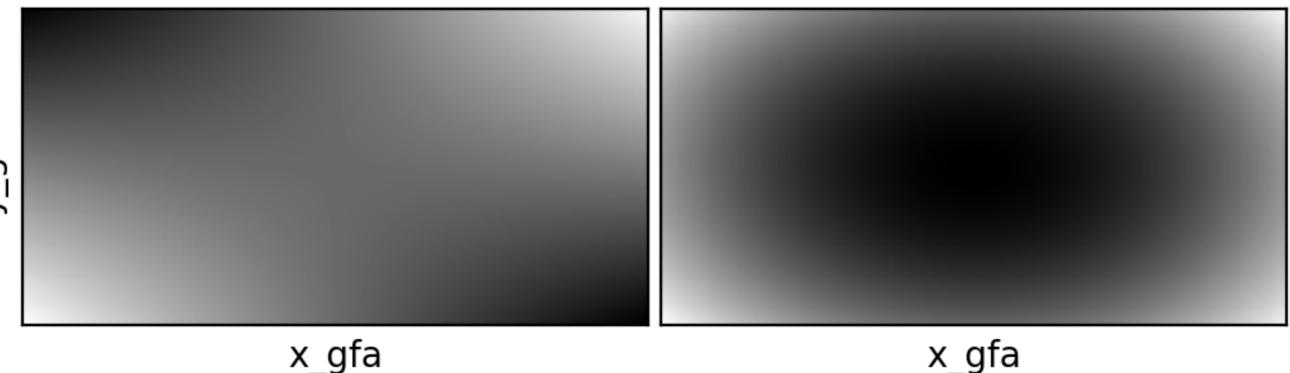
## WCS distortions/ templates based on desimeter metrology

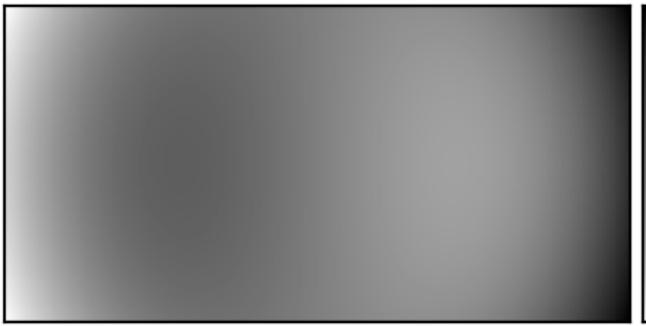
```
petal\_loc = 0 \\ x\_gfa\ resid\ (pixels)\ ;\ black = -1.31\ ;\ white = 1.79 \quad y\_gfa\ resid\ (pixels)\ ;\ black = -0.86\ ;\ white = 1.95
```

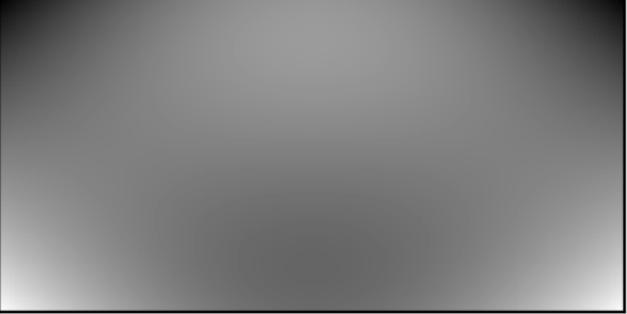


- Mean absolute residual per-coordinate = 0.44 pixels
- Max absolute residual per-coordinate = 1.95 pixels
- These residuals look essentially identical for all cameras

# Residuals relative to TAN-SIP (2nd order) WCS

```
petal\_loc = 0 \\ x\_gfa\ resid\ (pixels)\ ;\ black = -0.04\ ;\ white = 0.04\  \  \, y\_gfa\ resid\ (pixels)\ ;\ black = -0.03\ ;\ white = 0.03
```





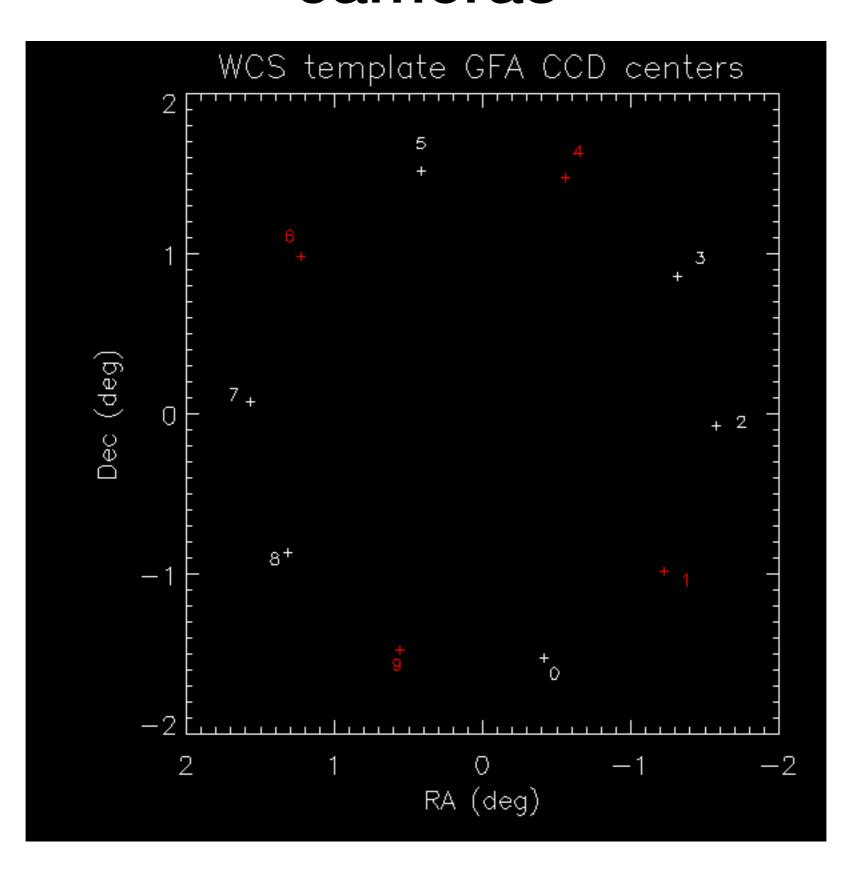
#### x\_gfa

- Mean absolute residual per-coordinate = 0.006 pixels
- Max absolute residual per-coordinate = 0.04 pixels
- These residuals look essentially identical for all cameras
- Second order SIP captures pretty much all of the distortions

#### x\_gfa

```
A_ORDER = 2 /polynomial order, axis 1, detector to sky A_O_2 = 6.66119E-08 / distortion coefficient A_I_I = 2.90122E-06 / distortion coefficient A_2_O = 2.36821E-07 / distortion coefficient B_ORDER = 2 /polynomial order, axis 2, detector to sky B_O_2 = 4.16623E-06 / distortion coefficient B_I_I = 1.21050E-07 / distortion coefficient B_2_O = 1.57192E-06 / distortion coefficient AP_ORDER = 2 / polynomial order, axis 1, sky to detecto AP_O_I = 4.11052225972E-07 / AP_O_2 = -6.66161429183E-08 / AP_I_O = 4.76955630405E-06 / AP_I_I = -2.90100825103E-06 / AP_2_O = -2.36819038613E-07 / BP_ORDER = 2 / polynomial order, axis 2, sky to detecto BP_O_I = 1.00983762920E-05 / BP_O_I = 1.00983762920E-05 / BP_I_O = 1.98495898559E-06 / BP_I_I = -1.20965168769E-07 / BP_2_O = -1.57194671124E-06 /
```

## desimeter-based WCS templates for focus cameras



### appendix: all plots

```
x\_gfa\ resid\ (pixels)\ ;\ black = -1.31\ ;\ white = 1.79
x\_gfa\ resid\ (pixels)\ ;\ black = -0.86\ ;\ white = 1.95
x\_gfa
x\_gfa
x\_gfa
x\_gfa
x\_gfa
```

```
petal_loc = 2
x_gfa resid (pixels); black = -1.34; white = 1.77

y_gfa resid (pixels); black = -0.86; white = 1.94

x_gfa

x_gfa

x_gfa

x_gfa

x_gfa

x_gfa
```

```
petal_loc = 4
x_gfa resid (pixels); black = -1.32; white = 1.79

y_gfa resid (pixels); black = -0.86; white = 1.95

x_gfa

x_gfa

x_gfa

x_gfa

x_gfa

x_gfa
```

```
x\_gfa\ resid\ (pixels)\ ;\ black = -1.32\ ;\ white = 1.79
x\_gfa\ resid\ (pixels)\ ;\ black = -0.86\ ;\ white = 1.95
x\_gfa\ x\_gfa
x\_gfa
x\_gfa
x\_gfa
x\_gfa
```

```
petal_loc = 7
x_gfa resid (pixels); black = -1.33; white = 1.78

y_gfa resid (pixels); black = -0.86; white = 1.95

x_gfa

x_gfa

x_gfa

x_gfa

x_gfa

x_gfa
```

```
petal_loc = 8
x_gfa resid (pixels); black = -1.35; white = 1.77

y_gfa resid (pixels); black = -0.86; white = 1.94

x_gfa

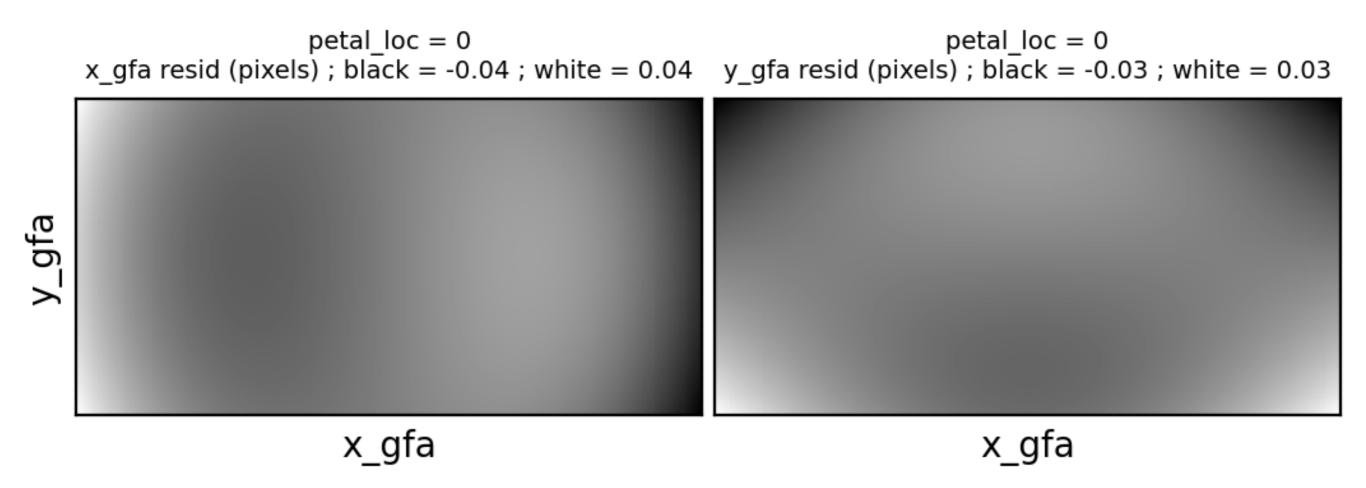
x_gfa

x_gfa

x_gfa

x_gfa

x_gfa
```



```
x\_gfa\ resid\ (pixels)\ ;\ black = -0.04\ ;\ white = 0.04
x\_gfa\ resid\ (pixels)\ ;\ black = -0.03\ ;\ white = 0.03
x\_gfa
x\_gfa
x\_gfa
x\_gfa
x\_gfa
x\_gfa
```

