# Soyuz 44S Undock 2016-03-01
# Quantify

BLACK is MAMS OSS, RED is ISS Rates/Angles

Start GMT 01−March−2016, 061/16:00:00
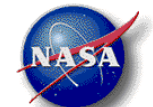


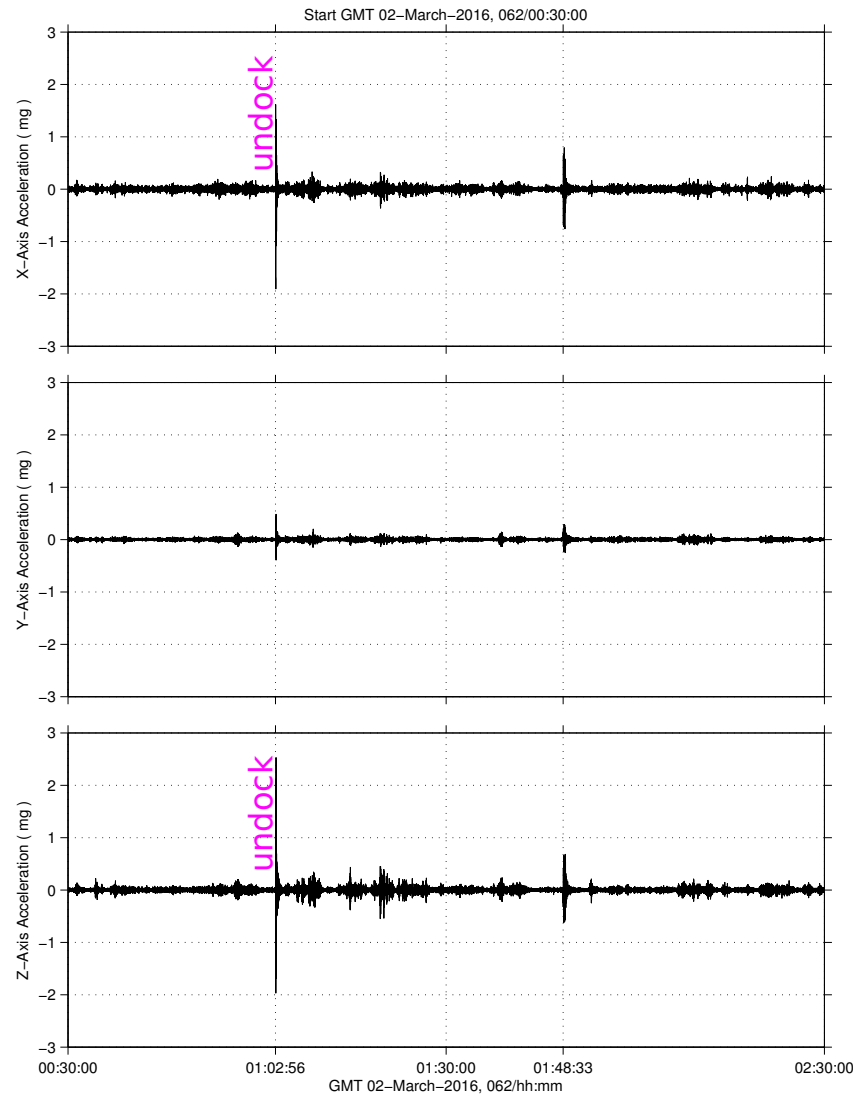| Description | |
|---|---|
| Sensor | MAMS ossbtmf 0.0625 sa/sec, 0.01 Hz |
| Location | LAB1O2, ER1, Lockers 3,4 |
| Plot Type | XYZ Accel. vs. Time |

**Notes:**
- This 3-panel plot of MAMS OSS (black) and ISS rates/angles (red) data shows that the undock event was most notable on the ISS XZ-plane as seen by the annotations at GMT 01:02. The as-flown timeline reported that physical separation occurred at 01:02:30.
- Other noteworthy events shown with blue annotations occurred with ISS maneuvers.

| Regime: | Quasi-Steady |
|---|---|
| Category: | Vehicle |
| Source: | Soyuz 44S Undock 2016-03-01 |

# Soyuz 44S Undock 2016-03-01
# Quantify

Start GMT 02–March–2016, 062/00:30:00

GMT 02–March–2016, 062/hh:mm

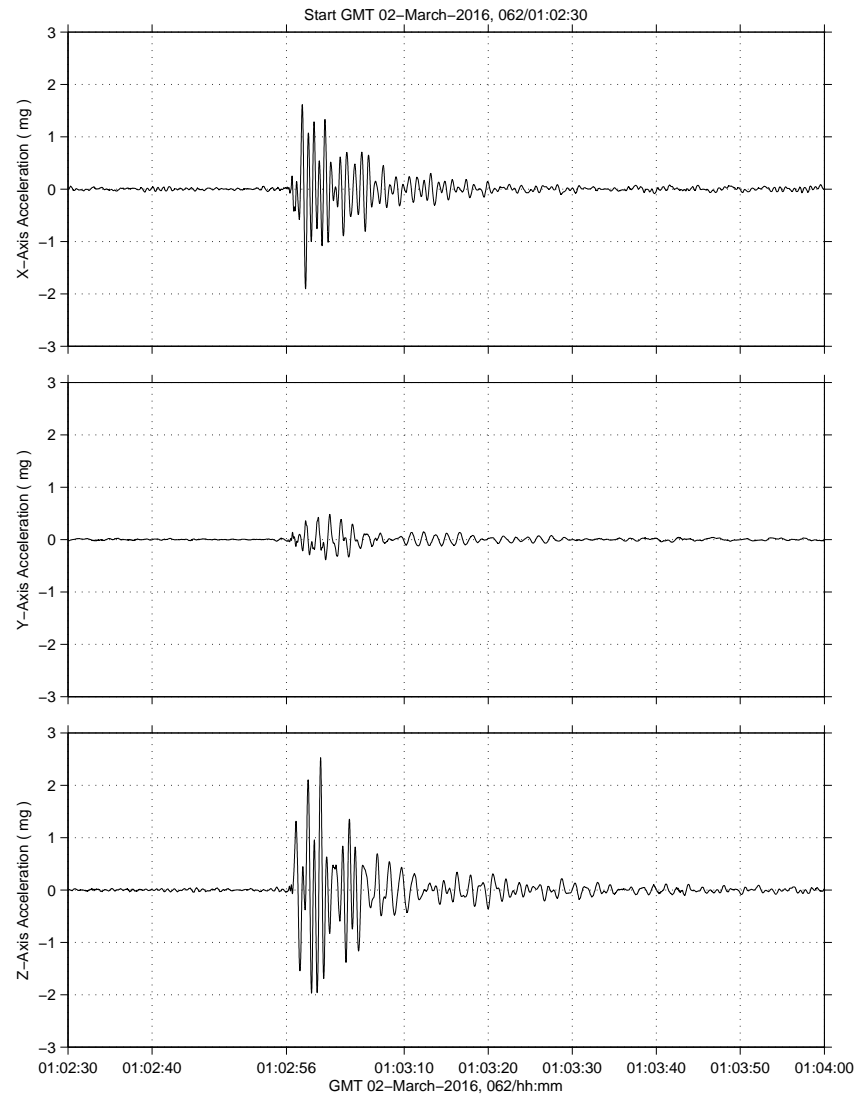| Description | |
|---|---|
| Sensor | SAMS 121f05 142.0 sa/sec, 6.0 Hz |
| Location | COL, Starboard Endcone, Adapter Bracket |
| Plot Type | XYZ Accel. vs. Time |

**Notes:**

- In this 3-panel set of plots, we examine SAMS data measured near the Columbus Starboard Endcone when the Soyuz 44S undocked from topside of MRM2.
- These data were low-passed filtered at 6 Hz in order to most clearly show the undocking event at about GMT 01:02:56.
- Peak-to-peak acceleration transient was maximized on the Z-axis at about 4.5 mg, while that value was under 4 mg on the X-axis.

| Regime: | Quasi-Steady |
|---|---|
| Category: | Vehicle |
| Source: | Soyuz 44S Undock 2016-03-01 |

sams2, 121f05006 at COL, Starboard Endcone, Adapter Bracket:[378.90 320.60 233.90]
142.0000 sa/sec (6.00 Hz)
SAMS2, 121f05006, COL, Starboard Endcone, Adapter Bracket, 6.0 Hz (142.0 s/sec)    SSAnalysis[ 0.0  0.0  0.0]

Start GMT 02–March–2016, 062/01:02:30

GMT 02–March–2016, 062/hh:mm

# Soyuz 44S Undock 2016-03-01
# Quantify

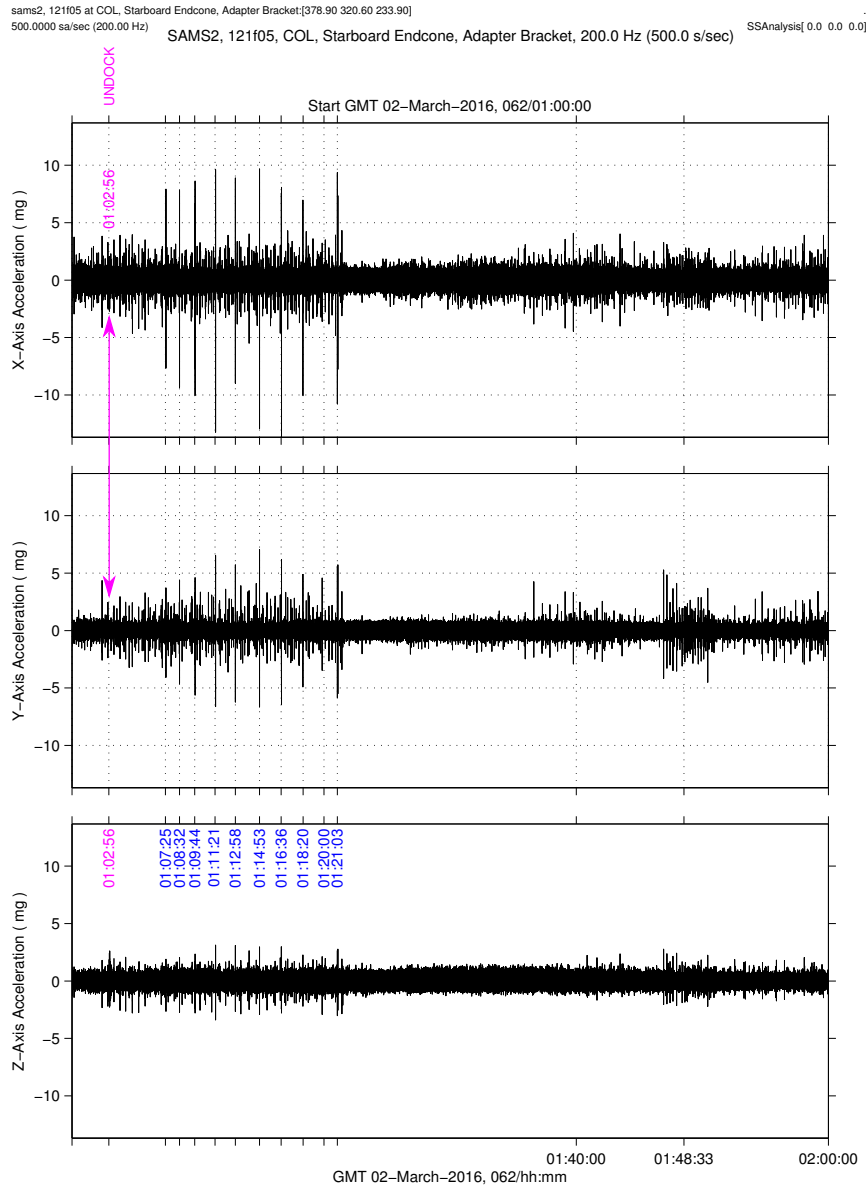| Description | |
|---|---|
| Sensor | SAMS 121f05 142.0 sa/sec, 6.0 Hz |
| Location | COL, Starboard Endcone, Adapter Bracket |
| Plot Type | XYZ Accel. vs. Time |

**Notes:**
- Here we zoom-in around the time of the physical separation at GMT 01:02:56.
- The twang on the XZ-plane that occurred at physical separation shows peak-to-peak of around 4.5 mg and, counting peaks, we see initial ringing at about 1.4 Hz ( 7 peaks in 5 seconds on the X- and Z-axis ).
- Also, the first big move was in the -ZA-direction (SAMS inverted polarity shows this as an initial +ZA spike).

| Regime: | Quasi-Steady |
|---|---|
| Category: | Vehicle |
| Source: | Soyuz 44S Undock 2016-03-01 |

Glenn Research Center

# Soyuz 44S Undock 2016-03-01
# Quantify

sams2, 121f05 at COL, Starboard Endcone, Adapter Bracket:[378.90 320.60 233.90]
500.0000 sa/sec (200.00 Hz)
SAMS2, 121f05, COL, Starboard Endcone, Adapter Bracket, 200.0 Hz (500.0 s/sec)
SSAnalysis[ 0.0  0.0  0.0]

Start GMT 02−March−2016, 062/01:00:00

UNDOCK
01:02:56

01:02:56
01:07:25
01:08:32
01:09:44
01:11:21
01:12:58
01:14:53
01:16:36
01:18:20
01:20:00
01:21:03

01:40:00   01:48:33   02:00:00

GMT 02−March−2016, 062/hh:mm

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

**Notes:**
- While the low-pass filtered data on the previous page highlight the actual undock event, this 3-panel plot shows unfiltered data from the same sensor on the Columbus endcone, and for the same time period.
- The undock event here is overwhelmed by other impulsive accelerations, most notably those shown with blue annotated text between 01:07:25 and 01:21:03.
- The spikes prominent here on the XY-plane appear to be related to a narrowband disturbance near 142 Hz as demonstrated on the next page.

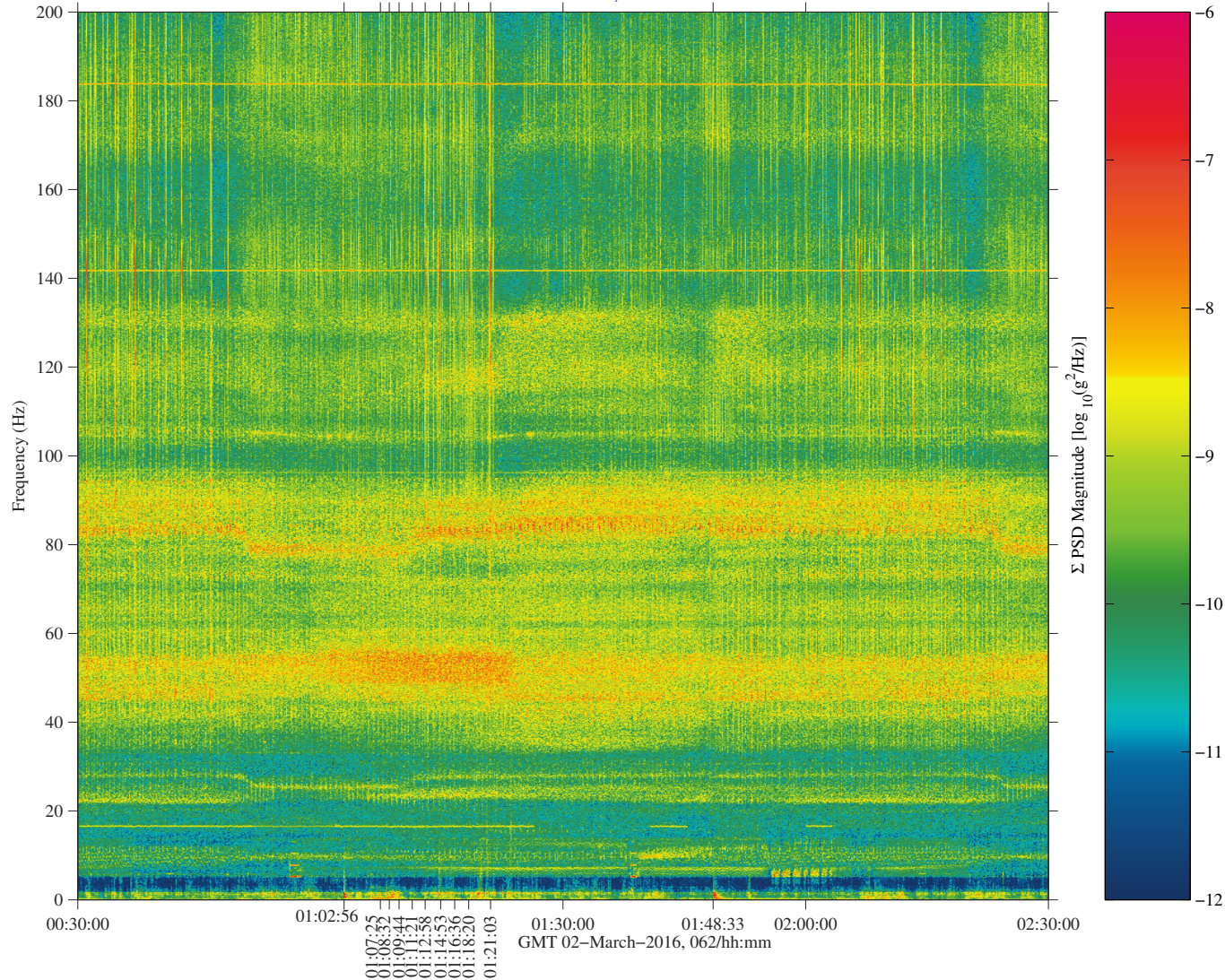| Regime: | Quasi-Steady |
|---|---|
| Category: | Vehicle |
| Source: | Soyuz 44S Undock 2016-03-01 |

## Soyuz 44S Undock 2016-03-01
## Qualify

sams2, 121f05 at COL, Starboard Endcone, Adapter Bracket:[378.90 320.60 233.90]
500.0000 sa/sec (200.00 Hz)
Δf = 0.122 Hz, Nfft = 4096
Temp. Res. = 8.192 sec, No = 0

sams2, 121f05

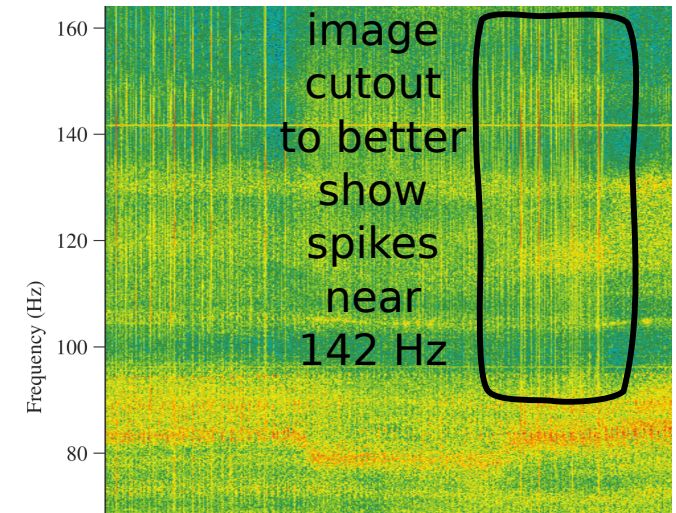Start GMT 02−March−2016, 062/00:30:00

Sum
Hanning, k = 3515
Span = 8.00 hours

Σ PSD Magnitude [log₁₀ (g²/Hz)]

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

**Notes:**
- This spectrogram shows red vertical streaks eminating from the narrowband trace near 142 Hz.
- These sporadic spikes appear to be common at the Columbus endcone location, and tend to dominate the profile when looking at acceleration versus time up to 200 Hz – a different plot type than what's shown here.

image cutout to better show spikes near 142 Hz

| Regime: | Quasi-Steady |
|---|---|
| Category: | Vehicle |
| Source: | Soyuz 44S Undock 2016-03-01 |