Tertiary Frankenstandards for Y3A1 (P)GCM Calibrations:

Comparison Against APASS/2MASS

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This presentation is a continuation of DES-doc#8980 and DES #9063

Procedure (I)

- Downloaded APASS DR9 and 2MASS PSC from Vizier.
- Vetted both catalogs and prepared a subset covering just the DES footprint (Sahar Allam).
- Matched combined APASS/2MASS "DES footprint" catalog to a catalog of GCM-calibrated Y1A1 stars in the SPT area.
- Followed an earlier prescription from Steve Kent to derive the following APASS/2MASS → DES transformation equations:

$g_{des} = g_{apass} - 0.0642\times(g-r)_{apass} - 0.0239$ (per star rms ~ 0.04mag)

$r_{des} = r_{apass} - 0.1264\times(r-i)_{apass} - 0.0098$ (per star rms ~ 0.05mag)

$i_{des} = r_{apass} - 0.4145\times(r_{apass}-J_{2mass}-0.81) - 0.0391$ (per star rms ~ 0.04mag)

$z_{des} = (J_{2mass}+0.81) + 0.3866\times(r_{apass}- J_{2mas} -0.81) - 0.0414$ (per star rms ~ 0.04mag)

$Y_{des} = (J_{2mass}+0.81) + 0.2938\times (r_{apass}- J_{2mass}- 0.81) - 0.0443$ (per star rms ~ 0.04mag)

[The equations for i_{des}, z_{des}, Y_{des} really only apply to stars with $(r_{apass}-J_{2mass}) < 1.8$.]

Procedure (II)

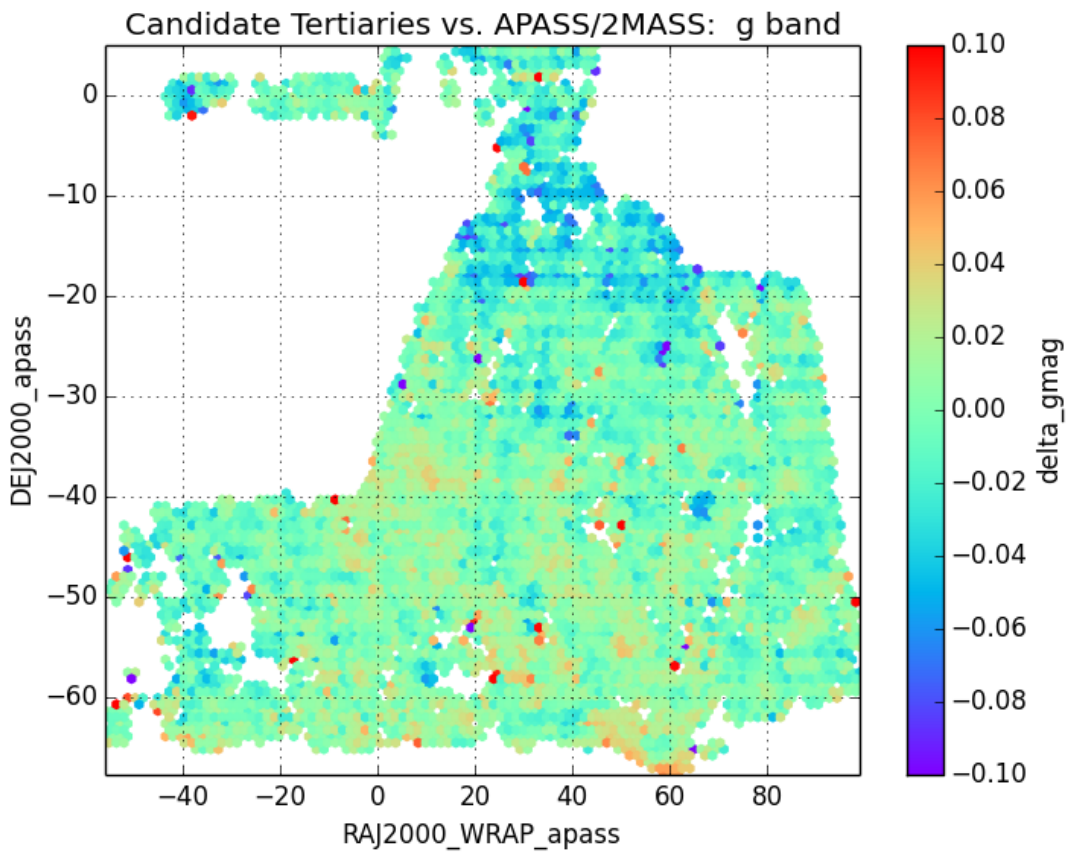
- Matched the APASS/2MASS catalog with the DES-transformed g,r,i,z,Y magnitudes against the current set of candidate Y3A1 tertiary Frankenstandards.

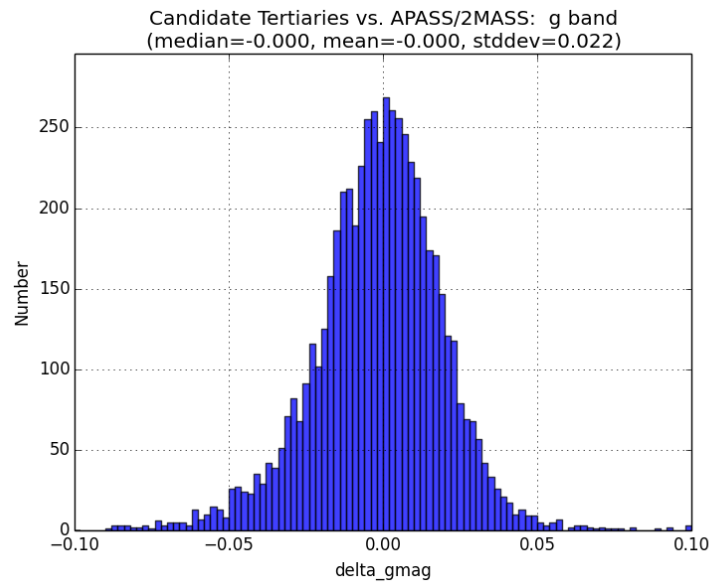
- Used the matplotlib “hexbin” function to bin the matched catalog into ~ 1 sq deg hexagonal bins.

- For each hexagonal bin, the median difference between the DES-transformed APASS/2MASS magnitudes and the magnitudes of the candidate Y3A1 tertiaries was calculated.

Frankenstandards vs. APASS/2MASS: g-band

DARK ENERGY SURVEY

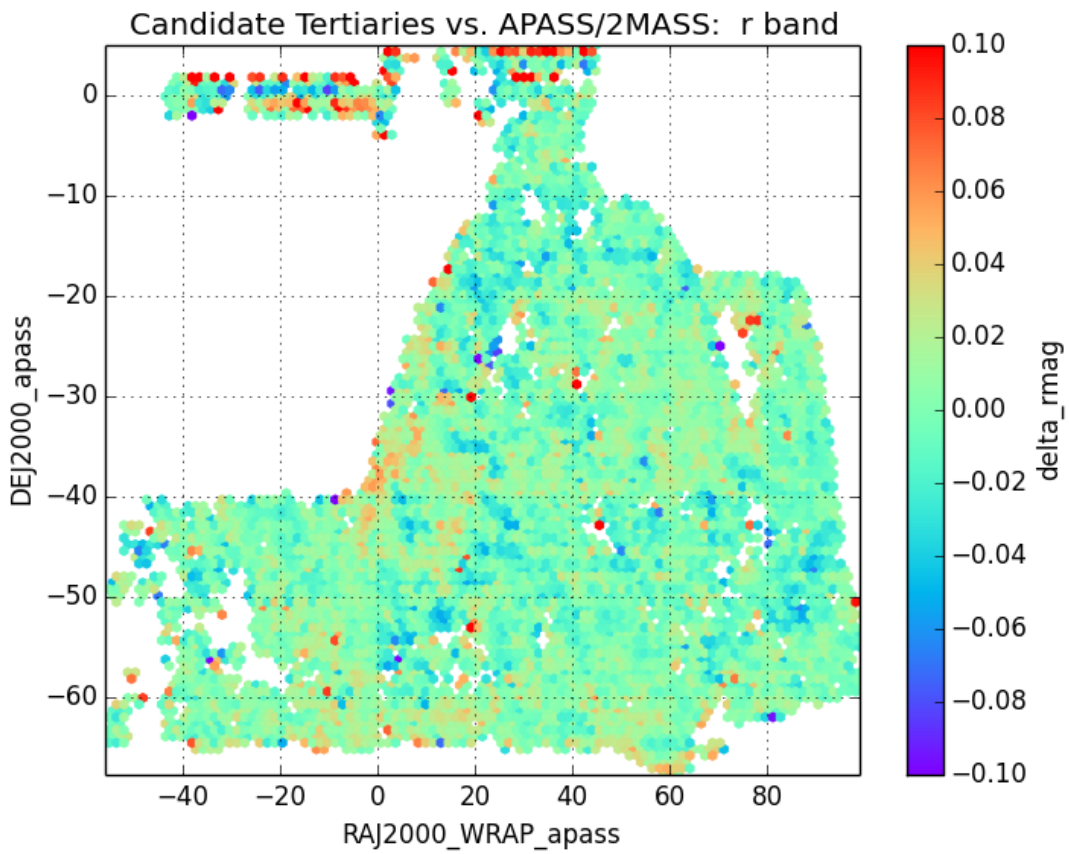


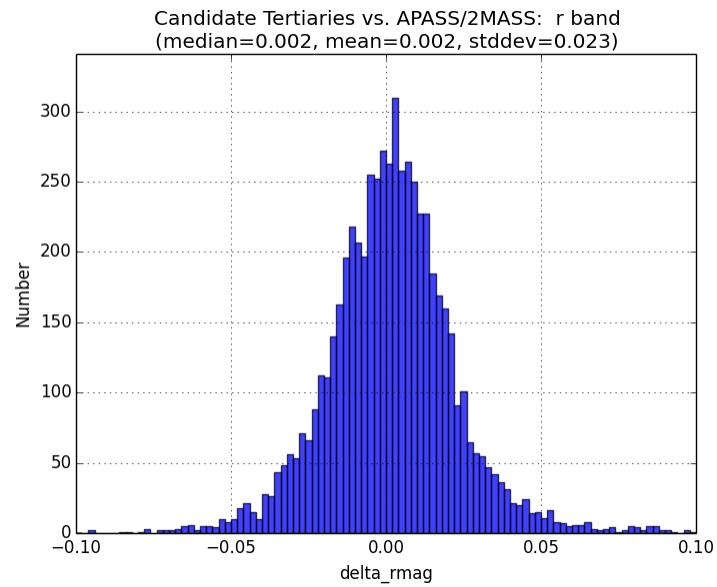


Δmag:	median:	0.000 mag
	mean:	0.000 mag
	RMS:	0.022 mag

Frankenstandards vs. APASS/2MASS: r-band

DARK ENERGY SURVEY

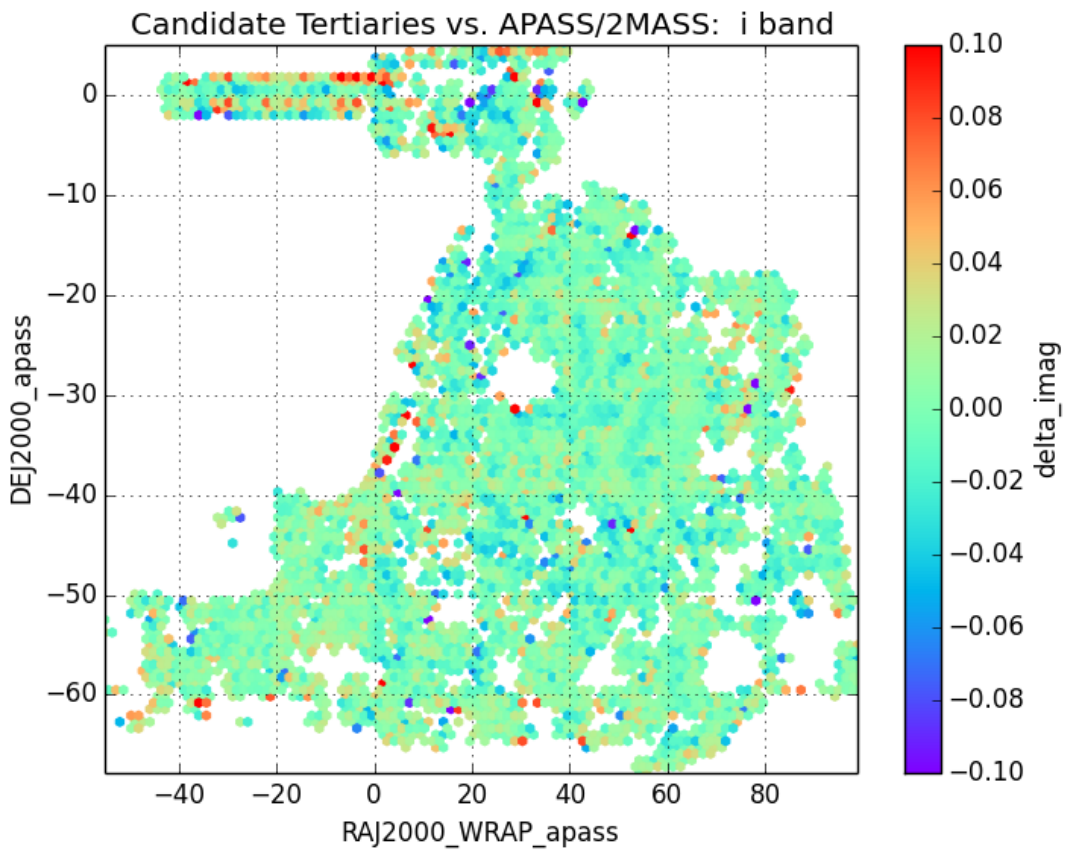


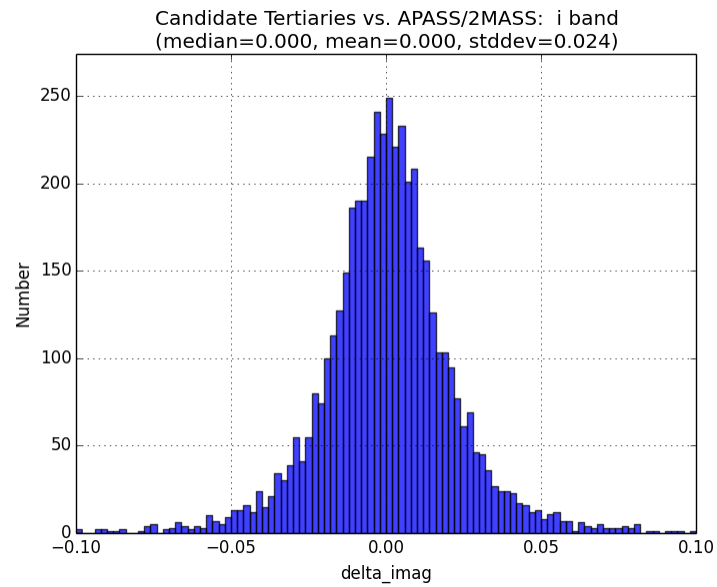


Δmag:	median:	0.002 mag
	mean:	0.002 mag
	RMS:	0.023 mag

Frankenstandards vs. APASS/2MASS: i-band

DARK ENERGY SURVEY

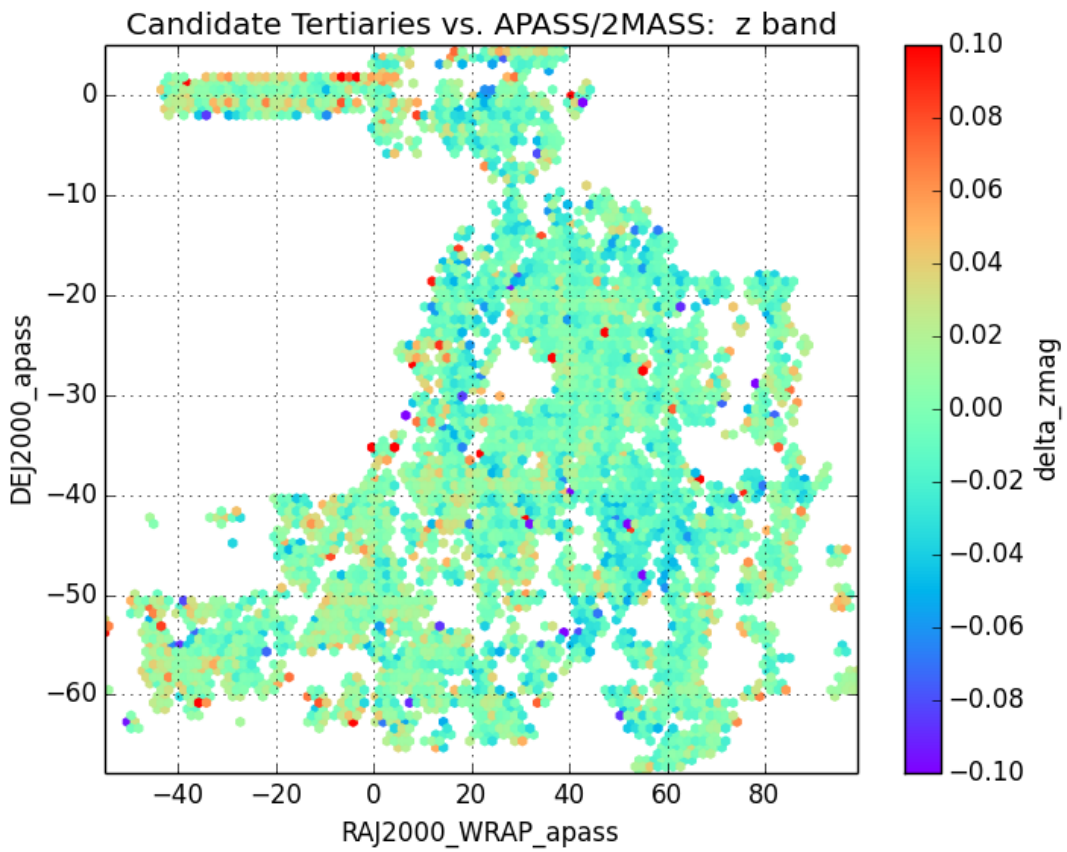


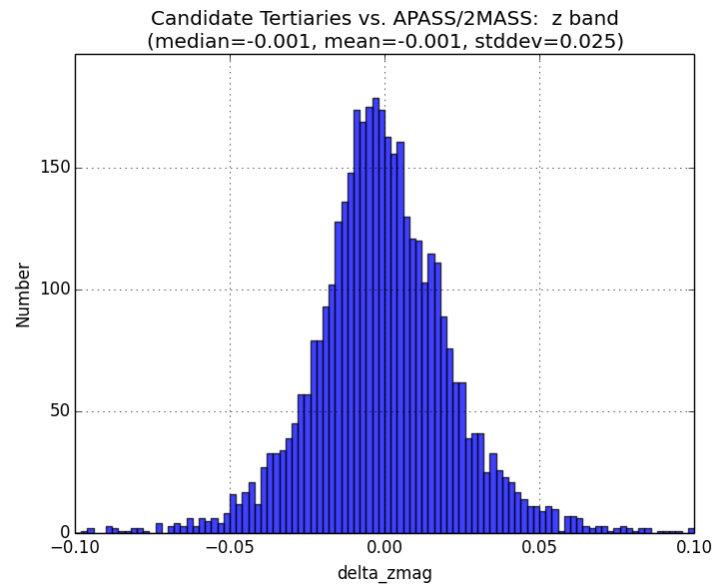


Δmag:	median:	0.000 mag
	mean:	0.000 mag
	RMS:	0.024 mag

Frankenstandards vs. APASS/2MASS: z-band

DARK ENERGY SURVEY

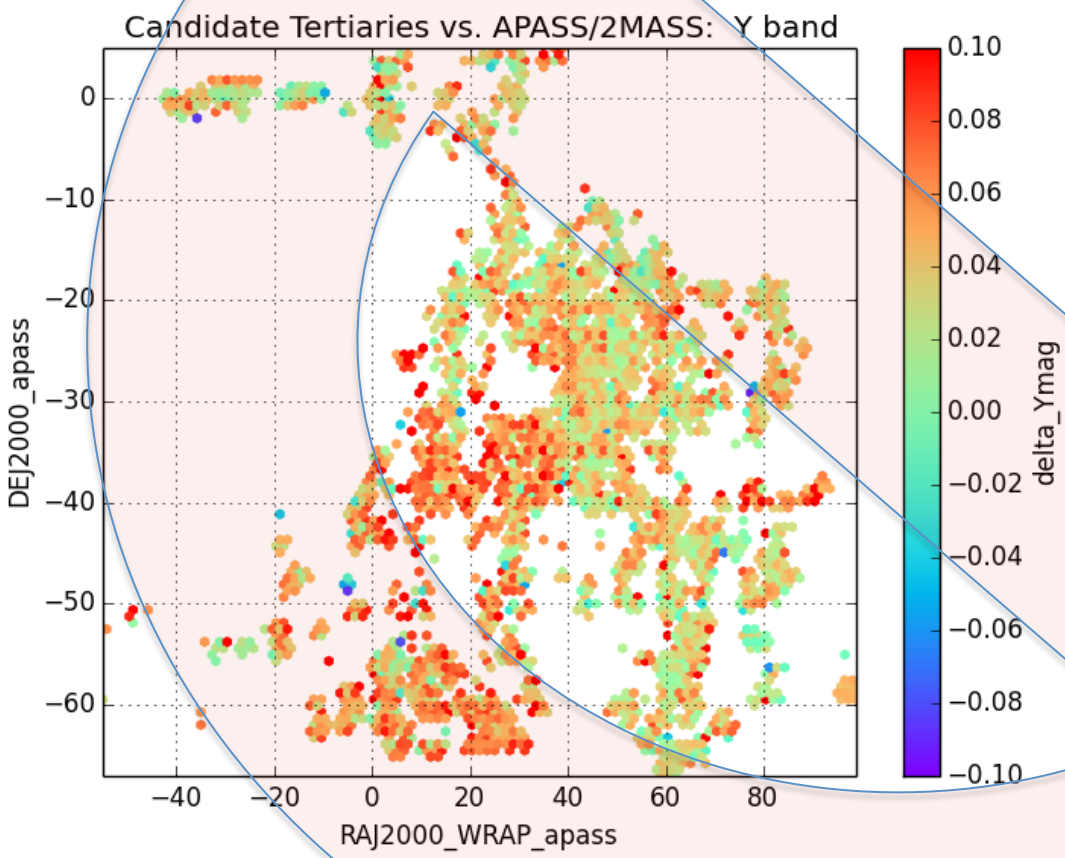


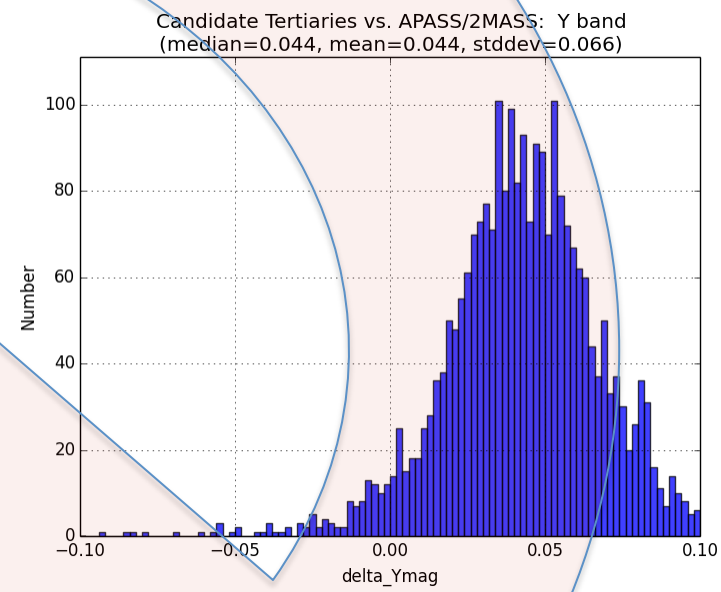


Δmag:	median:	-0.001 mag
	mean:	-0.001 mag
	RMS:	0.025 mag

Frankenstandards vs. APASS/2MASS: Y-band

DARK ENERGY SURVEY





Δmag:	median:	0.044 mag
	mean:	0.044 mag
	RMS:	0.066 mag

Minus sign error somewhere???

Conclusions and Next Steps

DARK ENERGY SURVEY

Conclusions

- Good consistency between transformed APASS/2MASS and the candidate Y3A1 tertiary standards for g,r,i,z.
- There is a problem with Y-band.

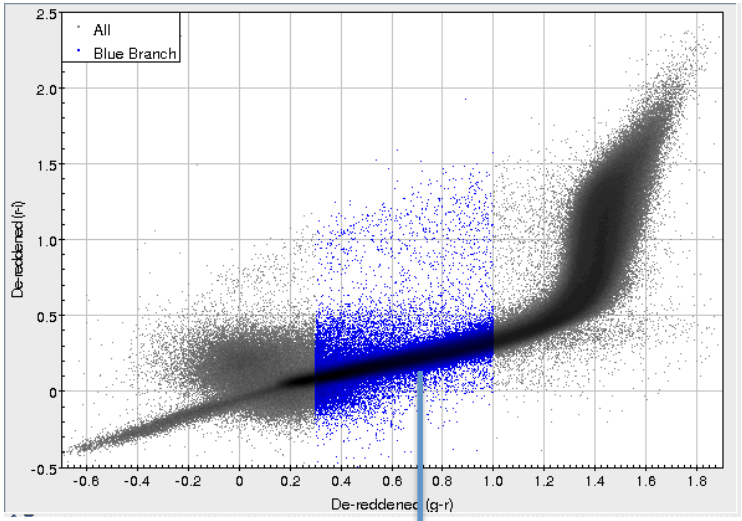
Next Steps

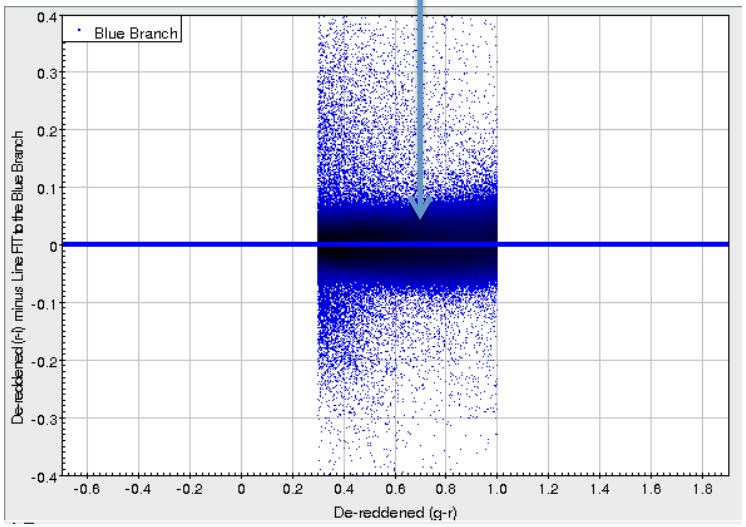
- Try to figure out problem with Y-band.
- Define gridwork.
- Also need to do u-band for SN and special fields.

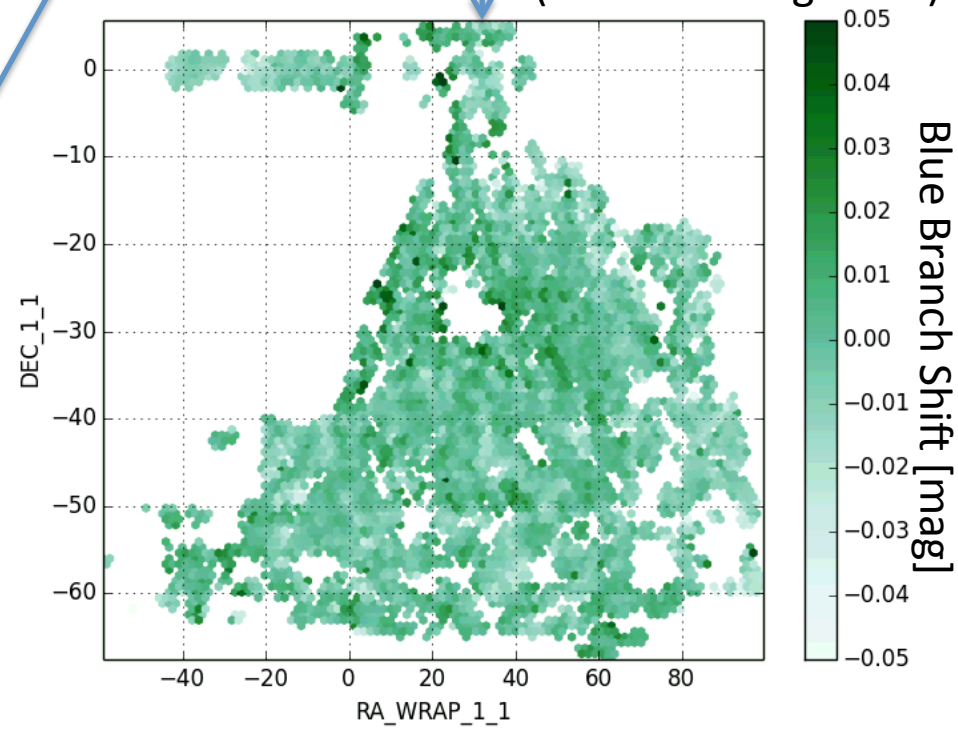
Extra Slides

Quick "Poor Man's SLR" Test: g,r,i-bands

DARK ENERGY SURVEY





- Bin in boxes ~ the size of a CCD
- Plot mean "Blue Branch" shift vs. RA,DEC

(rms<0.02mag? TBD)