ATUC ASKAP Update

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CSIRO ASTRONOMY AND SPACE SCIENCE
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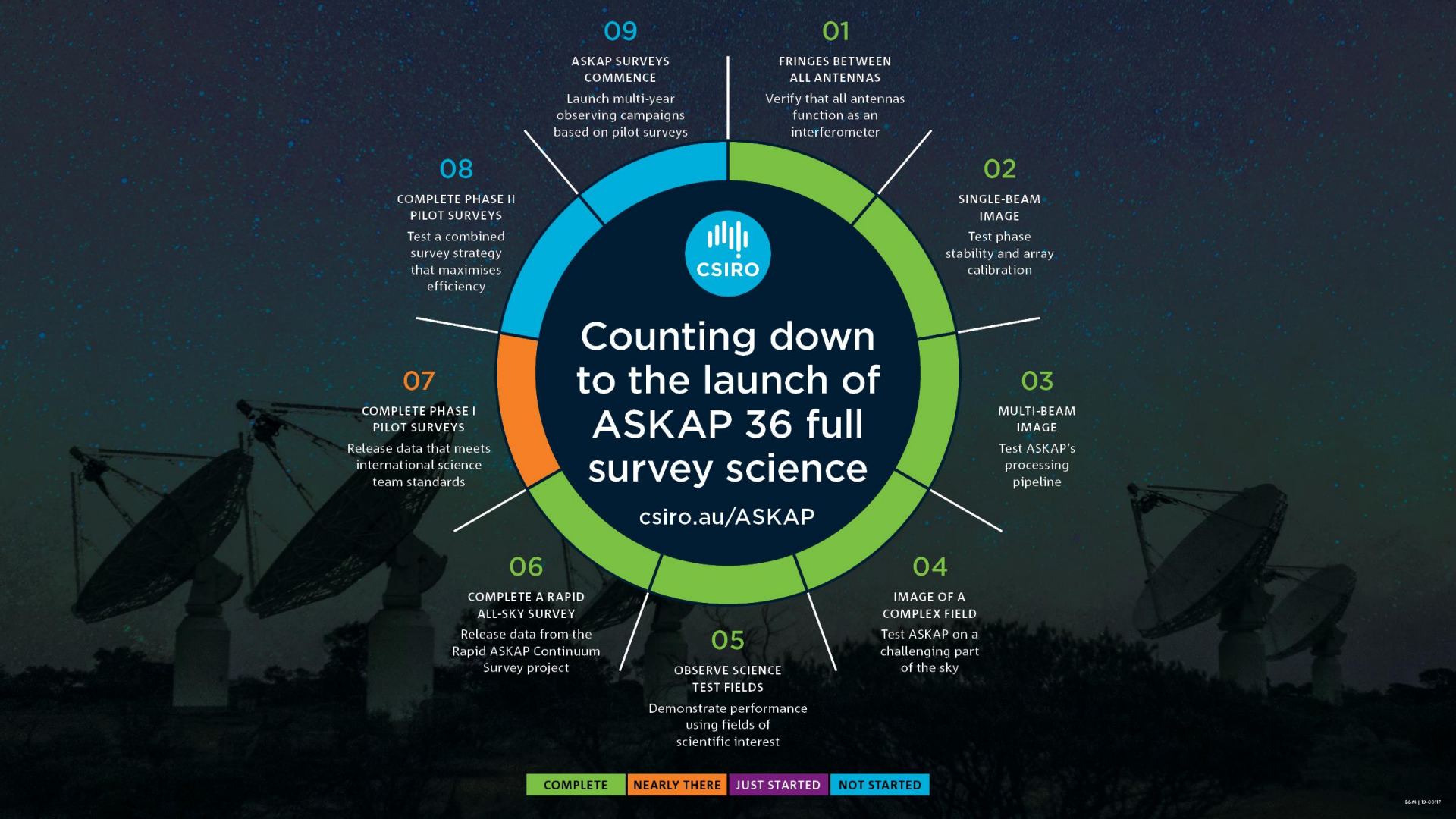
ASKAP observatory update

- Pilot Survey Phase I observations completed in May
  - Processing ongoing, data flowing into CASDA for validation and release
- Rapid ASKAP Continuum Survey low band soon to be released
  - Mid-band observations likely to occur over the end of year break
- SWAG-X GAMA-09 continuum test observations released
  - Spectral line processing underway, more observations planned
- Consolidation time used for multiple system enhancements
  - Reliability improvements, automation, fault-finding, etc.


09
ASKAP SURVEYS COMMENCE
Launch multi-year observing campaigns based on pilot surveys
01
FRINGES BETWEEN ALL ANTENNAS
Verify that all antennas function as an interferometer
08
COMPLETE PHASE II PILOT SURVEYS
Test a combined survey strategy that maximises efficiency
02
SINGLE-BEAM IMAGE
Test phase stability and array calibration
CSIRO
Counting down to the launch of ASKAP 36 full survey science
csiro.au/ASKAP
07
COMPLETE PHASE I PILOT SURVEYS
Release data that meets international science team standards
03
MULTI-BEAM IMAGE
Test ASKAP's processing pipeline
06
COMPLETE A RAPID ALL-SKY SURVEY
Release data from the Rapid ASKAP Continuum Survey project
04
IMAGE OF A COMPLEX FIELD
Test ASKAP on a challenging part of the sky
05
OBSERVE SCIENCE TEST FIELDS
Demonstrate performance using fields of scientific interest
COMPLETE
NEARLY THERE
JUST STARTED
NOT STARTED

Pilot Survey Phase I processing update

- EMU – complete & released (polarisation tests ongoing)
- POSSUM – complete & unreleased (pol. cal. quality concerns)
- WALLABY – ongoing & 1/3 released (contsub, divergence)
- DINGO – ongoing & partial release (ripples, divergence)
- VAST – complete & unreleased (awaiting bulk validation tool)
- FLASH – ongoing & not deposited (spectral artefacts)
- GASKAP HI – calibration & partial release (zoom & selfcal issues)
- GASKAP OH – ongoing & not deposited (zoom & selfcal issues)
- CRAFT – non-imaging mode

Rapid ASKAP Continuum Survey

- Primary beam flux corrections applied in the image domain
  - Based on holography and cross-matching, ~10% correction at field edge
  - Similar ability built into ASKAPsoft mosaicking for the future

- RACS images are being uploaded to CASDA
  - Large number of fields, lengthy process that will be optimised in future
  - Excellent lesson in managing all-sky data products

- Survey description paper will be published soon
- Global catalogue paper will follow after the survey description

SWAG-X: ASKAP eFEDS project

- MoU between AAL and the eROSITA-DE collaboration
  - ASKAP is observing GAMA-09, alongside eROSITA performance verification
  - Continuum test at 888 MHz covering the full area complete (released)
  - One spectral epoch at two frequency bands, processing ongoing
    - 888 and 1296 MHz
  - Additional spectral epoch planned
  - Total of 16 hours in each of 6 fields

- Significant international interest
- Public release encourages science

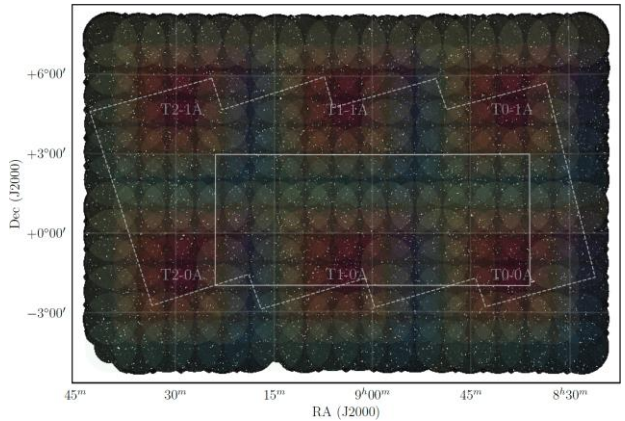


Image by Vanessa Moss

New ingest cluster and data workflow

- Hardware delivered, commissioning underway
- Initial performance tests look promising
  - New SSD storage array is very fast
  - More ingest and service nodes, better performance per node
- Expected to remove ingest/processing interdependence

- MRO network switch-over planned for November 23rd
  - Point of no return, may interrupt other development testing
  - Full integration expected by end of year

Pilot Surveys Phase II

- Evolve Phase I strategies to improve commensality and efficiency

- Need to test sustainable survey operations
  - Can we meet science goals with single-pass processing?
    - How many previously unseen deposits to CASDA will be accepted?
  - Can processing keep up with observing?
  - Can we manage disk space efficiently?

- New telescope features and improvements must be verified

The path to Pilot Surveys Phase II

- Finish phase I data processing and clear the Pawsey disks
- Integrate and commission the new ingest cluster
- Address technical barriers and data quality concerns
  - Zoom mode fringe rotation firmware fix required
  - Wider beamforming intervals not performing as intended
  - Fine tuning - calibration, continuum subtraction, divergence, etc.
- Finalise survey commensality and technical requirements
  - Topic of discussion at the Survey Science Team PI meeting in December 2020
- Observe, process and release technical test observations
- Observe, process and release quality gate observations
- Observe the bulk of Pilot Surveys Phase II

August Pilot Survey workshop

- Without commensality, ASKAP surveys would take 10+ years
  - Based on independent survey strategies and Pilots Phase I experience
  - Assuming 100% efficiency, as did the initial 5-year estimate

- Optimal science modes tend not to be commensal
  - EMU and POSSUM are currently the only surveys with a combined strategy
- Extending the surveys is an option, but not a solution
  - Prompt completion or review is still desirable

- Pilot Surveys Phase II should closely represent full surveys
  - More discussion of commensality requirements at December PI meeting

The path to full surveys

Milestone	Expected date
Pilot Surveys Phase II start	Q1 2021
Survey project time allocation review	Q2 2021
Commission new Pawsey supercomputer	Q3 2021
Full survey operations commence	Q4 2021

Review of ASKAP Survey Projects

- An external review of survey projects will allocate time
  - Survey strategy will be an input to this process
  - Pilots Phase II should be a realistic test of expected full survey strategy
    - Full results may not be available in time for the review

- Time allocation considerations likely to include:
  - Willingness to operate commensally
  - Science impact, community investment and technical feasibility

- Terms of reference under development

Conclusions

- Pilot Surveys Phase I:
  - Successfully demonstrate ASKAP science for the majority of teams
  - Also highlight areas where improvement is needed
- RACS demonstrates ASKAP's all-sky survey capabilities
  - It is the world's benchmark survey at 888 MHz
- Pilot Surveys Phase II will test readiness for full surveys
  - Data throughput targets must be met with acceptable quality
  - Full survey observing strategies need to be finalised and verified