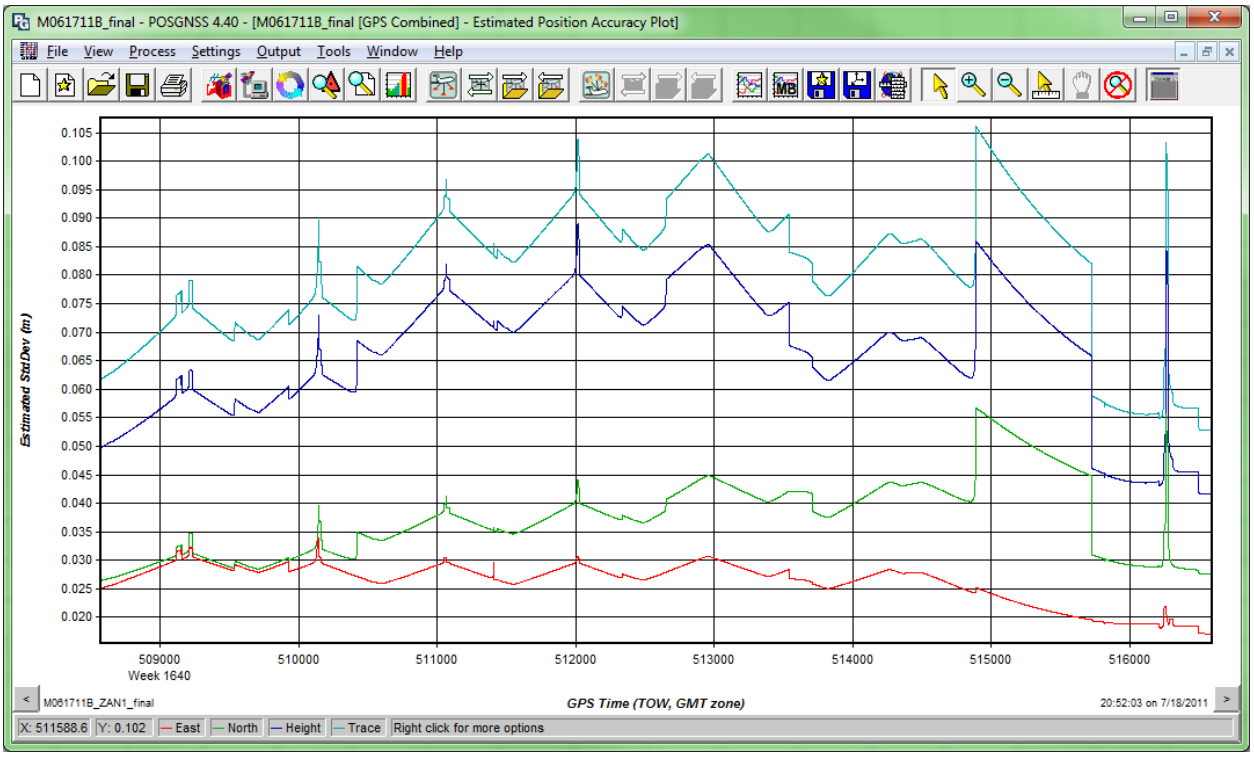
June 1 2011 Plot

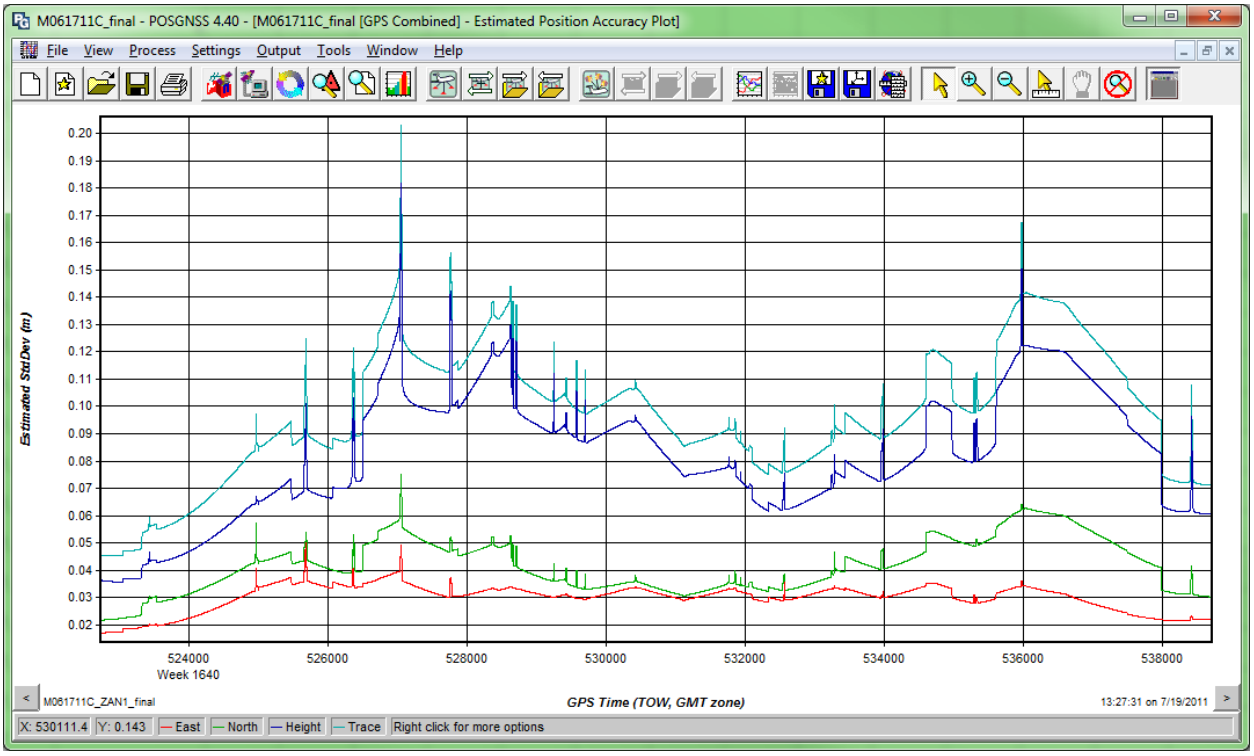


June 7 2011 Plot

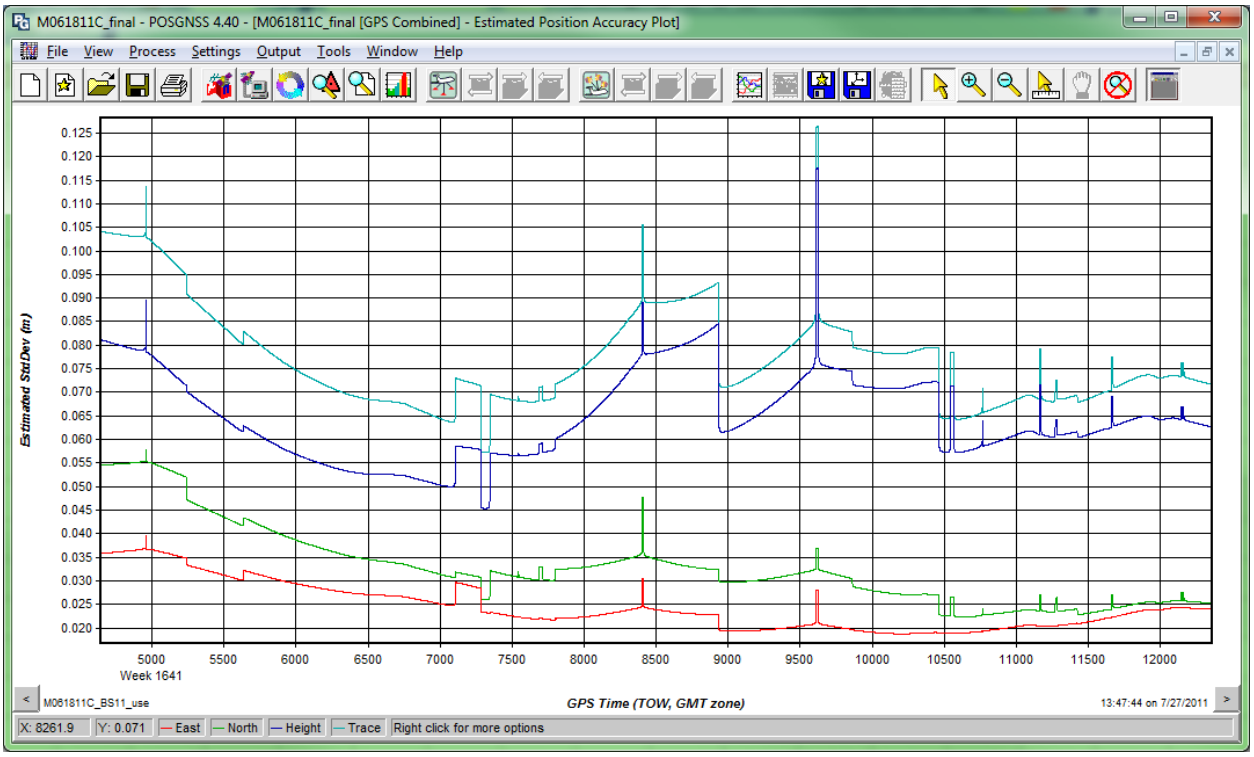


June 17 2011 Plots

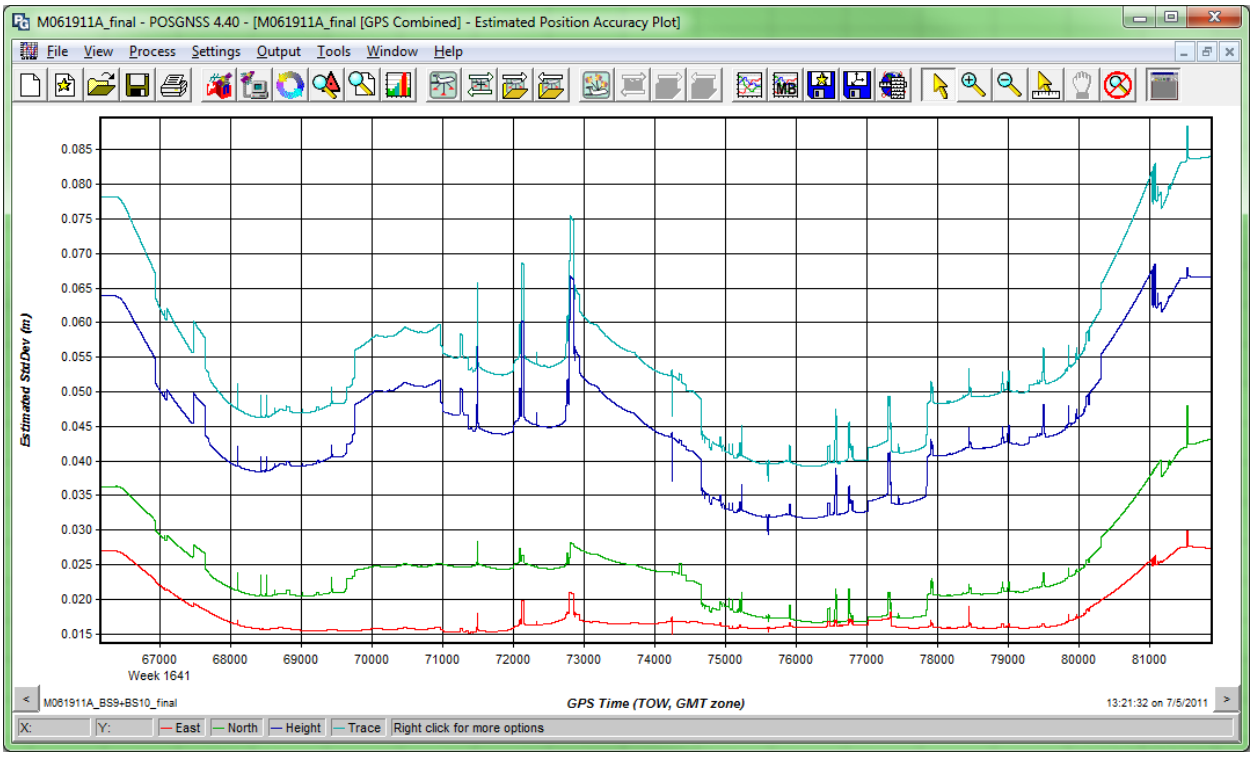




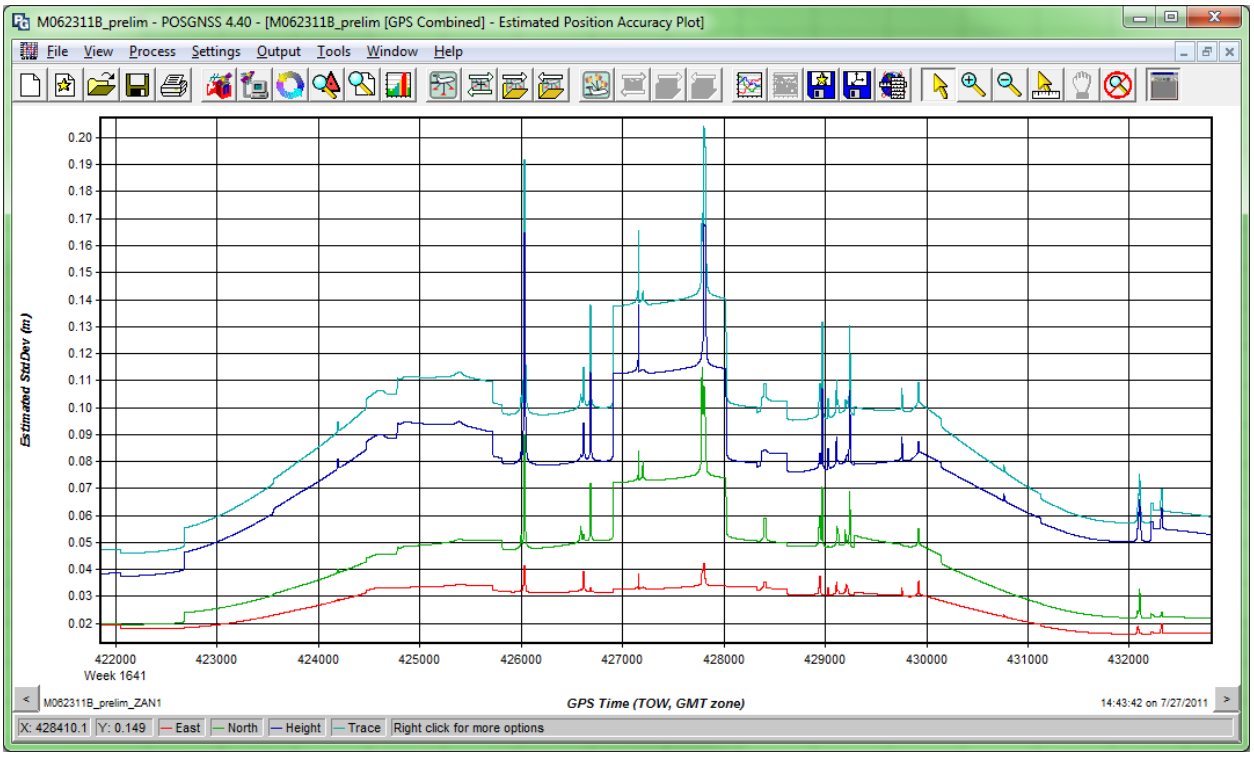
June 18 2011 Plot



June 19 2011 Plot

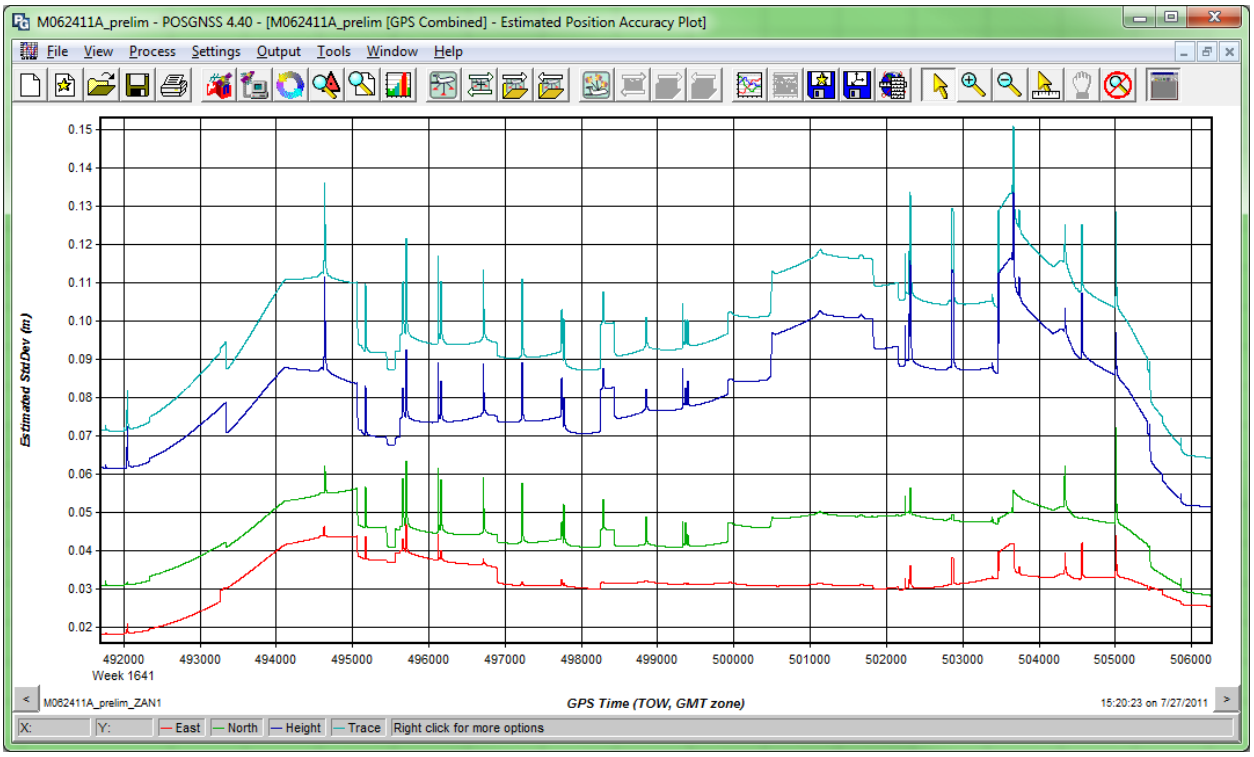


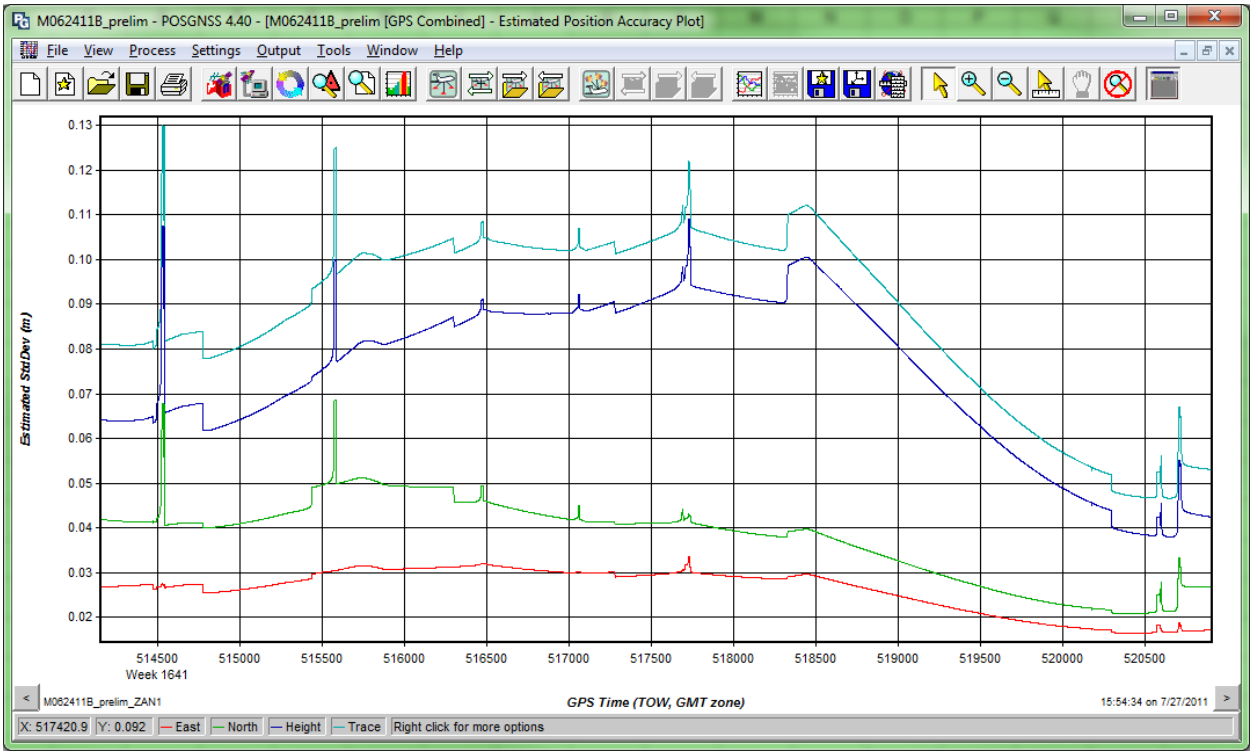
June 23 2011 Plot



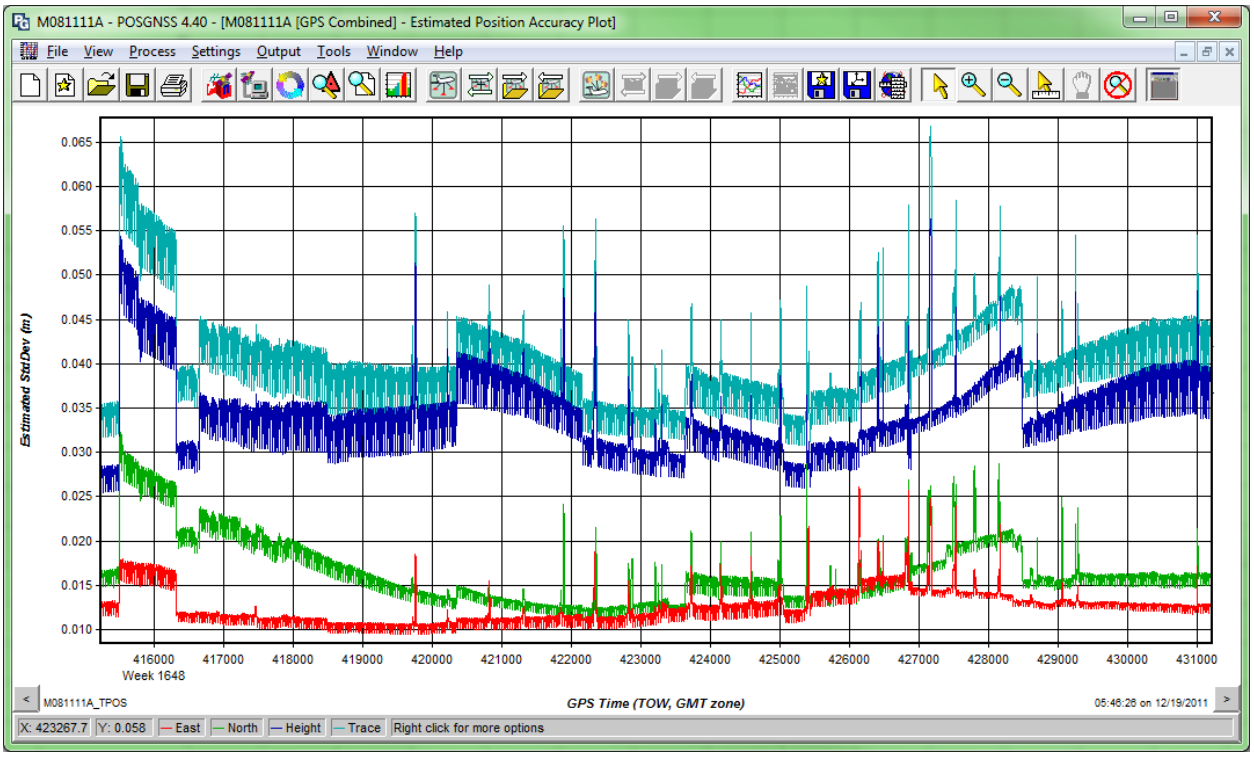
(quality spikes are while plane was in turns; not while LiDAR data was being collected)

June 24 2011 Plots

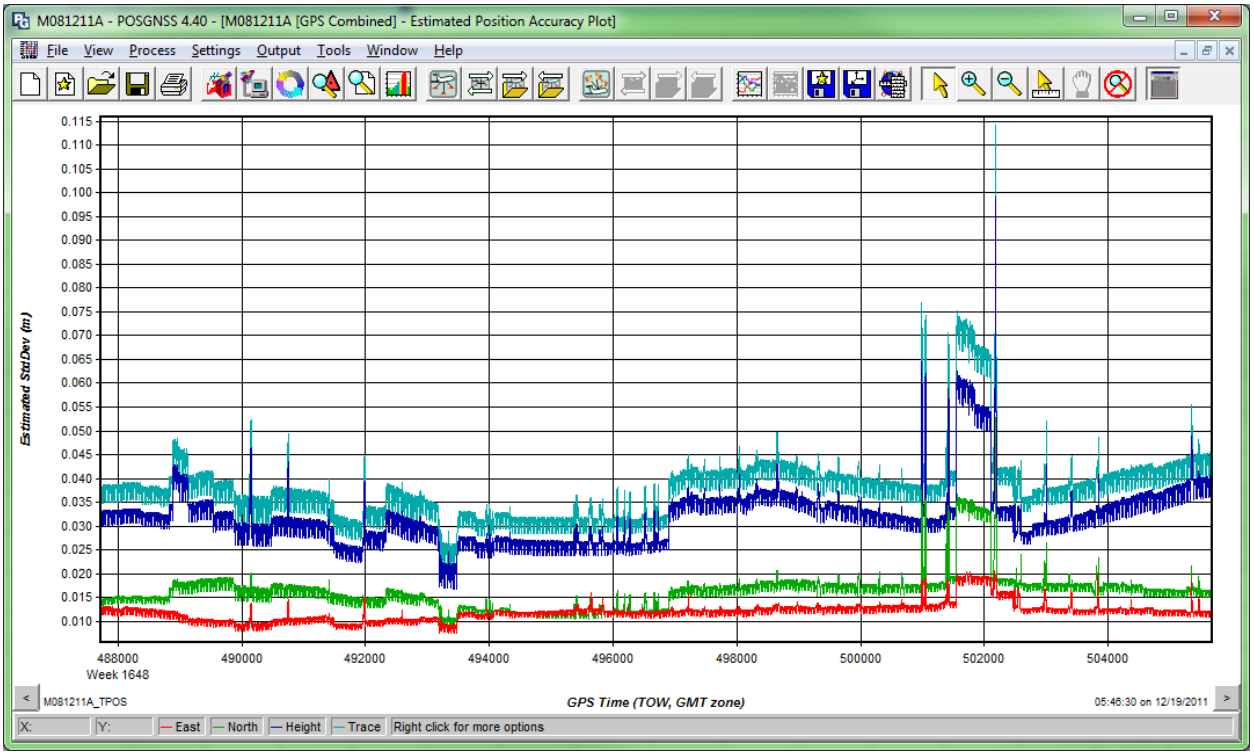




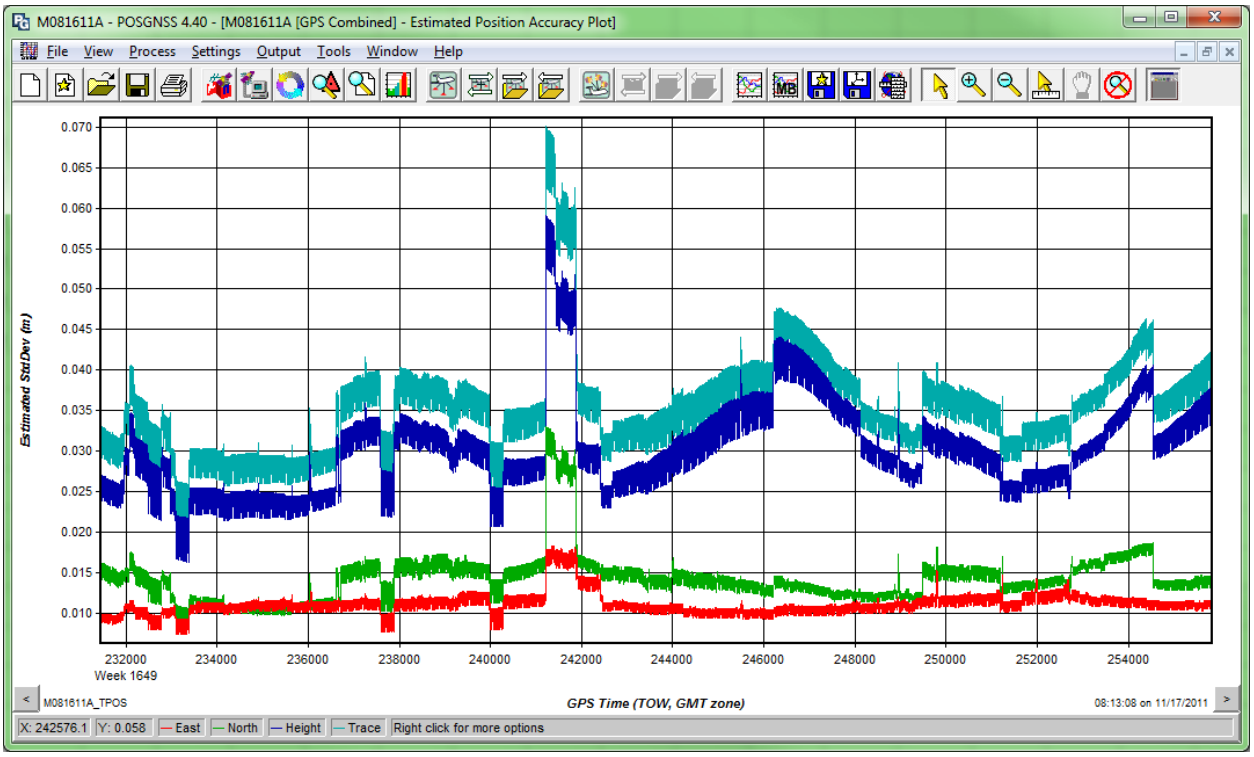
August 11 2011 Plot



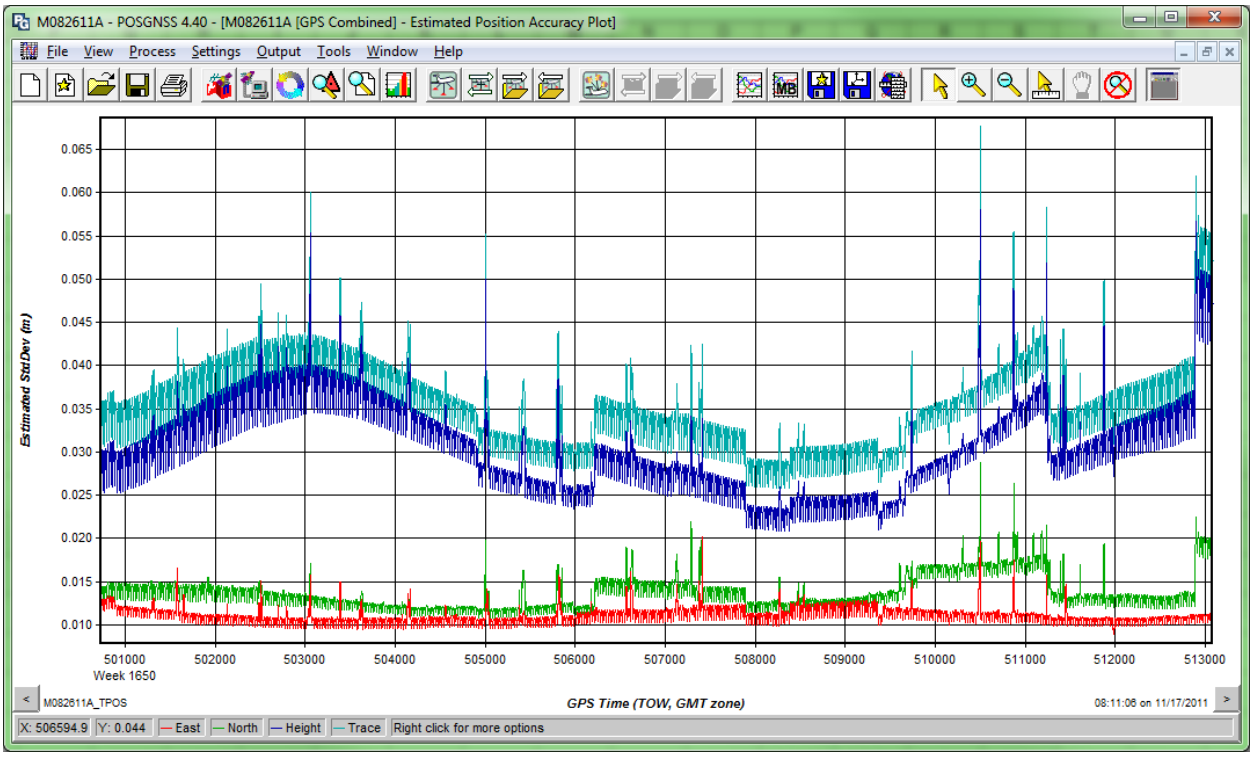
August 12 2011 Plot



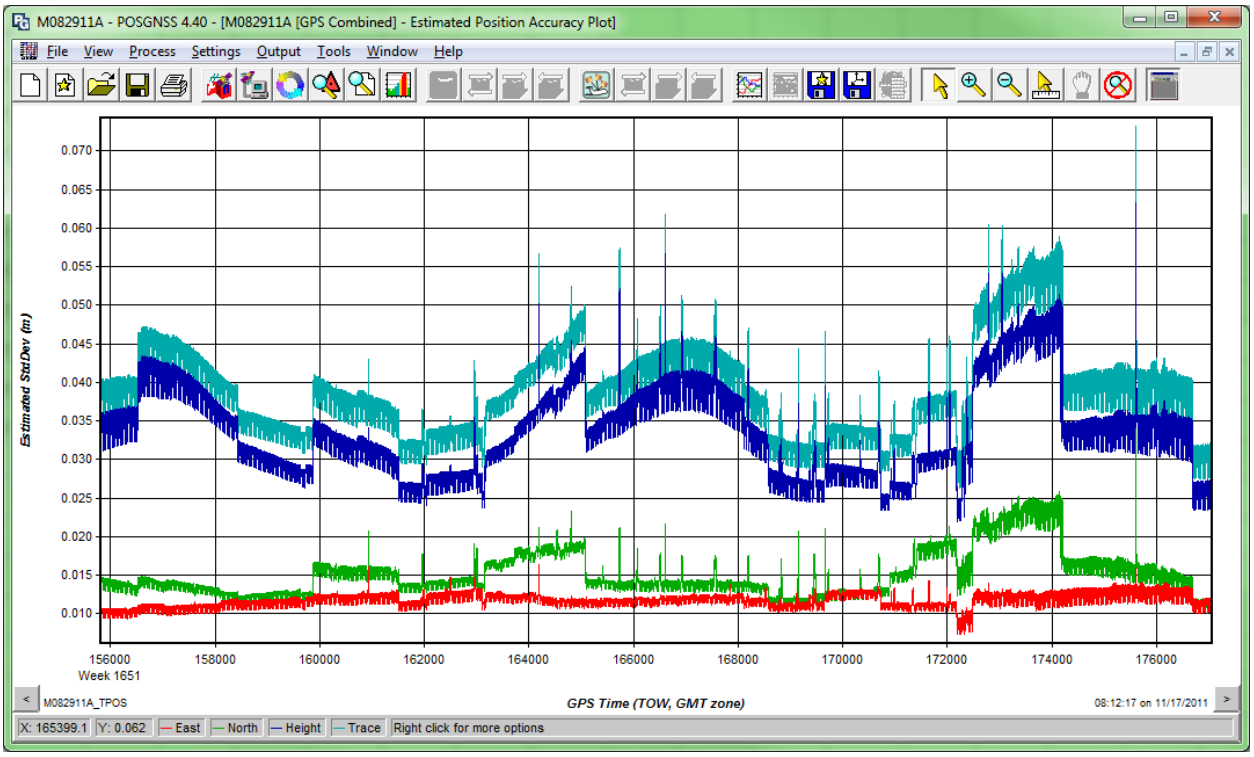
August 16 2011 Plot



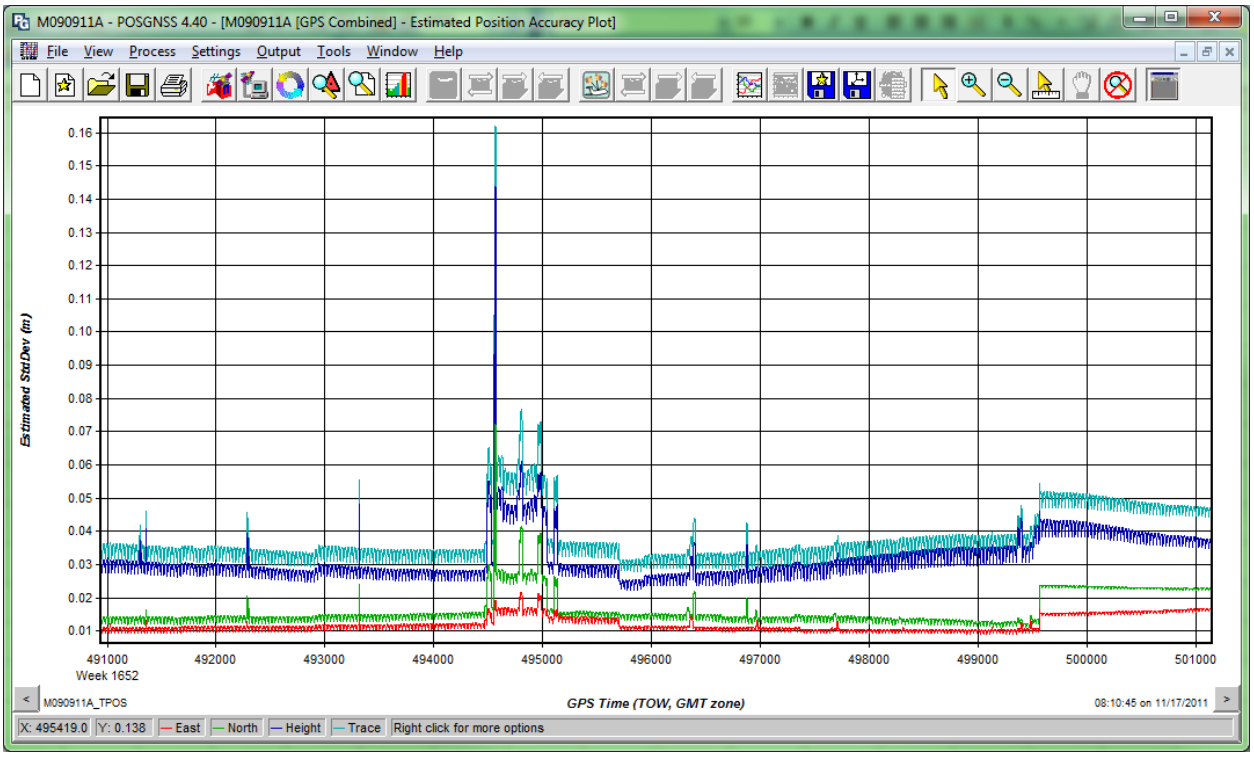
August 26 2011 Plot



August 29 2011 Plot

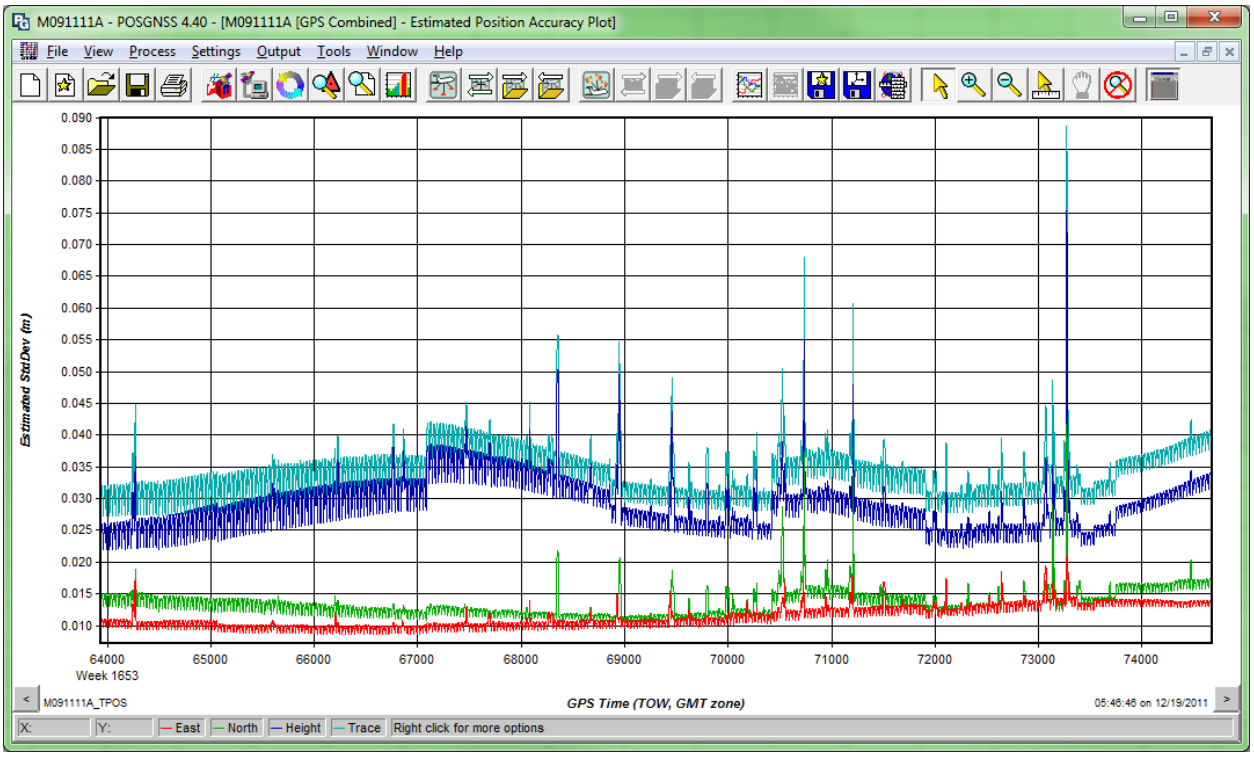


September 9 2011 Plot

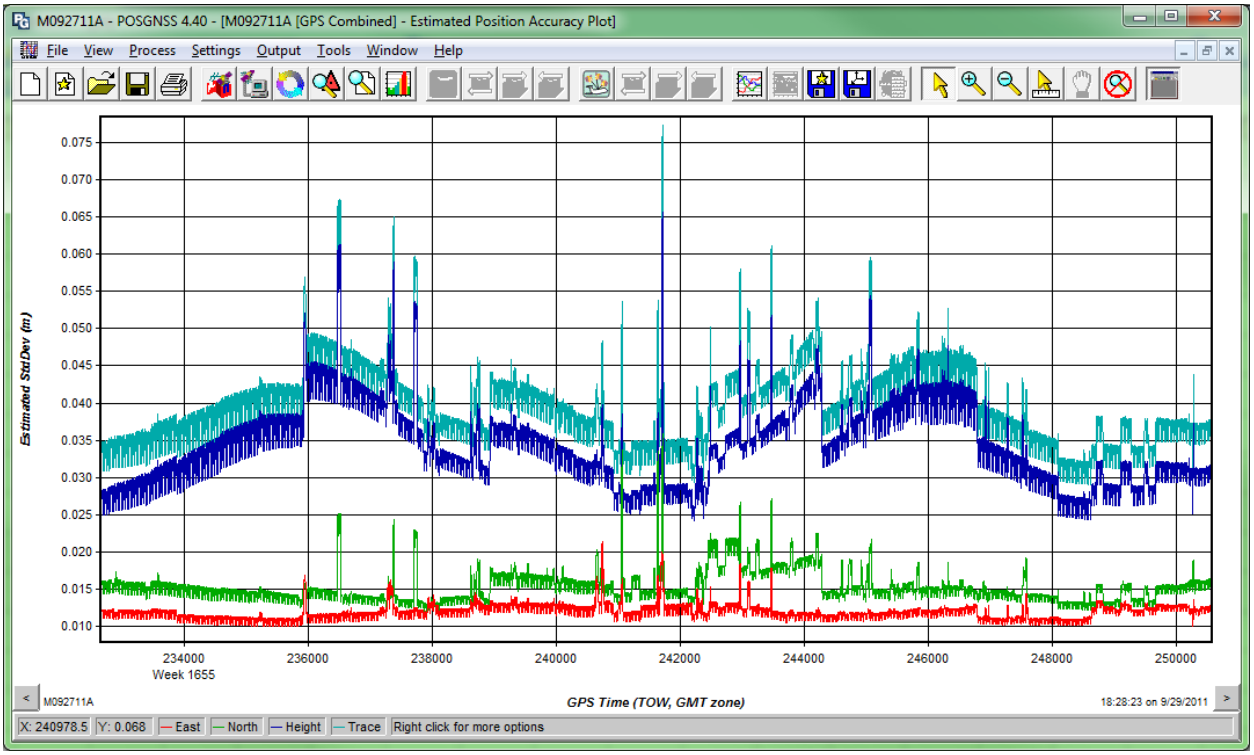


(quality spike is while plane was in a turn; not while LiDAR data was being collected)

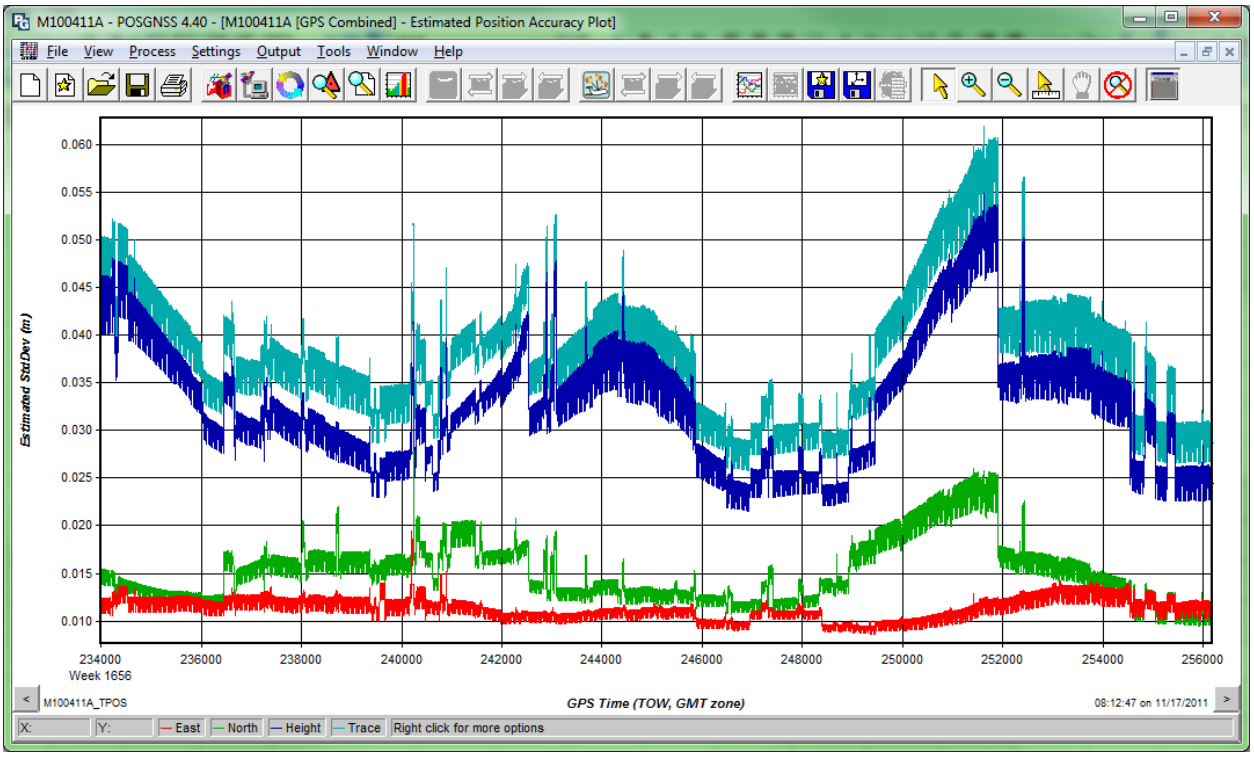
September 11 2011 Plot

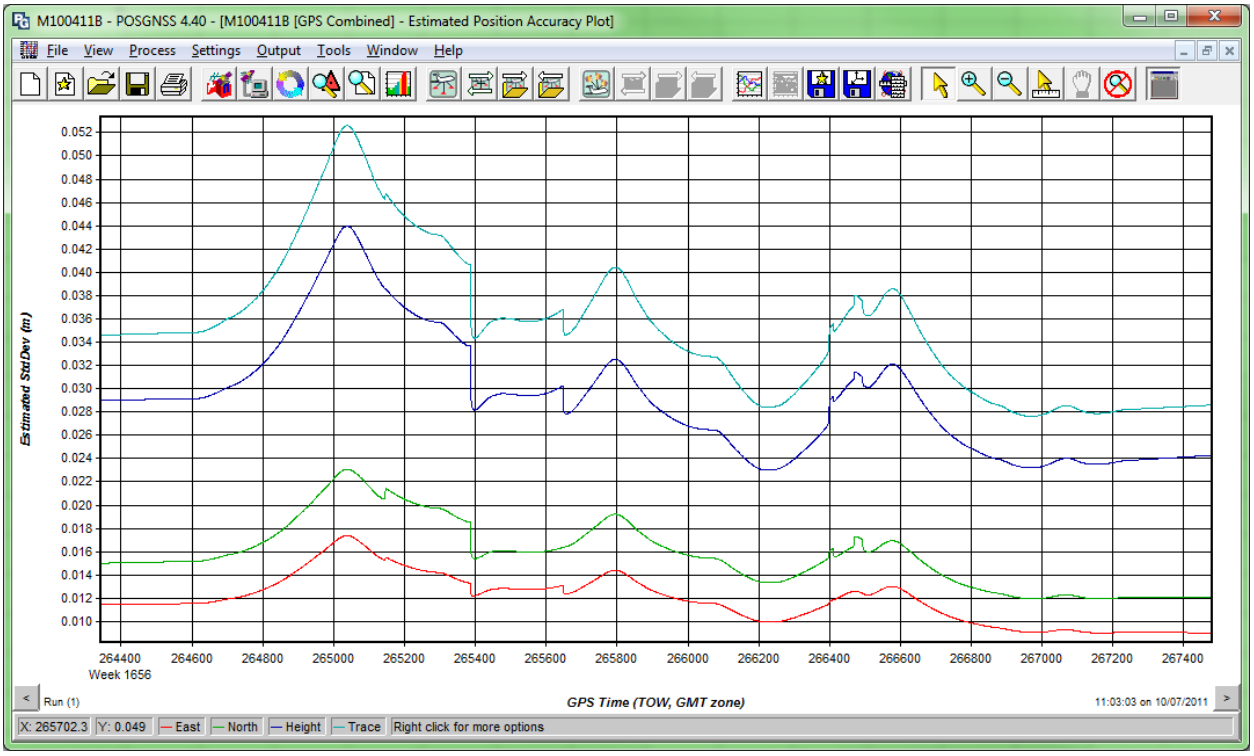


September 27 2011 Plot

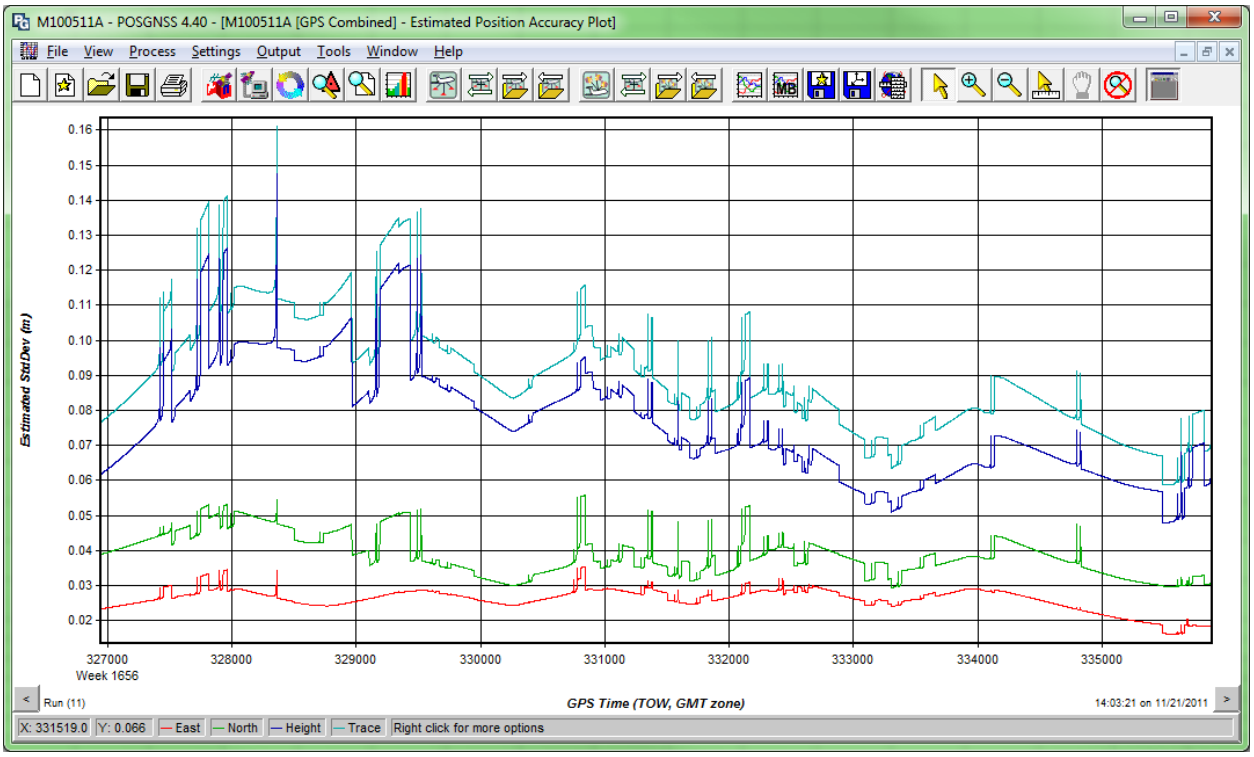


October 4 2011 Plots

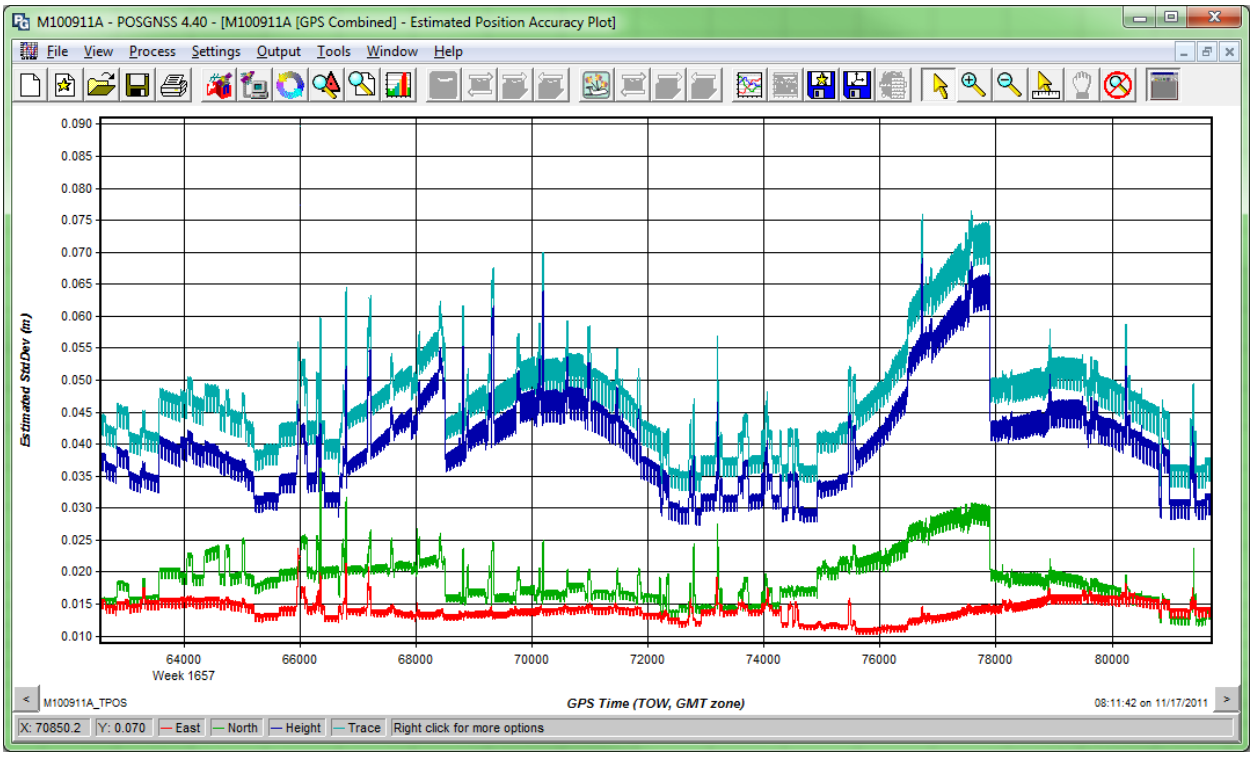


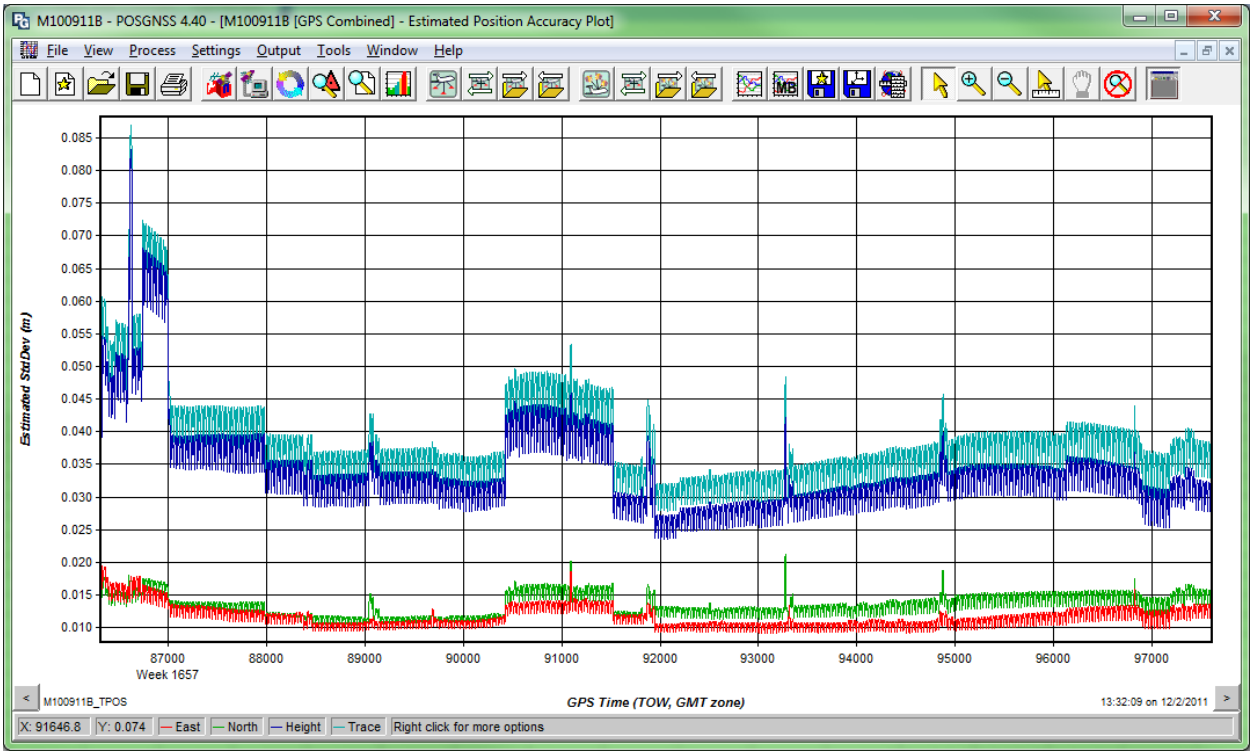


October 5 2011 Plot

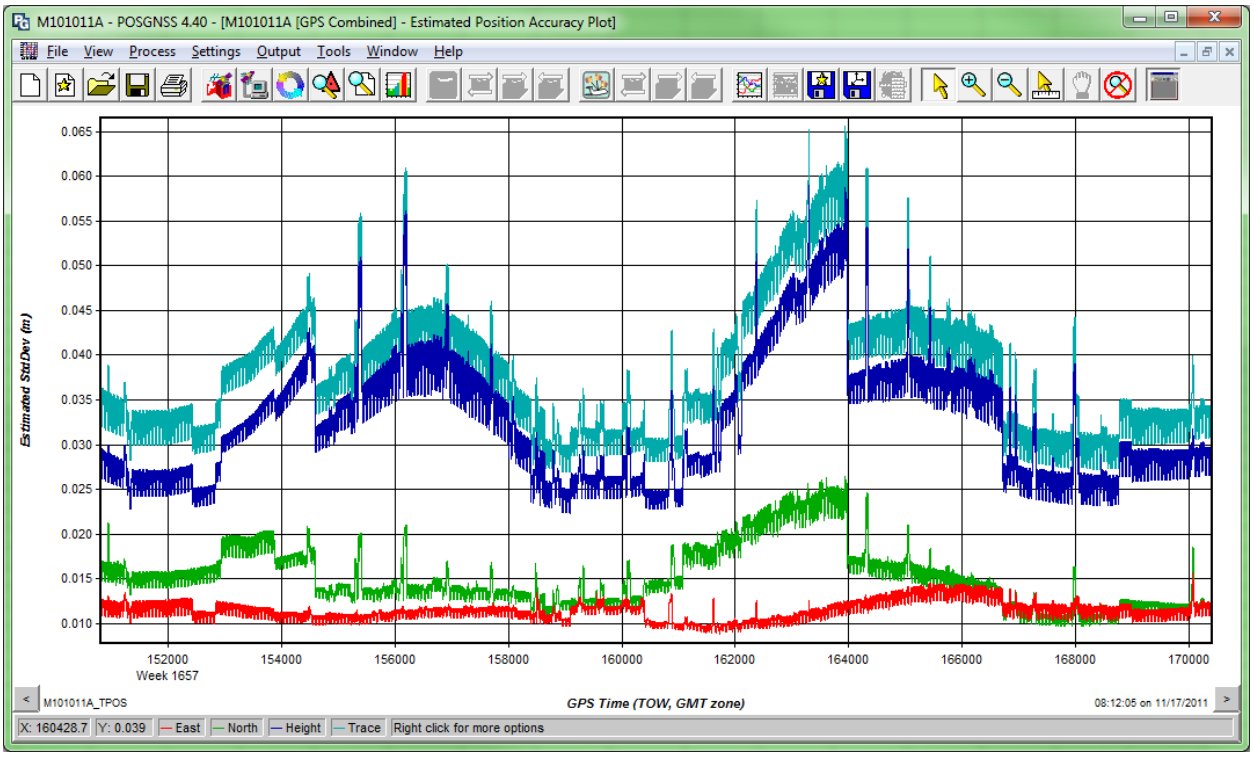


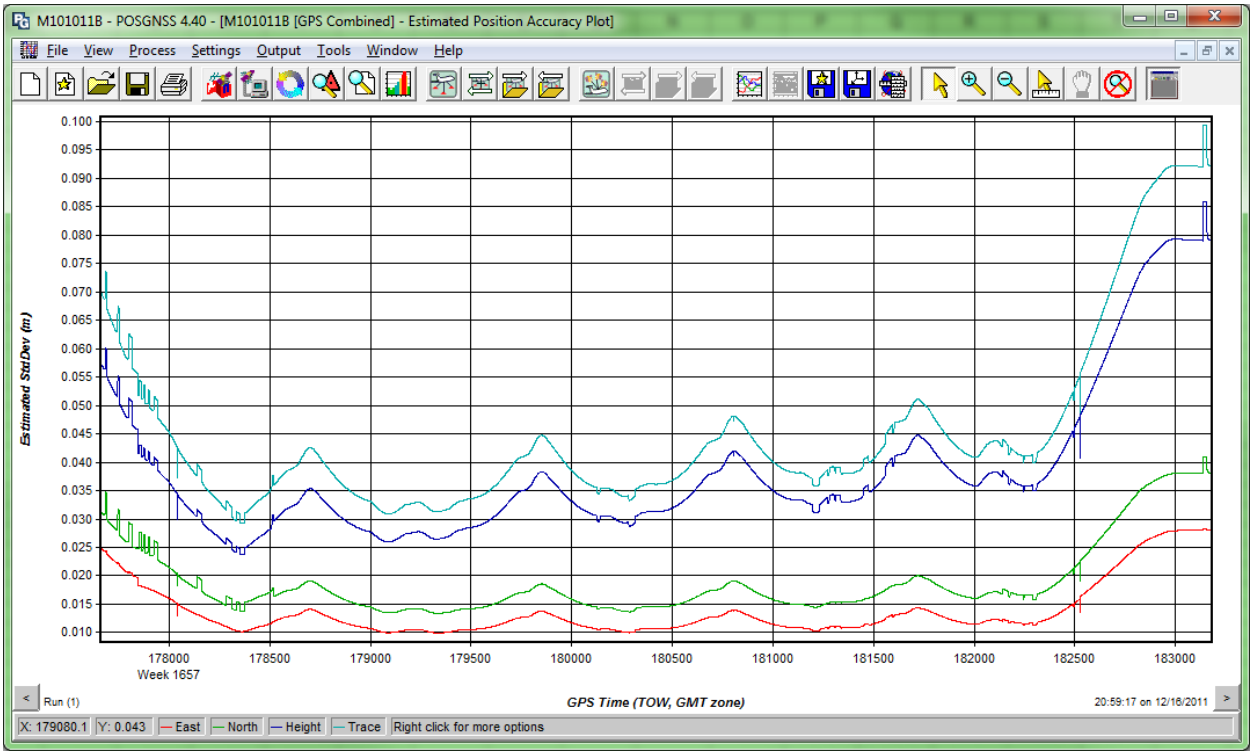
October 9 2011 Plots



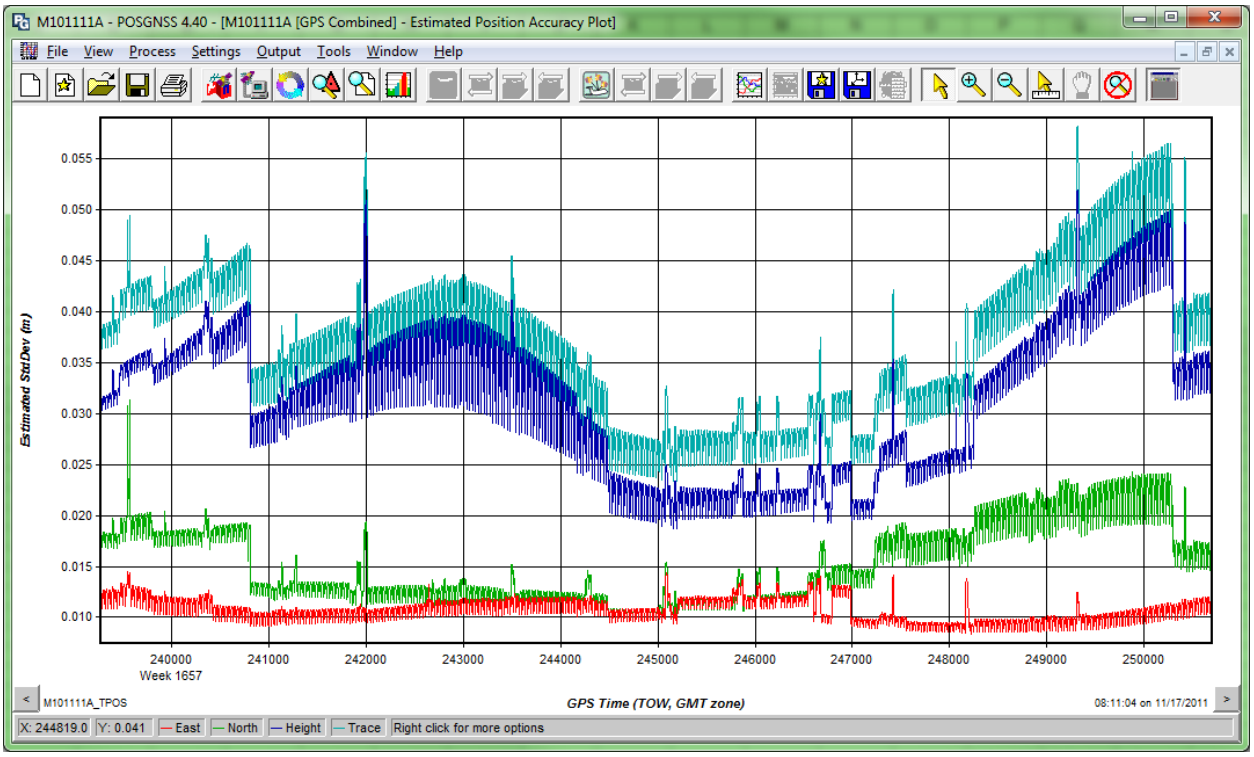


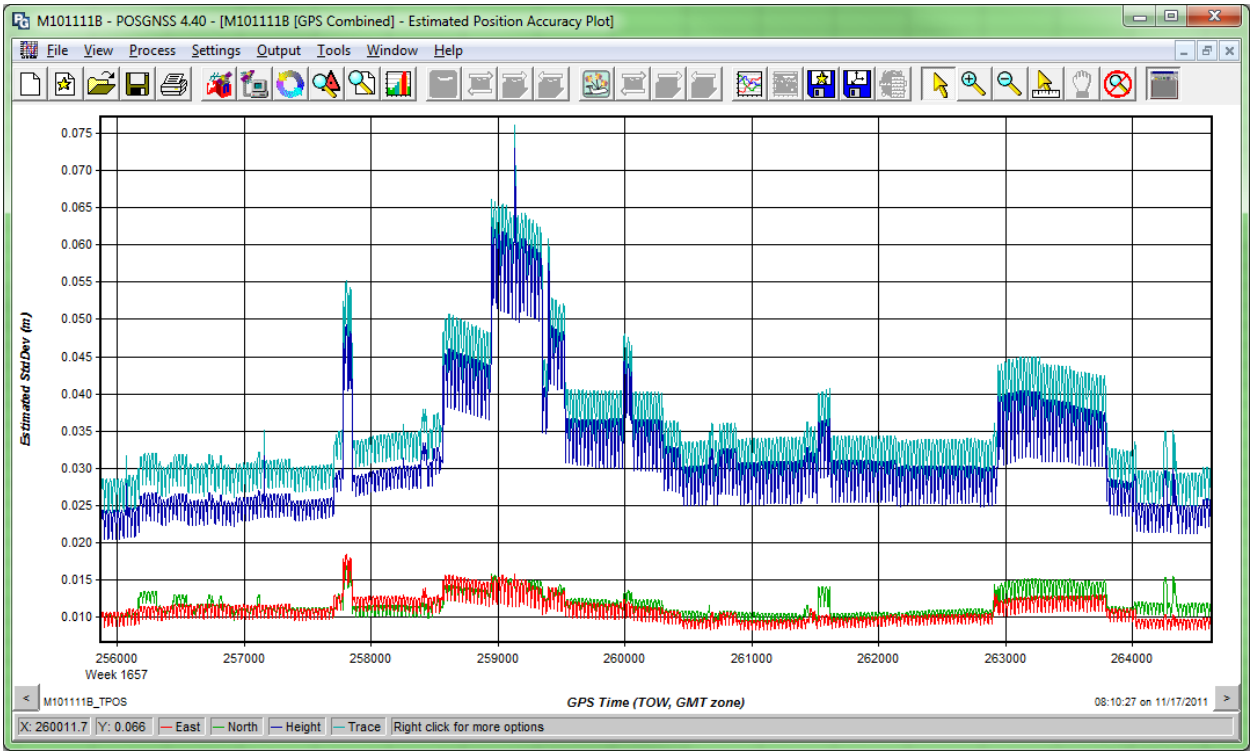
October 10 2011 Plots



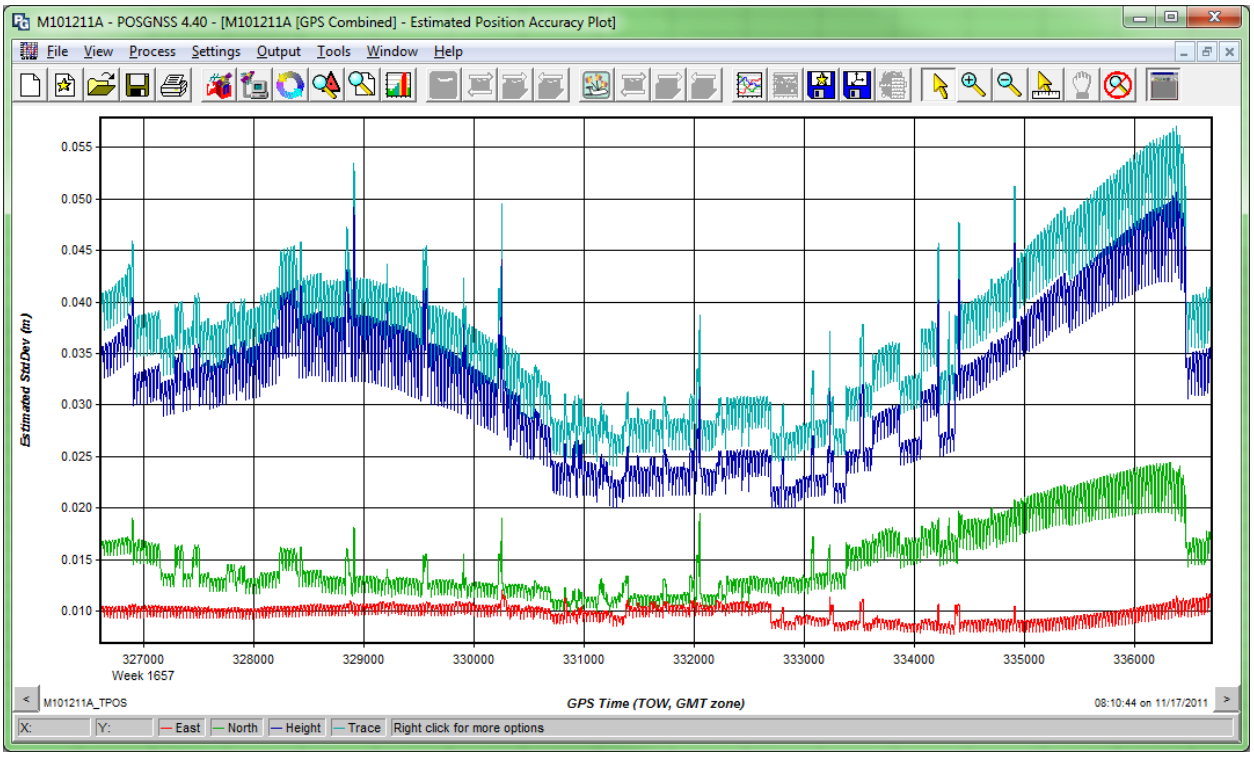


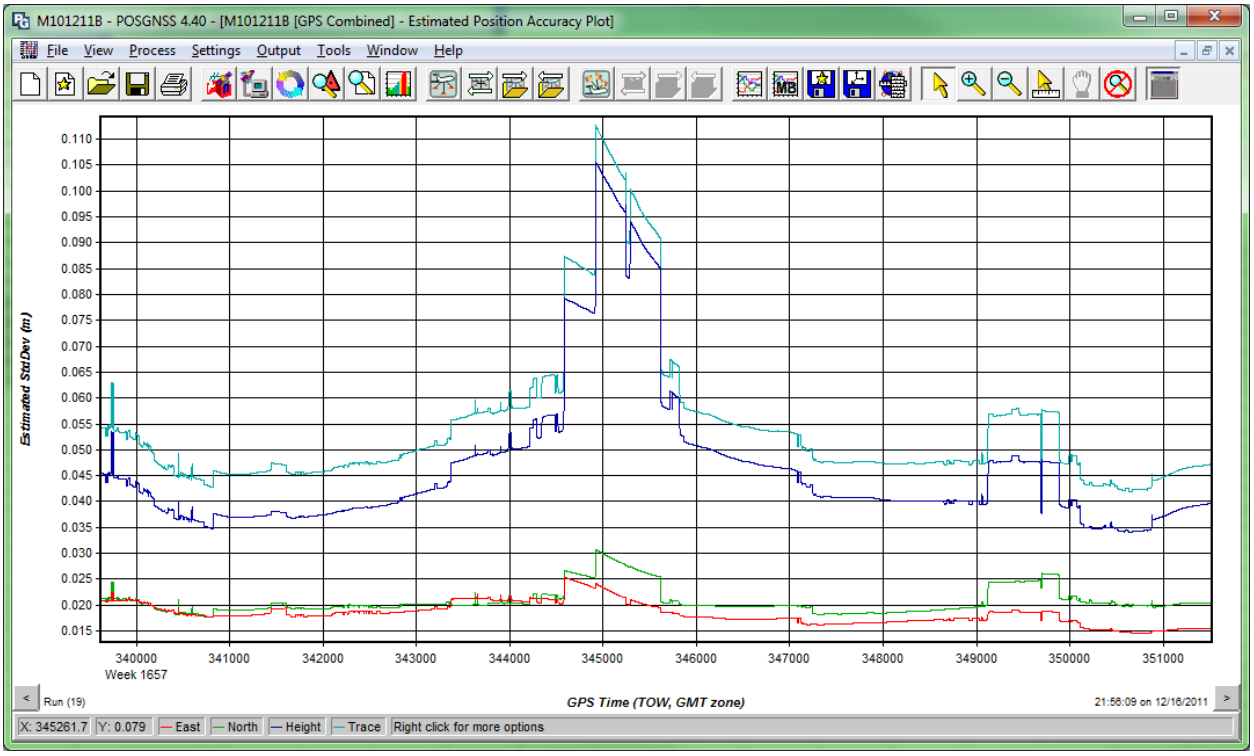
October 11 2011 Plots



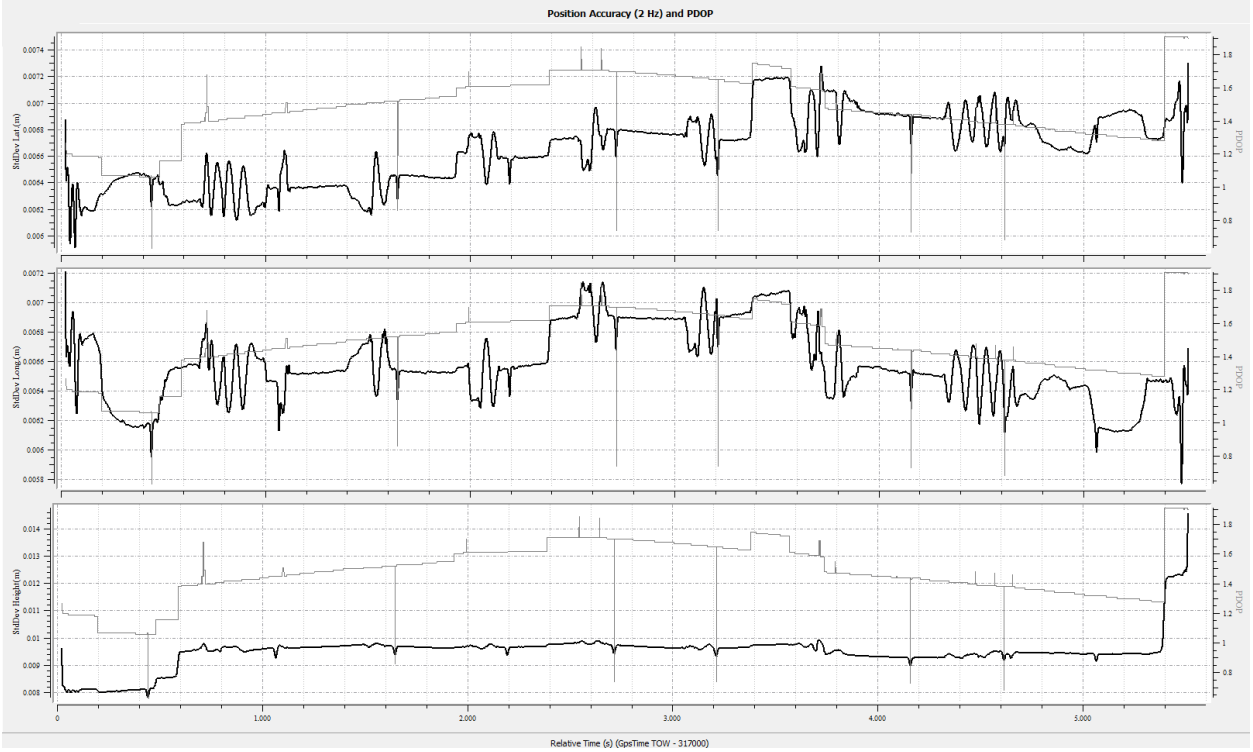


October 12 2011 Plots

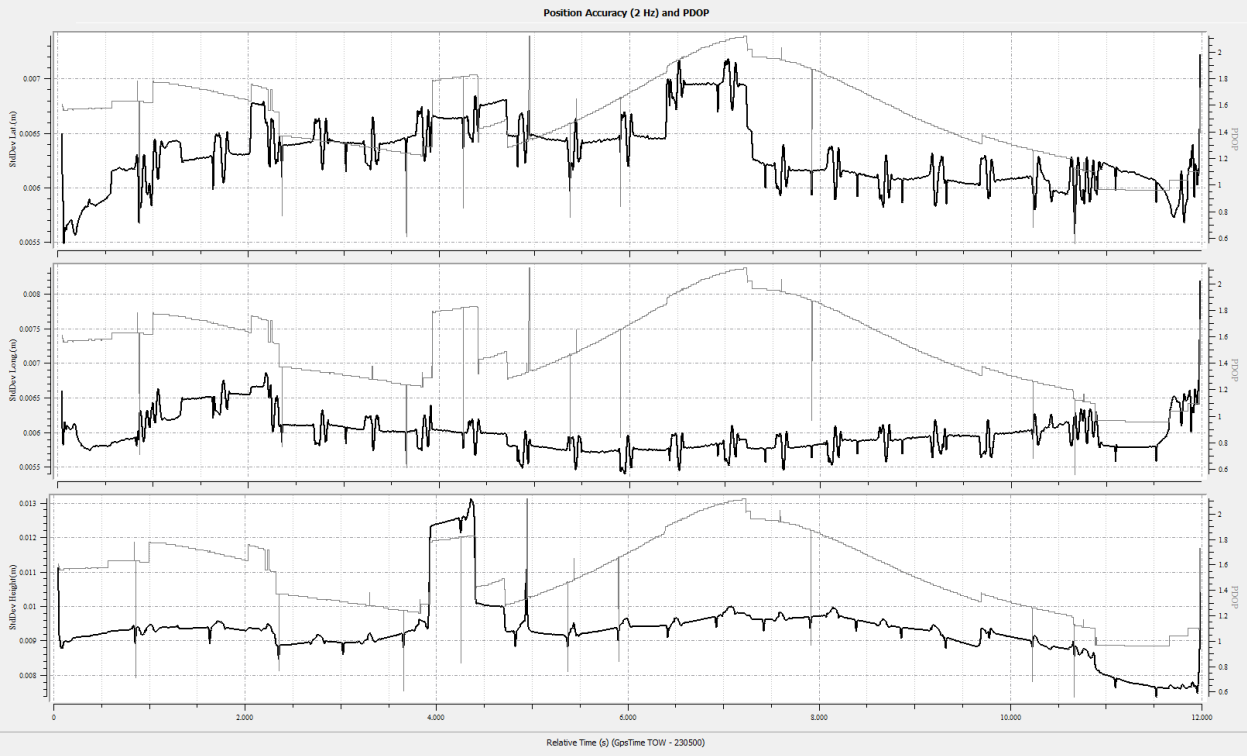




August 22 2012 Plot



August 28 2012 Plot



August 29 2012 Plot