

Space Acceleration Measurement System-II Crew Familiarization Briefing - Science

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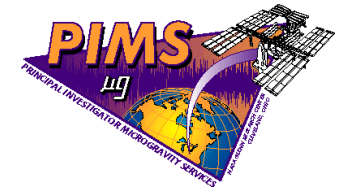
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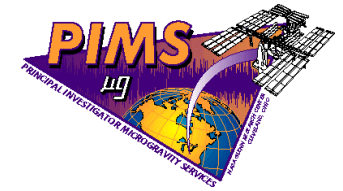
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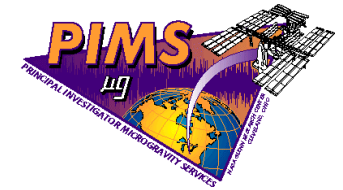


- Program provides acceleration measurement support to microgravity principal investigators
 - develop and operate accelerometer systems for microgravity research platforms
 - analyze and interpret accelerometer data to characterize the microgravity environment of the research platforms for principal investigators
 - support microgravity environment requirement activities
- Acceleration measurement WWW links
 - <http://microgravity.grc.nasa.gov>
 - http://microgravity.grc.nasa.gov/MSD/MSD_htmls/accel_meas.html
 - http://microgravity.grc.nasa.gov/MSD/MSD_htmls/PIMS.html
 - <http://www.grc.nasa.gov/WWW/MMAP/PIMS/HTMLS/Micro-descpt.html>
 - <http://www.lerc.nasa.gov/WWW/MMAP/PIMS/HTMLS/adapt.html>
 - <http://tsccrusader.grc.nasa.gov/pims>



- Purpose

- To analyze and interpret accelerometer data to characterize the microgravity environment of Earth-orbiting laboratories for the microgravity principal investigators
- Maintain archive of acceleration data from various microgravity platforms including ISS, MIR, Space Shuttle, KC-135, and sound rockets
- Approach
 - Throughout the PI's preparation for flight, the PIMS team will offer tutorial sessions and one-on-one interaction to help the PI team understand different aspects of measuring and interpreting the microgravity environment
 - Following the acquisition of accelerometer data, the PIMS team will provide expert consultation on interpretation of the microgravity environment and perform detailed analyses for general characterization and on a per-request basis



- Figure 1 – Nominal Environment Plot (STS-78)
- Figure 2 - Principal Component Spectral Analysis (STS-78)
- Figure 3 – Flight 7A Docking (STS-104)
- Figure 4 – Progress Docking Acceleration vs. Time (ISS)
- Figure 5 – EXPPCS Mixing Operations Spectrogram (ISS)
- Figure 6 - EXPPCS Mixing Operations Minimum/Maximum Acceleration vs. Time (ISS)
- Figure 7 – Quasi-Steady Three Dimensional Histogram During Crew Sleep (ISS)
- Figure 8 - Quasi-Steady Three Dimensional Histogram During Crew Wake Periods (ISS)
- Figure 9 – Cabin Depressurization (STS-87)
- Figure 10 - OARE vs. SOFBALL Radiometry Data (STS-94)

Figure 24: LMS, Head C (fc=25 Hz)

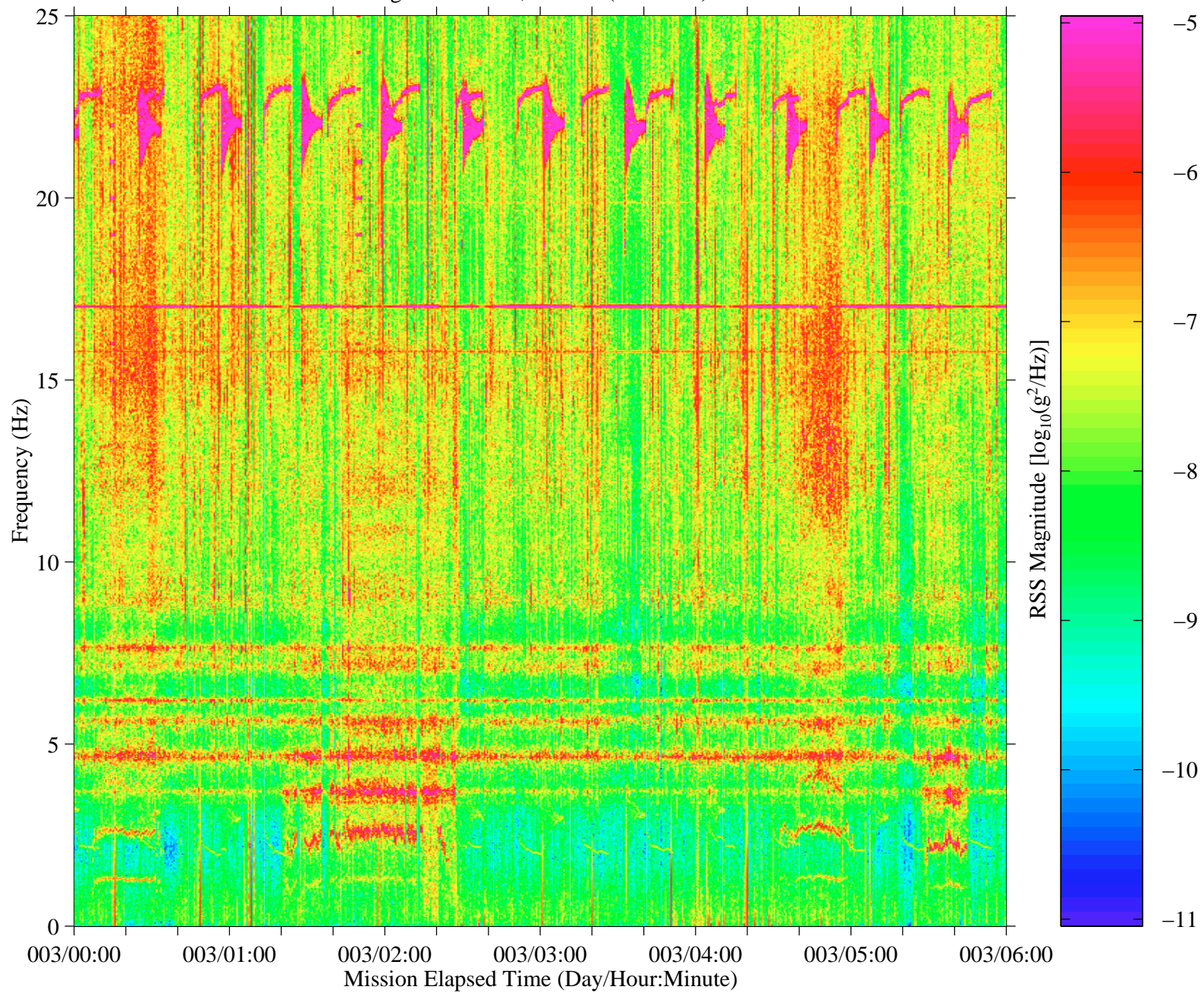


Figure 1. Nominal Environment Plot (STS-78)

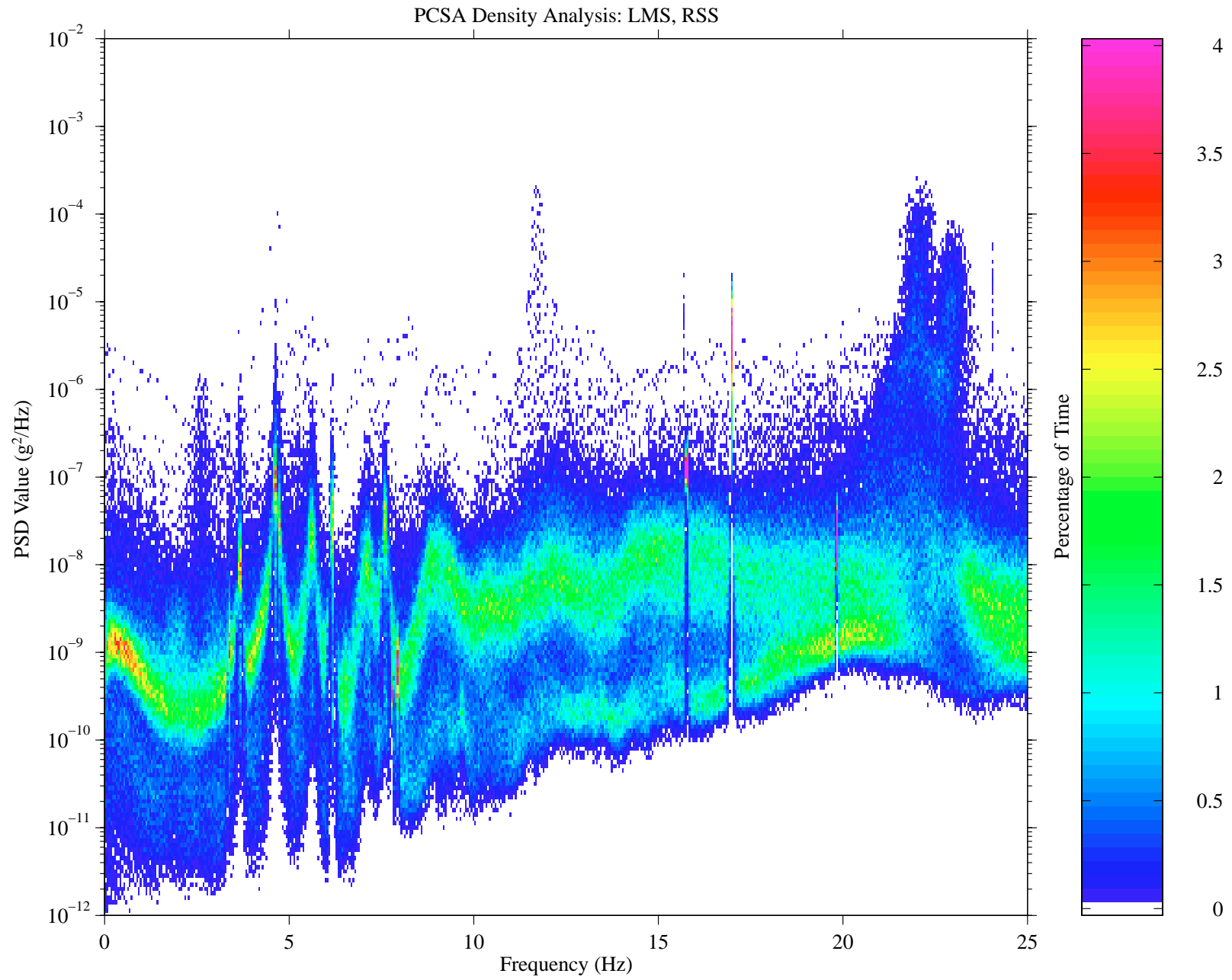


Figure 2. Principal Component Spectral Analysis (STS-78)

mams, hirap at LAB102, ER1, Lockers 3,4:[138.68 -16.18 142.35]
1000.0 sa/sec (100.00 Hz)
 $\Delta f = 0.122$ Hz, Nfft = 8192
Temp. Res. = 4.096 sec, No = 4096

STS-104 Docking
Start GMT 14-Jul-2001,02:38:40.000

Increment: 2, Flight: 6A
Sum
Hanning, k = 866
Span = 60.01 minutes

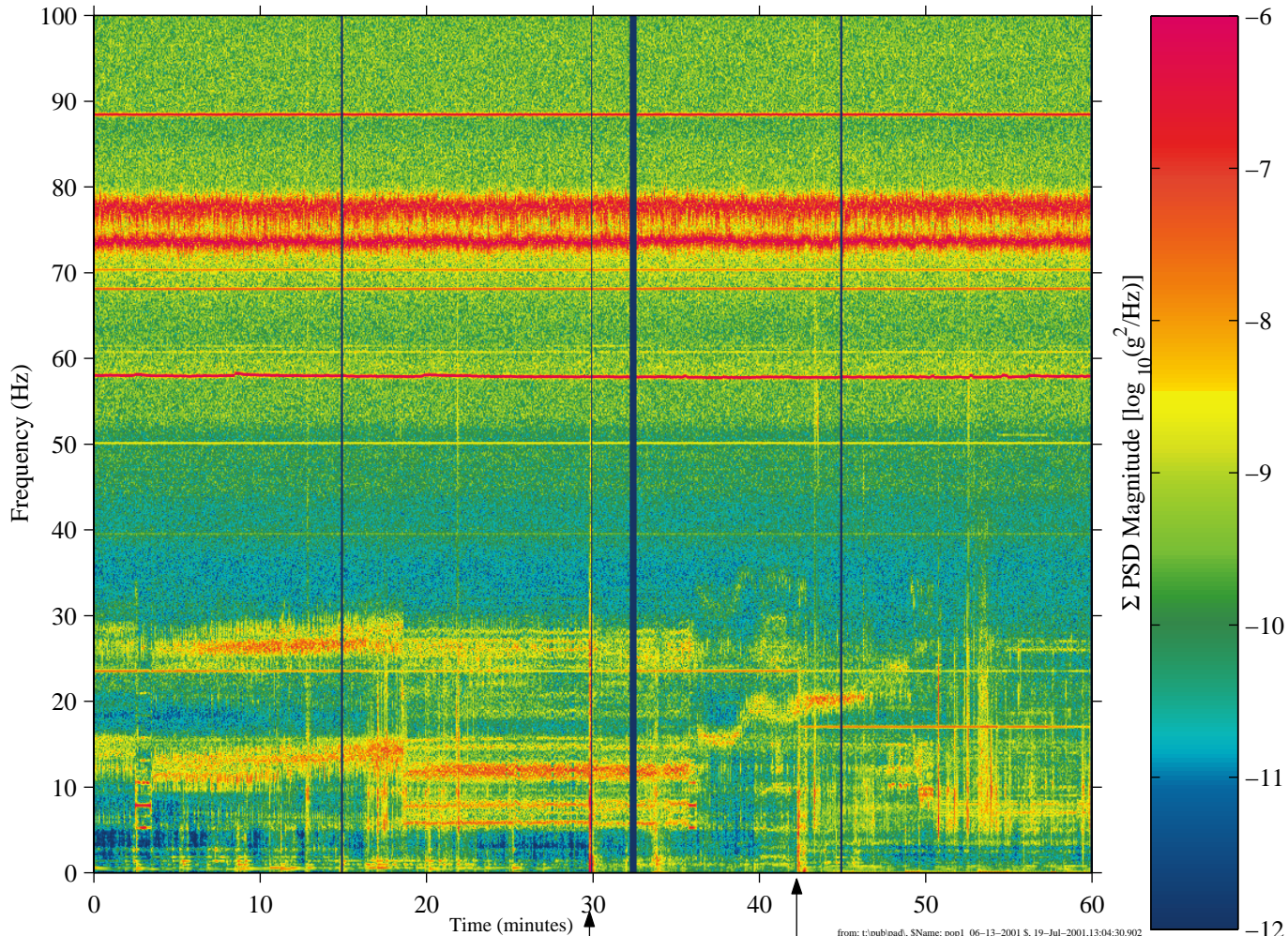


Figure 3 DFlight 7A Docking (STS-104)

STS-104 Hardware & Onset of 17 Hz Antenna Signature

Progress Docking

Start GMT 22-May-2001,20:00:05.398

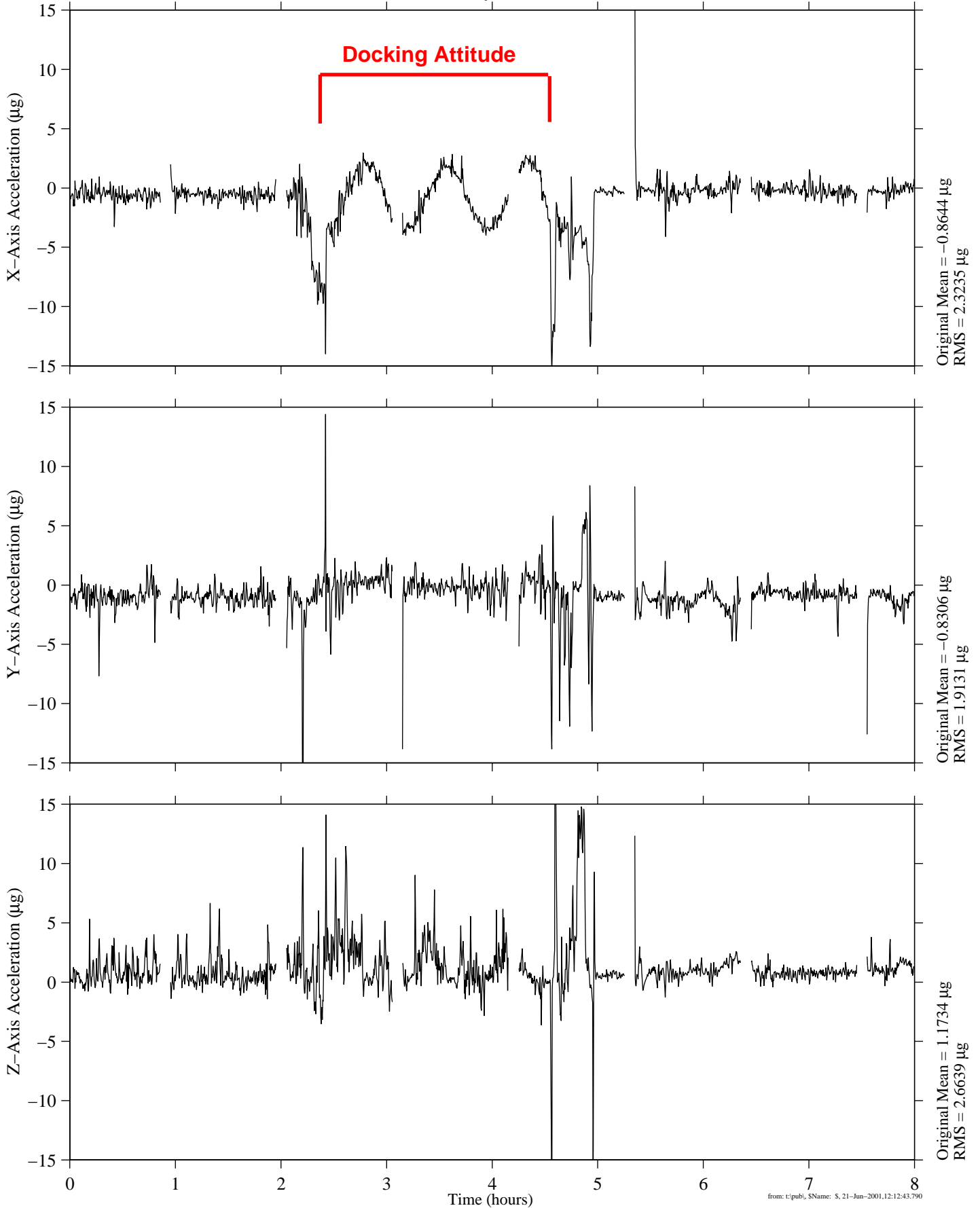


Figure 4 Progress Docking Acceleration vs. Time (ISS)

sams2, 121f06 at LAB101, ER2, PCS Test Section:[179.90 -6.44 145.55]
500.0 sa/sec (200.00 Hz)
 $\Delta f = 0.122$ Hz, Nfft = 4096
Temp. Res. = 4.096 sec, No = 2048

EXPPCS Sample Mix Operations
GMT 04-Jun-2001,22:10:00.001

Increment: 2, Flight: 6A
Sum
Hanning, k = 1160
Span = 1.33 hours

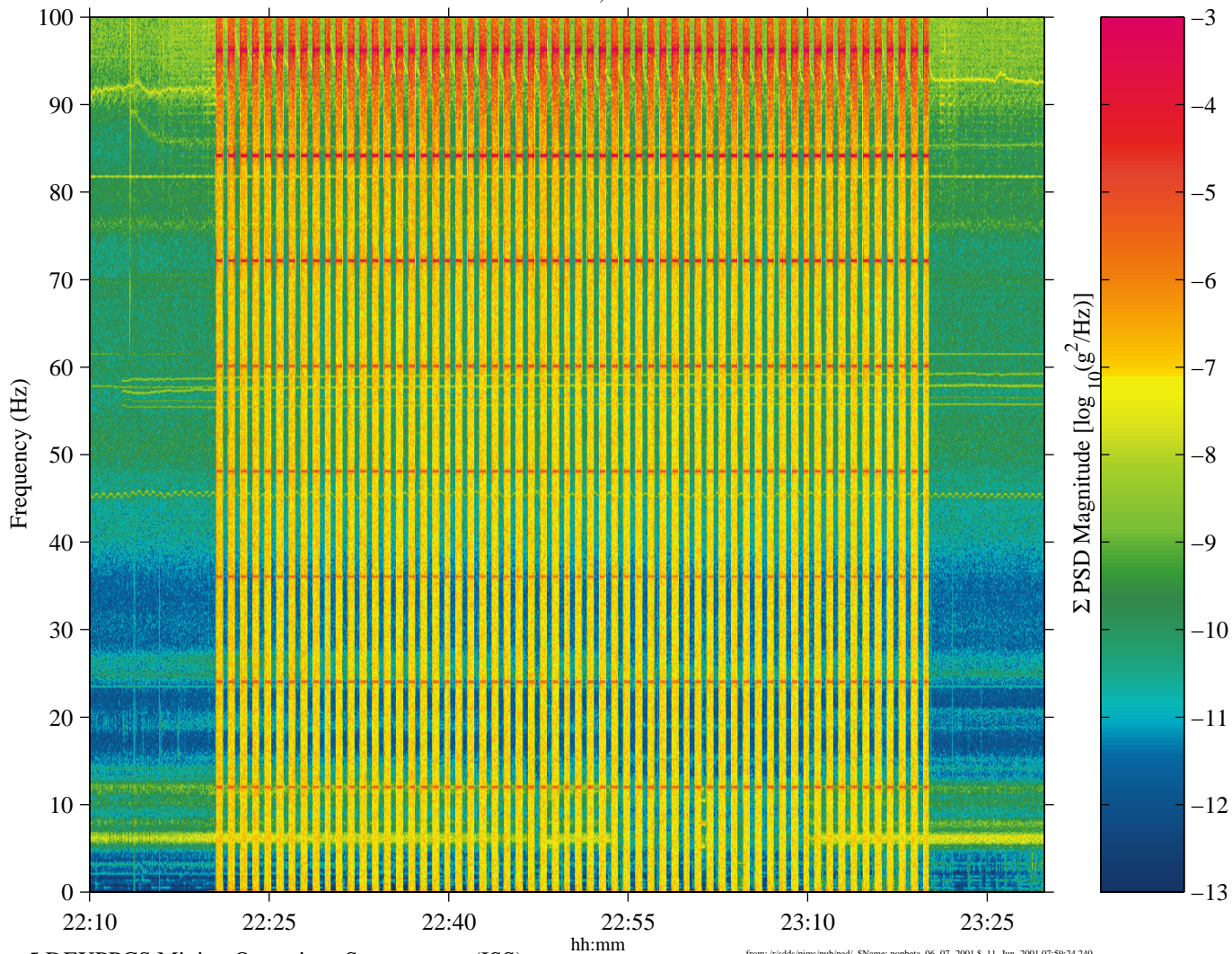


Figure 5 DEXPPCS Mixing Operations Spectrogram (ISS)

30-Second Duty Cycle of EXPPCS Sample Mix Operations

Start GMT 04-Jun-2001,22:20:10.873

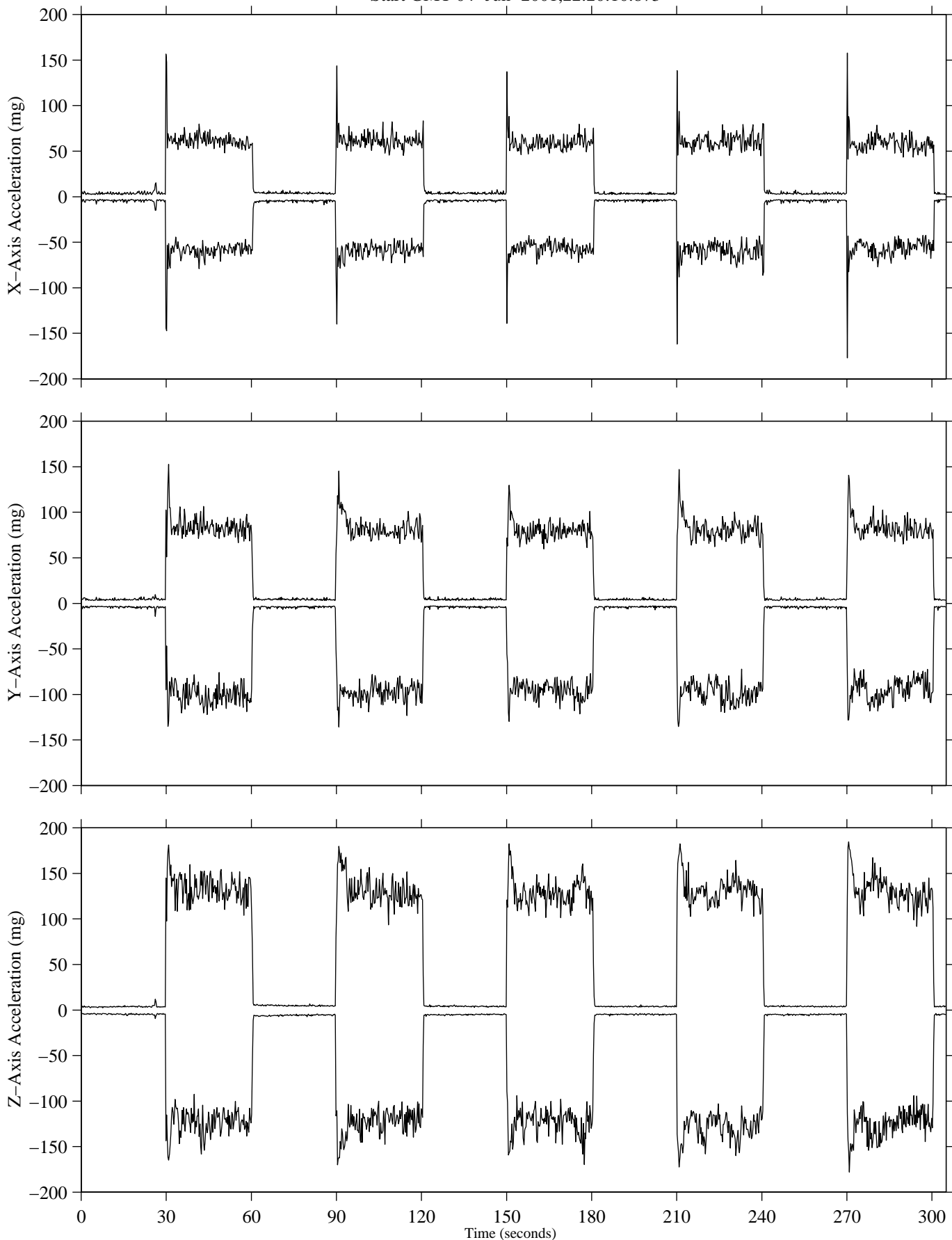
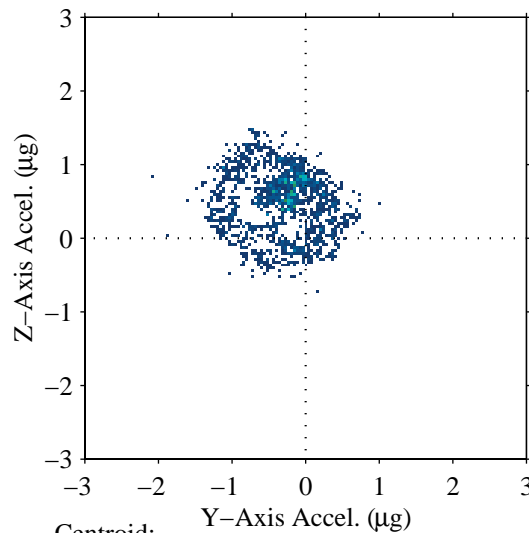
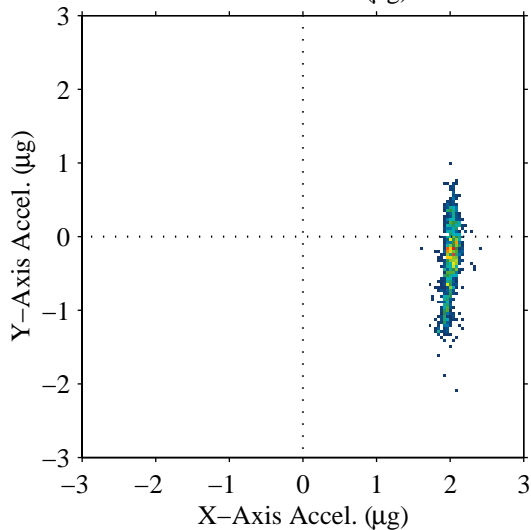
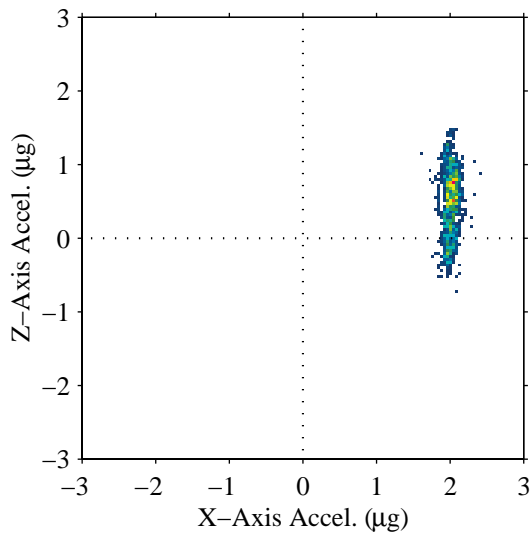


Figure 6 - EXPPCS Mixing Operations Minimum/Maximum Acceleration vs. Time (ISS)

Compilation of XPOP Attitude Profiles During Crew Sleep Periods



Centroid:

$X_{ct} = +2.027 (\mu\text{g})$

$Y_{ct} = -0.293 (\mu\text{g})$

$Z_{ct} = +0.524 (\mu\text{g})$

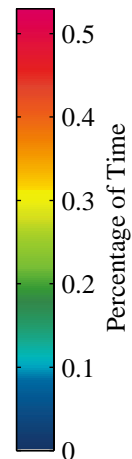


Figure 7 Quasi-Steady Three Dimensional Histogram During Crew Sleep (ISS)

Compilation of XPOP Attitude Profiles During Crew Active Periods

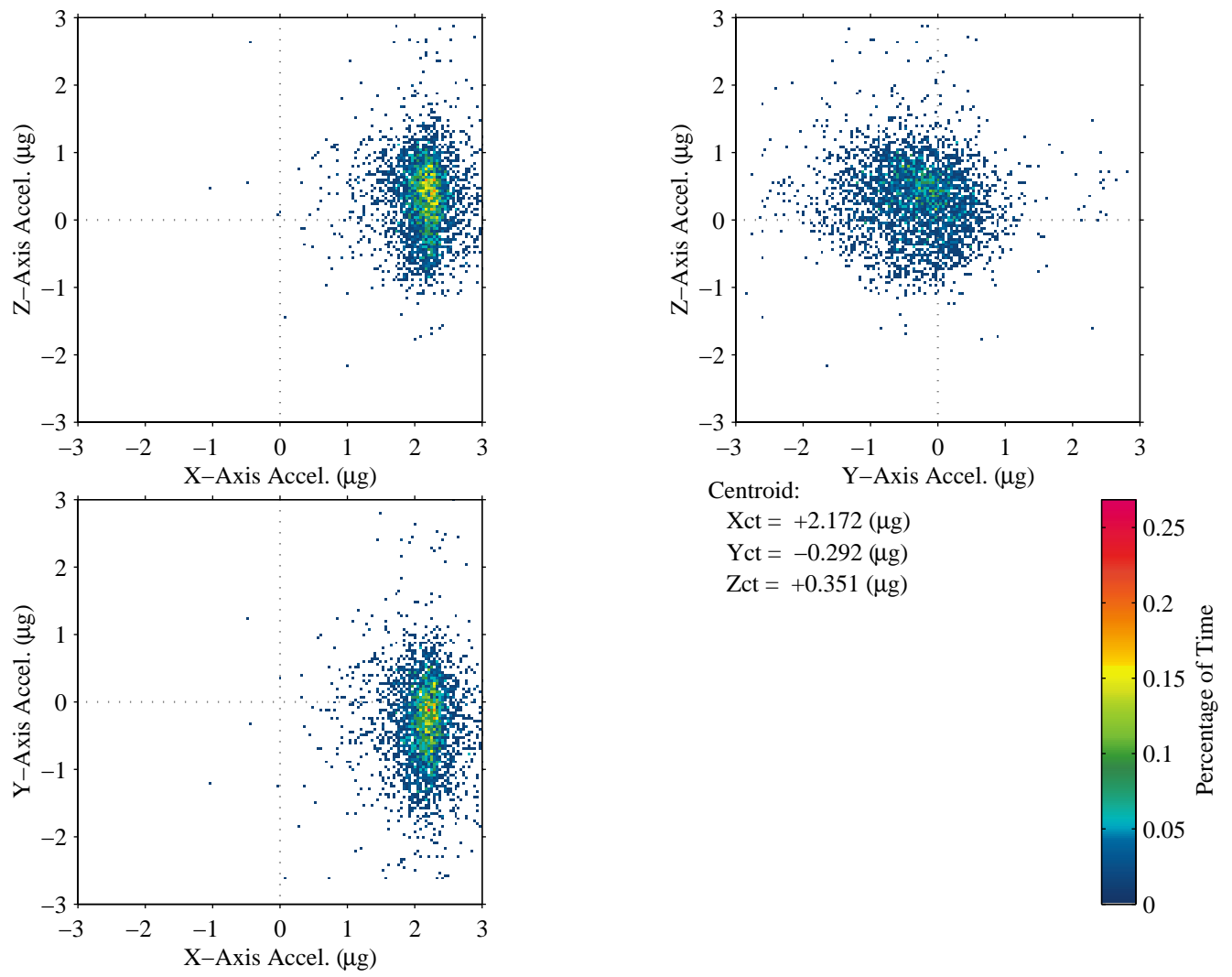


Figure 8 - Quasi-Steady Three Dimensional Histogram During Crew Wake Periods (ISS)

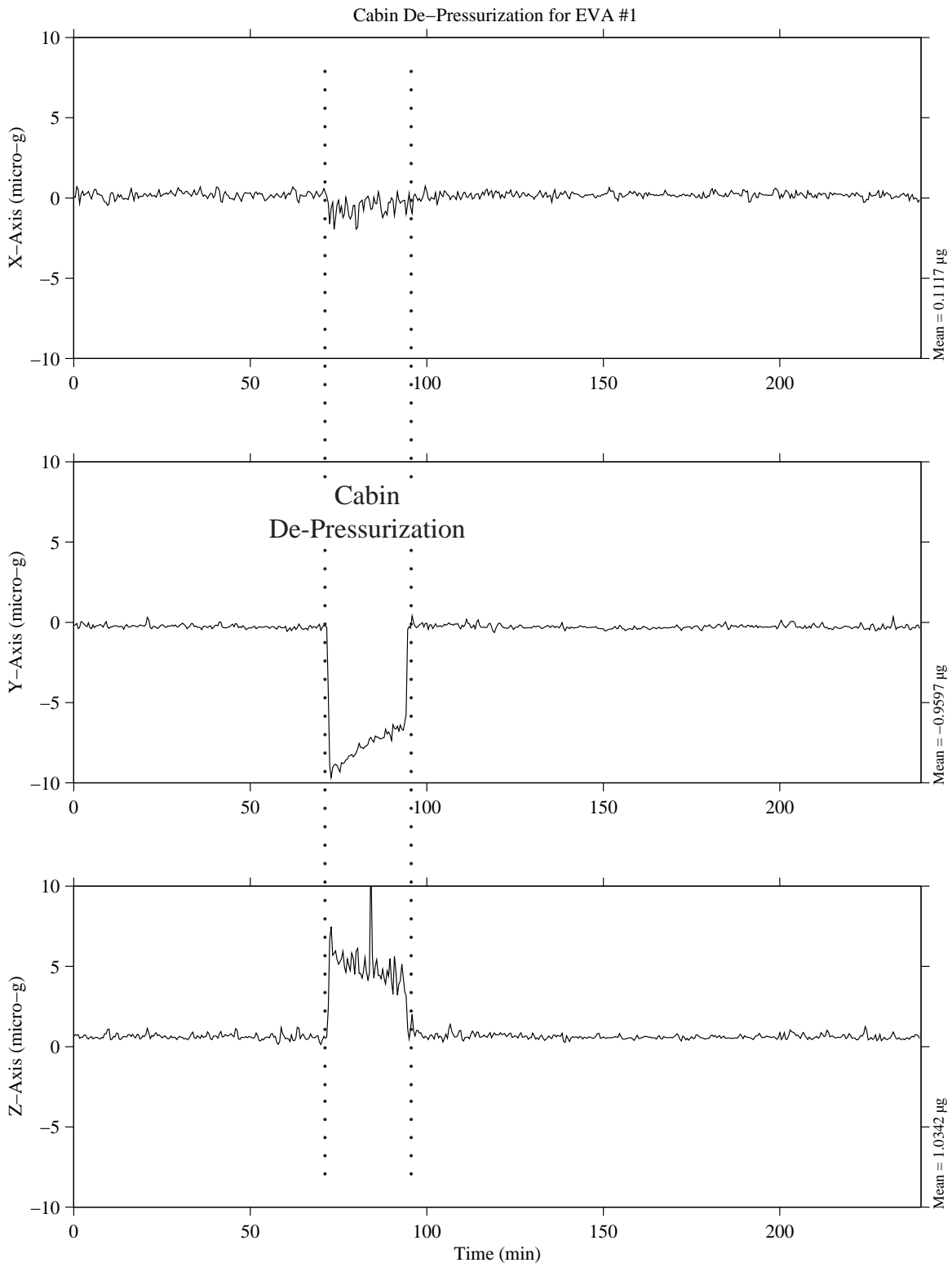


Figure 9. Cabin De-pressurization (STS-87)

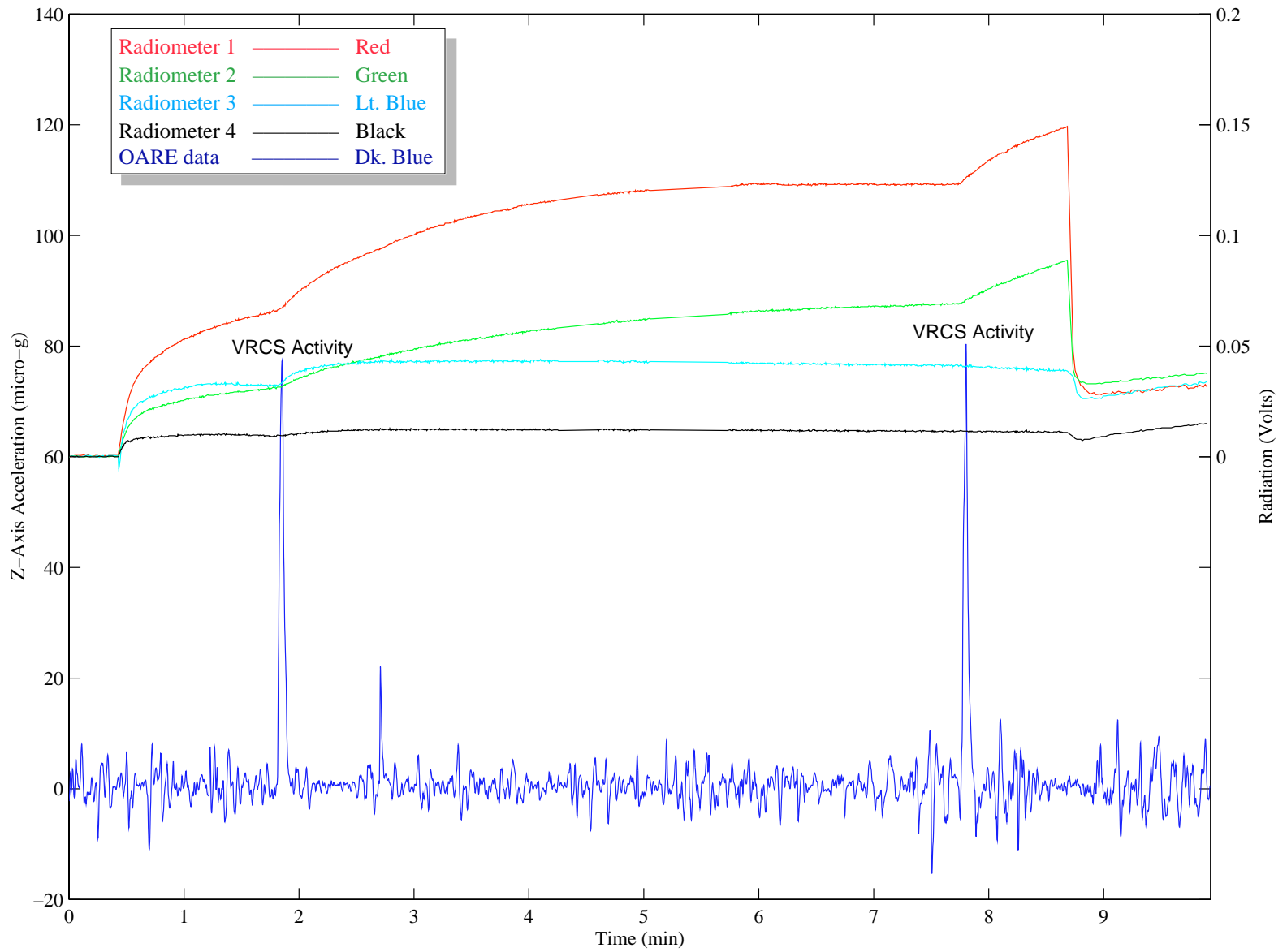


Figure 10. OARE vs. SOFBALL Radiometry Data (STS-94)