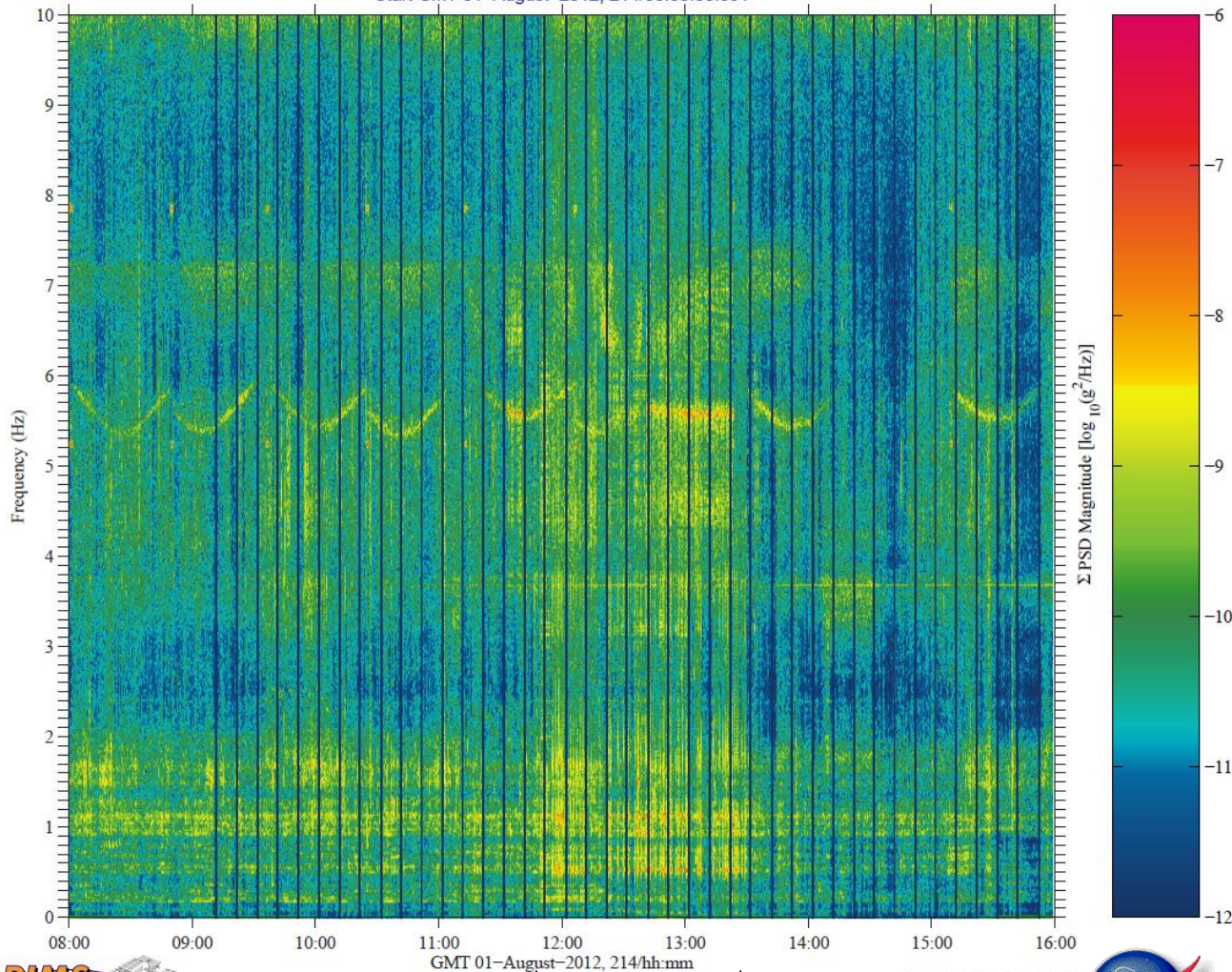


Optimized Propellant Maneuver (OPM) from +XVV to -XVV

sams2, 121f03 at LAB101, ER2, Lower Z Panel[191.54 -40.54 135.25]
 500.0000 sa/sec (200.00 Hz)
 Δf = 0.015 Hz, Nfft = 32768
 Temp. Res. = 32.768 sec, No = 16384

Qualify
 sams2, 121f03

Start GMT 01-August-2012, 214/08:00:00.001



Sum
 Hanning, k = 877
 Span = 7.97 hours

ΣPSD Magnitude [log₁₀(g²/Hz)]



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PIMS ISS Acceleration Handbook
 Date last modified 2013-04-17

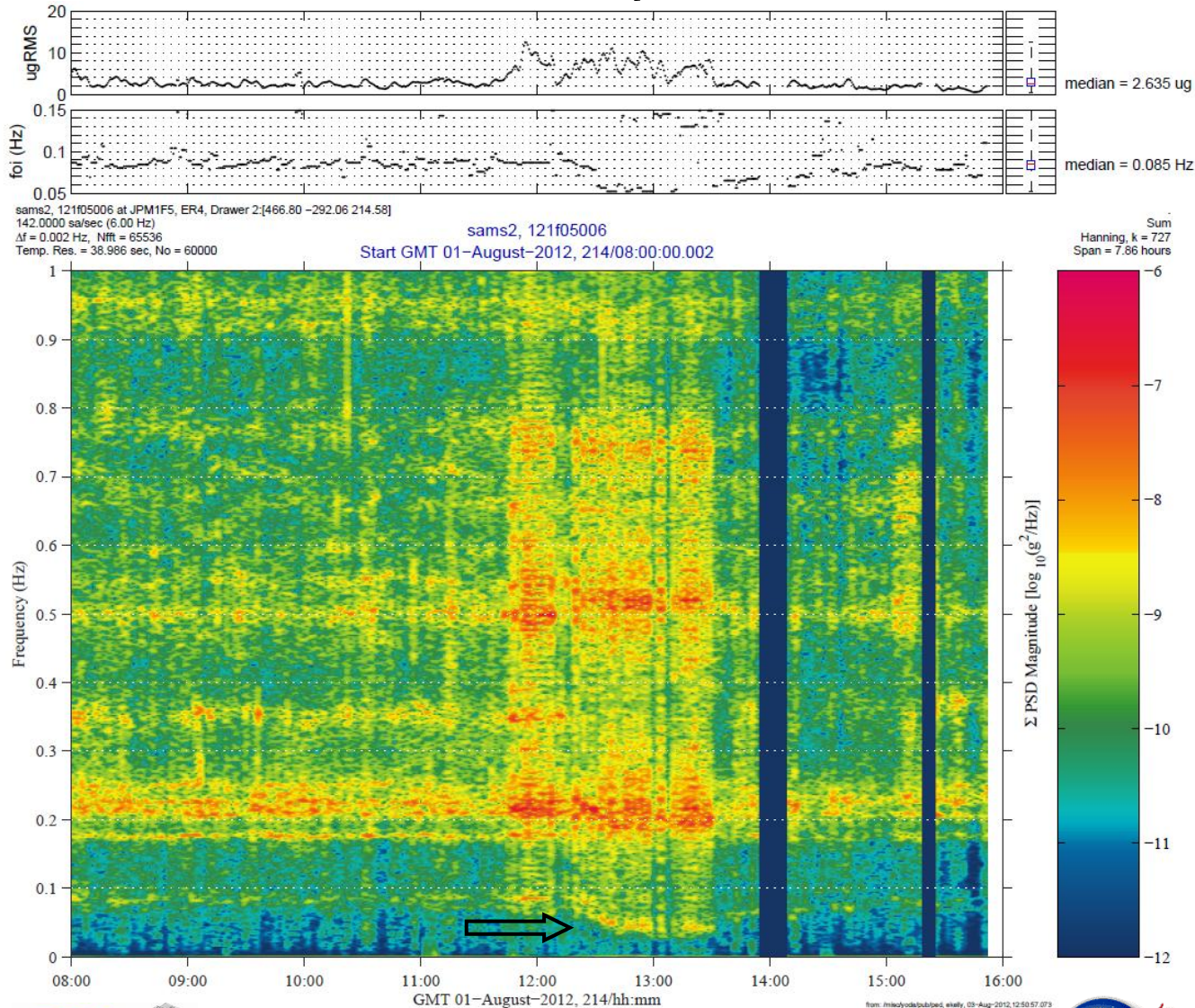
Description	
Sensor	121f03 500 sa/sec (200 Hz)
Location	LAB101, ER2, Lower Z Panel
Plot Type	spectrogram (Σ); f < 10 Hz

Notes:

- Historically, the ISS has been maneuvered from one attitude to another using the most direct route via an Eigen axis maneuver. For the Optimized Propellant Maneuver (OPM), flight controllers perform a sequence of several small maneuvers, which takes the station on a less direct route to the new attitude. This indirect route leverages environmental forces on the station to assist the maneuver, resulting in a significant propellant savings.
- This spectrogram shows the impact of the OPM in preparation for Progress 48P docking from a sensor located in the USL. Note the broadband excitation below 6 Hz, mostly concentrated at vehicle structural modes.
- The gray arrows on the time-axis mark the start and stop of the OPM from GMT 01-Aug-2012/1:55-13:25.

Regime:	Vibratory
Category:	Vehicle
Source:	OPM

Optimized Propellant Maneuver (OPM) from +XVV to -XVV Qualify



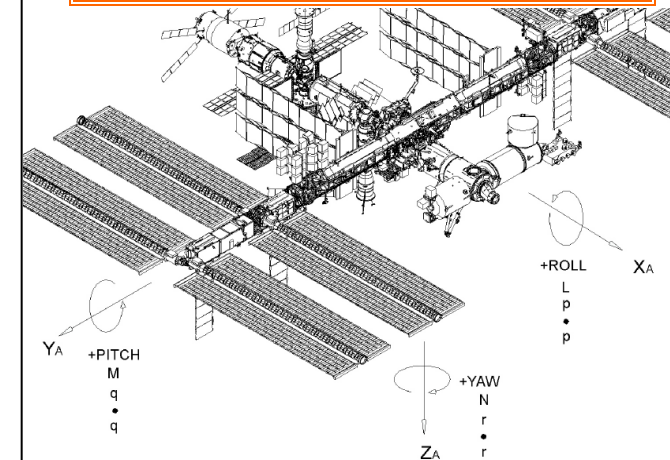
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PIMS ISS Acceleration Handbook
Date last modified 2013-04-17

Description	
Sensor	121f05 142 sa/sec (6 Hz)
Location	JPM1F5, ER4, Drawer 2
Plot Type	spectrogram (Σ); $f < 1$ Hz

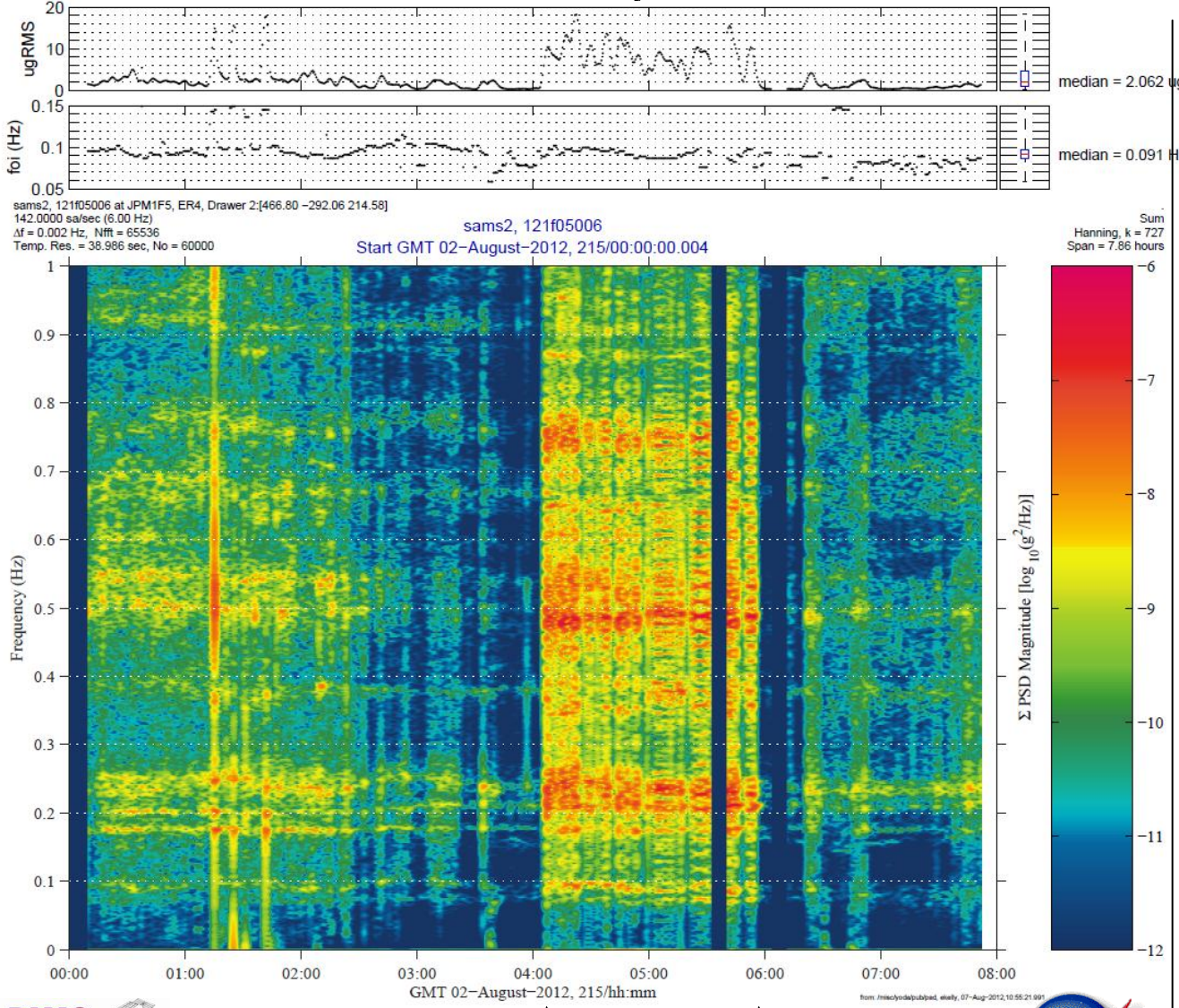
Notes:

- This spectrogram shows a zoom-in below 1 Hz for the same span and of the OPM event described on the previous page.
- Note the emergence of a lower mode during the OPM indicated by the horizontal, clear right-arrow and subsequent return to nominal “mode one” afterwards.
- This JEM sensor also registers higher levels of structural excitation compared to the USL.



Regime:	Vibratory
Category:	Vehicle
Source:	OPM

Optimized Propellant Maneuver (OPM) from -XVV to +XVV Qualify



Description	
Sensor	121f05 142 sa/sec (6 Hz)
Location	JPM1F5, ER4, Drawer 2
Plot Type	spectrogram (Σ); $f < 1$ Hz

- Notes:**
- According to the as-flown timeline, another OPM was performed to maneuver the station from -XVV to +XVV on GMT 02-Aug-2012 from 04:15-05:45. This spectrogram shows it actually started a bit early.
 - Compared to the previous day's OPM, this one did not exhibit the distinctive shift down in frequency, but clearly shows twin peaks just at/below about 0.1 Hz ("mode one").



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PIMS ISS Acceleration Handbook
Date last modified 2013-04-17

Regime:	Vibratory
Category:	Vehicle
Source:	Mode One

Optimized Propellant Maneuver (OPM) from +XVV to -XVV Quantify

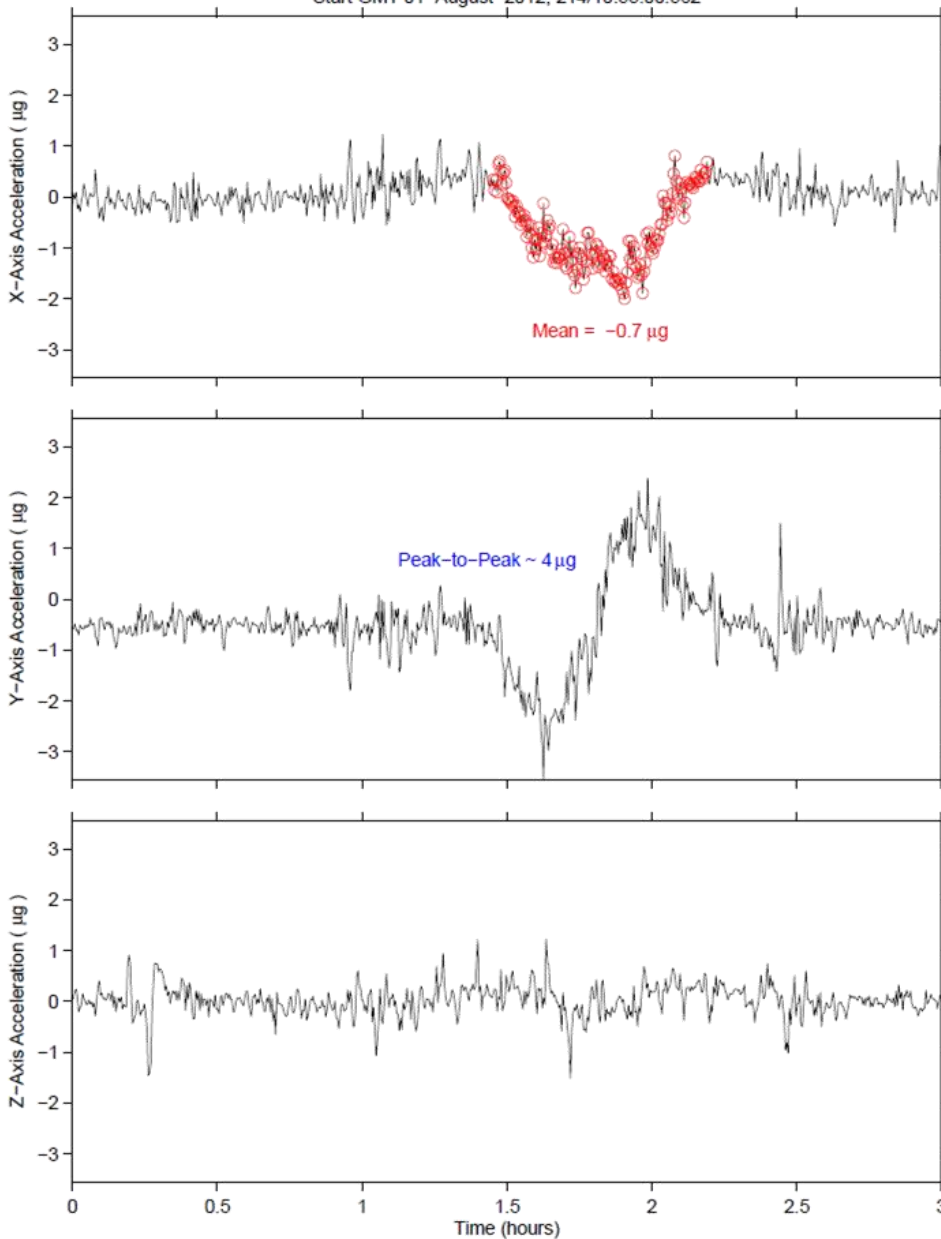
mams, ossbtrmf at LAB1O2, ER1, Lockers 3,4[135.28 -10.08 132.12]
0.0625 sa/sec (0.01 Hz)

Optimized Propellant Maneuver (OPM)

SSAnalysis[0.0 0.0 0.0]

Maneuver from +XVV to -XVV for Progress (48P) Docking

Start GMT 01-August-2012, 214/10:55:00.562



Description	
Sensor	MAMS OSS 0.0625 sa/sec, (0.01 Hz)
Location	LAB1O2, ER1, Lockers 3,4
Plot Type	Per-axis ug vs. time

Notes:

The per-axis acceleration versus time plots shown to the left spans 3 hours starting at GMT 01-Aug-2012/10:55 and shows the quasi-steady impact of this OPM as follows:

1. The X-axis exhibits a low-level offset (about 0.7 ug) that gradually comes and goes over about a 45-minute span.
2. The Y-axis exhibits a distinctive, bipolar event with peak-to-peak magnitude of about 4 ug. This occurs during the same span as the X-axis' offset.
3. The Z-axis is mostly unaffected during the OPM.



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Regime:	Quasi-steady
Category:	Vehicle
Source:	OPM

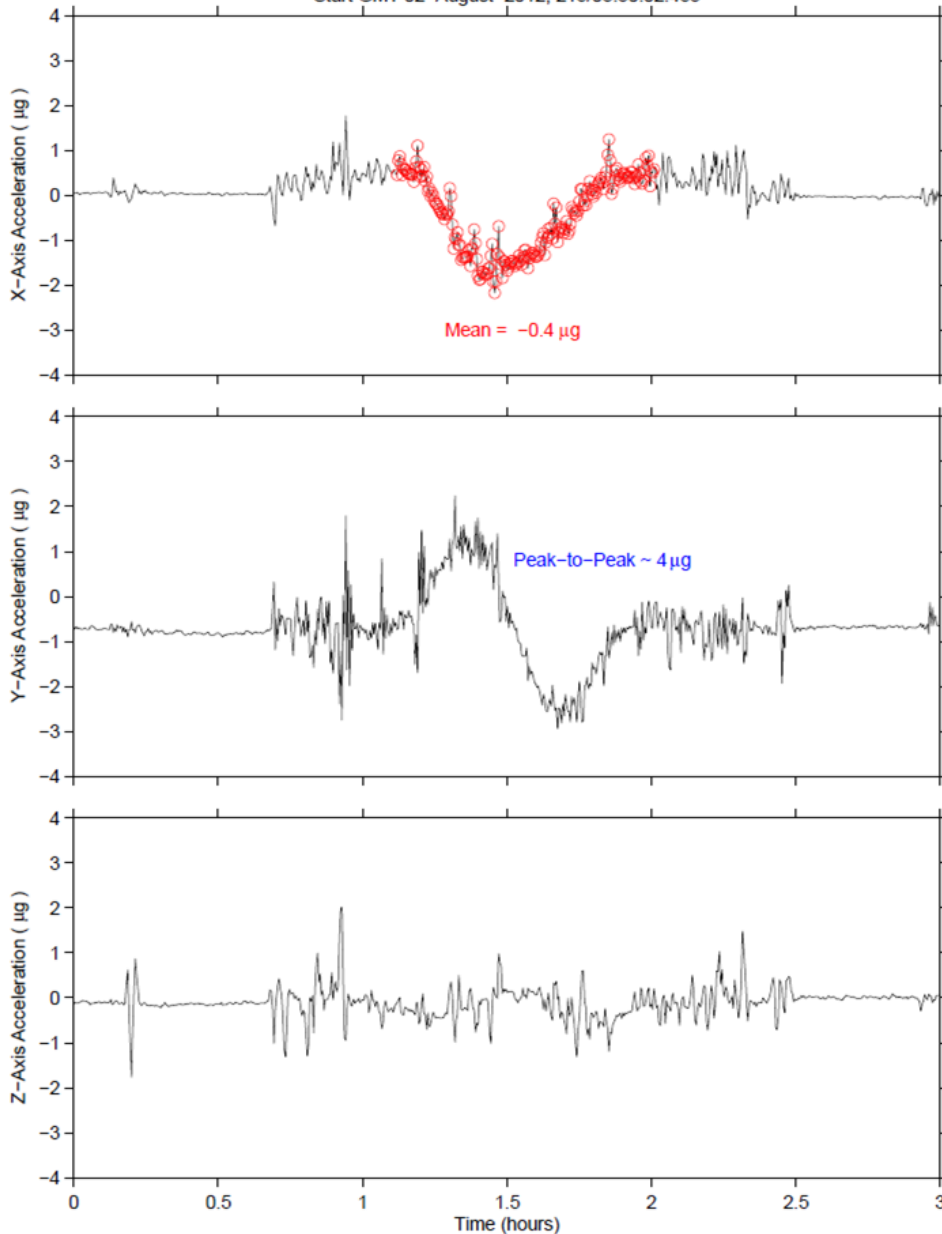
Optimized Propellant Maneuver (OPM) from -XVV to +XVV Quantify

mams_ossbtrmf at LAB102, ER1, Lockers 3,4.[135.28 -10.68 132.12]
0.0625 sa/sec (0.01 Hz)

SSAnalysis[0.0 0.0 0.0]

Optimized Prop Maneuver (OPM)
Maneuver from -XVV to +XVV

Start GMT 02-August-2012, 215/03:30:02.453

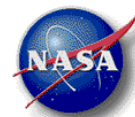


Description	
Sensor	MAMS OSS 0.0625 sa/sec, (0.01 Hz)
Location	LAB102, ER1, Lockers 3,4
Plot Type	Per-axis ug vs. time

Notes:

The per-axis acceleration versus time plots shown to the left spans 3 hours starting at GMT 01-Aug-2012/10:55 and shows the quasi-steady impact of this OPM as follows:

1. The X-axis exhibits a low-level offset (about 0.7 ug) that gradually comes and goes over about a 45-minute span.
2. The Y-axis exhibits a distinctive, bipolar event with peak-to-peak magnitude of about 4 ug. This occurs during the same span as the X-axis' offset. Note the polarity is reversed from previous day event (see previous page).
3. The Z-axis is mostly unaffected during the OPM.



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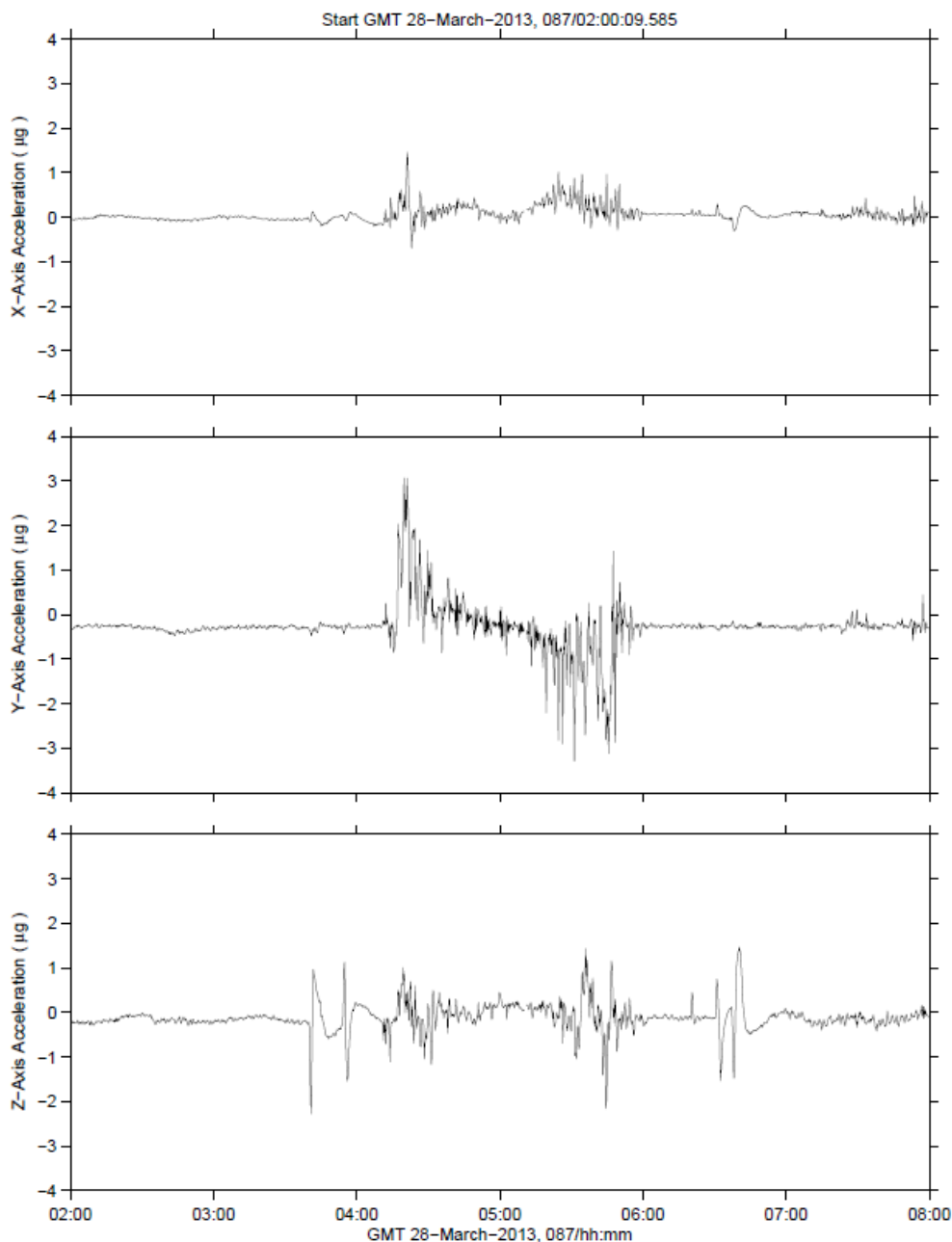
Regime:	Quasi-steady
Category:	Vehicle
Source:	OPM

Optimized Propellant Maneuver (OPM) to -XVV Quantify

mams_ossbtrmf at LAB102, ER1, Lockers 3,4 [135.28 -10.68 132.12]
0.0625 sa/sec (0.01 Hz)

Maneuver to -XVV using OP (Optim Prop)

SSAnalysis[0.0 0.0 0.0]



Description

Sensor	MAMS OSS 0.0625 sa/sec, (0.01 Hz)
Location	LAB102, ER1, Lockers 3,4
Plot Type	Per-axis ug vs. time

Notes:

The per-axis acceleration versus time plots shown to the left spans 6 hours starting at GMT 28-Mar-2013/02:00 and shows the quasi-steady impact of this OPM was primarily on the Y-axis between about 04:15 and 05:46.



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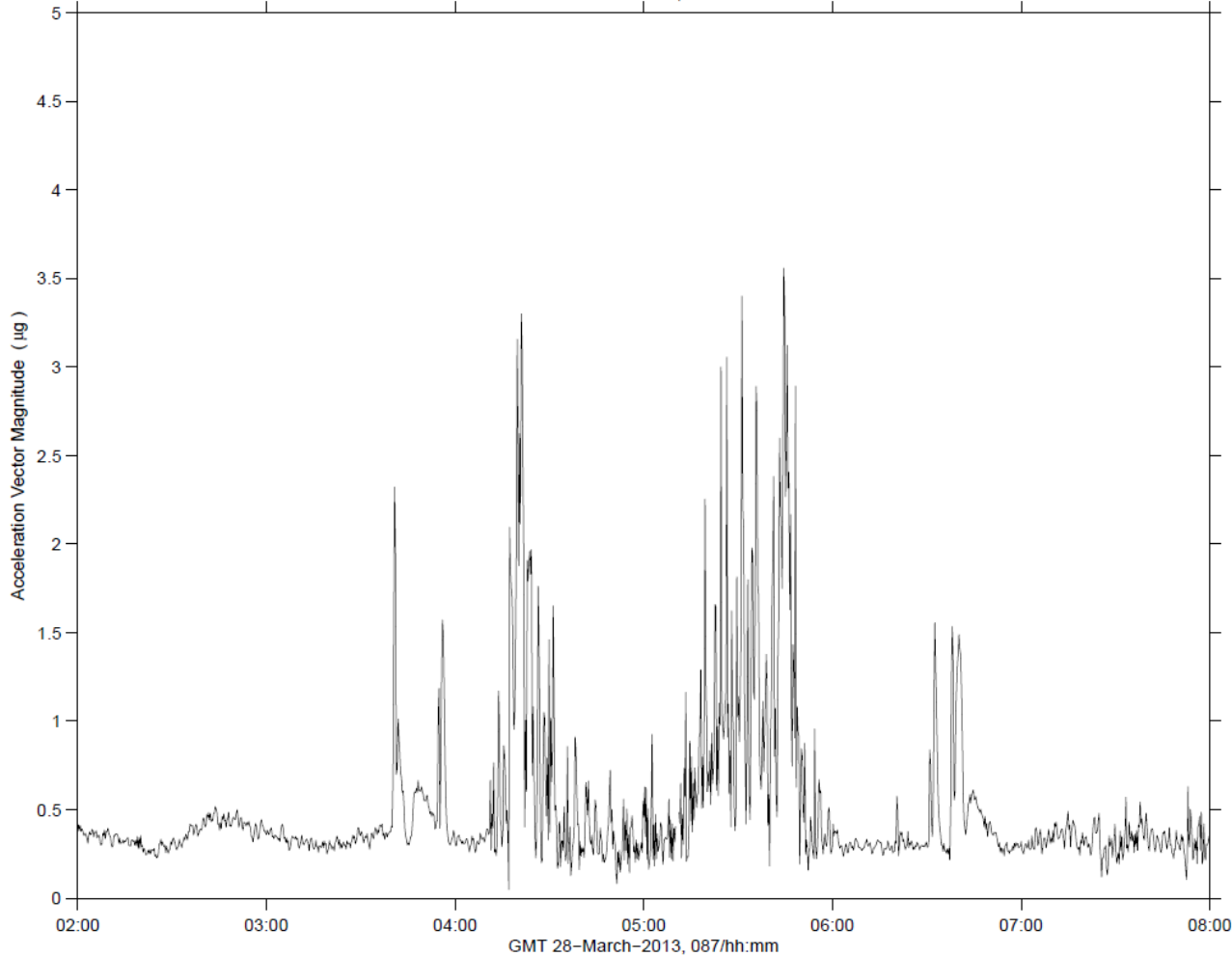
Regime:	Quasi-steady
Category:	Vehicle
Source:	OPM

Optimized Propellant Maneuver (OPM) to -XVV Quantify

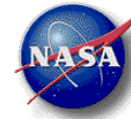
mams, ossbtmf at LAB1O2, ER1, Lockers 3,4:[135.28 -10.68 132.12]
0.0625 sa/sec (0.01 Hz)

Maneuver to -XVV using OP (Optim Prop)
Start GMT 28-March-2013, 087/02:00:09.585

Vector Magnitude



from: hmiac@gsfc.nasa.gov, 17-Apr-2013, 17:21:46:080



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PIMS ISS Acceleration Handbook
Date last modified 2013-04-17

Description	
Sensor	MAMS OSS 0.0625 sa/sec, (0.01 Hz)
Location	LAB1O2, ER1, Lockers 3,4
Plot Type	Accel. Vector Mag. vs. time

Notes:

- This plot of acceleration vector magnitude versus time shows maximum value of about 3.6 ug occurred near the end of this maneuver.

Regime:	Quasi-steady
Category:	Vehicle
Source:	OPM