

ASKAP Update, May 2020

In this landmark issue, we report completion of all pilot survey phase I observations, release of WALLABY and upload of VAST pilot survey data and plans for a second phase of pilot surveys to commence late this year.

Pilot survey observations complete

Last month, we commenced a fast-track campaign to complete observations for pilot surveys that began in July 2019. Nine pilot surveys were planned, and each received 100 hours of observing time. The primary aim was to determine whether we can meet each survey team's science goal and assess the viability of initial survey strategies. We have been steadily building the telescope's reliability and processing capabilities, using the pilot survey experience to direct development priorities.

To ensure secure access to data if the observatory needed to close due to COVID-19, we requested and obtained additional tape-backed disk storage at the Pawsey centre. This additional space, along with progressive deletion of processed data, has allowed completion of the remaining pilot observations in roughly the predicted amount of time. This is a major milestone for the telescope in a year full of challenges.

Switching to consolidation mode

During the intensive pilot observing campaign, non-critical maintenance and development testing were largely put on hold. Now, the focus of activity will shift back to improving the telescope, processing the backlog of data, and preparing for a second phase of pilot surveys.

This consolidation time is expected to last for around three months, which should be sufficient to process the data backlog, test various engineering changes and apply numerous software updates that were held back to ensure stability during recent observations. Although some observations will be conducted during the consolidation phase, they will be for test purposes or time critical science cases only. Regardless, there will be a steady flow of data and science from processing activities.

Data processing and recent releases

Data processing activities have continued to ramp up as we gain more experience with pilot survey data. This year has seen a steady stream of data releases on CASDA, as the quality of processing outputs improves.

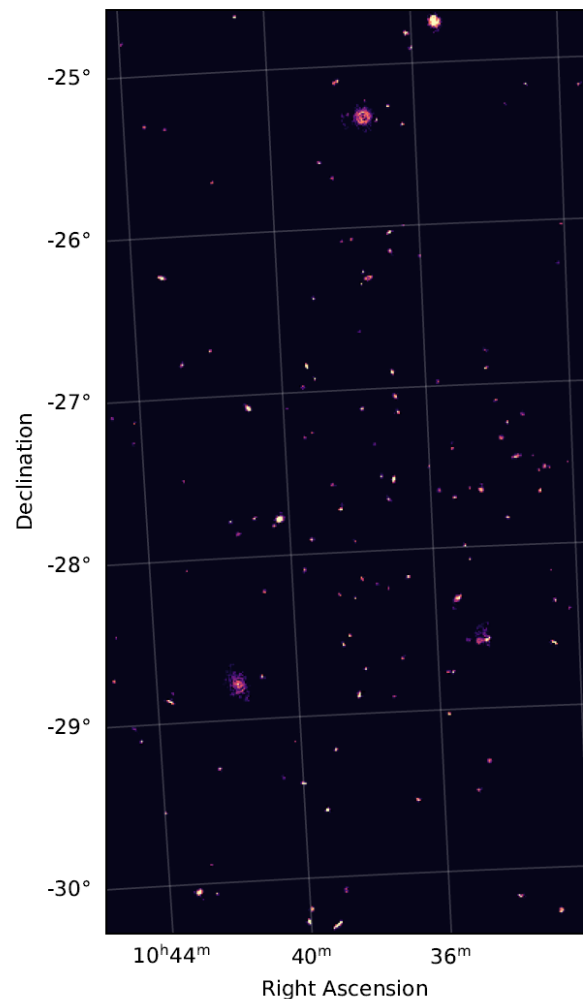


Figure 1. WALLABY Hydra data release 1, showing neutral hydrogen emission from almost 150 galaxies in this cluster. Image provided by T. Westmeier / WALLABY team.

WALLABY data release 1 and VAST pilot

The public release of data from WALLABY's observations of the Hydra cluster marks the first release of full-volume spectral line pilot data on CASDA. Although some artefacts remain in the continuum-subtracted data cubes and further processing improvements will be made, a large section of the Hydra field has been successfully analysed by the WALLABY team using the spectral line source

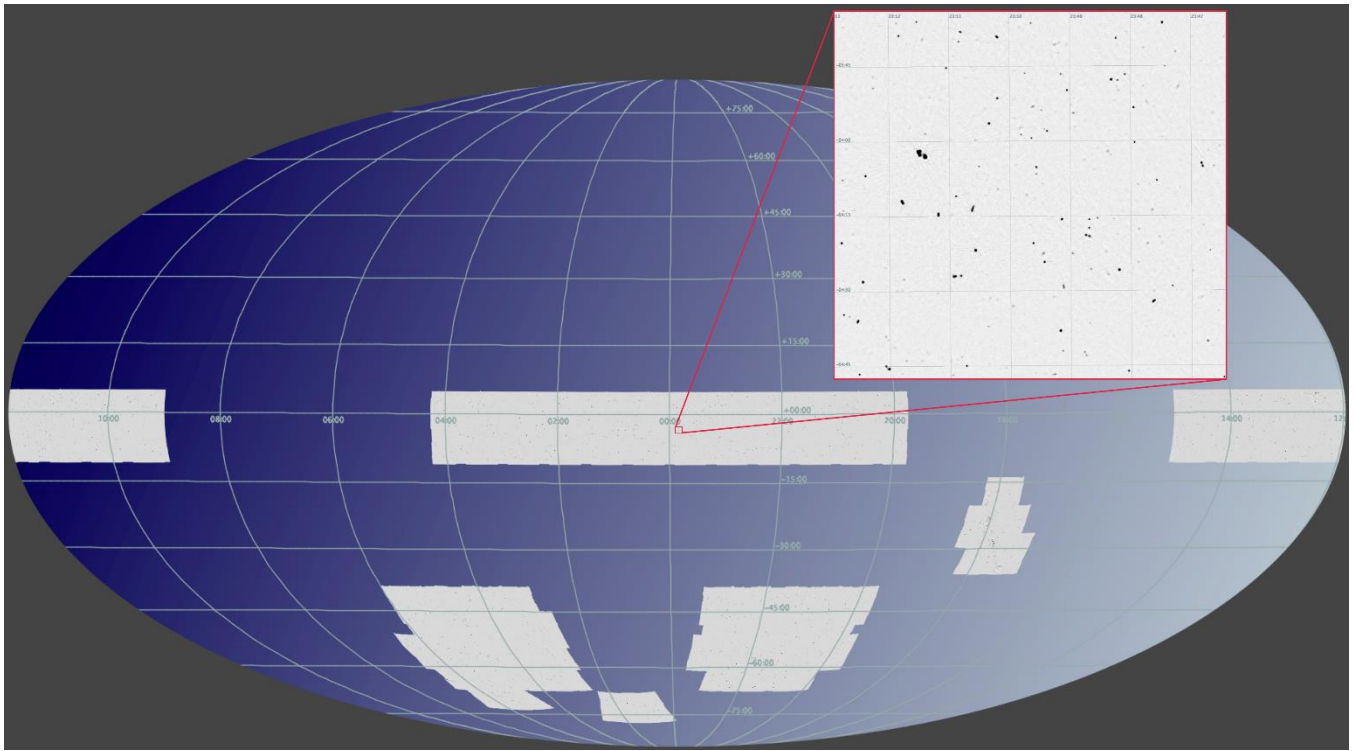


Figure 2. Sky coverage and example image from the VAST pilot survey data. VAST uses short, 12-minute observations to survey large areas, looking for sources that have changed. This pilot is the largest survey released by ASKAP to date. Image provided by E. Lenc

finding software SoFiA (see Figure 1). WALLABY recently released this value-added data product to its members, preceded by public release of the image cubes from which it was derived. The Hydra observations detected roughly 150 galaxies in a region where only 8 were previously known! Two more WALLABY cluster fields await processing and release.

Images from the VAST continuum pilot survey are also starting to appear in CASDA. The VAST team are searching for variable and transient sources over large areas using short, 12-minute observations to maximise sky coverage (see Figure 2). VAST imaging also includes multi-frequency synthesis polarisation products.

Timeline and planning

Experience with pilot surveys shows that although many improvements have been made, we are not yet ready to launch into full survey operations. ASKAP's observing efficiency in the last few months has been 34%, which meets established targets. Given the fact that the telescope is still very new, we have set the realistic goal of increasing this by 10% each year for the next few years. It

will be difficult to operate in continuous survey mode until the efficiency is significantly higher, so we have created a plan to continue with well-bounded pilot surveys. Phase II will begin later this year, with a focus on improving the commensality of survey strategies.

The total amount of observing time required to complete all survey projects independently could be significantly reduced by combining observing strategies and using the same data to address multiple science goals. Combining observations in this way will require extensive cross-team discussions which we plan to facilitate via a workshop in August this year. By this time, all teams should have access to at least some of the processed data from phase I pilot surveys. The goal of the workshop will be to create a combined survey strategy for pilot phase II, which we expect to begin in November. Phase II will provide more data for the science teams, with the same 900-hour total investment of observing time as the first pilot phase. If the combined survey strategy meets our commensality, efficiency, and data quality targets, we will begin ramping up operations to keep data flowing at a pace that can be sustainably processed and released.

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