

ASKAP Commissioning Update, September 2019

In this issue, we report on ASKAP pilot survey observing and data processing, outcomes from a busy week aimed at planning the Rapid ASKAP Continuum Survey data release and preparations for the first ASKAP-X project planning session.

ASKAP pilot surveys progress

Pilot survey observations continued this month with follow-up of an event from the Laser Interferometer Gravitational-wave Observatory (LIGO). We also observed the first pilot survey epoch for the Variable and Slow Transient (VAST) project. VAST are using the same observing mode as RACS in order to quickly build up time domain information over large areas.

Between other activities, we continued to conduct system test observations for the fast-transient (CRAFT) pilot survey, with the goal of improving data capture from the high time resolution module and better understanding the calibration of events captured in the voltage buffers.

LIGO follow-up

LIGO event S190814bv was triggered on the 14th of August, with the signature of a neutron star – black hole merger. LIGO's detectors localised the event to an area of 23 square degrees, just under ASKAP's instantaneous field of view, making it a perfect candidate for follow-up. We have observed several epochs of this field and the data are available on [CASDA](#) under project code AS111.

The ASKAP LIGO team have issued several [GCN circulars](#) describing the search for transient radio sources within this field. One transient was identified, but further follow-up with the Australia Telescope Compact Array has shown that this is likely an active galaxy, unrelated to the gravitational wave event. Further ASKAP observations are planned to cover a range of post-merger timescales.

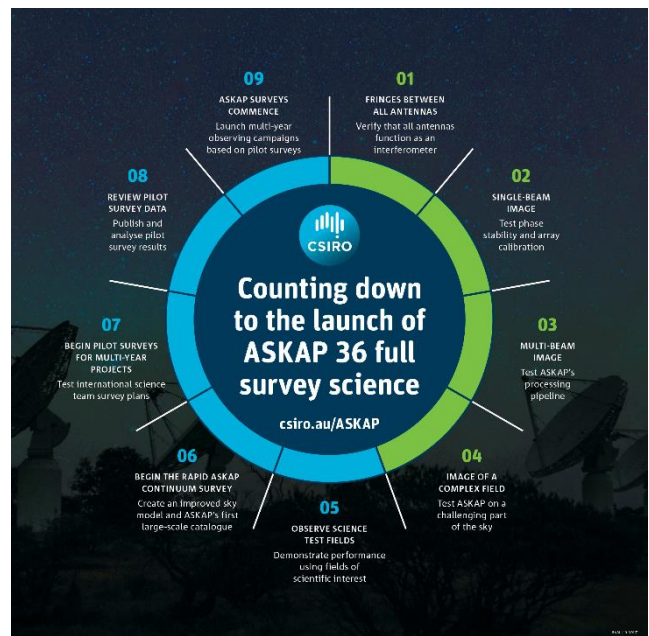
Thanks to extensive efforts by several science teams and the ASKAP science data processing team, we now have a good default set of continuum imaging parameters for observations with the full array. These were used to set a record turn-around time for this follow-up of only a couple of days from trigger to data release.

Pilot survey data processing

After performing quality analysis of a second processing run on the first EMU pilot survey field, the EMU team has given the green light to proceed with processing the full

set of pilot observations. This is now about 2/3 complete and the results are being loaded into [CASDA](#). The EMU team is drafting release notes for these data products and the first two scheduling blocks have been released. They can be found under project code AS101.

In addition to the Stokes I continuum cubes that are being uploaded with the first data release, the ASKAP operations team have produced one set of full Stokes cubes for the POSSUM polarisation science team. These will be used to assess the quality of ASKAP polarisation products at an upcoming busy week, the goal of which is to finalise plans for POSSUM's pilot survey. Although we are not yet doing leakage calibration in the standard pipeline, preliminary analysis shows that the polarisation products are of high quality.

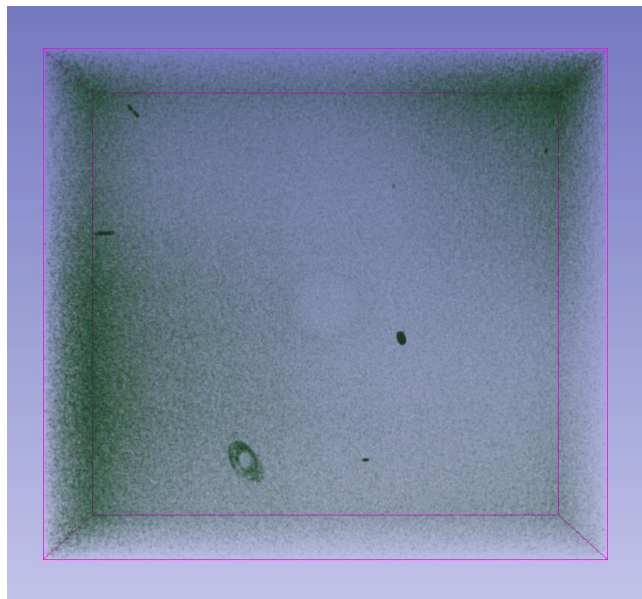


WALLABY data processing

Work continued this month on some remaining issues with spectral line data processing. These include CLEAN divergence in some channels on some beams, and failure of the image-based continuum subtraction on some beams. Release 0.24.5 of the ASKAP data processing

pipeline should address most of these issues and much of the Eridanus test field has been successfully processed.

To celebrate this achievement, we advanced the ASKAP survey countdown clock to stage 4, accompanied by an impressive 3D representation of HI in the Eridanus cluster.



3D representation of the Eridanus cube made by Karen Lee-Waddell, with velocity on the axis going into the page. Several HI detections are visible, including a ring of gas in the largest cluster galaxy.

RACS processing refinements

During the week of September 2nd, a cross-team group of people working on RACS processing and quality control met in Sydney to discuss progress. One of the goals of this busy week was to determine plans for releasing RACS data, with the goal of delivering survey data products to the astronomy community as soon as possible.

We decided that a staged data release would be most appropriate, with basic products such as images from each field being released first. These will be followed by

refined products such as multi-field mosaics and a source catalogue for the entire survey.

The second processing pass of the first RACS epoch is now complete and we are deciding whether a third pass will be necessary before release.

RACS quality control

Several science team members have been assisting with data quality analysis (according to the policy reported in the last newsletter). Initial results show that the flux scale is well matched to existing surveys. However, we are finding astrometry offsets at the level of roughly one arcsecond. Though much smaller than the synthesised beam, these offsets do appear to be statistically significant. This will be accounted for in the uncertainty quoted by the source catalogue. Investigations into the underlying cause will continue until the issue is understood.

ASKAP-X program increment planning

During the last month we have been gearing up for the first program increment of ASKAP-X. This project will finalise construction efforts and manage improvements to the telescope over the next three years.

In the scaled agile framework that we are using to run the project, a program increment is a package of work designed to last roughly three months (the remainder of this year). The planning process involves input from all team members and determines how to go about addressing the highest priority features required for smooth and efficient operation of the telescope.

The focus of the first program increment will be on increasing the success rate of observations and reducing the amount of data lost to system faults. Pilot survey data has been around 20% flagged and the overall success rate of long-track observations has been about 1 in 3. By addressing various system issues, we hope to make significant improvements during the next few months.

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