

PFMI Operations on 1-Oct-2002

Background Information:

SAMS is a distributed acceleration measurement system designed to capture vibratory and transient disturbance sources on the ISS. When MSG is active and the SAMS sensor in the MSG work volume is active, SAMS is collecting data from 5 sensors:

1. 121f02
 - located in SAMS drawer in EXPRESS rack #1 directly below the MAMS locker location
 - cutoff frequency 100 Hz
2. 121f03
 - located on Z-panel below EXPRESS rack #2
 - cutoff frequency 200 Hz
3. 121f04
 - located on Z-panel below EXPRESS rack #1
 - cutoff frequency 200 Hz
4. 121f05
 - located on light tray above EXPRESS rack #2
 - cutoff frequency 100 Hz
5. 121f08
 - located in MSG work volume
 - cutoff frequency 25 Hz

MAMS is an acceleration measurement system designed to measure both the quasi-steady (OSS sensor) and the vibratory/transient (HiRAP sensor) acceleration environments. HiRAP is utilized operationally by PIMS as a backup to SAMS and is occasionally activated during “interesting” microgravity events like dockings, undockings, EVA’s, etc. The OSS sensor cutoff frequency is 1 Hz and the HiRAP cutoff frequency is 100 Hz. MAMS is located in EXPRESS rack #1. HiRAP was not on GMT 274_2002 during PFMI’s test run.

Slide Description

The following 6 slides are as follows. A brief description of what is in each slide is provided along with some cautionary statements about the data.

- 1) PFMI PPT slide showing experiment hardware, video clip, and SAMS sensor 121f08 data. The time from the SAMS slide for the disturbance (GMT 274/20:44:00) was used as the analysis point for the graphs.
- 2) 24-hour acceleration vector magnitude plot using 121f08 sensor for GMT 274_2002. Shows a few impulsive type disturbances over the course of the day. The **red note** shows the 98th percentile detail for this day and indicates 98% of the acceleration data for the day were below 1 milli-g.
- 3) 4-hour acceleration vector magnitude plot using 121f08 sensor for GMT 274_2002. The **red box** shows the subject impulsive disturbance ~ 5 milli-g’s in magnitude.

- 4) 4-hour acceleration vector magnitude plot using 121f02 sensor for GMT 274_2002. The red box shows the subject impulsive disturbance ~ 9.5 milli-g's in magnitude. Recall, the 121f02 sensor is considering more energy (100 Hz cutoff) than the 121f08 sensor and is at a physically different location.
- 5) 10-minute 0.5 second interval average 3-axis acceleration versus time plot using 121f08 sensor for GMT 274_2002.
- 6) 10-minute 0.5 second interval average 3-axis acceleration versus time plot using 121f02 sensor for GMT 274_2002.

Conclusions/Cautions

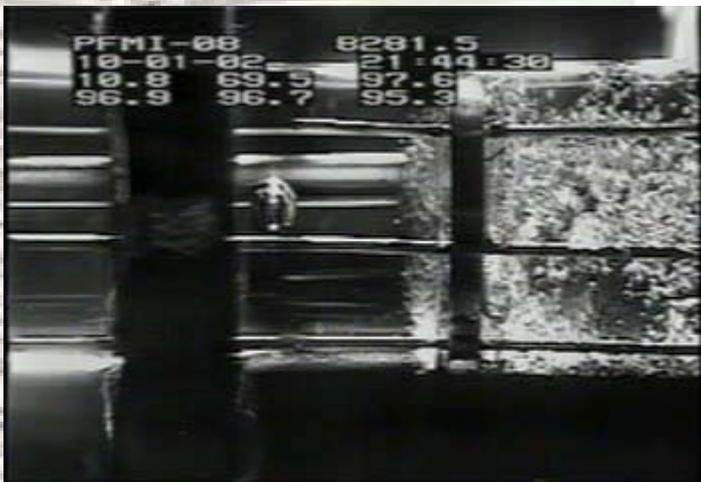
The microgravity environment of the ISS is quite dynamic and a fundamental point of emphasis here in the Microgravity Environment Program at NASA GRC is the localized measurement of vibratory/transient disturbances. Given that SAMS data is not available for the first PFMI run, HiRAP is the only vibratory/transient acceleration measurement device available.

MSG is located in bay 3, starboard and EXPRESS rack #1 (MAMS HiRAP location) is located in bay 2, ceiling. Obviously, these are not the same physical location and therefore, any conclusions drawn about the acceleration environment as measured by HiRAP and the acceleration environment experienced by PFMI must be done at a fairly high level. In particular, concerns about impulsive events such as localized pushoff/landing disturbances are best addressed from measurements at the location of concern. It is important to acknowledge that while impulsive accelerations may register at a sensor far removed from the location of interest, the magnitude of the disturbance cannot be confidently quantified from there.

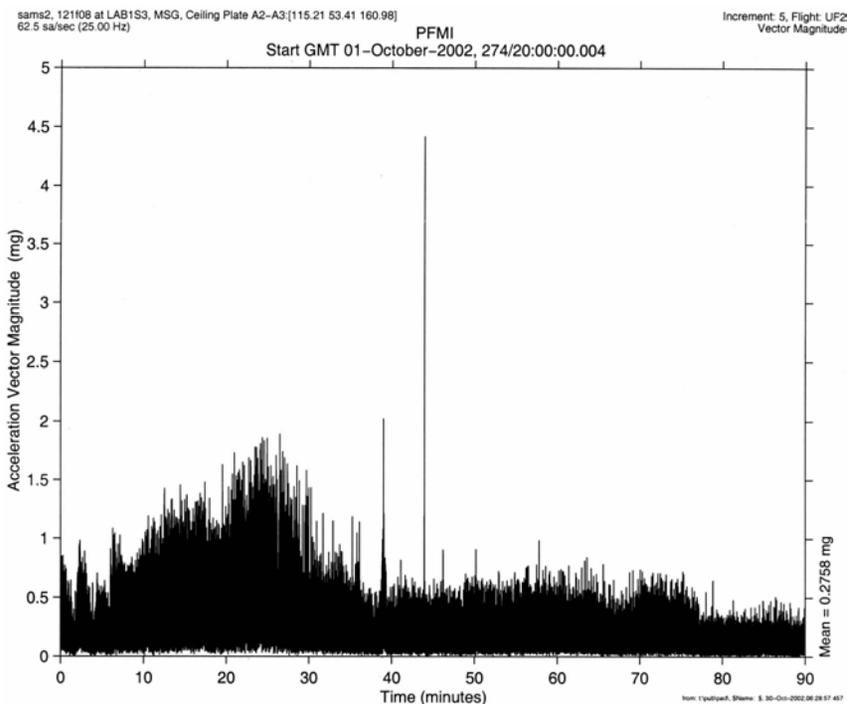


Pore Formation and Mobility Investigation (PFMI)

Influencing Bubble Movement

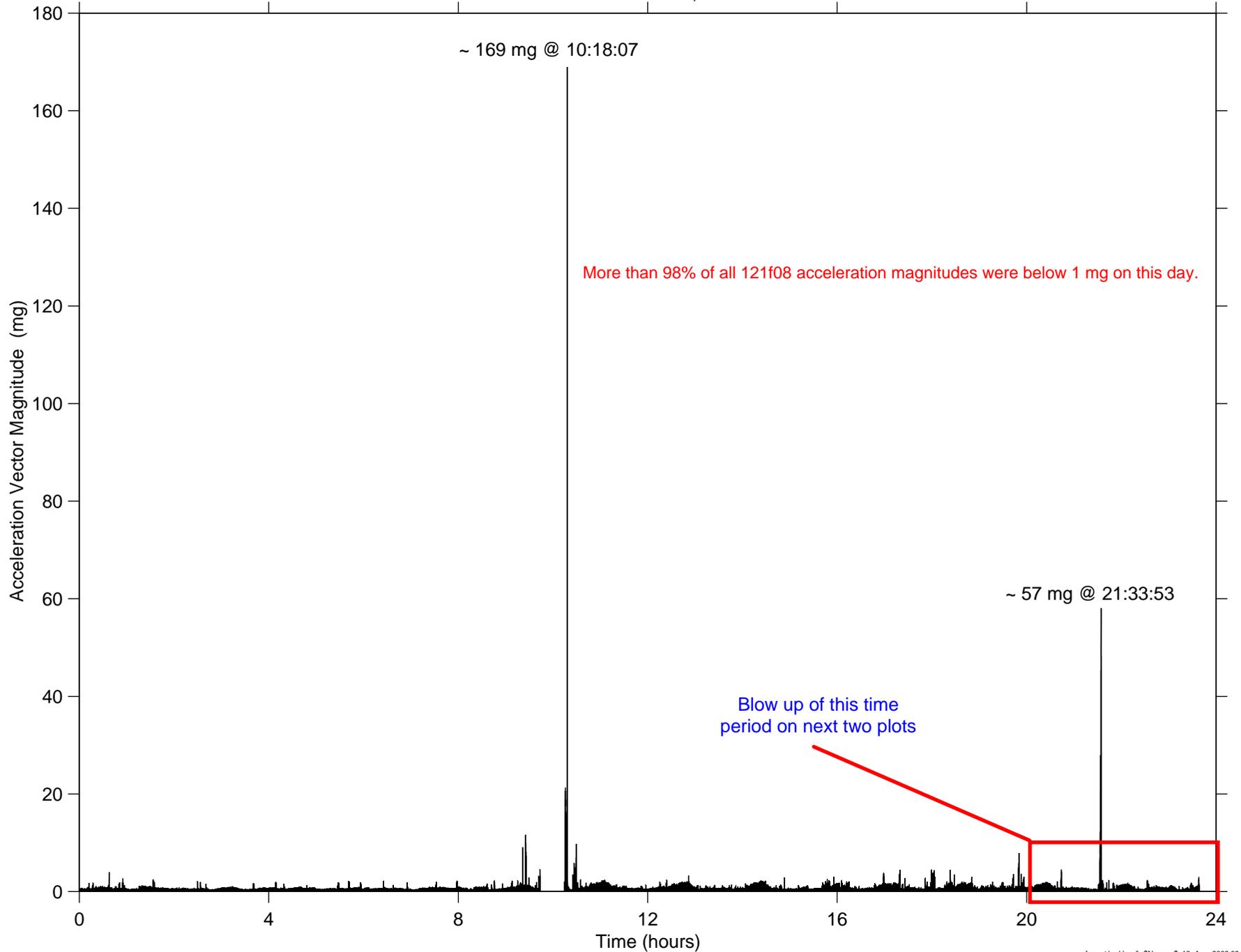


SAMS Acceleration Data

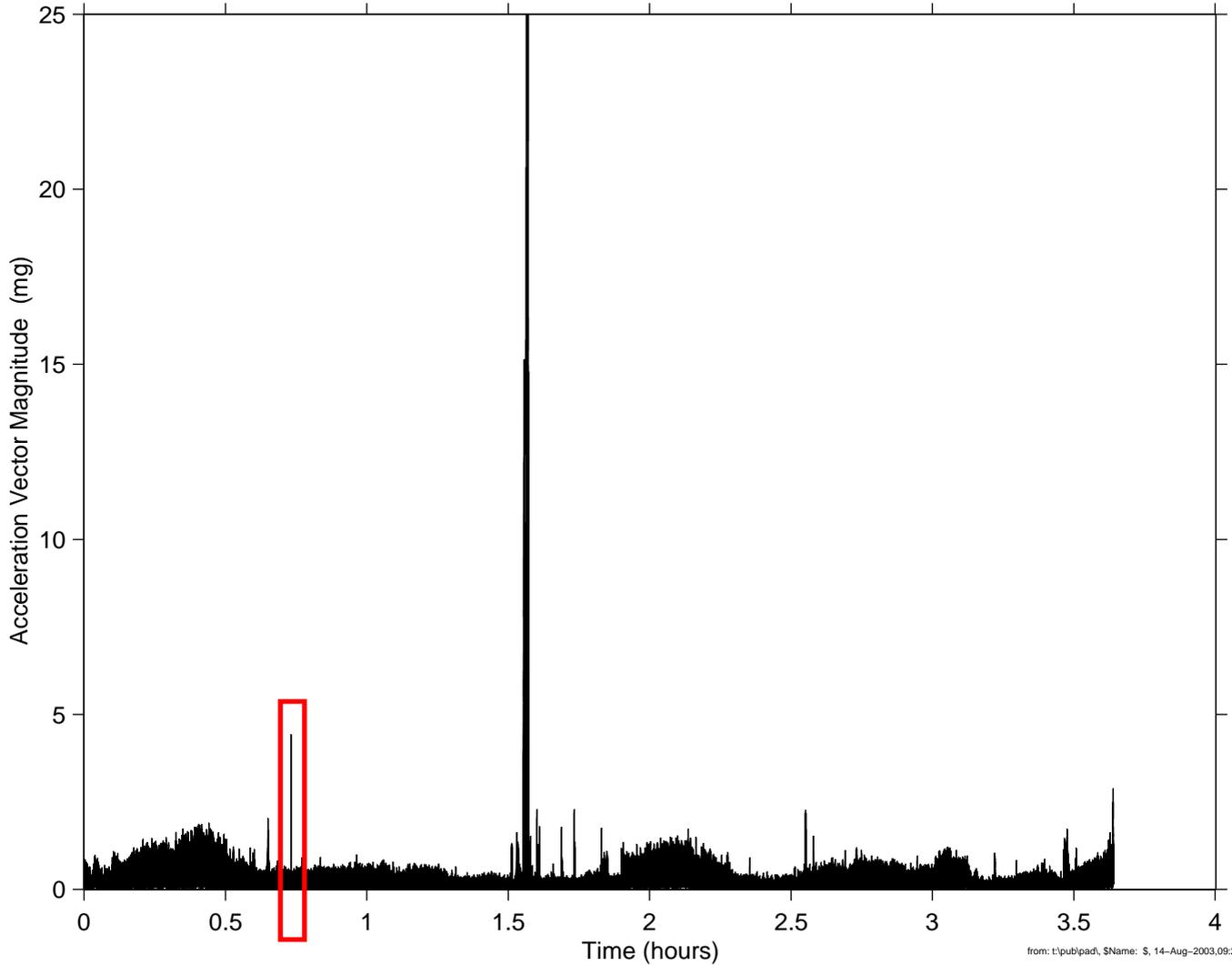


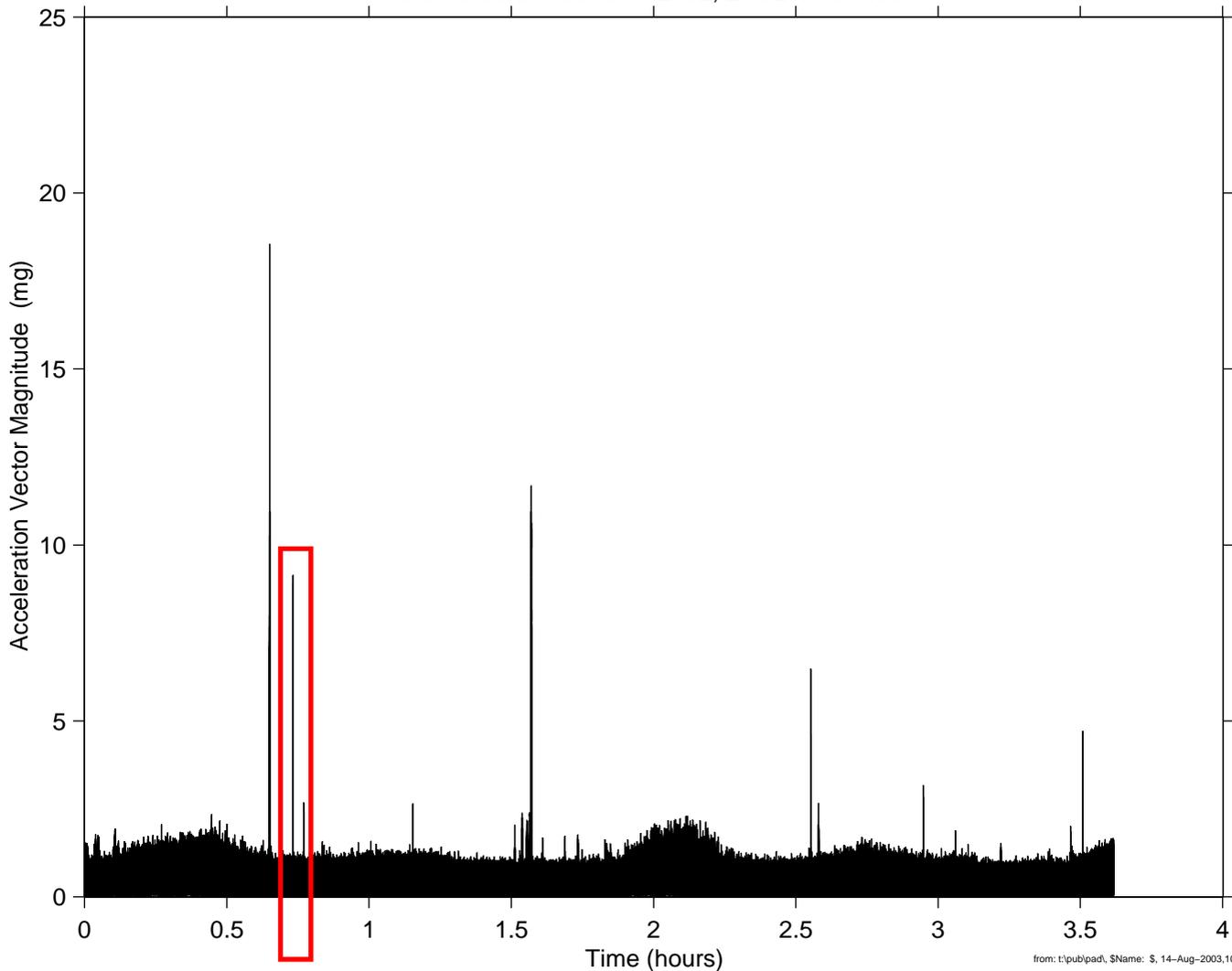
SAMS2, 121f08, LAB1S3, MSG, Ceiling Plate A2-A3, 25.0 Hz (62.5 s/sec)

Start GMT 01-October-2002, 274/00:00:00.010

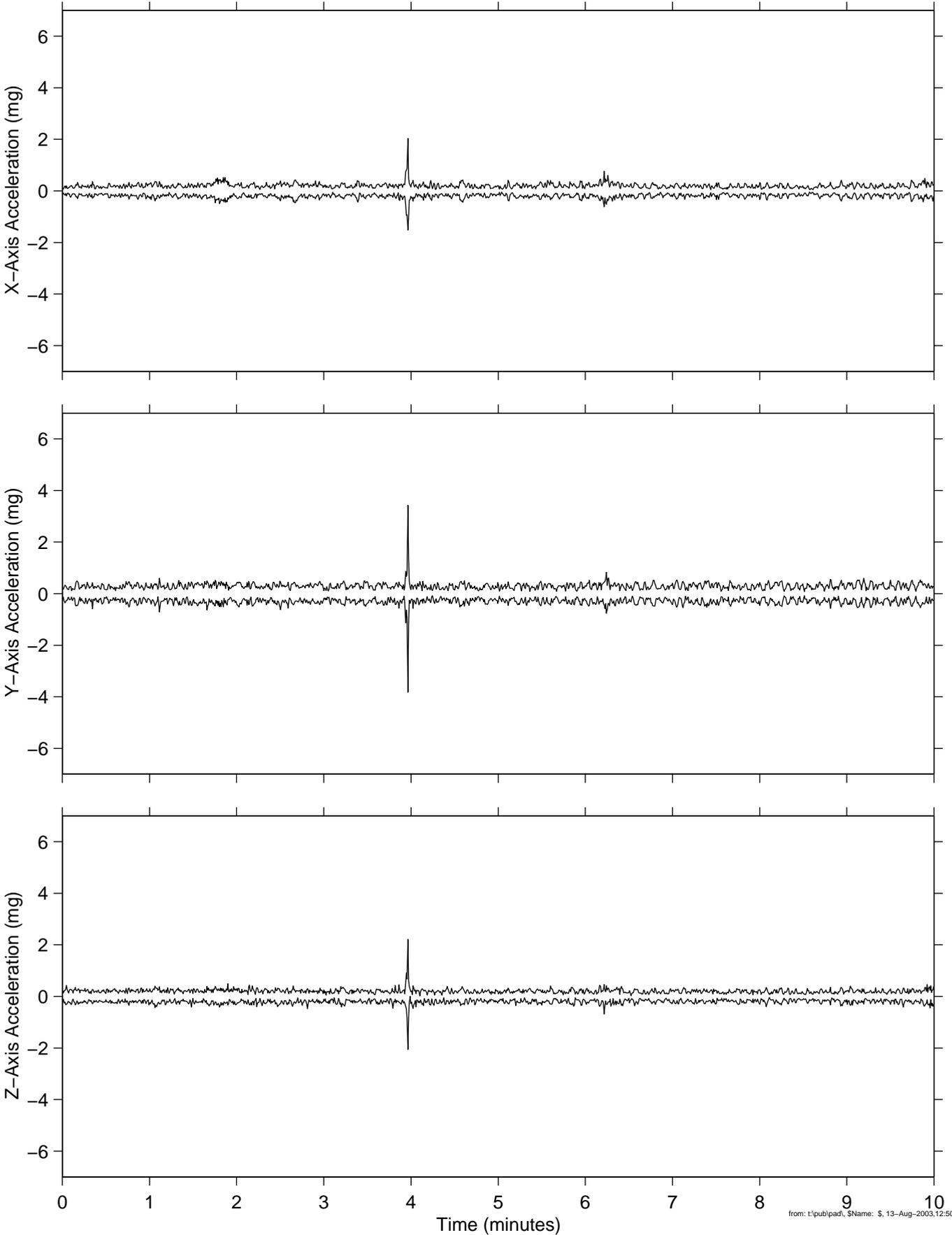


SAMS2, 121f08, LAB1S3, MSG, Ceiling Plate A2-A3, 25.0 Hz (62.5 s/sec)
Start GMT 01-October-2002, 274/20:00:00.004

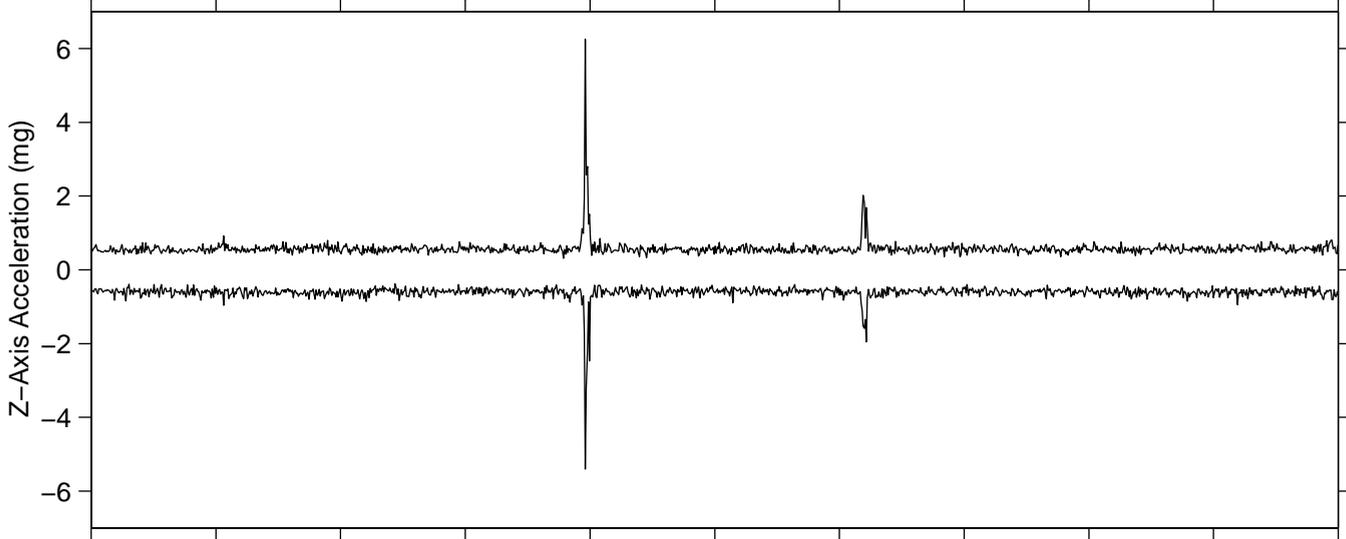
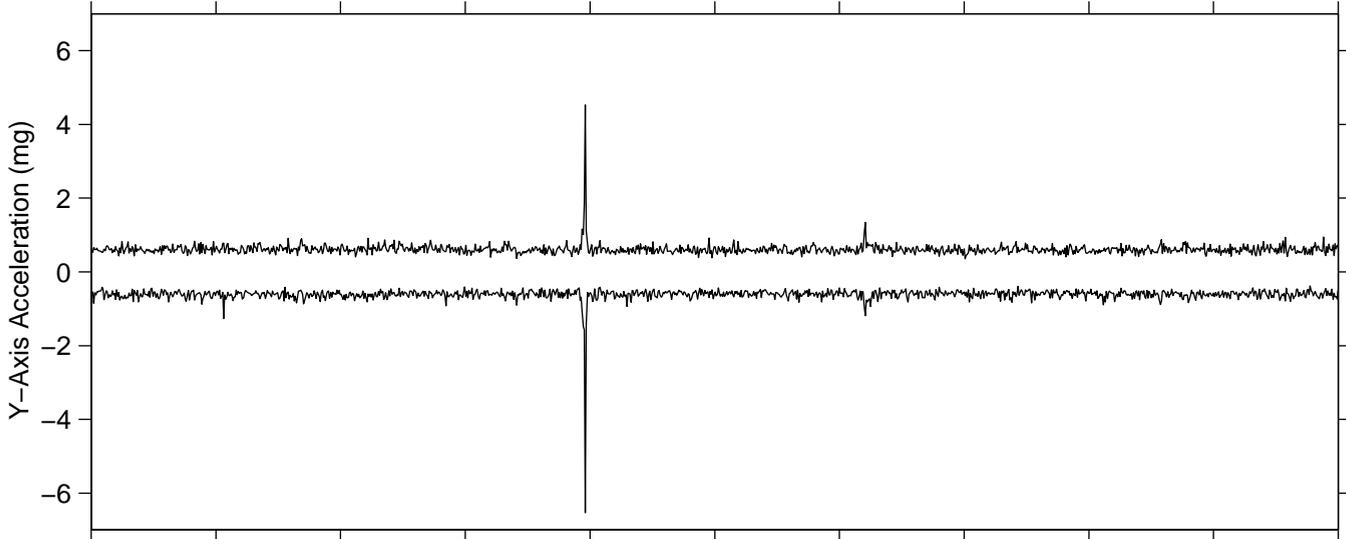
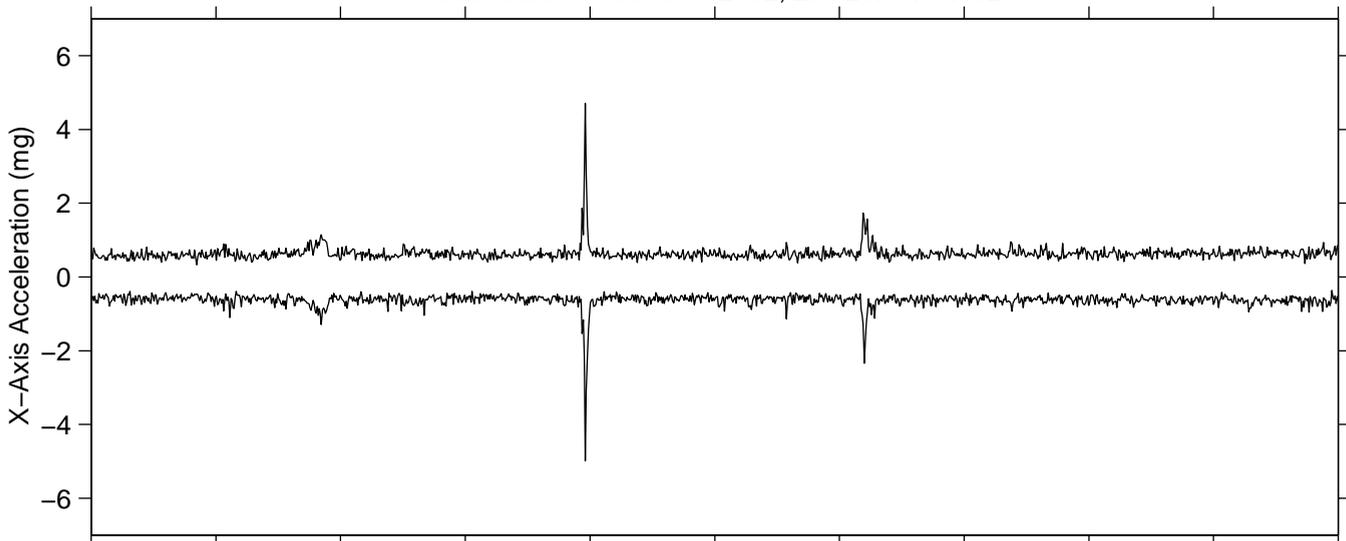




Start GMT 01-October-2002, 274/20:40:00.015



Start GMT 01-October-2002, 274/20:40:00.002



Time (minutes)