

Recent developments at TERAPIX

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Outline

- TERAPIX and the CHTLS
- Access to software and support
- Development plan
- New developments for T04
- Ongoing software developments (for T05)



The team at IAP

- 4 astronomers:
 - **Y.Mellier** (PI/PM),
E.Bertin (PS/PM),
H.J.McCracken
M.Schultheis
(Besançon)
- 4 engineers:
 - **M.Dantel-Fort**,
F.Magnard,
C.Marmo,
G.Semah
 - (Laurent Domisse left
in April)
- 1 Ph.D student:
 - **A.Baillard** (EFIGI)





The tasks of TERAPIX

- Develop and distribute software tools required for the processing of MEGACAM and WIRCAM data
 - Pre-processing done at CFHT (**Elixir**)
 - TERAPIX software is developed in-house and can be used on various kinds of data
 - Released as Open Source to the community
- Produce and release calibrated, resampled, co-added images, weight maps and catalogs on a regular basis.
 - The 4th release is currently being processed
 - The achieved re-processing cycle time is about 12 months
 - Each release benefits from
 - Extended coverage
 - Complete re-calibration with increasing overlaps
 - Software upgrades and new features
- Provide support to members of the Canadian and French communities
 - Process P.I programs on request
- Manage data and hardware
 - Compute/storage farm of 26 bi-, quad-, and octo-procs for processing
 - 250 Gflops peak
 - Direct access to the data with 120TB of redundant storage
 - Cluster of 8 bi-procs available on request for data-intensive CFHTLS science





Access to software

- What is distributed:
 - source packages
 - Binary, static Linux RPMs (both x86 32 et 64 bits, single and multi-threaded)
 - PDF documentation
- Public unstable versions:
 - accessible through our SubVersion repository
 - <http://terapix.iap.fr/wsvn>
 - “on demand” re-packaging of intermediary versions





Getting help

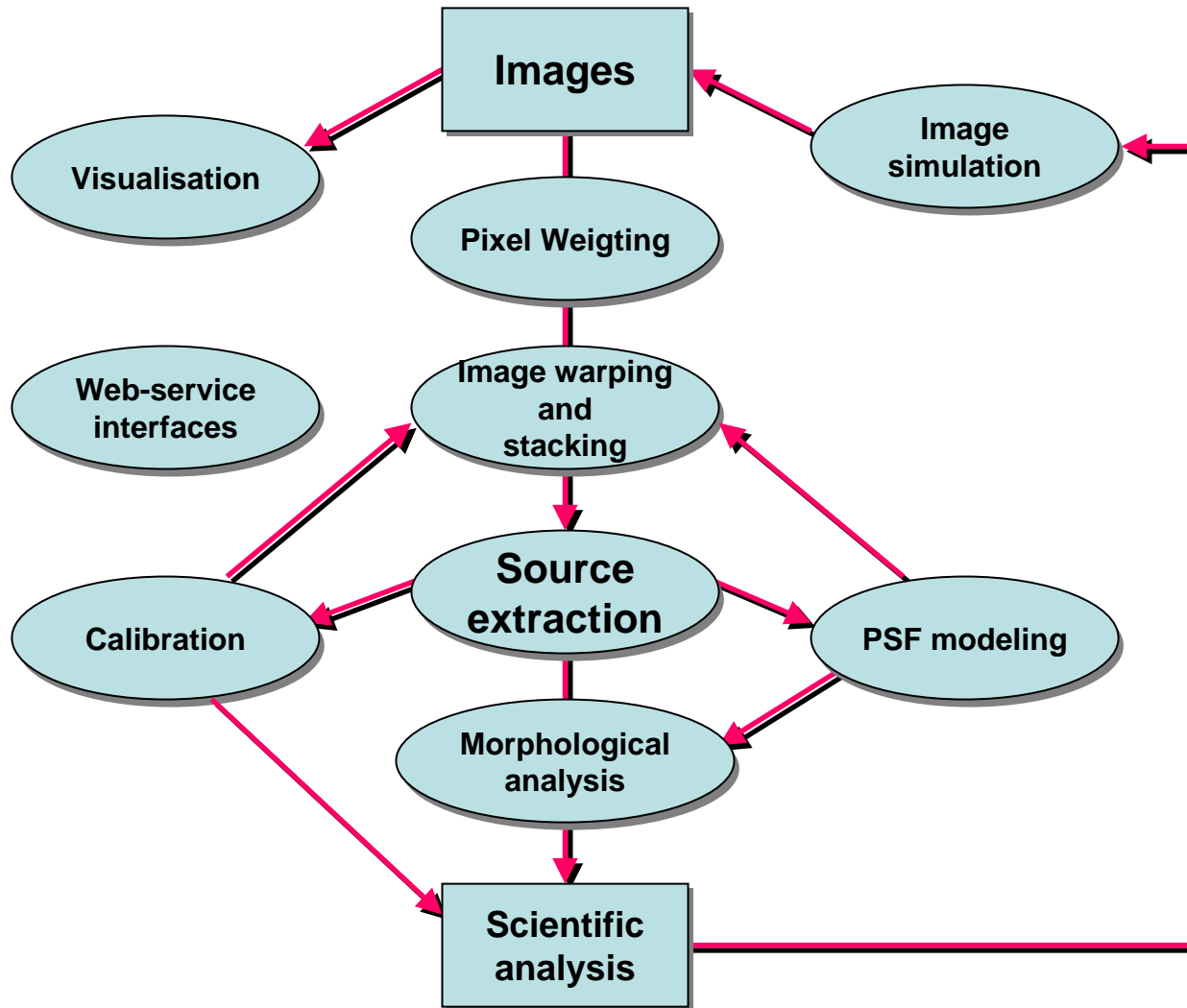
- Discussion forums
 - <http://terapix.iap.fr/forum>
 - MEGACAM
 - CFHTLS
 - P.I.
 - WIRCAM
 - TERAPIX software
 - software for astronomy
 - hardware for astronomy
 - private forums
 - We can host your forum!

The screenshot shows the TERAPIX forum interface. At the top, there's a navigation bar with 'File Edit View Go Bookmarks Tools Help' and the URL 'http://terapix.iap.fr/forum/index.php'. Below that, there's a table of threads. The first section is 'Hardware for data processing' with one thread titled 'Intel Core2' by Emmanuel Bertin. The second section is 'Data products' with a table listing threads for CFHTLS, MEGACAM P.I. programs, WIRCAM P.I. programs, and others. The third section is 'Software products' with a table listing threads for Eye, SCAMP, SExtractor, SkyMaker, STIFF, Stuff, and SWarp.

Forum	Threads	Posts	Last Post
Hardware for data processing	1	4	Intel Core2 08-02-2006 14:44 By Emmanuel Bertin
Data products			
CFHTLS CFHT Legacy Survey data	1	1	CFHTLS-F03 photometry re... 06-26-2006 15:34 By Henry Jey McCracken
MEGACAM P.I. programs	2	8	retrieve data from Terapi... 10-16-2006 16:39 By Henry Jey McCracken
WIRCAM P.I. programs	1	1	WIRCAM processing product... 08-07-2006 20:03 By Chien-Ming
others / open discussion	0	0	Never
Software products			
TerapiX's software			
Eye Eye (Enhance Your Extractor) generates non-linear image filters for SExtractor using machine learning.	0	0	Never
SCAMP SCAMP reads SExtractor catalogues and computes astrometric and photometric solutions for SWarp.	7	20	SCAMP V1.3.0 released! 10-13-2006 12:27 By joshua
SExtractor SExtractor extracts catalogues of objects from astronomical images.	29	101	defocused photometry 10-19-2006 17:58 By malin
SkyMaker SkyMaker generates artificial astronomical images.	2	4	CCD Bleeding 08-12-2006 02:13 By Emmanuel Bertin
STIFF STIFF converts scientific FITS images to TIFF format	1	3	TIFF to FITS program avail... 06-05-2006 21:24 By joshua
Stuff Stuff generates artificial catalogs of astronomical sources for SkyMaker.	1	2	Random Star Generation 07-09-2006 18:07 By Emmanuel Bertin
SWarp SWarp resamples and combines FITS images in any arbitrary World-Cordinate-System: complete projection.	10	50	All stars in SWarped imag... 10-17-2006 19:09 By tpm12345

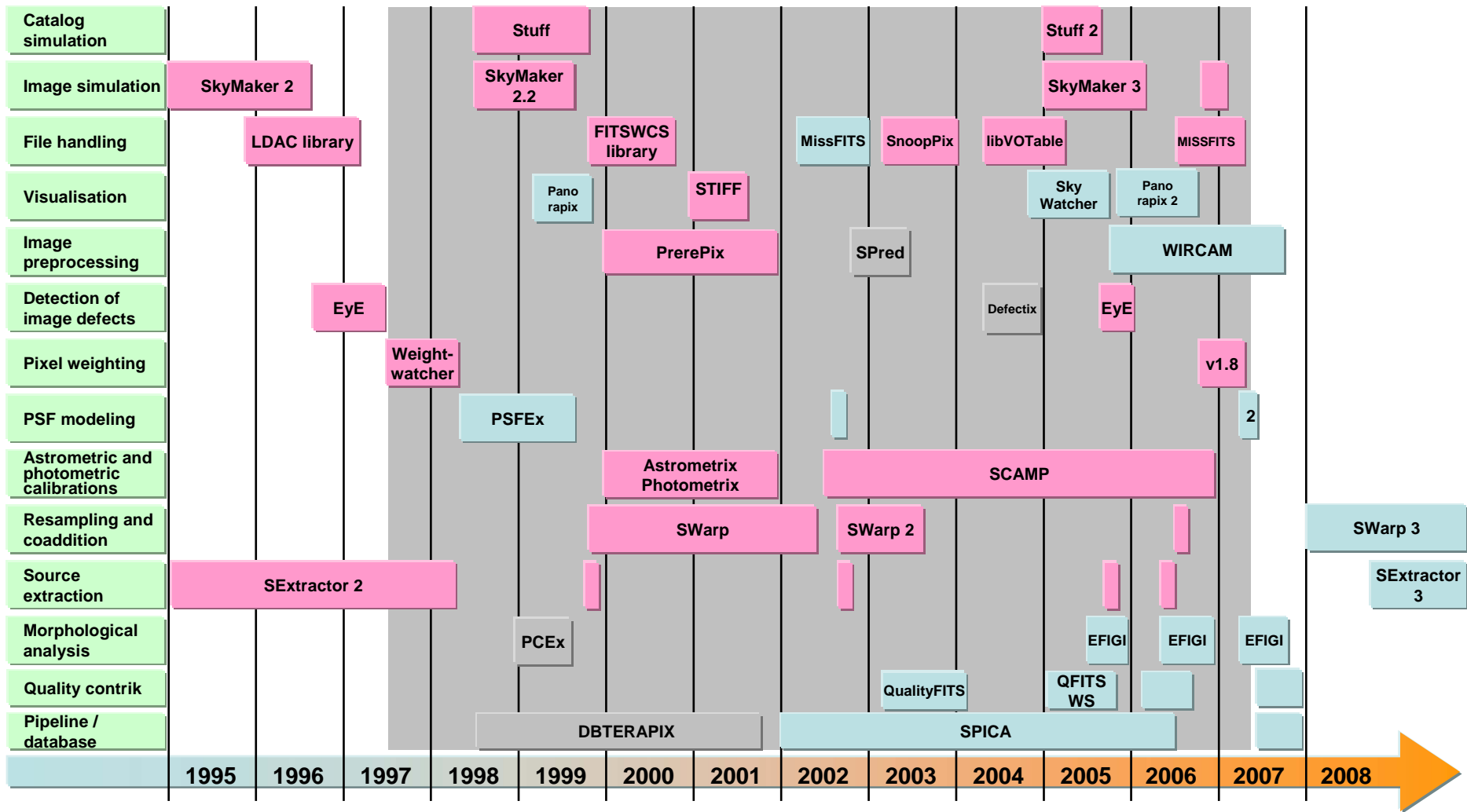


TERAPIX: An automated image analysis system





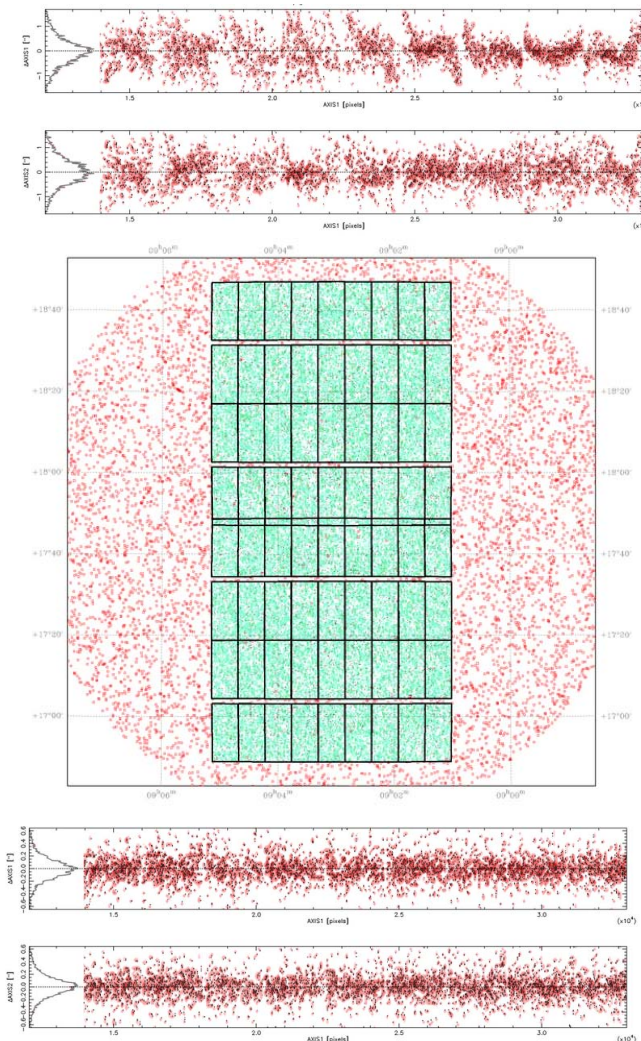
Development plan





New developments for T04

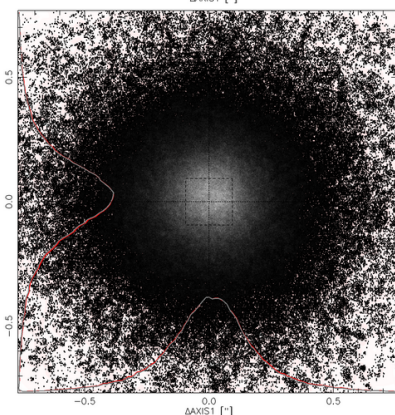
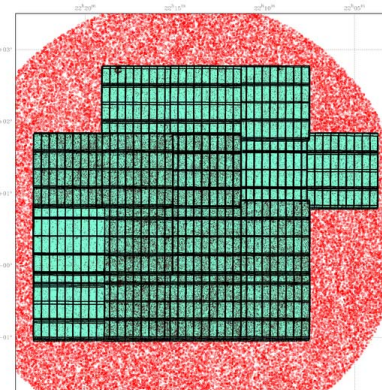
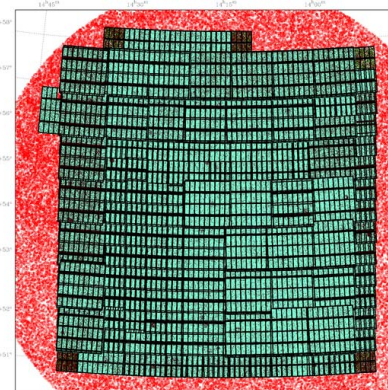
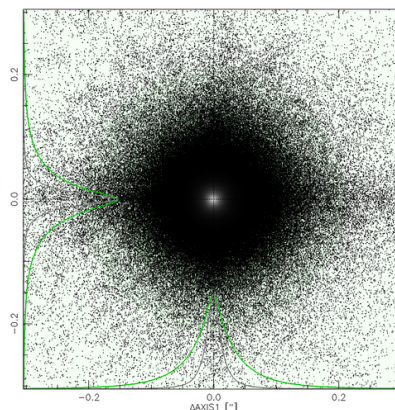
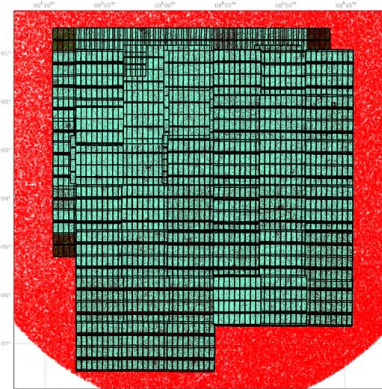
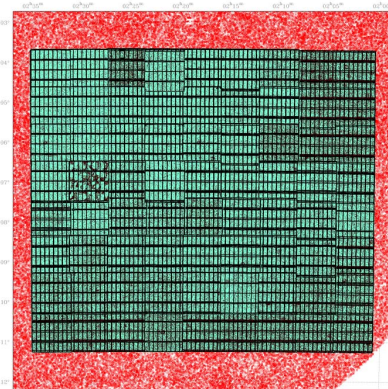
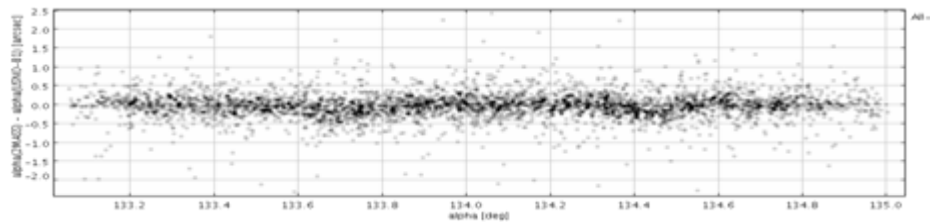
- SCAMP (astrometric and photometric calibration software): improve robustness of the existing approach
 - public release in 2006: testing by other users helped find bugs and improve algorithms
 - V1.2.1->1.3.8: recipes tuned to offer more robust behaviour in crowded fields and observing programs with poor dithering patterns.
 - WIRCAM processing (C.Marmo): very large number of exposures
 - used in various data challenges around the world
 - balancing between internal and external positional constraints
 - move to ICRS (at last)
 - Redistribute free parameters as the number of exposures increases





New developments for T04 (cont.)

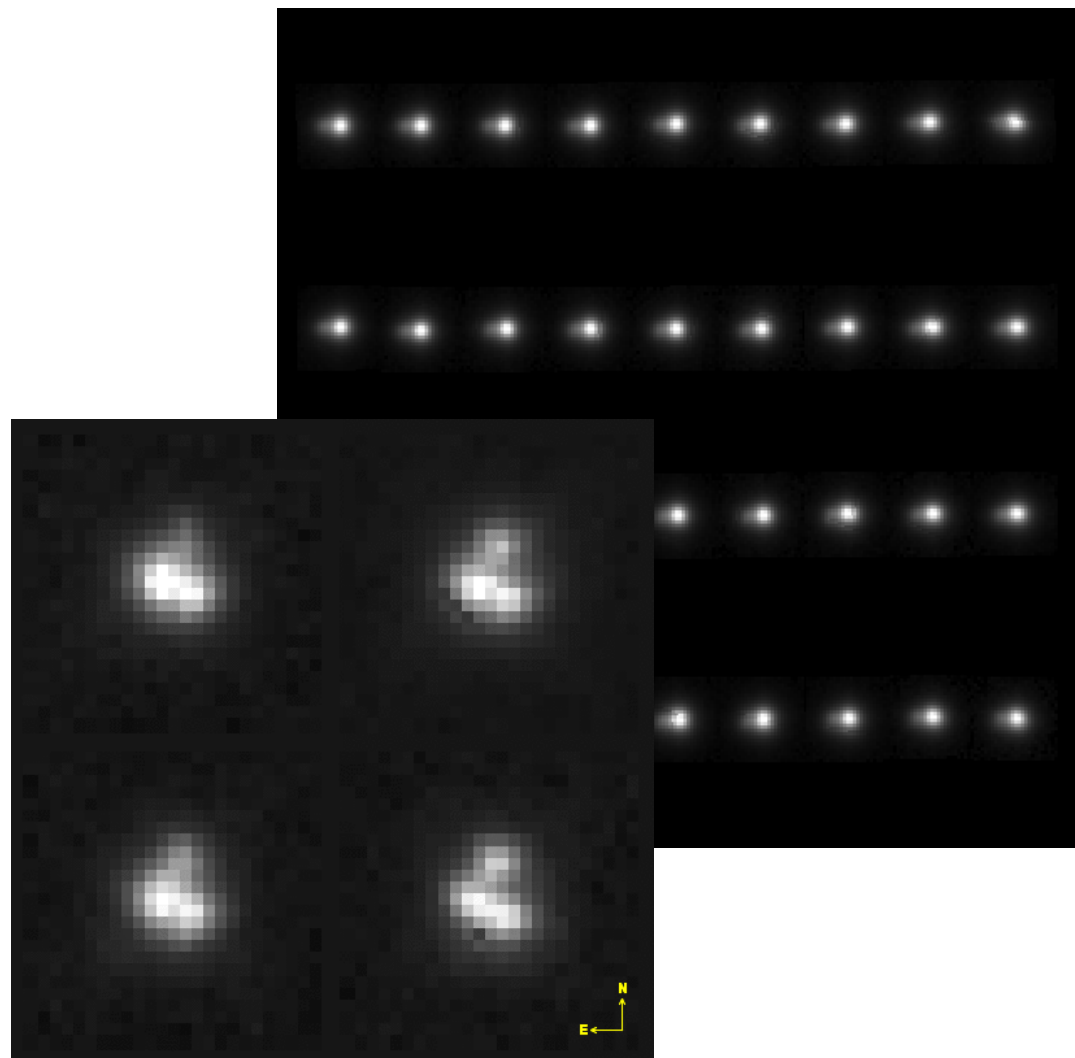
- Astrometric reference changed from USNO-B1 to 2MASS
- Astrometric stats in T04 - Wide:
 - Up to $34 \cdot 10^6$ sources used for solution and 48 instrumental “contexts”
 - Dispersion: (pairwise, 3σ -clipped)
 - 27mas RMS internal for sources with $S/N > 100$
 - 0.23” RMS with respect to 2MASS
 - Systematics with respect to 2MASS ≤ 0.13 ”





Ongoing software developments for T05

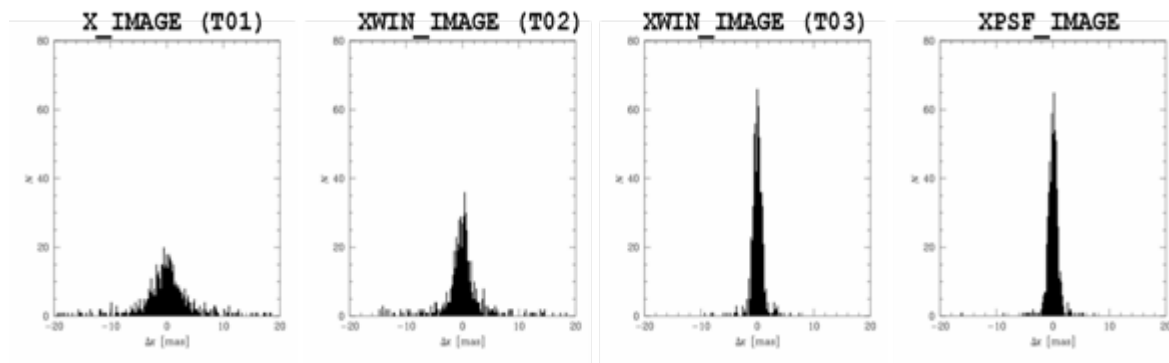
- Automated quality control
 - New PSFEx version
 - Will be released later this year
 - New metrics to track down bad PSFs (defocused, trailed, multimodal)
 - Works with undersampled data





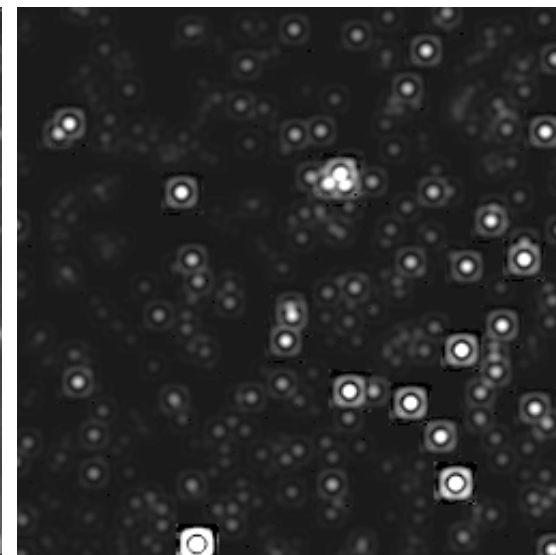
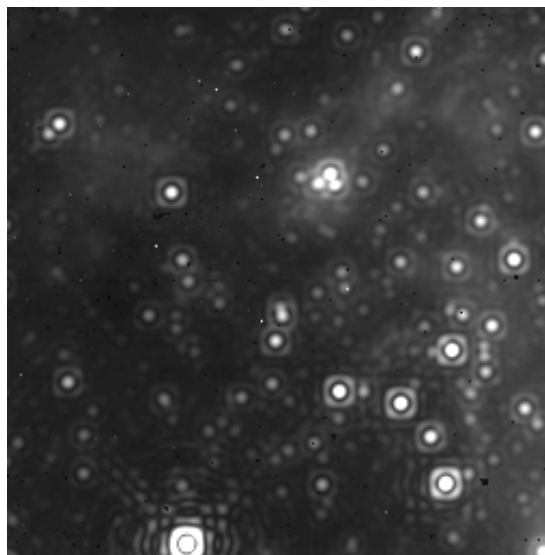
Ongoing software developments for T05 (cont.)

- PSF-fitting photometry
 - Mostly improve photometry
 - Improvements and testing contributed by Ph. Delorme (Grenoble)
 - Deblending issue: Extragalactic science vs galactic science



original

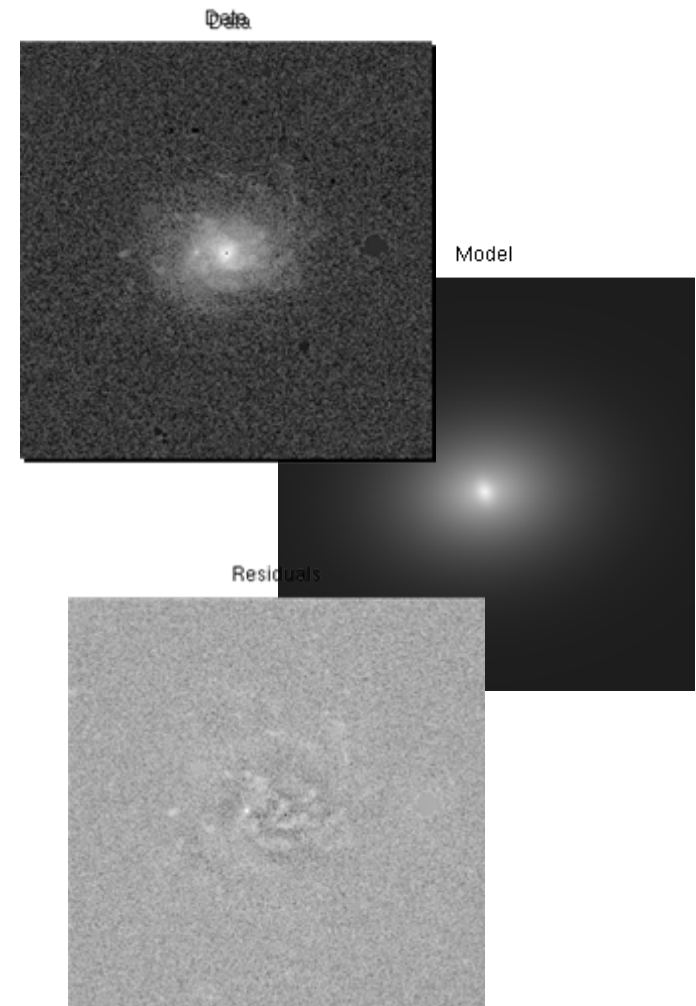
reconstructed





Ongoing software developments for T05 (cont.)

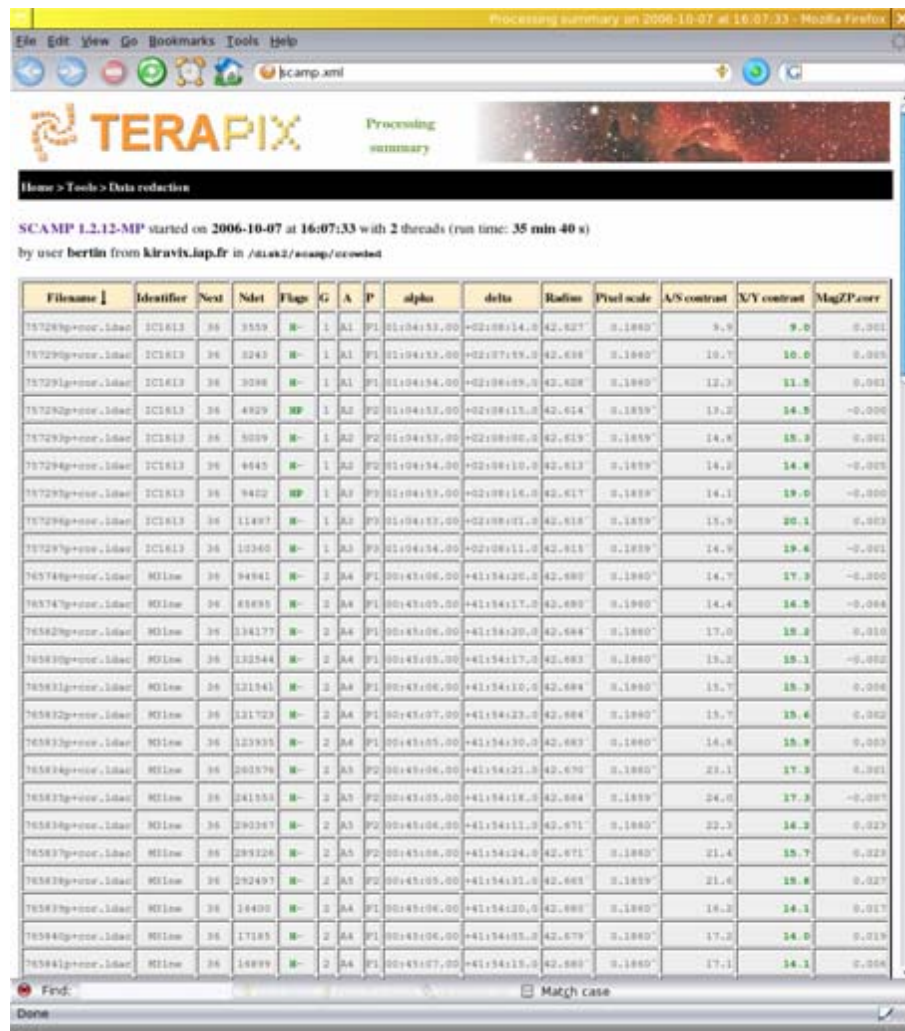
- Galaxy profile-fitting
 - PSF model available
 - varies smoothly over Deep and Wide stacks
 - Development done in the framework of the EFIGI project
 - Analytical profiles
 - Single Sersic
 - Sersic + exponential (12 free parameters)
 - About 10 (faint) galaxies per second per 2GHz core
 - Suitability for lensing studies needs to be assessed
 - Use for star-galaxy separation





Ongoing software developments for T05 (cont.)

- QualityFITS pipeline (automated pixel weighting / image diagnostic) moved to CFH
- New pipeline
 - Improved job balancing and data handling
 - Allow images from various imagers to be processed transparently
 - “shopping cart” model with full control on what is processed and what is not
 - Rely heavily on XML outputs from pipeline modules and the associated XSLT filters for visual checks and tracking of software configurations
 - More consistent use of flag maps



Processing summary on 2006-10-07 at 16:07:33 - Mozilla Firefox

Processing summary

Home > Tools > Data reduction

SCAMP L2.12-MP started on 2006-10-07 at 16:07:33 with 2 threads (run time: 35 min 40 s)
by user bertin from klravix.lap.fr in /data2/scamp/output

Filename	Identifier	Next	Ndet	Flags	G	A	P	alpha	delta	Radius	Pixel scale	A/S contrast	U/Y contrast	MagZP zero
757289p+scamp_l2a0	IC1613	34	3559	W	1	A1	P1	01:04:53.00	+02:08:54.0	42.627	0.1800"	9.9	9.0	0.201
757290p+scamp_l2a0	IC1613	34	3243	W	1	A1	P1	01:04:53.00	+02:07:59.0	42.638	0.1800"	10.7	10.0	0.205
757291p+scamp_l2a0	IC1613	34	3098	W	1	A1	P1	01:04:54.00	+02:06:09.0	42.628	0.1800"	12.3	11.5	0.201
757292p+scamp_l2a0	IC1613	34	4829	WP	1	A2	P2	01:04:53.00	+02:08:13.0	42.614	0.1839"	19.2	14.5	-0.000
757293p+scamp_l2a0	IC1613	34	5009	W	1	A2	P2	01:04:53.00	+02:08:00.0	42.619	0.1859"	14.8	15.0	0.201
757294p+scamp_l2a0	IC1613	34	4645	W	1	A2	P2	01:04:54.00	+02:08:10.0	42.613	0.1839"	14.2	14.8	-0.008
757295p+scamp_l2a0	IC1613	34	9402	WP	1	A3	P3	01:04:53.00	+02:08:14.0	42.617	0.1839"	14.1	19.0	-0.000
757296p+scamp_l2a0	IC1613	34	11487	W	1	A3	P3	01:04:53.00	+02:08:01.0	42.618	0.1839"	15.3	20.1	0.203
757297p+scamp_l2a0	IC1613	34	10360	W	1	A3	P3	01:04:54.00	+02:08:11.0	42.615	0.1839"	14.9	19.4	-0.201
765749p+scamp_l2a0	HD low	34	94941	W	2	A4	P4	00:43:06.00	+41:54:20.0	42.680	0.1800"	14.7	17.0	-0.200
765747p+scamp_l2a0	HD low	34	83895	W	2	A4	P4	00:43:05.00	+41:54:17.0	42.680	0.1800"	14.4	14.5	-0.004
765829p+scamp_l2a0	HD low	34	134177	W	2	A4	P4	00:43:06.00	+41:54:20.0	42.684	0.1800"	17.0	15.2	0.210
765830p+scamp_l2a0	HD low	34	132544	W	2	A4	P4	00:43:05.00	+41:54:17.0	42.683	0.1800"	15.2	15.1	-0.002
765831p+scamp_l2a0	HD low	34	121541	W	2	A4	P4	00:43:06.00	+41:54:10.0	42.684	0.1800"	15.7	15.3	0.204
765832p+scamp_l2a0	HD low	34	121723	W	2	A4	P4	00:43:07.00	+41:54:23.0	42.684	0.1800"	15.7	15.4	0.202
765833p+scamp_l2a0	HD low	34	123935	W	2	A4	P4	00:43:05.00	+41:54:30.0	42.683	0.1800"	14.8	15.8	0.203
765834p+scamp_l2a0	HD low	34	261576	W	2	A5	P5	00:43:06.00	+41:54:21.0	42.670	0.1800"	23.1	17.3	0.201
765835p+scamp_l2a0	HD low	34	241555	W	2	A5	P5	00:43:05.00	+41:54:14.0	42.684	0.1839"	24.0	17.2	-0.007
765836p+scamp_l2a0	HD low	34	291297	W	2	A5	P5	00:43:06.00	+41:54:11.0	42.671	0.1800"	22.3	14.2	0.227
765837p+scamp_l2a0	HD low	34	291226	W	2	A5	P5	00:43:06.00	+41:54:24.0	42.671	0.1800"	21.4	15.7	0.223
765838p+scamp_l2a0	HD low	34	292407	W	2	A5	P5	00:43:05.00	+41:54:31.0	42.683	0.1839"	21.0	15.8	0.227
765839p+scamp_l2a0	HD low	34	14400	W	2	A4	P4	00:43:06.00	+41:54:20.0	42.680	0.1800"	16.1	14.1	0.217
765840p+scamp_l2a0	HD low	34	17183	W	2	A4	P4	00:43:06.00	+41:54:03.0	42.679	0.1800"	17.2	14.0	0.219
765841p+scamp_l2a0	HD low	34	14899	W	2	A4	P4	00:43:07.00	+41:54:13.0	42.680	0.1800"	17.1	14.1	0.204

Find: Match case

Done



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