ASKAP update for May 2023

This month we report on the resumption of survey operations, plans for a dedicated RFI environment survey, and the upcoming call for guest science proposals.

Ramping up survey operations

Since the previous edition of this newsletter, we have successfully processed two epochs of a VAST dedicated transient survey region and two EMU/POSSUM fields using Pawsey's latest supercomputer, Setonix. In all cases, observations flowed through the telescope and processing pipeline into the data archive as expected, under event-driven control of the processing manager software.

As the table below shows, POSSUM have begun to validate the full survey trial fields from last year, allowing new data for the commensal EMU/POSSUM project to be observed. All other teams have cleared their validation backlog and are awaiting new data.

SST	Observed	Processing	Awaiting Validation	Released	Rejected
EMU	43	0	0	36	7
WALLABY	10	0	0	5	5
POSSUM	53	0	24	22	7
VAST	644	0	0	612	32
FLASH	9	0	0	7	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.

All standard processing templates have been updated to run on the Setonix work queue. While some of the auxiliary processing services (such as holography, diagnostics and SEFD calculation) still use Galaxy, we are investigating the most effective way to move everything over to Setonix while sharing resources with the main pipeline tasks. Learning more about the load associated with routine data processing in each survey mode will be an important part of this analysis.

Processing performance on Setonix

Processing of the 42 x 12 min observations for each VAST epoch took significantly longer than on the previous supercomputer, Galaxy, and longer than the time taken to observe them. Due to the differences in platform architecture (fewer nodes and more CPUs per node) there is scope to significantly optimise VAST processing.

On the 12th of May we commenced observations of two EMU/POSSUM fields specifically chosen to complete a multi-field tile needed to test the value-added EMUCAT processing pipeline. There were a couple of node failures that extended the overall processing time beyond that expected. We will continue to monitor processing performance as the observations progress to see how frequent such failures are, and look at ways to further improve the overall processing efficiency.

Where possible, we intend to continue survey operations from now on. Since we have made the transition to Setonix, there should be no need for long periods of downtime, and we are dedicated to providing the SSTs with as much data as possible throughout the rest of the year. Observations for FLASH and additional EMU/POSSUM fields are already underway. WALLABY observations will be scheduled by SAURON at the next available opportunity.

Expanding ASKAP's survey capabilities

Optimisation of the existing survey workflows is a high priority, but we are also working on integrating the remaining SSPs and addressing data quality concerns. The GASKAP-OH team are currently considering which of two possible velocity correction methods will best suit their science needs. Once a conclusion has been reached and final pipeline integration is complete, we will be ready to process science observations for GASKAP-OH. However, some scheduling issues still need to be clarified before observations can begin.

ASKAPsoft support for GASKAP-HI's joint deconvolution mode is ready for further testing and initial pipeline

integration. This work has been difficult to progress while simultaneously commissioning Setonix, so we are in discussion with the PIs about how best to proceed.

DINGO are working on updated requirements for deep observations and (u,v) grid storage while keeping an eye on related technology developments. We also need to schedule additional components of the VAST dedicated transient survey and will be discussing how best to accomplish this with the VAST team soon. Now that survey observations have resumed, we will activate the new CRACO commensal mode for further testing and commissioning.

We have also placed a high priority on reducing the artefacts generated by bright sources, especially those just outside the field of view.

Surveying ASKAP's RFI environment

With SKA construction ramping up, we can expect an increased risk of construction-related RFI impacting ASKAP surveys. In order to make sure we promptly detect changes in the RFI environment for the purpose of reporting, we need to establish the current baseline. Over the next few months, we are planning an RFI survey specifically designed to cover ASKAP's entire frequency range, including frequencies not commonly used for survey operations. This short survey will also test a new RFI analysis tool designed to calculate statistics and visualise the flagging tables produced as part of routine processing. The goal is to analyse the flagging statistics of every ASKAP scheduling block and make the output available as part of the diagnostics that can be used for validation. The new software will also be able to compute and visualise statistics over multiple scheduling blocks, which should provide more visibility of the dynamic RFI environment.

Guest science call for proposals

Around the time this newsletter is circulated, ATNF will issue the next call for observing proposals. This semester, ASKAP will be available for a limited amount of Guest Science Project time (150 hours). To reduce complexity in this first semester, we are recommending that proposals adopt one of the existing and well-tested survey observing and processing modes, however we may accommodate slight modifications if required to meet a compelling science goal. Additional information for prospective users is available online. We have also updated the ASKAP science observation guide with some of the lessons learned from ASKAP Pilot Surveys.

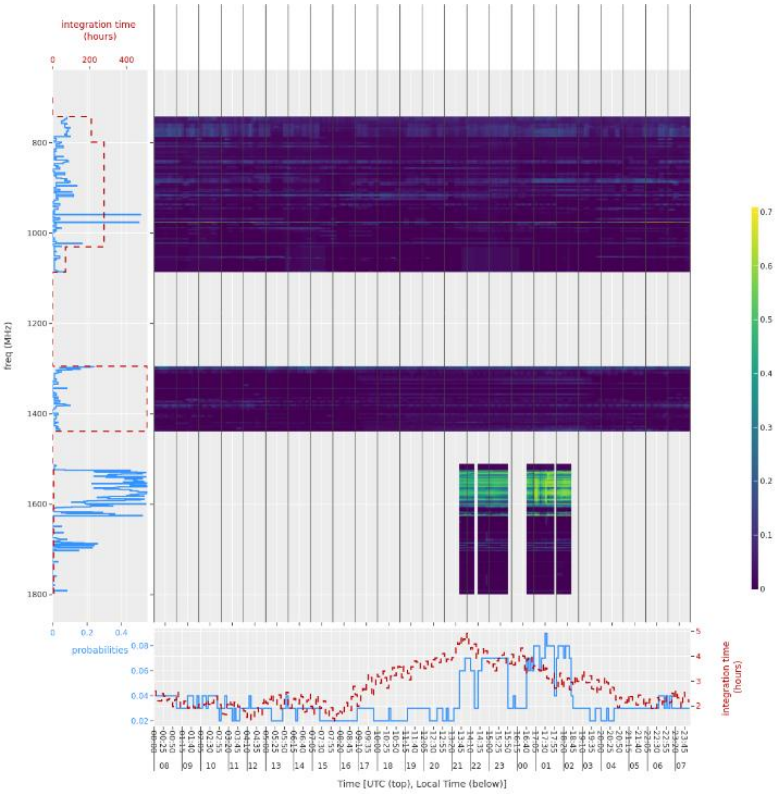

Figure 1: Flagging statistics summary plot from roughly 1000 hours of various survey observations since 2019. In the parts of the band used for surveys, we flag roughly 3% of the recorded data. Note that the gap between about 1100 and 1300 MHz is badly impacted by global navigation system satellites and is discarded before processing, so it does not influence these statistics. For the remaining science bands, we lose a total of about 20 MHz to aeronautical radio navigation, and 10 MHz each to fixed mobile and mobile satellite services.

Figure and analysis provided by Liroy Lourenco.

For further information

CSIRO Space & Astronomy
Aidan Hotan
+61 8 6436 8543
aidan.hotan@csiro.au
csiro.au/astronomy