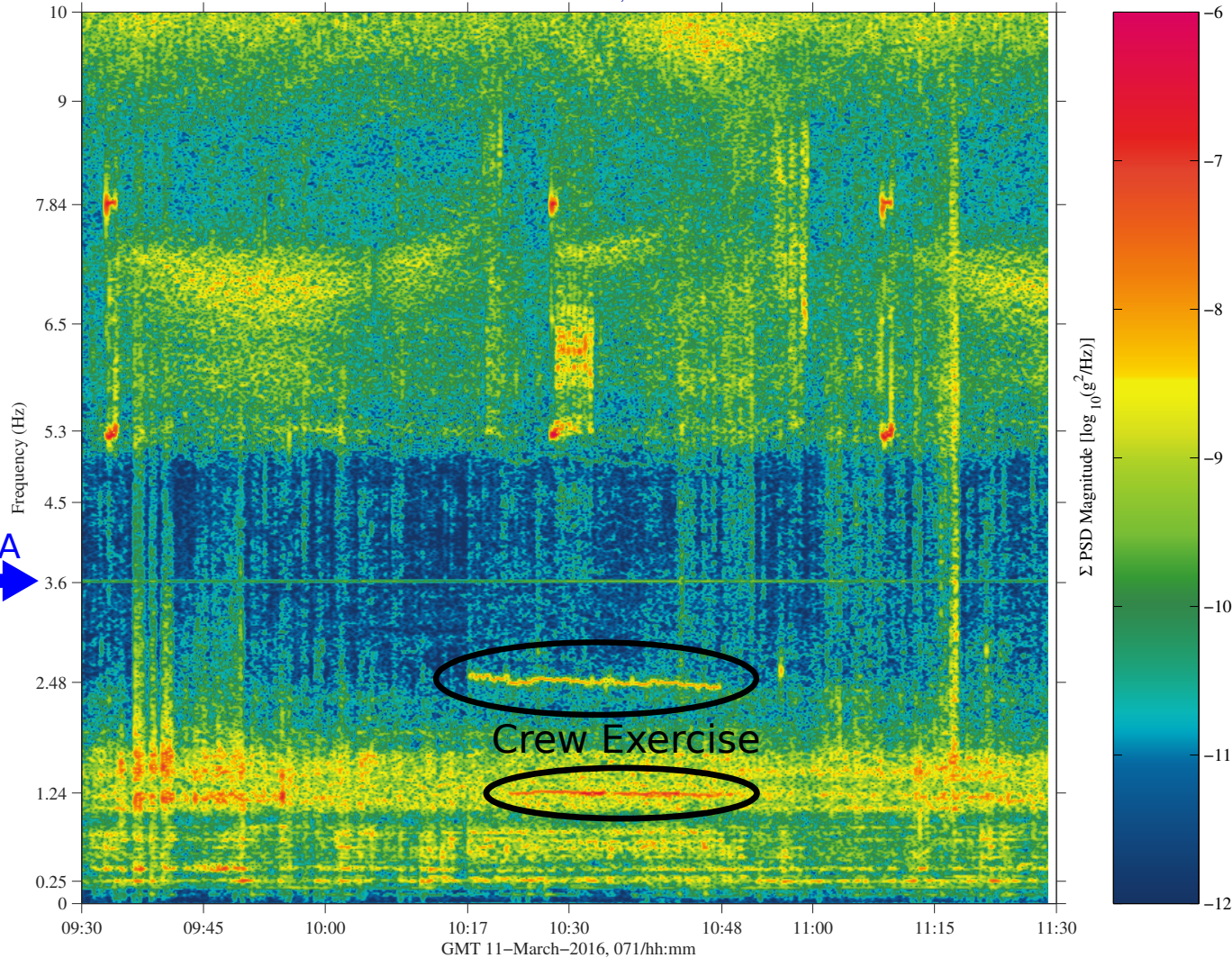


Crew Exercise and UPA March 2016 Qualify

sams2, 121f05 at COL, Starboard Endcone, Adapter Bracket:[378.90 320.60 233.90]
500.0000 sa/sec (200.00 Hz)
 $\Delta f = 0.015$ Hz, Nfft = 32768
Temp. Res. = 5.536 sec, No = 30000

SAMS2, 121f05, COL, Starboard Endcone, Adapter Bracket, 200.0 Hz (500.0 s/sec)

Start GMT 11-March-2016, 071/09:30:00



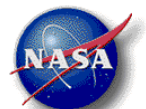
Sum
Hanning, k = 1289
Span = 118.84 minutes

Description	
Sensor	SAMS 121f05 500.0 sa/sec, 200.0 Hz
Location	COL, Starboard Endcone, Adapter Bracket
Plot Type	Spectrogram

Notes:

- This color spectrogram was calculated from SAMS measurements made on the Columbus Starboard Endcone.
- We focus here on the acceleration spectrum below 10 Hz for a two-hour period that contains a crew exercise signature and the UPA signature.
- Note for the exercise that there are 2 components: (1) a shoulder sway component near 1.24 Hz, and (2) a pedaling component near 2.48 Hz. These are shown in black ovals and note that the pedaling component starts before shoulder sway.
- The UPA shows a relatively faint, narrowband, but long duration signature at about 3.6 Hz.
- The other notable features on this spectrogram are: (1) vehicle structural modes below about 2 Hz, (2) a quiet band between about 2 Hz and about 5 Hz, and (3) Ku-band disturbances at about 5.3 Hz and 7.84 Hz.

Regime:	Vibratory
Category:	Crew
Source:	Crew Exercise and UPA March 2016



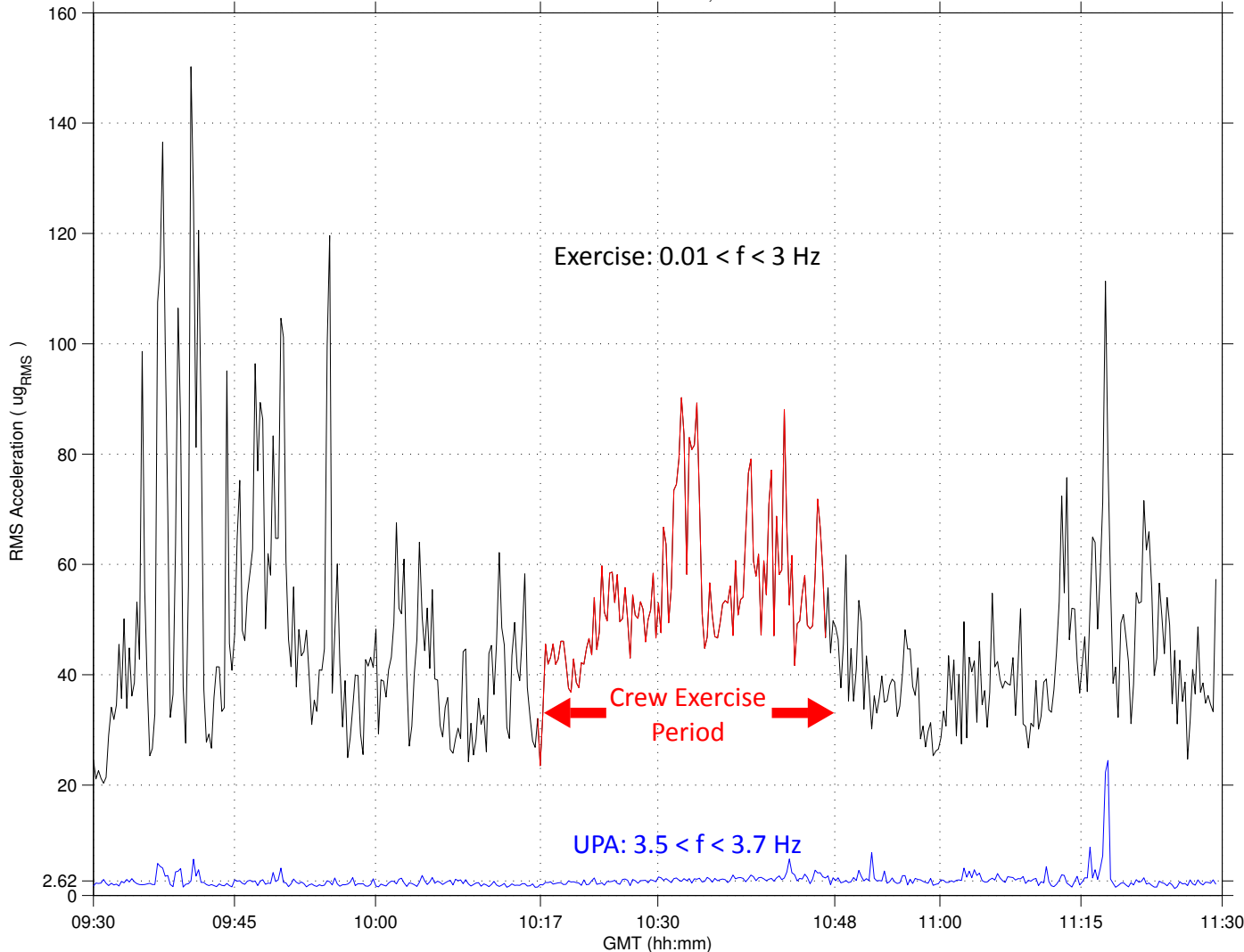
Crew Exercise and UPA March 2016 Quantify

sams2, 121f05 at COL, Starboard Endcone, Adapter Bracket:[378.90 320.60 233.90]
500.0000 sa/sec (200.00 Hz)
 Δf : 0.031 Hz
Temp. Resolution: 16.384 sec

SAMS2, 121f05, COL, Starboard Endcone, Adapter Bracket, 200.0 Hz (500.0 s/sec)

SSAnalysis[0.0 0.0 0.0]
Hanning, k = 1

Start GMT 11-March-2016, 071/09:30:00

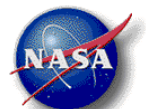


Description	
Sensor	SAMS 121f05 500.0 sa/sec, 200.0 Hz
Location	COL, Starboard Endcone, Adapter Bracket
Plot Type	RMS vs. Time

Notes:

- This plot shows overall RMS acceleration versus time for 2 frequency bands over the same 2-hour period shown on the previous page's spectrogram.
- In blue, toward the bottom, we plot the RMS acceleration due primarily to the UPA. This value stays near a baseline value of about 2.62 ugRMS throughout the 2 hours.
- The upper trace (in black and red) is a plot of RMS acceleration in the frequency range from 0.01 Hz to 3 Hz. This range includes structural modes and, as seen in red, the excitation due to crew exercise between 10:17 and 10:48 (~half-hour exercise period).
- Note from the red trace how when the crew starts pedaling there is a step up of RMS from about 20 ugRMS to over 40 ugRMS.

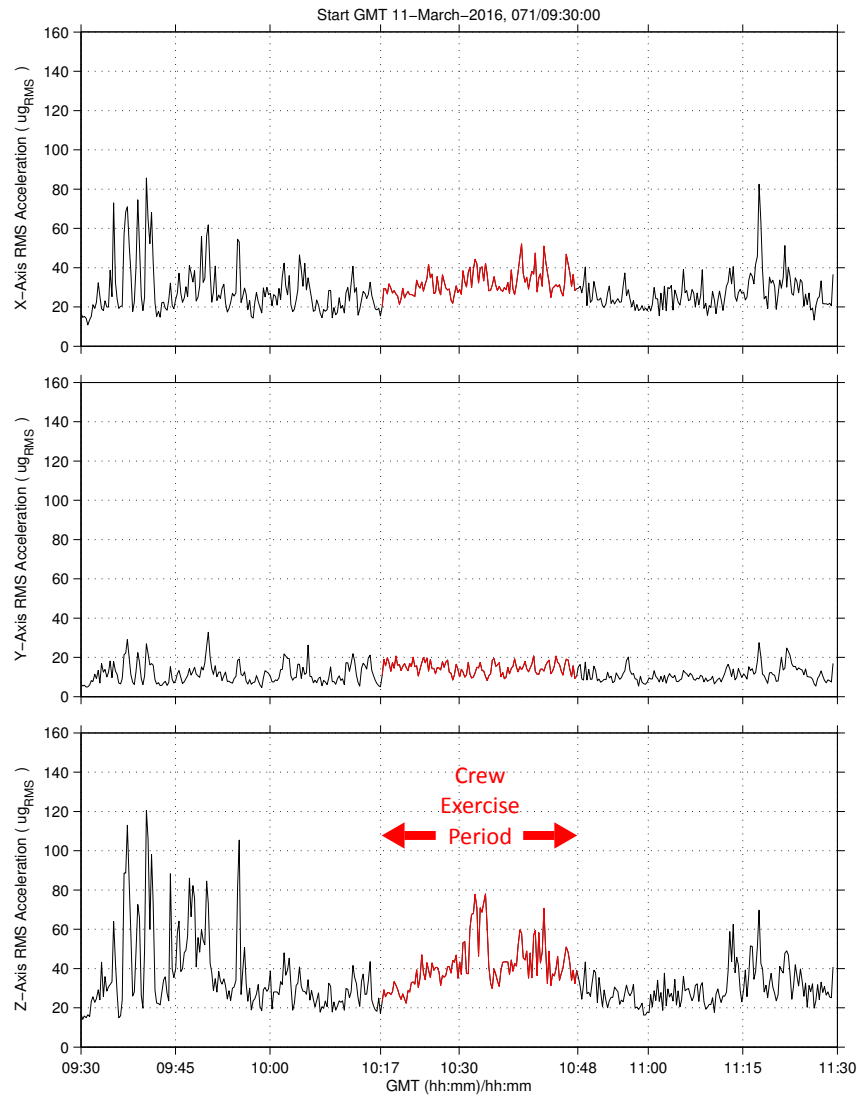
Regime:	Vibratory
Category:	Crew
Source:	Crew Exercise and UPA March 2016



Crew Exercise and UPA March 2016 Quantify

sams2, 121f05 at COL, Starboard Endcone, Adapter Bracket:[378.90 320.60 233.90]
500.0000 sa/sec (200.00 Hz)
 Δf : 0.031 Hz Range: 0.01 – 3 Hz
Temp. Resolution: 16.384 sec

SSAnalysis[0.0 0.0 0.0]
Hanning, k = 3



Description	
Sensor	SAMS 121f05 500.0 sa/sec, 200.0 Hz
Location	COL, Starboard Endcone, Adapter Bracket
Plot Type	RMS vs. Time

Notes:

- This 3-panel plot shows a per-axis version of the black/red trace on the plot from the previous page.
- Again, we are looking at just the RMS value from the frequency range from 0.01 Hz to 3 Hz (where the exercise signature appears).
- Now we see that the exercise is aligned primarily with the XZ-plane.

Regime:	Vibratory
Category:	Crew
Source:	Crew Exercise and UPA March 2016

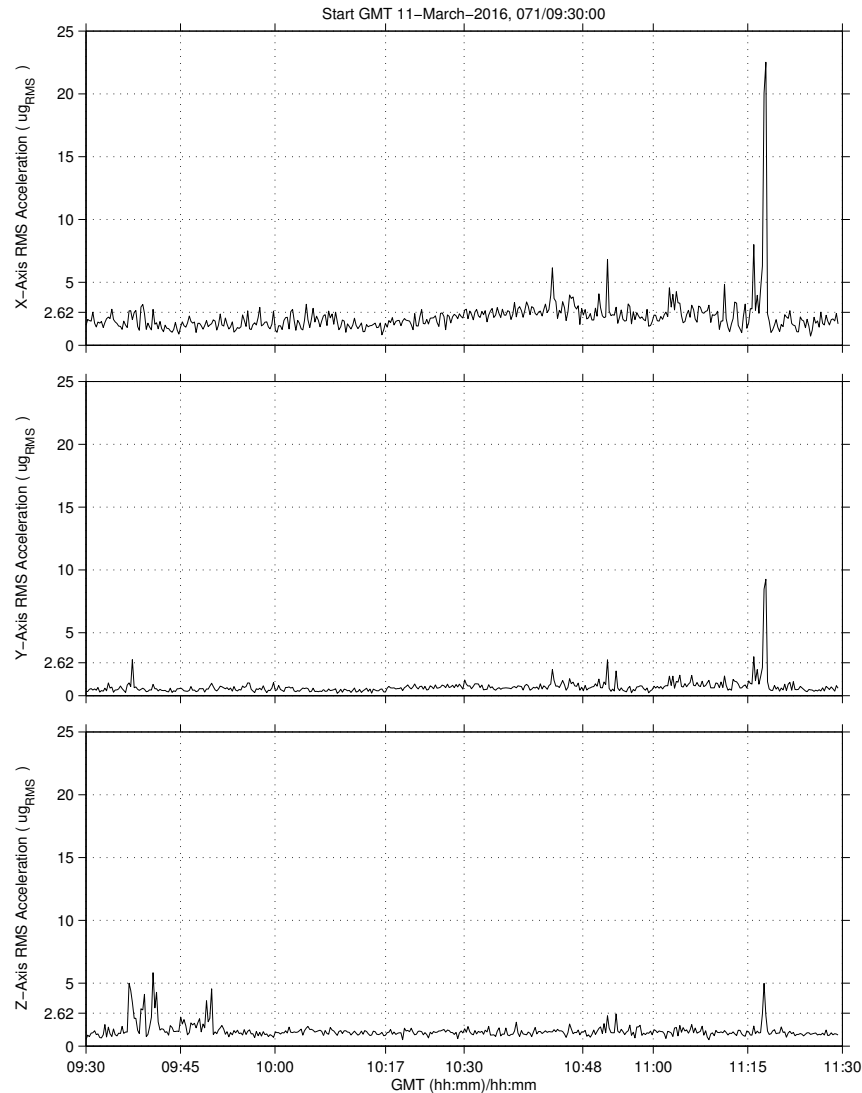


Crew Exercise and UPA March 2016 Quantify

sams2, 121f05 at COL, Starboard Endcone, Adapter Bracket:[378.90 320.60 233.90]
500.0000 sa/sec (200.00 Hz)
Δf: 0.031 Hz Range: 3.5 – 3.7 Hz
Temp. Resolution: 16.384 sec

SSAnalysis[0.0 0.0 0.0]
Hanning, k = 3

UPA



Description	
Sensor	SAMS 121f05 500.0 sa/sec, 200.0 Hz
Location	COL, Starboard Endcone, Adapter Bracket
Plot Type	RMS vs. Time

Notes:

- This 3-panel plot shows a per-axis version of the blue trace on the earlier plot.
- Again, we are looking at just the RMS value from the frequency range from 3.5 Hz to 3.7 Hz (the UPA signature appears at 3.6 Hz).
- Now we see that the UPA disturbance, albeit faint, is aligned primarily with the X-axis, suggesting a linear, piston type apparatus.

Regime:	Vibratory
Category:	Crew
Source:	Crew Exercise and UPA March 2016

