ATNF ATUC MEMORANDUM

To: ATUC
From: Bob Sault
Date: 24 November 2005
Subject **ATCA/Mopra operations report**

ATCA systems

May-October 2005 was the first full season of 3mm observations. Although observations at 3mm are now part of routine operations, they will always require more care and thought than those at the lower ATCA frequencies. The "frequency-dependent baseline issue" (also called "wrap dependent phase") is now understood. A work around is in place, and measures are in hand to eliminate it. Although the reference pointing process has been made robust, a better pointing model will simplify the observer's lot further.

There have been a number of receiver issues in recent times. The 12mm receivers have two different problems that can result in high system temperature. These problems are moisture condensing on the dewar window, and an ice build-up inside the dewar. Both problems are currently being handled by stop-gap measures while longer term solutions are implemented. They are not expected to be an observer issue during the 2006 season.

The 6cm receivers are also showing problems associated with age. A program is currently running to replace the problematic 6cm amplifiers before they become significant issues.

The second set of 16 MHz filters were installed in July, and are now a standard part of the system.

On-line system

As part of a move to eliminate VMS from the ATCA and to move to more modern hardware, the Narrabri Observatory has been porting the observing system to LINUX over a number of years. The LINUX version of the observing system is now ready for general use. By the time of the ATUC meeting, we expect to have switched to this as being the standard system.

As part of a medium-term planning exercise, the software for the ATCA and Mopra on-line systems was recently reviewed. A copy of the review document is included with this report.

Calibrators

The ATCA calibrator list has been updated with improved position determinations for 86 sources and with four new calibrators added. There continues to be fewer calibrators available at 3mm than one could hope for. The broad bandwidths available on the completion of the CABB upgrade will substantially increase the number of the existing calibrators that would be useful to 3mm observers.

Scheduling and overriding 3mm observations

During the 2005 millimetre season, as in previous seasons, the "swap" scheme has been used to give some element of robustness of 3mm observers to poor weather. In regards to this, the situation at the end of the 2005 season is same as that a year ago. One could hope for a better scheme, because there have been an inadequate number of swap partners. Basically observations at 3mm and at centimetre bands usually require different array configurations. Lack of swap partners was particularly an issue during the 3mm observations in the first half of October, where the weather was troublesome. Although not perfect, short of moving to full queue scheduling (which would require operators, significant reallocation of resources, and a major change in the ATNF observing culture), no better scheme than swaps has emerged.

ATUC has requested some discussion on "what is bad weather" in relation to 3mm observing, and when and by whom should an override be initiated. To date what represents "bad weather" has been quite obvious. Additionally the observers have been just as keen to not collect useless data as observatory staff have been to have the telescope do something more useful. As noted in the Director's Response to the last ATUC meeting, day-to-day responsibility for the effective use of the telescope sits with the observatory staff rather than the observers. Consequently the "bad weather" and override decision should rest with the observatory staff. In practise, however, this is a moot point.

ATCA array configurations

With the completion of the millimetre upgrade, there has been a significant change in the science that ATCA observers are pursuing. As a consequence, the mix of array configurations that are offered needs to adapt. Below is the suggested array configurations that will be offered over the next three years. The rationale is as follows:

- The scheme cycles through all offered arrays within 18 months.
- Two 6km array configurations will be offered each semester to meet the needs of the high-resolution science. Given that 6A is the "best" 6km configuration, this will be offered every semester.
- A single 750m and 1.5km configuration will be offered during the millimetre semester, and two are offered in the non-millimetre semester.
- The EW352 array will be offered each semester. Of the two 350m arrays, EW352 has a better complement of short baselines. The EW367 will be offered only in the non-millimetre semester.
- The EW214 array will no longer be scheduled routinely. EW214 has many spacings in common with EW352. Additionally the hybrid arrays can be used as alternatives to EW214.
- The hybrid arrays (H214, H168 and H75) will be scheduled every millimetre semester. In addition one hybrid (either H168 or H214) will be scheduled in the non-millimetre semester.

As in the past, observers can request "wildcard" array configurations that are not part of the standard set being offered in a semester. In this case, observers are requested to discuss this as early as possible with the Narrabri staff so that the possible scheduling of an array as a wildcard can be advertised to other potential proposers.

	2006		2007		2008	
	AprS	OctS	AprS	OctS	AprS	OctS

6A	●	●	●	●	●	●
6B		●			●	
6C			●			●
6D	●			●		
1.5A		●		●		
1.5B		●			●	
1.5C			●			●
1.5D	●			●		●
750A		●			●	
750B	●		●			●
750C				●		●
750D		●		●		
EW367		●		●		●
EW352	●	●	●	●	●	●
EW214						
H214	●	●	●		●	●
H168	●		●	●	●	
H75	●		●		●	

Mopra developments

The millimetre season at Mopra has been highly successful, with many good projects being completed. The telescope saw little idle time, with round-the-clock observing for most of the season. The cryogenic problems that plagued observations in 2004 had been resolved by system overhauls during the 2004/05 off period. The POCS backend (a proof of concept system for the full Mopra digital filterbank) was used for a set of observations in July. At the start of the season, the Mopra Lodge facilities received a facelift, with a new coat of paint, new carpet and some new furniture and fixtures. Most work aimed at allowing remote Mopra operation was completed. Remote operation awaits the completion of the broadband link.

The engineering highlight of the Mopra year came late in the millimetre season. A shutdown in September saw

- the successful installation of a 16-26 GHz and 77-116 GHz MMIC receiver;
- associated upgrades to the cryogenics, primary monitoring and system monitor and control hardware;
- the switch-over to a LINUX-based observing system;
- the installation of a wideband IF system; and
- the installation of a segment of the MOPS backend.

The sum total of all these upgrades has been excellent. The system is now more robust and much easier to use. With the completion of the MOPS system in 2006, Mopra will be able to observe up to 8 lines simultaneously. This, plus the on-the-fly mapping ability will make Mopra an excellent instrument for large surveys.

The 2005 year was also a good one for Mopra publications. The scientific productivity, as measured by papers published per dollar spent, is now on a par with the ATCA and Parkes.

Outreach

The redevelopment work to the Narrabri Visitors Centre is now expected to be completed in December. This will include new panels and exhibits, landscaping, shady areas and a new video running inside the building. The video being used is a NASA-developed package – ViewSpace. This is specifically designed for small visitors centres, such as the Narrabri one. It is automatically updated via the internet, and so it stays current.

Observatory Infrastructure

Work on the design of the major refurbishment/extension of the Narrabri Control Building is well progressed. The current estimate of the cost is $3.3M, including "premiums" of $0.2M for RFI shielding and $0.3M for environmentally friendly design aspects. The plan is for the ATCA to continue to observe throughout the building process, albeit with a relocated Control Room for a period. However there is likely to be some disruptions, particularly during the 2006OCTS semester.

Trenching work has commenced to install broadband links to the Observatories. It is likely that Mopra will be the first location with a broadband link. The fibres should be laid to Mopra before the end of the year, and to Narrabri by the end of January.

Advice sought

- The ATNF now has well developed 3mm observing systems at the ATCA and Mopra. General advice is sought from ATUC on areas where the ATNF can further optimise the observing systems and processes to improve their scientific productivity.
- ATUC are asked to comment on the proposed schedule for array configurations.
- Does ATUC have any comments on the on-line software review? In particular, would ATUC like to suggest any areas of priority?