

## Microgravity Acceleration Measurement System (MAMS) Attitude Catalog

These are the steps used to gather the information intended to serve as a MAMS catalog of International Space Station (ISS) attitudes:

1. The Grand Unified As-Flown Timeline (GUATL) from the ISS Motion Control Systems Flight Info web site was first downloaded. This GUATL provides a useful history of ISS attitude control activities over last 10+ years.
2. The GUATL was converted to a spreadsheet format, which made it more amenable to analysis. Extra columns were added to help track the preponderance of documented attitudes.
3. A pivot table was computed from the formatted GUATL to summarize the number of times a given attitude showed up in the GUATL since 2010. It is well known that the primary attitude is the +XVV +ZLV Torque Equilibrium Attitude (TEA), however, this pivot table showed other non-typical attitudes that are used as needed (e.g. for visiting vehicle dockings). Here are the results, which show the 5 predominant attitudes in the shaded rows:

Attitude	Count in GUATL
+XVV +ZLV	259
+XVV +ZLV TEA	1666
+YVV +ZLV	2
+YVV +ZLV TEA	6
+ZVV -XLV	99
unknown	6
-XVV +ZLV	36
-XVV +ZLV TEA	271
-YVV +ZLV	1
-ZVV -XLV	39
Grand Total	2385

4. Multiple pivot tables were next computed from the formatted GUATL to summarize the orientation in terms of yaw, pitch, and roll for each of the 5 predominant attitudes so identified. These pivot tables are presented on the next page and show a clear pattern of flight controllers orienting the space station consistently with only minor deviations, where the deviations were mainly in the pitch axis.
5. The MAMS OARE Sensor Subsystem (OSS) data were analyzed for a number of each of the 5 predominant attitudes identified from the GUATL. The results of that analysis are documented after the next page, which shows the set of tables from #4.

## Microgravity Acceleration Measurement System (MAMS) Attitude Catalog

The set of tables below show the clear pattern of flight controllers orienting the space station consistently with only minor deviations:

Index	Attitude	Yaw Average (deg.)	Pitch Average (deg.)	Roll Average (deg.)
1	+XVV +ZLV TEA	355.3	357.4	0.6
2	+XVV +ZLV TEA	354.0	357.0	0.6
3	+XVV +ZLV TEA	356.0	357.8	0.6
4	+XVV +ZLV TEA	356.0	358.3	0.6
5	+XVV +ZLV TEA	356.0	357.3	0.6
6	+XVV +ZLV TEA	356.0	357.8	0.6
	Grand Average	355.5	357.6	0.6

Index	Attitude	Yaw Average (deg.)	Pitch Average (deg.)	Roll Average (deg.)
1	-XVV +ZLV TEA	175.0	357.9	0.6
2	-XVV +ZLV TEA	177.0	359.0	0.6
3	-XVV +ZLV TEA	177.0	357.7	0.6
4	-XVV +ZLV TEA	177.0	119.6	0.6
5	-XVV +ZLV TEA	177.0	359.0	0.6
6	-XVV +ZLV TEA	177.0	0.4	0.6
	Grand Average	176.7	245.3	0.6

Index	Attitude	Yaw Average (deg.)	Pitch Average (deg.)	Roll Average (deg.)
1	-ZVV -XLV	180.0	90.0	0.0
2	-ZVV -XLV	180.0	90.0	0.0
3	-ZVV -XLV	180.0	90.0	0.0
4	-ZVV -XLV	180.0	90.0	0.0
5	-ZVV -XLV	180.0	90.0	0.0
6	-ZVV -XLV	180.0	90.0	0.0
	Grand Average	180.0	90.0	0.0

Index	Attitude	Yaw Average (deg.)	Pitch Average (deg.)	Roll Average (deg.)
1	+ZVV -XLV	0.0	90.0	0.0
2	+ZVV -XLV	0.0	90.0	0.0
3	+ZVV -XLV	0.0	90.0	0.0
4	+ZVV -XLV	0.0	90.0	0.0
	Grand Average	0.0	90.0	0.0

Index	Attitude	Yaw Average (deg.)	Pitch Average (deg.)	Roll Average (deg.)
1	+YVV +ZLV TEA	266.0	357.6	1.2
	Grand Average	266.0	357.6	1.2

## Microgravity Acceleration Measurement System (MAMS) Attitude Catalog

The MAMS OARE Sensor Subsystem (OSS) data were analyzed for a number of each of the 5 predominant attitudes identified from the GUATL. The results of that analysis are shown here:

Count	Attitude	Average YPR (deg)			Average OSS (ug)		
		Yaw	Pitch	Roll	X-Axis	Y-Axis	Z-Axis
6	+XVV +ZLV TEA	355.6	357.6	0.6	-0.0389	-0.1825	-0.1472
6	-XVV +ZLV TEA	176.7	318.9	0.6	0.0322	-0.1169	-0.0965
6	-ZVV -XLV	180.0	90.0	0.0	-0.5889	-0.0934	-0.0544
4	+ZVV -XLV	0.0	90.0	0.0	-0.8058	-0.1143	-0.1043
1	+YVV +ZLV	266.0	357.6	1.2	0.3078	-0.3975	-0.3280

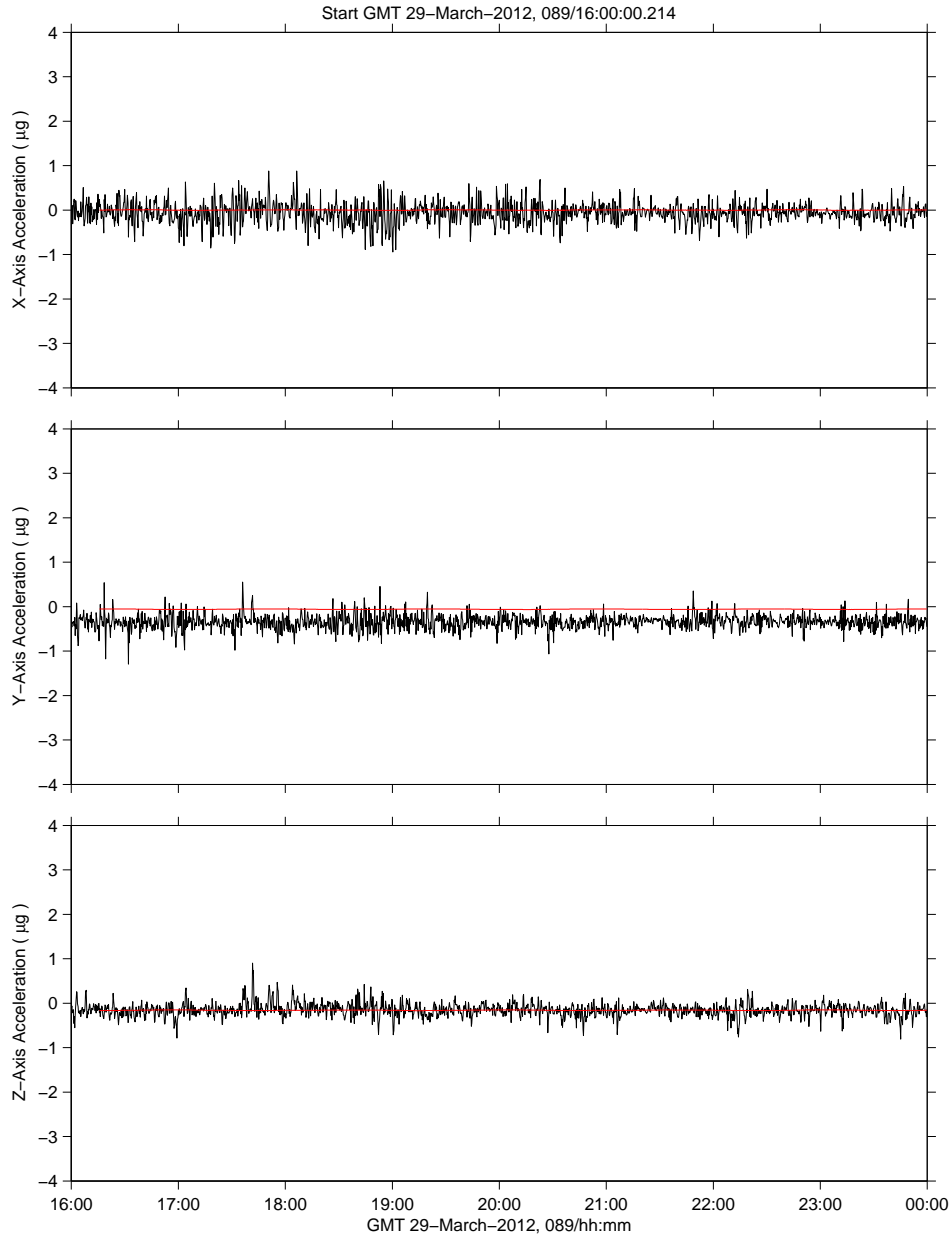
In addition, the rates and angles data from vehicle telemetry were analyzed similar to what was done for MAMS OSS above, and those results are shown here (*note* that these rates and angles only account for rotational and gravity gradient effects):

Count	Attitude	Average YPR (deg)			Average Rates/Angles (ug)		
		Yaw	Pitch	Roll	X-Axis	Y-Axis	Z-Axis
6	+XVV +ZLV TEA	355.6	357.6	0.6	-0.0039	-0.0284	-0.1506
6	-XVV +ZLV TEA	176.7	318.9	0.6	-0.0024	-0.0089	-0.1005
6	-ZVV -XLV	180.0	90.0	0.0	-0.6102	-0.0043	-0.0620
4	+ZVV -XLV	0.0	90.0	0.0	-0.7334	0.0005	-0.0404
1	+YVV +ZLV	266.0	357.6	1.2	0.3624	-0.0091	-0.1936

The next several pages are representative plots of acceleration data for each of the 5 predominant attitudes identified above.

The table after the next several pages gives a comprehensive accounting of the attitudes selected to serve as representative examples.

RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = -0.0616, Y = -0.2830, Z = 0.0067 (μg)  
 Mean for Rates & Angles Data: X = 0.0000, Y = -0.0586, Z = -0.1594 (μg)



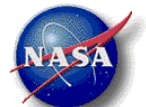
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

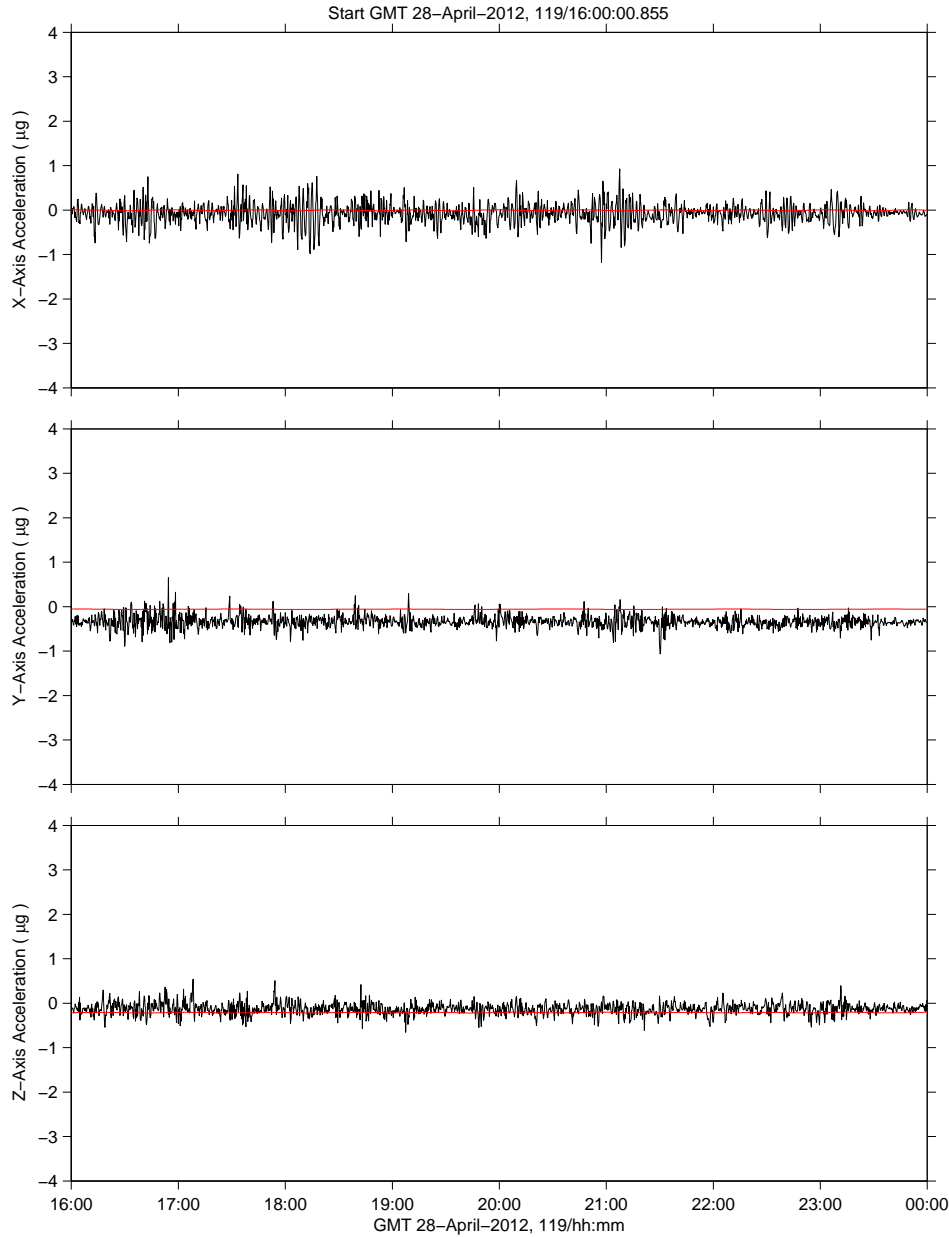
### Attitude:

- +XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = -0.0720, Y = -0.2791, Z = 0.0846 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.0056, Y = -0.0588, Z = -0.2118 ( $\mu\text{g}$ )



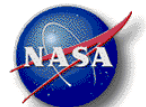
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

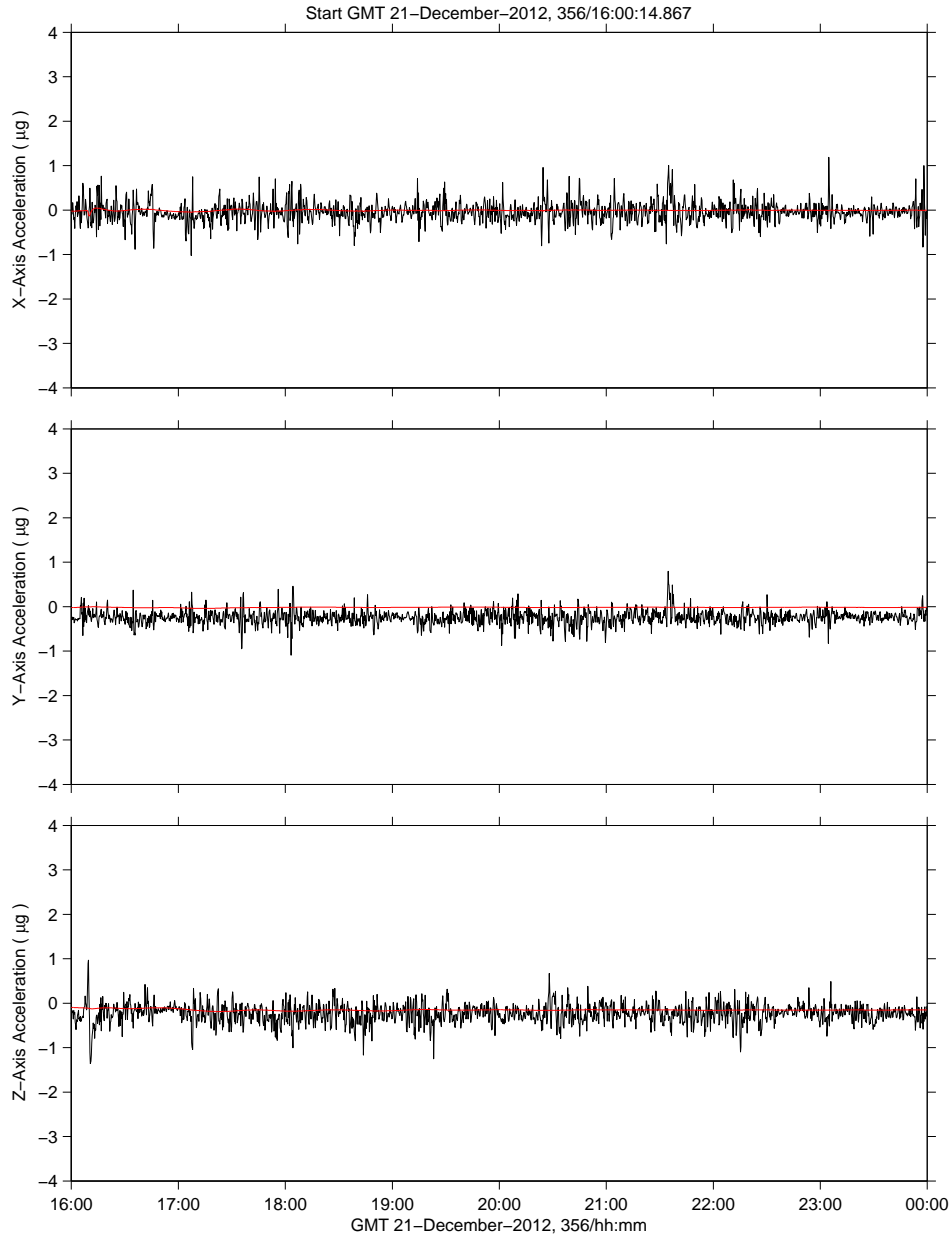
### Attitude:

- +XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbmf - radgse): X = -0.0364, Y = -0.2228, Z = -0.0813 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.0068, Y = -0.0183, Z = -0.1514 ( $\mu\text{g}$ )



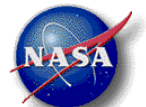
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

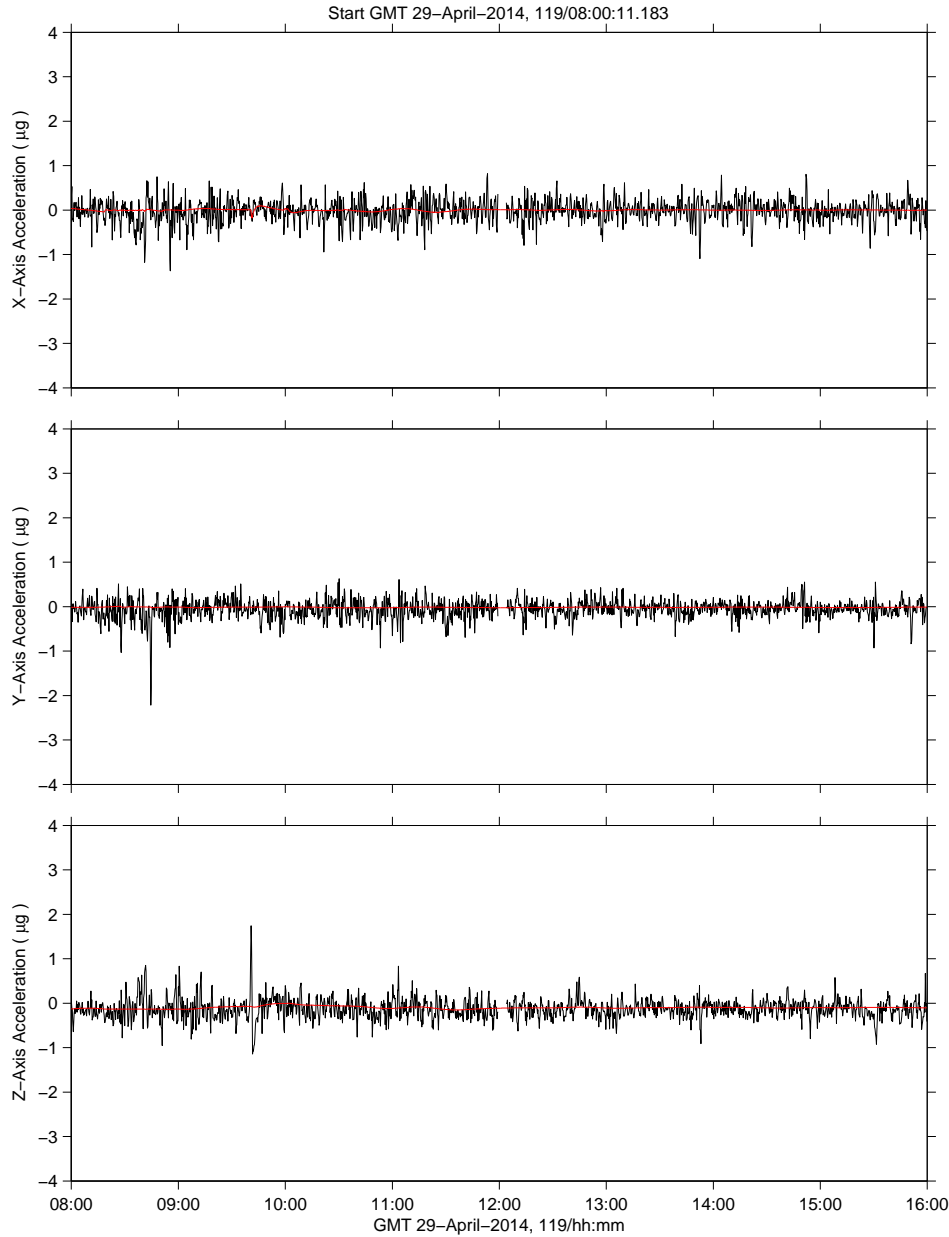
### Attitude:

- +XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtfm - radgse): X = -0.0222, Y = -0.0471, Z = -0.0283 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.0003, Y = -0.0160, Z = -0.0994 ( $\mu\text{g}$ )



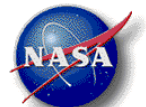
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

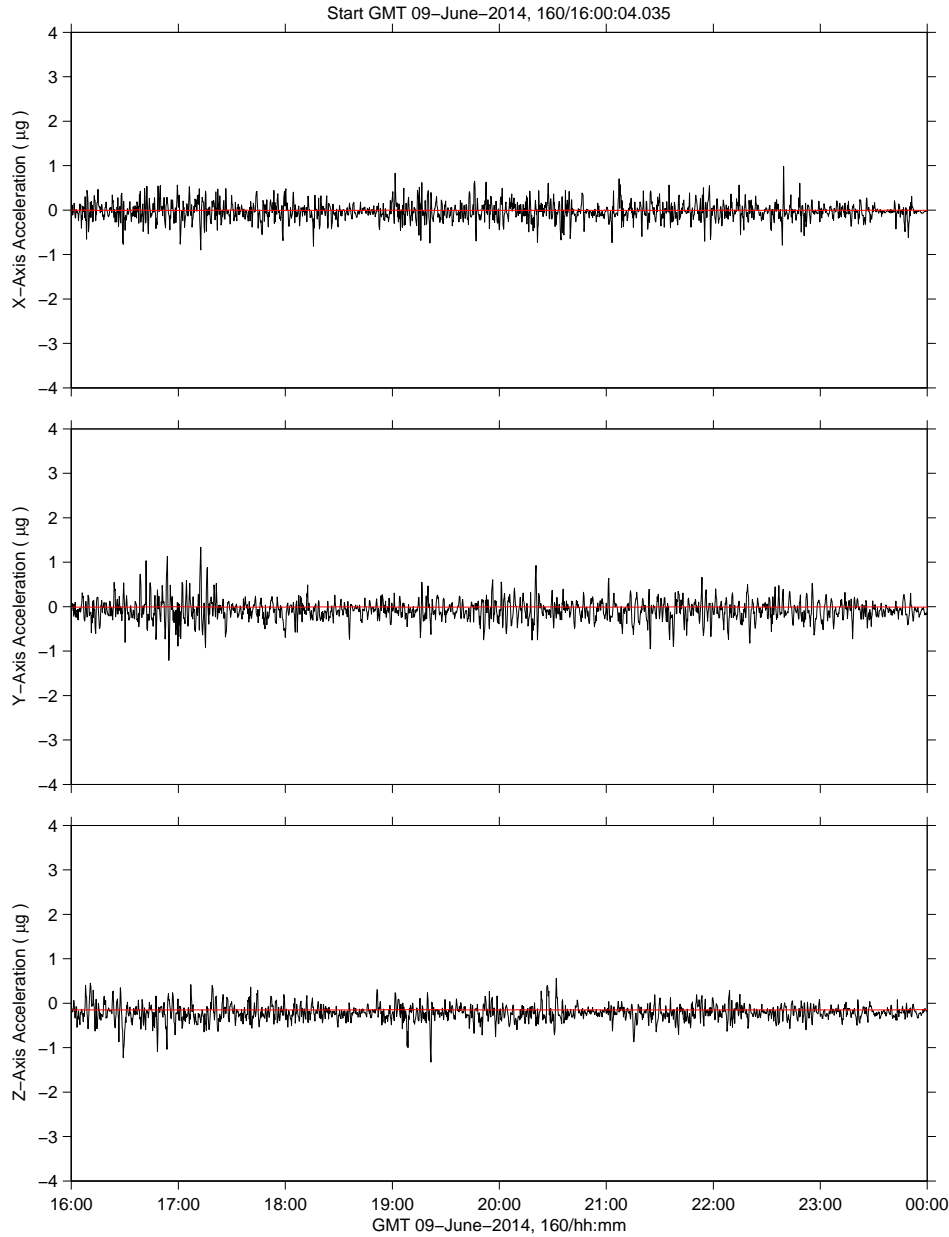
### Attitude:

- +XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbmf - radgse): X = -0.0241, Y = -0.0709, Z = -0.0654 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.0060, Y = -0.0096, Z = -0.1505 ( $\mu\text{g}$ )



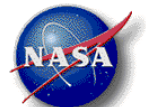
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

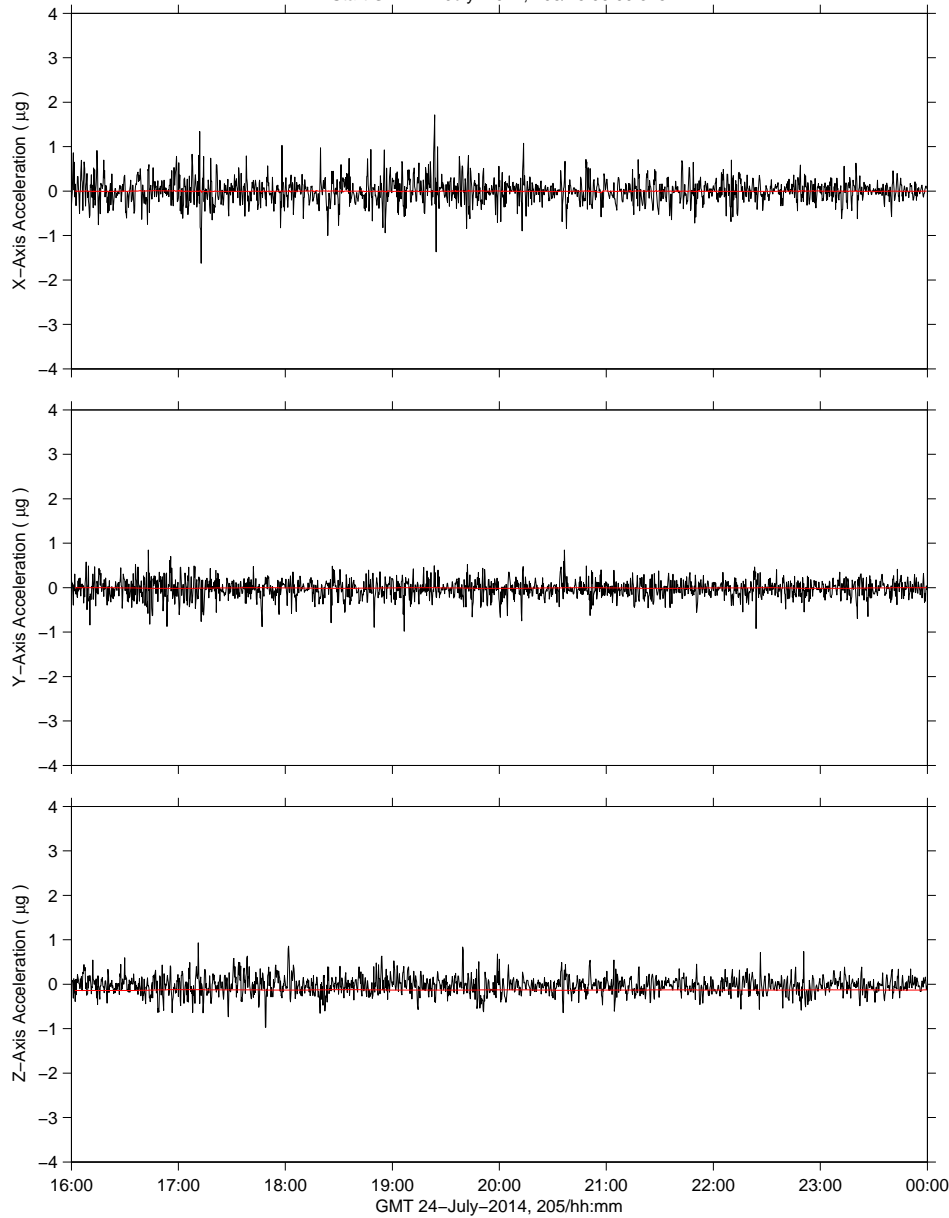
- +XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog





Start GMT 24-July-2014, 205/16:00:09.375



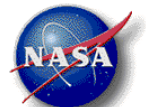
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB102, ER1
Plot Type	Acceleration vs. Time

### Attitude:

- +XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog

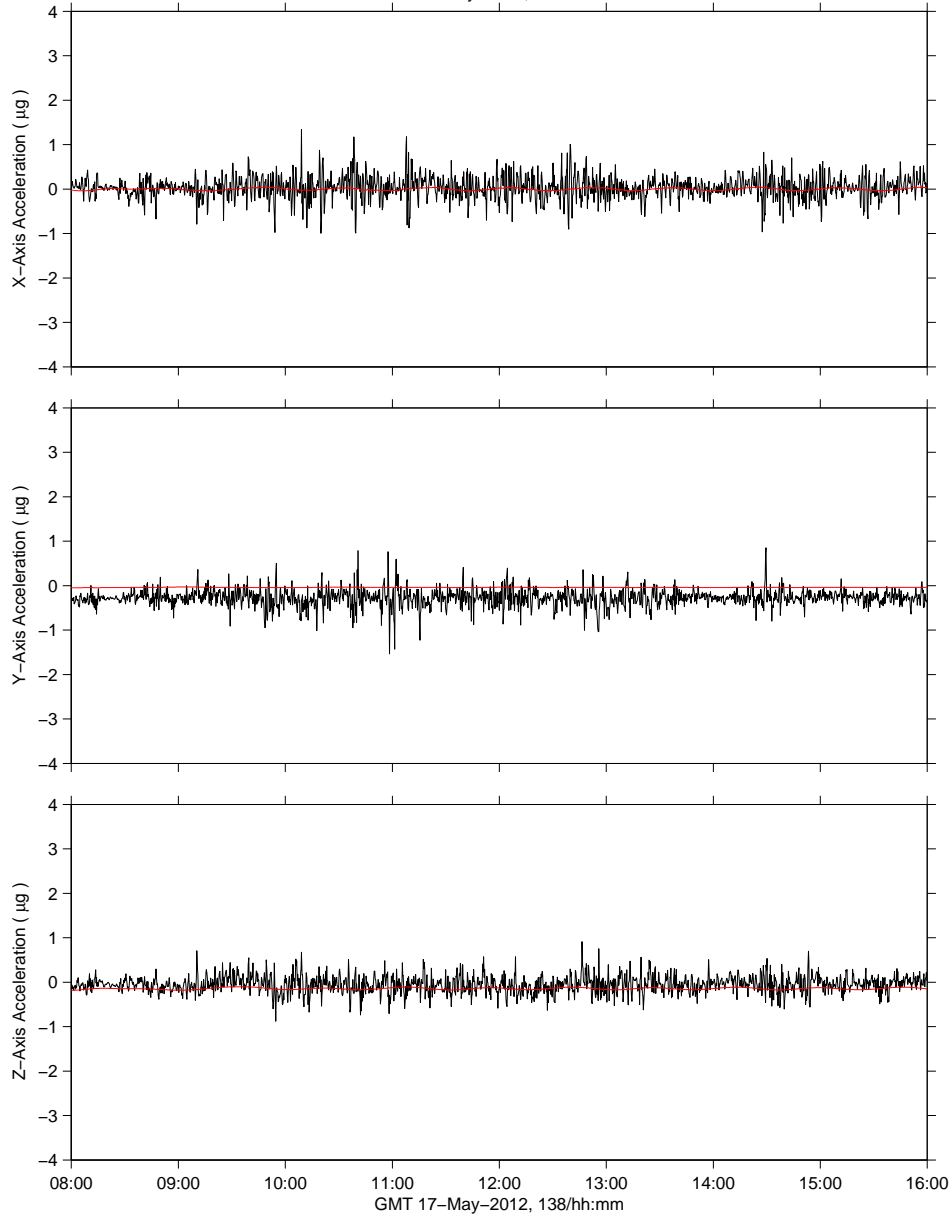


RED LINE IS GSE RATES & ANGLES DATA

DELTA (ossbtmf - radgse): X = 0.0335, Y = -0.2334, Z = 0.0946 ( $\mu\text{g}$ )

Mean for Rates & Angles Data: X = -0.0023, Y = -0.0405, Z = -0.1447 ( $\mu\text{g}$ )

Start GMT 17-May-2012, 138/08:00:10.011



## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

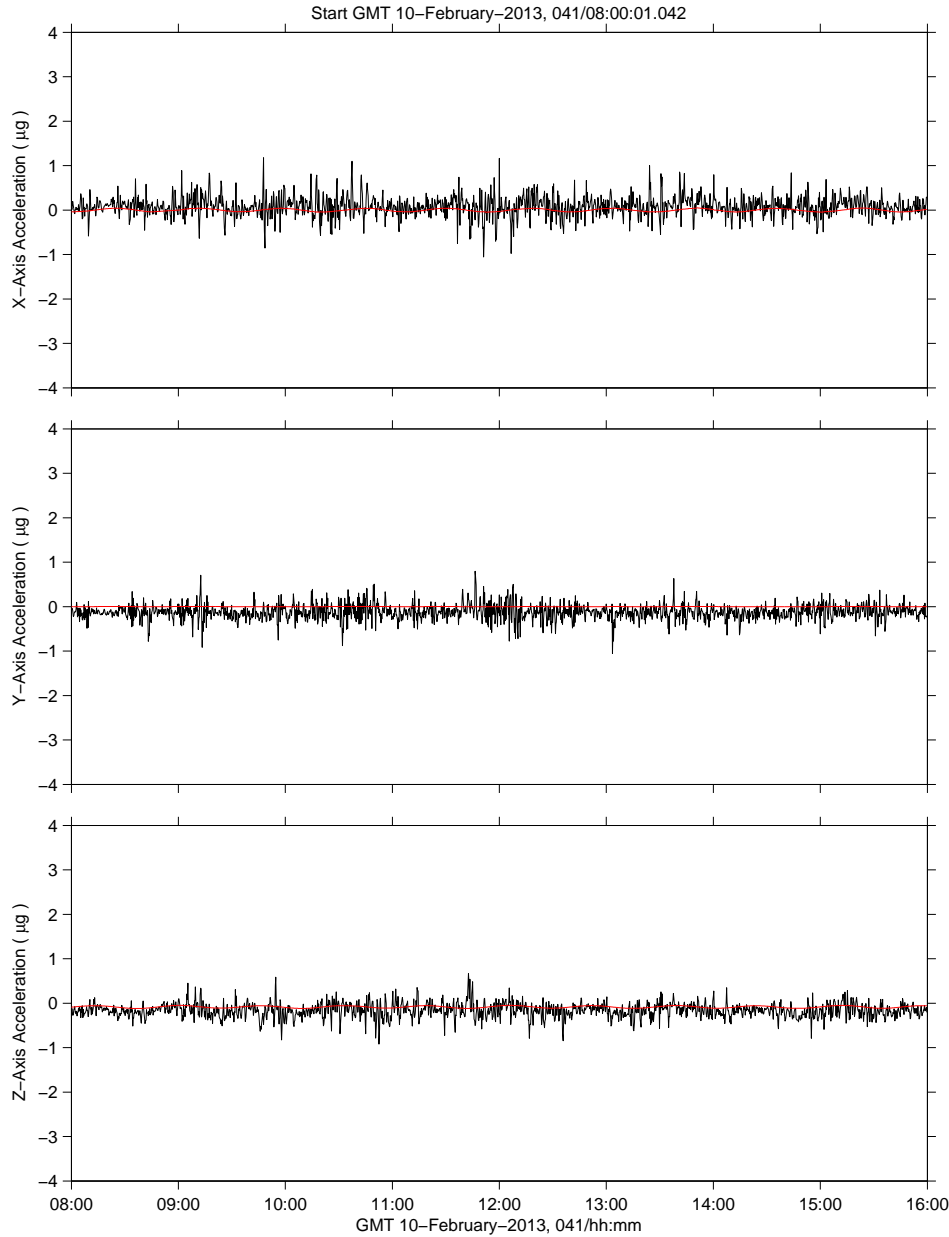
- XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = 0.0801, Y = -0.1234, Z = -0.0801 (µg)  
 Mean for Rates & Angles Data: X = -0.0018, Y = -0.0005, Z = -0.0841 (µg)

## Attitude Catalog Qualify



Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

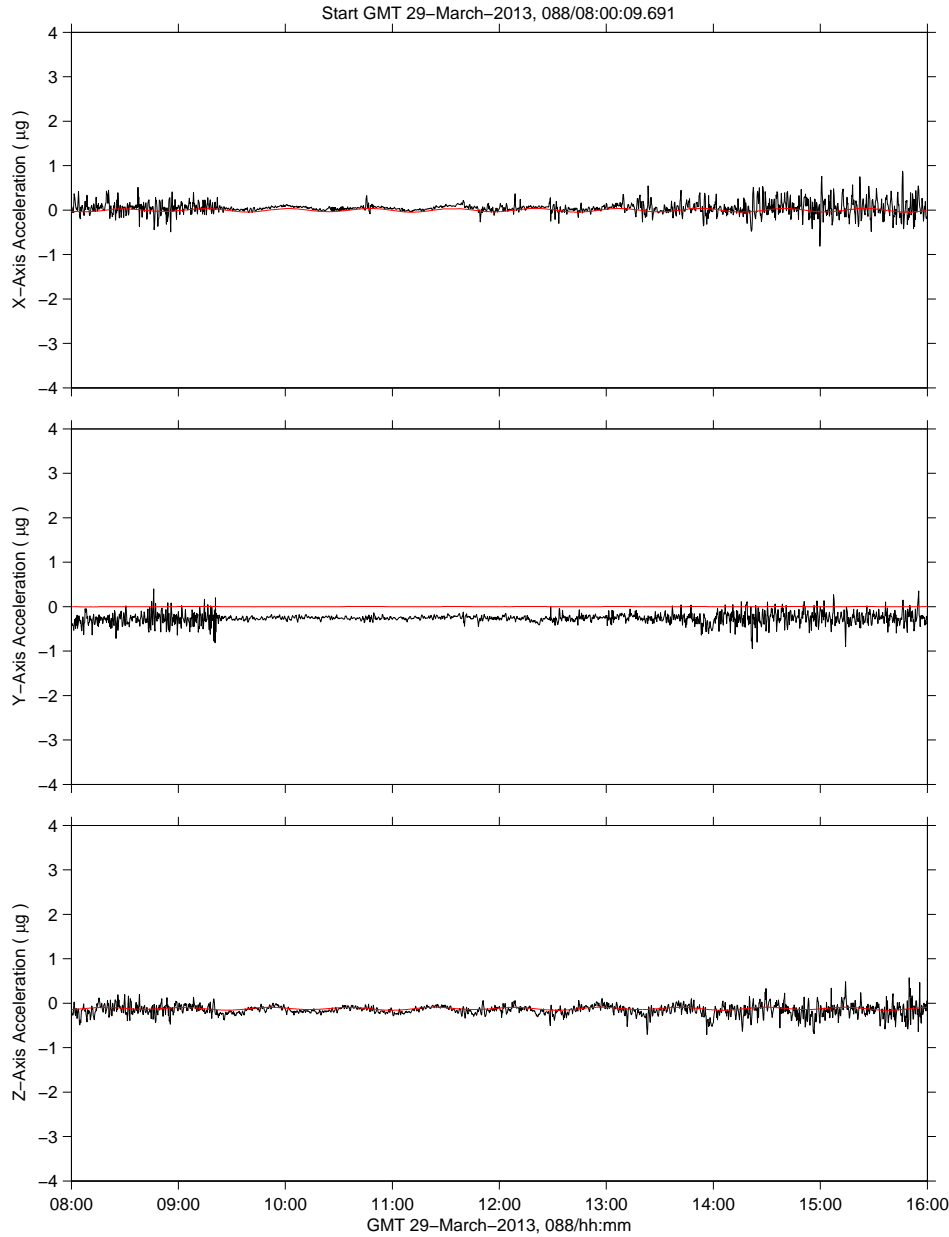
### Attitude:

- -XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = 0.0514, Y = -0.2596, Z = -0.0313 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.0052, Y = -0.0012, Z = -0.1223 ( $\mu\text{g}$ )



## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

- XVV +ZLV TEA

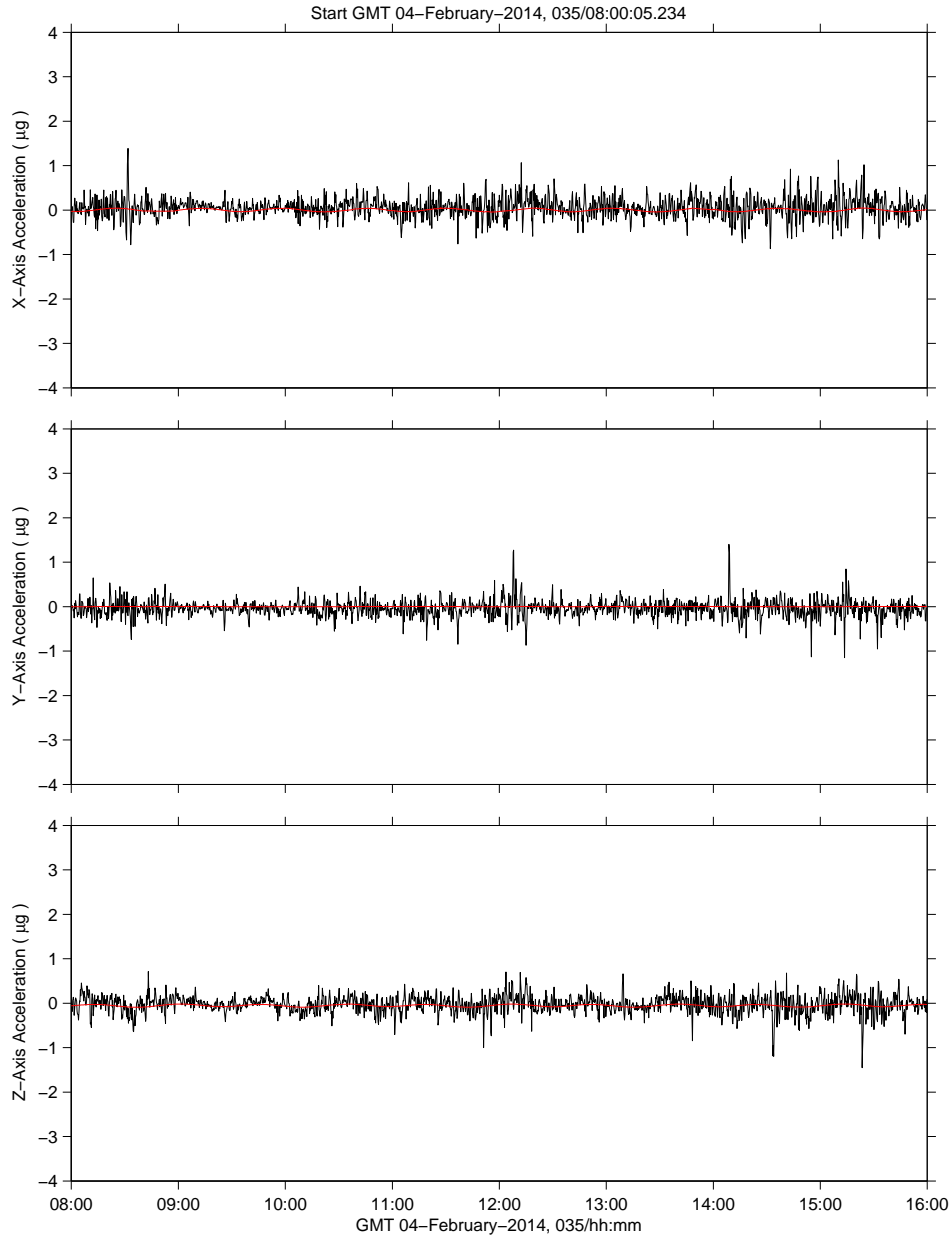
Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA

DELTA S (ossbtfm - radgse): X = 0.0548, Y = -0.0429, Z = 0.0292 ( $\mu\text{g}$ )

Mean for Rates & Angles Data: X = -0.0008, Y = -0.0000, Z = -0.0542 ( $\mu\text{g}$ )



## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

**Attitude:**

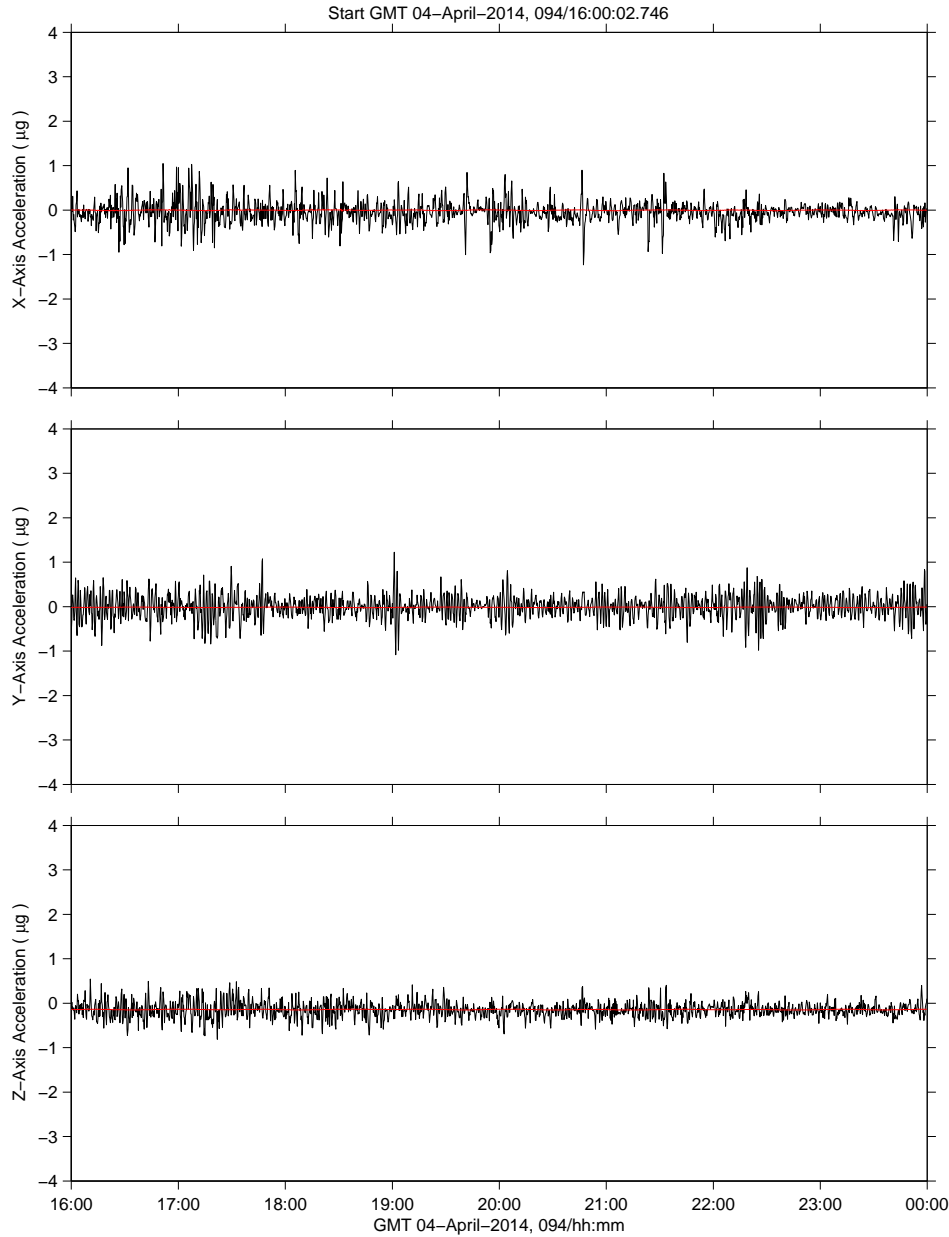
- XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = -0.0435, Y = 0.0177, Z = -0.0062 (μg)  
 Mean for Rates & Angles Data: X = -0.0042, Y = -0.0165, Z = -0.1439 (μg)

## Attitude Catalog Qualify

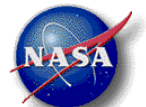


Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

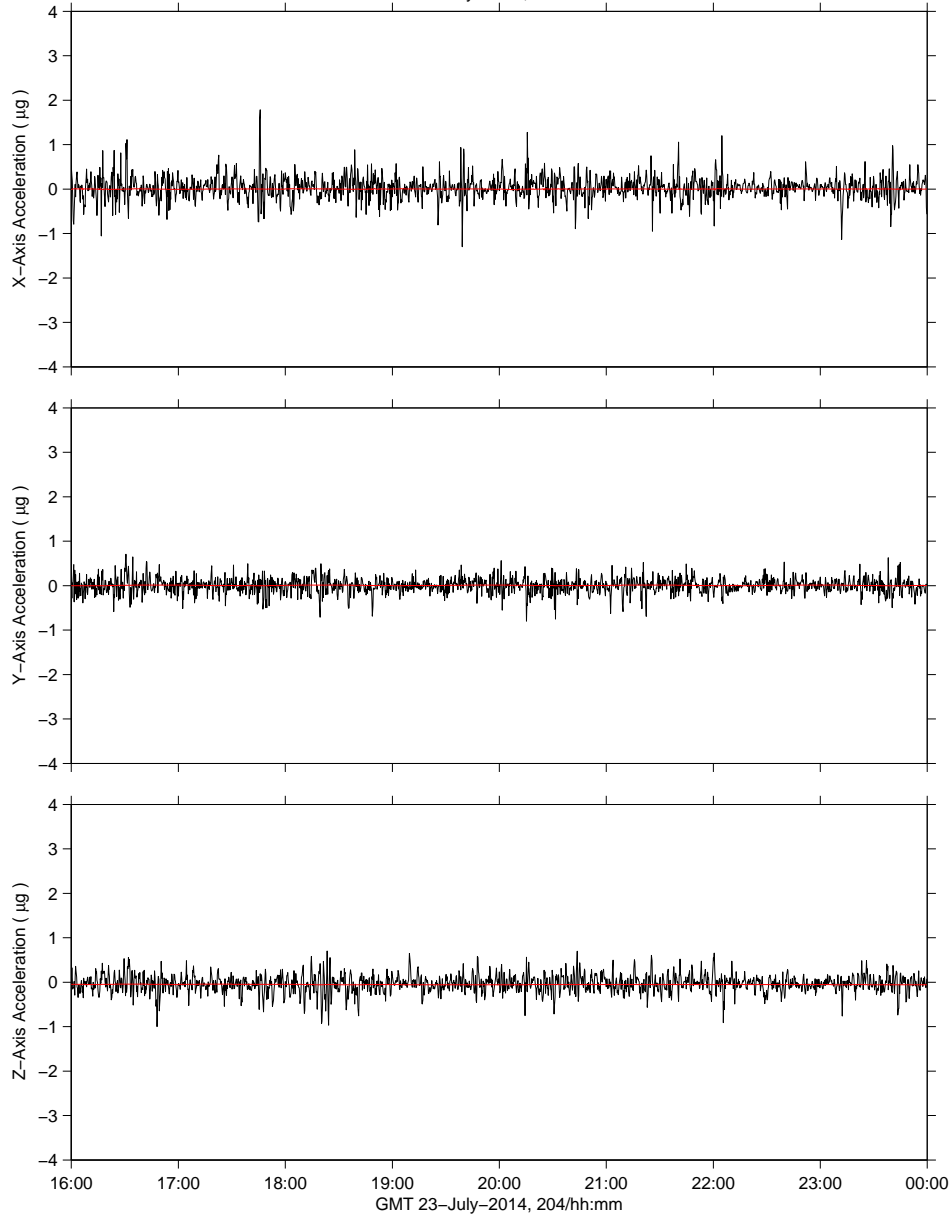
- -XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbmf - radgse): X = 0.0315, Y = -0.0060, Z = 0.0177 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.0001, Y = 0.0053, Z = -0.0537 ( $\mu\text{g}$ )

Start GMT 23-July-2014, 204/16:00:15.003



## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

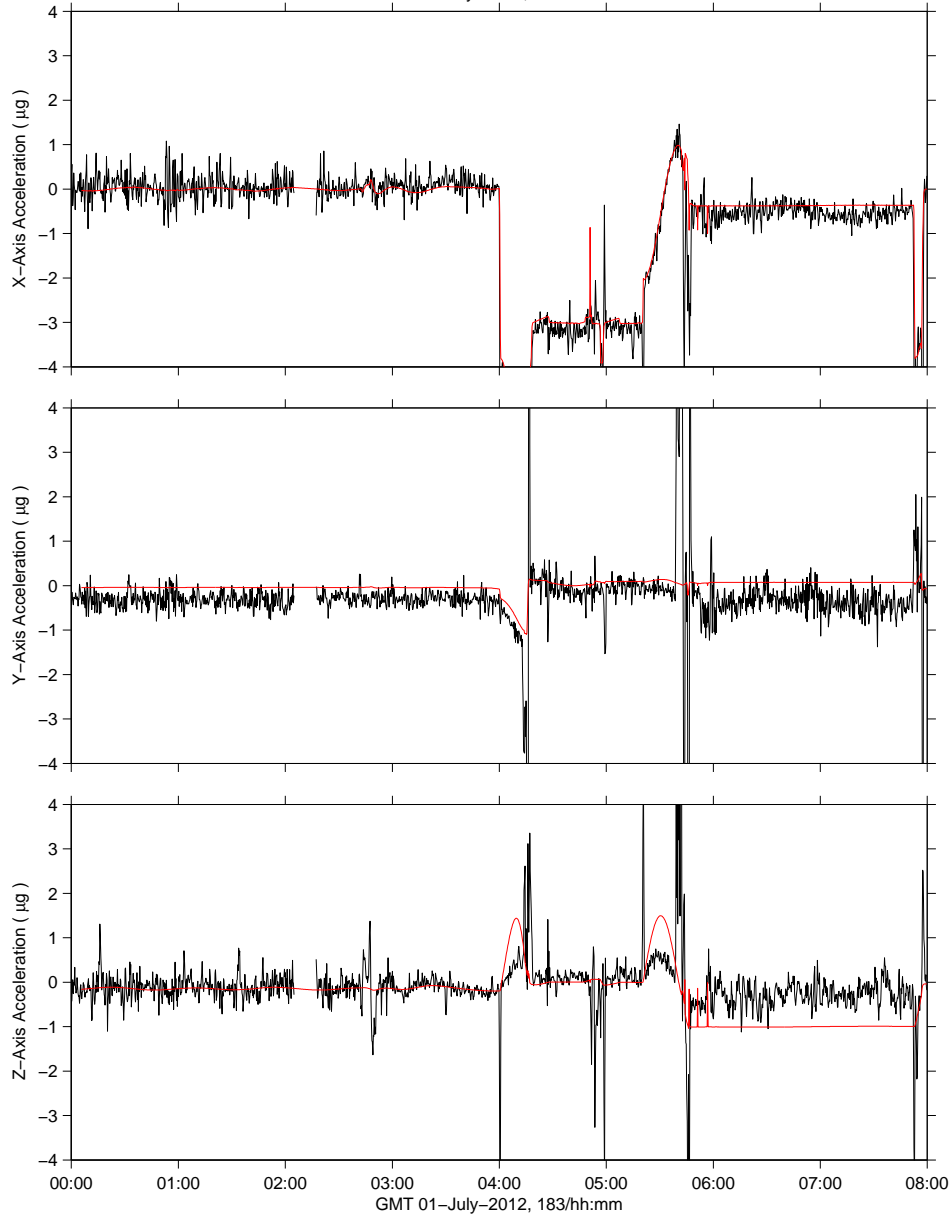
- -XVV +ZLV TEA

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = -0.1272, Y = -0.3159, Z = 0.1929 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.7765, Y = -0.0096, Z = -0.2826 ( $\mu\text{g}$ )

Start GMT 01-July-2012, 183/00:00:06.015



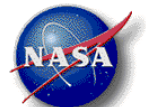
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

- ZVV -XLV

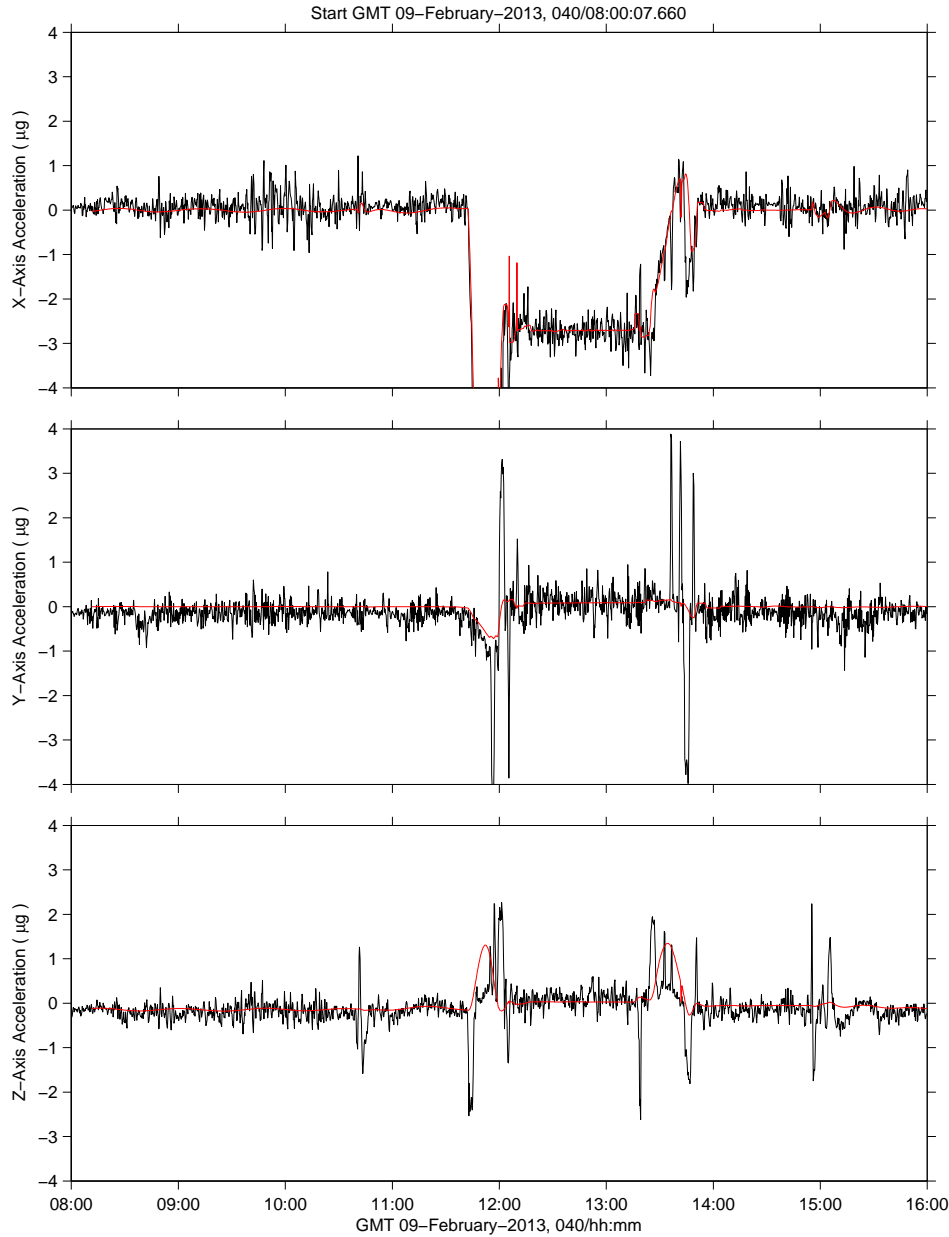
Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog





RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = 0.0288, Y = -0.1238, Z = -0.0788 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.7247, Y = -0.0014, Z = -0.0206 ( $\mu\text{g}$ )

## Attitude Catalog Qualify

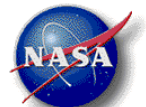


Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

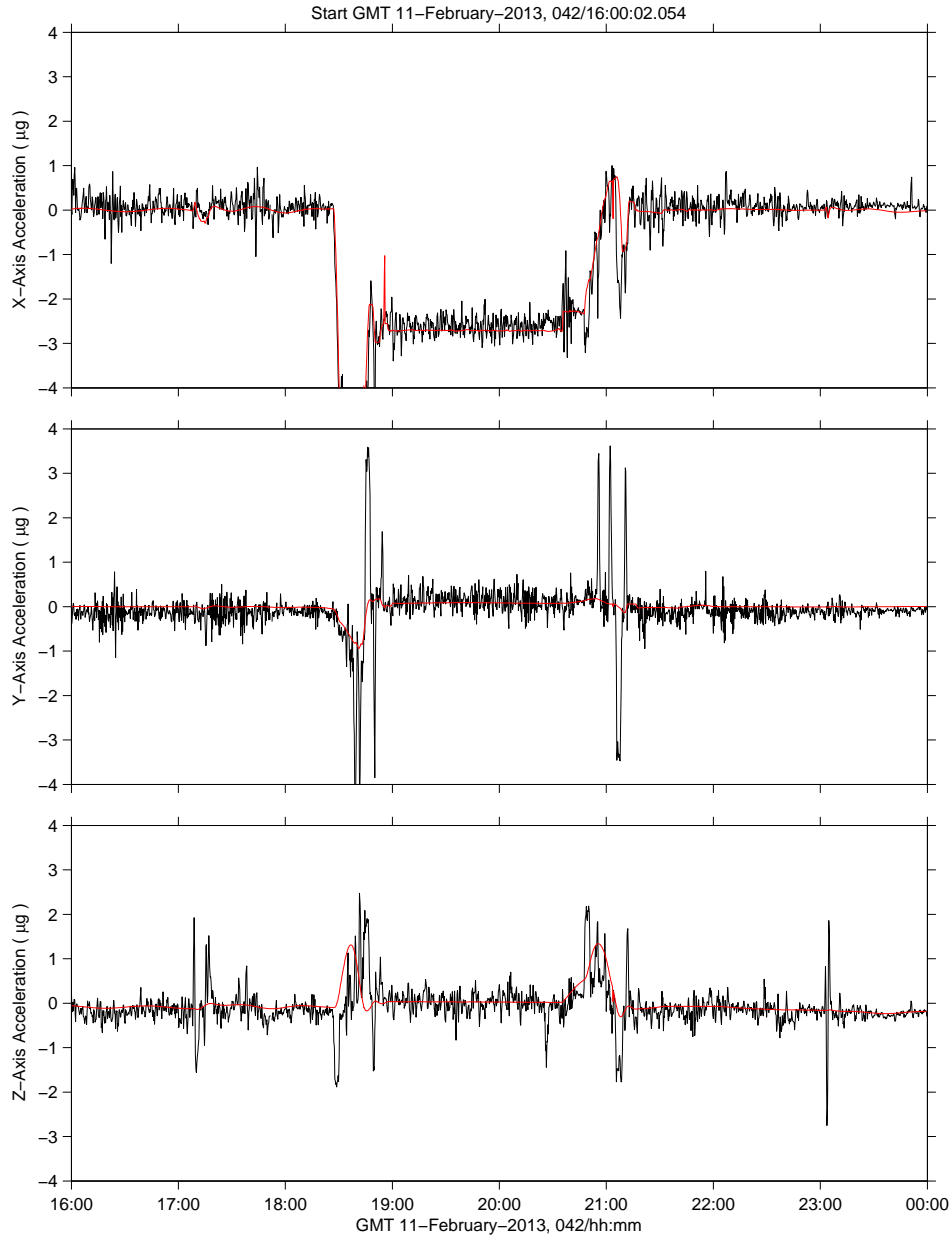
### Attitude:

- -ZVV -XLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



## Attitude Catalog Qualify

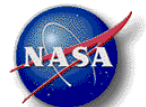


Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

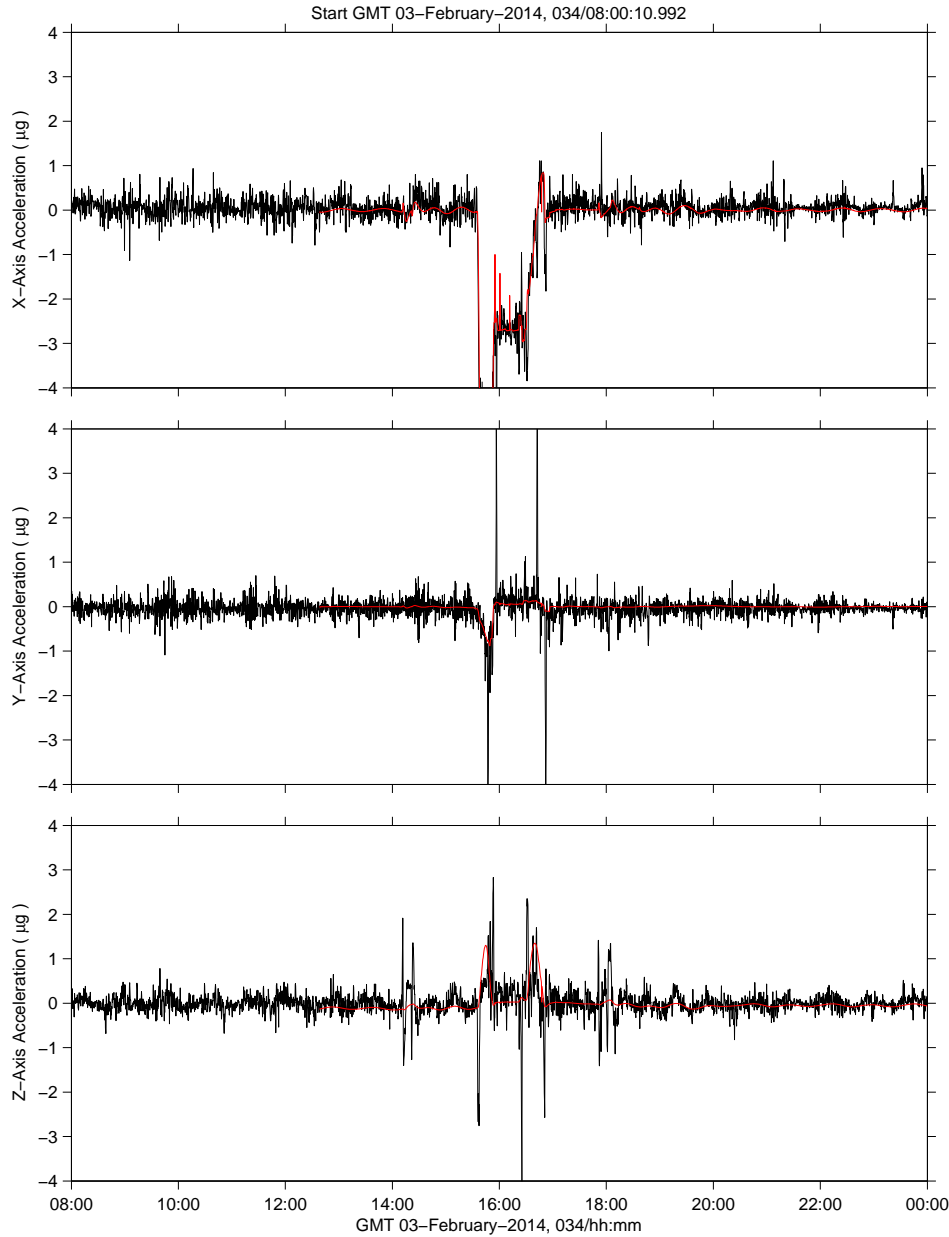
### Attitude:

- -ZVV -XLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



## Attitude Catalog Qualify

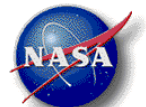


Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

- ZVV -XLV

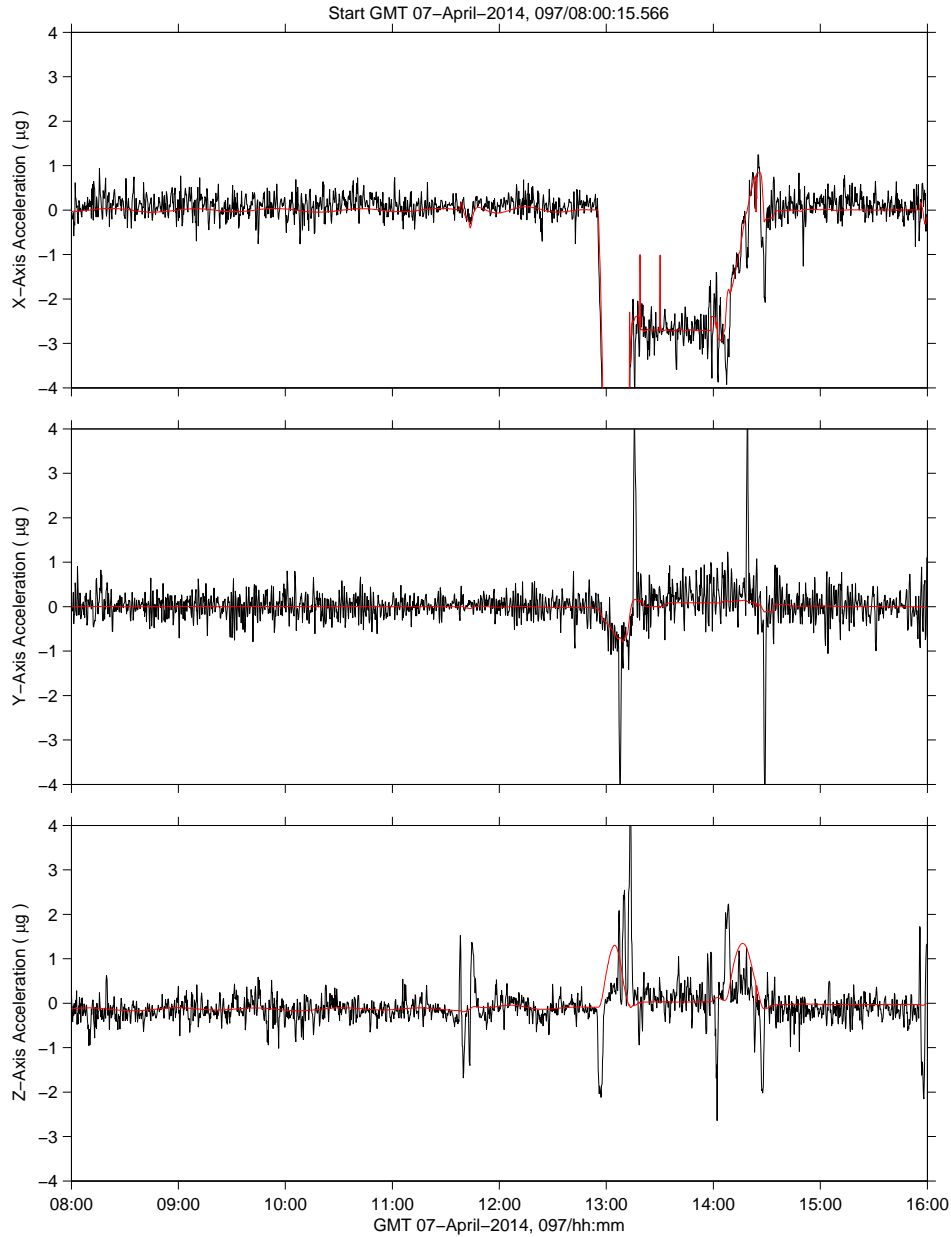
Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA

DELTA S (ossbtfm - radgse): X = 0.0547, Y = 0.0305, Z = -0.0505 (μg)

Mean for Rates & Angles Data: X = -0.5300, Y = -0.0087, Z = -0.0230 (μg)



## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

**Attitude:**

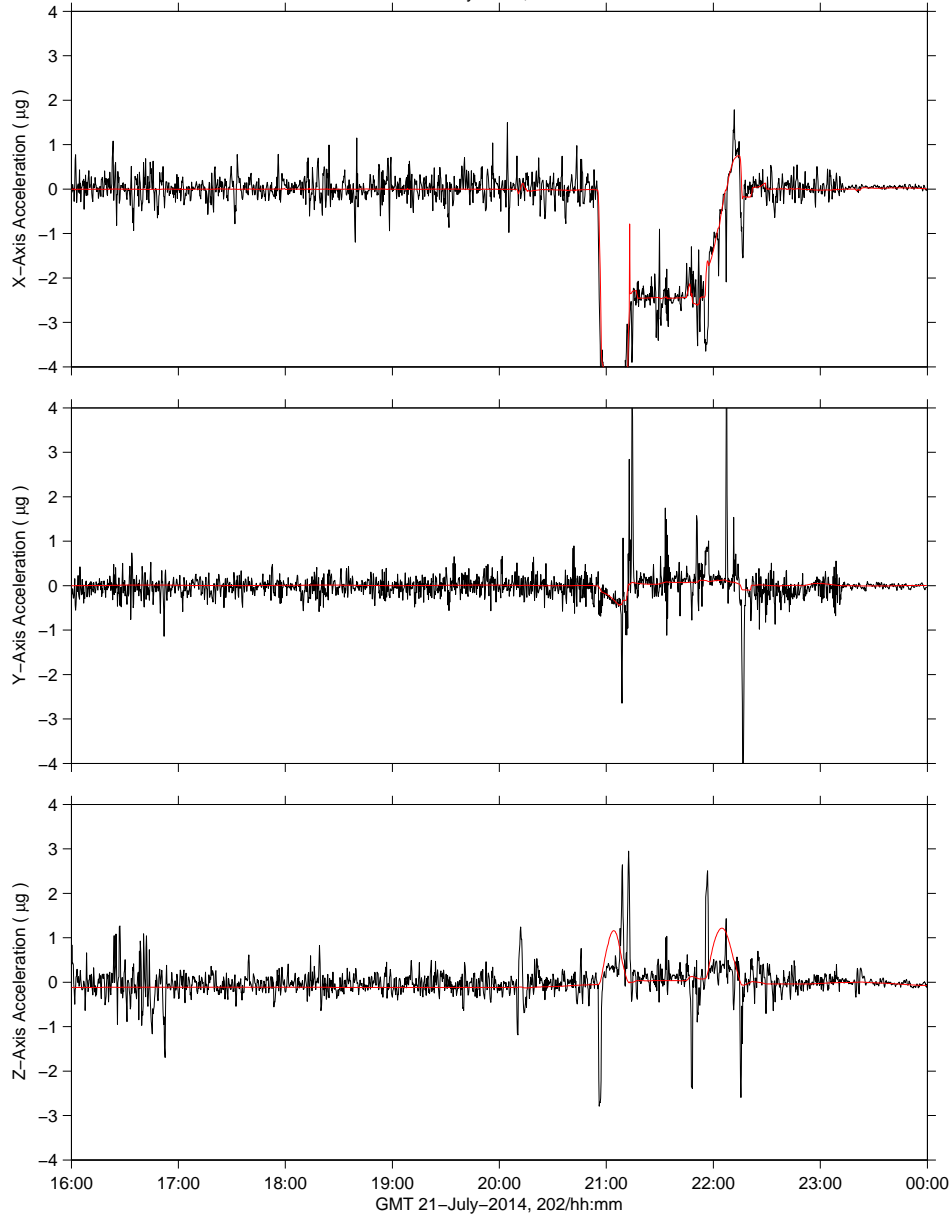
- -ZVV -XLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbmf - radgse): X = 0.0111, Y = -0.0206, Z = 0.0245 (μg)  
 Mean for Rates & Angles Data: X = -0.4213, Y = 0.0033, Z = -0.0207 (μg)

Start GMT 21-July-2014, 202/16:00:08.398



## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

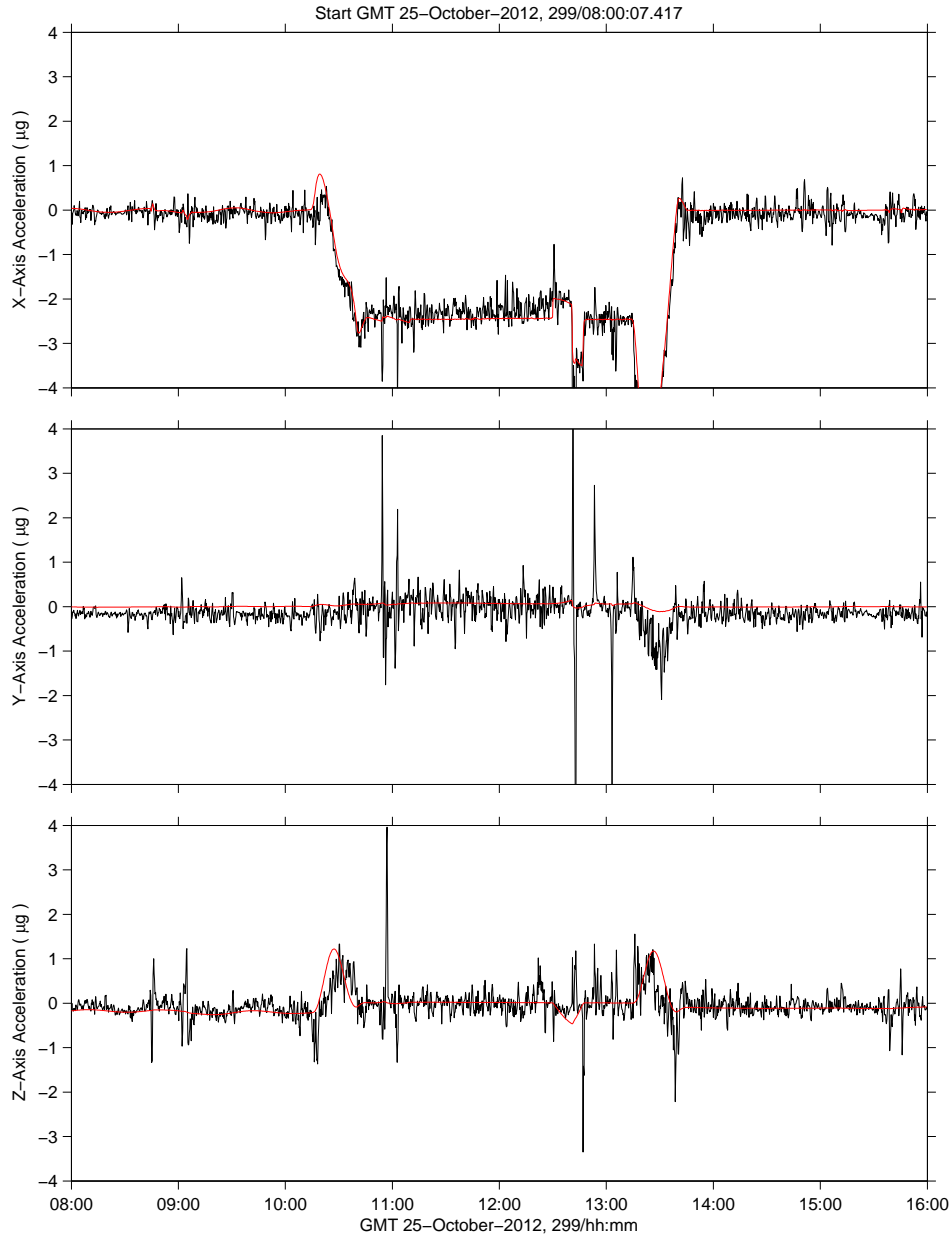
- ZVV -XLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtmf - radgse): X = -0.0486, Y = -0.1386, Z = 0.0058 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -1.0228, Y = 0.0177, Z = -0.0420 ( $\mu\text{g}$ )

## Attitude Catalog Qualify

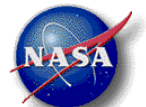


Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

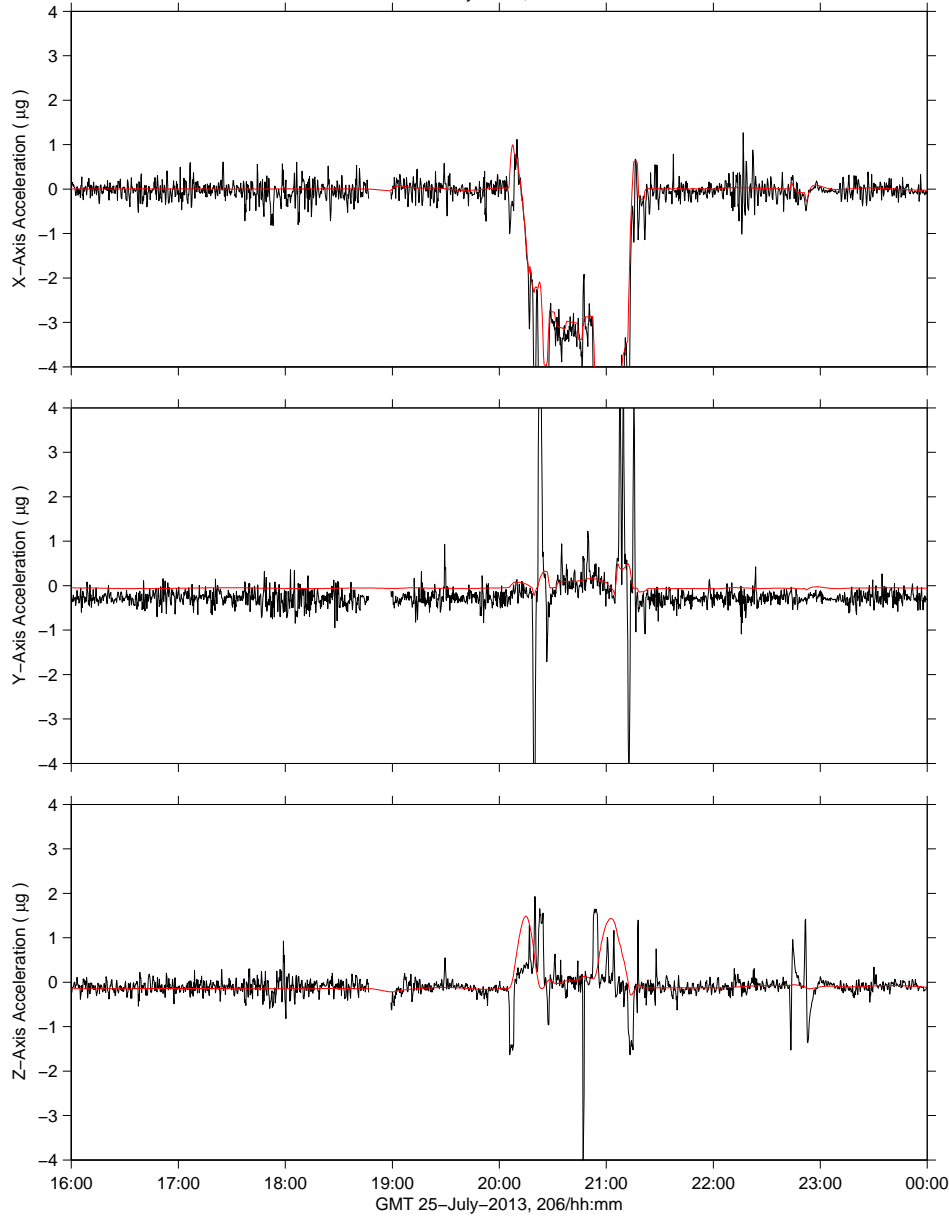
- +ZVV -XLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtfm - radgse): X = -0.1323, Y = -0.1788, Z = -0.0332 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.4353, Y = -0.0350, Z = -0.0492 ( $\mu\text{g}$ )

Start GMT 25-July-2013, 206/16:00:02.960



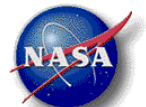
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

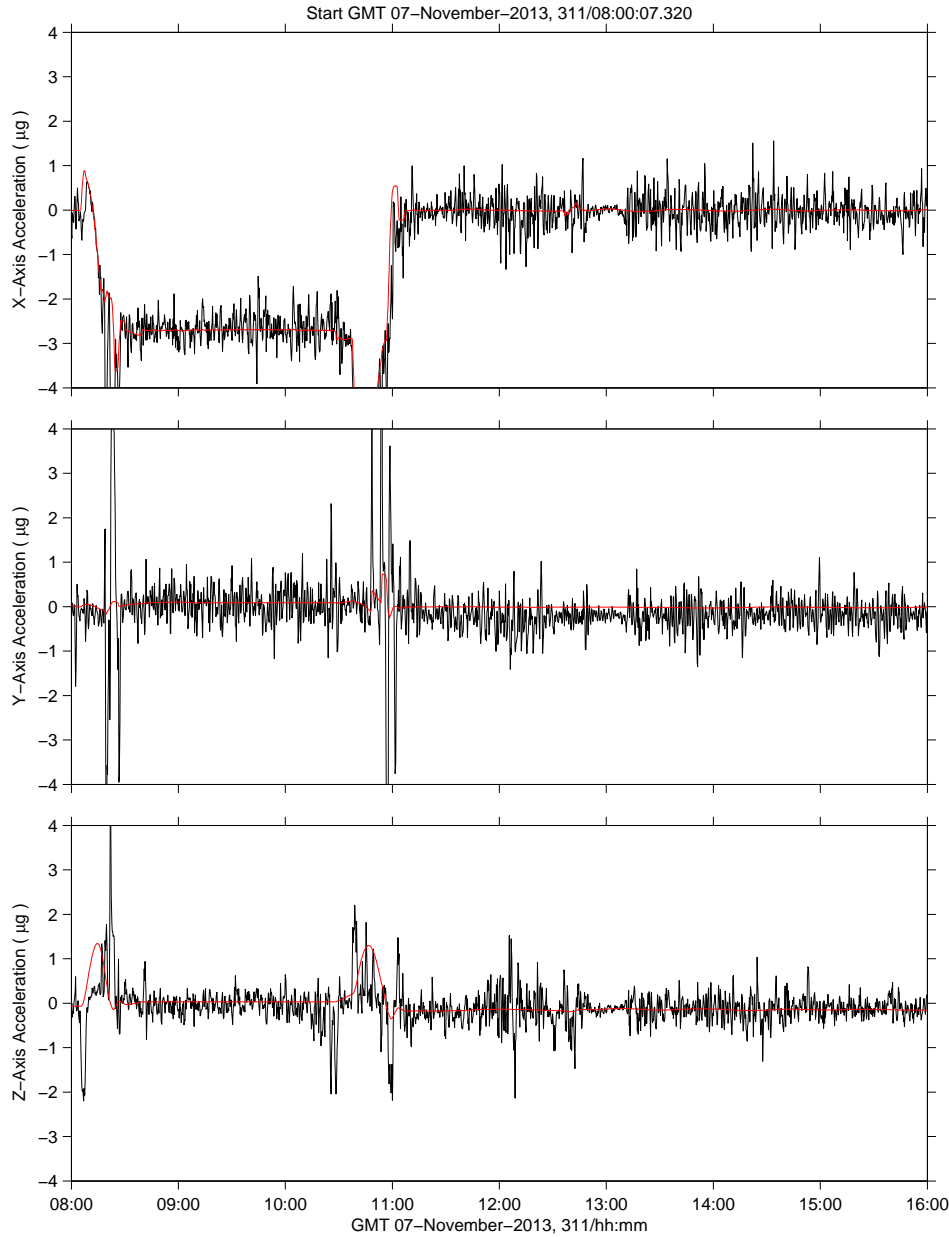
- +ZVV -XLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbtfm - radgse): X = -0.0747, Y = -0.1237, Z = -0.0445 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.9880, Y = 0.0205, Z = -0.0316 ( $\mu\text{g}$ )

## Attitude Catalog Qualify

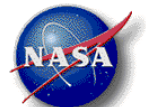


Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

- +ZVV -XLV

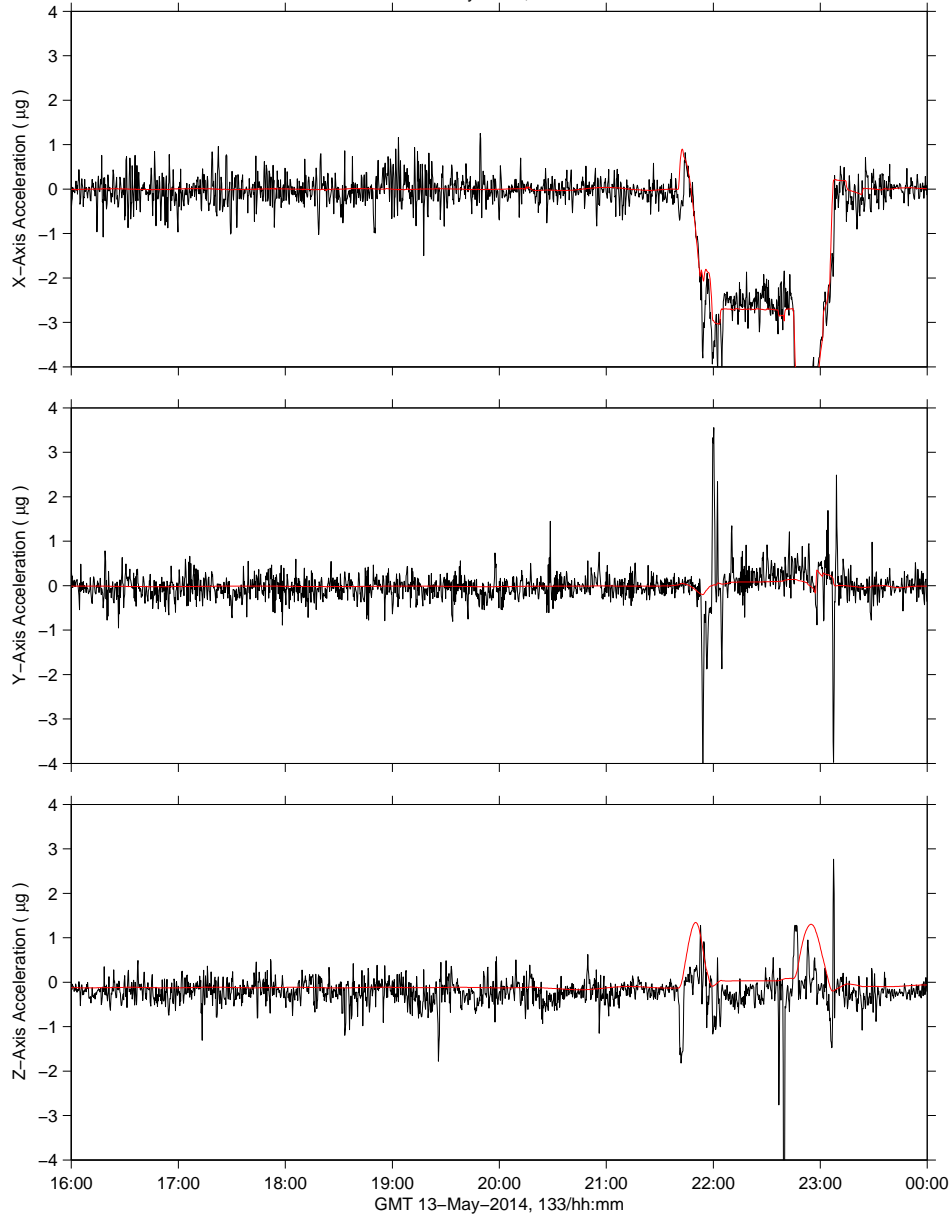
Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog





RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbmf - radgse): X = -0.0339, Y = -0.0181, Z = -0.1838 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = -0.4876, Y = -0.0012, Z = -0.0387 ( $\mu\text{g}$ )

Start GMT 13-May-2014, 133/16:00:03.664



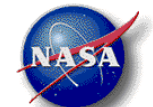
## Attitude Catalog Qualify

Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

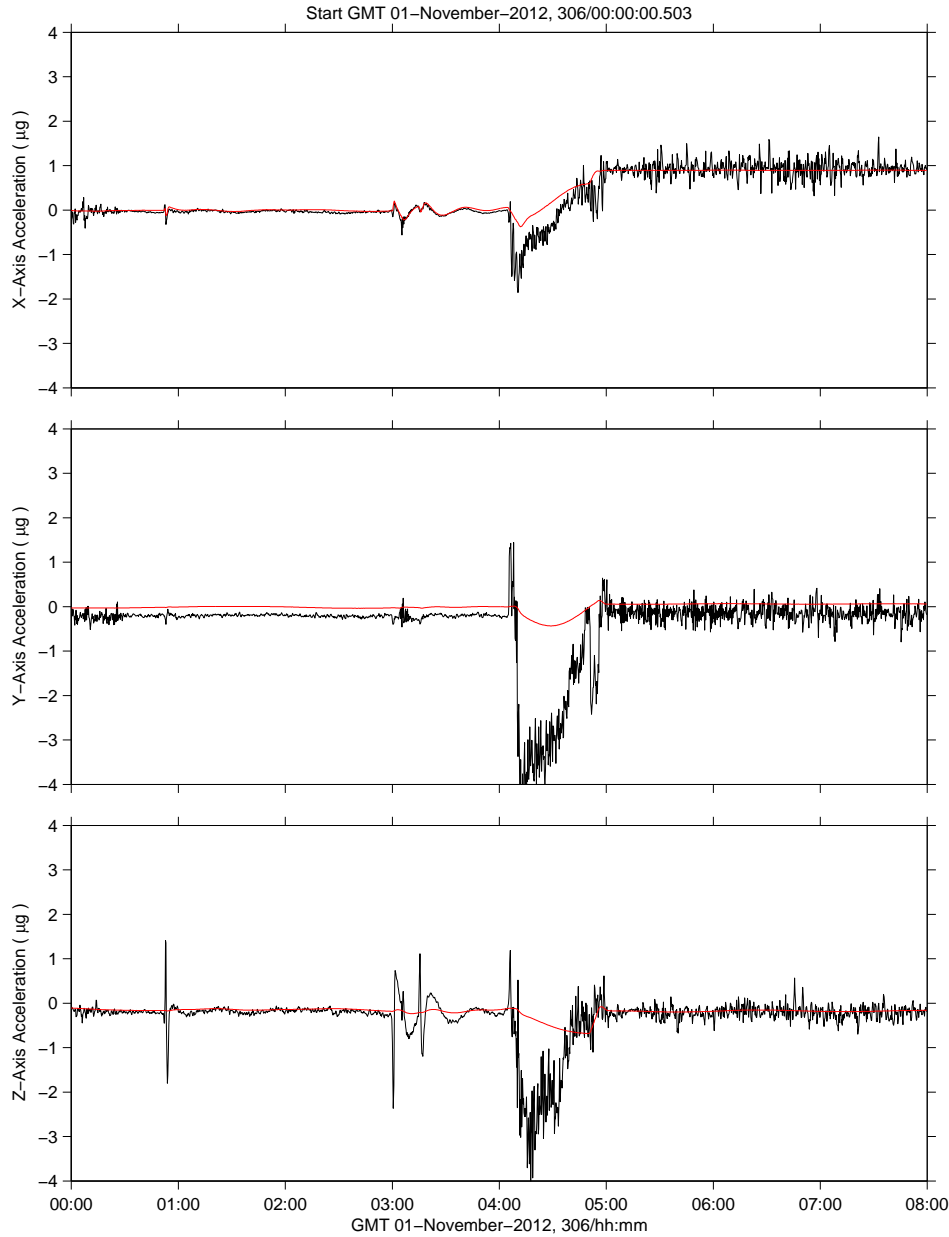
- +ZVV -XLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



RED LINE IS GSE RATES & ANGLES DATA  
 DELTAS (ossbmf - radgse): X = -0.0546, Y = -0.3884, Z = -0.1344 ( $\mu\text{g}$ )  
 Mean for Rates & Angles Data: X = 0.3624, Y = -0.0091, Z = -0.1936 ( $\mu\text{g}$ )

## Attitude Catalog Qualify

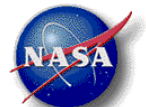


Description	
Sensor	MAMS OSS 0.0625 sa/sec, 1.0 Hz
Location	LAB1O2, ER1
Plot Type	Acceleration vs. Time

### Attitude:

- +YVV +ZLV

Regime:	Quasi-Steady
Category:	Vehicle
Source:	Attitude Catalog



## Microgravity Acceleration Measurement System (MAMS) Attitude Catalog

The following table gives a comprehensive accounting of the attitudes selected to serve as representative examples.

Attitude	GMT Start	Average OSS (ug)			Average Rates/Angles (ug)		
		X-Axis	Y-Axis	Z-Axis	X-Axis	Y-Axis	Z-Axis
+XVV +ZLV TEA	2012-03-29 16:00:00	-0.0616	-0.3416	-0.1527	0.0000	-0.0586	-0.1594
	2012-04-28 16:00:00	-0.0776	-0.3379	-0.1272	-0.0056	-0.0588	-0.2118
	2012-12-21 16:00:00	-0.0432	-0.2411	-0.2327	-0.0068	-0.0183	-0.1514
	2014-04-29 08:00:00	-0.0224	-0.0632	-0.1277	-0.0003	-0.0160	-0.0994
	2014-06-09 16:00:00	-0.0302	-0.0805	-0.2159	-0.0060	-0.0096	-0.1505
	2014-07-24 16:00:00	0.0018	-0.0306	-0.0271	-0.0044	-0.0093	-0.1312
-XVV +ZLV TEA	2012-05-17 08:00:00	0.0312	-0.2739	-0.0502	-0.0023	-0.0405	-0.1447
	2013-02-10 08:00:00	0.0783	-0.1238	-0.1642	-0.0018	-0.0005	-0.0841
	2013-03-29 08:00:00	0.0462	-0.2609	-0.1536	-0.0052	-0.0012	-0.1223
	2014-02-04 08:00:00	0.0539	-0.0429	-0.0250	-0.0008	0.0000	-0.0542
	2014-04-04 16:00:00	-0.0477	0.0012	-0.1500	-0.0042	-0.0165	-0.1439
	2014-07-23 16:00:00	0.0313	-0.0008	-0.0360	-0.0001	0.0053	-0.0537
-ZVV -XLV	2012-07-01 00:00:00	-0.9037	-0.3255	-0.0897	-0.7765	-0.0096	-0.2826
	2013-02-09 08:00:00	-0.6959	-0.1252	-0.0994	-0.7247	-0.0014	-0.0206
	2013-02-11 16:00:00	-0.8728	-0.0689	-0.0789	-0.9043	0.0006	-0.0085
	2014-02-03 08:00:00	-0.1754	-0.0449	0.0111	-0.3041	-0.0100	-0.0165
	2014-04-07 08:00:00	-0.4752	0.0217	-0.0734	-0.5300	-0.0087	-0.0230
	2014-07-21 16:00:00	-0.4101	-0.0174	0.0039	-0.4213	0.0033	-0.0207
+ZVV -XLV	2012-10-25 08:00:00	-1.0714	-0.1210	-0.0363	-1.0228	0.0177	-0.0420
	2013-07-25 16:00:00	-0.5675	-0.2138	-0.0823	-0.4353	-0.0350	-0.0492
	2013-11-07 08:00:00	-1.0627	-0.1031	-0.0761	-0.9880	0.0205	-0.0316
	2014-05-13 16:00:00	-0.5215	-0.0193	-0.2225	-0.4876	-0.0012	-0.0387
+YVV +ZLV	2012-11-01 00:00:00	0.3078	-0.3975	-0.3280	0.3624	-0.0091	-0.1936