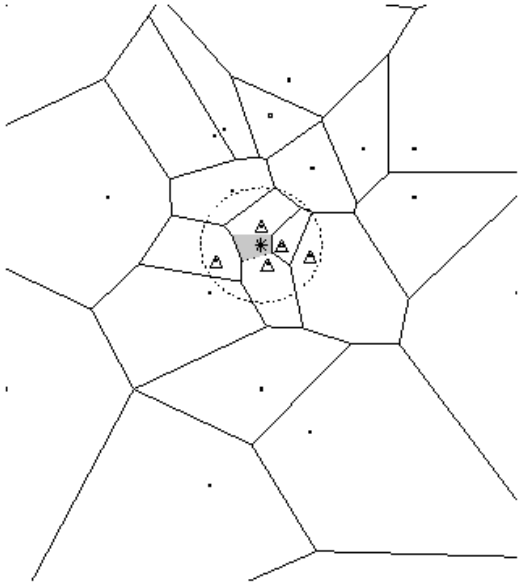
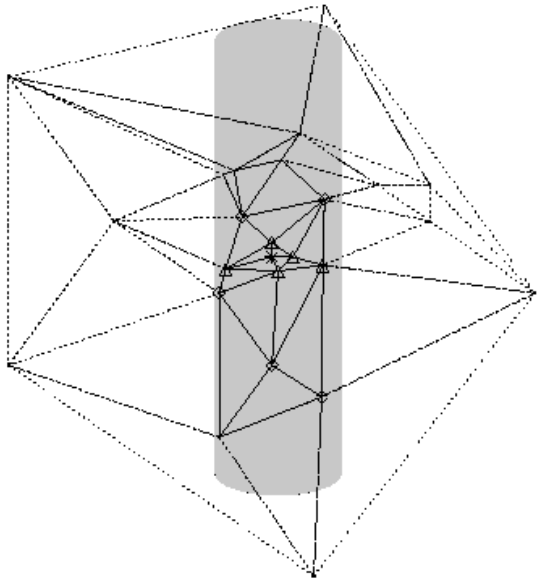
A cluster at z ~ 1.47 from the VVDS 2h-deep field

First tentative run of VDM for cluster search on the VVDS 2h-deep field gave, among others, a candidate located at z ~ 1.47.

A cluster at z ~ 1.47 from the VVDS 2h-deep field

The Voronoi–Delaunay Method





Marinoni, Davis, Newman & Coil 2002, ApJ, 580, 122

Gerke, Newman, Davis, Marinoni et al. 2005, ApJ in press, astro–ph/0410721

The initial cluster 'seed' consisted in 3 galaxies within a volume of projected radius 0.5 h^{-1} Mpcs and within 5 h^{-1} Mpcs in redshift direction.

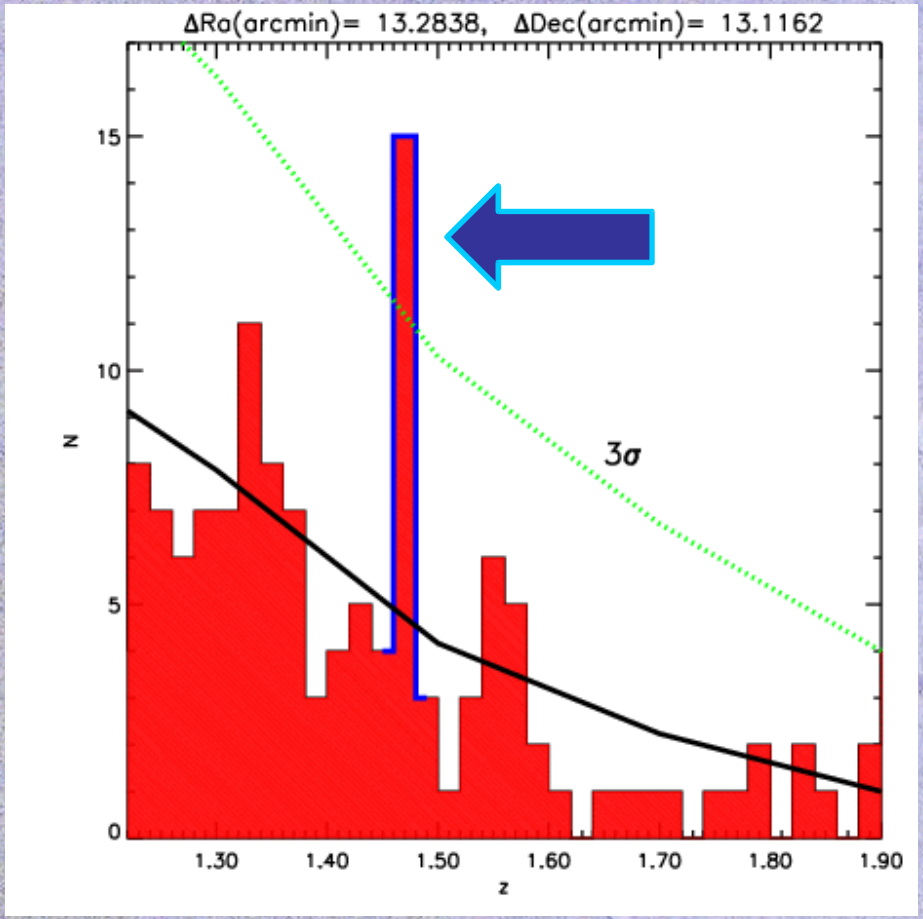
The obvious interest of this finding prompted a search for further corroborating evidences.

Further spectroscopic evidence:

We enlarged the area of the search and went back to the observed spectra.

Further spectroscopic evidence:

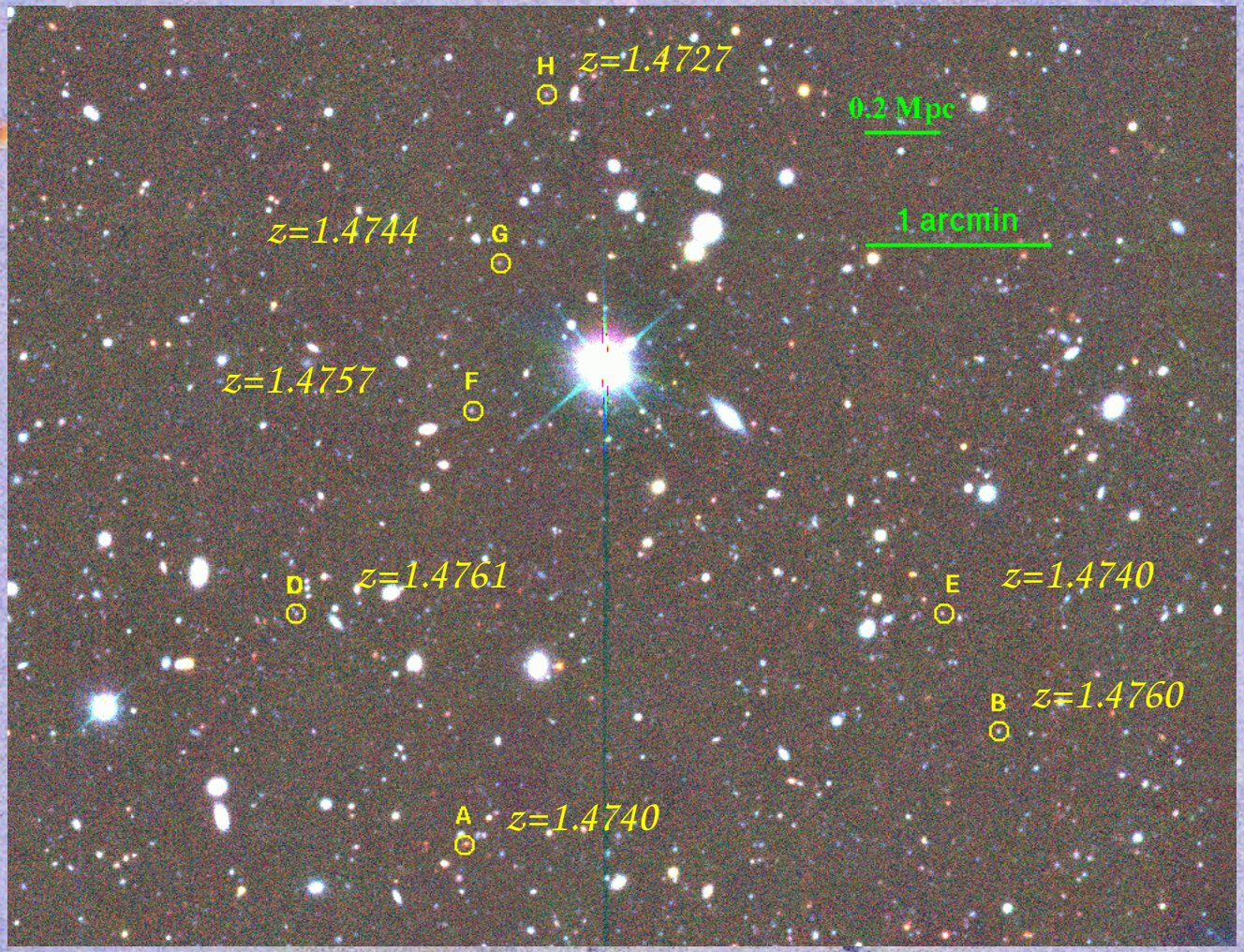
In the total JK band area (166 sq arcmin) there are 16 gals with $1.46 < z_{spec} < 1.48$



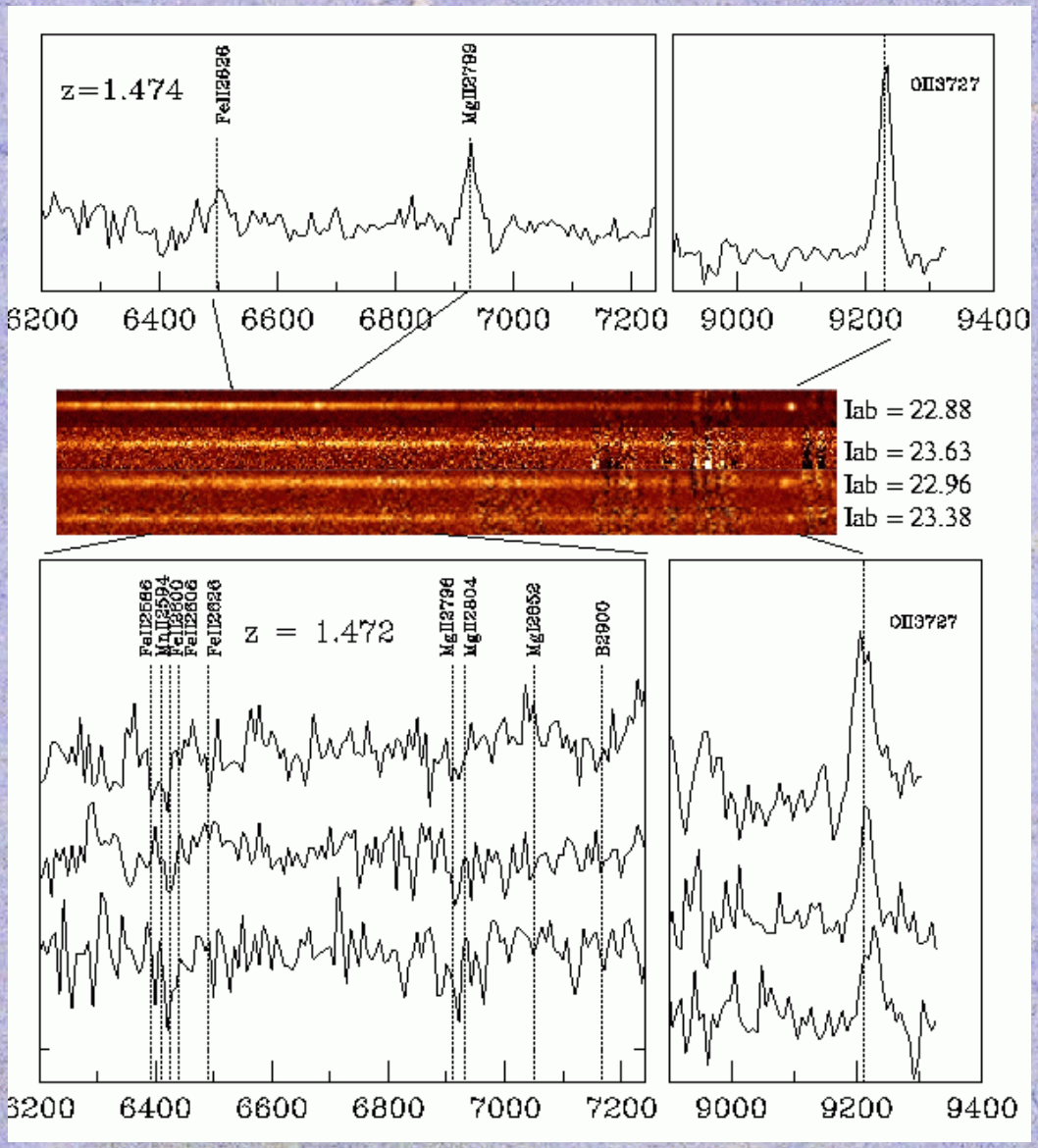
Further spectroscopic evidence:

7 of these 16 gals with $1.46 < z_{spec} < 1.48$ *are found within a radius of 2.8 arcmins from our putative 'cluster center'*

A cluster at z ~ 1.47 from the VVDS 2h-deep field



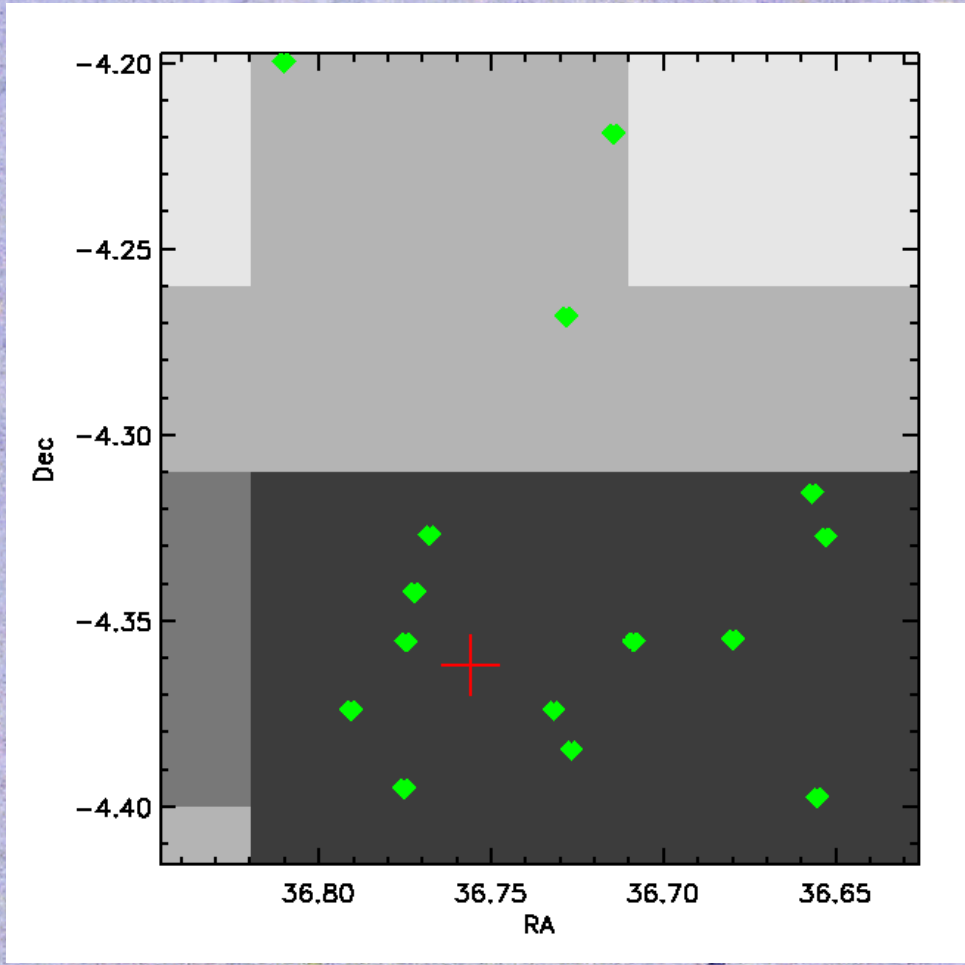
A cluster at z ~ 1.47 from the VVDS 2h-deep field

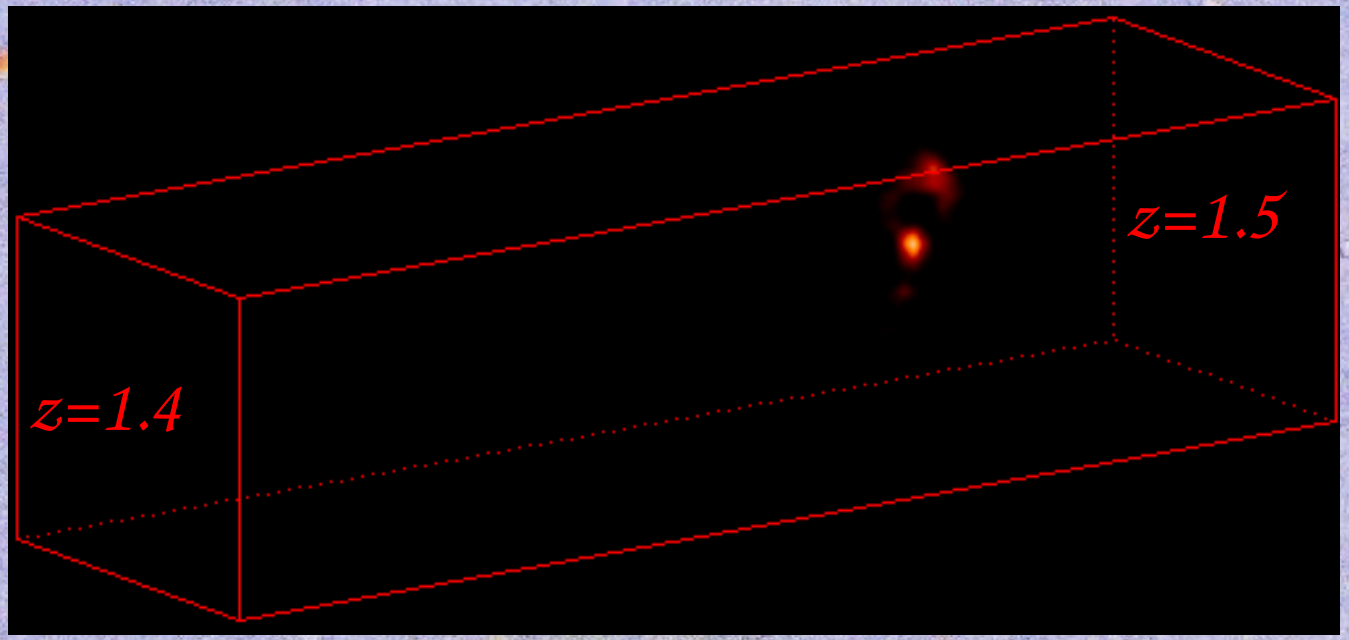


9 of these 16 gals are found within a FORS2 field (7X8 arcmins) . To be compared with the numbers by Mullis et al.: 12 galaxies.

But first remember our sampling rate !

A cluster at z ~ 1.47 from the VVDS 2h-deep field





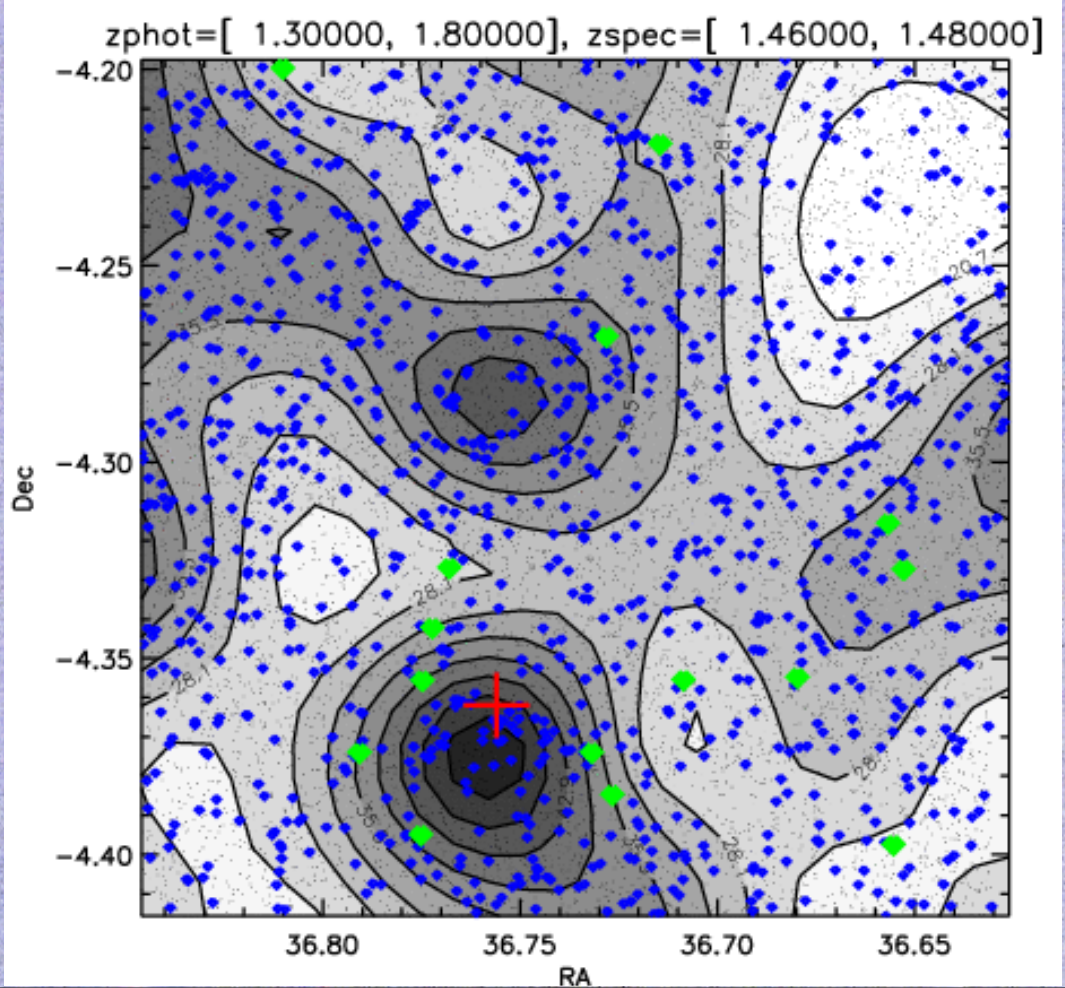
3-D cone diagram covering the full 2h-deep VVDS field (0.7X0.7 sq degs).

Only 2sigma density excesses are shown.

Photometric evidence:

We made an isodensity contours plot (with a smoothing box of 2.3 arcmins) of the galaxies within the photometric redshift range $1.3 < z_{phot} < 1.8$

Photometric evidence:

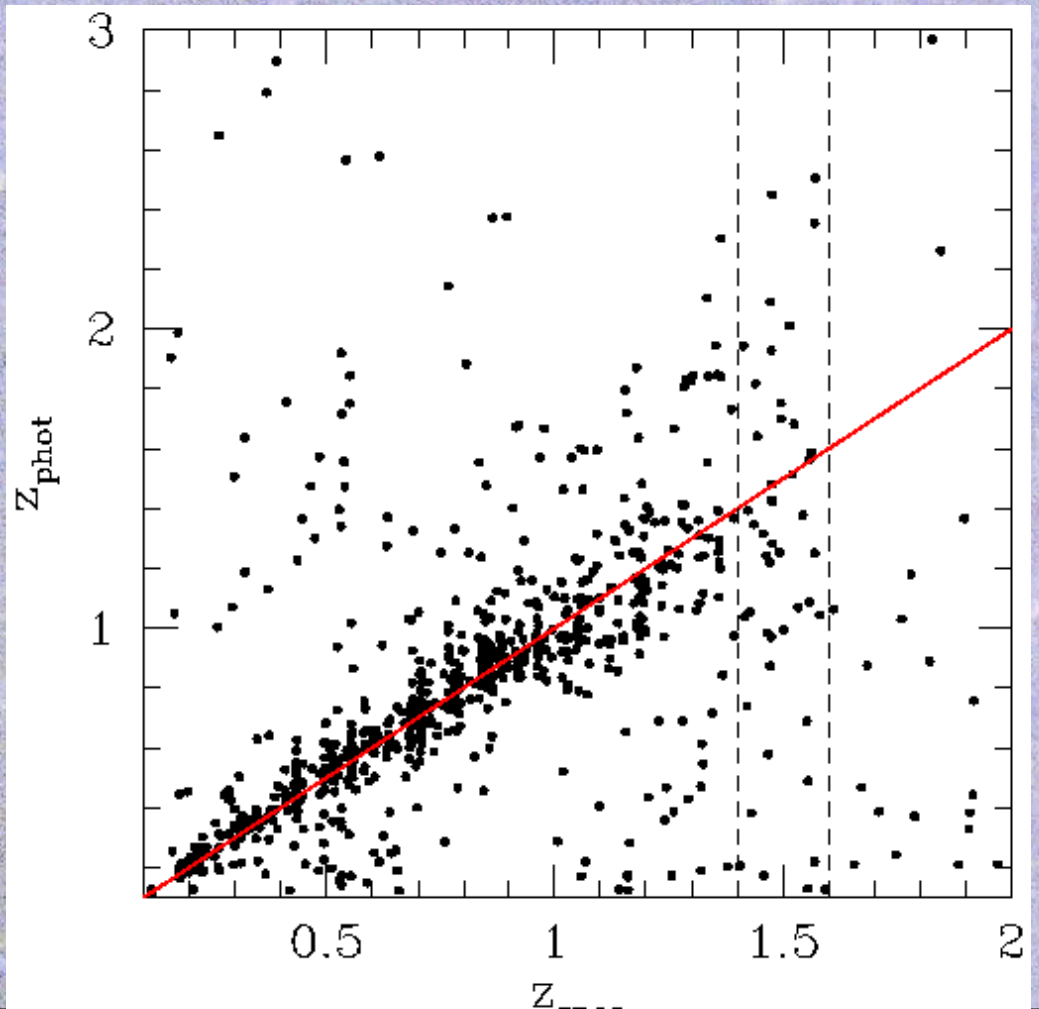


$1.3 < z_{phot} < 1.8$

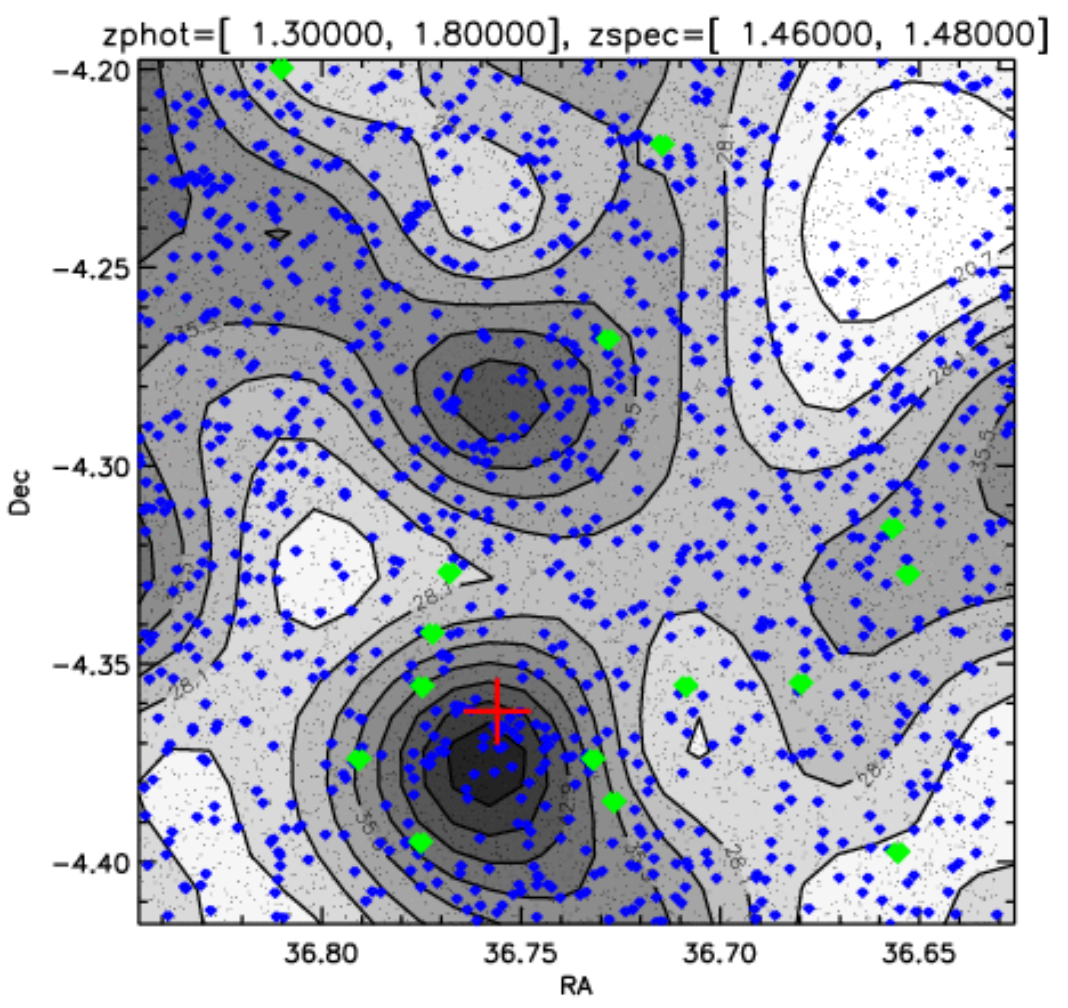
Photometric evidence:

Why

$1.3 < z_{phot} < 1.8$?

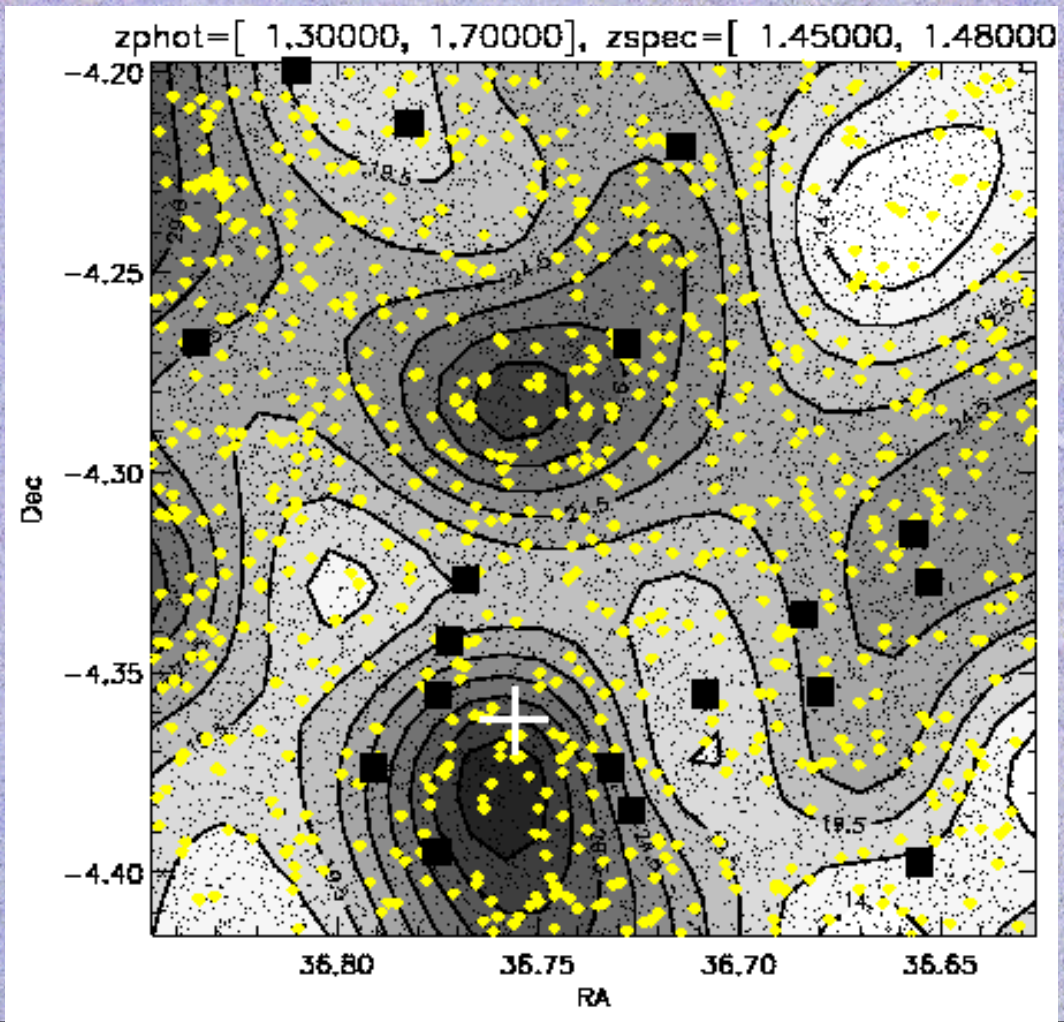


Photometric evidence:



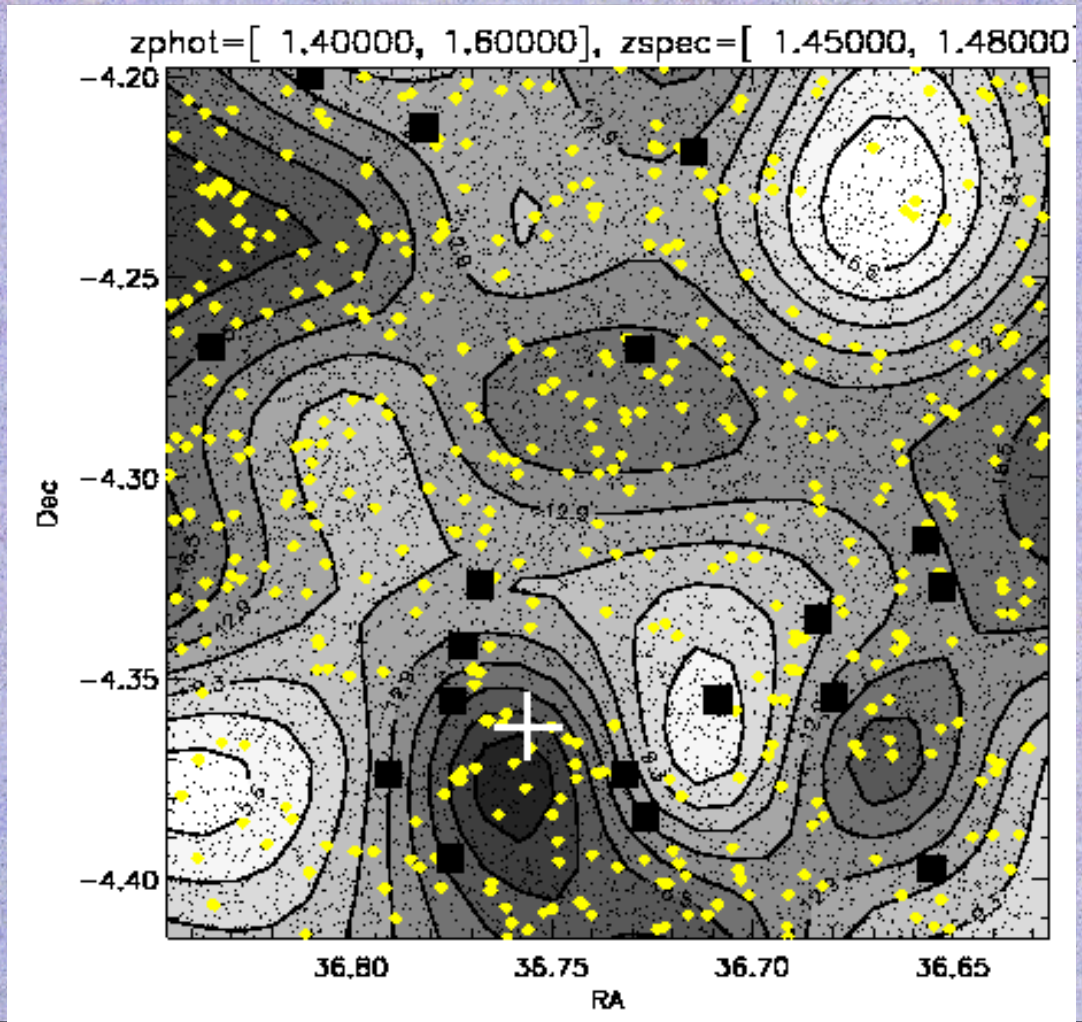
$1.3 < z_{phot} < 1.8$

Photometric evidence:



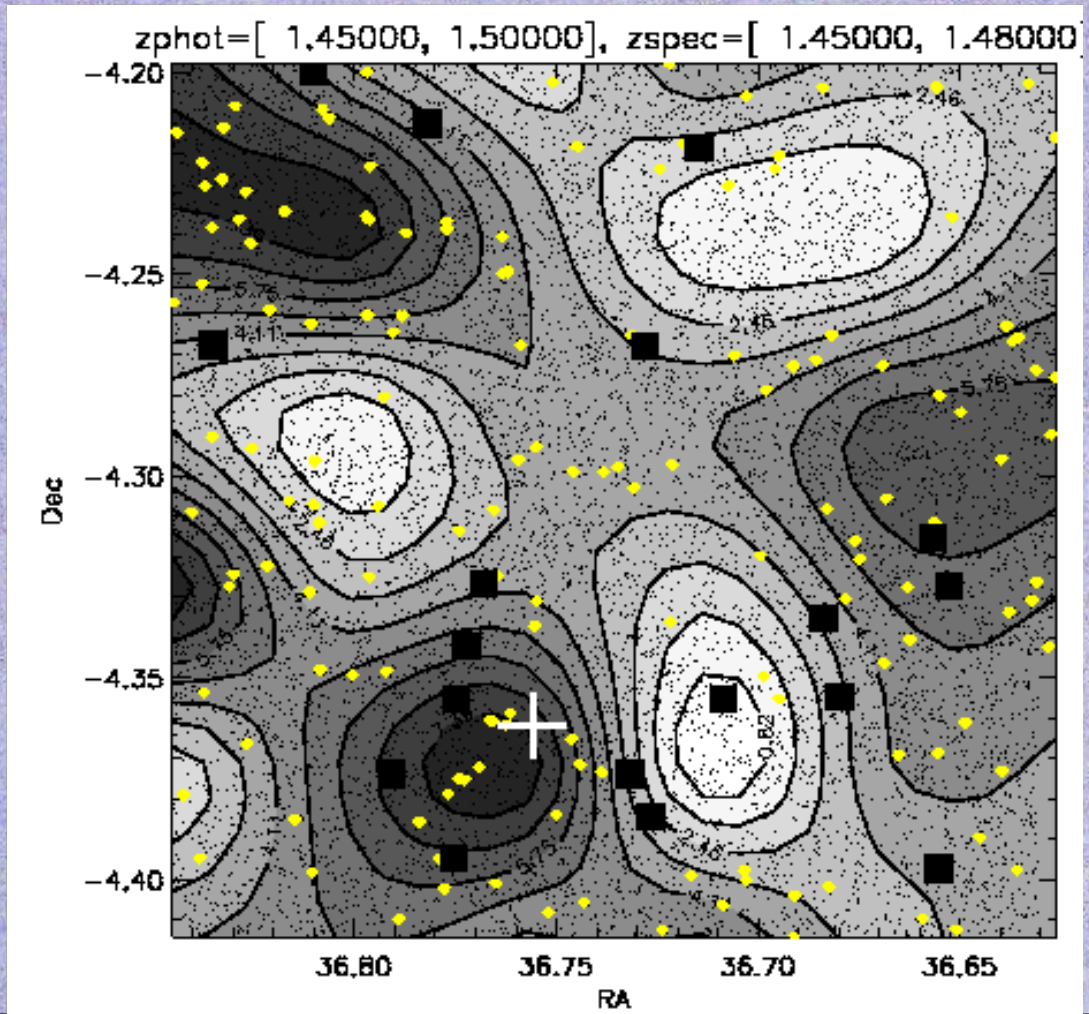
$1.3 < z_{phot} < 1.7$

Photometric evidence:



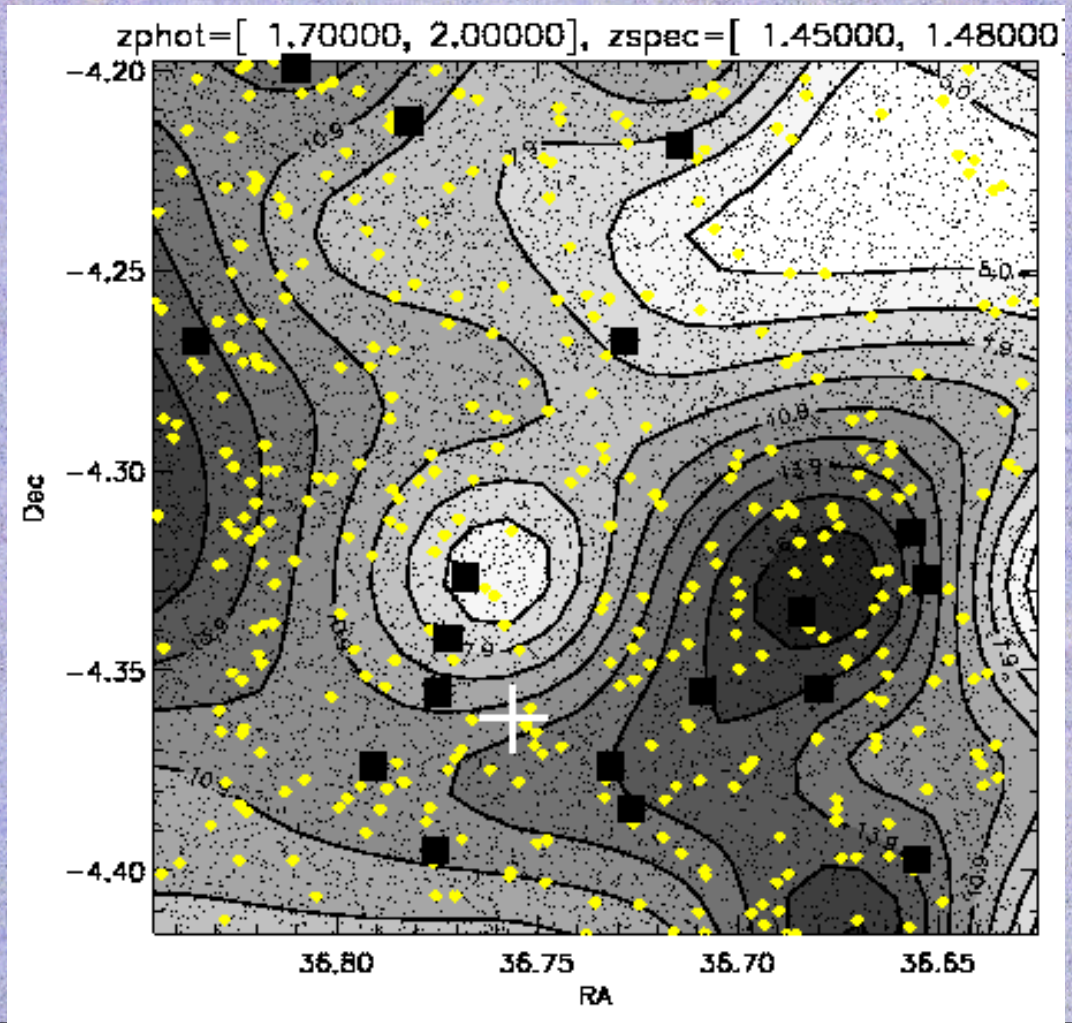
$1.4 < z_{phot} < 1.6$

Photometric evidence:



$1.45 < z_{phot} < 1.5$

Photometric evidence:



$$1.7 < z_{phot} < 2.0$$

But: where is the red sequence ?

Where should we search for a red sequence at z ~ 1.47 ?

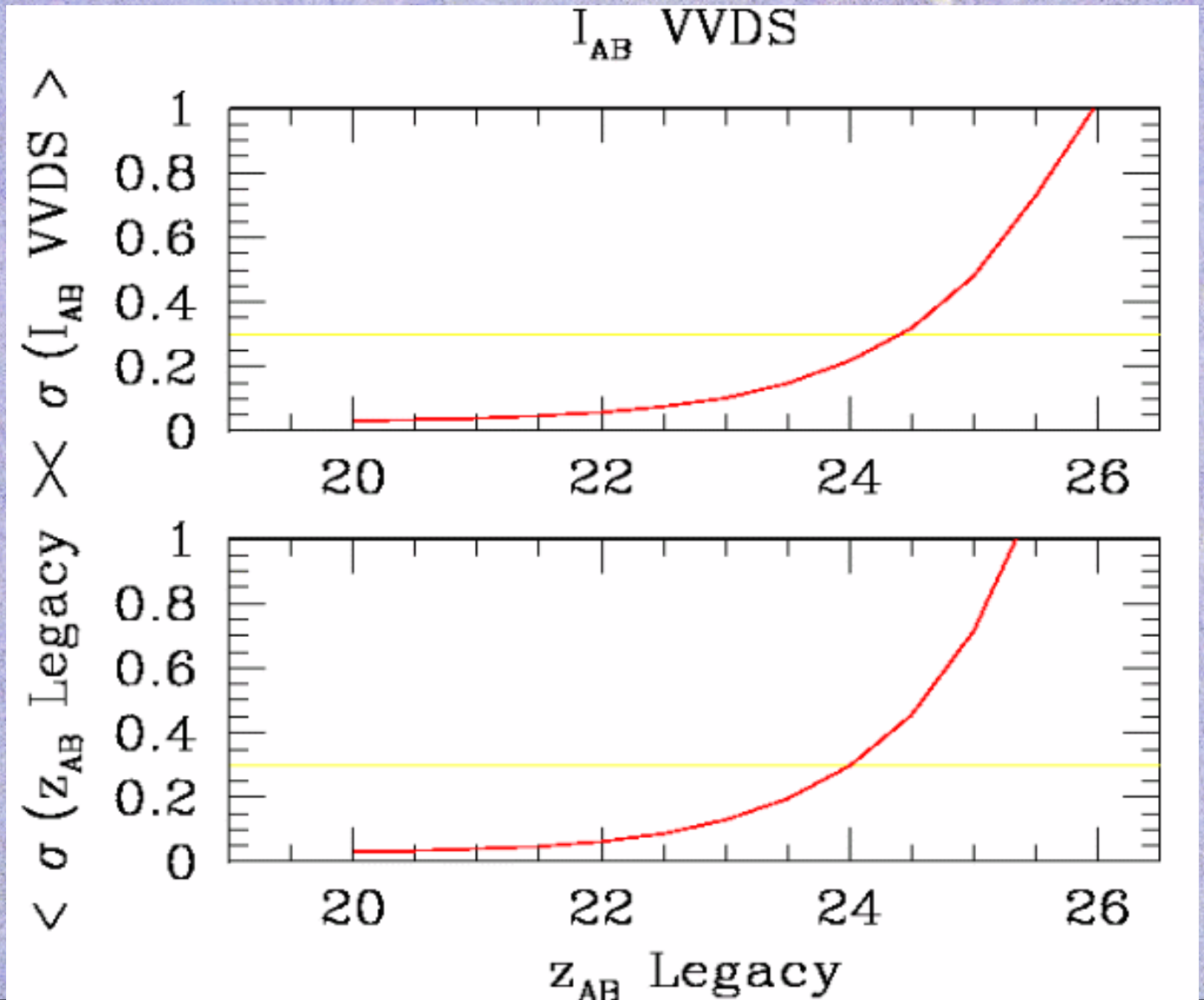
Looking for early type galaxies using the (z-J) color (ie. the 4000A break) would seem a good idea.

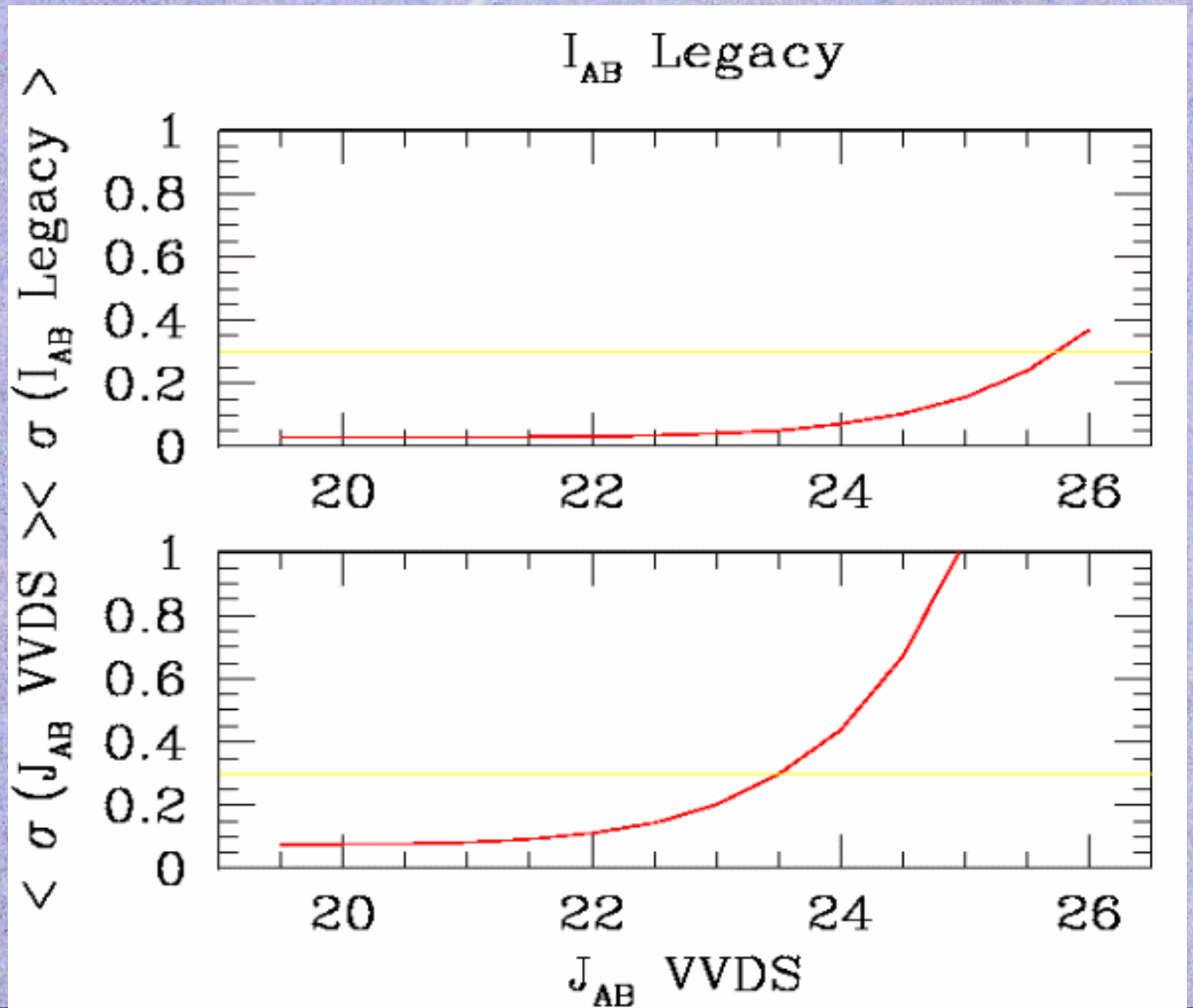
But there are two problems:

At z ~ 1.5 an M early type galaxy has magnitude I_{AB} ~ 25.0, equivalent in z band to z_{AB} ~ 24.5.*

our data are not deep enough to perform such a search.

A cluster at z ~ 1.47 from the VVDS 2h-deep field




I_AB Legacy
< σ (I_AB Legacy) >
1
0.8
0.6
0.4
0.2
0
20
22
24
26
< σ (J_AB VVDS) >
1
0.8
0.6
0.4
0.2
0
20
22
24
26
J_AB VVDS

- IAB data from the Legacy survey are deeper than our VVDS I_{AB} data

- J-band VVDS data are reliable down to $J_{AB} \sim 23.5$, enough for our purposes. High z early type galaxies are red in colors: $(I-J)_{AB} \sim 2.2$ for an elliptical at $z \sim 1.5$.

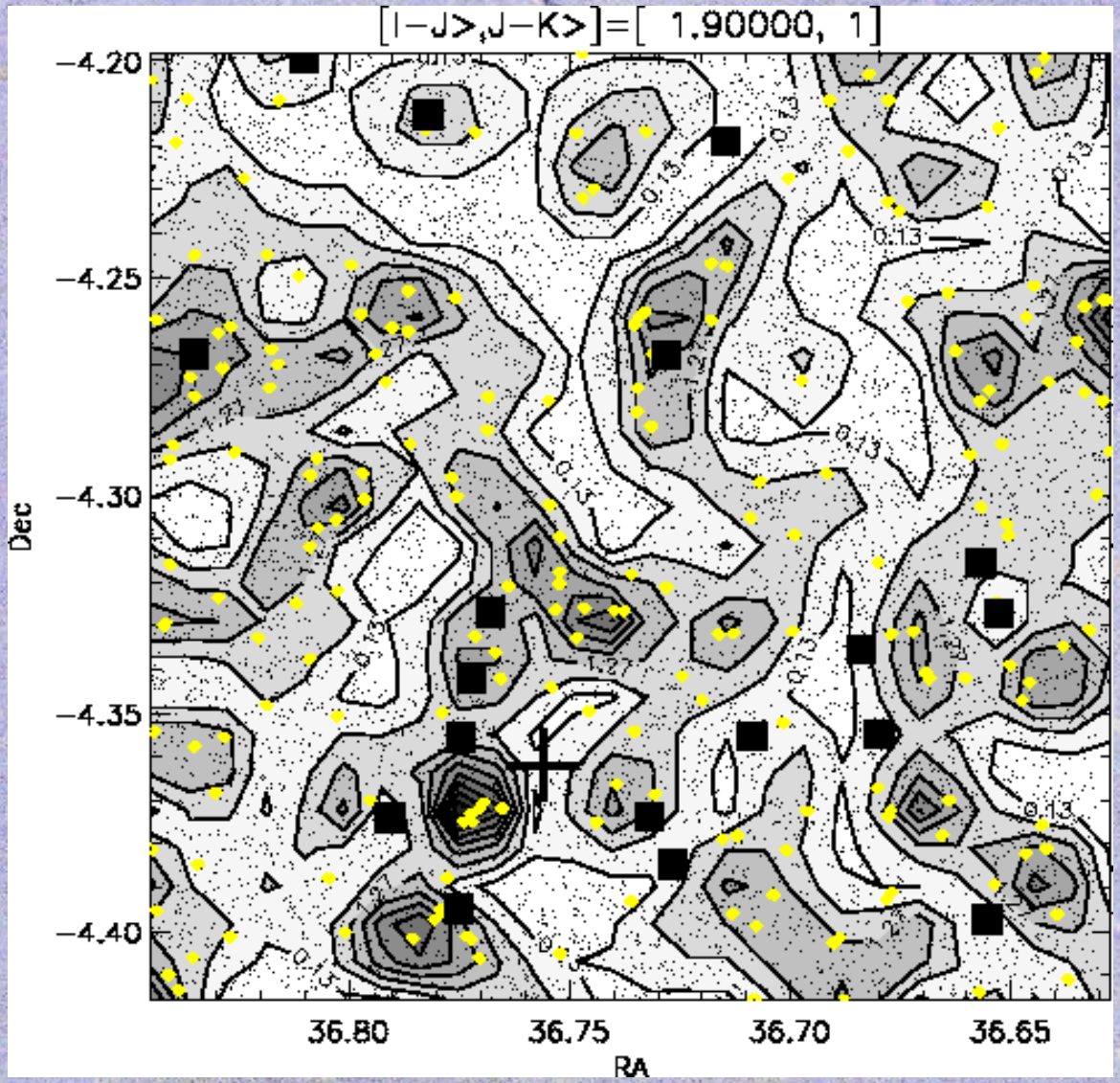
Using $(I-J)_{AB}$ vs I_{AB} color magnitude diagram is therefore a possibility to explore.

Another possibility is to combine $(I-J)_{AB}$ with $(J-K)_{AB}$ colors as a signature in both colors is expected for early type galaxies at redshift ~ 1.5

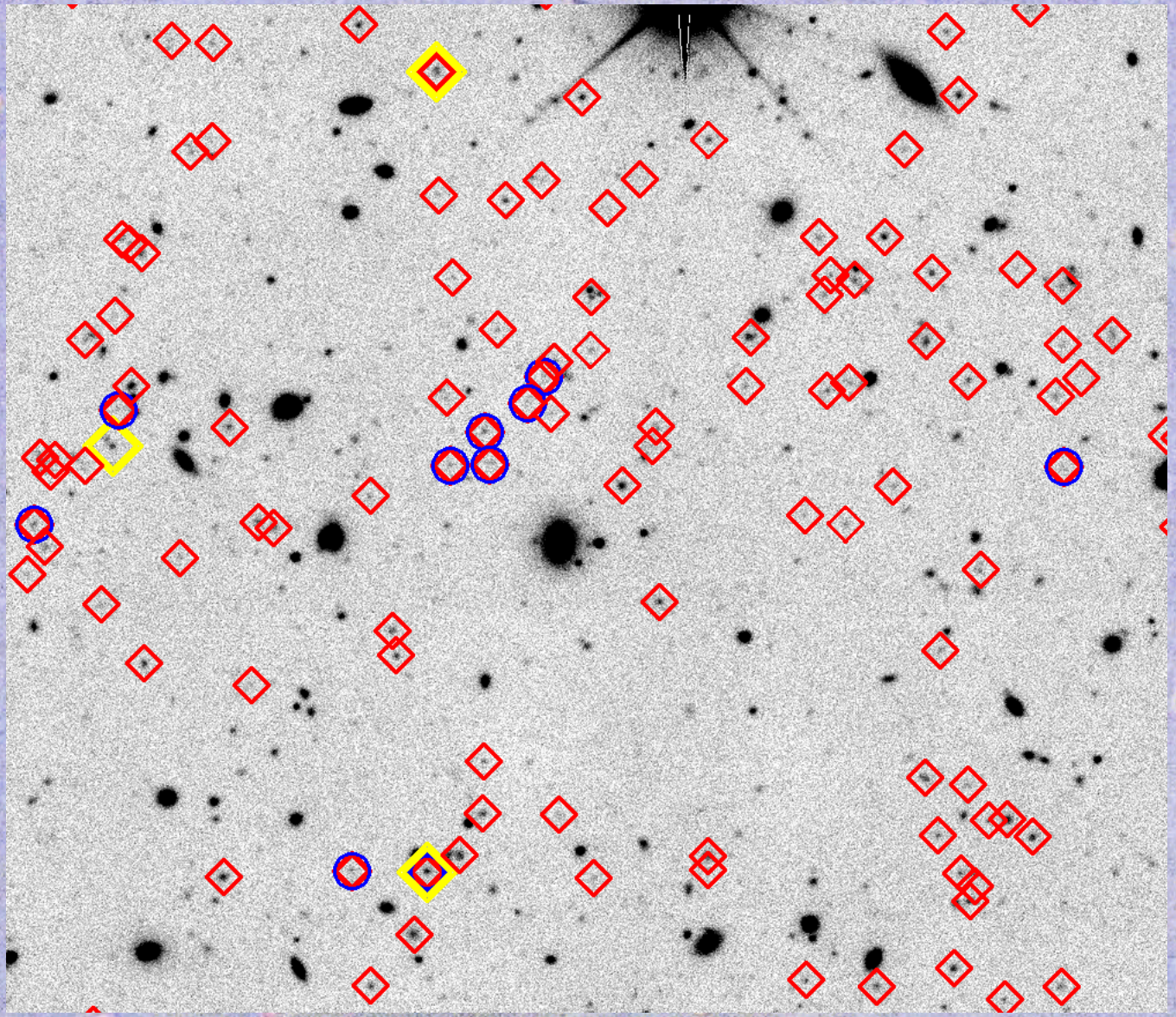
Predictions from Bruzual & Charlot models:

	Ell gal	S0 gal
$(I-J)_{AB}$	2.25	1.55
$(J-K)_{AB}$	1.02	0.75

Ra and dec distribution of red (I-J) and (J-K) objs

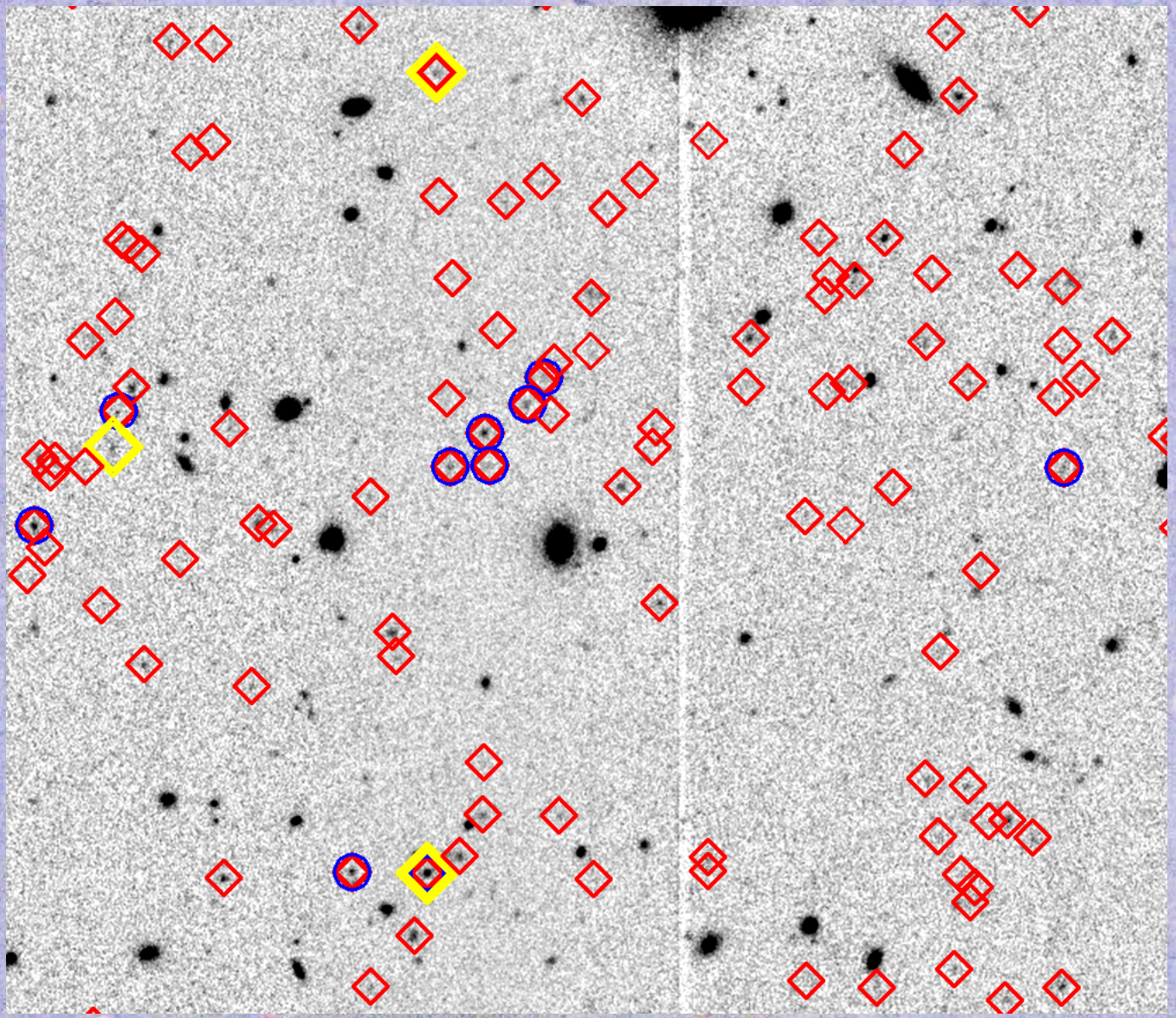


Let us explore visually our I, J and K images



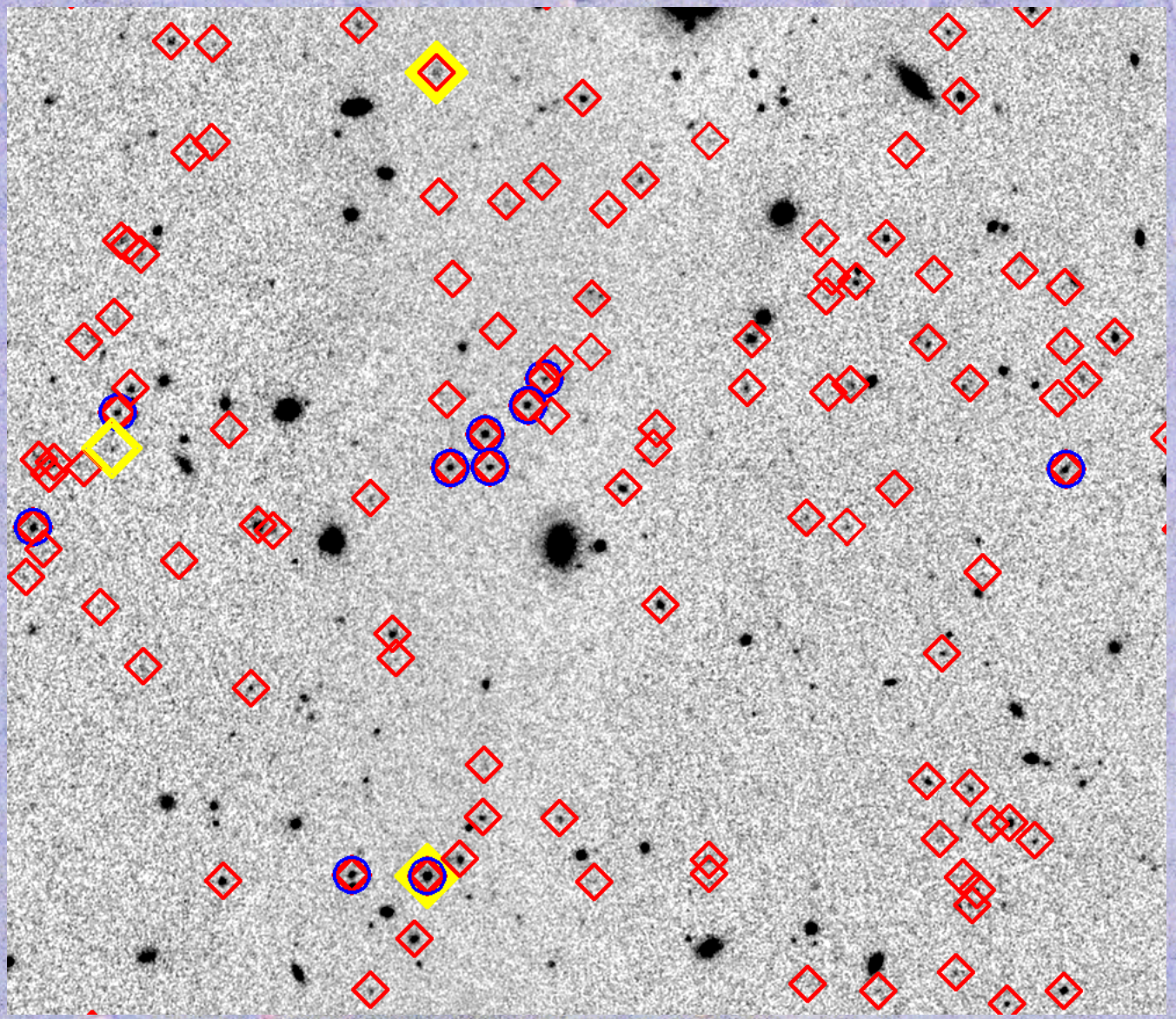
I

Let us explore visually our I, J and K images



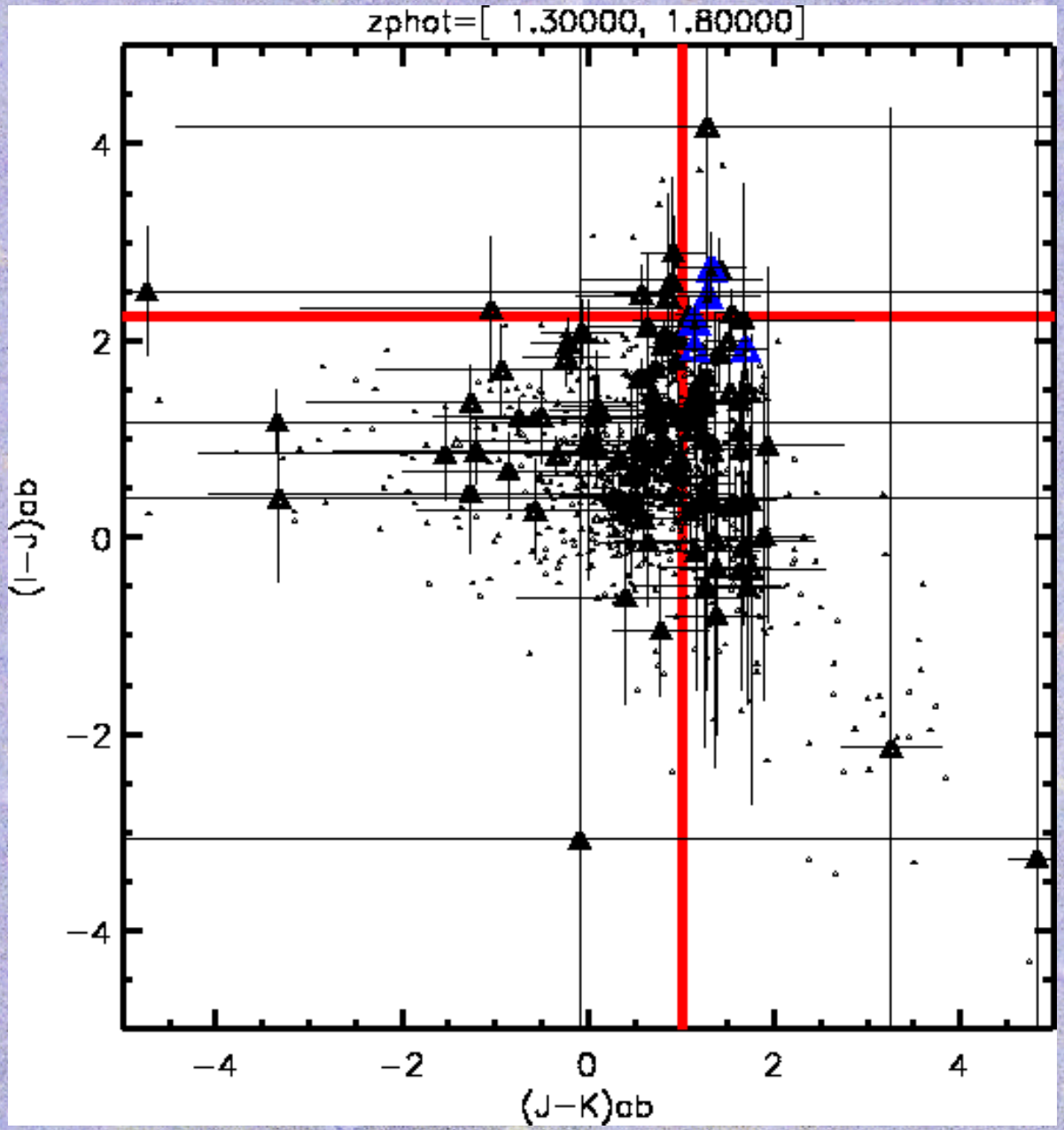
J

Let us explore visually our I, J and K images

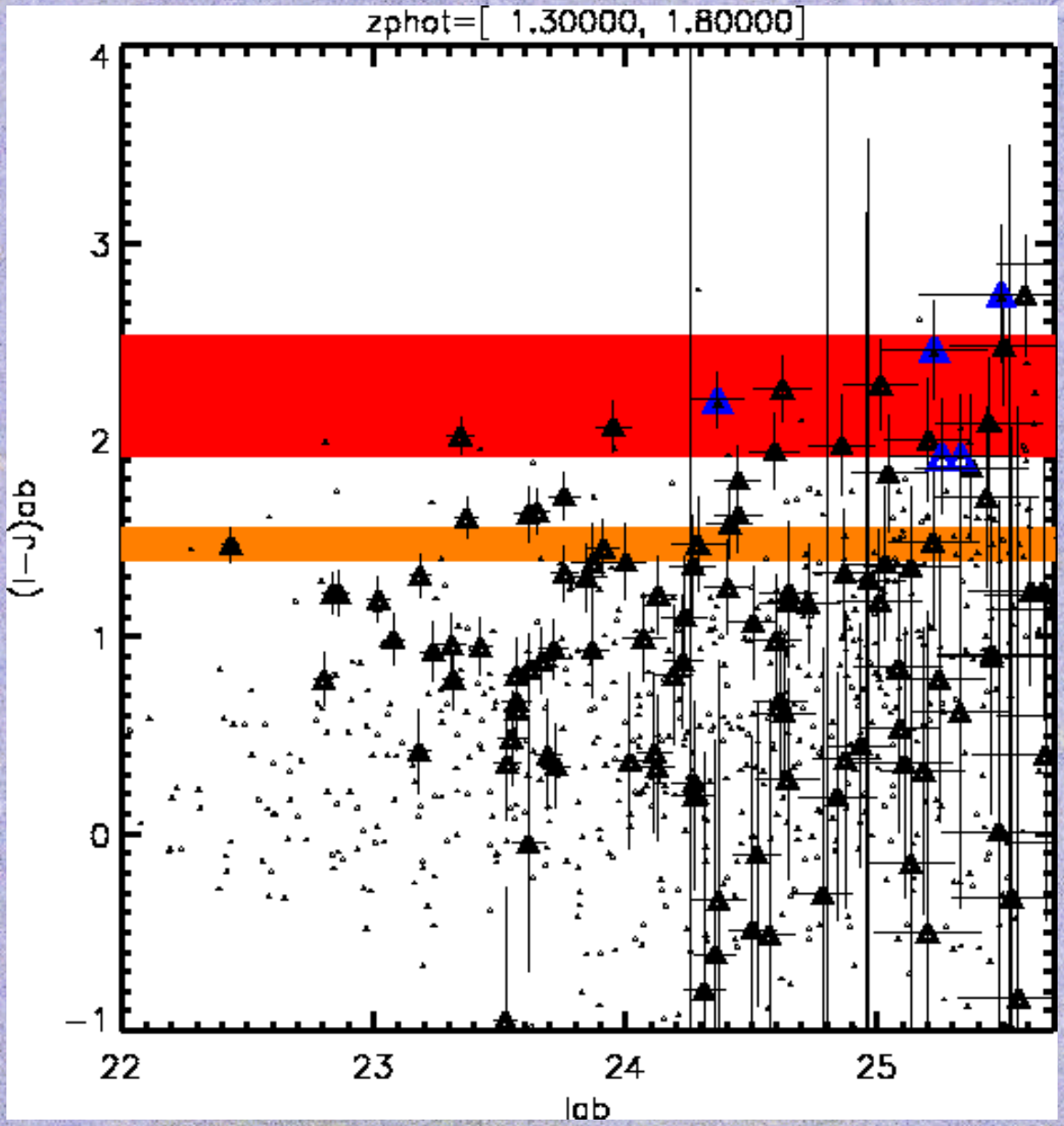


K

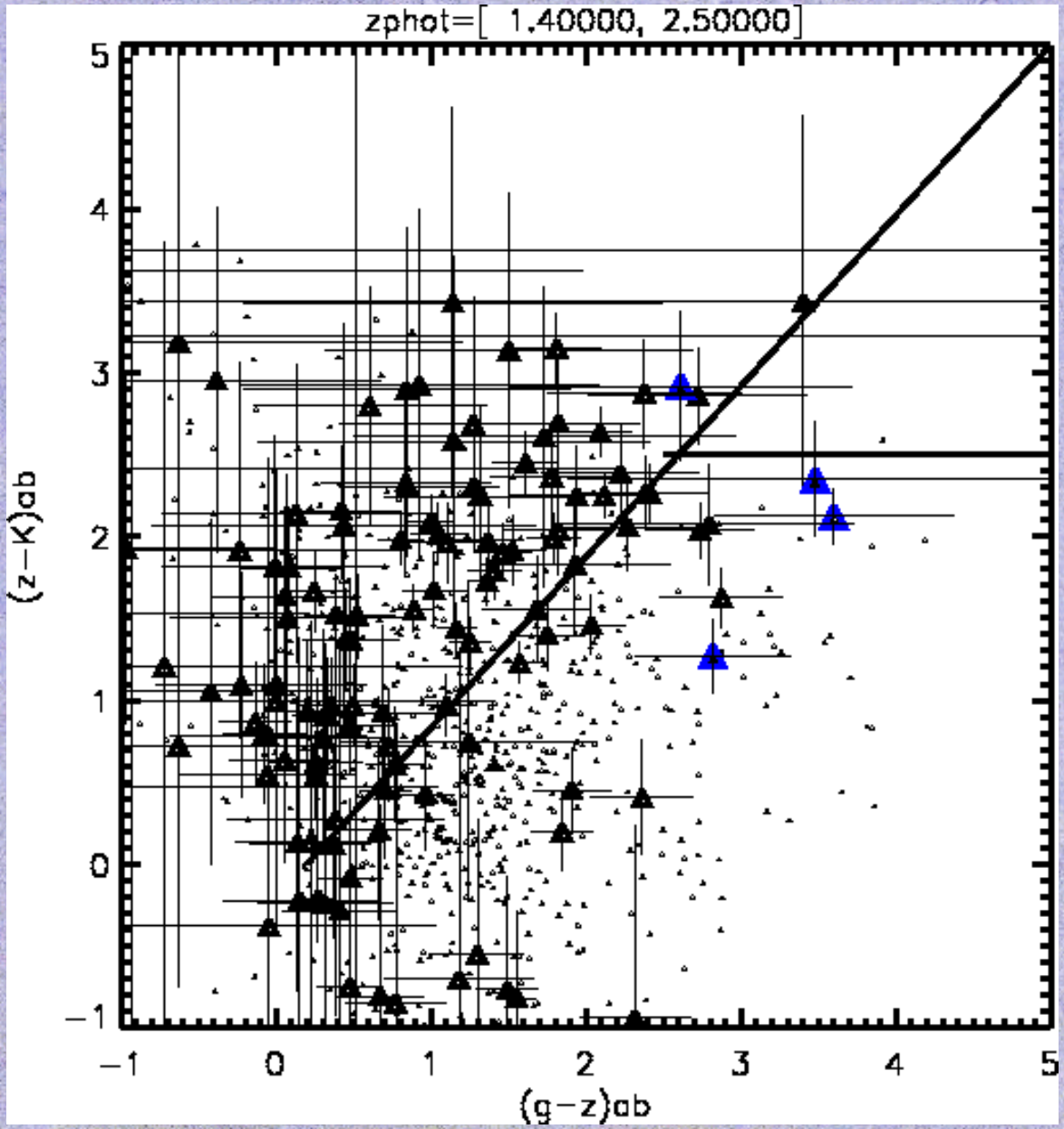
A cluster at z ~ 1.47 from the VVDS 2h-deep field



A cluster at z ~ 1.47 from the VVDS 2h-deep field



A cluster at z ~ 1.47 from the VVDS 2h-deep field



For further info look :

http://www.brera.mi.astro.it/~iovino/VVDS_clust/hz_cluster_from_VVDS.html

With the usual username and password (nimo$).