2021-02-10 TSO WG Meeting notes

Date

10 Feb 2021

Attendees

- Nestor Espinoza
- Nikolay Nikolov
- Diane Karakla
- Tony Keyes
- Unknown User (aroy)
- Unknown User (birkmann)
- Brian Brooks
- Knicole Colon
- Leonardo Ubeda
- Loic Albert

Meeting agenda:

1. News & announcements.
2. Outlier detection step analysis updates (Nikolay).
3. Updates on 1/f noise analyses (all).
4. Activities on each instrument branch (all).
5. Closing remarks

Discussion items

Time	Item	Who	Notes
5min	**1. News & announcements**		
			▪ Knicole Colon is going to start joining our TSO WG meetings!
			▪ Brian Brooks reminds us of the upcoming version of ETC 1.6, which has some TSO news! Check the ETC v.1.6 outerspace for details: Pandeia Engine News
15min	**2. Outlier detection step analysis updates**		
		Nikolay Nikolov	▪ Nikolay Nikolov gives updates on changes to the Jump DetectionStep, which are important for the outlier detection step updates. These were given by Mike Reagan on the CalWebb WG last week. He starts outlining how the algorithm works/what it assumes right now: current algorithm looks at the difference in signal between groups; when one of these "jumps" is large, then that is flagged as an outlier (e.g., a cosmic ray; also works for negative jumps). However, this works only for >= 5 groups. Mike Reagan showed how it can be improved down to 3 groups. Uncertainties right now is how to set the "n-sigma" on this detection; also algorithm does not use spatial information or TSO info right now. ▪ Nestor Espinoza is worried about the possibility of doubling our efforts on this; if a "super" jump algorithm is created, then there might not even be the need for an OutlierDetection algorithm in Stage 3 of TSO. It would make sense if the "super" jump algorithm is expected to not use TSO-information at all, but might be good to coordinate these efforts with Mike Reagan, in order to delineate differences on our approaches: ☐ Nestor Espinoza will organize a meeting with Mike Reagan et al., to coordinate our efforts. ▪ Nikolay Nikolov looked also at the difference imaging outlier detection algorithm; still working on upgrades, will show updates on next meeting.
15min	**3. Updates on 1/f noise analyses**		

		Nestor Espinoza	▪ Presented updates on his Notebook on NIRCam Dark TSO frames. He ran the experiment Nikolay Nikolov suggested in our previous meeting, namely, of trying to "emulate" the correction for central pixels with out-of-aperture pixels, in order to see if the power spectral density (PSD) of the pixels is able to go down to white-noise with column-to-column corrections. The answer is that, basically, as expected as you go to smaller subarrays you get closer to white-noise, but you never really hit that even at the smallest (16-pixel) subarrays. There is always a residual non-white component, which is unclear how important it is for actual TSOs (might be smaller than photon-noise in general — we calculated average PSDs on all groups in our experiment) or how it maps in terms of noise properties to time-series (e.g., this noise might creep-up if folks bin their data perhaps). ▪ Unknown User (birkmann) notes that these experiments make sense given using out-of-aperture pixels only handles noise properties until a given length-scale. Nestor Espinoza suggests that ideally, the best would then be to do something like what the NIRCam folks proposed in general, which is to perform spectral extraction accounting for this covariance. Unknown User (birkmann) suggests that also IRS2 could be used — but Nestor Espinoza mentions this can only be used with full frames, not with subarrays, which are what users will, in general, prefer for their observations. ▪ Bottom line is that given we now know that even for small subarrays column-to-column subtraction does not completely remove the correlated nature of pixels because of the read-noise, it might be good to (a) explore how this translates to time-series observations (i.e., what is the noise floor implied by this on the different subarrays) and (b) explore if further algorithms like the ones proposed by the NIRCam folks are needed to be implemented in the future for spectal extraction.
		Leonardo Ubeda Tony Keyes Diane Karakla	▪ Tony Keyes mentions they have been doing analyses on different subarrays divided between Leonardo Ubeda and Diane Karakla. ▪ Leonardo Ubeda updates on the analyses they are doing for the NIRSpec dark full frames. Showed a notebook where they used the same parameters that were done for the NIRCam analysis (e.g., timing for the readouts), and arrived at similar PSDs as the ones for NIRCam. There are some particularities, however; the overall shapes are not the same. ▪ Unknown User (aroy) mentions a similar result for NIRISS/SOSS.
5min	**5. Closing remarks**		