# Rocky Worlds DDT: HST Data Analysis Report for LTT 1445A, Visits 1-3

**Leonardo Dos Santos, John H. Debes** | *HST Data Analysis Team*
**Néstor Espinoza, Hannah Diamond-Lowe** | *RWDDT CIT Leads*

HST observed Visit 1, 2 and 3 of the program for LTT 1445A (PID 17903) between September 4, 2026 and September 26, 2026. These visits were designed with four consecutive orbits with COS/G130M to obtain a time-series to detect FUV flares in LTT 1445A and provide spectral coverage. These observations are fundamental to constraining the high-energy output of this host M dwarf in the UV, which can be applied to planetary models of atmospheric escape, as well as photochemistry if a planetary atmosphere is present. Along with this data analysis report, we also produce light curve high-level science products (HLSP) that are hosted on MAST.

More details about the observing modes, technical justifications and decisions are available in the RWDDT Scheduling Report for LTT 1445A (Debes et al., 2026)[1]. The observing log of the visits discussed in this report is shown in Table 1.

Table 1: Observations log of this data analysis report.

| Visit | Dataset | Mode | Start Date & Time | Exposure time (s) | Status |
|---|---|---|---|---|---|
| 1 | LFS601010 | COS/G130M | 2026-09-19 16:29:24 | 9156.320 | Pass |
| 2 | LFS602010 | COS/G130M | 2026-09-26 11:18:35 | 7943.808 | Pass |
| 3 | LFS603010 | COS/G130M | 2026-09-04 00:45:24 | 9156.288 | Pass |

## 1 Data quality

We did not receive any AlertObs notifications for Visit 1 and 3. However, we received two AlertObs notifications for Visit 2: (i) the Fine Guidance Sensors failed to acquire a second guide star before the fourth orbit, and (ii) data from this visit were partially or completely lost because HST had an anomaly and switched to Safe Mode on September 26, 2026 16:23 (during the fourth orbit). We do not observe any significant effects of jitter pointing trends in either of these three visits. A HOPR is not needed for Visit 2 given that only half orbit 4 was lost. We present the time series of jitter vectors in Figures 5 to 7.

## 2 Data Reduction

### 2.1 Spectral analysis

The host star LTT 1445A is bright enough in the FUV/G130M mode to be extracted automatically by CalCOS without any issues.

[1] Available on the Rocky Worlds DDT website.

### 2.2 Time-series analysis

All UV observations of LTT 1445A in the RWDDT program were executed in photon-counting mode, or `TIME-TAG`. The Rocky Worlds Utils codebase possesses a dedicated time-series analysis tool that enables the user to create flux-calibrated light curves integrated over user-defined wavelength ranges at any temporal resolution within the precision of the STIS and COS instruments. For the RWDDT program, we produced light curves with a temporal resolution of 5 s for all `TIME-TAG` observations. For every non-Ly$\alpha$ observation, we integrate fluxes in the entire wavelength available and mask out ranges with geocoronal contamination. We do not perform corrections for telescope breathing or other systematic effects.

## 3 Combined science products

### 3.1 Light curves

We present the resulting light curves of the HST COS/G130M observations of LTT 1445A in Figures 1 to 3. We do not detect any flares in Visits 1-3.

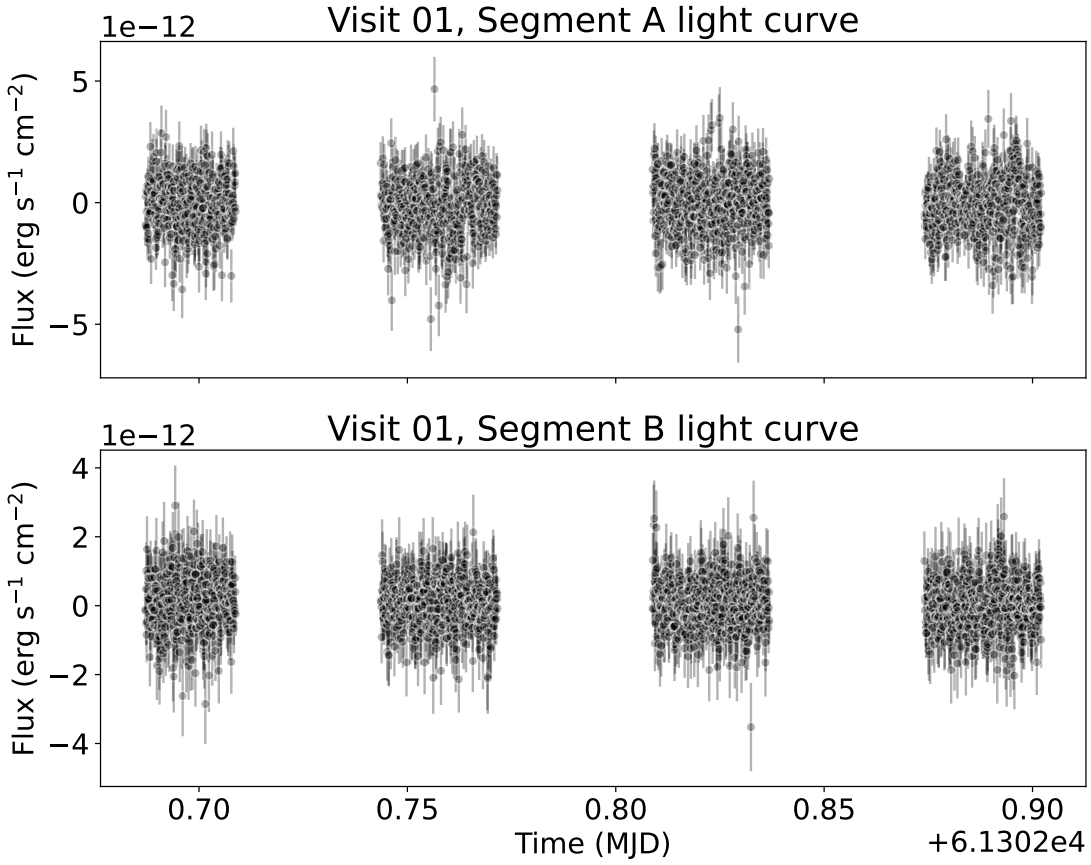


Figure 1: Light curve of Visit 1. Segment A corresponds to wavelengths [1230, 1365] Å and Segment B to [1140, 1214] Å.

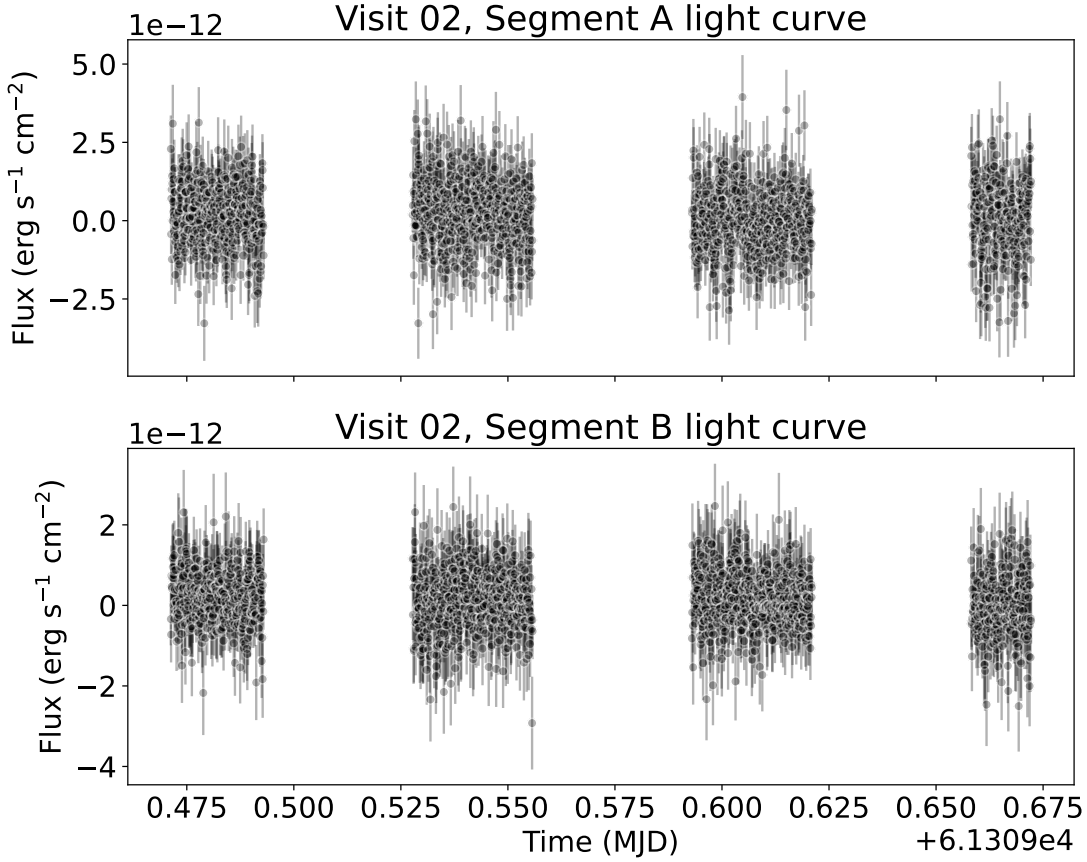


Figure 2: Light curve of Visit 2. Segment A corresponds to wavelengths [1230, 1365] Å and Segment B to [1140, 1214] Å.

### 3.2 Spectrum of LTT 1445A

We utilized the HSLA codebase (Sankrit et al., 2025) to co-add and abut all the final-stage HST observations obtained thus far in this program to produce a high-fidelity spectral energy distribution (SED) of LTT 1445A, which we present in Figure 4. At this stage we have not yet co-added the existing archival data of LTT 1445A.

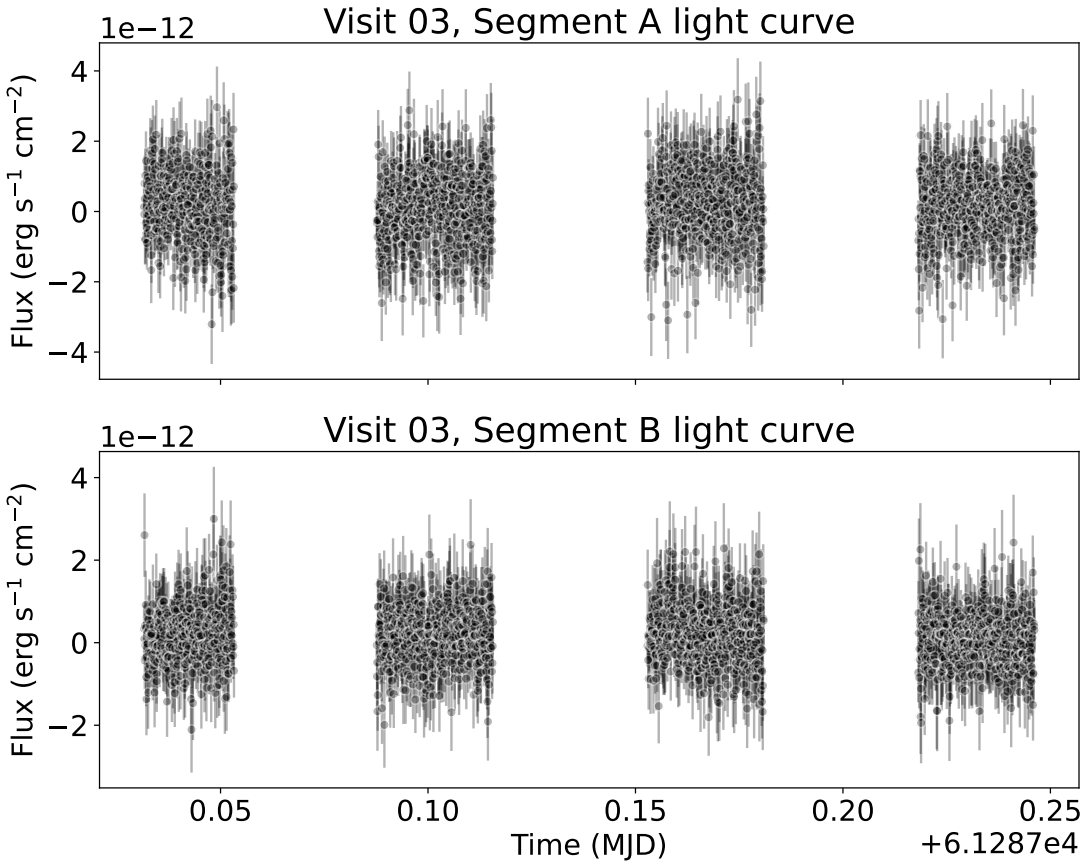


Figure 3: Light curve of Visit 3. Segment A corresponds to wavelengths [1230, 1365] Å and Segment B to [1140, 1214] Å.

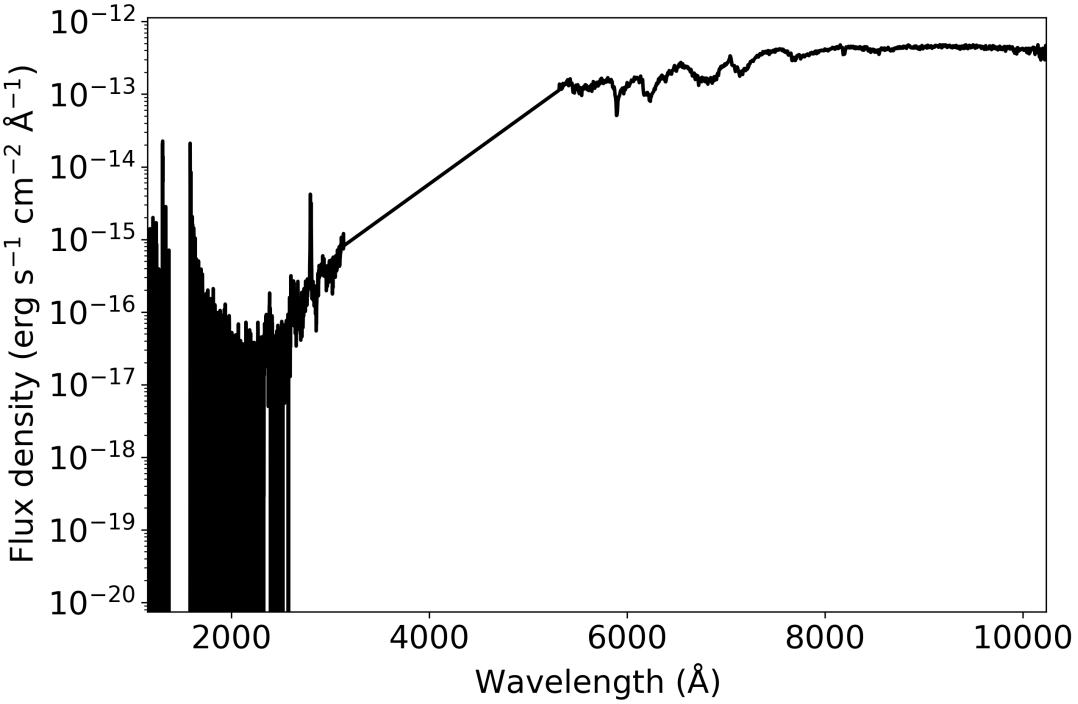


Figure 4: Full spectral energy distribution of LTT 1445A as observed in this program.

# Appendix

We present below the HST pointing jitter vectors of the visit in this report. We do not observe any significant trends that could potentially affect the quality of the observations.

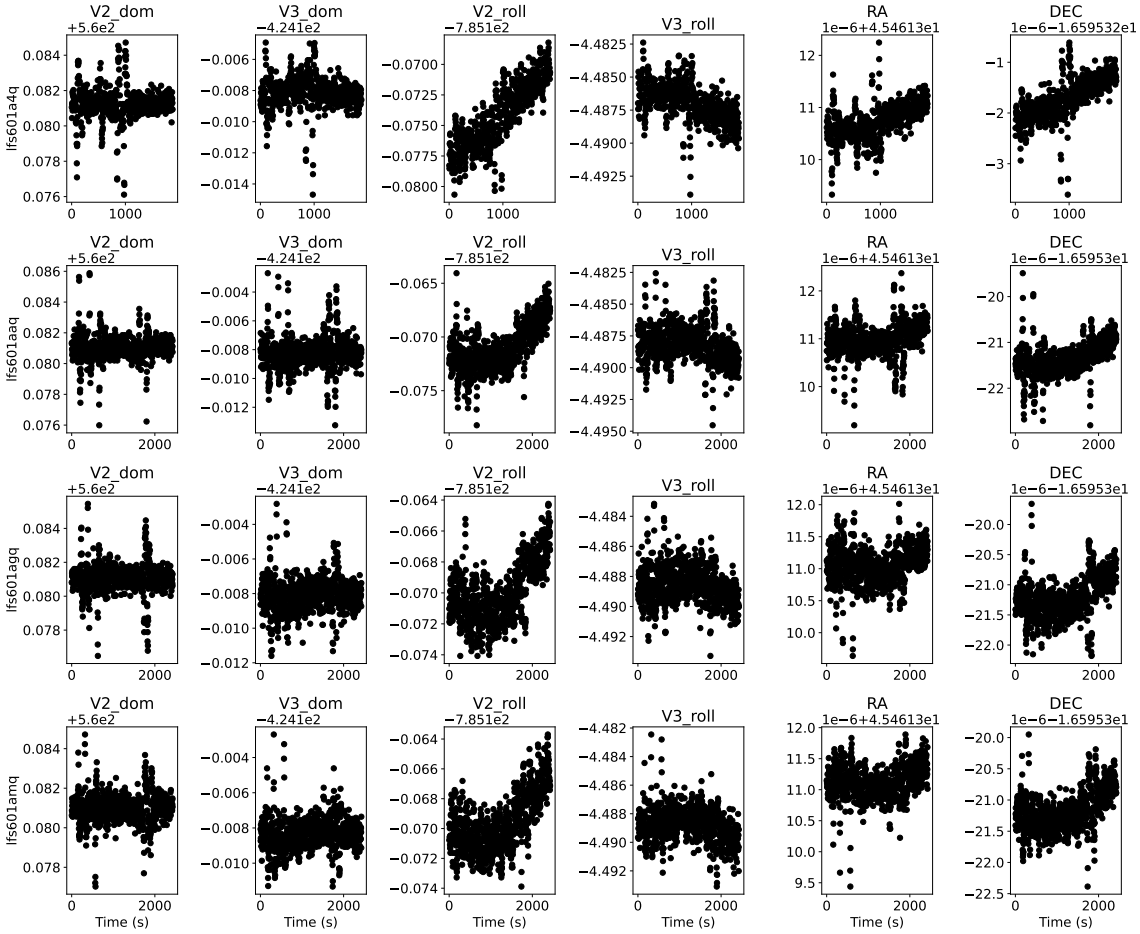


Figure 5: Jitter vectors for the COS/G130M exposure in Visit 1.

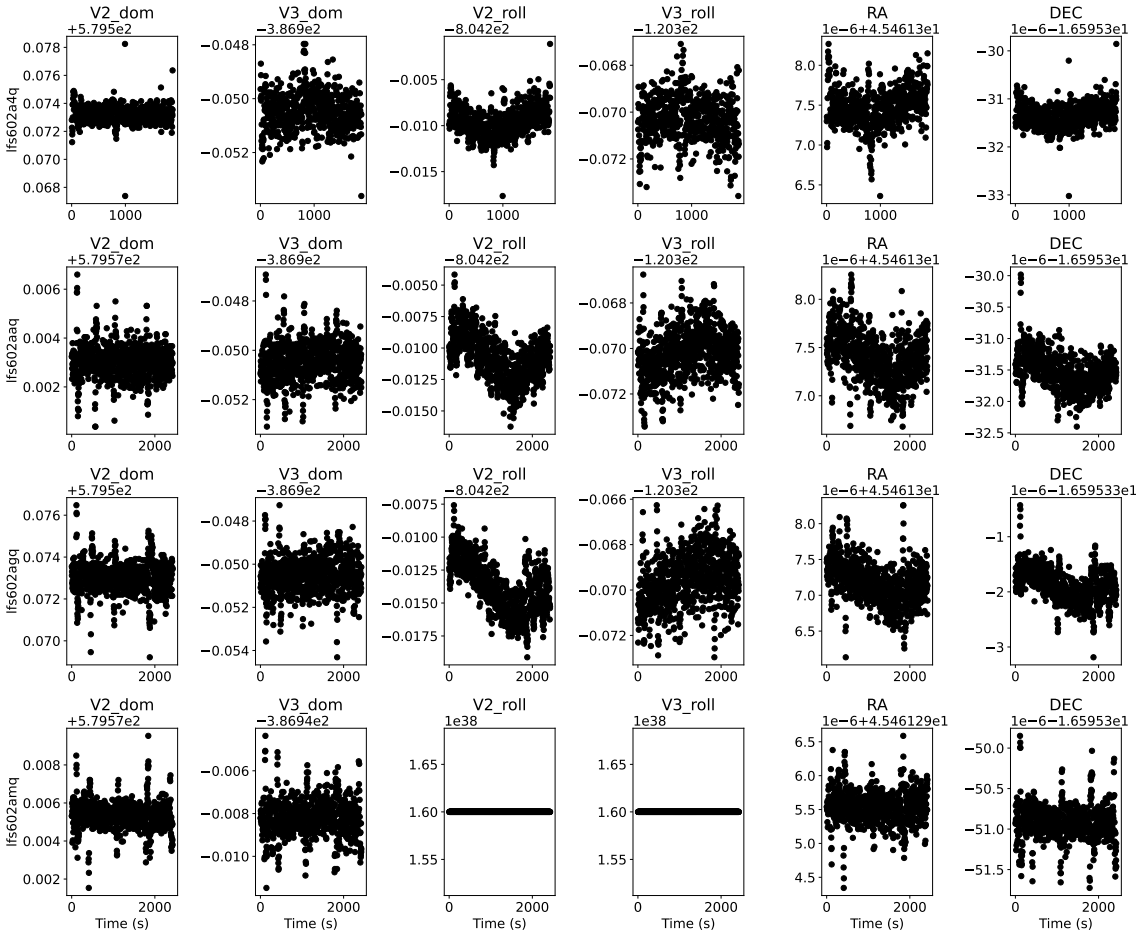


Figure 6: Jitter vectors for the COS/G130M exposure in Visit 2. The vectors corresponding to the `roll` guide star are set to zero in the fourth orbit because no second guide star was acquired.

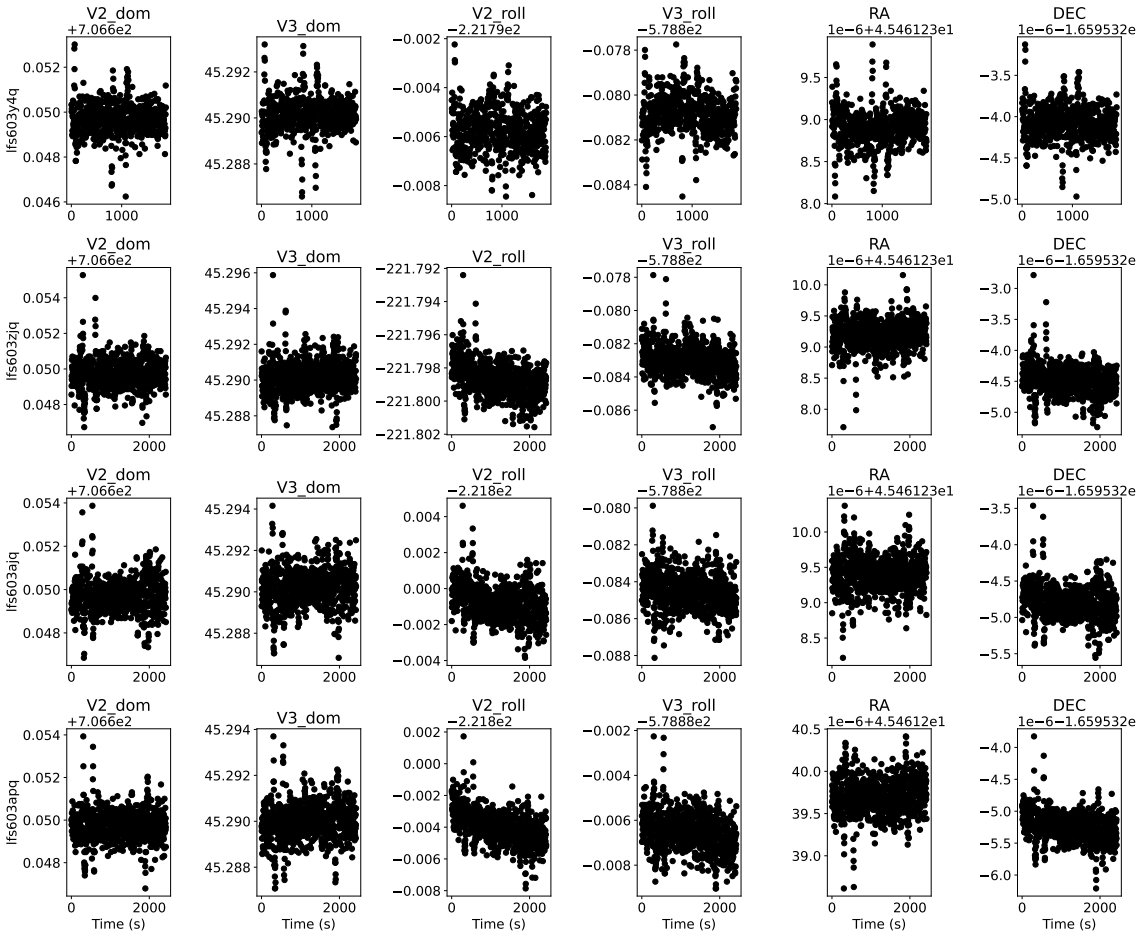


Figure 7: Jitter vectors for the COS/G130M exposure in Visit 3.

## References

Debes, J., Dos Santos, L., Espinoza, N., & Diamond-Lowe, H. 2026, Rocky Worlds DDT: HST Scheduling Report for LTT-1445A, RWDDT Scheduling Reports

Sankrit, R., Debes, J., Burger, M., et al. 2025, Overview of the new Hubble Spectroscopic Legacy Archive, Instrument Science Report COS 2025-18, 35 pages