SPECTROSCOPIC LBG SURVEY IN SSA22

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We report our redshift survey of z~3 Lyman break galaxies (LBGs). We have obtained spectral redshifts (spec-z) of 94 LBGs in SSA22 (22:17:34, +00:15:04) 912 arcsec² field to study three dimensional distribution of LBGs.

SSA22 is a field in which Steidel et al discovered high density region of LBGs at z=3.09 (Steidel et al 1998). They determined spec-z of 99 LBGs at z~3 in 162 arcsec² field. They found density peak of LBGs from their redshift distribution.
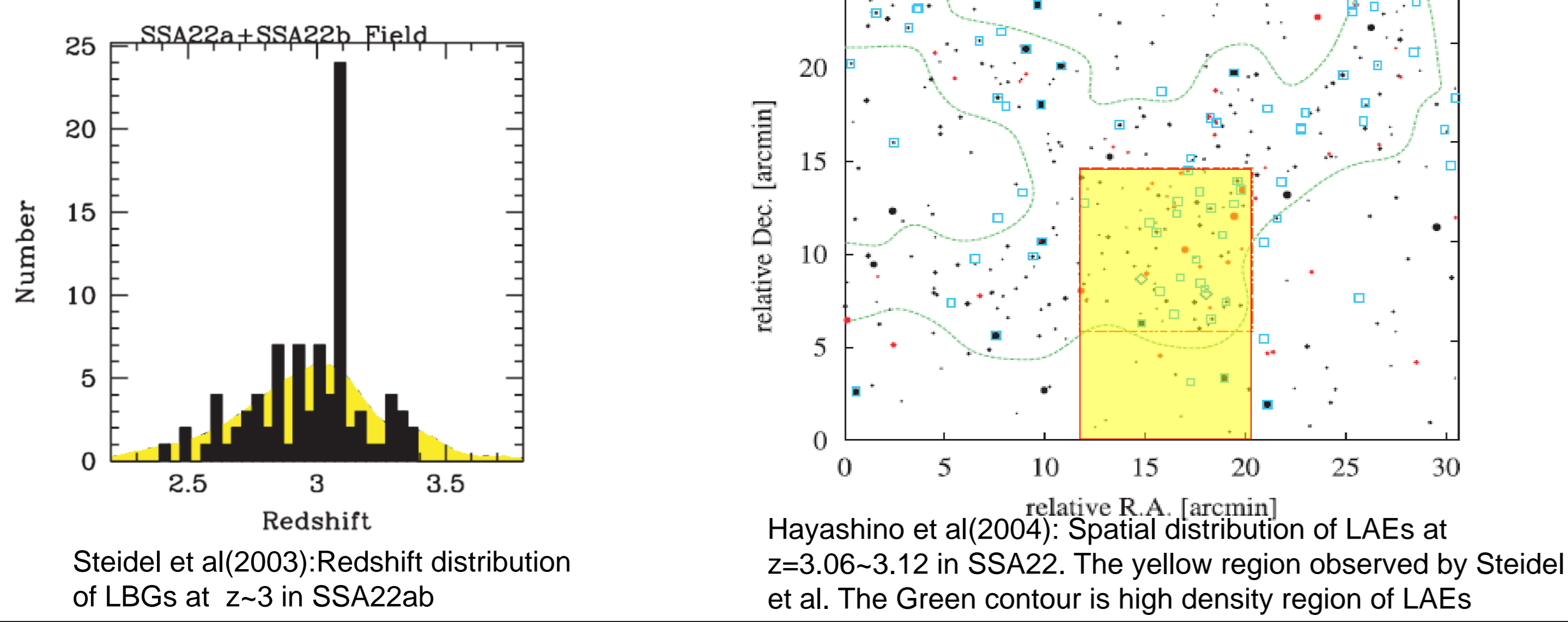
We have detected a lot of Lyman alpha emitters (LAEs) at z=3.09 in 912 arcsec² field which contains the high density region discovered by Steidel et al, in our narrowband filter (NB497: band pass centered at 4977 Å , bandwidth of FWHM 77 Å) survey for LAEs with Suprime-Cam to find a large scale structure of LAEs (Hayashino et al 2004). Also, we are carrying out LBG redshift survey in our LAE survey area. We obtained spectral redshifts of 94 LBGs in 2006 and 2008 VIMOS observation.

We have found spike not only at z=3.1, z=3.3 and z=3.7 in our redshift distribution of LBGs.

1. SSA22

Steidel et al discovered high density region of Lyman Break galaxies (LBGs) in SSA22 at z=3.09 (Steidel et al 1998). They observed 81 arcsec2 ×2 in their spectroscopic LBG survey.

We have detected Lyman alpha emitters (LAEs) at z=3.06~3.12 in 912 arcsec² field that contain the high density region which was discovered by Steidel et al (Hayashino et al 2004).

Steidel et al(2003):Redshift distribution of LBGs at z~3 in SSA22ab

Hayashino et al(2004): Spatial distribution of LAEs at z=3.06~3.12 in SSA22. The yellow region observed by Steidel et al. The Green contour is high density region of LAEs

2. Observation

The parameter of our LBG survey with VIMOS at 2006 and 2008.

	VIMOS 2006	VIMOS 2008
Survey area [arcsec²]	900	500
EXP time [hour]	2.5	4.0
Selection criteria of LBGs	(U−V)−1.8×(V−R)≧0.8 R−i'≦0.3 20≦V≦25.5	(U−V)−1.8(V−R)≧1.0 R−i'≦ 0.2 24≦R≦25.5
Grism	OS−Blue (Spectral res : R=180(1″ slit), Spectral range : 3700−6700Å)	

Field of view

VIMOS 2006
VIMOS 2008
Steidel et al

Model spectrum of star-forming galaxy at z=3.0 (green line) and U V R and I' band passes.
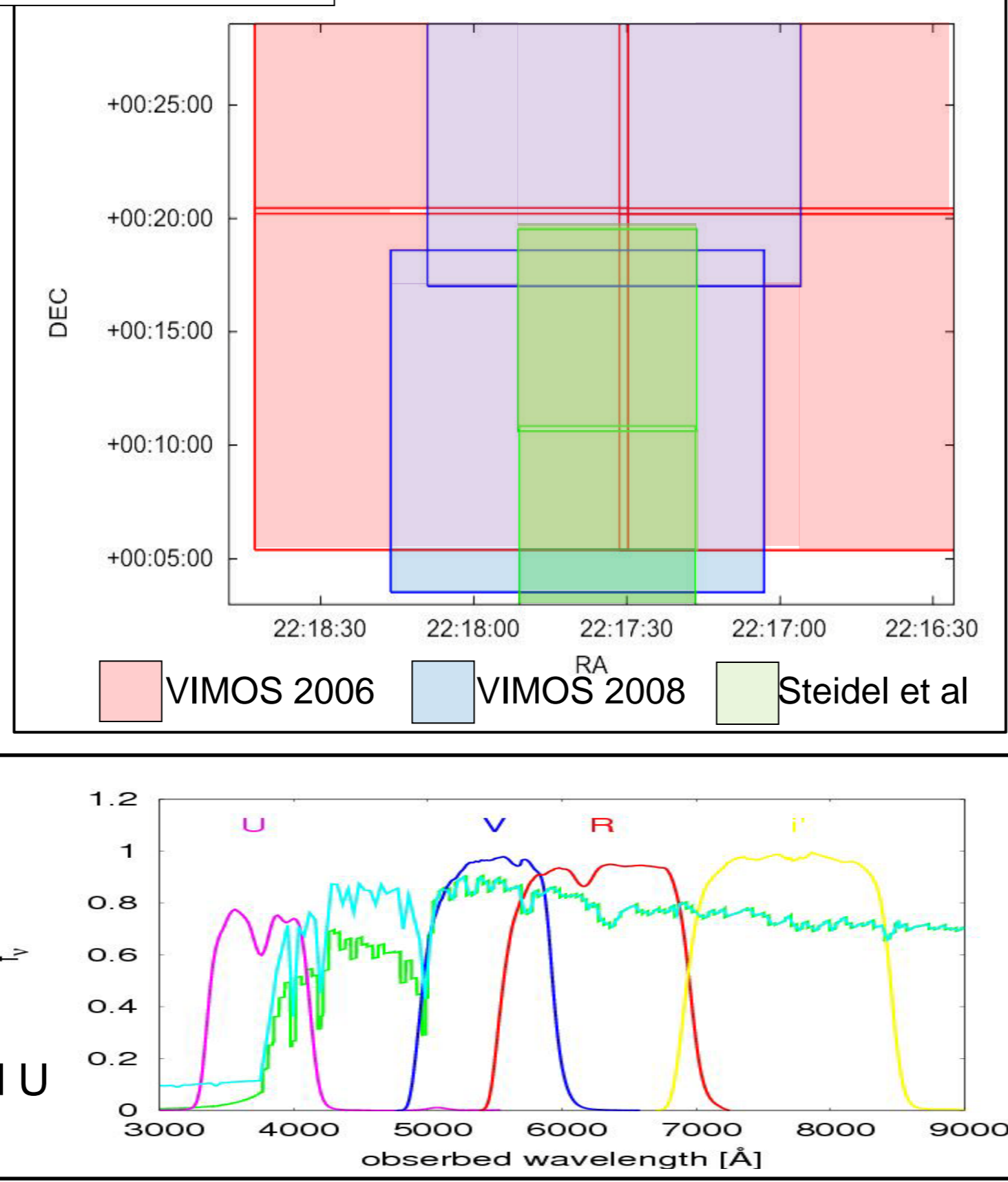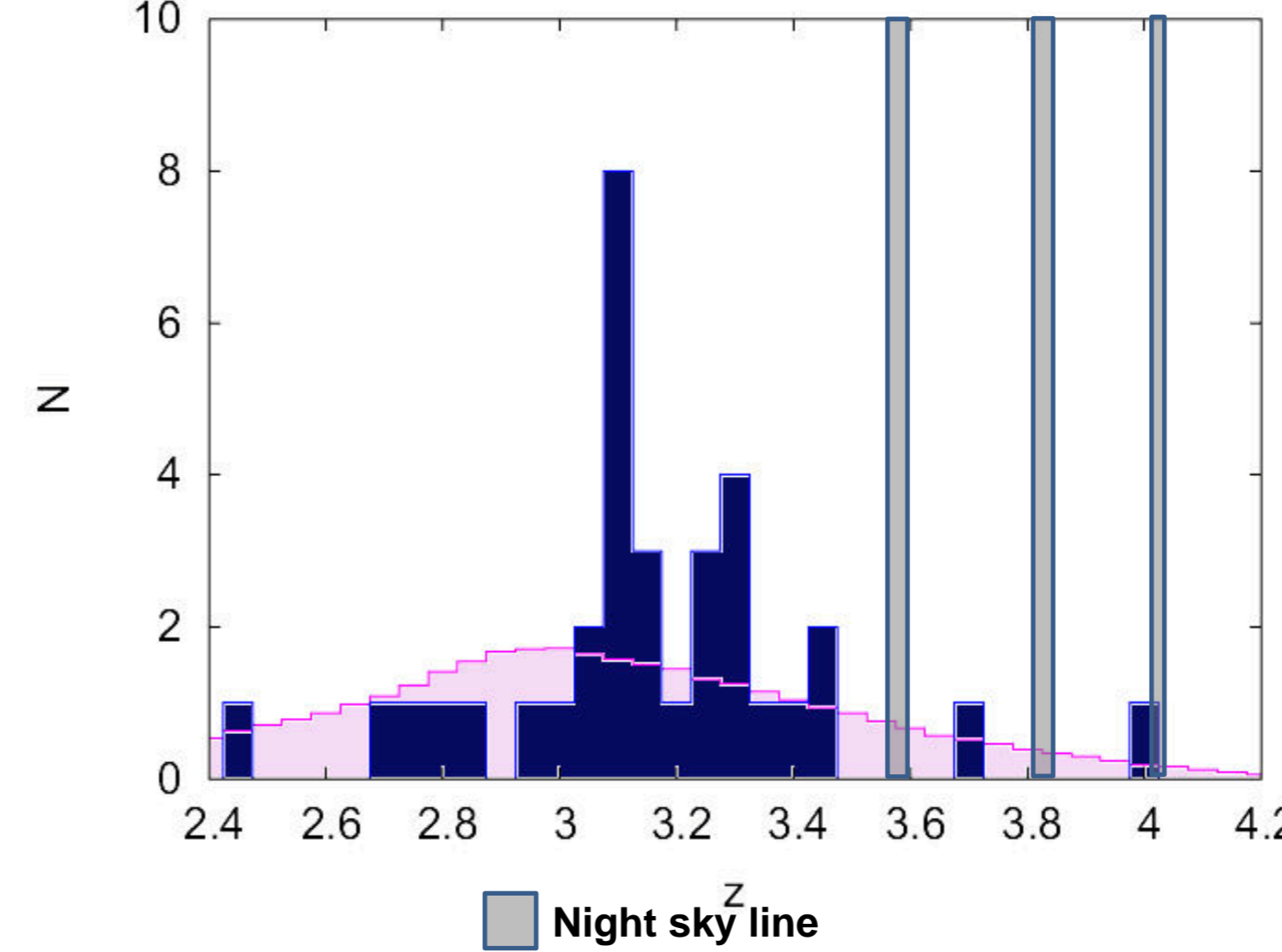
3. Redshift distribution

VIMOS 2006

We obtained spec-z of **34** LBGs by the data that observed at **2006**.
We have found spike at z=**3.1** and z=**3.3** in the redshift distribution. The magenta histogram represent the over all redshift selection function , normalized to the observed number of galaxies . We derived the selection function by Monte Carlo simulation.
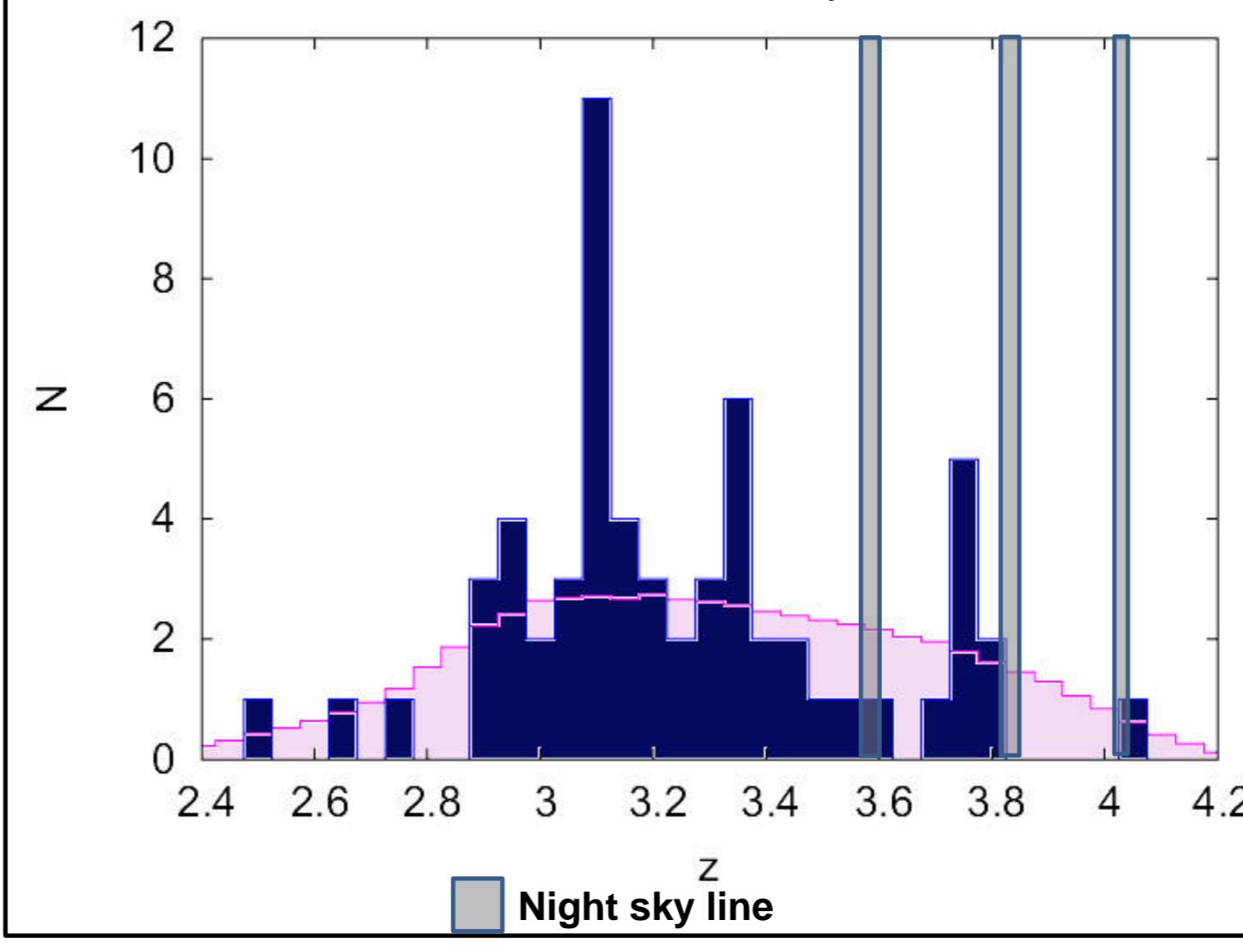
Night sky line

redshift	LBG / selection function	significance
3.1	5.1	5.1 σ
3.3	3.2	2.4 σ

Property of each spike.
We compared LBGs spike and selection function at the redshift.

VIMOS 2008

We obtained spec-z of **60** LBGs by the data that observed at **2008**.
We have found spike at z=**3.1** z=**3.35** and z=**3.7** in the redshift distribution. The magenta histogram represent the over all redshift selection function , normalize dto the observed number of galaxies . We derived the selection function by Monte Carlo simulation.
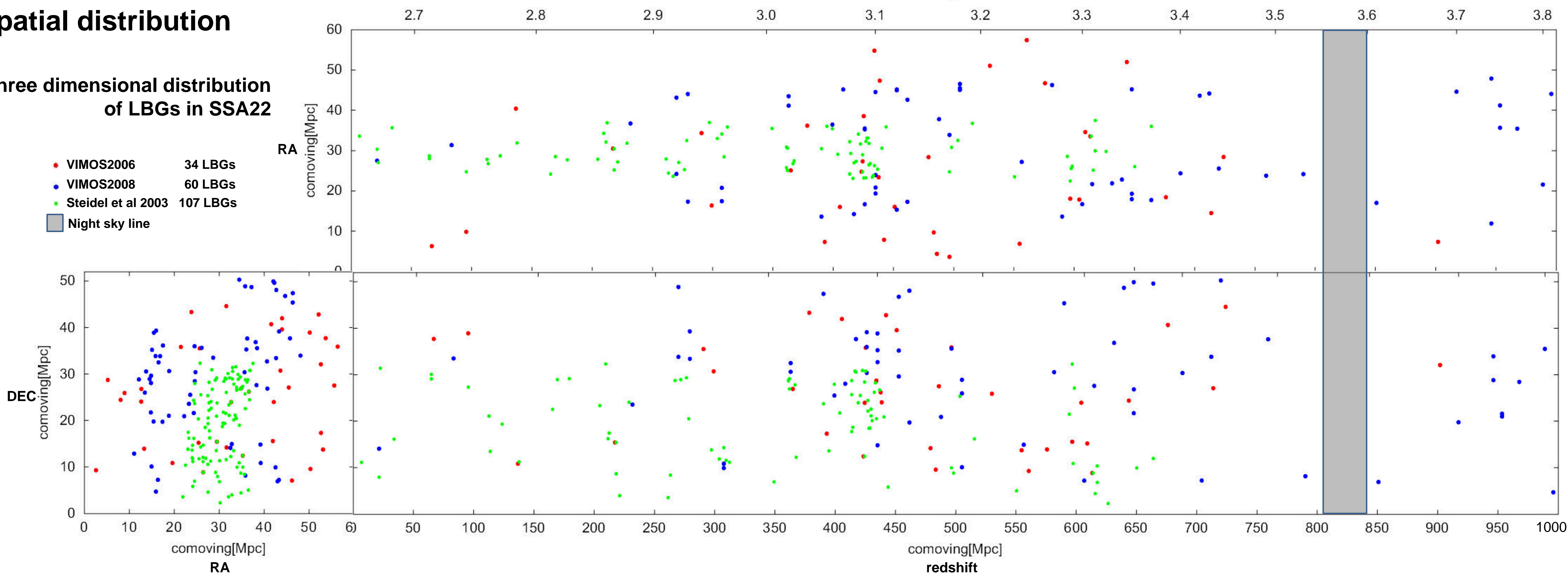
Night sky line

redshift	LBG / selection function	Significance
3.1	4.0	5.0 σ
3.35	2.3	2.1 σ
3.75	2.7	2.4 σ

Property of each spike.
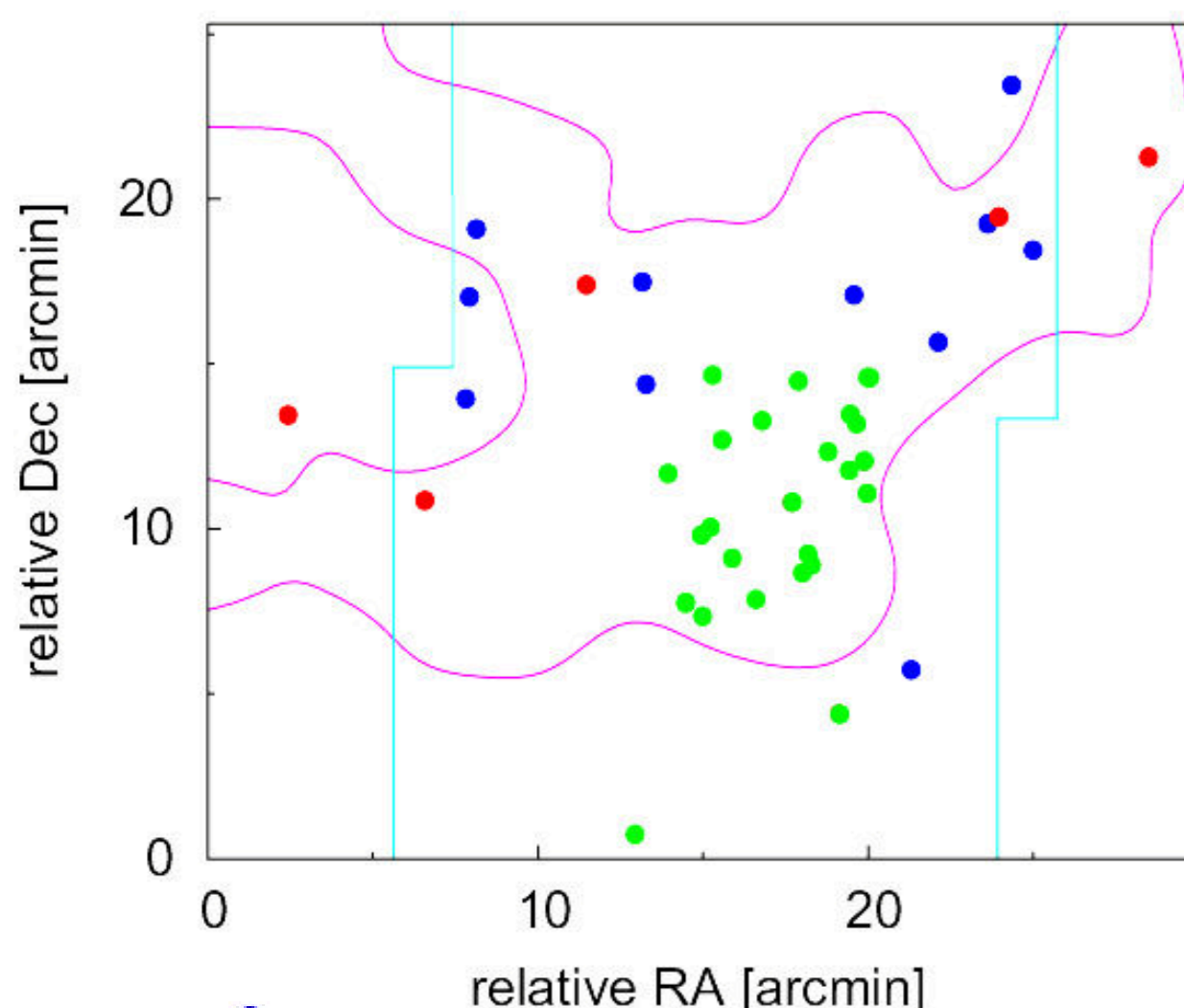We compared LBGs spike and selection function at the redshift.

4. Spatial distribution

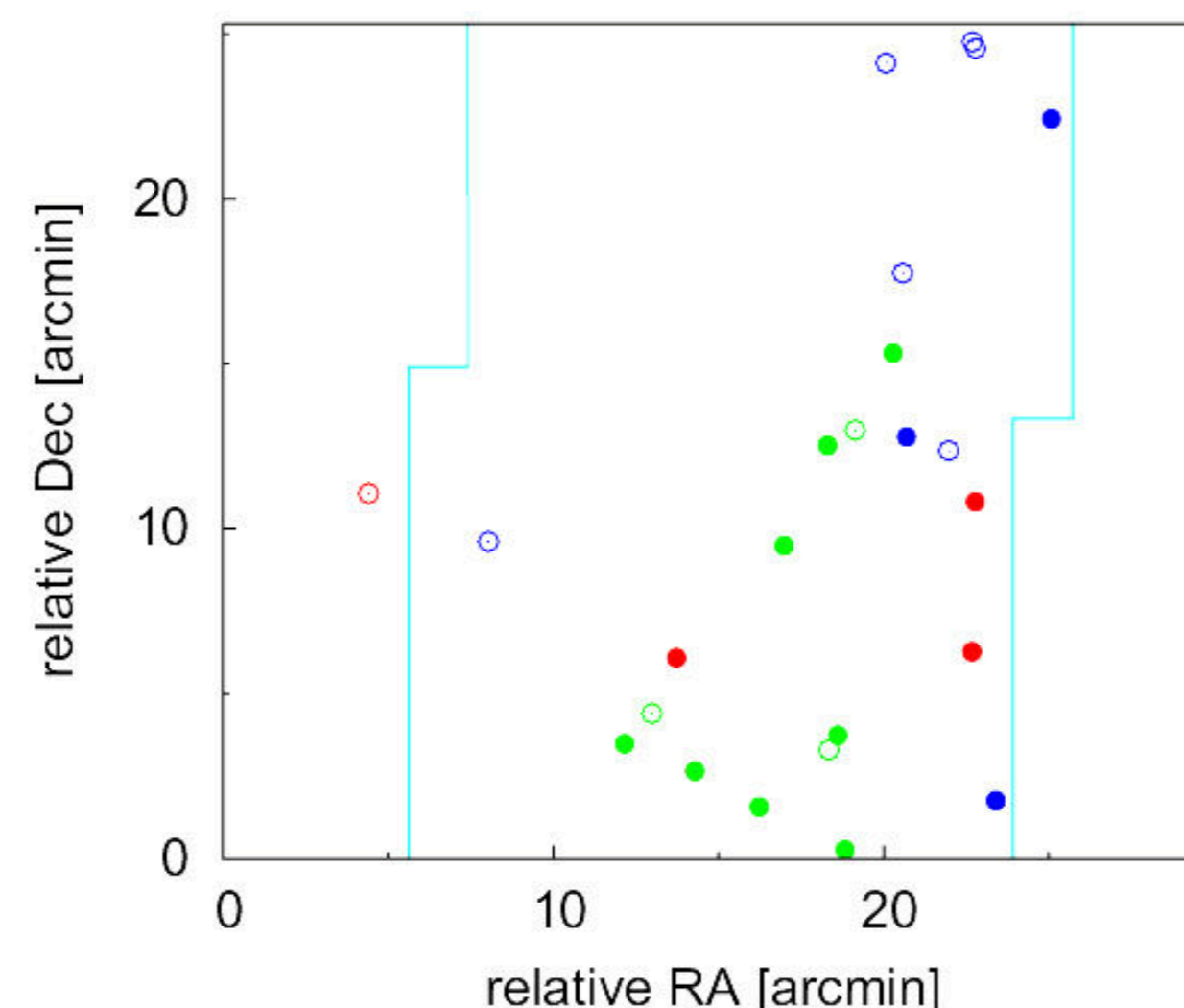### Three dimensional distribution of LBGs in SSA22

VIMOS2006   34 LBGs
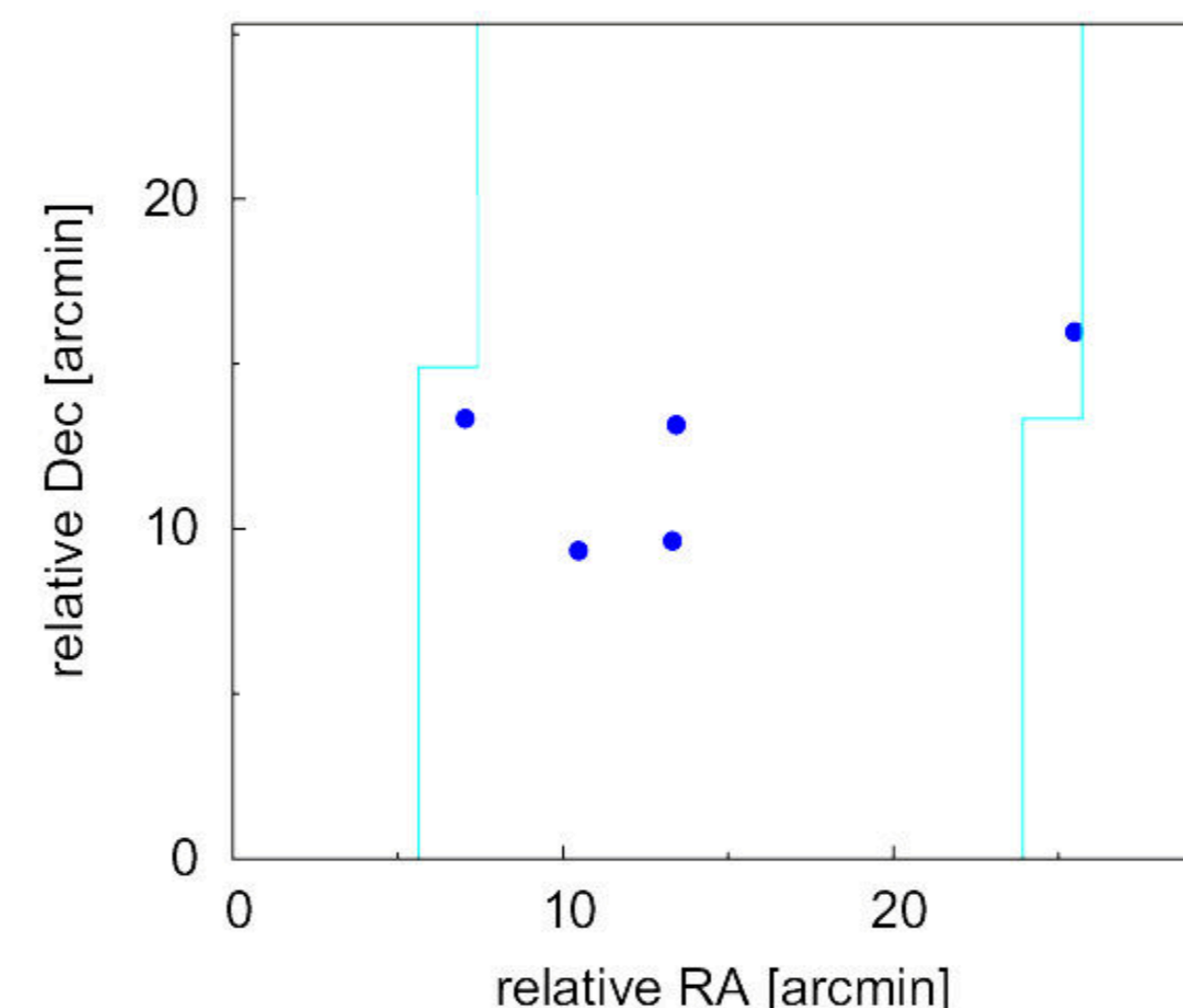VIMOS2008   60 LBGs
Steidel et al 2003   107 LBGs
Night sky line

RA

DEC

RA

redshift

Sky map of LBGs at z=3.075~3.125

VIMOS2008
VIMOS2006
Steidel et al 2003
z=3.1LAE high density region
VIMOS2008 field of view

Sky map of LBGs at z=3.275~3.375

VIMOS2008 z=3.275~3.325   VIMOS2008 z=3.325~3.375
VIMOS2006 z=3.275~3.325   VIMOS2006 z=3.325~3.375
Steidel et al 2003 z=3.275~3.325   Steidel et al 2003 z=3.325~3.375
VIMOS2008 field of view

Sky map of LBGs at z=3.725~3.775

VIMOS2008
VIMOS2008 field of view

5. SUMMARY

· We have obtained spec-z of **94** LBGs at z~3.

· We have found spikes not only at z=3.1 discovered by Steidel et al but also at z=**3.3** and **3.7** in our redshift distribution of LBGs.

· Most of the LBGs at z=3.075~3.125 distribute inside the high density region of LAE skymap at z=3.06~3.12.

· It seems that LBGs in other spike z=3.3 and 3.7 are also clustered in 2D sky maps.