CFHTLS

WIRCAM Workshop on LPs

November 5-6 , 2004

500 nights, 3 surveys: deep, wide , very wide

Survey	Area (deg x deg)	Filters	Depth for a point source SNR=5, 1.15"ap.,0.8"	Total integration per field	Observing strategy	Total nights
Deep Synoptic: ~3 nights per run & 5 runs a year for each of the four fields						
	4	u*	28.7	33 hr (10%)	11 x 660 sec per run	
		g'	28.9	33 hr (10%)	4.25 x 5 x 225 sec per run	
		r'	28.5	66 hr (20%)	5.25 x 5 x 360 sec per run	
		i'	28.4	132 hr (40%)	5.25 x 7 x 520 sec per run	
		z'	27.0	66 hr (20%)	5.25 x 5 x 360 sec per run	**202 (44%)**

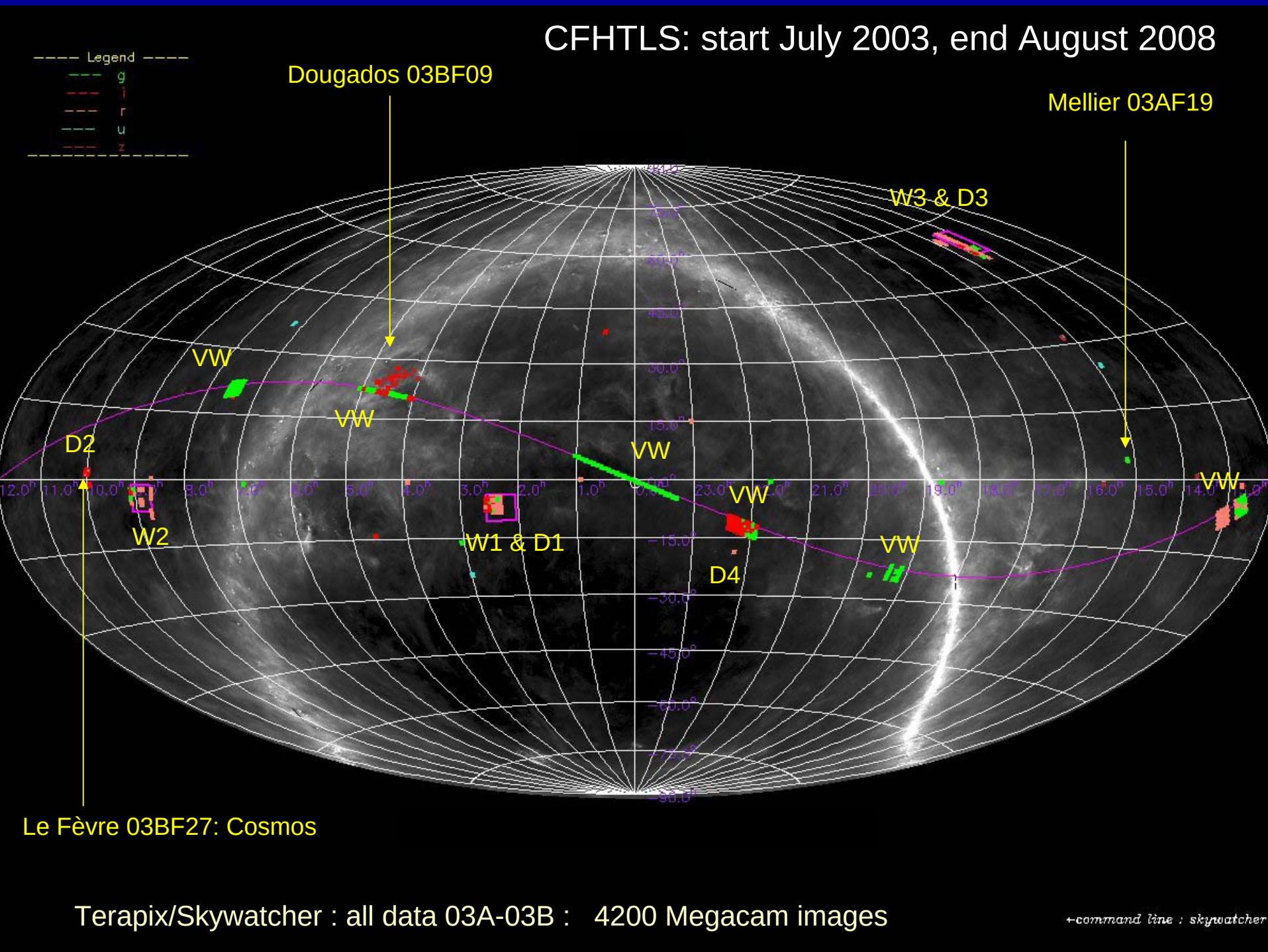
Survey	Area (deg x deg)	Filters	Depth for a point source SNR=5, 1.15"ap., 0.8"	Total integration per field	Observing strategy	Total nights
Wide Synoptic - Large dithering filling the larger gaps in the mosaic.						
	170	u*	26.4	6000 s (27.2%)	7x850 s	
		g'	26.6	2500 s (11.3%)	5x500 s	
		r'	25.9	2000 s (9.1%)	Twice 2x500 s 3 years apart	
		i'	25.5	4300 s (19.5%)	7x620 s	
		z'	24.8	7200 s (32.7%)	9x800 s	**162 (34%)**

Survey	Area (deg x deg)	Filters	Depth for a point source SNR=5, 1.15"ap., 0.8"	Total integration per field	Observing strategy	Total nights
Very Wide - No dithering (single pointing per field)						
Ecliptic strip	1200	r'	25.0 (560 s)	4x140 s (33%)	Optimized for KBO detection	
+/- 2 deg over 325 deg		g'	25.5 (600 s)	2x[3x70+90] s (35%)	with 2 epochs in g' 3 yrs apart	
		i'	24.4 (540 s)	3x180 s (32%)	Partial internal KBO follow-up.	**110 (22%)**

The CFHTLS

Primary science goals:

- Evolution of galaxy clustering (0<z<2-3)
- Star formation history of galaxies (0<z<5)
- High redshift quasars (<5)
- Galaxy dynamics and stellar proper motion
- Clusters of galaxies (0<z<1 - 2)
- SNIa : geometry of the universe
- Cosmic shear: biasing, P(k) and geometry
- KBOs: properties and formation history of the Solar System

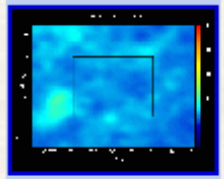

CFHTLS: start July 2003, end August 2008
Legend
g
i
r
u
z
Dougados 03BF09
Mellier 03AF19
W3 & D3
VW
VW
VW
VW
VW
VW
D2
W2
W1 & D1
D4
Le Fèvre 03BF27: Cosmos
Terapix/Skywatcher : all data 03A-03B : 4200 Megacam images
+command line : skywatcher

Deep and Wide locations

CFHTLS Deep Synoptic Survey Fields

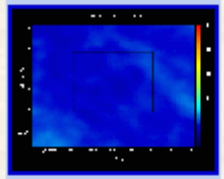
D1 - 1° x 1°
02:26:00 -04:30:00 2000

In W1



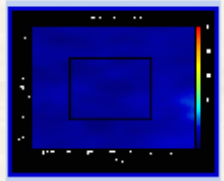
D2 - 1° x 1°
10:00:29 02:12:21 2000

On the COSMOS/ACS survey field



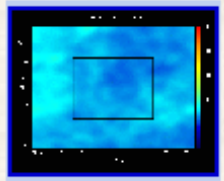
D3 - 1° x 1°
14:17:54 +52:30:31 2000

In W3



D4 - 1° x 1°
22:15:31 -17:44:05 2000

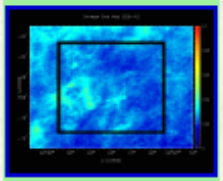
Around the quasar LBQS2212-17



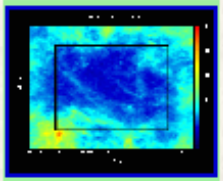
CFHTLS Wide Synoptic Survey Fields

W1 - 8° x 9°
02:18:00 -07:00:00 2000

On the XMM LSS field

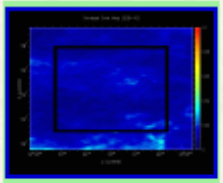


W2 - 7° x 7°
08:54:00 -04:15:00 2000



W3 - 7° x 7°
14:17:54 +54:30:31 2000

On the Groth Strip

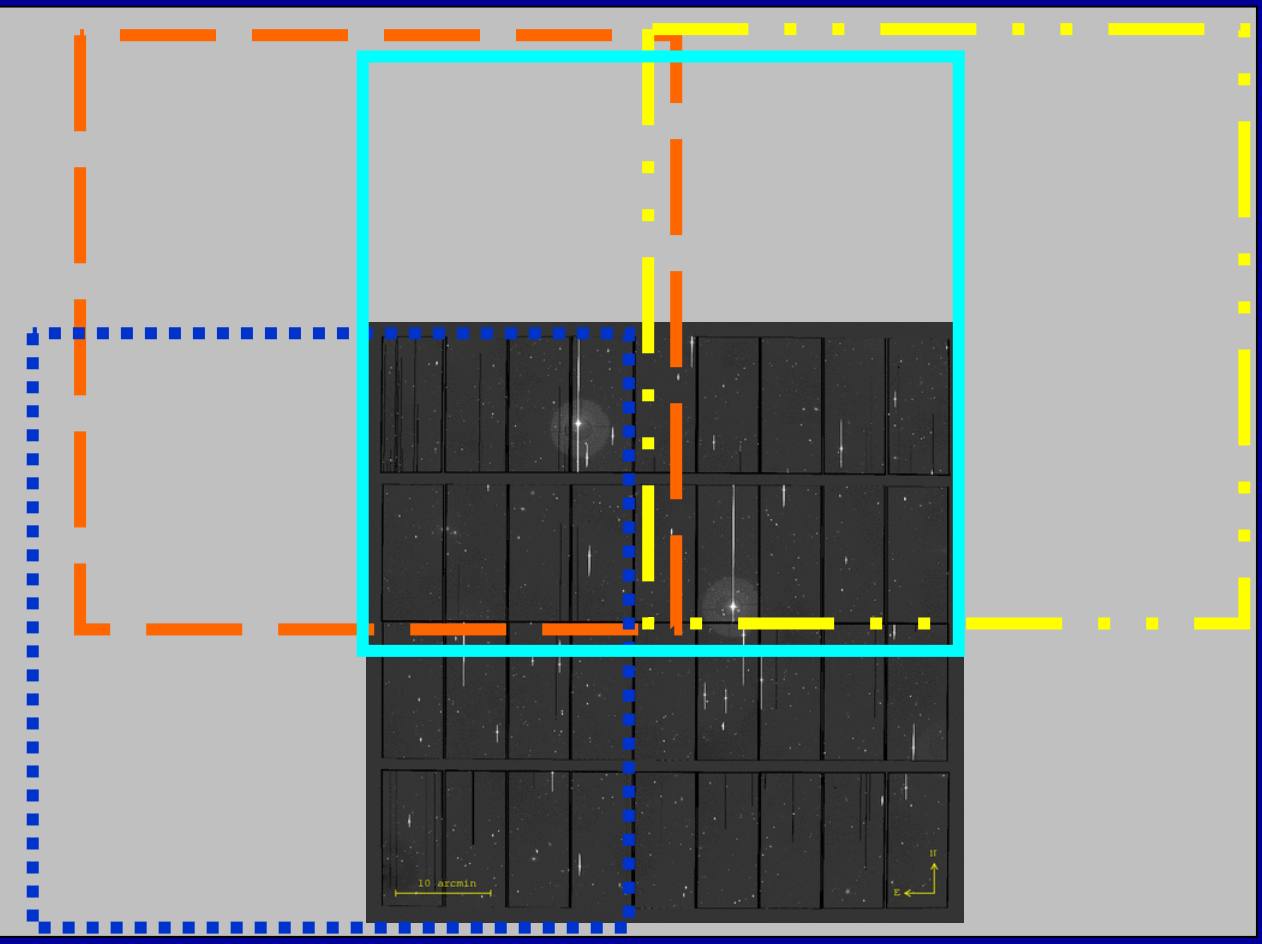


Field	RA(2000)	Dec(2000)	Other Observations
W1/D1	02:26:00.00	−04:30:00.0	XMM Deep, VIMOS, SWIRE, GALEX
D2	10:00:28.60	+02:12:21.0	Cosmos/ACS, VIMOS, SIRTF, XMM
W3/D3	14:19:28.01	+52:40:41.0	Groth strip, Deep2, ACS
D4	22:15:31.67	−17:44:05.7	XMM Deep

The Presurvey

Motivation: accurate, homogeneous and reliable calibration of the legacy survey

- Have wide shallow catalogues that provide global astrometric and photometric reference frames for W1, W2, W3 , D1, D3
- Accuracy provided by a strong overlap between each presurvey pointing (1/2 Megacam)



- Good calibrations
- Correct any drift from run to run over 5 years
- Garantee the legacy value

- But….Time consuming: 323 files for W1, 225 for W2 and W3 (180 sec each, in r)

Terapix/QualityFITS: field W3-0-0 i band

Very Wide: 1300 sq degrees

- 3x First night
  - Discovers outer solar system objects
- ~2 nights later
  - Very rough orbit
- 6 weeks later
  - 1 year orbit
- 1 year later
  - Dynamically useful orbit
- 3 and 5 years: galactic structure

CFHTLS Validated Exposures Statistics

Last update: Fri Oct 22 16:42:25 HST 2004

Global statistics since the official start (*) of the survey on May 30th, 2003.

*** moment when the integration time spent on the CFHTLS started to be accounted for as the instrumental configuration became stable (improved image quality, guiding, full mosaic)**

Survey Component :	Deep	Wide	Very Wide	Pre-Survey
Total integration [validated exp.]:	219.0 hr	98.5 hr	63.2 hr	2.7 hr
Current fraction of CFHTLS :	57.5 %	25.9 %	16.6 %	n/a
Target fraction of CFHTLS :	44.0 %	34.0 %	22.0 %	n/a

Note: the Pre-Survey is included in the Wide component for the computation of these global ratios.

Deep Survey

Deep D1	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
u	5.7	3.9 = 660 x 21	0.95 0.95 0.79 1.10 0.09	1.12	0.44	100
g	8.6	5.8 = 225 x 92	0.88 0.89 0.68 1.29 0.14	1.17	2.23	72
r	24.2	16.3 = 360 x 163	0.82 0.85 0.60 1.28 0.14	1.20	3.19	67
i	48.8	32.9 = 520 x 228	0.75 0.78 0.59 1.26 0.13	1.19	5.97	79
z	12.7	8.6 = 360 x 85	0.76 0.78 0.60 1.05 0.10	1.19	6.02	58

Deep D2	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
u	5.8	1.3 = 660 x 7	0.81 0.79 0.74 0.83 0.03	1.07	0.28	100
g	8.8	1.9 = 225 x 31	0.95 0.98 0.77 1.29 0.17	1.24	2.01	61
r	24.2	5.3 = 360 x 53	0.97 0.93 0.64 1.25 0.17	1.13	2.78	66
i	47.5	10.4 = 520 x 72	0.91 0.92 0.62 1.61 0.19	1.19	5.32	71
z	13.6	3.0 = 360 x 30	0.71 0.74 0.59 0.92 0.09	1.22	7.67	66

Deep D3	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
u	2.7	1.3 = 660 x 7	0.81 0.81 0.77 0.86 0.03	1.20	0.36	100
g	9.0	4.3 = 225 x 69	0.91 0.93 0.62 1.29 0.15	1.31	1.64	75
r	22.9	11.1 = 300 x 133	0.86 0.86 0.58 1.30 0.13	1.31	2.67	75
i	50.9	24.6 = 520 x 170	0.79 0.83 0.57 1.30 0.16	1.29	4.79	74
z	14.5	7.0 = 360 x 70	0.77 0.83 0.62 1.49 0.17	1.34	5.96	72

Deep D4	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
u	9.3	7.5 = 660 x 41	1.00 1.00 0.81 1.28 0.08	1.29	0.44	100
g	8.7	7.1 = 225 x 112	0.92 0.91 0.70 1.19 0.09	1.30	2.38	78
r	20.2	16.4 = 360 x 164	0.80 0.84 0.62 1.29 0.14	1.30	3.33	81
i	45.0	36.6 = 520 x 253	0.80 0.83 0.53 1.48 0.16	1.32	6.29	66
z	16.8	13.6 = 360 x 136	0.76 0.79 0.57 1.29 0.15	1.30	7.03	88

Wide Survey

Wide W1	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
u	13.3	10.0 = 600 x 59	0.94 0.94 0.76 1.10 0.09	1.13	0.35	82
g	19.4	14.6 = 500 x 105	0.87 0.87 0.69 1.09 0.08	1.15	2.27	61
r	10.6	7.9 = 180 x 158	0.83 0.85 0.62 1.15 0.12	1.18	5.47	86
i	30.9	23.2 = 620 x 134	0.77 0.77 0.55 1.03 0.10	1.18	5.74	60
z	25.8	19.3 = 600 x 115	0.73 0.74 0.53 1.01 0.10	1.18	5.57	62

Wide W2	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
u	0.0	0.0 = 0 x 0	0.00 0.00 0.00 0.00 0.00	0.00	0.00	0
g	64.1	4.2 = 500 x 30	0.88 0.86 0.66 1.10 0.11	1.24	1.74	80
r	35.9	2.3 = 500 x 16	0.85 0.82 0.61 1.01 0.12	1.25	2.33	90
i	0.0	0.0 = 0 x 0	0.00 0.00 0.00 0.00 0.00	0.00	0.00	0
z	0.0	0.0 = 0 x 0	0.00 0.00 0.00 0.00 0.00	0.00	0.00	0

Wide W3	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
u	0.0	0.0 = 0 x 0	0.00 0.00 0.00 0.00 0.00	0.00	0.00	0
g	35.1	6.0 = 500 x 43	0.89 0.92 0.78 1.12 0.08	1.28	1.62	76
r	14.2	2.4 = 500 x 17	0.85 0.85 0.65 1.02 0.11	1.32	2.09	75
i	50.6	8.6 = 620 x 50	0.72 0.72 0.61 0.91 0.07	1.24	6.68	98
z	0.0	0.0 = 0 x 0	0.00 0.00 0.00 0.00 0.00	0.00	0.00	0

Very Wide Survey

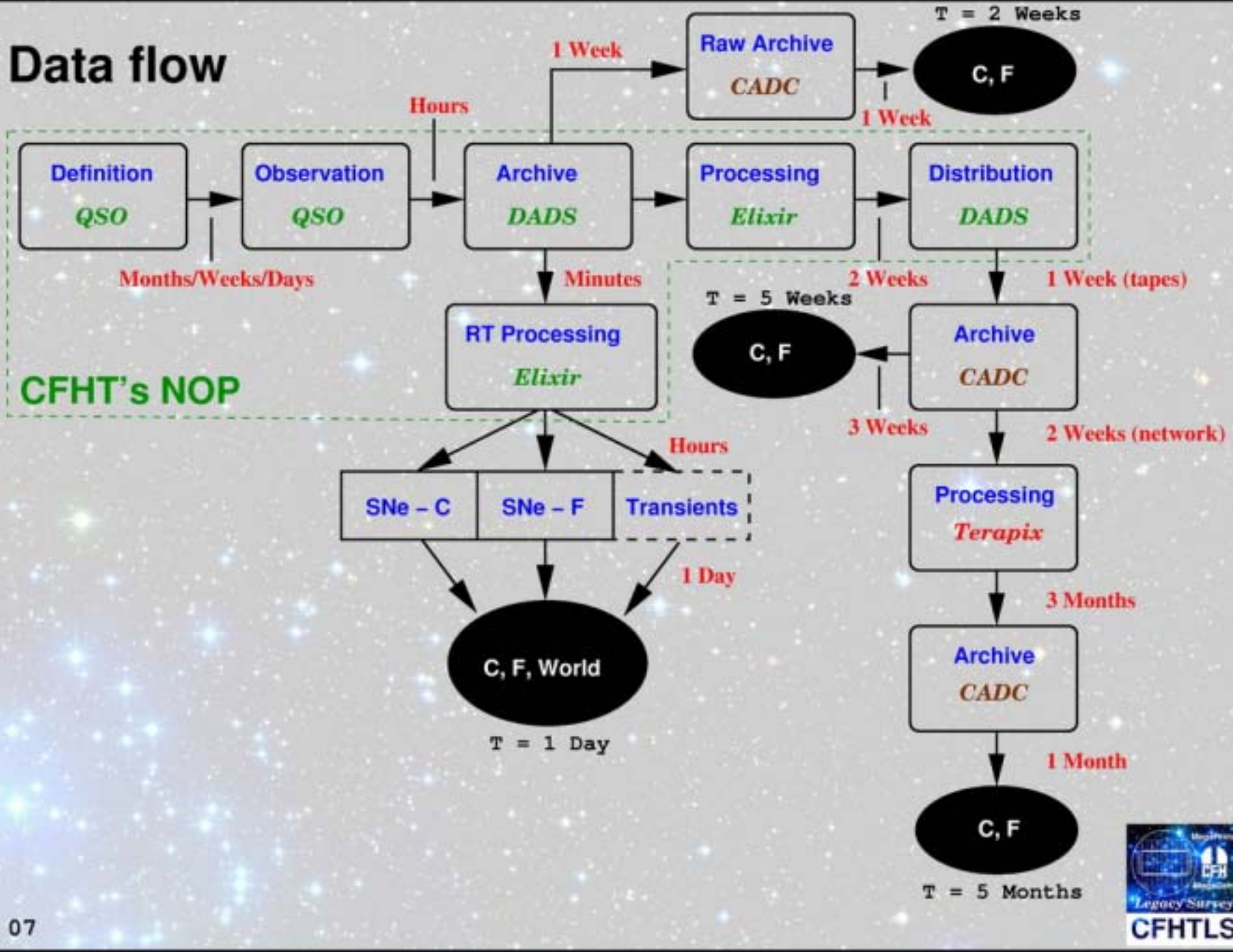
All Fields	Ratio (%)	Itime(hr) = itime(sec) x Nexp	Med Avg Min Max Dsp	A.	Bkg.	Ph.
g	31.5	19.9 = 70 x 1022	0.87 0.88 0.69 1.30 0.11	1.25	3.09	93
r	14.6	9.2 = 110 x 302	0.84 0.85 0.65 1.13 0.10	1.21	2.99	72
i	53.9	34.1 = 180 x 681	0.81 0.84 0.53 1.76 0.19	1.35	6.84	89

Validated Data as of Oct 15

Goal Nov. Run: u-Deep 10hrs, D: 20hrs, VW :7hrs, W: 7hrs

Field	u*	g'	r'	i'	z'	hours
1hr grey s/n=10 AB	25.20	25.7	25.3	24.9	23.9	
D1	2.57	5.50	15.49	31.72	10.1	65.38
D2	1.28	2.13	5.75	11.46	3.00	23.62
D3	1.28	5.59	15.13	33.41	9.01	64.42
D4	7.90	7.94	17.42	37.08	15.6	85.94
W1	9.99	14.72	8.09	23.17	7.33	63.3
W2		4.17	3.06	0.69		7.92
W3		9.45	3.91	12.75		26.1
V Wide		22.6	11.74	34.07		68.4

Data flow



CFHTLS

Terapix processing

- Get from CADC
- Input Q-assessment + selection Class A,B,C,D
- Weight map images
- Astrometric solution
- Photometric field-to-field calibration
- Resampling and stacking (+weight images)
- Output Q-assessment
- Processing history in DB
- Send to CADC

TERAPIX

Qualityfits Processed data

Home > Tools > Data reduction > Spica

- Server Admin Spica -
- Quality assessment 1.10 -

Images processed	5135
Images invalid	47
Search images	5135
Maximum images display	10

PI data access

Login :

Password :

Go

RunId 2003		
Name	Number	%
03AL01	408	7 %
03AL02	78	1 %
03AL03	371	7 %
03AL04	2	0 %
03AL05	49	0 %
03AQ97	260	5 %
03AQ98	10	0 %
03BL01	820	15 %
03BL02	238	4 %
03BL03	325	6 %
03BL04	70	1 %
03BL05	105	2 %
03BL06	248	4 %
03BQ97	595	11 %
03BQ98	67	1 %

RunId 2004		
Name	Number	%
04AL01	603	11 %
04AL02	76	1 %
04AL03	23	0 %
04AL04	66	1 %
04AL05	62	1 %
04AL06	659	12 %

Filter		
Name	Number	%
u.MP9301	193	3 %
g.MP9401	1683	32 %
r.MP9601	1099	21 %
i.MP9701	1722	33 %
z.MP9801	438	8 %

Grade		
Value	Number	%
Not graded	817	15 %
A	2332	45 %
B	1355	26 %
C	528	10 %
D	61	1 %

Node		
Name	Number	%
pix1	201	3 %
pix2	105	2 %
pix3	371	7 %
pix4	191	3 %
pix5	926	18 %
pix6	993	19 %
pix7	938	18 %
pix8	910	17 %
pix9	500	9 %

Spica: terapix pipeline

Quality Assessment summary table of input data derived from the Terapix quality assessment tool "QualityFITS" . These data are provided for ALL CFHTLS-related images that enter into the Terapix processing.

This front panel can be used to select images according to your preferences

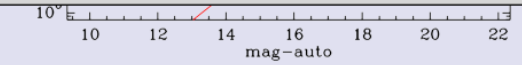
Search	Display	QF Version	Filename	Object / Field	RunId	Filter	DateObs Min & Max	Node	Grade (*)
Go	10	1.10		or ---	---	---	2003 03 22 / 2004 07 25	---	---
	RA Min & Max	Dec Min & Max	Master flat	Master mask	Exposure time	Airmass	Seeing	Bkg	
	-1 h -24 m -53.-85 / 23 h 59 m 50.13	-24 ° 22 ' 03.29 / 57 ° 46 ' 30.9	---	---	Min 1.02 Max 1200.19	Min 1 Max 2.912	Min 0.5608 Max 4.3188	Min -3.54 Max 23.0301	

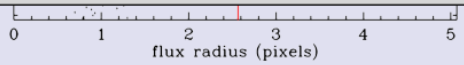
Images + weight maps: CFHTLS + Pis : more than 14,000 images at Terapix

Processing and release

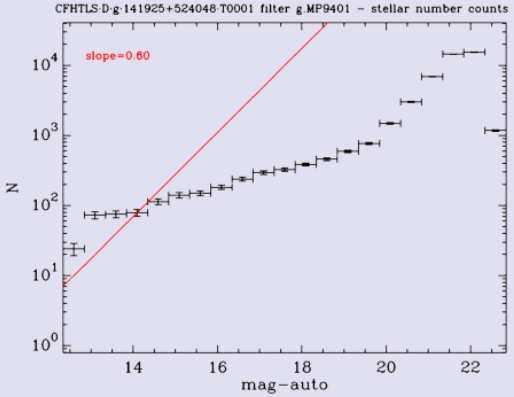
First release Terapix: 7 novembre 2004

- D1, D2, D3, D4,
- u,g,r,i,z
- Data between June 1st 2003 and July 22, 2004
- Exp. time > 60 seconds
- Seeing < 1.1’’; except u (<1.4 ’’)
- Airmass < 1.4
- Class Terapix (output image quality):A ou B
- u,g,r,z stacks aligned to i-band stacked images

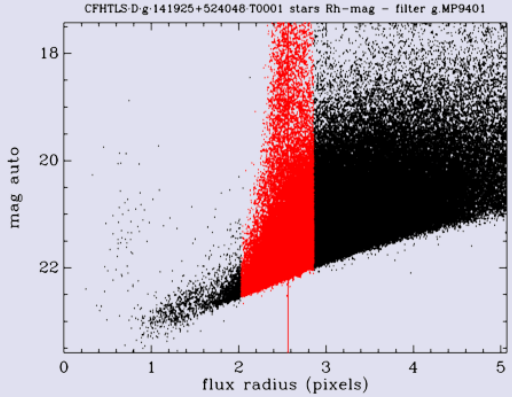




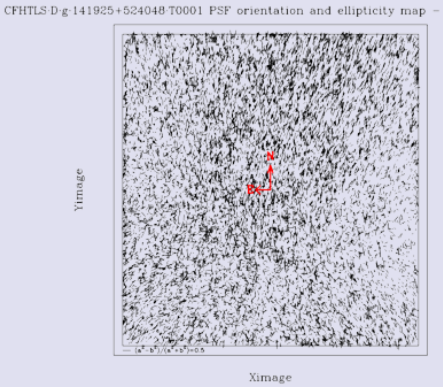
CFHTLS_D_g_141925+524048_T0001 filter g.MP9401 - stellar number counts



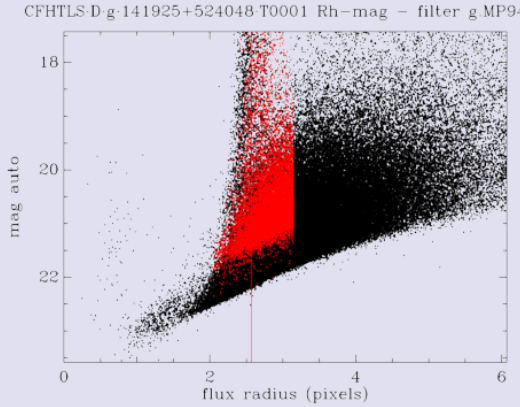
CFHTLS_D_g_141925+524048_T0001 stars Rh-mag - filter g.MP9401



CFHTLS_D_g_141925+524048_T0001 PSF orientation and ellipticity map - filter g.MP9401



CFHTLS_D_g_141925+524048_T0001 Rh-mag - filter g.MP9401



PSF orientation and ellipticity map

4x4 binned chip pixel (1,1) is at lower left	background (ADU)	sigma_bkg (ADU)	background (mag/arcsec^2)	nsexdet	seeing (pix)	seeing (arcsec)	sloaded	saccepted	schi2
EXT[0]	-0.0	0.4	26.55	134831	5.13	0.95	4440	3582	3.72

qualityFITS command line : /usr/local/bin/qualityFITS --filterfile /usr/local/etc/qualityFITS/filters_megacam.dat --logfile CFHTLS_D_g_141925+524048_T0001.log -vv -d CFHTLS_D_g_141925+524048_T0001.fits

Release Nov. 7 summary

TERAPIX

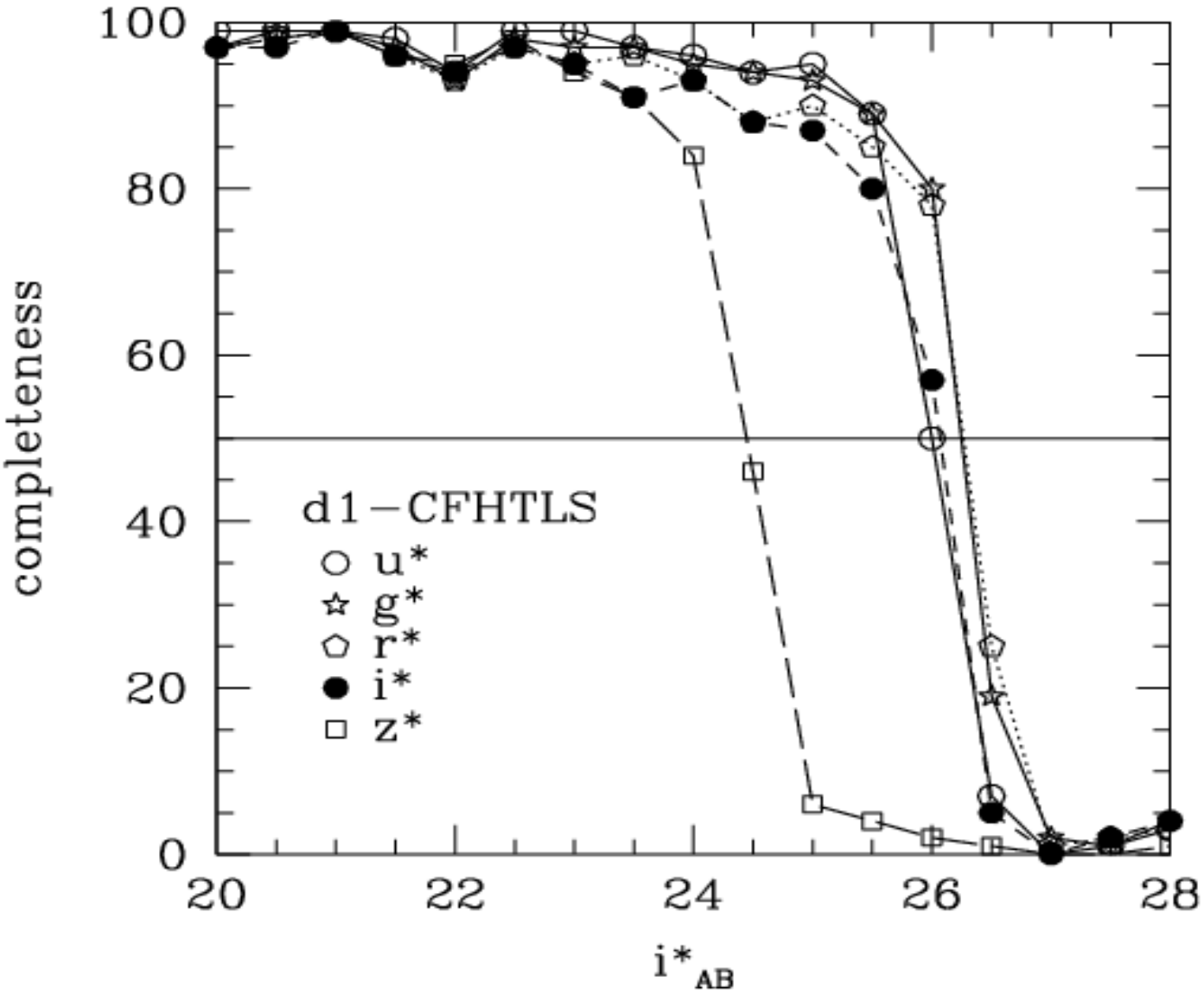
Intranet > Science > 1. CFHTLS Deep Release Summary

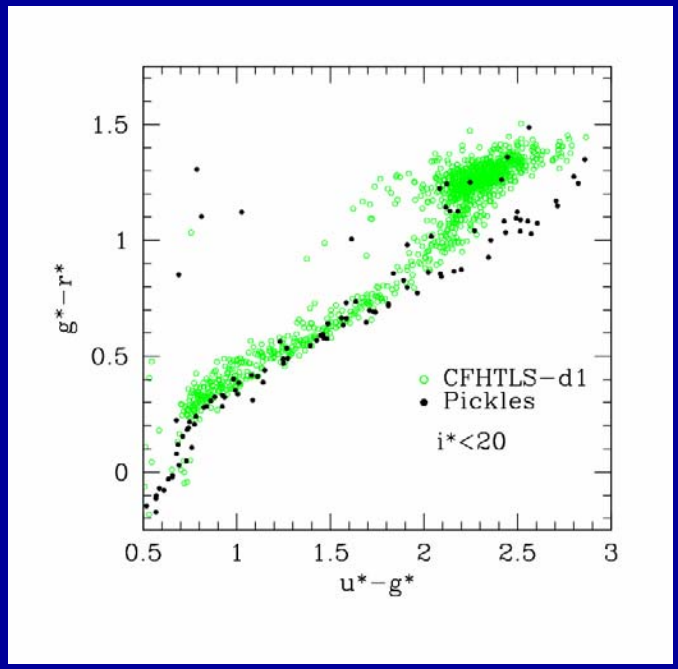
- Development
  - Defectix
- Meetings
- Administration
- System administration
  - Gentoo on opteron
  - CLIC
- Science
  - 1. CFHTLS Deep Release Summary
- Management
  - Publication
    - Tips and tricks
  - Stats
    - Technical data

Presentation

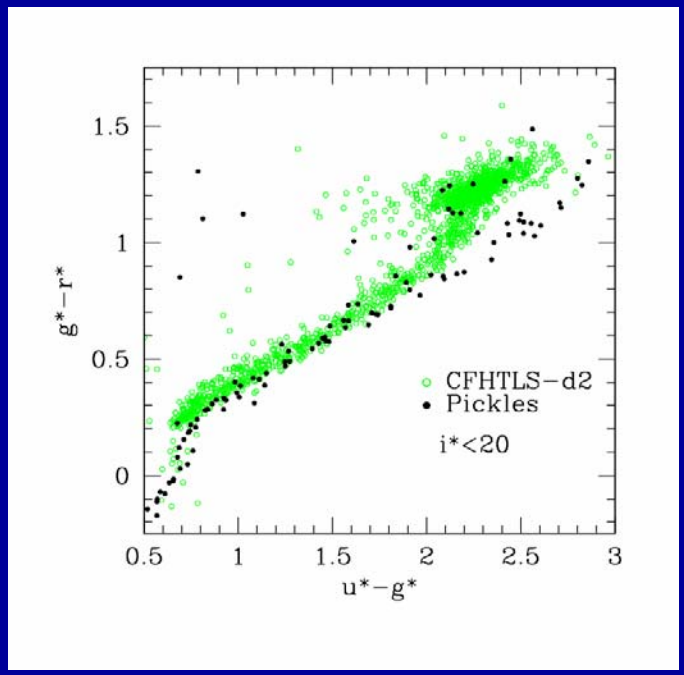
by GTI - Updated November 4th, 2004

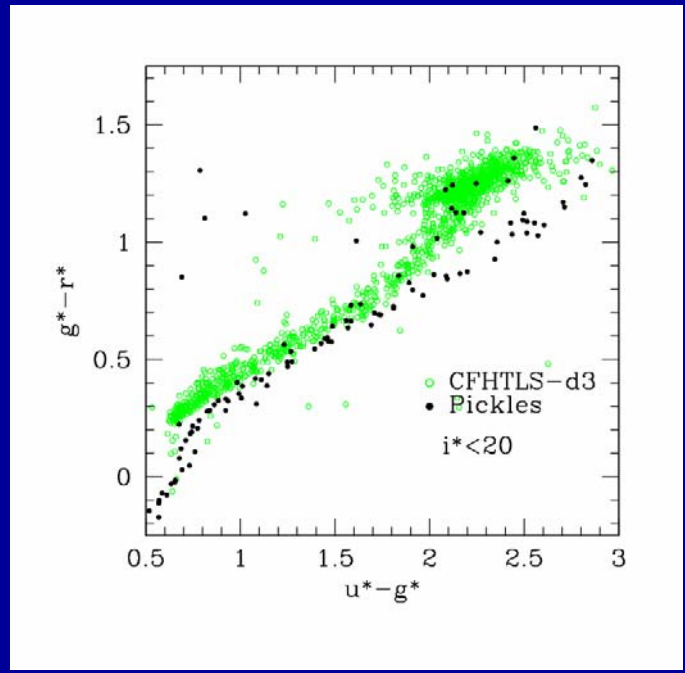
CFHTLS Field			D1					D2					D3					D4				
filter	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Stacked image	u	g	r	i	z	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	u	g	r	i	z
(RA,DEC)	u	g	r	i	z	u	g	r	i	z	14:39:29 +52:40:43	g	r	i	z	u	g	r	i	z
Nfiles added	u	g	r	i	z	u	g	r	i	z	7	37	64	127	42	u	g	r	i	z
Exp. time	u	g	r	i	z	u	g	r	i	z	4620	8010	20820	59640	15120	u	g	r	i	z
Seeing	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
ZP	u	g	r	i	z	u	g	r	i	z	30.	30.	30.	30.	30.	u	g	r	i	z
Pixel size	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
FOV	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Chi2 image	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Image size	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Dust Ext. image	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Completness	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Stellar color-color plots	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Galaxy counts	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Astrom. Q-assessment files	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
.head files	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Mask files	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Catalogs	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Config. SExtractor	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Congif. swarp	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Monochrom. png image	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Colored png image	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
List of FITS images stacked	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z
Qfits2	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z	u	g	r	i	z


100
80
60
40
20
0
completeness
20
22
24
26
28
i*AB
d1−CFHTLS
u*
g*
r*
i*
z*



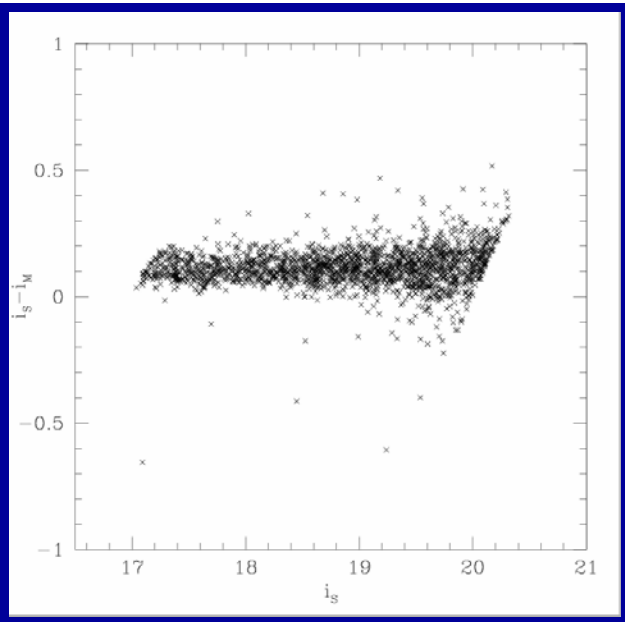
Color-color plots: stars

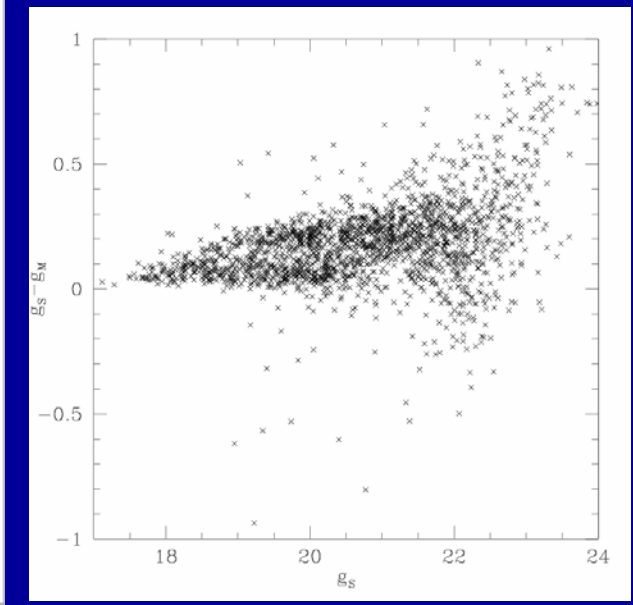


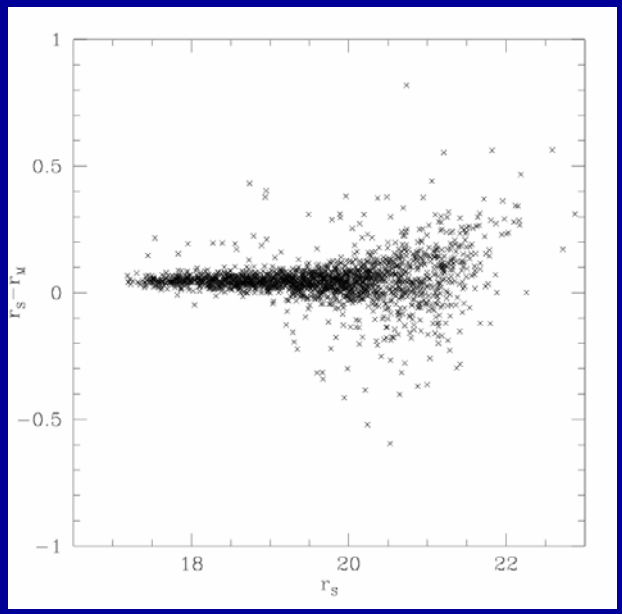


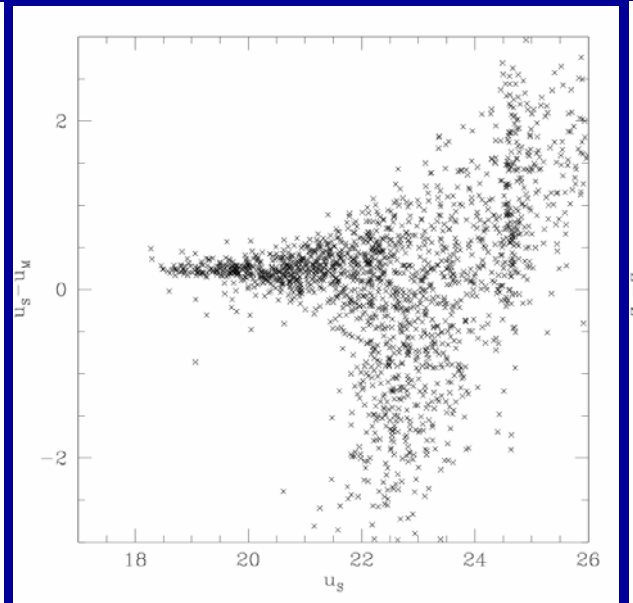
Photometric calibration: SDDS vs. CFHTLS

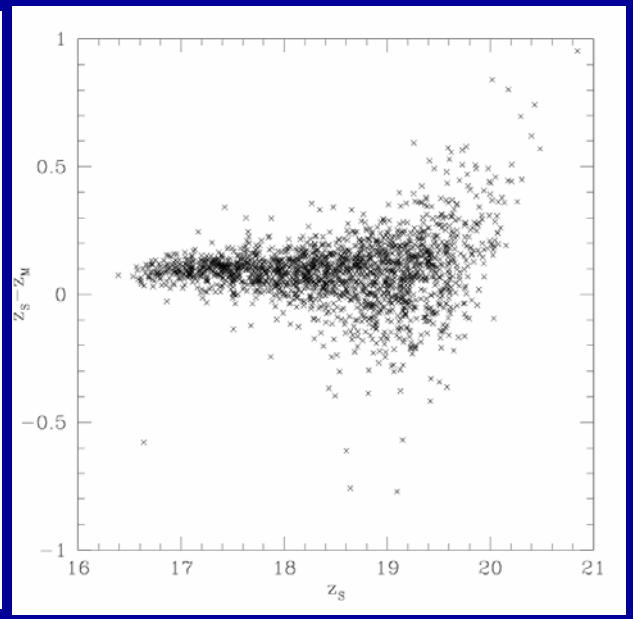
Terapix and C. Marmo



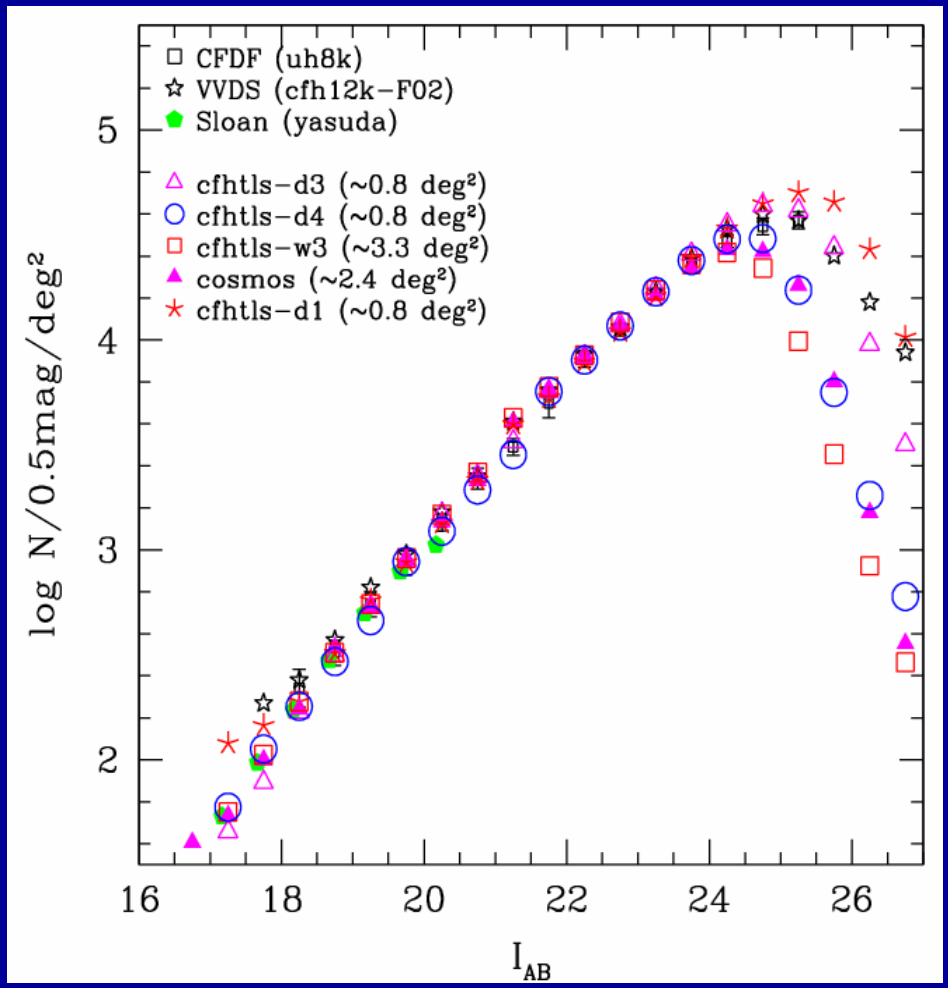


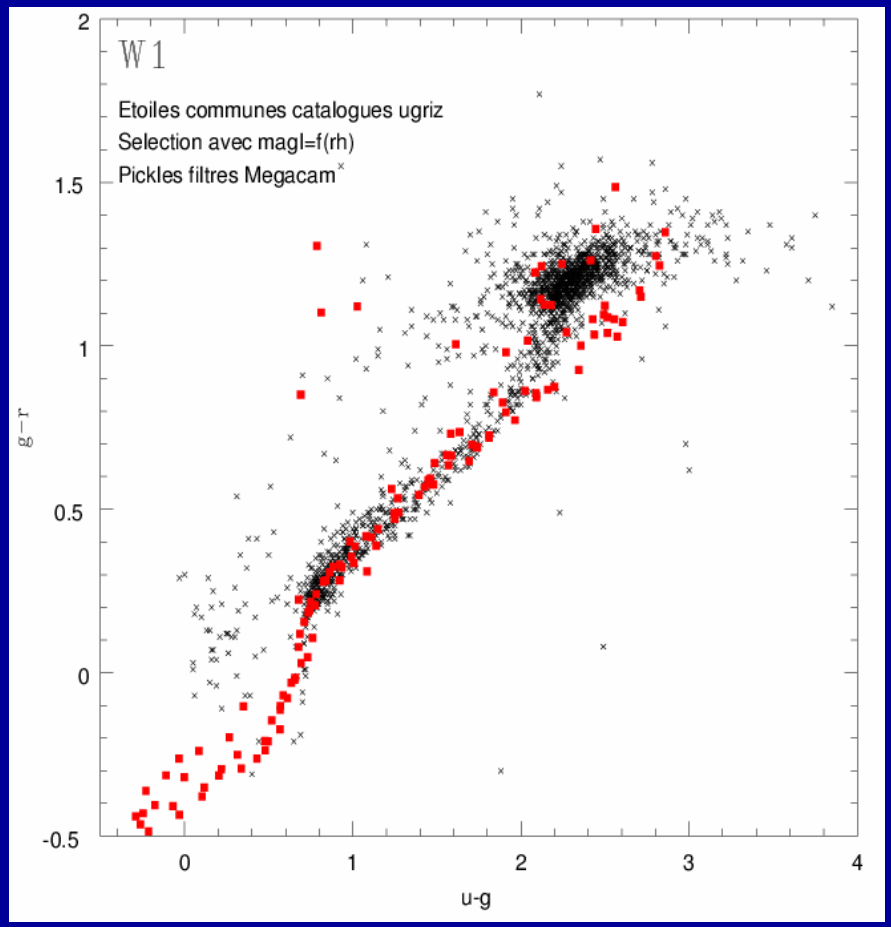




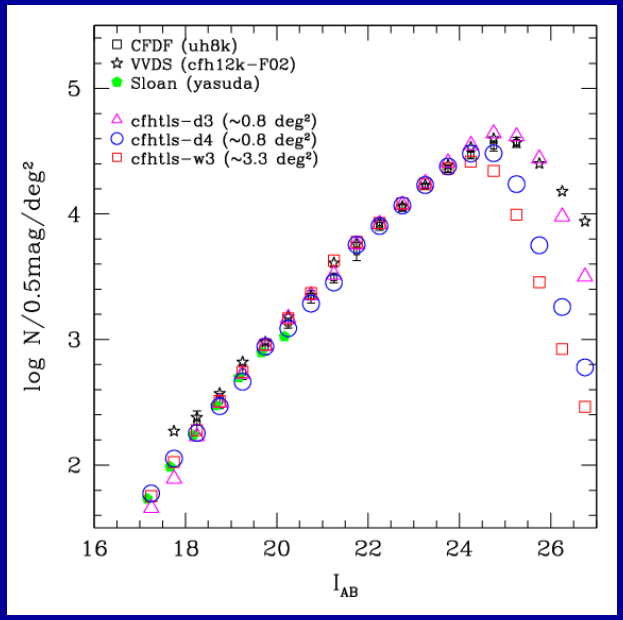


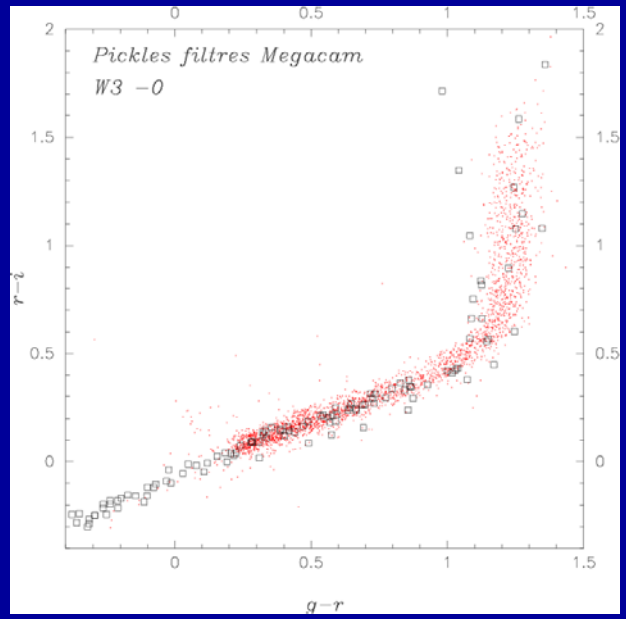
Photometric calibrations: W1

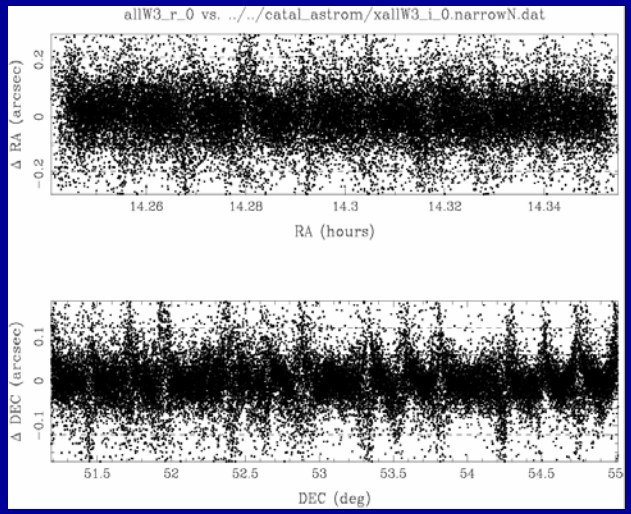


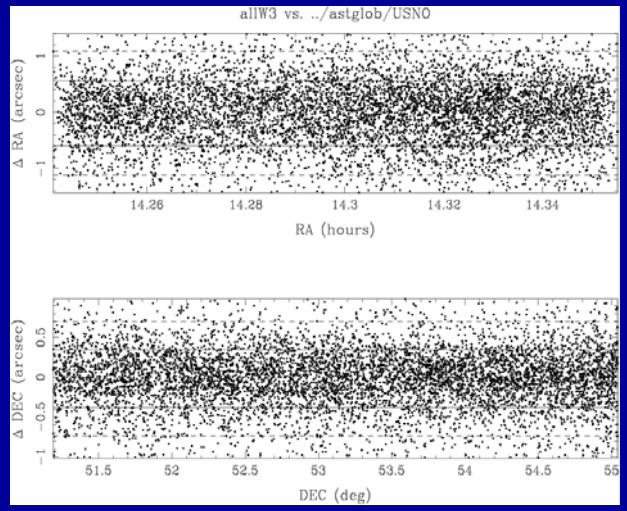


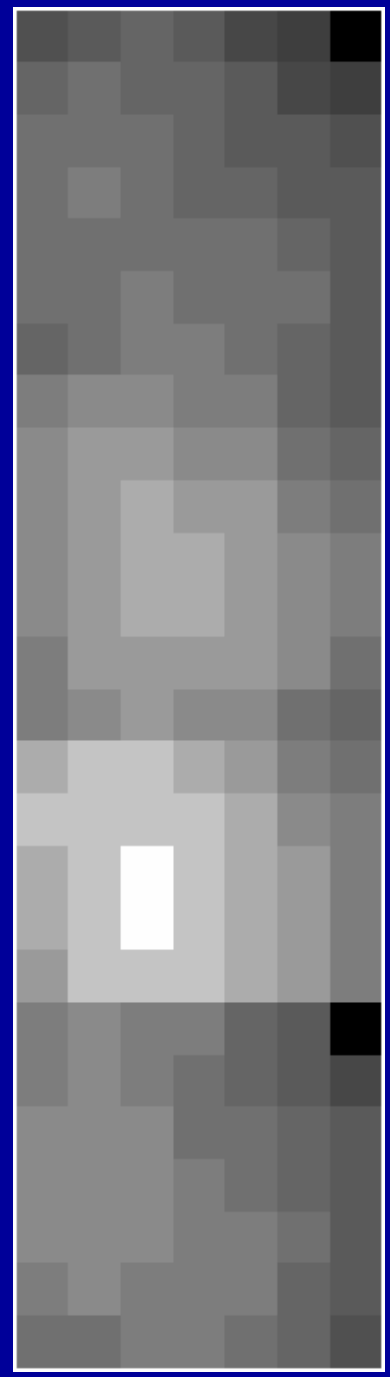
W3 data quality assessment





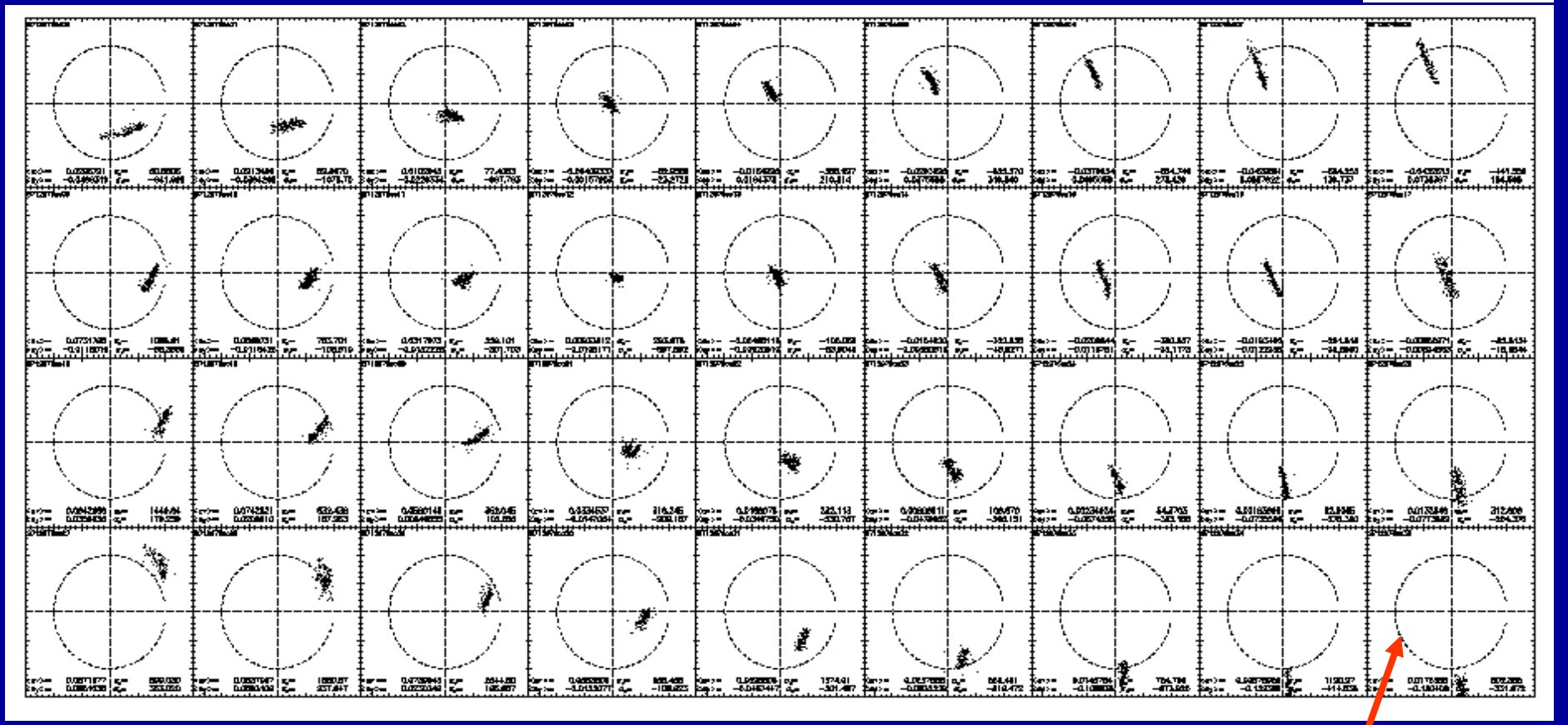






W3 pre-survey not used yet.

PSF anisotropy analysis: (e_x,e_y)



- Megacam CCD #0 (top left) to #35 (bottom right)
- Doted circle = maximum stellar PSF anisotropy

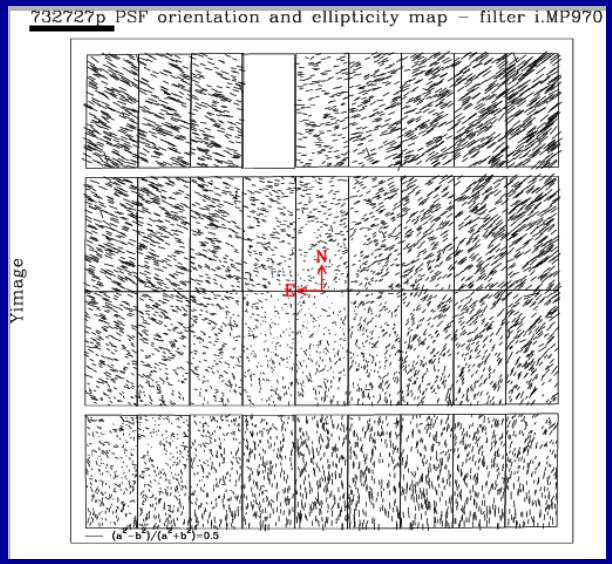
that current cosmic shear tools can correct to reach a 1% shear measured with a 10% accuracy:

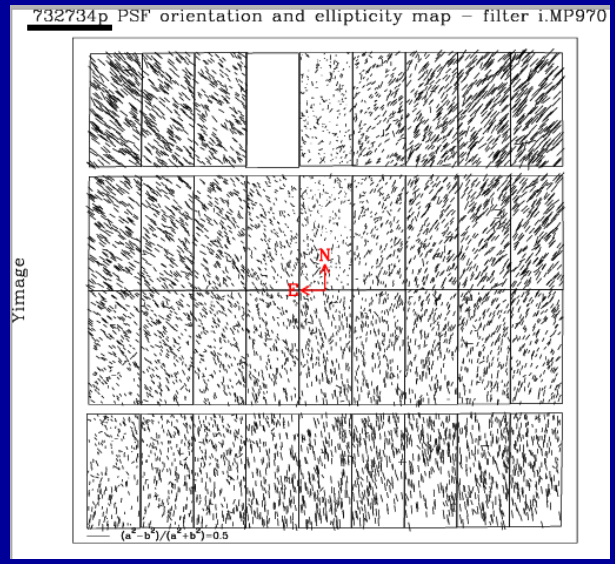
- 29-32/35 CCD ok (85-90%)

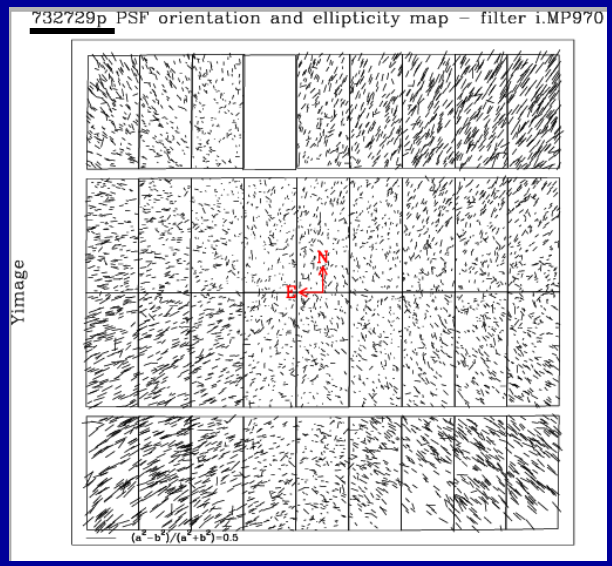
Upper limit for cosmic shear

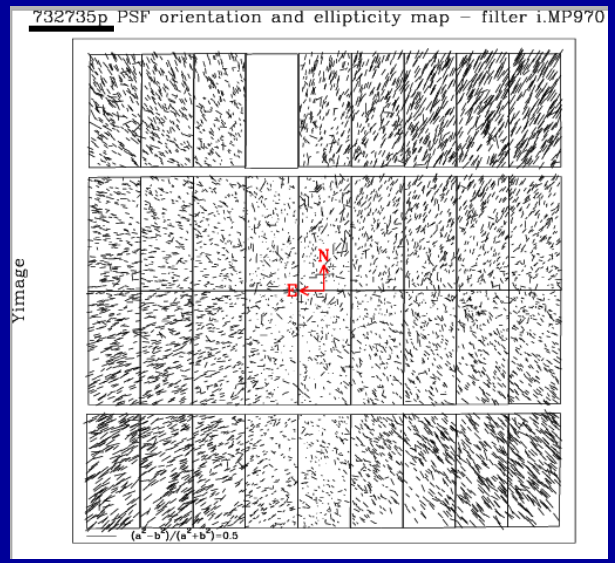
PSF anisotropy stability

another challenge for the wide - CFHTLS lensing legacy survey



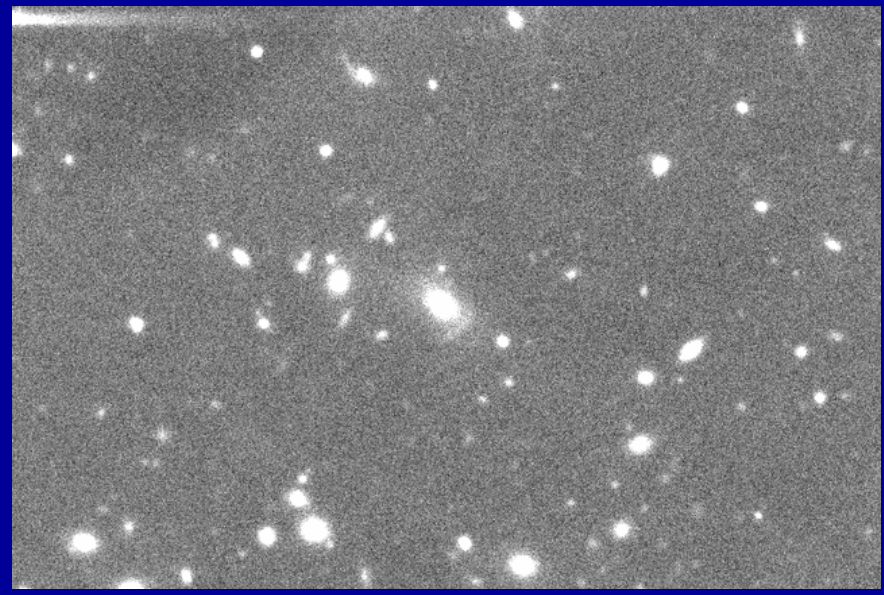




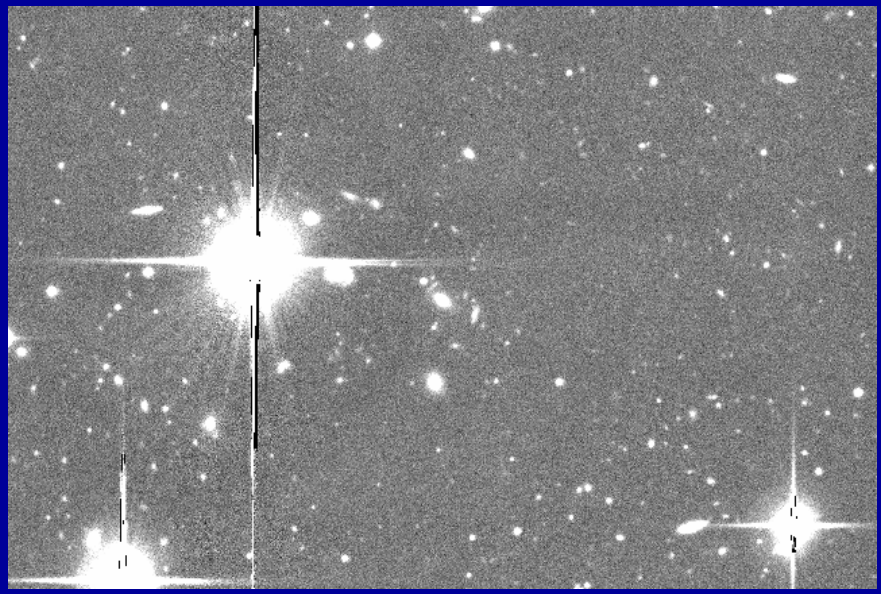


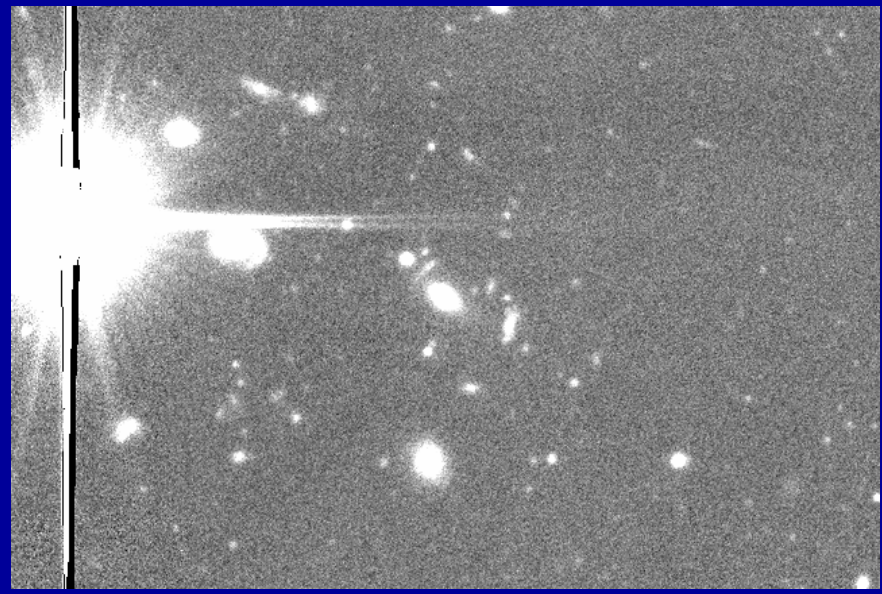
Terapix/QualityFITS evaluation

Arc1 in W3

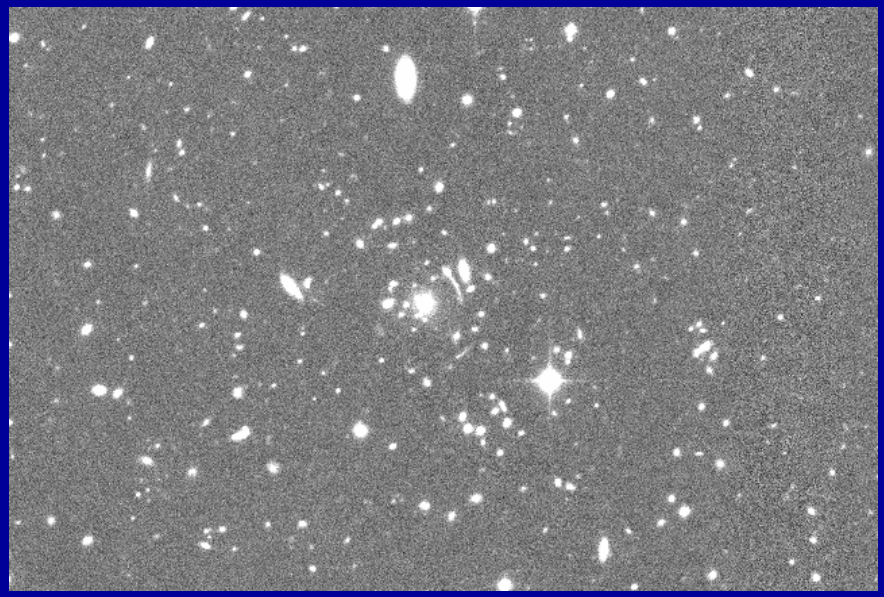


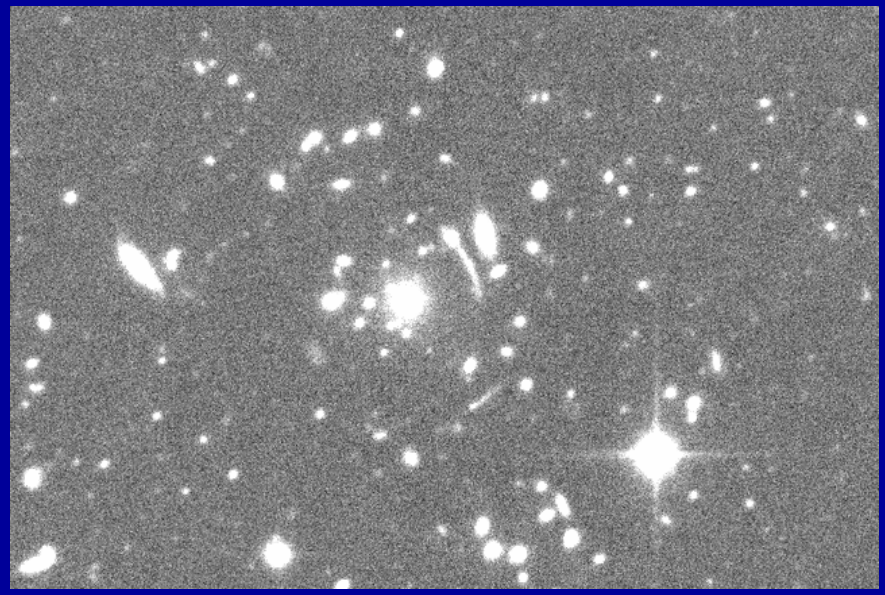
Arc2 in W3



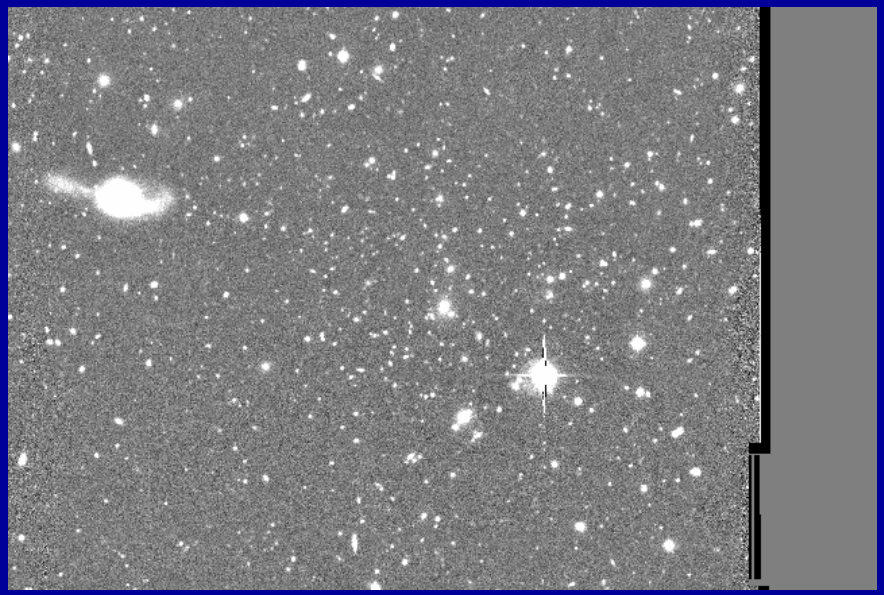


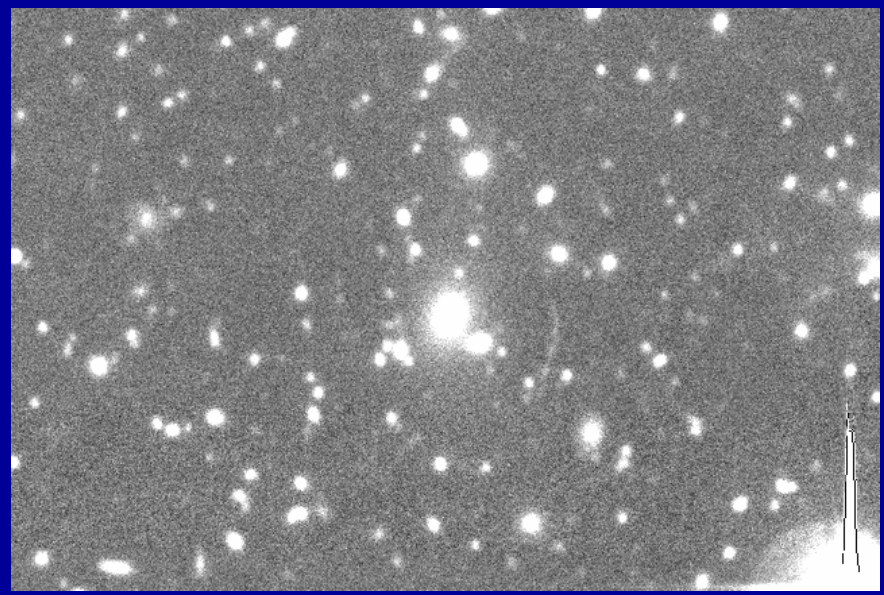
Arc3 in W3





Arc2 in W3





Releases

Schedule:

- November 7: Release Deep
- December 7: release Deep, Wide and Very wide

Spica + 2004A +new pre-calibrated 2003A/B data

- April 2005: Deep + Wide + Very Wide with 2004B
- Release updates: each 6 month
- End 2005: fully PSF homogenised release

PIs:

- On going work: 25% of Terapix activities (Le Fèvre, Dougados, Demers, Cayatte, Mellier, Petitjean, Seymour)

Summary

- Queue observations are running well, still below the expected flow, but very close now
- Data quality are ok for main science goals: e.g. SNIa, cosmic shear (85%) : see Ray's and Yannick's talk this afternoon
- Expect: better image quality: wide field corrector, autofocus? Promising on going stydies at CFHT.
- Processing and data delivery : late but very close to a current release flow of 2/year
- Quality of data products seems all excellent
- The Wide, Deep will procude first results during next semester (2005/A)