ASKAP update for July 2022

In this issue we discuss the first ASKAP continuum pipeline output from Setonix, the first call for observing targets corresponding to the full survey time allocation, and ongoing consolidation efforts.

First ASKAP images from Setonix

Commissioning of ASKAPsoft and the processing pipeline on the new Setonix supercomputer has progressed to the point where full continuum imaging jobs can be run. After making some changes to accommodate the structure of Setonix (with 128 cores per node and the ability to assign independent jobs to different cores within a single node), we can process a full 36-beam observation with 288 x 1 MHz channels on 72 of the 180 nodes available for ASKAP Operations. For a 10-hour observation, end-to-end processing takes under 5 hours, easily allowing us to keep up with incoming data. With additional optimisation we should be able to achieve the same result on 41 nodes.

The images resulting from these tests will be released elsewhere, but Figure 1 shows a typical job breakdown.

The next step will be to investigate the performance of spectral line imaging mode and the overheads associated with writing out continuum cubes and full polarisation products. For most survey fields, all these data products will be required as part of commensal processing. Understanding how the various jobs interact when run simultaneously will be necessary to gauge our efficiency ceiling, but early indications suggest we will achieve the expected performance improvements from Setonix.

We are still experiencing occasional job failures on some processing nodes (indicated by missing green bars for some beams in Figure 1), an issue that we were unable to solve on the previous Galaxy supercomputer. Pawsey staff are investigating this alongside the ASKAP team.

Although there are some minor packaging and deployment tasks remaining, we have encountered no major issues with the new platform, thanks to the extensive preparation and testing done on a smaller machine with the same architecture. We also need to finalise the Operations workflow, given that Setonix has new scratch and long-term storage options. Our goal is to begin using Setonix for Operational activities as soon as possible, to build experience for the full surveys.

Call for full survey field specifications

Although some work is still required to finish Pilot Surveys Phase II, the conclusion of the Review of ASKAP Survey Science Proposals (RASSP) means that we can begin detailed preparations for full surveys. One of the biggest questions is whether we can achieve our expected survey efficiency target.

With knowledge of the full observing pool, we can prepare for survey operations by running the SAURON scheduler in simulation mode. This will reveal our maximum achievable efficiency and whether we may encounter LST crowding, how often frequency band changes are required, the impact of ongoing testing and development reservations, and so on. Processing load is a key factor that we will also attempt to simulate using typical execution times as a guide.

With this goal in mind, we recently requested that each Survey Science Team (SST) supply a preliminary set of target fields based on their RASSP time allocation. The format of the request mirrors Pilot Surveys but includes active priority assignment for the first time.

We will iterate with the SSTs on the final field selections and tuning of associated observing constraints over the next few months.

Consolidation progress

While preparation and resourcing discussions for large-scale consolidation tasks continues, we have been making progress on smaller improvements. Updates to the beamforming code were deployed recently, which should improve masking of PAF ports with poor performance. This helps ensure that science observations are conducted with the best possible primary beam quality.

We also updated the conditions under which ASKAP's digital system is automatically re-synchronised, to eliminate a spurious trigger related to PAF status.

Staff at the observatory have been investigating unexpected signal level variations in antenna 8. Although these should calibrate out, it would be good to understand their cause, which we suspect to be somewhere in the on-dish calibration system.

Improvements to the holography software are also underway, to better store polarisation and frequency information in the beam map files.

Plans for integration of additional Central Processor (CP) control and monitoring features are also being drawn up. We hope to provide the SSTs with a web interface showing processing activity by the start of the full survey campaign, so team members can monitor ASKAP's full data life cycle. This should provide advanced notice of new CASDA deposits that will require validation. The CP Manager software will also be a key aspect of efforts to automate ASKAP's processing pipeline and various auxiliary tasks including the production of diagnostic plots and delay solutions.

ASKAP at the ASA

The Astronomical Society of Australia recently held its Annual Science Meeting, at which ASKAP was awarded the Peter McGregor prize for innovation in astronomical instrumentation. We were encouraged to see many talks highlighting results from Pilot Surveys throughout the meeting.

The RACS team also presented a summary of recent progress, including the latest SPICE-RACS polarisation data and early results from two additional frequency bands.

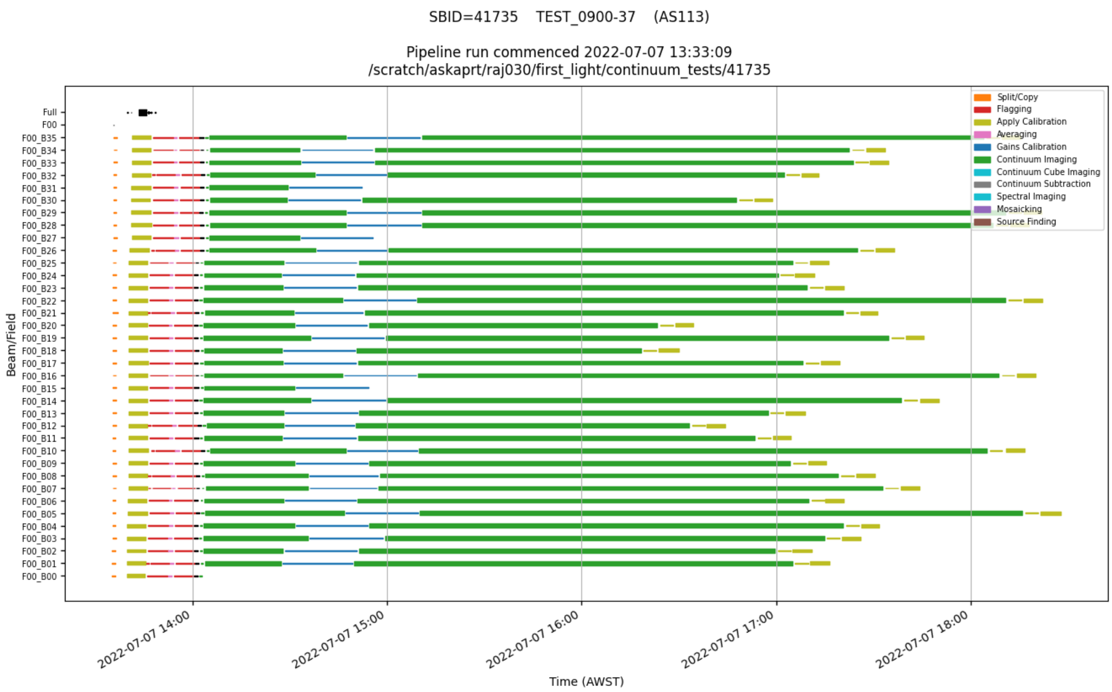

Figure 1: ASKAP pipeline job statistics plot showing the execution time of various processes throughout the duration of a full continuum imaging run. Figure provided by Wasim Raja.

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