

ASKAP Update, August 2020

In this issue, we report on plans to improve commensality during Pilot Surveys Phase II and an event that activated the observatory electronics room fire suppression system, which may impact the timescale for starting Pilot Surveys Phase II.

Pilot Surveys Phase II preparation

While consolidation and processing of Pilot Surveys Phase I data continues, we are reviewing the survey strategies employed so far and have begun planning a second phase of pilot observations. Pilot Surveys Phase I established a benchmark for science data quality, while Pilot Surveys Phase II will focus on improving the efficiency of observations and merging multiple survey strategies. Commensality will be key to completing ASKAP's survey programs promptly over the next 5 years.

Pilot Surveys Phase II will provide new data for all survey science teams, while testing longer-term strategies.

Combined survey strategy workshop

On August 26 and 27 we will host a workshop for survey science team leaders and key representatives. Leading up to this event, we have requested that all teams fill in a questionnaire describing the survey strategy they intend to use during Pilot Surveys Phase II. All teams have been asked to consider their strategy in the broader context of ASKAP survey science, and several teams have been actively discussing ways to merge observing plans.

The workshop will establish ASKAP's first combined survey strategy, a plan designed to minimise the number of observations required to meet all survey science goals. The first iteration of the strategy will utilise existing telescope capabilities, though future iterations could be improved with additional technical development, such as the ability to observe in split bands. Since any additional development will incur delays, Pilot Surveys Phase II will determine whether the combined survey strategy can deliver all necessary science data within 5 years. If further optimisation is required, new technical capabilities will be considered against their associated risk.

The initial timeline for Pilot Surveys Phase II suggested that observations could begin towards the end of 2020, but this will be impacted by recent events (see below). The start date will also be contingent upon completion of Pilot Surveys Phase I data processing and clearing the storage archives at Pawsey.

Consolidation activities

Great progress was made on improving overall data quality during Pilot Surveys Phase I. This included reducing the amount of erroneous data produced by the telescope itself and improving the data processing parameters to reduce imaging artefacts. Some of these efforts have reached the point of diminishing returns where issues occur infrequently and are difficult to investigate.

During the current consolidation period, we are prioritising improvements aimed at automating configuration of the telescope. This will allow better scheduling agility and ensure consistency between requested and actual configurations. The first step is to trigger array setup from a scheduling block based on key parameters specified within. Testing of this feature is underway and has helped to highlight areas where the reliability of system initialisation needs improvement.

As part of ongoing documentation efforts, we have also written a comprehensive system description paper which was recently submitted for peer review.

Rapid ASKAP Continuum Survey update

Roughly 15 months after the first observations, RACS data analysis, processing and quality control are now complete. The RACS survey description paper has been submitted for peer review. The final data products will be uploaded to CASDA over the next month or two, ready for release when the accompanying paper is published.

The first data release will consist of continuum images and catalogues from each of the 903 fields that tile the sky. We will include a version of the image convolved to a common resolution defined by the largest PSF in all beams, as well as the original image at its true resolution which may vary across the field. This first data release will be followed by publication of a global source catalogue derived from a combined all-sky map convolved to 25 arcseconds.

During Pilot Surveys Phase II we expect to fill gaps in the observing schedule with a second RACS pass at a different

frequency band. This strategy will improve scheduling efficiency and eventually extend RACS to cover the full 700 to 1800 MHz frequency range.

Central building fire suppression

Due to its remote location, the Murchison radio-astronomy observatory was designed to be remotely monitored and operated. Although maintenance crews regularly attend the site, there are extended periods of time (such as weekends and holidays) during which human intervention may not be promptly available. For this reason, the central electronics room that houses digital signal processing hardware, computing servers and networking gear was fitted with an automatic fire suppression system designed to safely extinguish any fire that might occur.

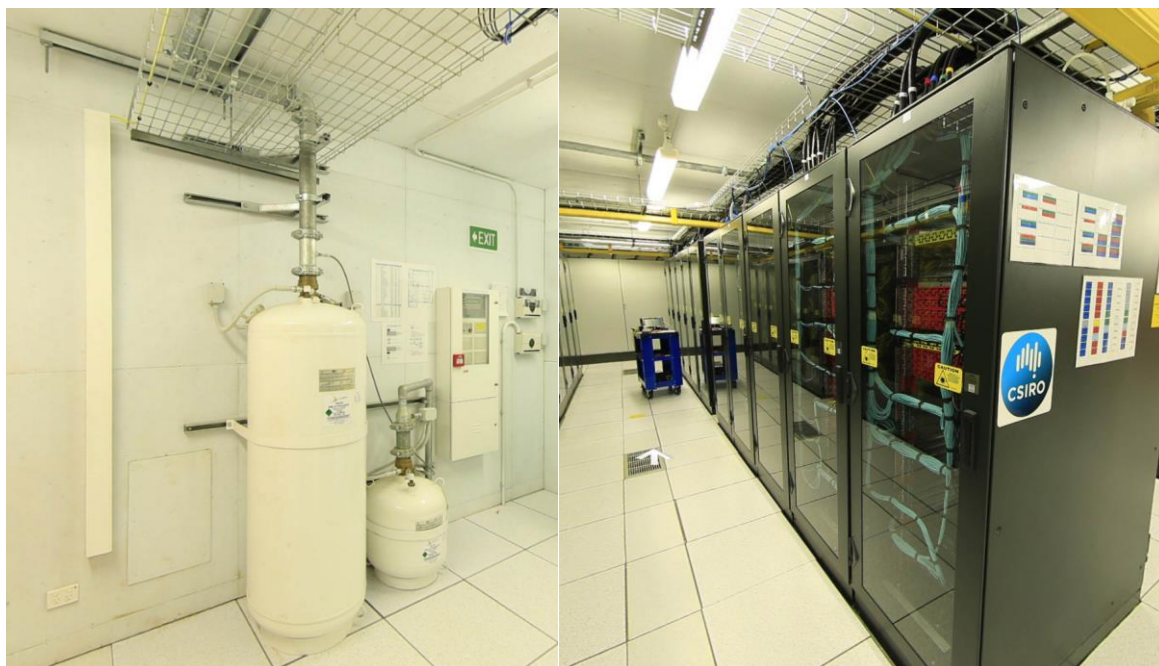
During normal working hours on the 23rd of July, the building's fire suppression system detected signs of smoke in the electronics room and raised an alarm. This triggered an automatic shutdown of mains power to the electronics and was followed soon after by discharge of FM200 gas into the electronics cabinets. Staff were present on site and were safely evacuated during the alarm. ASKAP was conducting test observations at the time, but we were

able to stow the antennas safely before the control system servers shut down.

Subsequent investigation suggests that a single power supply unit in one of the many electronic components had failed, generating enough smoke to trigger the fire system. No damage was caused to other systems as far as we know.

Due to the single-use nature of the fire suppression system, the observatory must remain offline until it can be replenished, tested and re-certified. This is expected to be complete by the end of August and we are aiming to have the gas bottles re-installed by the 21st. When power is restored, we will begin a careful process of restarting all systems one by one until normal operations can resume.

This delay of roughly one month comes during the consolidation period between ASKAP Pilot Surveys. ASKAP science observations are therefore not greatly impacted (although the Murchison Widefield Array is also offline) but the shutdown impacts our ability to deploy and test system upgrades. The incident is therefore likely to delay the start date of Pilot Surveys Phase II, which was tentatively scheduled for November.



MRO central building electronics room fire suppression system (left) and equipment racks (right).

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