



The Extragalactic Radio Sky at Faint Flux Densities

Dr Carole Jackson

Research School of Astronomy & Astrophysics

October 2002



THE AUSTRALIAN
NATIONAL UNIVERSITY



Probing deep fields...



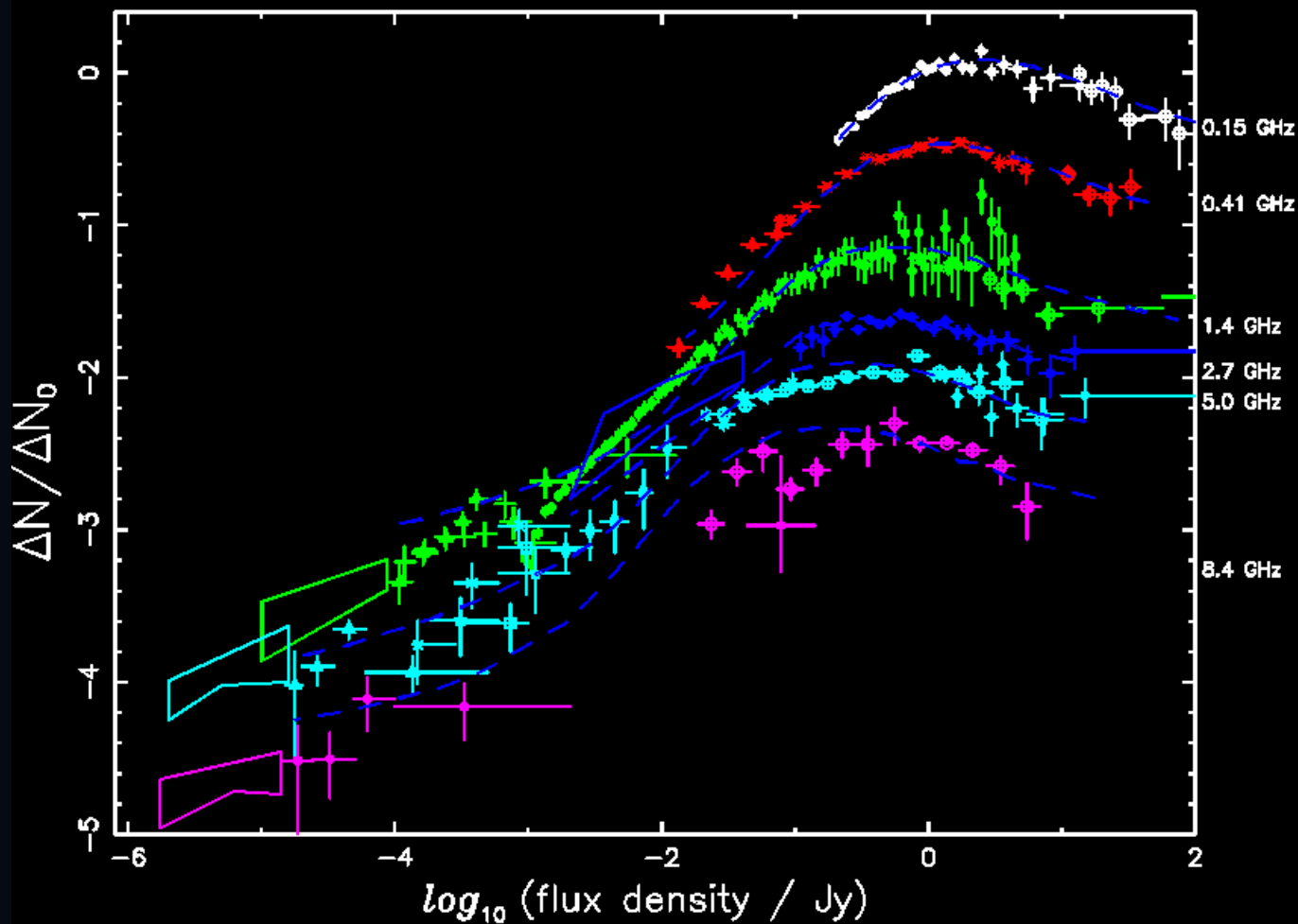
~ 3000 galaxies



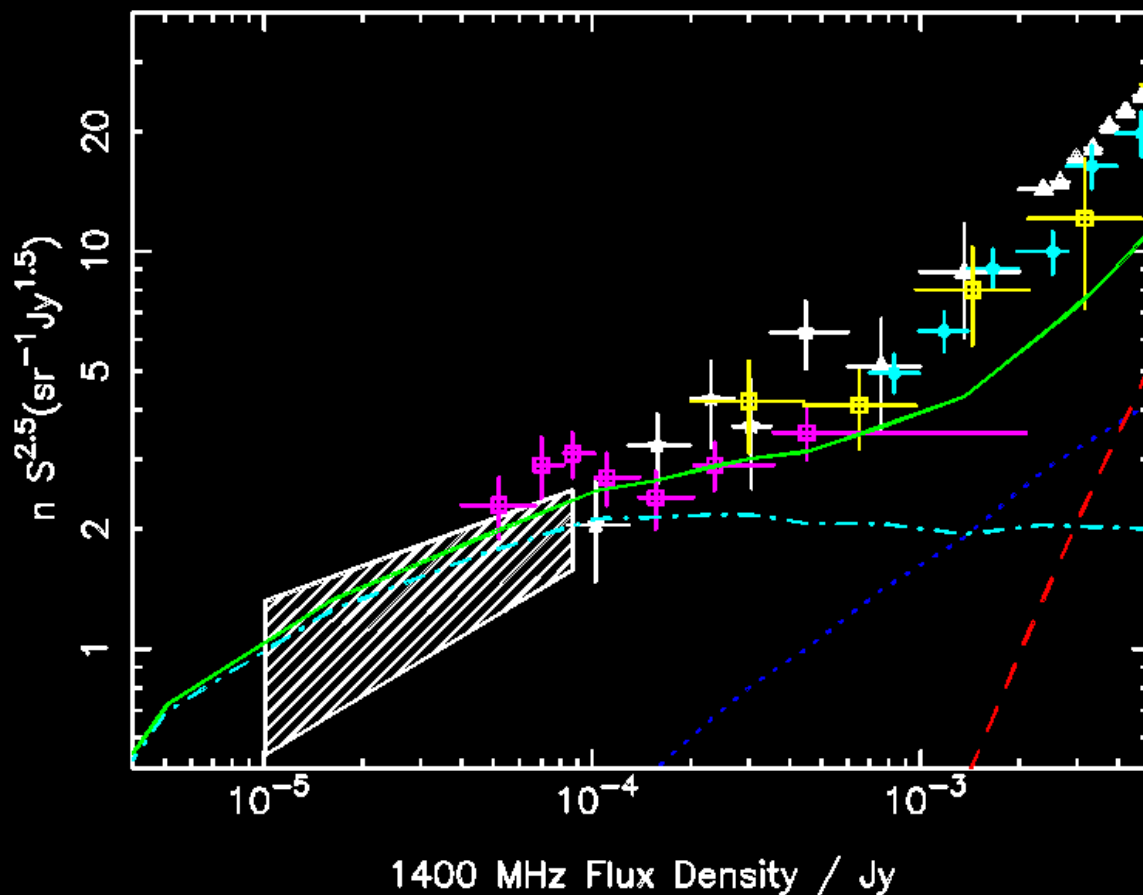
13 radio sources

Radio waveband samples different population of galaxies

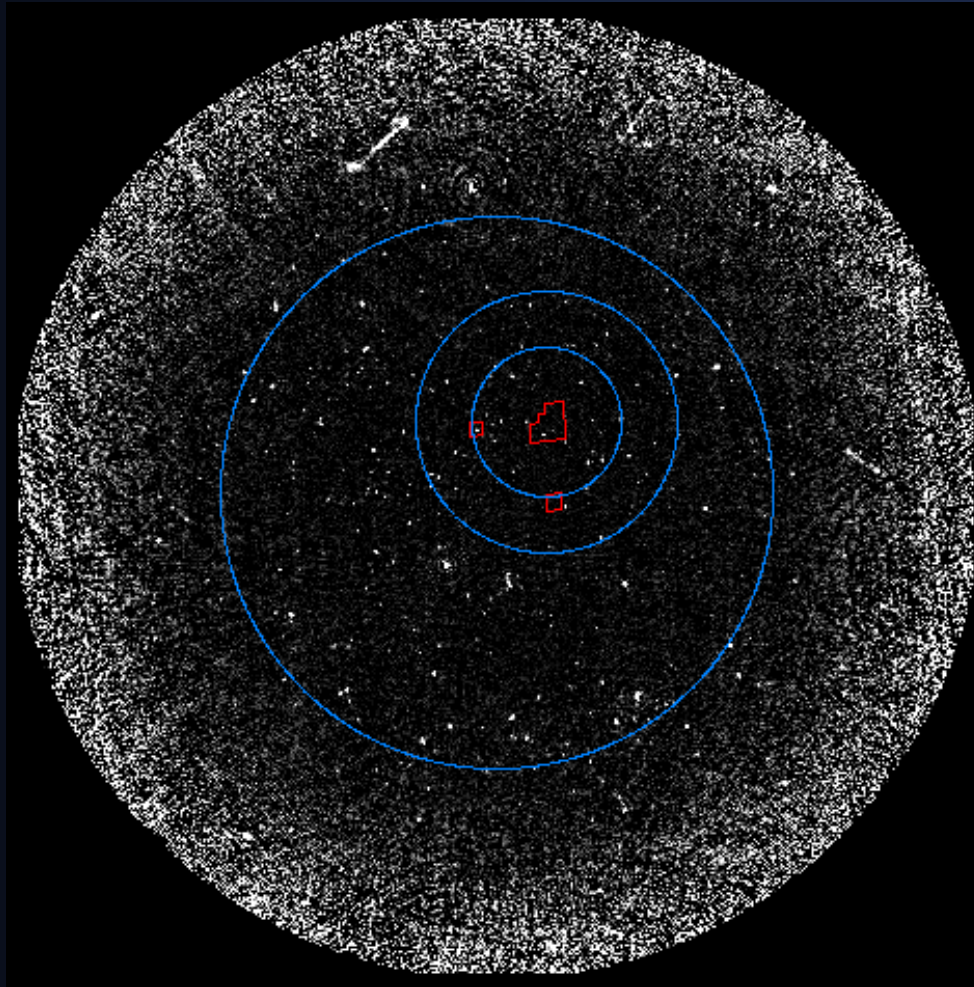
Current Deep Radio Surveys



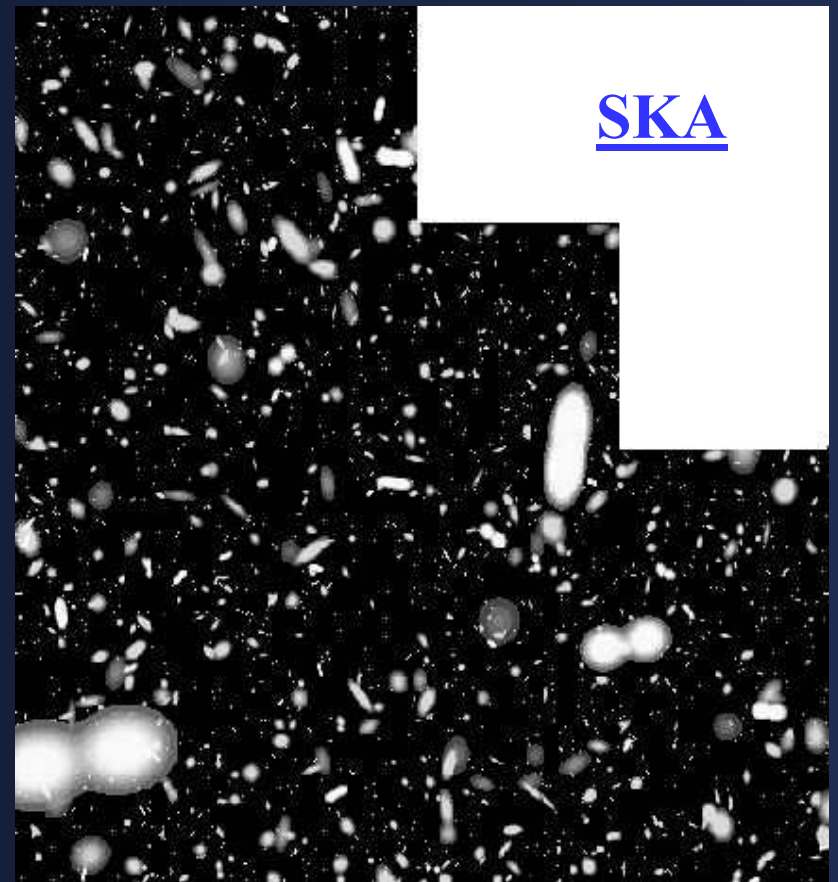
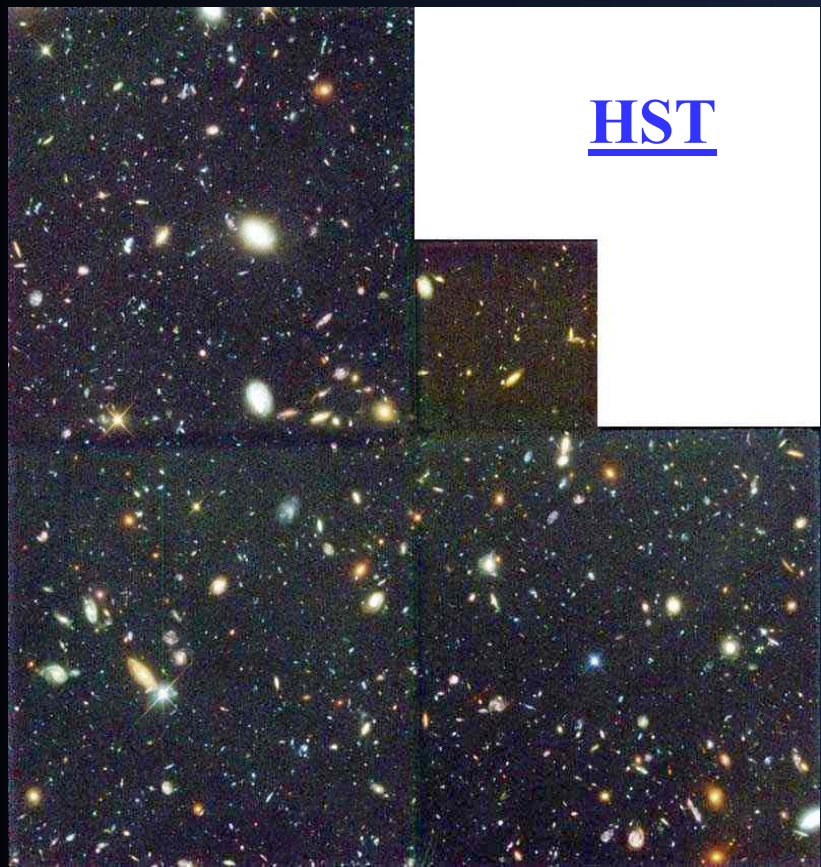
Current Deep Radio Surveys



HDF-s ATCA Image (rms=7 microJy)



The future 1 nJy at 1.4 GHz?



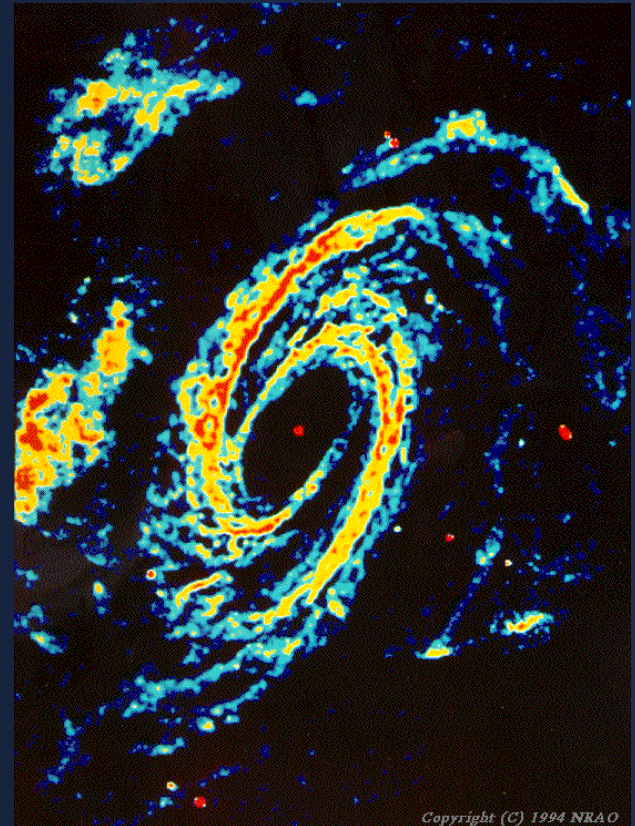
*Radio-loud AGN
(Quasars & radio galaxies)*

*CSIRO ATCA
PKS 2356-61 FR II RG*



Starburst galaxies

*NRAO VLA
M81 spiral galaxy*





Physical characteristics Of the source populations

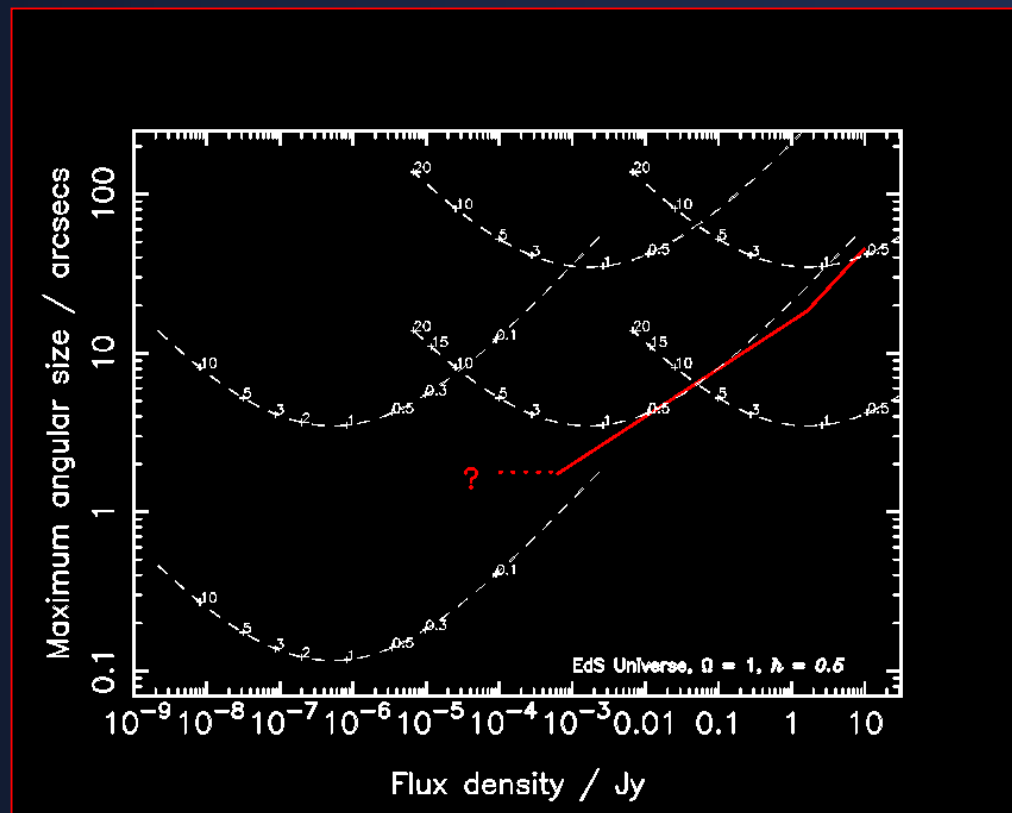
Spectral Shape

Simple $S \propto \nu^\alpha$ with -0.7
or fitted spectral model

-Ignores (peaked) low-
frequency population (if
there is one)

-Ignores GHz-peaked
sources

Source Sizes





Recipe for predicting the radio sky from the LRLF + Evolution

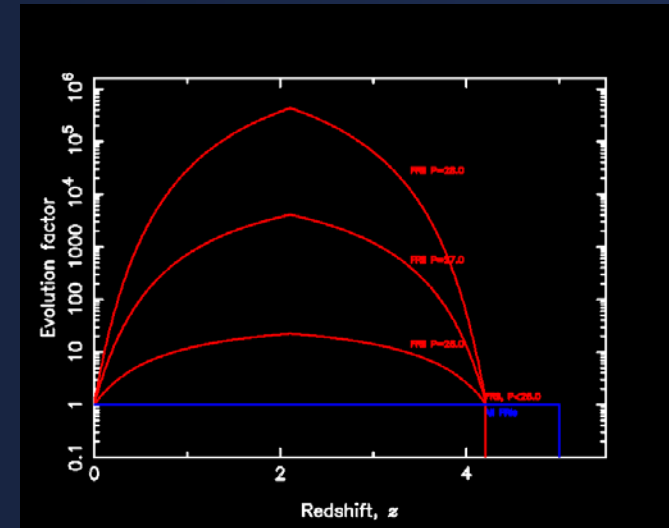
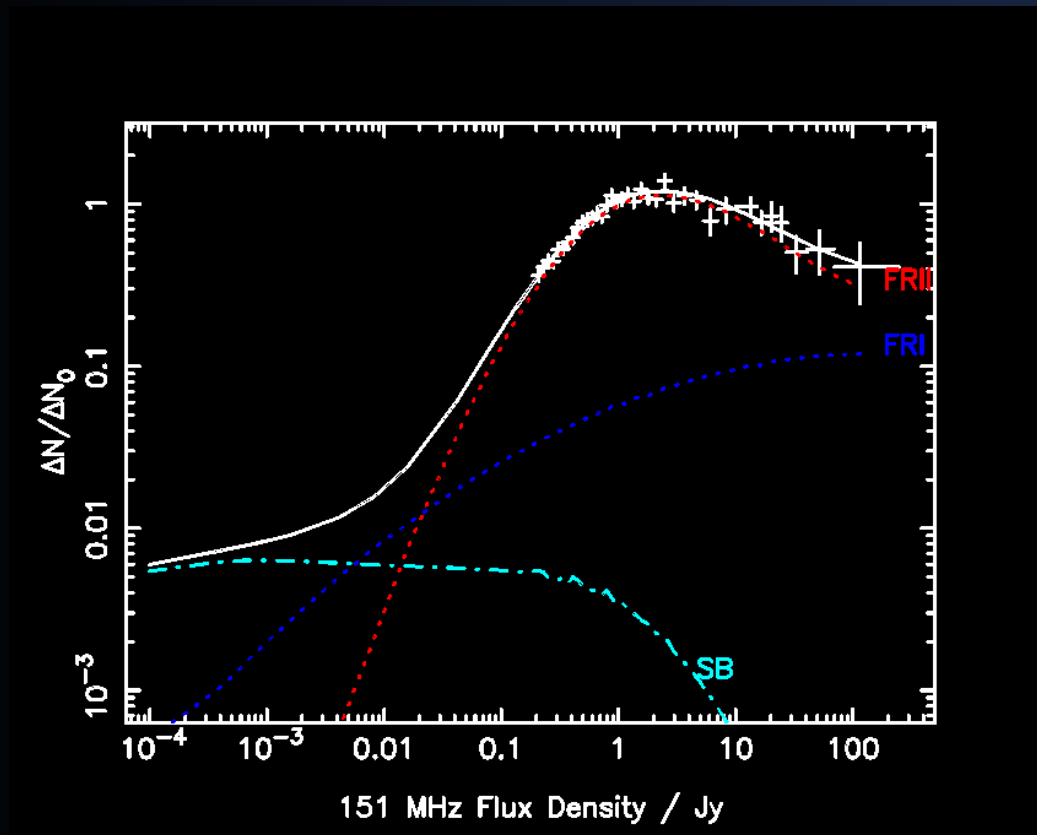
For the 3 radio galaxy populations (FRI, FRII & SB):

- Determine the LRLF & Evolution
 - Adopt reasonable evolution type (LDDE)
 - Use source counts & complete samples to constrain model
- Transpose Frequency if required
- Calculate source density (sky area, z distr)
- Adopt reasonable source sizes & shapes
 - Randomly place & orient sources on sky

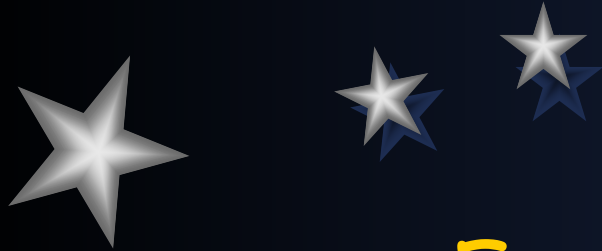


FRI & FRII Evolution & the LRLF

Best-fit to 151 MHz source count



LDDE - FRIIs strongly evolving, FRIIs not



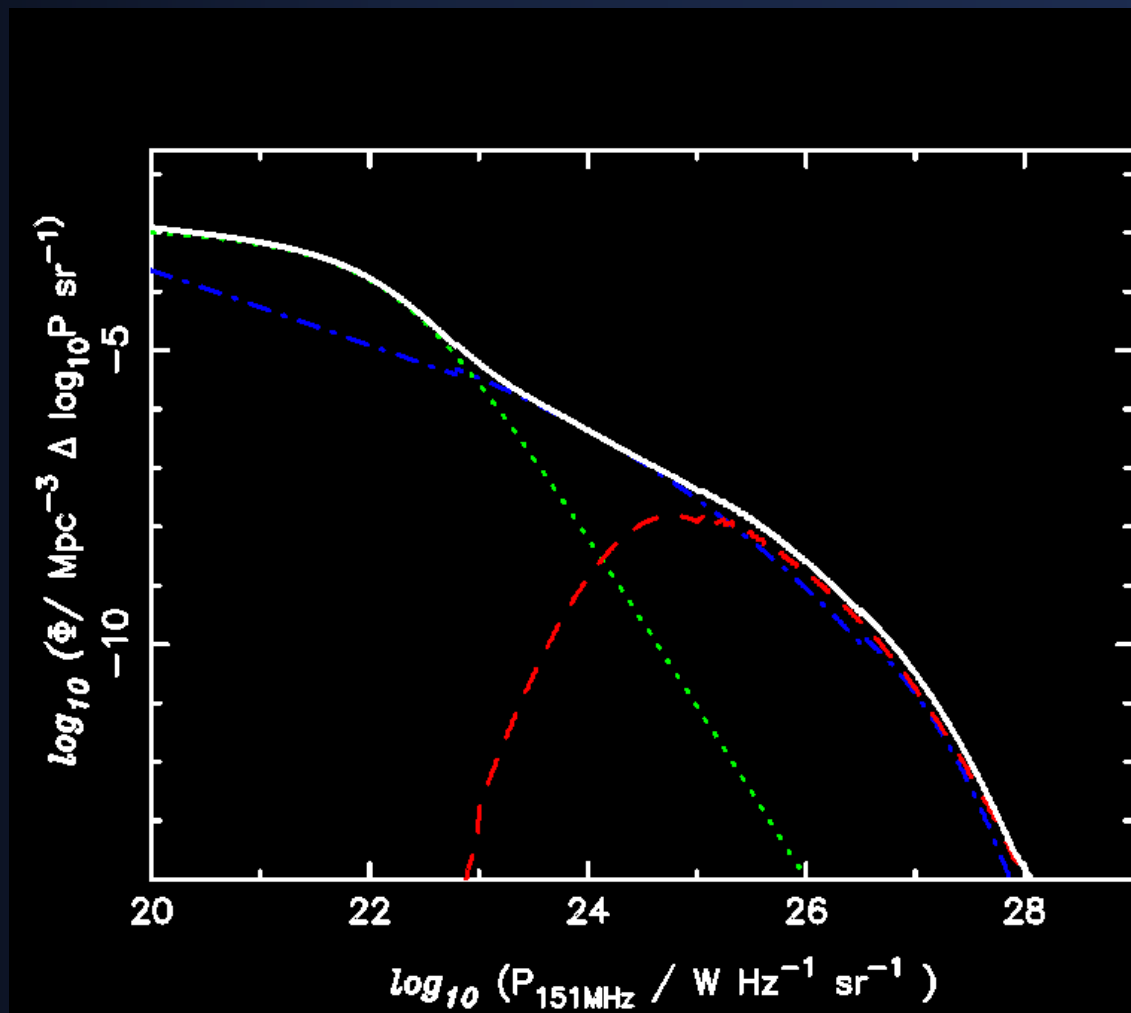
Evolution & the LRLF

LRLF from best-fit model.

Starburst galaxy

LRLF from
2dFGRS-NVSS
(Sadler et al 2002)

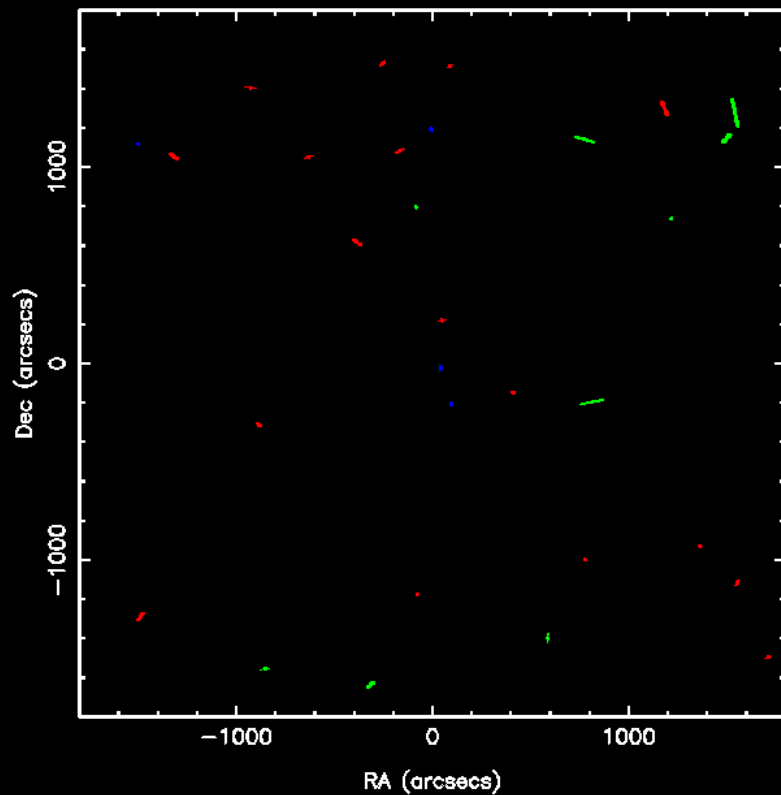
Evolution from
HDF (Haarsma et al
2000)





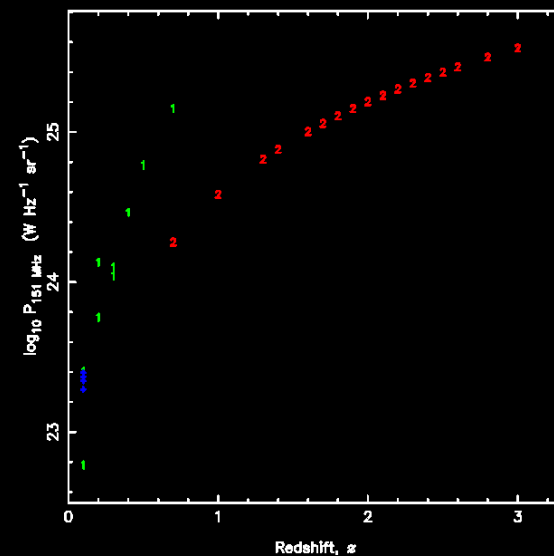
Faint radio skies at 151 MHz

1 degree sky region



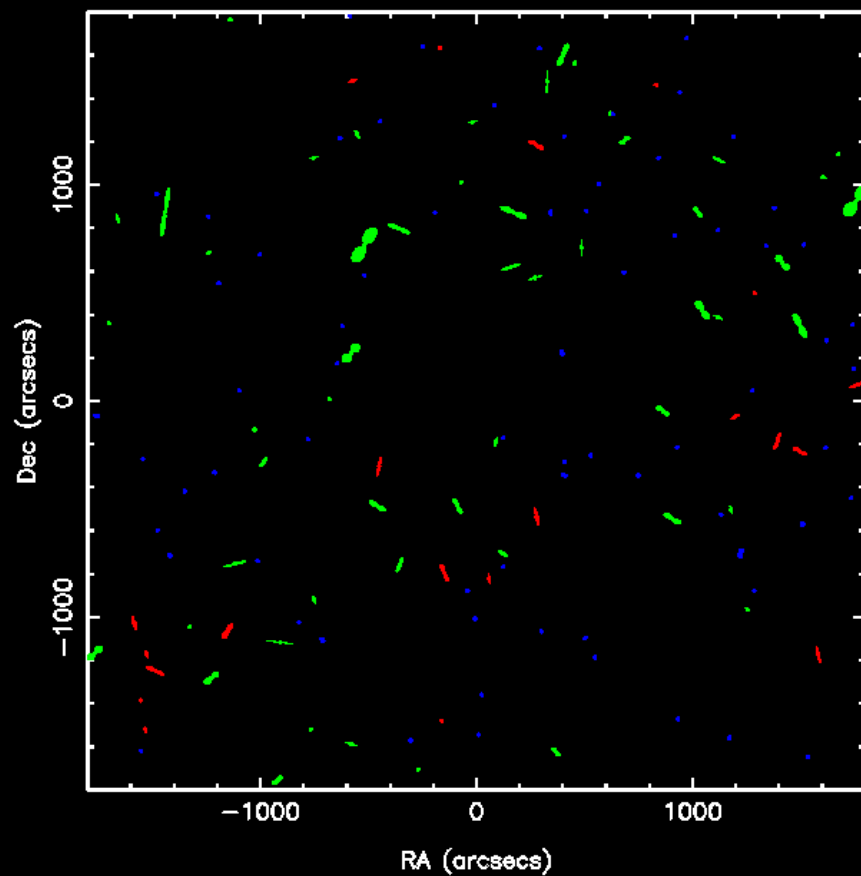
10 mJy at 151 MHz

P-z distribution



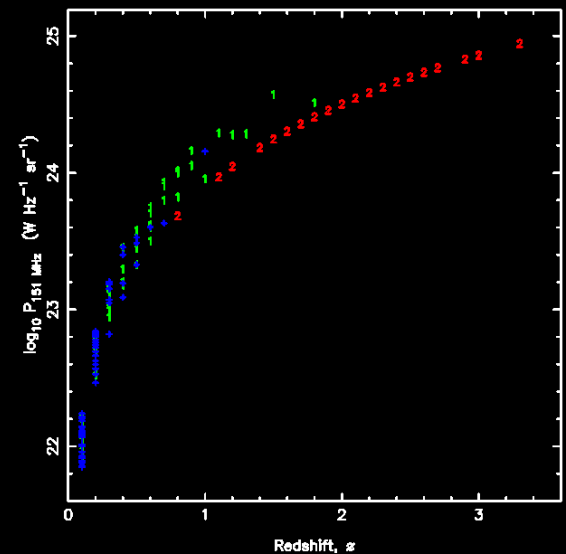
Faint radio skies at 151 MHz

1 degree sky region



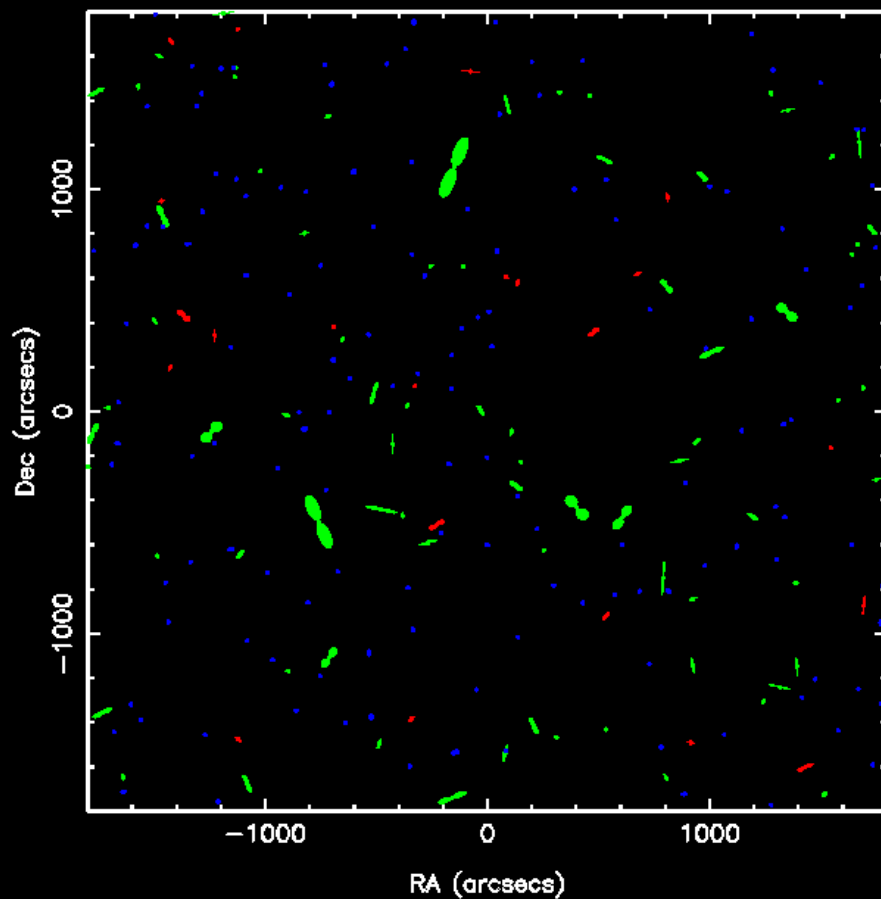
2 mJy at 151 MHz

P-z distribution



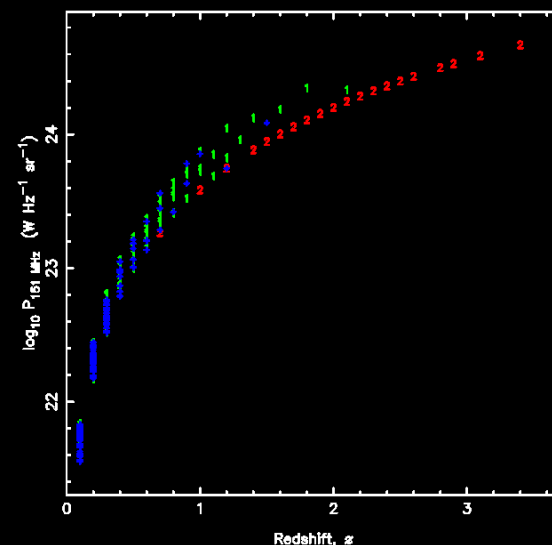
Faint radio skies at 151 MHz

1 degree sky region



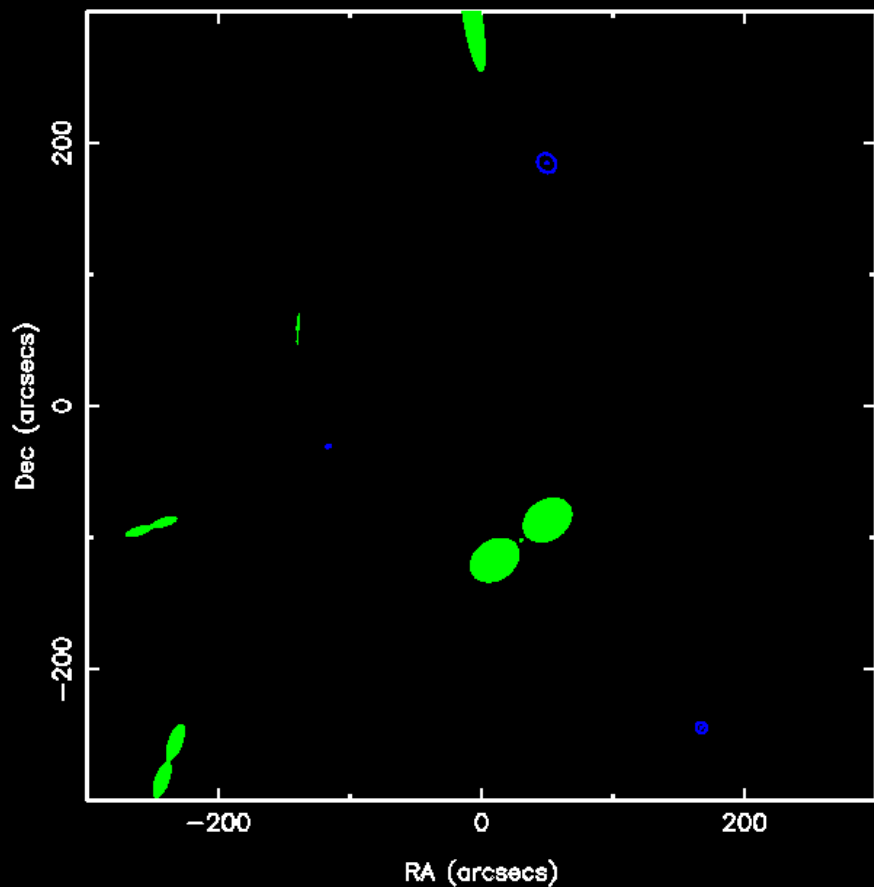
1 mJy at 151 MHz

P-z distribution



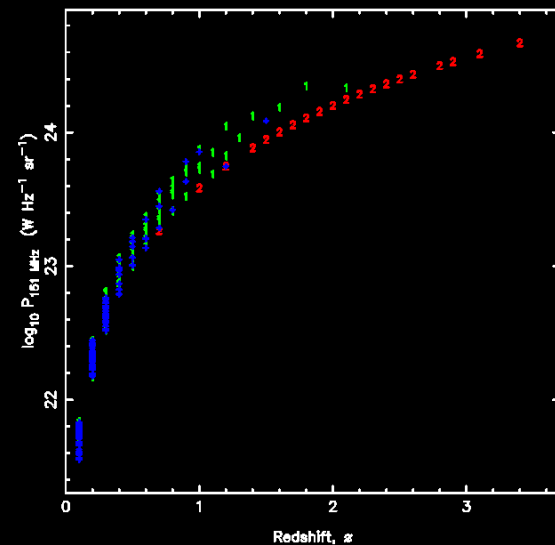
Faint radio skies at 151 MHz

10 arcmin square sky region



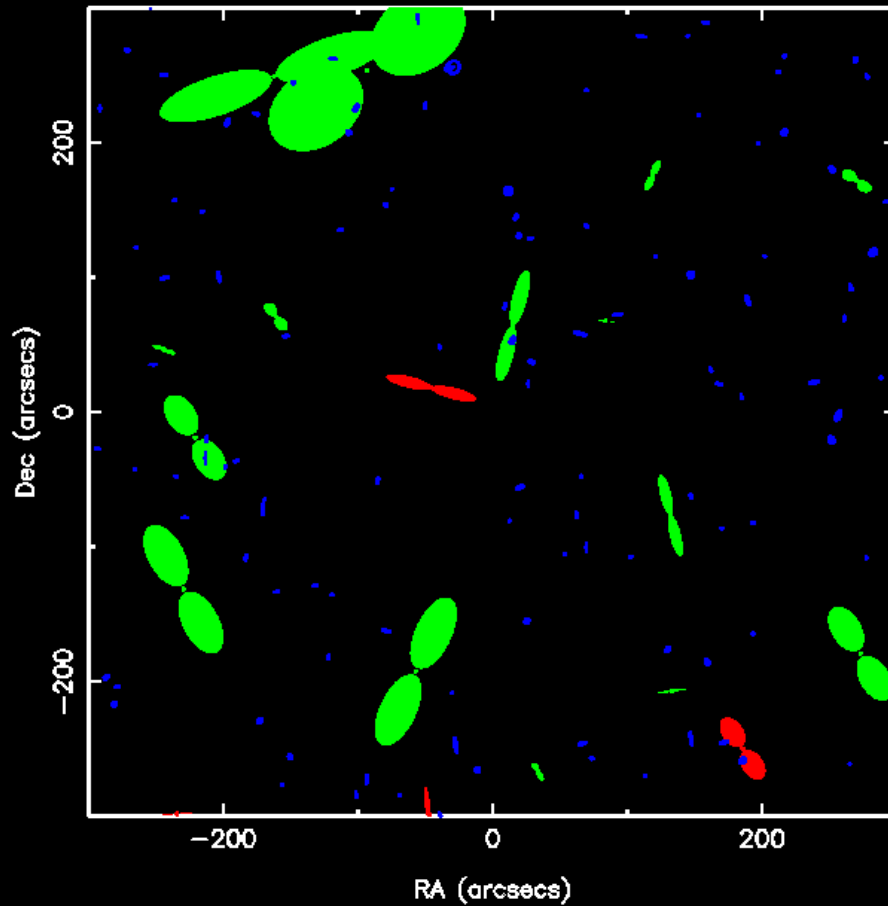
1 mJy at 151 MHz

P-z distribution



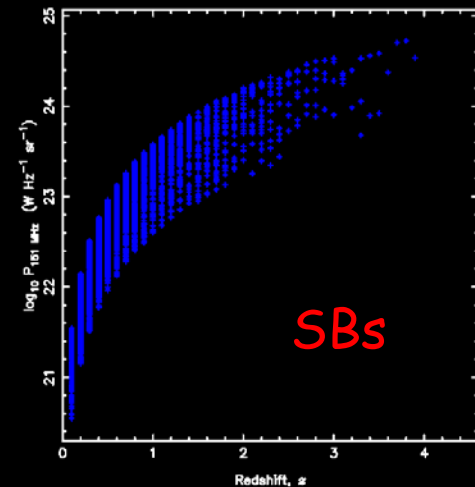
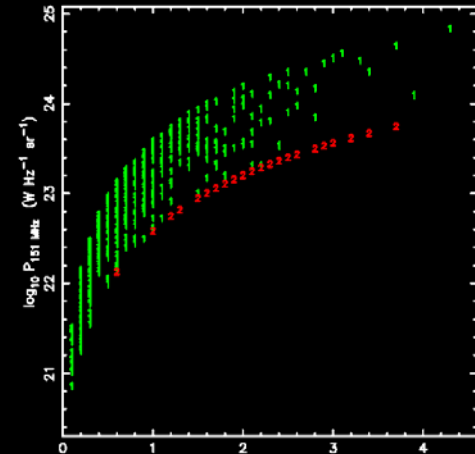
Faint radio skies at 151 MHz

10 arcmin square



0.1 mJy at 151 MHz

P-z distributions
FRI & FRIIs





Faint radio skies at 151 MHz

From simulated skies - predict resolution required
- fraction of sources 'overlapped' (line of sight)

Assumes no frequency-size dependence (probably ok up to 1 GHz?)

Assumes no size-RG age dependence

FRI+FR II LRLF + evolution (?) - degenerate, really FR-split ???

Starburst LRLF + evolution (?) - difficult to determine (HDF small sample)
- Late-type galaxies in LRLF ?

Other populations ?

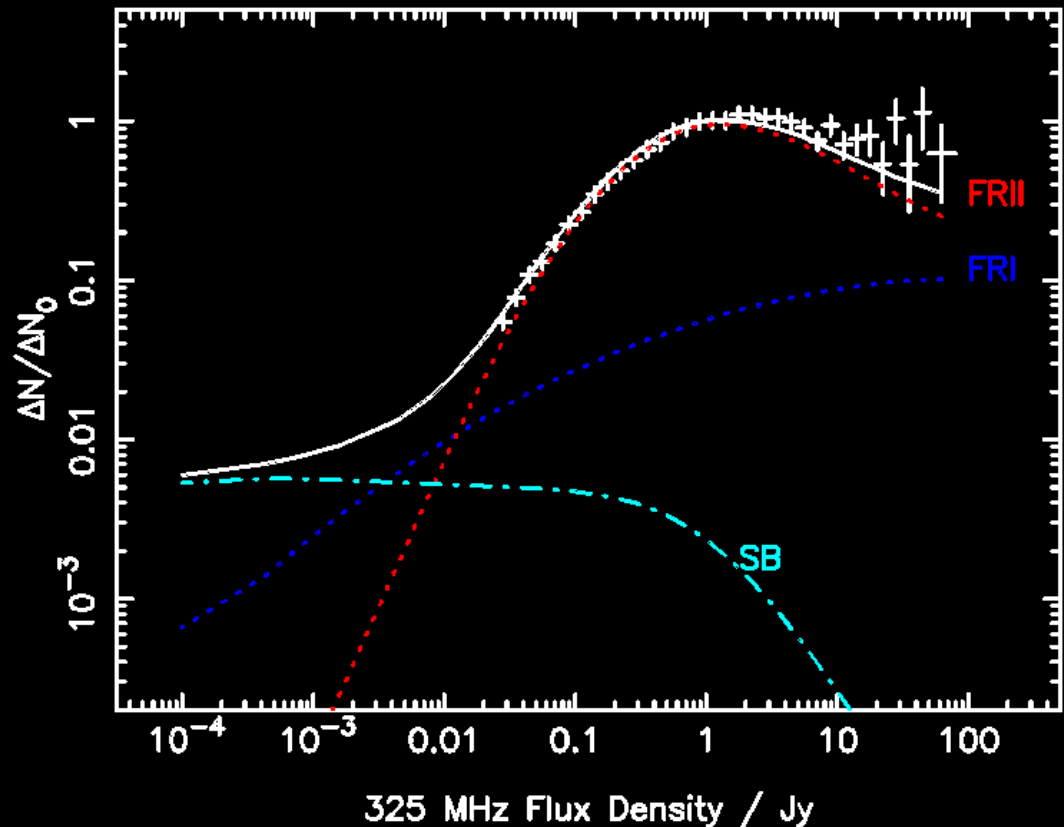


Faint radio skies at 325 MHz

325 MHz - WENSS
source count

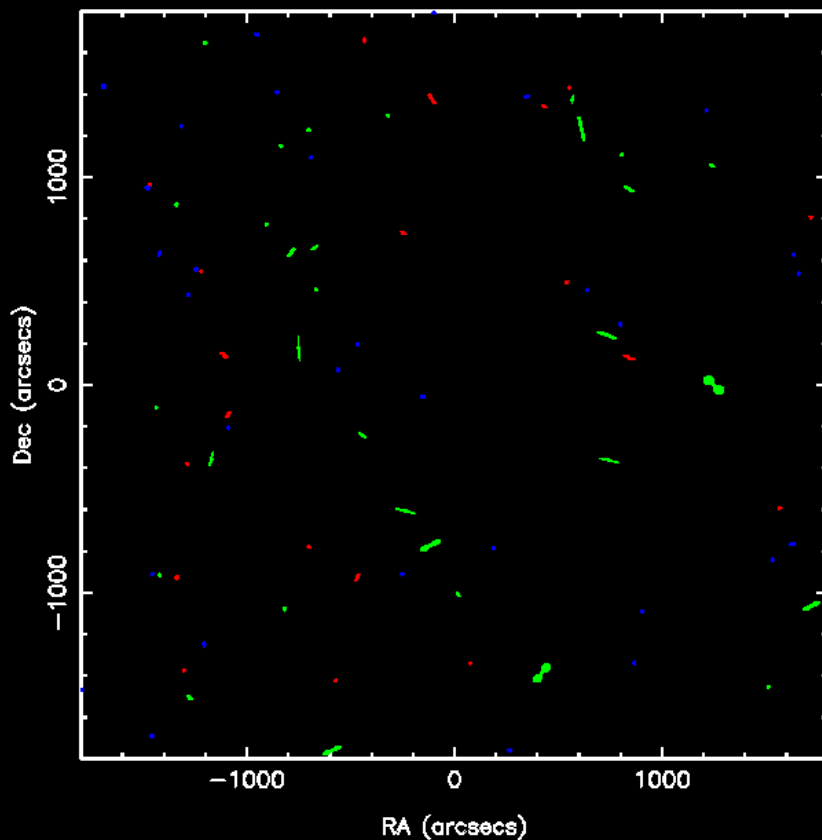
Transpose LRLFs to
325 MHz & generate
model count to 0.1 mJy

Molonglo Demonstrator
project - to 300 MHz
science - HI absorption
against bright RGs

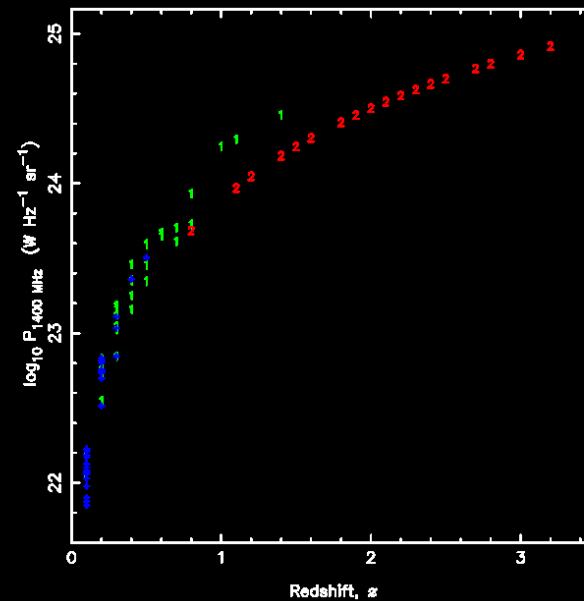


Faint radio skies at 325 MHz

1 degree sky region



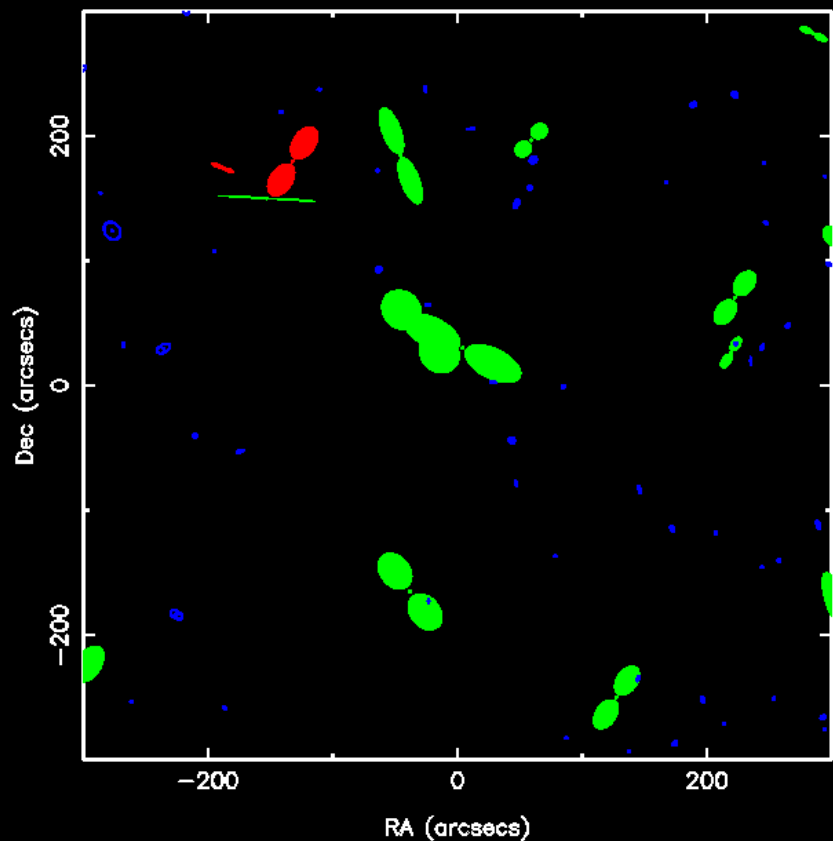
2 mJy at 325 MHz



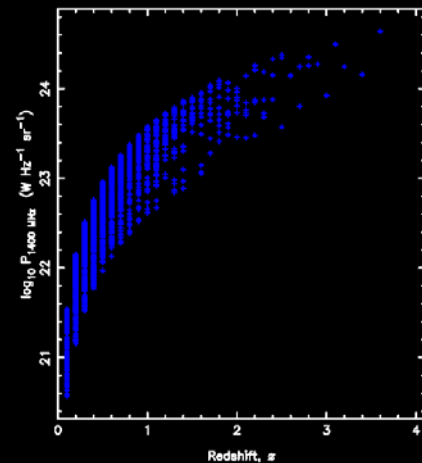
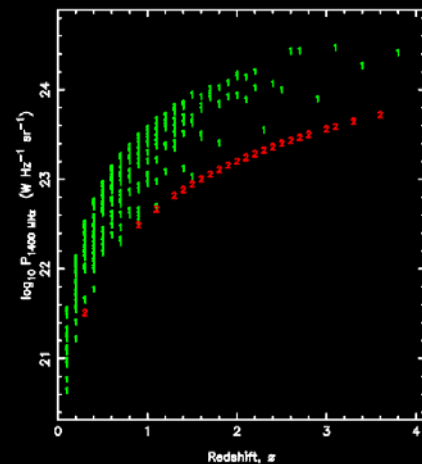


Faint radio skies at 325 MHz

10 arcmin square



0.1 mJy at 325 MHz





cjackson@mso.anu.edu.au

