

Euclid near-infrared imaging reduction pipeline: astrometric calibration, resampling and stacking

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and other 18 co-authors (OU-SIM, SDC-IT, NISP-IDT, SGS system team)

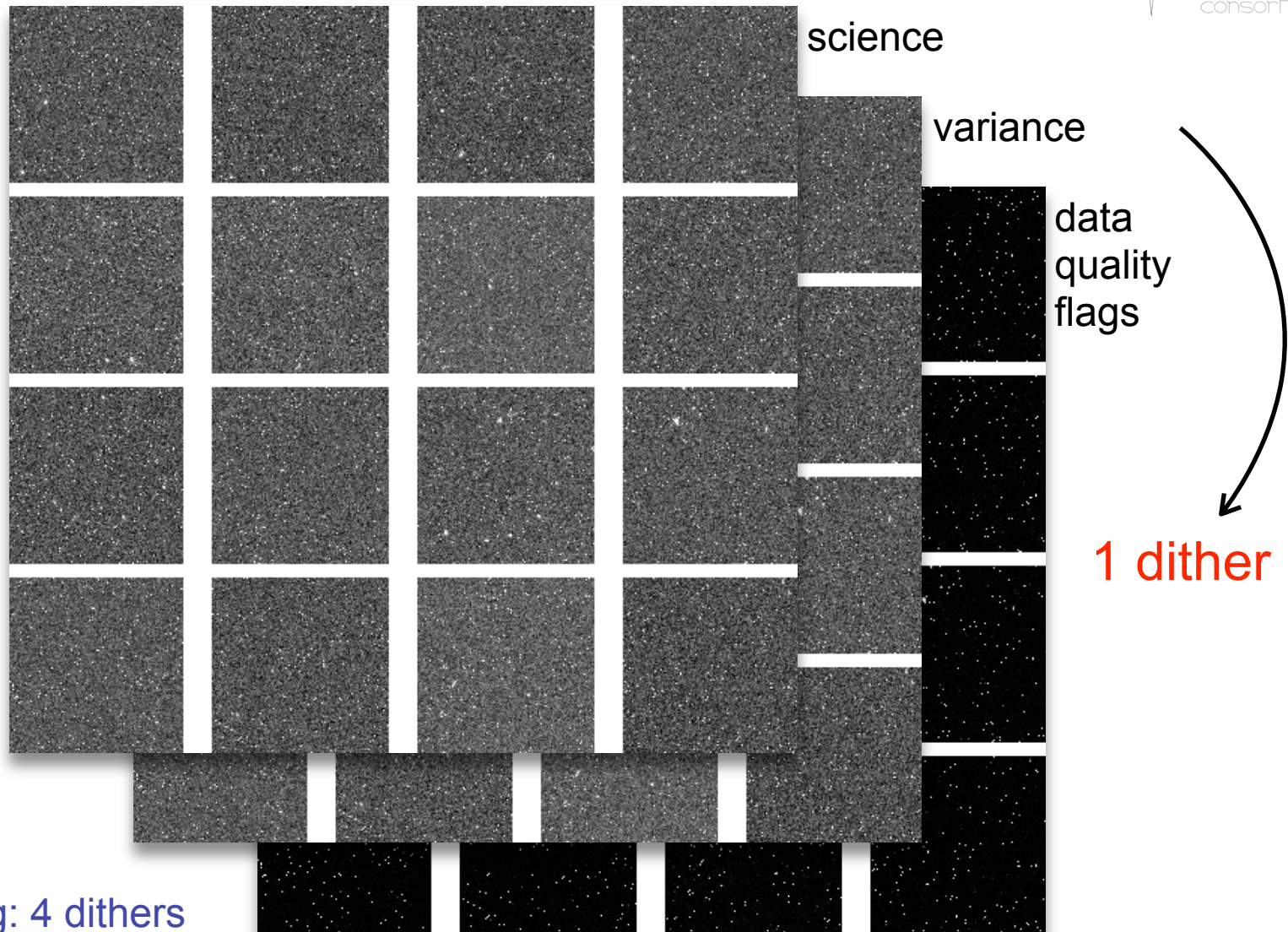
(1) ASI Science Data Center

(2) INAF - Osservatorio Astronomico di Roma

(3) INAF - Osservatorio Astronomico di Padova

(4) INAF - Osservatorio Astronomico di Trieste

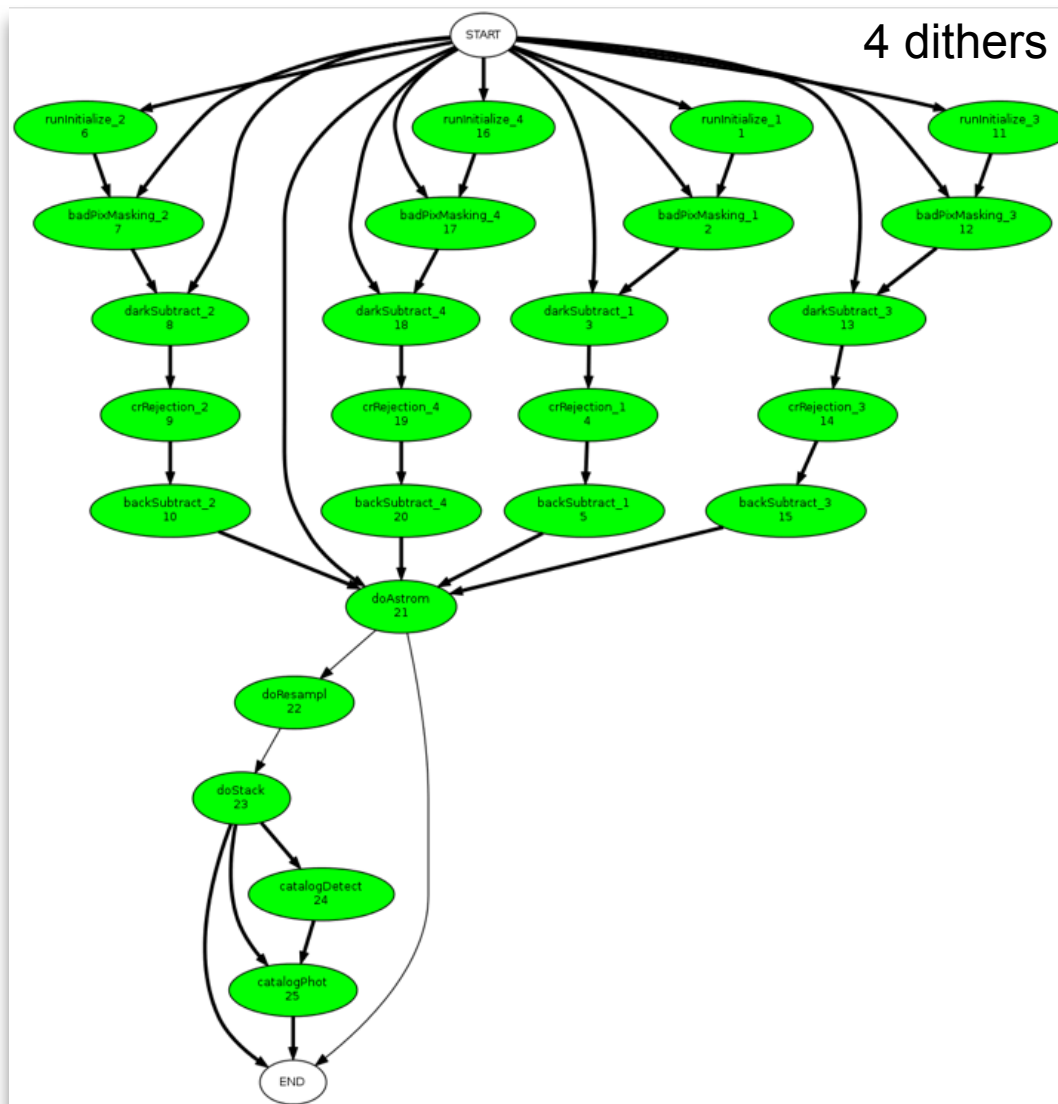
NIR raw frame - 16 detectors 2k x 2k - 3 layers



each pointing: 4 dithers

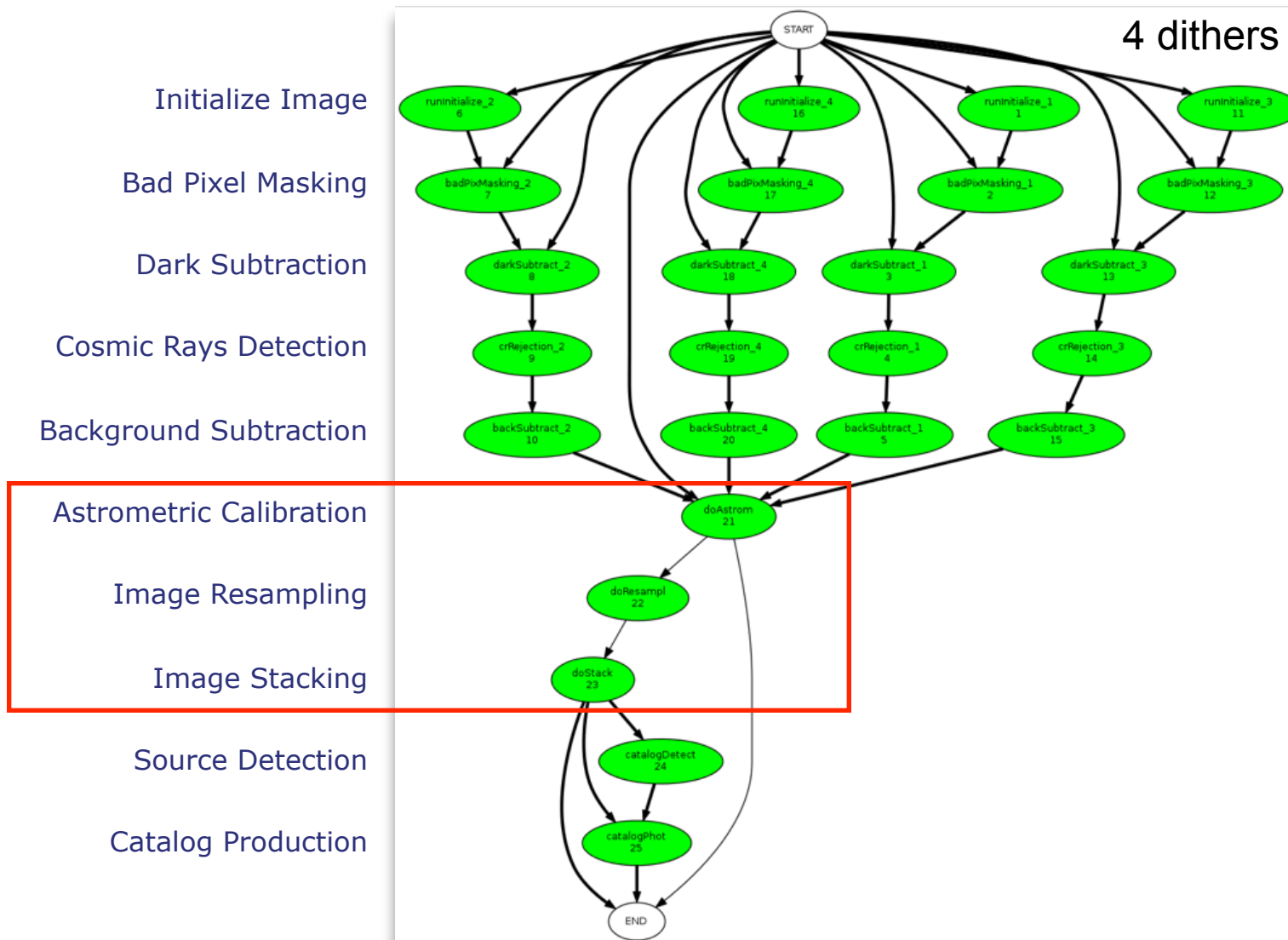
NIR Scientific Challenge 2 workflow

Initialize Image
Bad Pixel Masking
Dark Subtraction
Cosmic Rays Detection
Background Subtraction
Astrometric Calibration
Image Resampling
Image Stacking
Source Detection
Catalog Production



NIR Scientific Challenge 2 workflow

4 dithers



Utilization of AstrOmatic packages (www.astromatic.net/software)

- for source extraction: SExtractor
- for the astrometric solution: SCAMP
- for resampling and stacking: SWarp

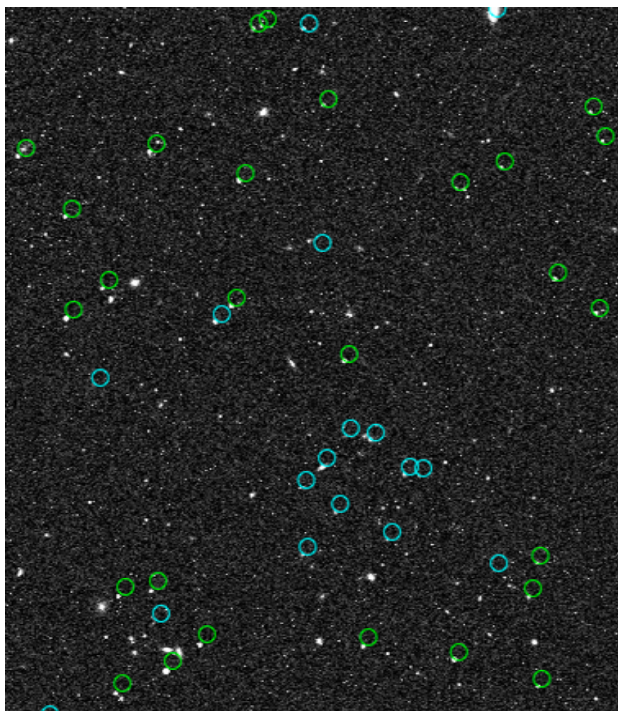
Results based on simulations released SC#2

- geometric distortions included
- three different fields tested (low-high stellar density / zodiacal light)
- Y, J, and H filters
- OU-SIM external catalog of reference stars

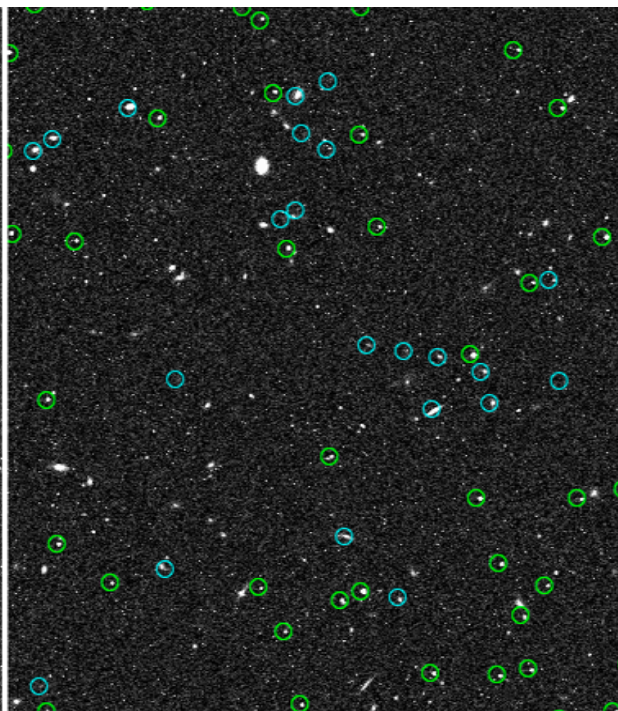
Distortions

- stars
- galaxies

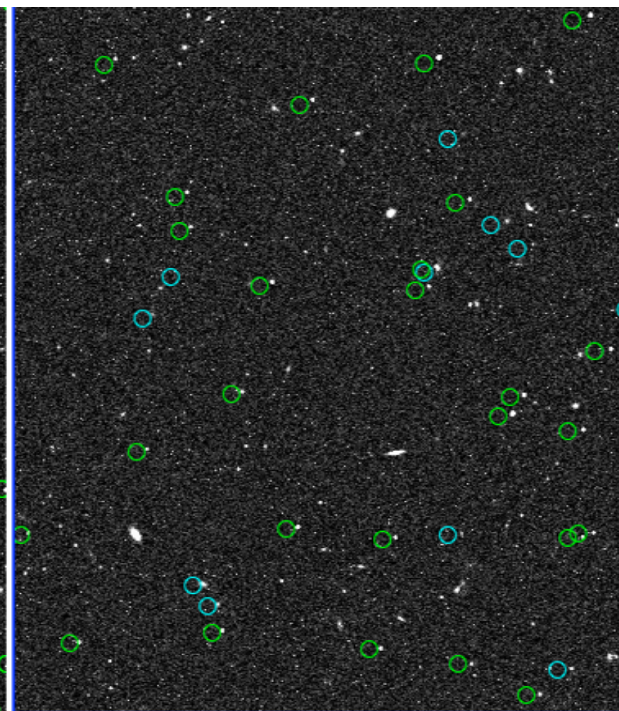
uncorrected



Det11



Det33

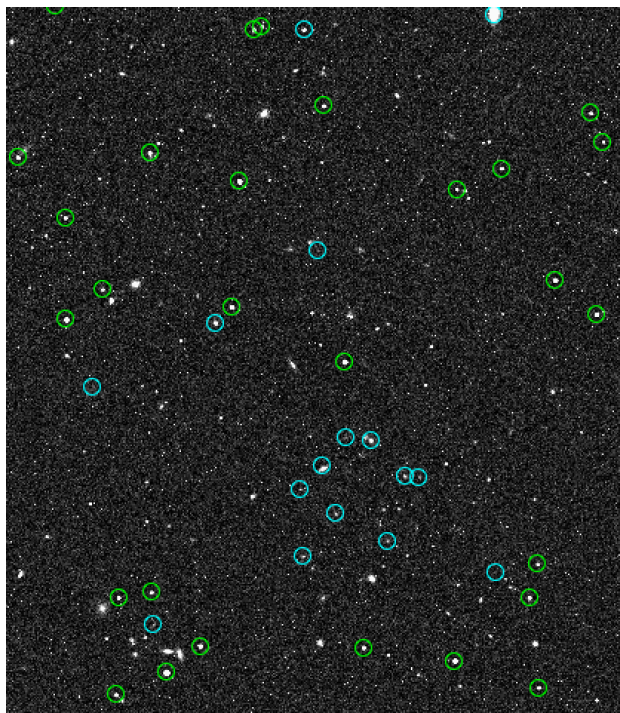


Det44

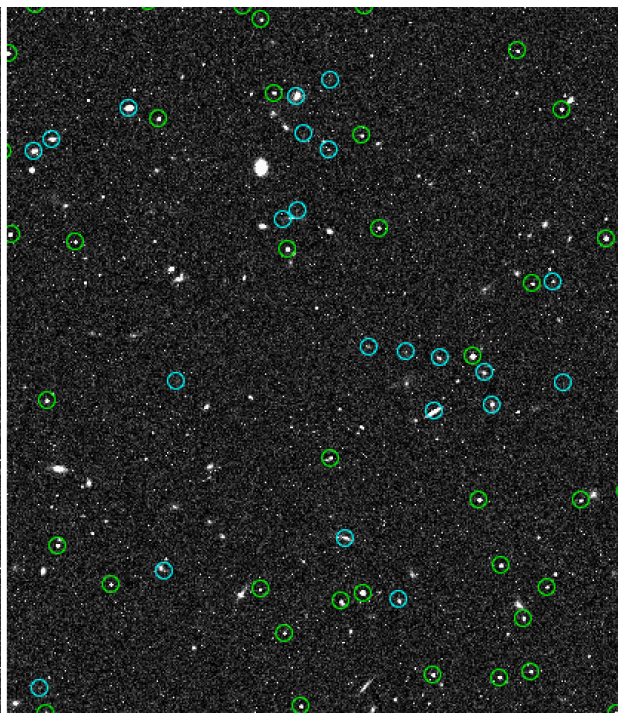
Distortions

- stars
- galaxies

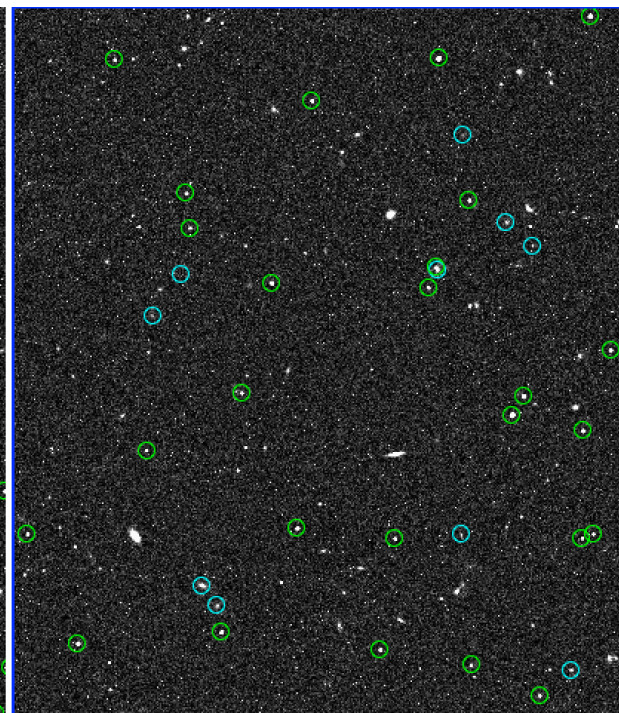
corrected



Det11

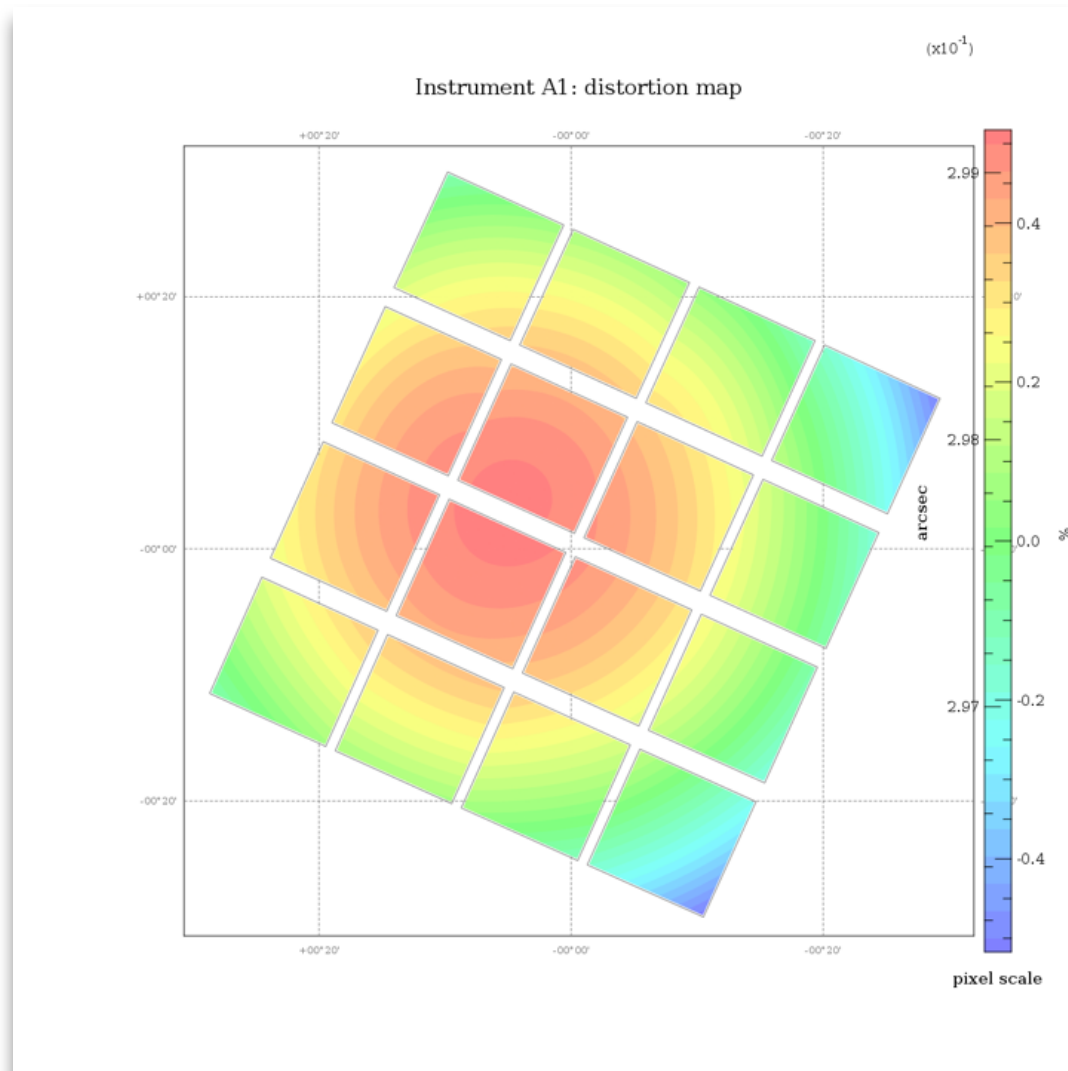


Det33



Det44

Distortion map

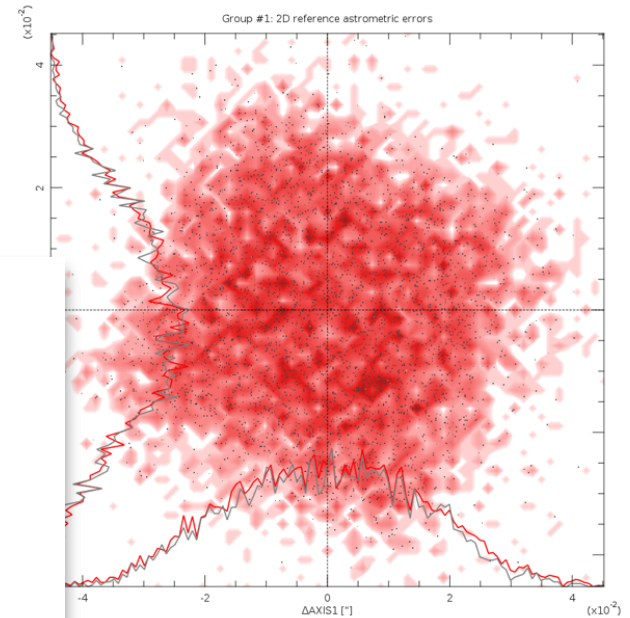
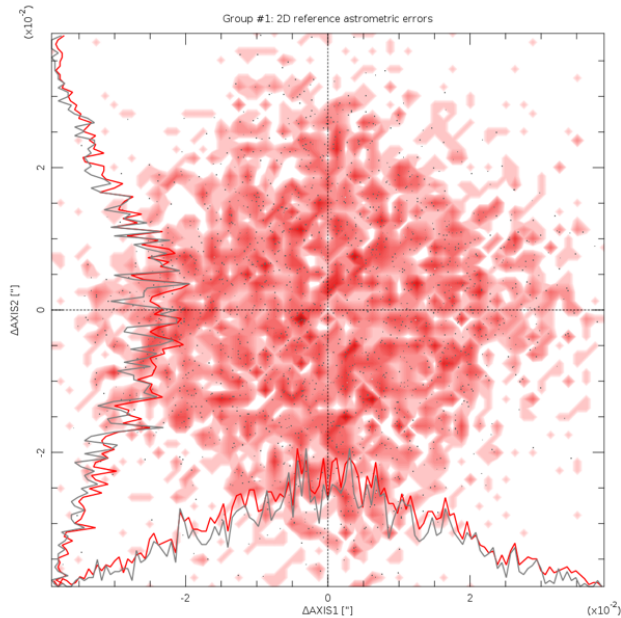


Field 34093
low SD
moderate ZL

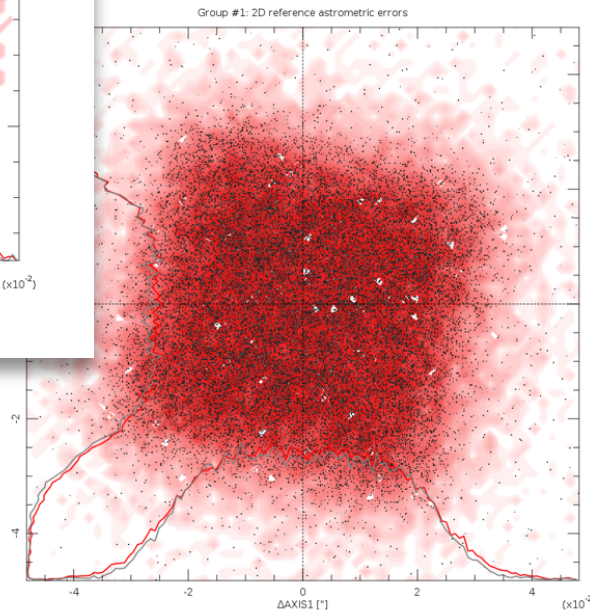
Reference astrometric errors

(differences between coordinates of detected sources and reference stars)

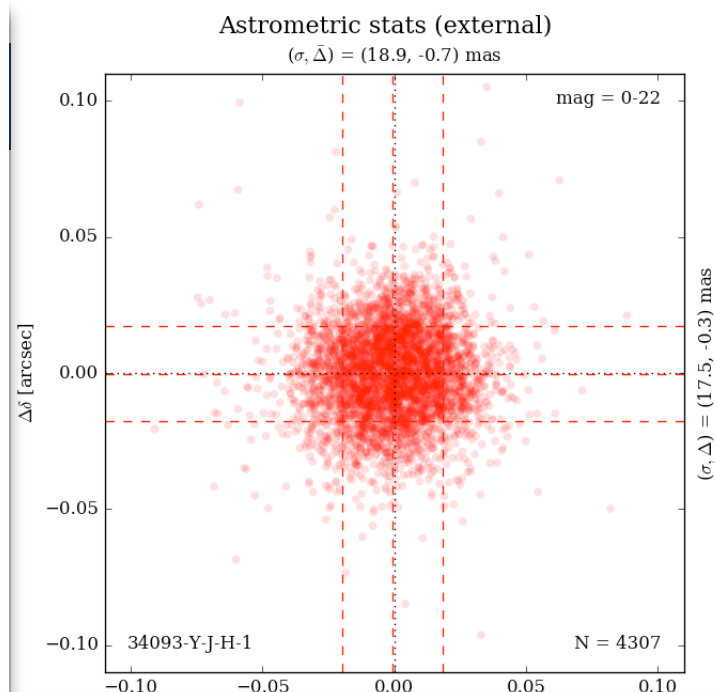
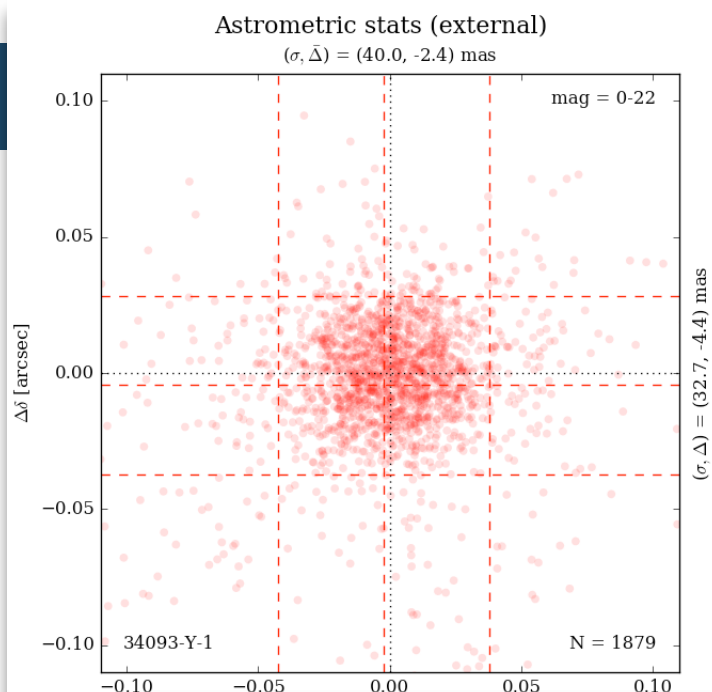
Field 11728
low SD
low ZL



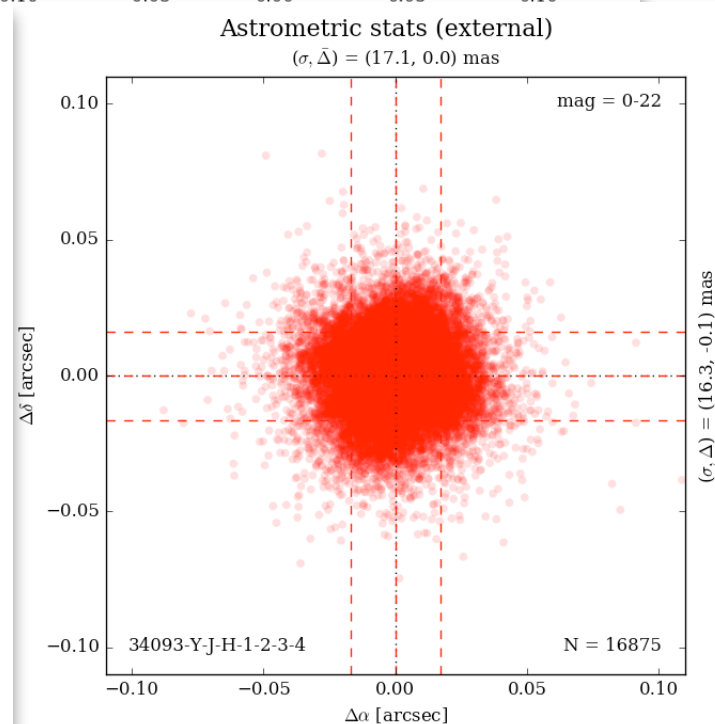
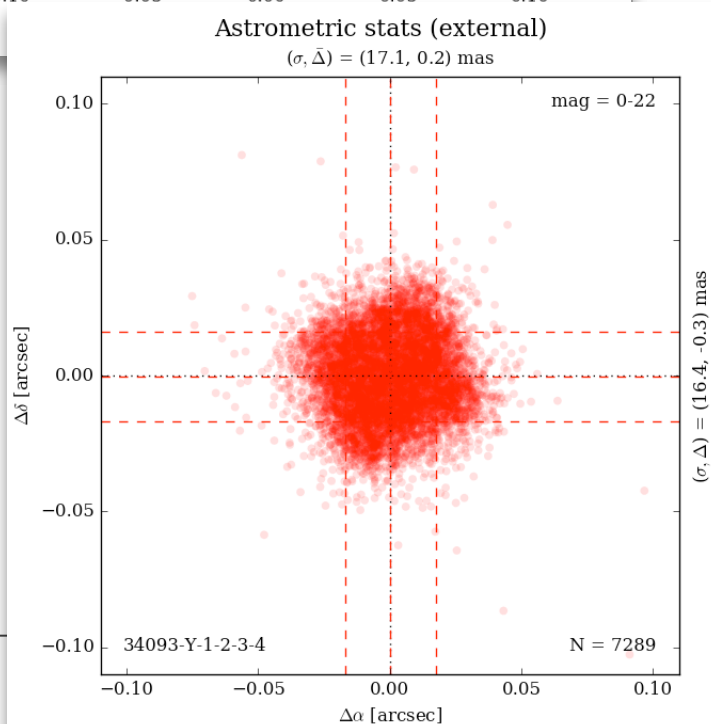
Field 39093
high SD
high ZL



Field 34093
low SD
moderate ZL

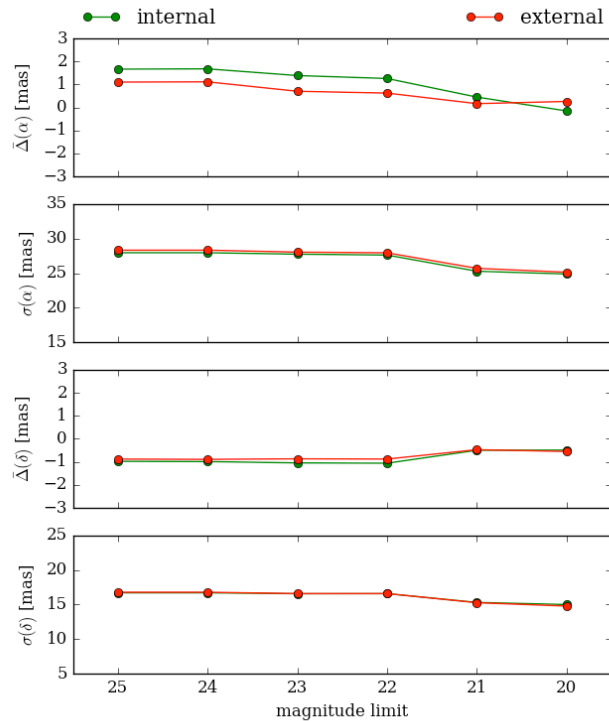


requirement:
 $\sigma < 0.2''$

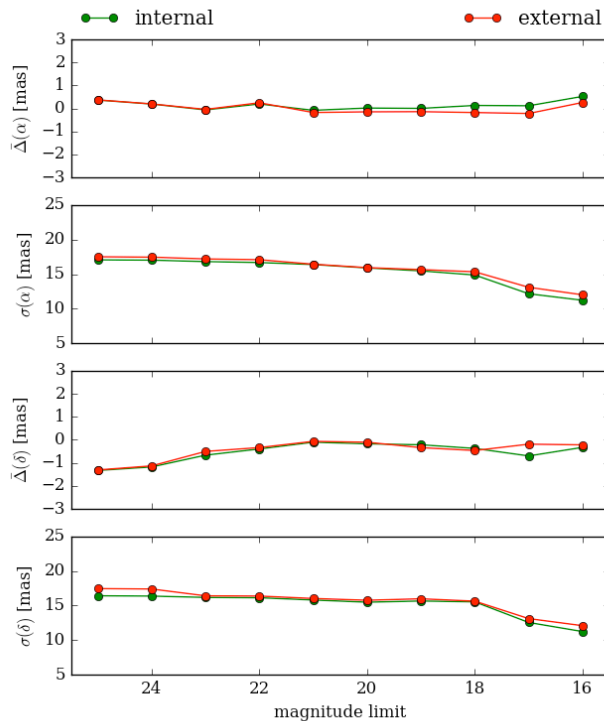


Dependence on magnitude

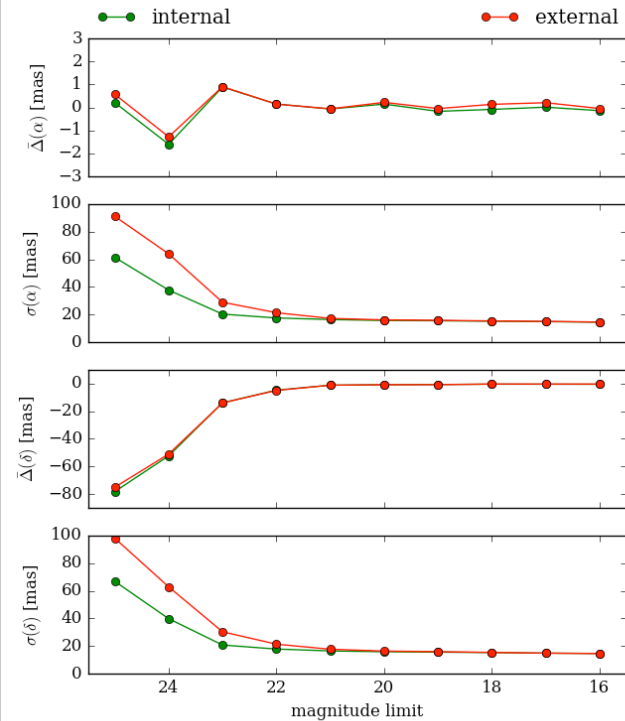
Astrometric stats (11728-Y)



Astrometric stats (34093-Y)



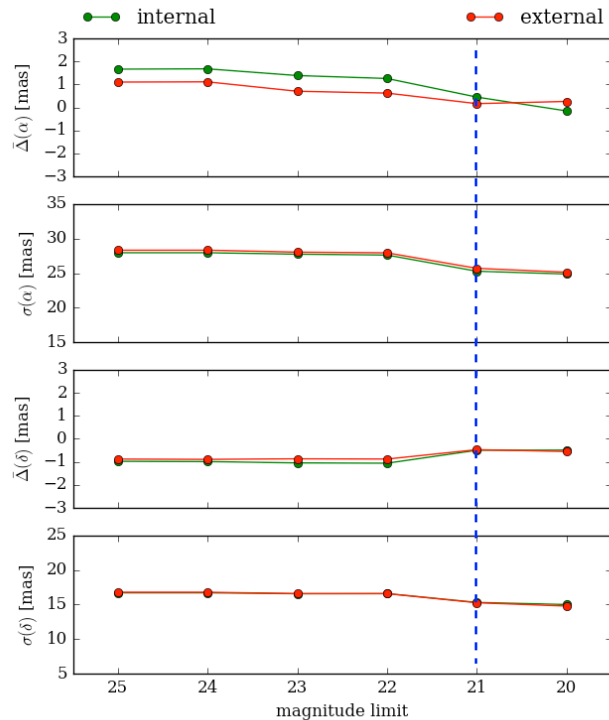
Astrometric stats (39093-Y)



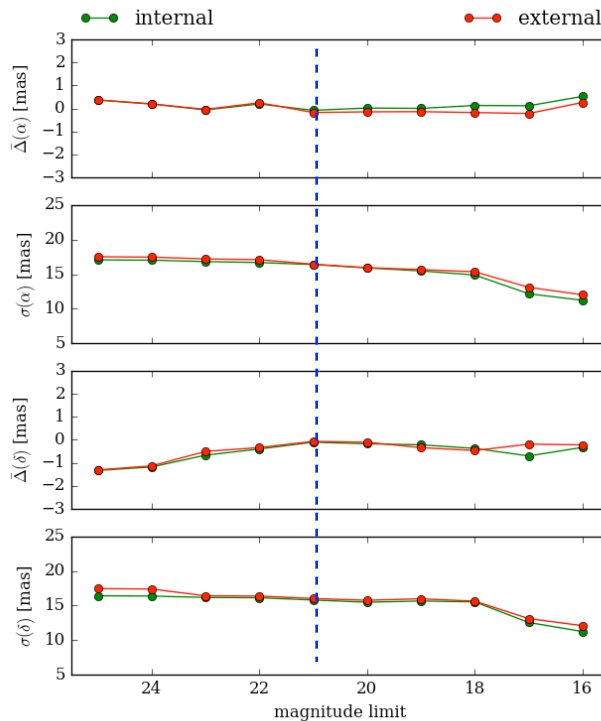
Dependence on magnitude

mag ≤ 21

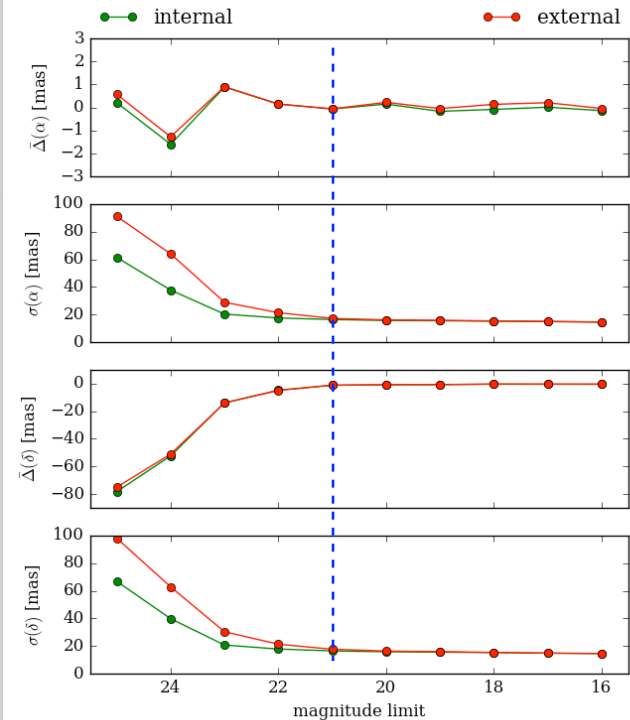
Astrometric stats (11728-Y)



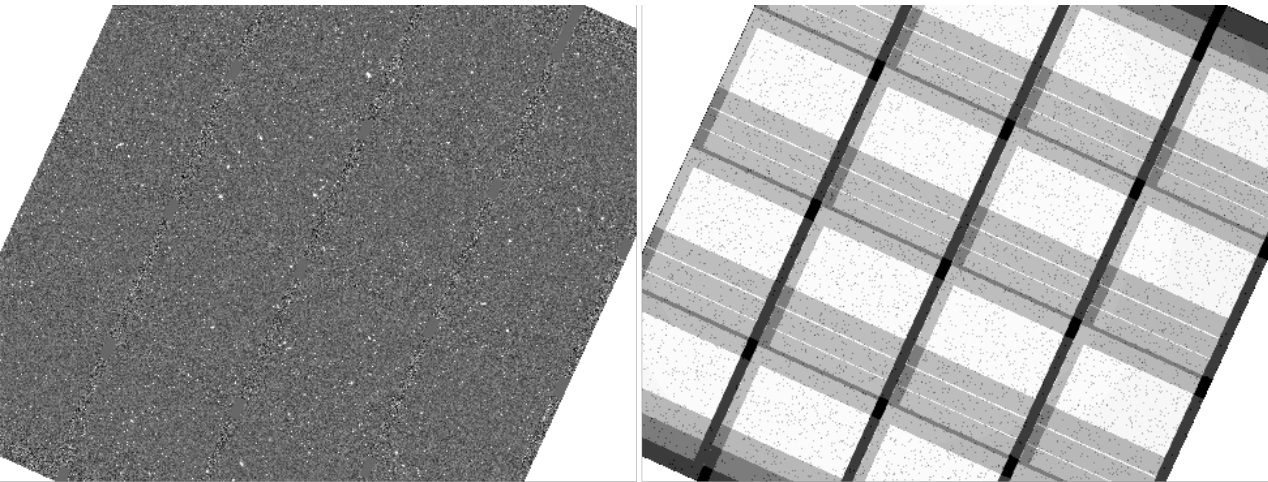
Astrometric stats (34093-Y)



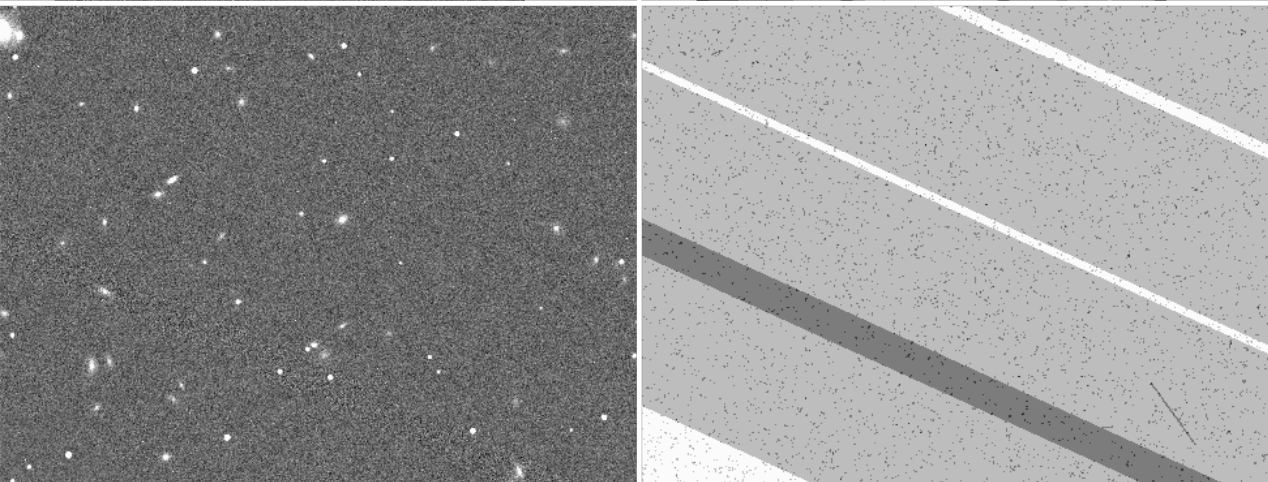
Astrometric stats (39093-Y)



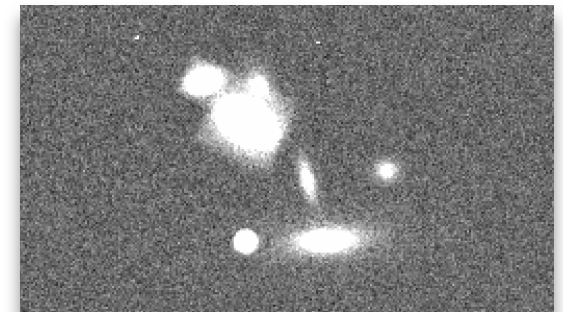
Resampled and stacked image



Stacked image 10k x 9k



Background issue for a few brightest objects



# of images	0	1	2	3	4
% of pixels	2%	12%	11%	40%	35%

Thank you!

