

1. INTRODUCTION

At GMT 2026-02-19, 050/00:57, the International Space Station (ISS) was to begin about an 8.5-minute reboost using the Progress 93P thrusters. Figure 1 shows the visiting vehicles' layout updated as of around this time frame with the Progress 93P vehicle as it was docked with its thrusters facing aft, putting thrust and the necessary orbital mechanics into play so as to speed up the ISS in its direction of flight, in direct opposition to its velocity vector. The thrusters' directional acceleration (increase in velocity), resulted in an altitude gain of ~1.62 km. An intended ΔV metric of 0.95 m/s for the space station was predicted.

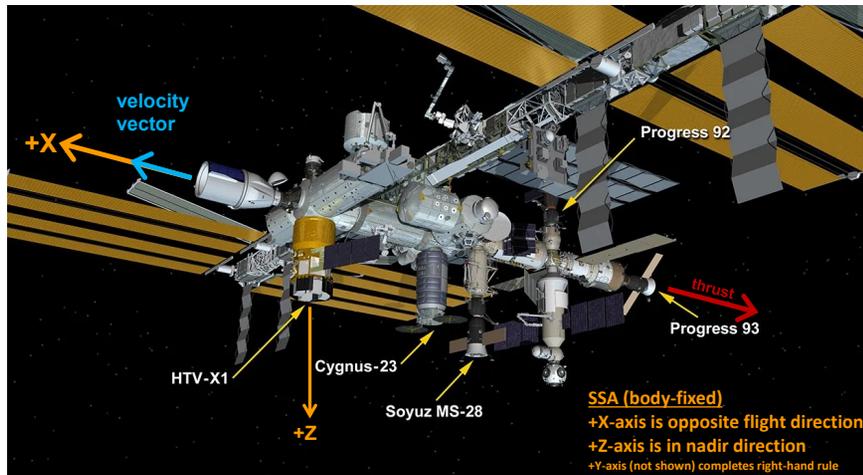


Fig. 1: Progress 93P's Location and Alignment during Reboost.

2. QUALIFY

The information shown in Figure 2 on page 3 was calculated from Space Acceleration Measurement System (SAMS) sensor 121f02 measurements acquired in the Columbus (COL) module, with the sensor mounted at the starboard endcone. This color spectrogram focuses on the structural mode regime below 6 Hz. Russian Segment attitude control thrusters, which routinely produce increased low-frequency excitation (primarily below 2 Hz) in the hours leading up to and following a reboost,

were somewhat active from GMT 2026-02-18 00:07 through 2026-02-19 01:52. This sporadic activity is visible across the spectrogram span as intermittent (red) excitation as those impulsive acceleration stimuli give way to structural response.

We see the clear signature of an approximately 11-minute reboost (thruster firing) event beginning shortly after 00:57 and prominently annotated with the large vertical "REBOOST" text. During the reboost event, we attribute the marked structural vibration increase to the Progress 93P thruster firings. These manifest as unmistakable horizontal streaks (structural/spectral peaks) that become significantly more energetic—shifting from yellowish to more orange-to-red on such spectrograms. The flare-up of these prominent horizontal spectral peaks is the signature of large space station appendages flexing, twisting, or bending at their natural frequencies in reaction to the thruster firing forces.

For science operations and general situational awareness, it is wise to be aware that the transient and vibratory environment (primarily below about 10 Hz or so) is impacted not only during the relatively brief reboost event itself (minutes in duration), but also during the much longer span of Russian Segment (RS) attitude control (hours in duration). The difference being that during the reboost itself, the dominant factor is the highly-directional step in the X-axis acceleration, while in the much longer attitude-control case, the dominant impact is the excitation of lower-frequency vibrational modes of large space station structures.

3. QUANTIFY

While the spectrogram in the previous "Qualify" section crudely shows acceleration magnitude on a color scale – actually, power spectral density magnitude – we now seek to better quantify the microgravity environment impact of the reboost event across multiple SAMS sensor heads distributed across all 3 main laboratories of the ISS with a more intuitive metric.

5-Second Interval Average Acceleration

Figure 3 on page 4 through Figure 9 on page 7 show 5-second interval average acceleration results computed from SAMS measurements. Note that across all 7 of the SAMS sensor heads, the tell-tale X-axis step started at GMT 00:57:16 (within a second or two) and had durations of approximately 10 minutes and 50 seconds. These discrepant ranges fall within the 5-second averaging window used to glean this information, independently for each sensor head. Information from flight controllers indicated that this reboost event would provide a space station

rigid body ΔV of 0.95 meters/second and the SAMS analysis indicated with red annotations in these interval average plots nearly match the predicted value. SAMS does not directly measure altitude, but flight controllers indicated that the ISS would gain ~1.62 km in altitude above the Earth as a result of this reboost activity.

closer to 0.2 mg, which may explain why the duration of the reboost had to be extended a bit. No clear reason known for "lower step magnitude value, therefore longer step duration" as of yet.

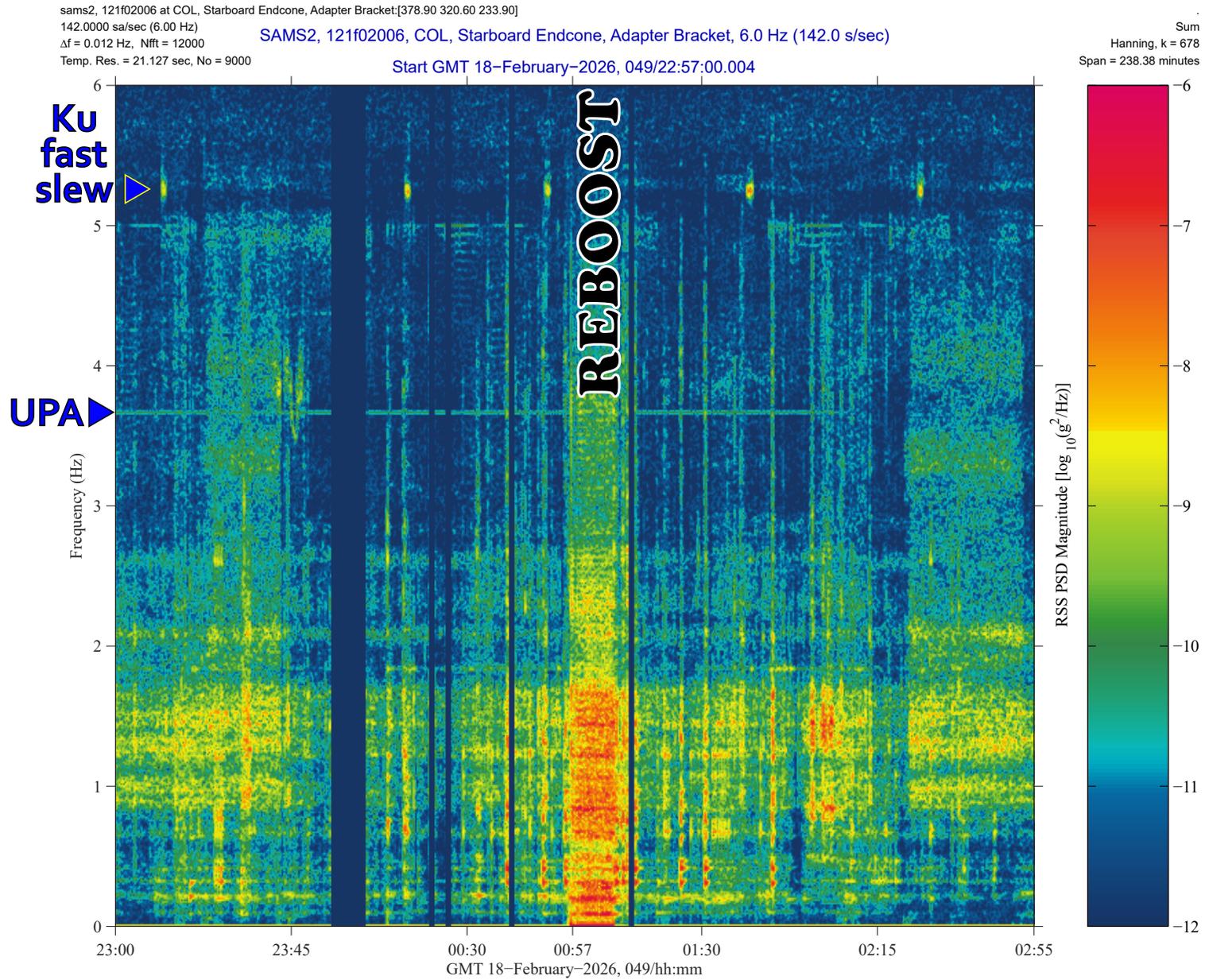
Table 1. **+X-axis Steps (mg)** During the Reboost Event for 7 SAMS Sensors.

Sensor Rack	Sensor	Step (mg)	TIG (hh:mm:ss)	Duration (mm:ss)	DeltaV (m/s)
LAB1S2 (MSG)	es20	0.149	00:57:17	10:49	0.95
JPM1F6 (ER4)	es19	0.150	00:57:17	10:51	0.96
LAB1O4 (ER6)	es18	0.149	00:57:17	10:49	0.95
LAB1O1 (ER2)	121f03	0.148	00:57:16	10:51	0.95
COL1A3 (EPM)	121f08	0.148	00:57:16	10:49	0.94
JPM1F1 (ER5)	121f05	0.148	00:57:16	10:49	0.94
COL Endcone	121f02	0.148	00:57:16	10:49	0.94
Average		0.149	00:57:16	10:50	0.95

Note that interval averaging effectively low-pass filters the data, which emphasizes the acceleration step that occurs on the X-axis during a reboost. Also note that we inverted the polarity of each axis of the SAMS plots owing to a polarity issue inherent in SAMS signal handling. A somewhat crude quantification of the reboost as measured by these distributed SAMS sensors is also given in Table 1 – expectedly consistent response levels as measured by SAMS throughout the ISS as such low-frequency dynamic events tend to be more "global" events.

4. CONCLUSION

SAMS measurements from seven distributed sensor heads across the U.S. Lab, JEM, and Columbus modules were analyzed for the Progress 93P reboost on GMT 2026-02-19. Using 5-second interval averages, all sensors show a clear rigid-body acceleration step primarily on the ISS +X axis beginning near GMT 00:57:16 and lasting approximately 10 minutes and 50 seconds, with a mean step magnitude of about 0.149 mg. Integrating the measured +X acceleration over the burn duration yields an empirical ΔV of approximately 0.95 m/s, in close agreement with the predicted value. It might be worth noting that the mean value is typically a bit



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Fig. 2: ~4-Hour, 6 Hz Spectrogram shows Progress 93P Reboost on GMT 2026-02-19, SAMS Sensor 121f02 on COL Endcone.

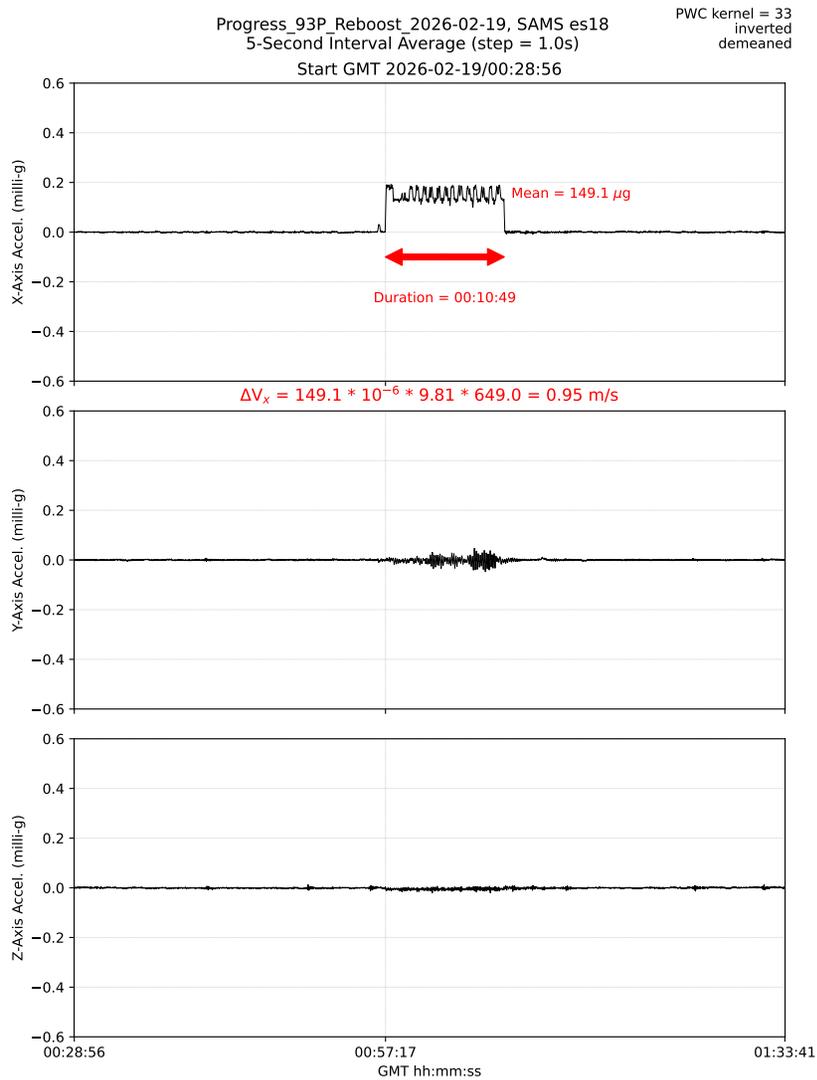


Fig. 3: 5-sec interval average for SAMS es18 sensor in the LAB.

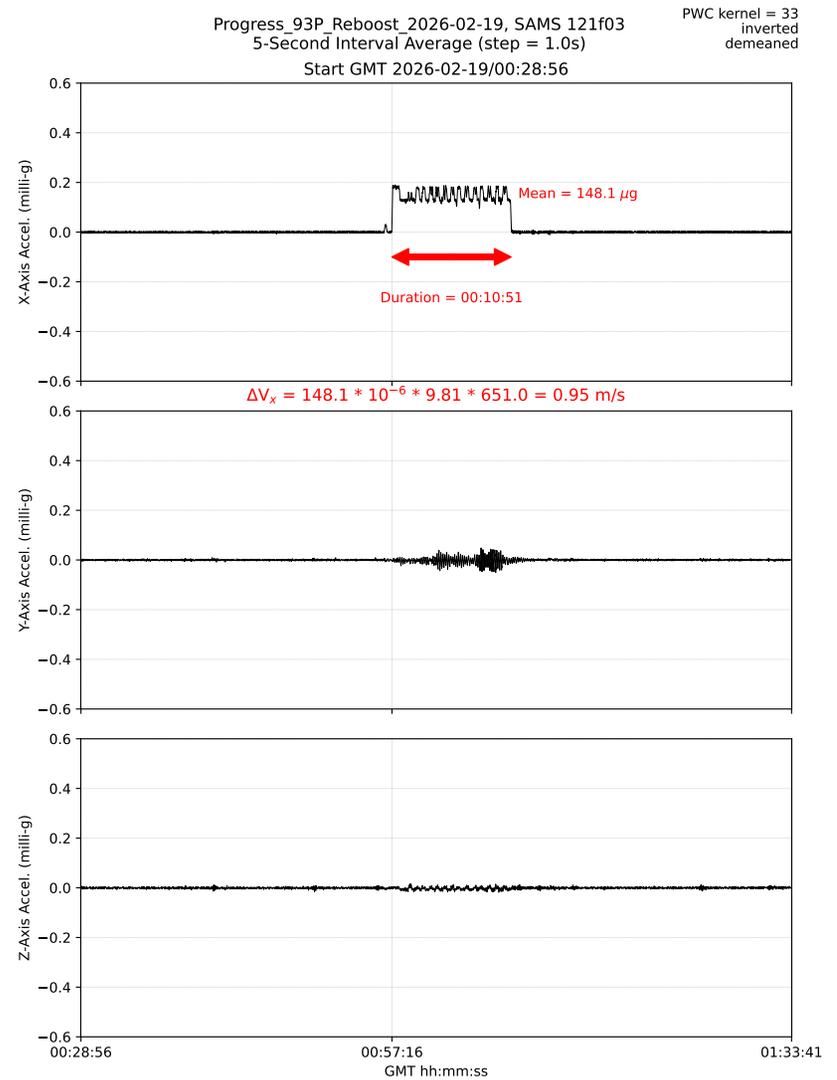


Fig. 4: 5-sec interval average for SAMS 121f03 sensor in the LAB.

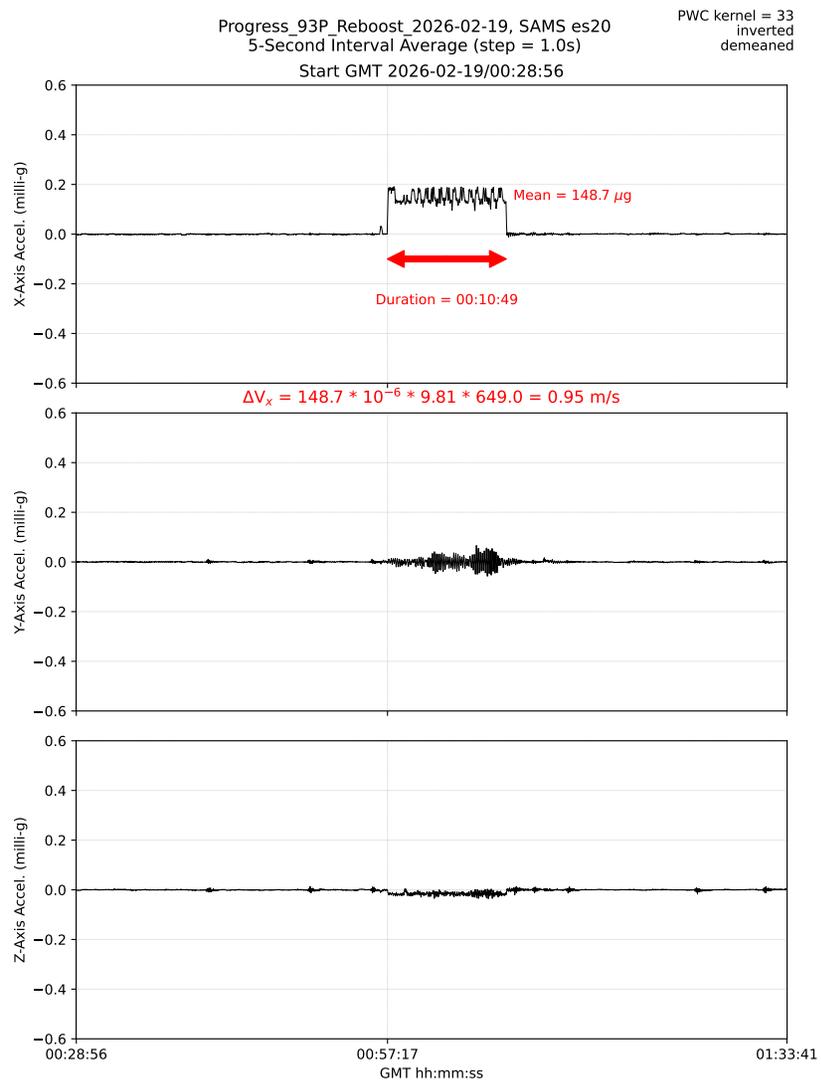


Fig. 5: 5-sec interval average for SAMS es20 sensor in the LAB.

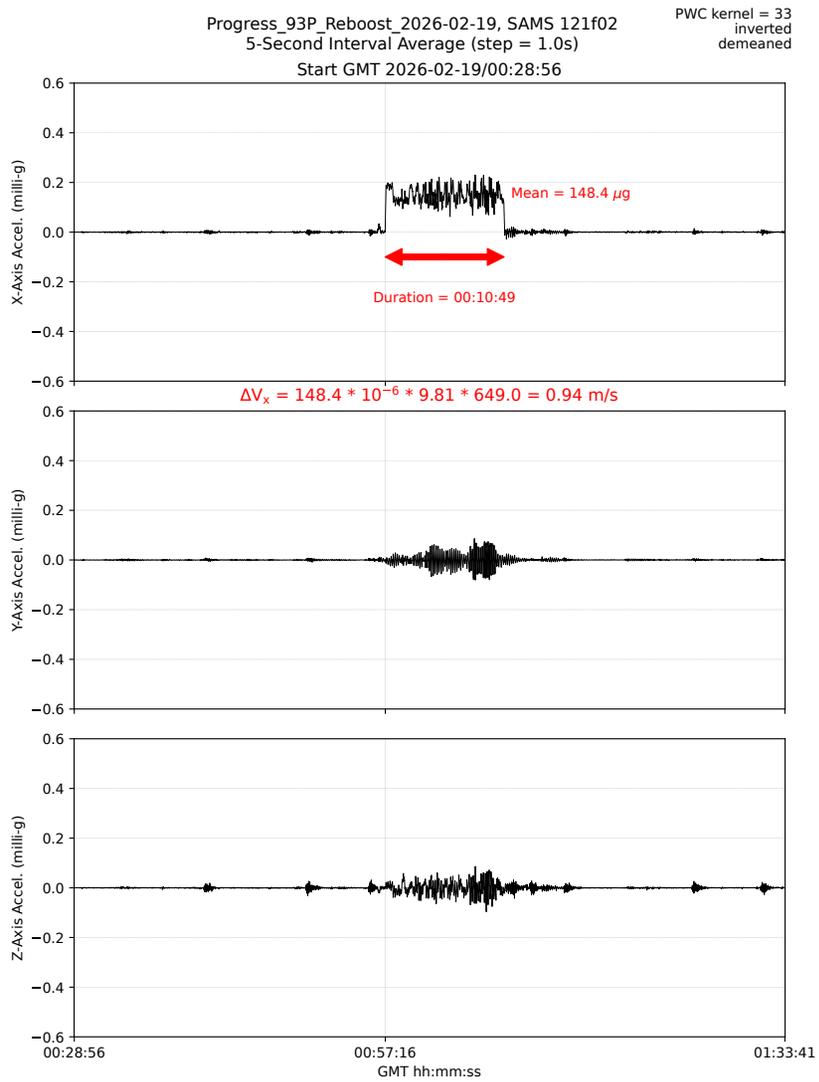


Fig. 6: 5-sec interval average for SAMS 121f02 sensor in the COL on Endcone.

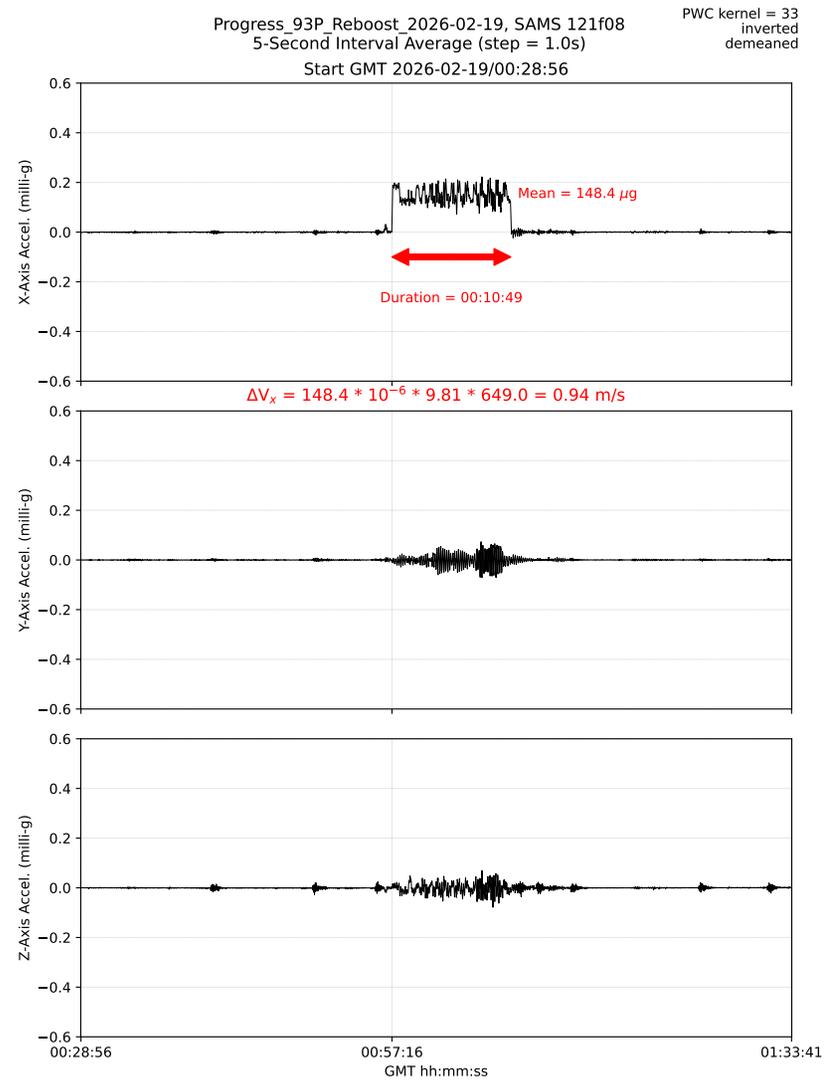


Fig. 7: 5-sec interval average for SAMS 121f08 sensor in the COL.

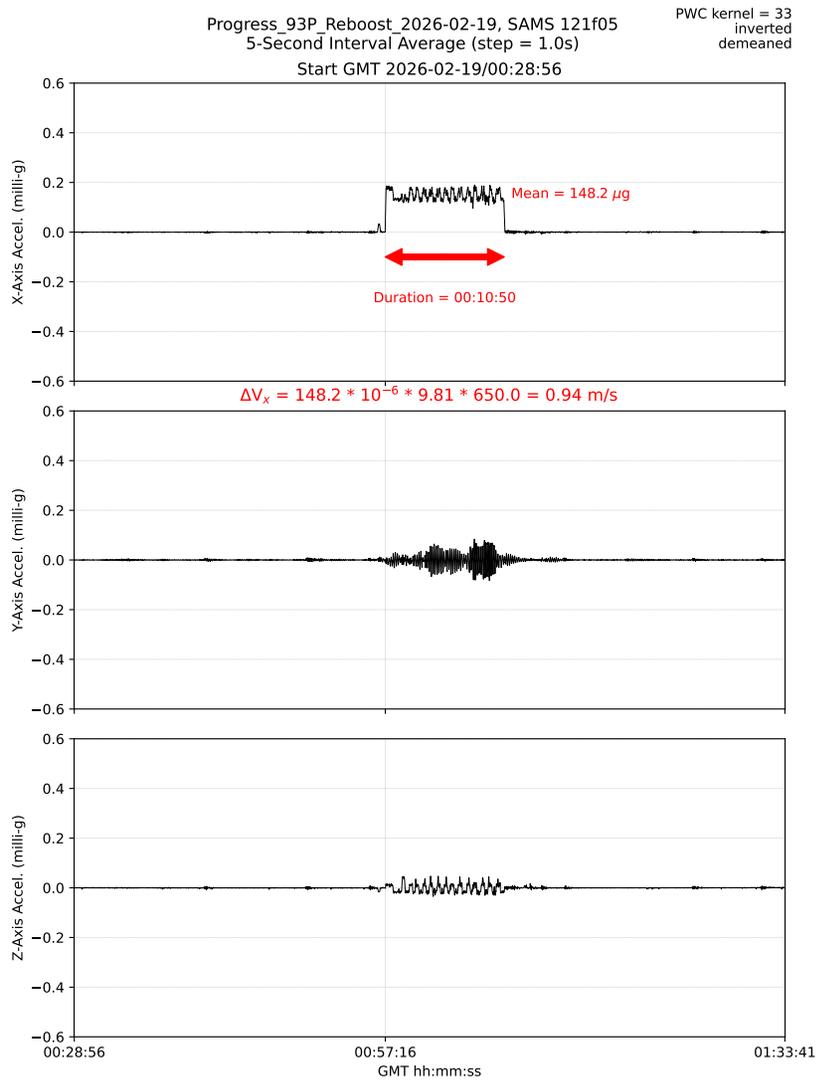


Fig. 8: 5-sec interval average for SAMS 121f05 sensor in the JEM.

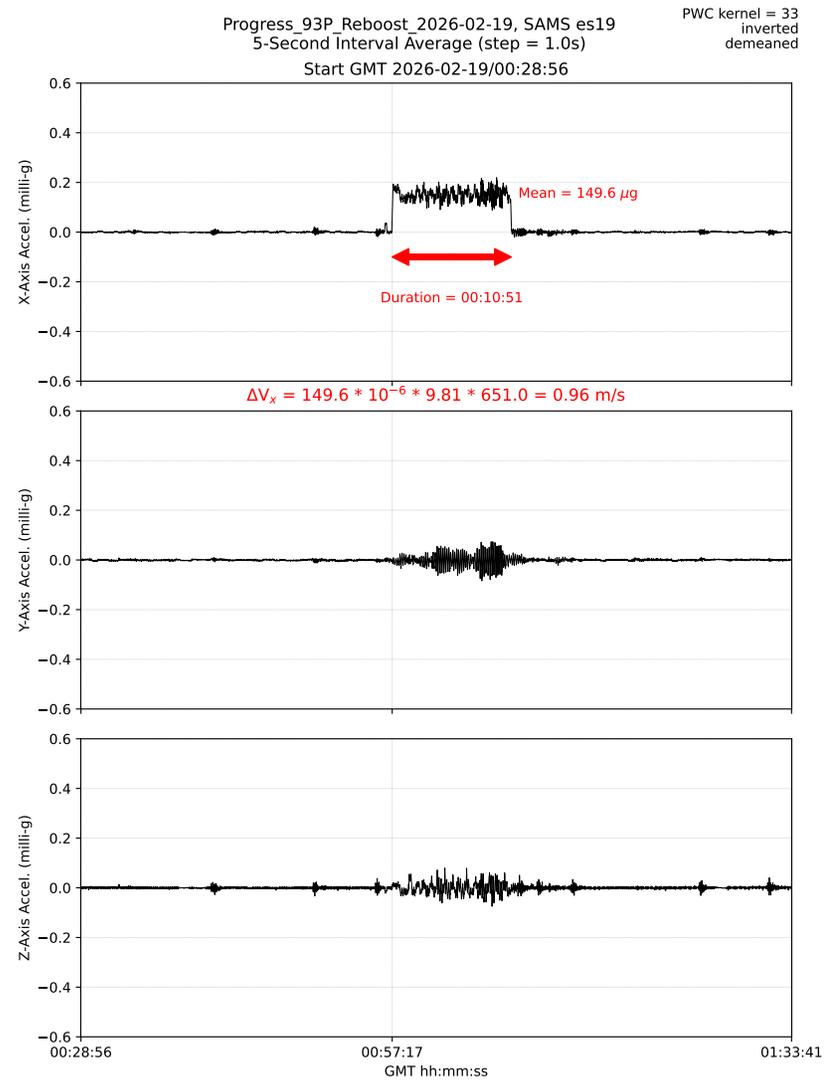


Fig. 9: 5-sec interval average for SAMS es19 sensor in the LAB.