



ASKAP update for October 2022

In this issue we discuss planning and development for the full survey trial in November, and progress on Pilot Surveys Phase II.

Full survey trial preparation

Pawsey's new supercomputer Setonix is currently unavailable while it receives key upgrades that should address issues encountered during our first round of full-scale processing pipeline tests. Meanwhile, the ASKAP team has been working on key additional features required to support the full survey trial. These include automation of the processing pipeline, connecting software components across the system with an event-driven framework, enhancing SAURON to support a full simulation mode, and finalising how we will manage calibration data.

Workflow automation

ASKAP's autonomous operations model requires robust automation across the entire workflow from scheduling to data processing and archiving. This will be critical to managing resources such as disk space and ensuring prompt availability of science data products from each observation.

During Pilot Surveys we have been working on an event-driven framework for communicating between several software components. This will be used to manage the life cycle of a scheduling block by triggering key tasks and transporting critical information from one task to the next. Our goal is to have a complete workflow established within this new framework in time for the trial so that it can be tested and refined under operational conditions.

During a recent internal workshop, the ASKAP operations and development teams created a sequence diagram for a typical survey field. We identified all key components and discussed how they should be linked together to achieve an autonomous workflow under ideal circumstances. This

includes expanding the role of the event driven processing manager tool, which will keep track of calibration and holography information and update science processing parameter files with the best selection at runtime. The manager will also conduct some high-level scheduling of processing jobs on the supercomputer and gather statistics that can be displayed in the central processor user interface, which will be made available to the ASKAP community in future.

Based on experience with Pilot Surveys, we expect that most observations will progress through the automated pipeline without issue. This means we can reserve human intervention for unexpected situations and maximise our overall efficiency. Additional pipeline checkpoints have been added to ensure that errors are raised before CASDA upload if data do not meet quality standards.

Consolidation and system improvement

Other important activities include ongoing development of correlator firmware that can support the CRAFT coherent FRB detection system. Although we have tested several iterations of CRACO firmware, we have yet to resolve all data integrity issues with the additional logic present. If the upgraded firmware is not available in time for the full survey trial, we will continue with the current production build and switch over as soon as possible.

The current production firmware exhibits occasional correlator drop-outs, which may cause re-observation of some spectral line fields if they impact significant channels or a large fraction of data. Unfortunately, the CRACO-enabled firmware typically has a much higher number of data glitches. The firmware team has made significant progress identifying some of the underlying causes for data path instability as part of the CRACO development

work and there is a good chance that the final version of the CRACO correlator firmware will be even more reliable than the existing production build.

Holography has become a key part of ASKAP's calibration workflow, and we continue to make improvements to the associated software. We are currently re-structuring the repository in which the holography code is stored to improve its maintainability, ease of deployment and compatibility with ASKAPsoft. We are also working to integrate the holography observing procedure with the weights archive database, which will allow better tracking of holography beamformer weights.

Other important tasks that we aim to complete before the full survey trial include improved tracking of phased array feed domino maintenance requirements and incorporating interferometer delay calibration into the event-driven framework described above.

Antenna pointing improvements

We are planning to update ASKAP's pointing parameters based on investigations conducted by the AKVET team, using light curve deviations around source transit to measure array-wide trends. This work shows that there is a residual elevation offset that is strongly covariant with a gravitational deflection term, which we have not been able to measure previously and is therefore set to zero in the current pointing model. Although it is difficult to disentangle the two parameters, we plan to introduce our best estimate of the gravitational deflection term and re-measure axis offsets per antenna, which should reduce the pointing residuals overall.

Documentation and survey field planning

Before the full survey trial commences, we will circulate a survey plan, update the ASKAP observation guide and ensure that documentation of data products found in CASDA matches the pipeline's naming conventions.

We will also work with the Survey Science Teams to finalise input field selections in conjunction with the outcomes of SAURON scheduling simulations.

Pilot Surveys Phase II progress

Processing of POSSUM re-observations is providing a useful test of per-beam source and spectrum extraction for the purposes of primary beam shape verification. The DINGO G12 and two POSSUM fields are currently in the solar avoidance zone but should be available again in early November. GASKAP-OH observations are ongoing. Our goal is to clear the disks of everything related to Pilot

Surveys before the full survey trial begins, but we will attempt to get as many of these pending observations done as possible.



Figure 1: Part of POSSUM field 1554-55A, recently imaged in the mid-band for Pilot Survey Phase II. Image provided by Matthew Whiting.

Observatory status

Work to address reliability issues with the water-cooling system that services the ASKAP central building will take place before the full survey trial begins. An outage of one high voltage track will also be required prior to the trial, but scheduled maintenance on the rest of the HV switch gear will take place in 2024. We aim to begin the trial with all 36 antennas operational, although observations will continue according to established constraints for the different science modes if any antennas are unavailable.

CASDA status

An issue with the Online Proposal Applications & Links (OPAL) system means that it is currently impossible to create new OPAL accounts. It may be some time before this can be resolved. If any new ASKAP users need access to CASDA and do not have an existing account, please contact the Operations team for assistance. It is important for all SSTs to have their validation team ready for an influx of new data when the full survey trial begins.

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