QSOs with VST-ATLAS & VHS

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Context

- VST-ATLAS+VHS is the southern hemisphere equivalent of SDSS+UKIDSS LAS which has already been very successful at finding high-z quasars (Bram Venemans talk)

- Bright high-z quasars suitable for detailed follow-up with next generation telescopes like E-ELT, ALMA and SKA

- VHS has already covered a significant fraction of VST-ATLAS area (Richard McMahon's talk this morning)

Simulating QSOs within VST-ATLAS + VHS

Filters
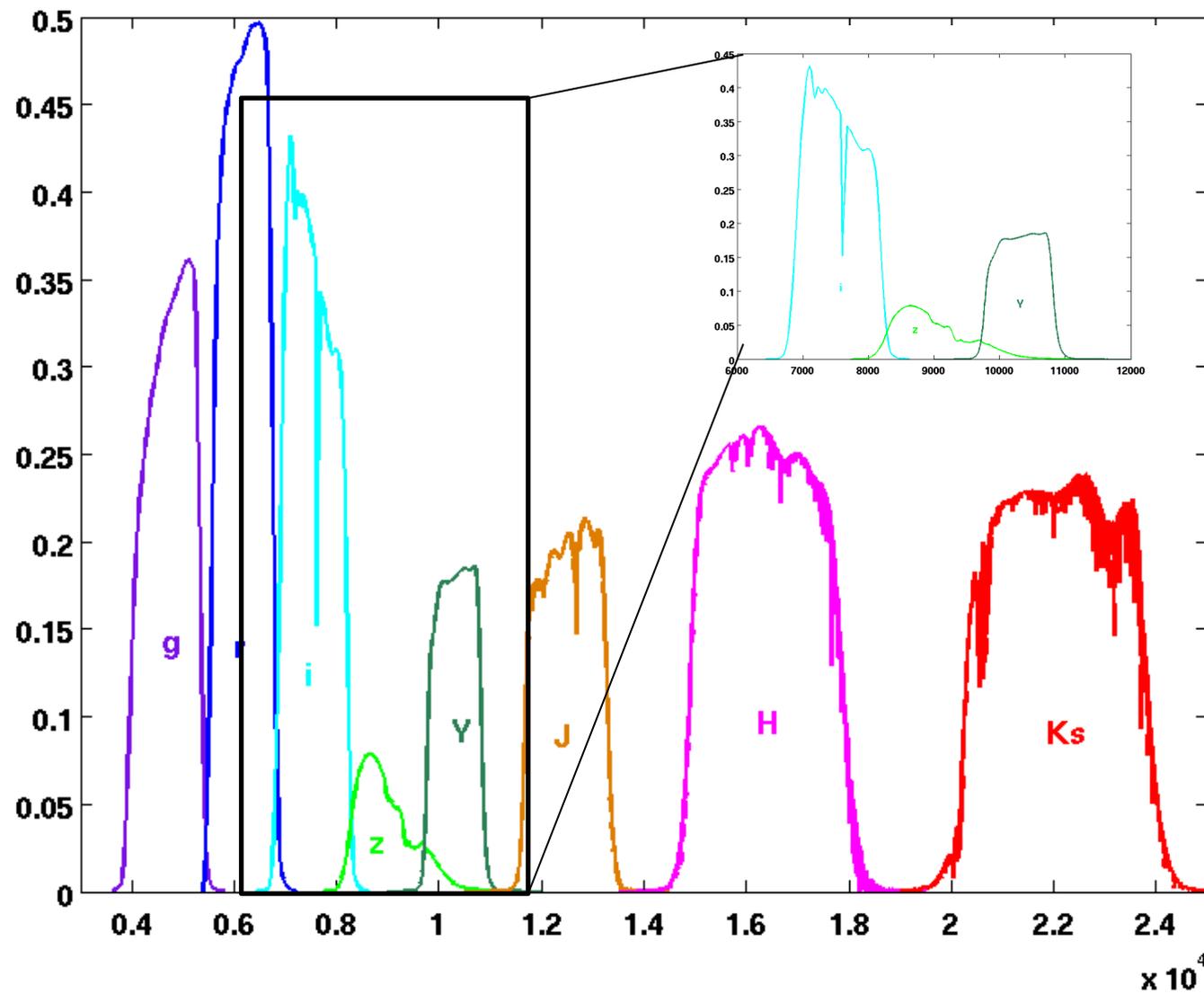
The QSO Spectrum
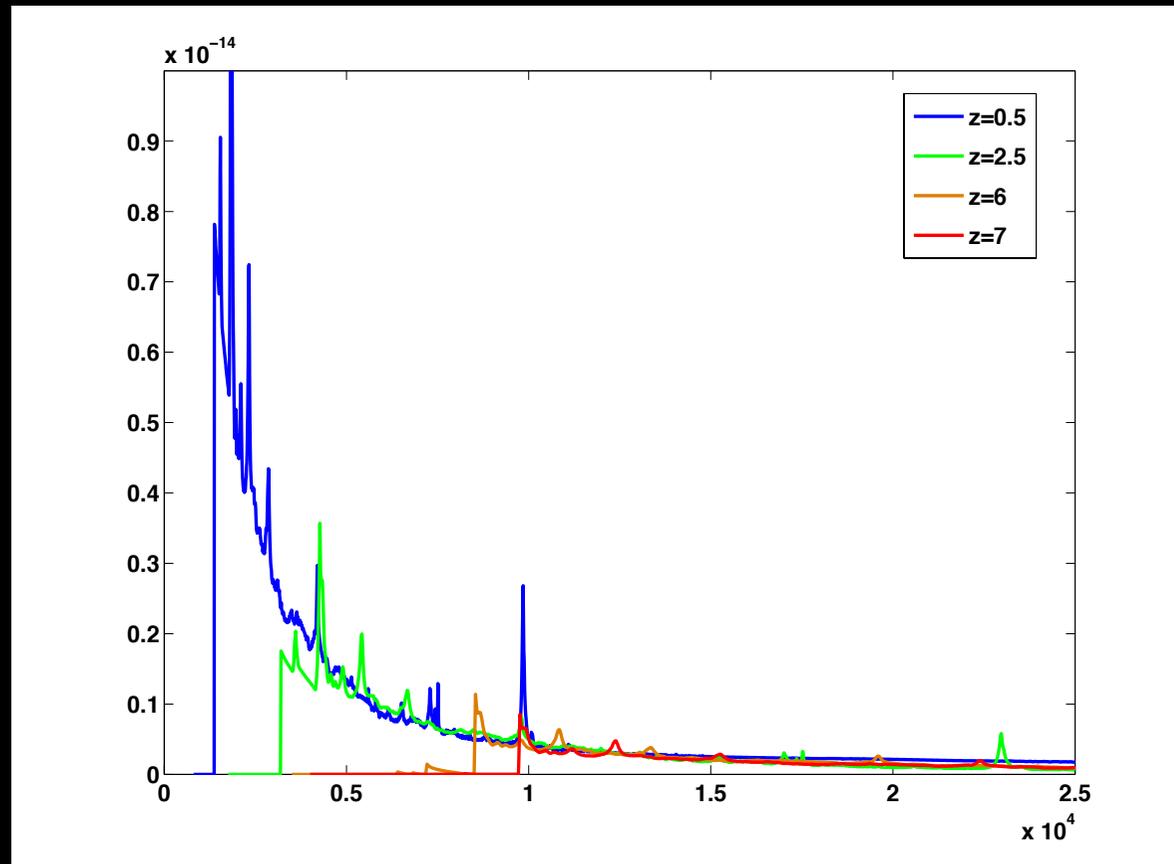
- Spectra taken from Maddox, Hewett, Warren & Croom (2008)

- Lya absorption modeled according to Songaila 2004

The QSO Spectrum

z=6 spectrum
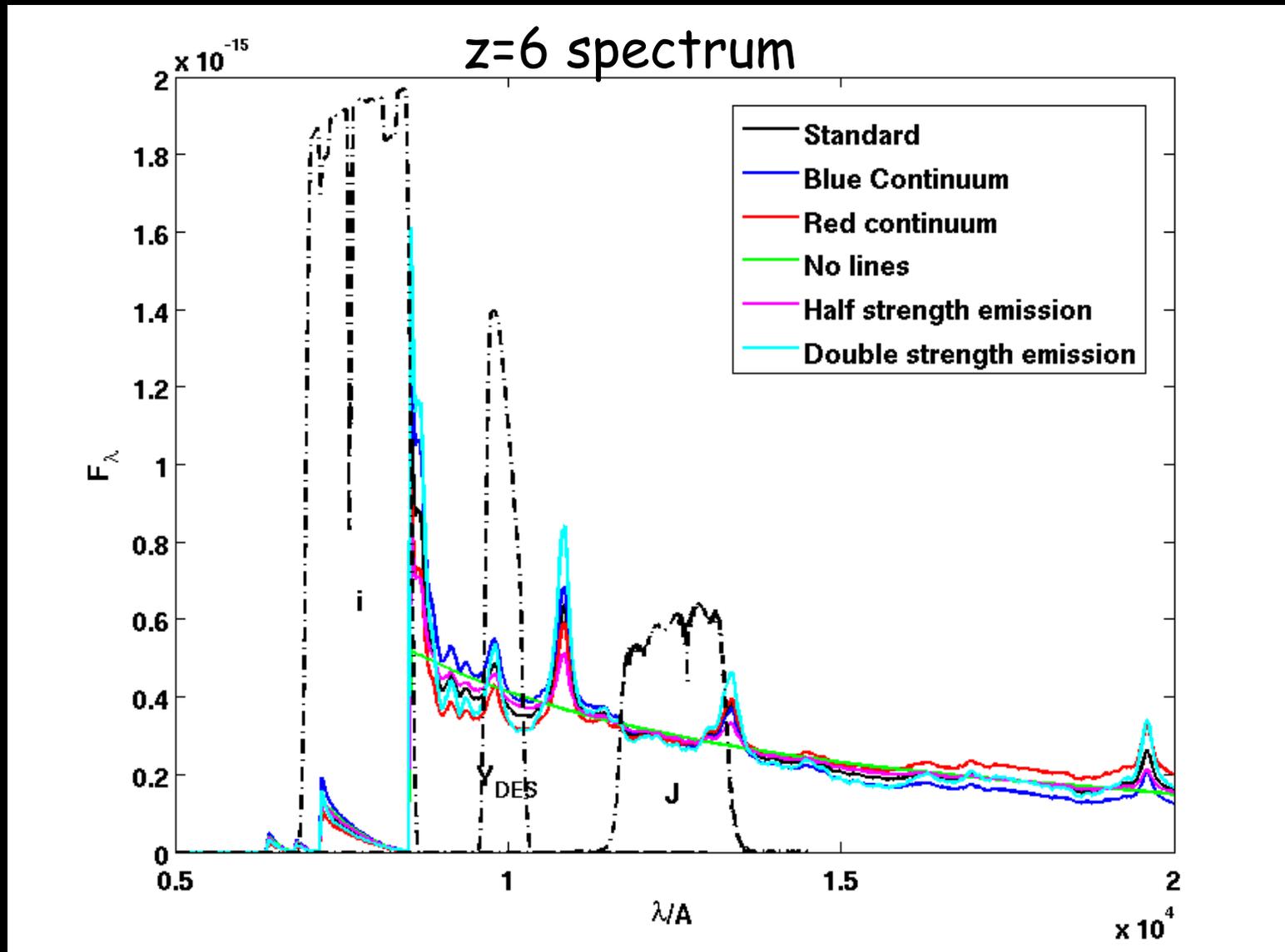
High-z QSO Selection
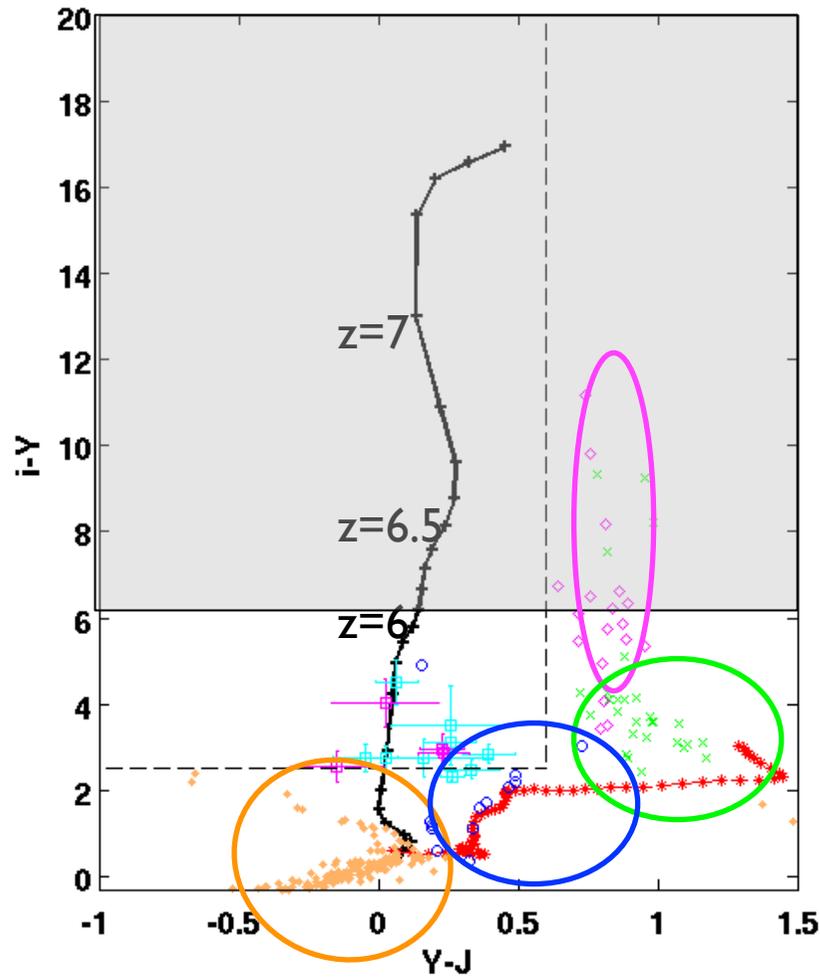
QSO too faint to be detected in the i-band
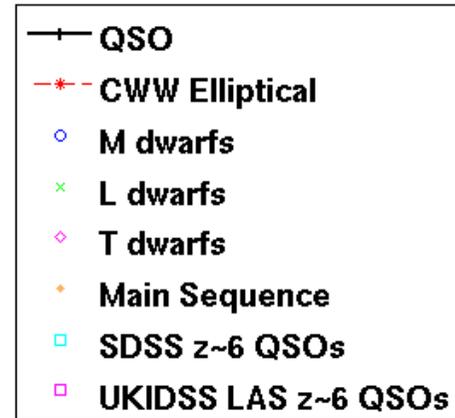
High-z QSO Selection
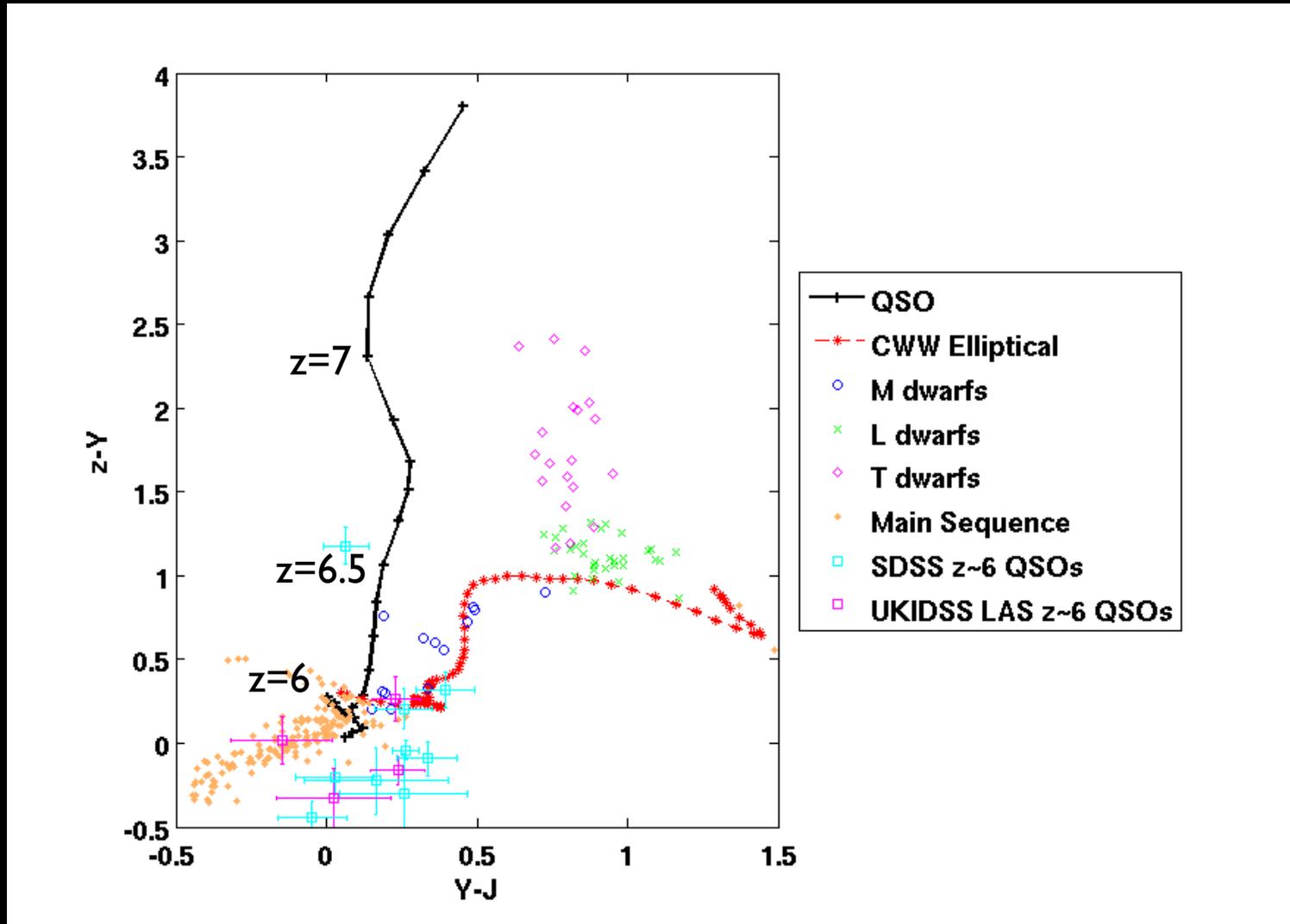
WISE Selection
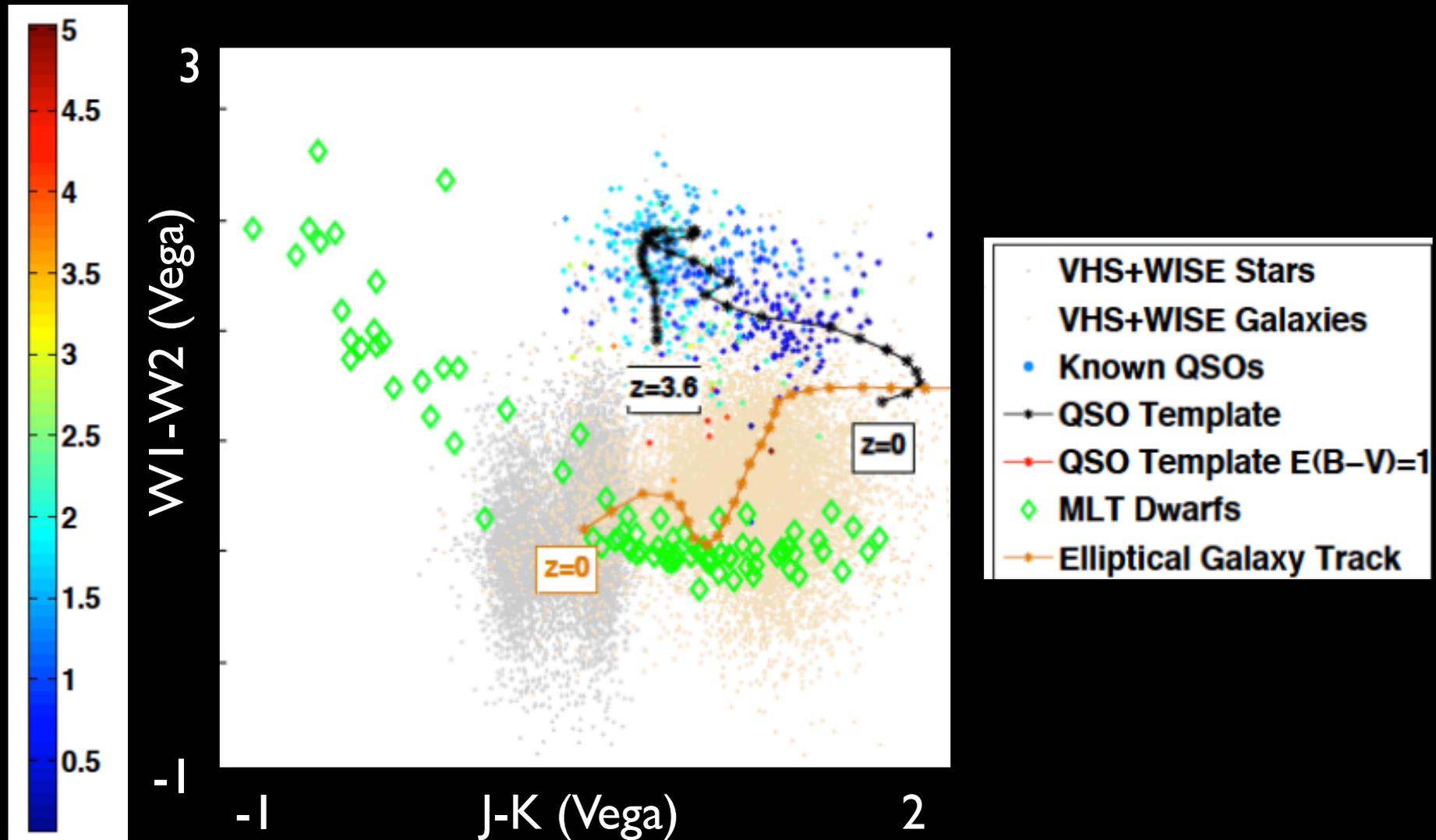
The QSO Luminosity Function at 0.5<z<2.5
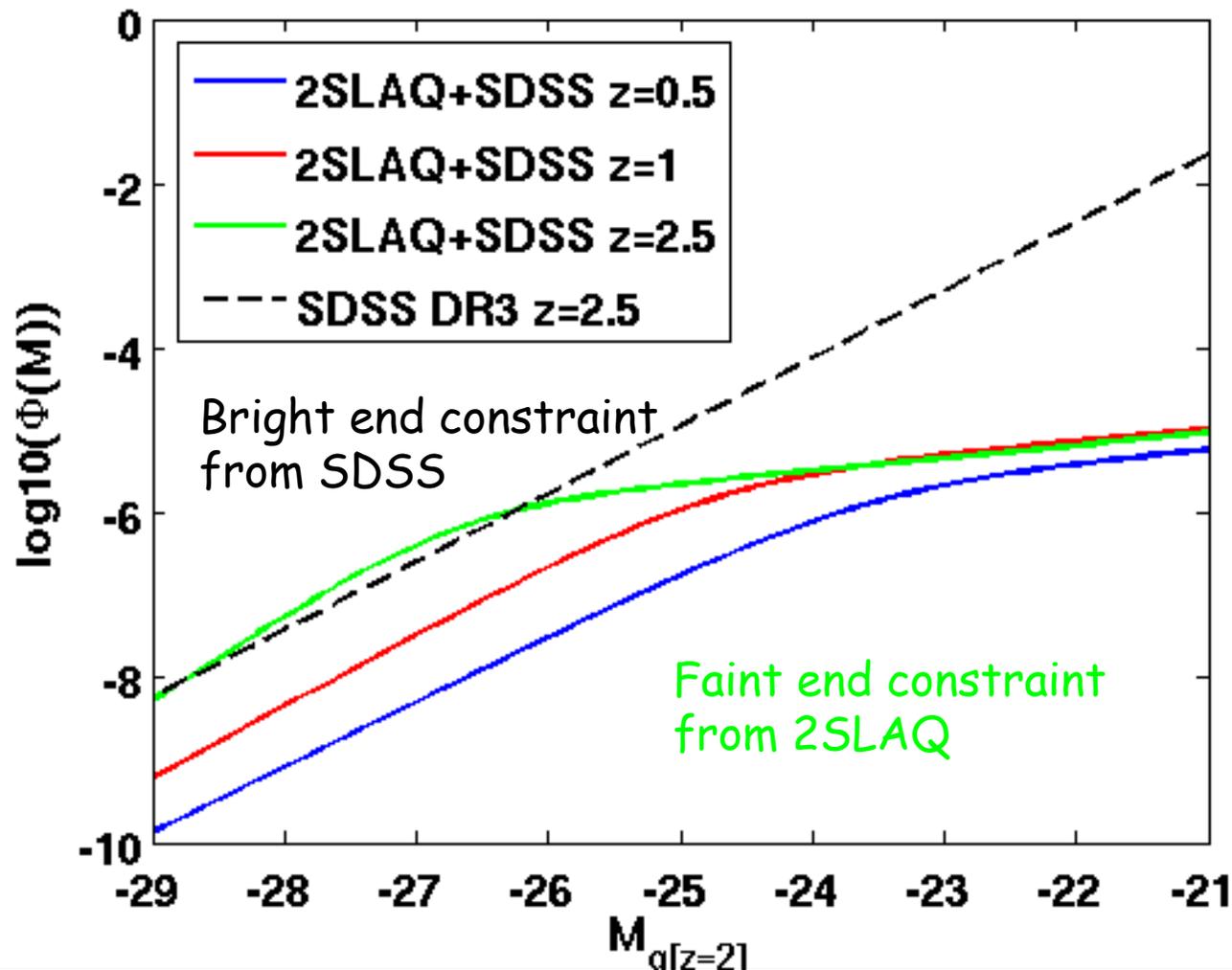
Croom et al. 2009

The QSO Luminosity Function at z~6
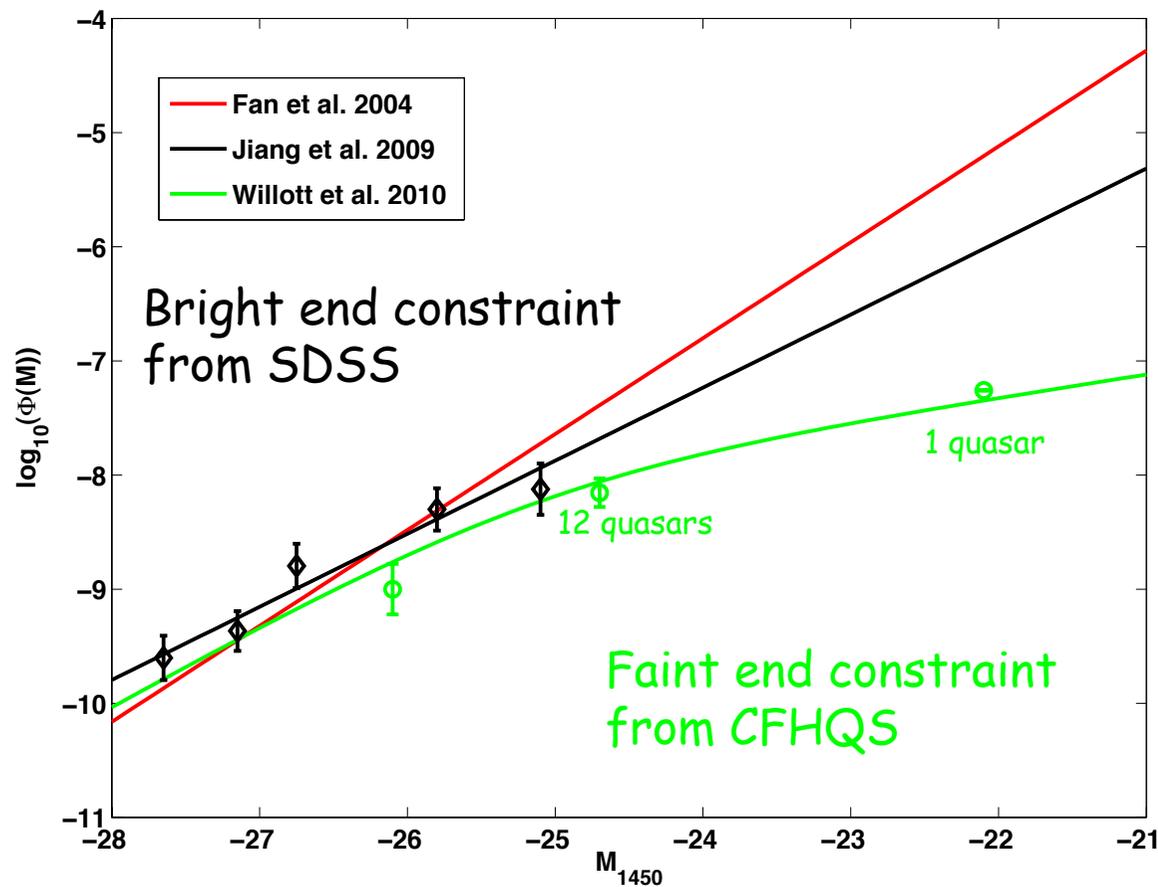
Willott et al (2010) LF used to generate QSOs above redshift 5.5 assuming pure density evolution

Intermediate redshifts e.g. z=3
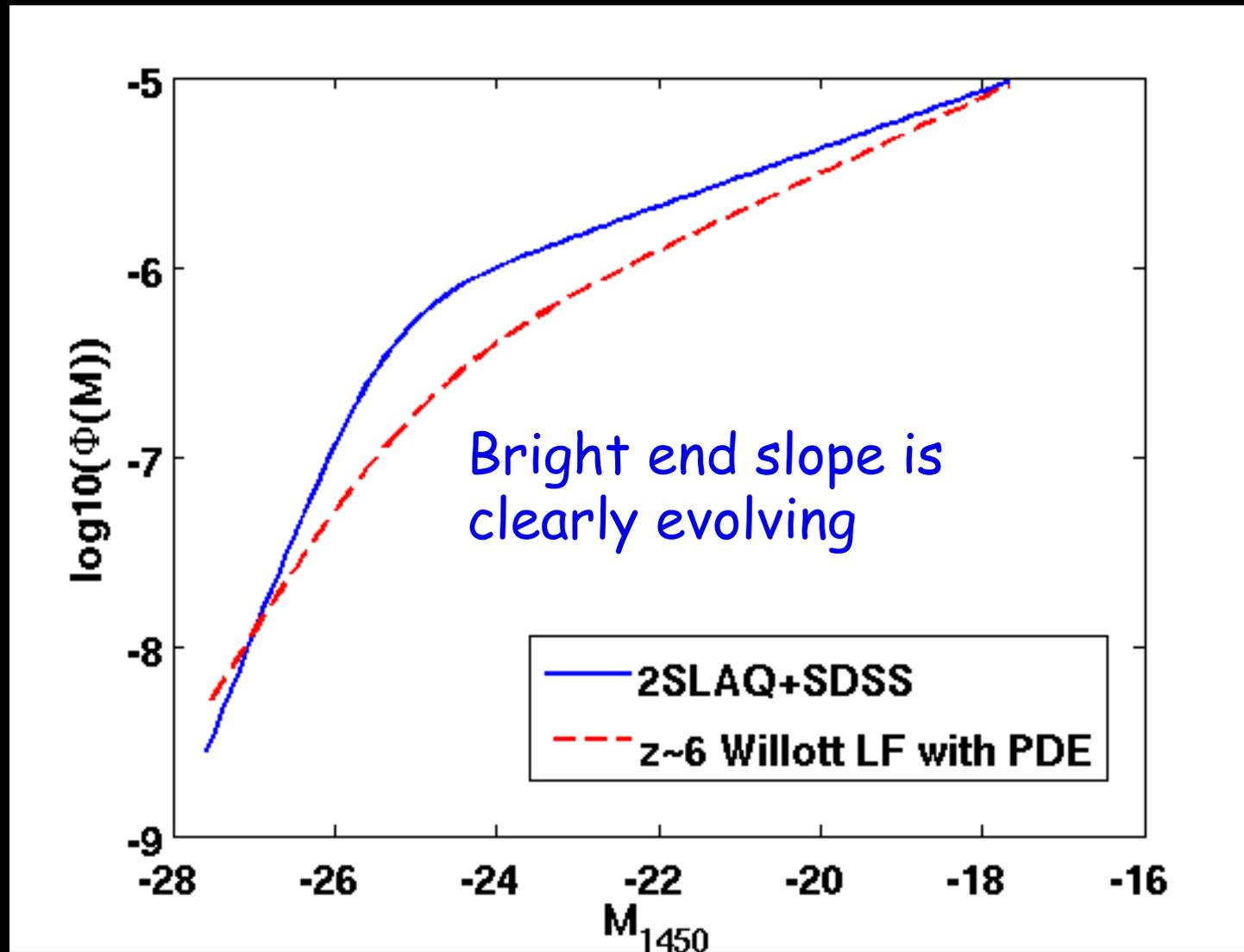
High-z QSOs

- Assume Willott et al. LF with pure density evolution for 5.5 < z < 7.5 in 20 bins of width 0.1

- Simulate over 4711 deg^2

- Apply flux limit in VHS Y-band (20.9 AB)

High-z QSOs
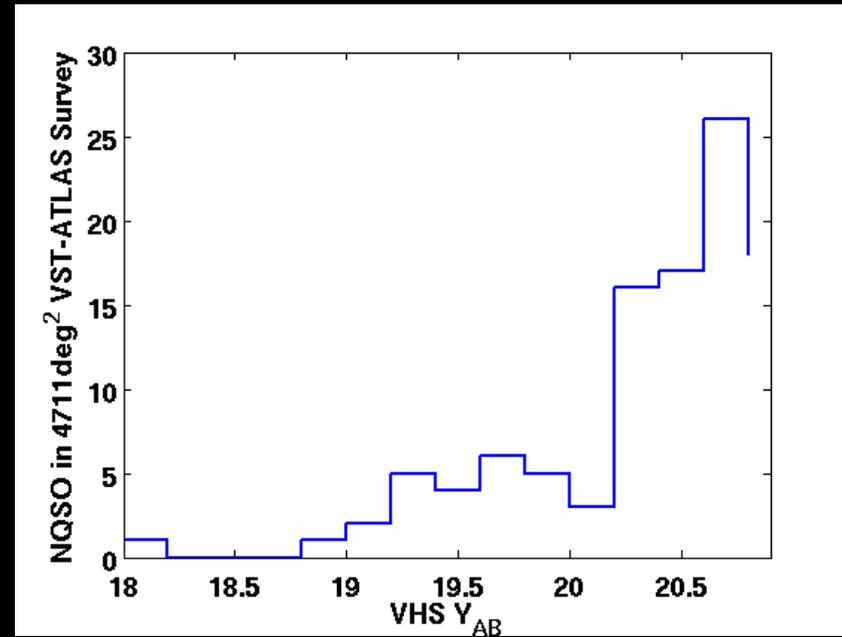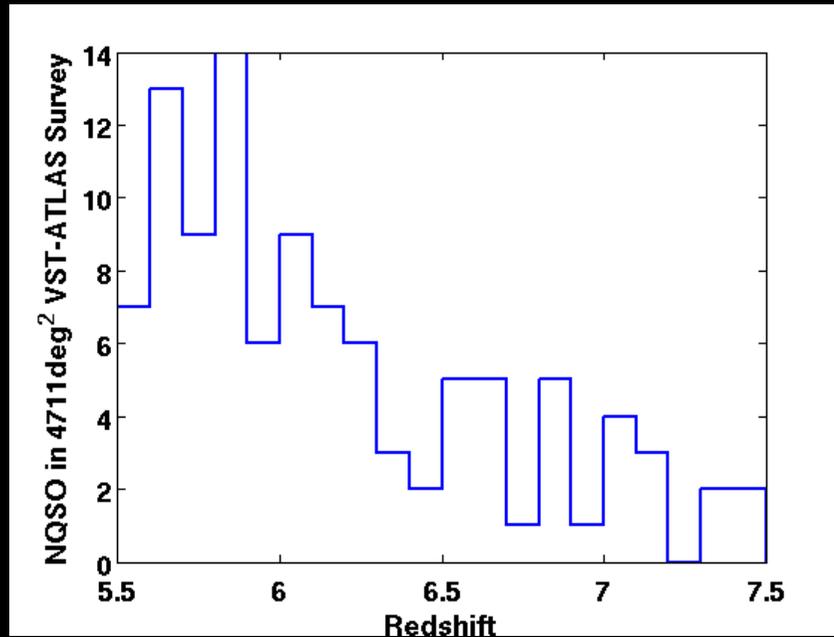
Assuming VHS Y-band limit of 20.9 (AB):
- 104 high-z QSOs with 5.5 < z < 7.5 over 4711 sq deg
  - 20 at z > 6.5
  - 8 at z > 7

Predicted Surface Densities
5.5 < z < 7.5
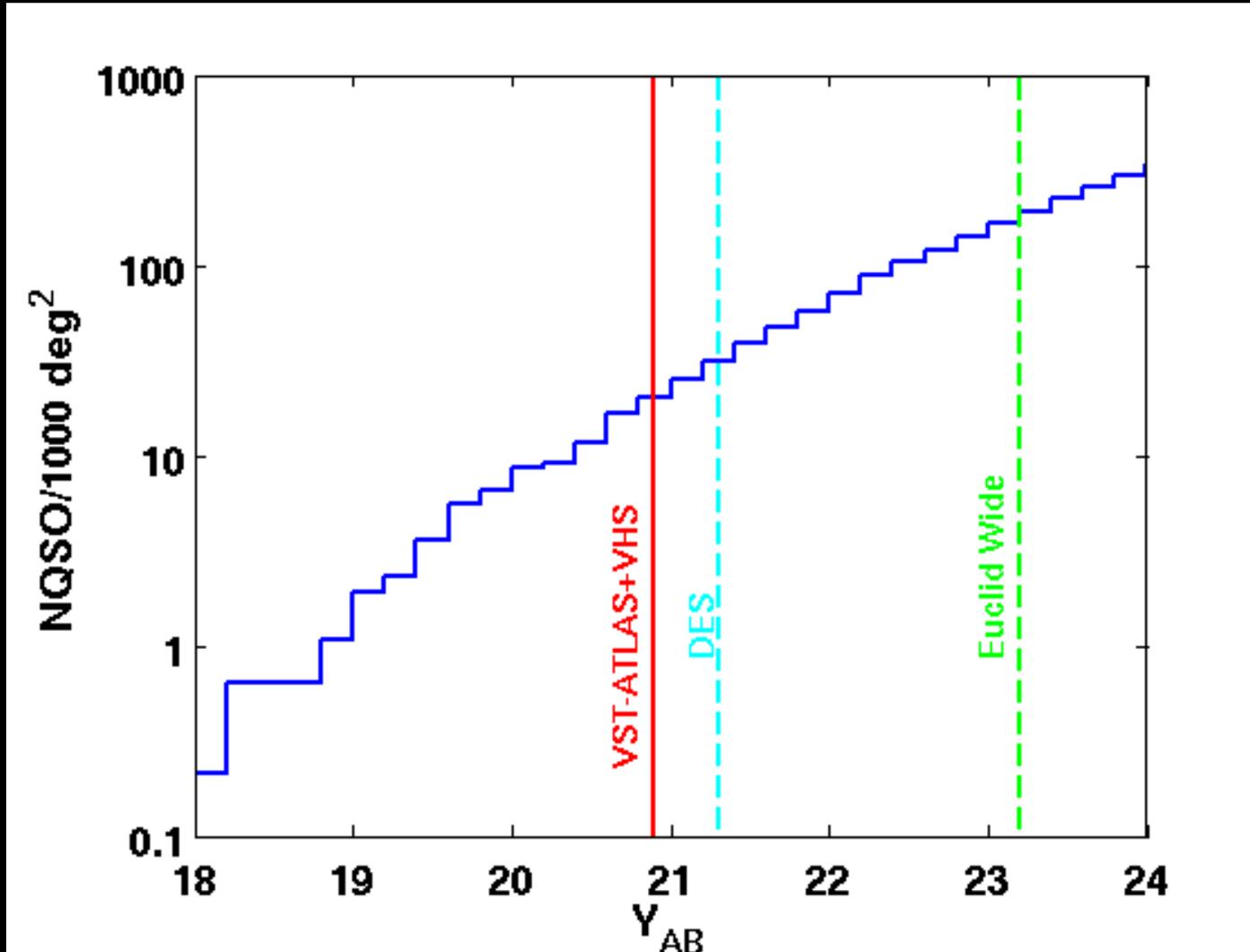
Low-z QSOs

- Assume Croom et al. LF with luminosity dependent density evolution for 0.5 < z < 2.5 in 20 bins of width 0.1

- Simulate over 4711 deg^2

- Apply flux limit in VST-ATLAS i-band (21.8, 10σ AB)

Low-z QSOs
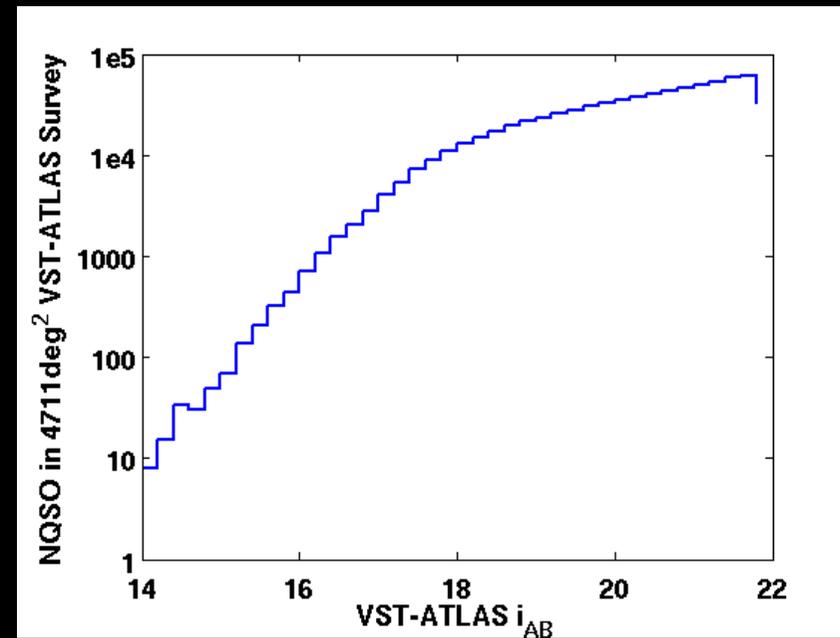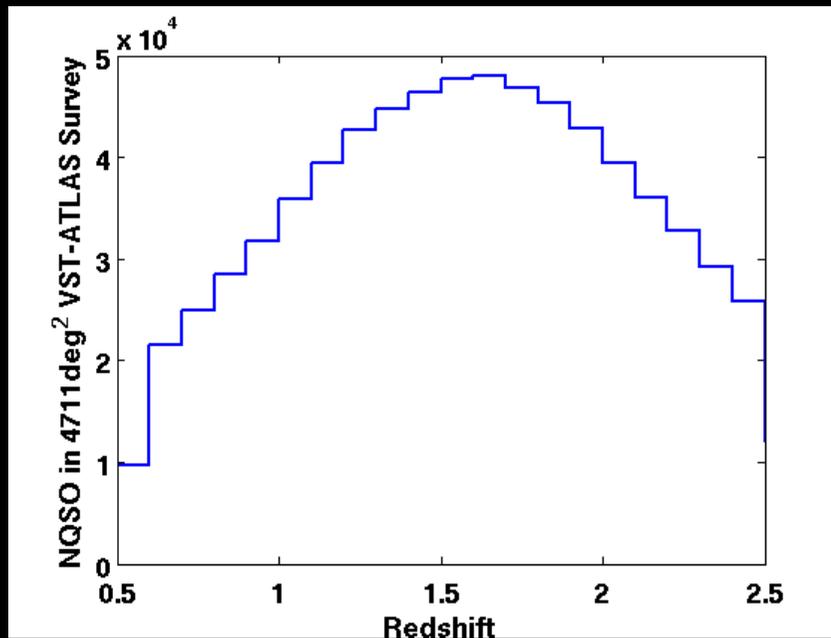
Assuming a VST-ATLAS i-band limit of 21.8 (AB)
- 731, 808 quasars with 0.5 < z < 2.5 over 4711 sq deg
  - Redshift distribution peaks at z~1-2 – interesting epoch for both galaxy formation and cosmology

Predicted Surface Densities
0.5 < z < 2.5
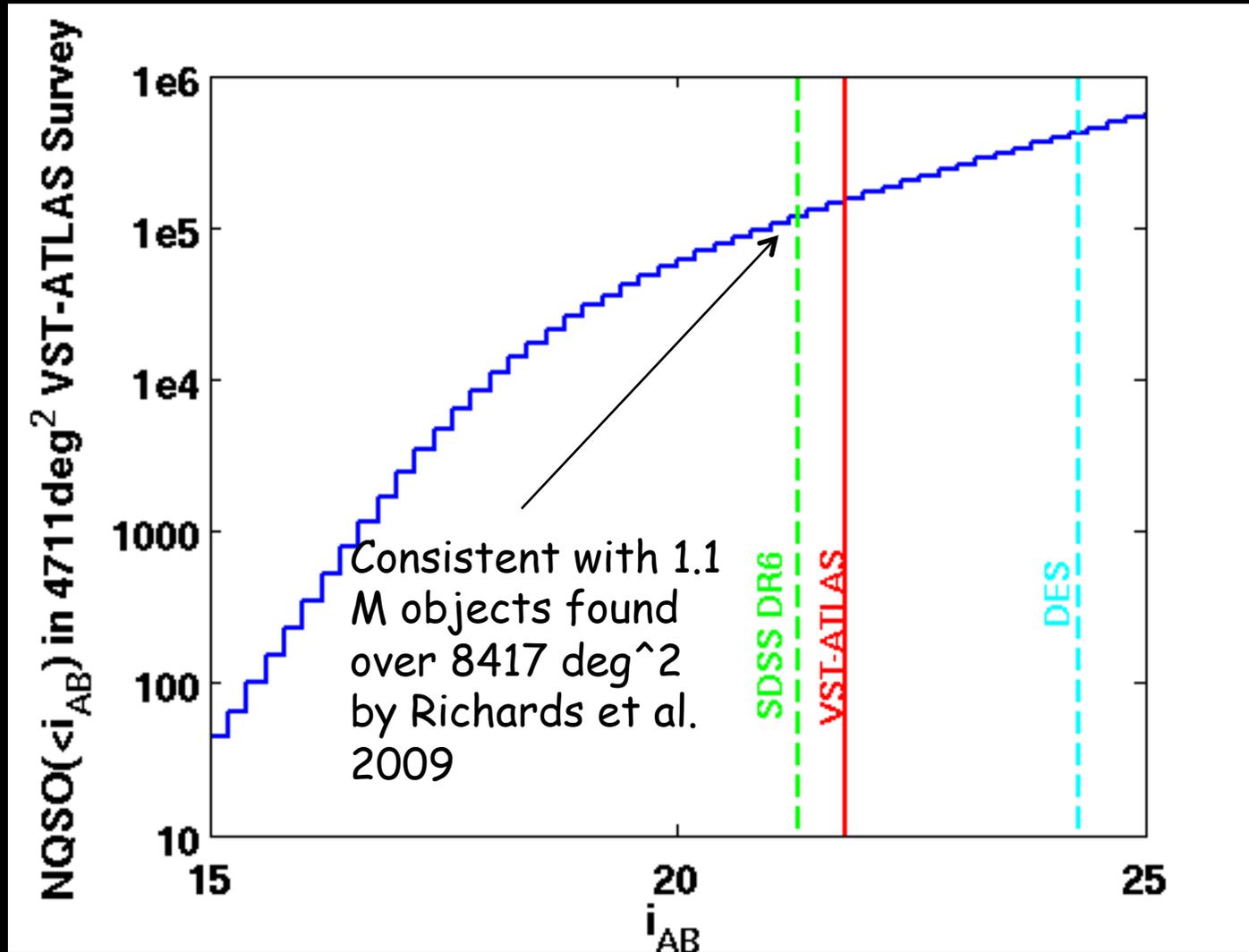
Conclusions

- VST-ATLAS + VHS will be a rich dataset for QSO science:

  - Low-z QSOs for cosmology
  - Constraints on the QSO LF at intermediate redshifts
  - The highest redshift QSOs suitable for detailed follow-up, studies of the IGM and epoch of reionization