Clusters of galaxies in Subaru Hyper Suprime-Cam survey

Survey webpage: http://hsc.mtk.nao.ac.jp/ssp/

Public data release: https://hsc-release.mtk.nao.ac.jp/doc/

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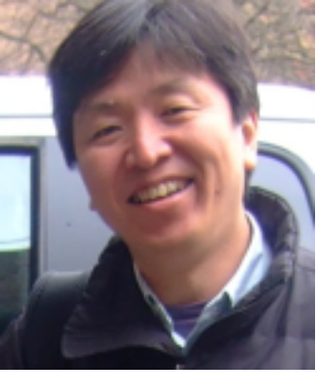
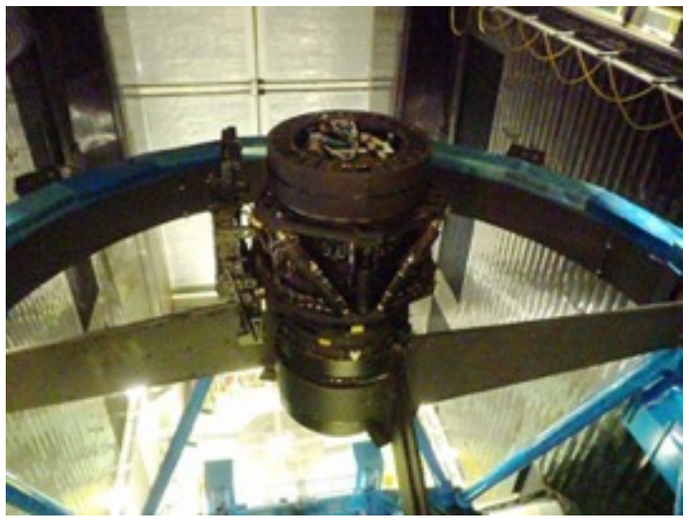
(University of Tokyo)

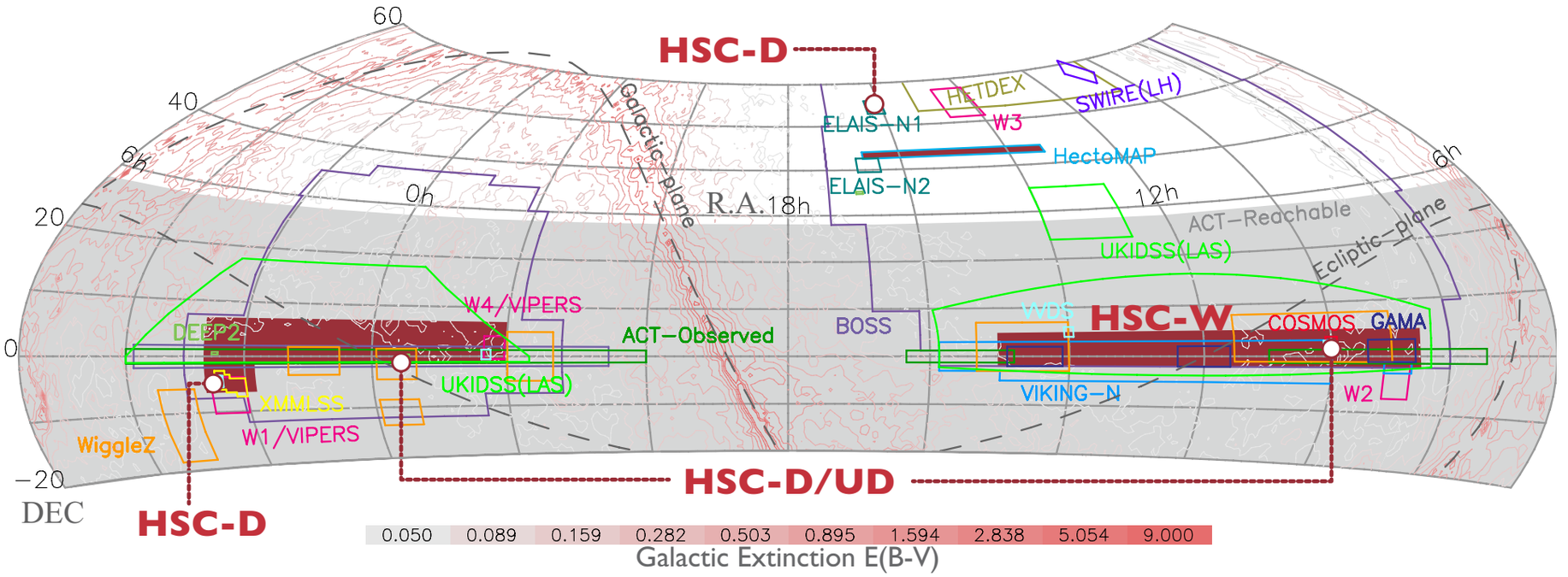
2017/6/16 Galaxy evolution across time@Paris



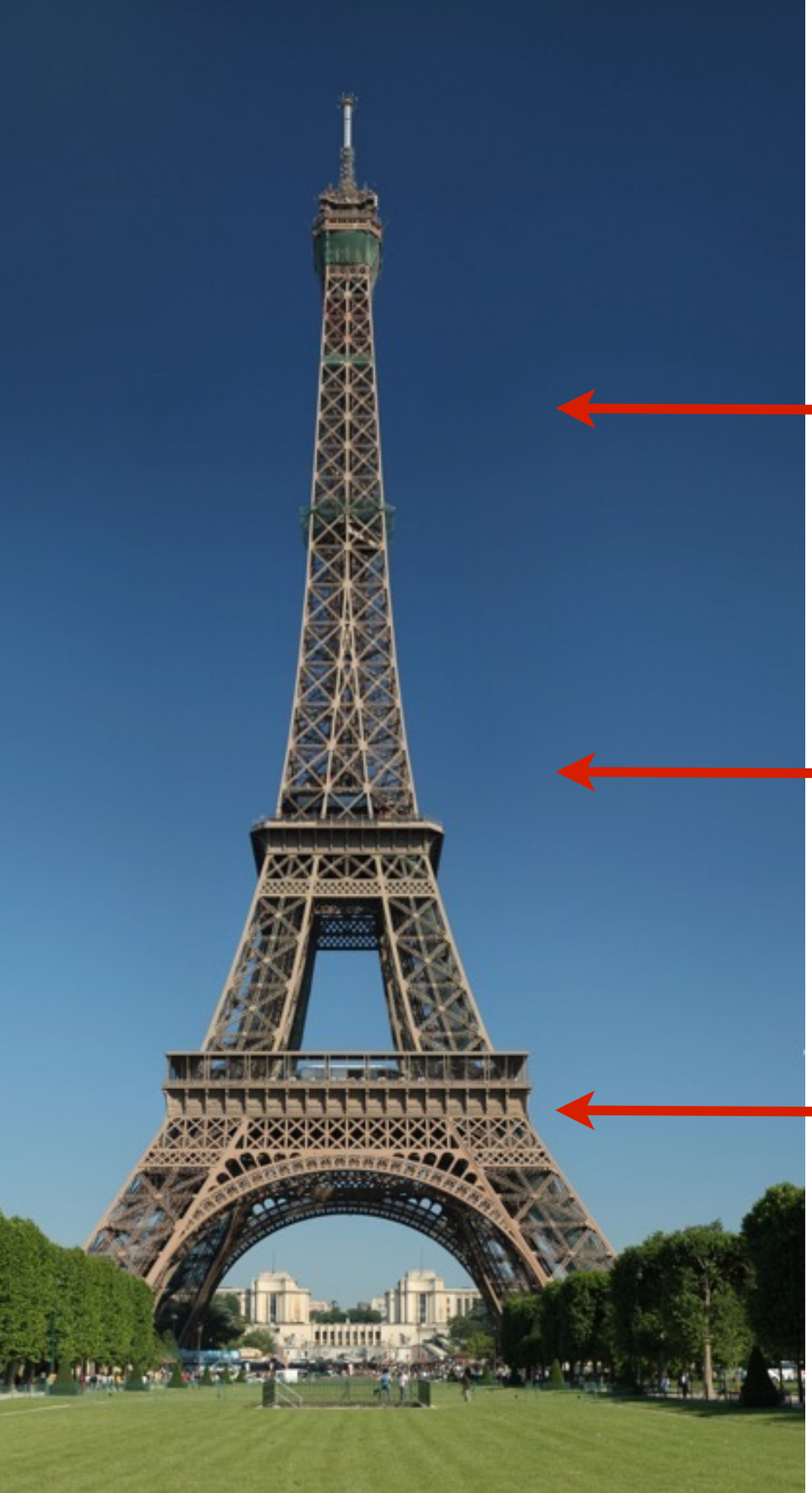
PI: Satoshi Miyazaki (NAOJ)

Hyper Suprime-Cam (HSC)





- new wide-field (1.7 deg^2) camera at Subaru telescope (first light in 2013)
- 300 nights awarded for imaging survey (HSC-SSP)
- three-layer survey from 2014 to 2019?



HSC-SSP: ``Eiffel-tower'' -type survey

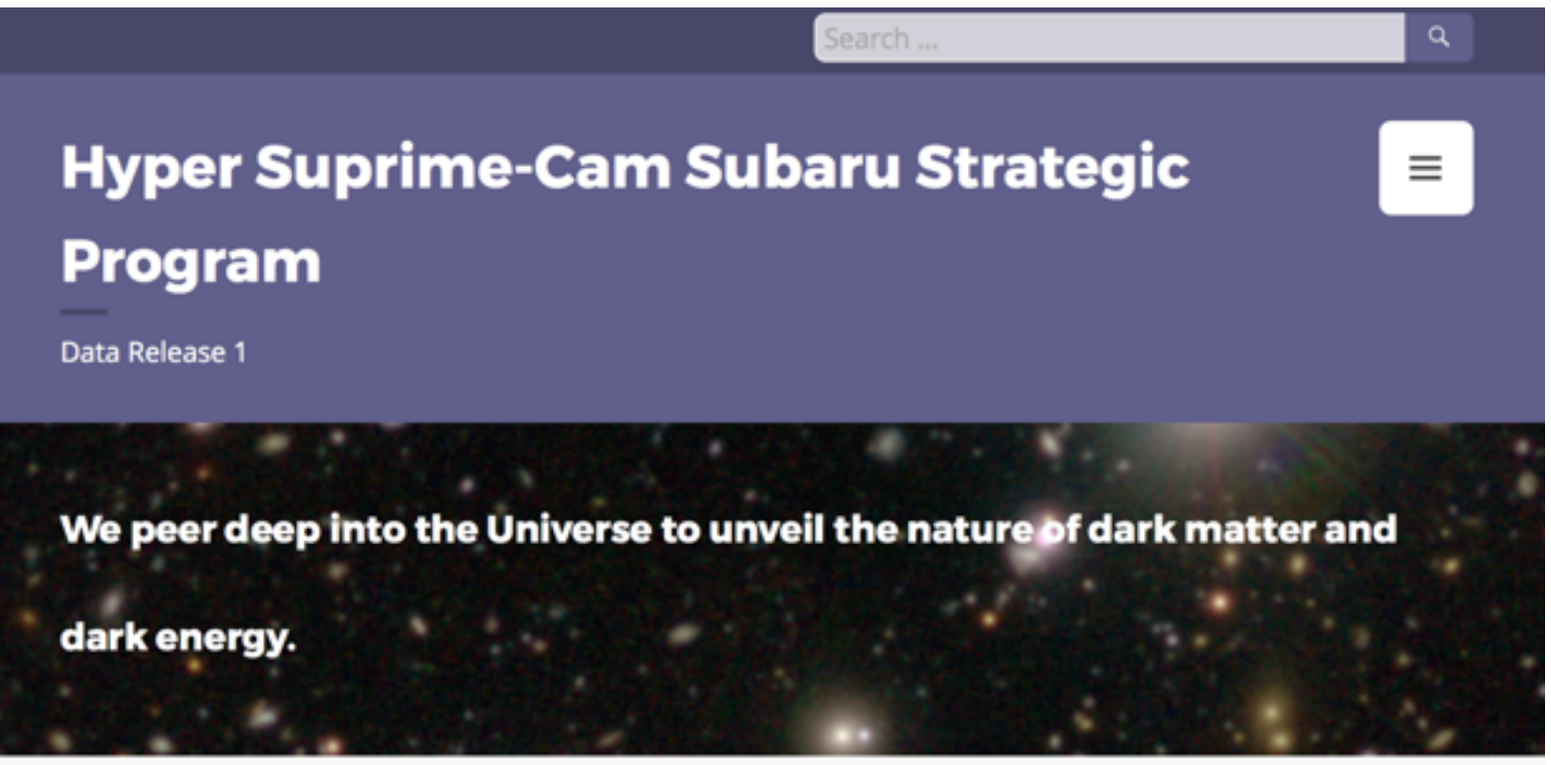
UltraDeep
(3.5 deg^2, r_{lim} ~ 28, grizy+3NBs)

Deep
(27 deg^2, r_{lim} ~ 27, grizy+3NBs)

Wide
(1400 deg^2, r_{lim} ~ 26, grizy)

https://hsc-release.mtk.nao.ac.jp/doc/

Public data release



News: the first incremental data release occurred on June 5!

An incremental data release is to add values top the current major release and may happen a few times a year. This first incremental release includes (1) photometric redshifts for the Wide layer and (2) the merged COSMOS data from the SSP team and the University of Hawaii. Photometric redshifts are now available over the entire area in the Public Data Release 1. The merged COSMOS data set is described in detail in this page.

Public Data Release 1

Welcome to the Hyper Suprime-Cam Subaru Strategic Program Data Release Site!
The first public release of HSC-SSP occurred on 28 February 2017. The release includes over 100

Fist public release on 2017 Feb 28, containing ~100 deg^2 images with full color (Aihara+ 1702.08449)

SQL server + very nice image browser (hscMap)

Please use it!

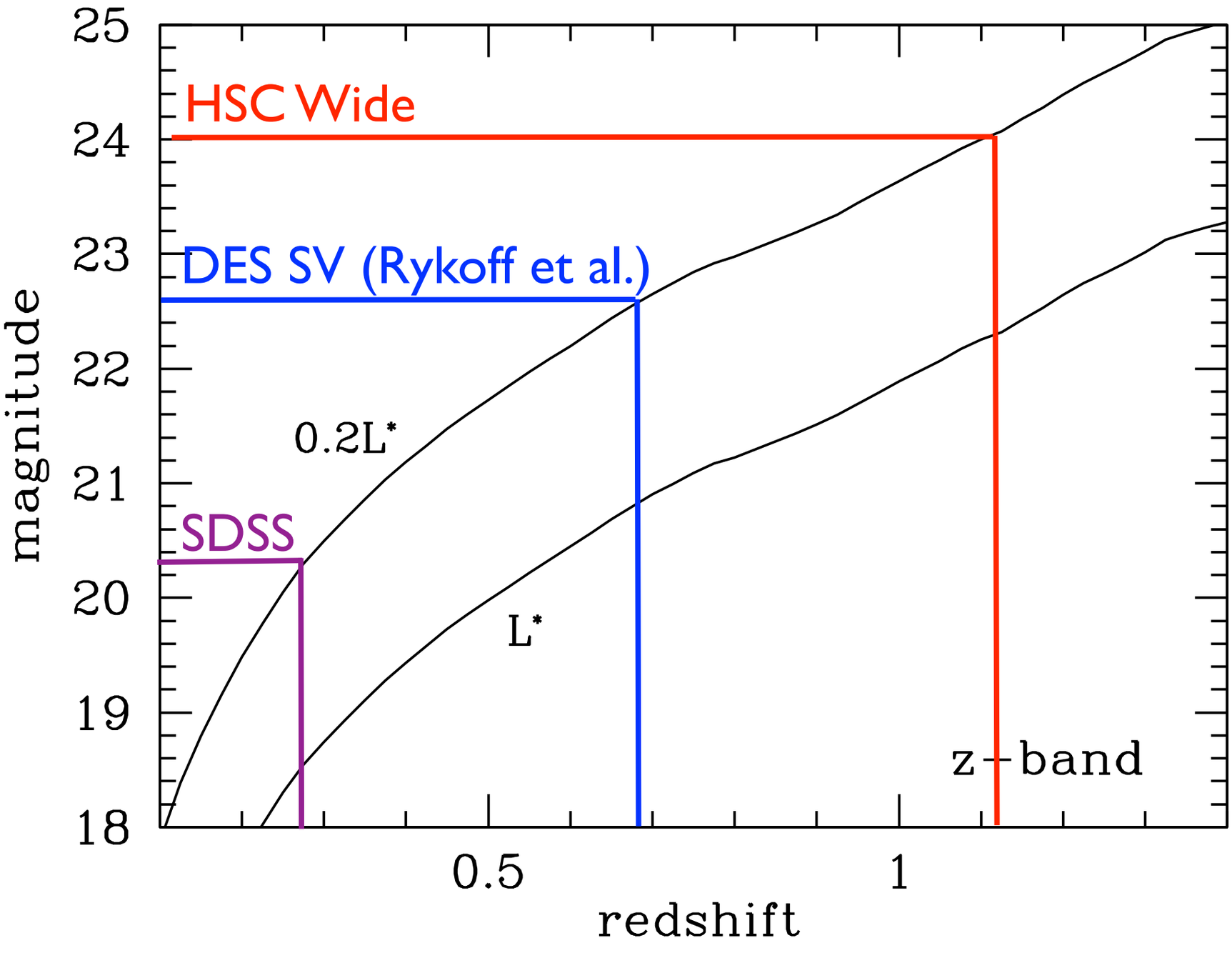
Oguri MNRAS **444**(2014)147

Optical cluster finder: CAMIRA

- "red-sequence" cluster finder with arbitrary set of filters
- fit all photometric galaxies with SPS model (BC03) to derive likelihood of being cluster members as a function of redshift
- construct a 3D richness map to find clusters as peaks in the map
- successfully applied to SDSS DR8 to produce a catalog of ~70,000 clusters at $0.1<z<0.6$

(available at: http://www.slac.stanford.edu/~oguri/cluster/)

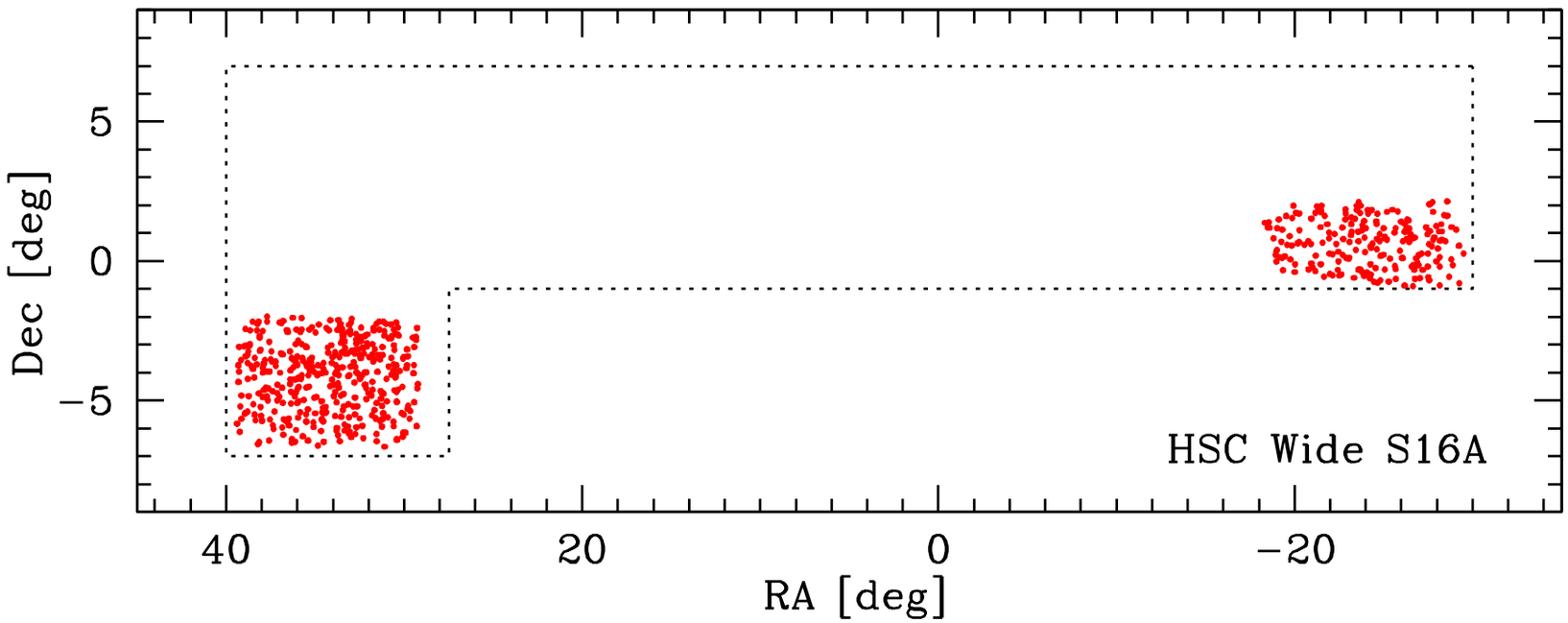
The power of HSC survey

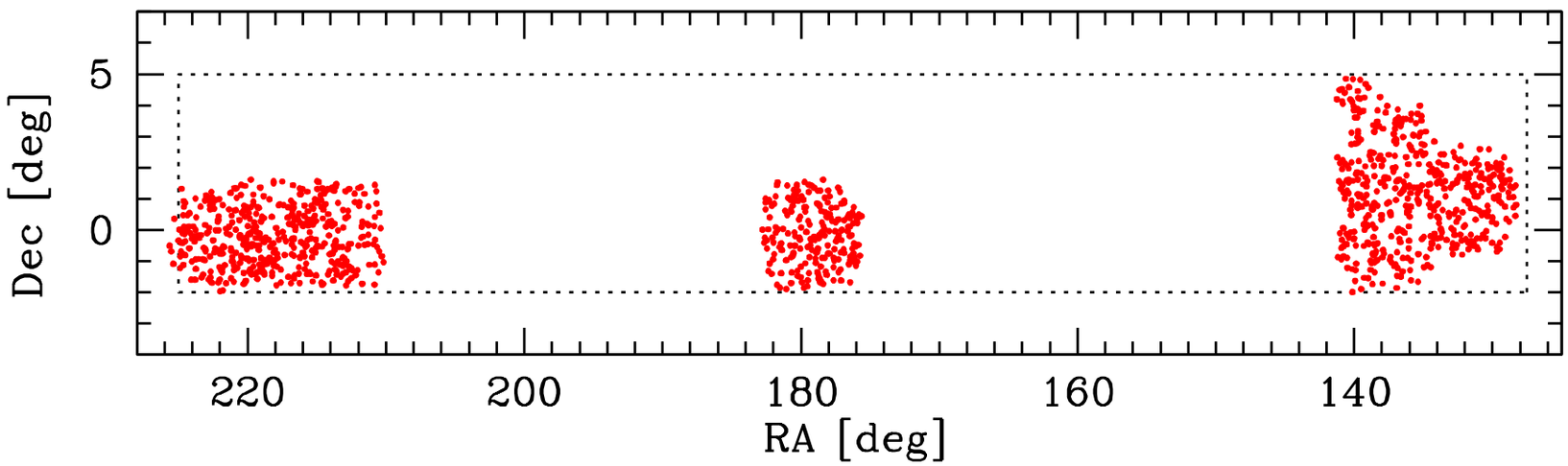


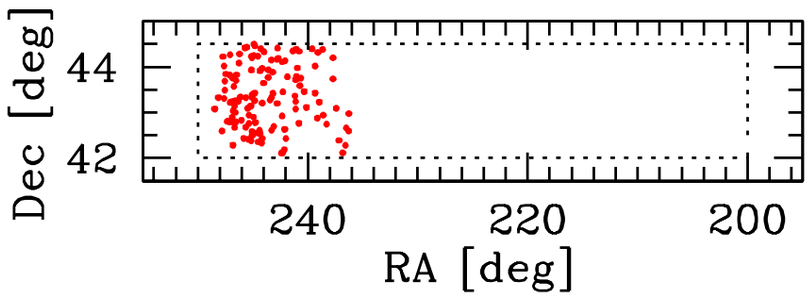
all members (>0.2L*) out to z~1.1!

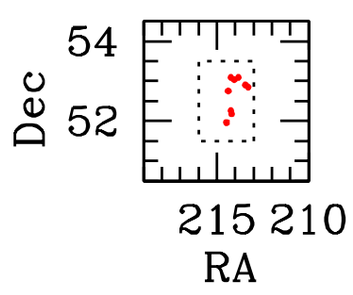
Oguri et al., arXiv:1701.00818

CAMIRA HSC cluster catalogue





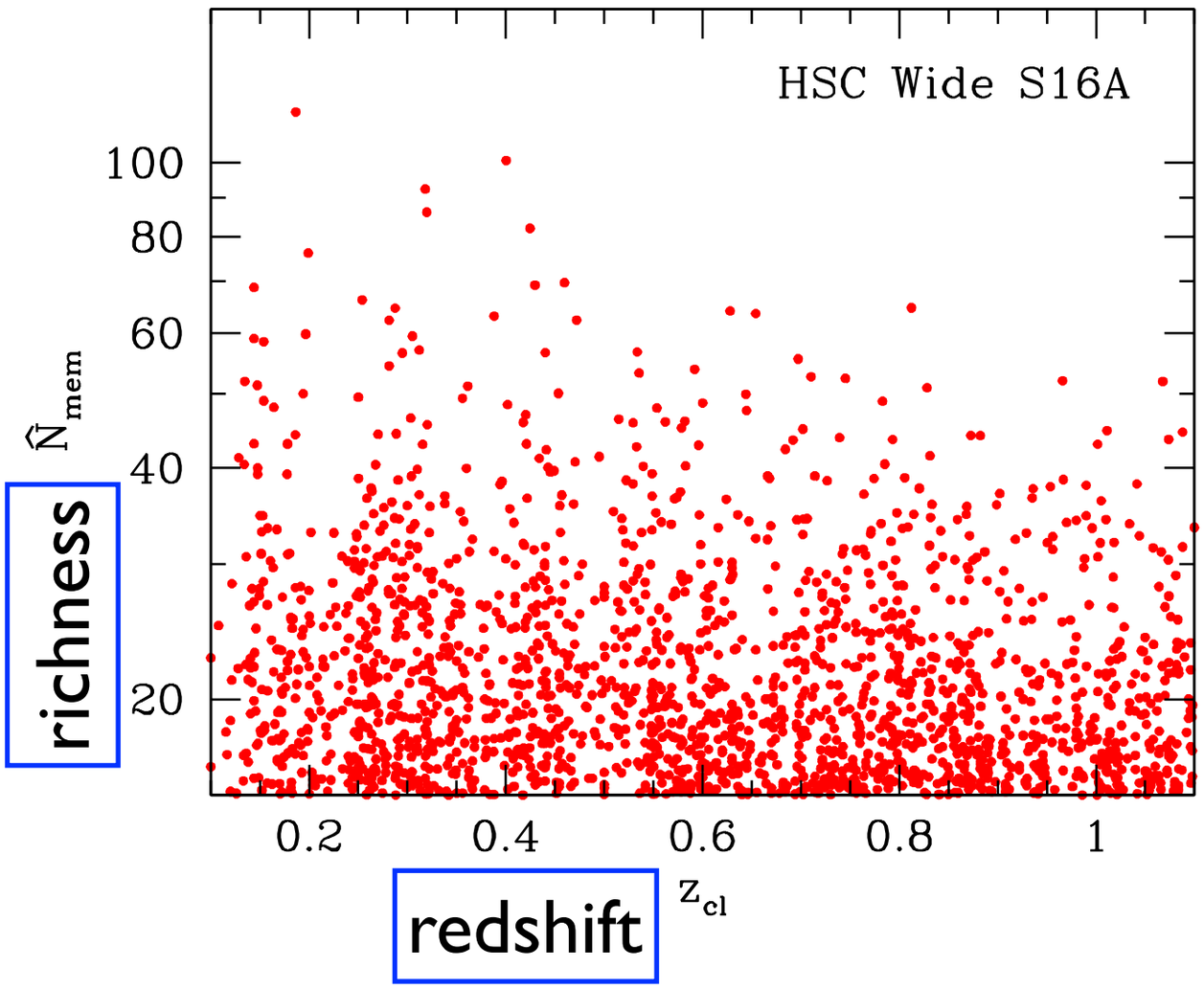


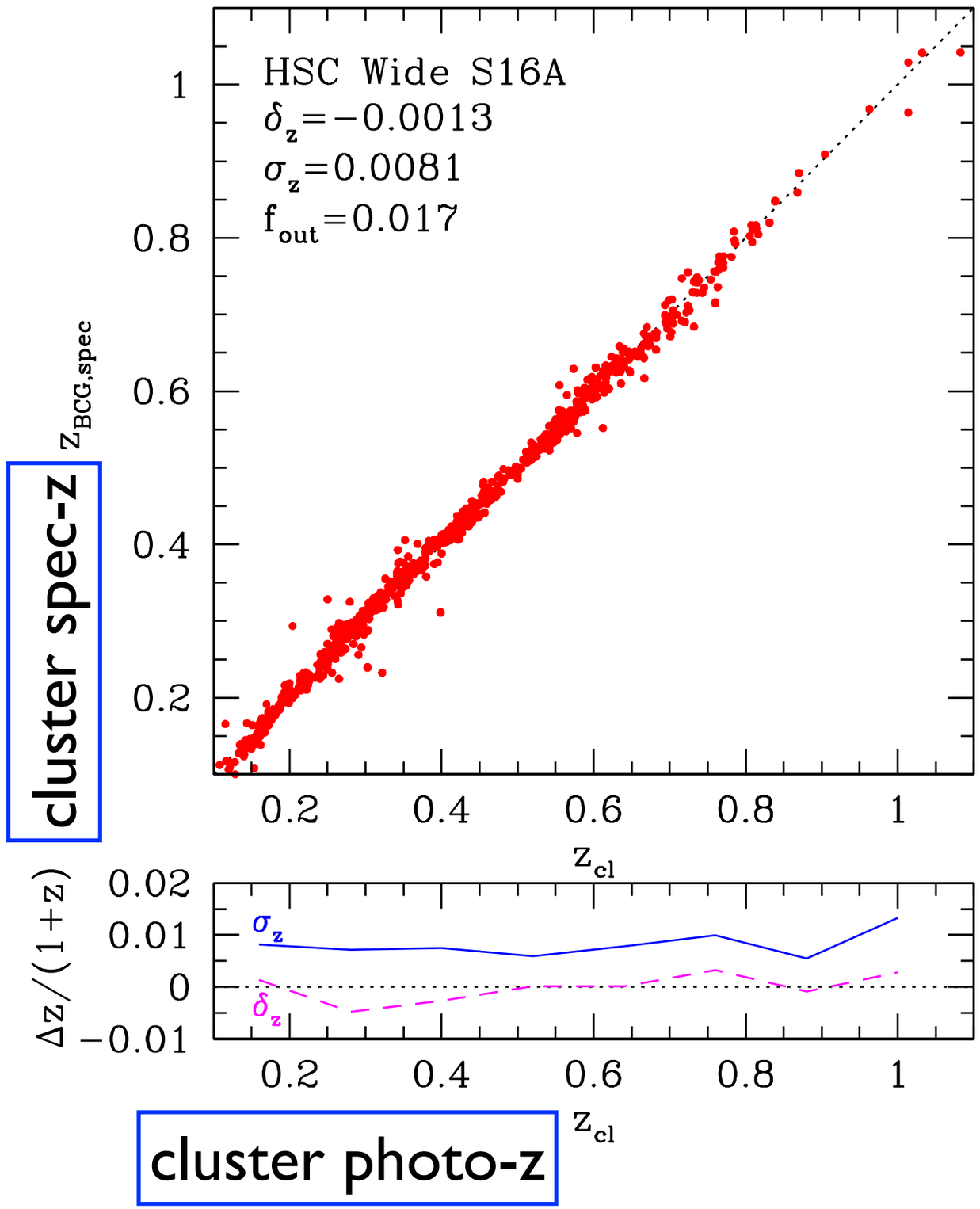


- clusters from internal release of HSC data (S16A) covering ~232 deg^2

Oguri et al., arXiv:1701.00818

CAMIRA HSC cluster catalogue





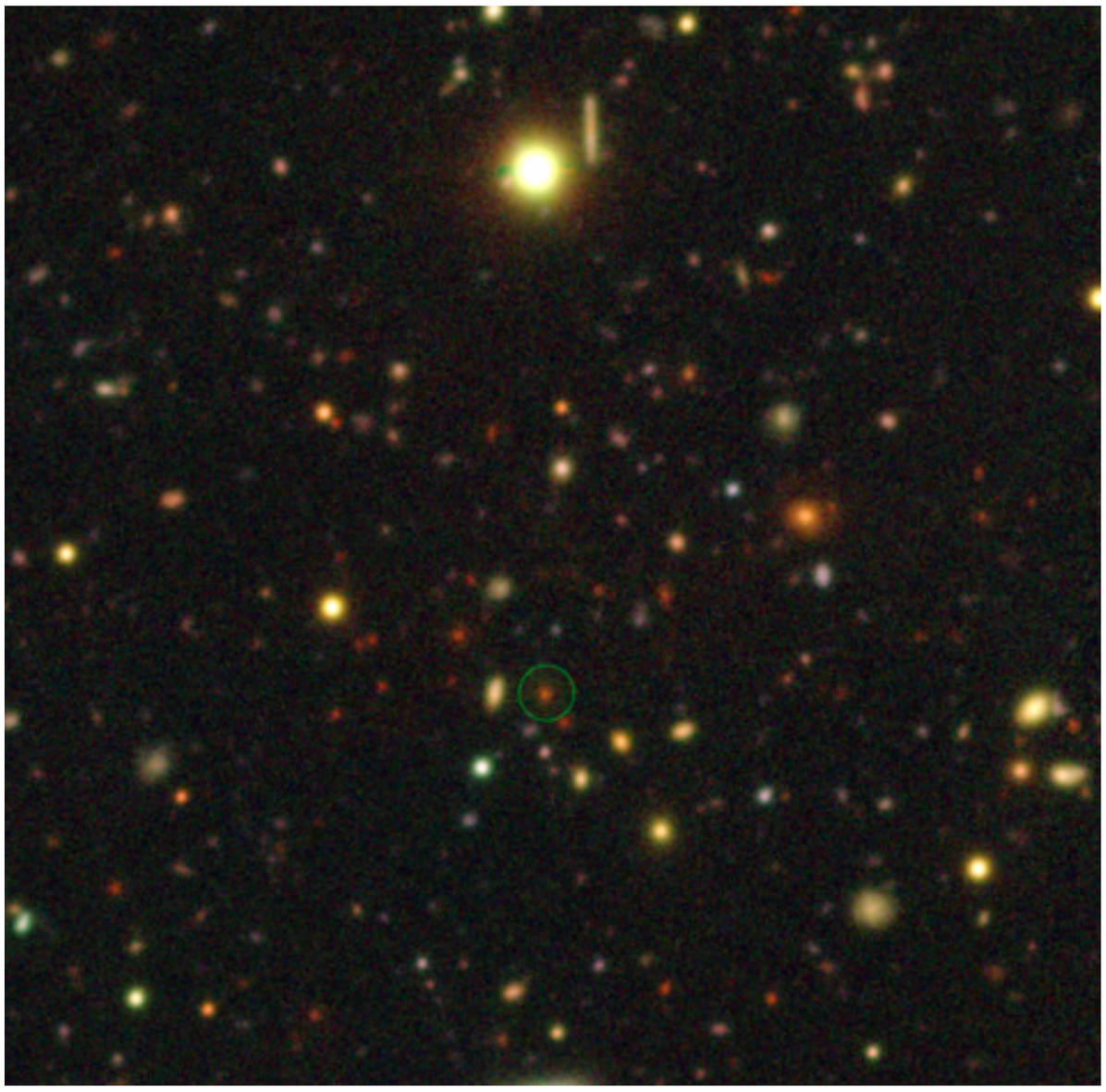
- 1921 clusters with $N>15$ at $0.1<z_{cl}<1.1$
- very good photo-z!

N=64.7 z=0.812

N=43.6 z=1.074

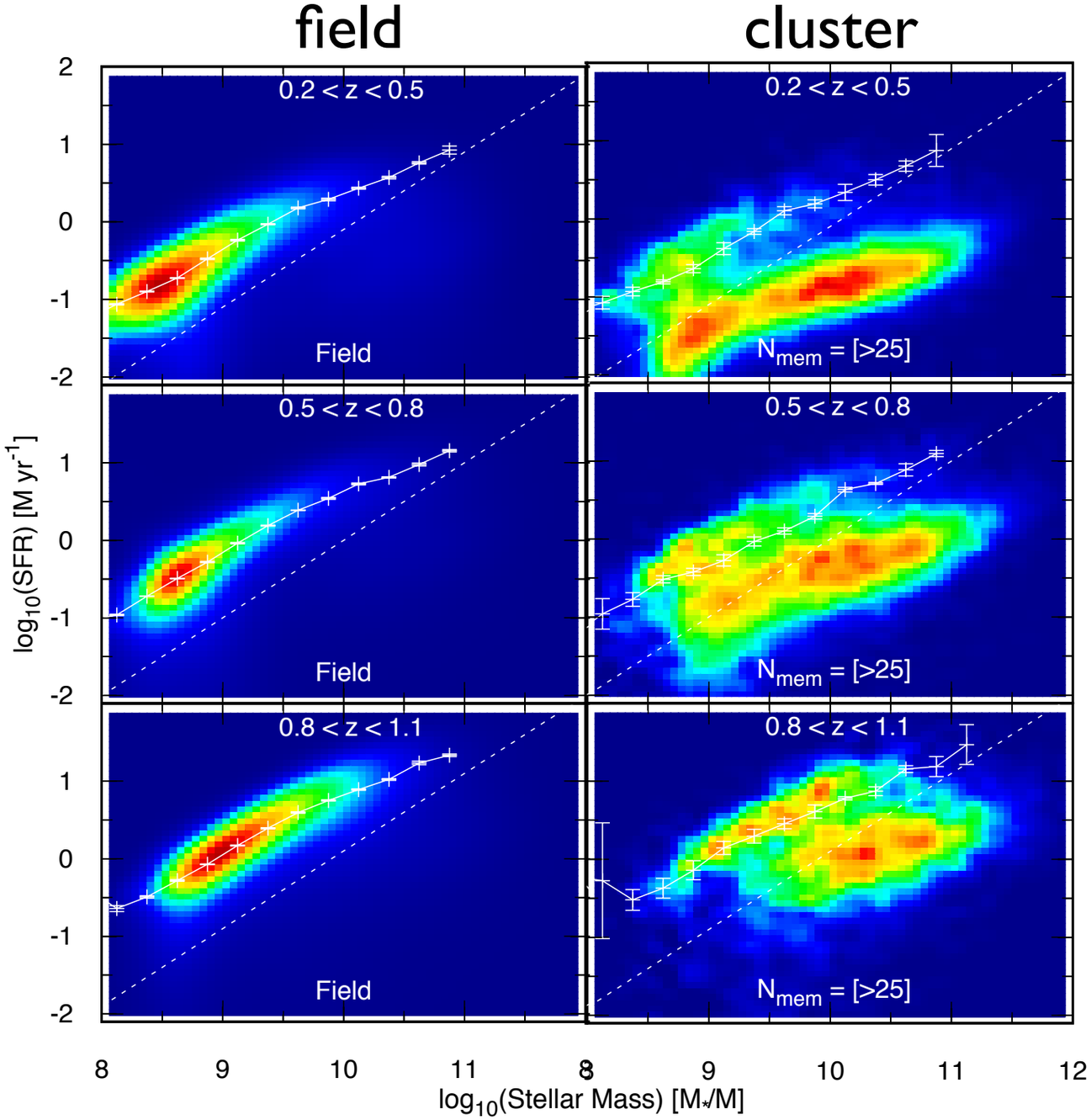
Future extension?

- pushing the redshift limit to z~1.4 (work in progress)

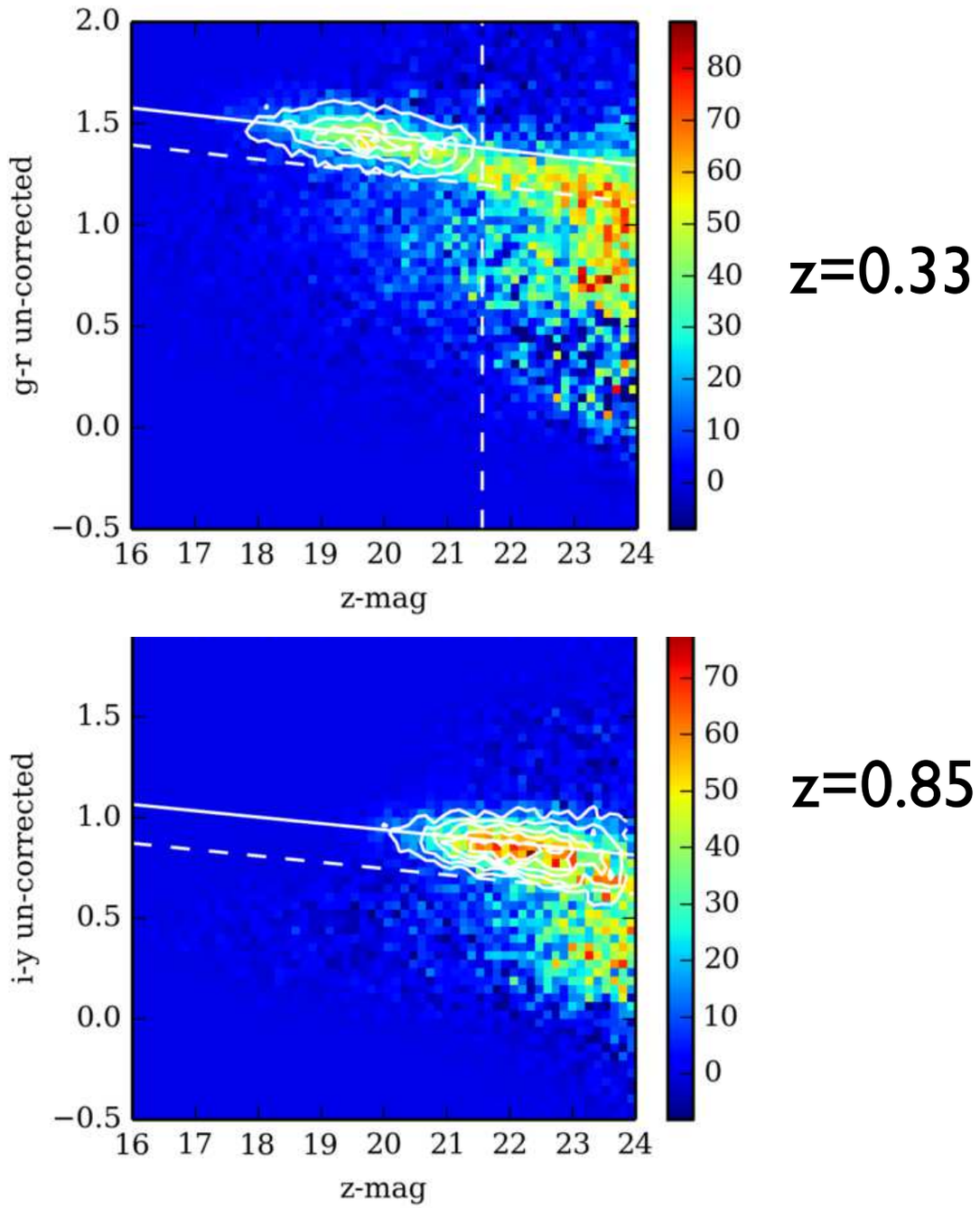


rich cluster at z~1.3

Cluster galaxy evolution studies



evolution of M*-SFR relation (Jian+ 1704.06219)



stacked color-mag diagram (Nishizawa+ submitted)

Other exciting (galaxy) results

- Hα/[OIII]/[OII] emitting galaxies from NB imaging (Hayashi+, Koyama+)
- quasars at z~4-7 (Matsuoka+, Akiyama+)
- LBGs at z~4-7 (Ono+), LAEs at z=5.7/6.6 (Shibuya+)
- strong lensing (Sonnenfeld+)
- weak lensing is ready (Mandelbaum+, Oguri+)
- and many others.... keep an eye on arXiv!

Summary

- HSC-SSP survey is ongoing and first public data release was made in 2017 Feb
- already >200 deg^2 in grizy with r_{lim}~26
- a lot of science results including galaxy and cluster studies
- reliable optical cluster selection out to z~1 and beyond