



ASKAP update for September 2022

In this issue we discuss plans for a full survey trial and progress on Pilot Surveys Phase II.

The ASKAP full survey trial

Our ultimate goal for 2022 is to commence full survey operations for as many Survey Science Teams as possible. Once underway, the full surveys will deliver a steady stream of data products over the next 5 years.

ASKAP's previous Pilot Surveys have tested our capacity to deliver data products with the required level of quality, but their relatively small observing time allocation has meant they were not a fully representative test of the telescope's throughput. While optimising parameters and strategies, typical processing times have been significantly longer than the time to observe each field.

For the full surveys, we know that the telescope must be capable of keeping up with incoming data, or our limited disk space will quickly fill and prevent observations in data-intensive modes. Our goal is to have an automated workflow that manages each new observation through every stage from scheduling to archiving. Combined with the increased processing power of Setonix, this should allow sustained survey operations. However, to test the full workflow we need to operate under representative conditions. This requires a full-scale trial that generates more data than we can store in the intermediate buffers.

Managing multiple timelines

The Setonix supercomputer is still being constructed and commissioned, which puts constraints on its availability. The next major downtime is for an upgrade taking place between the 19th of September and late October. Although this upgrade should solve some of the job reliability issues mentioned in last month's update, it means we will be unable to conduct further full-scale tests for several weeks. Given the generally positive results of

tests conducted so far, we hope to be ready for a full-scale survey trial shortly after Setonix is returned to service, assuming no new issues arise from the upgrade itself.

One month under representative conditions should be sufficient to quantify various aspects of ASKAP's readiness for sustained survey operations. Our current plan is to fit this month-long trial in between the conclusion of the Setonix upgrade, and the end of year break. The trial will nominally begin mid-November unless circumstances outside our control intervene.

We anticipate that ASKAP and Pawsey will remain online over the end of the year, and we intend to continue with automated operations into 2023 but may have to scale back some aspects of the observing pool during the break (e.g., reduced hours in spectral line mode) based on the results of the intensive month-long trial. If significant changes are required for sustained operations, we will transition back to consolidation mode in 2023 with the goal of resuming survey operations as soon as possible.

The time required to implement, integrate and test new ASKAP features including joint deconvolution across beams in spectral line mode and compressed (u,v) grid storage means that not all SSTs may be ready to begin by mid-November. We currently expect to commence full surveys for EMU, POSSUM, WALLABY, VAST, FLASH and CRAFT during the initial trial, with the remaining projects joining the observing pool as soon as possible.

A milestone for the entire community

The start of full survey operations will impact the entire ASKAP community. New data will be deposited into CASDA frequently and will need to be validated promptly by the SSTs, so the observatory receives feedback on its performance. Post-processing pipelines will receive a

torrent of input data and new discoveries are sure to emerge.

We aim to continue improving ASKAP based on the consolidation plan and community feedback throughout survey operations. However, the transition to full surveys shifts priority from development to science.

Guest science plans

Although ASKAP will spend most of its time conducting large-scale surveys, we still intend to offer a small amount of time for merit-based guest science projects and targets of opportunity. Our current plan is to issue a call for guest science proposals in May 2023, to be scheduled in the 2023OCT semester. Meanwhile, we are updating guidelines for requesting out-of-semester time sensitive observations that make good use of ASKAP's existing capabilities or test a possible new mode of operation. This will ensure that ASKAP can continue to respond to emerging opportunities even during survey operations. We will circulate the guidelines for these requests to the broader community shortly.

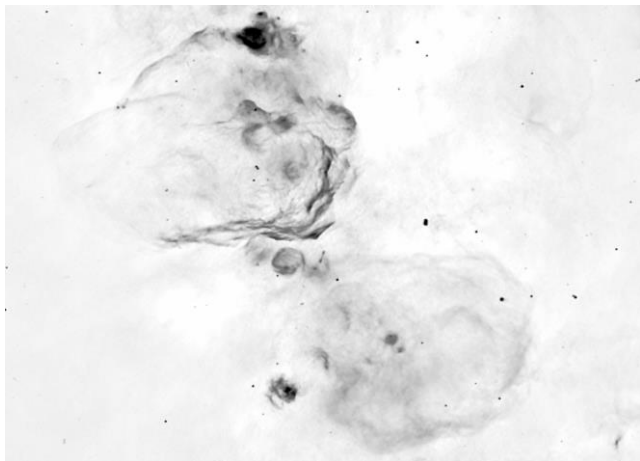


Figure 1: A complex source from a field recently observed as a target of opportunity for VAST. Image provided by Emil Lenc.

Pilot Surveys Phase II progress

While preparing Setonix for full survey operations, we are simultaneously using the previous supercomputer Galaxy to complete Pilot Survey Phase II processing. Galaxy will be decommissioned next year but should remain online long enough to conclude all Pilot Survey activity.

Observations for GASKAP-OH are getting underway for the first time after successful processing of the quality gate field. Re-observations for POSSUM, DINGO and FLASH are

also progressing and should confirm whether issues detected in the first set of observations have now been rectified in time for the full survey trial.

Collaborative intelligence

Linked with ASKAP's involvement with the CSIRO Future Science Platform on collaborative intelligence (CINTEL), we have been working with two PACE undergraduate students from Macquarie University to investigate anomaly detection using telescope diagnostic data.

ASKAP produces a huge amount of monitoring and diagnostic data to go along with its astronomical output. Using this auxiliary data effectively requires collaboration between humans with expert system knowledge, and algorithms that can quickly find, classify, and quantify anomalies. Creating a truly collaborative human + AI workflow is the ultimate goal of our CINTEL project. A dedicated postdoctoral fellow will join the project later this year to work towards this goal. Meanwhile, the students from Macquarie are working with us for 10 weeks to characterise the first stage of this workflow, which involves detecting and classifying anomalies such as radio frequency interference and correlator faults.

Observatory status

ASKAP was recently offline for about a week after an issue with the central building cooling system, which was exacerbated by lack of access to the site due to heavy rain. We are now back up and running as usual, though the cooling system needs further work to restore stable redundancy in operations. We will be monitoring its performance closely as we move towards summer in Australia, which coincides with the full survey trial.

CRACO commissioning

The digital firmware team has been hard at work chasing down data integrity issues in new correlator firmware that allows coherent fast transient detection. The upgrade to support the new CRAFT coherent (CRACO) instrument provided an excellent opportunity to add error checking into the main data stream, which has highlighted issues with on-board memory access. We hope to have a new correlator firmware build that enables CRACO features and reduces the number of correlator dropouts in the main astronomy data path ready for the full survey trial.

As Australia's national science agency and innovation catalyst, CSIRO is solving the greatest challenges through innovative science and technology.

CSIRO. Unlocking a better future for everyone.

Contact us

1300 363 400
+61 3 9545 2176
csiroenquiries@csiro.au
csiro.au

For further information

Space & Astronomy
Aidan Hotan
+61 8 8643 8543
aidan.hotan@csiro.au
<https://www.csiro.au/en/research/technology-space/astronomy-space>