



ASKAP update for March 2023

This month we describe further holography workflow improvements, ongoing efforts to migrate processing to Setonix, and CRACO firmware tests.

ASKAP full survey operations status

Survey observations remain paused except for time-critical components, although we have now processed the entire data backlog from the full survey trial at the end of 2022, using the Galaxy supercomputer. We had hoped to resume survey operations using the new Setonix supercomputer by this time, but we and Pawsey are still working through some issues with the platform.

It has taken about 4 months to process one month of observations on Galaxy, so we are reluctant to resume survey operations without Setonix. However, given the need to keep data flowing, we may resume observations for another limited trial period using Galaxy in April.

SST	Observed	Processing	Awaiting Validation	Released	Rejected
EMU	43	0	6	30	7
WALLABY	10	0	1	4	5
POSSUM	53	0	53	0	0
VAST	474	0	0	444	30
FLASH	9	0	7	0	2

Table 1: Status of scheduling blocks observed since the start of the full survey trial. The first column shows the total number of fields observed per survey, the second column shows the number currently progressing through various stages of processing, the third column shows the number that have been deposited into CASDA, and the final two columns show the number released to the public or rejected. POSSUM products are derived from both EMU and WALLABY observations.

Setonix commissioning update

After concentrated collaborative effort from ASKAP and Pawsey staff, we have been able to run all the necessary ASKAP applications on Setonix using the new software container system. Pawsey and the platform vendor completed another round of integration maintenance on the 13th of March. We had hoped to conduct two weeks of

post-maintenance testing across all survey modes and begin using Setonix at the start of April.

Unfortunately, we now see a significant number of jobs stall due to a wider issue of compatibility with Setonix's Lustre filesystems. This issue has been escalated to the vendor with high priority. Due to the large number of jobs required to process any given scheduling block, we have been unable to run full-scale tests.

Data validation progress

Ongoing Survey Science Team data validation efforts are providing important feedback from the full survey trial.

The WALLABY team recently rejected half of their observations due to inadequate continuum subtraction, which impacts the ability to find HI sources. The low-quality cubes in question all have strong continuum sources close to or within the field. Similar issues were noticed during Pilot Surveys and the WALLABY team explicitly quarantined a subset of fields that were at risk due to their position on the sky, but the threshold for exclusion will need to be adjusted based on the latest results. Unfortunately, this leaves a relatively small fraction of the total survey area in the observing pool.

The ASKAP data processing team will investigate ways to improve spectral line imaging in these circumstances so that by the time the initial pool of fields is exhausted, we should be ready to take on more challenging regions. Ongoing efforts to create a sky model should assist with this, but we may be able to implement source peeling even without a full sky model. Similar methods were adopted using CASA tools for RACS-mid but have not yet been replicated in ASKAPsoft. The methods used for RACS-mid are described in a survey description paper, which is currently undergoing peer review.

Automated processing has allowed prompt archiving of VAST fortnightly transient survey epochs and the VAST team has been able to keep up with validation, allowing quick release of data products. We will look to expand VAST's dedicated survey component to include additional

allocated regions when full survey operations resume. Epochs with dedicated cadence currently introduce an overall efficiency penalty by locking out longer observations, and this will need to be investigated fully to minimise impact on other Survey Science Teams.

Supporting additional survey modes

Observations of a test field for GASKAP-OH have been completed and the data are being processed on Galaxy using an updated velocity correction method. If the resulting spectral line cubes meet science requirements, we will be able to include GASKAP-OH in the observing pool when survey operations resume.

Efforts to compare ASKAPsoft's joint deconvolution capabilities with GASKAP-HI's WSCLEAN results are ongoing and we plan to proceed with pipeline integration in parallel with the verification work as much as possible. Some additional development is required to make spectral line joint deconvolution compatible with existing code, including a new visibility weighting approach that is already under construction. Ongoing issues with Setonix may cause further delays when it comes to testing the joint deconvolution mode at full scale.

CRACO commissioning progress

Recent on-sky tests of a candidate correlator firmware build containing the new CRAFT coherent fast transient output module showed that ordinary visibility data from the 32x zoom mode were severely corrupted. The ATNF firmware development team quickly found the source of the problem and provided a new build that fixed the issue.

We will conduct further tests in all zoom modes in future as part of ongoing verification activities. The coherent fast transient output is simultaneously being tested and improved, with more iteration expected over the next few months. The ASKAP operations team is working closely with the CRACO team to manage firmware versions and ensure we get CRACO up and running as soon as possible, with no impact on existing imaging modes.

Tracking holography beam weights

In the previous issue of this newsletter we reported on updates to the holography processing workflow. This month, we have tested changes to the holography observing procedure. Until recently, holography weights were made outside the archive used to track beams formed for science observations. Holography beam weights are now created within this weights archive

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database and stored under a new category that identifies their purpose, along with a new parameter that tracks the original beam weights under test.

In a full test of the new workflow, the SAURON scheduling software and ASKAP processing manager successfully conducted a holography measurement, triggered processing of the raw data and made the beam maps available to the ASKAPsoft pipeline, with no human intervention. This completes operational integration of the holography system and should ensure that all future survey observations are mosaicked with matching beam maps as intended.

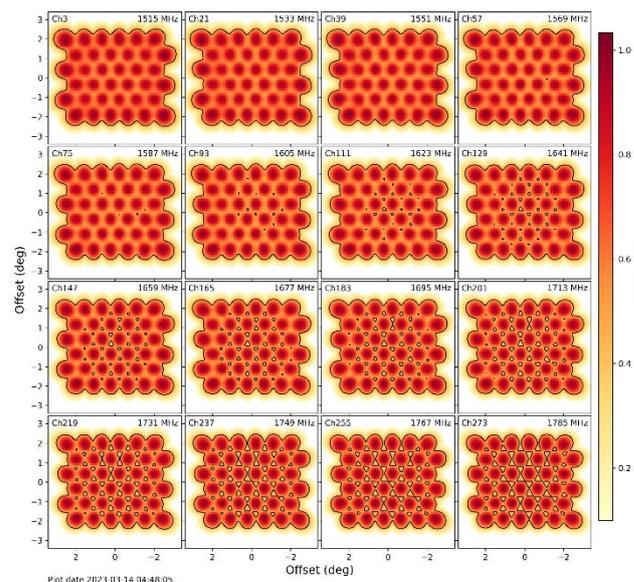


Figure 1: Total intensity beam maps for several frequency channels from the closepack36 configuration used to test database tracking and automatic processing of holography observations

Observatory maintenance

Staff from the Murchison Support Facility have been using the pause in survey operations to complete as much maintenance work as possible. This includes replacing failed domino receiver elements inside Phased Array Feeds, assisting the CRACO team with data link integrity checks, servicing antenna drive systems, installing a new RFI-secure access conduit for external control building sensors, and investigating water leaks in the central control building.

Maintenance on the long-distance optical fibre link from Geraldton to the observatory will take place over the next few months, causing loss of network to the observatory for about half a day per week. This may impact survey operations to a limited extent.

For further information

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