Probing the faint end of the quasar luminosity function in the COSMOS field

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Collaborators

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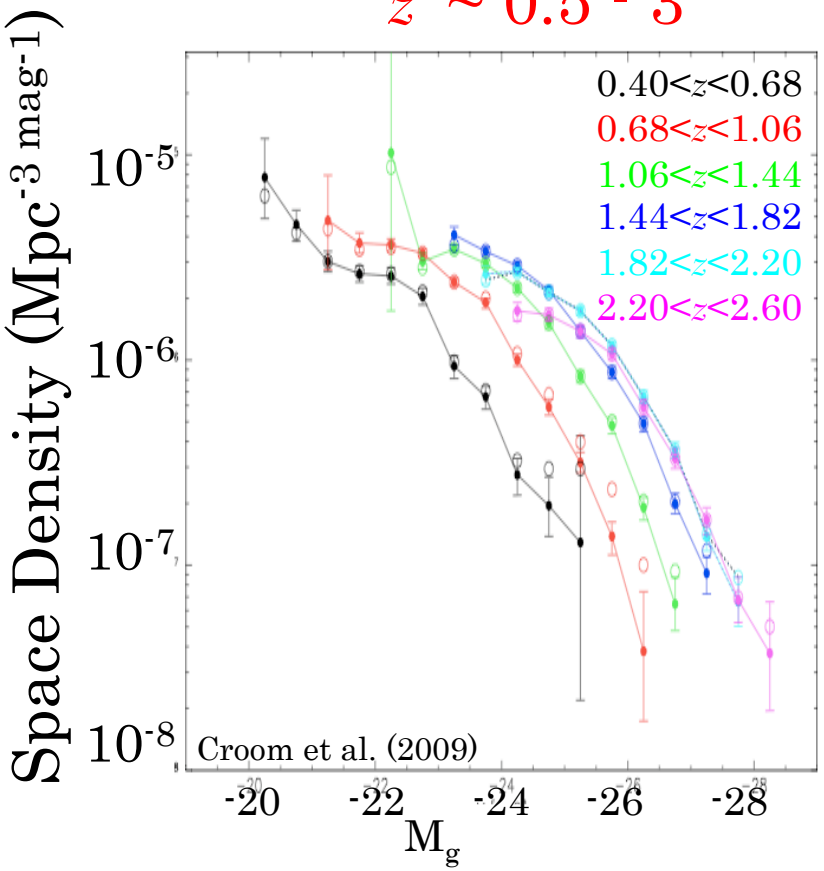
＜Introduction＞

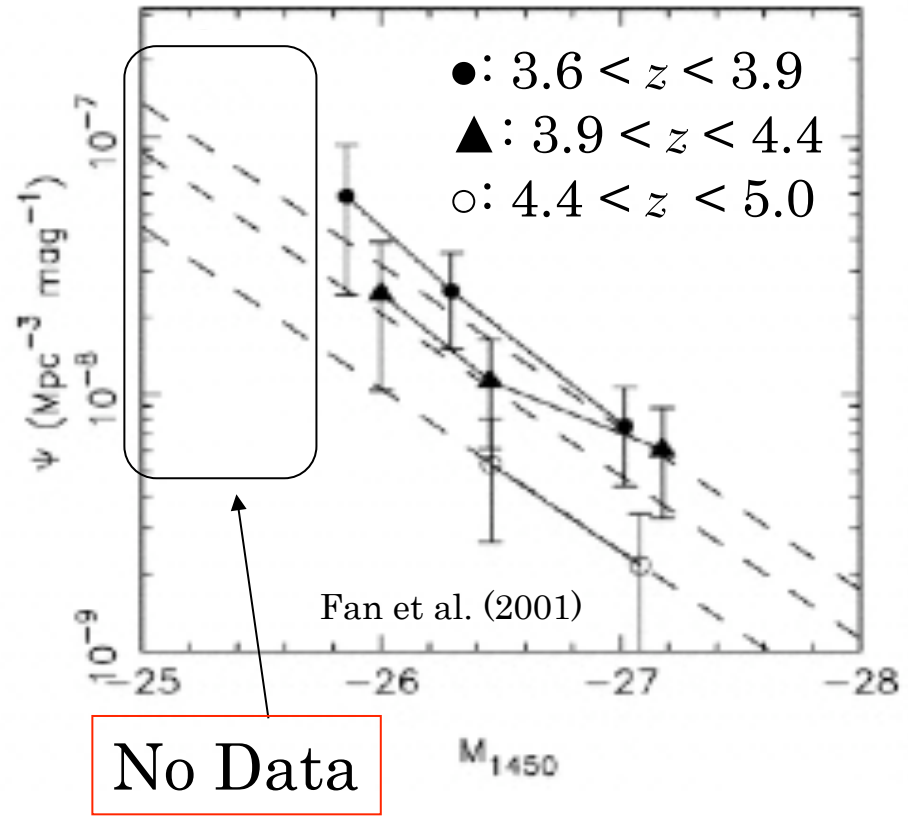
We have focused on the QSO Luminosity Function
to study the evolution of SMBHs.

QSO Luminosity Function

z ~ 0.5 - 3



z ~ 4 - 5



No Data

＜Data and Sample Selection＞

・Survey Area：COSMOS Field （2deg^2）

・ Data：COSMOS photometric catalog

Subaru/Suprime-Cam: Data of the g', r', i', z'filter

HST/ACS: Data of the F814W (i)

・Sample Selection

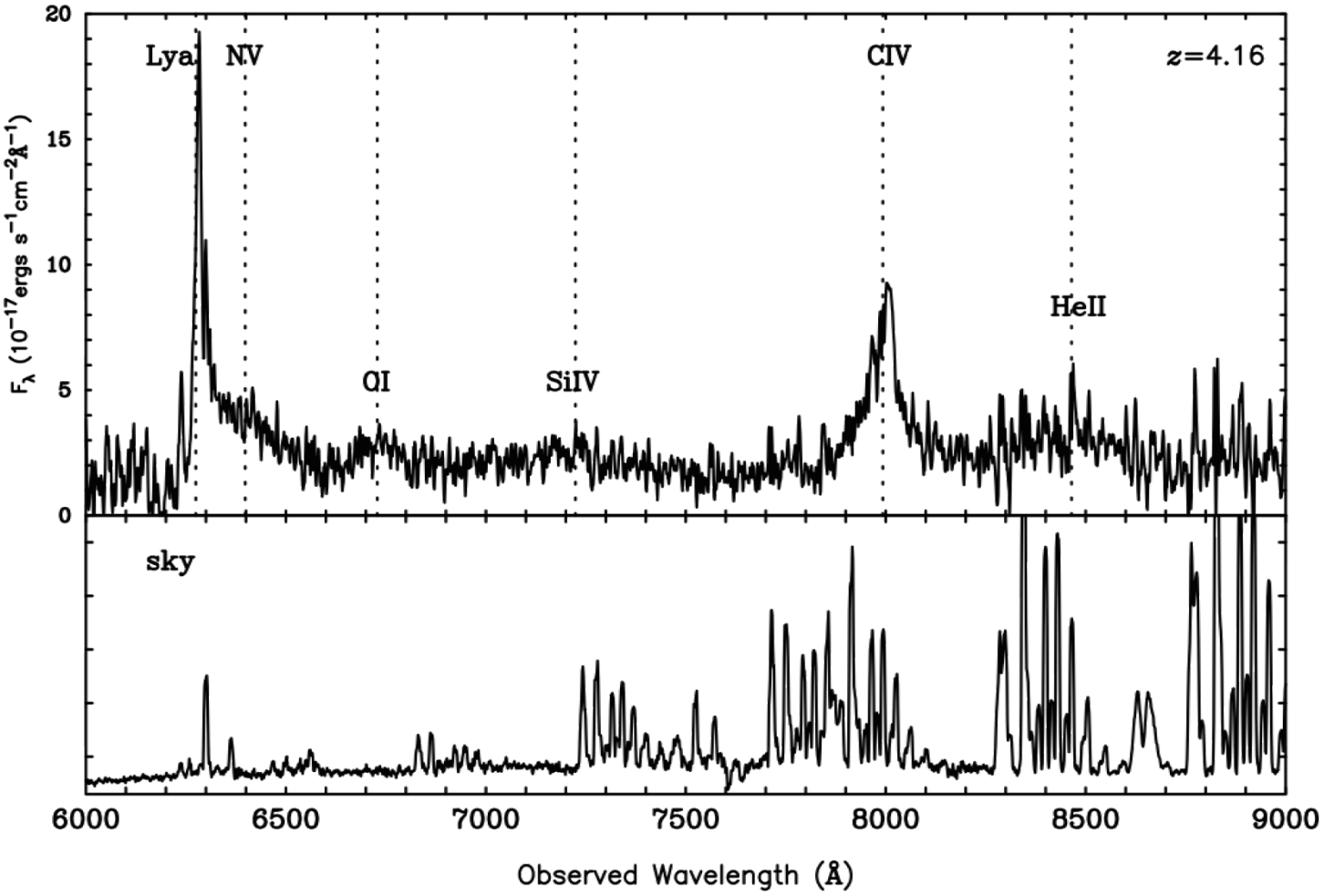
(1) Point source on the HST image and $22 < i' < 24$.

(2)Two-color diagram ($g'-r'$ vs. $r'-i'$)

31 candidates at $z \sim 4$

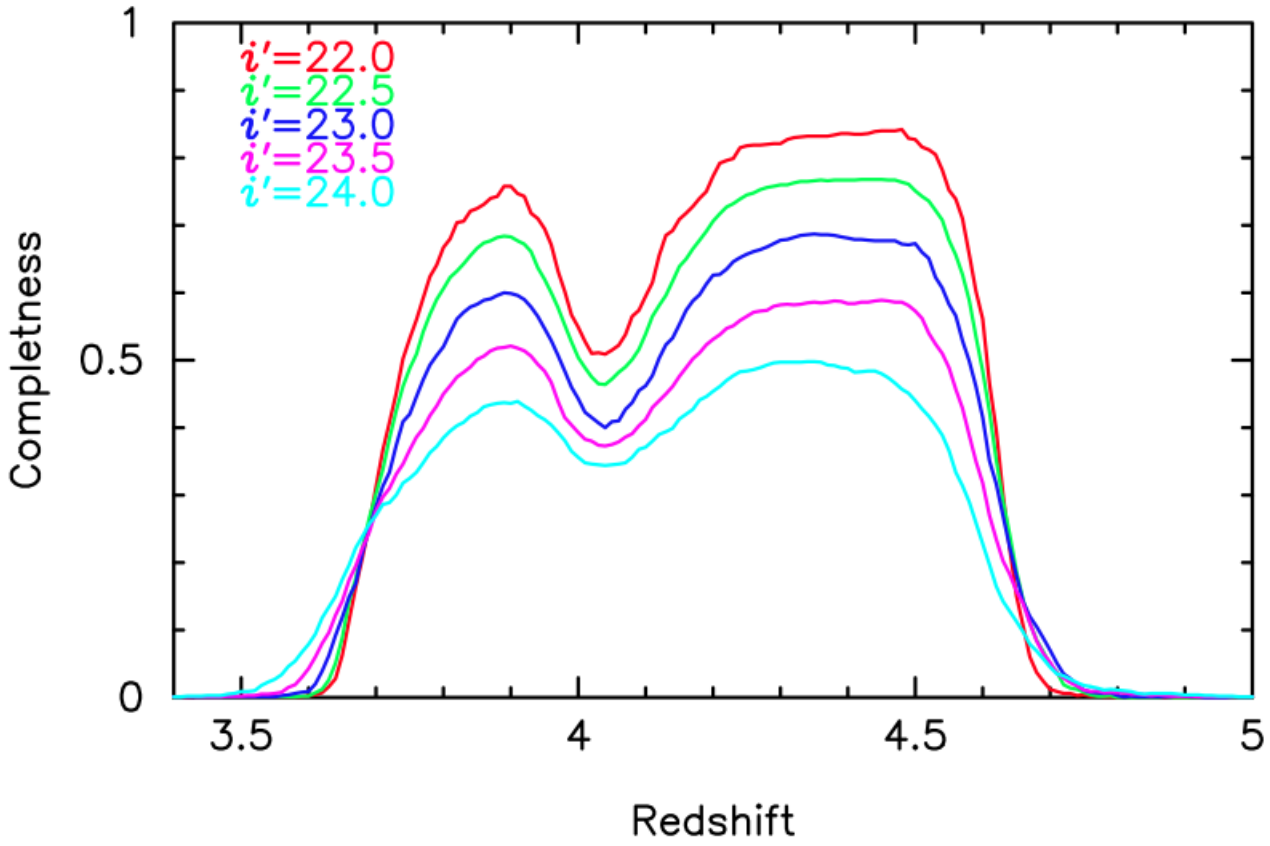
＜Spectroscopic Follow-up (Subaru/FOCAS)＞

8 objects show strong and broad Lyα and C iv emission lines!



＜Photometric Completeness＞

We have estimated the completeness through detailed Monte Carlo simulations by QSO model spectra.

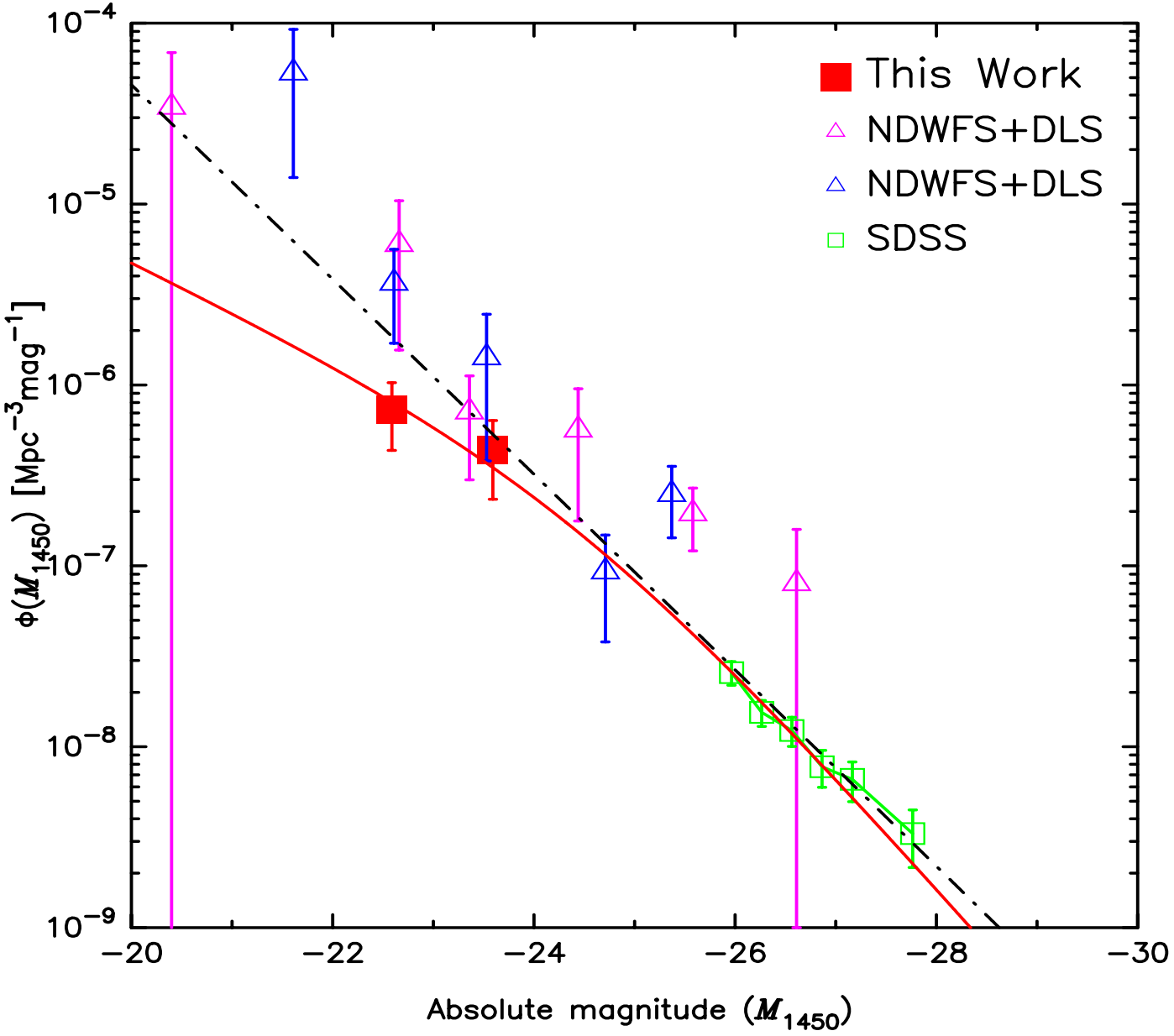


Completeness is not 1 at i'<22.

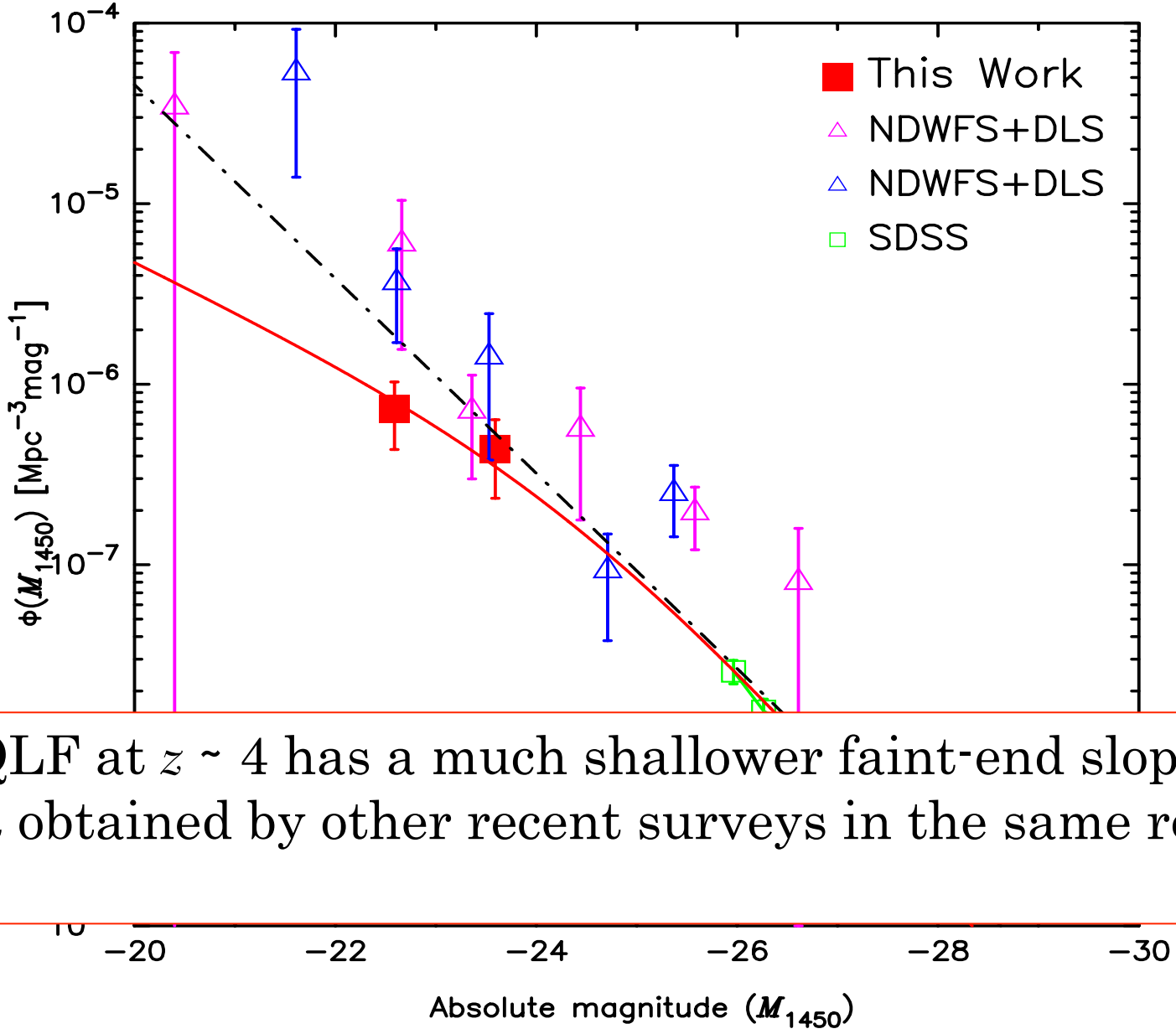
→Bright Objects that exist foreground
→Individuality of QSOs
→Photometric Error

} due to this 3 effects

< QSO Luminosity Function at $z \sim 4$ >

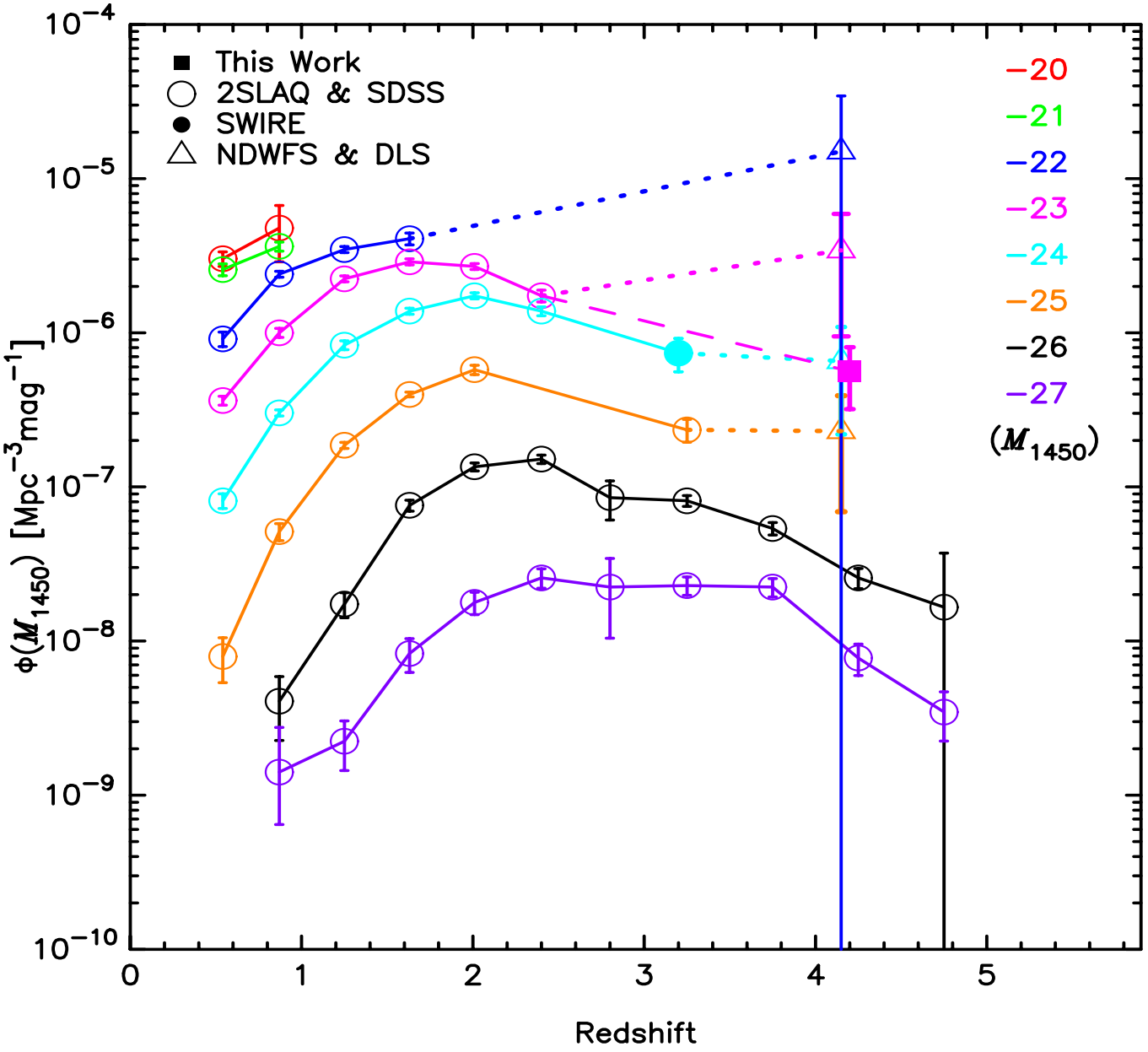


< QSO Luminosity Function at $z \sim 4$ >

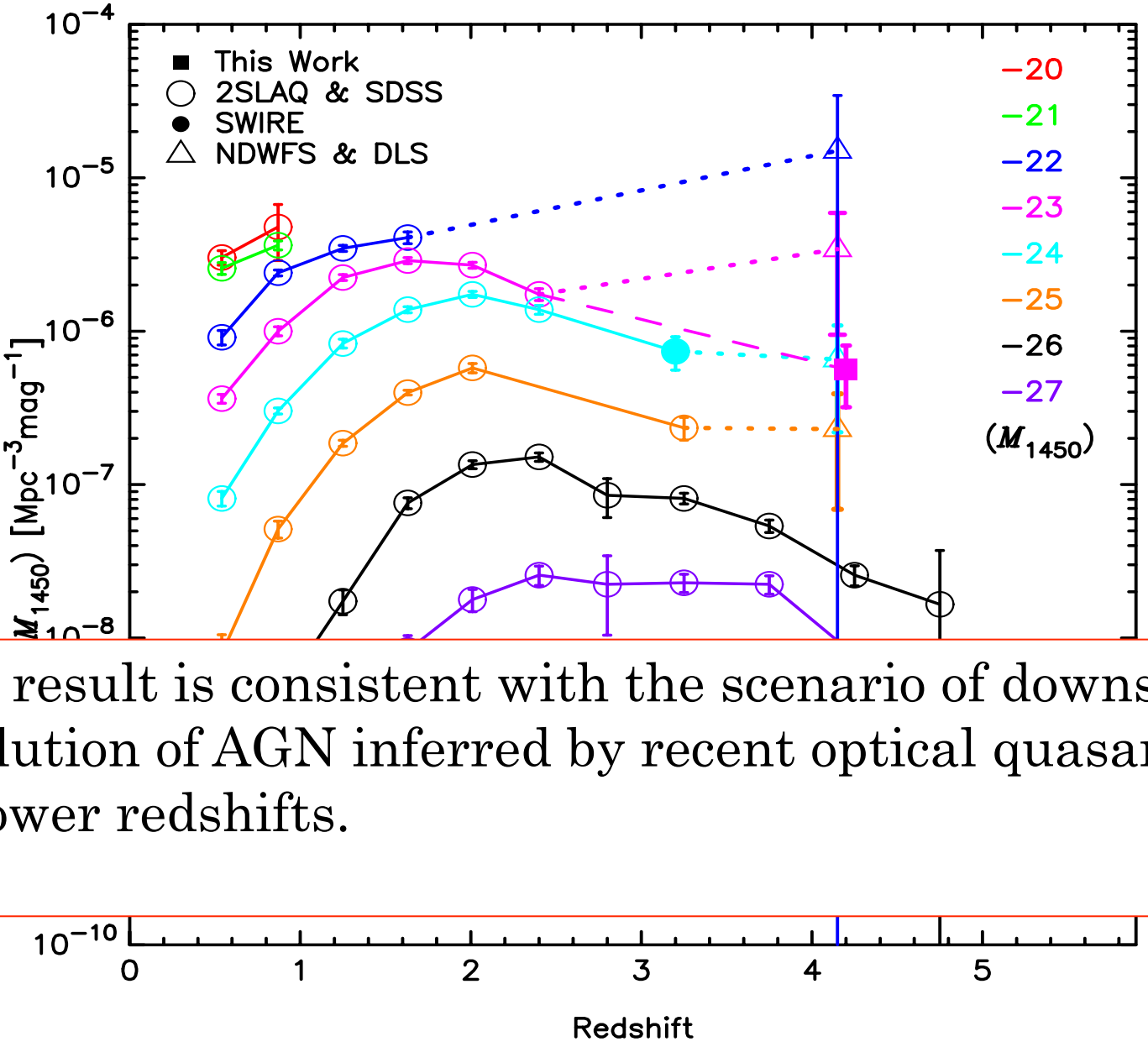


Our QLF at z ~ 4 has a much shallower faint-end slope than that obtained by other recent surveys in the same redshift.

＜Evolution of the QSO Space Density＞



＜Evolution of the QSO Space Density＞

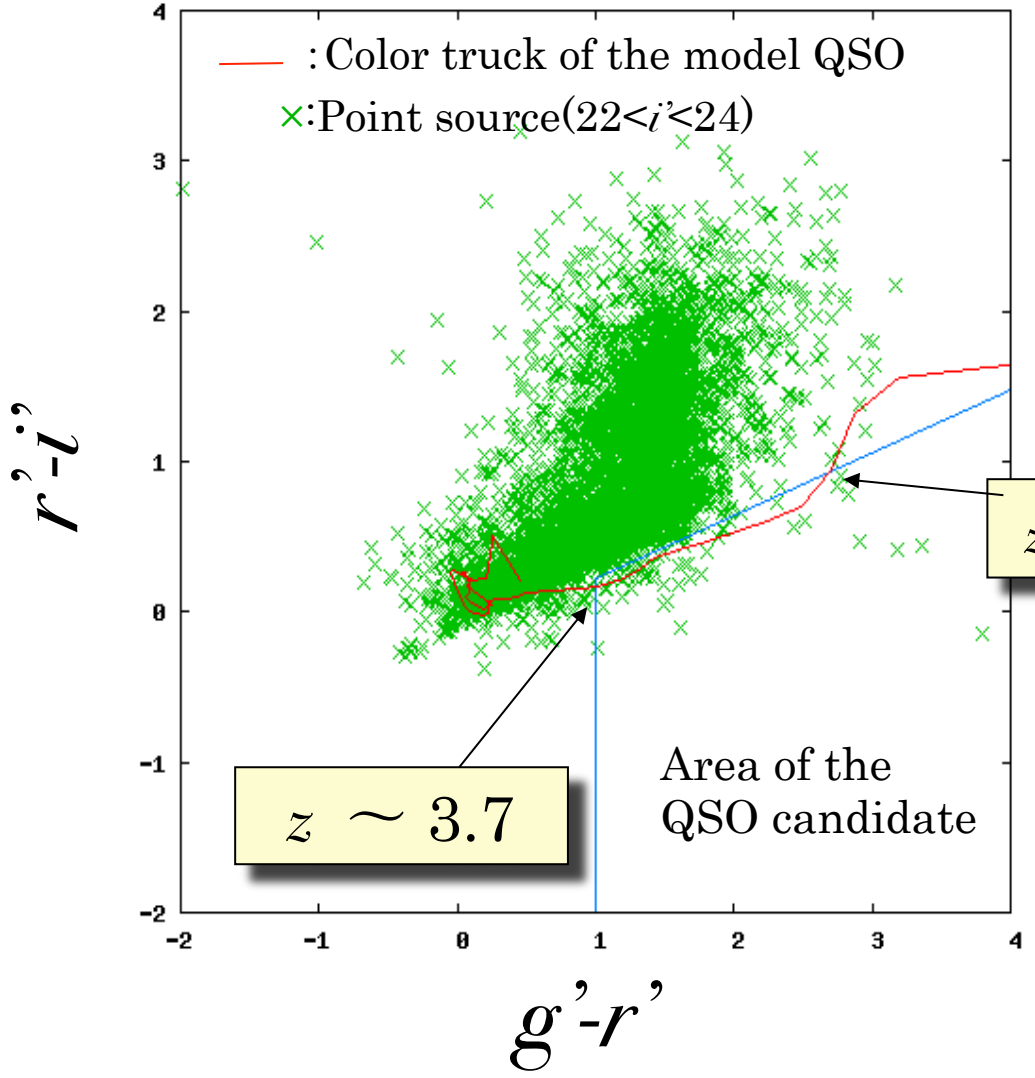


Our result is consistent with the scenario of downsizing Evolution of AGN inferred by recent optical quasar surveys at lower redshifts.

＜Summary＞

- We have surveyed high redshift QSOs in the COSMOS field.
- We have discovered 8 low luminosity QSOs at $z \sim 4$.
- We have estimated the completeness through detailed Monte Carlo simulations by QSO model spectra.
- Our QLF at $z \sim 4$ has a much shallower faint-end slope than that obtained by other recent surveys in the same redshift.
- Our result is consistent with the scenario of downsizing evolution of AGN inferred by recent optical quasar surveys at lower redshifts.

Two color diagram ($g'r'i'$)



＜Selection Criteria＞

(1) $g'-r' > 1.0$

(2) $r'-i' < 0.42(g'-r')-0.22$

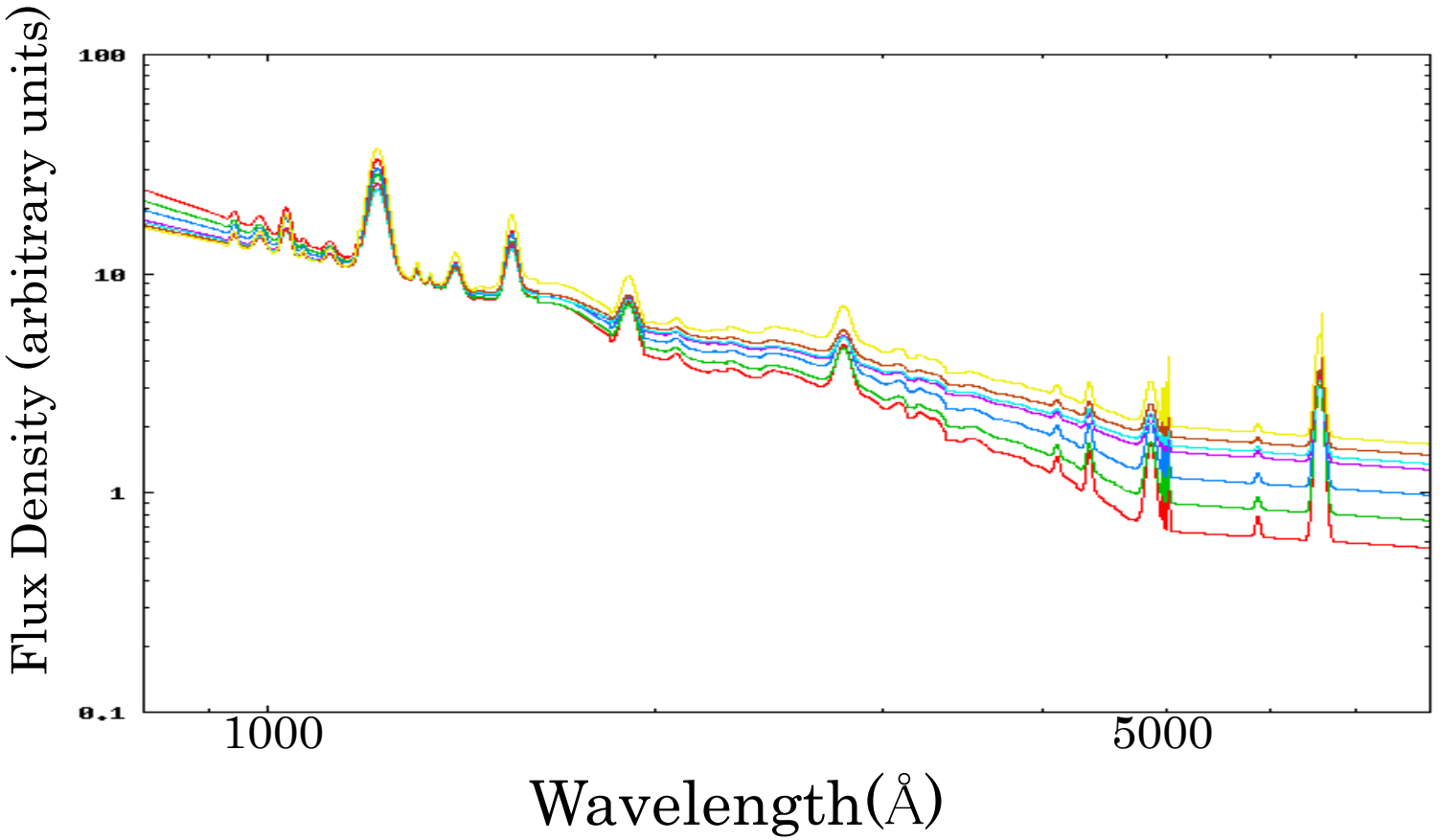
(3) $u-g' > 2.0$

31 candidates at $z \sim 4$

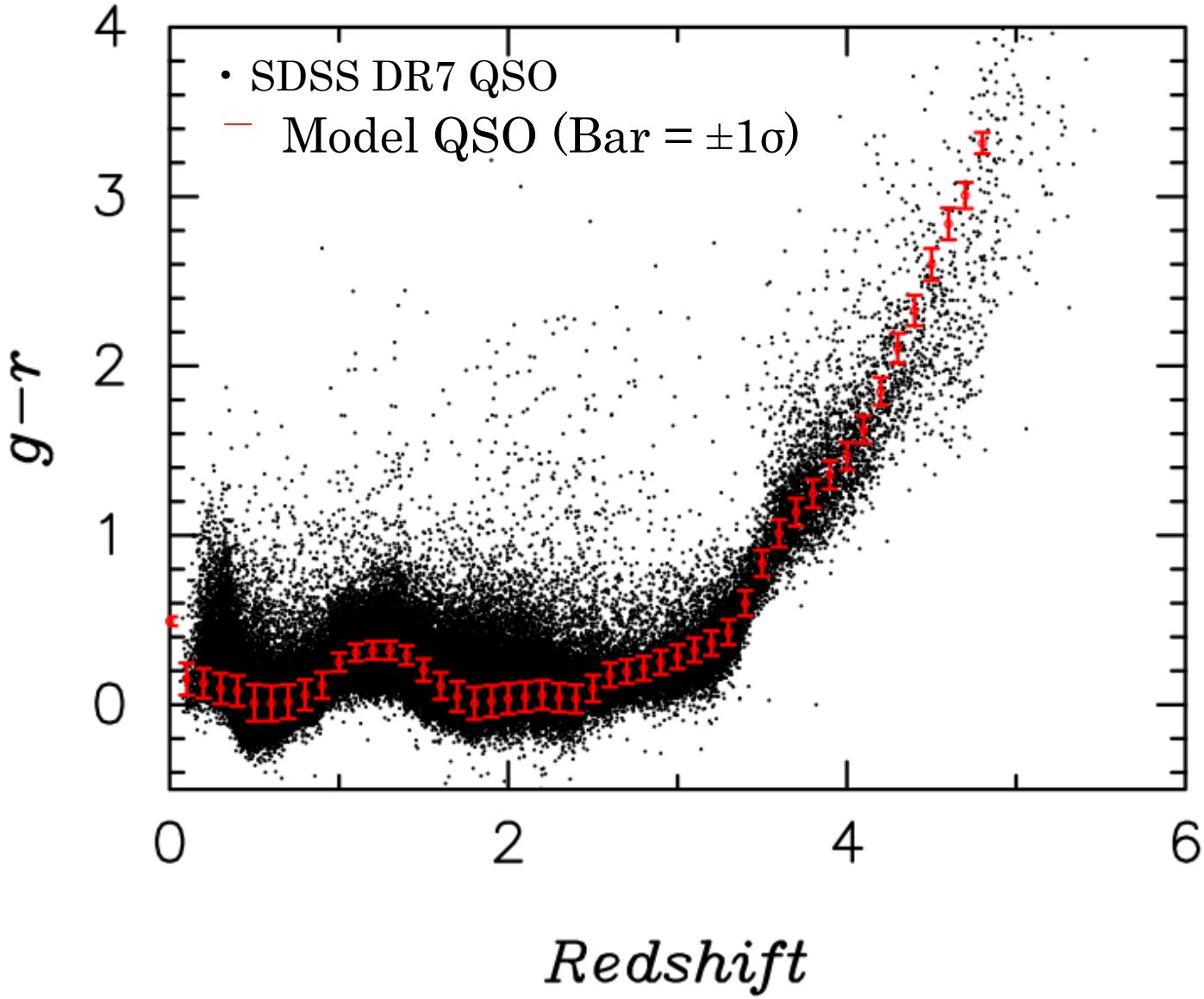
QSO Model Spectra

We have made QSO model spectra
to determine our photometric completeness.

$<\alpha_v>=0.46$、$\sigma_{\alpha v}=0.3$ $<EW(Ly\alpha)>=90$Å、$\sigma_{EW}=20$Å



SDSS DR7 QSO colors and simulated QSO colors



＜How to determine the completeness＞

・We assume that *i*'-band magnitude equals 22.
So, we can determine the other band magnitude.

・We insert model QSOs into the COSMOS images,
using the IRAF mkobjects task in the artdata package.

・We extract the model QSOs by SExtractor.

・We count up these objects that satisfy our selection criteria,
and we determine the completeness.

Two color diagram at $z \sim 4$