

# Virginia West Chesapeake, LiDAR Appendix A: Axis IMU and GPS Processing Reports

Report Date: 3/17/2019

SUBMITTED BY:

**Dewberry**

1000 North Ashley Drive Suite 801  
Tampa, FL 33602  
813.225.1325

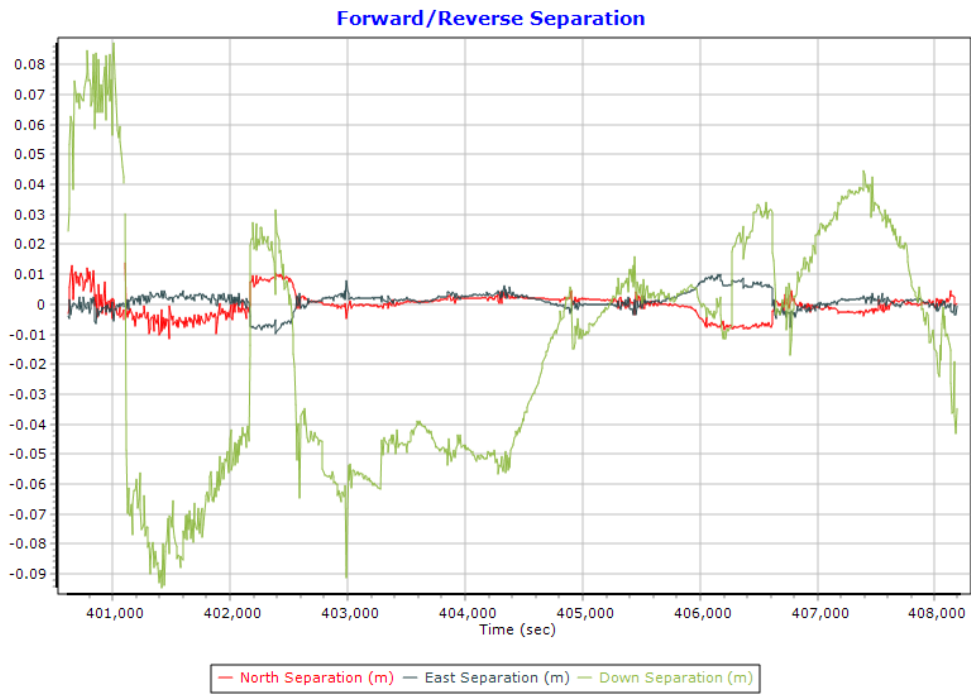
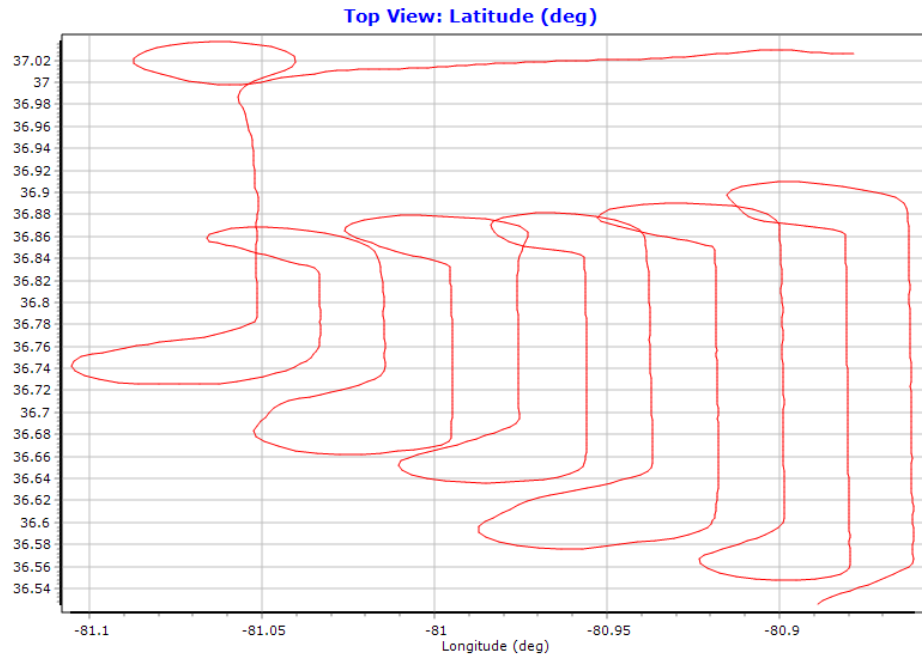
SUBMITTED TO:

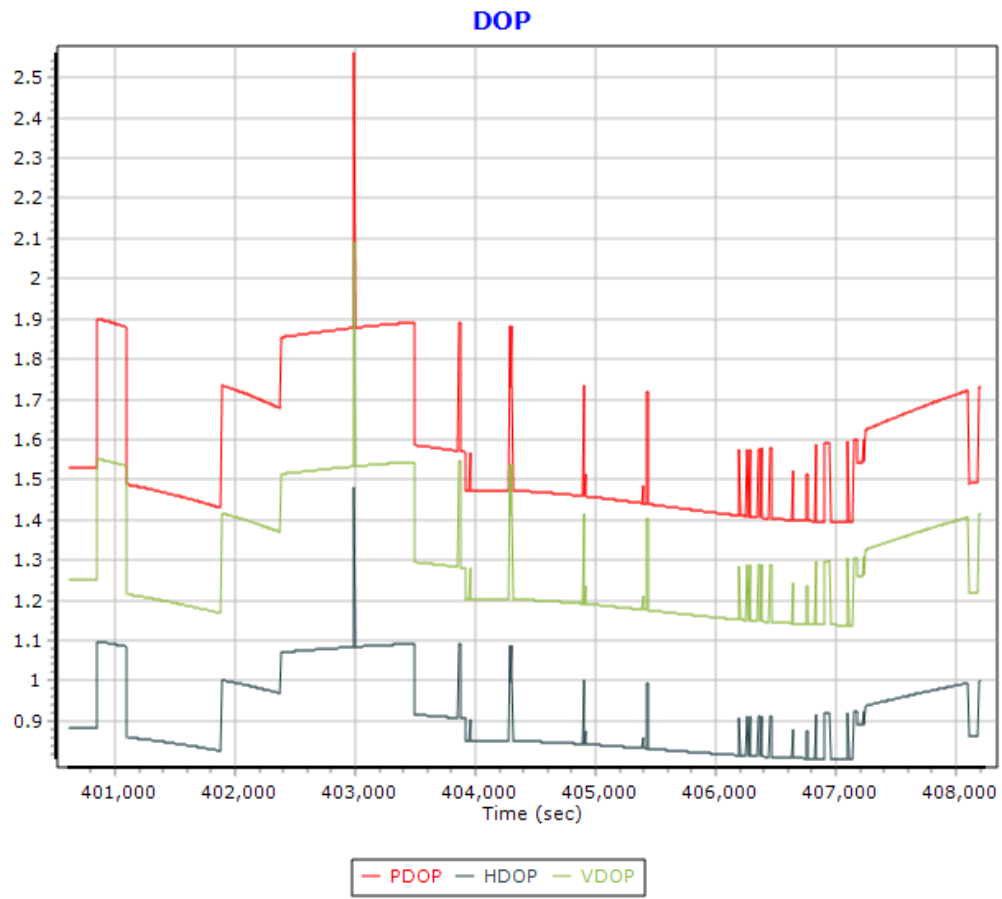
**U.S. Geological Survey**

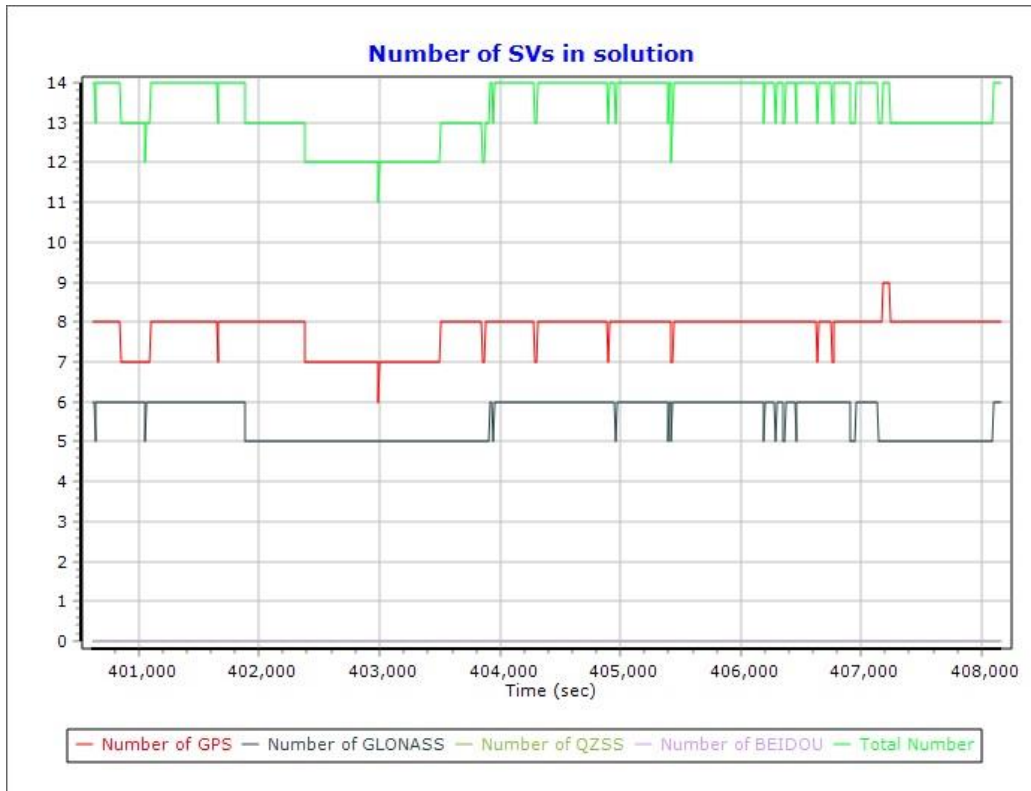
1400 Independence Road  
Rolla, MO 65401  
573.308.3810

## **Appendix A: GPS and IMU Processing Reports for Each Mission**

**NOVEMBER 16, 2017**







### Processing Summary Information

#### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171116\_VA

Solution Type: IN-Fusion SmartBase

Fixed: 7564 (99.99%)  
Float: 0 (0.00%)  
No Solution: 1 (0.01%)

Number of Epochs:

Total in RAW file: 7637  
No processed position: 73

Fwd/Rev Separation RMS Values (m):

North: 0.004  
East: 0.003  
Height: 0.043

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 3824 occurrences

North: 0.003  
East: 0.003  
Height: 0.037

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.996  
0.10 - 0.30 m: 0.004  
0.30 - 1.00 m: 0  
1.00 - 5.00 m: 0  
5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

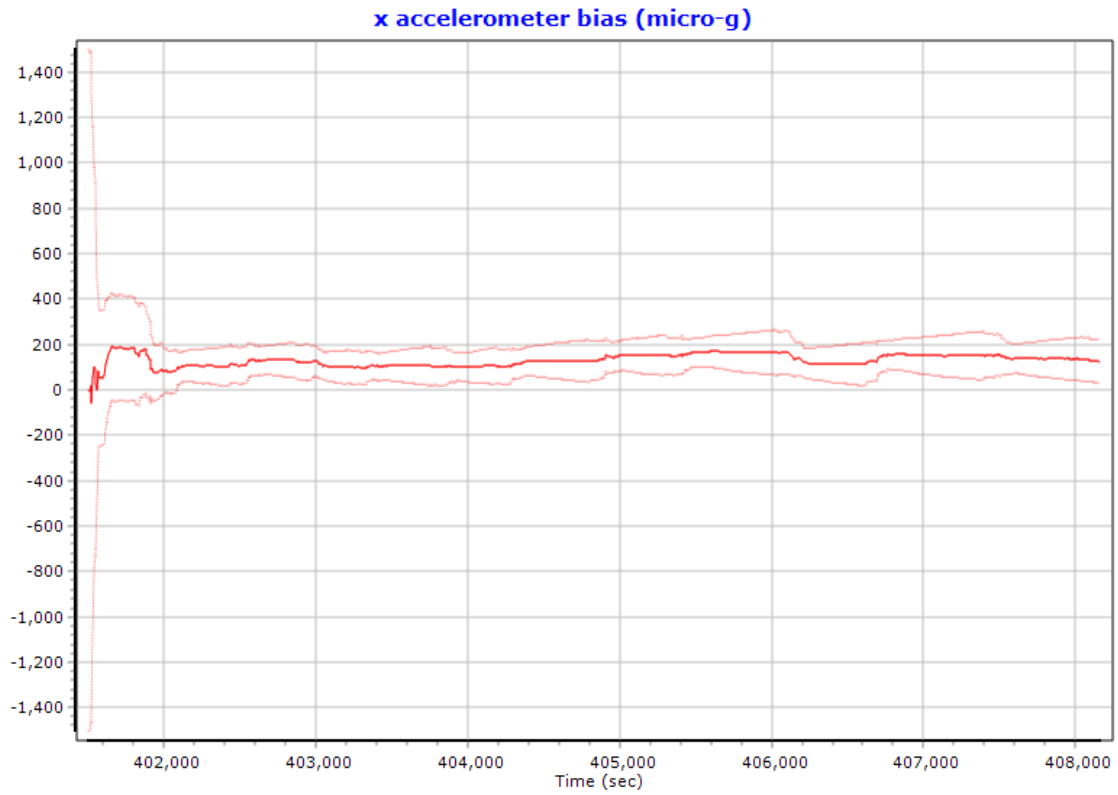
DOP over Tol: 1.58%

Baseline Distances (km):

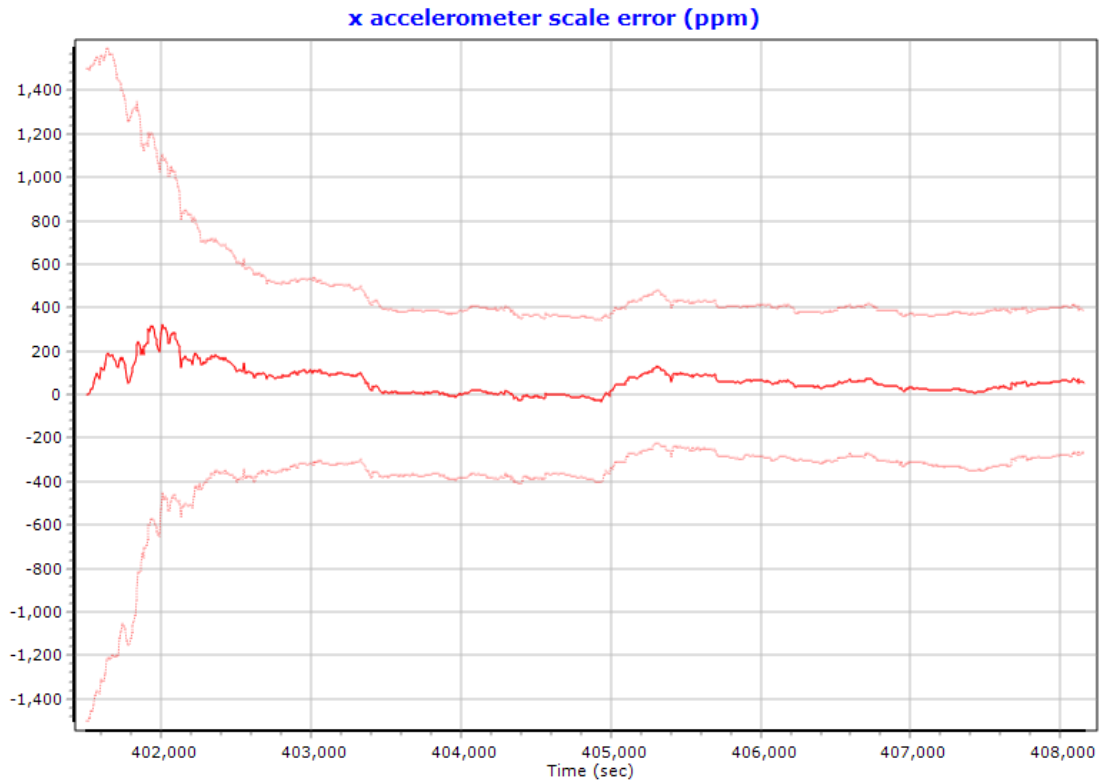
Maximum: 48.01  
Minimum: 0.06  
Average: 16.15  
First Epoch: 48.01  
Last Epoch: 28.49

## CORS Base Stations

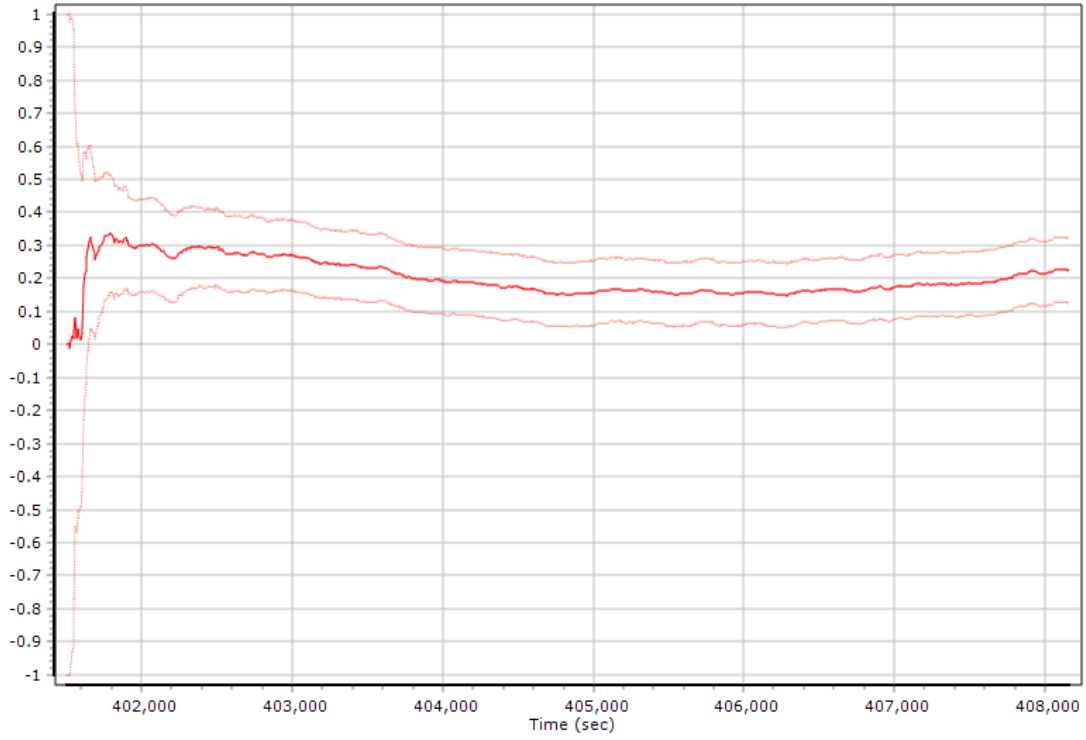
Station	Original			Adjusted		
WVAT	N37°25'42.67838"	W81°04'04.40385"	704.674	N37°25'42.67840"	W81°04'04.40403"	704.687
NCWJ	N36°23'34.97454"	W81°28'42.29376"	933.47	N36°23'34.97460"	W81°28'42.29370"	933.504
NCWC	N36°22'19.71490"	W80°11'05.64904"	274.974	N36°22'19.71501"	W80°11'05.64923"	275.098
NCSR	N36°29'51.93288"	W81°06'52.95770"	838.659			
NCNW	N36°09'59.30172"	W81°07'57.24905"	269.085	N36°09'59.30166"	W81°07'57.24906"	269.111
LS04	N37°21'47.16695"	W79°57'26.99407"	324.139	N37°21'47.16710"	W79°57'26.99408"	324.154



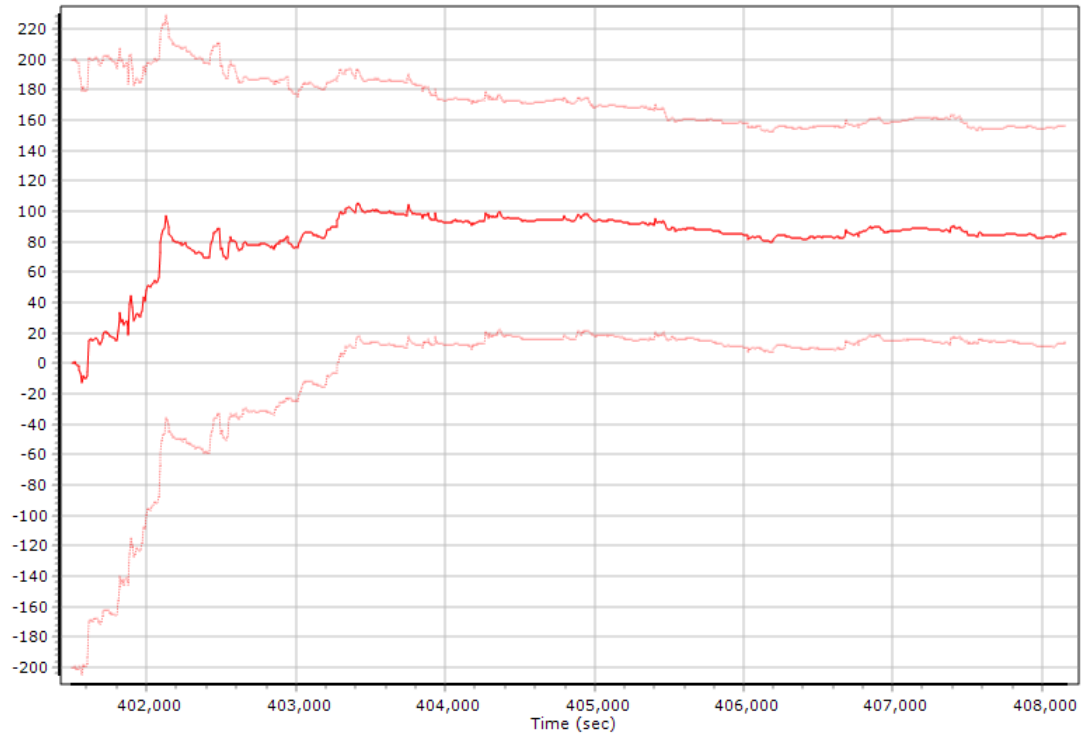




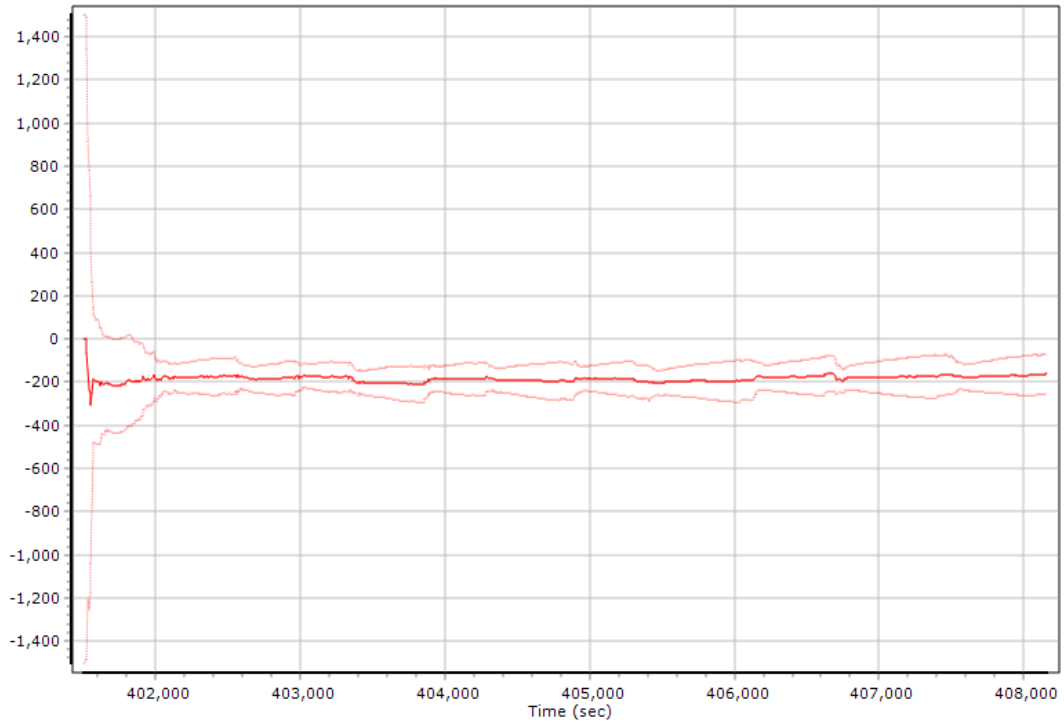
x gyro bias (deg/hr)



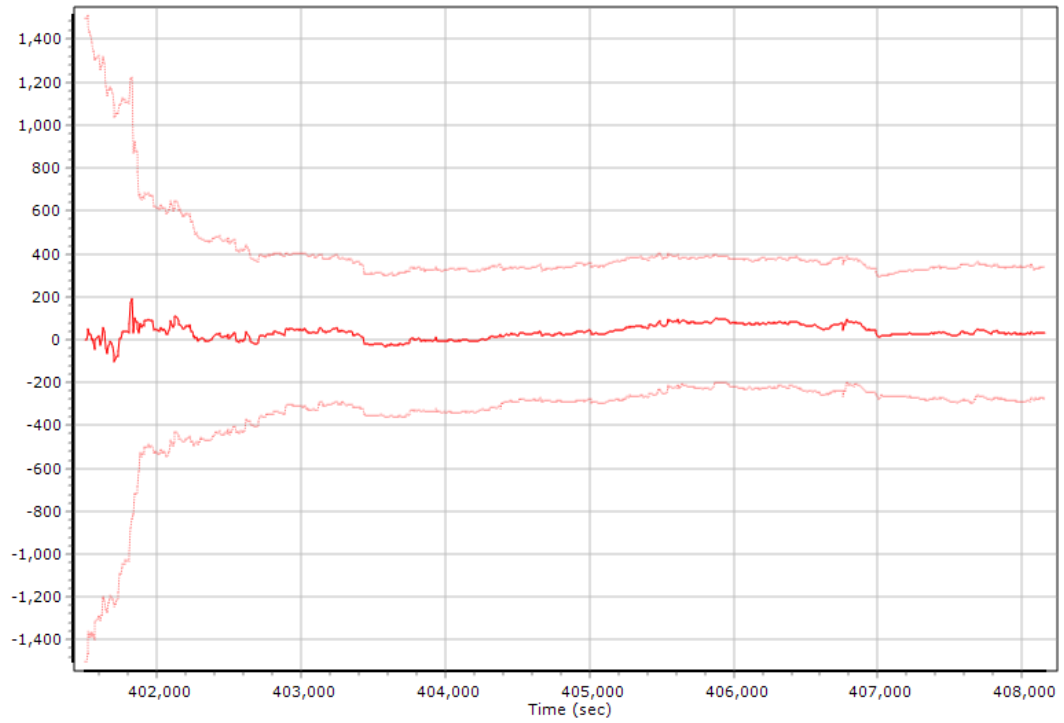
x gyro scale error (ppm)



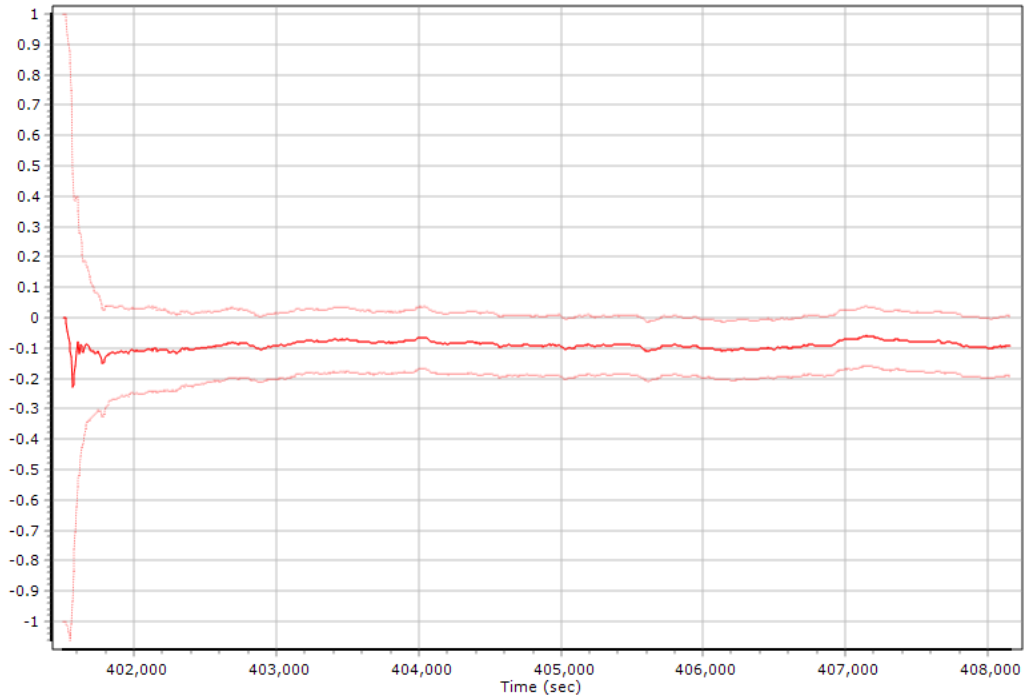
y accelerometer bias (micro-g)



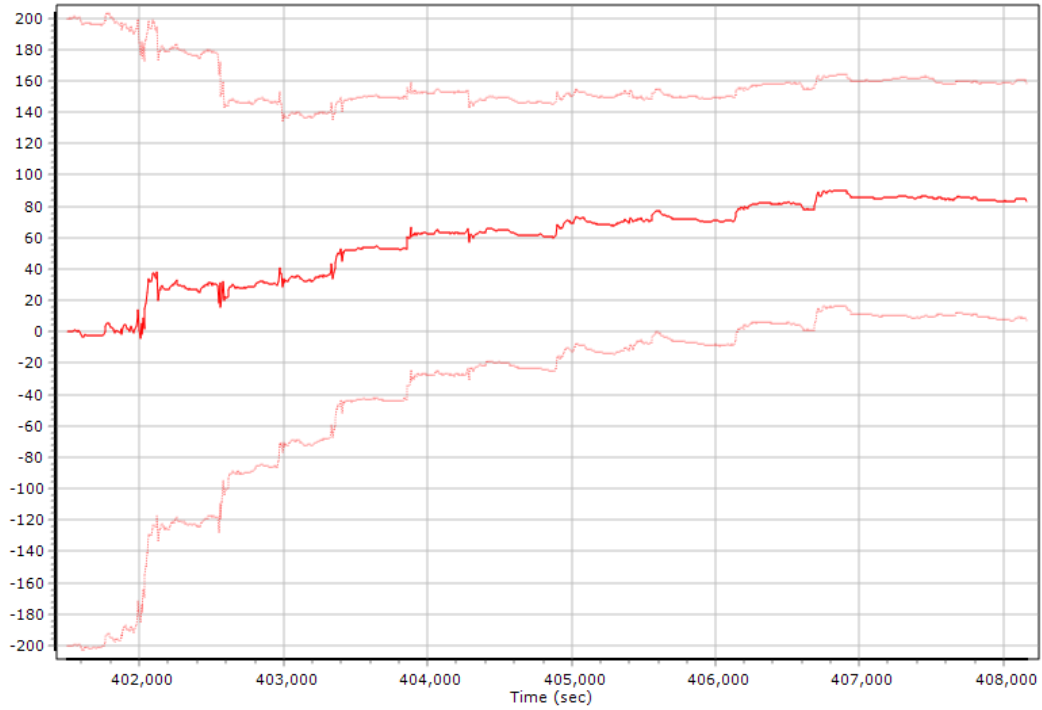
y accelerometer scale error (ppm)



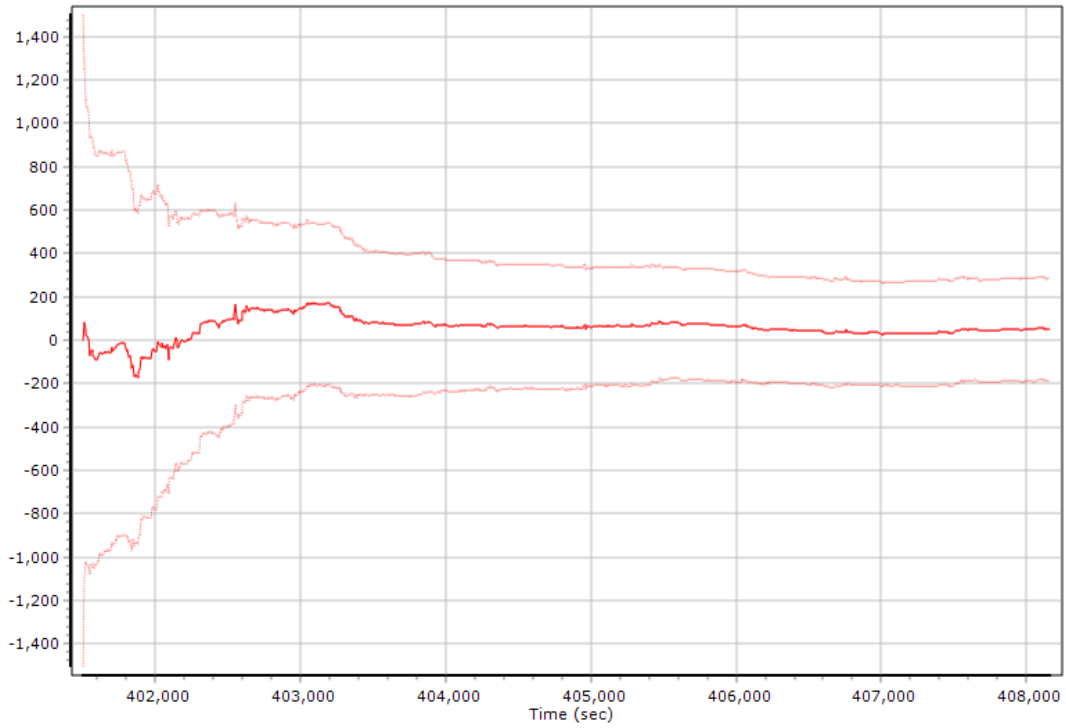
y gyro bias (deg/hr)



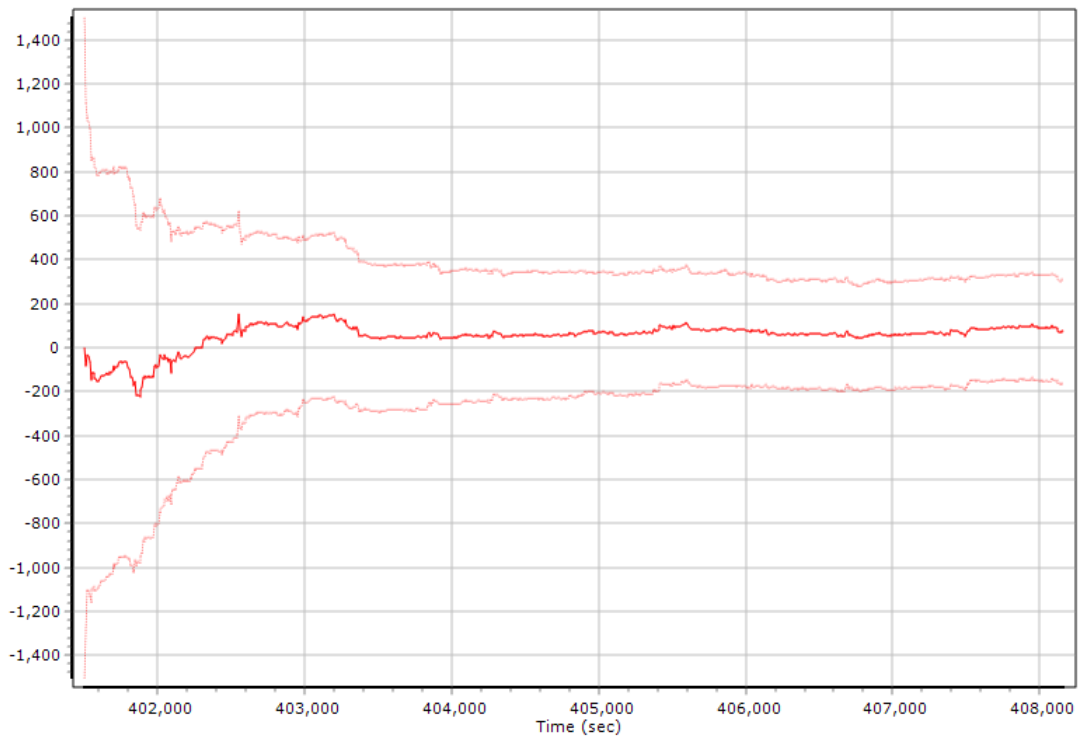
y gyro scale error (ppm)

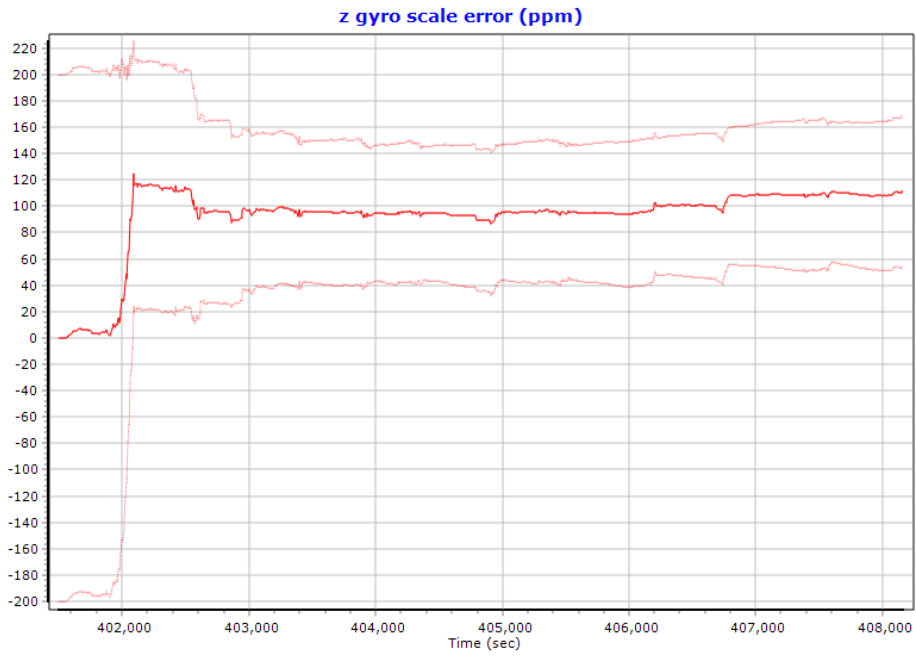
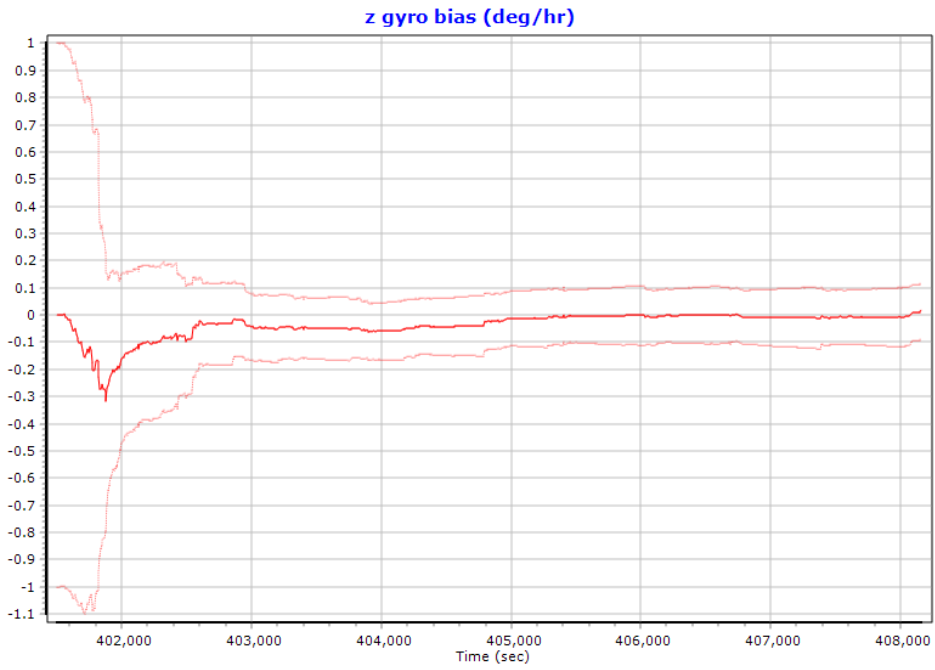


z accelerometer bias (micro-g)

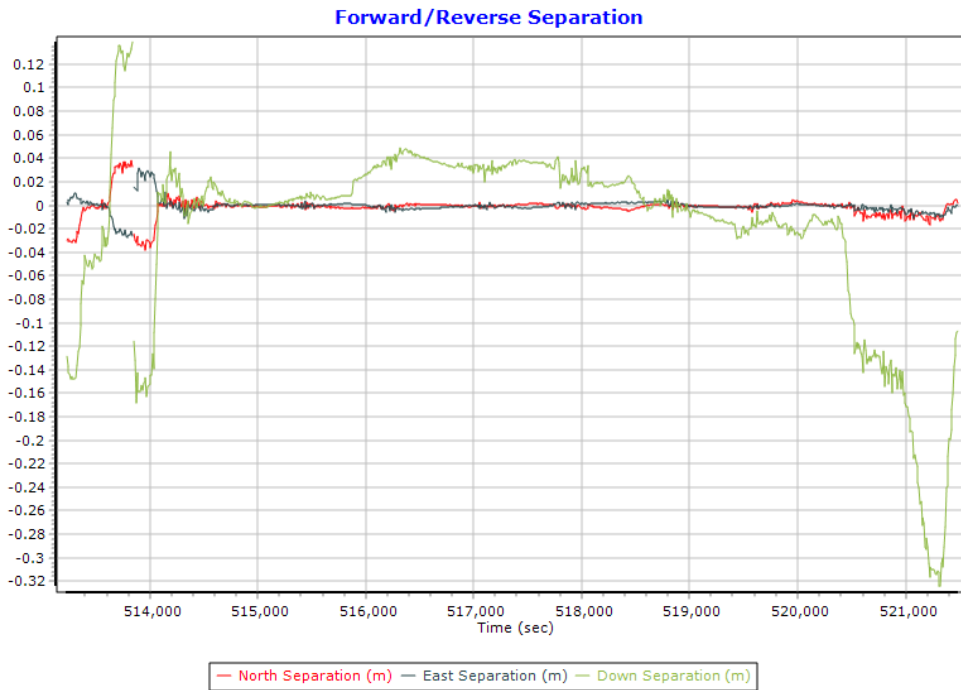
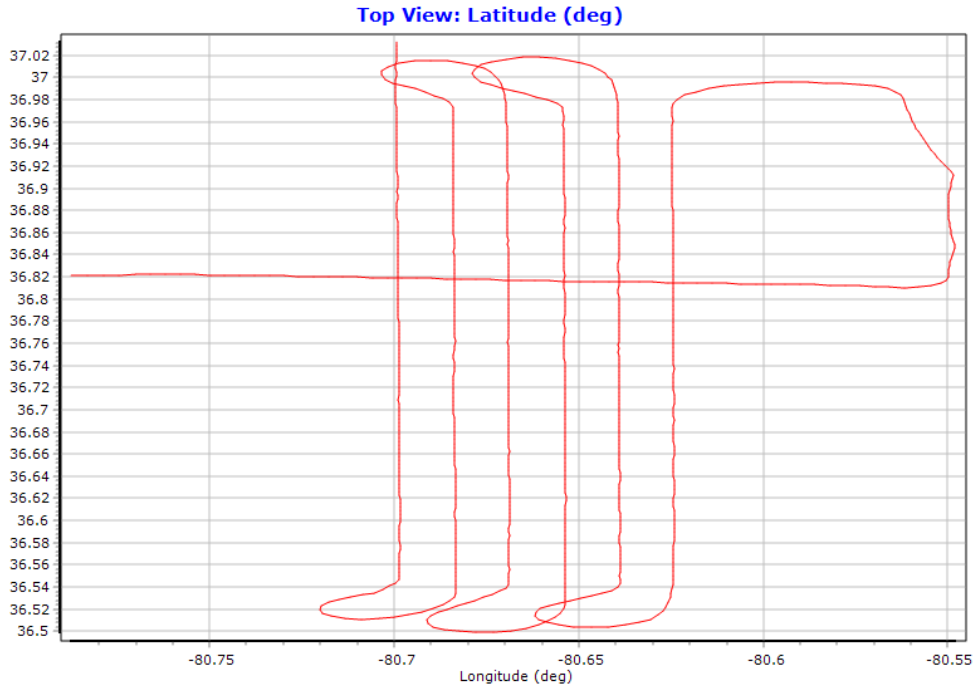


z accelerometer scale error (ppm)



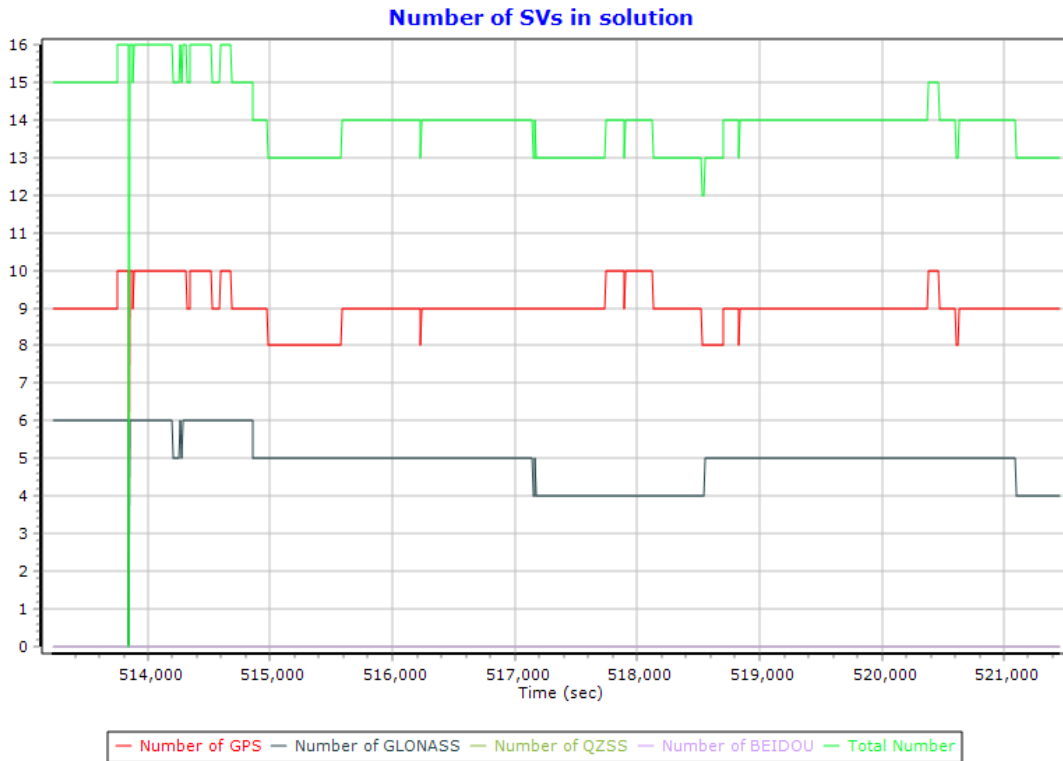
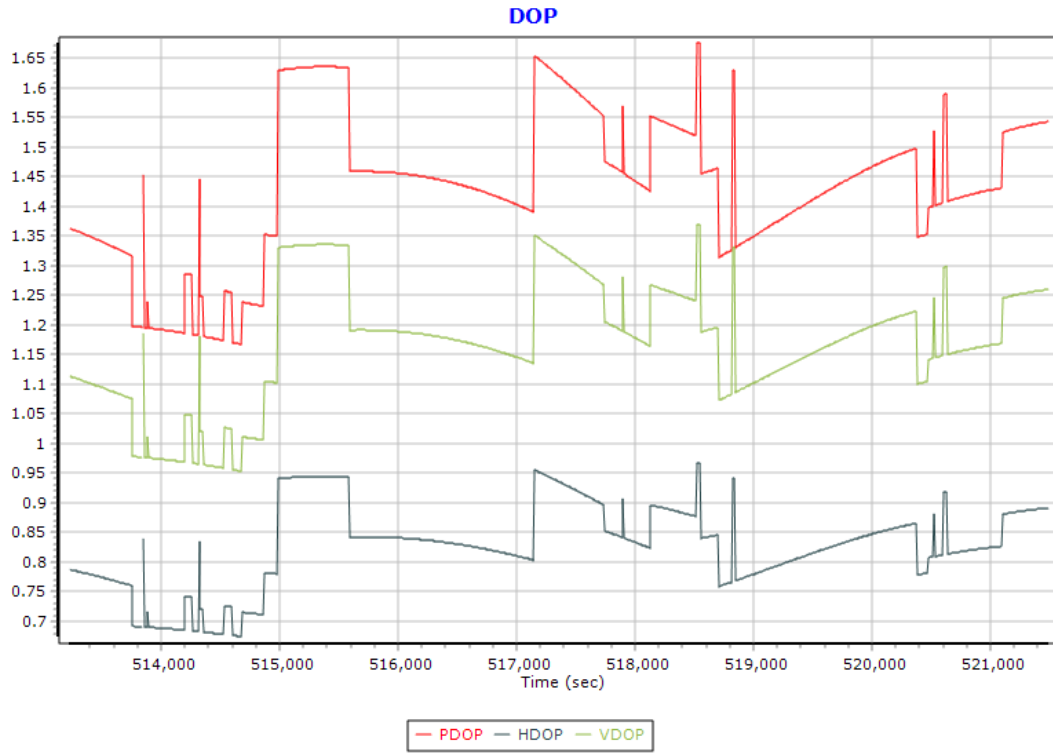


**NOVEMBER 17, 2017**









## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171117\_VA\_B

Solution Type: IN-Fusion SmartBase

Fixed: 8246	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 8281  
No processed position: 35

Fwd/Rev Separation RMS Values (m):

North: 0.009  
East: 0.006  
Height: 0.081

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 1447 occurrences

North: 0.002  
East: 0.002  
Height: 0.026

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.307

0.10 - 0.30 m: 0.693

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.43%

Baseline Distances (km):

Maximum: 43.01

Minimum: 0.3

Average: 21.75

First Epoch: 40.62

Last Epoch: 40.62

CORS Base Stations

Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVAT	N37°25'42.67838"	W81°04'04.40385"	704.674	N37°25'42.67853"	W81°04'04.40388"	704.687
NCWC	N36°22'19.71490"	W80°11'05.64904"	274.974	N36°22'19.71491"	W80°11'05.64888"	275.085
NCSR	N36°29'51.93288"	W81°06'52.95770"	838.659			
LS04	N37°21'47.16695"	W79°57'26.99407"	324.139	N37°21'47.16720"	W79°57'26.99384"	324.148
DOBS	N36°25'31.54122"	W80°43'11.73521"	339.304	N36°25'31.54132"	W80°43'11.73506"	339.308

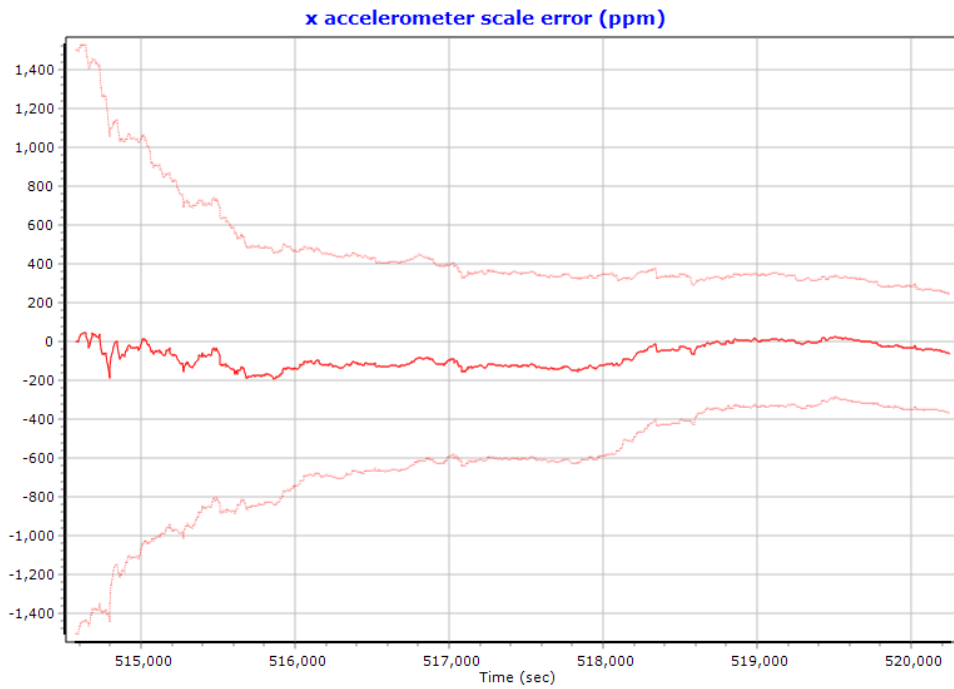
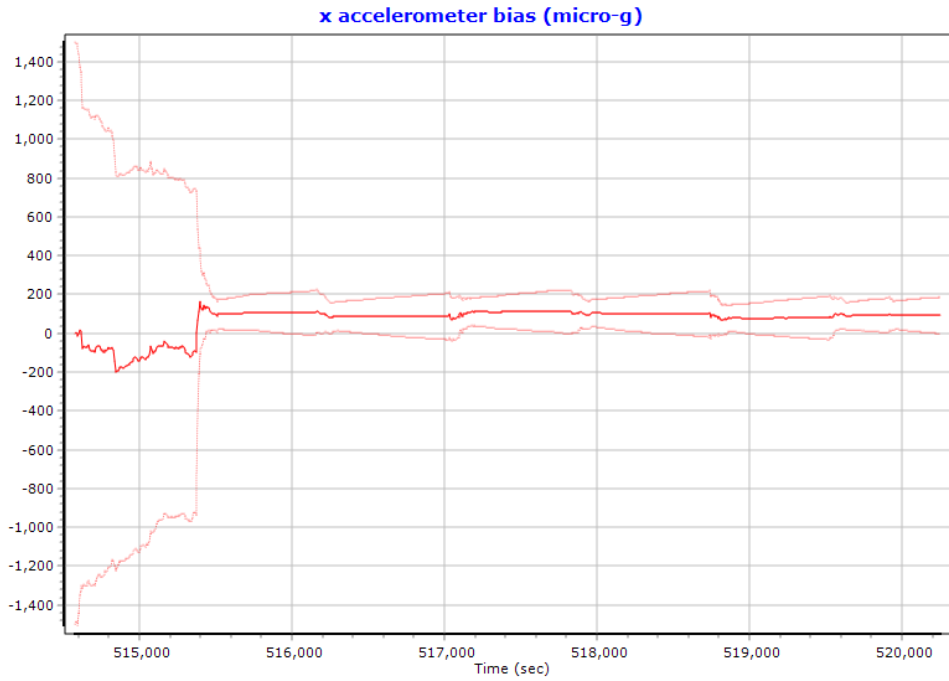
Virginia West Chesapeake Central LiDAR

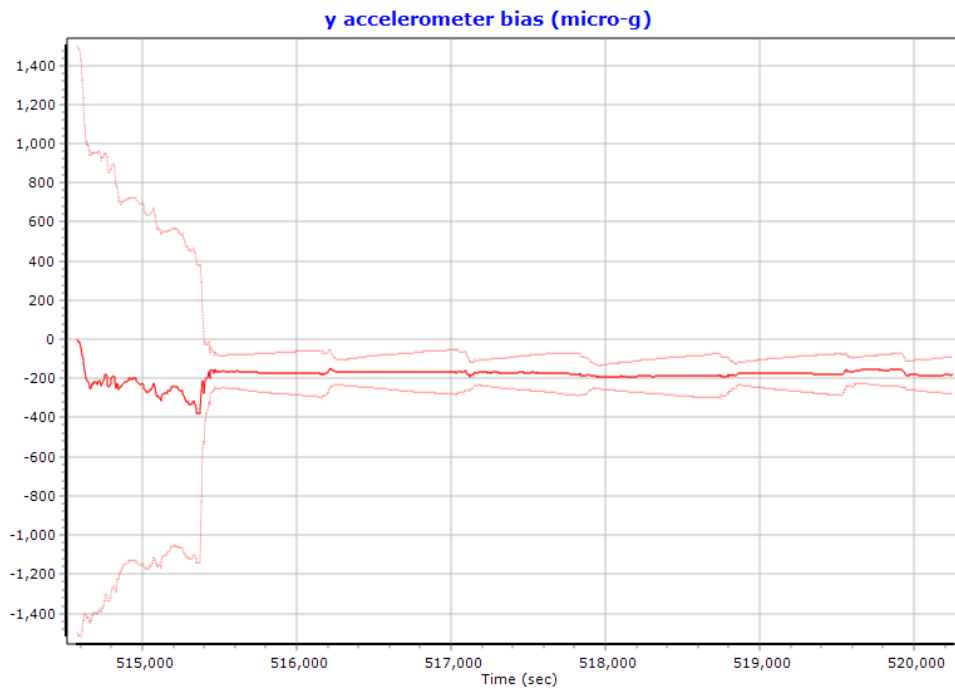
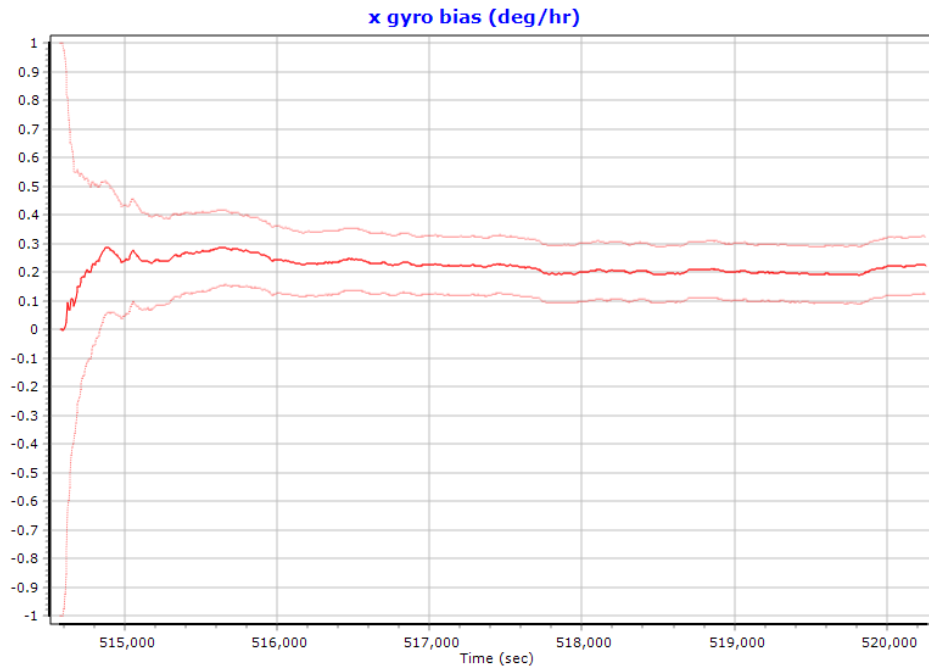
TO# **G15PD00714**

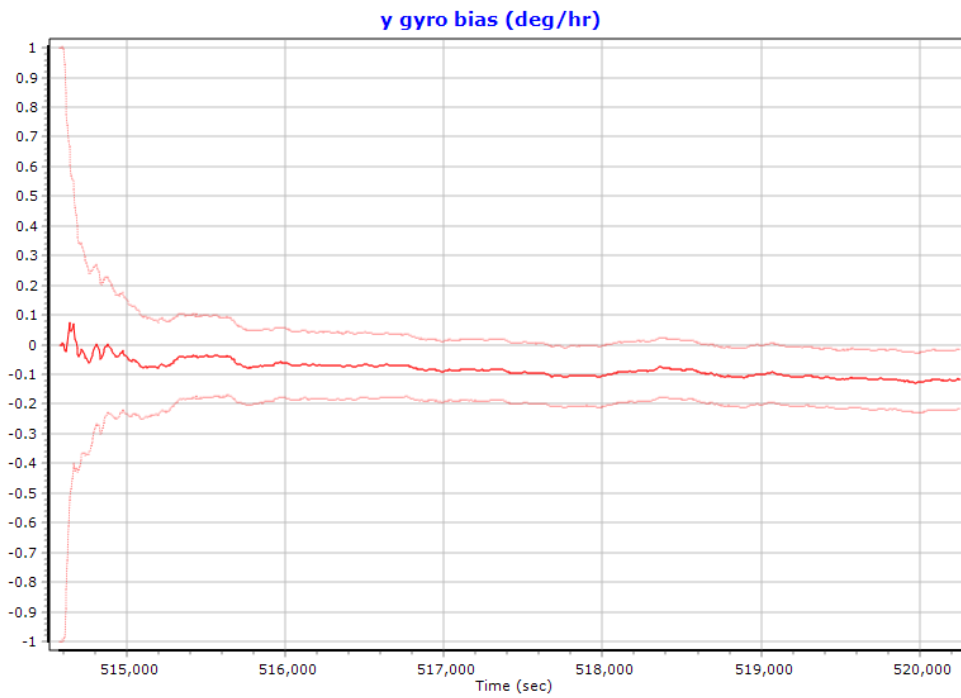
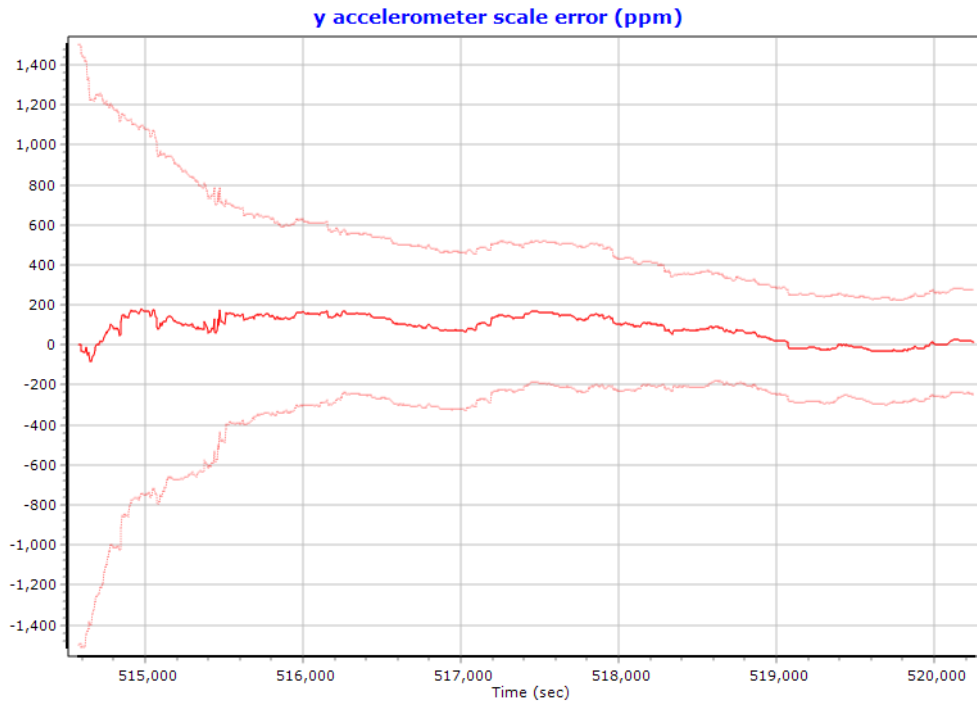
July 17, 2018

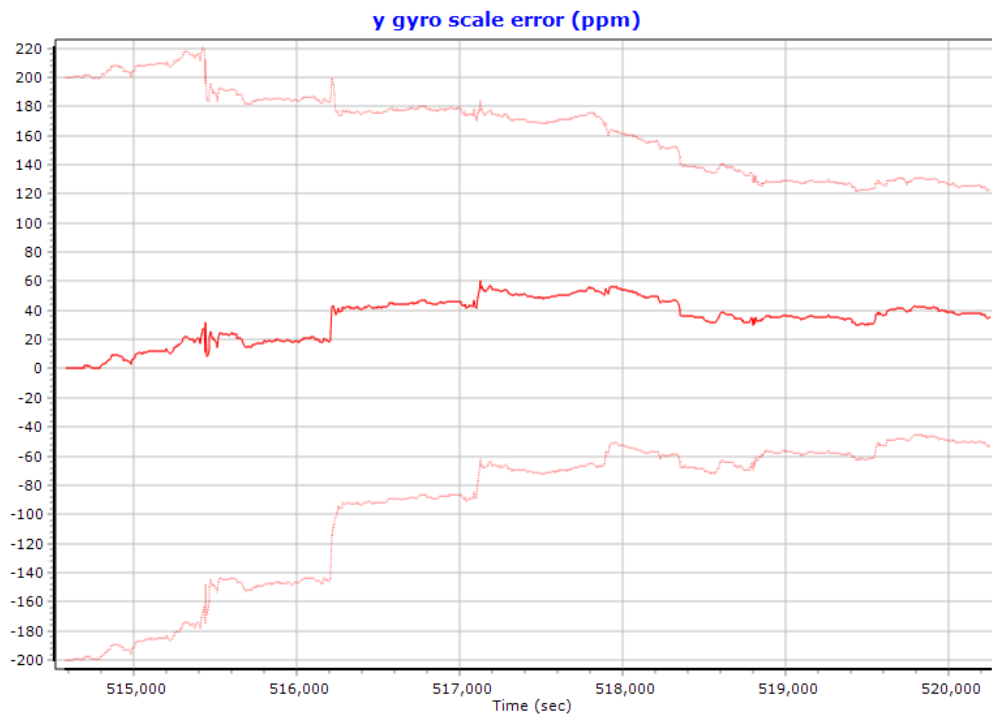
Page 20 of 202

WVAT	N37°25'42.67838"	W81°04'04.40385"	704.674	N37°25'42.67853"	W81°04'04.40388"	704.687
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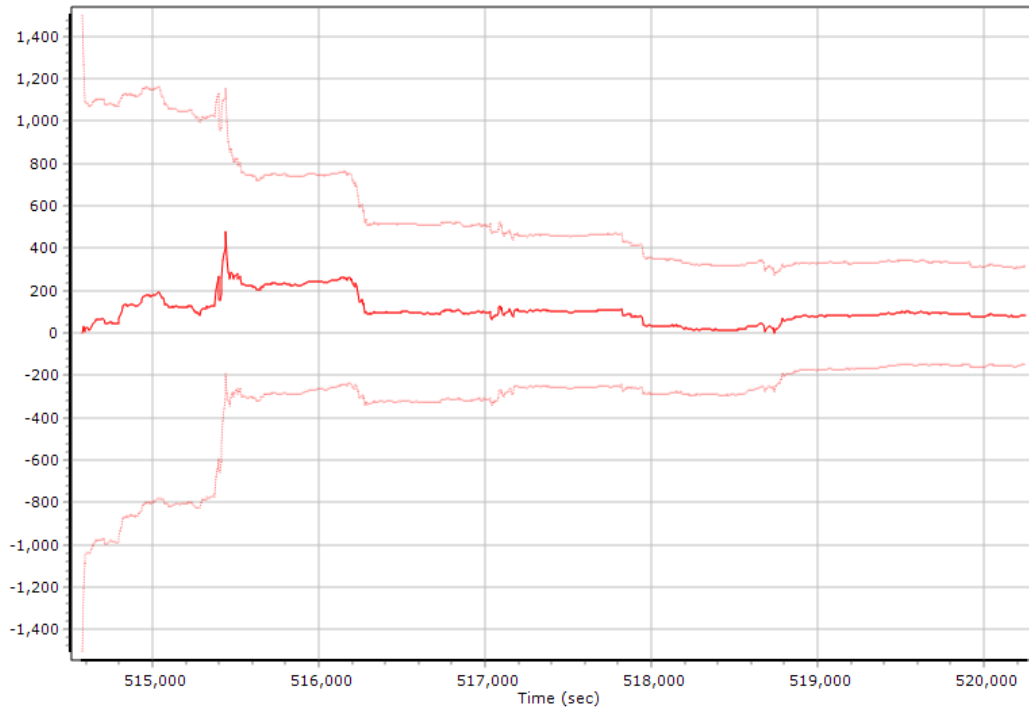




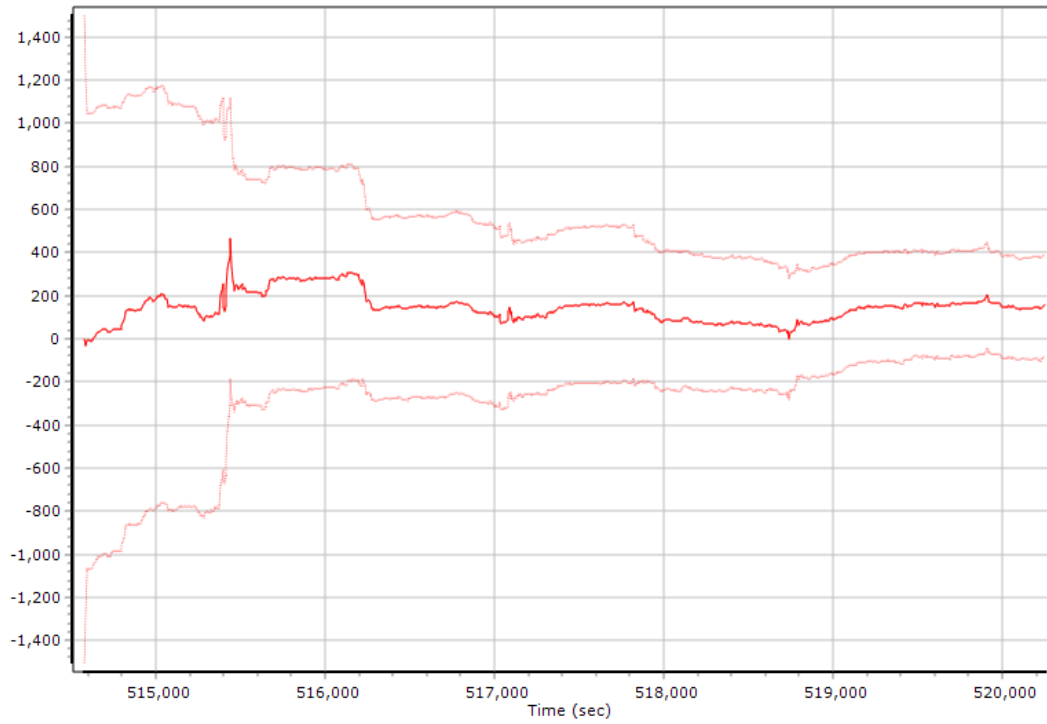


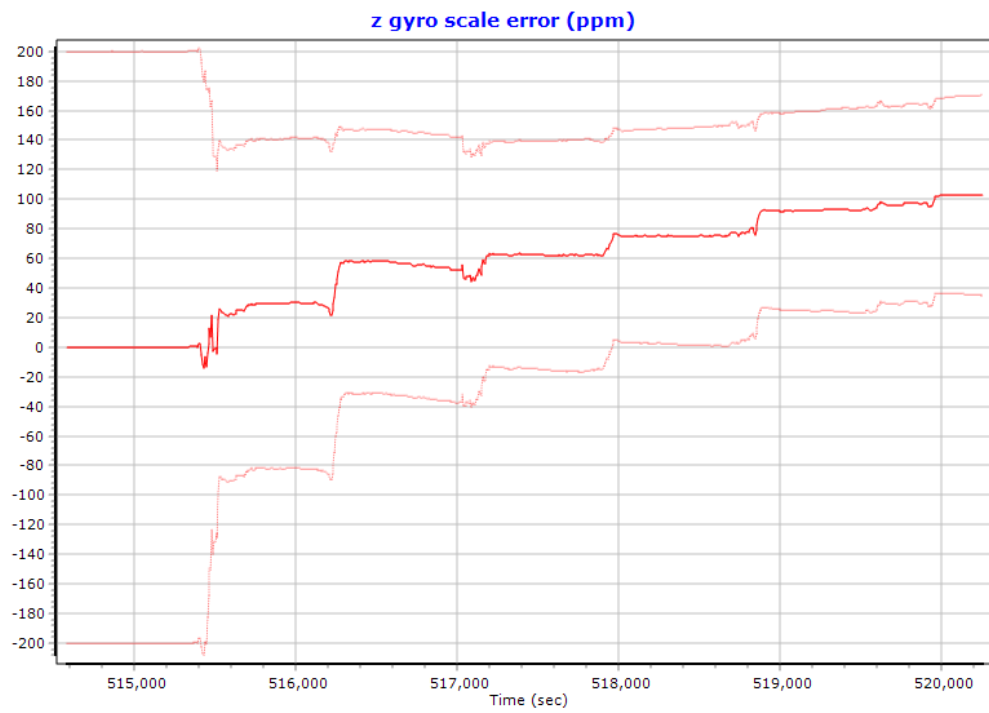
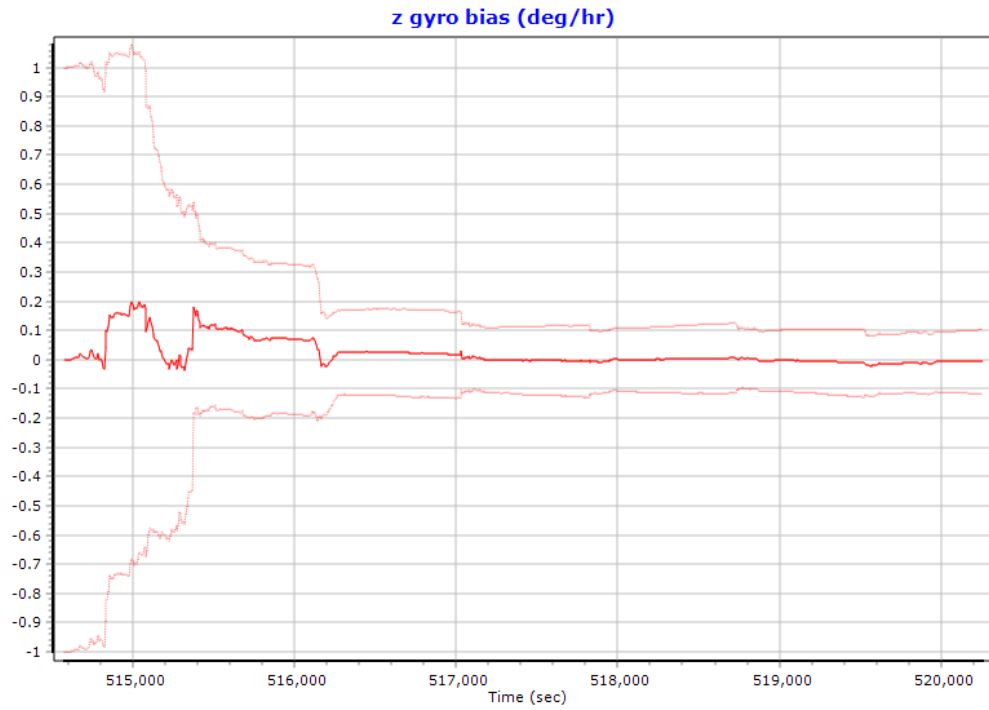


z accelerometer bias (micro-g)

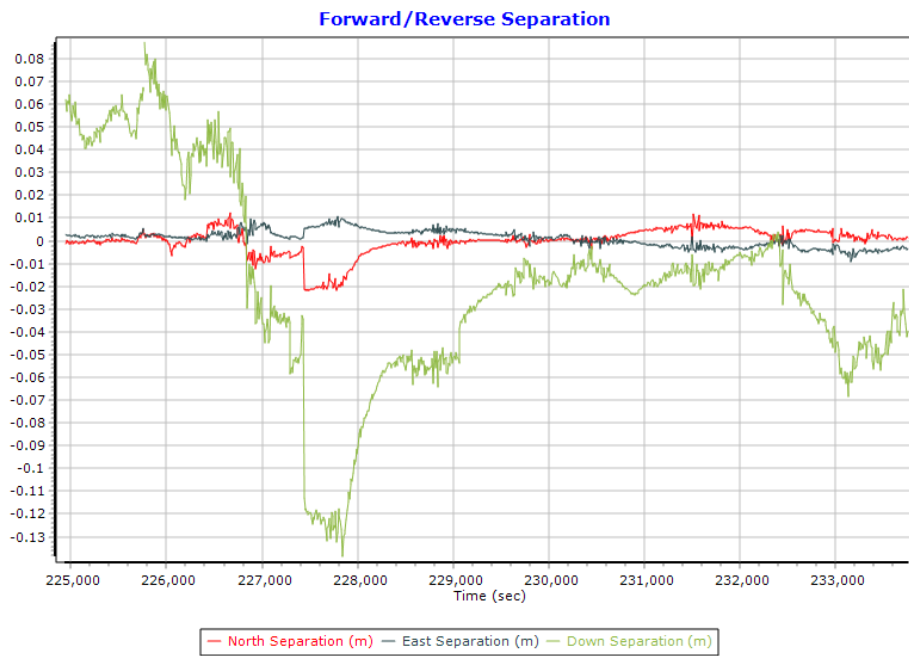
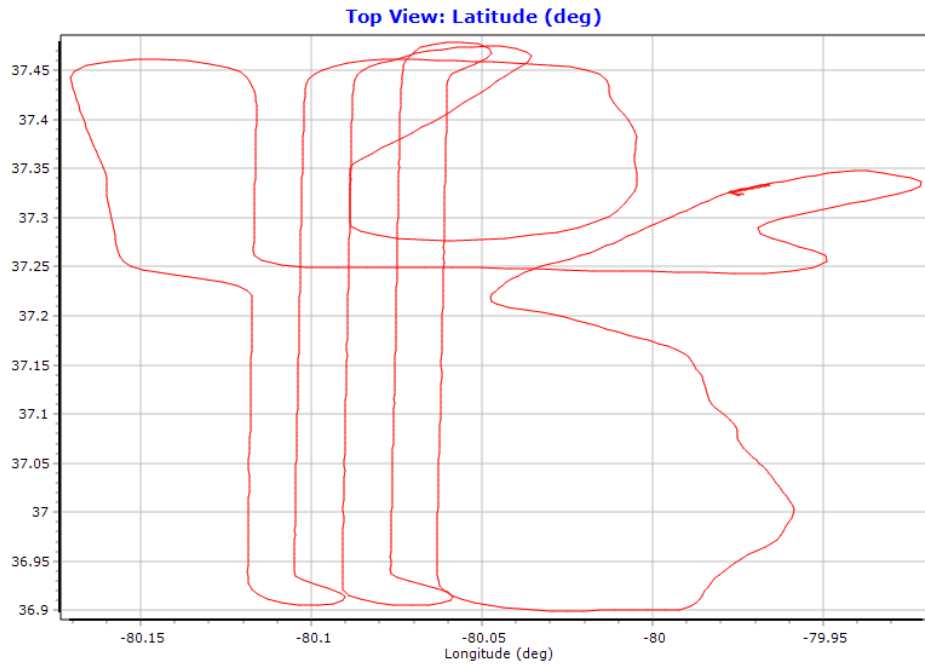


z accelerometer scale error (ppm)

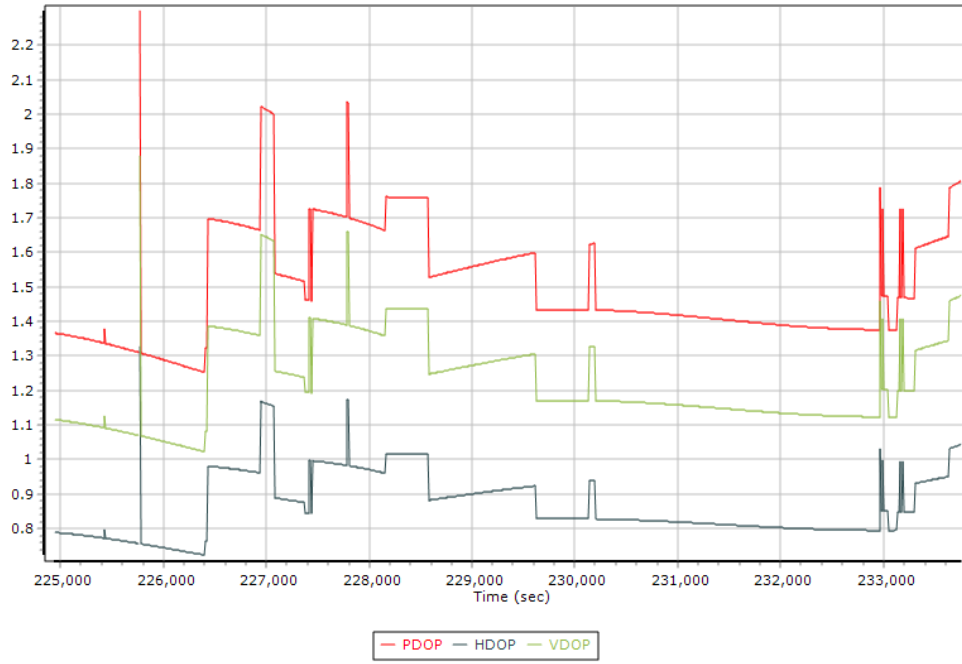




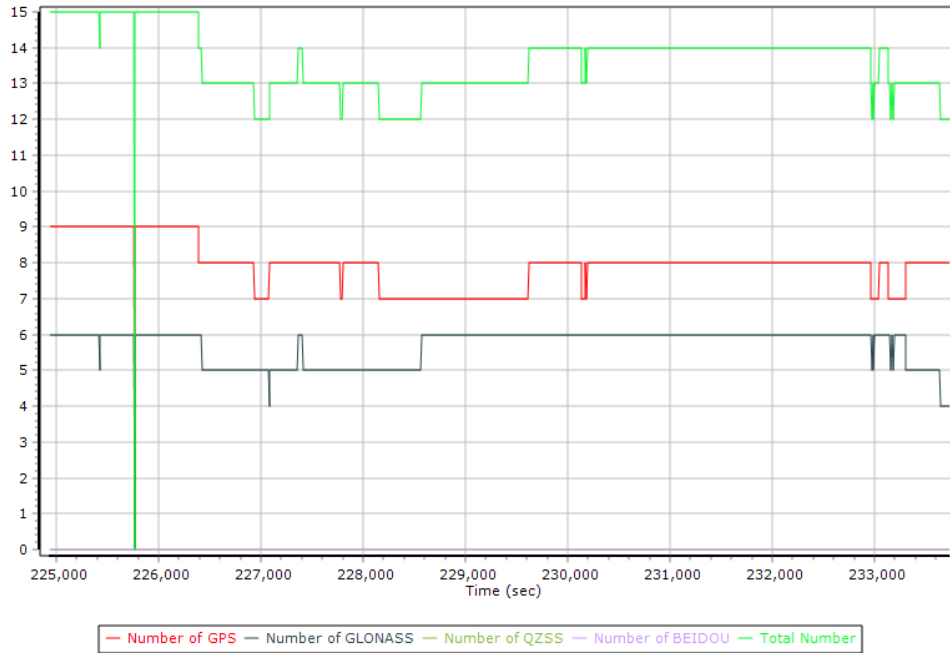
**NOVEMBER 21, 2017**



DOP



Number of SVs in solution



## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171121\_VA\_A

Solution Type: IN-Fusion SmartBase

Fixed: 8815	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 8834  
No processed position: 18

Fwd/Rev Separation RMS Values (m):

North: 0.009  
East: 0.006  
Height: 0.081

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 4420 occurrences

North: 0.007  
East: 0.004  
Height: 0.055

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.992

0.10 - 0.30 m: 0.008

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.50%

Baseline Distances (km):

Maximum: 36.69

Minimum: 0.84

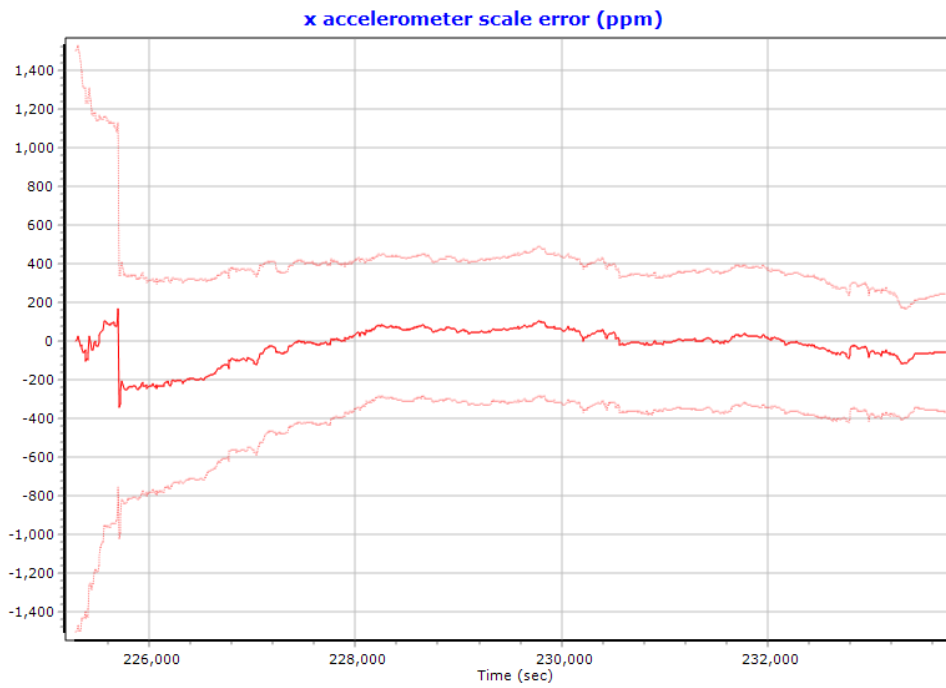
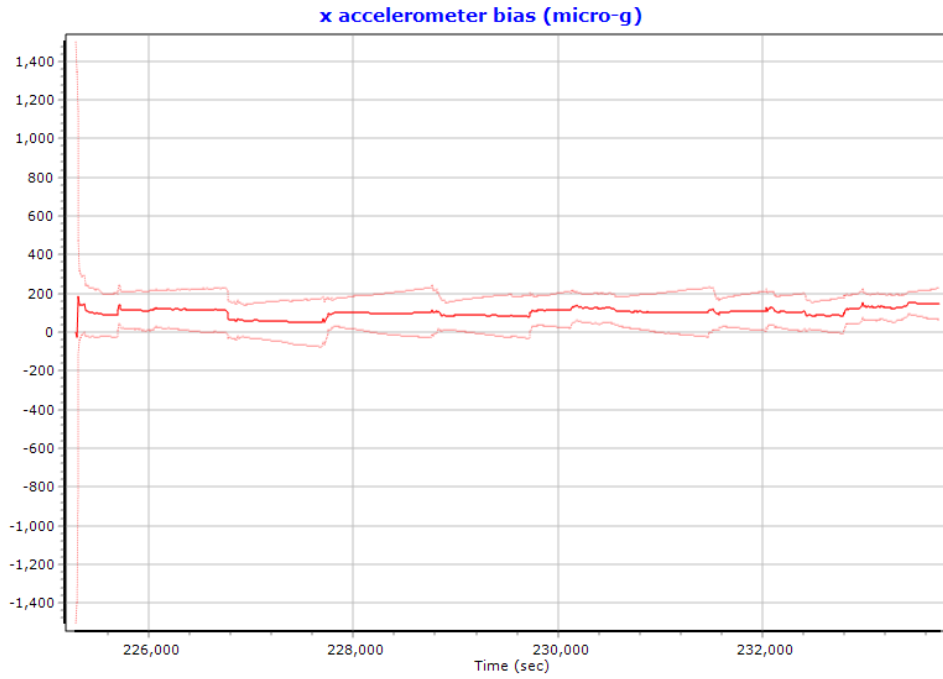
Average: 16.34

First Epoch: 13.08

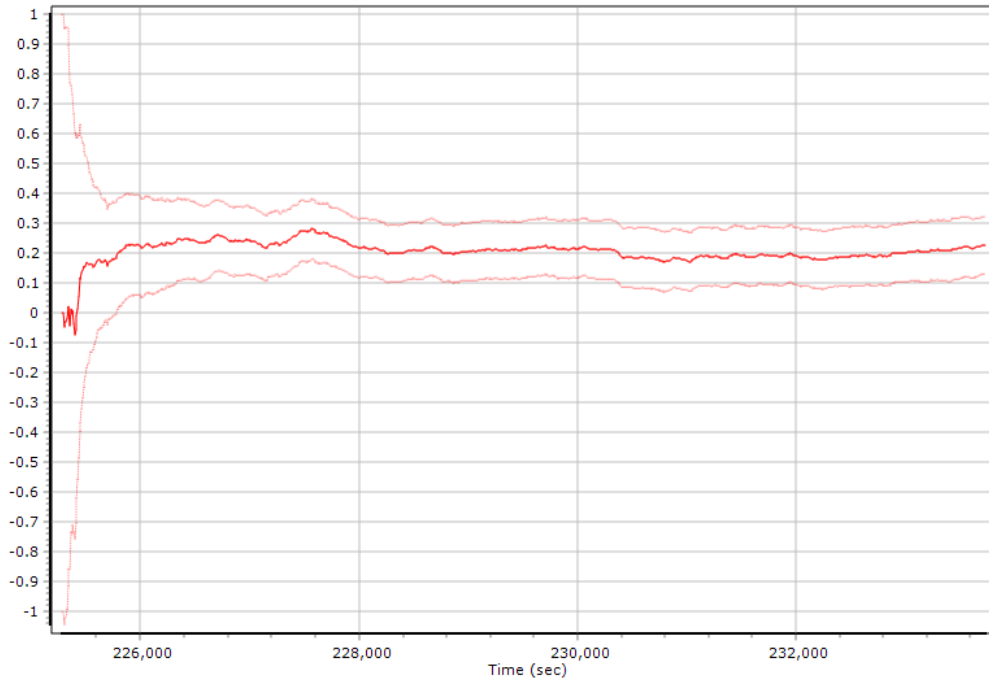
Last Epoch: 12.95

### CORS Base Stations

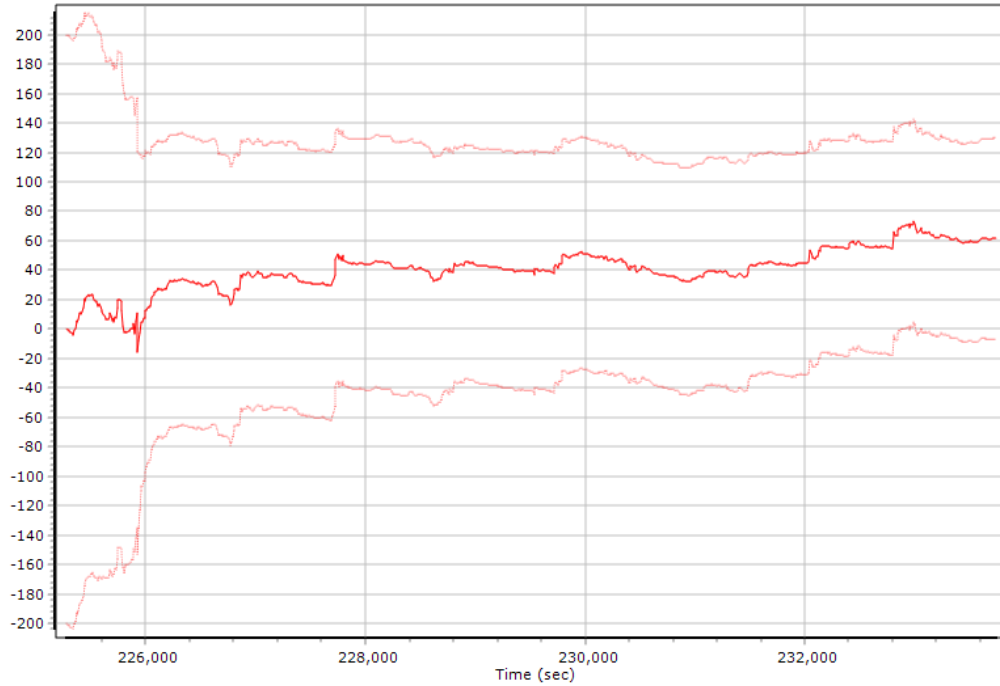
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVLE	N37°49'20.23017"	W80°25'18.58191"	655.2	N37°49'20.23011"	W80°25'18.58194"	655.202
WVAT	N37°25'42.67838"	W81°04'04.40385"	704.674	N37°25'42.67827"	W81°04'04.40403"	704.677
NCWC	N36°22'19.71490"	W80°11'05.64904"	274.974	N36°22'19.71460"	W80°11'05.64899"	275.083
LS04	N37°21'47.16695"	W79°57'26.99408"	324.139			
LOYH	N37°18'09.77783"	W79°19'28.19950"	204.445	N37°18'09.77790"	W79°19'28.19933"	204.434



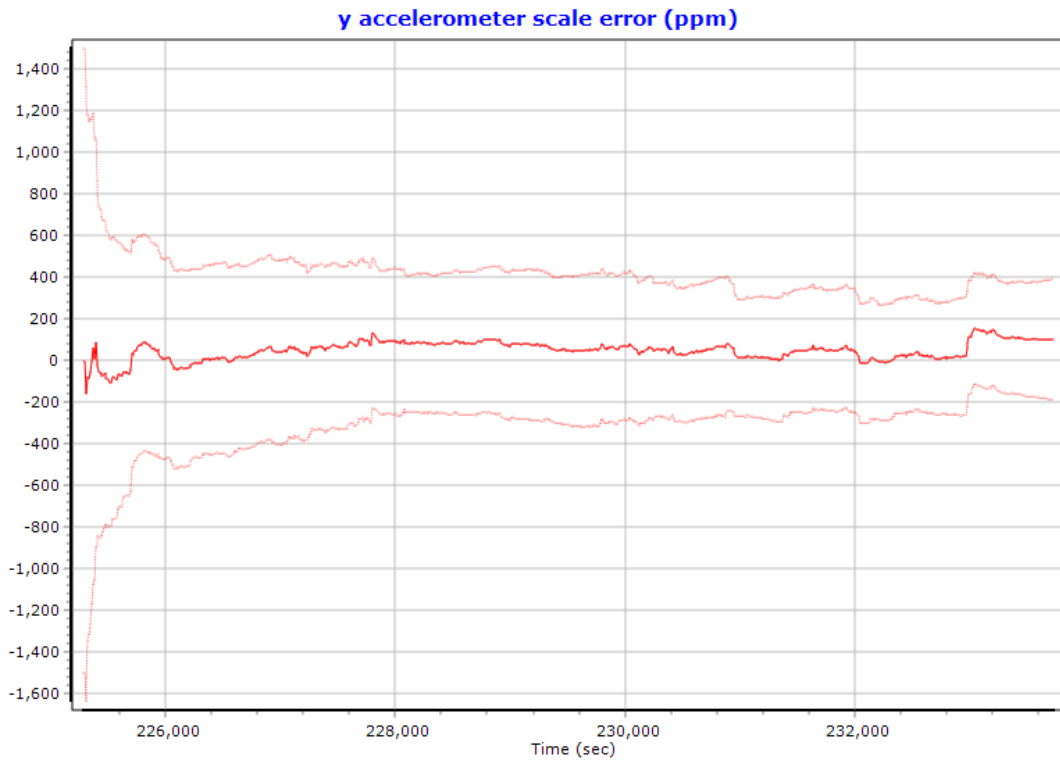
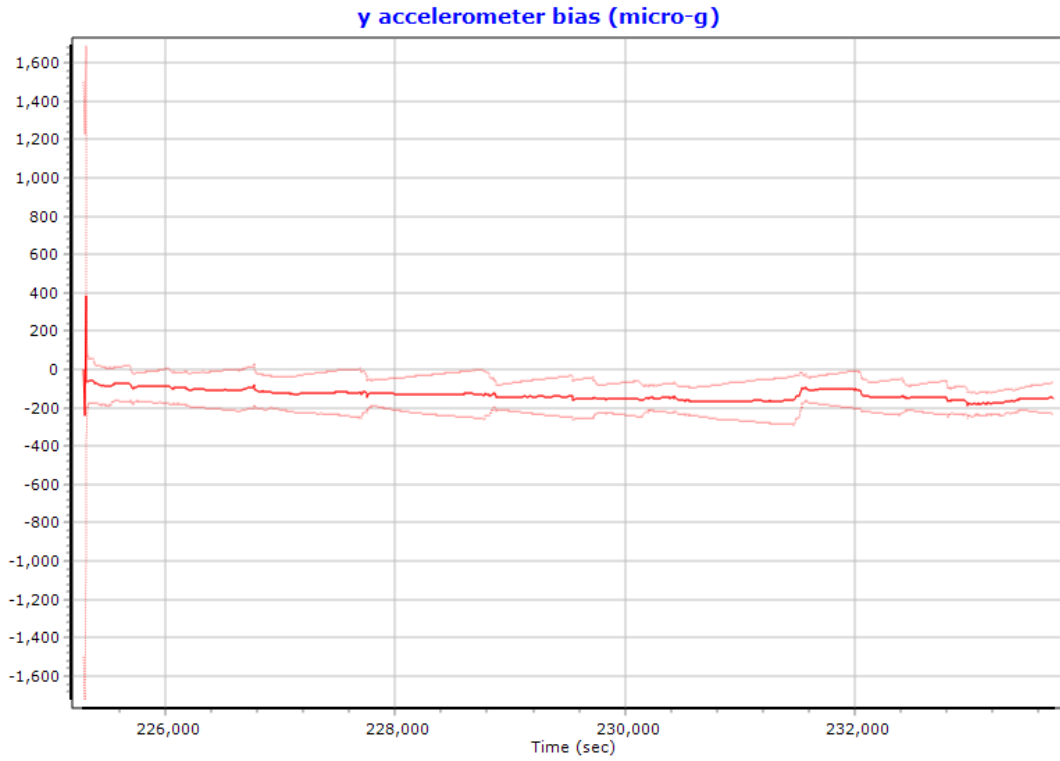
x gyro bias (deg/hr)



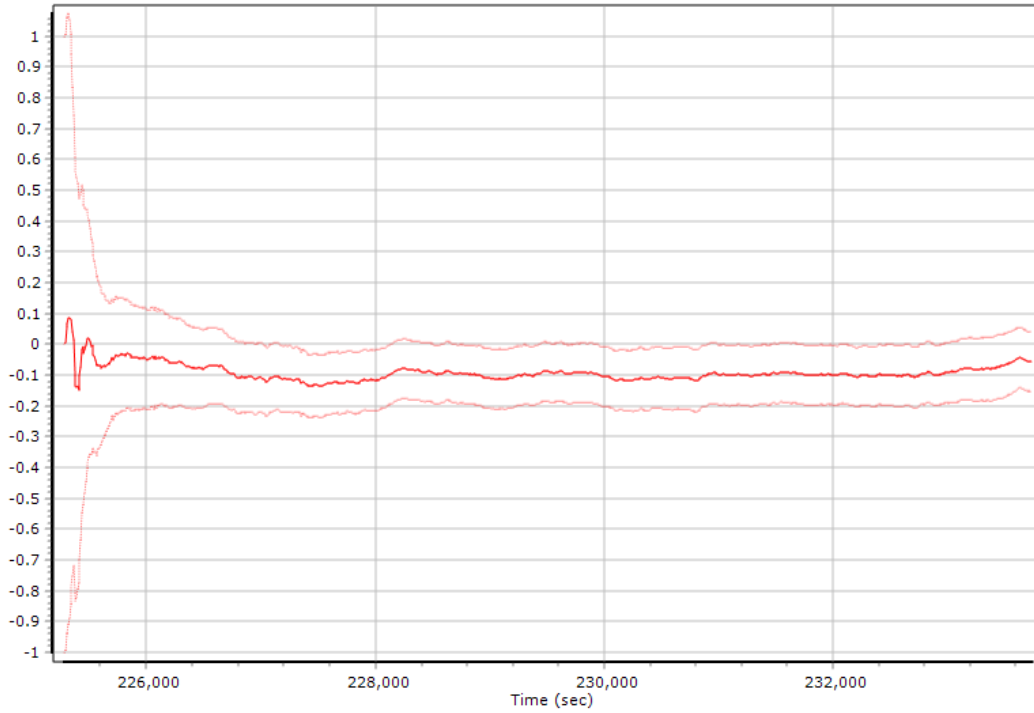
x gyro scale error (ppm)



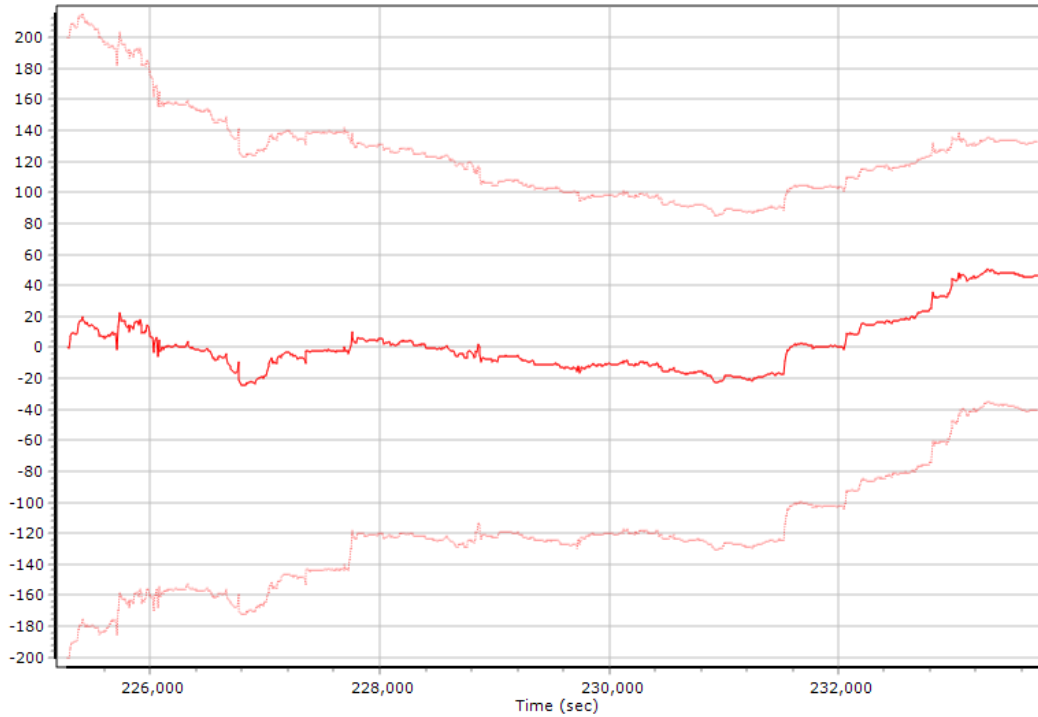


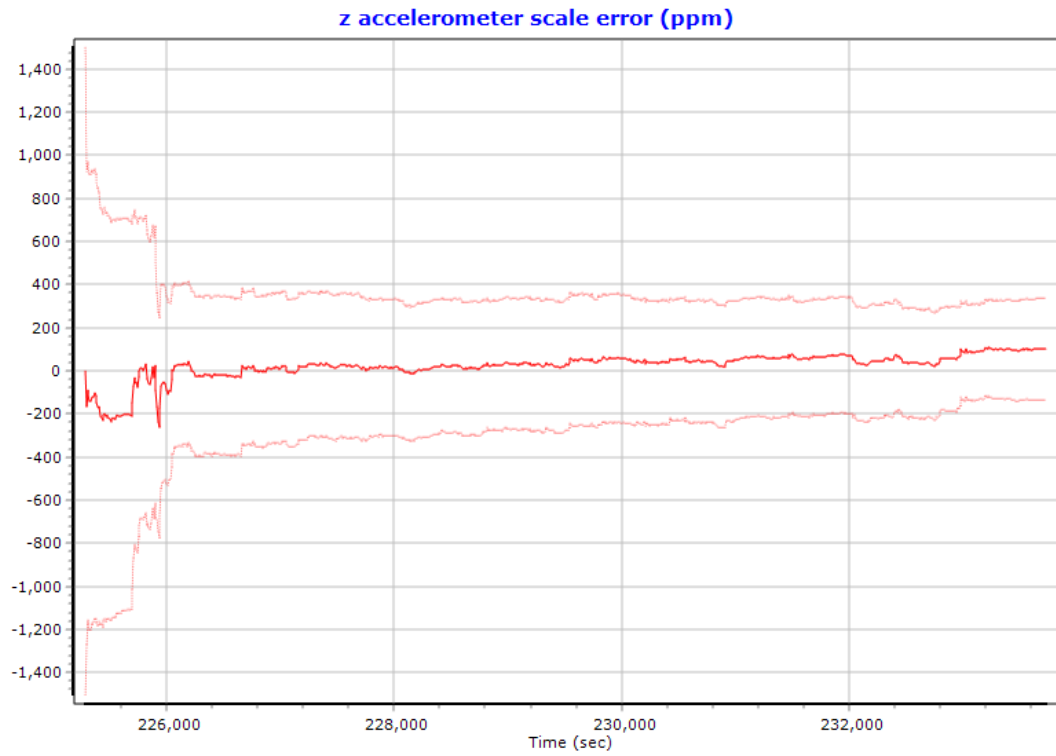
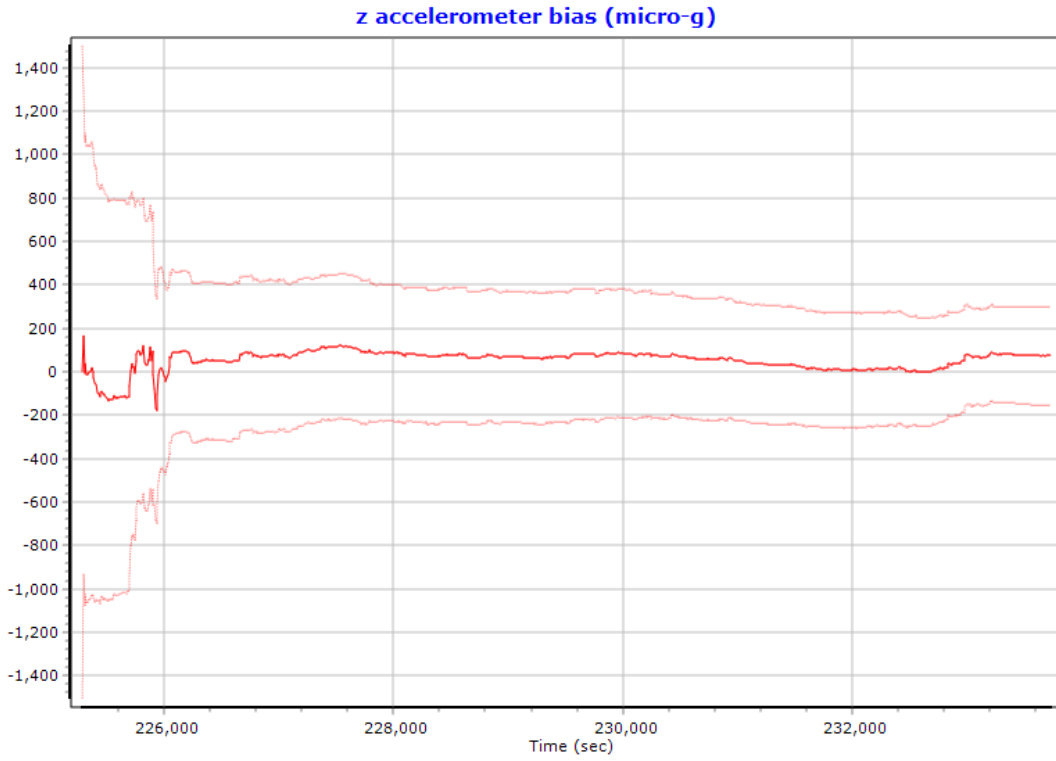


y gyro bias (deg/hr)

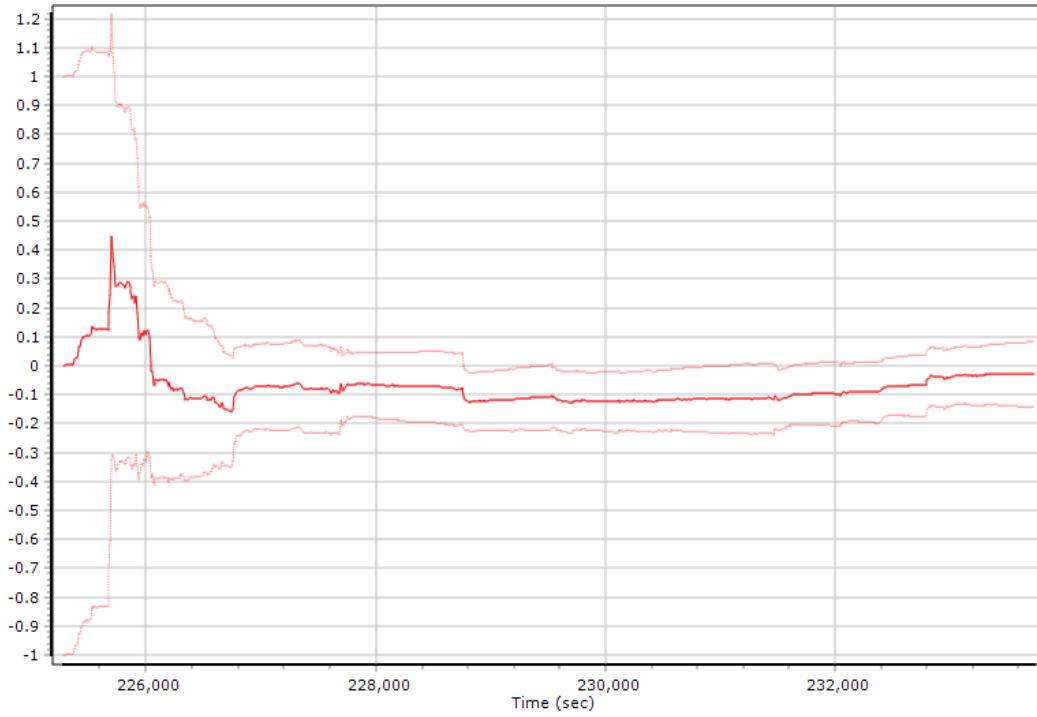


y gyro scale error (ppm)

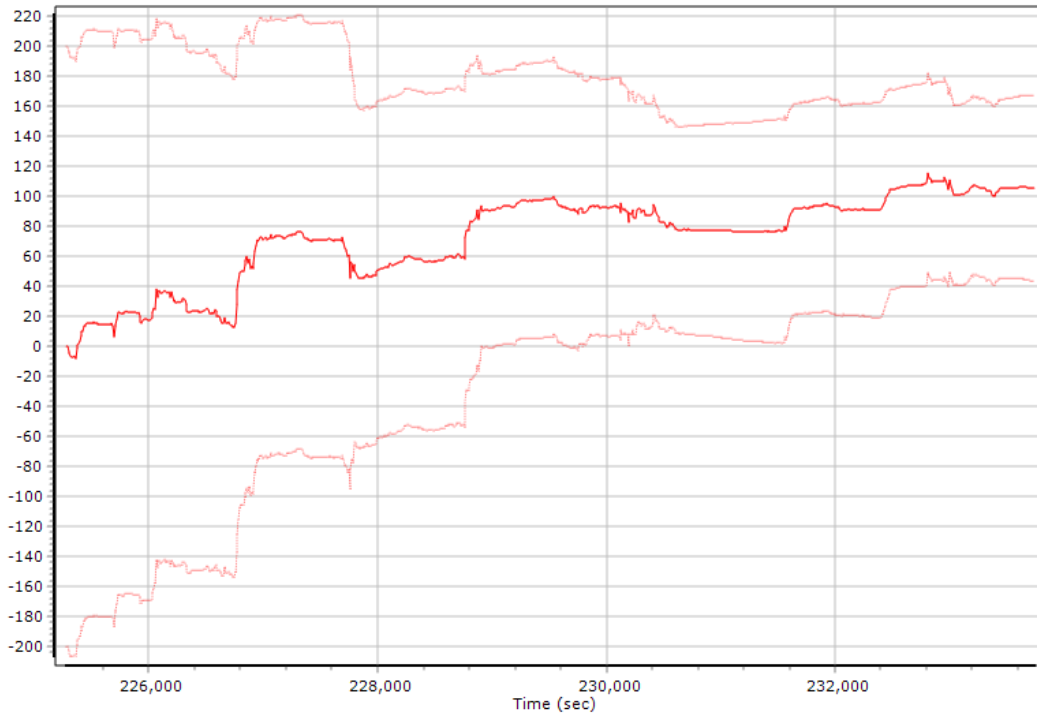




**z gyro bias (deg/hr)**



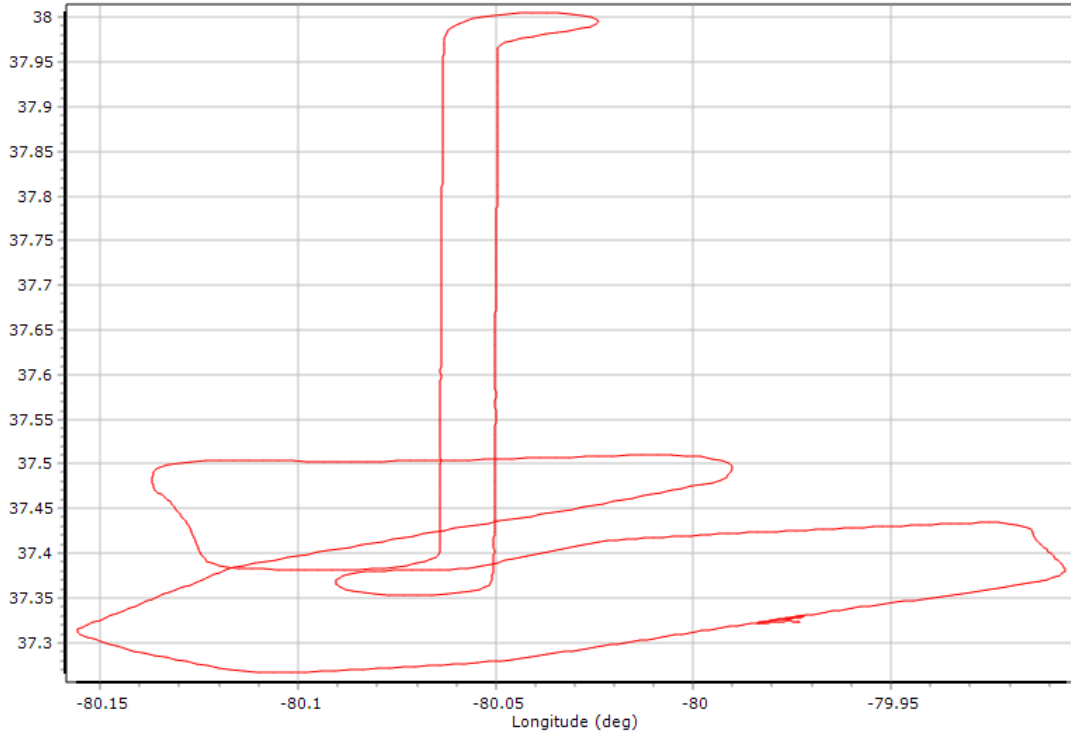
**z gyro scale error (ppm)**



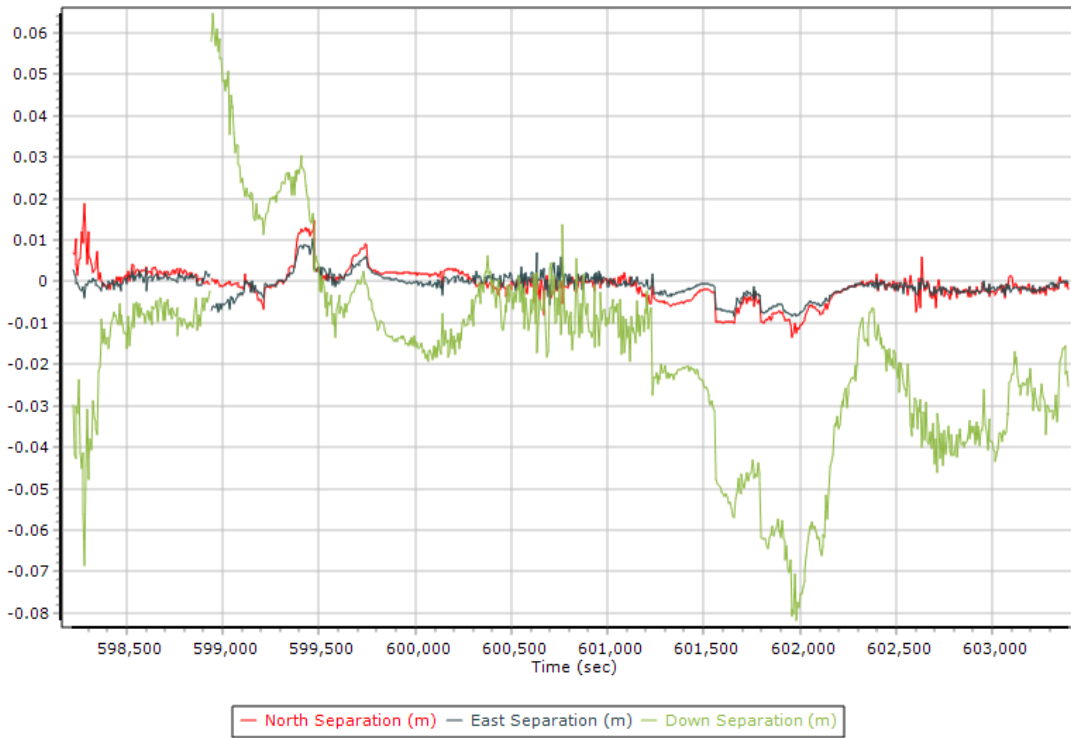
Virginia West Chesapeake Central LiDAR  
TO# G15PD00714  
July 17, 2018  
Page 37 of 202

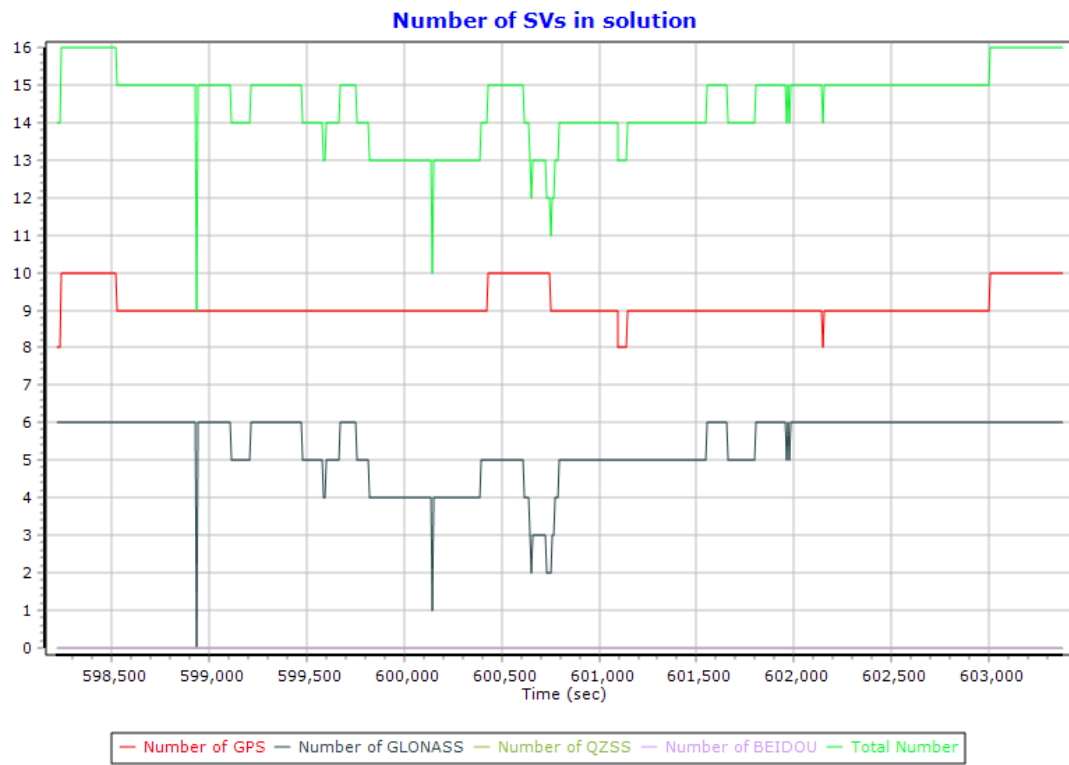
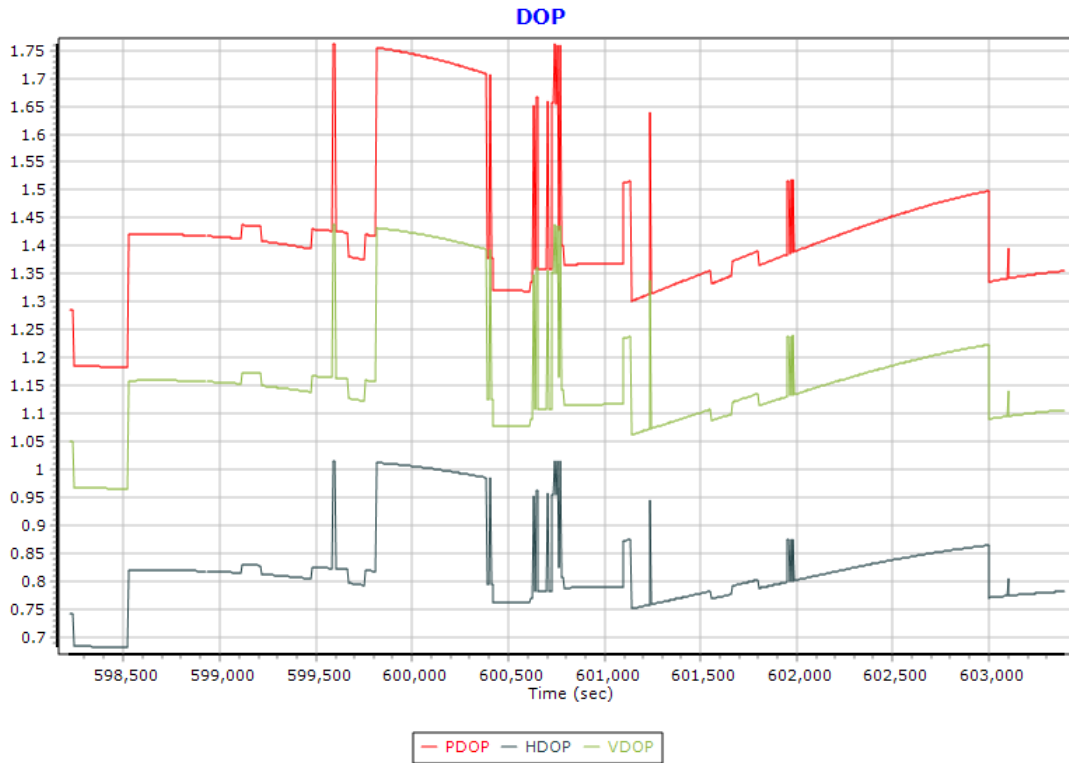
**DECEMBER 02, 2017**

Top View: Latitude (deg)



Forward/Reverse Separation





## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171122\_VA

Solution Type: IN-Fusion SmartBase

Fixed: 4435	(99.98%)
Float: 0	(0.00%)
No Solution: 1	(0.02%)

Number of Epochs:

Total in RAW file: 4473  
No processed position: 38

Fwd/Rev Separation RMS Values (m):

North: 0.021  
East: 0.020  
Height: 0.039

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 2239 occurrences

North: 0.006  
East: 0.007  
Height: 0.039

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):



0.00 - 0.10 m: 100

0.10 - 0.30 m: 0

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.41%

Baseline Distances (km):

Maximum: 62.18

Minimum: 2.9

Average: 27.38

First Epoch: 32.95

Last Epoch: 32.95

CORS Base Stations

Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVGB	N38°25'48.45404"	W79°49'01.31981"	811.18	N38°25'48.45379"	W79°49'01.32007"	811.172
WVAT	N37°25'42.67846"	W81°04'04.40374"	704.674	N37°25'42.67837"	W81°04'04.40378"	704.674
NCRE	N36°21'42.74202"	W79°39'56.56327"	233.466	N36°21'42.74191"	W79°39'56.56334"	233.455
WVLE	N37°49'20.23028"	W80°25'18.58180"	655.2	N37°49'20.23008"	W80°25'18.58191"	655.204
LS04	N37°21'47.16704"	W79°57'26.99400"	324.137			

Virginia West Chesapeake Central LiDAR

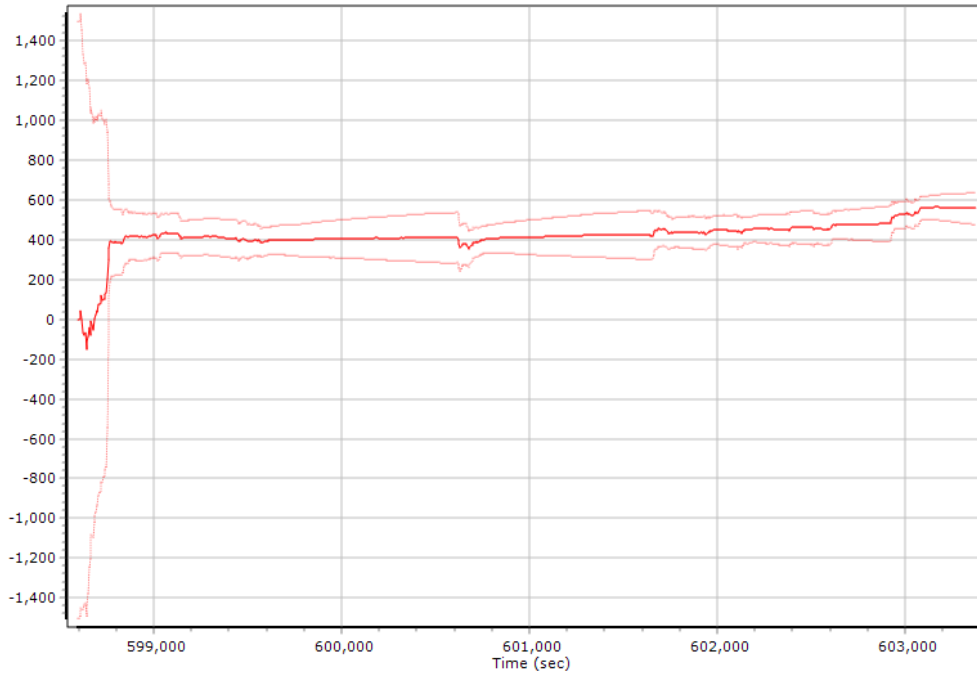
TO# G15PD00714

July 17, 2018

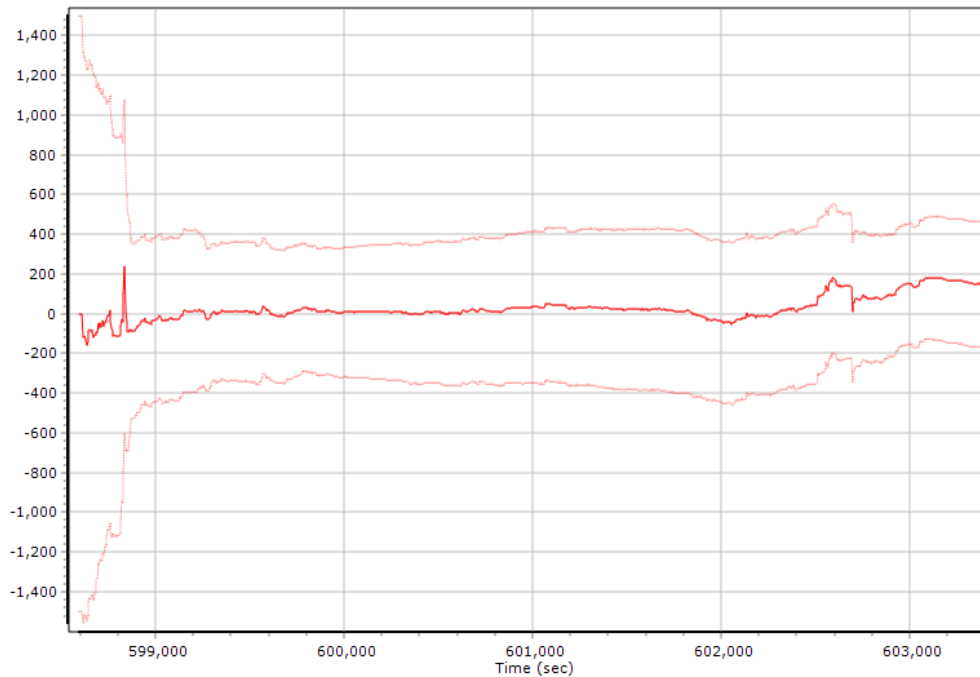
Page 42 of 202

LOYH	N37°18'09.77793"	W79°19'28.19940"	204.445	N37°18'09.77796"	W79°19'28.19943"	204.429
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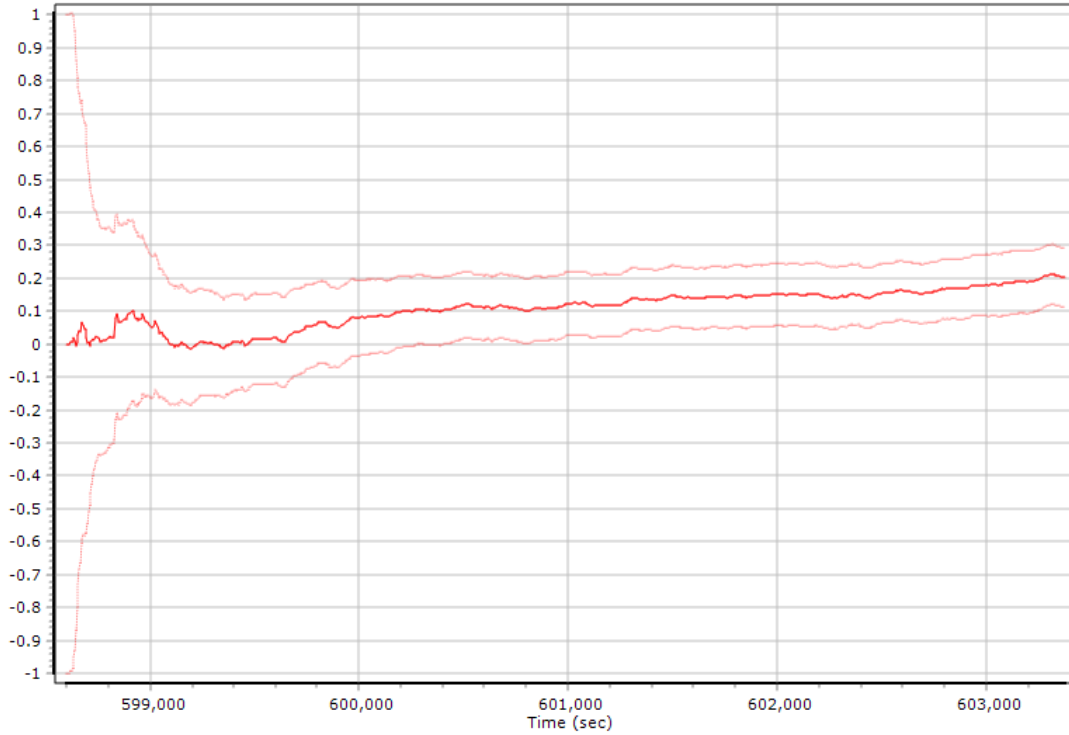
x accelerometer bias (micro-g)



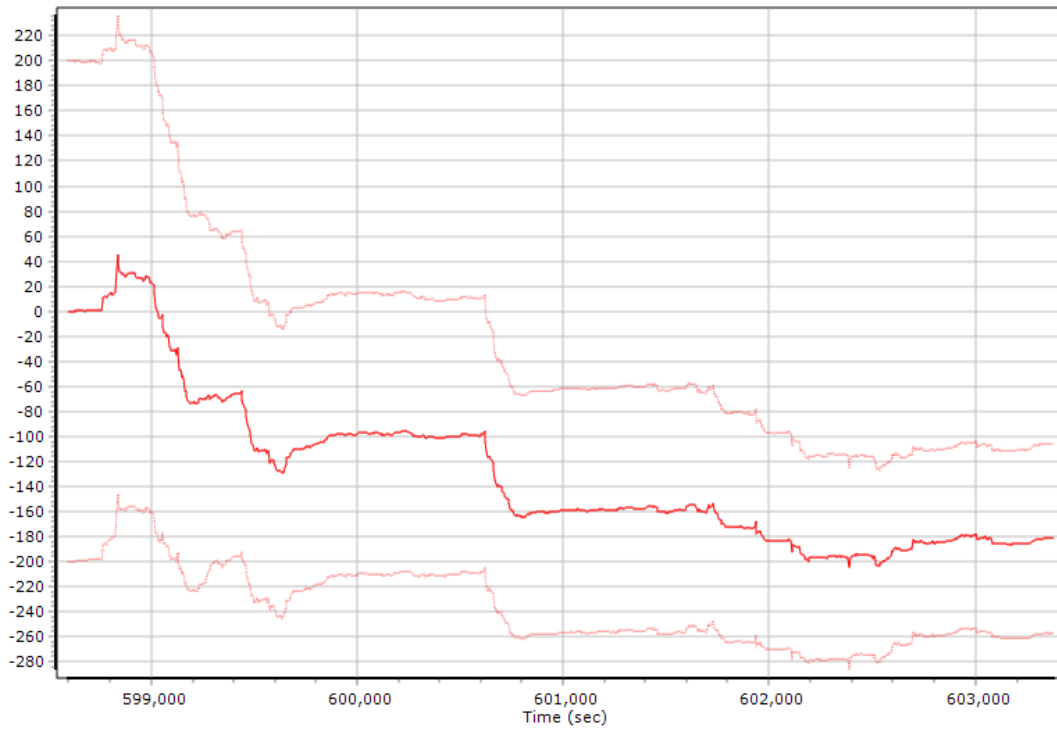
x accelerometer scale error (ppm)

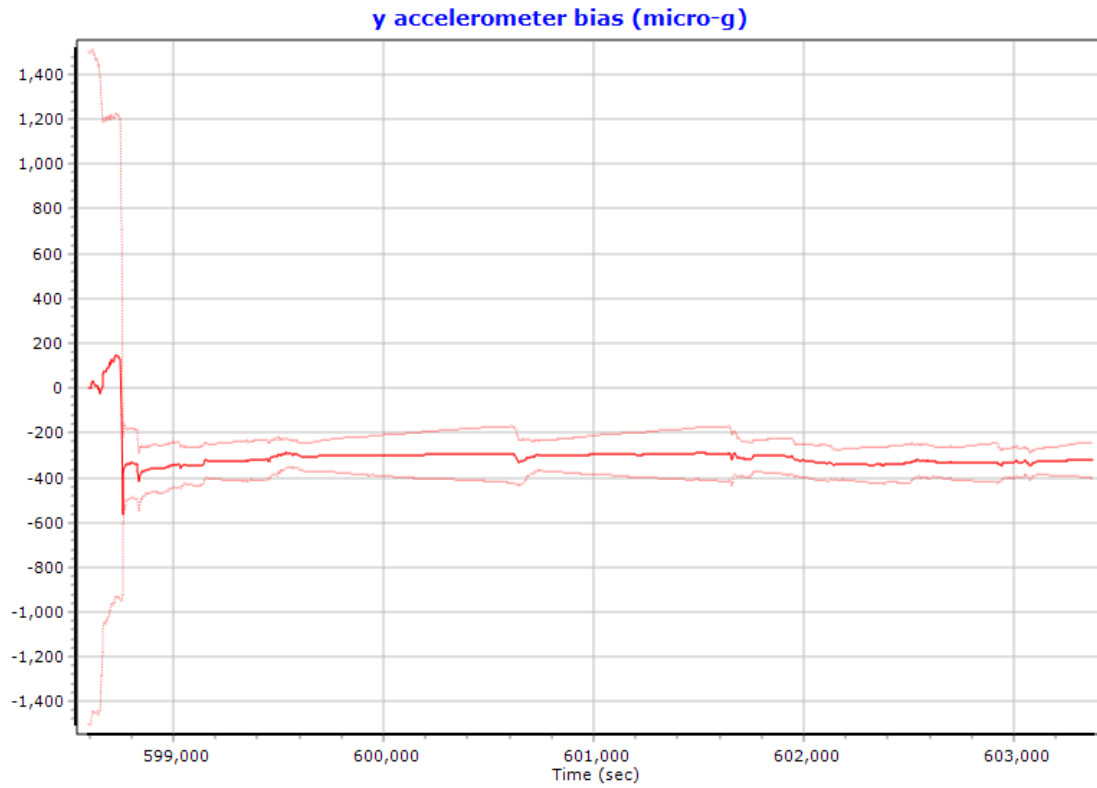


x gyro bias (deg/hr)

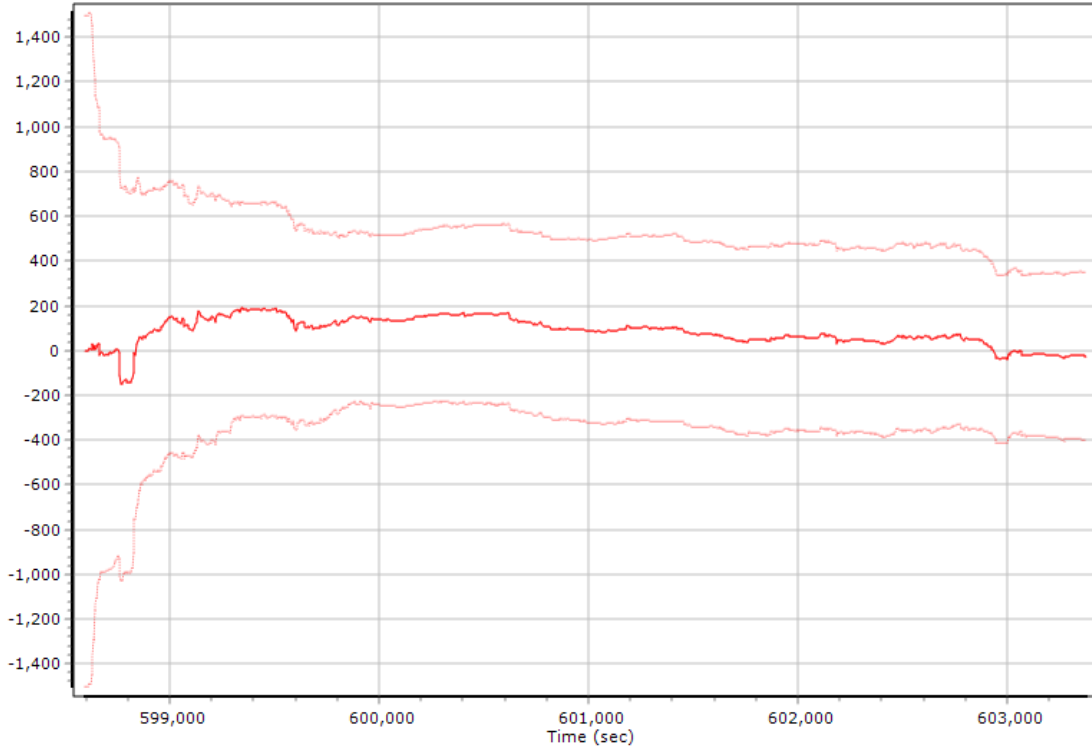


x gyro scale error (ppm)

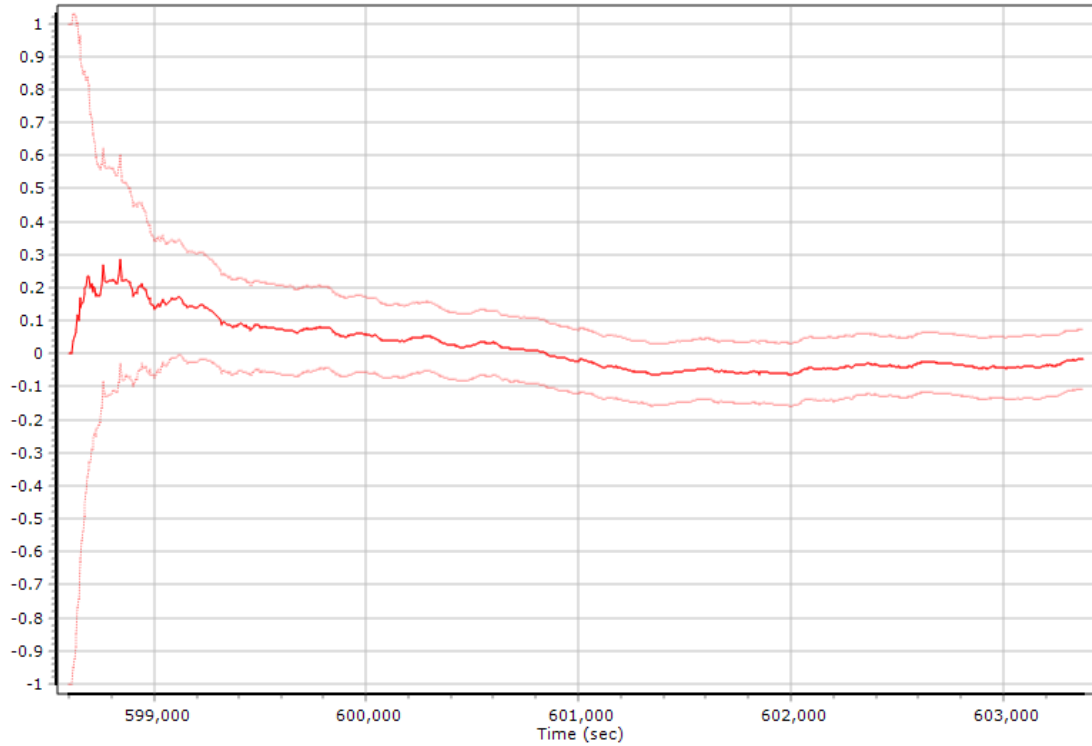


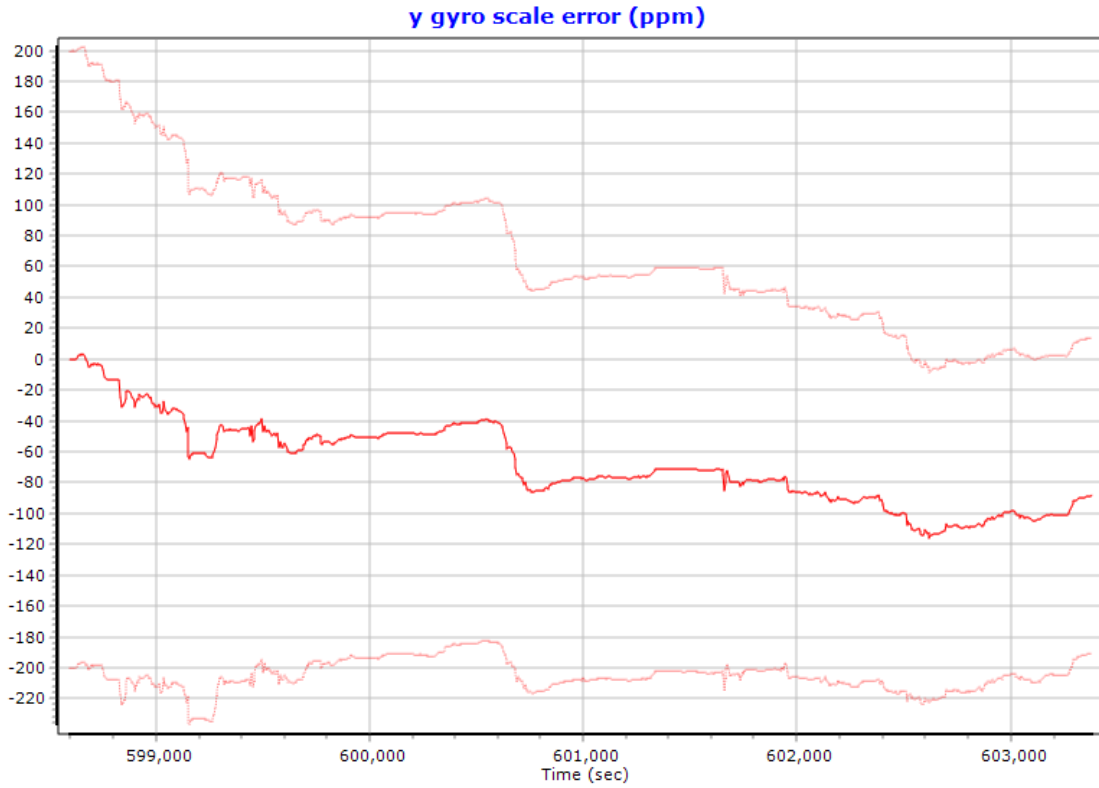


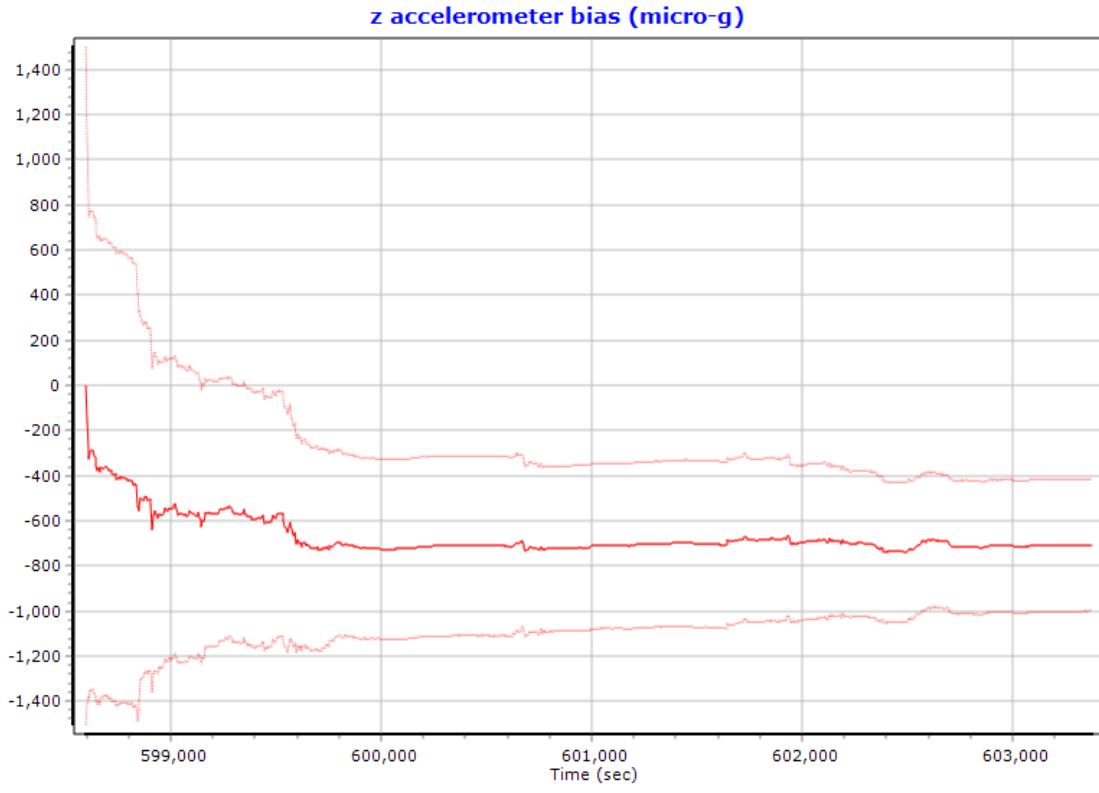
y accelerometer scale error (ppm)



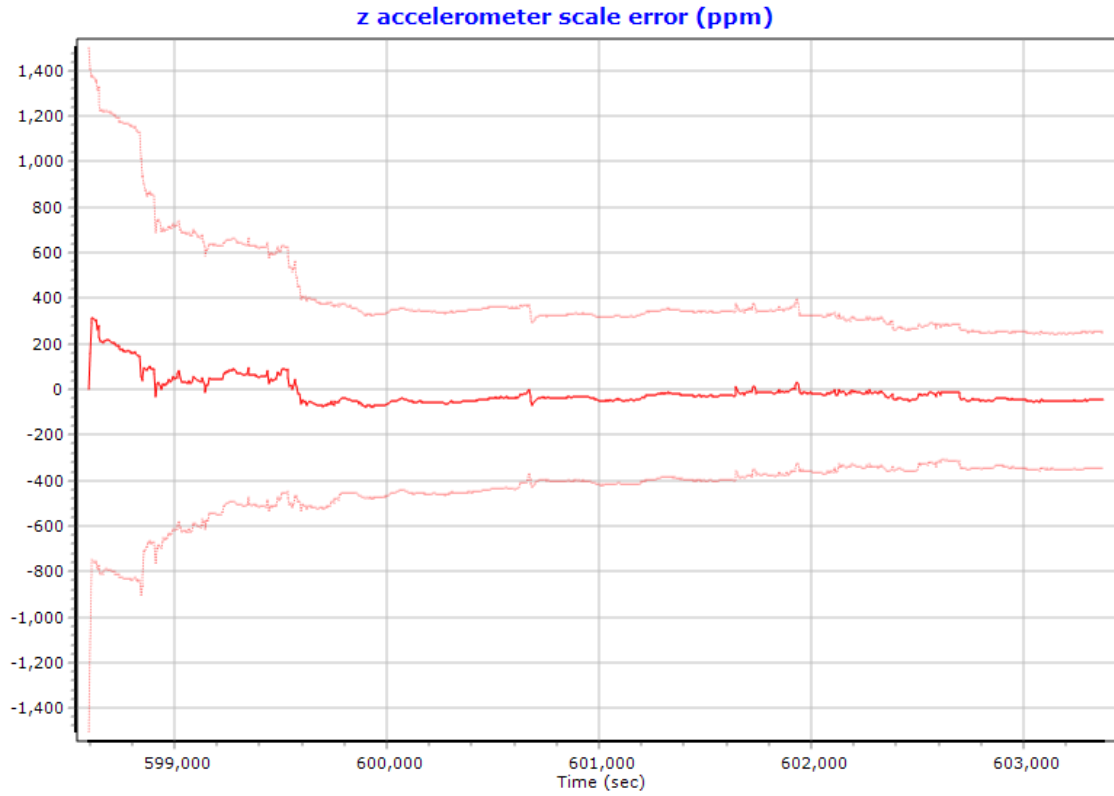
y gyro bias (deg/hr)

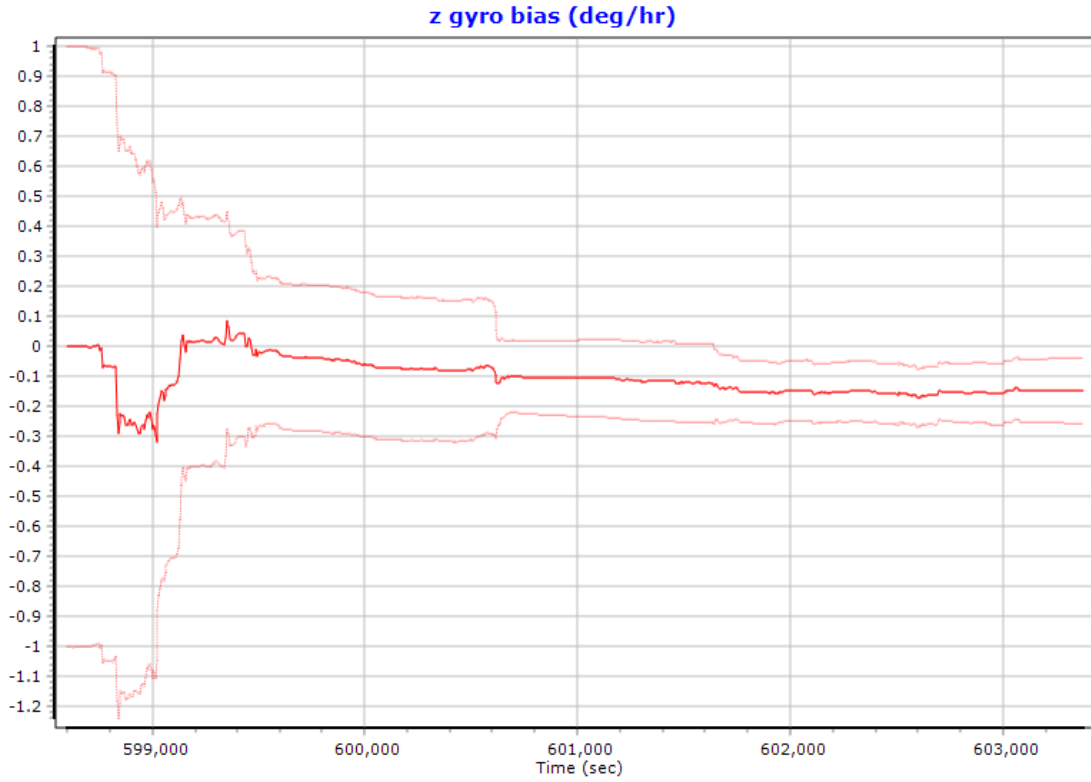


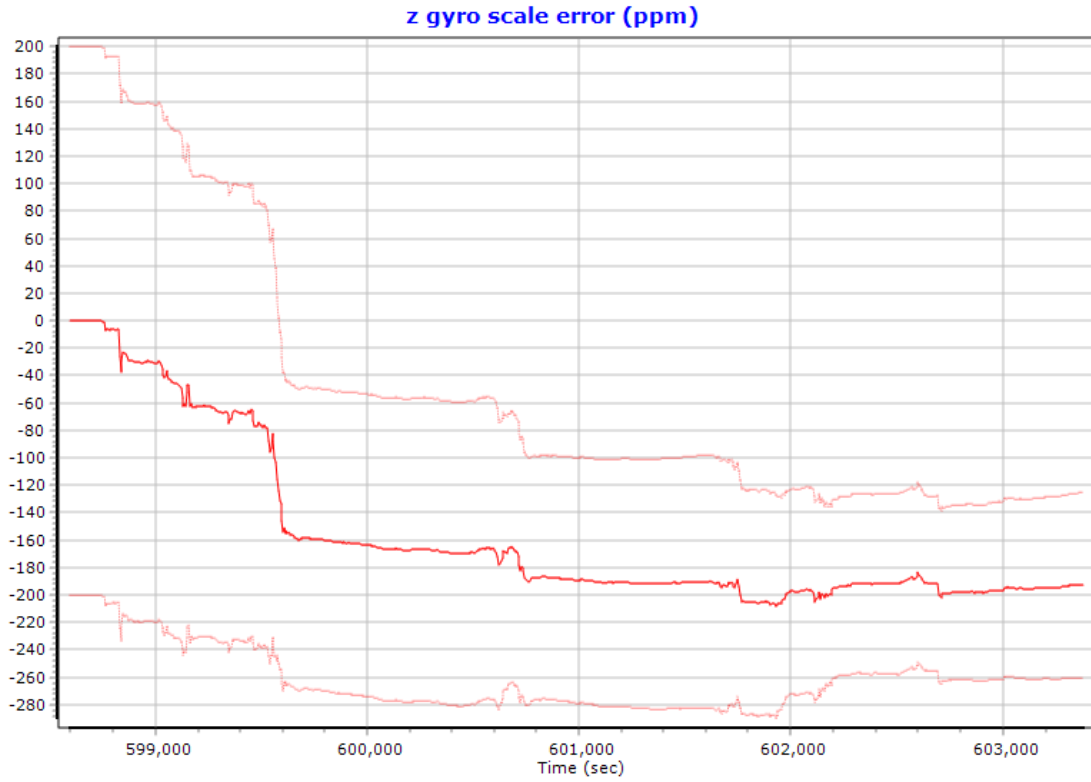






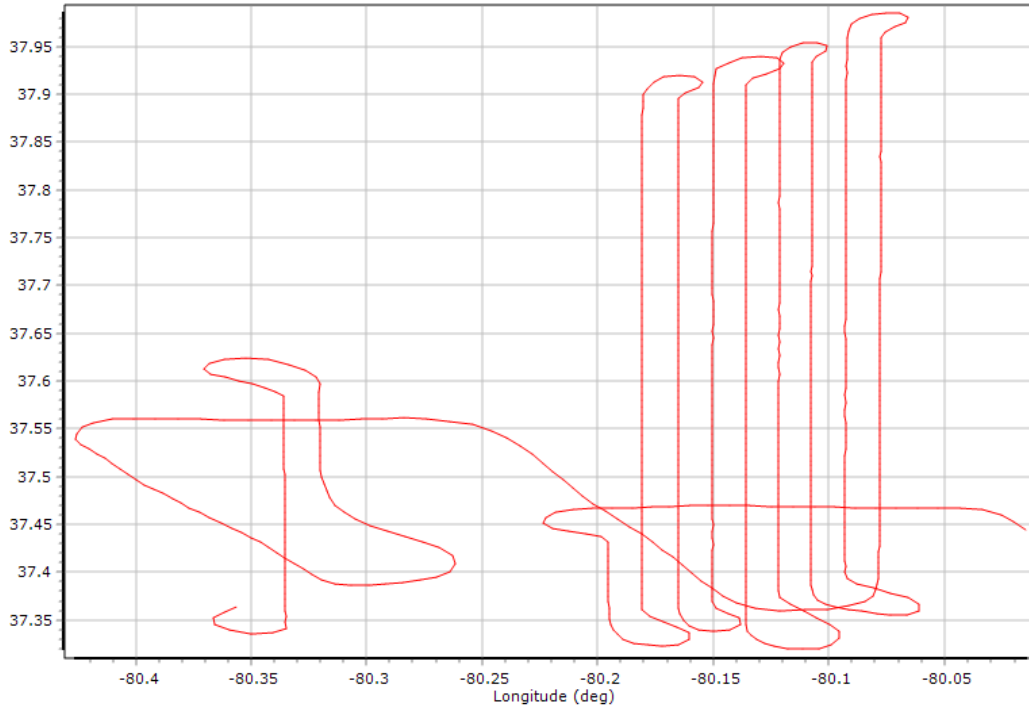




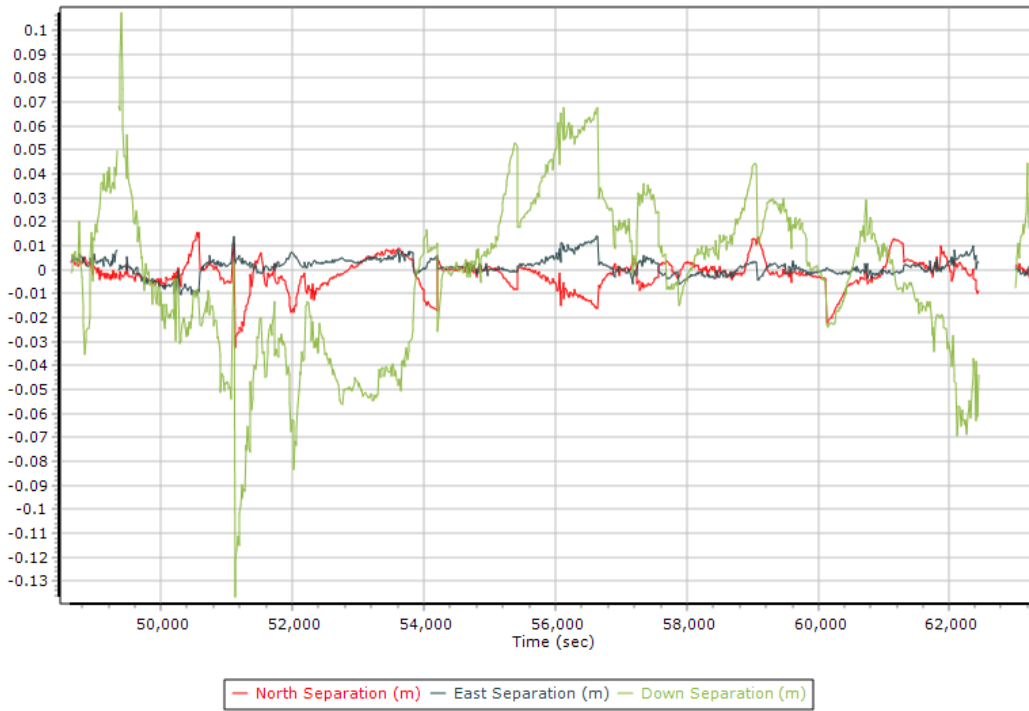


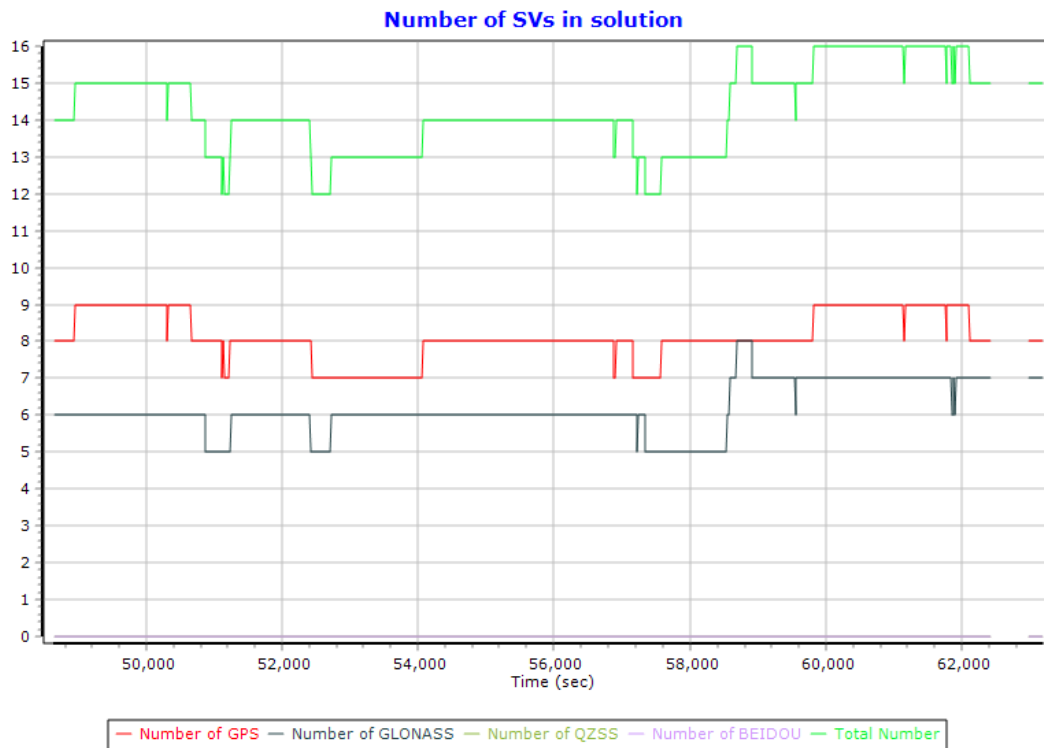
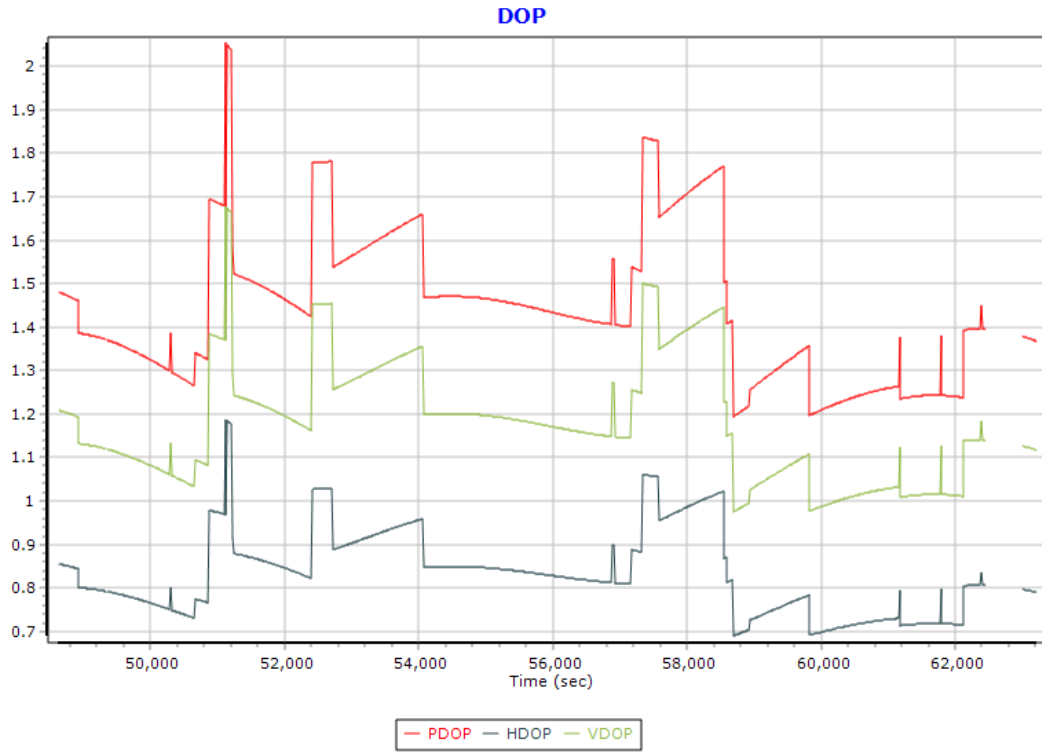
**DECEMBER 03, 2017 MISSION 1**

Top View: Latitude (deg)



Forward/Reverse Separation





## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171203\_VA\_A

Solution Type: IN-Fusion SmartBase

Fixed: 14048	(96.30%)
Float: 0	(0.00%)
No Solution: 540	(3.70%)

Number of Epochs:

Total in RAW file: 14592  
No processed position: 544

Fwd/Rev Separation RMS Values (m):

North: 0.007  
East: 0.004  
Height: 0.033

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 1906 occurrences

North: 0.006  
East: 0.004  
Height: 0.033

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.98

0.10 - 0.30 m: 0.012

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.44%

Baseline Distances (km):

Maximum: 43.15

Minimum: 0.48

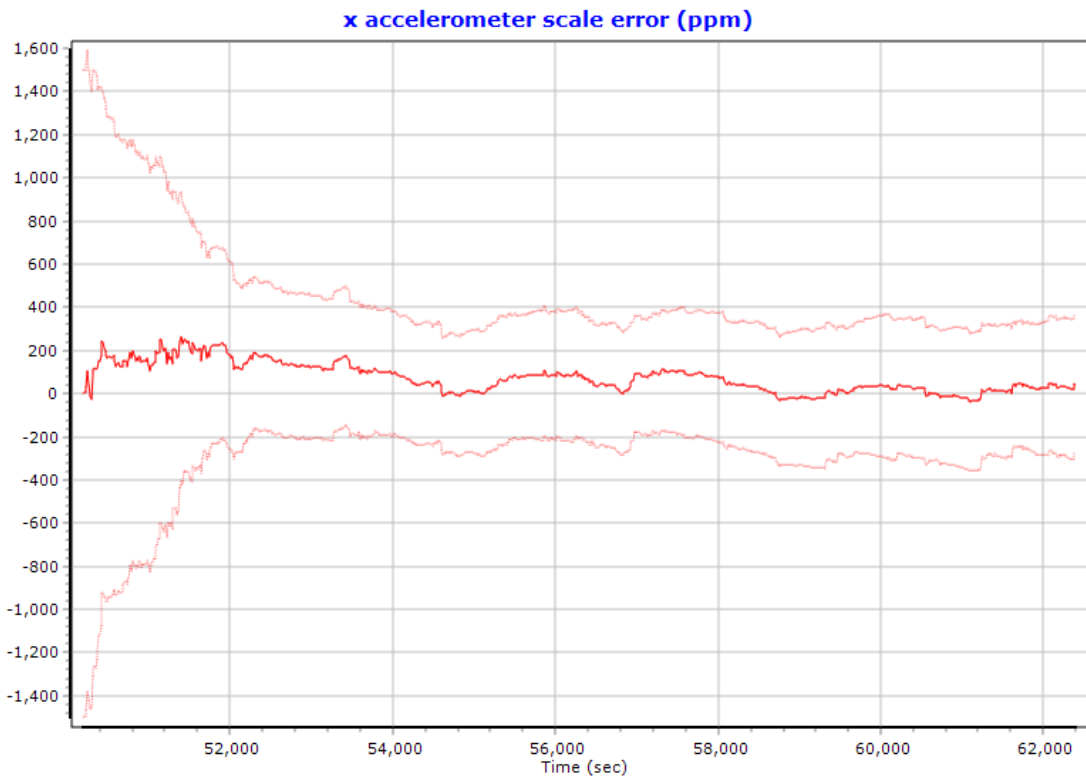
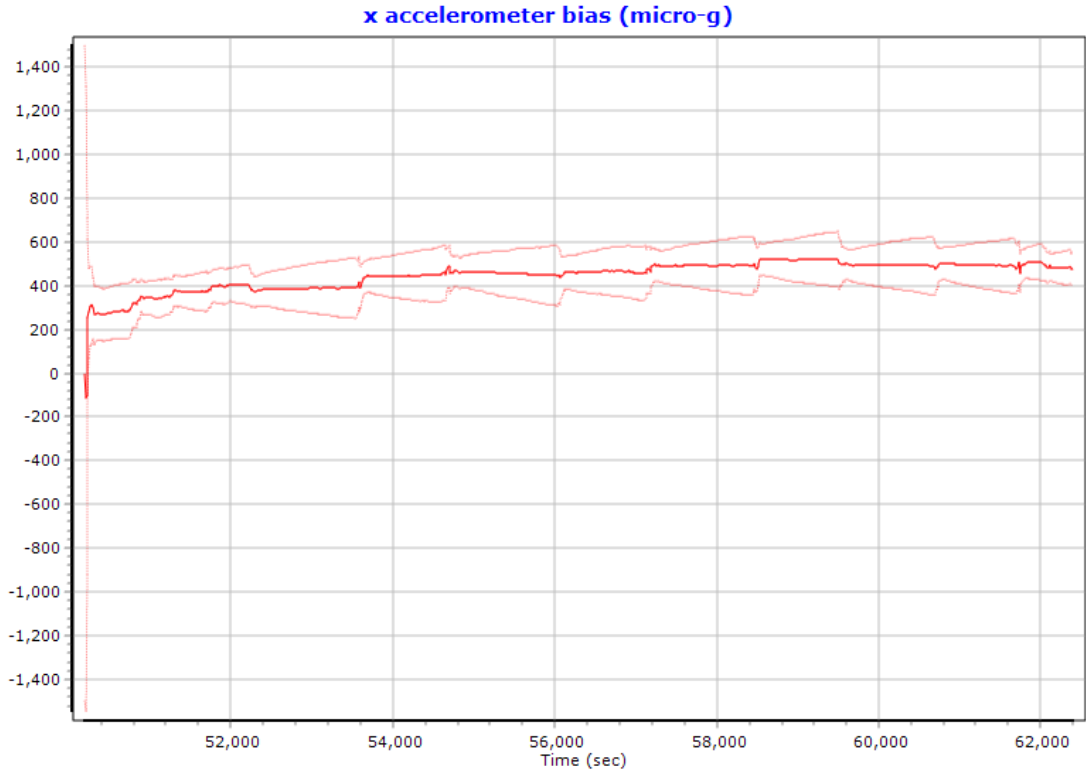
Average: 20.75

First Epoch: 35.23

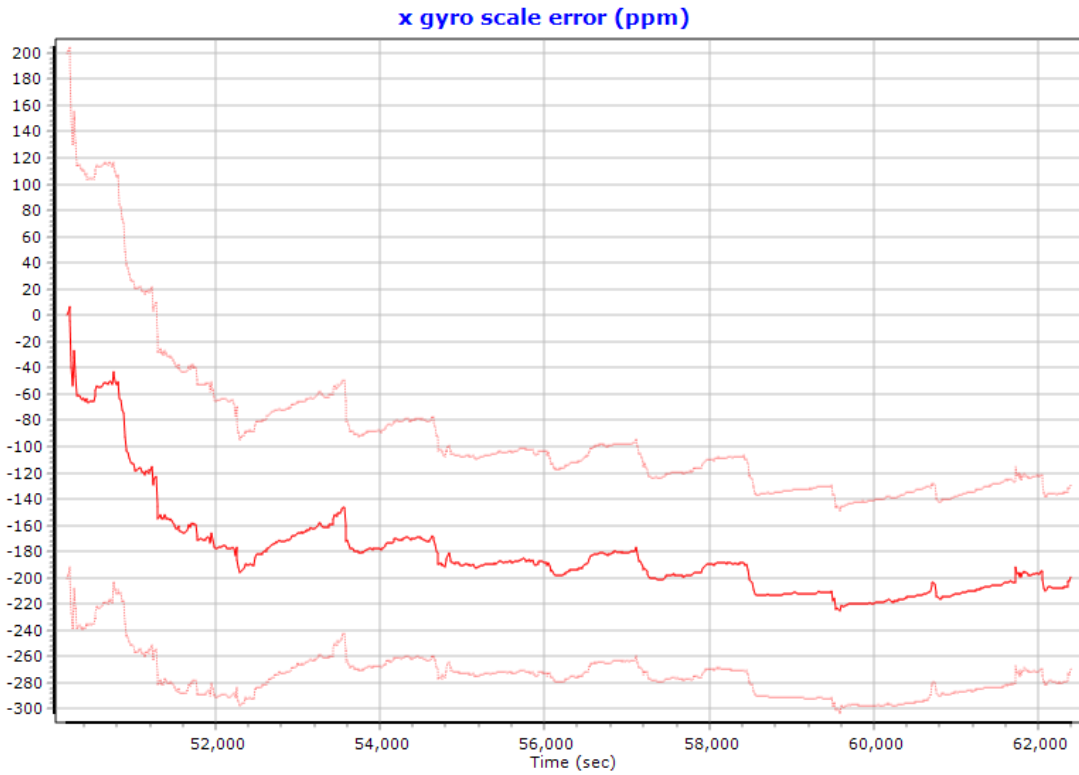
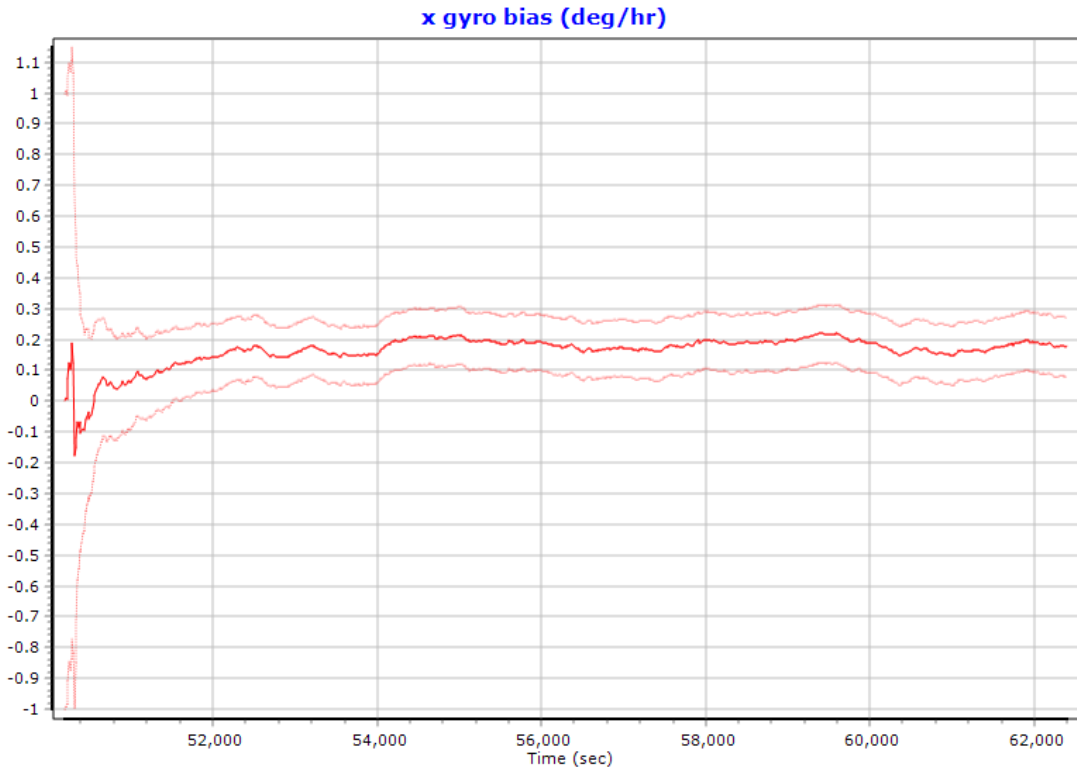
Last Epoch: 35.23

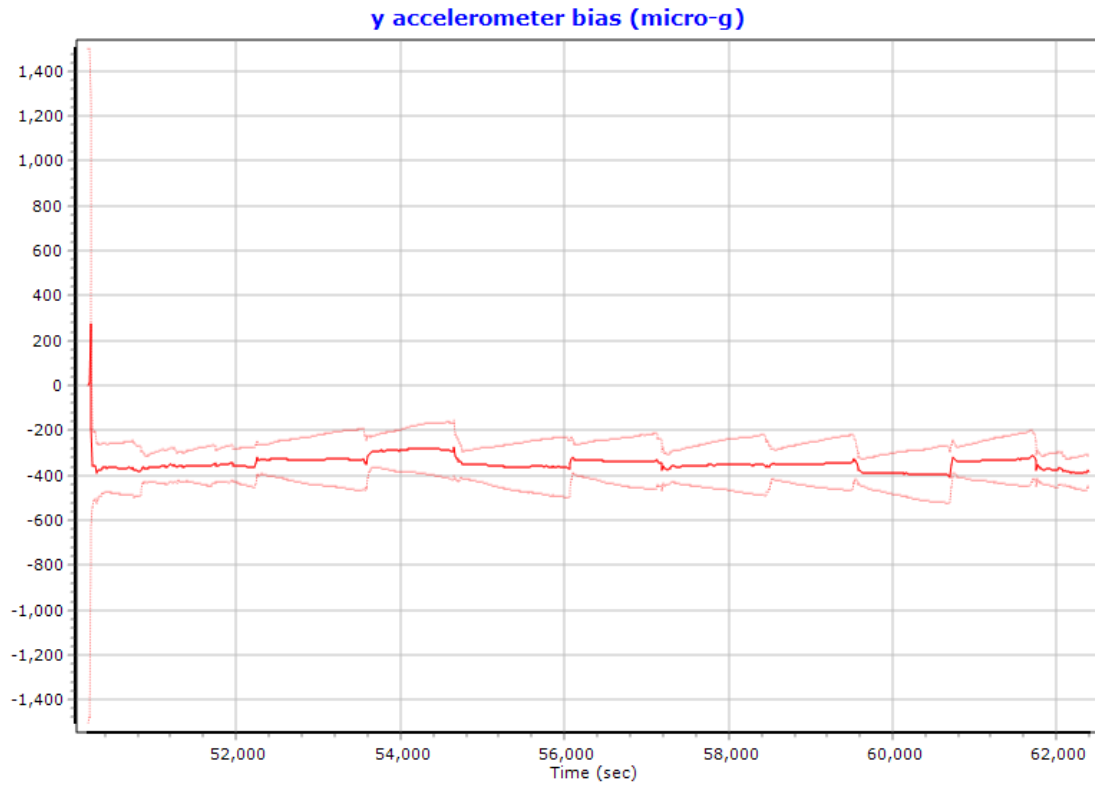
CORS Base Stations

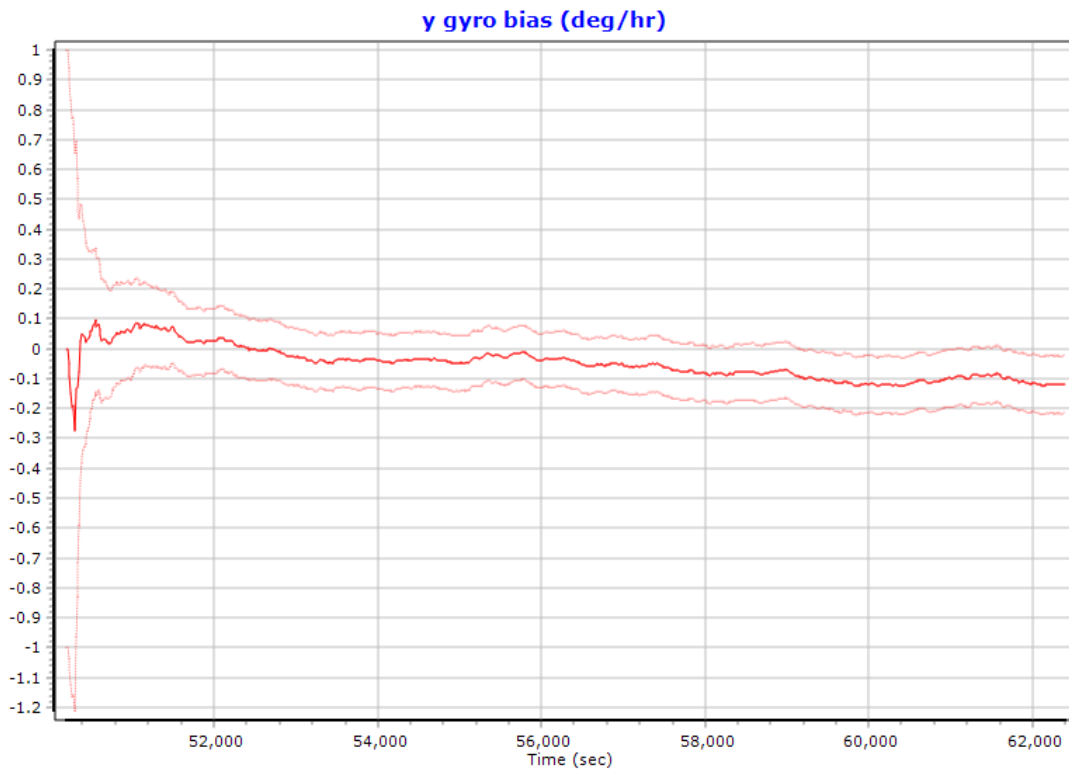
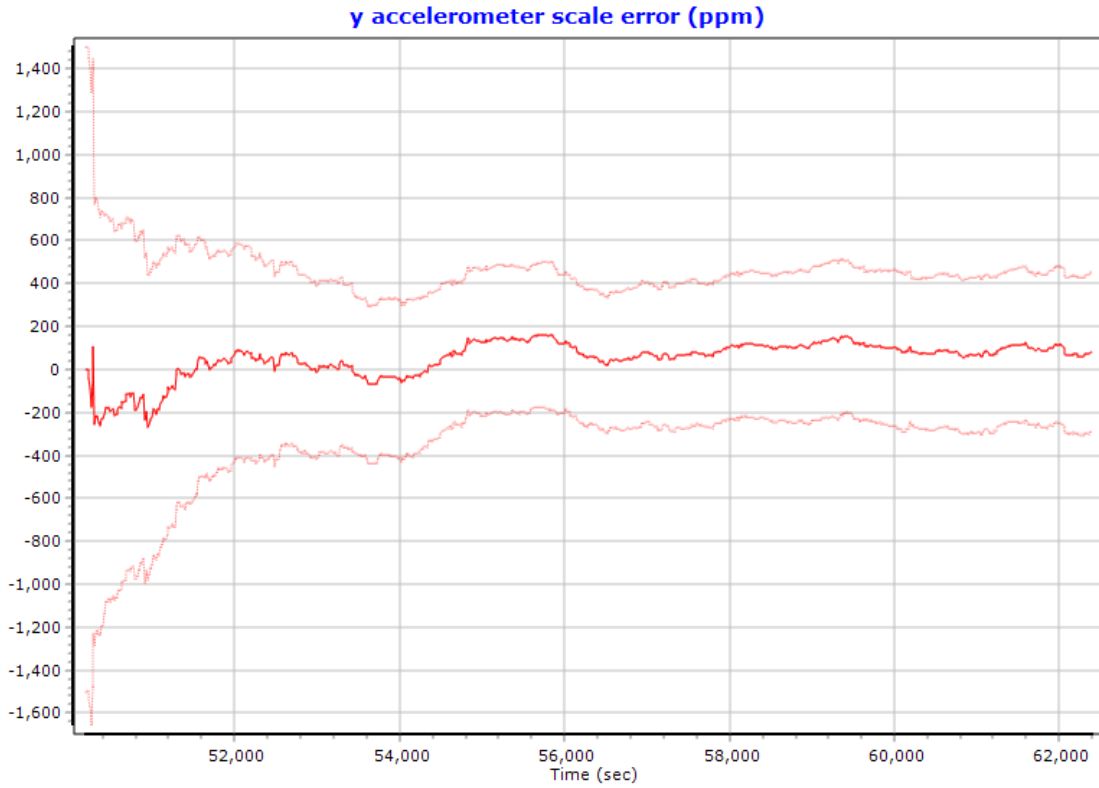
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVLE	N37°49'20.23017"	W80°25'18.58193"	655.2	N37°49'20.23010"	W80°25'18.58207"	655.204
WVGB	N38°25'48.45389"	W79°49'01.31999"	811.18	N38°25'48.45378"	W79°49'01.31998"	811.174
WVAT	N37°25'42.67838"	W81°04'04.40387"	704.674	N37°25'42.67828"	W81°04'04.40411"	704.678
NCWC	N36°22'19.71490"	W80°11'05.64906"	274.974	N36°22'19.71467"	W80°11'05.64912"	275.084
LS04	N37°21'47.16695"	W79°57'26.99410"	324.139			
LOYH	N37°18'09.77783"	W79°19'28.19952"	204.445	N37°18'09.77788"	W79°19'28.19936"	204.433



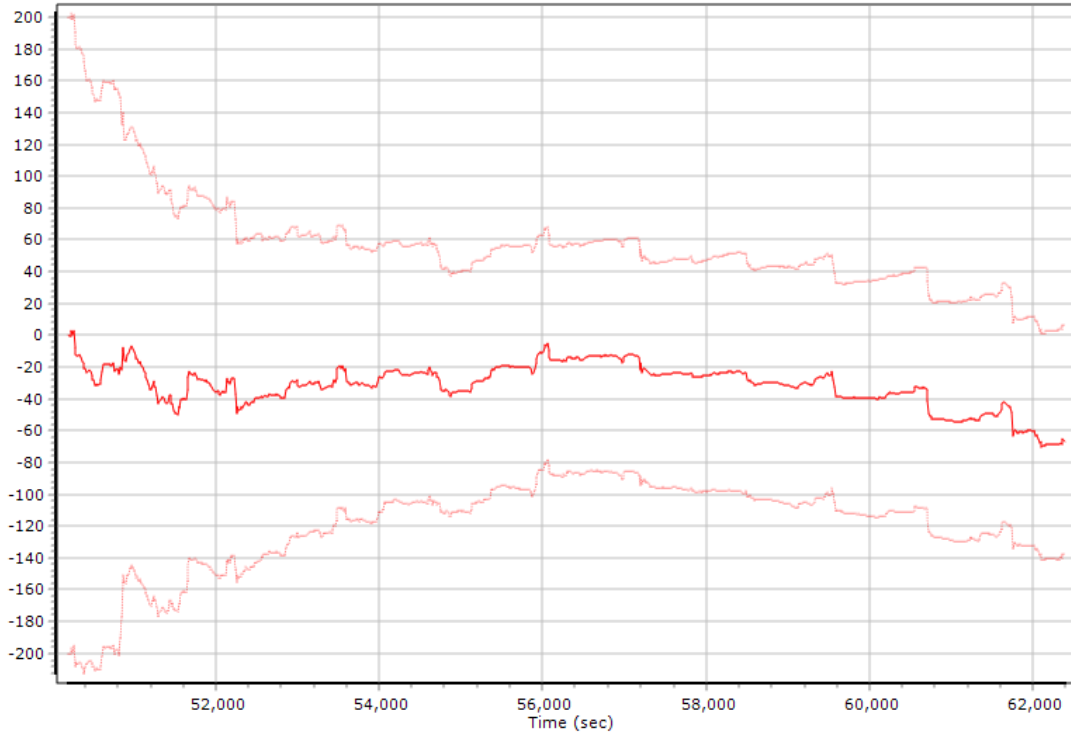




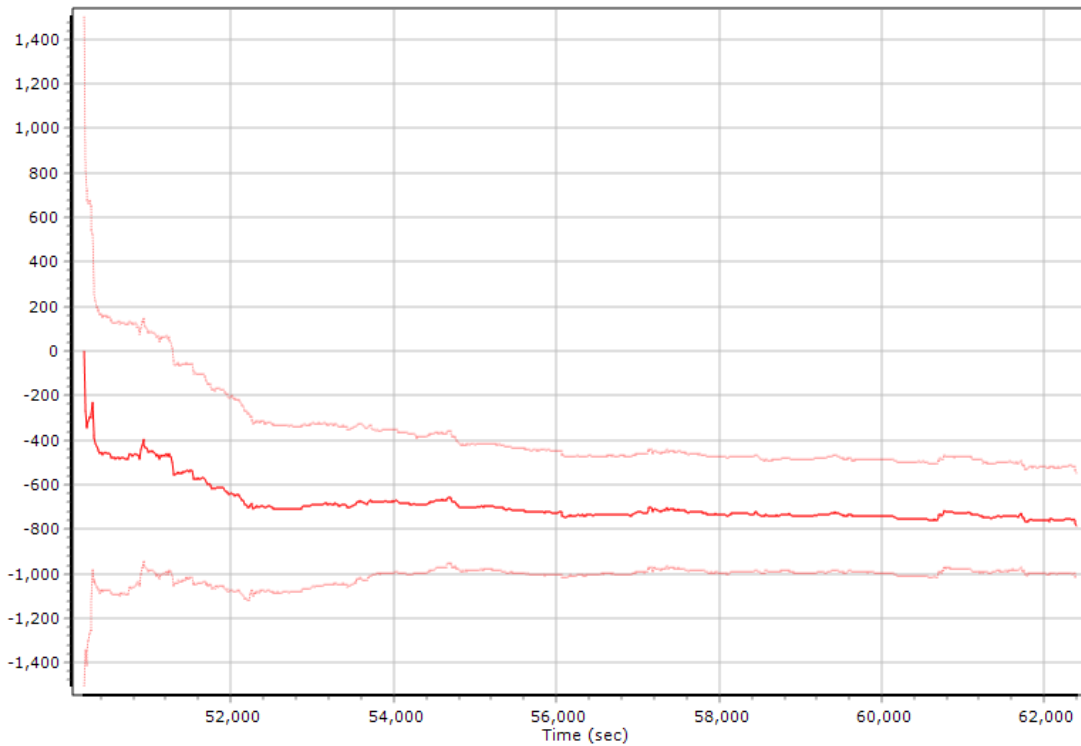




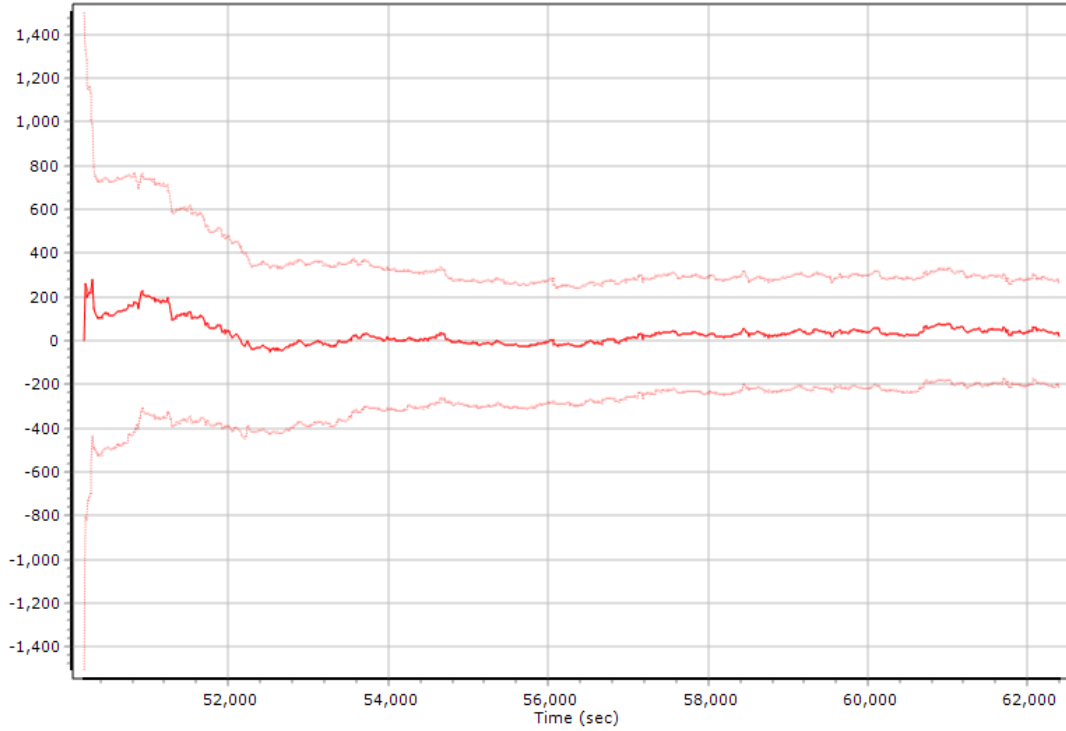
y gyro scale error (ppm)



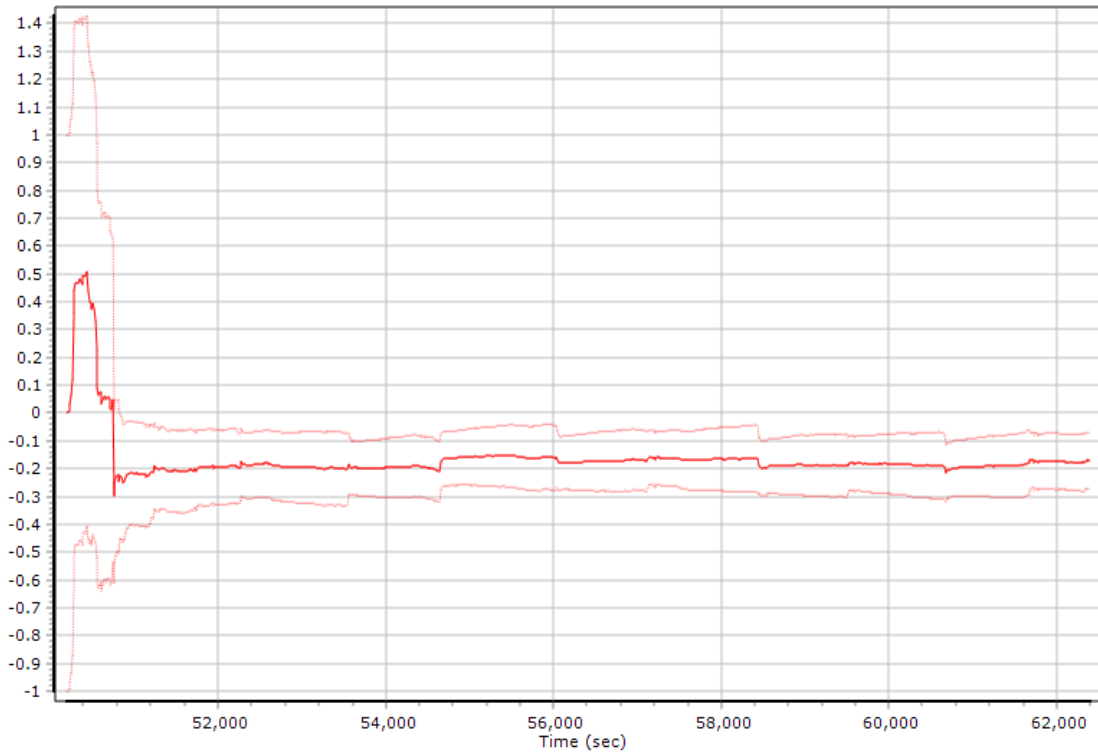
z accelerometer bias (micro-g)

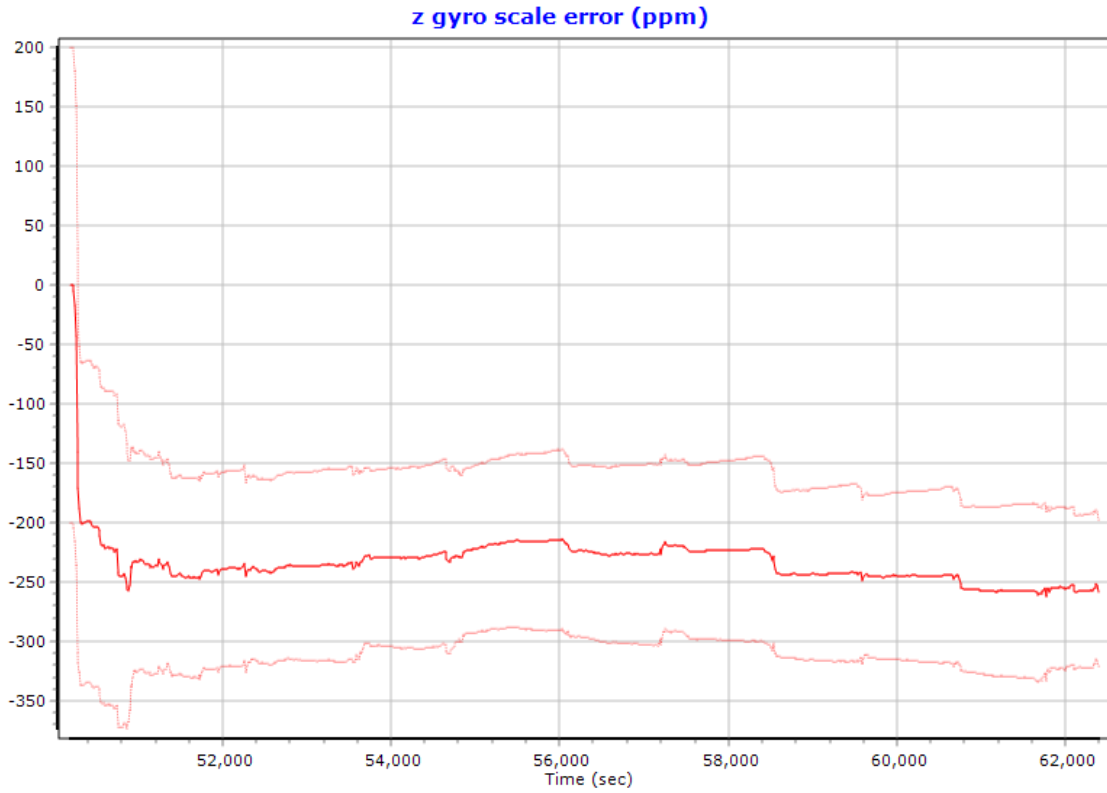


z accelerometer scale error (ppm)

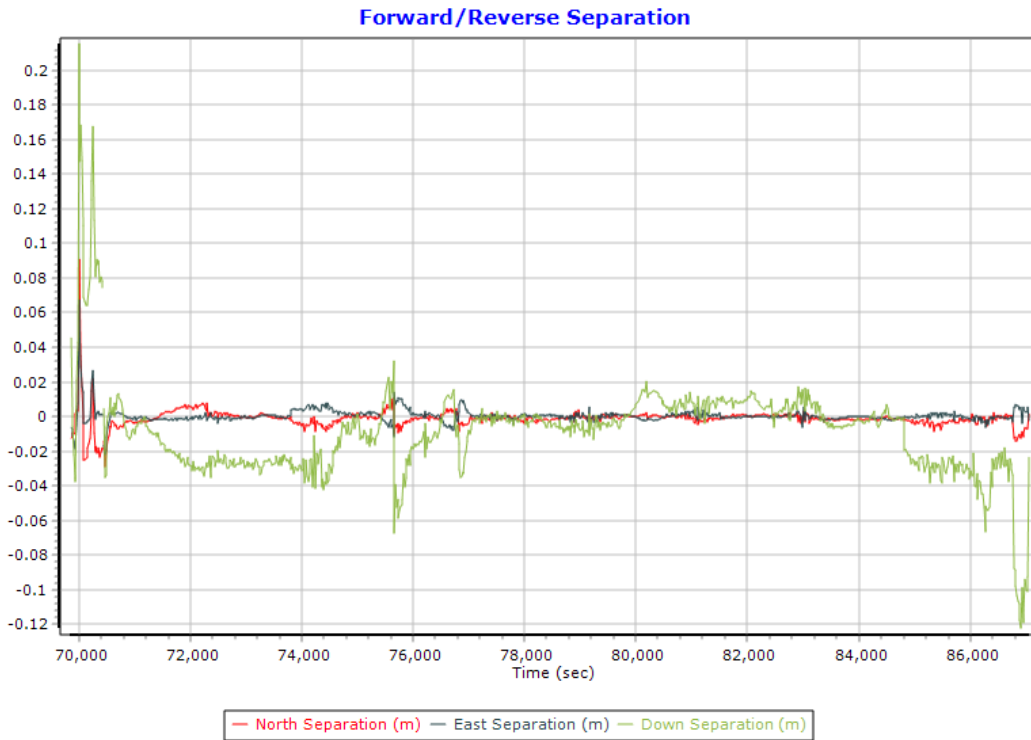
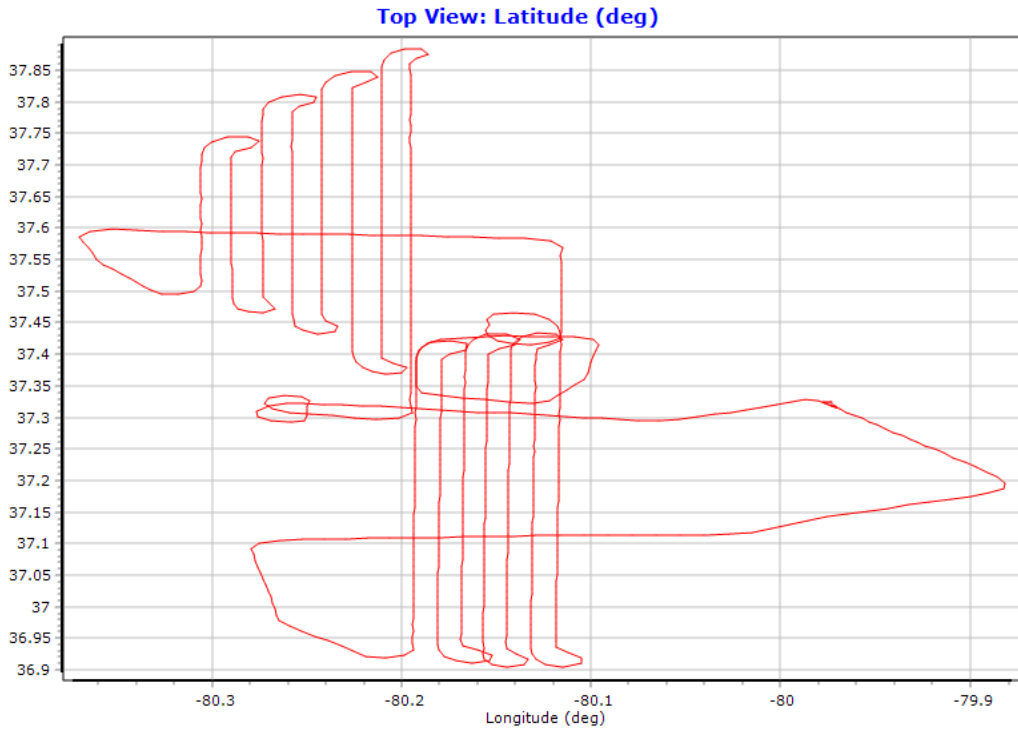


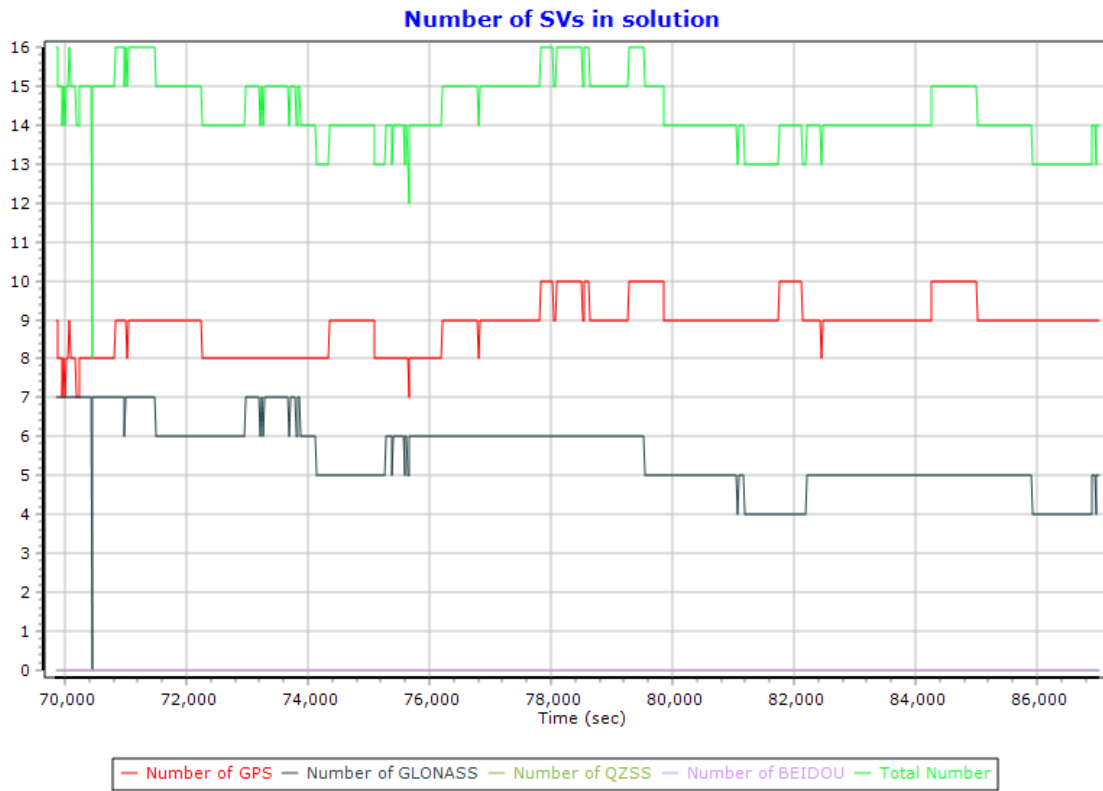
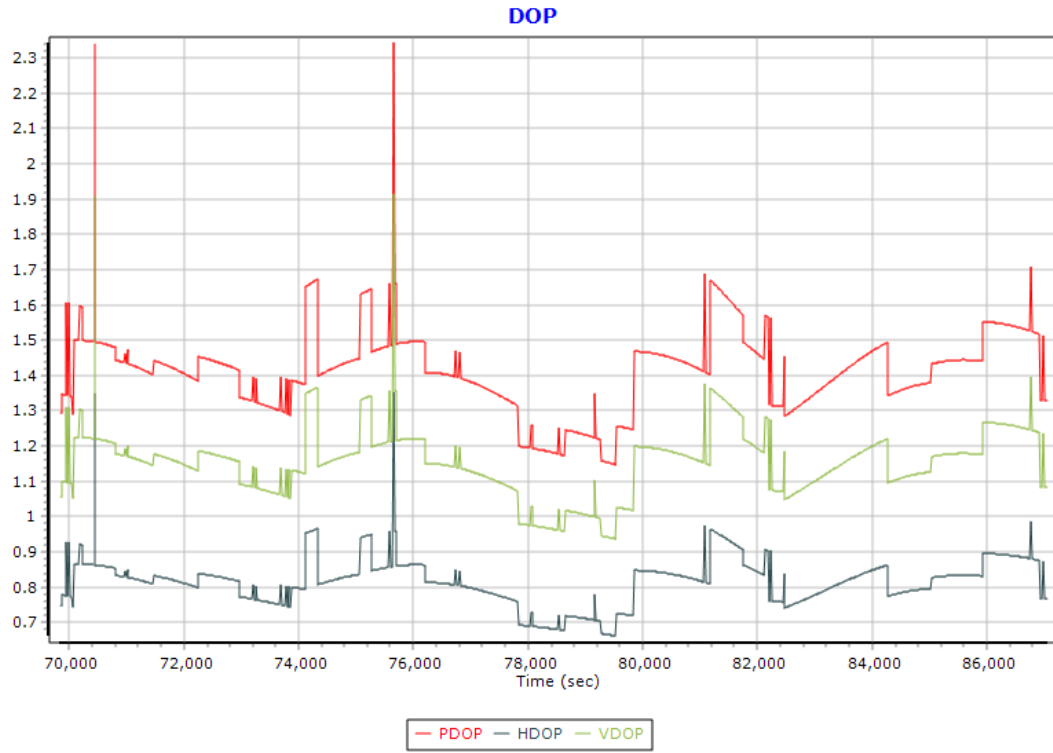
z gyro bias (deg/hr)





**DECEMBER 03, 2017 MISSION 2**







## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171203\_VA\_B

Solution Type: IN-Fusion SmartBase

Fixed: 17235	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 17257  
No processed position: 22

Fwd/Rev Separation RMS Values (m):

North: 0.006  
East: 0.004  
Height: 0.029

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 8628 occurrences

North: 0.002  
East: 0.003  
Height: 0.014

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.720

0.10 - 0.30 m: 0.280

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.41%

Baseline Distances (km):

Maximum: 57.73

Minimum: 0.46

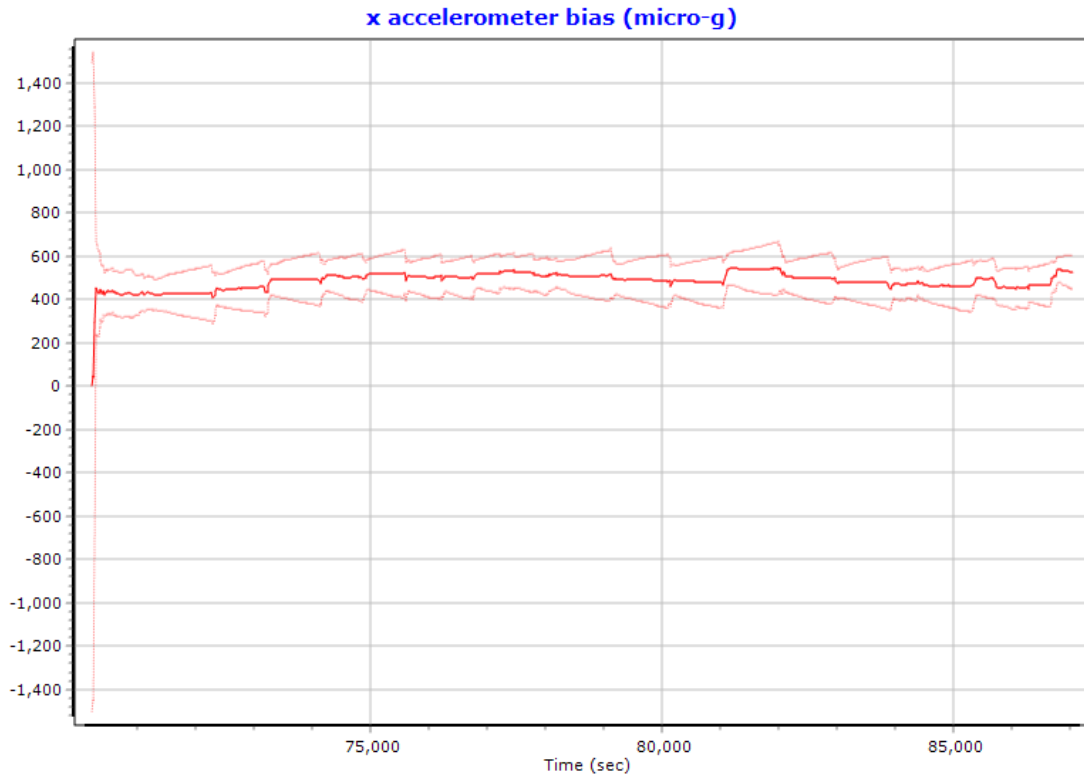
Average: 24.2

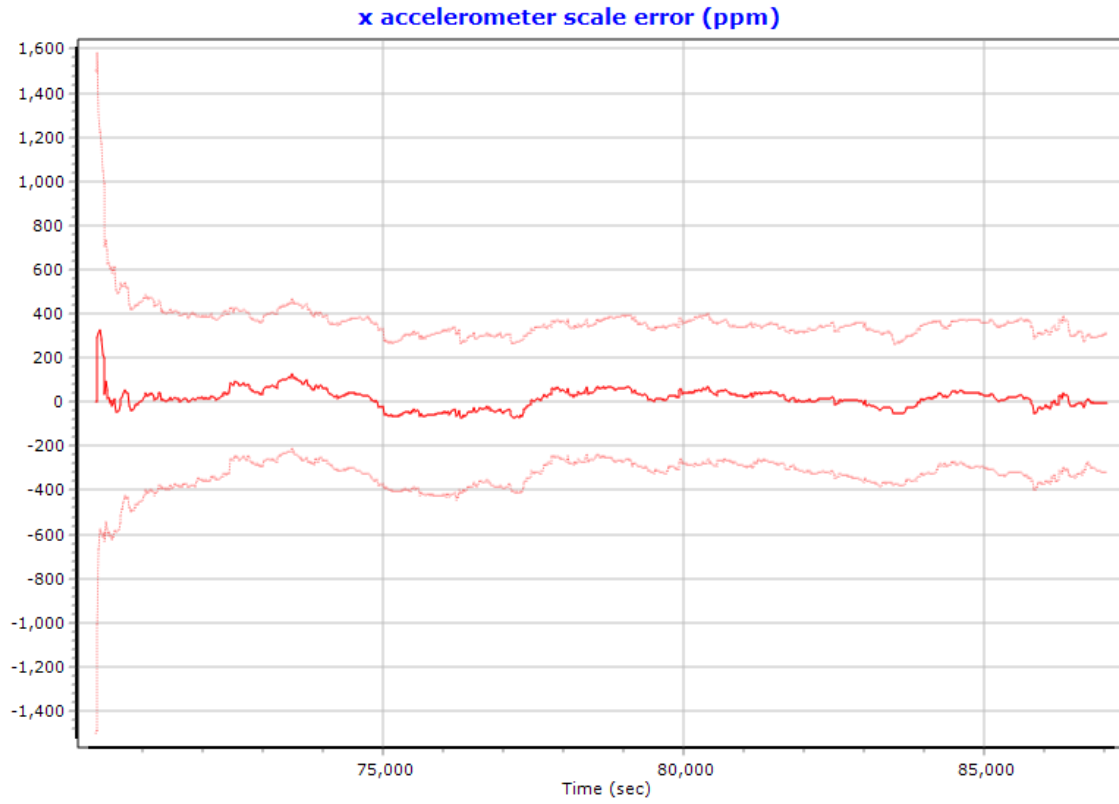
First Epoch: 18.3

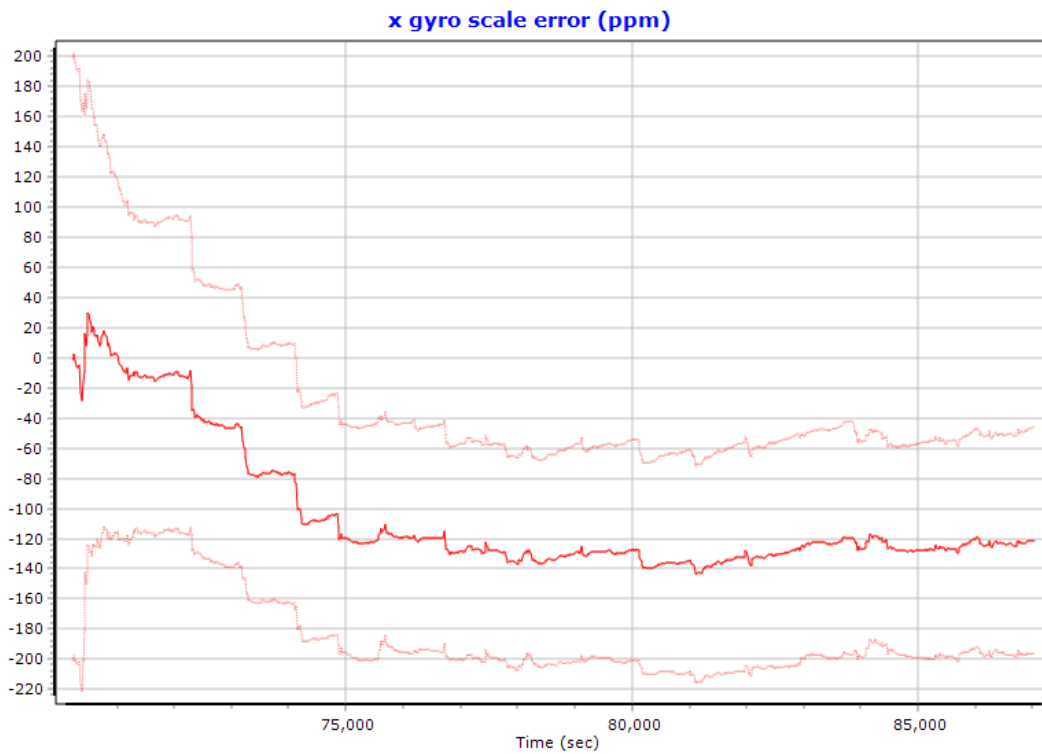
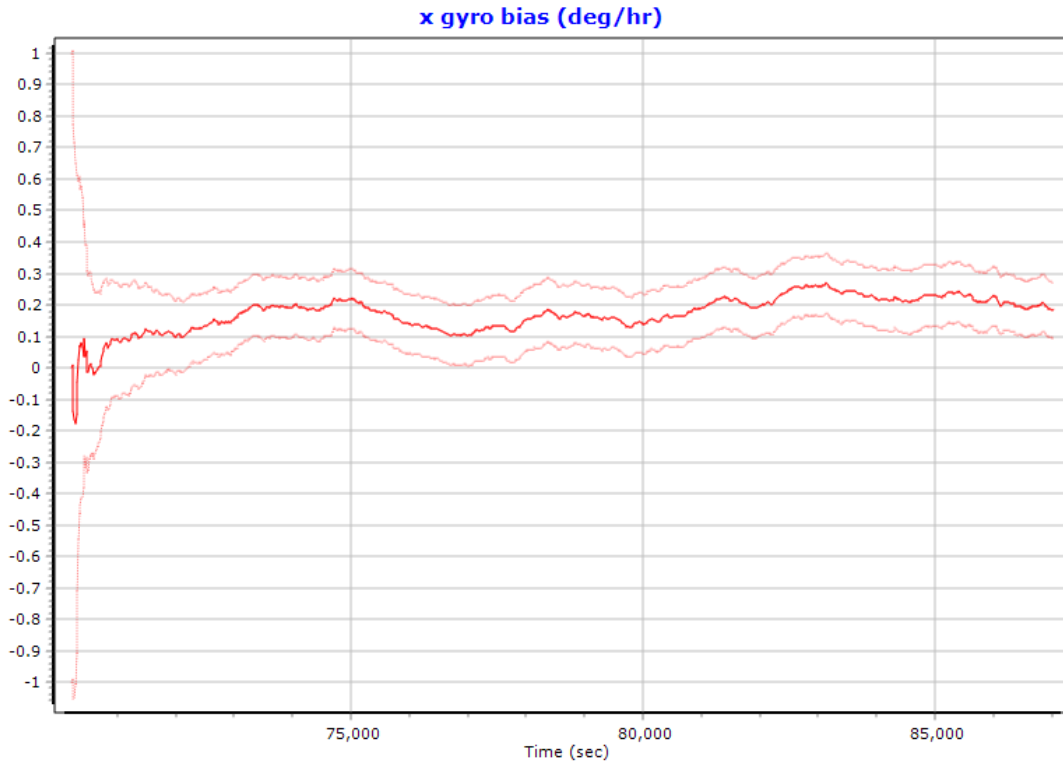
Last Epoch: 18.3

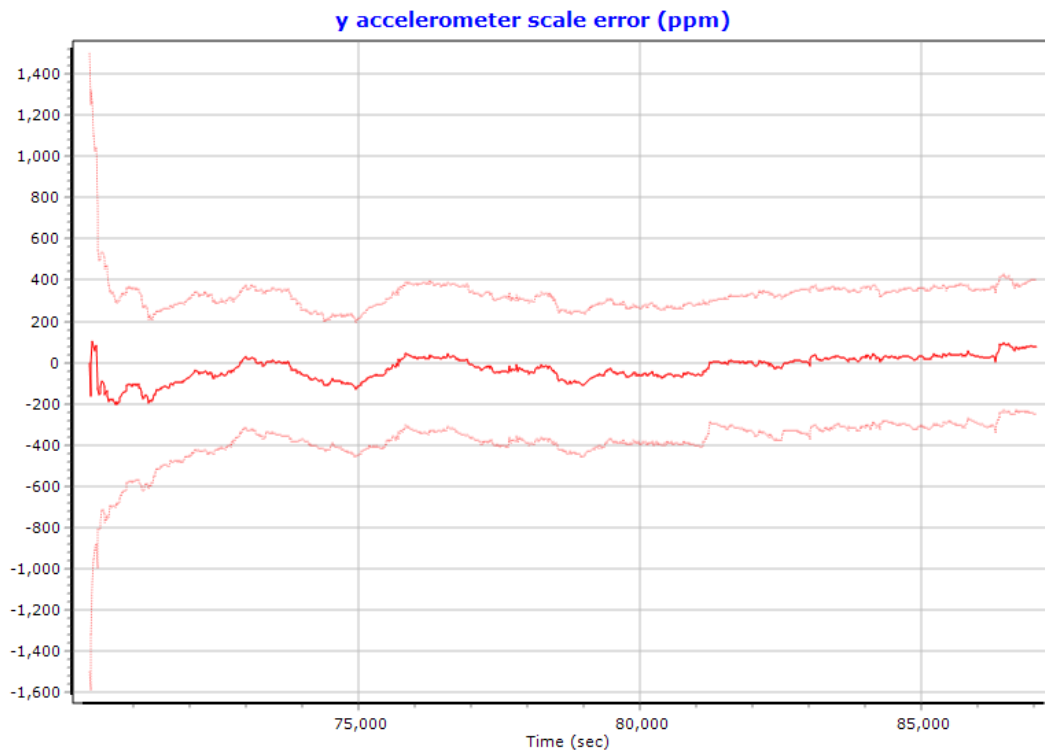
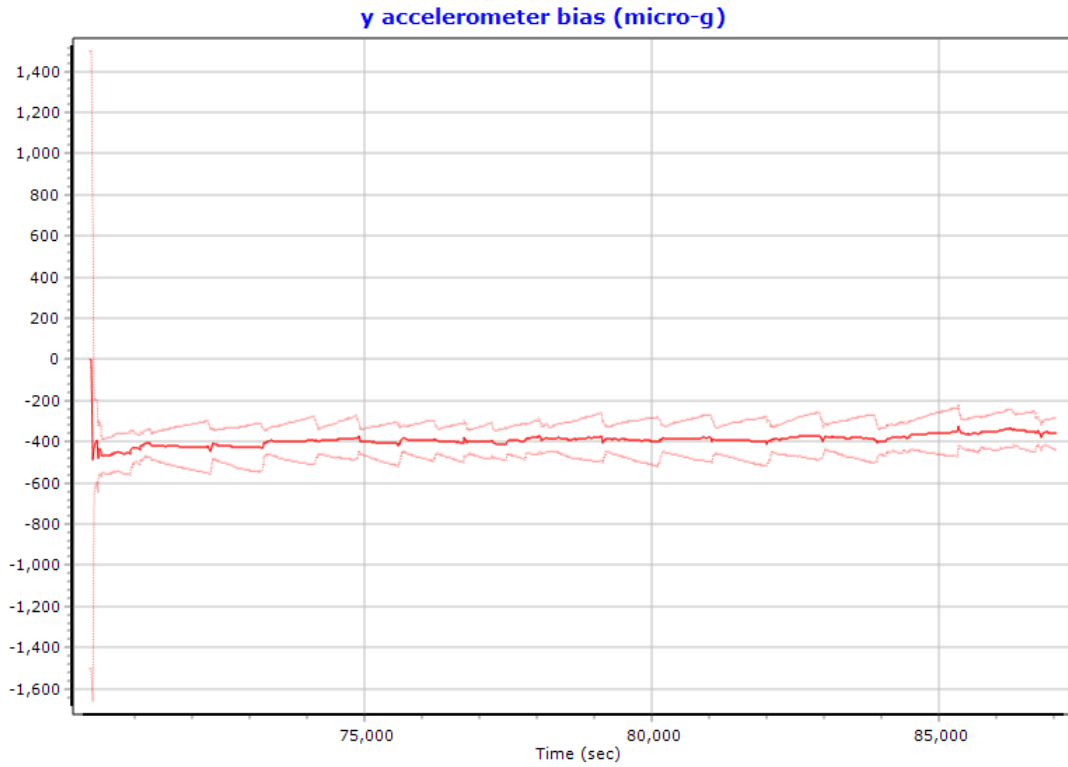
CORS Base Stations

Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
DOBS	N36°25'31.54122"	W80°43'11.73524"	339.304	N36°25'31.54118"	W80°43'11.73533"	339.301
WVLE	N37°49'20.23017"	W80°25'18.58193"	655.2	N37°49'20.23001"	W80°25'18.58200"	655.203
WVGB	N38°25'48.45389"	W79°49'01.31999"	811.18	N38°25'48.45371"	W79°49'01.32002"	811.171
WVAT	N37°25'42.67838"	W81°04'04.40387"	704.674	N37°25'42.67826"	W81°04'04.40404"	704.678
UVFM	N37°52'43.49361"	W78°41'37.27181"	512.944	N37°52'43.49355"	W78°41'37.27157"	512.941
LS04	N37°21'47.16695"	W79°57'26.99410"	324.139			

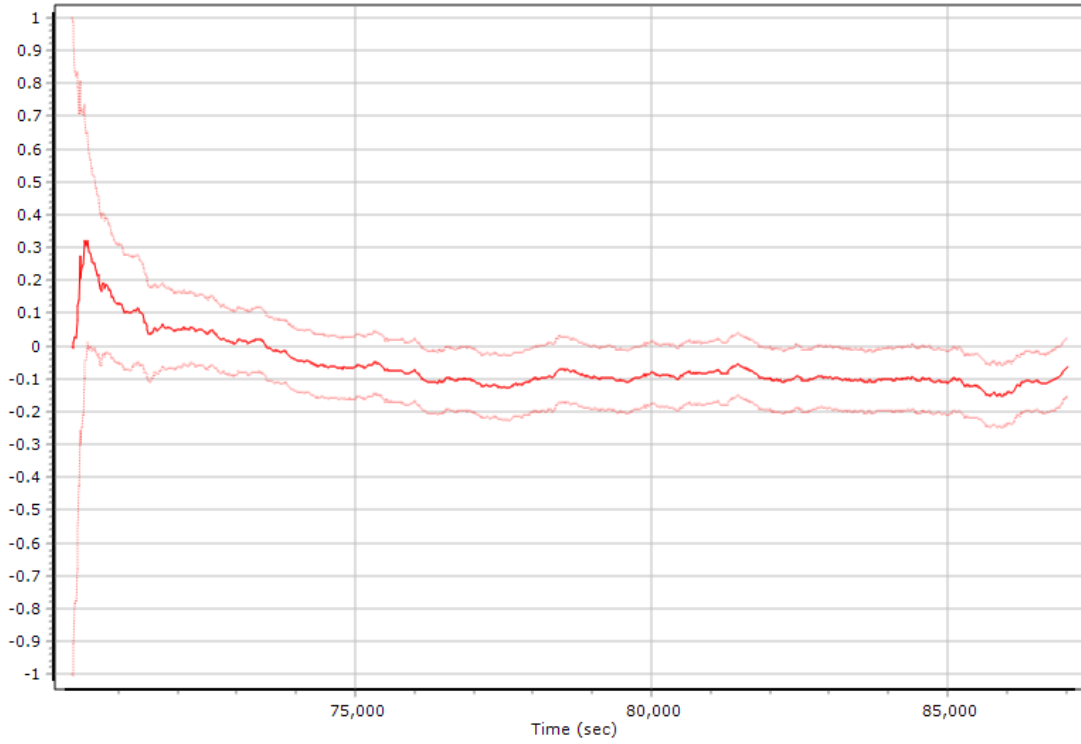




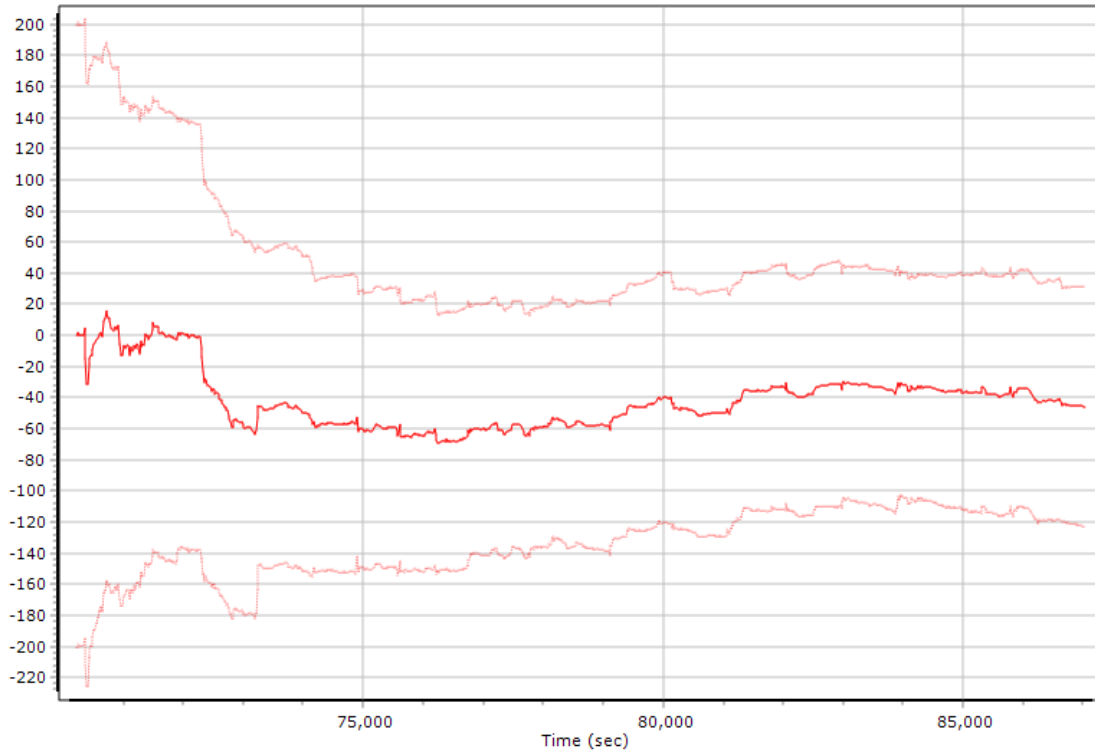


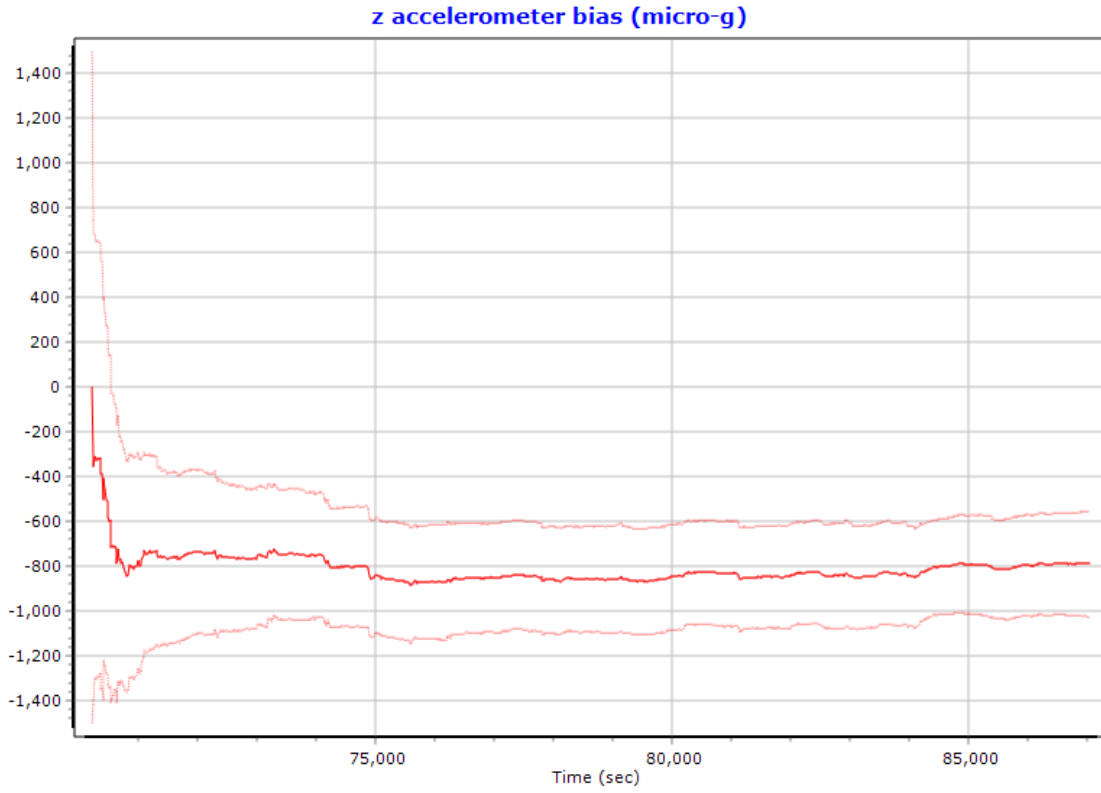


y gyro bias (deg/hr)



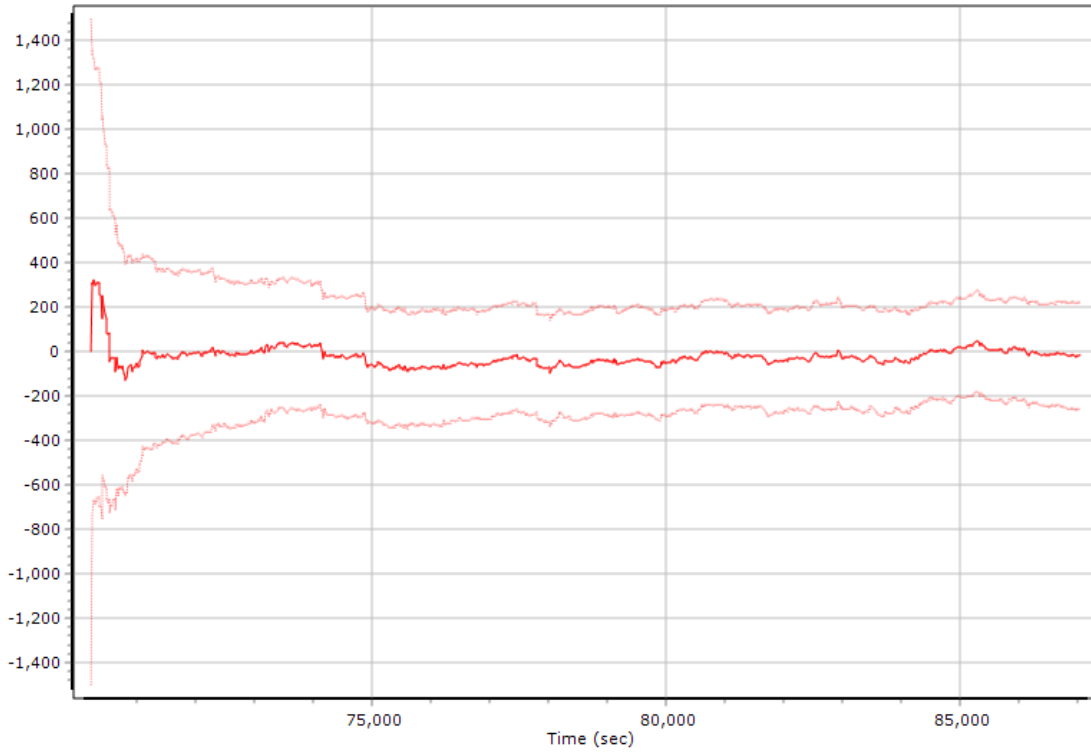
y gyro scale error (ppm)



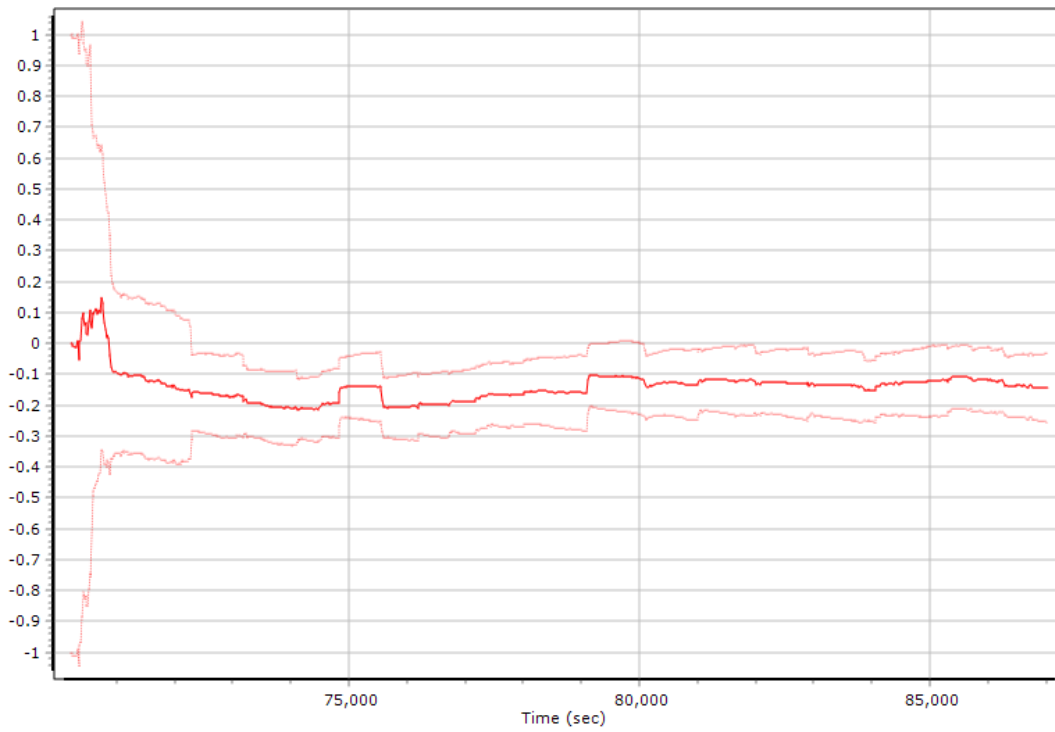


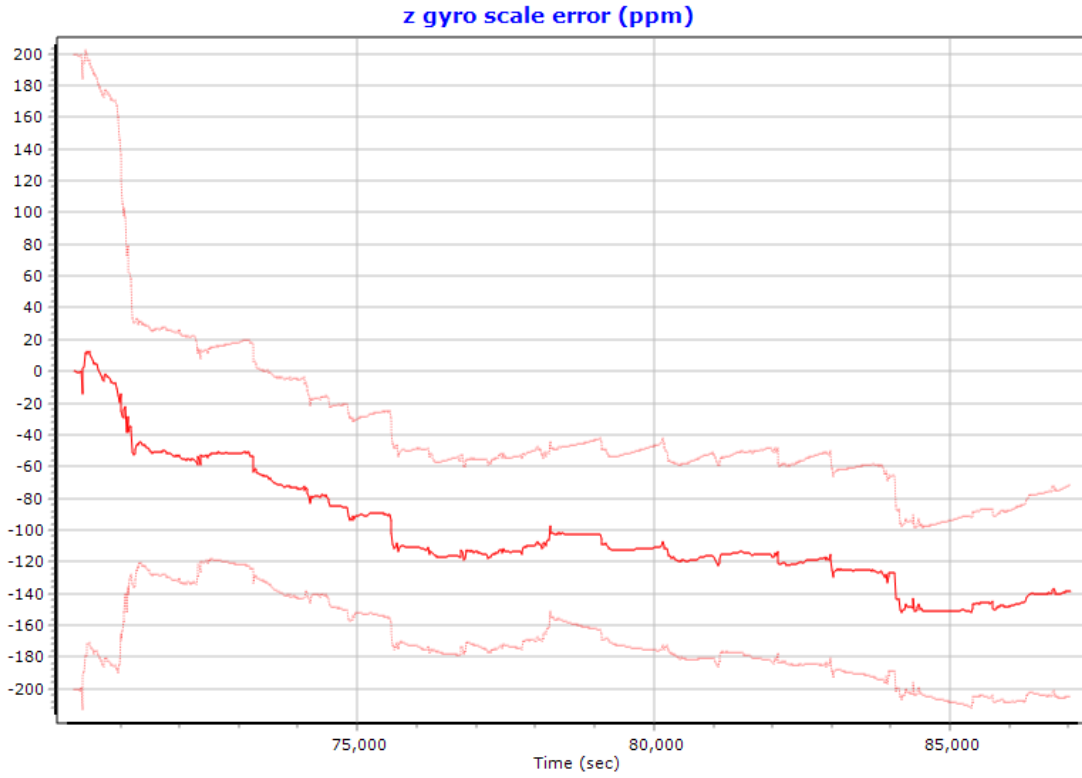


**z accelerometer scale error (ppm)**



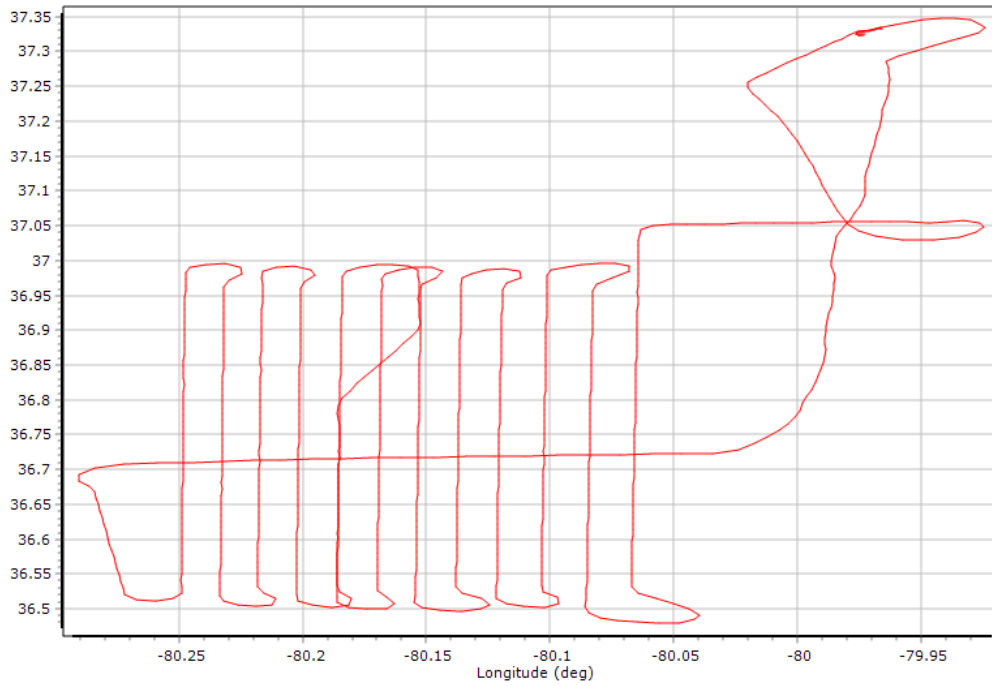
**z gyro bias (deg/hr)**



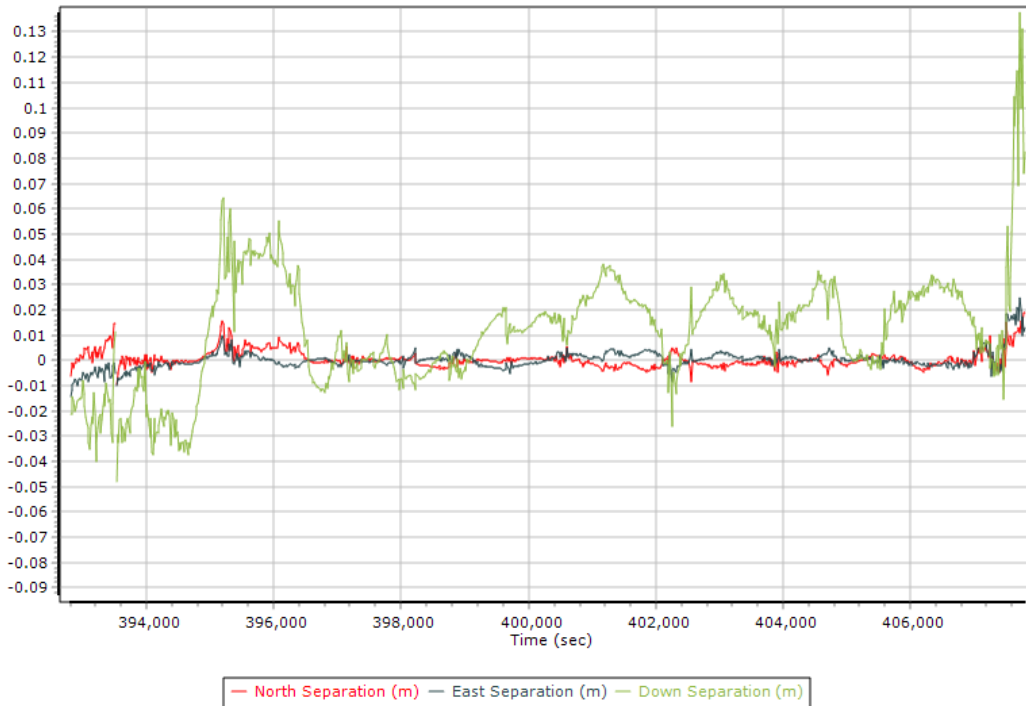


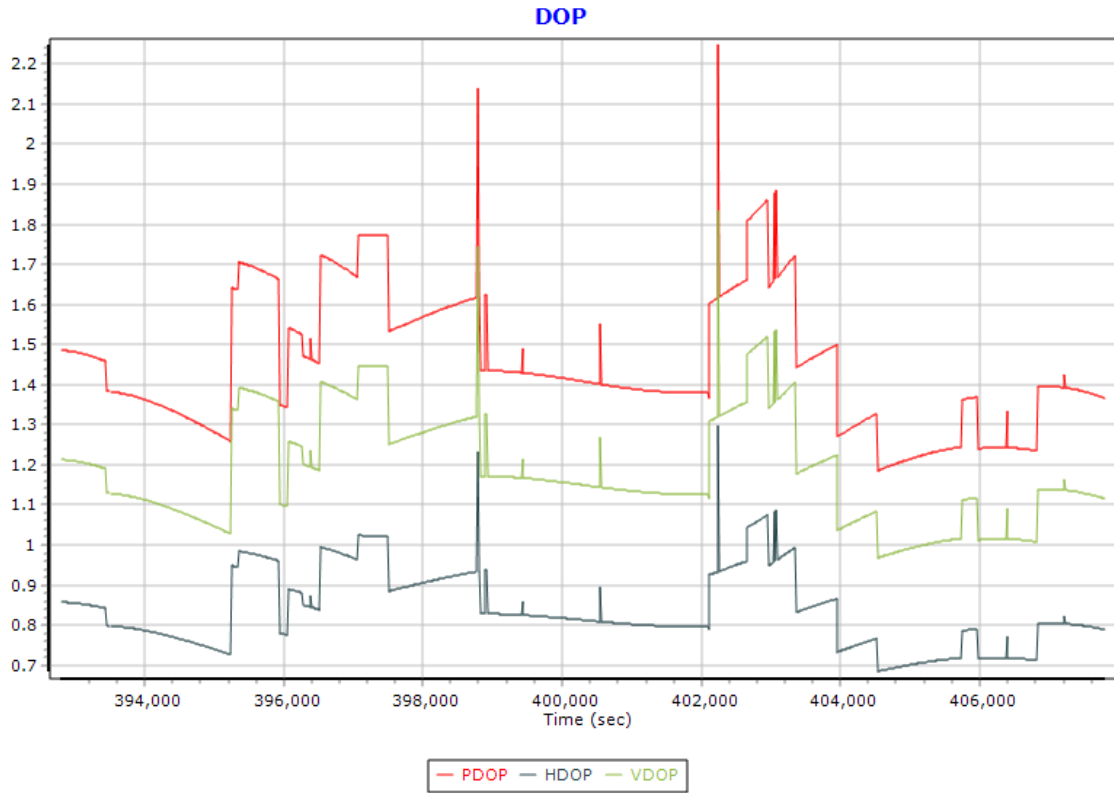
**DECEMBER 07, 2017**

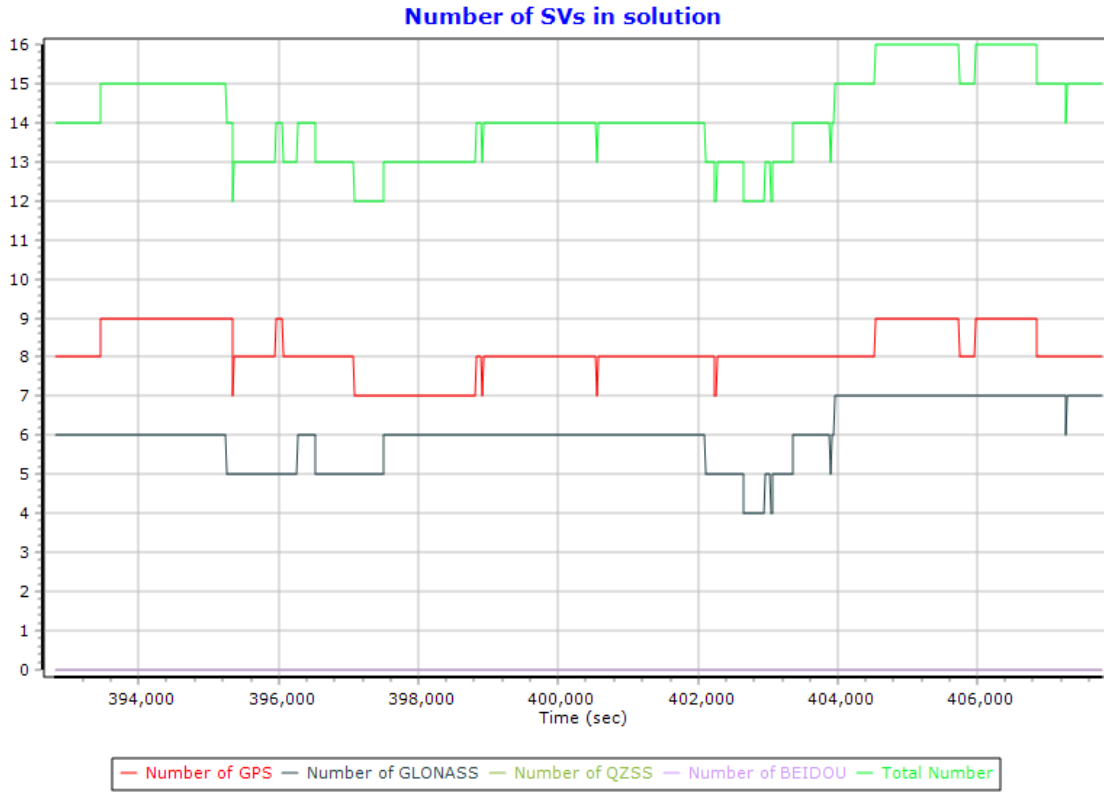
Top View: Latitude (deg)



Forward/Reverse Separation







### Processing Summary Information

#### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171207\_VA

Solution Type: IN-Fusion SmartBase

Fixed: 15016 (99.99%)  
Float: 0 (0.00%)  
No Solution: 1 (0.01%)

Number of Epochs:

Total in RAW file: 15033  
No processed position: 17

Fwd/Rev Separation RMS Values (m):

North: 0.003  
East: 0.004  
Height: 0.025

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 7510 occurrences

North: 0.002  
East: 0.002  
Height: 0.016

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.765  
0.10 - 0.30 m: 0.235  
0.30 - 1.00 m: 0  
1.00 - 5.00 m: 0  
5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.45%

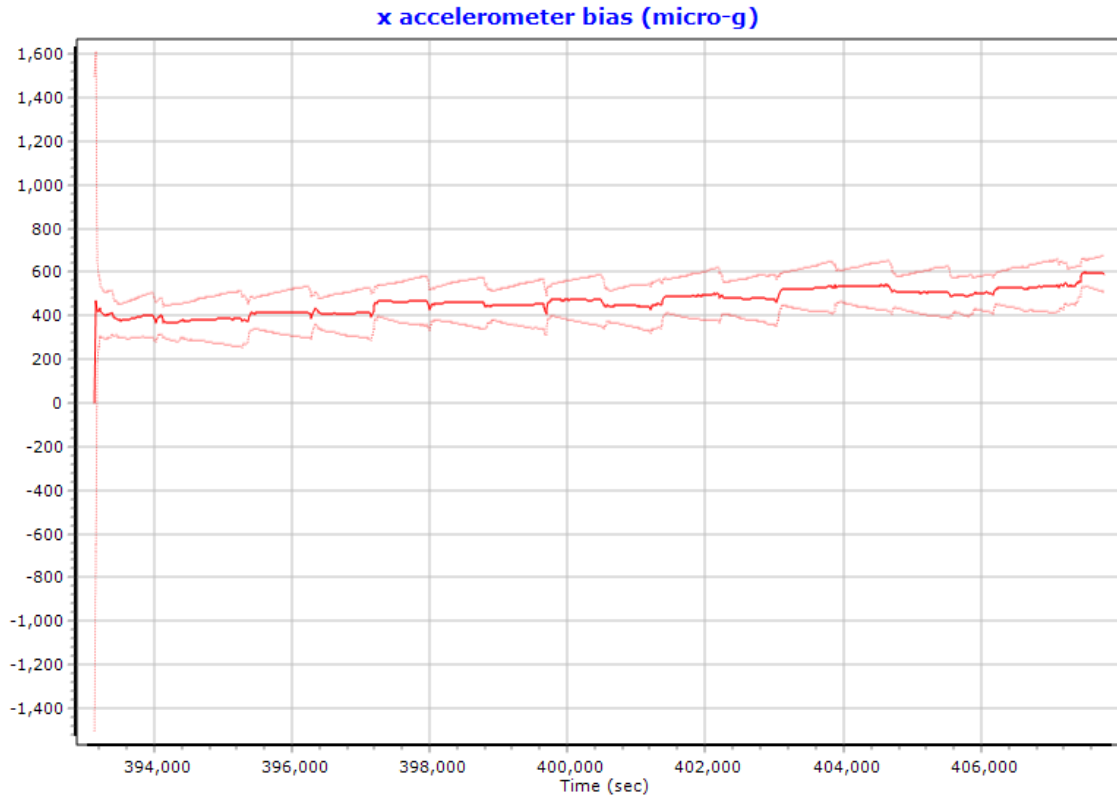
Baseline Distances (km):

Maximum: 59.11  
Minimum: 0.33  
Average: 22.96  
First Epoch: 55.91

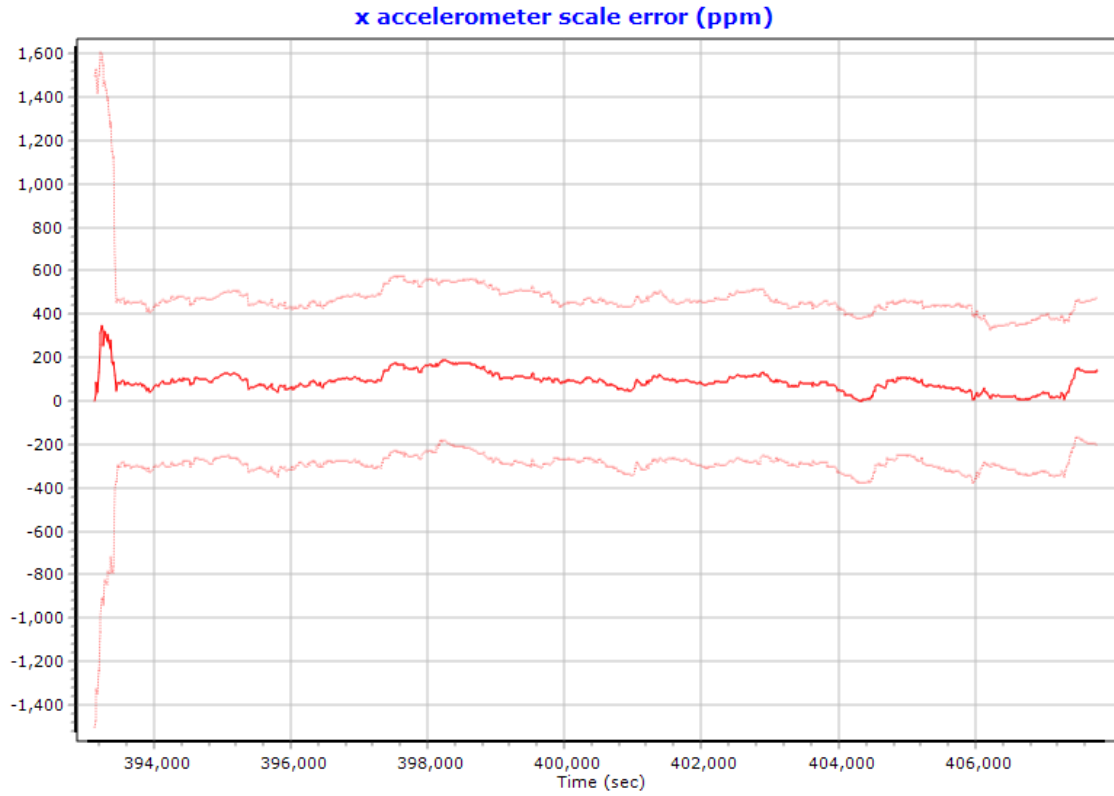
Last Epoch: 55.71

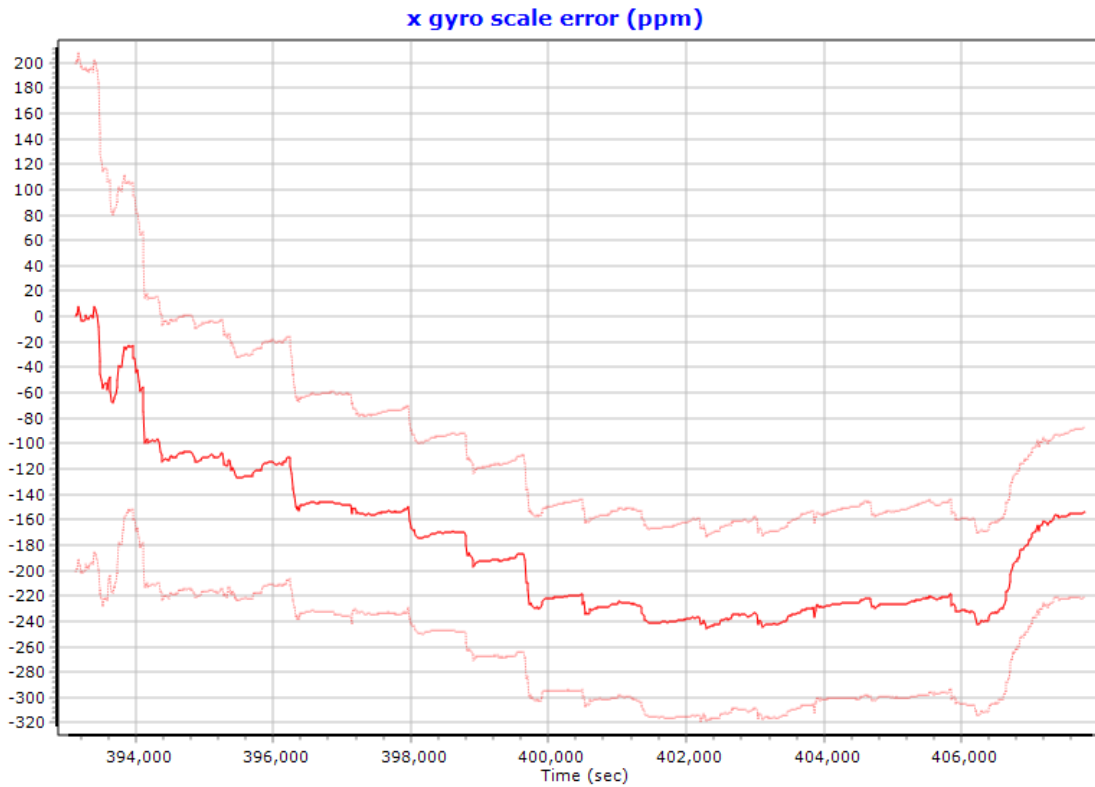
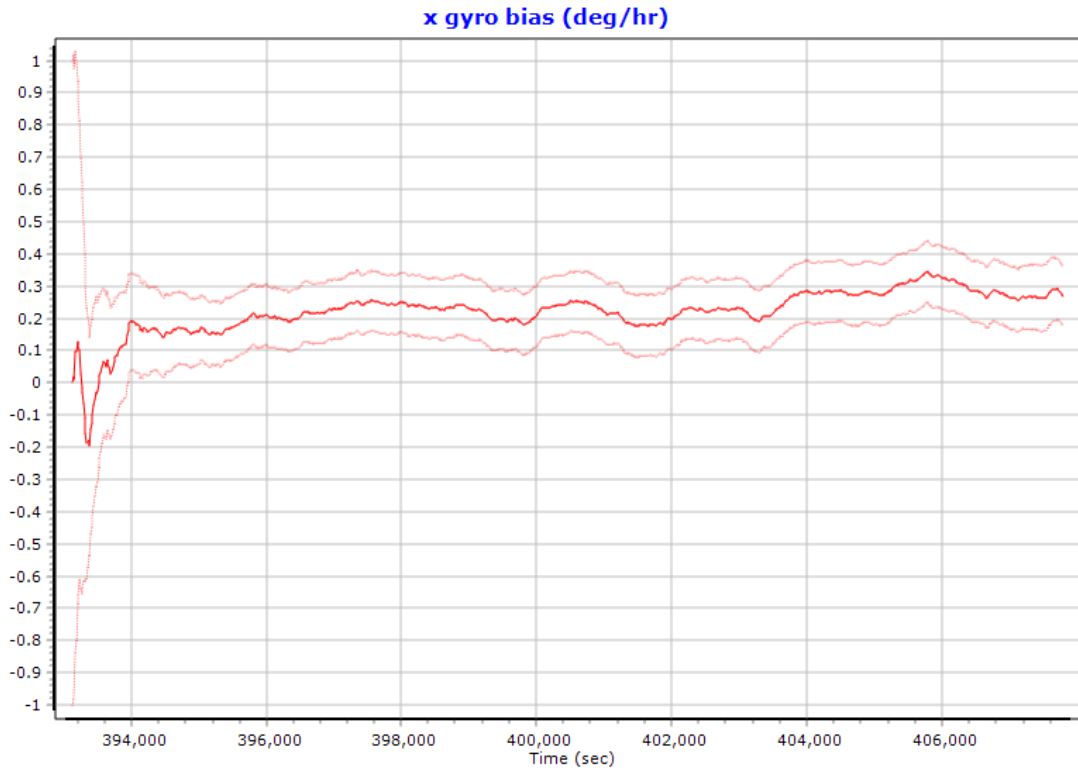
## CORS Base Stations

Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
NCWC	N36°22'19.71490"	W80°11'05.64907"	274.974	N36°22'19.71468"	W80°11'05.64902"	275.09
NCRE	N36°21'42.74193"	W79°39'56.56341"	233.465	N36°21'42.74163"	W79°39'56.56339"	233.473
LS04	N37°21'47.16695"	W79°57'26.99410"	324.139			
LOYH	N37°18'09.77783"	W79°19'28.19953"	204.445	N37°18'09.77786"	W79°19'28.19948"	204.437
DOBS	N36°25'31.54122"	W80°43'11.73524"	339.304	N36°25'31.54112"	W80°43'11.73540"	339.307

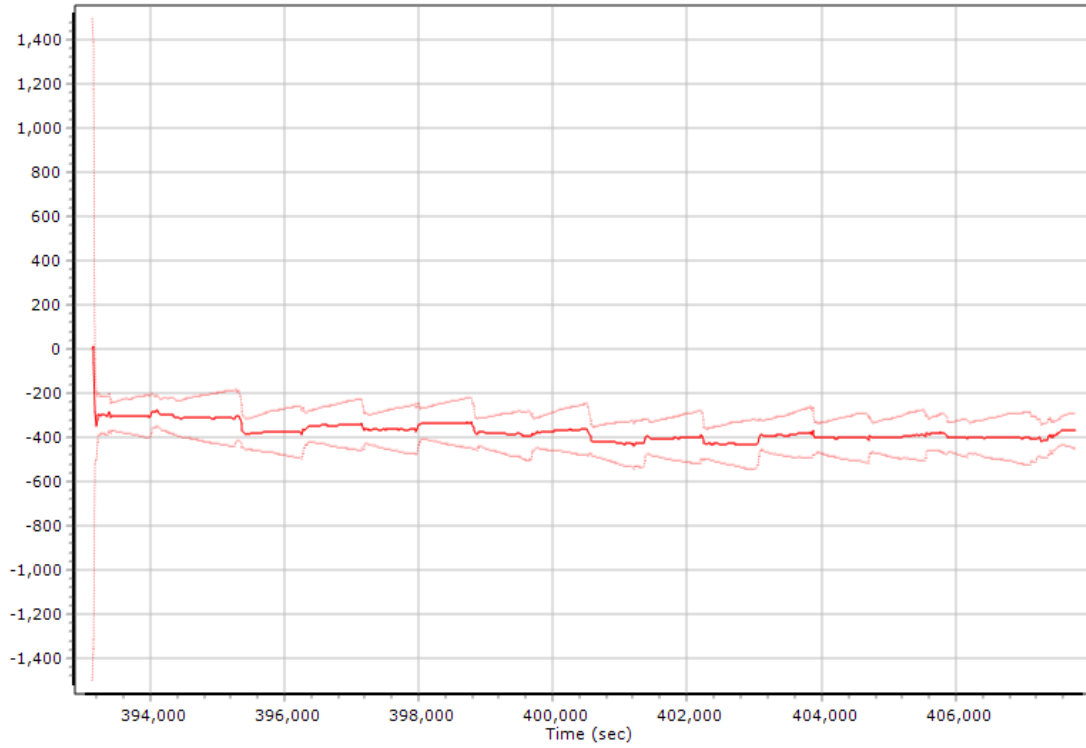




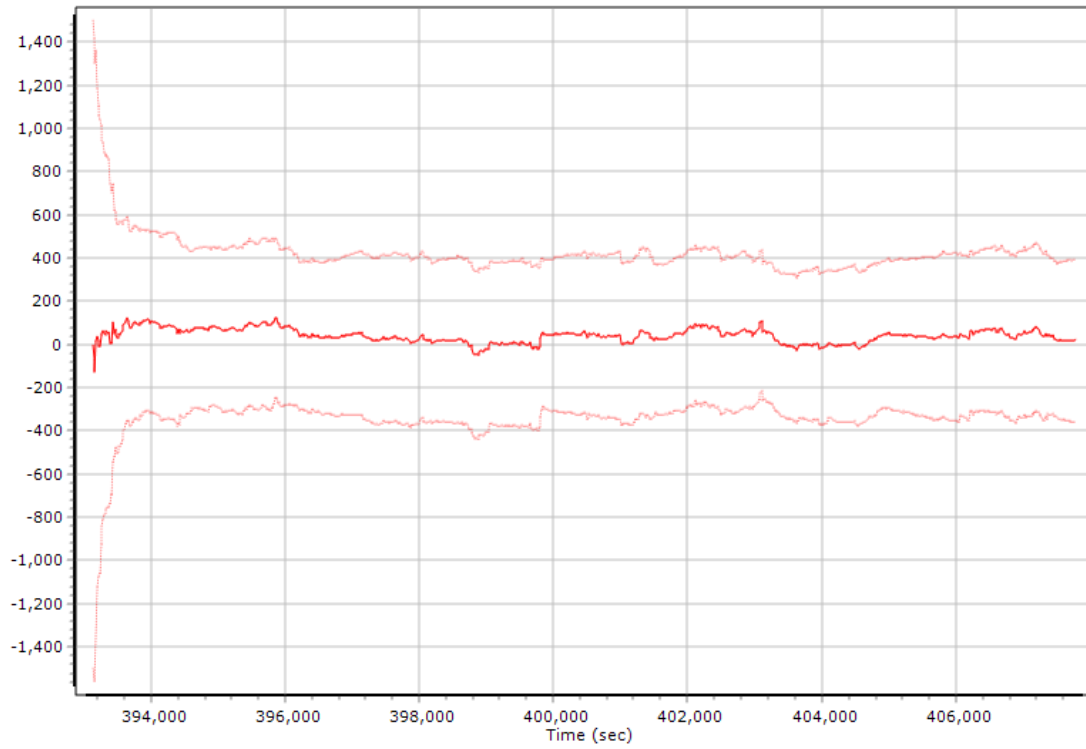




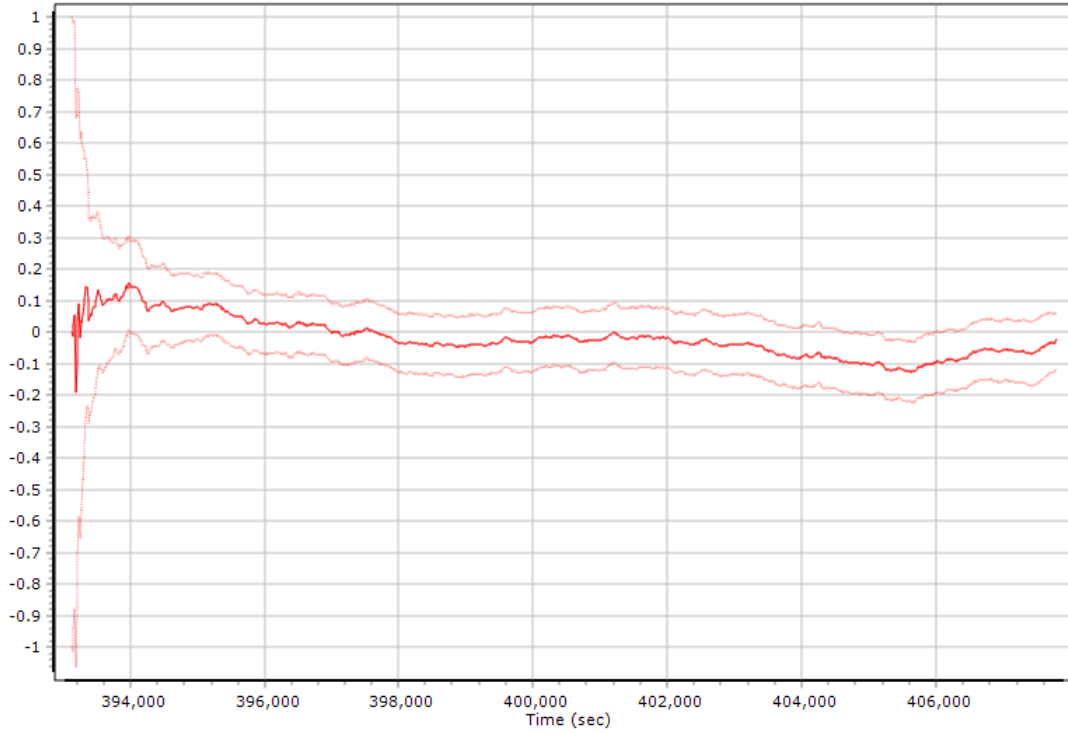
y accelerometer bias (micro-g)



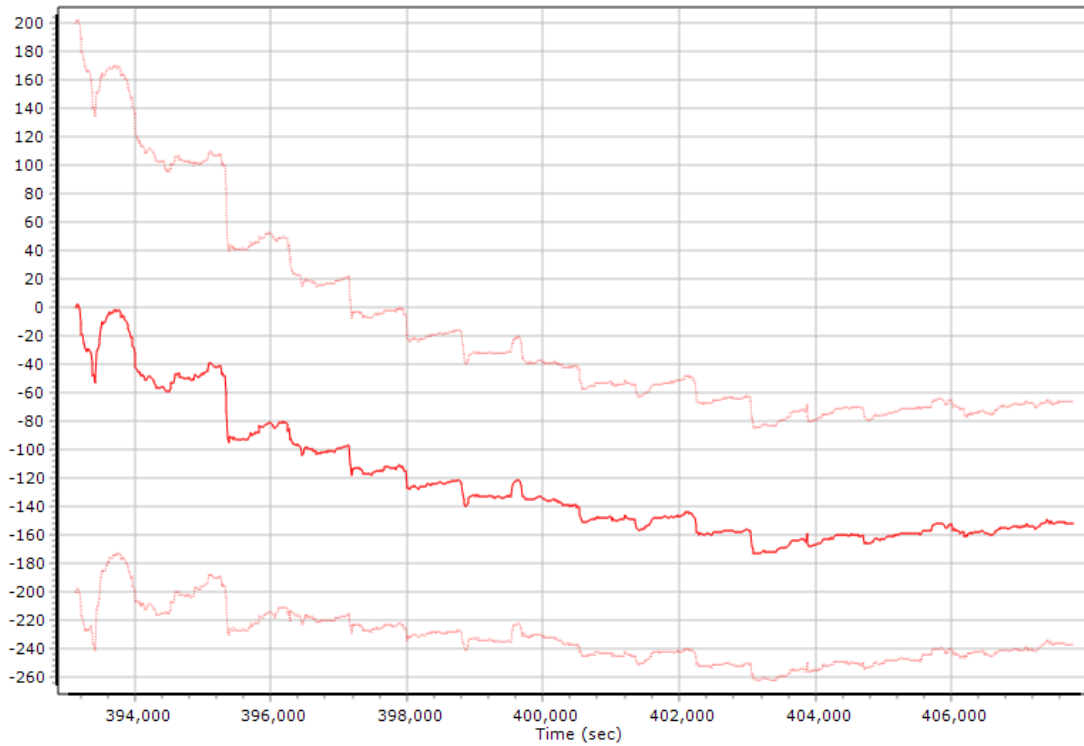
y accelerometer scale error (ppm)



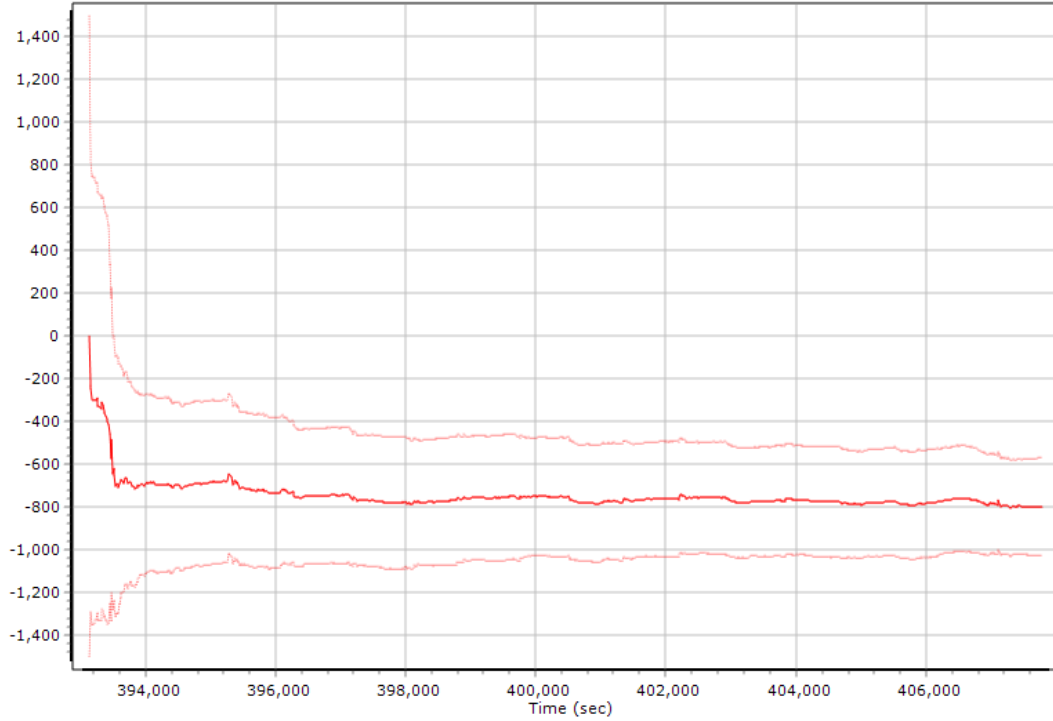
y gyro bias (deg/hr)



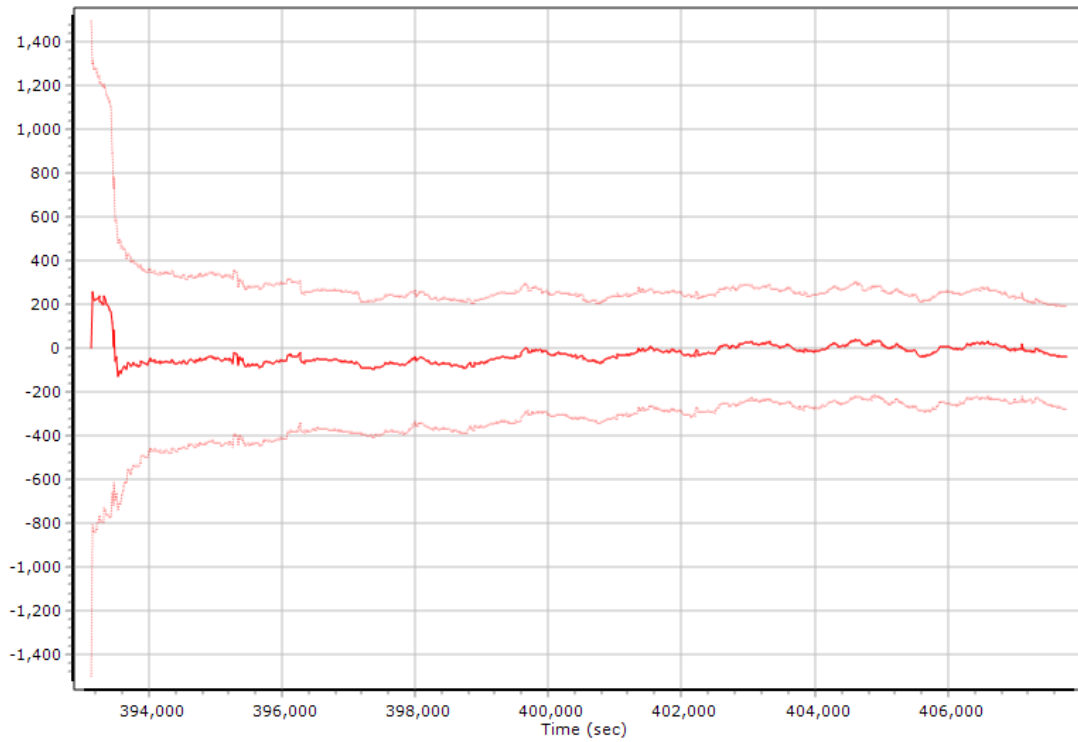
y gyro scale error (ppm)



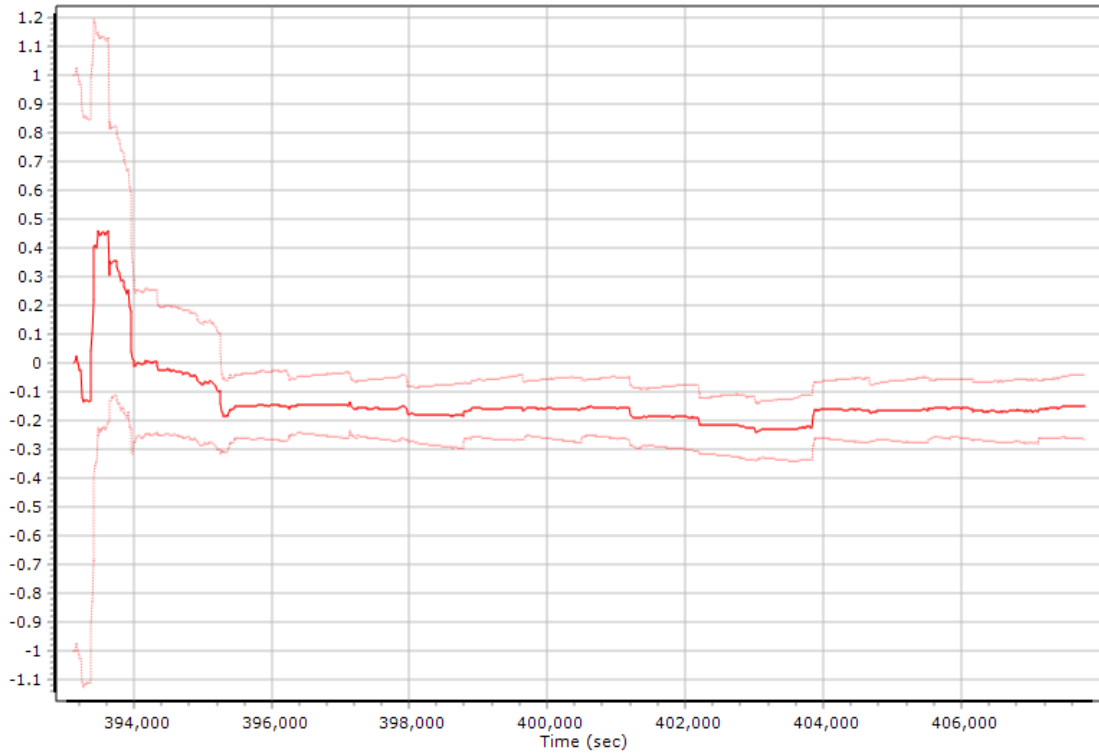
**z accelerometer bias (micro-g)**



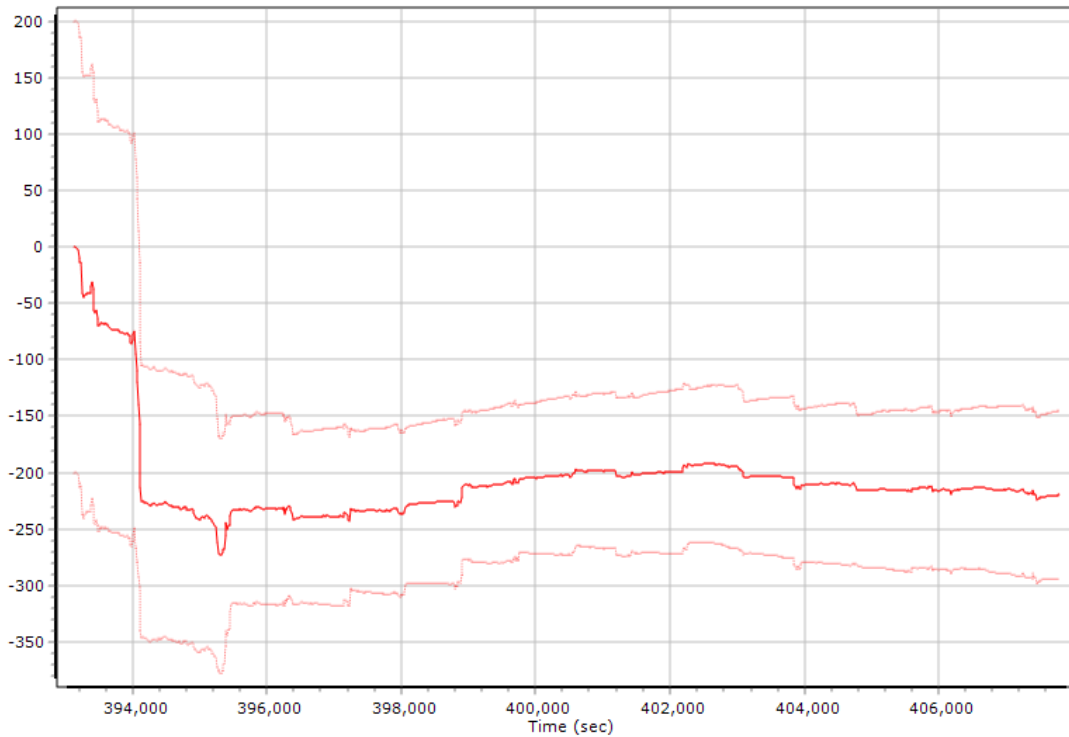
**z accelerometer scale error (ppm)**



**z gyro bias (deg/hr)**



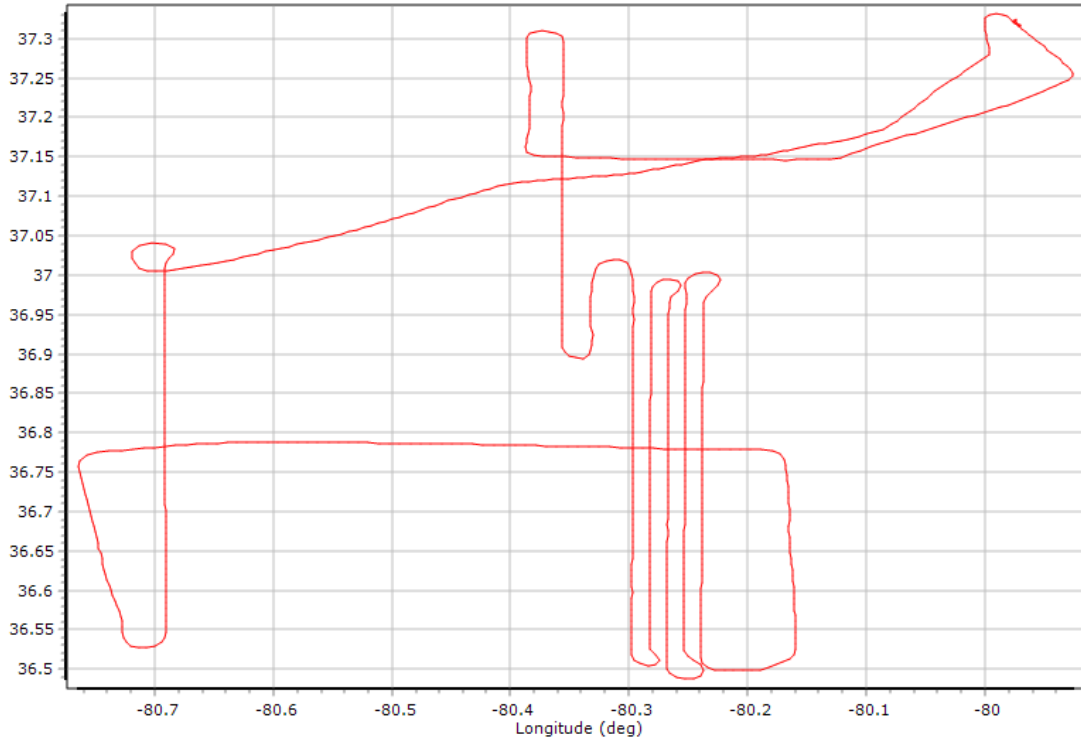
**z gyro scale error (ppm)**



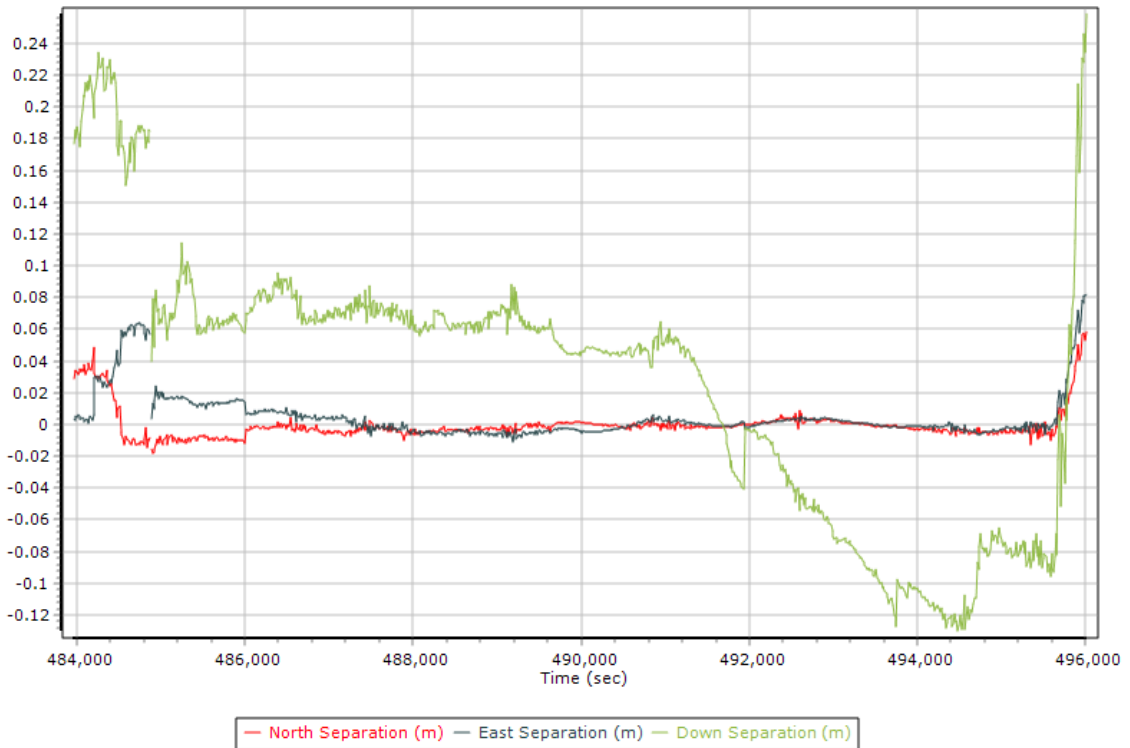
Virginia West Chesapeake Central LiDAR  
TO# G15PD00714  
July 17, 2018  
Page 87 of 202

**DECEMBER 22, 2017 MISSION 1**

Top View: Latitude (deg)

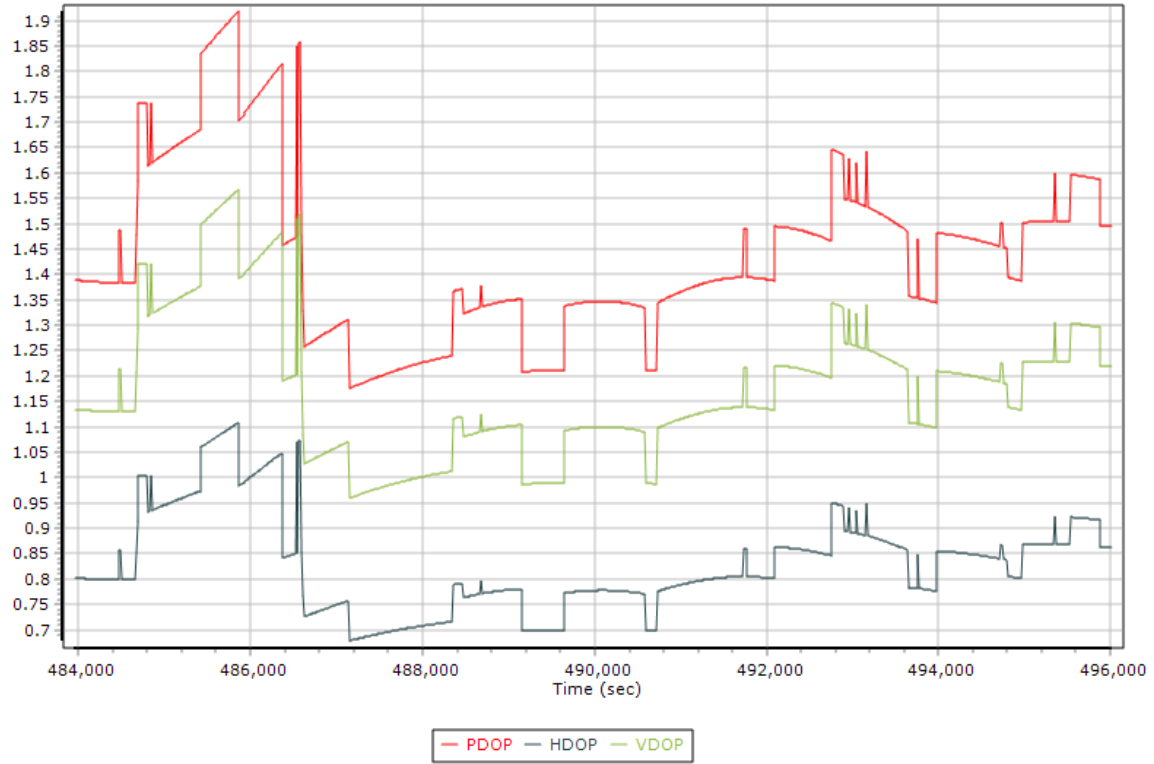


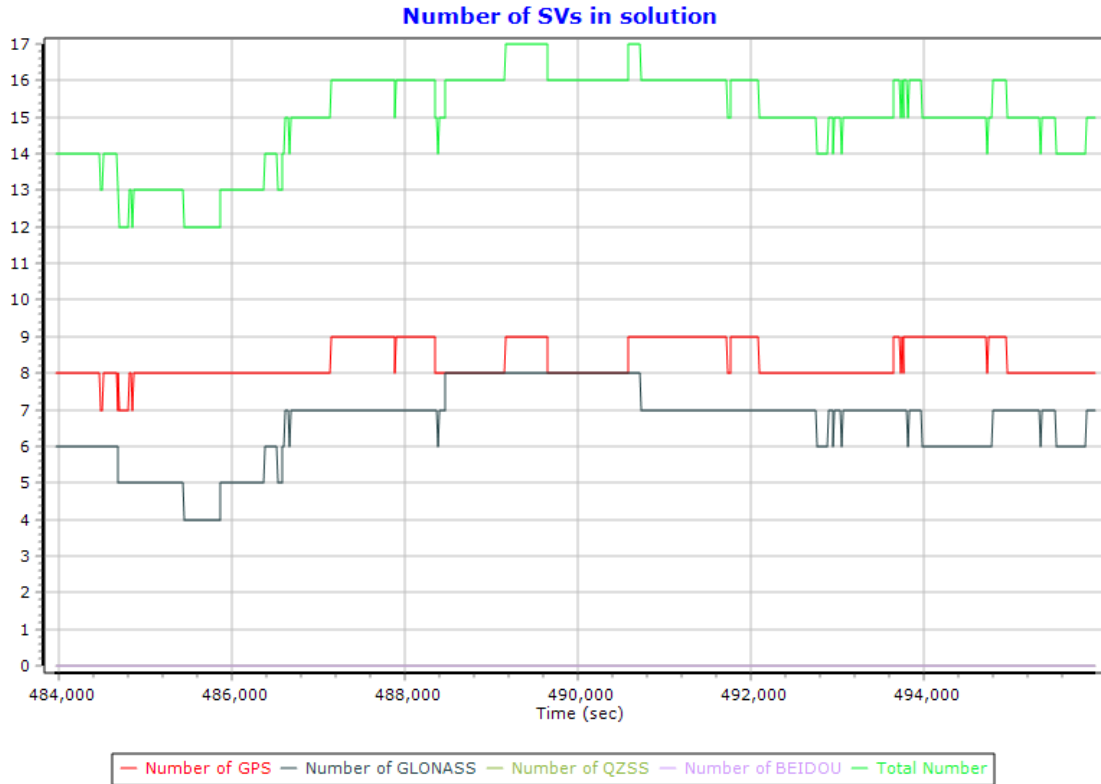
Forward/Reverse Separation





DOP





### Processing Summary Information

#### Processing Summary Information

Program: POSpac MMS  
 Version: 8.1.6388.30062  
 Project: \\sa\data\riegl\217058\ 20171222\_VA\_A

Solution Type: IN-Fusion SmartBase

Fixed: 12058 (99.99%)  
 Float: 0 (0.00%)  
 No Solution: 1 (0.01%)

Number of Epochs:

Virginia West Chesapeake Central LiDAR  
TO# G15PD00714  
July 17, 2018  
Page 91 of 202

Total in RAW file: 12083  
No processed position: 25

Fwd/Rev Separation RMS Values (m):

North: 0.010  
East: 0.016  
Height: 0.090

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 6058 occurrences

North: 0.003  
East: 0.004  
Height: 0.055

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 96.881  
0.10 - 0.30 m: 3.119  
0.30 - 1.00 m: 0  
1.00 - 5.00 m: 0  
5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

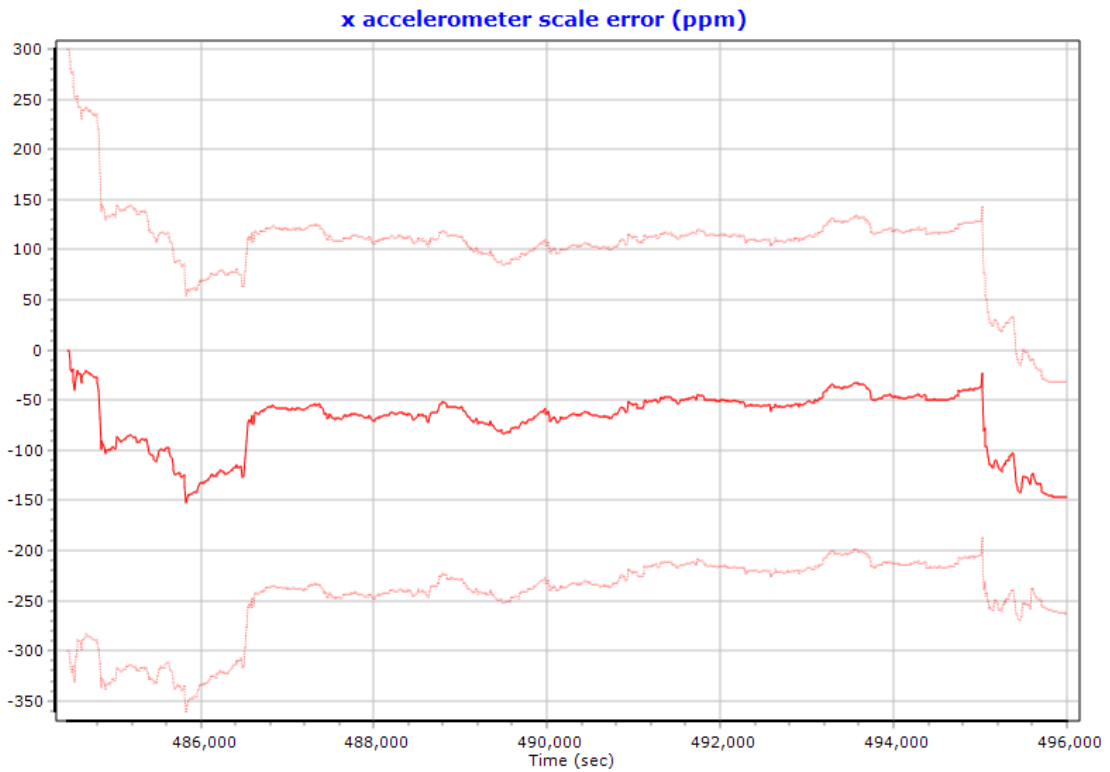
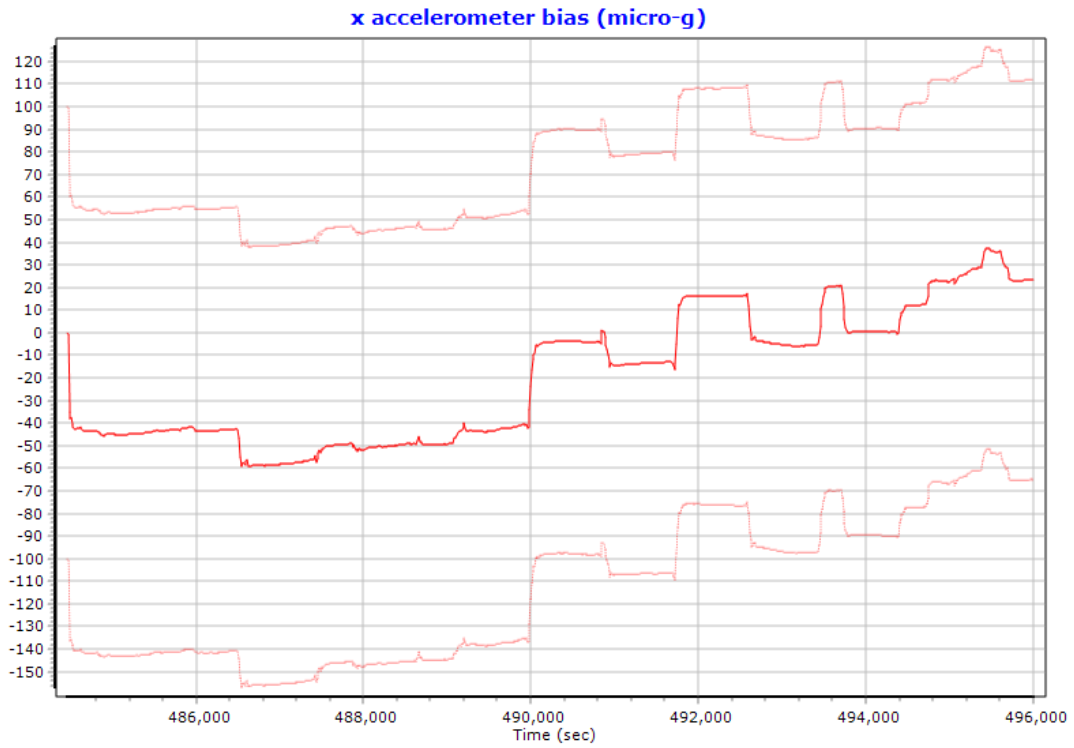
DOP over Tol: 1.44%

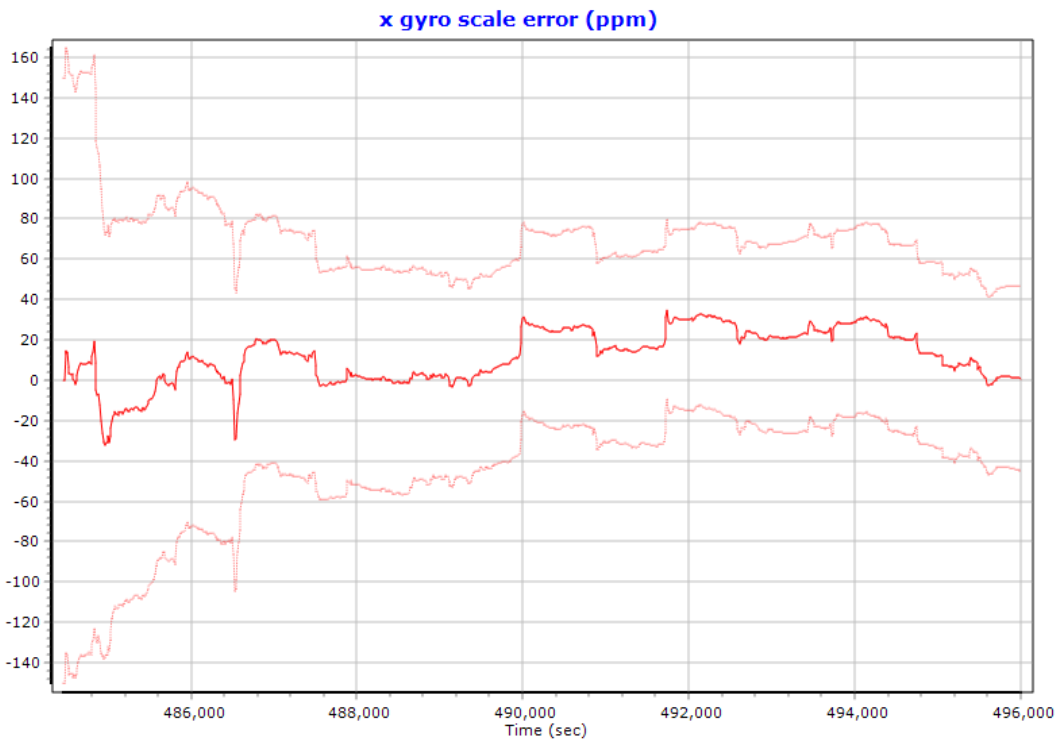
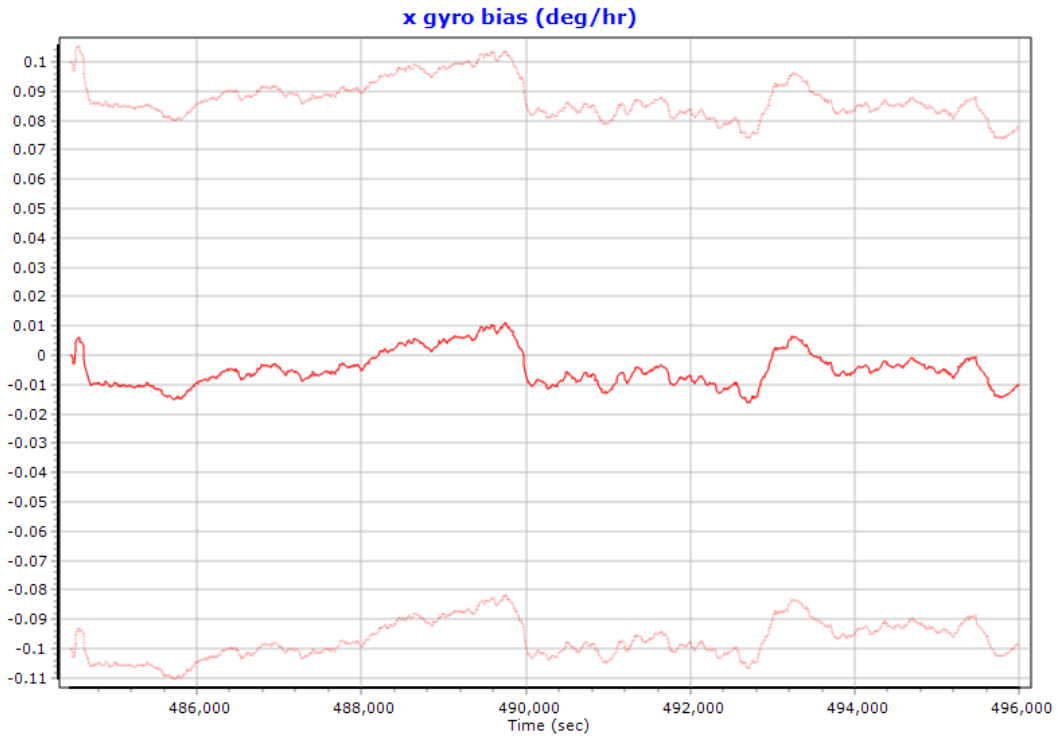
Baseline Distances (km):

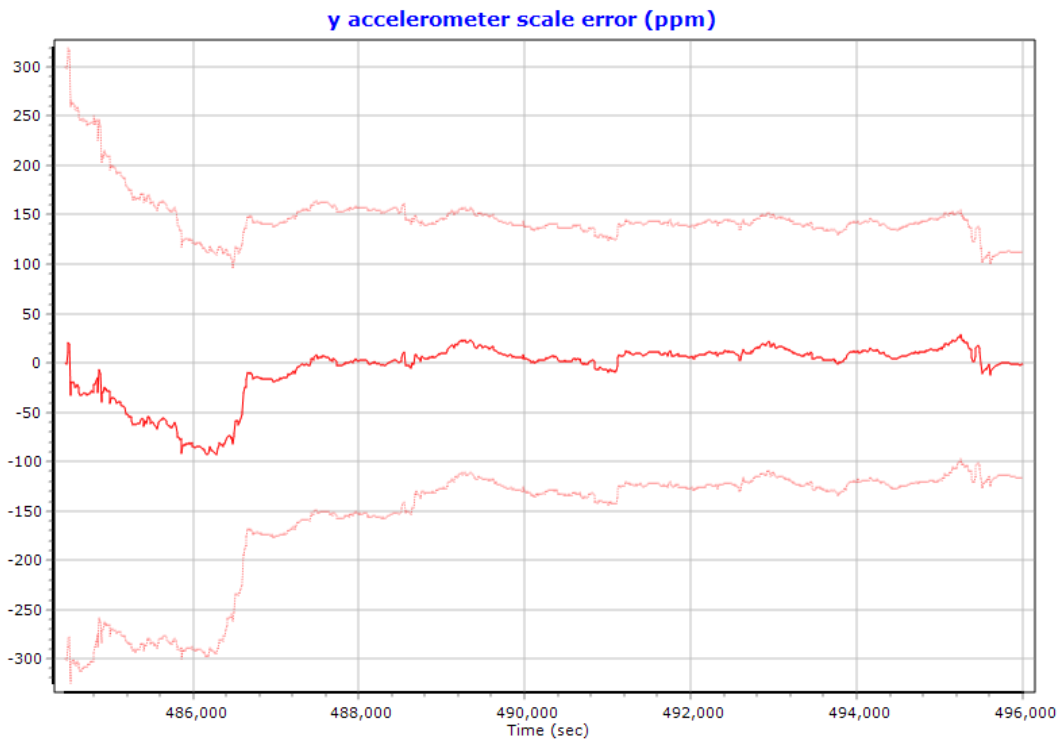
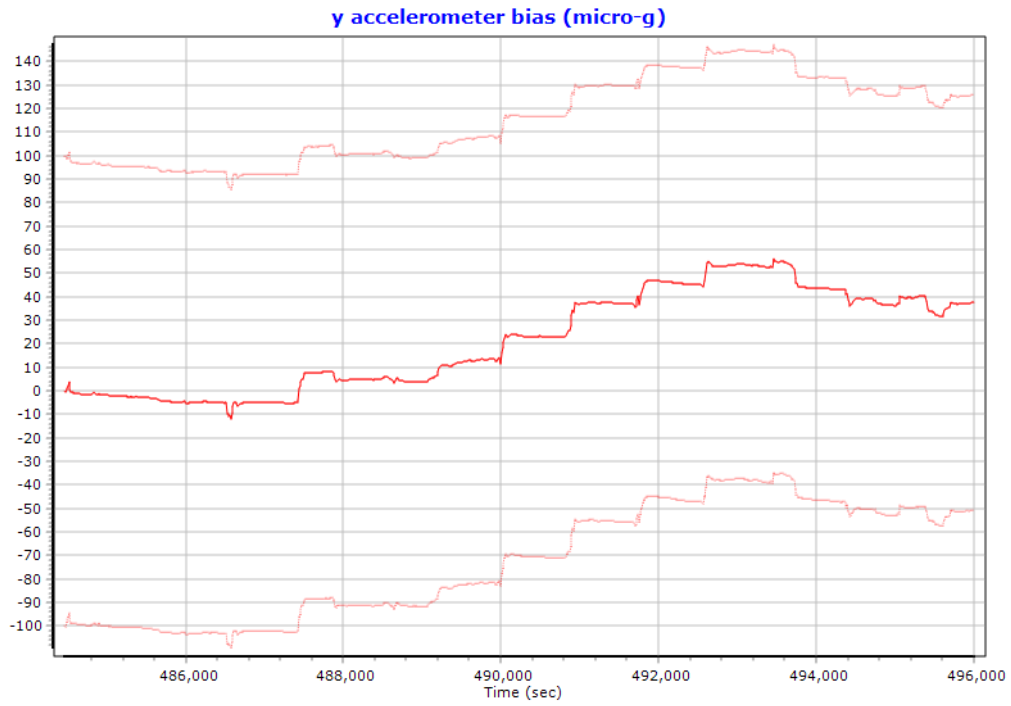
Maximum: 59.06  
Minimum: 0.48  
Average: 30.94  
First Epoch: 51.68  
Last Epoch: 51.68

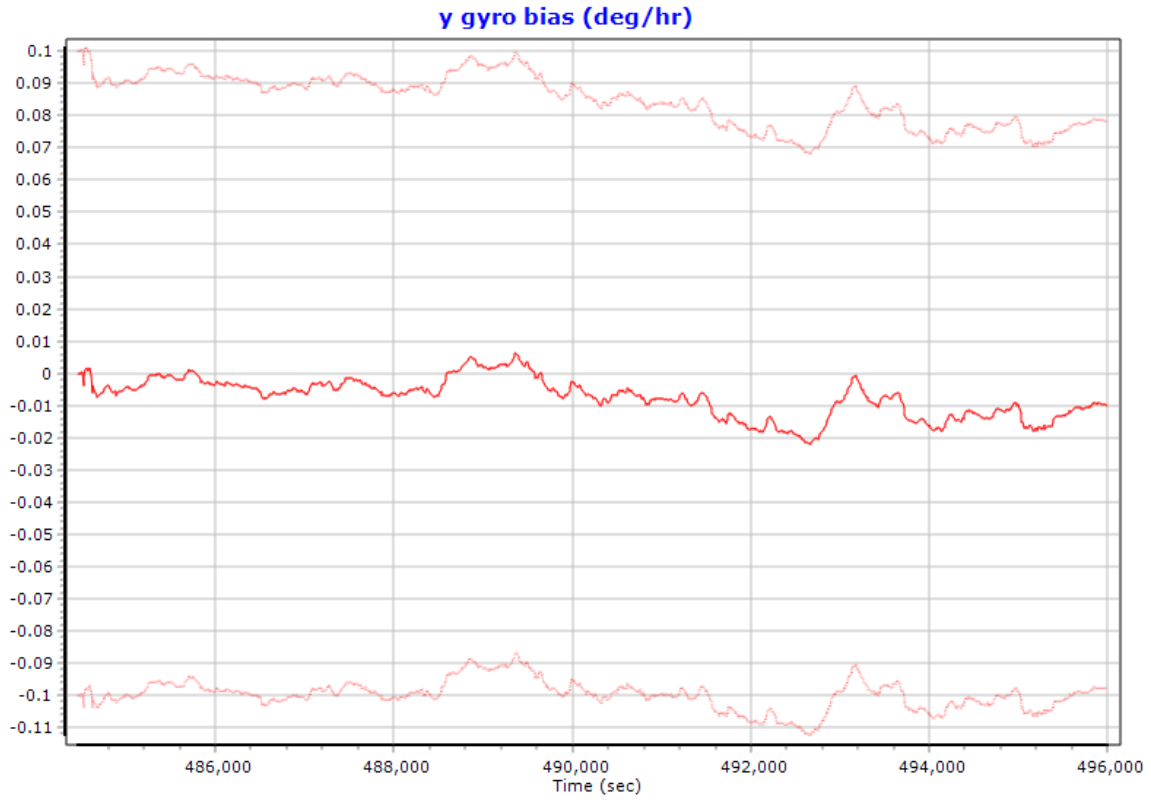
CORS Base Stations

Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVAT	N37°25'42.67846"	W81°04'04.40377"	704.674	N37°25'42.67866"	W81°04'04.40390"	704.568
NCWC	N36°22'19.71501"	W80°11'05.64895"	274.974			
NCRE	N36°21'42.74202"	W79°39'56.56330"	233.466	N36°21'42.74198"	W79°39'56.56333"	233.357
LS04	N37°21'47.16696"	W79°57'26.99413"	324.139	N37°21'47.16736"	W79°57'26.99395"	324.032
DOBS	N36°25'31.54122"	W80°43'11.73527"	339.304	N36°25'31.54147"	W80°43'11.73543"	339.186

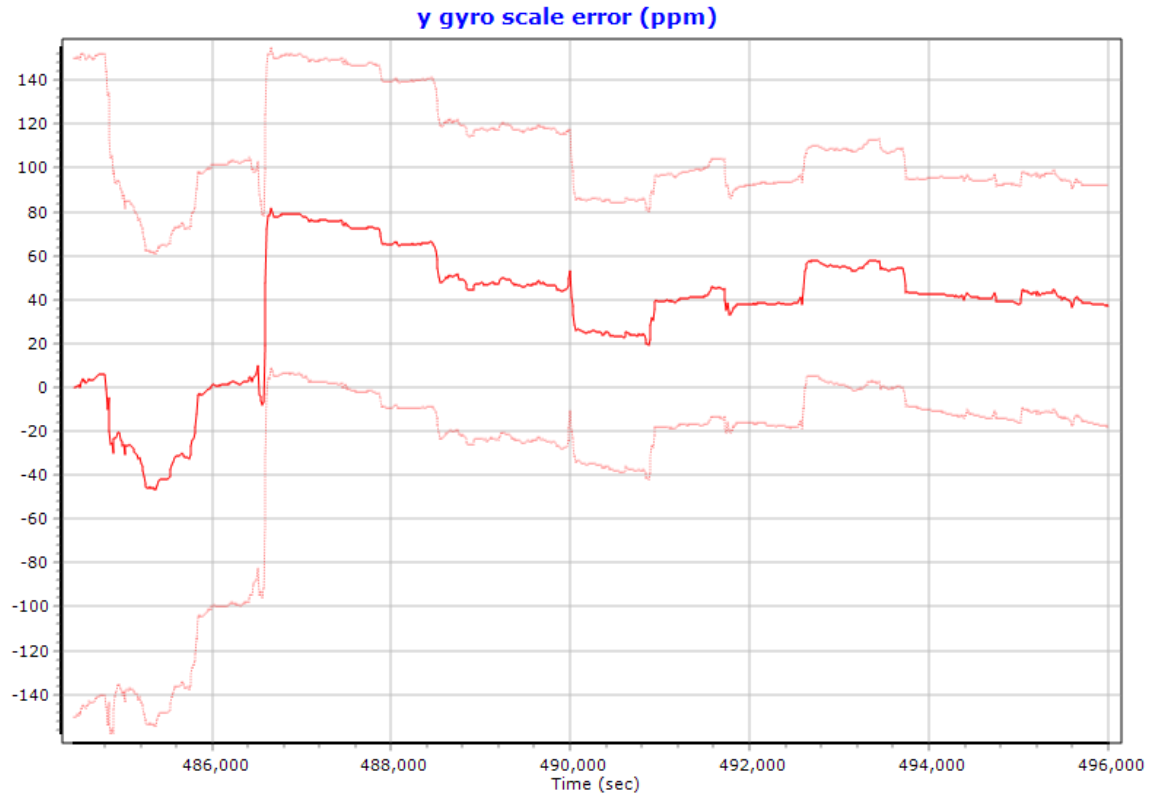


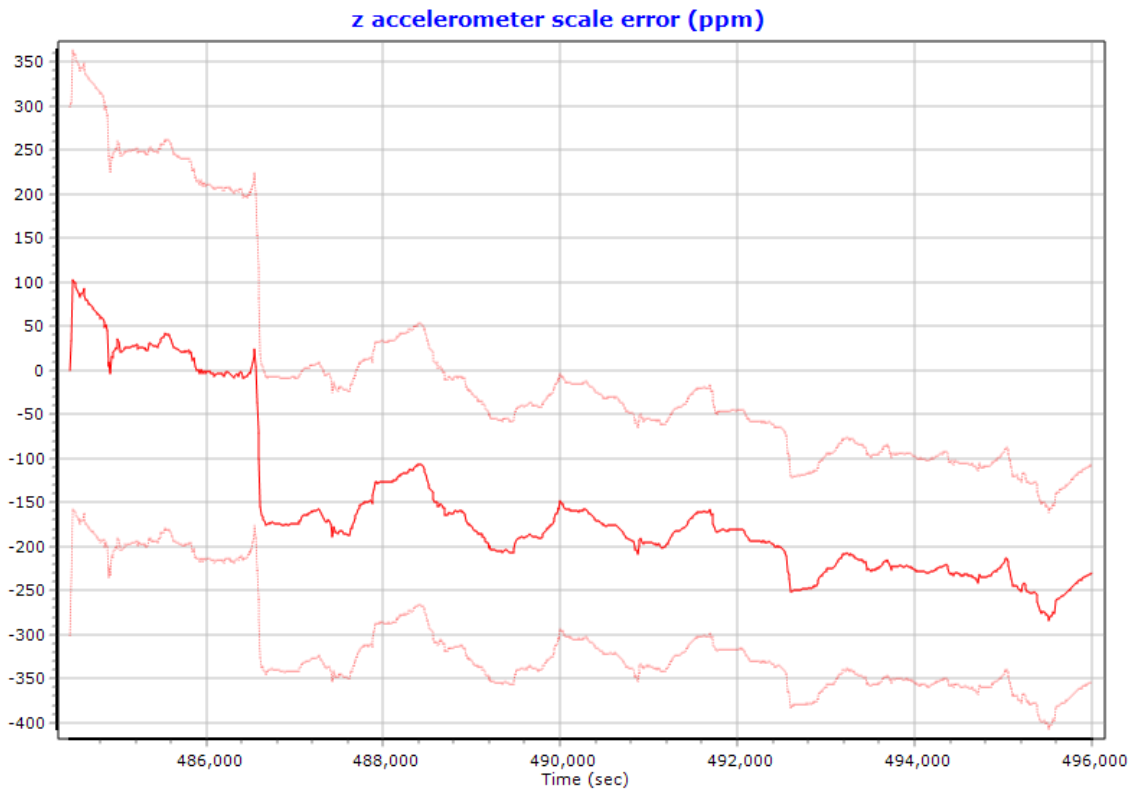
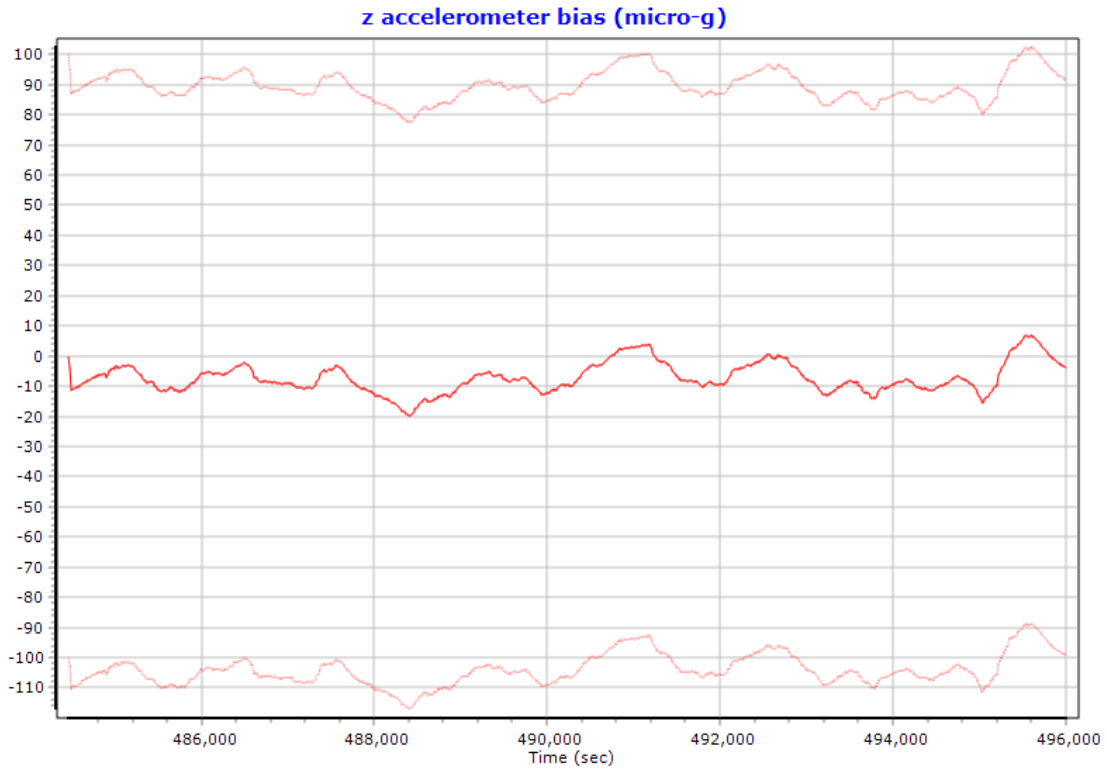


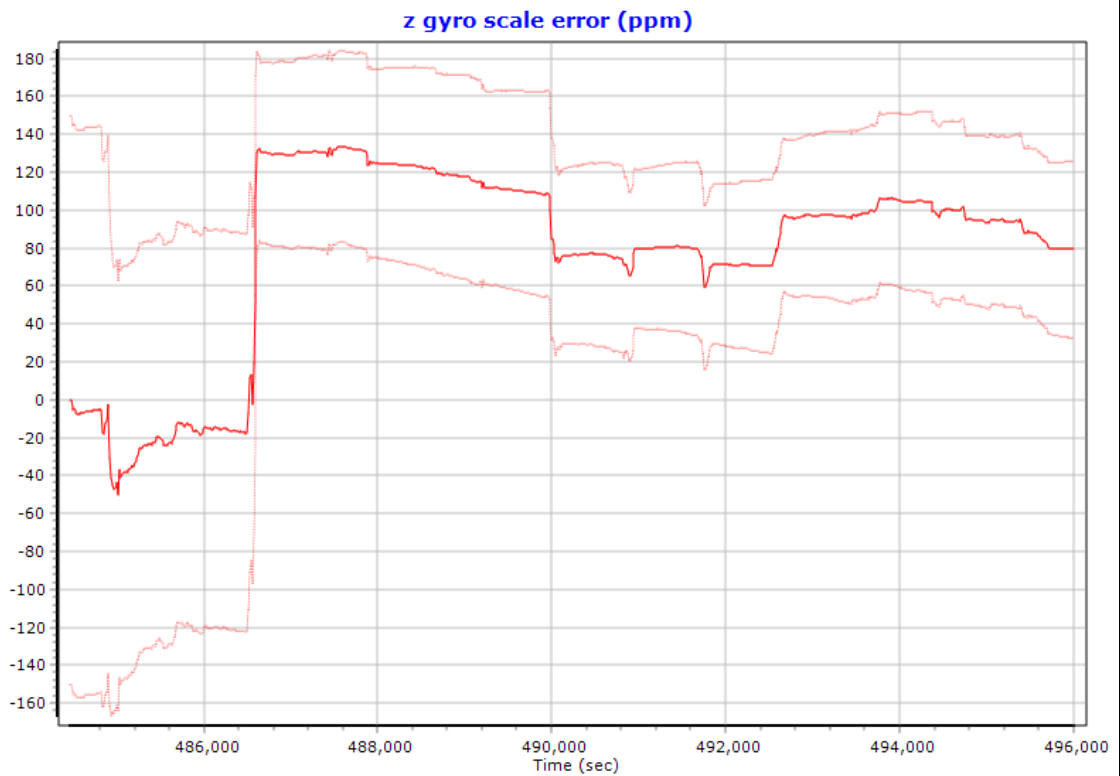
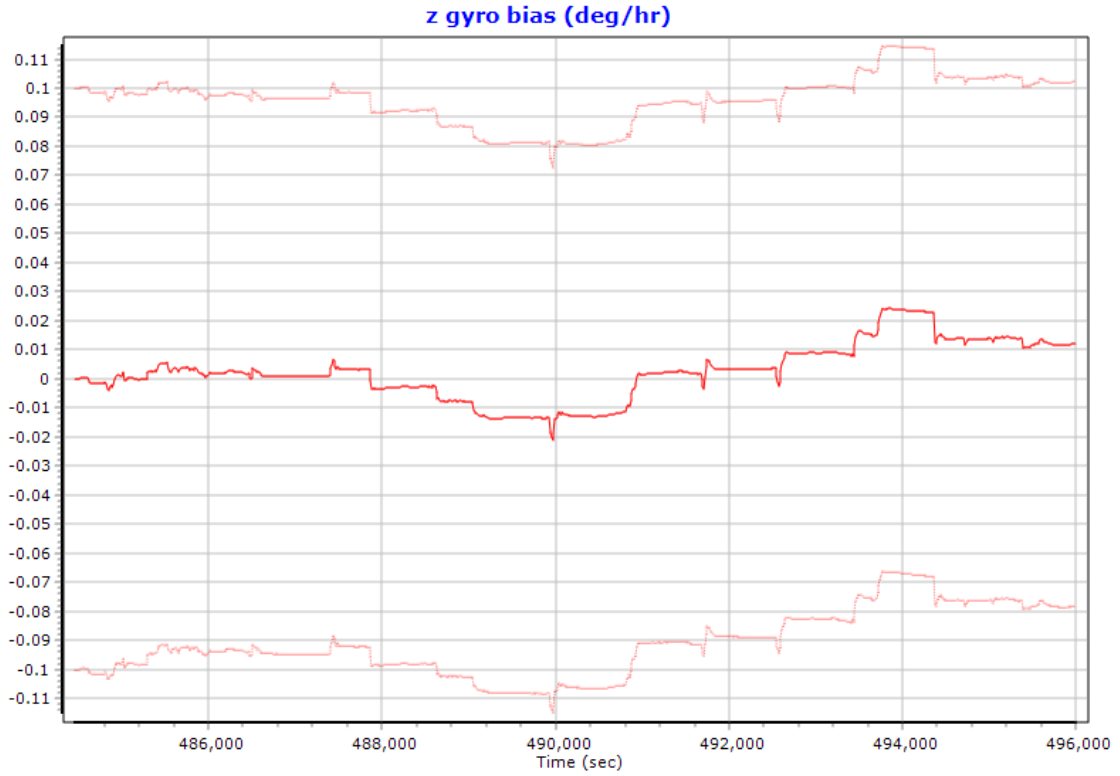




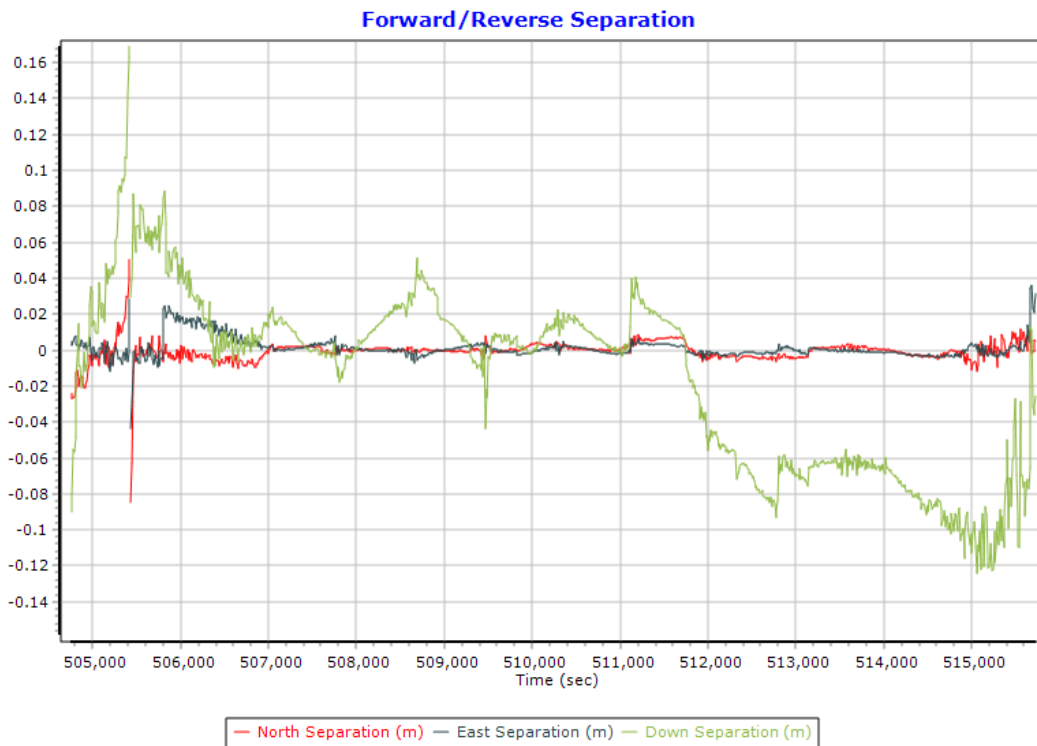
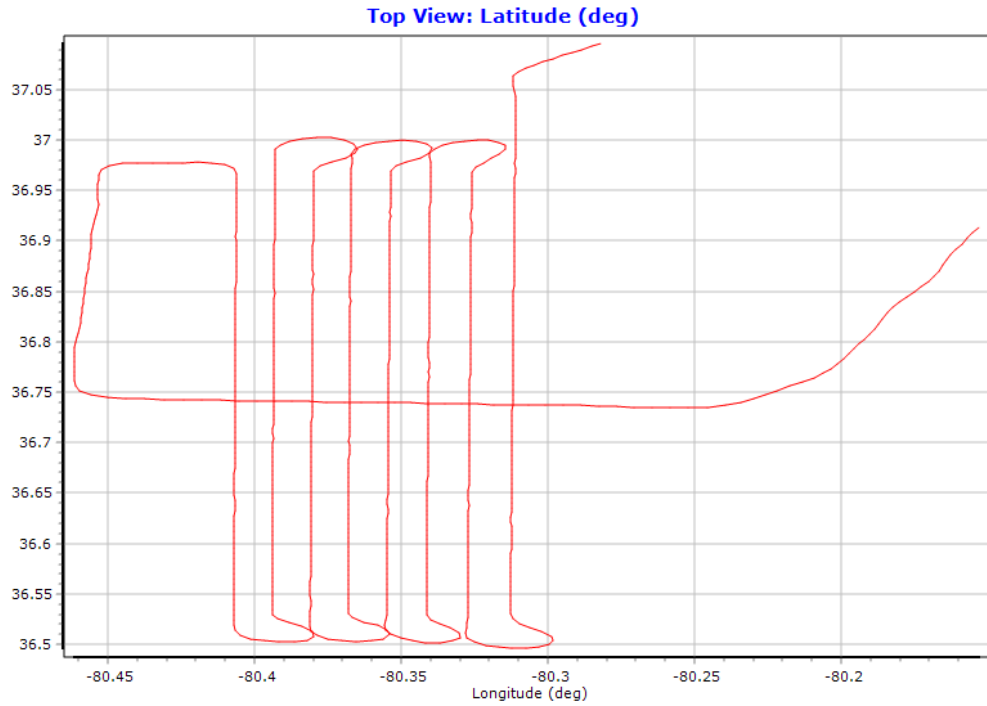




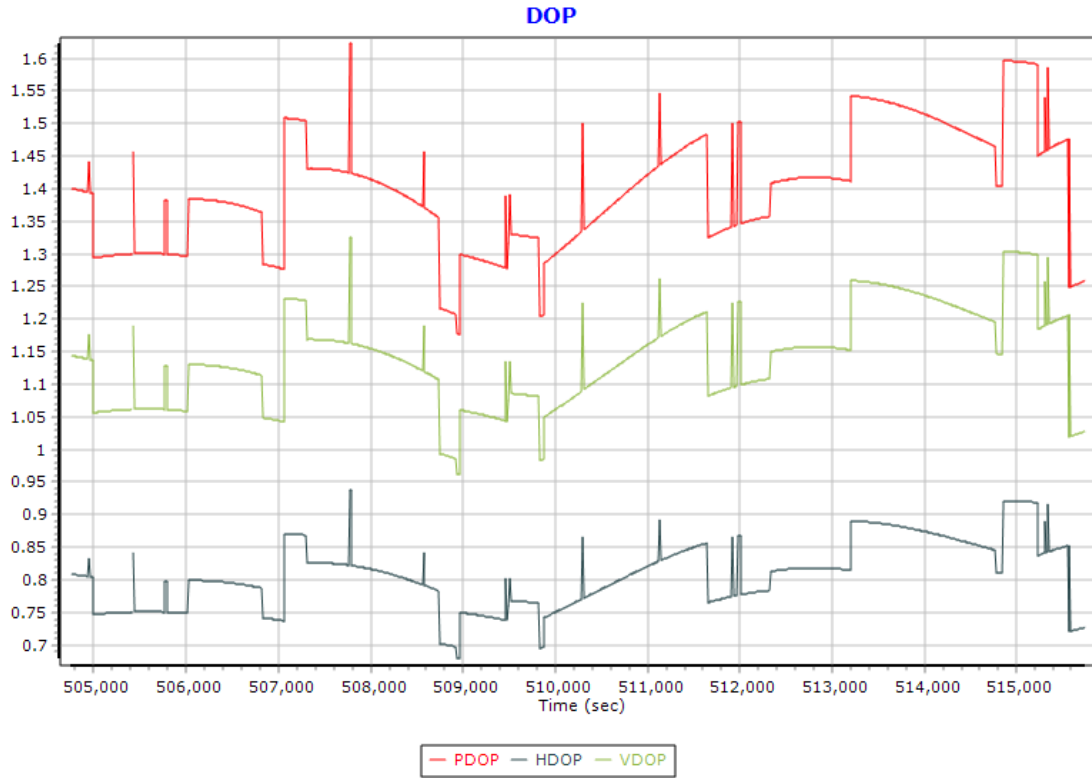


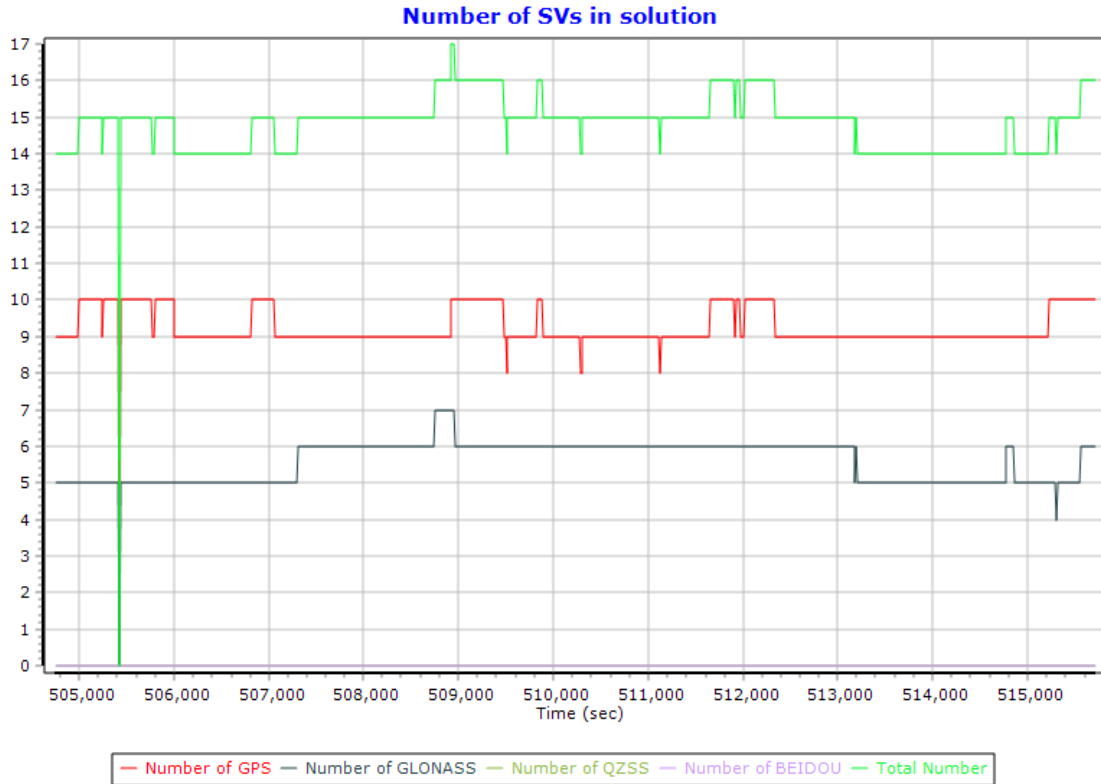


## DECEMBER 22, 2017 MISSION 2









### Processing Summary Information

#### Processing Summary Information

Program: POSpac MMS  
 Version: 8.1.6388.30062  
 Project: \\sa\data\riegl\217058\ 20171222\_VA\_B

Solution Type: IN-Fusion SmartBase

Fixed: 10977 (99.99%)  
 Float: 0 (0.00%)  
 No Solution: 1 (0.01%)

Number of Epochs:

Virginia West Chesapeake Central LiDAR  
TO# G15PD00714  
July 17, 2018  
Page 104 of 202

Total in RAW file: 11000  
No processed position: 23

Fwd/Rev Separation RMS Values (m):

North: 0.006  
East: 0.006  
Height: 0.051

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 5507occurrences

North: 0.003  
East: 0.002  
Height: 0.033

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.845  
0.10 - 0.30 m: 0.155  
0.30 - 1.00 m: 0  
1.00 - 5.00 m: 0  
5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.40%

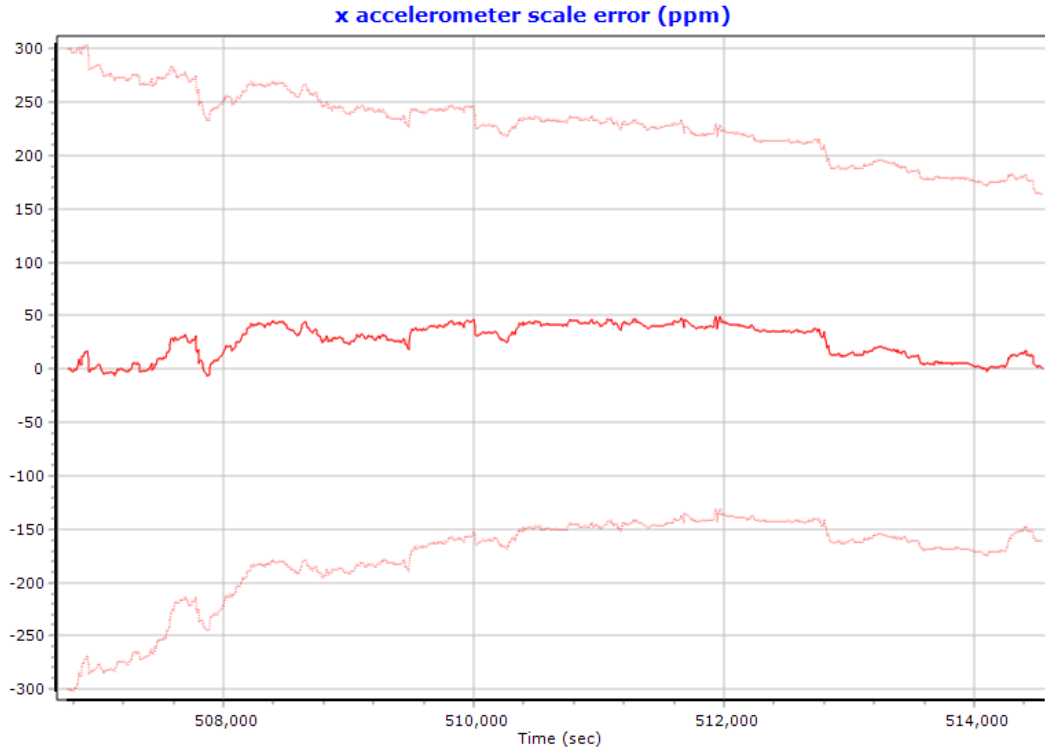
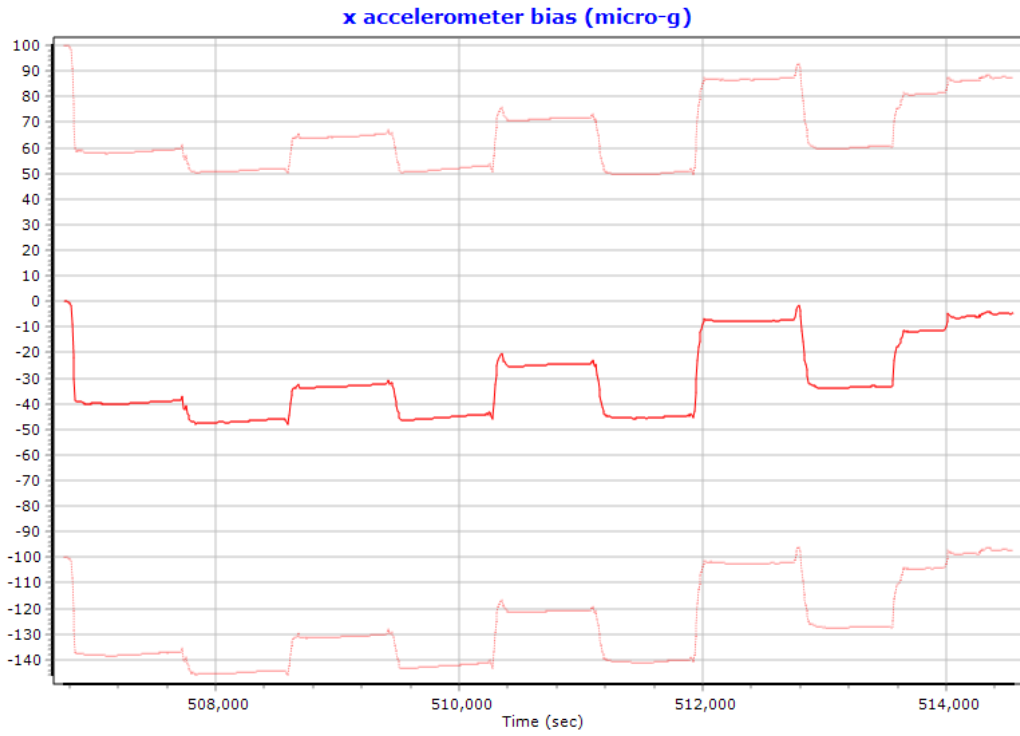
Baseline Distances (km):

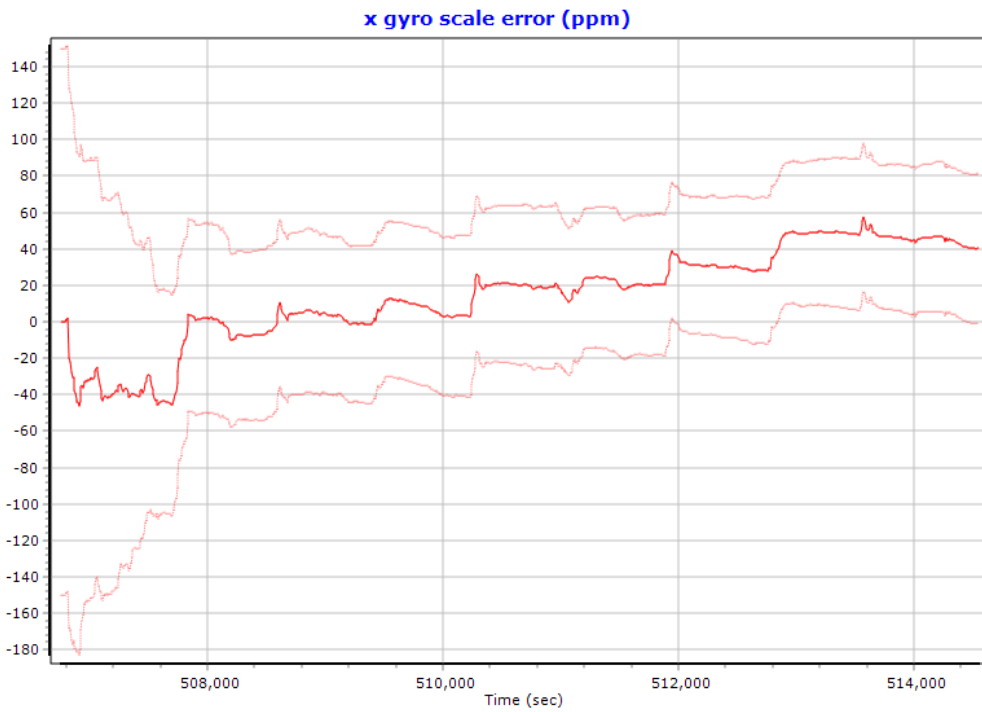
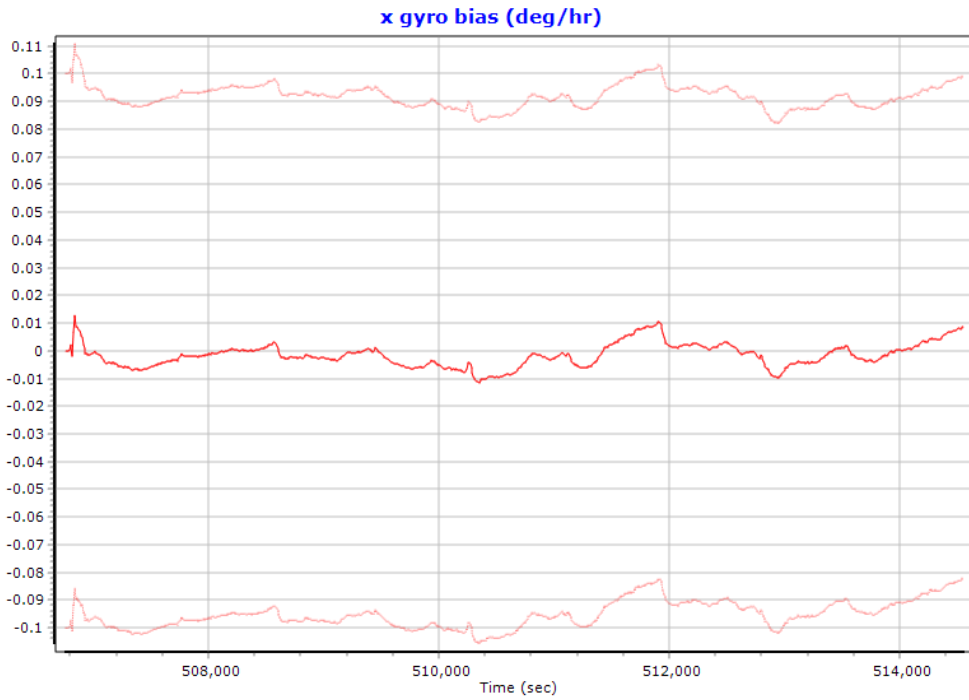
Maximum: 79.88  
Minimum: 0.18  
Average: 29.91  
First Epoch: 70.77  
Last Epoch: 70.77

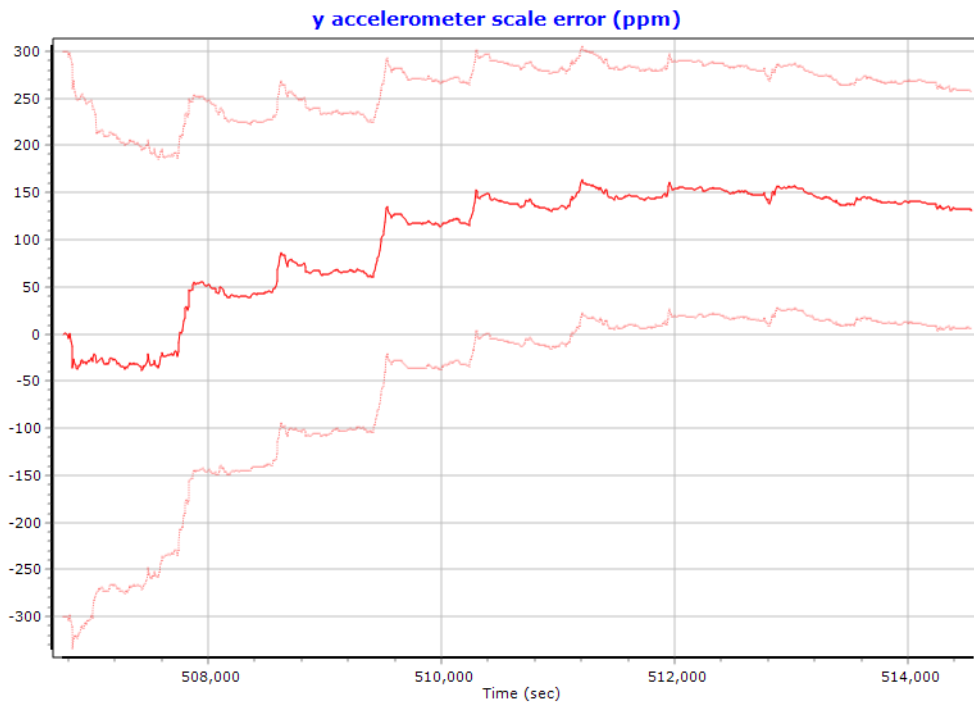
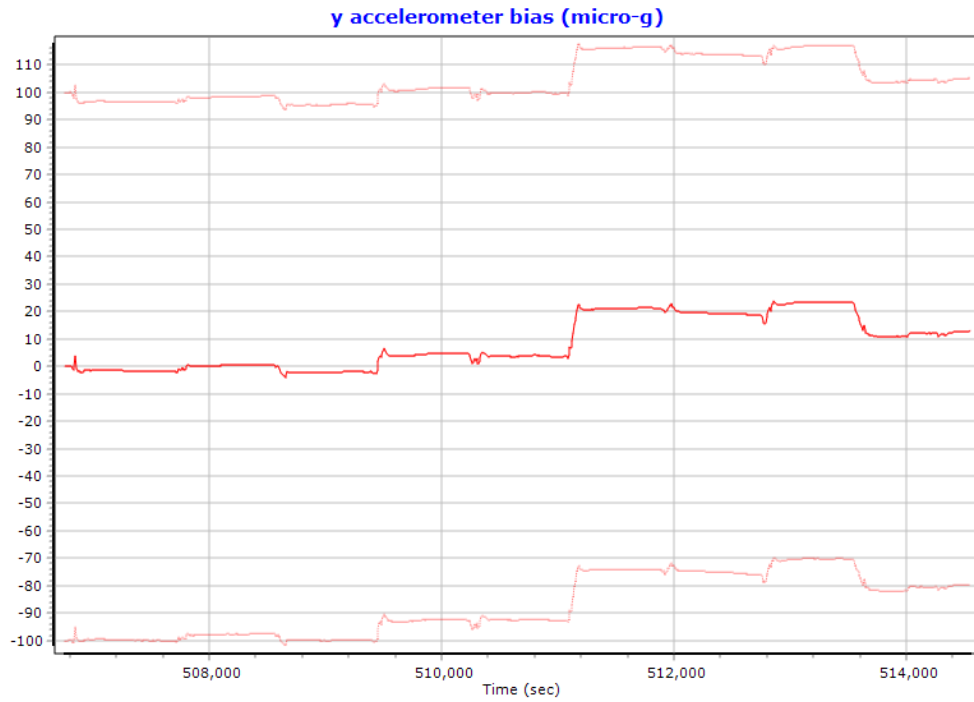


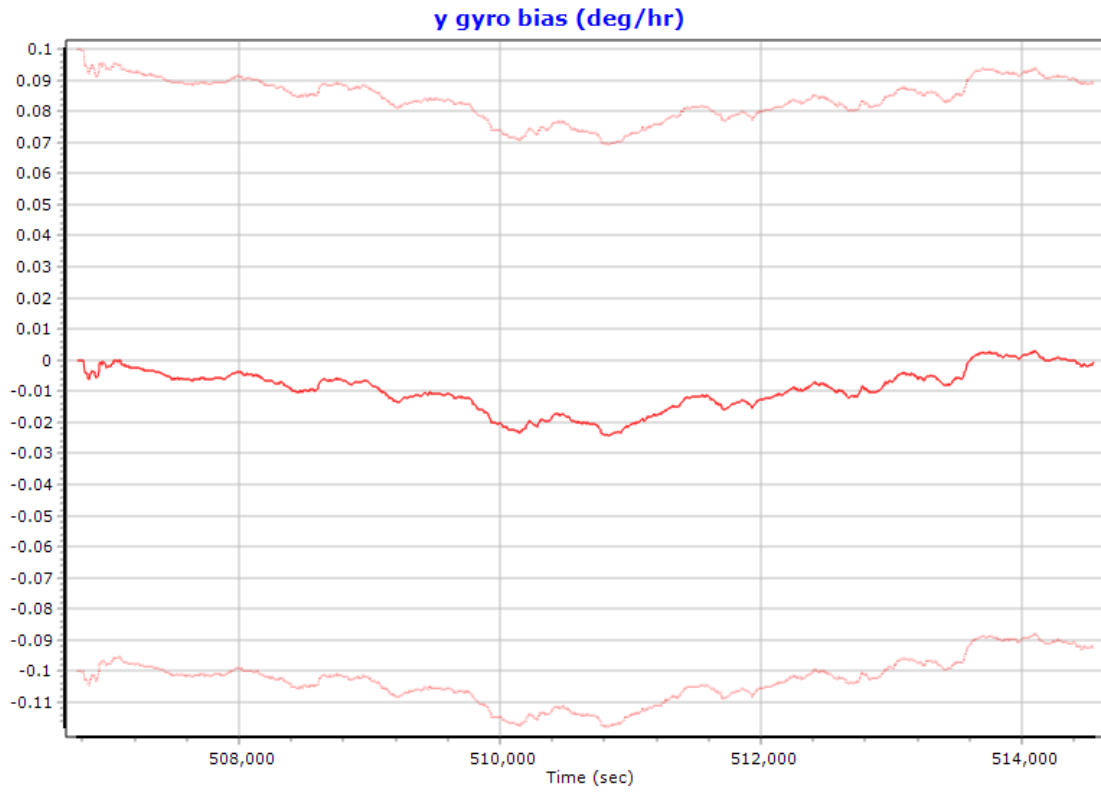
CORS Base Stations

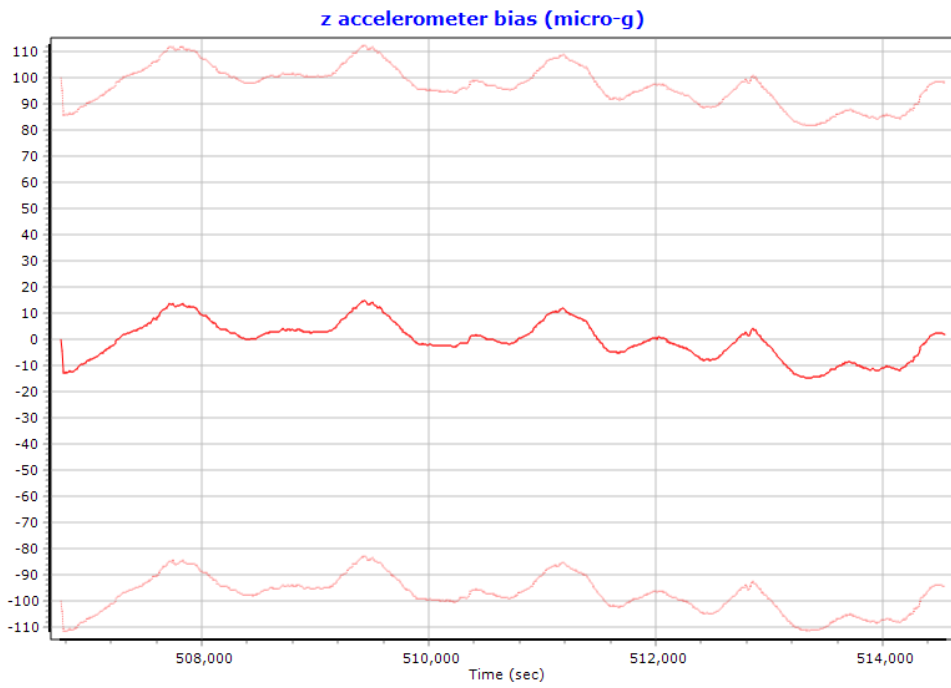
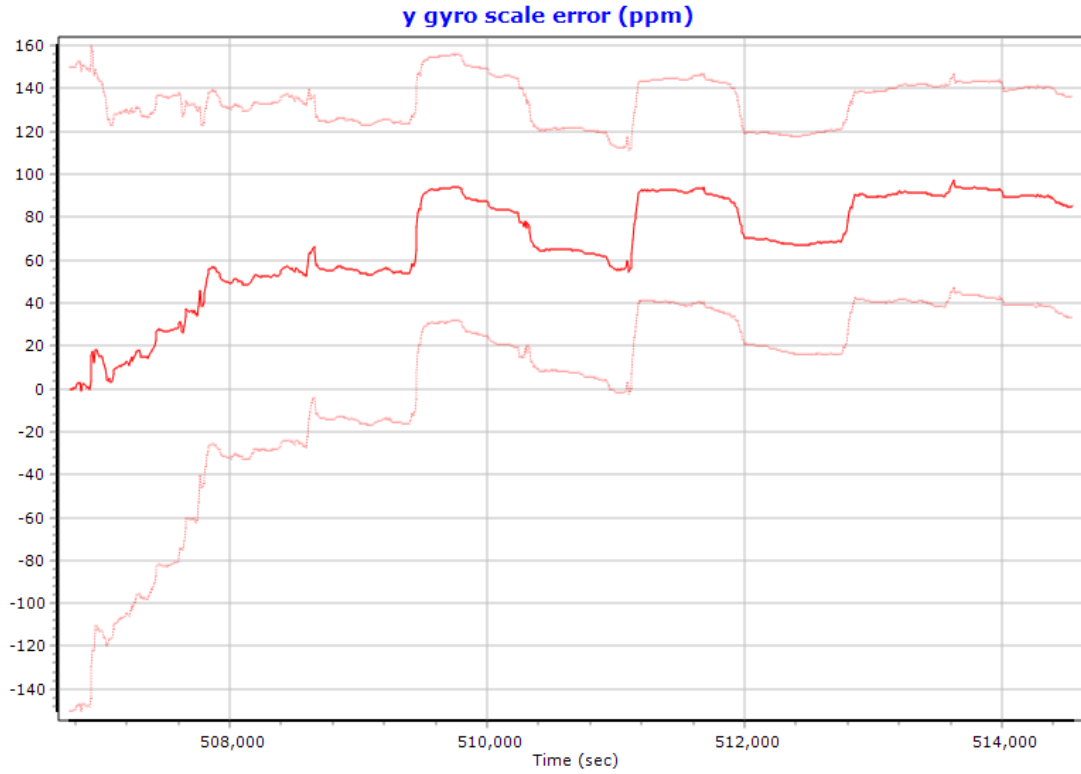
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVAT	N37°25'42.67846"	W81°04'04.40377"	704.674	N37°25'42.67866"	W81°04'04.40390"	704.568
NCWC	N36°22'19.71501"	W80°11'05.64895"	274.974			
NCRE	N36°21'42.74202"	W79°39'56.56330"	233.466	N36°21'42.74198"	W79°39'56.56333"	233.357
LS04	N37°21'47.16696"	W79°57'26.99413"	324.139	N37°21'47.16736"	W79°57'26.99395"	324.032
DOBS	N36°25'31.54122"	W80°43'11.73527"	339.304	N36°25'31.54147"	W80°43'11.73543"	339.186



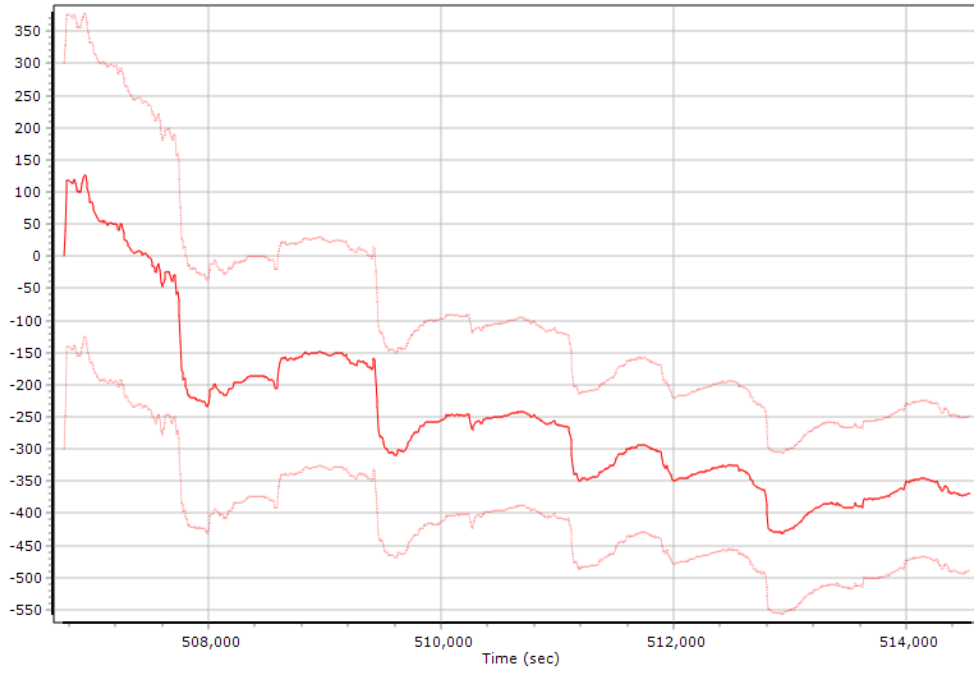




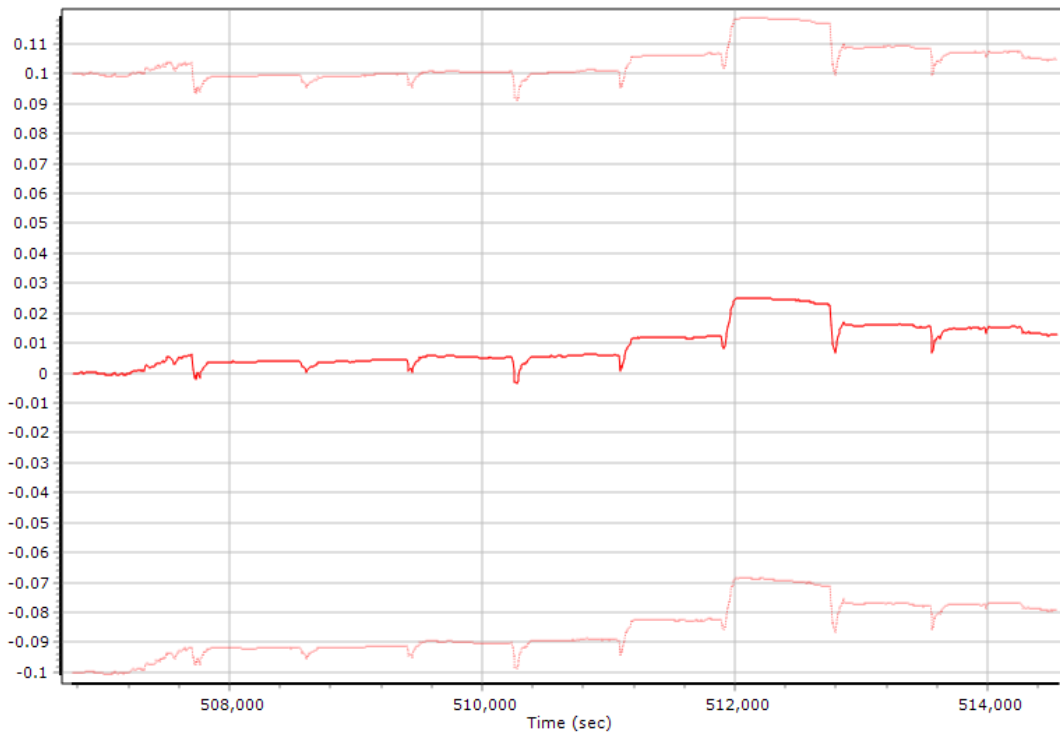


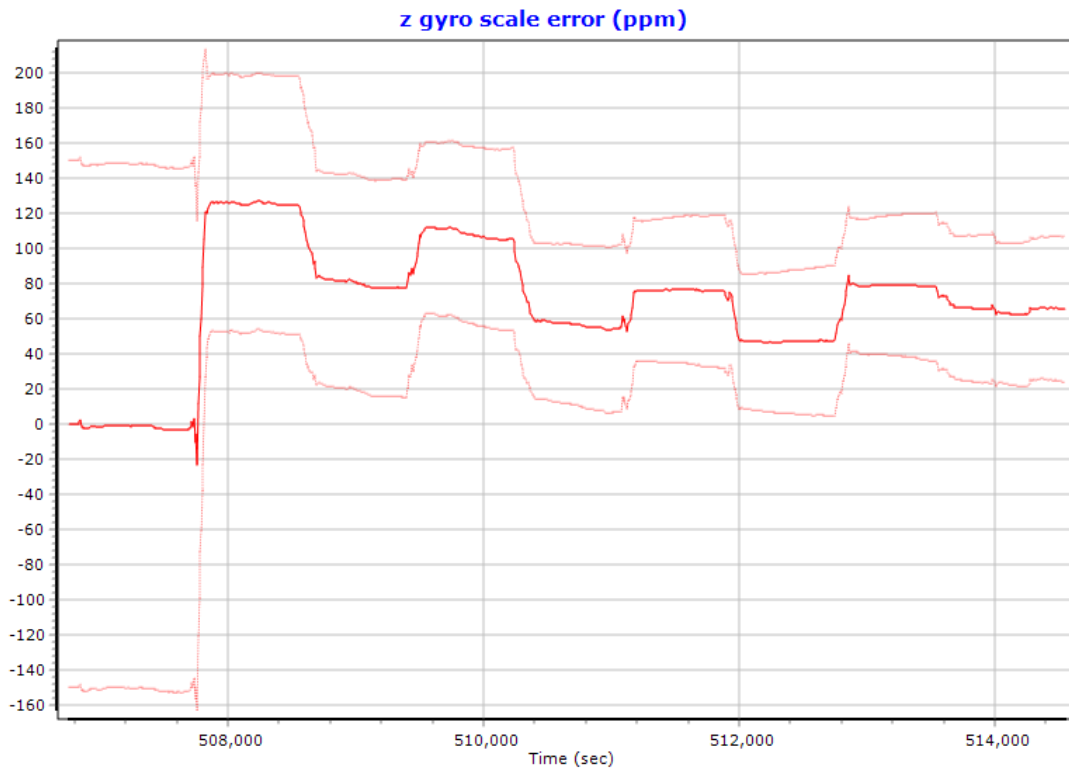


**z accelerometer scale error (ppm)**



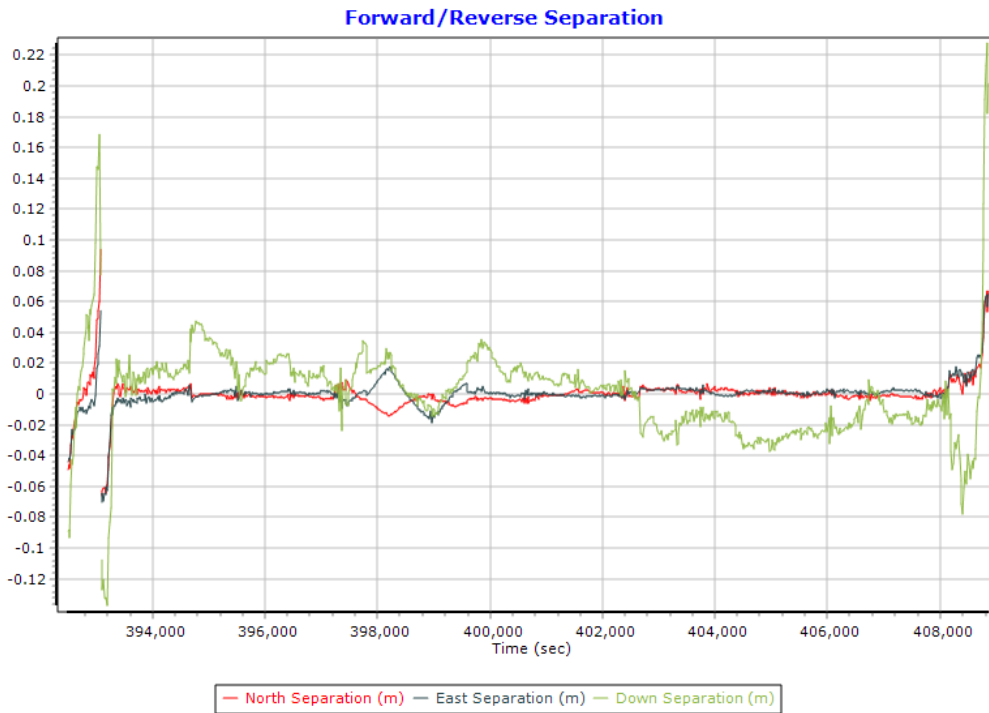
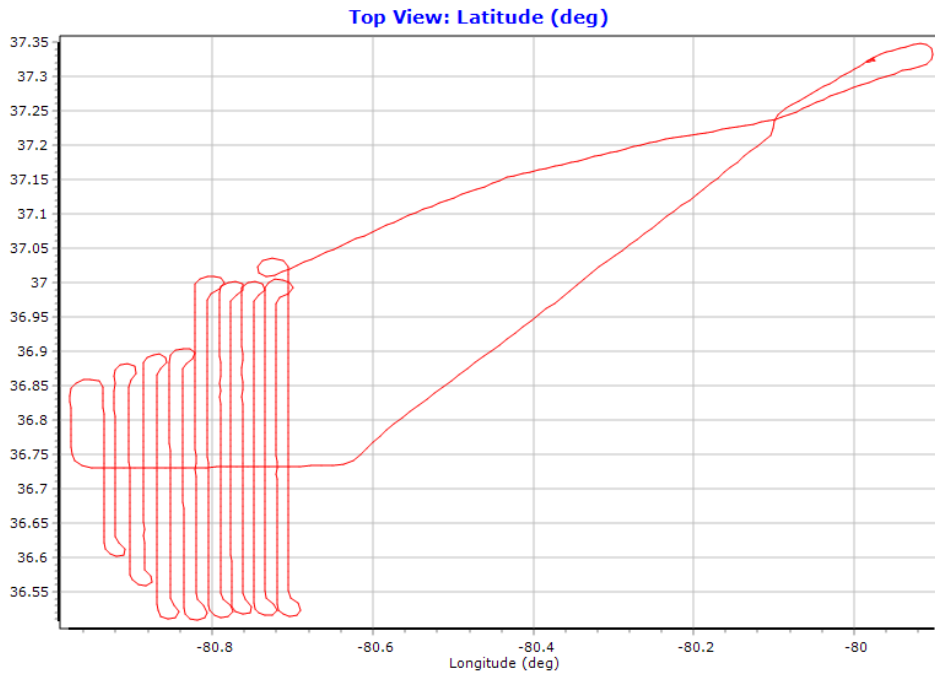
**z gyro bias (deg/hr)**

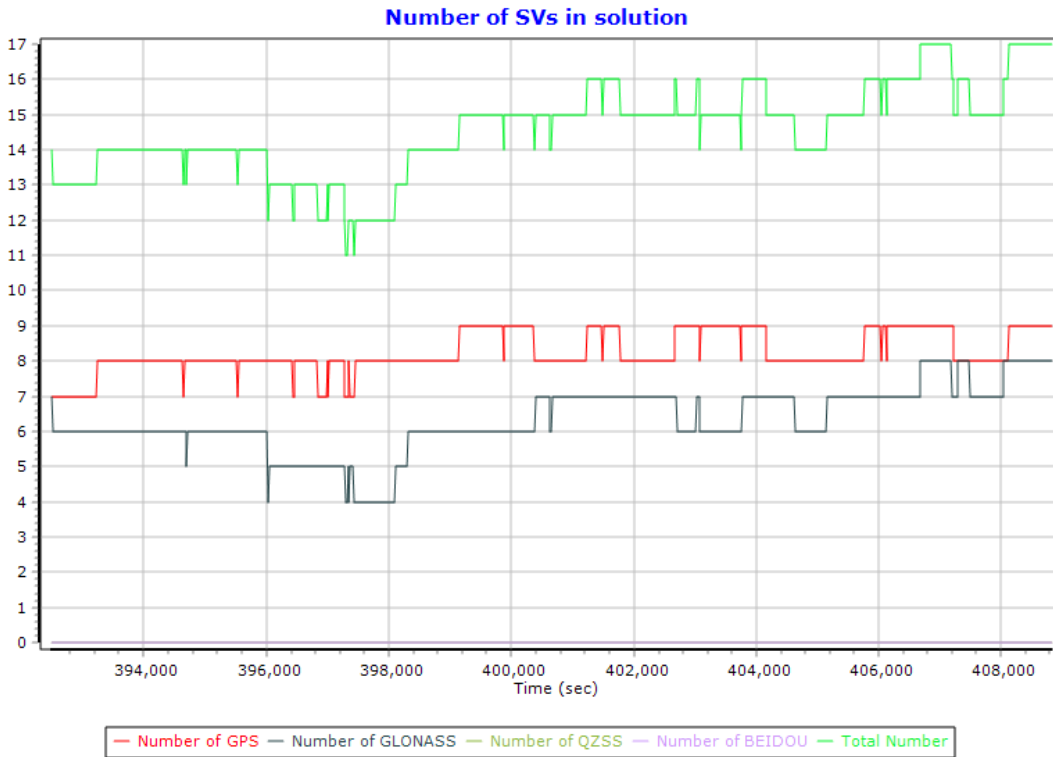
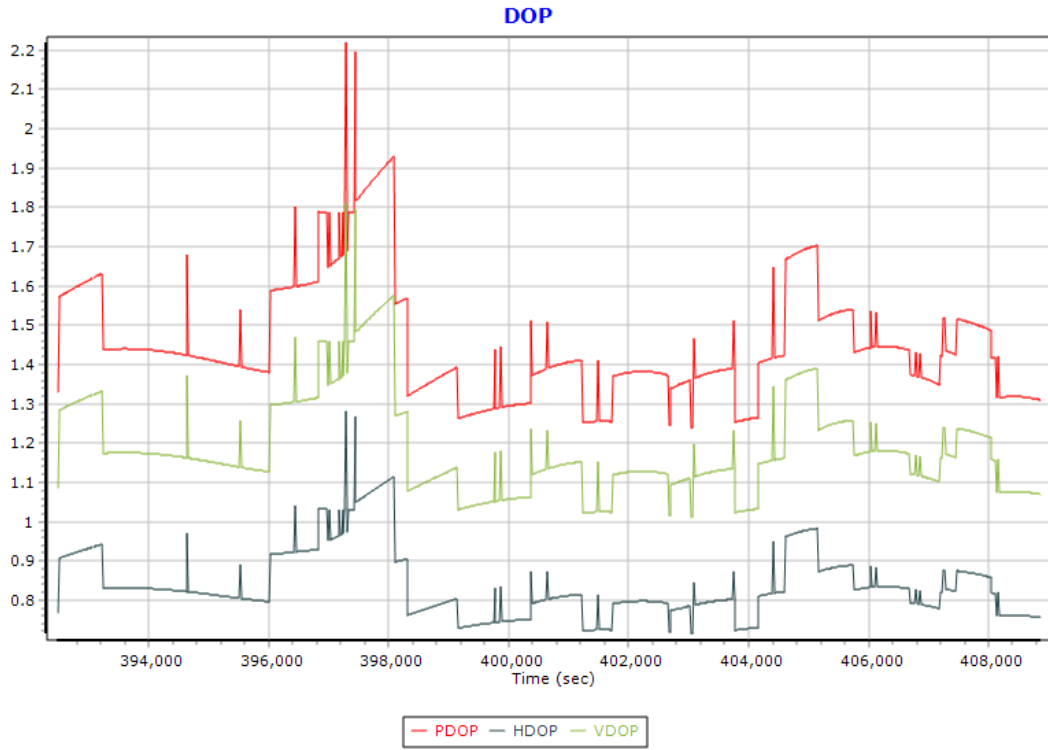




**DECEMBER 28, 2017 MISSION 1**







## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171228\_VA\_A

Solution Type: IN-Fusion SmartBase

Fixed: 16382	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 16420  
No processed position: 38

Fwd/Rev Separation RMS Values (m):

North: 0.010  
East: 0.010  
Height: 0.032

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 8219 occurrences

North: 0.004  
East: 0.005  
Height: 0.016

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.576

0.10 - 0.30 m: 0.424

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.45%

Baseline Distances (km):

Maximum: 86.78

Minimum: 3.82

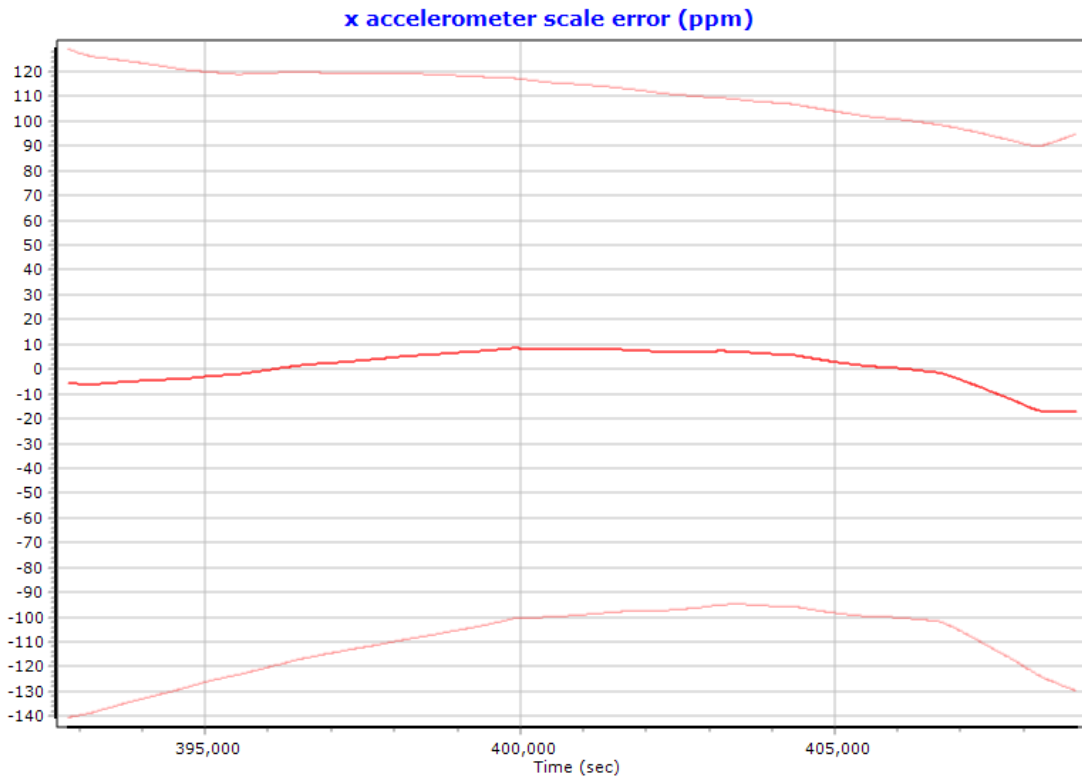
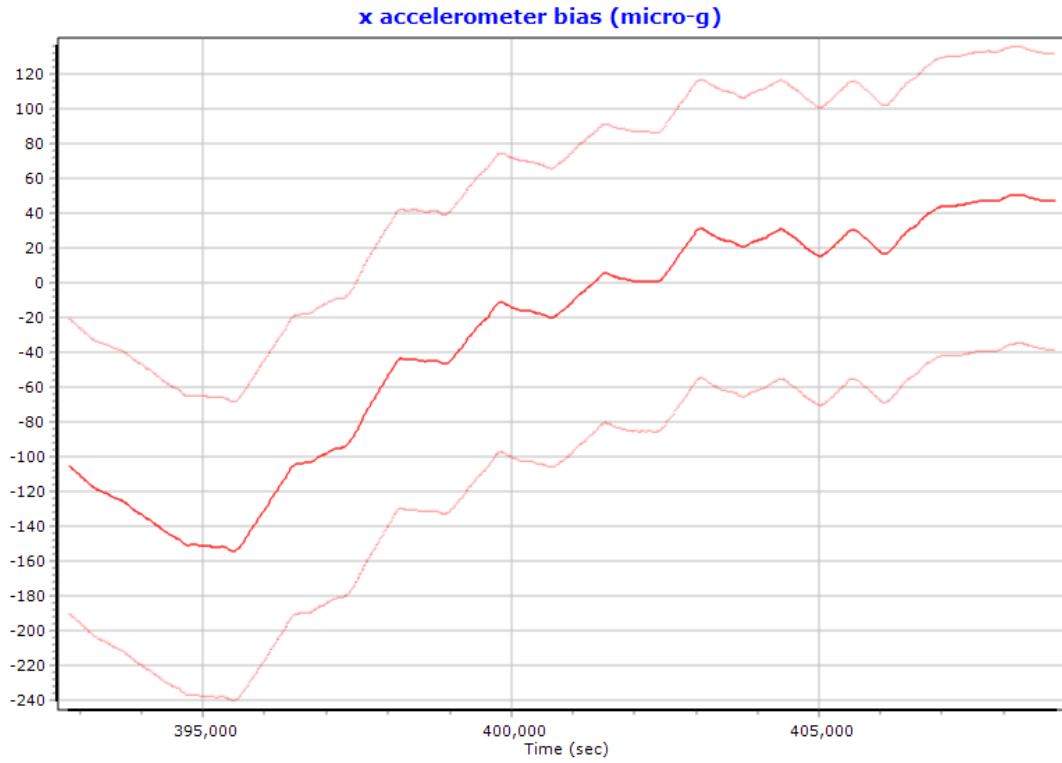
Average: 30.06

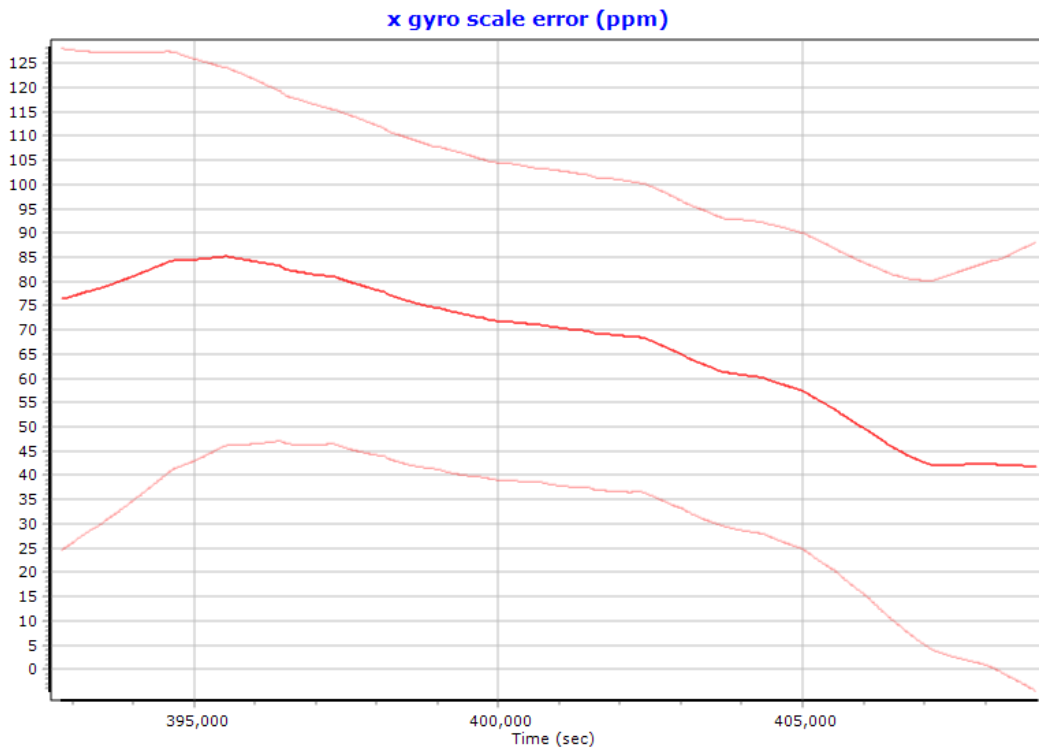
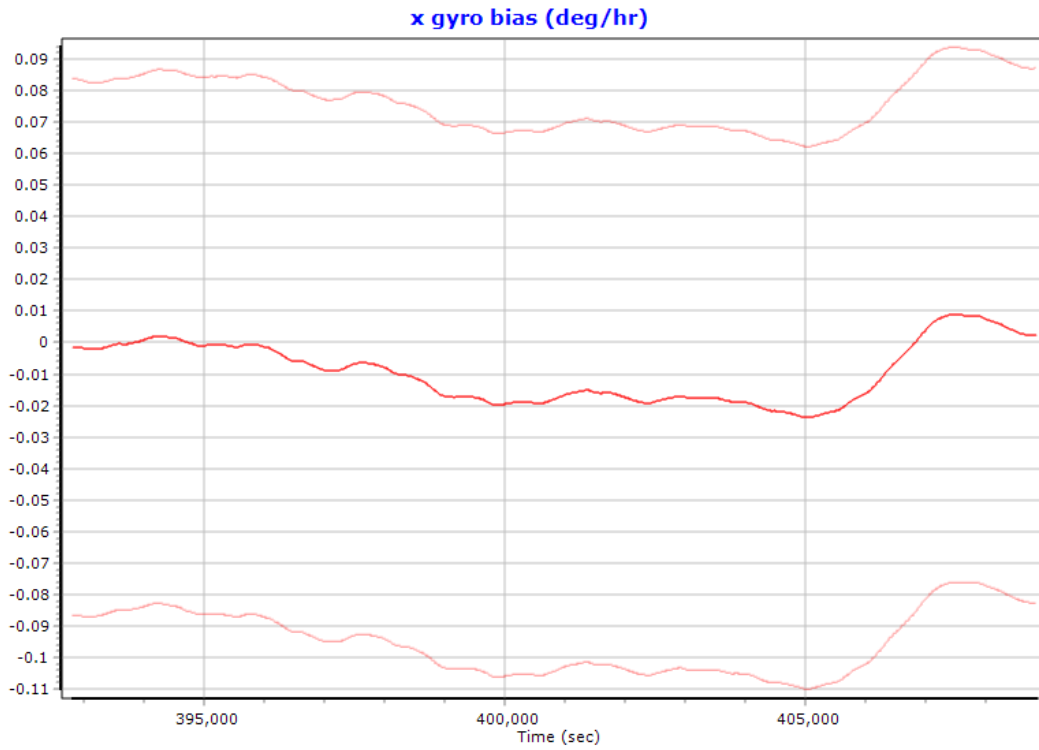
First Epoch: 80.74

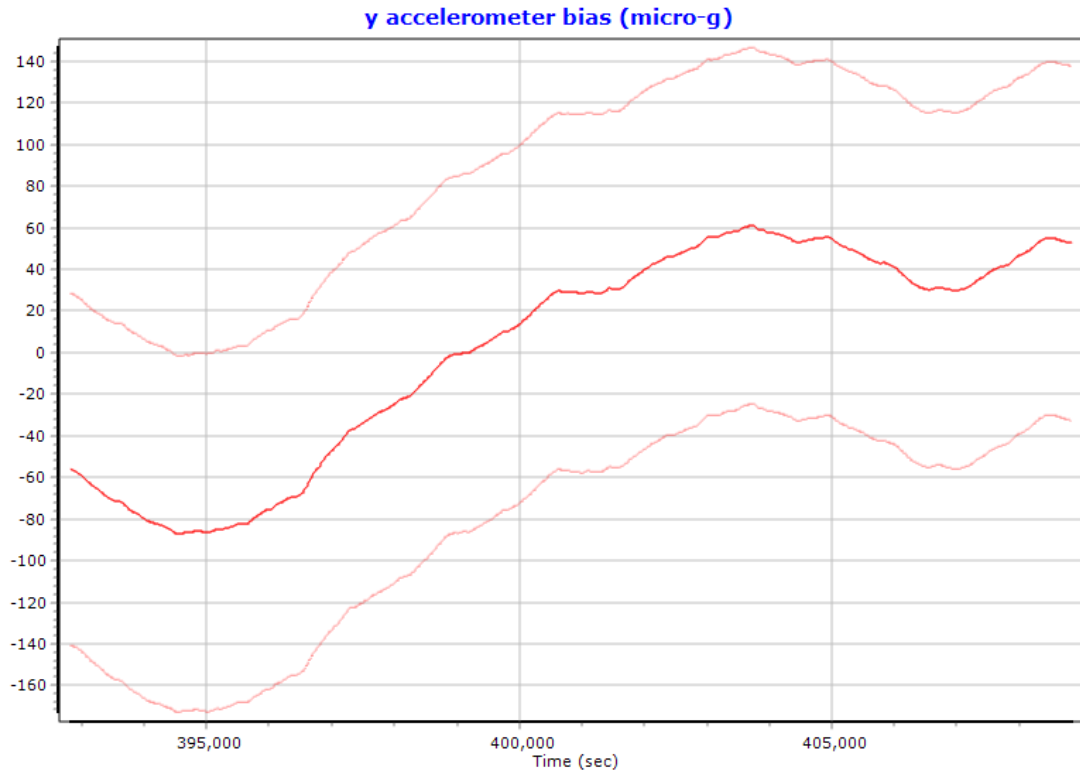
Last Epoch: 80.76

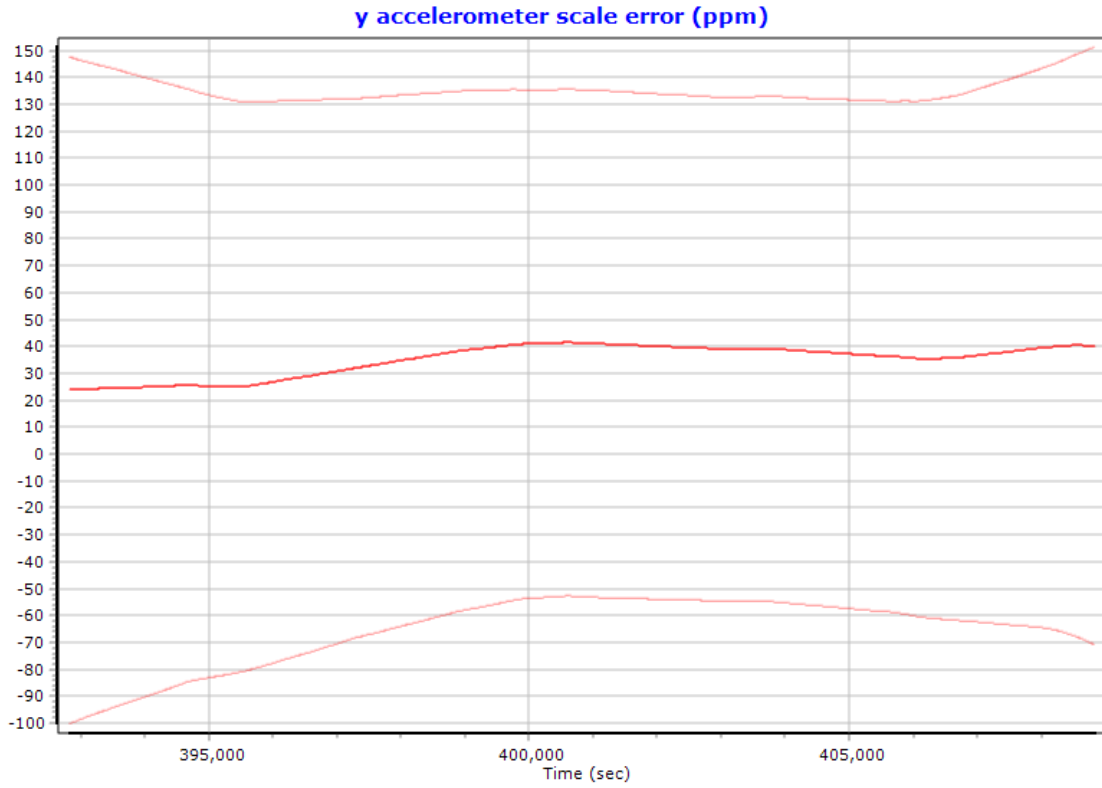
### CORS Base Stations

Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
DOBS	N36°25'31.54122"	W80°43'11.73528"	339.304			
WVAT	N37°25'42.67838"	W81°04'04.40392"	704.674	N37°25'42.67839"	W81°04'04.40401"	704.687
NCWC	N36°22'19.71491"	W80°11'05.64910"	274.974	N36°22'19.71483"	W80°11'05.64908"	275.092
NCSR	N36°29'51.93288"	W81°06'52.95776"	838.659	N36°29'51.93275"	W81°06'52.95786"	838.659
LS04	N37°21'47.16696"	W79°57'26.99414"	324.139	N37°21'47.16706"	W79°57'26.99400"	324.141

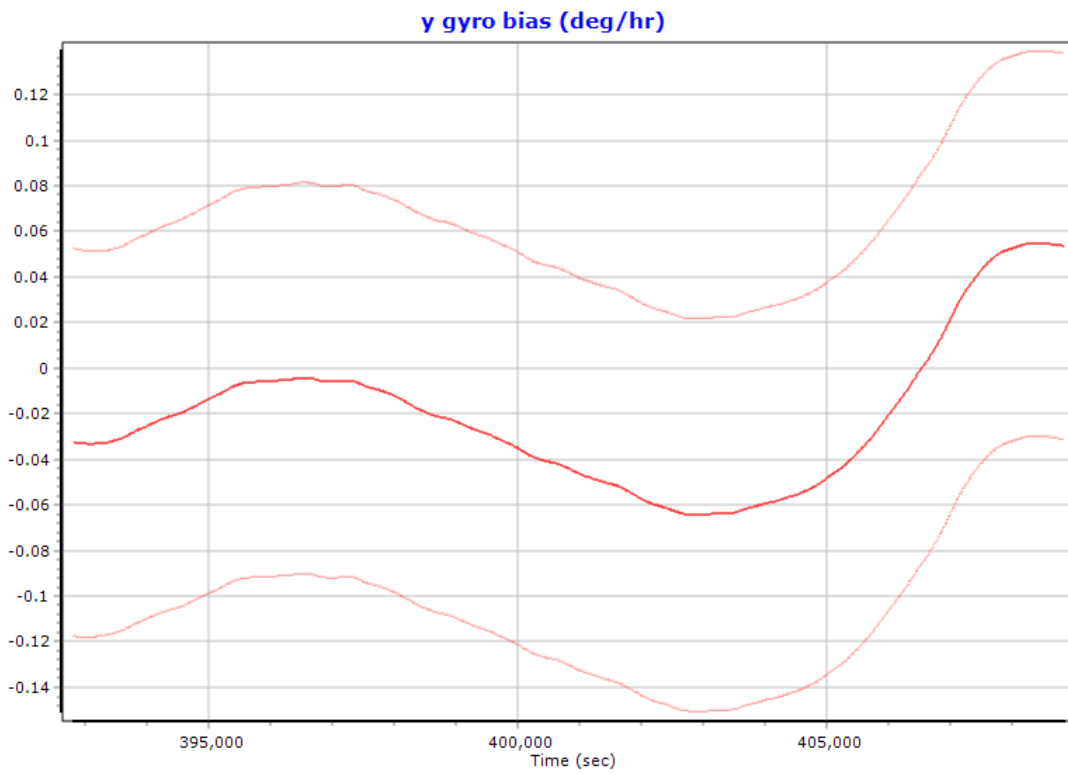




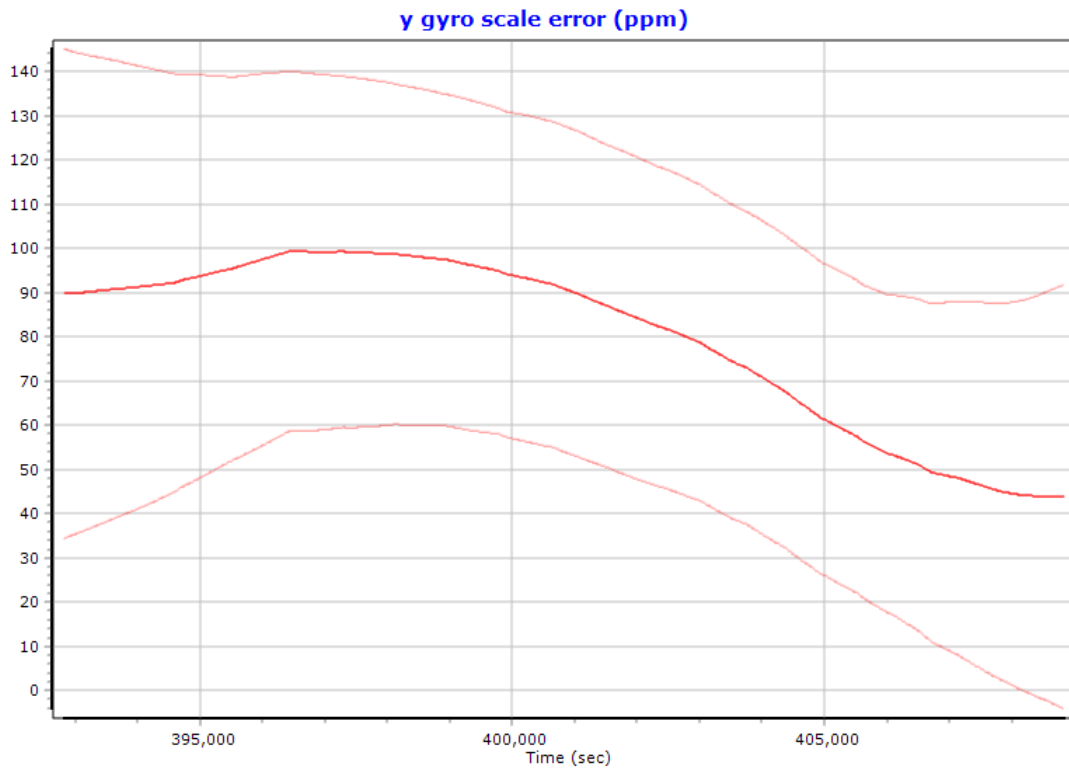


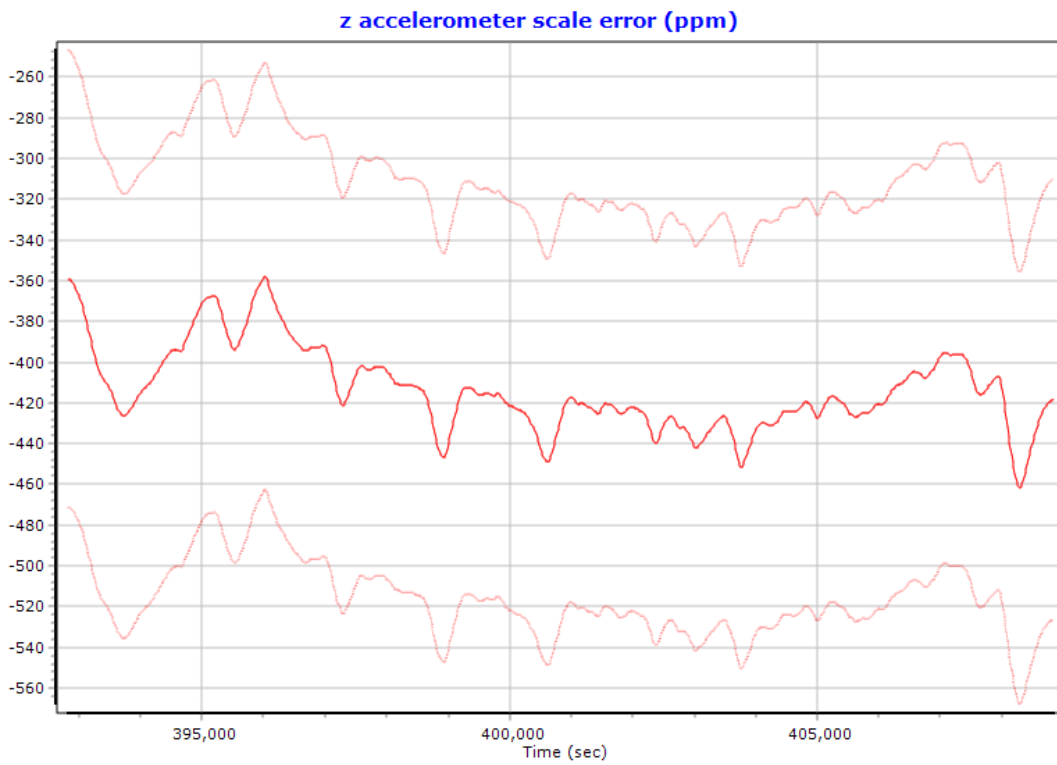
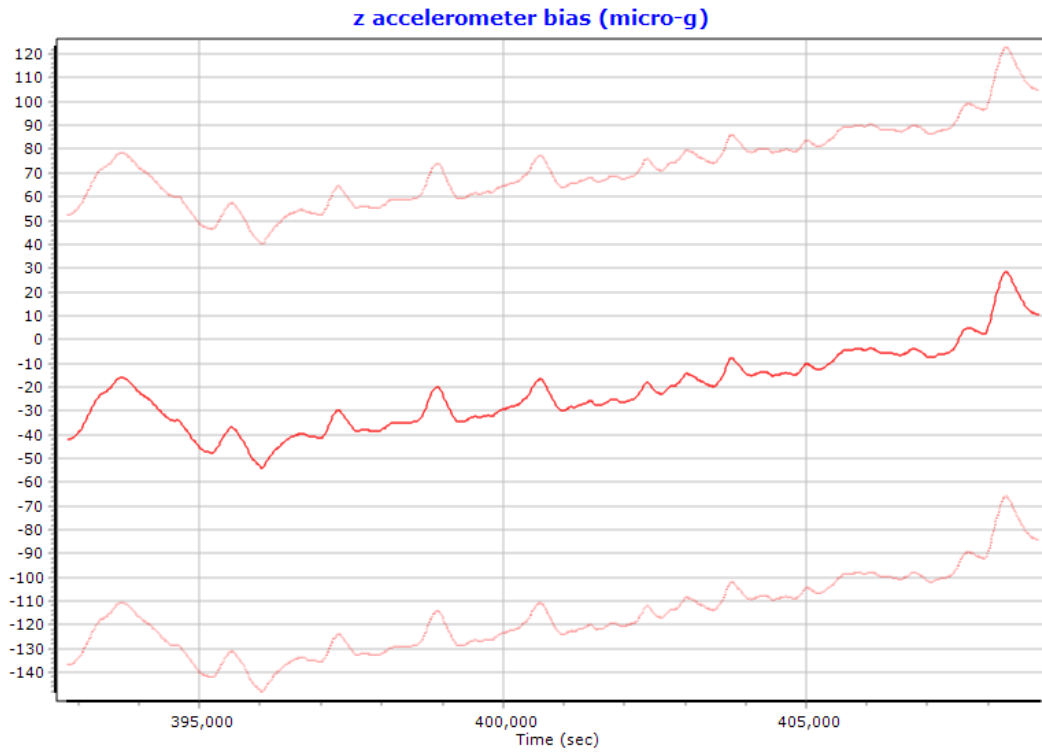


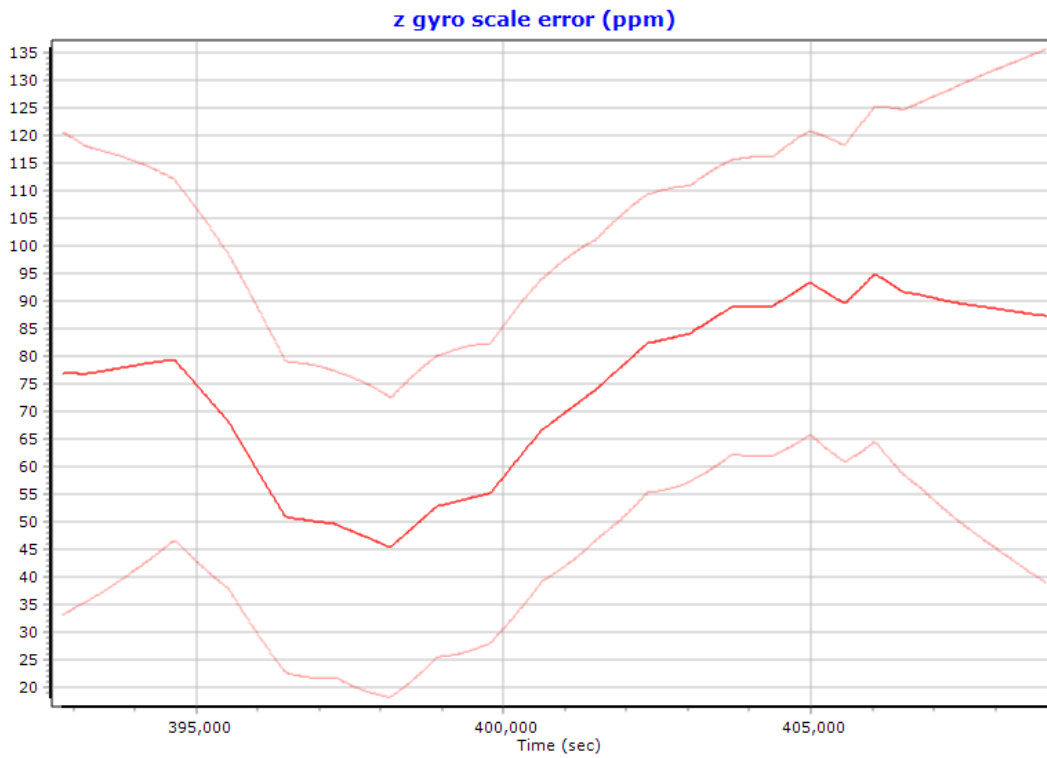
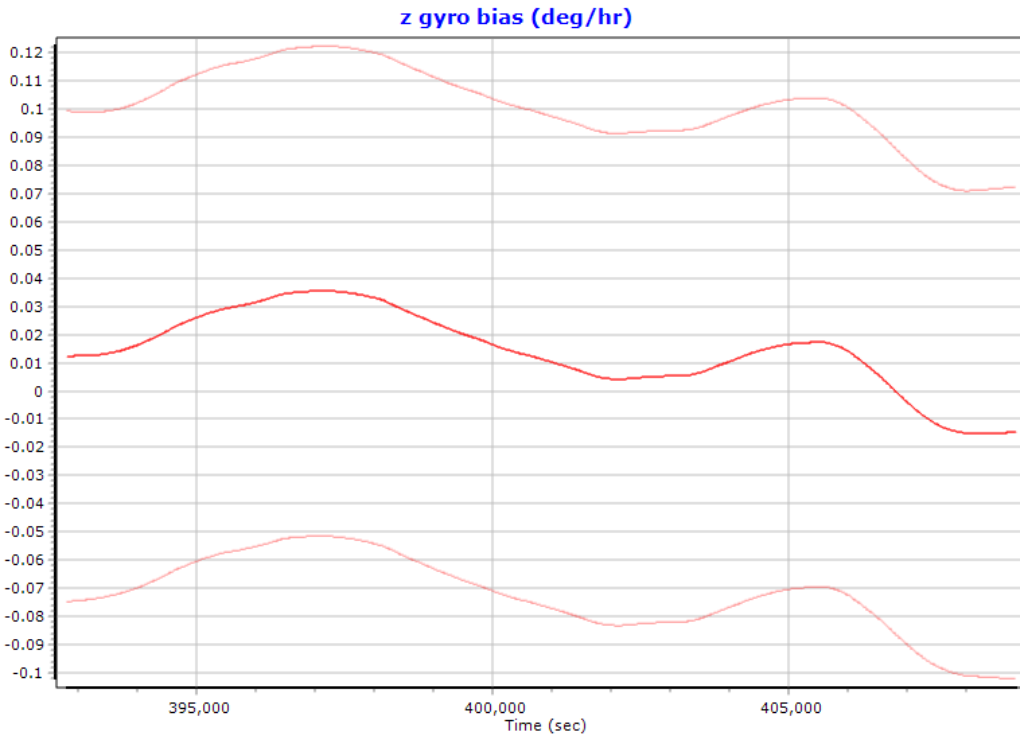
v



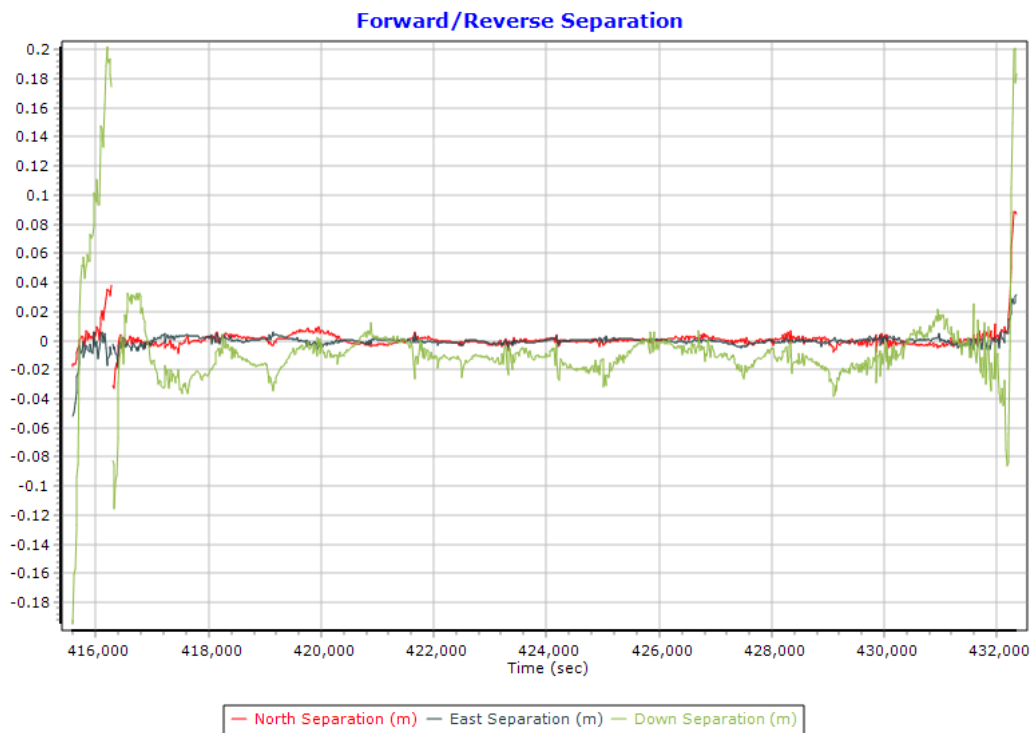
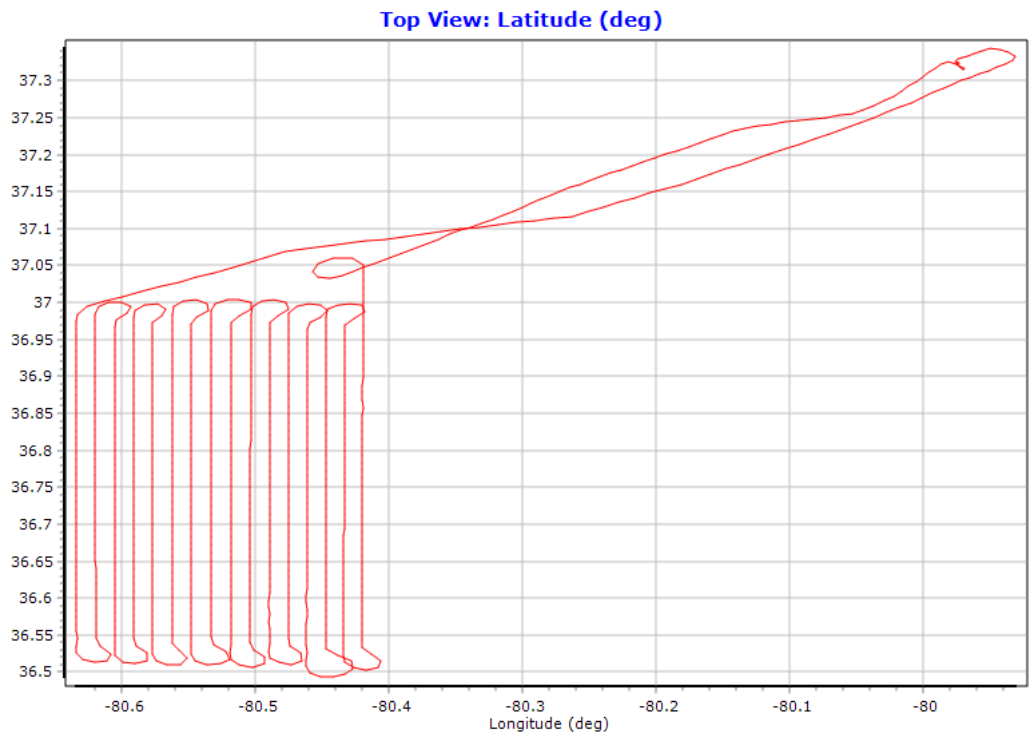


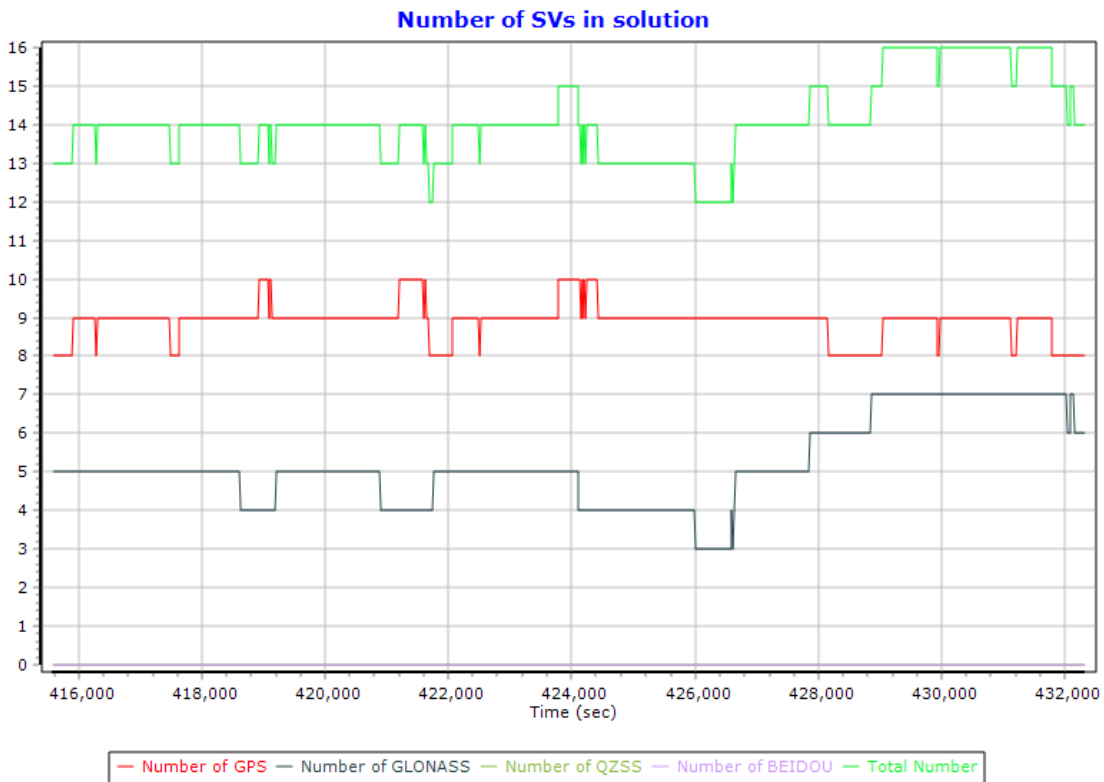
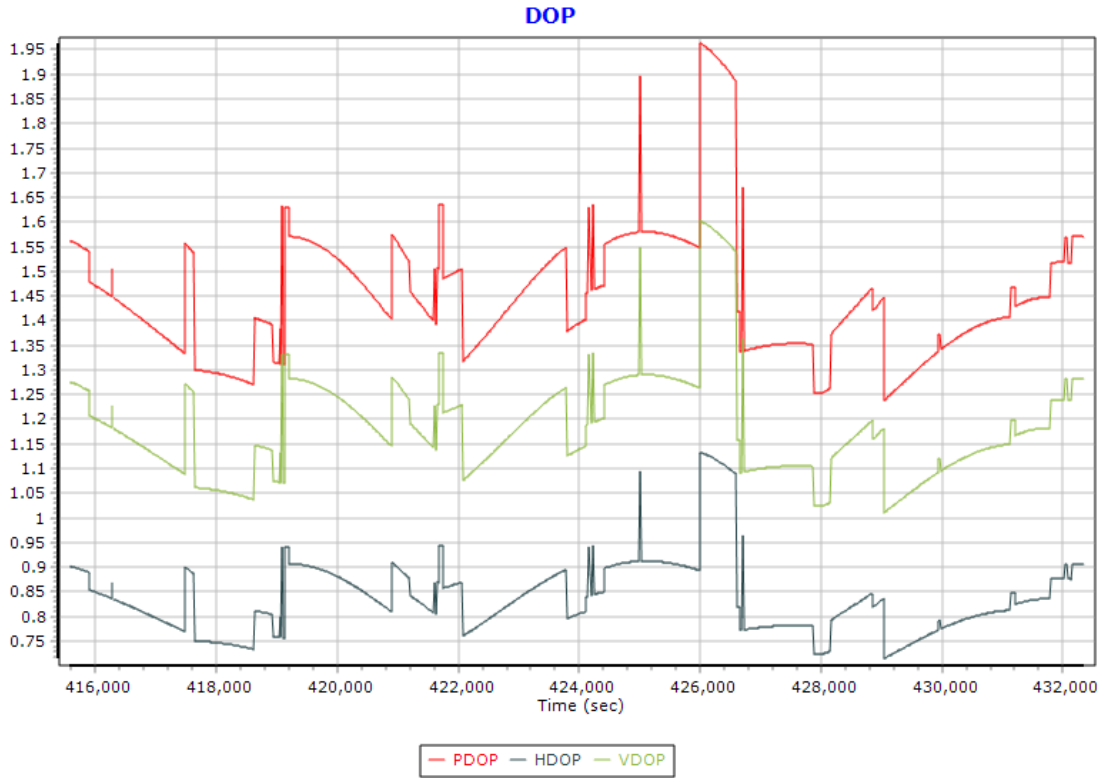






## DECEMBER 28, 2017 MISSION 2





## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171228\_VA\_B

Solution Type: IN-Fusion SmartBase

Fixed: 16780	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 16807  
No processed position: 27

Fwd/Rev Separation RMS Values (m):

North: 0.009  
East: 0.005  
Height: 0.034

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 8418 occurrences

North: 0.002  
East: 0.001  
Height: 0.012

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.262

0.10 - 0.30 m: 0.738

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.45%

Baseline Distances (km):

Maximum: 70.9

Minimum: 0.25

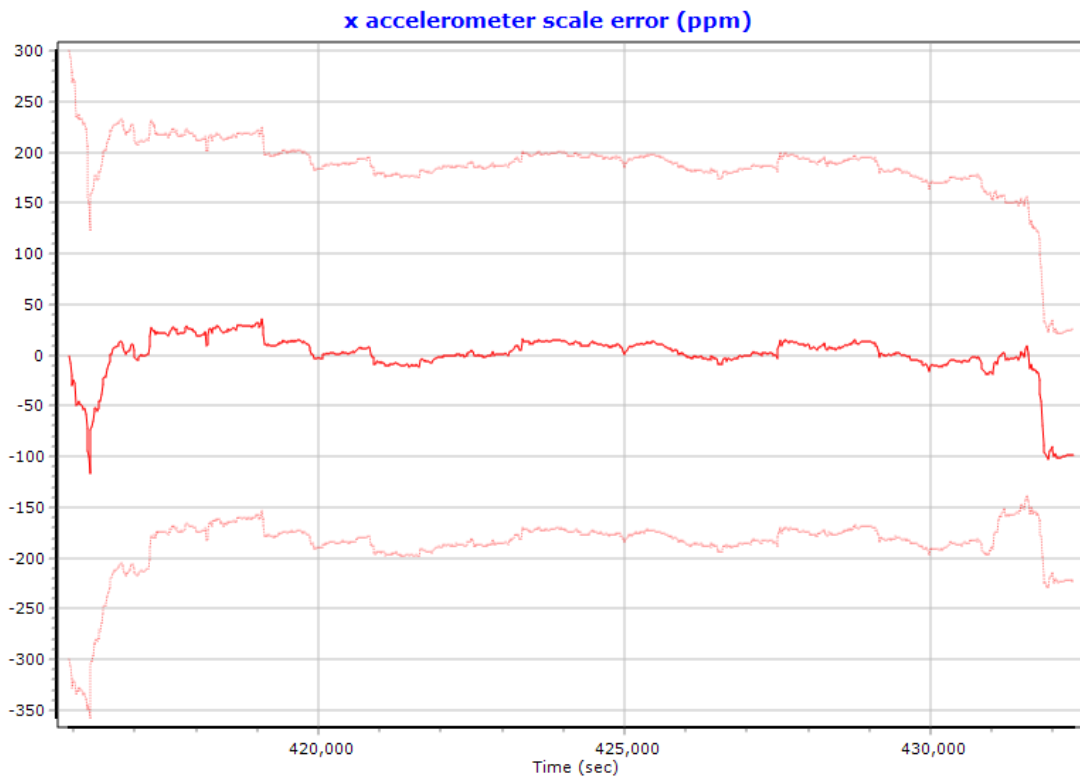
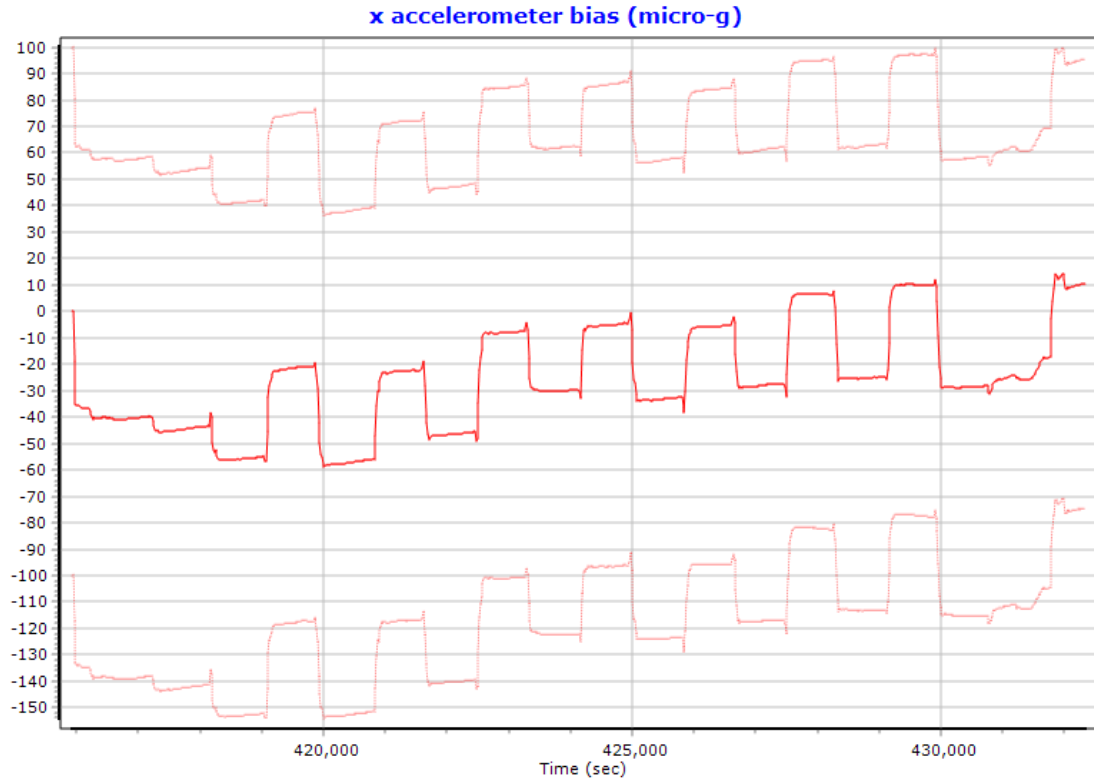
Average: 25.52

First Epoch: 67.46

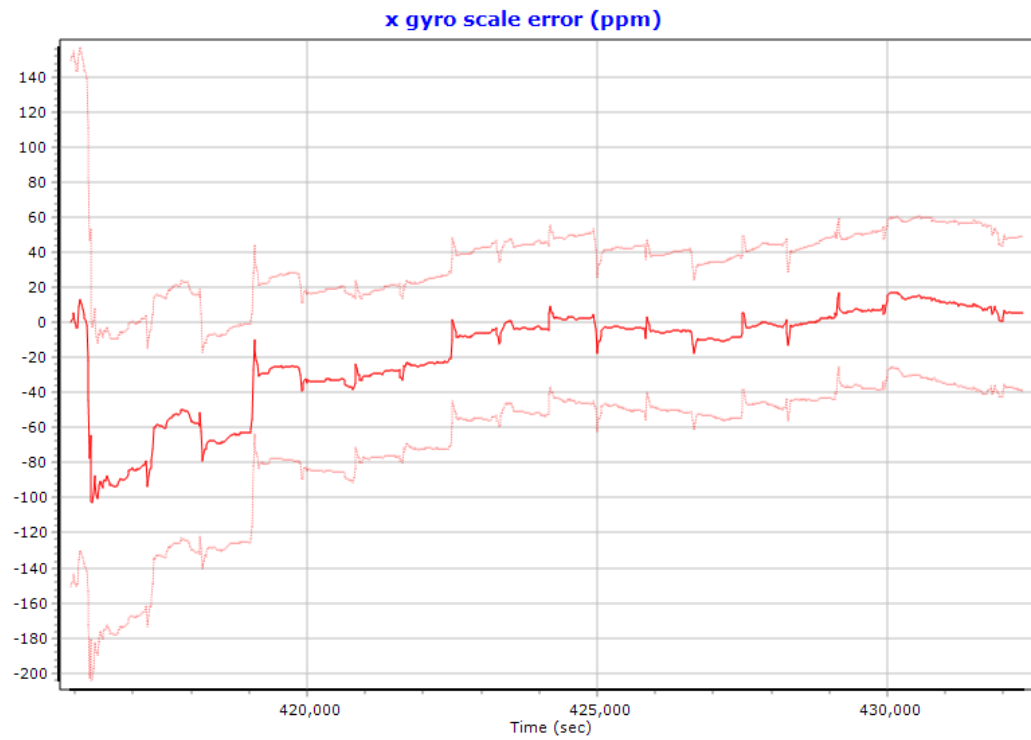
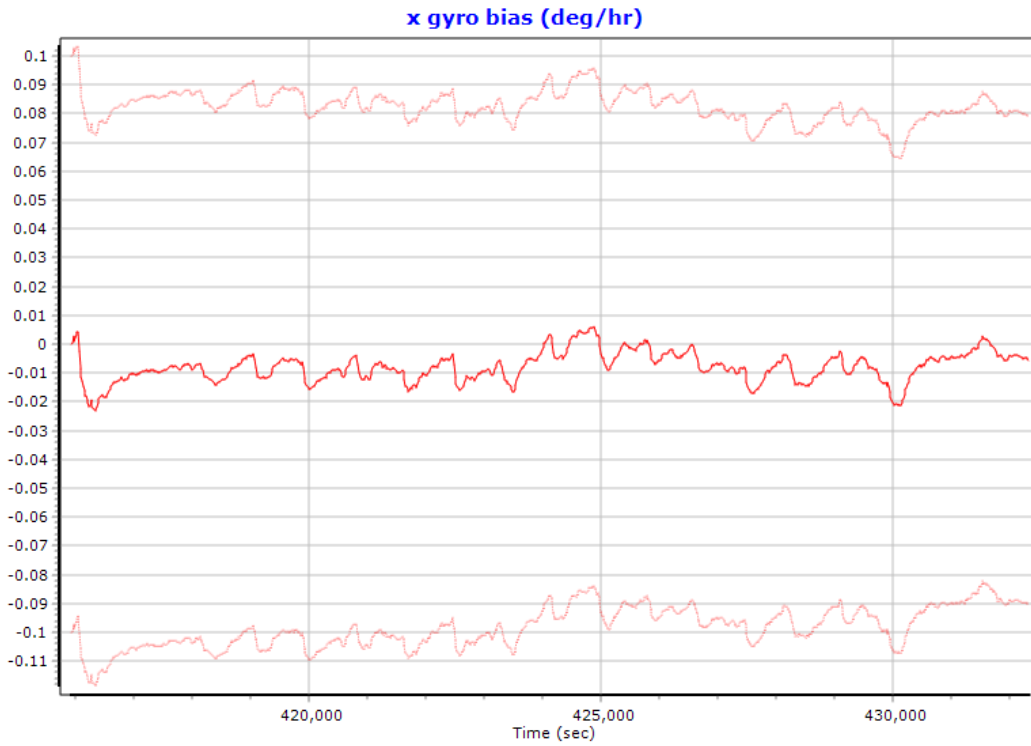
Last Epoch: 67.46

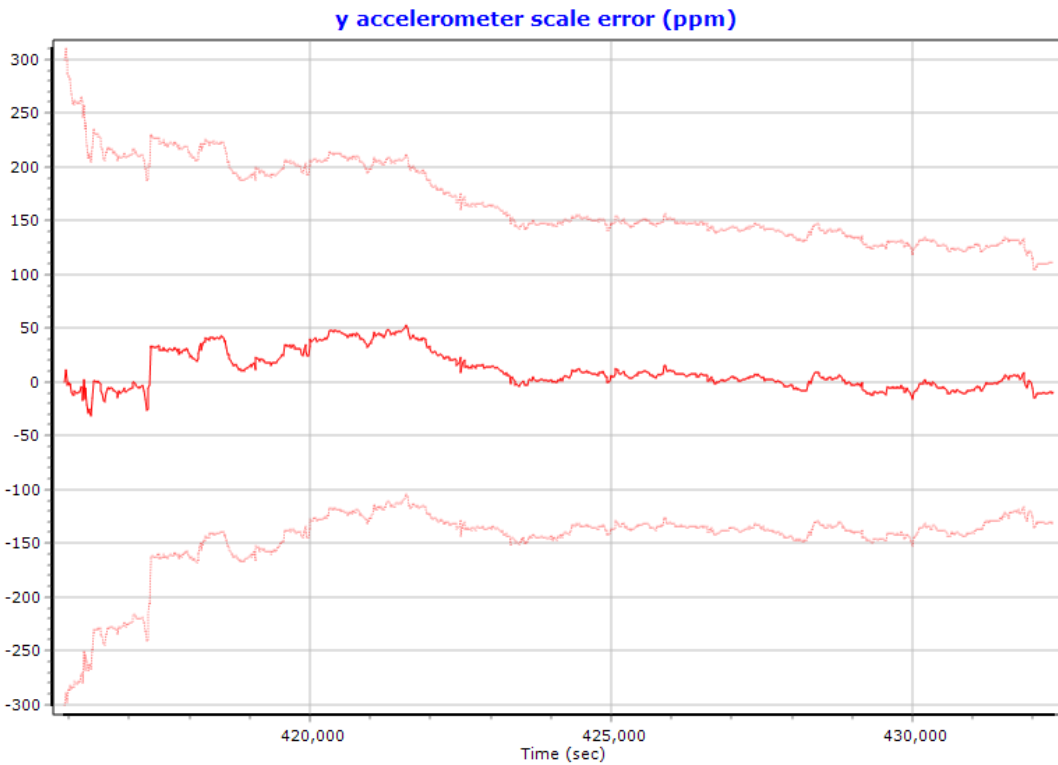
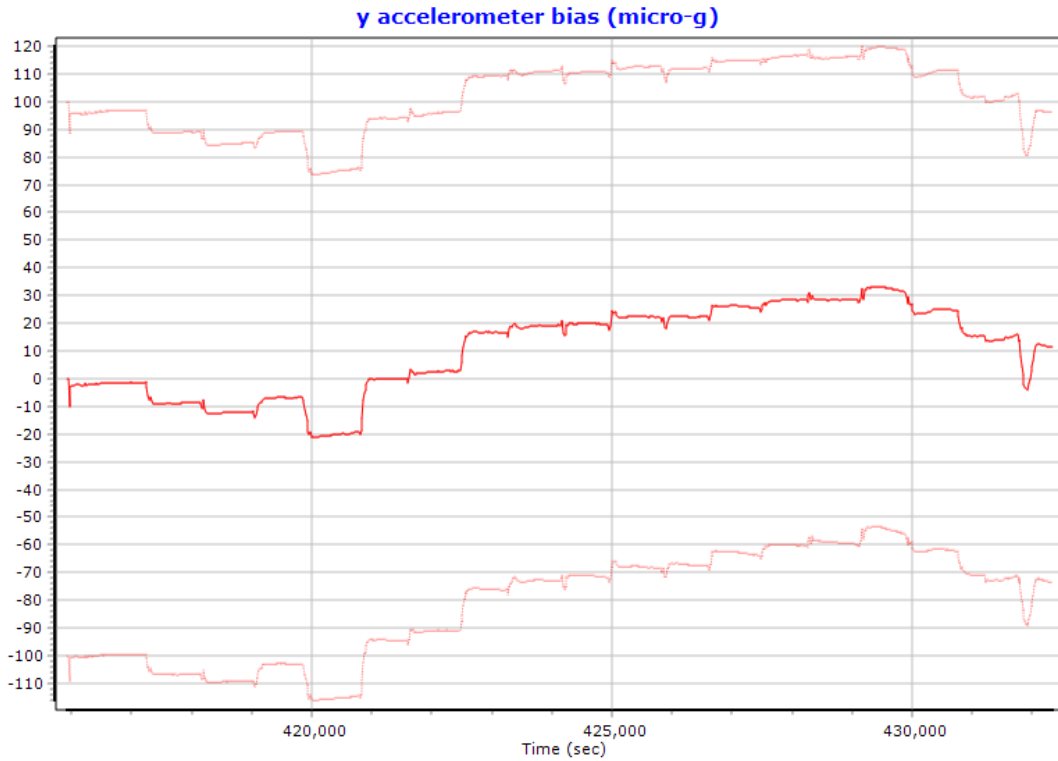
### CORS Base Stations

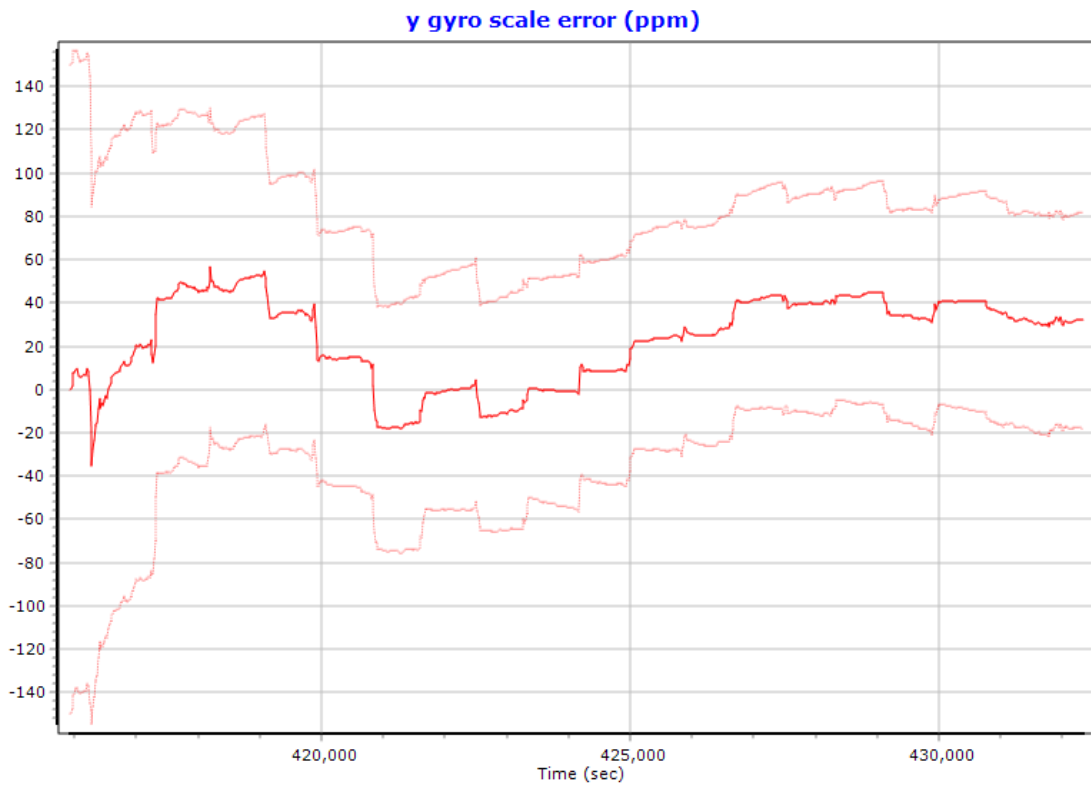
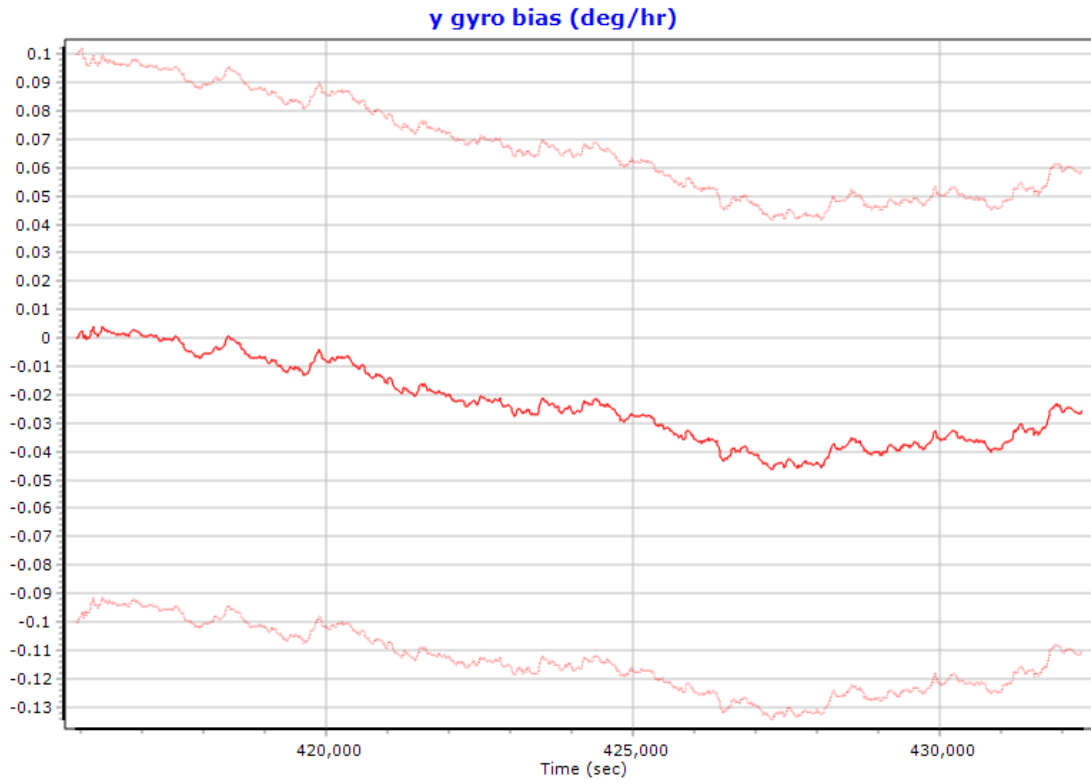
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVAT	N37°25'42.67838"	W81°04'04.40392"	704.674	N37°25'42.67841"	W81°04'04.40403"	704.687
NCWC	N36°22'19.71491"	W80°11'05.64910"	274.974	N36°22'19.71484"	W80°11'05.64908"	275.088
NCSR	N36°29'51.93288"	W81°06'52.95776"	838.659	N36°29'51.93277"	W81°06'52.95793"	838.659
LS04	N37°21'47.16696"	W79°57'26.99414"	324.139	N37°21'47.16706"	W79°57'26.99405"	324.142
DOBS	N36°25'31.54122"	W80°43'11.73528"	339.304			

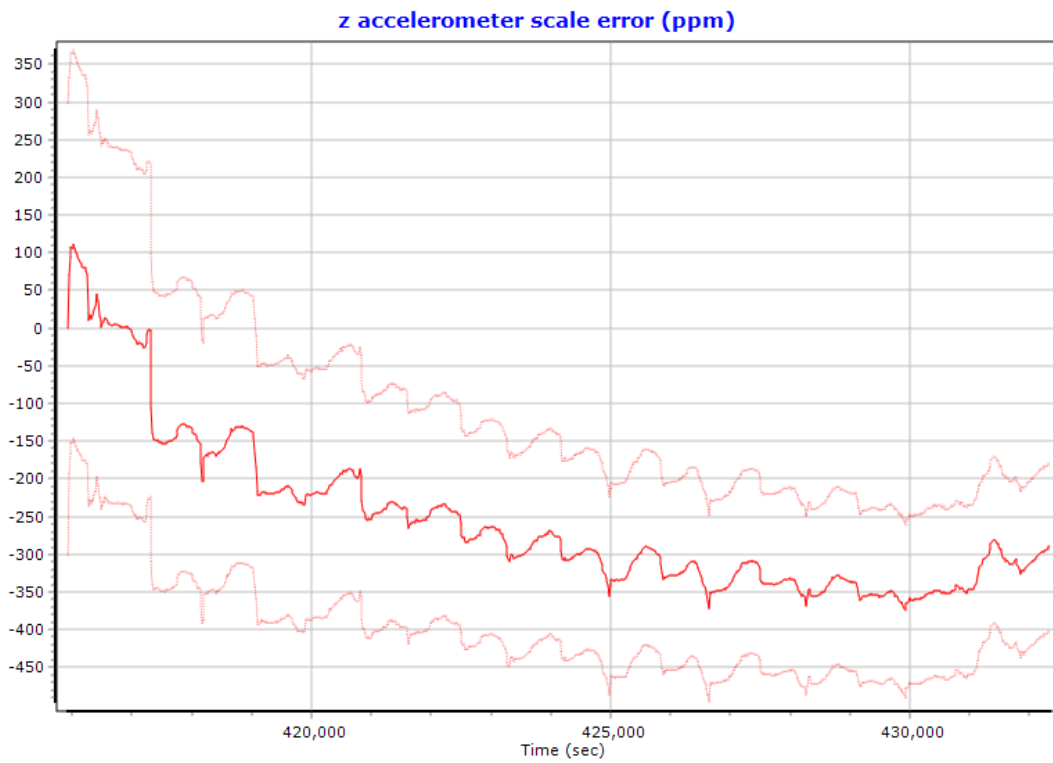
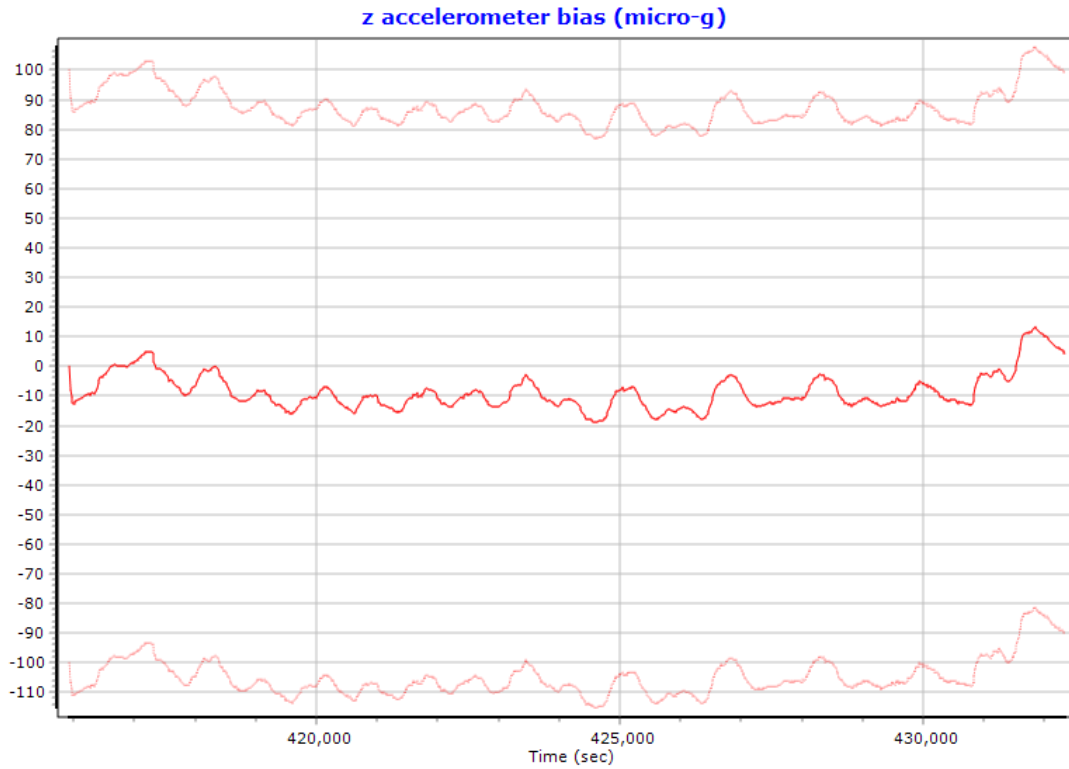


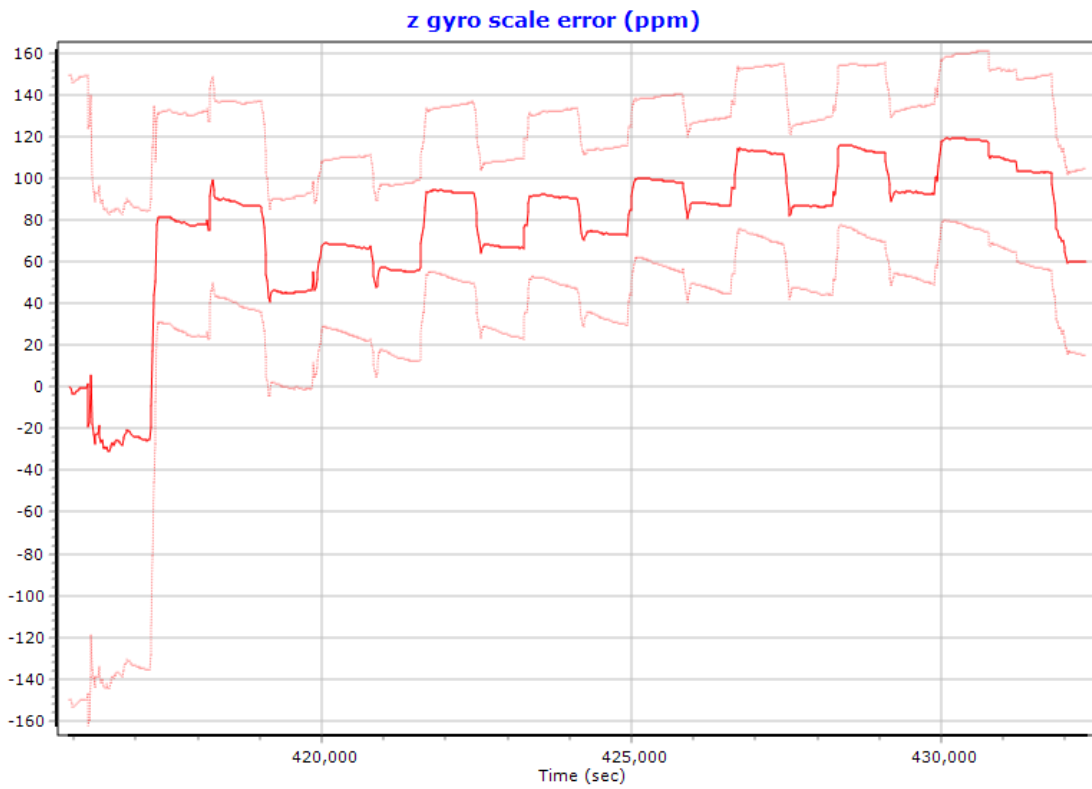
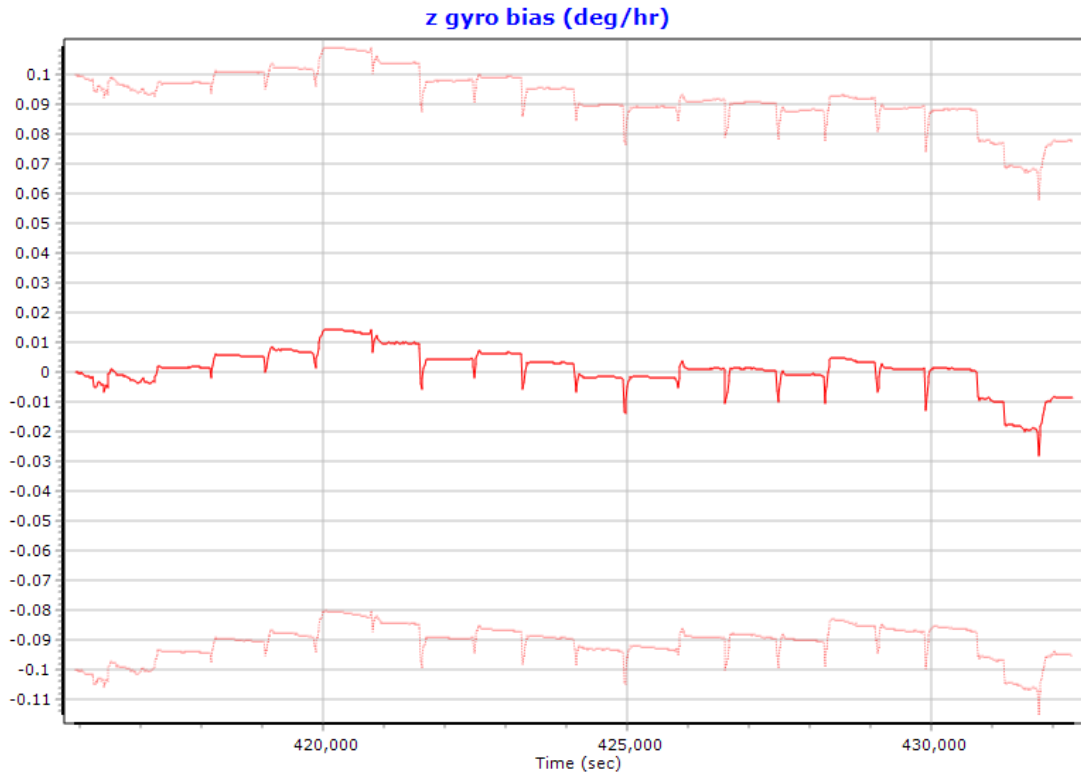






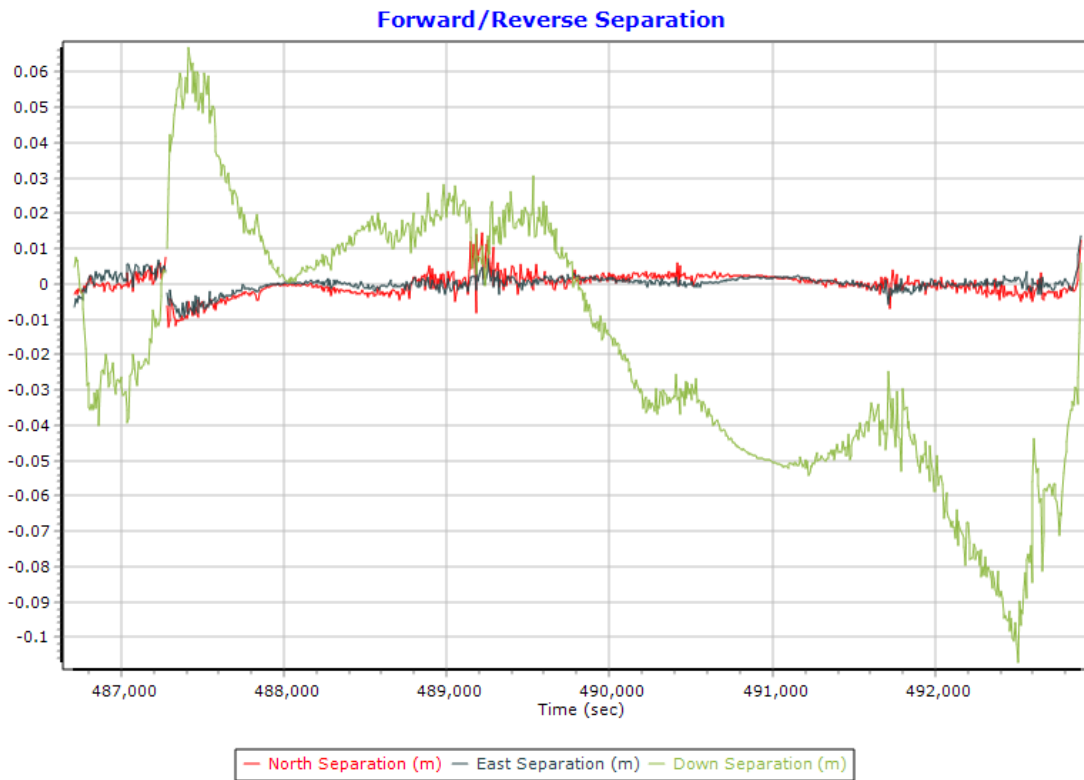
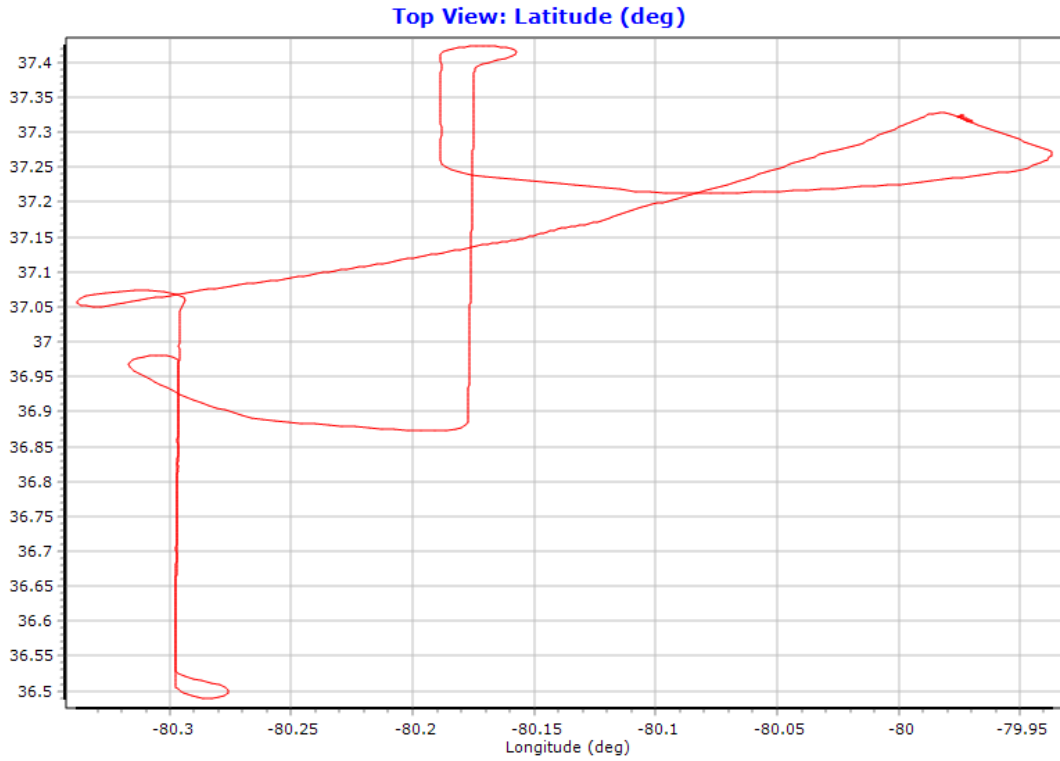






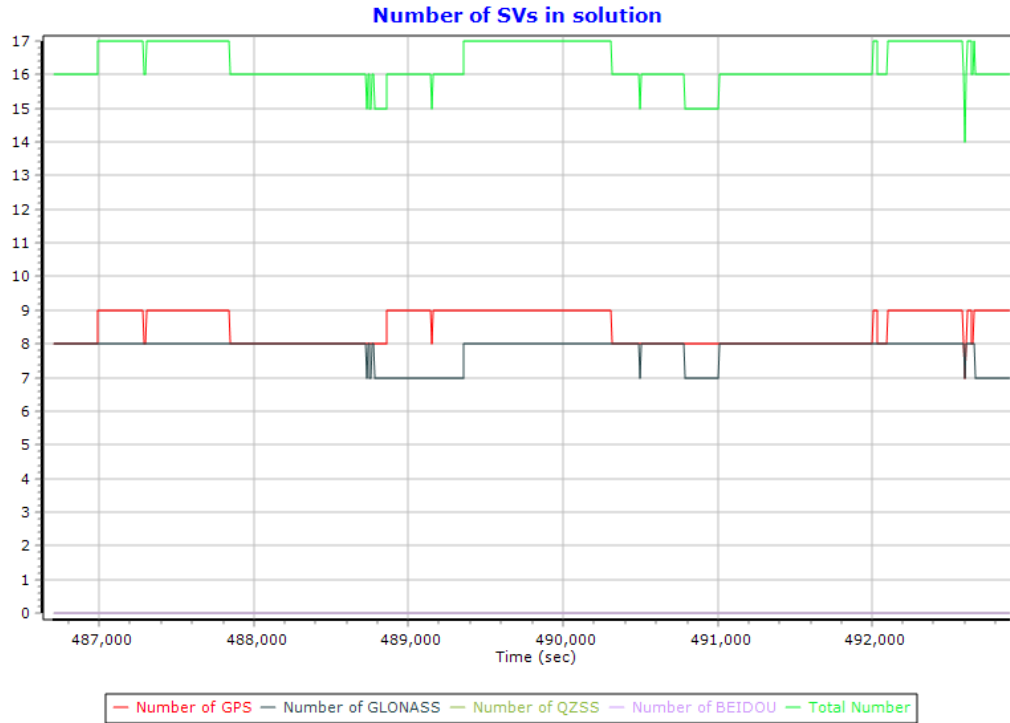
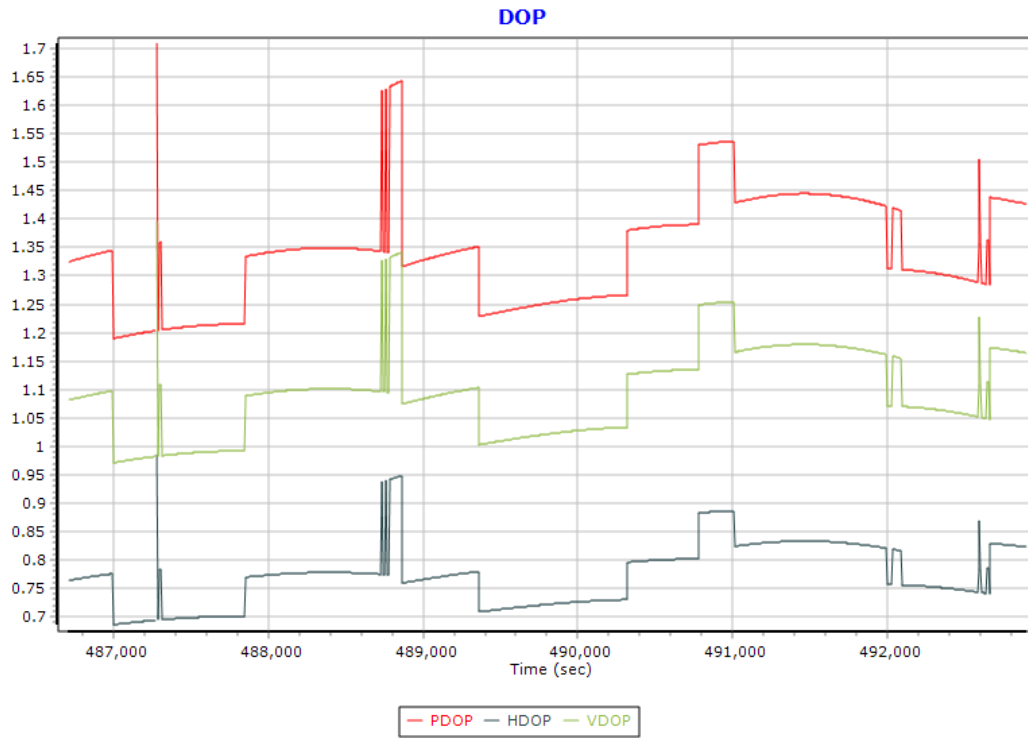
Virginia West Chesapeake Central LiDAR  
TO# G15PD00714  
July 17, 2018  
Page 134 of 202

**DECEMBER 29, 2017**









## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20171229\_VA

Solution Type: IN-Fusion SmartBase

Fixed: 6198	(99.98%)
Float: 0	(0.00%)
No Solution: 1	(0.02%)

Number of Epochs:

Total in RAW file: 6203  
No processed position: 5

Fwd/Rev Separation RMS Values (m):

North: 0.003  
East: 0.002  
Height: 0.040

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 3099 occurrences

North: 0.003  
East: 0.001  
Height: 0.029

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 100  
 0.10 - 0.30 m: 0  
 0.30 - 1.00 m: 0  
 1.00 - 5.00 m: 0  
 5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

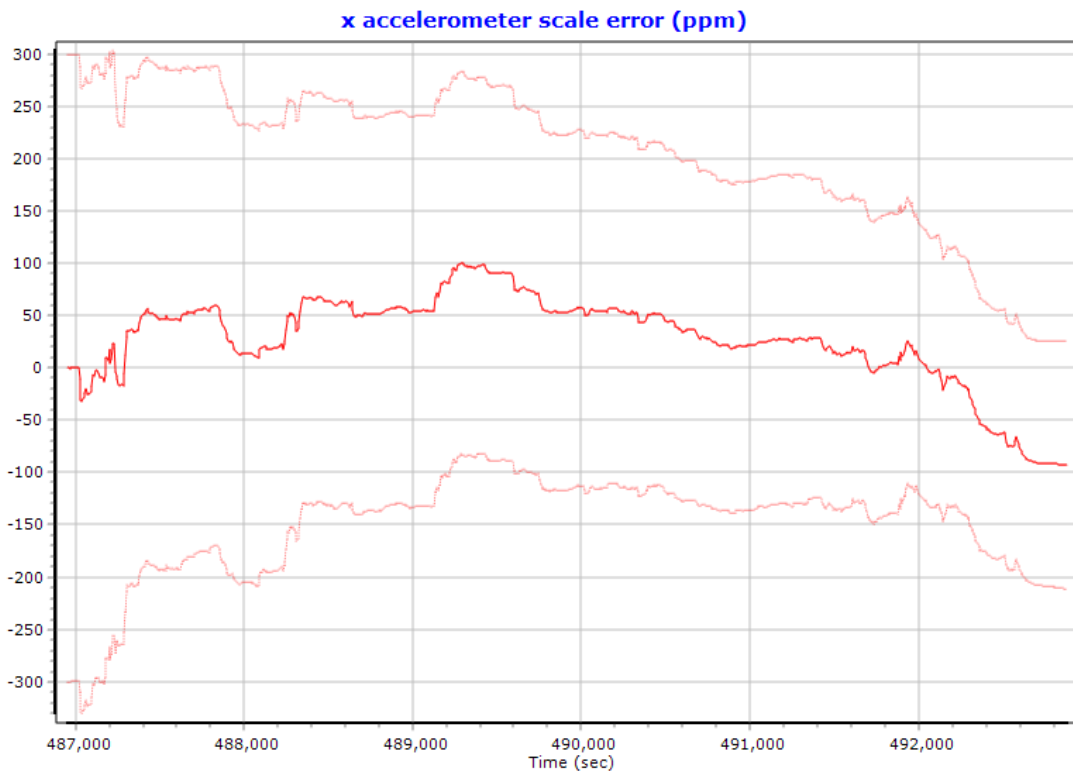
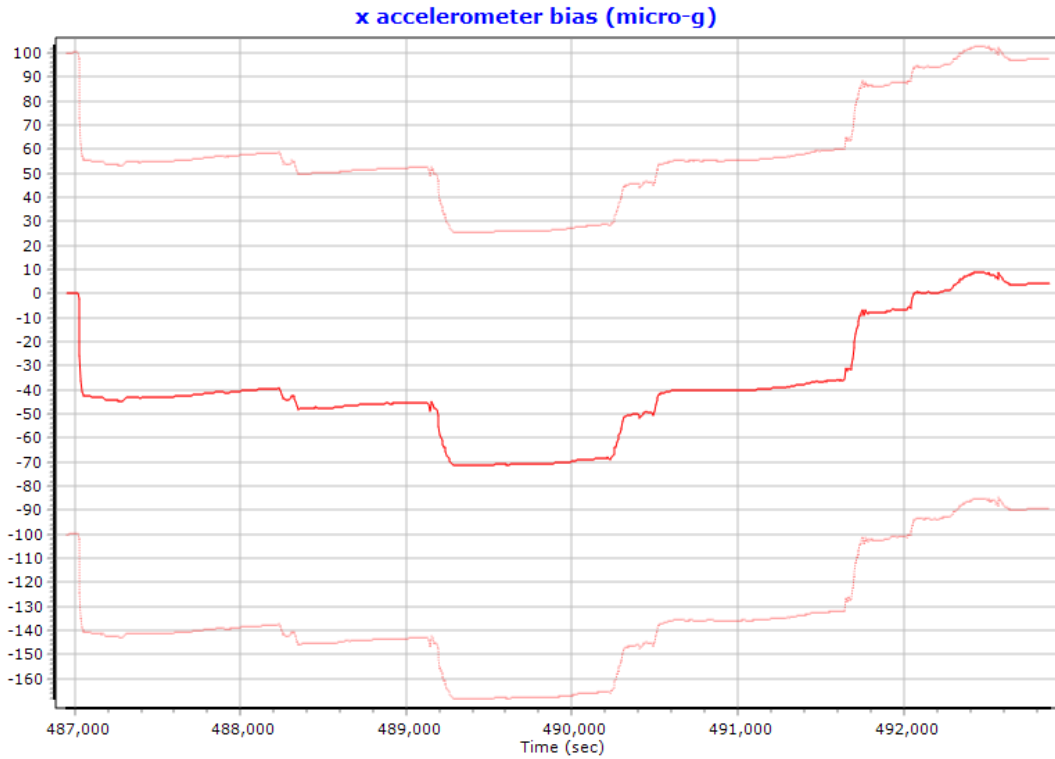
DOP over Tol: 1.34%

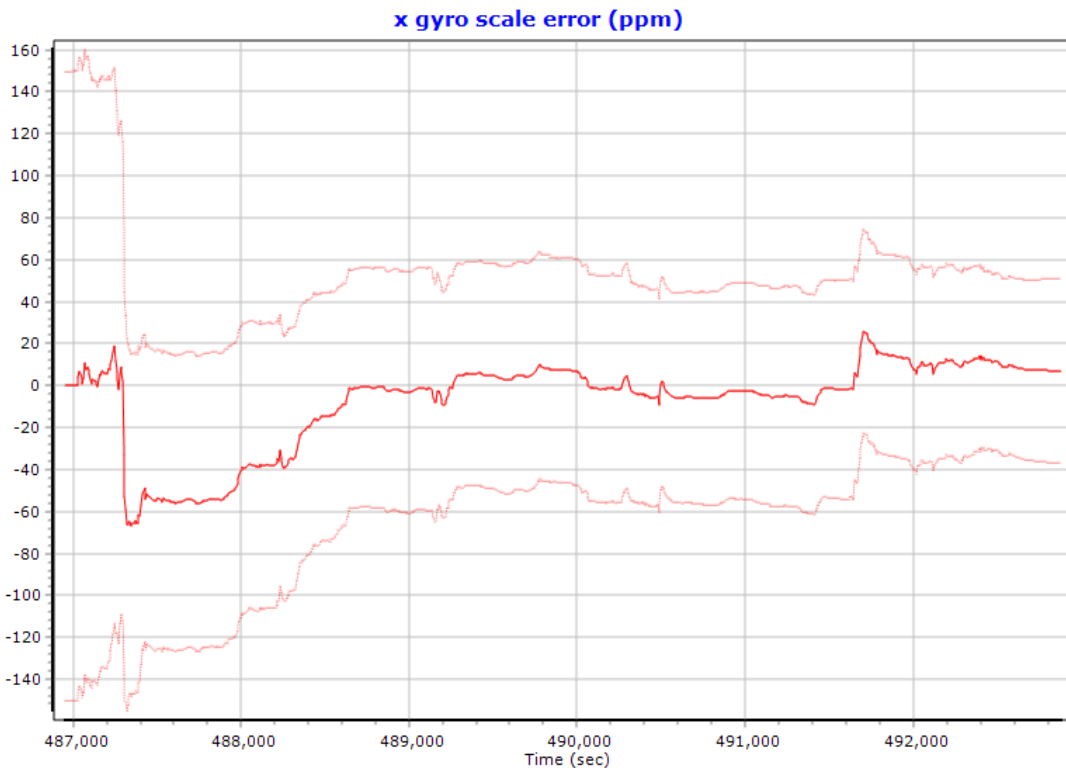
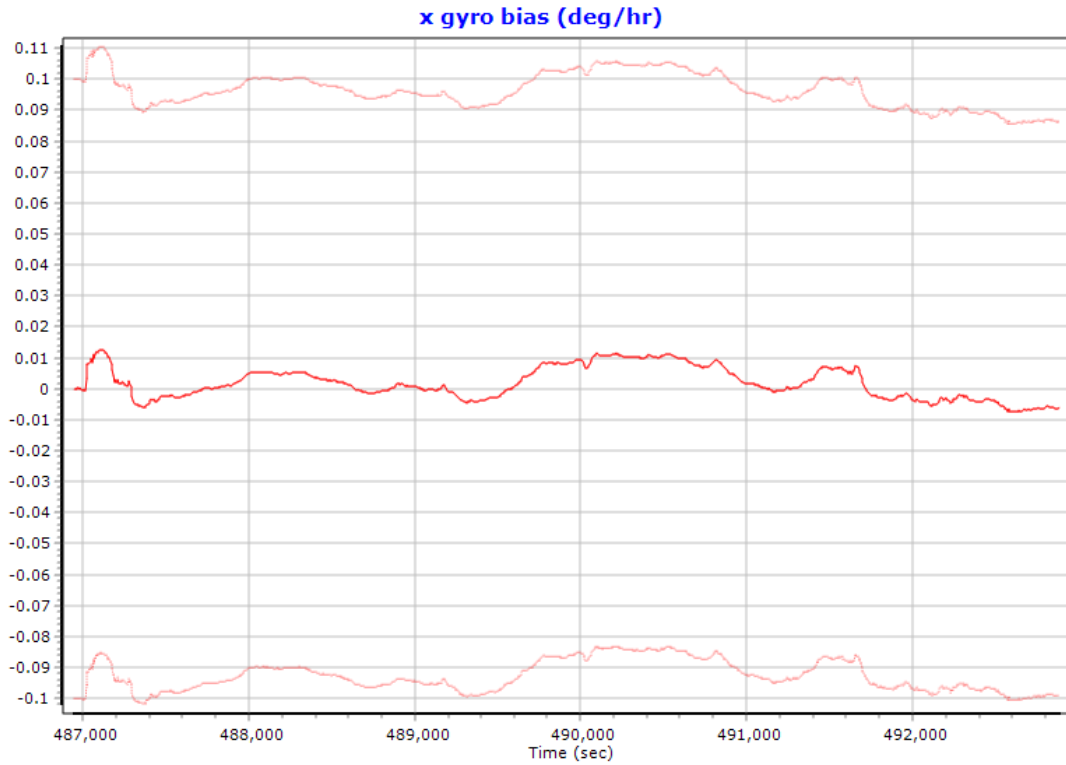
Baseline Distances (km):

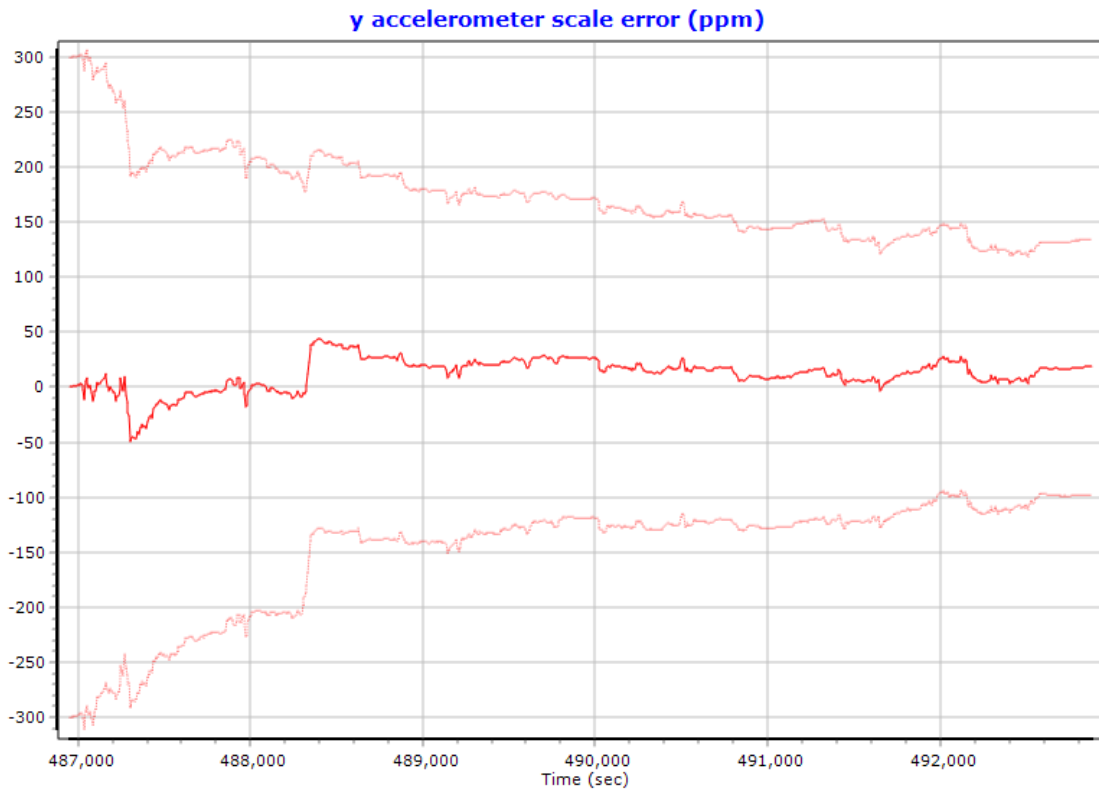
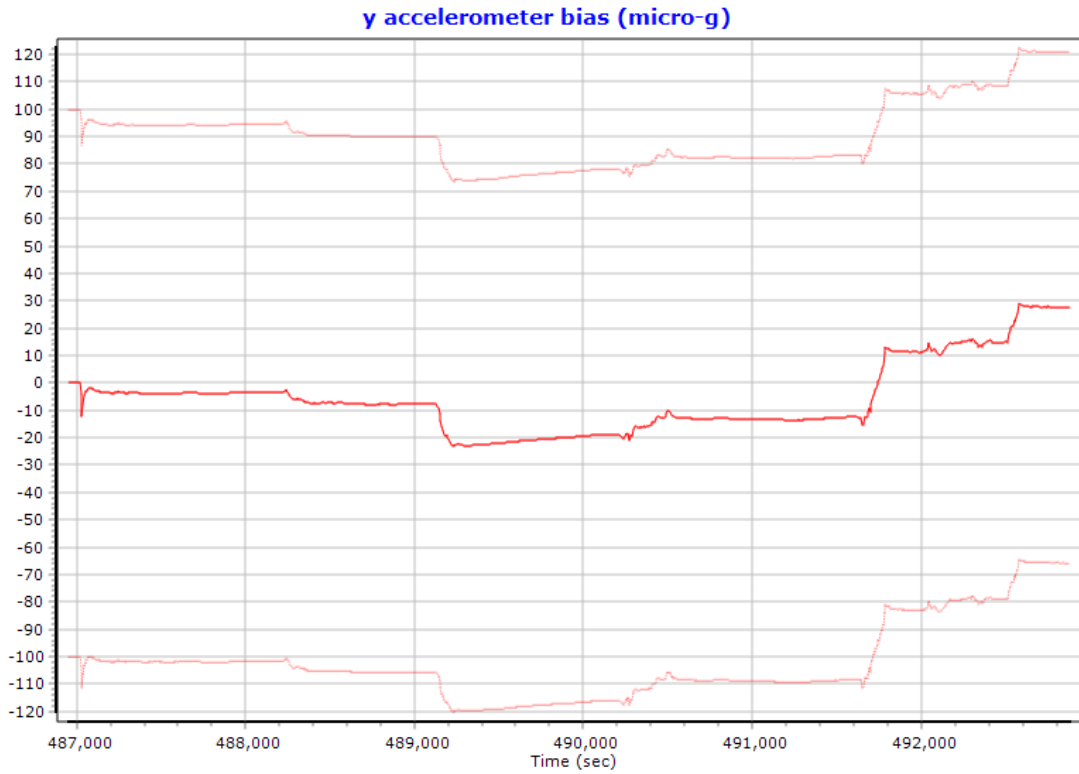
Maximum: 64.57  
 Minimum: 0.76  
 Average: 27.09  
 First Epoch: 33.88  
 Last Epoch: 33.74

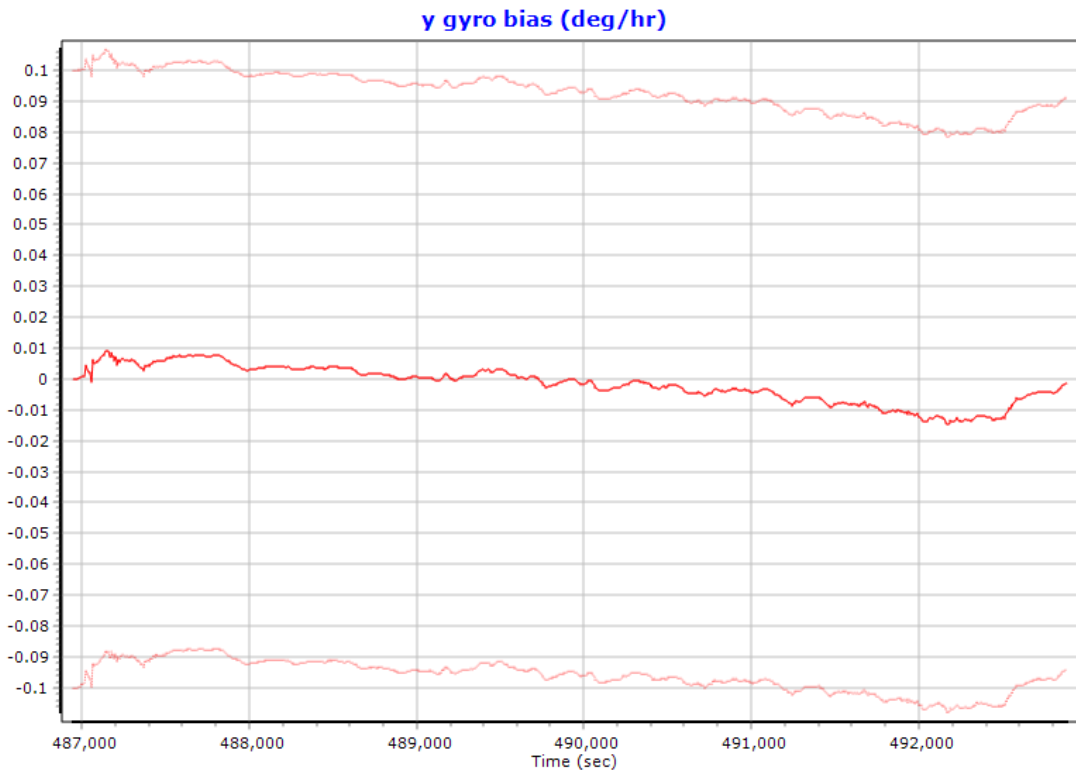
CORS Base Stations

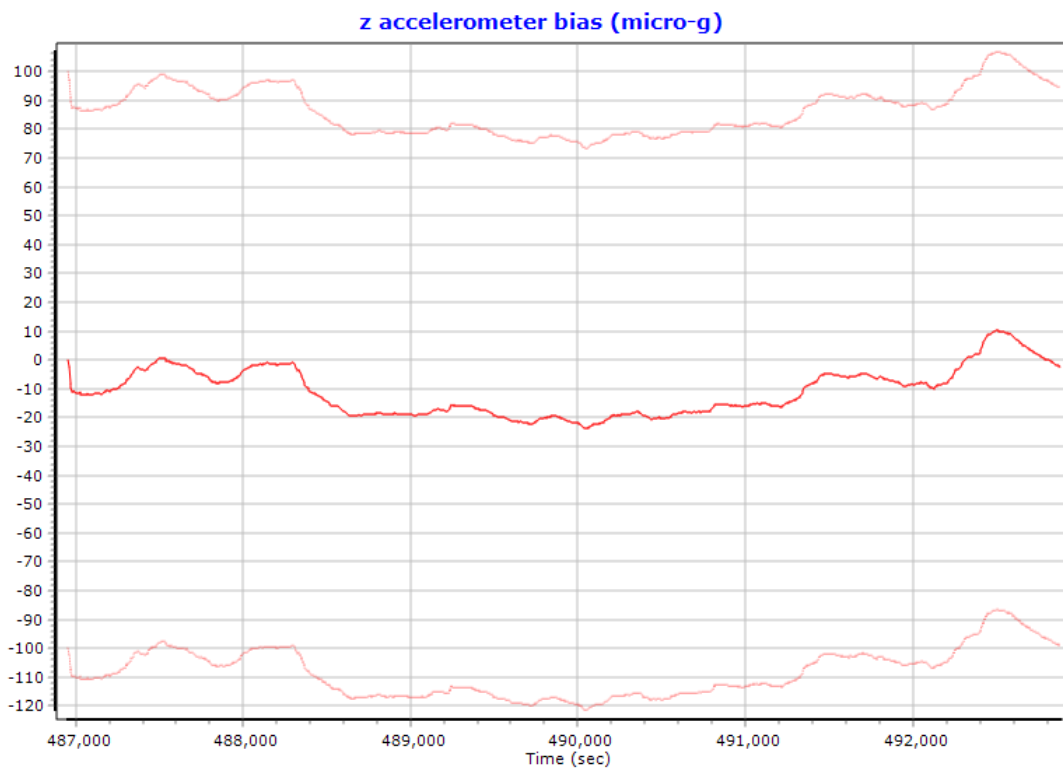
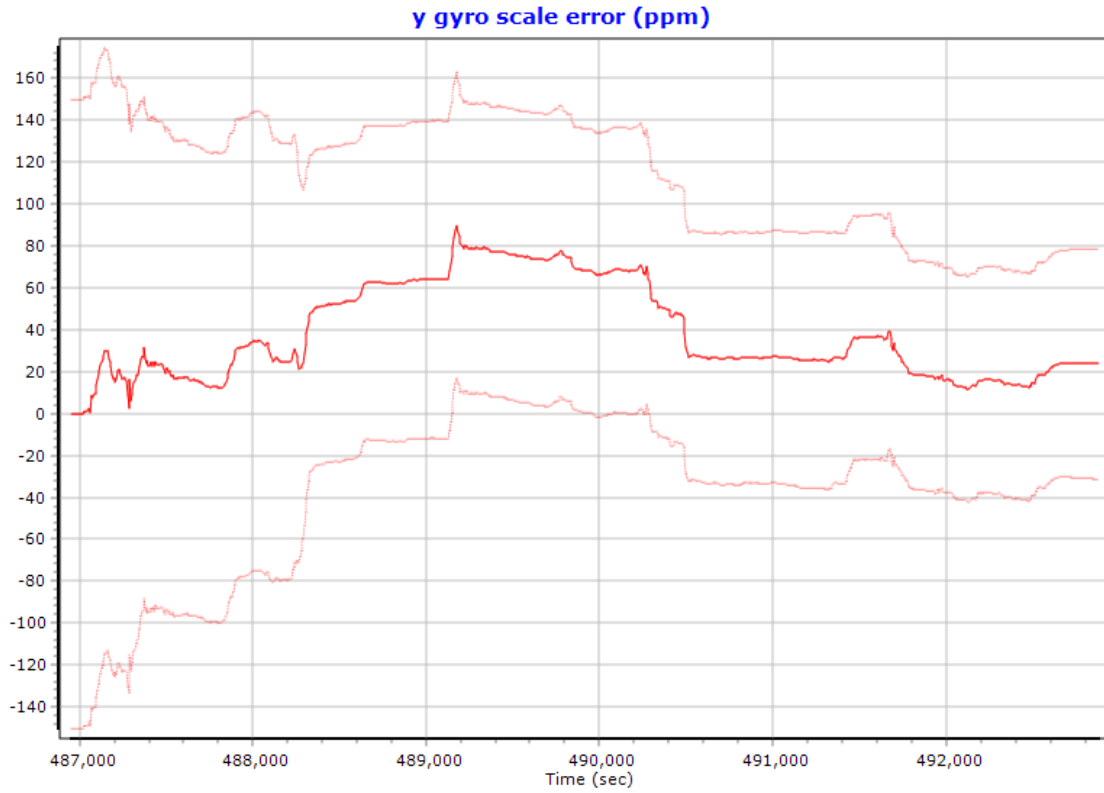
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVLE	N37°49'20.23028"	W80°25'18.58185"	655.2	N37°49'20.23010"	W80°25'18.58194"	655.201
WVAT	N37°25'42.67838"	W81°04'04.40392"	704.674	N37°25'42.67832"	W81°04'04.40402"	704.678
NCRE	N36°21'42.74202"	W79°39'56.56331"	233.466	N36°21'42.74179"	W79°39'56.56333"	233.466
LS04	N37°21'47.16696"	W79°57'26.99414"	324.139			
DOBS	N36°25'31.54122"	W80°43'11.73528"	339.304	N36°25'31.54123"	W80°43'11.73528"	339.298



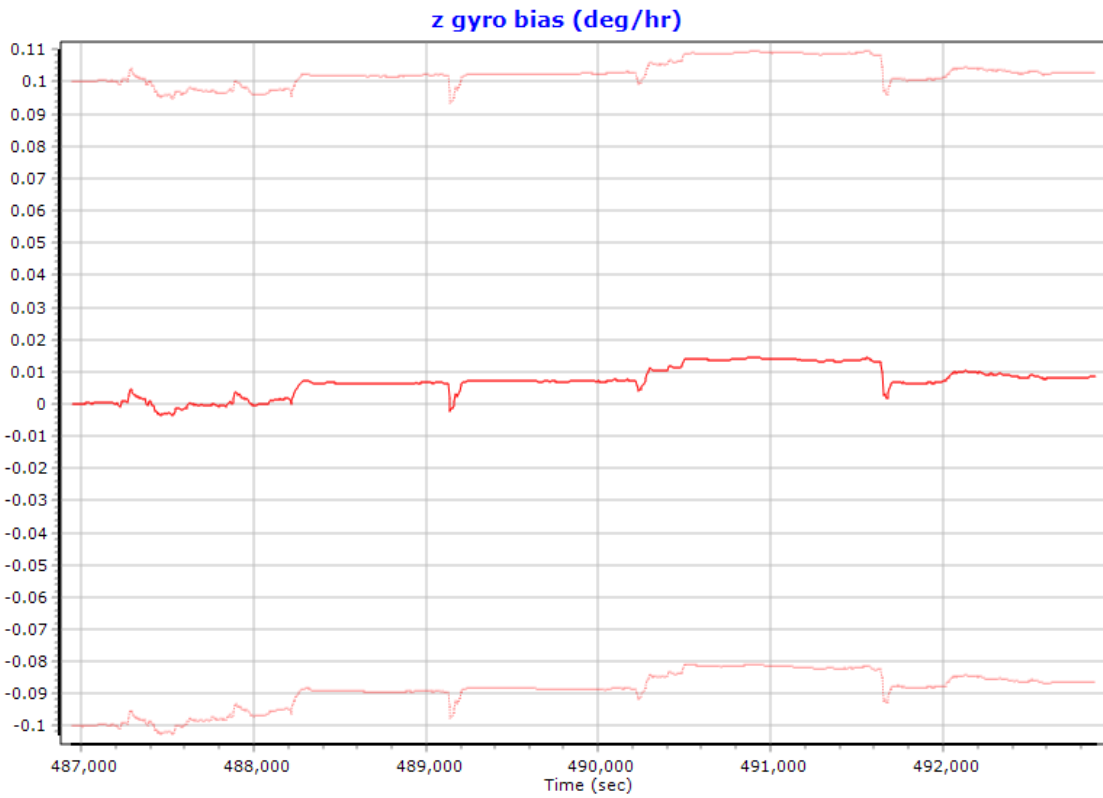
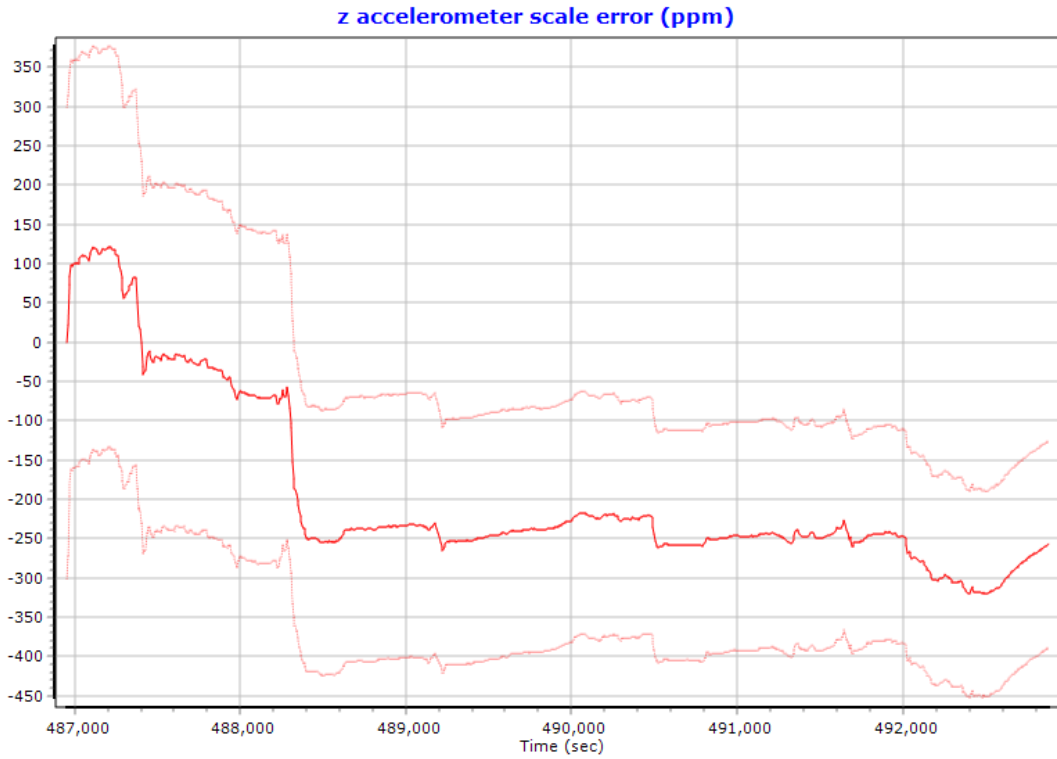


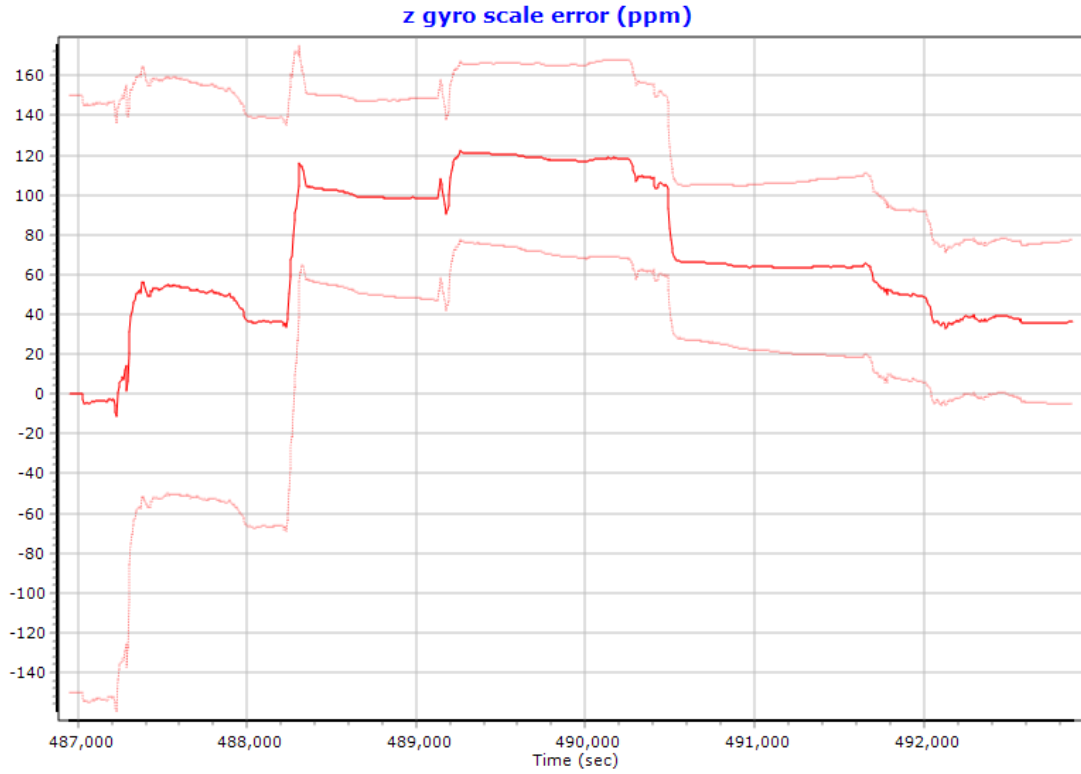








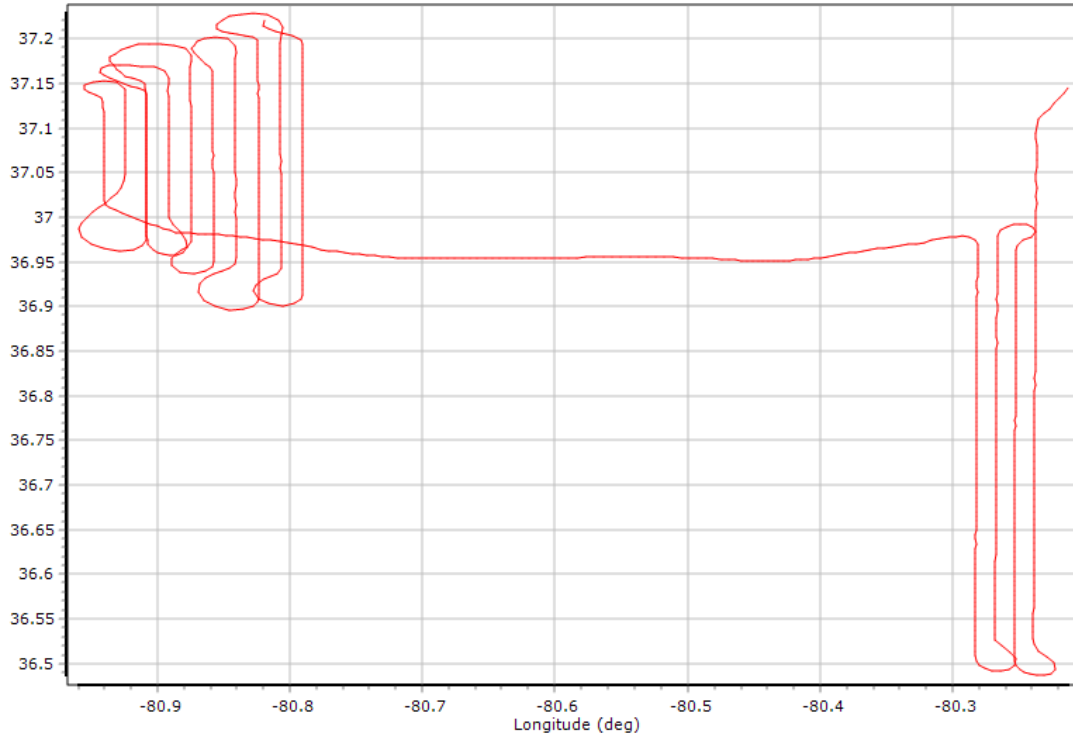




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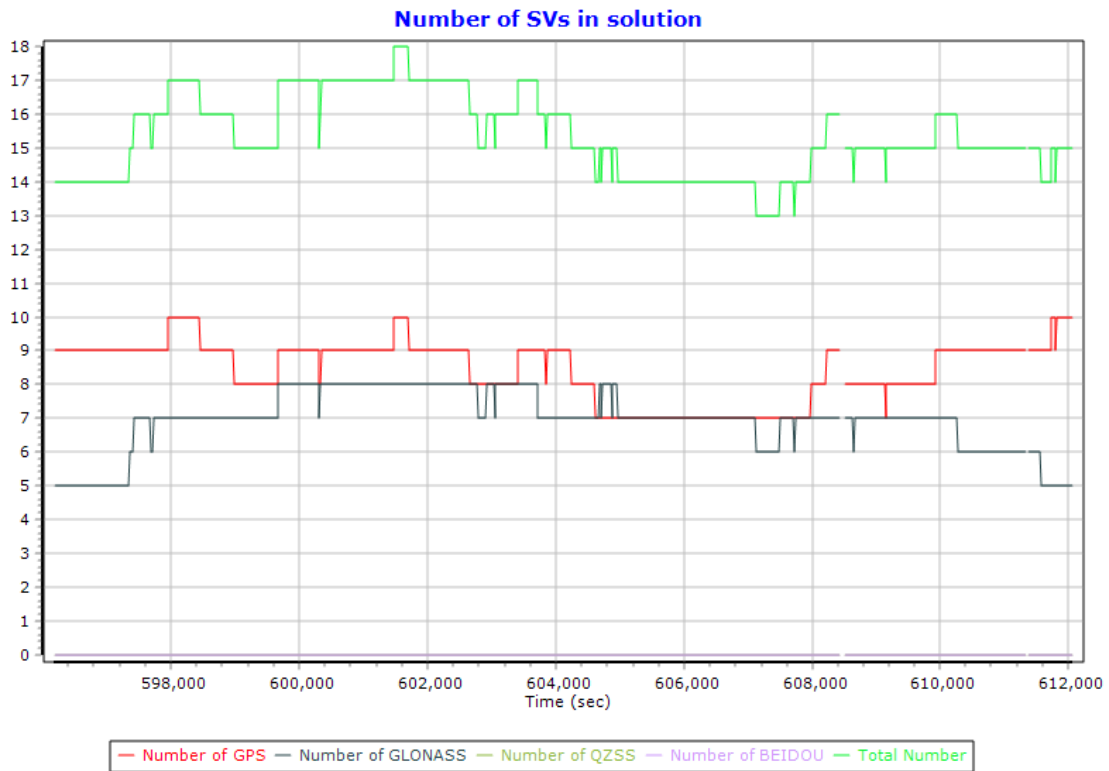
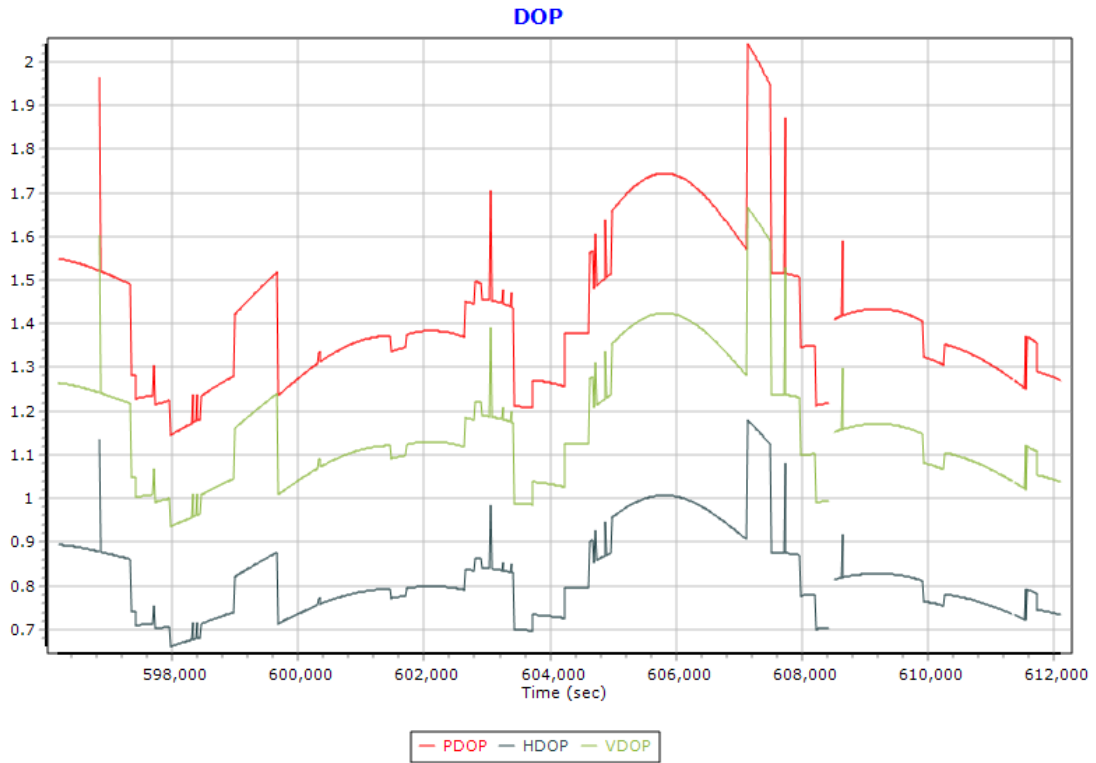
**JANUARY 06, 2018**

Top View: Latitude (deg)



Forward/Reverse Separation





## Processing Summary Information

### Processing Summary Information

Program: POSpac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20180106\_VA

Solution Type: IN-Fusion SmartBase

Fixed: 15813	(99.52%)
Float: 0	(0.00%)
No Solution: 77	(0.48%)

Number of Epochs:

Total in RAW file: 15935  
No processed position: 122

Fwd/Rev Separation RMS Values (m):

North: 0.008  
East: 0.011  
Height: 0.052

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 7968 occurrences

North: 0.004  
East: 0.003  
Height: 0.019

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 98.549  
 0.10 - 0.30 m: 1.539  
 0.30 - 1.00 m: 0.002  
 1.00 - 5.00 m: 0  
 5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

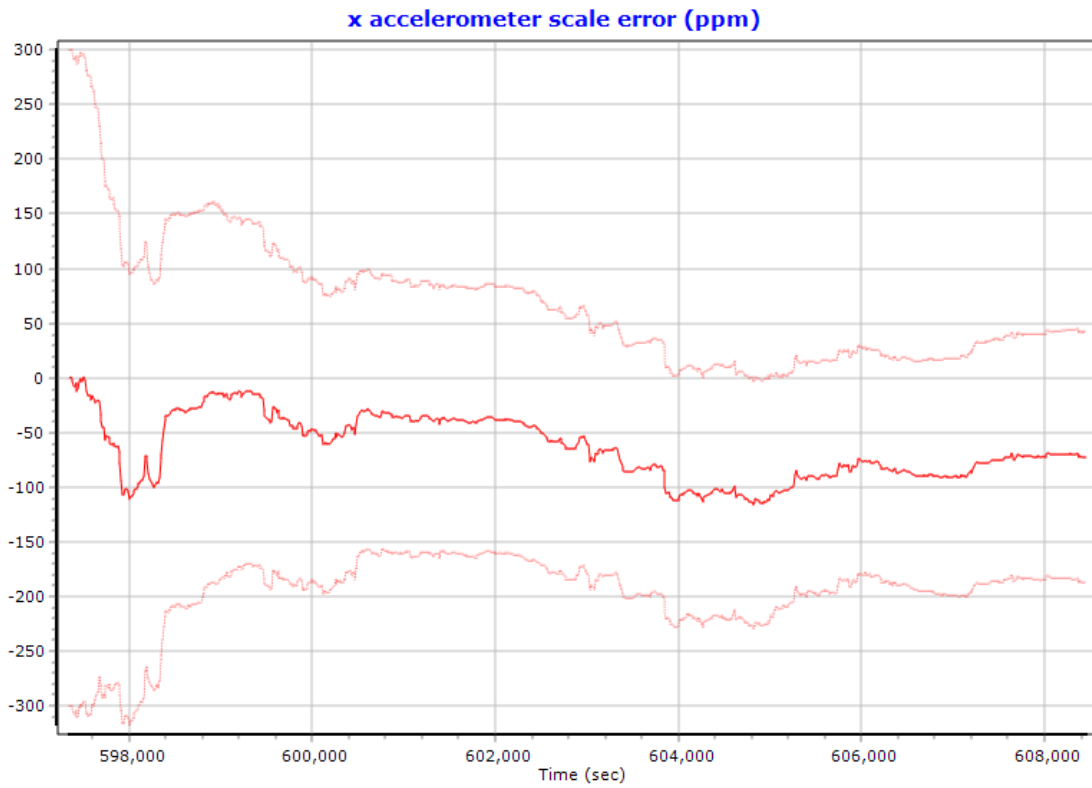
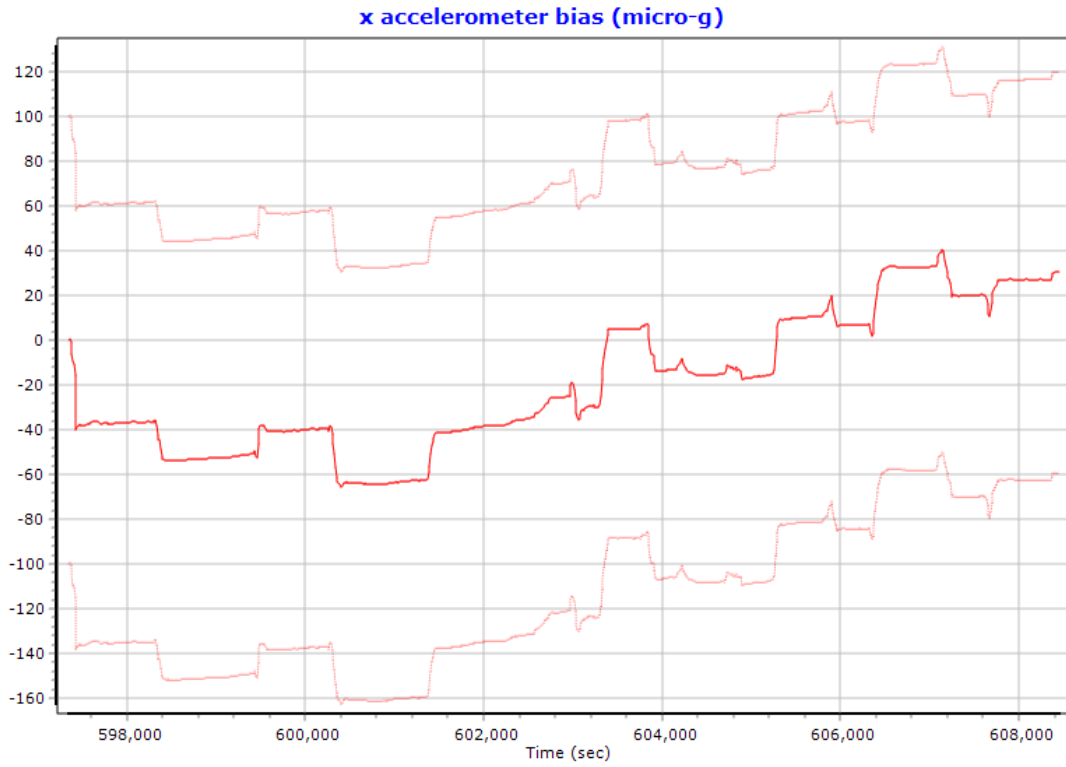
DOP over Tol: 1.43%

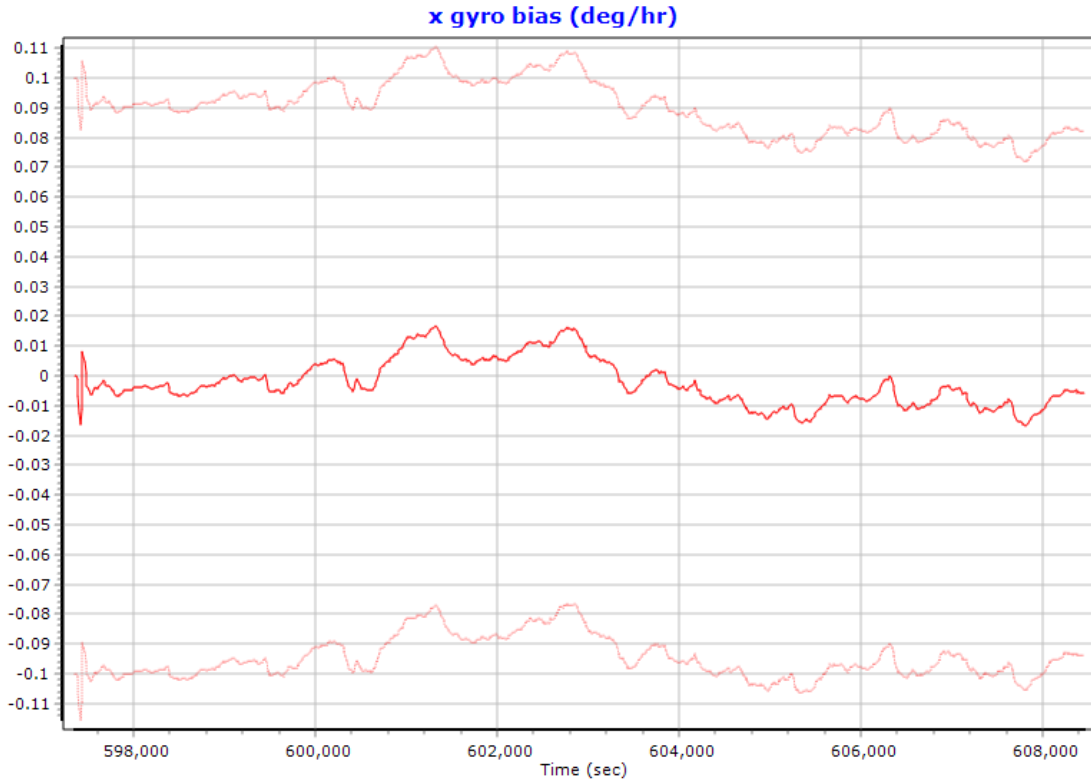
Baseline Distances (km):

Maximum: 71.72  
 Minimum: 1.24  
 Average: 35.75  
 First Epoch: 70.92  
 Last Epoch: 70.87

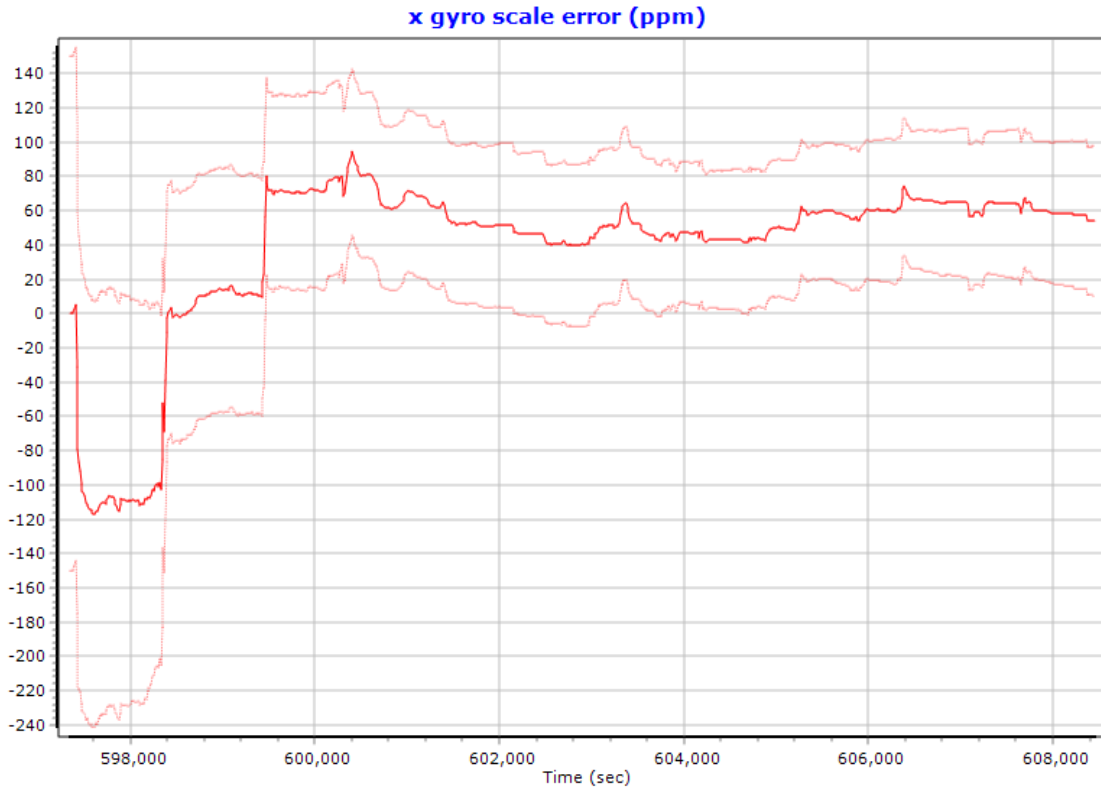
CORS Base Stations

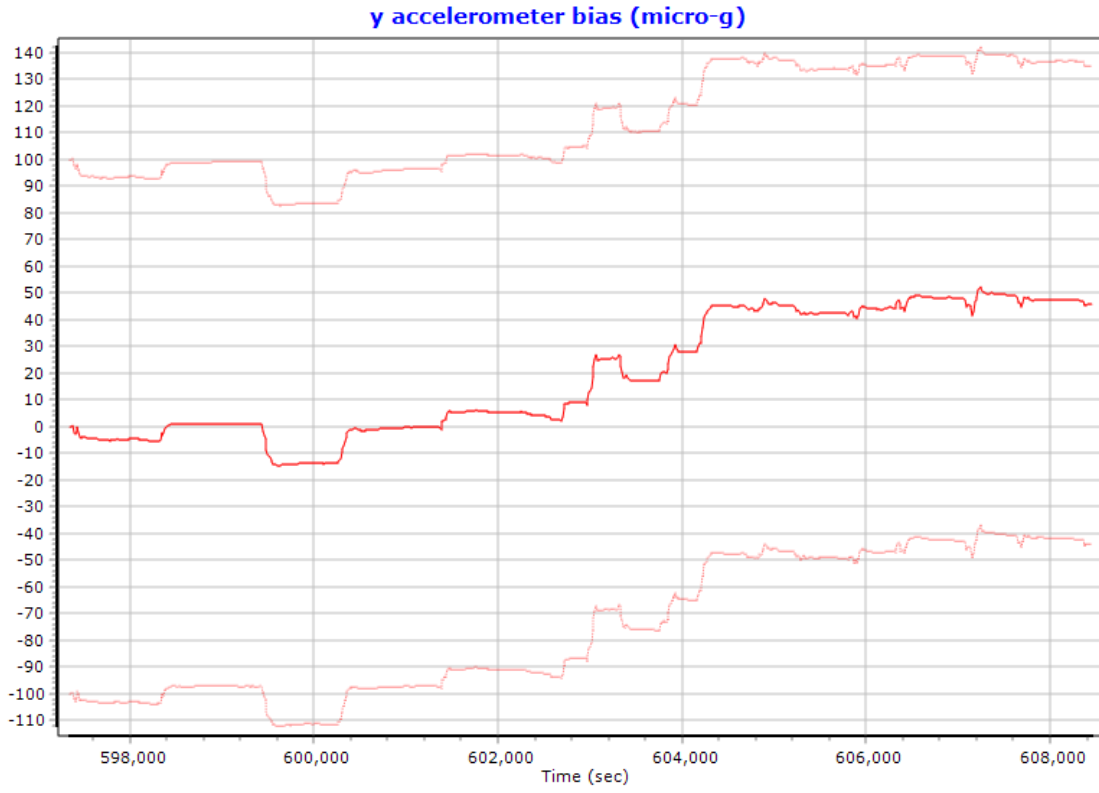
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVAT	N37°25'42.67838"	W81°04'04.40393"	704.674	N37°25'42.67830"	W81°04'04.40410"	704.679
NCWC	N36°22'19.71491"	W80°11'05.64912"	274.974	N36°22'19.71481"	W80°11'05.64909"	275.076
NCSR	N36°29'51.93288"	W81°06'52.95778"	838.659	N36°29'51.93267"	W81°06'52.95810"	838.645
NCRE	N36°21'42.74194"	W79°39'56.56346"	233.465	N36°21'42.74173"	W79°39'56.56344"	233.467
LS04	N37°21'47.16696"	W79°57'26.99415"	324.139			
DOBS	N36°25'31.54122"	W80°43'11.73529"	339.304	N36°25'31.54111"	W80°43'11.73545"	339.297

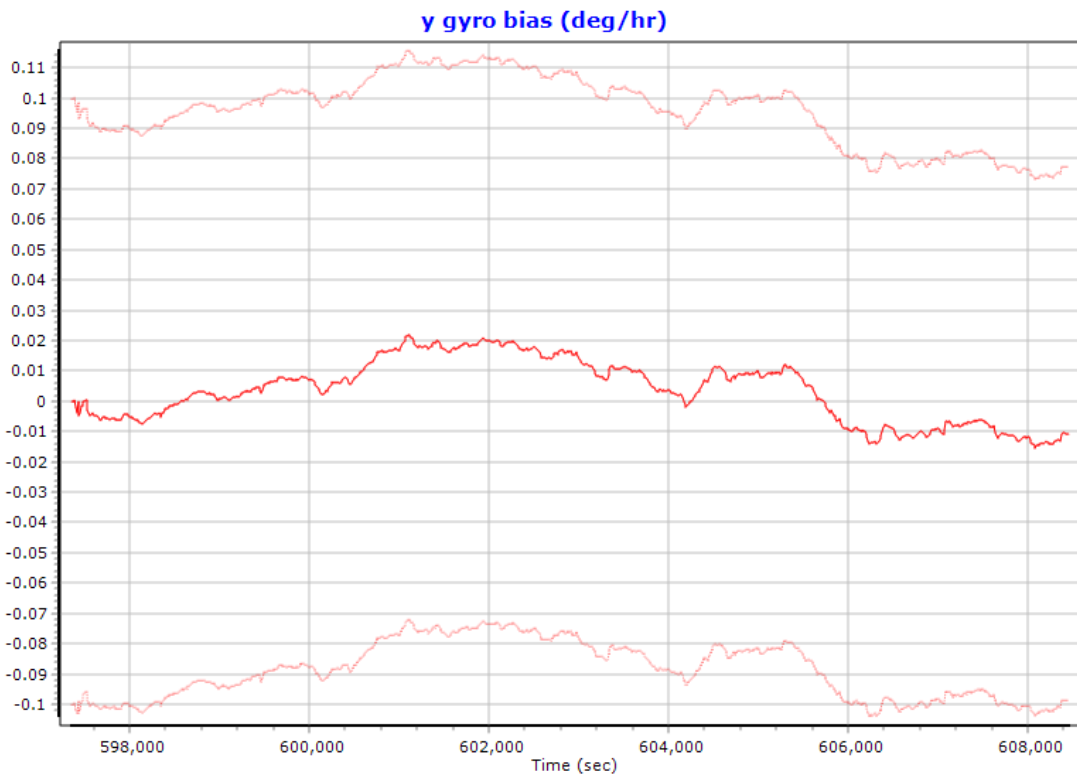
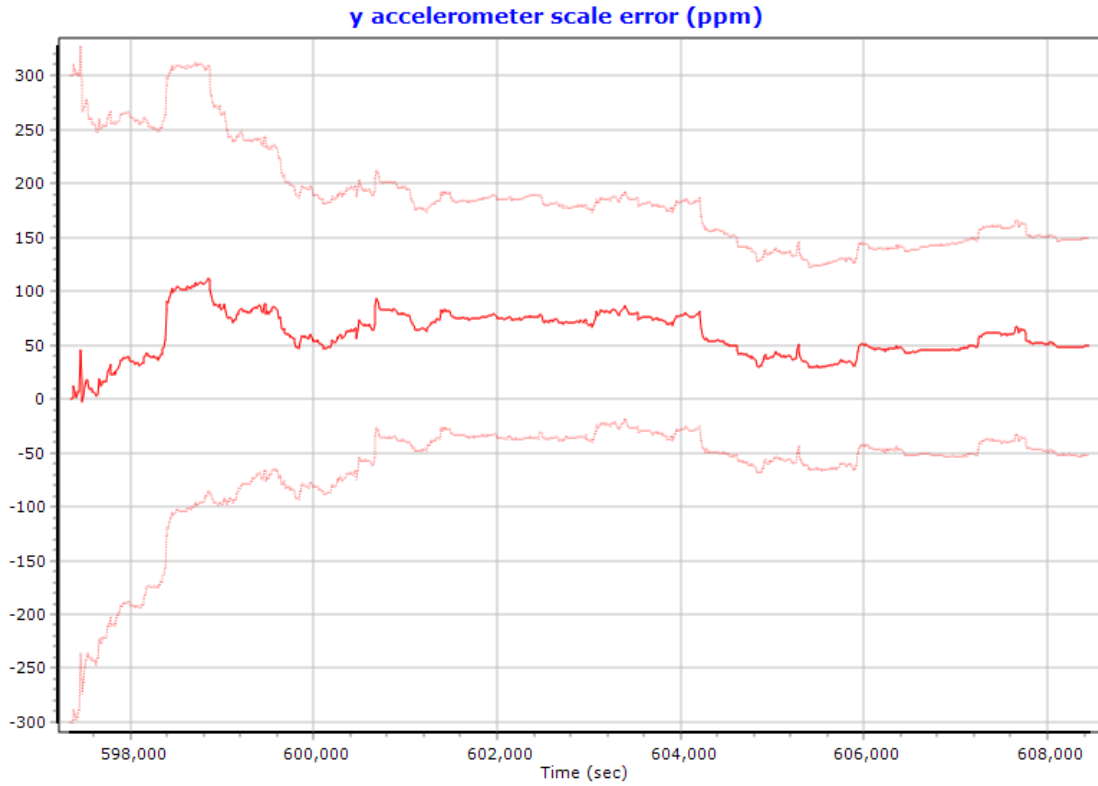


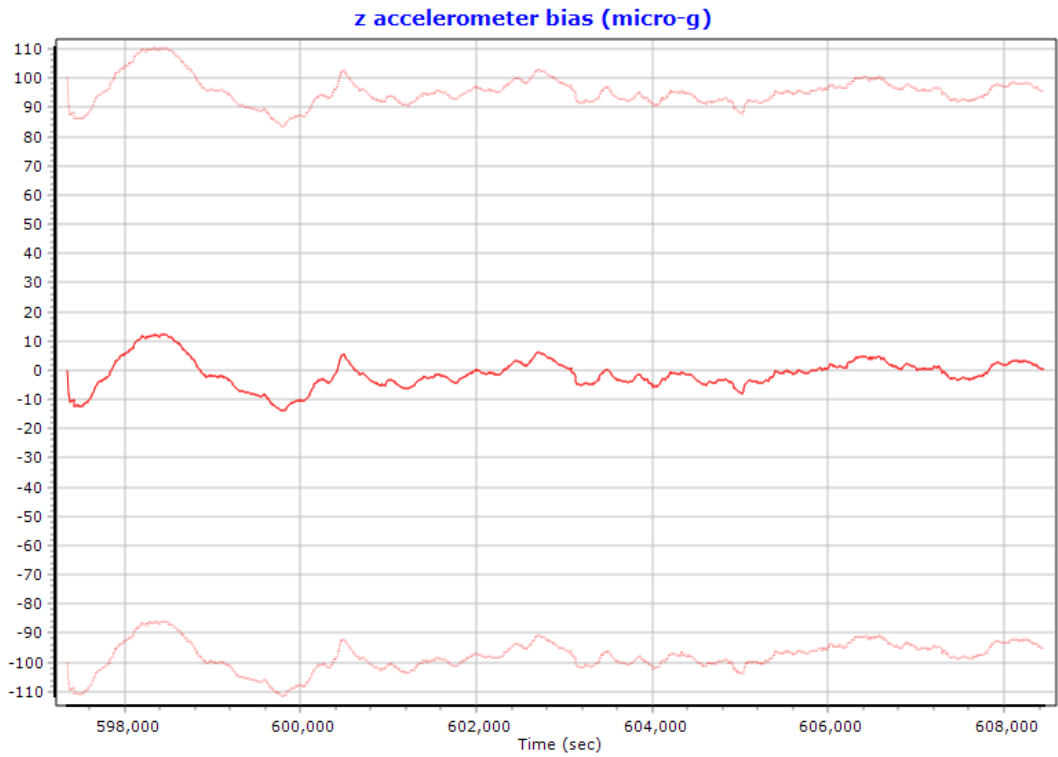
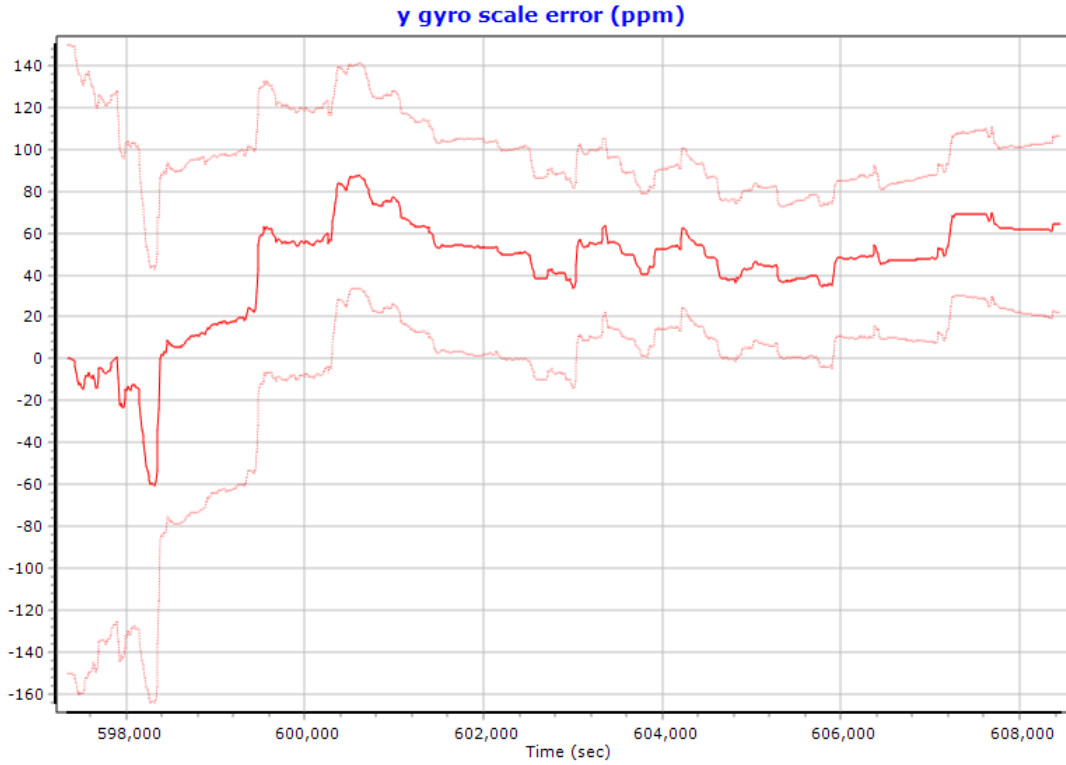


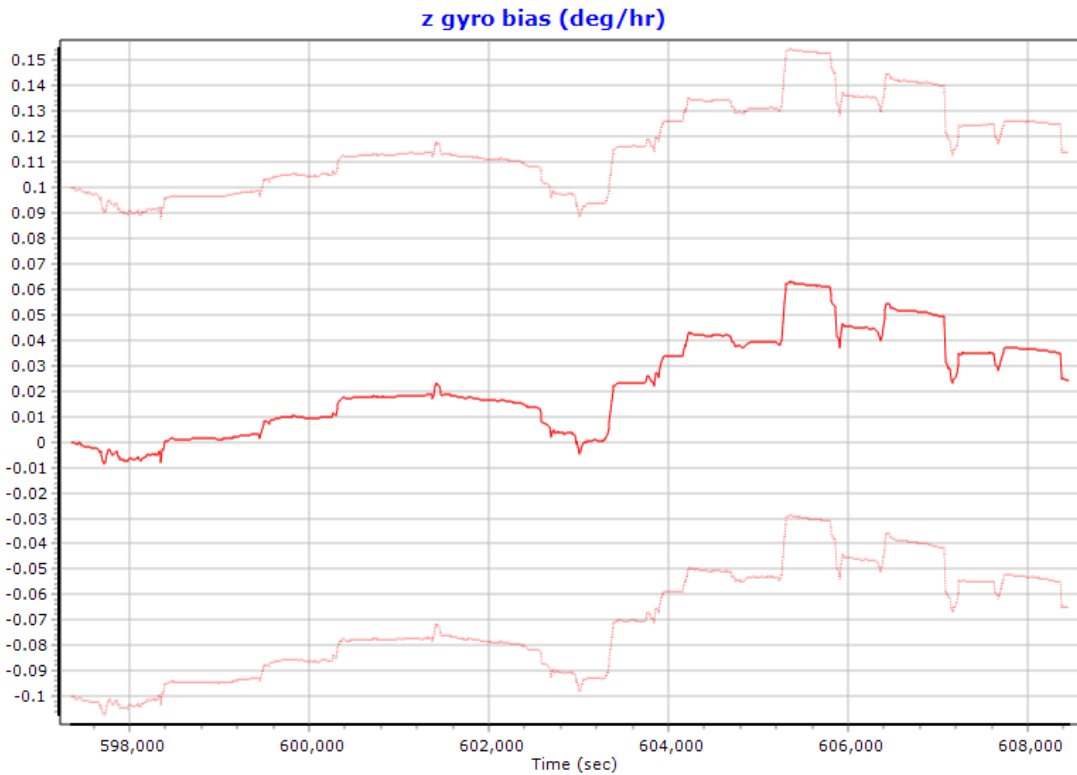
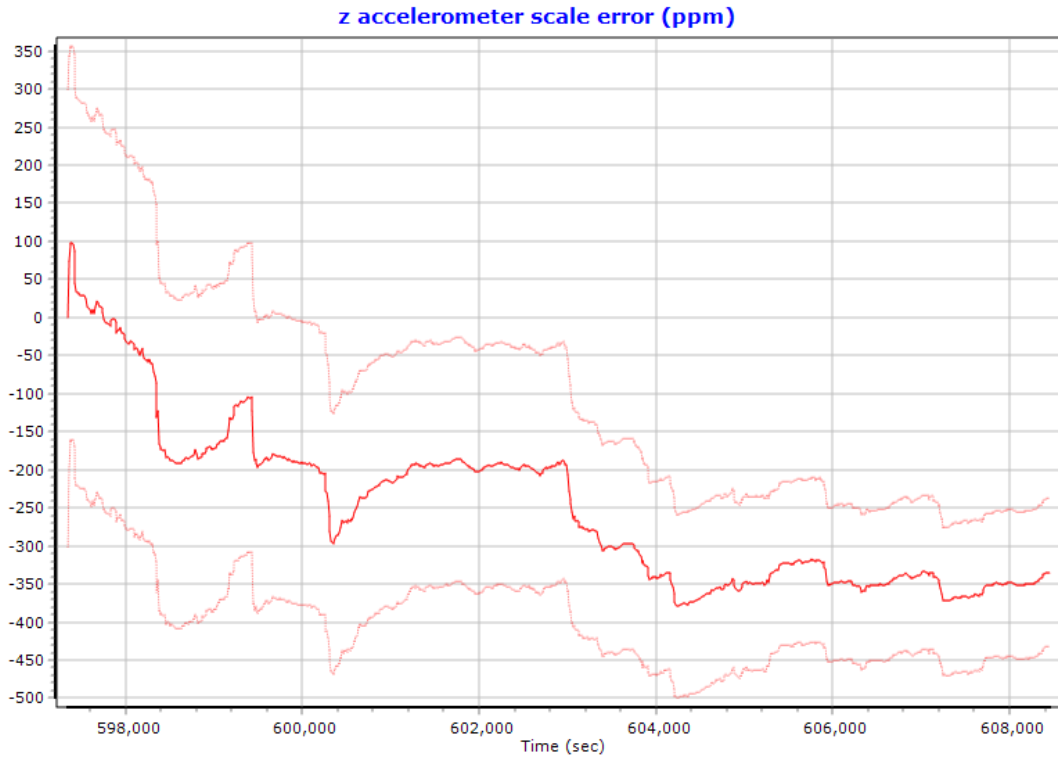


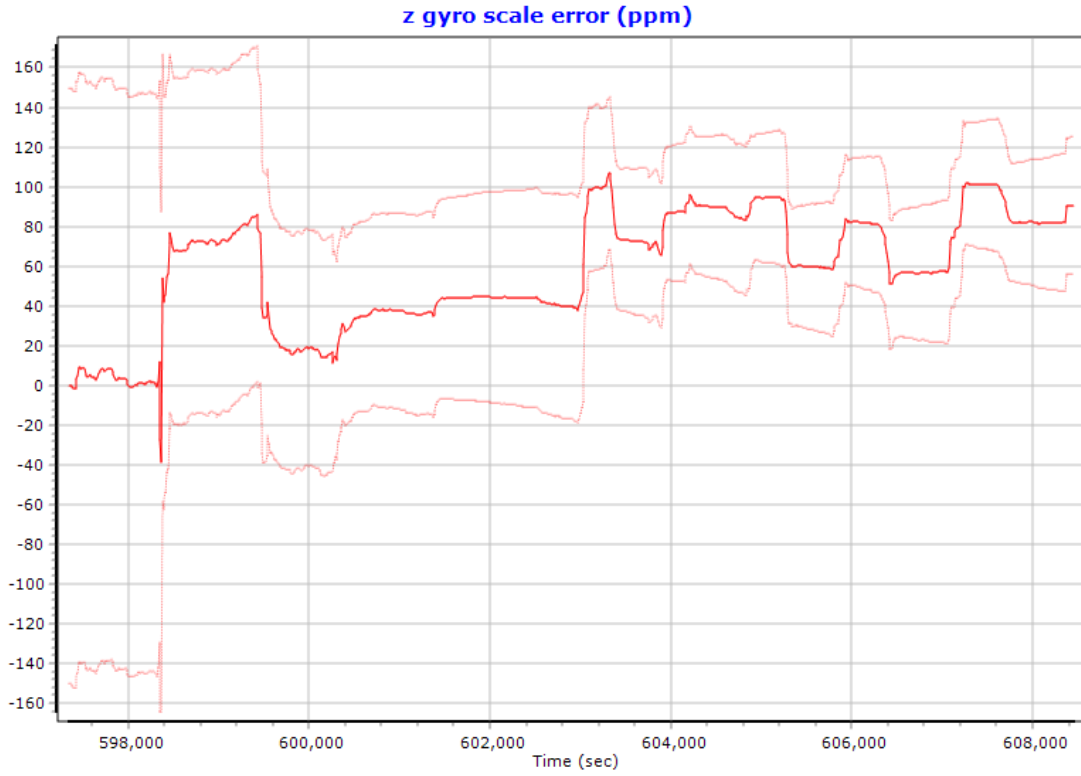




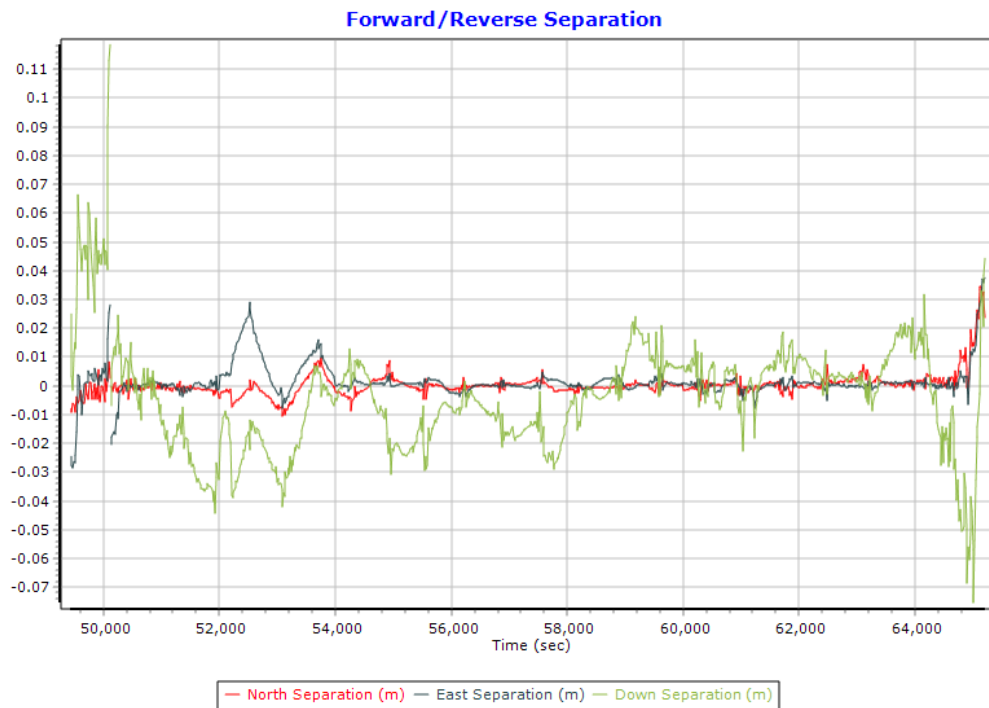
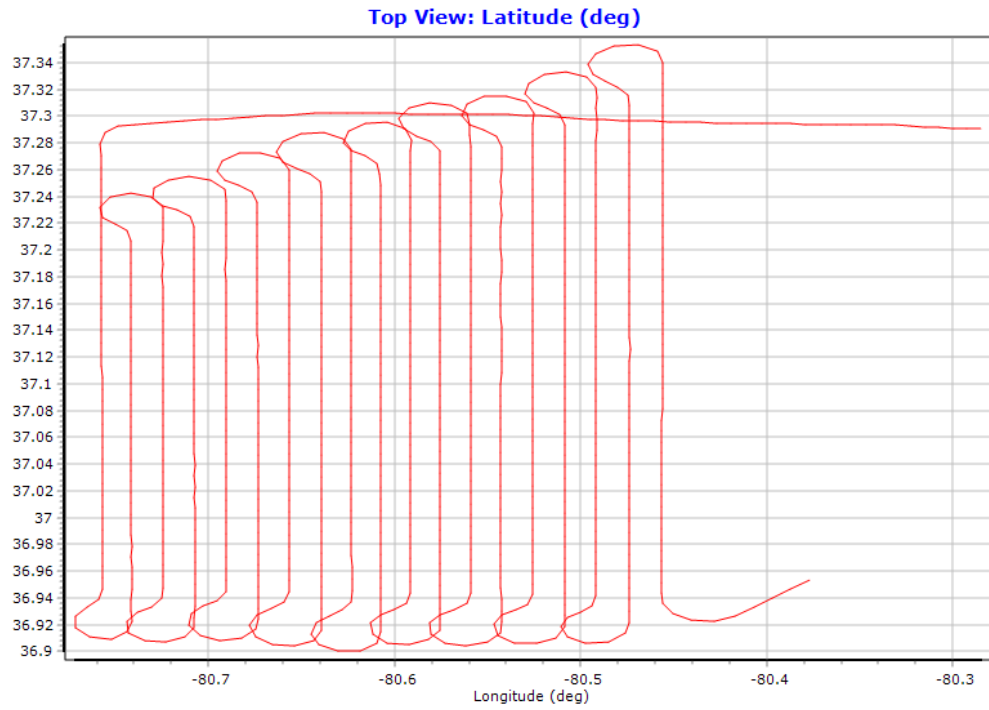




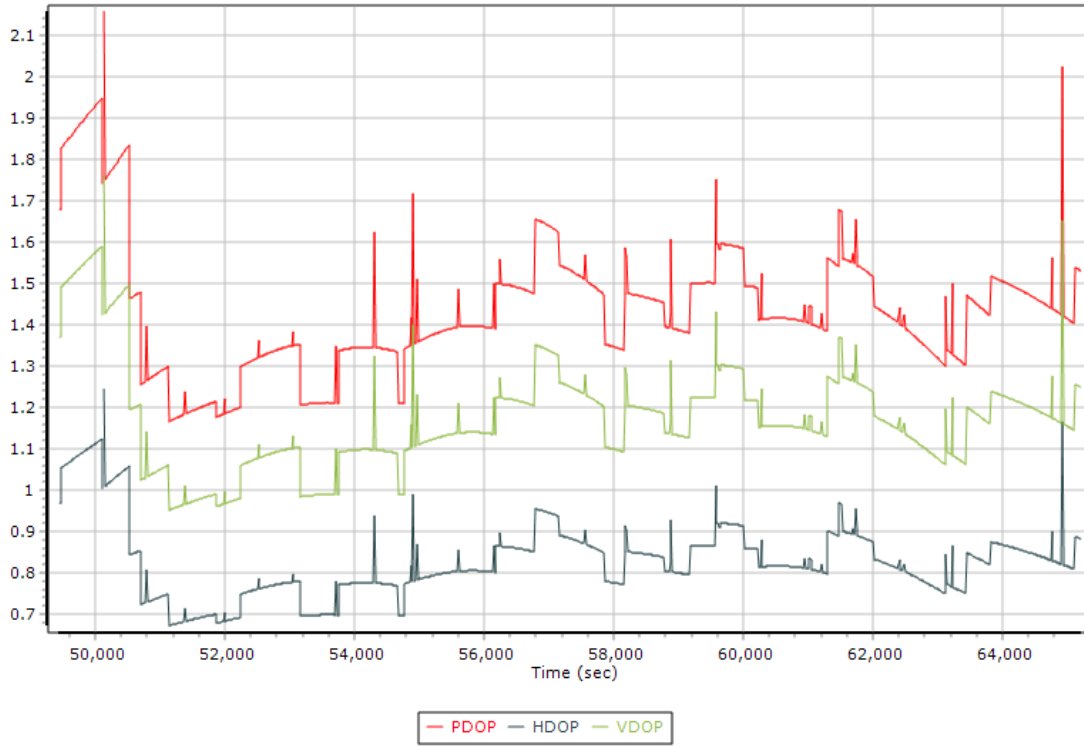




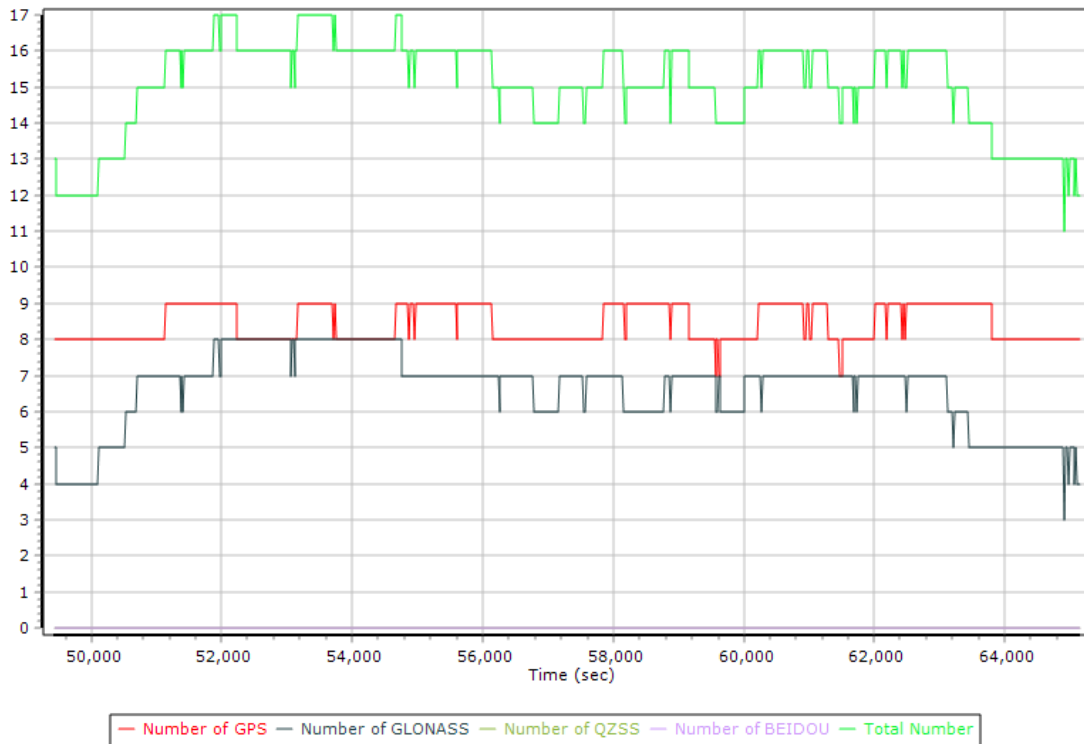
**JANUARY 07, 2018 MISSION 1**



### DOP



### Number of SVs in solution





## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20180107\_VA\_A

Solution Type: IN-Fusion SmartBase

Fixed: 15756	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 15807  
No processed position: 51

Fwd/Rev Separation RMS Values (m):

North: 0.005  
East: 0.006  
Height: 0.020

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 7915 occurrences

North: 0.002  
East: 0.003  
Height: 0.012

Quality Number Percentages:

Q 0: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.909

0.10 - 0.30 m: 0.091

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.44%

Baseline Distances (km):

Maximum: 60.92

Minimum: 0.38

Average: 20.54

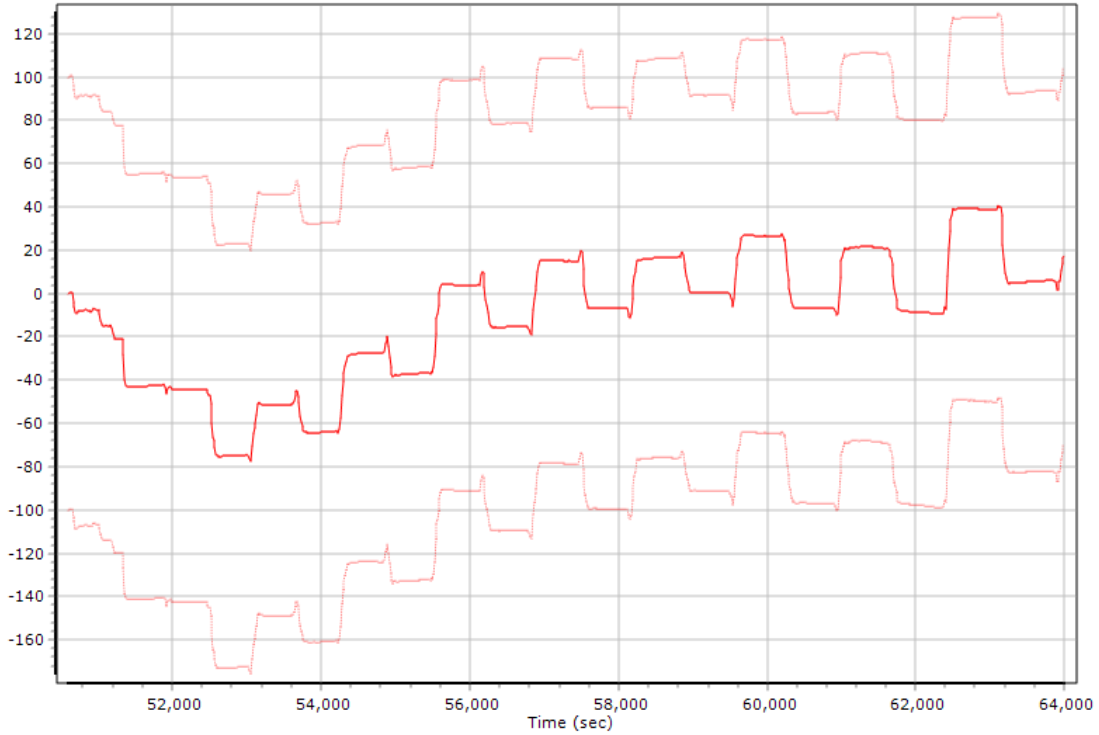
First Epoch: 60.01

Last Epoch: 60.03

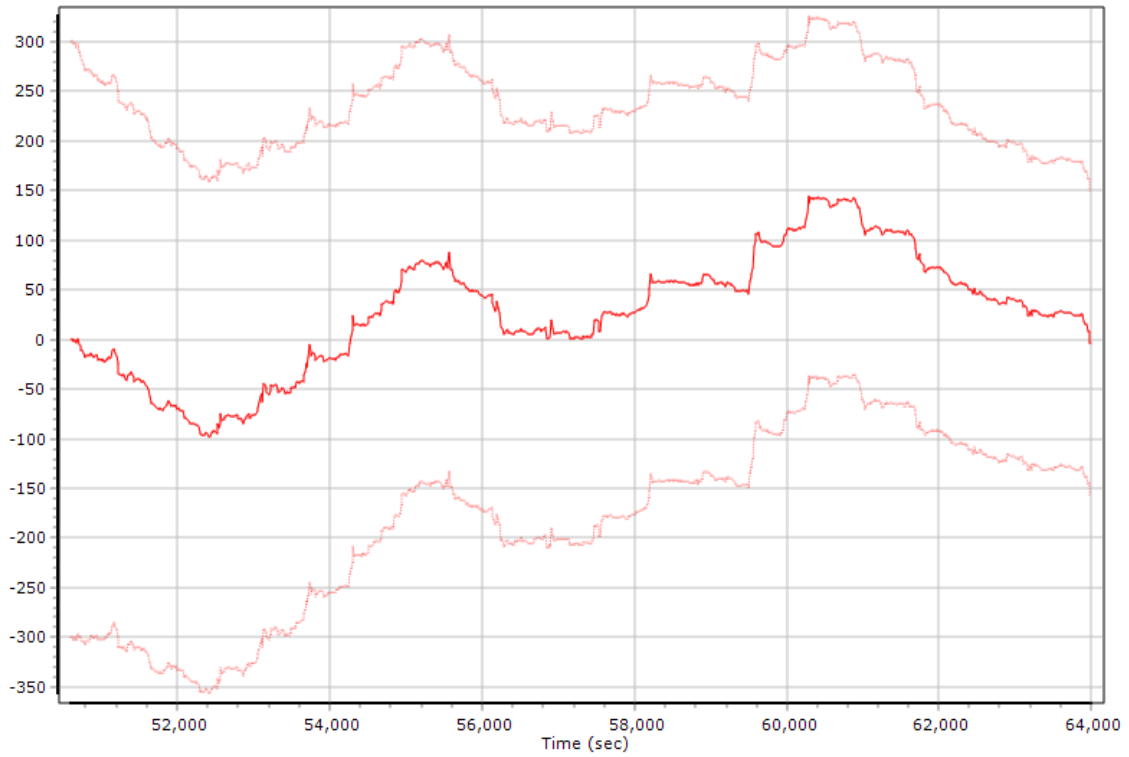
### CORS Base Stations

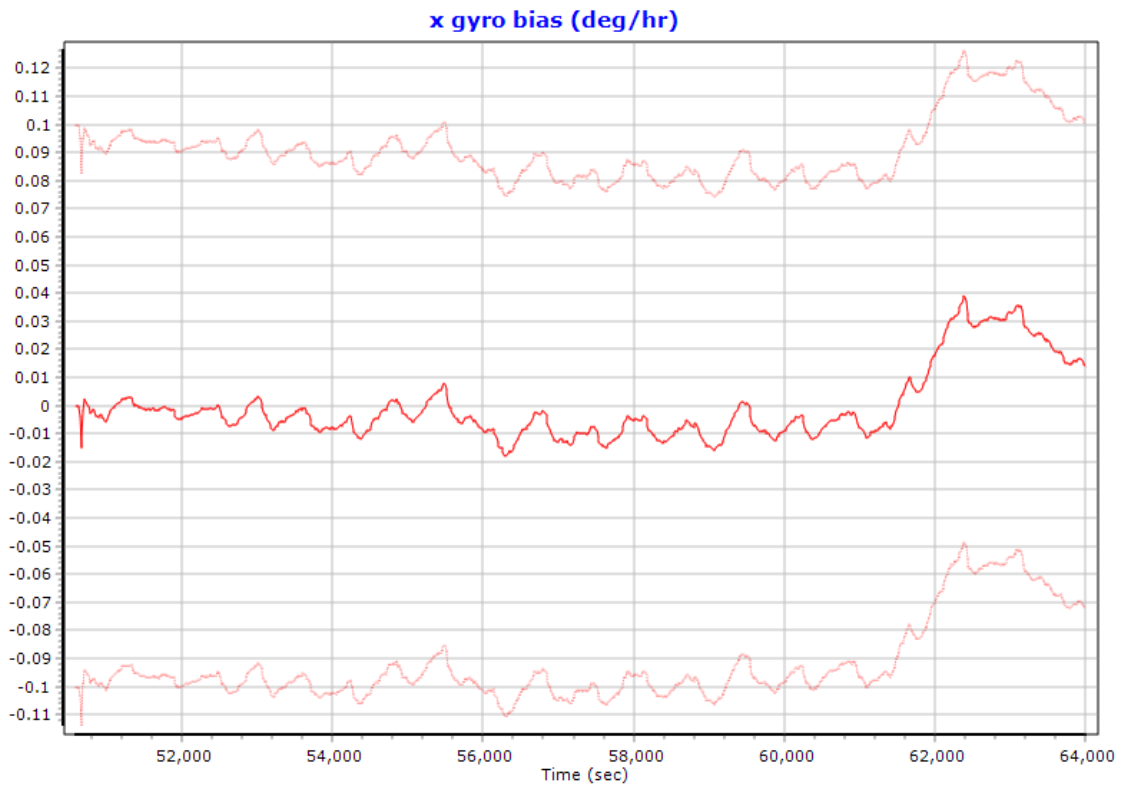
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVLE	N37°49'20.23018"	W80°25'18.58199"	655.2	N37°49'20.23012"	W80°25'18.58211"	655.21
WVAT	N37°25'42.67838"	W81°04'04.40393"	704.674	N37°25'42.67834"	W81°04'04.40409"	704.69
LS04	N37°21'47.16696"	W79°57'26.99415"	324.139	N37°21'47.16703"	W79°57'26.99433"	324.144
DOBS	N36°25'31.54122"	W80°43'11.73529"	339.304	N36°25'31.54129"	W80°43'11.73549"	339.308
BLA1	N37°12'40.85421"	W80°25'13.83284"	605.704			

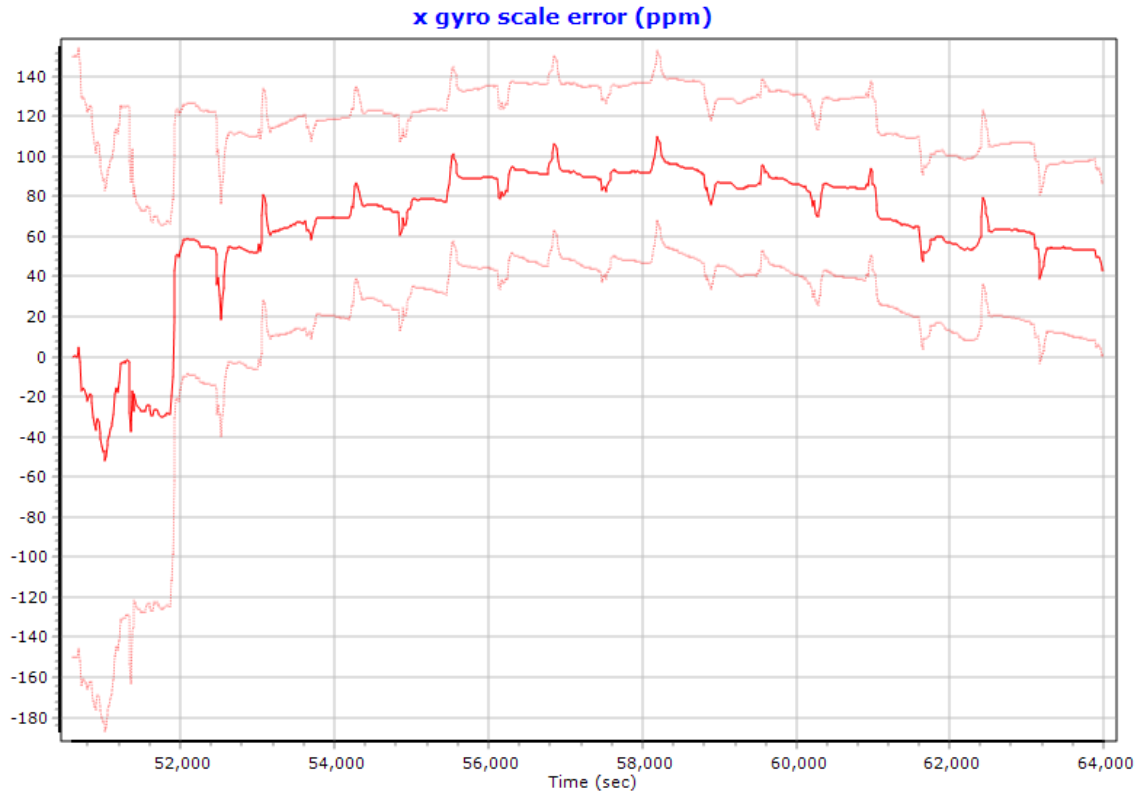
x accelerometer bias (micro-g)

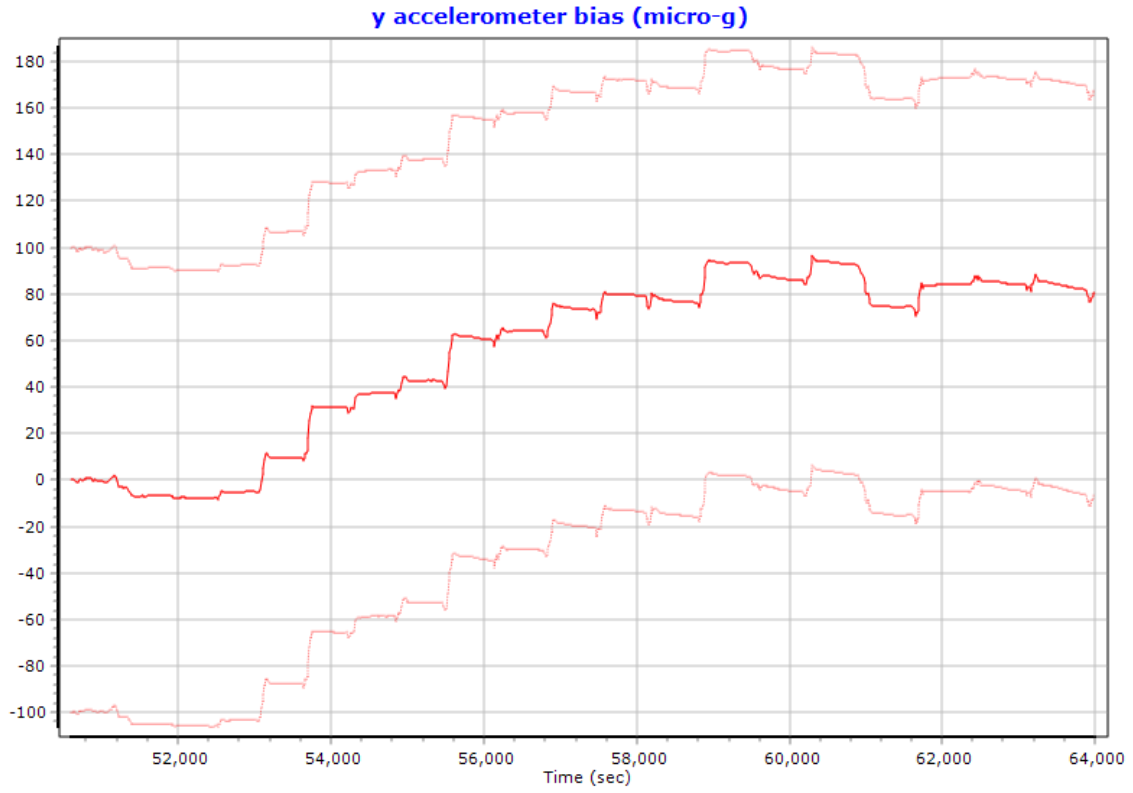


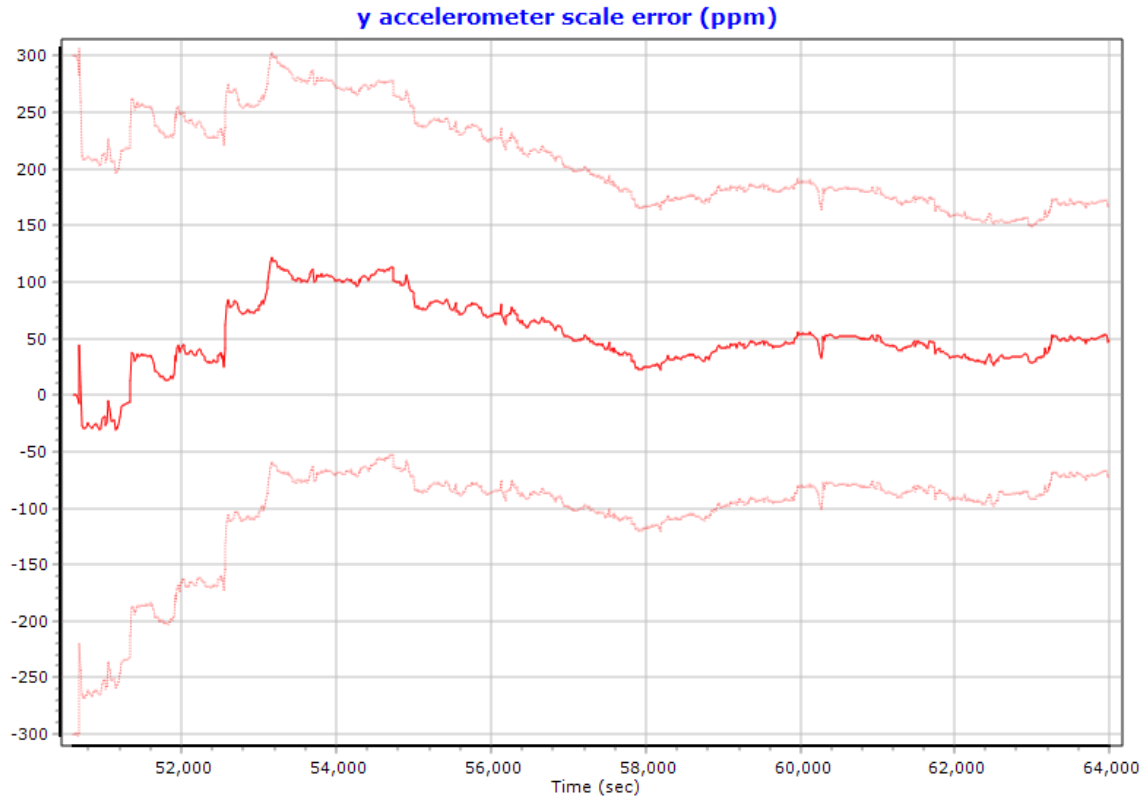
x accelerometer scale error (ppm)

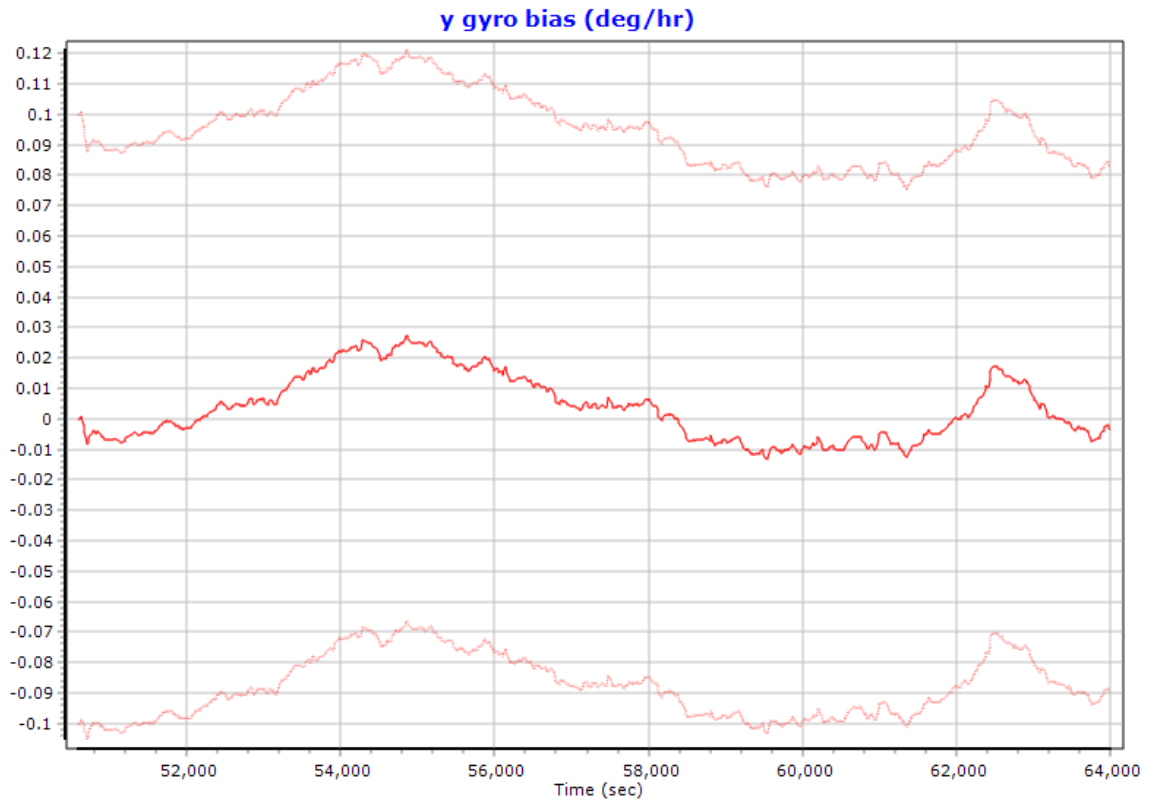




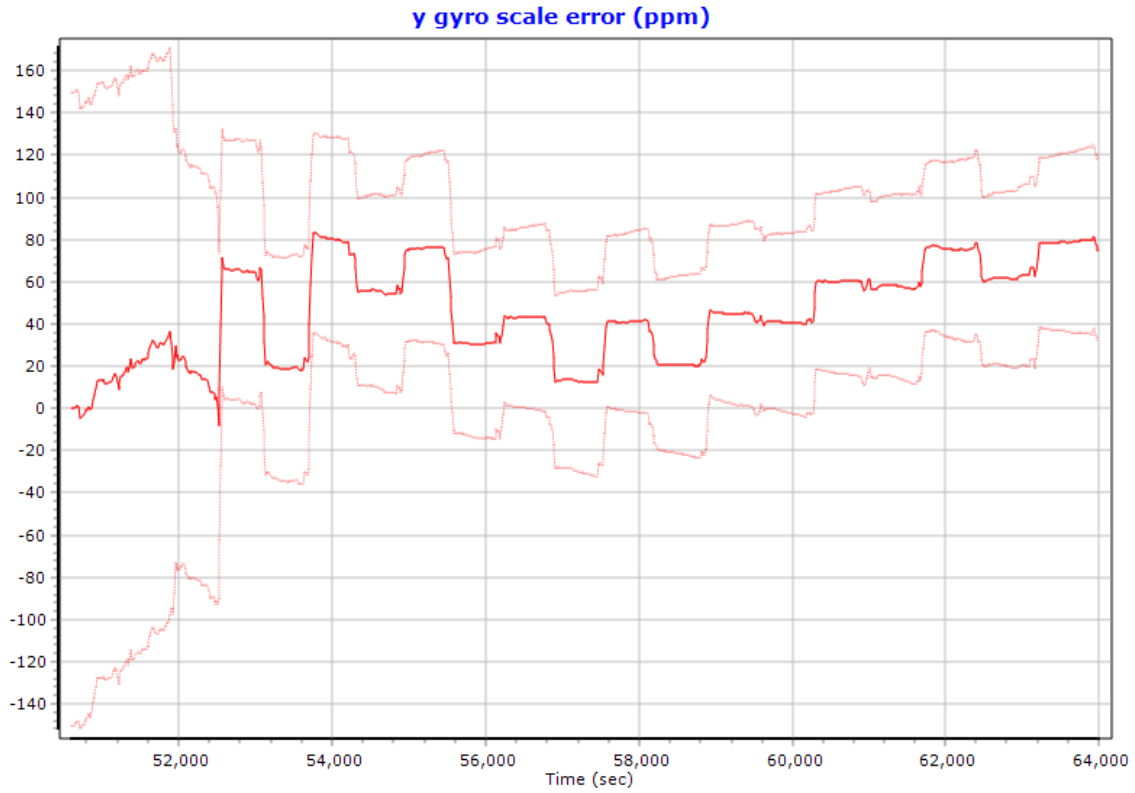


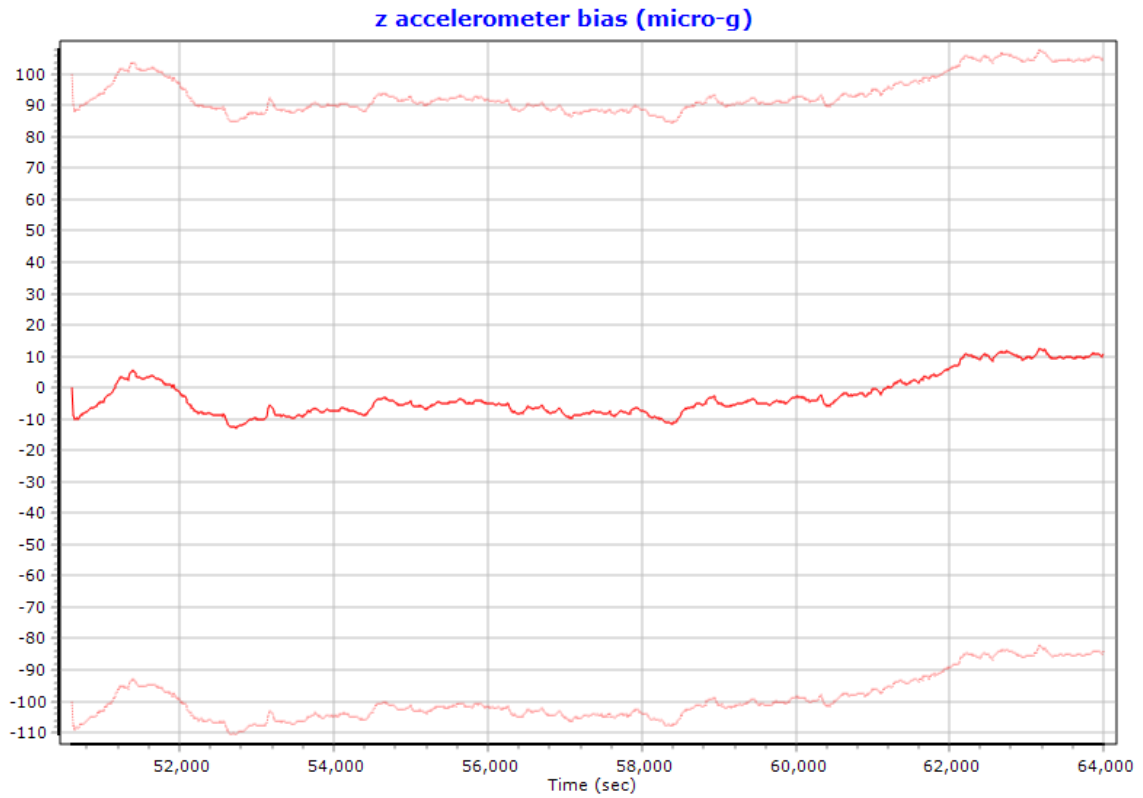


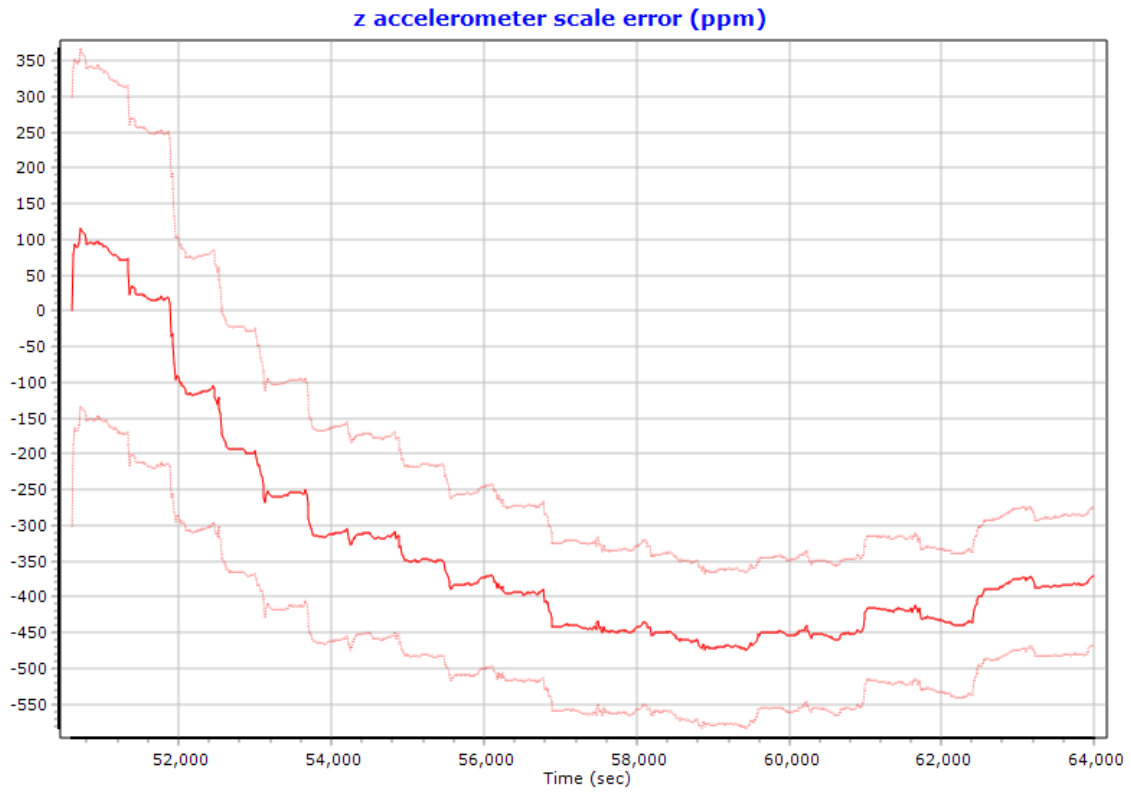




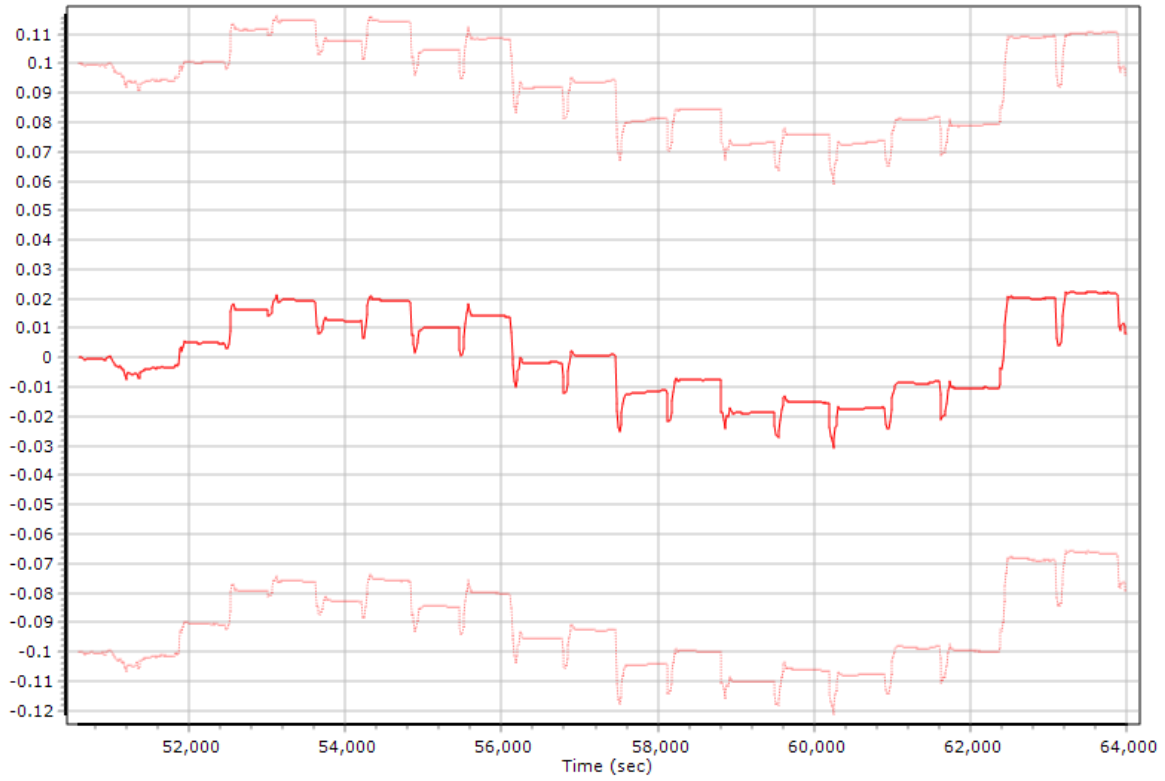




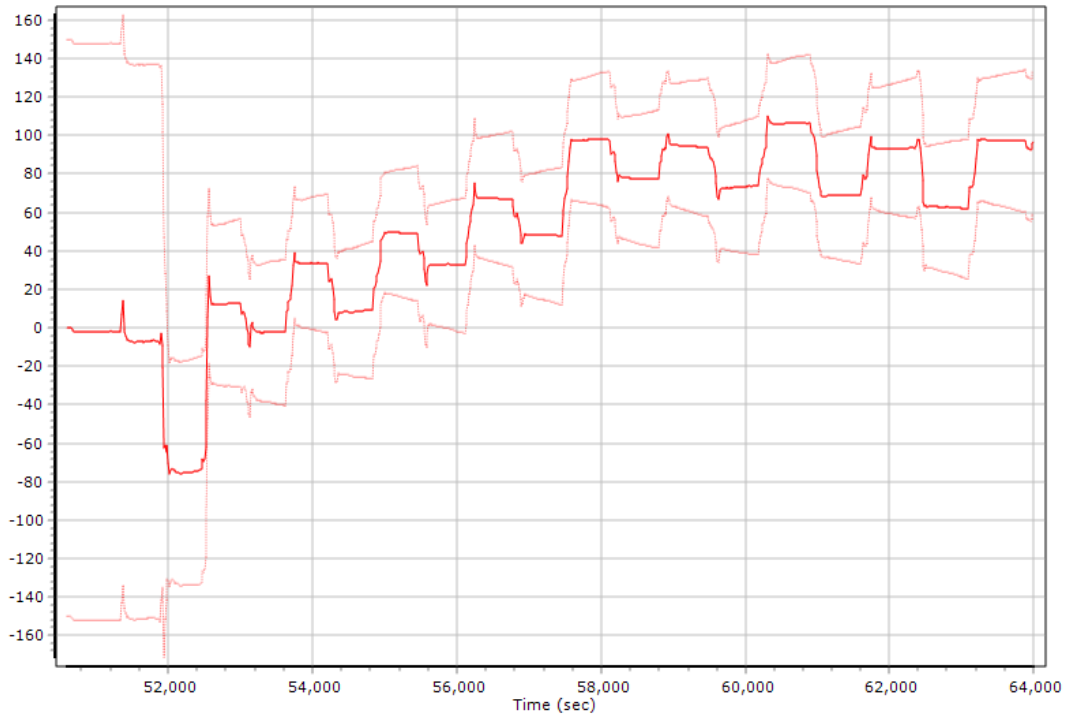




**z gyro bias (deg/hr)**



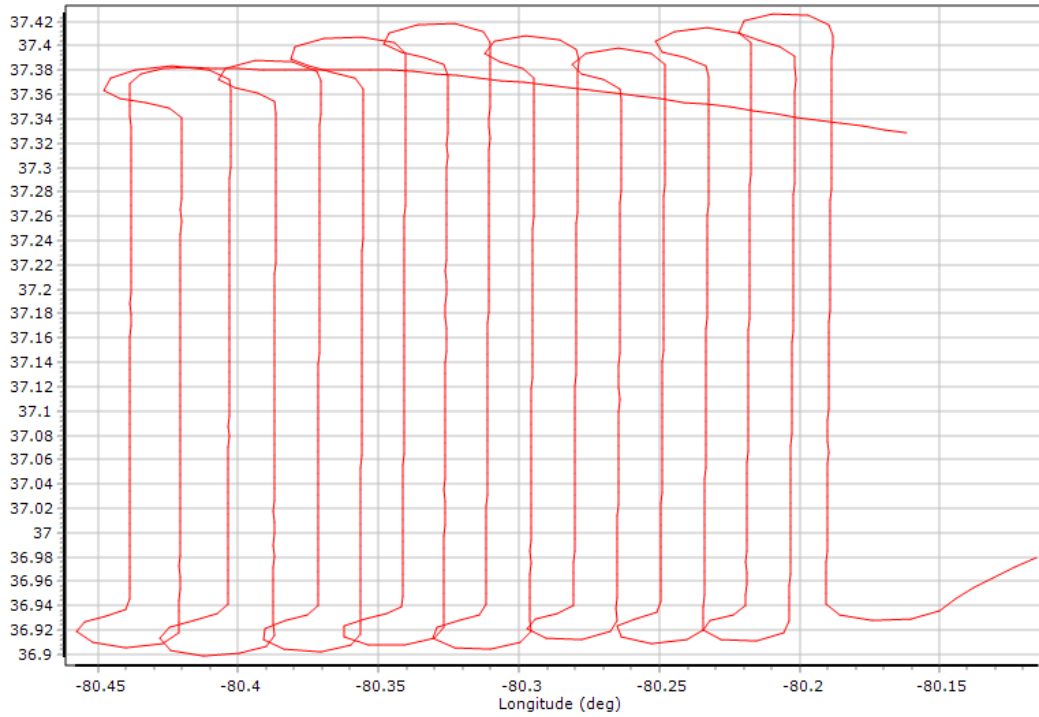
**z gyro scale error (ppm)**



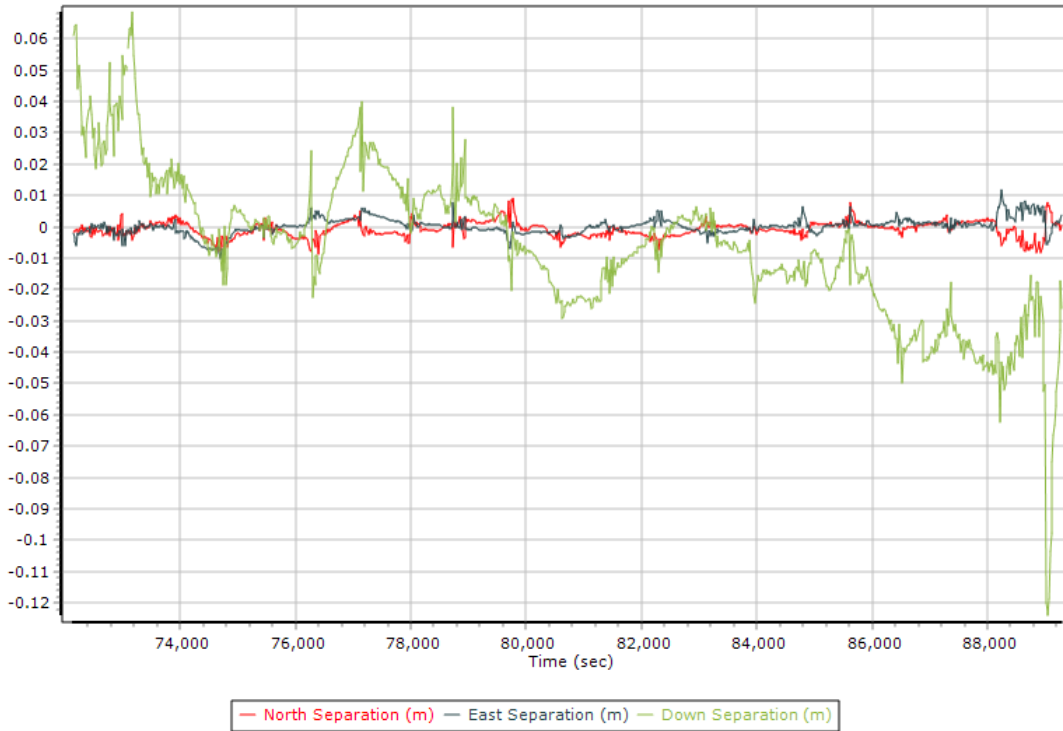
Virginia West Chesapeake Central LiDAR  
TO# G15PD00714  
July 17, 2018  
Page 173 of 202

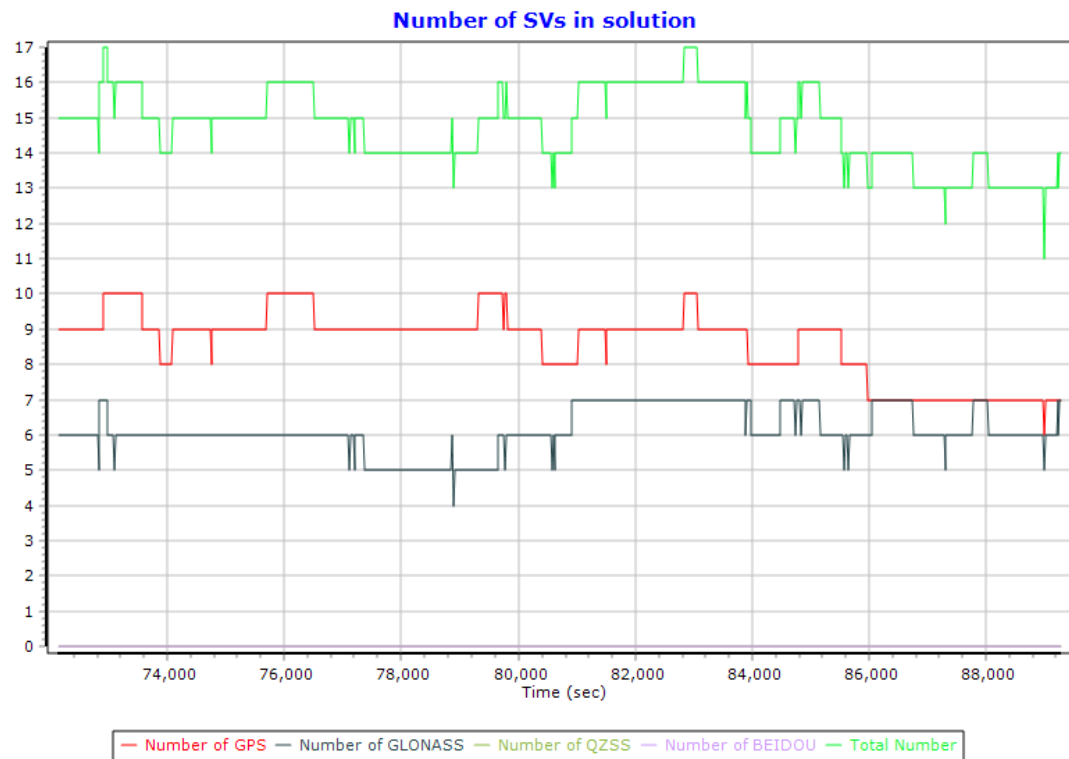
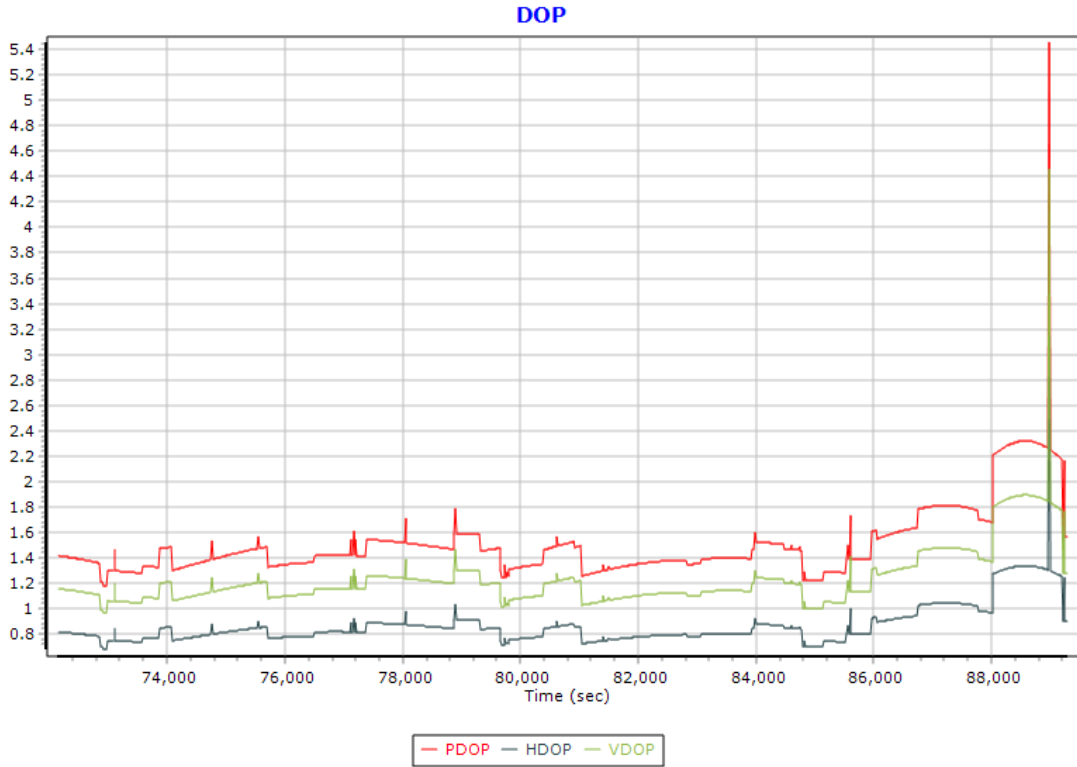
**JANUARY 07, 2018 MISSION 2**

Top View: Latitude (deg)



Forward/Reverse Separation





## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20180107\_VA\_B

Solution Type: IN-Fusion SmartBase

Fixed: 17178	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 17190  
No processed position: 12

Fwd/Rev Separation RMS Values (m):

North: 0.003  
East: 0.003  
Height: 0.025

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 8602 occurrences

North: 0.002  
East: 0.002  
Height: 0.014

Quality Number Percentages:

Q 0: 100.0 %



Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 99.909

0.10 - 0.30 m: 100

0.30 - 1.00 m: 0

1.00 - 5.00 m: 0

5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.51%

Baseline Distances (km):

Maximum: 36.09

Minimum: 0.19

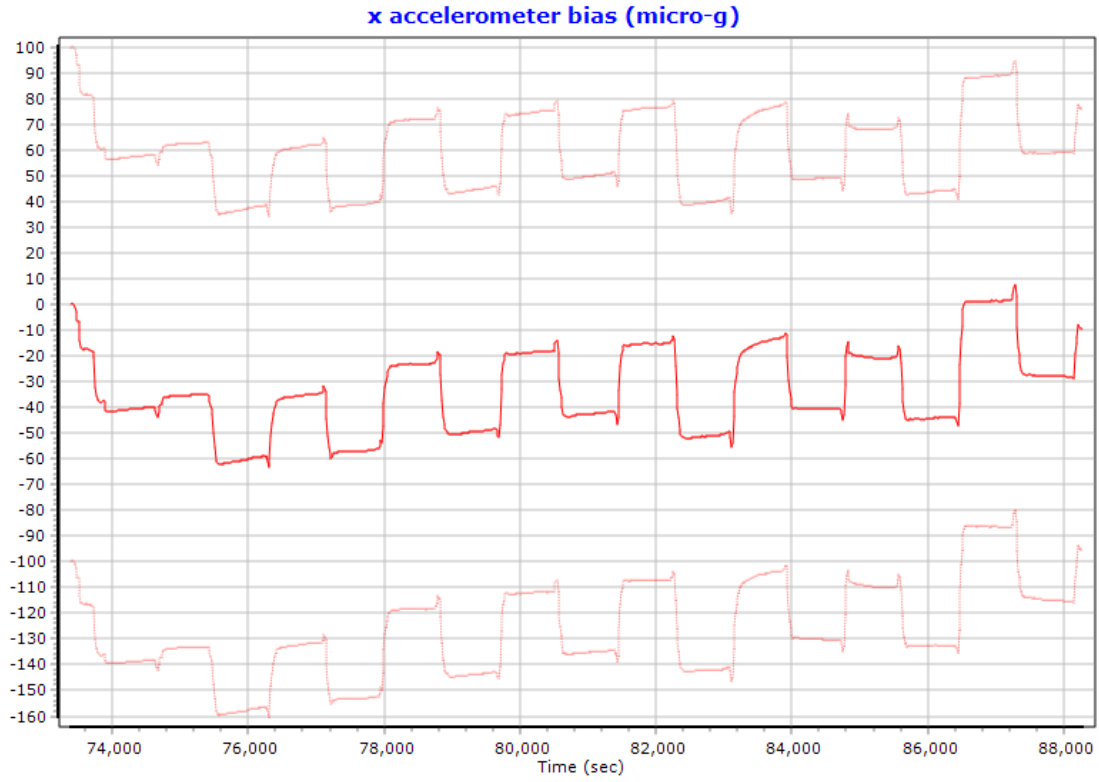
Average: 18.75

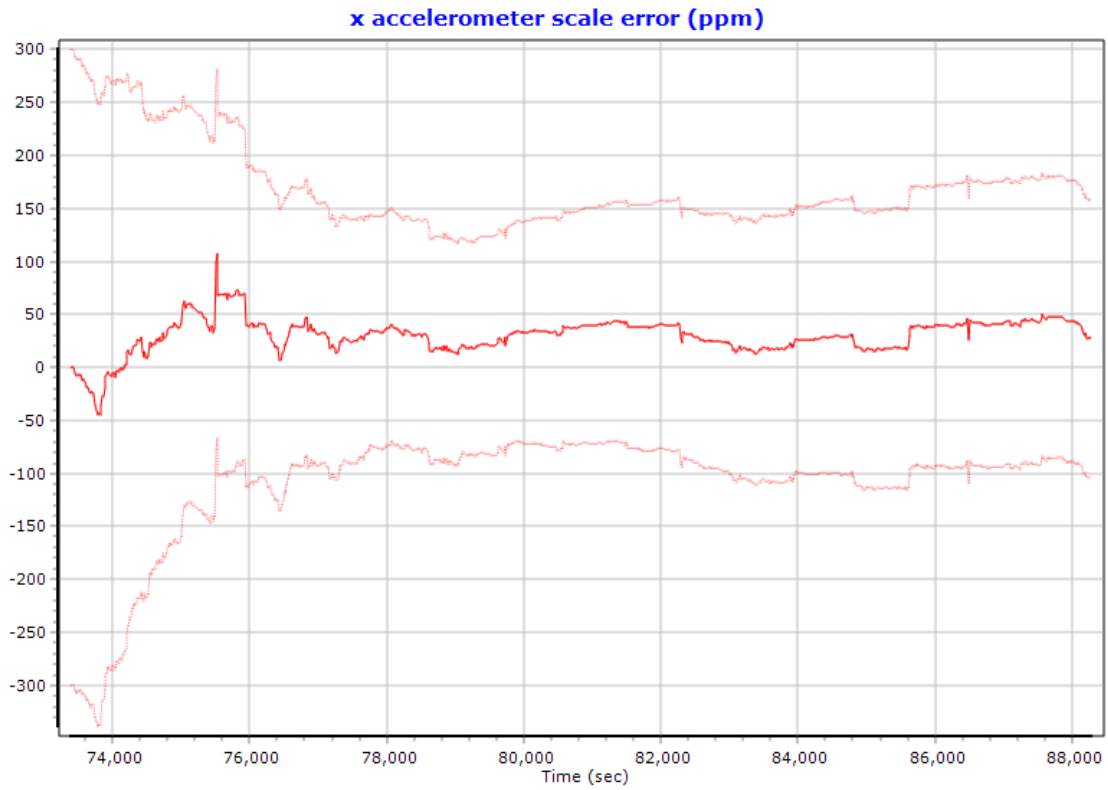
First Epoch: 34.77

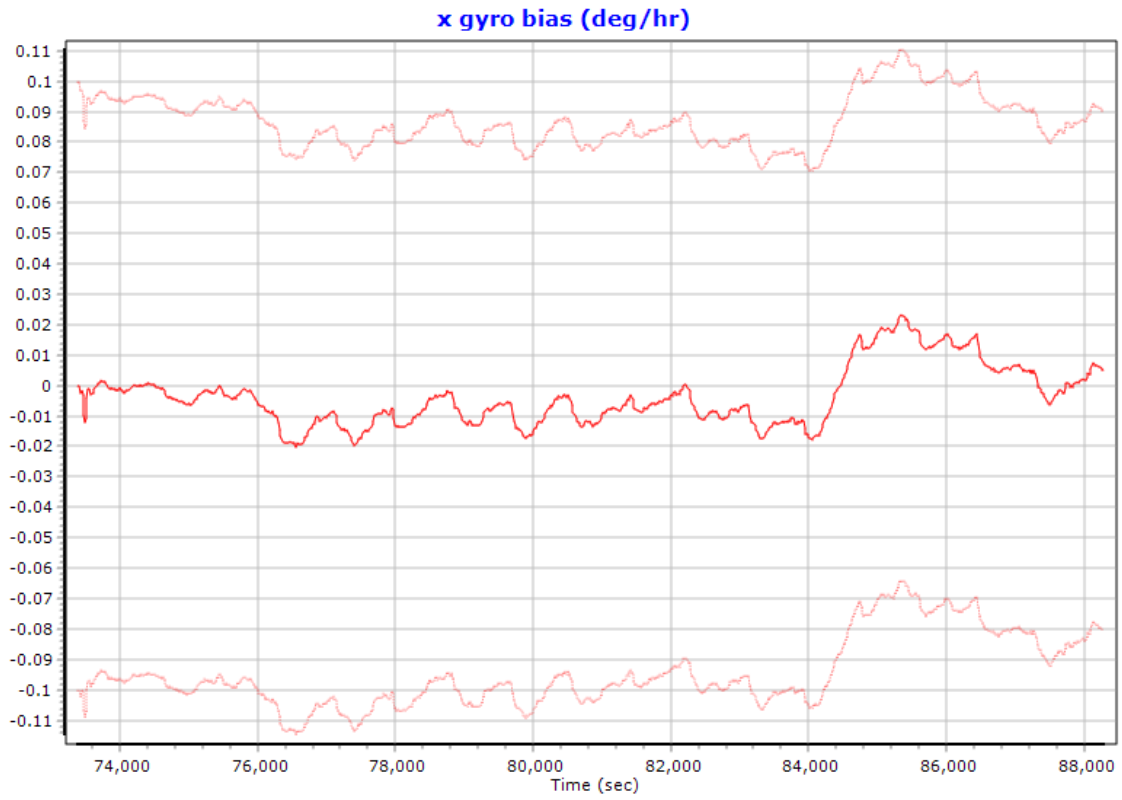
Last Epoch: 34.77

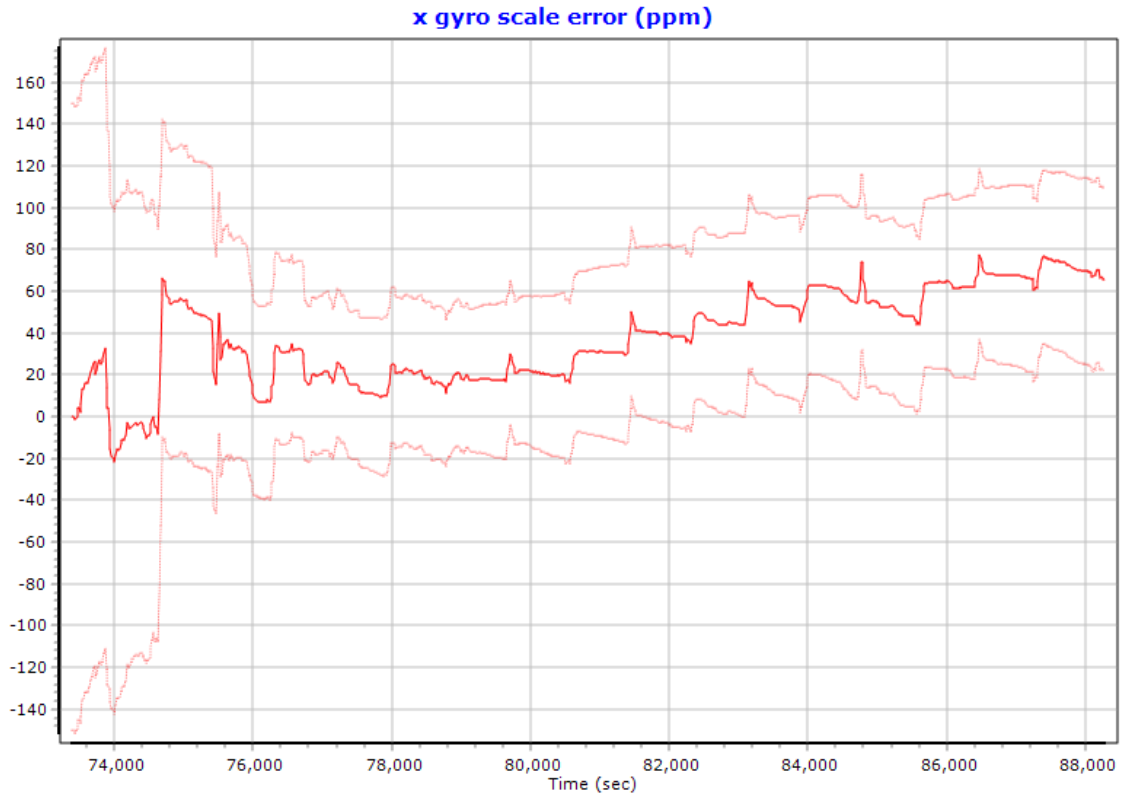
CORS Base Stations

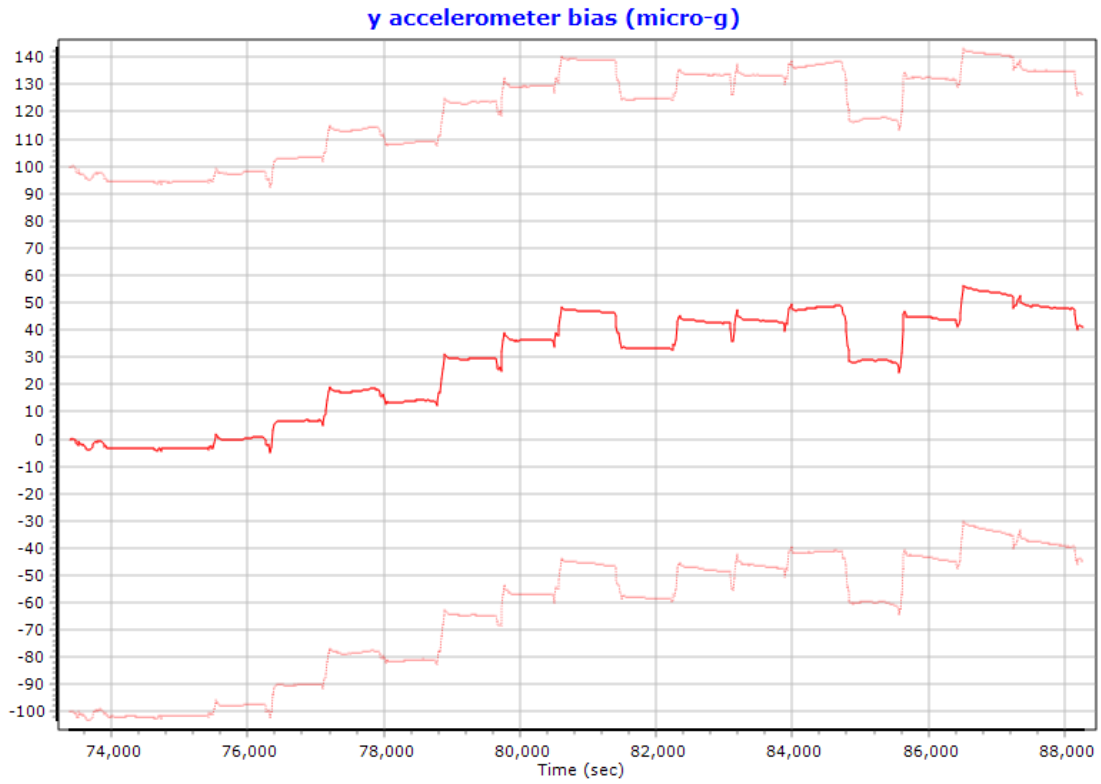
Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
vWVLE	N37°49'20.23028"	W80°25'18.58186"	655.200	N37°49'20.23002"	W80°25'18.58195"	655.201
WVGB	N38°25'48.45404"	W79°49'01.31987"	811.180	N38°25'48.45356"	W79°49'01.32031"	811.171
WVAT	N37°25'42.67846"	W81°04'04.40380"	704.674	N37°25'42.67831"	W81°04'04.40390"	704.681
NCRE	N36°21'42.74202"	W79°39'56.56333"	233.465	N36°21'42.74183"	W79°39'56.56352"	233.464
LS04	N37°21'47.16696"	W79°57'26.99415"	324.139			
BLA1	N37°12'40.85437"	W80°25'13.83274"	605.692	N37°12'40.85416"	W80°25'13.83273"	605.697

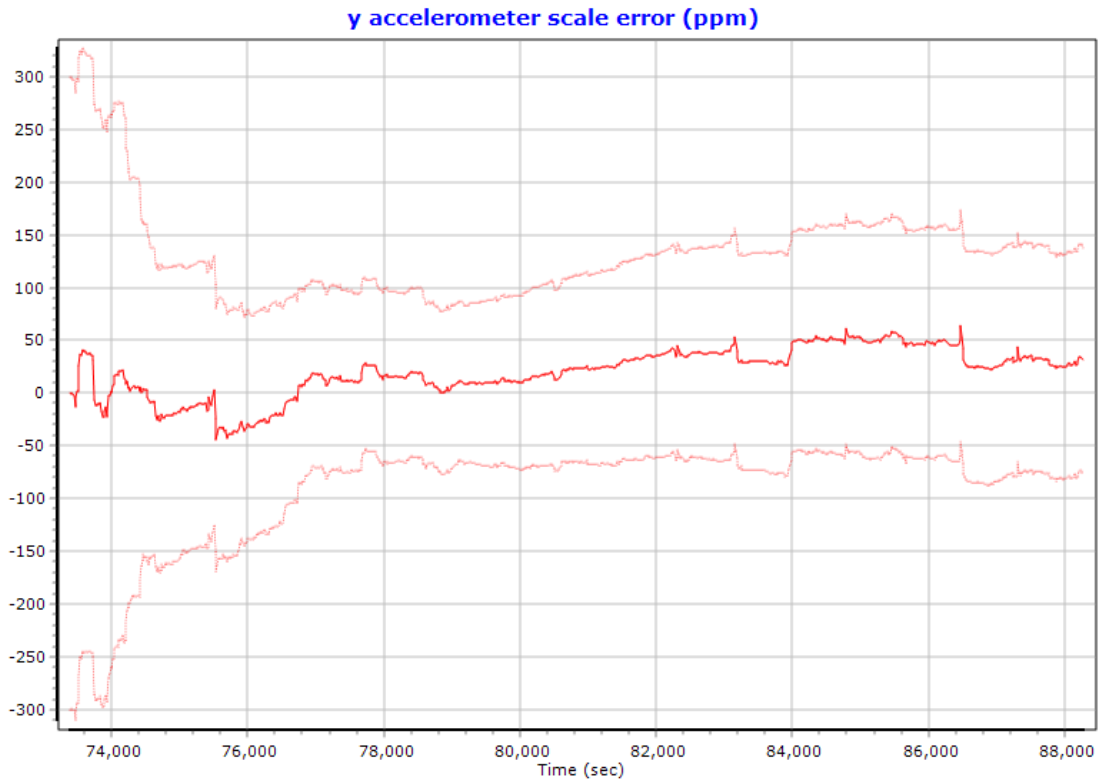


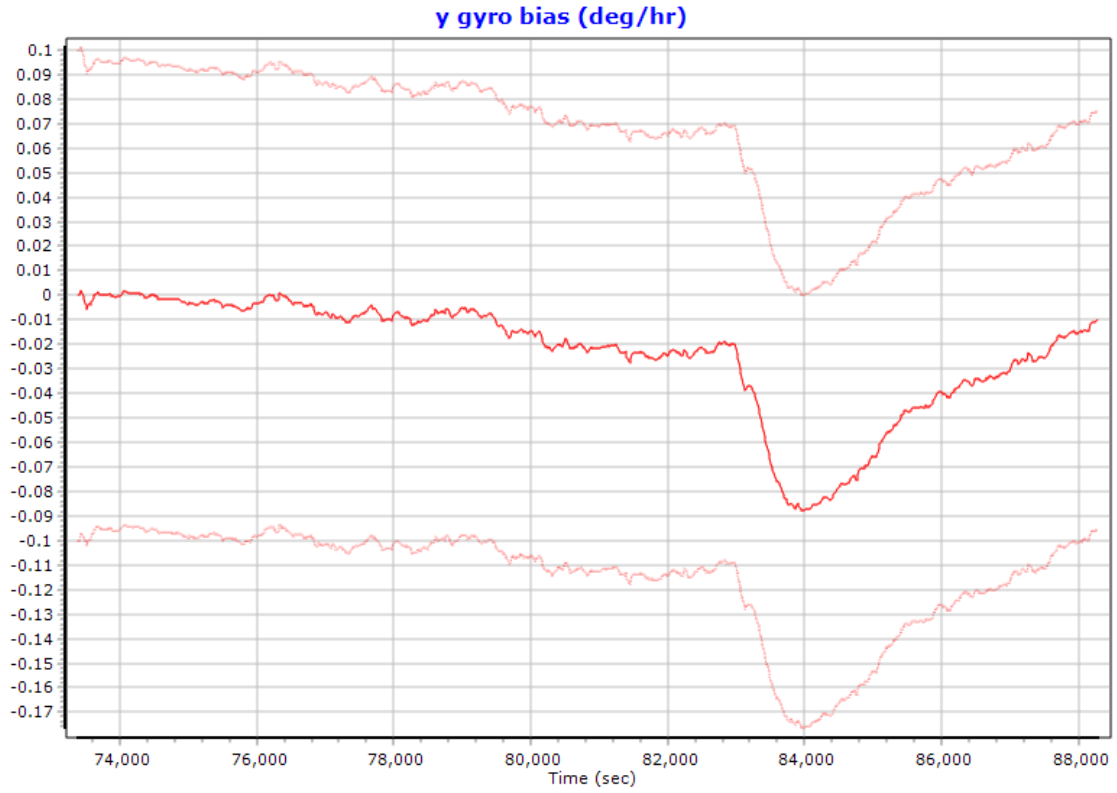




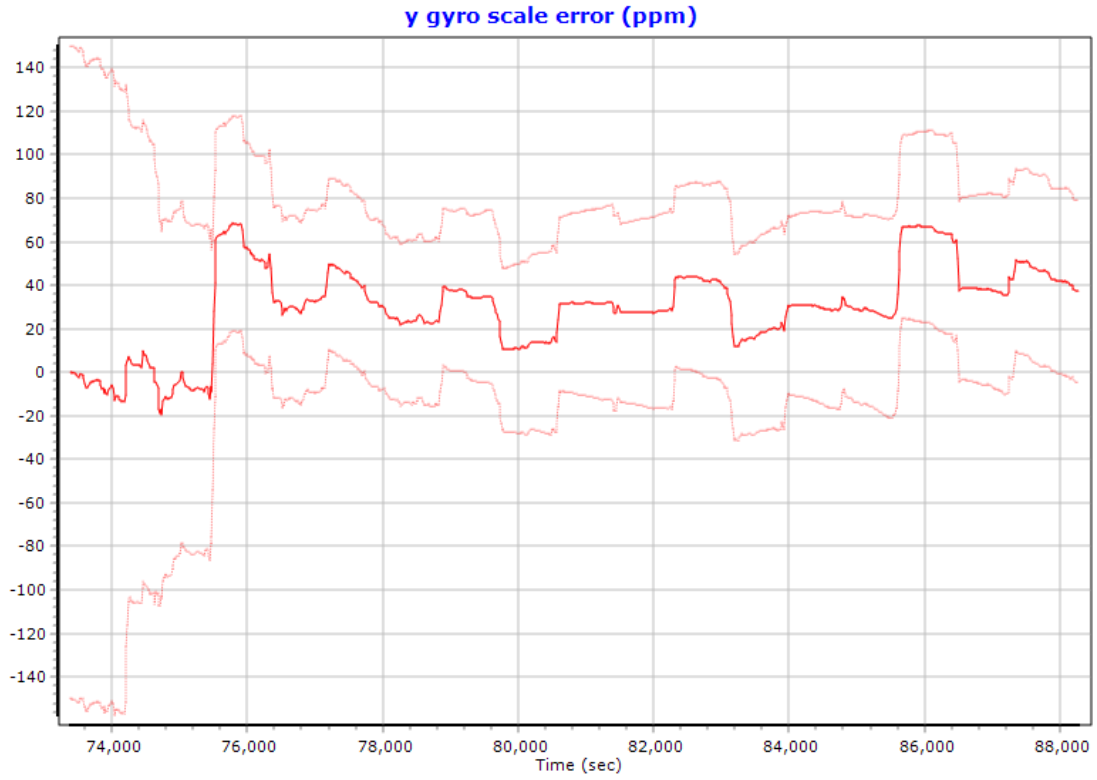


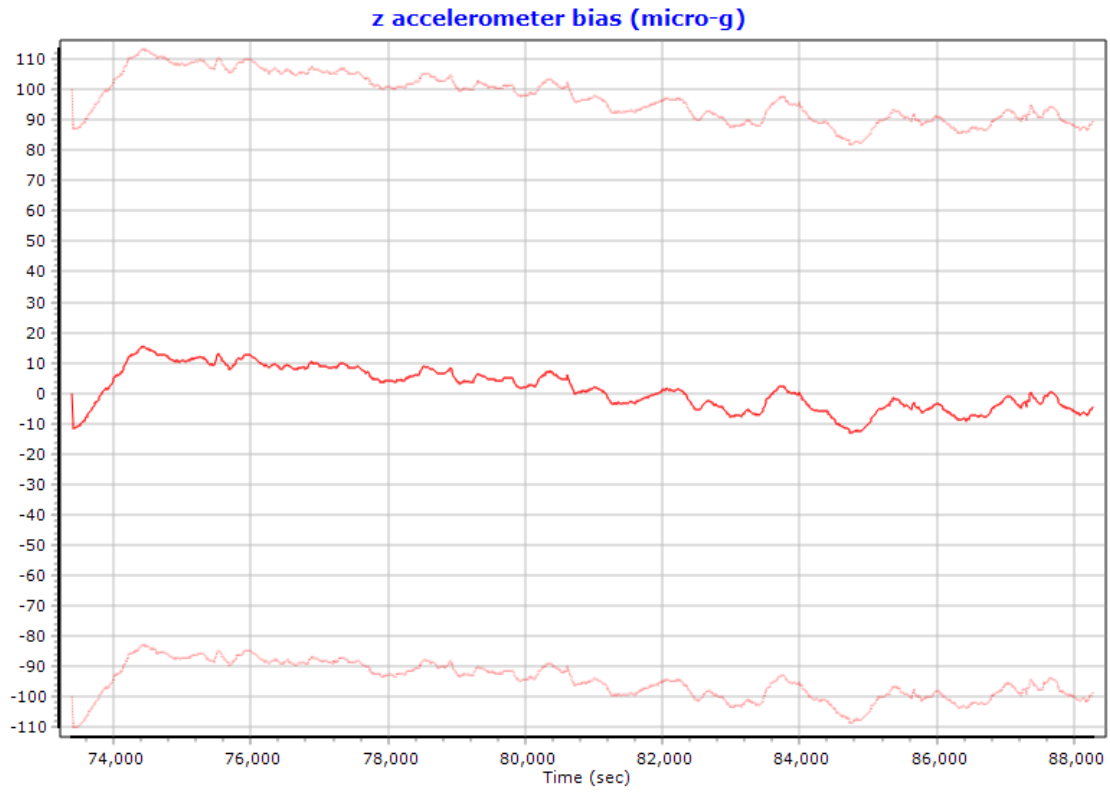


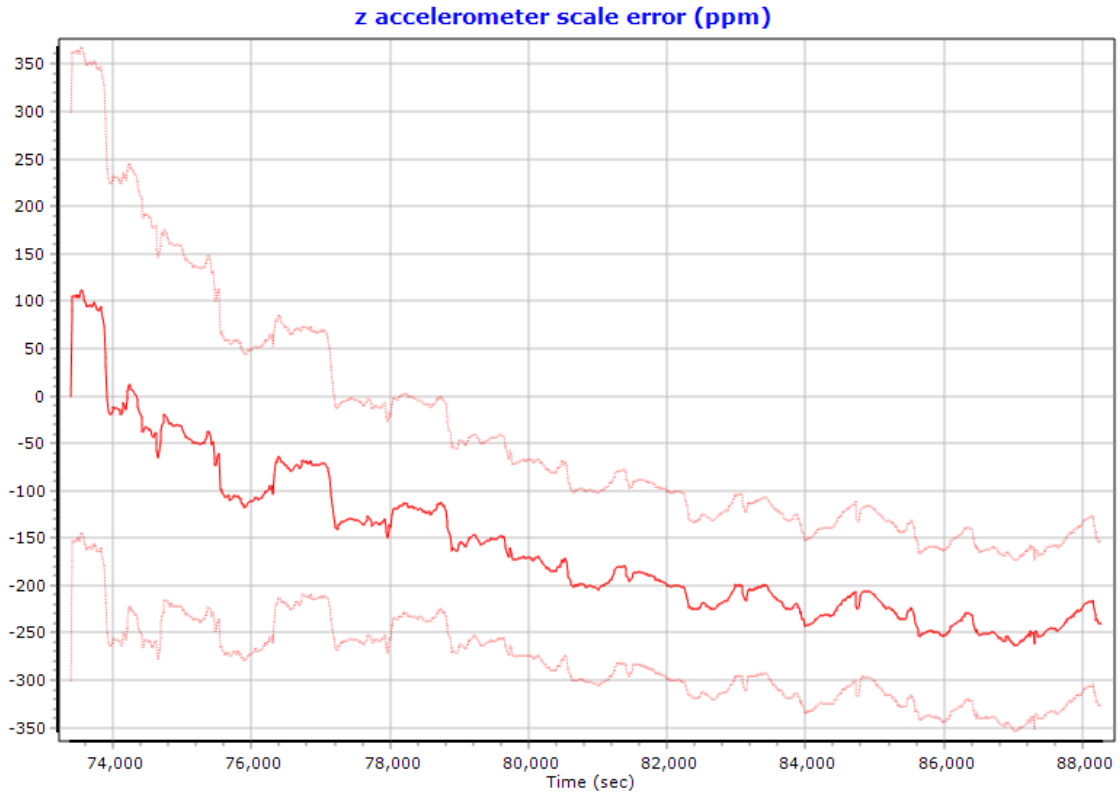


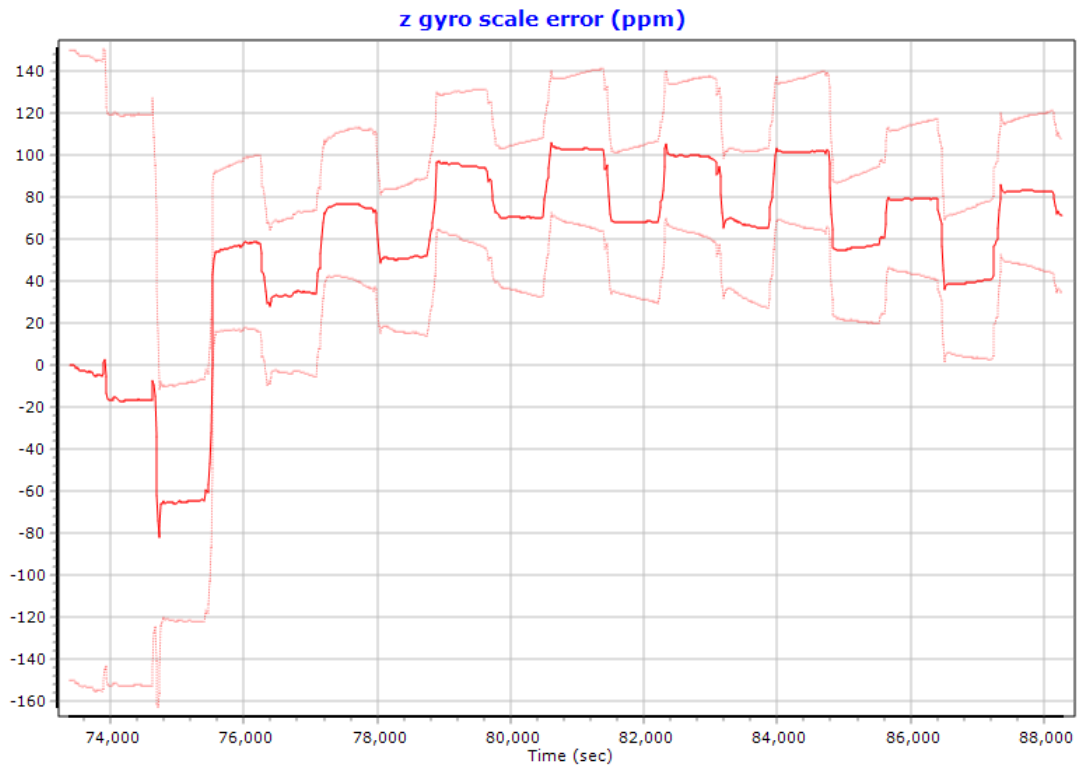
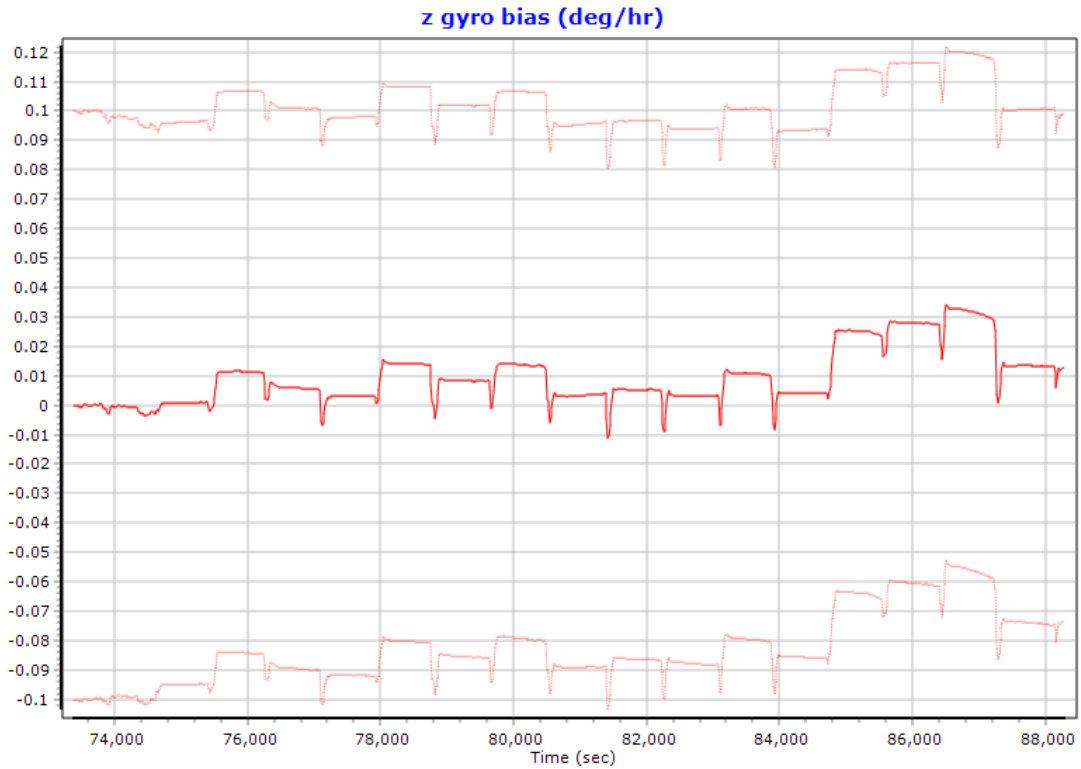






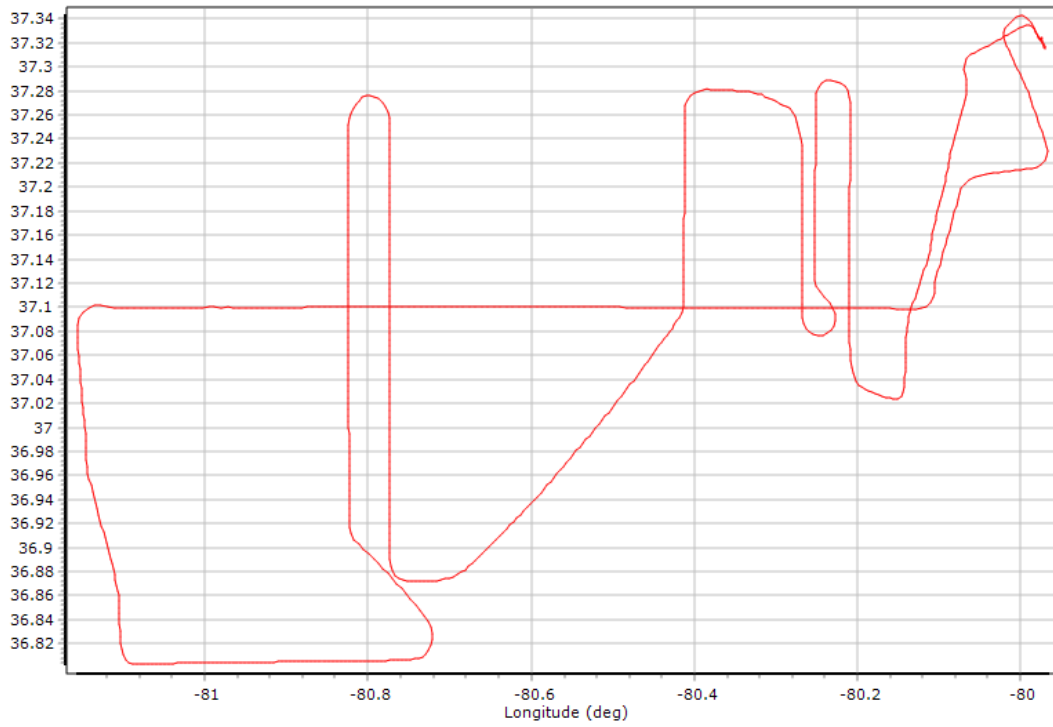




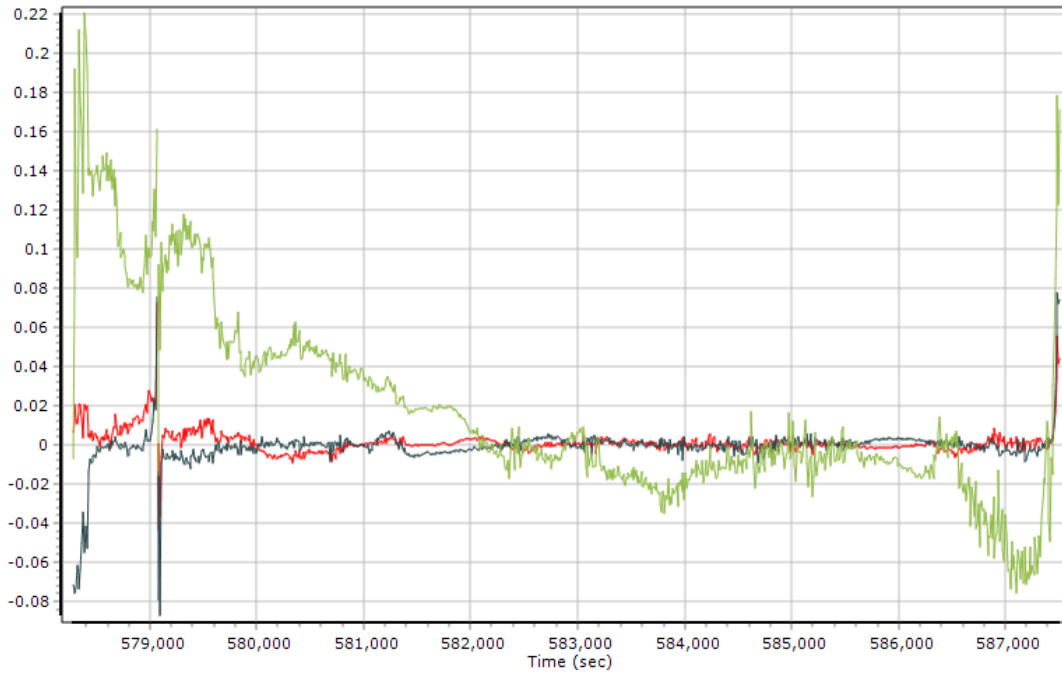


### MARCH 31, 2018

Top View: Latitude (deg)

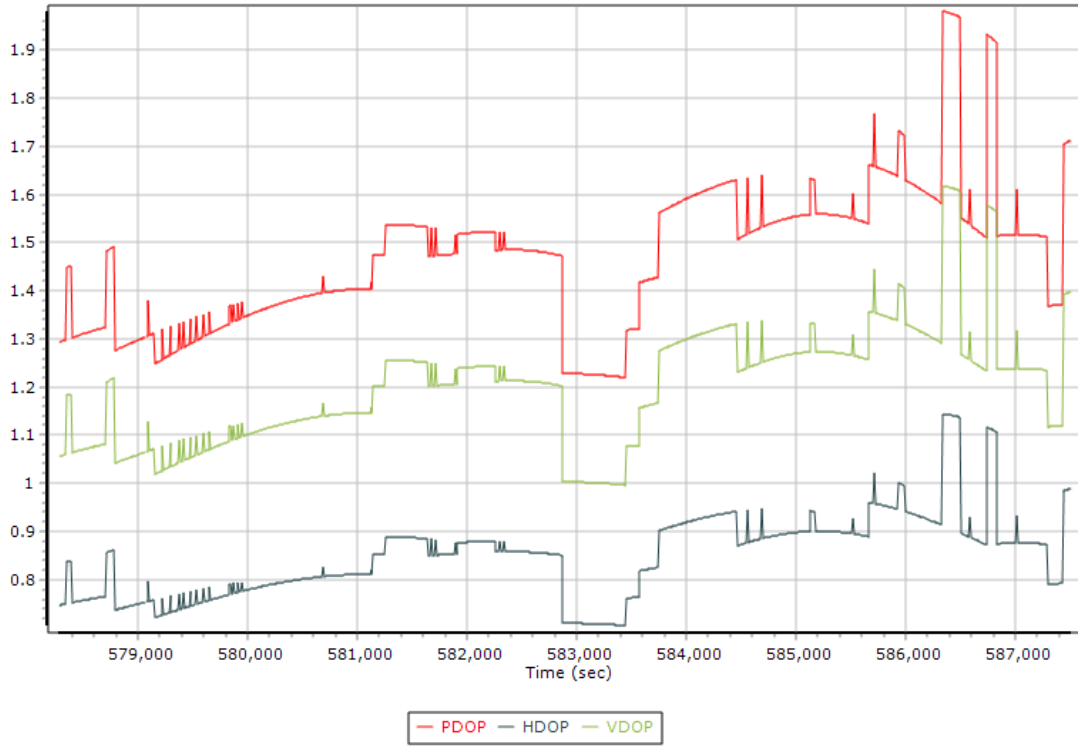


Forward/Reverse Separation

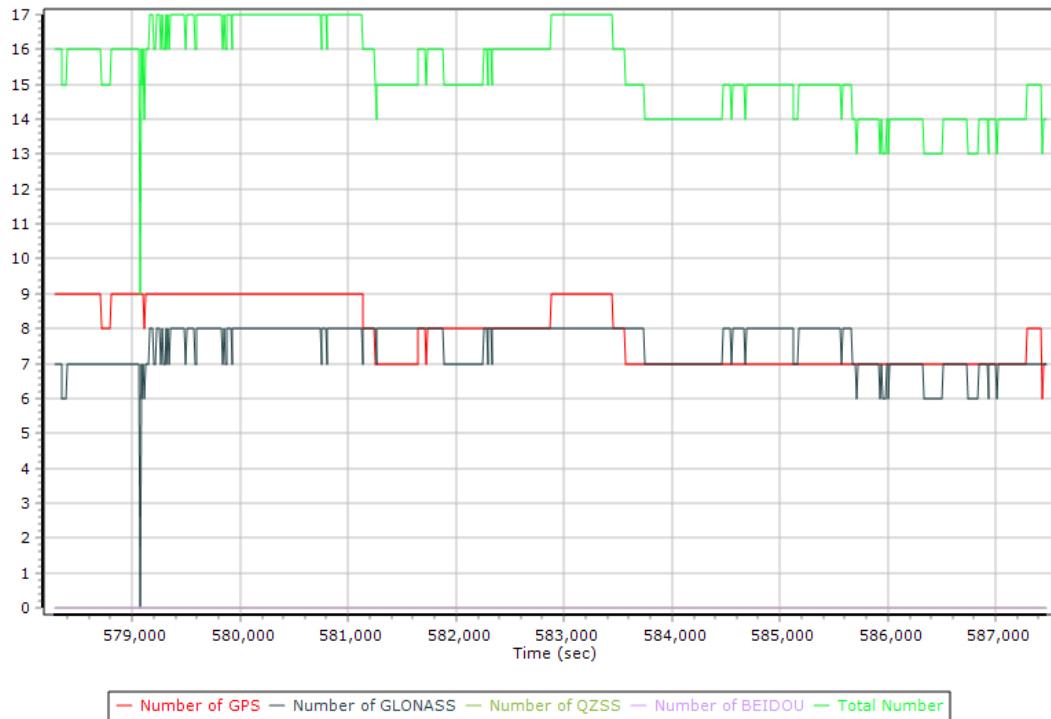


— North Separation (m) — East Separation (m) — Down Separation (m)

### DOP



### Number of SVs in solution



## Processing Summary Information

### Processing Summary Information

Program: POSPac MMS  
Version: 8.1.6388.30062  
Project: \\sa\data\riegl\217058\ 20180331\_VA

Solution Type: IN-Fusion SmartBase

Fixed: 9214	(99.99%)
Float: 0	(0.00%)
No Solution: 1	(0.01%)

Number of Epochs:

Total in RAW file: 9243  
No processed position: 29

Fwd/Rev Separation RMS Values (m):

North: 0.006  
East: 0.011  
Height: 0.052

Fwd/Rev Sep. RMS for 25%-75% weighting (m): 4620 occurrences

North: 0.002  
East: 0.003  
Height: 0.019

Quality Number Percentages:

Q o: 100.0 %

Position Standard Deviation Percentages (%):

0.00 - 0.10 m: 96.991  
 0.10 - 0.30 m: 3.009  
 0.30 - 1.00 m: 0  
 1.00 - 5.00 m: 0  
 5.00 m + over: 0

Percentages of epochs with DD\_DOP over 10.00: 0 %

DOP over Tol: 1.47%

Baseline Distances (km):

Maximum: 66.96  
 Minimum: 3.31  
 Average: 34.65  
 First Epoch: 48.38  
 Last Epoch: 48.34

CORS Base Stations

Station	Original			Adjusted		
	Latitude	Longitude	Altitude	Latitude	Longitude	Altitude
WVAT	N37°25'42.67838"	W81°04'04.40407"	704.673		W78°59'54.44159"	193.317
NCRX	N36°23'28.08364"	W78°59'54.44155"	193.300	N36°23'28.08341"	W78°41'37.27174"	512.945
UVFM	N37°52'43.49379"	W78°41'37.27175"	512.938	N37°52'43.49371"	W82°32'07.72304"	185.701
KYTL	N37°29'00.20373"	W82°32'07.72254"	185.679	N37°29'00.20355"	W81°40'54.67385"	956.592
ASUB	N36°12'50.87093"	W81°40'54.67348"	956.569	N36°12'50.87081"	W81°07'55.81247"	596.185
WVOH	N37°59'53.75060"	W81°07'55.81221"	596.194	N37°59'53.75053"	W80°25'18.58204"	655.203
WVLE	N37°49'20.23029"	W80°25'18.58199"	655.200	N37°49'20.23013"	W81°06'52.95811"	838.643
NCSR	N36°29'51.93297"	W81°06'52.95777"	838.659	N36°29'51.93282"	W80°00'48.96124"	266.586
HIPT	N35°57'56.51370"	W80°00'48.96086"	266.584	N35°57'56.51339"	W80°43'11.73554"	339.303



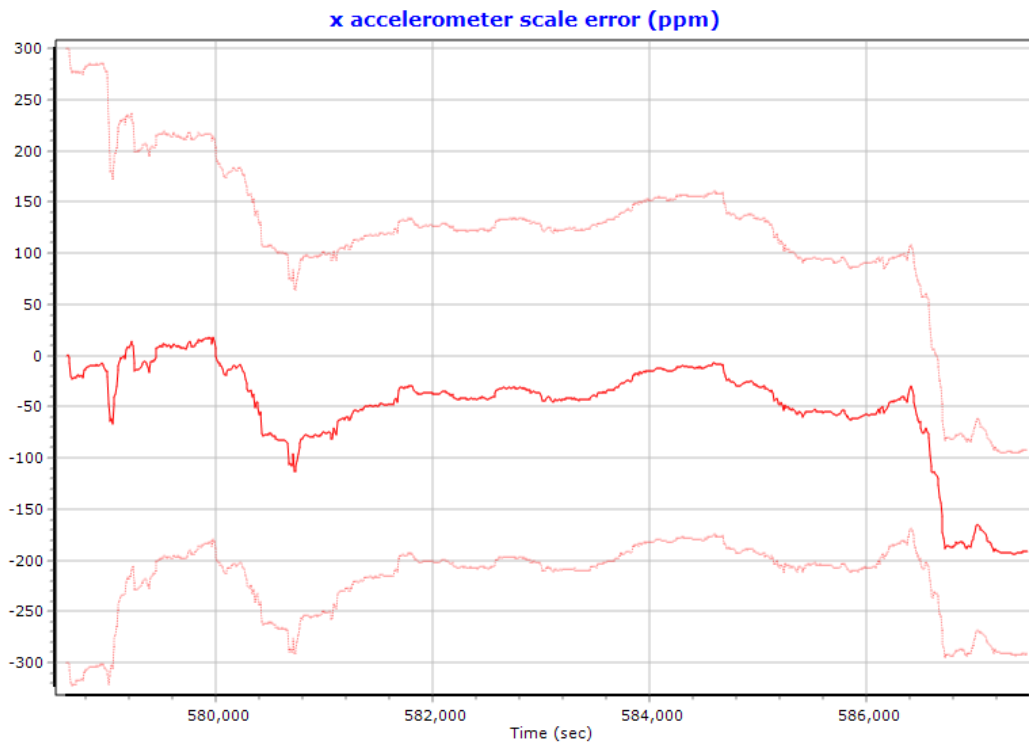
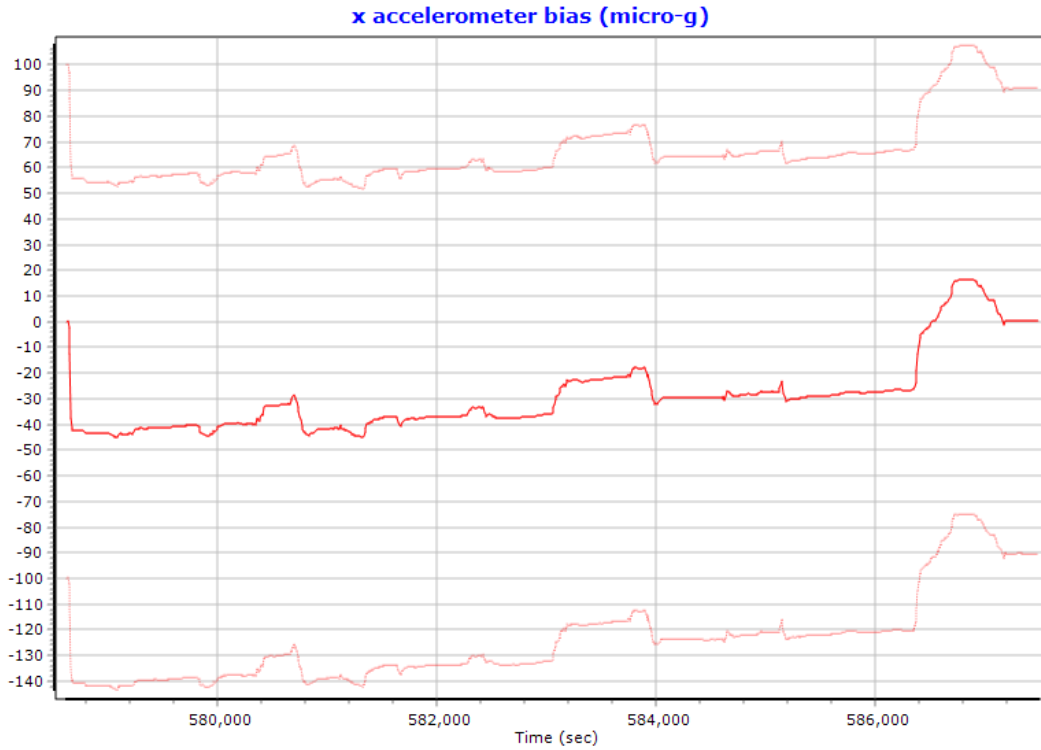
Virginia West Chesapeake Central LiDAR

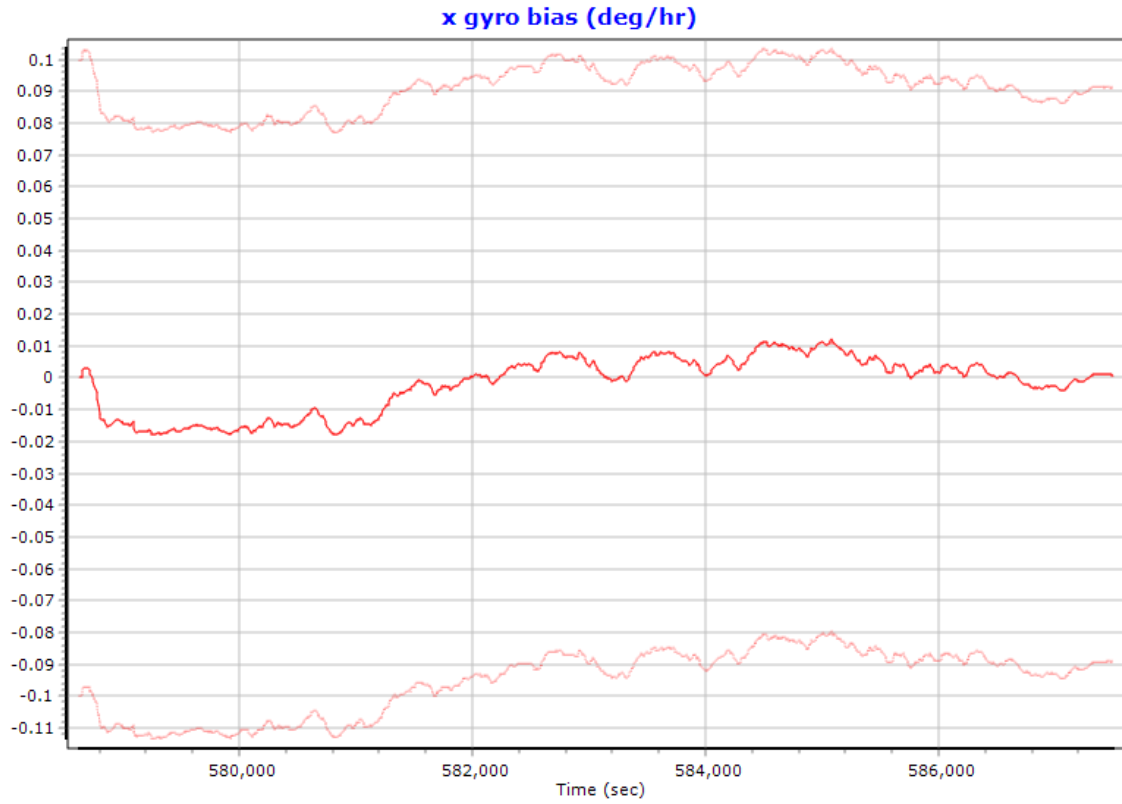
TO# G15PD00714

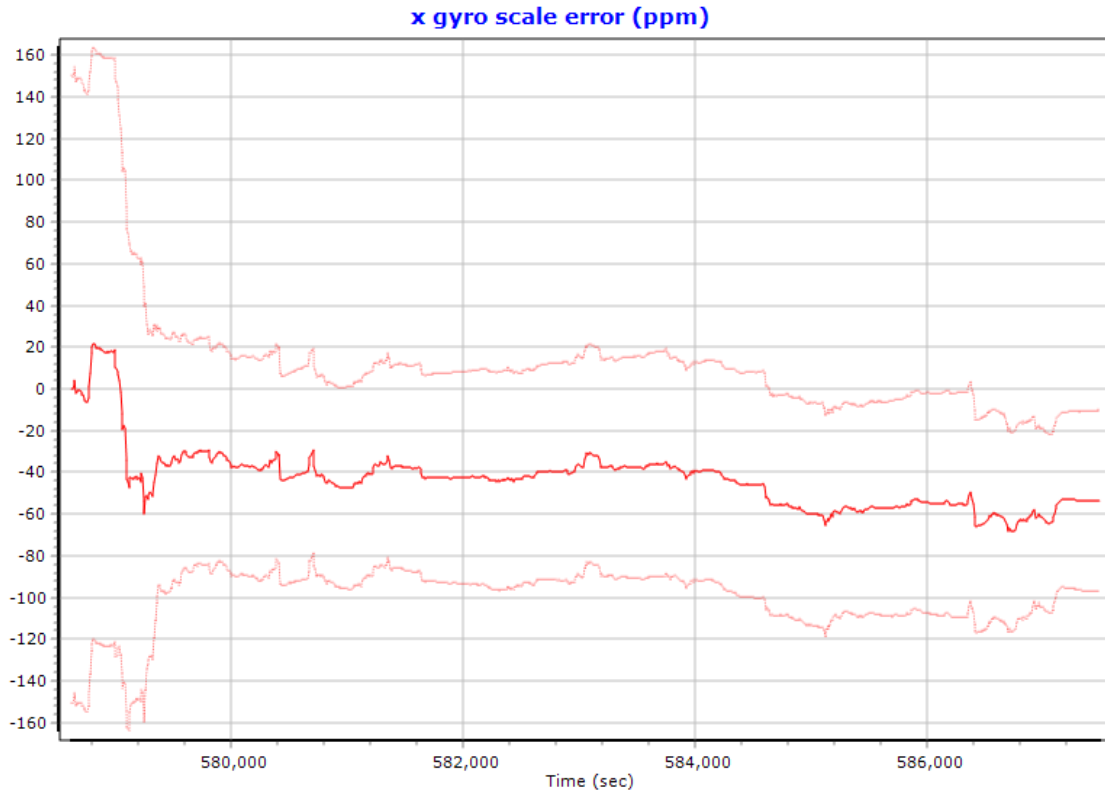
July 17, 2018

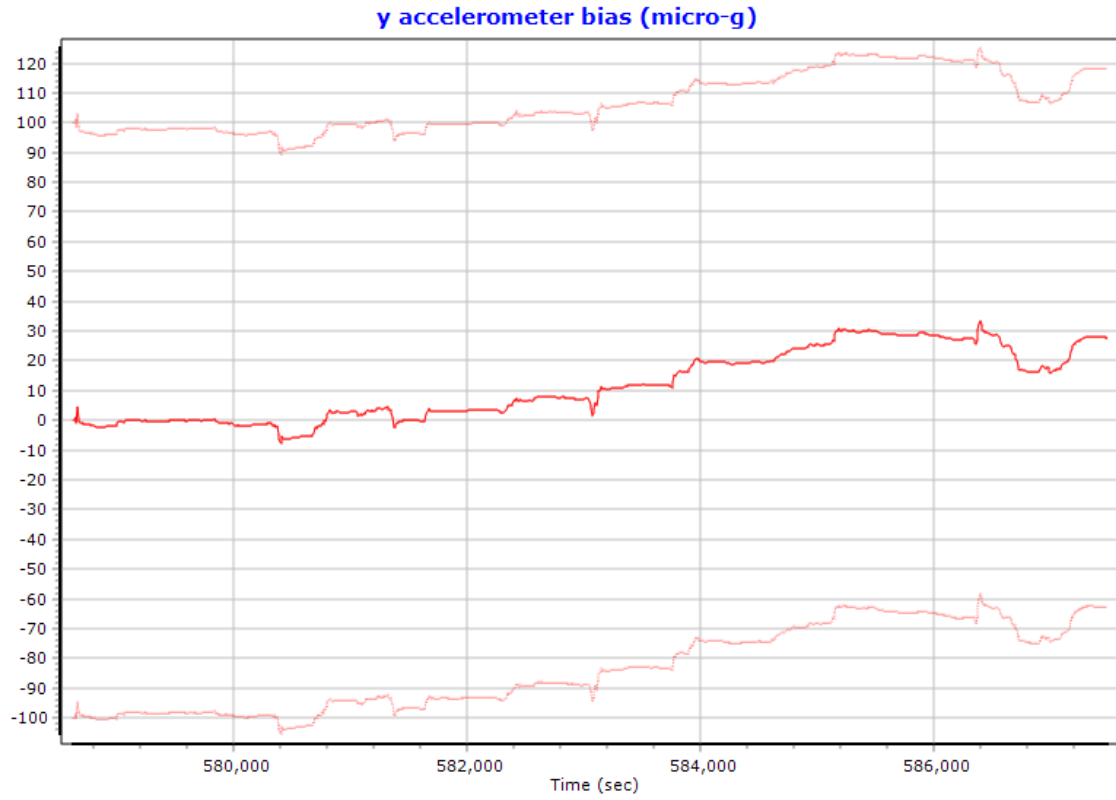
Page 193 of 202

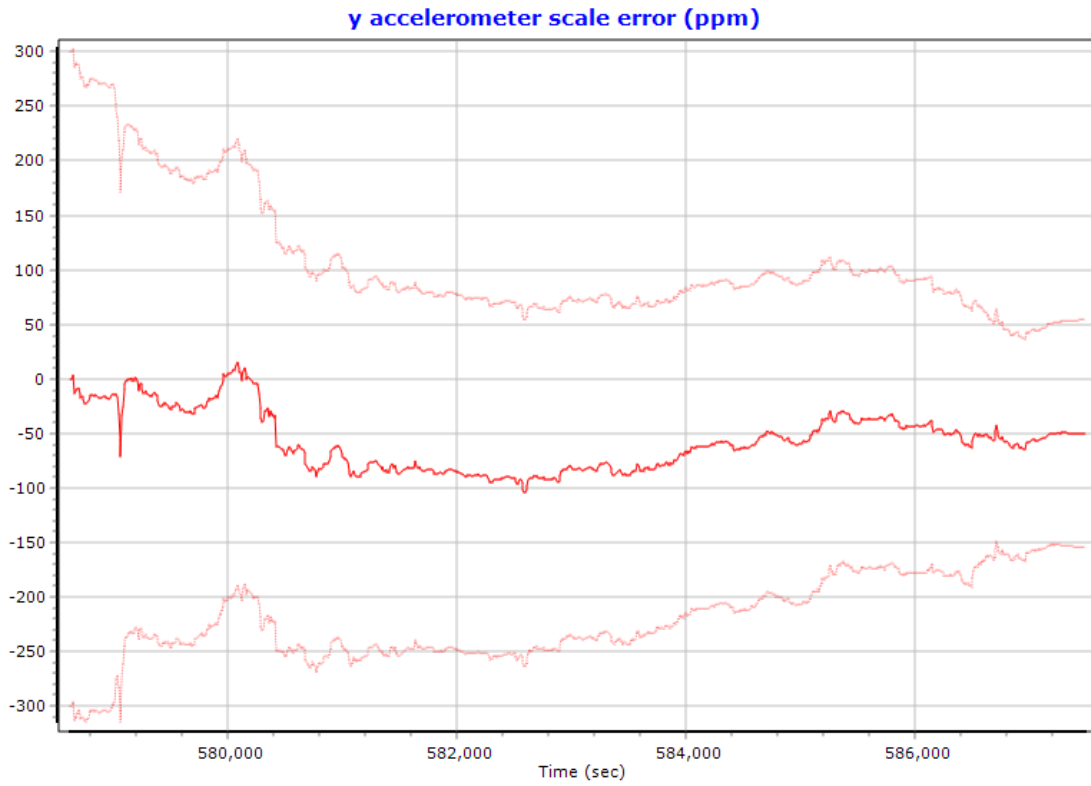
DOBS	N36°25'31.54135"	W80°43'11.73514"	339.298	N36°25'31.54127"	W80°25'13.83270"	605.693
BLA1	N37°12'40.85438"	W80°25'13.83288"	605.692	N37°12'40.85423"	W78°59'54.44159"	193.317

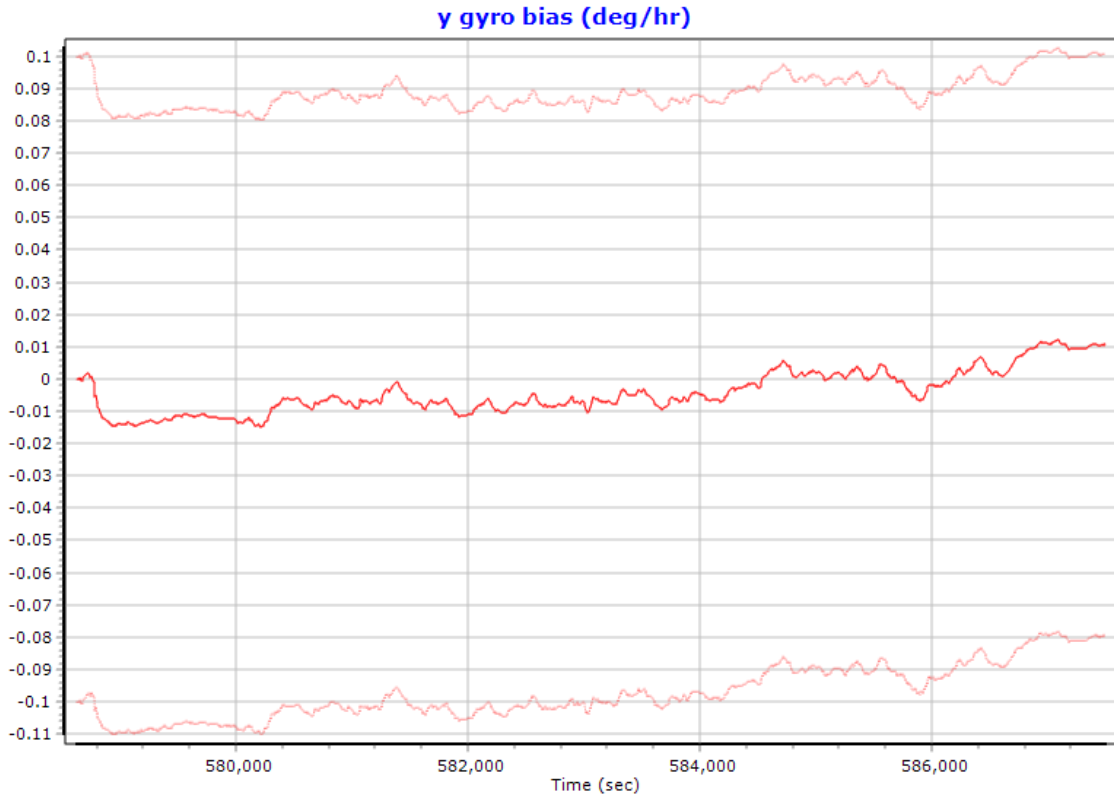


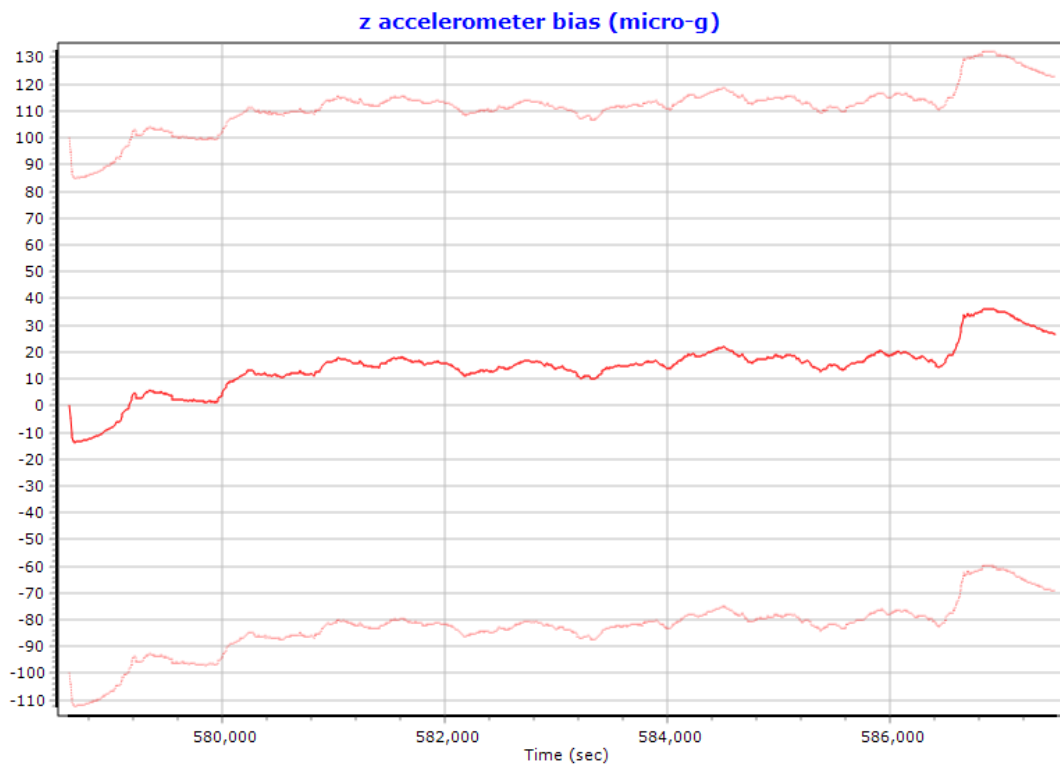
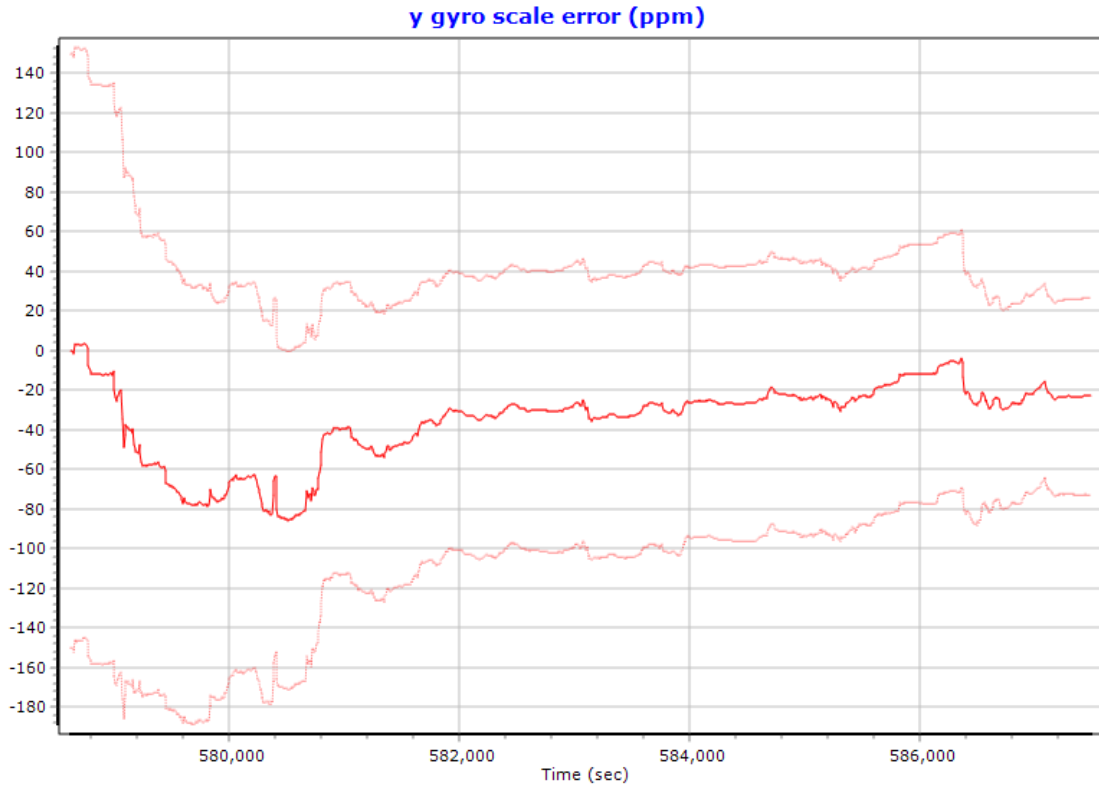






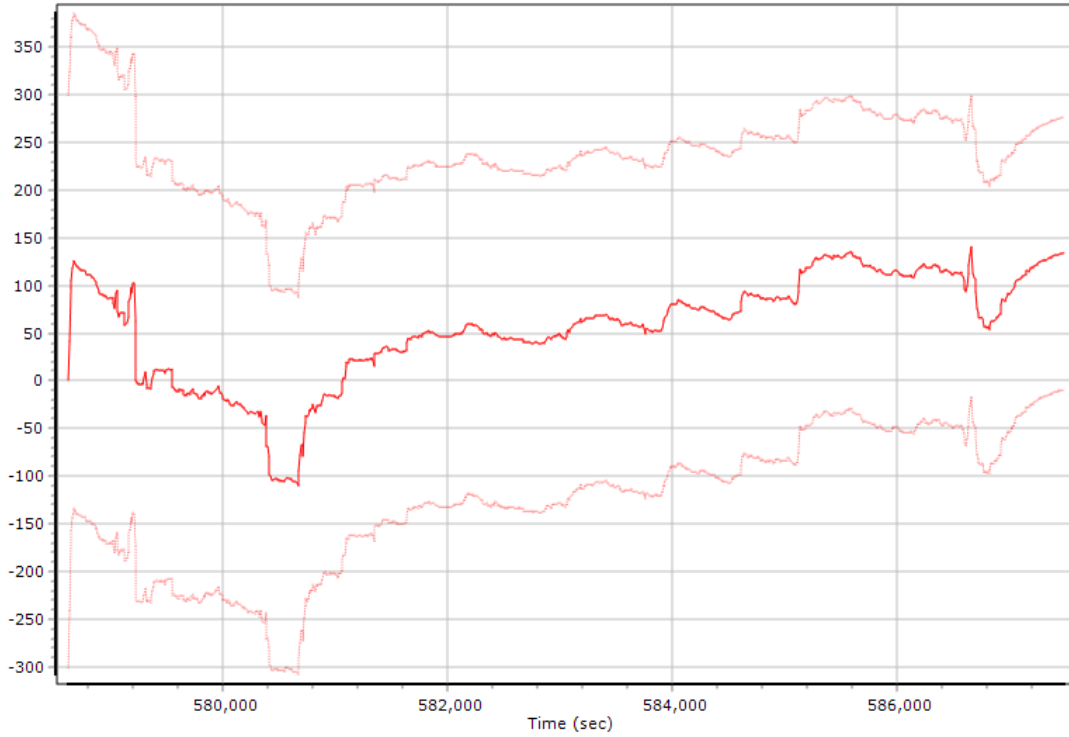








**z accelerometer scale error (ppm)**



**z gyro bias (deg/hr)**

