2021-03-24 TSO WG Meeting notes

Date

24 Mar 2021

Attendees

- Nestor Espinoza
- Sarah Kendrew
- Brian Brooks
- Leonardo Ubeda
- Tony Keyes
- Nikolay Nikolov
- Loic Albert
- Diane Karakla
- Michael Regan
- Everett Schlawin

Meeting agenda:

1. News & announcements.
2. Updates on 1/f noise analyses.
3. High efficiency mode
4. Closing remarks

Meeting slides here
(links to Innerspace page which is unavailable for external folks — if interested in seeing them, send Nestor Espinoza or Sarah Kendrew an e-mail).

Discussion items

Time	Item	Who	Notes
5 mins	**1. News & announcements**	Everyone	▪ Reports from SIR3: ▪▪ MIRI (SK): reran a TSO LRS activity that had previously had bad header keywords. MAST had the right products but not had the changce to look into the data in detail. ▪▪ NIRCam (NN): able to run a TSO for the first time with TA ▪▪ NIRISS (NE): ran 2 TSO observations. There is a problem with header keywords which don't match the start and end times of the exposure. perhaps the reset times are not being accounted for? Raising a ticket for that. There was a problem with the longer time series (2 hrs); the uncal files did not show up in MAST. Had to wait many days for the data to show up. ▪▪▪ MIRI too has found an issue with uncal files and the search procedure in MAST is a bit confusing ▪▪▪ TK reports a conversation with Mark Kyprianou, who suggested searching by keywords or engineering parameters. if use this then only the highest-level processed products. so confirms that how you search for the files can give different results. ▪▪ NIRSpec: TK will check with Charles to see what was run for NIRSpec in SIR3 ▪ SK: the ESAC archives team are building an online research workflow platform called DataLabs, which will include some TSO-specific visualization tools. SK provided a few test simulations (raw & processed) of MIRI imaging TSOs, for testing. May as Nikolov for an example NIRCam simulation to provide to them for testing. ESAC contact for this is Marcos Lopez-Cañego.
30min	**2. Updates on 1/f noise analyses**		

		Nestor Espinoza	▪ See meeting slides for updates
			▪ Update from NIRISS via Roy, see plots in slides.
			  ▪ different substrips do show qualitative differences
			  ▪ How good is the column-by-column subtraction? Keep a remnant bump in the PSD as some temporal frequencies harder to correct than others (a filtering issue). Bottom line is col-by-col is pretty effective but a residual noise component remains over the white noise limit.
			  ▪ What are the high frequency spikes? Seem to be related to the sampling. ES suggests there may actually be correlations, not just sampling effects; others disagree. Could be related to the mux?
			
			▪ NIRSpec update (DK) - looking into SUB512S (CV3 data):
			  ▪ looking into simulating the subarray to see if col-by-col subtraction would help here.
			  ▪ simulated by padding the data with the row reset time for the specific subarray
			  ▪ analysis tried to use the edge pixels for correction for the full subarray (because there are no ref pixels).
			  ▪ main plot shows that the initial correction did not do a very good job - still much raised over the white noise component.
			  ▪ NE: is a timescale issue. the sampling is too small, which is exactly the problem with small subarrays. not able to sample the full range of frequencies. NN suggests using the entire row.
			  ▪ suggests the row by row will not be sufficient for these data.
			  ▪ comparison to the SUB512 subarray (25 ints, each 25 groups)
			
			▪ MIRI (SK): we have some CV3 darks that can be used but right now no time for this analysis. They are full array data, and MR says the translation from full to subarray is very different for MIR than it is for the NIR as the mux is very different.
			
			• Next steps (NE): modeling the PSD
			  ○ only way of simulating 100s/1000s of integrations
			  ○ NIRCam ppl proposal extraction accounting for covariance: need a form/function to evaluate that covariance matrix.
			  ○ if we want to correct for the effect, modeling might enlighten us.
			  ○ also: should model in the time domain, not frequency domain
			  ○ Gaussian processes seem very promising for this: see nespinoza's Github notebook
			  ○ LA: Bernie Rauscher has also been simulating this. NE has looked at this but we are working with more complex PSDs
			  ○ MR: is the goal to model or is the goal to analyse the data? GP seems excellent way to model this but won't change what we actually get.
			  ▪ NE: 2-fold goal. first is to be prepared fro what we see in cycle 1. so want to simulate. may have to revisit once we have flight darks. second, the way NIRCam propose to extract spectra in small subarrays is to model the noise together during the extraction, accounting for the covariance. if we can measure this covariance model from the darks we can implement this in the extraction.
			  ▪ LA: if you have a spectrum on top to the noise then the covariance properties will be different. the correlation is not on the flux of the spectrum but on the small added noise component. the collected photons will not have the same correlation as the noise - the 1/f noise is an additive noise component.
			  ▪ MR: there is an additional covariance component that is not measured from the darks - related to the flux - eg the IPC

5min	**3. High efficiency mode (slides)**		
			▪ No time for this issue, moving to the next meeting
	4. Final remarks		