ASKAP update for March 2022

In this issue we focus on preparation for full scale testing on Setonix Phase I. We also report on RACS and Pilot Surveys Phase II progress.

Update on the RASSP process

The Review of ASKAP Survey Science Proposals (RASSP) is ongoing. The external review panel has received input from the Survey Science Teams and the ASKAP Operations team and is currently preparing its report. Although the CSIRO S&A Executive had hoped to receive the report by the end of February, this timeline has slipped by a month.

When finalised, the report will go to the director of CSIRO Space & Astronomy, who will assess its recommendations and amend if necessary. From there, the ASKAP Operations team will determine how best to implement the survey plan, in consultation with the SSTs.

Planning for Setonix and full surveys

Current planning indicates that ASKAP should be ready to begin full surveys at the end of October 2022. This depends on several factors outside of our direct control, including completion of Pilot Surveys, resourcing of and progress on key consolidation tasks and commissioning the ASKAP data processing pipeline on the new Setonix supercomputer at Pawsey.

Moving ASKAP to Setonix

Pawsey have indicated that we will have access to Setonix Phase I (the first system with enough capacity to support ASKAP operations) in late April. We have assurances that Galaxy will be kept operational for at least 6 months from the hand-over point, which should provide enough time to complete commissioning activities and transition all operational processing to Setonix.

Setonix is critical to ASKAP's survey operations since we expect it to deliver at least a factor of two improvement in processing throughput. On Galaxy, we are unable to keep up with spectral line observations since processing takes roughly twice as long as observing (or more for some especially intensive modes). The throughput we achieve with Setonix will therefore be one of the main factors determining ASKAP's operational efficiency during the full survey program, with possible implications for scheduling priority between continuum and spectral line observing modes (in addition to scientific ranking).

Our development team already has access to a small-scale installation of the same hardware architecture that will comprise Setonix. Benchmarks of individual software tools suggest that the factor of two is achievable, but this will need to be tested with full scale processing jobs when more hardware is available.

The pipeline is a sequence of linked tasks, some of which utilise more resources than others, with varying degree of parallel processing support. Moving to Setonix will likely change the distribution of time spent on each task, prompting reassessment of future improvement priorities.

In addition to the change of hardware platform, significant changes will be made to how ASKAPsoft is deployed. Instead of the module-based approach used previously on Galaxy, we will be using Singularity containers on Setonix. This should increase the robustness of the ASKAP pipeline and reduce its dependence on packages managed outside of the ASKAP operations team.

In preparation for increased activity and the need to maintain data throughput during full-scale surveys, the ASKAP Operations team is in the process of recruiting a full-time data specialist. The new member of the team will take an active role in managing operations of and improving the ASKAPsoft pipeline, which we intend to have automated by the start of the full survey program.

Consolidation tasks

Pilot Surveys have tested ASKAP's capabilities to the limit. Although we have been able to produce science ready data products for most of the SSTs, significant work is needed to ensure that we can conduct the full survey program efficiently and effectively.

The ASKAP Operations team is compiling a document detailing the work required before surveys commence. Items include integration of operationally critical tasks such as holography, improved mitigation of correlator dropouts, full support for commensal processing modes, pipeline automation and work to bring antenna mechanical components up to a uniform standard. This work will need to take place between the conclusion of Pilot Surveys and the start of the full survey program.

Alongside the Setonix upgrade, we will be integrating a new instrument for coherent fast transient surveys, CRACO. This should improve ASKAP's sensitivity to Fast Radio Bursts by a factor of 6. Although most of the search hardware lies outside of ASKAP's primary data path, changes to the correlator firmware are needed to support a new data output channel for rapid access to visibilities. This requires careful testing to ensure that all existing observing modes continue to work as expected.

Progress reports

Several fields from RACS-mid have been re-observed after processing revealed data quality issues. Processing of both the -mid and -high bands is nearing completion, with plans underway for test uploads of individual fields to CASDA in the next month or two. We will be releasing mosaicked images of each field, as well as value-added data products including HiPS versions of the full survey area, re-mosaicked field images with uniform sensitivity obtained by including data from neighbouring tiles, and a global source catalogue. These additional data products may be released after the initial deposit and will be accompanied by at least one publication describing the survey.

Pilot Surveys Phase II

Observations for VAST, FLASH, WALLABY, EMU, and POSSUM are mostly complete, with data continuing to flow into CASDA. Please remember that all released ASKAP observations are available to the public and can be used by anyone. We encourage wide sharing of ASKAP survey data throughout the astronomical community.

WALLABY is preparing an internal data release of value-added products from their quality gate observations. The two GASKAP teams and DINGO are working on quality gate verification and validation prior to commencing their Pilot Survey Phase II science observations. DINGO and the ASKAP team have been finalising a method to export UV-gridded visibilities to better support future deep imaging while using less disk space than the raw data.

Additional VAST epochs have been validated and released.

Target of Opportunity

We recently observed a Target of Opportunity for VAST, with the goal of parameterising previously detected variable and transient sources. The selected field was located close to the Galactic plane and contains many extended sources (see Figure 1). An overlapping field was observed in a different frequency band to test holography beam map accuracy. ToO data are available in CASDA under project code AS113.

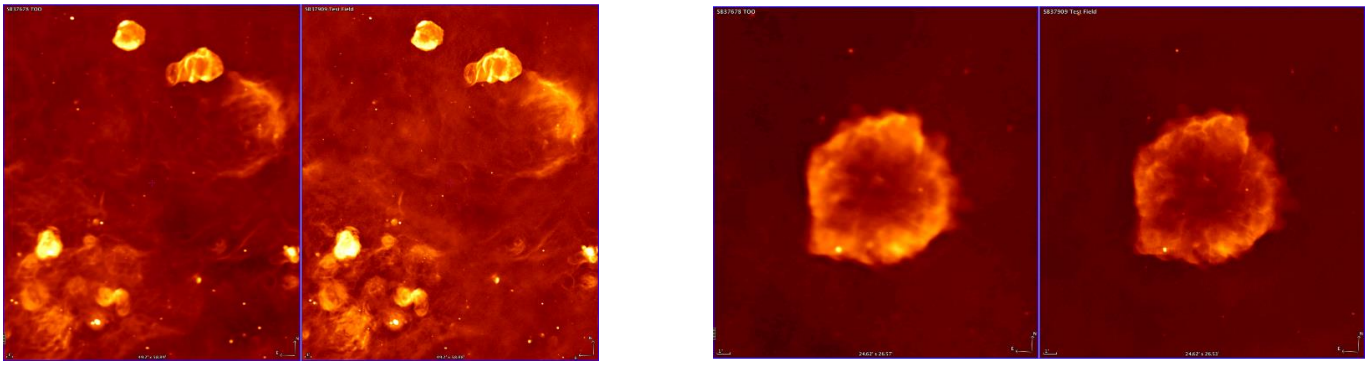

Figure 1: Comparison of a region in the galactic plane, imaged with ASKAP in two different frequency bands, 944 MHz on the left and 1296 MHz on the right. The first panel shows a large segment of the field and the second shows a supernova remnant in the field, displayed at the natural resolution of the image. Images made by Emil Lenc.

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