Astrometric accuracy in astrowise

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Purpose

- Investigate astrometric and photometric accuracies reached by AW with the standard reduction

- Is it good enough for shear measurements in KIDS and accurate photo-Zs?

- Set Reqs. for KIDS

- Method: use DEEP3a data for which we have a good reference with Theli

DEEP 3a Dataset

- 30 WFI pointings i.e. 240 chips
- Exposure time = 300s (total=6.25 hours)
- 1.01<airmass<1.32
- 5 observing nights (9 nights)
- Selection:
  - seeing < 2" (median 0.8")
  - all airmasses
  - all nights

- Source extraction: Detect_Threshold =5 sigma

Methods

- Compare source positions on the regridded frames to the ones detected on Coadded frame for:
  - Astrowise: LDAC
  - Theli: Astrometrix
  - Scamp
- Compare quality and speed
- All data   : 30 pointings
- One night : 16 pointings

Astrowise/LDAC: 1 chip, 30 p.

Nb=   11852   sources

<dra> = 0.004 " FWHM 0.342   WFI.all.reg_5sig.ascii.idl

<ddec>= 0.007 " FWHM 0.216   coadd_deep3a_ccd50_30_5sig.ascii.idl
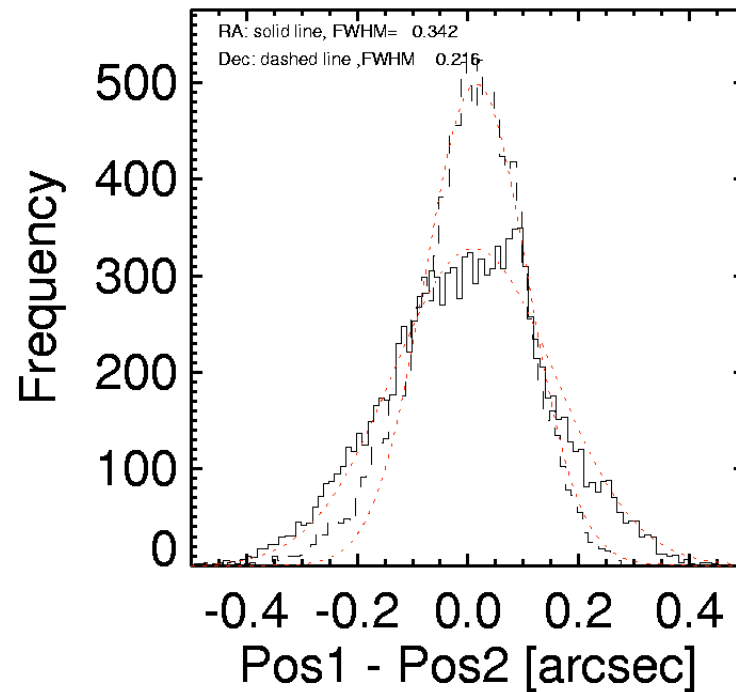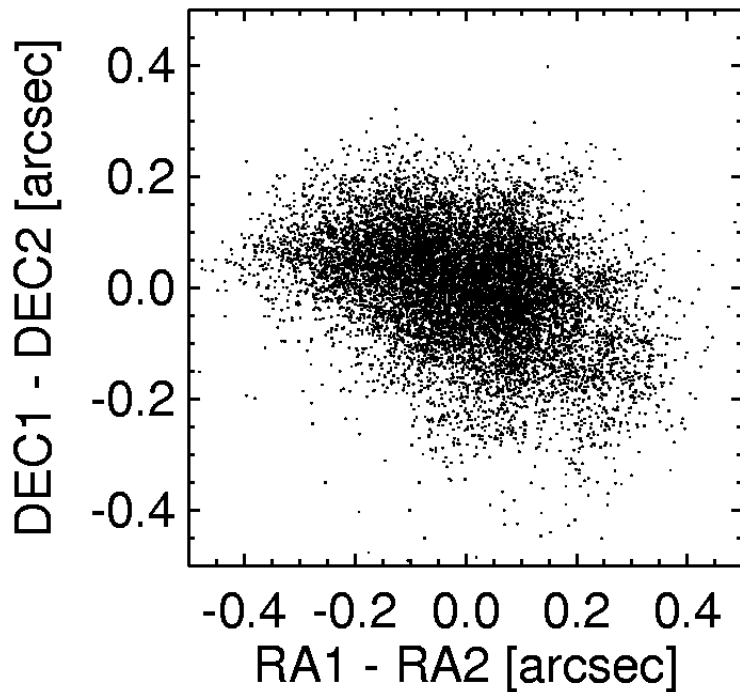
RMS: 0.145" (RA)
      0.092" (DEC)

UNTIL LAST WEEK!

Astrowise/LDAC: all chips, 18 selected pointings

DATE_OBS = N/A
<RA> = 171.18610
<DEC> = −21.69497
N = 42769

<DRA> = -0.00035 -- 0.04093
<DDEC> = -0.00014 +- 0.03854
RMS = 0.05622
Max = 0.16861

CHIP: coadd

Coadd Residuals for
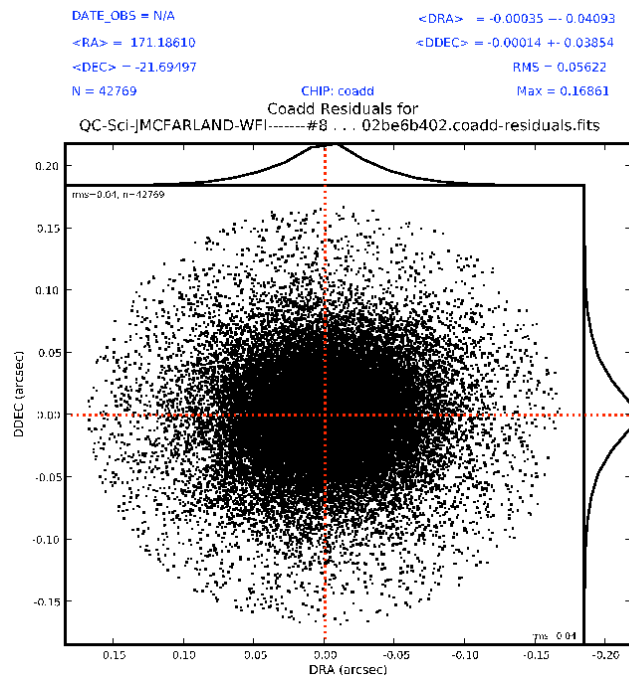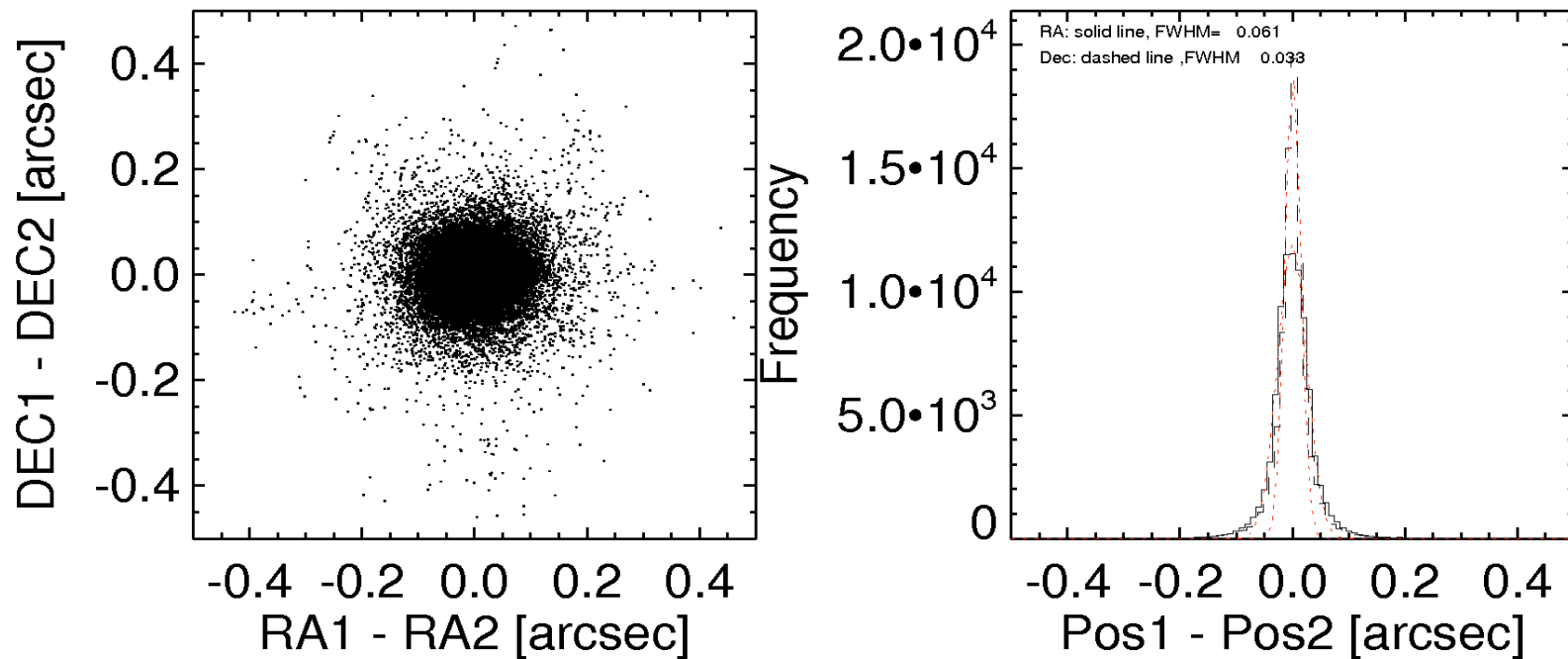QC-Sci-JMCFARLAND-WFI------#8 . . . 02be6b402.coadd-residuals.fits

Fig 19 from John's report, standard reduction.
18 selected pointings (5 plus 3 consecutive dithers)

RMS: 0.041" (RA)
        0.038" (DEC)

SINCE LAST WEEK!!

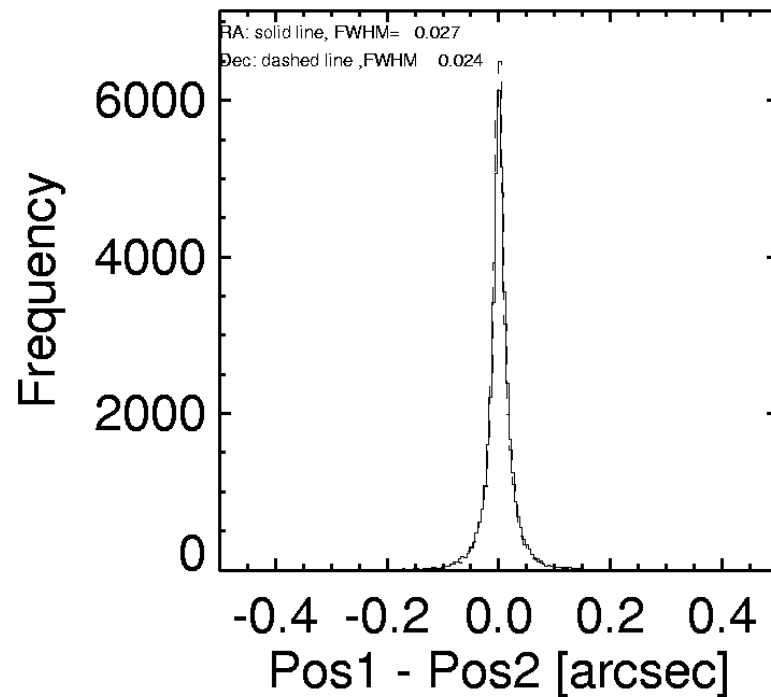# Astrometrix - All chips, 30 p.
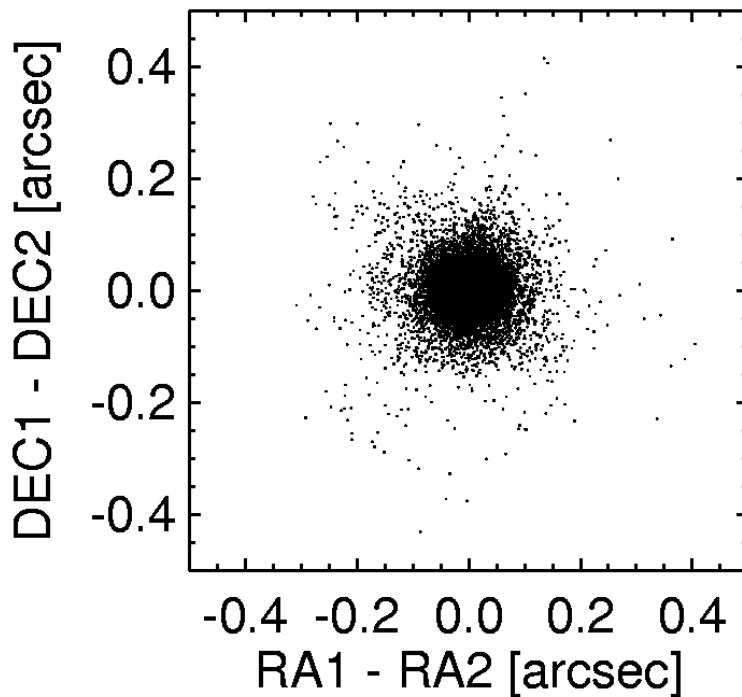
Nb= 83911 sources

<dra> = 0.000 " FWHM 0.061   WFI.all.wcs.D3AA.resamp_5sig.ascii.idl

<ddec>= 0.000 " FWHM 0.033   Deep3a_R.D3AA.swarp_5sig.ascii.idl

RMS: 0.026" (RA)
         0.014" (DEC)

Scamp - All chips, 1 night (16 p.)
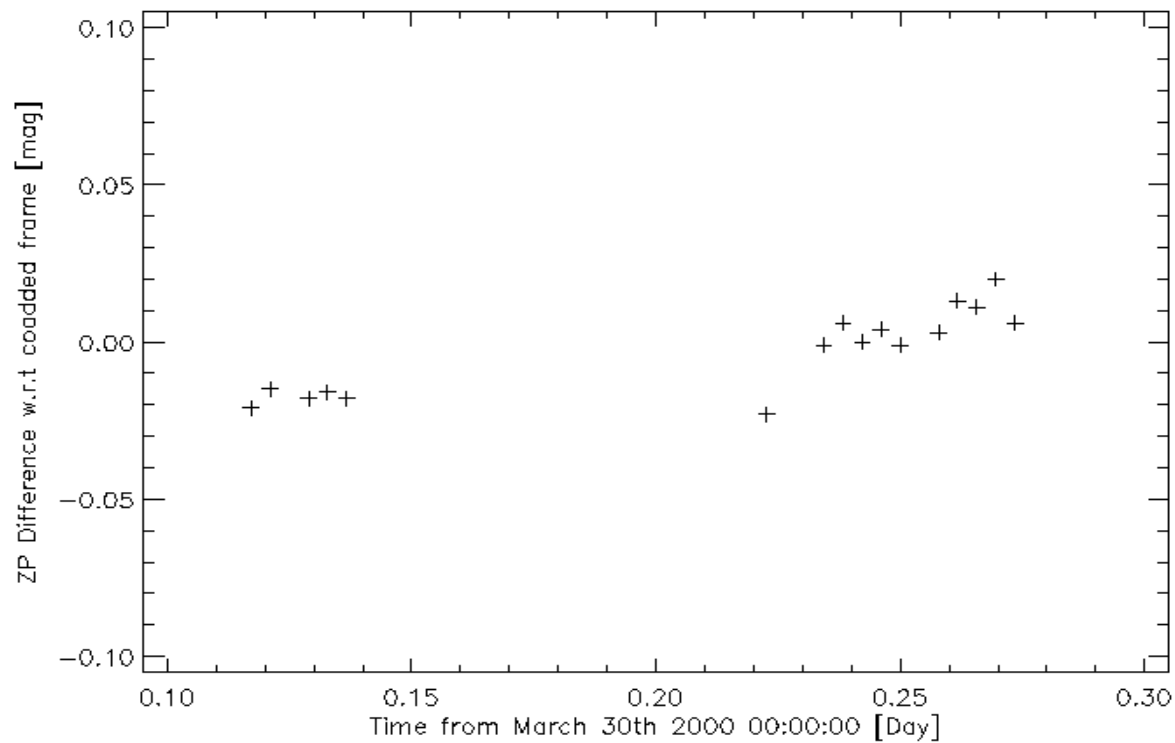
Nb= 41731 sources

<dra> = 0.000 " FWHM= 0.027   WFI_#844_all_point.ascii.idl

<ddec>= 0.000 " FWHM= 0.024   coadd_#844.ascii.idl

RMS: 0.011" (RA)
     0.010" (DEC)

Mosaic_type = LOOSE

Relative Photometry:
1 night, 1 CCD, photometric?

Summary

- AW/LDAC:
  - **RA/DEC: 0.041"/0.038"**
  - Detect_Threshold = 10
  - 18 **selected** pointings
  - 43000 associations

  improves to 0.025" with manual tweaking

- Astrometrix:
  - **RA/DEC: 0.026"/0.014"**
  - Detect_Threshold = 5
  - all 30 pointings
  - 84000 Associations
  - RA ~2x worse than DEC

- SCAMP:
  - **RA/DEC:0.011"/0.010"** as a first try (loose option)
  - Detect_Threshold = 5
  - All 16 pointings in 1 night (no limitation) but similar results with all nights
  - Can still be improved

5 very good reasons to install SCAMP in Astrowise

- It gives better results than LDAC without any refinement (a factor ~2-4)
- It is much faster (50 times for 16 WFI pointings 50mn/1mn)
- It has many options
- It derives absolute astrometry + global astrometry+relative photometry at ONCE
- It is maintained and updated