

ATUC Report – October 2024

1. ATUC members in attendance

Stas Shabala (Chair), Vanessa Moss (Executive Officer), Hayley Bignall, Marcus Lower, Adelle Goodwin, Ivy Wong, Kovi Rose (student member), Gavin Rowell, Sanja Lazarevic (student member), Craig Anderson (remote).

2. Commendations for S&A

- Successful installation and performance of the CryoPAF at Murrinyang
- Successful fringes and progress on BIGCAT at the ATCA
- Deployment of CRACO as a shared-risk national facility
- Revival of ASKAP's AKVET
- An all-sky RM map with SPICE-RACS
- The Prime Minister's Prize for Science to Matthew Bailes and his team for the "discovery of FRBs and leadership in the field of radio astronomy". The first FRB was discovered in archival data from Murrinyang in 2007, underscoring the importance of ATNF archives.
- Engagement with users including the ATNF radio school and VLBI workshop.

ATUC thanks Tasso Tzioumis for his decades-long contributions to the radio astronomy community, and wishes him all the best in his retirement.

3. Operations

3.1. ASKAP

3.1.1. ASKAP spectral line observations

We welcome the acknowledgement in the previous director's response that improvement to the ASKAPsoft workflow is a priority. ATUC is happy to hear of AKVET's revival meeting in November 2024 and is looking forward to the ASKAP symposium in May 2025. ATUC looks forward to the improvements enabled by the ASKAP Key Capabilities Project. The community would be interested in forecasts for where efficiencies and improvements can be expected in the coming year to improve progress on the SSPs.

In particular, we welcome the revival of ASKAP spectral line processing. Specific to concerns regarding ASKAP's HI spectral line capabilities, ATUC is pleased to hear of the recent progress with processing DINGO's 8-hr observations in ~8 hours at Pawsey.

ATUC notes ongoing concerns from the WALLABY team regarding the low number and fraction of observations validated as usable over the past several semesters. ATUC supports the continued resourcing of WALLABY project needs by the ATNF, aimed at improving the fraction of usable observations, noting that it is one of two ASKAP flagship surveys and has a large international profile (the team is composed of over 200 national and international team members). The outstanding issue which ATUC would like to see addressed is the reliability of data product delivery.

Recommendation: ATUC requests an update on the progress specific to the WALLABY survey (fraction of usable observations resulting from recent observations and workflow improvements) by mid-January 2024.

3.1.2. ASKAP data processing

The ASKAP continuum Survey Science Teams have raised recurring concerns about progress towards enhancing imaging capabilities to meet radio astronomy best practices (e.g. CLEAN boxes/masks; broadband, joint-Stokes cube deconvolution). Additionally, questions persist about whether the ASKAPsoft pipeline, in its current form, is maintainable, extensible, portable, and adaptable enough to support rapid capability development. While the ASKAP Key Capabilities Project aims to address some of these gaps, there is concern within large teams about allocating resources to develop functionality already available in high-performance packages like WSClean, given ASKAPsoft's limited broader community uptake.

Recommendation: Conduct a feasibility study over the next six months to evaluate the benefits of continuing ASKAPsoft-specific imaging development versus adopting widely supported 'off-the-shelf' solutions, which are already available. Additionally, consider a targeted assessment of the current pipeline's adaptability for integration with external calibration and imaging tools to enhance development timelines where practical.

3.1.3. ASKAP survey timelines

There is a strong desire among the continuum Survey Science Teams for greater clarity on ASKAP's survey execution timelines, especially given the recent increased prioritisation of spectral line observations, alongside pressures from solar interference and Guest Science Proposal time allocations. A high-level, forward-looking simulation (rather than projections based solely on historical observation rates) would be valuable for understanding the range of possible project completion timelines, and the impact of emergent delays (including those due to issues outside ATNF) or scheduling pressures. This would support essential planning for data release schedules, funding applications, and timelines for student projects and postdoctoral appointments. ATUC views developing such timelines as a key component of large-scale survey science with ASKAP.

Recommendation: Within the next six months, develop and share a high-level simulation model to estimate realistic survey completion date ranges. ATUC recommends updates to this model each semester, to incorporate evolving priorities and operational impacts, providing teams with a structured, realistic timeline where feasible to guide planning and resource allocation.

3.2. Standardisation of ATCA Usage

ATUC received pre-meeting user feedback about the barriers to obtaining science-ready data from ATCA. A possible solution is to maintain a pool of experts willing to assist, and to use their expertise to design standardisation and automation of ATCA observing and data reduction, akin to the procedures in place for many astronomical facilities. To initiate this, ATUC suggests that the ATNF gather and unify the existing ATCA software tools (from volunteer experts, either already in the public domain or donated for this purpose) such as automated observing scripts and reduction pipelines. To start this process, ATUC proposes to include this topic in the ATCA science day meeting (section 4.2), and will assist in issuing the call for the relevant experts to participate.

Recommendation: ATNF to create and endorse a standardised ATCA data pipeline, for both archival and future data, which users can employ to achieve minimal radio continuum science-ready data products.

3.3. ATCA array configurations

During the open session, it was suggested that it may be possible to achieve improved UV-coverage in many ATCA observations that require high resolution by permanently placing one antenna on the North-South spur. New array configurations that allow for improved UV-coverage and thus shorter observations would certainly aid in reducing the amount of time that NAPAs require for each observation, however it is unclear if this may affect the resolution of observations. ATUC supports the ATNF initiative to have a student project investigate this possibility, and looks forward to hearing the outcome of this analysis.

Recommendation: ATNF communicates to ATUC the outcomes of the analysis of investigation into different ATCA array configurations that may improve UV-coverage.

3.4. BIGCAT spectral line modes

ATUC congratulates the ATNF on progress towards BIGCAT's planned science commissioning in March/April 2025 and development of the observers' user interface. ATUC looks forward to extragalactic spectral line capability with the ATCA. In response to requests for ATUC input into the default BIGCAT observing modes, the current list of suggested default modes appears sufficient for both extragalactic and Galactic spectral line observations (in addition to wideband continuum capabilities). The default spectral resolution complements the capabilities offered by ASKAP and, in the future, the CryoPAF on Parkes Murrumbidgee.

3.5. Archives

Given the growing data rates of current and upcoming telescope facilities, the management and storage of these data represent critical issues for the ATNF.

ATUC recognises the importance of data archiving and availability of archival data, given the increasing significance of archival data in scientific publications. ATUC also recognises that data storage is expensive, and storing the full raw visibilities of radio observations results in huge datasets needing to be archived. At the same time, it is the international standard that telescope data be archived and remain available to the public years after the observations have been taken. This approach ensures that radio observations taken for dedicated science cases are more broadly applicable and able to be used for many more science cases, as well as maintaining the world-class reputation of ATNF facilities.

Recommendation: ATUC supports ATNF's exploration of data compression opportunities for more cost-effective data archiving.

4. ATNF future priorities

4.1. New projects

4.1.1. Delivery of existing projects

ATUC welcomes the potential for new technology development, a traditional strength of the ATNF. ATUC's view is that such developments need to be balanced against the importance of the timely completion of already well-established hardware projects such as BIGCAT and CryoPAF. There has been significant community investment (via ARC LIEF) in ATCA's BIGCAT upgrade, as well as in the

Parkes' Murriyang CryoPAF system. These new systems will be flagship ATNF facilities that will help underpin the reputation of ATNF over the coming decade. The existing funding risk to ATCA poses serious limitations to their science capability, and the value for money from the ARC co-funding (LIEF) awarded to the community.

Recommendation: ATNF ensures that ATCA and Murriyang operations continue for a time period enabling a sufficient amount of high-impact science from the stakeholders once the new hardware (BIGCAT and CryoPAF) is commissioned. ATNF and LIEF stakeholders should together discuss and establish the appropriate operational time needed to complete an acceptable number of science goals.

4.1.2. Upgrades and new projects

ATUC noted with interest the development of CASATTA, and would like to learn about the likely user community for this instrument. ATUC welcomes community interest in the VLBI science day, including the role of LAMBDA in the SKA era, and sees this as a useful process for gauging likely community involvement. ATUC also notes that the recent Decadal Plan survey of Australian astronomers indicated strong demand for existing ATNF facilities.

ATUC has received pre-meeting feedback expressing concern that decisions relating to ASKAP upgrades are being made without consultation of the SSPs, and without having adequately resolved existing issues regarding processing of data products. ATUC appreciates the challenges ATNF faces in balancing support of existing programs with the development of new technology, and emphasises the need to deliver on projects ATNF is already committed to.

Recommendation: ATUC recommends that the ATNF seeks input from the broader user community, including on prioritisation, before committing to either a large upgrade (e.g. ASKAP), development of a new demonstrator (e.g. CASATTA/LAMBDA), or new instrumentation (SKA-Mid Band 5 receiver).

4.2. Future of existing facilities

ATUC welcomes the "ATNF from now to 2035" document recently posted on the ATNF website. This document nicely outlines the motivation for the future in the context of the SKAO era. However, the ATUC feels there is a surprising lack of acknowledgement of the future needs for radio facilities from the many next-generation multi-national facilities beyond radio astronomy that Australia engages with and are prominently mentioned in the Decadal Plan. Examples of these include the LSST (Vera Rubin Obs.), the European Southern Observatory (ESO) and the Cherenkov Telescope Array Observatory (CTAO). All of these will demand many thousands of hours of future radio coverage spanning cm to mm wavelengths into the next decade.

Recommendation: ATNF to release the internal Multi Messenger Astronomy document produced as a part of the "Future of the ATNF" efforts, which discusses the above mentioned facilities and their synergies with radio astronomy in some detail (some editing may be necessary to release this as a stand-alone document).

The future of ATCA remains a serious concern within the community. ATCA's user base is extensive and its role in astrophysics, especially in high-frequency studies of Southern-Hemisphere transients, is a unique capability that will remain apparent into the SKA-Mid and ALMA upgrade eras. To further support ATCA, ATUC recommends that ATNF organise a "Science with ATCA in the SKA era" day to engage the broad astronomy community on its future needs for ATCA in the BIGCAT era. This Science Day can be co-scheduled with the next ATUC meeting, and the proposed ATNF Student

Symposium (see section 6.1). ATUC stands ready to engage the astronomy community in preparation for the ATCA Science day.

Recommendation: A “Science with ATCA in the SKA era” day is held adjacent to the APR2025 ATUC meeting.

5. Policies

5.1. Widefield VLBI

A proposal for commensal widefield (targeting multiple phase centres) processing of LBA data (below 3 GHz) was submitted to ATUC, supported by parallel discussions relating to feasibility with LBA Operations staff. A similar project is being developed for the European VLBI Network, and some of the new pipeline software would be useful also for the LBA.

ATUC sees the potential science value of the high-resolution data on additional field sources, and encourages the delivery of science-ready data to the community. The proposal requires a relatively modest increase in resources for correlation, in addition to post-processing to supply advanced data products, and space on the archive. ATUC supports a change in policy to enable this commensal use of the LBA, making the (non-PI target) widefield data publicly available while maintaining proprietary periods on the target fields to protect the PI-proposed science case, with the PI being able to opt out of the project if desired. ATUC recognises that additional resources will be required to ensure scientific return via provision of post-processed and advanced output data products as described in the proposal document, and encourages ATNF to explore options facilitating this.

Recommendation: ATUC recommends adapting LBA user policy as necessary to enable commensal widefield correlation of LBA data, and communicating this to the broader user community.

Recommendation: ATNF works with the proposing team and any other relevant stakeholders on details of the implementation, including resourcing.

5.2 ASKAP guest science program

Users noted that the different choices for ASKAP beam footprints and data collection modes can be confusing for inexperienced users. There was also a suggestion from the audience during the open session that difficulties in assessing data quality could be alleviated through making the EMU data validation processes and documentation available to the wider community.

Users have also noted that GSPs have no visibility in OPAL. ATUC’s view is that ASKAP GSPs should be included in OPAL for full visibility of TAC outcomes.

Recommendation: ATNF works with ASKAP SSPs to make their data quality assessment processes available to GSP users.

Recommendation: ASKAP GSPs are included in OPAL.

5.3. DDT and NAPA policies

During the open session, it was noted that close to 50% of proposals accepted for observing with ATCA are now NAPAs, and this fraction has been consistently increasing over time. This is an

excellent example of the utility of radio facilities in other areas of astronomy. Approximately 20% of ATCA time actually observes NAPAs. Phil Edwards raised the point that the substantial percentage of ATCA proposals being NAPAs is increasingly affecting regular scheduled projects, with the rescheduling of displaced observations done on a best-effort basis but not always possible. Recently, there has been a change in NAPA policy which now allows any NAPA program to displace a regularly scheduled program, resulting in an increase in the number of displaced observations. Phil suggested some possible changes to the traditional scheduling of ATCA observations, with suggestions including:

1. Not scheduling the last ~2 days of each array configuration, with the time dedicated for replacement time for displaced observations.
2. Leaving 1 full day per month to run all NAPA targets, allowing for better UV coverage.
3. New array configurations to improve UV coverage and enable shorter observations for NAPAs.
4. Implementing dynamic scheduling (which would be challenging, so is less realistic).

The increase in the relative fraction of NAPA proposals for the Compact Array reflects its unique capability in transient science and an increase in radio transient science in the Southern Hemisphere. Leaving 1 full day per month for observing NAPAs in the schedule is attractive, but many NAPAs require timely observations, and thus this solution may not be practical.

Recommendation: ATUC supports reconsidering the scheduling of ATCA observations given the increasing fraction of successful NAPA proposals. ATUC recommends leaving blocks of time in the schedule regularly (e.g. 2 days per month), dedicated to replacing time for observations that have been displaced by NAPAs. Projects with the highest TAC ranking should be prioritised for allocation of the replacement time.

6. Training, user engagement and user support

6.1. Student engagement

Engagement within the ATNF student community remains low, and ATUC welcomes suggestions to strengthen the community by organising an ATNF Student Symposium adjacent to an ATUC meeting. Over 50% of the ATNF students are based in Sydney, and holding the symposium in conjunction with the APR2025 Marsfield ATUC meeting is likely to maximise student attendance at both the Symposium and the ATUC open session.

ATUC reiterates the suggestion from a previous report that students may help review and test new training materials that are currently being developed for new shared-risk instruments.

Recommendation: ATUC supports organising the Student Symposium adjacent to the APR2025 ATUC meeting, and recommends that ATUC student representatives take a leading role in coordinating this initiative.

6.2. User issue reporting/ticketing system

The October 2023 ATUC report suggested a possible ticketing system to address issues deemed too specific to include in the ATUC report. User feedback since then suggests that development of a system to deal with such issues is still relevant. ATUC's April 2024 report recommended implementation of a new ticketing system as a conduit for minor feedback/requests (e.g. minor problems with existing software, or desired user support features). However, there is some concern that implementing such a ticketing system could place an increased burden on ATNF staff, which is certainly not desirable.

ATUC's view is that there needs to be an easy-to-find mechanism for issues to be reported, prioritised and resolved in a timely manner, ideally with transparent tracking.

ATUC recognises that there are existing fault reporting systems for each telescope, and various platforms for community support (e.g. ASKAP forums, the ATCA online forum, ATCA User Community Mattermost channel), in addition to the ATUC feedback web form. A possible alternative to another ticketing system may be an easy-to-find, centralised page containing all feedback forms. The website refresh may provide an opportunity to facilitate this.

Whatever the mechanism, ATUC's view is that it is important for users to receive a response and commitment to resolve issues within a reasonable timeframe.

Recommendation: ATNF develop a clear pathway for dealing with minor user requests.

6.3. Website

ATUC commends the ATNF for updating the website, which has consistently been reported by users as being outdated and hosting conflicting information. During the open session, a community member noted that the accessibility of the website should be taken into consideration during development; for example a day/night mode to enable switching between white and black backgrounds. ATUC also notes the relative lack of visibility of some information, for example relating to ATUC itself. ATUC looks forward to reviewing the website in due course following its December launch.

Recommendation: ATUC recommends that accessibility concerns are taken into consideration during the final stages of development of the new ATNF website.

Recommendation: ATUC pages are made visible, for example via a drop-down menu under "Governance".

7. ATUC operations

7.1. Membership continuity

The terms of the majority of ATUC members are due to be finished following the APR2025 meeting. To ensure the continuity of ATUC, it would be preferable to have no more than approximately one-third of the members (four people) rolling off at any given time. In the immediate term, this could be achieved by extending the terms of a suitable subset of ATUC members by another semester.

Recommendation: ATNF ensures staggered ATUC terms, with no more than four members rolling off in any semester.

The two student representatives currently join ATUC for two semesters at the same time. This does not allow for continuity of student contributions, with a pair of inexperienced representatives coming in every year. Staggering their terms would resolve these issues.

Recommendation: ATNF appoints one new student member each semester.