

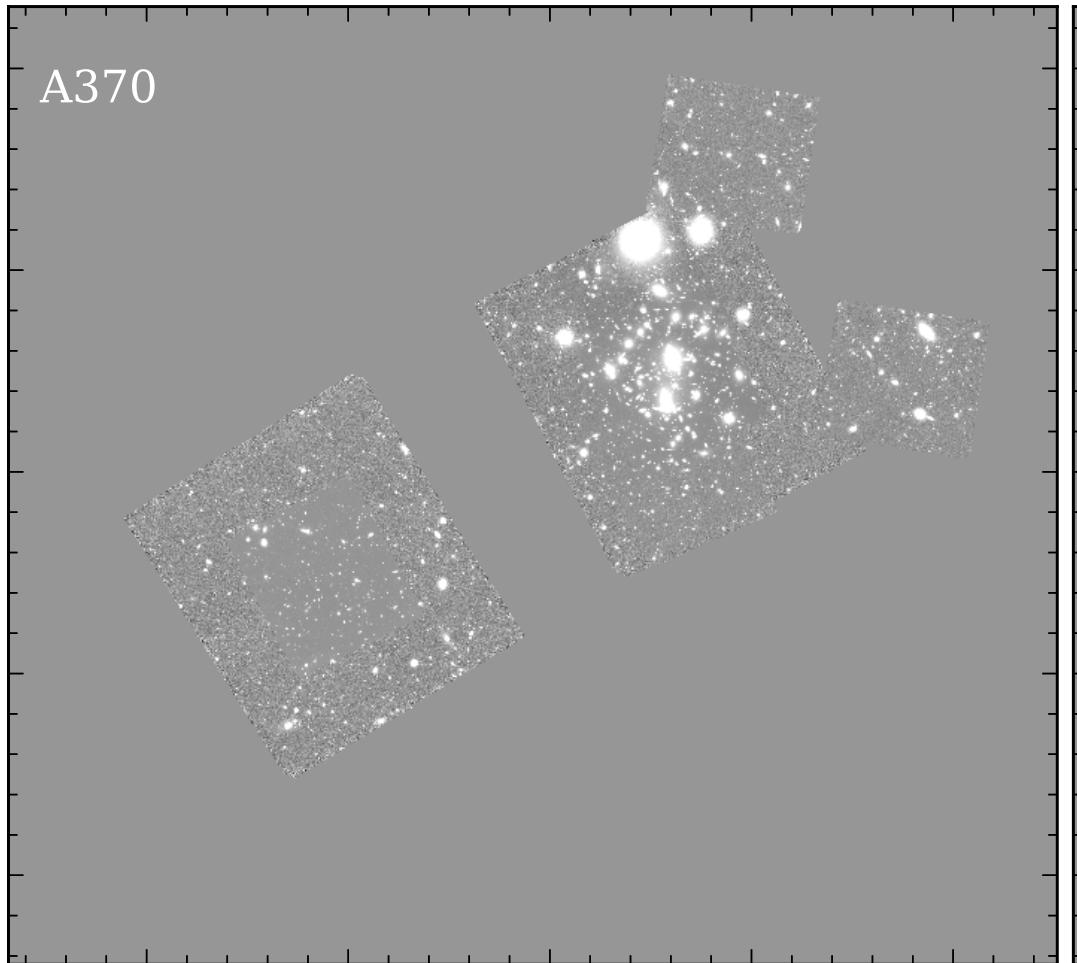
# **Updated HST & IRAC Catalogue in ALCS**

Vasily Kokorev and Gabe Brammer

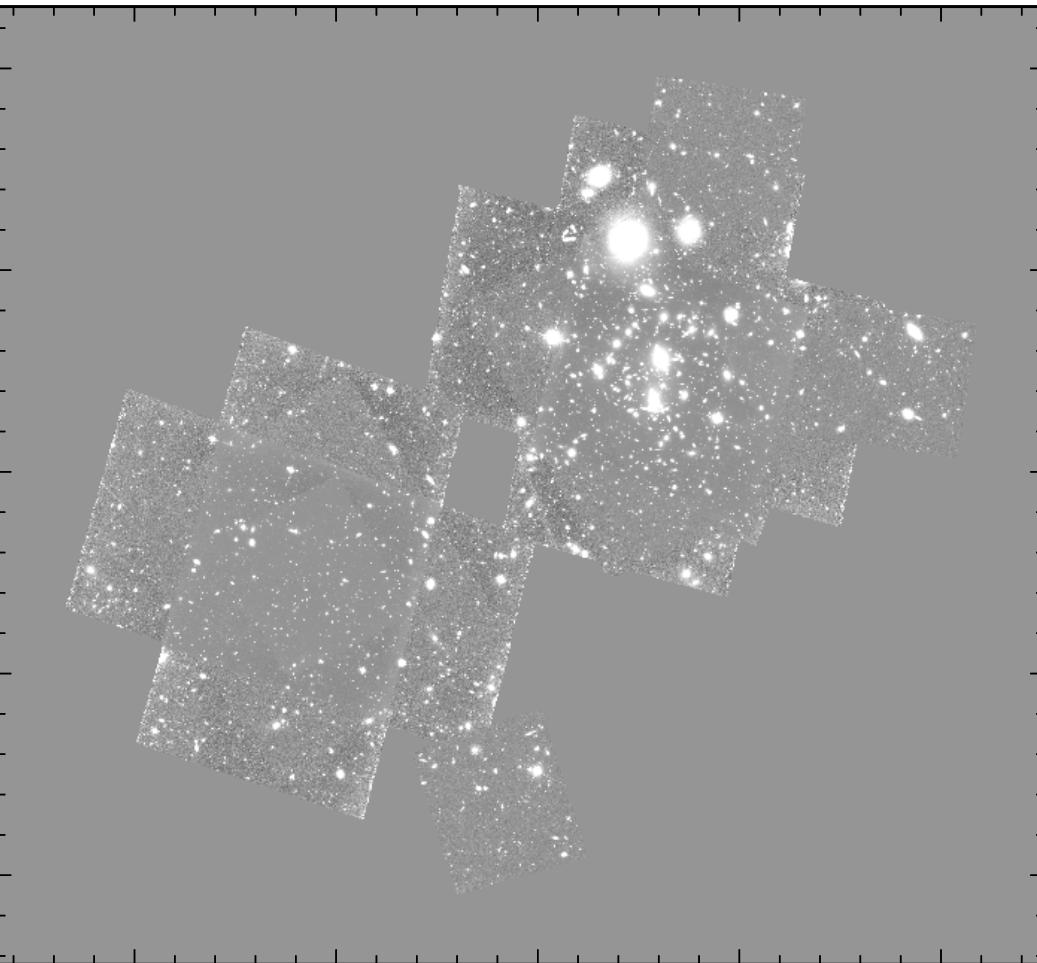
20/01/2022 ALCS Meeting

# Area and Source Count

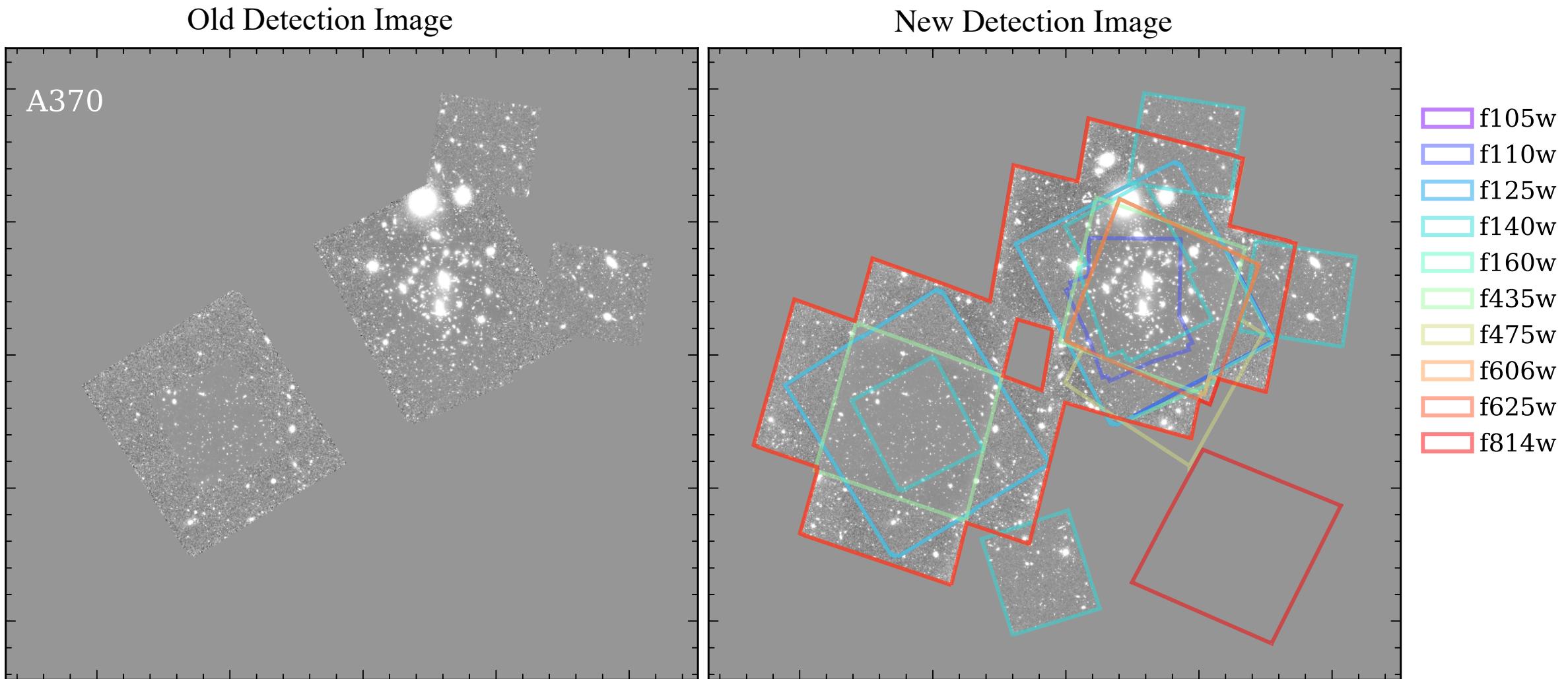
Old Detection Image



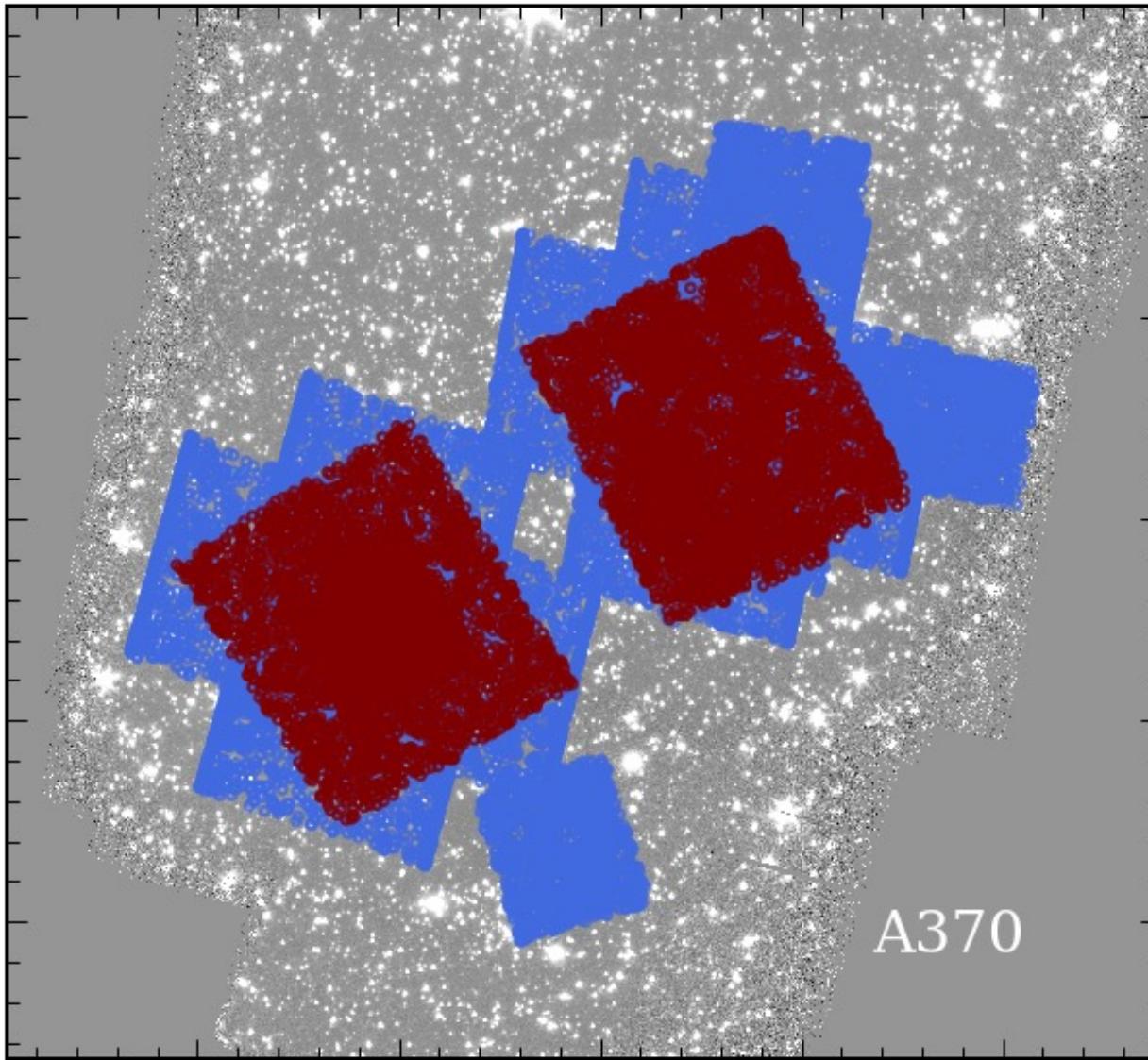
New Detection Image

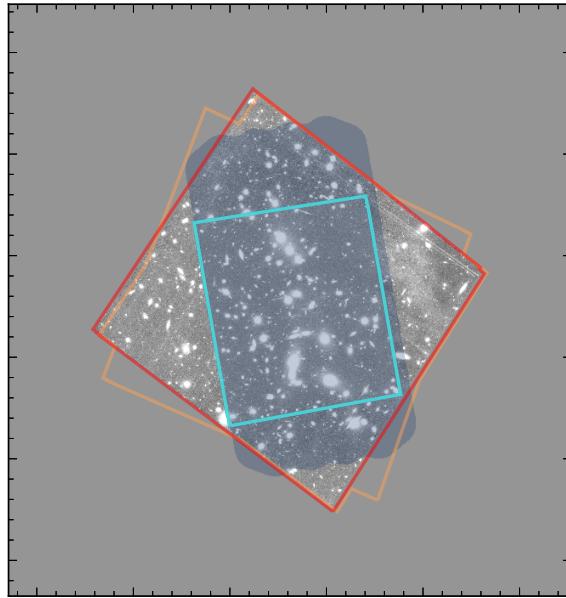
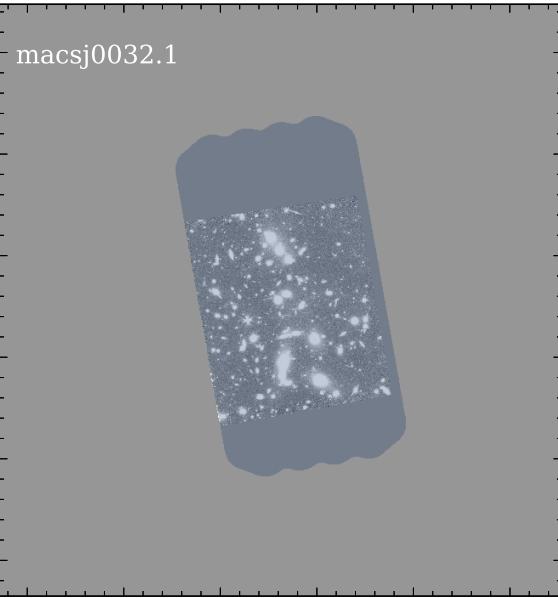
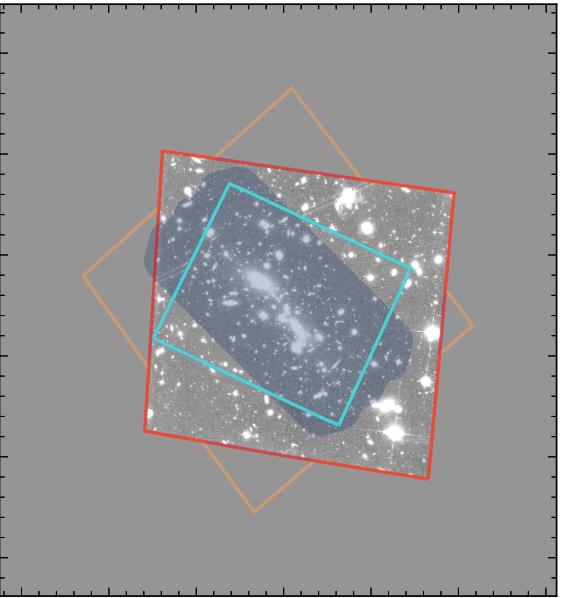
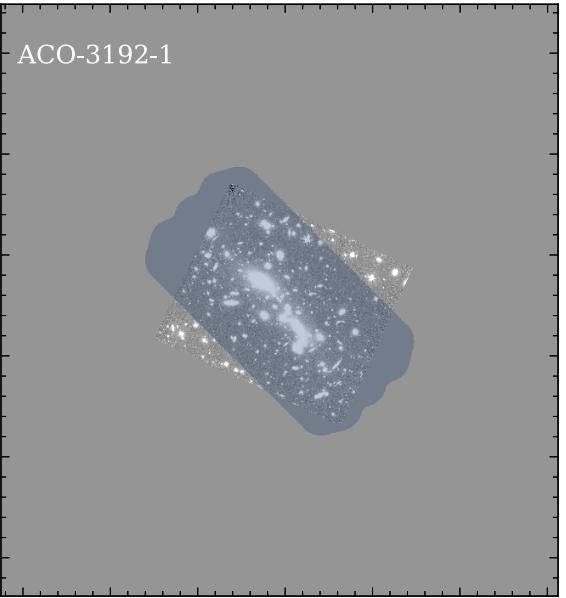


# Area and Source Count

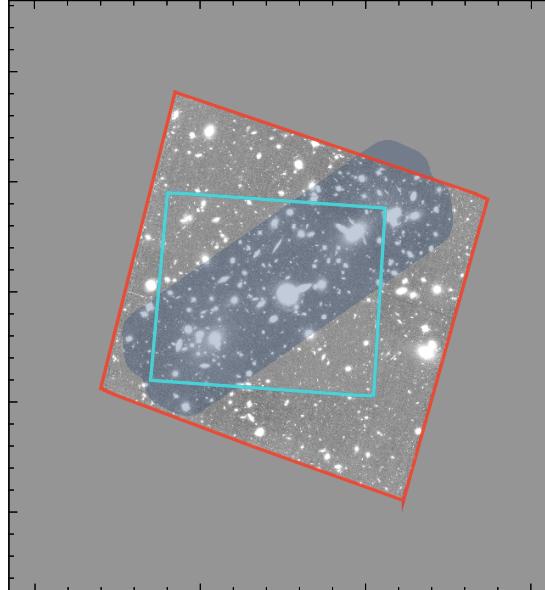
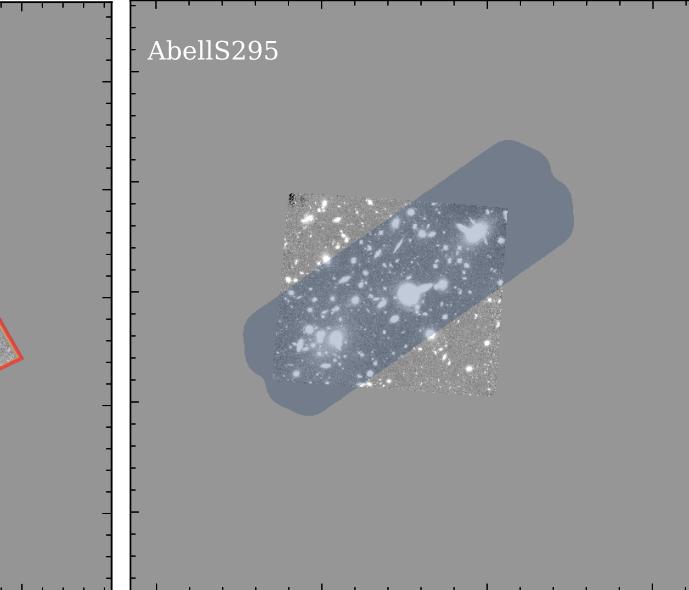
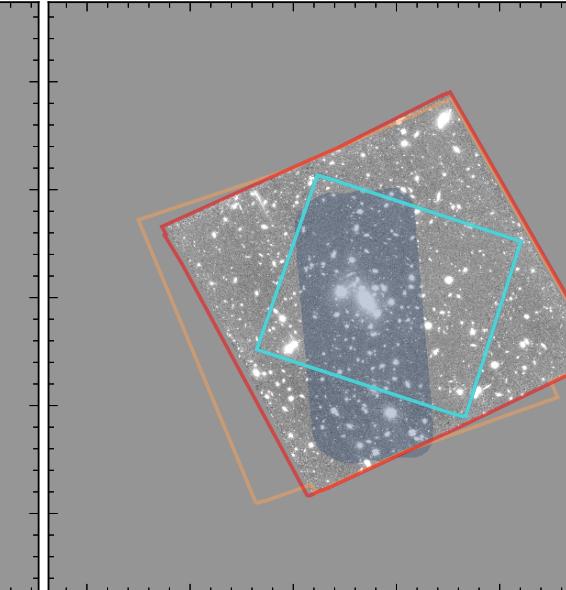
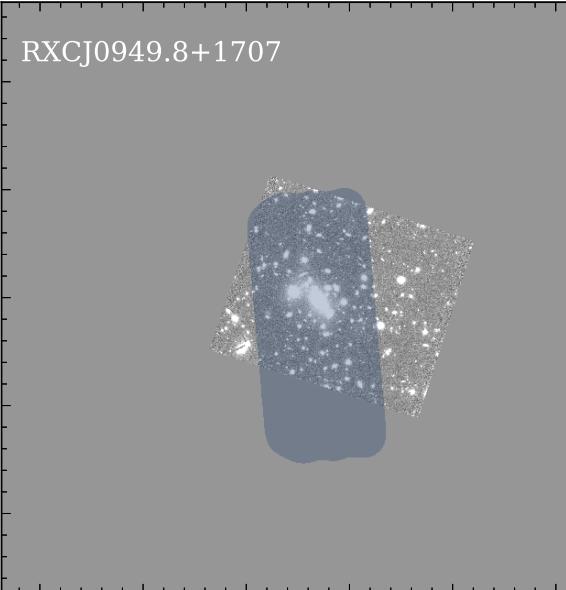


# Area and Source Count

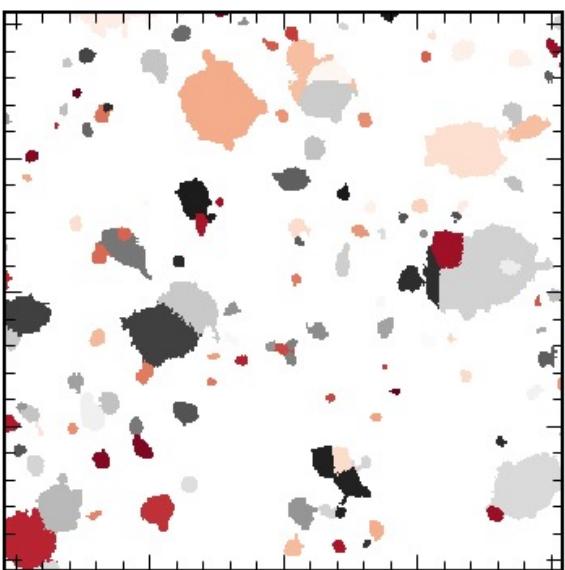
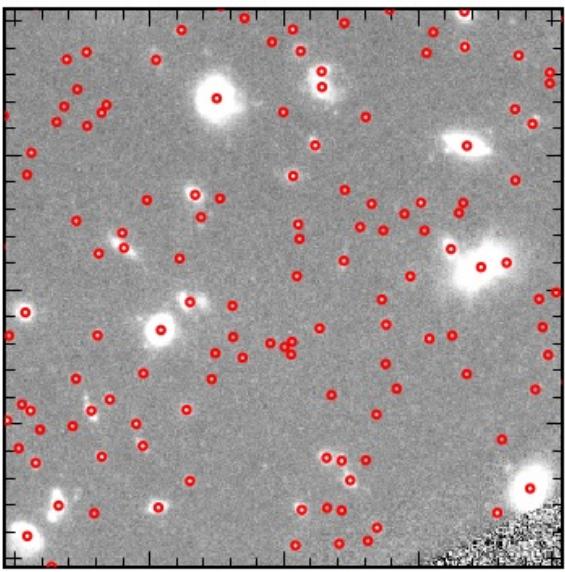




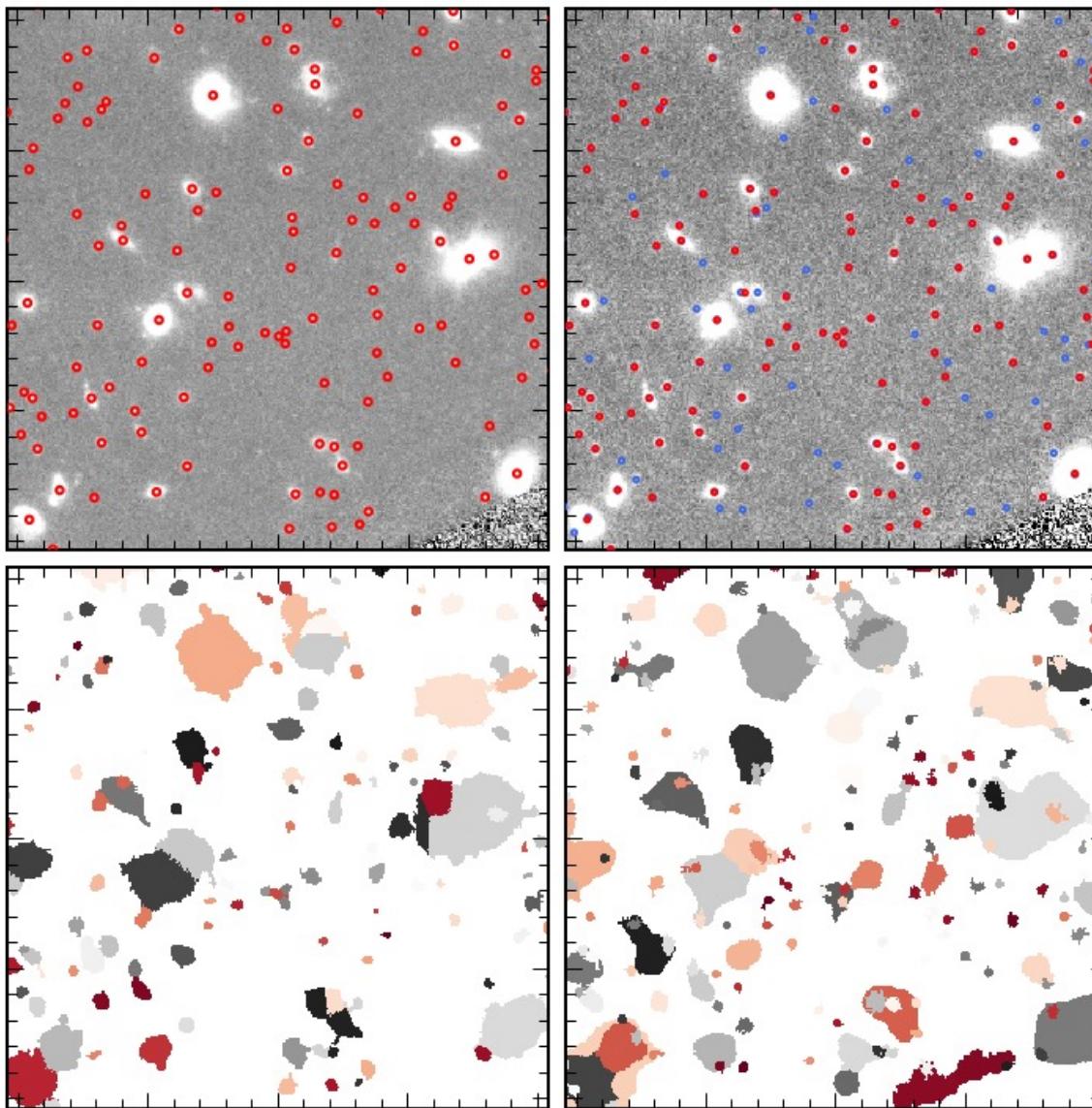
f105w  
f125w  
f140w  
f160w  
f606w  
f814w



# Source Density and Segmentation



# Source Density and Segmentation

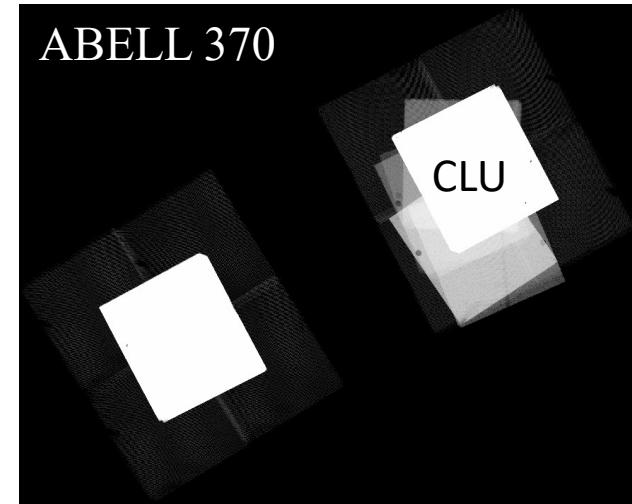
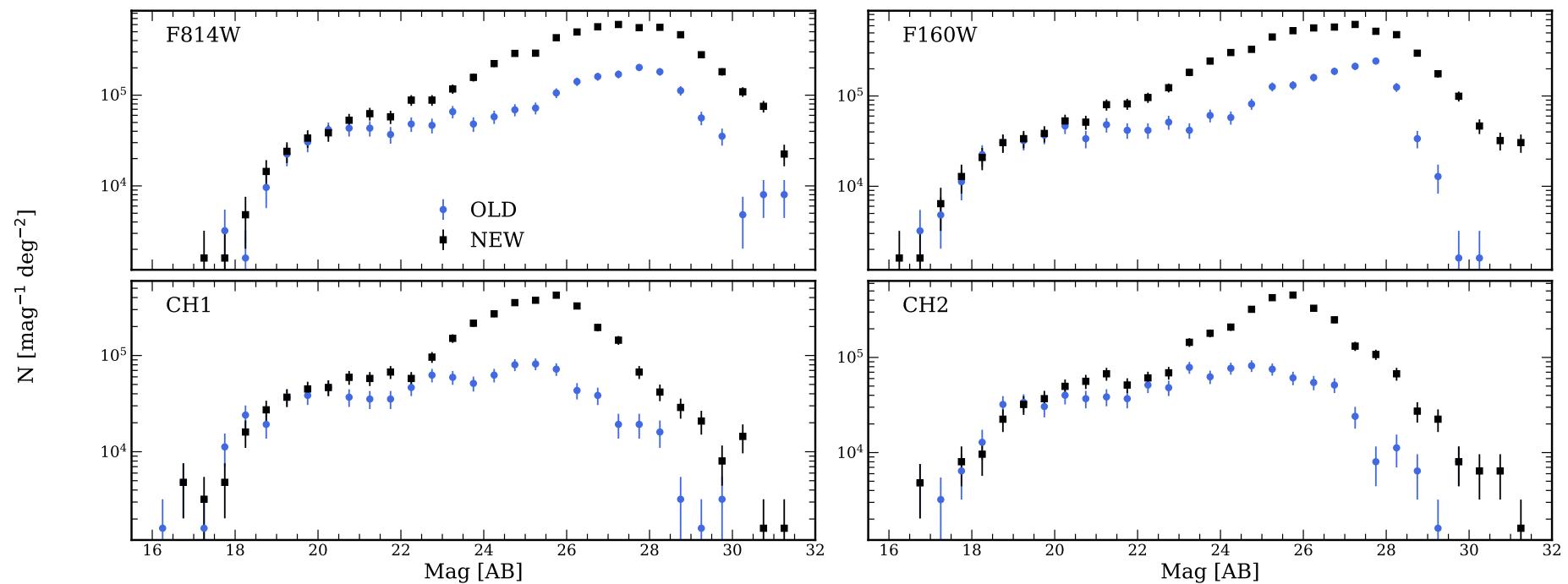


# Total Area and Source Gain

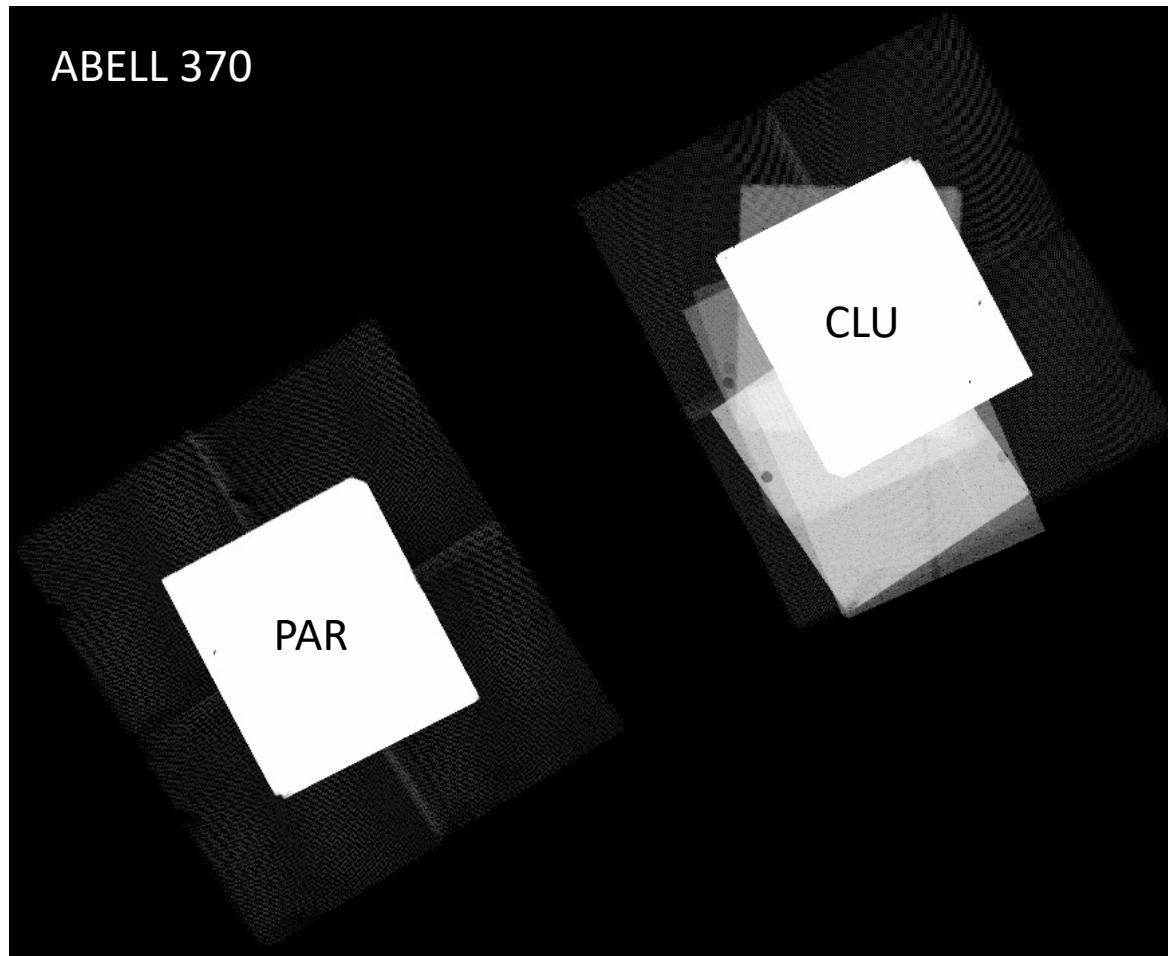
|                        | Effective Science Area                           | Source Count                   |
|------------------------|--|--------------------------------|
| Hubble Frontier Fields | ~ 312 arcmin <sup>2</sup> <b>x1.6</b> ( + 60 %)  | 125,947 <b>x2.9</b> ( + 190 %) |
| RELICS                 | ~ 210 arcmin <sup>2</sup> <b>x2.4</b> ( + 140 %) | 45,657 <b>x2.8</b> ( + 180 %)  |
| CLASH                  | ~ 171 arcmin <sup>2</sup> <b>x1.8</b> ( + 80 %)  | 46,354 <b>x2.7</b> ( + 170 %)  |

A total of 218,000 objects (vs 76,000).  
Covering an area of ~ 690 arcmin<sup>2</sup>.

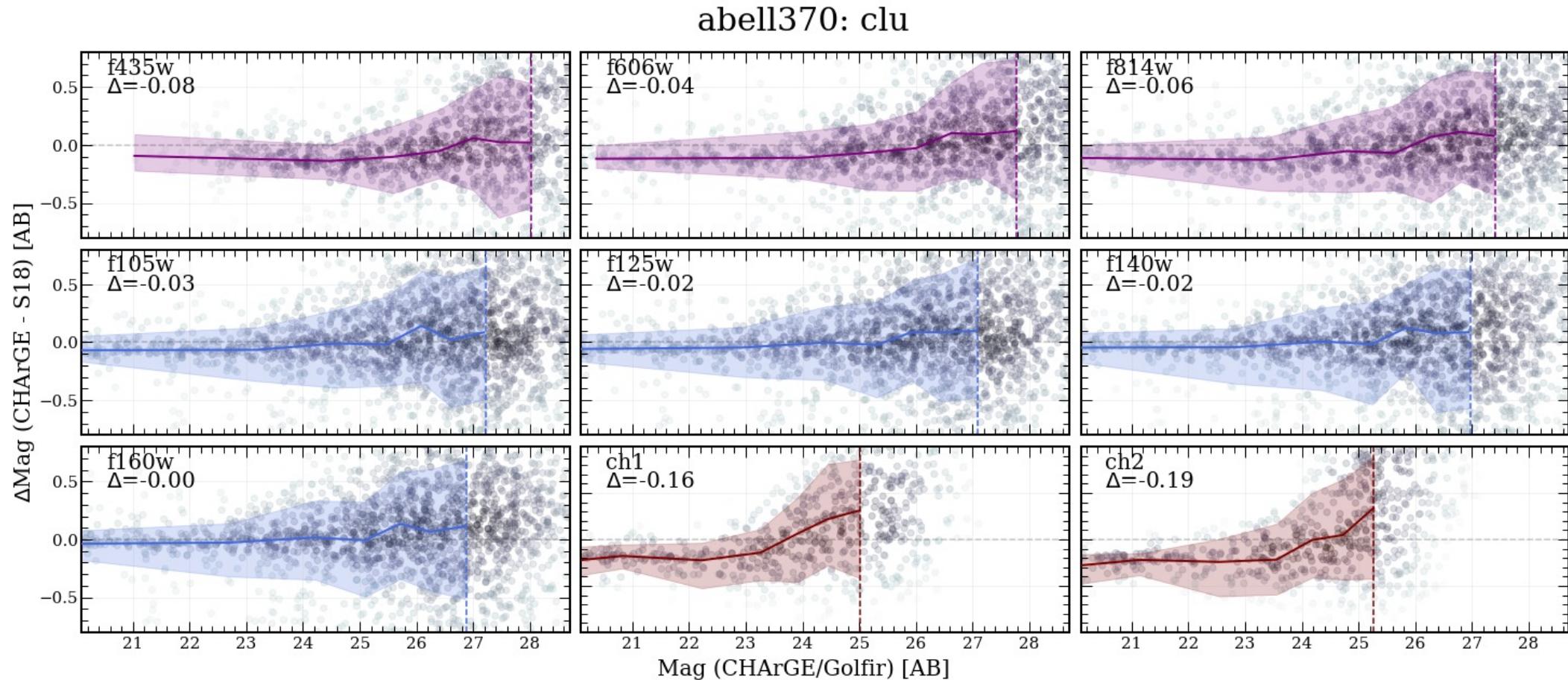
# Improvement in Number Counts



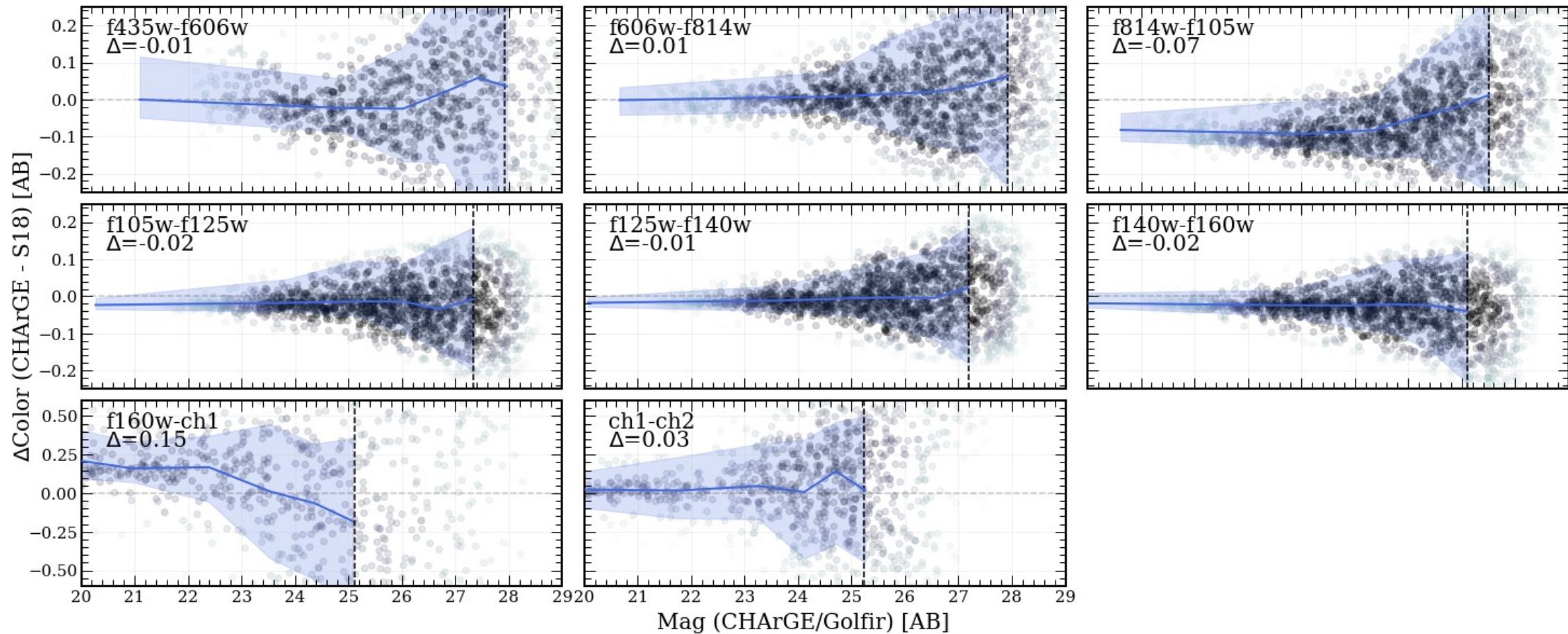
# Consistency Comparison to the Shipley+18 HFF Catalogue



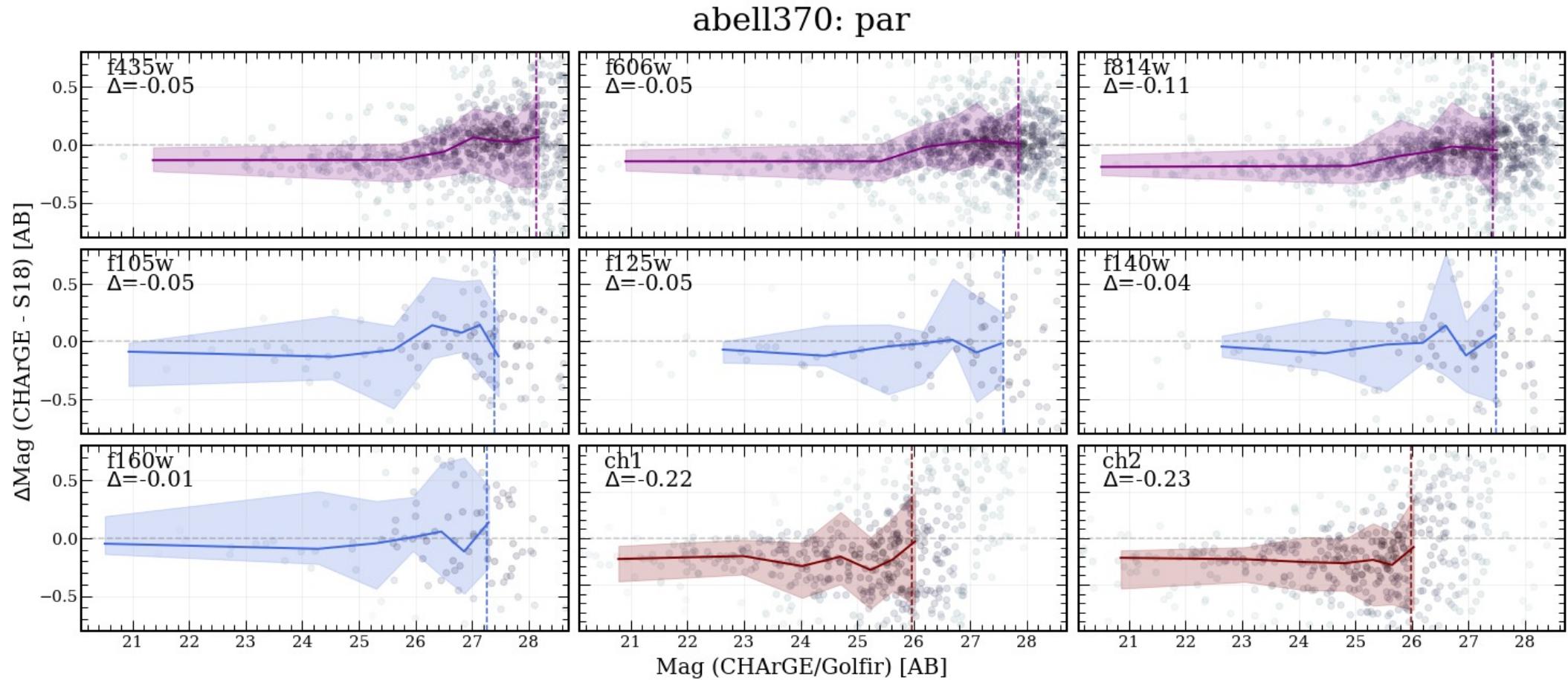
# Photometry Comparison to Shipley+18: Deep Cluster



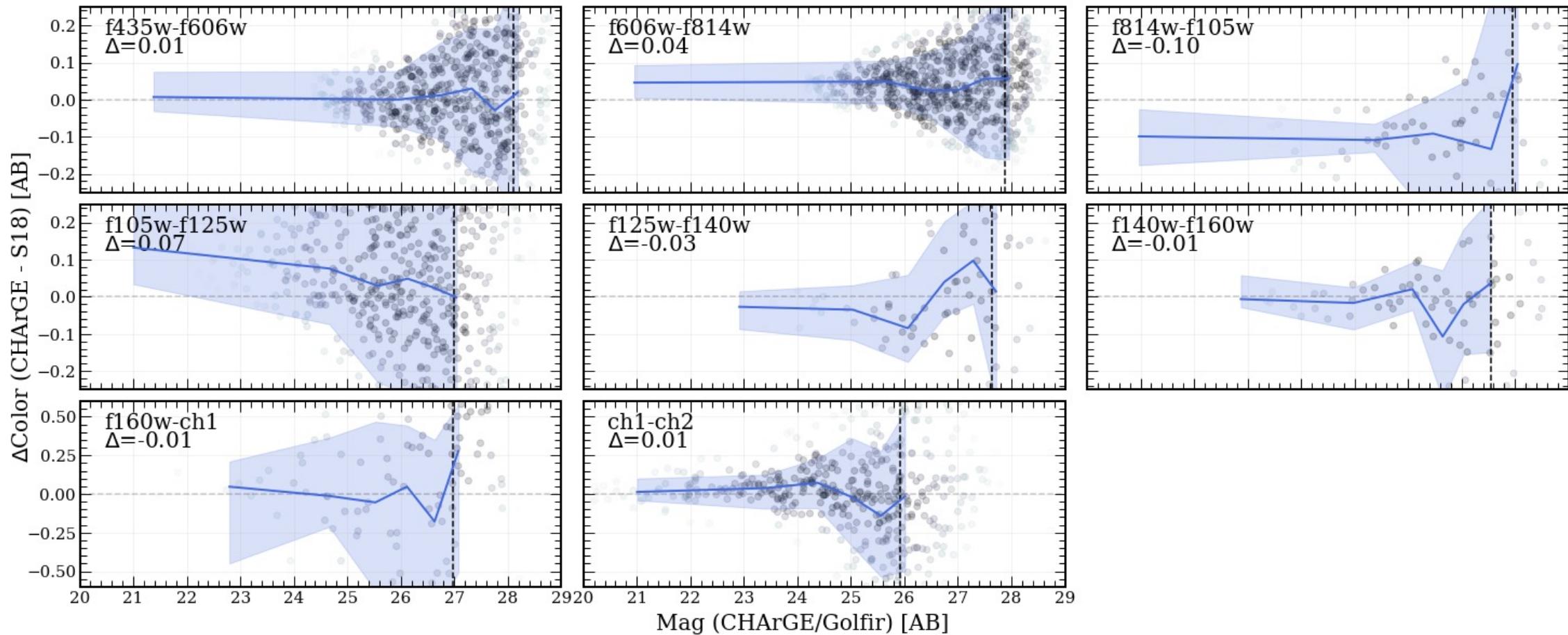
# Colour Comparison to Shipley+18: Deep Cluster



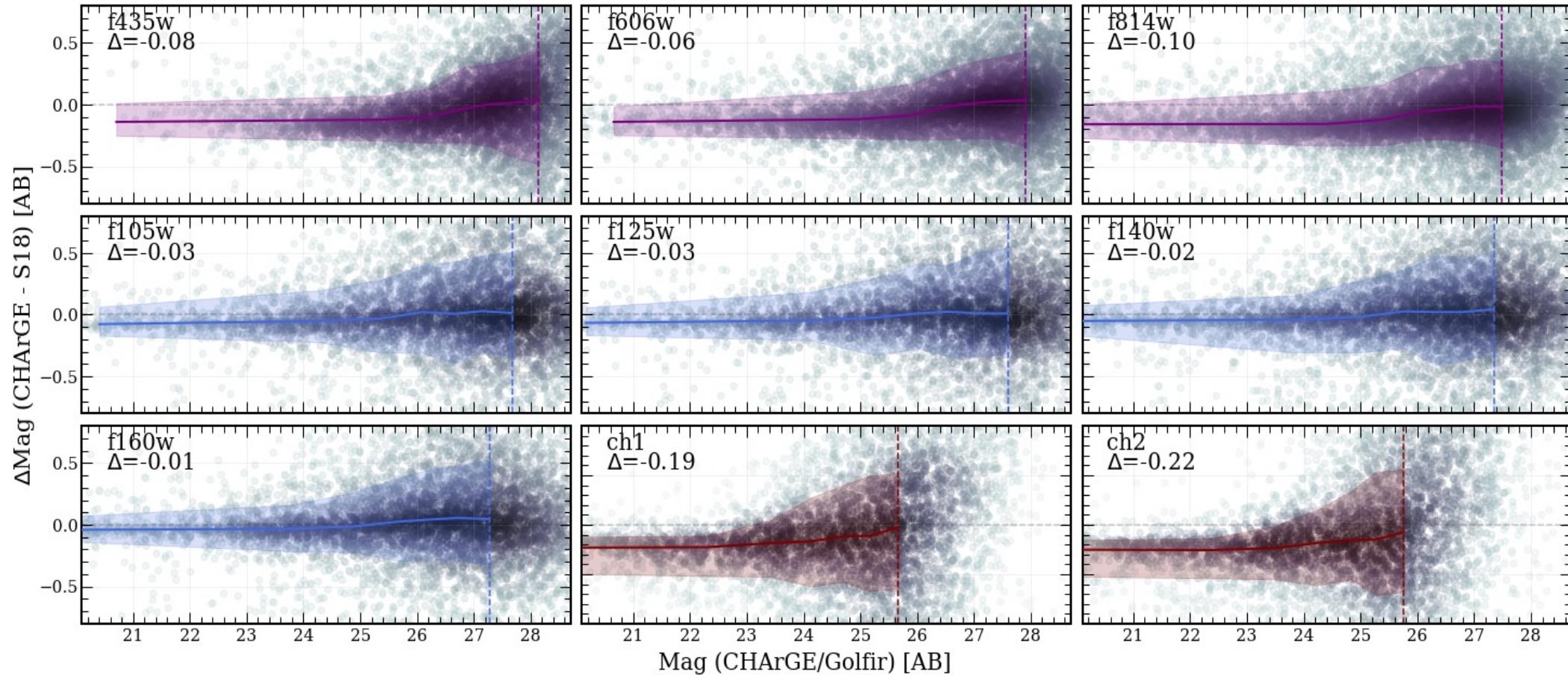
# Photometry Comparison to Shipley+18: Deep Parallel



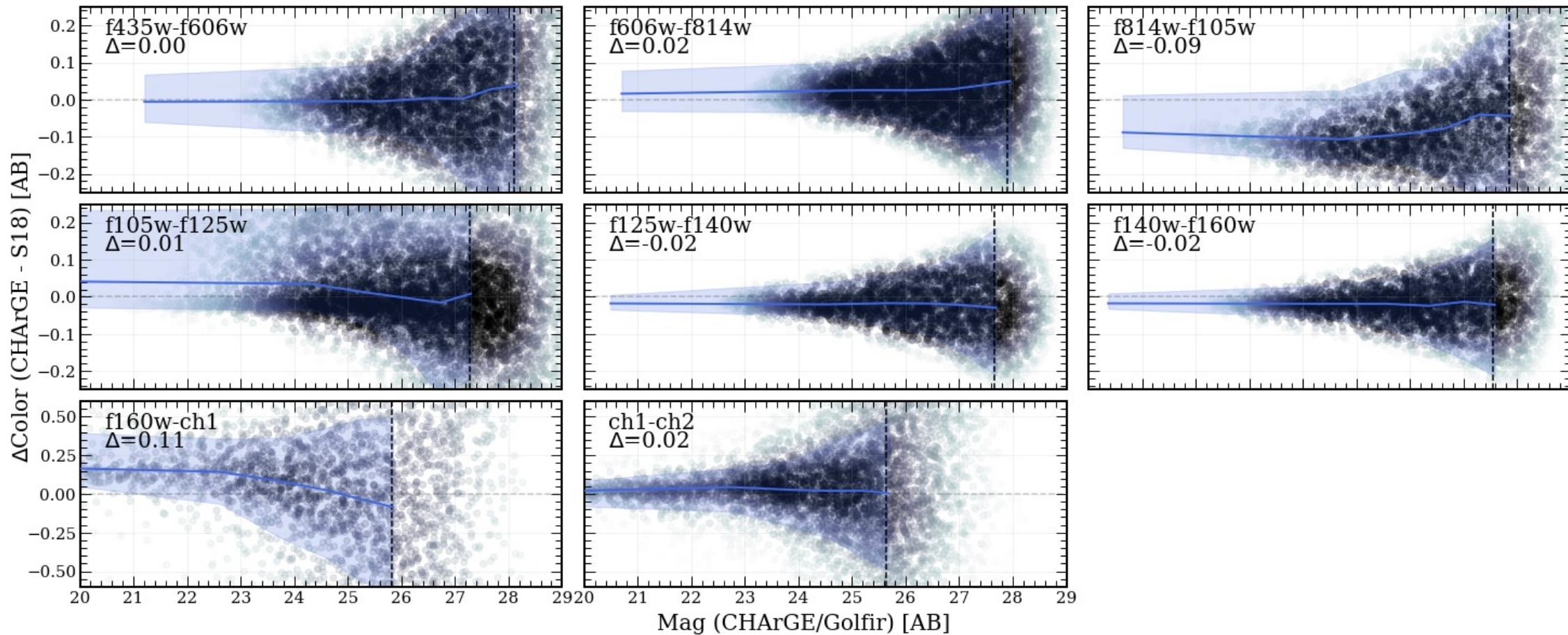
# Colour Comparison to Shipley+18: Deep Parallel



# Photometry Comparison to Shipley+18: Everything

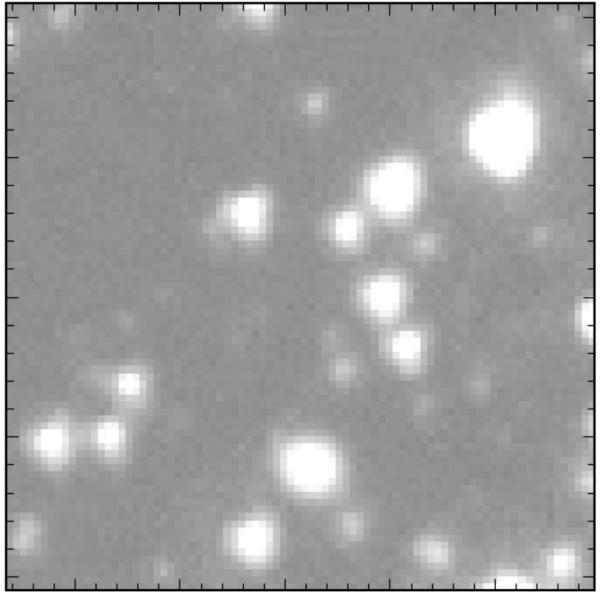


# Colour Comparison to Shipley+18: Everything

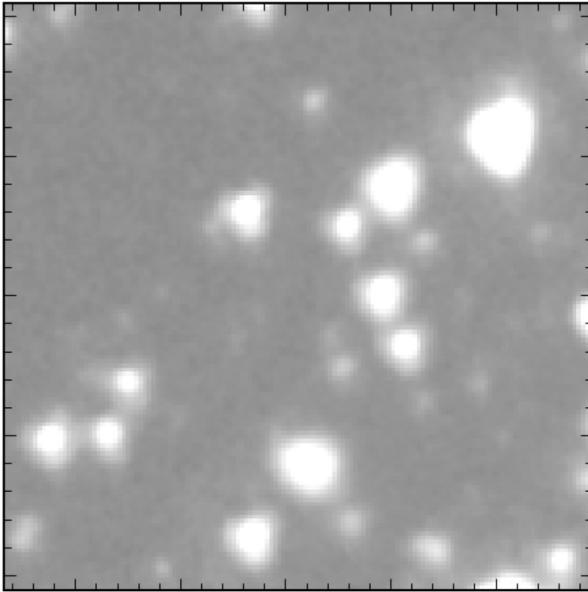


# IRAC Photometry Offset: Mosaics

GOLFIR

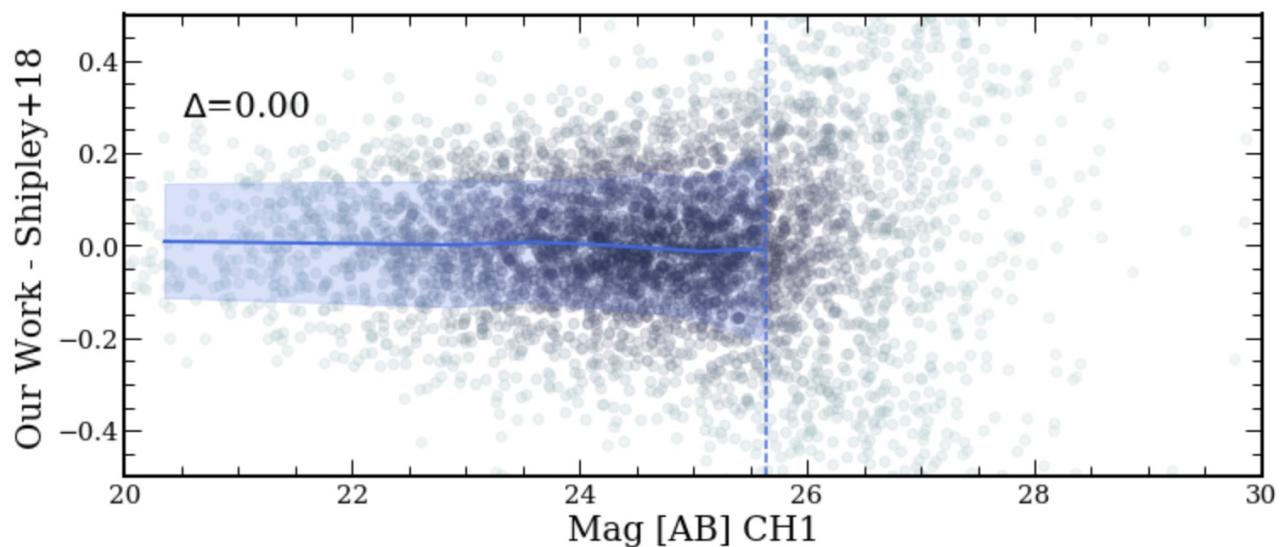


SHIPLEY+18

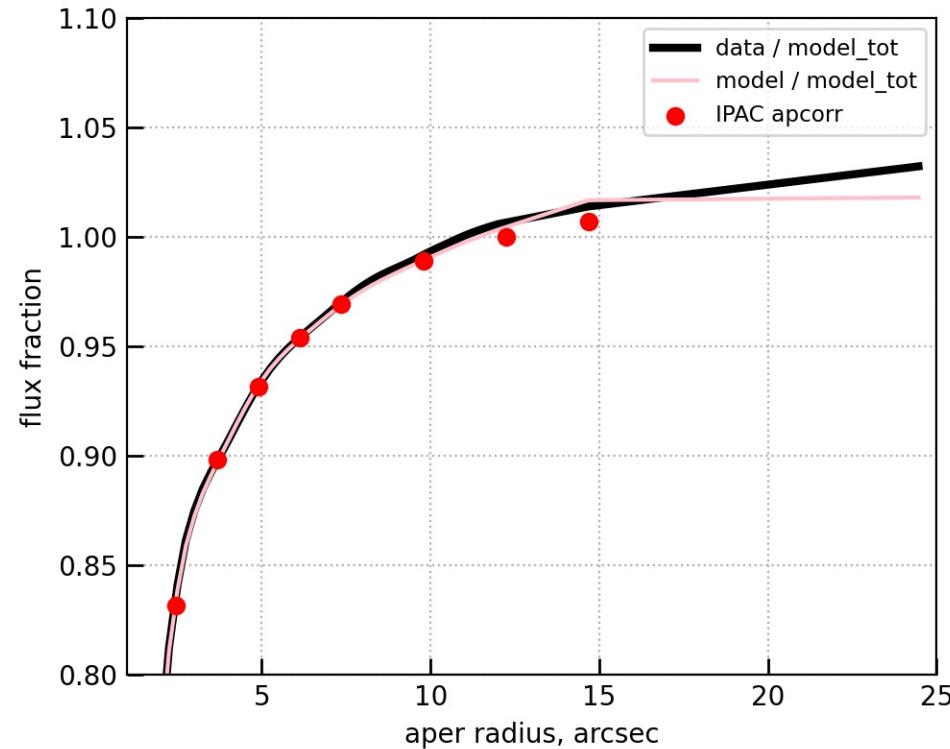
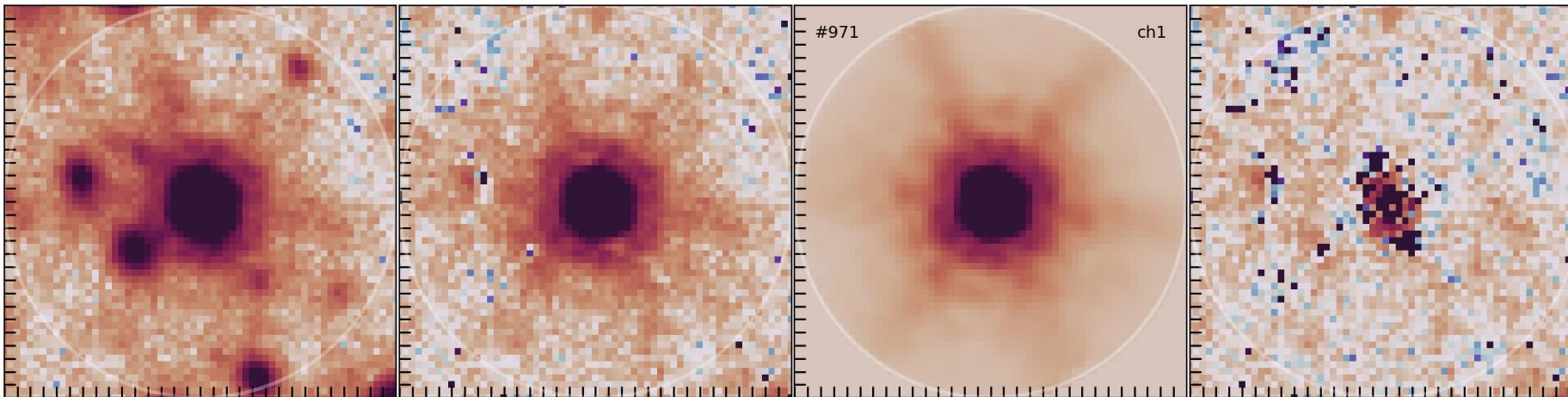


Random 1.5" apertures.

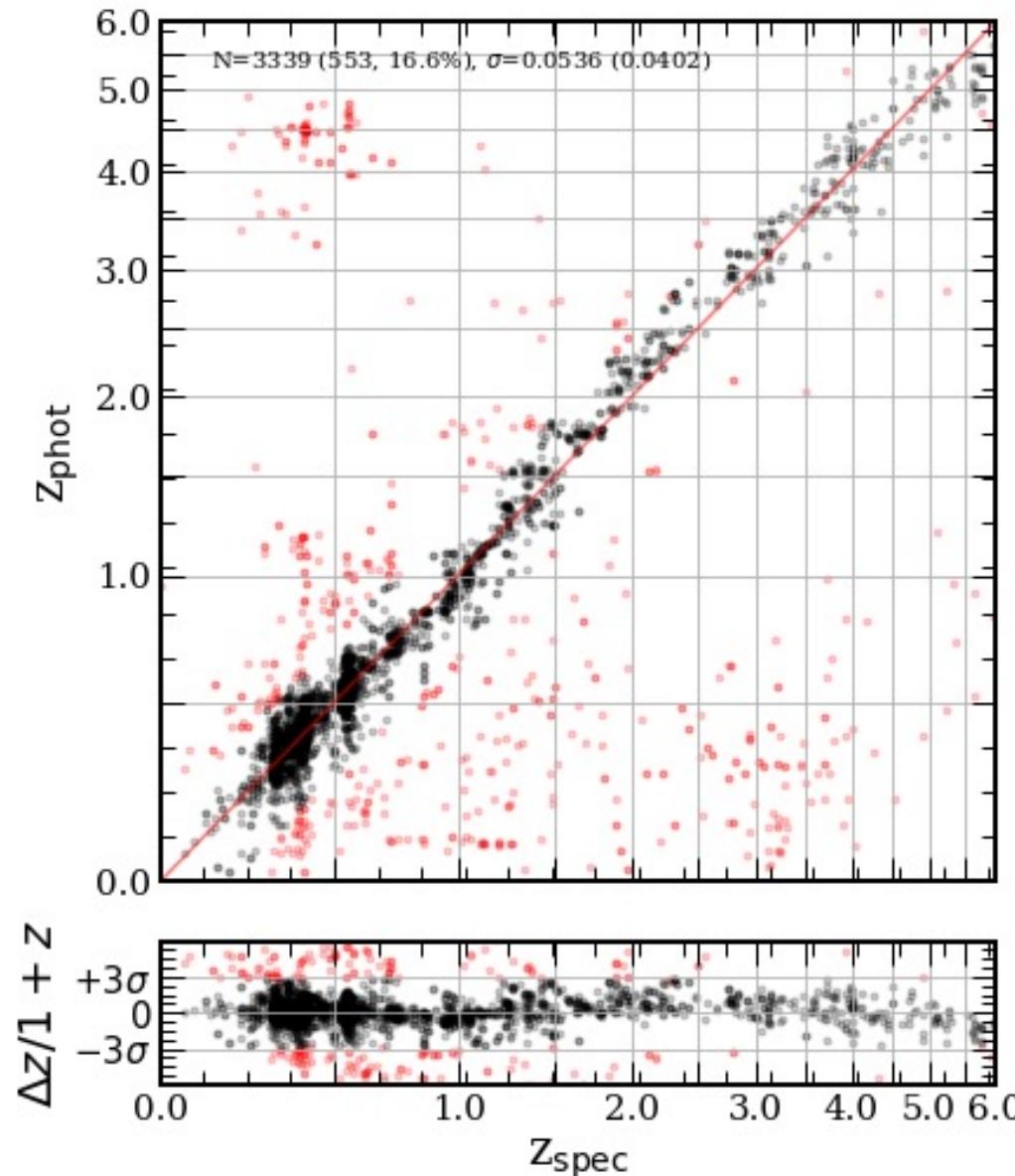
Mosaics appear to be almost identical.



# IRAC Photometry Offset: Aperture Correction

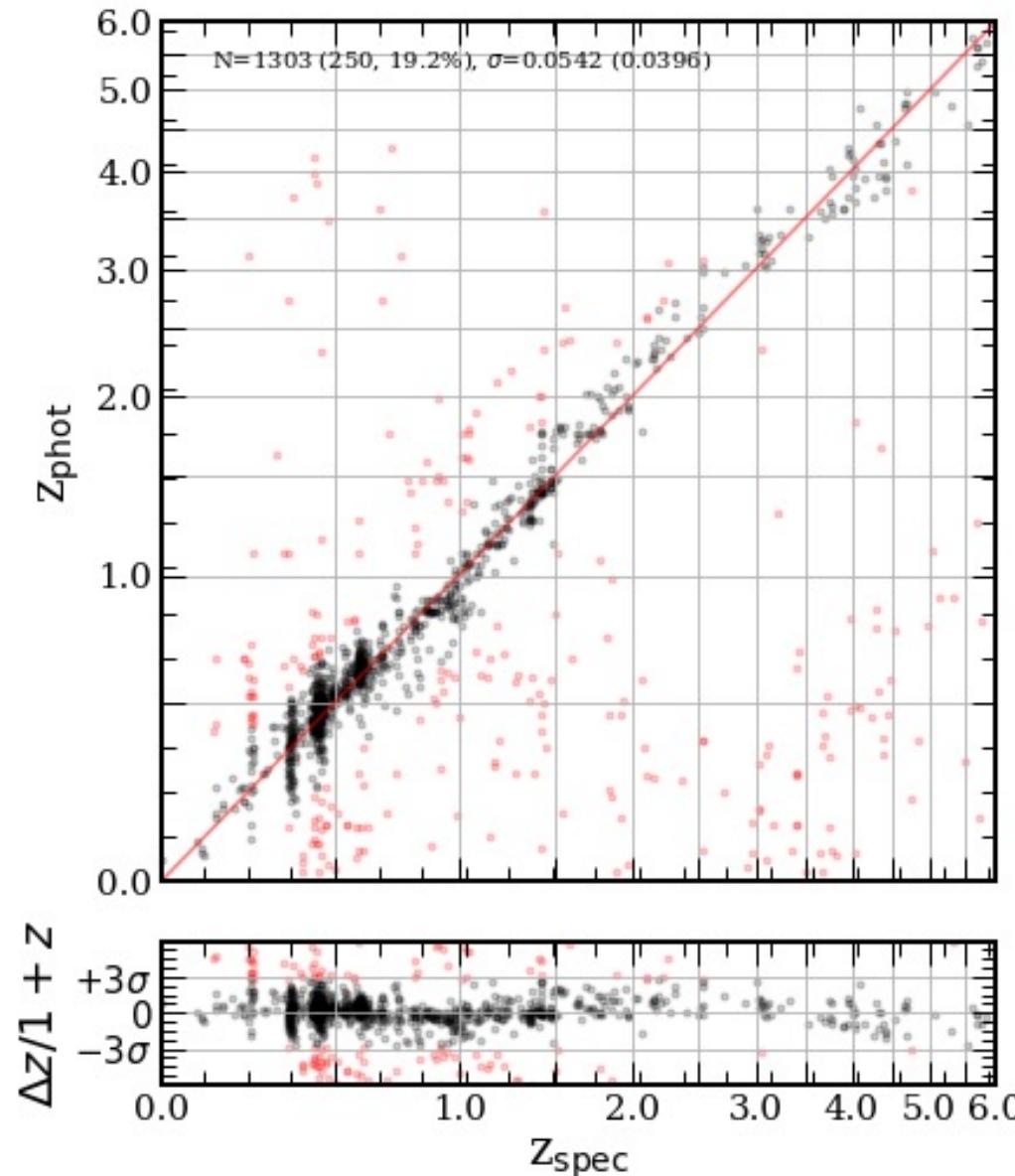


# Redshift Quality: HFF



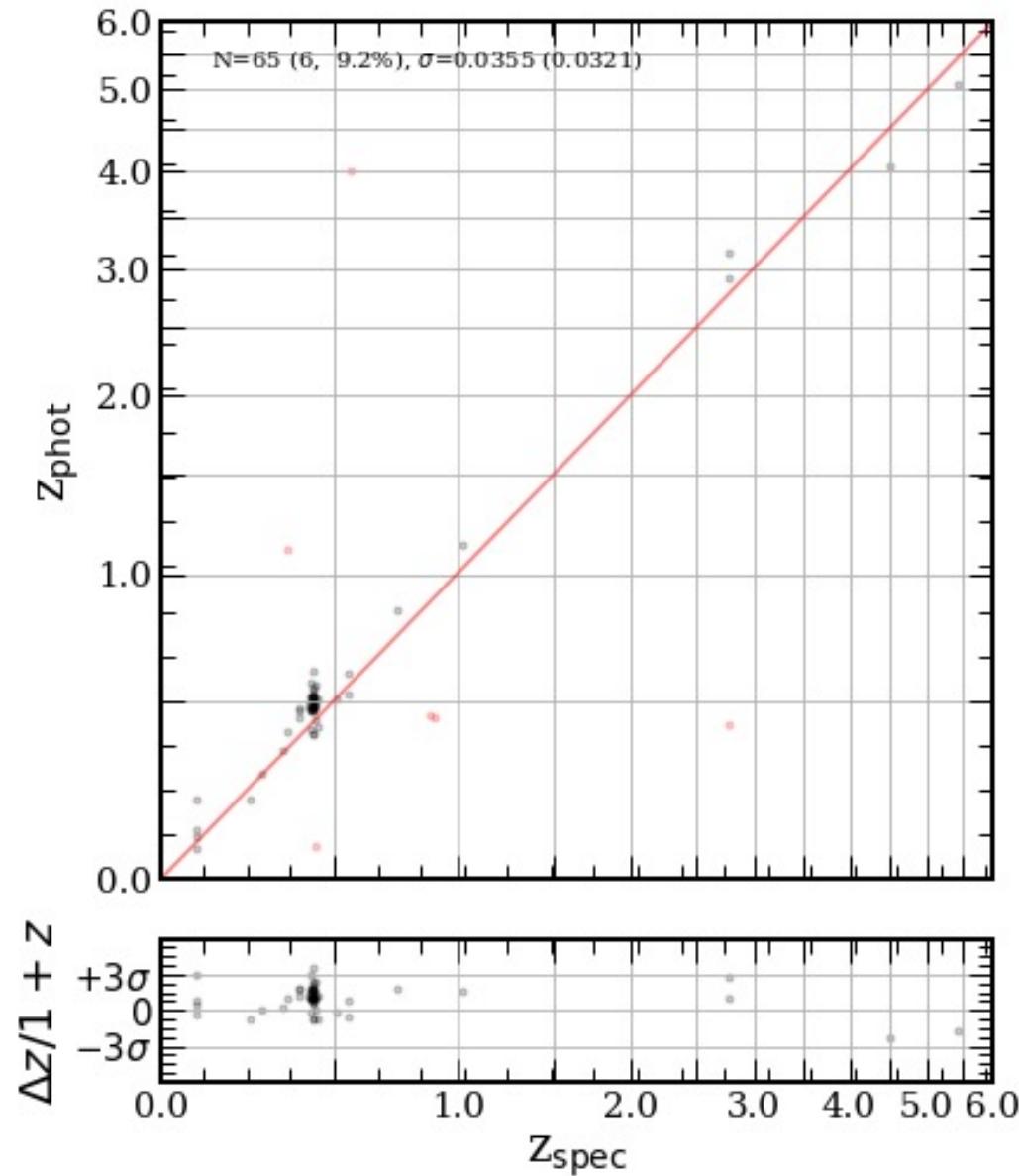
NMAD: 0.04  
Outlier Fraction: 16.6 %

# Redshift Quality: CLS



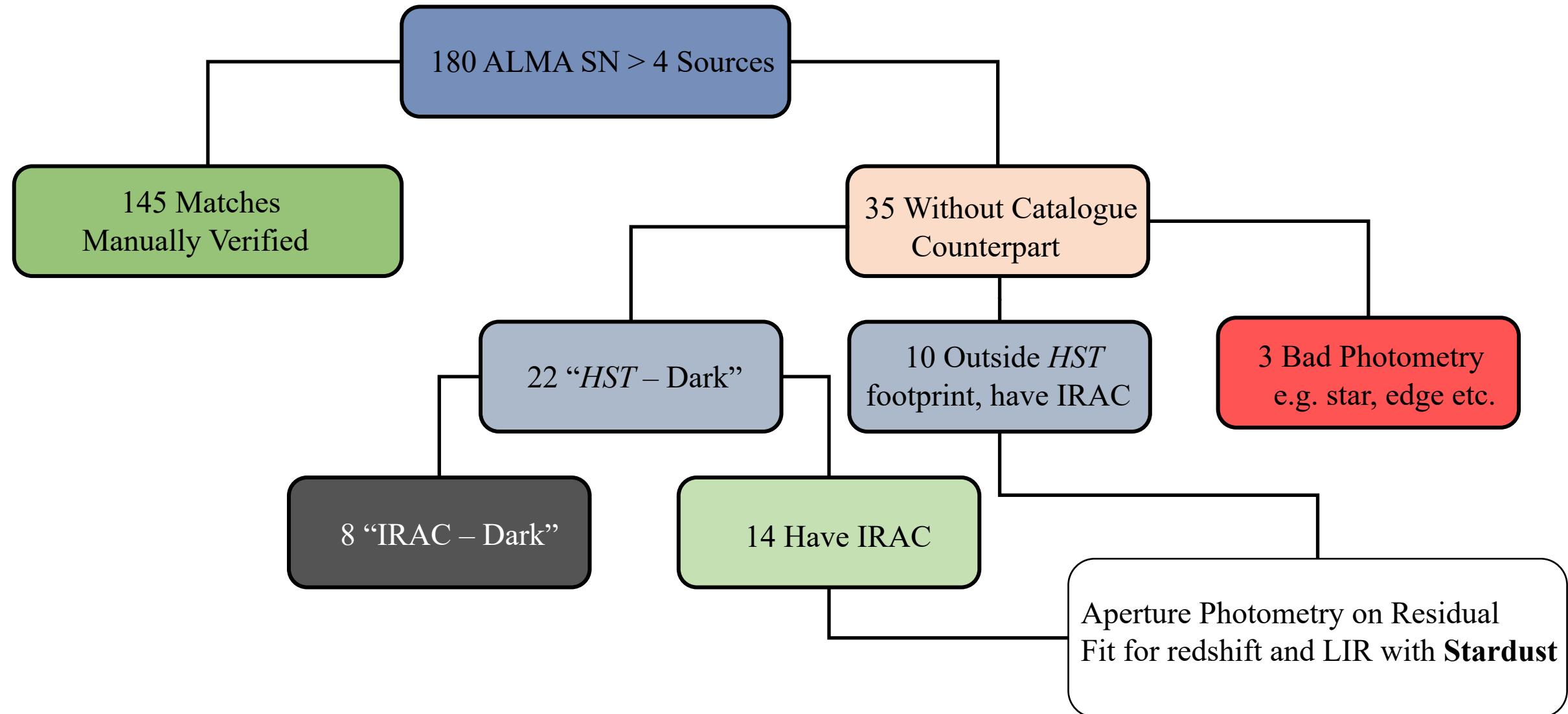
NMAD: 0.04  
Outlier Fraction: 19.2 %

# Redshift Quality: RLC

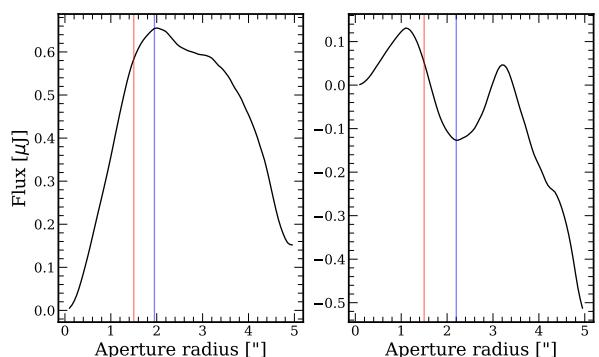
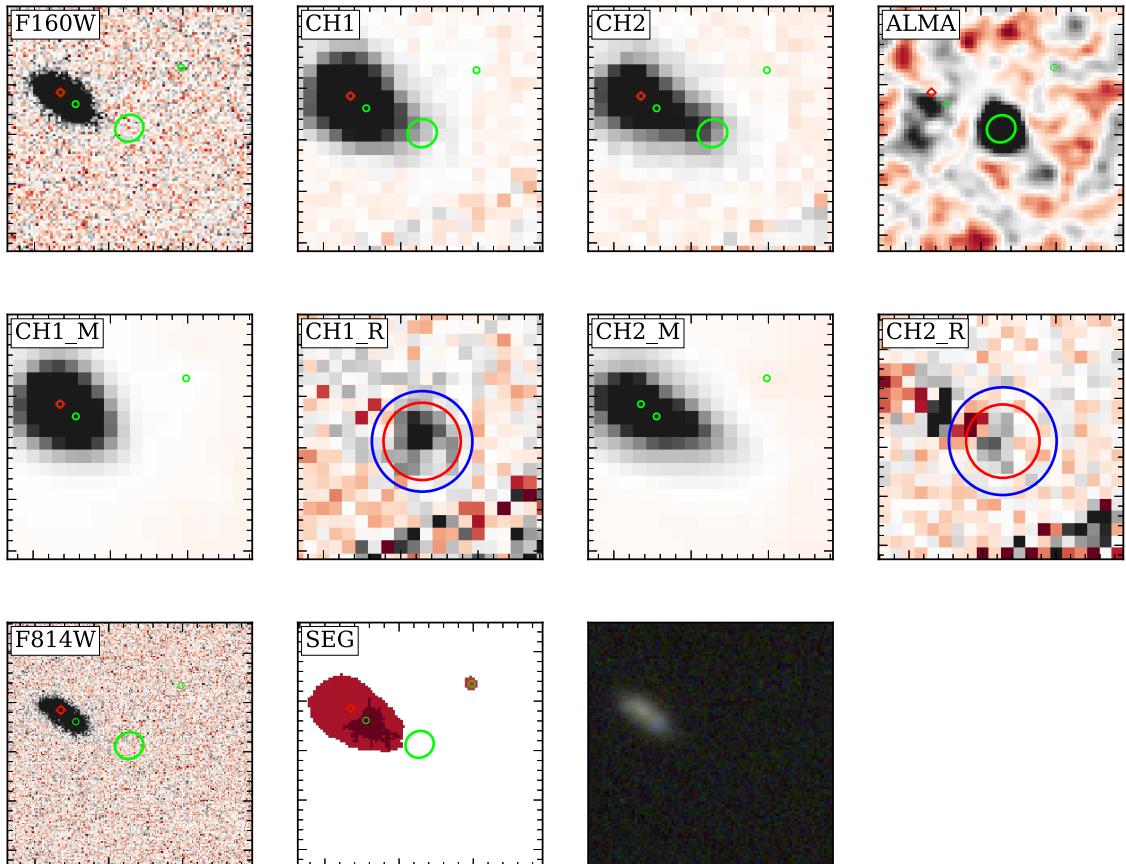


NMAD: 0.03  
Outlier Fraction: 9.2 %

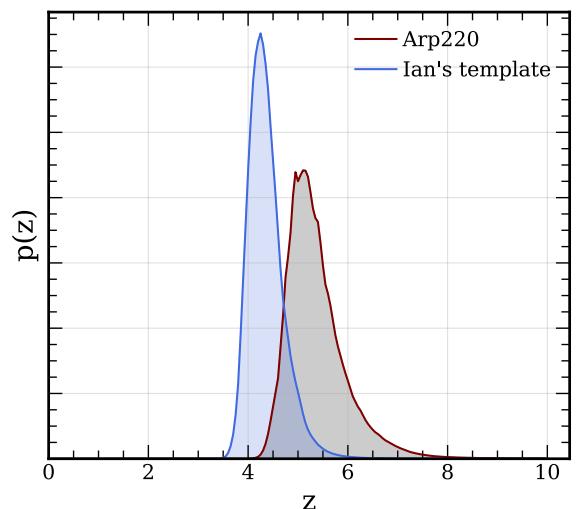
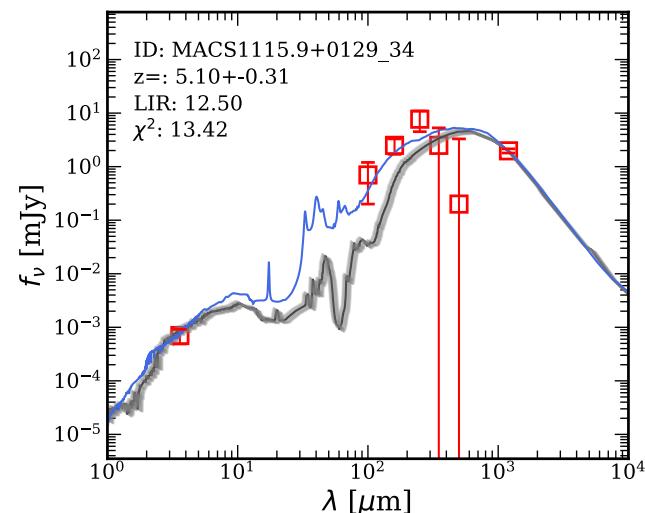
# ALMA Detections



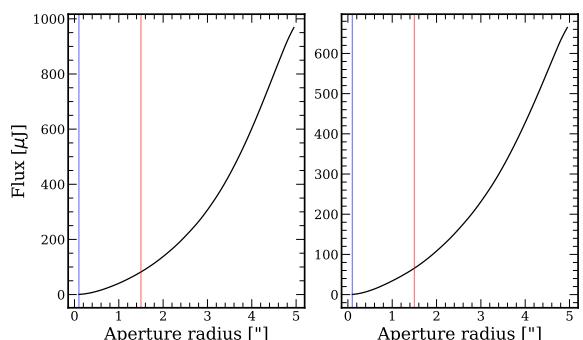
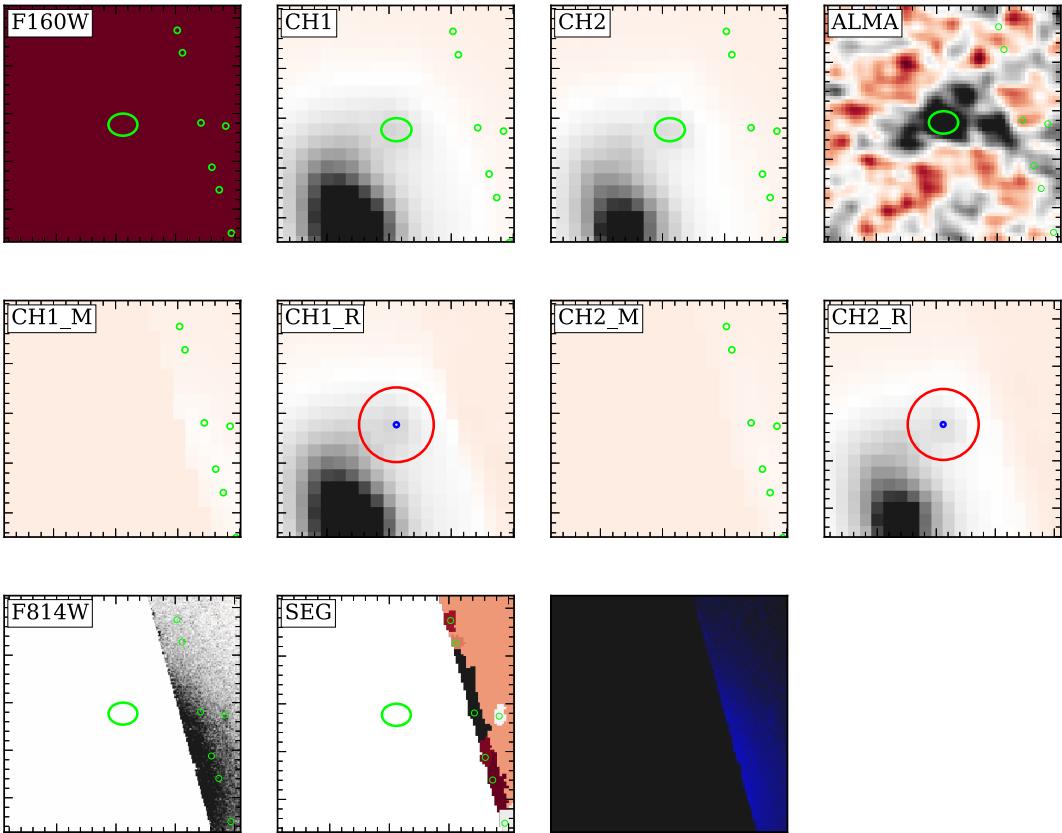
# *HST* Dark Sources fit with *Stardust*



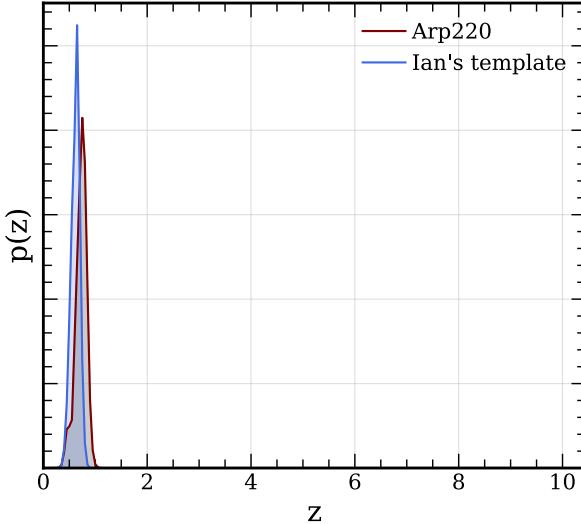
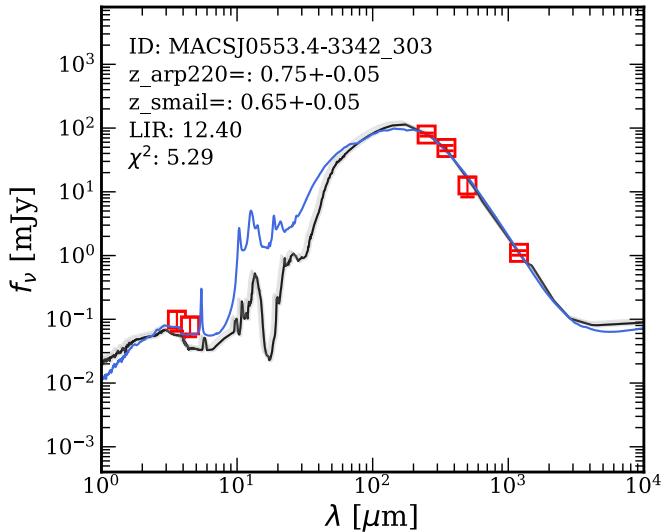
CLS: MACS1115.9+0129  
 ALMA ID=34  
 $z_{\text{spec}}=-1.00$   
 ALMA S/N=16.06  
 CH1  $1.5=0.70+-0.02 \mu\text{J}$   
 CH2  $1.5=0.06+-0.06 \mu\text{J}$   
 CH1 deriv= $0.79+-0.03 \mu\text{J}$   
 CH2 deriv= $-0.16+-0.08 \mu\text{J}$



# *HST* “Missed” Sources fit with *Stardust*



RLC: MACSJ0553.4-3342  
 ALMA ID=303  
 $z_{\text{spec}}=0.84$   
 ALMA S/N=7.60  
 CH1 1.5=98.81+16.12  $\mu\text{J}$   
 CH2 1.5=80.33+12.60  $\mu\text{J}$   
 CH1 deriv=0.58+-1.07  $\mu\text{J}$   
 CH2 deriv=0.52+-0.84  $\mu\text{J}$



# Catalogue Format

Source Extraction Parameters: RA, DEC, a, b, Flux\_auto, npix etc.

HST Photometry: ACS, UVIS, WFC3 within 0.7 arcsec apertures

IRAC model photometry refined with galfit

IRAC aperture photometry within 3"

Physical Parameters: z, stellar mass, sfr and Rest-frame magnitudes: U, V, J, NUV, r

# Catalogue Format

Source Extraction Parameters: RA, DEC, a, b, Flux\_auto, npix etc.

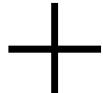
HST Photometry: ACS, UVIS, WFC3 within 0.7 arcsec apertures

IRAC model photometry refined with galfit

IRAC aperture photometry within 3"

Physical Parameters: z, stellar mass, sfr and Rest-frame magnitudes: U, V, J, NUV, r

Auxiliary: Magnification, ALMA upper limit from maps, ALMA quality flag



Supplementary catalogue with predicted FIR  
fluxes from SED – MIPS, Herschel and SCUBA2

## Future Plans

Draft of the catalogue paper is in an advanced stage.  
We will circulate it soon.

- Refine optical properties with FAST
- Run full SED analysis with Stardust, maybe useful for crosschecking
- Search for high-z objects as potential targets for future proposals
- Catalogue science papers: dust properties of red galaxies, high-z sources (if any)