

# KIC 010462980

## Q1-17 DR25 TCE Parameters

| TCE          | Run Type | KOI? | Period (Days) | Epoch (BKJD) | Depth (ppm) | Duration (Hours) | MES  | SNR  | $R_{\star}$ ( $R_{\odot}$ ) | $T_{\star}$ (K) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010462980-01 | OBS      | No   | 0.773223      | 132.218616   | 47.8        | 3.896            | 11.8 | 6.7  | 2.28                        | 7700            | 1.84                   | 41790.14               |
| 010462980-02 | OBS      | No   | 0.542963      | 131.668280   | 175.1       | 6.516            | 9.8  | 19.9 | 2.28                        | 7700            | 3.06                   | 66955.54               |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|--|
| 010462980-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT        |
| 010462980-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT |

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

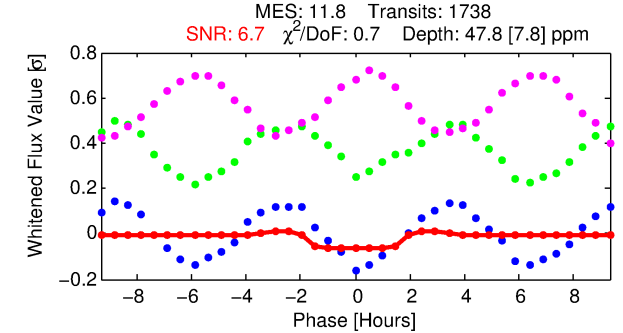
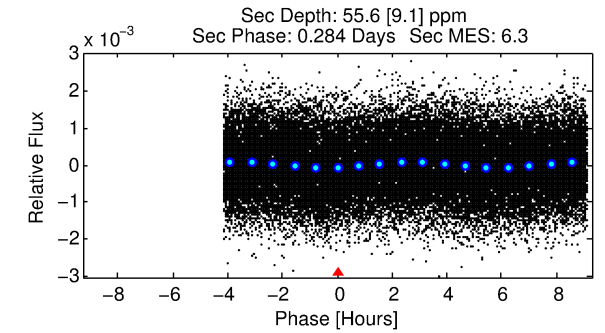
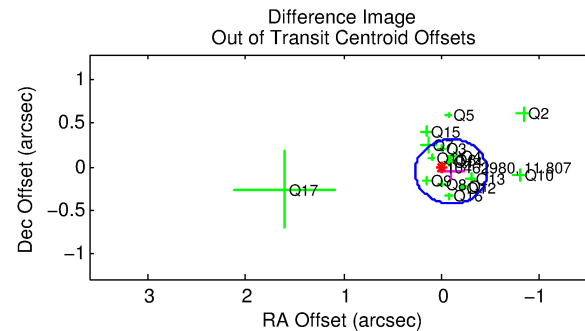
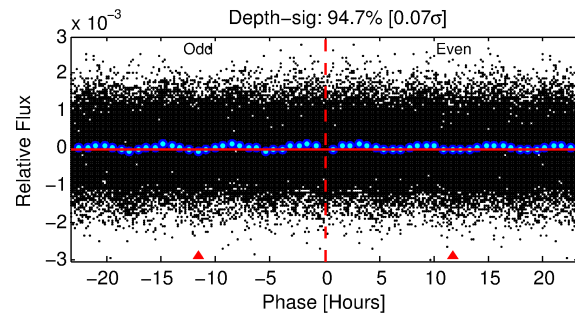
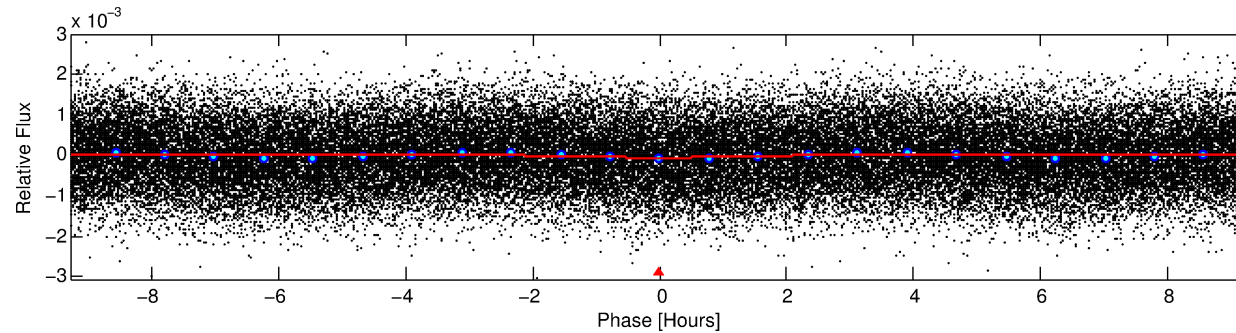
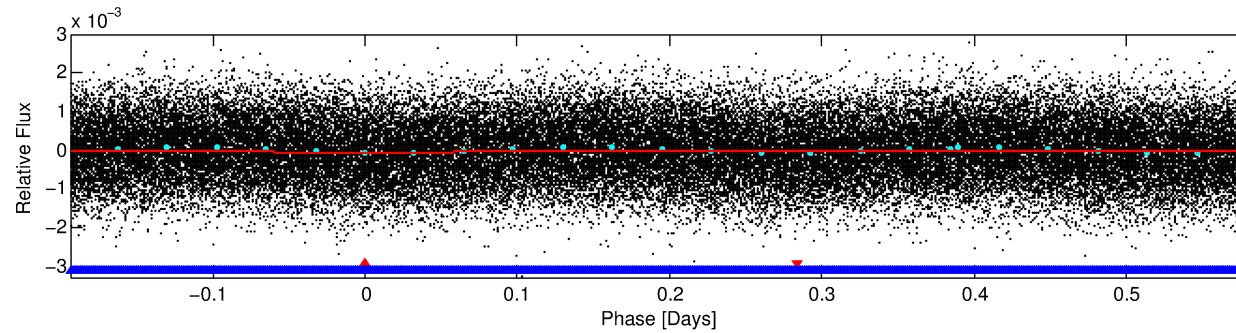
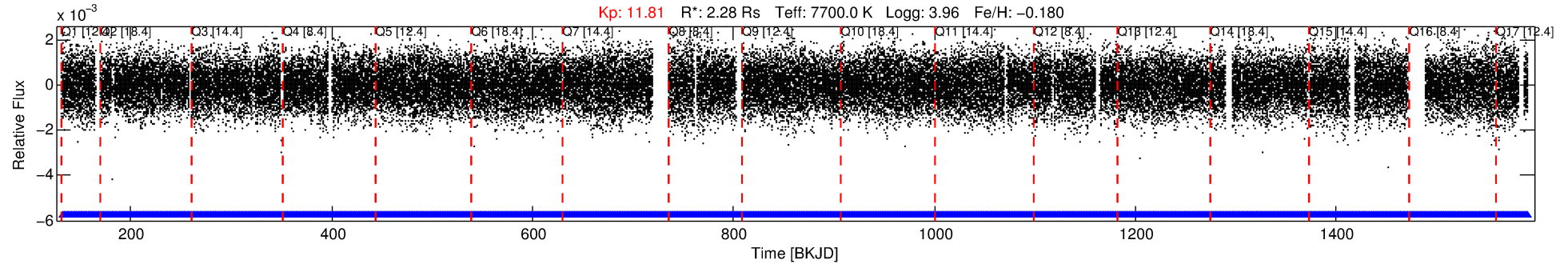
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010462980-01

No Significant Match Found

# DV One-Page Summary

KIC: 10462980 Candidate: 1 of 2 Period: 0.773 d



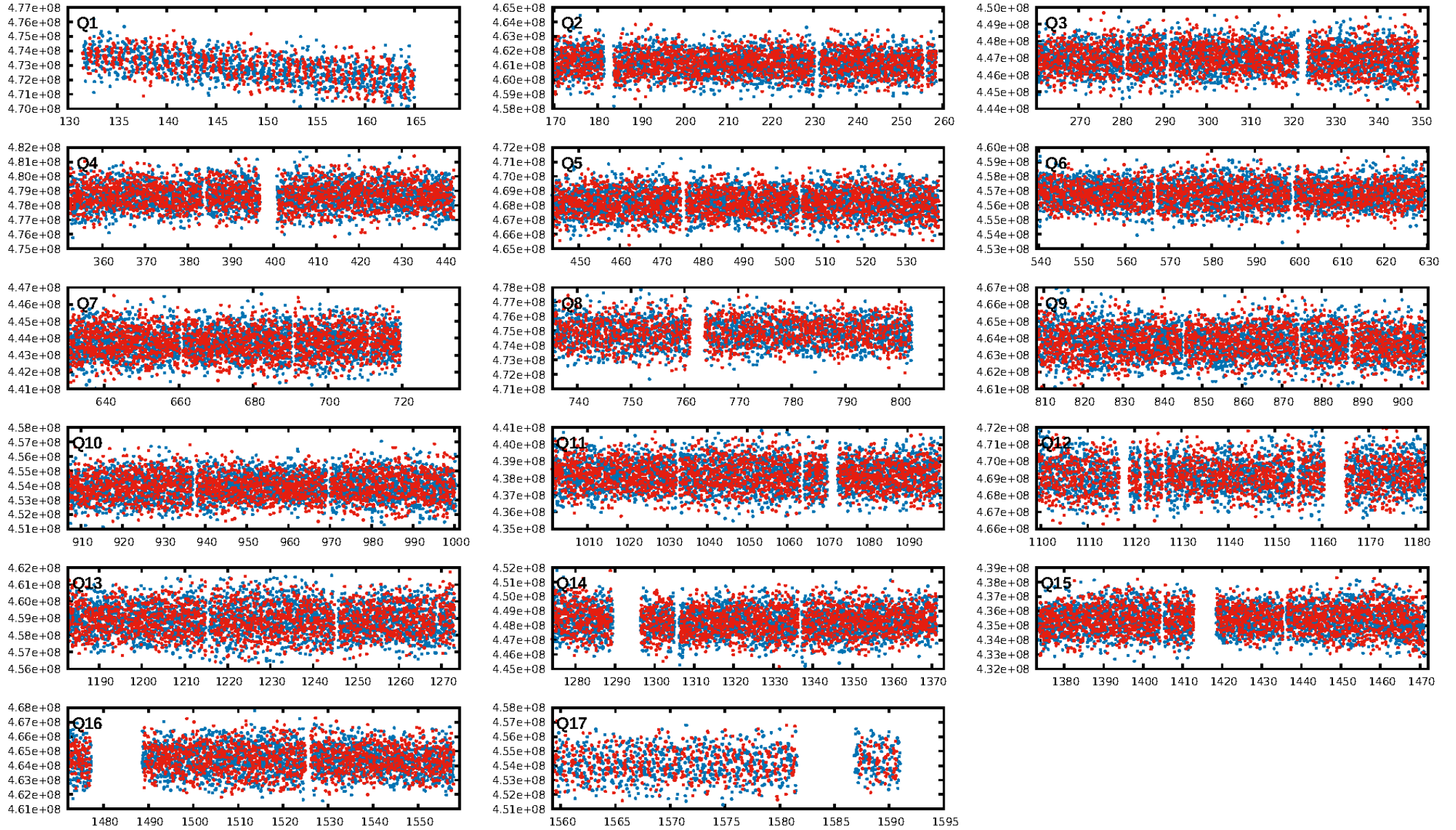
## DV Fit Results:

Period = 0.77322 [0.00001] d  
Epoch = 132.2186 [0.0055] BKJD  
Rp/R\* = 0.0074 [0.0059]  
a/R\* = 1.16 [1.42]  
b = 0.90 [1.01]  
Seff = 41790.14 [19428.82]  
Teq = 3646 [424] K  
Rp = 1.84 [1.58] Re  
a = 0.0198 [0.0056] AU  
Ag = 3.52 [5.83] [0.43 $\sigma$ ]  
Teffp = 7724 [3095] K [1.31 $\sigma$ ]

## DV Diagnostic Results:

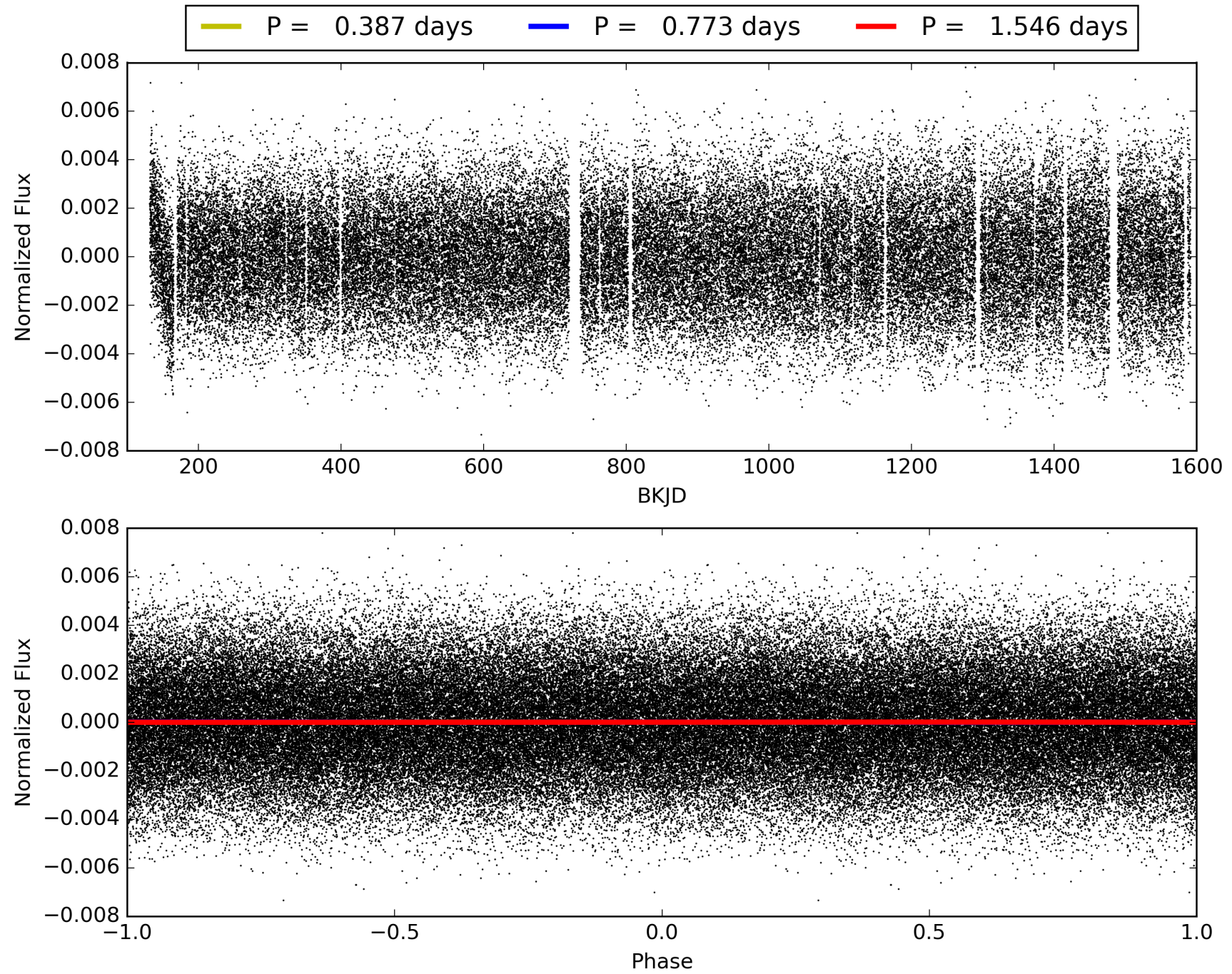
ShortPeriod-sig: 53.3% [0.73 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1660/1660]  
GhostDiagnostic-chr: 1.354  
Centroid-sig: 63.8%  
Centroid-so: 0.014 arcsec [0.09 $\sigma$ ]  
OotOffset-rm: 0.114 arcsec [0.92 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.061 arcsec [0.46 $\sigma$ ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.41 [7/17]  
DiffImageOverlap-fno: 0.00 [0/17]

# TCE 010462980-01, PDC Light Curves



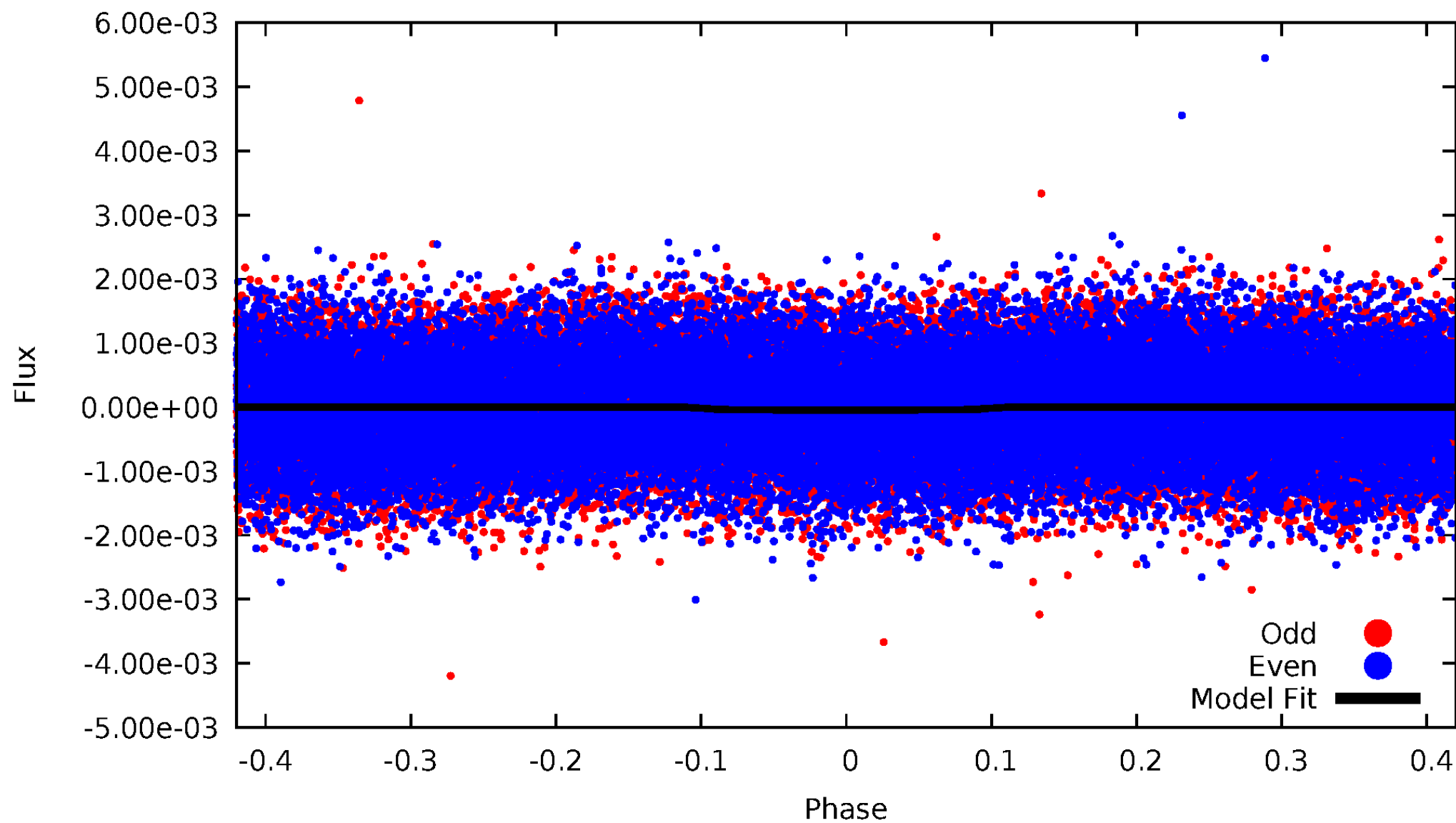


TCE 010462980-01



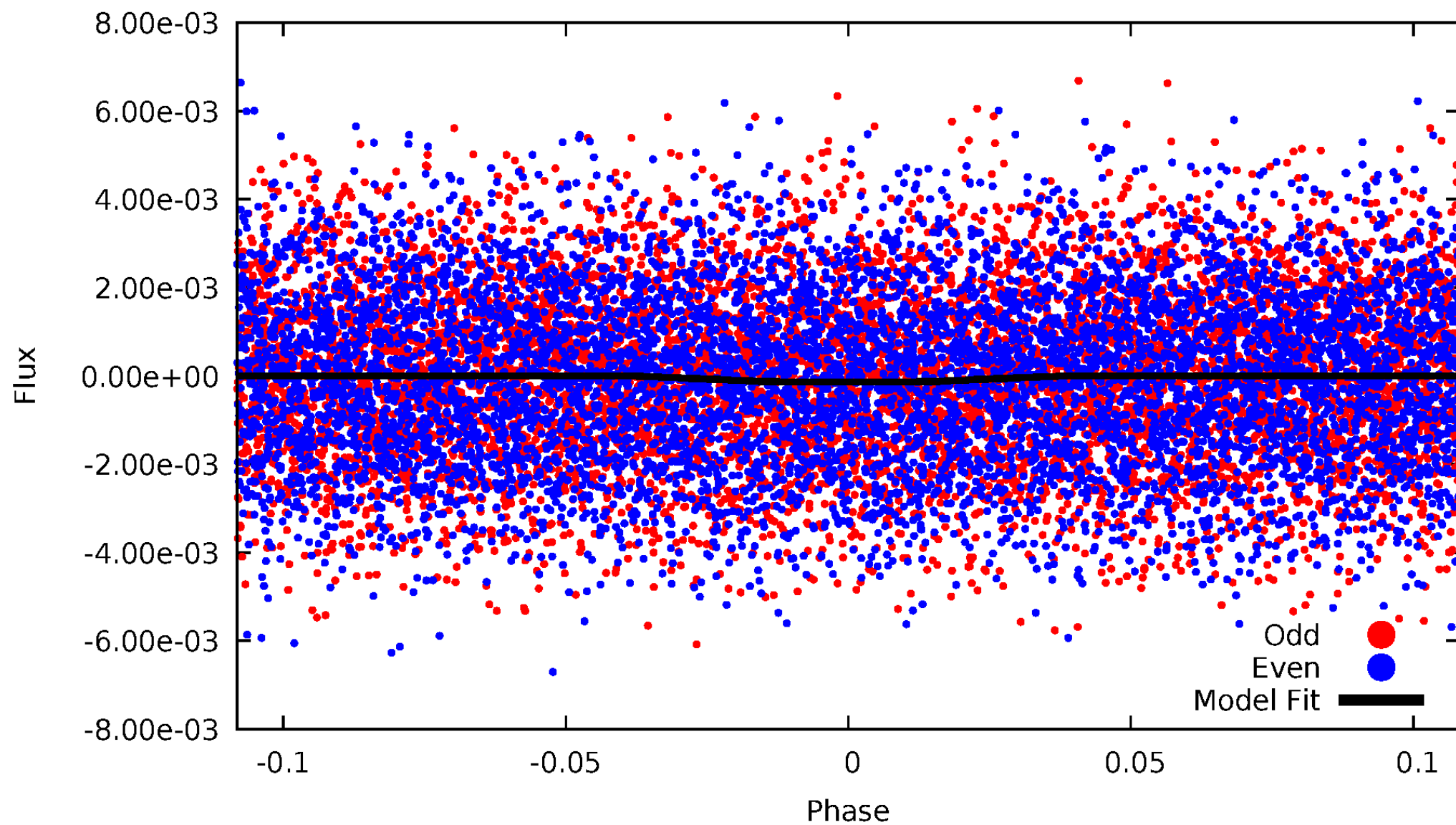
# DV Odd/Even

TCE 010462980-01



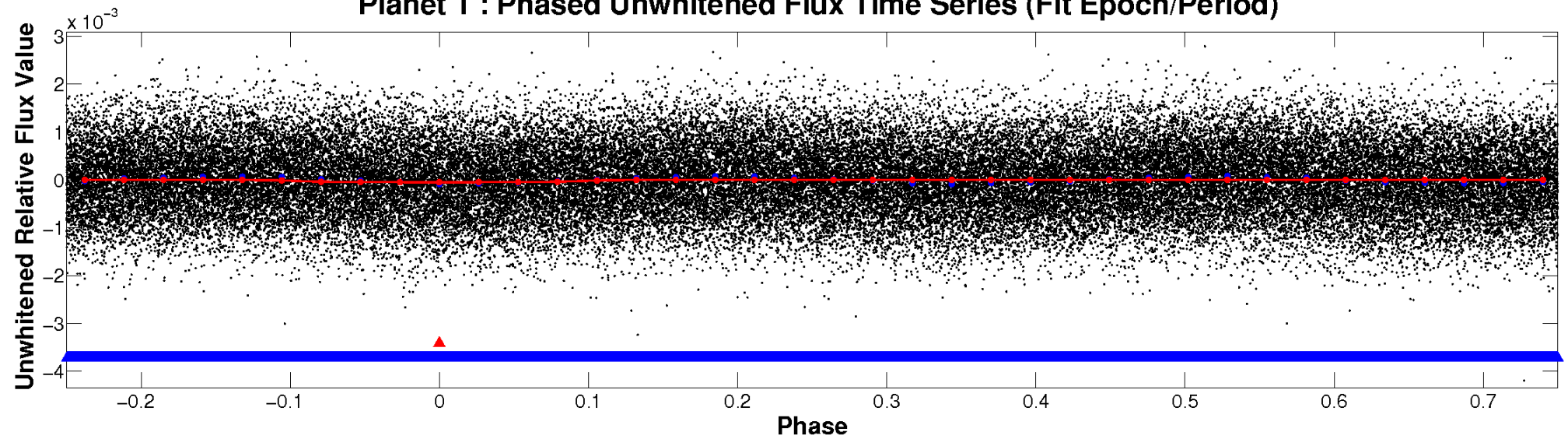
# ALT Odd/Even

TCE 010462980-01

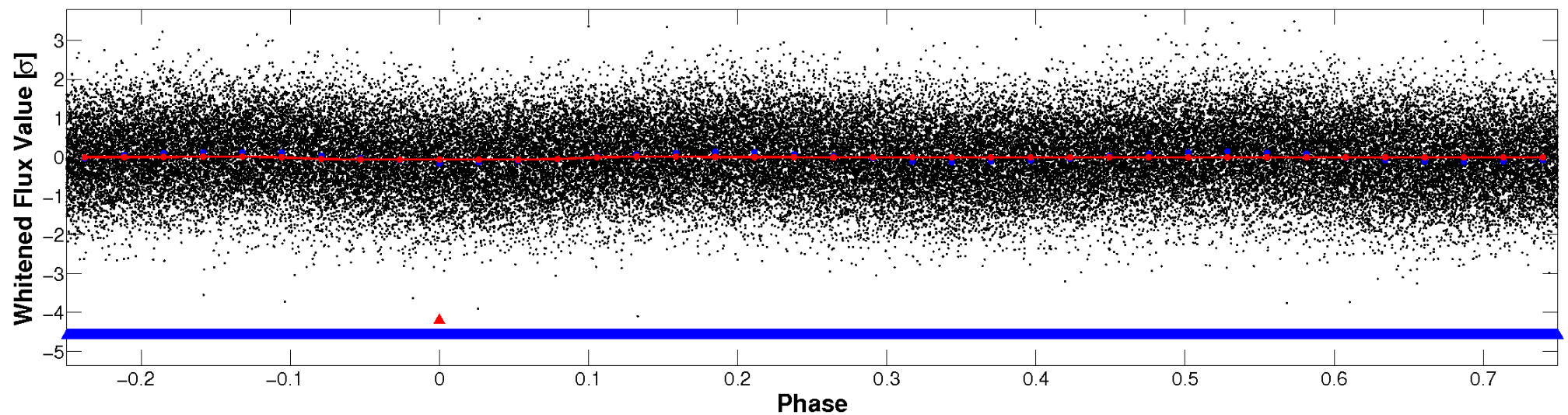


# Non-Whitened Vs. Whitened Light Curve

**Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**



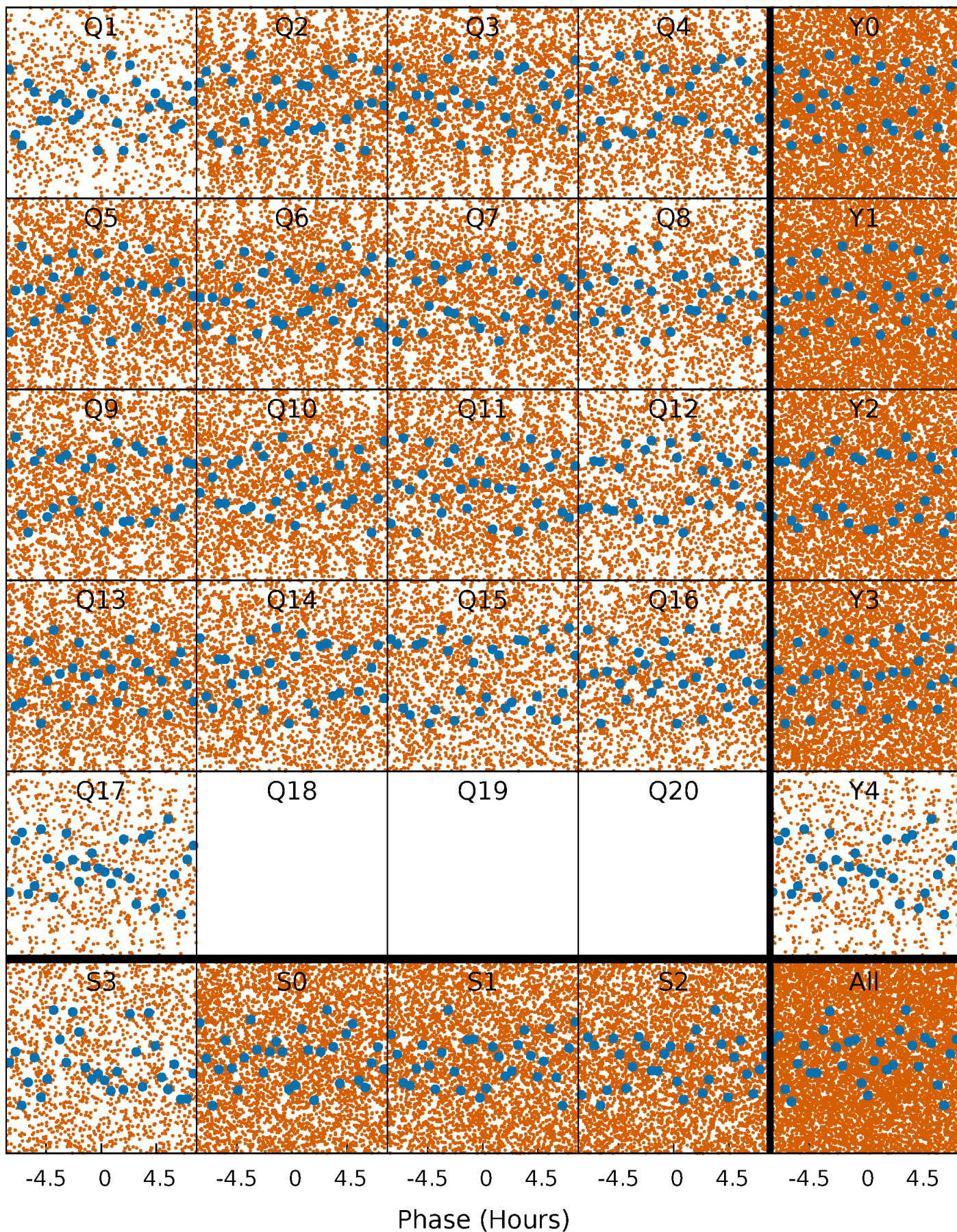
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

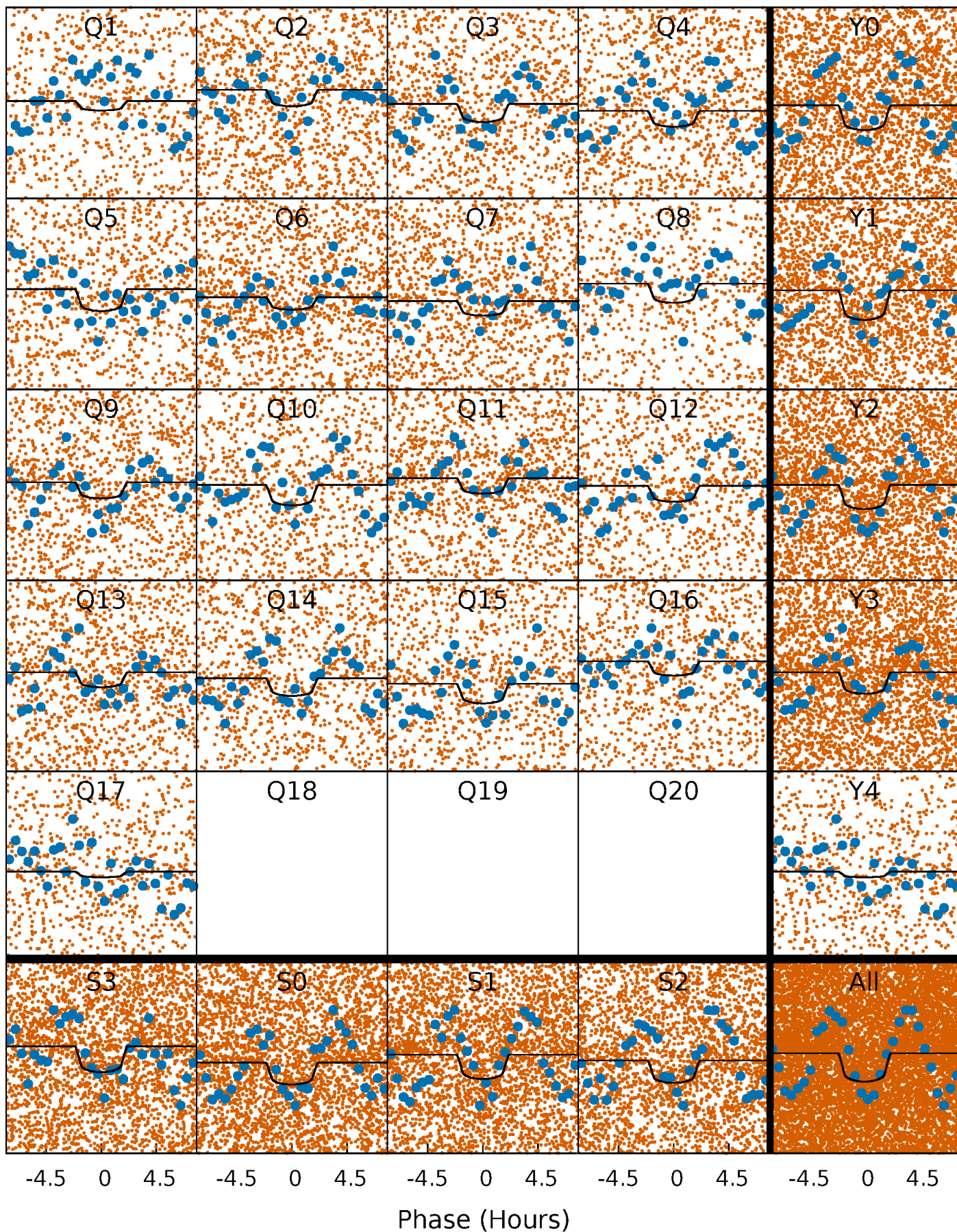
TCE 010462980-01 P= 0.773223 Days  $T_0=132.218615$  (BKJD)





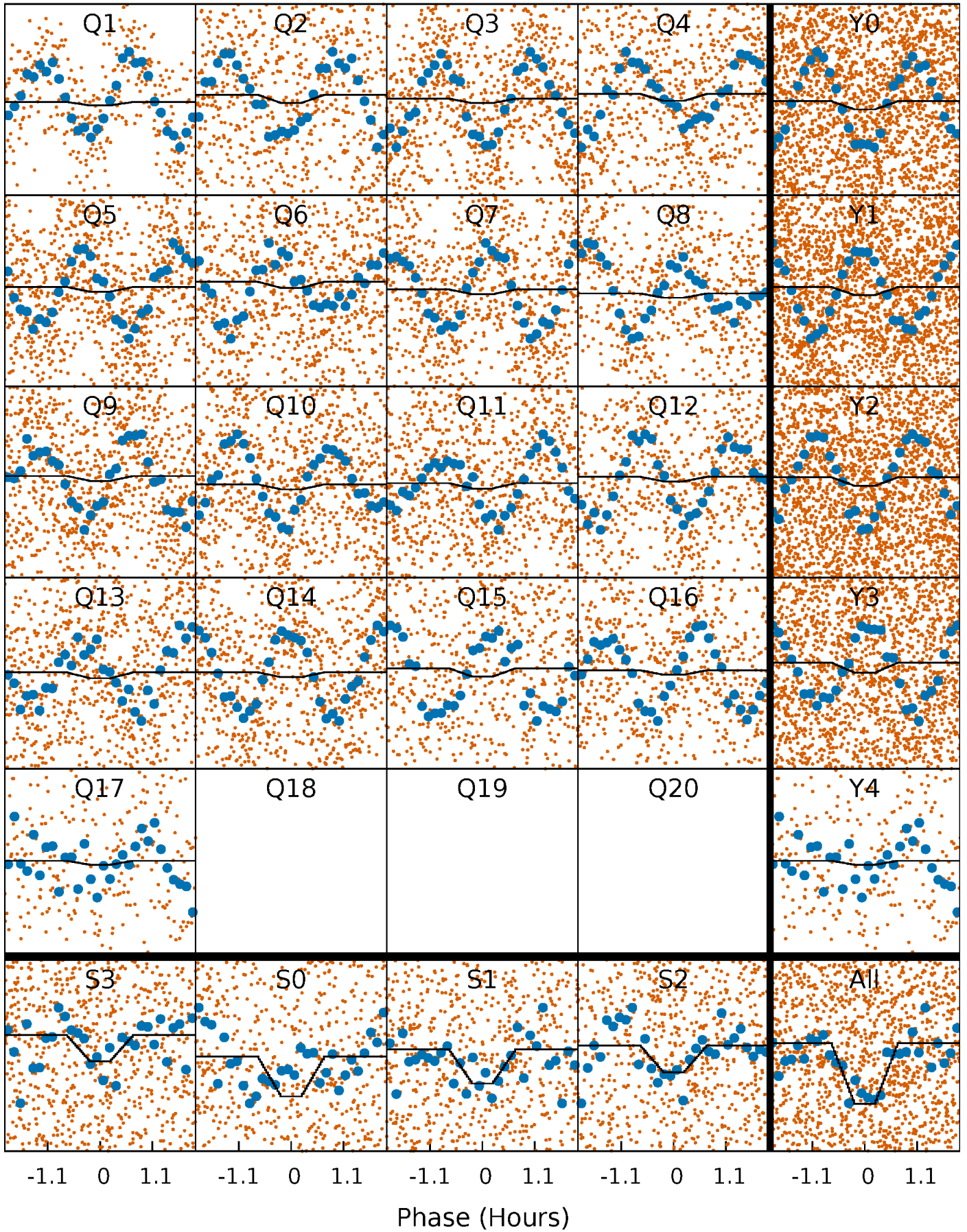
# DV Quarter-Phased Transit Curves

TCE 010462980-01 P= 0.773223 Days  $T_0=132.218615$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

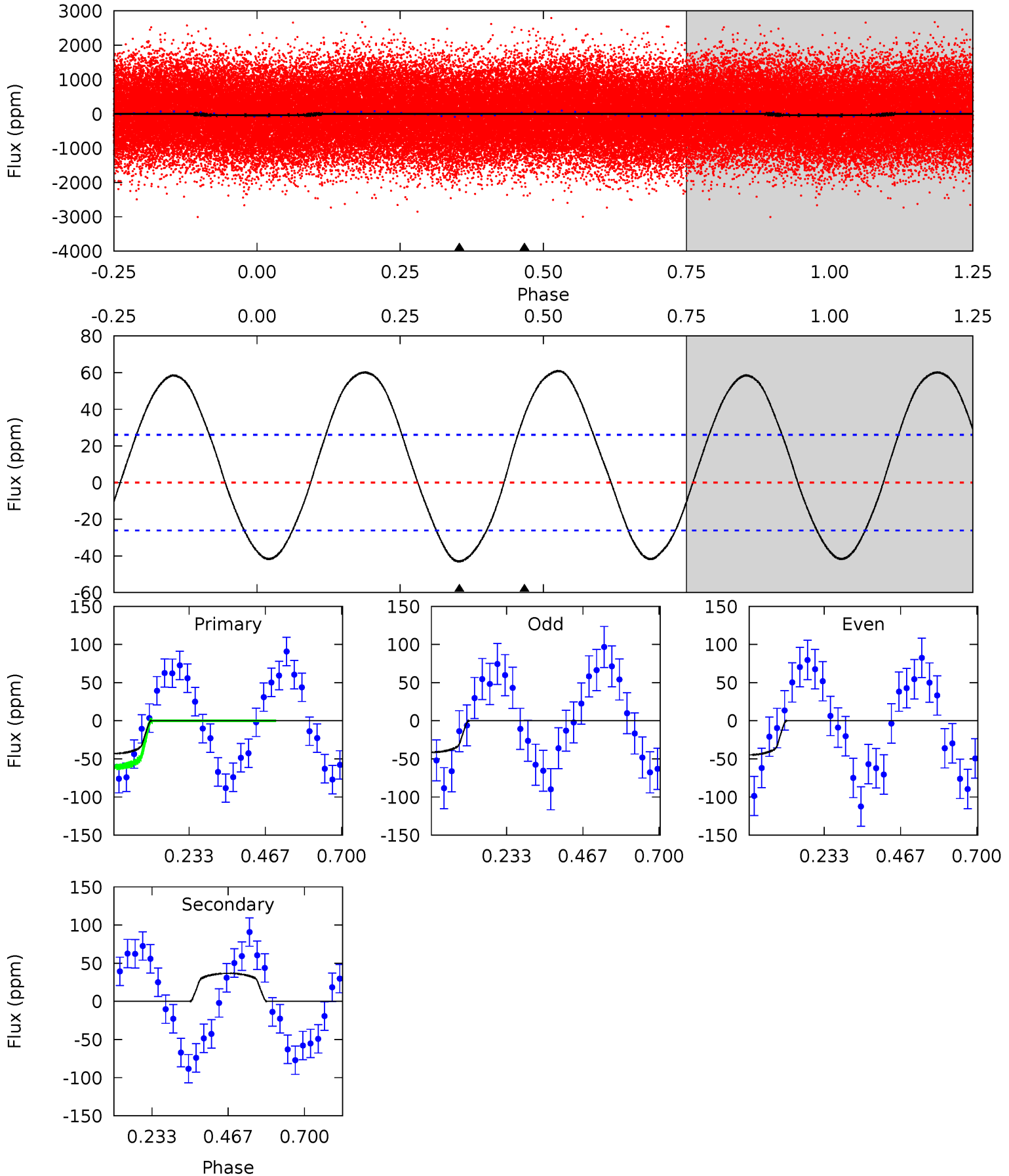
TCE 010462980-01   P= 0.773242 Days    $T_0=132.219024$  (BKJD)



# DV Model-Shift Uniqueness Test

010462980-01, P = 0.773223 Days, E = 131.445392 Days

| Pri  | Sec   | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|-------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.23 | -6.16 | 0   | 0   | 4.38            | 1.19            | 5.67             | 7.23    | 7.23    | -6.16   | -6.16   | 0.30    | 1.29 | 0.59  | 2.97 |

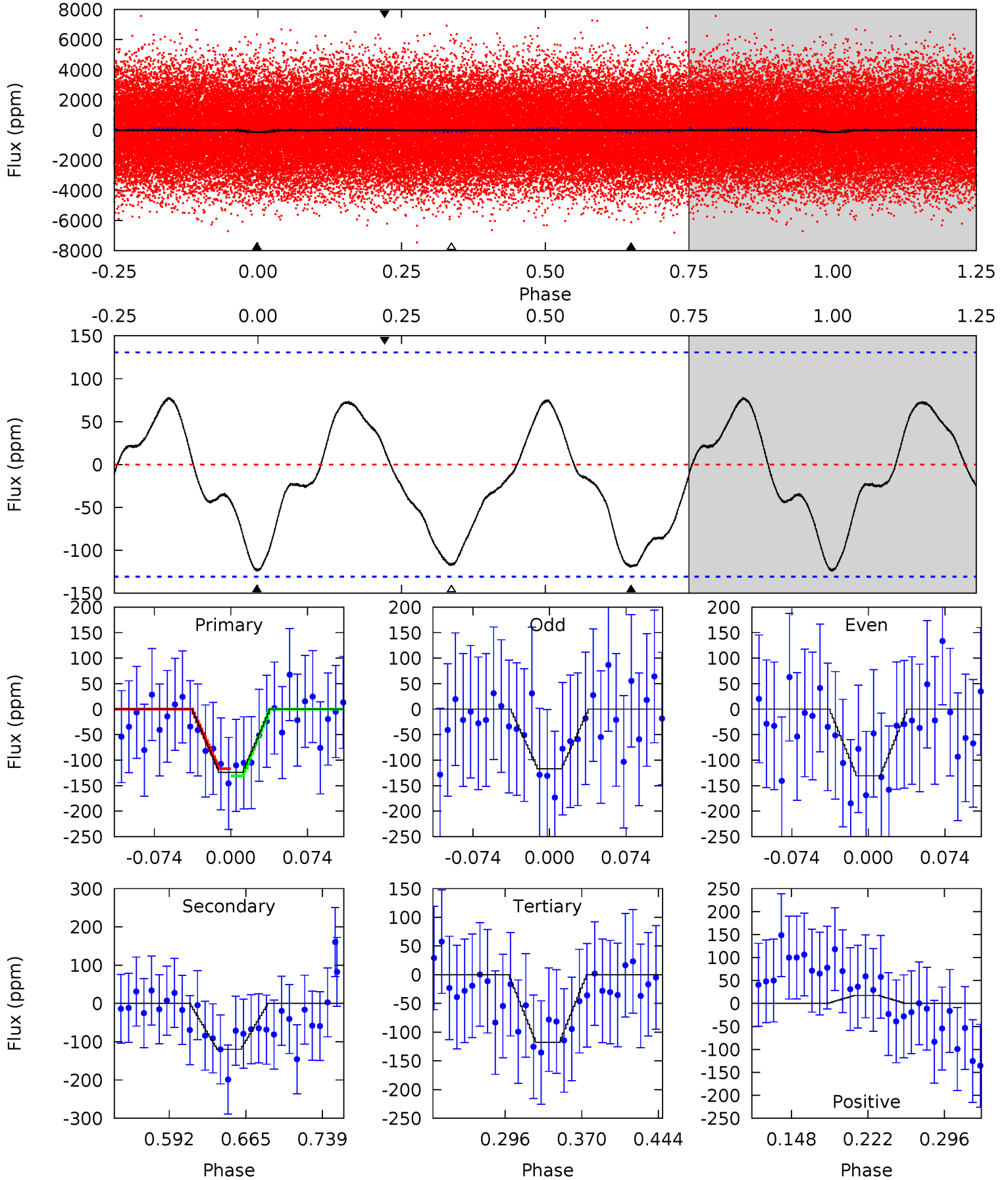




# Alt Model-Shift Uniqueness Test

010462980-01, P = 0.773242 Days, E = 131.445782 Days

| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 4.38 | 4.24 | 4.16 | 0.62 | 4.63            | 1.79            | 1.86             | 0.22    | 3.76    | 0.08    | 3.62    | 0.24    | 0.93 | 0.39  | 0.25 |



### Stellar Parameters For KIC 010462980

|        | $T_{\text{eff}} (K)$ | $\log(g)$                 | $[\text{Fe}/\text{H}]$     | $R (R_{\odot})$           | $M (M_{\odot})$           | $\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|--|
|        | $7700^{+211}_{-316}$ | $3.960^{+0.247}_{-0.133}$ | $-0.180^{+0.200}_{-0.300}$ | $2.280^{+0.486}_{-0.729}$ | $1.728^{+0.198}_{-0.322}$ | $0.205^{+0.314}_{-0.080}$                    |
|        | +3%/-4%              | +6%/-3%                   | +111%/-167%                | +21%/-32%                 | +11%/-19%                 | +153%/-39%                                   |
| Source | KIC0                 | KIC0                      | KIC0                       | DSEP                      |                           |  |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010462980-01 / KOI

| Detrend | Depth (ppm)   | $R_p (R_{\oplus})$     | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$    | $A_{\text{obs}}$            |
|---------|---------------|------------------------|----------------------|-------------------------|-----------------------------|
| DV      | $37 \pm 6$    | $1.98^{+1.39}_{-1.21}$ | $5021^{+346}_{-399}$ | $-6604^{+1105}_{-5184}$ | $-1.976^{+1.289}_{-10.819}$ |
| Alt.    | $-120 \pm 28$ | $2.84^{+1.55}_{-1.30}$ | $5013^{+371}_{-446}$ | $7082^{+3588}_{-1673}$  | $3.184^{+7.565}_{-1.943}$   |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

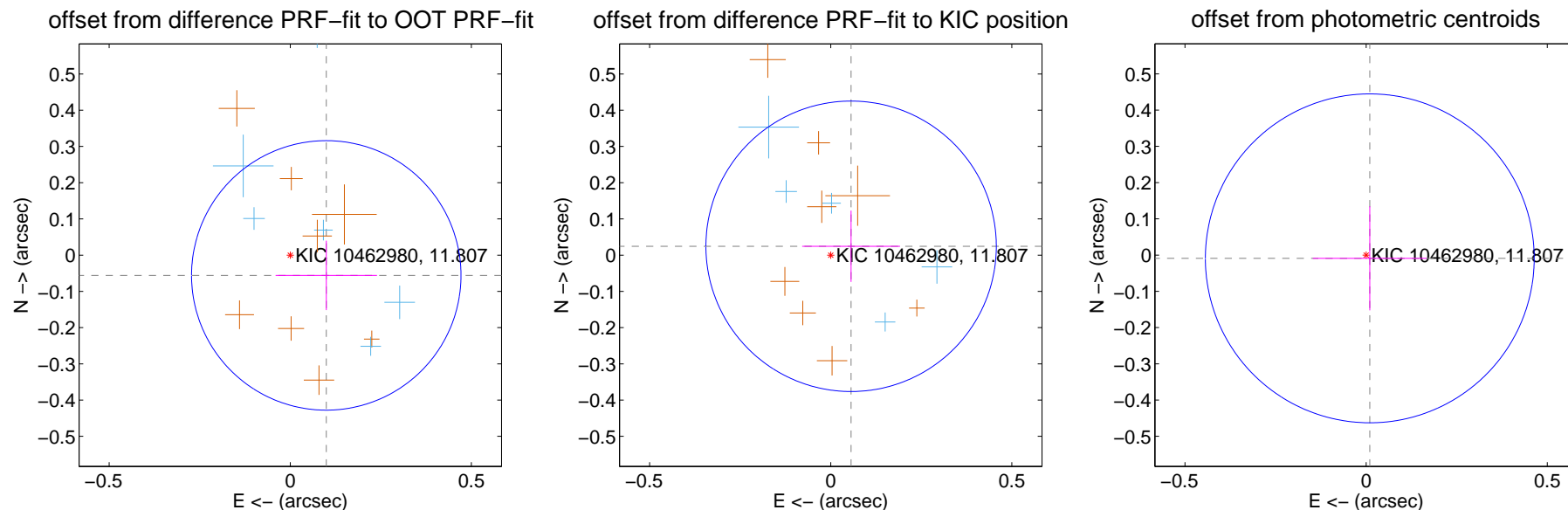
## DV Centroid Data

Supplemental centroid analysis for 010462980-01. **Kepler magnitude: 11.81.** Transit SNR 6.68

There are 7 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

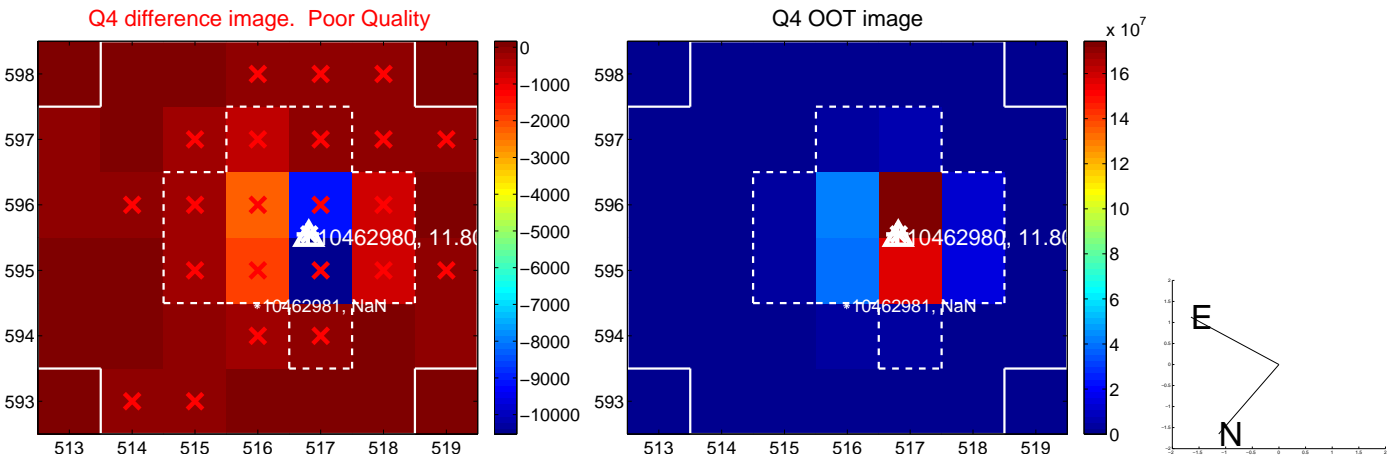
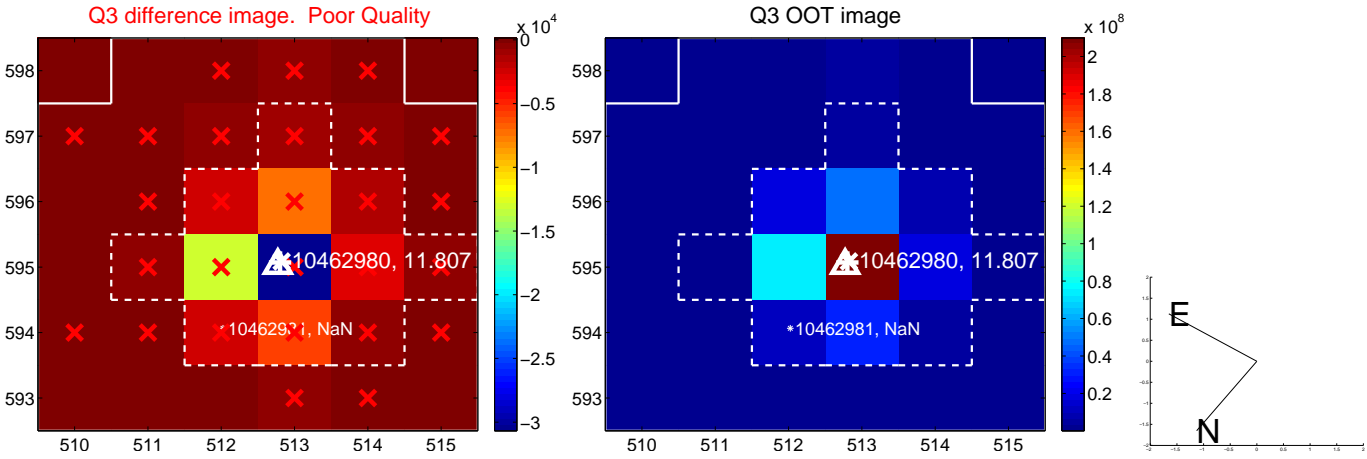
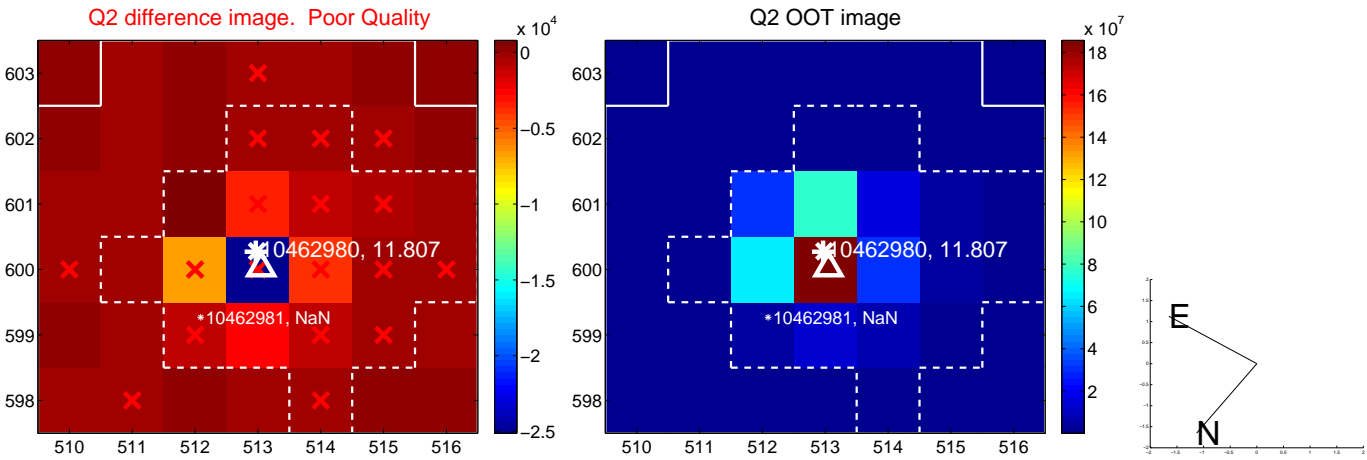
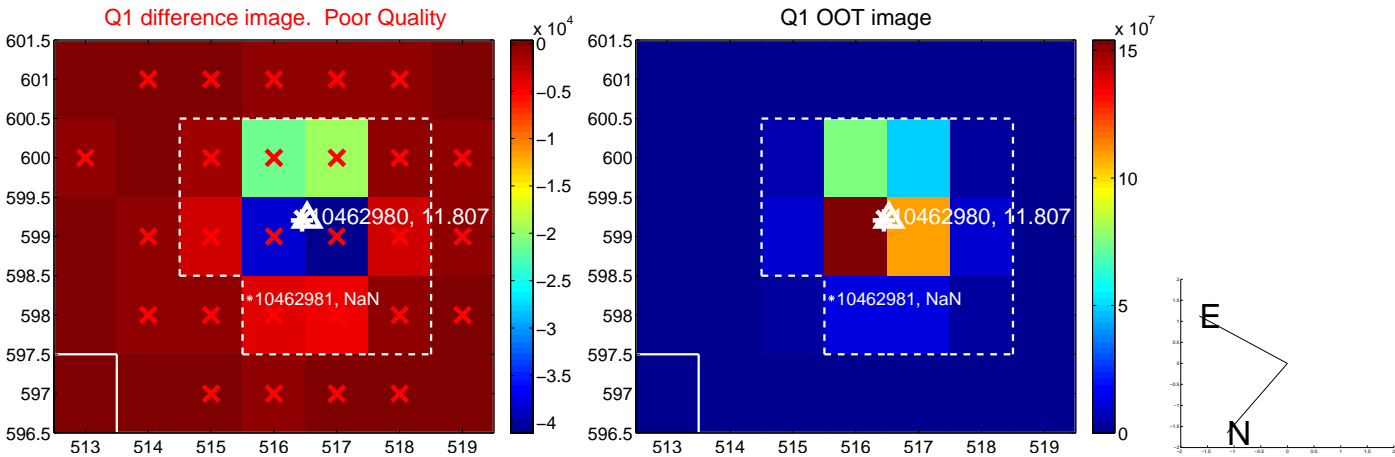
|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.114 \pm 0.124$  | 0.92                | $-0.099 \pm 0.140$ | $-0.056 \pm 0.096$ |
| PRF-fit source offset from KIC position | $0.061 \pm 0.134$  | 0.46                | $-0.056 \pm 0.135$ | $0.024 \pm 0.098$  |
| photometric centroid source offset      | $0.01 \pm 0.15$    | 0.09                | $-0.01 \pm 0.16$   | $-0.01 \pm 0.14$   |



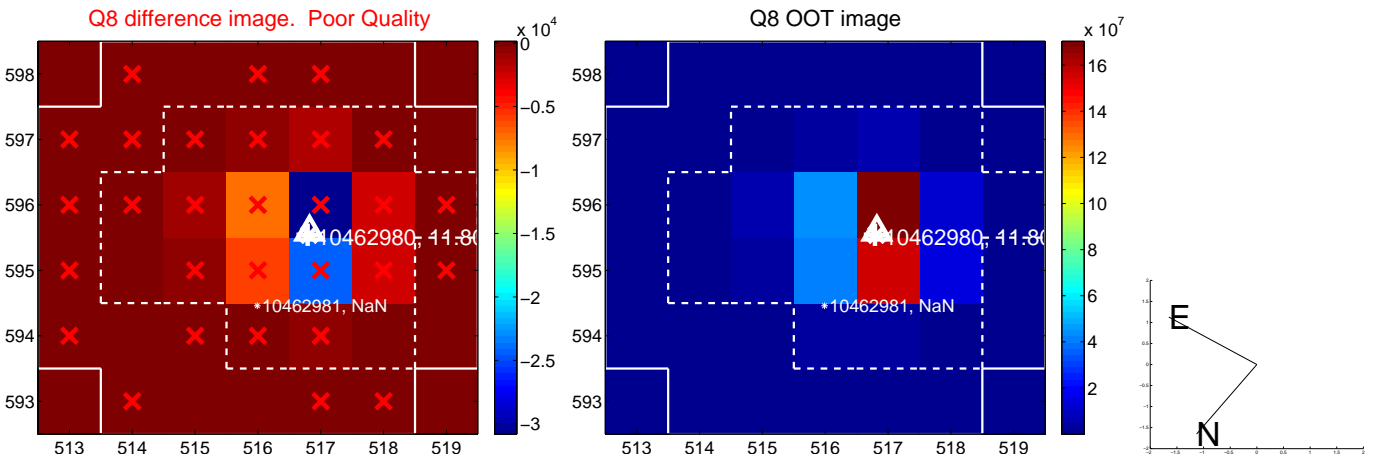
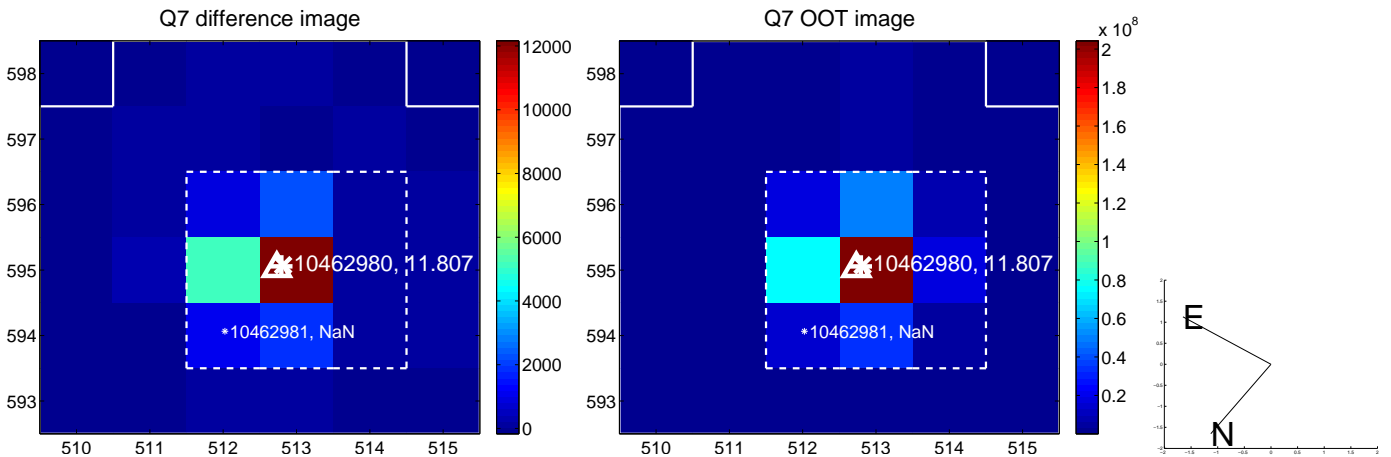
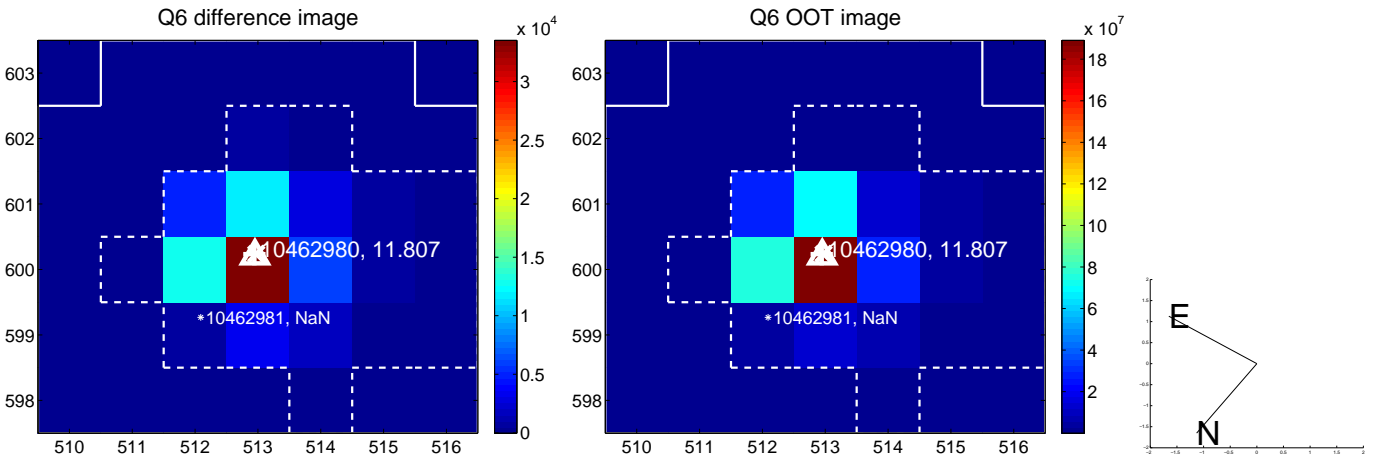
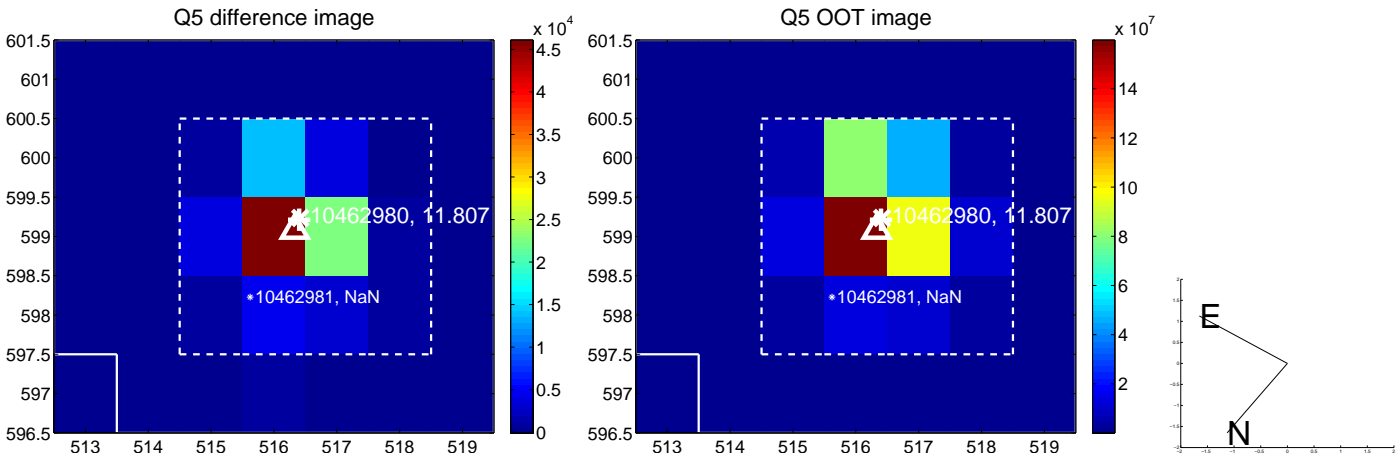
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.



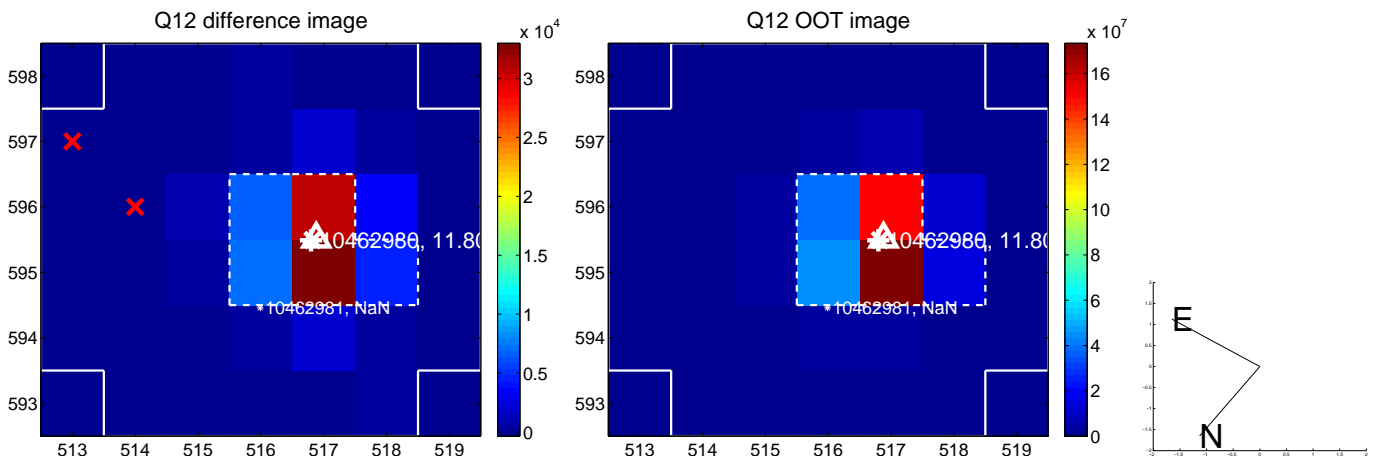
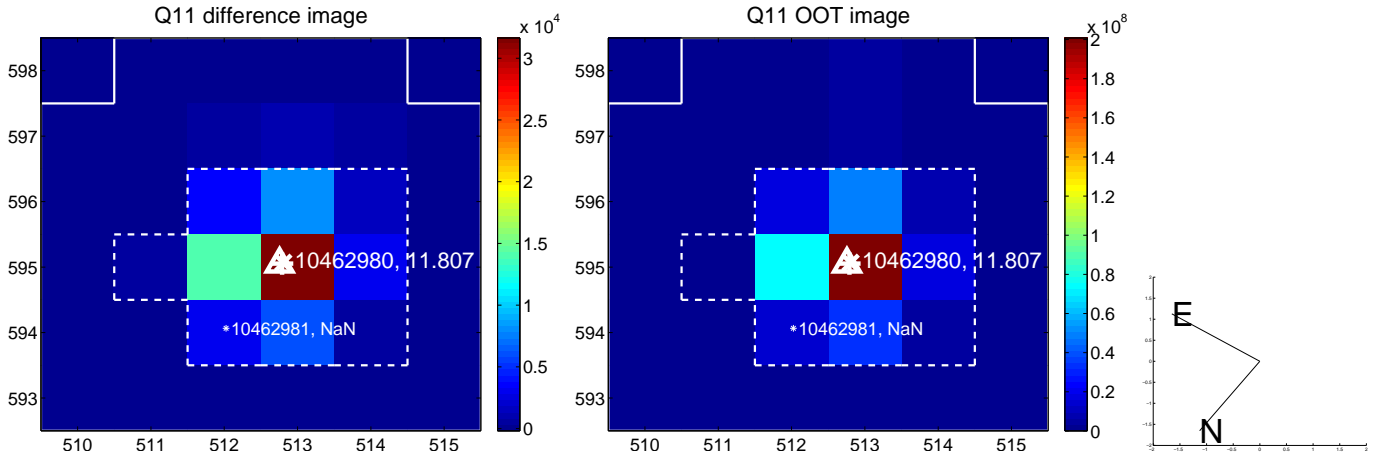
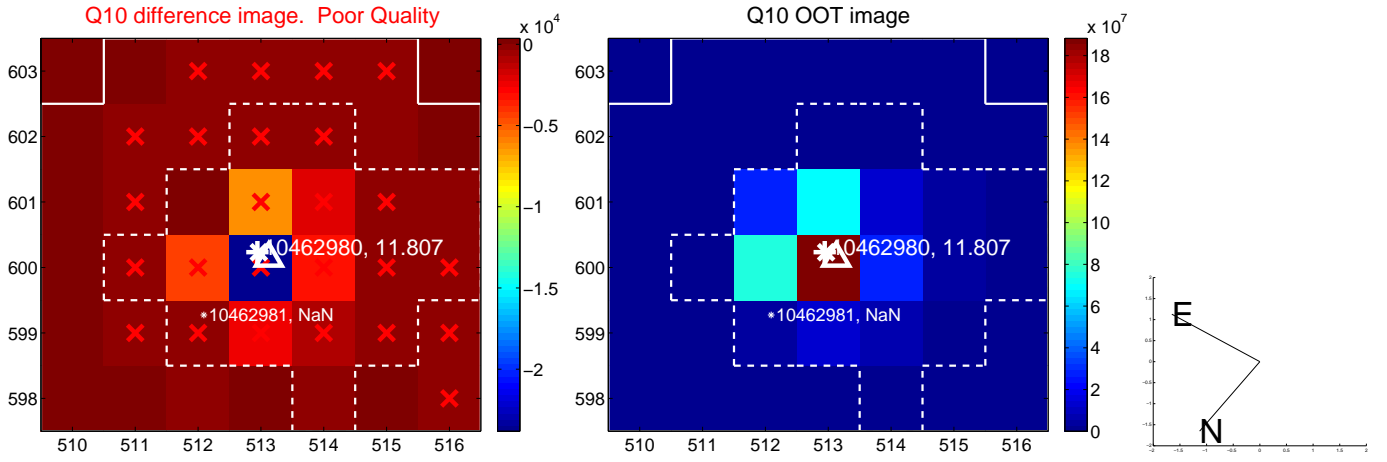
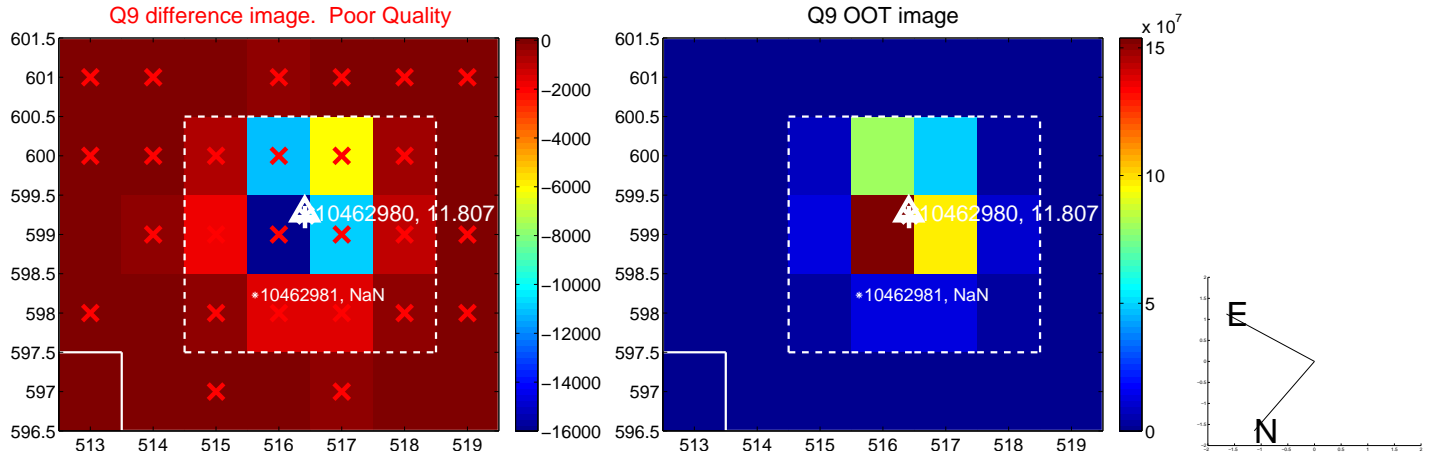
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

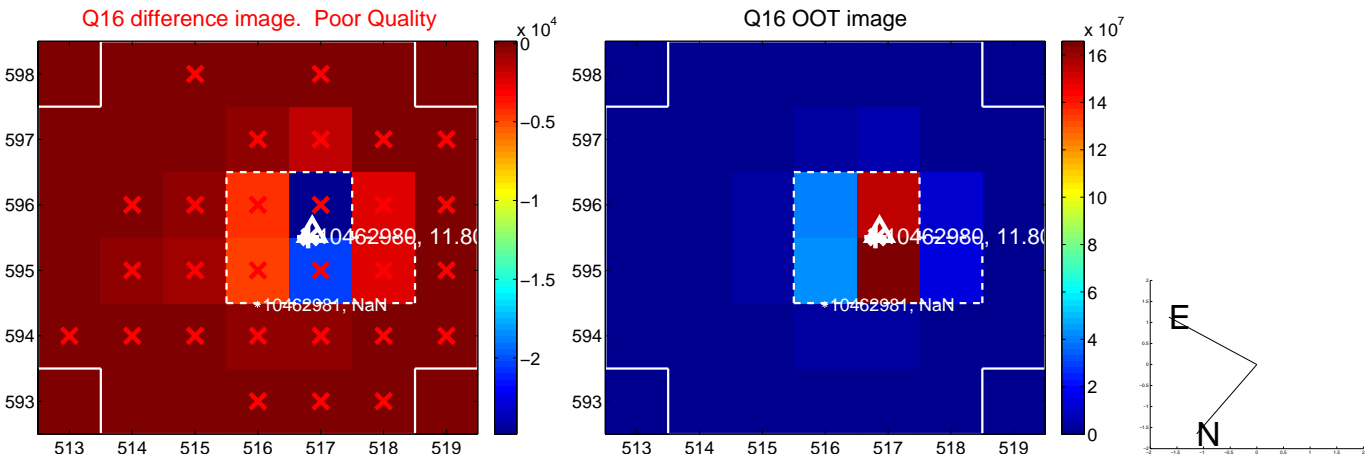
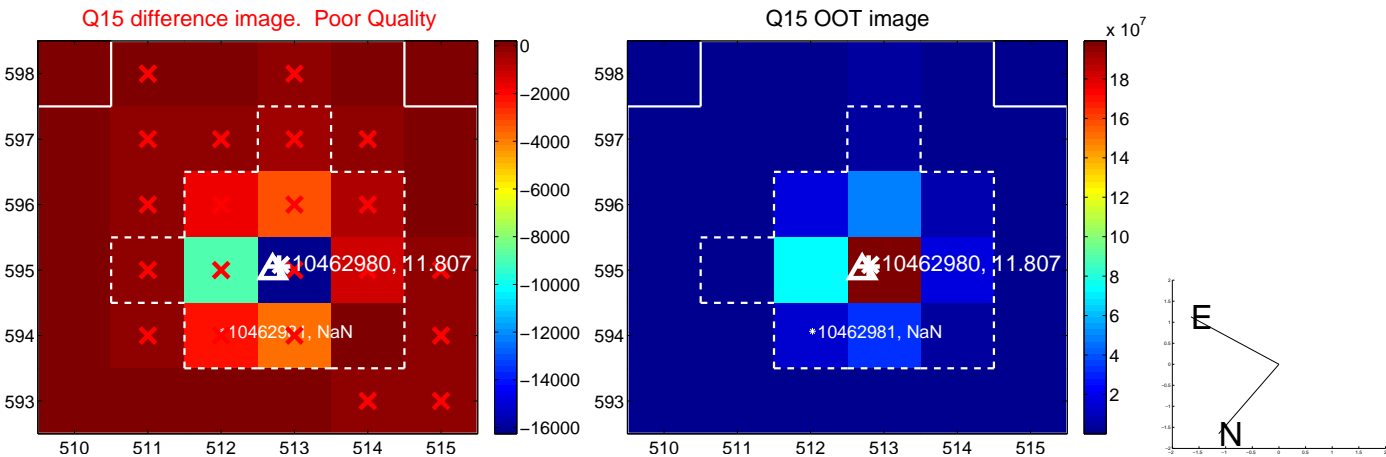
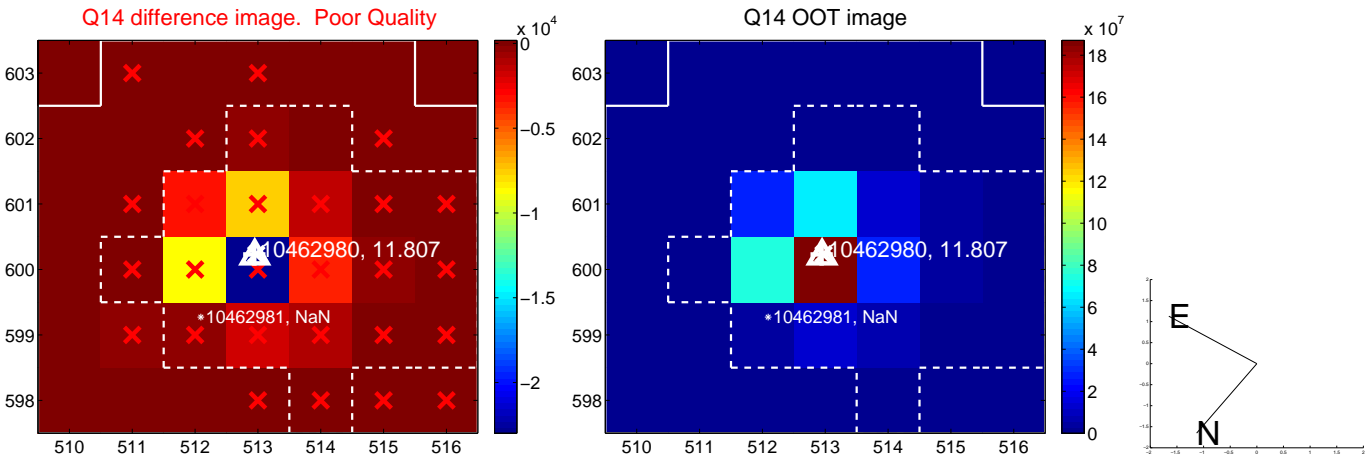
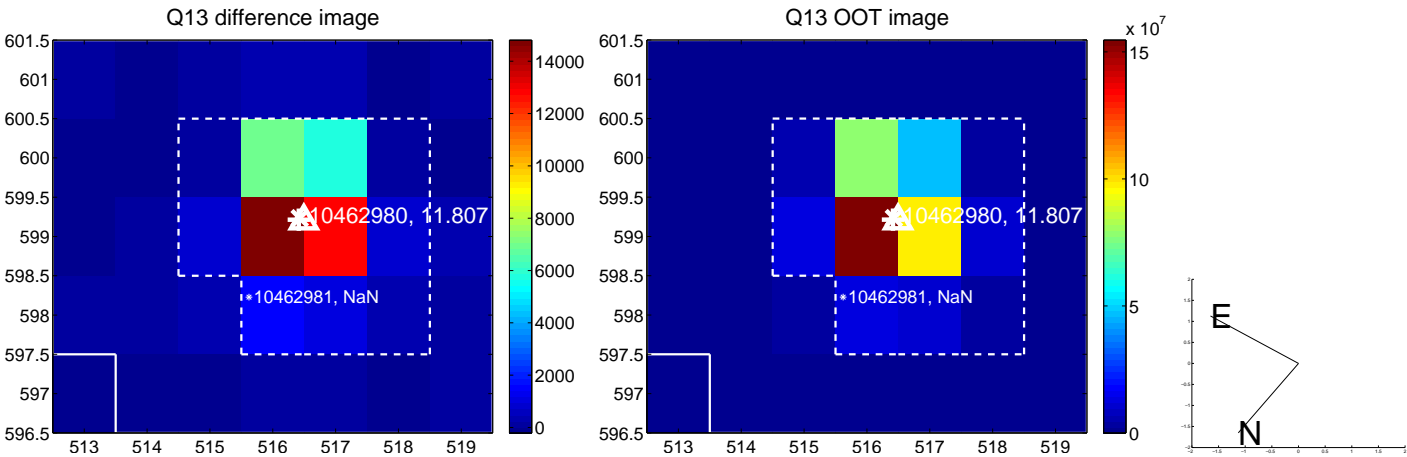


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

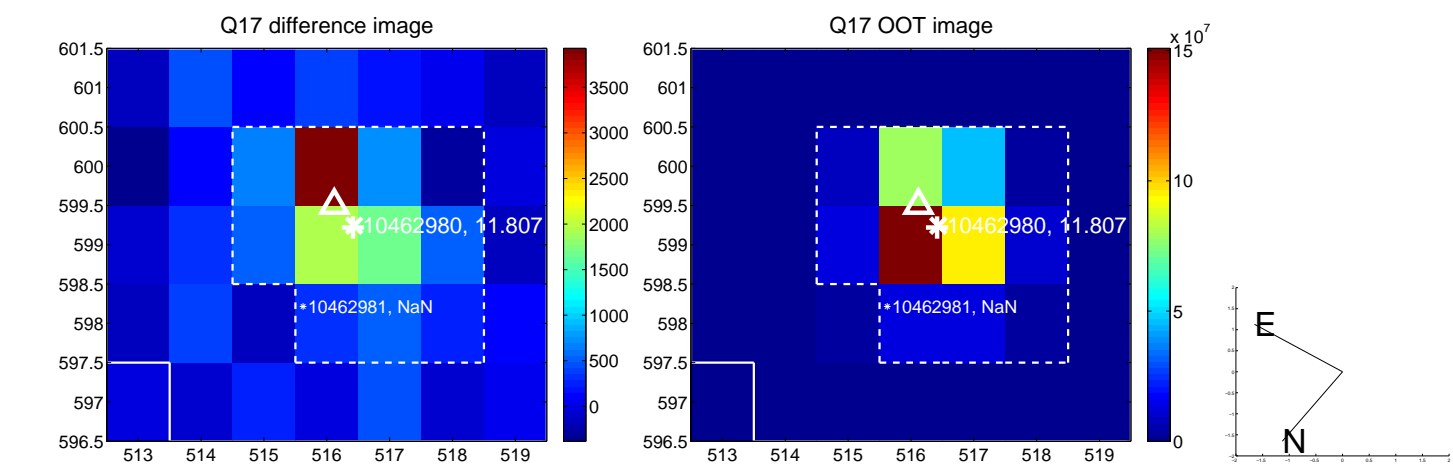




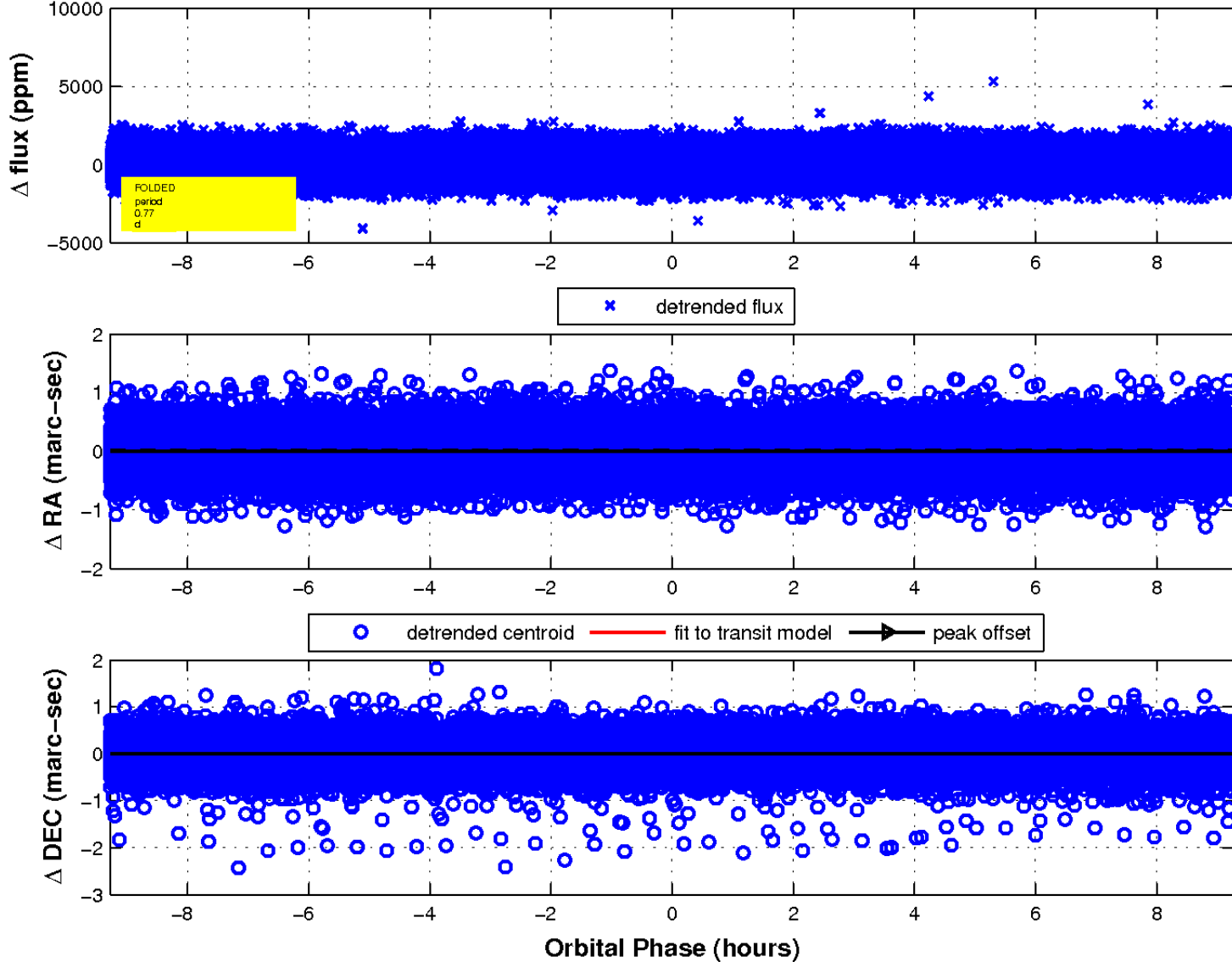
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

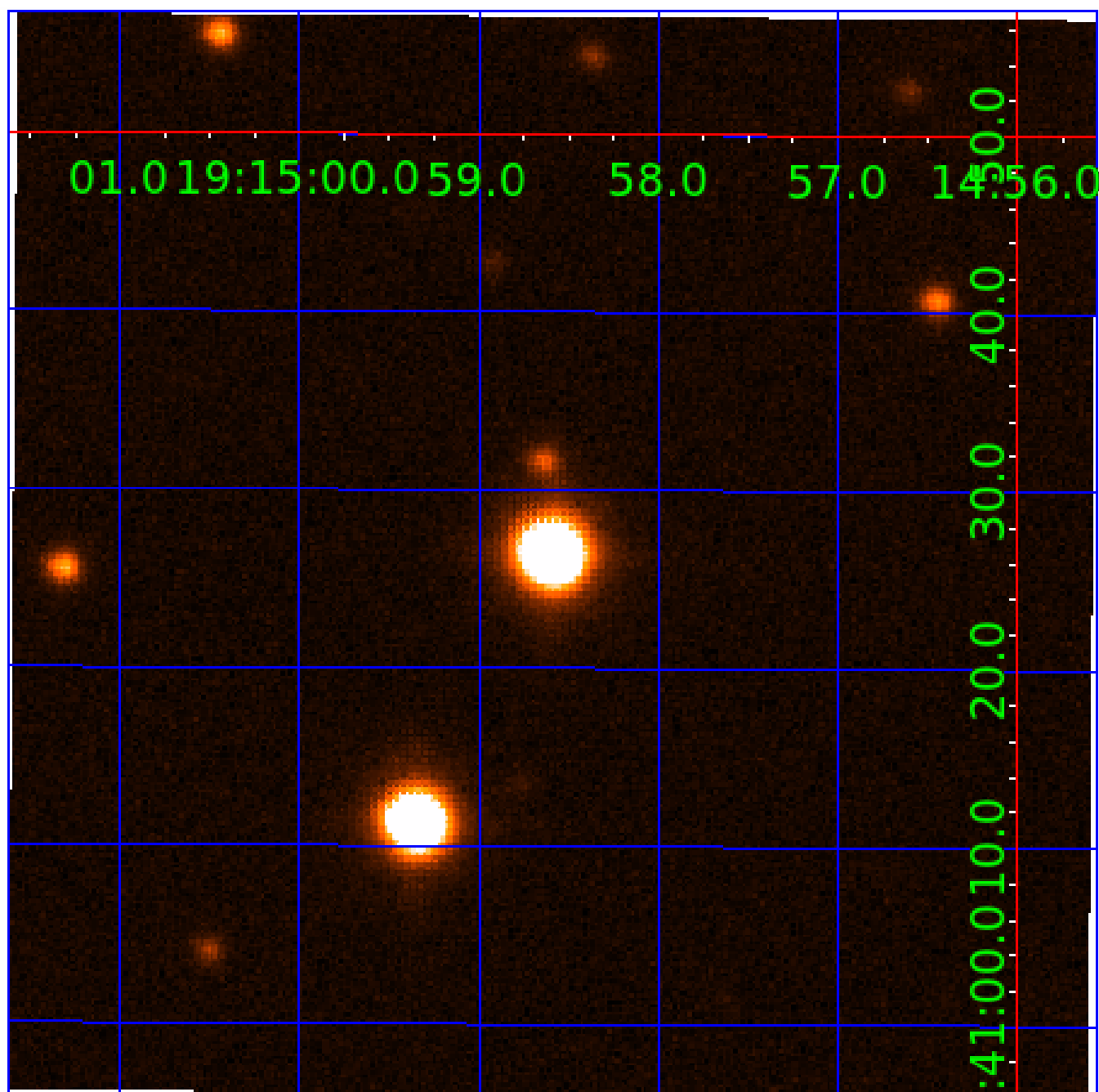


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



# KIC 010462980

## Q1-17 DR25 TCE Parameters

| TCE          | Run Type | KOI? | Period (Days) | Epoch (BKJD) | Depth (ppm) | Duration (Hours) | MES  | SNR  | $R_{\star}$ ( $R_{\odot}$ ) | $T_{\star}$ (K) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010462980-01 | OBS      | No   | 0.773223      | 132.218616   | 47.8        | 3.896            | 11.8 | 6.7  | 2.28                        | 7700            | 1.84                   | 41790.14               |
| 010462980-02 | OBS      | No   | 0.542963      | 131.668280   | 175.1       | 6.516            | 9.8  | 19.9 | 2.28                        | 7700            | 3.06                   | 66955.54               |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|--|
| 010462980-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT        |
| 010462980-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—MOD_NONUNIQ_ALT |

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

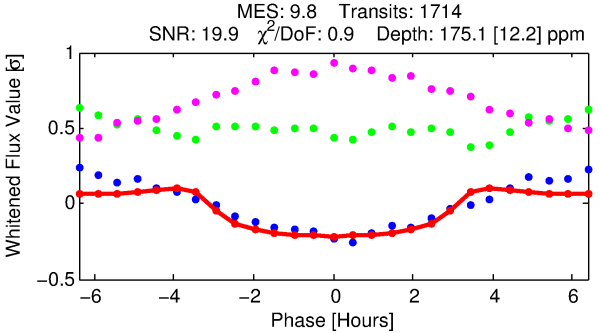
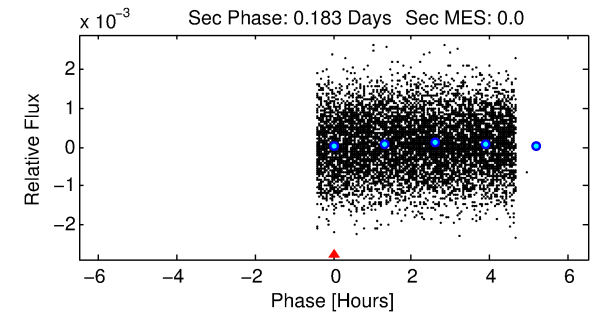
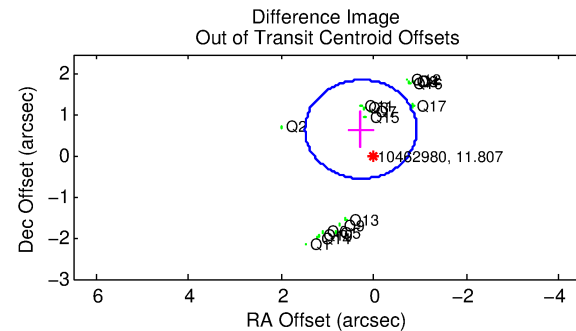
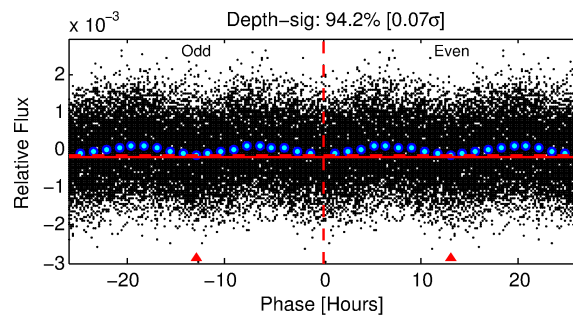
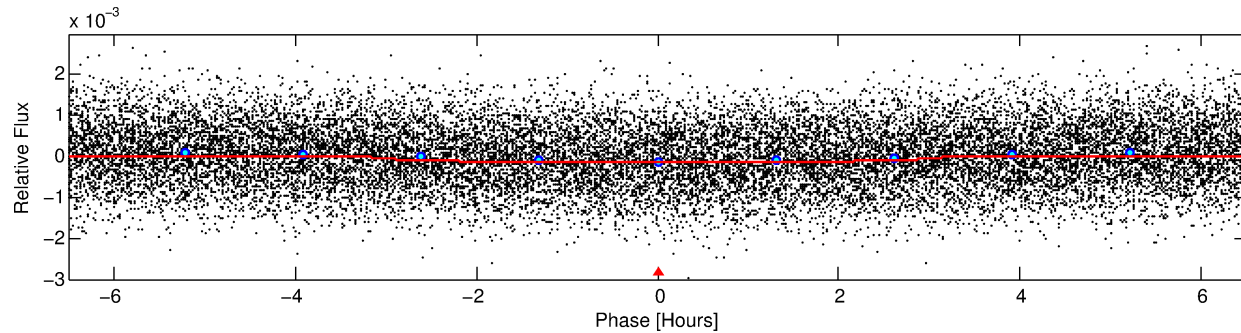
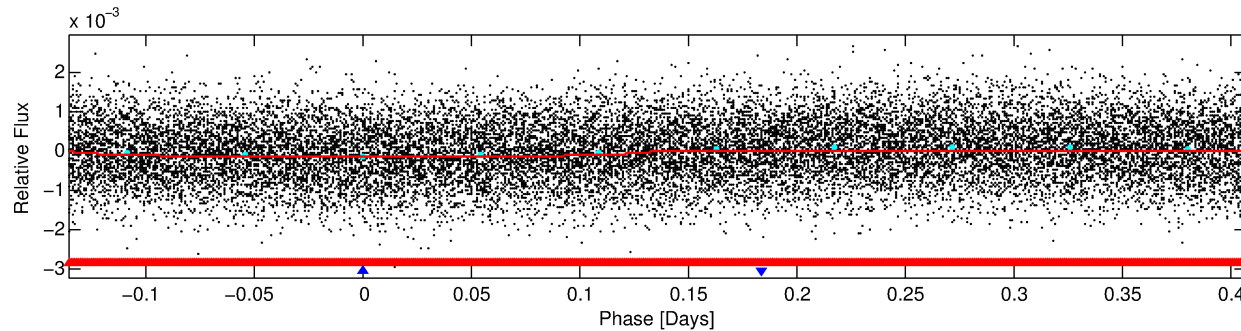
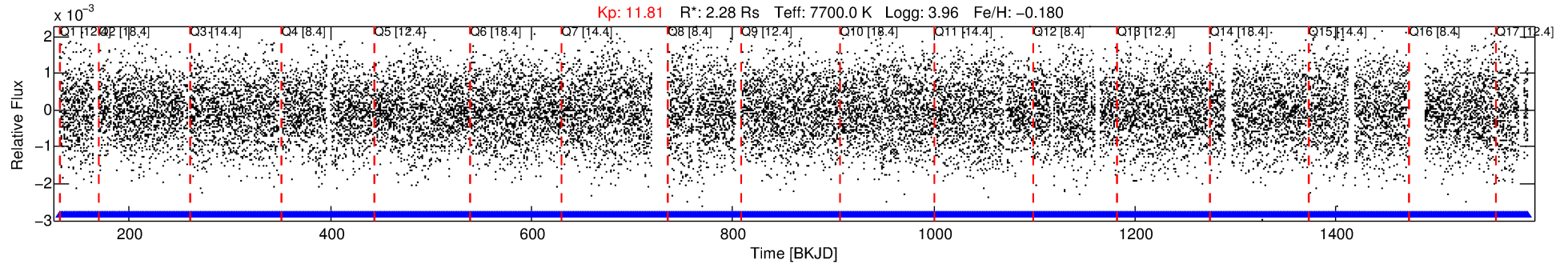
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010462980-02

No Significant Match Found

# DV One-Page Summary

KIC: 10462980 Candidate: 2 of 2 Period: 0.543 d



## DV Fit Results:

Period = 0.54296 [0.00001] d  
Epoch = 131.6683 [0.0033] BKJD  
Rp/R\* = 0.0123 [0.0049]  
a/R\* = 1.00 [0.01]  
b = 0.26 [7.74]  
Seff = 66955.54 [31128.56]  
Teq = 4102 [477] K  
Rp = 3.05 [1.57] Re  
a = 0.0156 [0.0045] AU  
Ag = N/A  
Teffp = N/A

## DV Diagnostic Results:

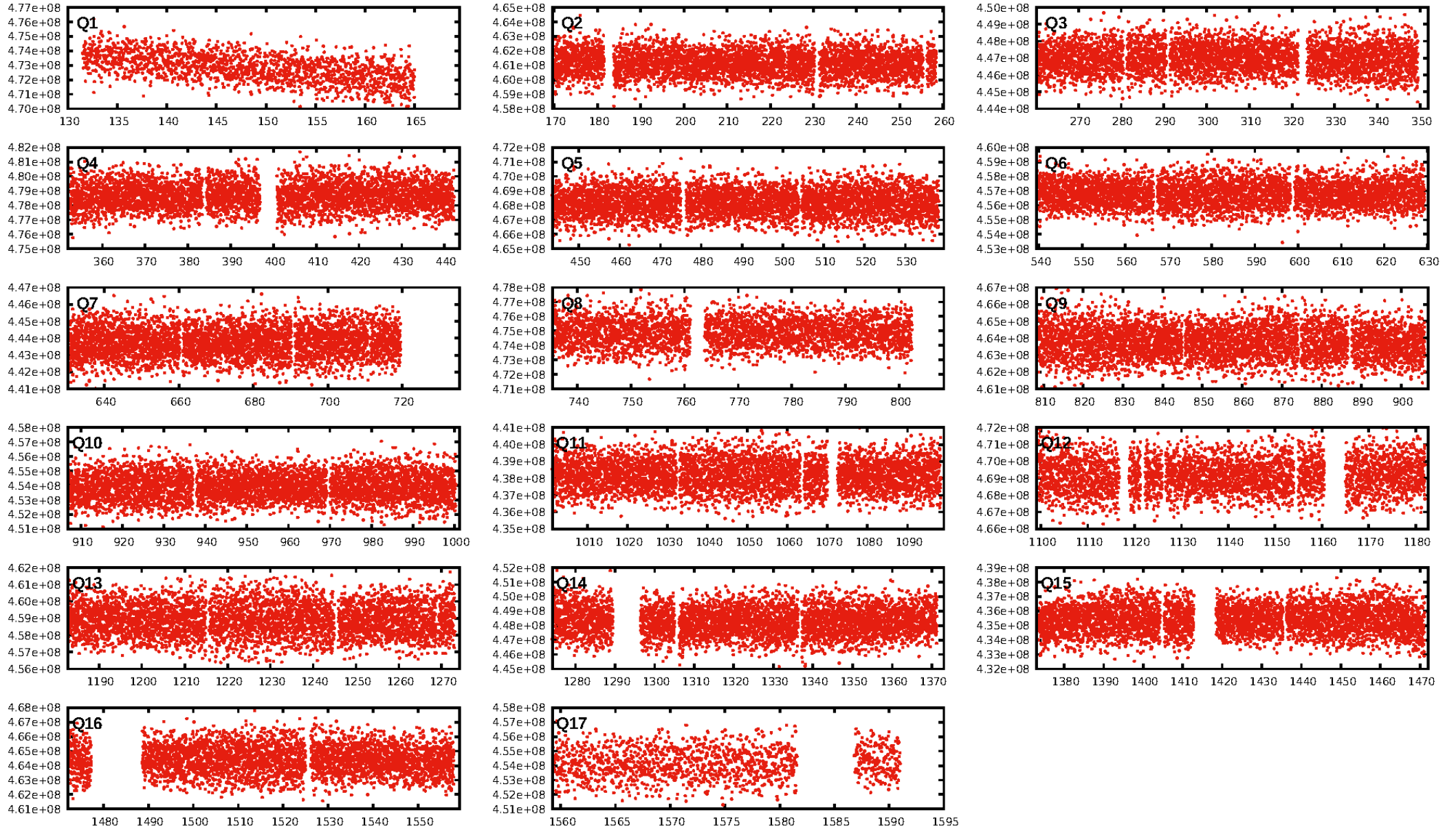
ShortPeriod-sig: N/A  
LongPeriod-sig: 53.3% [0.73 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1637/1637]  
GhostDiagnostic-chr: 1.665  
Centroid-sig: 0.1%  
Centroid-so: 0.057 arcsec [1.92 $\sigma$ ]  
OotOffset-rm: 0.721 arcsec [1.79 $\sigma$ ]  
KicOffset-rm: 0.811 arcsec [2.04 $\sigma$ ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 0.00 [0/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 23:09:04 Z

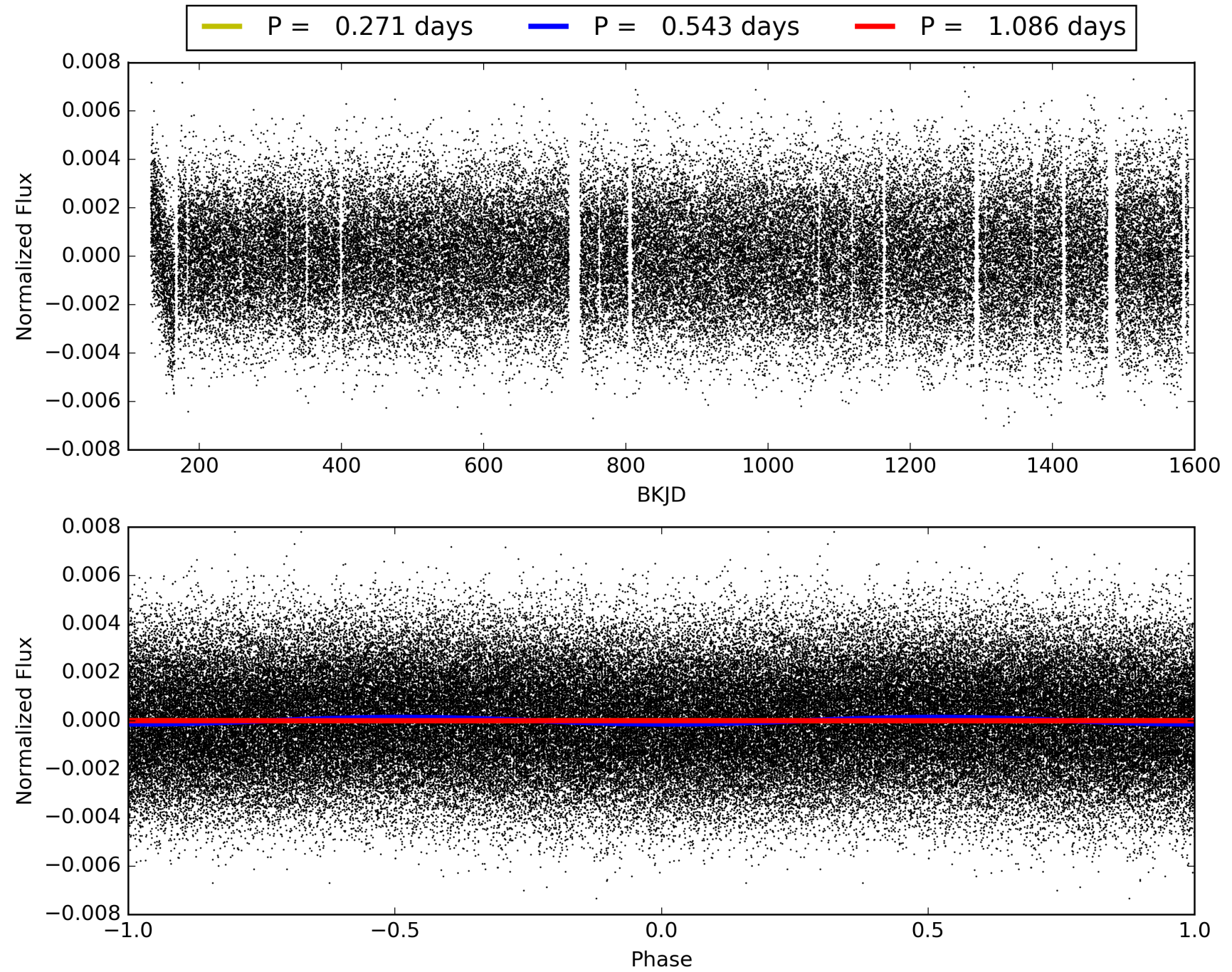
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 010462980-02, PDC Light Curves

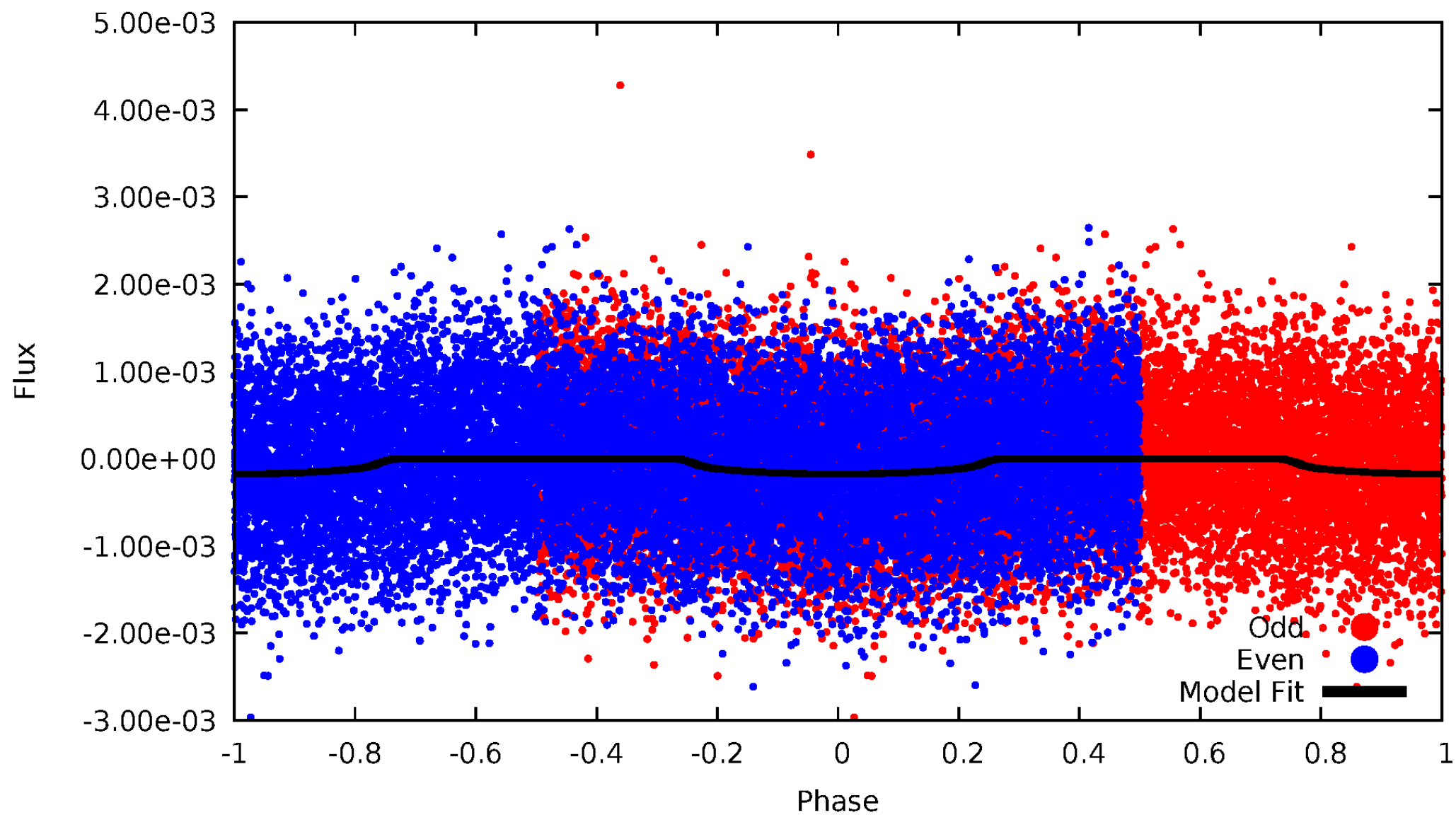


# TCE 010462980-02



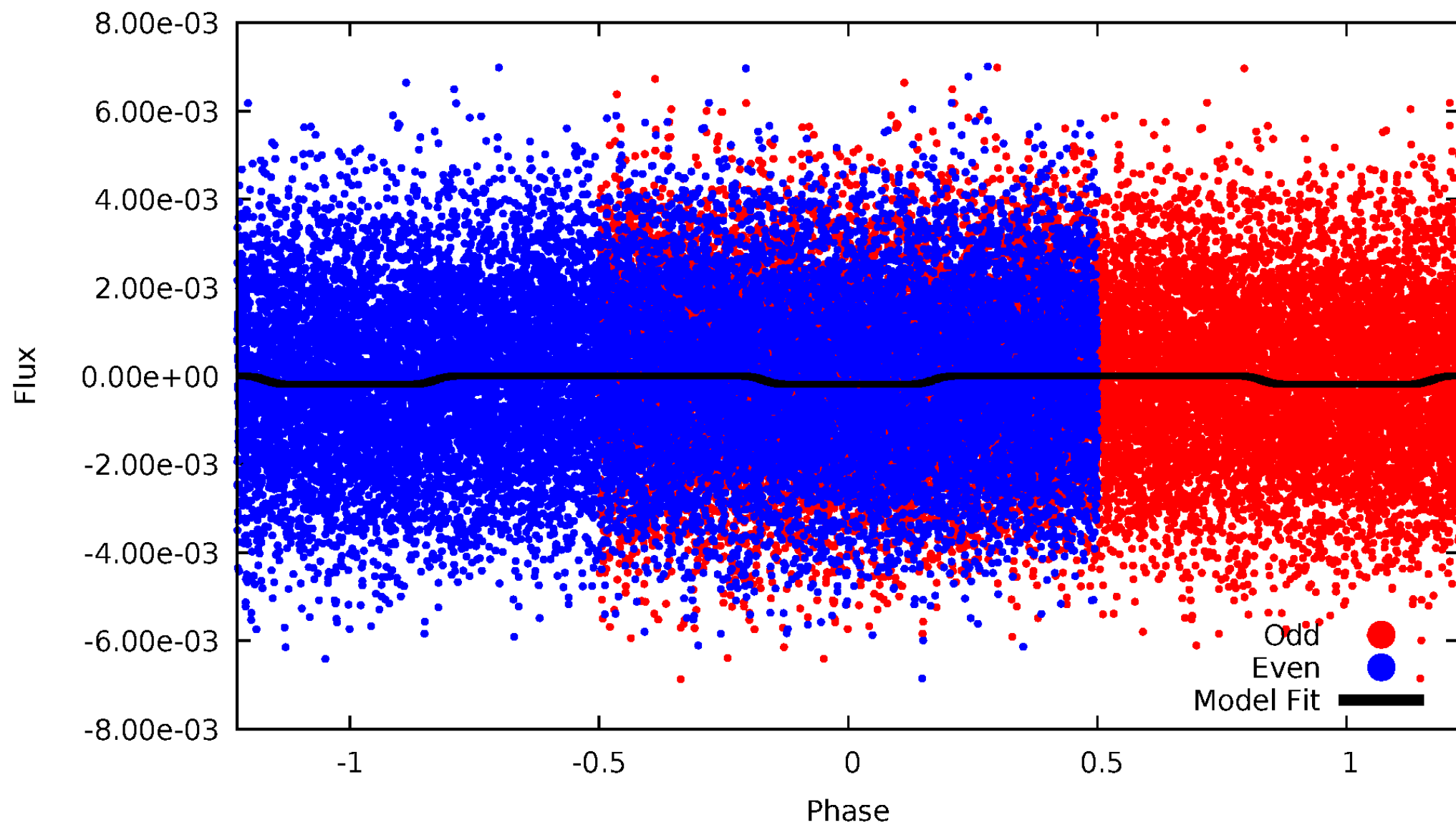
# DV Odd/Even

TCE 010462980-02



# ALT Odd/Even

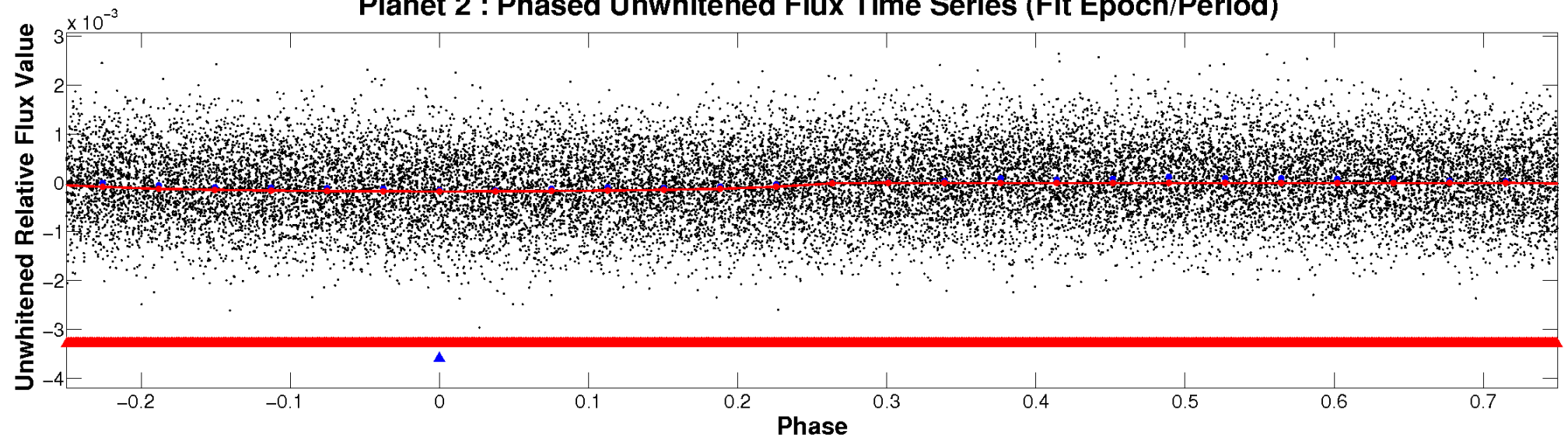
TCE 010462980-02



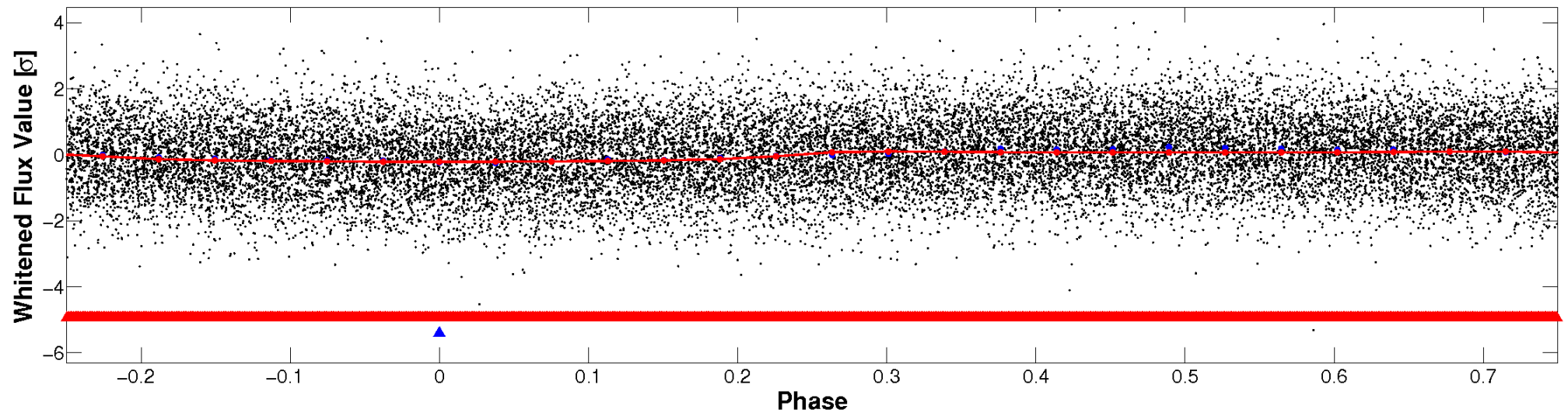


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



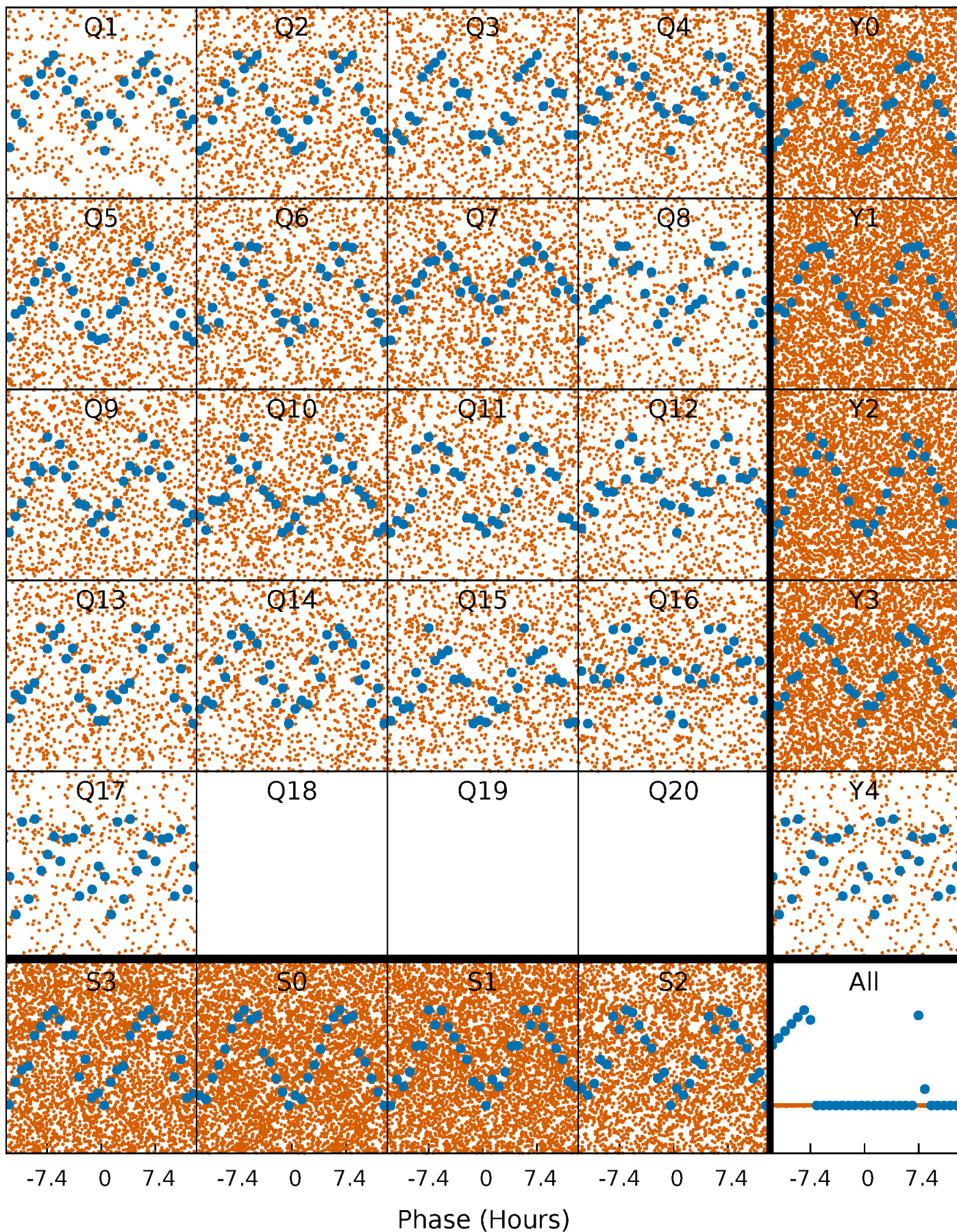
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





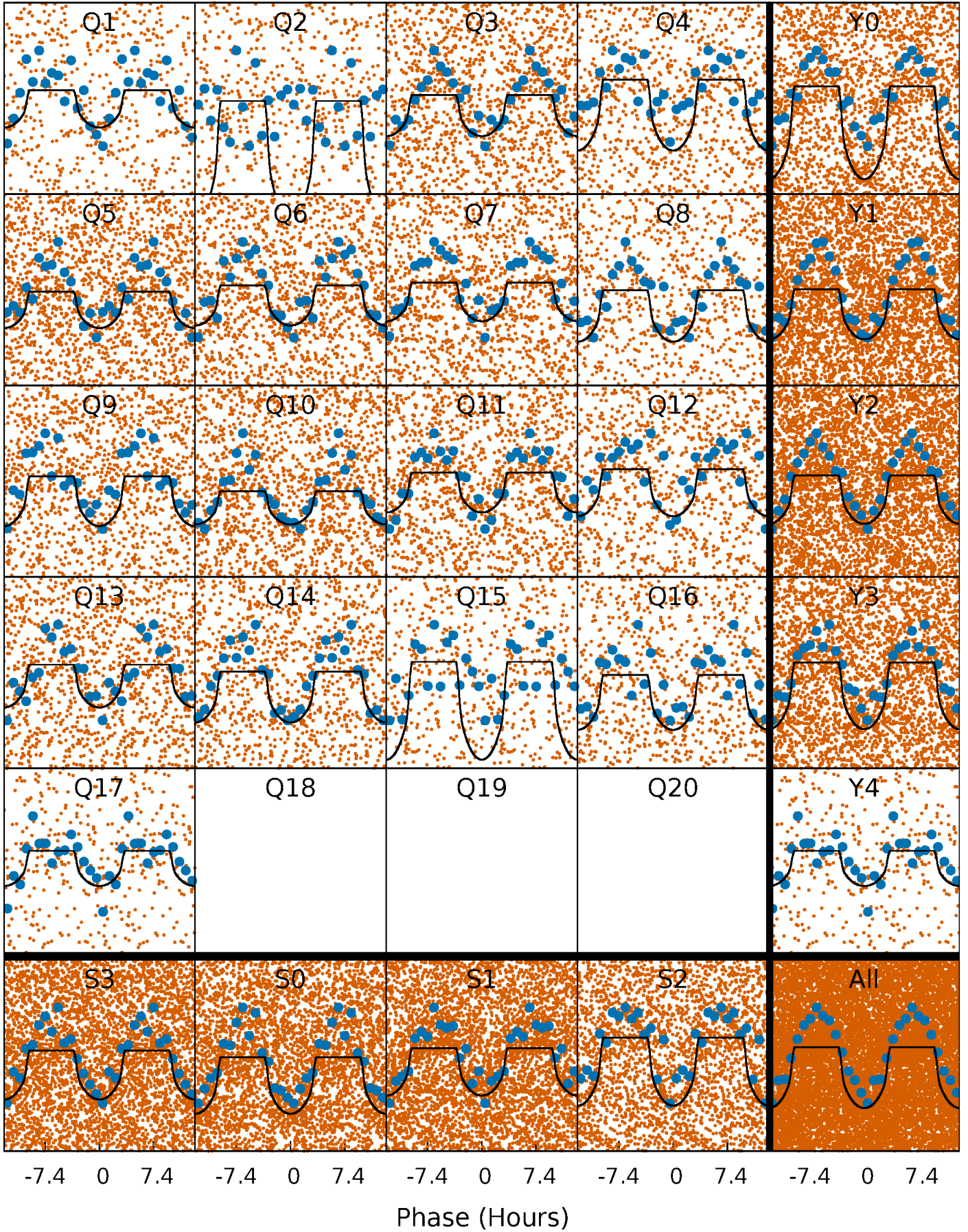
# PDC Quarter-Phased Transit Curves

TCE 010462980-02   P= 0.542963 Days    $T_0=131.668280$  (BKJD)



# DV Quarter-Phased Transit Curves

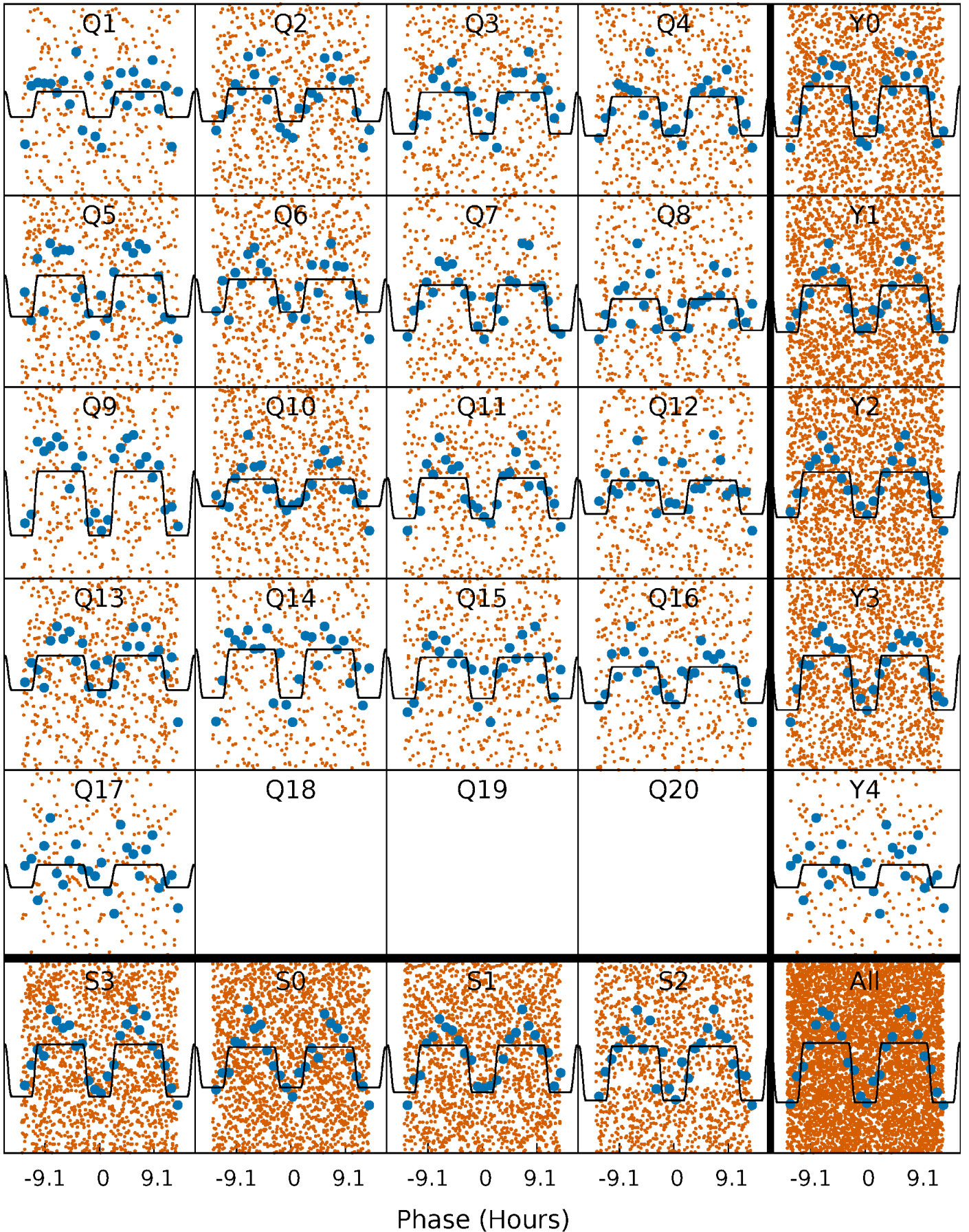
TCE 010462980-02     $P = 0.542963$  Days     $T_0 = 131.668280$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

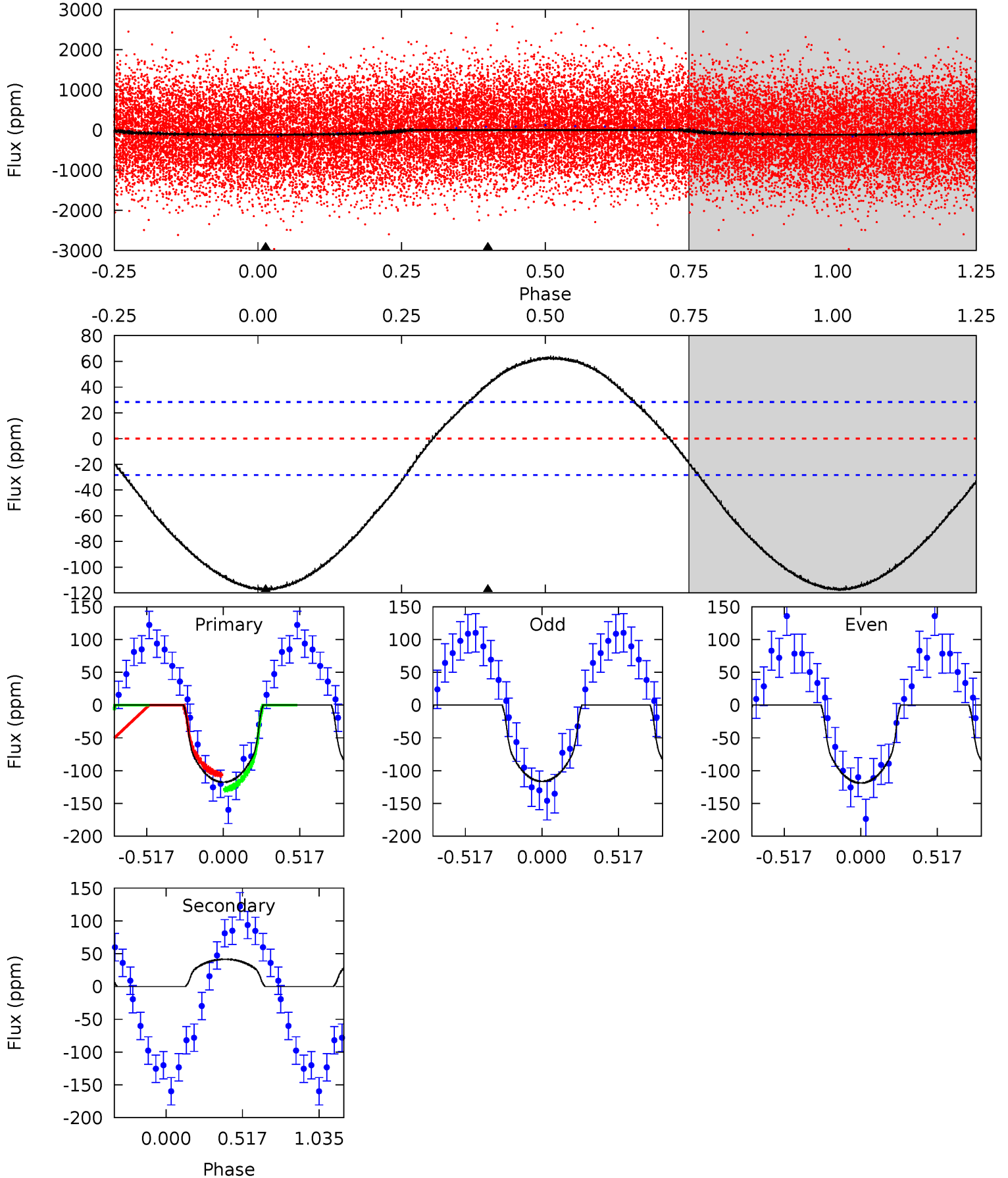
TCE 010462980-02     $P = 0.542972$  Days     $T_0 = 131.663995$  (BKJD)



# DV Model-Shift Uniqueness Test

010462980-02, P = 0.542963 Days, E = 131.668280 Days

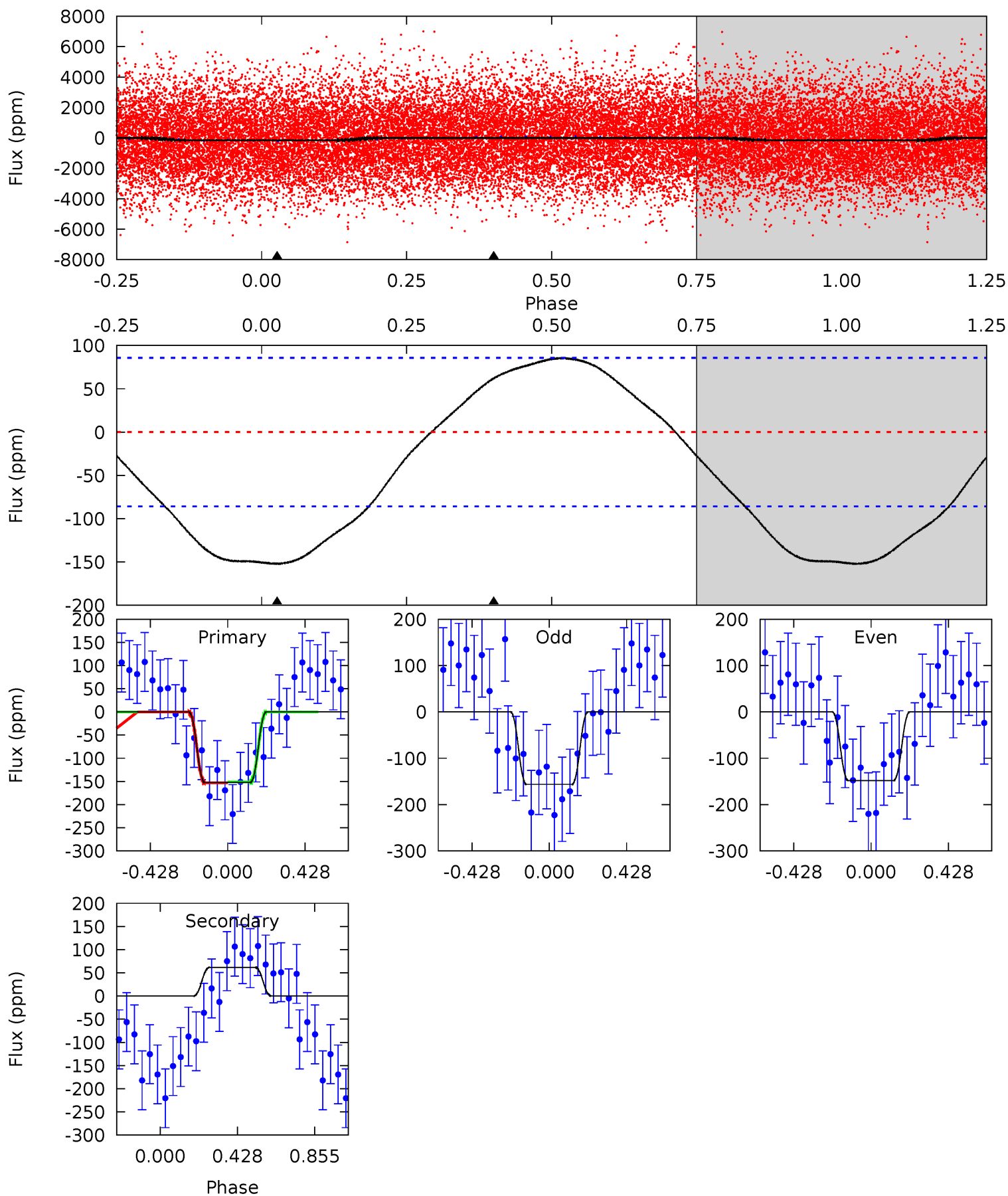
| Pri  | Sec   | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|-------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 17.5 | -6.17 | 0   | 0   | 4.21            | 0.65            | 2.27             | 17.5    | 17.5    | -6.17   | -6.17   | 0.19    | 1.01 | 0.35  | 1.64 |



# Alt Model-Shift Uniqueness Test

010462980-02, P = 0.542972 Days, E = 131.663995 Days

| Pri  | Sec   | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|-------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.55 | -3.07 | 0   | 0   | 4.25            | 0.79            | 1.00             | 7.55    | 7.55    | -3.07   | -3.07   | 0.21    | 1.21 | 0.36  | 0.04 |





### Stellar Parameters For KIC 010462980

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R (R_{\odot})$           | $M(M_{\odot})$            | $\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|--|
|        | $7700^{+211}_{-316}$ | $3.960^{+0.247}_{-0.133}$ | $-0.180^{+0.200}_{-0.300}$ | $2.280^{+0.486}_{-0.729}$ | $1.728^{+0.198}_{-0.322}$ | $0.205^{+0.314}_{-0.080}$                    |
|        | +3%/-4%              | +6%/-3%                   | +111%/-167%                | +21%/-32%                 | +11%/-19%                 | +153%/-39%                                   |
| Source | KIC0                 | KIC0                      | KIC0                       | DSEP                      |                           |  |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010462980-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$     | $T_{max} (K)$        | $T_{obs} (K)$          | $A_{obs}$                  |
|---------|-------------|------------------------|----------------------|------------------------|----------------------------|
| DV      | $42 \pm 7$  | $2.99^{+1.26}_{-1.25}$ | $5638^{+409}_{-466}$ | $-5988^{+570}_{-1346}$ | $-0.613^{+0.314}_{-1.286}$ |
| Alt.    | $62 \pm 20$ | $3.30^{+1.27}_{-1.12}$ | $5650^{+403}_{-492}$ | $-6166^{+673}_{-1339}$ | $-0.732^{+0.397}_{-1.095}$ |

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

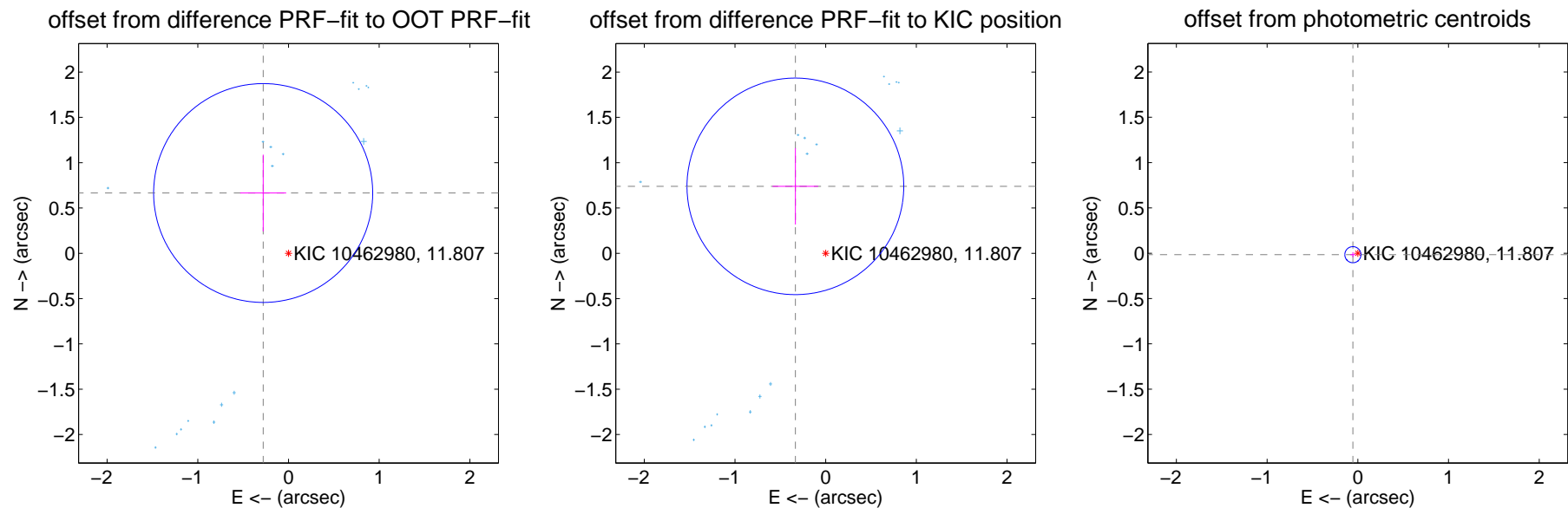
## DV Centroid Data

Supplemental centroid analysis for 010462980-02. **Kepler magnitude: 11.81.** Transit SNR 19.95

There are 17 quarters with good PRF difference image offsets

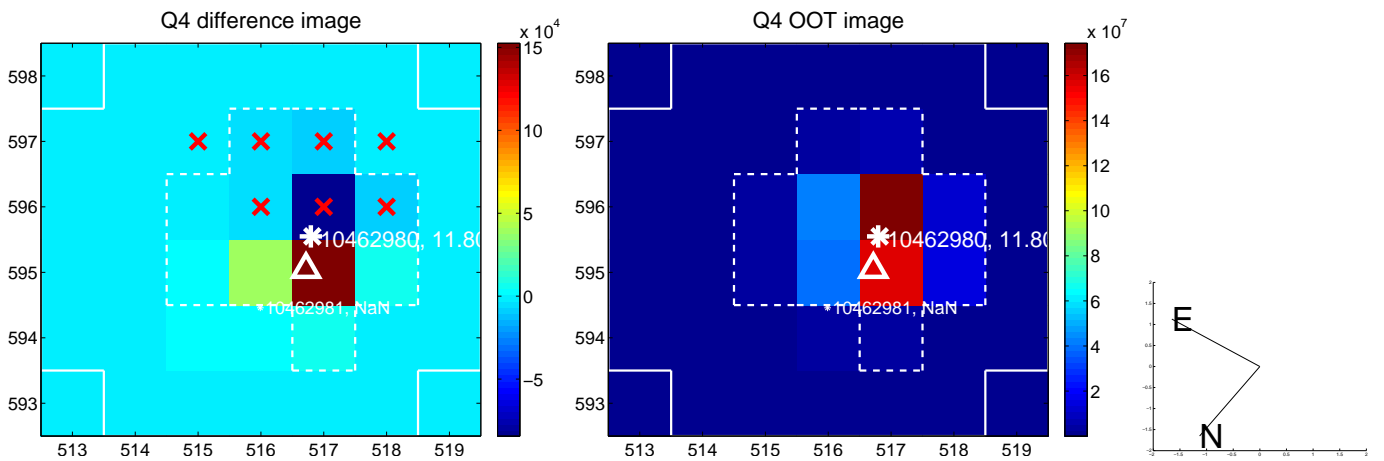
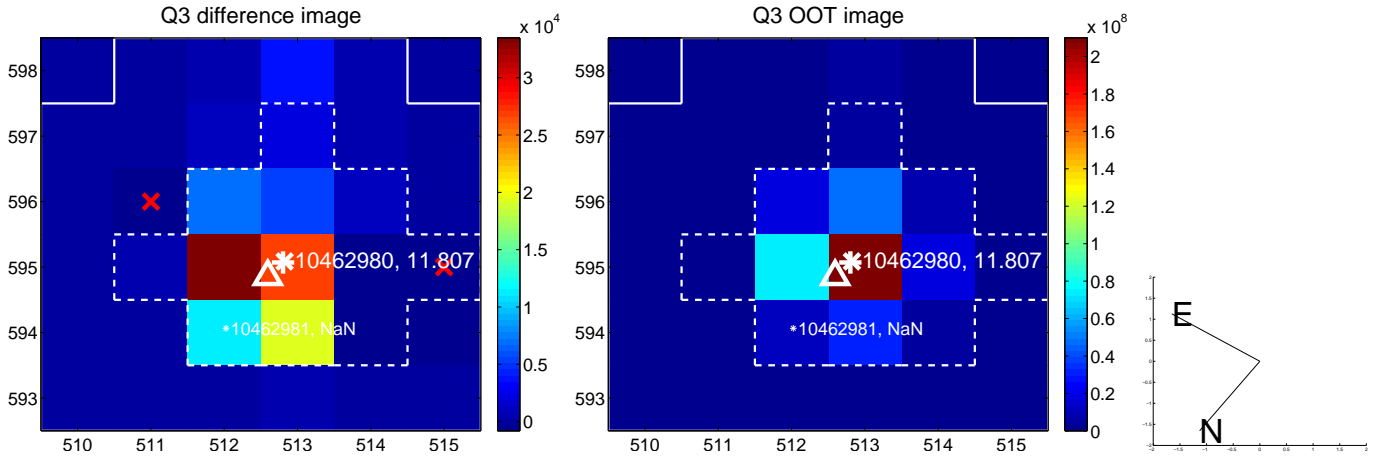
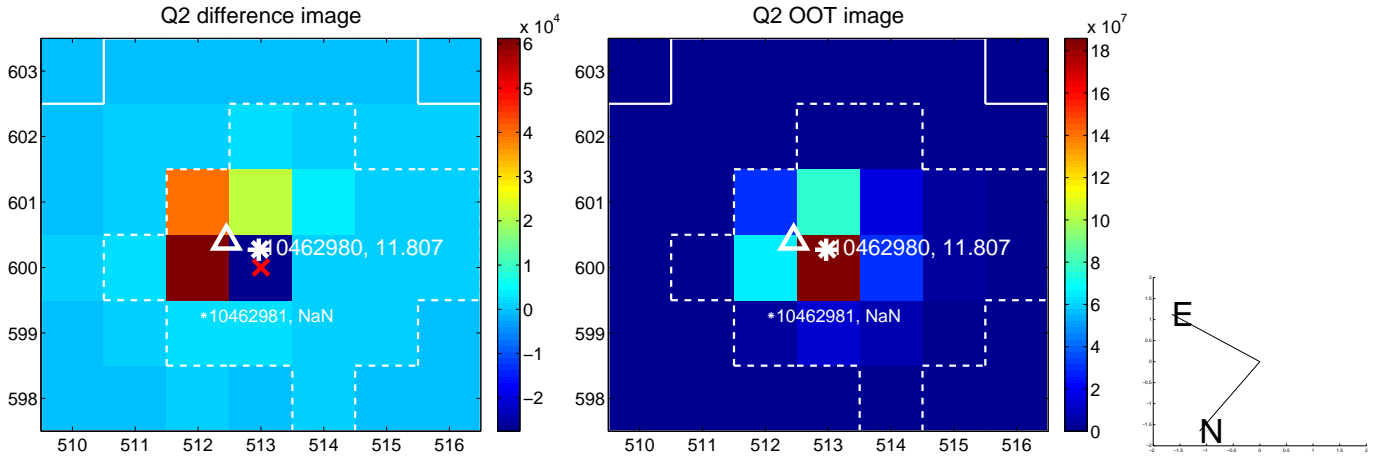
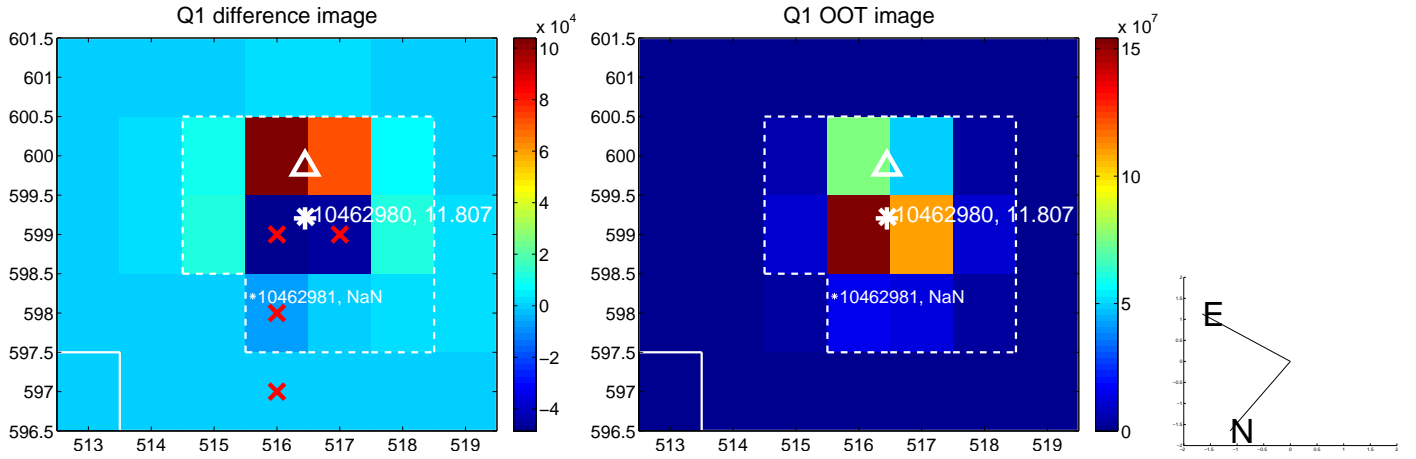
The direct PRF centroid is offset from the target star catalog position by about 0.12 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec      |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT          | $0.721 \pm 0.402$  | 1.79                | $0.279 \pm 0.254$ | $0.665 \pm 0.423$ |
| PRF-fit source offset from KIC position | $0.811 \pm 0.398$  | 2.04                | $0.334 \pm 0.251$ | $0.739 \pm 0.422$ |
| photometric centroid source offset      | $0.06 \pm 0.03$    | 1.92                | $0.05 \pm 0.03$   | $-0.02 \pm 0.03$  |

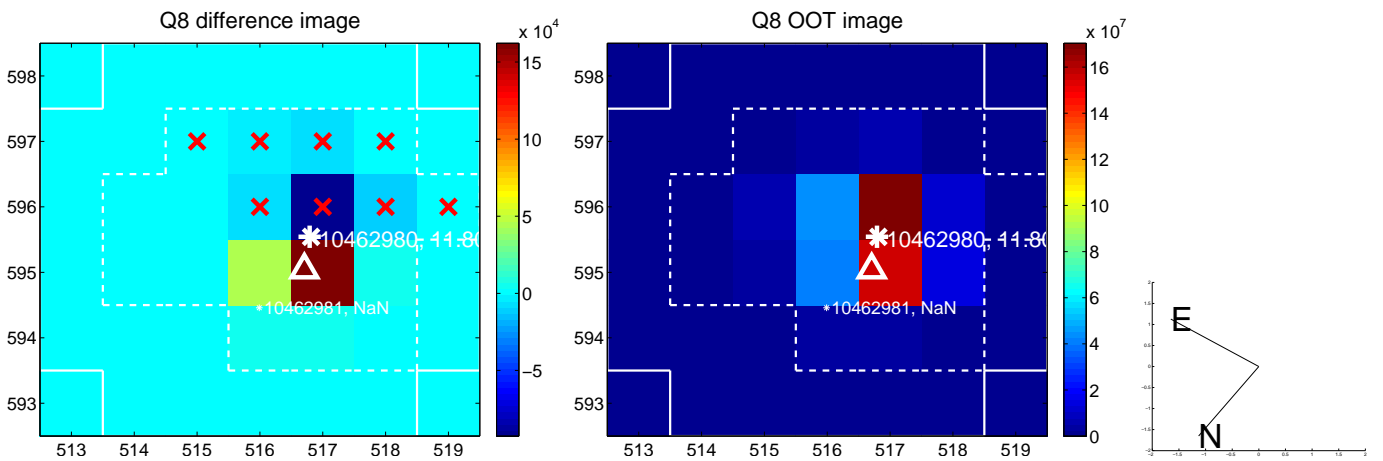
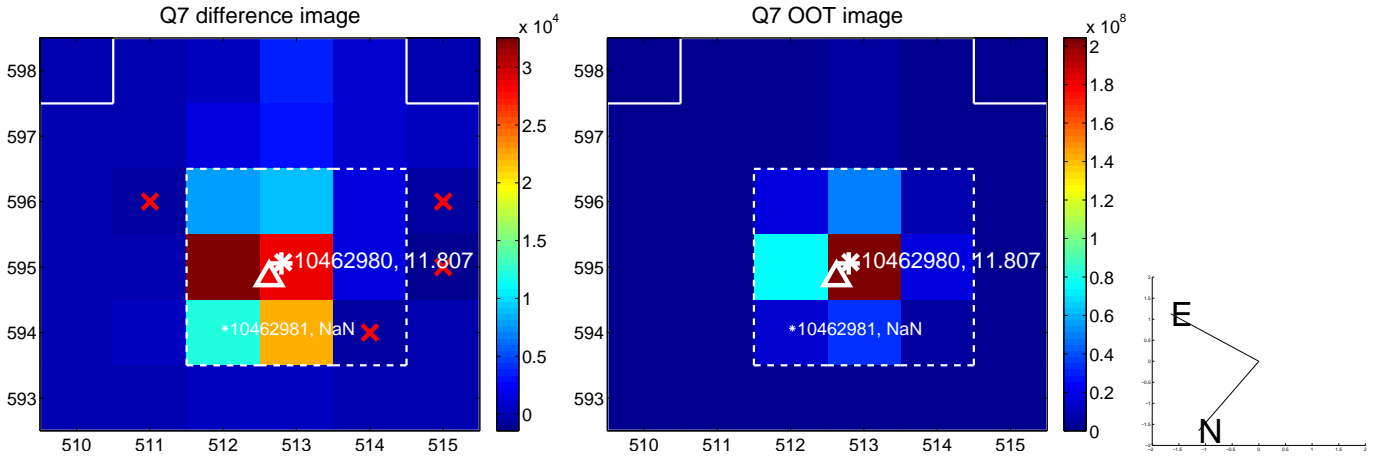
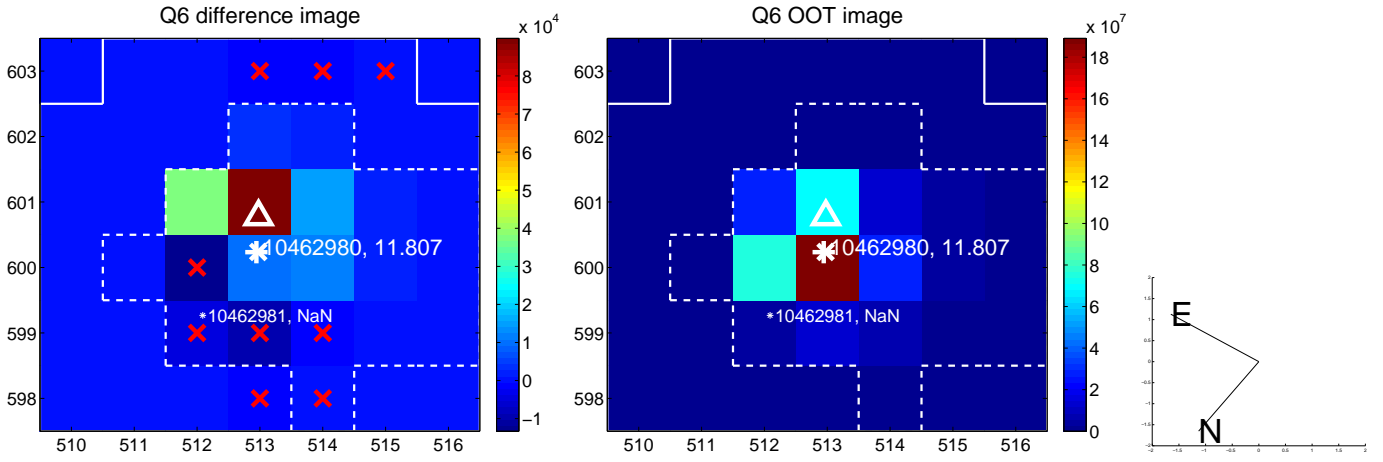
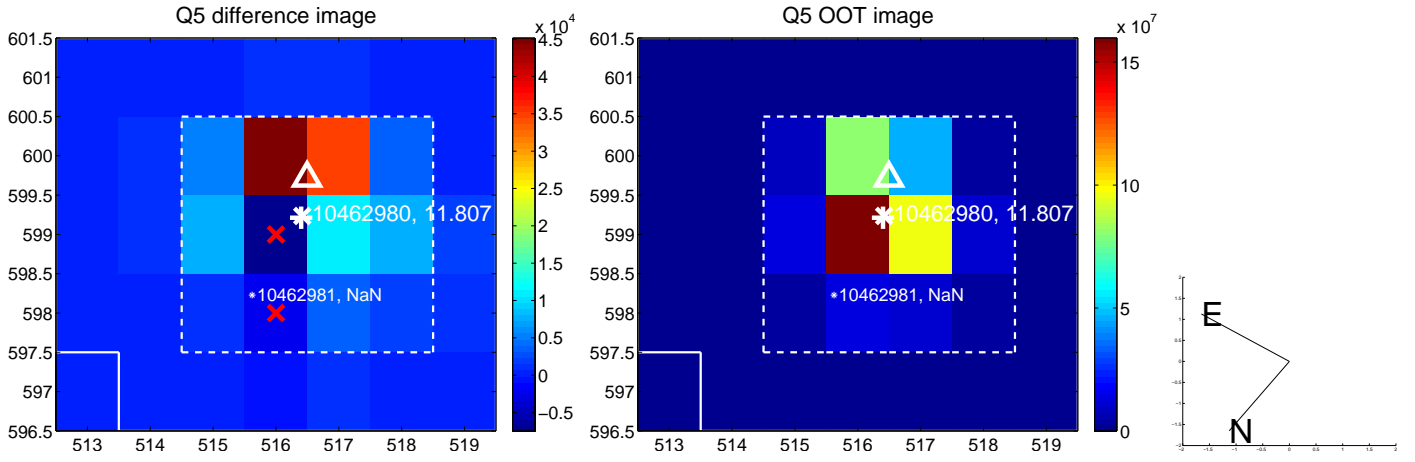


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

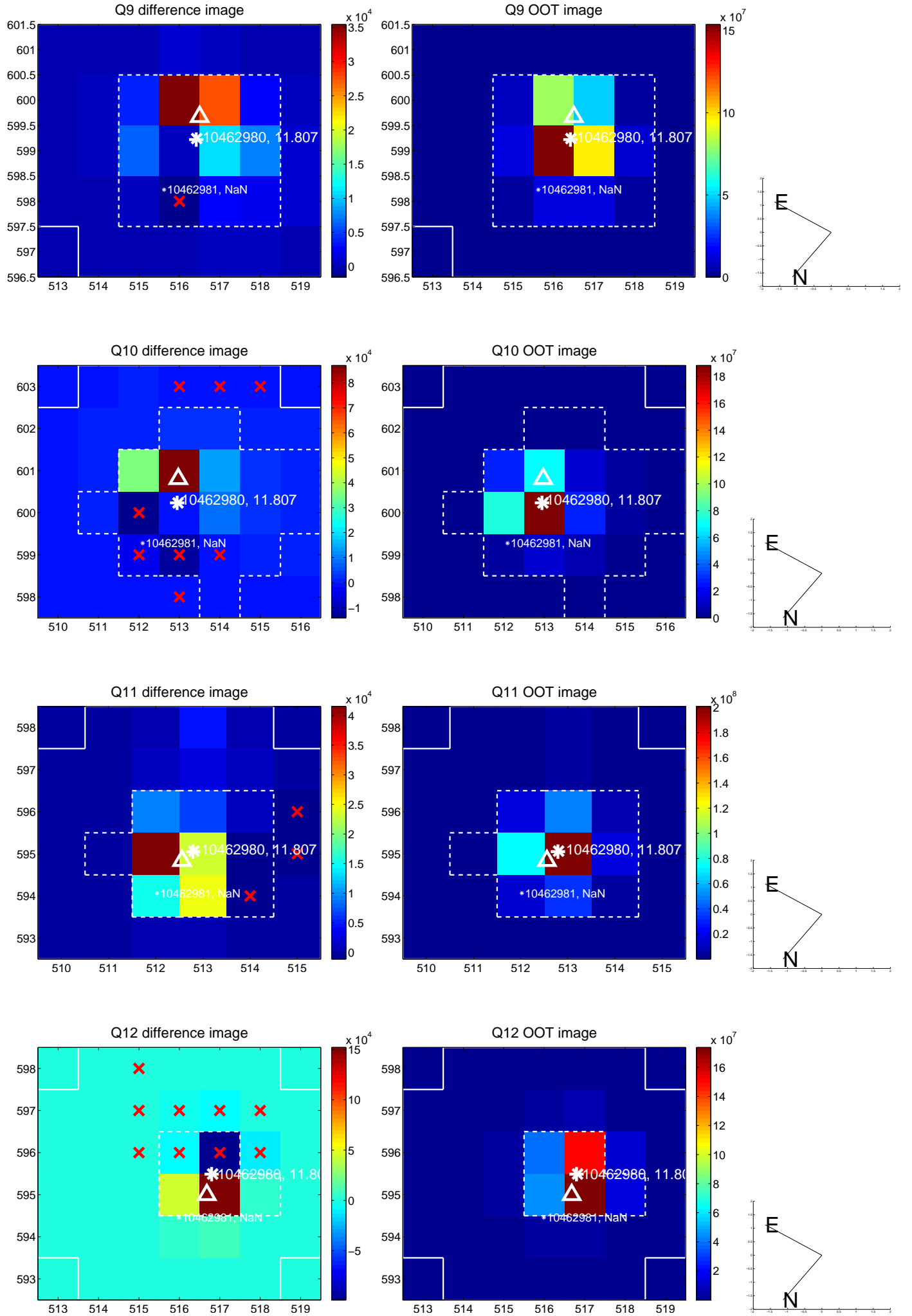


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

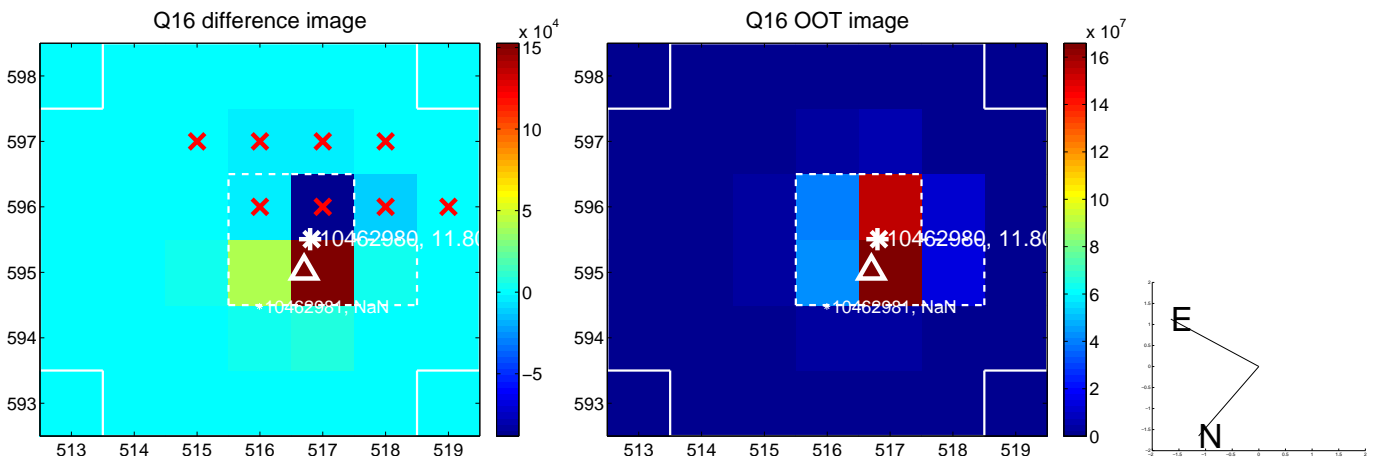
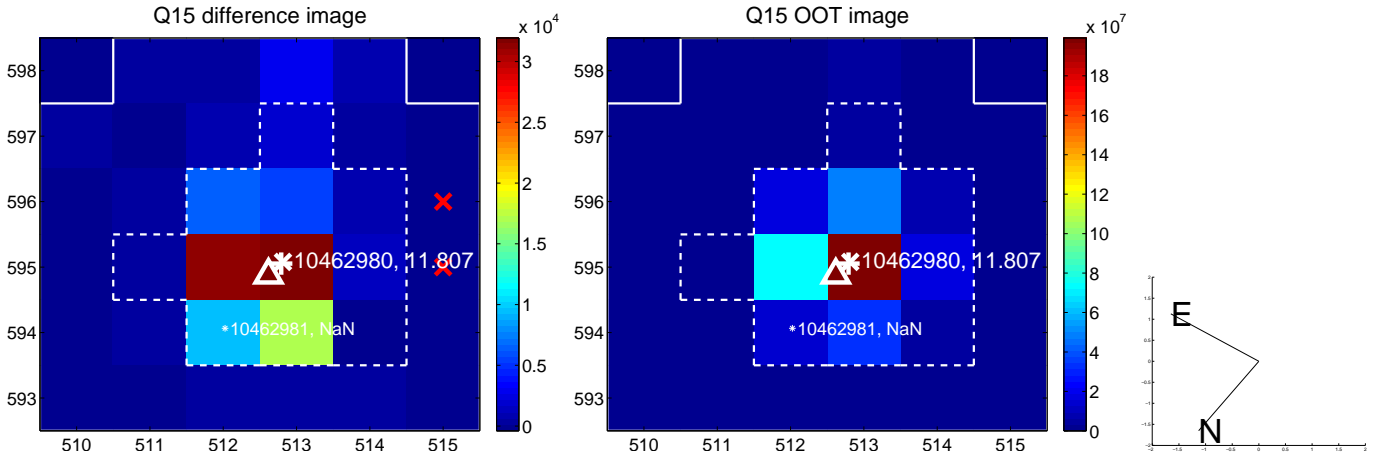
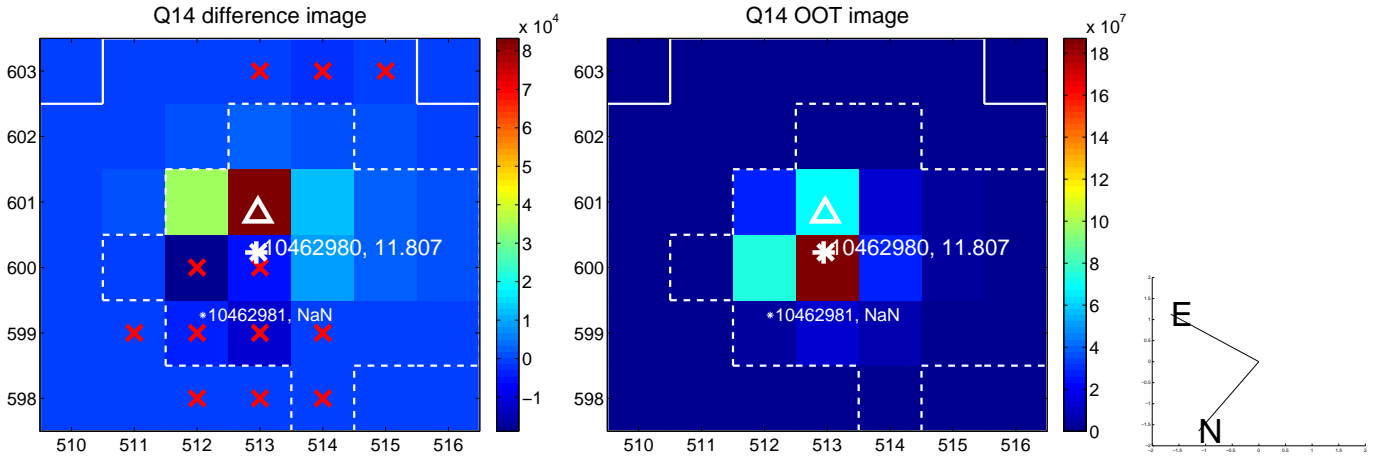
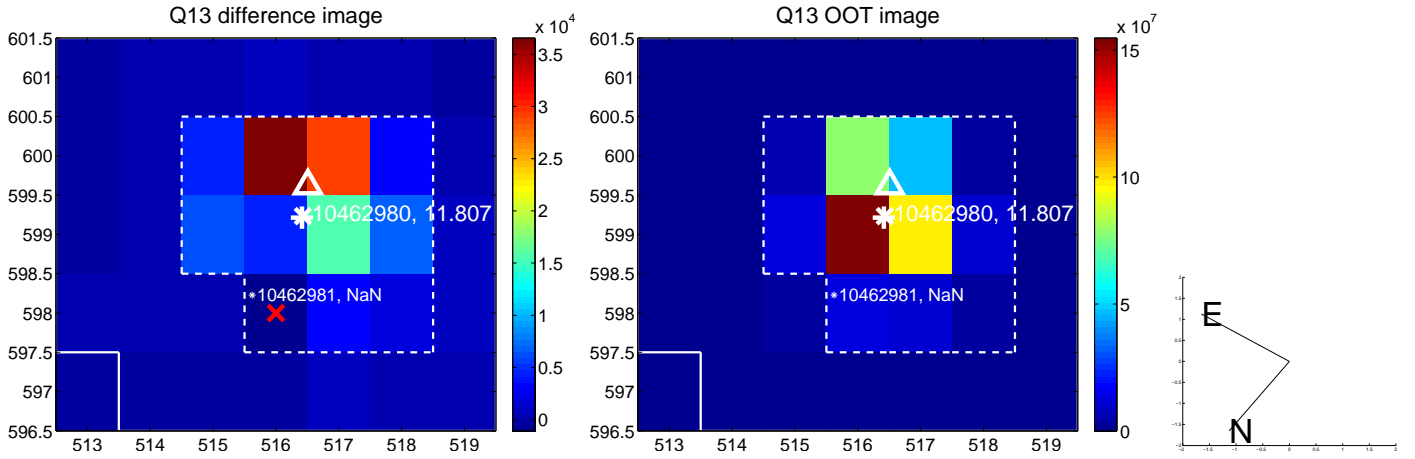




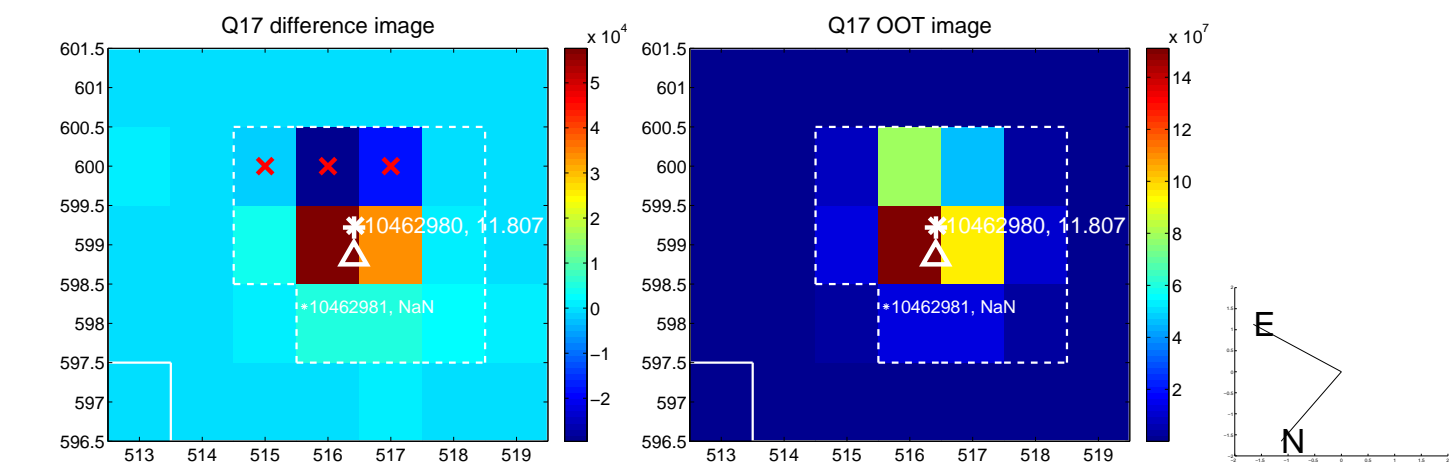
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



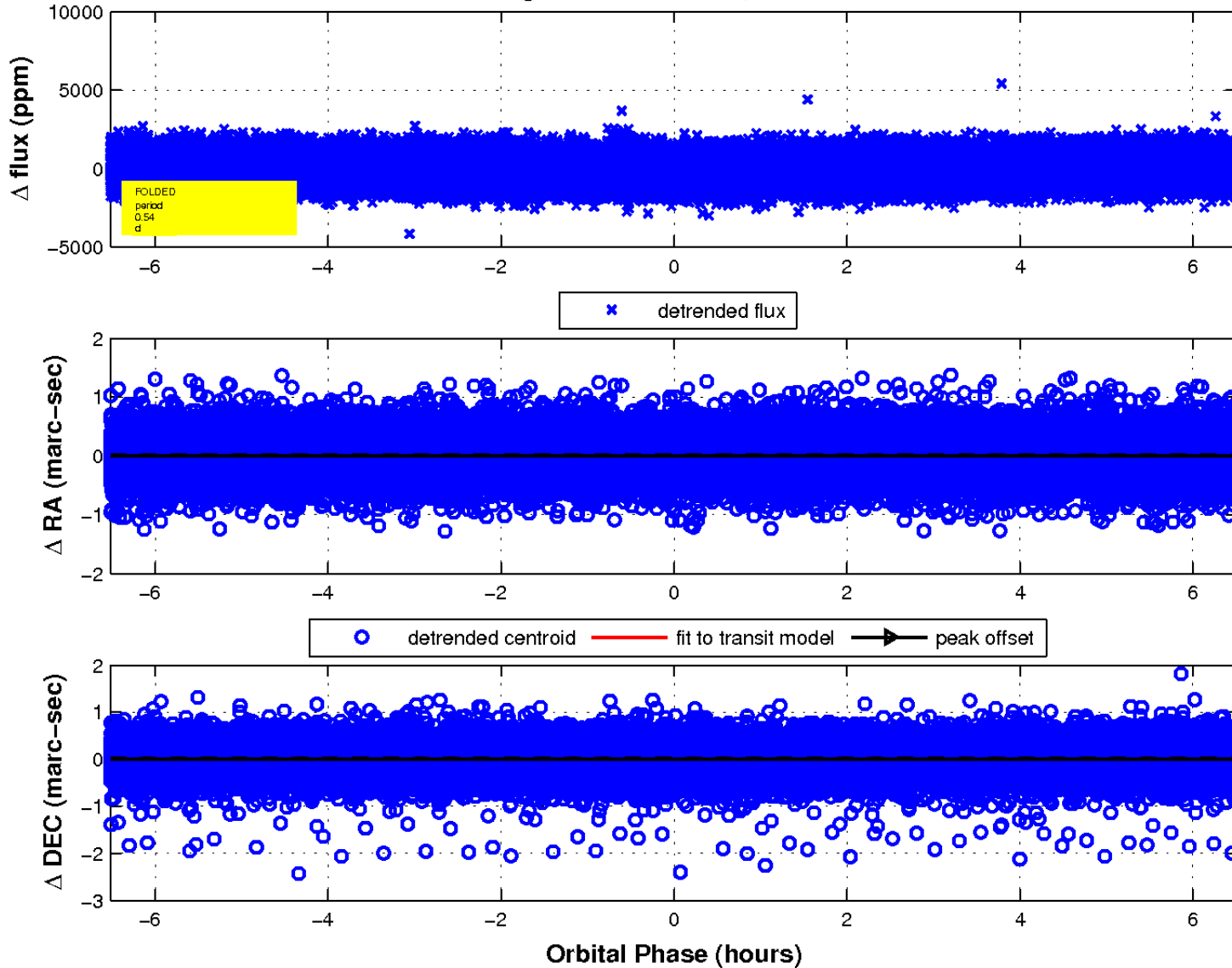
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

