ASKAP update for January 2025

This month we report on survey progress over the holidays, recent publications arising from ASKAP data, and plans for 2025.

Survey science progress update

ASKAP continued to operate largely autonomously with only small issues throughout the end of year holiday shutdown period. Both the telescope and the Pawsey Supercomputing Research Centre remained online for the duration and all processing was completed promptly with no data backlog developing. A few issues with individual antennas and subsystems required human intervention, but most of these corresponded to known failure modes that we are looking to address or eliminate with future development or major upgrades.

Observations were conducted entirely in the lowest frequency band to minimise configuration changes, with most of the time spent on VAST and EMU continuum fields to minimise data rates. Some Guest Science Project observations were also completed. We started with FLASH in the observing pool, but issues with the RFI ducting alert system reliability led to FLASH being quarantined part way through the shutdown to avoid recording unusable data. We have already updated the ducting alert system to eliminate one source of false negatives and will continue to investigate how the overall reliability can be improved.

SST	Deposited	Awaiting Validation	Released	Rejected
EMU	342	2	269	74
WALLABY	90	0	54	40
POSSUM	431	9	299	128
VAST	4560	275	4545	42
FLASH	276	11	146	119
GASKAP-HI	12	11	1	0
GASKAP-OH	1	1	0	0
DINGO	24	2	19	3

Table 1: Survey progress as of 15-01-2025

Some data quality issues arose towards the end of the holiday period, with 7 EMU scheduling blocks rejected due to artifacts and beams that did not meet the spatial resolution requirements for the survey. However, 15 other EMU fields were successfully processed and released during the shutdown. We are investigating the cause of the data quality issues and will seek to improve automated flagging and implement additional processing checkpoints to avoid archiving sub-optimal data in future.

Survey operations in 2025

Towards the end of 2024, we demonstrated sustained spectral line observing capabilities using the Setonix supercomputer for the first time. Going into 2025, our intention is to have all Survey Science Projects in the active observing pool where possible this year. This will be the first time that ASKAP can run as intended, dynamically scheduling the entire survey program using constraints specified by the Survey Science Teams and generating science data products promptly in all modes.

If we manage to sustain the expected level of efficiency throughout the year, we will have sufficient data to make more reliable estimates of survey completion timelines and verify simulations of survey progress. We will also be able to assess the scheduling efficiency impact of unplanned constraints, like the need to observe some projects at night and other environmental impacts.

RACS-high full results published

The full set of value-added data products for RACS-high are now available on CASDA. A paper describing these data products has been accepted for publication and a preprint is now available. These additional data products have been corrected for systematic flux scale and astrometry variations which are described in detail in the paper. We recommend all Survey Science Teams familiarise themselves with these corrections since many of the same systematics will be present in longer observations to some extent.

Full-sensitivity images were made by combining data from adjacent fields and trimming to the original field boundaries. A curated all-sky source catalogue is also provided.

This data release completes the full frequency coverage planned for RACS, though additional epochs within each band have already been observed in some cases. With all three frequency bands published, one of the next steps will be to create a global sky model across ASKAP's full observing frequency range. In parallel, we are developing software to calibrate ASKAP by comparing any observed field with the global sky model. If this approach performs well, it could greatly reduce our calibration overheads and provide more frequent calibration solutions.

ASKAP discovers 6.5 hr periodic transient

Another recently published paper highlights the discovery of the longest ultra-long period radio transient, ASKAP J183950.5−075635.0. This source was serendipitously discovered in a previous epoch of RACS-low (see Figure 1) and exhibits interpulses, strongly suggesting that a rotating magnetic dipole is responsible for the emission. Our current understanding of the radio pulsar emission mechanism can't explain bright coherent emission from such a slowly rotating dipole, so this discovery may lead to a new understanding of these ultra-long period sources.

Priorities for 2025

In addition to the short-term development priorities listed in the final newsletter of 2024, we will focus on a few large-scale development topics as part of the ASKAP Key Capabilities project in 2025. The main goal is to develop, verify and deploy sky-model calibration as a standard mode of operation. This should increase ASKAP's survey efficiency and improve data quality. Work on constructing the RACS sky model continues in parallel with software tool development for pipeline integration. We are also testing the fundamental approach by deriving bandpass solutions on individual fields and comparing to standard solutions based on observations of the reference source PKS B1934-638. We will seek to bring these threads together and deliver the full system as soon as possible.

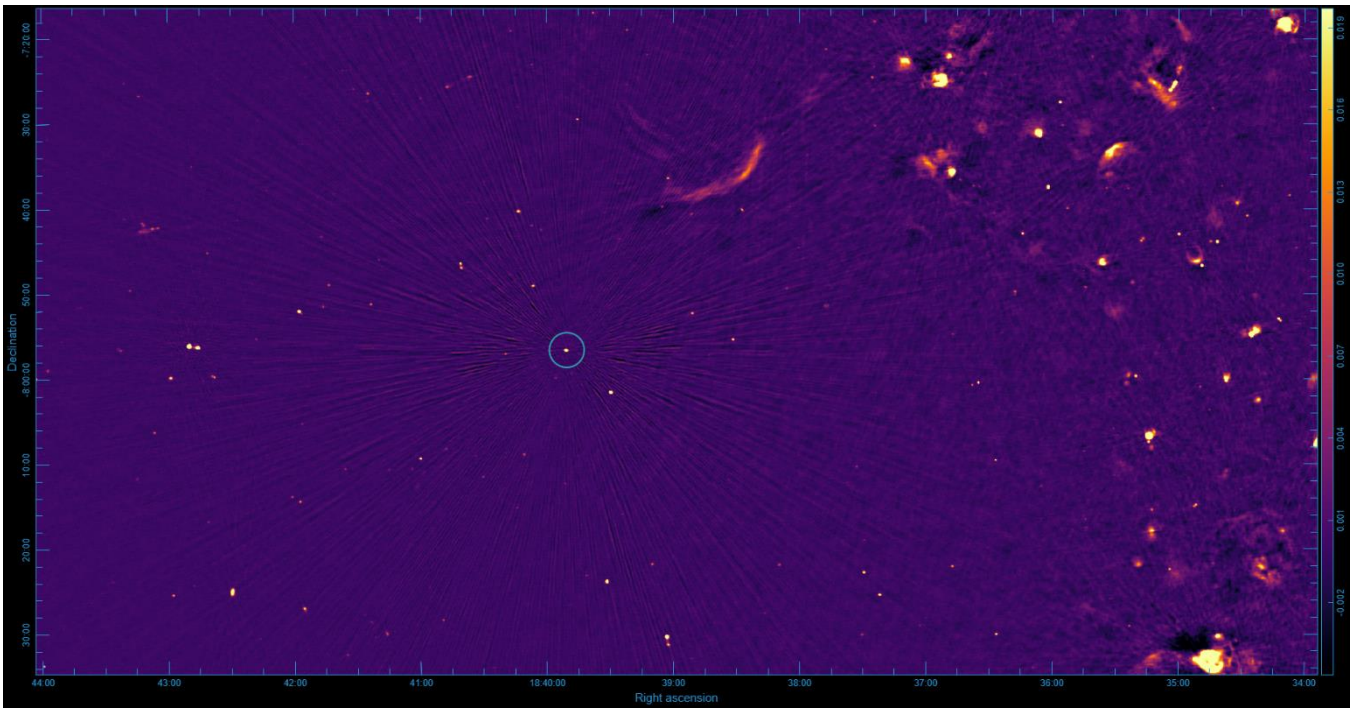

Figure 1: Continuum Stokes I image cutout from the 15-minute RACS observation SBID 57929 showing the ultra-long period transient source ASKAP J183950.5−075635.0 as first discovered. The blue circle highlights the location of the source, which is about 1 degree from the Galactic plane. Image made by Aidan Hotan.

For further information

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