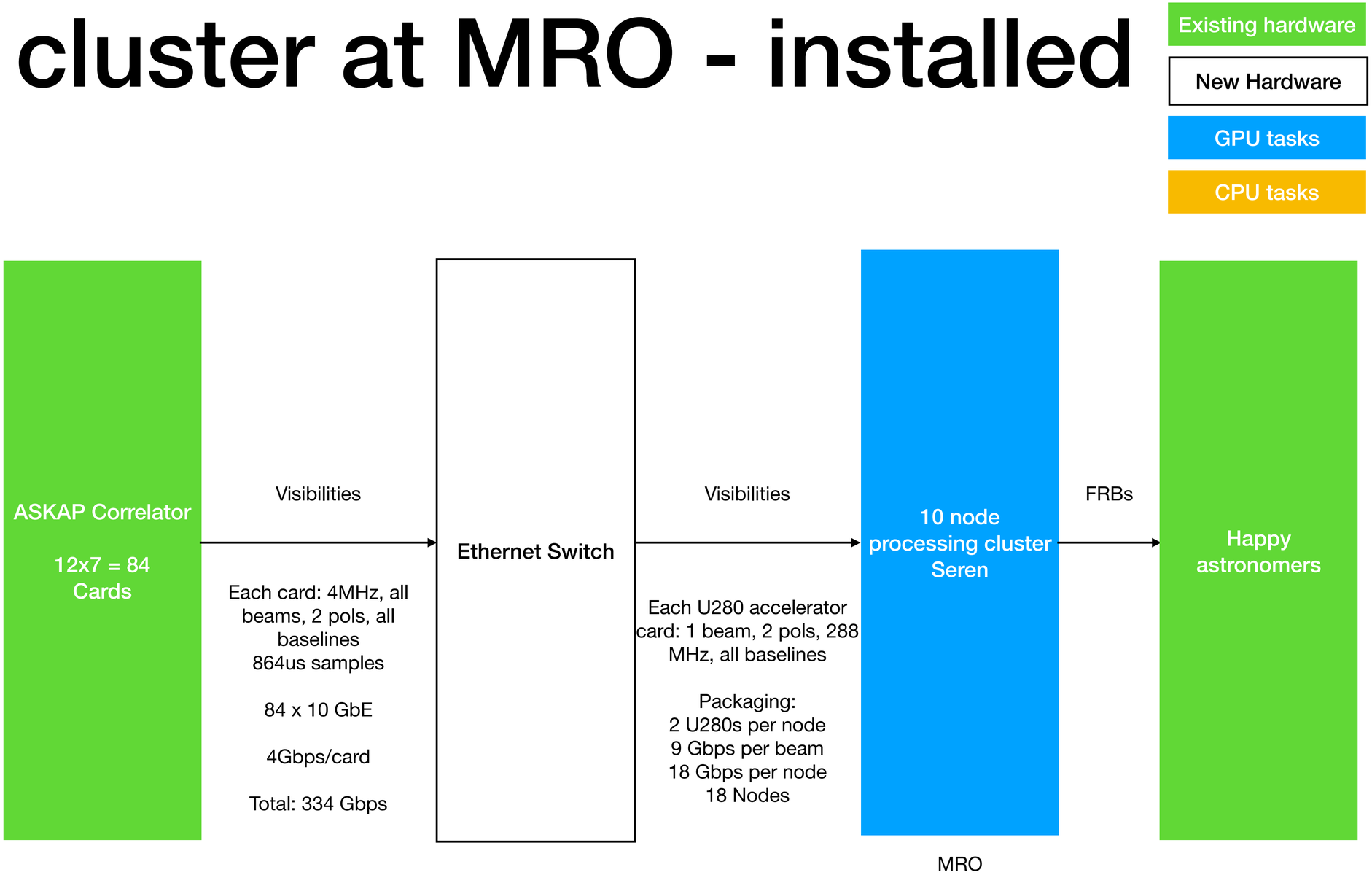
CRACO status

Keith Bannister - Oct 2023

Pilot cluster at MRO - installed

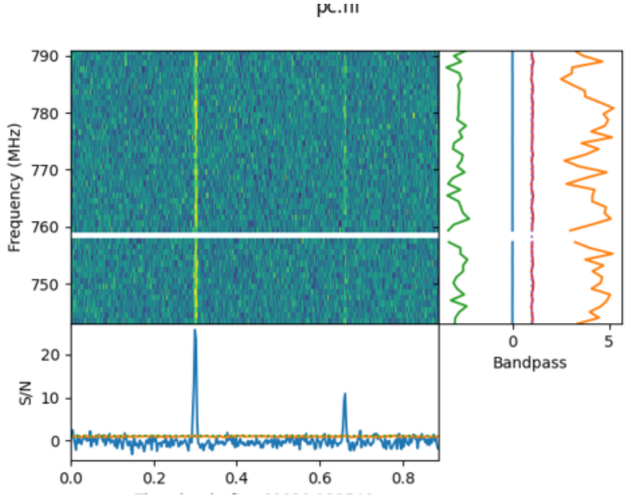


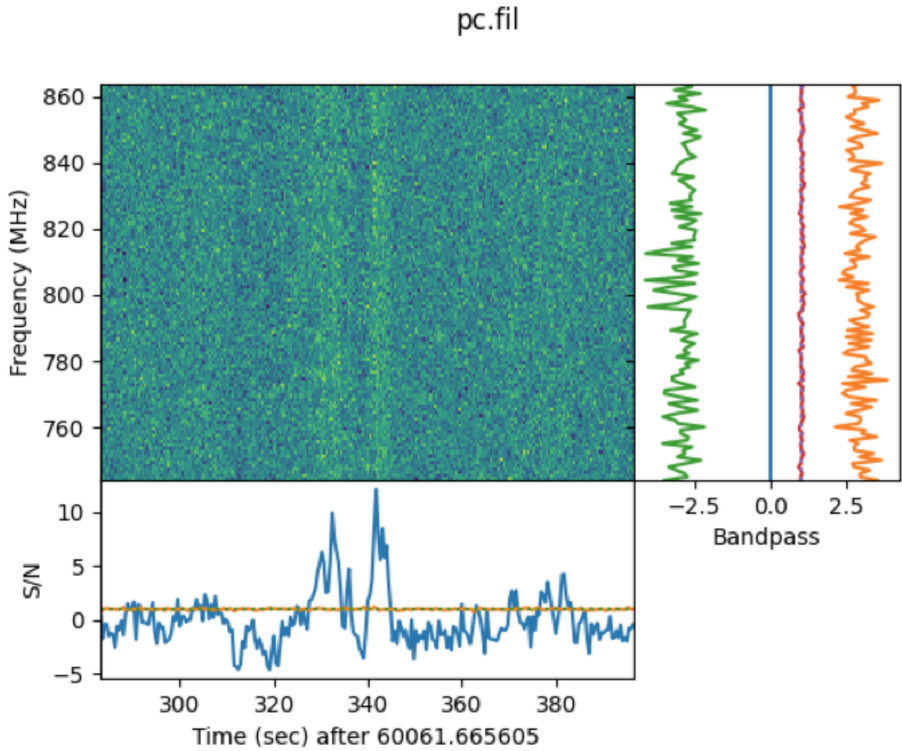
Overall progress

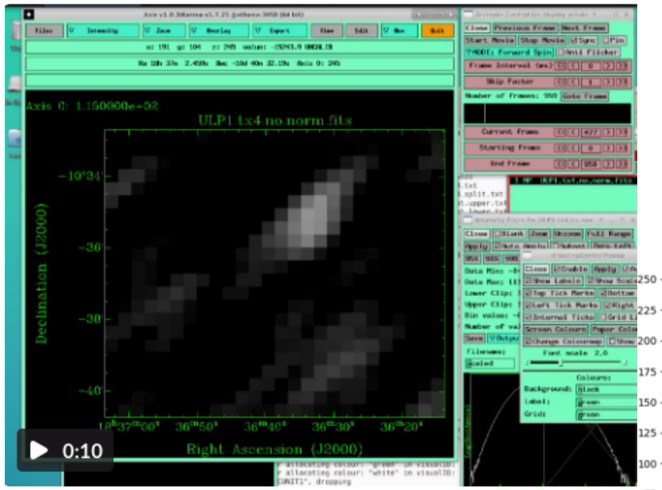
- Original completion date Feb 2023
- Applied for extension from ARC. New completion date: Dec 2023.
- First light: April 2022
- V1 Alveo firmware: complete Sep 2021
- Correlator firmware: complete Feb 2023 after 9 month debugging correlation hardware issues
- Control software: Functional but we continue to add features
- Commissioning: in progress but encouraging
- Platform procurement - delivered ~April 2023
- Racks: Arrived April 2023. Installed Sep 2023
- Hardware installation: Not yet installed

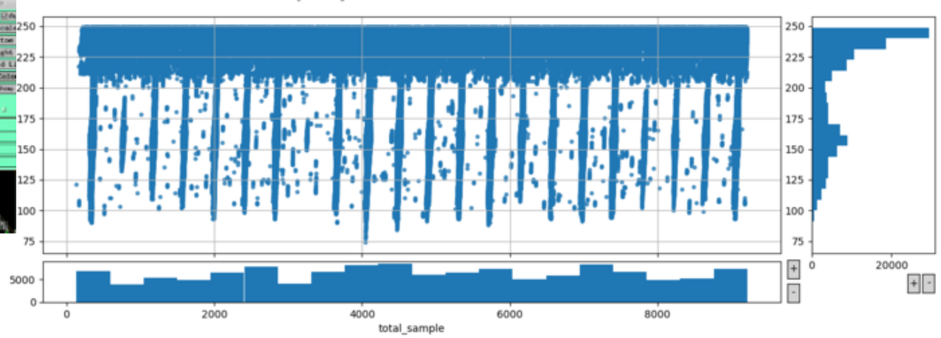
Commissioning

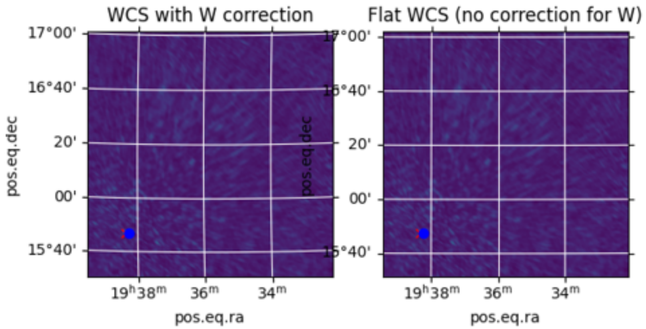
- Offline processing of single beams works.
- Saving of de-scoped (40 of 288 MHz) bandwidth / beams works fairly reliably
- Many improvements still to be made
- Real time searches not yet possible
- IPS observations of eclipse & near sun worked well

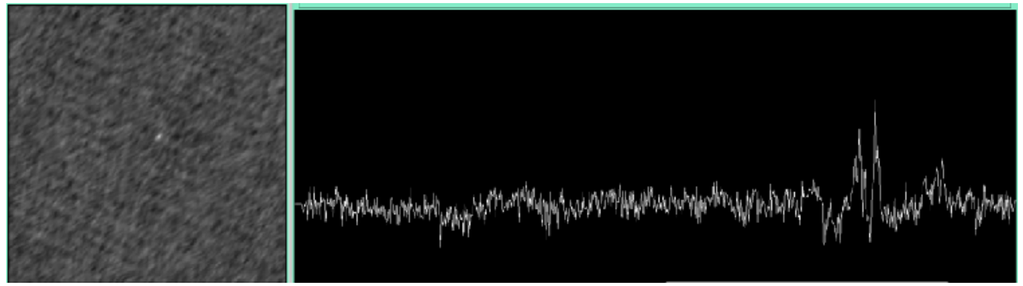






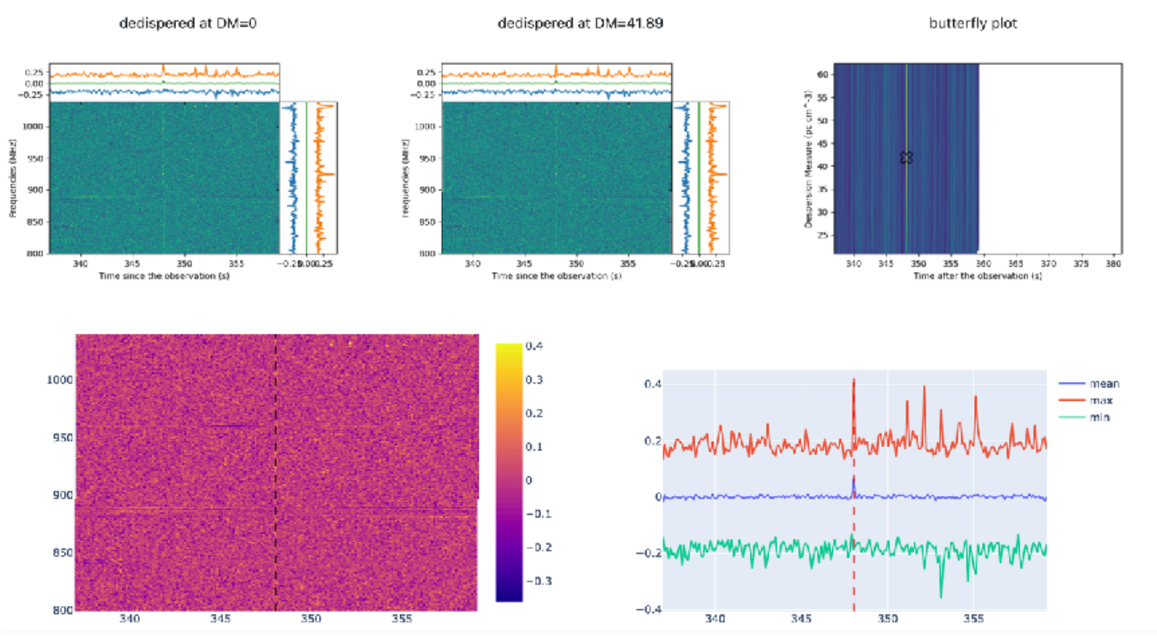


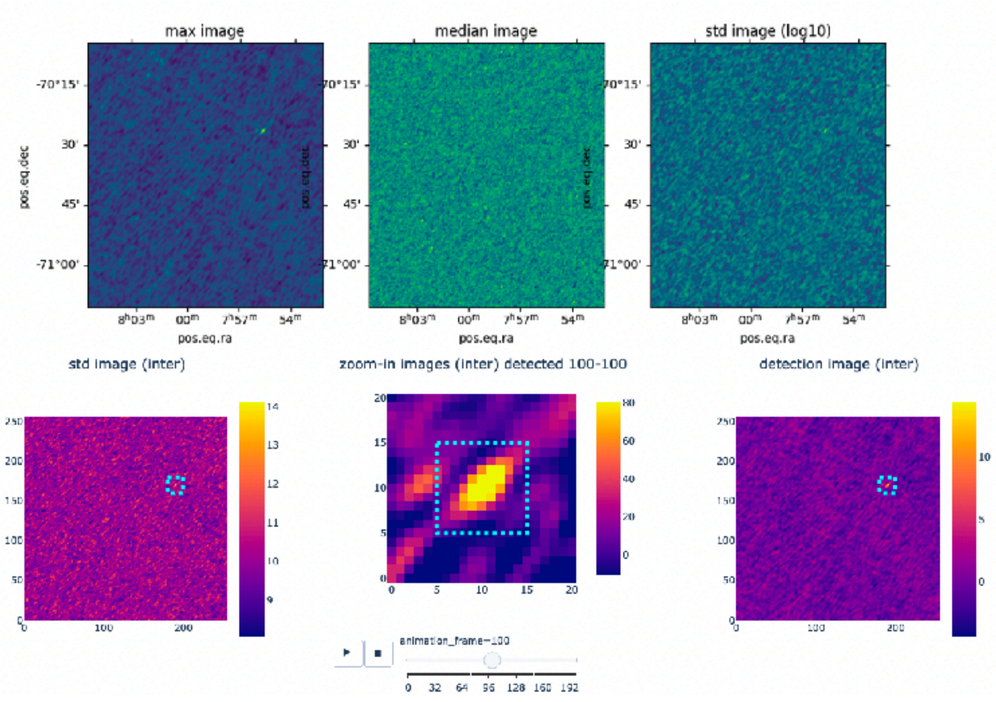




Early science

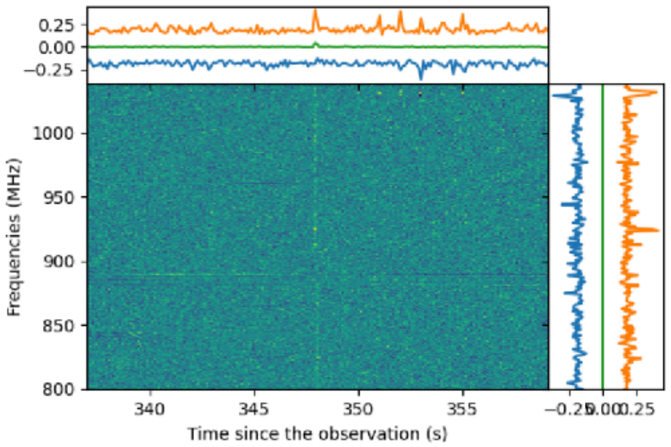
- ~300hrs of data processed with 110ms time resolution (aiming for 1ms)
- No FRBs
- Many detections of unpublished MeerKAT transients.
- Candidate new pulsar
- Many scintillators in the field
- Supported solar observing - excellent measurements of interplanetary scintillation





New pulsar detection

dedispered at DM=0



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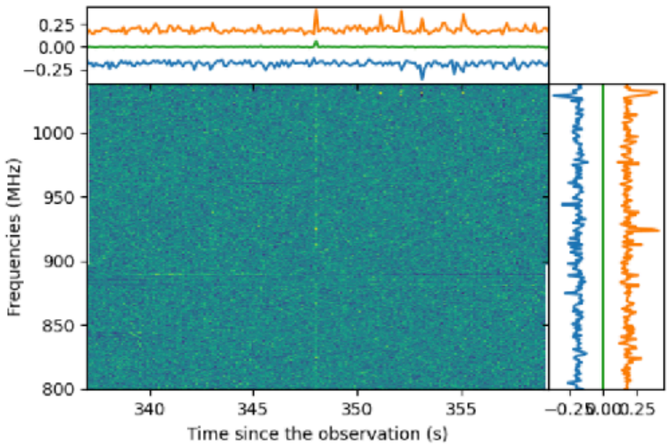
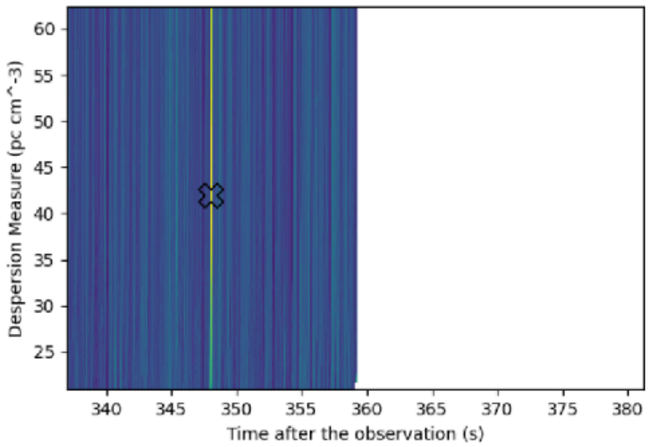
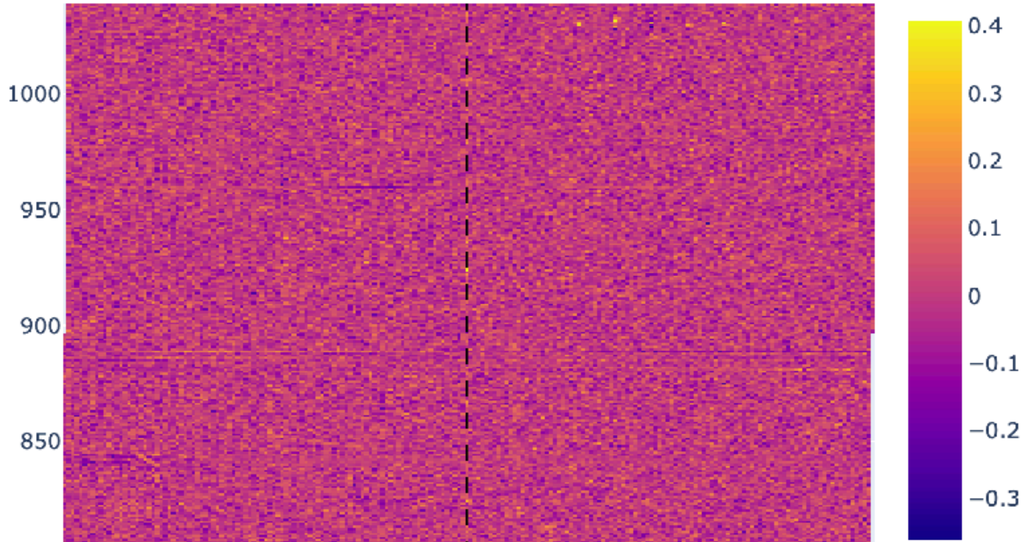
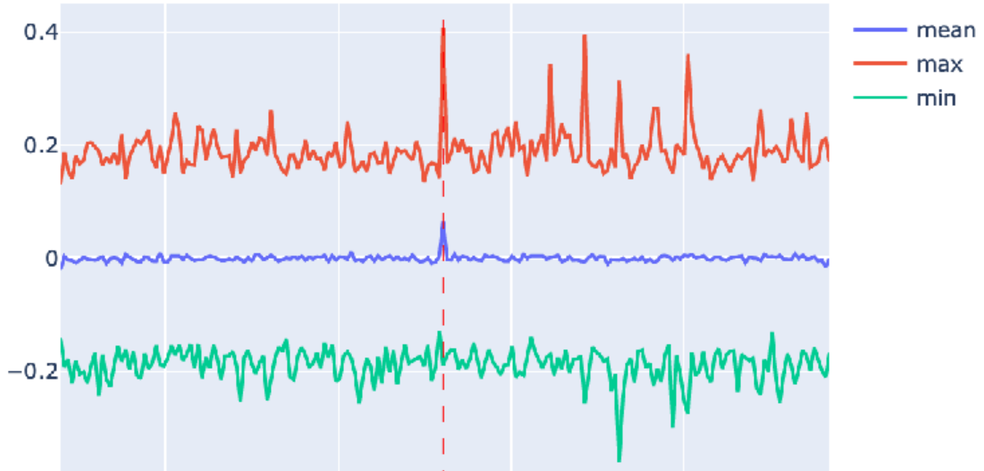


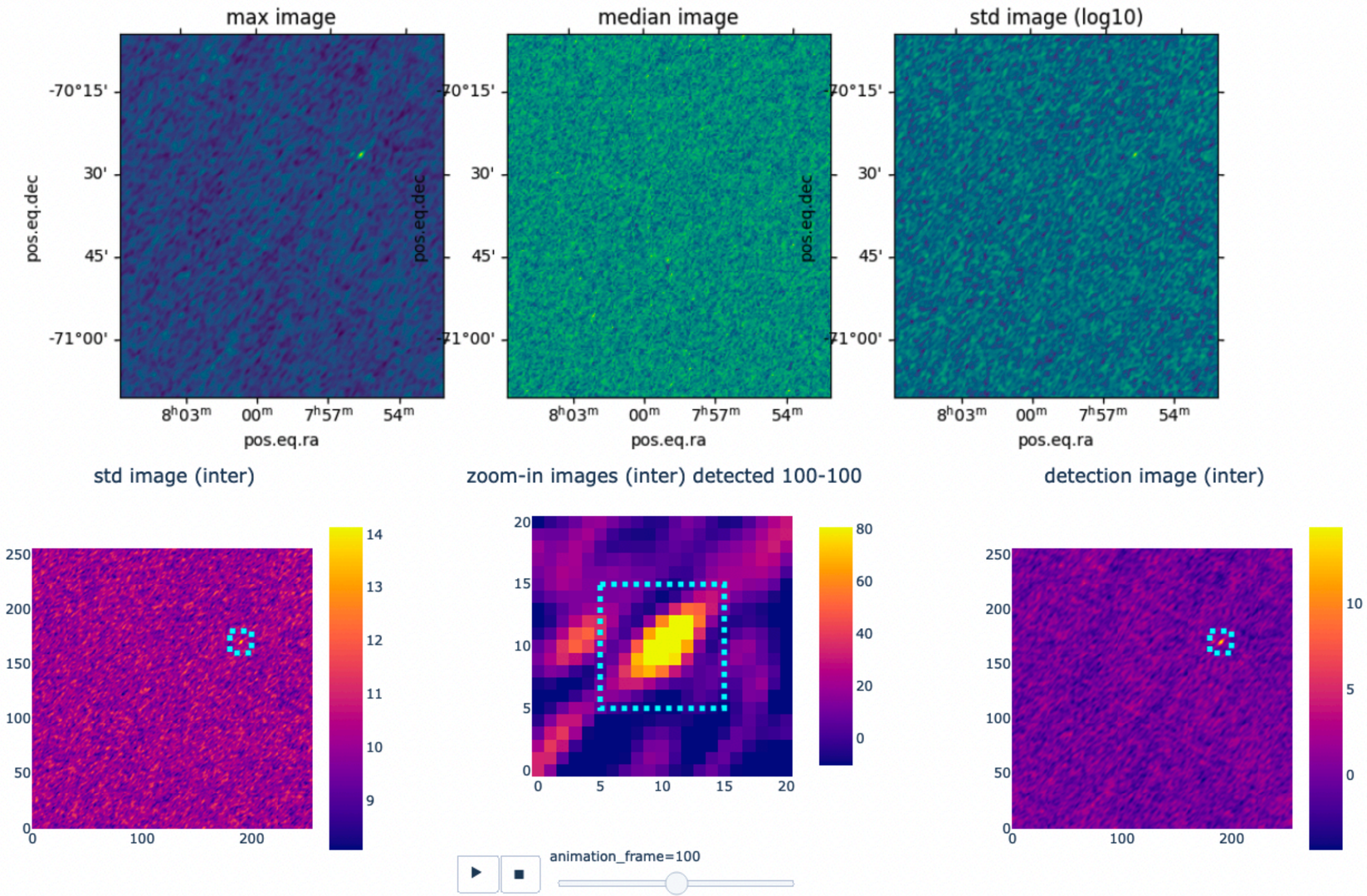
butterfly plot







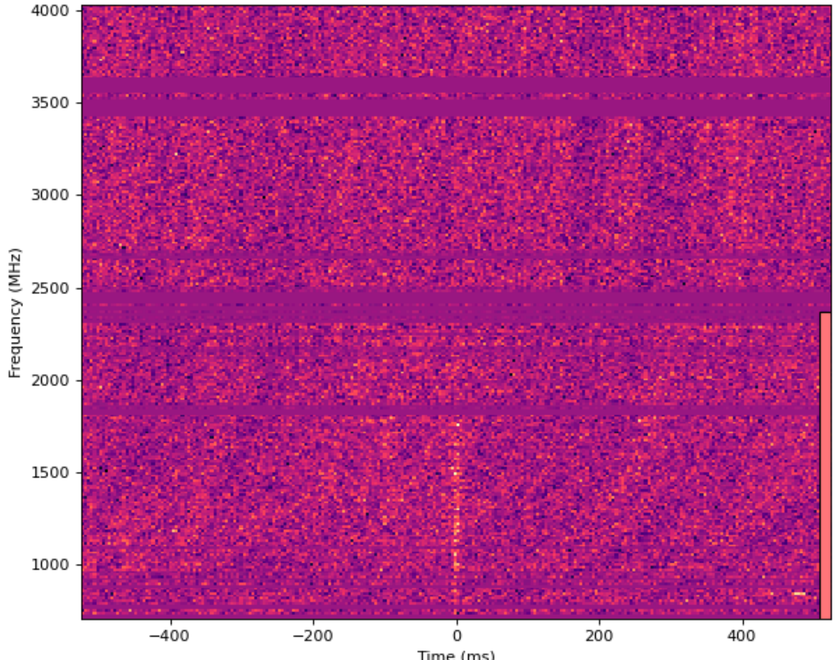
New pulsar detection

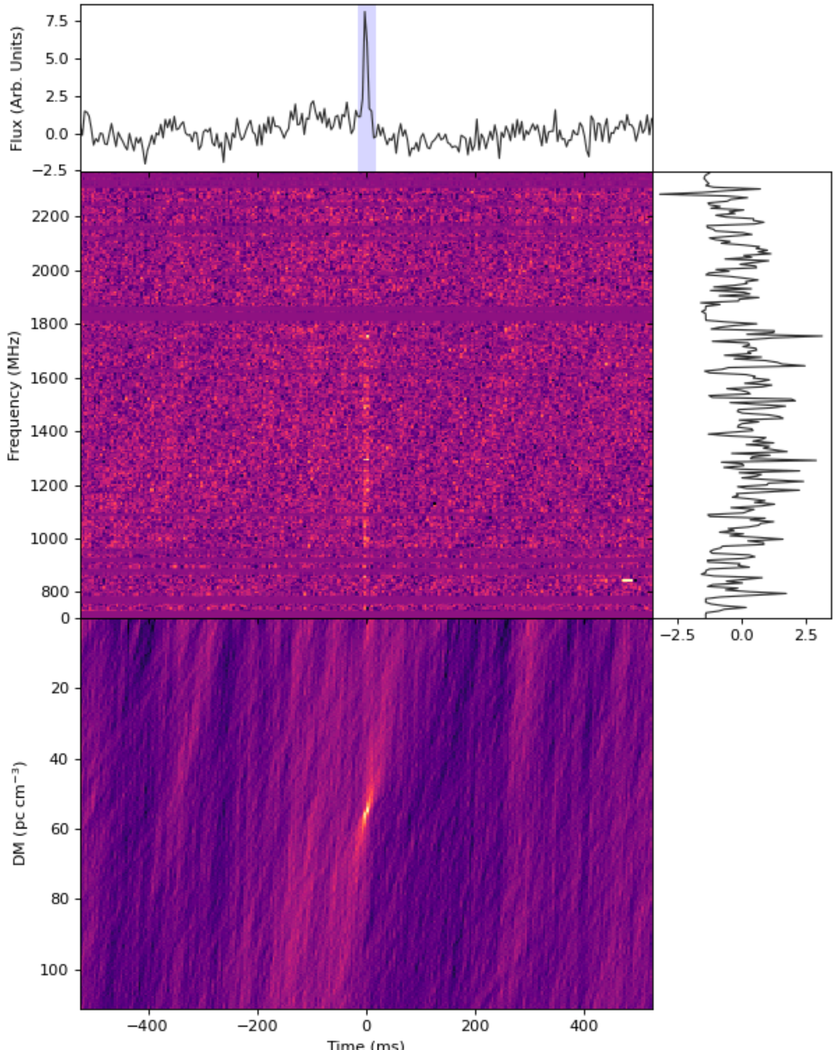


New pulsar detection - Murriyang follow-up

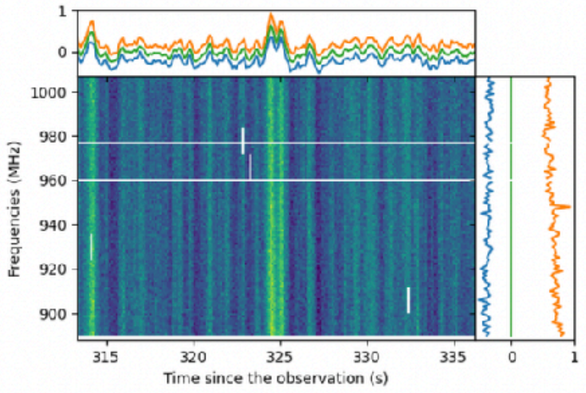
SPS result for /fred/oz002/zwang/craco_J0755/CRACO_J0755/uwl_230930_174032_7.sf

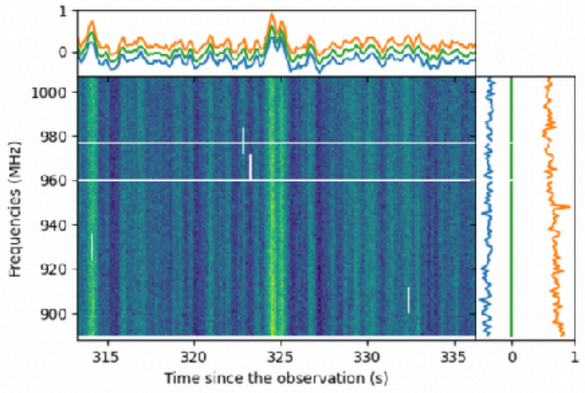
Source	CRACO_J0755	
Telescope	Parkes	FAKE
RA	07:55:42.1000	
Dec	-70:27:03.0000	
MJD	60217.741325	23-09-30
Tsamp	64.00	μs
Freq_{ctr}	1535.50	MHz
Downsample	64	
Masking	23.38	%
DM	55.65	pc cm^{-3}
Time	27.81	s
S/N	17.58	
Width	128	bins

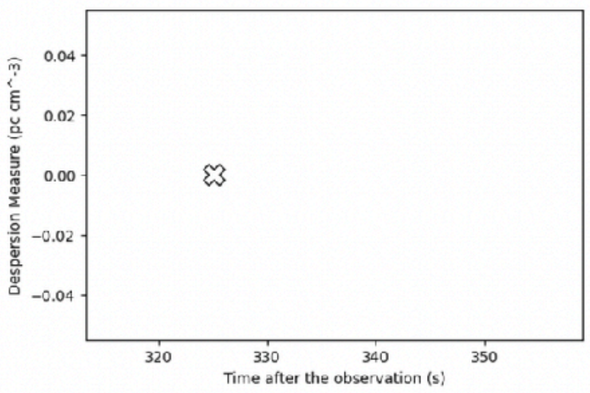


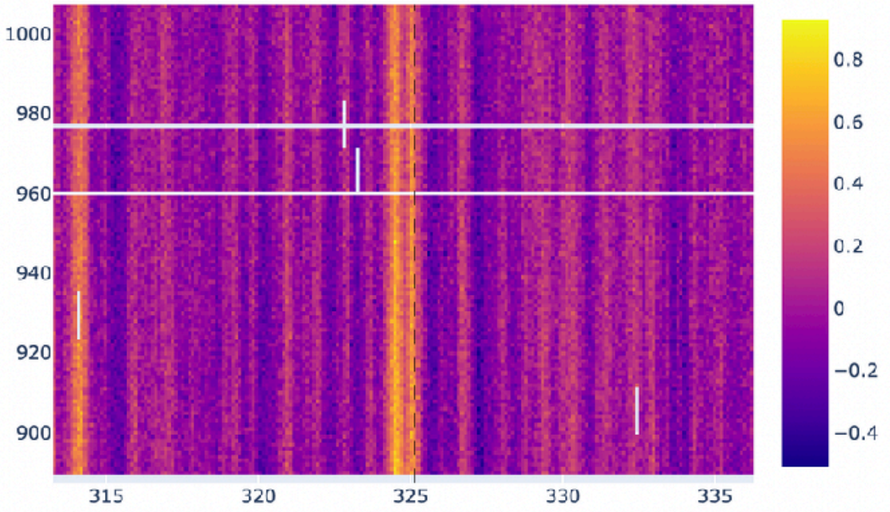


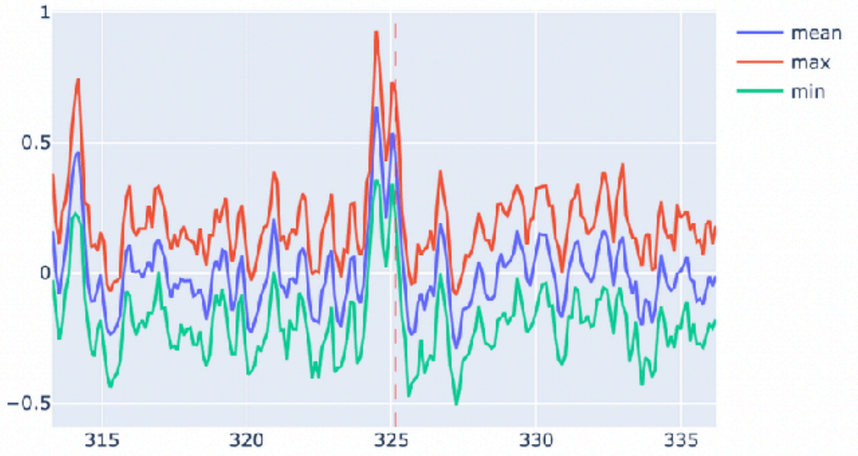
Scintillators



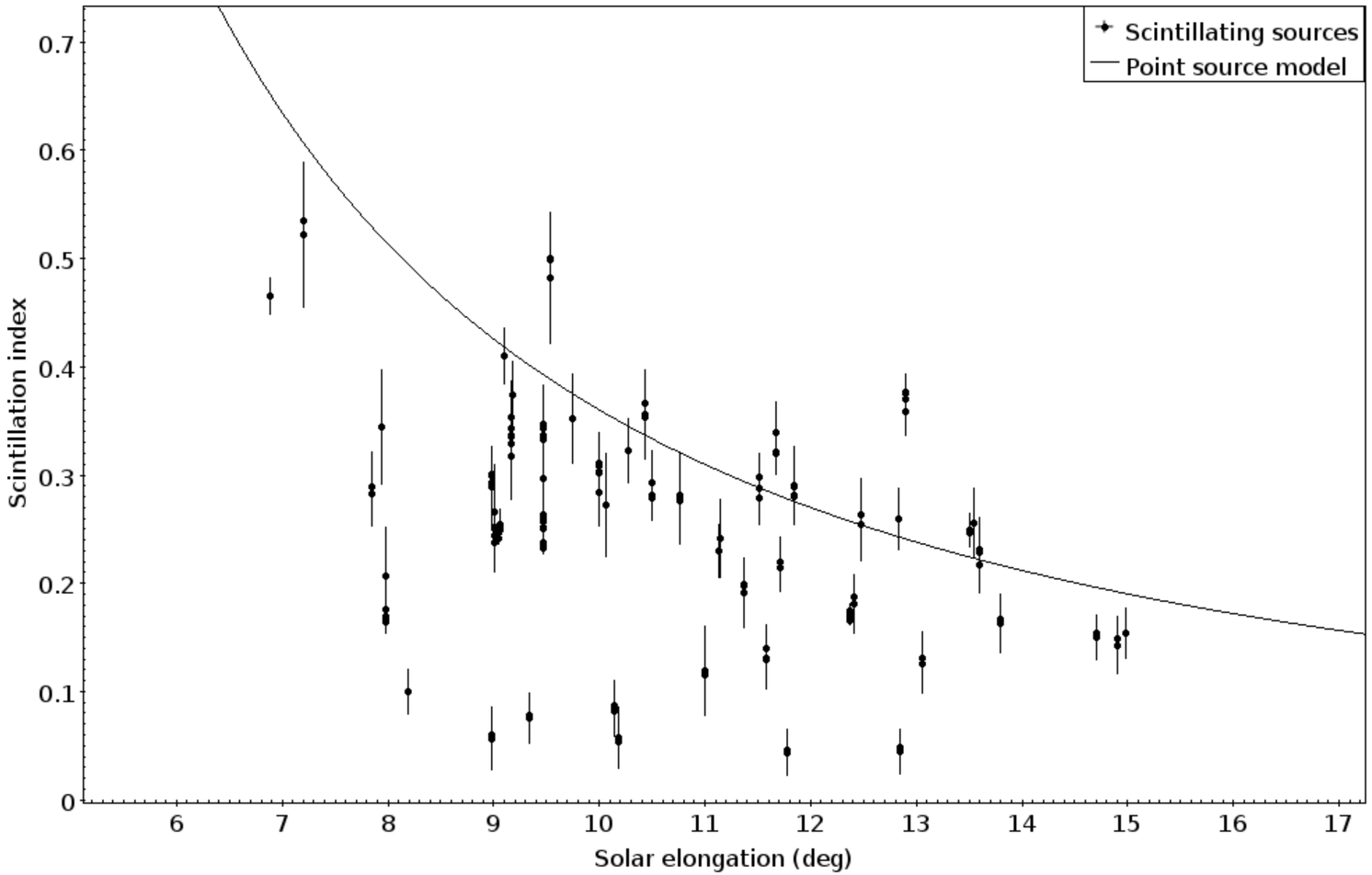








Interplanetary Scintillation Measurements



Rajan Chetri

Software / firmware

- **Correlator firmware** modifications largely complete after fixing Redback memory corruption added 9 month delay.
  - Some minor outstanding issues (e.g. control of lookup tables, & packet delays).
- **Support Software:** Help debugging memory corruption slowed progress. Development ongoing. Version 1 should complete May 2023.
- **Alveo firmware:** Version 1 (for U280) complete since Sep 2021. V2 and porting to U55 not yet started.

Risks

- **It's ambitious:** This system is unique in the world. The numbers are staggering.
- **Packet drops** (CRACO-66) and intermittent link failures (CRACO-61, CRACO-114) cause havoc with the system. Unknown cause or solution. Currently we're hoping new nodes / switches / network cards will help. If it doesn't we have no answer other than to run at reduced bandwidth = less science. May need significant help from vendors / consultants.
- **Alveos have been known to lock up:** requiring hard reboot. Unknown cause. Seems like a hardware problem. May or may not be resolved by new hardware. Investigations with Xilinx suggest its' a manufacturing fault. Returning 1 card for more investigation.
- **Alveo development**: Current Alveo firmware targets U280 (pilot cluster) needs to be ported to U55C (new cluster). It should be easy, but firmware never is. We haven't started largely because of delays debugging corrector firmware.