

# KIC 004263293

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004263293-01 | OBS      | 1895.01 | 8.457448      | 133.873591   | 1279.8      | 2.508            | 30.9 | 33.9 | 0.52                        | 4347            | 2.14                   | 20.12                  |
| 004263293-02 | OBS      | 1895.02 | 17.281203     | 136.006152   | 1409.4      | 2.933            | 25.3 | 28.5 | 0.52                        | 4347            | 2.23                   | 7.76                   |
| 004263293-03 | OBS      | 1895.03 | 32.133907     | 142.276212   | 1104.4      | 2.577            | 13.9 | 14.3 | 0.52                        | 4347            | 1.88                   | 3.39                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments         |
|--------------|----------|------|-------|---|---|---|---|------------------|
| 004263293-01 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT       |
| 004263293-02 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT       |
| 004263293-03 | OBS      | FP   | 0.24  | 0 | 1 | 0 | 0 | DEPTH_ODDEVEN_DV |

**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.

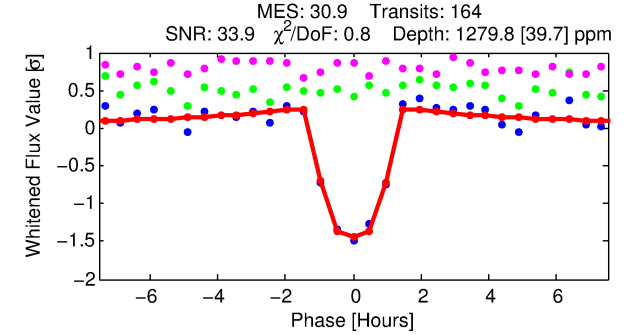
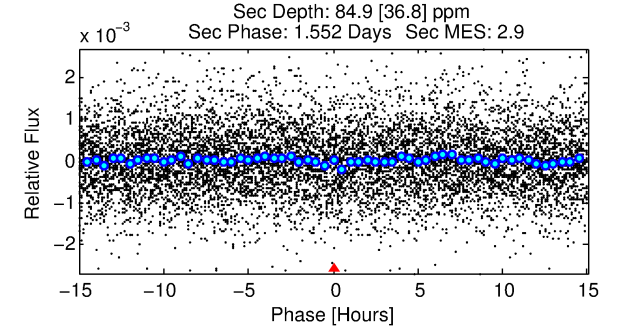
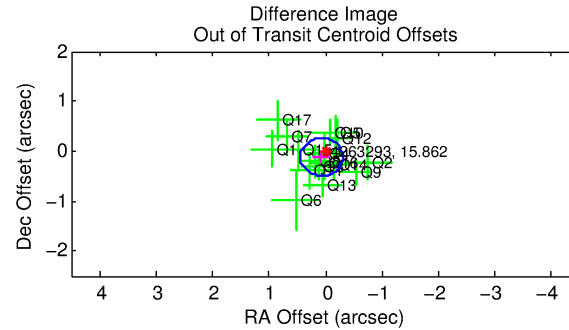
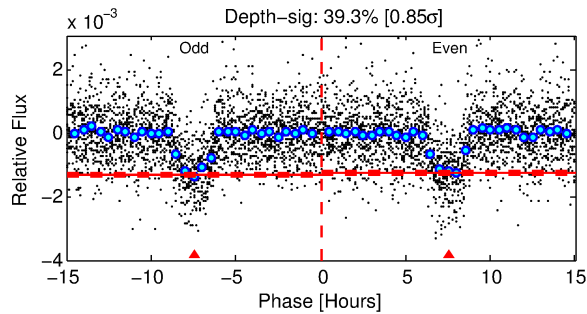
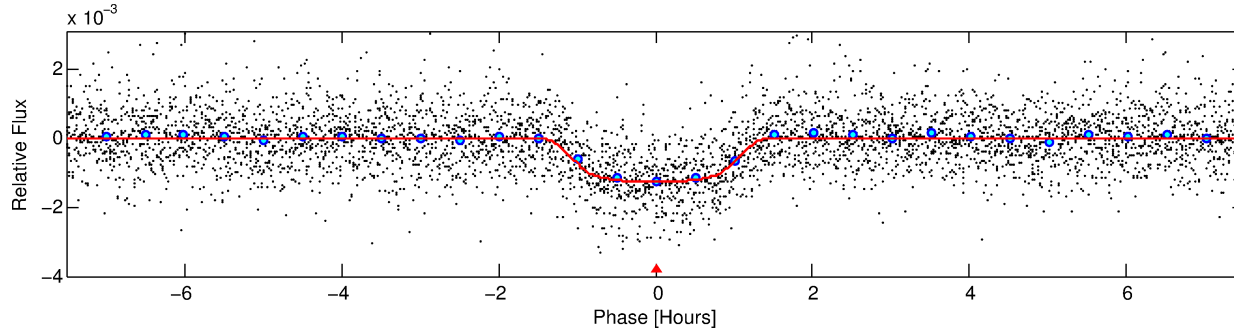
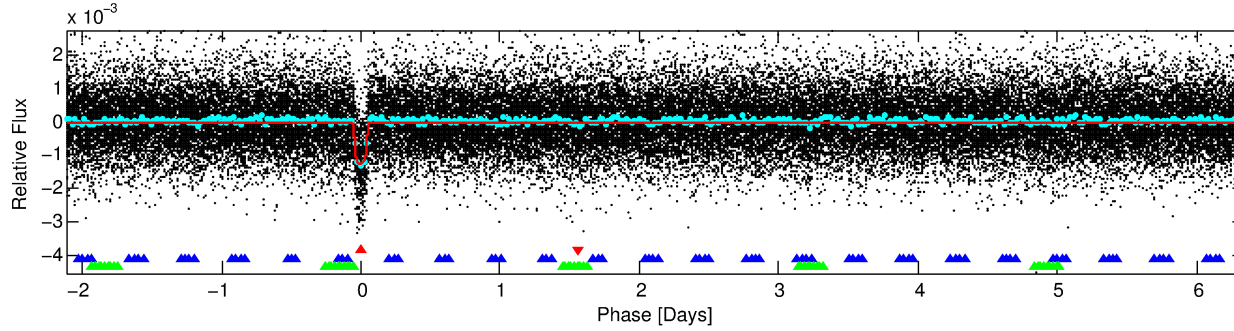
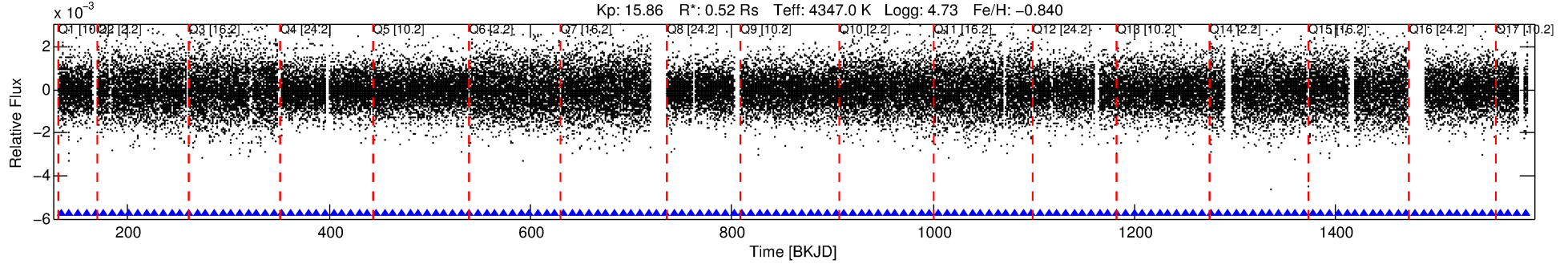
Ephemeris Match Information For 004263293-01

No Significant Match Found

# DV One-Page Summary

KIC: 4263293 Candidate: 1 of 3 Period: 8.457 d  
KOI: K01895.01 Name: Kepler-331b Corr: 0.949

Kp: 15.86 R\*: 0.52 Rs Teff: 4347.0 K Logg: 4.73 Fe/H: -0.840



## DV Fit Results:

Period = 8.45745 [0.00002] d  
Epoch = 133.8736 [0.0015] BKJD  
Rp/R\* = 0.0375 [0.0047]  
a/R\* = 15.75 [7.92]  
b = 0.84 [0.18]  
Seff = 20.12 [3.27]  
Teq = 540 [22] K  
Rp = 2.14 [0.32] Re  
a = 0.0661 [0.0046] AU  
Ag = 44.41 [22.59] [1.92σ]  
Teffp = 2155 [278] K [5.79σ]

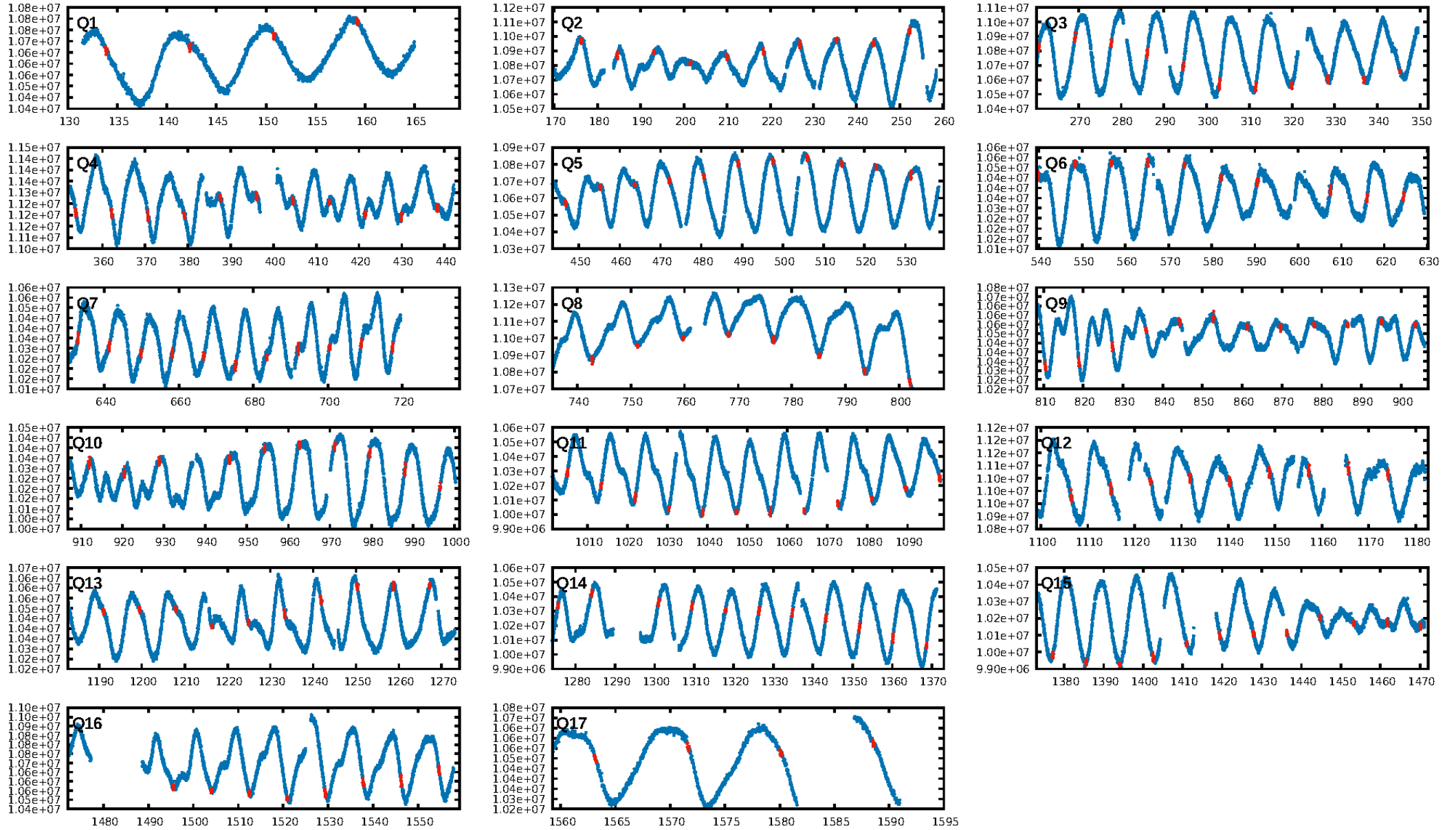
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [54.88σ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.04e-204  
RollingBand-fgt: 1.00 [156/156]  
GhostDiagnostic-chr: 1.67  
Centroid-sig: 12.4%  
Centroid-so: 0.312 arcsec [0.93σ]  
OotOffset-rm: 0.138 arcsec [1.10σ]  
KicOffset-rm: 0.246 arcsec [1.92σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

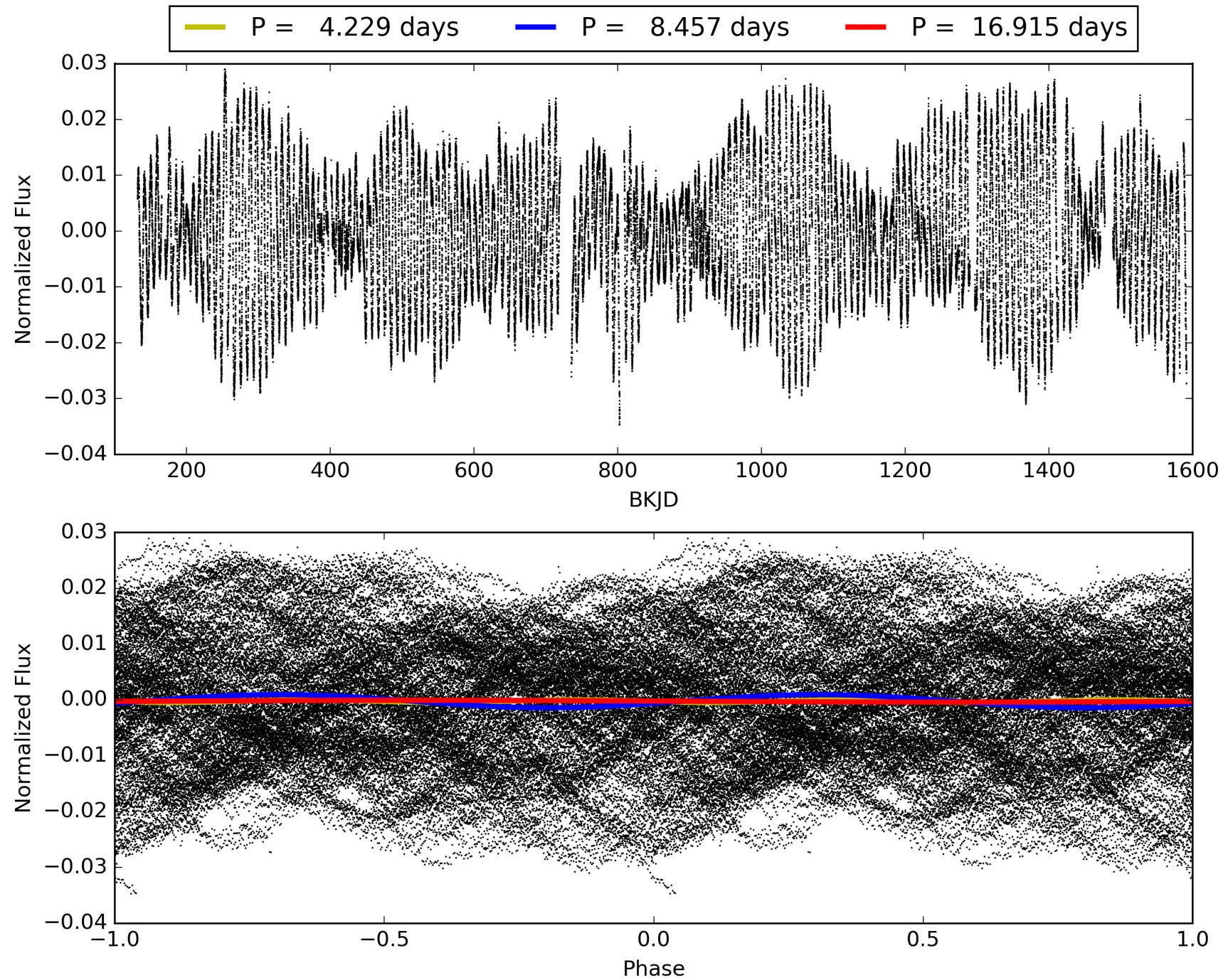
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:13:42 Z

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

# TCE 004263293-01, PDC Light Curves



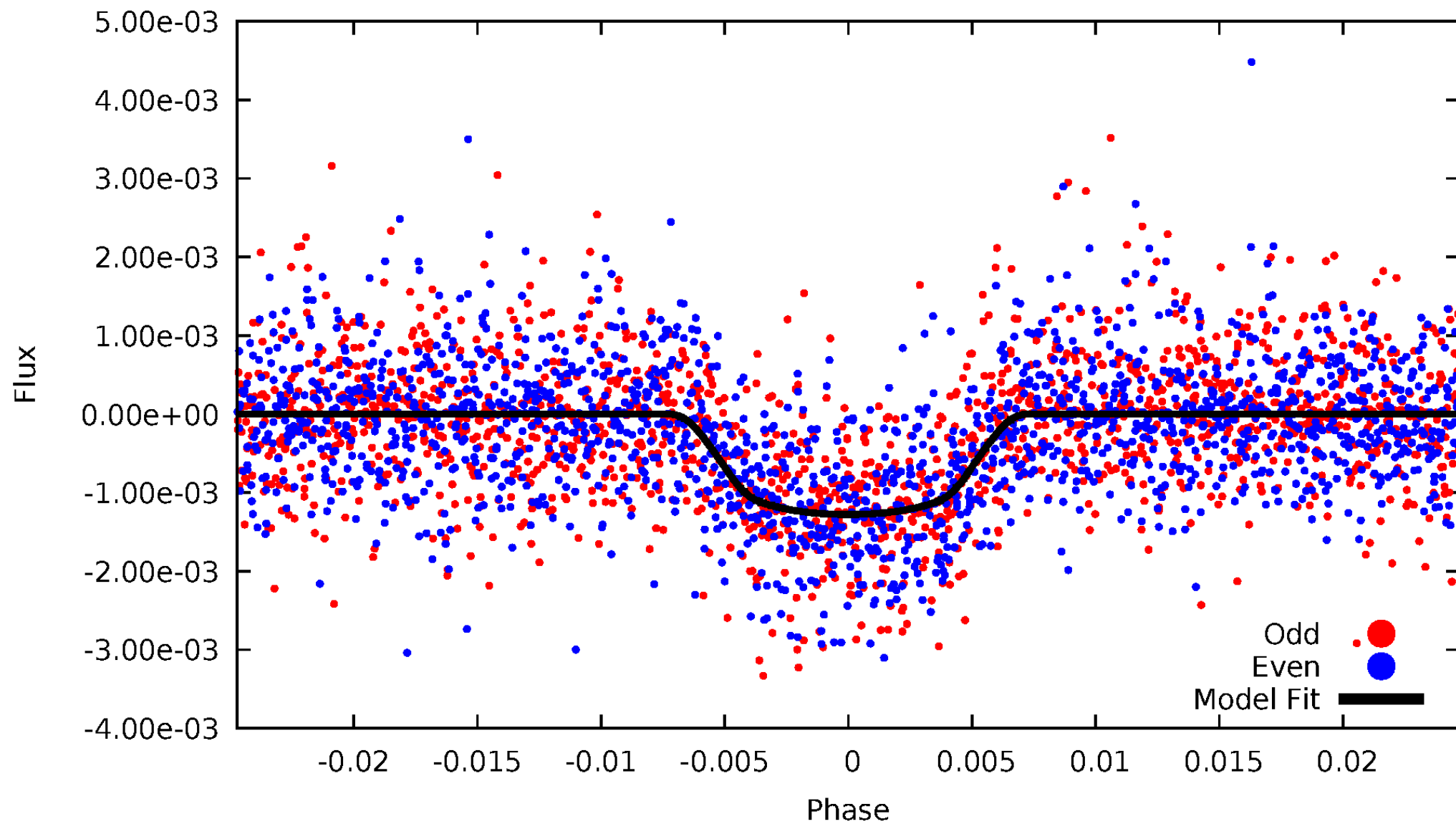
TCE 004263293-01





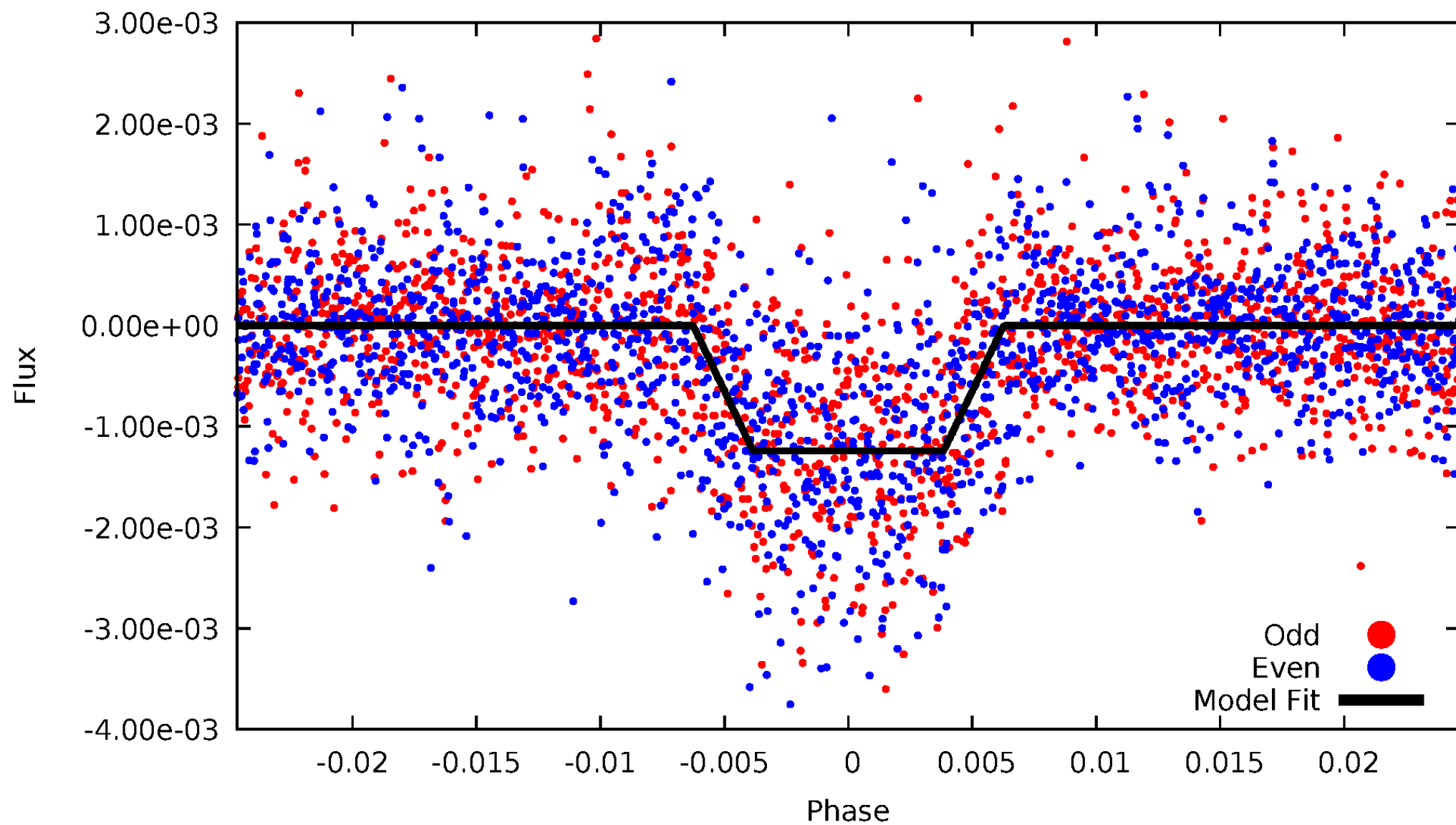
# DV Odd/Even

TCE 004263293-01



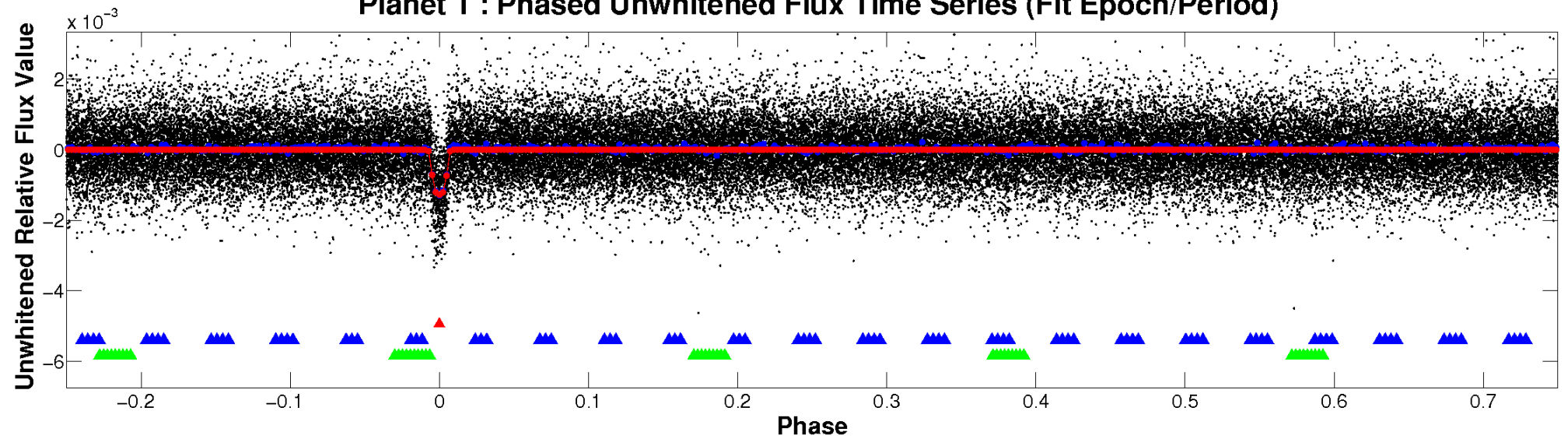
# ALT Odd/Even

TCE 004263293-01

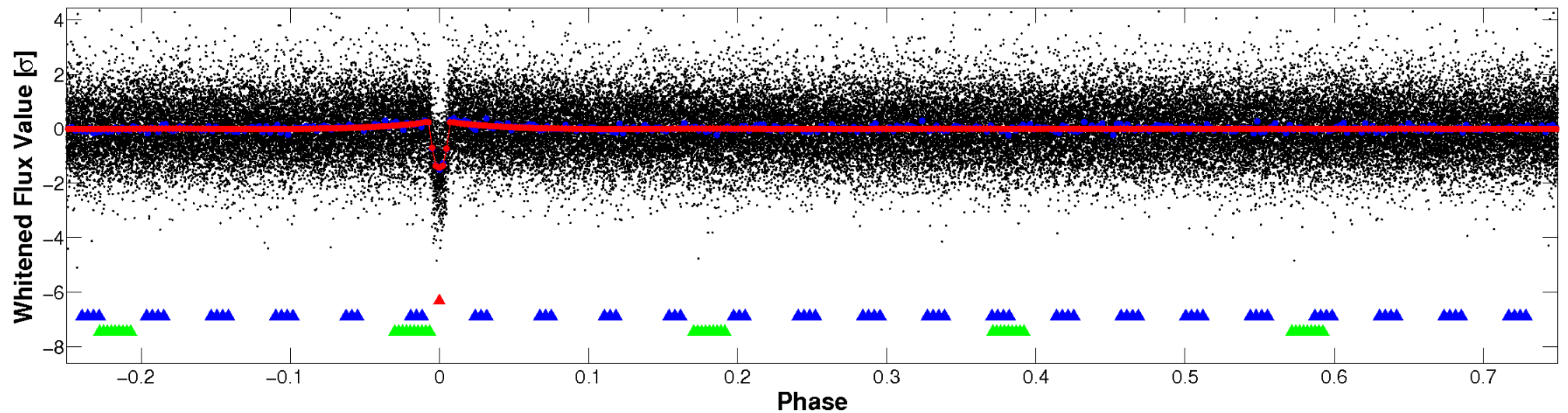


# Non-Whitened Vs. Whitened Light Curve

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

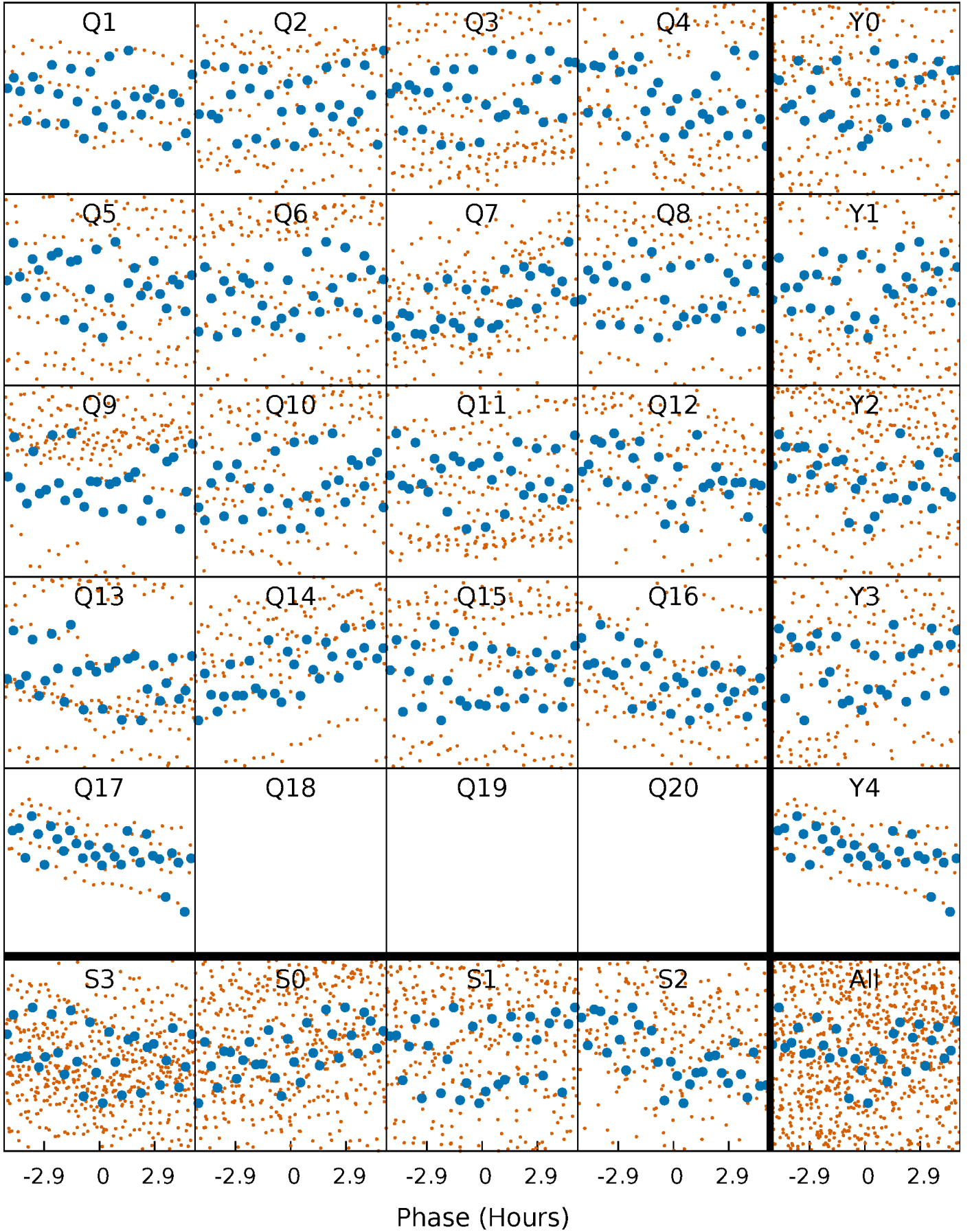


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

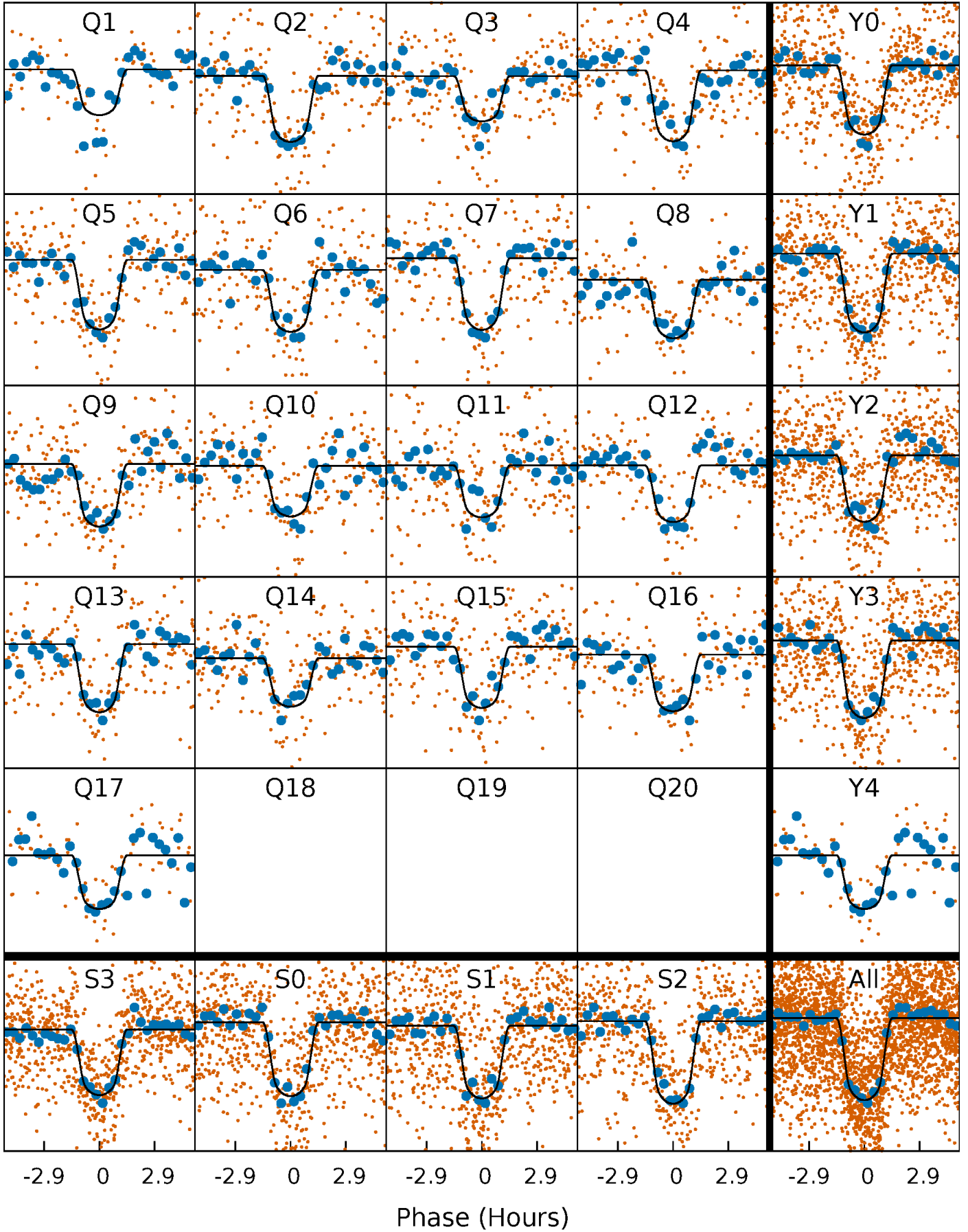
TCE 004263293-01   P= 8.457448 Days    $T_0=133.873591$  (BKJD)





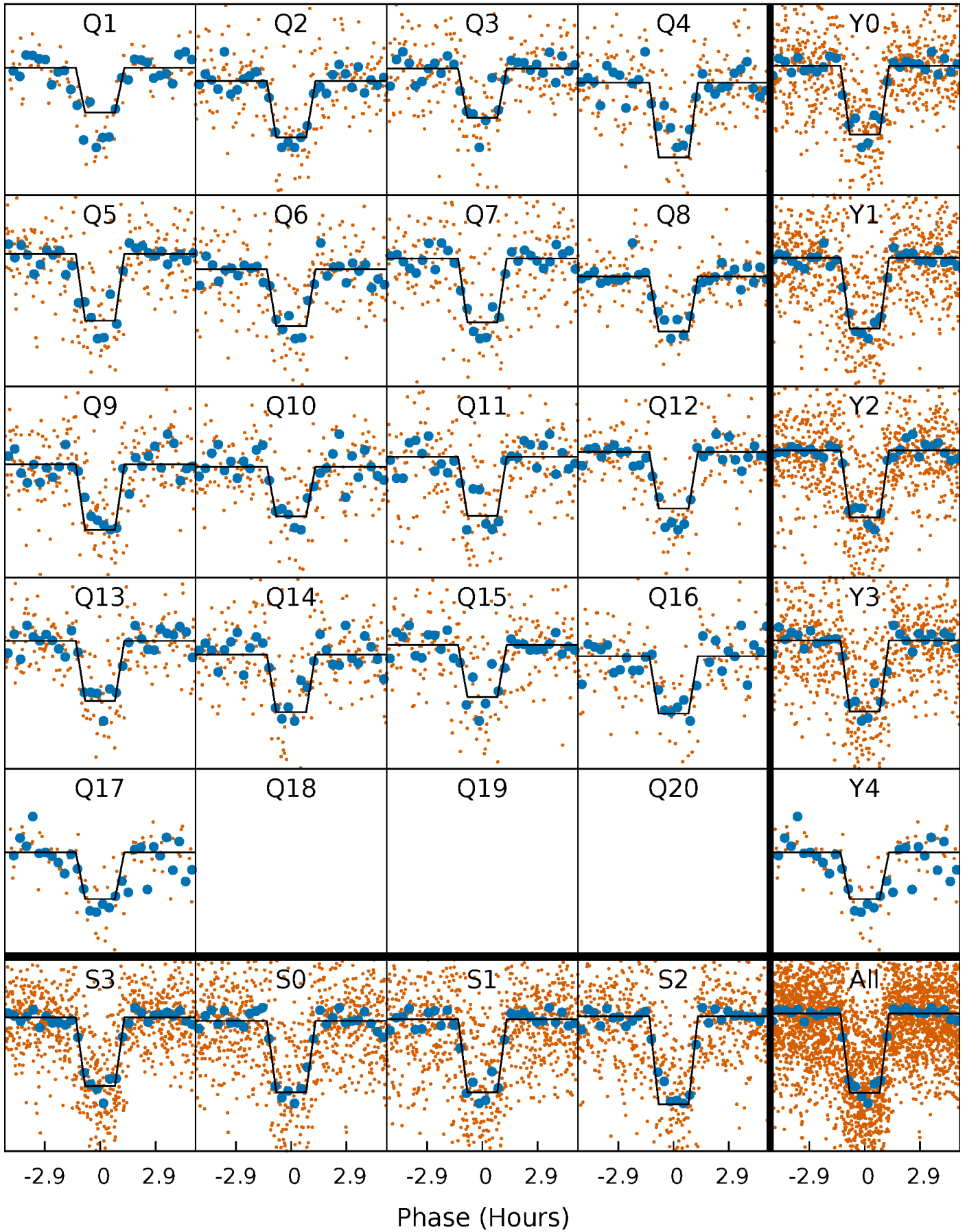
# DV Quarter-Phased Transit Curves

TCE 004263293-01 P= 8.457448 Days  $T_0=133.873591$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

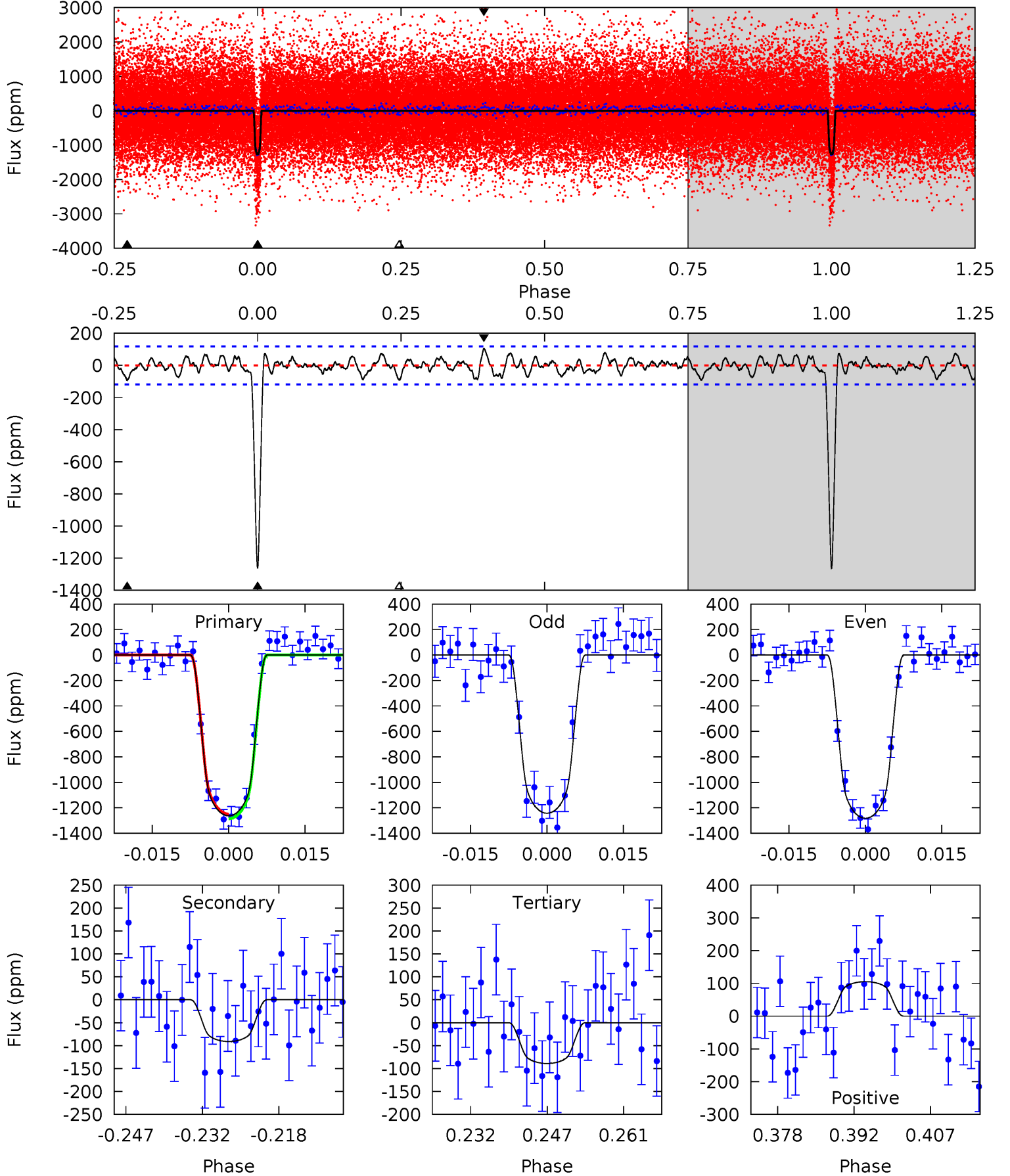
TCE 004263293-01     $P = 8.457436$  Days     $T_0 = 133.874505$  (BKJD)



# DV Model-Shift Uniqueness Test

004263293-01, P = 8.457448 Days, E = 125.416143 Days

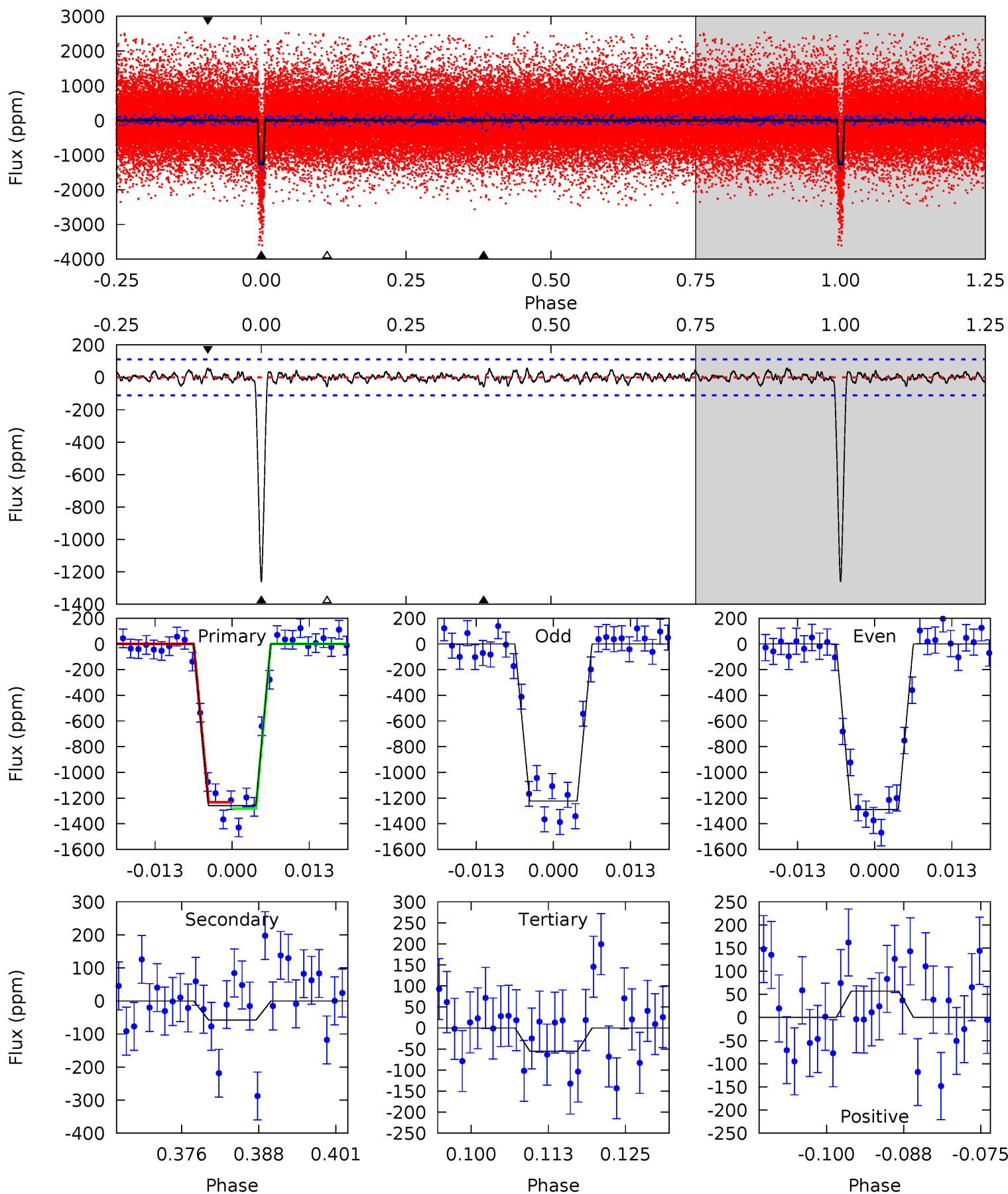
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 52.9 | 3.81 | 3.73 | 4.40 | 4.95            | 2.44            | 1.44             | 49.1    | 48.5    | 0.09    | -0.59   | 0.82    | 1.02 | 0.08  | 0.75 |



# Alt Model-Shift Uniqueness Test

004263293-01, P = 8.457436 Days, E = 125.417069 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 56.5 | 2.60 | 2.48 | 2.55 | 4.98            | 2.50            | 0.84             | 54.0    | 53.9    | 0.12    | 0.05    | 1.50    | 1.03 | 0.04  | 1.11 |





### Stellar Parameters For KIC 004263293

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $4347^{+117}_{-143}$ | $4.730^{+0.050}_{-0.041}$ | $-0.840^{+0.300}_{-0.350}$ | $0.524^{+0.045}_{-0.045}$ | $0.537^{+0.043}_{-0.043}$ | $5.272^{+1.142}_{-0.853}$                     |
|        | +3%/-3%              | +1%/-1%                   | +36%/-42%                  | +9%/-9%                   | +8%/-8%                   | +22%/-16%                                     |
| Source | PHO1                 | 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 004263293-01 / KOI 1895.01

| Detrend | Depth (ppm)  | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K) | $A_{\text{obs}}$ |
|---------|--------------|------------------------|----------------------|----------------------|------------------|
| DV      | $-91 \pm 24$ | $2.14^{+0.29}_{-0.27}$ | $752^{+24}_{-30}$    | $2809^{+152}_{-158}$ | $48^{+21}_{-16}$ |
| Alt.    | $-58 \pm 22$ | $2.00^{+0.32}_{-0.28}$ | $752^{+26}_{-26}$    | $2689^{+173}_{-173}$ | $34^{+19}_{-14}$ |

$T_{\text{max}}$  = 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  $A_{\text{obs}} \gg 1.0$

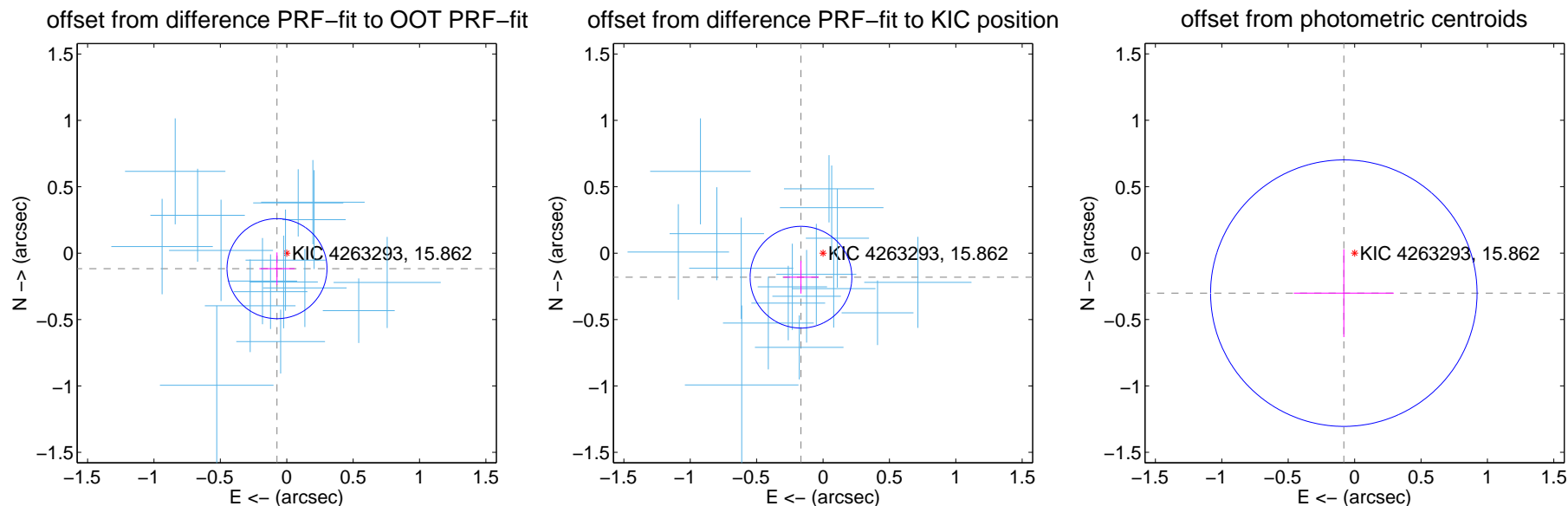
## DV Centroid Data

Supplemental centroid analysis for 004263293-01. Kepler magnitude: 15.86. Transit SNR 33.91

There are 17 quarters with good PRF difference image offsets

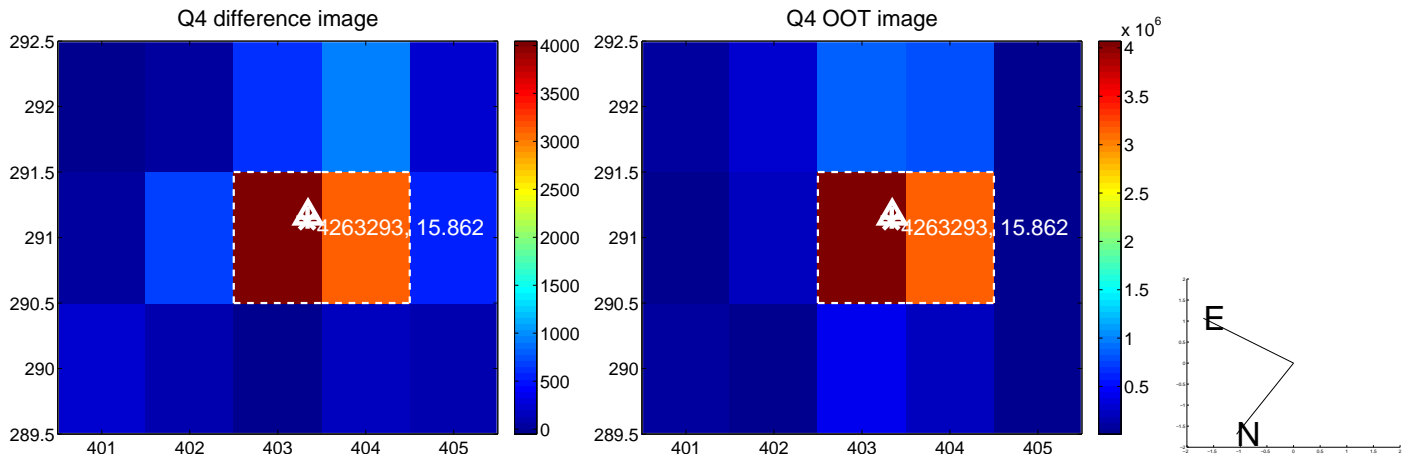
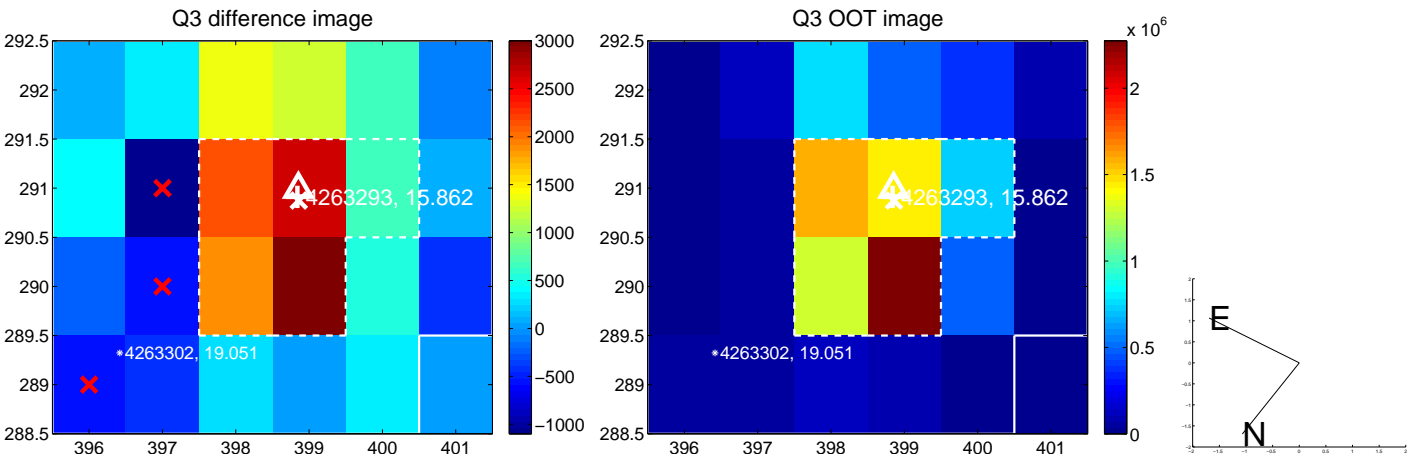
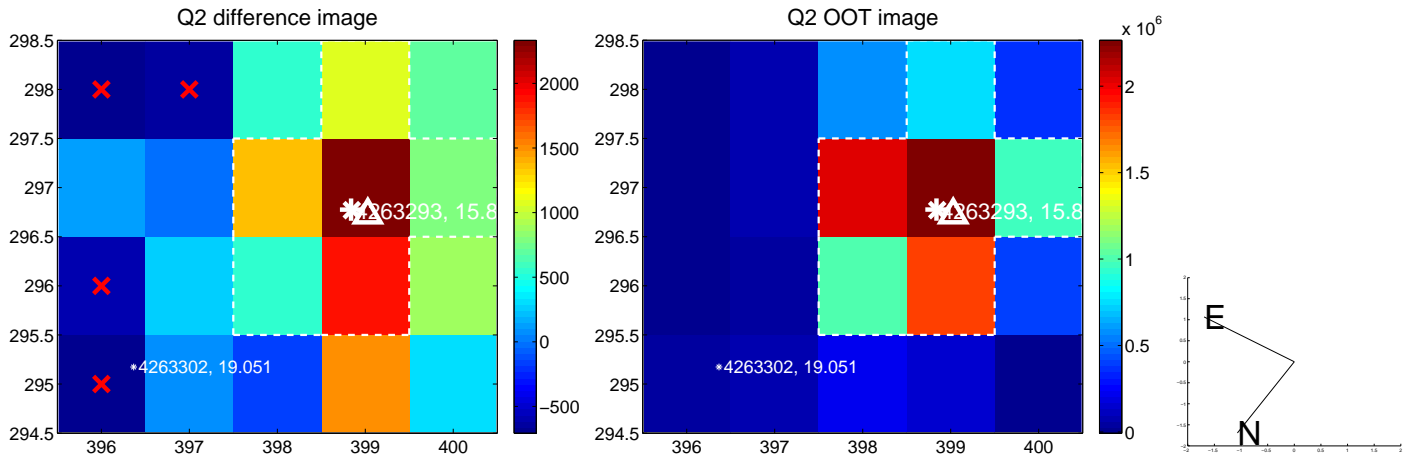
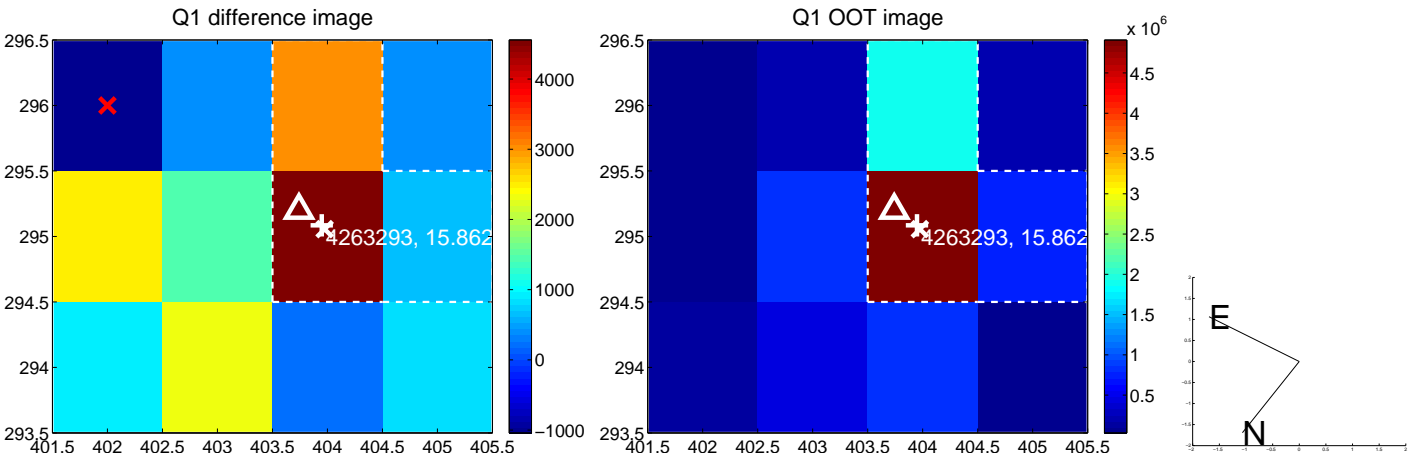
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.138 \pm 0.126$  | 1.10                | $0.073 \pm 0.133$ | $-0.117 \pm 0.122$ |
| PRF-fit source offset from KIC position | $0.246 \pm 0.128$  | 1.92                | $0.166 \pm 0.133$ | $-0.181 \pm 0.123$ |
| photometric centroid source offset      | $0.31 \pm 0.33$    | 0.93                | $0.08 \pm 0.38$   | $-0.30 \pm 0.33$   |

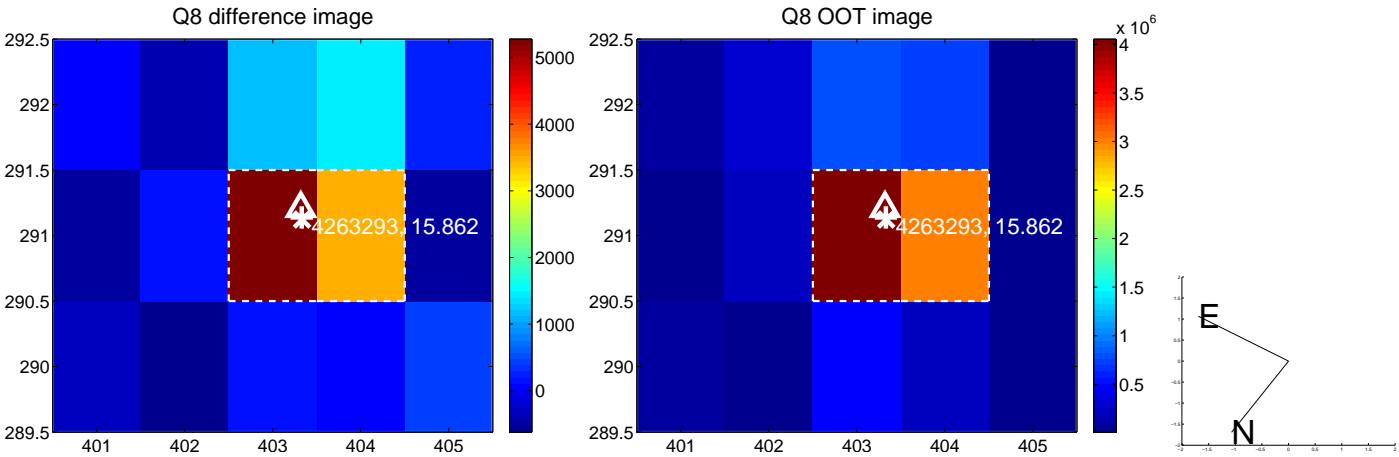
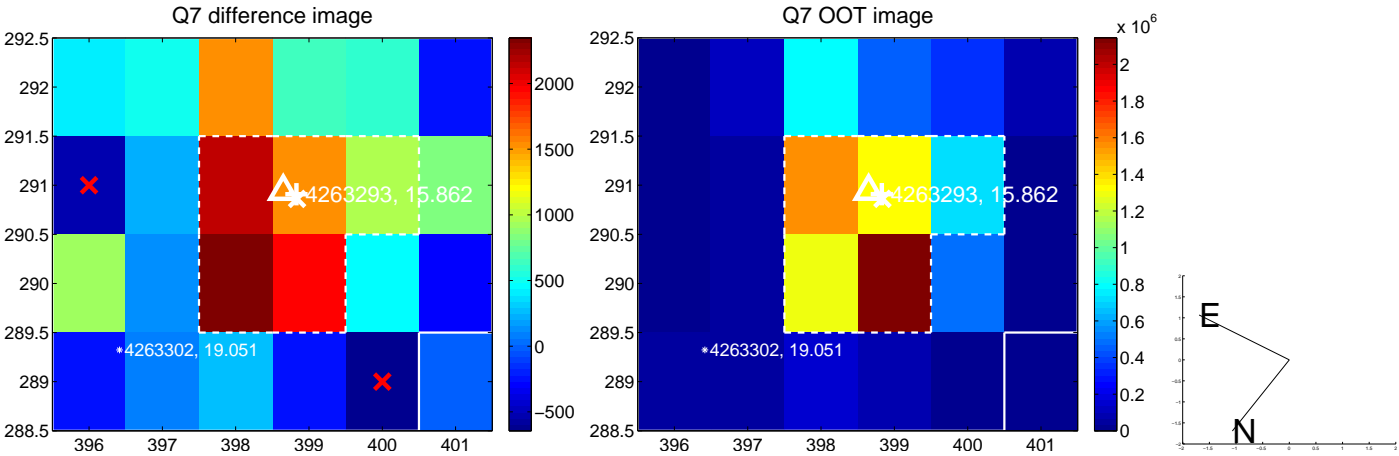
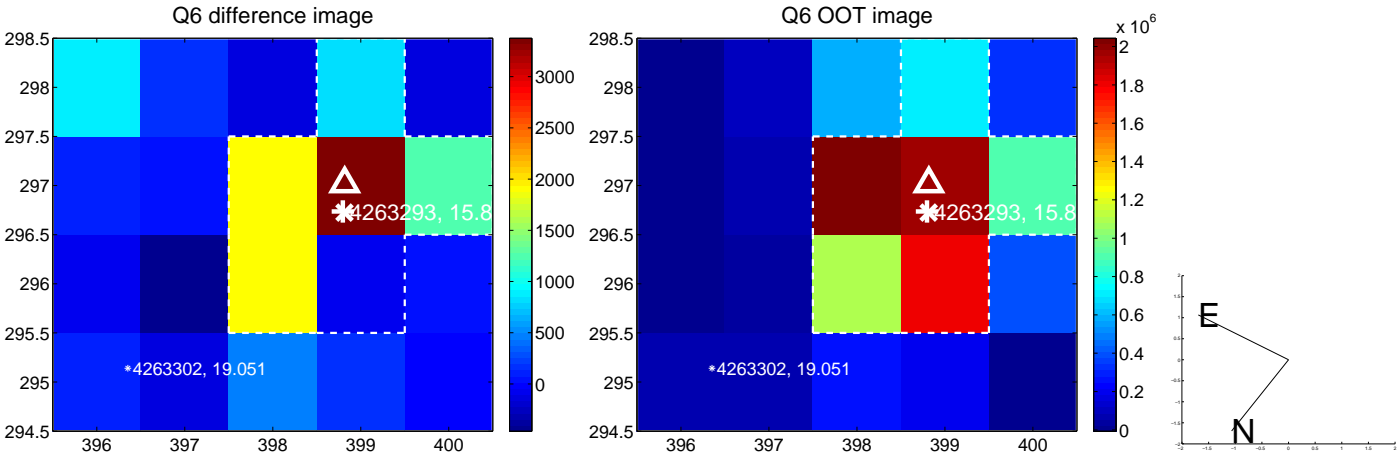
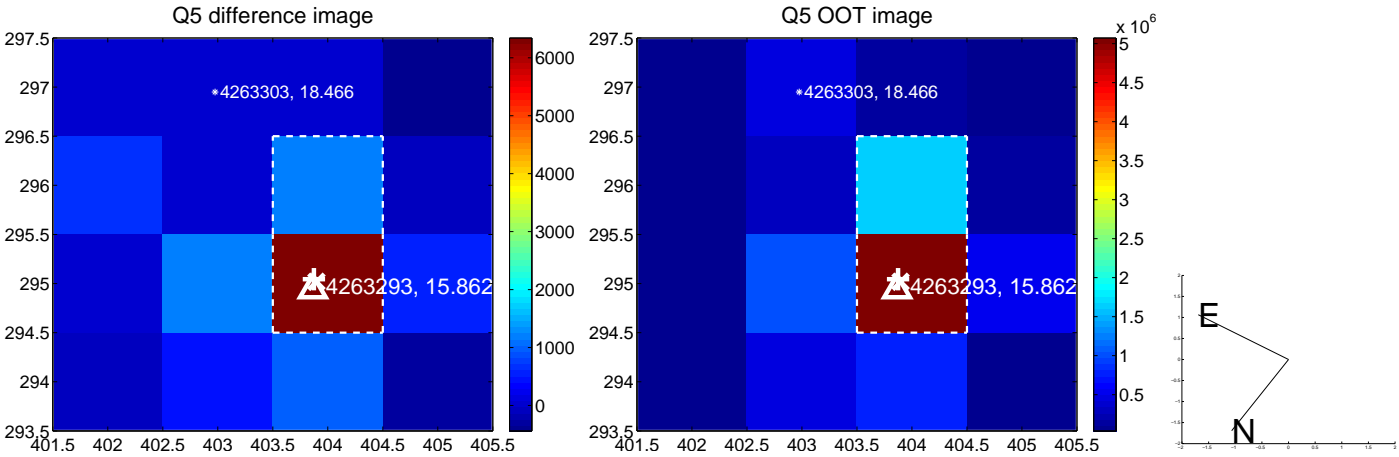


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

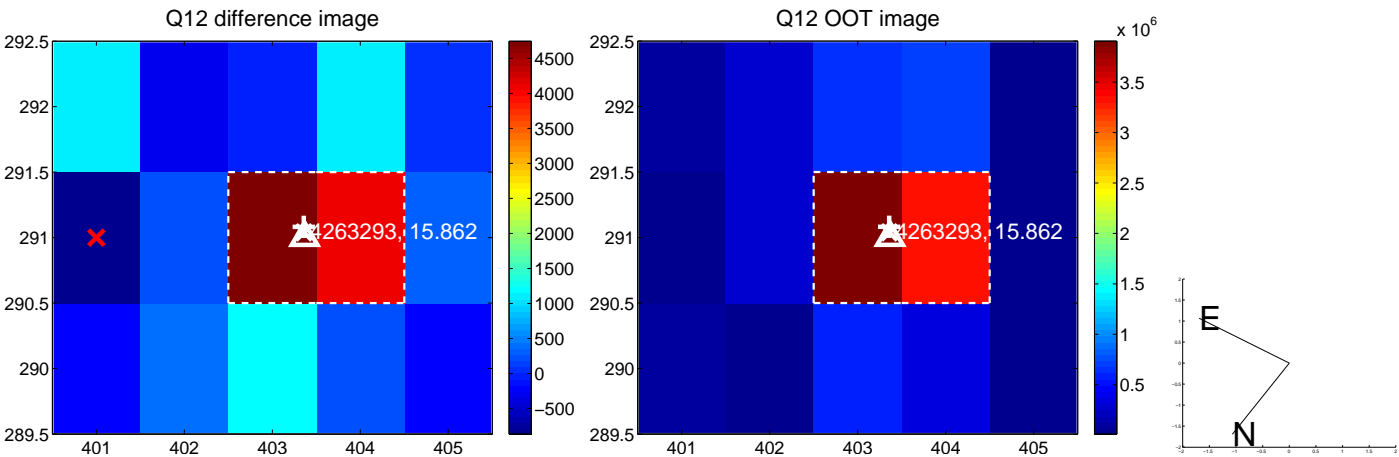
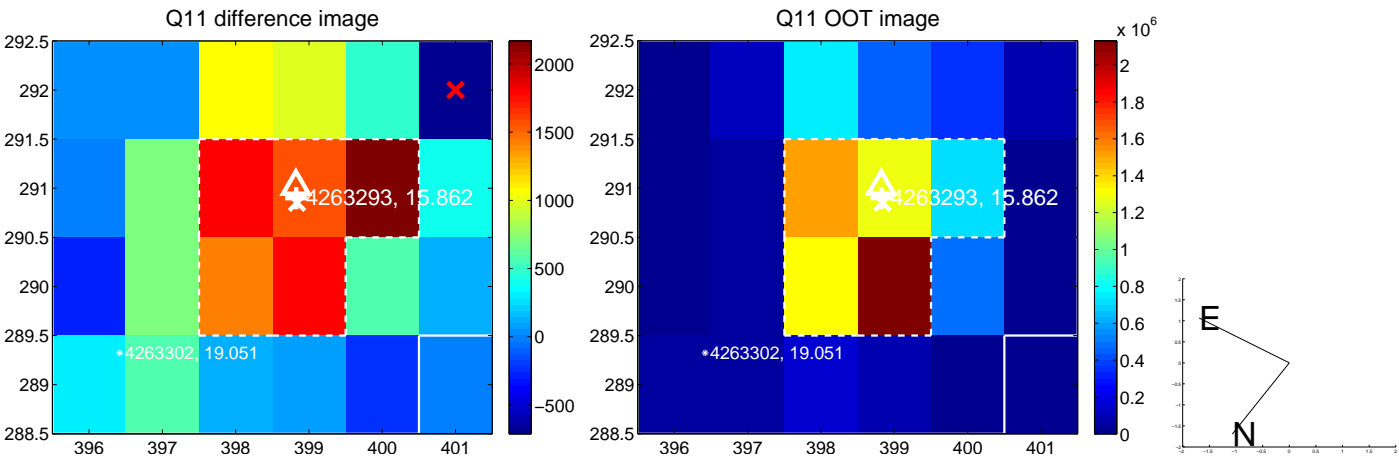
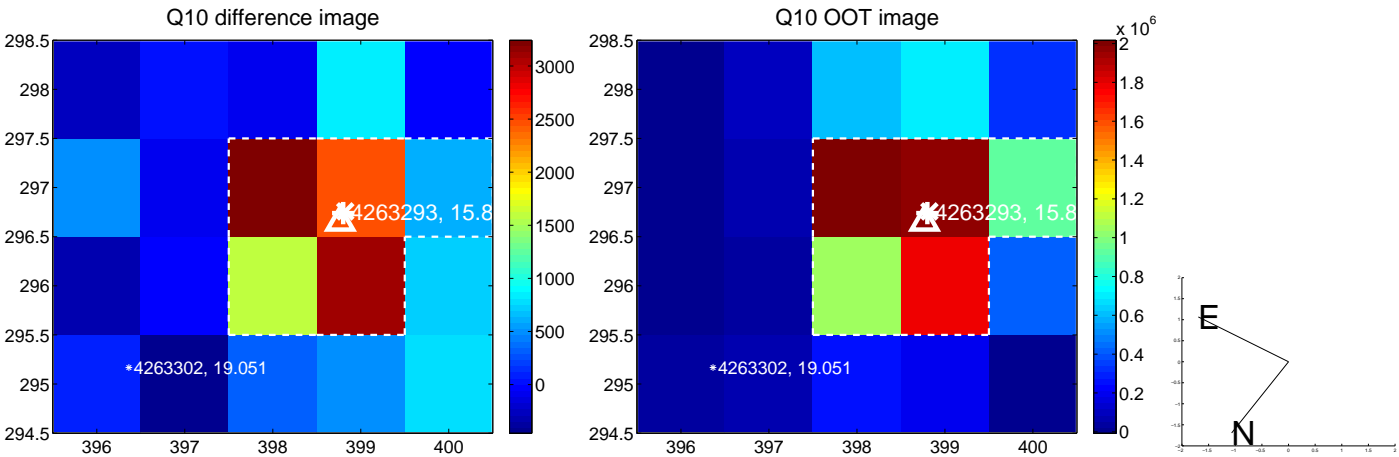
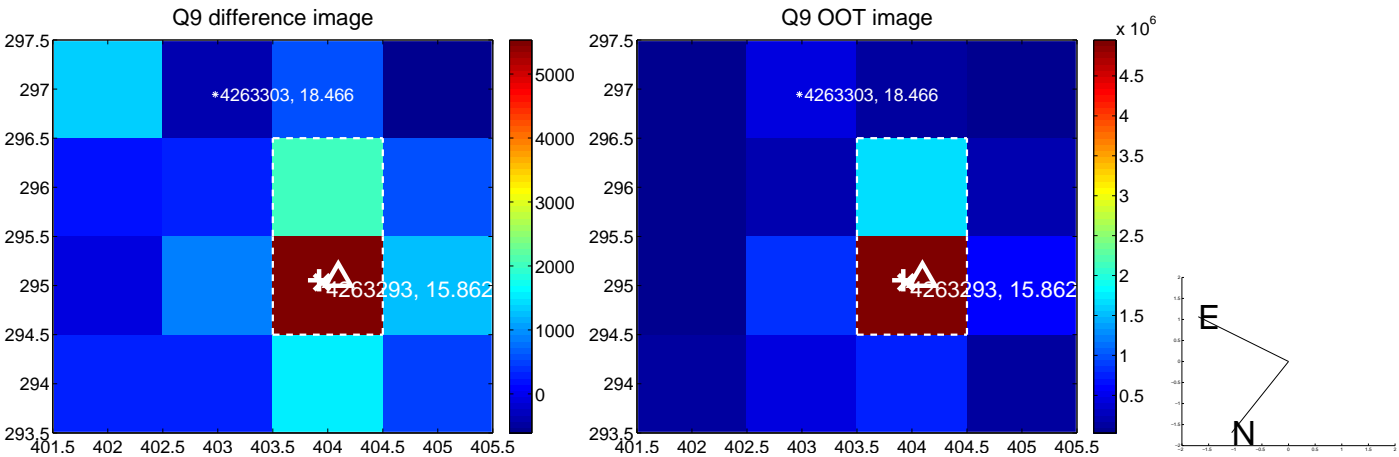


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

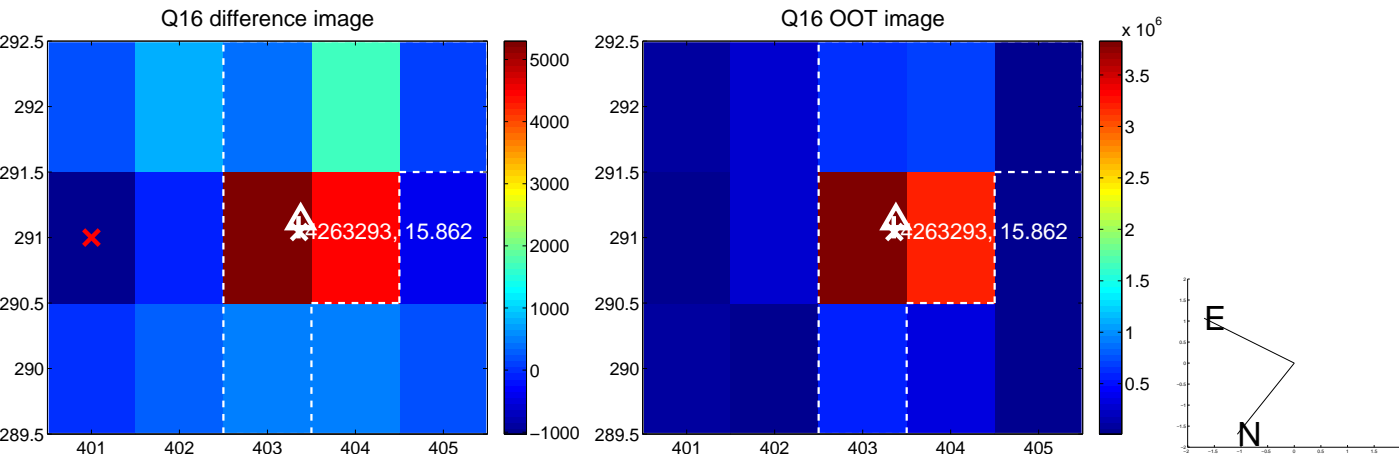
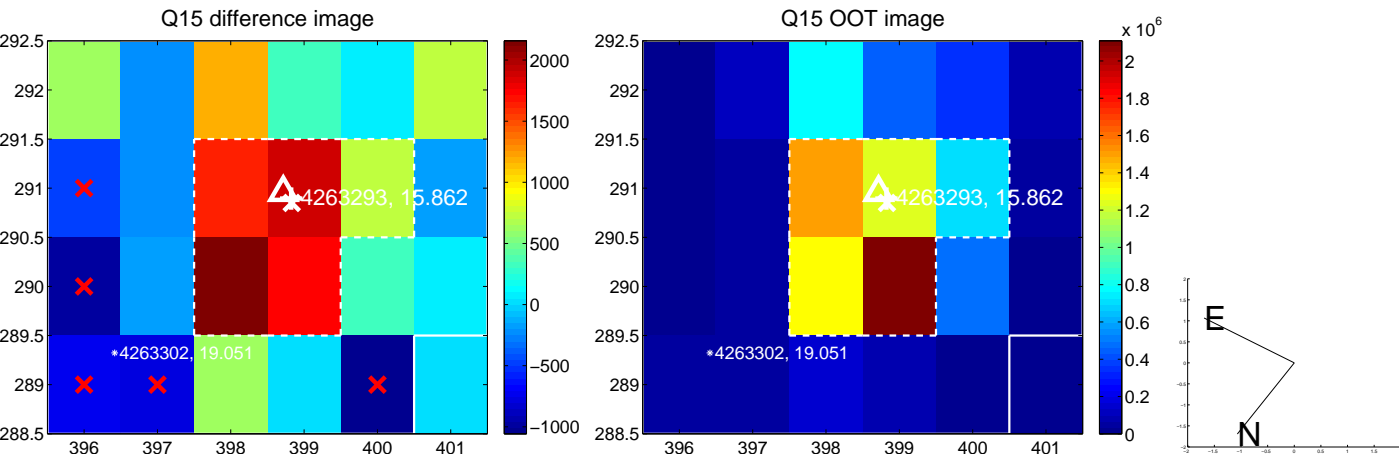
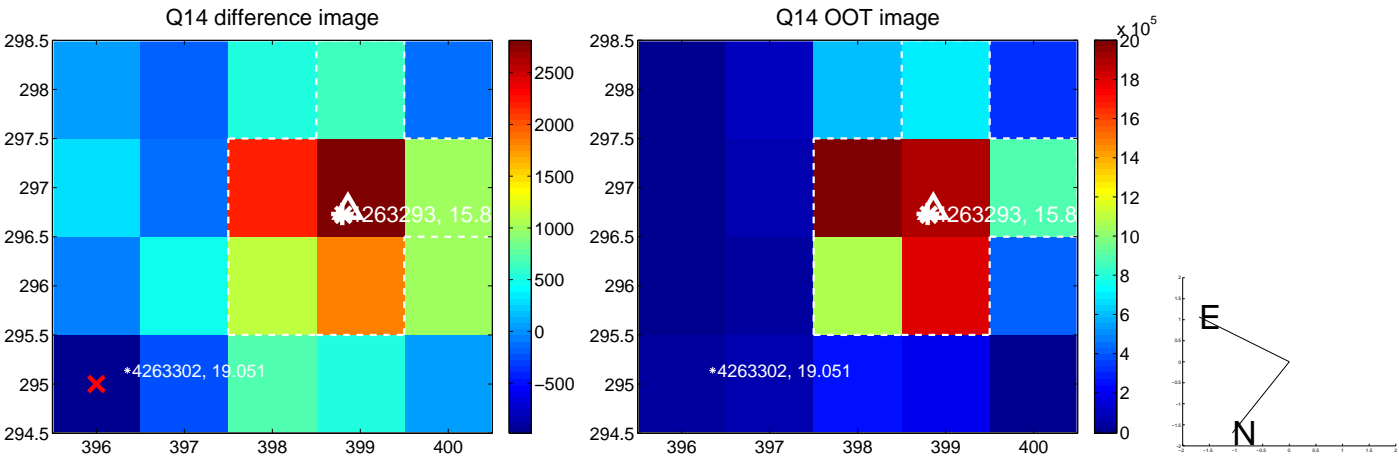
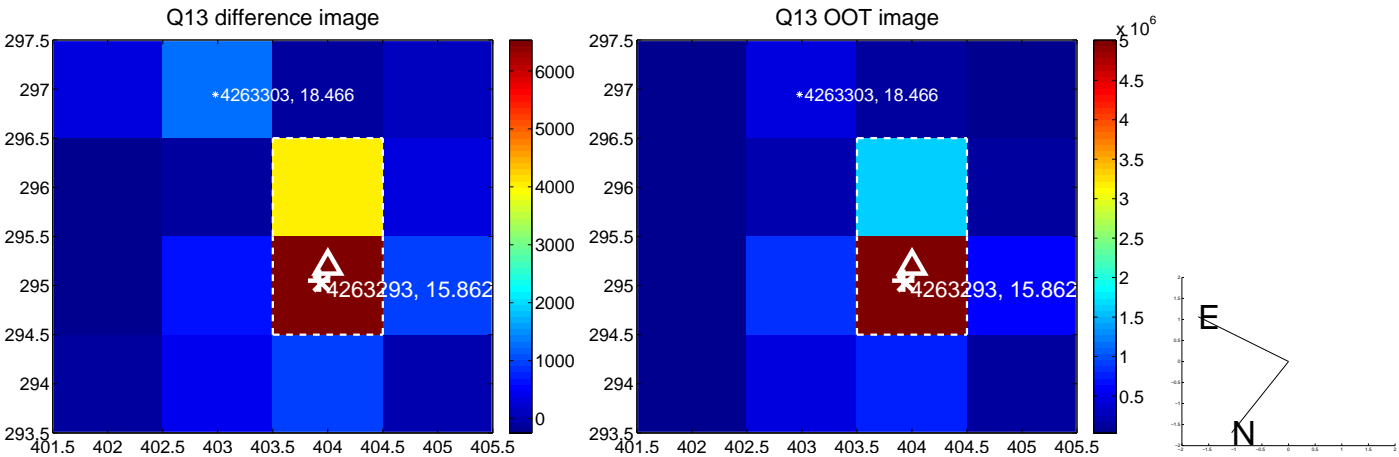




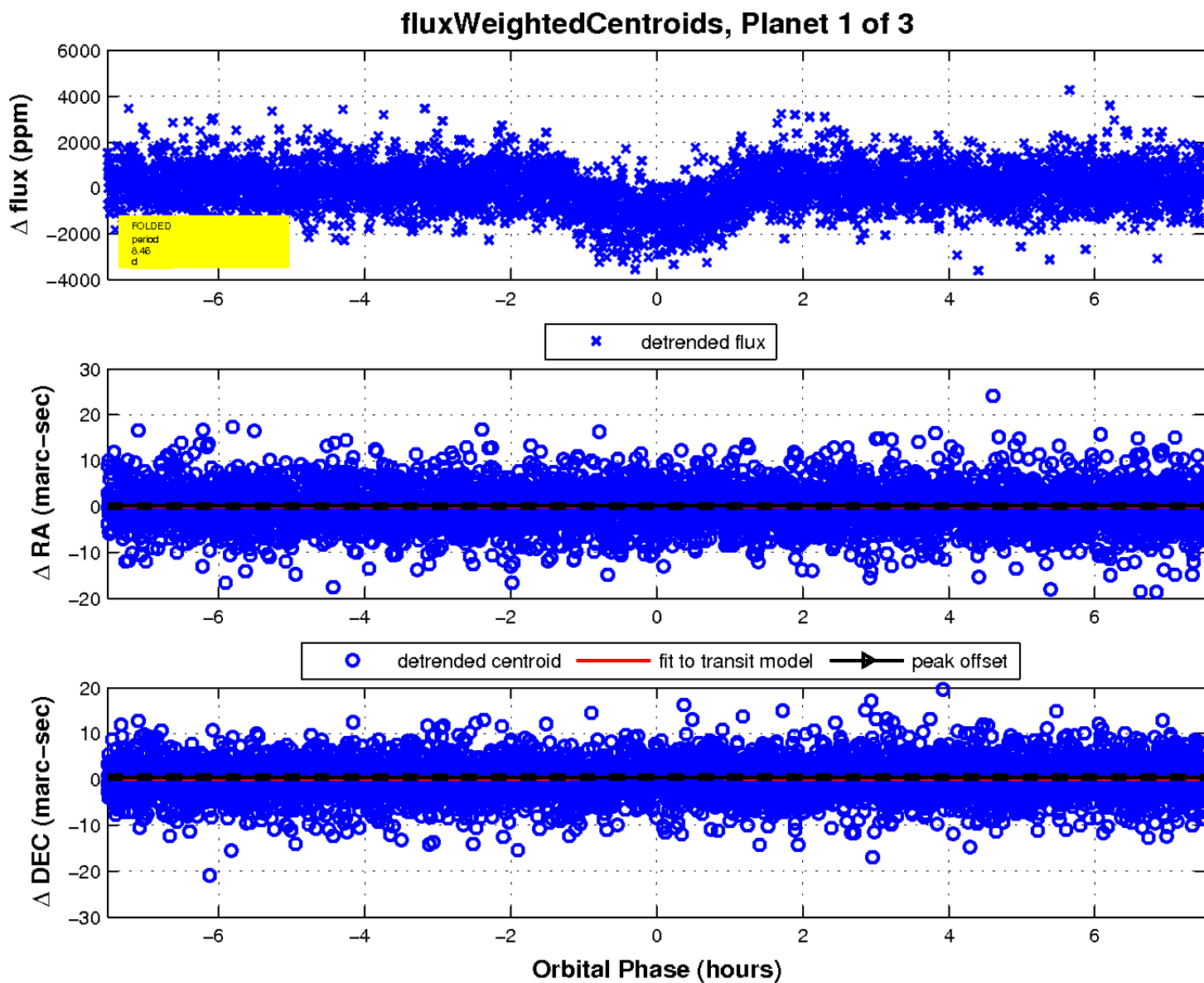
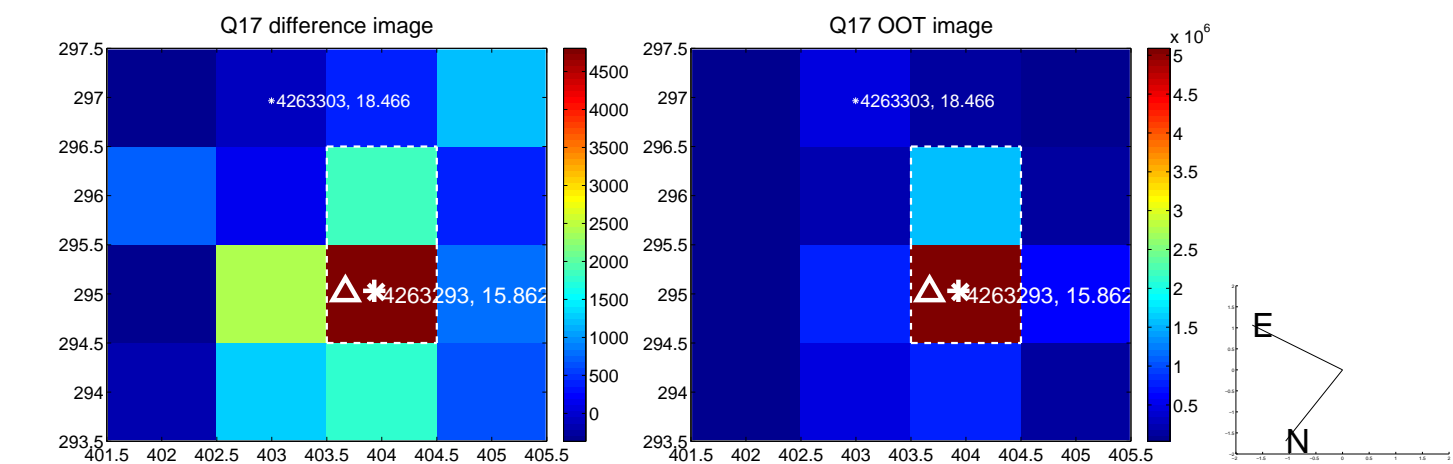
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

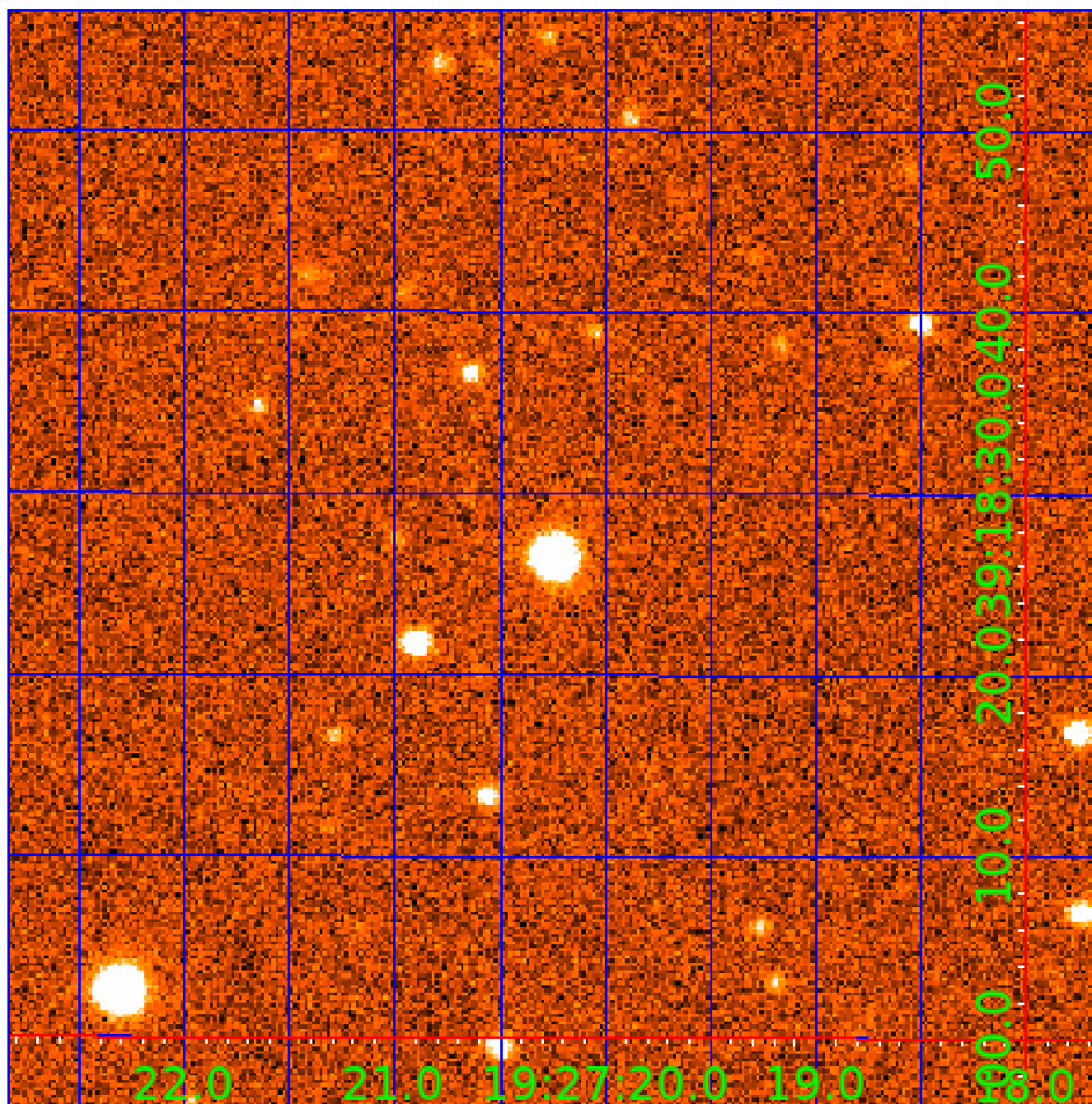


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination





# KIC 004263293

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004263293-01 | OBS      | 1895.01 | 8.457448      | 133.873591   | 1279.8      | 2.508            | 30.9 | 33.9 | 0.52                        | 4347            | 2.14                   | 20.12                  |
| 004263293-02 | OBS      | 1895.02 | 17.281203     | 136.006152   | 1409.4      | 2.933            | 25.3 | 28.5 | 0.52                        | 4347            | 2.23                   | 7.76                   |
| 004263293-03 | OBS      | 1895.03 | 32.133907     | 142.276212   | 1104.4      | 2.577            | 13.9 | 14.3 | 0.52                        | 4347            | 1.88                   | 3.39                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments         |
|--------------|----------|------|-------|---|---|---|---|------------------|
| 004263293-01 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT       |
| 004263293-02 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT       |
| 004263293-03 | OBS      | FP   | 0.24  | 0 | 1 | 0 | 0 | DEPTH_ODDEVEN_DV |

**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.

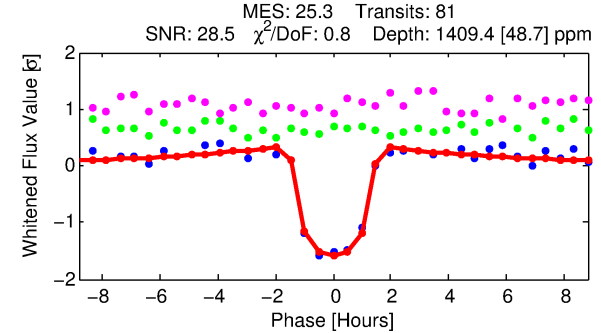
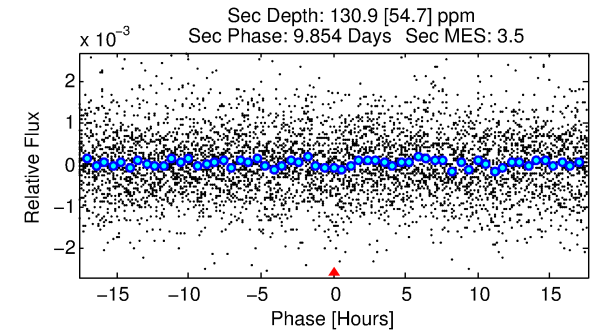
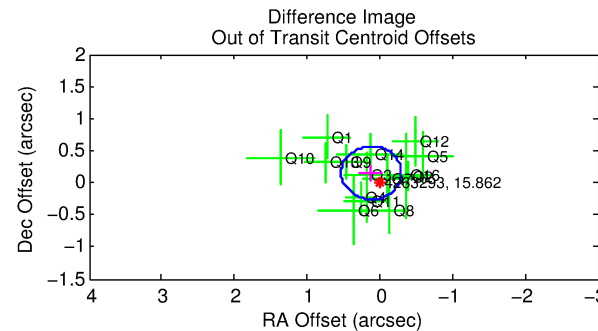
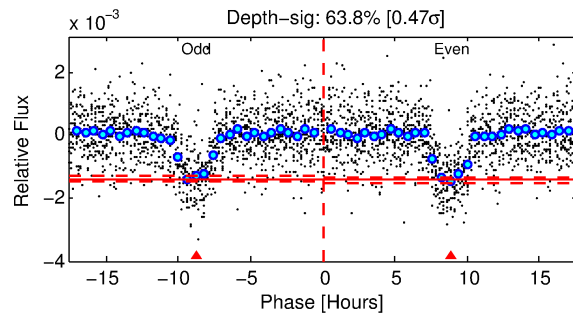
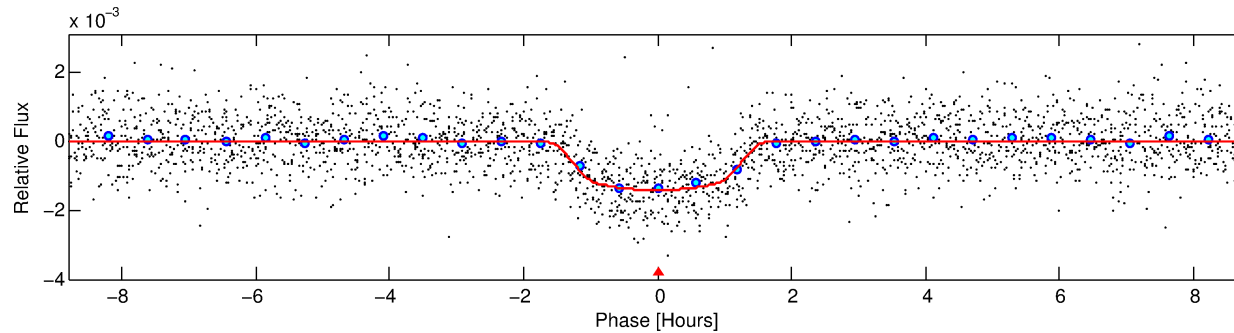
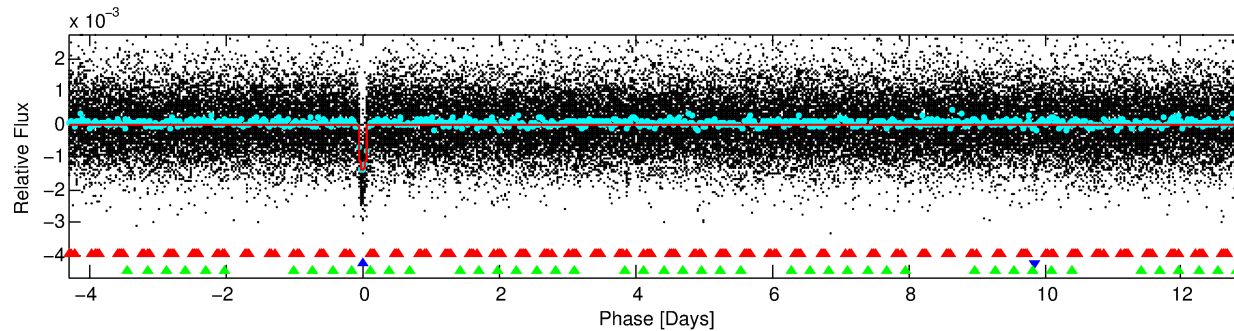
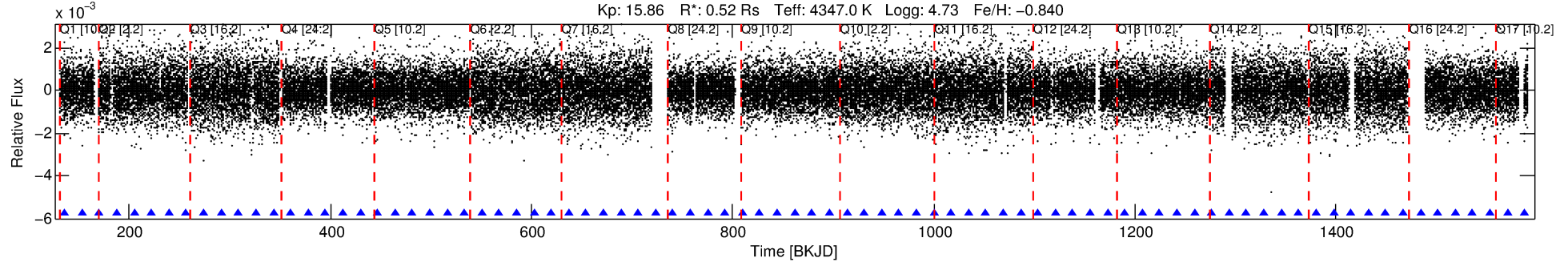
## Ephemeris Match Information For 004263293-02

No Significant Match Found

# DV One-Page Summary

KIC: 4263293 Candidate: 2 of 3 Period: 17.281 d  
KOI: K01895.02 Name: Kepler-331c Corr: 0.966

Kp: 15.86 R\*: 0.52 Rs Teff: 4347.0 K Logg: 4.73 Fe/H: -0.840



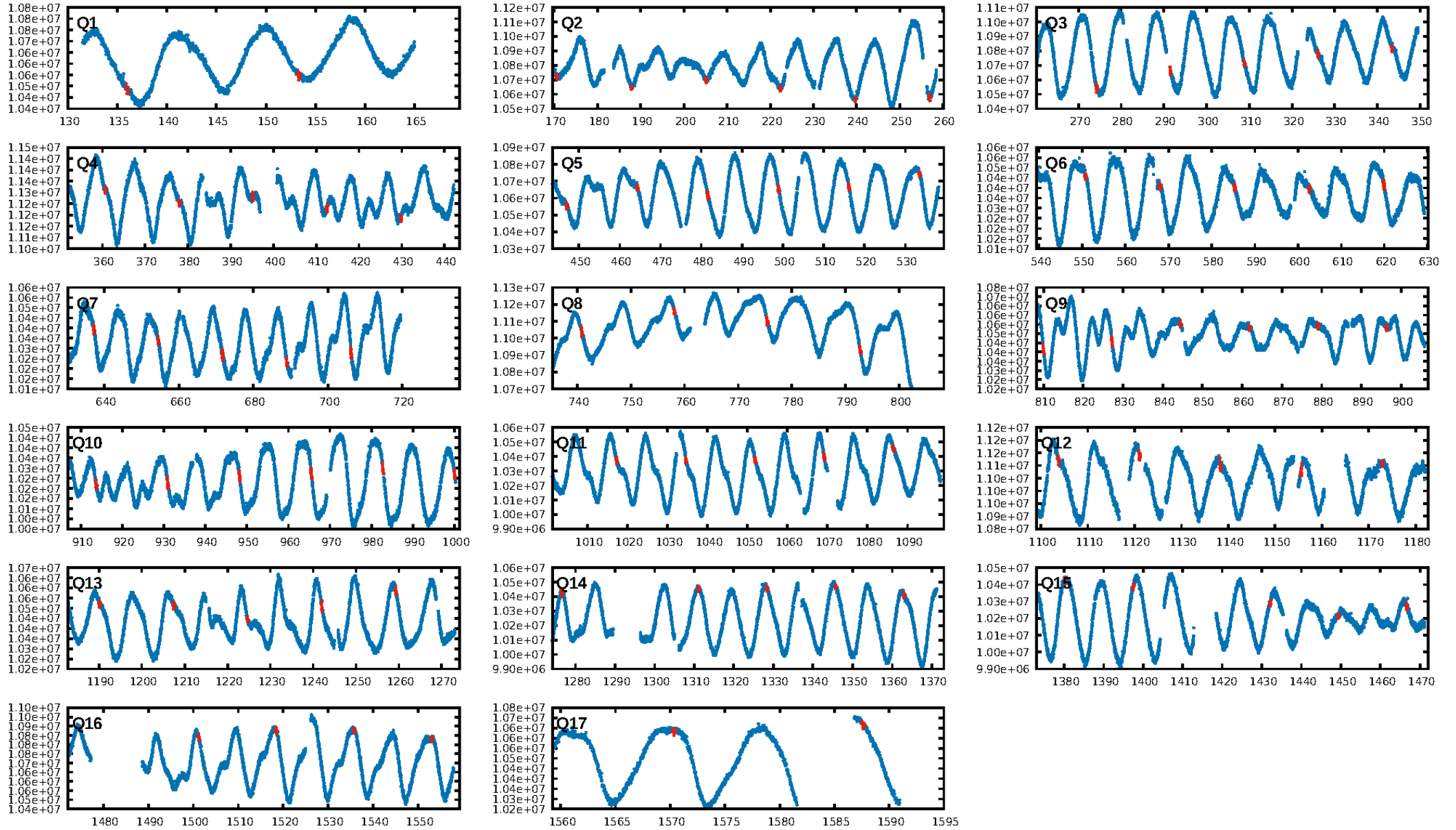
## DV Fit Results:

Period = 17.28120 [0.00004] d  
Epoch = 136.0062 [0.0020] BKJD  
Rp/R\* = 0.0390 [0.0052]  
a/R\* = 28.47 [15.11]  
b = 0.82 [0.21]  
Seff = 7.76 [1.26]  
Teq = 426 [17] K  
Rp = 2.23 [0.35] Re  
a = 0.1064 [0.0073] AU  
Ag = 164.37 [82.84] [1.97σ]  
Teffp = 2356 [302] K [6.39σ]

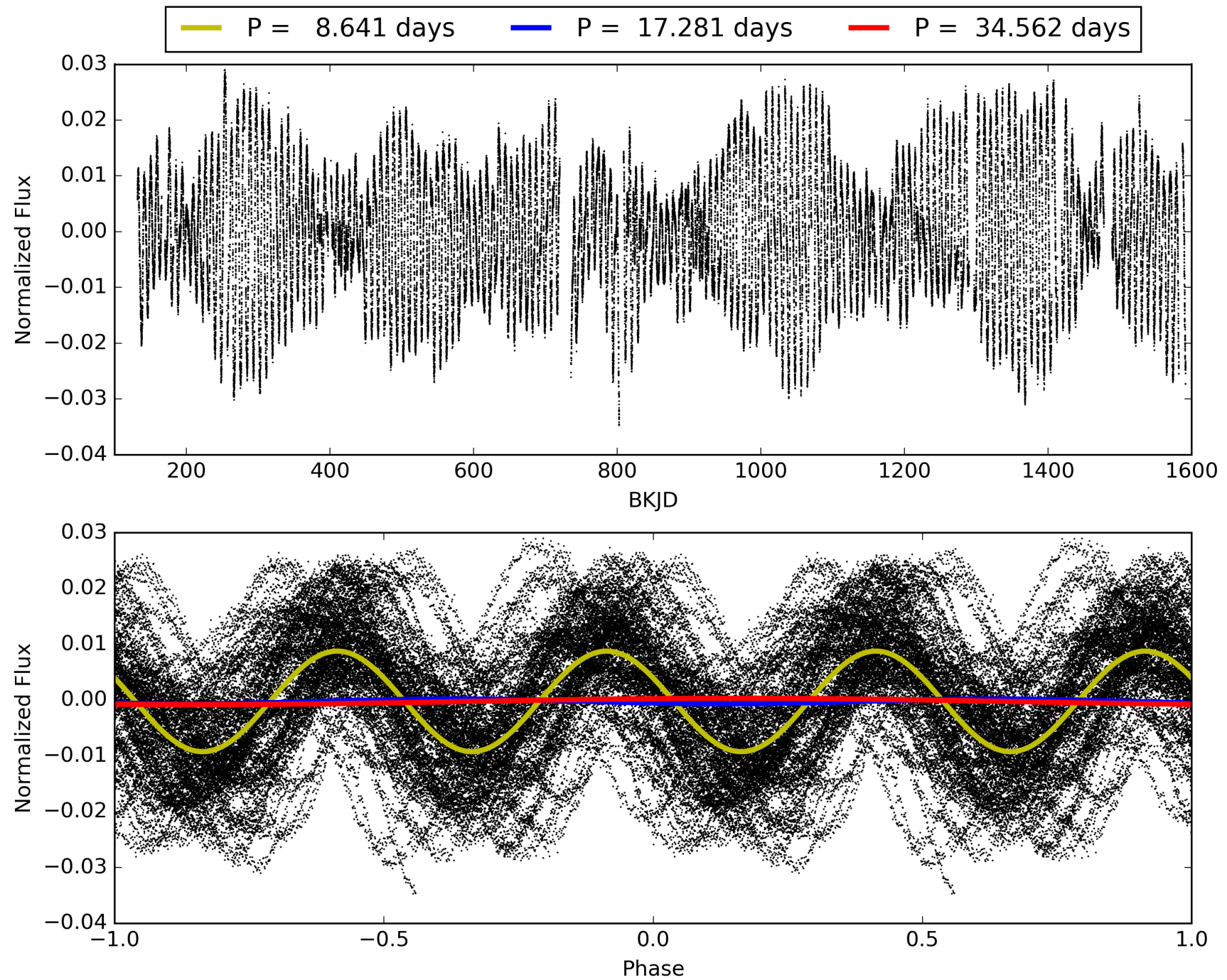
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [54.88σ]  
LongPeriod-sig: 100.0% [91.30σ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.94e-136  
RollingBand-fgt: 1.00 [77/77]  
GhostDiagnostic-chr: 1.797  
Centroid-sig: 0.0%  
Centroid-so: 1.103 arcsec [2.68σ]  
OotOffset-rm: 0.195 arcsec [1.41σ]  
KicOffset-rm: 0.234 arcsec [1.51σ]  
OotOffset-st: 4/3/4/4 [15]  
KicOffset-st: 4/3/4/4 [15]  
DiffImageQuality-fgm: 1.00 [15/15]  
DiffImageOverlap-fno: 1.00 [17/17]

# TCE 004263293-02, PDC Light Curves

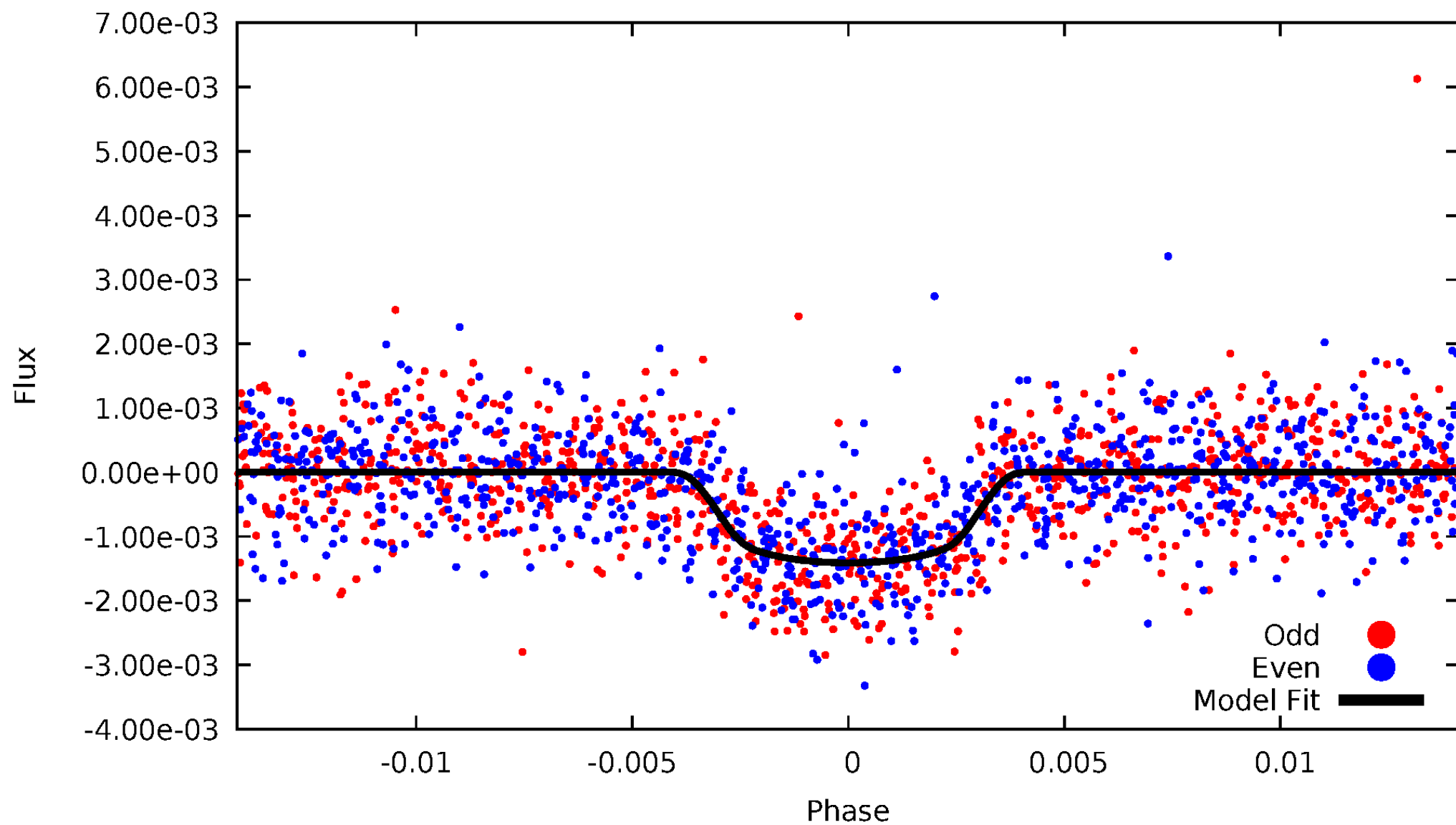


TCE 004263293-02



# DV Odd/Even

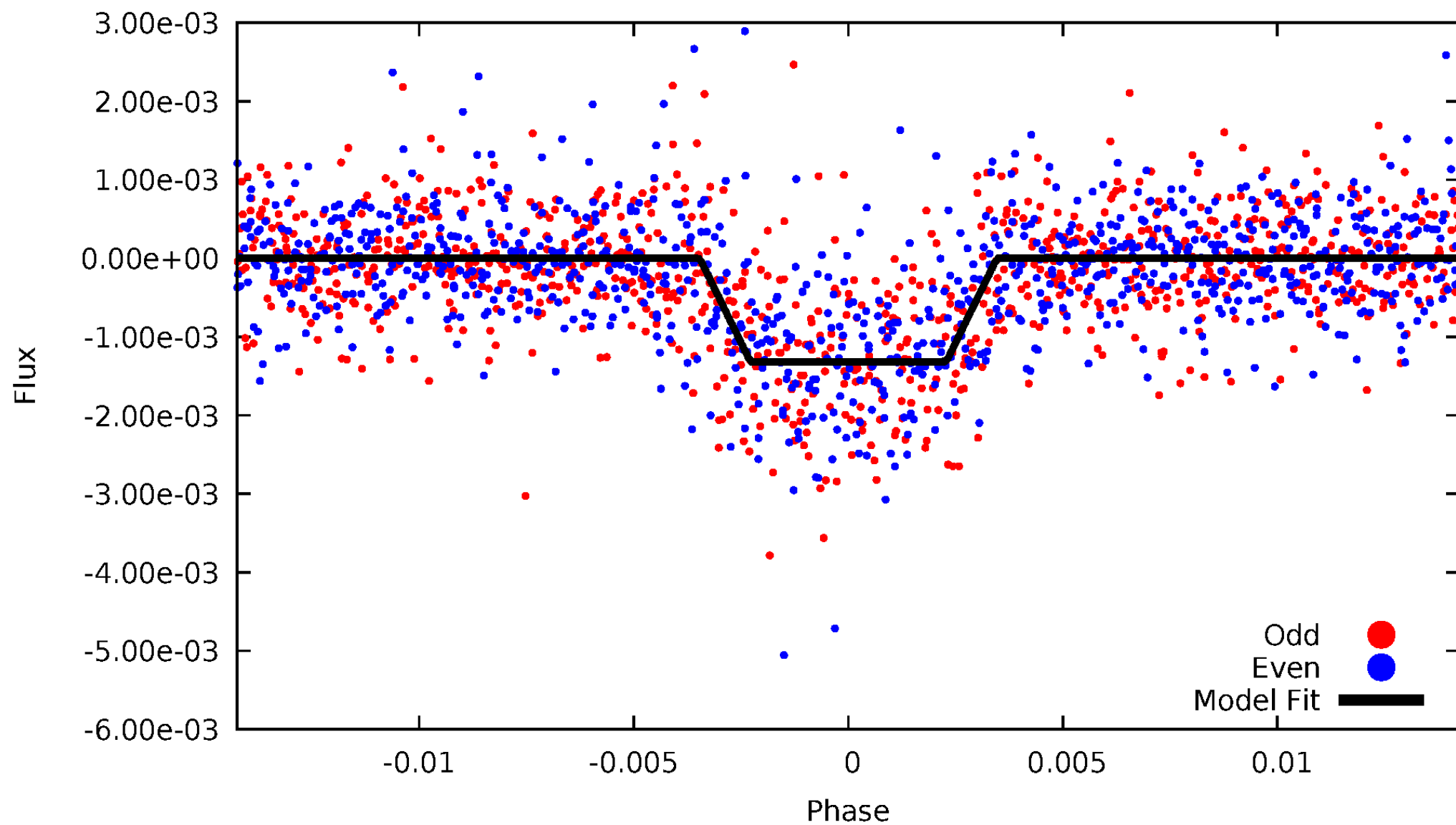
TCE 004263293-02





# ALT Odd/Even

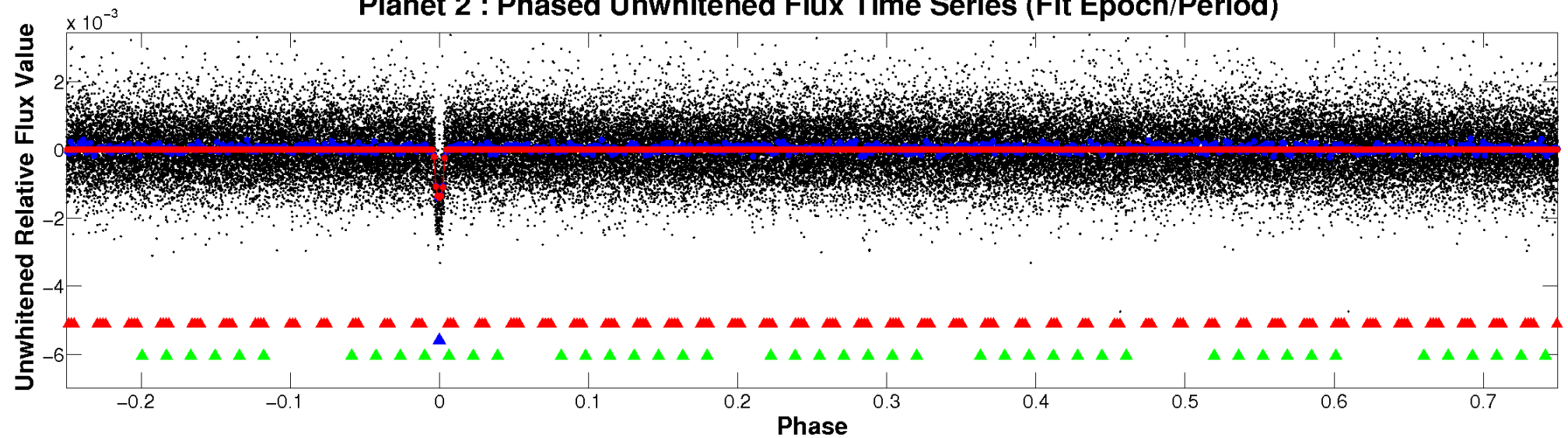
TCE 004263293-02



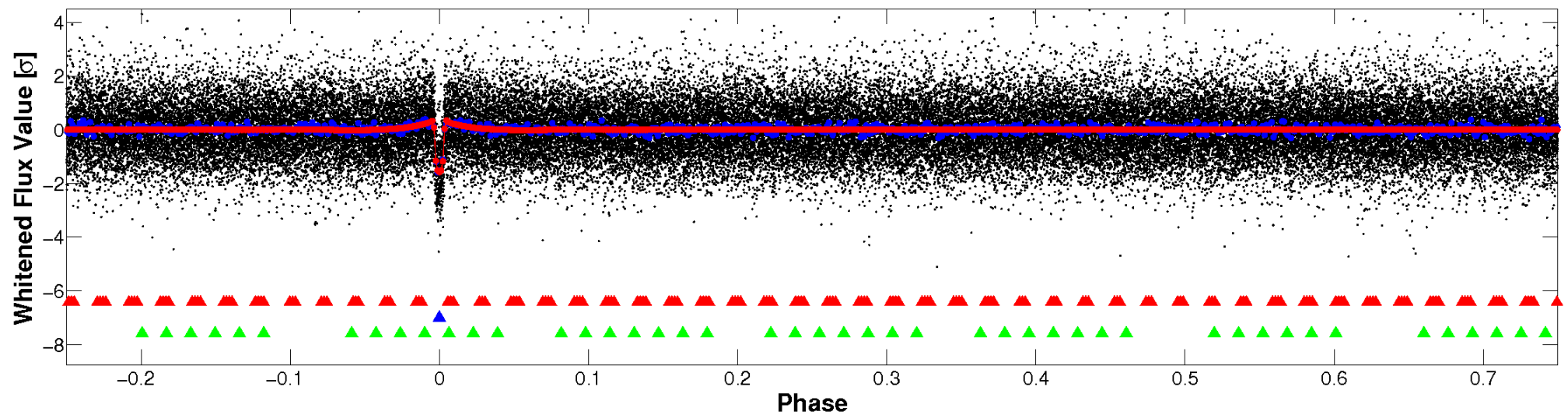


# Non-Whitened Vs. Whitened Light Curve

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

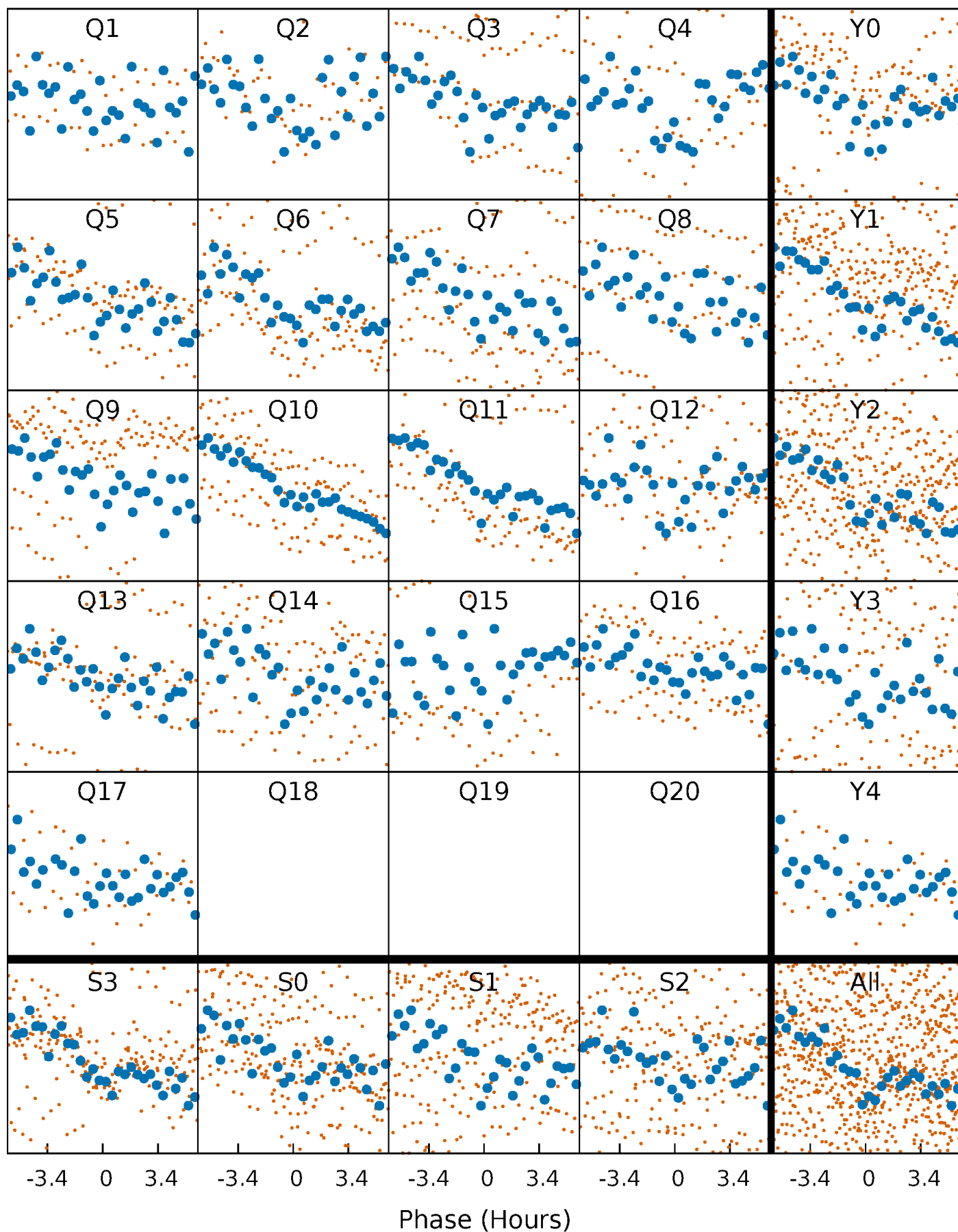


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



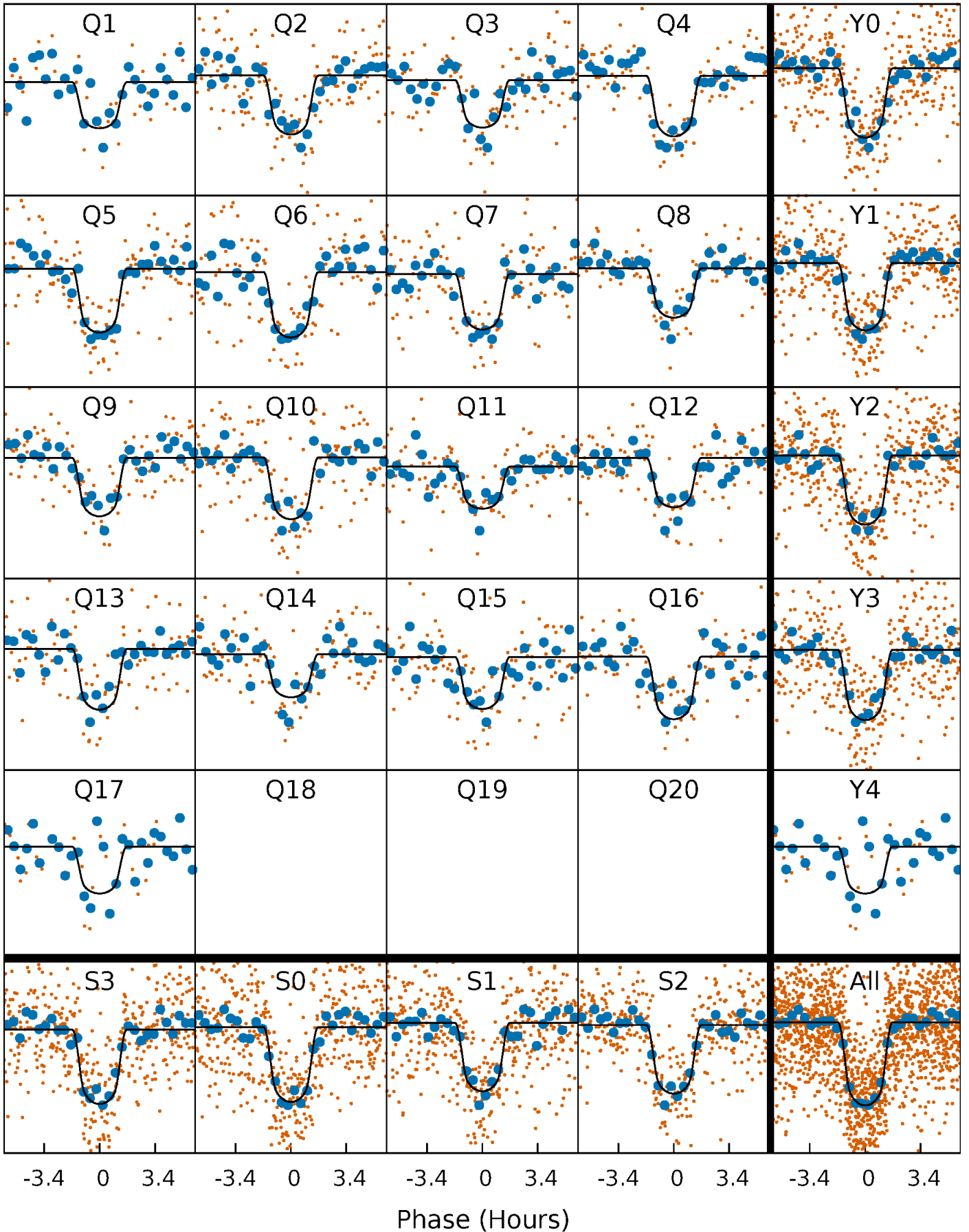
# PDC Quarter-Phased Transit Curves

TCE 004263293-02 P= 17.281203 Days  $T_0=136.006152$  (BKJD)



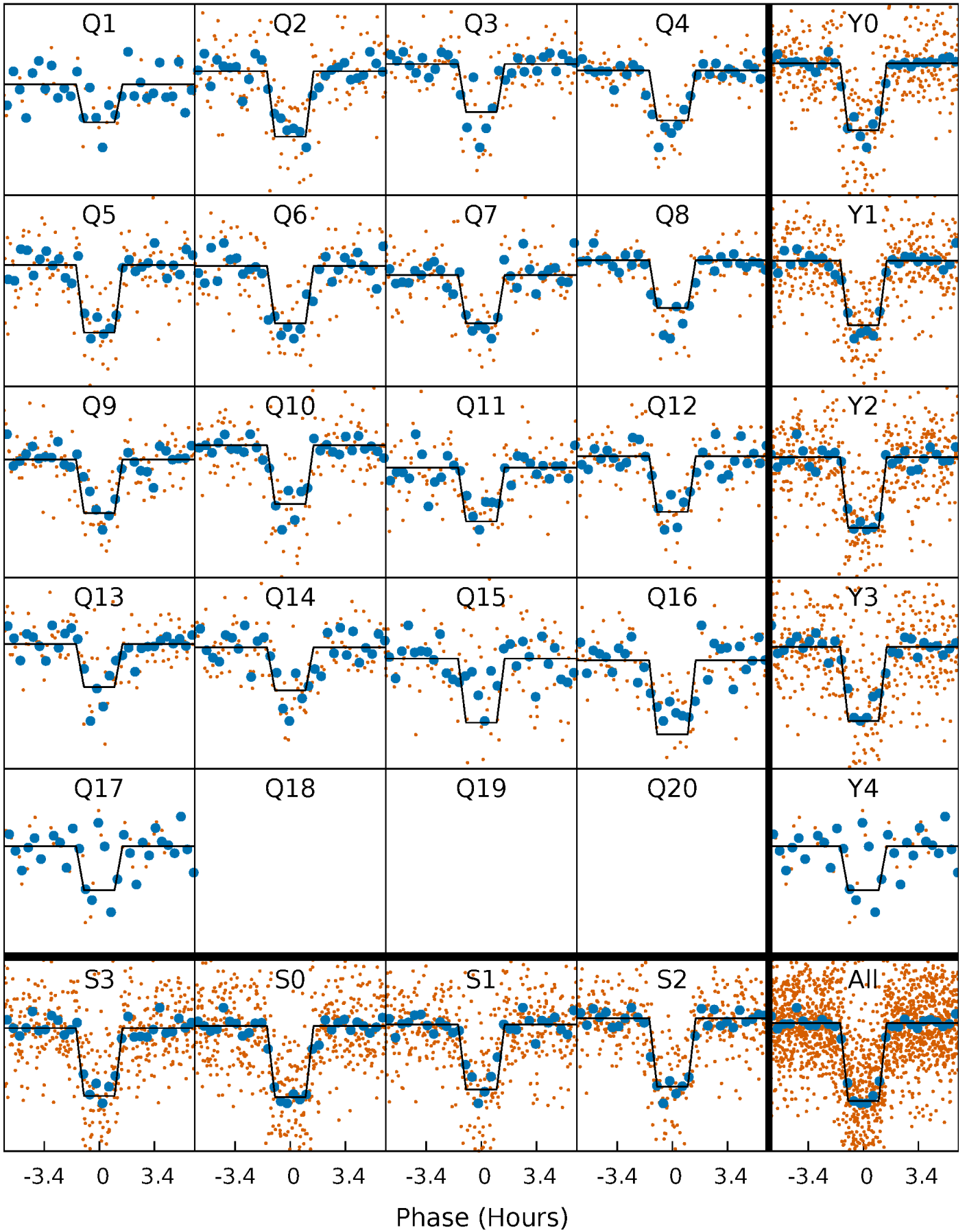
# DV Quarter-Phased Transit Curves

TCE 004263293-02   P= 17.281203 Days    $T_0=136.006152$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

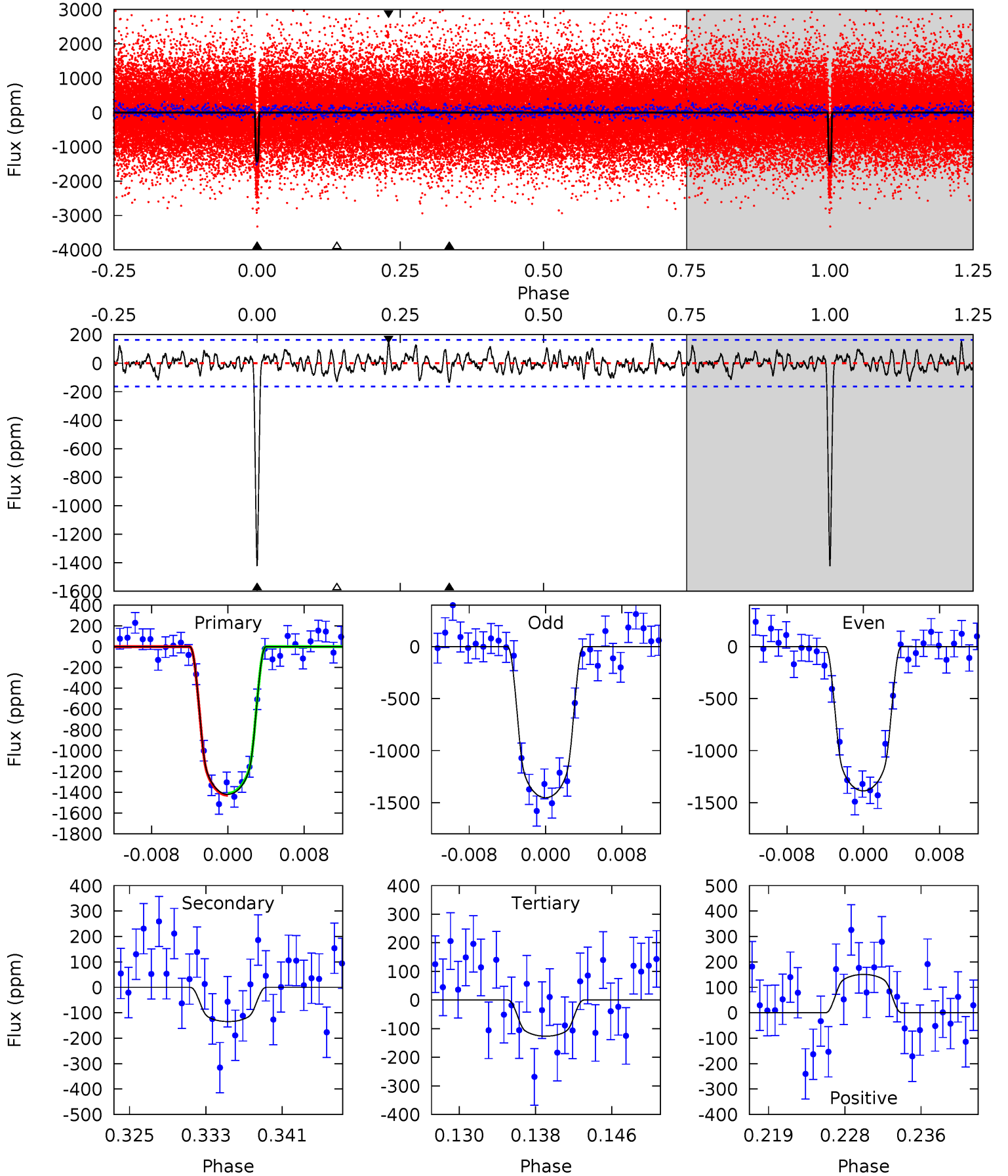
TCE 004263293-02 P= 17.281144 Days  $T_0=136.008913$  (BKJD)



# DV Model-Shift Uniqueness Test

004263293-02,  $P = 17.281203$  Days,  $E = 118.724949$  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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 44.1 | 4.18 | 3.92 | 4.68 | 5.07            | 2.65            | 1.43             | 40.1    | 39.4    | 0.26    | -0.50   | 1.03    | 0.98 | 0.10  | 0.28 |

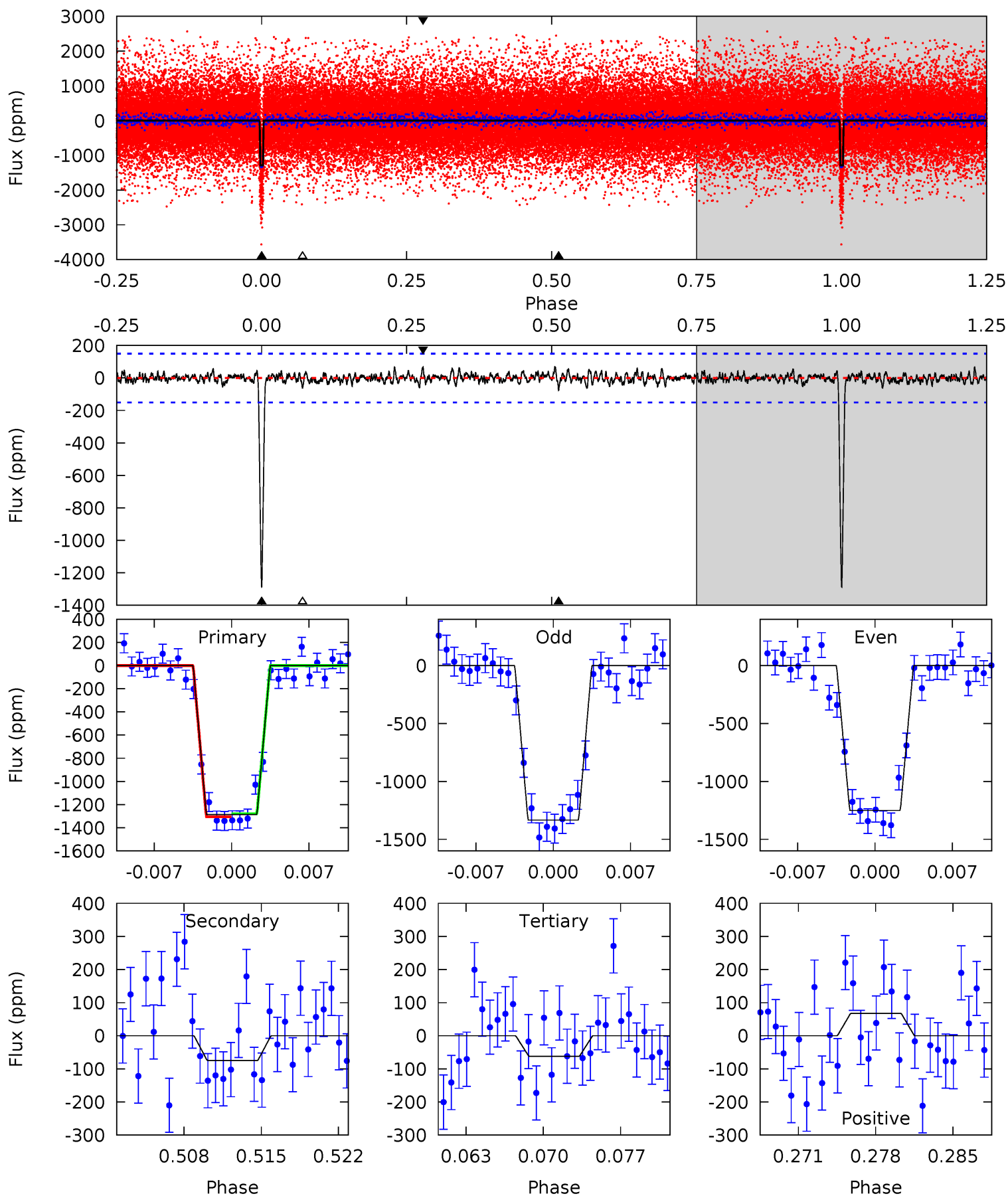




# Alt Model-Shift Uniqueness Test

004263293-02,  $P = 17.281144$  Days,  $E = 118.727769$  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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 43.6 | 2.54 | 2.10 | 2.29 | 5.10            | 2.70            | 0.70             | 41.5    | 41.3    | 0.44    | 0.25    | 1.42    | 1.00 | 0.05  | 0.45 |





### Stellar Parameters For KIC 004263293

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | $[\text{Fe}/\text{H}]$     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $4347^{+117}_{-143}$ | $4.730^{+0.050}_{-0.041}$ | $-0.840^{+0.300}_{-0.350}$ | $0.524^{+0.045}_{-0.045}$ | $0.537^{+0.043}_{-0.043}$ | $5.272^{+1.142}_{-0.853}$                     |
|        | +3%/-3%              | +1%/-1%                   | +36%/-42%                  | +9%/-9%                   | +8%/-8%                   | +22%/-16%                                     |
| Source | PHO1                 | 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 004263293-02 / KOI 1895.02

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K) | $A_{\text{obs}}$  |
|---------|---------------|------------------------|----------------------|----------------------|-------------------|
| DV      | $-135 \pm 32$ | $2.21^{+0.33}_{-0.30}$ | $593^{+21}_{-21}$    | $2940^{+180}_{-157}$ | $171^{+78}_{-54}$ |
| Alt.    | $-75 \pm 29$  | $2.08^{+0.32}_{-0.30}$ | $593^{+20}_{-22}$    | $2756^{+184}_{-184}$ | $108^{+59}_{-46}$ |

$T_{\text{max}}$  = 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

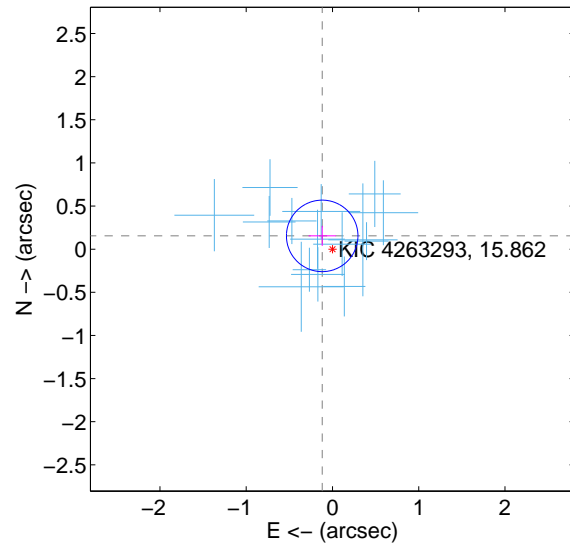
Supplemental centroid analysis for 004263293-02. Kepler magnitude: 15.86. Transit SNR 28.49

There are 15 quarters with good PRF difference image offsets

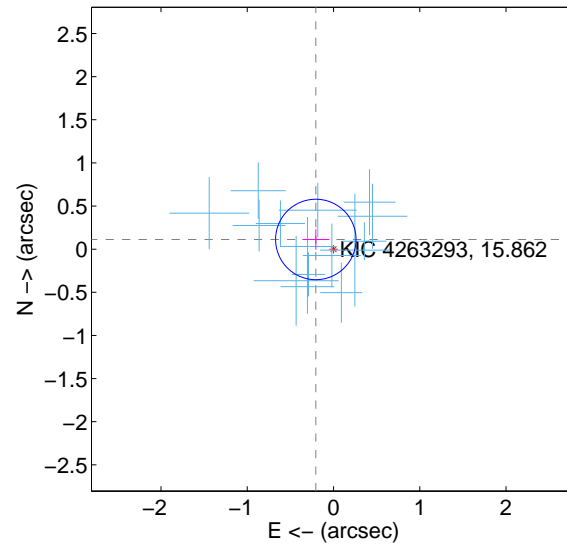
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec      |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT          | $0.195 \pm 0.138$  | 1.41                | $0.119 \pm 0.158$ | $0.154 \pm 0.116$ |
| PRF-fit source offset from KIC position | $0.234 \pm 0.155$  | 1.51                | $0.205 \pm 0.156$ | $0.113 \pm 0.119$ |
| photometric centroid source offset      | $1.10 \pm 0.41$    | 2.68                | $-0.64 \pm 0.44$  | $0.90 \pm 0.40$   |

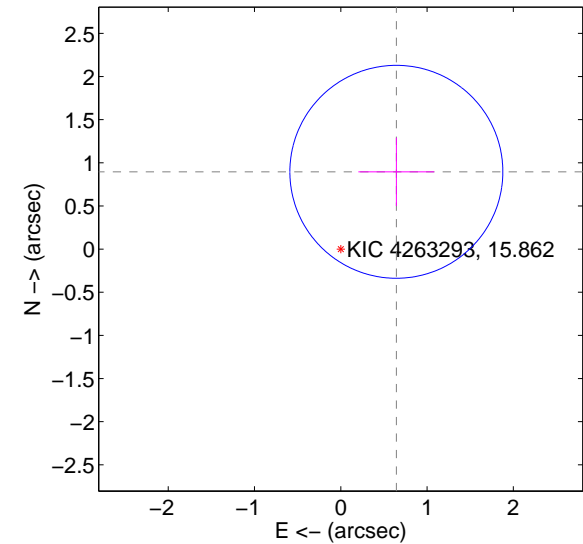
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



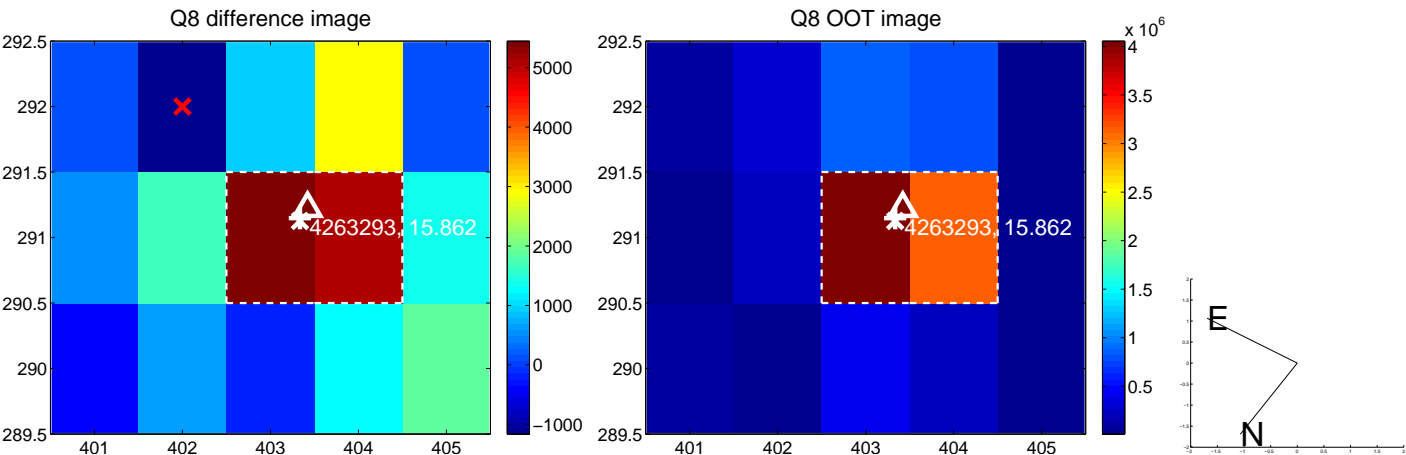
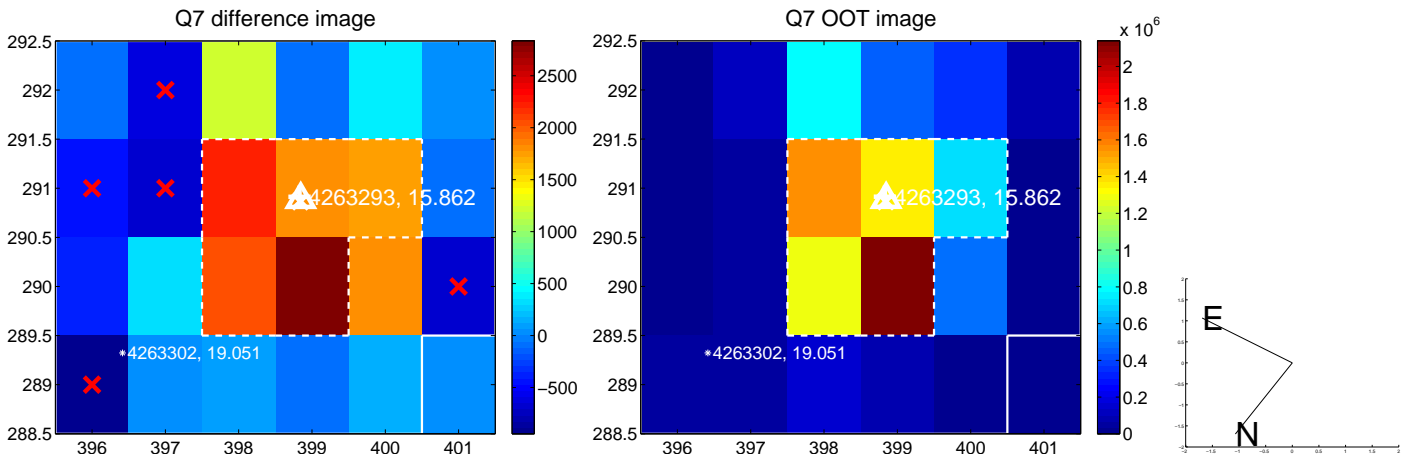
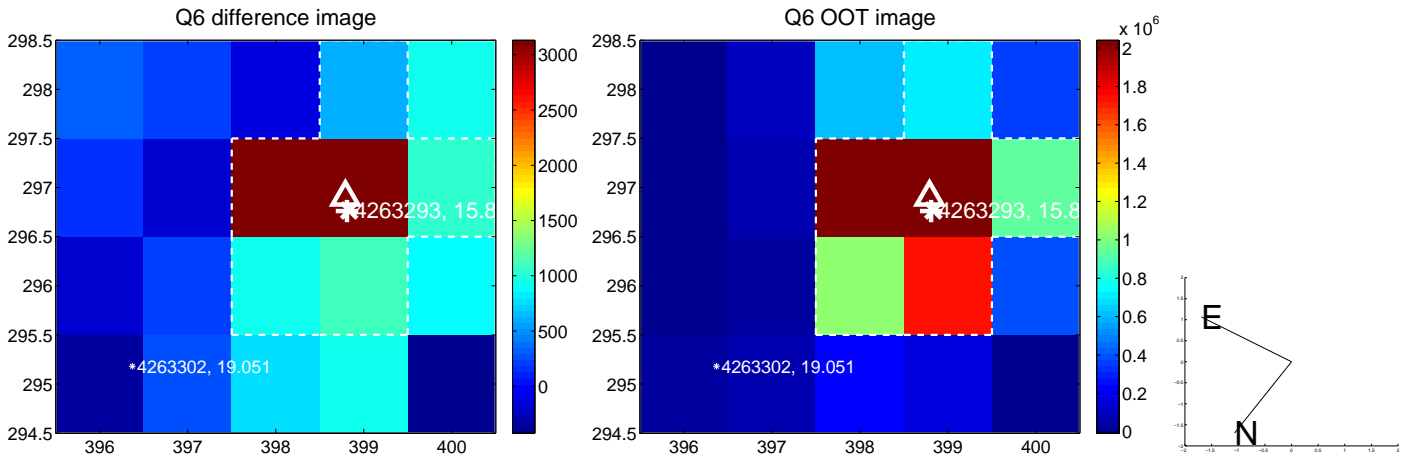
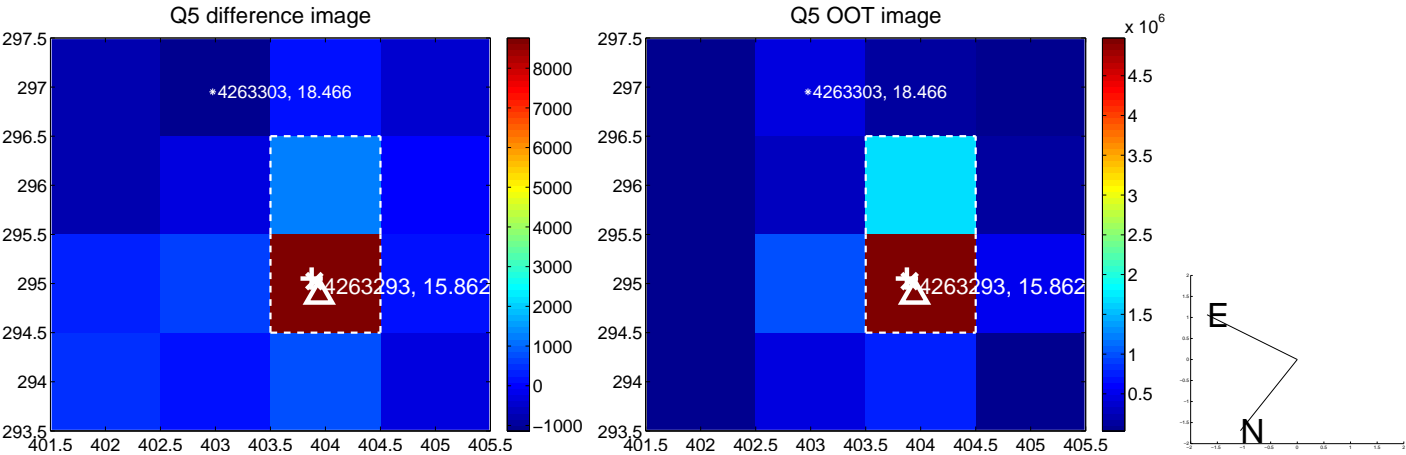
offset from photometric centroids



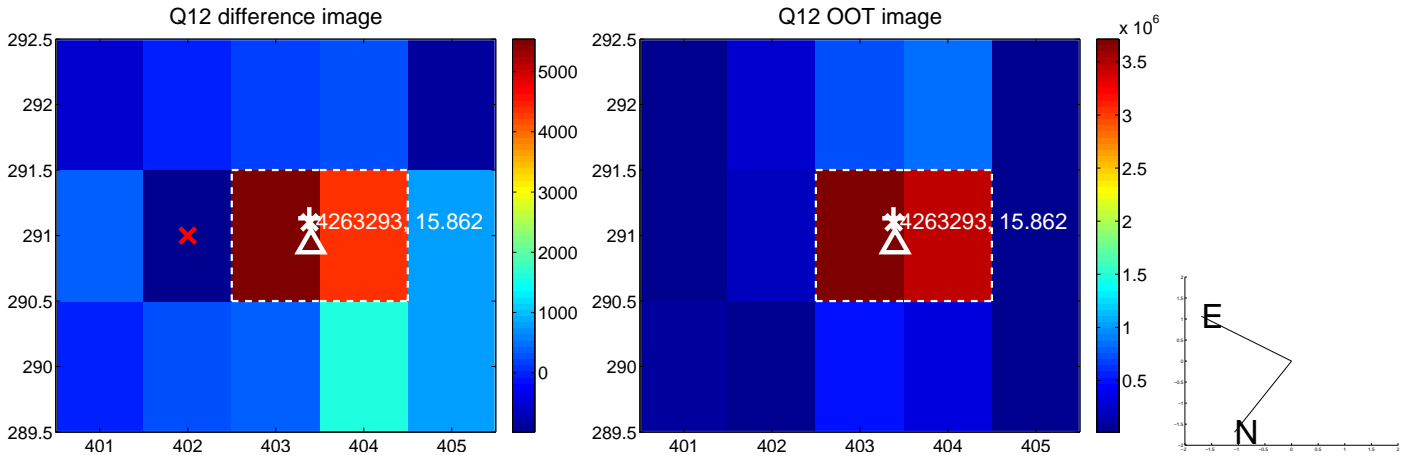
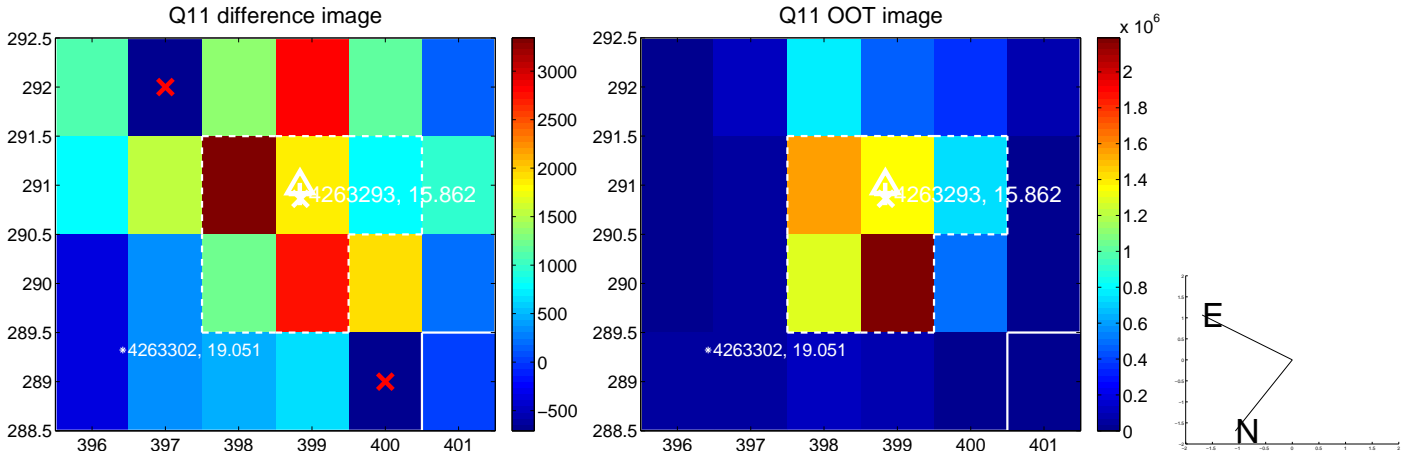
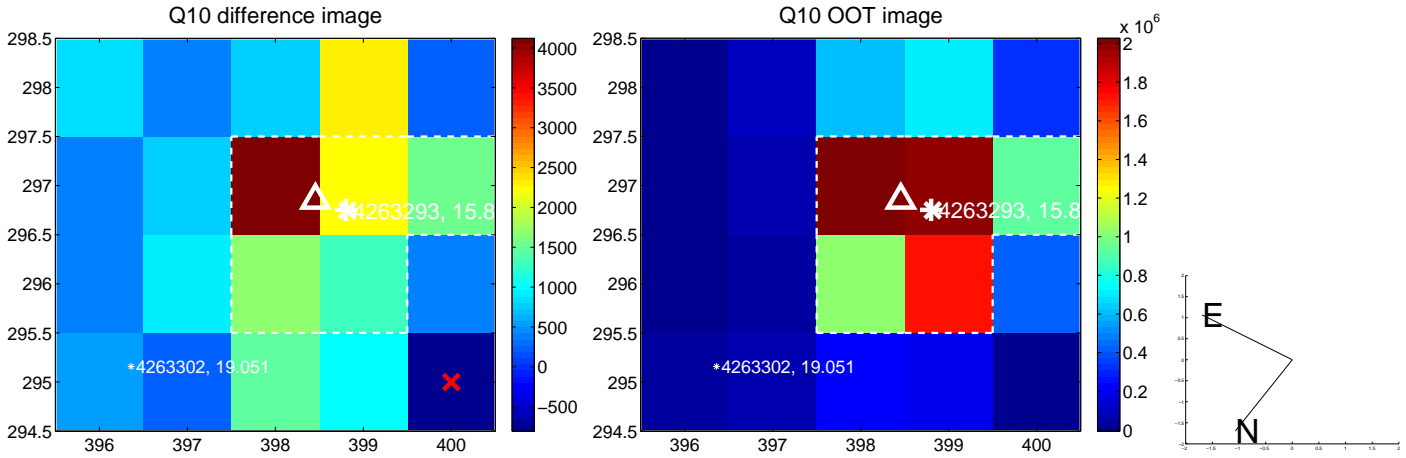
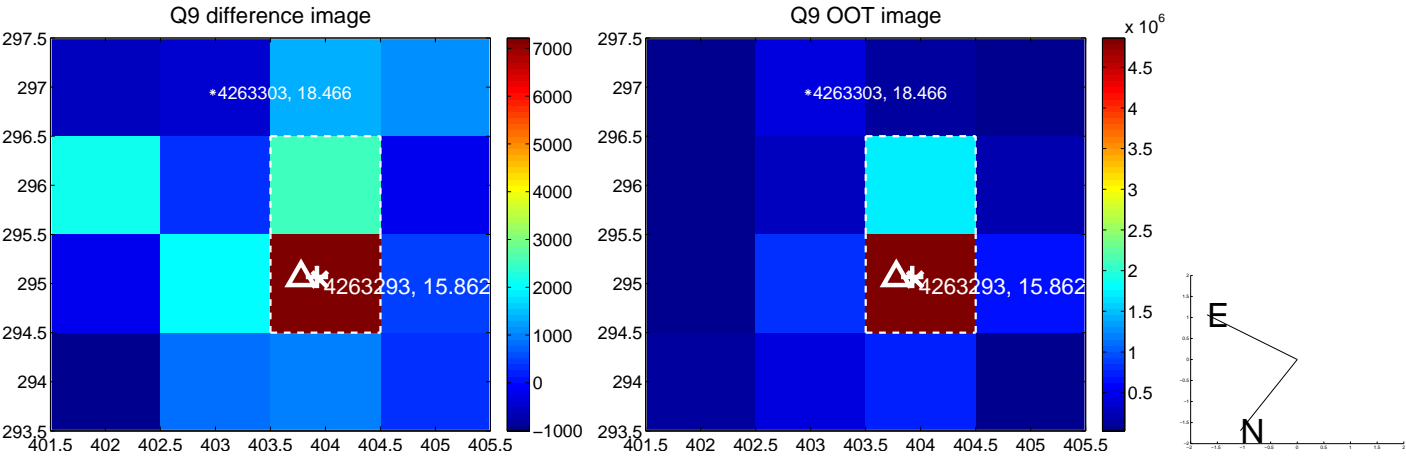
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.



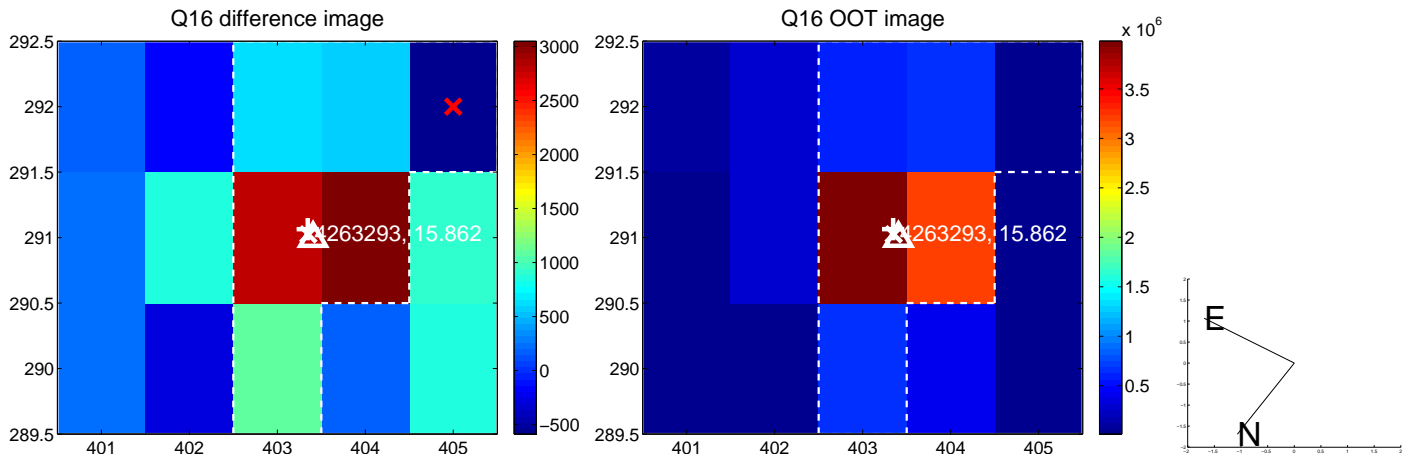
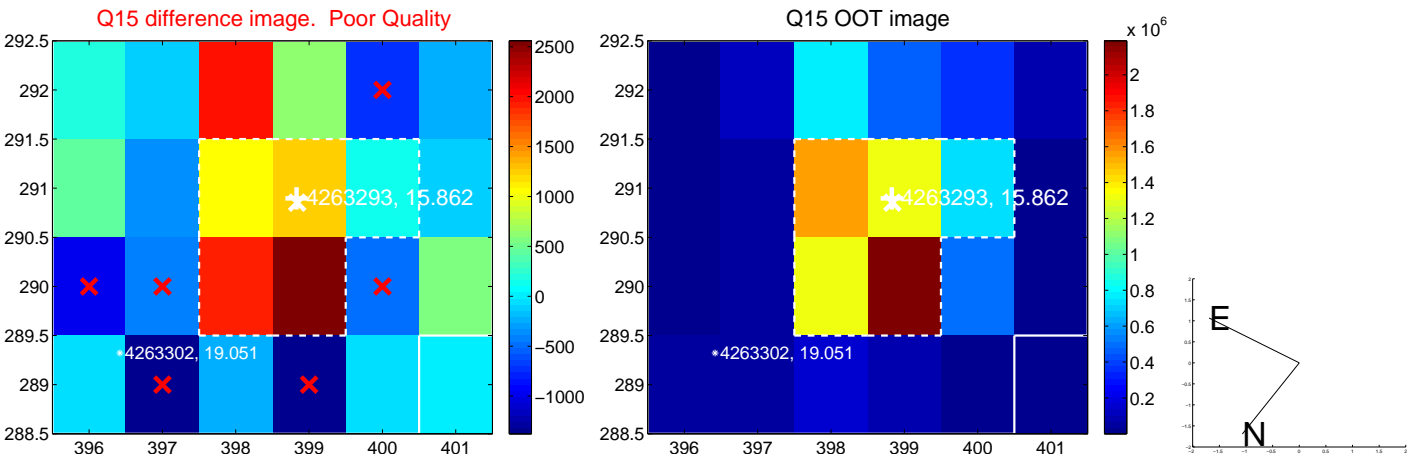
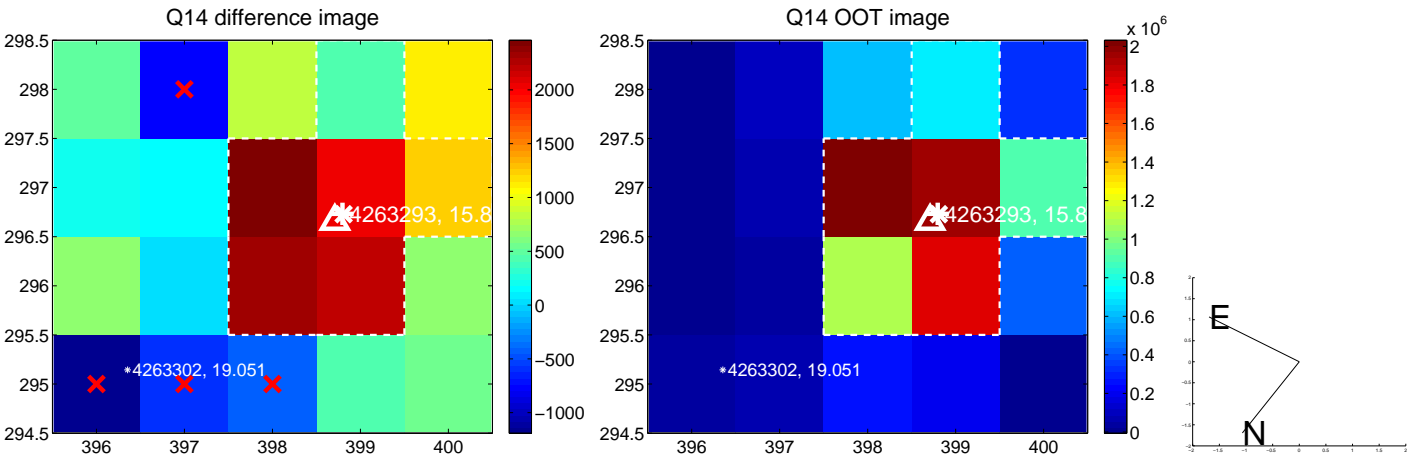
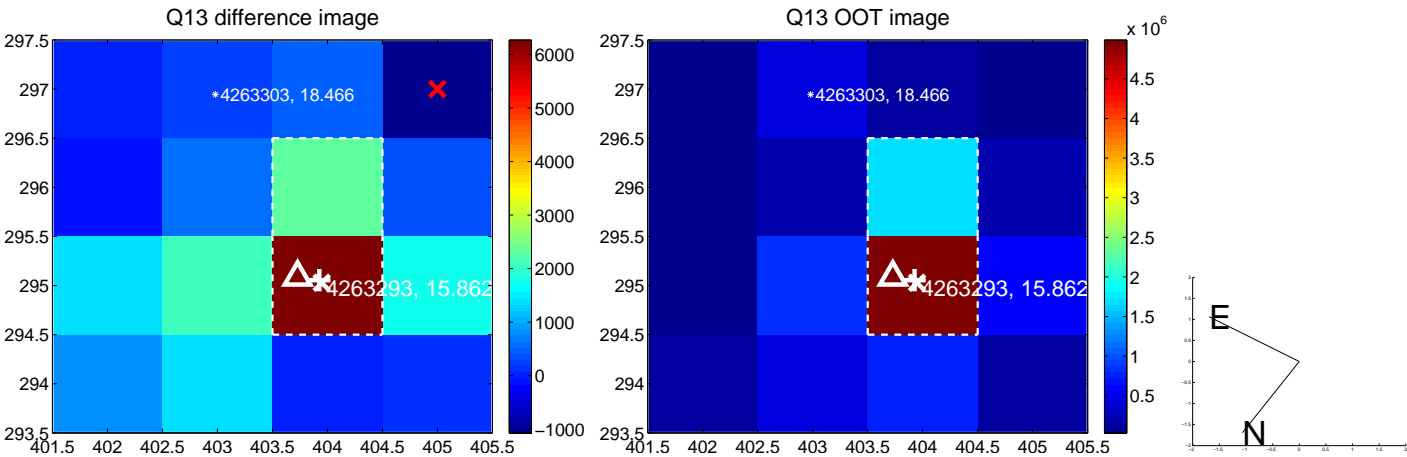
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

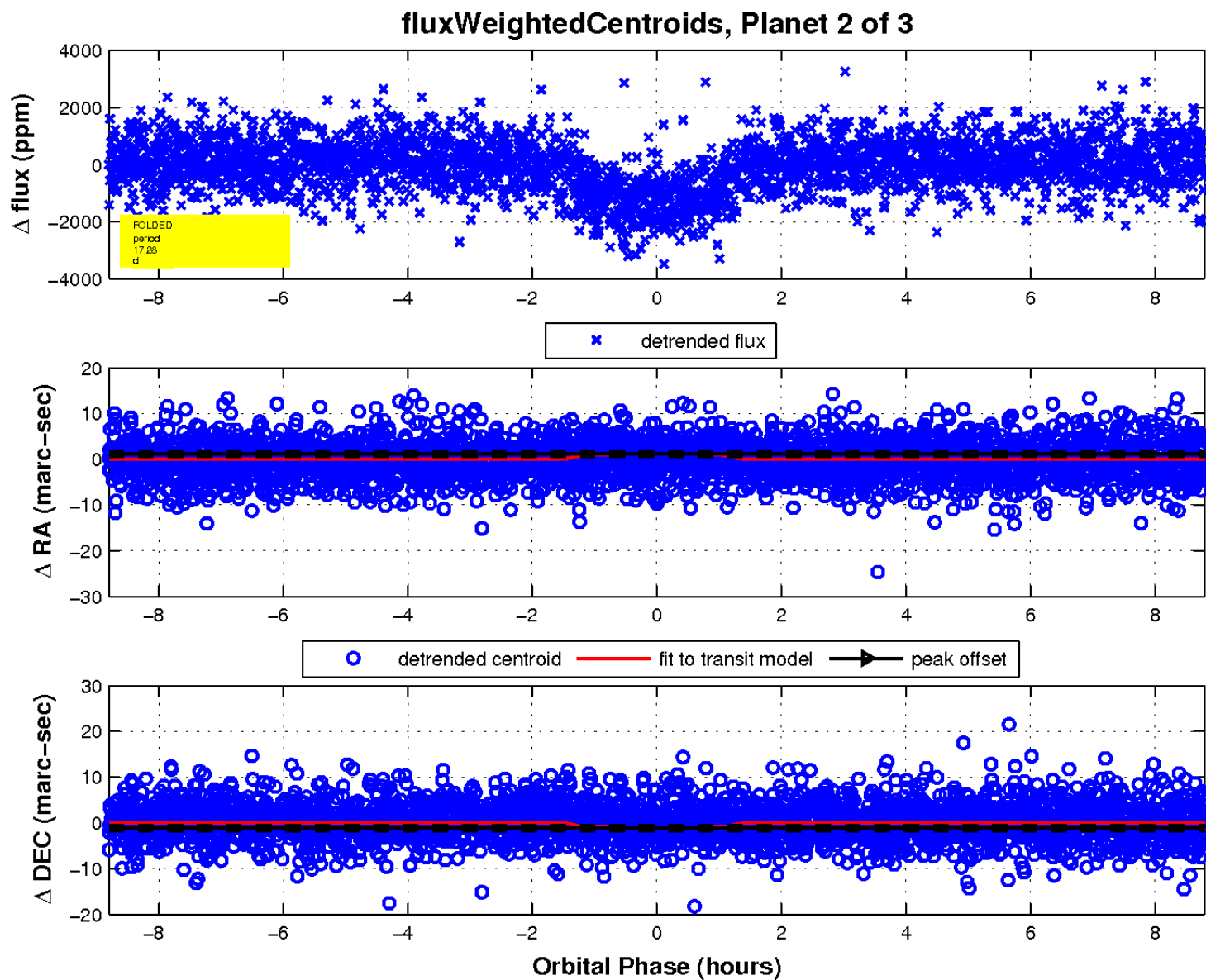
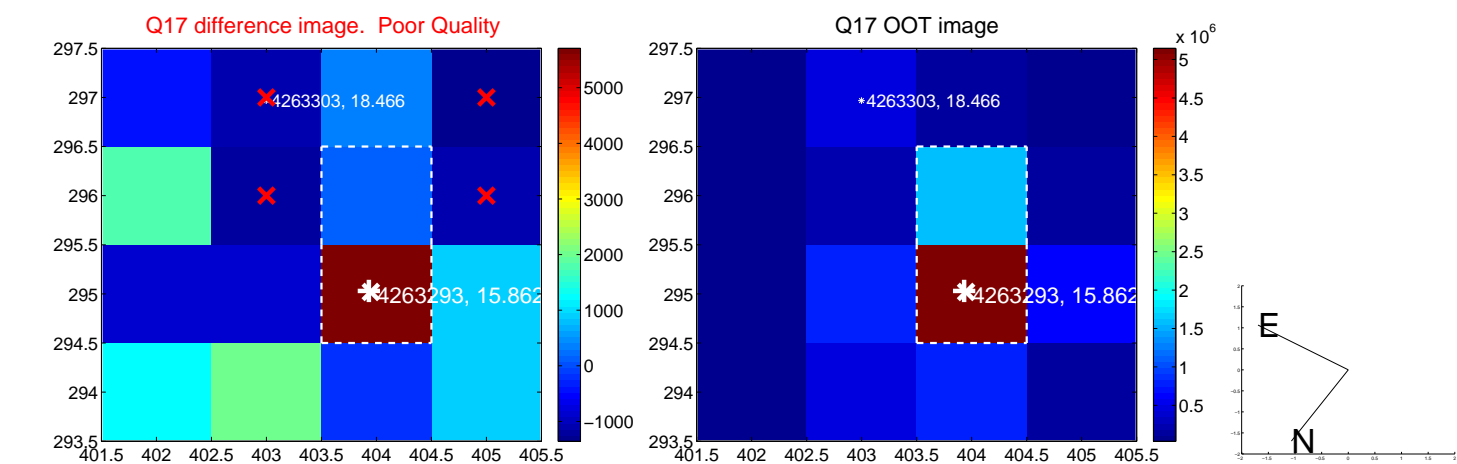


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



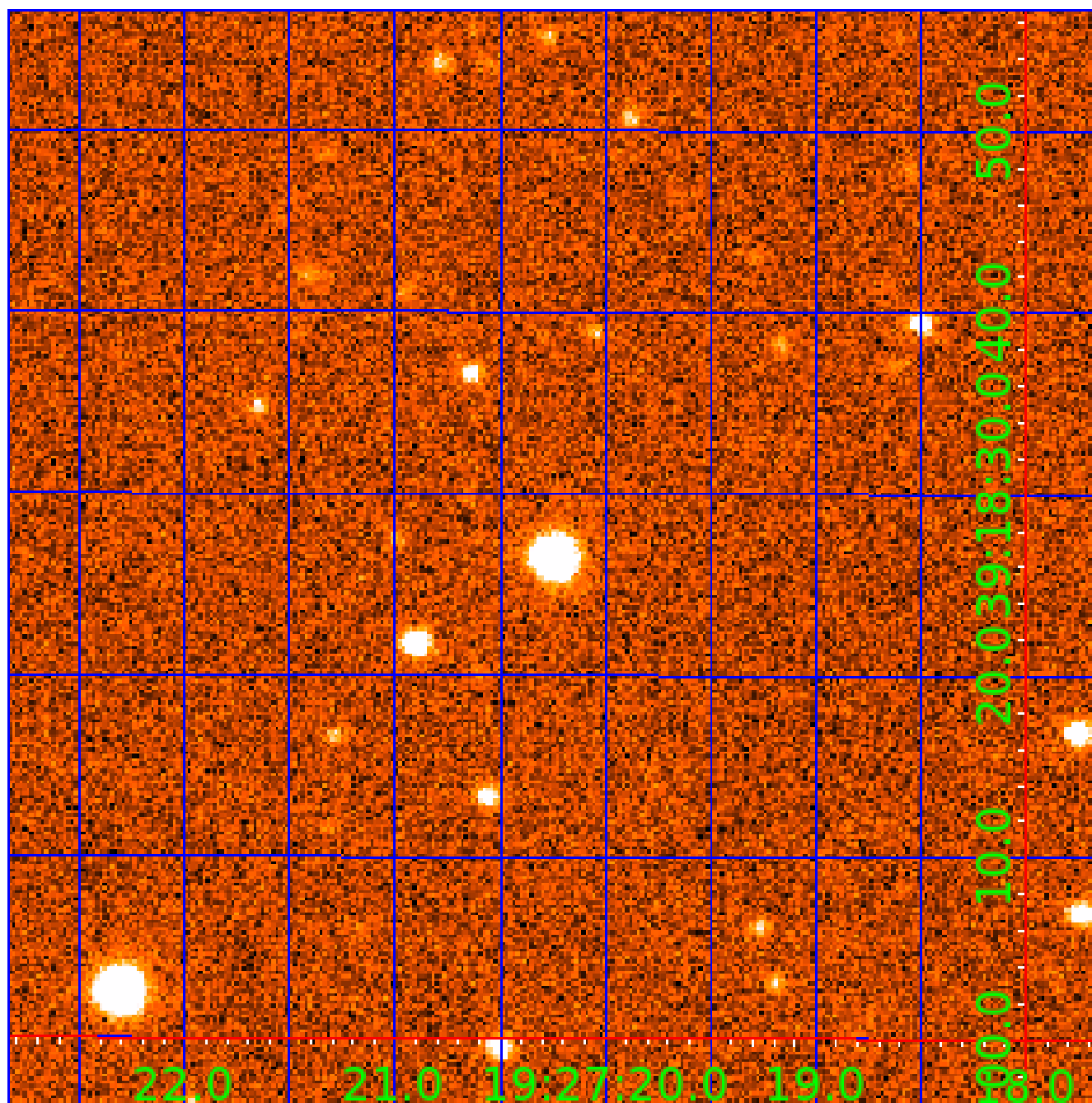


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 004263293

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004263293-01 | OBS      | 1895.01 | 8.457448      | 133.873591   | 1279.8      | 2.508            | 30.9 | 33.9 | 0.52                        | 4347            | 2.14                   | 20.12                  |
| 004263293-02 | OBS      | 1895.02 | 17.281203     | 136.006152   | 1409.4      | 2.933            | 25.3 | 28.5 | 0.52                        | 4347            | 2.23                   | 7.76                   |
| 004263293-03 | OBS      | 1895.03 | 32.133907     | 142.276212   | 1104.4      | 2.577            | 13.9 | 14.3 | 0.52                        | 4347            | 1.88                   | 3.39                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments         |
|--------------|----------|------|-------|---|---|---|---|------------------|
| 004263293-01 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT       |
| 004263293-02 | OBS      | PC   | 1.00  | 0 | 0 | 0 | 0 | NO_COMMENT       |
| 004263293-03 | OBS      | FP   | 0.24  | 0 | 1 | 0 | 0 | DEPTH_ODDEVEN_DV |

**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.

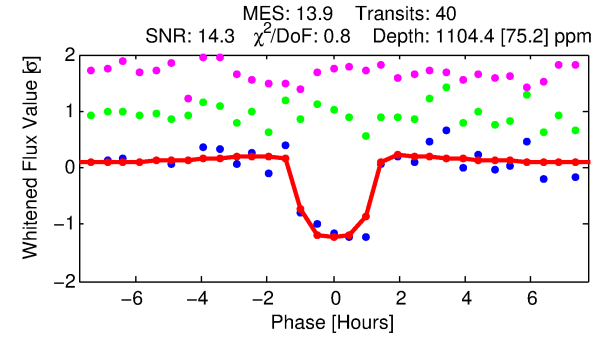
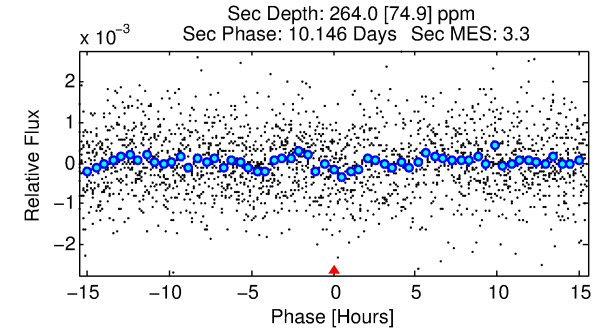
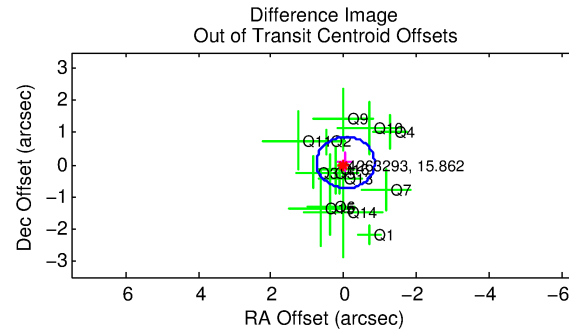
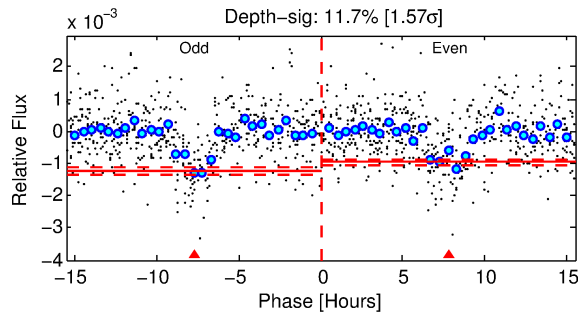
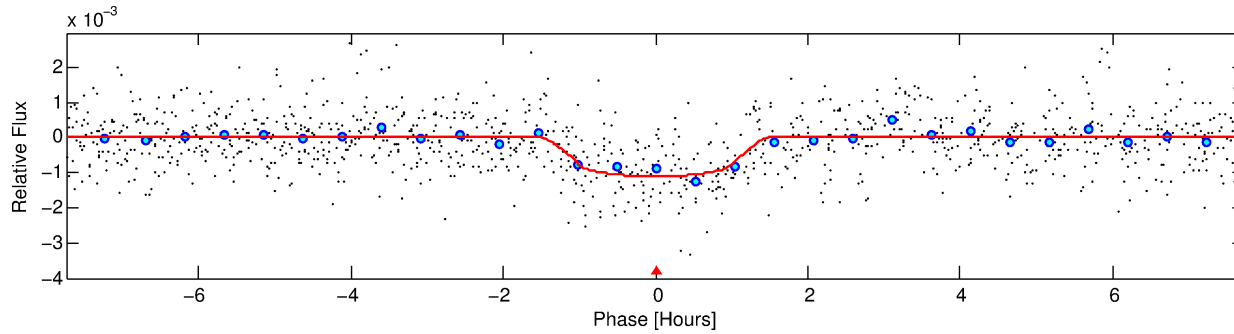
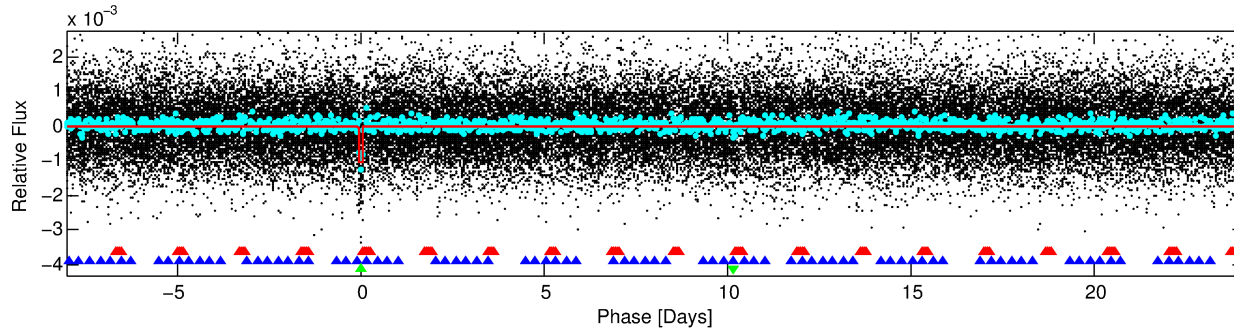
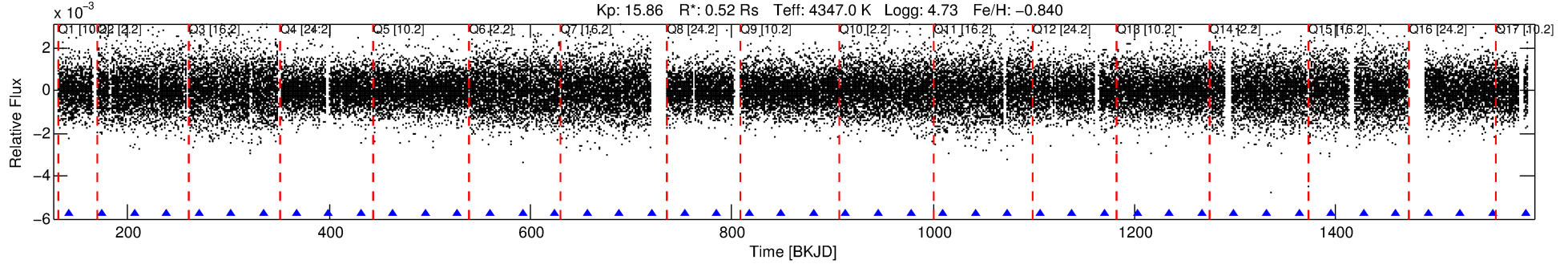
## Ephemeris Match Information For 004263293-03

No Significant Match Found

# DV One-Page Summary

KIC: 4263293 Candidate: 3 of 3 Period: 32.134 d  
KOI: K01895.03 Name: Kepler-331d Corr: 0.974

Kp: 15.86 R\*: 0.52 Rs Teff: 4347.0 K Logg: 4.73 Fe/H: -0.840



## DV Fit Results:

Period = 32.13391 [0.00015] d  
Epoch = 142.2762 [0.0040] BKJD  
Rp/R\* = 0.0328 [0.0246]  
a/R\* = 70.30 [209.16]  
b = 0.72 [2.01]  
Seff = 3.39 [0.55]  
Teq = 346 [14] K  
Rp = 1.88 [1.42] Re  
a = 0.1609 [0.0111] AU  
Ag = 1066.02 [1630.69] [0.65σ]  
Teffp = 3057 [1171] K [2.31σ]

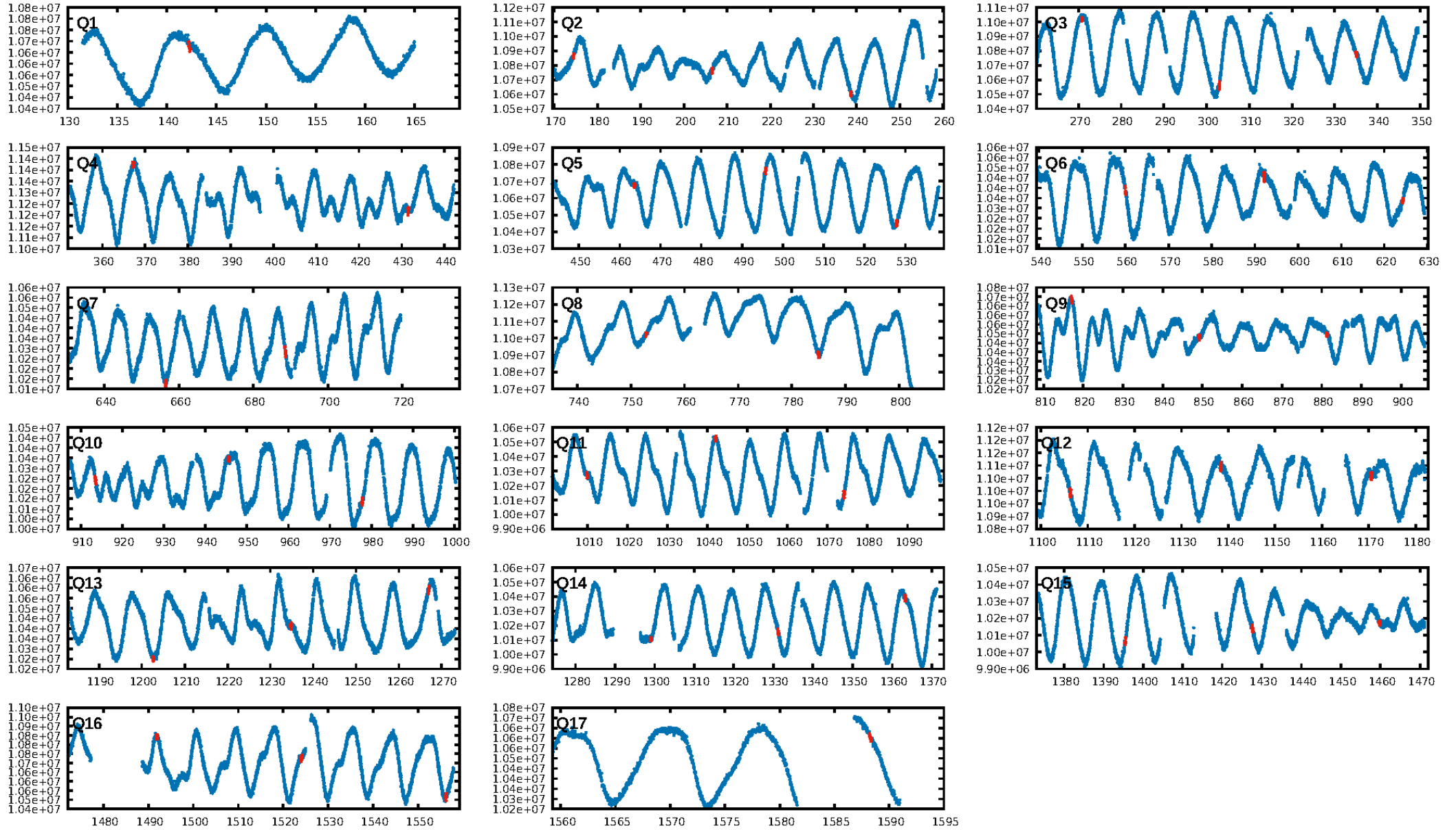
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [91.30σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 4.65e-42  
RollingBand-fgt: 1.00 [39/39]  
GhostDiagnostic-chr: 1.615  
Centroid-sig: 5.6%  
Centroid-so: 1.069 arcsec [1.37σ]  
OotOffset-rm: 0.079 arcsec [0.30σ]  
KicOffset-rm: 0.044 arcsec [0.18σ]  
OotOffset-st: 4/4/2/4 [14]  
KicOffset-st: 4/4/2/4 [14]  
DiffImageQuality-fgm: 0.86 [12/14]  
DiffImageOverlap-fno: 0.88 [15/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 03:13:56 Z

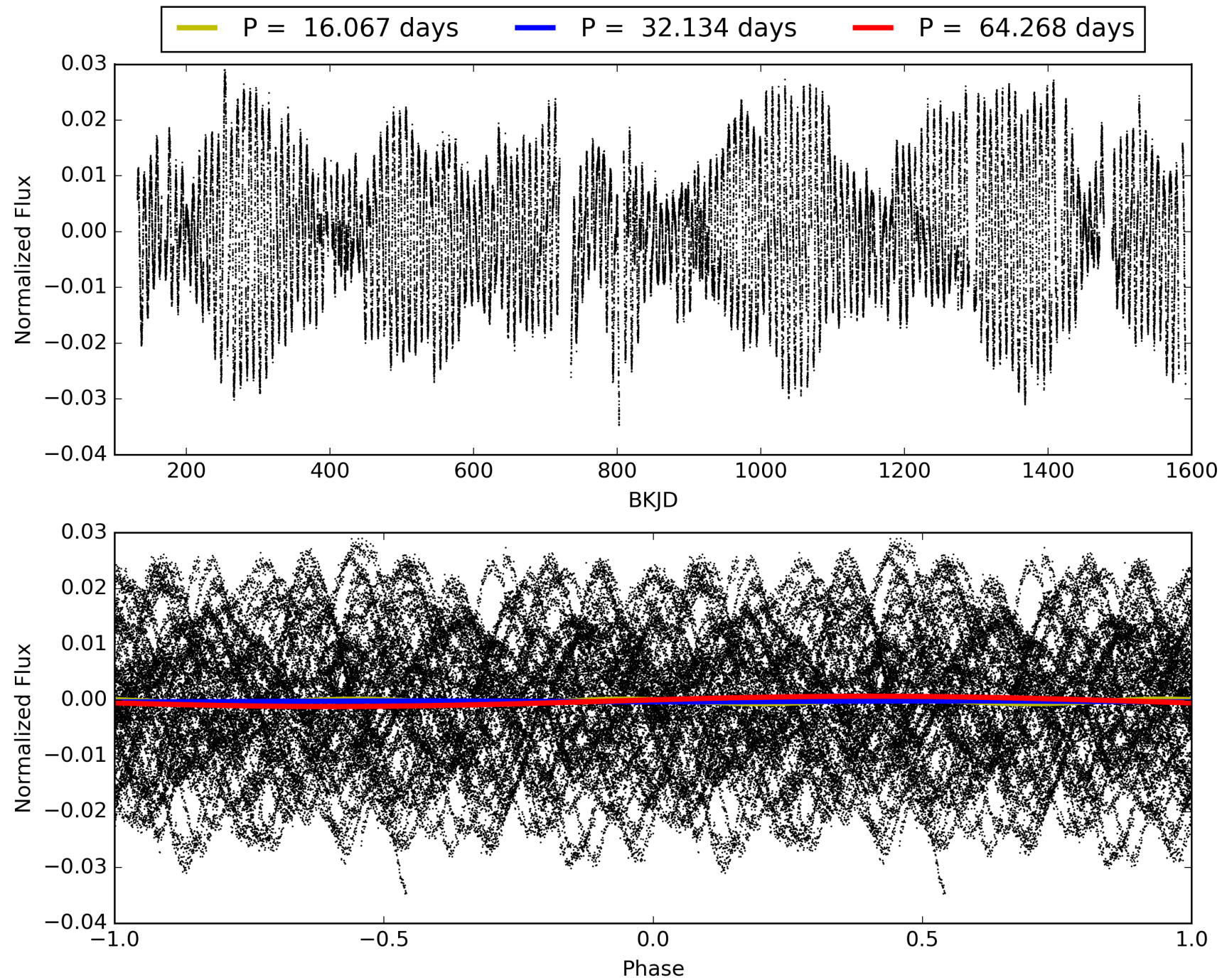
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004263293-03, PDC Light Curves





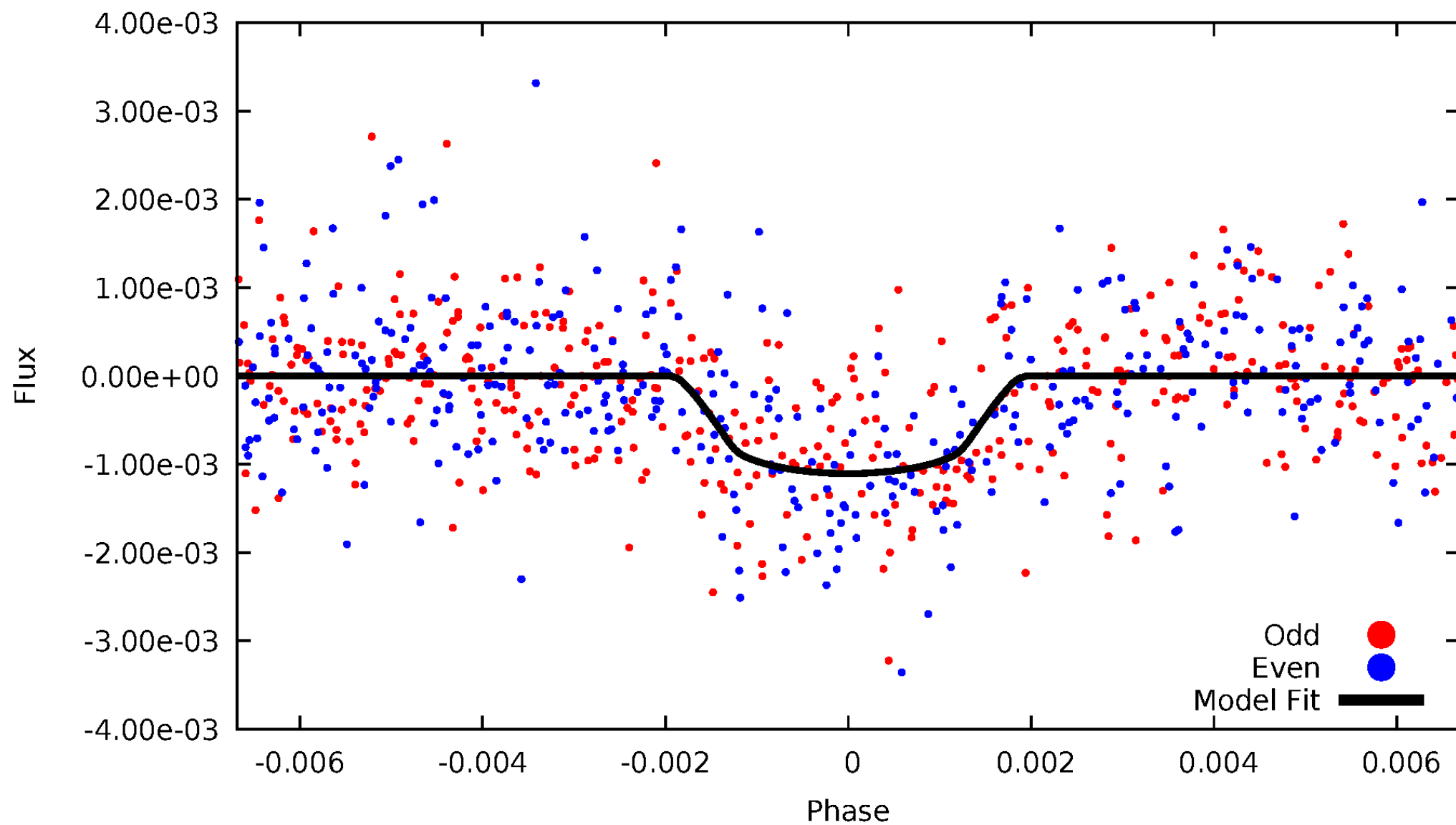
TCE 004263293-03





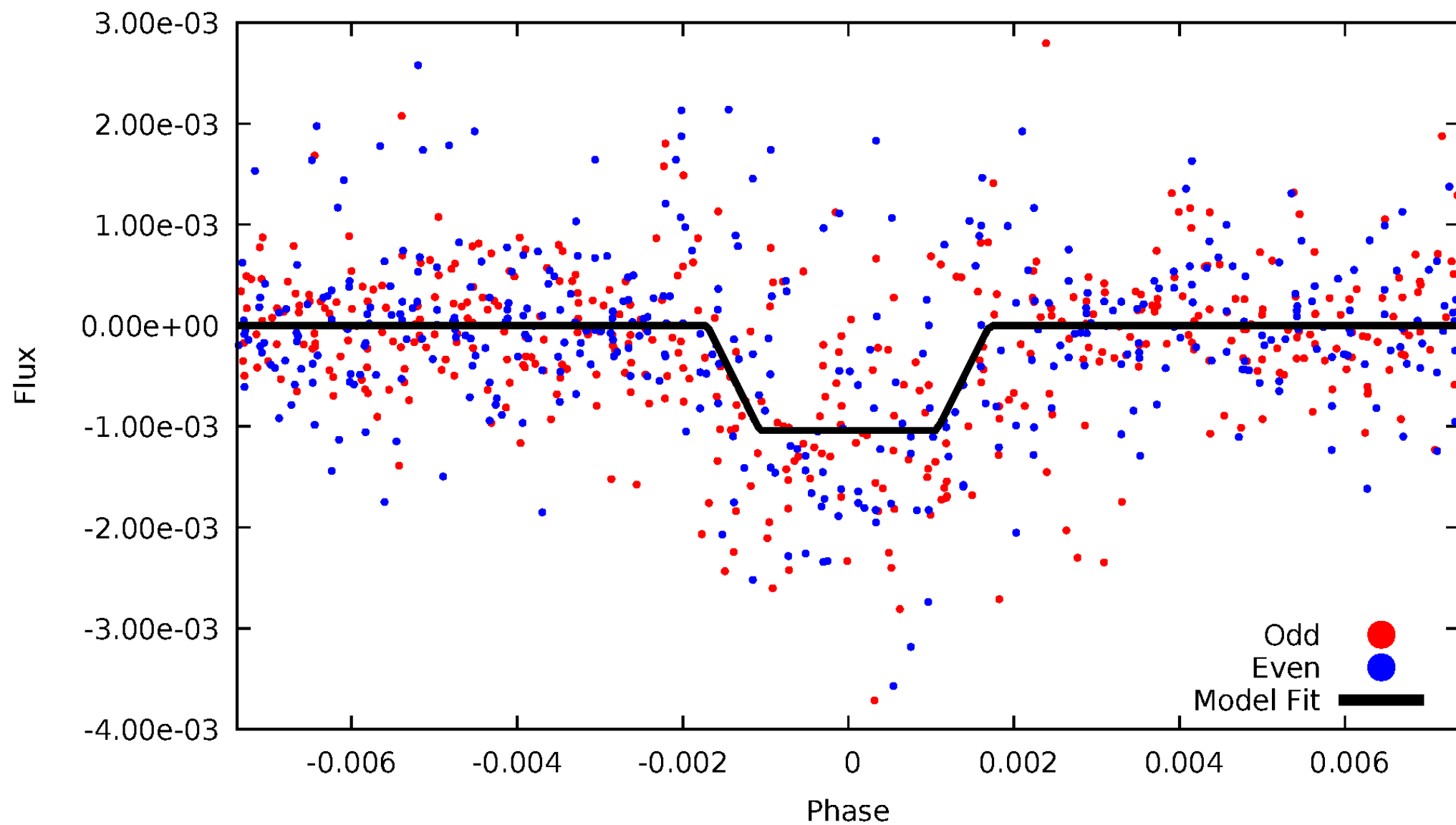
# DV Odd/Even

TCE 004263293-03

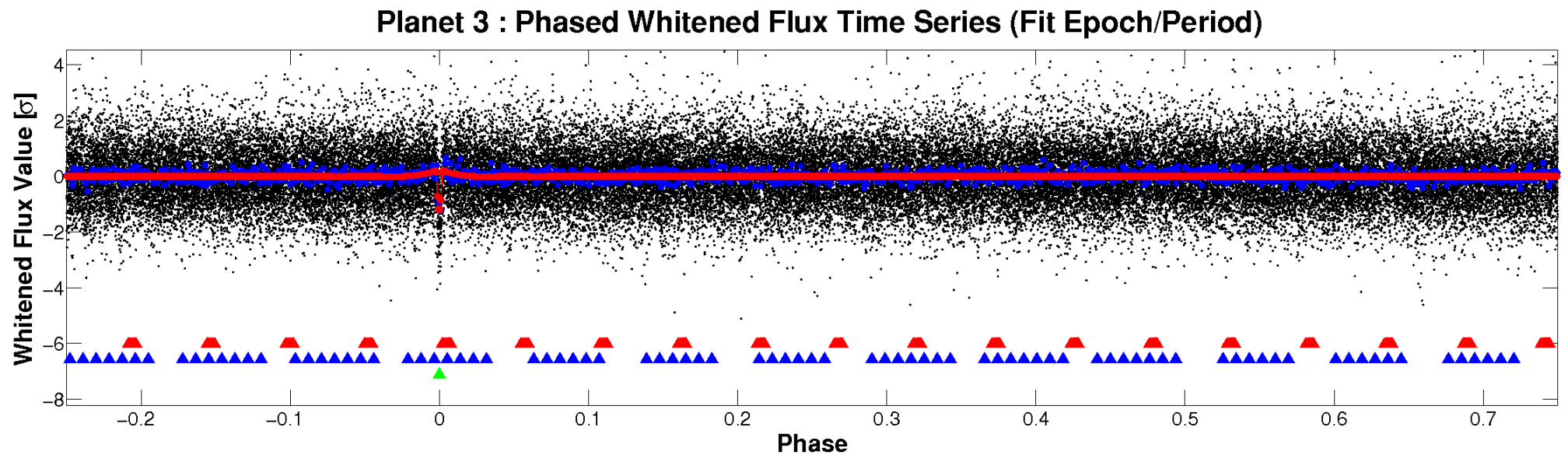
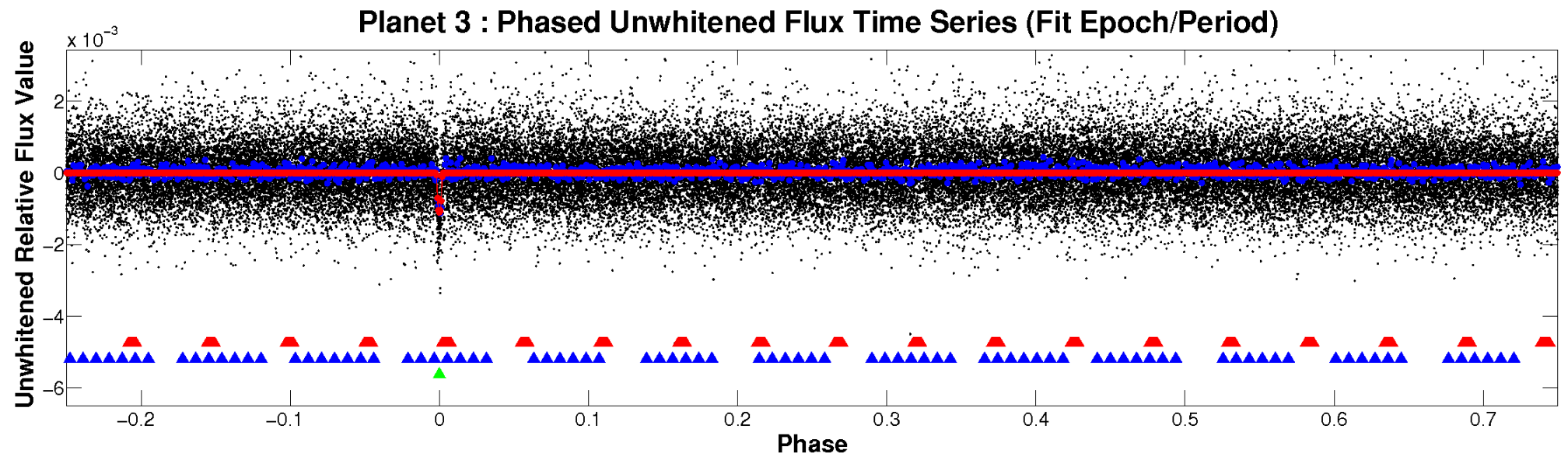


# ALT Odd/Even

TCE 004263293-03

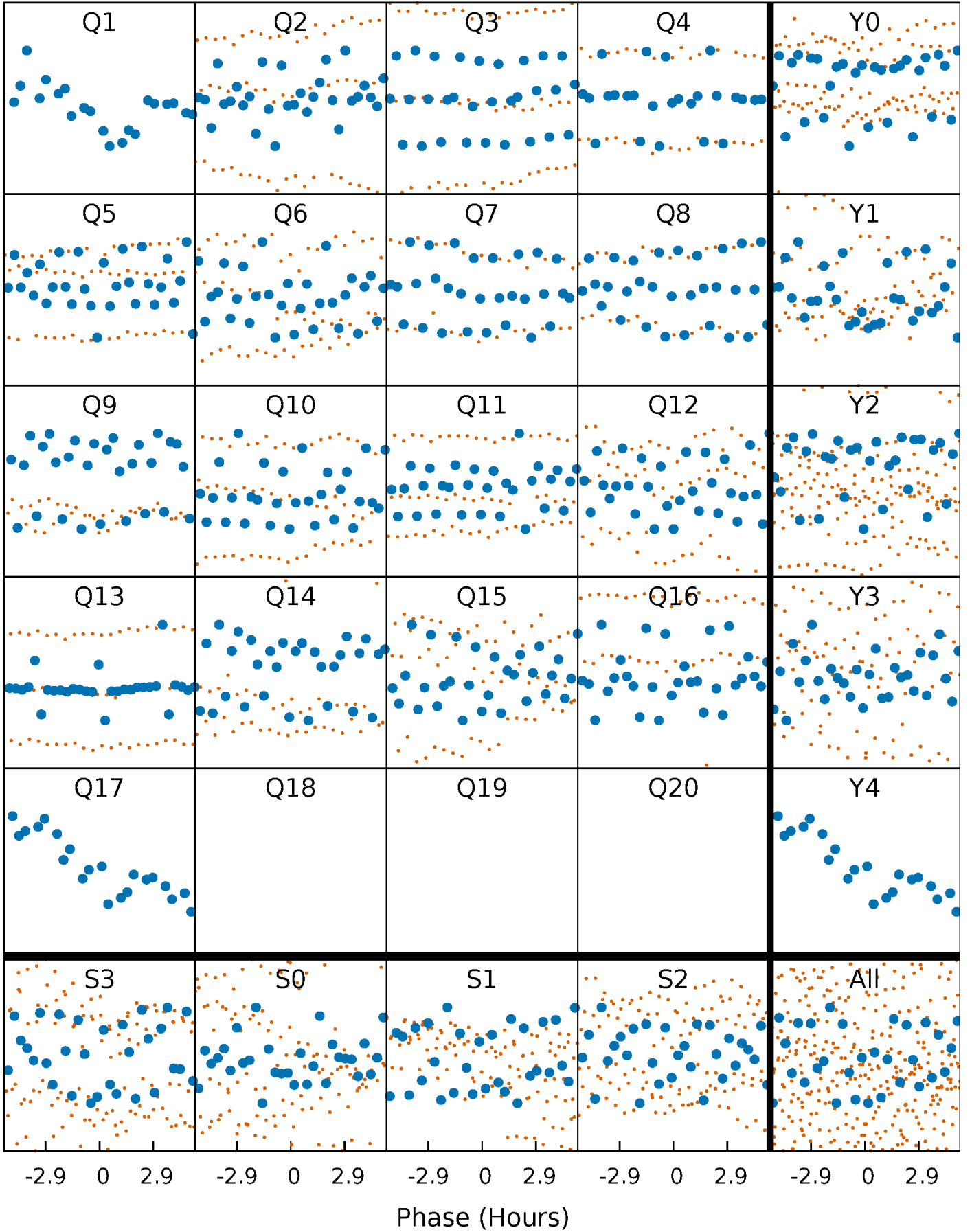


# Non-Whitened Vs. Whitened Light Curve



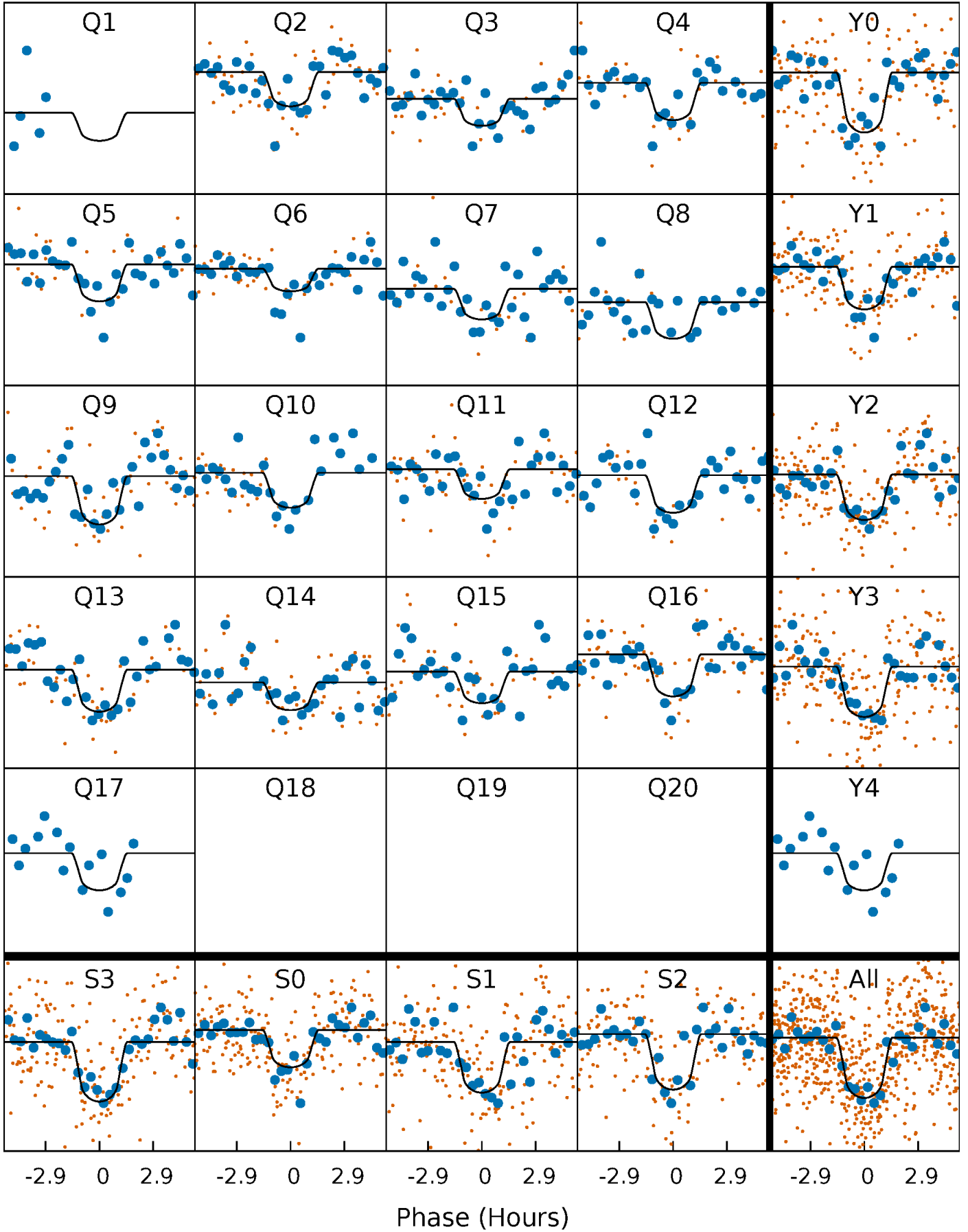
# PDC Quarter-Phased Transit Curves

TCE 004263293-03   P= 32.133907 Days    $T_0=142.276212$  (BKJD)



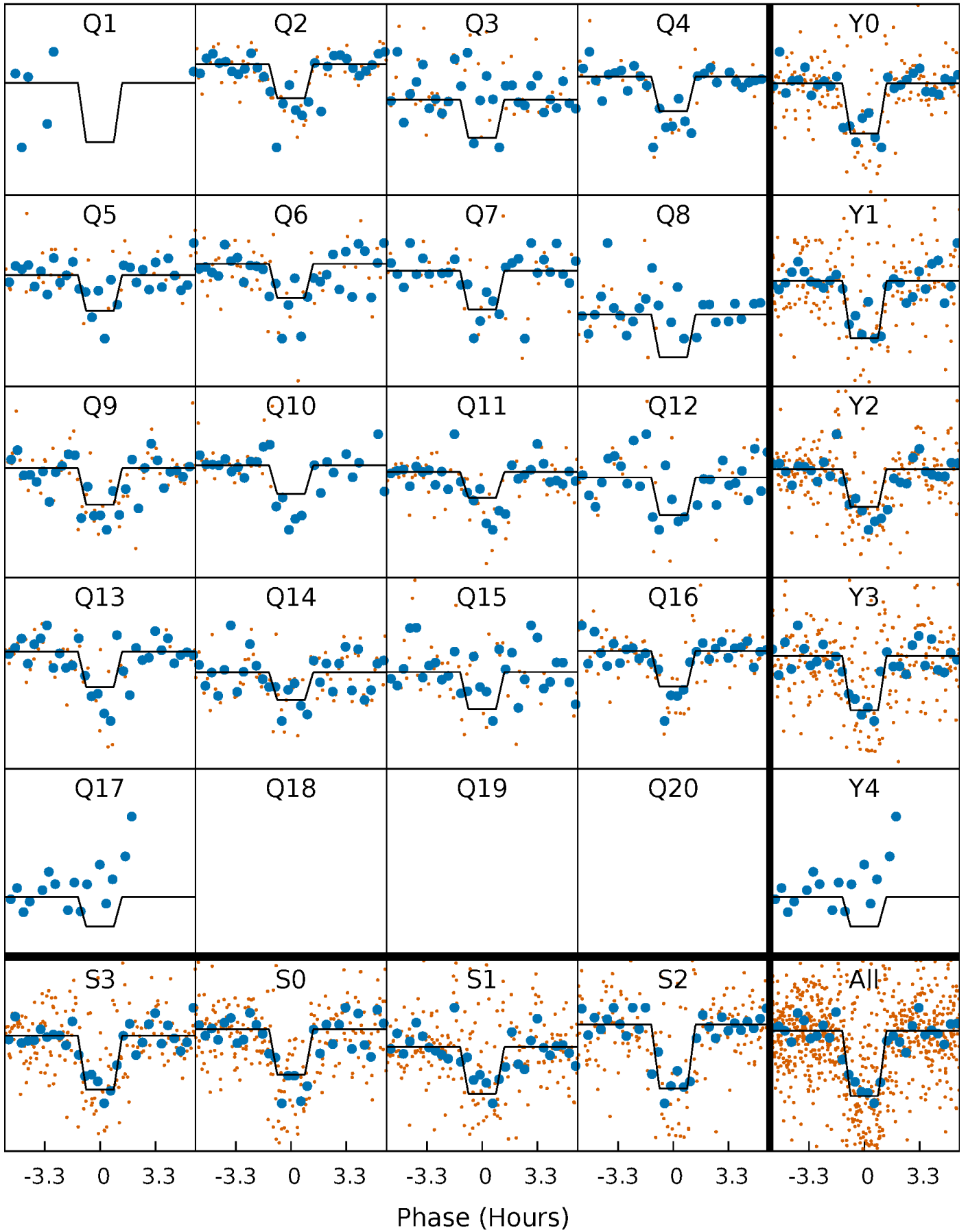
# DV Quarter-Phased Transit Curves

TCE 004263293-03   P= 32.133907 Days    $T_0=142.276212$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

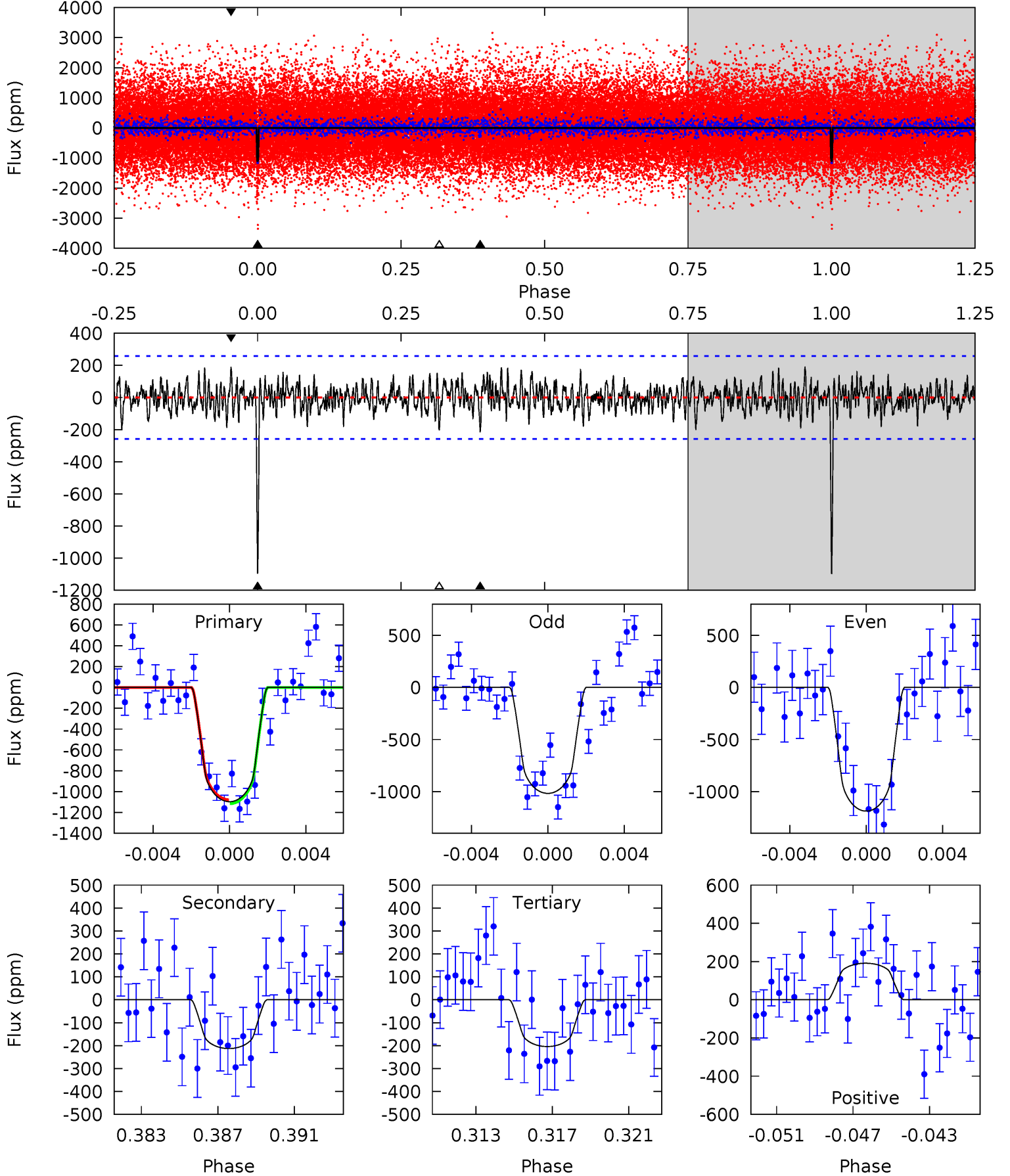
TCE 004263293-03 P= 32.134092 Days  $T_0=142.274898$  (BKJD)



# DV Model-Shift Uniqueness Test

004263293-03, P = 32.133907 Days, E = 110.142305 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 22.1 | 4.29 | 4.12 | 3.86 | 5.20            | 2.89            | 1.31             | 18.0    | 18.3    | 0.17    | 0.43    | 1.72    | 0.93 | 0.15  | 0.38 |

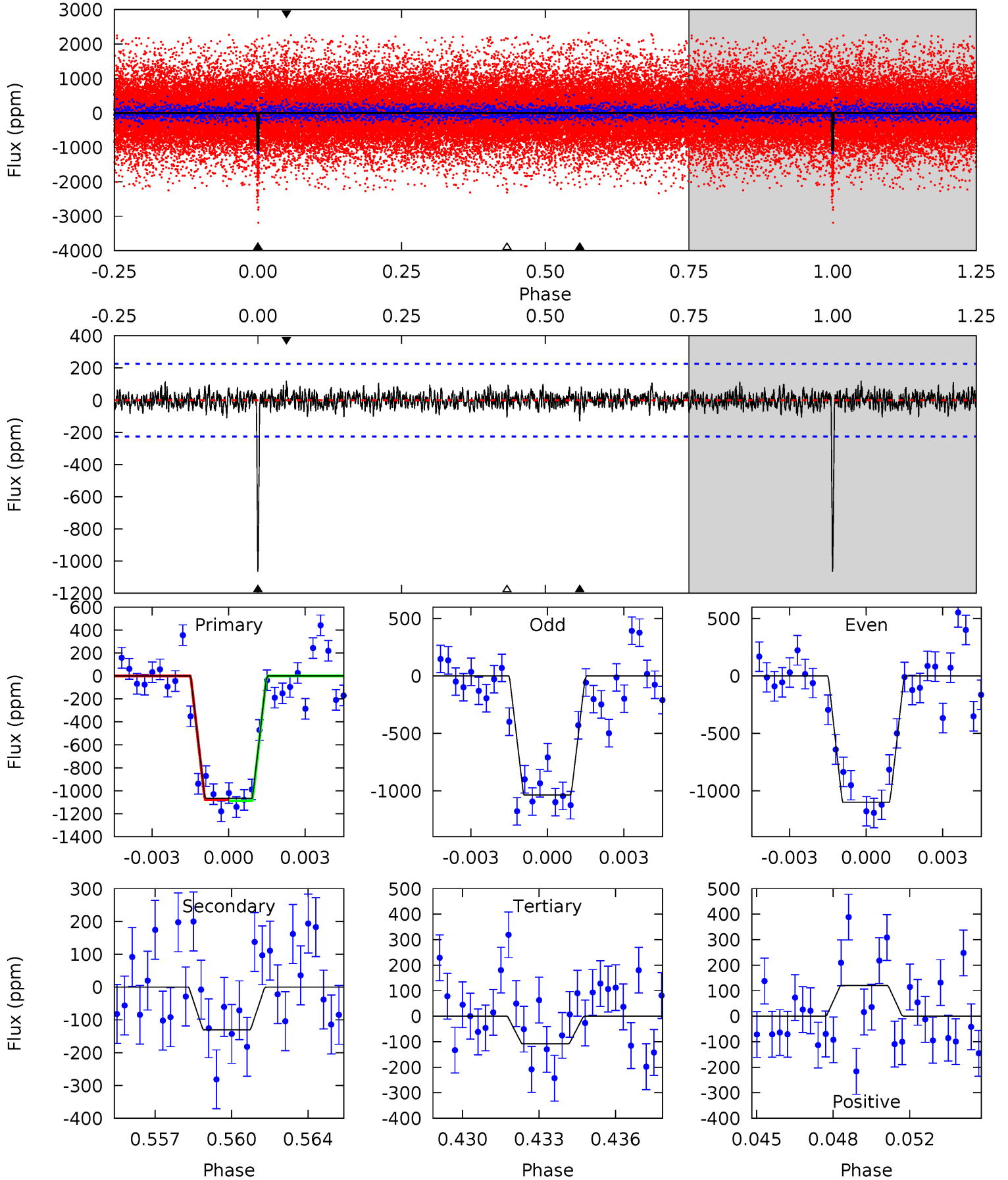




# Alt Model-Shift Uniqueness Test

004263293-03,  $P = 32.134092$  Days,  $E = 110.140806$  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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 24.7 | 3.02 | 2.50 | 2.80 | 5.23            | 2.93            | 0.79             | 22.2    | 21.9    | 0.52    | 0.22    | 0.74    | 0.90 | 0.10  | 0.14 |



### Stellar Parameters For KIC 004263293

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $4347^{+117}_{-143}$ | $4.730^{+0.050}_{-0.041}$ | $-0.840^{+0.300}_{-0.350}$ | $0.524^{+0.045}_{-0.045}$ | $0.537^{+0.043}_{-0.043}$ | $5.272^{+1.142}_{-0.853}$                     |
|        | +3%/-3%              | +1%/-1%                   | +36%/-42%                  | +9%/-9%                   | +8%/-8%                   | +22%/-16%                                     |
| Source | PHO1                 | 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 004263293-03 / KOI 1895.03

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)     | $T_{obs}$ (K)         | $A_{obs}$            |
|---------|---------------|------------------------|-------------------|-----------------------|----------------------|
| DV      | $-213 \pm 50$ | $2.07^{+1.29}_{-1.20}$ | $482^{+16}_{-18}$ | $3198^{+1030}_{-429}$ | $705^{+3034}_{-455}$ |
| Alt.    | $-130 \pm 43$ | $2.04^{+1.31}_{-1.20}$ | $482^{+16}_{-18}$ | $2996^{+943}_{-413}$  | $451^{+2177}_{-301}$ |

$T_{max}$  = 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  $A_{obs} \gg 1.0$

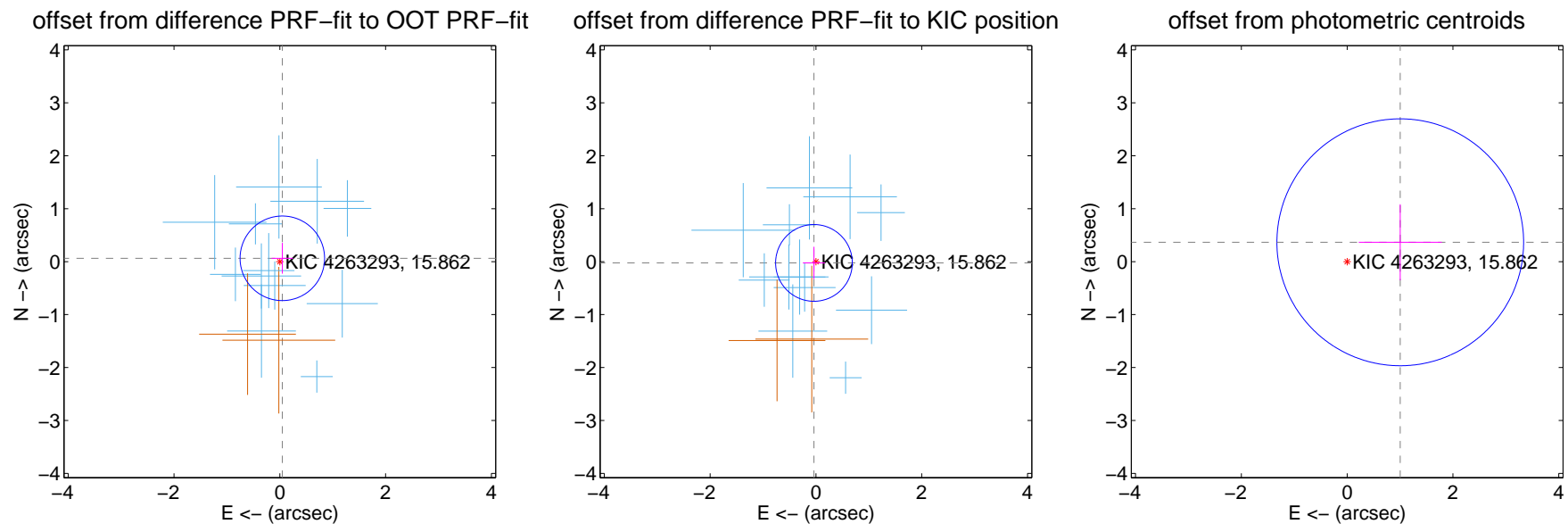
## DV Centroid Data

Supplemental centroid analysis for 004263293-03. Kepler magnitude: 15.86. Transit SNR 14.25

There are 12 quarters with good PRF difference image offsets

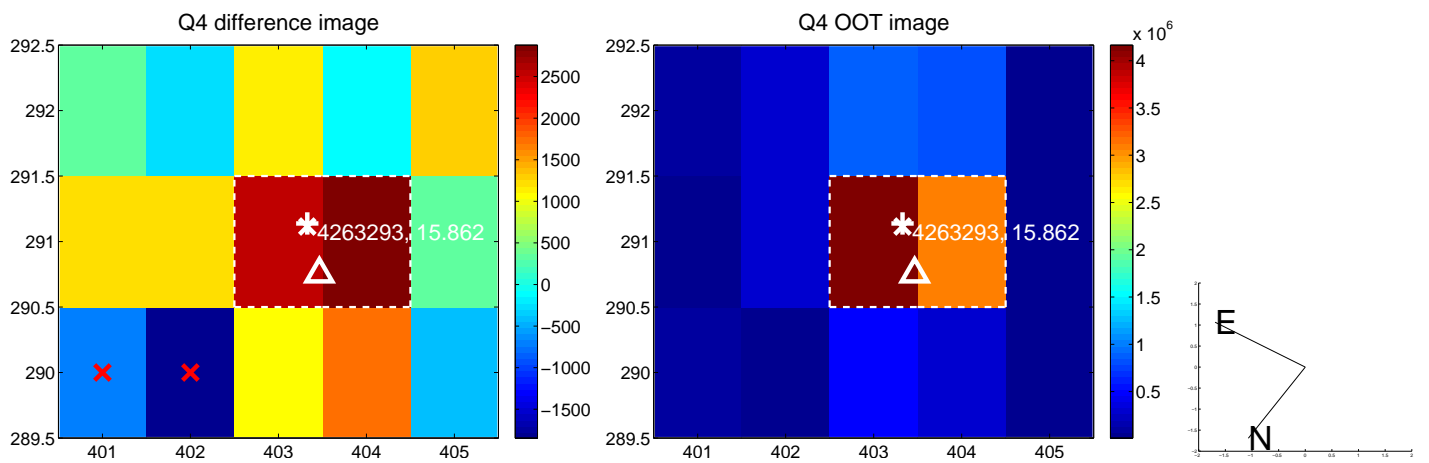
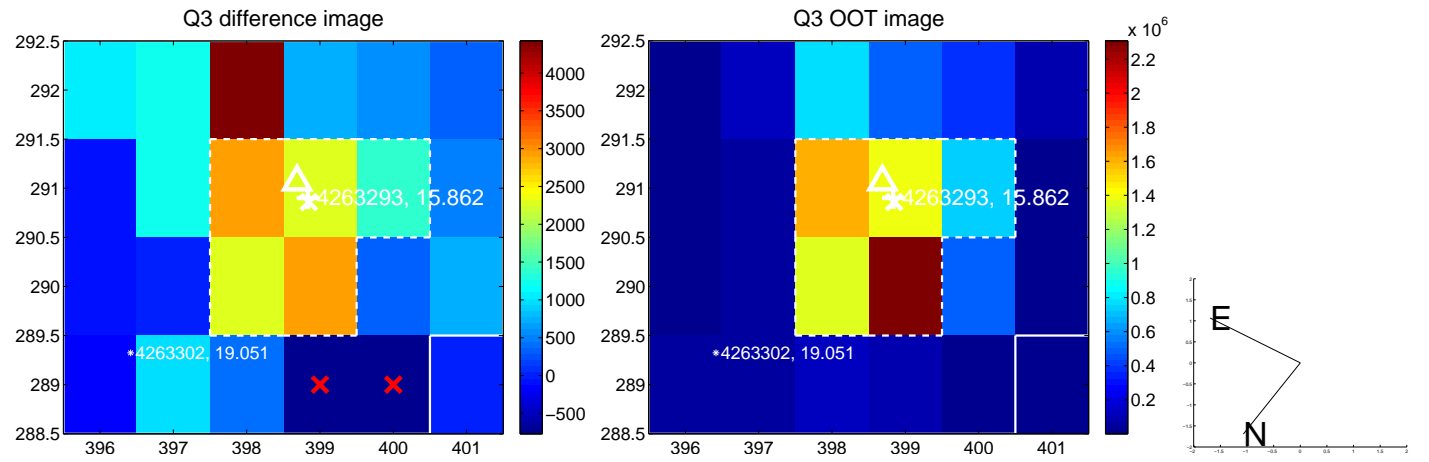
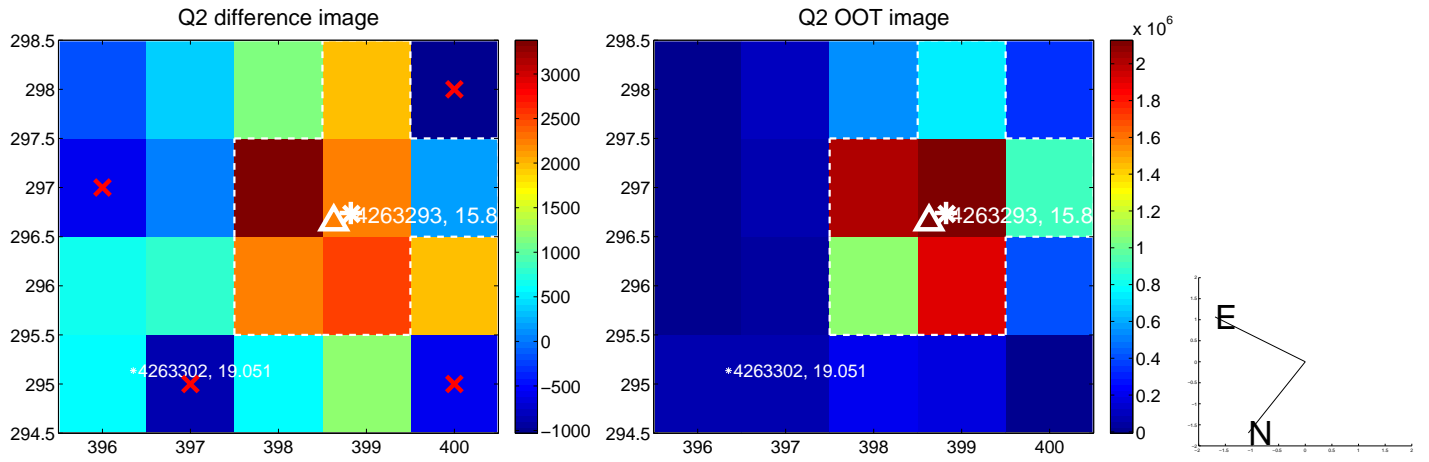
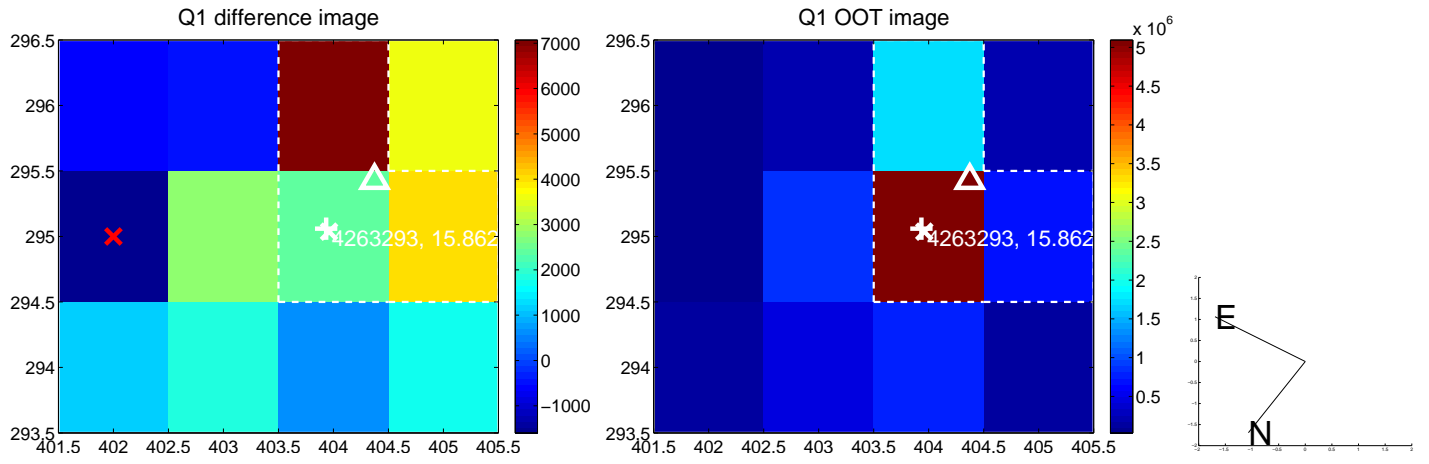
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.079 \pm 0.266$  | 0.30                | $-0.048 \pm 0.202$ | $0.063 \pm 0.290$  |
| PRF-fit source offset from KIC position | $0.044 \pm 0.242$  | 0.18                | $0.037 \pm 0.210$  | $-0.024 \pm 0.305$ |
| photometric centroid source offset      | $1.07 \pm 0.78$    | 1.37                | $-1.00 \pm 0.78$   | $0.37 \pm 0.72$    |

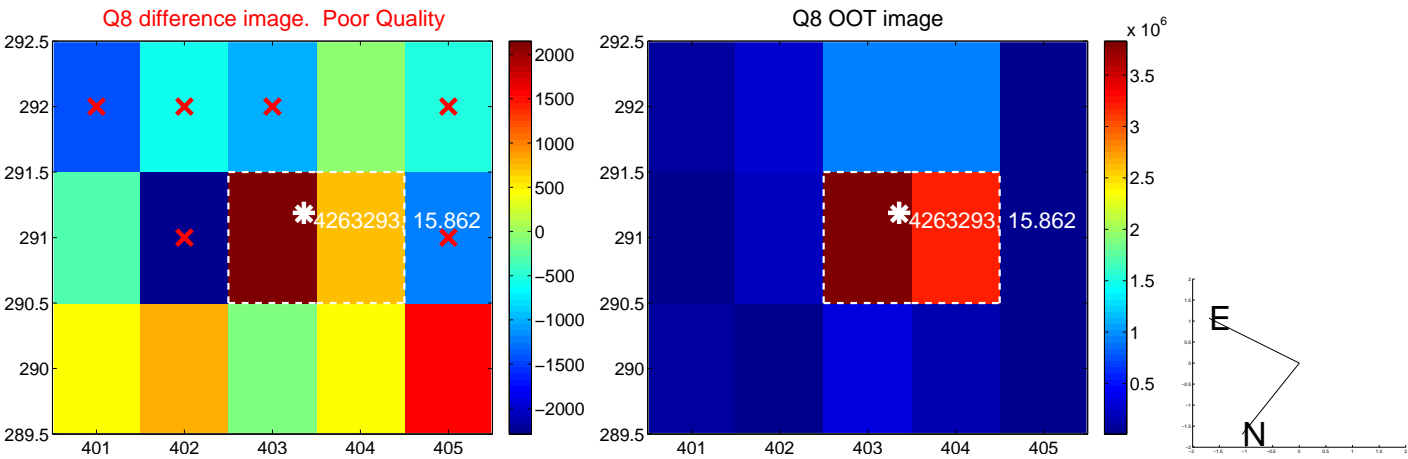
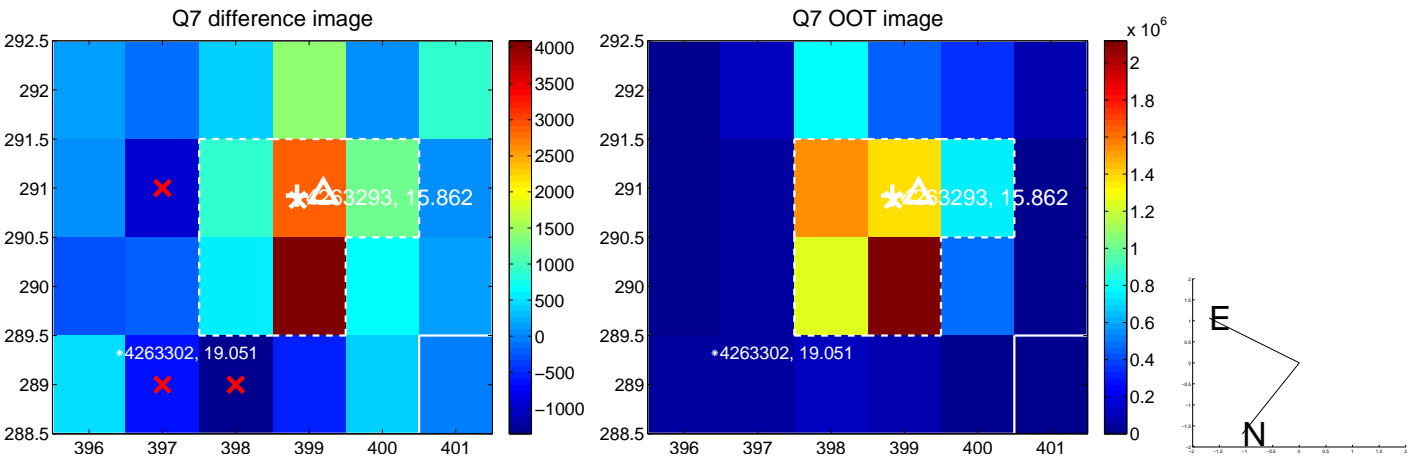
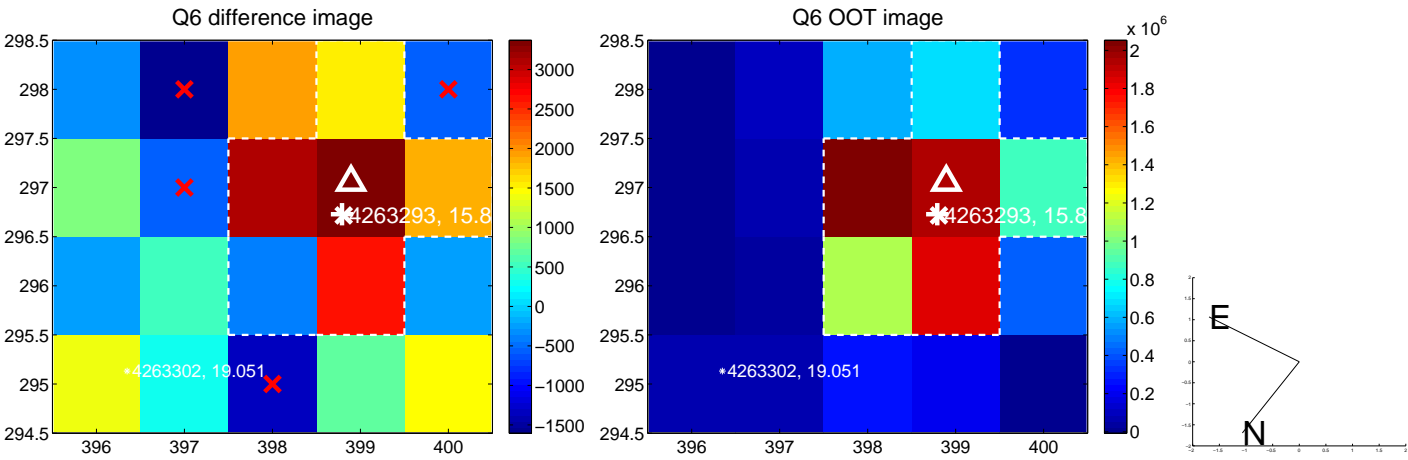
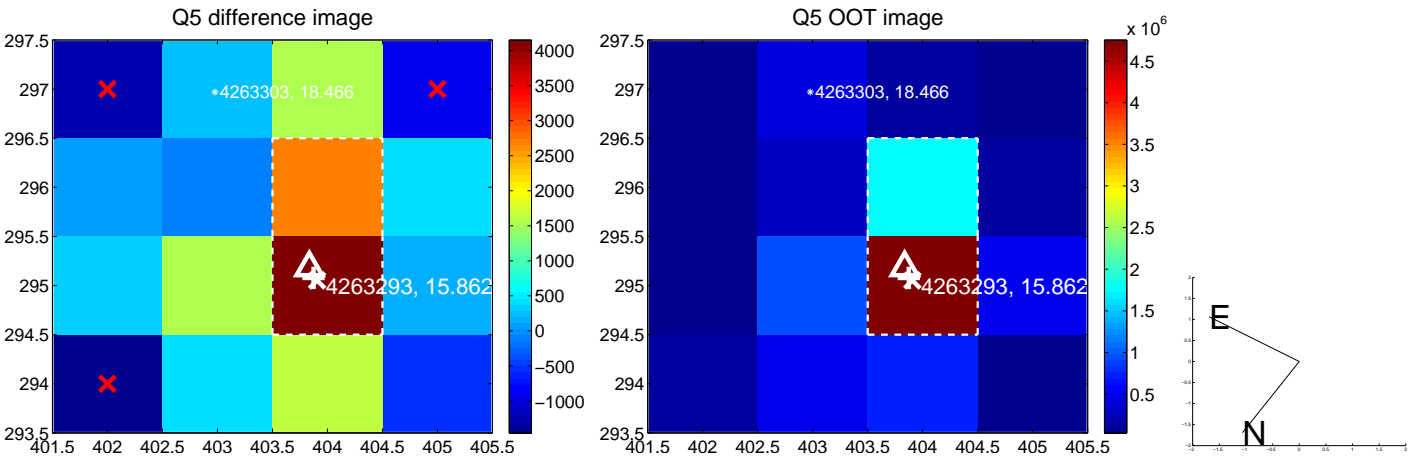


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

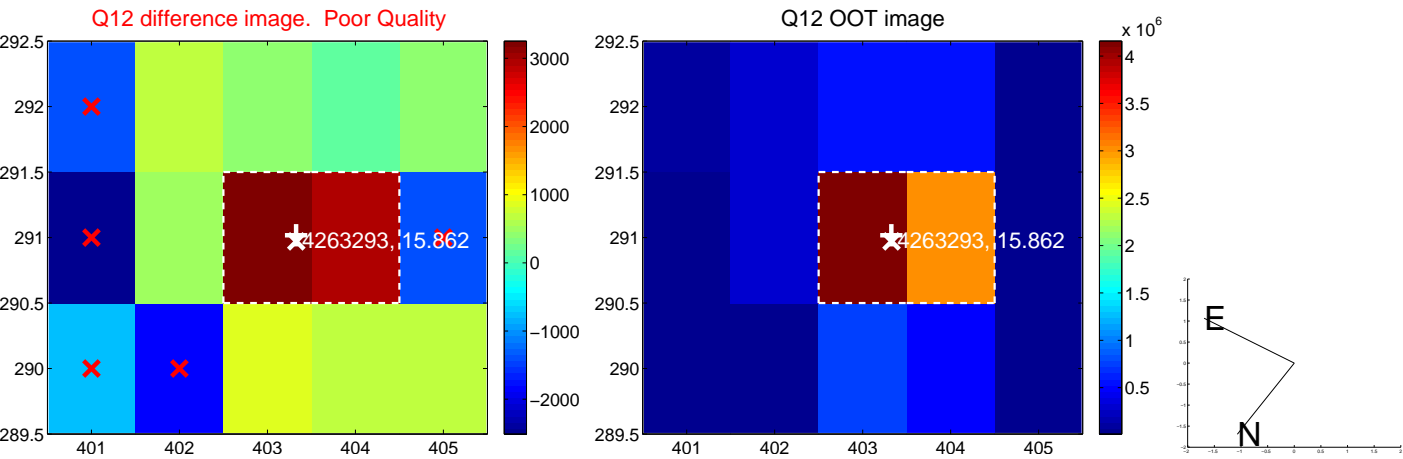
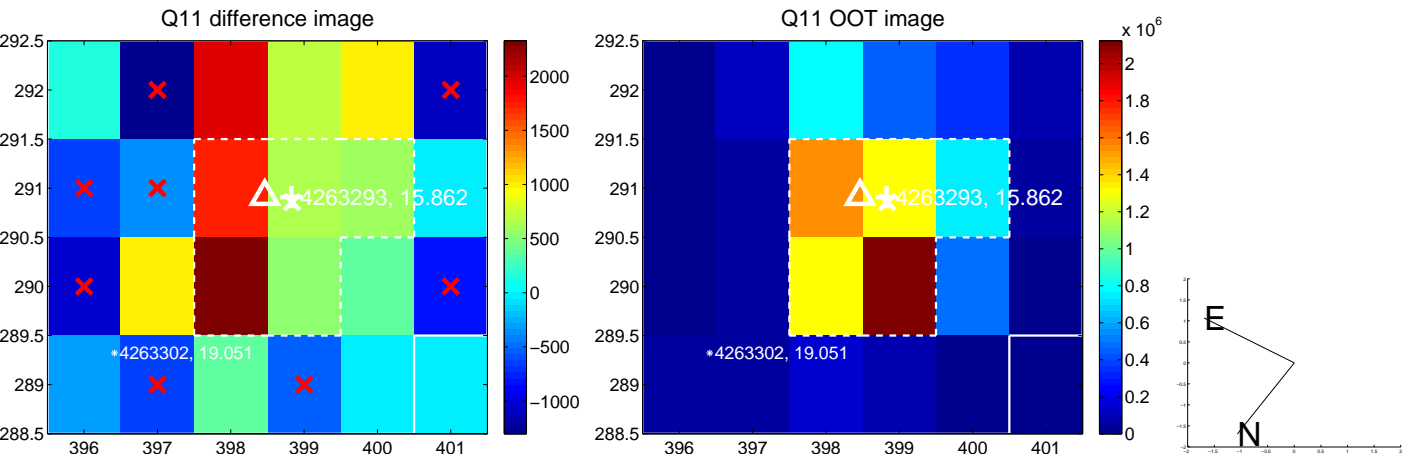
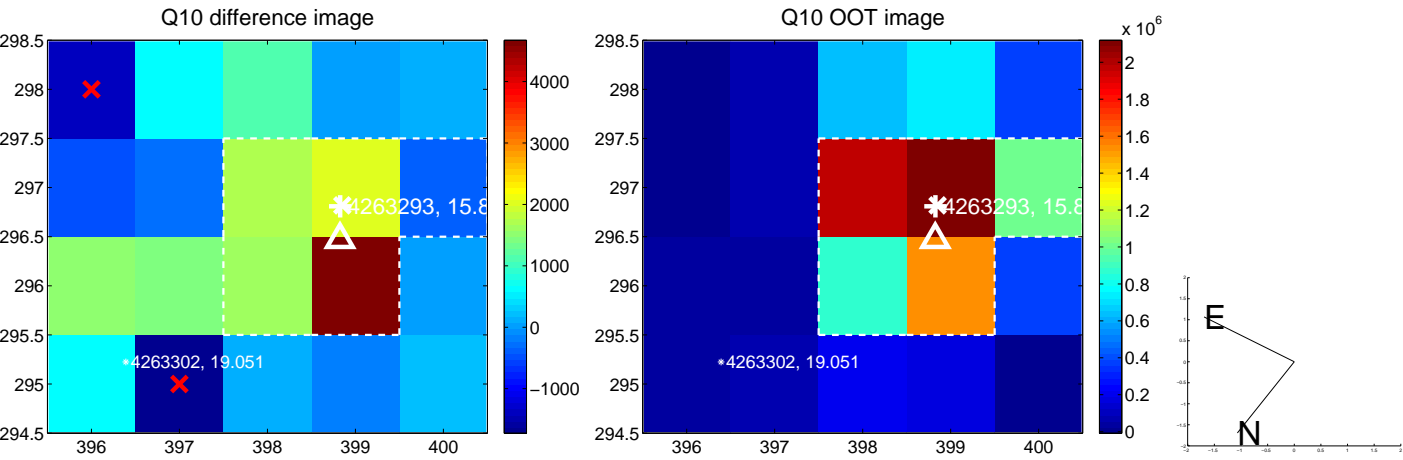
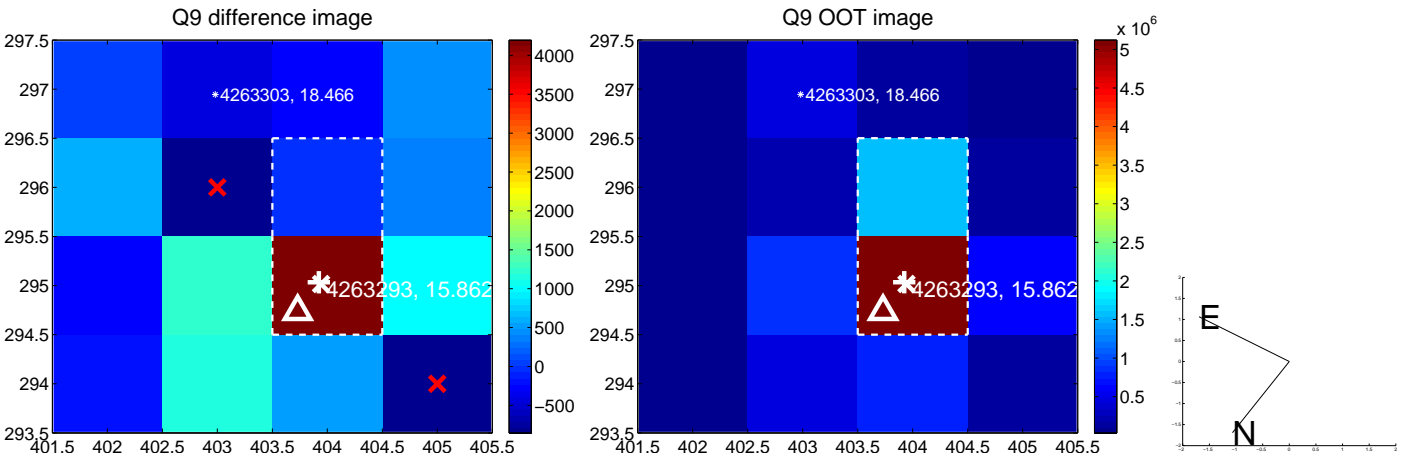
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



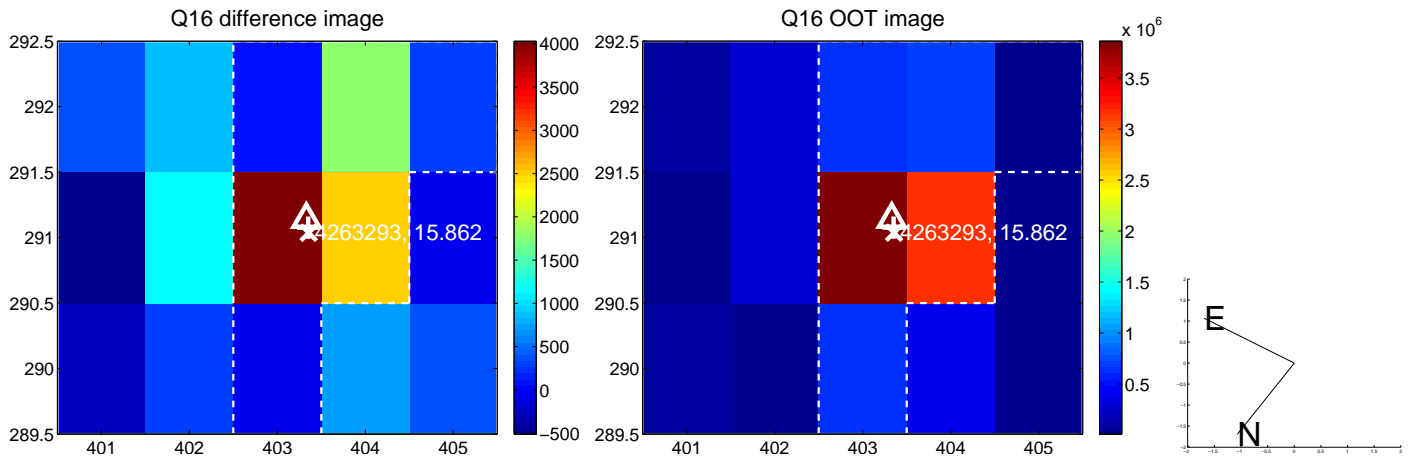
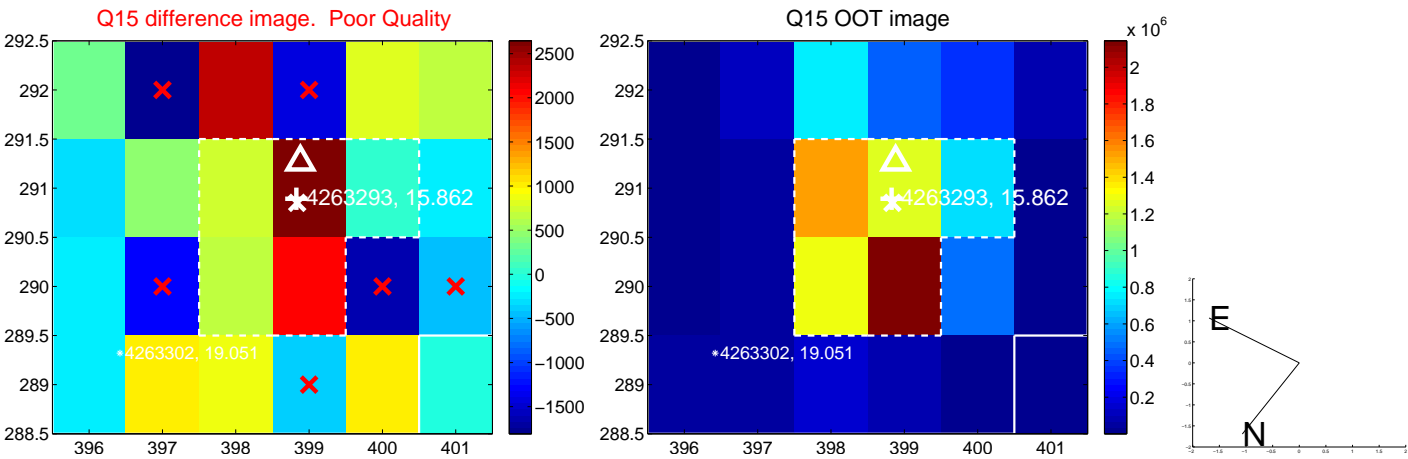
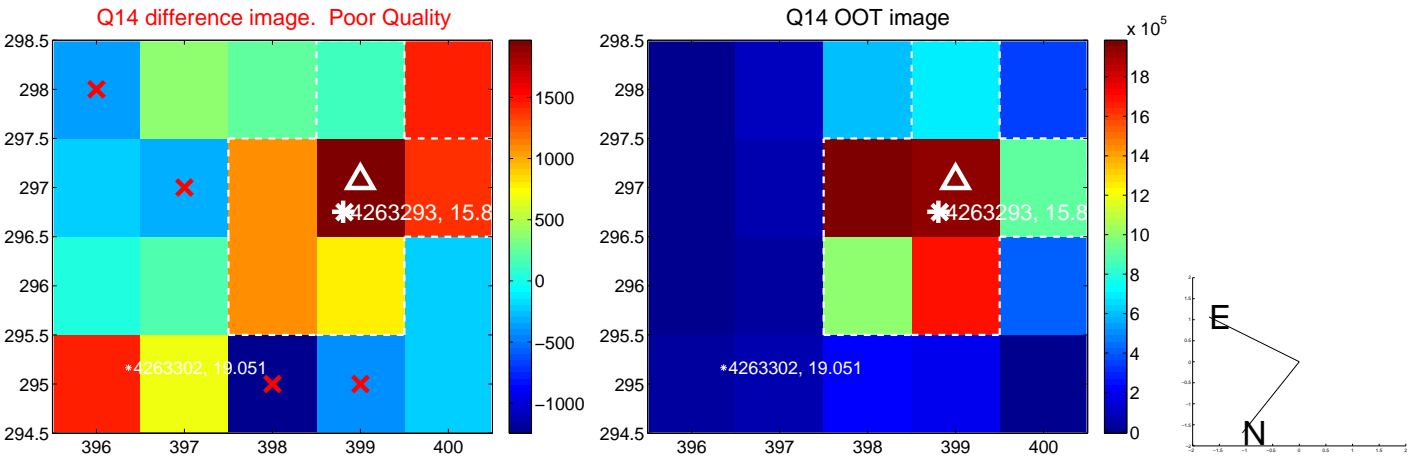
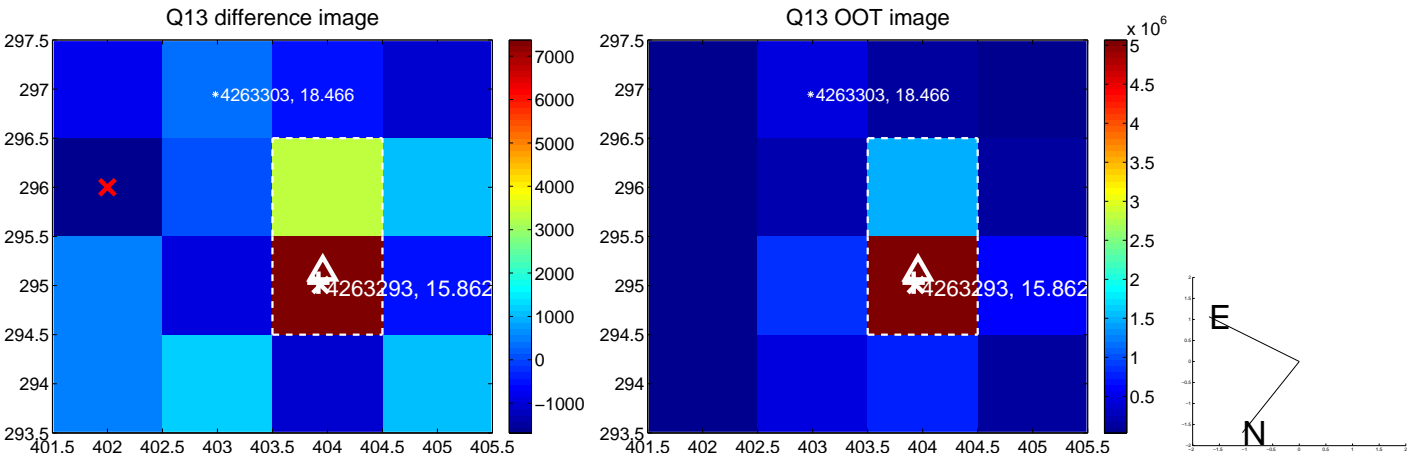
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

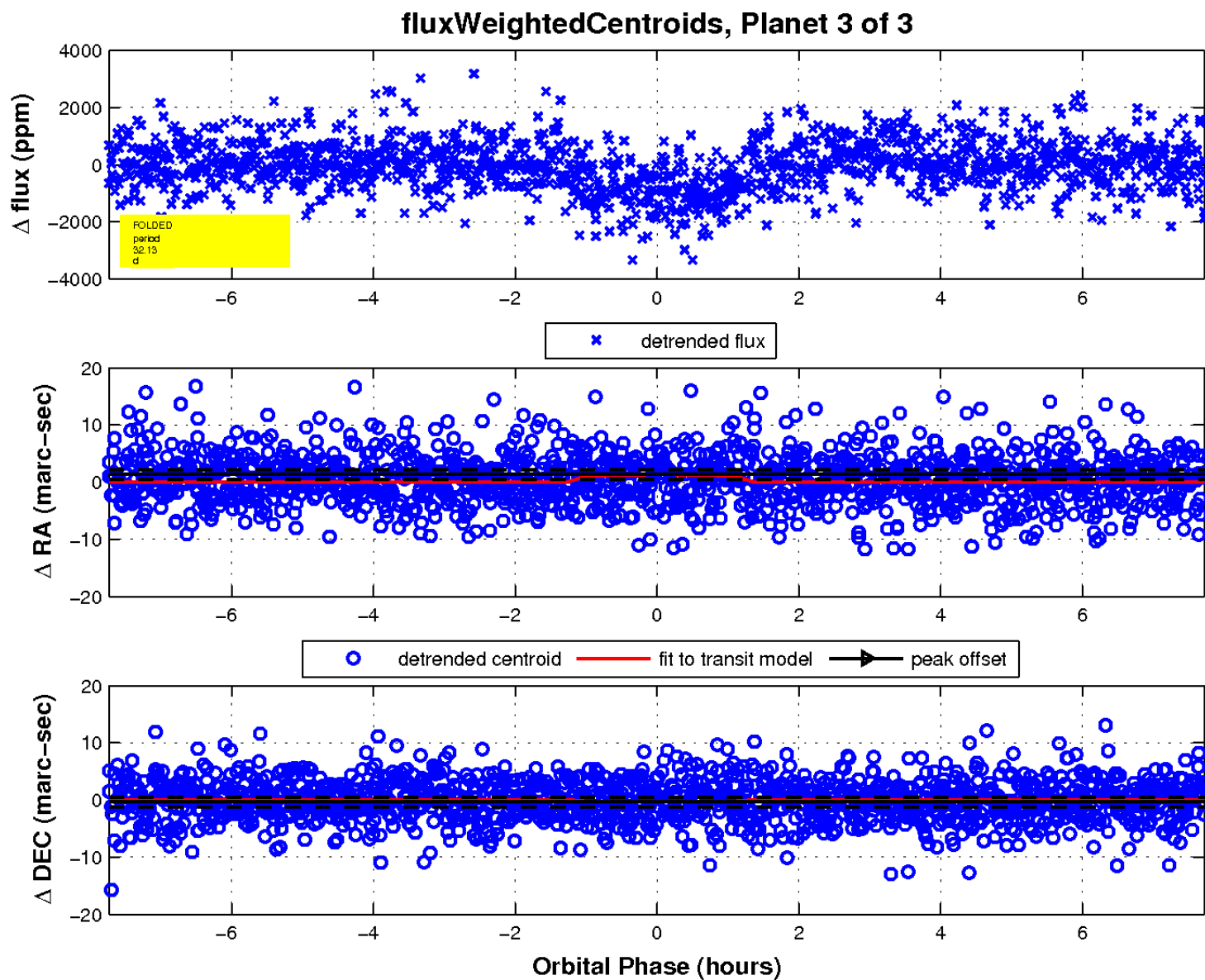
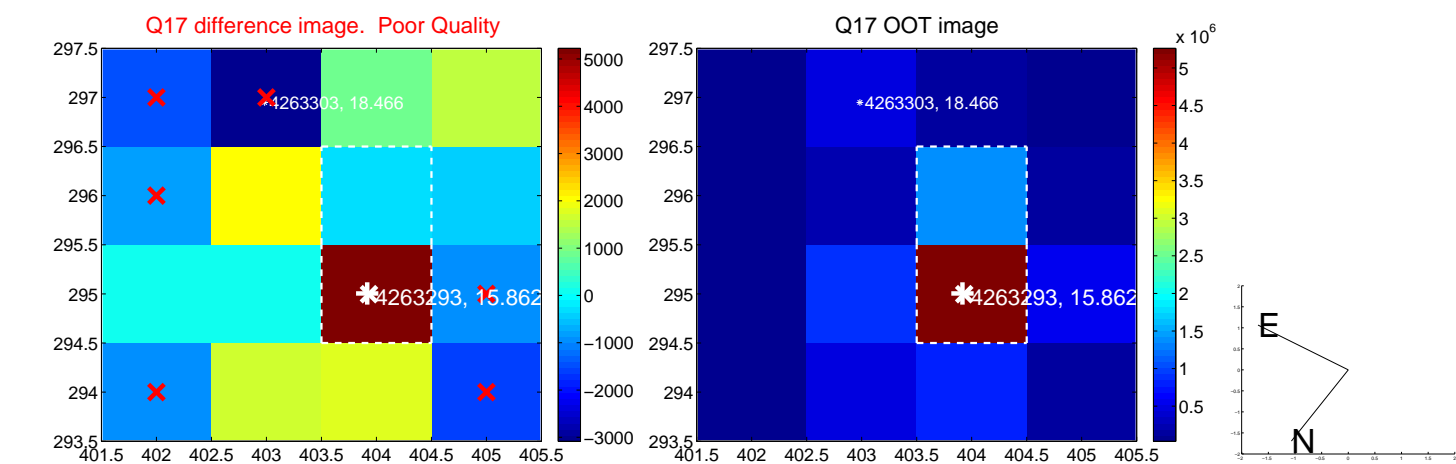


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





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



# UKIRT Image

Declination

