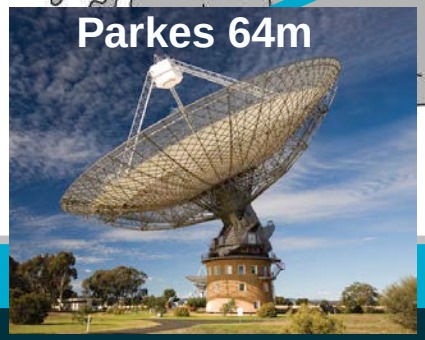
ATNF Operations
ATUC November 2016

John Reynolds

The ATNF



BOOLARDY STATION
GERALDTON
PERTH
WESTERN AUSTRALIA
NEW SOUTH WALES
NARRABRI
MOPRA
PARKES
SYDNEY

Radiophysics Laboratory

Pawsey HPC Centre

Staff changes

Welcome

Michael George (Nar)

Peter Dunn (Get)

Marilyn Drake (Ken)

Vale Scott Munting

Farewell & Thanks

Mary D'Sousa (Get)

ASKAP Operations

ASKAP operations - headlines

- Recent ACES & Early Science - Dave McConnell
- Early Science has started! - Baerbel Koribalski
- ADE-12 working with 36 beams & 144MHz (192MHz)

- Cut-over to new power station in August 2016

- New model at Boolardy for accommodation and catering with increased indigenous capability

- CRAFT and “zoom” modes progressing
- VLBI tied-array mode – covered in Tasso’s talk
- First PAF-PAF fringes – Oct 2016!
- CASDA Stage 2 started

Sep 2016 - cut-over to new power station

In the trenches

PAF Production/Installation Status (as of 10/11/2016)

PAF #	FEEDER WIRES SOLDERED	THERMAL EDGES INSTALLED	DOMINOES & PCBS INSTALLED	DC CABLES TESTED	OPTICAL FIBRES TESTED	AIR LEAK TESTED	FUNCTIONAL TESTING	EMI TESTED	CRATED	Installed @ MRO
1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK04
2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK05
3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK02
4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK13
5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK12
6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK14
7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK24
8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK17
9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK10
10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK30
11	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK28
12	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK16
13	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK22
14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK27
15	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK18
16	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ MPI
17	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK25
18	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK01
19	✓	✓	✓	✓	✓	✓	✓	✓	✓	shipped
20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK19
21	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK20
22	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK34
23	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK26
24	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK08
25	✓	✓	✓	✓	✓	✓	✓	✓	✓	shipped
26	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK06
27	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓ AK03
28	✓	✓	✓	✓	✓	✓	✓	✓	✓	shipped
29	✓	✓	✓	✓	✓	✓	✓	✓	✓	shipped
30	✓	✓	✓	✓	✓					
31	✓	✓	✓	✓	✓	✓	↑			
32	✓	✓	✓							

✓ COMPLETED / PASS ↑ PARTIAL COMPLETION → RETEST REQUIRED

PAF # 31 @ EMC chamber

4 PAFs shipped to MRO

ASKAP Timeline

- **7 Oct 2016:** start of **ASKAP-12** Early Science with BW = 48 MHz
  - WALLABY has gathered ~10 nights of data on one ES field
  - 24 PAFs are currently installed at the MRO, 4 more PAFs arrived at MRO 08/11
- **from 21 Oct 2016:** ASKAP commissioning team to upgrade bandwidth to the full 300 MHz and test performance
- **Nov/Dec 2016:** ASKAP-12 Early Science, increase b/w (300 MHz)
- **Dec 2016:** 30 PAFs at the MRO, ready for single dish testing
- **Feb 2017:** upgrade Pawsey computing system (storage focus)
- **Feb – Jul 2017:** observing continues with core ASKAP-12
  - work on adding six PAFs to ASKAP-12 for science
- **Sep 2017:** final 6 PAFs at MRO, ready for testing (31 – 36)
  - Commence rollout of AR3, AR4 etc to enable 24, 30, 36
- **Q3 2017:** commissioning with **ASKAP-30 ****

The Early Science Program

- **A wide area continuum survey**
  (1 MHz and 18.5 kHz resolution, full Stokes, 700-1800 MHz, 6-12 hours per field)

- **A few 30 square degree fields studied in neutral hydrogen**
  (18.5 kHz resolution, 1130-1430 MHz, 120 hours integration time per field (TBC).

- **A single deep HI field**
  (18.5 kHz resolution, 1000-1300 MHz)

- **A science program at high spectral resolution** (details TBC)

- **A science program to probe the variable and transient radio sky (details TBC)**

Other ideas requiring very small observing times (e.g. MWA EoR field) may be observed on an "opportunistic" basis as part of commissioning.

Estimated time available for early science

Program duration: 12-14 months ≈ 9400 hours

Fraction for early science 25% ≈ 2300 hours

Minus ~20% overheads (beamforming, calibration etc.)

Total available on sky ≈ 1800 hours*

Estimated commencement of Early Science operations: ~~September~~ 2016
October

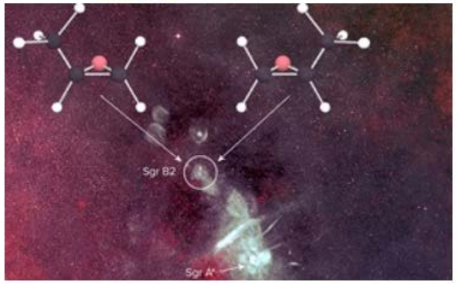
Contact for further information: Lisa Harvey-smith

Status & Impact

Media impacts

ATCA reveals white dwarfs, red dwarfs and mystery rays

By Fiona McFarlane, Helen Sim 1ST AUGUST 2016



08 NOVEMBER 2016

Search for ET underway with CSIRO's Parkes radio telescope >

Breakthrough Listen, the 10-year, $100-million astronomical search for intelligent life beyond Earth launched in 2

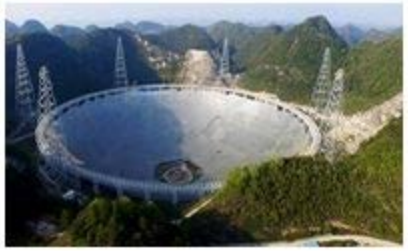
15 JUNE 2016

Parkes telescope detects key feature of life outside our solar system >

Research with CSIRO's Parkes telescope has discovered the first molecule in space that has a key attribute associated with life – 'handedness' or chirality.

Eureka!

Eureka!



05 MAY 2016

Australian technology behind the world's largest telescope >

Technology developed by CSIRO will sit at the heart of one of the world's biggest ever science projects, following an agreement with China's leading astronomical research organisation.

25 FEBRUARY 2016

Solved! First distance to a 'fast radio burst' >

For the first time a team of scientists has tracked down the location of a fast radio burst (FRB), confirming that these short but spectacular flashes of radio waves originate

Publications

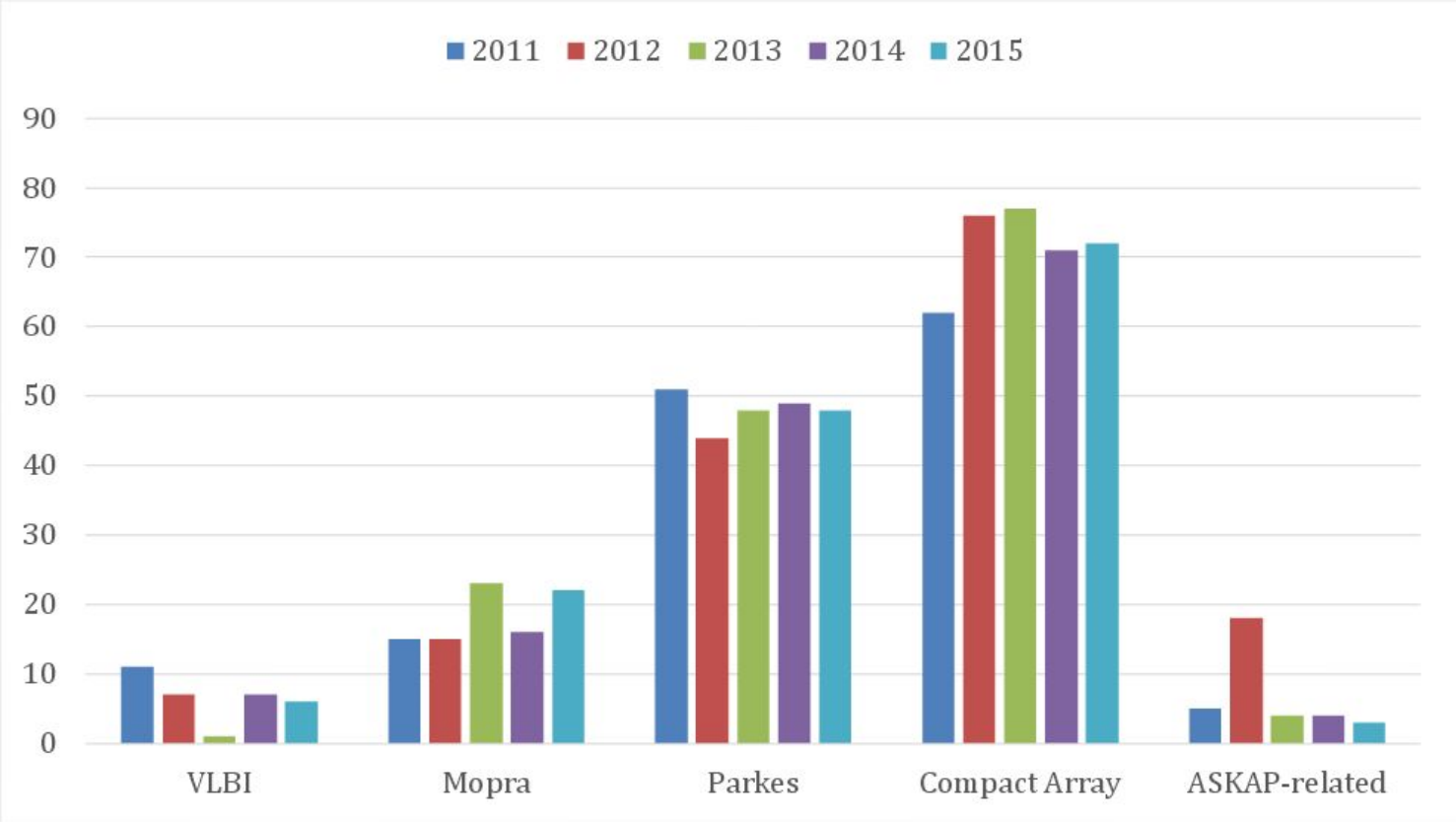


Figure 10: Publications that include data from, or are related to, the Compact Array, Mopra, Parkes, VLBI and ASKAP, grouped by facility for 2011–2015. A small number of papers with data from more than one facility are counted more than once.

Papers and impact for 2014

	No. of papers	No. of citations	Citations/paper
VLA/JVLA	199	1885 -> 2345	9.4 -> 11.8
ATCA	70	662 -> 777	9.5 -> 11.1
Parkes	49	588 -> 728	12.0 -> 14.9
LBA	7	76 -> 90	11.0 -> 12.9
Mopra	17	104 -> 123	6.1 -> 7.2
ASKAP	4	26 -> 35	6.5 -> 8.8
Other	74	1075 -> 1418	14.3 -> 19.2

Results for ATCA and Parkes (based on ATNF publications lists) examining impact for papers published in 2014, based on citations as given by ADS in the following years.

"Other" – CASS affiliated author(s) using non-CASS facilities

Funding

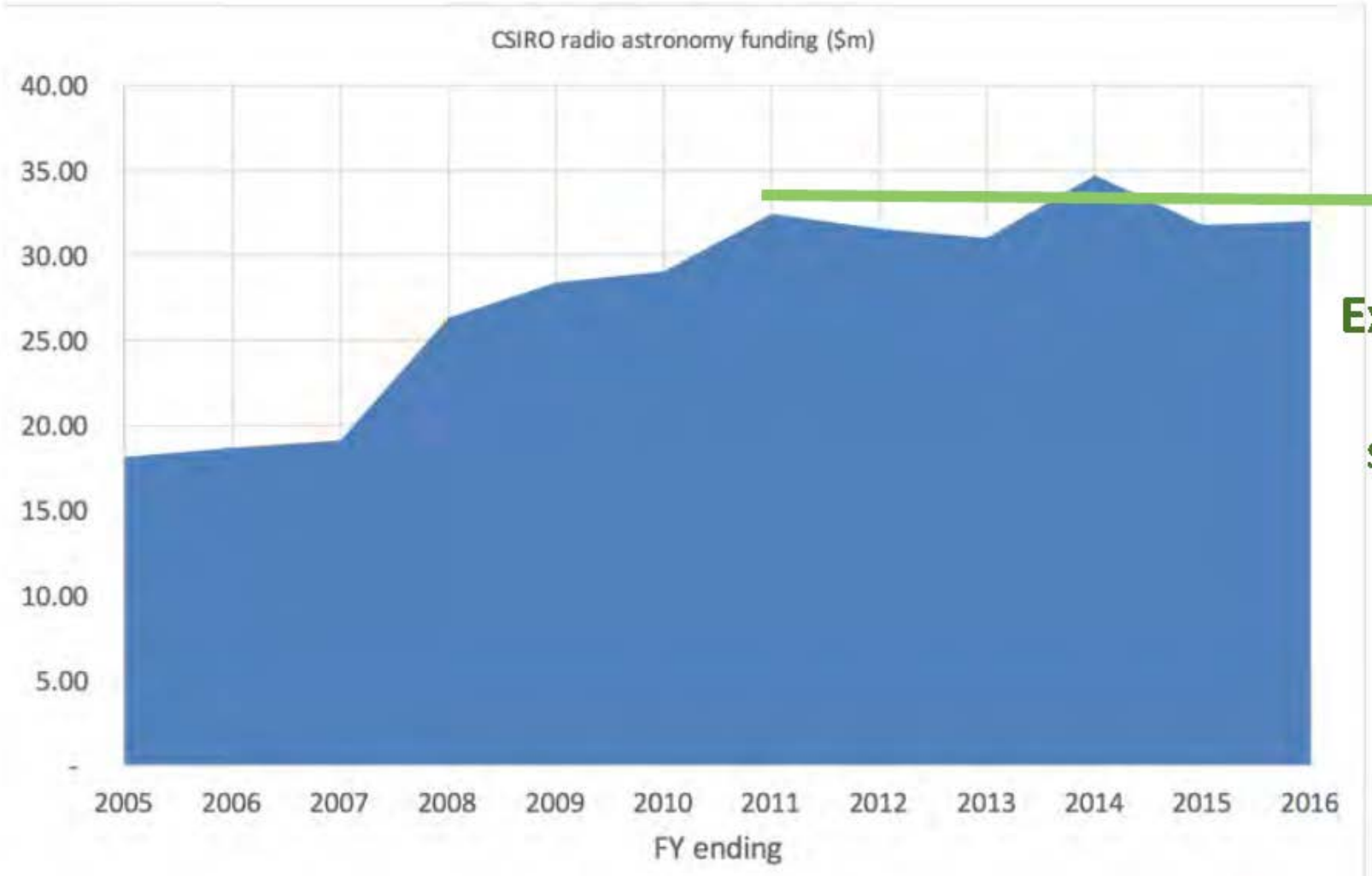
“Breakthrough Listen” Project

- 25% of Parkes time for 5 years for SETI
- Full cost of operating Parkes for 25% of time (current model)
- No impact on high-ranked proposals
- Uniform LST coverage, time-critical overrides still OK
- Observations commence in October 2016

Science benefits:

- Potential commonalities in new software/hardware
- Includes new versatile backend that will support SETI + other sci.
- Potential for future collaboration / support of new receivers
- Open data and commensal observing

CSIRO funding of radio astronomy



NCRIS funding history

2013-14	CRIS + NCRIS 2013	$1.4M	
2014-15	CRIS + NCRIS 2013	$4.5M	
2015-16	NCRIS 2013 + 2015	$4.8M	(BUT only $3.4M new)
2016-17	NCRIS 2016	$3.2M	(BUT only $2.5M new
2017-		$1M ?	

2016/17 reduction can be managed

- Breakthrough Listen funding (partially offset by increase in ASKAP energy costs)

Zero NCRIS funding from 2017 poses serious problems for current ATNF operations

- CASS is committed to commissioning and operating ASKAP – little scope for savings
- Contraction of science operations – ATCA and/or Parkes – now become serious options
- Parkes, ATCA have already been streamlined

Making ends meet FY17/18 and beyond

Revenues

$1.5M/y from Breakthrough Listen contract (commencing 2016)
$1M/y from MRO cost-recovery
$1M/y ongoing funding from AAL
} from FY 17/18

Costs

	FY15/16 (actual)	FY16/17 (forecast)	FY17/18 (forecast)	FY18/19 (forecast)
ASKAP & MRO	$7.9M	$8.5M	$9.2M	$9.4M
ATCA	$2.9M	$2.9M	$3.0M	$3.0M
Parkes	$2.1M	$2.2M	$2.2M	$2.2M
ATNF Operations Operating result	$1.5M	$0.3M	-$1.2M	-$1.5M

Closing the gap

- Preferred option is to offer telescope time for sale
- Up to 50% of ATCA time, 25% of Parkes & ASKAP
- Remaining (unsold) time awarded on merit, free to end-user

- Call for expressions of interest (EoI) close to release
- Closing date ~mid-December

- Market largely untested but some early interest
- Pitch widely – “no strings attached”

ASTRONOMY

NSF says: Out with the old telescopes, in with the new

Agency wants to shed ownership of iconic radio dishes

Scientists who rely on the threatened telescopes say they are appalled by the prospect of closure. "It's mind-boggling that NSF doesn't see the merit of this facility," says Robert Kerr, who quit as Arecibo director in 2015 because of frustration with NSF funding cuts.

Telescopes for sale

The National Science Foundation (NSF) is trying to shed 10 aging telescopes to make way for new ones

TELESCOPE ON OFFER	LOCATION	FIRST LIGHT	PARTNERS/ST	
2.1-Meter Telescope	Kitt Peak in Arizona	1964	Caltech-led c	
Mayall Telescope	Kitt Peak in Arizona	1973	Taken over by	
Very Long Baseline Array	Various	1993	50% partnership with U.S. Navy	$4 million
Green Bank Telescope	Green Bank, West Virginia	2000	Breakthrough Listen, NANOGrav, West Virginia University	$2.5 million
SOLIS Telescope/GONG	Kitt Peak in Arizona	2003	NOAA sharing GONG operations costs	$1 million
WIYN Telescope	Kitt Peak in Arizona	1994	NASA providing new exoplanet instrument	
Dunn Solar Telescope	Sacramento Peak in New Mexico	1969	University consortium in development	
Arecibo Observatory	Arecibo, Puerto Rico	1963	Environmental review in process	
SOAR Telescope	Cerro Pachón, Chile	2003	Status review when collaboration ends in 2020	
McMath-Pierce Solar Telescope	Kitt Peak in Arizona	1962	Small user community presents few partner opportunities	

ATNF Ops - Fall-back options

Option 1 – potential saving of $0.4M~$0.7M/y

- Restrict science operations at Parkes to support of Breakthrough Listen
- Cease operation of the Long Baseline Array
- Offer guided tours at Parkes during unused time

Option 2 – potential saving of ~$0.5M

- Restrict ATCA science operations to support of Legacy Projects (at 60-70%)
- Cease operation of the Long Baseline Array.

Option 3 – Potential saving of ~$1M/y

- Operate the ATCA with reduced support in short term, freezing all h/w and s/w
- Cease operations with the Long Baseline Array
- Not sustainable for more than a year or two

Option 4 – Potential saving of ~$3.6M/y

- Cease all science operations with ATCA and LBA

The ATNF User Community – your input

Obtain broad astronomy community input on the implications of ceasing or substantially decreasing funding for ATCA and Parkes, to inform a decision on a timescale of ~6 months. (June 2016)

Decision will involve identifying and evaluating several new scenarios for operating our facilities, including a risk analysis of the various options (underway).

Input welcome on;

- sale of telescope time: market approach, general guidance
- fall-back options

Observing on site

Narrabri
- limited accommodation and no user support
- Prior approval but not other restrictions

Parkes
- No on-site accommodation
- Requires a science or technical case
- Minimum two observers in the tower
- Prior approval

ASKAP
- Not generally possible
- Possible ‘open week’ ~once per year – any interest?

We acknowledge the Wajarri Yamatji people as the traditional owners of the Murchison Radio-astronomy Observatory site

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