FMOS and the Faint Radio Source Population

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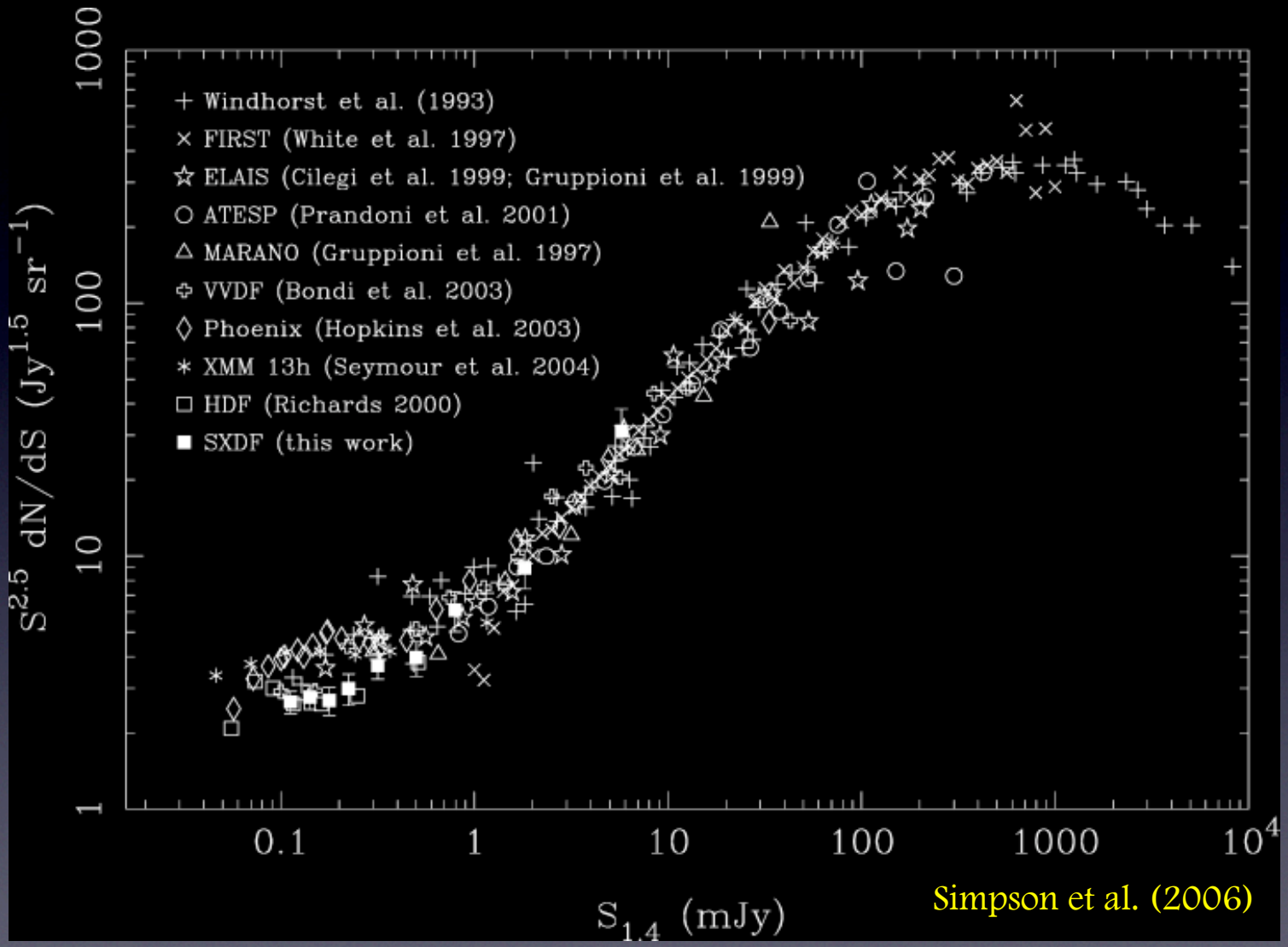
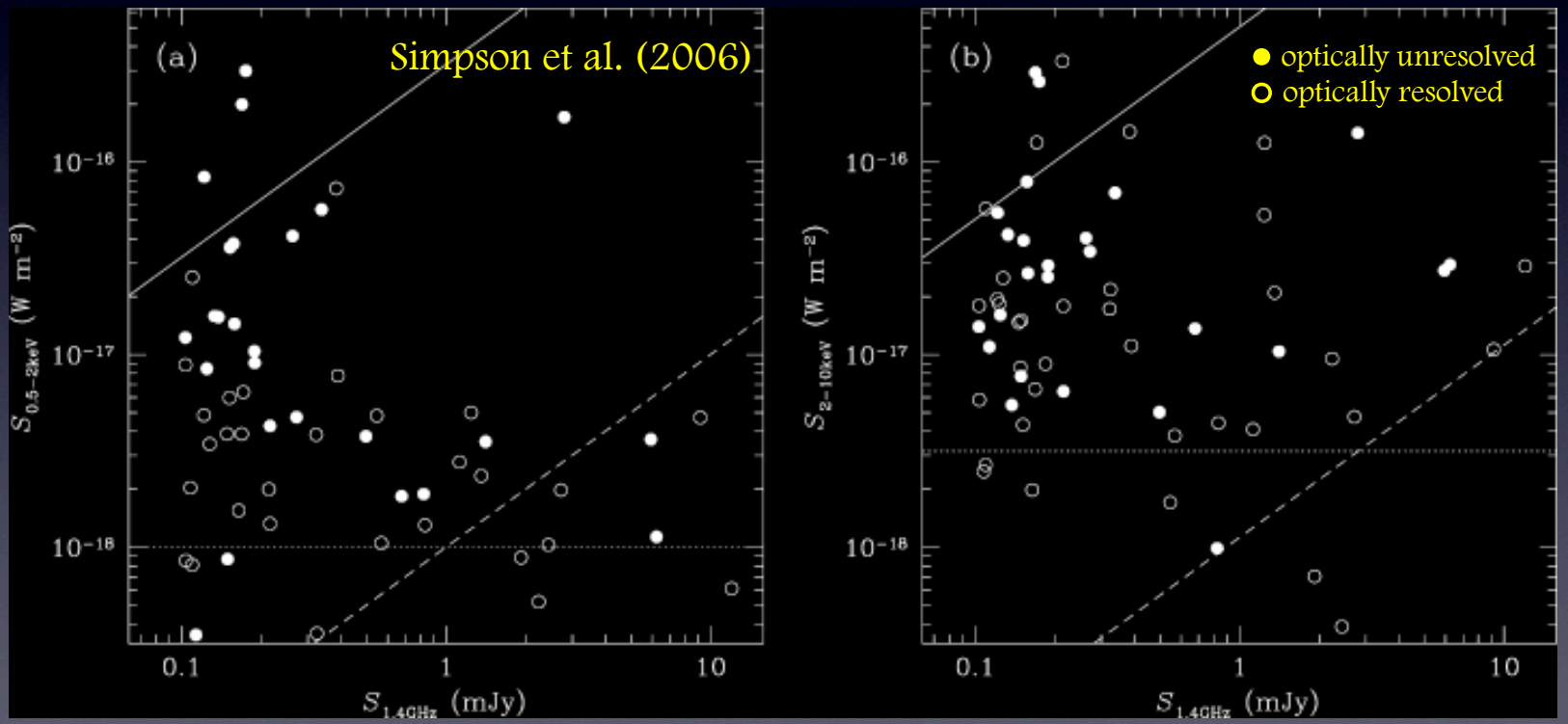
Radio source counts



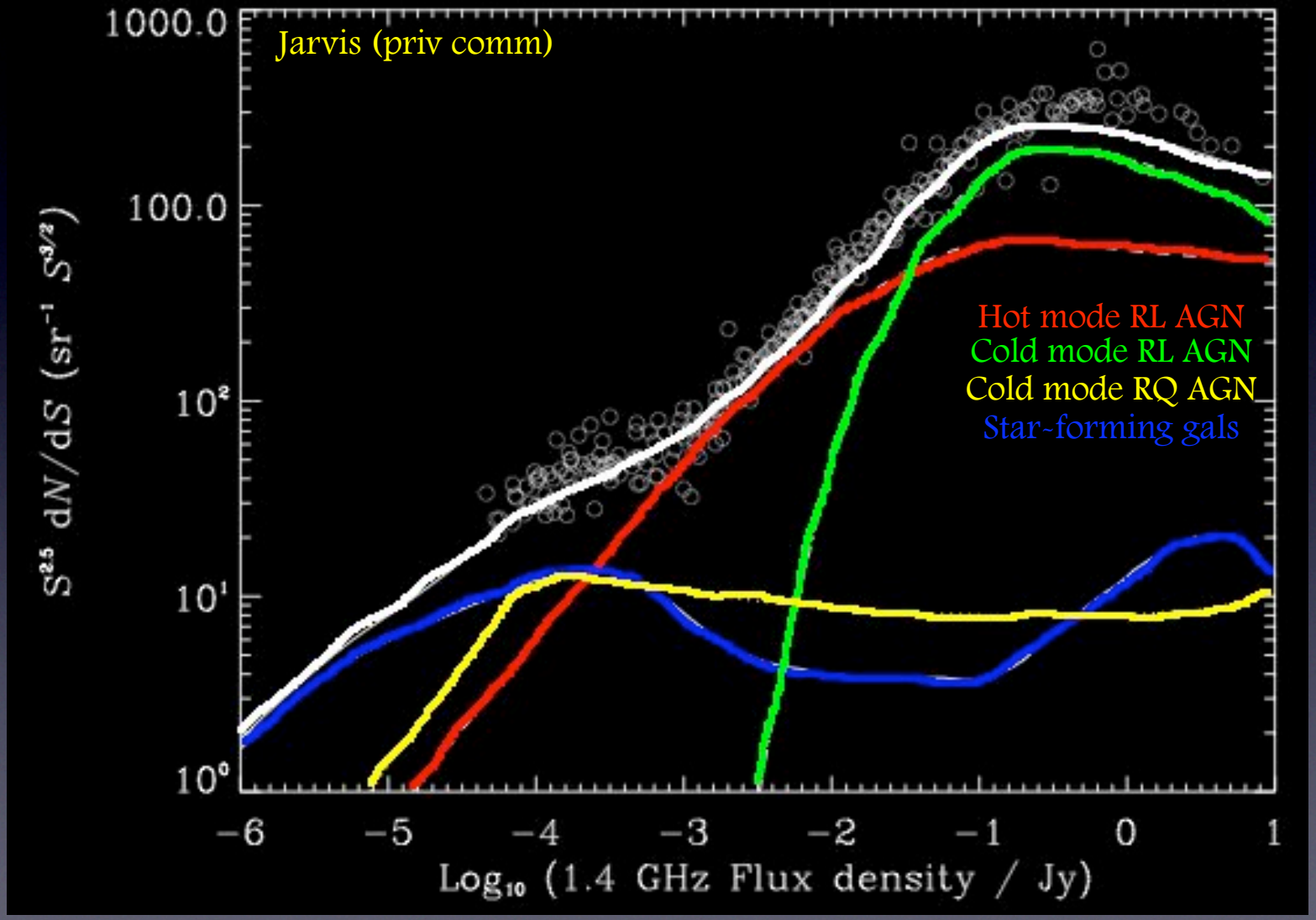
Simpson et al. (2006)

Radio source populations

Faint radio sources ($S_{1.4}$<0.3mJy) now known to contain a large population of radio-quiet AGN.



Radio source populations



Radio source populations

At 1.4-GHz flux densities of 30-300μJy, the radio sources are:

- Star-forming galaxies
  - Trace the cosmic star formation history, irrespective of obscuration
- Hot-mode radio-loud AGN
  - Identify the epoch at which AGN feedback balances gas cooling
- Cold-mode radio-quiet AGN
  - Track the accretion history of the Universe, irrespective of obscuration

Expected to be similar numbers of sources of each type.

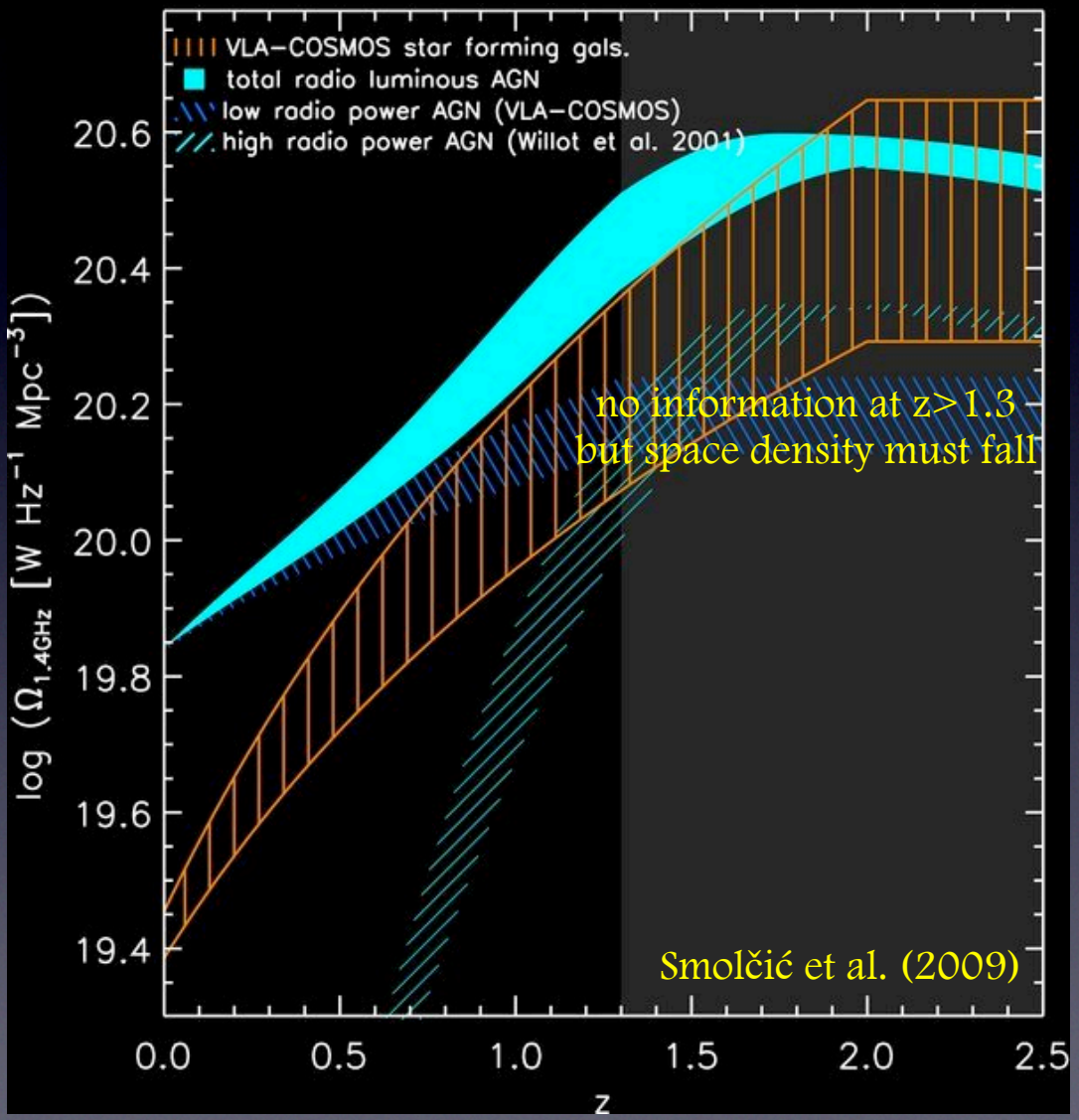
Require redshifts and (spectroscopic) classifications.

Populations at z>1

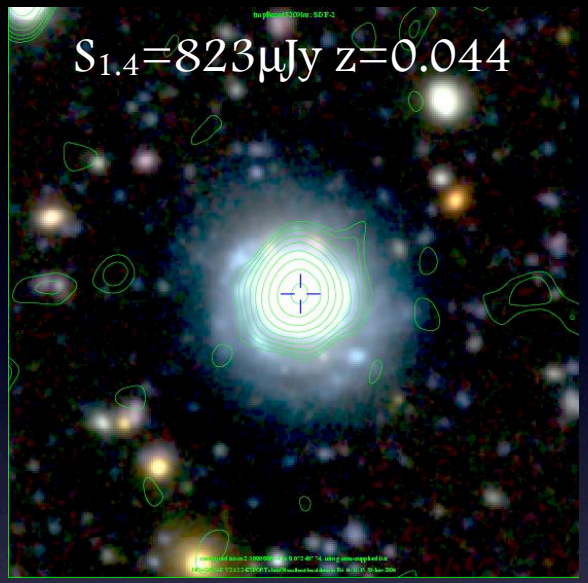
RQAGN should follow the cold mode RLAGN evolution:

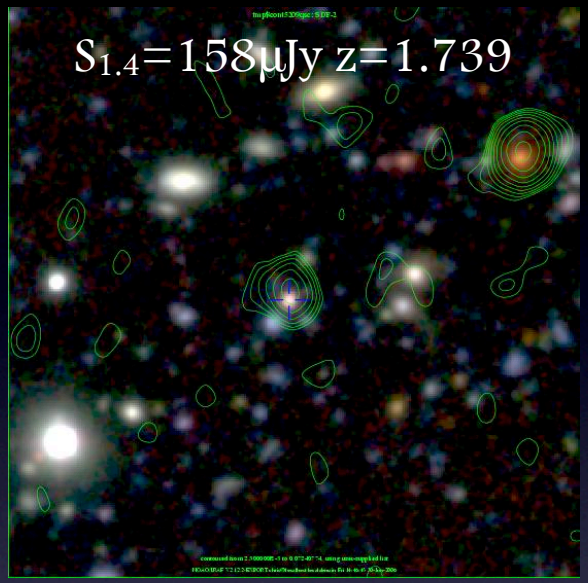
- 1000× less luminous
- 50× more numerous

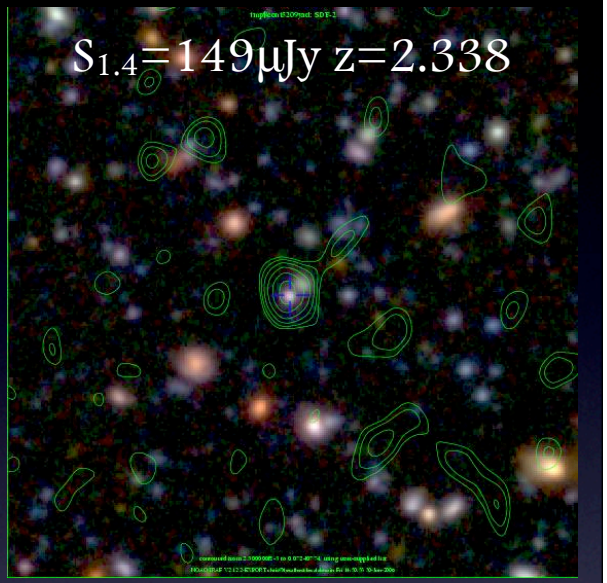
Hot mode (high M, low $\dot{M}$) AGN must become less numerous at z≫1

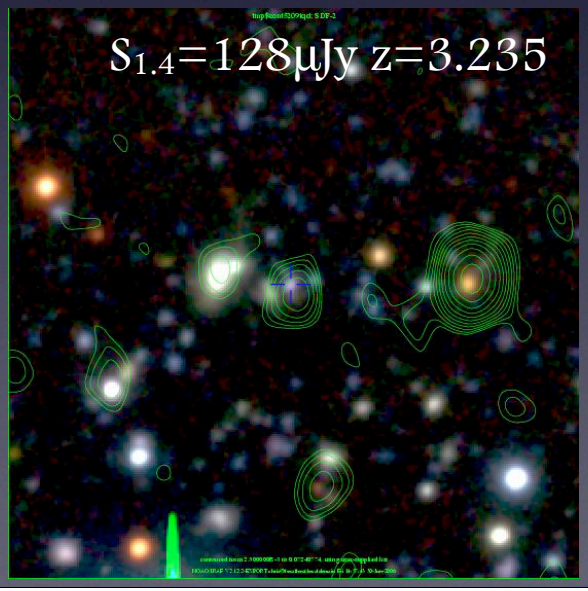


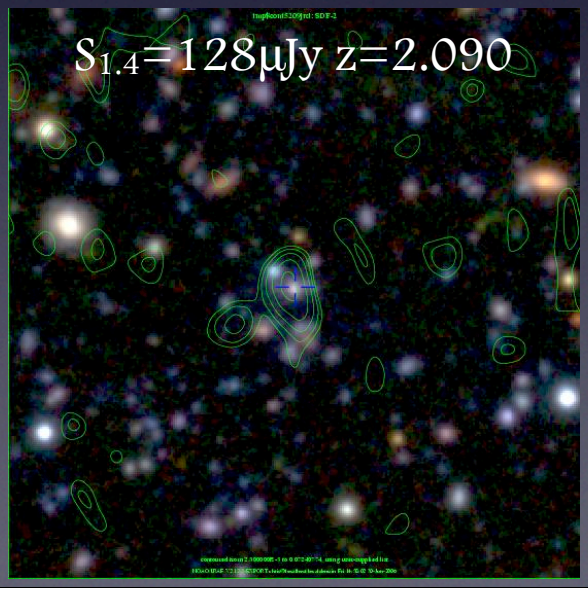
SXDF/UDS radio survey

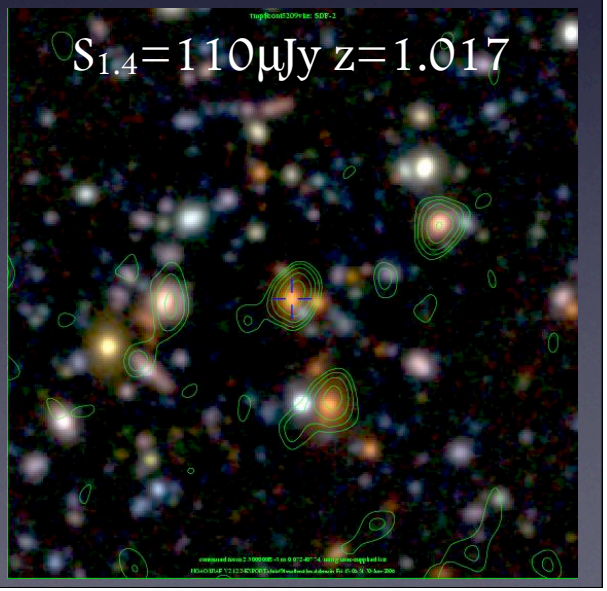




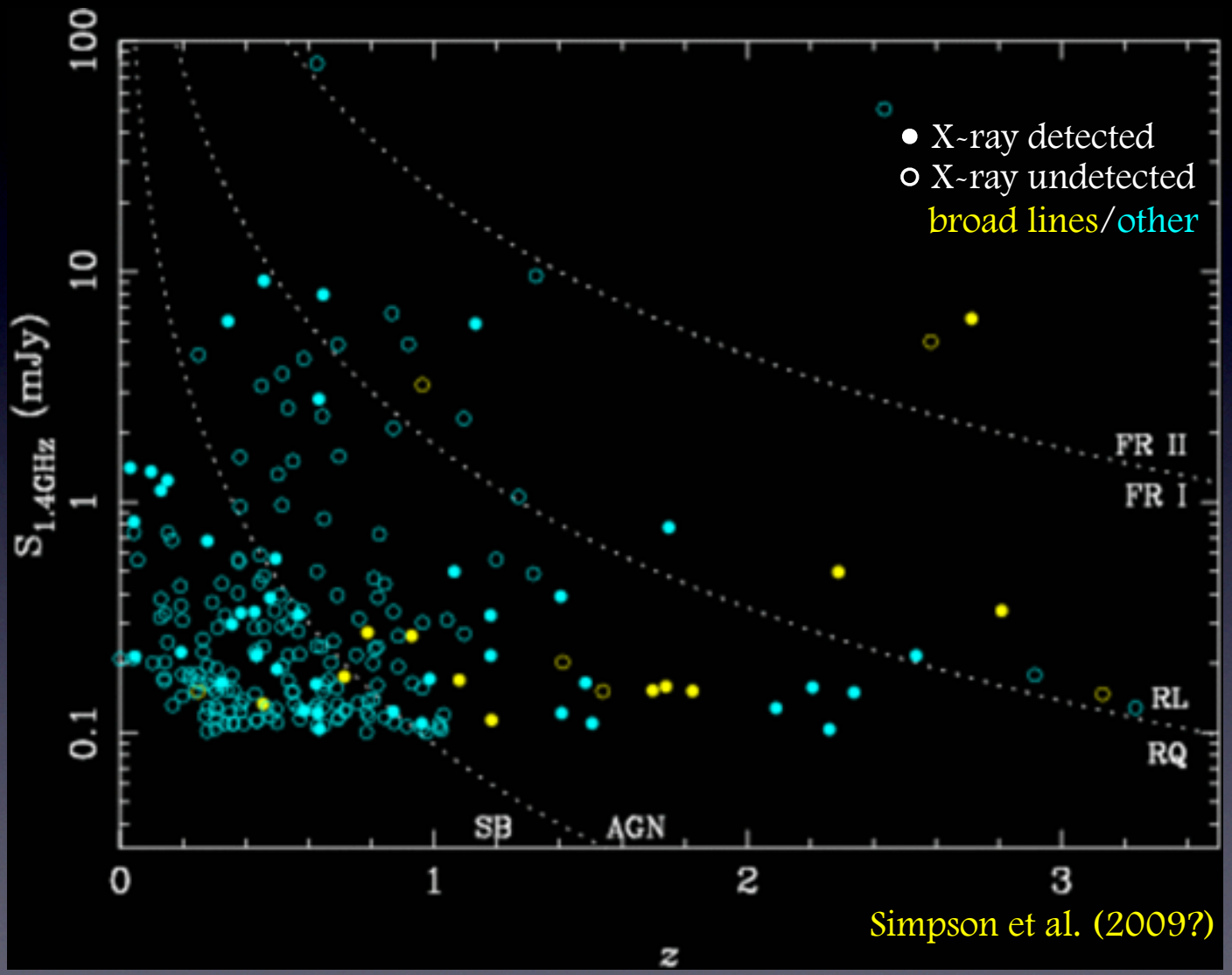








Redshift completeness



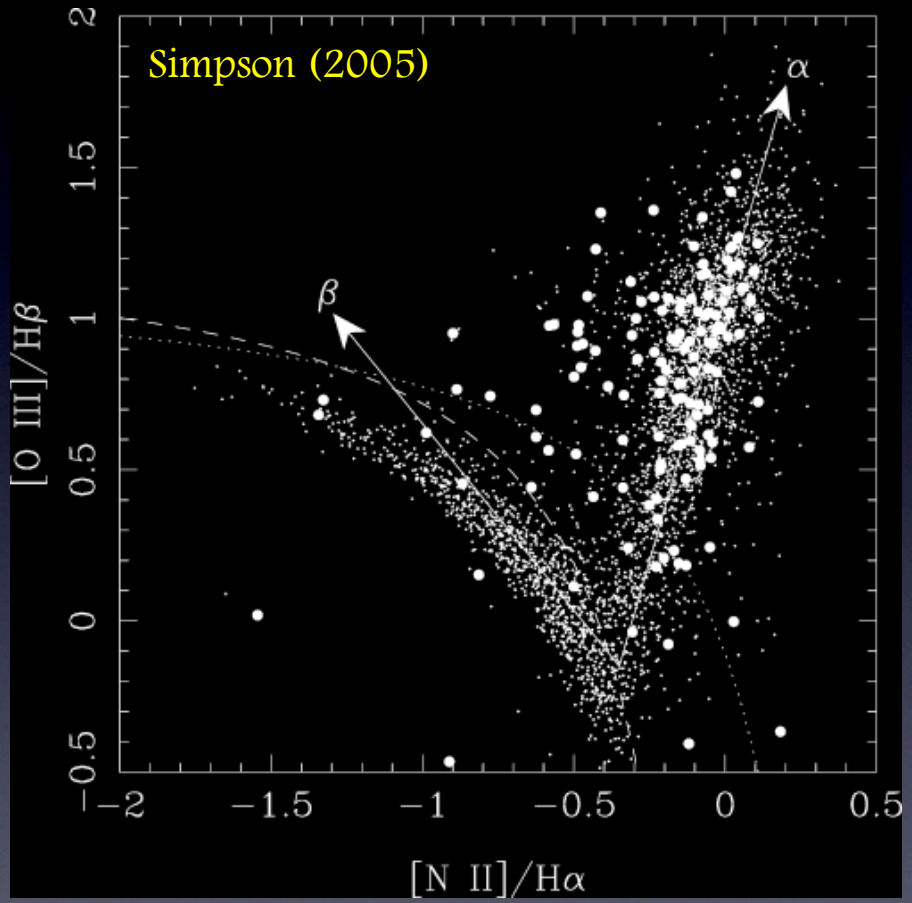
FMOS observations

1.3<z<1.7 range interesting:

- Ca HK, Hβ, [OIII] in zJ-band
- Hα, [NII] in H-band

Lower redshifts useful when combined with optical spectroscopy.

Higher redshifts more problematic, but 2<z<2.5 provides [OII],Hβ,[OIII].



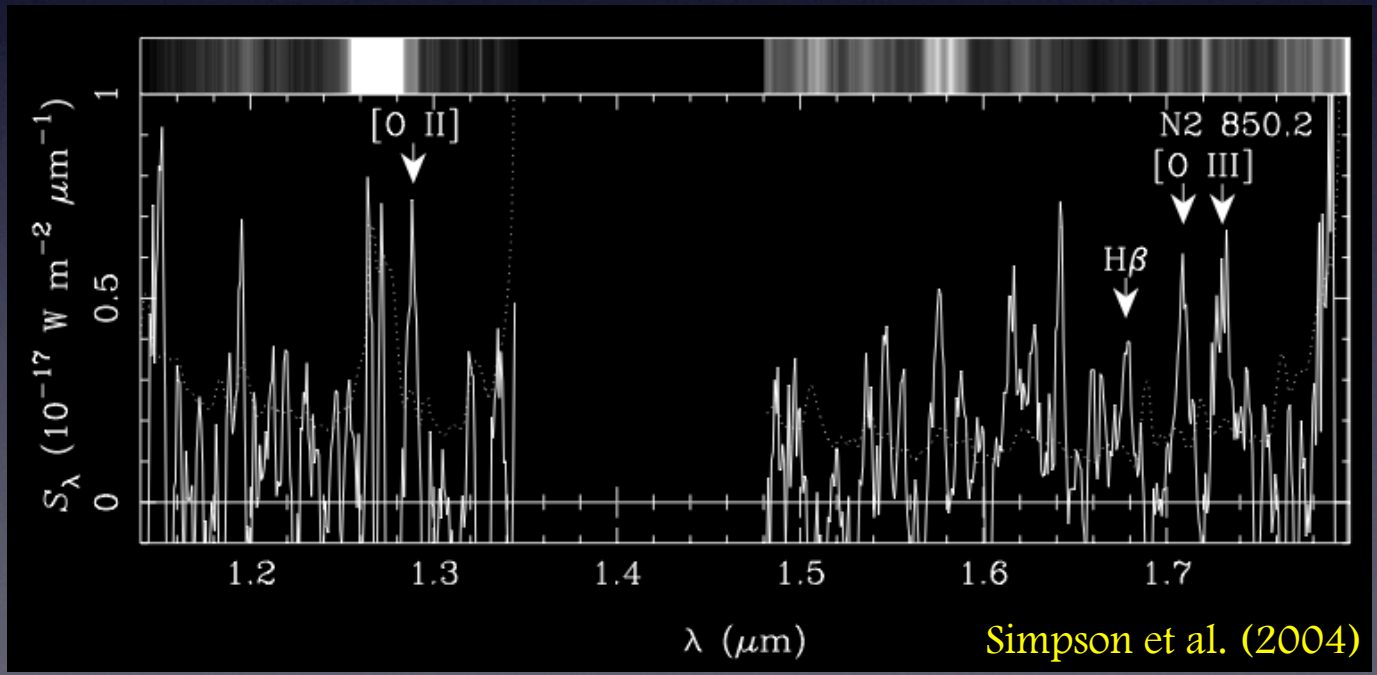
Starburst redshift completeness

$L_{[OII]} \approx 5\times10^{33}$ (SFR/$M_\odot$ yr^{-1}) W ($L_{H\alpha} \approx L_{[OII]}$)

$L_{1.4GHz} \approx 5\times10^{21}$ (SFR/$M_\odot$ yr^{-1}) W Hz^{-1}

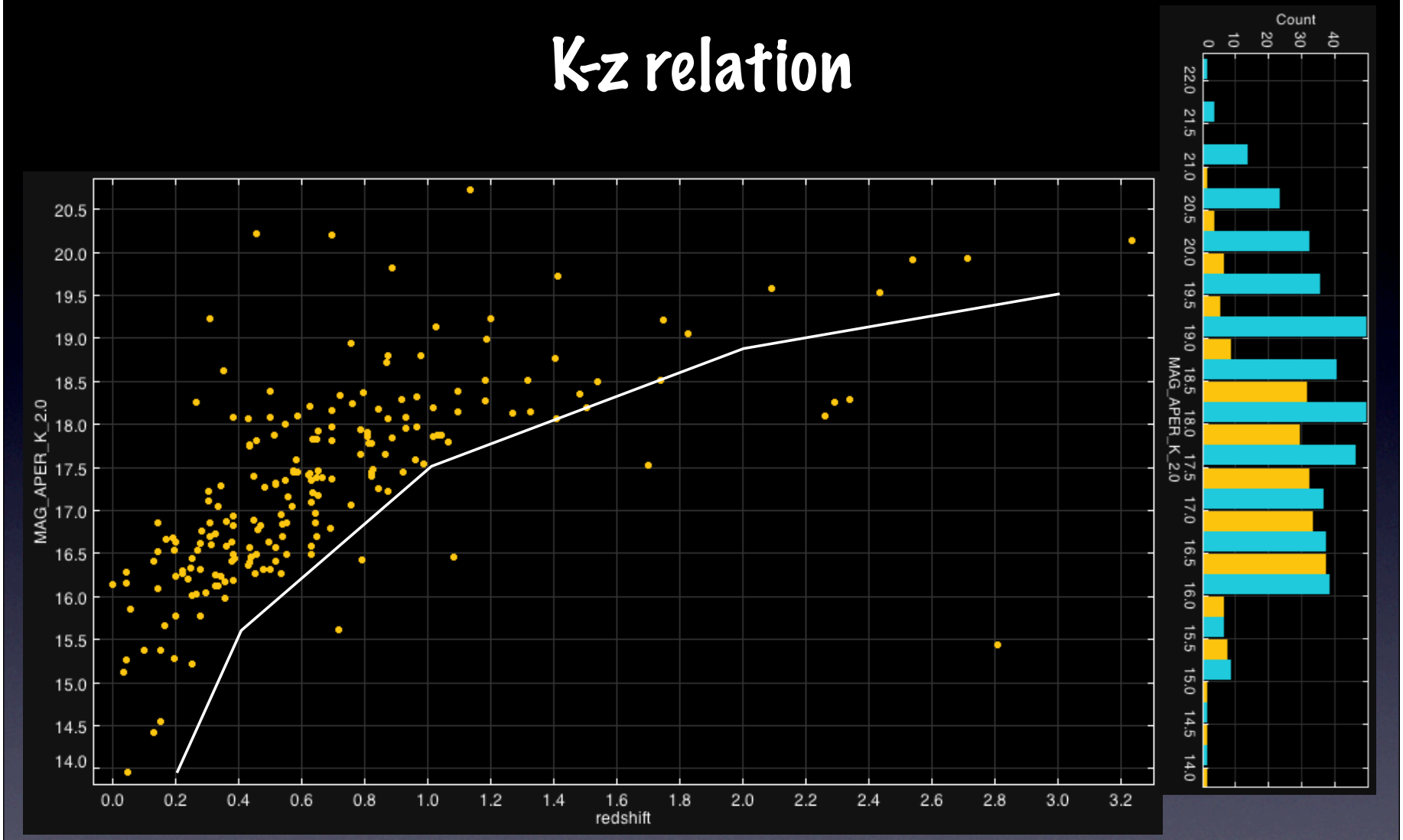
$S_{[OII]} \approx 10^{12}\, S_{1.4}\, (1+z)^{\alpha-1} \approx 8\times10^{-19}$ ($S_{1.4}$/100μJy) W m^{-2}

...in the absence of extinction!

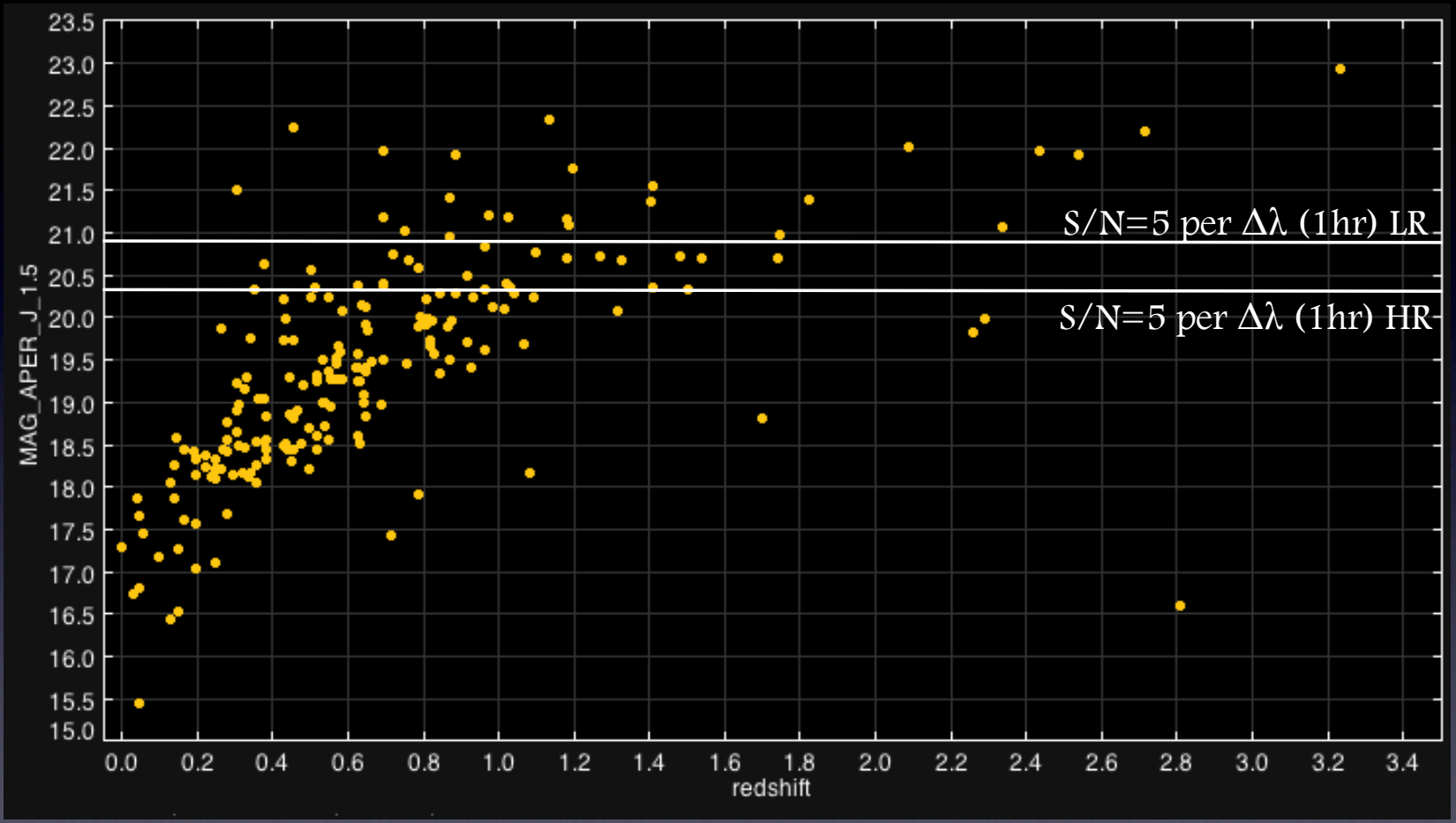


Simpson et al. (2004)

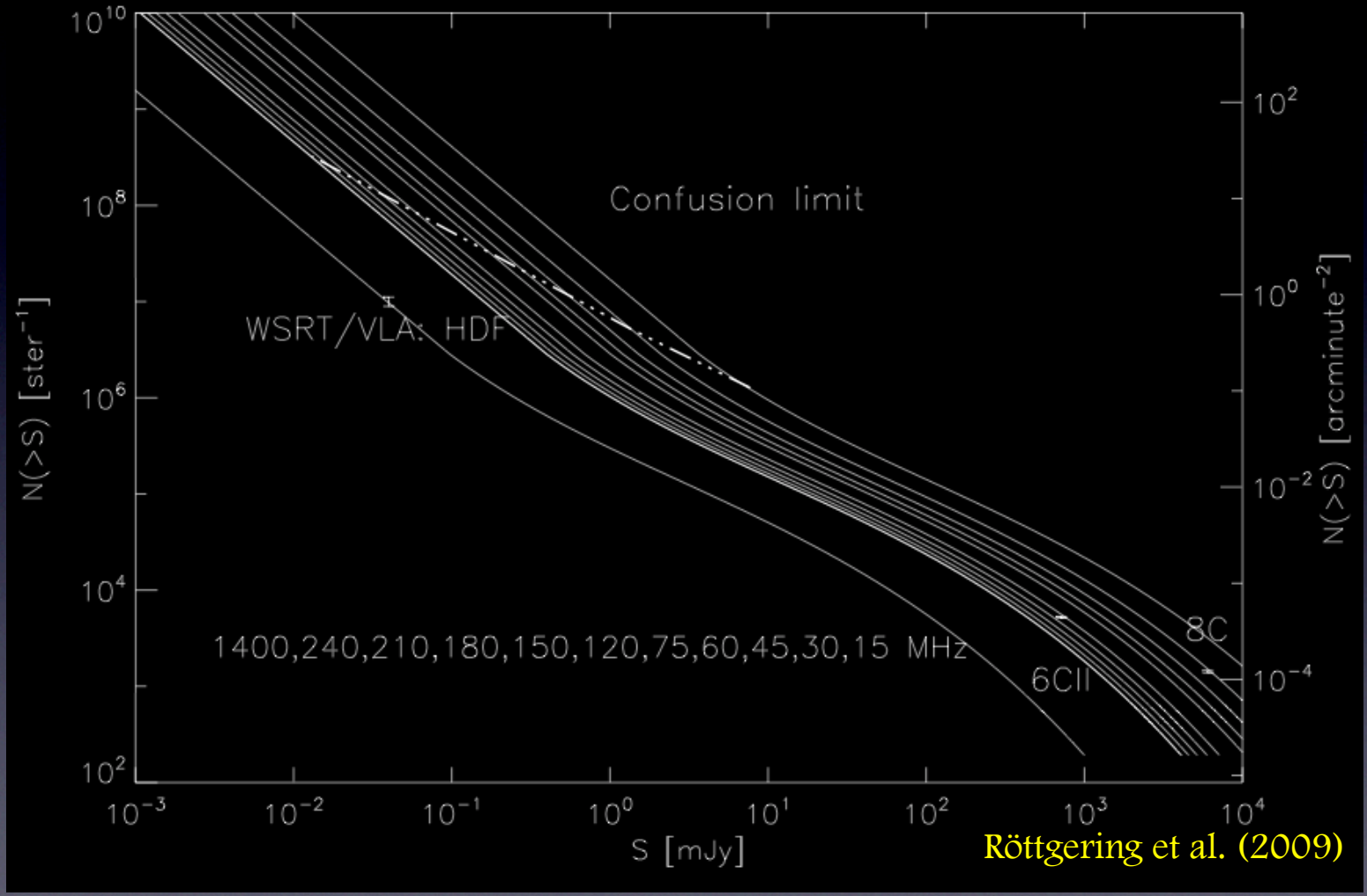
K-z relation



J-z relation


MAG_APER_J_1.5
redshift
S/N=5 per Δλ (1hr) LR
S/N=5 per Δλ (1hr) HR
23.5
23.0
22.5
22.0
21.5
21.0
20.5
20.0
19.5
19.0
18.5
18.0
17.5
17.0
16.5
16.0
15.5
15.0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4

Sky density of targets



Röttgering et al. (2009)

Cosmology

LOFAR radio surveys could provide a source catalogue for BAO studies.

At a sky density of ~1000 deg^{-2}, this is probing the same sources as I've just described.

Can use UDS observations to infer N(z) and the redshift completeness of a survey and refine target selection to boost the success of such an experiment.

Conclusions

Faint radio sources can tell us about the cosmic evolution of several important populations.

FMOS will probe a redshift range which is otherwise difficult to study (especially for hot-mode AGN).

SXDF/UDS is a good place to start due to excellent multi-λ data and photo-z's (LR vs HR).

Detailed survey of ~1000 sources will allow the utilization of radio sources for BAO studies.