1. Introduction

On GMT 2026-04-16 (Day 106), the International Space Station (ISS) underwent a reboost using the docked Progress 93P vehicle. Based on results computed from measurements by seven Space Acceleration Measurement System (SAMS) sensor heads, the reboost produced a clear station-wide $+X$ rigid-body acceleration step beginning near GMT 02:34:18 and lasting about 4m 48s. Across the distributed SAMS sensor heads in the U.S. Laboratory, Japanese Experiment Module, and Columbus module, the measured $+X$ step clustered tightly around 87 μg, which corresponds to an empirical ΔV of about 0.25 m/s. Flight controllers cited a planned TIG of 02:34:00 and a planned duration of 5m 3s and ended up reporting a ΔV of 0.24 m/s.

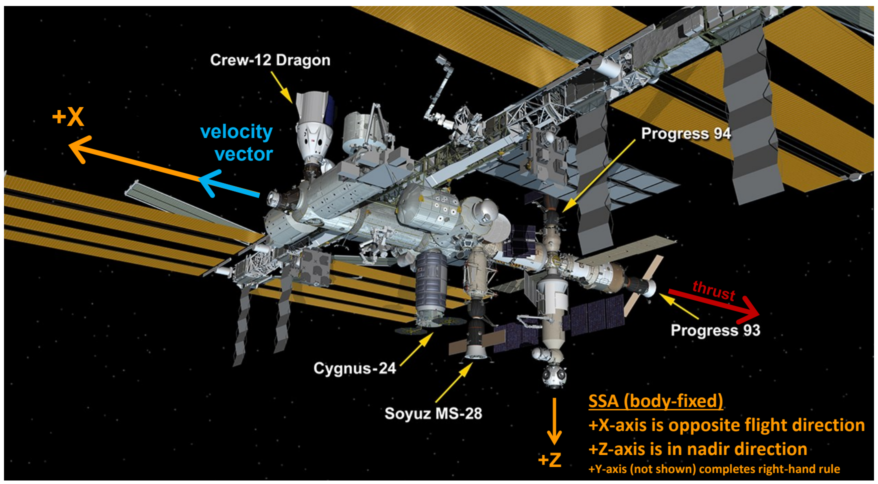

Fig. 1: Progress 93P's Location and Alignment during Reboost.

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 in the hours surrounding a reboost, were active from GMT 2026-04-16 01:43 through 2026-04-16 03:05. This broader activity is visible as intermittent, impulse-driven low-frequency excitation bracketing the main event.

We also see the clear signature of the Progress 93P reboost beginning near GMT 02:34:18. During the reboost interval, the spectrogram shows a marked increase in structural vibration energy, with horizontal streaks corresponding to natural-frequency response of large ISS structures. The Progress' thruster firings do not merely produce a local disturbance near the Russian segment; they excite station-wide structural response that is readily measured by SAMS troughout the space station's pressurized modules.

The strongest qualitative result is the exceptional station-wide coherence of the $+X$ step: despite being located in different parts of the station, all seven independent SAMS sensor heads registered the same $+X$ "kick" in close time alignment. This indicates a common, whole-body response of the station. Every one of the seven SAMS sensor heads shows the same abrupt increase in $+X$ acceleration at essentially the same time, with only a small sensor-to-sensor spread in both onset time and step magnitude. The measured $+X$ step magnitudes span 87–88 μg, and the measured durations span 4m 46s to 4m 50s.

In the interval RMS figures discussed below, the $+X$ component dominates the event while the Y and Z components remain comparatively small, aside from secondary structural motion riding on top of the reboost event interval. Interim step-detail plots (not shown herein) showed a sharp rise into the step/plateau and a comparably sharp return toward baseline at thrust completion, which is exactly the signature expected for a reboost-driven rigid-body acceleration event.

3. Quantify

Figures 3–6 provide a straightforward way to quantify the reboost response seen by SAMS across the station. Together, these four figures present the seven 5-second interval-average acceleration plots, grouped where practical by common ISS module location: two LAB plots in Figure 3, the remaining LAB plot in Figure 4, two COL plots in Figure 5, and two JEM plots in Figure 6. Table 1 summarizes, for each sensor, the measured $+X$ step, the visually indicated event time, the measured burn duration, and the empirical ΔV reported directly on the plots. The $+X$ step values are reported in micro-g (μg) throughout this section.

The timing agreement across the seven sensors is tight: the indicated event time clusters around GMT 02:34:18, and the measured durations differ by only a few seconds from one sensor to the next. This consistency is what one would expect for a low-frequency, station-wide response to a reboost event given the temporal resolution of the derived interval-averaged quantity.

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

Sensor Rack	**Sensor**	**Step (μg)**	**TIG** (hh:mm:ss)	**Duration** (mm:ss)	**DeltaV** (m/s)
LAB1S2 (MSG)	es20	87	02:34:19	04:46	0.25
JPM1F6 (ER4)	es19	88	02:34:17	04:50	0.25
LAB1O4 (ER6)	es18	87	02:34:19	04:47	0.25
LAB1O1 (ER2)	121f03	87	02:34:16	04:49	0.25
COL1A3 (EPM)	121f08	87	02:34:19	04:47	0.25
JPM1F1 (ER5)	121f05	87	02:34:16	04:50	0.25
COL Endcone	121f02	87	02:34:19	04:46	0.24
Average		**87**	**02:34:18**	**04:48**	**0.25**

Note that interval averaging effectively low-pass filters the data and therefore emphasizes the rigid-body acceleration step that occurs primarily along the ISS $+X$ axis during such a reboost. In addition, each axis was inverted to correct for intrinsic SAMS transducer polarity so that the plotted directions align with the ISS body axes. Within the accuracy of the available figures, the distributed SAMS measurements are mutually consistent and provide a robust station-wide estimate of the event strength.

In general, an empirical reboost ΔV estimate is obtained from the discretized 5-second interval-average products by first identifying, for each sensor, the time span corresponding to the $+X$ burn plateau and then computing the mean $+X$ interval-average value over that span. That mean value, expressed in micro-g, is converted to $\mathrm{m/s^2}$ using standard gravity and multiplied by the measured burn duration in seconds. Here we treat the pre-burn baseline as sufficiently close to zero that the mean $+X$ level over the burn plateau can be used directly as the step magnitude. For sensor i, this is

$$\Delta V_i = \left(\frac{\Delta a_{x,i}}{10^6}\right) g \, \Delta t_{\mathrm{burn}},$$

where $\Delta a_{x,i}$ is the observed mean $+X$ level during the burn from the 5-second interval-average product, expressed in micro-g, $g = 9.81\,\mathrm{m/s^2}$, and Δt_{burn} is the measured burn duration in seconds. That gives one sensor-specific engineering estimate of the rigid-body ΔV. The station-wide value quoted here is then formed as the simple arithmetic average of those seven sensor-specific ΔV estimates.

4. CONCLUSION

SAMS measurements from seven distributed sensor heads across the U.S. Lab, JEM, and Columbus modules were reviewed for the Progress 93P reboost on GMT 2026-04-16. The available interval-average PDFs show a clear, coherent $+X$ acceleration step across the station beginning near GMT 02:34:18. The mean measured step magnitude is about 87 μg, the mean measured duration is about 4m 48s, and the corresponding empirical ΔV is about 0.25 m/s.

The Columbus endcone 121f02 spectrogram adds useful operational context by showing that the reboost occurred within a broader interval of Russian Segment attitude-control activity from GMT 01:43 to 03:05, while still standing out as a distinct, stronger event. Together, the spectrogram and the interval-average plots show that this reboost was a strong, rigid-body/global event at these low frequencies, and that SAMS captured the response consistently across all three major ISS laboratory modules.

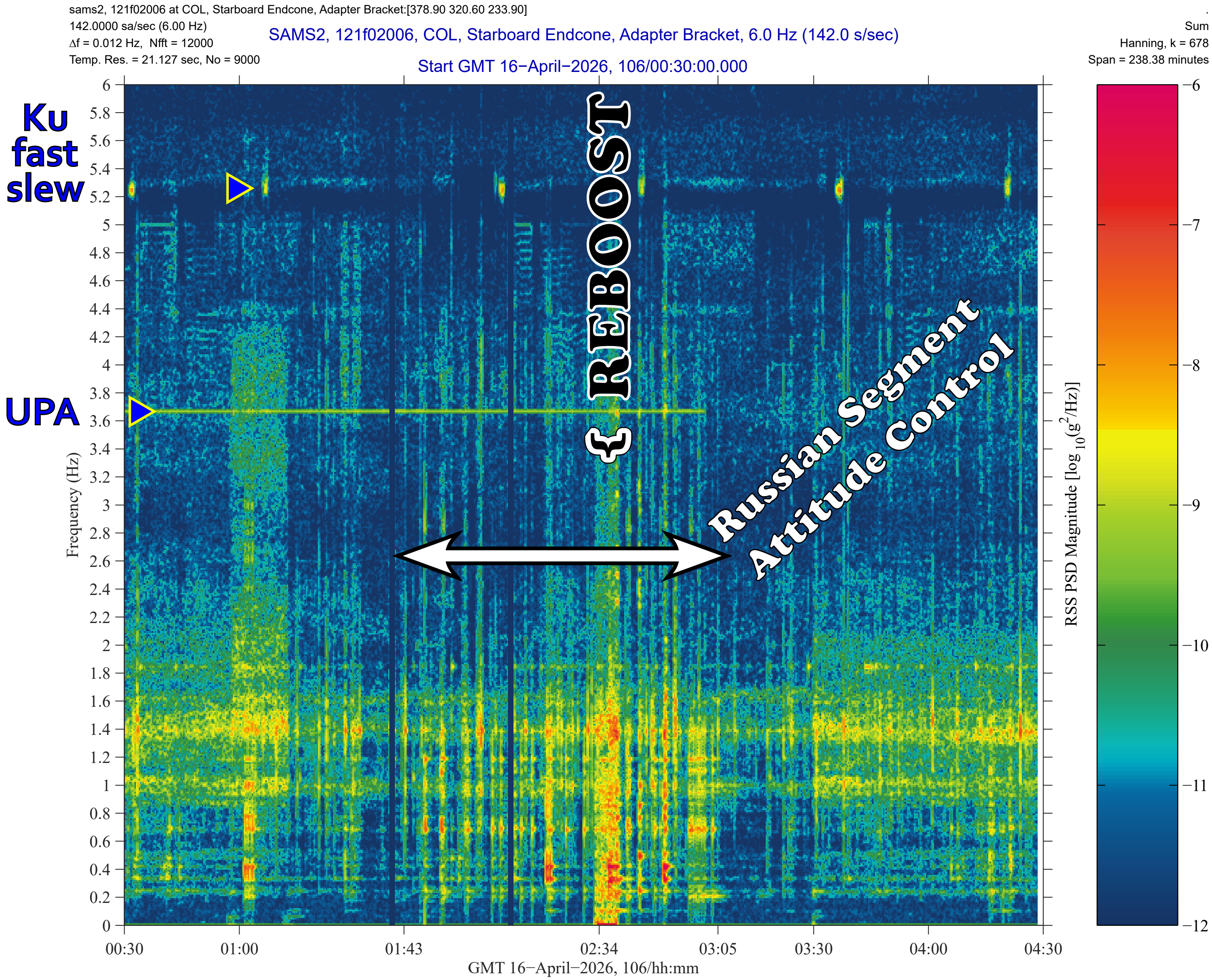

Fig. 2: ~4-hour, 6 Hz spectrogram shows Progress 93P reboost on GMT 2026-04-16, **SAMS Sensor 121f02 on COL Endcone.**

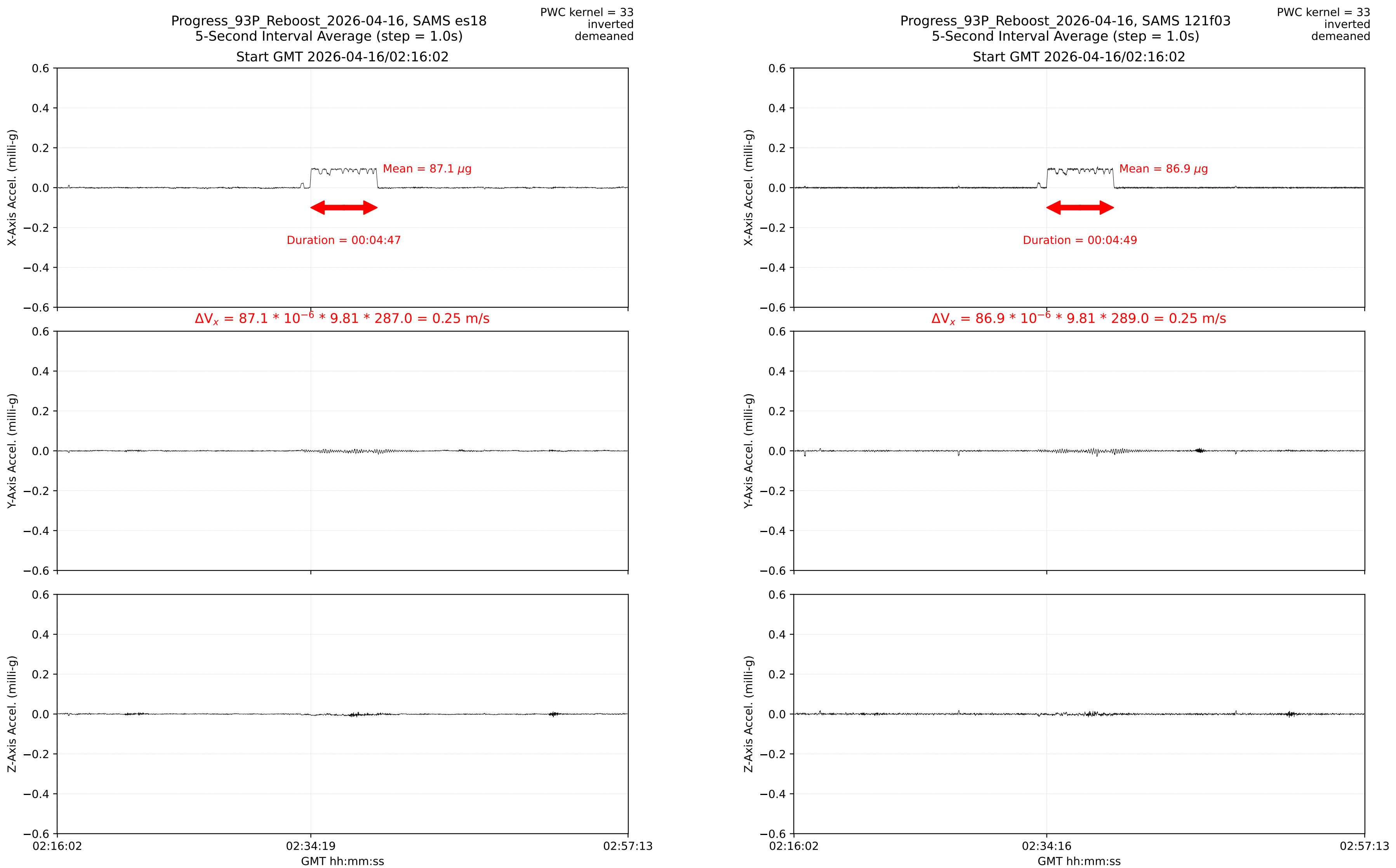

Fig. 3: 5-sec interval-average plots for two LAB-located SAMS sensors: (**left**) es18 at LAB1O4 (ER6) and (**right**) 121f03 at LAB1O1 (ER2).

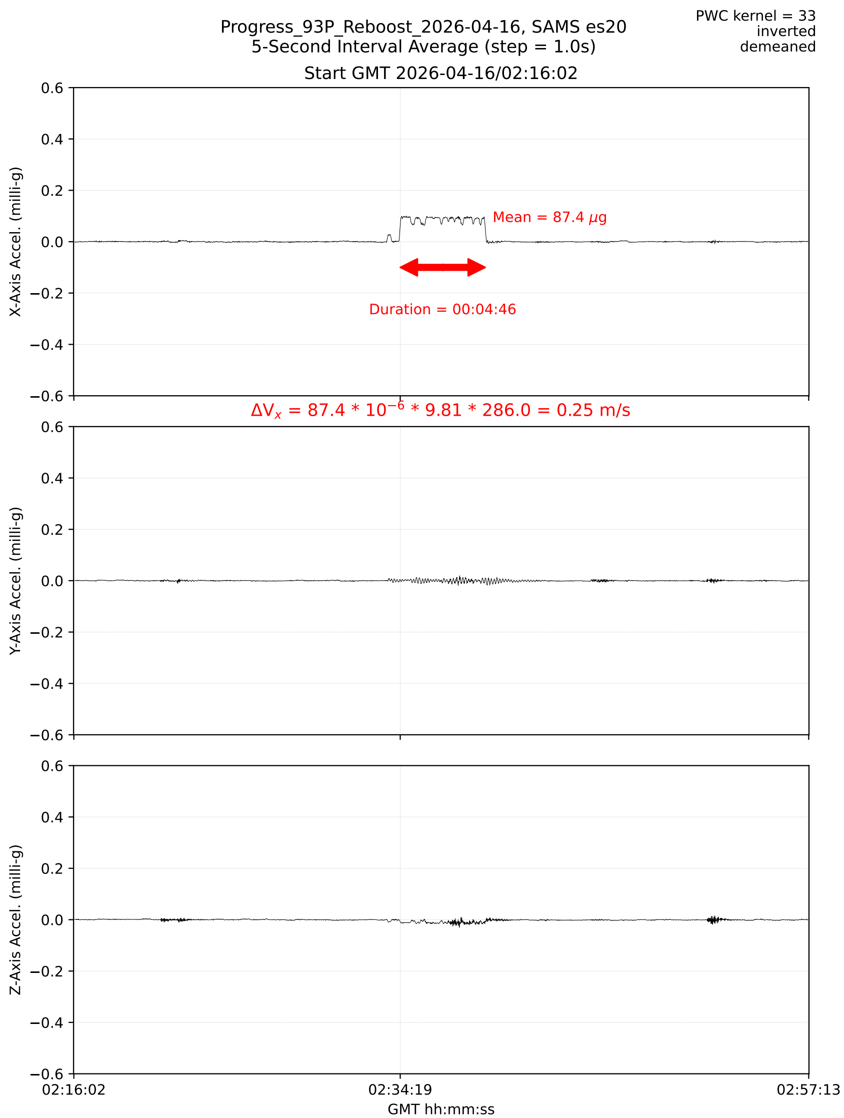

Fig. 4: 5-sec interval-average plot for the third LAB-located SAMS sensor, es20 at LAB1S2 (MSG).

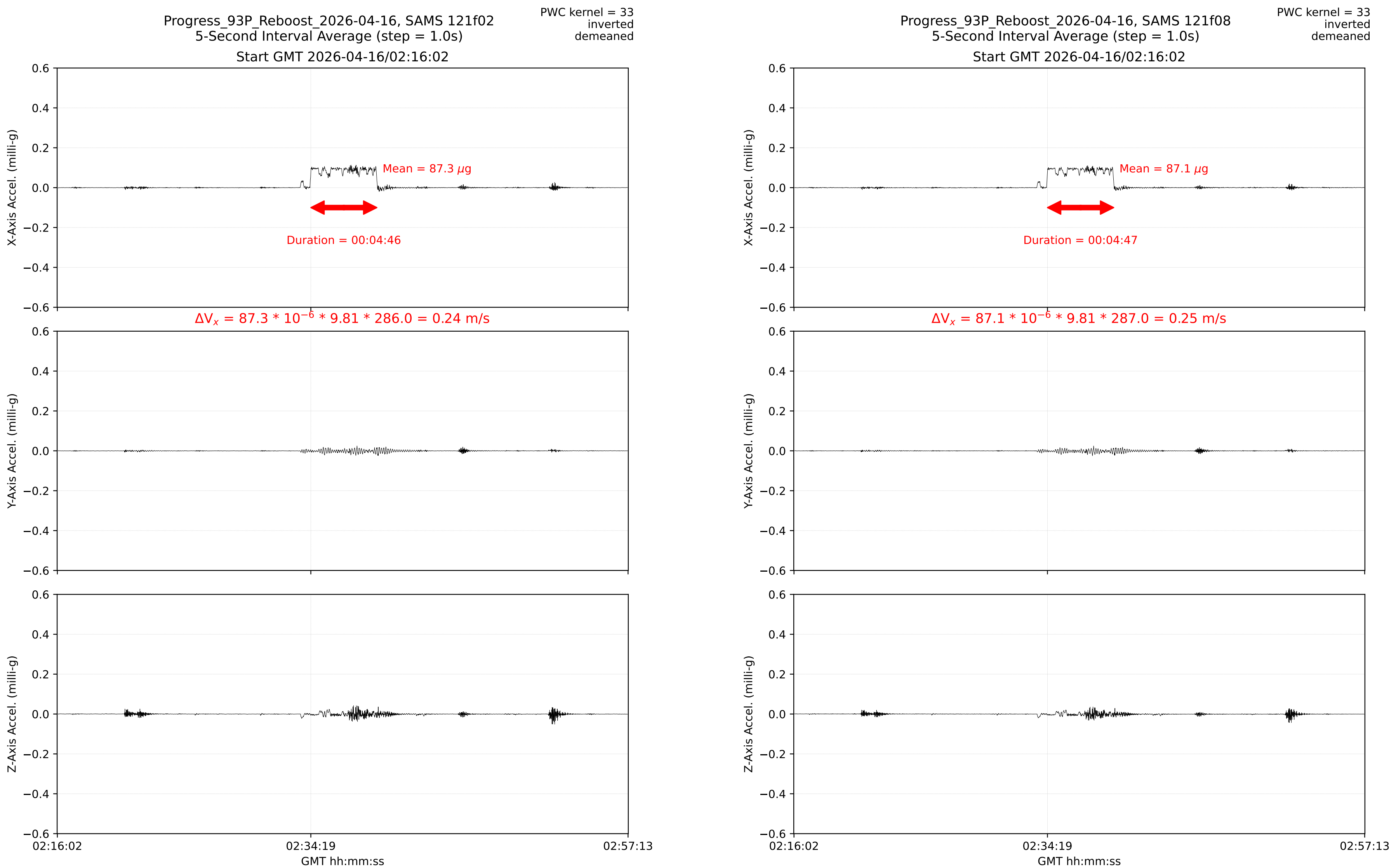

Fig. 5: 5-sec interval-average plots for the two COL-located SAMS sensors: (**left**) 121f02 on the COL Endcone and (**right**) 121f08 at COL1A3 (EPM).

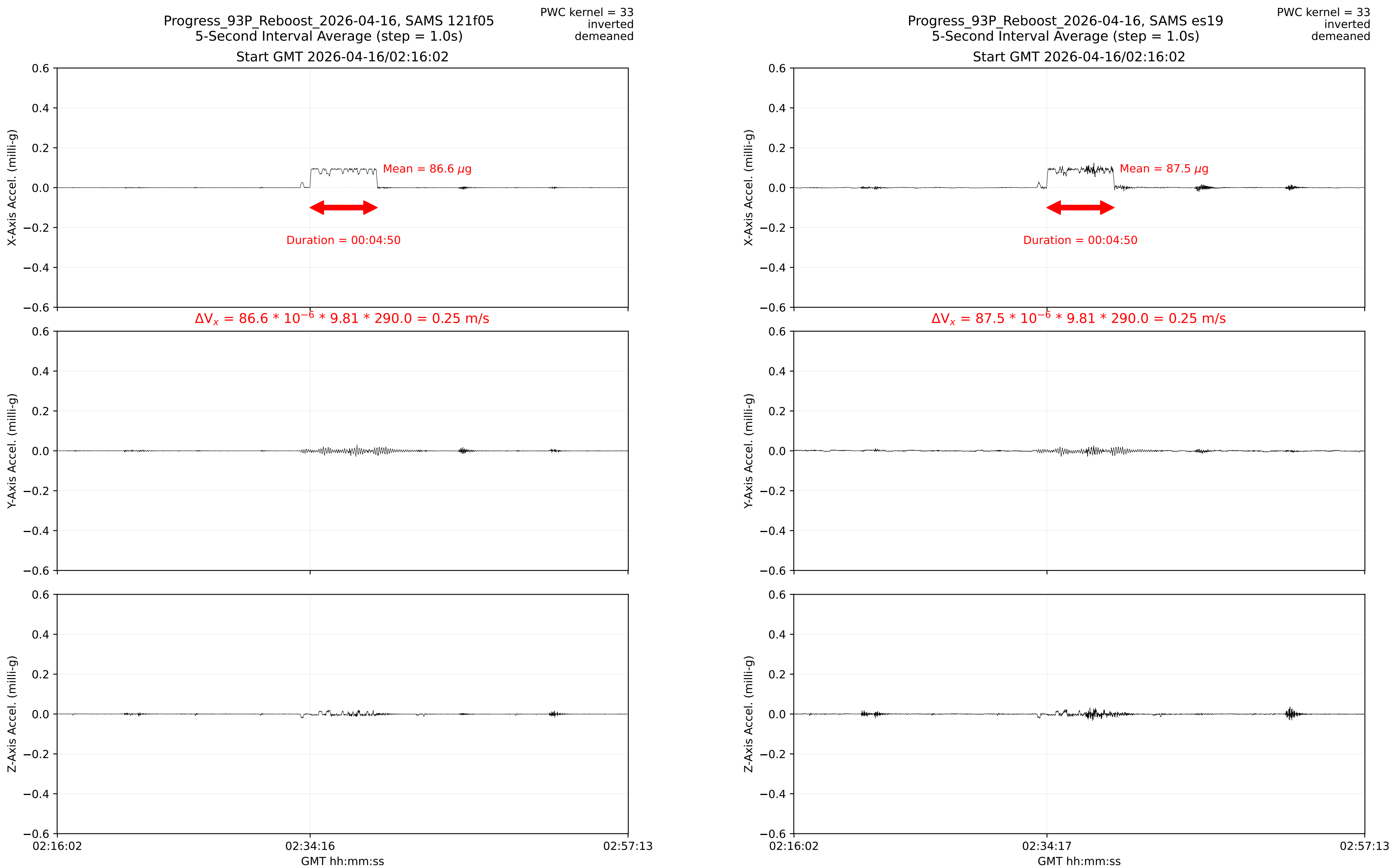

Fig. 6: 5-sec interval-average plots for the two JEM-located SAMS sensors: (**left**) 121f05 at JPM1F1 (ER5) and (**right**) es19 at JPM1F6 (ER4).