

Image Quality Assessments on PS1 MD Surveys

Chin-Wei Chen (ASIAA),
Sebastien Foucaud (NTNU),
Lihwai Lin (ASIAA),
Hung-Yu Jiang (NTU)

What fields that we've analyzed?

- ◆ IPP stacks:

MD03, 04, 05, 06, 07, 10, 04_{Deep}, 09_{Deep} (PS1 grizy)

- ◆ Seb stacks:

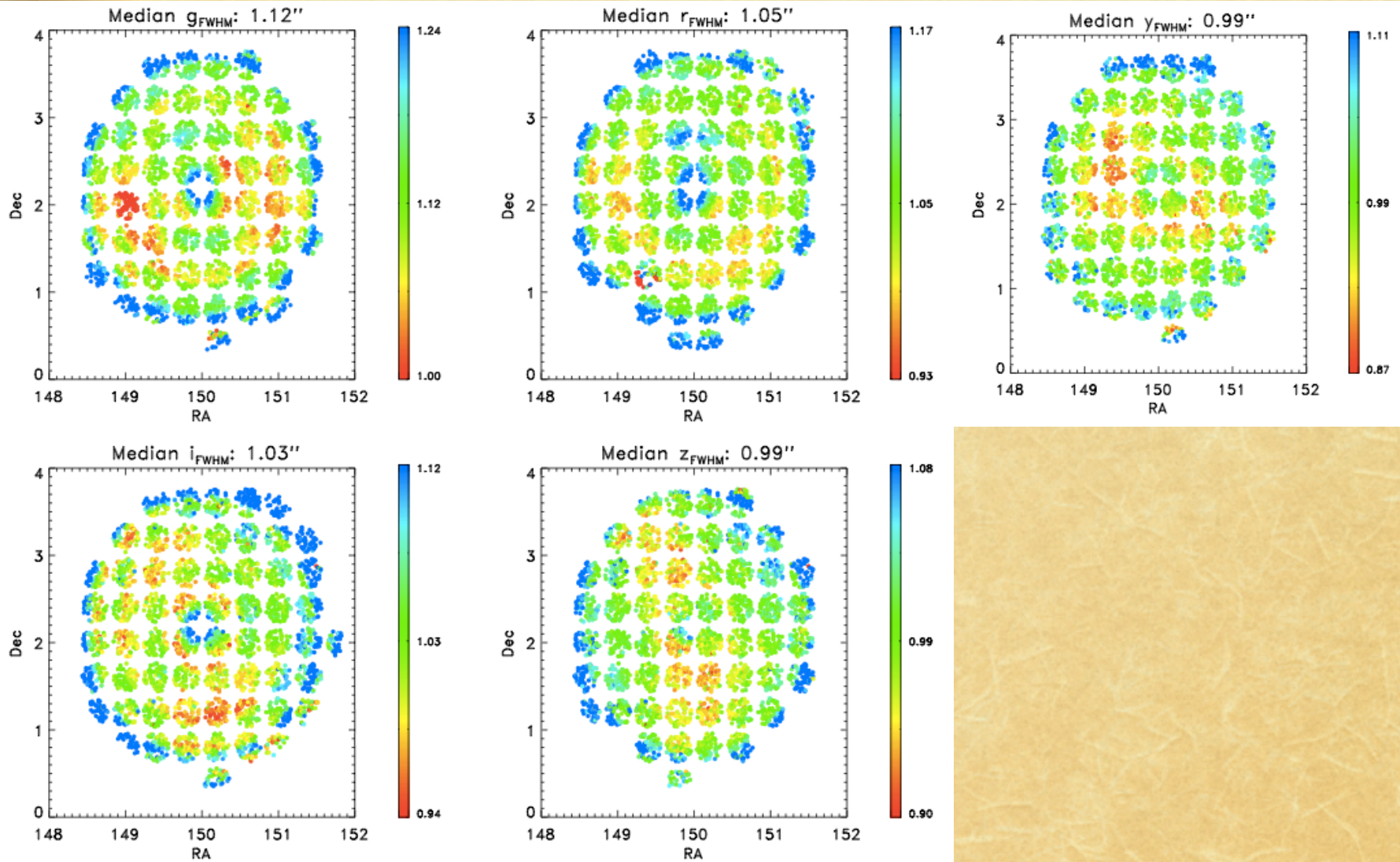
MD03, MD04, MD05, MD07, MD10 (PS1 grizy)

MD04, MD07, MD10 (CFHT u-band)

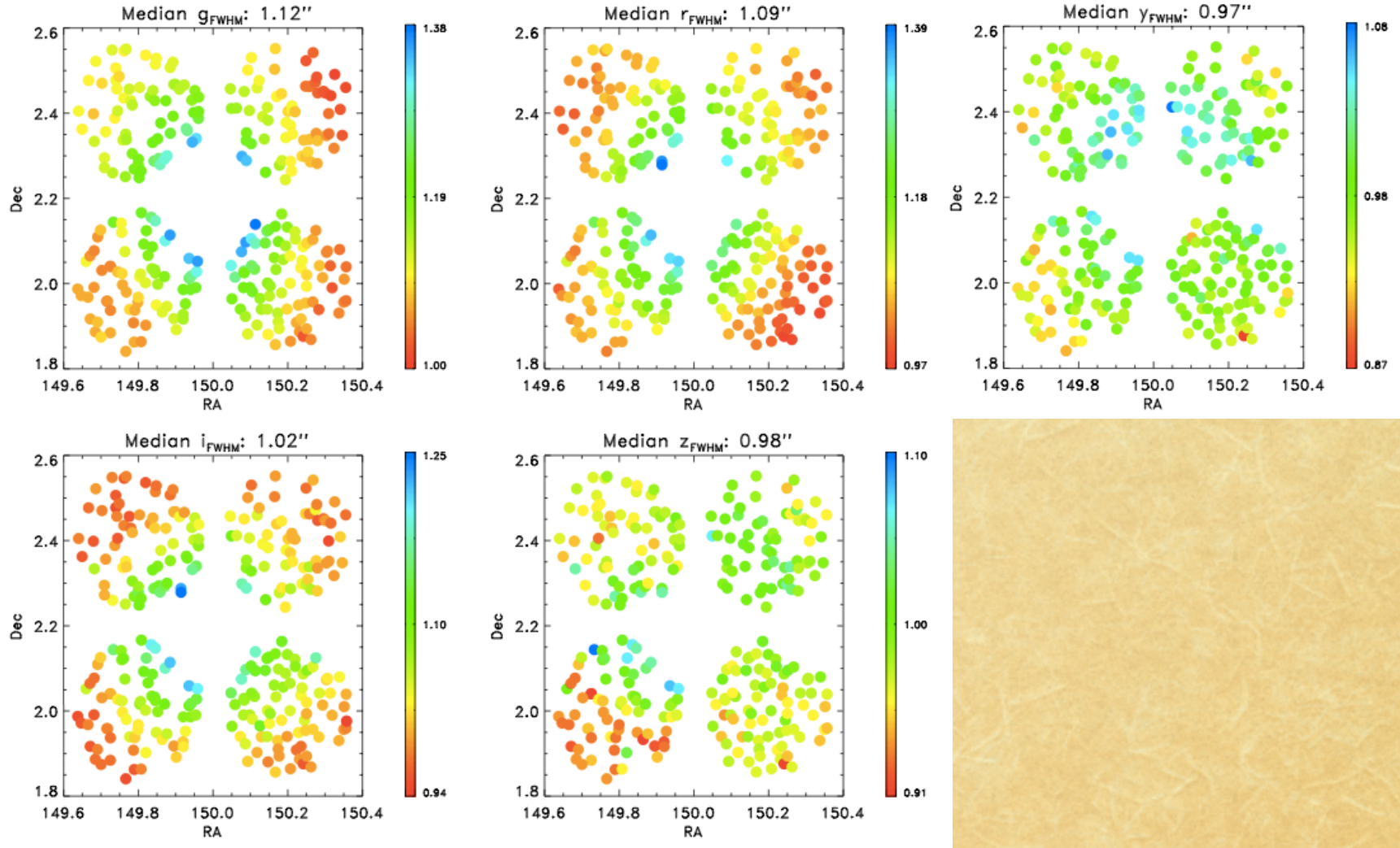
What analysis that we have carried out?

- ◆ Seeing: 2D-moffat fitting with SDSS DR7 point sources
- ◆ PSF shape: b/a , P.A.
- ◆ Depth: $5\sigma_{\text{sky}}$ within 2'' sky apertures
- ◆ ZP correction: Calibrated with point sources from SDSS DR7
 $y_{\text{SDSS}} = z_{\text{SDSS}} - 0.247 * (i_{\text{SDSS}} - z_{\text{SDSS}})$

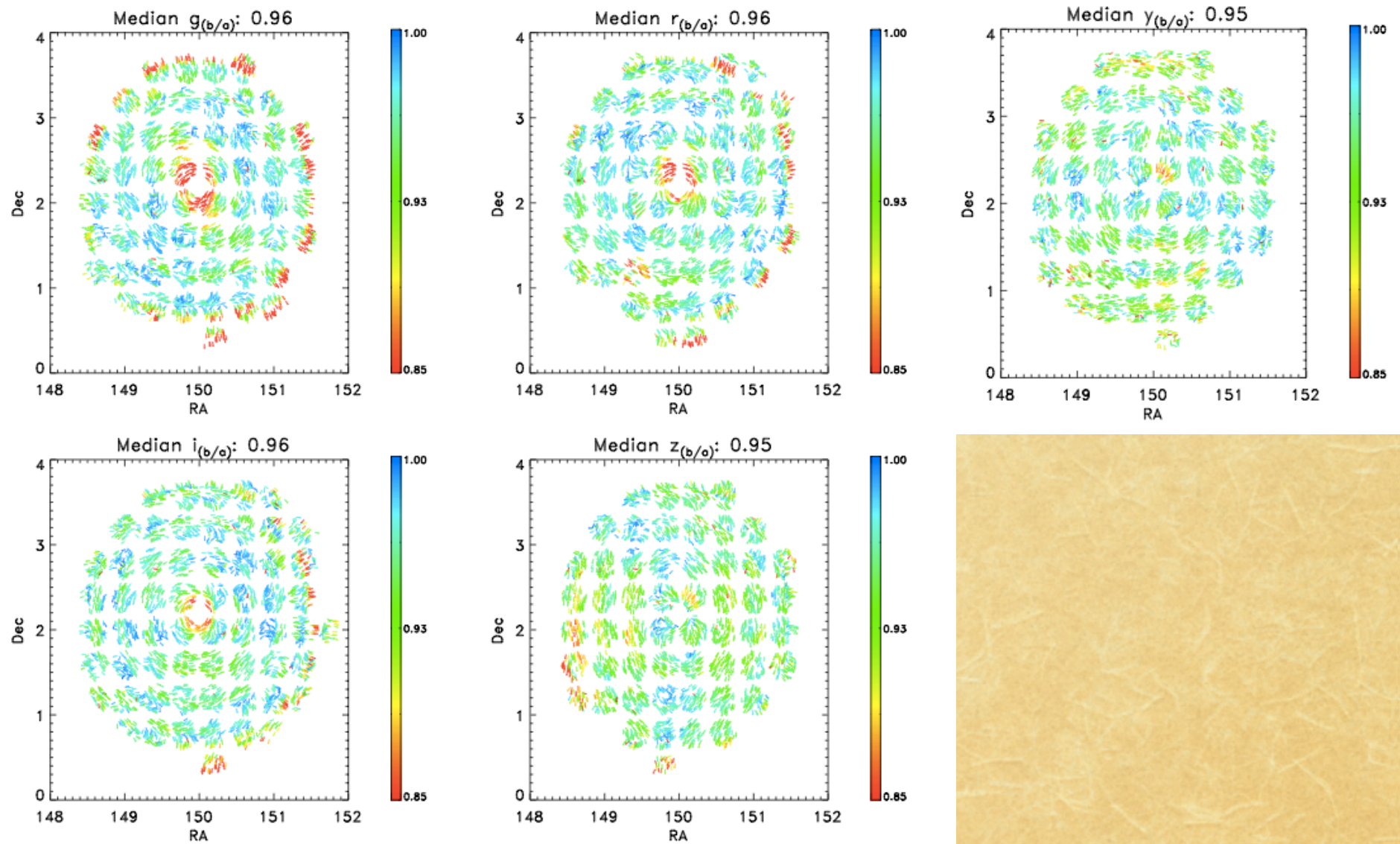
MDO4_{deep_all}: Seeing



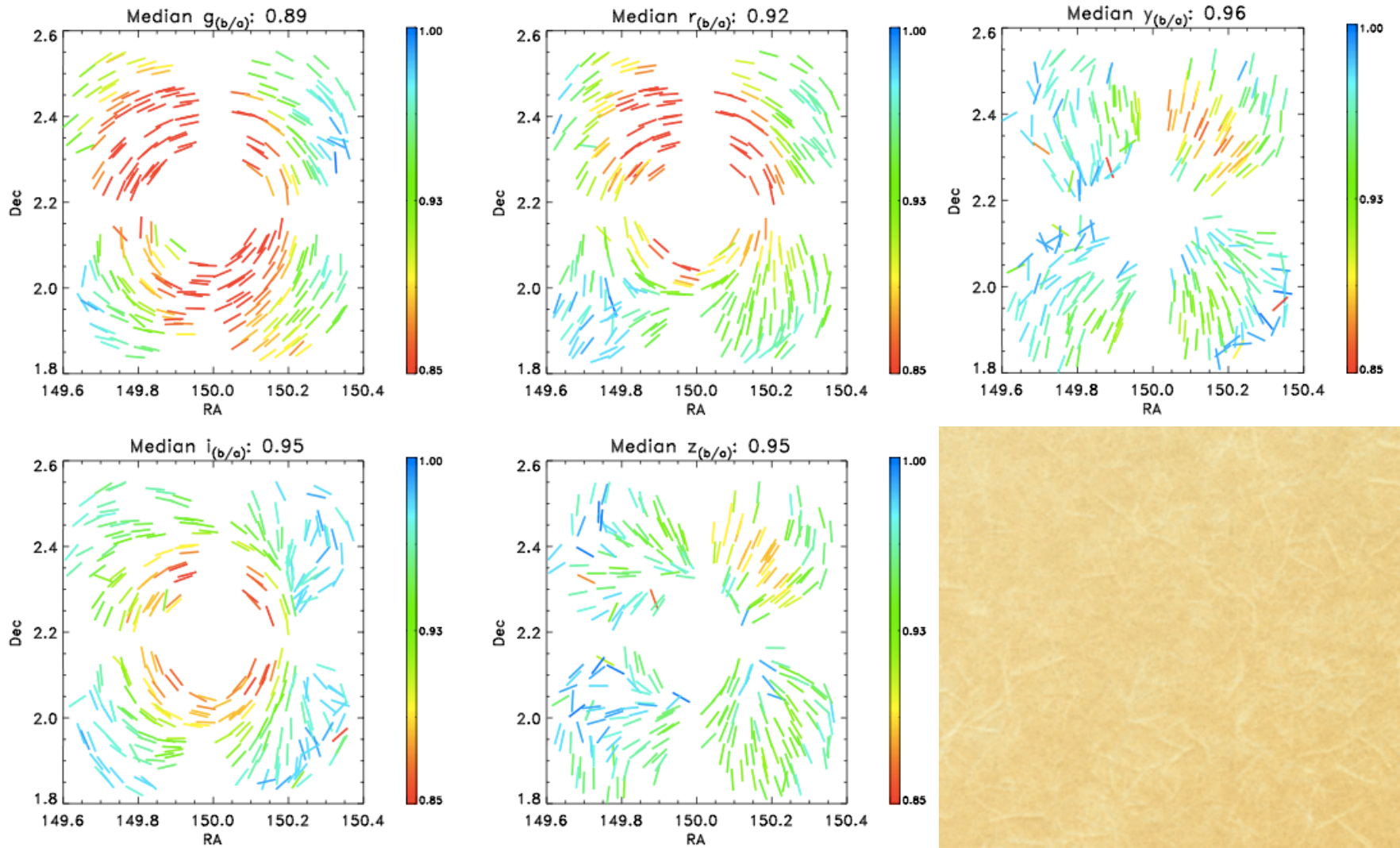
MDO4_{deep_center}: Seeing



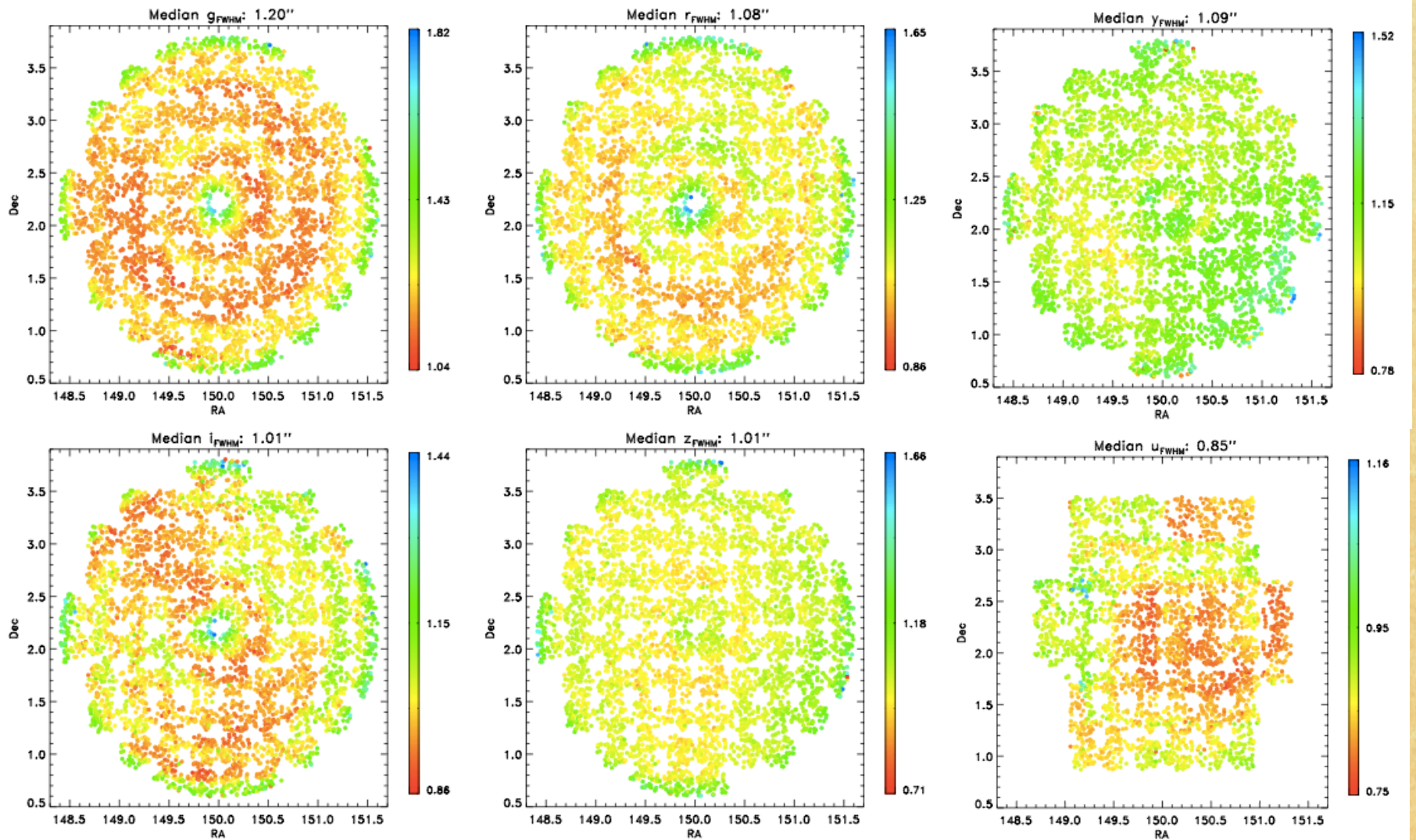
MDO4_{deep_all}: $b/a, \Phi$



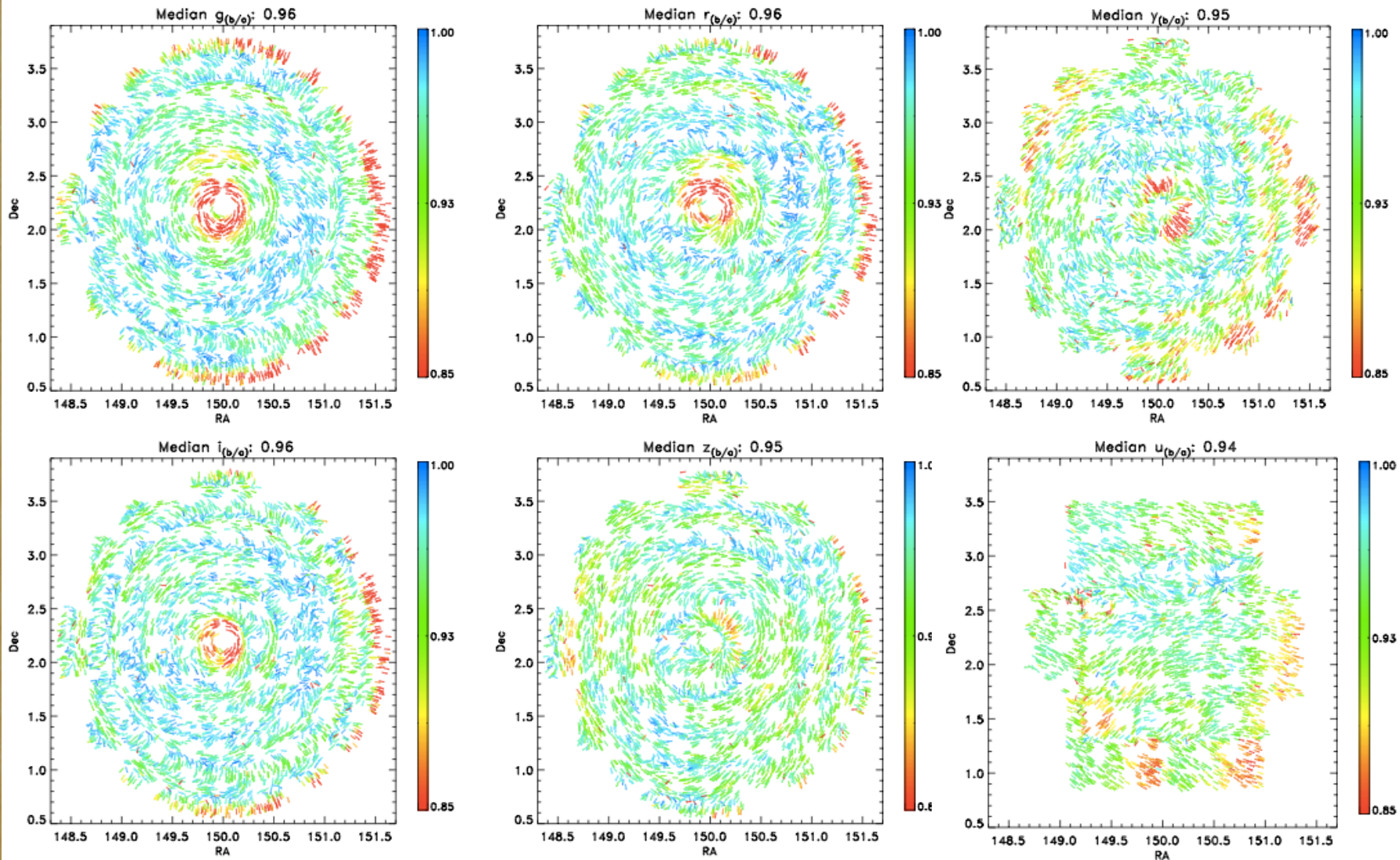
MDO4_{deep_center}: $b/a, \Phi$



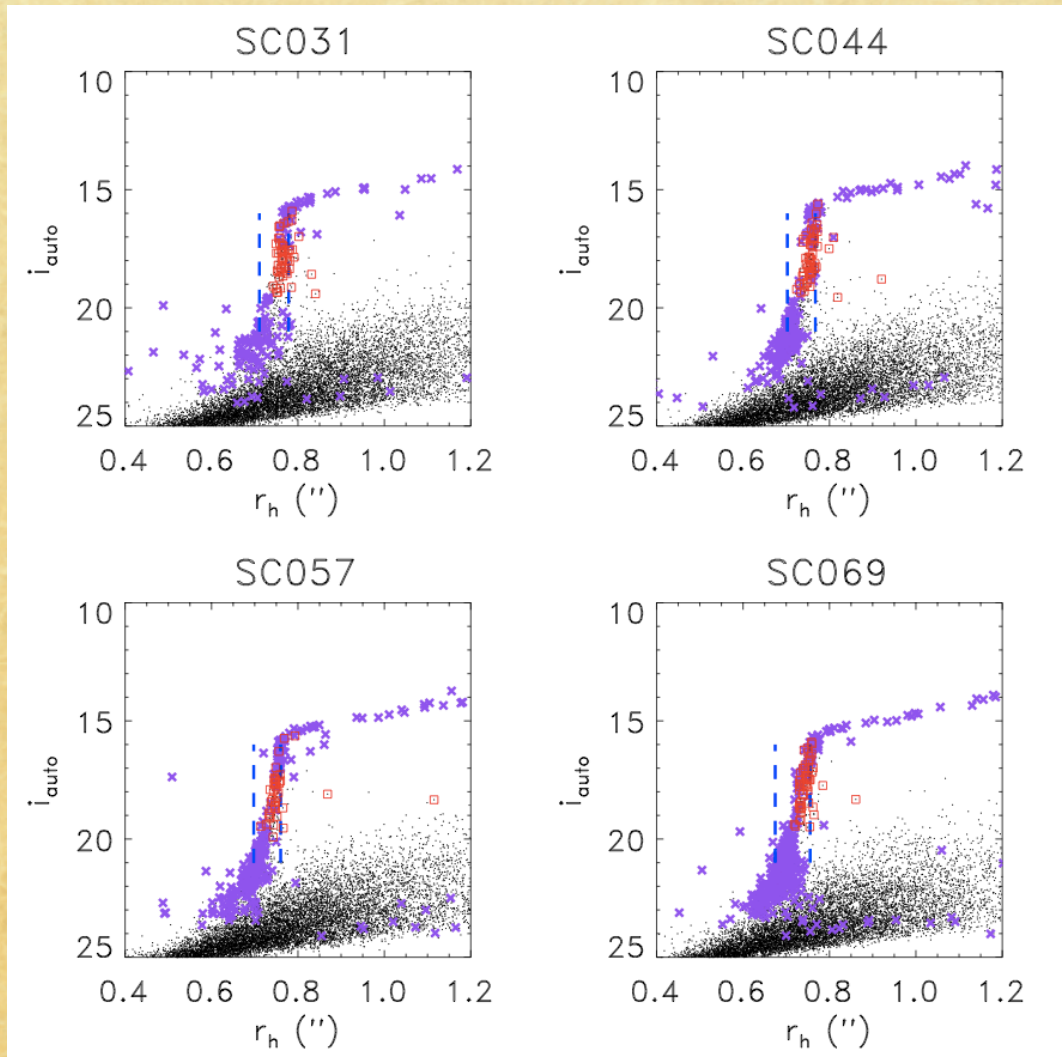
MDO4_{Seb_all}: Seeing



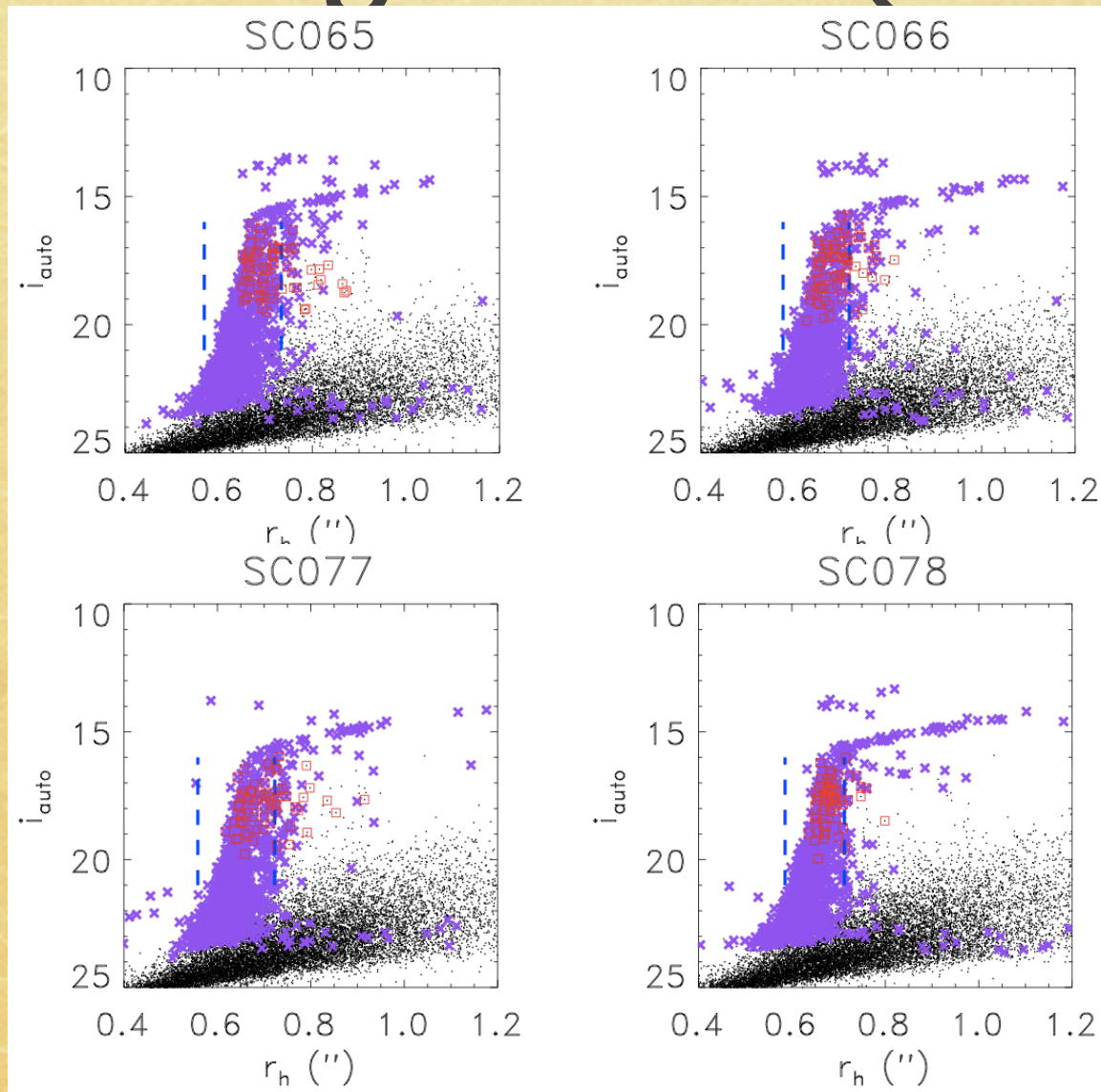
MDO4_{Seb_all}: b/a , Φ



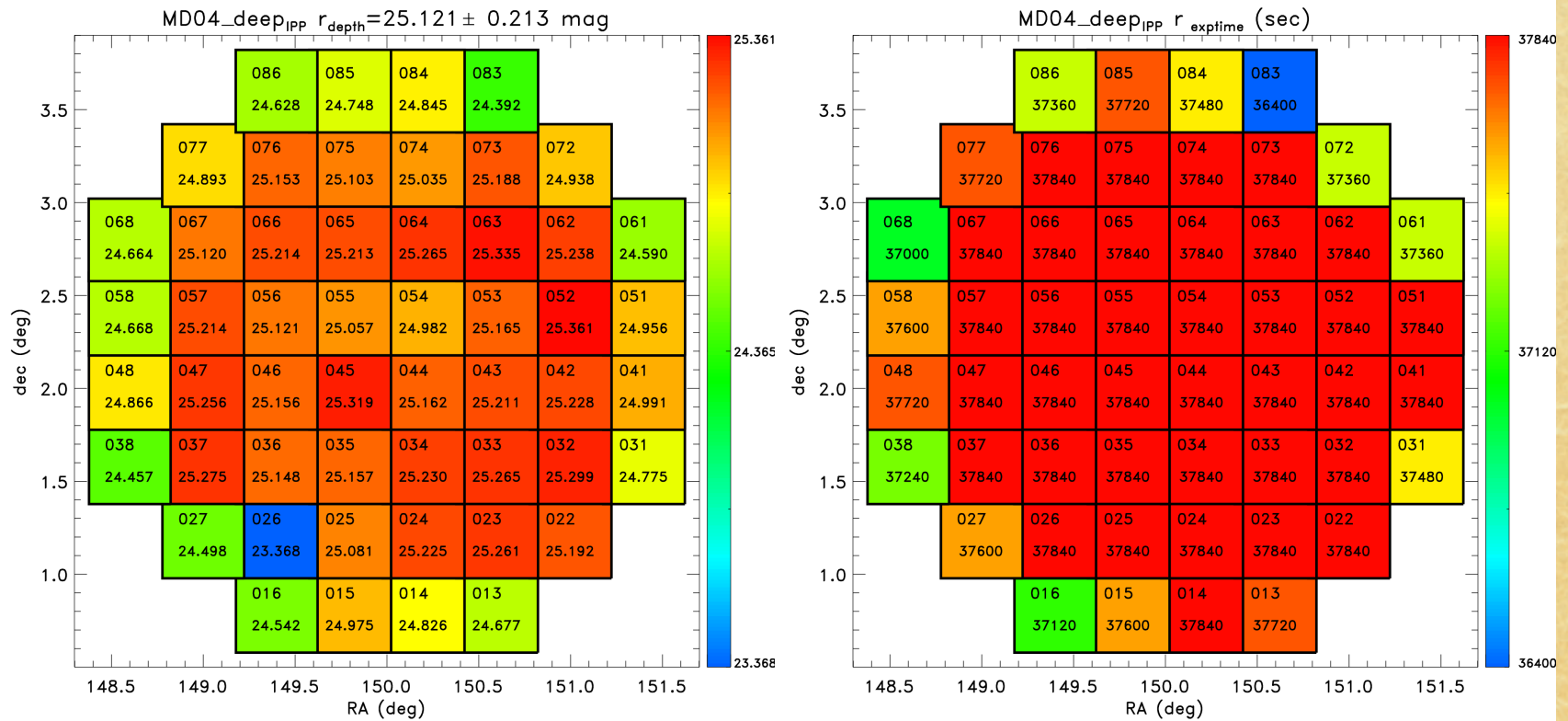
Size-Mag relation (MDo7)



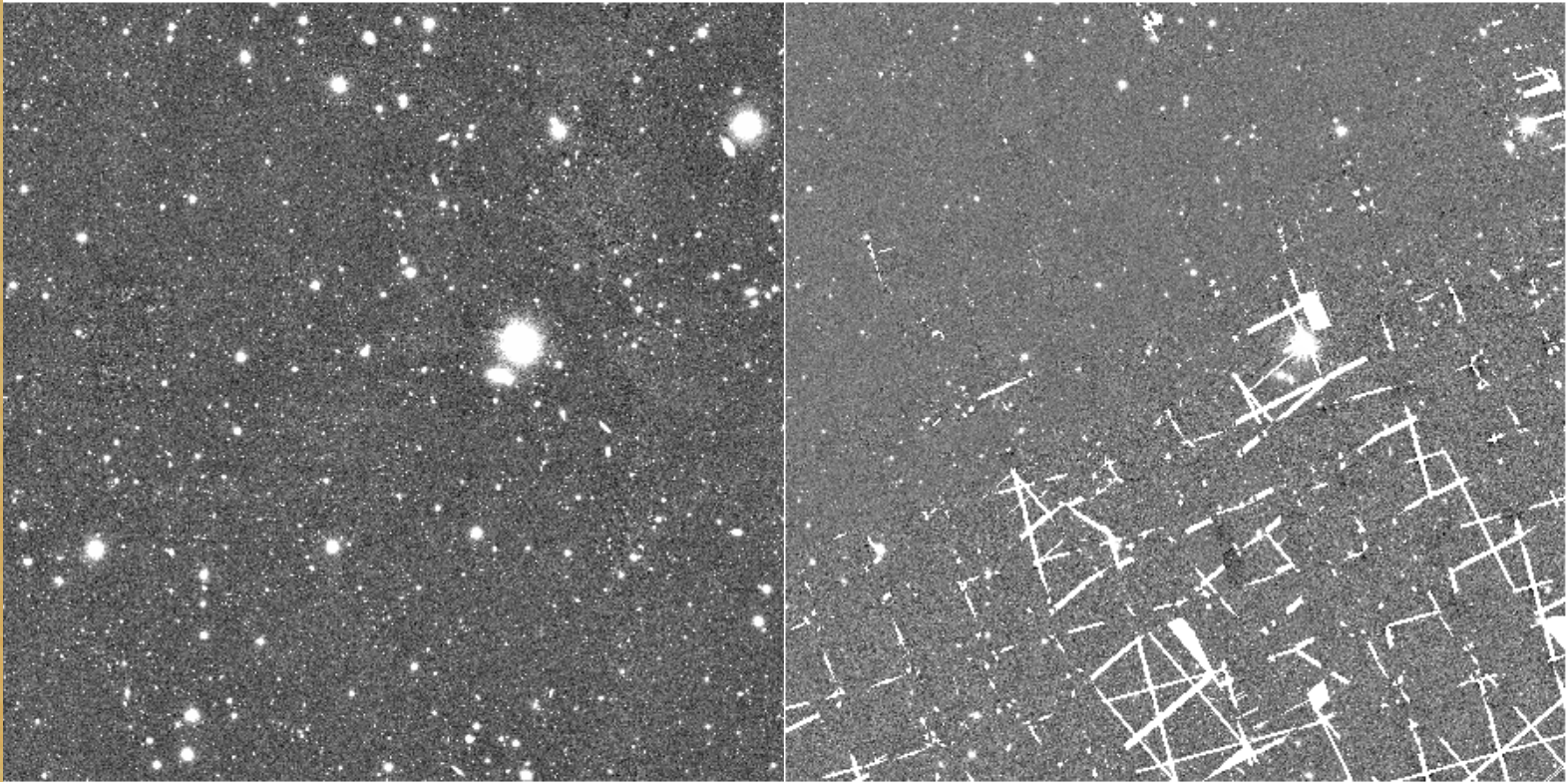
Size-Mag relation (MDo4)



Results: MD04_{deep} *r*-band



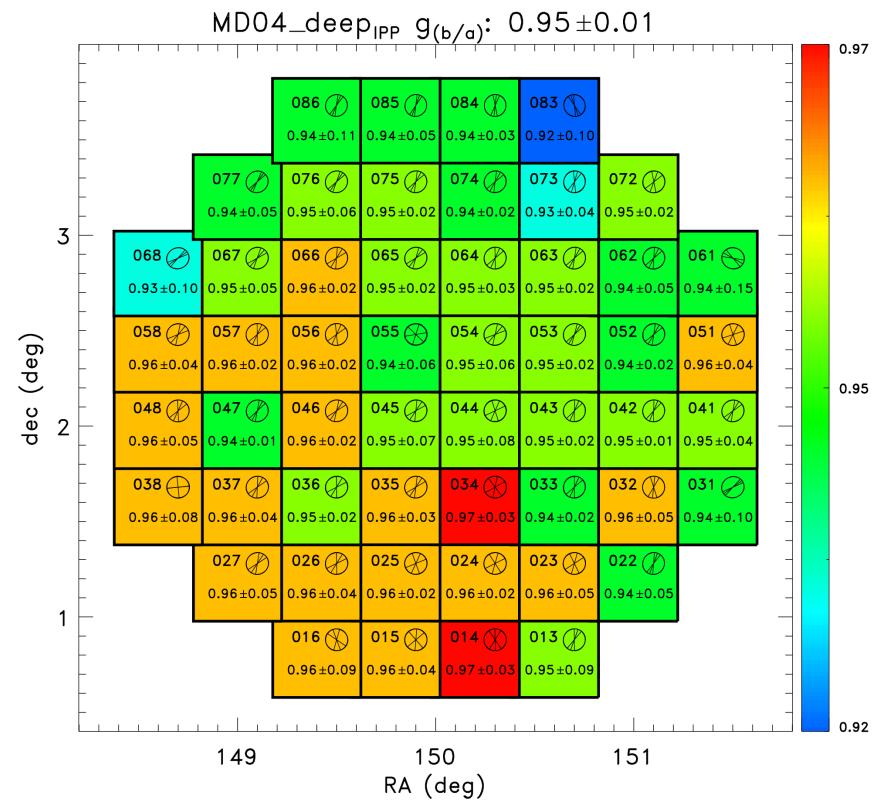
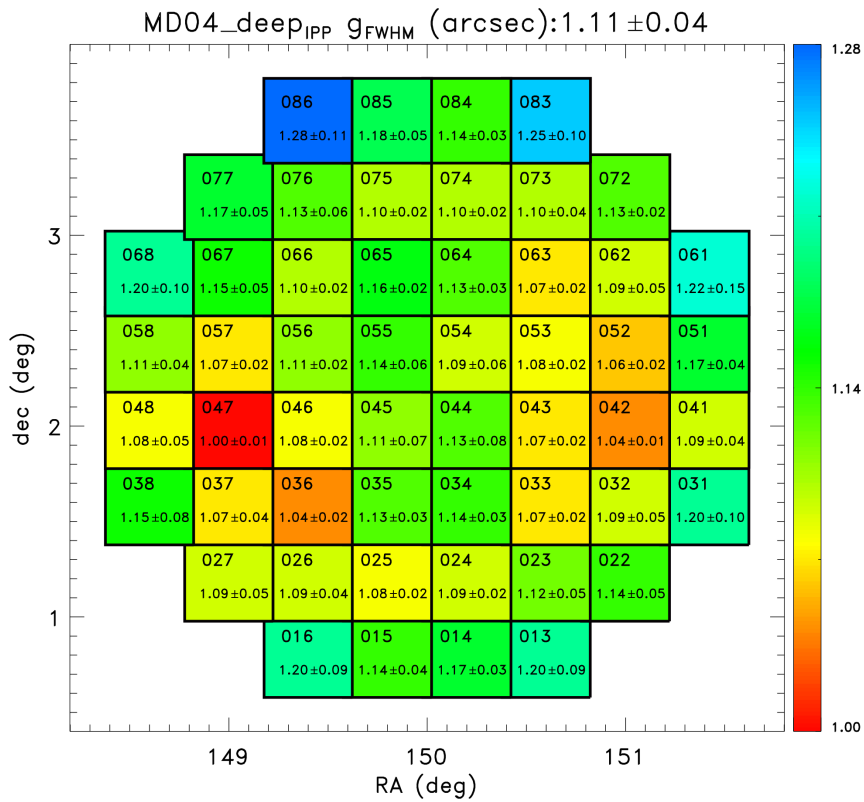
Results: *g*, *r* images



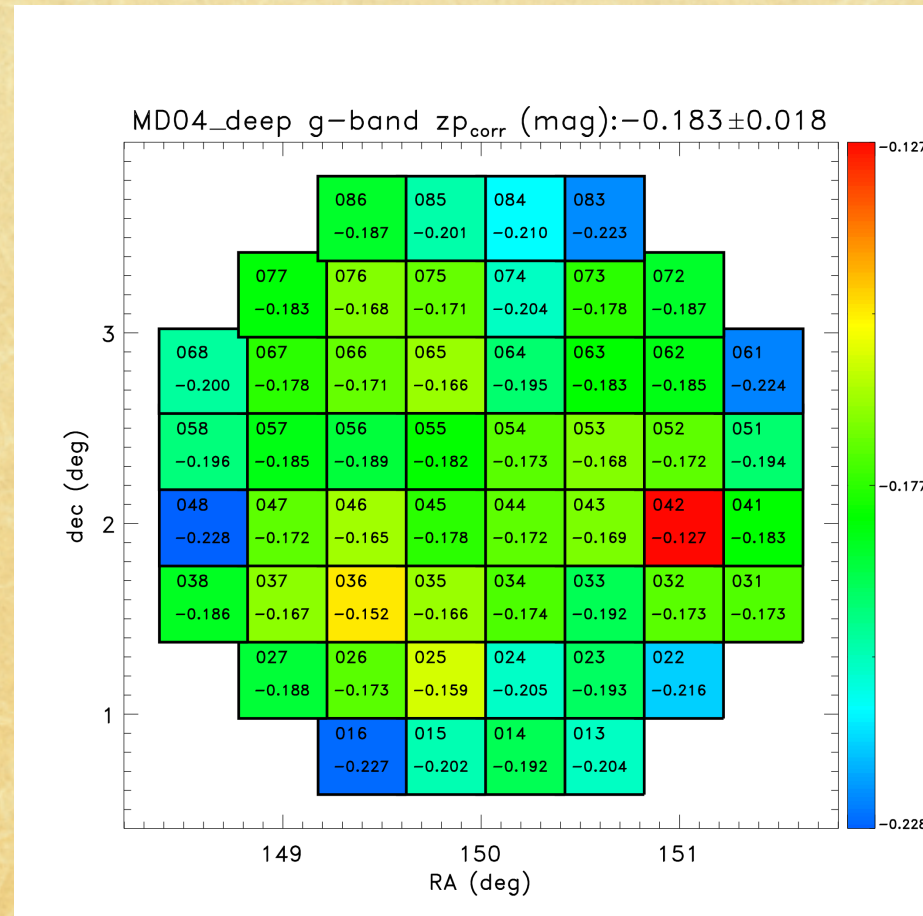
MDo4 SCo26 *g*,
FOV 27'x27'

MDo4 SCo26 *r*,
FOV 27'x27'

Results: Shape

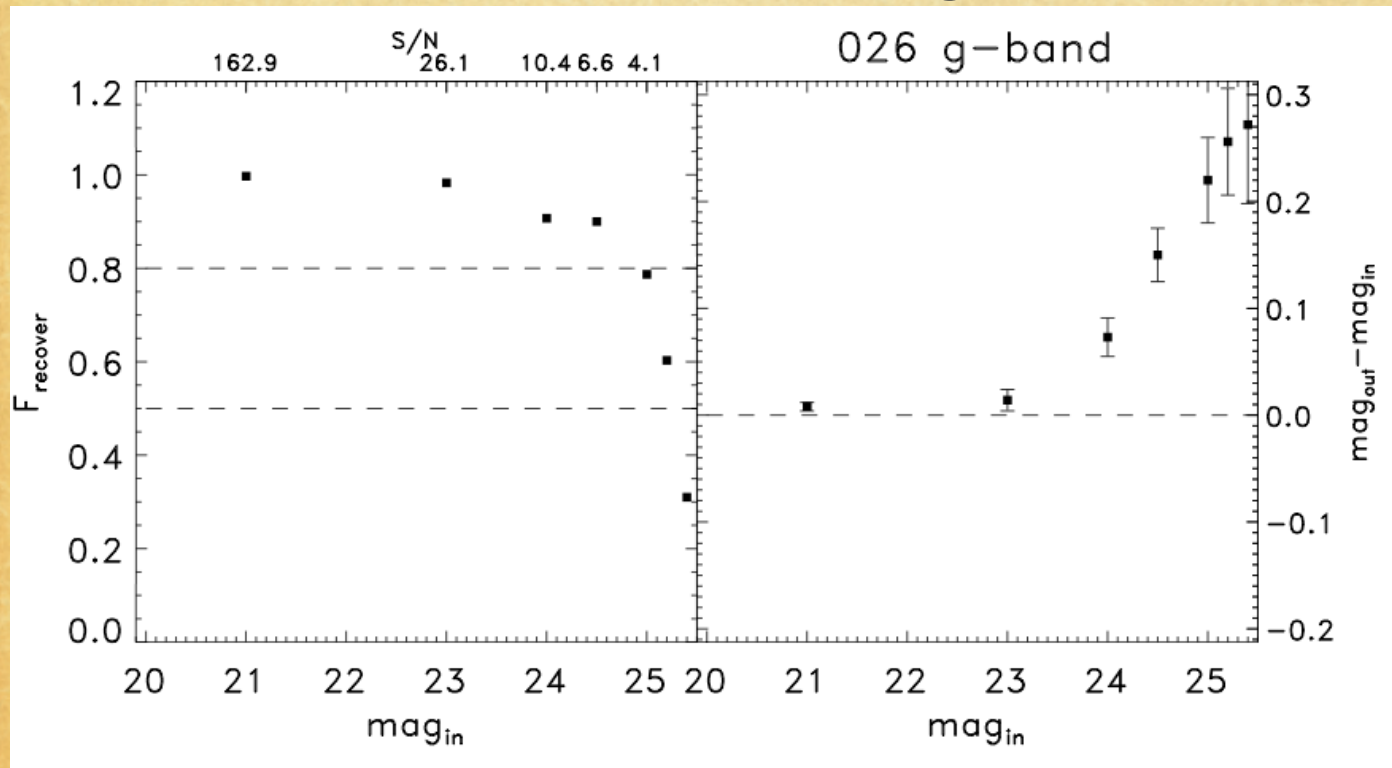


Results: ZP correction

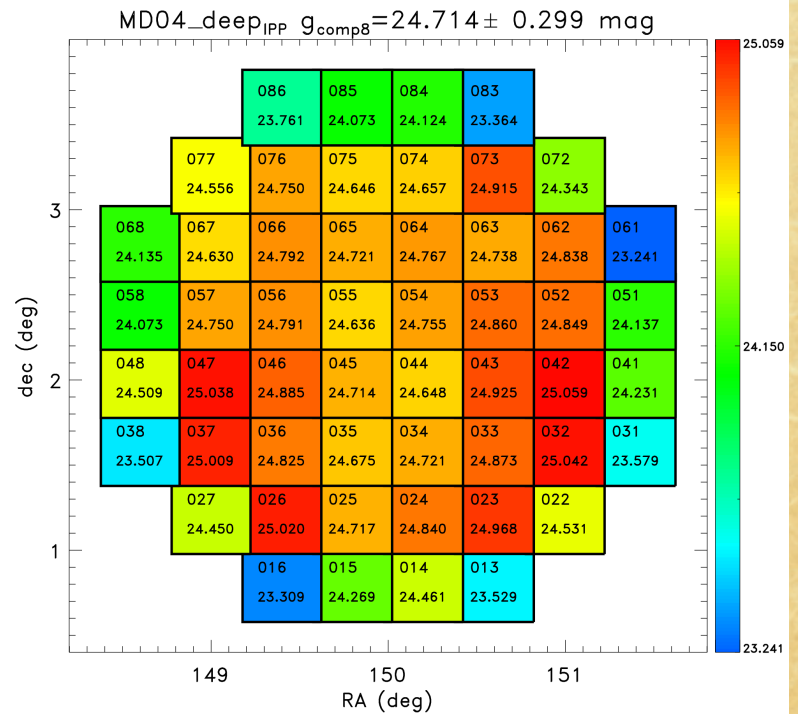
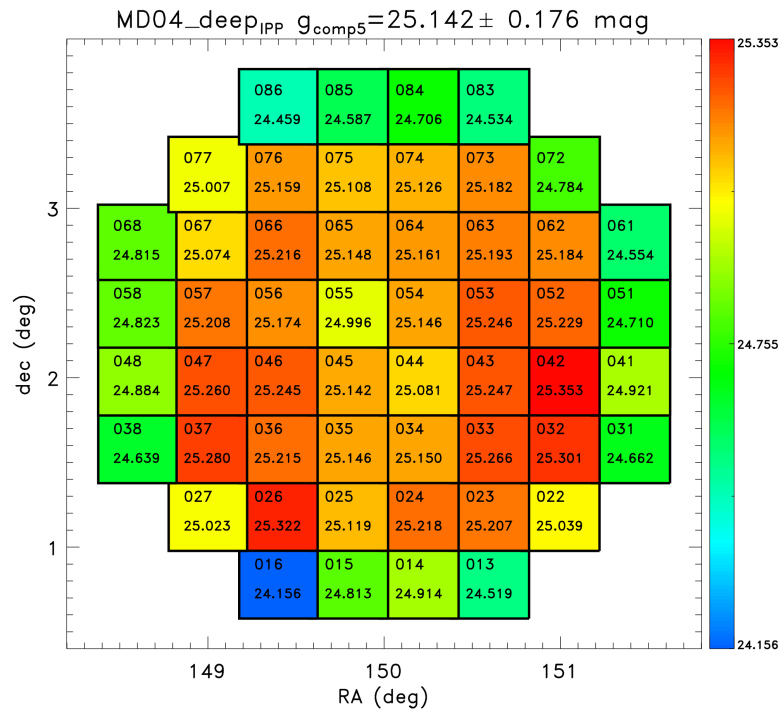


Results: Completeness

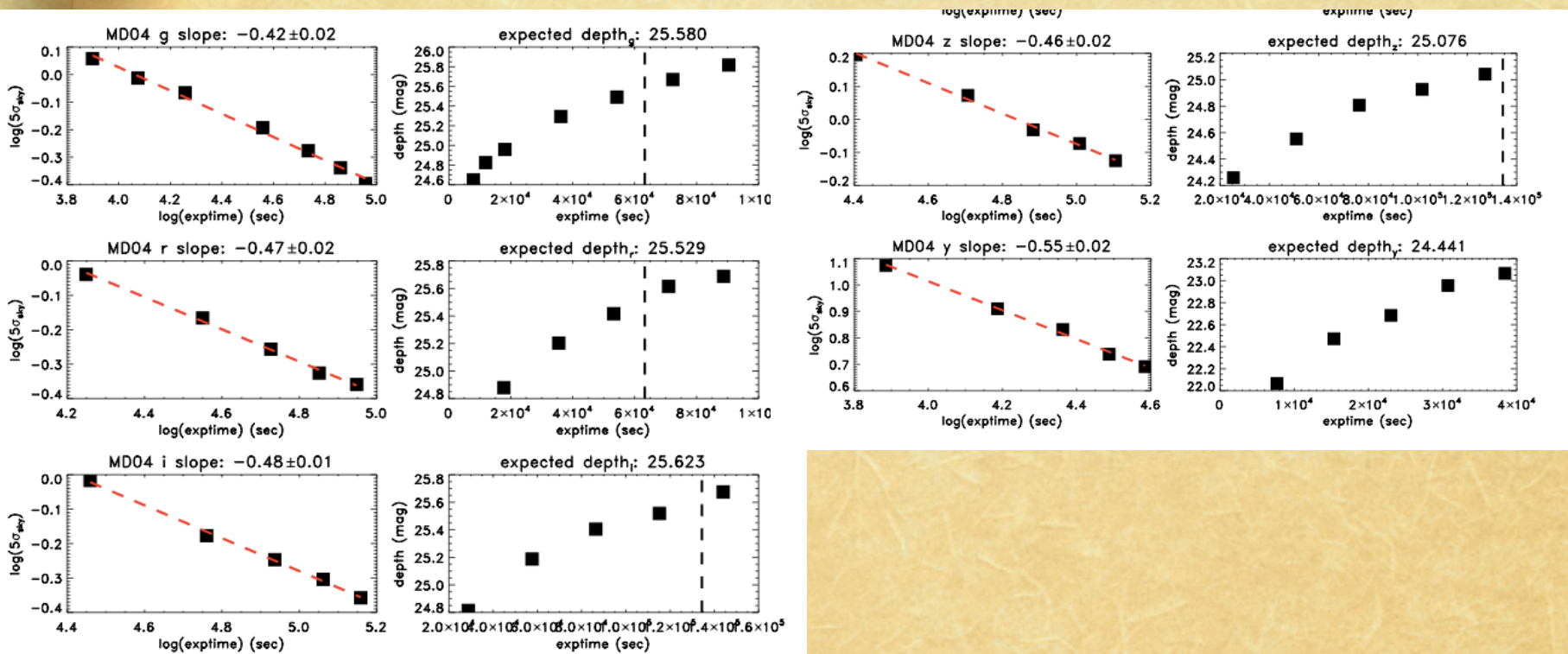
- ◆ Artificial-Star Test: Fake stars in different mags were randomly distributed in the images.



Results: Completeness



Expected Depth till 2013/12



Results

Kp12tw stacking analysis

http://ps1sc.ifa.hawaii.edu/PS1wiki/index.php/Kp12tw_stacking_analysis

	g	r	i	z	y	^u CFHT
MD03 _{IPP_GR} (b/a)	1.02±0.04 (0.94±0.01)	0.95±0.04	0.91±0.03	0.84±0.03	0.90 ±0.04	N/A
MD03 _{Seb_pre} (b/a)	1.19±0.04 (0.96±0.01)	1.03±0.04	1.02±0.04	0.92±0.04	1.09 ±0.04	On Going
MD04 _{IPP_pre} (b/a)	1.10±0.06 (0.95±0.01)	1.03±0.04	1.01±0.07	0.95±0.04	0.90 ±0.07	N/A
MD04 _{IPP_GR} (b/a)	1.06±0.04 (0.95±0.01)	0.98±0.04	0.92±0.04	0.92±0.04	0.93 ±0.04	N/A
MD04 _{IPP_deep} (b/a)	1.11±0.04 (0.95±0.01)	1.05±0.04	1.02±0.03	0.99±0.04	0.99 ±0.04	N/A
MD04 _{Seb_pre} (b/a)	1.20±0.04 (0.97±0.01)	1.08±0.04	1.02±0.06	1.01±0.03	1.08 ±0.06	0.85 ±0.04
MD05 _{IPP_GR} (b/a)	1.10±0.06 (0.96±0.01)	1.03±0.04	0.93±0.03	0.87±0.03	0.90 ±0.04	N/A
MD05 _{Seb_pre} (b/a)	1.20±0.04 (0.96±0.01)	1.07±0.04	1.08±0.04	0.91±0.04	1.21 ±0.07	On Going
MD06 _{IPP_GR} (b/a)	1.07±0.04 (0.96±0.01)	0.98±0.04	0.90±0.04	0.87±0.04	0.85 ±0.04	N/A
MD06 _{Seb_pre} (b/a)	1.18±0.09 (0.96±0.01)	1.05±0.06	1.03±0.03	0.95±0.04	1.02 ±0.04	On Going
MD07 _{IPP_GR} (b/a)	1.07±0.04 (0.95±0.01)	0.97±0.04	0.93±0.04	0.90±0.06	0.82 ±0.07	N/A
MD07 _{Seb_pre} (b/a)	1.13±0.04 (0.96±0.01)	1.01±0.06	1.08±0.04	1.02±0.03	0.95 ±0.04	0.88 ±0.10 0.86 ±0.10

	g	r	i	z	y	^u CFHT
MD03 _{IPP_GR} (exptime/s)	25.060±0.141 (14376)	24.919±0.116 (15097)	24.735±0.154 (27840)	24.186±0.132 (27480)	22.844±0.209 (25200)	N/A
MD03 _{Seb_pre} (exptime/s)	24.704±0.087 0	24.719±0.079 0	24.644±0.067 0	24.148±0.096 0	22.642±0.132 0	On Going
MD04 _{IPP_pre} (exptime/s)	25.035±0.197 (15944)	24.808±0.173 (15113)	24.649±0.142 (25920)	24.178±0.148 (25440)	22.749±0.190 (16140)	N/A
MD04 _{IPP_GR} (exptime/s)	25.069±0.239 (16719)	24.944±0.145 (17144)	24.684±0.165 (22080)	24.346±0.123 (26160)	22.759±0.237 (19920)	N/A
MD04 _{IPP_deep} (exptime/s)	25.221±0.237 (35636)	25.26*±0.215 (37840)	25.2*±0.197 (84240)	24.7*±0.193 (63120)	23.0*±0.242 (29460)	N/A
MD04 _{Seb_pre} (exptime/s)	24.938±0.065 (18080)	24.888±0.082 (17741)	24.811±0.098 (28800)	24.186±0.074 (25440)	22.259±0.090 (7680)	26.200±0.509 (191597)
MD05 _{IPP_GR} (exptime/s)	25.045±0.168 (18297)	24.870±0.147 (14381)	24.706±0.173 (25920)	24.143±0.181 (26400)	22.842±0.194 (25320)	N/A
MD05 _{Seb_pre} (exptime/s)	24.603±0.090 (11752)	24.554±0.085 (11752)	24.425±0.080 (21120)	23.694±0.093 (11520)	22.346±0.110 (13440)	On Going
MD06 _{IPP_GR} (exptime/s)	25.081±0.190 (14383)	24.870±0.147 (14381)	24.706±0.173 (25920)	24.143±0.181 (26400)	22.842±0.194 (25320)	N/A
MD06 _{Seb_pre} (exptime/s)	24.698±0.117 (13447)	24.736±0.073 (14351)	24.753±0.101 (42000)	24.095±0.074 (25200)	22.926±0.114 (27840)	On Going
MD07 _{IPP_GR} (exptime/s)	25.014±0.259 (18700)	24.853±0.208 (16610)	24.710±0.209 (30240)	24.193±0.159 (30240)	22.797±0.196 (27300)	N/A
MD07 _{Seb_pre} (exptime/s)	24.982±0.166 (20792)	24.846±0.098 (19888)	24.812±0.099 (48000)	24.308±0.077 (45360)	23.103±0.126 (36480)	25.595±0.299 (142527) 25.678±0.273 (131064)

MDo4	g	r	i	z	y
Seeing _{IPPD}	1.11±0.04	1.05±0.04	1.02±0.03	0.99±0.04	0.99±0.04
Seeing _{IPP}	1.06±0.04	0.98±0.04	0.92±0.04	0.92±0.04	0.93±0.04
Seeing _{Seb}	1.20±0.04	1.08±0.04	1.02±0.06	1.08±0.06	0.95±1.20
Depth _{IPPD}	25.2±0.2 (36k -> 30k)	25.3±0.2 (38k -> 30k)	25.2±0.2 (84k -> 55k)	24.7±0.2 (63k -> 40k)	23.0±0.2 (29k -> 25k)
Depth _{IPP}	25.1±0.2 (17k)	24.9±0.1 (17k)	24.7±0.2 (22k)	24.3±0.1 (26k)	22.8±0.2 (20k)
Depth _{Seb}	24.93±0.07 (18k)	24.89±0.08 (18k)	24.81±0.10 (29k)	24.19±0.07 (25k)	22.26±0.09 (8k)

Conclusions

- ◆ In general, the seeing is around 1.1" in *g*, 0.95-1" in *ri* and 0.85~0.95" in *zy*. The psfs are round and no preferential elongation/pointing toward certain position angle. The scattering of ZP correction in 5 bands are within 0.02 mag.
- ◆ Significant PSF variation in the central skycells => Be careful on S/G separation and Galfit.....
- ◆ The IPP "deepest" version on MD04 has twice the exptime hence about 0.4 mag deeper than Seb version. The seeing is slightly better for 0.1" in *g* and 0.03" in others.
- ◆ PSFmatching

Image Quality of MDo4-g with different Seeing-Cut

SC	Seeing (")	Depth (mag)	Seeing-Cut
065	1.13±0.09	24.67±0.05	S1.4F10 (9000s)
065	1.15±0.07	24.92±0.04	S1.6F15 (13500s)
065	1.27±0.12	24.99±0.03	F20 (18000s)
066	1.12±0.09	24.57±0.04	S1.2F11 (9900s)
066	1.18±0.10	24.84±0.06	S1.4F15 (13500s)
066	1.24±0.08	24.93±0.05	F20 (18000s)
077	1.15±0.06	24.56±0.02	S1.4F11 (9900s)
077	1.19±0.09	24.84±0.04	S1.6F14 (12600s)
077	1.26±0.09	24.93±0.03	F20 (18000s)
078	1.06±0.07	24.57±0.03	S1.2F10 (9000s)
078	1.12±0.06	24.71±0.02	S1.4F15 (13500s)
078	1.19±0.06	24.94±0.02	F20 (18000s)