

Summary

SAMS (Space Acceleration Measurement System) measurements on GMT 2026-06-30 reveal a broad, station-wide increase in the low-frequency vibratory environment aboard the International Space Station (ISS) during the Extra-Vehicular Activity (EVA) interval – nearly 10 hours of activity. The 200 Hz spectrogram for SAMS 121f02 at the COL Starboard Endcone provides full measurement passband context: although narrowband spectral lines and other background features persist across the spectrum, the EVA-related disturbance appears primarily as a broadband elevation concentrated below approximately 10 Hz and exciting large structures with vibrations below about 2 Hz.

The 6 Hz spectrogram from the same sensor resolves the ISS structural-mode regime with greater clarity. It distinctly captures the crew-wake transition (marked by a sharp rise in activity) and the stronger, more sustained low-frequency response throughout the EVA operational window.

Daily acceleration root-mean-square (RMS) summaries in the sub-2 Hz band confirm that the perturbation was not confined to the Columbus module. Multiple SAMS sensor heads distributed across the ISS exhibit a correlated rise in root-sum-square (RSS) acceleration RMS on the EVA day. The previous-day comparison (2026-06-29) supplies representative context: while that day featured intermittent elevated [exercise] episodes, it lacked the prolonged, sustained, coherent, day-scale interval observed on 2026-06-30.

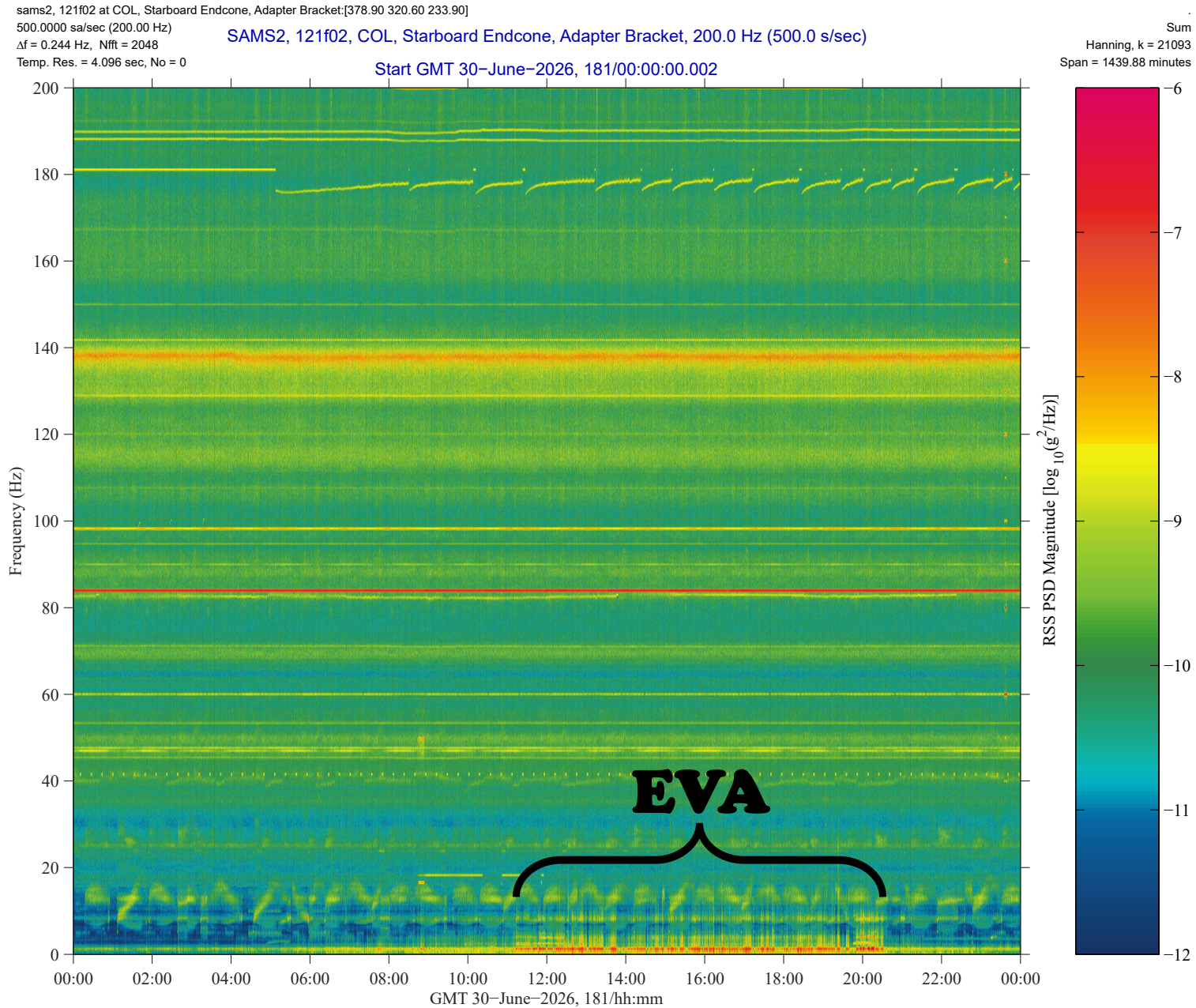
Finally, the per-axis RMS decomposition for 121f02 demonstrates some directionality. The EVA impact was carried predominantly by the X-axis, with significant additional contribution from the Z-axis; the Y-axis remained comparatively quiescent.

Figure Notes

The figures are deliberately sequenced from broad spectral context, through detailed structural-mode analysis, to station-wide RMS impact, a previous-day baseline comparison, and finally a directional per-axis view at the Columbus endcone sensor. This progression highlights the core engineering interpretation: the EVA vibrational signature is strongest in the low-frequency structural resonance regime, propagates visibly across distributed ISS sensor locations (indicating a global station-wide effect), and exhibits pronounced directional character (primarily X/Z) at SAMS 121f02.

Key Observations and Interpretation

- The concentration of elevated energy below 10 Hz indicates excitation of large-scale ISS structural modes rather than localized high-frequency equipment noise.
- The high degree of coherence across widely separated sensors reinforces expected mechanical coupling through the ISS primary structure and truss, consistent with crew movements, airlock operations, or EVA support activities being transmitted internally.
- Characterization of such transient low-frequency events is informative for microgravity research payloads or technology developers, as these accelerations can couple into long-timescale disturbances affecting fluid dynamics, materials processing, and other sensitivities.



SAMS

MODIFIED JULY 1, 2026

Figure 1. SAMS 121f02 at the COL Starboard Endcone, 200 Hz spectrogram for GMT 2026-06-30. The full-band view shows that the visually dominant EVA-related broadband increase is concentrated primarily below about 10 Hz, even though persistent narrowband features are present elsewhere in the band.

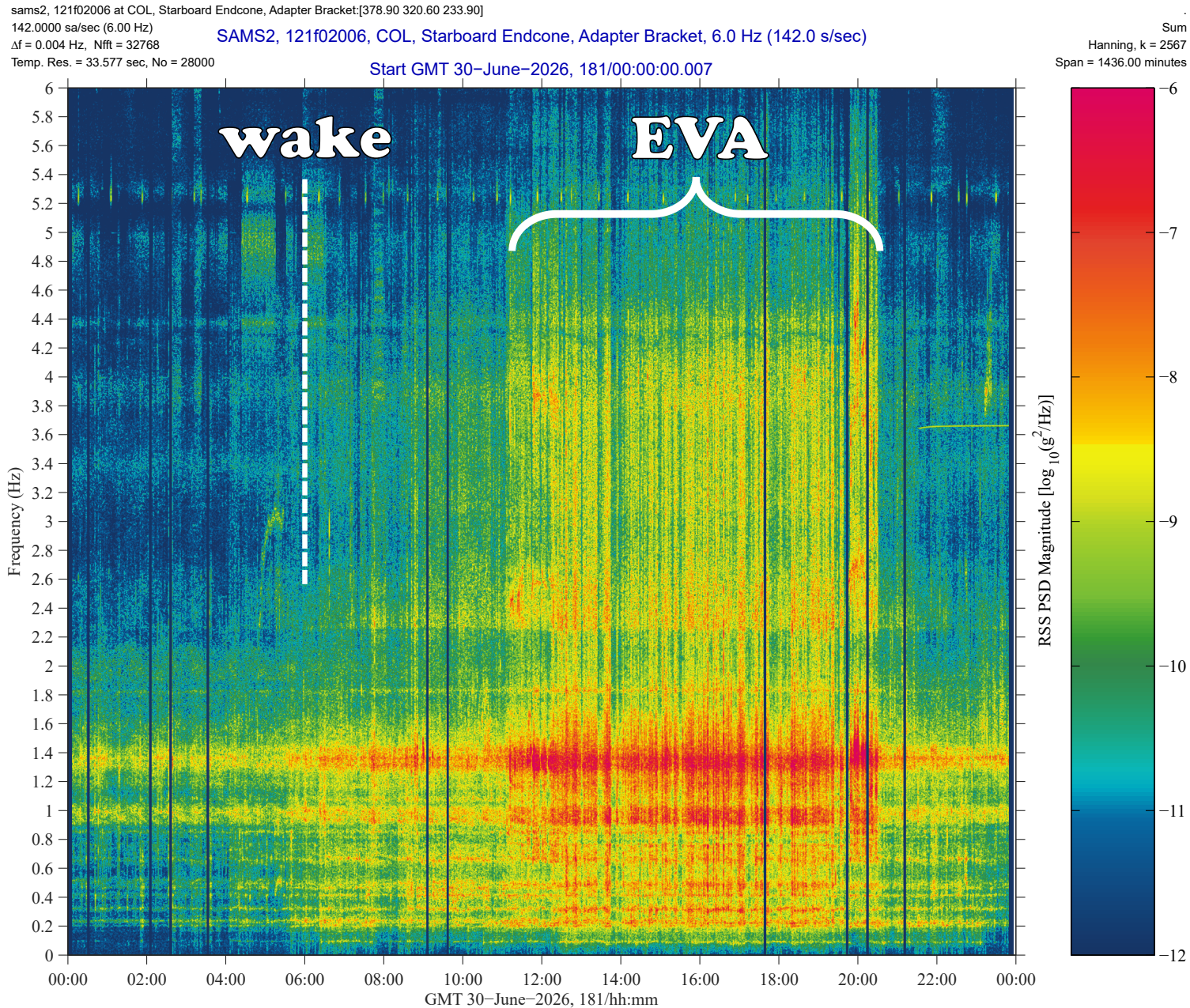


Figure 2. SAMS 121f02 at the COL Starboard Endcone, 6 Hz spectrogram for GMT 2026-06-30. The expanded low-frequency view shows better detail in the ISS structural-mode regime, including the crew-wake transition and the stronger sustained response associated with the EVA interval.

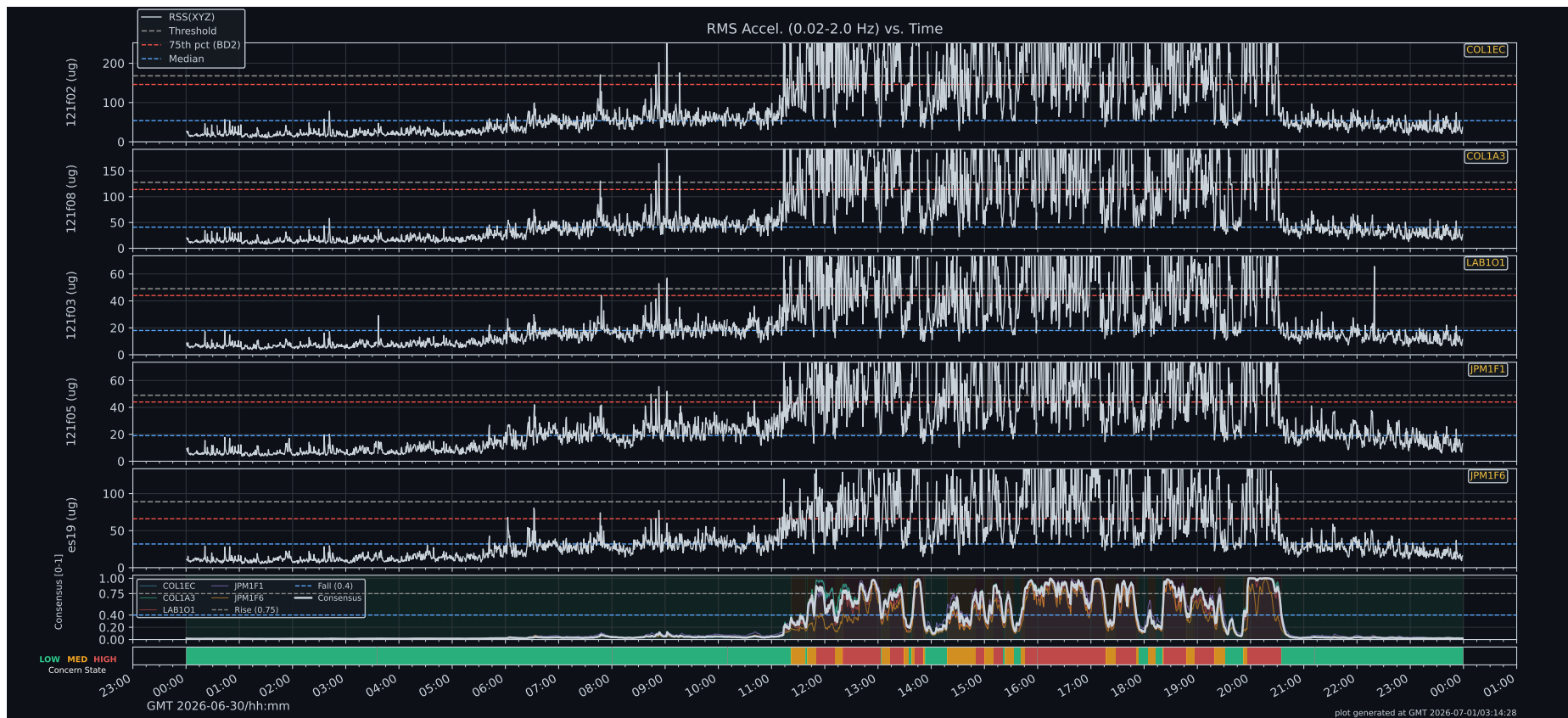


Figure 3. Daily RSS acceleration RMS below 2 Hz for five distributed SAMS sensor heads on GMT 2026-06-30. The EVA day shows a broad, station-wide rise in low-frequency RMS response, with the sensor-head traces moving together strongly enough to produce an extended high-consensus interval.



Figure 4. Daily RSS acceleration RMS below 2Hz for the same distributed SAMS sensor-head set on GMT 2026-06-29. This previous-day view provides comparison context: intermittent elevated activity is present, but it is more episodic and lacks the same sustained, coherent EVA-day interval seen on GMT 2026-06-30.

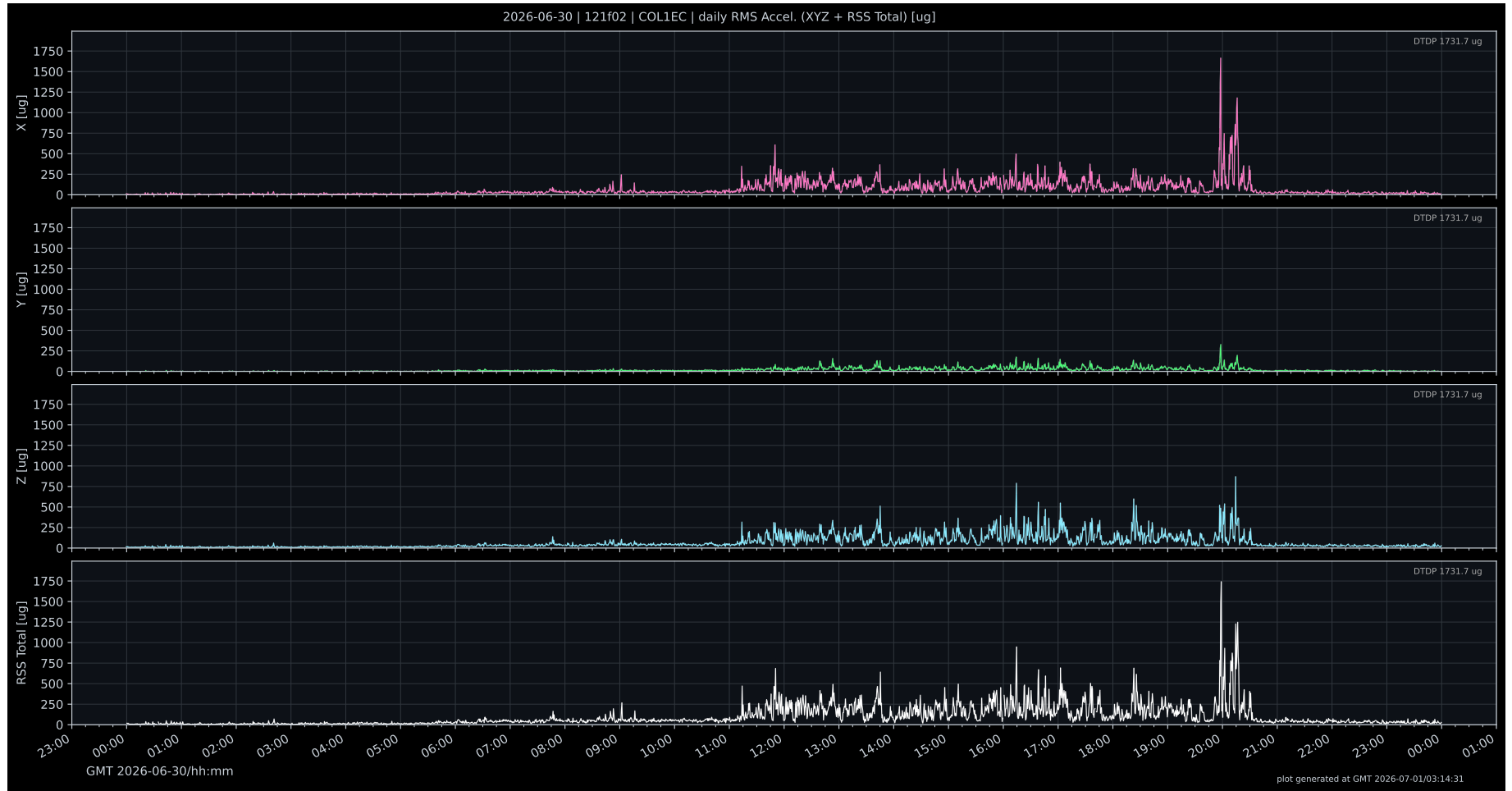


Figure 5. Per-axis + total accel. RMS for SAMS 121f02 at the COL Starboard Endcone on GMT 2026-06-30. The Columbus endcone sensor shows clear directionality during the EVA impact: the XZ-plane carries the largest response, and Y-axis remains comparatively smaller.