www.csiro.au

Introduction to ATNF Facilities

Phil Edwards
Head of Science Operations
CSIRO Astronomy and Space Science

CSIRO

Welcome!

- Huan-ying ni-man!
- Hwangyong-hamnida!
- Welkom!
- Willkommen!
- Haere mai!
- Bienvenidos!
- Youkoso!
- Dobro pozalovat!
- Ehryagowenmayd!

Overview

- Introduction to LOC & SOC
- Safety induction
- CSIRO
- CASS and ATNF
- Why are we here?
- Program for the week
- Final words of reassurance

Introduction to LOC & SOC

- Local Organising Committee
  - Jo Houldsworth, Margaret McFee, Robin Wark
  - Jamie Stevens, Mark Wieringa, Brett Hiscock
  - Peter Mirtschin, Tim Wilson, Clarrie Leven
  - All staff!
- Scientific Organising Committee
  - James Urquhart (Chair)
  - Robert Braun
  - Phil Edwards
  - Jimi Green
  - Kate Brooks

CSIRO

Request

- This is a radio-astronomy observatory
- Observations are being made now
- Please turn off your
  - Mobile phone
  - Wi-fi
  - Bluetooth
  - Radio transmitters
  - Microwave ovens
  - ….

Safety

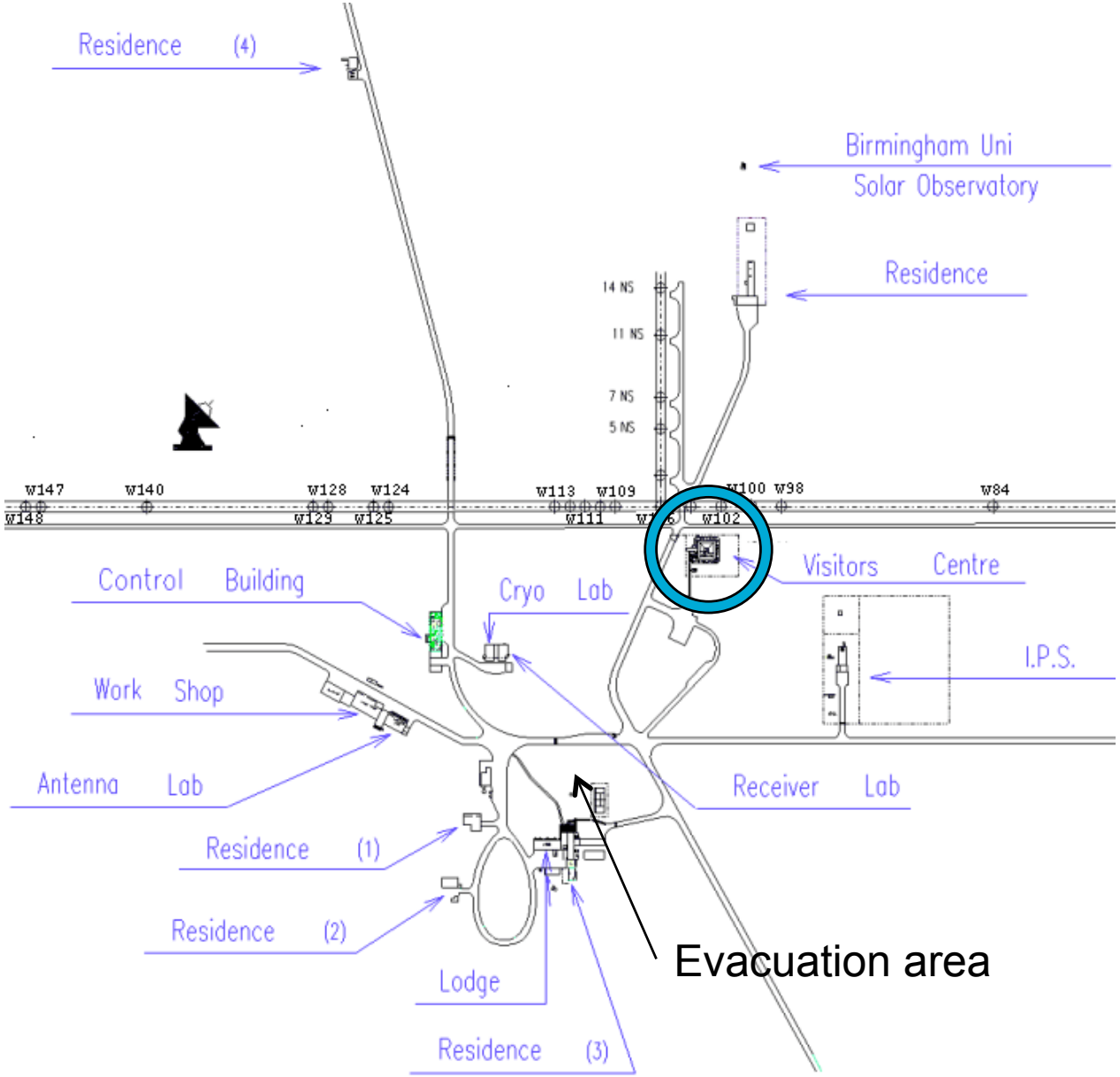
- The Observatory is a safe place
- Please be careful of
  - The sun (sun screen is available)
  - The paths (watch where you're going)
  - Heights (antenna tours are optional)
  - Kangaroos (do not get too close)
  - Mosquitoes (cover up; repellent is available)
  - Snakes (if you see one on-site, let us know)
- If you have any questions, ask a member of the LOC or local staff or SOC

CSIRO

Fire alarm

- If an alarm sounds once, do not evacuate, but stay alert
- The alarm will be stopped by Observatory staff, who will investigate
- If the alarm sounds a second time, move to the evacuation area

Site map


Residence (4)
Birmingham Uni
Solar Observatory
Residence
14 NS
11 NS
7 NS
5 NS
W147
W140
W128
W124
W113
W109
W100
W98
W84
W148
W129
W125
W111
W102
Visitors Centre
Control Building
Cryo Lab
I.P.S.
Work Shop
Antenna Lab
Receiver Lab
Residence (1)
Residence (2)
Lodge
Residence (3)
Evacuation area

CSIRO

- The Council for Scientific and Industrial Research (CSIR) was founded in 1926
- In 1926, CSIR had a staff of 41
- CSIR became the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in 1949
- In 2010, CSIRO has a staff of 6500 in 13 Divisions, and an annual budget of a little over $1000 million, roughly half from government and half external revenue

CSIRO Divisions

1. Astronomy & Space Science
2. Earth Science & Resource Engineering
3. Ecosystem Sciences
4. Energy Technology
5. Food & Nutritional Sciences
6. Information & Communication Technologies Centre
7. Land & Water
8. Livestock Industries
9. Marine & Atmospheric Research
10. Materials Science & Engineering
11. Mathematics, Informatics & Statistics
12. Plant Industry
13. Process Science & Engineering

CSIRO

Australia Telescope National Facility

- The CSIRO Division of Radiophysics was established in 1939
- ATNF became a separate division in 1989
- CSIRO Astronomy and Space Science formed in 2009, combining ATNF, CDSCC (Tidbinbilla Deep Space Network station), and other space activities
- ATNF has 4 themes
  - Astrophysics
  - Operations
  - Technologies for Radio Astronomy
  - ASKAP (the Australian Square Kilometre Array Pathfinder)

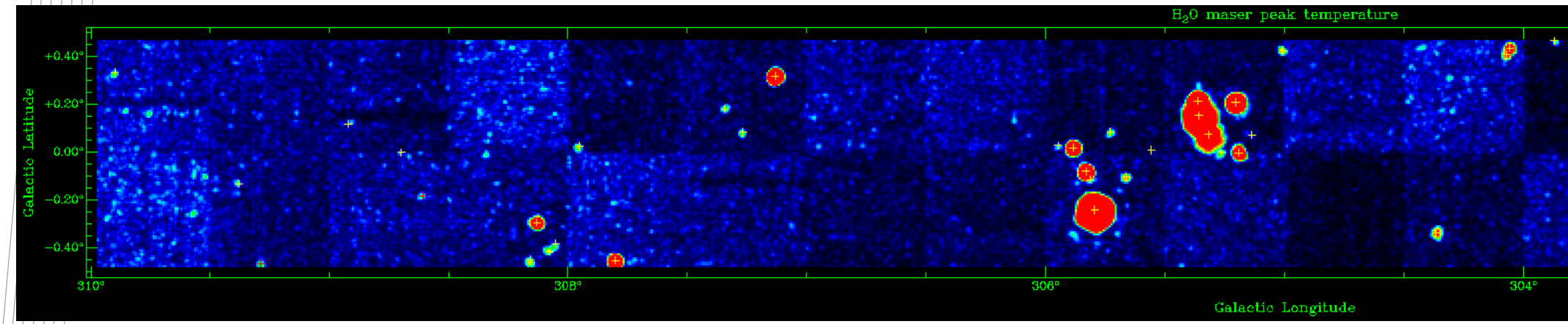
ATNF Facilities: Parkes 64m


APOD 100803

ATNF Facilities: ATCA 6 x 22m

ATNF Facilities: Mopra 22m

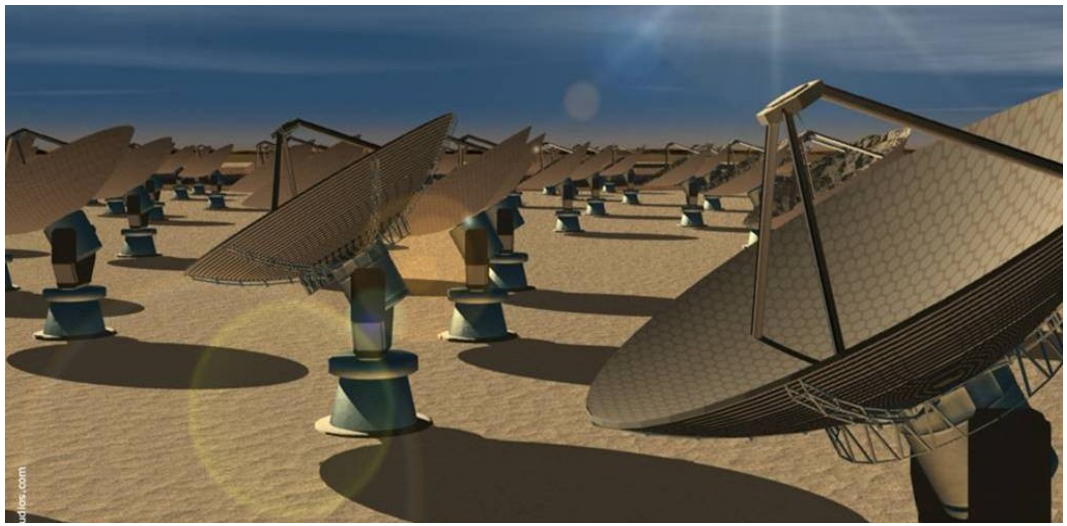
The 22m Mopra telescope is located between Coonabarabran and Siding Springs



Portion of the map of the inner galactic plane from the HOPS 12mm survey

CSIRO

ASKAP at the Murchison Radio Observatory



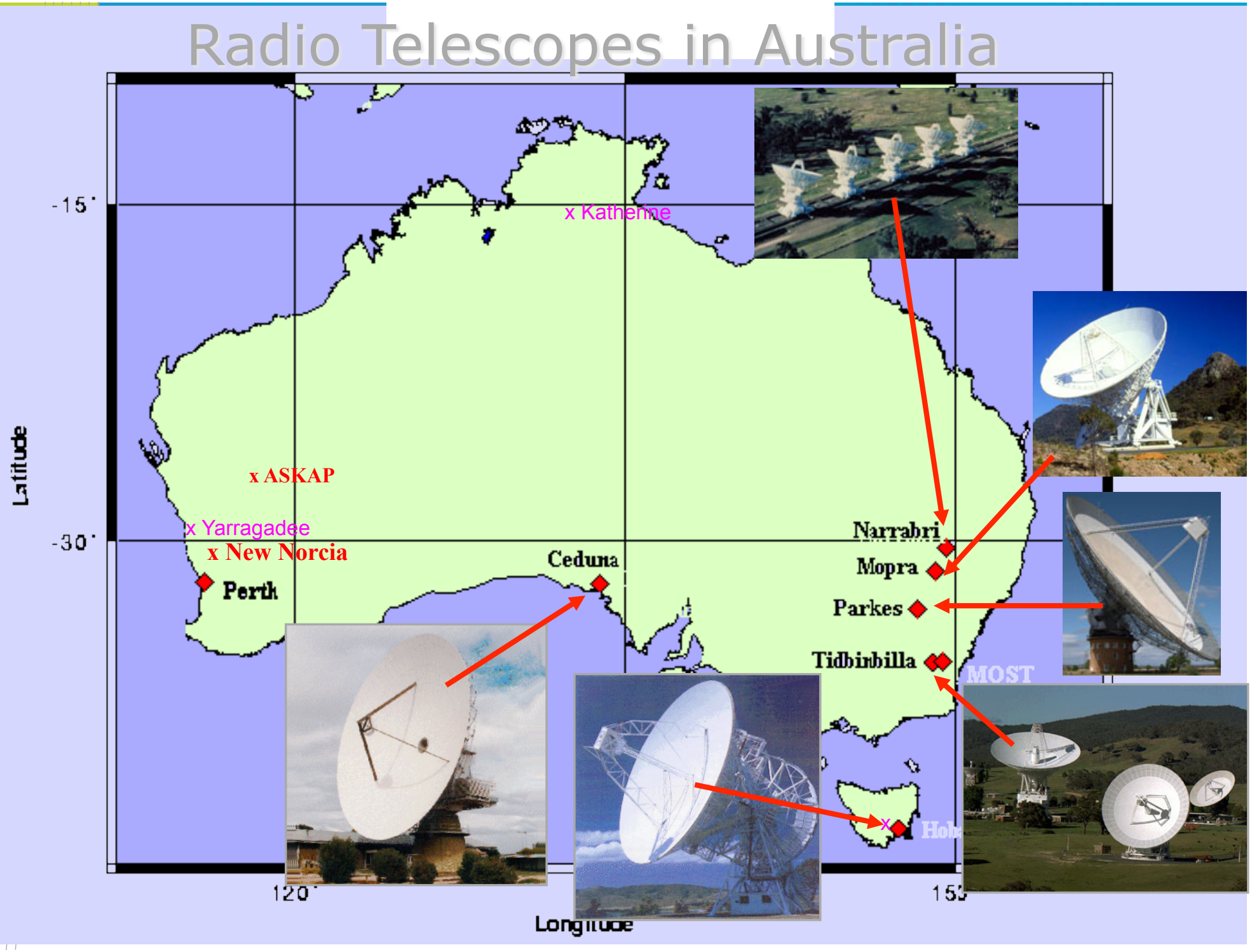
Antennas	**36 x 12m diam., 3-axis rotation**
Max baseline	**8 km**
Frequency	**700–1800 MHz**
FOV	**30 deg^2**
Bandwidth	**300 MHz**
Channels	**16k**
PAF	**10x10x2**
T_{sys}	**35 K**

First antenna on-site 2010,
Six element test array (BETA) in 2011

CSIRO

First ASKAP antenna

Radio Telescopes in Australia



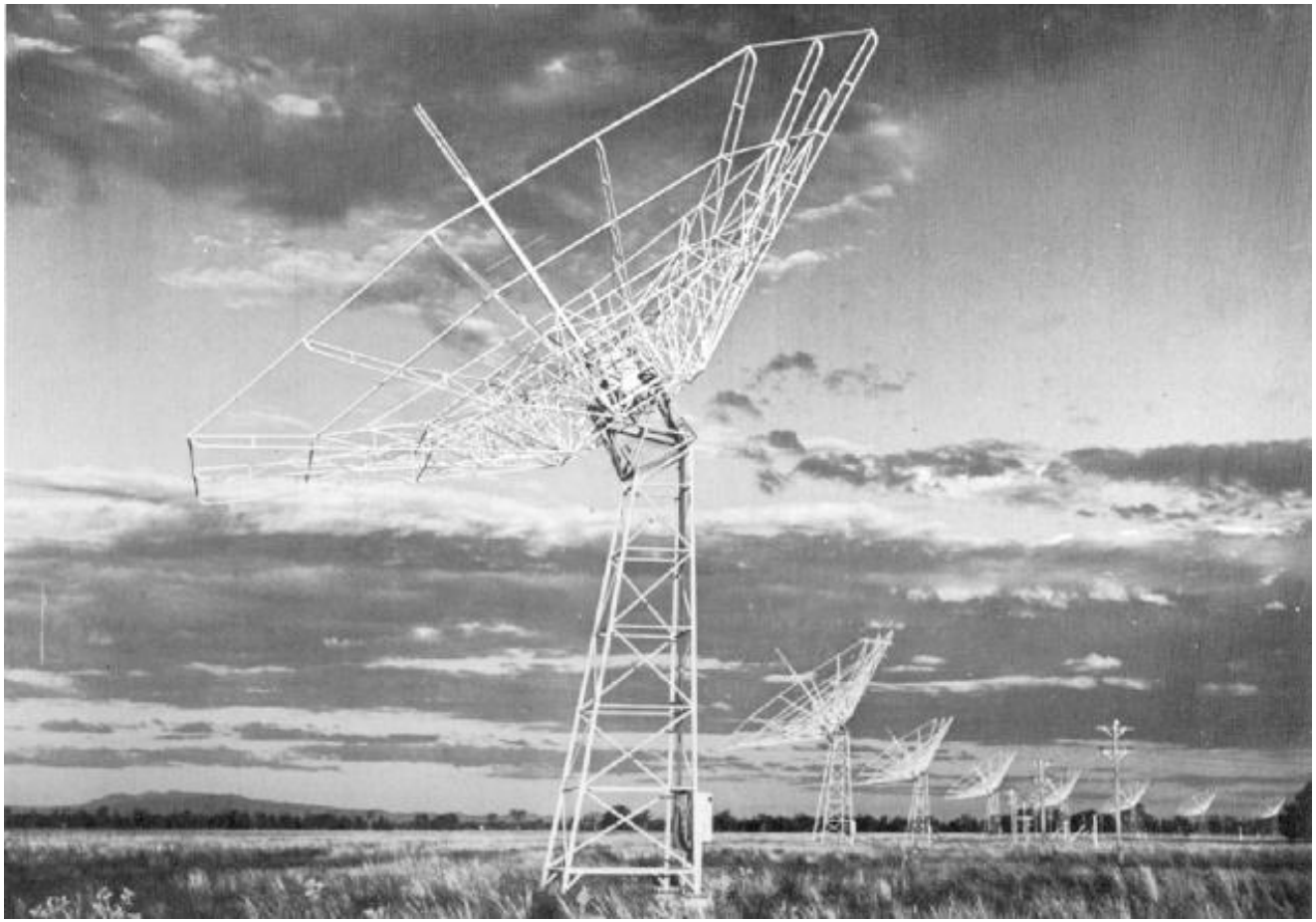

Why are we here?

The Culgoora Radio Heliograph

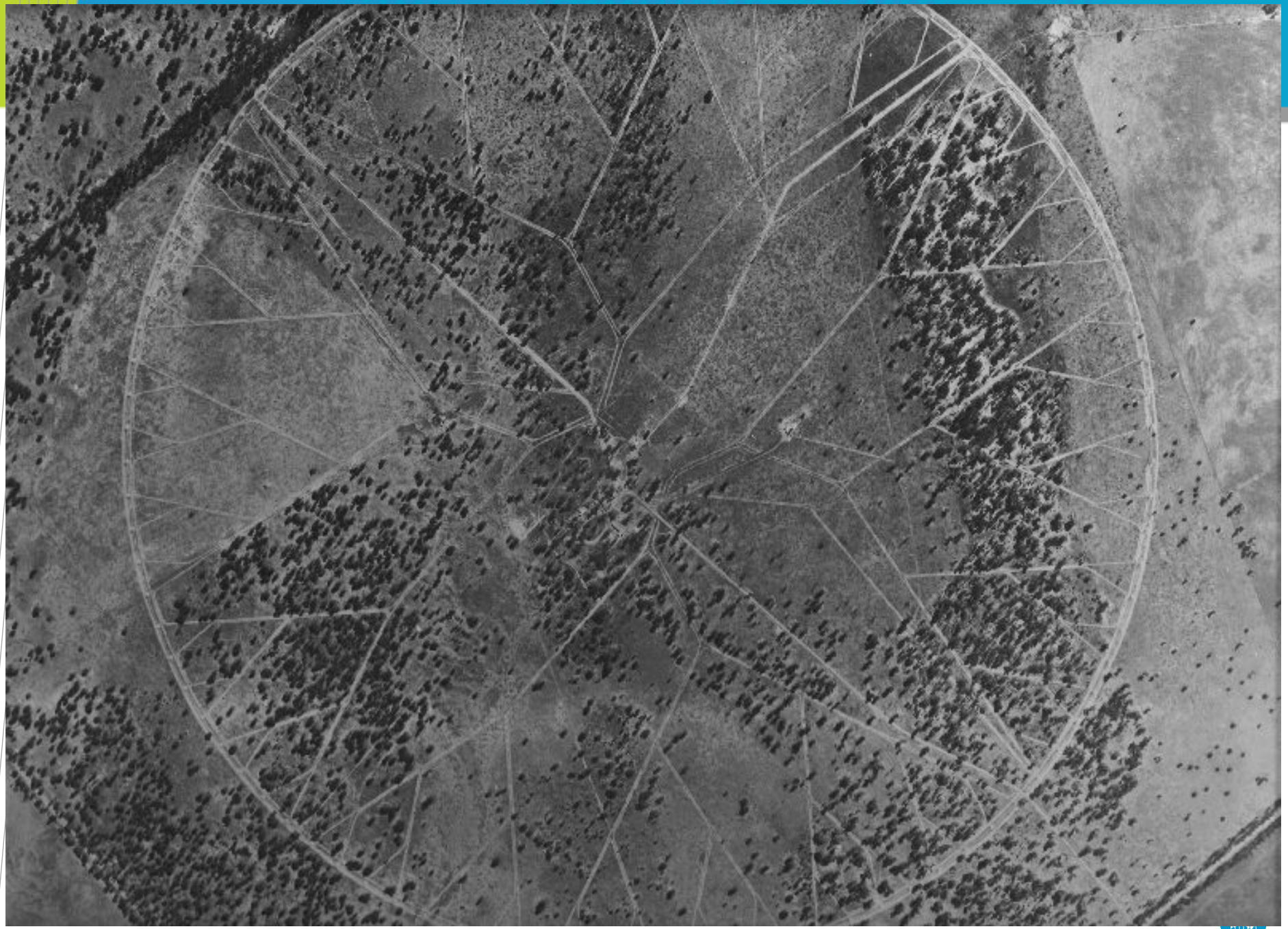
- First planned to be located at Parkes.
- Culgoora selected as large flat area with
  - suitable soil
  - free from flooding
  - relatively free from RFI
  - easy access from Sydney
- CSIRO DAP elected to base solar optical observatory at the same site.
- Funding (US$550,000) granted by Ford Foundation in April 1962
- Construction from mid-1962 to mid-1967

CSIRO

The Culgoora Radioheliograph



1967 to 1984



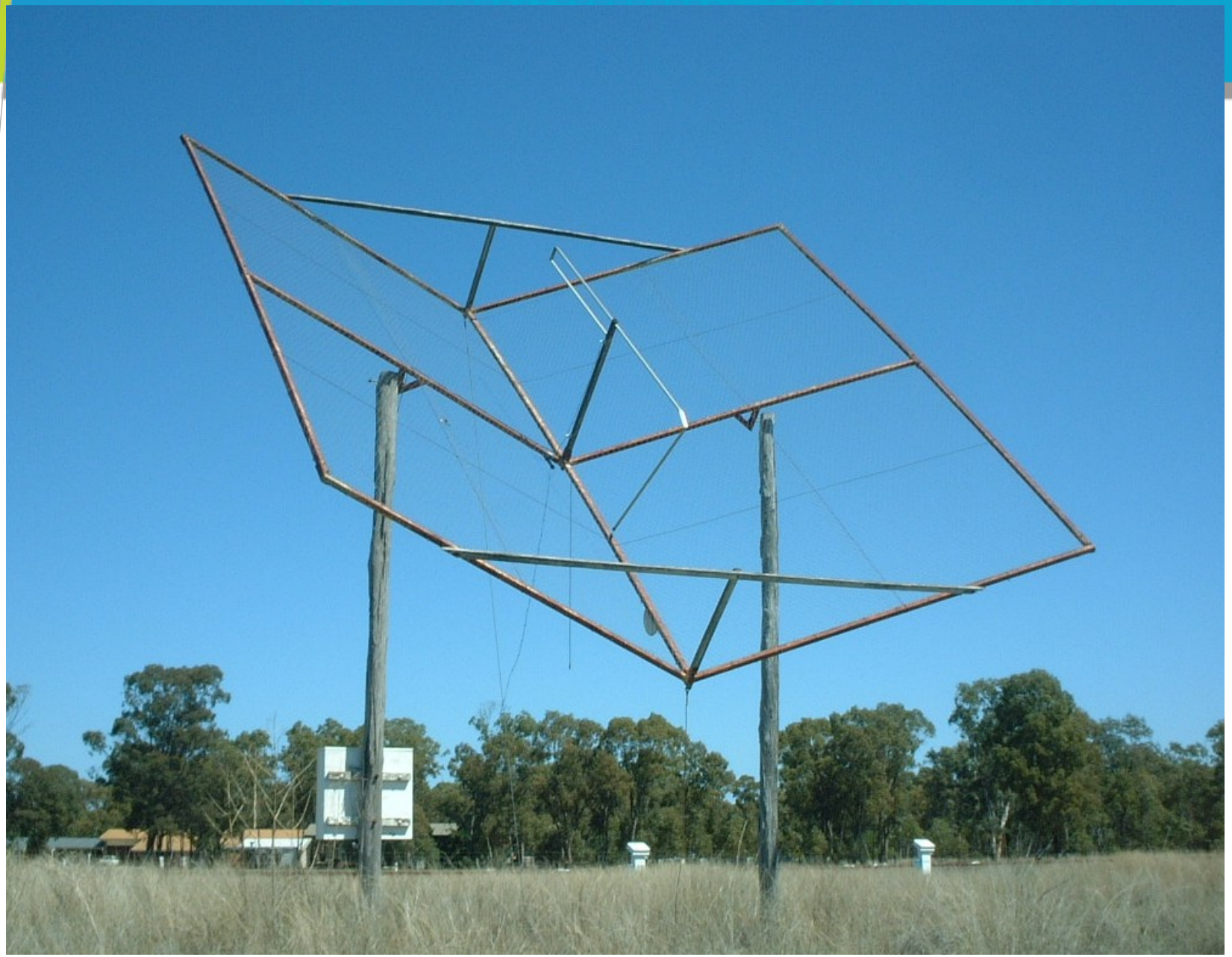
Paul Wild

- b. 17 May 1923, Sheffield, UK
- Joined CSIR in 1947
- Led the team that built and operated the Culgoora radioheliograph
- Chief of Division of Radiophysics 1971 to 1978
- Chairman of CSIRO 1978 to 1985
- d. 10 May 2008

Radio Heliograph

- A ring of 96 wire-mesh antennas of 13.7m diameter, in a circle with a 3km diameter
- Covered HA range of +/- 2.5 hr
- Operated initially at 80MHz (with 3.8’ beam), later also at 160 MHz and (with a concentric array of 48 corner-reflector antennas) 43 MHz
- Signals transmitted from antenna to control building along open transmission lines (320km of copper wire used!)
- 48 pencil beams (N-S) scanned (E-W) across sun every second, as a phased array

CSIRO



Radioheliograph results

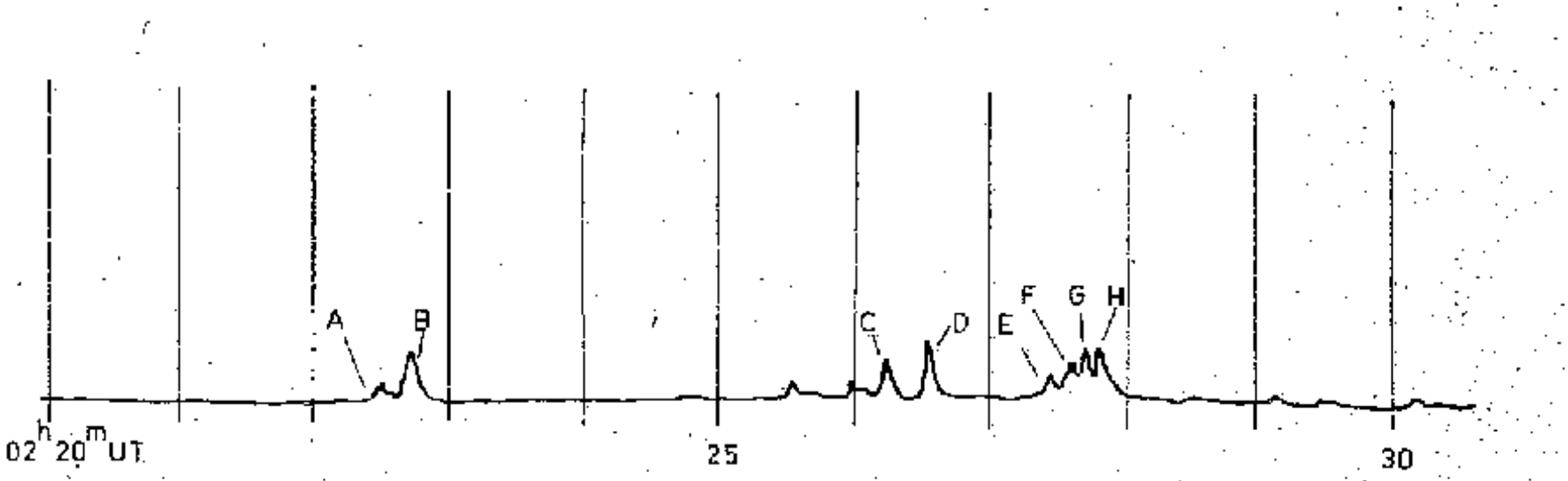


Figure 1.—Radiometer record of the total solar flux at 80 MHz during an event of September 2, 1967.

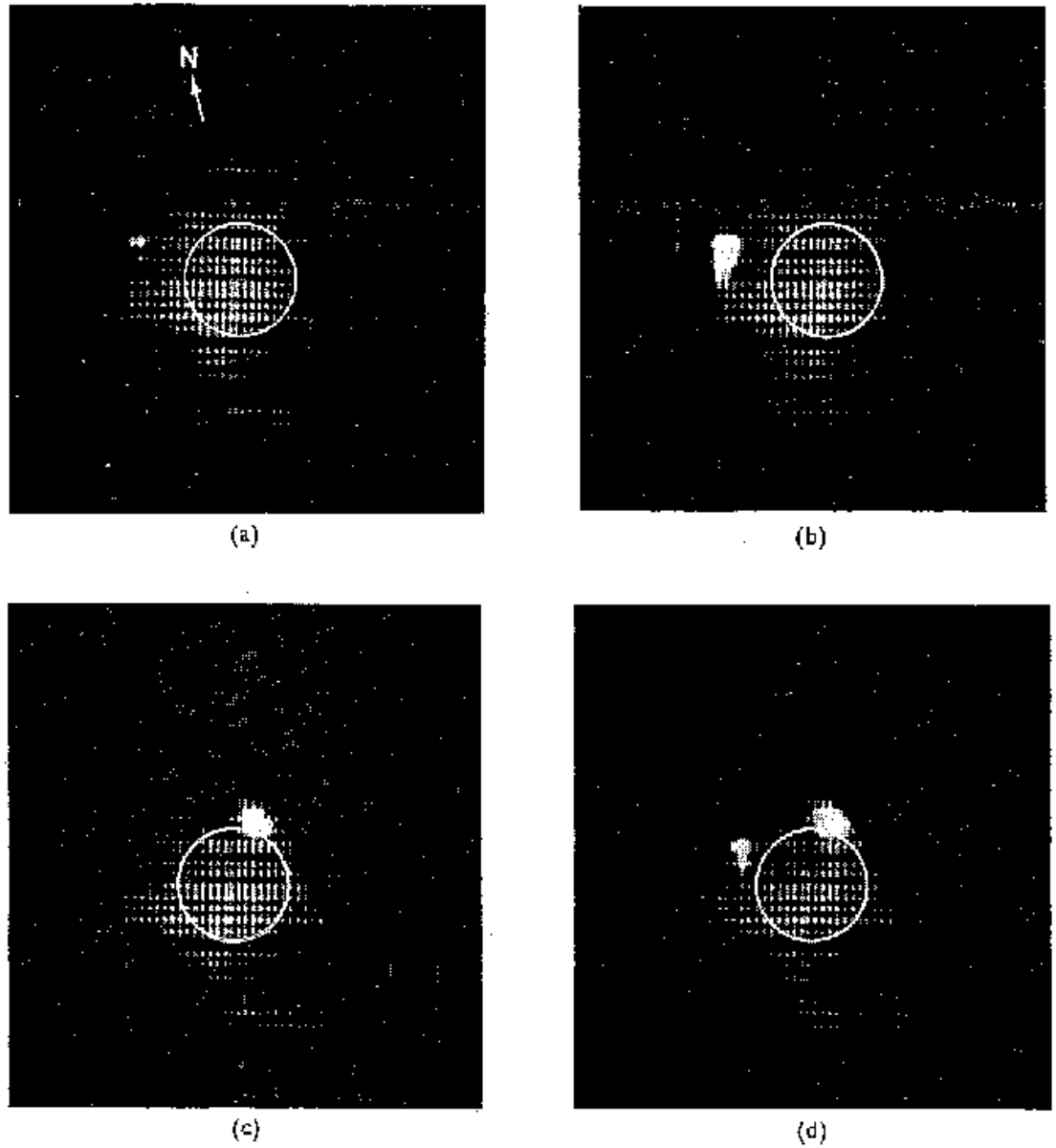


Figure 2.—Radioheliograph (80 MHz) pictures taken for the event shown in fig. 1. Superimposed on the quiet Sun are :

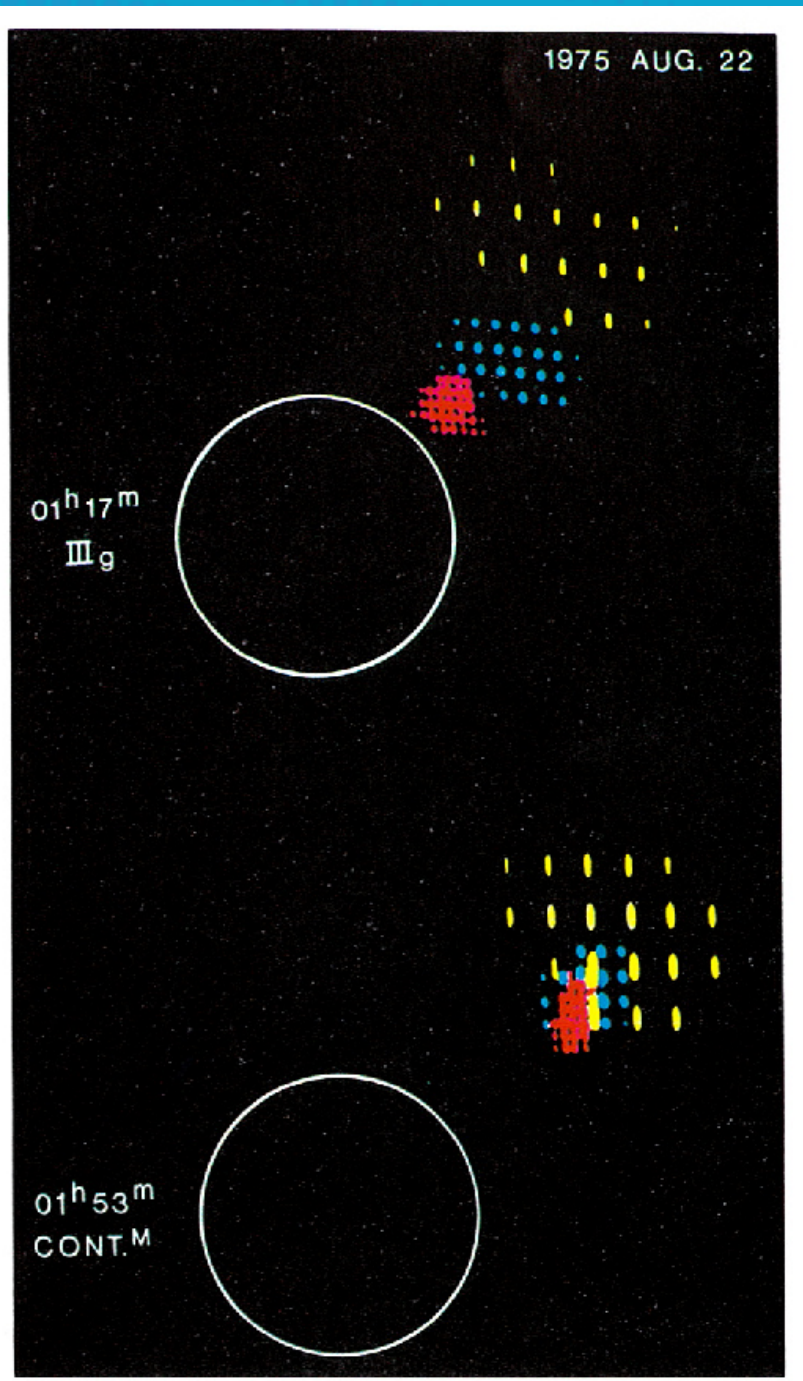
(a) burst A of fig. 1 ; (b) burst B ; (c) bursts C and D ; and (d) bursts E, F, G, and H.

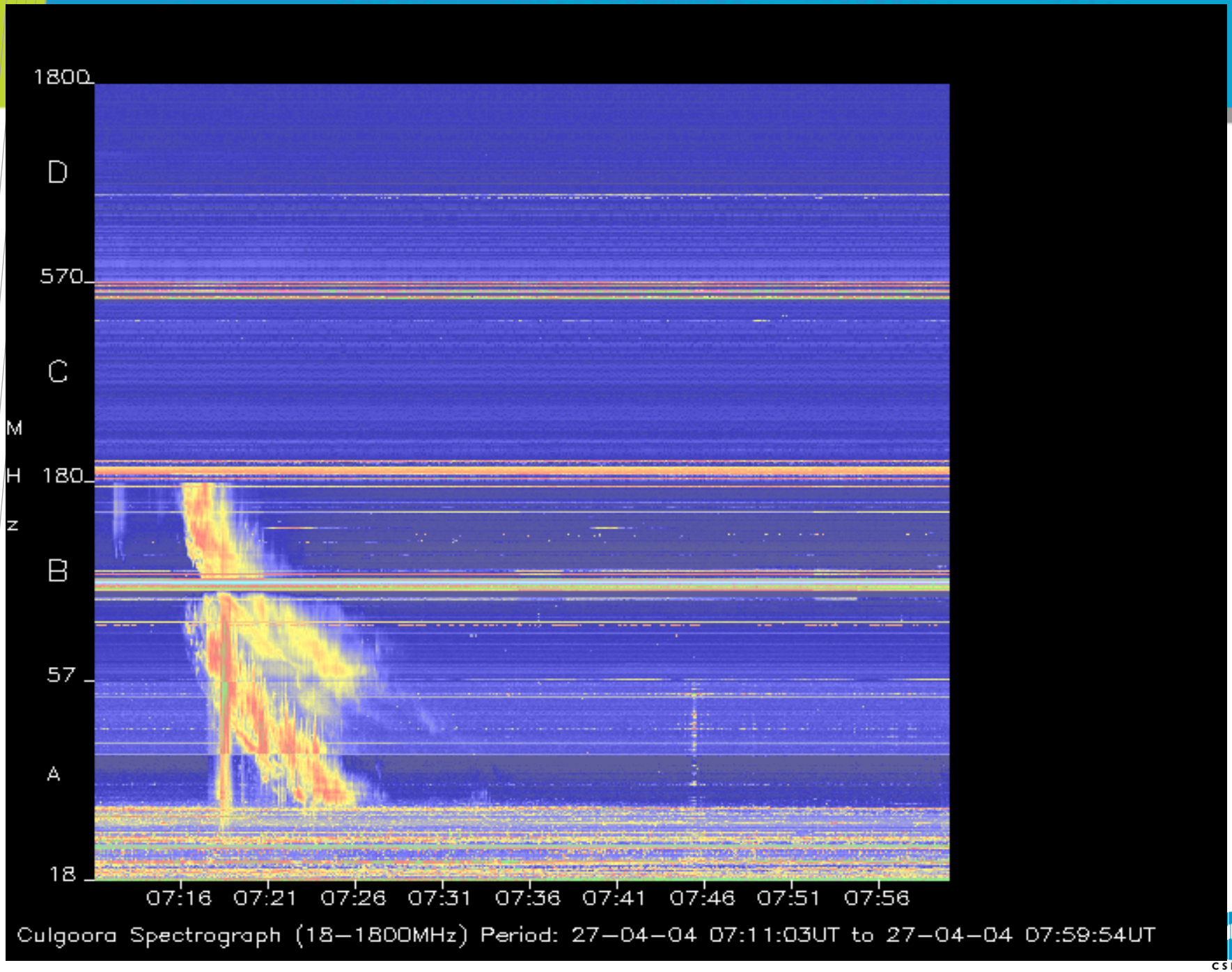
Burst E occurs in the eastern (left-hand) region and bursts F, G and H in the northern. The circles indicate the optical limb of the Sun.

CSIRO

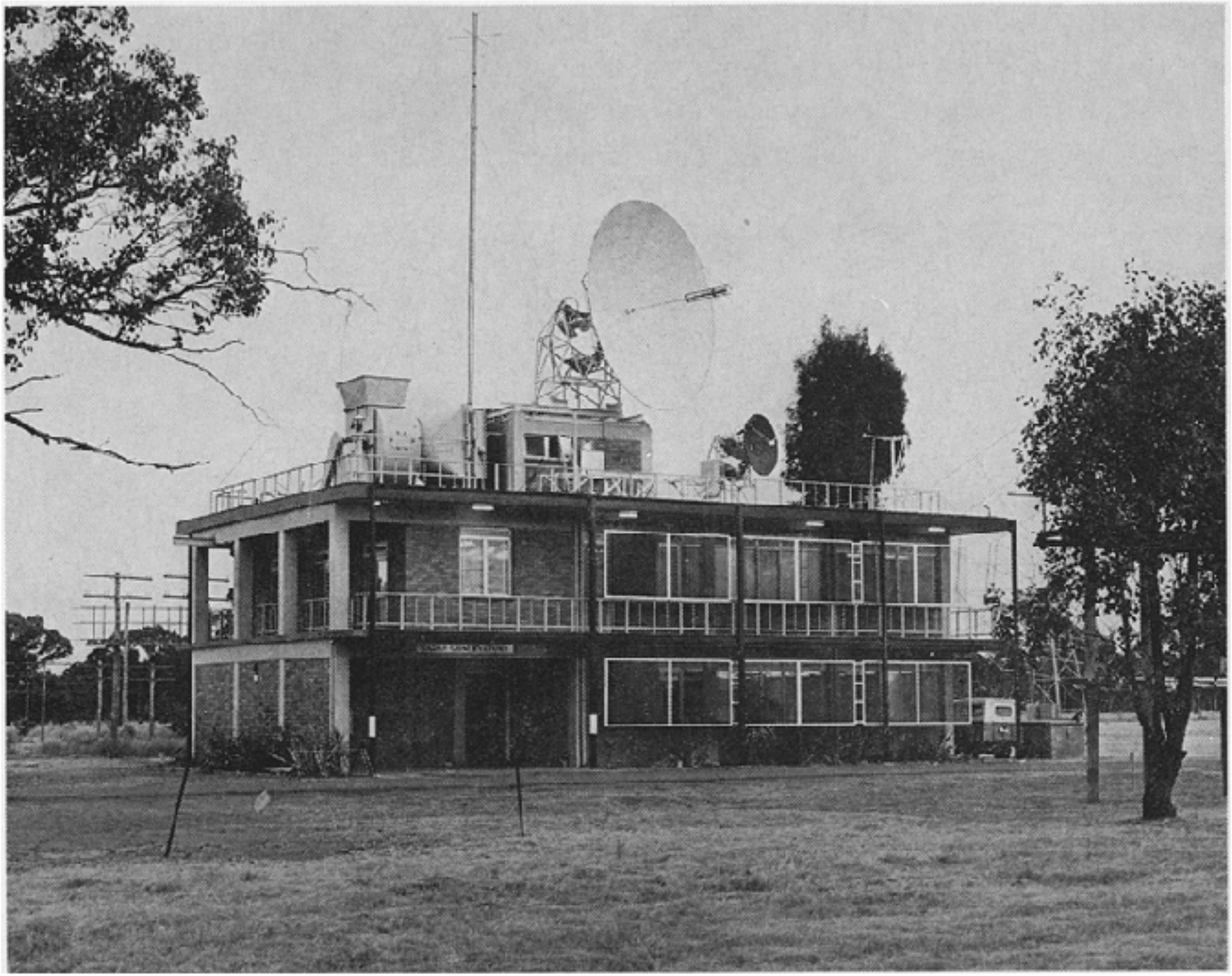
Bursts

- Superimposed radioheliograms at 160 MHz (red) 80 MHz (blue) and 43MHz (yellow) of a type III burst (top) and a type IV moving source (bottom)
- The different frequencies are separated by 1 sec in time




1800
D
570
C
M
H 180
z
B
57
A
18
07:16 07:21 07:26 07:31 07:36 07:41 07:46 07:51 07:56
Culgoora Spectrograph (18–1800MHz) Period: 27–04–04 07:11:03UT to 27–04–04 07:59:54UT

CSIRO



IPS today

- The Ionospheric Prediction Service, a unit of the Bureau of Meteorology, is the Australian Space Weather Agency. The Culgoora site monitors the sun daily at radio and optical wavelengths.

Thoughts for the week

“You don’t need to understand everything to learn something useful”

Thoughts for the week

“You don’t need to understand everything to learn something useful”

“The next best thing to knowing something is knowing where to find it” -- Samuel Johnson

Thoughts for the week

"You don't need to understand everything to learn something useful"

"The next best thing to knowing something is knowing where to find it" -- Samuel Johnson

"Experience is a wonderful thing, it enables you to recognize a mistake when you make it again"

Thoughts for the week

"You don't need to understand everything to learn something useful"

"The next best thing to knowing something is knowing where to find it" -- Samuel Johnson

"Experience is a wonderful thing, it enables you to recognize a mistake when you make it again"

"What we learn with pleasure with never forget"

-- Alfred Mercier

CSIRO

CSIRO/ATNF
Philip Edwards
CSIRO ATNF Head of Science Operations

Email: Philip.Edwards@csiro.au
Web: www.atnf.csiro.au

Thank you

Contact Us
Phone: 1300 363 400 **or** +61 3 9545 2176
Email: Enquiries@csiro.au **Web:** www.csiro.au