ATUC Report to the Director - December 2013

This meeting of the Australia Telescope Users' Committee was held at the ATNF Headquarters on 5-6 December 2013.

Attendance: John Dickey (Chair), Nick Seymour (Secretary), James Allison, Virginia Kilborn, Ryan Shannon, Steve Ord, Minh Huynh, Tobias Westmeier and Craig Anderson & Emily Petroff (student representatives).

Commendations and Successes

ATUC wishes to commend ATNF on scientific discoveries and technical advances that make the Observatory more productive and powerful for astronomical research. In particular, several points of welcome progress were discussed at the open session of the December 2013 ATUC meeting, including:

- Winning a national Engineers Australia Engineering Award for PAF development
- PAF and multibeam design contracts for MPIfR and FAST
- Funding obtained, or in negotiation, to complete at least 32 and maybe 35 ADE PAF systems for ASKAP
- Great progress on the ASKAP telescope and data processing path, and the recent detection of HI absorption at significant redshift with three ASKAP baselines
- The success of remote observing for Parkes
- Parkes TPS and other hardware and software improvements
- Hosting the Australian ALMA workshops which are very important for the community
- Improvements made in ASKAP communications to the community
- CASDA archive planning
- Creation of ACES
- CSIRO board strategic priority for SKA
- Establishing principles for availability of CSIRO telescopes under any future co-funding arrangements

Recommendations and Discussion

The committee considered many issues relevant to ATNF operations and development, as detailed below.

ASKAP

1. Plans for early science

The ASKAP leadership in consultation with the user community and the survey science project teams has developed a strategic plan for early science with ASKAP. These observations are based on an array of 12 to 18 ADE PAFs, which will be available by early 2015. The Committee approves this process as a way to demonstrate the scientific capability of the ASKAP design for astronomical surveys.

2. Secondments to ACES

The ACES secondments program is an excellent idea that could be more widely advertised to university partners, perhaps through the general email exploder, or by emailing heads of departments.

3. Clarification on decision where NCRIS2 MkII PAFs go (on BETA antennas?)

As the ASKAP antennas become fully outfitted with MkII PAF receivers, the existing MkI PAFs currently in use for BETA will become a liability due to their poor performance at frequencies above 1 GHz. Although this is still one to two years away, it would be prudent for CASS to begin consideration of when to replace the MkI PAFs. Their locations on the inner antennas of the array makes them particularly detrimental to the performance of the telescope, particularly for low surface brightness, spectral line projects. A cost-effective strategy for putting MkII PAFs on all the inner antennas could be developed, perhaps through a workshop or other process of consultation with the user community. As the array moves from the engineering test phase to the early science phase, BETA can be decommissioned.

4. Short Baselines.

Several members of the community have voiced their concern over the lack of short baselines in early ASKAP configurations (ASKAP 12 and beyond). Many Survey Science Projects would greatly benefit from the increased surface brightness sensitivity provided by additional short baselines. While we understand the need for BETA as a testbed for PAF technology, we encourage ATNF to consider installing MkII PAFs on current BETA antennas as early as possible during the deployment of PAFs 13-24 to add short baselines to the array.

5. CSIRO ASKAP Science Data Archive (CASDA)

ATUC was asked to consider the potential data requirements of "guest" projects, other than those of the existing Survey Science Projects (SSPs). We suggest that it would be instructive for the CASDA group to look at the requirements of those ASKAP projects that were not selected as one of the SSPs. This might highlight potential science use cases that have not already been addressed by the CASDA Science Reference Group.

ATCA

0. The CABB system is now among the most popular observing modes on the Compact Array telescope. The 64MHz zoom modes and the 1 MHz zoom modes are working more and more reliably, but further debugging and documentation would be helpful. The 4 MHz and 16 MHz zoom modes are still being implemented. Although demand for these configurations is less than for the 64 and 1 MHz zooms, there is still a need to complete the CABB spectrometer system as planned.

The CABB 4 to 12 GHz feed and receiver combination is producing excellent science with impressive sensitivity. As recommended in our last report, the on-line sensitivity calculator has been adjusted to give good estimation of the integration time needed to achieve a given noise level.

1. Improved ATCA Duty Astronomer training documentation.

Observers and Duty Astronomers (DAs) have continued to highlight the need for improved training and documentation at the ATCA. It was noted by users that significant observing time is lost due to minor issues associated with the relative complexity of the Compact Array Broadband Backend (CABB) system. An example of such an issue would be the exact procedure for delay calibration for a given frequency configuration and mode. In reply to the last response from the Director, ATUC acknowledges that an extensive manual would be excessive and unwarranted. We therefore recommend that detailed checklists for both the CABB primary setup procedure (to include the various modes of observation) and resolution of common failures of the system (for example loss of a correlator block) would be very helpful for both on-site and remote observers. Such checklists would need to be frequently updated, easily accessible by external users and clearly linked from the observers webpage. We note that a generic checklist for ATCA setup already exists in the online Users Guide, and we suggest that this form the basis for a more detailed and up-to-date checklist.

2. Offset of ATCA calibrators.

Users have noted that there is evidence for offsets of the observed positions of calibrators

from their catalogued positions of up to 20 arcsec. Depending on frequency and configuration used, this could potentially result in significant position errors in scientific data taken with the ATCA of which the average user may not be aware. We recommend that the ATCA calibrator data base be systematically checked for position inconsistencies. In addition, the Miriad task ‘gpcal’ could be changed to print a warning message whenever a calibrator is found to be offset from the phase centre to alert users of potential problems.

3. Dynamic Scheduling of mm observing with ATCA

The observing efficiency of mm observations on the ATCA could be greatly increased with dynamic scheduling. User experience is that more than half the time can be lost due to weather (cloud and rain, as well as seeing), even at 7mm. Not only does this waste the observer’s time, but the science output of the array is adversely affected. However, cm projects may not overlap with mm configurations. The ATUC would like to see the statistics on how much cm time was asked for in compact configurations. The ATUC recommends that the ATNF survey mm observers of the last 2 to 3 years to ascertain how much time is really lost. The ATNF should re-examine dynamic scheduling of mm observing, or implement other strategies for highly ranked mm projects to complete their observations, e.g. allowing mm proposers to account for 30-50% of time lost to weather in their time request.

4. ATCA / CABB fault reporting

Users have expressed a concern that observatory faults affecting observations are not being communicated to observers as often or effectively as they should be. Feedback indicates that users would like to see the ATCA ‘current issues’ webpage being utilised to communicate, in brief, a greater range of hardware (or other) problems identified by ATNF staff affecting observations.

ATUC recommends that the ‘current issues’ web page be updated with brief descriptions of any issue that has a significant bearing on observations, which could not be reasonably expected to be identified by an experienced observer during the course of an observing run. Reports can be brief, but should report the nature of the problem, the type of observations likely to be affected, and the timeframe over which observations were possibly affected. ATUC also recommends that a dedicated ‘current issues’ page be set up on the ATCA forum. This should mirror content on the ‘current issues’ web page. Additionally, it would provide a centralised place for users to communicate with ATCA staff on any issues raised, and for users themselves to let the community know about observatory issues identified during the course of communication with ATNF staff or otherwise (thus removing some of the reporting burden from ATNF staff).

Remote Observing/SOC

As the ATNF telescopes enter into fully remote observation modes, new capabilities for the telescopes have opened up. The users have noted that the transition to remote observation has been smooth and in general have had very positive experiences observing from Sydney and further afield.

1. Initial training and qualification for remote observing (Parkes). Observer training for Parkes is now occurring with trainees attending sessions from Marsfield with staff based in Parkes, via video. This training involves familiarising observers with the telescope safety issues and remote observing procedures, but does not cover project-specific strategies or other technical training. While users value the training they receive, they find that the sessions could be effectively conducted from their own home institutions or by CASS staff visiting their institutions. **The users committee recommends that ATNF enable qualification and re-qualification for observing be allowed by observers directly contacting Parkes staff from their home institutions.**

The Committee recognizes that there should be a process of extensive training and mentoring for new Parkes users, either by collaborators in an established consortium or through training by the CASS staff. This level of training may require a stay of one to two weeks at Marsfield, with frequent observing sessions in the SOC.

2. Qualification for remote observing (ATCA). The ATNF is now proposing to have re-qualification for remote observing with ATCA occur from either the Marsfield SOC or from Narrabri. If remote ATCA training follows the same format as Parkes observations (with trainers connecting via video from Narrabri), the users committee recommends that remote training be offered to users at their home institutions.

3. Feedback on user experience in remote observing and at the SOC: At the time of the next meeting, the SOC will have been in full operation for nearly one year. ATUC was pleased to hear that the ATNF will be soliciting feedback on remote observations. **ATUC looks forward to a summary of the findings of the survey at the next meeting.**

ATUC recognises that our recommendations regarding remote observing certification for both Parkes and ATCA could be consolidated. We are proposing that the ATNF investigate two certification processes, one for observers who desire a more extensive training program, and one for experienced observers who still require safety training.

ATUC propose a more extensive training program, provided at Marsfield SOC, which not only covers the safe remote operation of the telescope concerned but should also include a component directly related to the proposed observing program and be conducted with a suitably qualified mentor. ATUC consider that such training would be attractive to new users and make a qualification visit to Marsfied more beneficial for the user and meet the ATNF desire to promote interaction between CASS staff and the wider user community.

The second class of observer, considered to be someone with significant experience with the telescope modes that they intend to use, or part of a large collaboration capable of providing their own training, should be permitted to obtain their certification remotely.

PARKES

1. Receivers: renaissance of Parkes science by investigating all three. All have been good progress.

For several years, the Users Committee has been considering the future operations model for the Parkes telescope. As operations costs for the ASKAP telescope began increasing in 2010 and 2011, budget reductions in Parkes operations were necessary. One effect of the reduced Parkes operations budget is a decrease in the number of receiver changes per semester. This means that some projects cannot be scheduled because the frequency needed will not be available. A remedy that would improve the capabilities of the telescope is the development of ultra-wide bandwidth receivers. In October 2012 we held a "Science Day" to discuss the possible applications and motivation for development of new receivers that could cover wide bandwidths. Many people contributed talks, with a variety of scientific applications described. The ATUC report from October 2012 summarizes the more important issues that the committee discussed in the light of the Science Day. The June 2013 report carries the Parkes receiver discussion further. By that time, the committee decided that most of the users' needs could be satisfied if the telescope were equipped with three new receivers: an ultra-wideband low frequency (UWL, 0.7 - 4.0 GHz) receiver, an ultra-wideband high frequency (UWH, 4.0-26 GHz, perhaps a combination of two or three receivers on separate feeds) receiver, and a phased-array feed (PAF, 0.7-1.8 GHz) and receiver package. The first two would be cryogenically cooled, the PAF would be similar to the MkII PAFs designed for ASKAP.

On 4 December 2013 the ATUC held another Science Day, to consider the specifications and range of scientific applications of these three receiver options, based on preliminary

design and costing work provided by the CASS engineering staff. The Science Day discussion was comprehensive and highly focused, and the Committee is grateful for the efforts of the engineering staff, and all the people who gave talks and contributed ideas from the audience. On 5 December during the open part of the ATUC meeting, the Parkes discussion was continued with consideration of the compatibility of different receivers and the operations changes that would be required depending on the choice of which new receiver to develop and install first.

The main conclusion of the discussions of the Parkes receiver options is that everyone agrees on the long-term goal: in about five years we would like to have all three of the receivers, UWL, UWH and a PAF, mounted together in the focus cabin so that no receiver changes are needed **at all** for science operations over the entire frequency range from 0.7 to 26 GHz. In time, the savings from the reduced operations costs from no receiver changes will partially pay back the cost of developing the receivers. Scientifically, the three planned receivers will rejuvenate the Parkes telescope and make it a world leading facility for ten or more years.

Given the stringent budgetary limitations on Parkes receiver construction, it is not currently possible to construct all three receivers simultaneously, although this is the preferred option. The ATUC has considered the difficult choices that will have to be made to determine the sequence of developments given limited resources. Enabling immediate receiver construction with external contributions of funding, e.g. from universities, ARC LIEF grants, or international collaboration, are welcome possibilities. Meanwhile, the most urgent development for the UWL and UWH designs is to build and test a prototype feed based on a breakthrough concept described by the engineering staff. If the performance of this feed confirms the expectations, it will be an important technological advance; two or three scaled copies could cover the full range of frequencies needed for Parkes operations. Thus wideband feed testing and characterisation has the highest priority for the next 9 to 12 months. At the same time, development of a PAF receiver for the MPIfR will provide experience and demonstrate the advantages of a PAF for Parkes. Finally, the ATNF is leading the consortia responsible for development of the PAF receivers for the SKA, which will require much lower system temperatures than the MkII ADE PAFs. This SKA development work is on a longer time scale than the expected schedule of a PAF for Parkes, but it may produce early results that can be applied to an improved design.

The ATUC recommends that CASS should give a high priority to advancing the designs of all three receivers in parallel for the next 12 months, with an objective of having complete designs for a suite of UW receivers, either in a single dewar or multiple dewars on a common turret, by late 2014. Meanwhile, the current MkII PAF design will be revised for

mounting on a 100m-class single dish, and the experience from that project can be directly applied to advance a PAF for Parkes.

For the interim period until the full set of three new receivers is finished, Parkes users will face limitations in the availability of some frequencies in some semesters. The ATUC congratulates the telescope schedulers for accommodating almost all highly ranked proposals in the first year of the reduced-changes operations model. It is particularly important that potential proposers should not be put off by negative expectations due to the reduced availability of the existing receivers.

Depending on the sequence of receiver construction, it may be necessary to take the 20cm multibeam receiver (MB-20) off the telescope for extended periods. If that should be necessary, the Committee notes that the user community will need warning at least two semesters before the change. Given the high use of the 20-cm band, an improved sensitivity in a single pixel receiver (UWL) would be necessary if the MB-20 is used only in campaign mode, roughly once per year.

2. Establish Parkes online forum. Observers have suggested an online forum linked to the Parkes Remote Observing setup where users of the remote system can post questions related to general and specific observing problems. We recommend a system similar to the ATCA users forum. Such a forum will give users a venue to ask questions to Parkes staff but also observers who know more about their specific science cases.

3. Contact procedures during Parkes remote observations. In the remote observation era, observers contact with site staff has been maintained through the PORTAL chat and via telephone, with non-emergency site staff support provided only during business hours. Some observers unfortunately have had difficulty contacting on-call staff during business hours. Other observers are unclear of when it is appropriate to contact staff or their project experts. If this information was included in the PORTAL, it might facilitate communication between observers and sites staff. For example, a flow chart describing who observers should contact (and at what hours) would be useful.

4. Minor changes to way VNC observing works

Remote observers have requested a change to the size of the VNC session windows as the current size is often too large to fit on laptops and small desktop monitors. We recommend that the vnc windows are re-sized to enable easier use on smaller screened computers. Users have also noted that the “beep” on chat portal is quiet (particularly compared to FROG noises) and can be missed. Users recommend the volume be increased.

5. Notes on the RFI environment at Parkes

Observers have also noted that the RFI at the Parkes site has gotten significantly worse over the past six months. The ATUC worries that significant amounts of telescope time are being lost to interference. The committee has made note of the RFI reporting tool on the ATNF webpages but they and other observers would like to know how this tool is monitored. The users of the Parkes facility would appreciate an update on the RFI monitoring process currently in operation.

ASTRO

1. Feedback on proposed changes to how large projects are considered by the TAC: Current ATNF policy requires large projects with "pre-graded" status to re-propose every year instead of twice-yearly. ATUC feels that the current time assignment process balances the needs of large programmes to have reasonable certainty in their time allocation with their accountability to the observatory.

m2. Bolton Symposium

The Bolton Symposium is an excellent opportunity for Early Career Researcher (ECR) users of the ATNF to showcase their research, benefiting both CASS and the wider Australian astronomy community. ATUC notes that the 2013 symposium was not advertised to the wider community as it has been in recent years. We encourage that such changes in policy be communicated to users.

COMPUTING

m1. Specialised software requirements on ATNF computers

Some users have expressed a desire to use software packages on ATNF computers (such as Kaputar) that are not currently installed. Examples of such software include non-standard shells or programming languages. ATUC recommends that a formal channel for requesting such installations be set up, such as an IT request form on the ATNF webpage. Assuming the requested software does not create security concerns or other serious problems, ATNF staff should work with users to make such software available to the community.

m2. strategy of downloading very large files from ATOA

ATNF users can download data using the Australia Telescope Online Archive (ATOA) website, which at present bundles the requested files into a single compressed archive file for transfer. While this process was adequate in the past, successful development of the CABB system and the availability of up to 16 x 2048 channels in each IF means that a single ATCA observation can produce many 4GB files and so generate a large single compressed archive file. For those users with a download connection that is intermittent this procedure can prove frustrating. ATUC recommends that the ATOA system be updated to either allow individual files to be downloaded as a batch job or that the transfer of a single large file be easily resumed.

MOPRA

ATUC was pleased to hear the new Mopra model appears to be working well for the external partners. Given it has been around 12 months since the Mopra model was put into place, it is timely to revisit how the arrangement is working for the general ATNF user community. For example, ATUC suggests a report into the oversubscription rate of the telescope for ATNF general users would be useful after the next Time Allocation Committee meeting in February.

Date and Format of the next meeting:

The next ATUC meeting will be held in June 2014, with the specific dates to be determined.