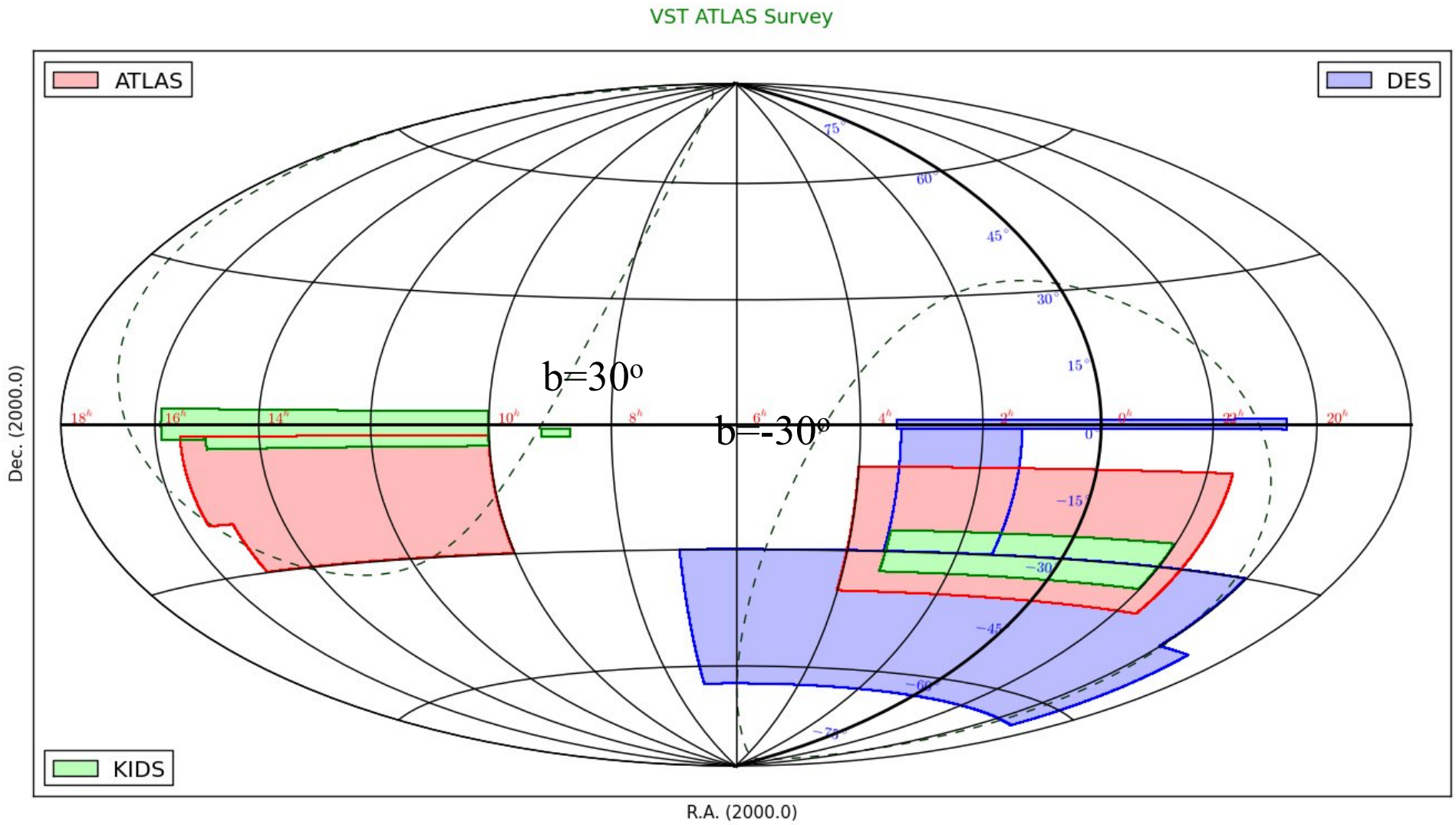
VST ATLAS: Overview + Status

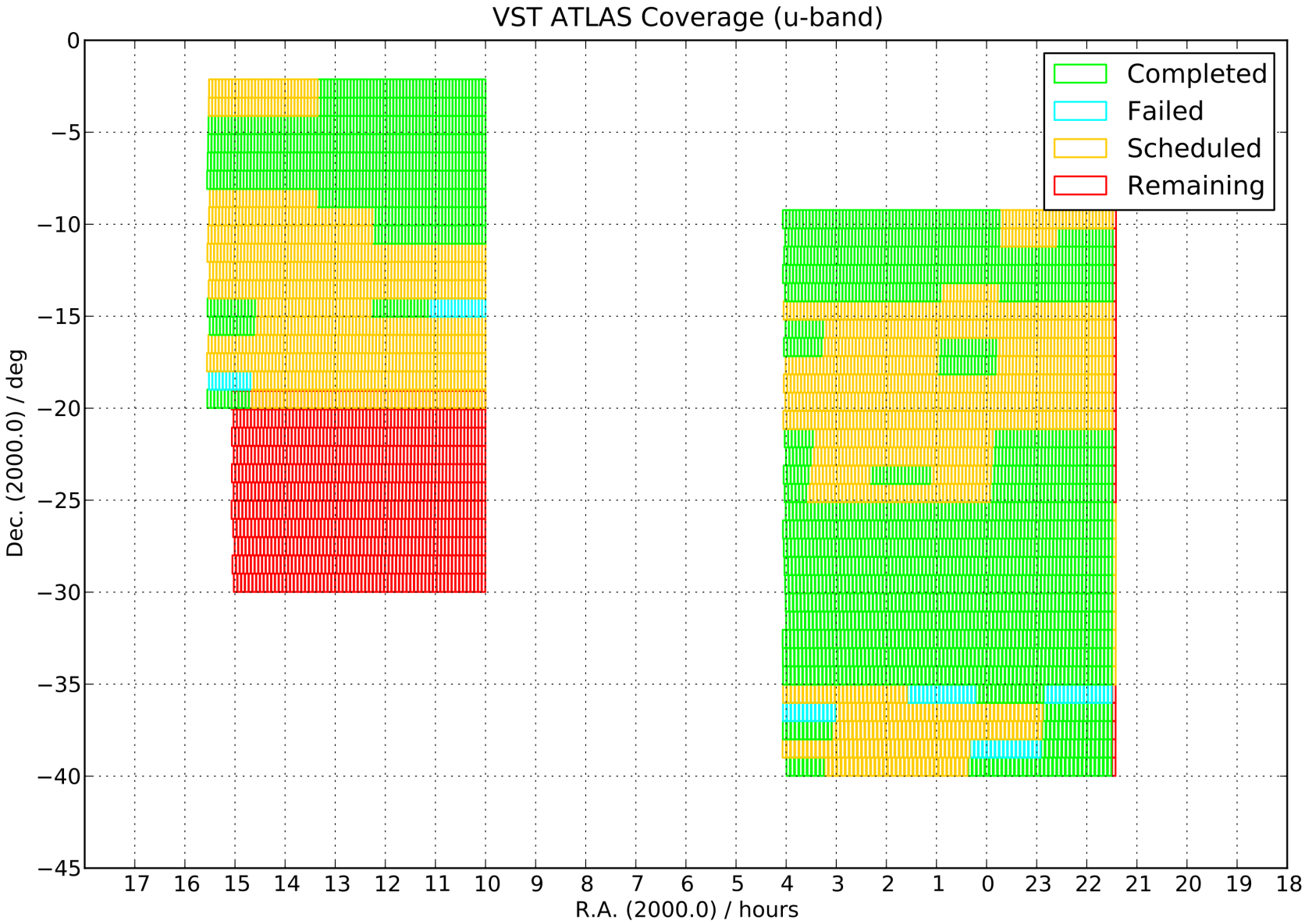
Tom Shanks, Ben Chehade, Joe Findlay, Nigel Metcalfe et al (Durham) + ESO (M Petr-Gotzens et al) + CASU(MJ Irwin et al) + WFAU (RG Mann et al)

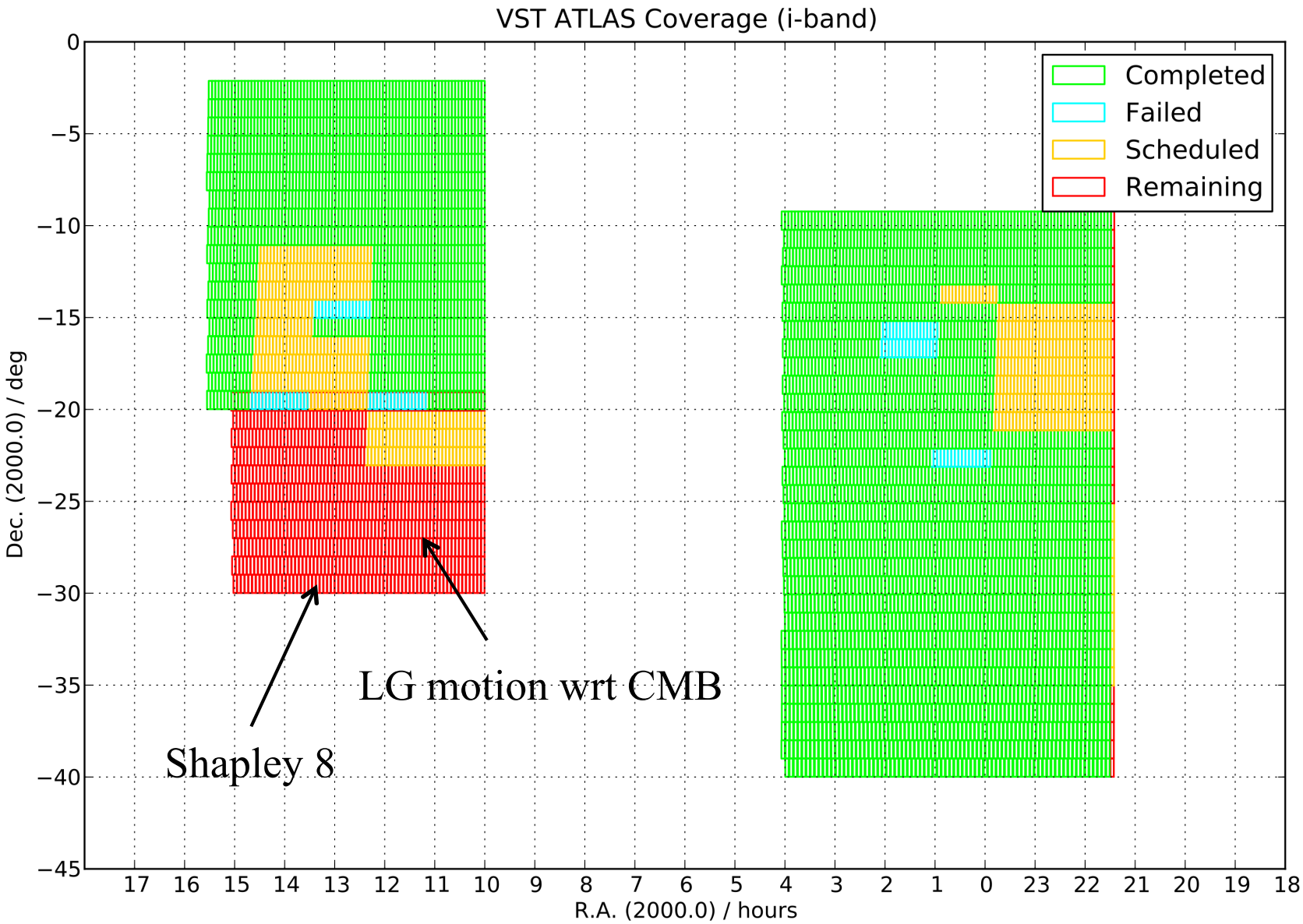
VST ATLAS Survey

- VST ATLAS (+VHS) → Southern SDSS in ugriz(+YJHK)!
- Exposures u: 2x60s, g: 2x50s, riz: 2x45s – one filter per hourly concatenation – ugr (dark), iz (gray/bright)
- Chilean u extension (PI L. Infante) → doubles u exposure
- 2-tile dither – 84" in Dec, 24" in RA
- Offsets 58' in RA and Dec – 2' overlap
- Calibration – ESO v APASS v overlaps – see Irwin/Findlay talks
- seeing<1."4 – better than SDSS - see later!
- Footprint ~2500deg^2 in SGC and ~2000deg^2 in NGC
- Equivalent of ~2900deg^2 ugriz observed since September 2011
- ATLAS DR1 released 6 months ago contains ~1500deg^2 to 9/12

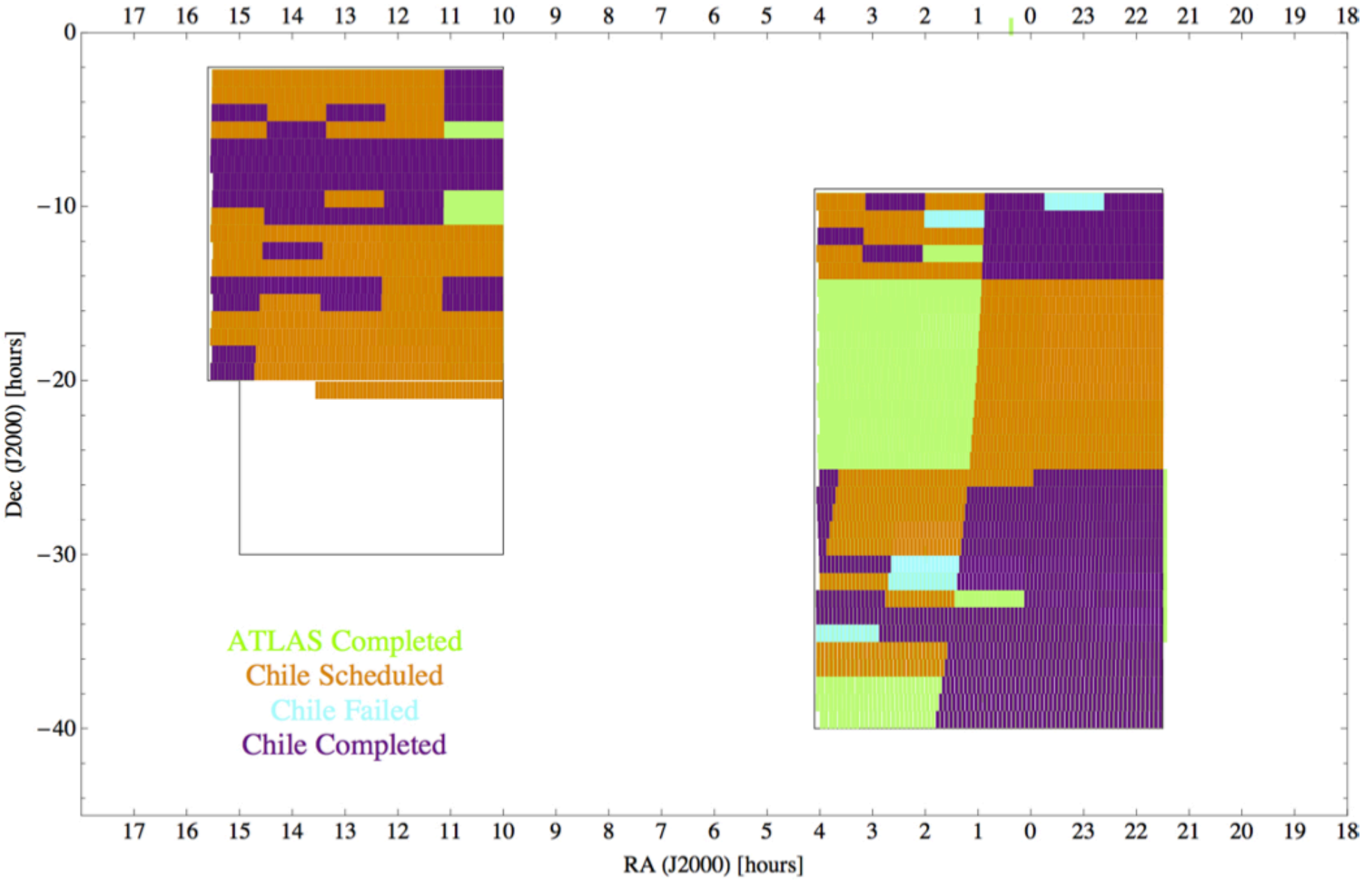
VST ATLAS Survey Area



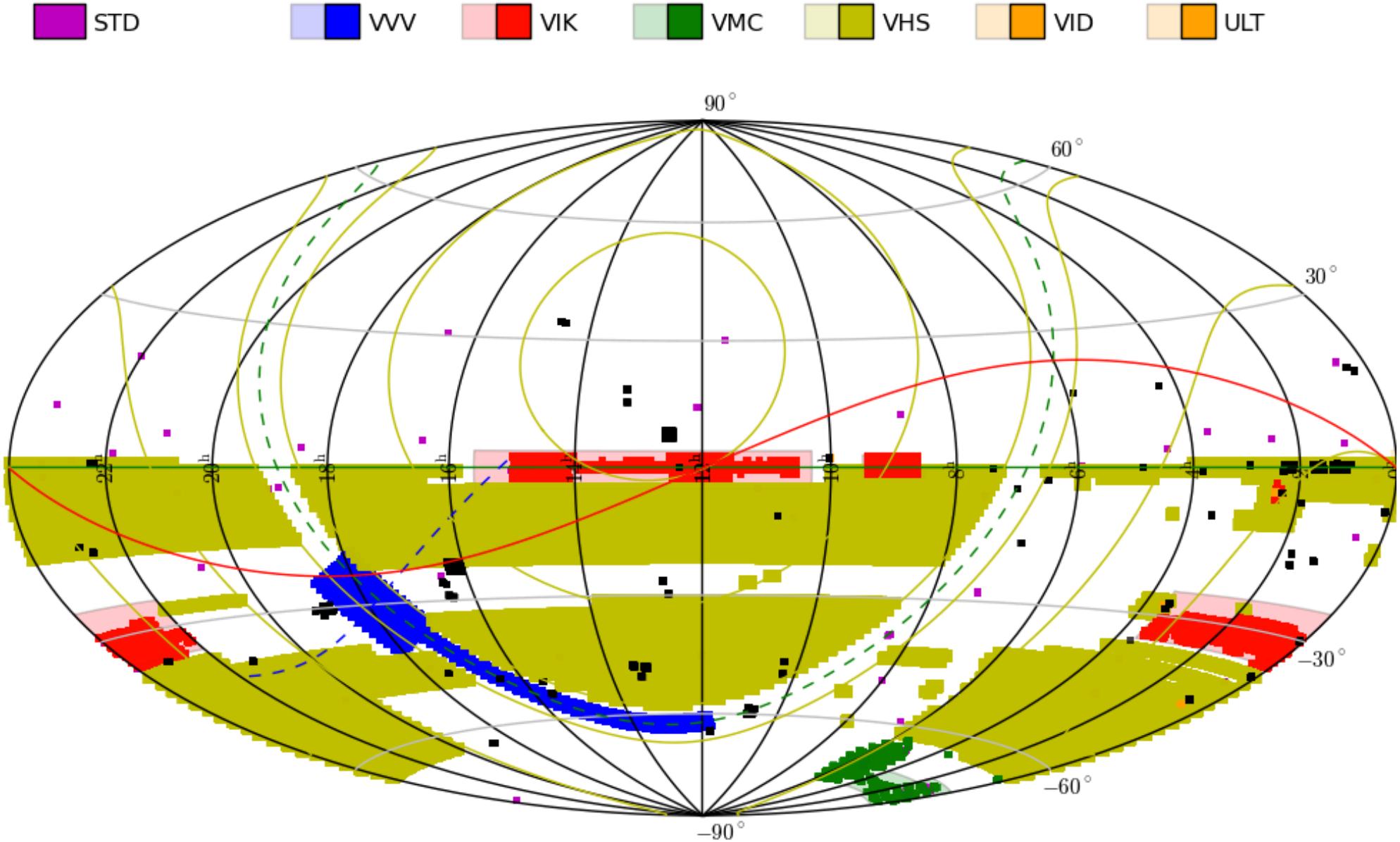

VST ATLAS Coverage (u-band)
Completed
Failed
Scheduled
Remaining
Dec. (2000.0) / deg
0
−5
−10
−15
−20
−25
−30
−35
−40
−45
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 23 22 21 20 19 18
R.A. (2000.0) / hours


VST ATLAS Coverage (i-band)
Completed
Failed
Scheduled
Remaining
Dec. (2000.0) / deg
R.A. (2000.0) / hours
0
−5
−10
−15
−20
−25
−30
−35
−40
−45
17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 23 22 21 20 19 18
LG motion wrt CMB
Shapley 8

Chilean ATLAS u Extension



VHS+VIKING Progress

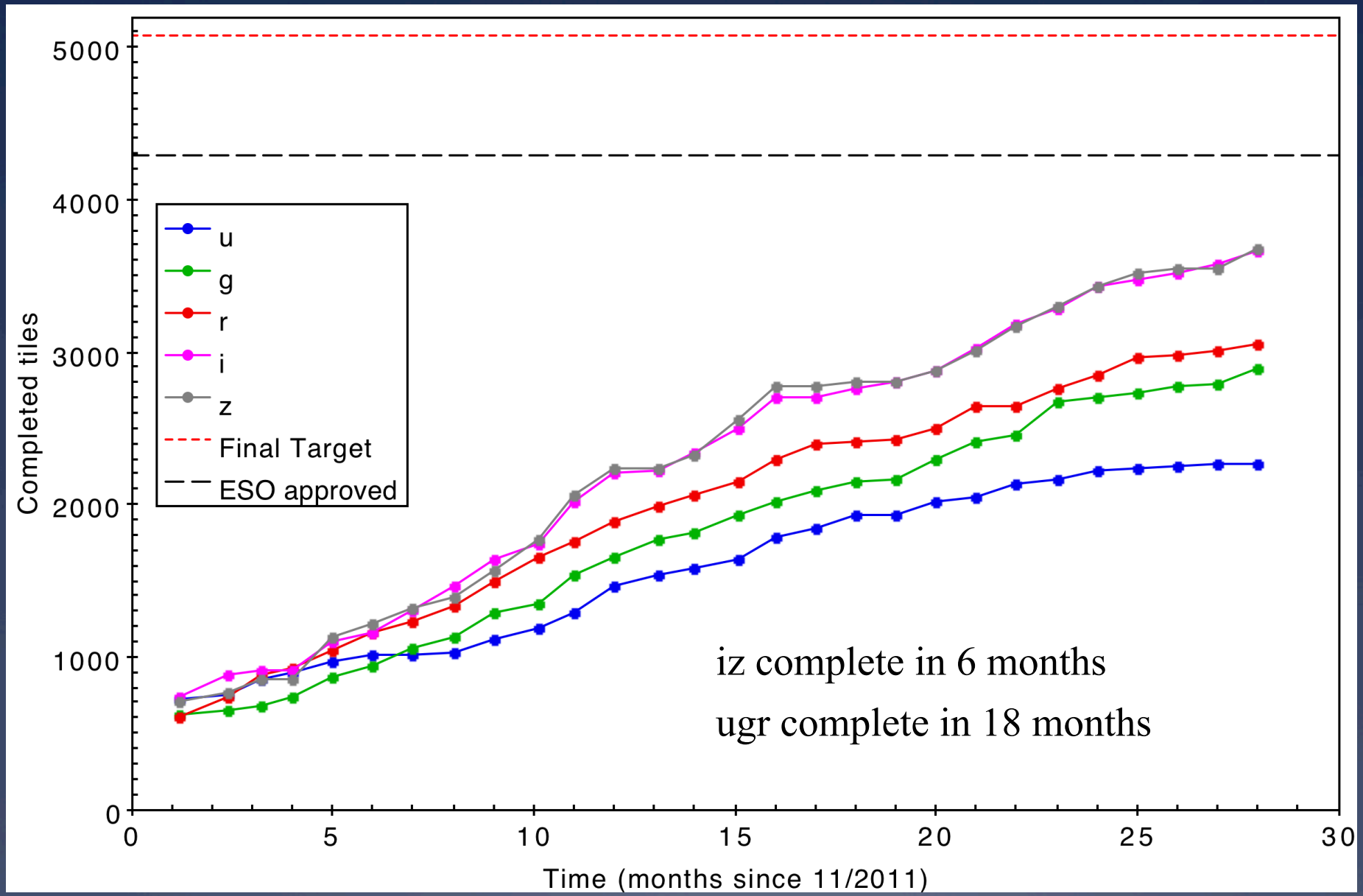


Observing dates: 20091015 - 20140228

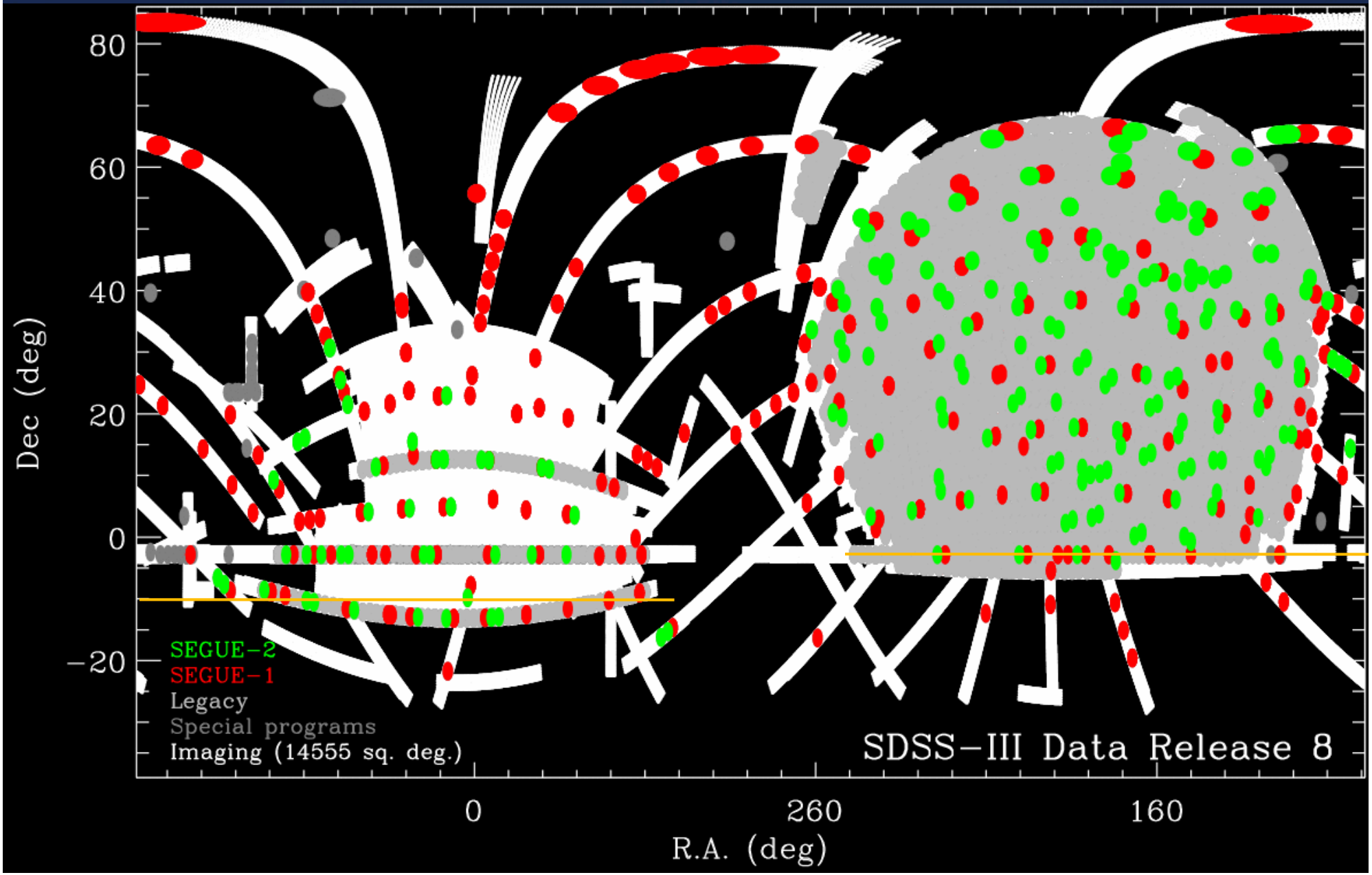
Cambridge Astronomy Survey Unit

Last Updated: 10/04/2014

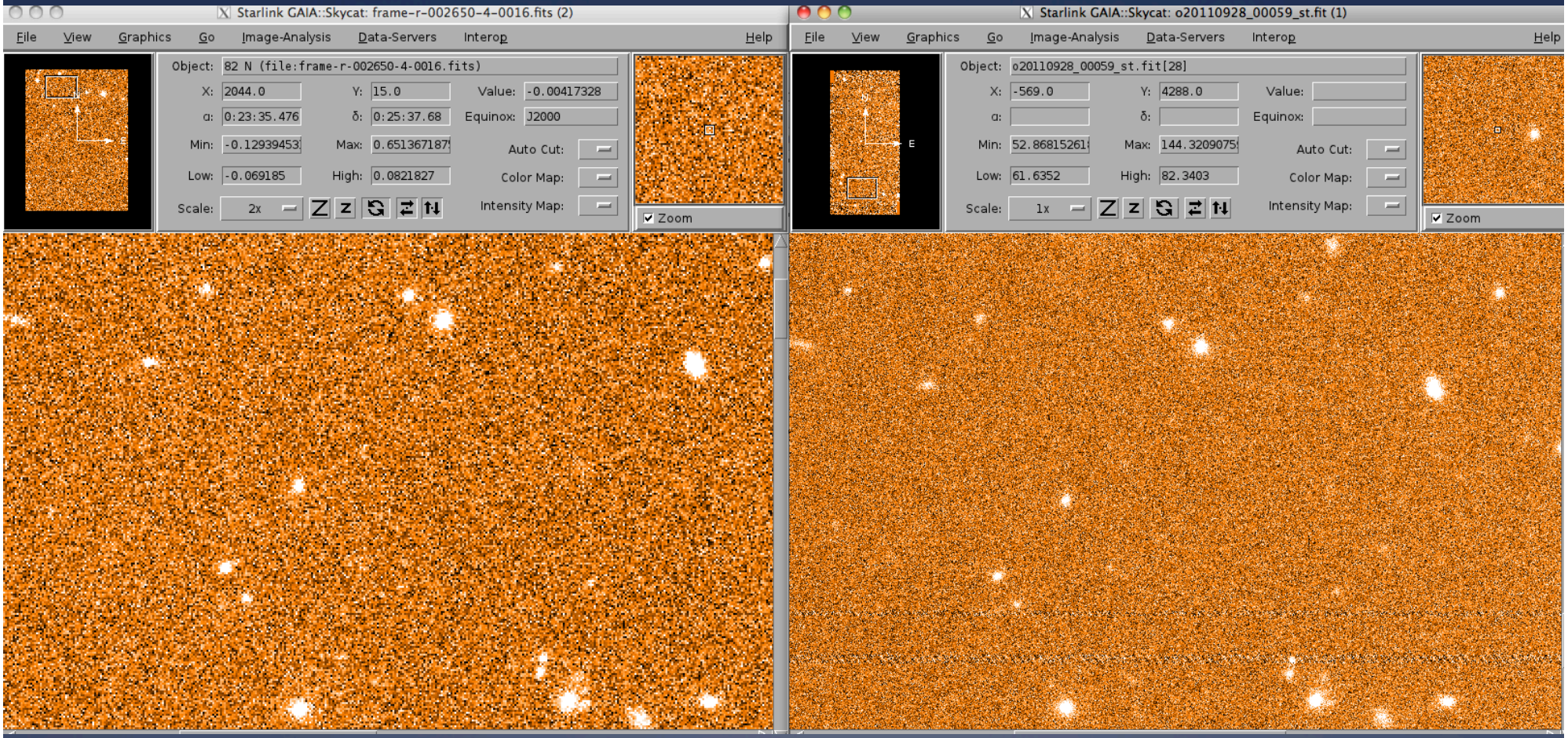
ATLAS Progress by band



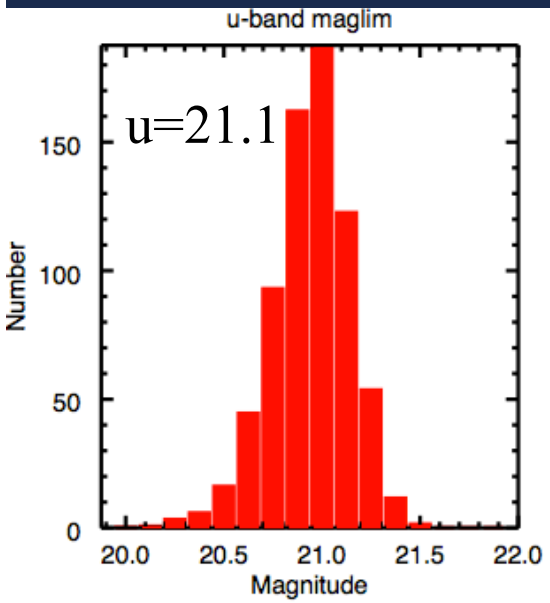
SDSS Overlap

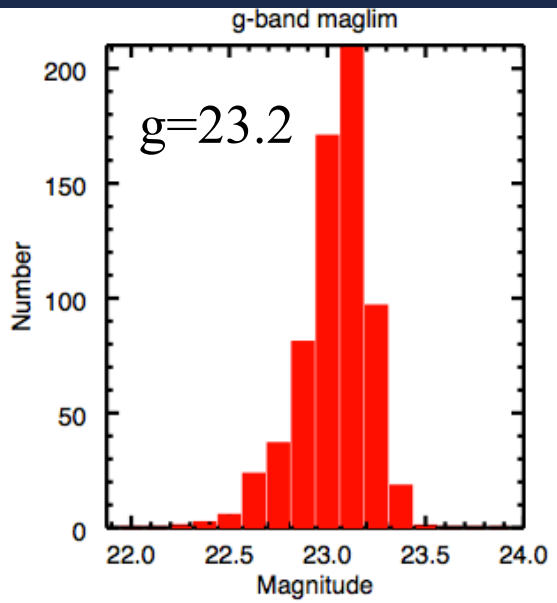


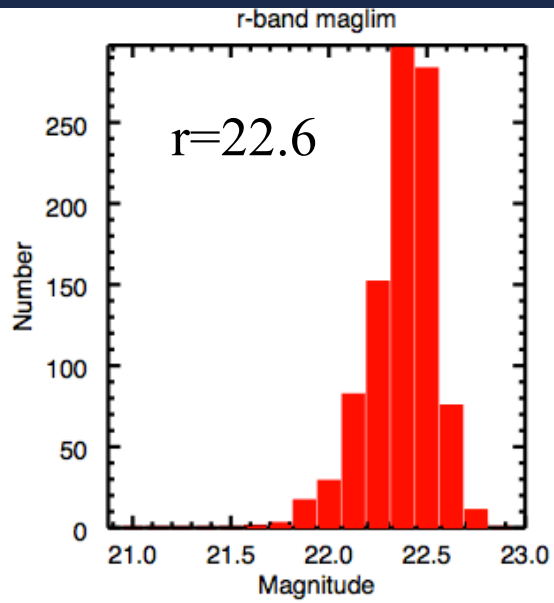
SDSS-ATLAS - r

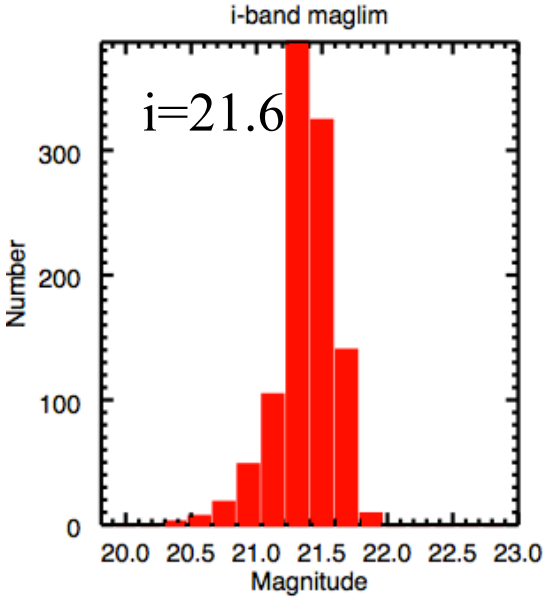


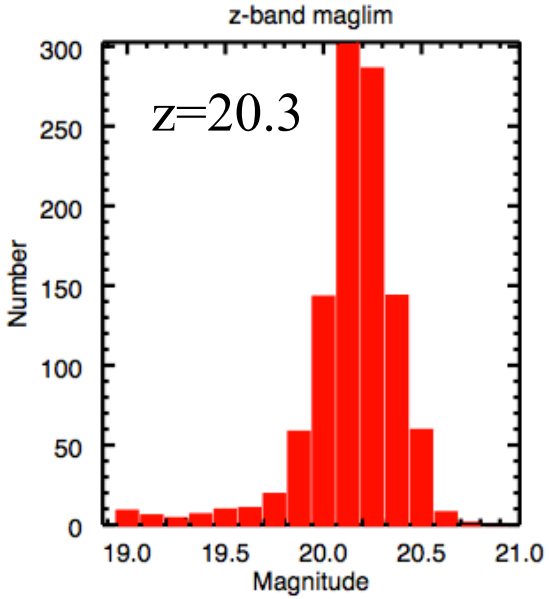
SDSS ATLAS



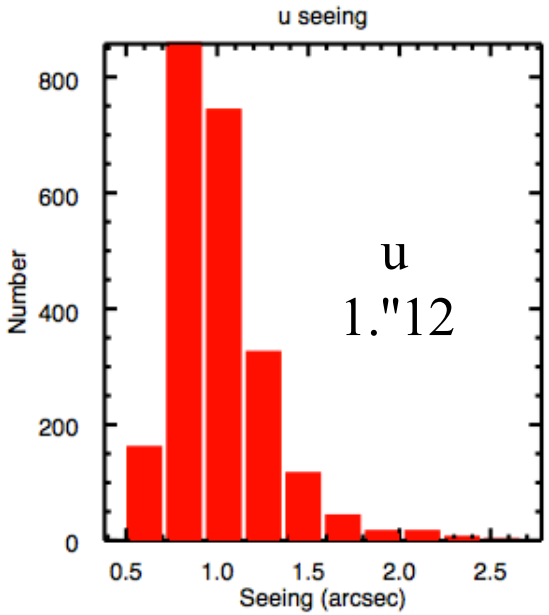


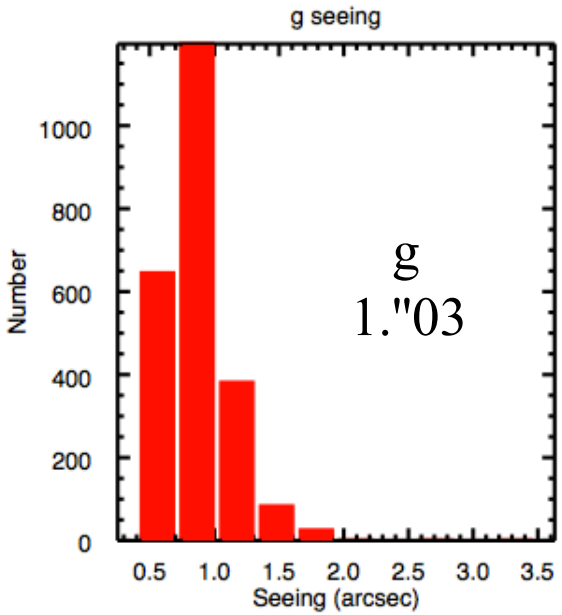


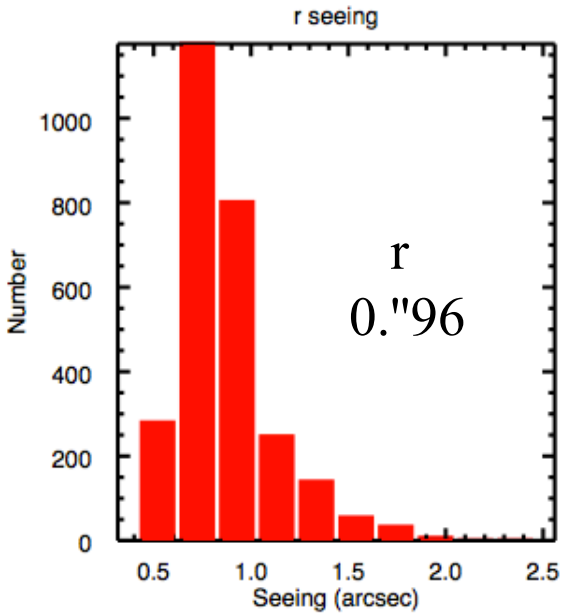


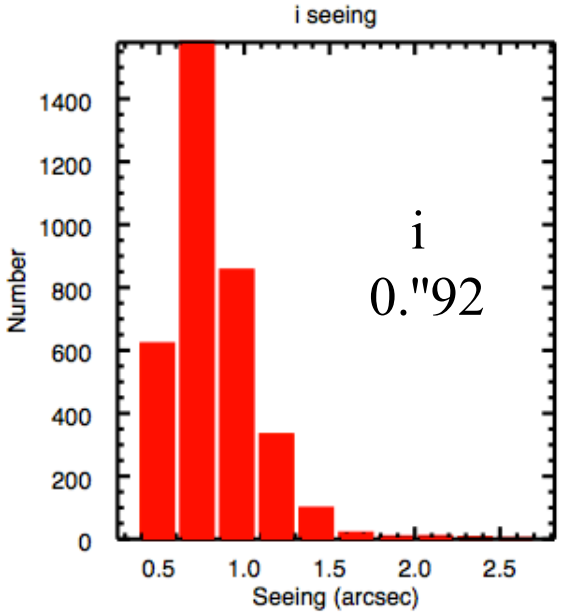


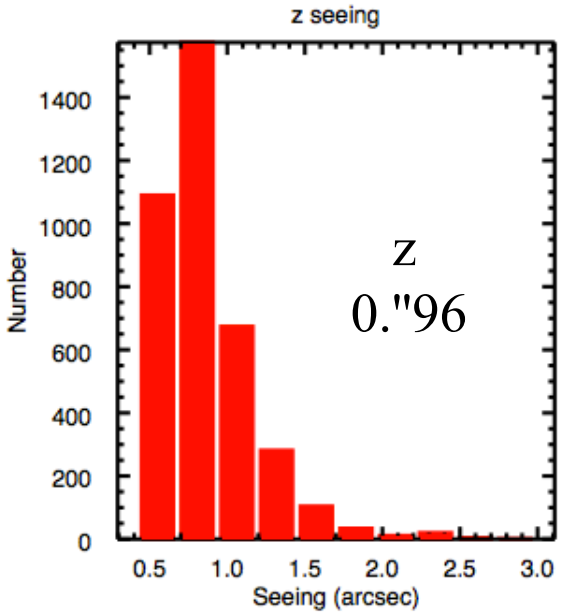
Band	Ndata	Median	10%	90%	Range
u	704	21.08	20.80	21.33	0.532
g	644	23.20	22.92	23.37	0.443
r	947	22.56	22.29	22.73	0.436
i	1036	21.58	21.29	21.83	0.545
z	1075	20.32	20.02	20.54	0.520





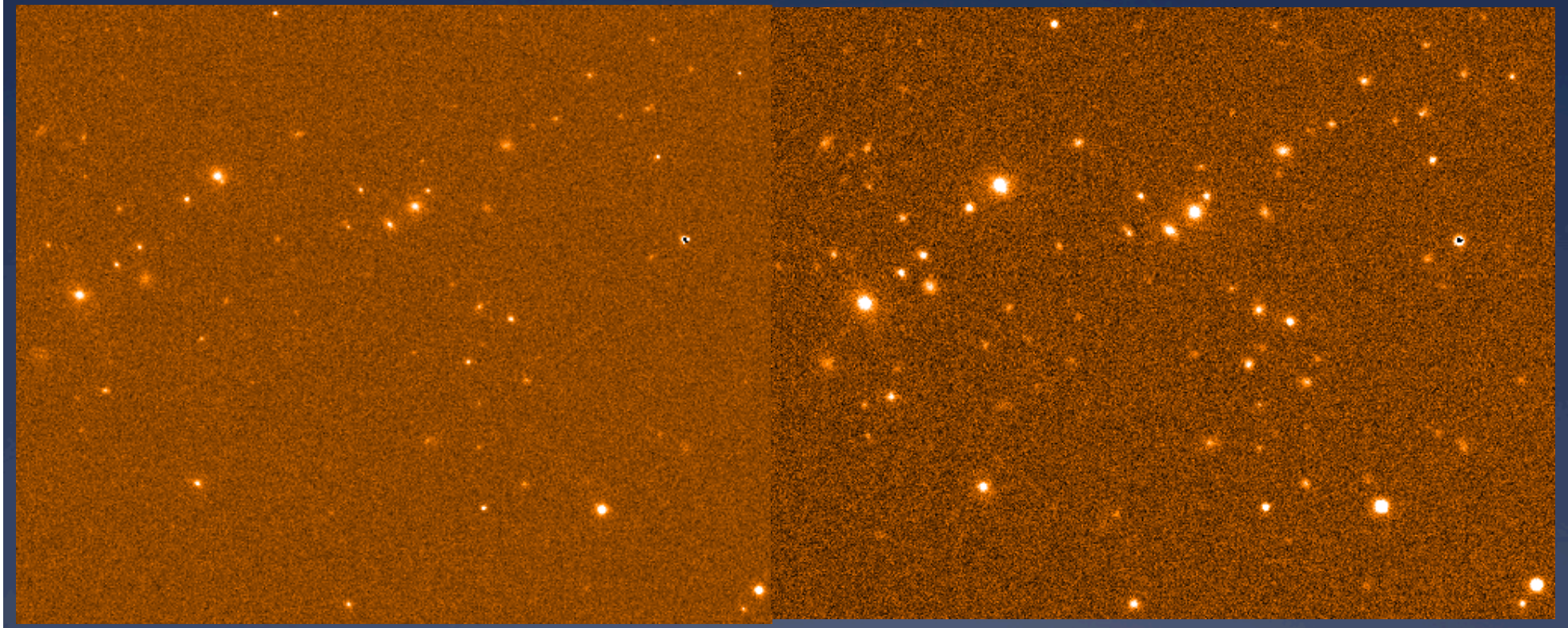






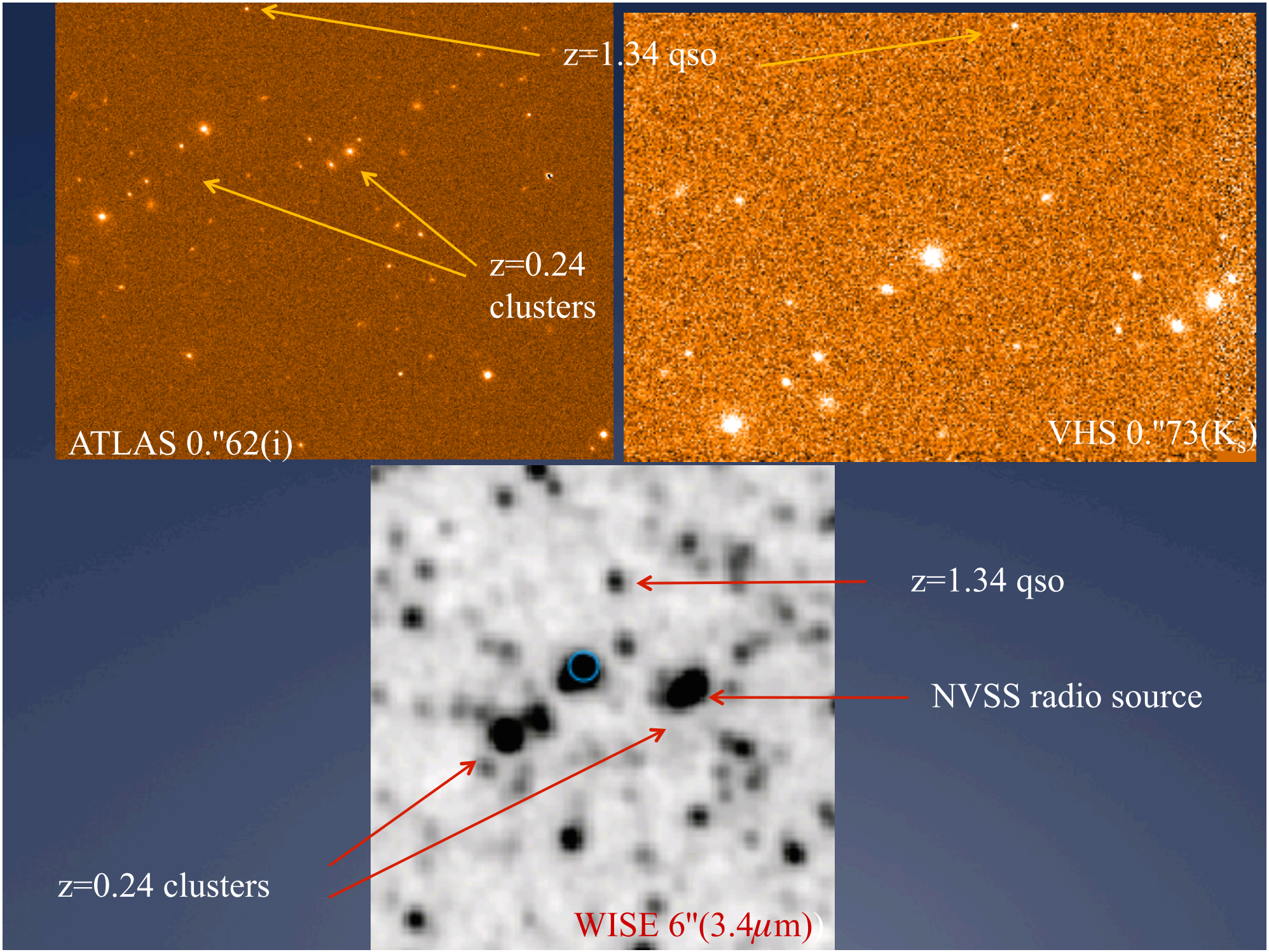
Band	Ndata	Median	10%	90%	Range
u	2276	1.12	0.87	1.52	0.650
g	2334	1.03	0.76	1.41	0.650
r	2742	0.96	0.74	1.38	0.640
i	3517	0.92	0.69	1.33	0.640
z	3793	0.96	0.70	1.46	0.760

ATLAS v SDSS galaxy clusters

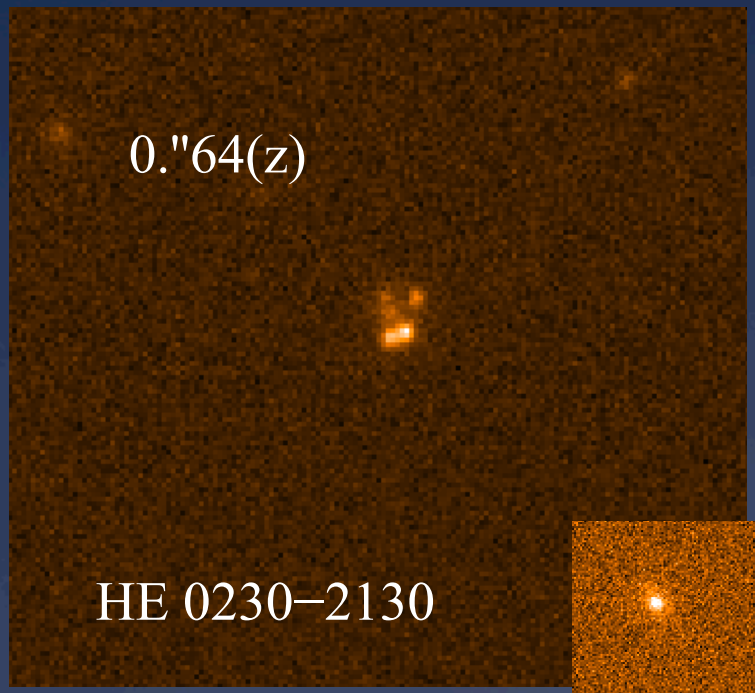


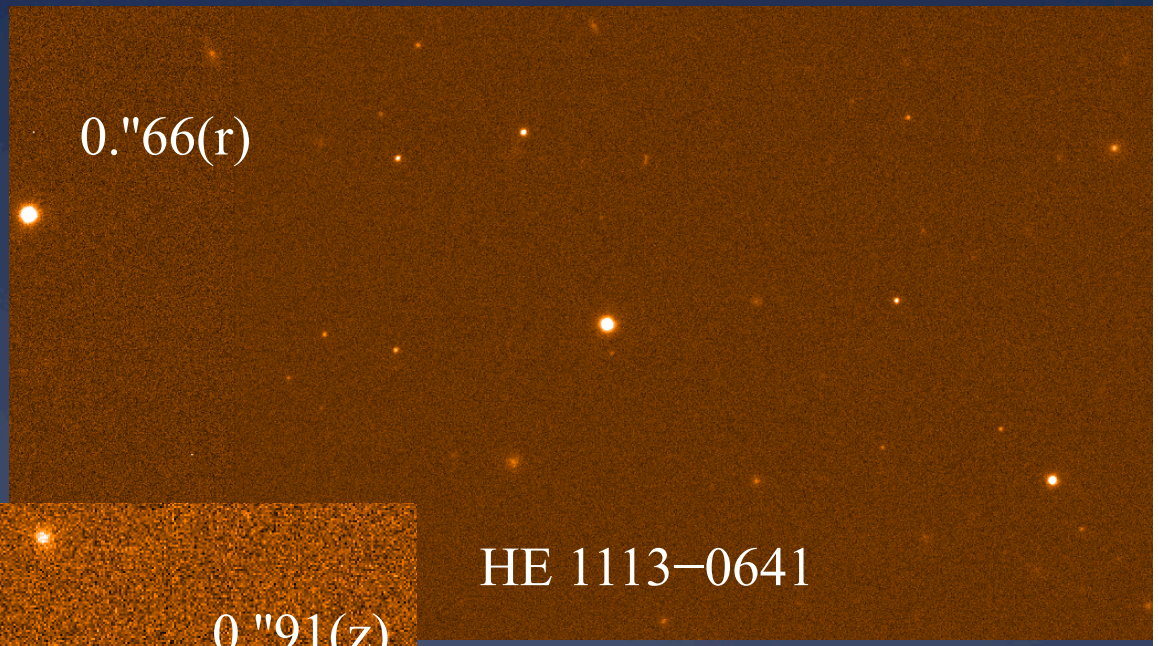
ATLAS i-band 0."62 seeing

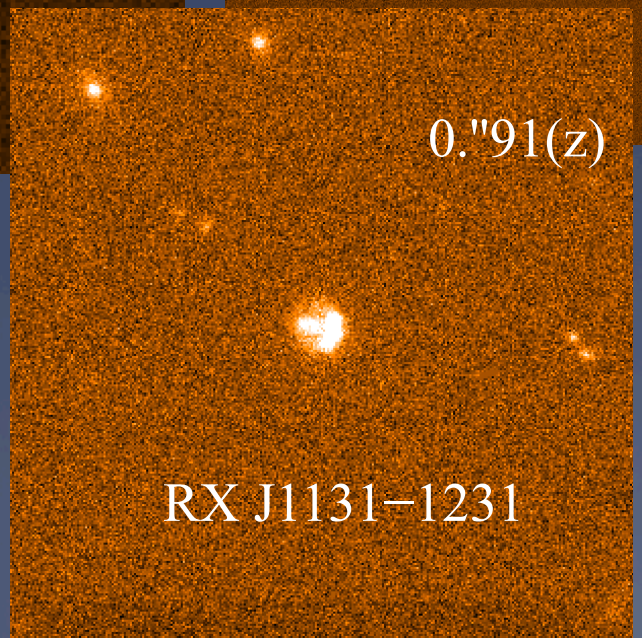
SDSS i band 1."20 seeing


z=1.34 qso
z=0.24
clusters
ATLAS 0."62(i)
VHS 0."73(K$_s$)
z=1.34 qso
NVSS radio source
z=0.24 clusters
WISE 6"(3.4μm)

Schechter's quadruple lenses







ATLAS images

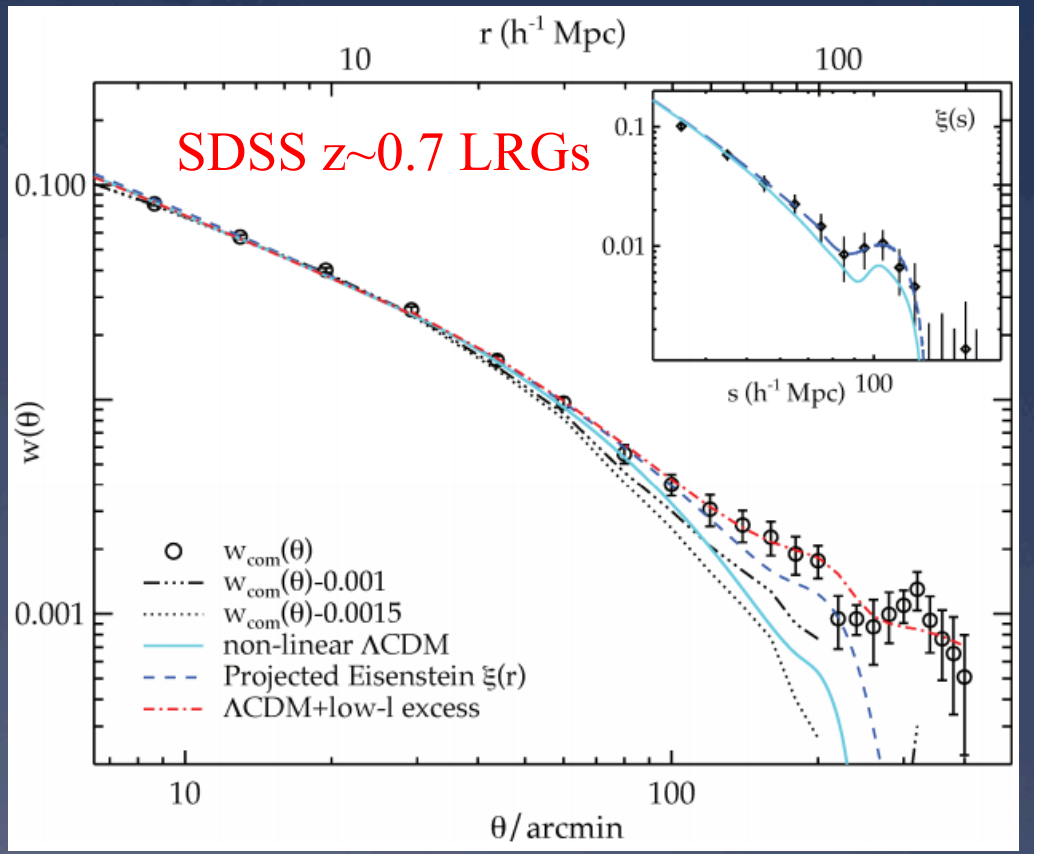
ATLAS Science Goals

- Cosmology
  - Z survey of up to ~300000 QSOs – e-Rosita+4MOST?
    - 10000 QSO z survey already completed via 2dF
  - ISW + non-Gaussianity via LRG clustering
  - QSO Lensing + galaxy ugrizYJHK photo-z
    - +quadruple lenses (Schechter et al)
  - Galaxy counts – study extent of "Local Hole"
- Other Science
  - Milky Way satellites + Stellar Streams
  - Z~7 QSOs via ATLAS+VHS z dropouts
  - Beyond the Great Attractor + Fornax etc

Science Goal - Galaxy Clustering

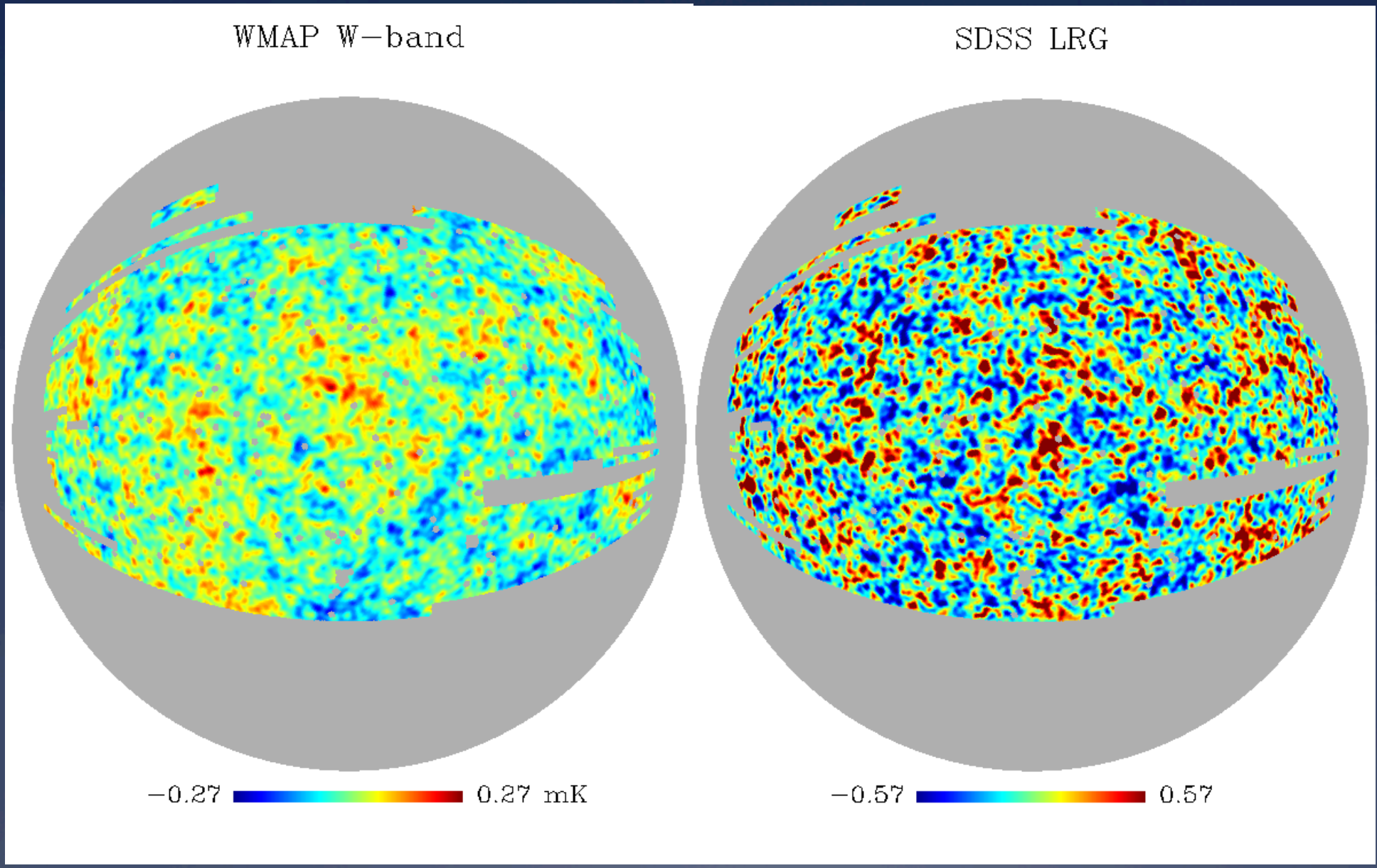
- ±10% variation in galaxy number density
- ⇒0.01 amplitude in angular correlation, w(θ)
- Significant when looking for BAO at w~ 0.001
- w(θ)~0.001 needs ±0.03 mag global calibration

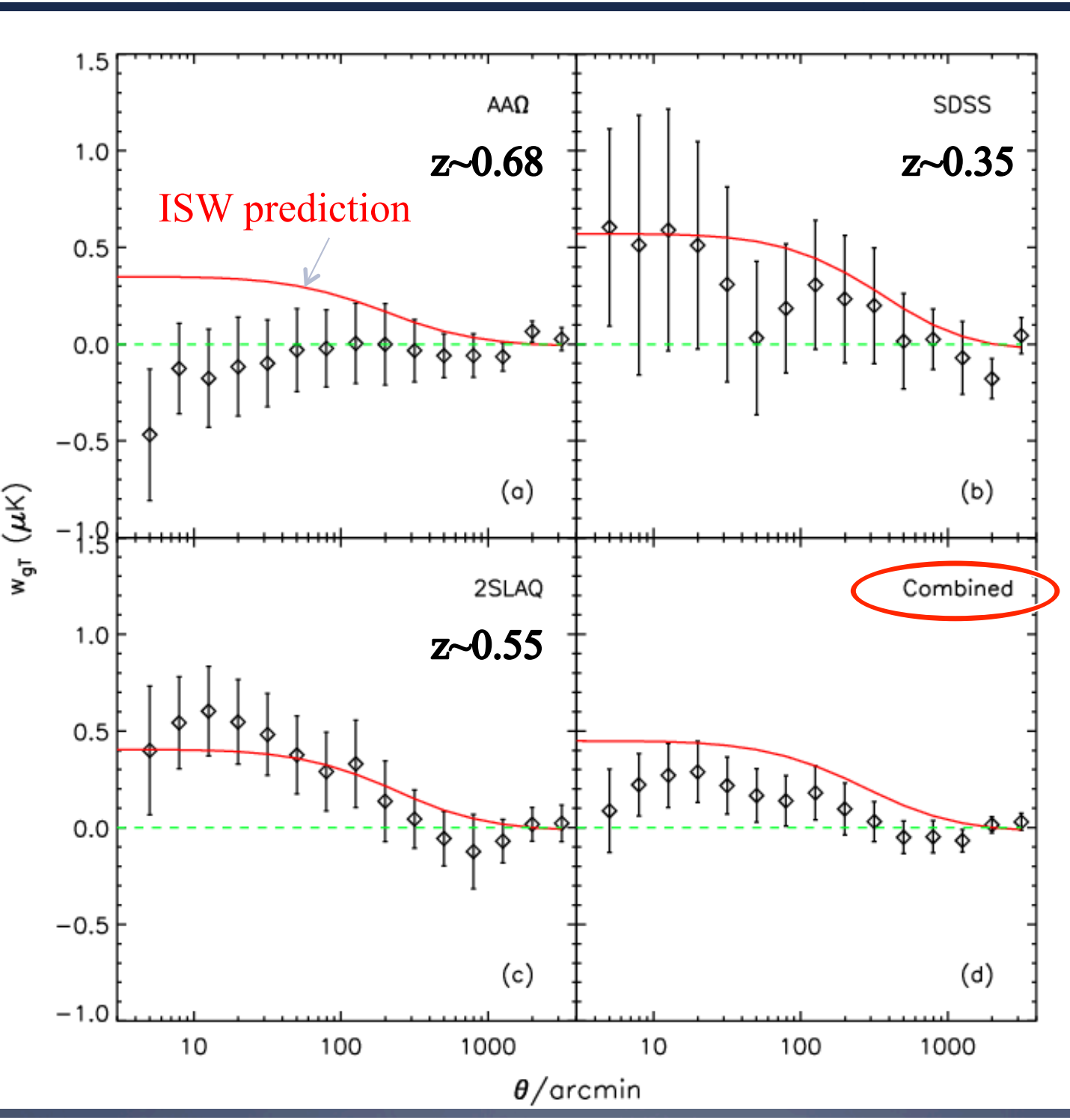
(See Joe Findlay's talk)



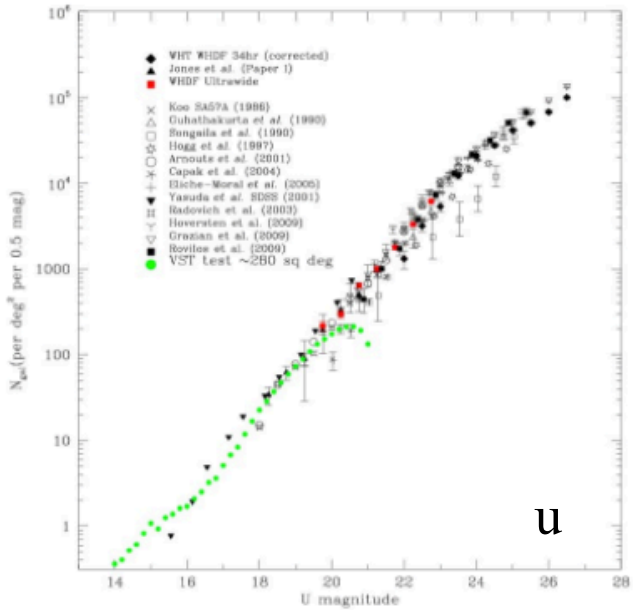
Sawangwit et al. (2011)

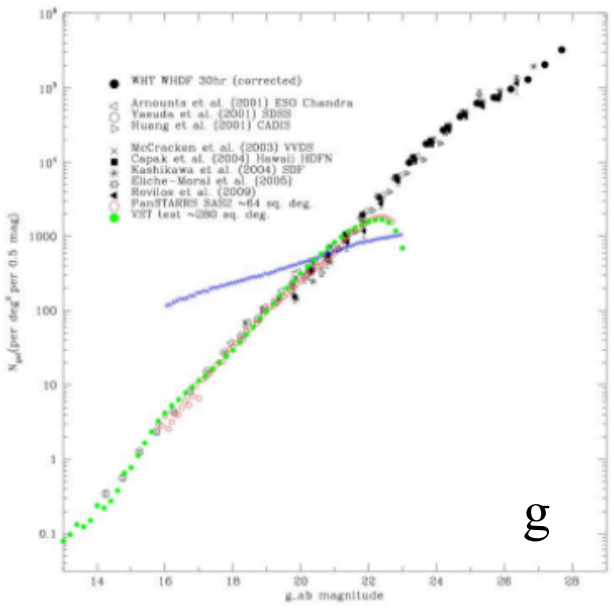
Science Goal: LRG-Planck ISW

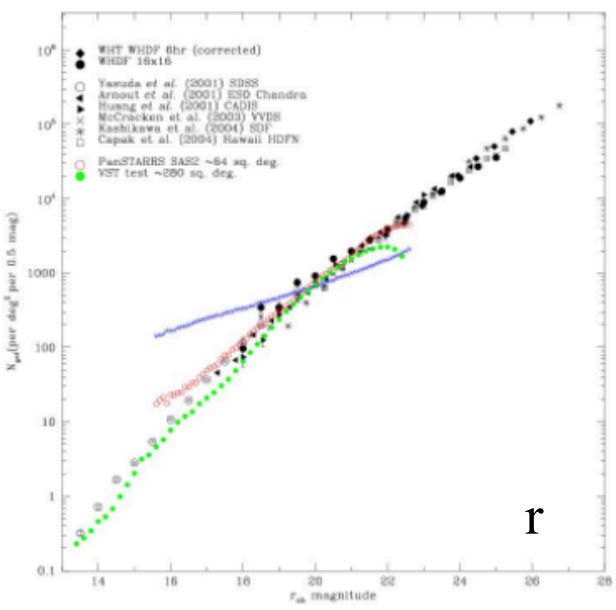


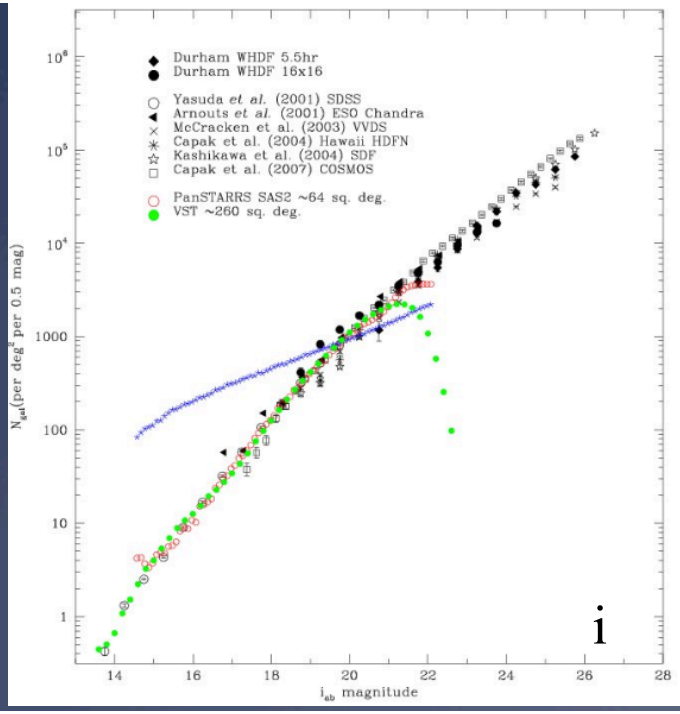

AAΩ
z~0.68
ISW prediction
SDSS
z~0.35
2SLAQ
z~0.55
Combined
(a)
(b)
(c)
(d)
w_{gT} (μK)
θ/arcmin
1.5
1.0
0.5
0.0
−0.5
−1.0
10
100
1000

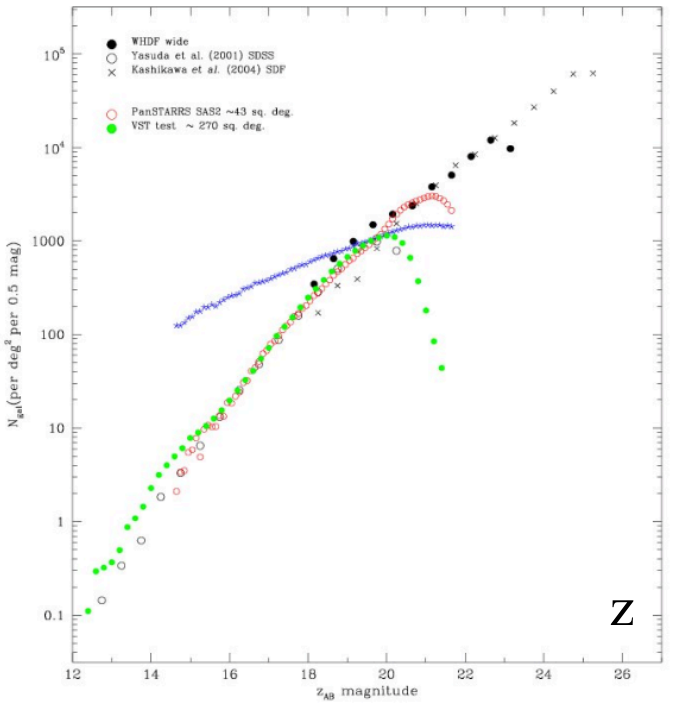
Science Goal: Galaxy Counts



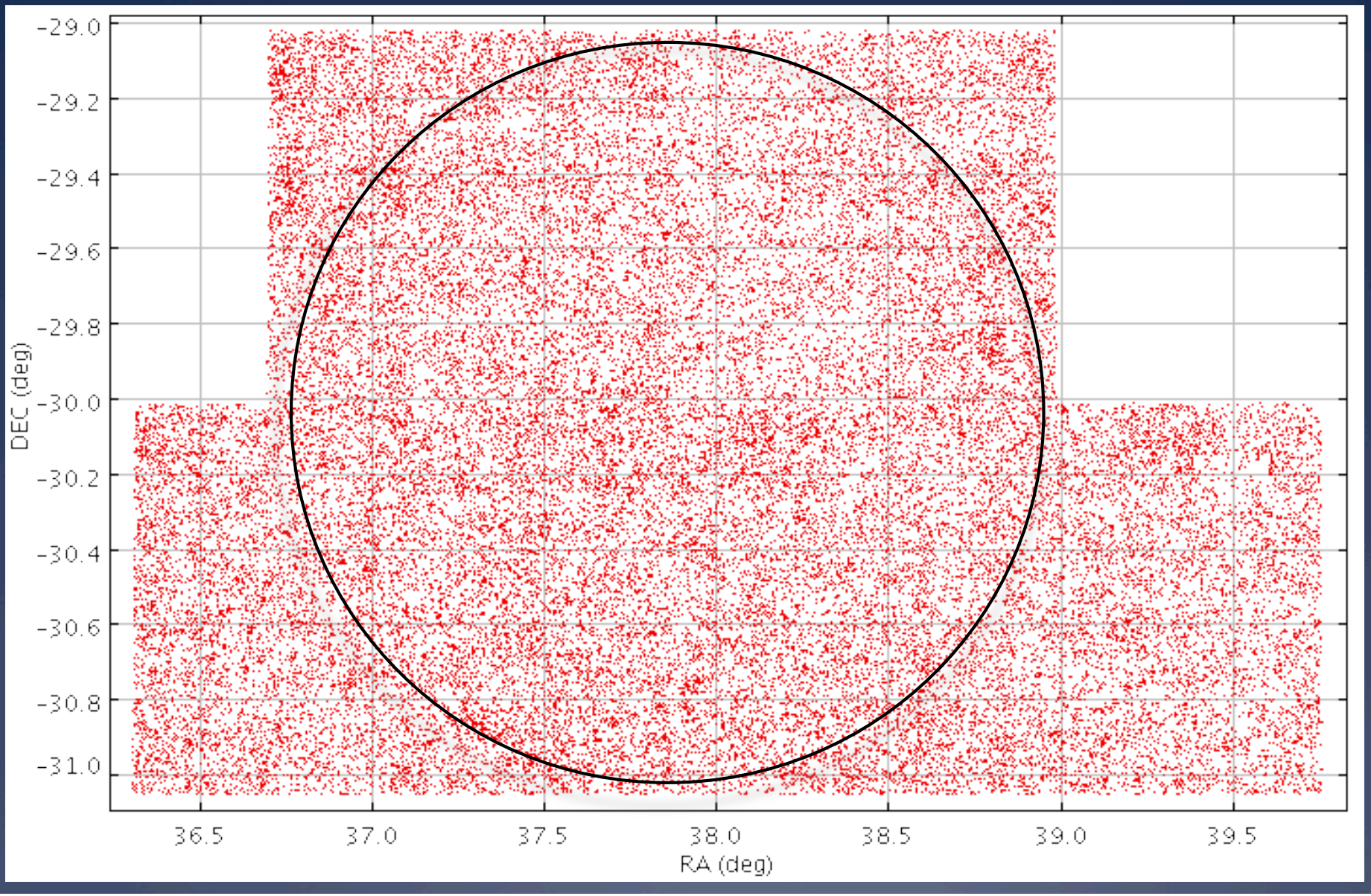




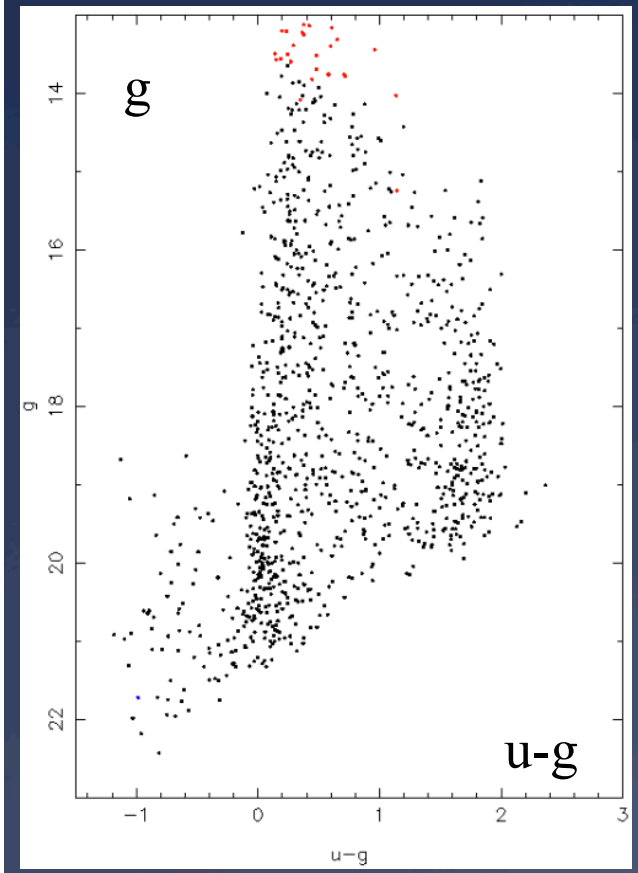




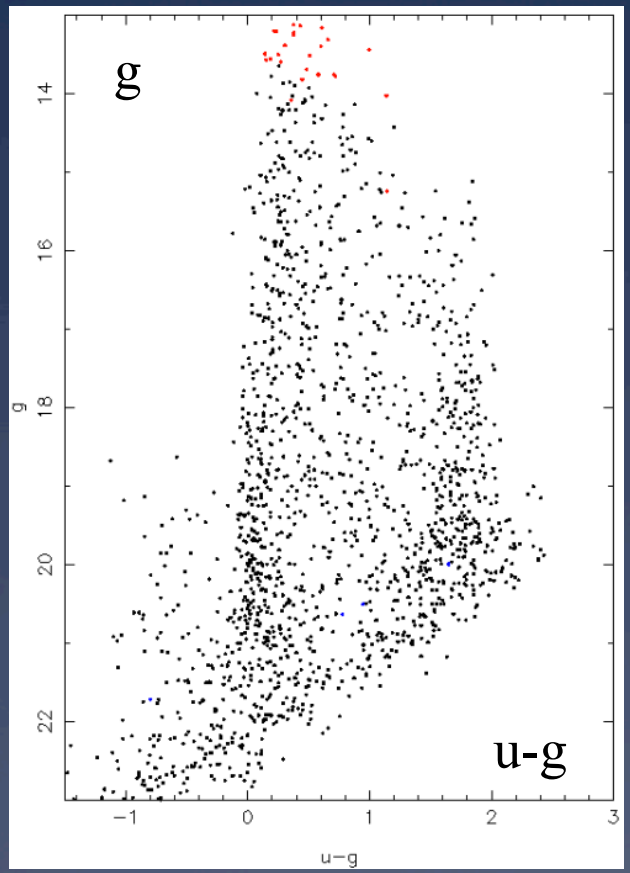
2QDES Pilot: 5 ATLAS fields → 2dF



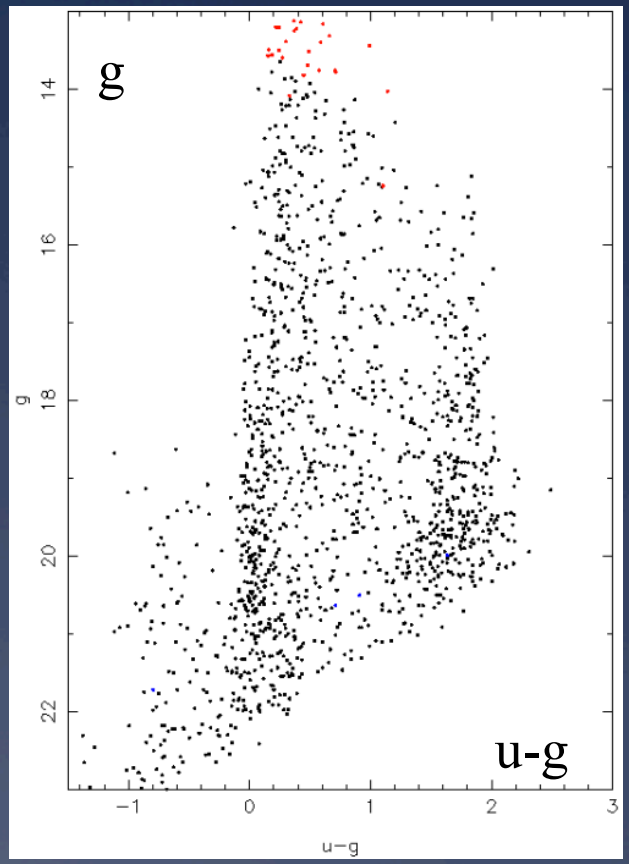
ATLAS u + list +Chile u - stars



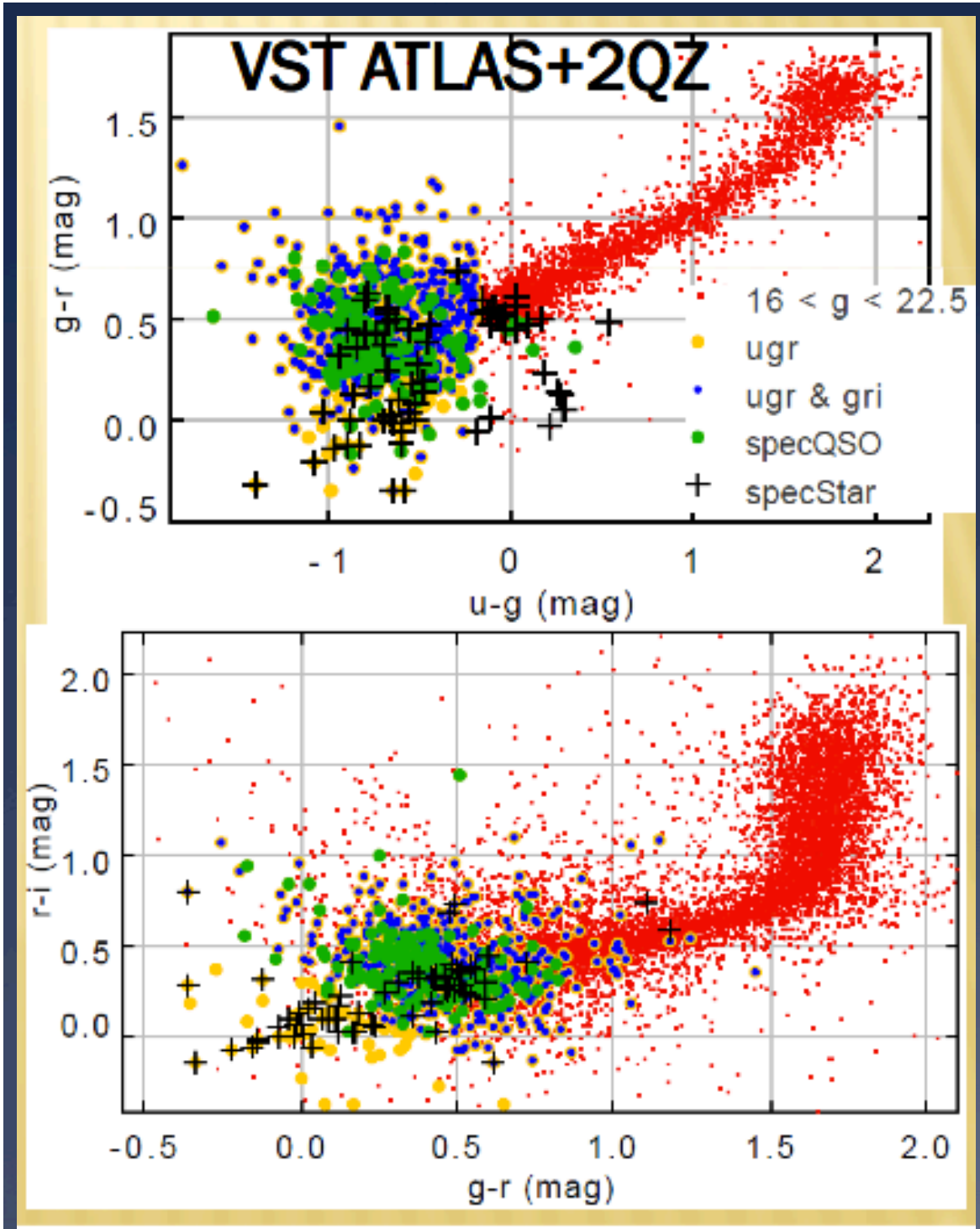
ATLAS



ATLAS list driven



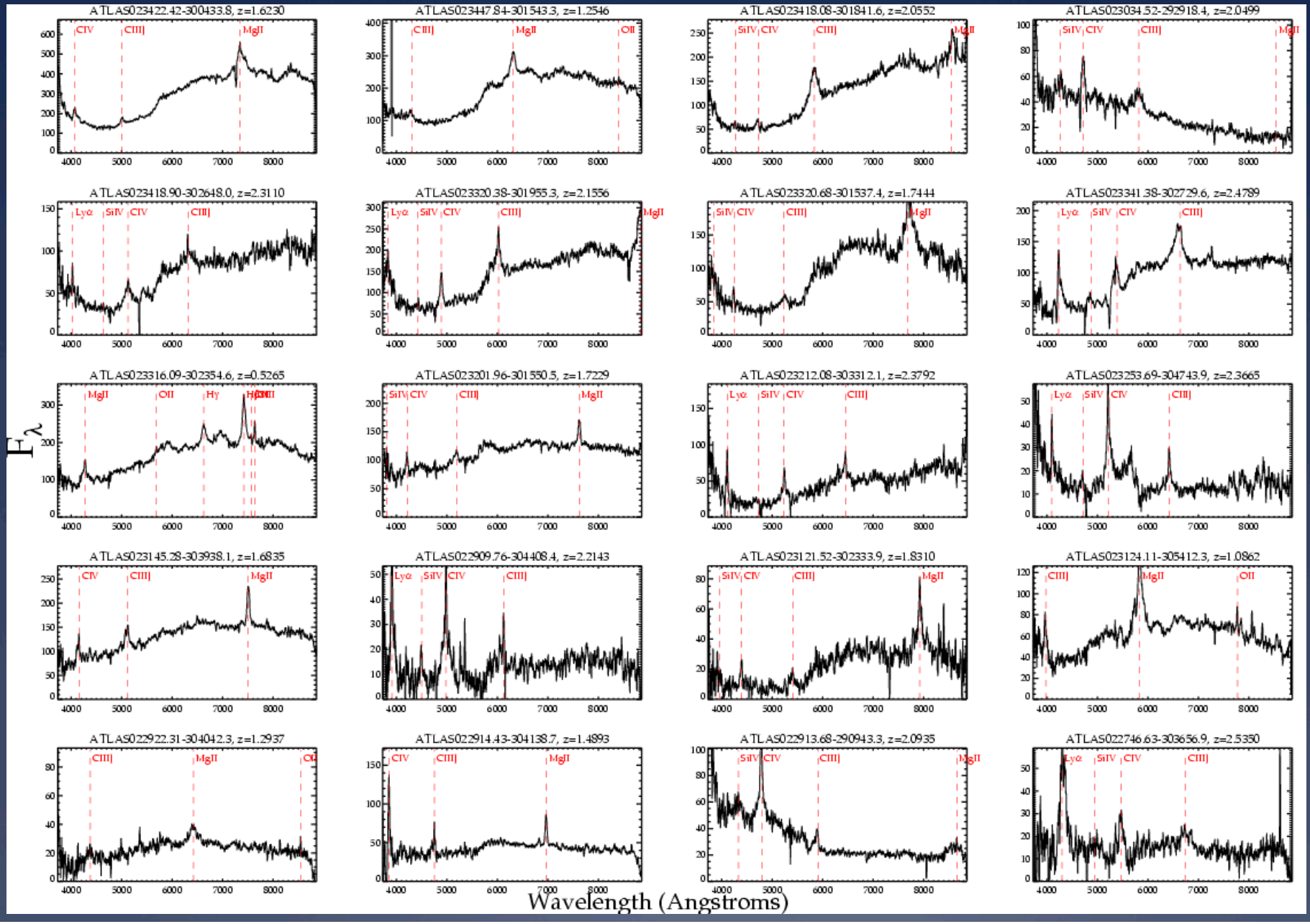
ATLAS+Chile list driven



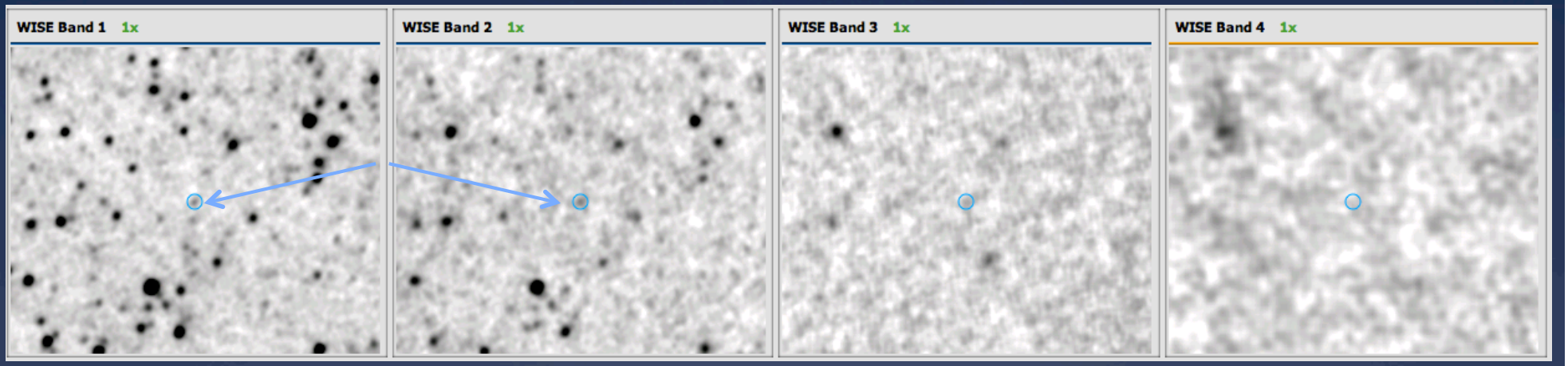
ATLAS 2QDES ugri QSO selection

* Simple selection in ugr and gri
* + XDQSO selection of Bovy et al
* Limit g<22.5
* ~50% success rate at g~22
* ~60-70 qso/deg^2

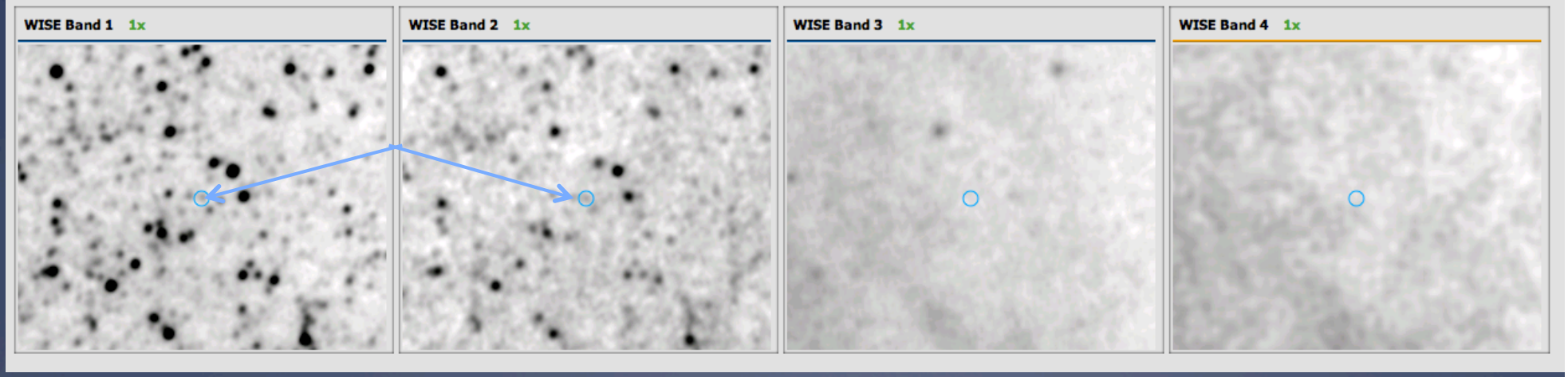
2dF ATLAS QSO Spectra



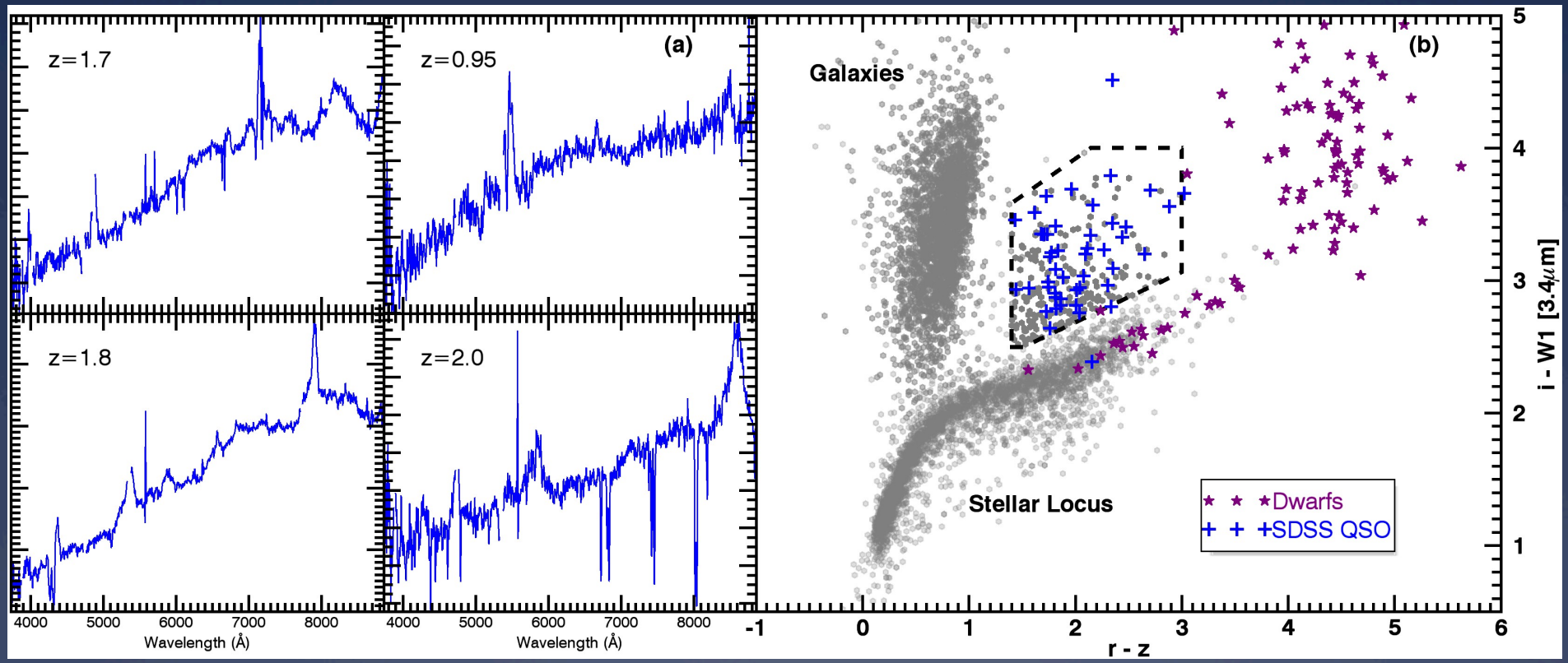
WISE - g~21.5 QSOs at 3.4,4.6 μm



3.4μm 4.6μm 11μm 24μm



ATLAS + WISE quasar searches



Dust reddened quasars

High Redshift 5<z<6 quasars

Conclusions

* VST ATLAS ~3000/4000deg^2 completed (+33% Chilean u)
* iz complete in 6 months but ugr wil take ~18 months
* Propose - add 700deg^2 in NGC→4700deg^2 total
* Sub-arcsecond seeing available in most fields
* VHS/WISE already covers half/full ATLAS area
* 100deg^{-2} **quasar clustering via ATLAS+e-Rosita+4MOST**
* LRG clustering+ISW+Local Hole+Great Attractor…
* **MilkyWay satellites+stellar** streams…..