

***The 6dF Galaxy Survey  
Progress and Luminosity Functions  
from the First 80k Redshifts***

***Heath Jones***  
*Australian National University*

***Matthew Colless, Will Saunders***  
*Anglo-Australian Observatory*

## *The 6dF Galaxy Survey:*

- The 6dFGS is designed to be the first of a new generation of combined  $z+v$ -surveys, combining...
  - NIR-selected redshift survey of the local universe
  - Peculiar velocity survey using FP distances
  - Additional redshift surveys of other ‘interesting’ source samples.

## *The 6dF Galaxy Survey:*

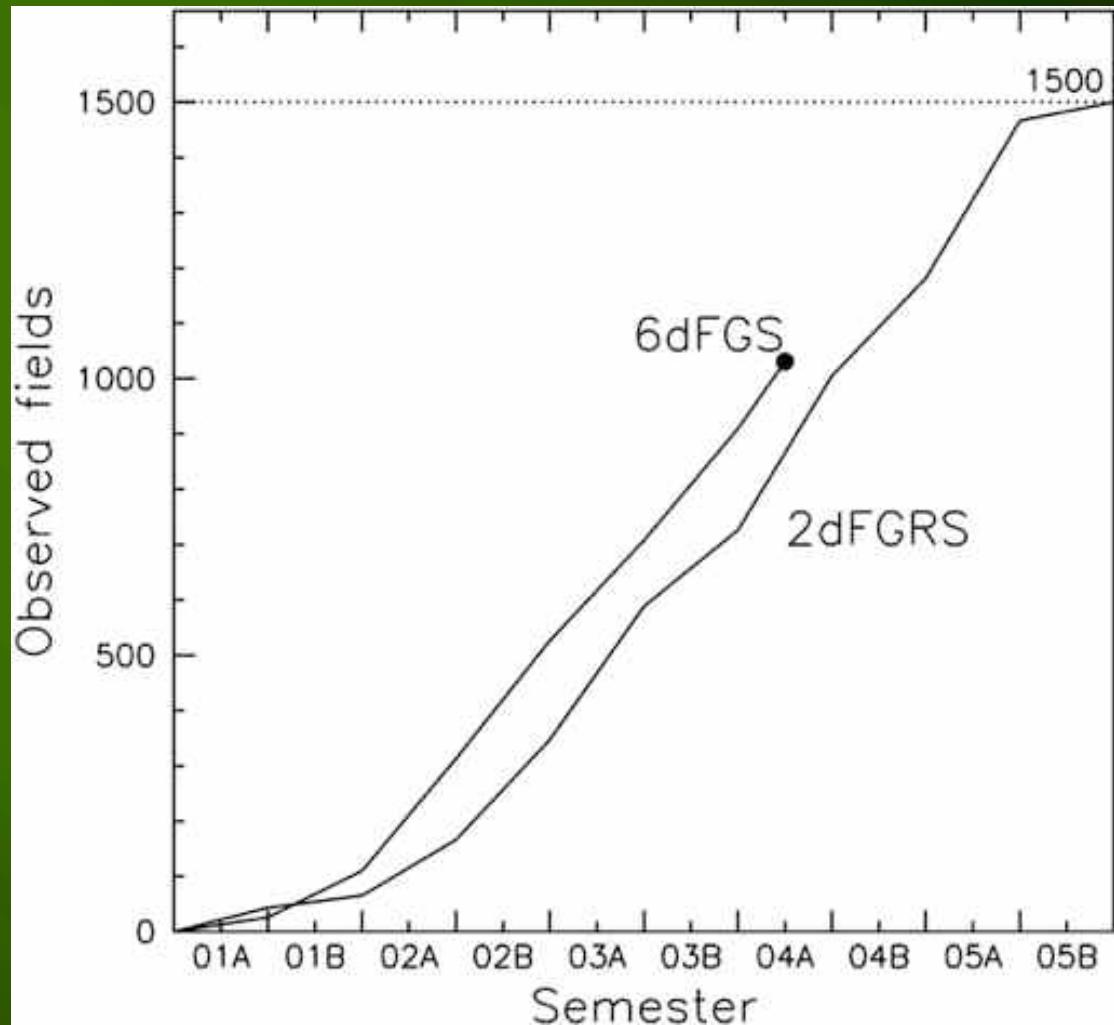
- The 6dFGS is designed to be the first of a new generation of combined  $z+v$ -surveys, combining...
  - NIR-selected redshift survey of the local universe
  - Peculiar velocity survey using FP distances
  - Additional redshift surveys of other ‘interesting’ source samples.
- Survey strategy...
  - survey whole southern sky with  $|b| > 10^\circ$
  - primary  $z$ -survey: 2MASS galaxies to  $K_{\text{tot}} < 12.75$
  - secondary samples:  $H < 13$ ,  $J < 13.75$ ,  $r < 15.6$ ,  $b < 16.75$
  - 11 additional samples: radio, X-ray, IRAS...
  - $v$ -survey:  $\sim 15,000$  brightest early-type galaxies

# *Observing Progress of 6dFGS*

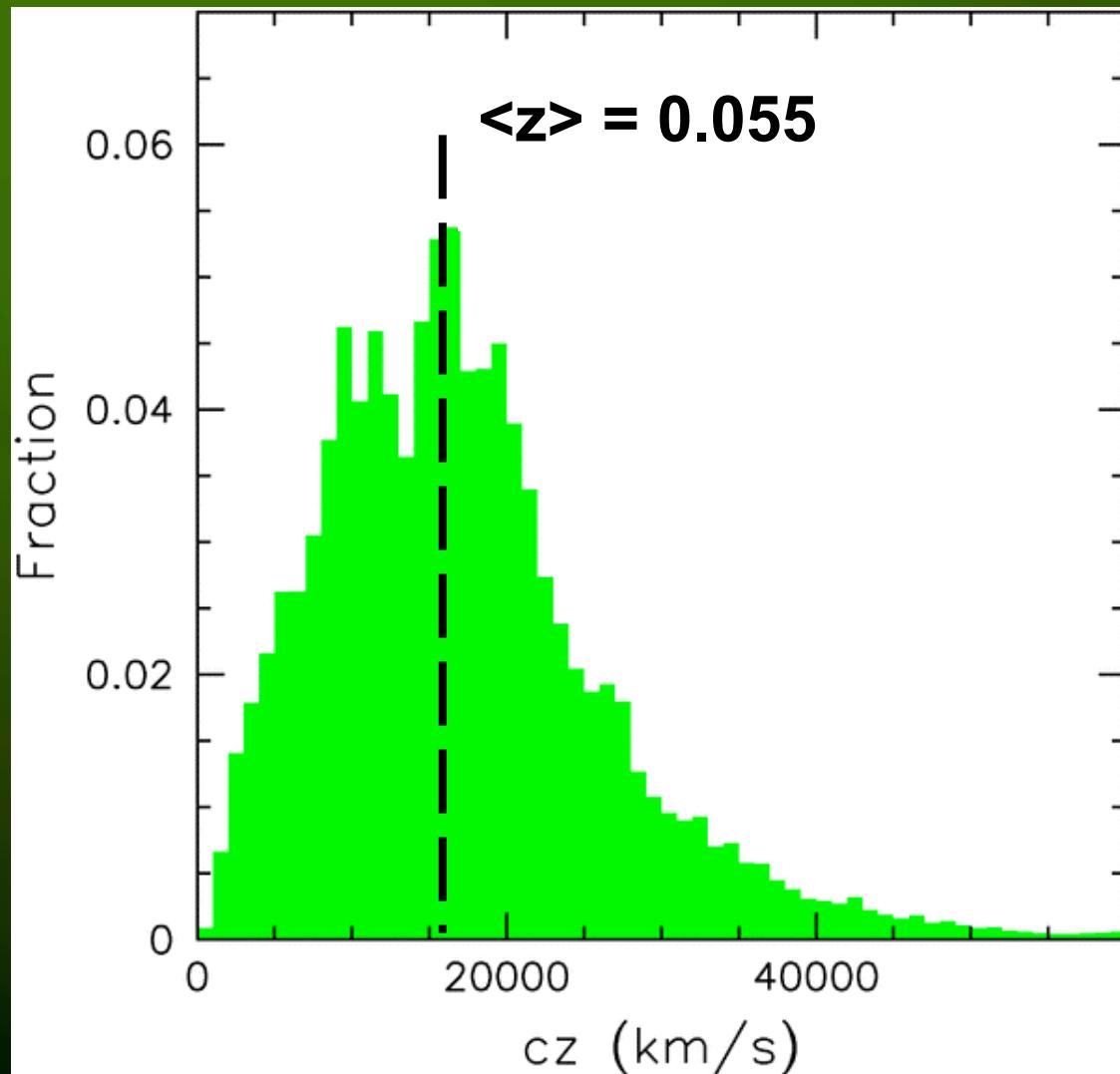
- 1031 fields have been observed to mid-2004.  
(99114 spectra)

Year	Observed # of fields	Cumulate fields
2001	98	98
2002	387	485
2003	396	881
2004	150	1031

- 524 fields have contributed to 1st Data Release  
(52048 spectra)

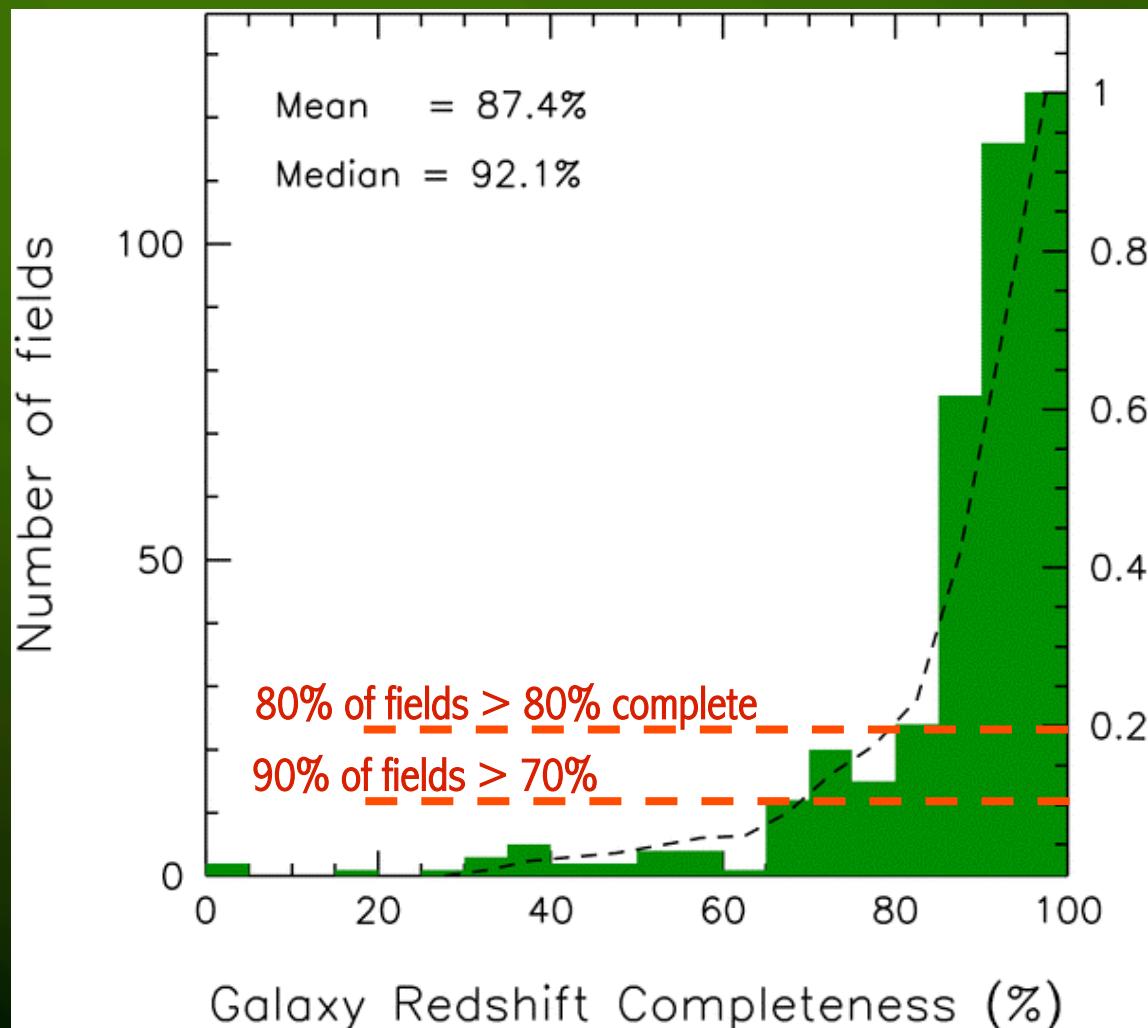


# *The redshift-space distribution*



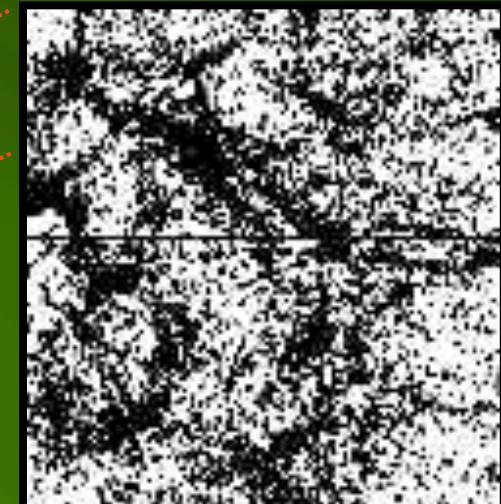
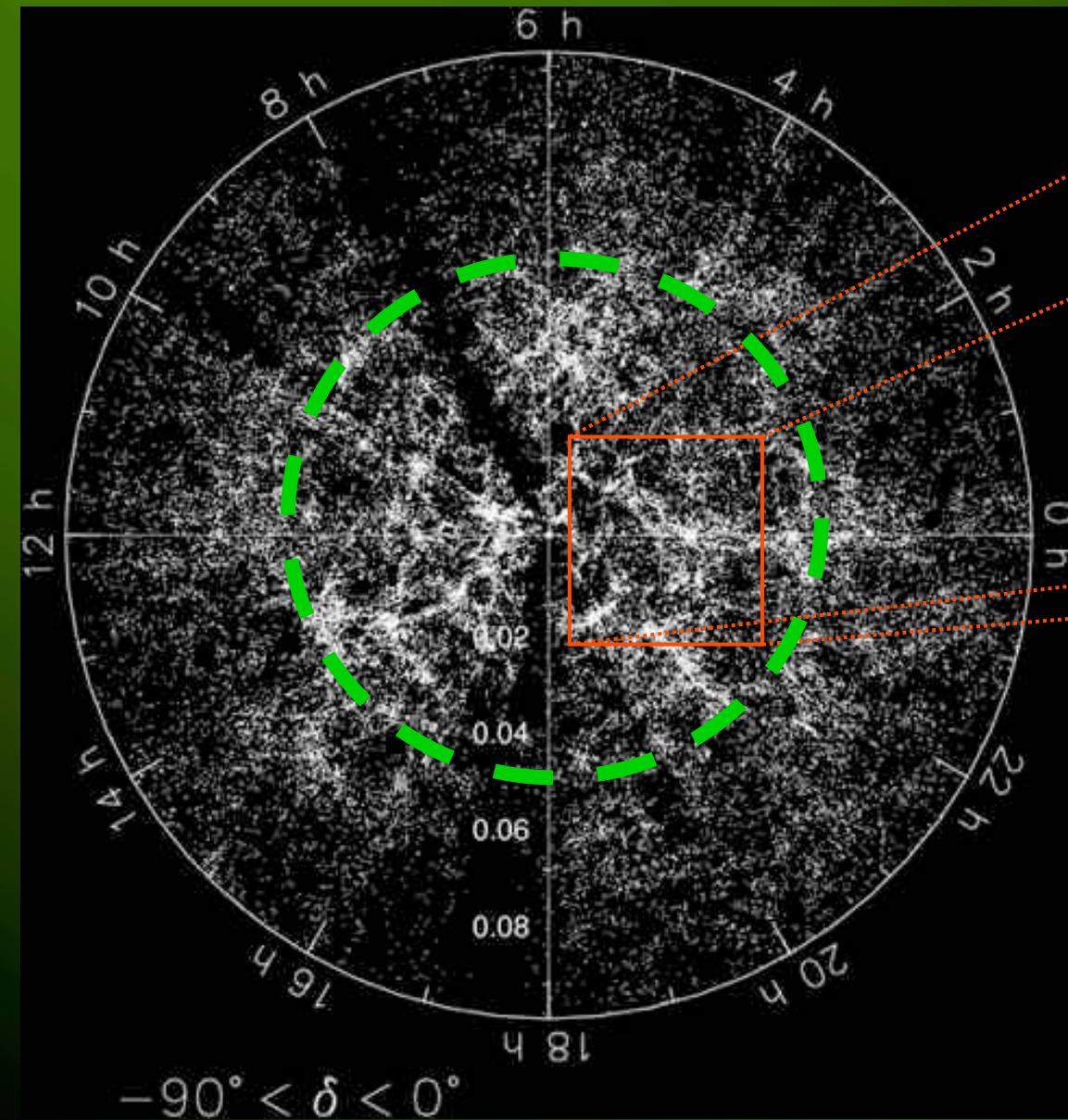
- First Data Release: 52048 spectra yielding 46474 unique redshifts
- Breakdown of spectra
  - galaxy redshifts (85 %)
  - stellar (3 %)
  - HII regions, PNe (1 %)
  - failures (11 %)

# *The redshift-space distribution*



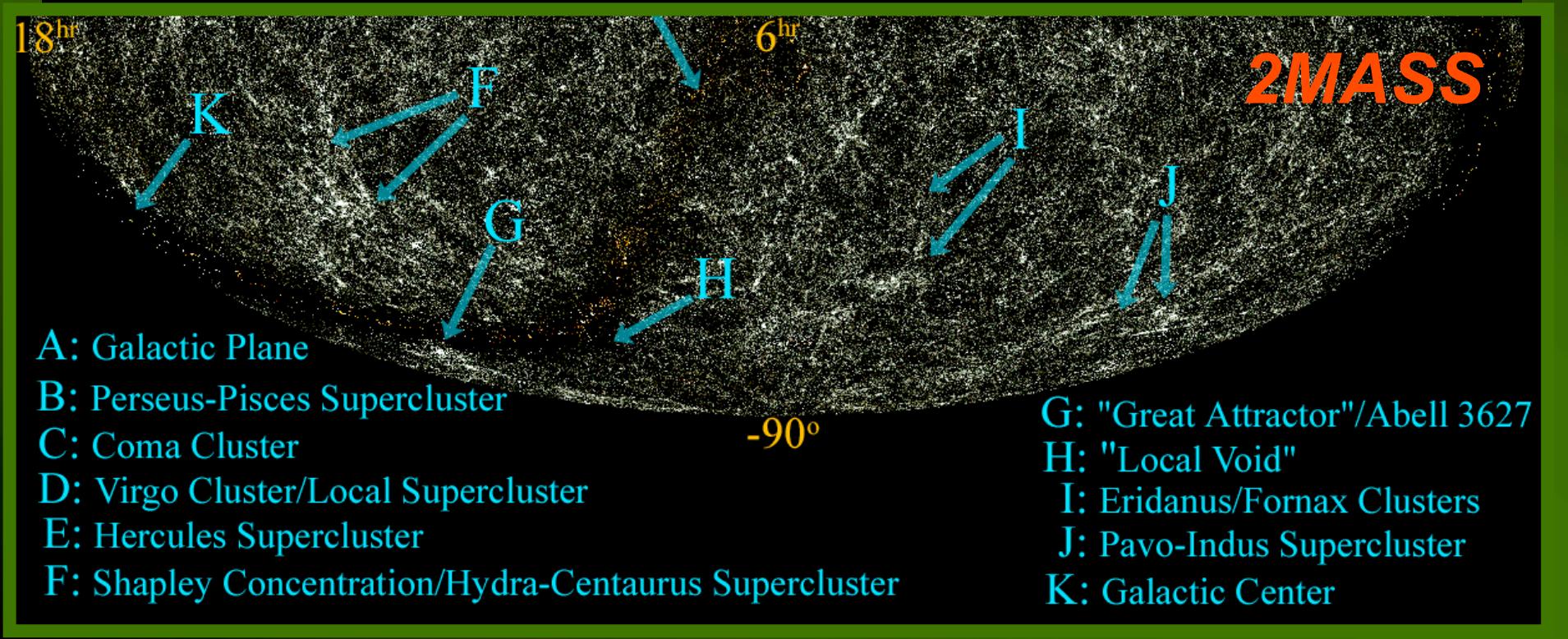
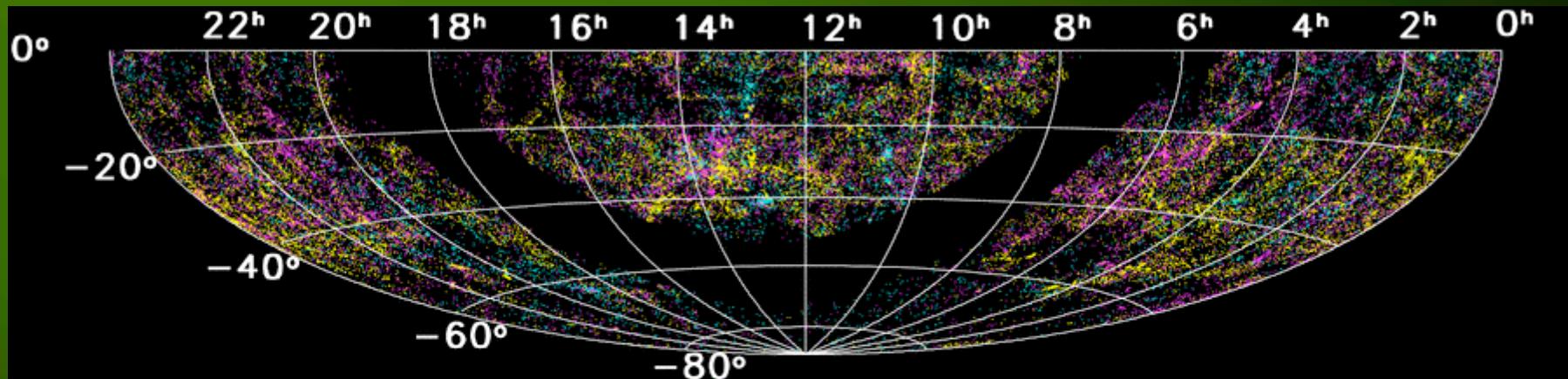
- First Data Release: 52048 spectra yielding 46474 unique redshifts
- Breakdown of spectra
  - galaxy redshifts (85 %)
  - stellar (3 %)
  - HII regions, PNe (1 %)
  - failures (11 %)

# *Redshift Map: 80k redshifts*

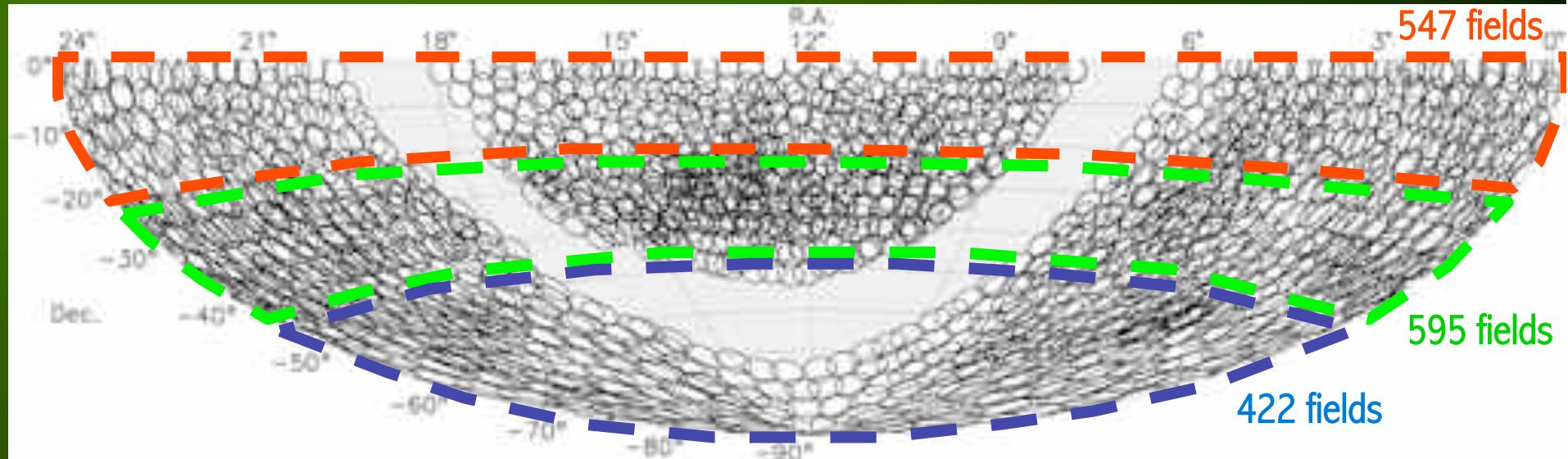


- 50426 6dFGS redshifts
- 19570 ZCAT redshifts  
(Huchra et al 1999)
- 8444 2dFGRS redshifts  
(Colless et al 2001)
- **TOTAL: 78440 redshifts**

# *Redshift Map: 80k redshifts*

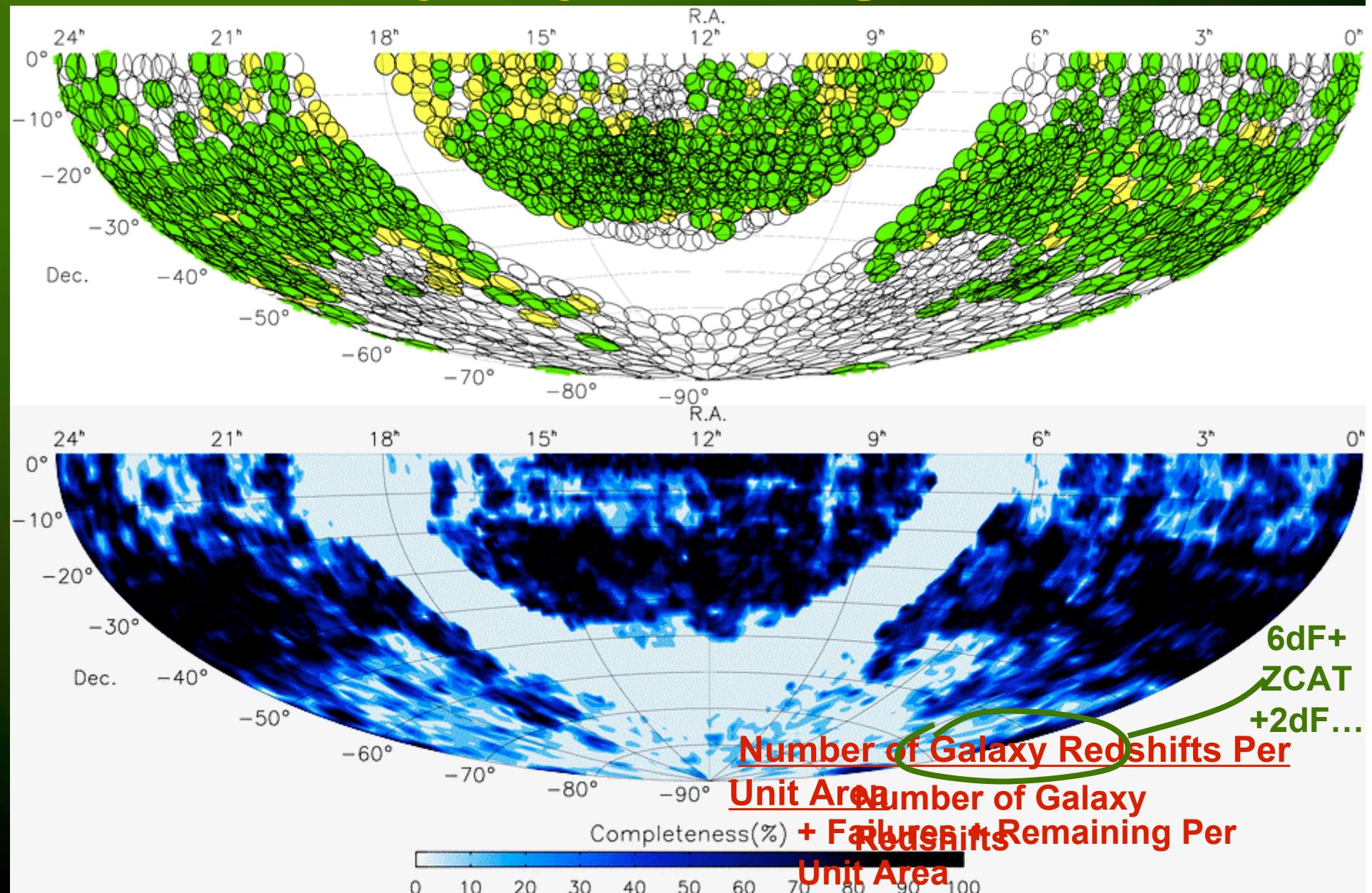


# *Survey Sky Coverage*

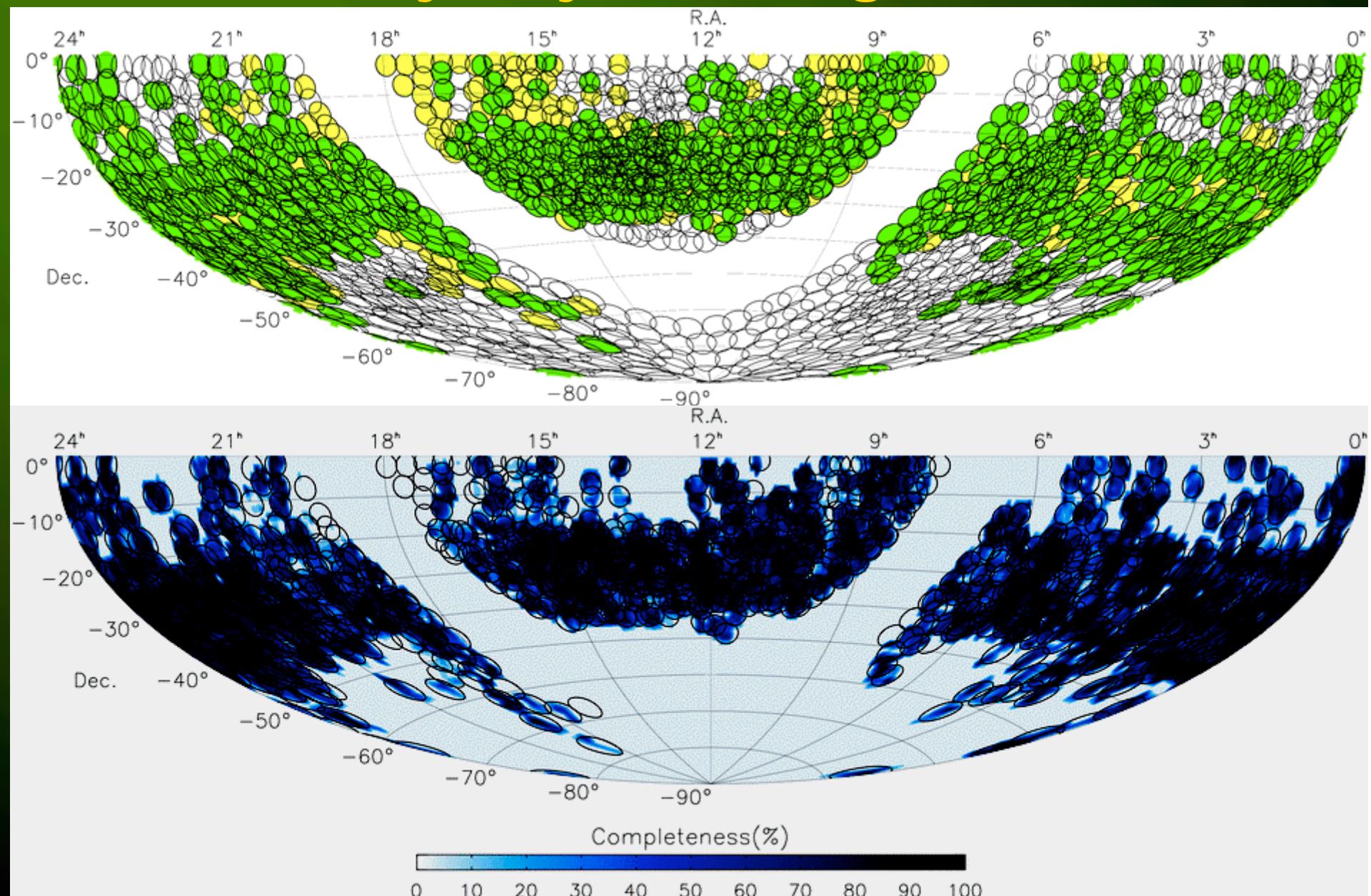


- 1500 fields over southern sky with  $|b| > 10^\circ = 17000 \square^\circ$
- Observing strategy is to cover the sky in thirds: (1) central strip; (2) equatorial strip; (3) southern polar cap.

# Survey Sky Coverage



# Survey Sky Coverage



## *K-band Luminosity Function*

Luminosity function of  
NIR-selected galaxies  
(i.e. the stellar mass  
function of collapsed  
structures)

**2MASS + 2dF**

~17000  
galaxies  
600 sq deg

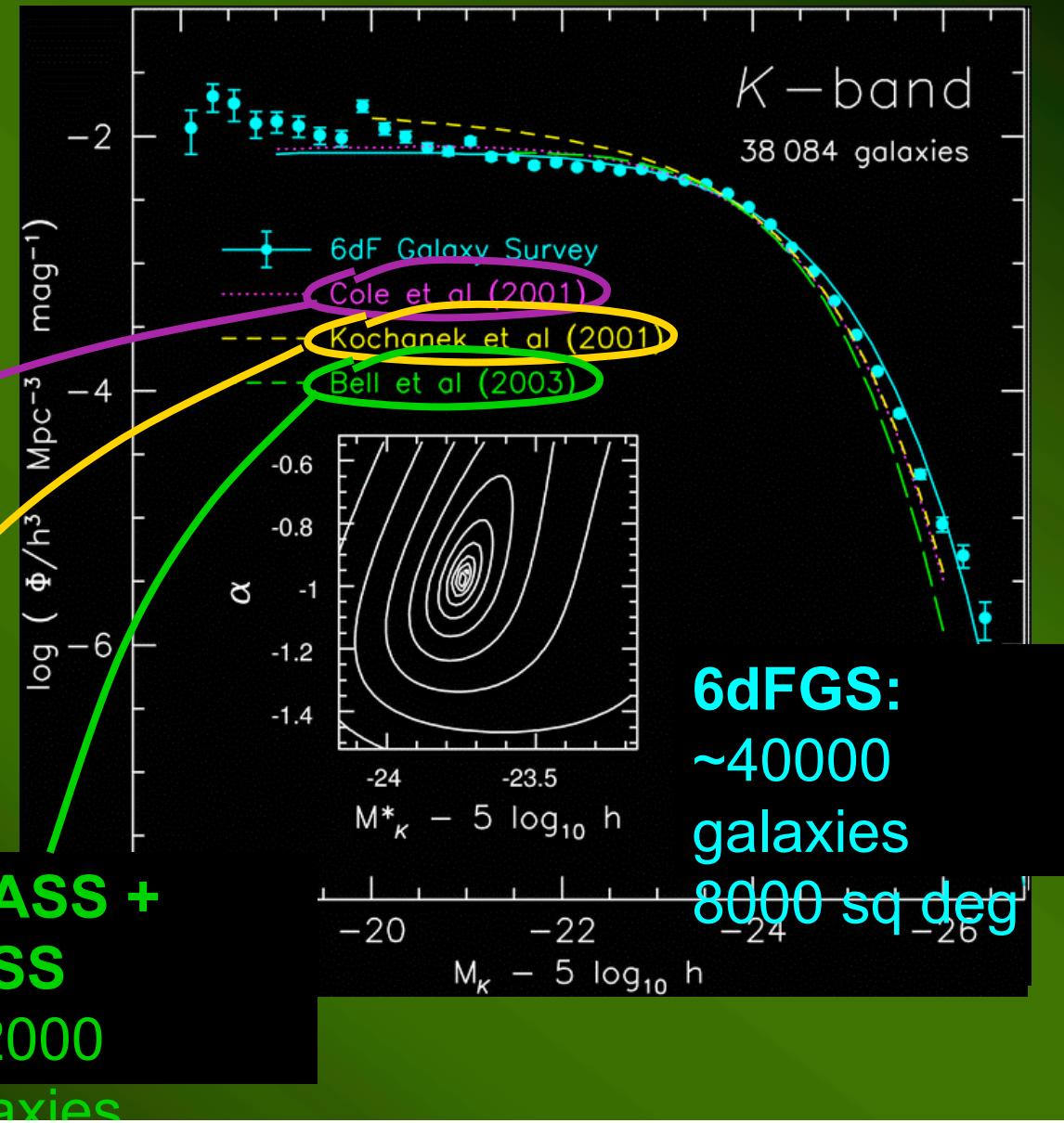
**2MASS +**

**ZCAT**

~4000  
galaxies

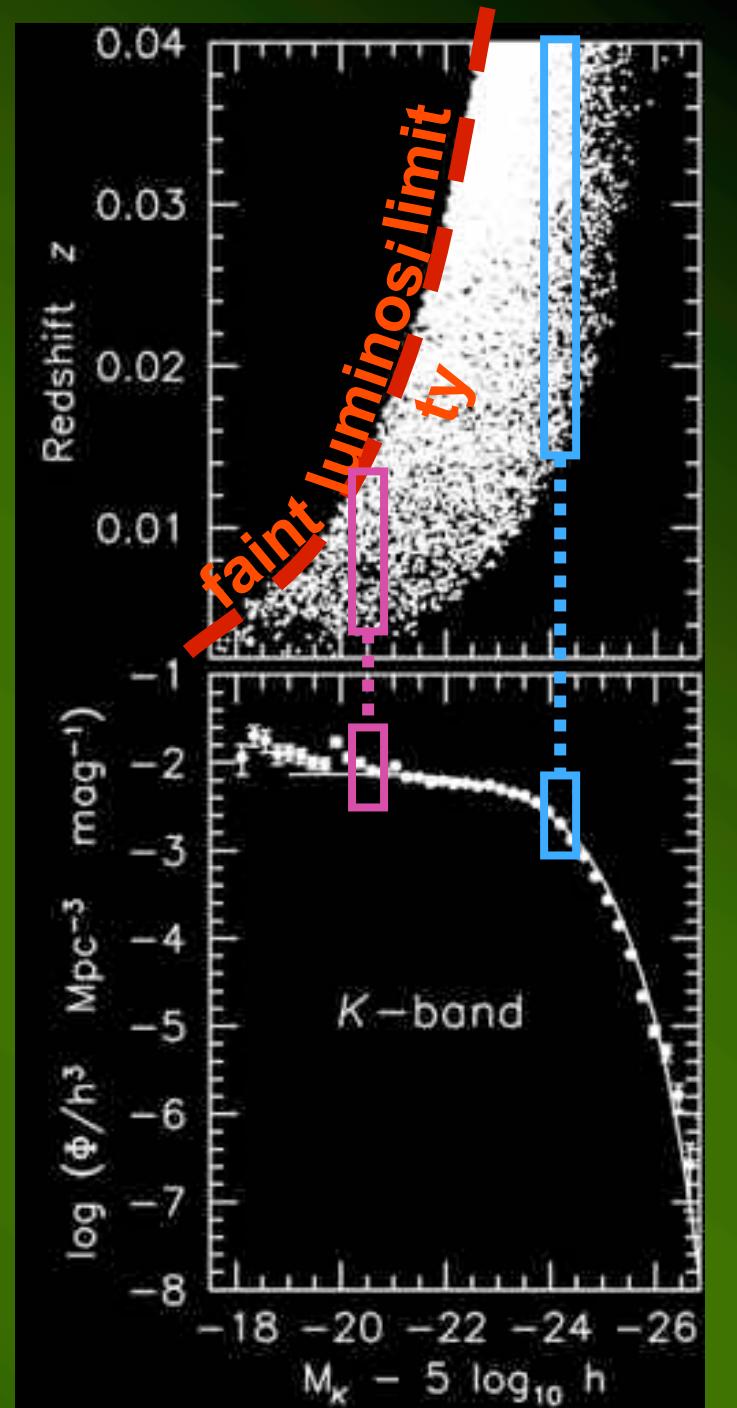
7000 sq deg

**2MASS +**  
**SDSS**  
~12000  
galaxies

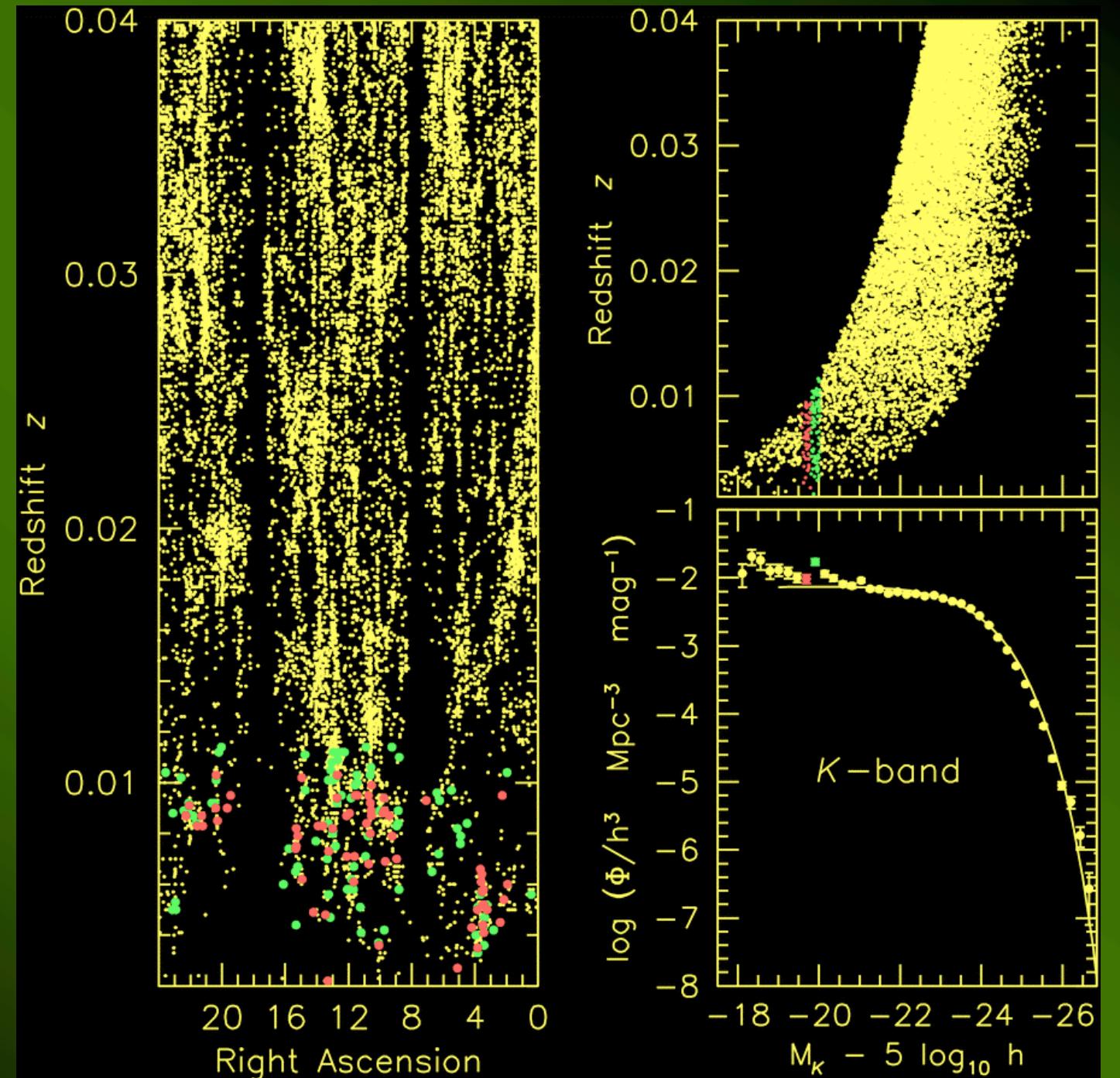


# *Luminosity Function*

Relationship between  
luminosity and  
volume probed



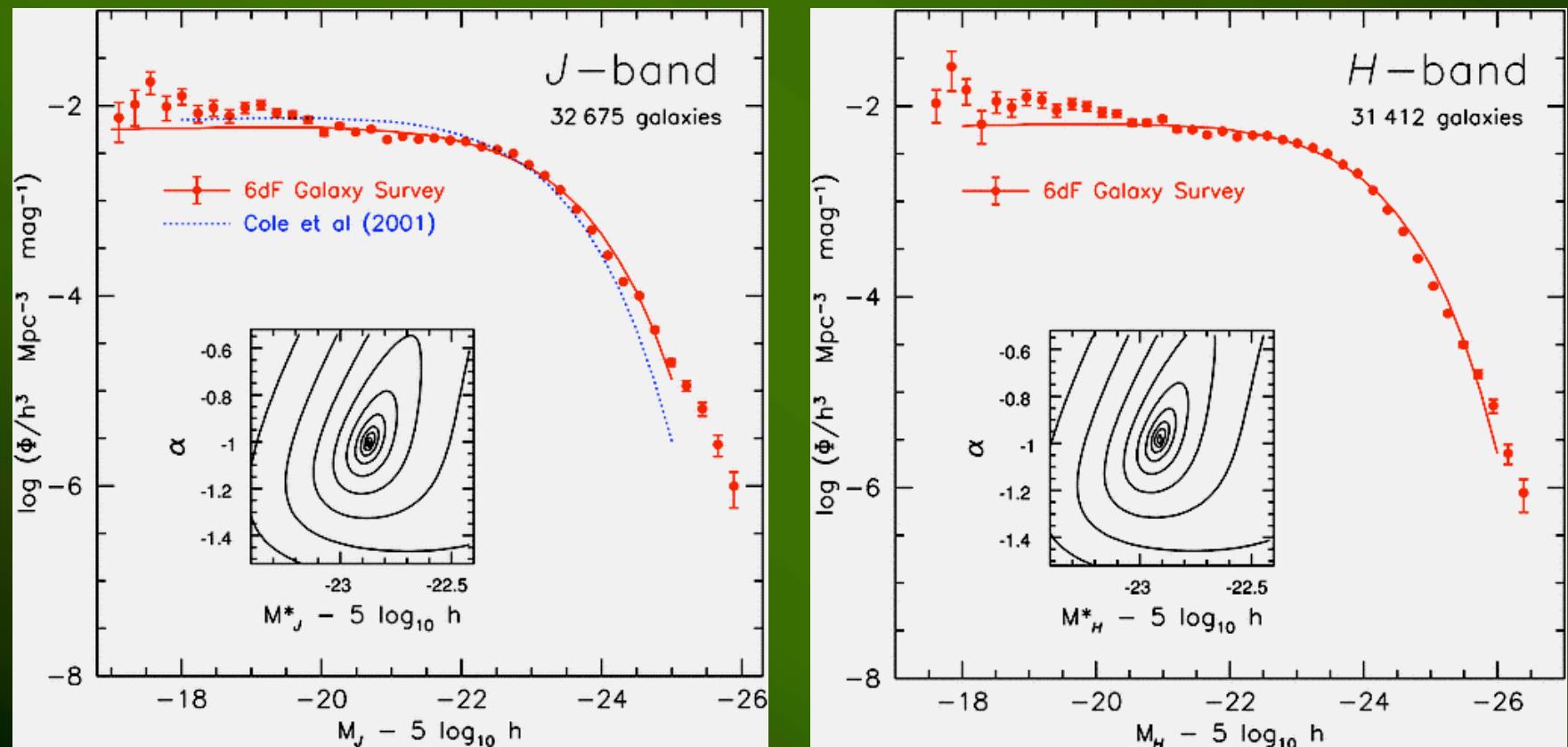
# Luminosity Function



# *Luminosity Functions in J and H*

Flat faint end in both cases

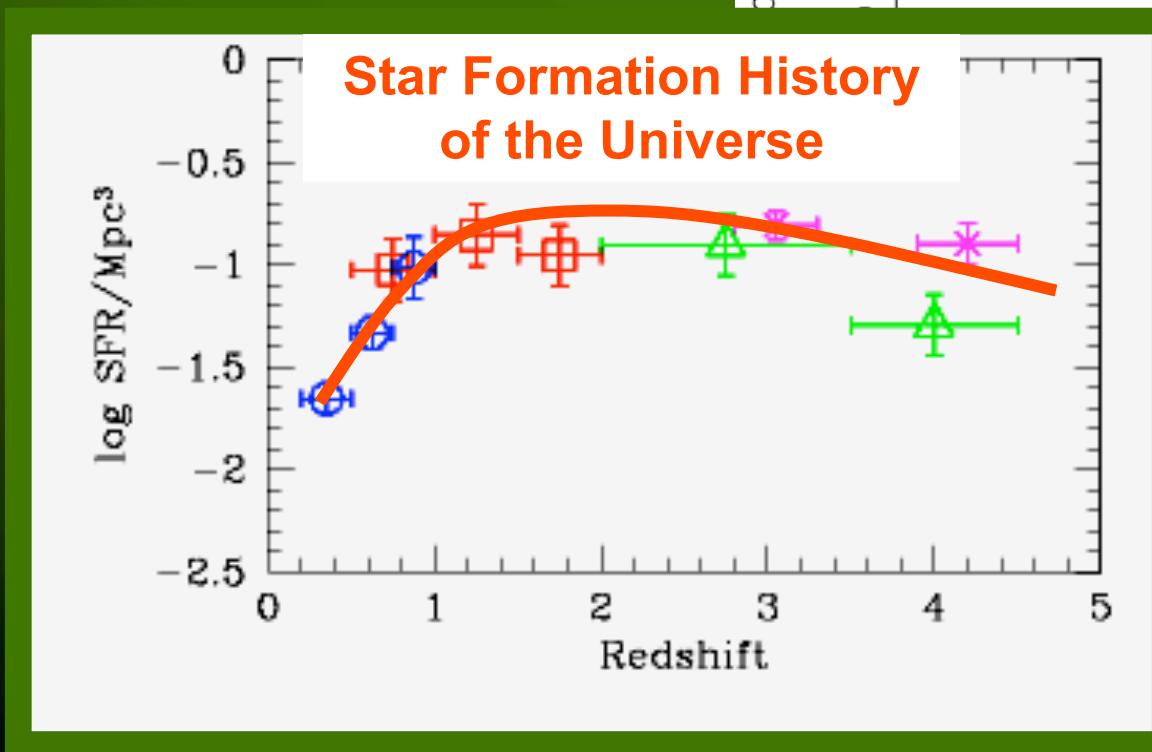
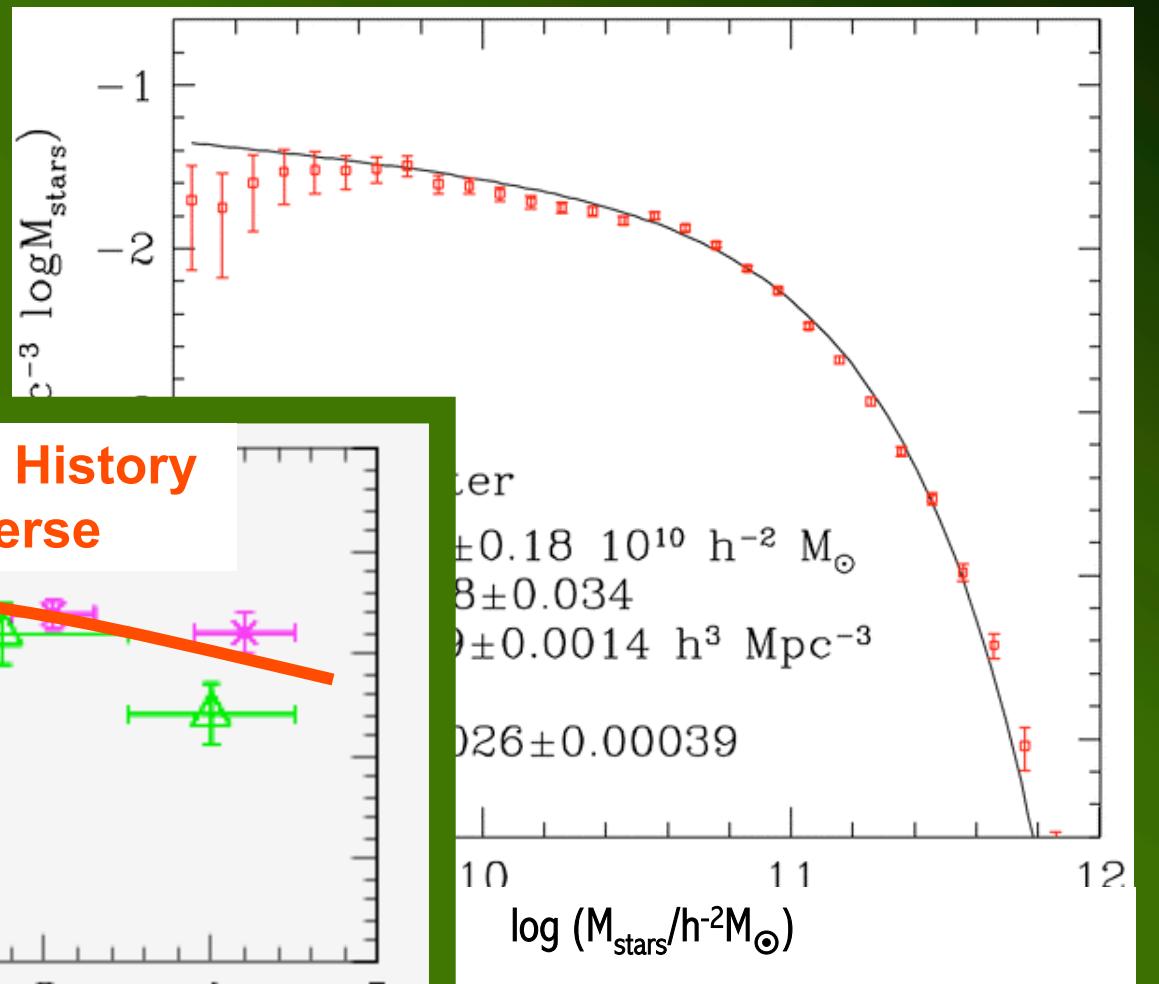
Agreement with 2MASS+2dF in J



# *Stellar Mass Function*

*Cole et al (2001)*

- NIR luminosity is very closely correlated with total stellar mass, and so yields the stellar mass function.



# **6dFGS First Data Release: March 2004**

- Jan 2002 – July 2003 data made public → 52048 spectra; 46474 unique redshifts; 524 fields across central southern declinations
- Survey Paper: Jones et al (2004) → astro-ph/0403501
- 6dFGS Home → <http://www.mso.anu.edu.au/6dFGS>
- 6dFGS Database

**6dF Galaxy Survey Database**  
<http://www-wfau.roe.ac.uk/6dFGS/>

The screenshot shows the homepage of the 6dFGS Database. At the top right is the URL <http://www-wfau.roe.ac.uk/6dFGS/>. Below it is a plot titled "g0013200-263535 2002/07/17 z= 0.05745 quid= 4". The y-axis is labeled "Counts" and ranges from 0 to 3000. The x-axis is labeled "Wavelength (Å)" and ranges from 4500 to 8500. The plot shows a noisy spectrum with several absorption lines labeled: OH H&H, C II Ly, H& H I II, Mg II, Ne III, and He II II. Below the plot is a table titled "g0013200-263535" with columns for UKST B, UKST R, 2MASS J, 2MASS H, 2MASS K, and 2MASS color. Each column contains a small grayscale image of a galaxy and its size in arcseconds: 60 arcsec for UKST B and R, 35 arcsec for the rest. At the bottom are links to "Home | Intro", "Schema | Access | FITS files |". On the left side of the page is a sidebar with the "6dF GS Database" logo, a menu with links to Database Home, Introduction, Database Schema, FITS files, Database Access, AAO 6dF pages, RSAA 6dFGS pages, and Publications, and the WFAU logo.