ASKAP update for May 2025

This month we report on survey progress, observing over the Easter break, an attempt to see the re-entry of COSMOS 482 and the first calibration reference field observations.

Survey science progress update

Observations continued this month alongside a scheduled interruption for one day of supercomputer maintenance. Some ongoing disruption is also being caused by hardware issues with an ingest cluster node, leading to about 3 days of downtime so far. Maintenance on Setonix took a day longer than planned, but we were able to catch up with processing of the small backlog of observations. On the 22nd of May we will be pausing observations to replace the fire panel in the central building at the observatory site and will use the disruption as an opportunity to upgrade the operating system on the ingest cluster. Observations are expected to resume by the 28th of May.

SST	Deposited	Awaiting Validation	Released	Rejected
EMU	438	9	340	92
WALLABY	118	7	75	40
POSSUM	554	56	355	148
VAST	5409	274	5095	42
FLASH	301	7	168	126
GASKAP-HI	12	3	15	1
GASKAP-OH	1	1	0	0
DINGO	24	2	19	3

Table 1: Survey progress as of 15-05-2025

Observations during the Easter shutdown

The last month included a period over the Easter long weekends in Australia. From April 17th to April 28th there were no support staff at the observatory due to the small number of working days and associated travel overheads. ASKAP ran autonomously throughout this time in a mode similar to the end of year shutdown and we achieved the highest operational efficiency ever recorded (98%) due to a combination of good weather, no interruptions for maintenance or testing, and few system faults. 16% of this time was due to required observations of B1934-638 for calibration, so our current Key Capabilities Project priority of implementing reference field calibration (see below) should significantly increase the rate of survey progress when it is deployed.

We also compared a simulation of the predicted observations during this time against reality (see Figure 1). Although the overall fractional allocation of time is very similar to what was predicted, the actual selection of fields diverged after 64 hours due to scheduling block failures caused by correlator misalignments, highlighting the importance of adaptive dynamic scheduling.

COSMOS 482

On the 10th of May, the Soviet-era spacecraft COSMOS 482 re-entered Earth's atmosphere after several decades stranded in an elliptical low-Earth orbit. The spacecraft was launched in 1972 with the goal of deploying a descent module into the atmosphere of Venus, but the planetary orbital transfer manoeuvre failed. The resulting elliptical orbit decayed over time, eventually leading to uncontrolled re-entry this year.

Since the predicted ground impact point was close to Inyarrimanha Ilgari Bundara, the CSIRO Murchison Radio-astronomy Observatory, several of the telescopes on site (including ASKAP) attempted to detect the re-entry plasma trail by searching for reflected terrestrial transmissions. However, we did not detect anything and a subsequent report by Roscosmos indicated that the spacecraft fell in the Indian Ocean west of Jakarta.

Reference fields and offset imaging

Development of our new reference field calibration scheme took another step forward with the first official observation of a reference field taking place on April 30th. We are now observing one of the selected 12 reference fields every time beamformer weights are updated. We also have a pipeline processing strategy in place to derive

an updated calibration solution from these observations, in conjunction with the most recent observation of B1934-638. The next steps are to test the quality of the calibration solutions resulting from these reference field observations, automate the processing, track the solutions in our calibrator database and finally, test the entire system by using the updated solutions to calibrate science fields. After the testing phase concludes, we should need only one observation of B1934-638 each time new beam weights are formed every few months.

Alongside development of the reference field calibration scheme, we are continuing to test the new offset source subtraction feature. At the spectral line working group on April 30th, we shared preliminary results from a test field observed in WALLABY mode near bright sources of the kind that we currently avoid. Although the subtraction process removed the worst artefacts picked up by source finding in the original cube, some different artefacts remain. In general, the approach seems to improve continuum image quality but still requires that we can form an accurate CLEAN model of the bright sources, which can be challenging. While we investigate further, we will make the new feature available for optional use in the coming weeks so that more experience can be gained.

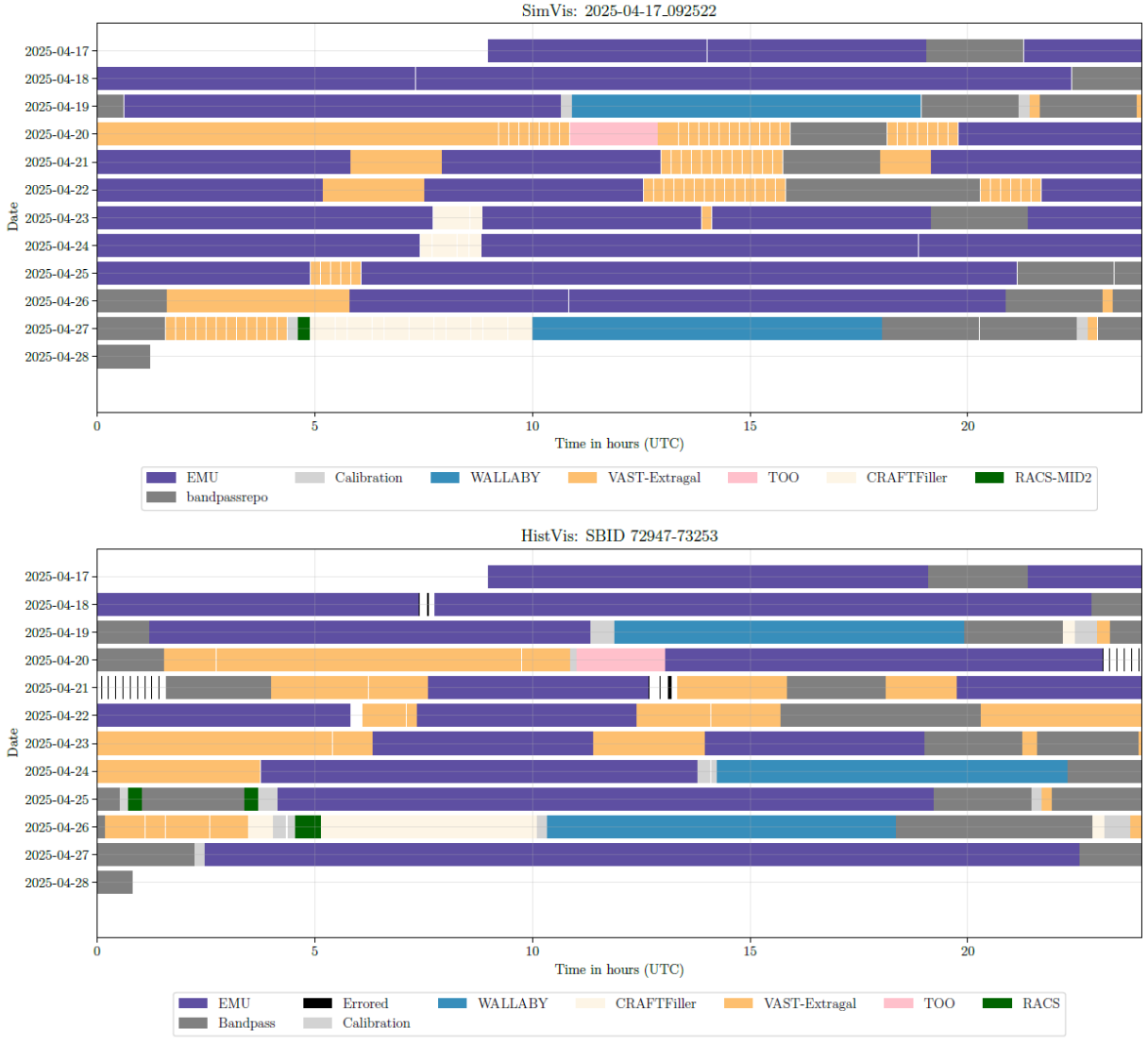

Figure 1: Comparison of the SAURON simulation predictions (top) versus actual (bottom) observations for the Easter Shutdown period. Overall, the observations match well with the expected projection for this period and the fractions of data obtained for each survey are comparable. The science fields observed exactly matched until 01:33 UTC on the 20th of April (around 64.5 hr), and reality only significantly diverged from the prediction at 13:04 UTC on the 20th (just over 72 hr). Figure provided by Vanessa Moss.

For further information

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