

1. INTRODUCTION

On GMT 2026-03-18, NASA astronauts Jessica Meir and Chris Williams completed U.S. spacewalk 94 aboard the International Space Station (ISS). The extravehicular activity (EVA) lasted about 7 hours and 2 minutes, beginning at about GMT 077/12:52 and ending at about GMT 19:54. According to NASA, the crew completed the primary objectives of preparing the 2A power channel, installing a solar-array modification kit, and routing a 2A power-system jumper cable in support of a future ISS Roll-Out Solar Array (IROSAs) installation; several get-ahead tasks were deferred to a later EVA[1]. A prior ISS handbook entry for EVA hatch operations is available at [GIPOC PIMS ISS Handbook — EVA Hatch Open/Close](#) and the PIMS handbook index also lists prior EVA-oriented crew vibration writeups including the pair of P6 IROSAs installation EVAs from June 2021[3], [4], [5], [2].

Every EVA imposes dynamic loads on the ISS through crew translation, push-off and landing events, body restraint interactions, tool use, and intermittent bangs or pings as hardware is manipulated and seated. Earlier EVA handbook entries emphasize that the resulting response is expressed most clearly in the lower-frequency structural-mode regime, with the strongest crew-induced effects primarily below about 2 Hz[4], [5]. The present document follows that same viewpoint. Here we use two complementary data products derived from SAMS measurements to characterize the March 18, 2026 EVA: a spectrogram from a Columbus-module sensor that highlights the frequency-time pattern of the event, and a five-sensor interval RMS summary in the 0.02–2.0 Hz band that shows how the response was distributed across the station.

The spectrogram discussed below was computed from SAMS sensor 121f02 located at the Columbus Starboard Endcone (adapter bracket). The RMS figure discussed below presents total RMS acceleration versus time for five SAMS sensors distributed across Columbus, the U.S. Laboratory, and JEM. Taken together, these figures show the EVA as an extended period of vigorous, crew-induced excitation of global ISS structural modes below 2 Hz, punctuated by short-duration transients that are consistent with discrete contact or tool-interaction events.

2. QUALIFY

Figure 1 shows a one-day spectrogram featuring the EVA day and focused on the lower-frequency portion of the vibratory environment. The plot was produced from SAMS sensor 121f02 in Columbus and displays RSS(X,Y,Z) power spectral

density magnitude on a logarithmic color scale, with frequency on the vertical axis and time on the horizontal axis. The processing parameters given on the figure show a frequency resolution of about $\Delta f = 0.009$ Hz using $N_{\text{fft}} = 16,384$ and a Hanning window with a temporal resolution of just over 115 seconds.

The most important visual feature is the more-or-less sustained excitation of structural response below about 2 Hz during the EVA work period. Relative to the quieter background before the EVA, energy becomes elevated over a broad low-frequency region, with especially persistent bands near roughly 1.0–1.4 Hz and additional activity extending through the surrounding sub-2 Hz structural-mode regime. This is consistent and expected with external crew motion exciting large ISS structural members, where the forcing is not narrowly tonal but instead a mixture of repeated body motions, reaction loads, and intermittent discrete impacts.

In addition to the broad low-frequency elevation, the spectrogram also shows brief, vertically-oriented transients and localized brightenings that likely correspond to more impulsive events: tool engagements, seatings, contact transitions, or sharper push-off/ landing exchanges. These do not define the event by themselves; rather, they ride on top of a broader interval of elevated structural response. That overall interval begins near the EVA start time around 12:52 GMT and remains visibly enhanced until near the reported conclusion at 19:54 GMT[1]. The response is therefore best described as a long-duration, crew-driven excitation period with superposed short-lived transients.

The WAKE, EVA, and SLEEP annotations overlaid on the spectrogram provide some context for daily crew milestones surrounding the event.

One additional feature visible in the figure is activity above 2 Hz, including a recurring band near approximately 3.7 Hz (the Urine Processing Assembly, UPA) and weaker structure at still higher frequencies. Those are not the focus of this document. For EVA characterization, the dominant lesson again holds: the most diagnostic signature is the global, elevated response of the ISS structural modes below 2 Hz, which notably intensifies during the EVA[4], [5].

3. QUANTIFY

While the spectrogram shows where the energy hits in time and frequency, Figure 2 provides a more intuitive measure of the event's magnitude by plotting total interval RMS acceleration in the 0.02–2.0 Hz band for five distributed SAMS sensors. This is the band most directly aligned with the global structural response seen in Figure 1 and in prior EVA handbook entries[4], [5].

All five sensors show the same gross temporal behavior. Before the EVA, levels are typical and relatively modest, though not perfectly quiet. Beginning near 13:00 GMT, the traces rise markedly and remain elevated for most of the EVA interval, before dropping back toward the pre-EVA background after about 20:00 GMT. That coherence across widely separated sensor locations is one of the clearest indicators that the disturbance is not local equipment activity but rather a station-wide structural response to crew operations outside the vehicle.

The same WAKE, EVA, and SLEEP annotations as seen in the Qualify section above, now on the RMS plot, confirm that this "global"/station-wide response is pronounced in the EVA interval within the crew day's other activities.

The Columbus sensors show the largest response. Sensor 121f02 at the Columbus Starboard Endcone exhibits the highest and most persistent low-frequency RMS levels, with sustained values commonly above its plotted threshold and with transient excursions exceeding approximately 200 μg . Sensor 121f08 at COL1A3 shows a similar but somewhat smaller pattern.

The U.S. Laboratory sensors 121f03 and 121f05 also respond clearly but at lower amplitude, while sensor es19 in JEM remains substantially affected yet generally below the Columbus maxima. This ordering shows the structural coupling to work being performed on the station's truss/power-channel hardware, with Columbus responding most strongly in this particular event.

The RMS traces also reveal the character of the EVA forcing. The response is not smooth or steady; instead it is highly intermittent, with bursts, dips, and sharp spikes embedded in an elevated envelope. That behavior matches what one would expect from EVA work: periods of translation or repositioning, pauses, renewed activity, and occasional sharper impacts or tool-driven interactions. In other words, the EVA signature in the 0.02–2.0 Hz band is best described as a prolonged interval of elevated structural excitation with superposed transient peaks, not as a single isolated event. See Table 1 for compact summary of relative responses from five-sensor RMS figure.

4. CONCLUSION

SAMS measurements from distributed ISS locations show that the GMT 2026-03-18 EVA was a clear, station-wide vibratory event in the global structural-mode regime. The spectrogram from Columbus demonstrates that the response is concentrated primarily below 2 Hz and is sustained for essentially the full EVA work interval. The 0.02–2.0 Hz interval RMS plots confirm that all five monitored

Table 1. Relative 0.02–2.0 Hz EVA Response on GMT 2026-03-18

Sensor	Location Tag	Relative EVA Response
121f02	COL1EC	Highest of the five; sustained exceedances and largest peaks
121f08	COL1A3	Strong; clearly elevated for most of EVA
121f03	LAB1O1	Moderate; sustained EVA enhancement visible
121f05	JPM1F1	Moderate; elevated with frequent transient bursts
es19	JPM1F6	Moderate-to-strong; clear EVA interval response

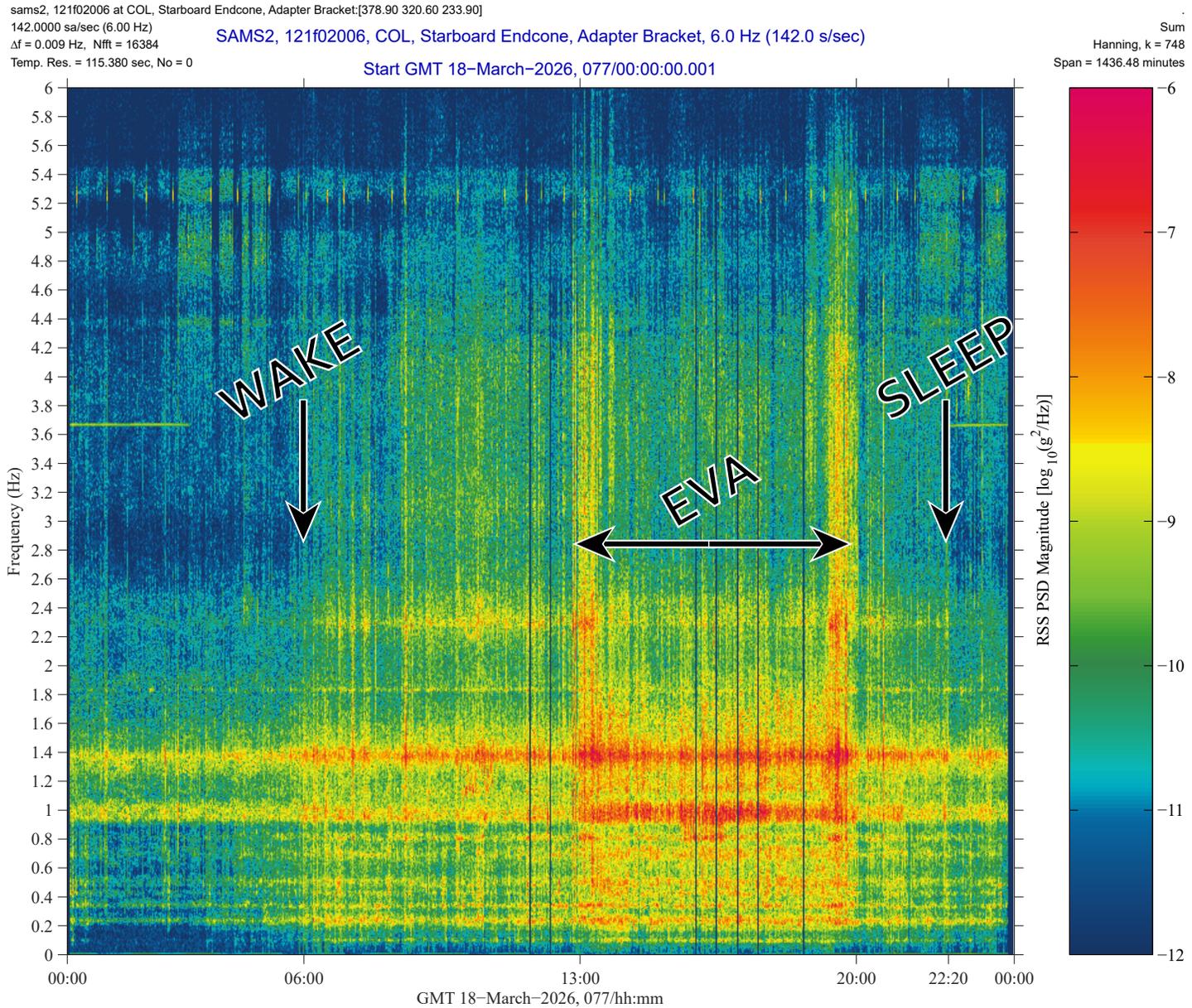
locations experienced a pronounced increase in low-frequency structural response during the EVA.

The physical interpretation is straightforward. EVA is effectively a period of vigorous crew-induced loading on the ISS structure. Push-offs, landings, body restraint reactions, tool use, and occasional bangs or pings act as stimuli; the station's large flexible structures provide the response. For the March 18, 2026 event, that response was strongest at the monitored Columbus locations, but it was detectable across Columbus, the U.S. Laboratory, and the JEM.

As with prior EVA handbook entries, the most useful diagnostic perspective is to focus on the lower-frequency structural bands rather than on isolated high-frequency details. From that viewpoint, this EVA is well characterized as an extended sub-2 Hz structural excitation event superposed with intermittent transients. Such observations remain useful for microgravity-environment awareness, experiment planning, and the broader structural health-monitoring context of an aging orbital platform.

REFERENCES

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VIBRATORY

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Fig. 1: One-day, 6 Hz spectrogram for GMT 2026-03-18 from SAMS sensor head 121f02 at the Columbus Starboard Endcone. The EVA interval mainly manifests as elevated structural response (red horizontal streaks) below 2 Hz, with superposed transient (vertical) brightenings consistent with sporadic crew/tool interaction events.

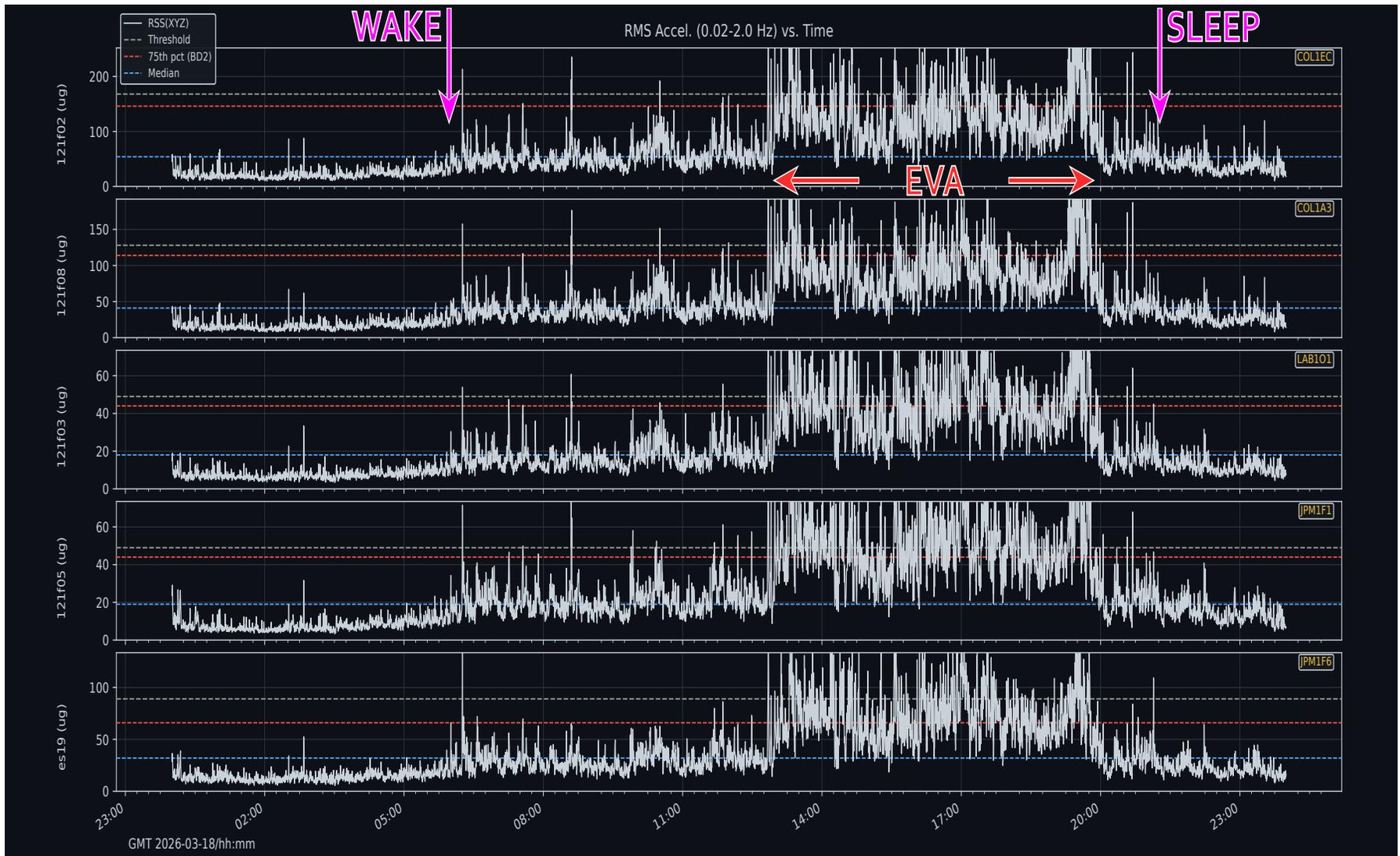


Fig. 2: Total interval RMS acceleration versus time in the 0.02–2.0 Hz band for five distributed SAMS sensors on GMT 2026-03-18. All locations show a clear increase during the EVA, with the largest response observed at the Columbus starboard endcone locations.