The SEARFE Project

Canberra Launch

Dr. George "Ñima" Warr

17 March 2004

Students
Exploring
Australia's
Radio
Frequency
Environment

www.searfe.atnf.csiro.au

SEARFE Project Aims

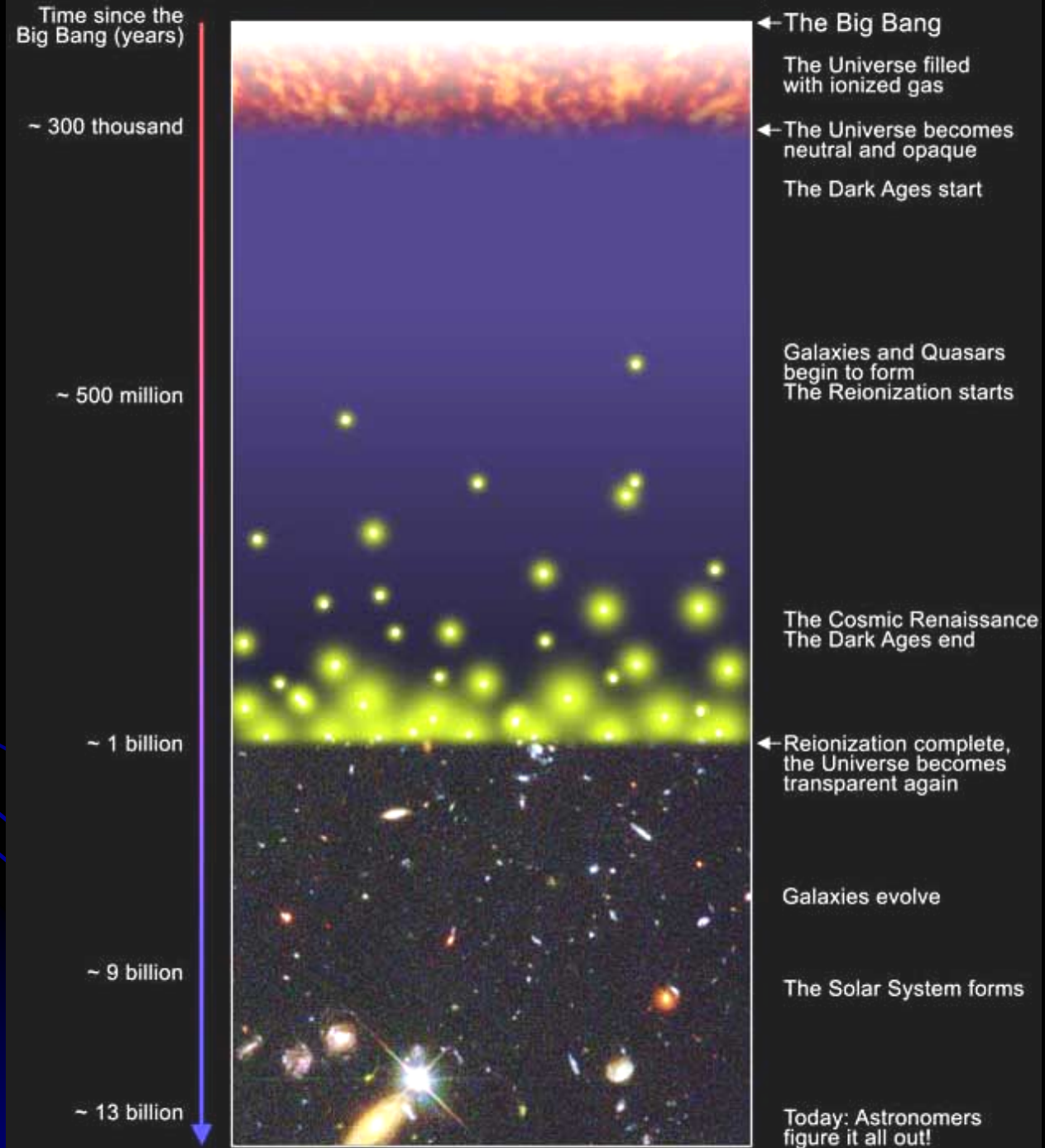
Education & Outreach

- Raise awareness of radio-science
- Give students practical experience of:
  - the value and use of the RF spectrum
  - the requirements of a radio-quiet site (by comparing results from city and country areas) and why a radio-quiet site is required for the next generation radio telescopes SKA & LOFAR

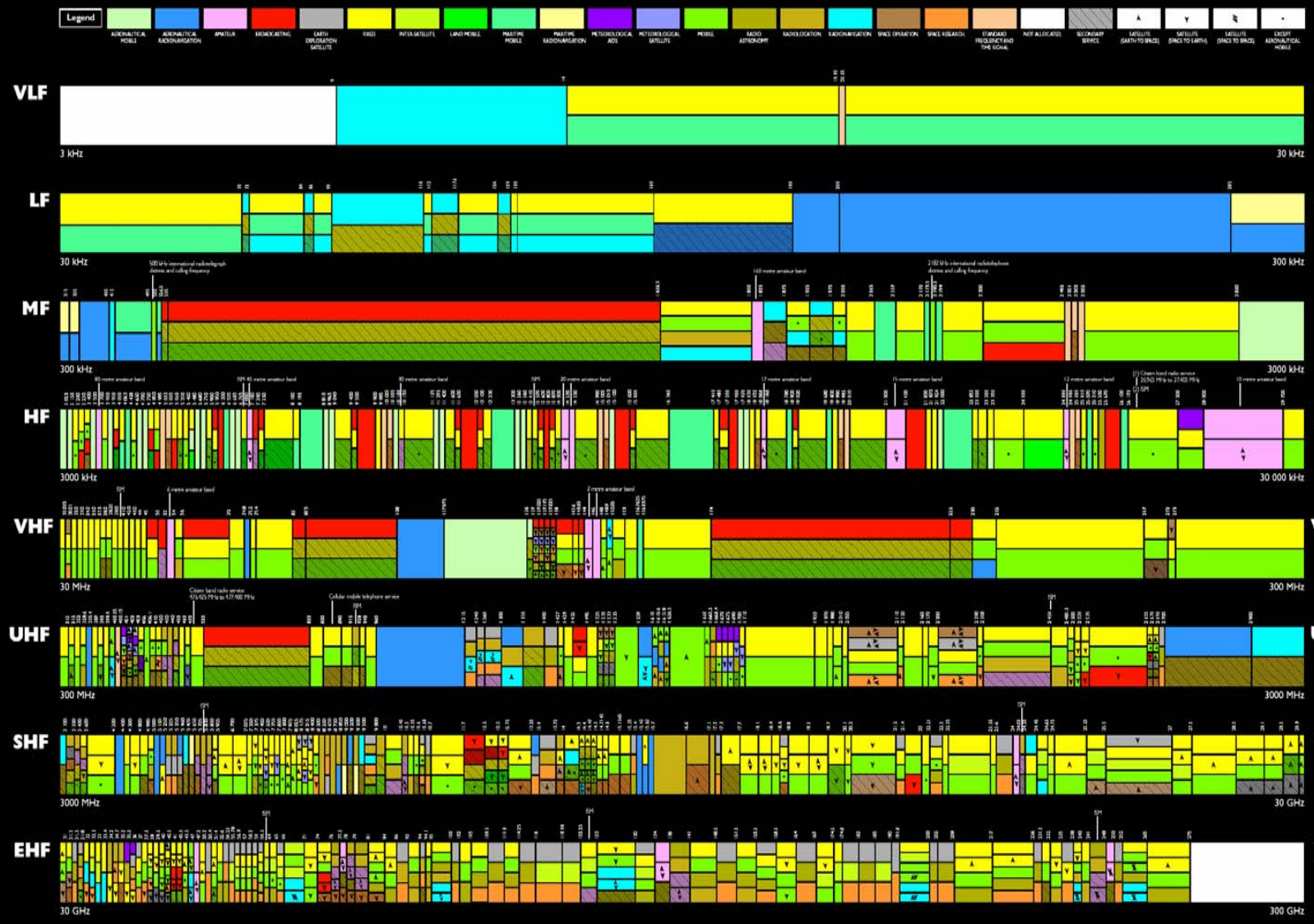
Research

- Characterising and potential long-term monitoring of Australia's radio-frequency environment
- Compare measurements with predictions based on the Australian Communication Authority's database of licensed transmitters

A Schematic Outline of the Cosmic History

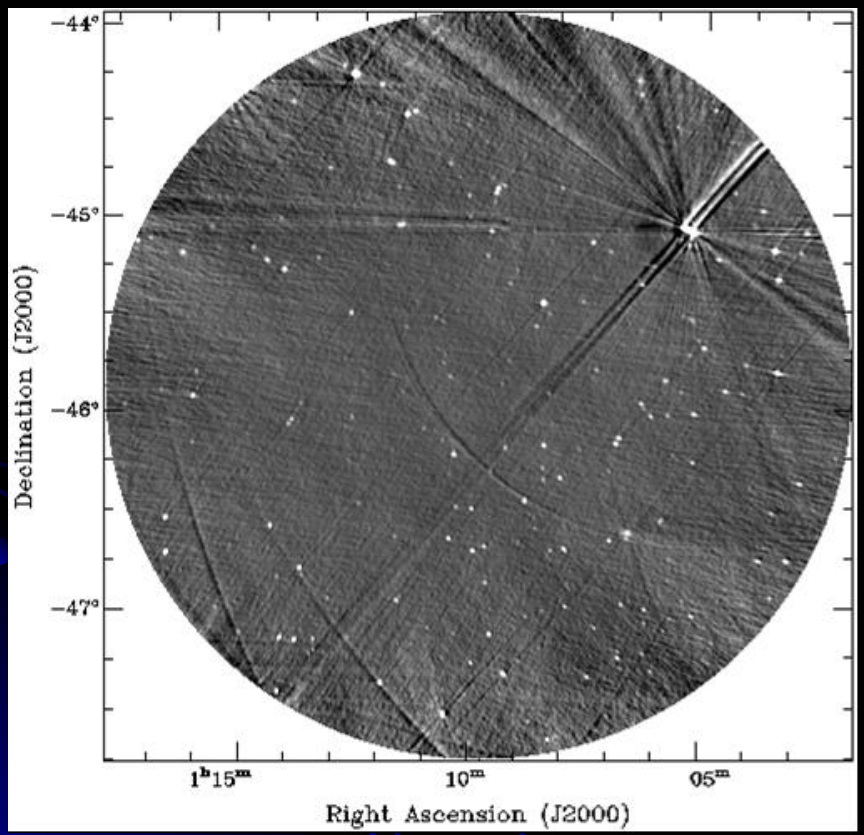


Radio Spectrum Allocation

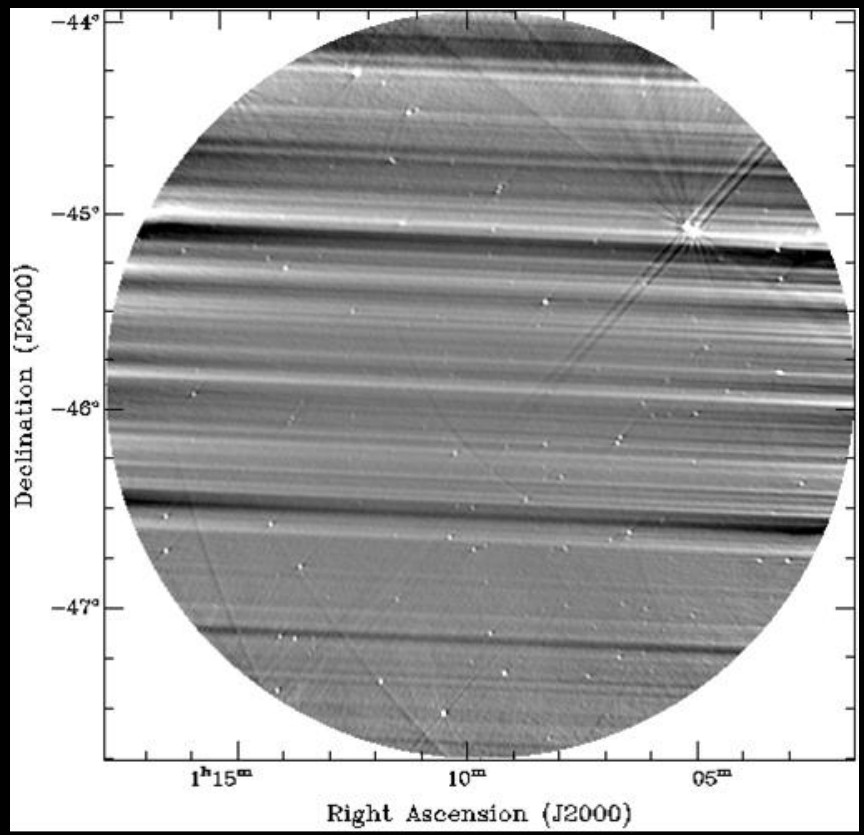


Sydney University Molonglo Radiotelescope

Effect of Interference on Molonglo Radiotelescope Observations



Normal



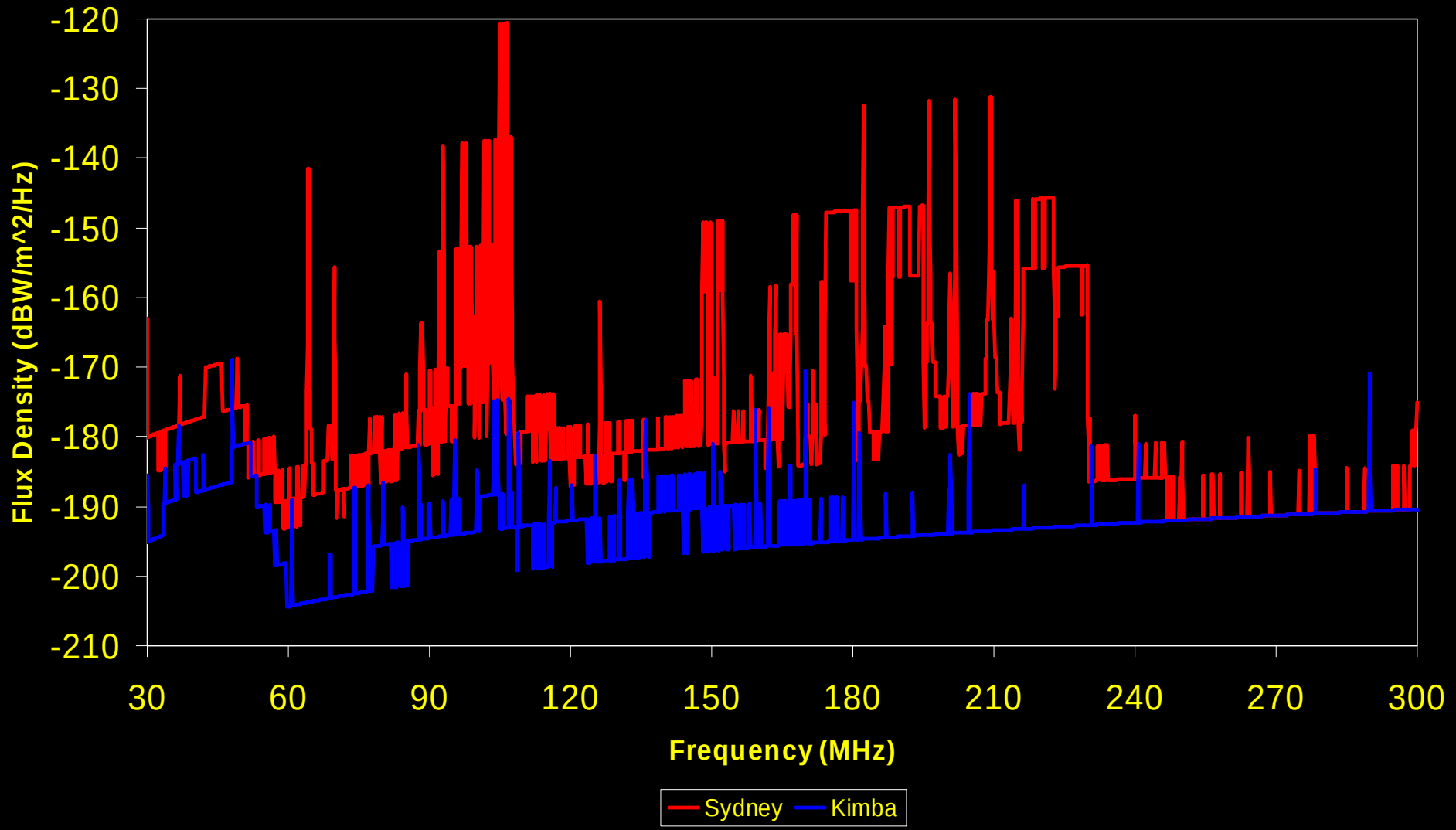
With small interferer

Location of schools involved in the SEARFE Project

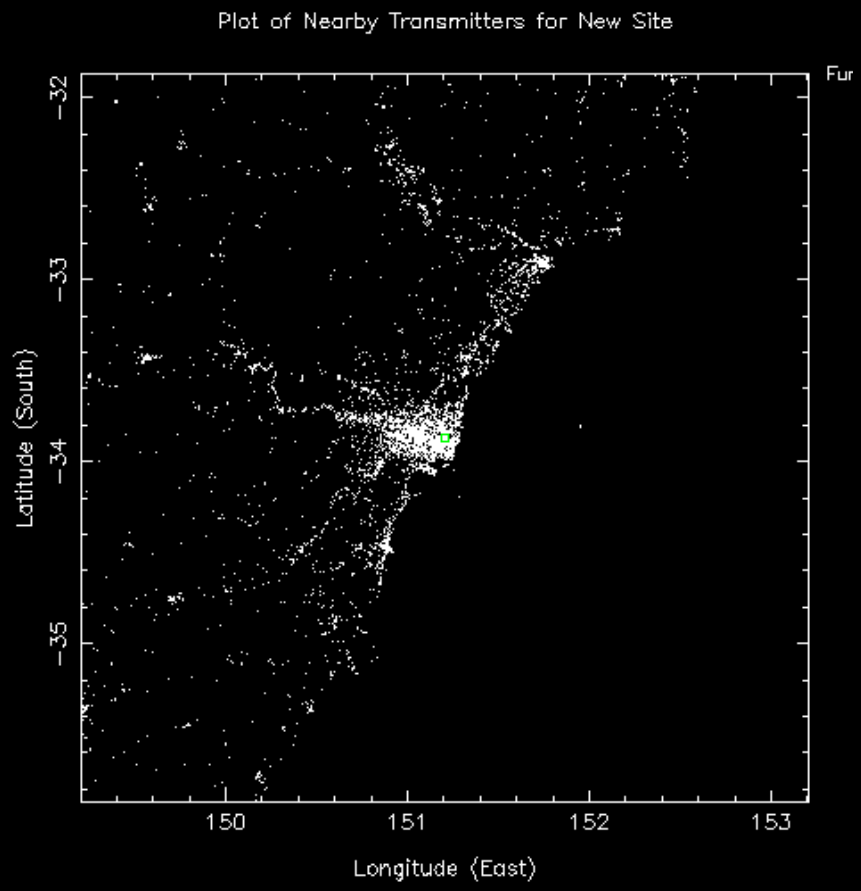
SEARFE Equipment Kit

- RF scanning receiver AOR AR3000A or WinRadio 1550e
- IBM laptop computer
- Software for spectrum acquisition and display
- 25-1300 MHz discone antenna + cables
- Student Research Guides and Teacher Resource Kit, including operating instructions, experimental notes and background information

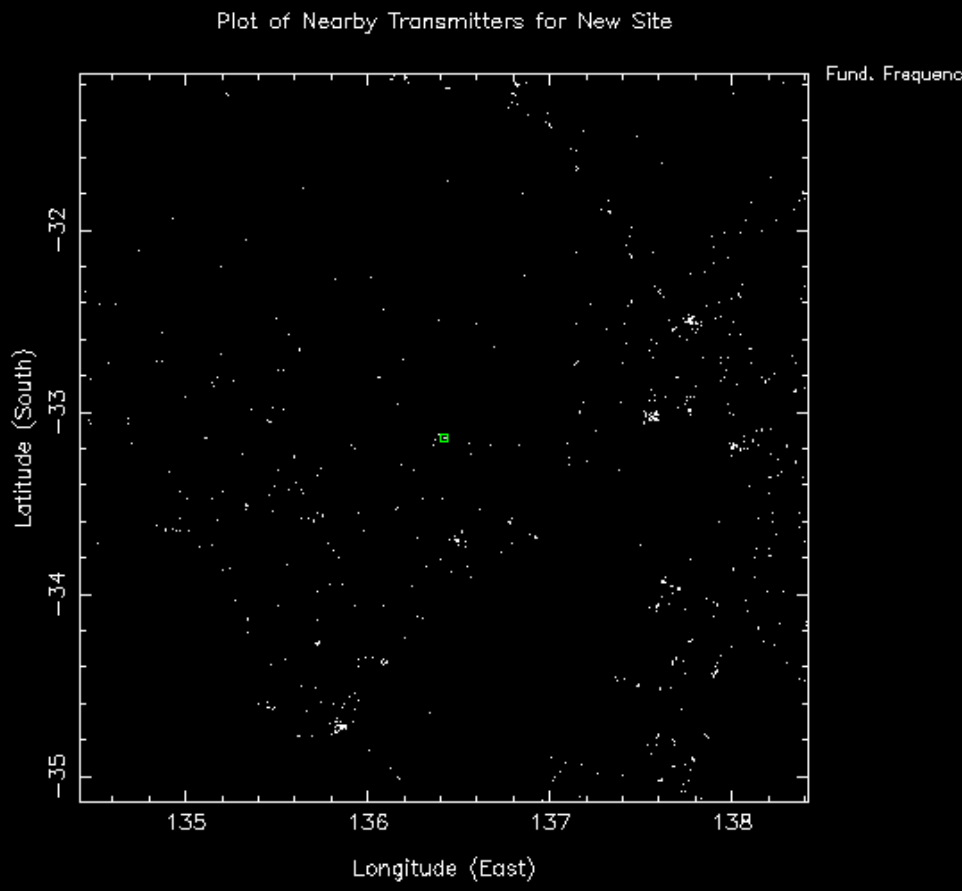
SEARFE Results: Sydney and Kimba



RF Transmitters within ~200km of Sydney and Kimba

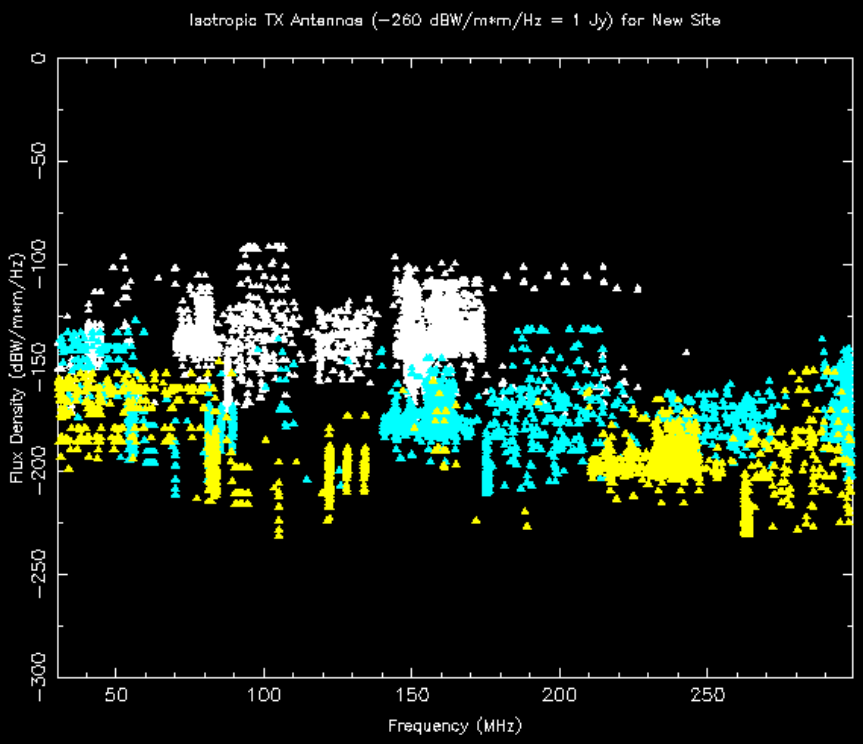


Sydney (NSW)

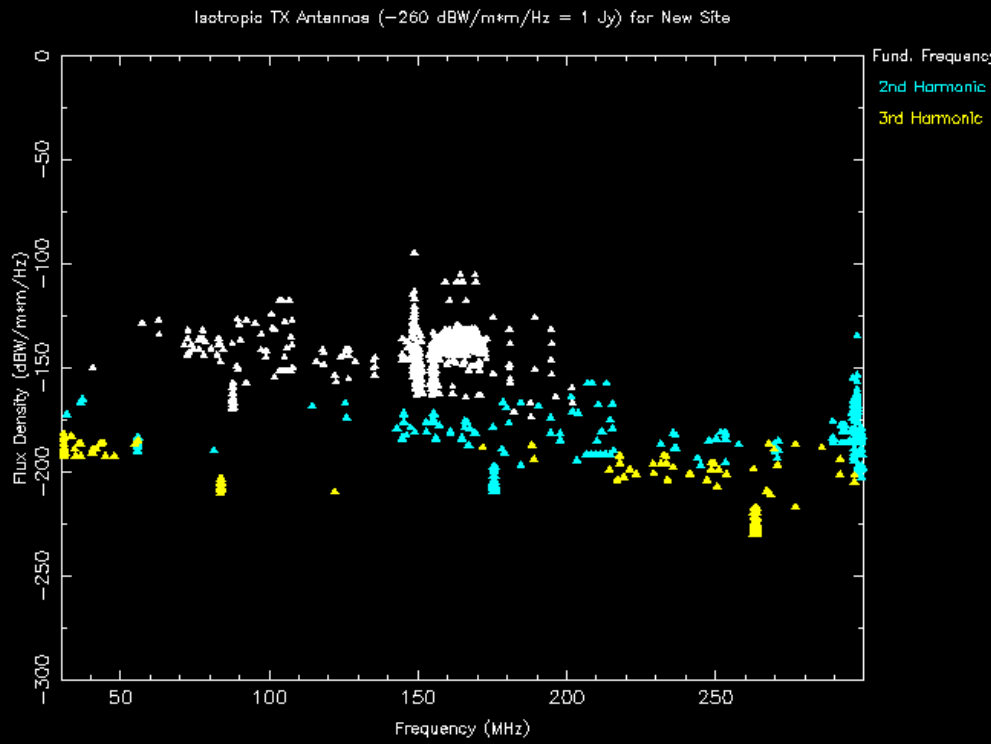


Kimba (SA)

Predicted Flux Density 30-300 MHz



Sydney (NSW)



Kimba (SA)

"SEARFE in a Box" on tour with Astronomy on the Go

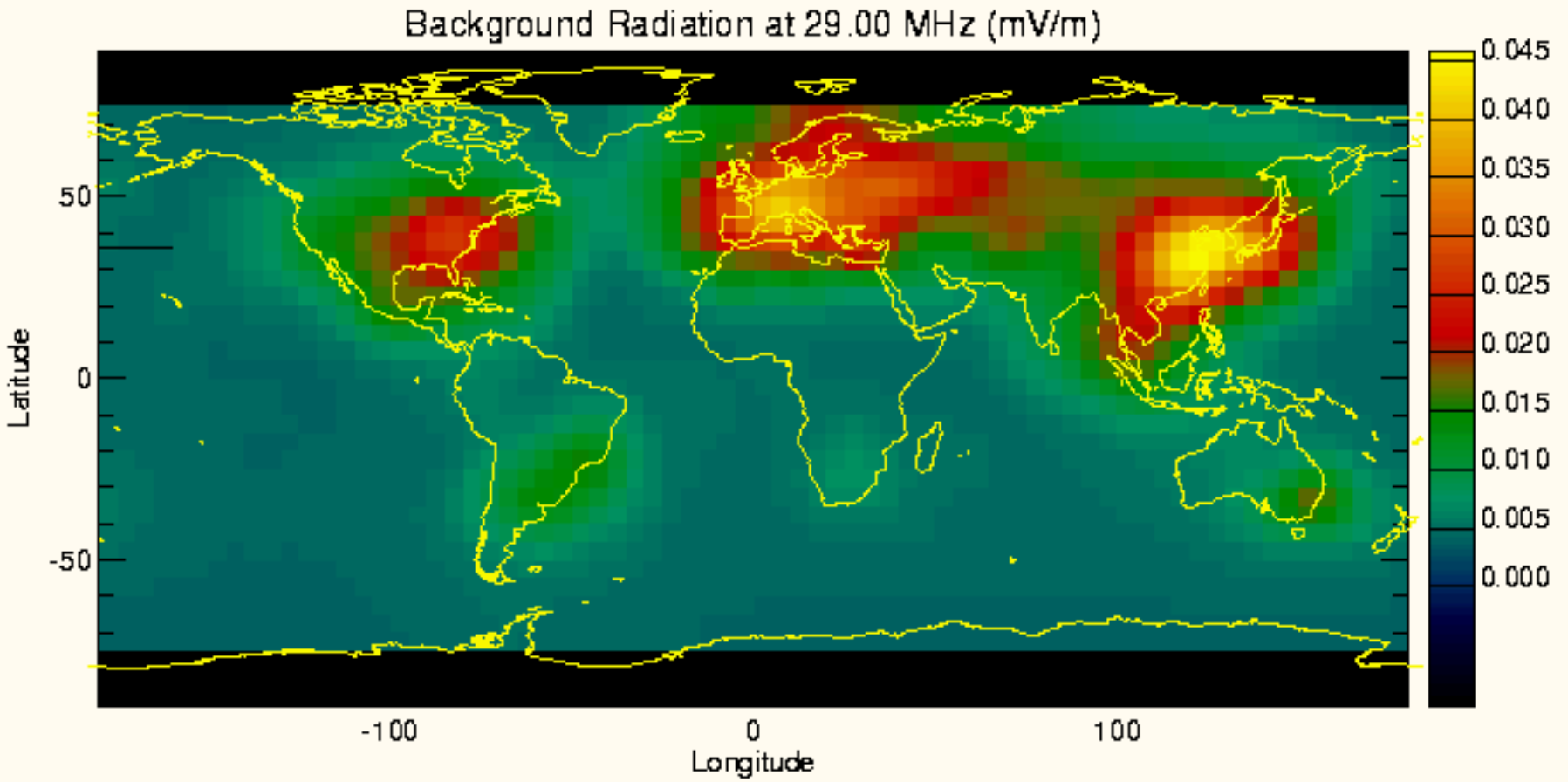
Catherine McCauley School

Geraldton Students Present SEARFE Results at International SKA2003 Conference

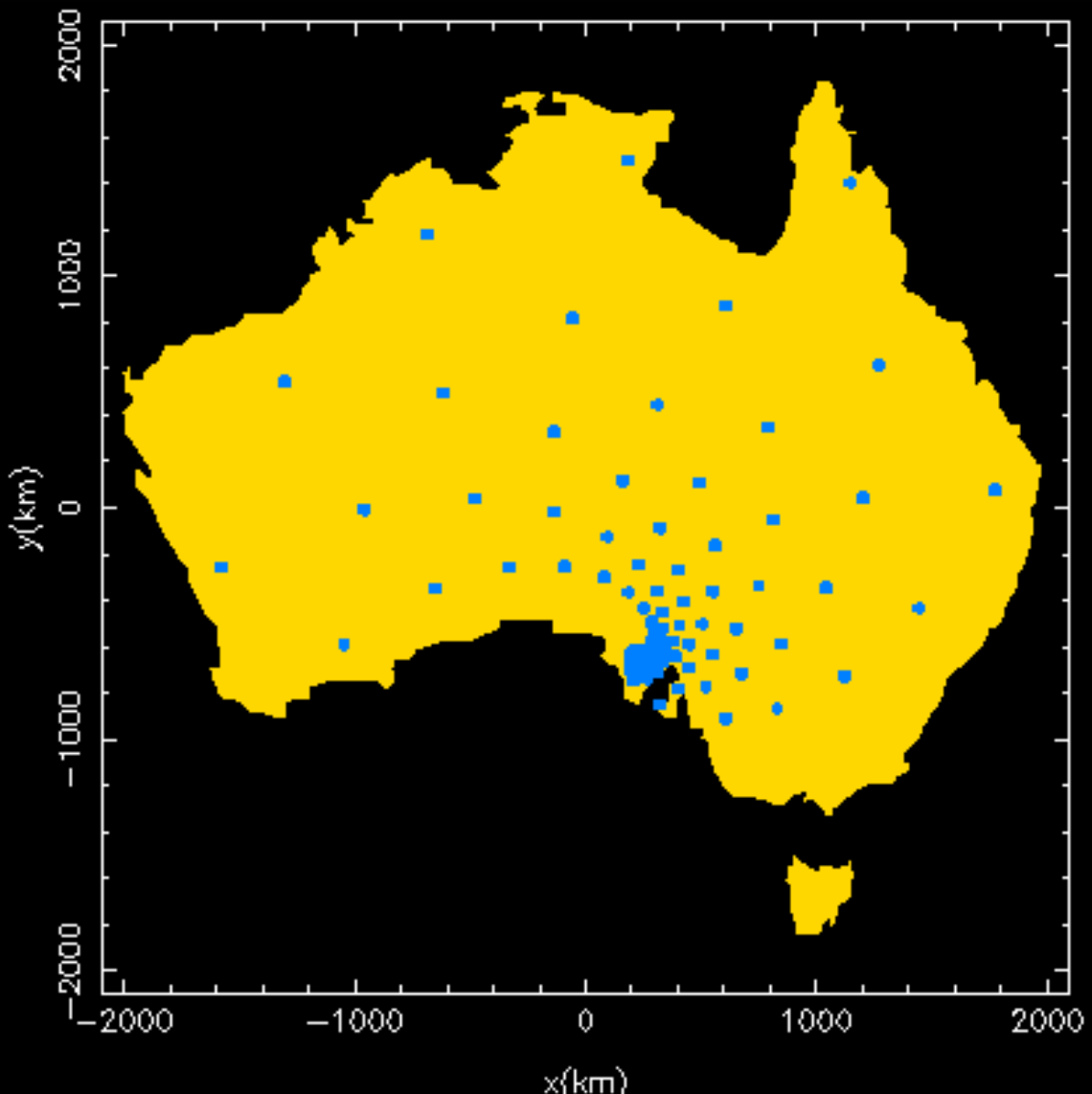
Geraldton Nagle Catholic College students Alice Wenderling, Hoanh Hoang, Adam Harvey and Kylie Judd (pictured) and Candice Woodhams and Maree Altham (out of frame) explaining their work on the SEARFE Project to International SKA Steering Committee Chair Jill Tarter (left) and other conference delegates at the International SKA2003 Conference in Geraldton.

Due to its low use of the RF Spectrum, Australia is an excellent host site for the SKA

Forte Satellite Global Radio-Frequency Environment Measurements: 29-51 MHz & 121-146 MHz

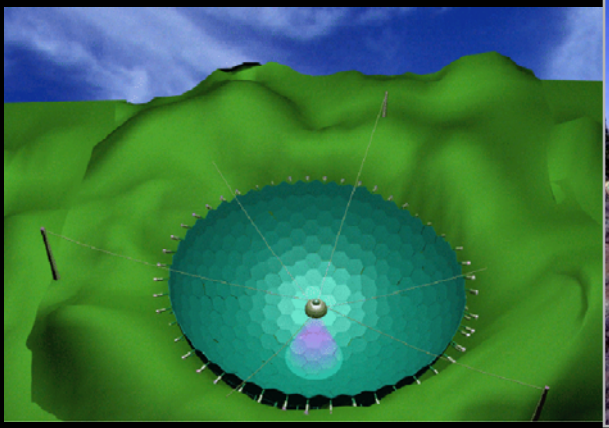


Possible Layout of SKA Stations

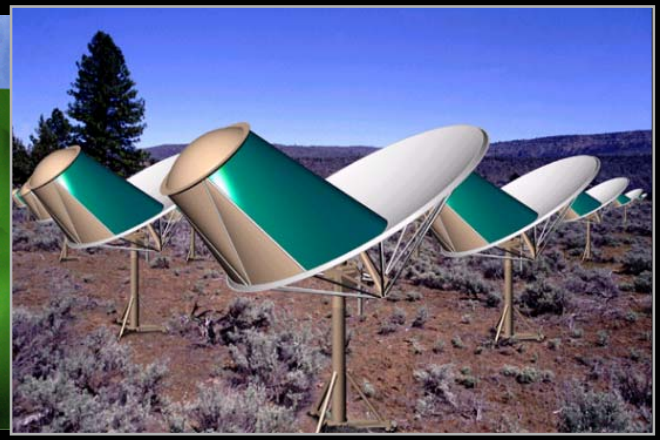


- Each blue dot is an array station
- Total collecting area is 1 km^2 or one million square metres

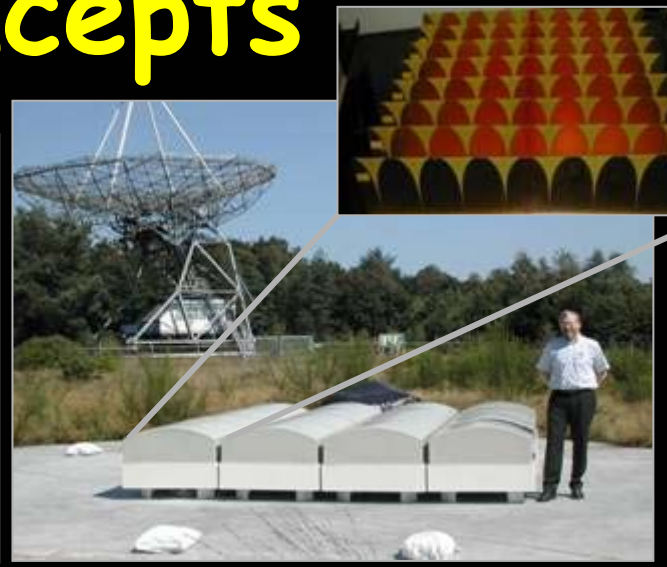
SKA Design concepts



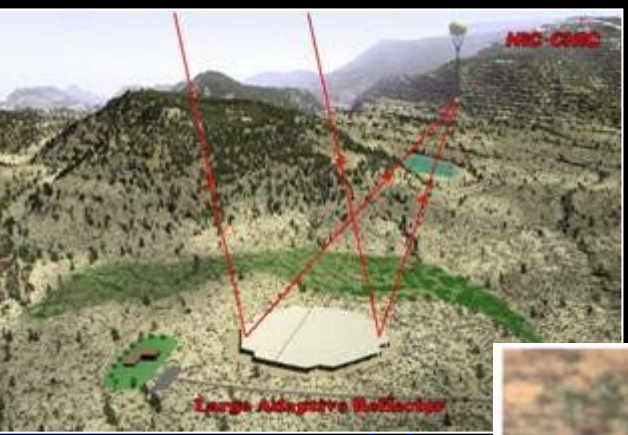
Reflectors in natural holes (China)



Many small dishes (USA)

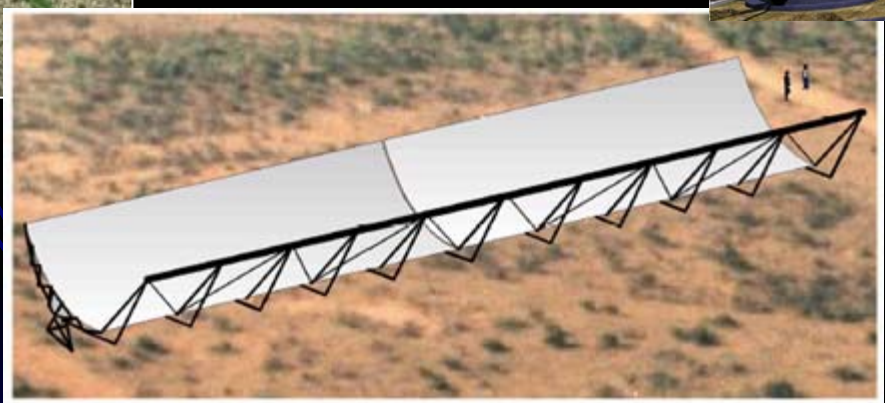


Flat aperture arrays (Netherlands)



Large adaptive reflector (Canada)

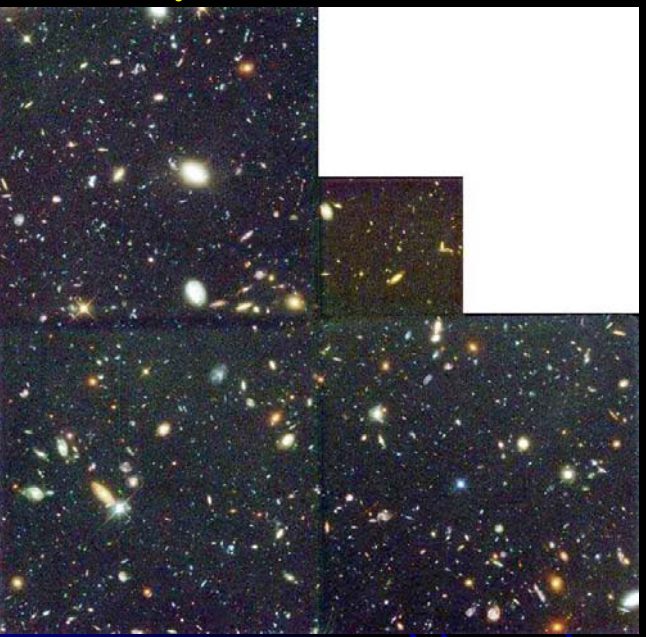
Luneburg lenses (Australia)



Cylindrical reflectors (Australia)

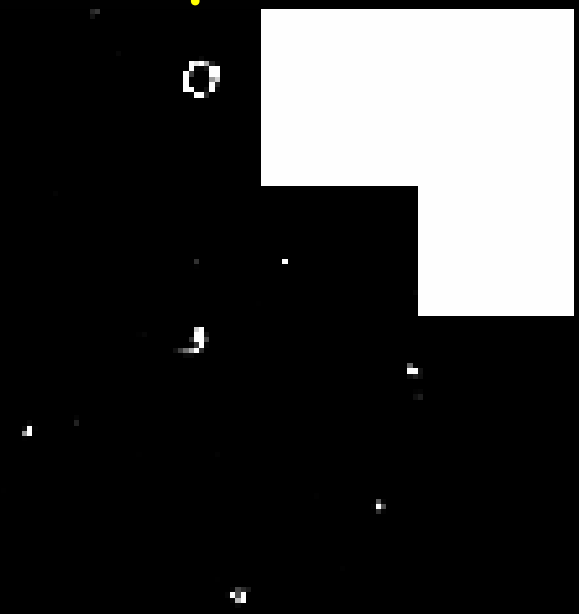
SKA will provide high sensitivity and resolution

HST (Optical)
present

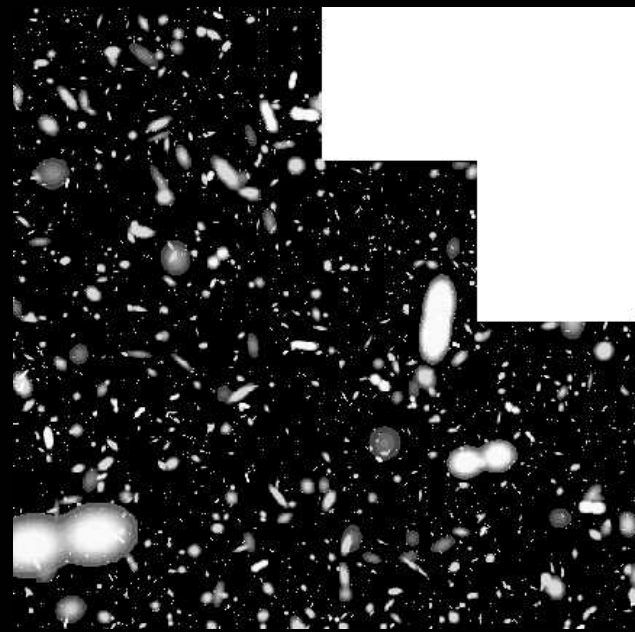


The Hubble Deep Field
the deepest image so far

VLA (Radio)
present



SKA (Radio)
future ~2020



SEARFE Scientists & Engineers

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	Peter Hall (ATNF CSIRO)
	Duncan Campbell-Wilson (USyd)
Regional Support:	**Western Australia:** Jamie Biggs (Perth Observatory)
	Canberra: Duncan Campbell-Wilson (MRO, USyd)
	Narrabri: Bob Sault (ATCA ATNF CSIRO)
	Melbourne: Maurizio Toscano, Jamie Stevens, Rachel Webster (UMelb)
	Kimba & Sydney: Sydney SEARFE team
Astronomy on the Go:	Michael Burton, Andrew Simpson (UNSW)