ASKAP update for April 2024

This month we report on the status of survey operations, a new round of Guest Science Projects, the recent ATUC open session and ongoing issues with filesystems.

Survey science progress update

We are currently observing in continuum-only mode due to several issues that have reduced our capacity to process large files. On April 2nd the /scratch storage system on Setonix experienced a failure of both metadata servers, leading to downtime. Changes to the file locking scheme were made but performance did not return to the level needed to run ASKAP processing and archiving tasks simultaneously. The Pawsey Supercomputing Research Centre conducted scheduled maintenance on the 9th of April, during which further diagnostics were run. We have been running some ASKAP data processing on the older /askapbuffer filesystem, but this experienced an issue with one of its object storage devices on the 12th of April. Fail-over to a secondary device has restored the expected performance of /askapbuffer, but this is less than the nominal performance of /scratch, which is needed to keep up with ASKAP's high data rate.

SST	Deposited	Awaiting Validation	Released	Rejected
EMU	213	5	167	39
WALLABY	53	1	24	28
POSSUM	265	44	160	62
VAST	2973	325	2611	38
FLASH	109	15	49	45
GASKAP-HI	1	1	0	0
GASKAP-OH	1	1	0	0
DINGO	2	2	0	0

Table 1: Survey progress as of 12-04-2024

We were also informed that ASKAPsoft pipeline's workflow can place a high load on the /software filesystem's metadata servers, which store the containers, scripts and applications used on Setonix. This causes degraded performance for all users, so ASKAP has been moved to an isolated section of /software, which seems to have further impacted the performance of our pipeline.

It's unclear which part of the workflow is causing the high load, but we are investigating possible issues with containerisation or access to auxiliary files needed by the casacore libraries.

Our latest attempt at attenuation and beamforming degraded the performance of a few specific antennas, which we are cross-checking for any hardware issues in the Phased Array Feed receivers. Follow-up beamforming performed better with the previous attenuator settings left unchanged. We will continue to investigate this and other examples of complex behaviour that ASKAP can exhibit as part of the Collaborative Intelligence (CINTEL) project, in the hope that more effective use of monitoring data can increase our understanding of the system.

ASKAP's autonomous scheduler SAURON recently observed an EMU field that contains the bright radio source Hydra A. ASKAP's current processing scheme leaves significant artefacts around bright sources, and EMU have elected to quarantine fields containing such sources (as WALLABY have already done) while we continue to work on improving dynamic range.

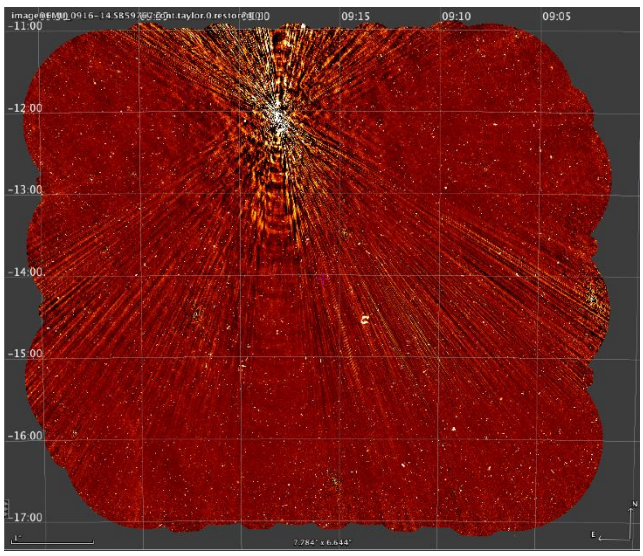

Figure 1: Pipeline image of an EMU field containing Hydra A, showing significant artefacts. Image supplied by Emil Lenc.

RACS-high data release

The first set of RACS-high observations have been released on CASDA for general-purpose use. Roughly 1/3 of RACS-high has been processed so far and further deposits will be made as the processing progresses. We plan to have all three RACS frequency bands available in full within a few months.

As an Observatory Project, RACS is available to everyone and is currently the best wide-area survey at radio frequencies between 700-1800 MHz. Please encourage your colleagues and research groups to make full use of this excellent resource while the deeper ASKAP surveys are underway.

APR2024 Guest Science Projects

We received 4 proposals for the current semester, all of which were ranked favourably by the Time Assignment Committee. We are in the final stages of assessing the technical feasibility of these proposals and will contact the PIs shortly with further information. Given that the semester has already started, we aim to streamline the process in future and give feedback more promptly.

As reported by the CRAFT team at ATUC, we have identified a path towards integration of the CRACO coherent high-time-resolution instrument into ASKAP as part of the national facility. While initially developed for research into Fast Radio Bursts, there has been interest in using CRACO's output for other science cases requiring higher time resolution than the standard 10-second visibilities produced by ASKAP's correlator. Prerequisites for operational integration of CRACO include creating suitable links to the ASKAP control and monitoring system, and automated management of output data products.

It is possible that CRACO may be available on a shared-risk basis in the 2024OCT semester. Potential users will likely need to make their own arrangements for storage space to receive high-time-resolution visibility data which will be kept for a limited time on the CRACO processing cluster.

GASKAP-HI parameter space exploration

After an initial assessment of the latest jointly-deconvolved ASKAP data cubes made for GASKAP-HI, the Survey Science Team has requested some additional checks. We are re-imaging the data using several different weighting schemes so that a direct comparison can be used to select the optimal strategy. We are also implementing the ability to apply different processing parameters to different parts of the frequency band, in line with what GASKAP-HI have been doing for their internal processing of Pilot Survey Data.

ATUC open session

The latest meeting of the Australia Telescope User's Committee included an open session on the 10th of April, designed to bring community representatives together with ATNF staff. The program for this session placed an emphasis on current and future projects, to ensure that ATNF's direction aligns with the needs of the radio astronomy community. This is especially timely with preparations for an updated decadal plan for Australian astronomy well underway.

The ASKAP team presented a summary of current issues and possible upgrade pathways and requested specific feedback on the community's vision for ASKAP in the SKA era. There seems to be wide community support for improving the sensitivity of ASKAP by upgrading the Phased Array Feed receivers, which could increase survey speed by almost an order of magnitude without changing ASKAP's data rate. To explore this possibility in more detail, we will be proposing an internal ATNF project to build a single prototype PAF using the latest low noise amplifier, power supply, cooling, and monitoring system technology. We expect that several improvements to operational stability can be made at the same time. If this project is accepted by ATNF management, it will run for two years and conclude with detailed analysis of the prototype's performance and realistic cost/effort estimates for deployment of a similar upgrade across all 36 antennas.

We also highlighted the need for continuous improvement to meet the goals of the existing Survey Science Projects on schedule. There is the possibility that specific feature developments could be funded as new projects. Any such project would need to be well integrated with operational activities and discussions around how to manage this are ongoing.

For further information

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