



# ASKAP update for September 2023

This month we report on survey progress, maintenance activities, proposed data validation assignment changes, and polarisation calibration investigations.

## Survey progress report

Survey operations continued during the past month. A subset of the GASKAP-HI survey area is now active in the observing pool, but issues with the digital system on ak03 have interrupted recent observation attempts. GASKAP-HI requires all inner antennas for short baselines and optimal sensitivity to extended emission. Although these issues have since been resolved, disk space is now limiting our capacity to observe in spectral line modes. We have also had to replace gearboxes on ak01 and ak11 over the last few weeks.

We currently have a backlog of unprocessed data due to an unexpected week-long processing pipeline outage following the Pawsey Supercomputing Research Centre's planned maintenance at the beginning of September. An update to the slurm resource management software introduced a bug in a specific mode used by ASKAPsoft, causing jobs submitted with heterogeneous resource requirements to fail. Pawsey staff assisted in the investigation and subsequently applied a patch that resolved the issue. We were able to resume processing on the 12<sup>th</sup> of September and will work through the backlog as quickly as possible. As all disks are now full, spectral line observing will be on hold until space is available.

SST	Observed	Awaiting Validation	Released	Rejected
EMU	106	0	92	14
WALLABY	45	2	17	26
POSSUM	150	18	100	32
VAST	1660	361	1264	36
FLASH	51	6	21	24

Table 1: Survey progress as of 13-09-2023

Table 1 (above) shows progress since the beginning of full survey operations. Continuum and polarisation projects are proceeding well, with a relatively low rate of rejection

due to issues with data quality. Unfortunately, spectral line data products are more heavily impacted by solar interference, low-level continuum artefacts, ducted RFI and other systematic issues. This currently leads to rejection rates above 50%. WALLABY and FLASH are also receiving less data than the continuum projects due to the rate at which our processing pipeline can complete large spectral line jobs. We are discussing options to increase our supercomputer resource allocation, while investigating ways to further optimise the software.

## Dividing data validation among projects

The high WALLABY rejection rate has prompted a review of how we assign validation responsibilities across the various survey data products. Being fully commensal with EMU and opportunistically commensal with WALLABY, the POSSUM team are already assigned validation responsibilities for polarisation-specific data products from these surveys. WALLABY is currently assigned validation responsibilities for all other data products corresponding to their scheduling blocks, but EMU intend to use the continuum data from these where possible.

In several of the rejected WALLABY observations, it appears that the continuum data would be of sufficient quality for science, even though the spectral line source-finding fails WALLABY quality thresholds. To preserve archival access to useful continuum data from WALLABY observations, we propose assigning validation responsibilities for WALLABY continuum data to EMU. WALLABY will retain validation responsibilities for the spectral line data products. Deposits rejected by WALLABY will still trigger a re-observation of the associated field, ensuring that WALLABY will eventually get a full set of high-quality data. In the unlikely event that WALLABY accepts data from a scheduling block and EMU rejects it, the corresponding field will also be re-observed. We expect this to be sufficiently rare as to not unduly impact WALLABY's survey efficiency.

We will continue to investigate ways in which the quality of spectral data might be improved. If new tools and techniques are required, this work may take time. The goal of altering validation responsibilities is to maximise the science output of the telescope in the meantime.

## Polarisation calibration verification

POSSUM recently reported unusual off-axis leakage patterns in fields observed within the Southern polar cap region. As part of our investigation, we conducted off-axis test observations of the radio source 3C286, which has well-known polarisation characteristics. These observations show that application of the holography-based primary beam and polarisation leakage correction was not being rotated according to the field orientation for the Q and U component – leading to the issue reported by POSSUM.

As part of this analysis, we have also discovered that the on-axis component of polarisation leakage is removed twice, during bandpass calibration and during holography correction. This second issue would likely have impacted

all science data processed to date, not just the polar cap fields. We will test fixes for these issues with new observations as soon as possible. If, as expected, the fixes improve our polarisation calibration and result in reduced leakage overall, we will need to consider the implications for POSSUM data that has already been processed and released.

## Guest science project preparation

The October ATNF observing semester begins soon, and ASKAP will participate for the first time with 4 Guest Science Projects (GSPs) in the observing pool. These will be scheduled autonomously around ongoing survey observations over the next 6 months. We will shortly be in contact with the GSP PIs to finalise the observing and processing strategies. Like all other ASKAP observations, data from the GSPs will be made publicly available on CASDA as soon as it has been validated by the proposer. GSPs are assigned project codes beginning with AS300, to distinguish them from the Survey Science Projects in the AS200 range.

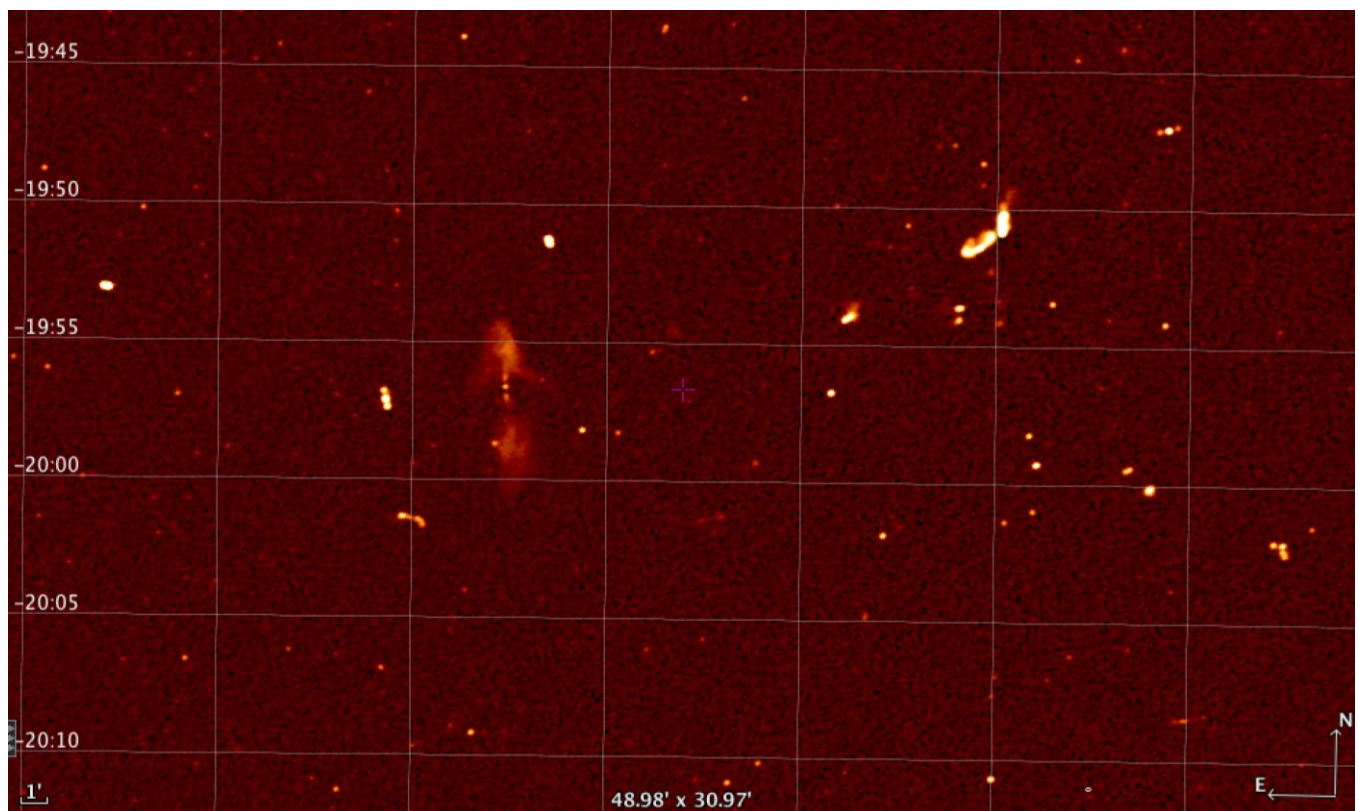


Figure 1: A small region of the continuum image from a recent WALLABY observation, showing many extended sources. Image made by Emil Lenc.

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