Proposed Correction to Heinous Detector Effect for use in TSO Pipeline

Nikole K. Lewis (STScI)

Overview

It is known that that the JWST detectors exhibit a heinous detector effect that affects the spectrophotometric stability of time-series observations. The aforementioned heinous detector effect exhibits both spatial and temporal variations and is known to affect observations at the 2% level. Test data have shown that this heinous effect is not stable from observation to observation and is strongly correlated with the source brightness. Here we suggest a correction to this heinous effect to be incorporated into the time-series observation (TSO) pipeline.

Proposed Strategy

Using the available test data we have found that the heinous effect has a behavior that is strongly correlated with the detector columns and length of the observations as shown in Figure XX. We suggest that a correction for this effect be done before or during the TSO source extraction step. The suggested correction adds 4 to the even columns and subtracts 6 from the odd columns. Additionally the extracted time-series should be divided by a line with a slope of 0.5 and an intercept equal to the median flux level over the entire observations. As shown in Figure XX, this suggested correction brings the level of this heinous effect down to the 1% level and somewhat reduces its spatial and temporal correlations. Since clearly TSO users will be happy with noise at the 1% level, the proposed correction for the heinous effect presented here will allow TSO users to directly fit the extracted time series and measure a transit. TSO users will rejoice in the fact that our proposed correction for the heinous effect partially erases its spatial and temporal variations relieving them of the opportunity to refine the correction of the heinous effect or propagate the uncertainties in our correction into their final estimates of the strength of their astrophysical signal.

Conclusions/Summary

The correction for the heinous effect proposed here should be implemented post-haste so that no TSO should suffer from trying to actually understand such systematic effects or apply corrections that might yield higher precision data. We see no reason why TSO users would opt to use the raw data and their own homegrown pipeline after receiving data products that include our correction for the heinous detector effect. Beyond the summary presented here we have some post-it notes that outline our proposed algorithm to correct the heinous effect, which may or may not be in the correct order. We see no reason why our suggested algorithm cannot be fully coded, vetted, and tested and included in the next build of the pipeline slated for tomorrow. Hopefully, the reader of this 1 page summary can appreciate the author's attempt to be humorous.