



WIRCam activities @ TERAPIX

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CFHT users meeting
May 9-11, 2007
Marseille, France



P.I. programs processed at TERAPIX

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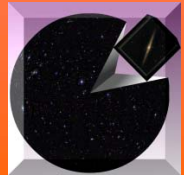
WIRCam Processing steps @ TERAPIX

- image datacube unpacking if necessary;
- first pass sky-subtraction if necessary;
- quality assessment and weight map production;
- precise astrometric and photometric calibrations;
- first stack generation;
- second pass sky-subtraction;
- astrometric and photometric re-calibration;
- final stack generation;
- catalogs and final quality assessment delivery.



Unpacking data-cubes

- ❑ For archiving reasons CFHT delivers data-cubes of dithered exposures to users. Every slice is actually an image with changing seeing, sky features, photometric quality and zero-points: quality assessment has to be performed before any medianing or combining.
- ❑ Before using TERAPIX software, one needs to unpack CFHT data-cubes. Use MissFITS!



<http://terapix.iap.fr/soft/missfits>

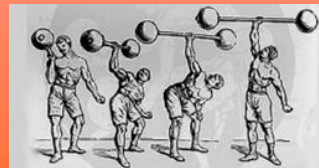




Quality assessment

- Identify bad pixels running SExtractor with a specific filter (EyE);
- Produce weight maps running WeightWatcher;
- Produce the catalogs for astrometric and photometric calibrations with SExtractor;
- Build a PSF model with PSFEx;
- Check background maps and preliminary star and galaxy counts.

<http://terapix.iap.fr/soft/eye>



<http://terapix.iap.fr/soft/weightwatcher>





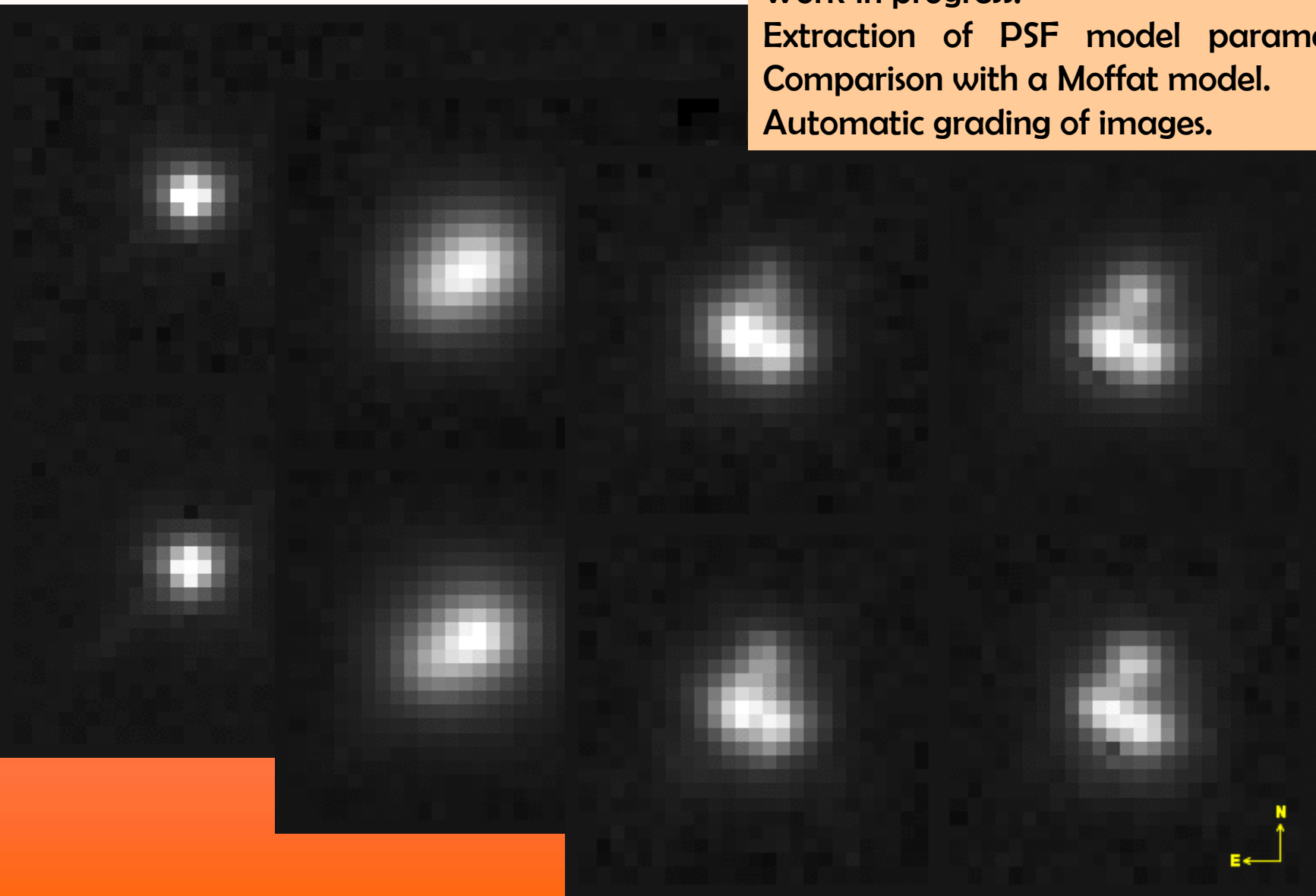
PSF quality estimation.

Work in progress.

Extraction of PSF model parameters.

Comparison with a Moffat model.

Automatic grading of images.





Astrometry

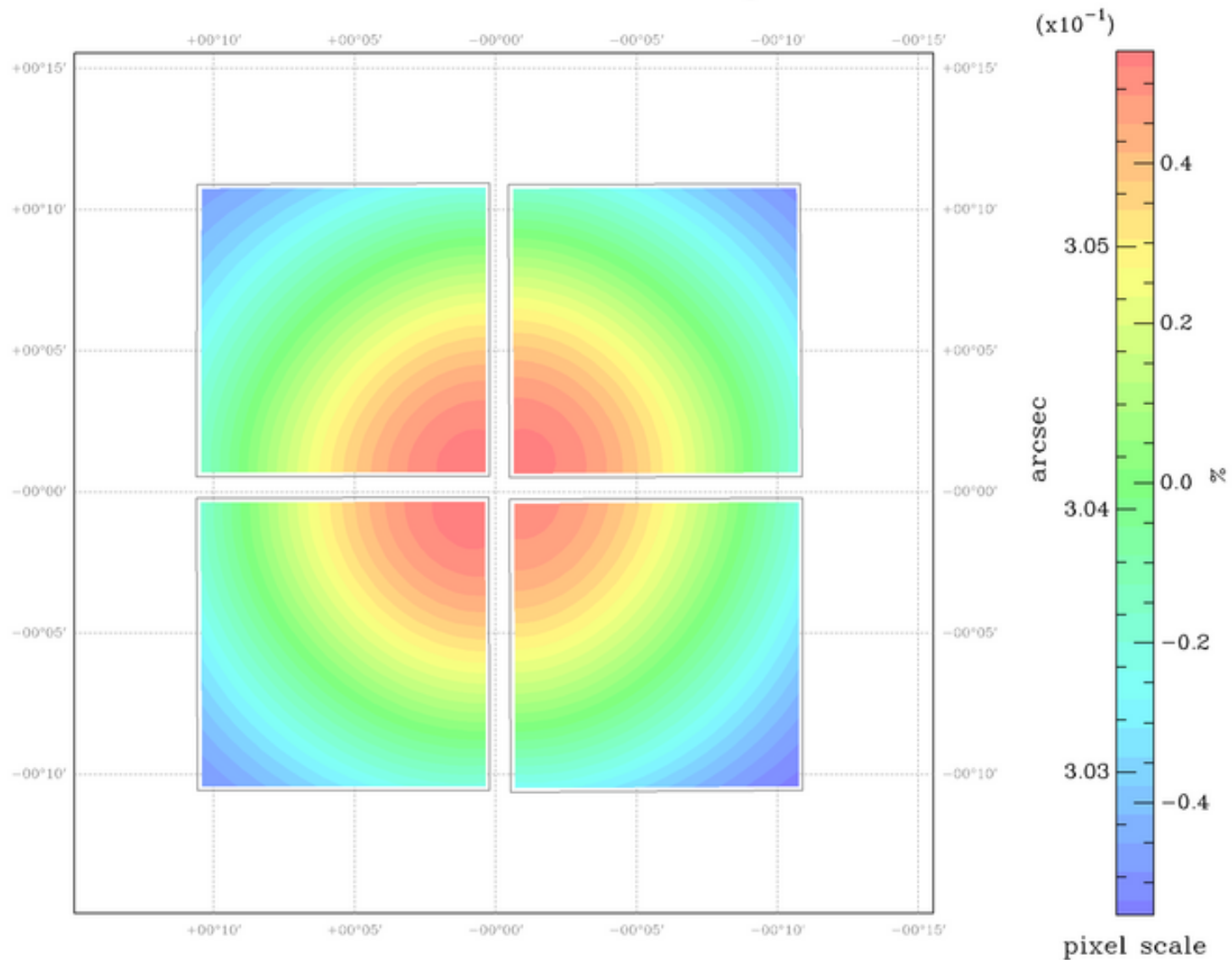
Using SCaMP:

- ❑ the CFHT QSO team has provided us with a stellar astrometric field. A model of the WIRCam field was produced, and used as a basic focal plane model.
- ❑ 2MASS astrometric reference catalog and fourth degree polynomial solution. Typical values for the (pairwise) residuals of the astrometric solution go from ~30 mas (a few tens of exposures) to ~90 mas (several thousands of exposures) rms internal, and 130 mas rms with respect to reference catalog.
- ❑ WIRCam can be considered an astrometrically stable instrument.





Instrument A1: distortion map





Photometry

Using SCAmP:

- ❑ The CFHT photometric calibration is based on 2MASS, for 2MASS-like filters: zero-points for every detector and every image are provided to TERAPIX.
- ❑ SCAmP matches the detected sources and rescales the fluxes relative to an arbitrary (30) zero-point: the magnitude system is instrumental Vega because of the 2MASS calibration.
- ❑ Until now, no absolute calibration was possible at TERAPIX for no-2MASS filters, because no zero-points were computed at CFHT.

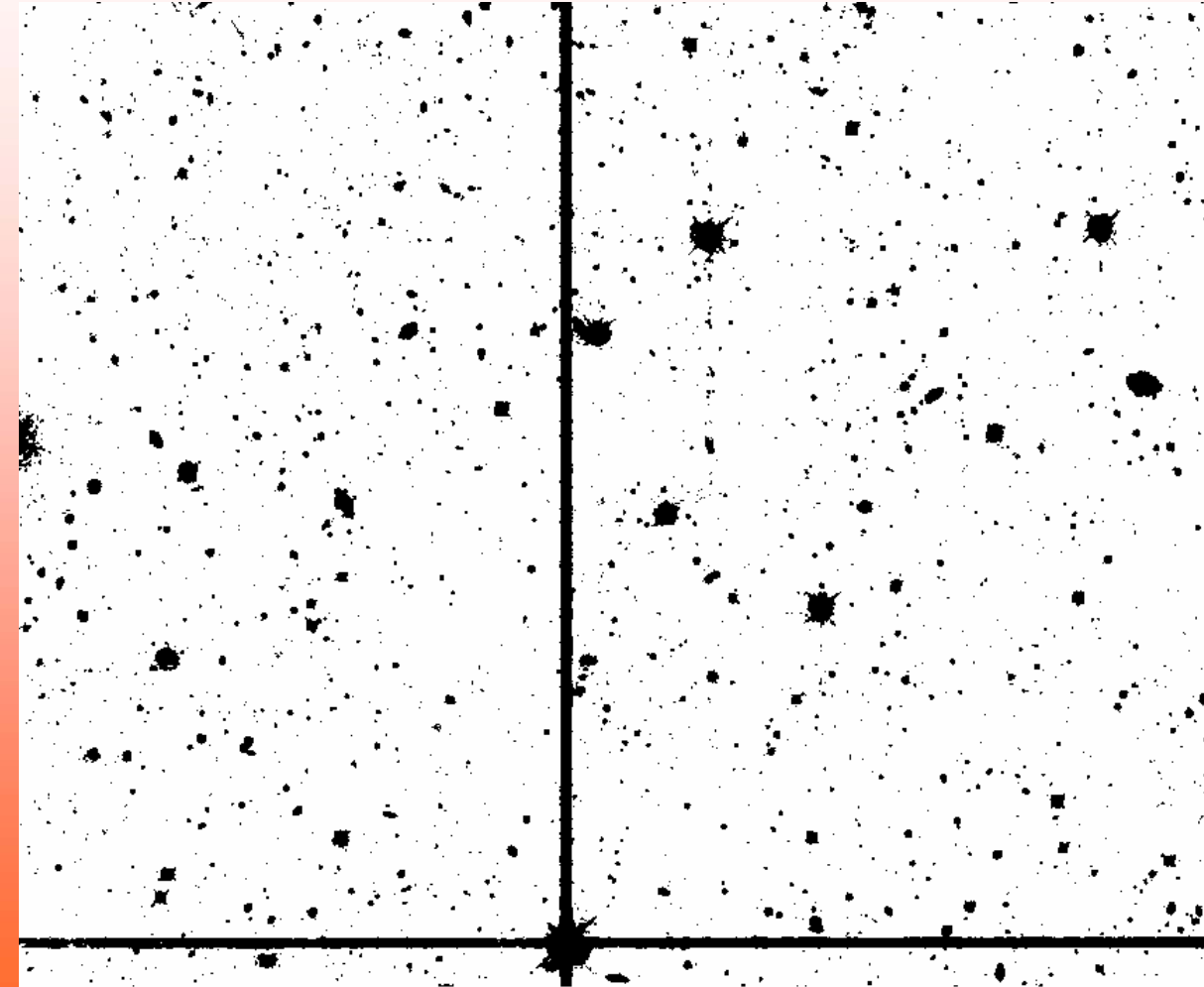
After astrometric and photometric calibration
a preliminary stack is produced





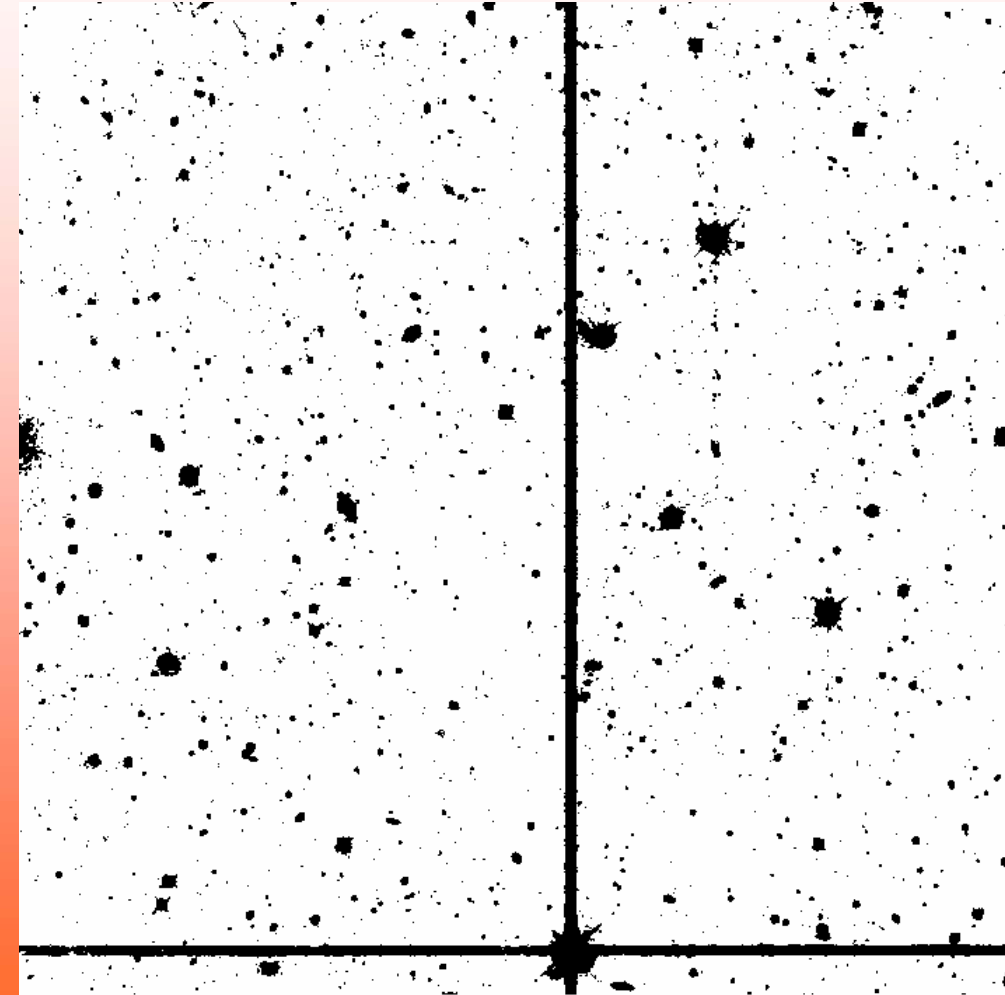
Second pass background subtraction

- ❑ First Stack -> SExtractor -> CHECKIMAGE OBJECTS
- ❑ CHECKIMAGE OBJECTS + astrometric solution (.head) -> Swarp -> OBJECTS reprojected
- ❑ Bad Pixel Mask + OBJECTS reprojected -> WeightWatcher -> Output Mask





Second pass background subtraction



Problems:

- 🤔 Not portable!
- 🤔 Very slow! (5 minutes per image medianing ~25 images).
- 🤔 Strong I/O cost!

Solution:

- 😊👍 rewritten soon into a portable C package. ... work in progress...



Second pass background subtraction



Stay tuned! Visit the TERAPIX WIRCam Forum for news!

<http://terapix.iap.fr/forum/>

strong I/O cost!

Solution:

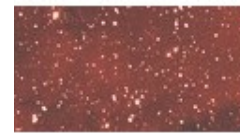
👉 rewritten soon into a portable C package. ... work in progress...



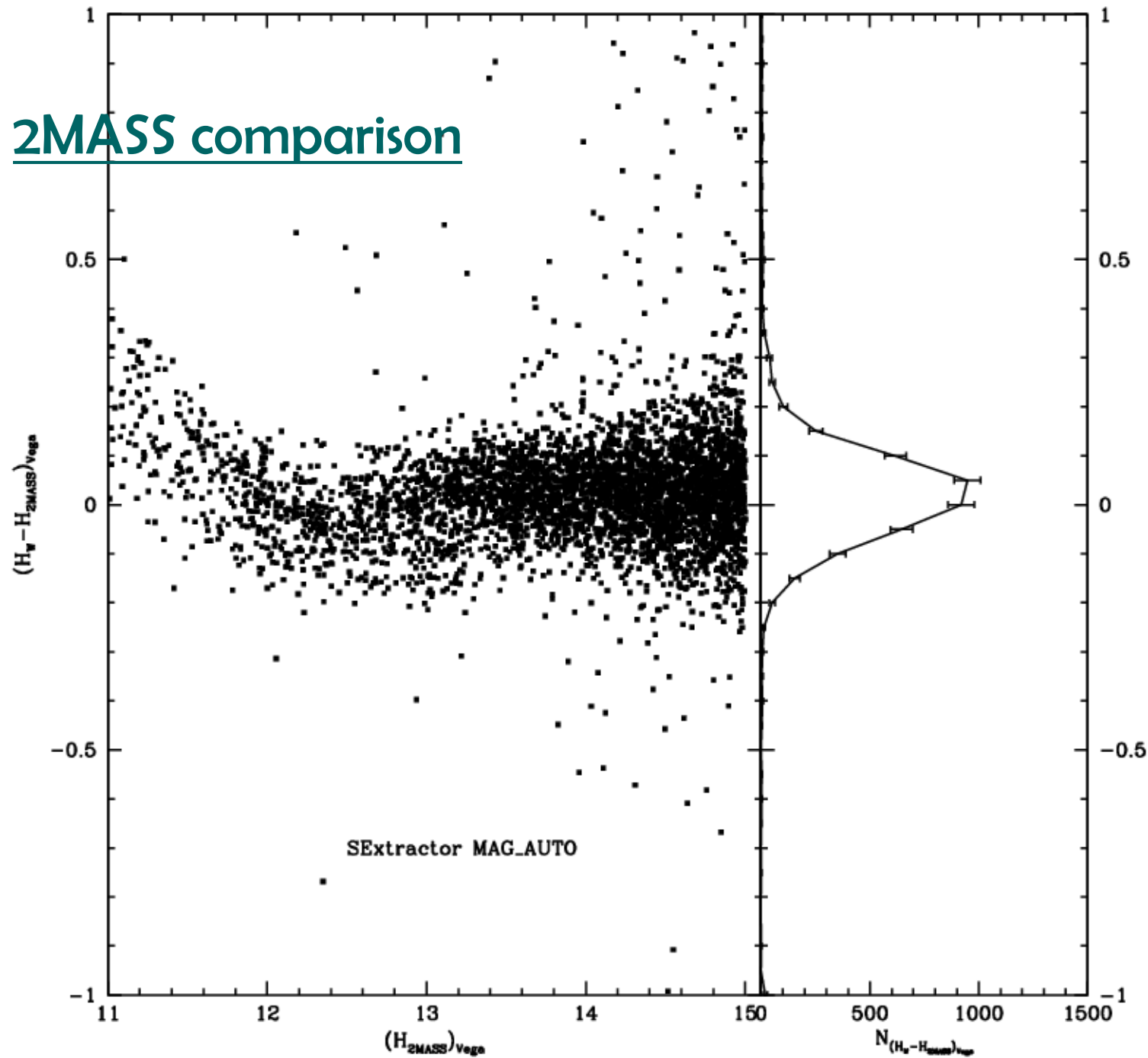
Final products http://terapix.iap.fr/article.php?id_article=610

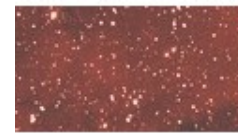
- Stacked images (effective field of view, magnitude zero-points, saturation), the weight and flag images, the ds9 .reg ASCII files.
- Catalog containing basic object parameters (FITS/LDAC or/and ASCII).
- Quality assessment including background and PSF analysis.
- Astrometric and photometric quality assessment plots: astrometric solution scatter plots, photometric solution scatter plots, galaxy counts plot.
- χ^2 image and merged catalog, if more than one filter is processed.



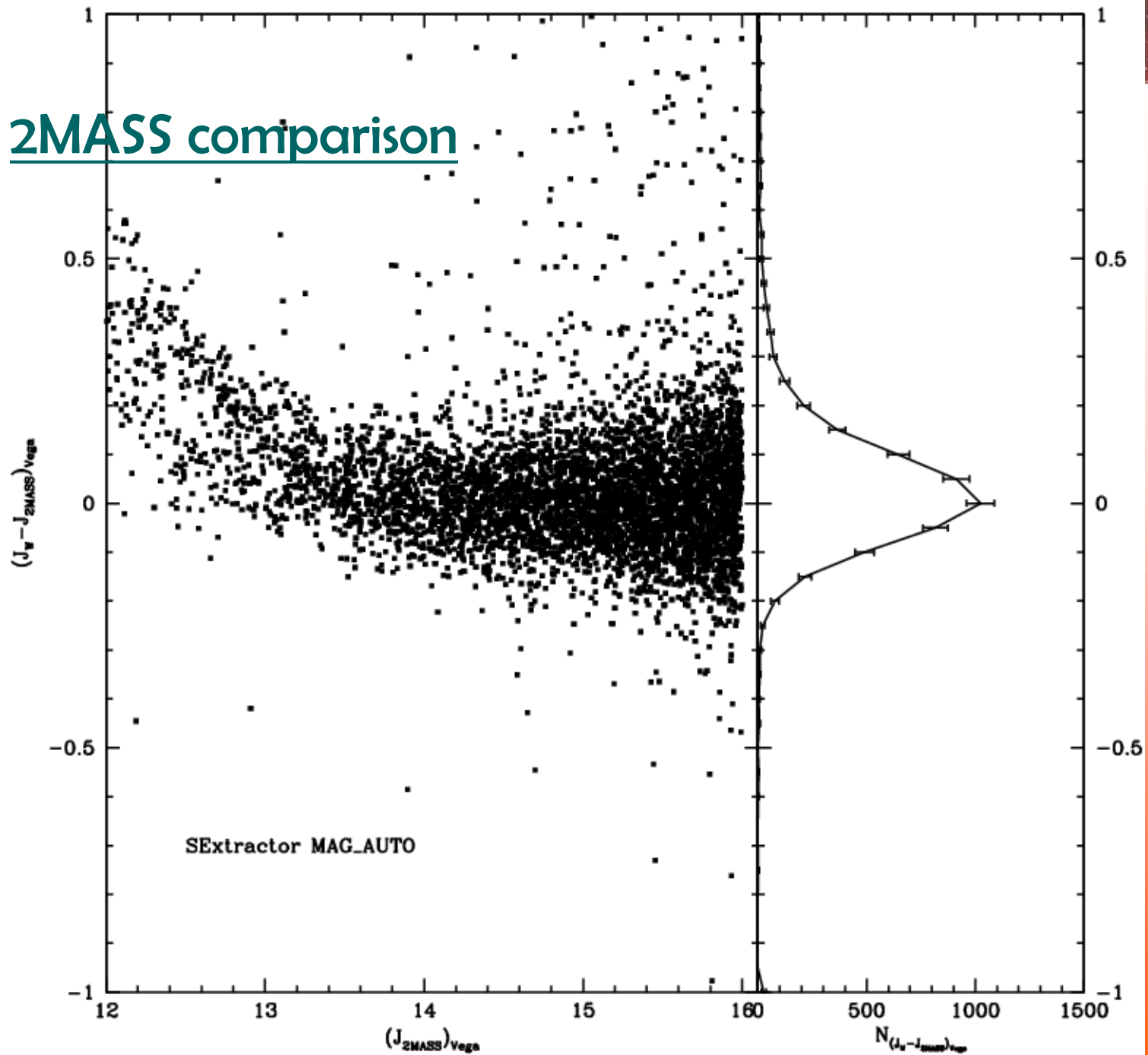


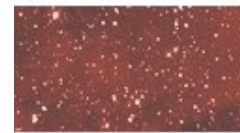
2MASS comparison



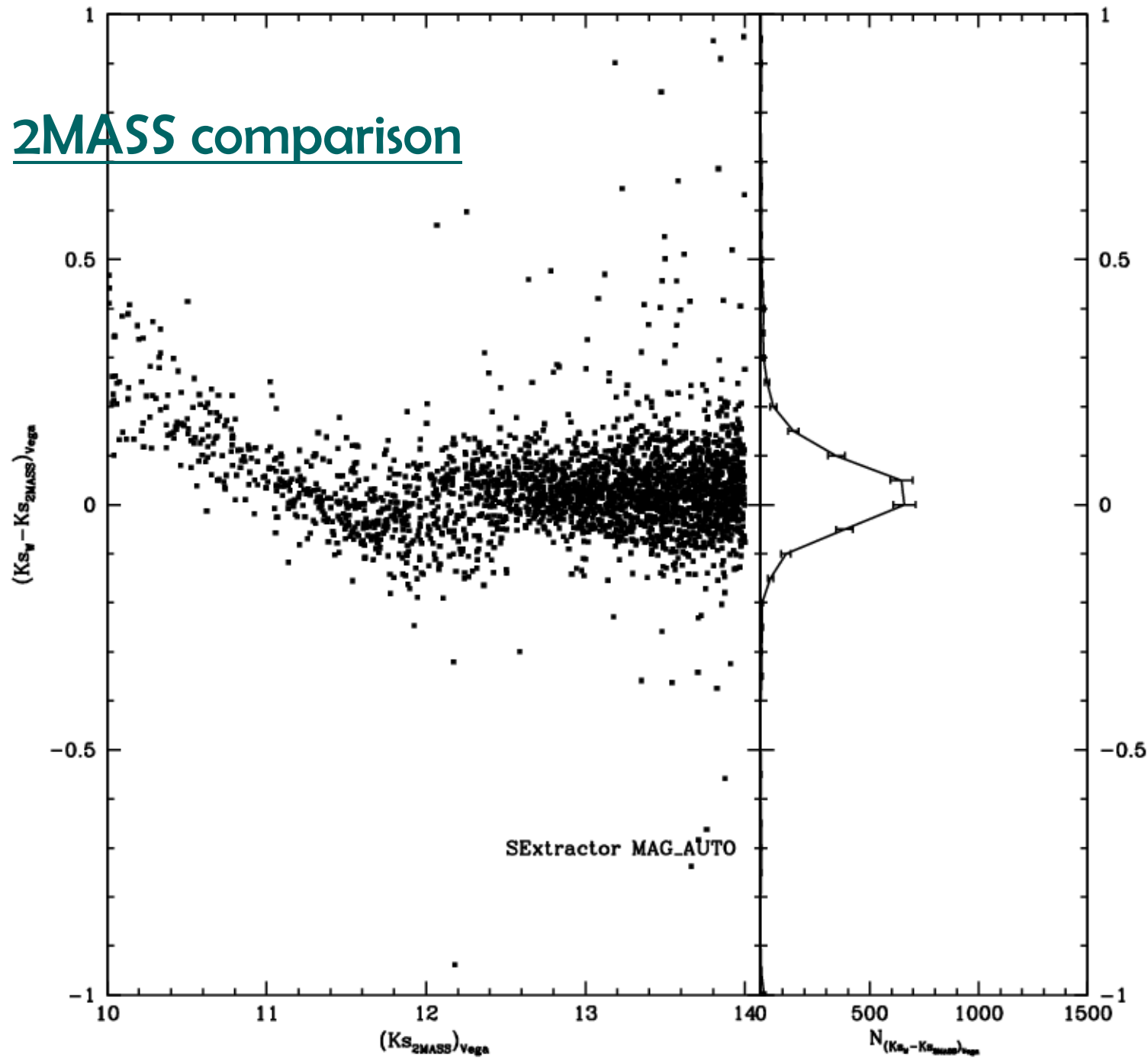


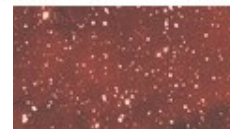
2MASS comparison





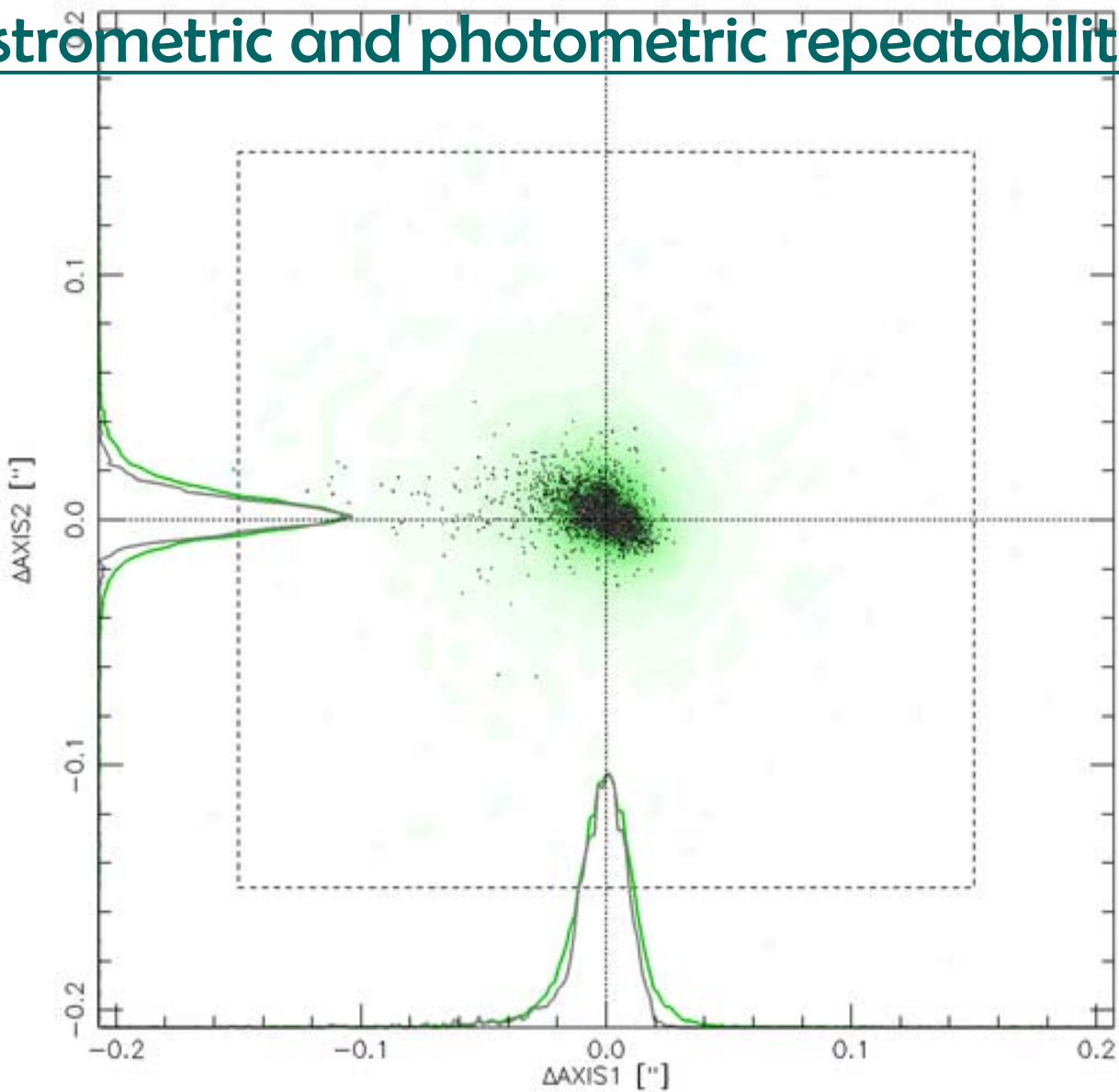
2MASS comparison





Group #1: 2D internal astrometric errors

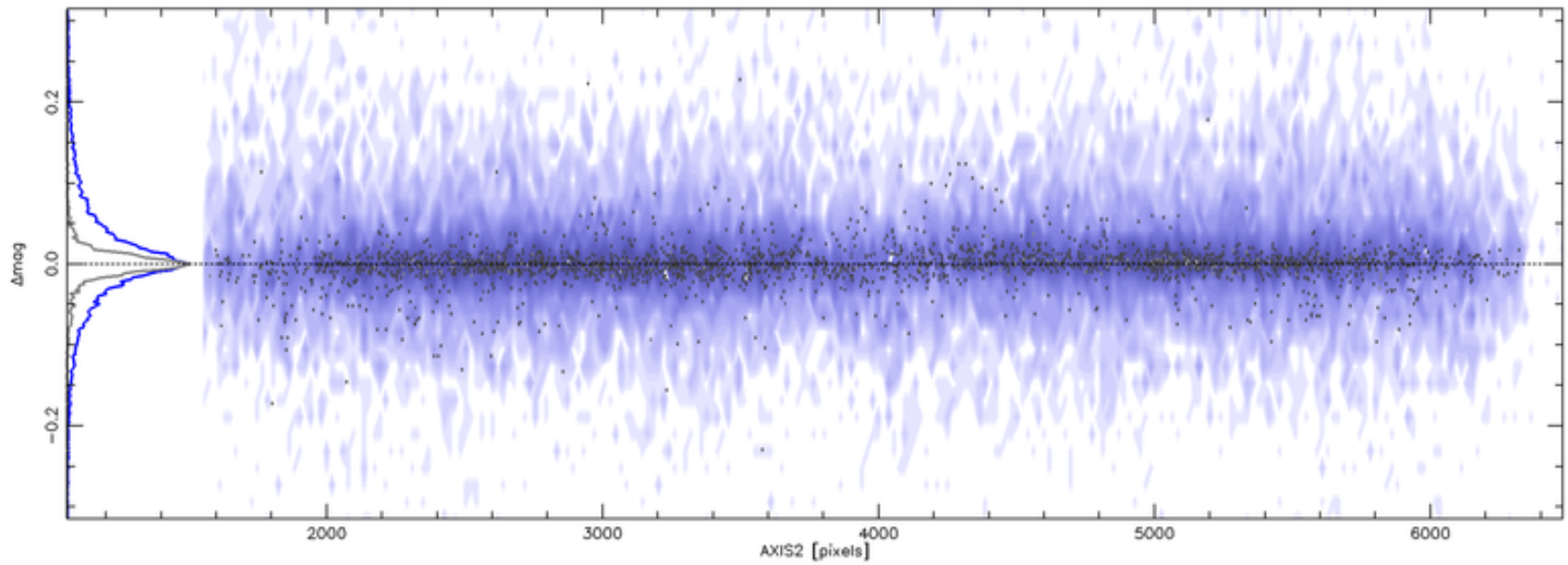
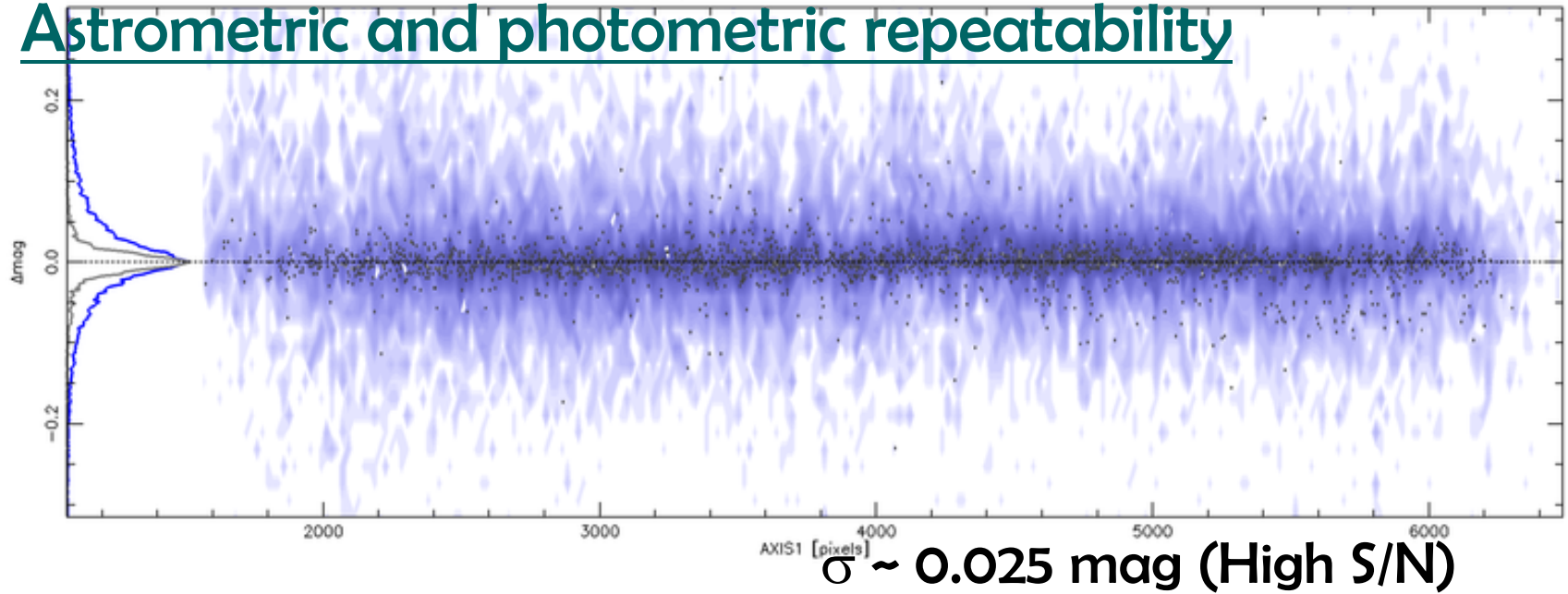
Astrometric and photometric repeatability





Group #1 / Instrument P1: Internal photometric error

Astrometric and photometric repeatability





PIs and TERAPIX

- ❑ PIs ask for more info about processing procedures. I am preparing the WIRCam processing documentation. Soon available on our website!
- ❑ Often PIs do not provide scientific evaluation (sometimes they do not even tell TERAPIX if data are downloaded or not!). TERAPIX needs to know if data are used and if they meet scientific PI objectives. We are considering to set up an “Evaluation Form” for WIRCam and MegaCam PIs.



PIs and TERAPIX

- PIs ask for more info
- pre
- av
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- the
- not
- me
- “Evo

Visit both MegaCam and WIRCam
Forums for news!

<http://terapix.iap.fr/forum/>