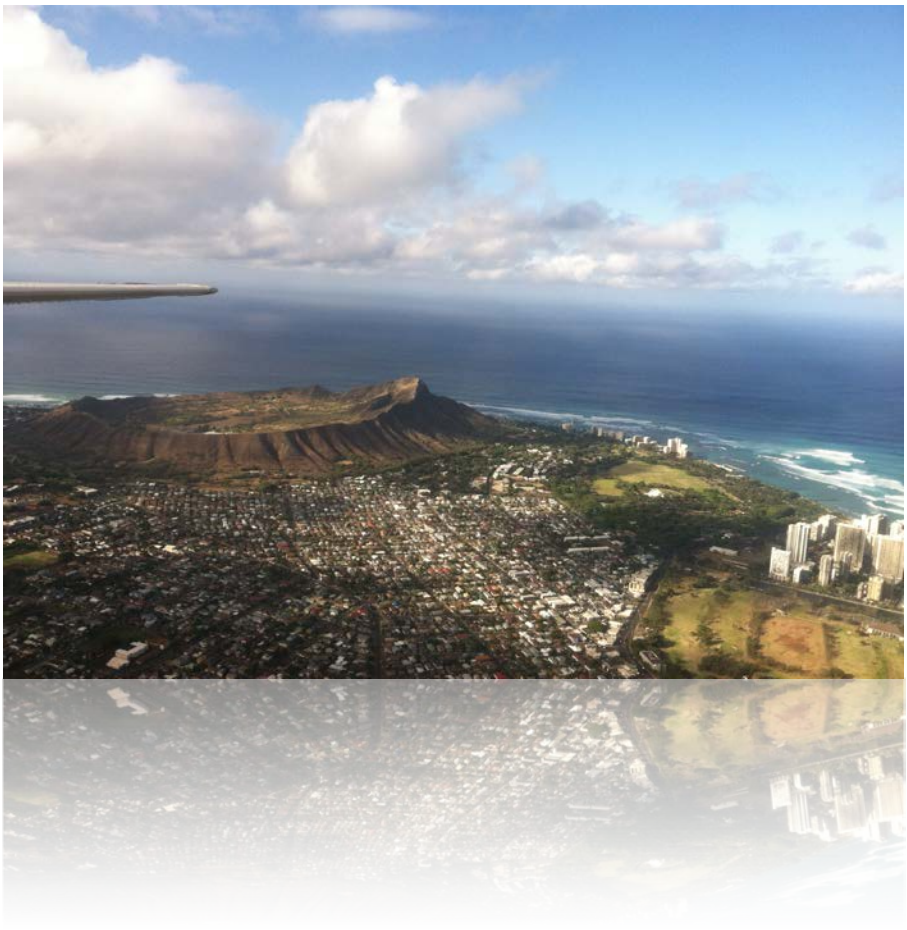
AIRBORNE TOPOGRAPHIC LIDAR REPORT

OAHU, HAWAII

Contract No. G10PC00026
Requisition No. 0040075464
Task Order No. G13PD00211

January 31, 2013



Completed by Photo Science, Inc.

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1. SUMMARY / SCOPE

1.1. SUMMARY

This report contains a summary of the Oahu LiDAR acquisition task order, issued by the USGS National Geospatial Technical Operations Center (NGTOC), under their Geospatial Products and Services Contract (GPSC). A separate but related task order was issued by the NOAA Coastal Services Center (Contract Number EA133C-11-CQ-0009; Requisition Number NCNP0000-13-00518; Task Order Number 20) to leverage the same resources committed to the USGS LiDAR project for the acquisition of LiDAR data in the northern 2/3 portion of Oahu. The combined task orders yielded one study area covering the entire island of Oahu. The intent of this document is to only provide specific validation information for the LiDAR data acquisition/collection work completed for the USGS project.

1.2. SCOPE

The scope of the Oahu LiDAR task order included the acquisition of aerial topographic LiDAR using state of the art technology, along with necessary surveyed ground control points (GCPs) and airborne GPS and inertial navigation systems, for the island of Oahu. The aerial data collection was designed with the following specifications listed in Table 1 below.

Table 1. Originally Planned LiDAR Specifications

LiDAR				
Average Point Density	Flight Altitude (AGL)	Field of View	Side Overlap	RMSEz
1.15 pts / m^2	4,000 ft	36.0 degrees	25%	15 cm or better

1.3. LOCATION / COVERAGE

The Oahu LiDAR project boundary consists of two areas of interest, one encompassing the northern ~2/3 of the Island of Oahu (NOAA task order) and the southern ~1/3 of the island (USGS task order). The project area totals approximately 619 square miles as shown in Figure 1 on the following page.

Figure 1. Oahu LiDAR Project Boundary

1.4. DURATION

The aircraft and flight crew arrived in Honolulu, HI in late May 2013, with sensor installation and testing occurring shortly thereafter. The first attempt to collect LiDAR data occurred on June 01, 2013 along the western coast of the island. Acquisition occurred during the months of June and July whenever weather permitted. Acquisition continued into the second week of August with the final acquisition flight occurring on August 09, 2013. The LiDAR sensor was removed from the aircraft on August 10, 2013. In summary, nineteen sorties were required to collect the LiDAR data for the project, over a period of approximately 9 weeks.

1.5. ISSUES

The primary issue of concern with this task order was the overall weather conditions during the time Photo Science was on-site in Oahu. This particular season (June/July/August) was specifically selected for the aerial acquisition, based on close review of historic weather patterns that indicated June/July/August to be the driest time of year. However, persistent cloud cover and rain plagued flight operations the entire time Photo Science was on-site for the LiDAR acquisition work. With rain nearly every day, sustaining saturated and high humidity conditions, the island exhibited a cycle of daily self-generating cloud cover once the sun came up (warming conditions) each day, particularly in the higher elevations. Active trade winds, tropical storms, and diurnal variations of cloud cover produced quick changing weather conditions that meant that the flight crew had to rely on daily visual assessments of the weather/cloud cover to determine if acquisition could occur each day.

In addition to weather concerns, Photo Science was faced with consistent challenges in flight coordination. Photo Science worked closely with both civilian and military Air Traffic Control in order to coordinate flights and gain access to as much of the island as possible. These challenges required acquisition to often take place during late-night or early morning hours, with flights nearly always in the air by 7:00 AM.

Due to these challenges, Photo Science was forced to abandon the originally planned flightlines. A modified flight plan was created to capture the coastal areas, which were of a higher priority than the mountainous interior areas. This coastal flight plan was modified further on multiple occasions to take advantage of good flying conditions in certain portions of the island. This strategy allowed for Photo Science to acquire roughly 72% of the island. Persistent cloud cover on the eastern mountain ridge prevented any acquisition from occurring in this area. The only other area that could not be acquired was the higher elevations of the restricted Schofield Barracks.

2. PLANNING / EQUIPMENT

The entire target area was comprised of 160 planned flight lines and approximately 4028 flight line kilometers. Please refer to Figure 2 on the following pages.

Figure 2. Oahu Originally Planned Flight Lines

Detailed project flight planning calculations were performed for the Oahu project using Optech ALTM Nav planning software. Flight planning was based on the unique project requirements and characteristics of the project site. The basis of planning included: required accuracies, type of development, amount / type of vegetation within project area, required data posting, and potential altitude restrictions for flights in project vicinity. Please note that certain values in the table below are listed as "Variable" due to the various flight plans used, as described in Section 1.5 of this document. A brief summary of the aerial acquisition parameters for the project are shown in the LiDAR System Specification Table 2 below:

Table 2. LiDAR System Specifications

LiDAR System Specifications	
Terrain and Aircraft	Flying Height AGL: Variable (2500, 3000 or 4500ft)
	Recommended Ground Speed (GS): 135 kts
Scanner	Field of View (FOV): Variable
	Scan Rate Setting used (SR): 37 Hz
Laser	Laser Pulse Rate used: 70,000 Hz
	Multi Pulse in Air Mode: Enabled
Coverage	Full Swath Width: Variable
	Line Spacing: Variable
Point Spacing and Density	Maximum Point Spacing Across Track: 0.923 m
	Maximum Point Spacing Along Track: 0.939 m
	Average Point Density: 1.15 pts / m^2

2.1. EQUIPMENT: AIRCRAFT

All flights for the Oahu project were accomplished through the use of a customized twin-engine Piper PA-31 Navajo (Tail # N3949W).This aircraft provided an ideal, stable aerial base for LiDAR acquisition. This aerial platform has relatively fast cruise speeds which are beneficial for project mobilization / demobilization while maintaining relatively slow stall speeds which proved ideal for collection of high-density, consistent data posting using a state-of-the-art Optech LiDAR system.

Figure 3. Operations Aircraft

Figure 4. In-Flight Operations

2.2. LiDAR Sensor

Photo Science utilized an Optech LiDAR sensor, serial number 240 during the project. This system is capable of collecting data at a maximum frequency of 167kHz, which affords elevation data collection of up to 167,000 points per second. The system utilizes a Multi-Pulse in the Air option (MPIA). This sensor is also equipped with the ability to measure up to 5 returns per outgoing pulse from the laser and these come in the form of 1st, 2nd, 3rd, 4th, and last returns. The intensity of the first four returns is also captured during aerial acquisition. During mission collection of the Oahu project the LiDAR operator monitored point density and swath to ensure data integrity and desired coverage were obtained.

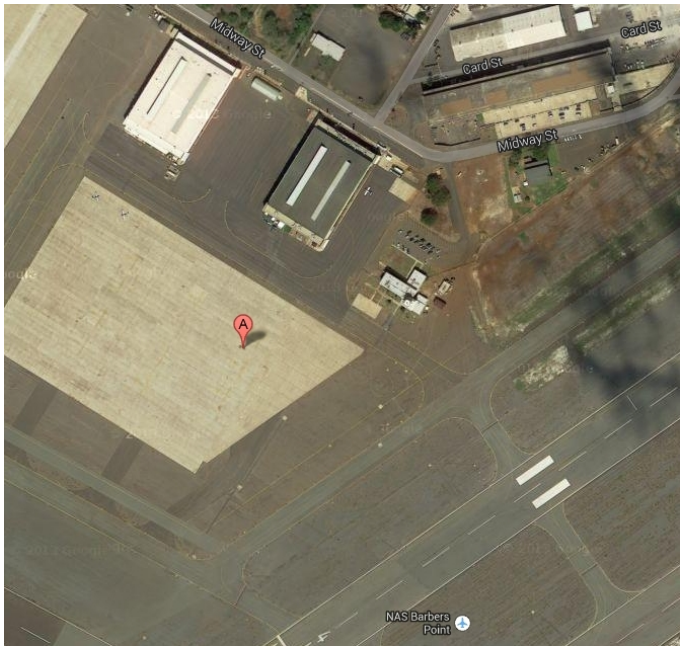
Figure 5. Optech Gemini LiDAR System

2.3. Base Station Information

A GPS base station was utilized during all phases of flight. Base station PSI HJR at Kalaeloa Airport (formerly NAS Barbers Point) was occupied during airborne operations of the project. The base station location was verified using NGS OPUS service and subsequent surveys. Data sheets, graphical depiction of base station locations and log sheets used during station occupation are available in Appendix A.

Figure 6. Trimble R7 GNSS receiver with a Zephyr Geodetic 2 Antenna

Figure 7. PSI HJR Base Station Location



2.4. TIME PERIOD

Project specific flights were conducted over (18) days. Nineteen sorties, or aircraft lifts were completed. Accomplished sorties are listed below:

- 130601a-240
- 130605a-240
- 130606a-240
- 130608a-240
- 130612a-240
- 130619a-240
- 130620a-240
- 130704a-240
- 130705a-240
- 130717a-240
- 130718a-240
- 130727a-240
- 130730a-240
- 130802a-240
- 130806a-240
- 130806b-240
- 130807a-240
- 130808a-240
- 130809a-240

3. PROCESSING SUMMARY

Applanix + POSPac Mobile Mapping Suite software was used for post-processing of airborne GPS and inertial data (IMU), which is critical to the positioning and orientation of the LiDAR sensor during all flights. POSPac combines aircraft raw trajectory data with stationary GPS base station data yielding a "Smoothed Best Estimate Trajectory (SBET) necessary for additional post processing software to develop the resulting geo-referenced point cloud from the LiDAR missions.

During the sensor trajectory processing (combining GPS & IMU datasets) certain statistical graphs and tables are generated within the Applanix POSPac processing environment which are commonly used as indicators of processing stability and accuracy. This data for analysis include: Max horizontal / vertical GPS variance, separation plot, altitude plot, PDOP plot, base station baseline length, processing mode, number of satellite vehicles, and mission trajectory. All relevant graphs produced in the POSPac processing environment for each sortie during the Photo Science Oahu project mobilization are available in Appendix B.

The generated point cloud is the mathematical three dimensional composite of all returns from all laser pulses as determined from the aerial mission. Laser point data are imported into TerraScan and a manual calibration is performed to assess the system offsets for pitch, roll, heading and scale. At this point this data is ready for analysis, classification, and filtering to generate a bare earth surface model in which the above-ground features are removed from the data set. Point clouds were created using Optech DASHMap Post Processor software. GeoCue distributive processing software was used in the creation of some files needed in downstream processing, as well as in the tiling of the dataset into more manageable file sizes. TerraScan and TerraModeler software packages were then used for the automated data classification, manual cleanup, and bare earth generation. Project specific macros were developed to classify the ground and remove side overlap between parallel flight lines.

All data will manually be reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler. Global Mapper will be used as a final check of the bare earth dataset. GeoCue will then be used to create the deliverable industry-standard LAS files for both the All Point Cloud Data and the Bare Earth. In-house software will then used to perform final statistical analysis of the classes in the LAS files. All graphic statistical analysis will be provided within the Final Report.

Due to the differing needs of each agency, the vertical datums used were different between the USGS and the NOAA deliverables for this project. Orthometric heights were used for the USGS deliverables while ellipsoid heights were used for the NOAA deliverables. Photo Science processed and adjusted the data in ellipsoid heights using the ellipsoid heights of control points collected by Photo Science and Sam O. Hirota, Inc. The completed dataset (using ellipsoid heights) was provided to Dewberry

for the QA/QC process. Upon approval by Dewberry, the dataset will be converted to orthometric heights, adjusted to control using orthometric heights and all required deliverables will then be provided to USGS.

Metadata was generated for the project on a deliverable level.

3.1. FLIGHT LOGS

Flight logs were completed by LIDAR sensor technicians for each mission during acquisition. These logs depict a variety of information, including:

- Job / Project #
- Flight Date / Lift Number
- FOV (Field of View)
- Scan Rate (HZ)
- Pulse Rate Frequency (Hz)
- Ground Speed
- Altitude
- Base Station
- PDOP avoidance times
- Flight Line #
- Flight Line Start and Stop Times
- Flight Line Altitude (AMSL)
- Heading
- Speed
- Returns
- Crab

Notes: (Visibility, winds, ride, weather, temperature, dew point, pressure, etc). Project specific flight logs for each sortie are available in Appendix C.

3.2. LAS CLASSIFICATION SCHEME

The classification classes are determined by the USGS Version 1.0 specifications and are an industry standard for the classification of LIDAR point clouds. All data starts the process as Class 1 (Unclassified), and then through automated classification routines, the classifications are determined using TerraScan macro processing.

The classes used in the dataset are as follows and have the following descriptions:

- Class 1 – Processed, but Unclassified – These points would be the catch all for points that do not fit any of the other deliverable classes. This would cover things like vegetation, buildings, cars, bridges, etc.
- Class 2 – Bare earth ground – This is the bare earth surface
- Class 7 – Noise – Low or high points, manually identified above or below the surface that could be noise points in point cloud.
- Class 9 – In-land Water – Points found inside of inland lake/ponds
- Class 10 – Ignored Ground – Points found to be close to breakline features. Points are typically moved to this class from Class 2. This class is ignored during the DEM creation.
- Class 17 – Overlap Default (Unclassified) – Points found in the overlap between flight lines. These points are created through automated processing methods and not cleaned up during processing.

- Class 18 – Overlap Bare-earth ground – Points found in the overlap between flight lines. These points are created through automated processing, matching the specifications determined during the automated process, that are close to the Class 2 dataset (when analyzed using height from ground analysis)
- Class 25 – Overlap Water – Points found in the overlap between flight lines that are located inside hydro features. These points are created through automated processing methods and not cleaned up during processing.

3.3. CLASSIFIED LAS PROCESSING

The bare earth surface is then manually reviewed to ensure correct classification on the Class 2 (Ground) points. After the bare-earth surface is finalized; it is then used to generate all hydro-breaklines through heads-up digitization.

All ground (ASPRS Class 2) LiDAR data inside of the Lake Pond and Double Line Drain hydro flattening breaklines were then classified to water (ASPRS Class 9) using TerraScan macro functionality. A buffer of 1 meter was also used around each hydro flattened feature to classify these ground (ASPRS Class 2) points to Ignored ground (ASPRS Class 10). All Lake Pond Island and Double Line Drain Island features were checked to ensure that the ground (ASPRS Class 2) points were reclassified to the correct classification after the automated classification was completed.

All overlap data was processed through automated functionality provided by TerraScan to classify the overlapping flight line data to approved classes by USGS. The overlap data was classified to Class 17 (Overlap Default) and Class 18 (Overlap Ground). These classes were created through automated processes only and were not verified for classification accuracy. Due to software limitations within TerraScan, these classes were used to trip the withheld bit within various software packages. These processes were reviewed and accepted by USGS through numerous conference calls and pilot study areas.

All data was manually reviewed and any remaining artifacts removed using functionality provided by TerraScan and TerraModeler. Global Mapper is used as a final check of the bare earth dataset. GeoCue was then used to create the deliverable industry-standard LAS files for both the All Point Cloud Data and the Bare Earth. Photo Science proprietary software was used to perform final statistical analysis of the classes in the LAS files, on a per tile level to verify final classification metrics and full LAS header information.

3.4. HYDRO FLATTENING BREAKLINE PROCESS

Class 2 LiDAR was used to create a bare earth surface model. The surface model was then used to heads-up digitize 2D breaklines of Inland Streams and Rivers with a 30 meter nominal width, Inland Ponds and Lakes of 8,000 sq. meters or greater surface area as well as Coastal Shorelines and Coastal Islands.

Elevation values were assigned to all Inland Ponds and Lakes, Inland Pond and Lake Islands, Inland Stream and River Islands and Coastal Shorelines and Coastal Islands using TerraModeler functionality.

Elevation values were assigned to all Inland streams and rivers using Photo Science proprietary software.

All ground (ASPRS Class 2) LiDAR data inside of the collected inland breaklines were then classified to water (ASPRS Class 9) using TerraScan macro functionality. A buffer of 1 meter was also used around each hydro flattened feature. These points were moved from ground (ASPRS Class 2) to Ignored Ground (ASPRS Class 10).

The breakline files were then translated to ESRI Shapefile format using ESRI conversion tools.

3.5. HYDRO FLATTENING RASTER DEM PROCESS

Class 2 LiDAR in conjunction with the hydro breaklines were used to create a 1.0 meter Raster DEM. Using automated scripting routines within ArcMap, an ERDAS Imagine IMG file was created for each tile. Each surface is reviewed using Global Mapper to check for any surface anomalies or incorrect elevations found within the surface.

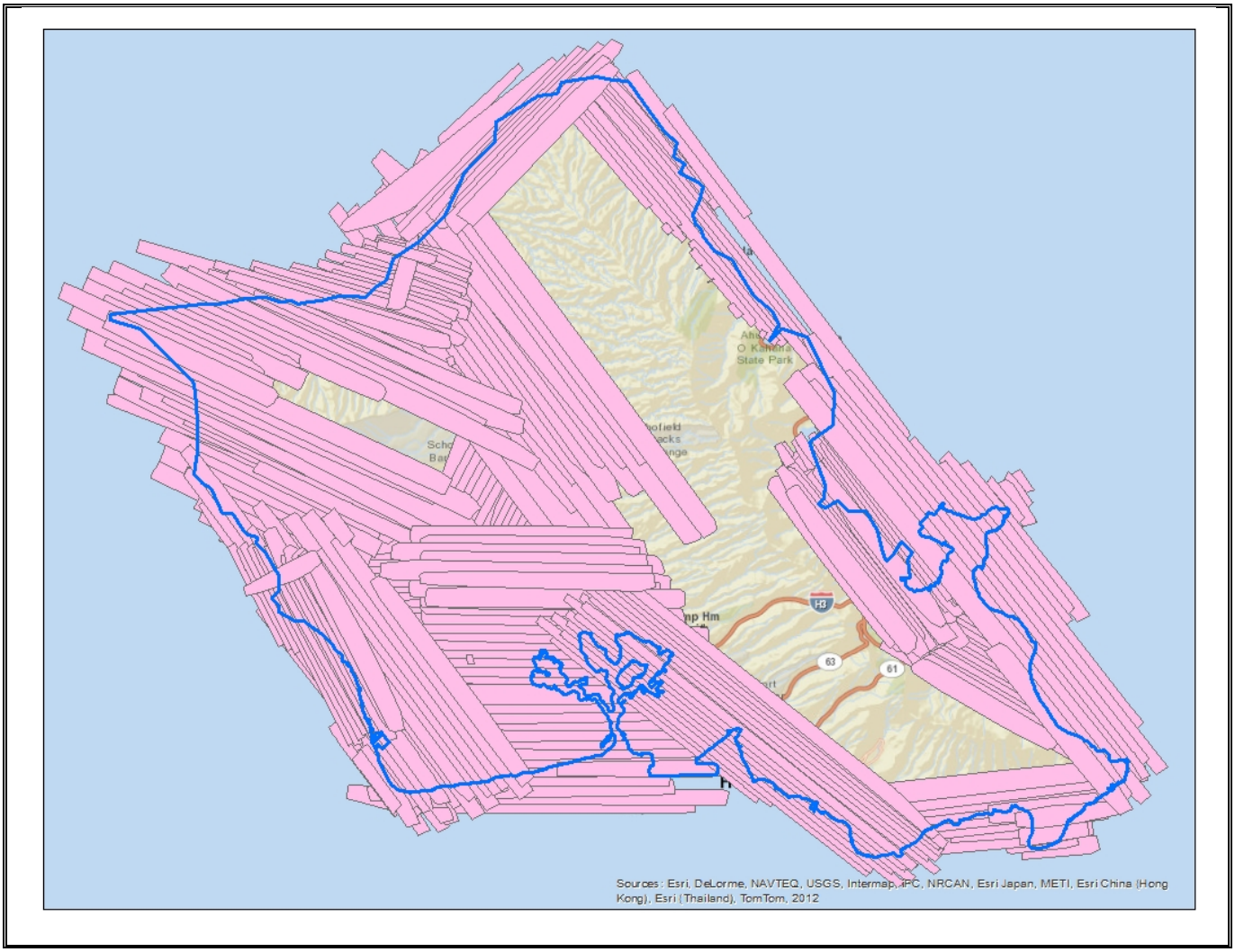
4. DELIVERABLES

- Raw point cloud swath LAS in version 1.2 format
- Classified point cloud in LAS version 1.2 format
- Hydro flattened raster DEM in ERDAS .IMG format
- Hydro flattened breaklines in shape file format
- Ground control points in ESRI geodatabase format
- As-flown flightlines in ESRI geodatabase format
- Tile index in shape file format
- Project and deliverable level metadata in XML format
- Accuracy Assessment in XLS format
- Project and acquisition reports in PDF format

5. PROJECT COVERAGE VERIFICATION

The Oahu project area coverage verification was performed by comparing coverage of processed .LAS files captured during project collection to generate project shape files depicting boundaries of specified project areas. Please refer to Figure 8.

Figure 8. Oahu Flightline Swath LAS Coverage



6. GROUND CONTROL AND CHECK POINT COLLECTION

The Photo Science, Inc. and local surveying team (Sam O. Hirota, Inc.) completed a GPS survey of variously selected ground control points for LiDAR accuracy validation. Figure 9 shows control point locations across the project area. Table 3 depicts the Final Control Reports for Oahu as computed in TerraScan as a quality assurance check. Please see Dewberry's independent qualitative and quantitative quality assessment using independent control points established by NOAA survey crews to validate FVA, SVA and CVA. Josh Novac, GISP is Dewberry's contact for the assessment, his contact information follows:

Josh Novac, GISP
Associate Project Manager
Remote Sensing Services
1095 South Monaco Parkway
Denver, CO 80224
813.421.8632 direct
303.825.2322 fax

Figure 9. Oahu Control Point Locations

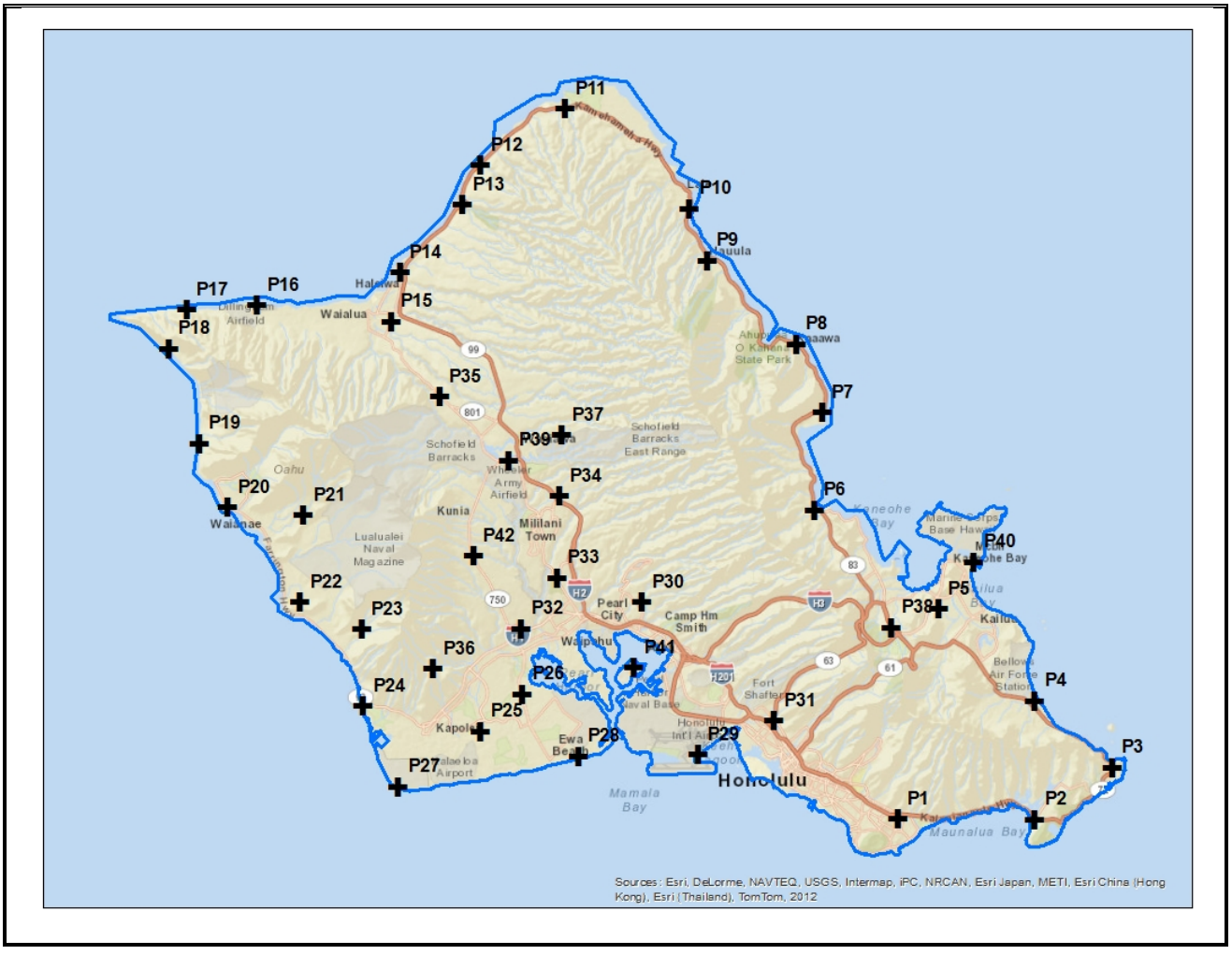


Table 3. Oahu Final Control Report (units = meters)

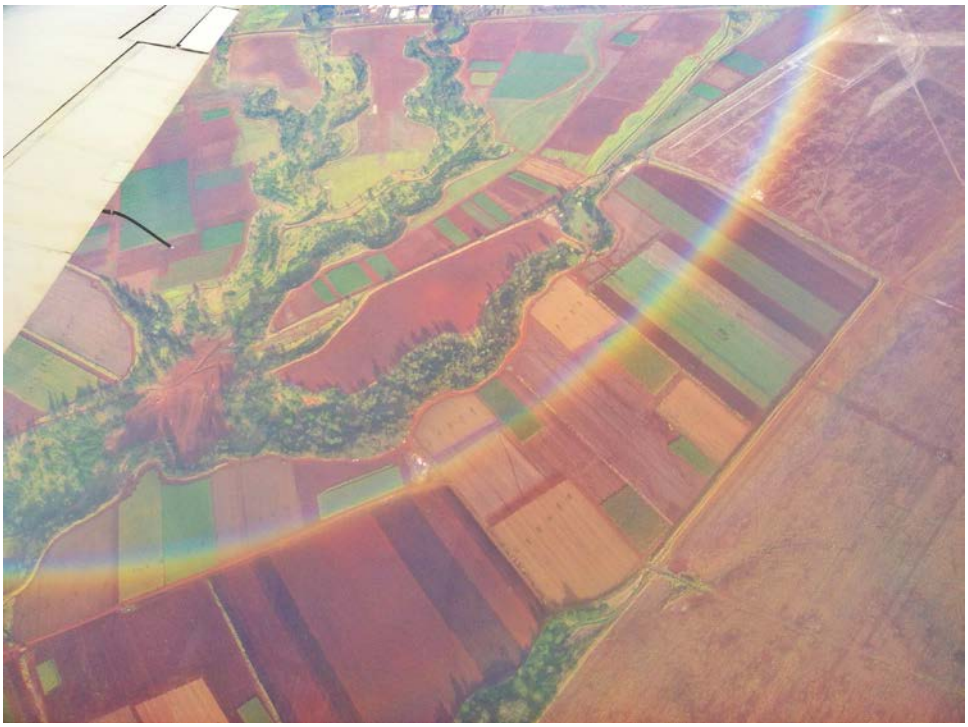
Oahu Final Control Report					
Number	Easting	Northing	Known Z	Laser Z	Dz
1	625376.1	2353237	35.826	35.86	0.034
2	634331	2353196	2.896	2.88	-0.016
3	639374.5	2356578	18.241	18.17	-0.071
4	634320.6	2360922	3.995	3.97	-0.025
5	628013.8	2366913	4.786	4.74	-0.046
6	619932	2373349	2.152	slope	*
7	620440.5	2379724	1.713	1.66	-0.053
8	618732	2384181	2.587	2.74	0.153
9	612954	2389653	2.186	2.1	-0.086
10	611764.1	2393019	3.424	3.58	0.156
11	603711	2399543	5.004	4.89	-0.114
12	598150.4	2395865	7.804	7.82	0.016
13	597006.5	2393267	6.456	6.23	-0.226
14	592901.1	2388855	1.89	1.89	0
15	592312.7	2385664	16.142	16.2	0.058
16	583611.6	2386742	3.079	3.13	0.051
17	578990.4	2386446	7.963	7.94	-0.023
18	577808.2	2383892	7.493	7.44	-0.053
19	579804.5	2377694	4.545	4.47	-0.075
20	581663.2	2373560	2.953	3	0.047
21	586596.9	2373018	61.853	61.72	-0.133
22	586387.3	2367382	14.547	14.5	-0.047
23	590400.6	2365617	66.266	66.27	0.004
24	590524.5	2360585	5.947	5.95	0.003
25	598168.1	2358933	15.853	15.88	0.027
26	600868.2	2361348	14.077	14.05	-0.027
27	592778.3	2355344	2.528	2.55	0.022
28	604537.2	2357308	1.356	1.48	0.124
29	612327.7	2357434	2.097	2.22	0.123
30	608689.9	2367348	95.891	95.87	-0.021
31	617282.5	2359629	27.684	27.63	-0.054
32	600832.6	2365620	64.103	64.07	-0.033
33	603164.2	2368948	124.652	124.63	-0.022
34	603313.1	2374299	234.624	234.72	0.096
35	595474.6	2380763	279.441	279.51	0.069
36	595085.4	2363007	280.264	280.25	-0.014
37	603470.8	2378280	337.206	337.26	0.054
38	624955.2	2365712	85.362	85.29	-0.072
39	600002.3	2376611	262.776	262.95	0.174
40	630343.1	2369986	2.119	2.13	0.011
41	608192	2363088	6.205	6.18	-0.025
42	597693.1	2370370	238.479	238.61	0.131

Average dz	+0.003 m
Minimum dz	-0.226 m
Maximum dz	+0.174 m
Average Magnitude	0.063 m
Root Mean Square	0.082 m
Std Deviation	0.083 m

7. SELECTED IMAGES

Diamond Head

Pearl Harbor



Central Oahu

Honolulu

Makapu'u Point Lighthouse

APPENDIX A
BASE STATION LOCATION / DATA SHEETS

PHOTO SCIENCE
Geospatial Solutions

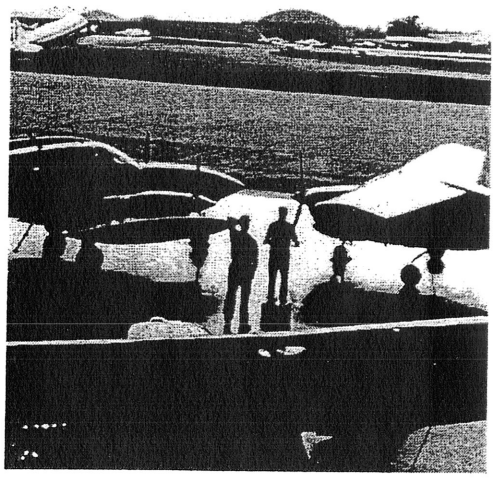
Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport
Completed by: Berry

Project Number: 7525-06 / 7505-078
Date: June 1, 2013

Receiver: Trimble "2"
Receiver Type: RT GNSS
Antenna Type: Zephyr Geodetic 2
Station ID: PSI HJR
Start -- H.I. (m): 1.6165 1.667 1.6166
End -- H.I. (m): 1.6166
H.I. (ft): 5.46
Start Time: 6:16 AM
End Time: 8:54 AM
Time Zone: HST
Operator: Berry



Comments 130601a-240 1/0 OPEP by 130605a-240

PSI\FORMS\Station Occupation Report June 24, 2013

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report For Airborne GPS

Project: Oahu LiDAR

Location: Kaholoa Airport

Completed by: Berry

Project Number: 525-061 505-073

Date: June 12, 2013

Receiver: Trimble "2"

Receiver Type: RT GNSS

Antenna Type: Zephyr Geodetic 2

Station ID: PSI-HJR

Start -- H.I. (m): 1.680 1.678 1.679

End -- H.I. (m): 1.679

H.I. (ft): 5.51

Start Time: 6:18AM

End Time: 9:30AM

Time Zone: HST

Operator: Berry

Comments 306129-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LIDAR

Location: Kalaeloa Airport

Project Number: 7525-061
7505-518

Completed by: Barry

Date: June 19 2013

Receiver: Trimble "2"

Receiver Type: R7 GNSS

Antenna Type: Zephyr Geodetic 2

Station ID: PSI LJR

Start -- H.I. (m): 1.696 1.698 1.695

End -- H.I. (m): 1.697

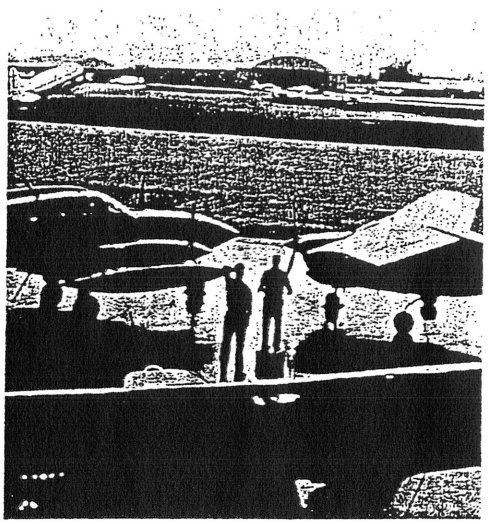
H.I. (ft): 5.5'

Start Time: 6:10 AM

End Time: 9:15 AM

Time Zone: HST

Operator: Barry



Comments 13D 19a-24D

PSI\FORMS\Station Occupation Report August 9, 2010

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report For Airborne GPS

Project: Oahu LiDAR

Location: Kaheloa Airport (PHJR)

Project Number: 7525-06 (Nort
7505-08 (Wes

Completed by: Berry

Date: June 20, 2013

Receiver: Ironde "2"

Receiver Type: R7 GNSS

Antenna Type: Zephyr Geodetic 2

Station ID: PSI PHJR

Start -- H.I. (m): 1.739 1.740 1.741

End -- H.I. (m): 1.740

H.I. (ft): 5.705

Start Time: ~2:30 AM

End Time: 6:50 AM

Time Zone: HST (-10 utc)

Operator: Berry

Comments 130620a-7178

PSI\FORMS\Station Occupation Report August 9, 2010

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report For Airborne GPS

Project: DanaLiDAR

Location: Kalaeloa Airport

Completed by: Barry

Project Number: 7525-061 7505-078

Date: June 5, 2013

Receiver: Trimble "2"

Receiver Type: R7 GNSS

Antenna Type: Zephyr Geodetic 2

Station ID: PSI4JR

Start -- H.I. (m): 1.628 1.628 1.630

End -- H.I. (m): 1.629

H.I. (ft): 5.34

Start Time: 5:35AM

End Time: 8:22 AM

Time Zone: HST

Operator: Barry

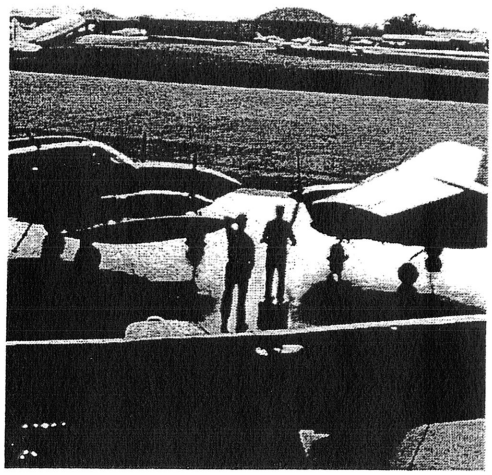


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PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport

Completed by: Berry

Project Number: 7525-061 7505-073

Date: June 6, 2013

Receiver: Trimble 2

Receiver Type: Zephyr Geodetic 2

Antenna Type: TRM [illegible]

Station ID: POI HJR

Start -- H.I. (m): 1.726 1.729 1.728

End -- H.I. (m): 1.728

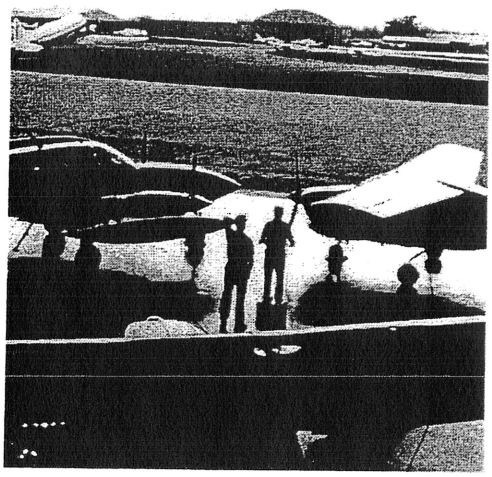
H.I. (ft): 5.1d0

Start Time: 804 AM

End Time: 1023 AM

Time Zone: HST

Operator: Berry



Comments BX60 060 - 240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport

Project Number: 7525-001 7505-078

Completed by: Barry

Date: June 8, 2013

Receiver: Trimble "2"

Receiver Type: R7 GNSS

Antenna Type: Zephyr Geodetic 2

Station ID: PSIHTR

Start -- H.I. (m): 1.678 1.681 1.679

End -- H.I. (m): 1.680

H.I. (ft): 5.505

Start Time: 6:13AM

End Time: 10:02 AM

Time Zone: HST

Operator: Barry

Comments BD6080-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report For Airborne GPS

Project: Oahu

Location: HJR
Completed by: MC

Project Number: 7505-061 7505-073
Date: 7/17/13

Receiver: T2
Receiver Type: ~~RAYTHEON~~ 5706
Antenna Type: Zephyr Geo
Station ID: PSI HJR
Start – H.I. (m): 1.665
End – H.I. (m): 1.665
H.I. (ft):
Start Time: 735
End Time: 1139
Time Zone: HST
Operator: MC

Comments 130717a-240

PHOTO SCIENCE
Geospatial Solutions

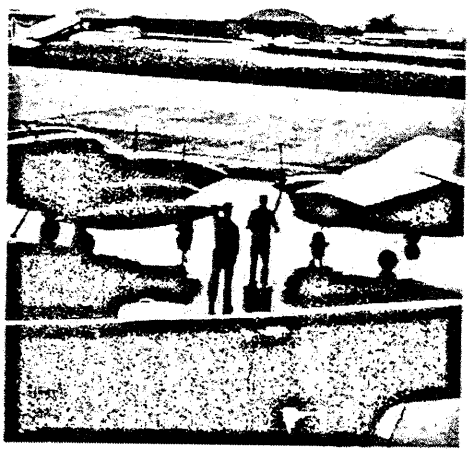
Station Occupation Report
For Airborne GPS

Project: Oahu

Location: HJR
Completed by: MC

Project Number: 7525-061 7505-078
Date: 7/18/13

Receiver: T2
Receiver Type: 5700
Antenna Type: Zephyr Geo
Station ID: PSI HJR
Start – H.I. (m): 1.735
End – H.I. (m): 1.735
H.I. (ft):
Start Time: 602
End Time: 915
Time Zone: HST
Operator: MC



Comments 130718a-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport
Completed by: Berry

Project Number: 7525-061 7505-073
Date: July 27, 2013

Receiver: Trimble
Receiver Type: 5700
Antenna Type: Zephyr Geodetic
Station ID: PSI HJR
Start – H.I. (m): 1.681 1.682 1.682
End – H.I. (m): 1.692
H.I. (ft): 5.565
Start Time: 8:15AM
End Time: 12:50PM
Time Zone: HST
Operator: Berry

Comments 130727a-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Project Number: 7505-078 7525-061

Location: Kaheloa Airport

Date: July 30, 2013

Completed by: Berry

Receiver: Trimble

Receiver Type: 5700

Antenna Type: Zephyr Geodetic

Station ID: PSI HTR

Start -- H.I. (m): 1.768 1.770 1.769

End -- H.I. (m): 1.769

H.I. (ft): 5.80

Start Time: 3:43 pm

End Time: ~5:30 PM

Time Zone: HST

Operator: Barry

Comments 130730a-240

PSI\FORMS\Station Occupation Report August 9, 2010

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu

Location: HJR

Project Number: 7525-061 7505-078

Completed by: MC

Date: May 4th 2013

Receiver: T2

Receiver Type: [illegible] 5700

Antenna Type: Zephyr Geo

Station ID: PSI HJR

Start – H.I. (m): 1.57

End – H.I. (m): 1.57

H.I. (ft):

Start Time: 545

End Time: 1015

Time Zone: HST

Operator: MC

Comments B07040-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu

Location: HJR
Completed by: MC

Project Number: 7525-CG1 7505-CG1
Date: 7/5/13

Receiver: TA
Receiver Type: [illegible] 5700
Antenna Type: Zephyr Geo
Station ID: PSI HJR
Start – H.I. (m): 1.477
End – H.I. (m): 1.477
H.I. (ft):
Start Time: 555
End Time: 1025
Time Zone: HST
Operator: MC

Comments 130705a-24D

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport

Completed by: Berry

Project Number: 7525-061 7505-073

Date: August 2, 2013

Receiver: Trimble

Receiver Type: 5700

Antenna Type: Zephyr Geodetic

Station ID: PSI HJR

Start -- H.I. (m): 1.612 1.612 1.610

End -- H.I. (m): 1.611

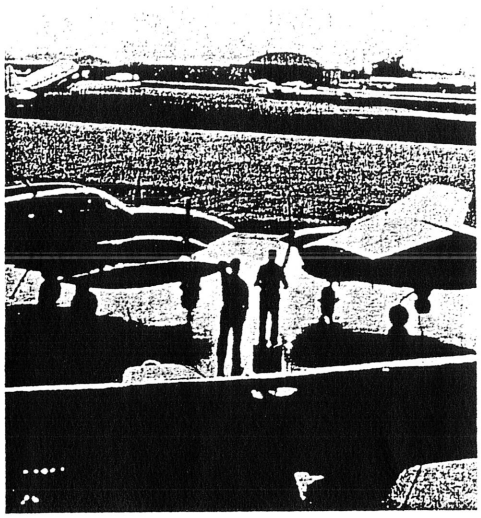
H.I. (ft): 5.285

Start Time: 11:25 AM

End Time: ~2:30pm

Time Zone: HST

Operator: Berry



Comments 130802a-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport

Completed by: Berry

Project Number: 7525-061 7505-078

Date: August 06, 2013

Receiver: Trimble

Receiver Type: 5700

Antenna Type: Zephyr Geodetic

Station ID: PSIHSR

Start -- H.I. (m): 1.651 1.651 1.650

End -- H.I. (m): 1.651

H.I. (ft): 5.42

Start Time: 8:20 AM

End Time: ~10:20 AM

Time Zone: HST

Operator: Berry

Comments BD806a-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kaloeloa Airport

Completed by: Berry

Project Number: 7525-061 7505-078

Date: August 06, 2013

Receiver: Trimble

Receiver Type: 5700

Antenna Type: Zephyr Geodetic

Station ID: PSI HSR

Start -- H.I. (m): 1.675 1.675 1.674

End -- H.I. (m): 1.675

H.I. (ft): 5.495

Start Time: 2pm

End Time: ~645pm

Time Zone: HST

Operator: Berry

Comments 13D806b-240

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kahuku Airport

Completed by: Berry

Project Number: 7525-061
7505-078

Date: August 07, 2013

Receiver: Trimble

Receiver Type: 5700

Antenna Type: Zephyr Geodetic

Station ID: PSI HJR

Start -- H.I. (m): 1.634 1.634 1.633

End -- H.I. (m): 1.634

H.I. (ft): 5.36

Start Time: 430 PM

End Time: ~730 PM

Time Zone: ~~HST~~

Operator: Berry

Comments 130807a-24D

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport

Completed by: Berry

Project Number: 7525-061 (7305-078)

Date: August 8, 2013

Receiver: Trimble

Receiver Type: 5700

Antenna Type: Zephyr Geodetic

Station ID: PS1-HJR

Start -- H.I. (m): 1.694 1.695 1.693

End -- H.I. (m): 1.694

H.I. (ft): 5.555

Start Time: 6:04 AM

End Time: ~11:30 PM

Time Zone: HST

Operator: Berry

Comments 130808a-24D

PHOTO SCIENCE
Geospatial Solutions

Station Occupation Report
For Airborne GPS

Project: Oahu LiDAR

Location: Kalaeloa Airport

Project Number: 7505-078 7525-061

Completed by: Berry

Date: August 09 2013

Receiver: Trimble

Receiver Type: 5700

Antenna Type: Zephyr Geodetic

Station ID: PSI HJR

Start -- H.I. (m): 1.607 1.607 1.606

End -- H.I. (m): 1.607

H.I. (ft): 5.27

Start Time: 6:11 AM

End Time: ~10:40 AM

Time Zone: HST

Operator: Berry

Comments 130809a-240

From: opus [opus@ngs.noaa.gov]
Sent: Thursday, June 06, 2013 12:00 AM
To: Jeremy Berry
Subject: OPUS solution : 76021560.DAT OP1370490063085

FILE: 76021560.DAT OP1370490063085

2005 NOTE: The IGS precise and IGS rapid orbits were not available
2005 at processing time. The IGS ultra-rapid orbit was/will be used to
2005 process the data.
2005

NGS OPUS SOLUTION REPORT
==========

All computed coordinate accuracies are listed as peak-to-peak values.
For additional information: http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy

USER: jberry@photoscience.com DATE: June 06, 2013
RINEX FILE: 7602156p.13o TIME: 04:00:47 UTC

SOFTWARE: page5 1209.04 master13.pl 082112 START: 2013/06/05 15:35:00
EPHEMERIS: igu17433.eph [ultra-rapid] STOP: 2013/06/05 18:22:00
NAV FILE: brdc1560.13n OBS USED: 6464 / 6657 : 97%
ANT NAME: TRM57971.00 NONE # FIXED AMB: 30 / 37 : 81%
ARP HEIGHT: 1.575 OVERALL RMS: 0.019(m)

REF FRAME: NAD_83(PA11)(EPOCH:2010.0000) IGS08 (EPOCH:2013.4266)

X:	-5514650.754(m)	0.076(m)	-5514651.670(m)	0.076(m)
Y:	-2219938.988(m)	0.017(m)	-2219936.321(m)	0.017(m)
Z:	2303406.813(m)	0.036(m)	2303407.973(m)	0.036(m)

LAT:	21 18 35.76183	0.011(m)	21 18 35.79870	0.011(m)
E LON:	201 55 38.62753	0.020(m)	201 55 38.52982	0.020(m)
W LON:	158 4 21.37247	0.020(m)	158 4 21.47018	0.020(m)
EL HGT:	24.372(m)	0.085(m)	24.658(m)	0.085(m)
ORTHO HGT:	9.337(m)	0.144(m)	[H = h-N (N = GEOID12A HGT)]	

	UTM COORDINATES (Zone 04)	STATE PLANE COORDINATES (5103 HI 3)
Northing (Y) [meters]	2356732.404	15864.137
Easting (X) [meters]	596185.961	492467.156
Convergence [degrees]	0.33705373	-0.02638504
Point Scale	0.99971432	0.99999070
Combined Factor	0.99971049	0.99998687

US NATIONAL GRID DESIGNATOR: 4QEJ9618556732(NAD 83)

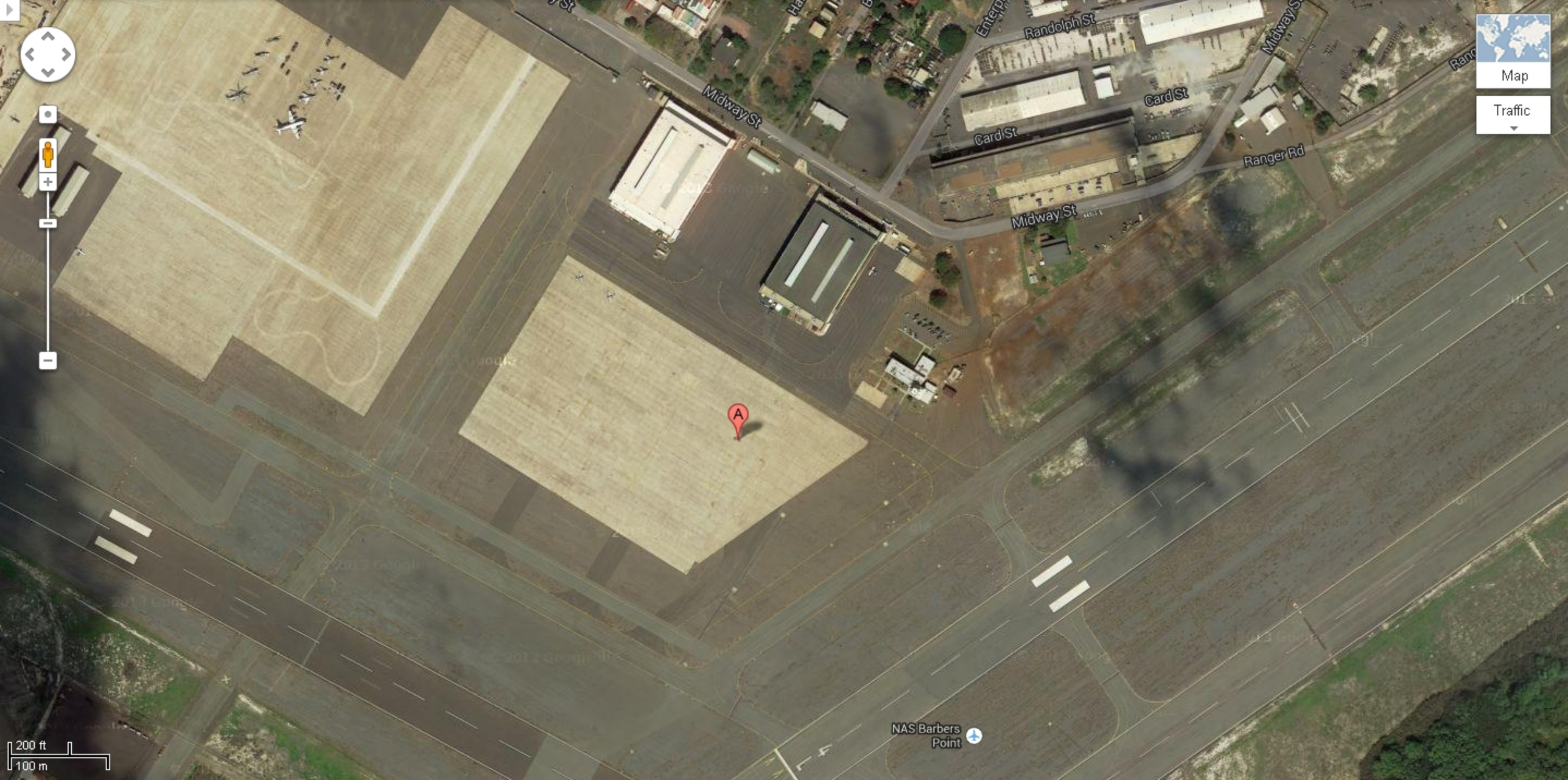
BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)

DF8972 ZHN1 HONOLULU WAAS 1 CORS ARP N211846.729 W1575514.882 15753.7
AI4960 KOKB KOKEE PARK CORS ARP N220734.518 W1593953.661 187926.2
DJ8967 KOK5 KOKOLE POINT 5 CORS ARP N215900.546 W1594529.318 189742.6

NEAREST NGS PUBLISHED CONTROL POINT
TU1662 BARBERS PT NAS BASE CONT TR BN N211837.272 W1580414.874 192.9

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.


Midway St
Randolph St
Card St
Card St
Midway St
Midway St
Ranger Rd
Map
Traffic
A
NAS Barbers Point
200 ft
100 m

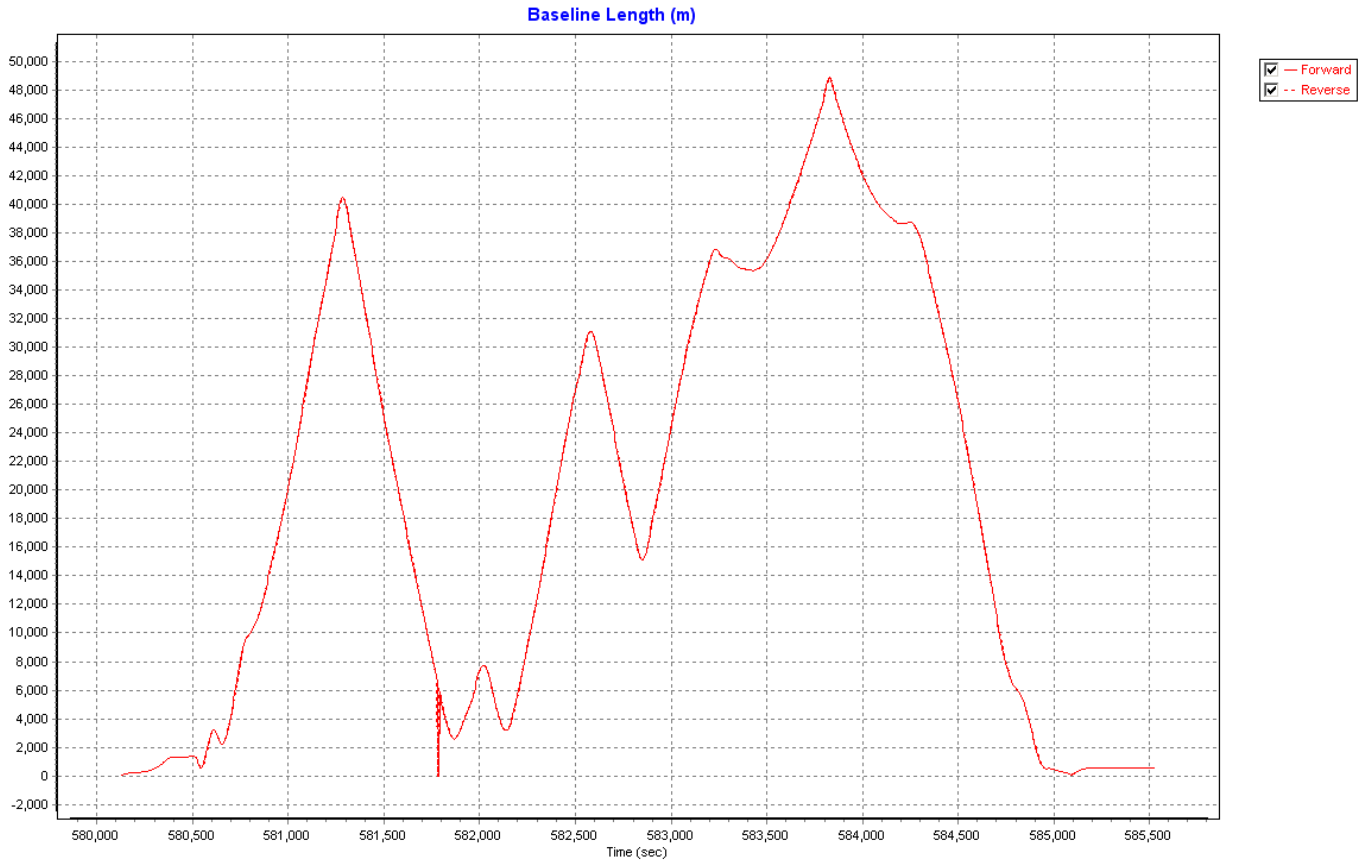
APPENDIX B
AIRBORNE GPS/IMU PROCESSING REPORT

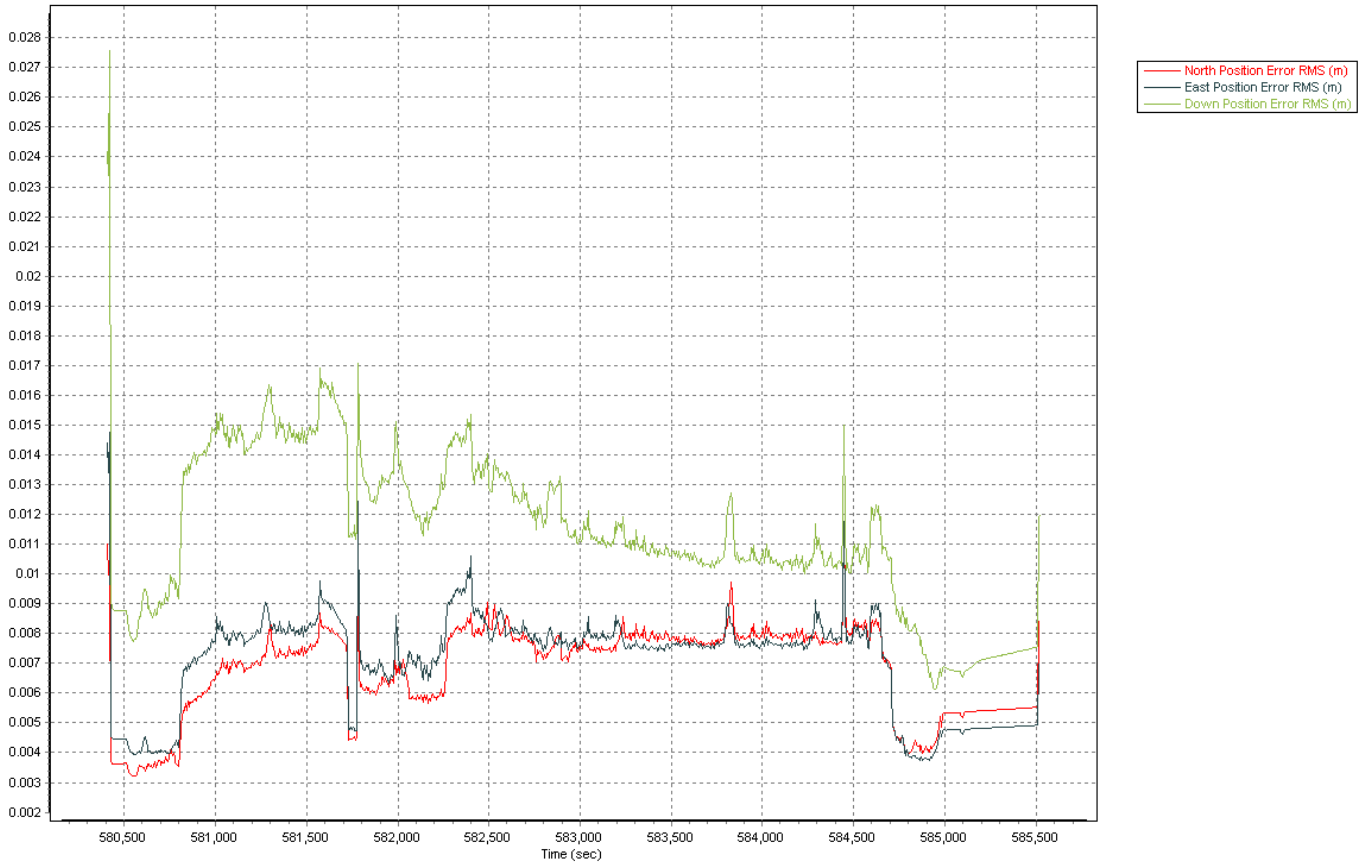
Lift GNSS Reports

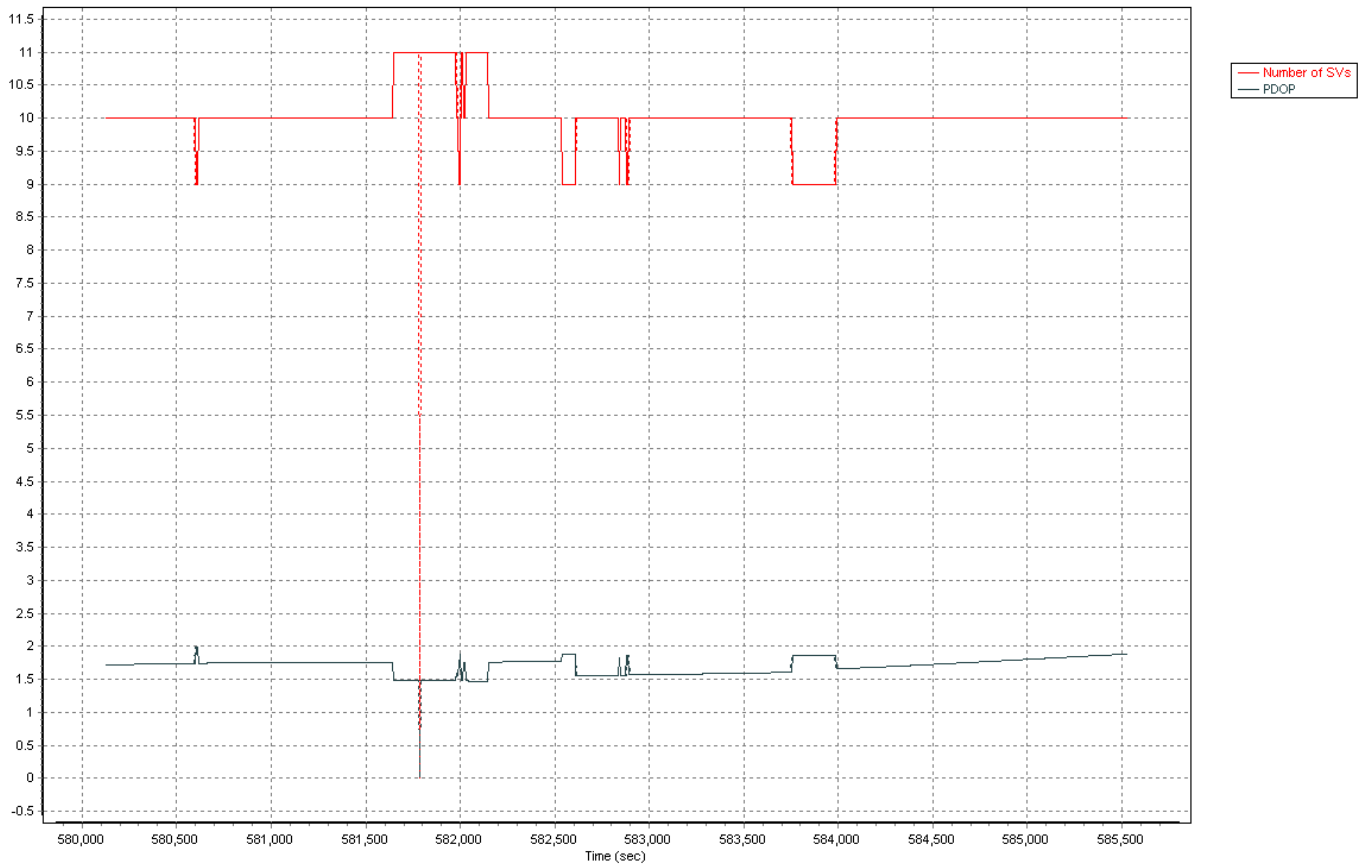
There are five lifts, each with separate graph reports generated from processing software. The lifts are as follows:

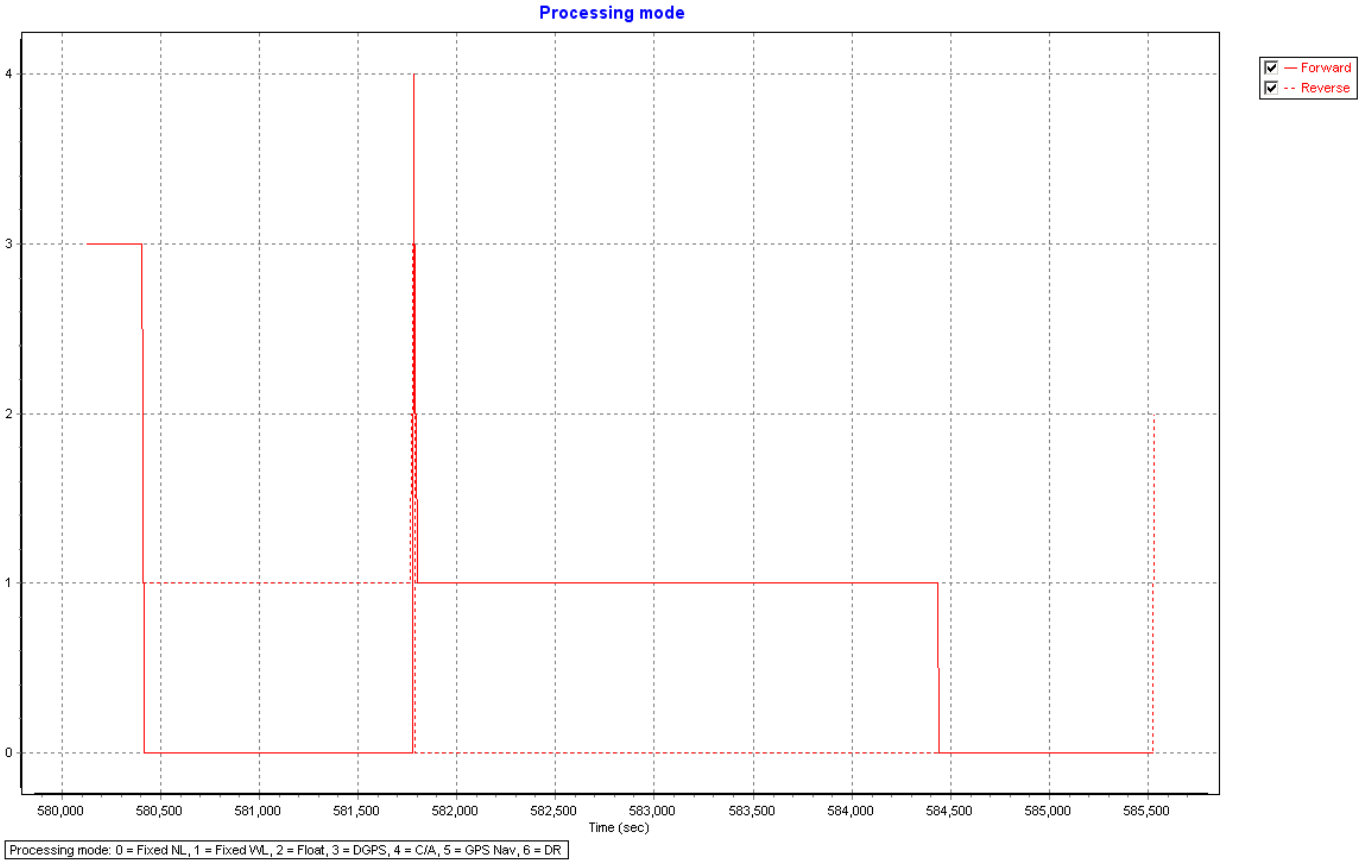
130601a-240
130605a-240
130606a-240
130608a-240
130612a-240
130619a-240
130620a-240
130704a-240
130705a-240
130717a-240
130718a-240
130727a-240
130730a-240
130802a-240
130806a-240
130806b-240
130807a-240
130808a-240
130809a-240

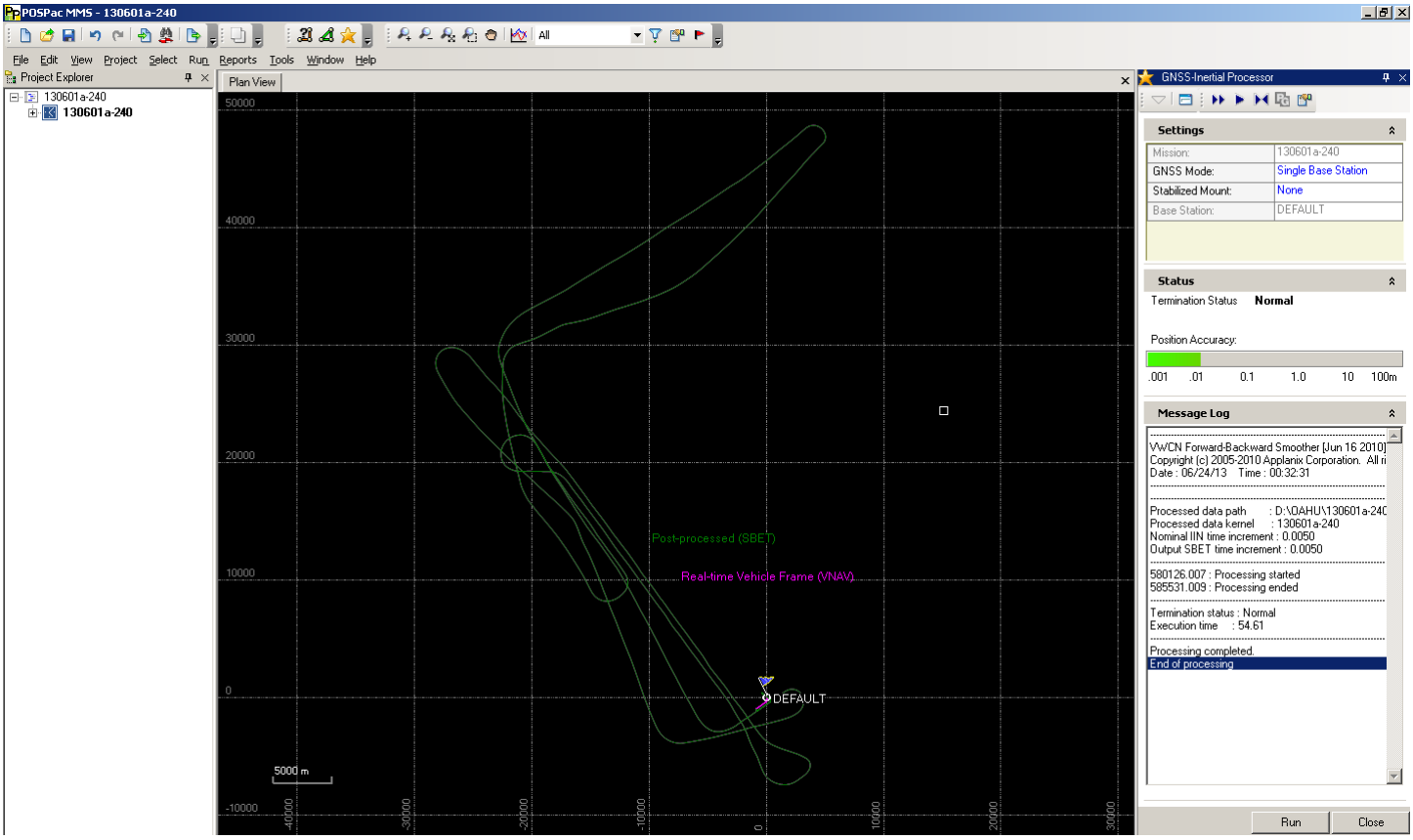
130601a-240


Baseline Length (m)
Forward
Reverse
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
580,000
580,500
581,000
581,500
582,000
582,500
583,000
583,500
584,000
584,500
585,000
585,500
Time (sec)

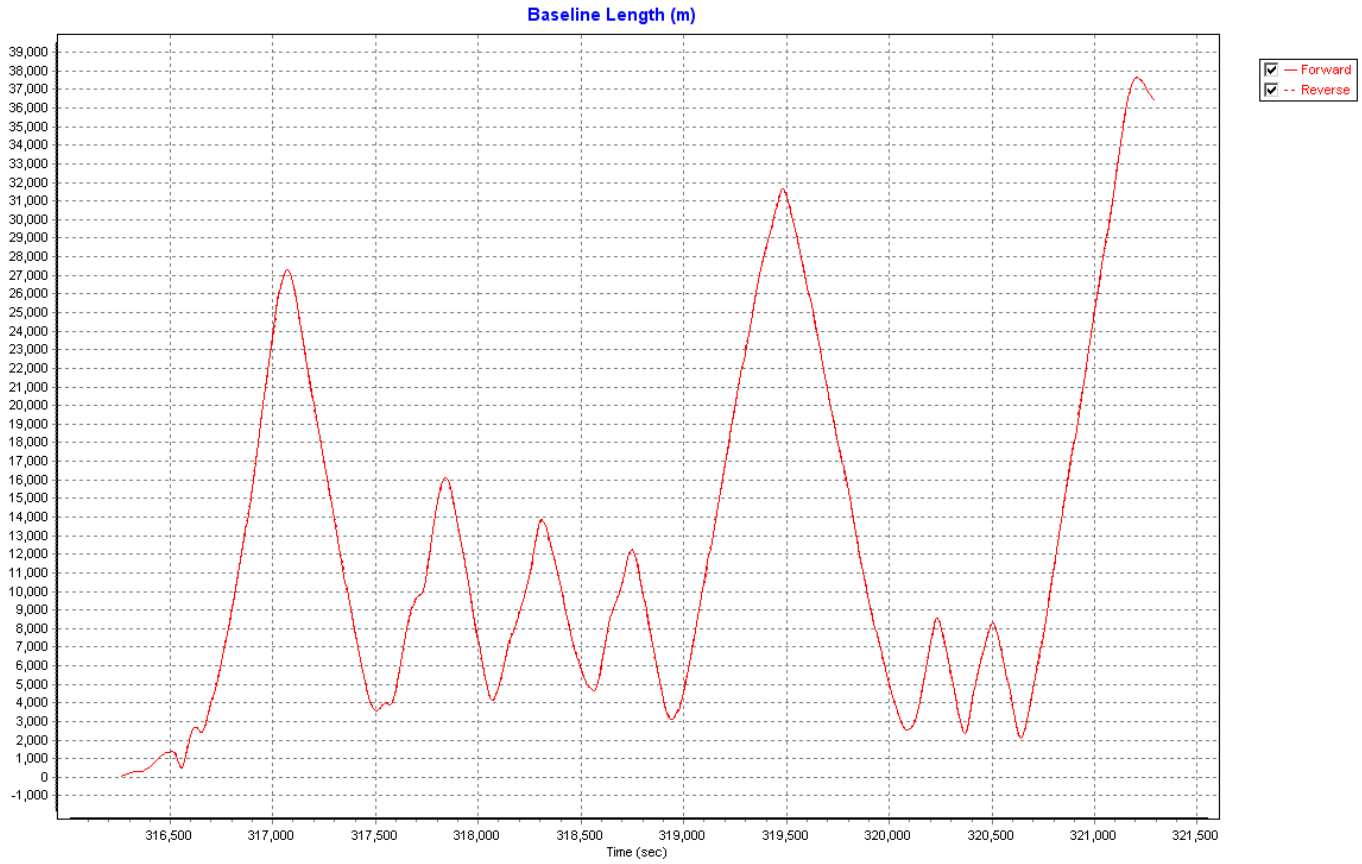

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.028
0.027
0.026
0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
580,500
581,000
581,500
582,000
582,500
583,000
583,500
584,000
584,500
585,000
585,500
Time (sec)


Number of SVs
PDOP
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
580,000
580,500
581,000
581,500
582,000
582,500
583,000
583,500
584,000
584,500
585,000
585,500
Time (sec)


Processing mode
Forward
Reverse
4
3
2
1
0
580,000
580,500
581,000
581,500
582,000
582,500
583,000
583,500
584,000
584,500
585,000
585,500
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


POSPac MMS - 130601a-240
File Edit View Project Select Run Reports Tools Window Help
Project Explorer
130601a-240
130601a-240
Plan View
50000
40000
30000
20000
10000
0
-10000
Post-processed (SBET)
Real-time Vehicle Frame (VNAV)
DEFAULT
5000 m
GNSS-Inertial Processor
Settings
Mission: 130601a-240
GNSS Mode: Single Base Station
Stabilized Mount: None
Base Station: DEFAULT
Status
Termination Status Normal
Position Accuracy:
.001 .01 0.1 1.0 10 100m
Message Log
VWCN Forward-Backward Smoother (Jun 16 2010)
Copyright (c) 2005-2010 Applanix Corporation. All ri
Date : 06/24/13 Time : 00:32:31
Processed data path : D:\OAHU\130601a-240
Processed data kernel : 130601a-240
Nominal IIN time increment : 0.0050
Output SBET time increment : 0.0050
580126.007 : Processing started
585531.009 : Processing ended
Termination status : Normal
Execution time : 54.61
Processing completed.
End of processing
Run
Close

130605a-240


Baseline Length (m)
Forward
Reverse
39,000
38,000
37,000
36,000
35,000
34,000
33,000
32,000
31,000
30,000
29,000
28,000
27,000
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24,000
23,000
22,000
21,000
20,000
19,000
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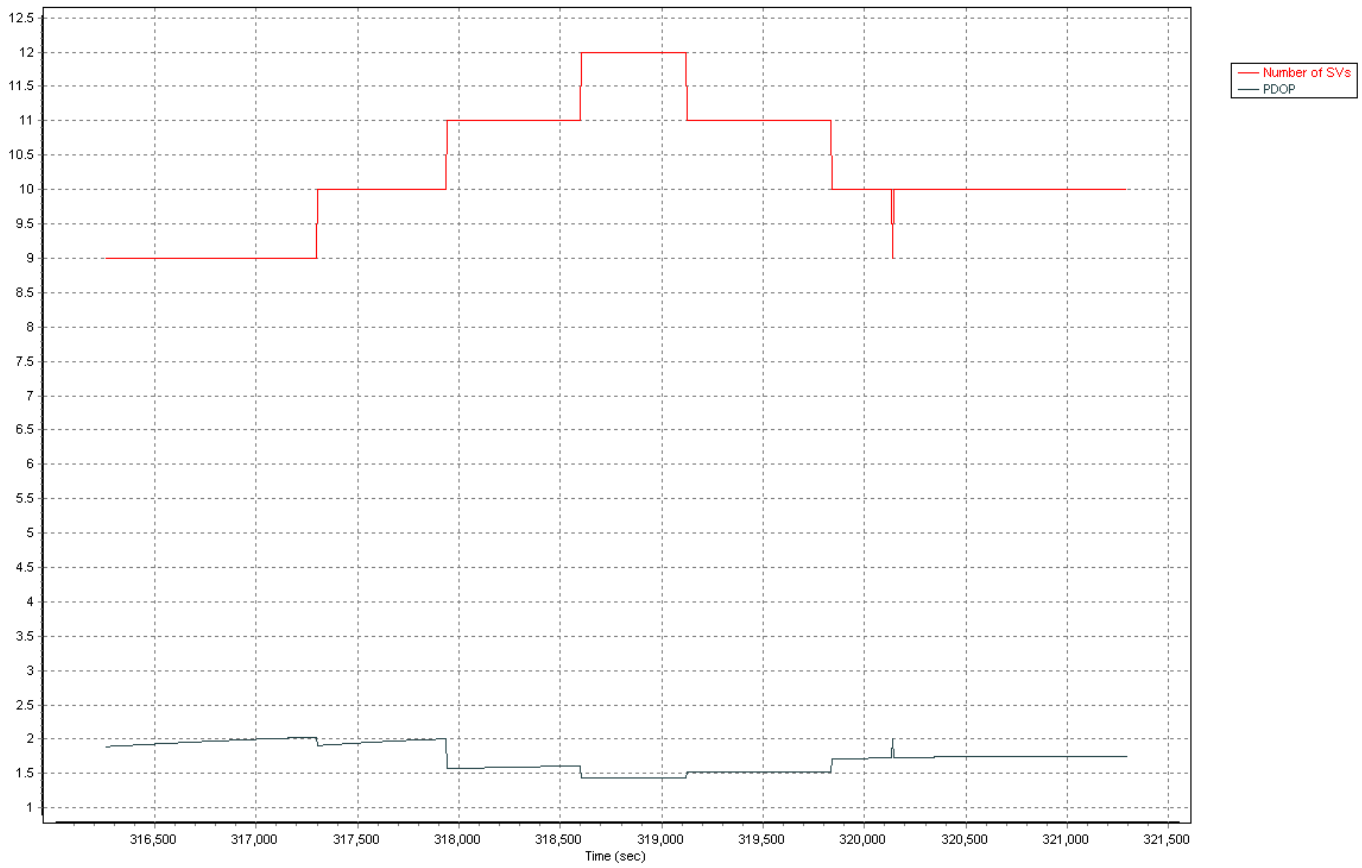
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
316,500
317,000
317,500
318,000
318,500
319,000
319,500
320,000
320,500
321,000
321,500
Time (sec)


North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.037
0.036
0.035
0.034
0.033
0.032
0.031
0.03
0.029
0.028
0.027
0.026
0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
317,000
317,500
318,000
318,500
319,000
319,500
320,000
320,500
321,000
Time (sec)


Number of SVs
PDOP
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
316,500
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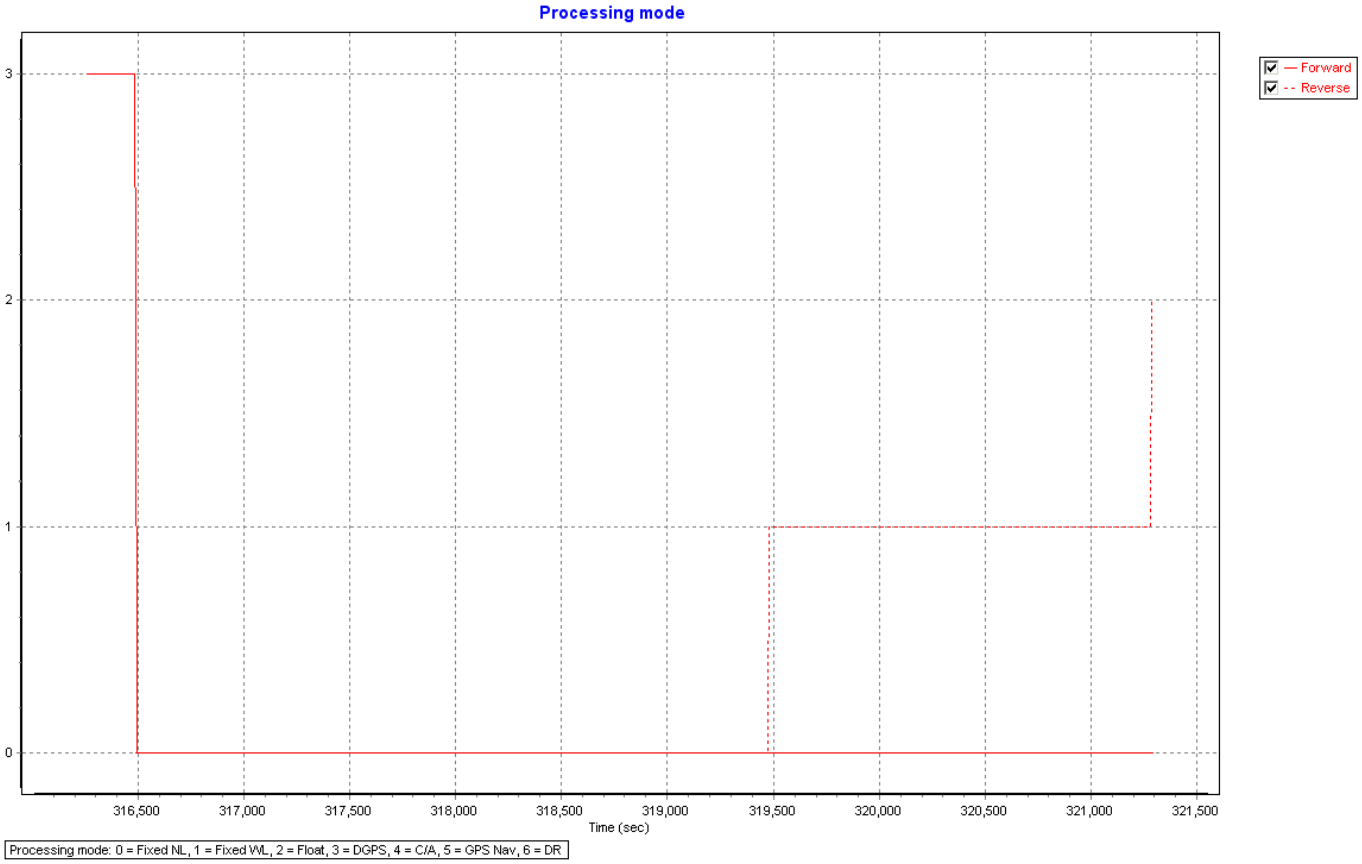
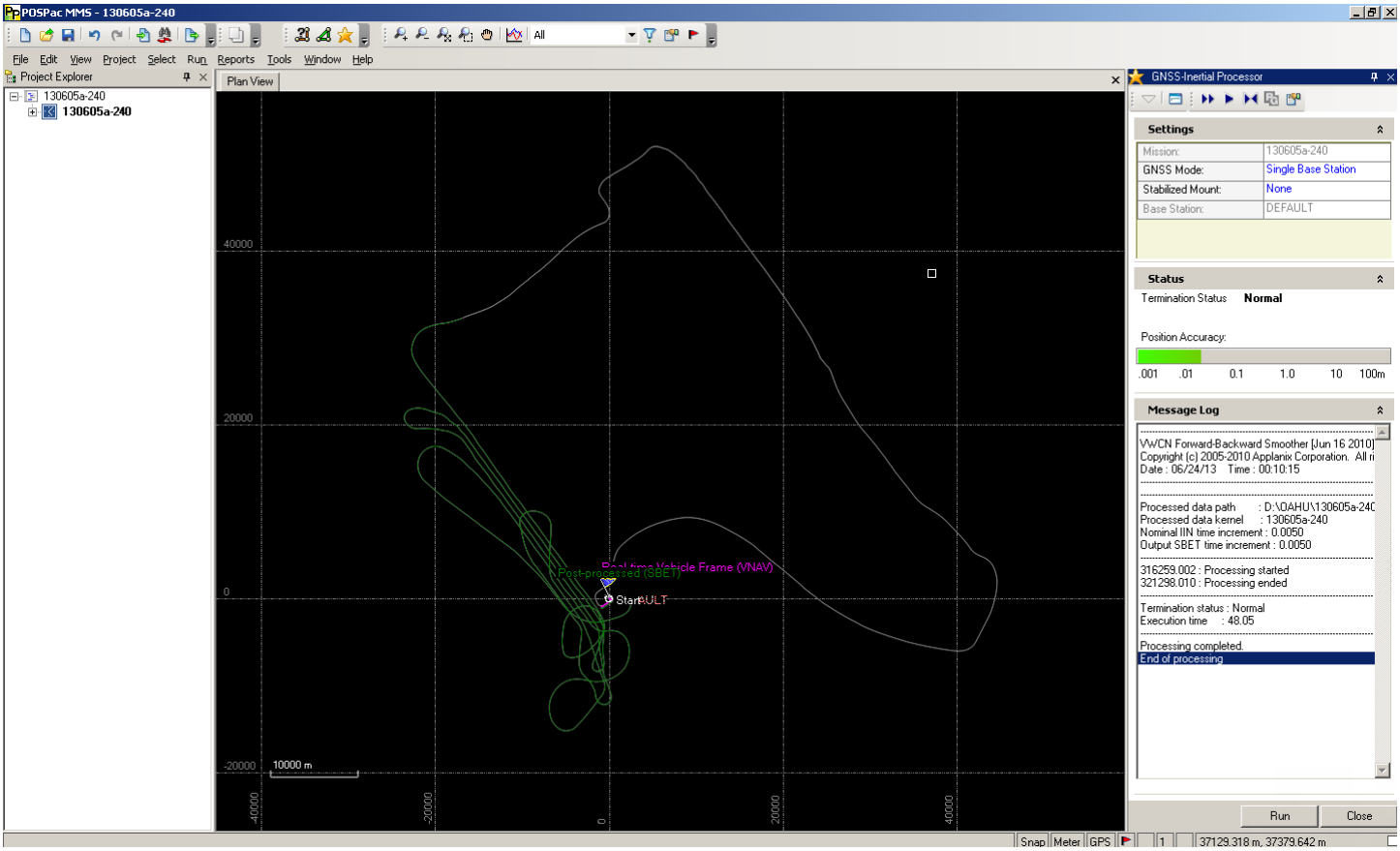
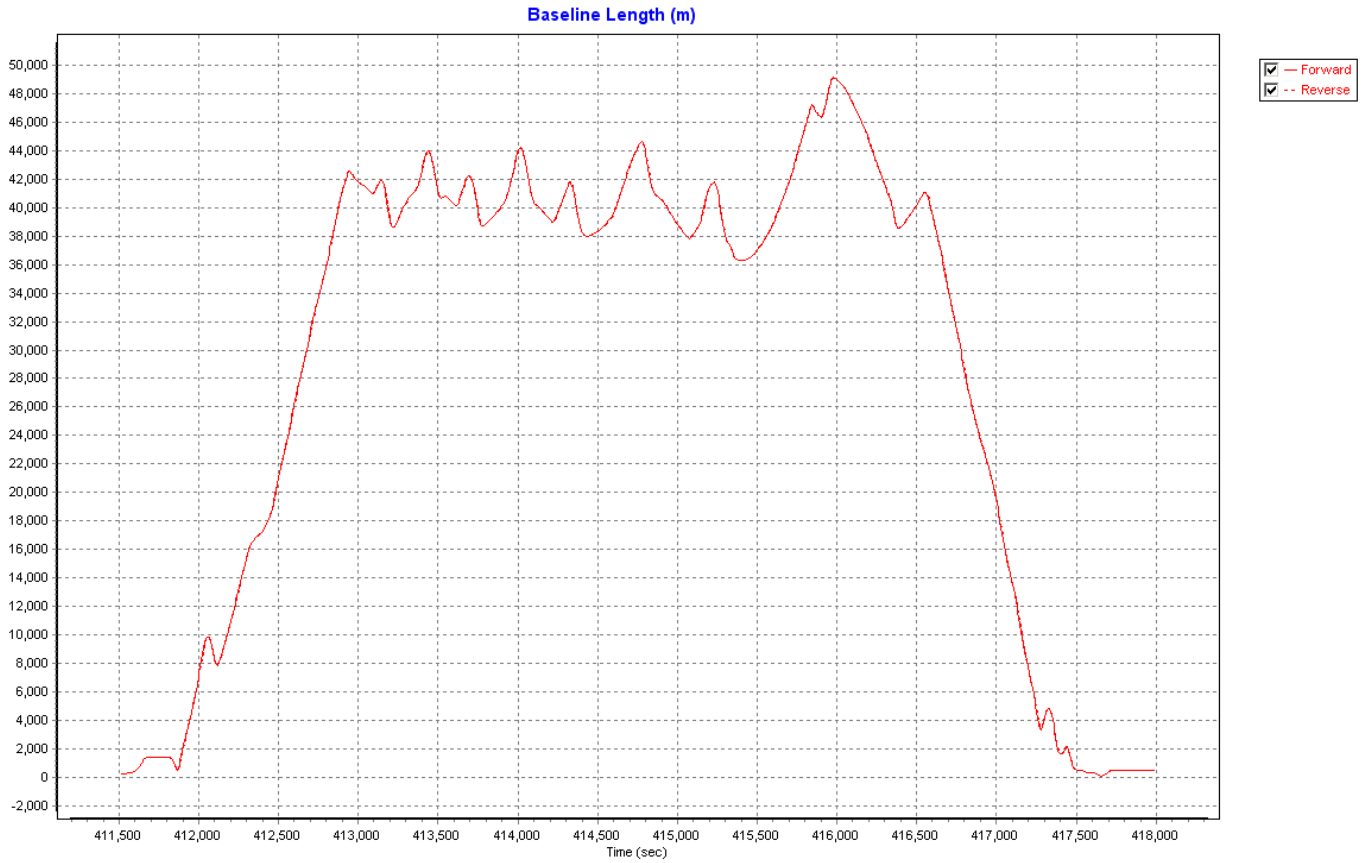
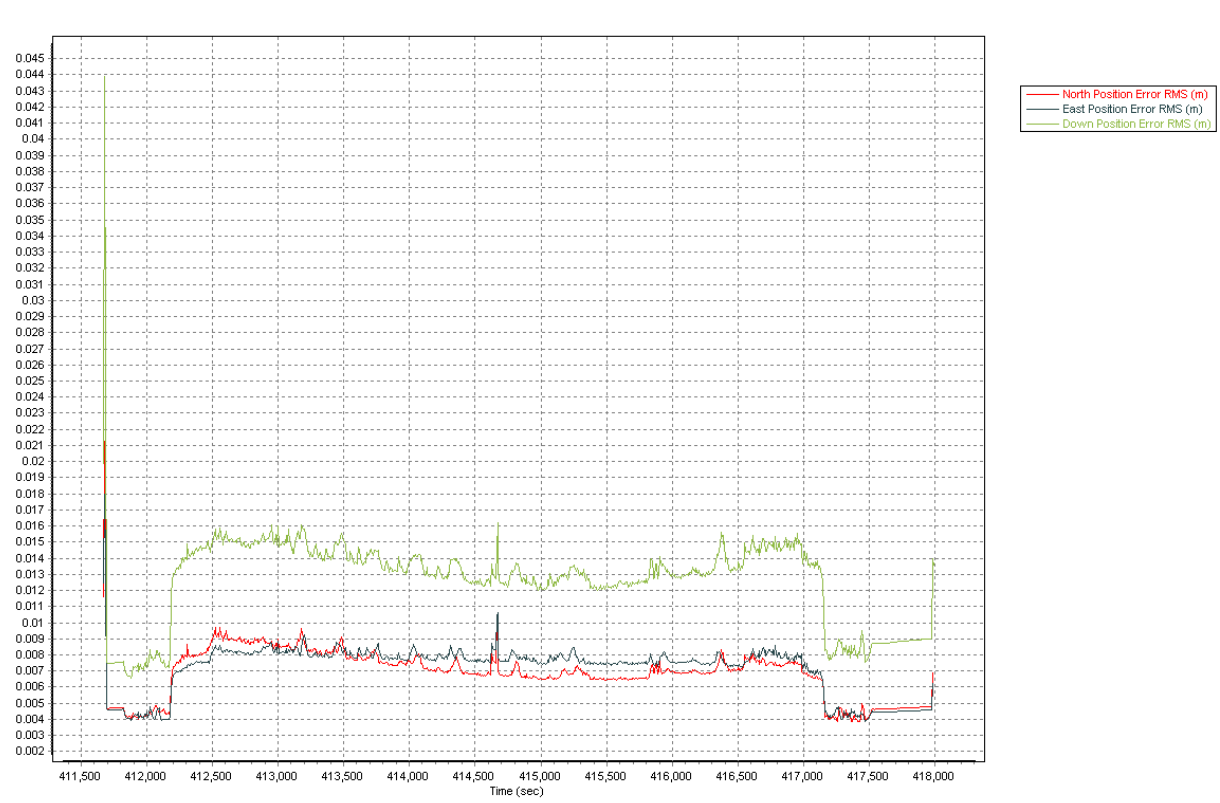
320,000
320,500
321,000
321,500
Time (sec)

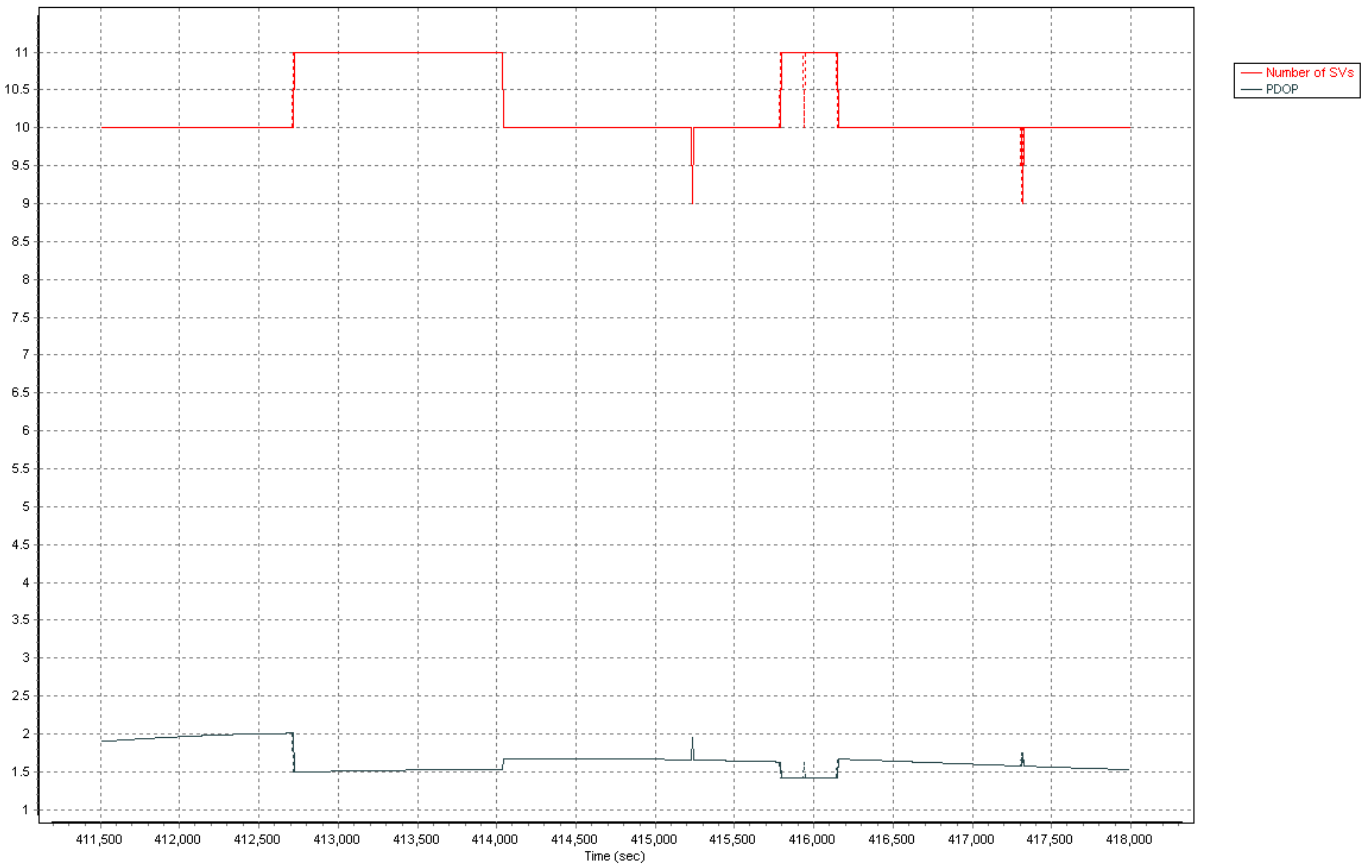

Processing mode
Forward
Reverse
3
2
1
0
316,500
317,000
317,500
318,000
318,500
319,000
319,500
320,000
320,500
321,000
321,500
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR

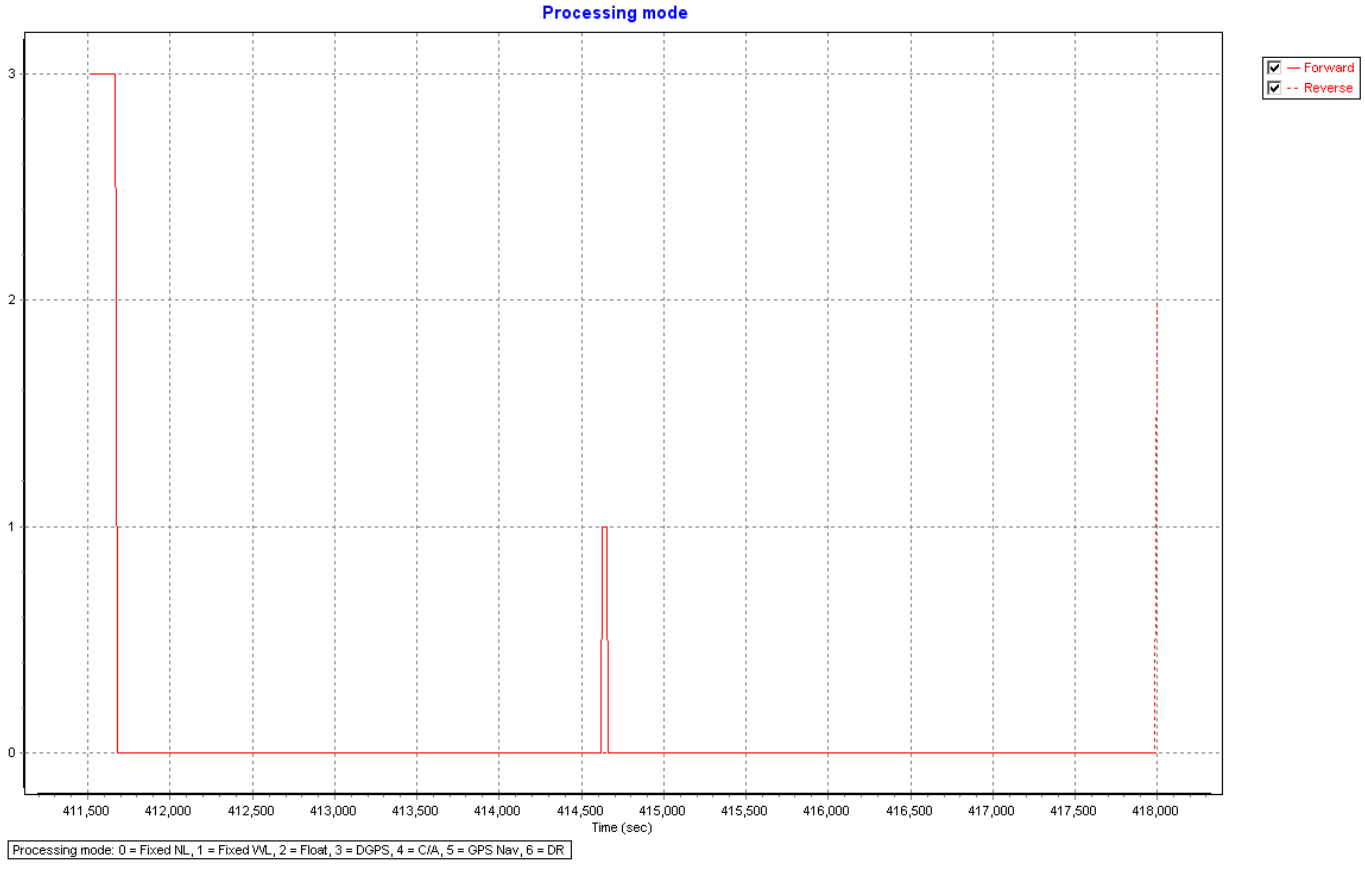

POSPac MMS - 130605a-240
File Edit View Project Select Run Reports Tools Window Help
Project Explorer
130605a-240
130605a-240
Plan View
40000
20000
0
-20000
10000 m
Post-processed (SBET)
Real-time Vehicle Frame (VNAV)
Start ULT
GNSS-Inertial Processor
Settings
Mission: 130605a-240
GNSS Mode: Single Base Station
Stabilized Mount: None
Base Station: DEFAULT
Status
Termination Status Normal
Position Accuracy:
.001 .01 0.1 1.0 10 100m
Message Log
VWCN Forward-Backward Smoother (Jun 16 2010)
Copyright (c) 2005-2010 Applanix Corporation. All ri
Date : 06/24/13 Time : 00:10:15
Processed data path : D:\OAHU\130605a-240
Processed data kernel : 130605a-240
Nominal IIN time increment : 0.0050
Output SBET time increment : 0.0050
316259.002 : Processing started
321298.010 : Processing ended
Termination status : Normal
Execution time : 48.05
Processing completed.
End of processing
Run
Close
Snap Meter GPS
37129.318 m, 37379.642 m

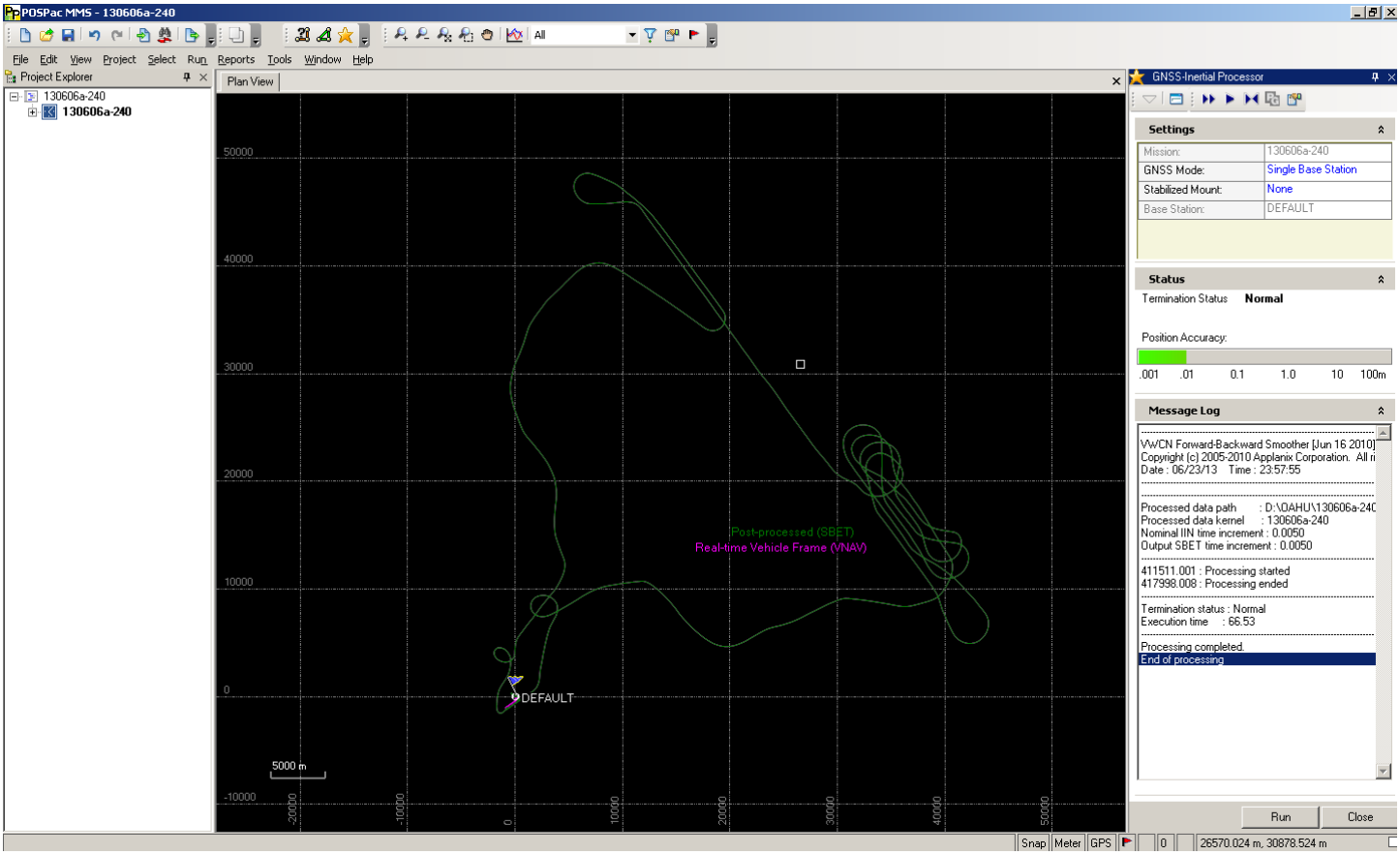
130606a-240


Baseline Length (m)
Forward
Reverse
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
411,500
412,000
412,500
413,000
413,500
414,000
414,500
415,000
415,500
416,000
416,500
417,000
417,500
418,000
Time (sec)

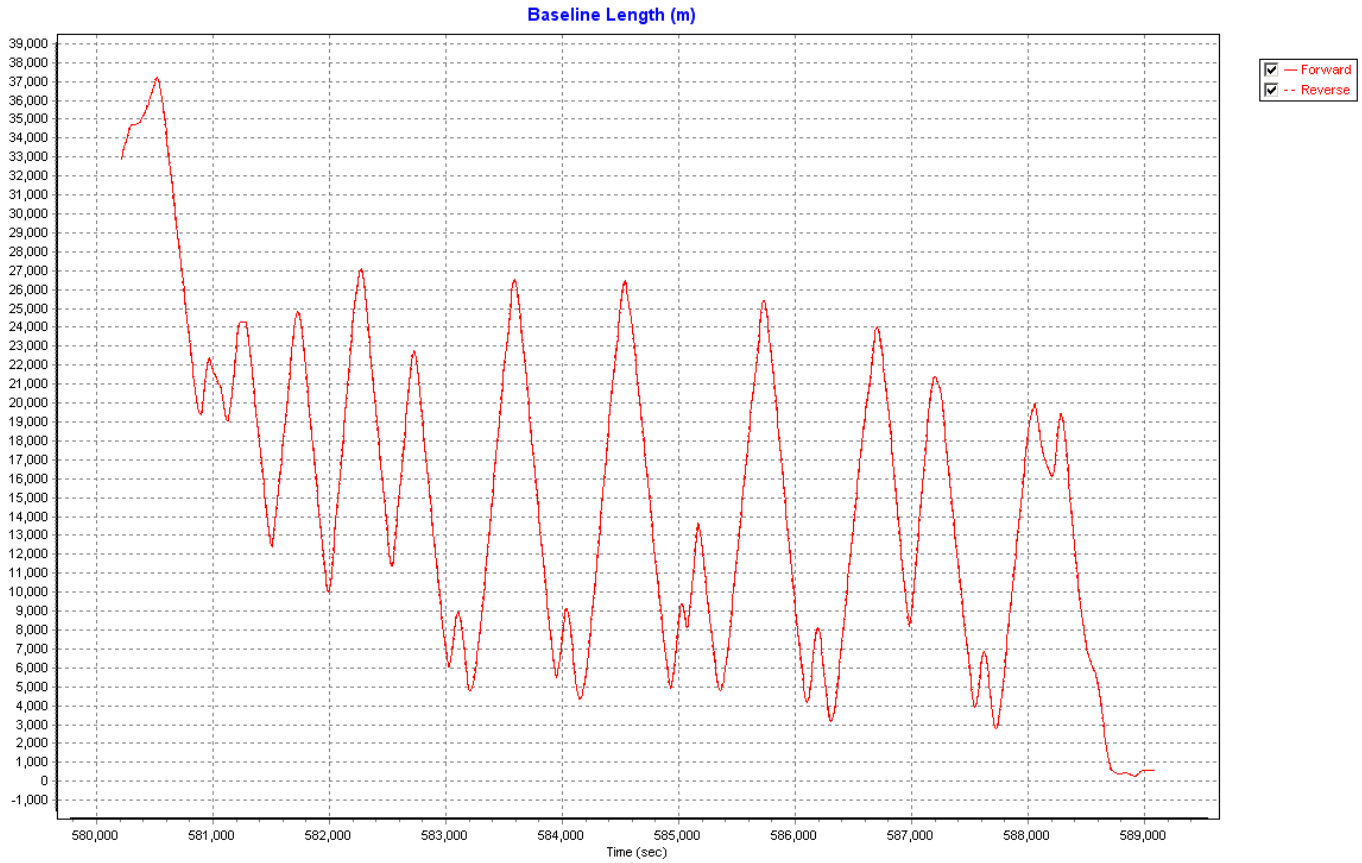

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.045
0.044
0.043
0.042
0.041
0.04
0.039
0.038
0.037
0.036
0.035
0.034
0.033
0.032
0.031
0.03
0.029
0.028
0.027
0.026
0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
411,500
412,000
412,500
413,000
413,500
414,000
414,500
415,000
415,500
416,000
416,500
417,000
417,500
418,000
Time (sec)


Number of SVs
PDOP
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
411,500
412,000
412,500
413,000
413,500
414,000
414,500
415,000
415,500
416,000
416,500
417,000
417,500
418,000
Time (sec)

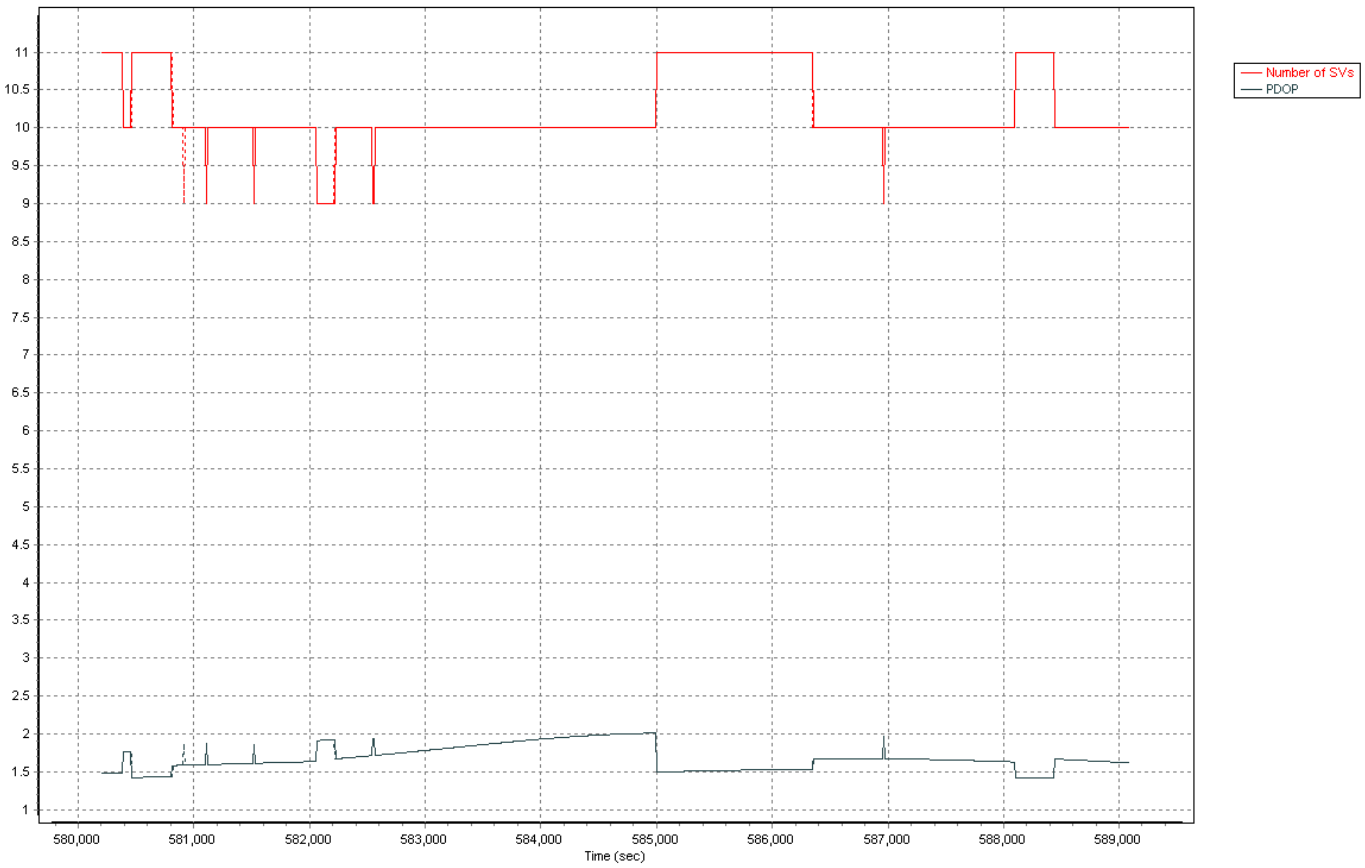

Processing mode
Forward
Reverse
3
2
1
0
411,500
412,000
412,500
413,000
413,500
414,000
414,500
415,000
415,500
416,000
416,500
417,000
417,500
418,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR

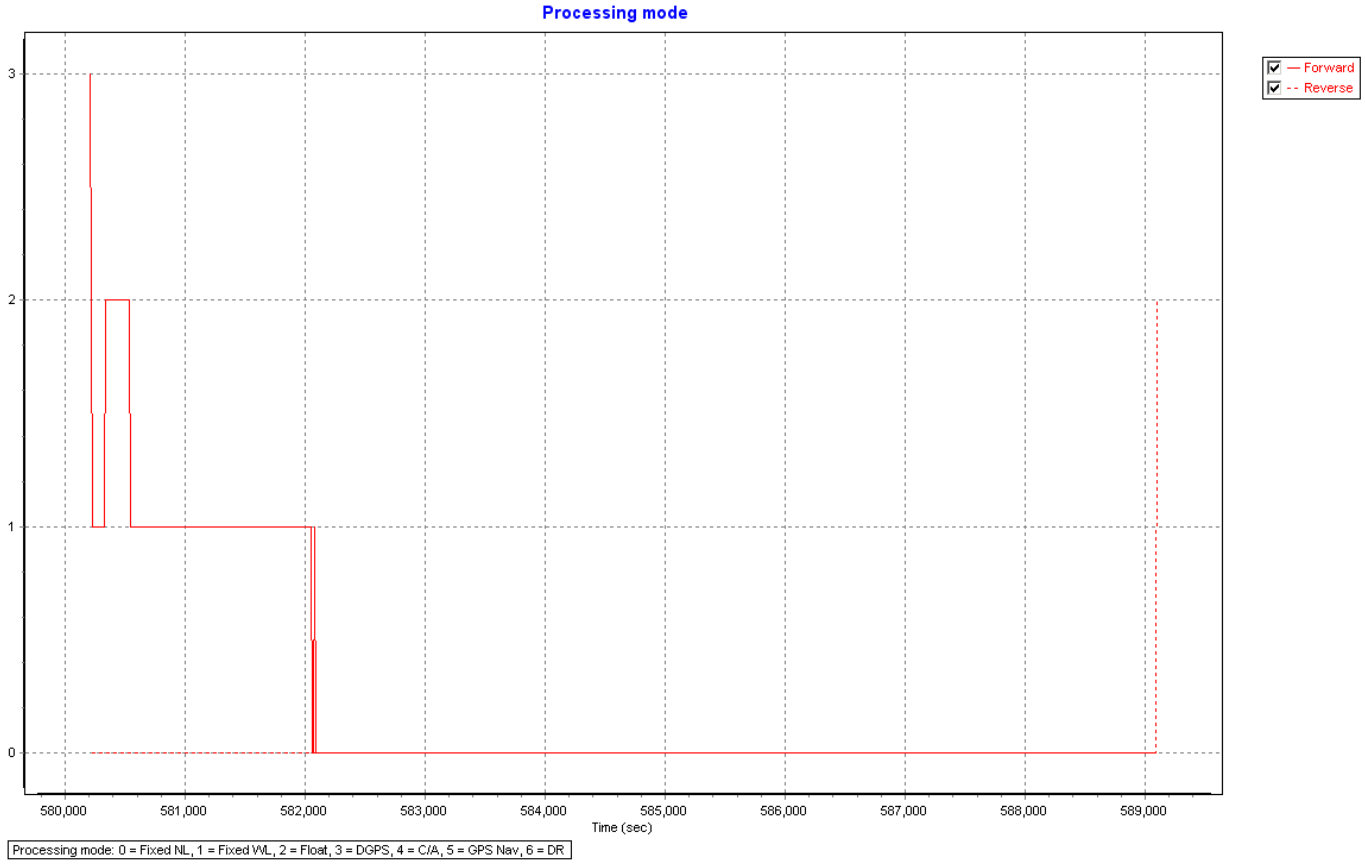

POSPac MMS - 130606a-240
File Edit View Project Select Run Reports Tools Window Help
Project Explorer
130606a-240
130606a-240
Plan View
50000
40000
30000
20000
10000
0
-10000
Post-processed (SBET)
Real-time Vehicle Frame (VNAV)
DEFAULT
5000 m
GNSS-Inertial Processor
Settings
Mission: 130606a-240
GNSS Mode: Single Base Station
Stabilized Mount: None
Base Station: DEFAULT
Status
Termination Status Normal
Position Accuracy:
.001 .01 0.1 1.0 10 100m
Message Log
VWCN Forward-Backward Smoother (Jun 16 2010)
Copyright (c) 2005-2010 Applanix Corporation. All ri
Date : 06/23/13 Time : 23:57:55
Processed data path : D:\OAHU\130606a-240
Processed data kernel : 130606a-240
Nominal IIN time increment : 0.0050
Output SBET time increment : 0.0050
411511.001 : Processing started
417998.008 : Processing ended
Termination status : Normal
Execution time : 66.53
Processing completed.
End of processing
Run
Close
Snap
Meter
GPS
26570.024 m, 30878.524 m

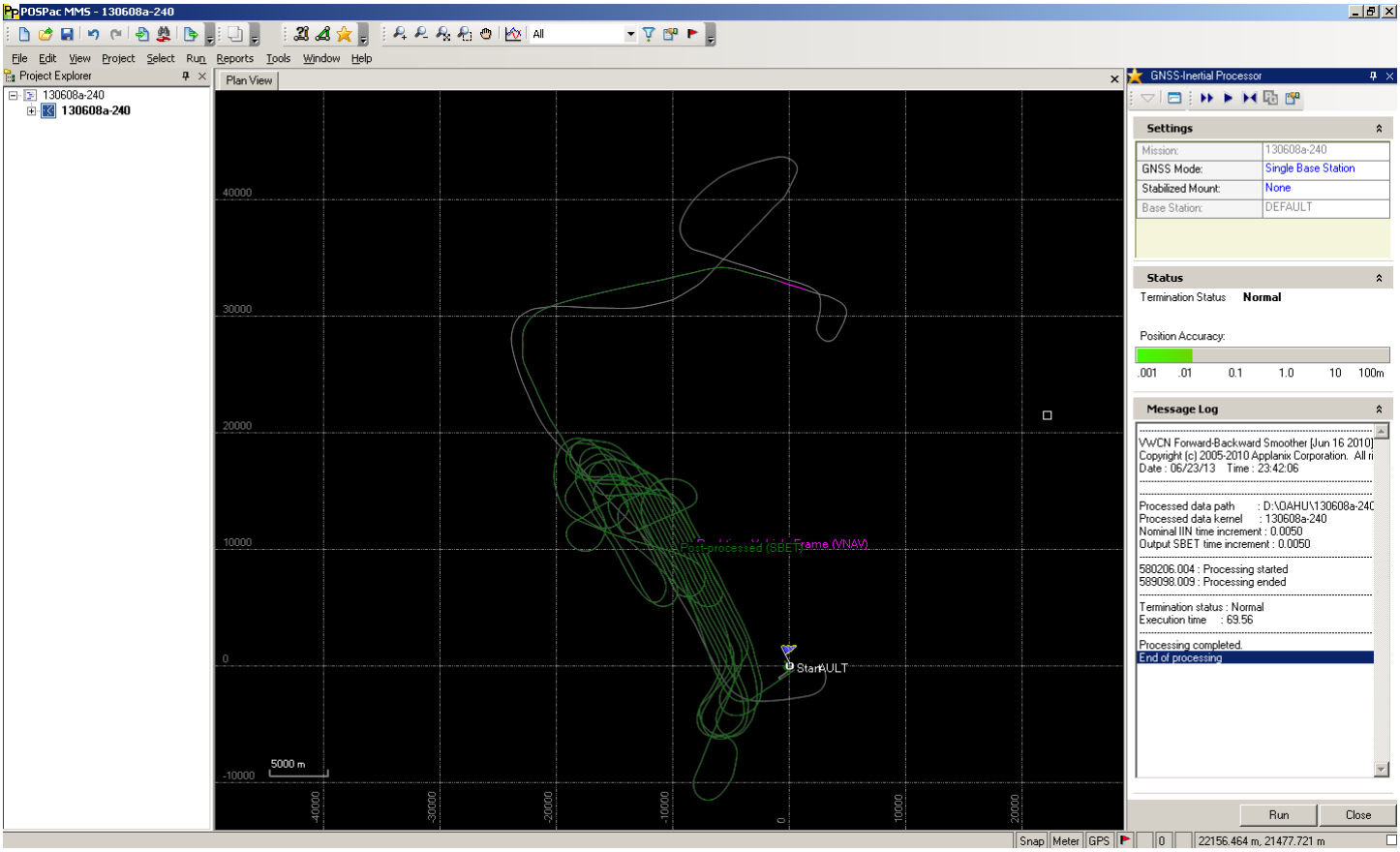
130608a-240


Baseline Length (m)
39,000
38,000
37,000
36,000
35,000
34,000
33,000
32,000
31,000
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
580,000
581,000
582,000
583,000
584,000
585,000
586,000
587,000
588,000
589,000
Time (sec)
Forward
Reverse


0.066
0.064
0.062
0.06
0.058
0.056
0.054
0.052
0.05
0.048
0.046
0.044
0.042
0.04
0.038
0.036
0.034
0.032
0.03
0.028
0.026
0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
580,000
581,000
582,000
583,000
584,000
585,000
586,000
587,000
588,000
589,000
Time (sec)
North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)


Number of SVs
PDOP
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
580,000
581,000
582,000
583,000
584,000
585,000
586,000
587,000
588,000
589,000
Time (sec)


Processing mode
Forward
Reverse
3
2
1
0
580,000
581,000
582,000
583,000
584,000
585,000
586,000
587,000
588,000
589,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


POSPac MMS - 130608a-240
File Edit View Project Select Run Reports Tools Window Help
Project Explorer
130608a-240
130608a-240
Plan View
40000
30000
20000
10000
0
-10000
5000 m
-40000
-30000
-20000
-10000
0
10000
20000
Start
ULT
GNSS-Inertial Processor
Settings
Mission: 130608a-240
GNSS Mode: Single Base Station
Stabilized Mount: None
Base Station: DEFAULT
Status
Termination Status Normal
Position Accuracy:
.001 .01 0.1 1.0 10 100m
Message Log
VWCN Forward-Backward Smoother (Jun 16 2010)
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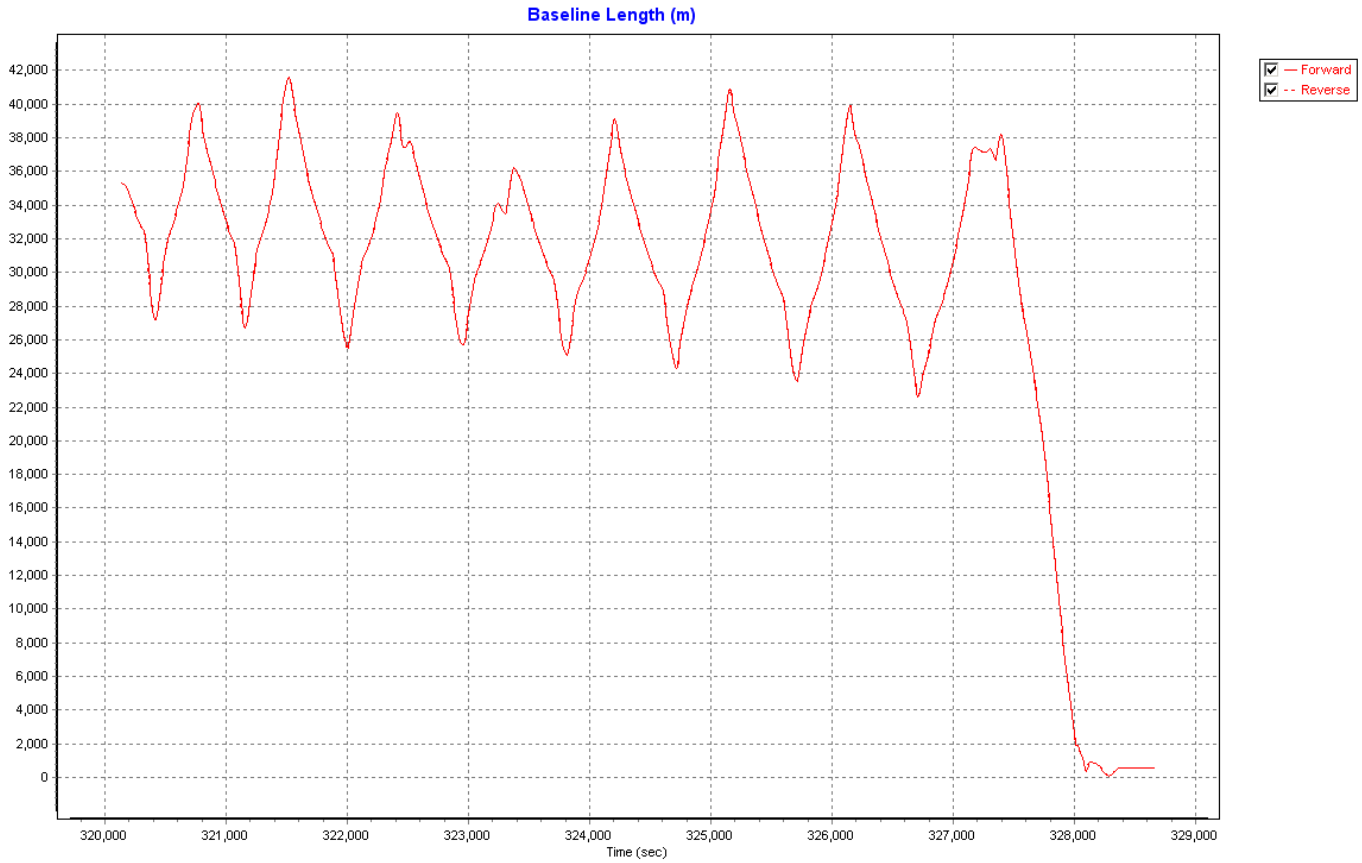
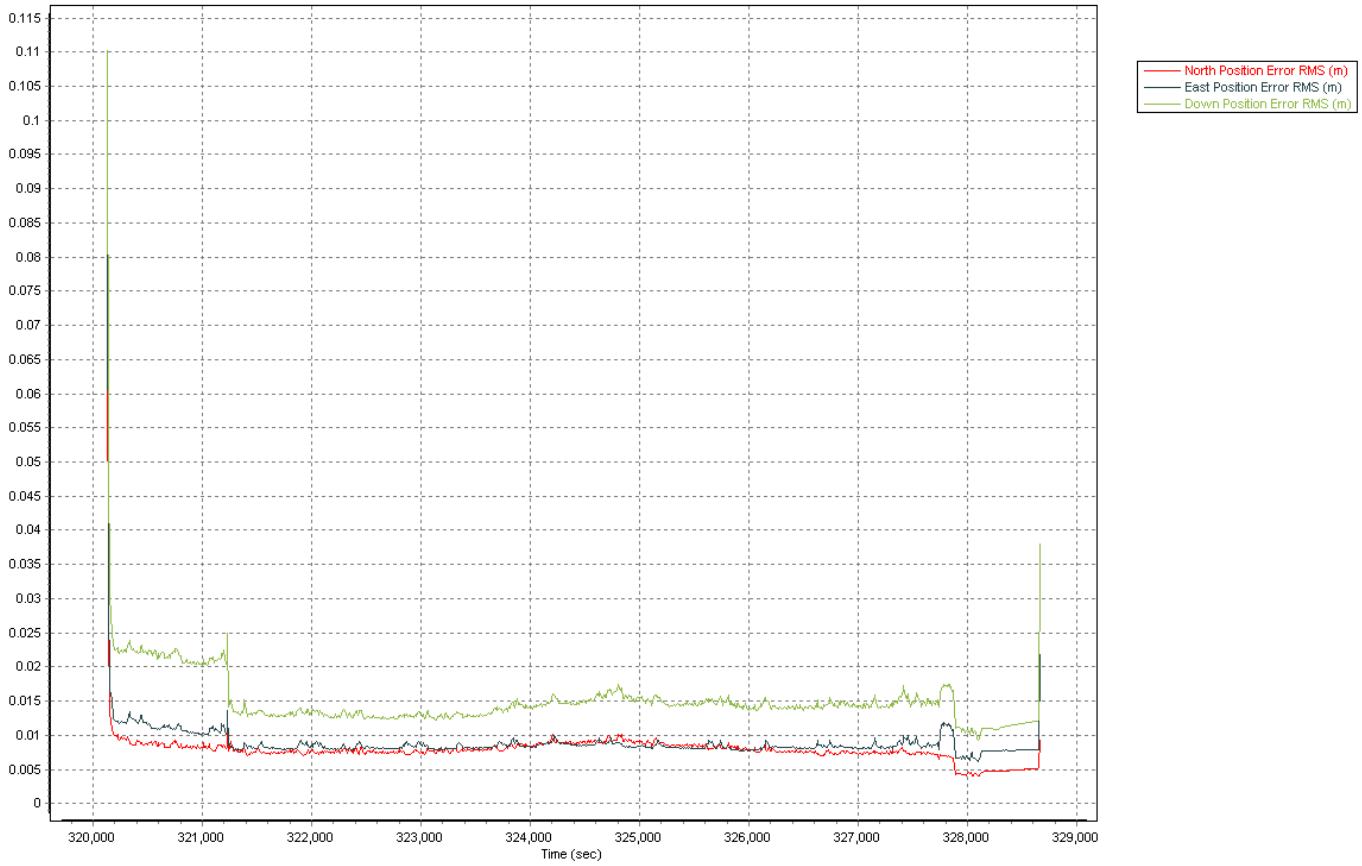
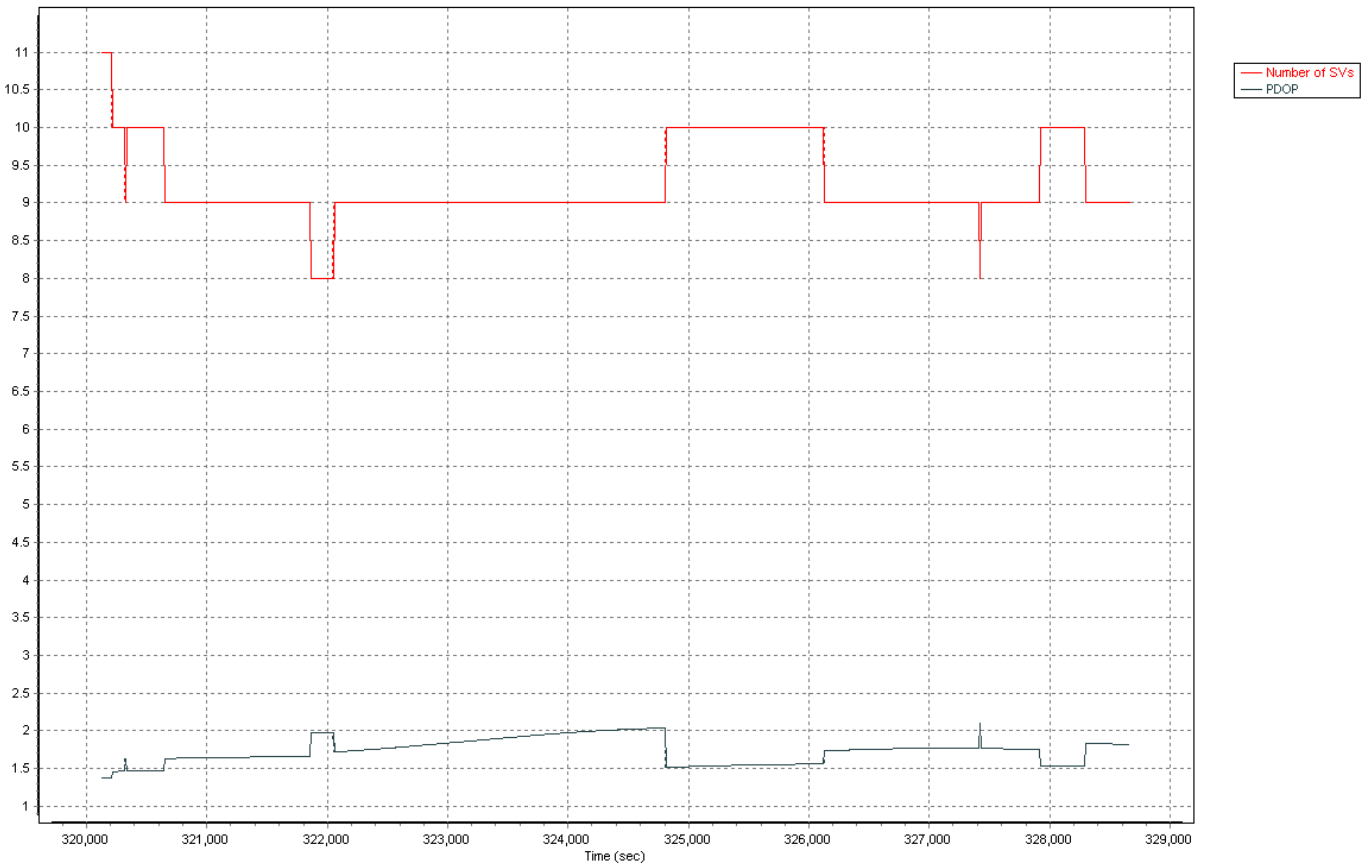
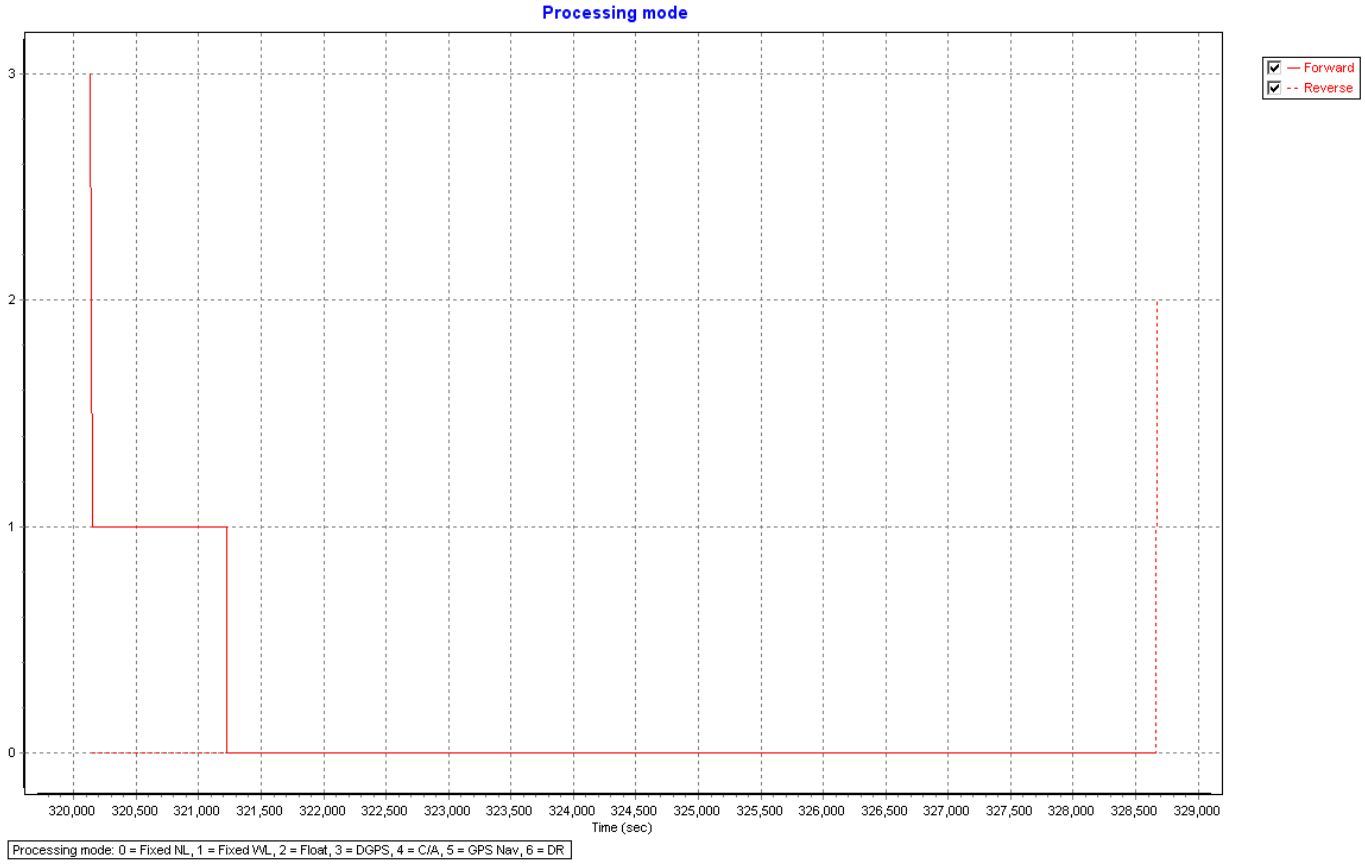
Date : 06/23/13 Time : 23:42:06
Processed data path : D:\OAHU\130608a-240
Processed data kernel : 130608a-240
Nominal IIN time increment : 0.0050
Output SBET time increment : 0.0050
580206.004 : Processing started
589098.009 : Processing ended
Termination status : Normal
Execution time : 69.56
Processing completed.
End of processing
Run
Close
Snap
Meter
GPS
0
22156.464 m, 21477.721 m

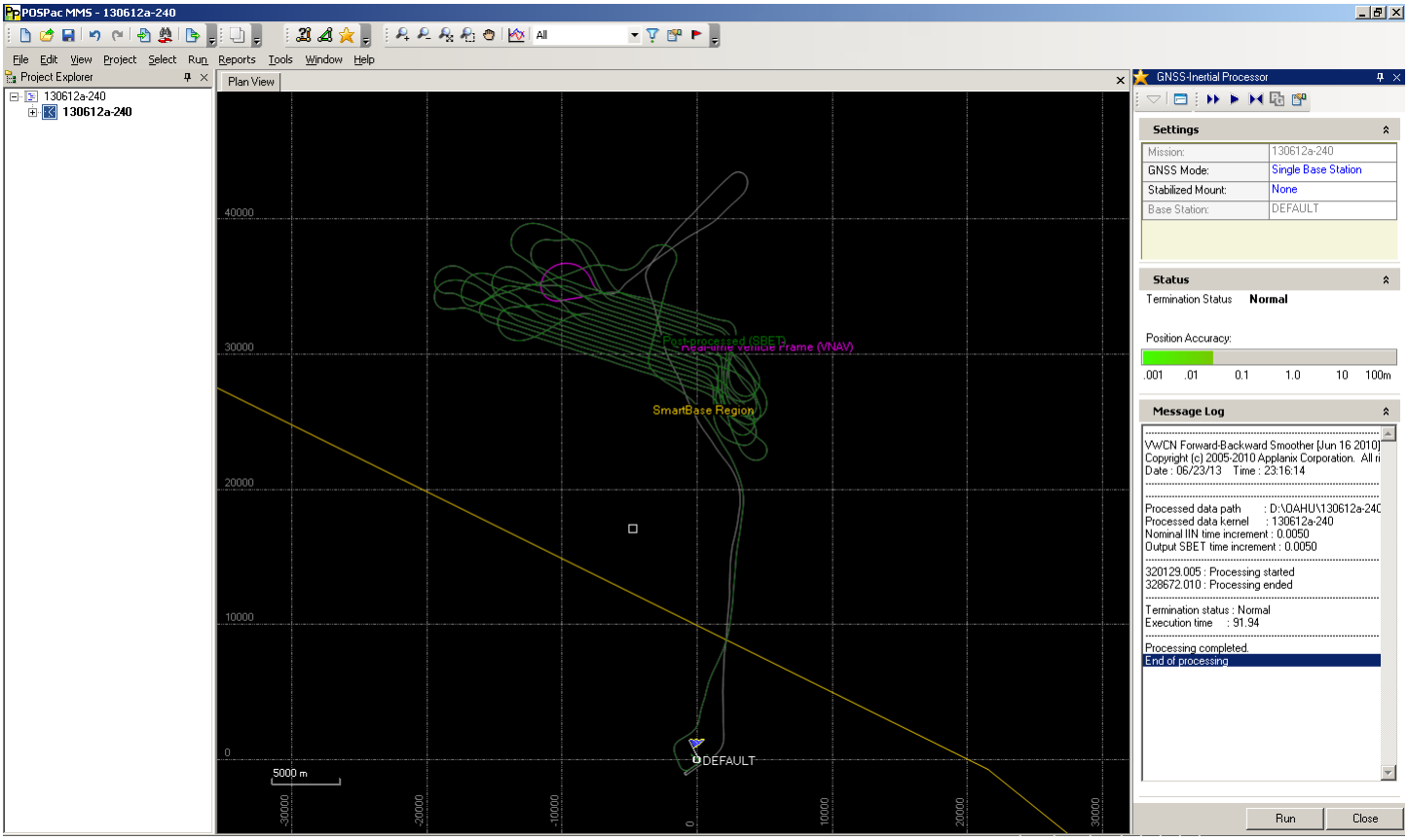
130612a-240


Baseline Length (m)
Forward
Reverse
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
320,000
321,000
322,000
323,000
324,000
325,000
326,000
327,000
328,000
329,000
Time (sec)


North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.115
0.11
0.105
0.1
0.095
0.09
0.085
0.08
0.075
0.07
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
320,000
321,000
322,000
323,000
324,000
325,000
326,000
327,000
328,000
329,000
Time (sec)


Number of SVs
PDOP
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
320,000
321,000
322,000
323,000
324,000
325,000
326,000
327,000
328,000
329,000
Time (sec)


Processing mode
Forward
Reverse
3
2
1
0
320,000
320,500
321,000
321,500
322,000
322,500
323,000
323,500
324,000
324,500
325,000
325,500
326,000
326,500
327,000
327,500
328,000
328,500
329,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


POSPac MMS - 130612a-240
File Edit View Project Select Run Reports Tools Window Help
Project Explorer
130612a-240
130612a-240
Plan View
40000
30000
20000
10000
0
SmartBase Region
DEFAULT
5000 m
-30000
-20000
-10000
0
10000
20000
30000
GNSS-Inertial Processor
Settings
Mission: 130612a-240
GNSS Mode: Single Base Station
Stabilized Mount: None
Base Station: DEFAULT
Status
Termination Status Normal
Position Accuracy:
.001 .01 0.1 1.0 10 100m
Message Log
VWCN Forward-Backward Smoother (Jun 16 2010)
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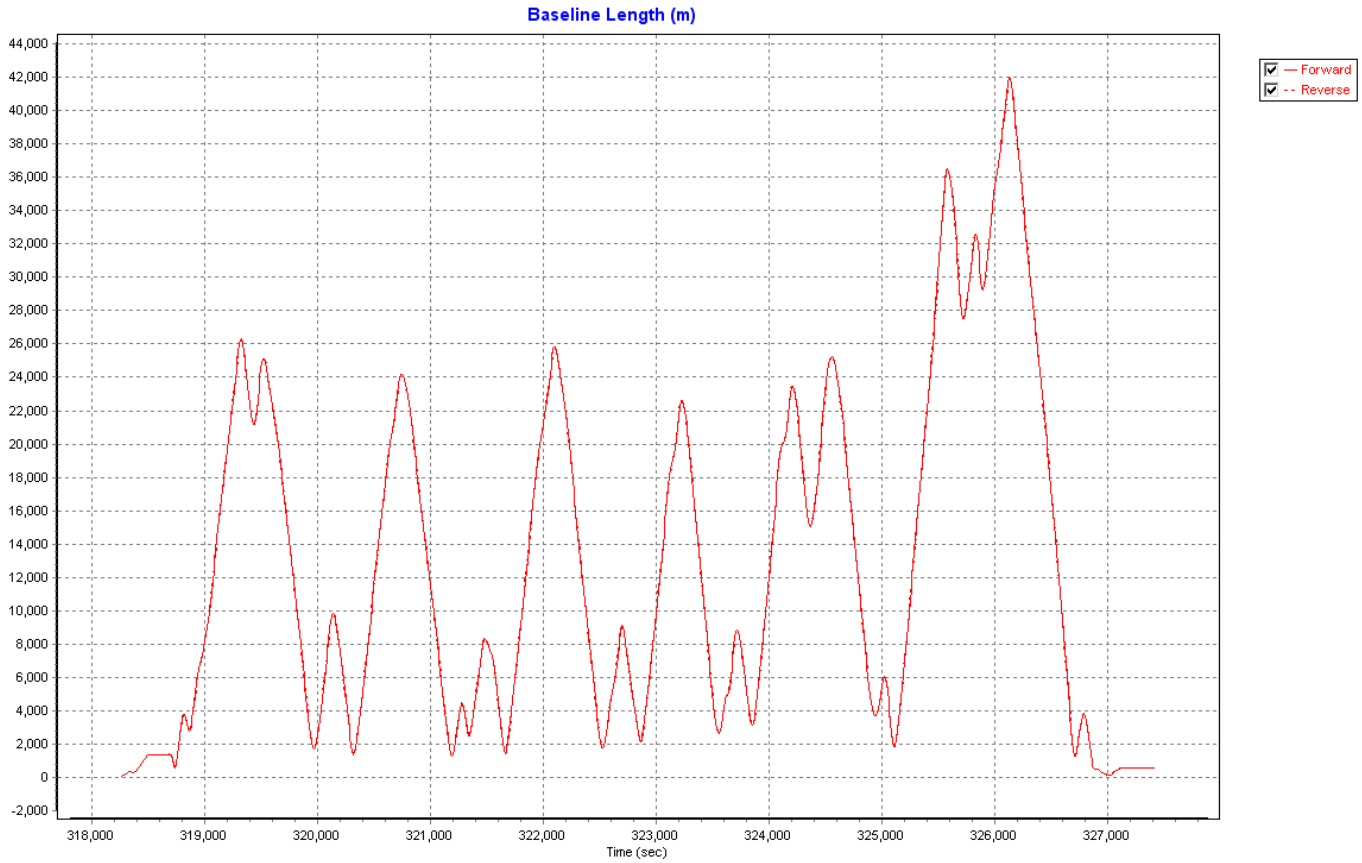
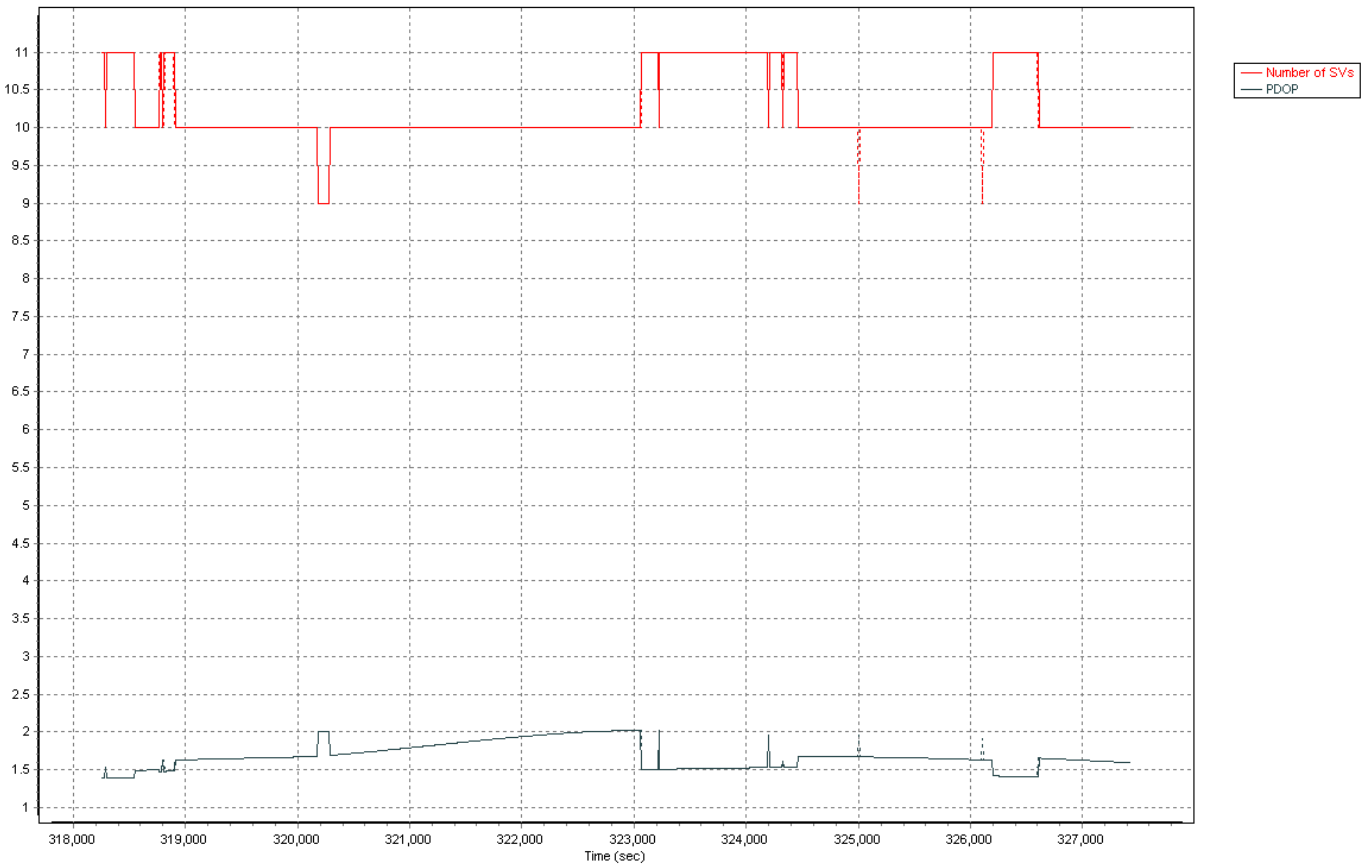
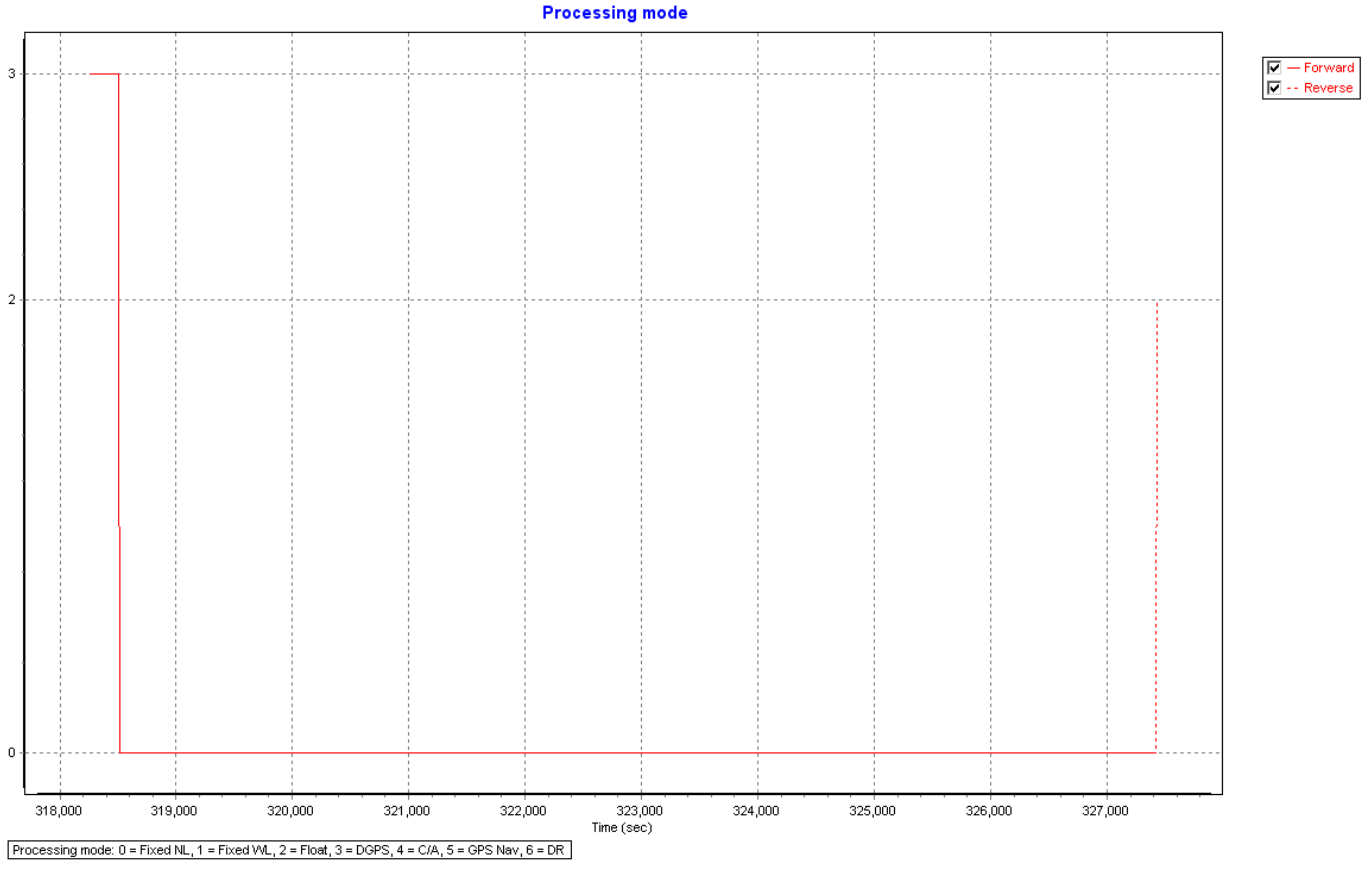
Date : 06/23/13 Time : 23:16:14
Processed data path : D:\OAHU\130612a-240
Processed data kernel : 130612a-240
Nominal IIN time increment : 0.0050
Output SBET time increment : 0.0050
320129.005 : Processing started
328672.010 : Processing ended
Termination status : Normal
Execution time : 91.94
Processing completed.
End of processing
Run
Close

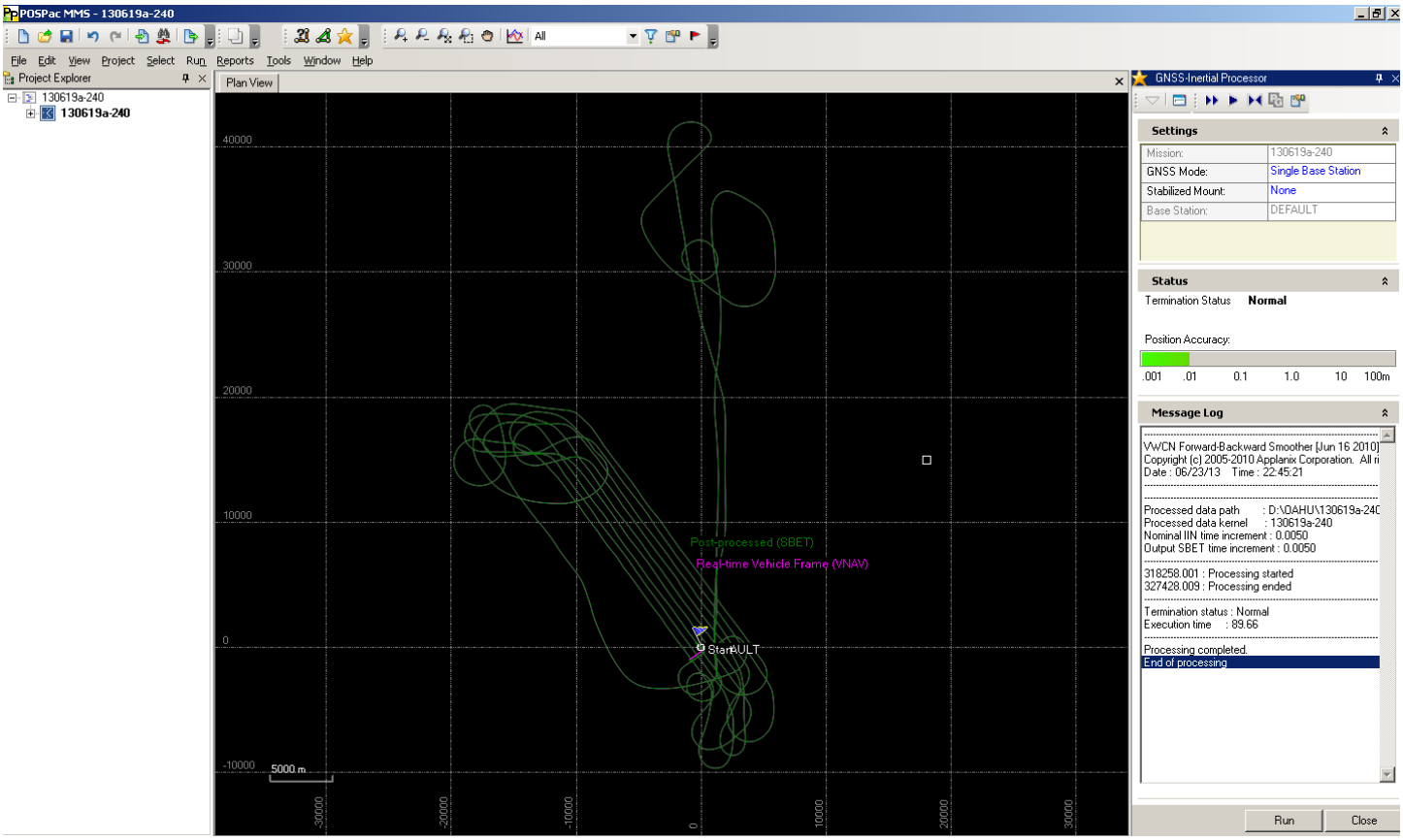
130619a-240


Baseline Length (m)
Forward
Reverse
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
318,000
319,000
320,000
321,000
322,000
323,000
324,000
325,000
326,000
327,000
Time (sec)

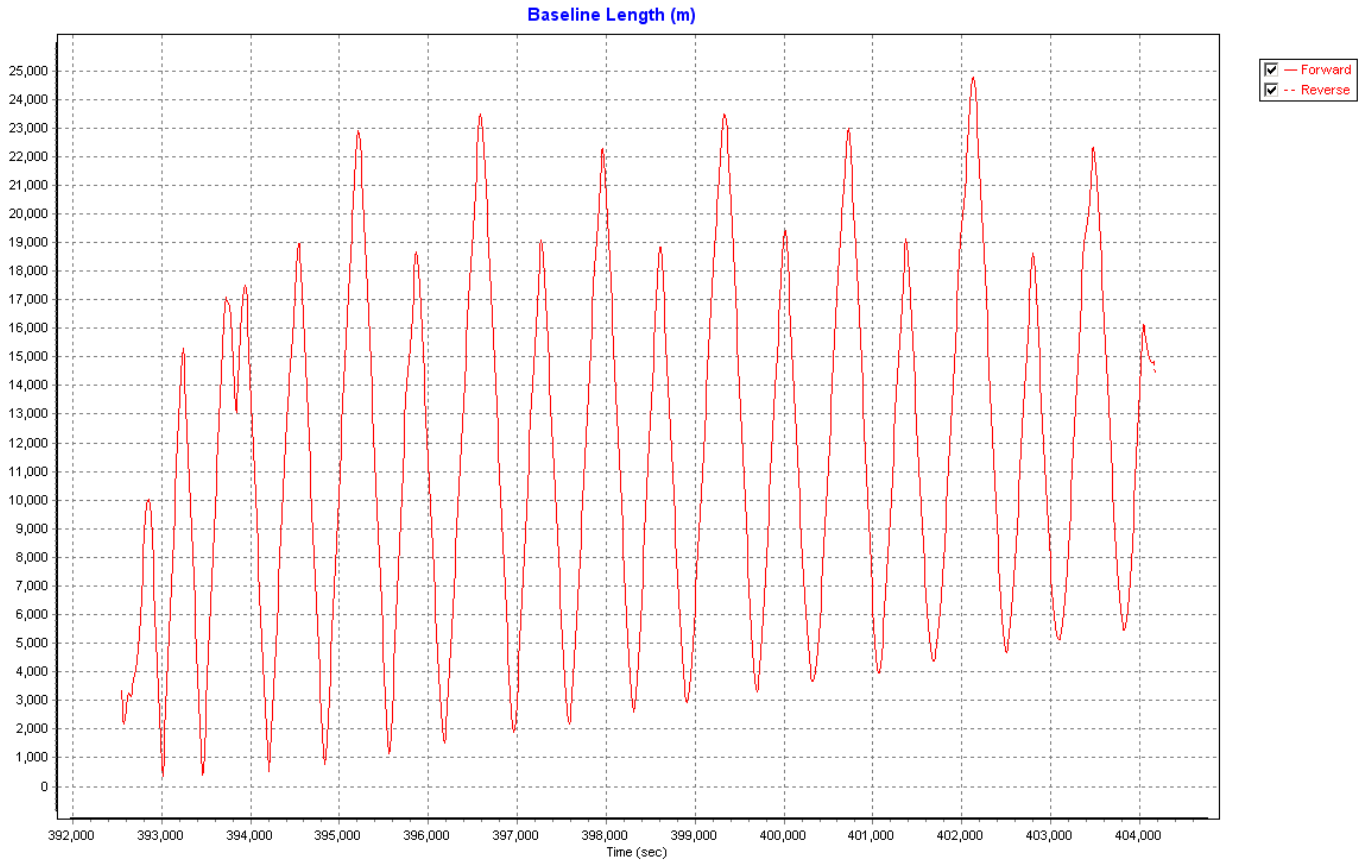

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.02
0.0195
0.019
0.0185
0.018
0.0175
0.017
0.0165
0.016
0.0155
0.015
0.0145
0.014
0.0135
0.013
0.0125
0.012
0.0115
0.011
0.0105
0.01
0.0095
0.009
0.0085
0.008
0.0075
0.007
0.0065
0.006
0.0055
0.005
0.0045
0.004
0.0035
0.003
0.0025
319,000
320,000
321,000
322,000
323,000
324,000
325,000
326,000
327,000
Time (sec)


Number of SVs
PDOP
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
318,000
319,000
320,000
321,000
322,000
323,000
324,000
325,000
326,000
327,000
Time (sec)

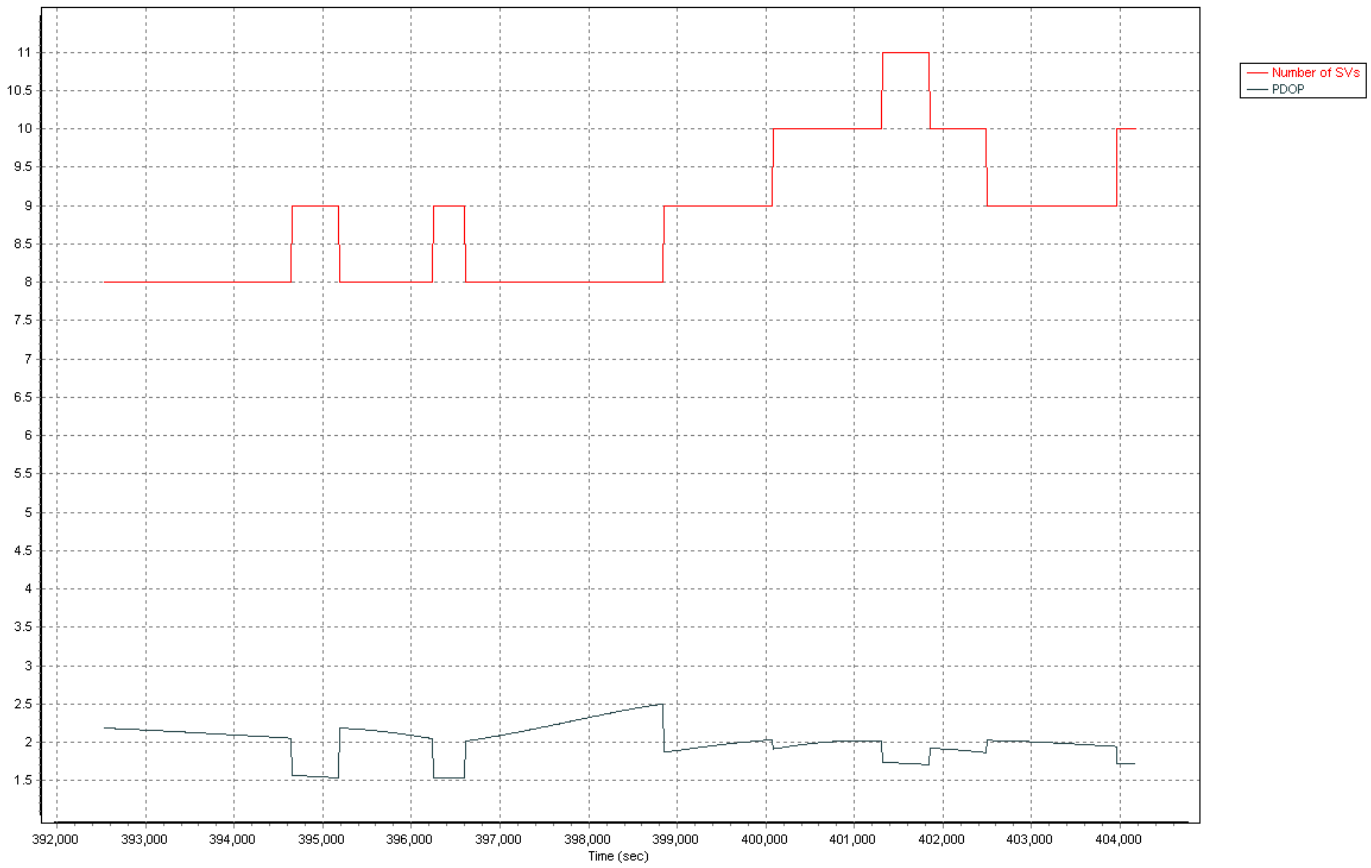

Processing mode
Forward
Reverse
3
2
0
318,000
319,000
320,000
321,000
322,000
323,000
324,000
325,000
326,000
327,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR

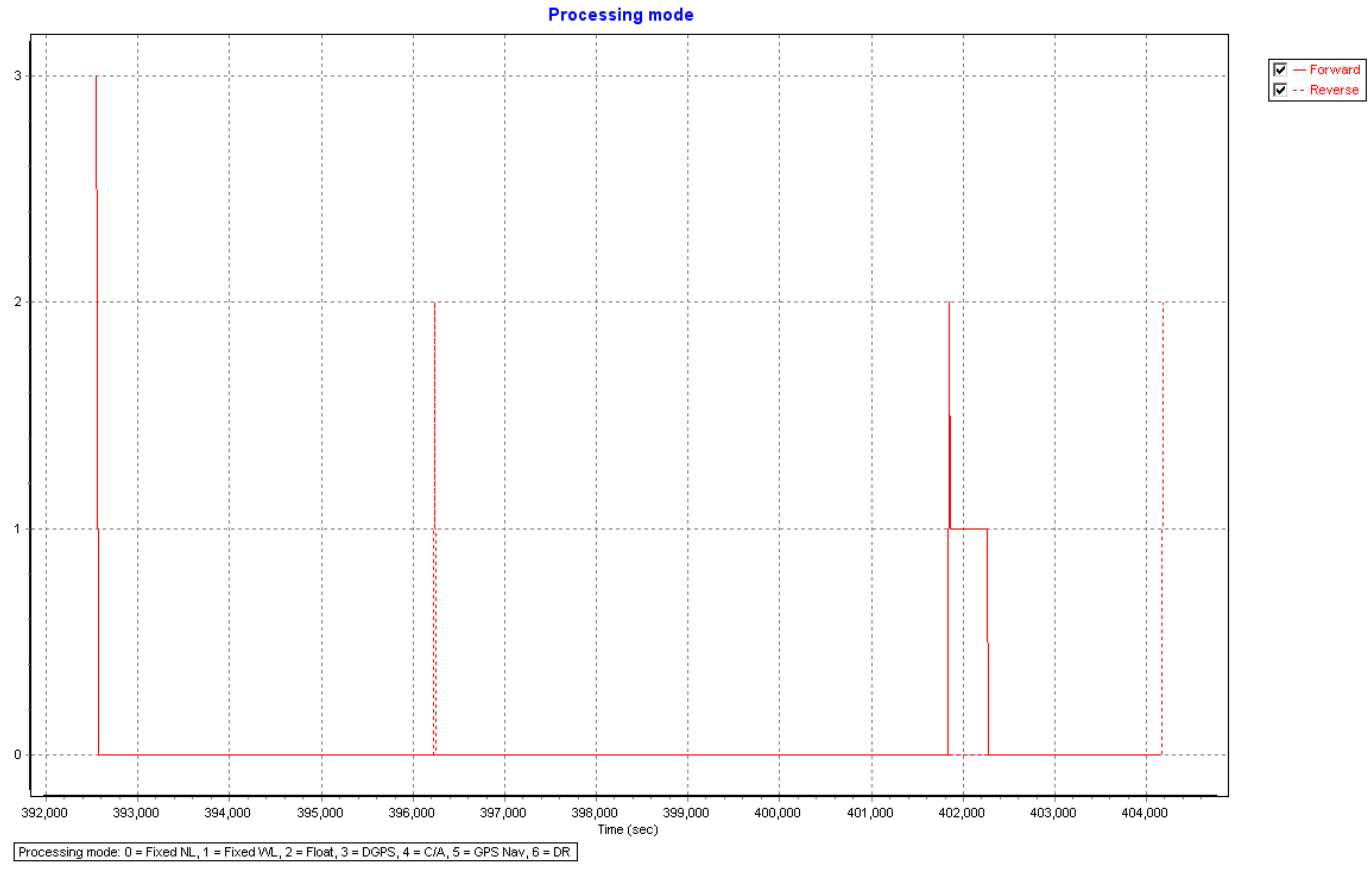

POSPac MMS - 130619a-240
File Edit View Project Select Run Reports Tools Window Help
Project Explorer
130619a-240
130619a-240
Plan View
40000
30000
20000
10000
0
-10000
5000 m
-30000
-20000
-10000
0
10000
20000
30000
Post-processed (SBET)
Real-time Vehicle Frame (VNAV)
StartAULT
GNSS-Inertial Processor
Settings
Mission: 130619a-240
GNSS Mode: Single Base Station
Stabilized Mount: None
Base Station: DEFAULT
Status
Termination Status Normal
Position Accuracy:
.001 .01 0.1 1.0 10 100m
Message Log
VWCN Forward-Backward Smoother (Jun 16 2010)
Copyright (c) 2005-2010 Applanix Corporation. All ri
Date : 06/23/13 Time : 22:45:21
Processed data path : D:\OAHU\130619a-240
Processed data kernel : 130619a-240
Nominal IIN time increment : 0.0050
Output SBET time increment : 0.0050
318258.001 : Processing started
327428.009 : Processing ended
Termination status : Normal
Execution time : 89.66
Processing completed.
End of processing
Run
Close

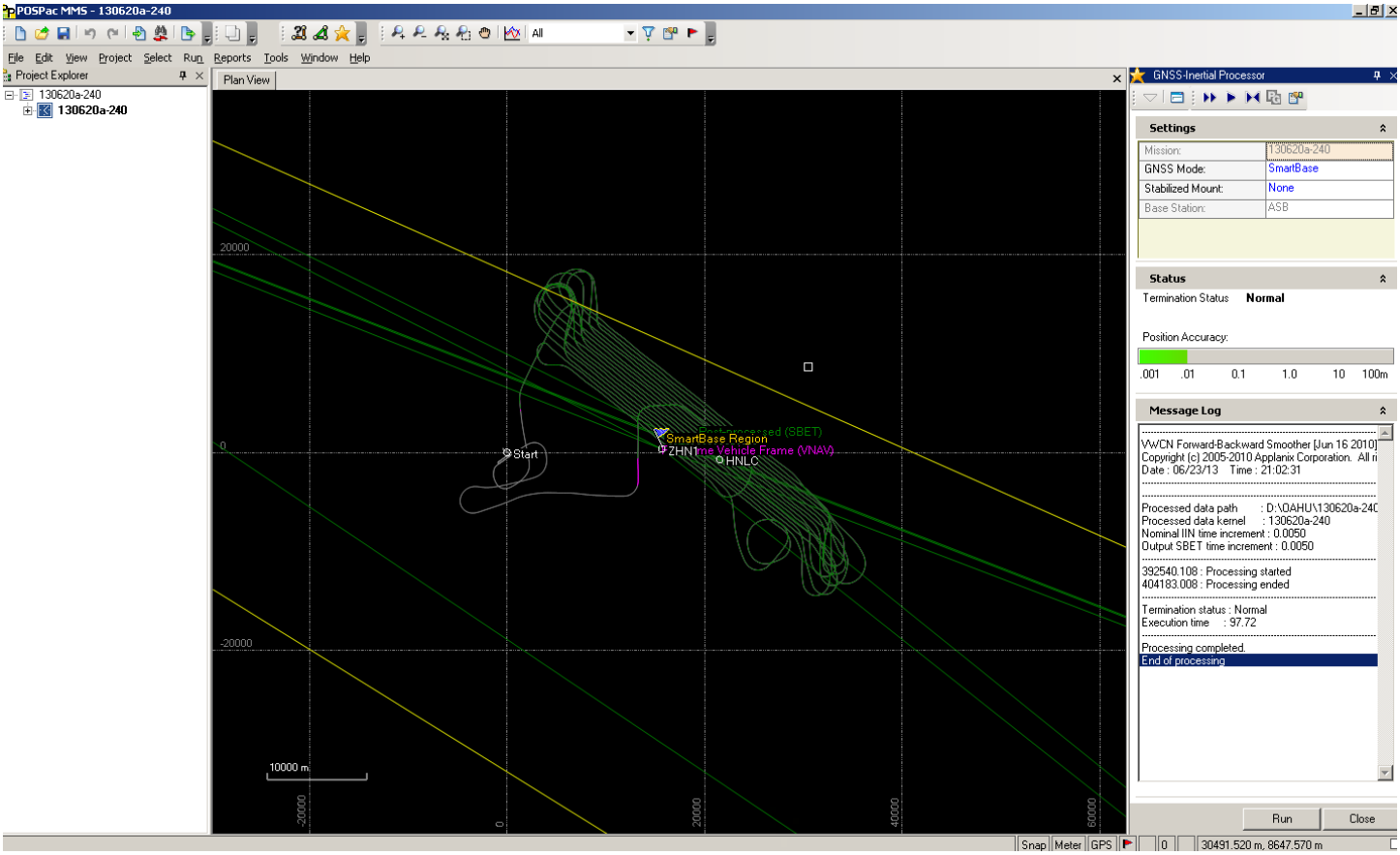
130620a-240


Baseline Length (m)
Forward
Reverse
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
392,000
393,000
394,000
395,000
396,000
397,000
398,000
399,000
400,000
401,000
402,000
403,000
404,000
Time (sec)

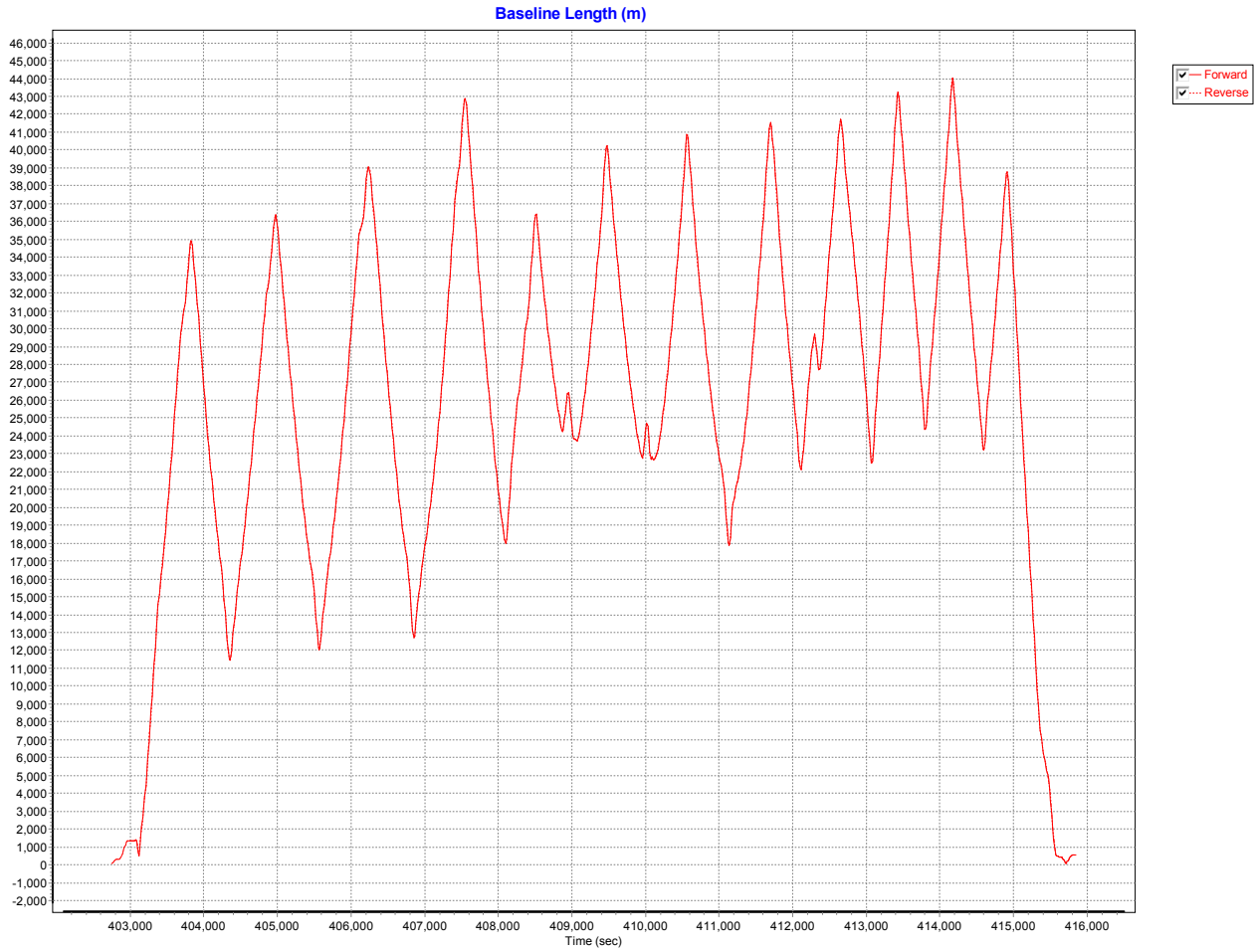

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.02
0.0195
0.019
0.0185
0.018
0.0175
0.017
0.0165
0.016
0.0155
0.015
0.0145
0.014
0.0135
0.013
0.0125
0.012
0.0115
0.011
0.0105
0.01
0.0095
0.009
0.0085
0.008
0.0075
0.007
0.0065
0.006
0.0055
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
-0.0005
394,000
396,000
398,000
400,000
402,000
404,000
Time (sec)

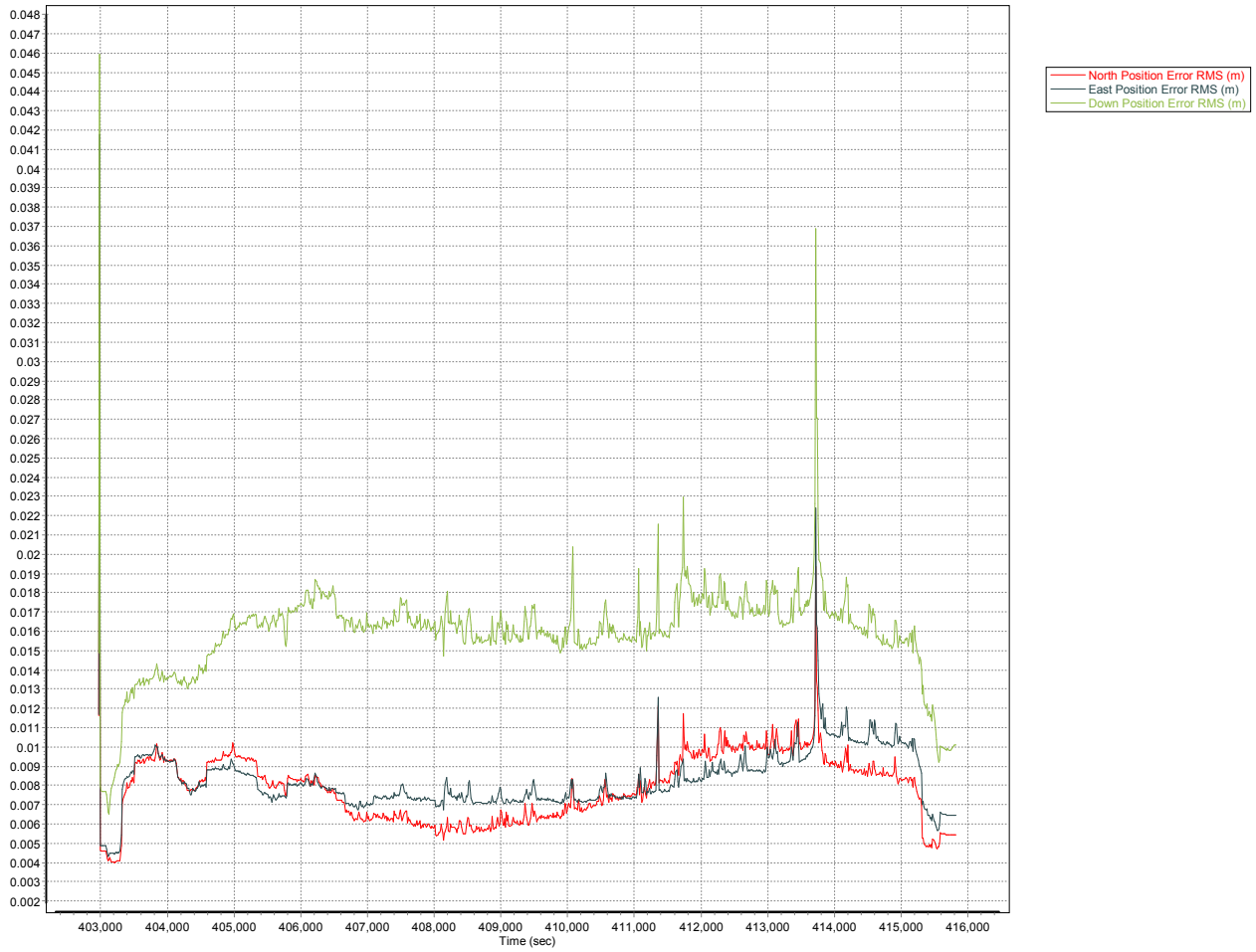

Number of SVs
PDOP
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
392,000
393,000
394,000
395,000
396,000
397,000
398,000
399,000
400,000
401,000
402,000
403,000
404,000
Time (sec)

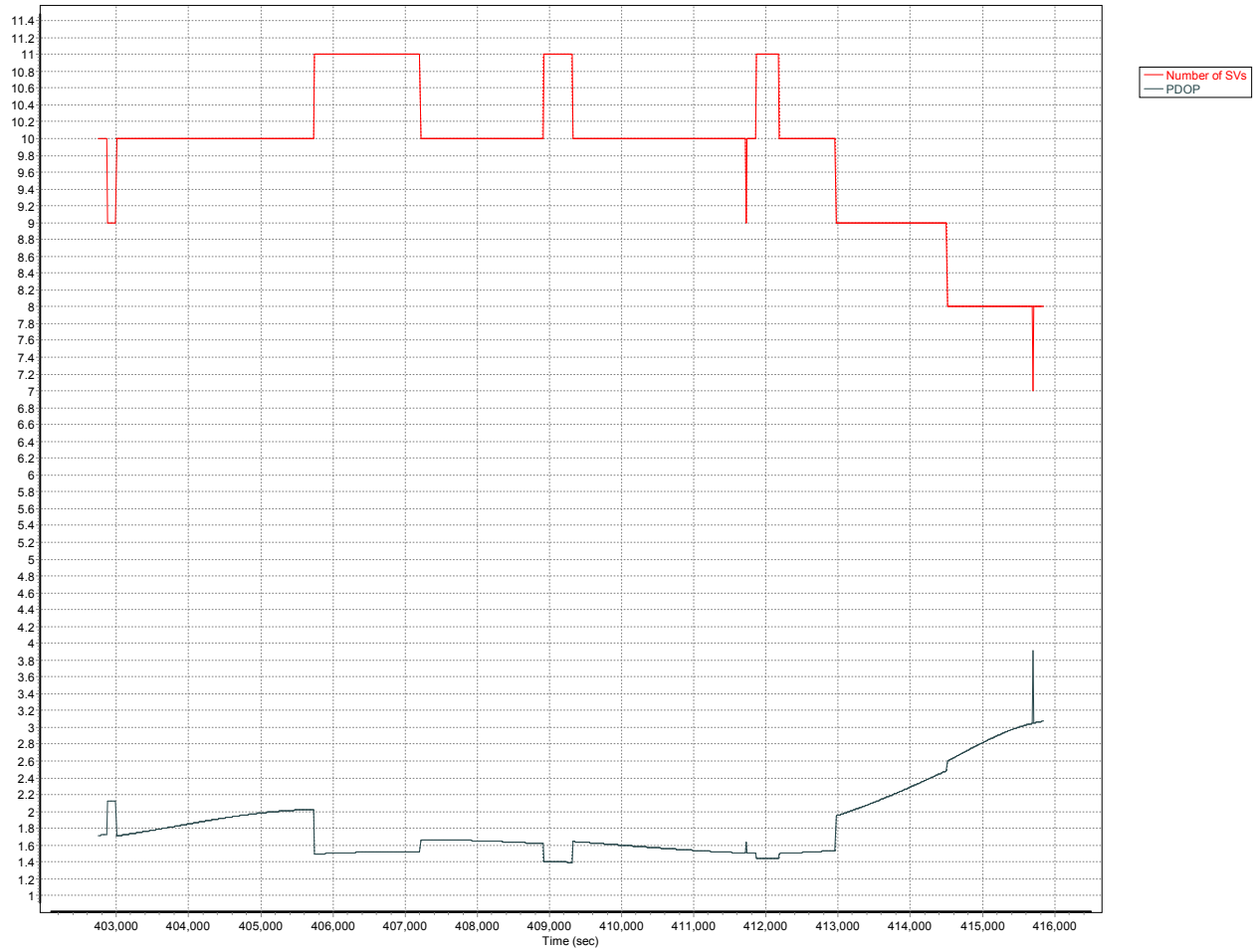

Processing mode
Forward
Reverse
3
2
1
0
392,000
393,000
394,000
395,000
396,000
397,000
398,000
399,000
400,000
401,000
402,000
403,000
404,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


POSPac MMS - 130620a-240
File Edit View Project Select Run Reports Tools Window Help
Project Explorer
130620a-240
130620a-240
Plan View
20000
0
-20000
Start
SmartBase Region
HNLC
10000 m
-20000
0
20000
40000
60000
GNSS-Inertial Processor
Settings
Mission: 130620a-240
GNSS Mode: SmartBase
Stabilized Mount: None
Base Station: ASB
Status
Termination Status Normal
Position Accuracy:
.001 .01 0.1 1.0 10 100m
Message Log
Copyright (c) 2005-2010 Applanix Corporation. All
Date : 06/23/13 Time : 21:02:31
Processed data path : D:\OAHU\130620a-240
Processed data kernel : 130620a-240
Nominal IIN time increment : 0.0050
Output SBET time increment : 0.0050
392540.108 : Processing started
404183.008 : Processing ended
Termination status : Normal
Execution time : 97.72
Processing completed.
End of processing
Run
Close
Snap
Meter
GPS
30491.520 m, 8647.570 m

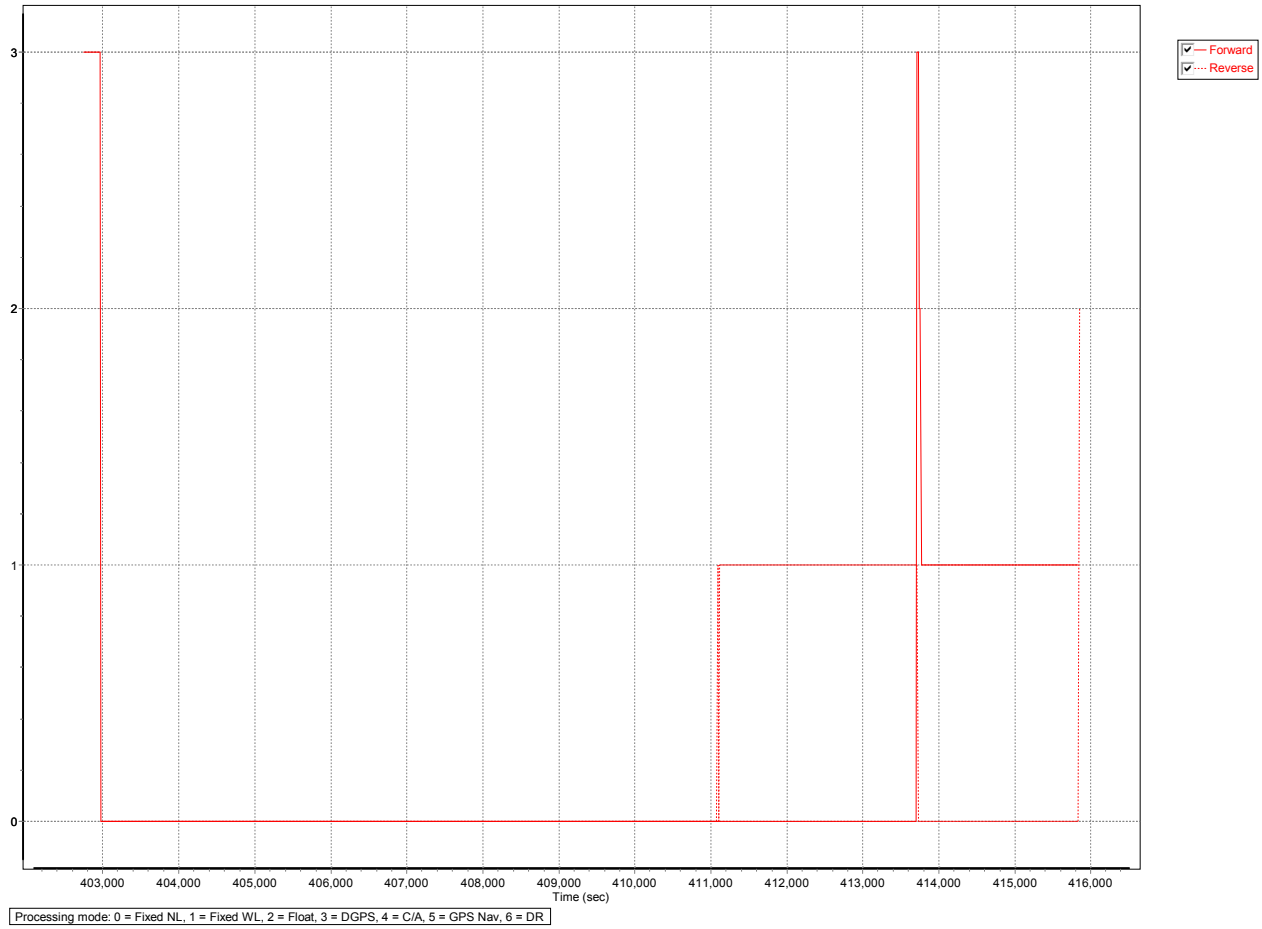
130704a-240


Baseline Length (m)
Forward
Reverse
Time (sec)

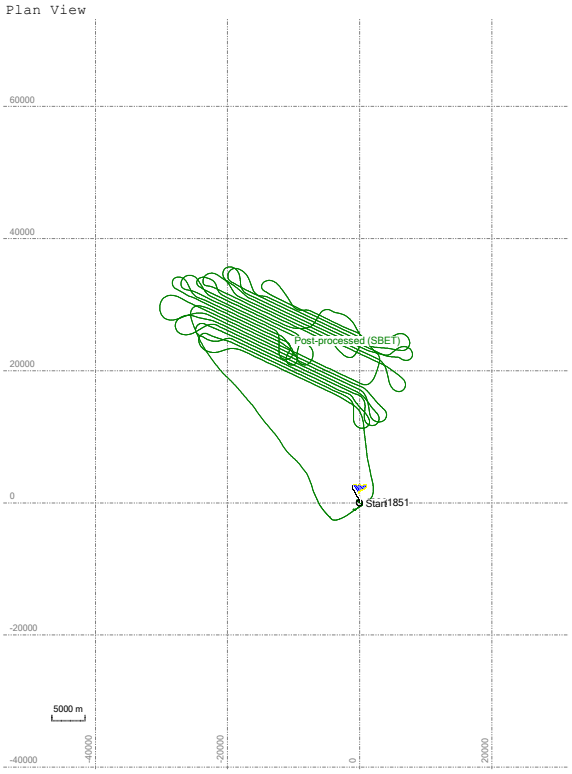

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
Time (sec)



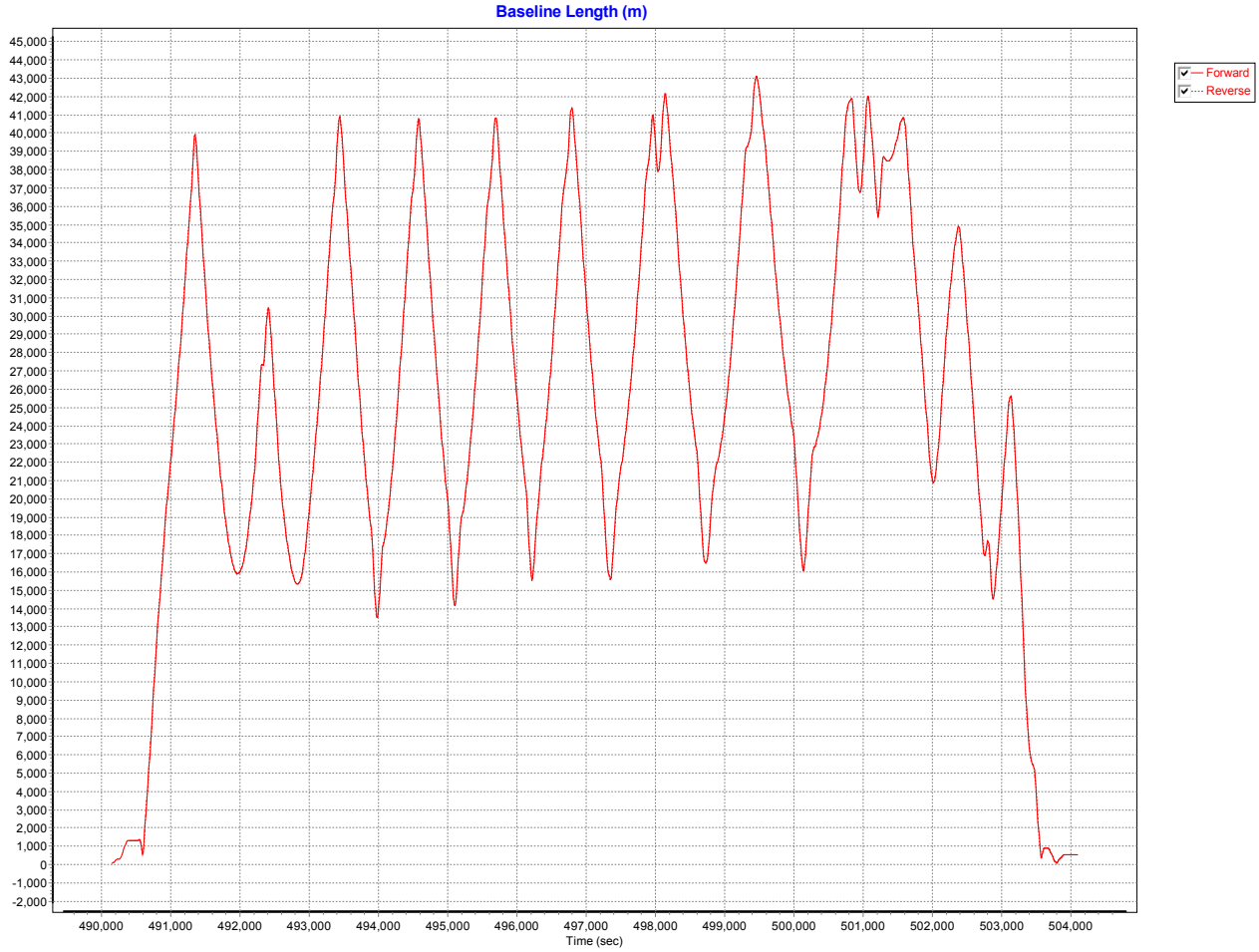
Processing mode

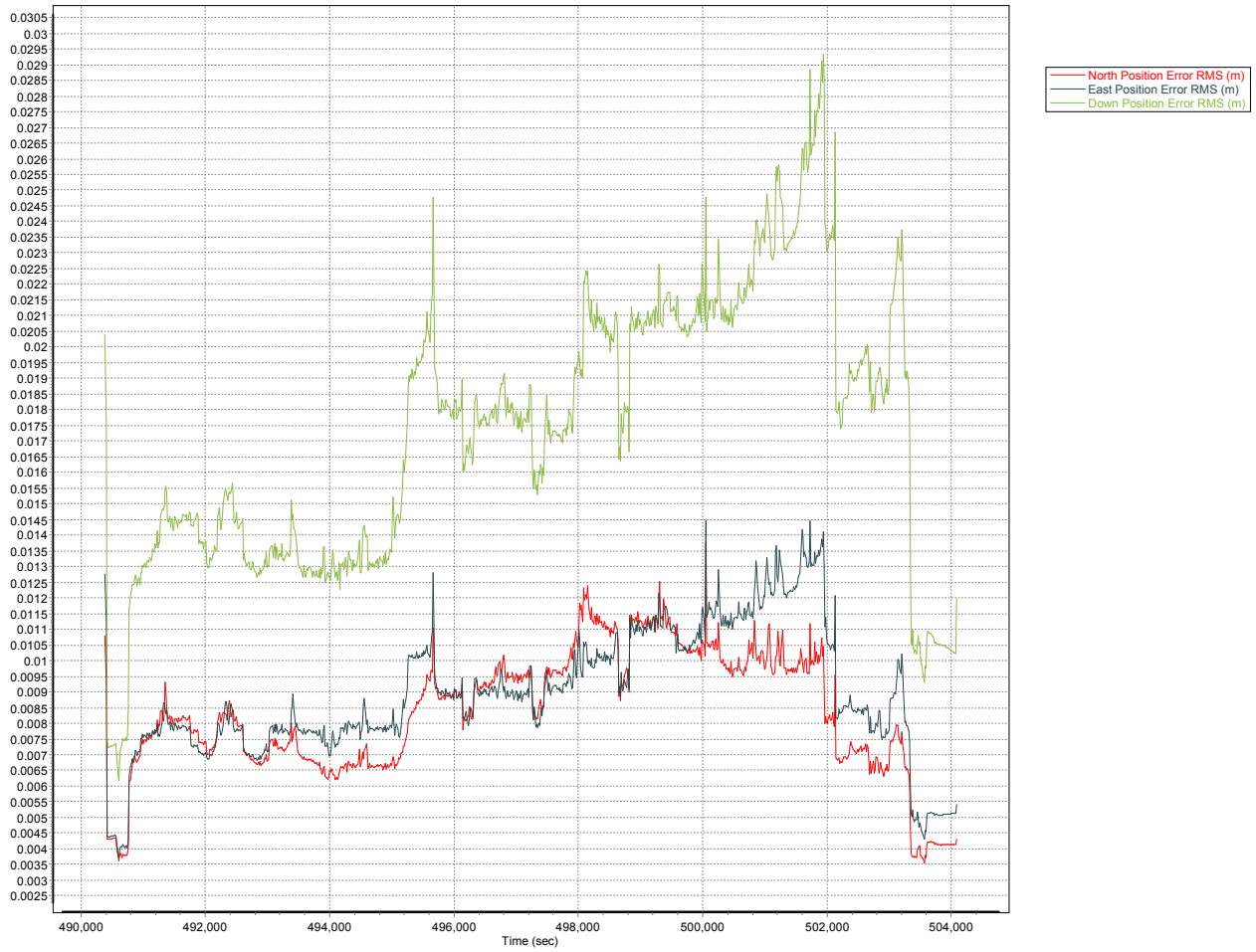


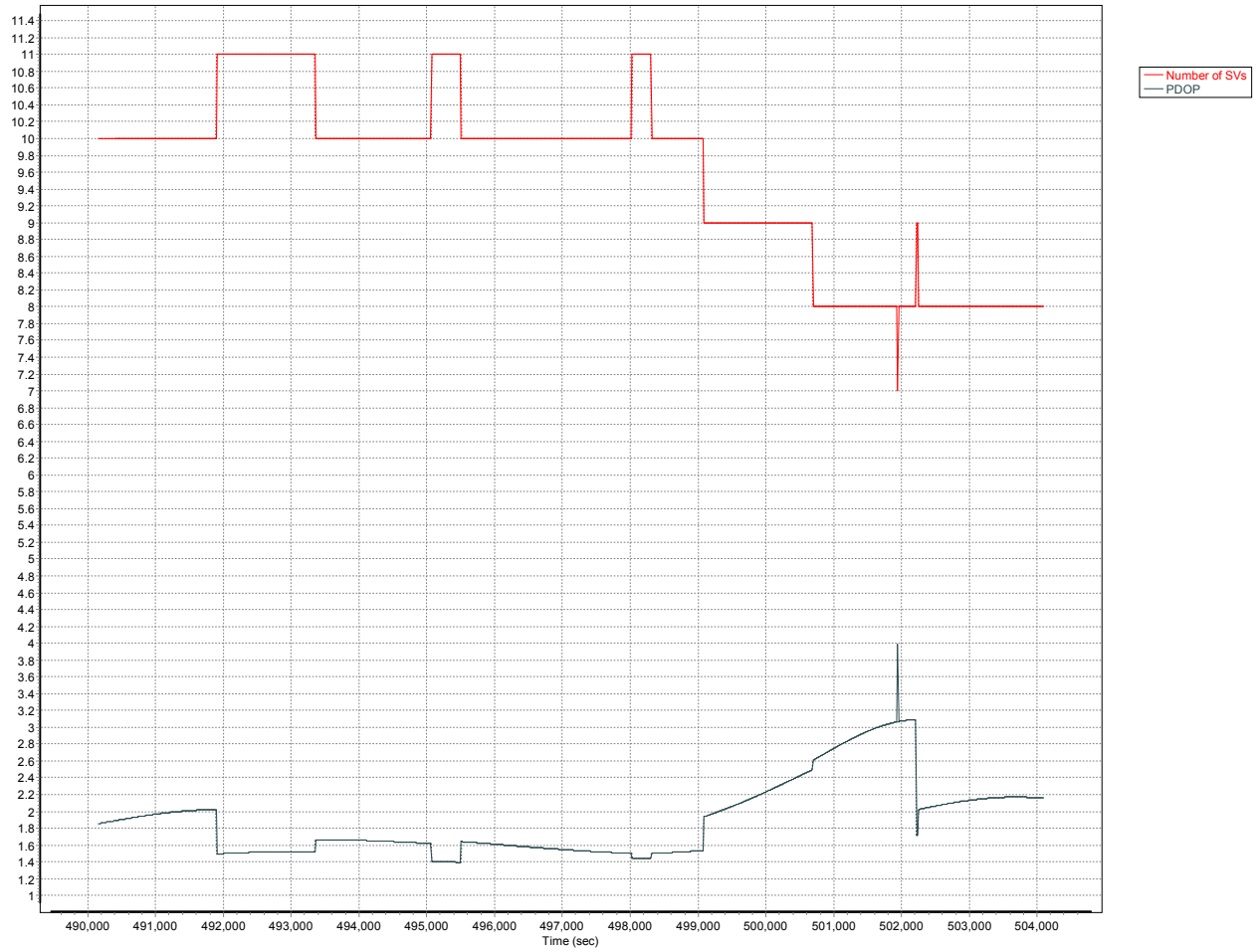
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


Plan View
60000
40000
20000
0
-20000
-40000
Post-processed (SBET)
Start1851
5000 m
-40000
-20000
0
20000

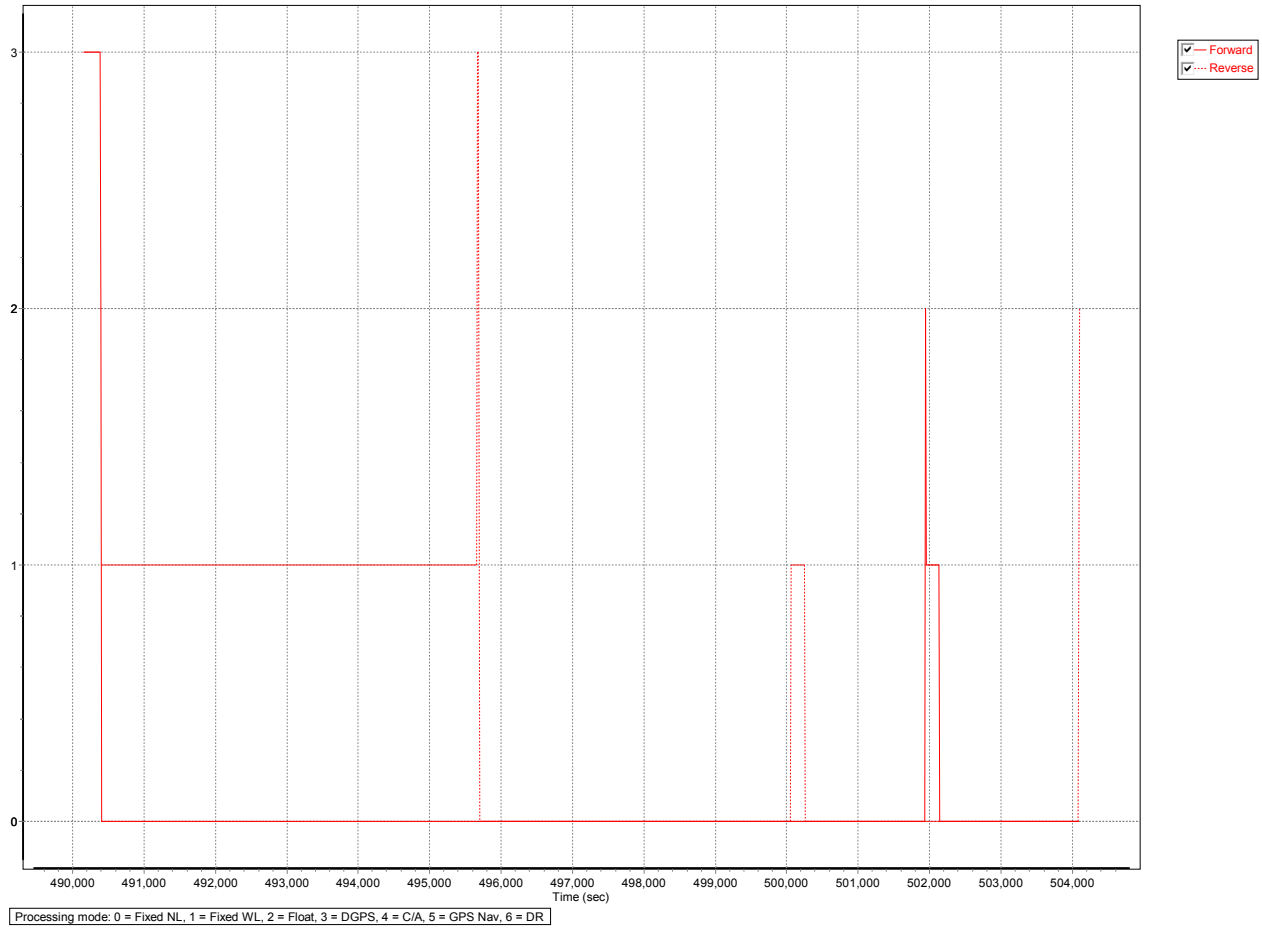
130705a-240


Baseline Length (m)
Forward
Reverse
45,000
44,000
43,000
42,000
41,000
40,000
39,000
38,000
37,000
36,000
35,000
34,000
33,000
32,000
31,000
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
-2,000
490,000
491,000
492,000
493,000
494,000
495,000
496,000
497,000
498,000
499,000
500,000
501,000
502,000
503,000
504,000
Time (sec)

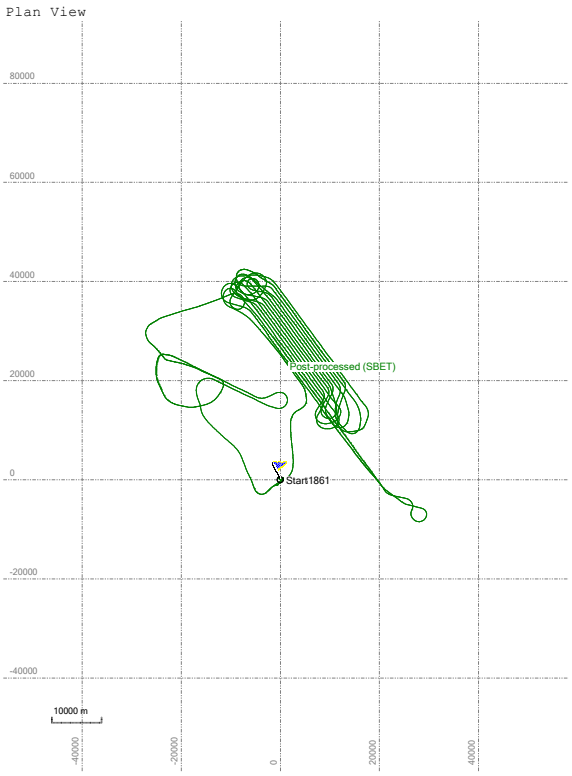

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.0305
0.03
0.0295
0.029
0.0285
0.028
0.0275
0.027
0.0265
0.026
0.0255
0.025
0.0245
0.024
0.0235
0.023
0.0225
0.022
0.0215
0.021
0.0205
0.02
0.0195
0.019
0.0185
0.018
0.0175
0.017
0.0165
0.016
0.0155
0.015
0.0145
0.014
0.0135
0.013
0.0125
0.012
0.0115
0.011
0.0105
0.01
0.0095
0.009
0.0085
0.008
0.0075
0.007
0.0065
0.006
0.0055
0.005
0.0045
0.004
0.0035
0.003
0.0025
490,000
492,000
494,000
496,000
498,000
500,000
502,000
504,000
Time (sec)



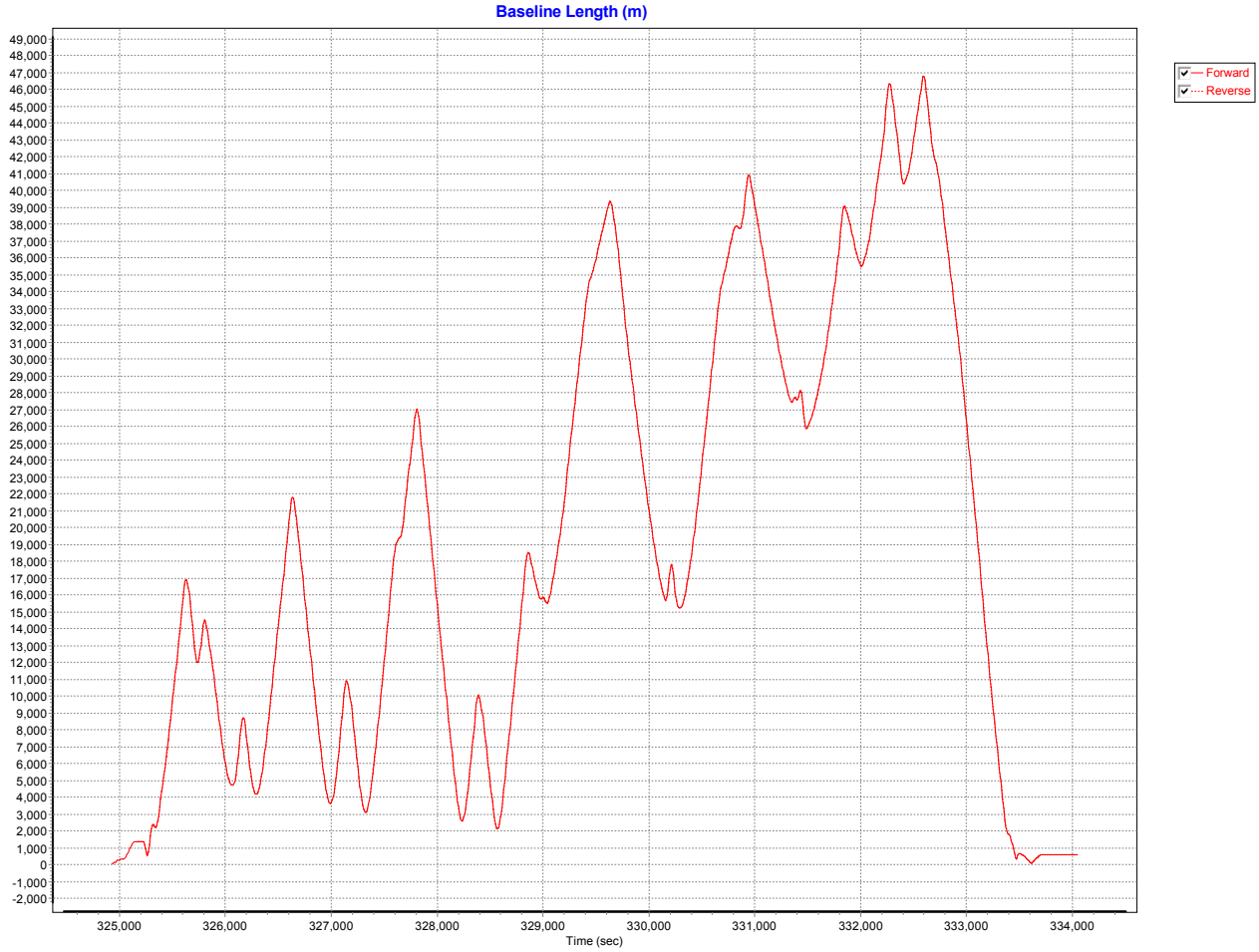
Processing mode

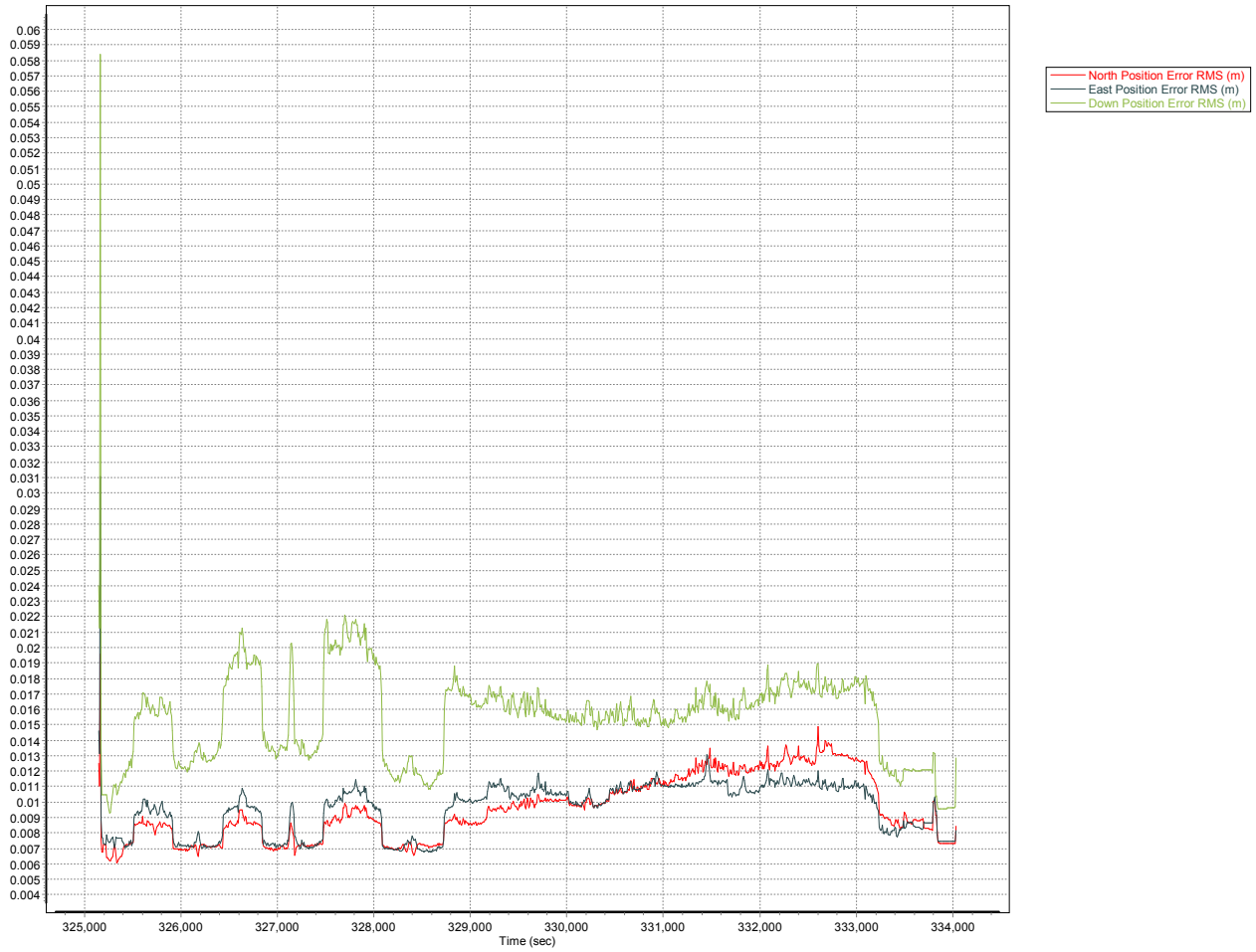


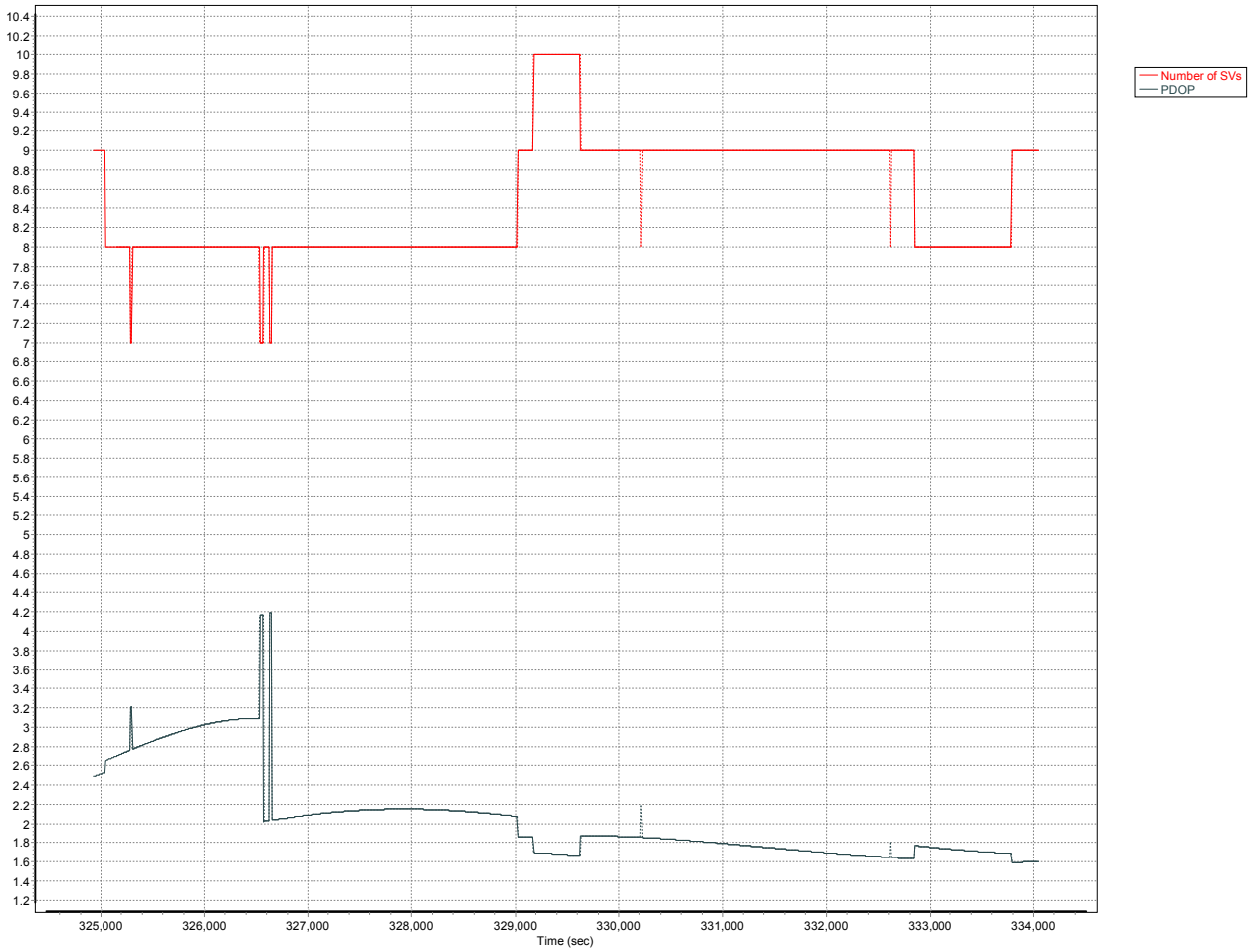
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


Plan View
80000
60000
40000
20000
0
-20000
-40000
Start1861
10000 m
-40000
-20000
0
20000
40000

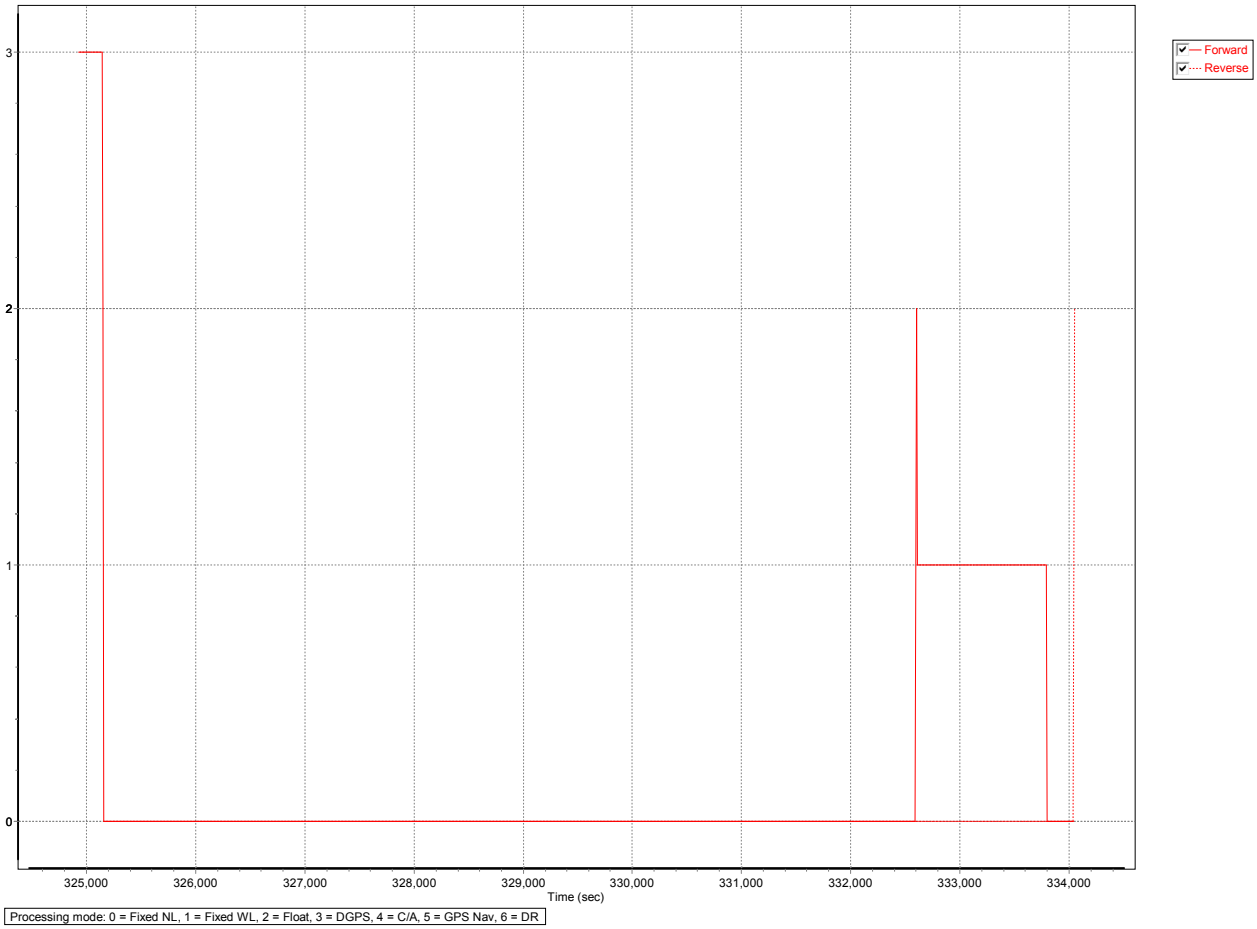
130717a-240


Baseline Length (m)
Forward
Reverse
Time (sec)

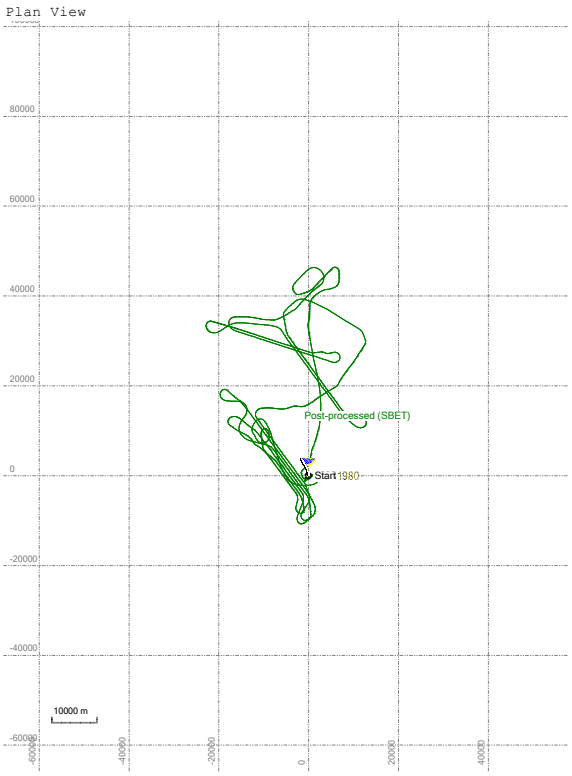

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
Time (sec)



Processing mode

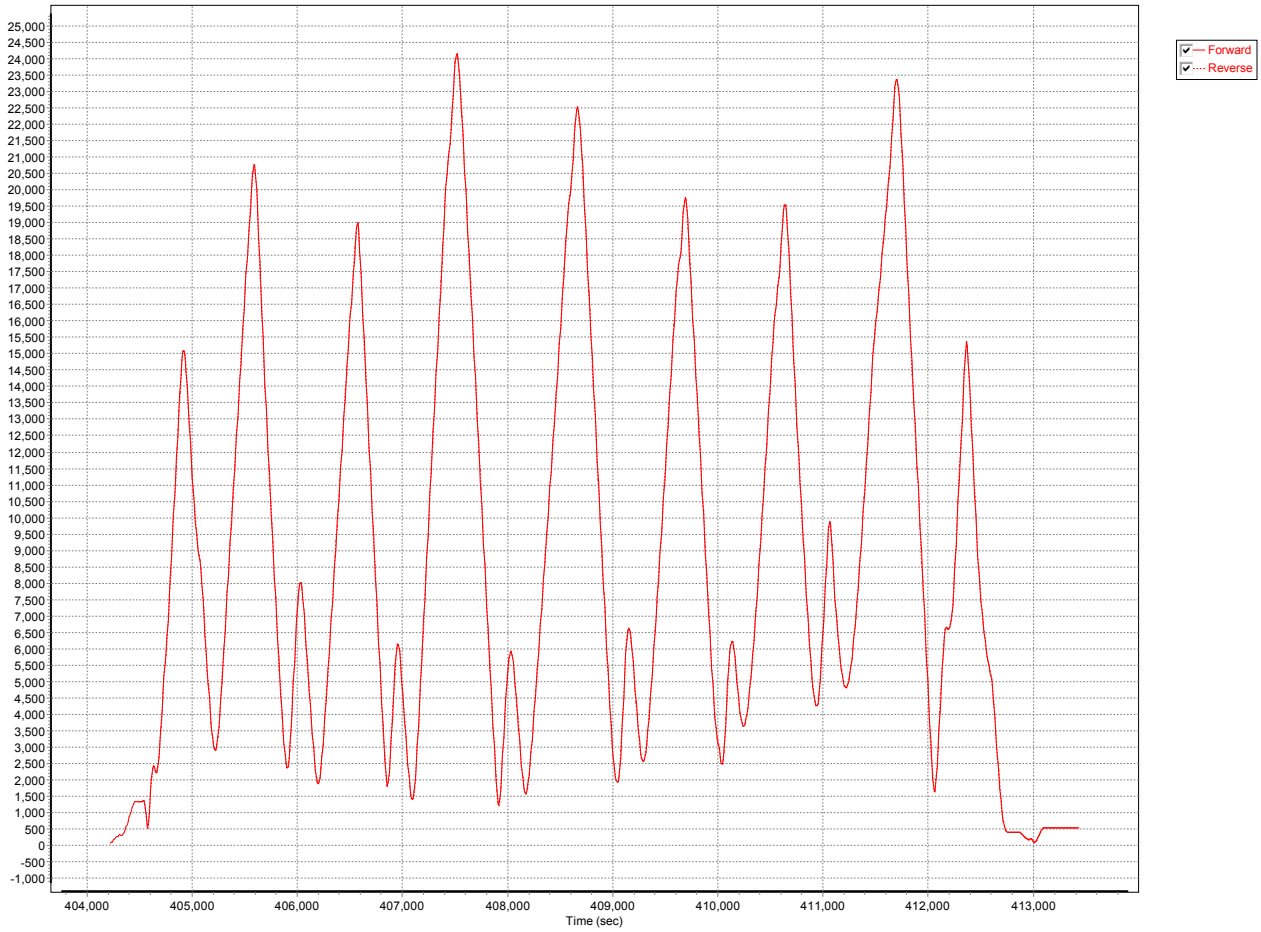


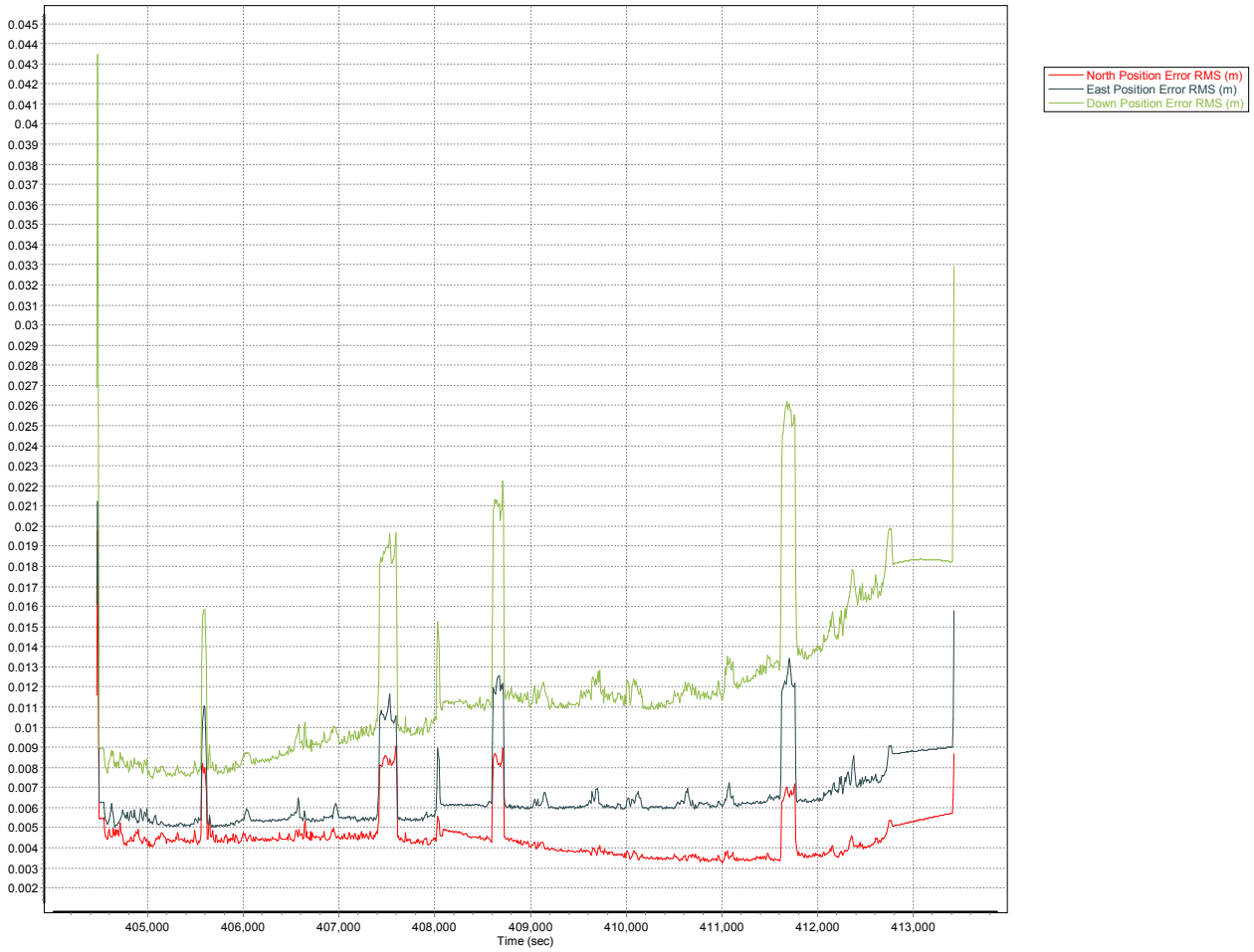
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR

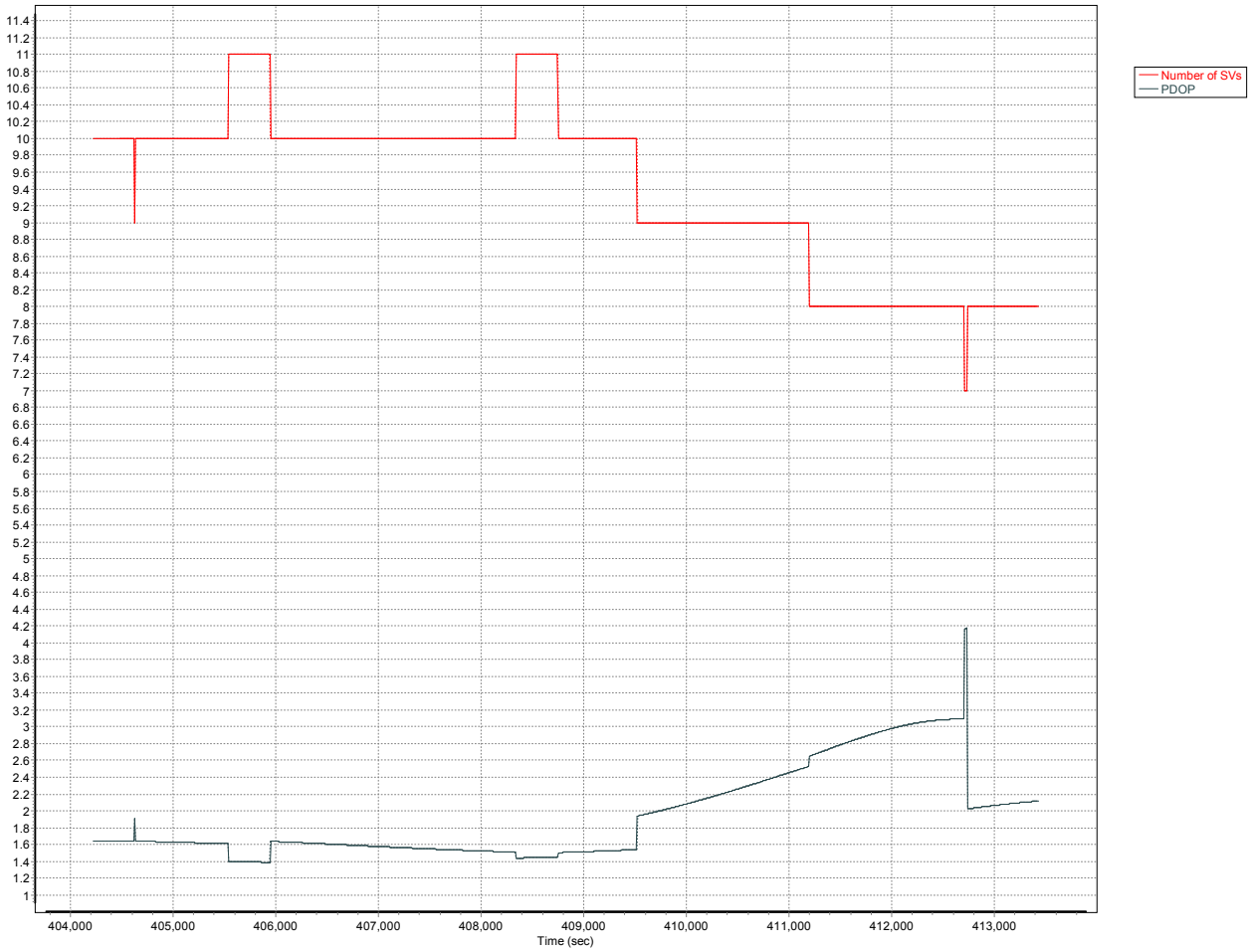

Plan View
80000
60000
40000
20000
0
-20000
-40000
-60000
Post-processed (SBET)
Start 1980
10000 m
-60000
-40000
-20000
0
20000
40000

130718a-240

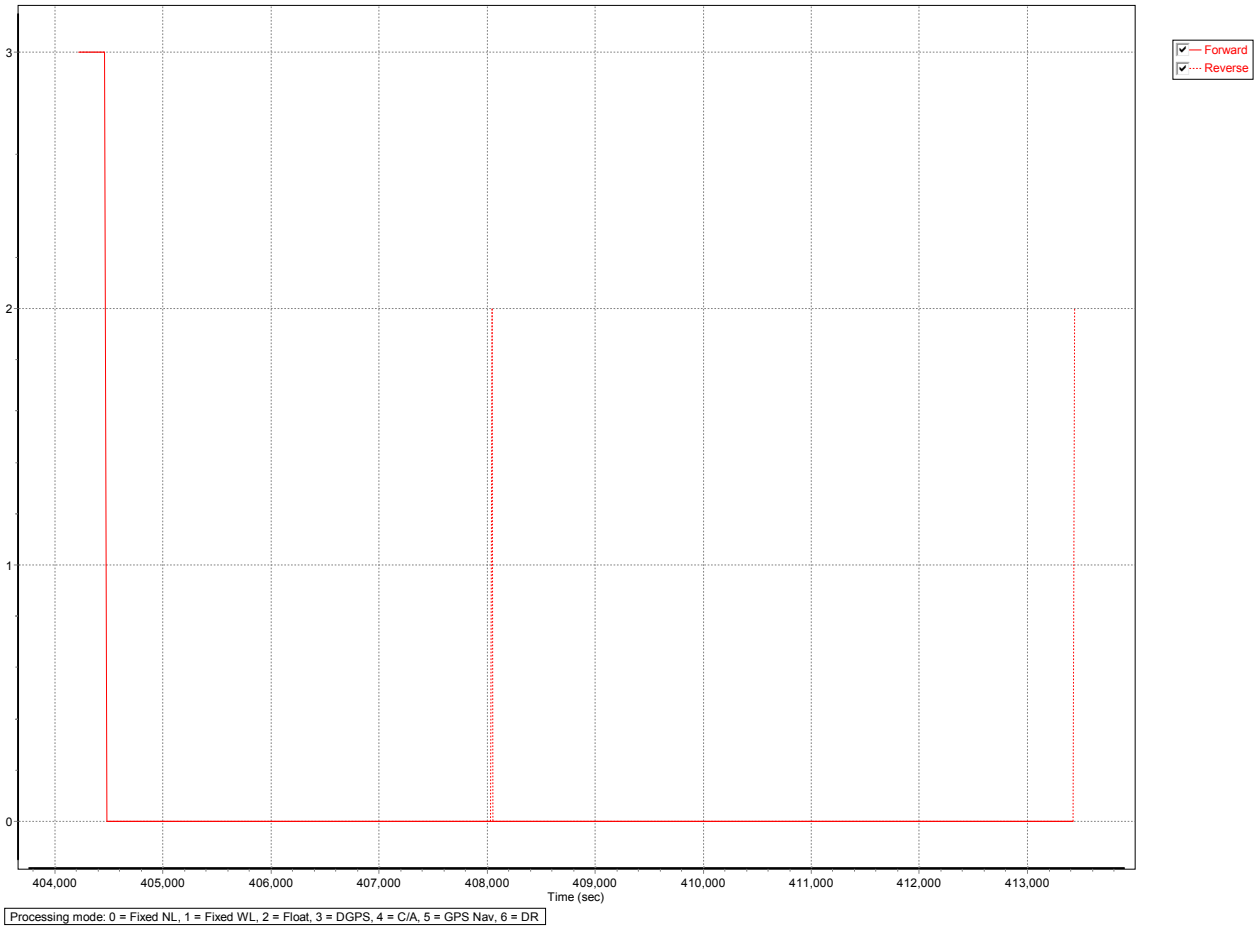
Baseline Length (m)



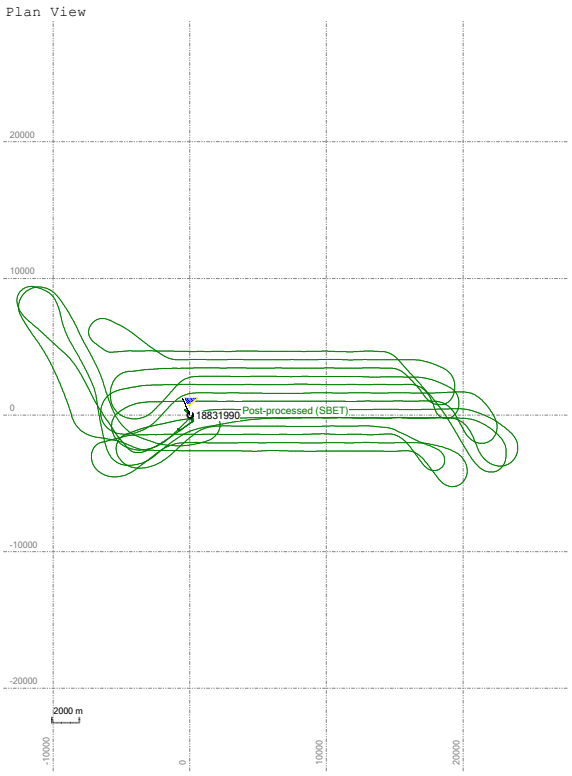




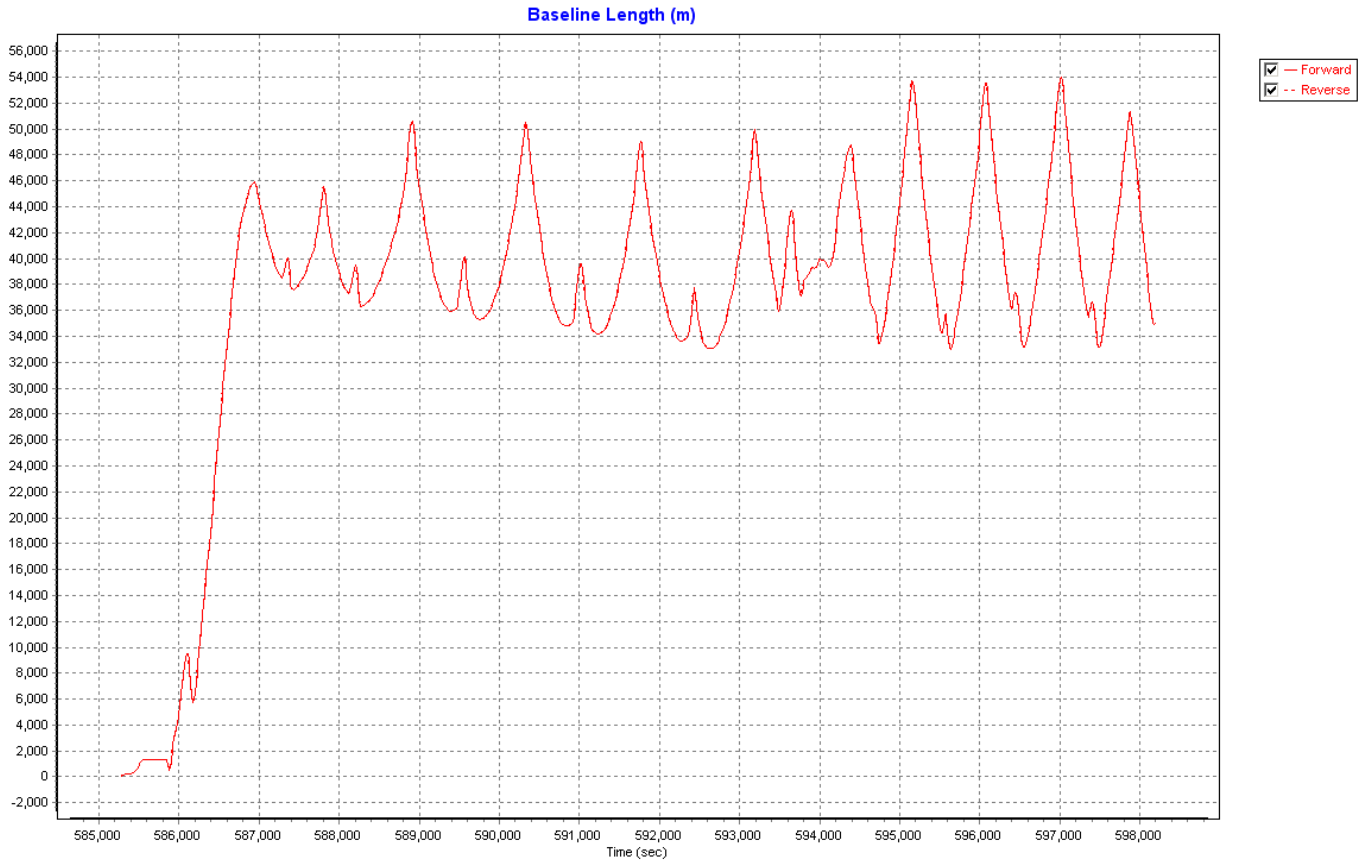
Processing mode

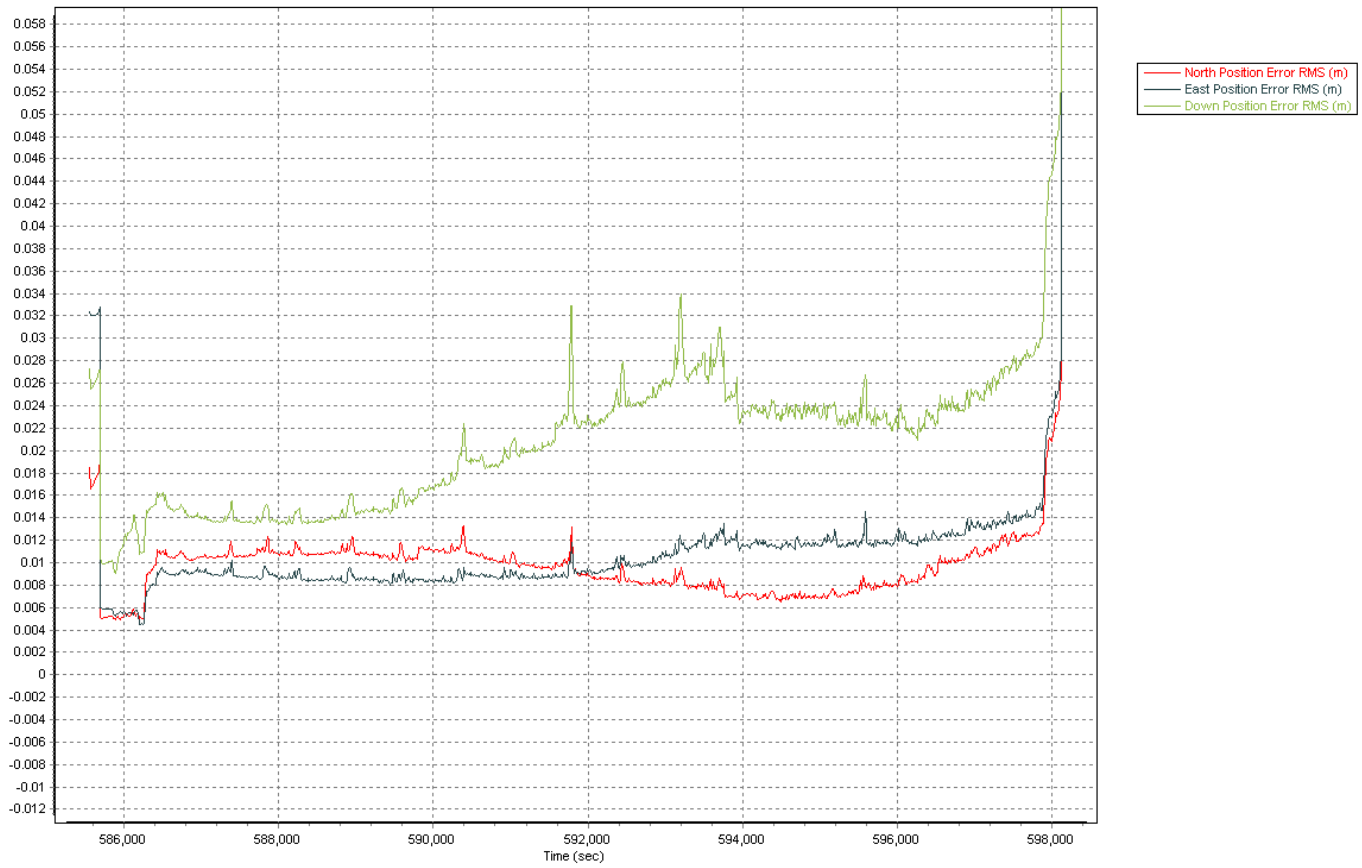


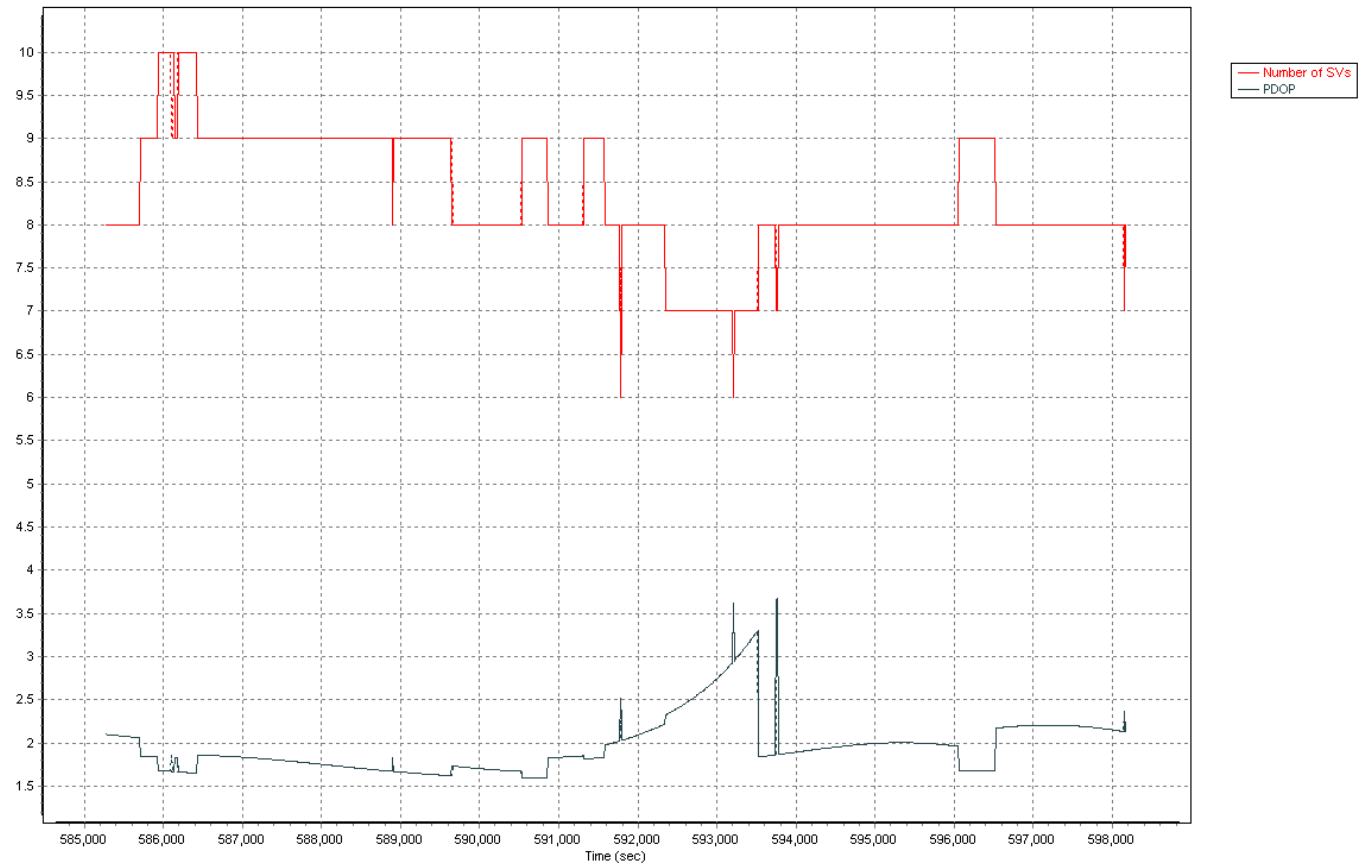
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR

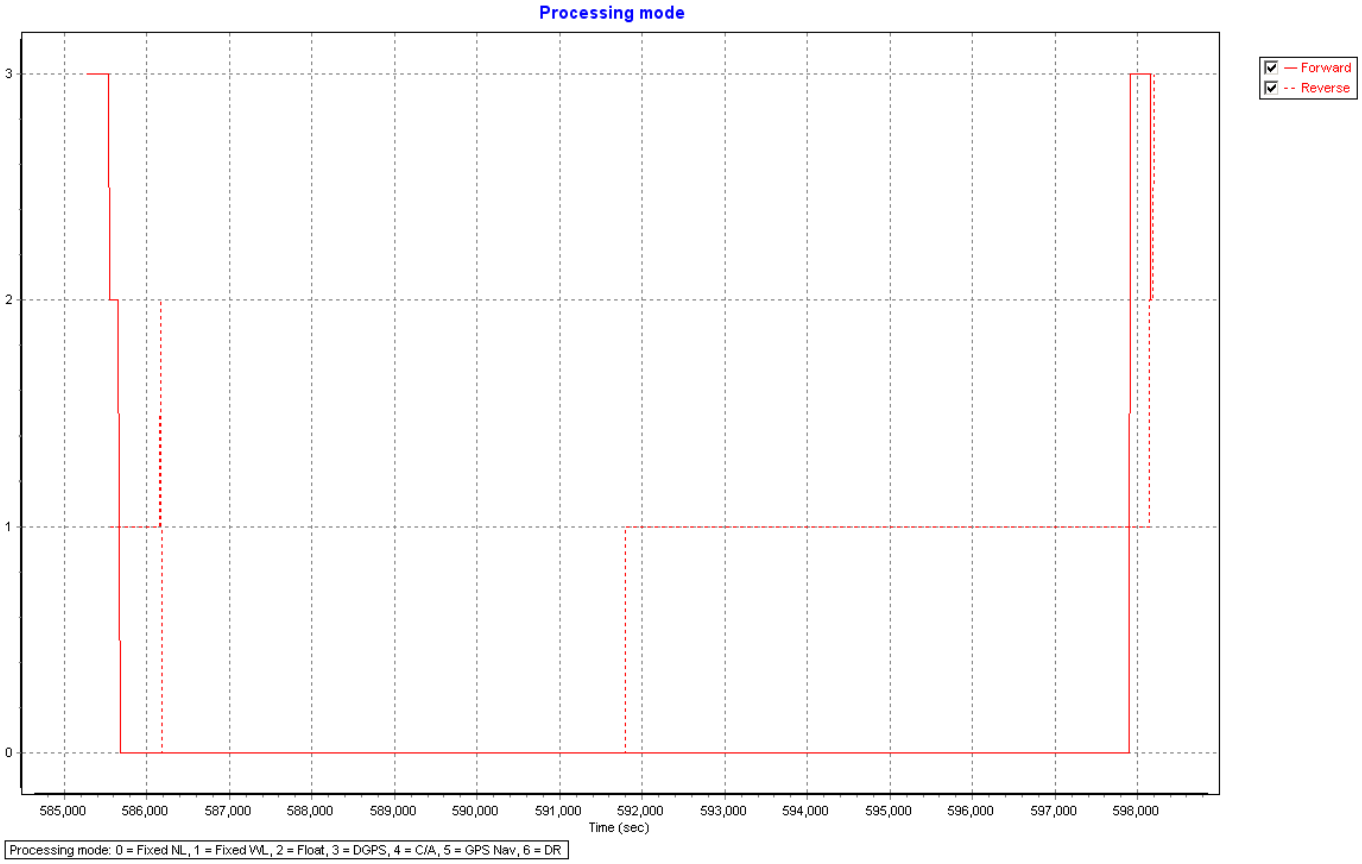

Plan View
20000
10000
0
-10000
-20000
18831990
Post-processed (SBET)
2000 m
-10000
0
10000
20000

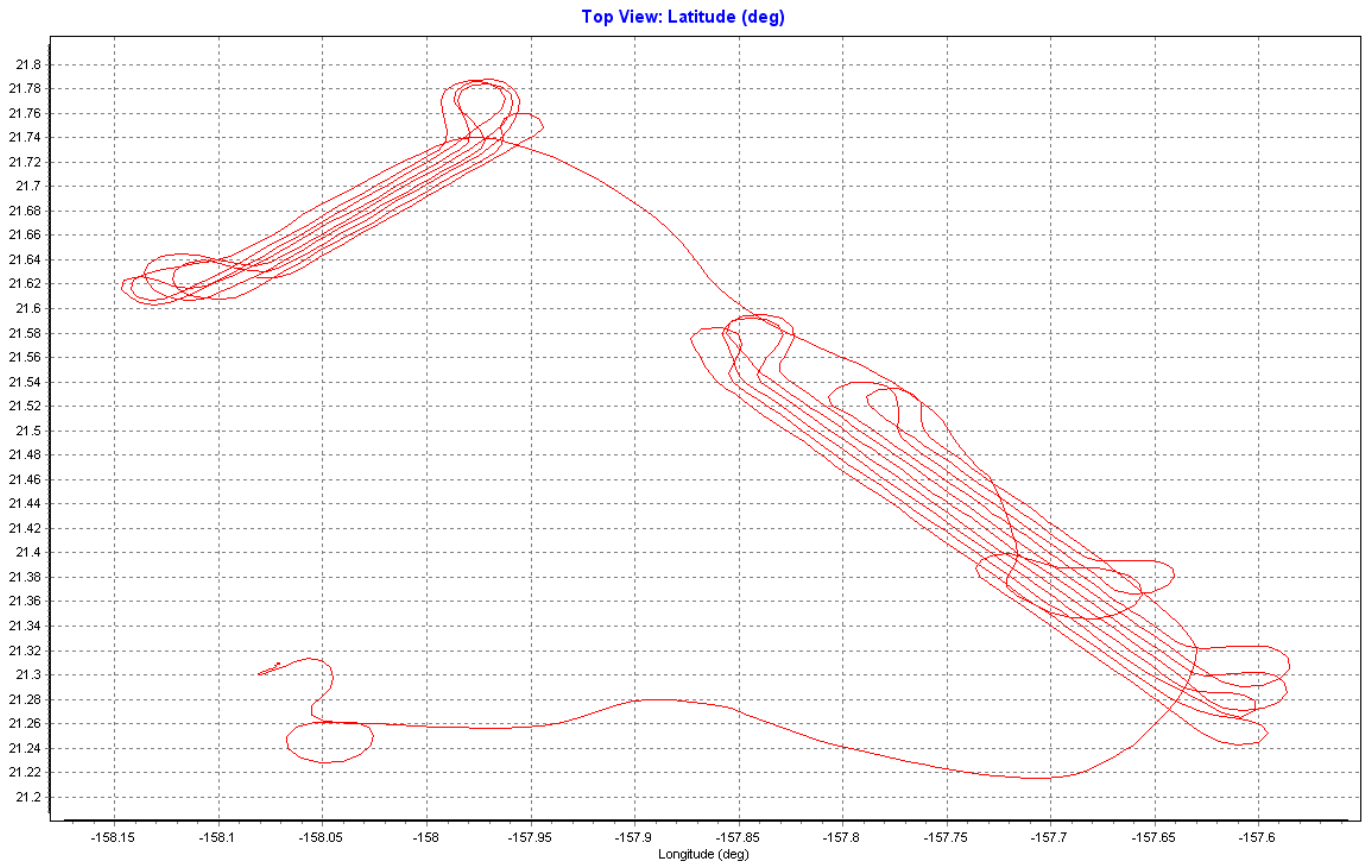
130727a-240


Baseline Length (m)
Forward
Reverse
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
585,000
586,000
587,000
588,000
589,000
590,000
591,000
592,000
593,000
594,000
595,000
596,000
597,000
598,000
Time (sec)

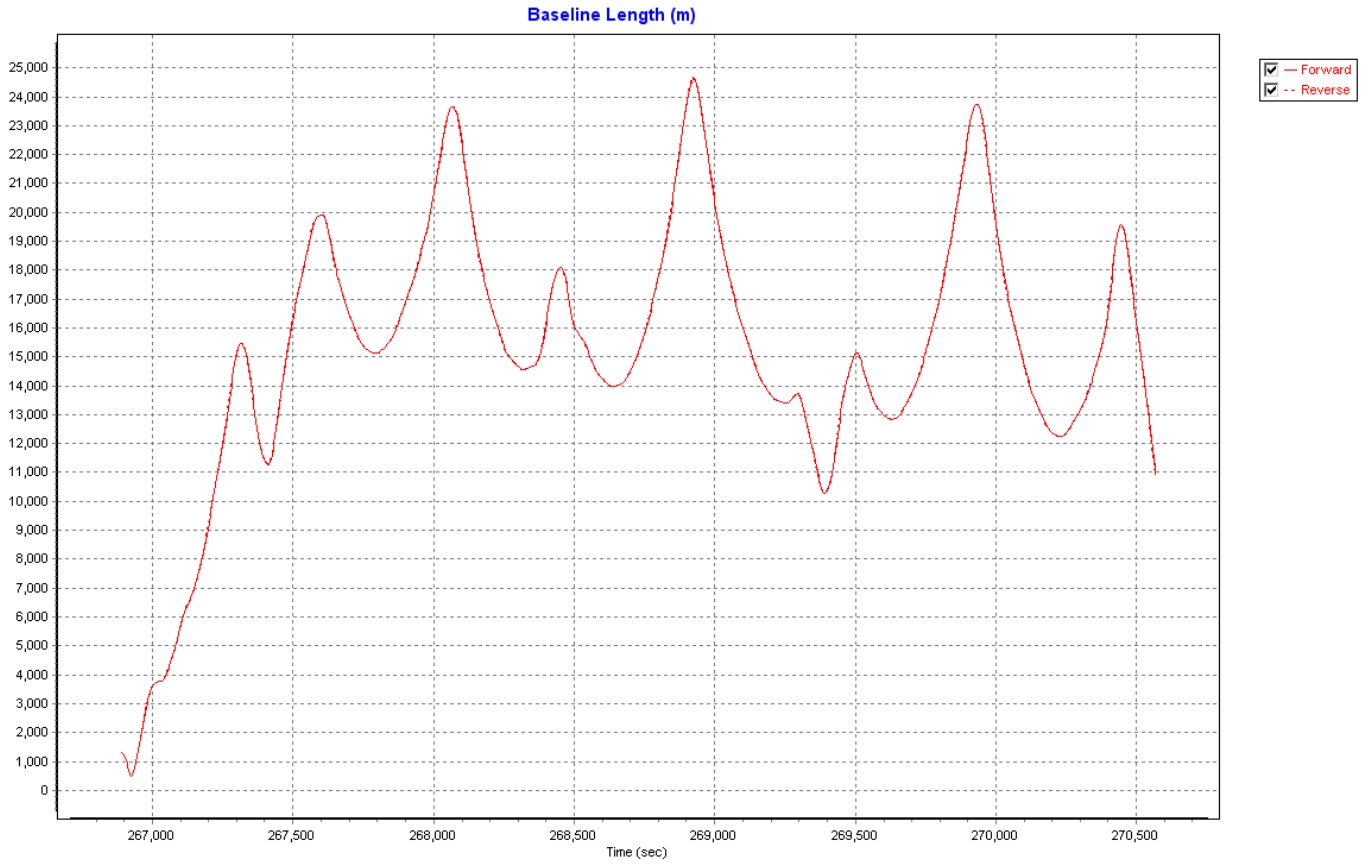

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.058
0.056
0.054
0.052
0.05
0.048
0.046
0.044
0.042
0.04
0.038
0.036
0.034
0.032
0.03
0.028
0.026
0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
-0.002
-0.004
-0.006
-0.008
-0.01
-0.012
586,000
588,000
590,000
592,000
594,000
596,000
598,000
Time (sec)

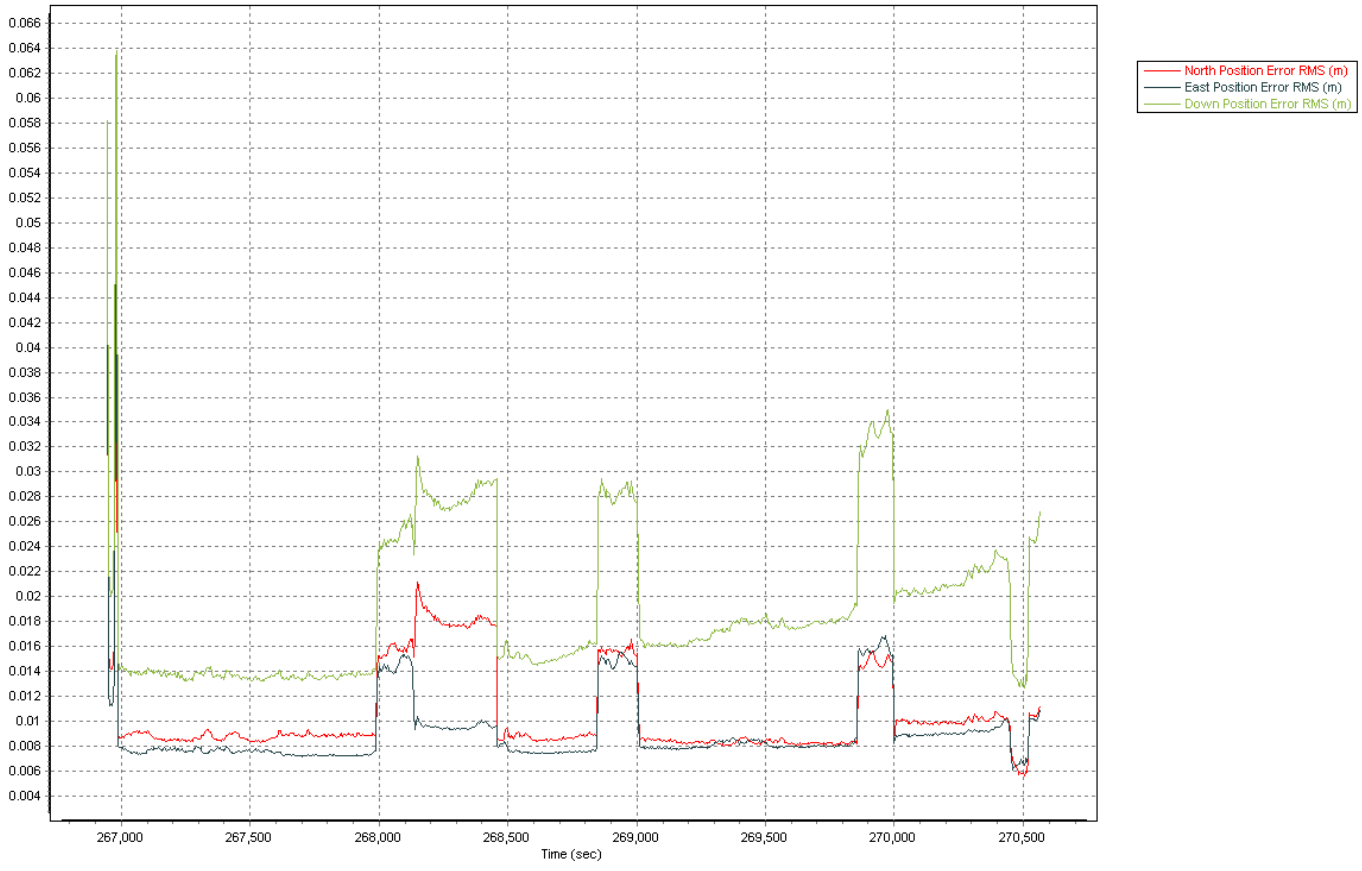

Number of SVs
PDOP
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
585,000
586,000
587,000
588,000
589,000
590,000
591,000
592,000
593,000
594,000
595,000
596,000
597,000
598,000
Time (sec)

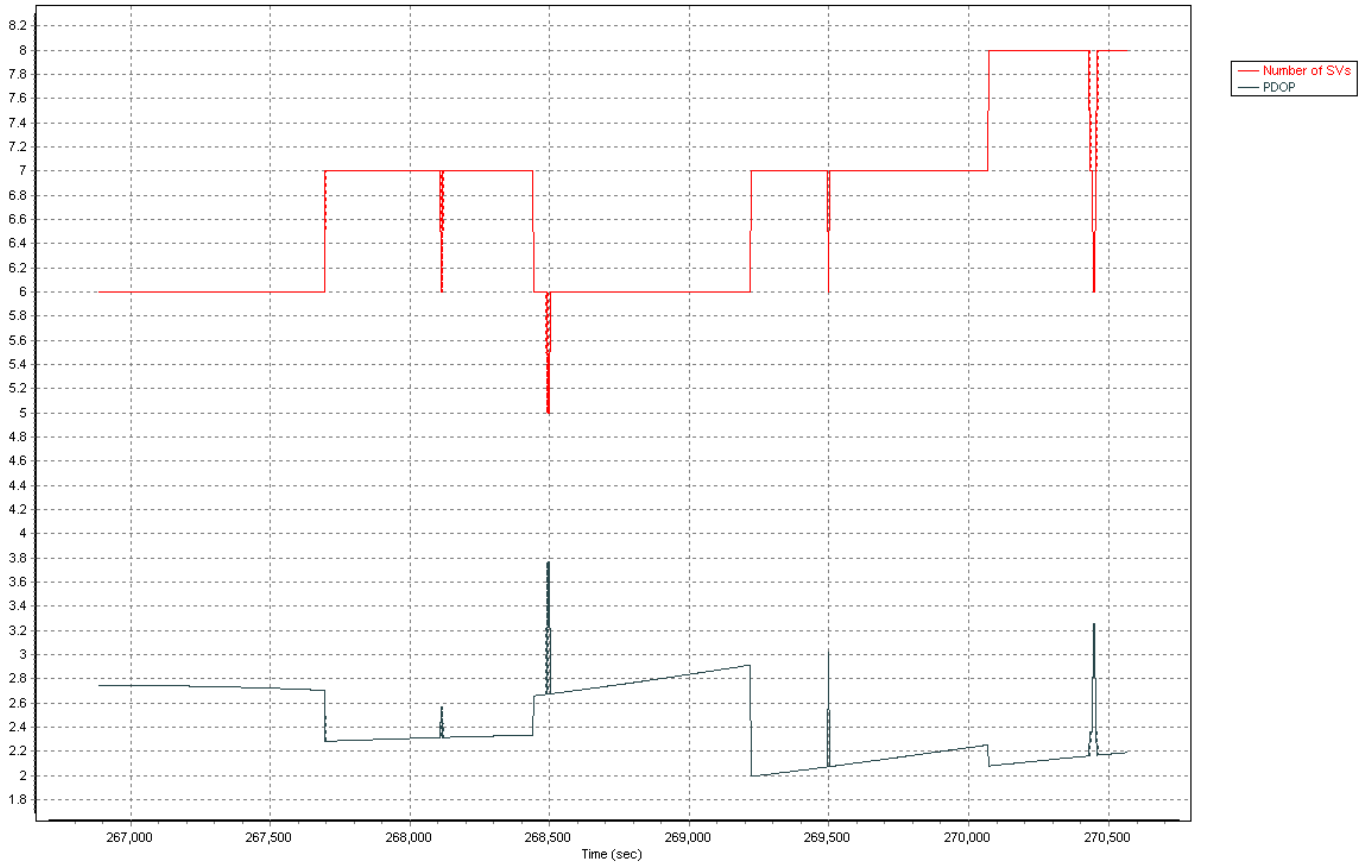

Processing mode
Forward
Reverse
3
2
1
0
585,000
586,000
587,000
588,000
589,000
590,000
591,000
592,000
593,000
594,000
595,000
596,000
597,000
598,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


Top View: Latitude (deg)
21.8
21.78
21.76
21.74
21.72
21.7
21.68
21.66
21.64
21.62
21.6
21.58
21.56
21.54
21.52
21.5
21.48
21.46
21.44
21.42
21.4
21.38
21.36
21.34
21.32
21.3
21.28
21.26
21.24
21.22
21.2
-158.15
-158.1
-158.05
-158
-157.95
-157.9
-157.85
-157.8
-157.75
-157.7
-157.65
-157.6
Longitude (deg)

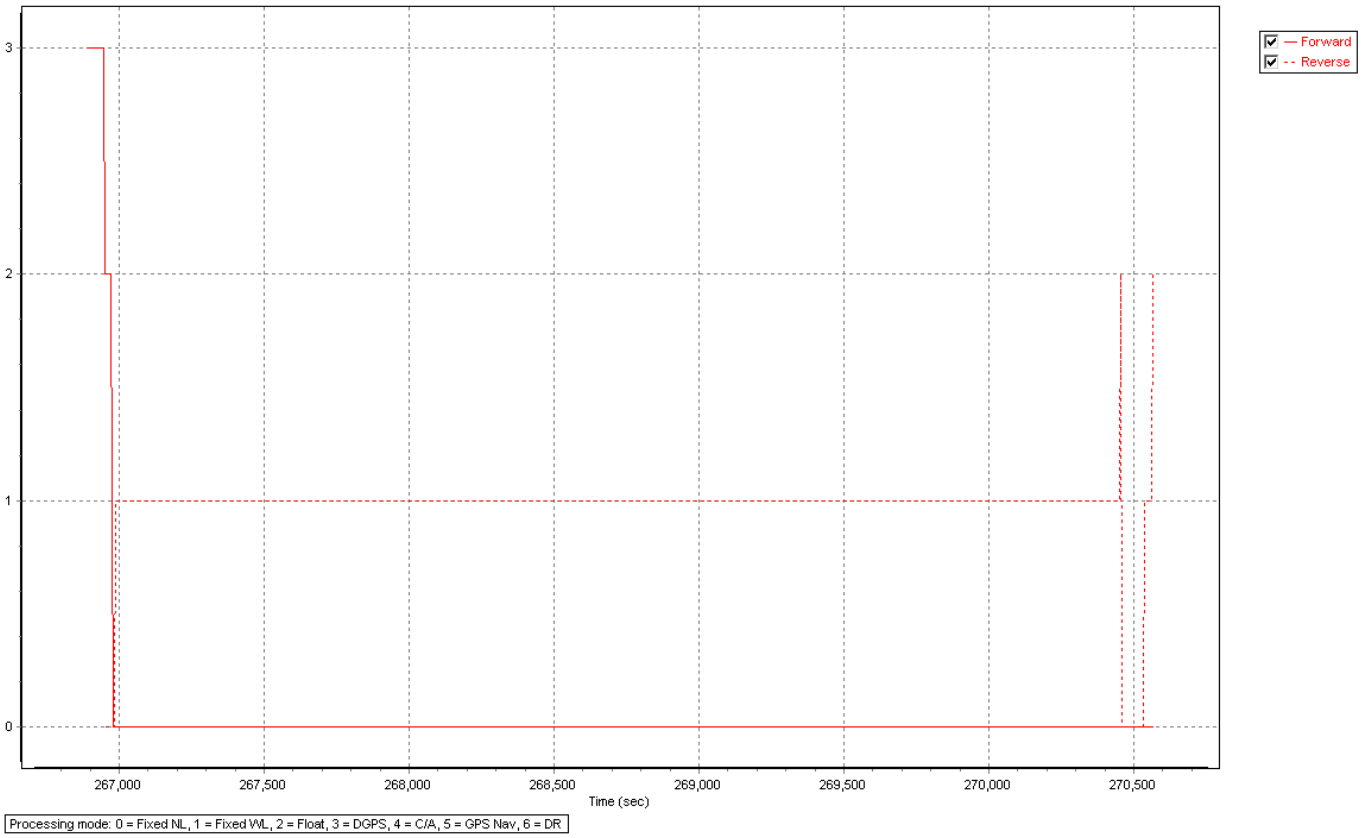
130730a-240

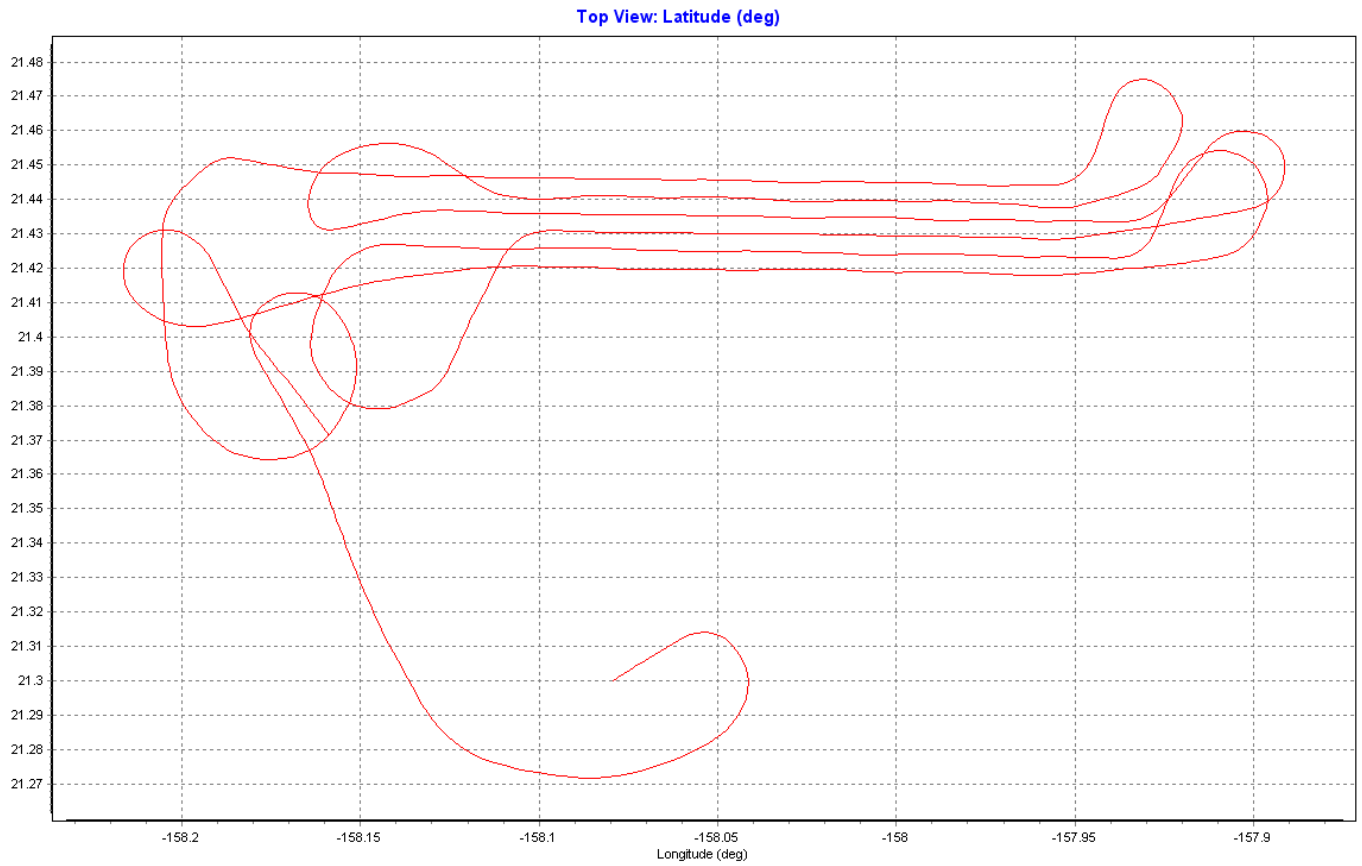

Baseline Length (m)
Forward
Reverse
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
267,000
267,500
268,000
268,500
269,000
269,500
270,000
270,500
Time (sec)


North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.066
0.064
0.062
0.06
0.058
0.056
0.054
0.052
0.05
0.048
0.046
0.044
0.042
0.04
0.038
0.036
0.034
0.032
0.03
0.028
0.026
0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
267,000
267,500
268,000
268,500
269,000
269,500
270,000
270,500
Time (sec)

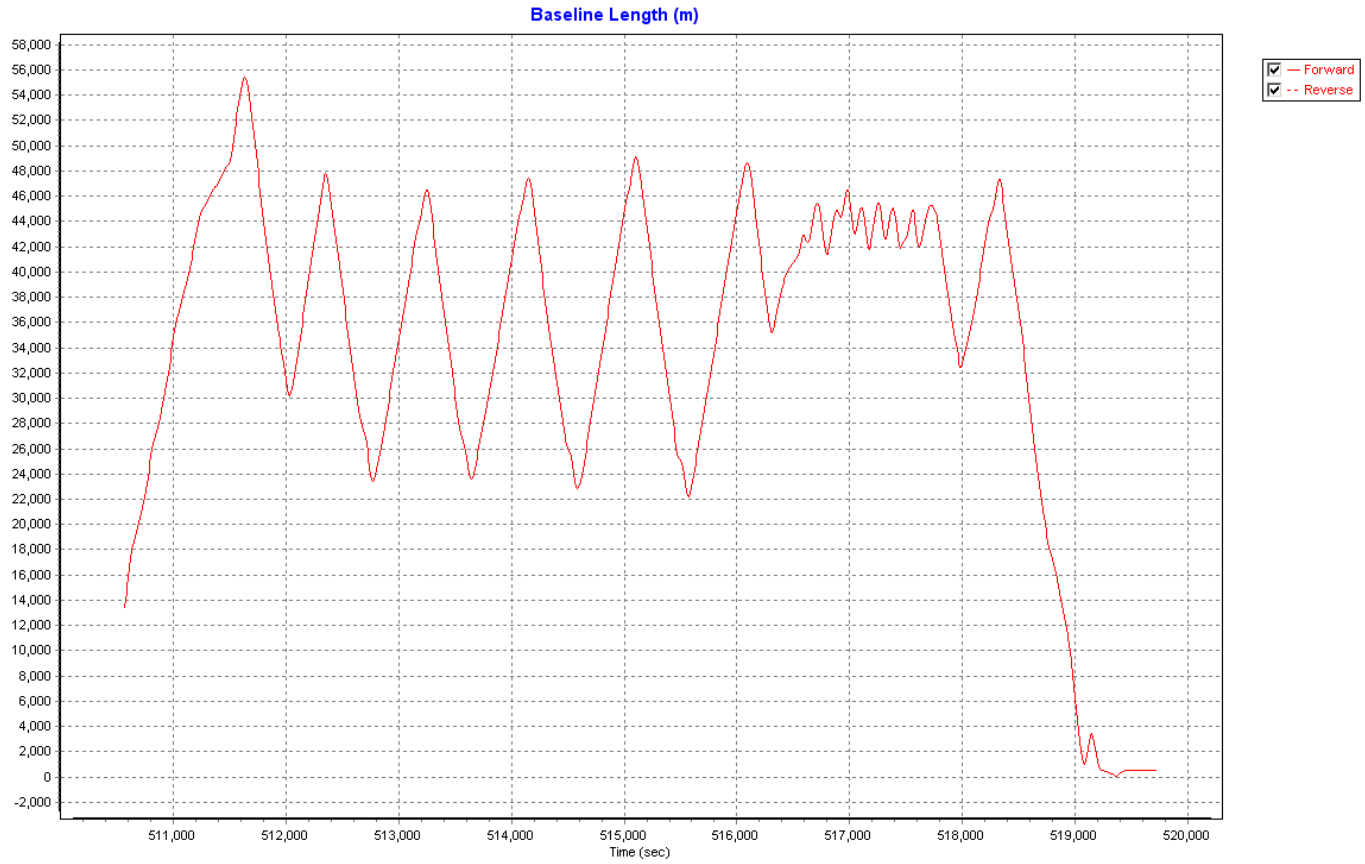


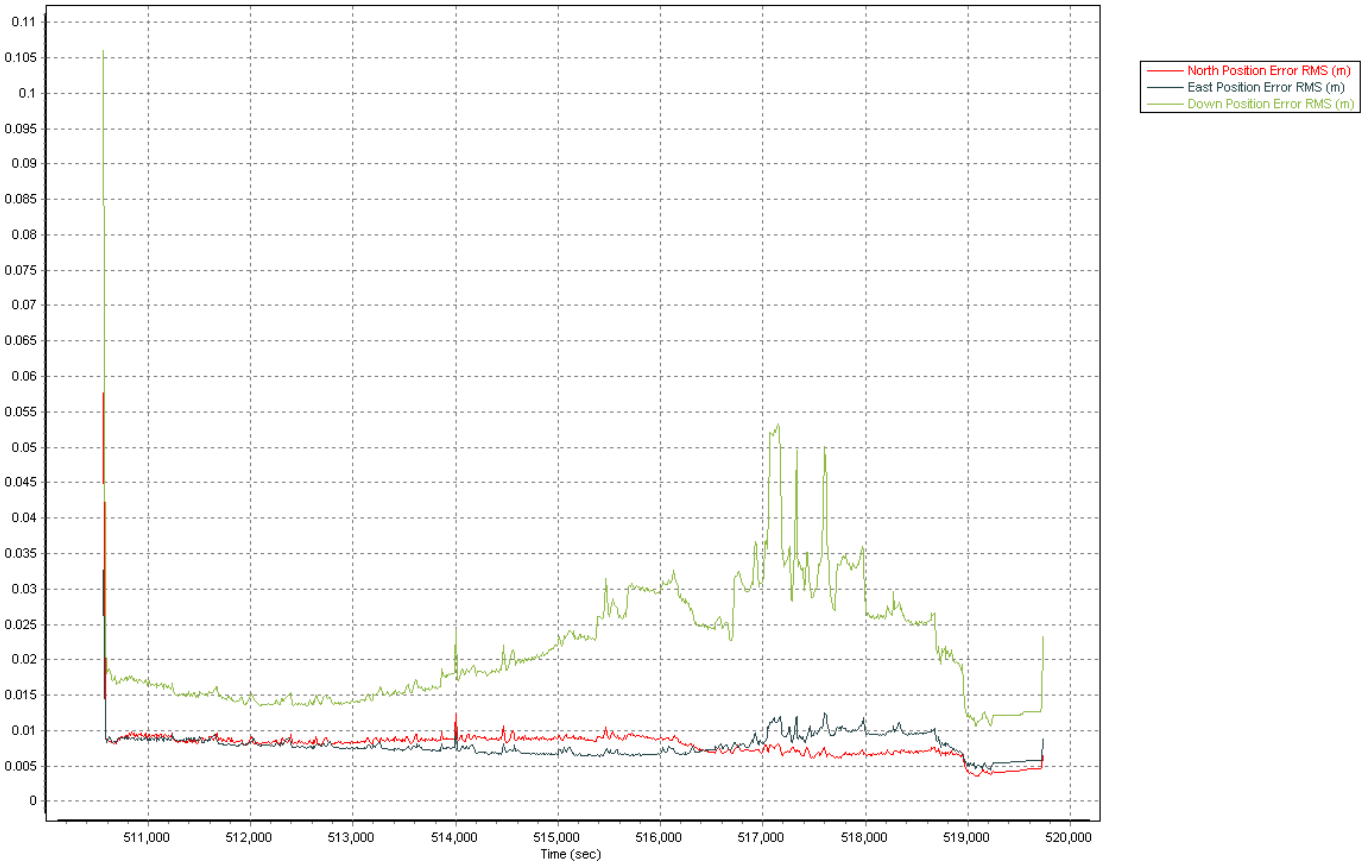
Processing mode

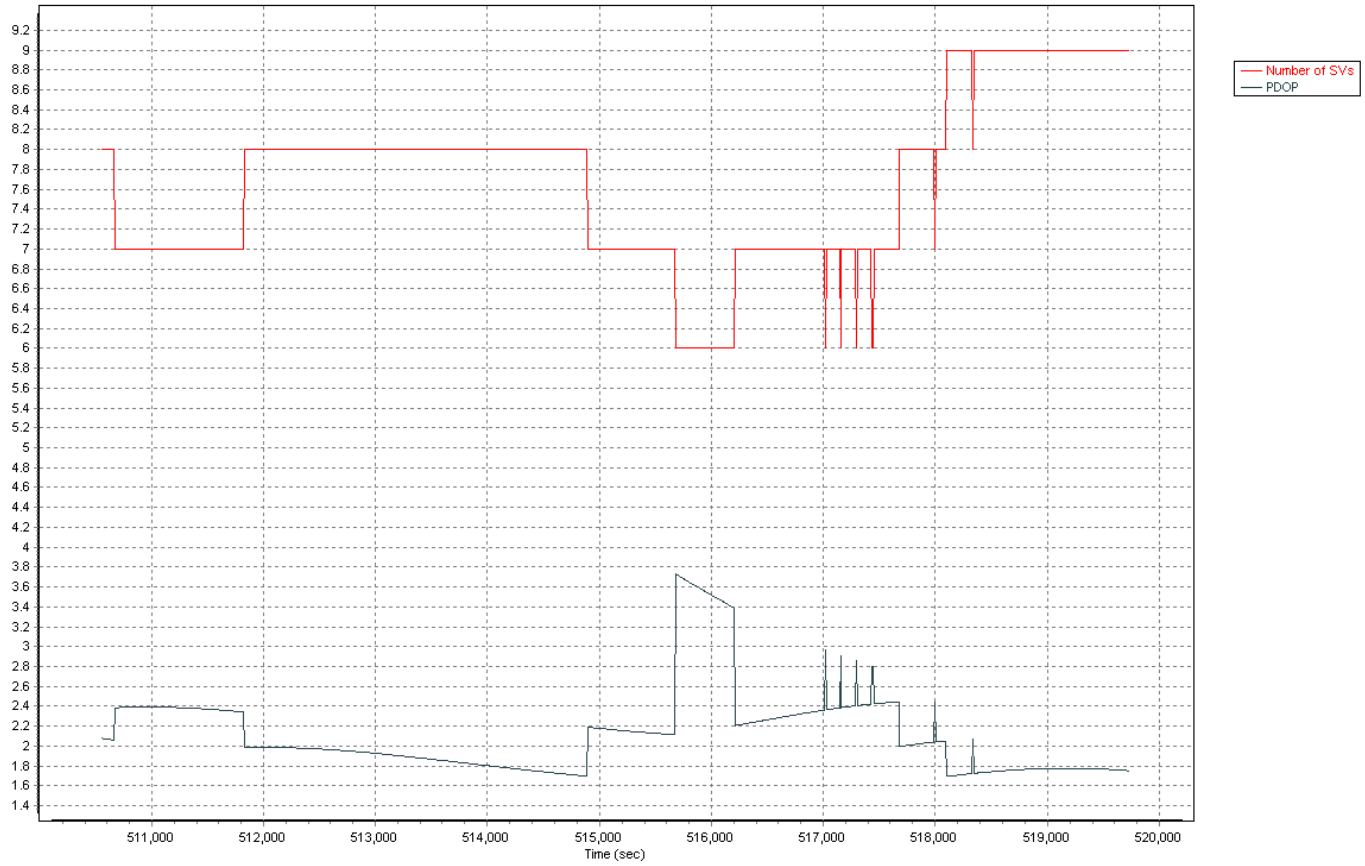



Top View: Latitude (deg)
21.48
21.47
21.46
21.45
21.44
21.43
21.42
21.41
21.4
21.39
21.38
21.37
21.36
21.35
21.34
21.33
21.32
21.31
21.3
21.29
21.28
21.27
-158.2
-158.15
-158.1
-158.05
-158
-157.95
-157.9
Longitude (deg)

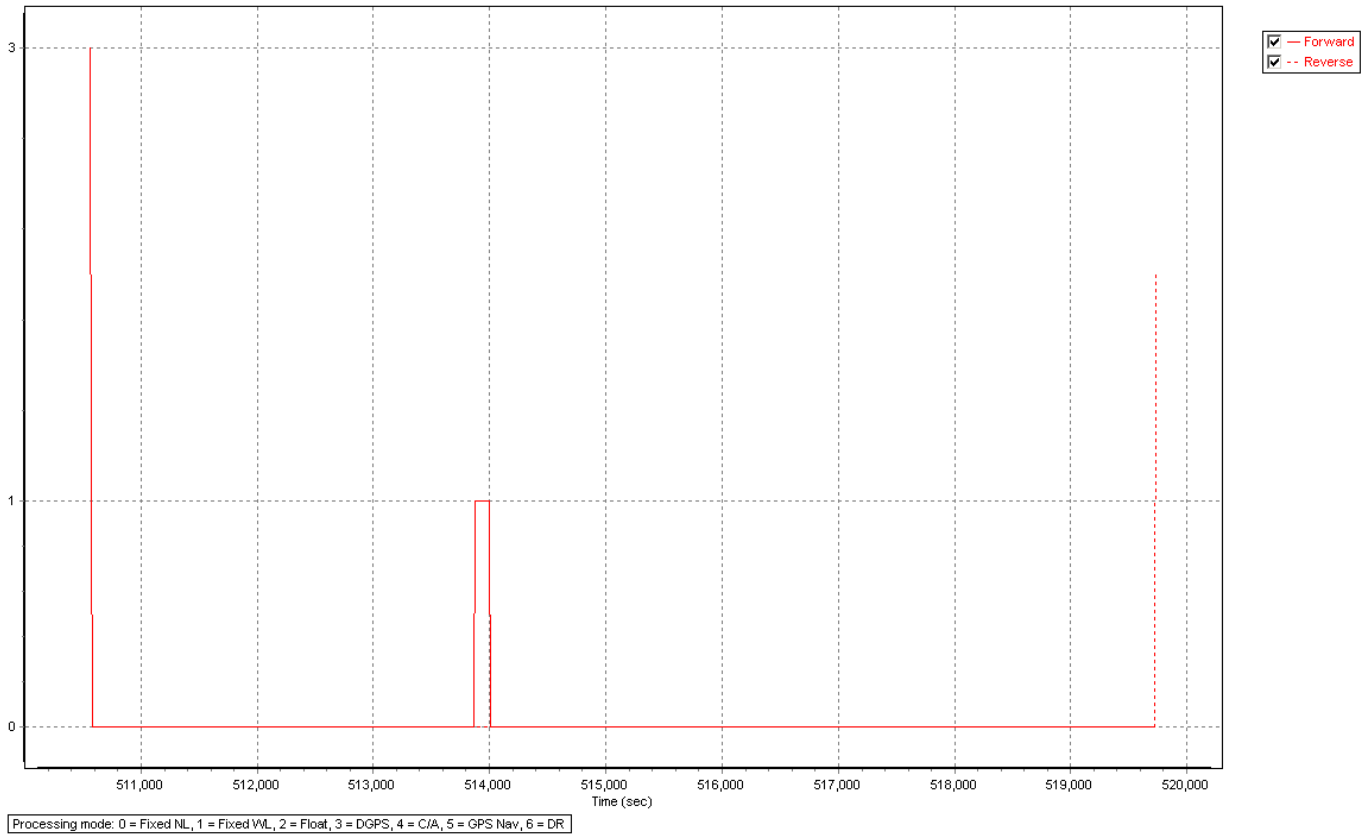
130802a-240

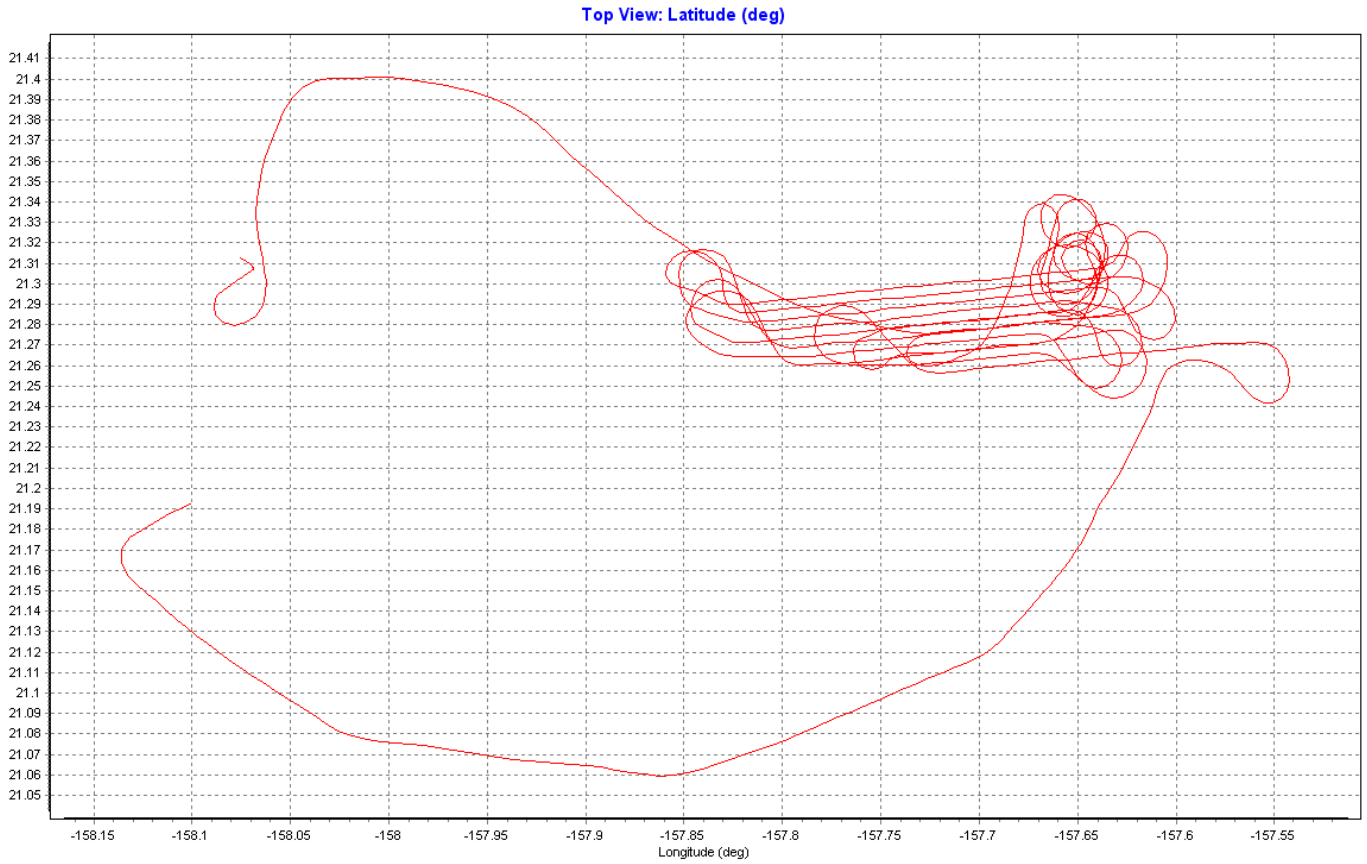

Baseline Length (m)
Forward
Reverse
58,000
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
511,000
512,000
513,000
514,000
515,000
516,000
517,000
518,000
519,000
520,000
Time (sec)


North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.11
0.105
0.1
0.095
0.09
0.085
0.08
0.075
0.07
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
511,000
512,000
513,000
514,000
515,000
516,000
517,000
518,000
519,000
520,000
Time (sec)

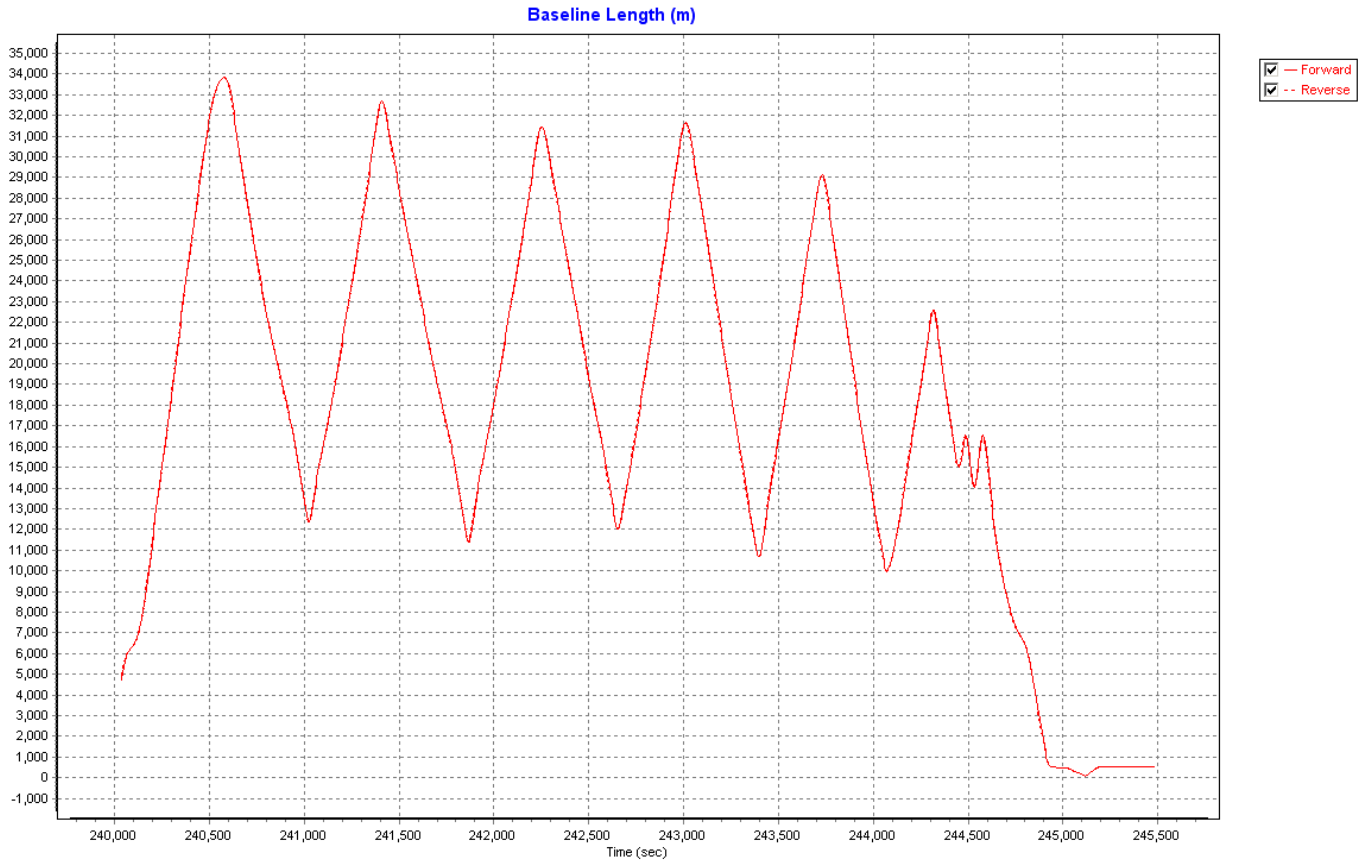


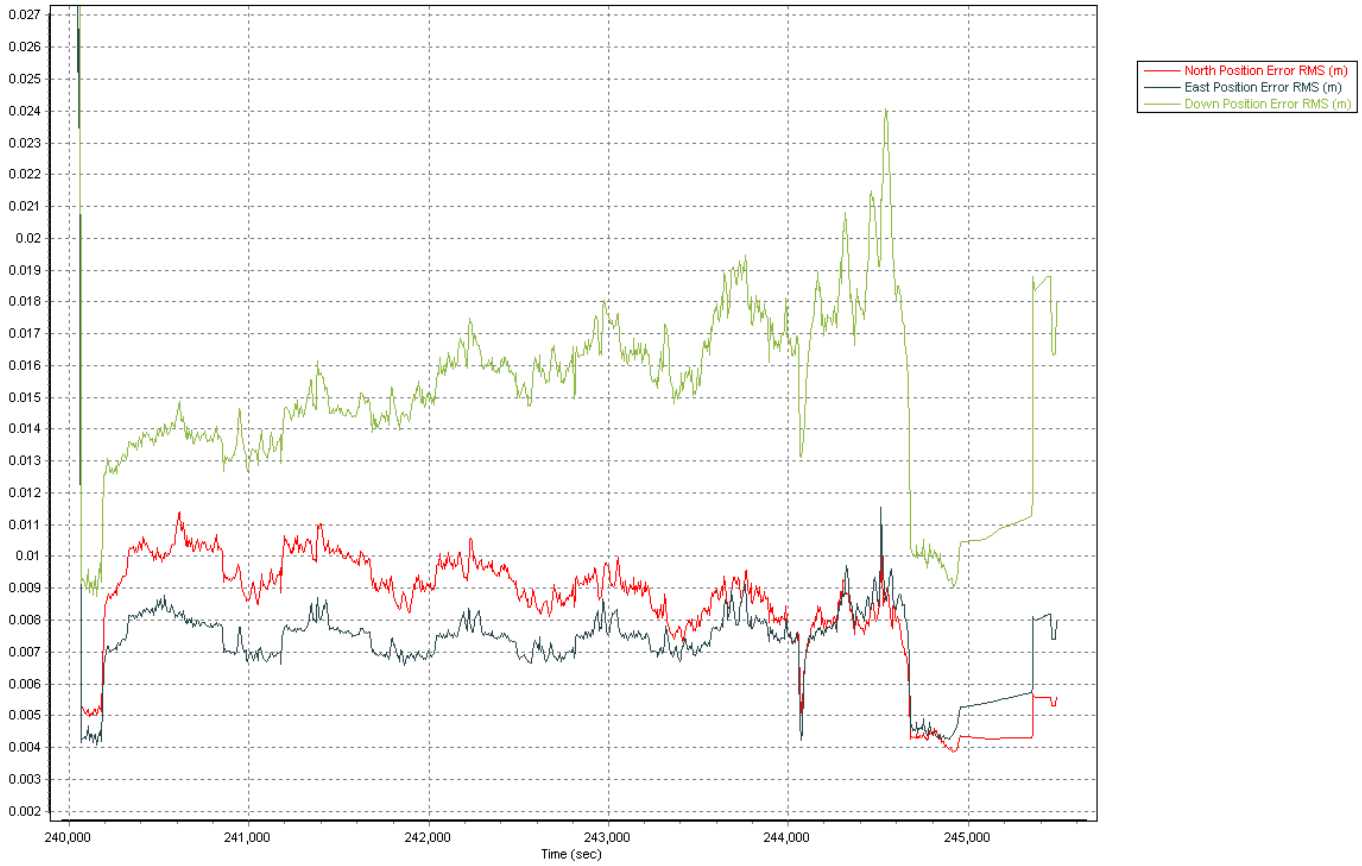
Processing mode

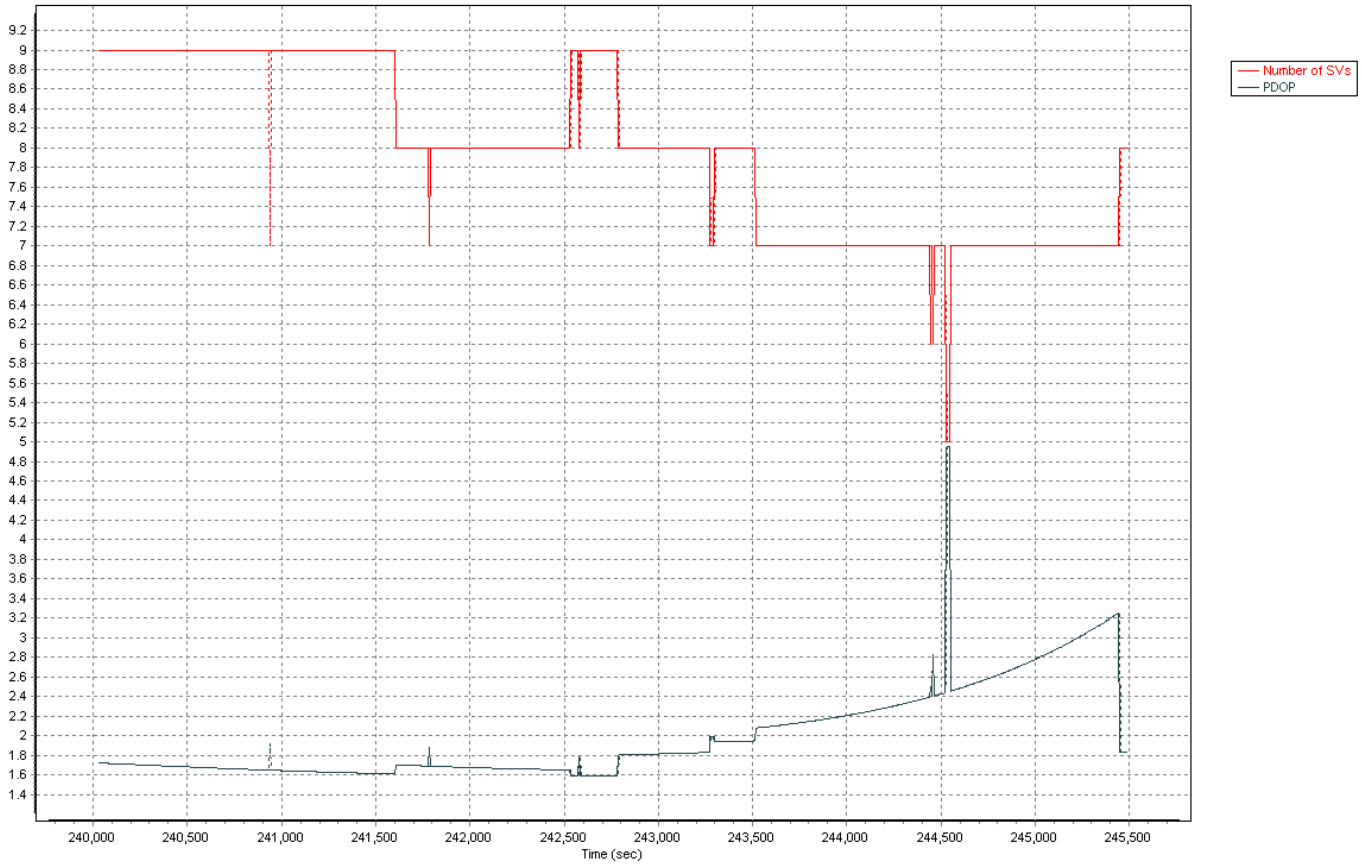



Top View: Latitude (deg)
21.41
21.4
21.39
21.38
21.37
21.36
21.35
21.34
21.33
21.32
21.31
21.3
21.29
21.28
21.27
21.26
21.25
21.24
21.23
21.22
21.21
21.2
21.19
21.18
21.17
21.16
21.15
21.14
21.13
21.12
21.11
21.1
21.09
21.08
21.07
21.06
21.05
-158.15
-158.1
-158.05
-158
-157.95
-157.9
-157.85
-157.8
-157.75
-157.7
-157.65
-157.6
-157.55
Longitude (deg)

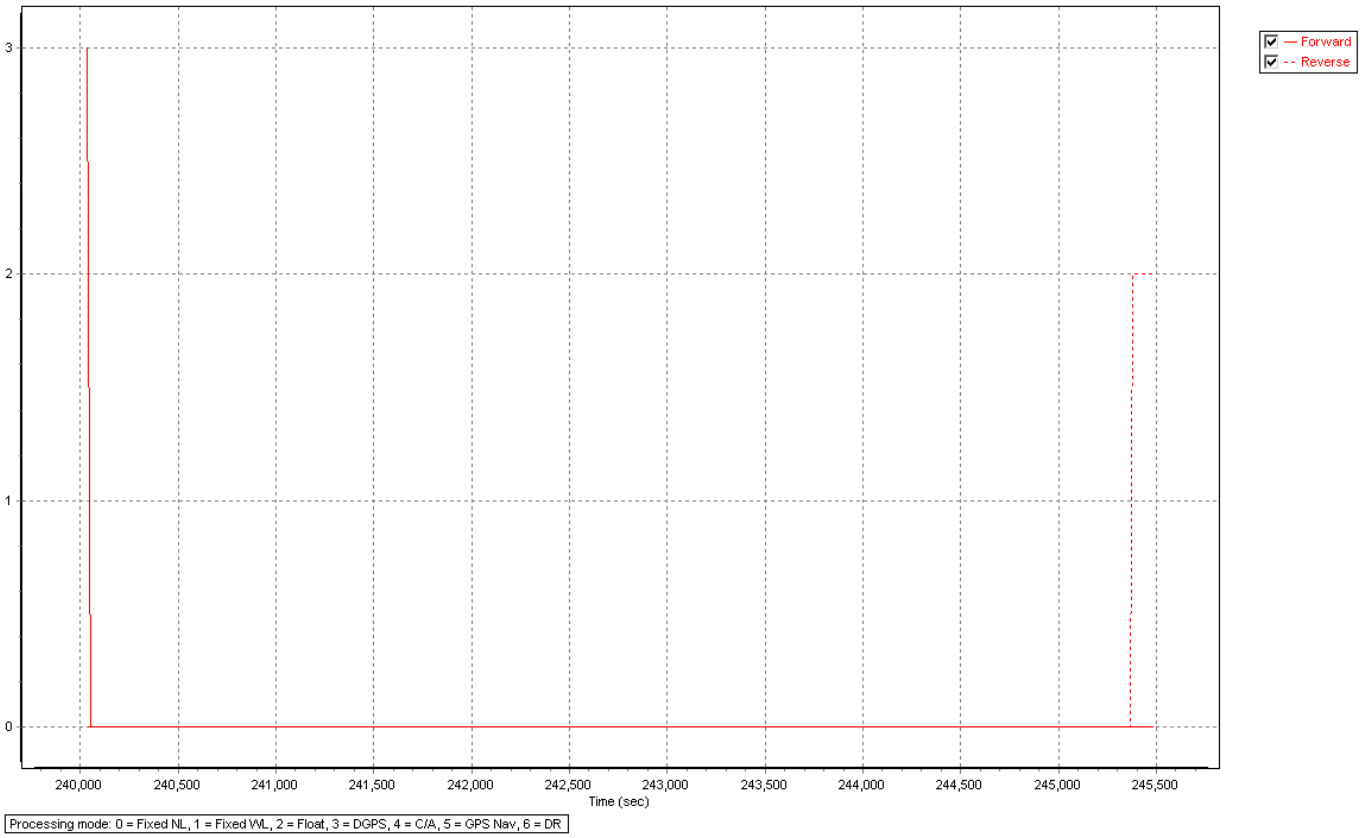
130806a-240

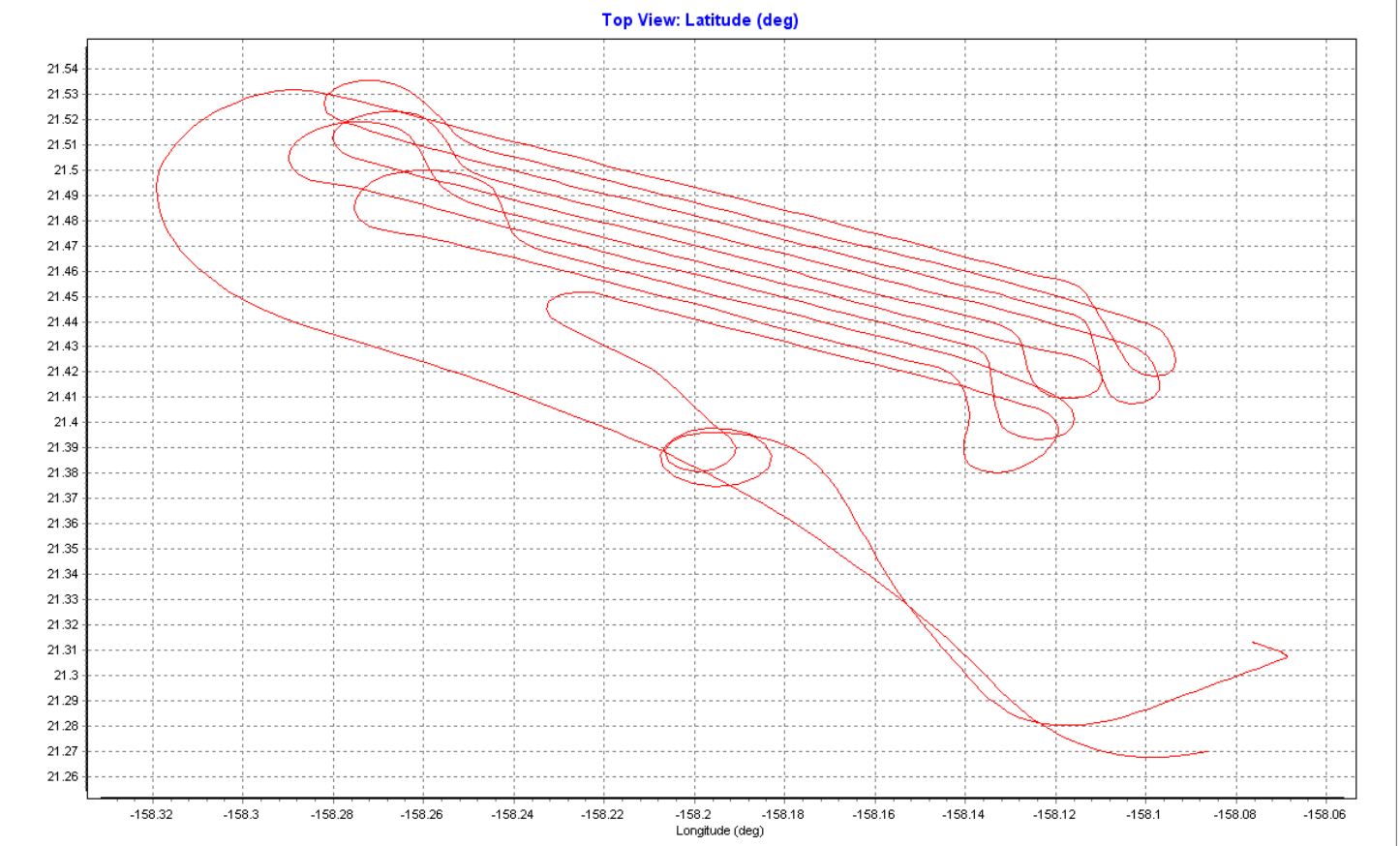

Baseline Length (m)
Forward
Reverse
35,000
34,000
33,000
32,000
31,000
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
240,000
240,500
241,000
241,500
242,000
242,500
243,000
243,500
244,000
244,500
245,000
245,500
Time (sec)


North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.027
0.026
0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
240,000
241,000
242,000
243,000
244,000
245,000
Time (sec)

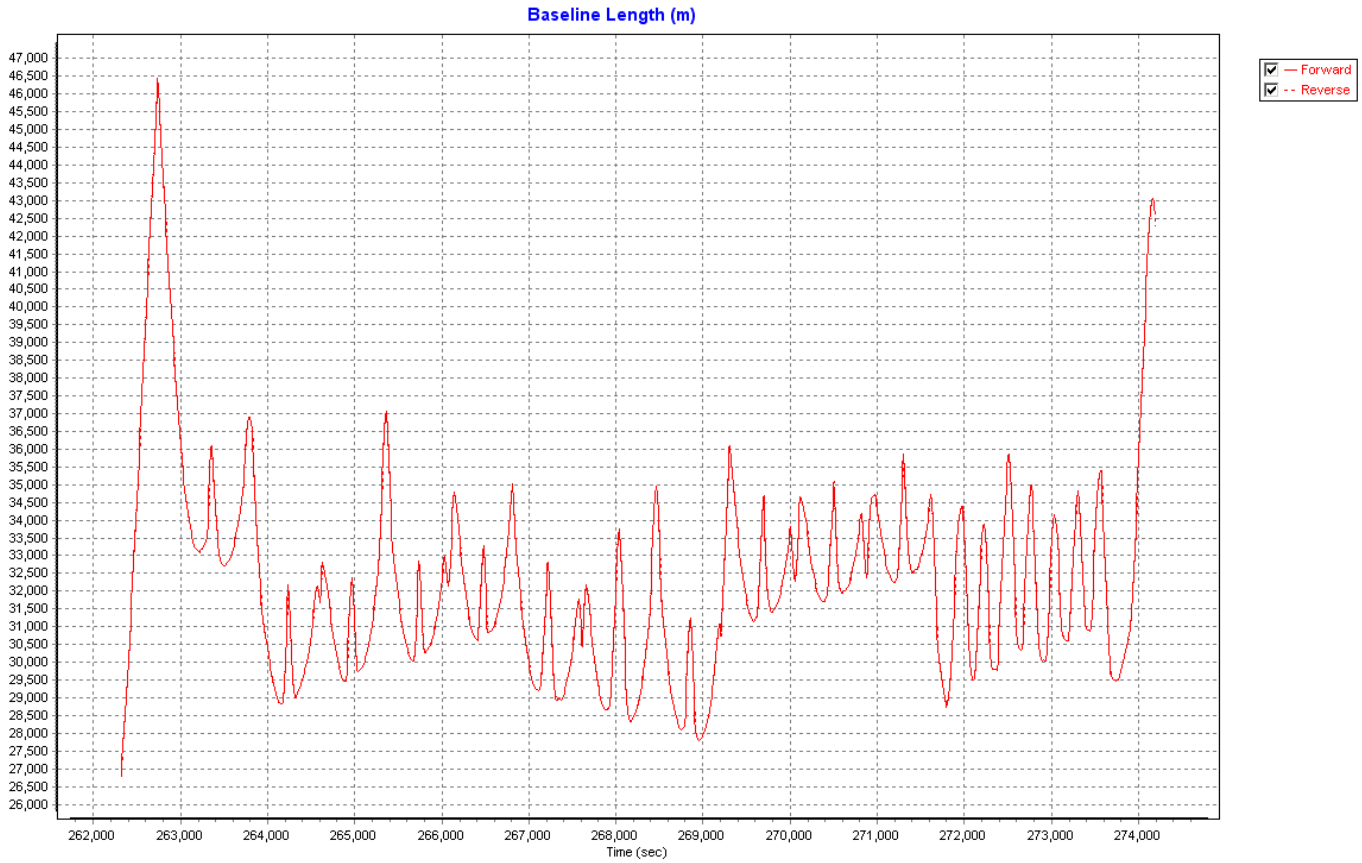


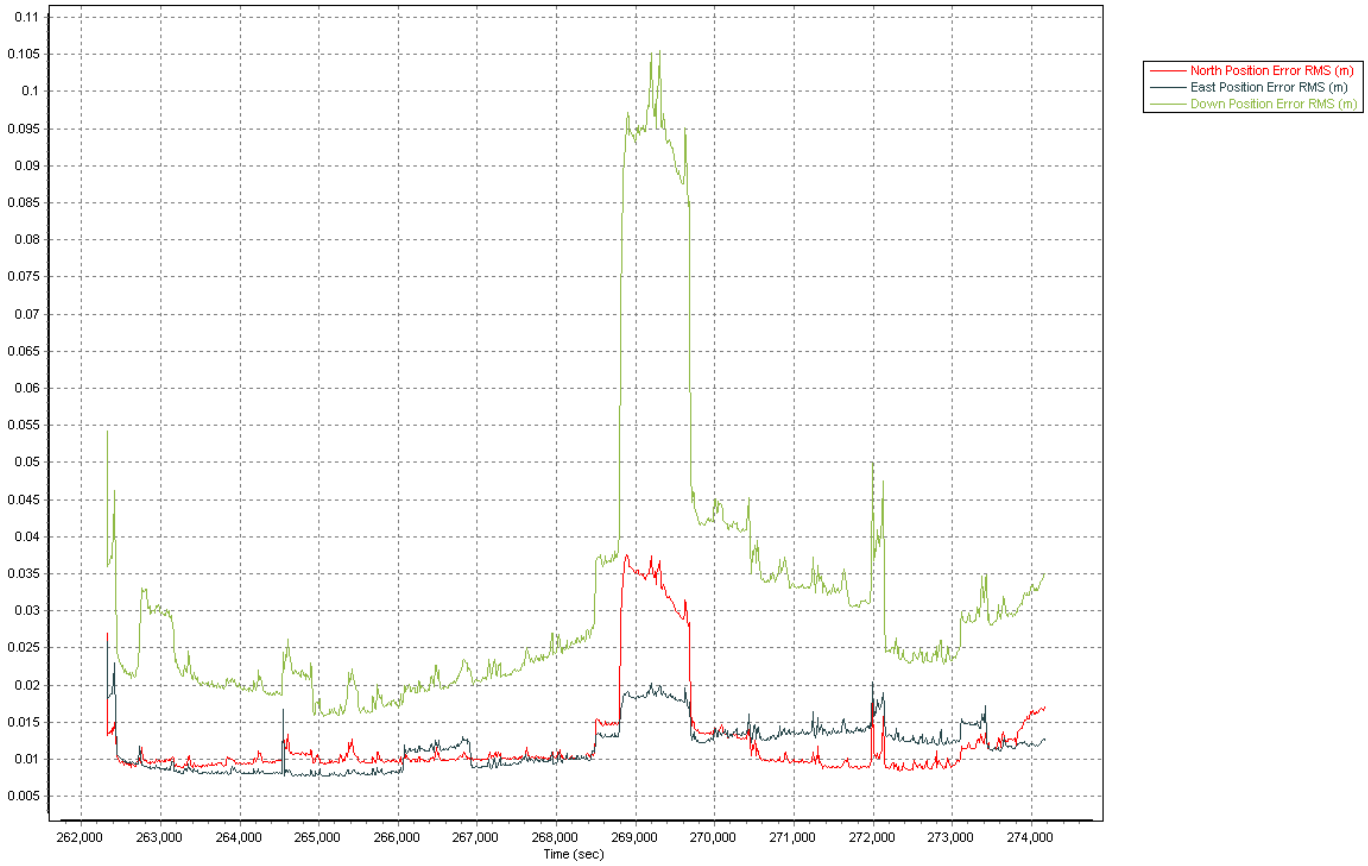
Processing mode

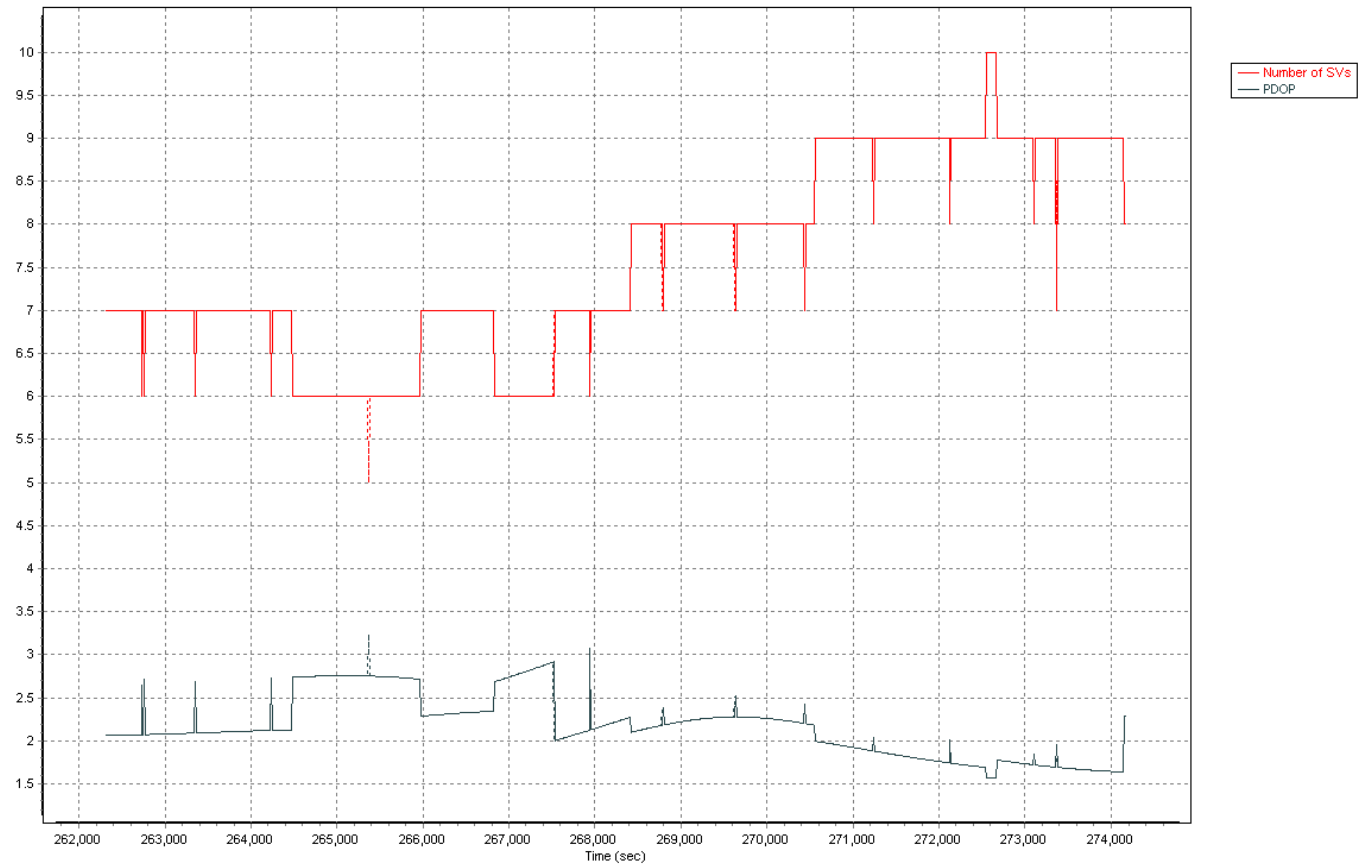


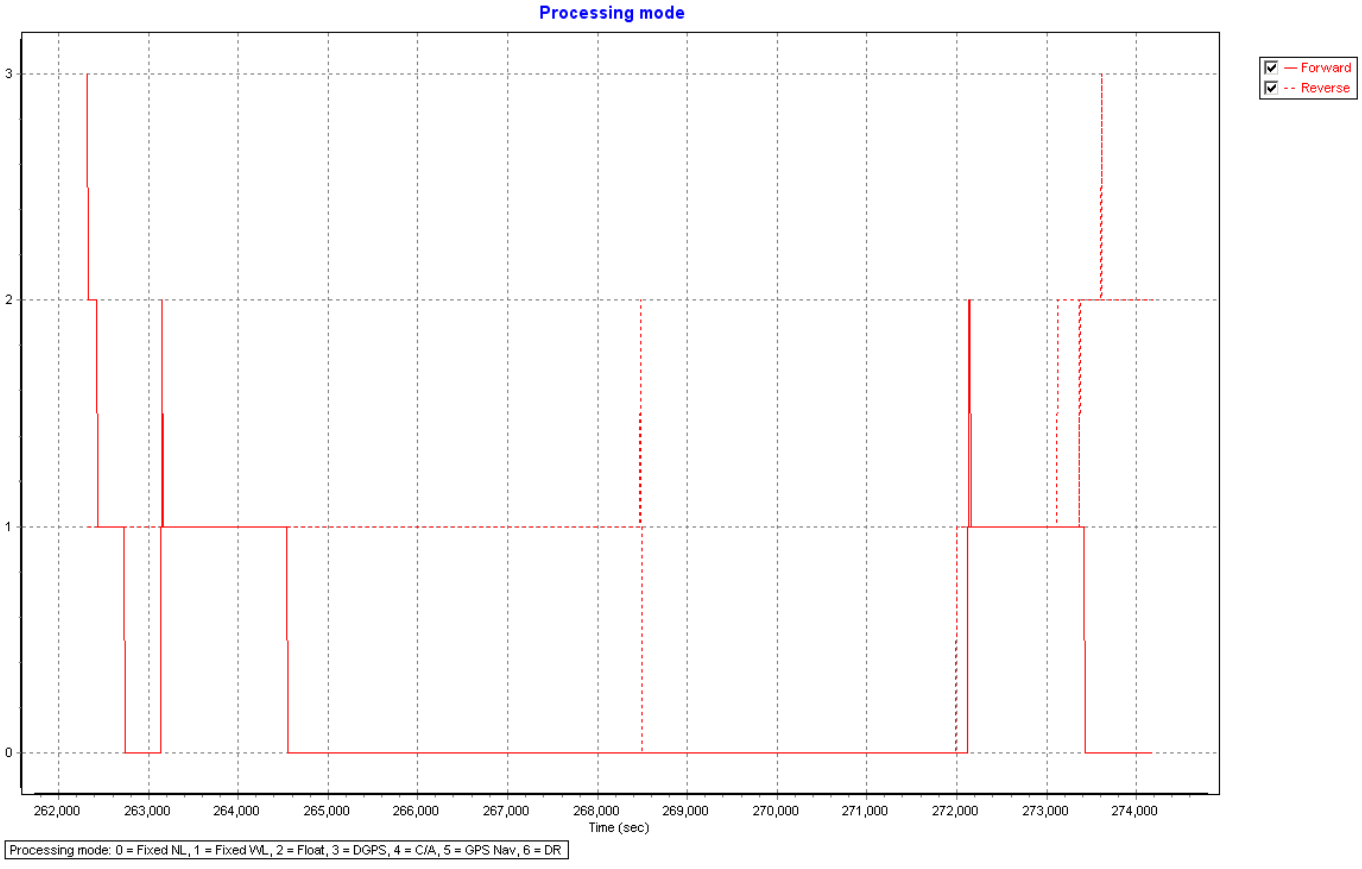

Top View: Latitude (deg)
21.54
21.53
21.52
21.51
21.5
21.49
21.48
21.47
21.46
21.45
21.44
21.43
21.42
21.41
21.4
21.39
21.38
21.37
21.36
21.35
21.34
21.33
21.32
21.31
21.3
21.29
21.28
21.27
21.26
-158.32
-158.3
-158.28
-158.26
-158.24
-158.22
-158.2
-158.18
-158.16
-158.14
-158.12
-158.1
-158.08
-158.06
Longitude (deg)

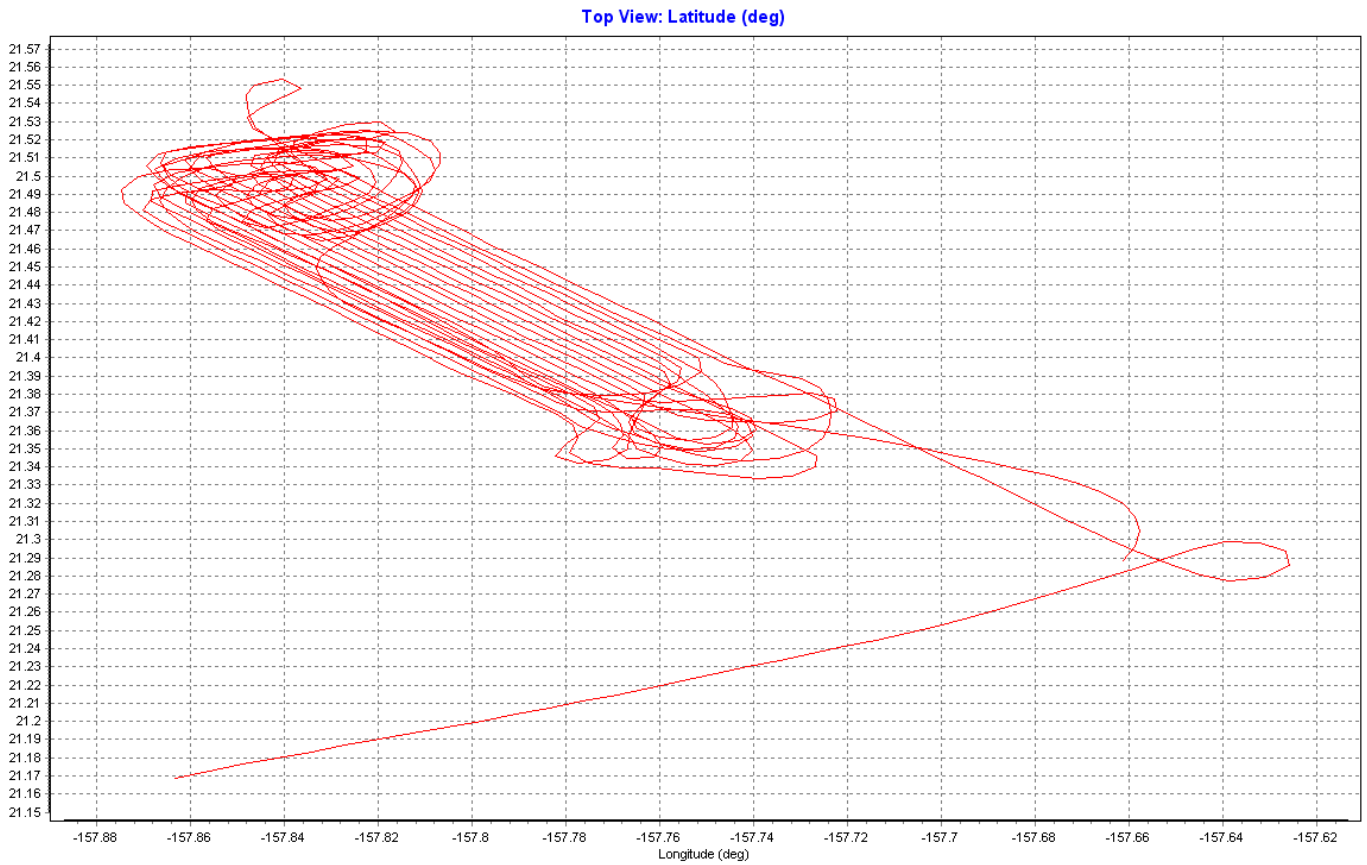
1300806b-240


Baseline Length (m)
Forward
Reverse
47,000
46,500
46,000
45,500
45,000
44,500
44,000
43,500
43,000
42,500
42,000
41,500
41,000
40,500
40,000
39,500
39,000
38,500
38,000
37,500
37,000
36,500
36,000
35,500
35,000
34,500
34,000
33,500
33,000
32,500
32,000
31,500
31,000
30,500
30,000
29,500
29,000
28,500
28,000
27,500
27,000
26,500
26,000
262,000
263,000
264,000
265,000
266,000
267,000
268,000
269,000
270,000
271,000
272,000
273,000
274,000
Time (sec)

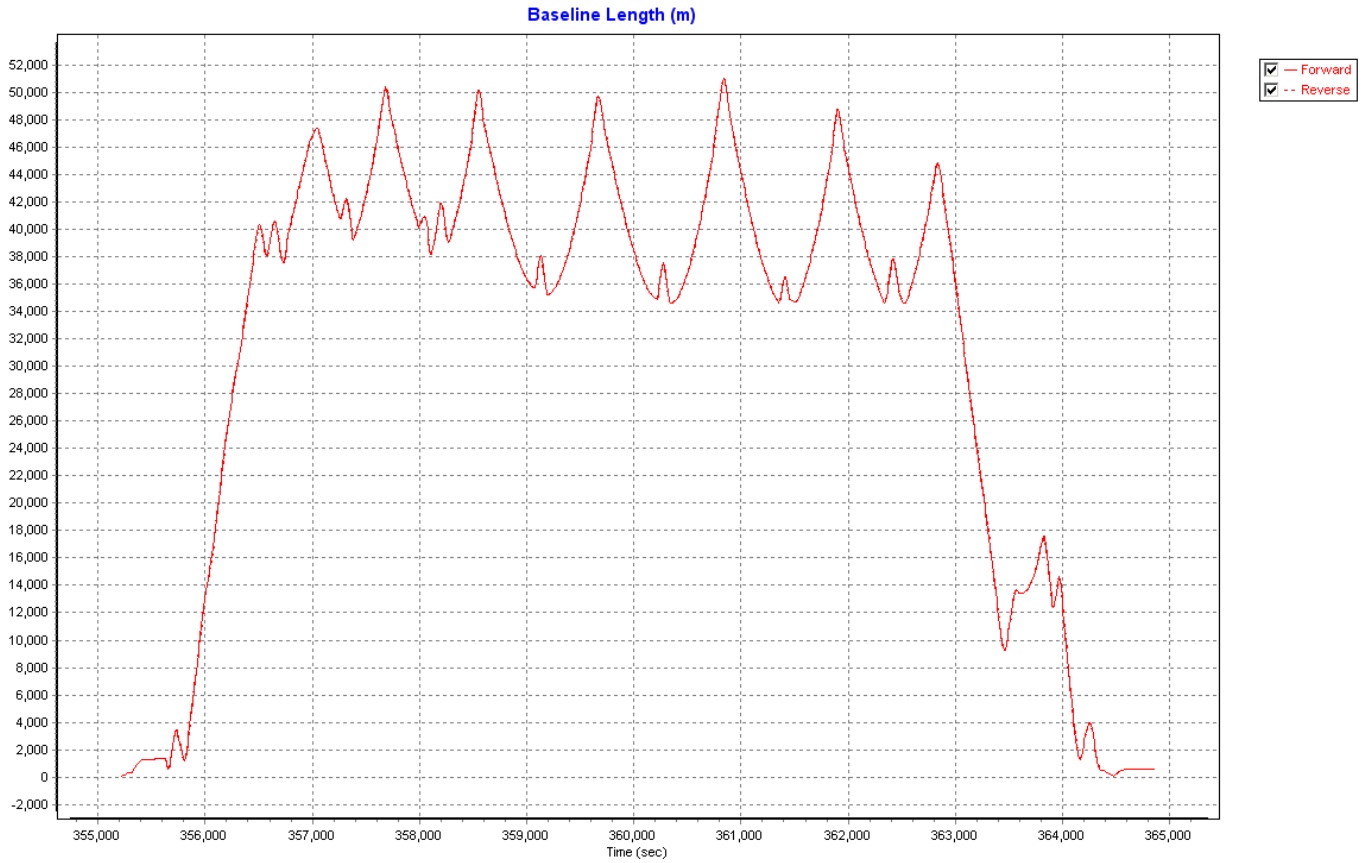

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.11
0.105
0.1
0.095
0.09
0.085
0.08
0.075
0.07
0.065
0.06
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
262,000
263,000
264,000
265,000
266,000
267,000
268,000
269,000
270,000
271,000
272,000
273,000
274,000
Time (sec)

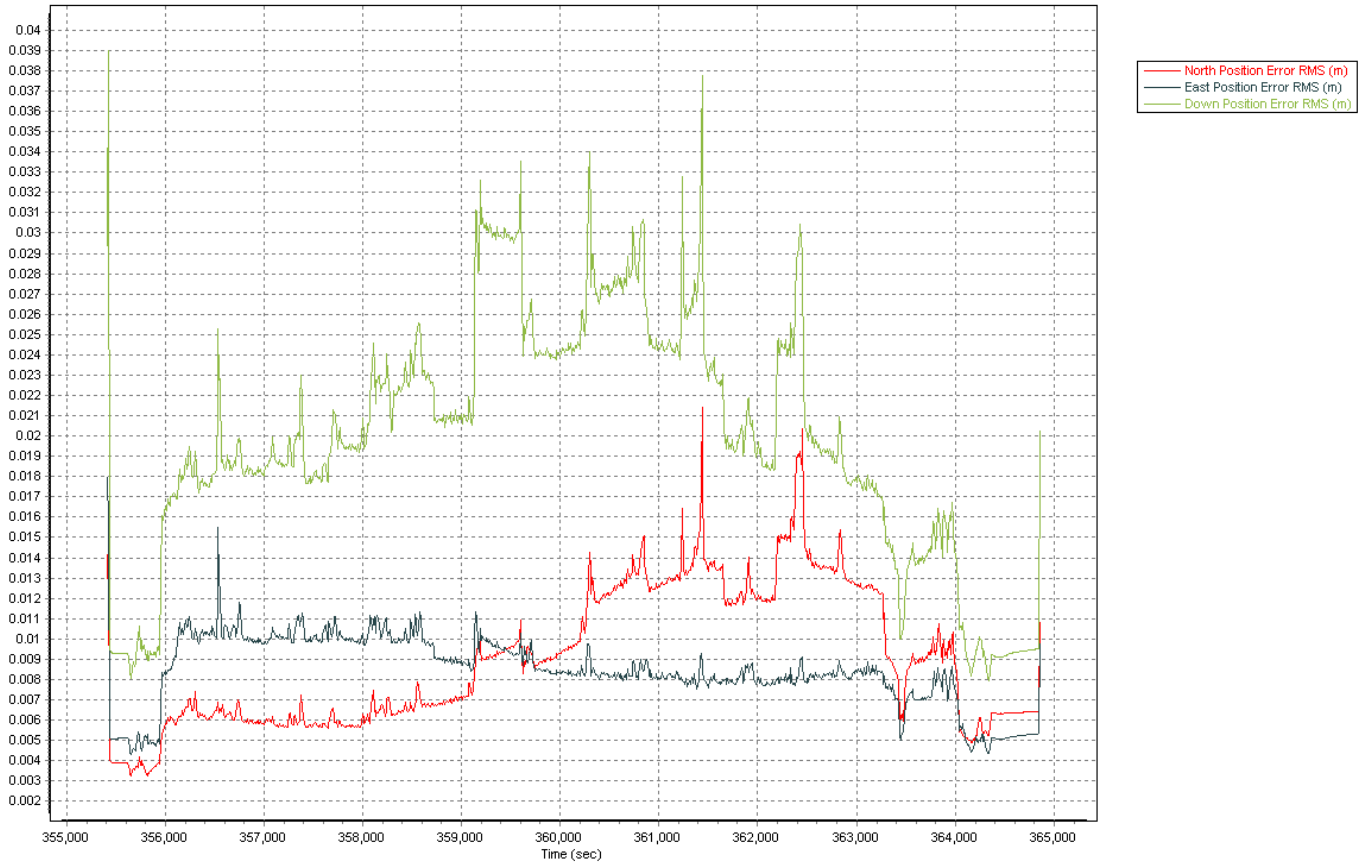

Number of SVs
PDOP
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
262,000
263,000
264,000
265,000
266,000
267,000
268,000
269,000
270,000
271,000
272,000
273,000
274,000
Time (sec)

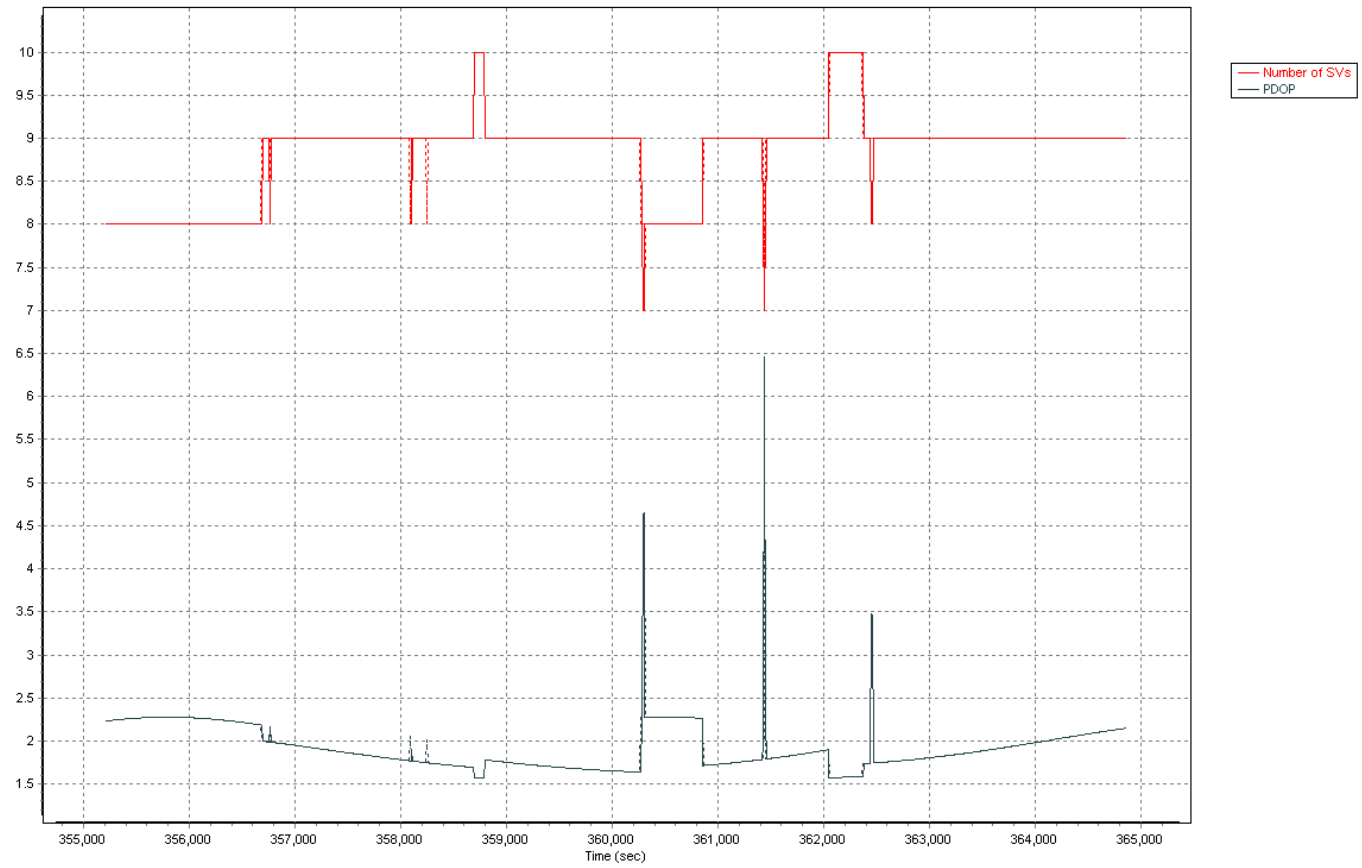

Processing mode
Forward
Reverse
3
2
1
0
262,000
263,000
264,000
265,000
266,000
267,000
268,000
269,000
270,000
271,000
272,000
273,000
274,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR

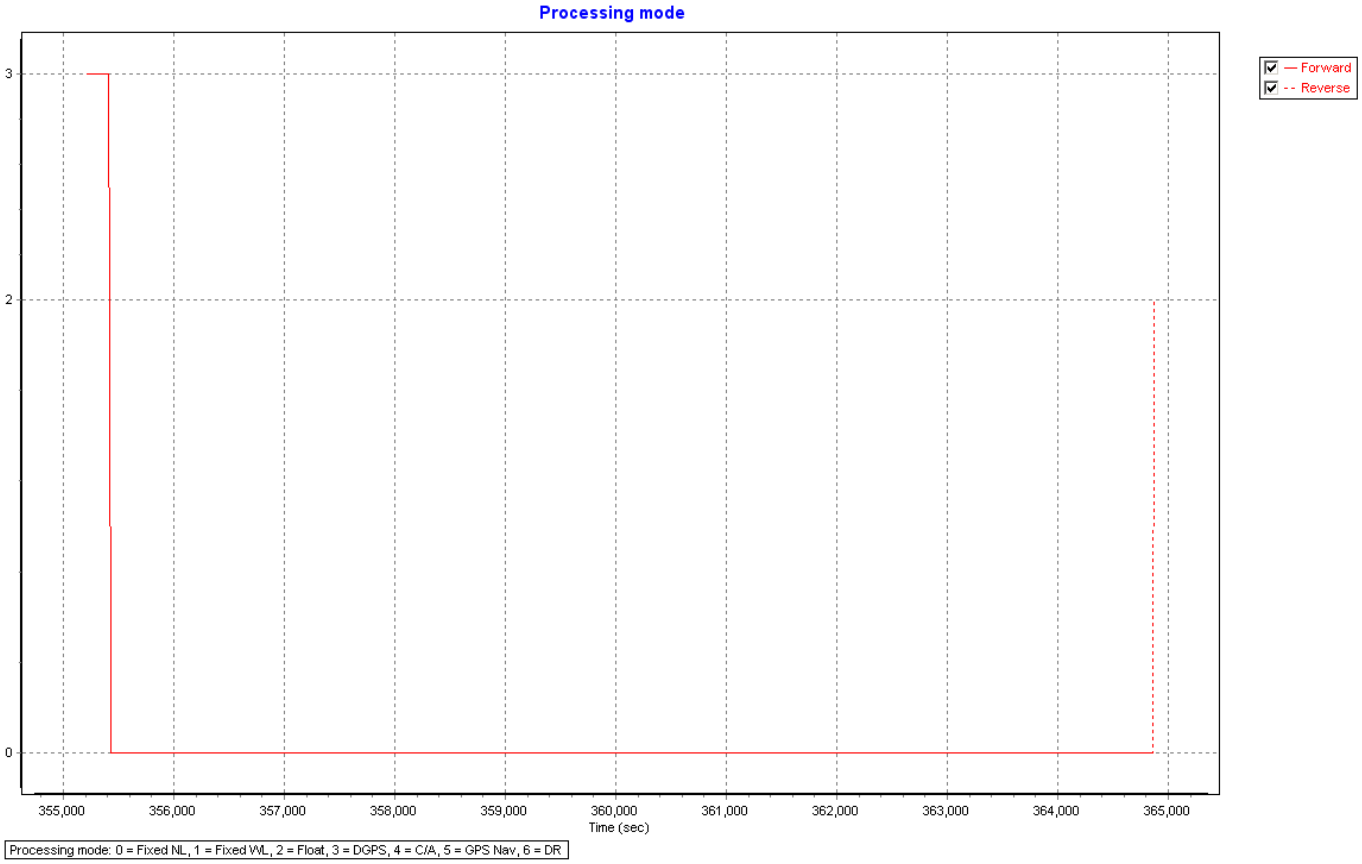

Top View: Latitude (deg)
21.57
21.56
21.55
21.54
21.53
21.52
21.51
21.5
21.49
21.48
21.47
21.46
21.45
21.44
21.43
21.42
21.41
21.4
21.39
21.38
21.37
21.36
21.35
21.34
21.33
21.32
21.31
21.3
21.29
21.28
21.27
21.26
21.25
21.24
21.23
21.22
21.21
21.2
21.19
21.18
21.17
21.16
21.15
-157.88
-157.86
-157.84
-157.82
-157.8
-157.78
-157.76
-157.74
-157.72
-157.7
-157.68
-157.66
-157.64
-157.62
Longitude (deg)

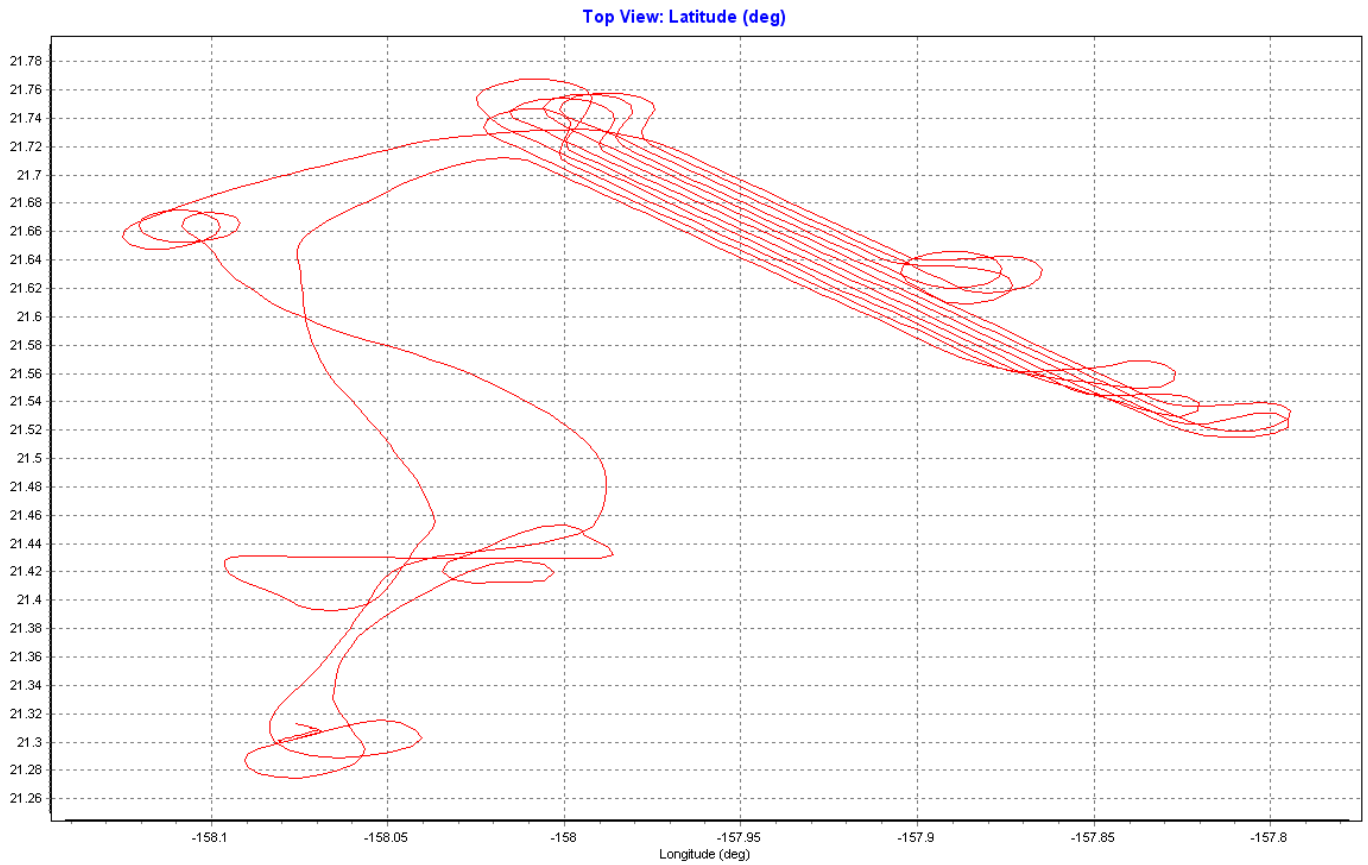
130807a-240


Baseline Length (m)
Forward
Reverse
52,000
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
355,000
356,000
357,000
358,000
359,000
360,000
361,000
362,000
363,000
364,000
365,000
Time (sec)

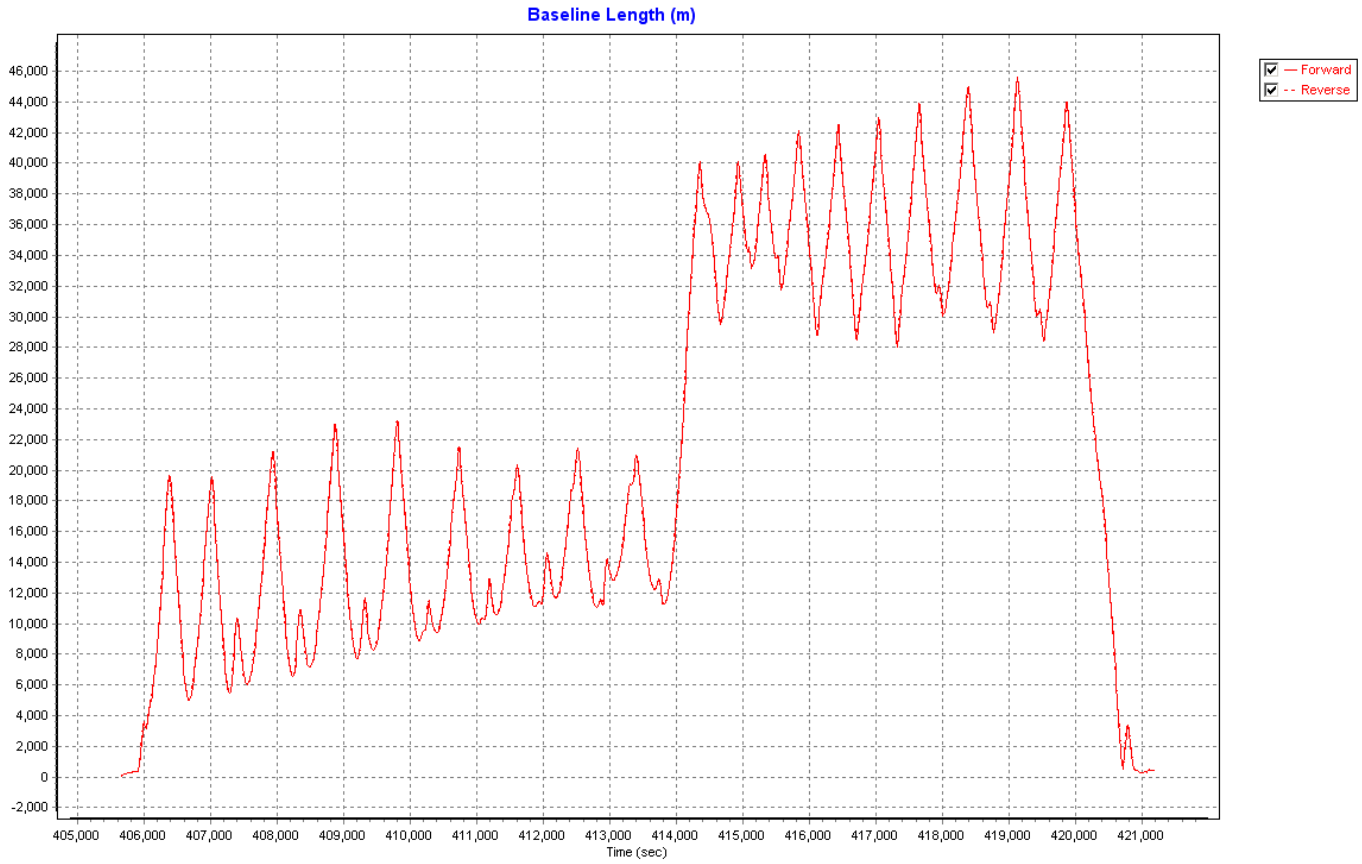

North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.04
0.039
0.038
0.037
0.036
0.035
0.034
0.033
0.032
0.031
0.03
0.029
0.028
0.027
0.026
0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
355,000
356,000
357,000
358,000
359,000
360,000
361,000
362,000
363,000
364,000
365,000
Time (sec)

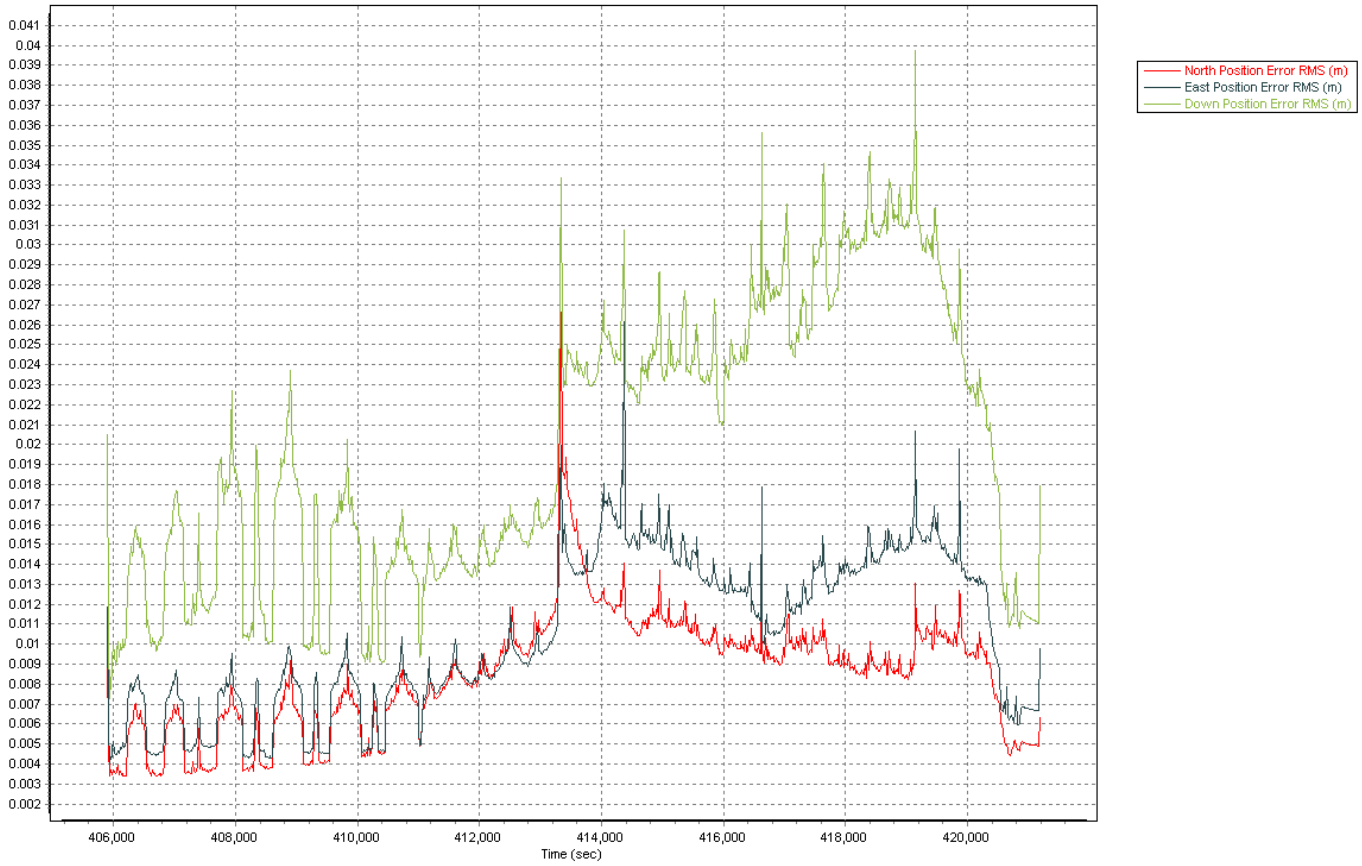

Number of SVs
PDOP
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
355,000
356,000
357,000
358,000
359,000
360,000
361,000
362,000
363,000
364,000
365,000
Time (sec)

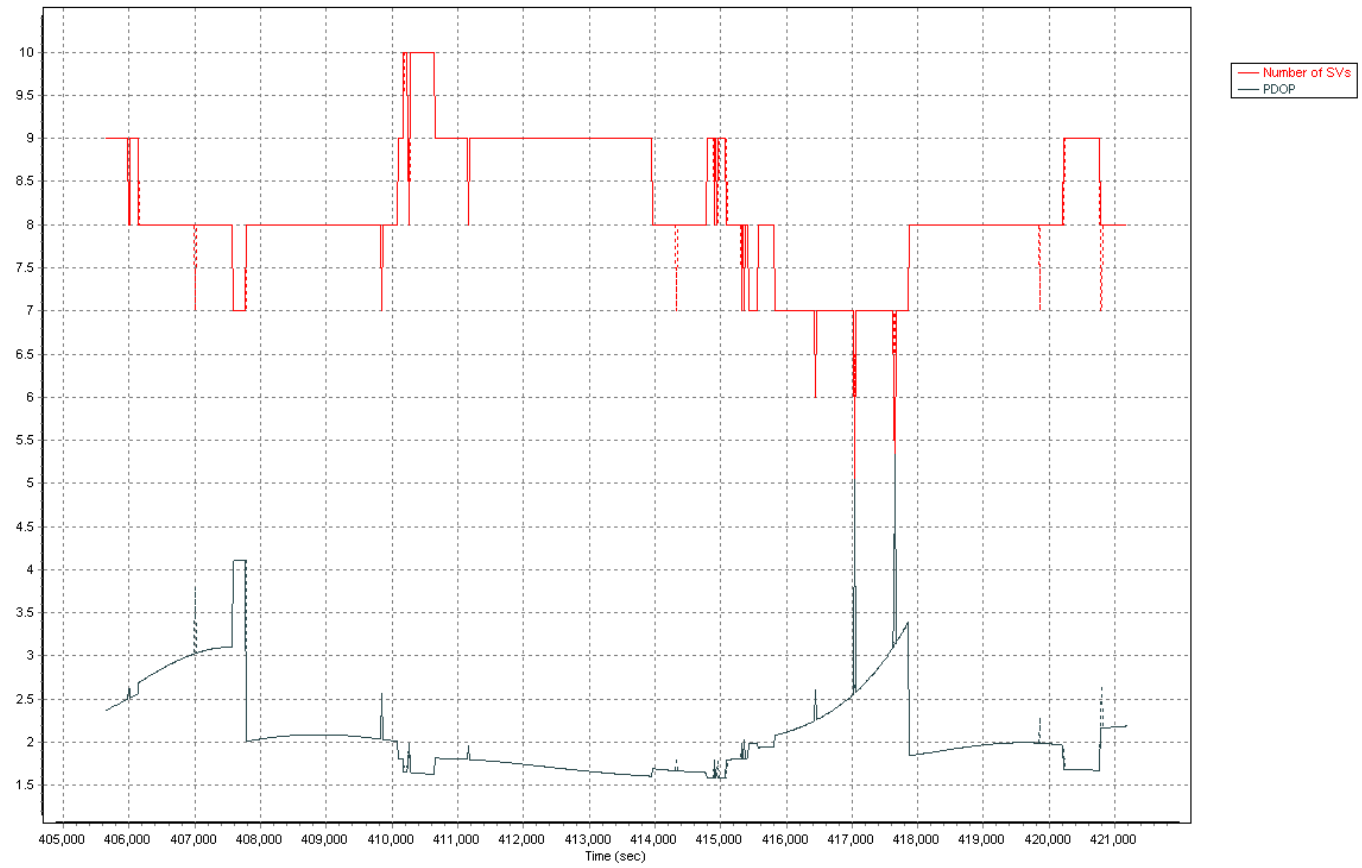

Processing mode
Forward
Reverse
3
2
0
355,000
356,000
357,000
358,000
359,000
360,000
361,000
362,000
363,000
364,000
365,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


Top View: Latitude (deg)
21.78
21.76
21.74
21.72
21.7
21.68
21.66
21.64
21.62
21.6
21.58
21.56
21.54
21.52
21.5
21.48
21.46
21.44
21.42
21.4
21.38
21.36
21.34
21.32
21.3
21.28
21.26
-158.1
-158.05
-158
-157.95
-157.9
-157.85
-157.8
Longitude (deg)

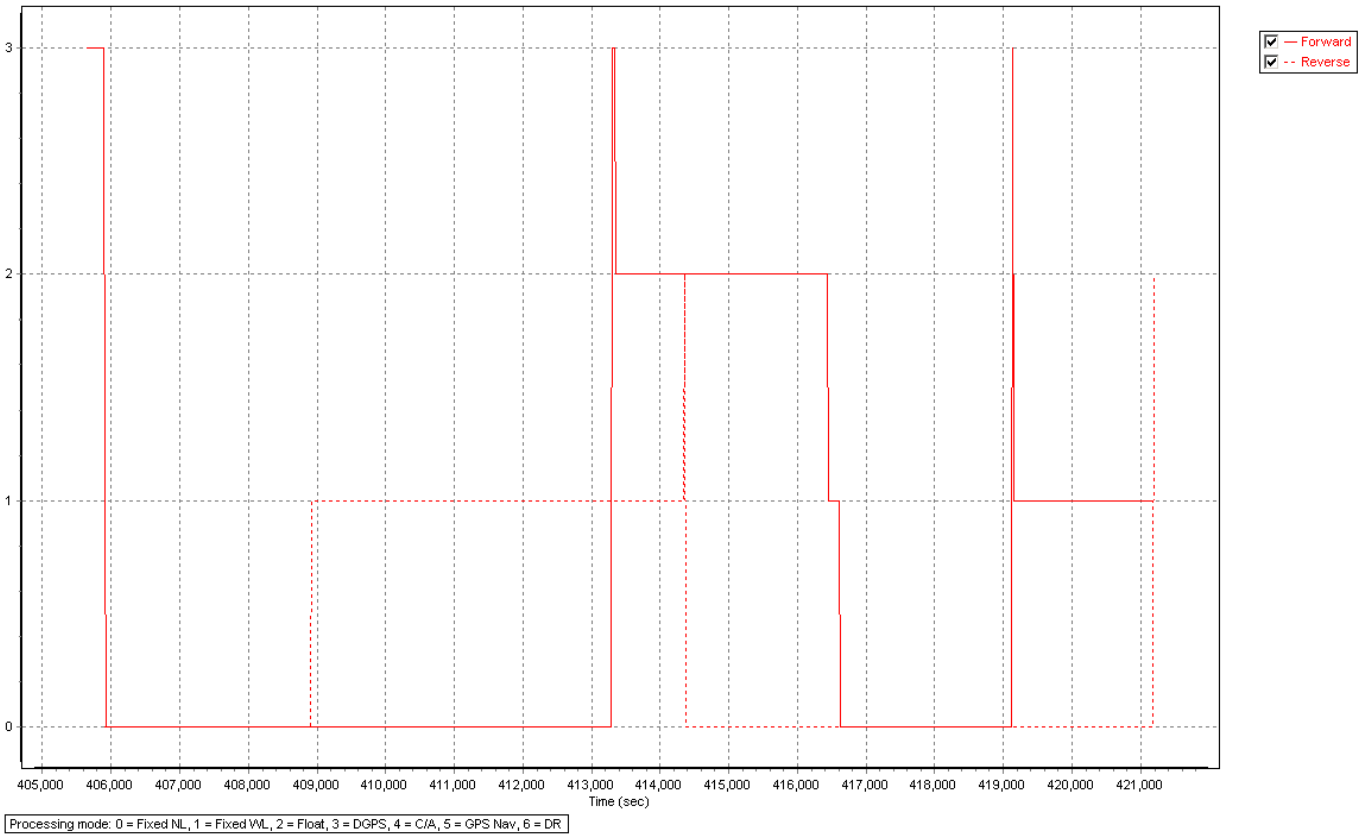
130808a-240

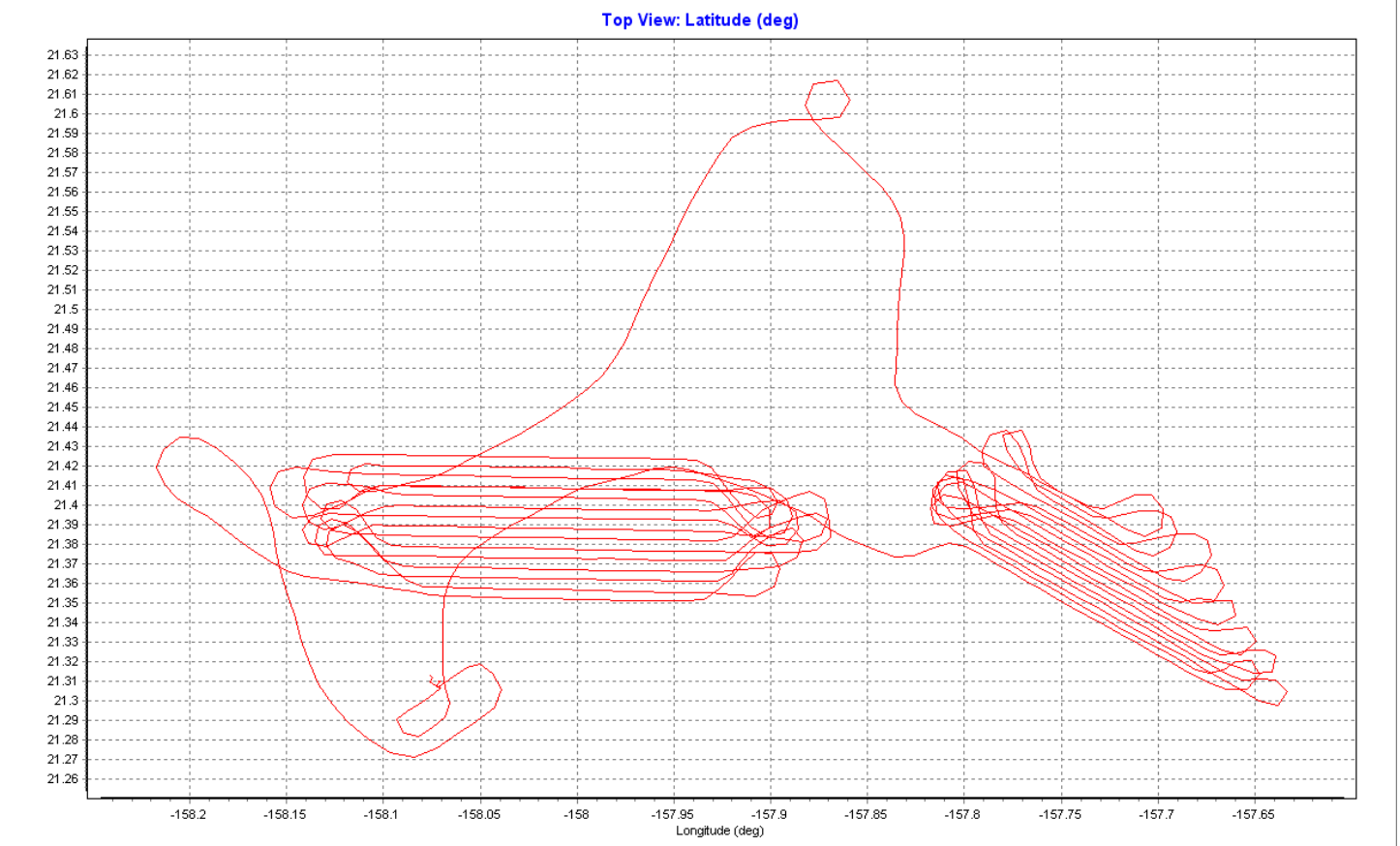

Baseline Length (m)
Forward
Reverse
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
-2,000
405,000
406,000
407,000
408,000
409,000
410,000
411,000
412,000
413,000
414,000
415,000
416,000
417,000
418,000
419,000
420,000
421,000
Time (sec)


North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.041
0.04
0.039
0.038
0.037
0.036
0.035
0.034
0.033
0.032
0.031
0.03
0.029
0.028
0.027
0.026
0.025
0.024
0.023
0.022
0.021
0.02
0.019
0.018
0.017
0.016
0.015
0.014
0.013
0.012
0.011
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
406,000
408,000
410,000
412,000
414,000
416,000
418,000
420,000
Time (sec)

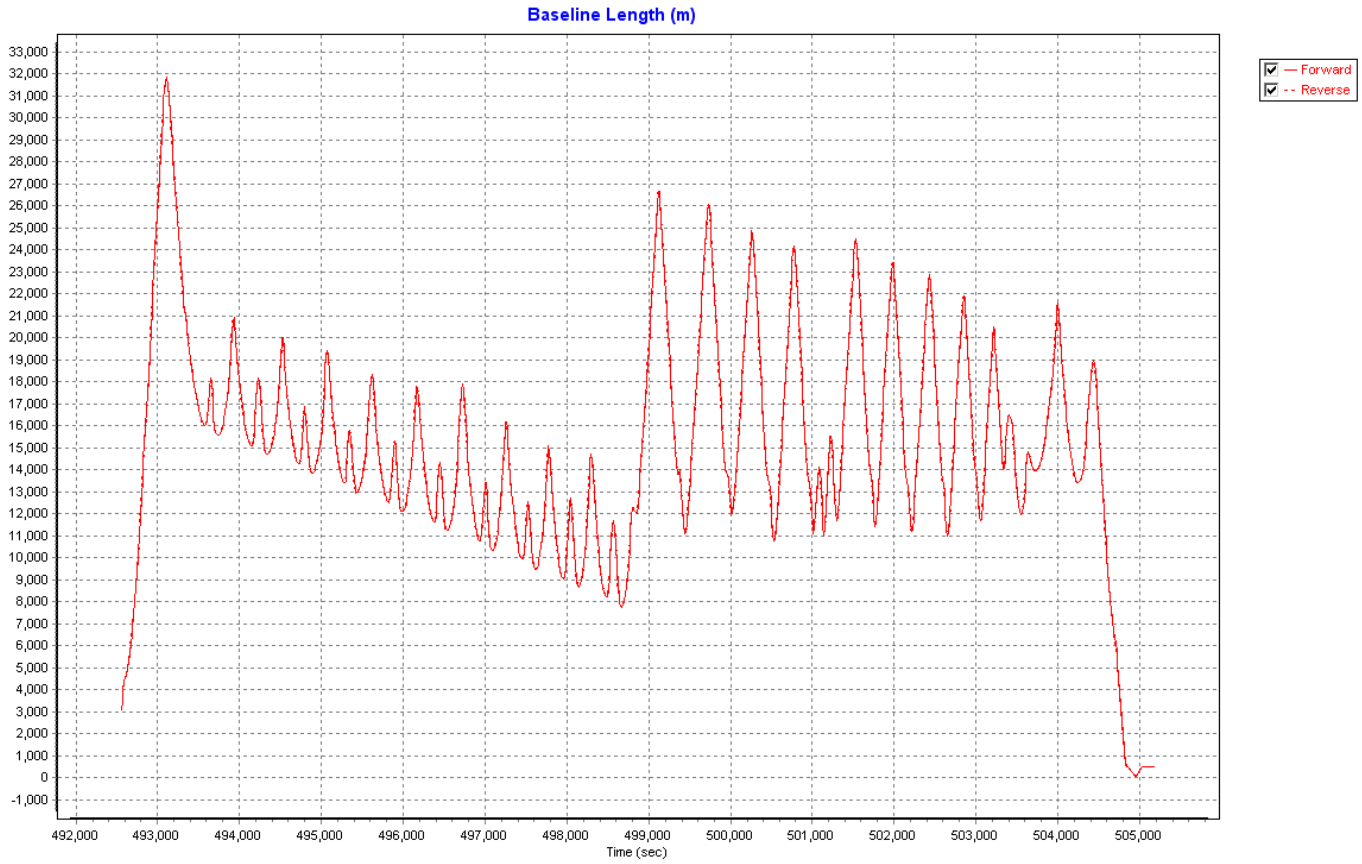


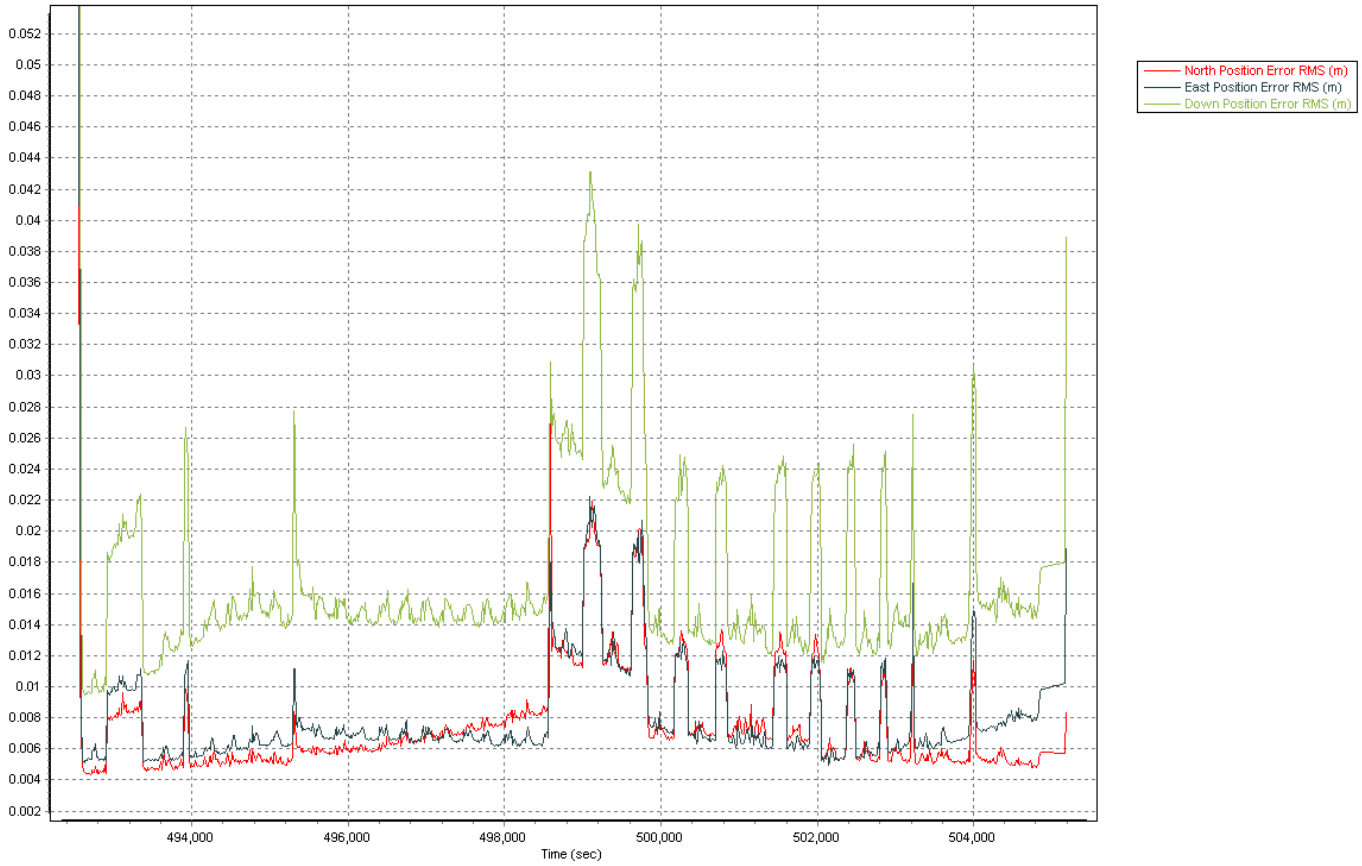
Processing mode

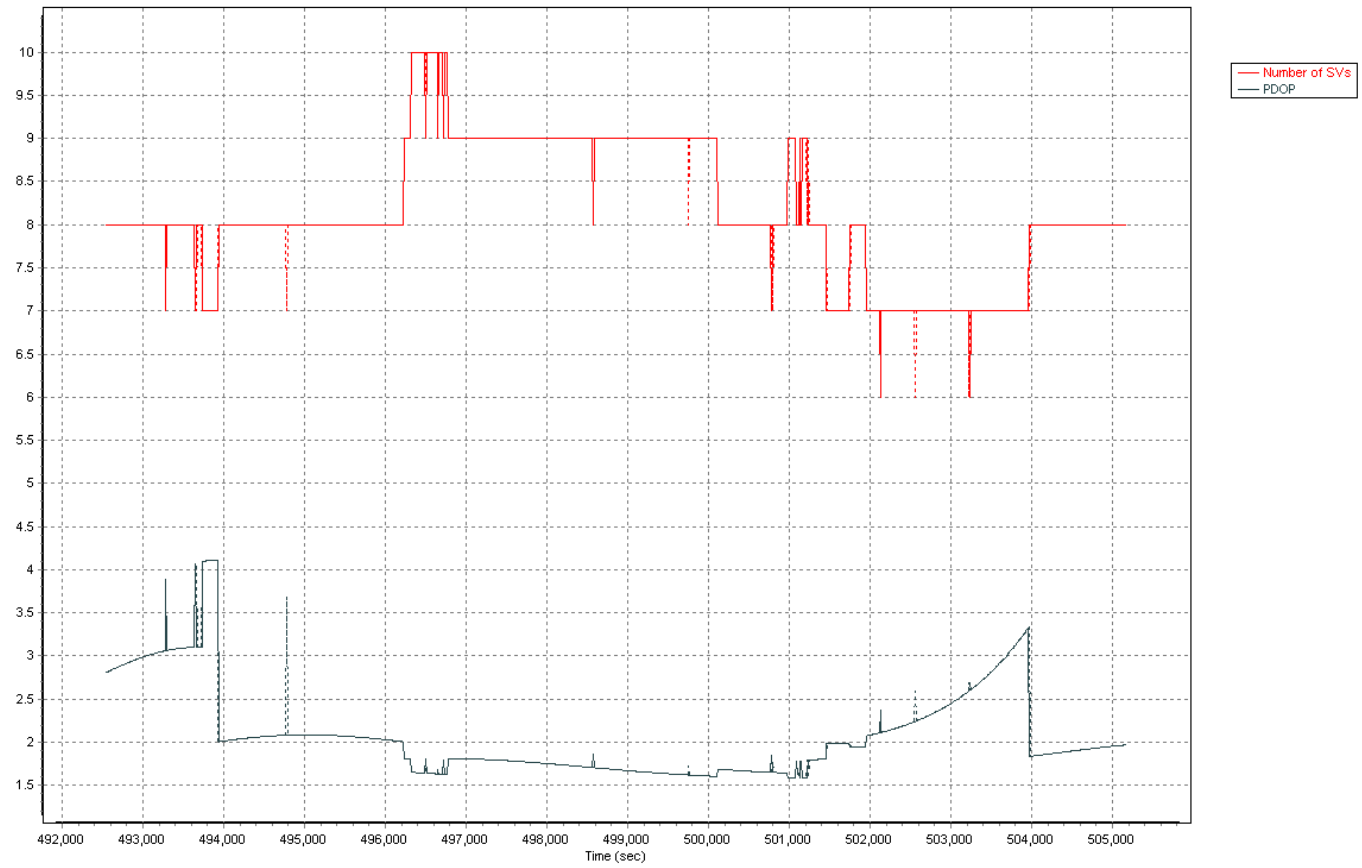


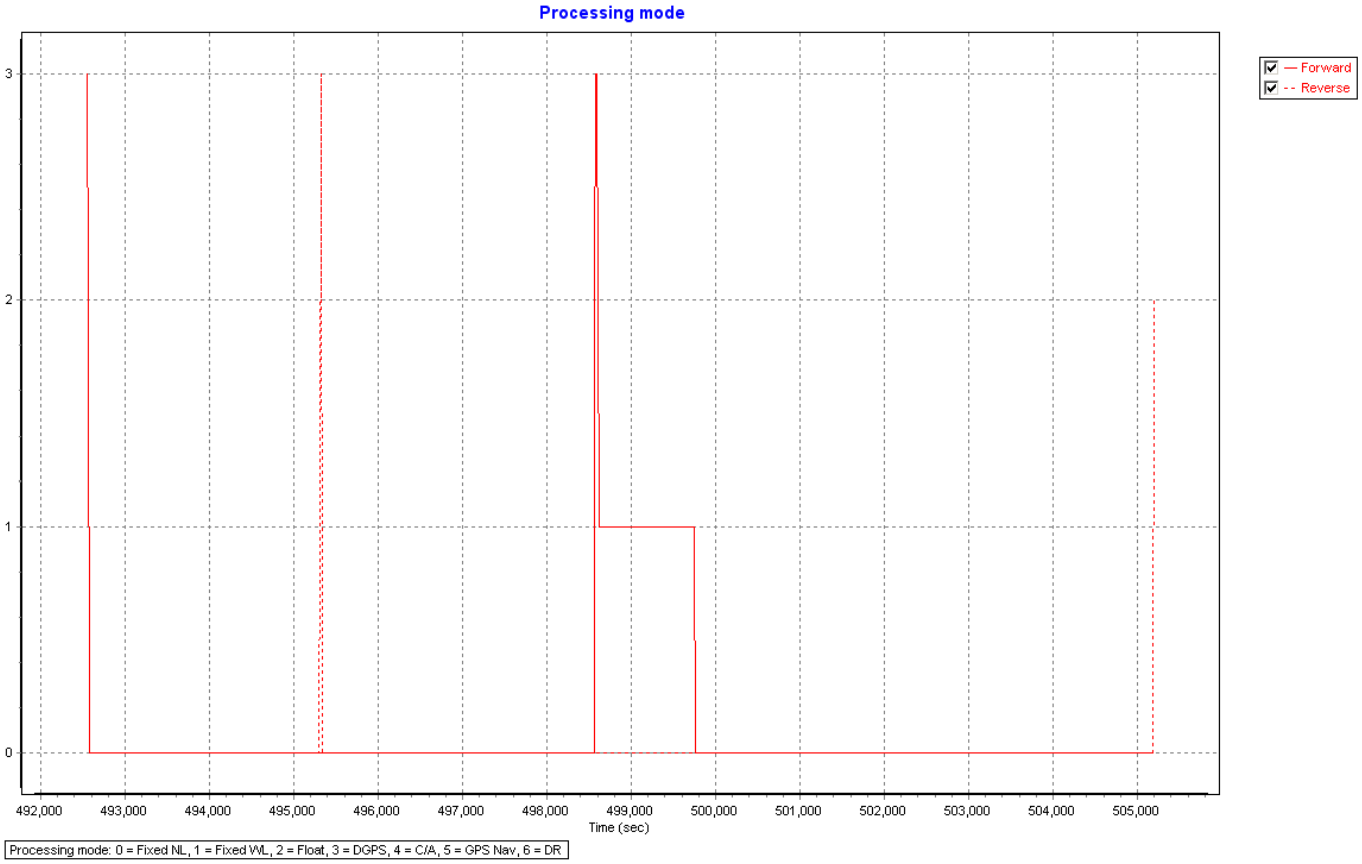

Top View: Latitude (deg)
21.63
21.62
21.61
21.6
21.59
21.58
21.57
21.56
21.55
21.54
21.53
21.52
21.51
21.5
21.49
21.48
21.47
21.46
21.45
21.44
21.43
21.42
21.41
21.4
21.39
21.38
21.37
21.36
21.35
21.34
21.33
21.32
21.31
21.3
21.29
21.28
21.27
21.26
-158.2
-158.15
-158.1
-158.05
-158
-157.95
-157.9
-157.85
-157.8
-157.75
-157.7
-157.65
Longitude (deg)

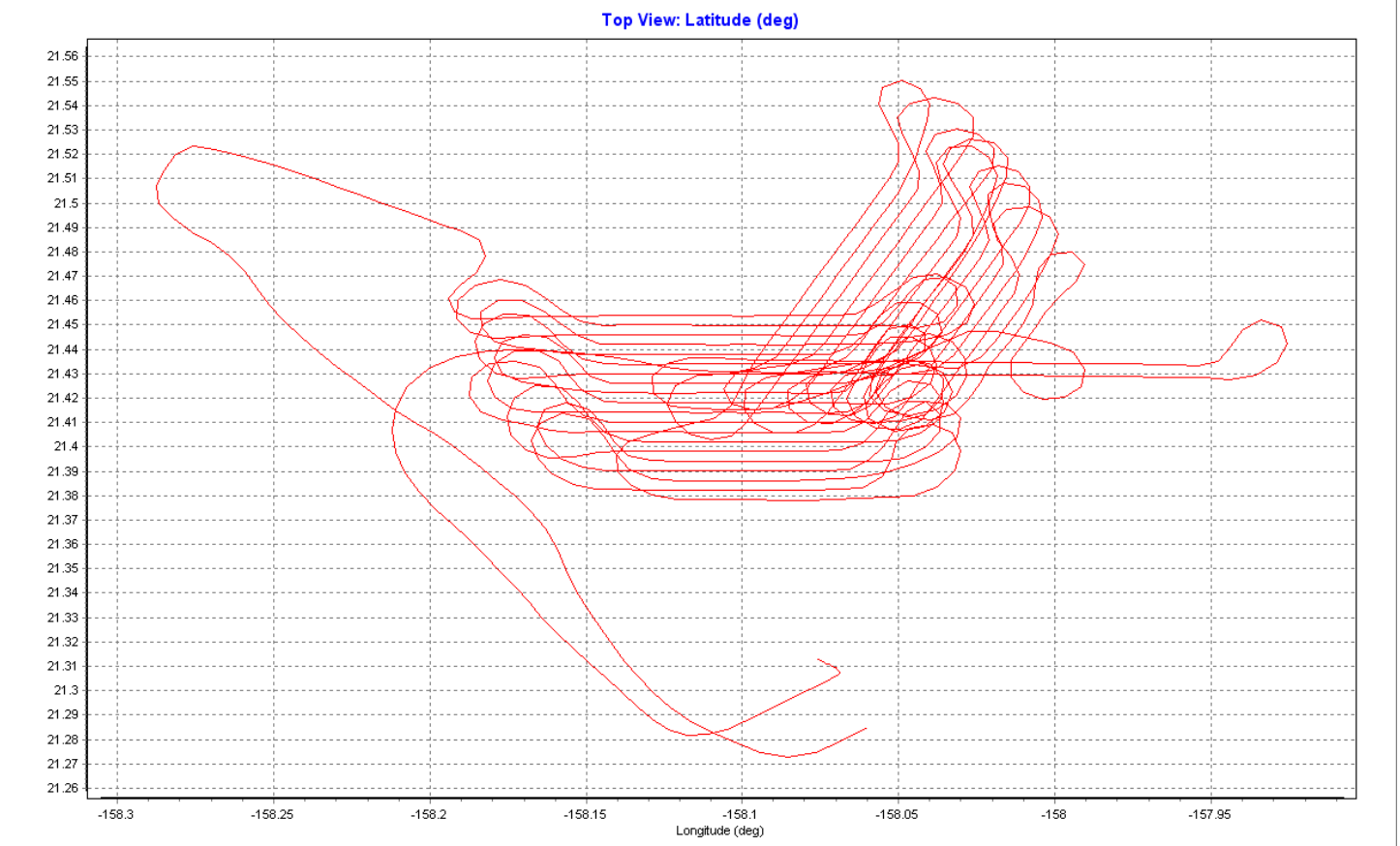
130809a-240


Baseline Length (m)
Forward
Reverse
33,000
32,000
31,000
30,000
29,000
28,000
27,000
26,000
25,000
24,000
23,000
22,000
21,000
20,000
19,000
18,000
17,000
16,000
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
492,000
493,000
494,000
495,000
496,000
497,000
498,000
499,000
500,000
501,000
502,000
503,000
504,000
505,000
Time (sec)


North Position Error RMS (m)
East Position Error RMS (m)
Down Position Error RMS (m)
0.052
0.05
0.048
0.046
0.044
0.042
0.04
0.038
0.036
0.034
0.032
0.03
0.028
0.026
0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
494,000
496,000
498,000
500,000
502,000
504,000
Time (sec)


Number of SVs
PDOP
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
492,000
493,000
494,000
495,000
496,000
497,000
498,000
499,000
500,000
501,000
502,000
503,000
504,000
505,000
Time (sec)


Processing mode
Forward
Reverse
3
2
1
0
492,000
493,000
494,000
495,000
496,000
497,000
498,000
499,000
500,000
501,000
502,000
503,000
504,000
505,000
Time (sec)
Processing mode: 0 = Fixed NL, 1 = Fixed WL, 2 = Float, 3 = DGPS, 4 = C/A, 5 = GPS Nav, 6 = DR


Top View: Latitude (deg)
21.56
21.55
21.54
21.53
21.52
21.51
21.5
21.49
21.48
21.47
21.46
21.45
21.44
21.43
21.42
21.41
21.4
21.39
21.38
21.37
21.36
21.35
21.34
21.33
21.32
21.31
21.3
21.29
21.28
21.27
21.26
-158.3
-158.25
-158.2
-158.15
-158.1
-158.05
-158
-157.95
Longitude (deg)

APPENDIX C
FLIGHT LOGS

6-1-13 7525-061/7505-078 SN240/N3949W OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu Lidar
Project Number	7525-061 / 7505-078
Navigation File	Oahu_-edited-PPK.v4.prj

Pilot	Art - Honolulu
Tech	Berry
Aircraft	N3949W

Date Flown	June 1, 2013		
Takeoff Time	1715Z 715AM	Airport	HBJ
Landing Time	1830Z 830AM	Airport	HBJ

Project's Scanning Requirements			
FOV (half-degrees):	30	Ground Speed (kts):	140
Scan Rate (Hz):	30	Altitude AGL (ft):	4000'
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	5001
POS File Name	130601a
from → to	000 → 012

Weather	Ground	Airport
Begin Temp		
Begin Dewpoint		
Begin Pressure		
End Temp		
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI -
PDOP Avoidance	Good this morning
Static or Flyover?	Static
→ if flyovers, times:	-

130601a

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
77	1731	1738	4000'	SE	140	100%	-3	Light turbulence
78	1741	1747	4000'	NW	140	100%		Cloud on Send
79	1752	1759	4000'	SE	140	100%		Abort
								VOIDED By 130605a-240
5								
10								
15								
20								

6-5-13 7525-061 / 7505-078 SN 240/N3949W OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu LiDAR
Project Number	7505-078 & 7525-061
Navigation File	Oahu-edited.nc.v4.pln

Pilot	Keith
Tech	Ben
Aircraft	N3949W

Date Flown	June 05 2013		
Takeoff Time	16027Z / 602AM HST	Airport	HJR
Landing Time	17557Z / 755AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	25°	Ground Speed (kts):	140
Scan Rate (Hz):	25	Altitude AGL (ft):	4000'
Pulse Rate Frequency (Hz):	33	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	350 #1
POS File Name	130605a
from → to	000 → 018

Weather	Ground	Airport
Begin Temp	21	HJR
Begin Dewpoint	17	
Begin Pressure	3004	
End Temp		
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	Coordinator Morning
Static or Flyover?	Static
→ if flyovers, times:	–

130605a-240

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
29	1600	1611	2900'	SE	130	100%	-10	Nice smooth ride,
30	1620	1633	3900'	NW	130	100%	12	" "
31	1637	1648	3900'	SE	130	100%	-9	" "
32	1655	1641	3900'	NW	130	100%	15	" "
5	1658	1705	3900'	SE	130	100%	-9	" "
33	1650	1659	3900'	NW	130	100%	15	Above
34	1713	1719	3900'	SE	140	100	14	" "
8	1732	1731	3900'	NW	140	100%	14	Cloudy Above Landing
10								
15								
20								

MISSION PAGE 1 OF 1

6-6-13 7525-061/7505-078 SN240/N3949W HAWAII OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu LiDAR
Project Number	7525-061 / 7505-078
Navigation File	Oahu edited POS_MV.pnv

Pilot	Jude
Tech	Dave
Aircraft	130600a

Date Flown	June 6, 2013		
Takeoff Time	18247 / 824AM HST	Airport	HJR
Landing Time	17592 / 959AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	37	Altitude AGL (ft):	4000
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	350 #1
POS File Name	130600a-240
from → to	000 → 015

Weather	Ground	Airport
Begin Temp	26	HJR
Begin Dewpoint	17	
Begin Pressure	30.06	
End Temp	27	HJR
End Dewpoint	16	
End Pressure	30.06	

GPS Base Location(s)	T51 HJR
PDOP Avoidance	400 - 800 PM HST
Static or Flyover?	Static
→ if flyovers, times:	--

130600a-240

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
1	1843	1844	3960	NW	130	100%	8	Smooth ride OK
2	1848	1849	3950	SE	130	70%	-6	Some Chop OK
3	1852	1853	3950	NW	120	100%	5	mostly smooth OK
4	1857	1858	3950	SE	120	70%	-4	OK
5	1902	1903	4000	NW	120	100%	7	Possible Cloud Patchy OK
6	1908	1909	4000	SE	130	100%	-10	Cloud OK
7	1914	1917	4000	NW	130	100%	4	Clouds Cloud over lava (OK)
9	1922	1927	4000	NW	130	100%	9	Clouds - intercept line Some Patchy
8	1936	1938	4000	SE	130	100%		Some Patchy
10 Test								Test 2600' Void Donat Process
15								
20								

MISSION PAGE _____ OF _____

6-8-13 7525-061/7505-078 SN240/N3949W HAWAII OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu LiDAR
Project Number	7525-061/7505-078
Navigation File	Oahu_..._2500'.txt

Pilot	Garrison (AFS)
Tech	Brian
Aircraft	N3949W

Date Flown	June 8, 2013		
Takeoff Time	1635Z / 1235AM HST	Airport	HJR
Landing Time	1932Z / 932AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	47.5	Altitude AGL (ft):	2500
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	HD #1
POS File Name	B060813a
from → to	000 →

130003a-240

Weather	Ground	Airport
Begin Temp		
Begin Dewpoint		
Begin Pressure		
End Temp	77	HJR
End Dewpoint	17	
End Pressure	3004	

GPS Base Location(s)	PGC HJR
PDOP Avoidance	400 - 3000m HST
Static or Flyover?	Static
→ if flyovers, times:	-

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
200	1703	1715	2500	-	120	-		Rain Clouds Northshore Clouds 2000' ~~Void~~ Void Do not Process
201	1709	1721	2500	-	120			60m returns ~~Void~~ Void Do not Process
142	1729	1741	2500	SE	120	0-100%	-2	Mostly over water
141	1736	1748	2500'	SE	120	0-100%	-3	" "
5 142	1742	1748	2500'	SE	120	0-100%	-2	"
149	1753	1756	2500'	SE	120	0-100%	-3	
198	1800	1804	2500'	NW	120	0-100%		
137	1805	1812	2500'	SE	140	0-100%	-4	
134	1816	1819	2500'	NW	120	0-100%		
10 135	1824	1828	2500'	SE	120	0-100%	-11	
134	1834	1839	2500'	NW	130	0-100%		
133	1844	1847	2500'	SE	120	100%		
130	1900	1902	2500'	NW	120	100%		
131	1909	1912	2500'	SE	130	100%		
15 130	1916	1919	2500'	NW	120	100%		
Cross	1921	1923	2500'	SE	120	100%		
								The lift now mostly Void after 4000' area flown
20								

6-12-13 7525-061/7505-078 SN240/N3949W HAWAII OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	[illegible]
Project Number	[illegible]
Navigation File	[illegible]

Pilot	Keith (AFS)
Tech	Barry
Aircraft	N3949W

Date Flown	June 12, 2013		
Takeoff Time	16:53:37 / 6:33 AM HST	Airport	HRJ
Landing Time	19:08:27 / 9:08 AM HST	Airport	HRJ

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	76	Altitude AGL (ft):	2500
Pulse Rate Frequency (Hz):	125	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	350 #1
POS File Name	130612a
from → to	000 → 240

Weather	Ground	Airport
Begin Temp	22	HRJ
Begin Dewpoint	18	
Begin Pressure	3006	
End Temp	28	HRJ
End Dewpoint	18	
End Pressure	3008	

GPS Base Location(s)	[illegible]
PDOP Avoidance	[illegible]
Static or Flyover?	[illegible]
→ if flyovers, times:	[illegible]

Last Calibration Mission:	

	Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
		[illegible]	16:49	2500			100%		Clouding 2200 low (Could not process)
	[illegible]	16:56	16:58	2500	E		100%	-2	Refly
	25	17:01	17:03	2500	W	120	100%	2	
	24	17:08	17:10	2500	E	115	100%	1	
5	23	17:14	17:16	2500	W	115	100%	-1	
	22	17:21	17:21	2500	E	120	100%	2	rain! Refly (if too many rain)
	21	17:28	17:36	2500	W	120	100%	-1	Refly "
	20	17:37	17:45	2500	E	120	100	2	refly "
	19	17:41	17:46	2500	W	120	100%	1	refly "
10	18	17:51	17:54	2500	E	120	100%	-2	refly "
	17	17:58	18:01	2500	W	120	100%	2	ok
	16	18:05	18:09	2500	E	120	100%	-2	"
	15	18:13	[illegible]	[illegible]	W	120	100%	2	"
	14	18:21	18:24	2500	E	120	100%	-2	"
15	13	18:30	18:34	2500	W	120	100	0	"
	12	18:37	18:42	2500	E	120	100%	3	rain refly (if too many rain)
	11	18:47	18:51	2500	W	120	100%	1	rain refly "
	close	18:57	18:59	2500	E	120	100%	-	
20									

MISSION PAGE 1 OF _____

6-19-13 7525-061/7505-078 SN240/N3949W HAWAII OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE
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523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu JAC
Project Number	7525-061 / 7505-078
Navigation File	Oahu_..._mc_14.plo

Pilot	Gunner IAPS
Tech	Eric
Aircraft	N3949W

Date Flown	June 19 2013		
Takeoff Time	1620Z / 630AM HST	Airport	HJR
Landing Time	1830Z / 830 AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	57	Altitude AGL (ft):	4000
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	350 #1
POS File Name	130619a
from → to	000 → 021

130619a-240

Weather	Ground	Airport
Begin Temp	59	HJR
Begin Dewpoint	13	
Begin Pressure	3005	
End Temp		
End Dewpoint		
End Pressure		

GPS Base Location(s)	PS1 HJR
PDOP Avoidance	Afternoon / Evening times
Static or Flyover?	Static
→ if flyovers, times:	--

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
75	1647	1653	4000	SE	120	100%	0	
74	1657	1703	4100	NW	120	100%	9	
73	1707	1713	4200	SE	120	100%	1	
72	1720	1725	4300	NW	120	100%	10	Clouds
71	1732	1736	4400	SE	120	100%	-	Cloud
70	1740	1744	4500	NW	120	100%	-	Cloud
69	1748	1753	4600	SE	120	100%		
68	1756	1801	4700	NW	120	100%	-	
60	1811	1812	4800	SE	120	100%	-	Eyesafety Smoke Vog
67	1812	1814	4800	SE	120	100%	-	[illegible]
								Switch flight plans

MISSION PAGE 1 OF 1

6-20-13 7525-061/7505-078 SN240/N3949W HAWAII OAHU

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Hawaii 2013 LiDAR
Project Number	7525-061 / 7525-078
Navigation File	Honolulu_Waikiki_v14_2500.fpl

Pilot	Garrison
Tech	Brian
Aircraft	N3949W

Date Flown	June 20, 2013		
Takeoff Time	12502 / 1230 PM HST	Airport	HJR
Landing Time	1617 / 1621 PM HST	Airport	HJK

Project's Scanning Requirements			
FOV (half-degrees):	20°	Ground Speed (kts):	140
Scan Rate (Hz):	47	Altitude AGL (ft):	2500
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	30411
POS File Name	130620a
from → to	000 →

Weather	Ground	Airport
Begin Temp	21°C	HJR
Begin Dewpoint	17°C	
Begin Pressure	3004	
End Temp	21°C	HJK
End Dewpoint	17°	
End Pressure	3003	

GPS Base Location(s)	PSI HCP
PDOP Avoidance	1100-1300 PM HST
Static or Flyover?	Static
→ if flyovers, times:	--

130620_240

Last Calibration Mission:	--

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)	Use
1	1305	1312	2500	NW	140	100%	3	Clouds above at 2800'	OK
2	1314	1319	2500'	SE	140	100	-5		OK
3	1324	1332	2500	NW	140	100%	4		OK
4	1337	1344	2500	SE	140	100%	-4		OK
5	1348	1355	2500'	NW	140	100%	5		OK
6	1350	1407	2500'	SE	140	100%	-6		OK
7	1411	1418	2500'	NW	140	100%	5		RF NW 4.5nm (5m)
8	1420	1430	2500	SE	140	100%	-6		RF NW 4.5nm 5m
9	1434	1441	2500'	NW	140	100%	5		OK
10	1445	1453	2500'	SE	140	100%	-8		OK
11	1457	1504	2500'	NW	140	100%	7		RF NW 6.5nm (7.5m
12	1508	1516	2500'	SE	140	100%	-8	Rain on NW end	RF NW 8.5nm (9.5m
13	1520	1528	2500'	NW	140	100%	7	Rain on Mauna Loa to go.	RF NW 3nm (4m
14	1531	1539	2500	SE	140	100%	-8		RF NW 3nm (4m
15	1544	1551	2500	NW	140	100%	7		OK
16	1554	1601	2500	SE	140	100%	-8	Rain first two rows	Rain @ end last 3 miles	RF all
17	1610	1617	2500	NW	140	100%	7	Rain first 3 rows	Rain last 4 miles	RF all
18									
19									
20									

MISSION PAGE 1 OF 1

7-4-13 7525-061/7505-078 SN240/N OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu
Project Number	7525-061/7505-078
Navigation File	oahu-rev2

Pilot	Keith
Tech	MATT
Aircraft	NAMPA AFB

Date Flown	7/4/13		
Takeoff Time	0600 AM HST	Airport	HJR
Landing Time	1000 AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees)	20	Ground Speed (kts)	130
Scan Rate (Hz)	37	Altitude AGL (ft)	4700
Pulse Rate Frequency (Hz)	70,000	MPiA or SPiA?	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	1
POS File Name	130704a
from → to	000 →

130704a-240 1/2

Weather	Ground	Airport
Begin Temp	71	HJR
Begin Dewpoint	63	
Begin Pressure	29.98	
End Temp	76	HJR
End Dewpoint	69	
End Pressure	29.91	

GPS Base Location(s)	Airport
PDOP Avoidance	2:30-7pm
Static or Flyover?	Static
→ if flyovers, times	

Last Calibration Mission	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
1	602	606	4700	286	130	100		
2	610	615	4800	106	120	100		
3	620	626	5700	286	120	100		
4	630	636	5700	106	125	100		NAV DATA LOST
5	640	646	5700	286	126	100		
6	652	659	5800	106	115	100		
7	703	709	5800	286	115	100		
8	714	726	5700	106	121	100		Clouds
23	723	725	5000	286	125	100		
10 22	729	733	4500	106	112	100		
21	736	741	4700	286	116	100		
20	745	750	4700	106	119	100		
19	755	800	4700	286	122	100		
18	809	810	4800	106	120	100		
15 17	813	818	4800	286	122	100		
16	822	826	3700	106	135	?		Clouds
15	830	835	4300	286	135	100		Partial line
14	839	842	4300	106	110	100		Partial line
13	845	848	5000	286	130	100		Partial line
20 12	850	855	5000	106	120	100		Partial line

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

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Project Name	Oahu
Project Number	7525-00 / 7505-073
Navigation File	Varied

Pilot	Kevin
Tech	Matt
Aircraft	N9650

Date Flown	7/4/13		
Takeoff Time	0600	Airport	HSR
Landing Time	1000	Airport	HSR

Project's Scanning Requirements			
FOV (half-degrees)	20	Ground Speed (kts)	130
Scan Rate (Hz)	37	Altitude AGL (ft)	9700
Pulse Rate Frequency (Hz)	70 kHz	MPiA or SPiA?	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	1
POS File Name	130704a
from → to	000 →

Weather	Ground	Airport
Begin Temp	71	HSR
Begin Dewpoint	63	
Begin Pressure	2998	
End Temp	76	HSR
End Dewpoint	68	
End Pressure	2996	

GPS Base Location(s)	Airport
PDOP Avoidance	2.36-6.70
Static or Flyover?	Static
→ if flyovers, times	

130704a-240
2/2

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
11	857	900	5200	286	120	108		Partial
10	903	906	5100	106	115	100		Partial
9	910	913	5200	286	118	100		Partial
5								
15								
15								
20								

7-5-13 7525-061/7505-078 SN240 OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu
Project Number	7525-061/7505-078
Navigation File	VS

Pilot	Travis
Tech	Matt C
Aircraft	Navajo

Date Flown	7/5/13		
Takeoff Time	615 AM HST	Airport	HJR
Landing Time	1002 AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees)	20	Ground Speed (kts)	130
Scan Rate (Hz)	37	Altitude AGL (ft)	9900
Pulse Rate Frequency (Hz)	70,000	MPiA or SPiA?	M

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	1
POS File Name	130705a
from → to	000 →

130705a-240

Weather	Ground	Airport
Begin Temp	70	HJR
Begin Dewpoint	62	
Begin Pressure	3002	
End Temp	80	HJR
End Dewpoint	65	
End Pressure	3005	

GPS Base Location(s)	Airport HJR
PDOP Avoidance	2:30 - 6:30pm
Static or Flyover?	Static
→ if flyovers, times:	X

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
45	630	637	4400	134	130	100		ATC kick off line Partial
46	647	700	4400	314	125	100		ATC issues
44	705	710	4500	134	125	100		Partial
43	714	726	4500	314	120	100		Partial
42	725	730	4500	134	125	100		Partial
41	734	740	4500	314	125	100		Partial
40	744	748	4500	134	130	100		Partial
39	752	756	4600	314	130	100		Partial
38	801	806	4600	134	125	100		Partial
37	811	816	4600	314	125	100		ALTM NAV [illegible] Crashed
36	822	836	4700	134	130	100		Partial
35	834	840	4900	314	125	100		Partial
34	845	852	4900	134	125	100		Partial
33	856	904	5100	314	125	100		Partial
15 ~~DUP~~	921	X	4006	116	110	100		PLAN CHANGE - ABORTED (line)
72	932	937	5500		125	100		Turnaround
73	941		5800	296	130	100		//
20								

7-17-13 7525-061/7505-078 SN 240/N OAHU

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Oahu
Project Number	7525-061 / 7505-078
Navigation File	Various

Pilot	Kent		
Tech	AJC		
Aircraft	Navajo		

Date Flown	7/17/13		
Takeoff Time	6:[illegible] am HST	Airport	HNL
Landing Time	10:[illegible] am HST	Airport	HNL

Project's Scanning Requirements			
FOV (half-degrees)	20	Ground Speed (kts)	140
Scan Rate (Hz)	37	Altitude AGL (ft)	4000
Pulse Rate Frequency (Hz)	70,001	MPiA or SPiA?	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	[illegible]
POS File Name	[illegible]
from → to	000 →

Weather	Ground	Airport
Begin Temp	62	HNL
Begin Dewpoint	54	
Begin Pressure	30.05	
End Temp	80	HNL
End Dewpoint	66	
End Pressure	30.02	

GPS Base Location(s)	Arpt HNL
PDOP Avoidance	2-6pm
Static or Flyover?	Static
→ if flyovers, times:	

130 717a-240

Last Calibration Mission	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
81	830	833	4000	144	120	100		Partial
80	837	839	4000	324	115	100		"
79	845	849	4000	144	125	100		"
78	854	857	4000	324	125	100		"
5 77	905	910	4000	144	125	100		"
76	914	917	4000	324	125	100		"
47	935	942	4300	144	120	100		"
48	946	950	4300	324	125	100		"
137	955	1001	4000	108	130	100		New Plan
10 136	1004	1010	4300	288	140	100		
204	1019	1023	2500	44	110			New Plan AGAIN
15								
20								

7-18-13 7525-061/7505-078 SN 240/N OAHU

LIDAR MISSION RECORD SHEET - Optech

PHOTO SCIENCE
Geospatial Solutions

523 Wellington Way - Lexington KY - 40503 - 859.277.8700 - www.photoscience.com

Project Name	Oahu
Project Number	7525-061 / 7505-078
Navigation File	oahu.e3.tej.rev5

Pilot	[illegible]
Tech	MC
Aircraft	[illegible]

Date Flown	7/18/13		
Takeoff Time	615 Am HST	Airport	HJR
Landing Time	840 Am HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	135
Scan Rate (Hz):	37	Altitude AGL (ft):	4100
Pulse Rate Frequency (Hz):	70,000	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	1
POS File Name	130718a
from → to	000 →

Weather	Ground	Airport
Begin Temp	73	HJR
Begin Dewpoint	65	
Begin Pressure	2999	
End Temp	78	HJR
End Dewpoint	65	
End Pressure	3003	

GPS Base Location(s)	Airport
PDOP Avoidance	1120-1200 1400-1900
Static or Flyover?	Static
→ if flyovers, times:	

130718a-240

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
8	6:30	637	4000	90	125	100		Partial
9	6:40	644	4000	270	130	100		//
10	6:47	653	4000	90	100	100		//
11	656	700	4000	270	130	100		//
12	709	710	4000	90	120	100		clouds - had to turn laser back on
13	713	717	4000	270	125	100		//
14	721	726	4100	90	100	100		Partial
15	730	735	4000	270	118	100		//
16	740	745	4100	90	110	100		//
17	749	753	4000	270	125	100		//
18	756	801	4000	90	110	100		//
19	804	808	4000	270	120	100		//
20	811	816	4000	90	120	100		//
10	821		4000	270	130	100		- RF part of line for clouds - ALTM Crash

7-27-13 7525-061 7505-078 SN240/N3949W OAHU

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Oahu LiDAR
Project Number	7525-061 / 7505-078
Navigation File	Oahu Coast 40pfl v3.pln

Pilot	Jackson AFB
Tech	[illegible]
Aircraft	N3949W

Date Flown	July 27 2013		
Takeoff Time	1337	Airport	HJR
Landing Time	2052	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees)		Ground Speed (kts)	140
Scan Rate (Hz)		Altitude AGL (ft)	4000
Pulse Rate Frequency (Hz)		MPiA or SPiA?	MPA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	2001
POS File Name	130727a
from → to	000 →

Weather	Ground	Airport
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	
Static or Flyover?	Static
→ if flyovers, times	-

130727a-240

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
64	1904	1907	4000	NW	140	100?	7	Clouds (probably over water)
65	1911	1915	4000	SE	110	100	-9	Clouds
64	1918	1925	4000	NW	140	100%	7	
63	1925	1933	4000	SE	110	100%	-8	
62	1936	1944	4000'	NW	140	100%	7	
61	1947	1956	4000'	SE	135	100%	-4	
60	2000	2008	4000'	NW	140	100%	6	
59	2010	2021	4000'	SE	12[illegible]	100%	-8	Small cloud
58	2023	2032	4000	NW	140	100%	6	
57	2035	2044	4000'	SE	125	100%	-	Cloud over water on Kaneohe. Clouds to end for cloud.
56	2049	2057	4000'	NW	140	100%	-	
2x	2051	2111	2500'	SW	140	100%	-	⊠ switch to 2500' plan ⊠
199	2113	2117	2500'	NE	135	100%	-	
198	2120	2128	2500'	SW	140	100%	-	
197	2083	2132	2500'	NE	135	100%	-	
196	2136	2139	2500	SW	134	100%	-	
195	2143	2148	2500'	NE	135	100%	-	
194	2151	2155	2500'	SW	1	100%		
193	2159	2203	2500'	NE				
192	2205	2208	2500'	SW				

MISSION PAGE _____ OF _____

7-30-13 7525-01 7505-078 SN240/N3949W OAHU

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Oahu LiDAR
Project Number	2015-078-7525001
Navigation File	Pearl-Bio10.pln

Pilot	Garrison AFB
Tech	Berry
Aircraft	N8411J

Date Flown	July 30, 2013		
Takeoff Time	0203 / 408 [illegible]	Airport	HJR
Landing Time	0315 / 515 [illegible]	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees)	20	Ground Speed (kts)	140
Scan Rate (Hz)	37	Altitude AGL (ft)	4000
Pulse Rate Frequency (Hz)	70	MPiA or SPiA?	MPiA

Data Information	
LIDAR Unit	Optech Gemini sn240
HD #	SN240 SEP 1
POS File Name	130730a
from → to	000 →

130730a-240

Weather	Ground	Airport
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PS1 HJR
PDOP Avoidance	
Static or Flyover?	Static
→ if flyovers, times	-

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
19	0222	0226	4800	E	130	100%		
18	0229	0232	4800'	W	140	100%		
17	0236	0240	4800'	E	140	106%		
16	0243	0248	4800'	W	140			Cloud
15	0250	0257	4800	E	140			
14	0300	0304	4800	W	140			
10								
15								
20								

MISSION PAGE _____ OF _____

8-2-13A-240 7525-061 / 7505-078 SM240/N3949W Oahu

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Oahu LiDAR
Project Number	7525-061/7505-078
Navigation File	Koko Head.pln

Pilot	Garrison AFB
Tech	Barry
Aircraft	N3949W

Date Flown	August 2, 2013		
Takeoff Time	2140Z / 1140 PM HST	Airport	HRT
Landing Time	0014Z / 214 PM HST	Airport	HRJ

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	70	Altitude AGL (ft):	4000'
Pulse Rate Frequency (Hz):	37	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	550 1
POS File Name	130802a
from → to	000 →

130802a-240

Weather	Ground	Airport
Begin Temp	29	HRJ
Begin Dewpoint	18	
Begin Pressure	30.06	
End Temp	30	HRJ
End Dewpoint	17	
End Pressure	30.01	

GPS Base Location(s)	PSI HRJ
PDOP Avoidance	
Static or Flyover?	Static
→ if flyovers, times:	--

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
11	2010	2211	4000'	W	140	100%		
10	2215	2217	4100'	E	120	100%		
9	2220	2223	4100'	W	140	100%		Cloud
8	2227	2229	4100'	E	120	100%		Void
5 7	2229	2232	4100	E	120	100%		
7	2235	2238	4100	W	140	100%		Cloud near Koko
6	2242	2247	4100	E	120	100%		Cloud near Koko
5	2250	2254	4200'	W	140	100%		
4	2257	2302	4200'	E	120	100%		
10 3	2306	2311	4300'	W	140	100%		
2	2314	2318	4400'	E	120	100%		Clouds on E end
1	2323	2324	4000'	W	120	100%		Possible Cloud
9	2350	2357	4000'	W	120	100%		
6	2354	2356	4000'	E	140	100%		
15 7	?	?	4000'	W	140	100%		
20								

MISSION PAGE _____ OF _____

8-6-13A 7525-061 / 7505-078 SN240 / N3949W. OAHU

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Project Name	Oahu LiDAR
Project Number	7525-061
Navigation File	Makaha_400.fln

Pilot	Garrison (APS)
Tech	Barry
Aircraft	N3949W

Date Flown	August 6, 2013		
Takeoff Time	1839 / 839 AM HST	Airport	HJR
Landing Time	2000Z / 1000 AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	37	Altitude AGL (ft):	4000'
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	SSD #1
POS File Name	130806a
from → to	000 →

Weather	**Ground**	**Airport**
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	-
Static or Flyover?	Static
→ if flyovers, times:	-

130806a - 240

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
2	1851	1855	5200'	SE	130	100%	0	Cloud
3	1857	1901	5200	NW	130	100%	4	Cloud
4	1904	1909	5300'	SE	130	100%	0	
5	1912	1915	5300'	NW	130	100%	4	
6	1918	1922	5300'	SE	130	100%	1	
7	1924	1928	5300	NW	130	100%	5	
8	1931	1935	5300	SE	130	100%	1	
9	1937	1940	5000	NW	130	100%	3	
10	1943	1946	5000'	SE	130	100%	1	
11	1949	1951	5000'	NW	130	100%	2	
15								
20								

8-6-13b 7505-078 / 7525-061 SN240 / N3949W OAHU

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Oahu LiDAR
Project Number	7505-078 / 7525-061
Navigation File	Heeia Priority.ppk

Pilot	Garrison
Tech	Barry
Aircraft	N3949W

Date Flown	August 06, 2013		
Takeoff Time	1033Z / 230 PM HST	Airport	HJR
Landing Time	0425Z / 625 PM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	47	Altitude AGL (ft):	2500
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	5001
POS File Name	130806a
from → to	000 →

Weather	Ground	Airport
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	
Static or Flyover?	Static
→ if flyovers, times:	

130806b - 240 1/2

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
Trip001	0103	0103	2200	N	124	100½		
002	0110	0114	2200	S	120	100		
003	0116	0122	2200	N	120	100		
004	0124	0129	2200	S	120	100		
005	0131	0134	2200	N	120	100		
006	0137	0140	2200'	S	120	100		Switch to 50% overlap
007	0144	0147	2400'	N	140	100		
008	0149	0153	2400'	S	140	100		
009	0202	0205	2400'	N	140	100		
010	0208	0212	2400'	S	140	100		
011	0214	0219	2400	N	140	100		
012	0221	0225	2400	S	140	100		
013	0229	0233	2400	N	140	100		
014	0236	0239	2400	S	140	100		
015	0241	0245	2400	N	140	100		
016	0249	0253	2400	S	140	100		
017	0256	0259	2400	N	140	100		
018	0302	0307	2400	S	140	100		
019	0309	0313	2400'	N	140	100		
020	0314	0320	2400'	S	140	100		

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Project Name	Oahu LiDAR
Project Number	7505-078 7525-0601
Navigation File	Hecia Priority.pn

Pilot	Zamboni
Tech	Remy
Aircraft	N3949W

Date Flown	August 06, 2013		
Takeoff Time	0302 / 2330 PM	Airport	HJR
Landing Time	0402 6:02 PM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	47	Altitude AGL (ft):	2500
Pulse Rate Frequency (Hz):	170	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	SSP1
POS File Name	130806b
from → to	000 →

Weather	Ground	Airport
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	POSL HJR
PDOP Avoidance	
Static or Flyover?	Static
→ if flyovers, times:	

130806b-240
2f2

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
Strip021	0302	0324	2500	N	140	100%		
Strip022	0324	0339	"	S	140	100%		
Strip023	0339	0339	"	S	140	100%		Void ✗ Zamboni to add length to lines
Strip024	0343	0344	"	S	140	100%		
5 Strip025	0347	0347	"	S	140	100%		Off Eyes at 0347
Strip026	0347	0347	"	S	140	100%		
Strip027	0352	0353	"	S	140	100%		
Strip028	0356	0357	"	S	140	100%		
Strip029	0401	0402	"	S	140	100%		
10								
15								
20								

8-7-13A 7505-078 / 7525-061 SN240 / N3949W OAHU.

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Project Name	OahuLidar
Project Number	7505-078/7525-061
Navigation File	Exact.ppk

Pilot	Garrison
Tech	Barry
Aircraft	N3949W

Date Flown	August 07, 2013		
Takeoff Time	0245Z / 445PM HST	Airport	HRJ
Landing Time	0520Z / 720PM HST	Airport	HRJ

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	47	Altitude AGL (ft):	2500
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	SSD #1
POS File Name	130807a
from → to	000 →

130807a-240

Weather	Ground	Airport
Begin Temp		HRJ
Begin Dewpoint		
Begin Pressure		
End Temp		HRJ
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSL HJR
PDOP Avoidance	
Static or Flyover?	Static
→ if flyovers, times:	

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
2	0311	0314	2500'	SE	130	100%		
3	0317	0319	2500'	NW	130	100%		
4	0322	0326	2500'	SE	130	100%		
5	0331	0334	2500'	NW	130	100%		
6	0337	0344	2500'	SE	110	100%		
7	0346	0353	2500'	NW	130	100%		
8	0355	0402	2500'	SE	130	100%		
9	0407	0411	2500'	NW	130	100%		Eyerafely takeoff x3
10	0415	0422	2500'	SE	130	100%		
11	0425	0427	2500'	NW	130	100%		
11	0427	0430	2500'	SE	130	100%		
12	0432	0436	2500	NW	130	100%		
12	0436	0438	2500	NW	130	100%		
13	0441	0442	2500	SE	130	100		ESO
13	0442	0444	2500	SE	130	100		
13	0444	0447	2500	SE	130	100		
16	0459	0503	—	—	—	—	—	Pearl Bravo.ppk Off to clouds (Vectorpatch 130730a-240 Strip 4

MISSION PAGE 1 OF 1

8-8-13A 7525-061 / 7505-078 SN240 / N3949W Oahu

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Oahu LiDAR
Project Number	7525-061 / 7505-078
Navigation File	Pearl Bravo.pln

Pilot	Keade
Tech	Berry
Aircraft	N3949W

Date Flown	August 08, 2013		
Takeoff Time	1645Z / 645AM HST	Airport	HJR
Landing Time	2055Z / 1055AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	37	Altitude AGL (ft):	4000'
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	SN240SD1
POS File Name	130808a
from → to	000 →

Weather	Ground	Airport
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	
Static or Flyover?	Static
→ if flyovers, times:	

130808a-240 1/2

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
1	1657	1701	4100	E	100	100%	0	Pearl Bravo Plan
2	1704	1708	4100'	W	140	100%	1	
3	1711	1716	4100	E	100	100%	0	
4	1719	1724	4100'	W	140	100%	2	
5	1720	1730	4100	E	100	100%	0	
6	1735	1740	4100'	W	140	100%	2	
7	1742	1748	4300	E	100	100%	0	
8	1751	1756	4300'	W	140	100%	-1	
9	1758	1803	4300'	E	100	100%	0	
10	1806	1810	4300	W	140	100%		
11	1814	1818	4300	E	100	100%		
12	1820	1825	4400	W	140	100%		Cloud
13	1828	1832	4500'	E	100	100%		
12	1836	1840	4500'	W	140	100%		
15	1843	1847	4600'	E	100	100%		
14	1850	1855	4200	W	140	100%		Clouded out
1	1913	1918	2300'	SE	100	100%		Switch to Southeastish >> Void Line New plan!!
1	1916	1917	2300'	NW	100	100%		
2	1919	1920	2300	SE	100	100%		
3	1923	1924	2300	NW	100	100%		

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Project Name	Oahu LiDAR
Project Number	525-061 / 505-075
Navigation File	South East.ipn

Pilot	Reade (AFS)
Tech	Benny
Aircraft	N3949W

Date Flown	August 08 2012		
Takeoff Time	1645Z / 645AM HST	Airport	HJR
Landing Time	0552Z / 1052PM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	37	Altitude AGL (ft):	2500
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	GN240SSD1
POS File Name	130808a
from → to	000 →

Weather	**Ground**	**Airport**
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	-
Static or Flyover?	Static
→ if flyovers, times:	-

130808a-240
2/2

Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
4	1926	1938	2300	SE	100	100%	-4	
5	1931	1935	2300	NW	100	100%		
6	1934	1939	2300	SE	100	100%		
7	1941	1943	2300	NW	100	100%		
5 8	1946	1951	2300	SE	110	100%		
9	1951	1953	2300	NW	110	100%		
10	1956	1959	2300	SE	110	100%		
11	2001	2004	2300	NW	110	100%		
12	2007	2011	2300	SE	110	100%		
10 13	2013	2017	2300	NW	110	100%		
14	2019	2024	2300	SE	110	100%		
15	2026	2029	2300	NW	110	100%		
16	2032	2036	2300	SE	110	100%		
17	2039	2041	2300	NW	110	100%		
15								
20								

8-9-13A 7505-078 | 7525-061 SM240 / M3949W OAhu.

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Project Name	OahuLiDAR
Project Number	7505-078 / 7525-061
Navigation File	Ridgestrip.pln

Pilot	Brady (AES)
Tech	Barry
Aircraft	N3949W

Date Flown	August 09, 2013		
Takeoff Time	1602Z / 650 AM HST	Airport	HJR
Landing Time	2015Z / 1015 AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	37	Altitude AGL (ft):	4000'
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	SN240 SSD 1
POS File Name	130809a
from → to	000 →

Weather	Ground	Airport
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	-
Static or Flyover?	Static
→ if flyovers, times:	-

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Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
1	1650	1701	5000	SE	140	100		Makaha 4000'. pk pickup for clouds »
1	1703	1706	5400	E	140	100		Load Ridge Strip. pln
2	1708	1710	5400	W	140	100		
3	1713	1715	5400	E	140	100		Cloud?
4	1716	1718	5400	W	140	100		
5	1723	1725	5400	E	140	100		
6	1727	1730	5400	W	140	100		
7	1732	1734	5400	E	140	100		
8	1736	1739	5400	W	140	100		
9	1741	1743	5400	E	140	100		
10	1744	1748	5400	W	140	100		
11	1750	1753	5400	E	140	100		
12	1755	1757	5400	W	140	100		
13	1800	1802	5400	E	140	100		
14	1804	1806	5400	W	140	100		
15	1808	1811	5400	E	140	100		
16	1813	1815	5400	W	140	100		
17	1817	1819	5400	E	140	100		
18	1821	1823	5400	W	140	100		
19	1826	1828	5400	E	140	100		
20	1830	1832	5400	W	140	100		

LIDAR MISSION RECORD SHEET - Optech

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Project Name	Oahu LiDAR
Project Number	7525-078/7525-001
Navigation File	RidgesSap.pb

Pilot	Roedel (AFS)
Tech	Terry
Aircraft	N394Q

Date Flown	August 08 2013		
Takeoff Time	1650Z / 650 AM HST	Airport	HJR
Landing Time	2015Z / 1015 AM HST	Airport	HJR

Project's Scanning Requirements			
FOV (half-degrees):	20	Ground Speed (kts):	140
Scan Rate (Hz):	37	Altitude AGL (ft):	4000'
Pulse Rate Frequency (Hz):	70	MPiA or SPiA?:	MPiA

Data Information	
LiDAR Unit	Optech Gemini sn240
HD #	SN240SSD1
POS File Name	130809a
from → to	000 →

Weather	Ground	Airport
Begin Temp		HJR
Begin Dewpoint		
Begin Pressure		
End Temp		HJR
End Dewpoint		
End Pressure		

GPS Base Location(s)	PSI HJR
PDOP Avoidance	-
Static or Flyover?	Static
→ if flyovers, times:	-

130809a-240

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Last Calibration Mission:	

Flt. Line #	Start	Stop	Alt. (AMSL)	Heading	Speed	Returns	Crab	NOTES (weather, visibility, winds, ride, etc.)
2	1800	1835	5400	NE	140	100%		Load NearRestricted.pb
3	1845	1842	5400	SW	140	100%		
4	1844	1847	5400	NE	140	100%		
5	1850	1852	5400	SW	140	100%		
5 6	1854	1856	5400	NE	140	100%		
7	1859	1900	5400	SW	140	100%		
8	1903	1904	5400	NE	140	100%		
9	1907	1909	5400	SW	140	100%		
10	1915	1917	3500	NE	100	100%		Down to 3500
10 11	1920	1921	3500	SW	100	100%		Switch to 50% Sidelap
12	1923	1925	3500	NE	140	100%		
13	1929	1930	3500	SW	140	100%		
14	1932	1932	3500	NE	140	100%		
15	1934	1935	3500	SW	140	100%		
15 16	1938	1939	3500	NE	140	100%		
17	1941	1942	3500	SW	140	100%		
18	1945	1946	3500	NE	140	100%		
19	1947	1948	3500	SW	140	100%		
17	1954	1956	3500	E	140	100%		Switch to Pearl Bravo.pb / Patch for cloud from earlier mission
20 16	2000	2004	3500	W	140	100%		