

# KIC 004352328

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004352328-01 | OBS      | No   | 542.839585    | 294.326853   | 839.3       | 3.250            | 13.9 | 9.8  | 0.68                        | 5332            | 2.12                   | 0.26                   |
| 004352328-02 | OBS      | No   | 400.610780    | 181.734216   | 505.4       | 3.468            | 15.3 | 6.9  | 0.68                        | 5332            | 1.71                   | 0.39                   |
| 004352328-04 | OBS      | No   | 451.761487    | 187.600777   | 764.2       | 12.967           | 15.7 | 6.4  | 0.68                        | 5332            | 1.95                   | 0.33                   |
| 004352328-05 | OBS      | No   | 417.771793    | 497.001898   | 510.6       | 5.093            | 13.2 | 6.5  | 0.68                        | 5332            | 1.63                   | 0.36                   |
| 004352328-06 | OBS      | No   | 449.245439    | 491.523076   | 320.1       | 4.500            | 12.5 | -1.0 | 0.68                        | 5332            | 1.20                   | 0.33                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004352328-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS   |
| 004352328-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_KIC_POS |
| 004352328-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS                              |
| 004352328-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS       |
| 004352328-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS          |

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

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

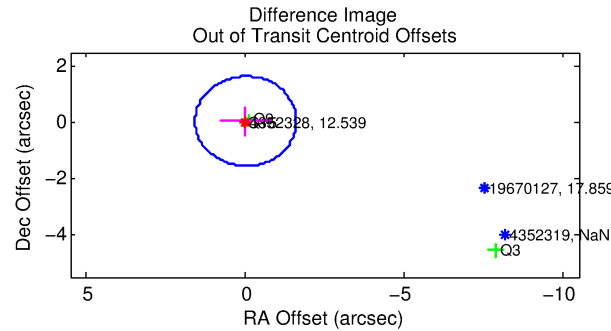
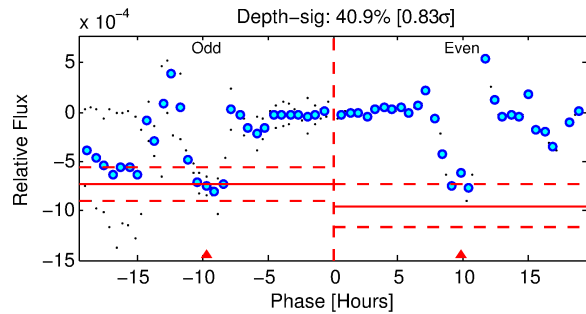
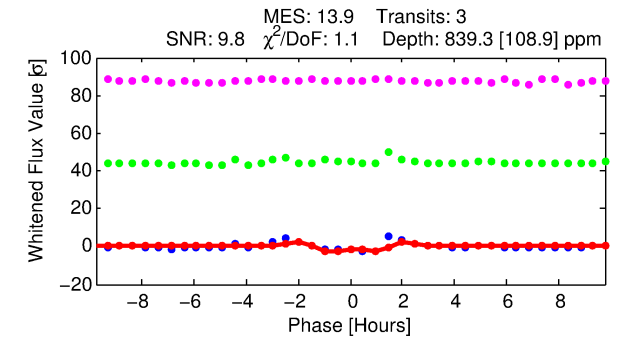
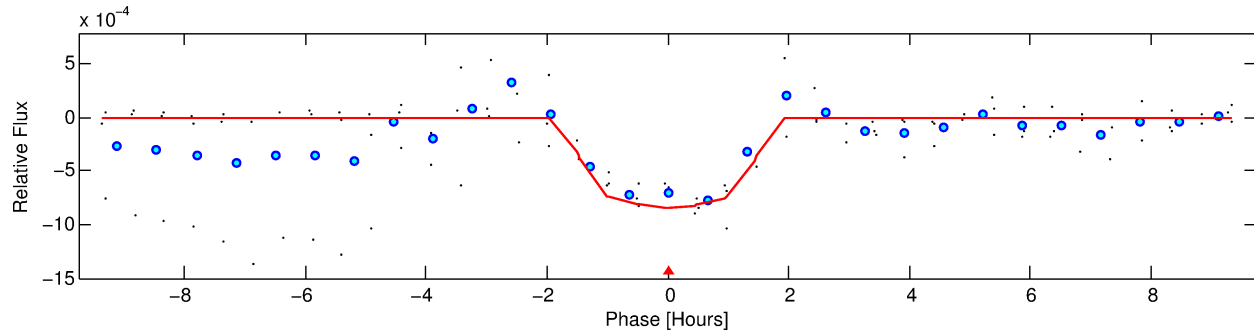
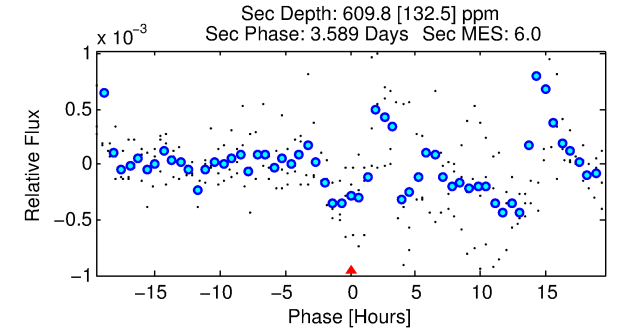
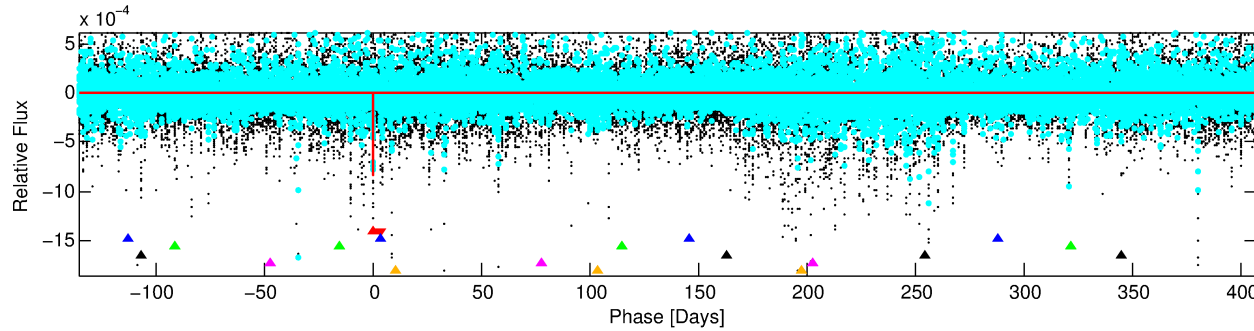
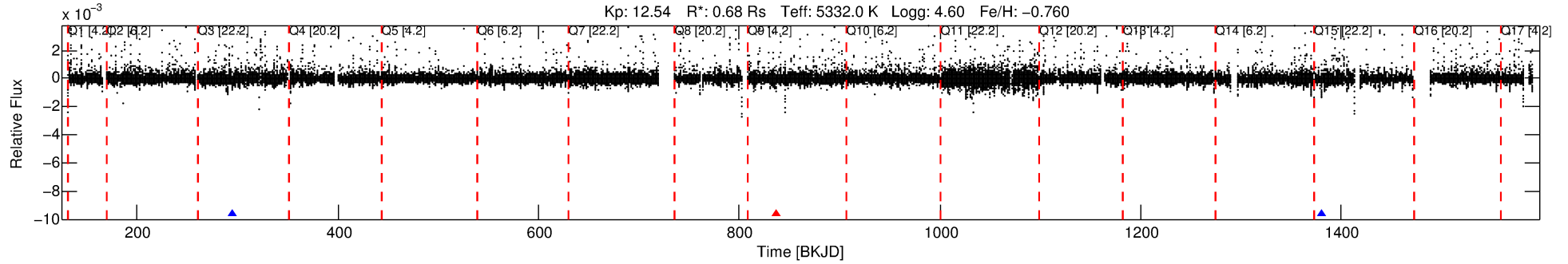
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004352328-01

No Significant Match Found

# DV One-Page Summary

KIC: 4352328 Candidate: 1 of 6 Period: 542.840 d



## DV Fit Results:

Period = 542.83959 [0.00375] d  
Epoch = 294.3269 [0.0041] BKJD  
Rp/R\* = 0.0286 [0.0852]  
a/R\* = 932.61 [12085.60]  
b = 0.72 [8.69]  
Seff = 0.26 [0.04]  
Teq = 182 [8] K  
Rp = 2.12 [6.32] Re  
a = 1.1415 [0.0987] AU  
Ag = 97268.51 [580565.03] [0.17σ]  
Teffp = 4957 [7397] K [0.65σ]

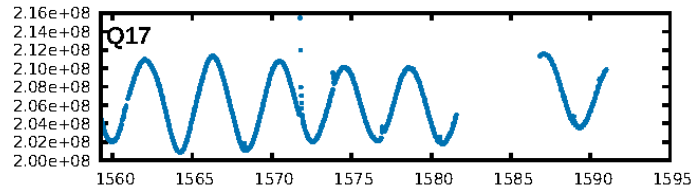
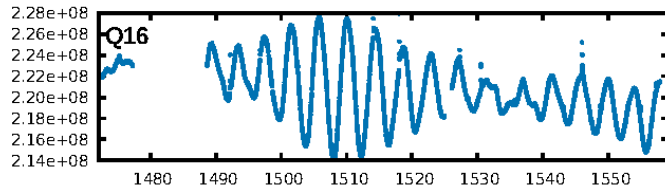
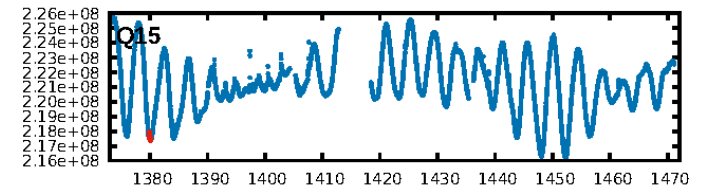
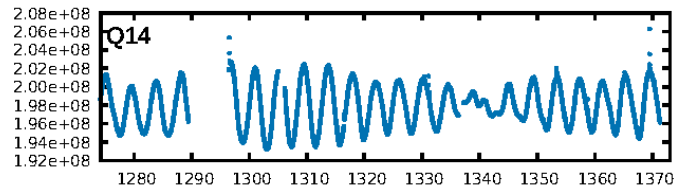
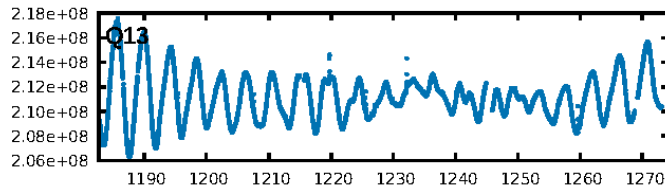
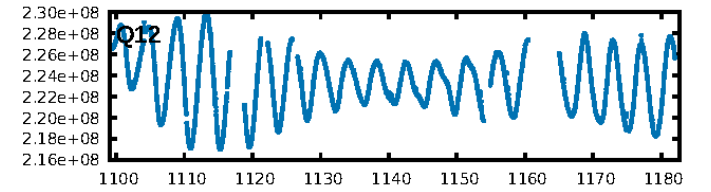
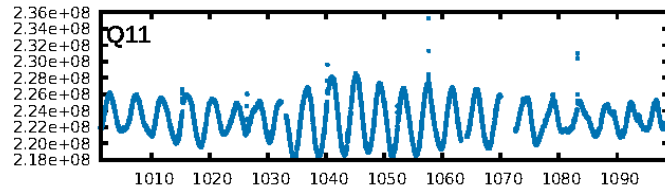
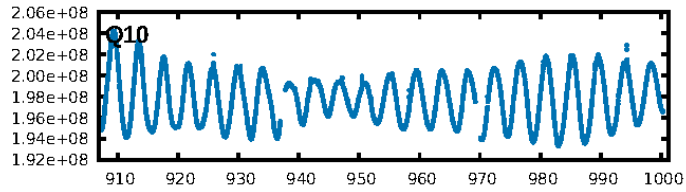
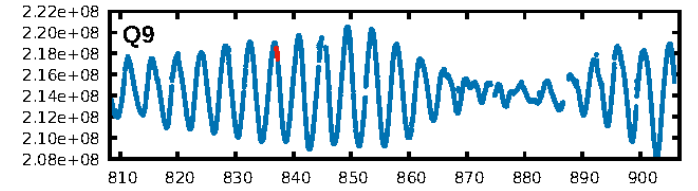
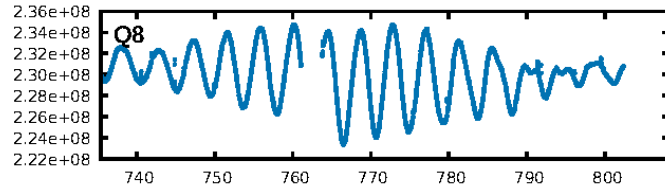
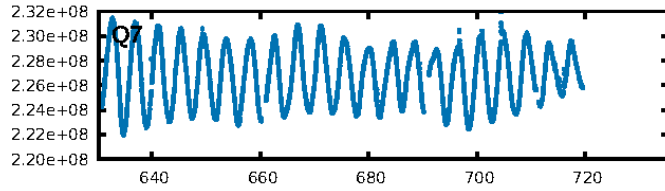
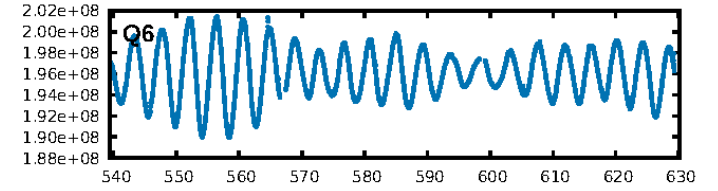
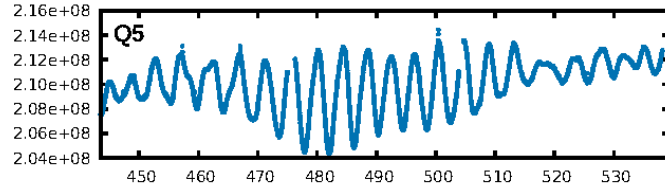
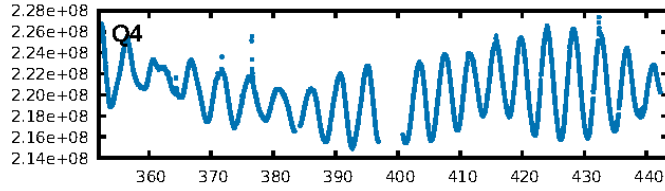
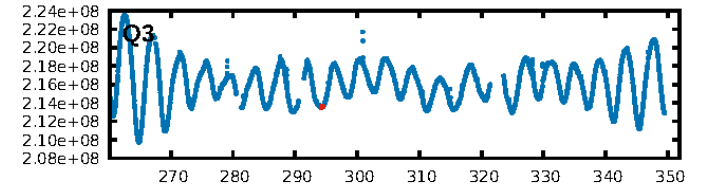
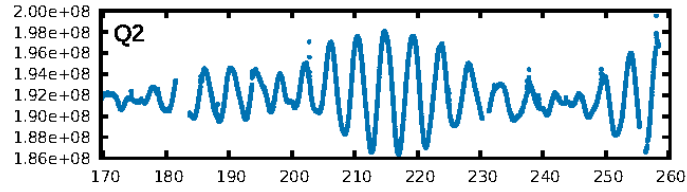
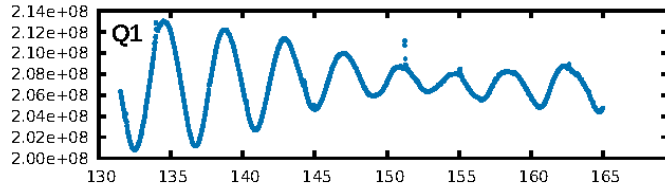
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [163.51σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.2%  
ModelChiSquareGof-sig: 91.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.67 [2/3]  
GhostDiagnostic-chr: -18.77  
Centroid-sig: 89.7%  
Centroid-so: 0.328 arcsec [0.46σ]  
OotOffset-rm: 0.053 arcsec [0.10σ]  
OotOffset-st: 0/2/0/1 [3]  
KicOffset-rm: 0.310 arcsec [0.50σ]  
KicOffset-st: 0/2/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

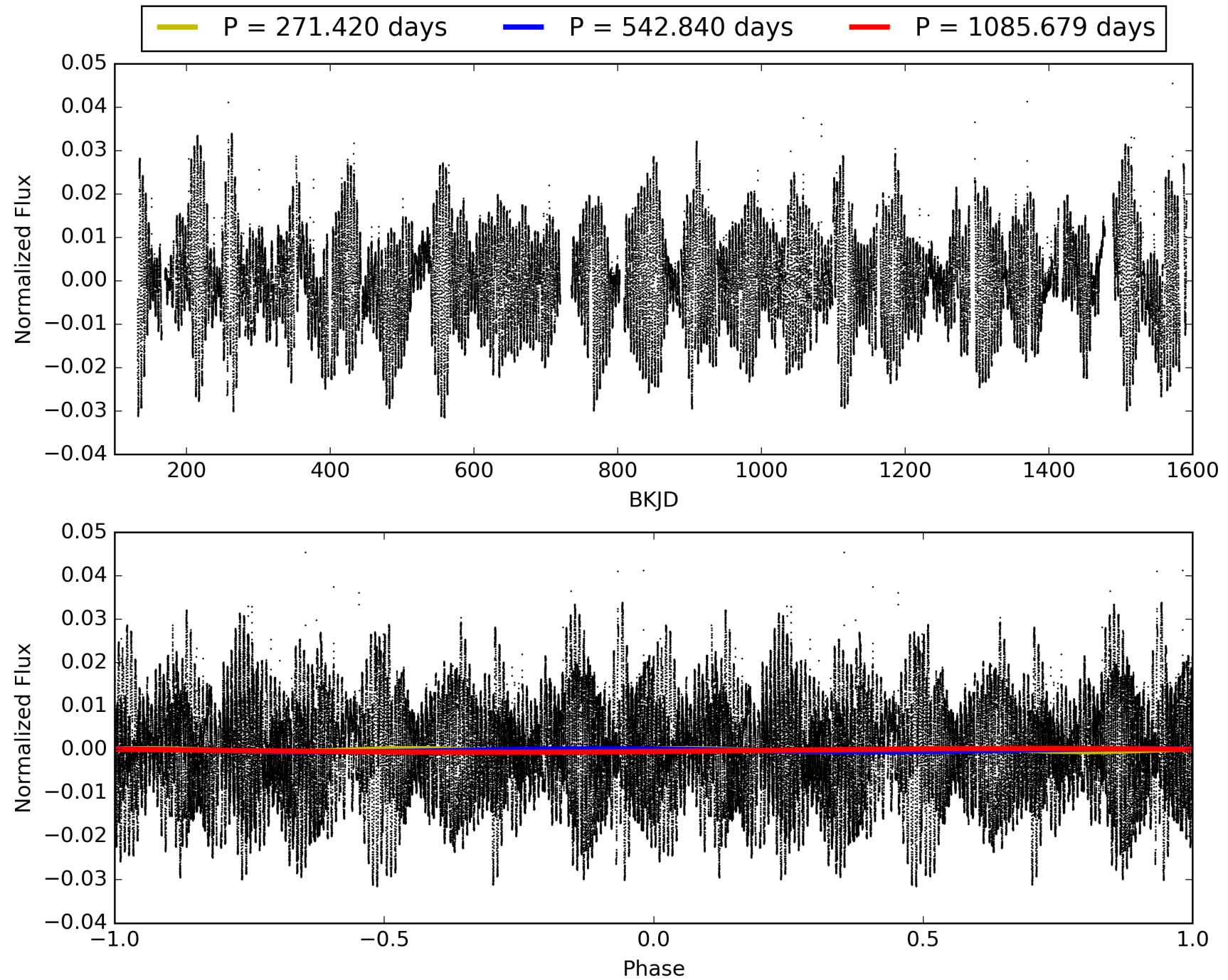
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:45:52 Z

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

# TCE 004352328-01, PDC Light Curves



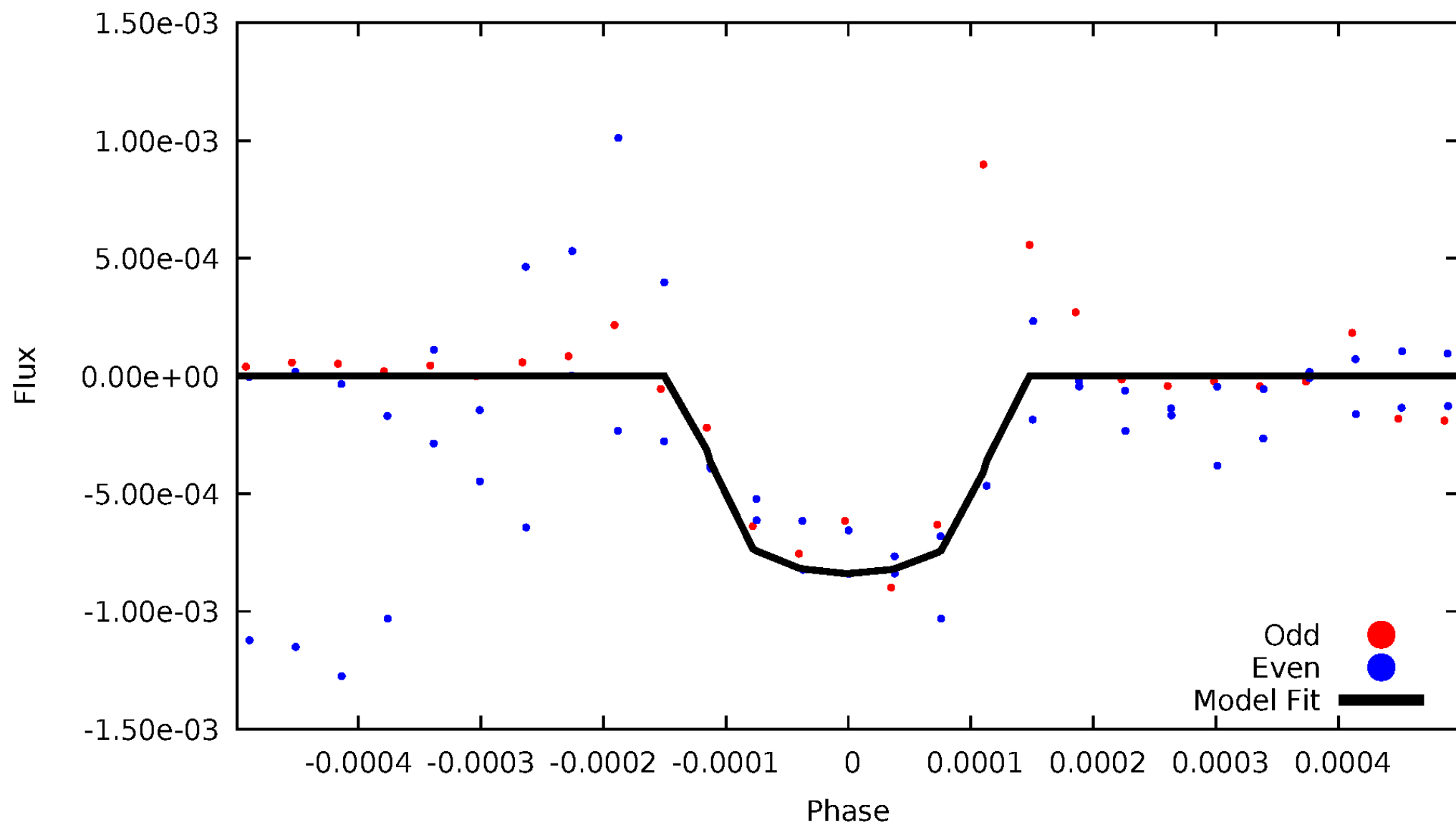
TCE 004352328-01





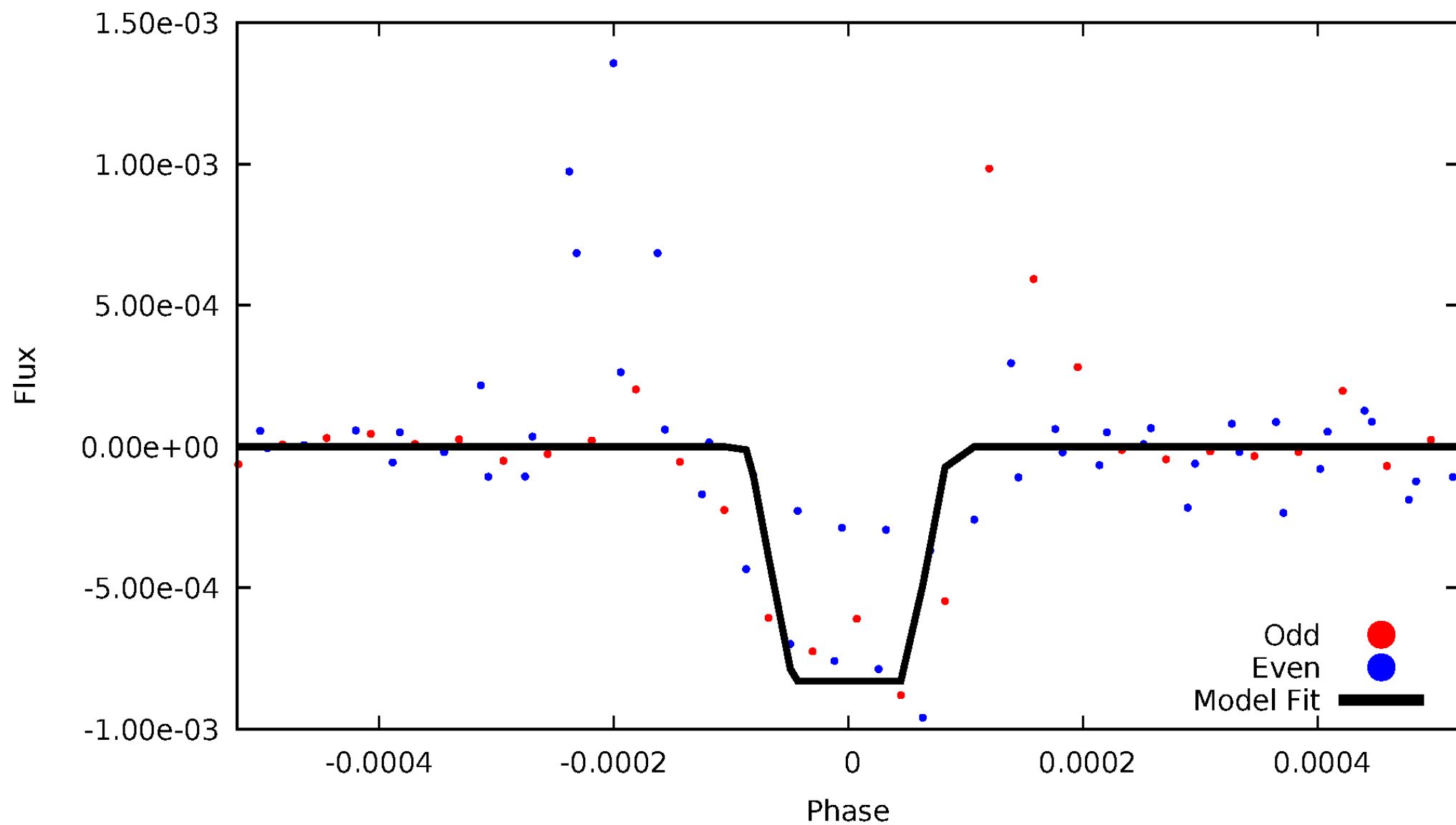
# DV Odd/Even

TCE 004352328-01



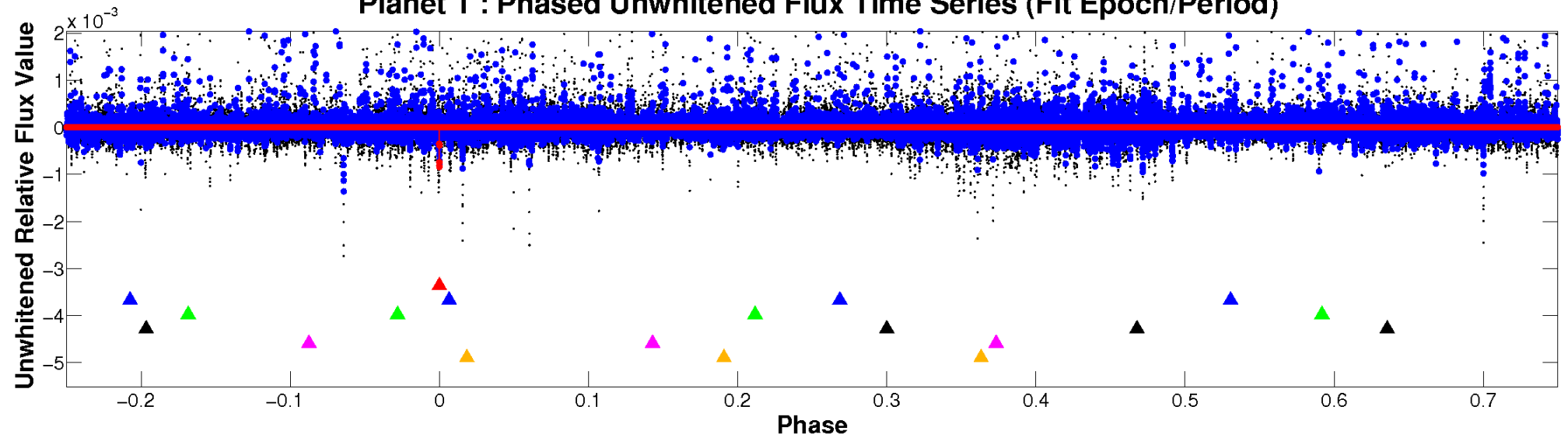
# ALT Odd/Even

TCE 004352328-01

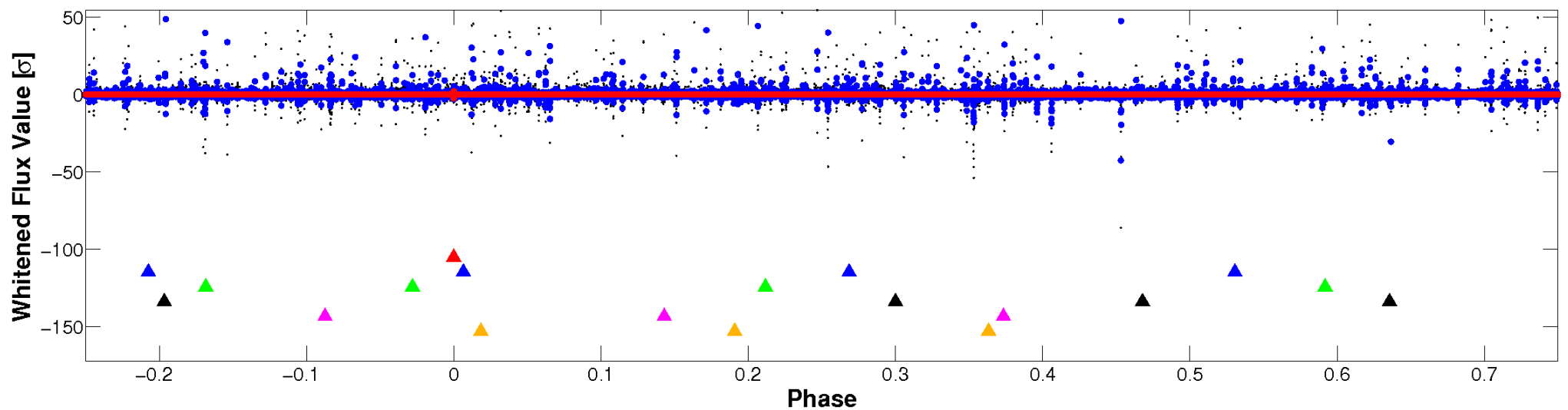


# Non-Whitened Vs. Whitened Light Curve

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

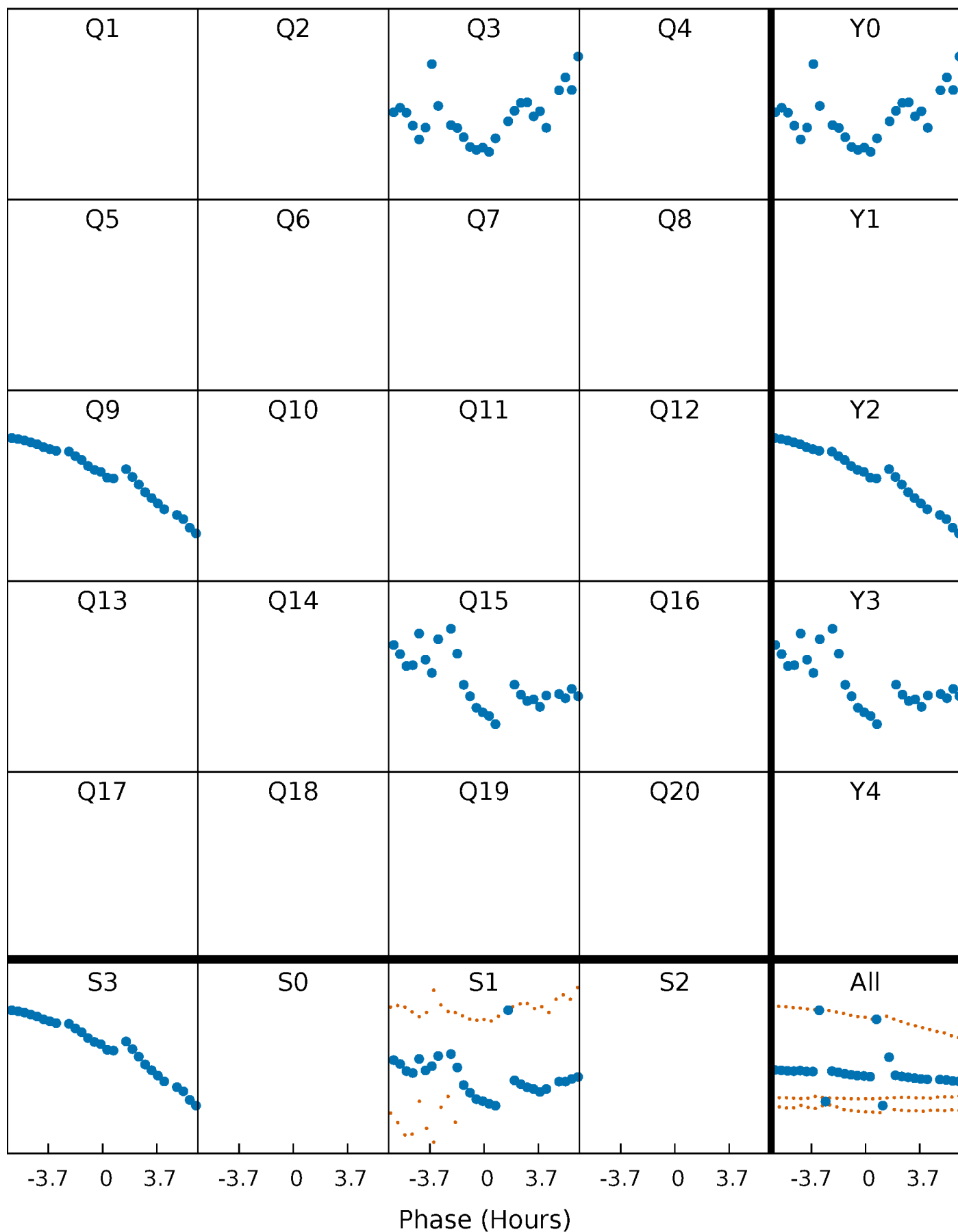


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



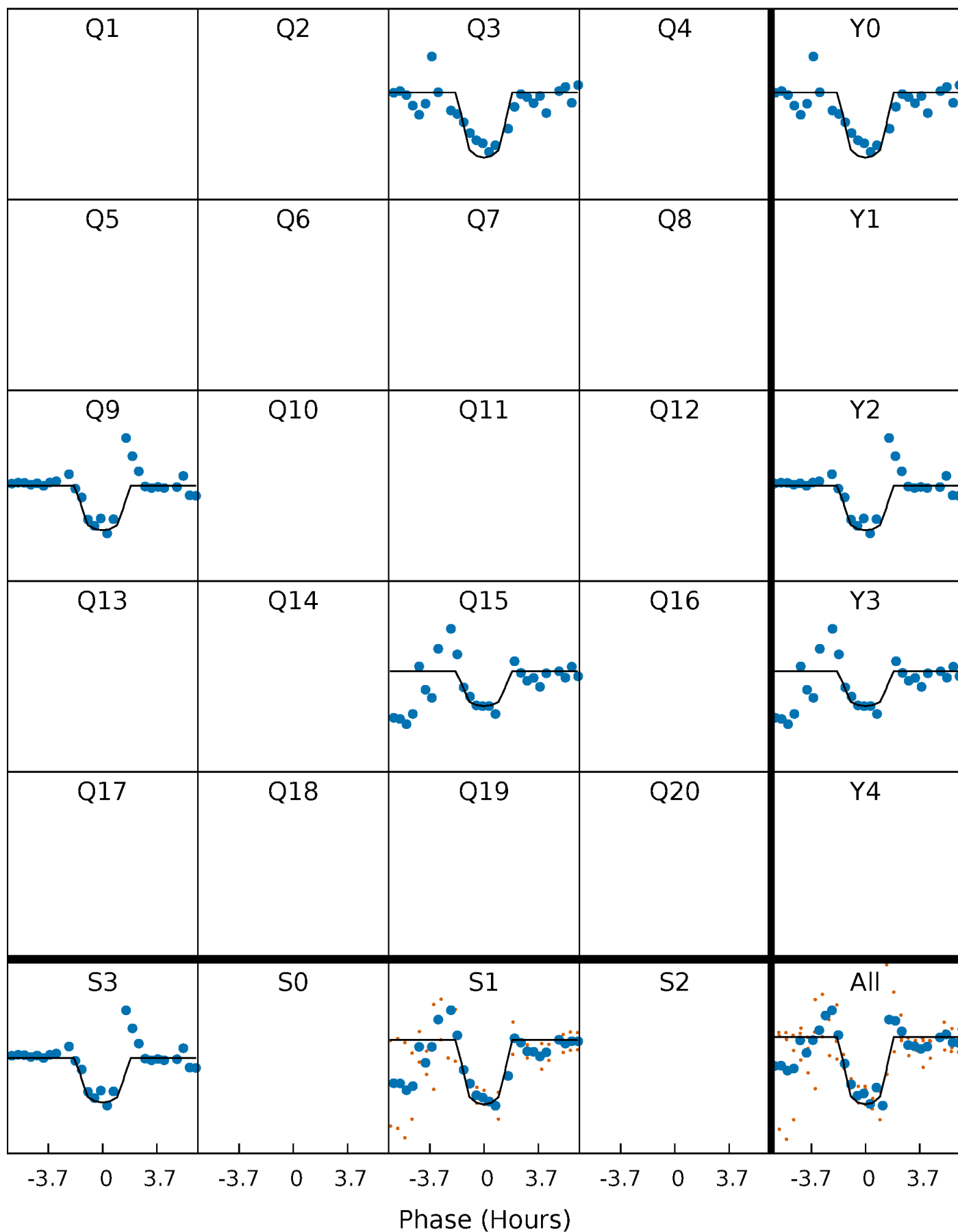
# PDC Quarter-Phased Transit Curves

TCE 004352328-01 P=542.839585 Days  $T_0=294.326853$  (BKJD)



# DV Quarter-Phased Transit Curves

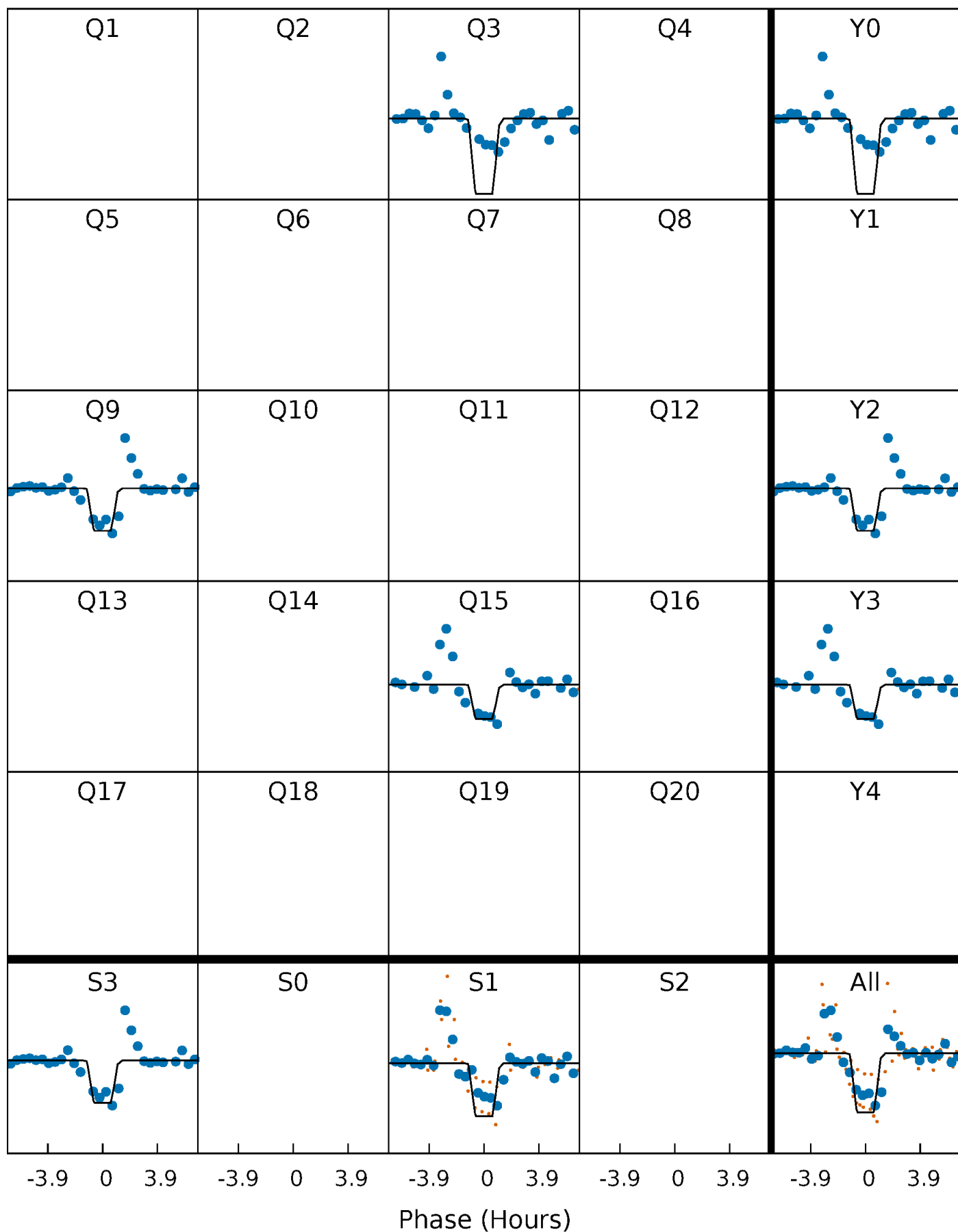
TCE 004352328-01 P=542.839585 Days  $T_0=294.326853$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

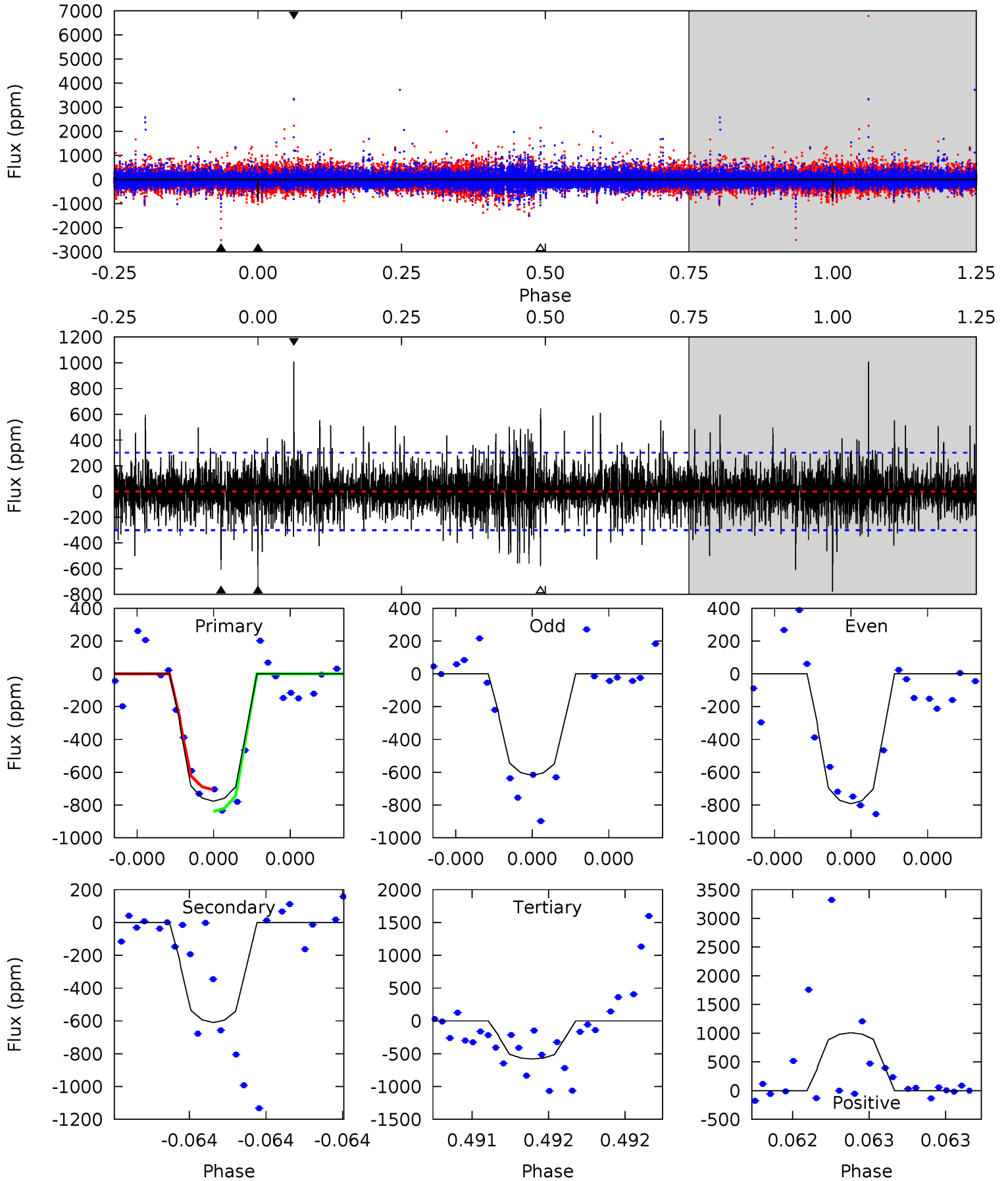
TCE 004352328-01 P=542.851577 Days  $T_0=294.309519$  (BKJD)



# DV Model-Shift Uniqueness Test

004352328-01, P = 542.839585 Days, E = 294.326853 Days

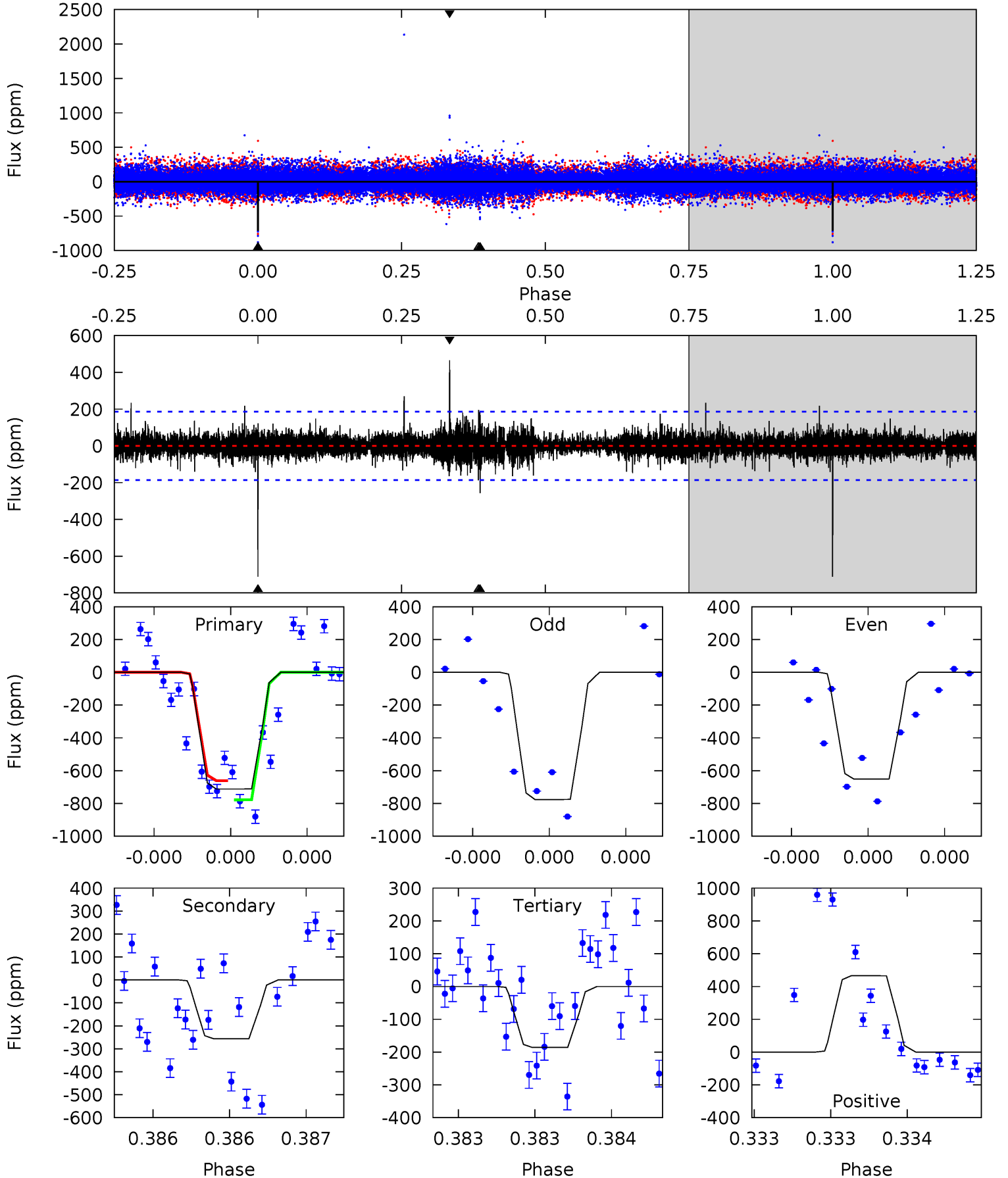
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 14.7 | 11.5 | 11.0 | 19.0 | 5.69            | 3.65            | 2.09             | 3.71    | -4.36   | 0.55    | -7.53   | 0.91    | 1.04 | 0.56  | 1.27 |



# Alt Model-Shift Uniqueness Test

004352328-01, P = 542.851577 Days, E = 294.309519 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 22.0 | 7.93 | 5.76 | 14.4 | 5.76            | 3.77            | 1.00             | 16.3    | 7.64    | 2.17    | -6.48   | 1.66    | 0.82 | 0.40  | 1.80 |



### Stellar Parameters For KIC 004352328

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M$ ( $M_{\odot}$ )       | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5332^{+159}_{-159}$ | $4.601^{+0.065}_{-0.058}$ | $-0.760^{+0.300}_{-0.300}$ | $0.680^{+0.072}_{-0.057}$ | $0.673^{+0.071}_{-0.033}$ | $3.013^{+0.789}_{-0.626}$                     |
|        | +3%/-3%              | +1%/-1%                   | +39%/-39%                  | +11%/-8%                  | +11%/-5%                  | +26%/-21%                                     |
| 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 004352328-01 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)    | $T_{obs}$ (K)         | $A_{obs}$                  |
|---------|---------------|------------------------|------------------|-----------------------|----------------------------|
| DV      | $-609 \pm 53$ | $5.32^{+5.11}_{-3.67}$ | $253^{+10}_{-9}$ | $3582^{+2011}_{-661}$ | $15704^{+144403}_{-11613}$ |
| Alt.    | $-256 \pm 32$ | $4.96^{+5.28}_{-3.37}$ | $254^{+10}_{-9}$ | $3178^{+1589}_{-560}$ | $7132^{+67280}_{-5406}$    |

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

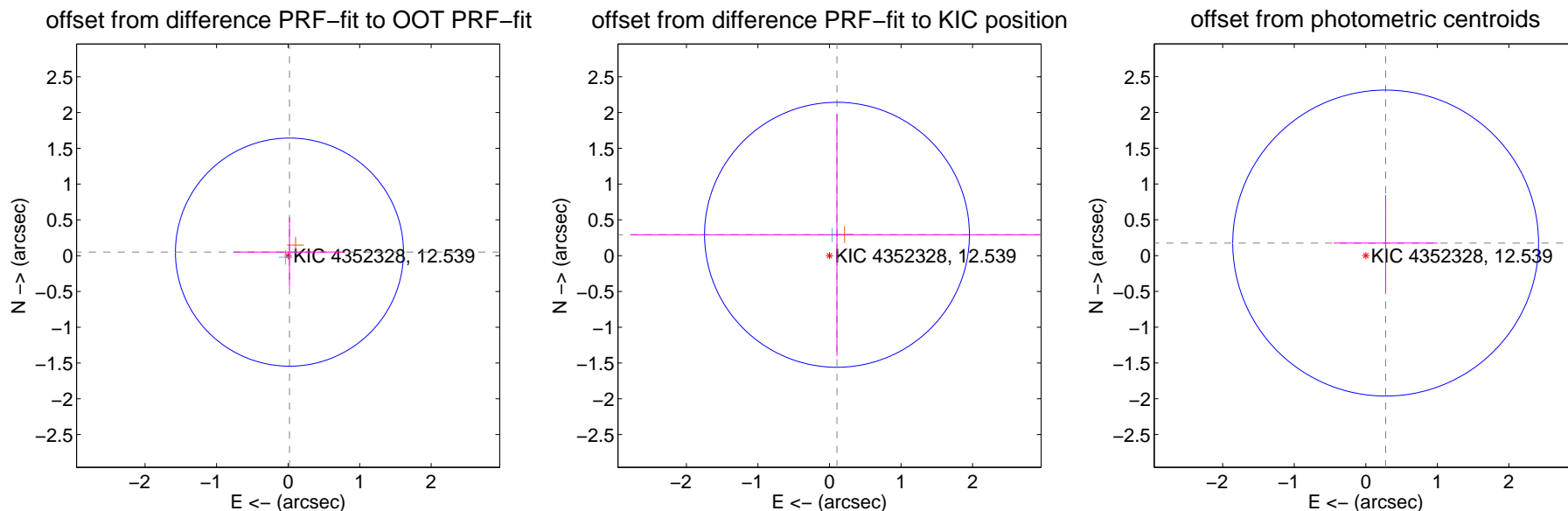
## DV Centroid Data

Supplemental centroid analysis for 004352328-01. Kepler magnitude: 12.54. Transit SNR 9.85

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

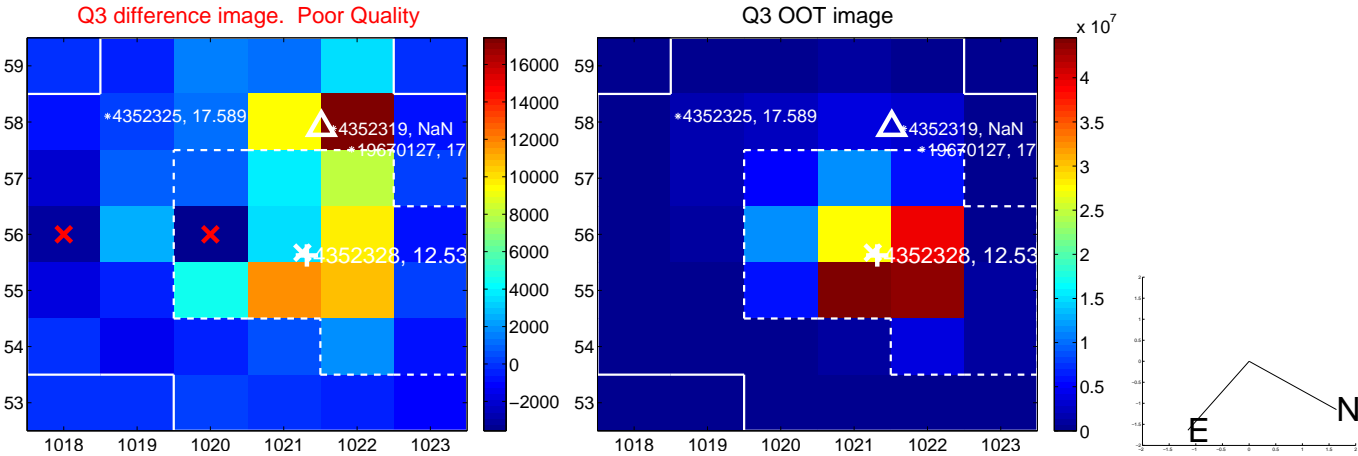
|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $0.053 \pm 0.531$  | 0.10                | $-0.019 \pm 0.779$ | $0.049 \pm 0.485$ |
| PRF-fit source offset from KIC position | $0.310 \pm 0.617$  | 0.50                | $-0.105 \pm 2.886$ | $0.292 \pm 1.692$ |
| photometric centroid source offset      | $0.33 \pm 0.71$    | 0.46                | $-0.28 \pm 0.73$   | $0.17 \pm 0.67$   |



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.



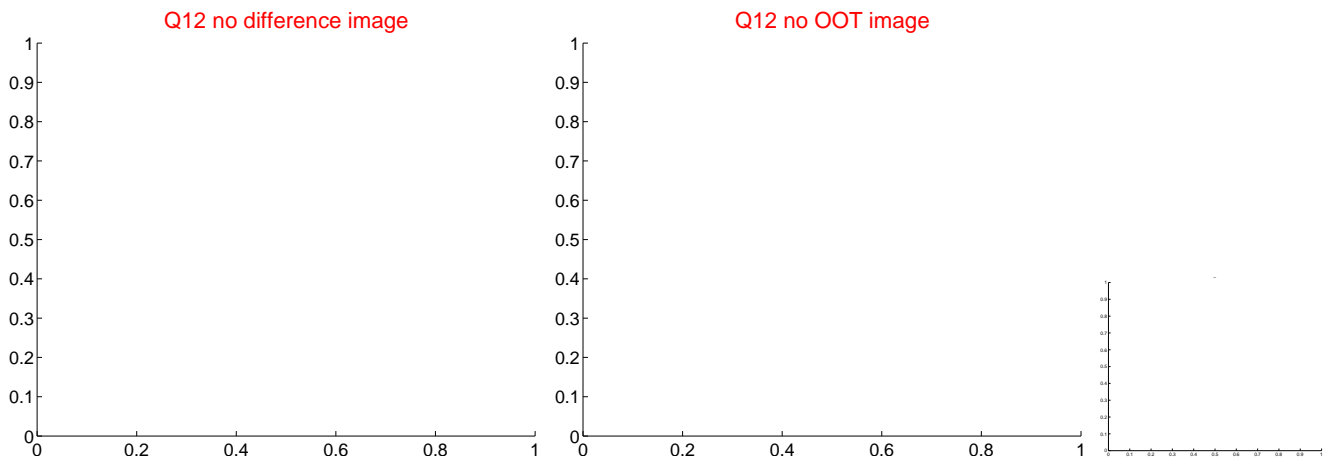
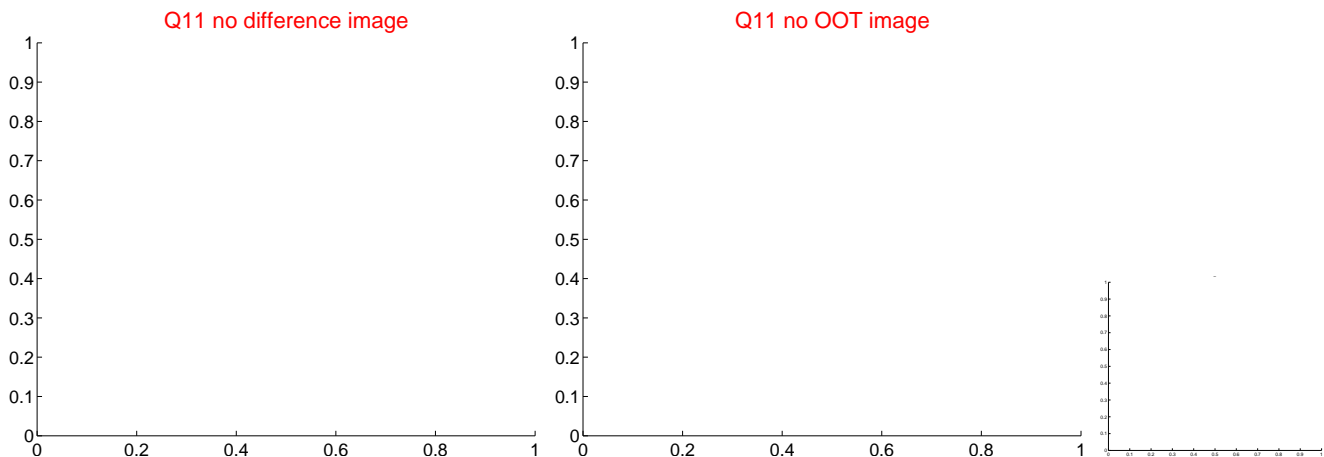
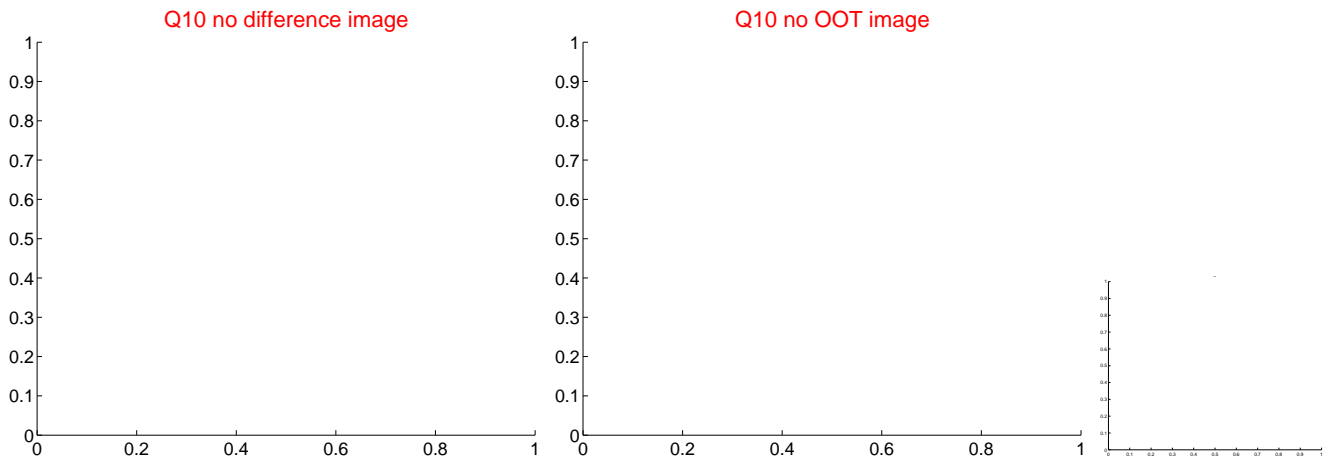
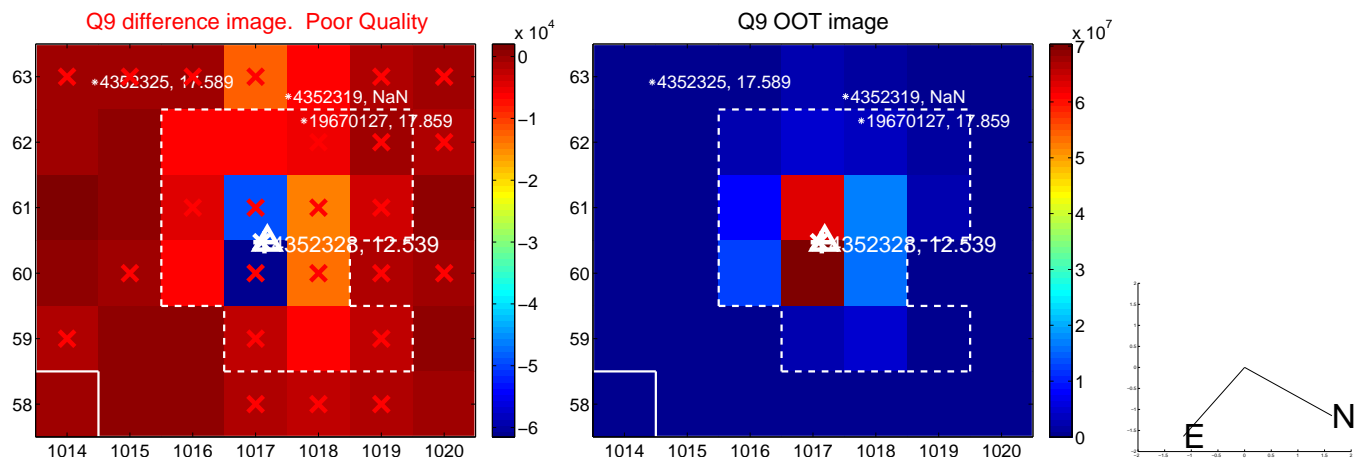
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\Delta$ : difference centroid. red  $\times$ : large negative pixel value.



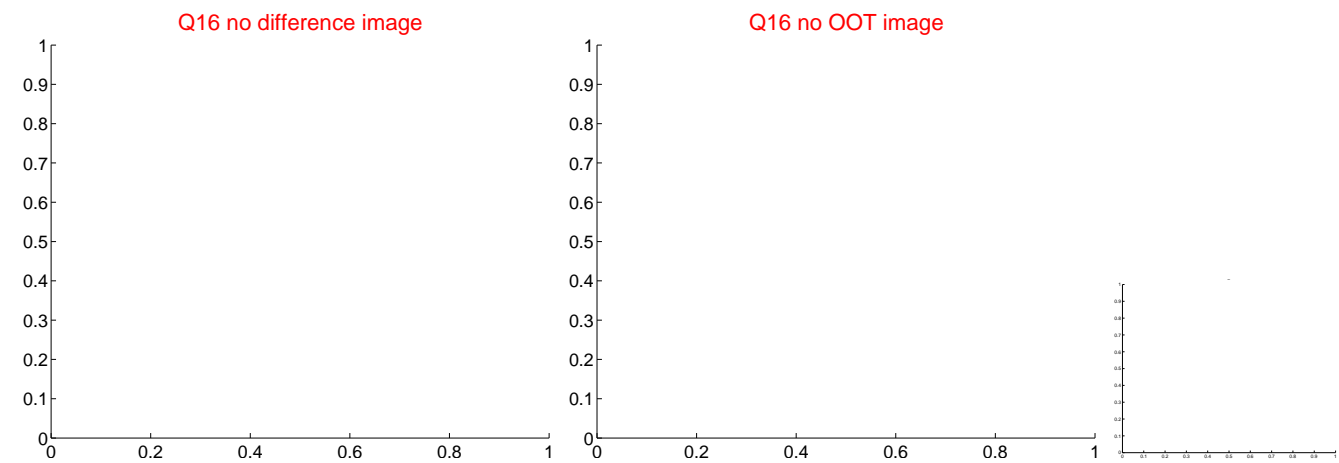
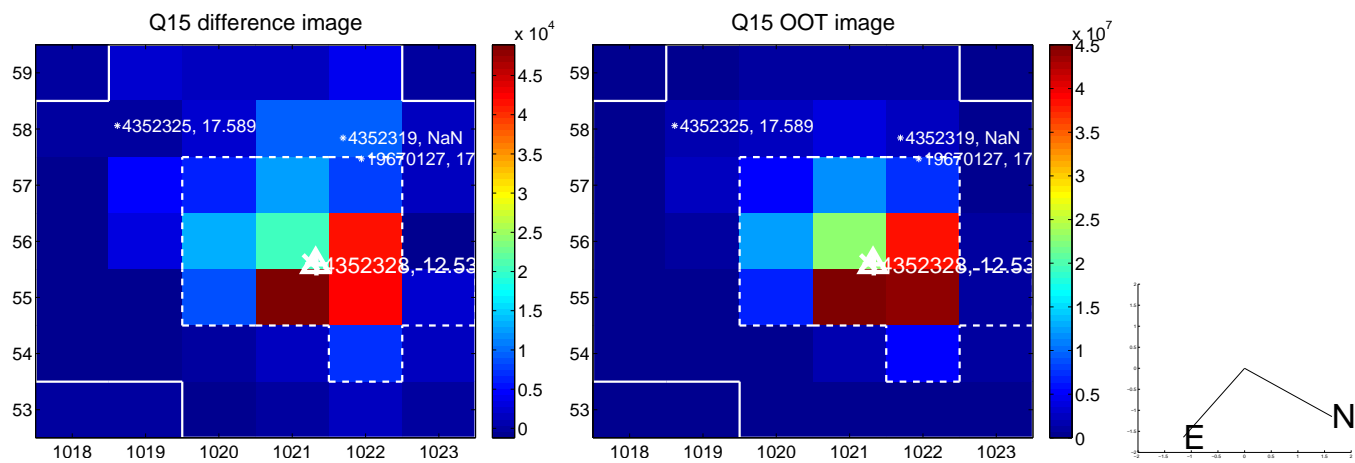
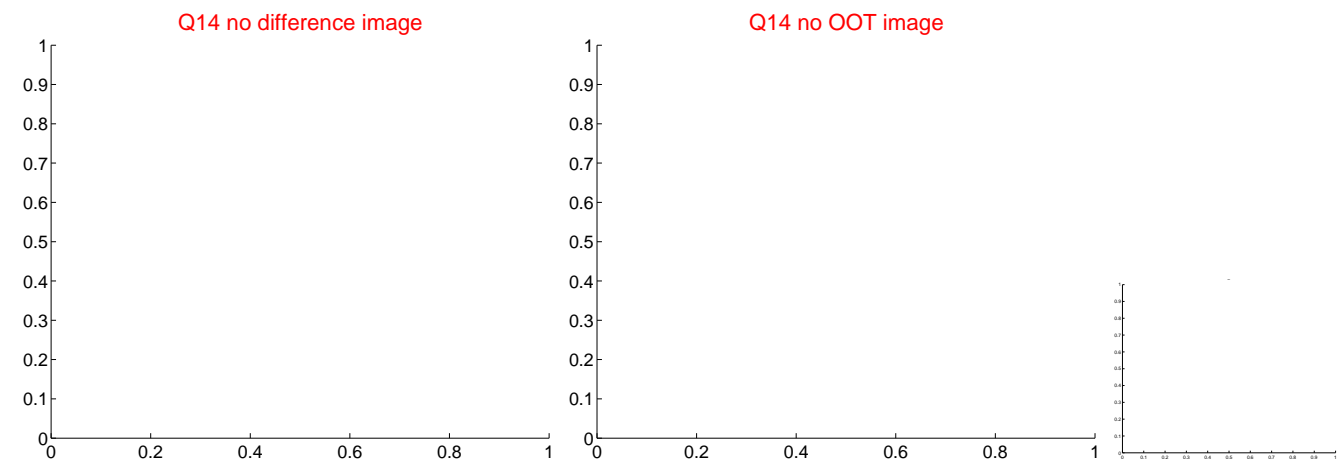
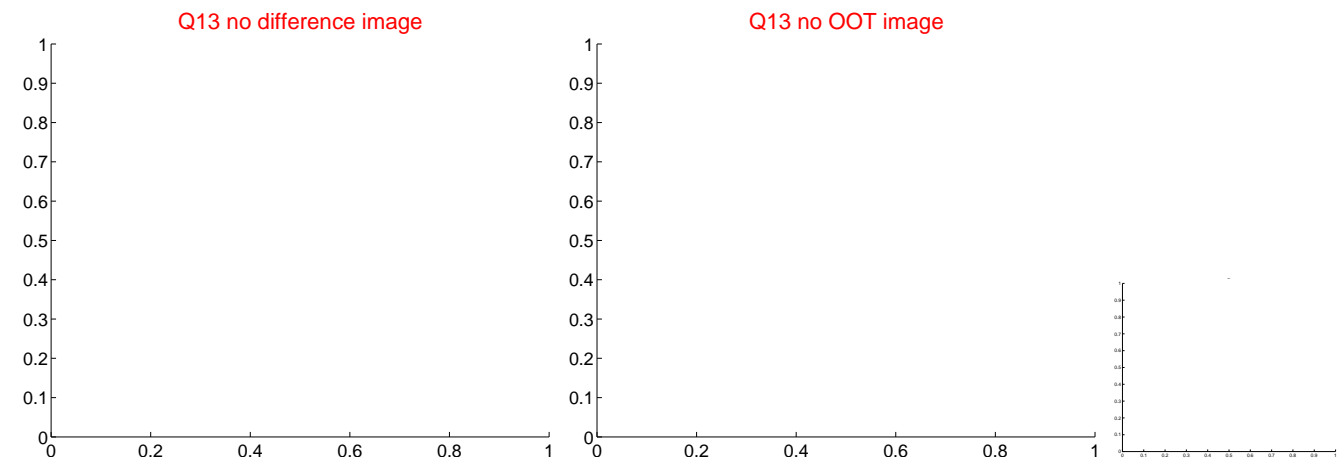
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



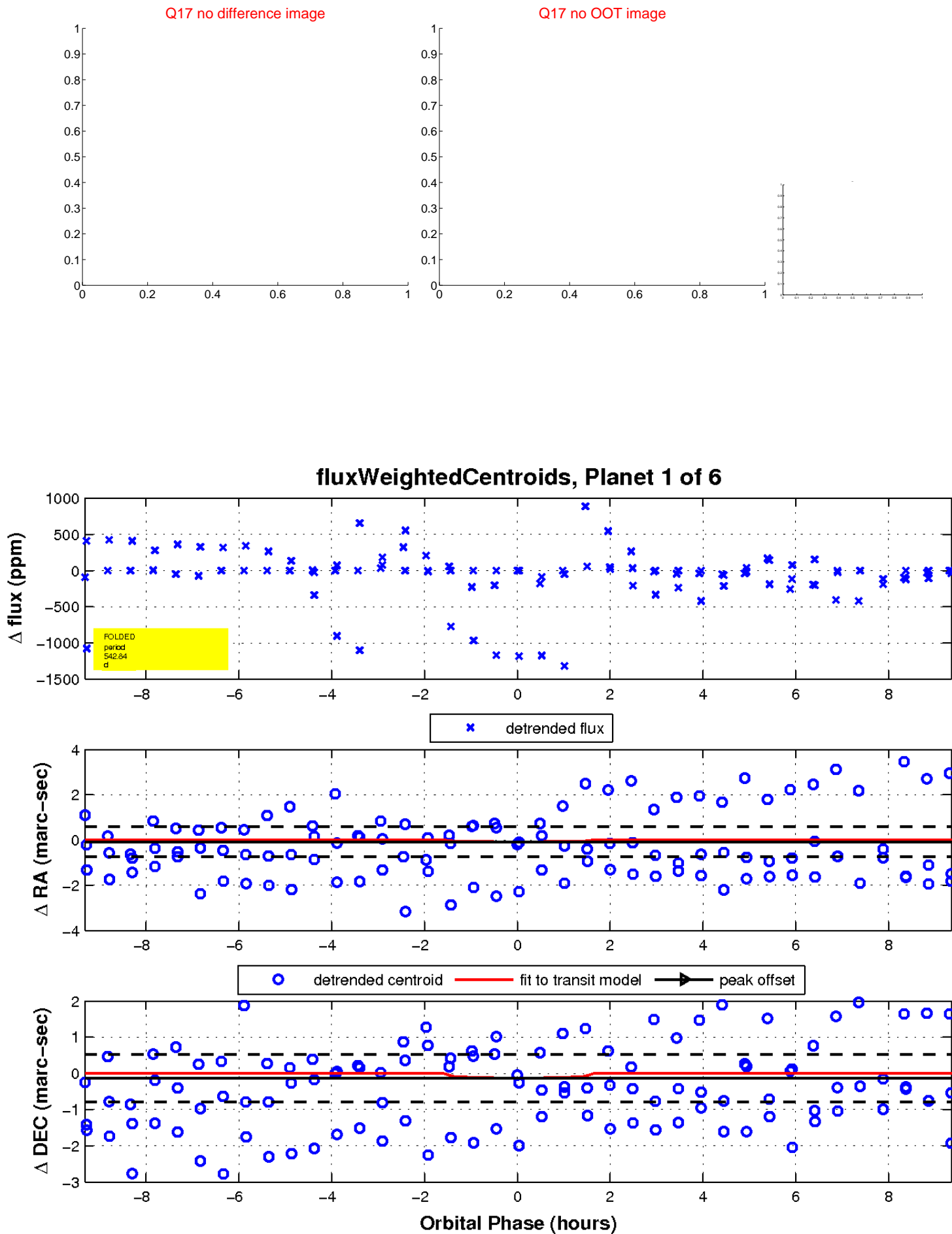
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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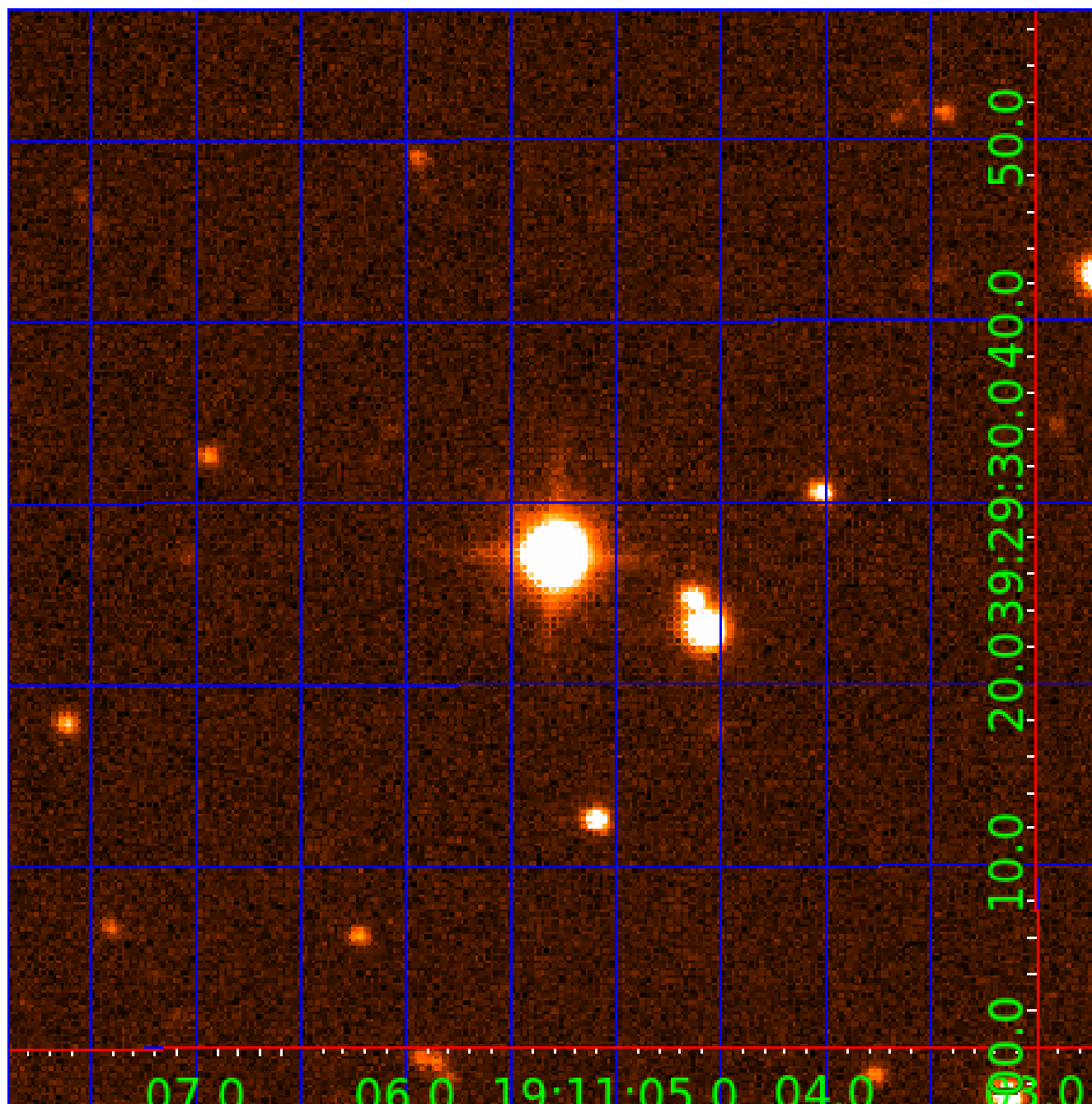
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 004352328

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004352328-01 | OBS      | No   | 542.839585    | 294.326853   | 839.3       | 3.250            | 13.9 | 9.8  | 0.68                        | 5332            | 2.12                   | 0.26                   |
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| 004352328-06 | OBS      | No   | 449.245439    | 491.523076   | 320.1       | 4.500            | 12.5 | -1.0 | 0.68                        | 5332            | 1.20                   | 0.33                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004352328-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS   |
| 004352328-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_KIC_POS |
| 004352328-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS                              |
| 004352328-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS       |
| 004352328-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS          |

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

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

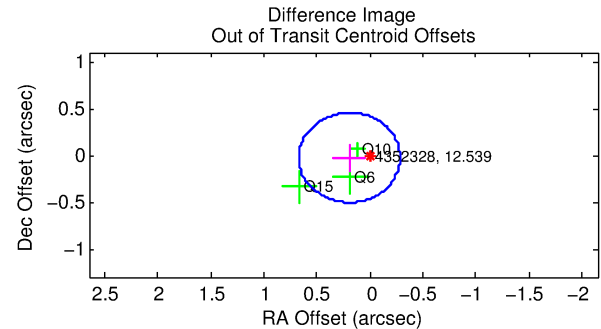
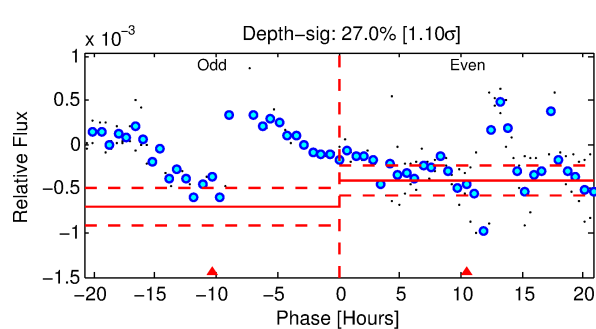
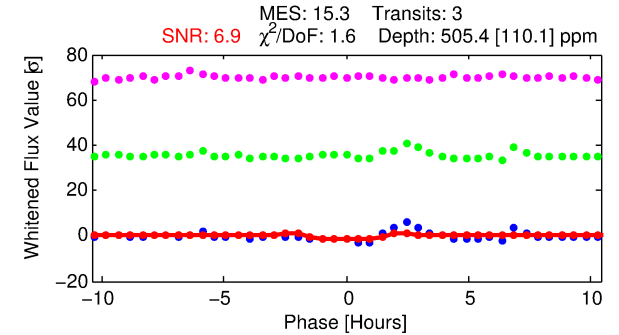
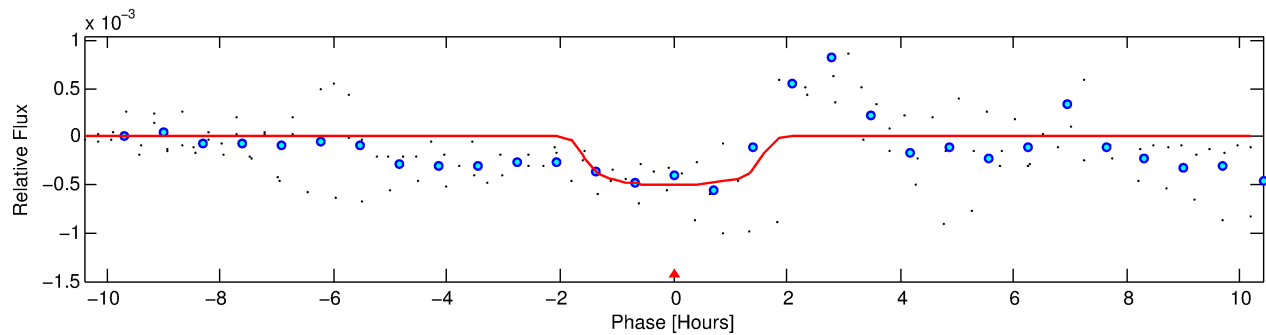
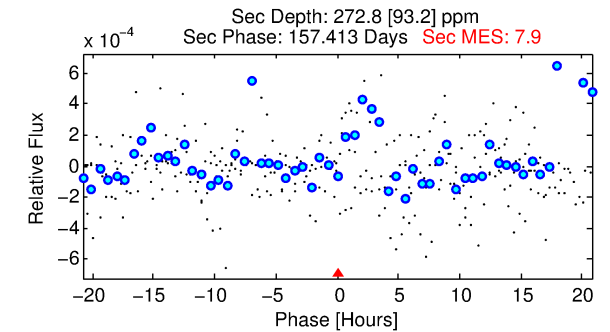
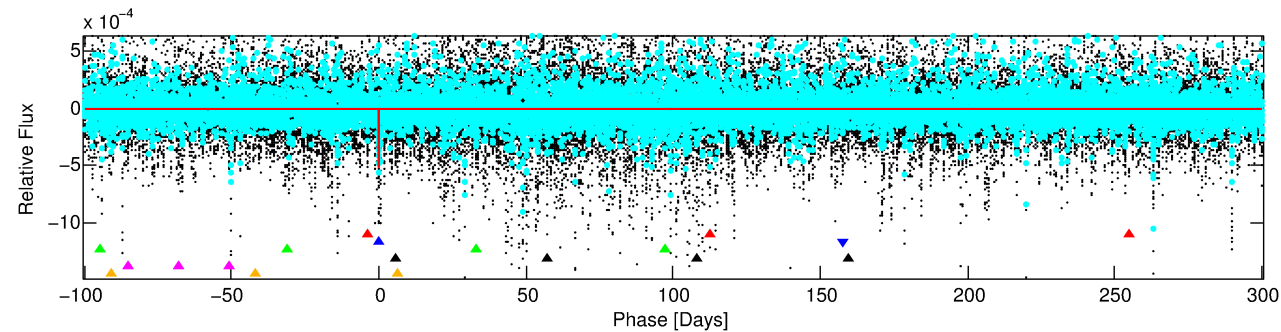
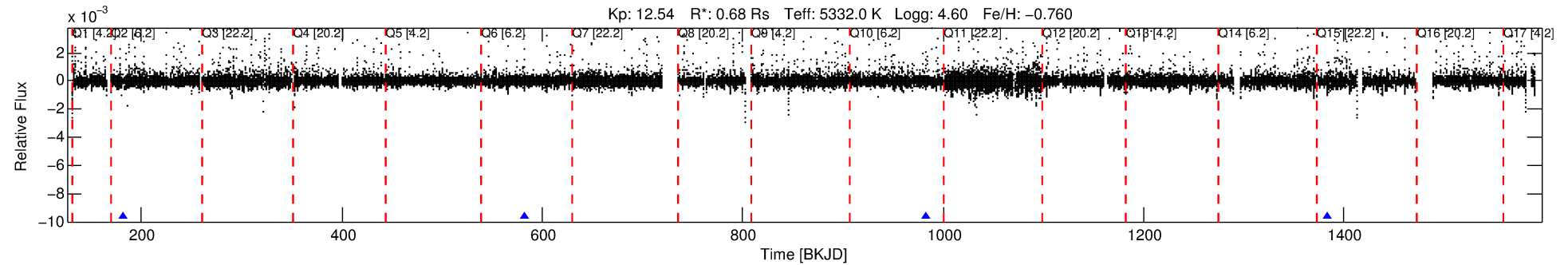
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004352328-02

No Significant Match Found

# DV One-Page Summary

KIC: 4352328 Candidate: 2 of 6 Period: 400.611 d



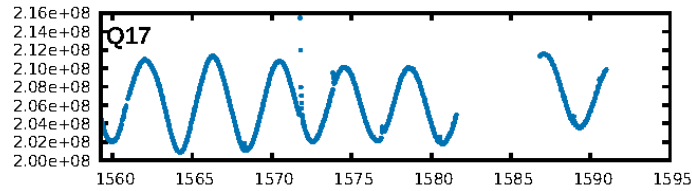
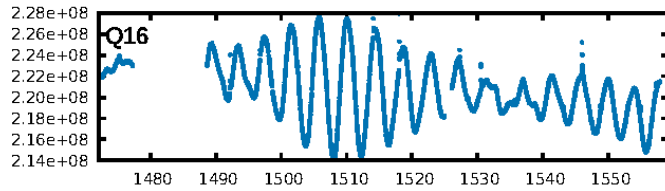
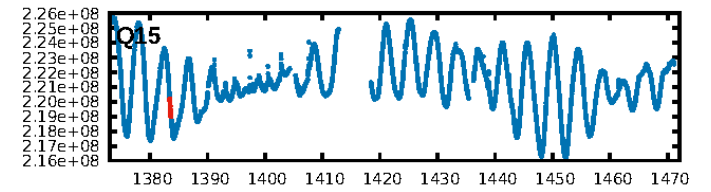
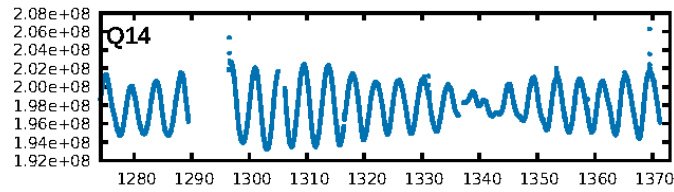
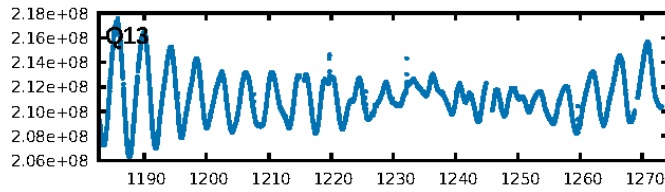
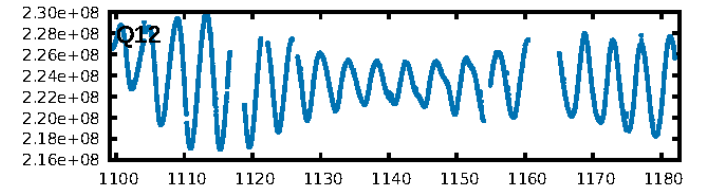
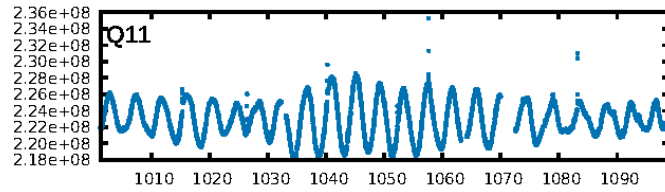
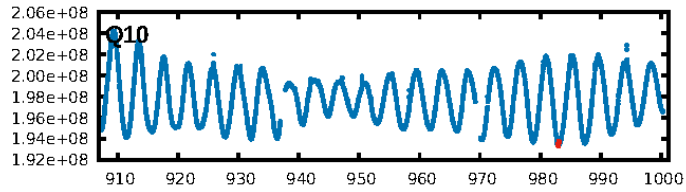
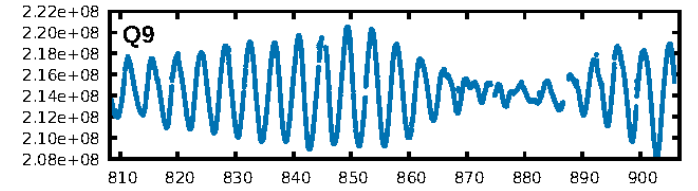
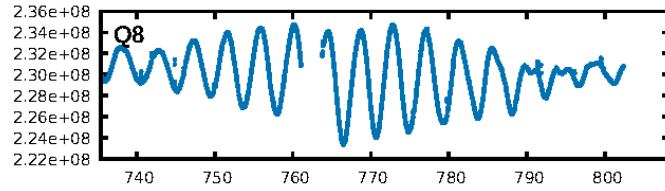
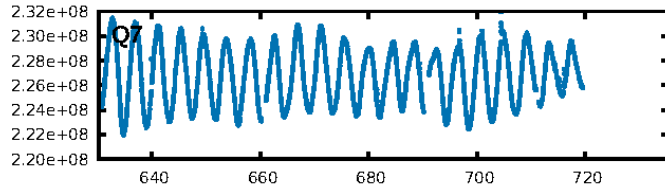
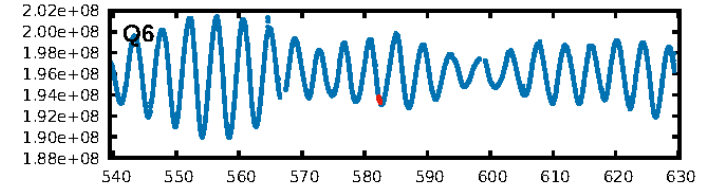
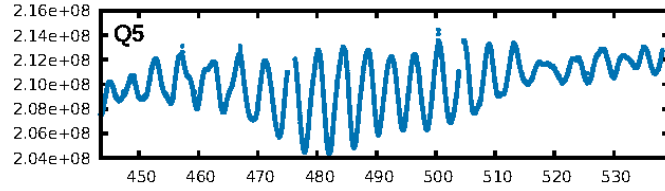
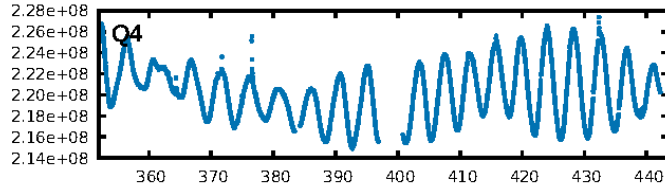
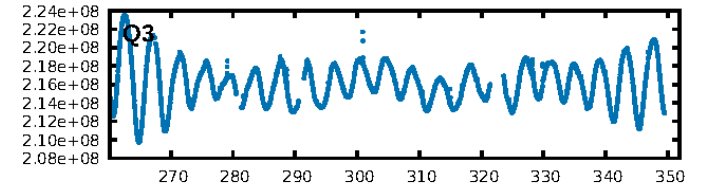
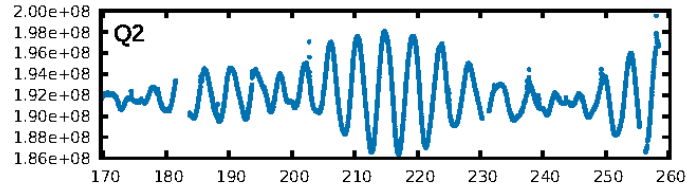
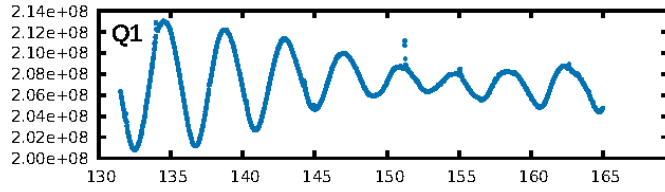
## DV Fit Results:

Period = 400.61078 [0.00661] d  
Epoch = 181.7342 [0.0150] BKJD  
Rp/R\* = 0.0230 [0.0196]  
a/R\* = 550.87 [2021.19]  
b = 0.81 [1.58]  
Seff = 0.39 [0.07]  
Teq = 201 [9] K  
Rp = 1.71 [1.46] Re  
a = 0.9322 [0.0806] AU  
Ag = 44731.23 [77826.41] [0.57σ]  
Teffp = 4517 [1965] K [2.20σ]

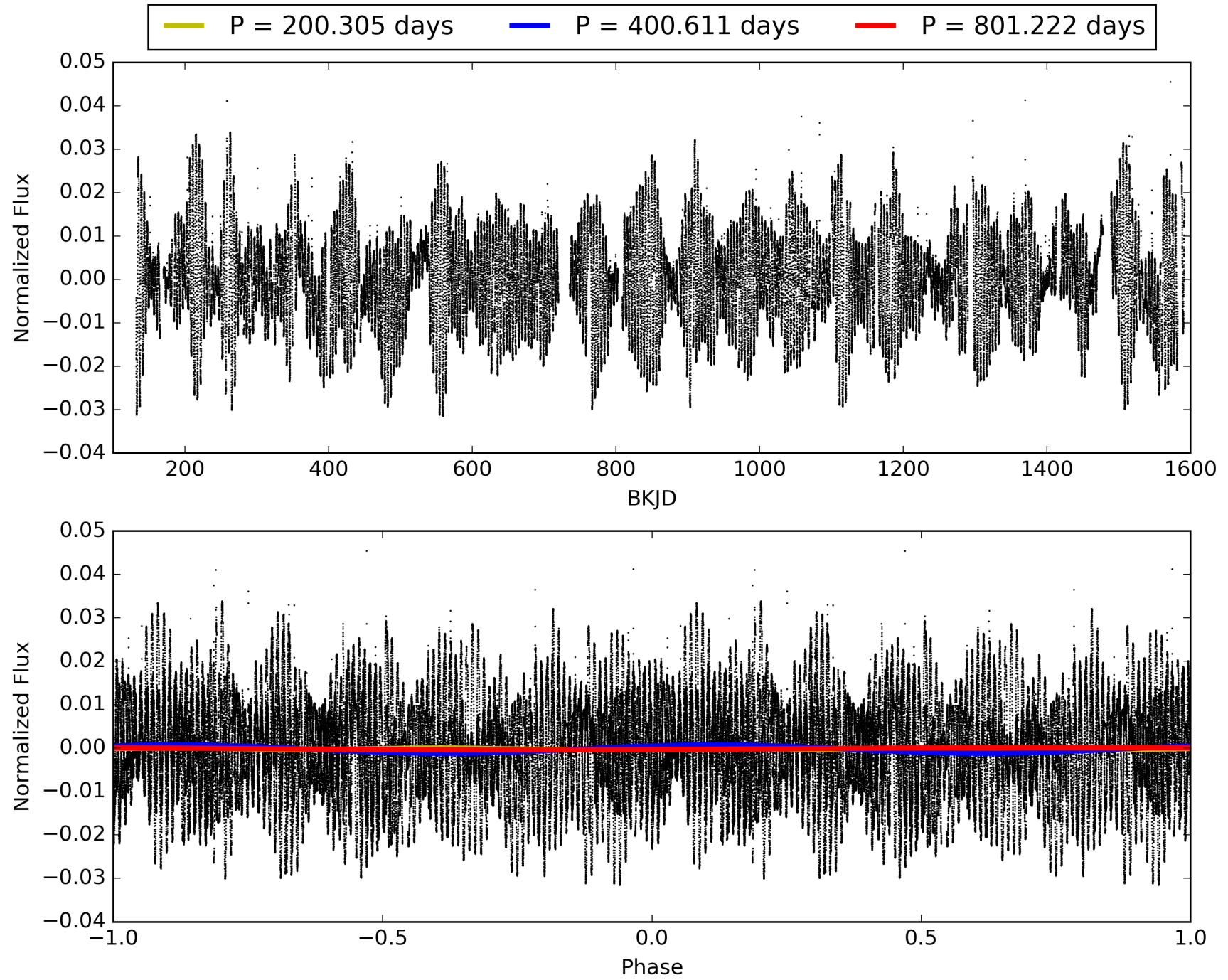
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [318.35σ]  
LongPeriod-sig: 100.0% [66.84σ]  
ModelChiSquare2-sig: 20.1%  
ModelChiSquareGof-sig: 50.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -1.841  
Centroid-sig: 38.8%  
Centroid-so: 0.719 arcsec [0.60σ]  
OotOffset-rm: 0.196 arcsec [1.23σ]  
KicOffset-rm: 0.303 arcsec [1.78σ]  
OotOffset-st: 2/1/0/0 [3]  
KicOffset-st: 2/1/0/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

# TCE 004352328-02, PDC Light Curves

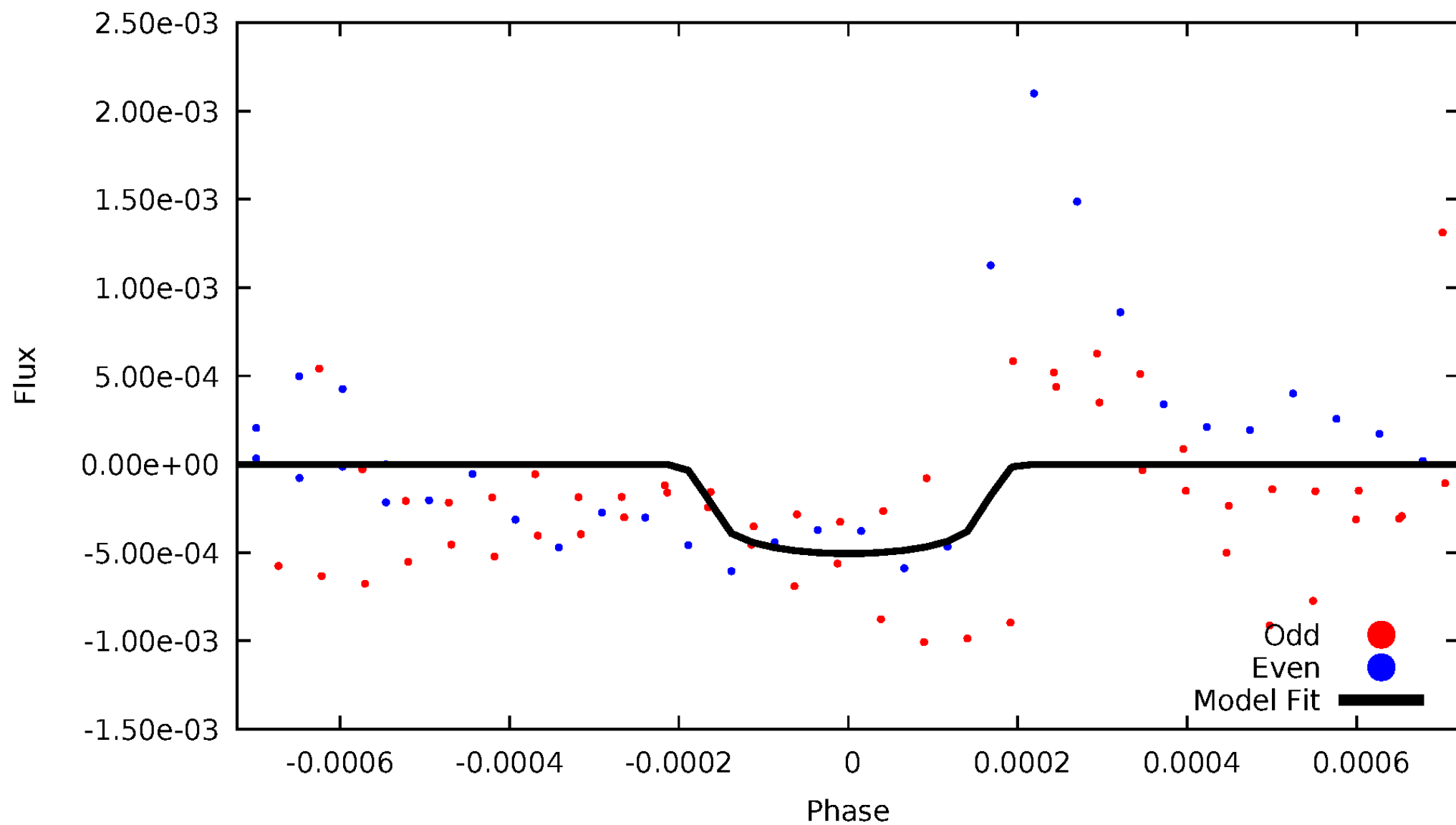


# TCE 004352328-02



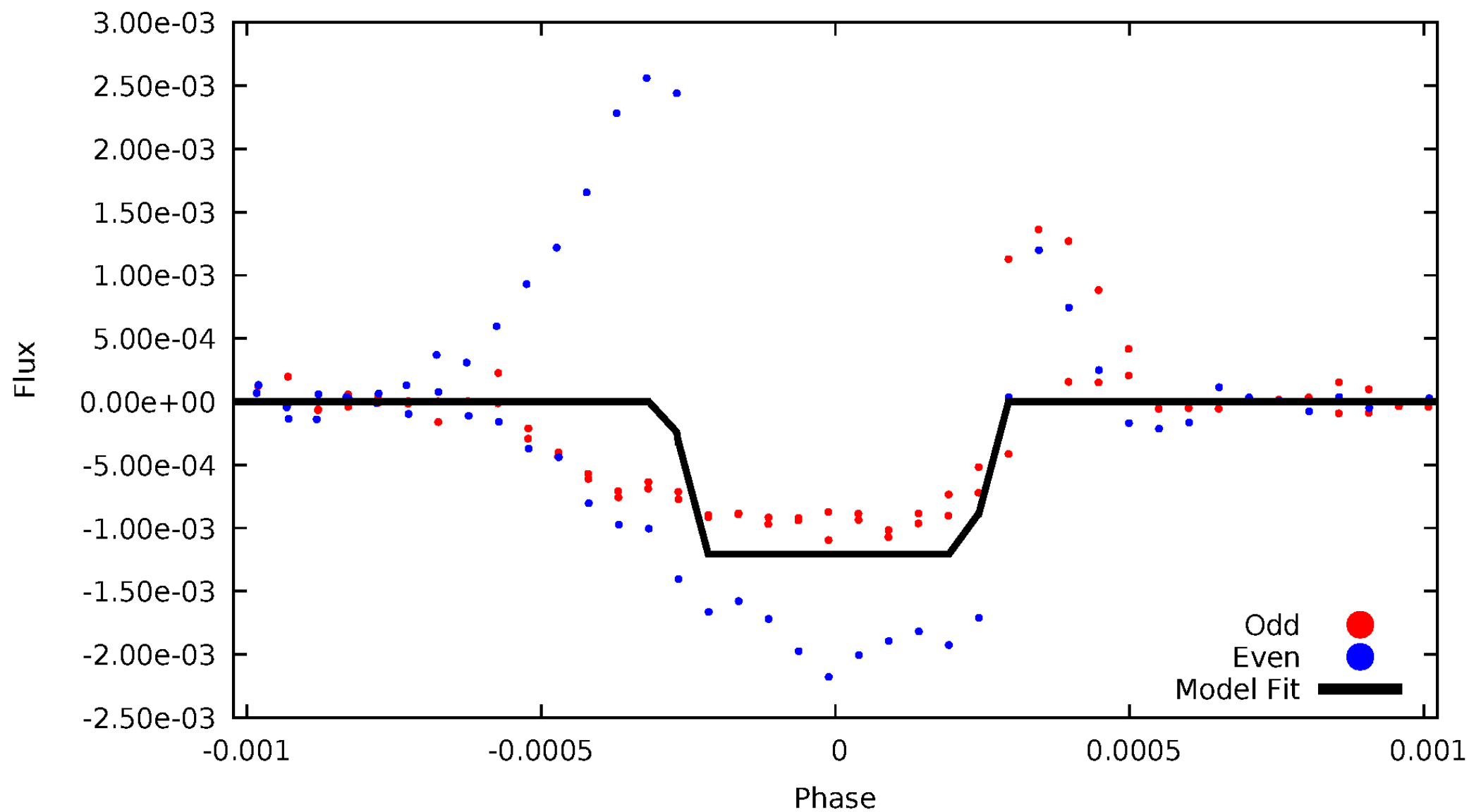
# DV Odd/Even

TCE 004352328-02



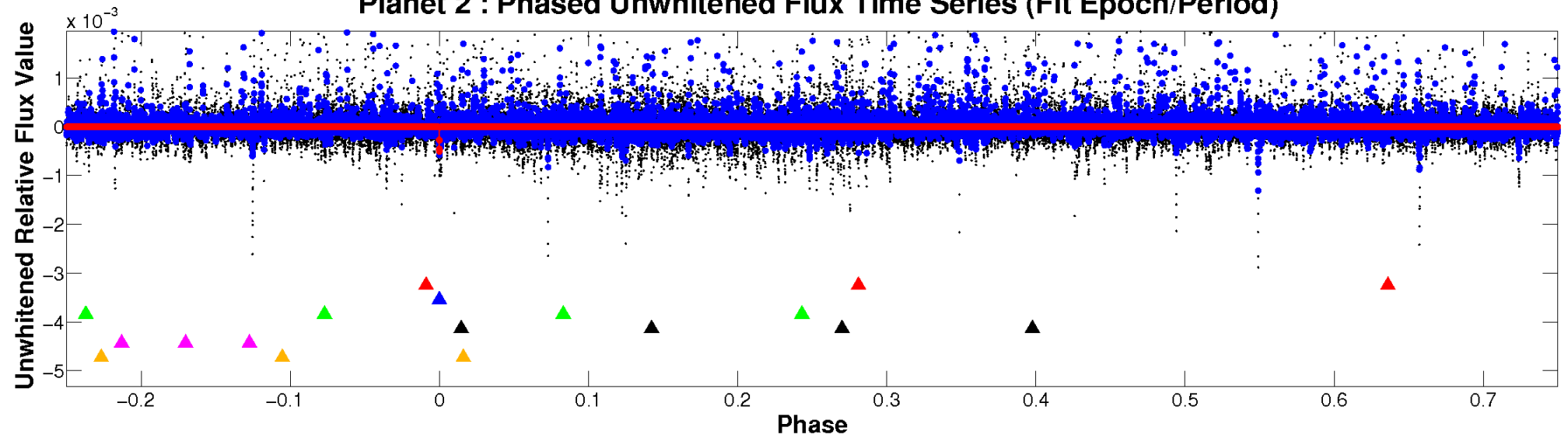
# ALT Odd/Even

TCE 004352328-02

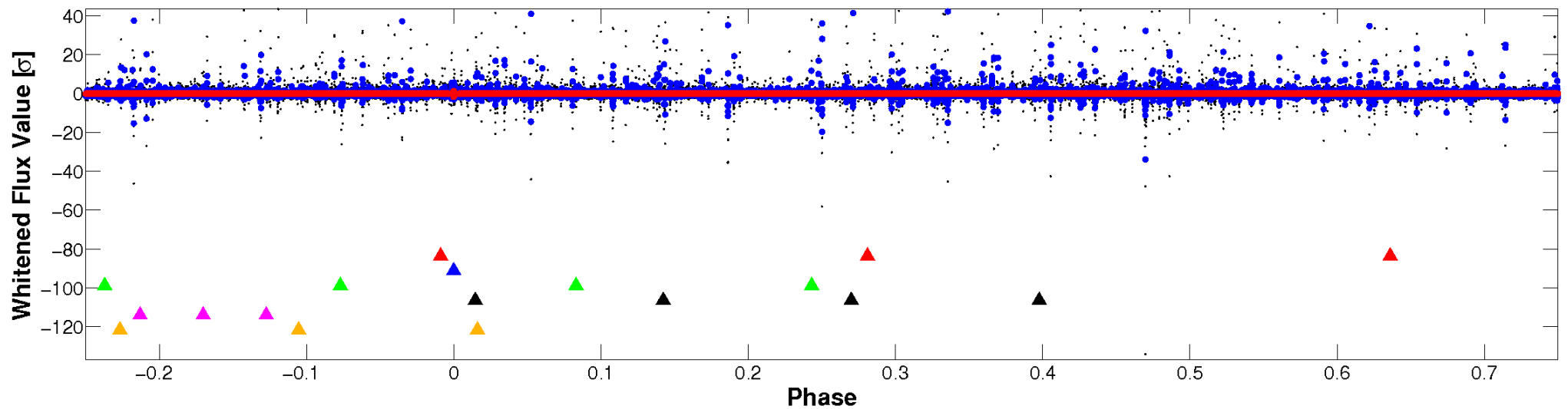


# Non-Whitened Vs. Whitened Light Curve

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



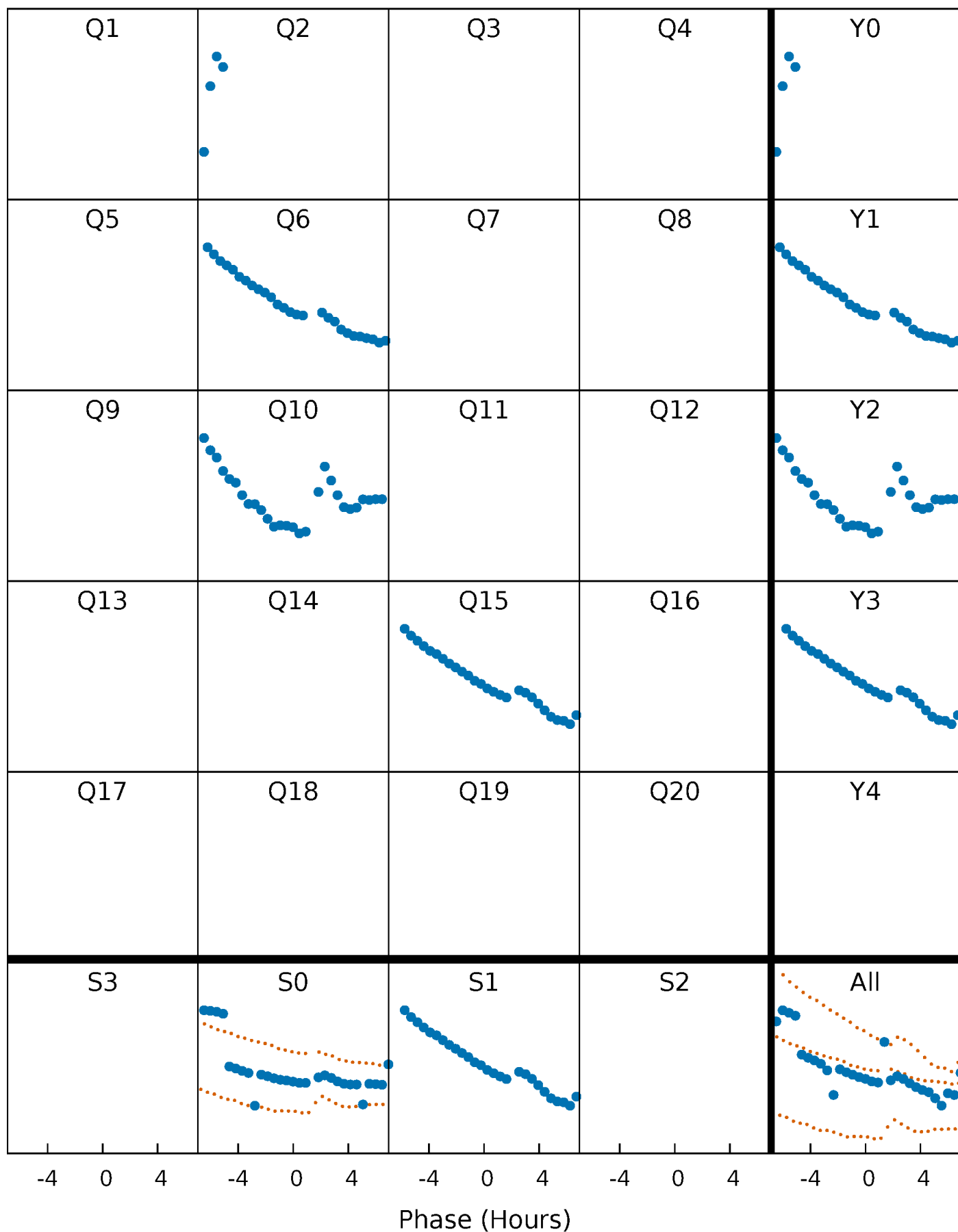
## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)





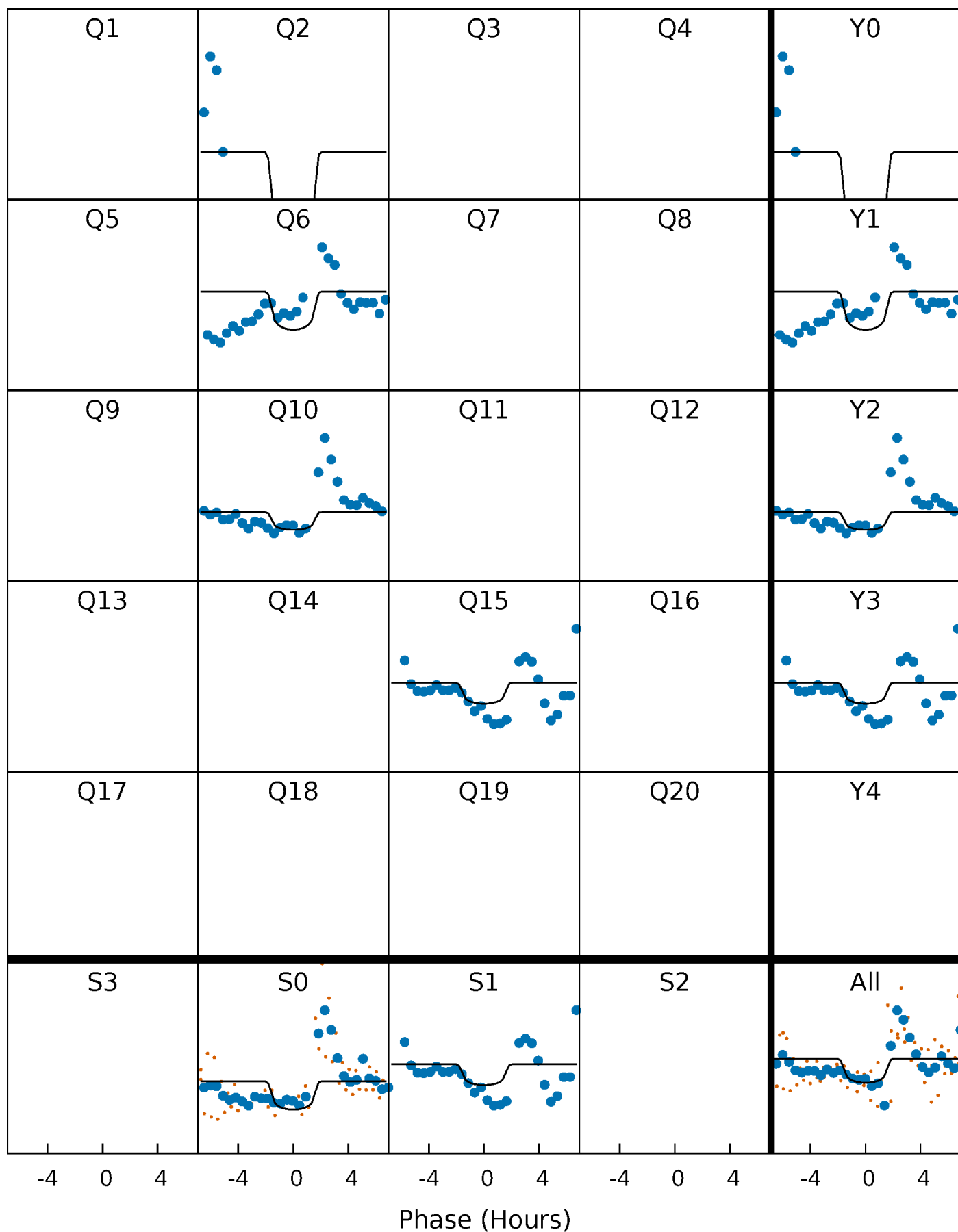
# PDC Quarter-Phased Transit Curves

TCE 004352328-02     $P=400.610780$  Days     $T_0=181.734216$  (BKJD)



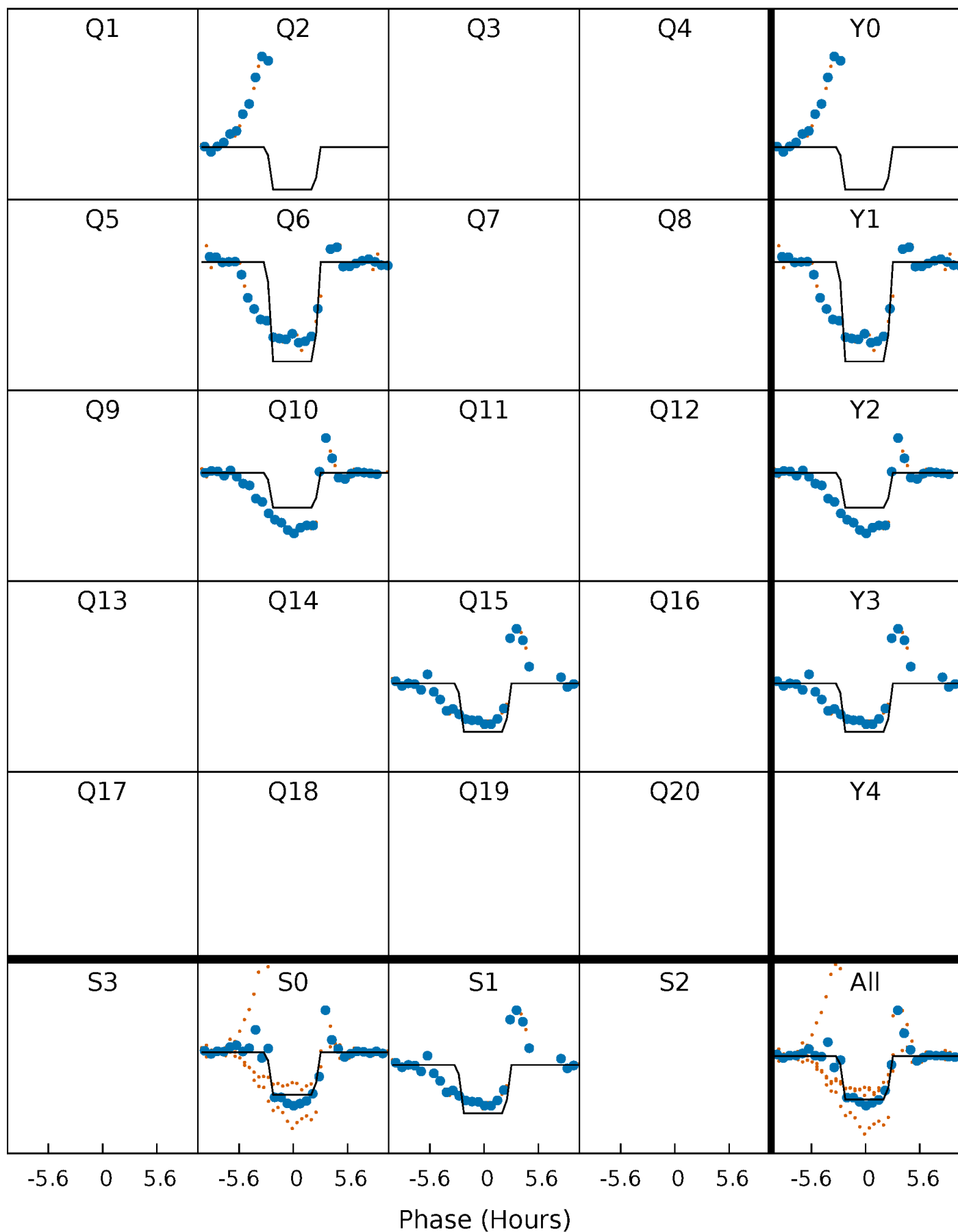
# DV Quarter-Phased Transit Curves

TCE 004352328-02 P=400.610780 Days  $T_0=181.734216$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

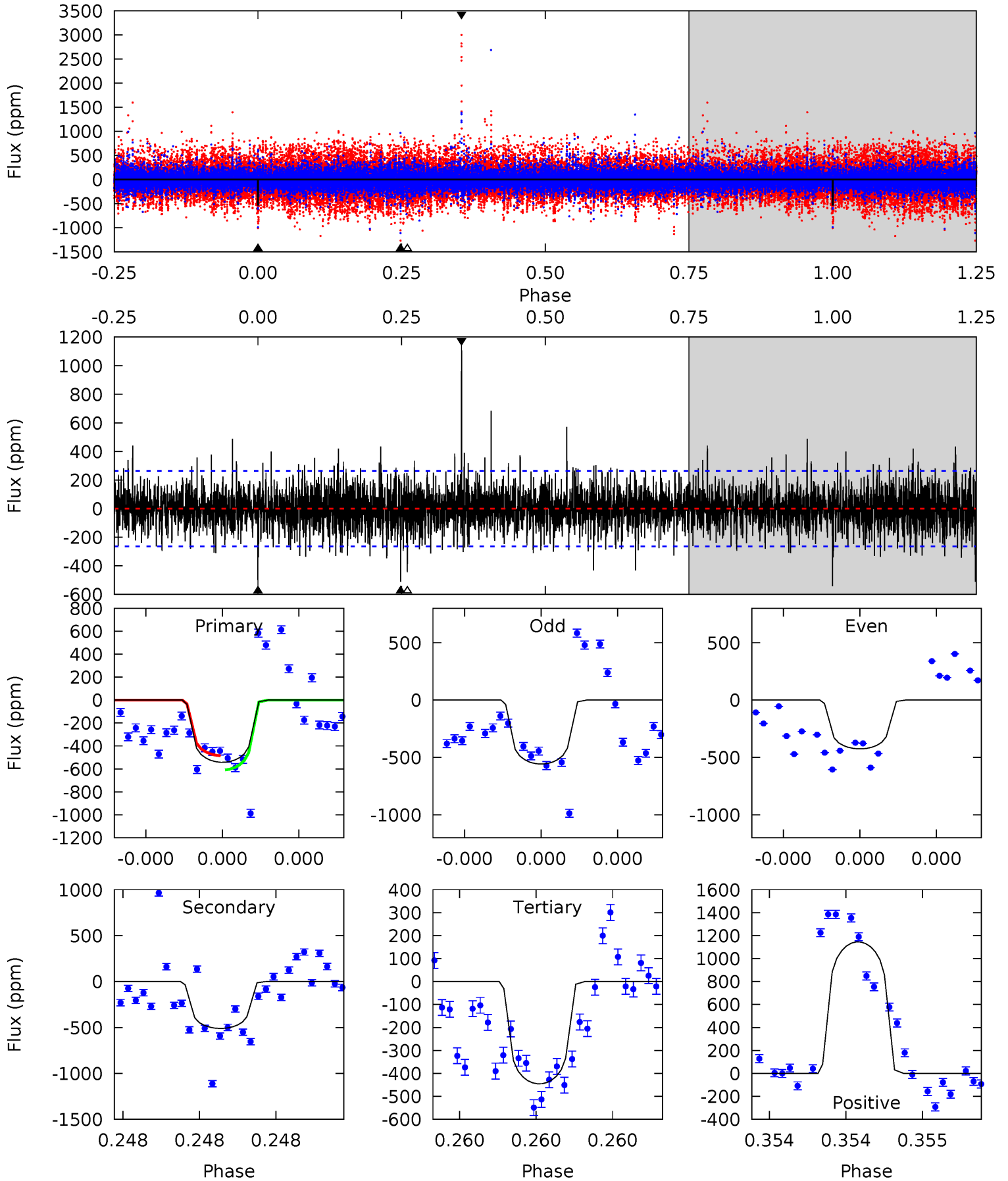
TCE 004352328-02     $P=400.640811$  Days     $T_0=181.623367$  (BKJD)



# DV Model-Shift Uniqueness Test

004352328-02, P = 400.610780 Days, E = 181.734216 Days

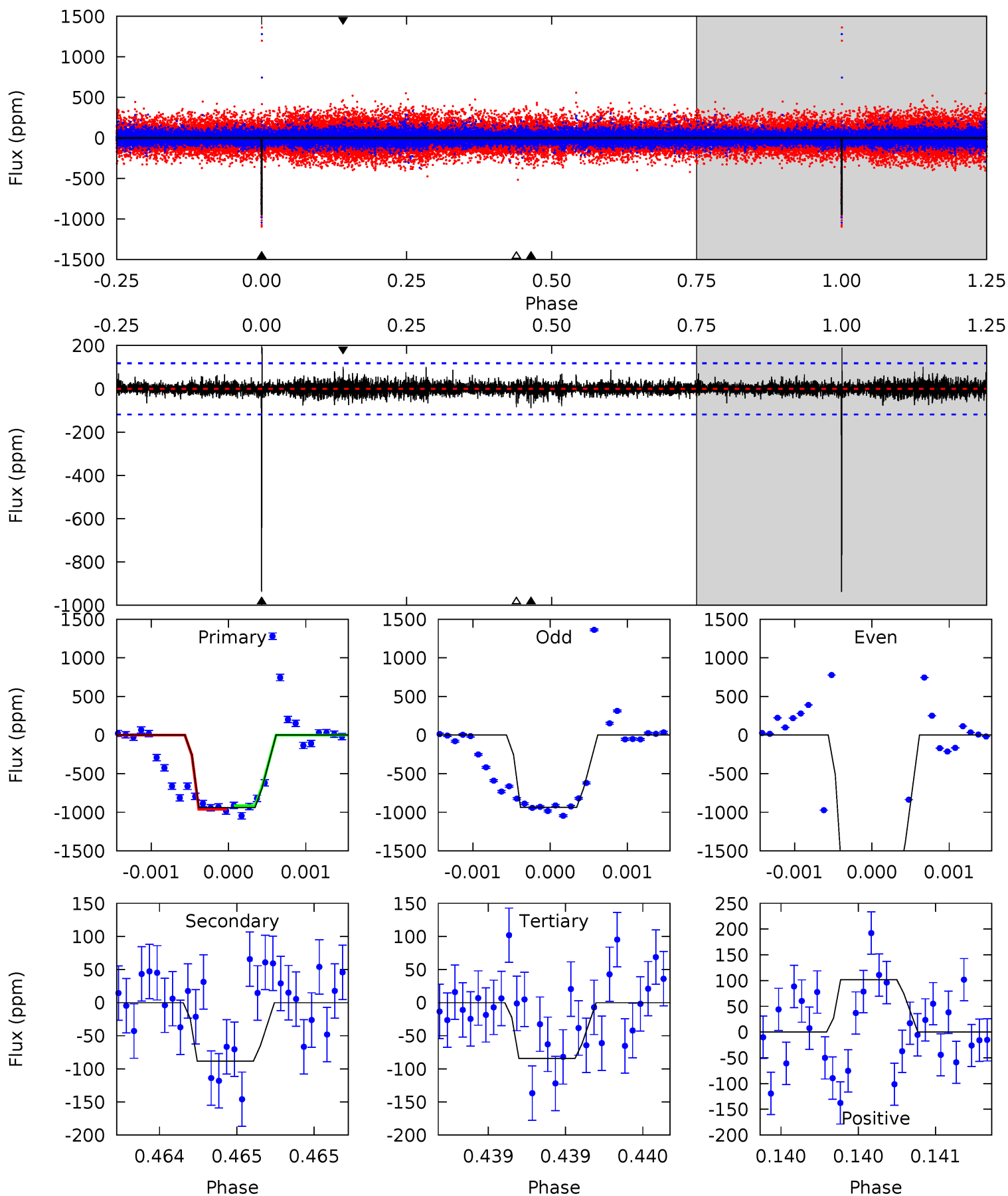
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 11.5 | 10.8 | 9.45 | 24.3 | 5.61            | 3.53            | 2.12             | 2.06    | -12.8   | 1.38    | -13.5   | 1.05    | 1.19 | 0.68  | 1.31 |



# Alt Model-Shift Uniqueness Test

004352328-02, P = 400.640811 Days, E = 181.623367 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 | 4.15 | 3.96 | 4.78 | 5.55            | 3.45            | 0.75             | 40.1    | 39.3    | 0.20    | -0.62   | 23.6    | 1.33 | 0.17  | 0   |



### Stellar Parameters For KIC 004352328

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5332^{+159}_{-159}$ | $4.601^{+0.065}_{-0.058}$ | $-0.760^{+0.300}_{-0.300}$ | $0.680^{+0.072}_{-0.057}$ | $0.673^{+0.071}_{-0.033}$ | $3.013^{+0.789}_{-0.626}$                     |
|        | +3%/-3%              | +1%/-1%                   | +39%/-39%                  | +11%/-8%                  | +11%/-5%                  | +26%/-21%                                     |
| 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 004352328-02 / KOI

| Detrend | Depth (ppm)   | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)     | $T_{obs}$ (K)         | $A_{obs}$                  |
|---------|---------------|------------------------|-------------------|-----------------------|----------------------------|
| DV      | $-510 \pm 47$ | $1.97^{+1.24}_{-1.25}$ | $281^{+10}_{-11}$ | $4996^{+3500}_{-918}$ | $63215^{+401169}_{-40146}$ |
| Alt.    | $-88 \pm 21$  | $2.68^{+1.45}_{-1.35}$ | $280^{+10}_{-11}$ | $3261^{+846}_{-384}$  | $5891^{+17613}_{-3443}$    |

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

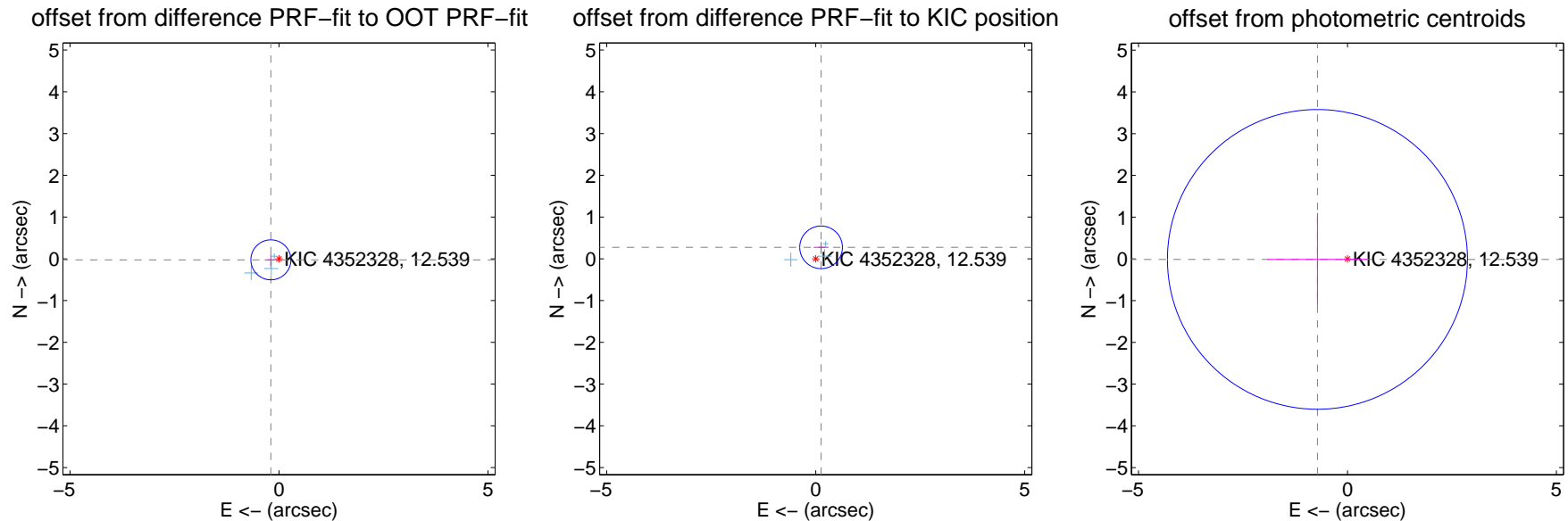
## DV Centroid Data

Supplemental centroid analysis for 004352328-02. Kepler magnitude: 12.54. Transit SNR 6.87

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.196 \pm 0.160$  | 1.23                | $0.194 \pm 0.148$  | $-0.025 \pm 0.137$ |
| PRF-fit source offset from KIC position | $0.303 \pm 0.170$  | 1.78                | $-0.128 \pm 0.180$ | $0.275 \pm 0.128$  |
| photometric centroid source offset      | $0.72 \pm 1.20$    | 0.60                | $0.72 \pm 1.20$    | $-0.01 \pm 1.11$   |



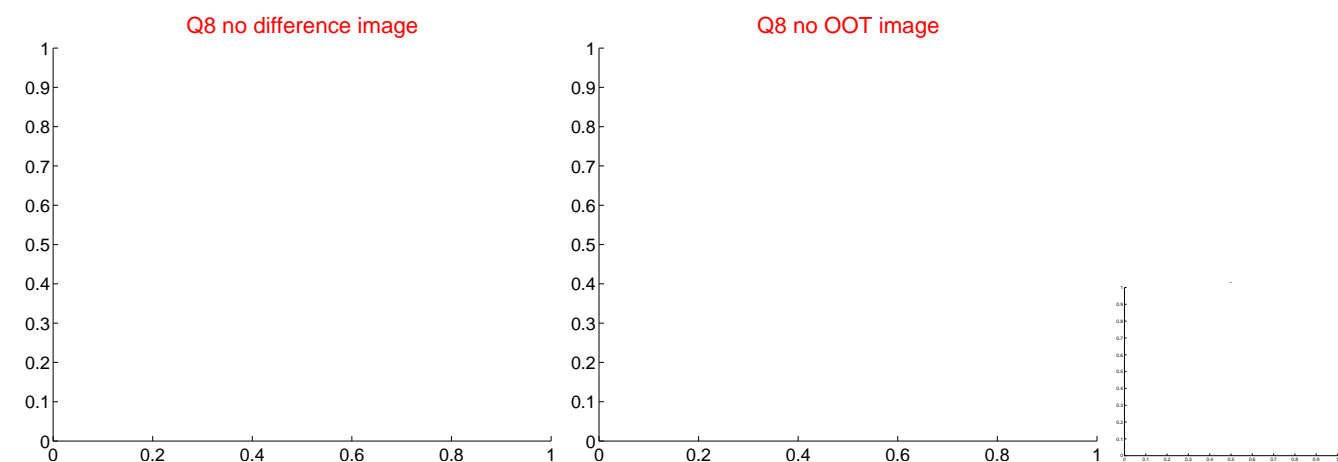
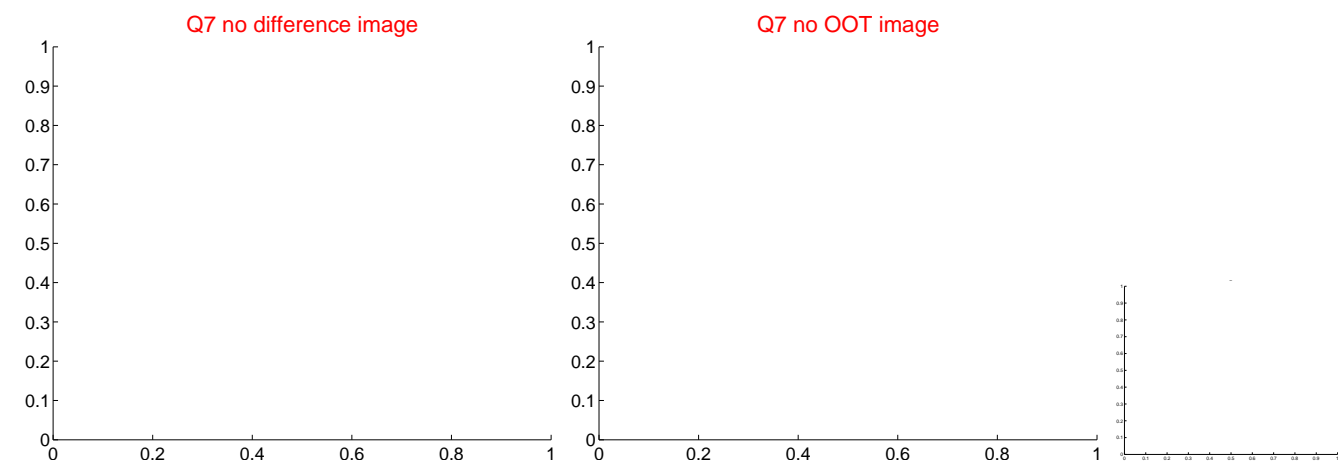
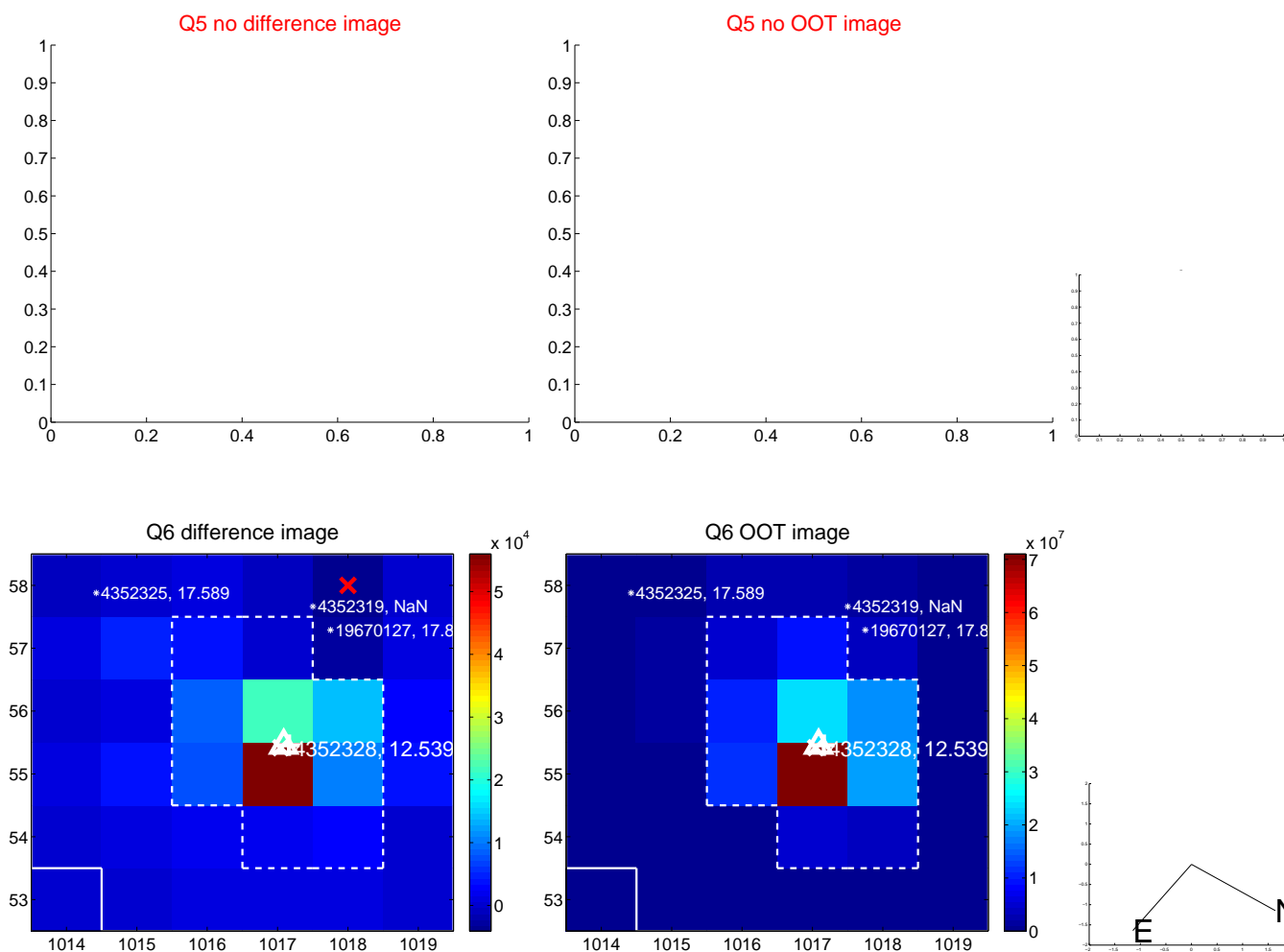
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

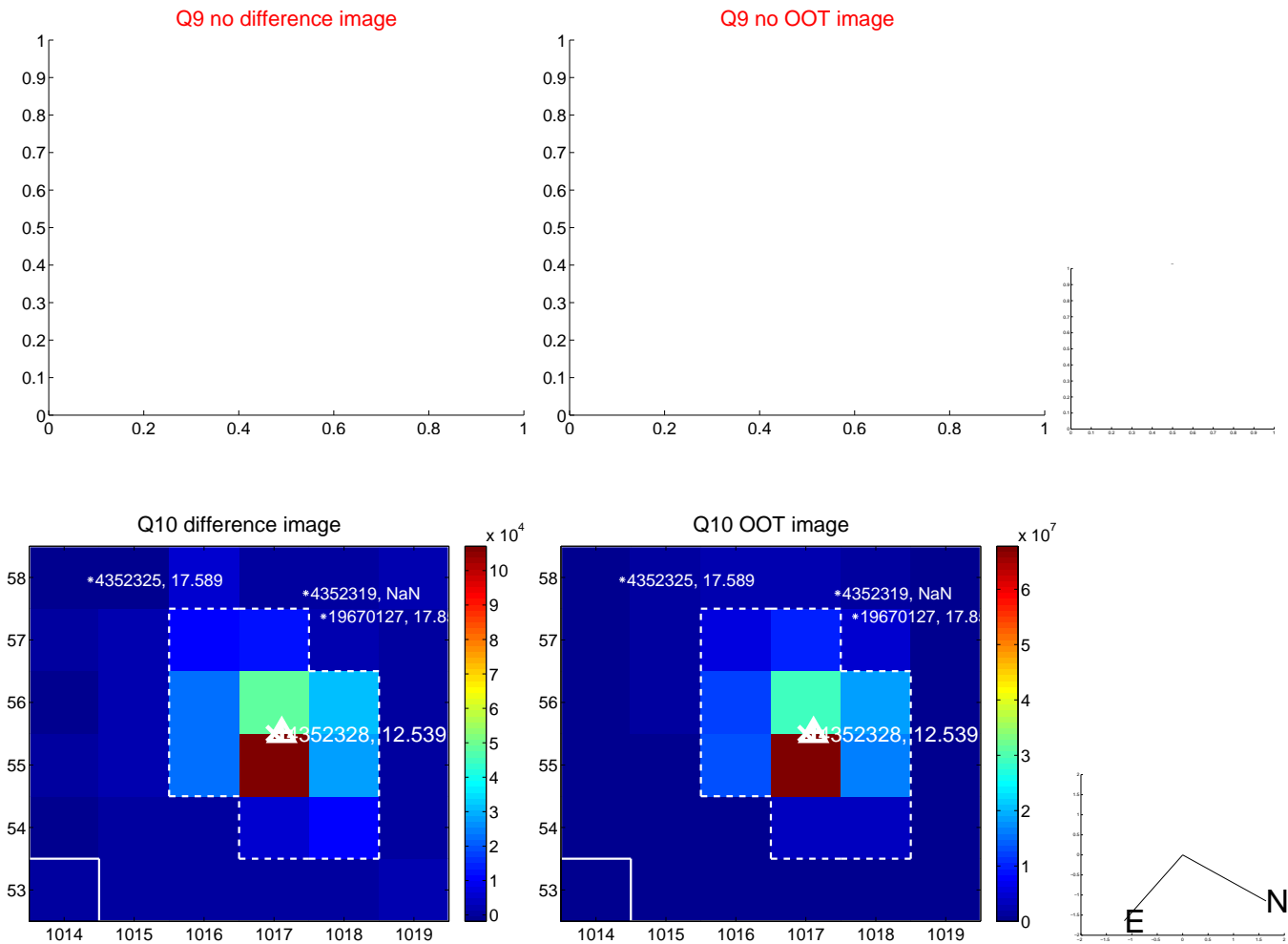




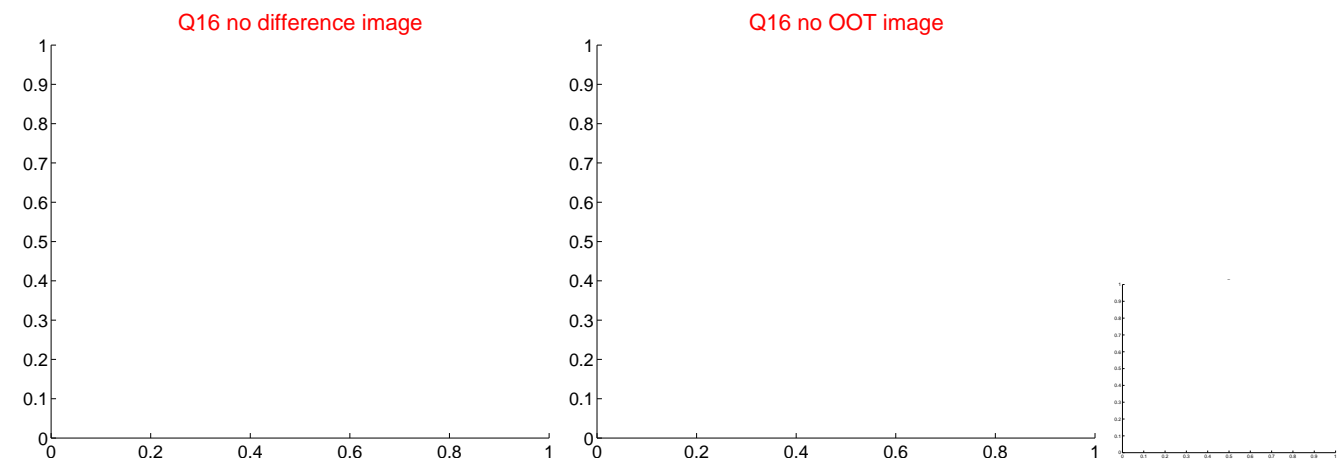
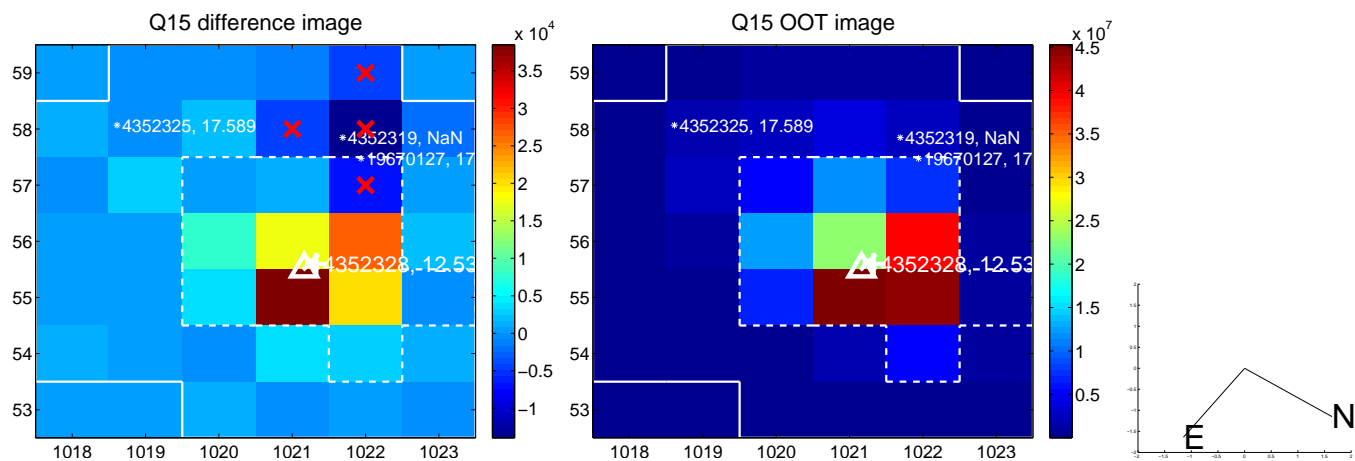
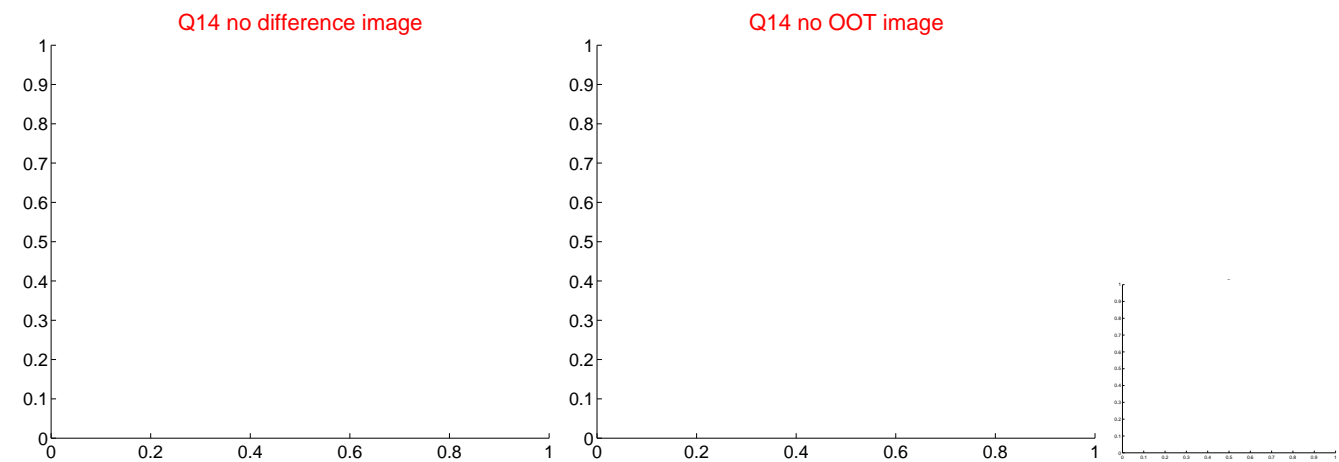
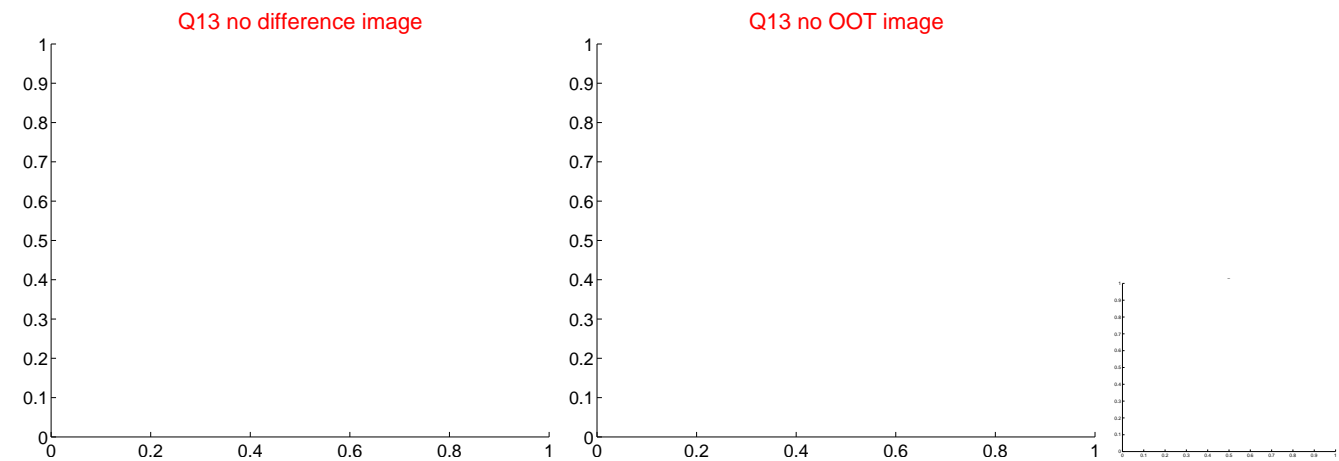
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



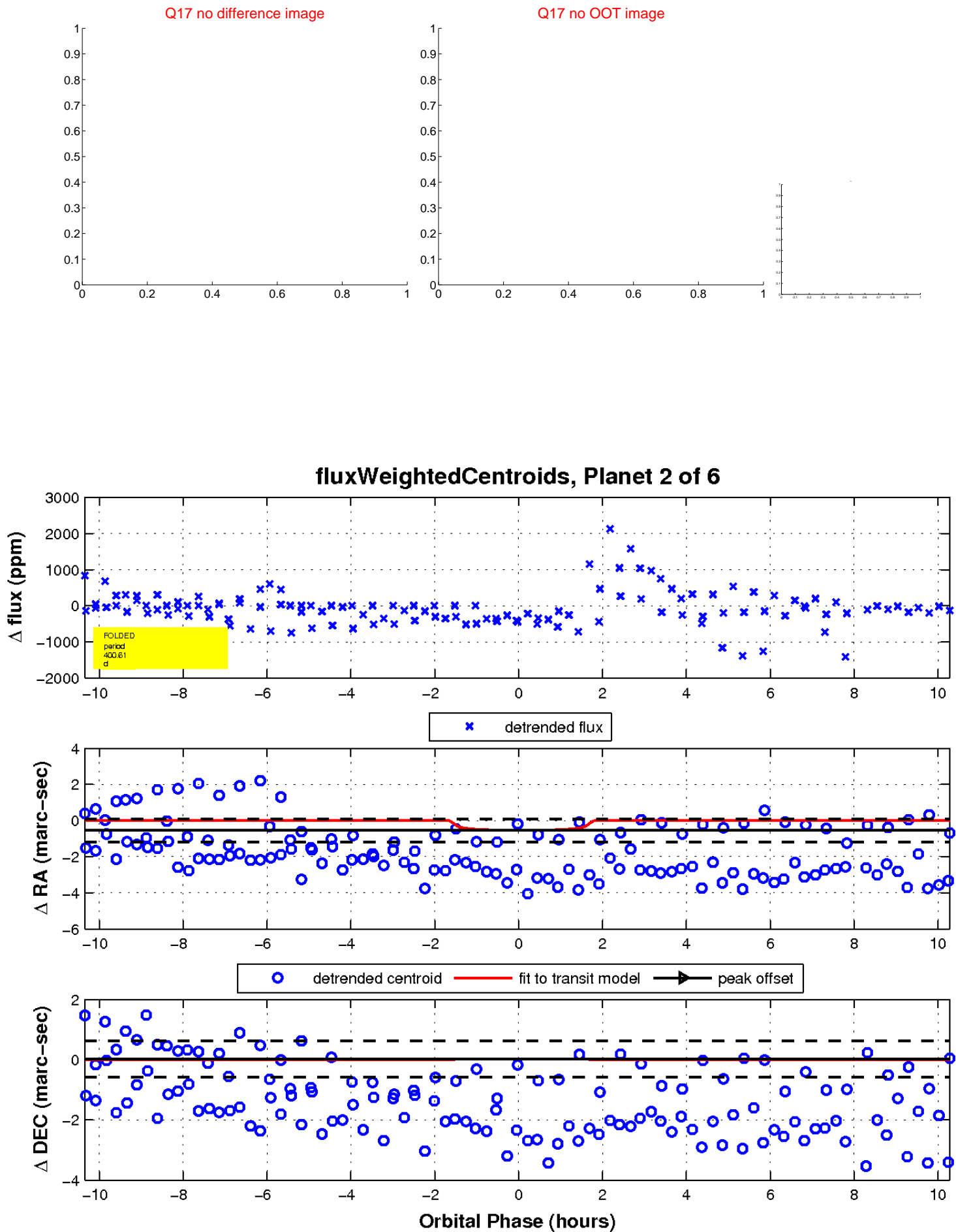
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

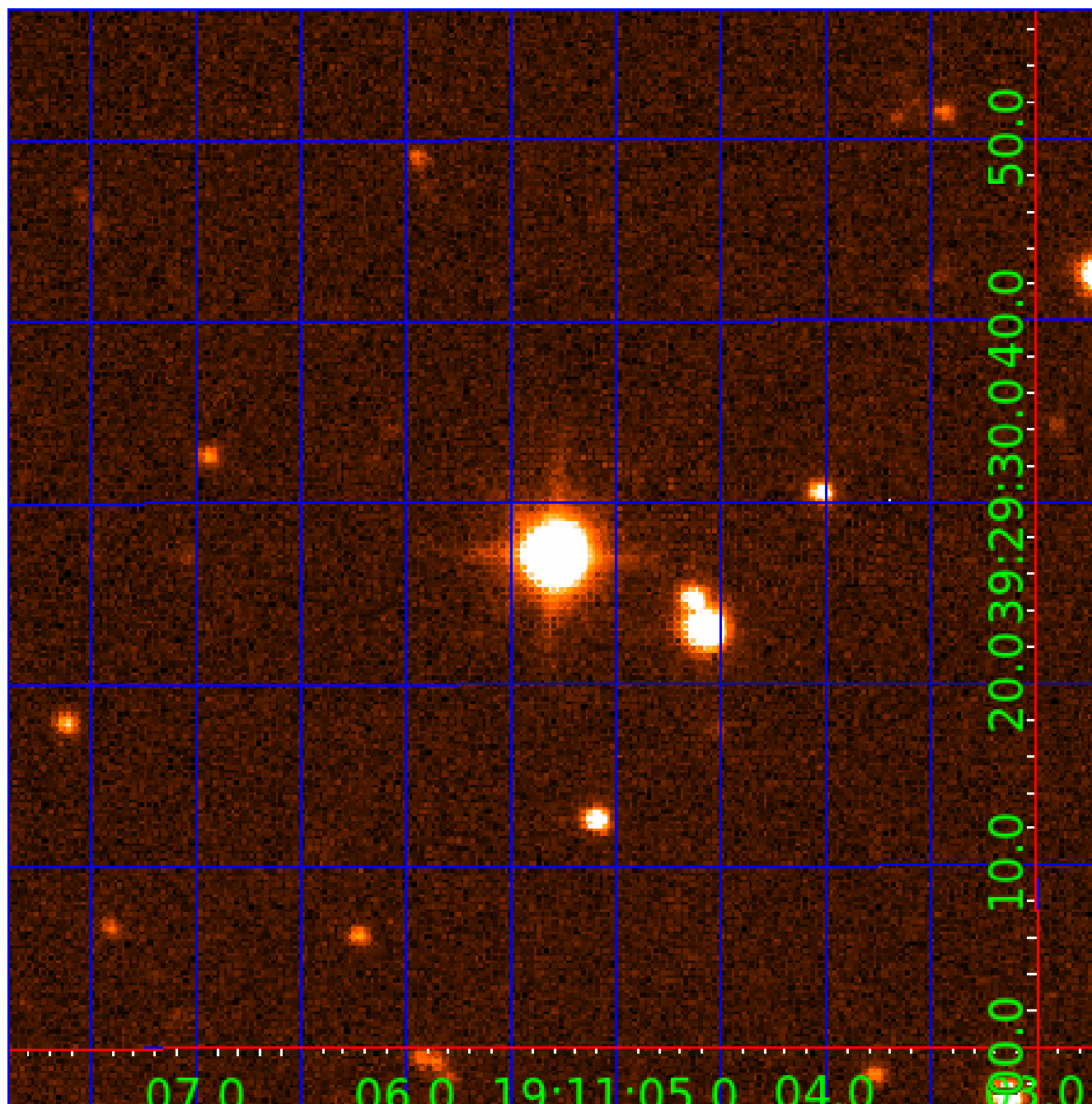


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004352328

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004352328-01 | OBS      | No   | 542.839585    | 294.326853   | 839.3       | 3.250            | 13.9 | 9.8  | 0.68                        | 5332            | 2.12                   | 0.26                   |
| 004352328-02 | OBS      | No   | 400.610780    | 181.734216   | 505.4       | 3.468            | 15.3 | 6.9  | 0.68                        | 5332            | 1.71                   | 0.39                   |
| 004352328-04 | OBS      | No   | 451.761487    | 187.600777   | 764.2       | 12.967           | 15.7 | 6.4  | 0.68                        | 5332            | 1.95                   | 0.33                   |
| 004352328-05 | OBS      | No   | 417.771793    | 497.001898   | 510.6       | 5.093            | 13.2 | 6.5  | 0.68                        | 5332            | 1.63                   | 0.36                   |
| 004352328-06 | OBS      | No   | 449.245439    | 491.523076   | 320.1       | 4.500            | 12.5 | -1.0 | 0.68                        | 5332            | 1.20                   | 0.33                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004352328-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS   |
| 004352328-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_KIC_POS |
| 004352328-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS                              |
| 004352328-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS       |
| 004352328-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS          |

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

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

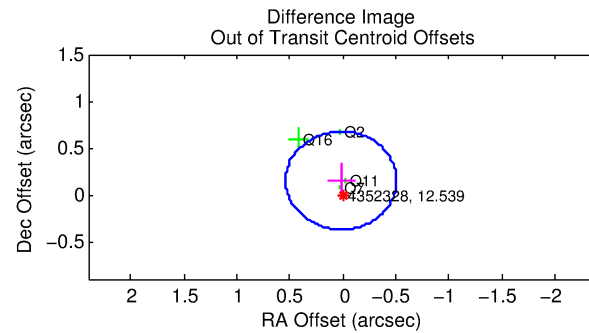
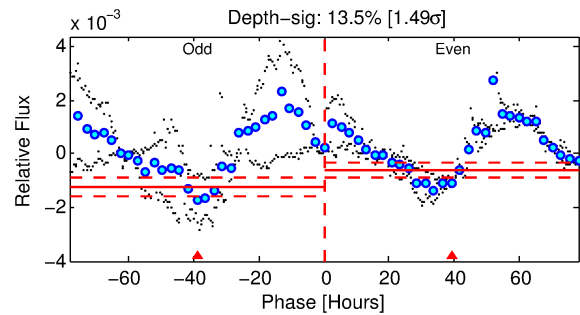
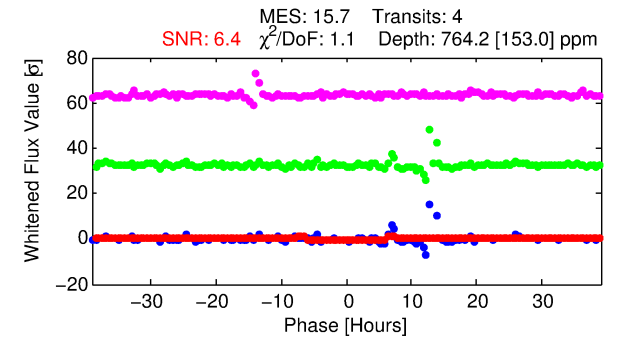
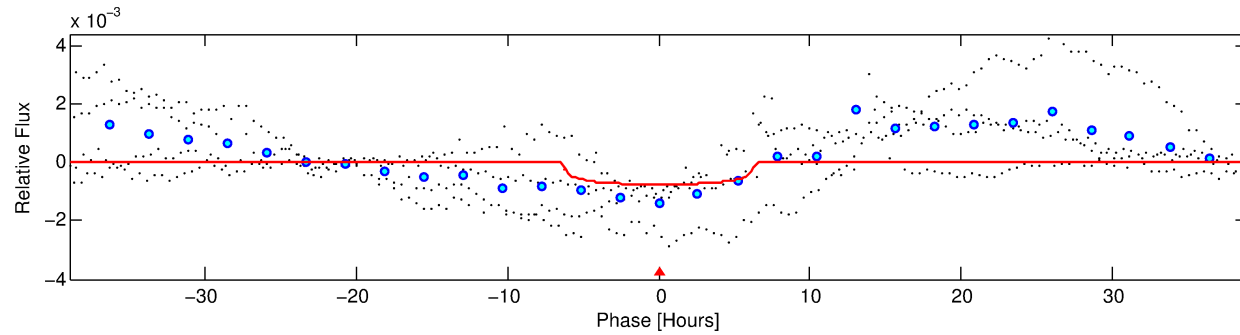
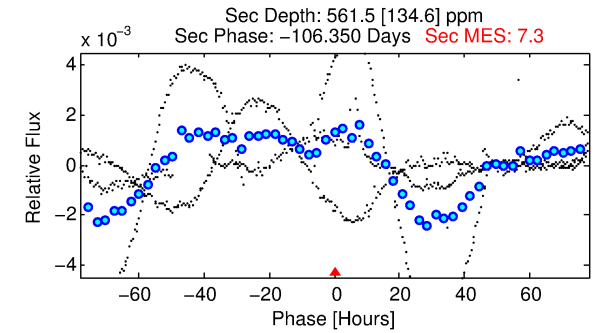
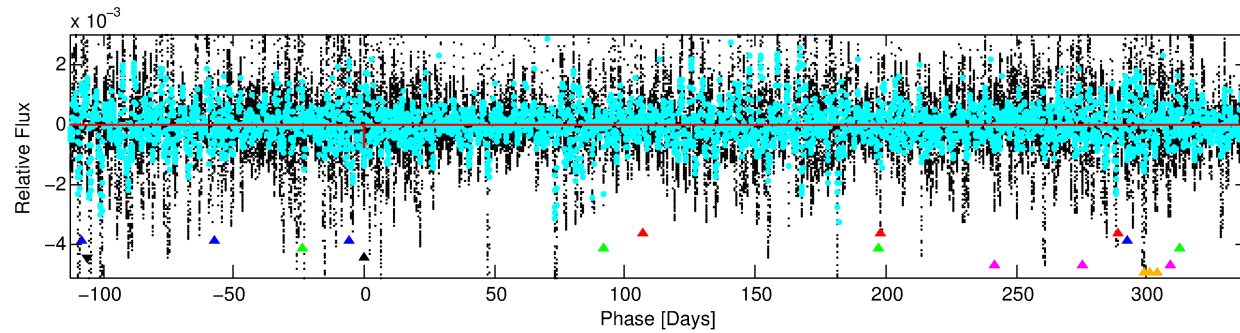
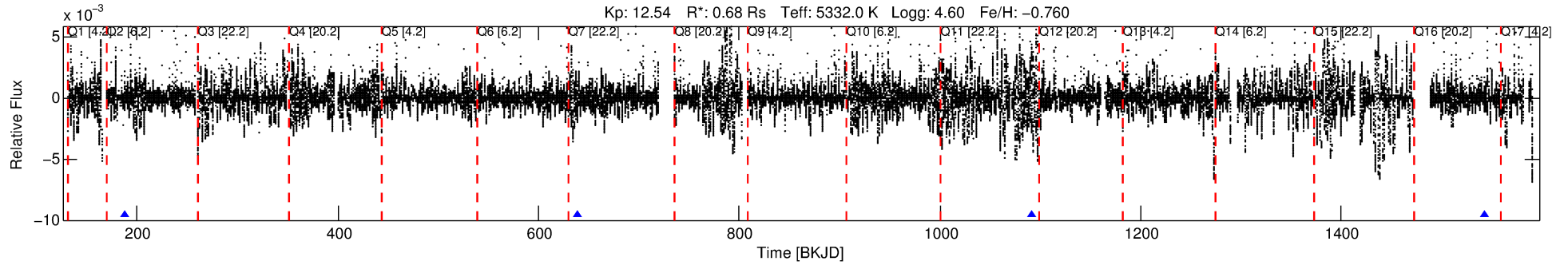
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004352328-04

No Significant Match Found

# DV One-Page Summary

KIC: 4352328 Candidate: 4 of 6 Period: 451.761 d



## DV Fit Results:

Period = 451.76149 [0.00408] d  
Epoch = 187.6008 [0.0084] BKJD  
Rp/R\* = 0.0263 [0.0060]  
a/R\* = 223.45 [177.02]  
b = 0.59 [0.88]  
Seff = 0.33 [0.06]  
Teq = 193 [8] K  
Rp = 1.95 [0.49] Re  
a = 1.0100 [0.0873] AU  
Ag = 82859.28 [43980.41] [1.88 $\sigma$ ]  
**Teffp = 5063 [671] K [7.26 $\sigma$ ]**

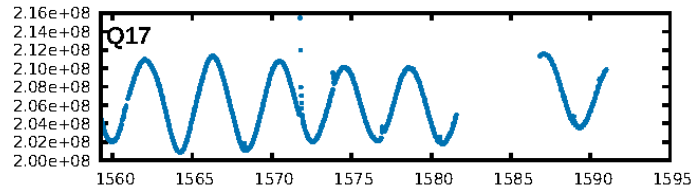
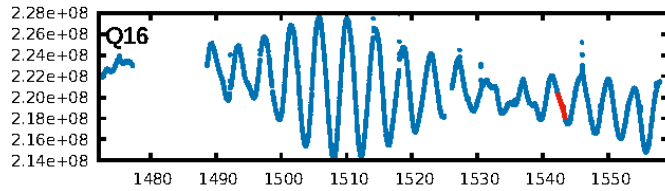
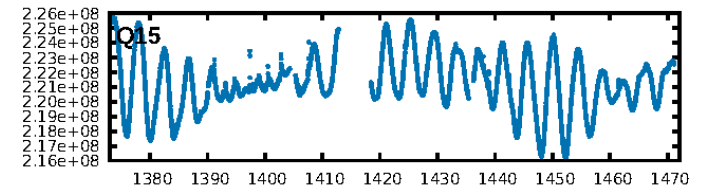
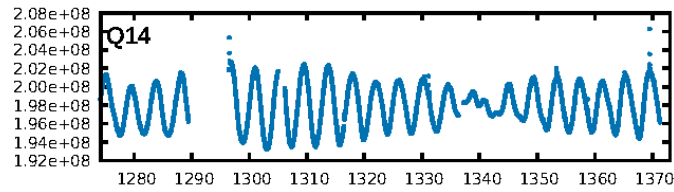
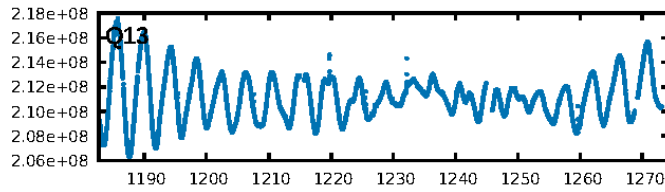
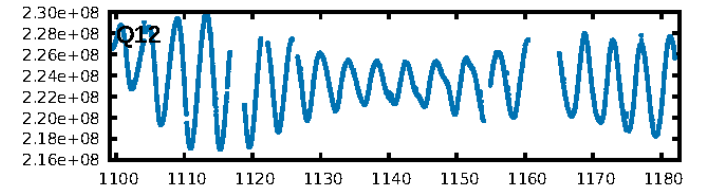
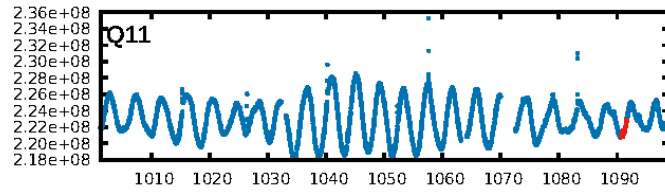
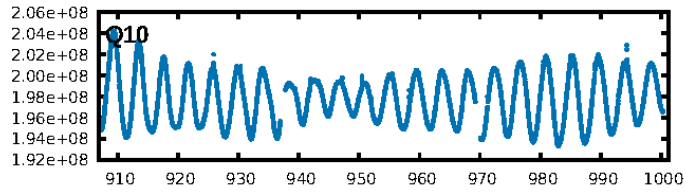
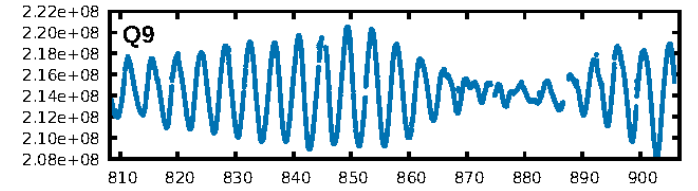
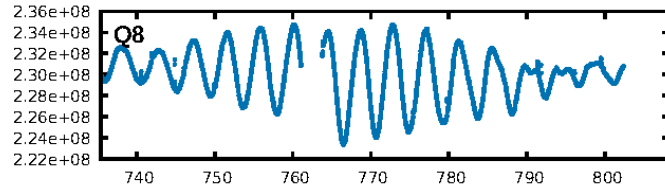
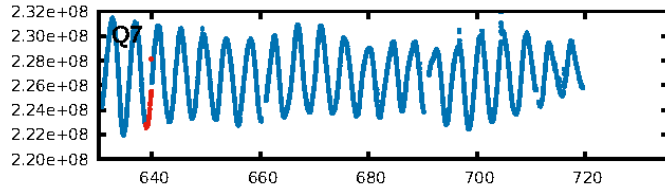
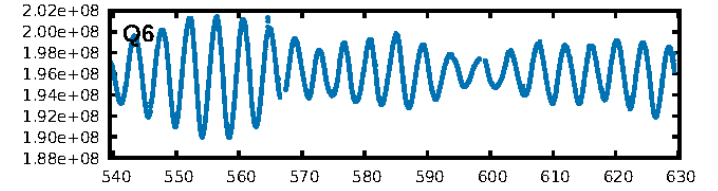
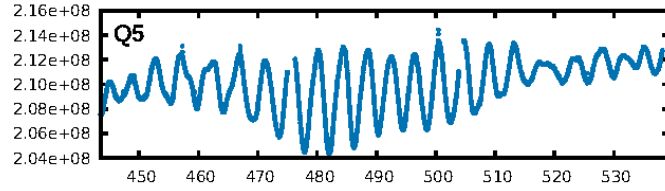
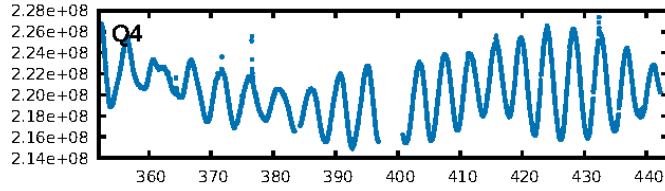
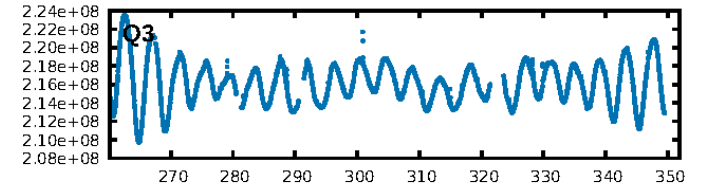
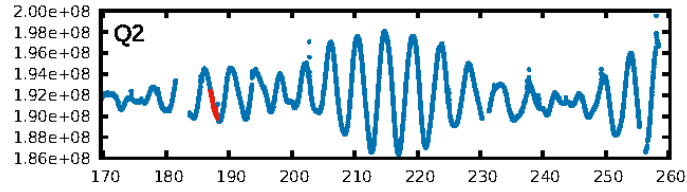
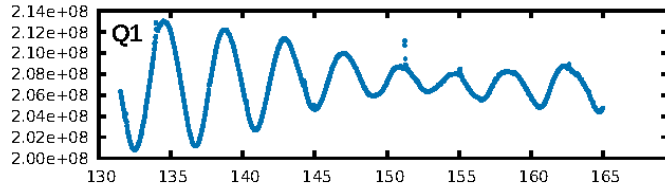
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [4.40 $\sigma$ ]  
LongPeriod-sig: 100.0% [163.51 $\sigma$ ]  
ModelChiSquare2-sig: 15.8%  
ModelChiSquareGof-sig: 99.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: -1.009**  
Centroid-sig: 40.0%  
Centroid-so: 1.007 arcsec [1.25 $\sigma$ ]  
OotOffset-rm: 0.152 arcsec [0.87 $\sigma$ ]  
OotOffset-st: 1/2/1/0 [4]  
KicOffset-rm: 0.345 arcsec [2.43 $\sigma$ ]  
KicOffset-st: 1/2/1/0 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 1.00 [4/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:46:34 Z

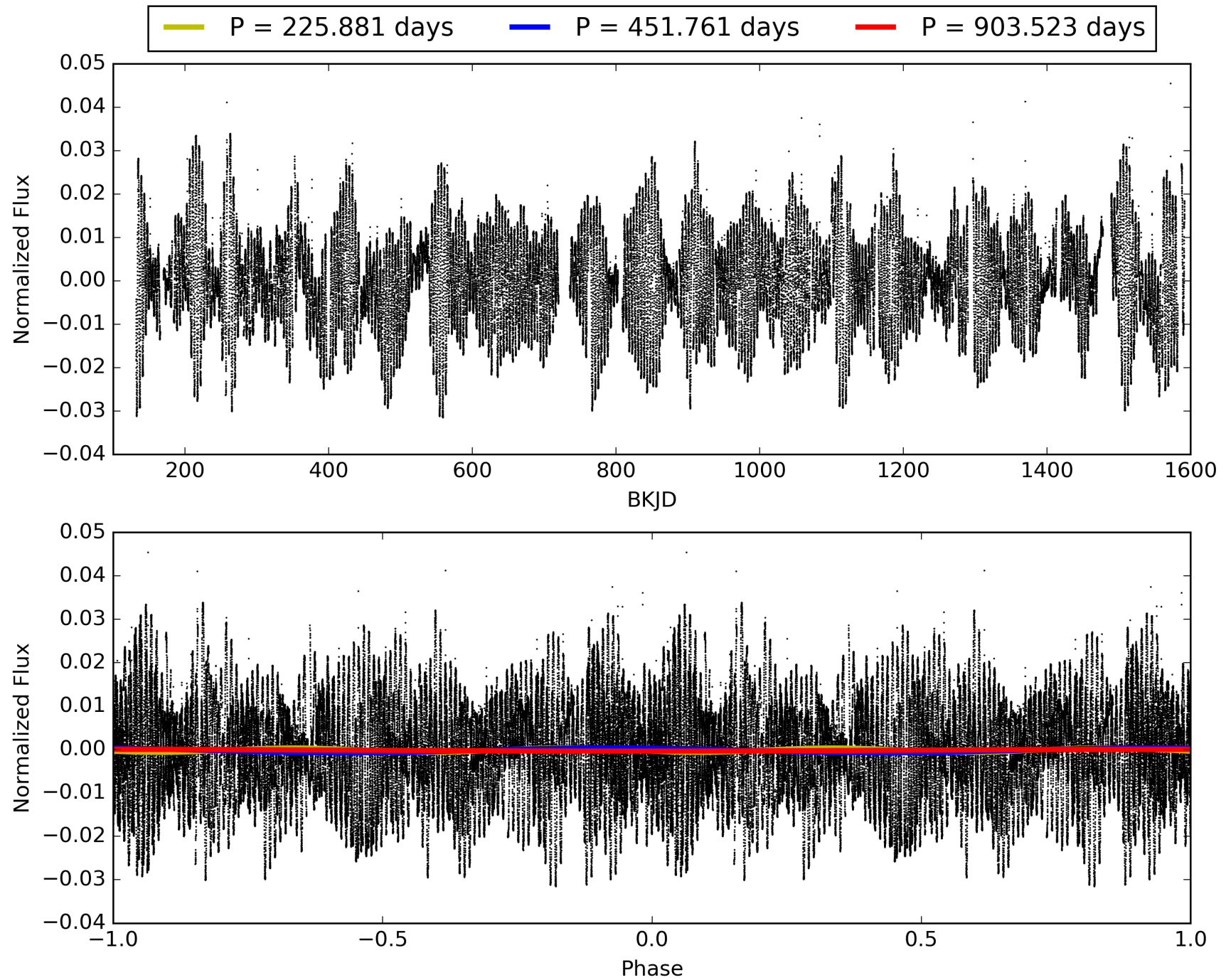
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004352328-04, PDC Light Curves



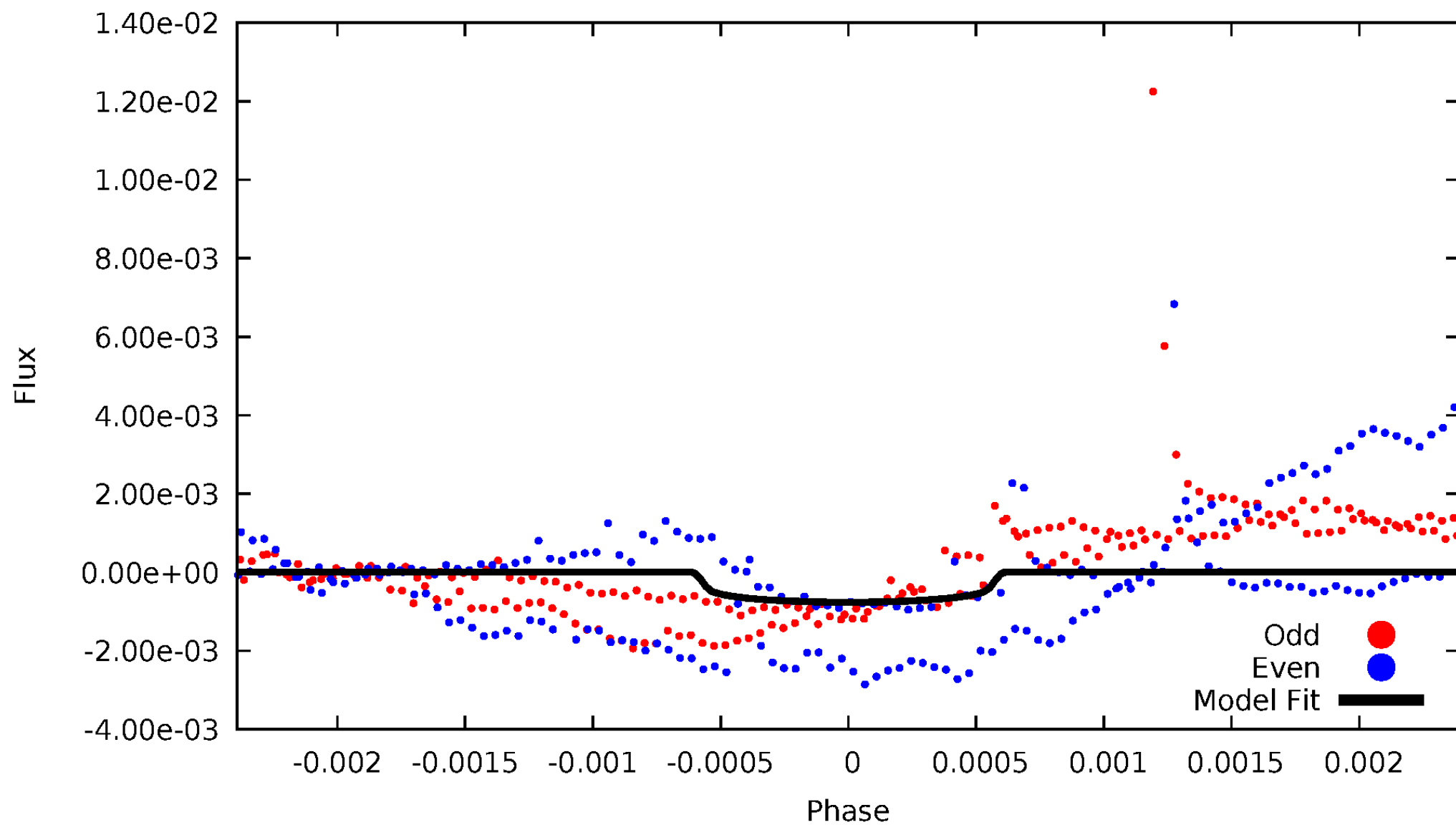


TCE 004352328-04



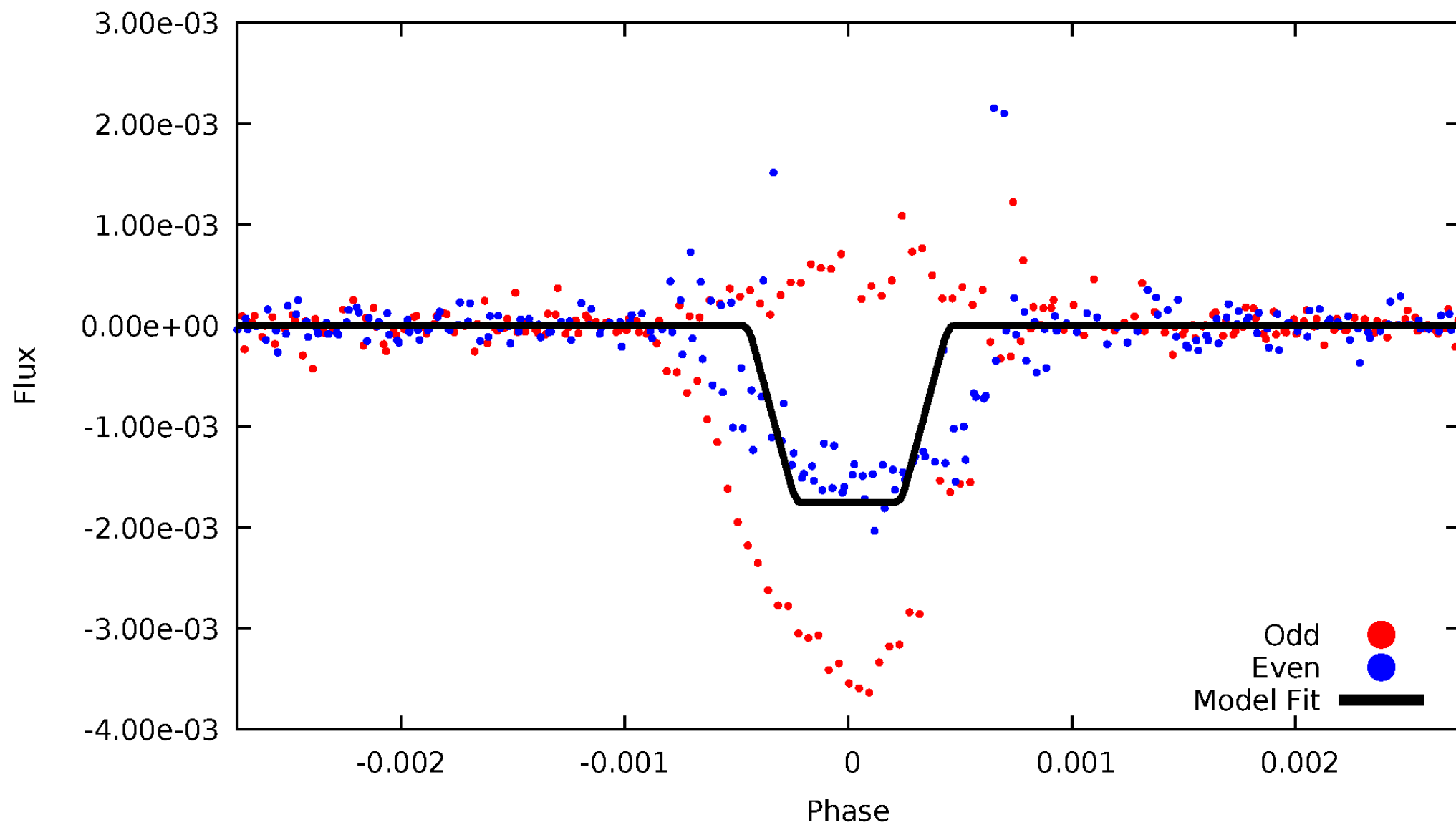
# DV Odd/Even

TCE 004352328-04



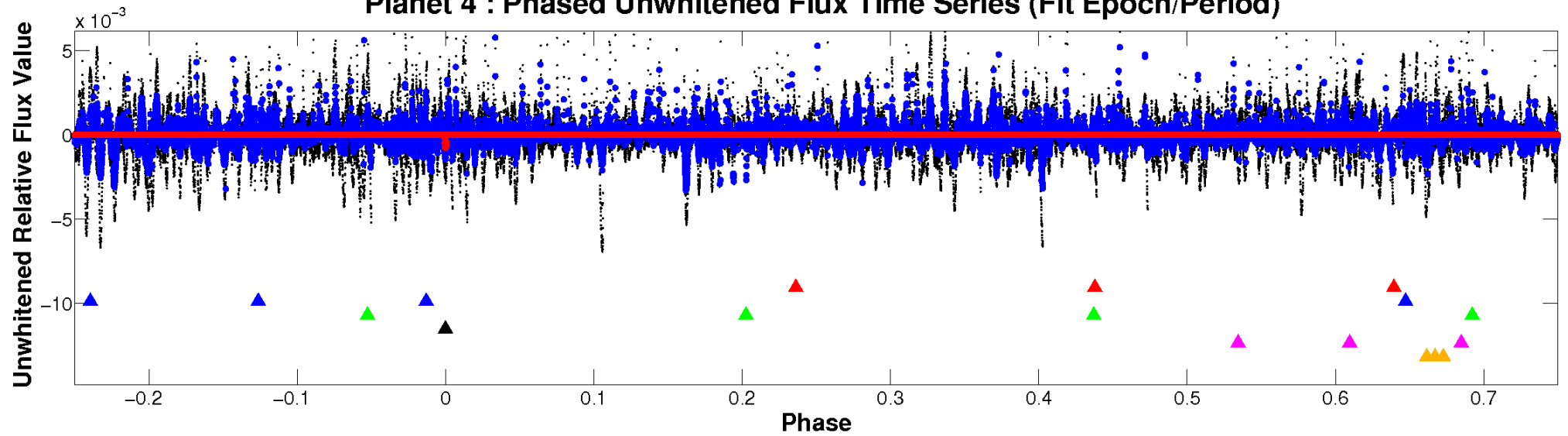
# ALT Odd/Even

TCE 004352328-04

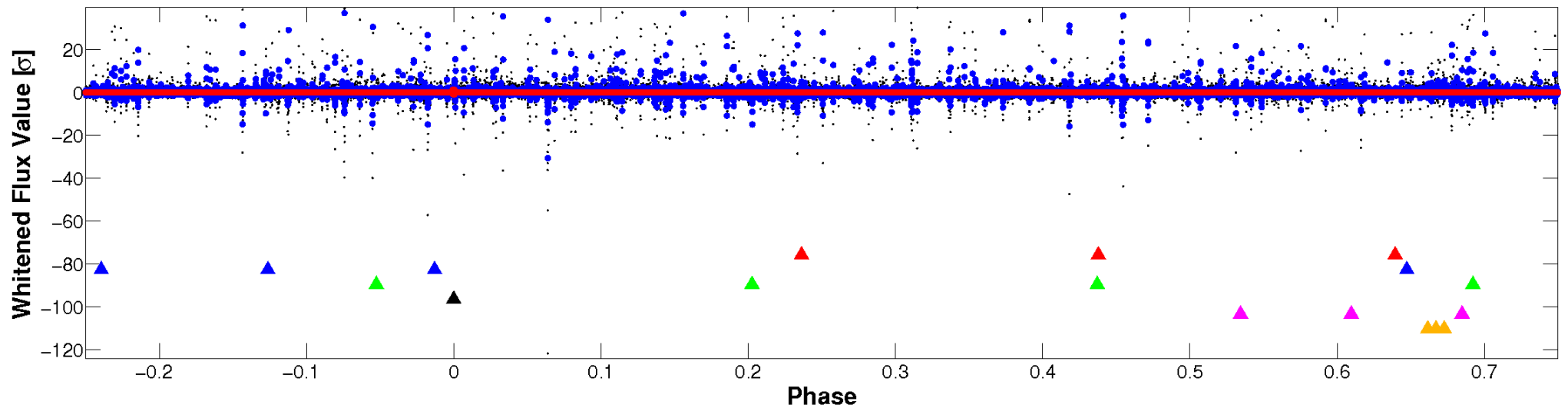


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

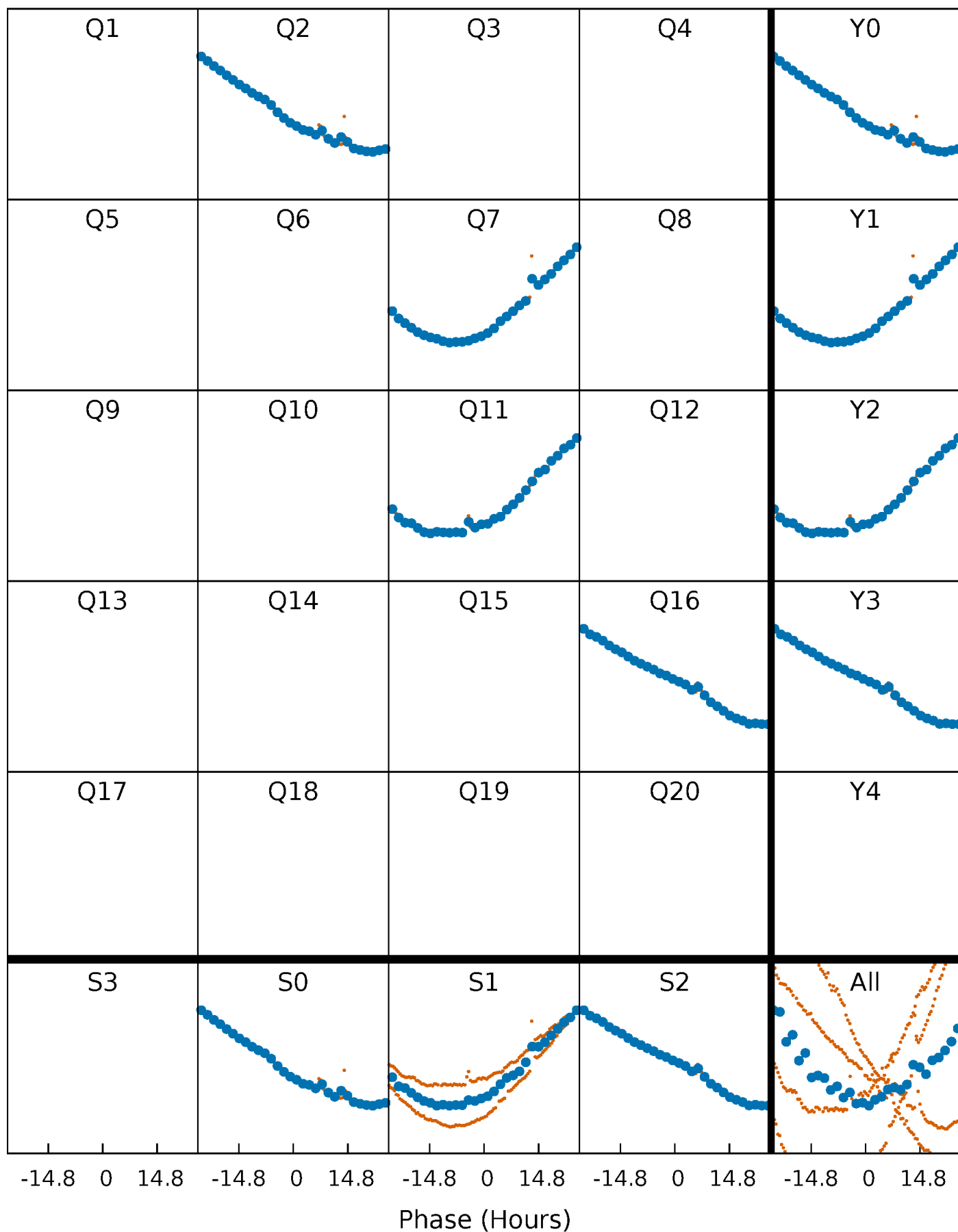


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



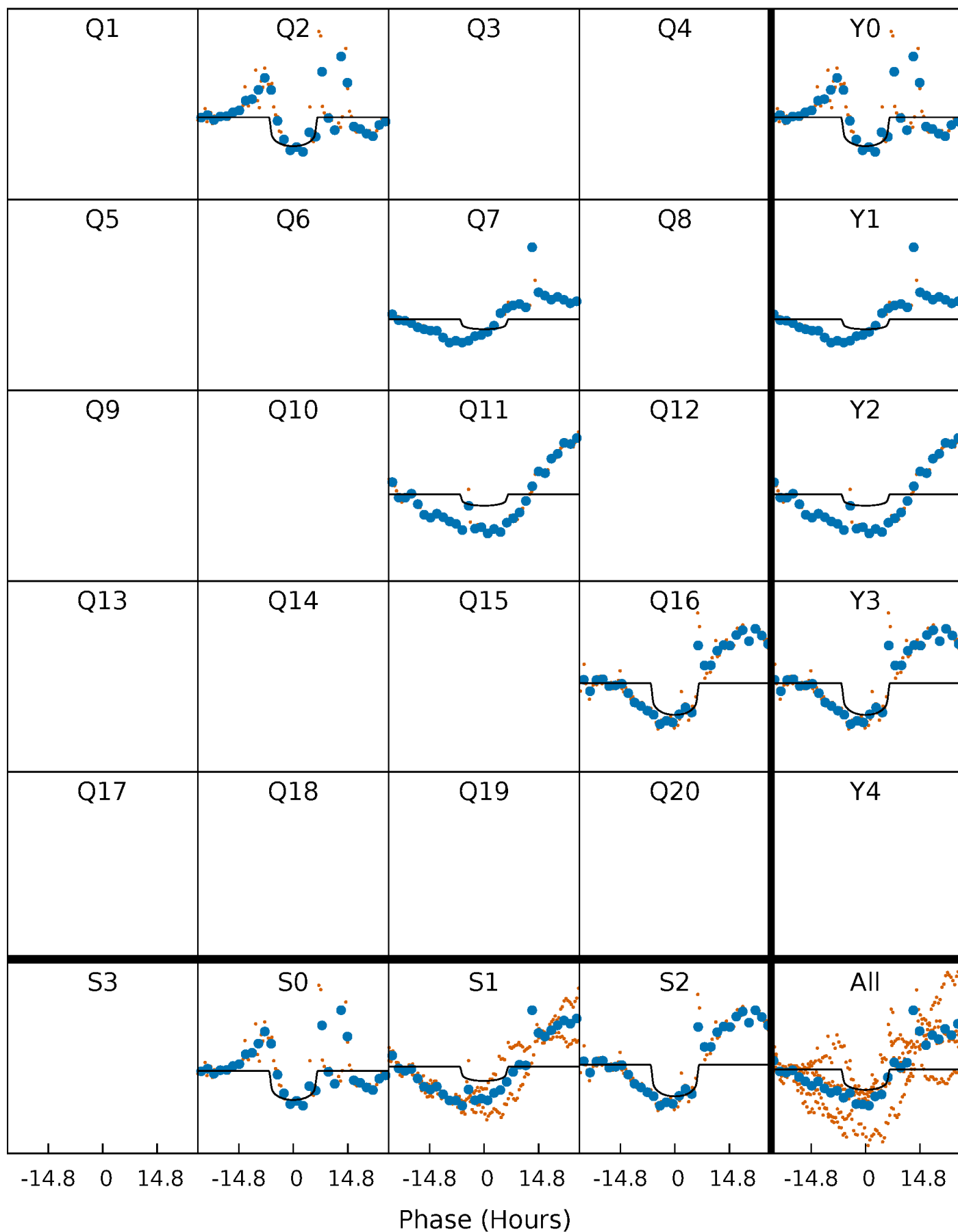
# PDC Quarter-Phased Transit Curves

TCE 004352328-04 P=451.761487 Days  $T_0=187.600777$  (BKJD)



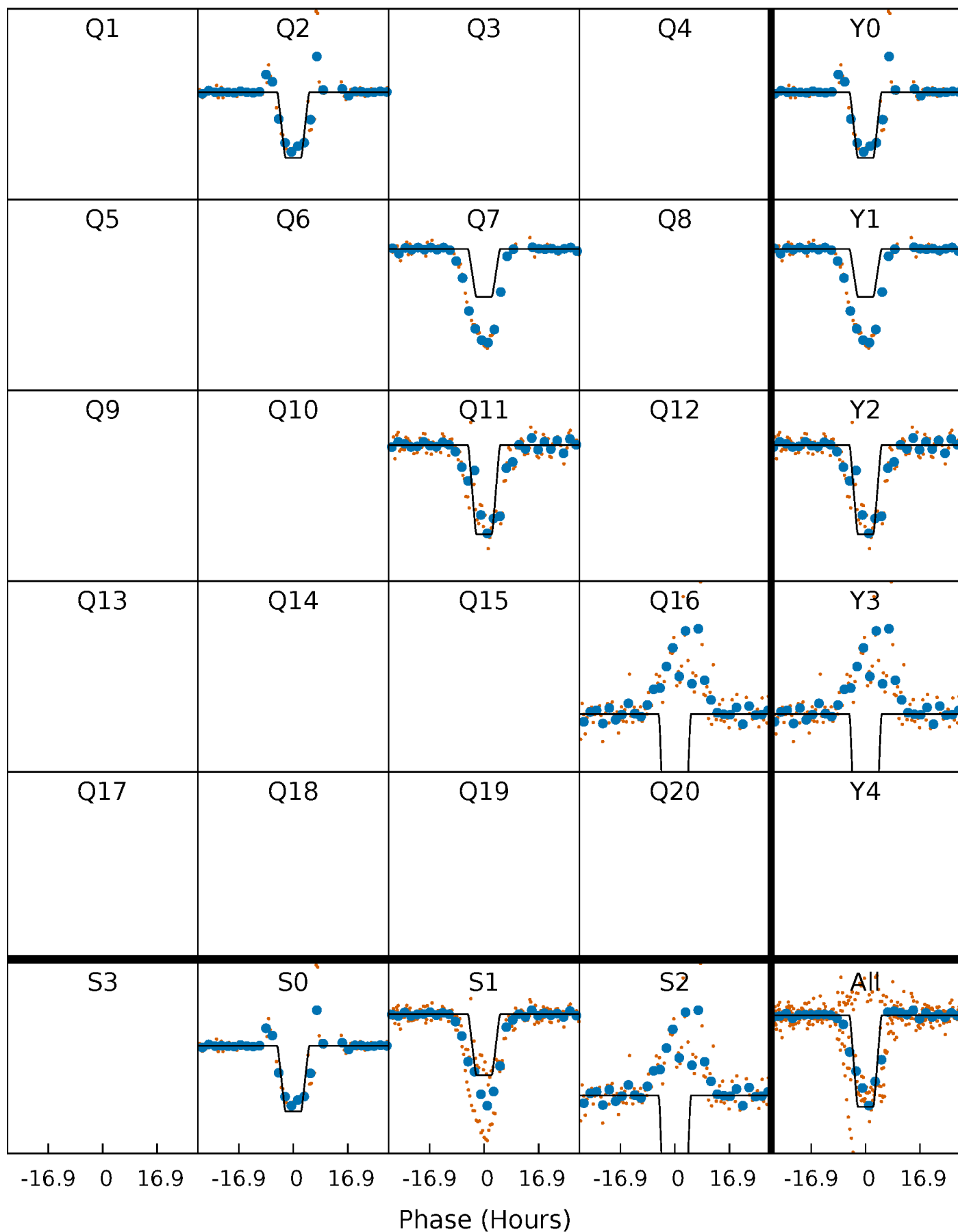
# DV Quarter-Phased Transit Curves

TCE 004352328-04 P=451.761487 Days  $T_0=187.600777$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

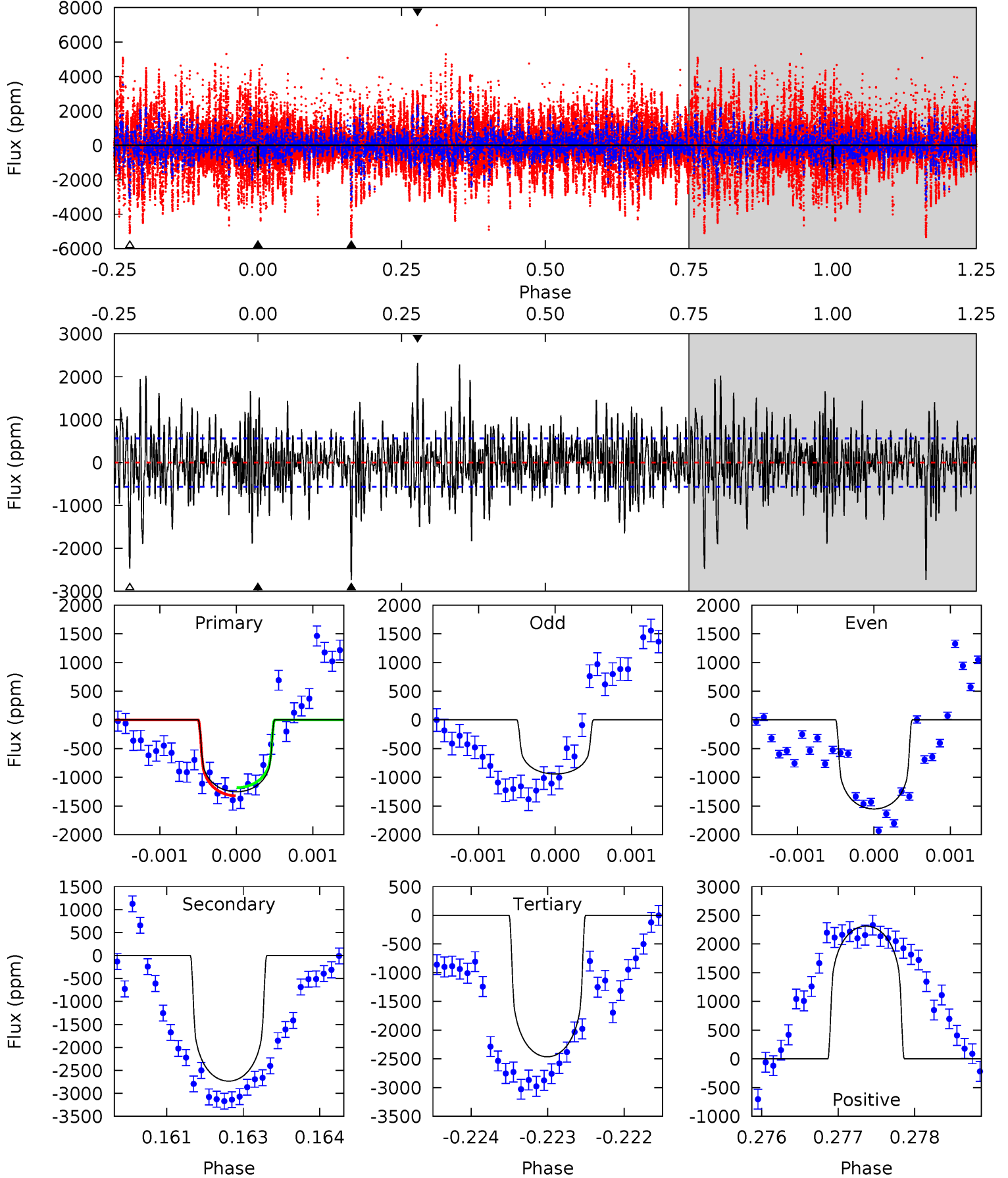
TCE 004352328-04 P=451.751956 Days  $T_0=187.596323$  (BKJD)



# DV Model-Shift Uniqueness Test

004352328-04, P = 451.761487 Days, E = 187.600777 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.0 | 26.3 | 23.7 | 22.2 | 5.41            | 3.23            | 5.45             | -11.6   | -10.2   | 2.60    | 4.05    | 2.61    | 1.31 | 0.46  | 0.69 |

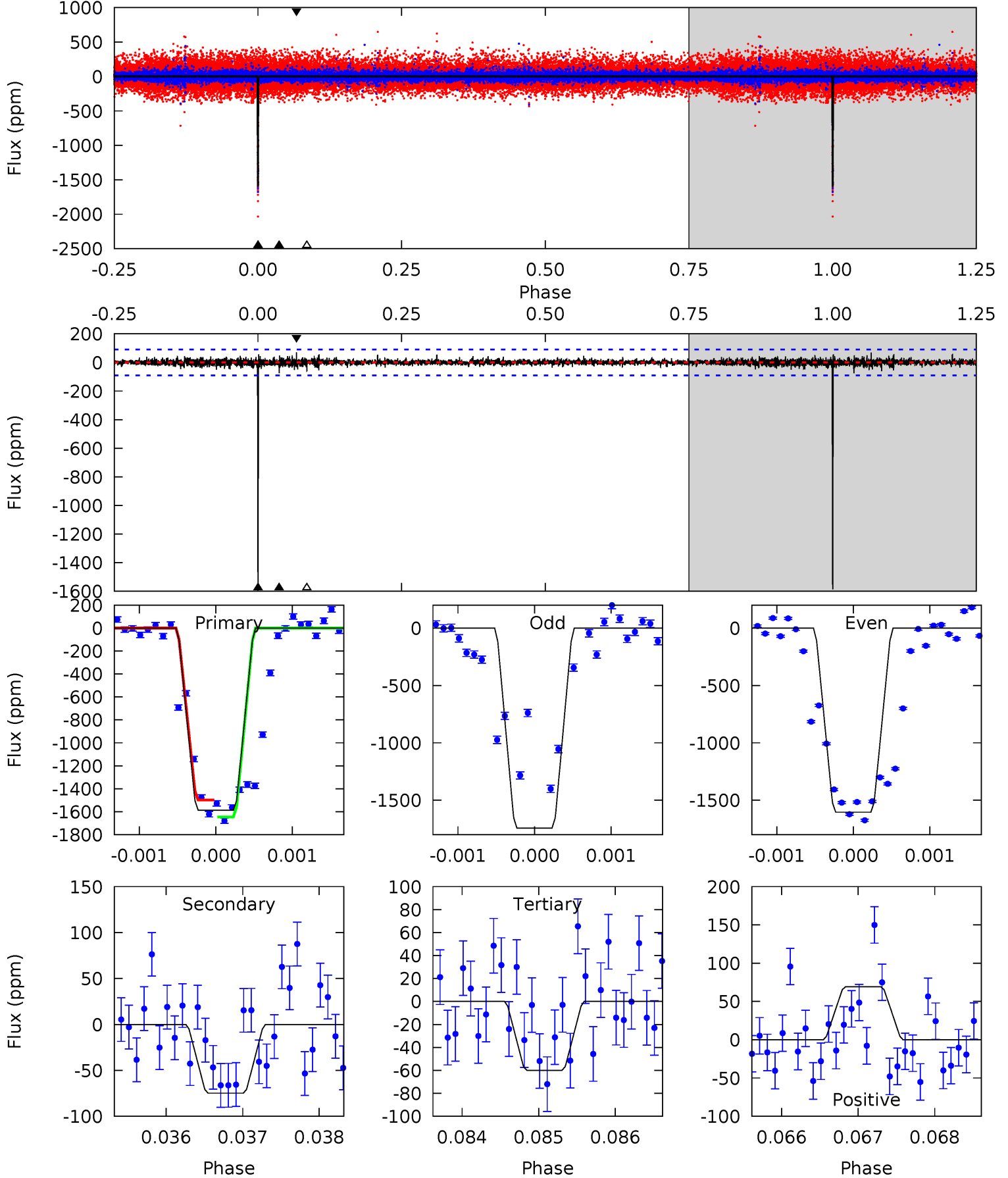




# Alt Model-Shift Uniqueness Test

004352328-04, P = 451.751956 Days, E = 187.596323 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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 95.8 | 4.52 | 3.62 | 4.18 | 5.47            | 3.32            | 0.65             | 92.2    | 91.7    | 0.90    | 0.34    | 5.36    | 0.98 | 0.04  | 4.41 |



### Stellar Parameters For KIC 004352328

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5332^{+159}_{-159}$ | $4.601^{+0.065}_{-0.058}$ | $-0.760^{+0.300}_{-0.300}$ | $0.680^{+0.072}_{-0.057}$ | $0.673^{+0.071}_{-0.033}$ | $3.013^{+0.789}_{-0.626}$                     |
|        | +3%/-3%              | +1%/-1%                   | +39%/-39%                  | +11%/-8%                  | +11%/-5%                  | +26%/-21%                                     |
| 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 004352328-04 / KOI

| Detrend | Depth (ppm)     | $R_p$ ( $R_{\oplus}$ ) | $T_{\text{max}}$ (K) | $T_{\text{obs}}$ (K)  | $A_{\text{obs}}$             |
|---------|-----------------|------------------------|----------------------|-----------------------|------------------------------|
| DV      | $-2734 \pm 104$ | $1.95^{+0.49}_{-0.45}$ | $269^{+10}_{-10}$    | $7575^{+1349}_{-853}$ | $410751^{+283015}_{-147121}$ |
| Alt.    | $-75 \pm 17$    | $3.14^{+0.47}_{-0.46}$ | $269^{+10}_{-9}$     | $3047^{+171}_{-172}$  | $4283^{+2089}_{-1326}$       |

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

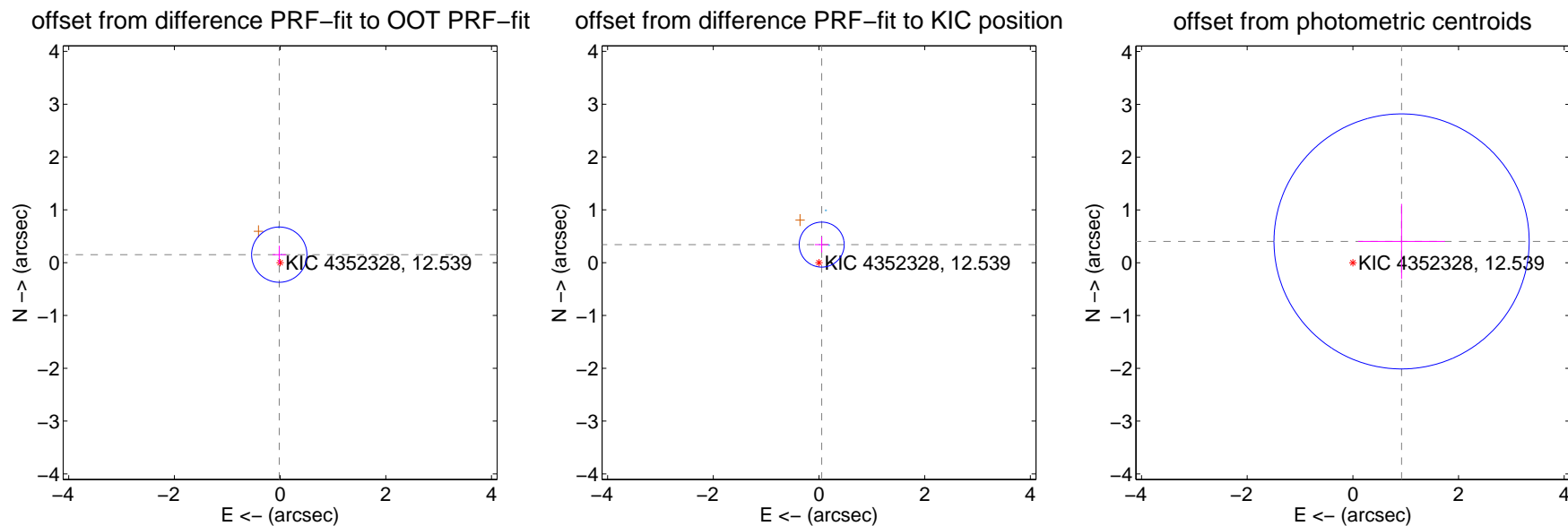
## DV Centroid Data

Supplemental centroid analysis for 004352328-04. Kepler magnitude: 12.54. Transit SNR 6.37

There are 3 quarters with good PRF difference image offsets

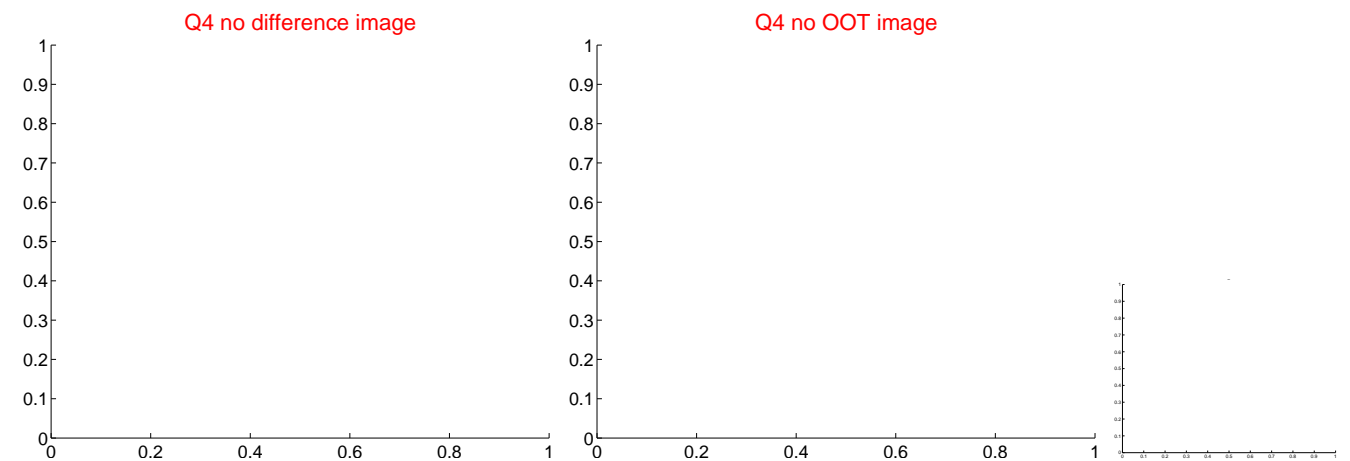
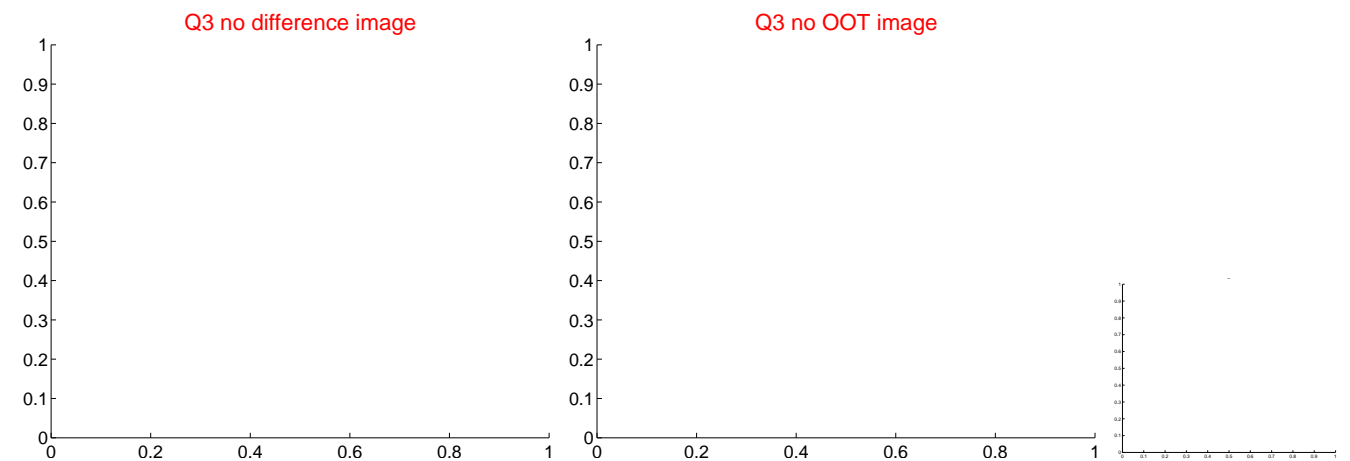
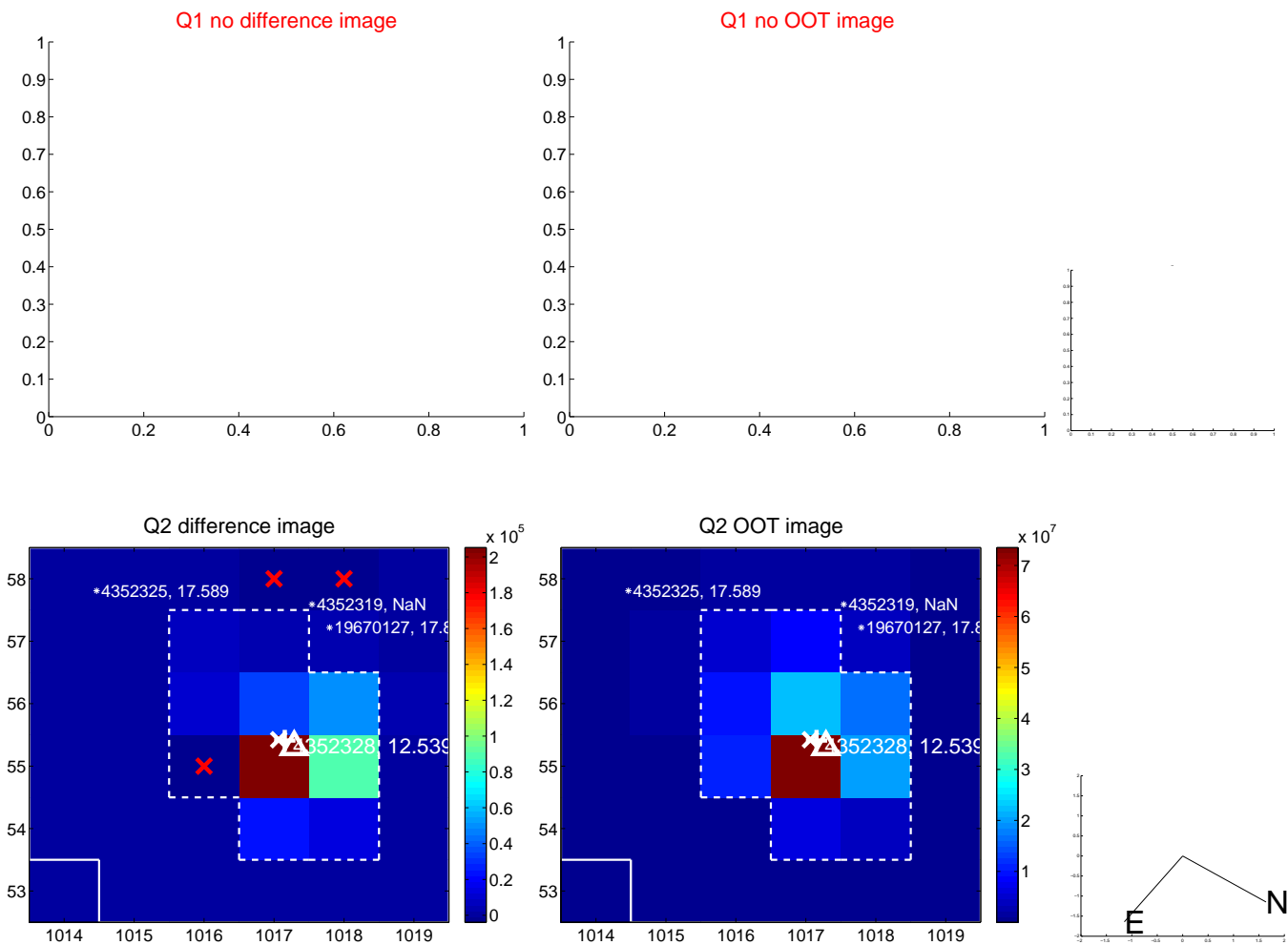
The direct PRF centroid is offset from the target star catalog position by about 0.22 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $0.152 \pm 0.174$  | 0.87                | $0.016 \pm 0.125$  | $0.151 \pm 0.169$ |
| PRF-fit source offset from KIC position | $0.345 \pm 0.142$  | 2.43                | $-0.052 \pm 0.129$ | $0.341 \pm 0.150$ |
| photometric centroid source offset      | $1.01 \pm 0.81$    | 1.25                | $-0.92 \pm 0.82$   | $0.40 \pm 0.71$   |

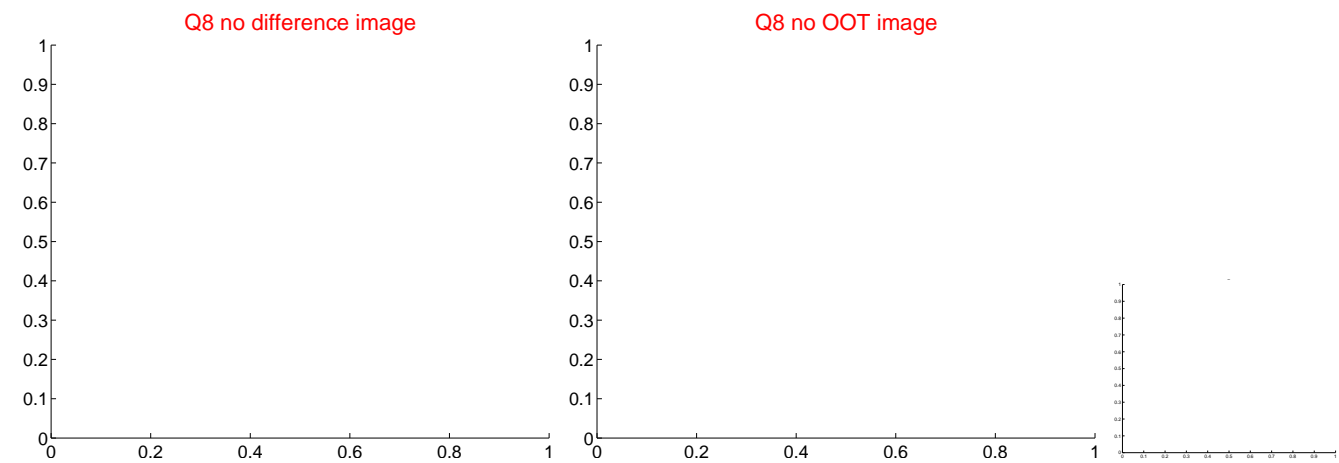
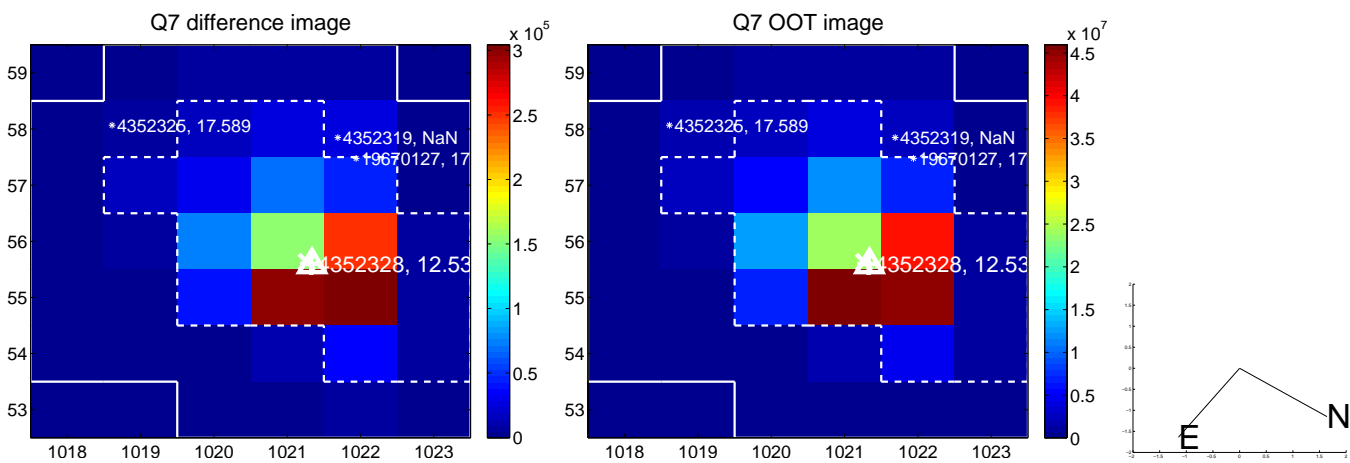
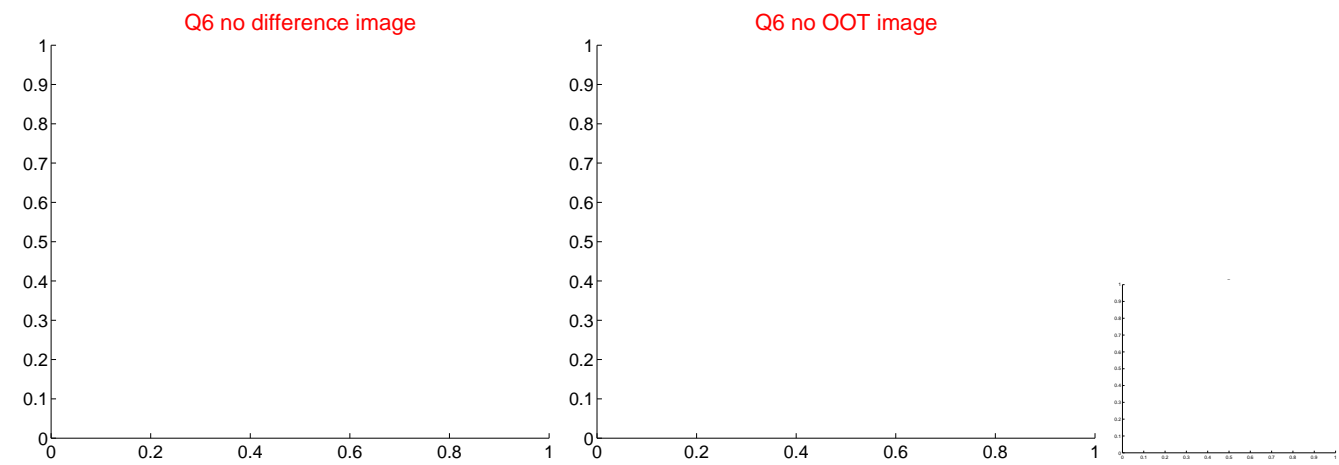
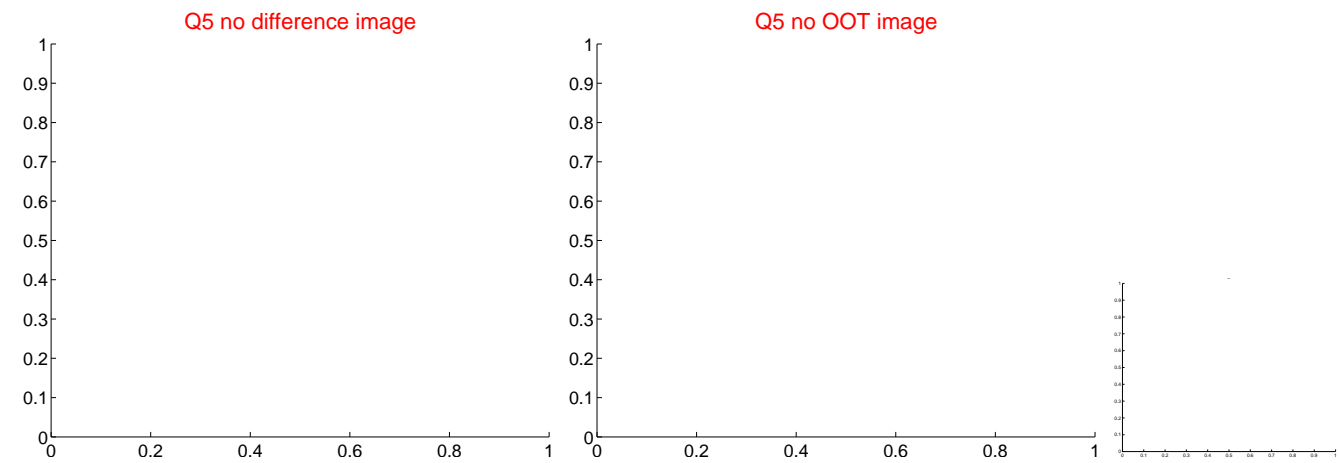


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

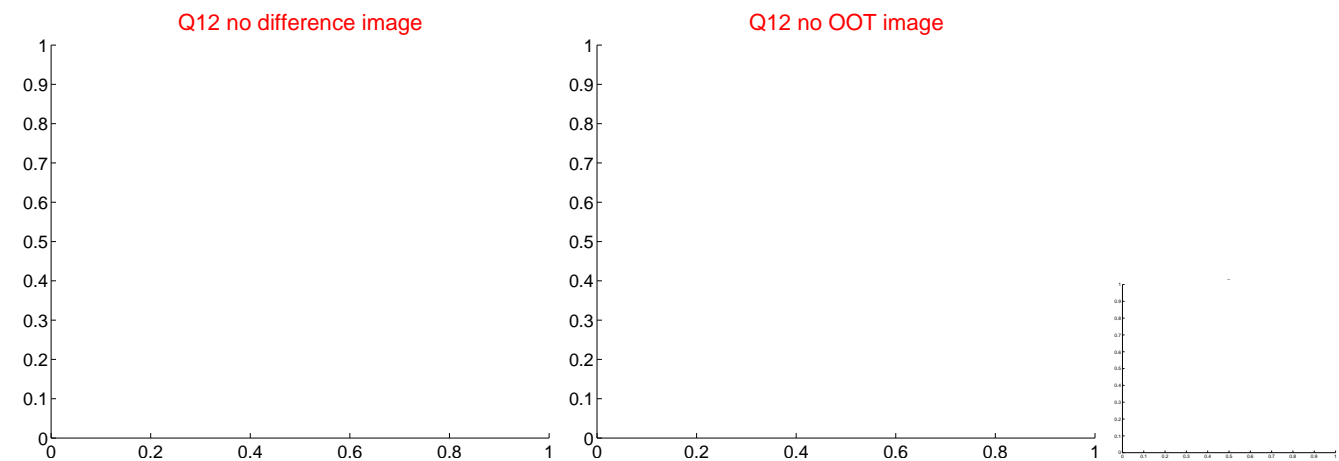
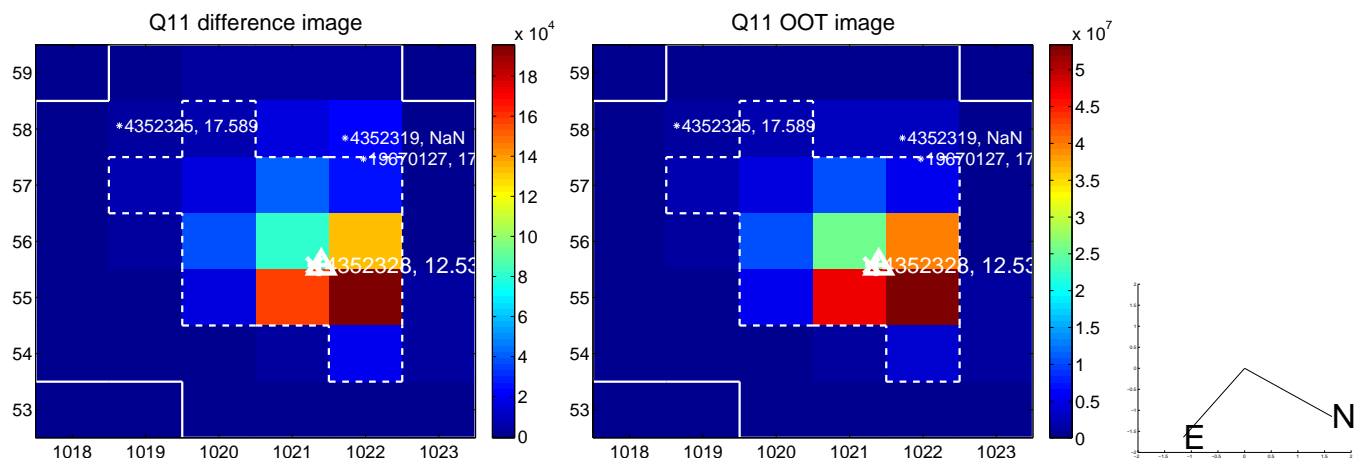
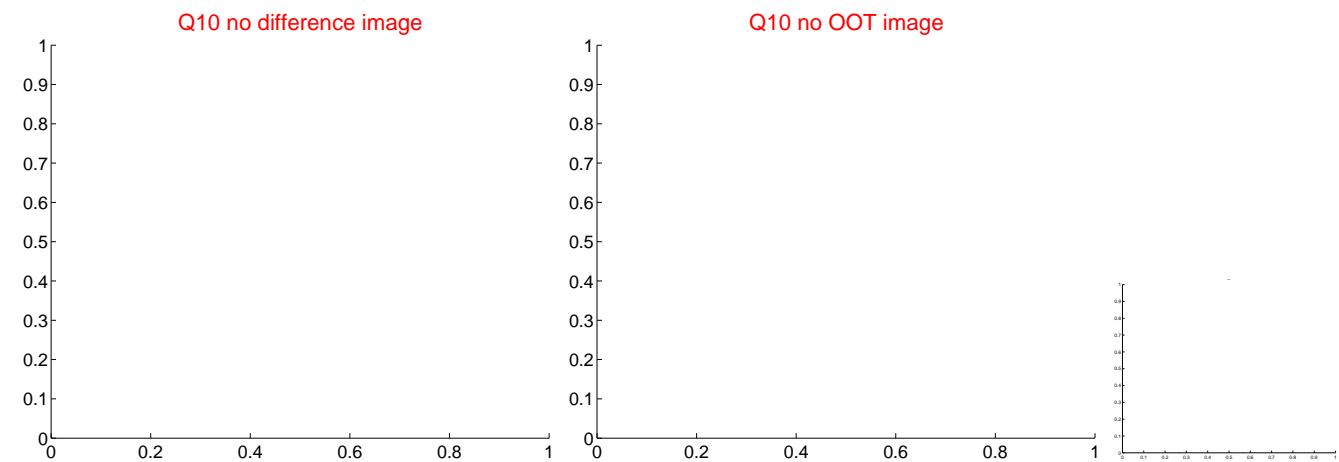
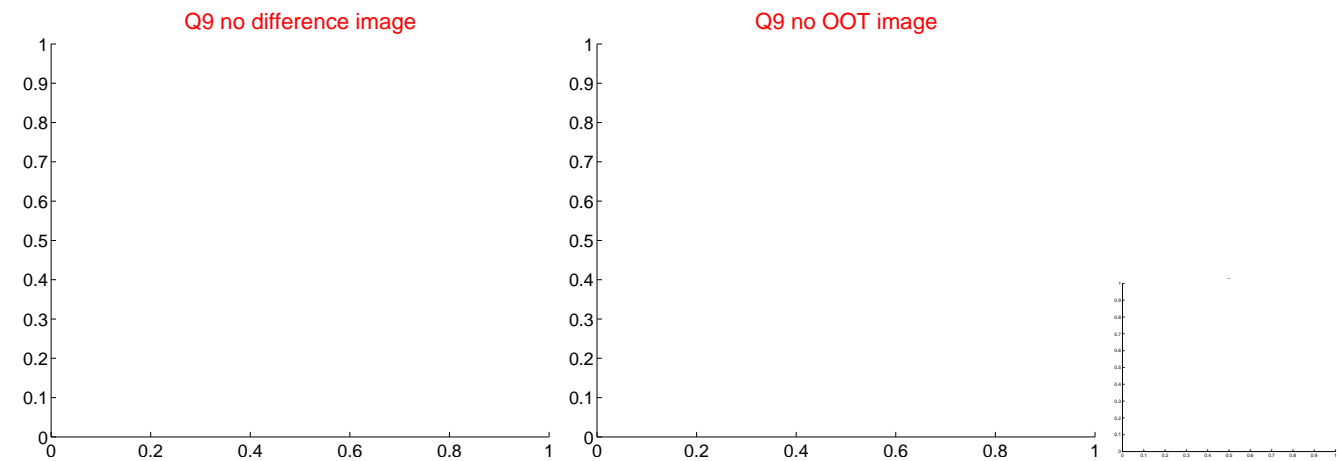
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



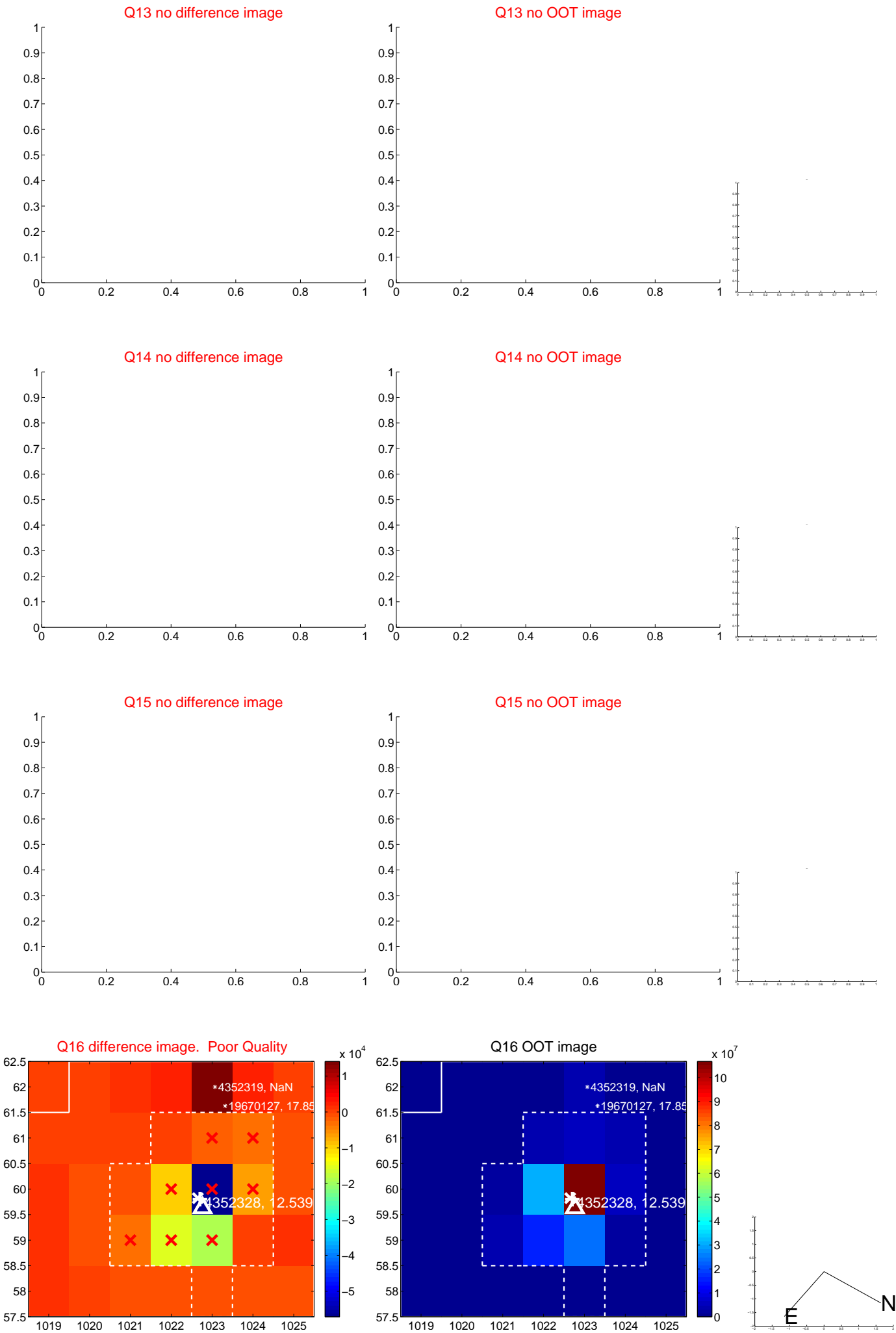
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



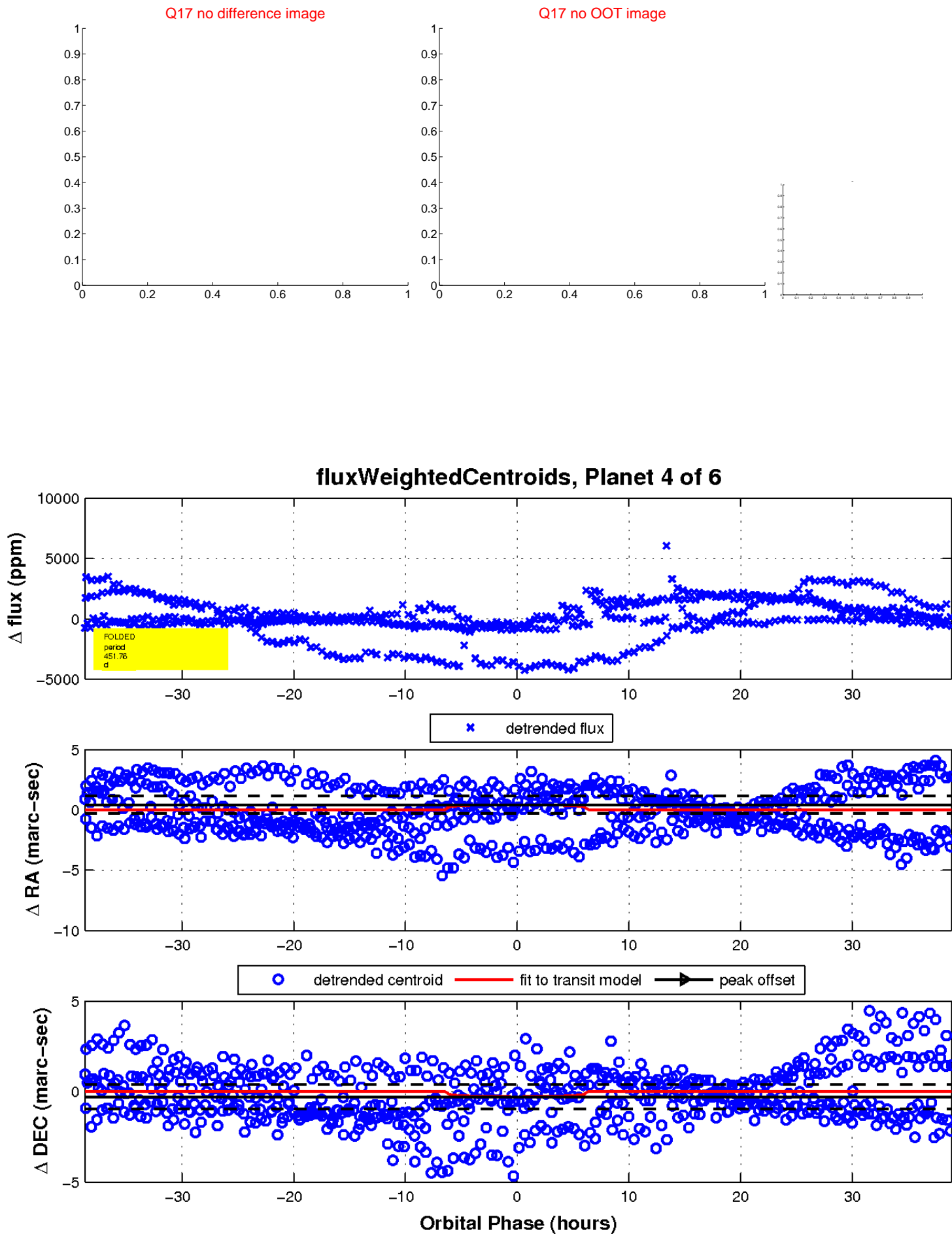
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



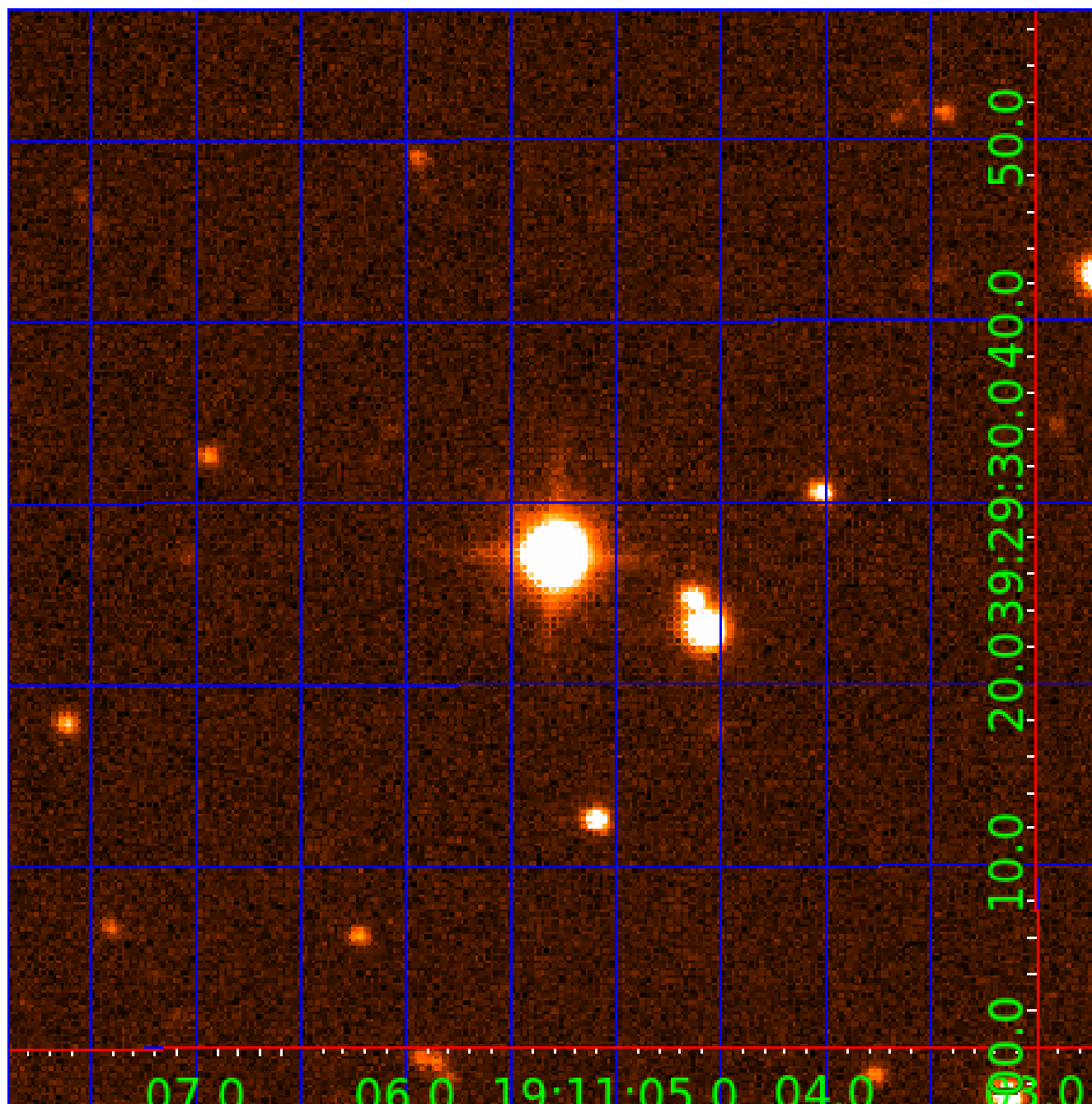
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 004352328

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004352328-01 | OBS      | No   | 542.839585    | 294.326853   | 839.3       | 3.250            | 13.9 | 9.8  | 0.68                        | 5332            | 2.12                   | 0.26                   |
| 004352328-02 | OBS      | No   | 400.610780    | 181.734216   | 505.4       | 3.468            | 15.3 | 6.9  | 0.68                        | 5332            | 1.71                   | 0.39                   |
| 004352328-04 | OBS      | No   | 451.761487    | 187.600777   | 764.2       | 12.967           | 15.7 | 6.4  | 0.68                        | 5332            | 1.95                   | 0.33                   |
| 004352328-05 | OBS      | No   | 417.771793    | 497.001898   | 510.6       | 5.093            | 13.2 | 6.5  | 0.68                        | 5332            | 1.63                   | 0.36                   |
| 004352328-06 | OBS      | No   | 449.245439    | 491.523076   | 320.1       | 4.500            | 12.5 | -1.0 | 0.68                        | 5332            | 1.20                   | 0.33                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004352328-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS   |
| 004352328-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_KIC_POS |
| 004352328-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS                              |
| 004352328-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS       |
| 004352328-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS          |

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

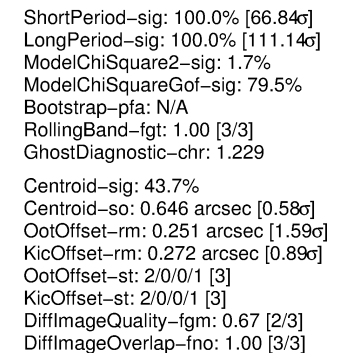
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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.

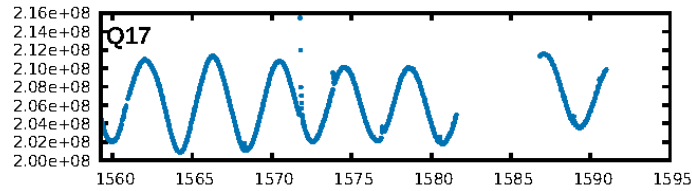
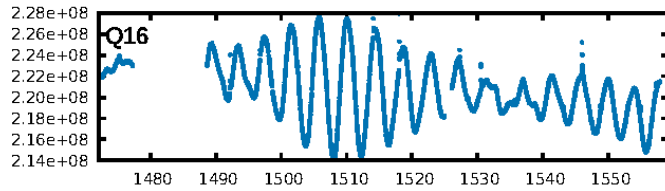
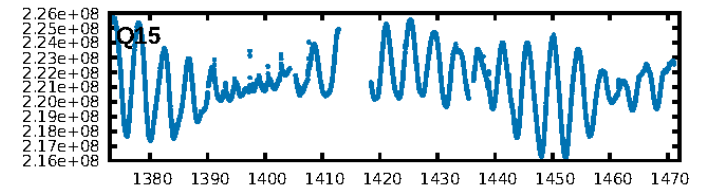
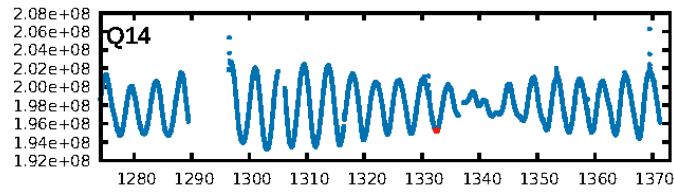
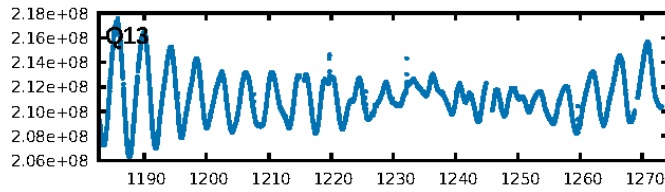
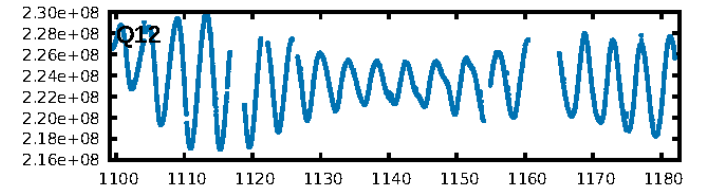
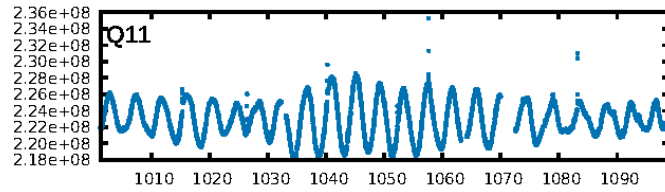
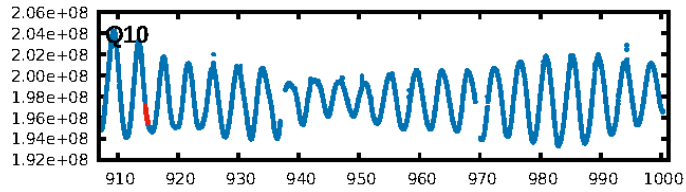
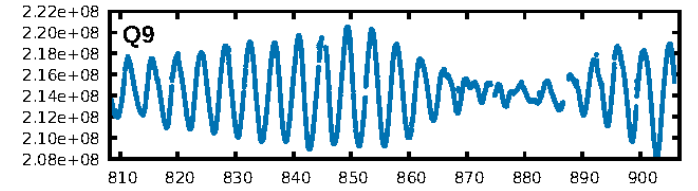
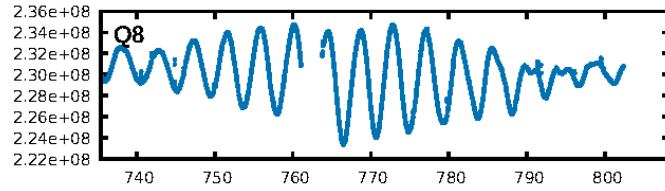
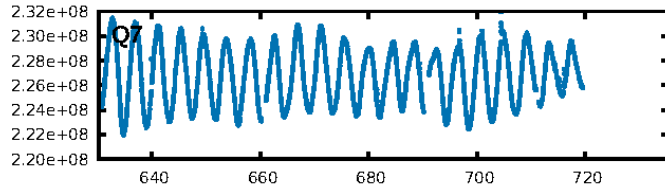
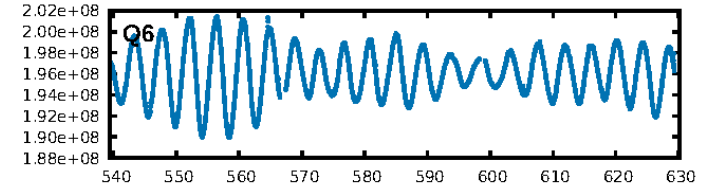
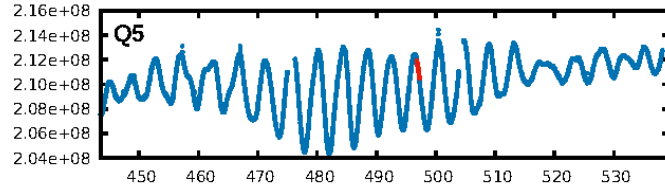
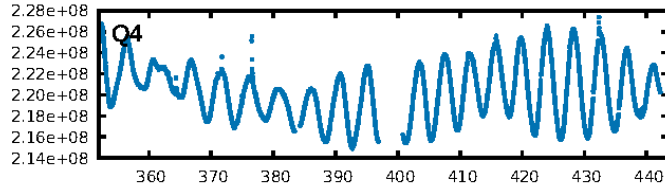
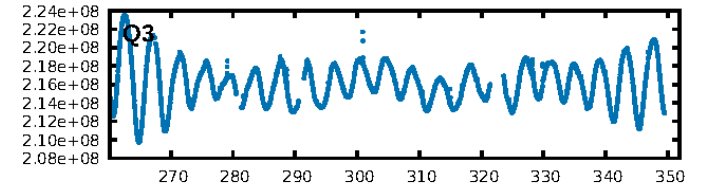
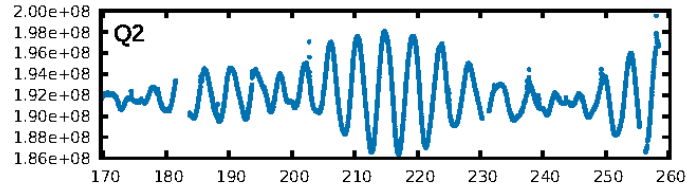
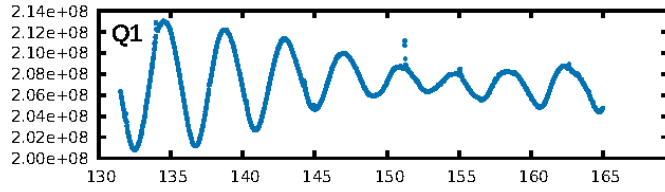
Ephemeris Match Information For 004352328-05

No Significant Match Found

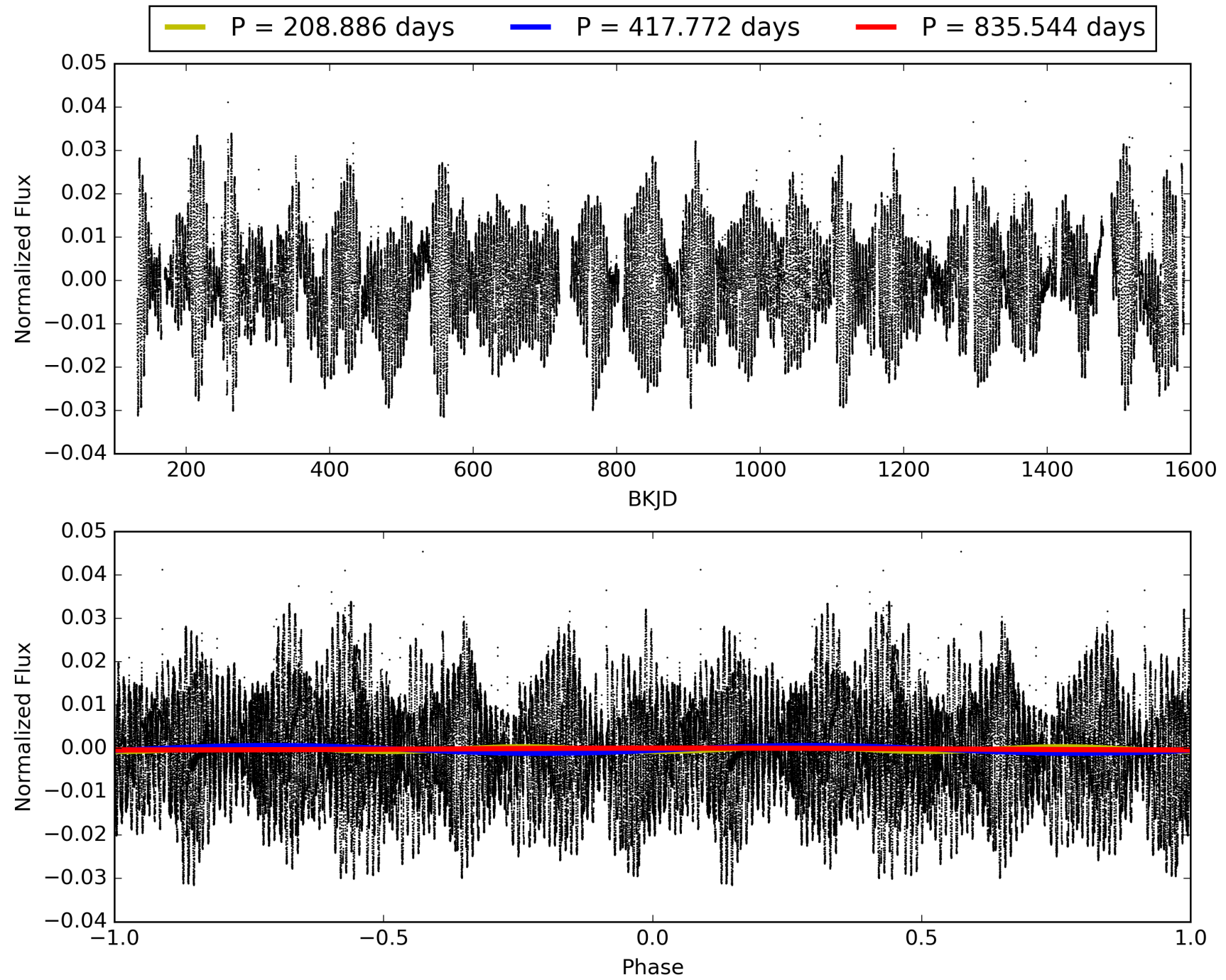
## KIC: 4352328    Candidate: 5 of 6    Period: 417.772 d



# TCE 004352328-05, PDC Light Curves

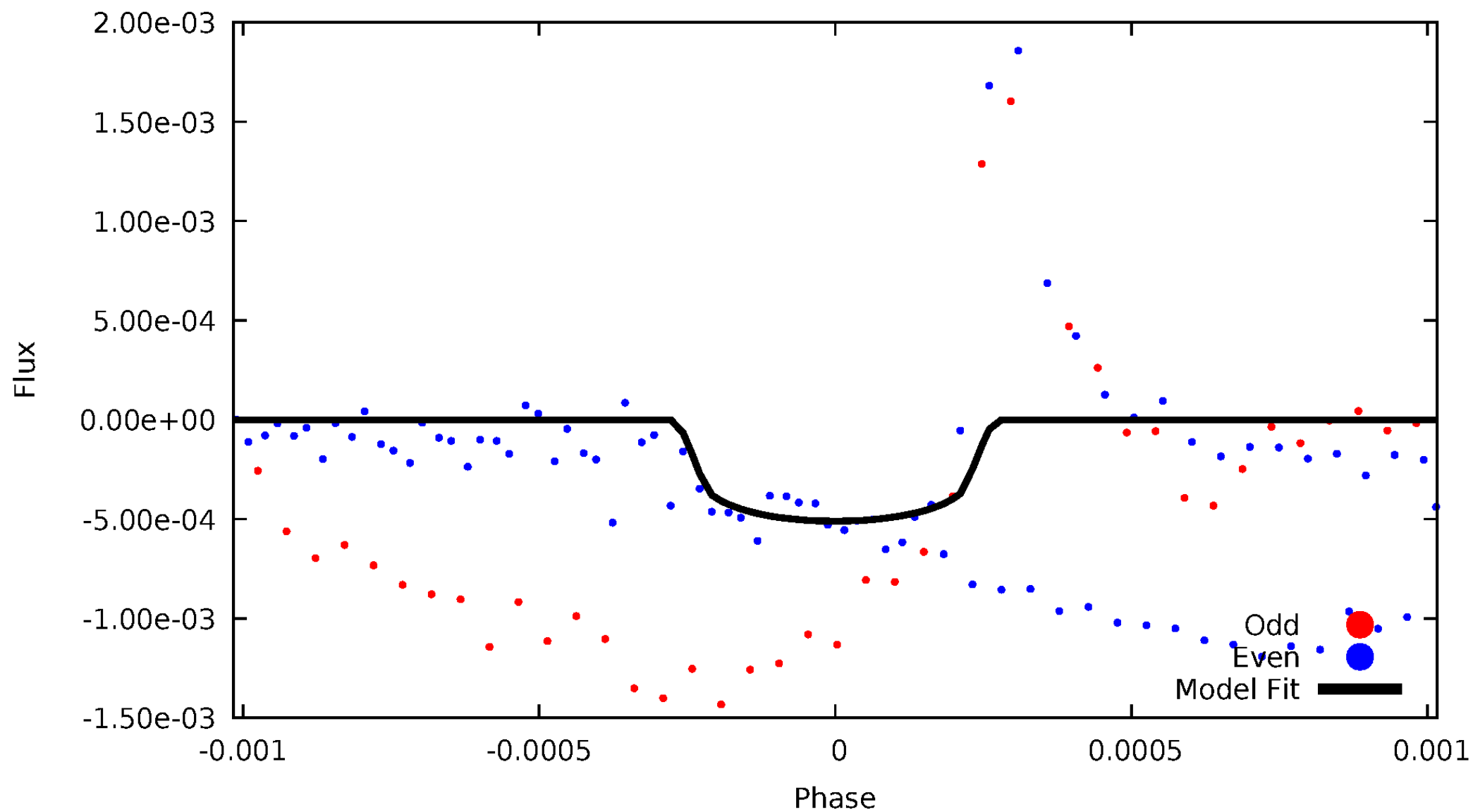


TCE 004352328-05



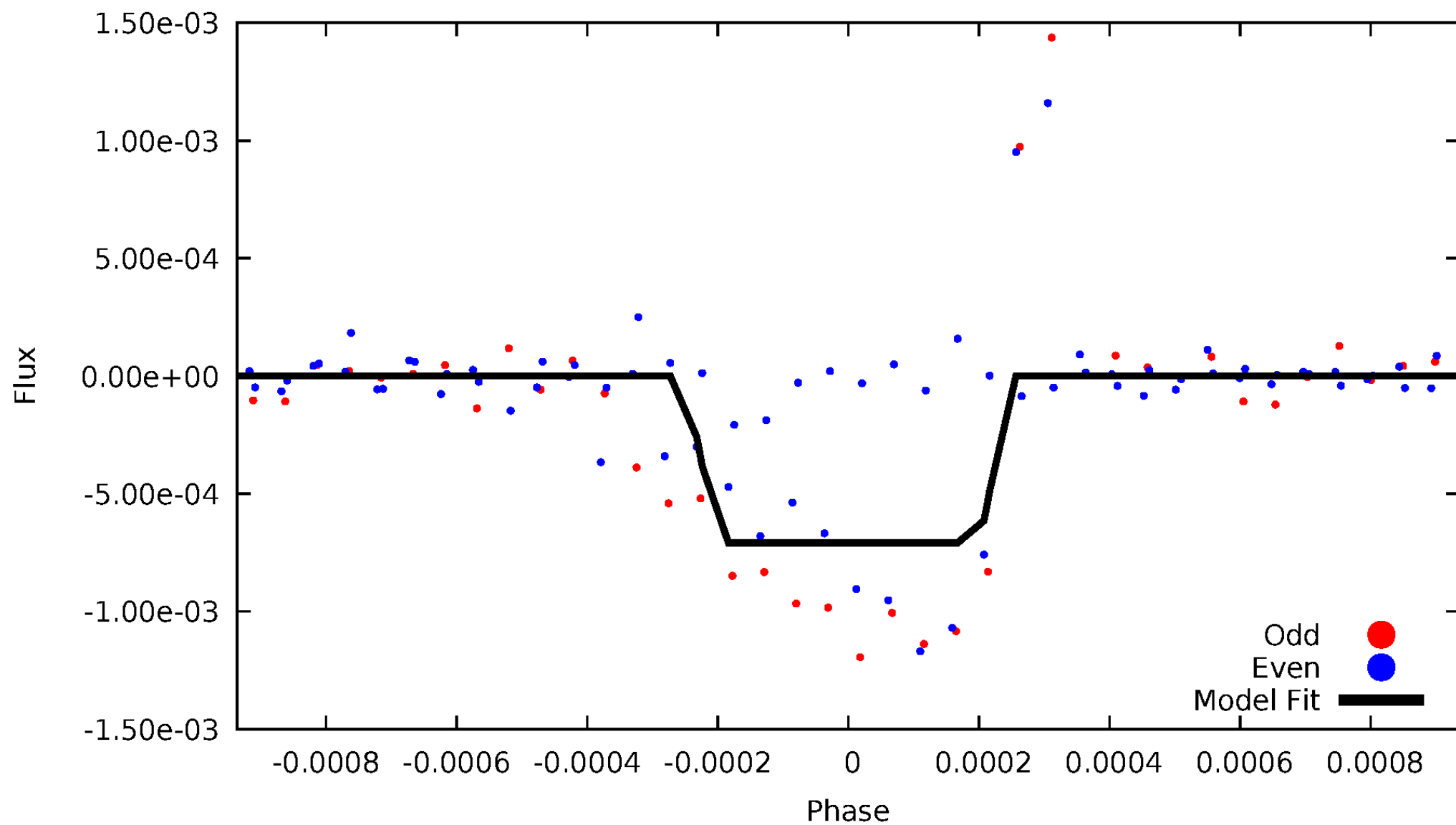
# DV Odd/Even

TCE 004352328-05



# ALT Odd/Even

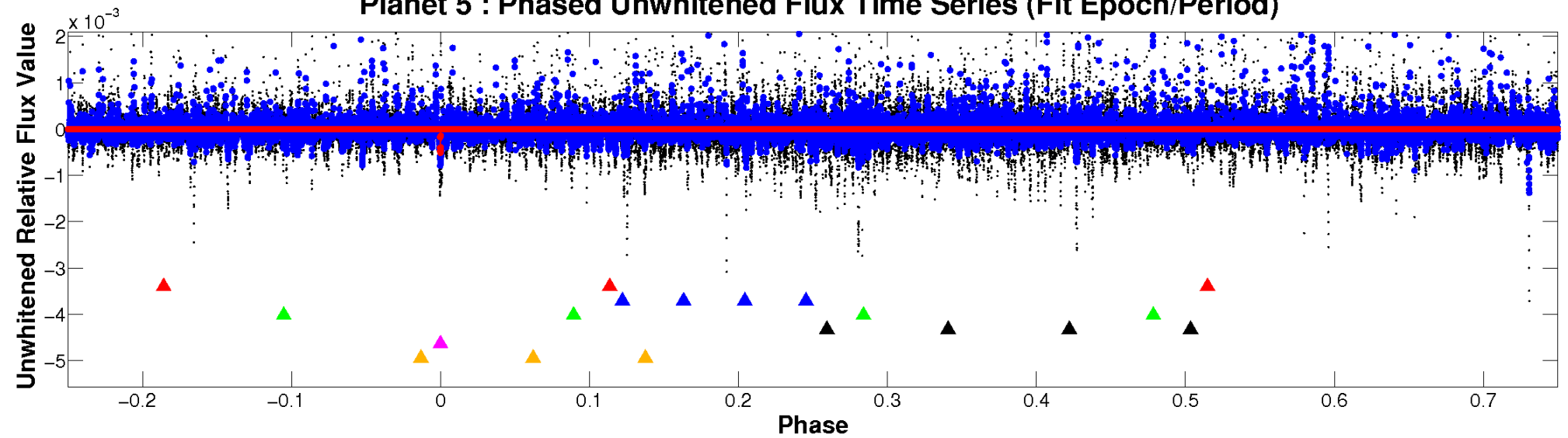
TCE 004352328-05



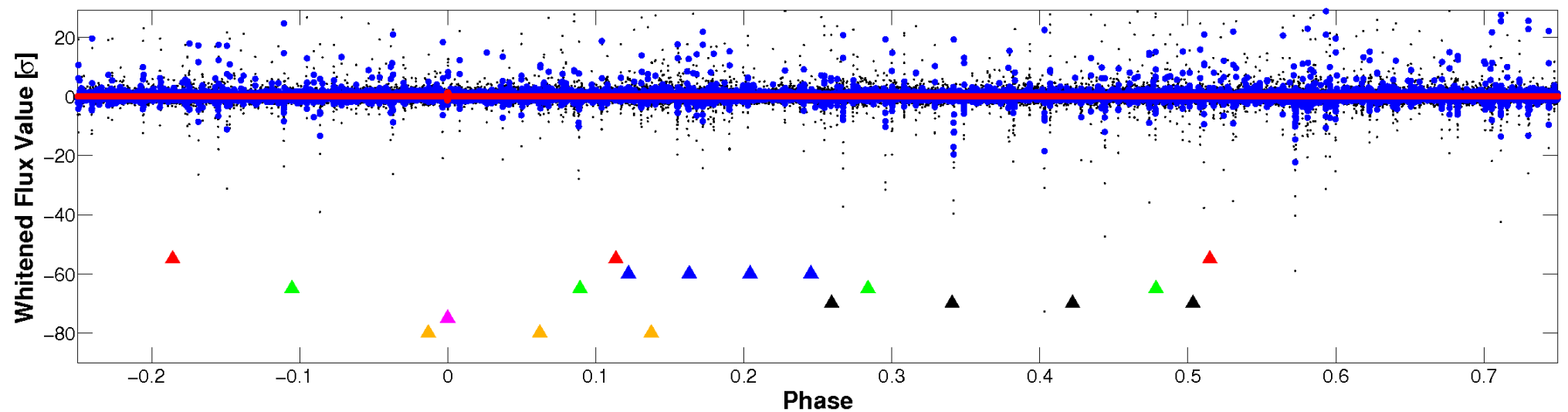


# Non-Whitened Vs. Whitened Light Curve

Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



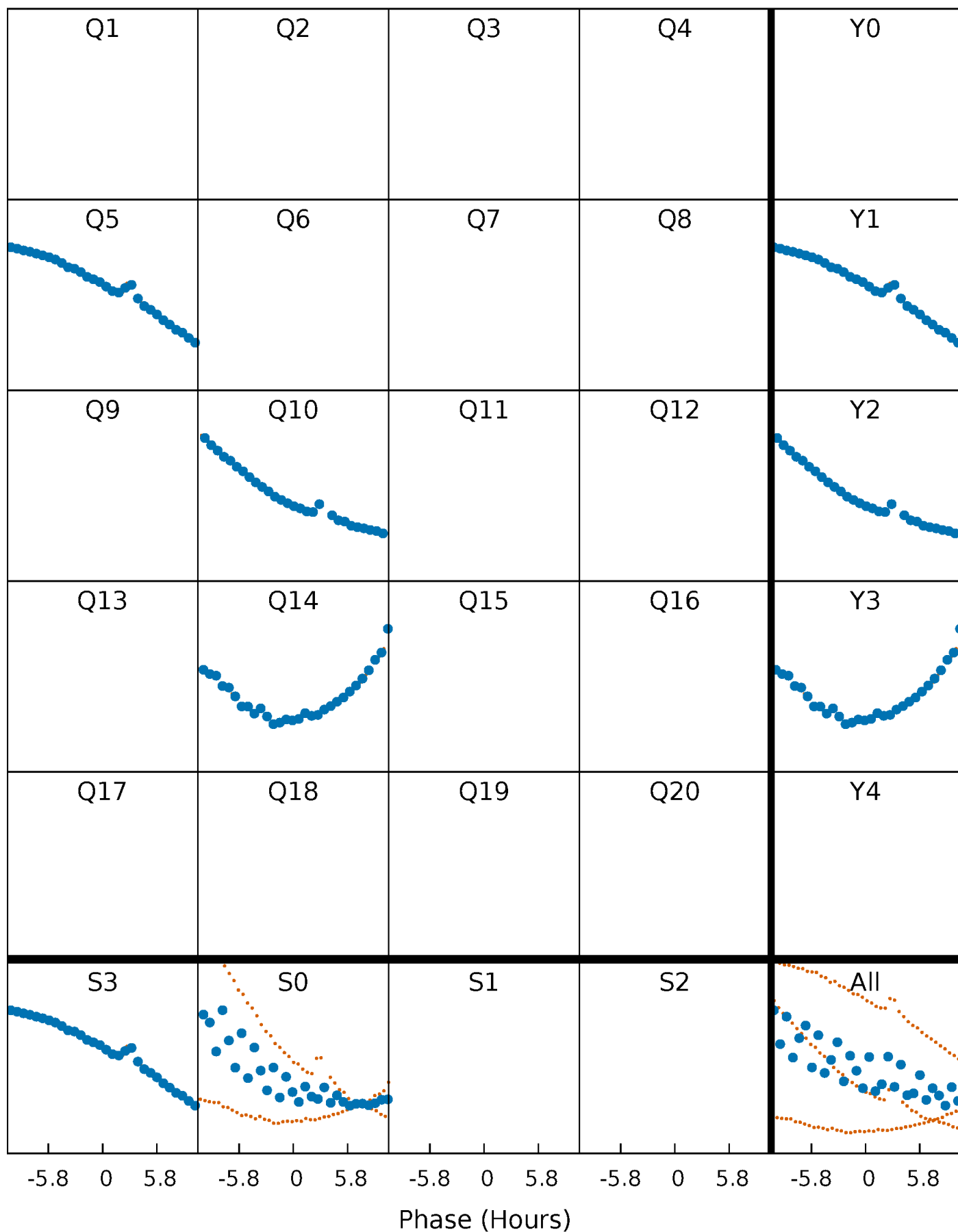
Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)





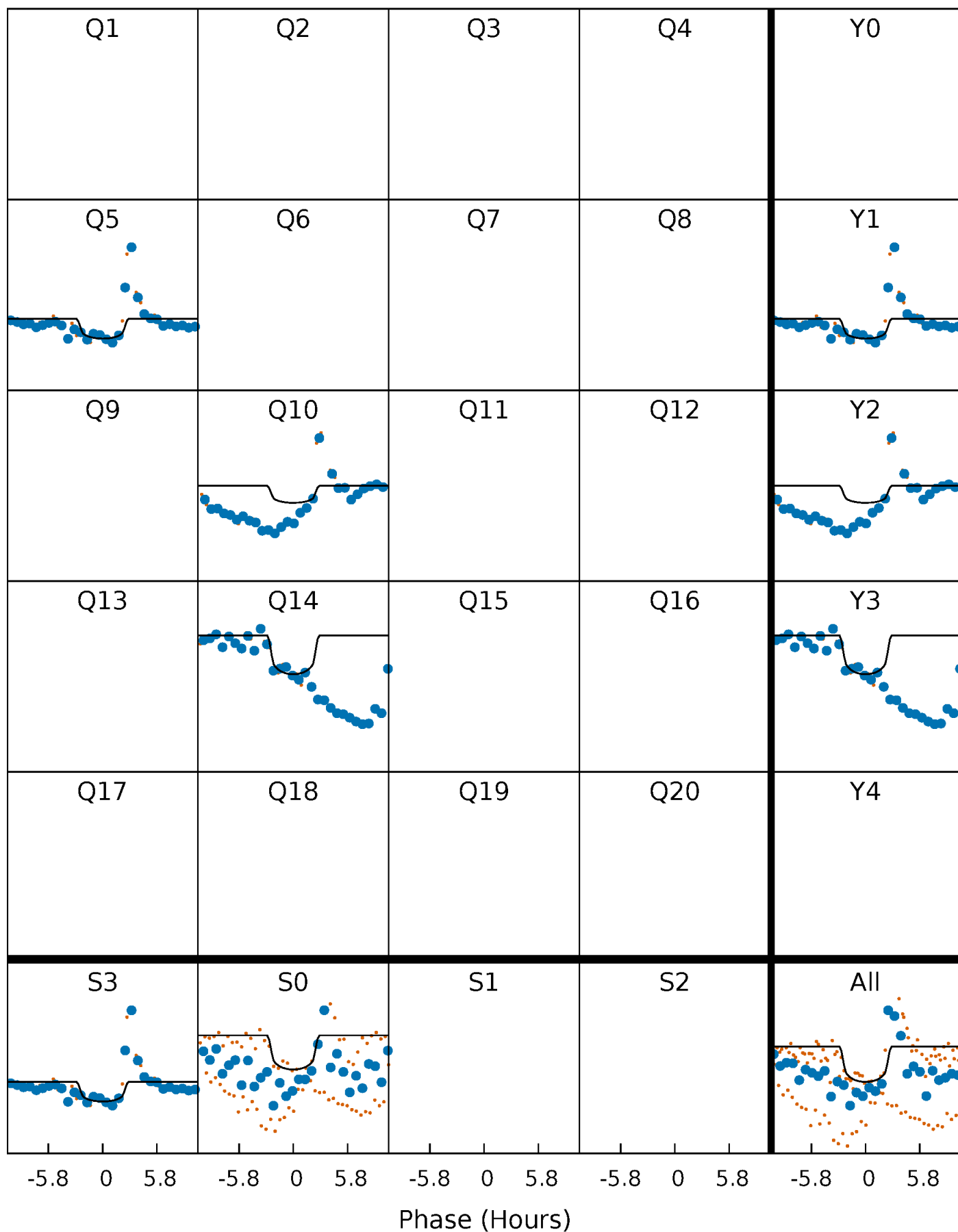
# PDC Quarter-Phased Transit Curves

TCE 004352328-05     $P=417.771793$  Days     $T_0=497.001898$  (BKJD)



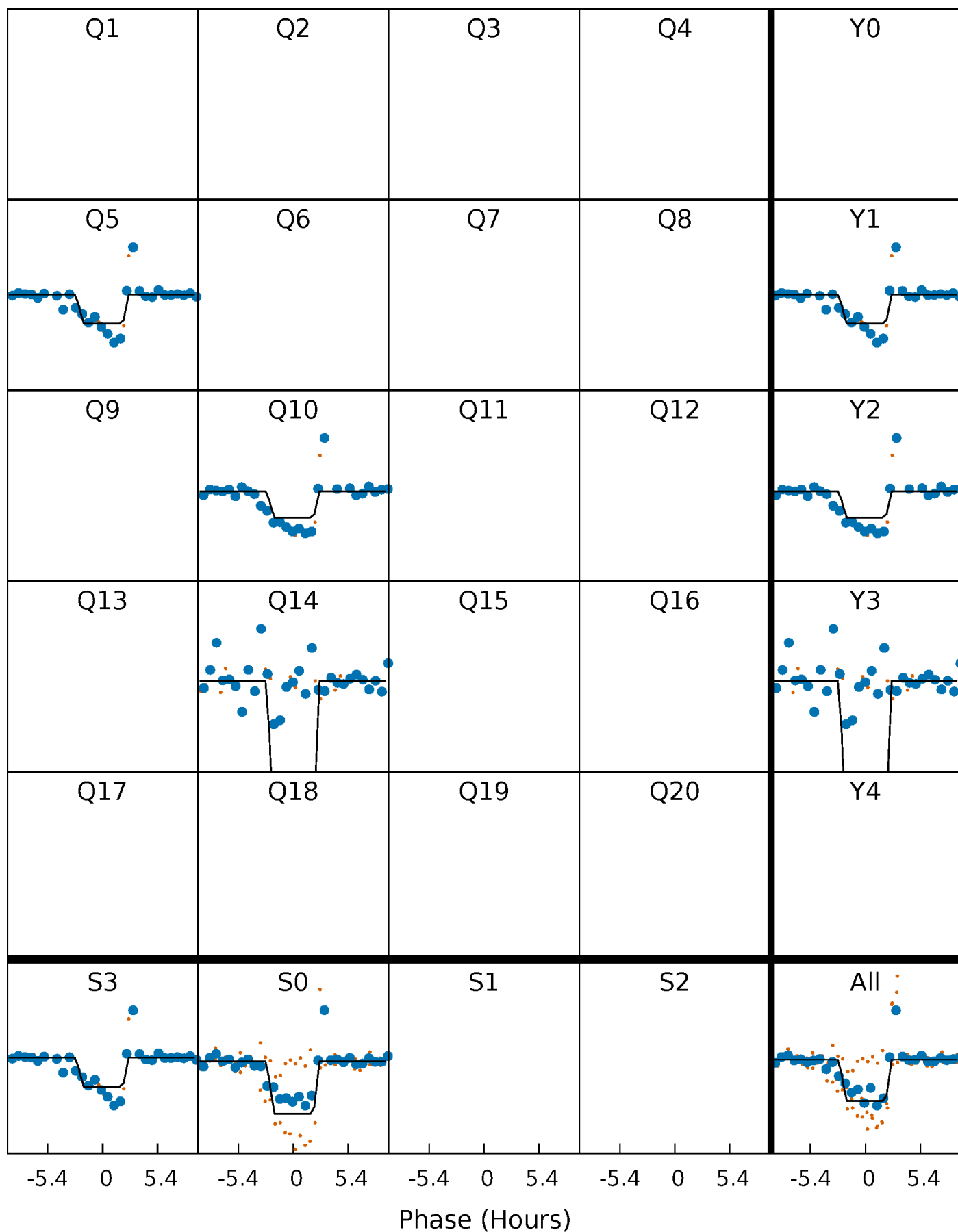
# DV Quarter-Phased Transit Curves

TCE 004352328-05     $P=417.771793$  Days     $T_0=497.001898$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

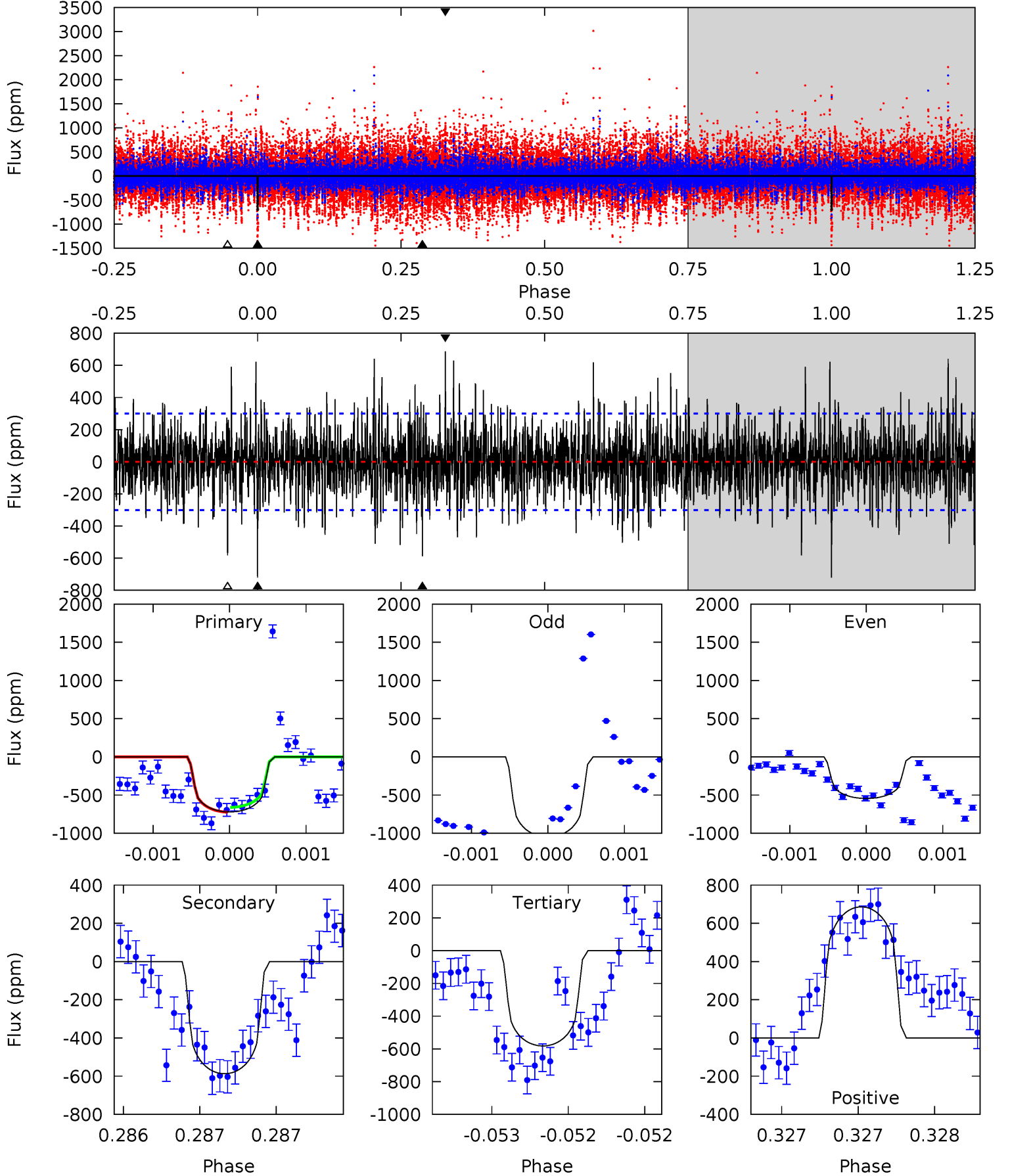
TCE 004352328-05     $P=417.764134$  Days     $T_0=497.003255$  (BKJD)



# DV Model-Shift Uniqueness Test

004352328-05, P = 417.771793 Days, E = 79.230105 Days

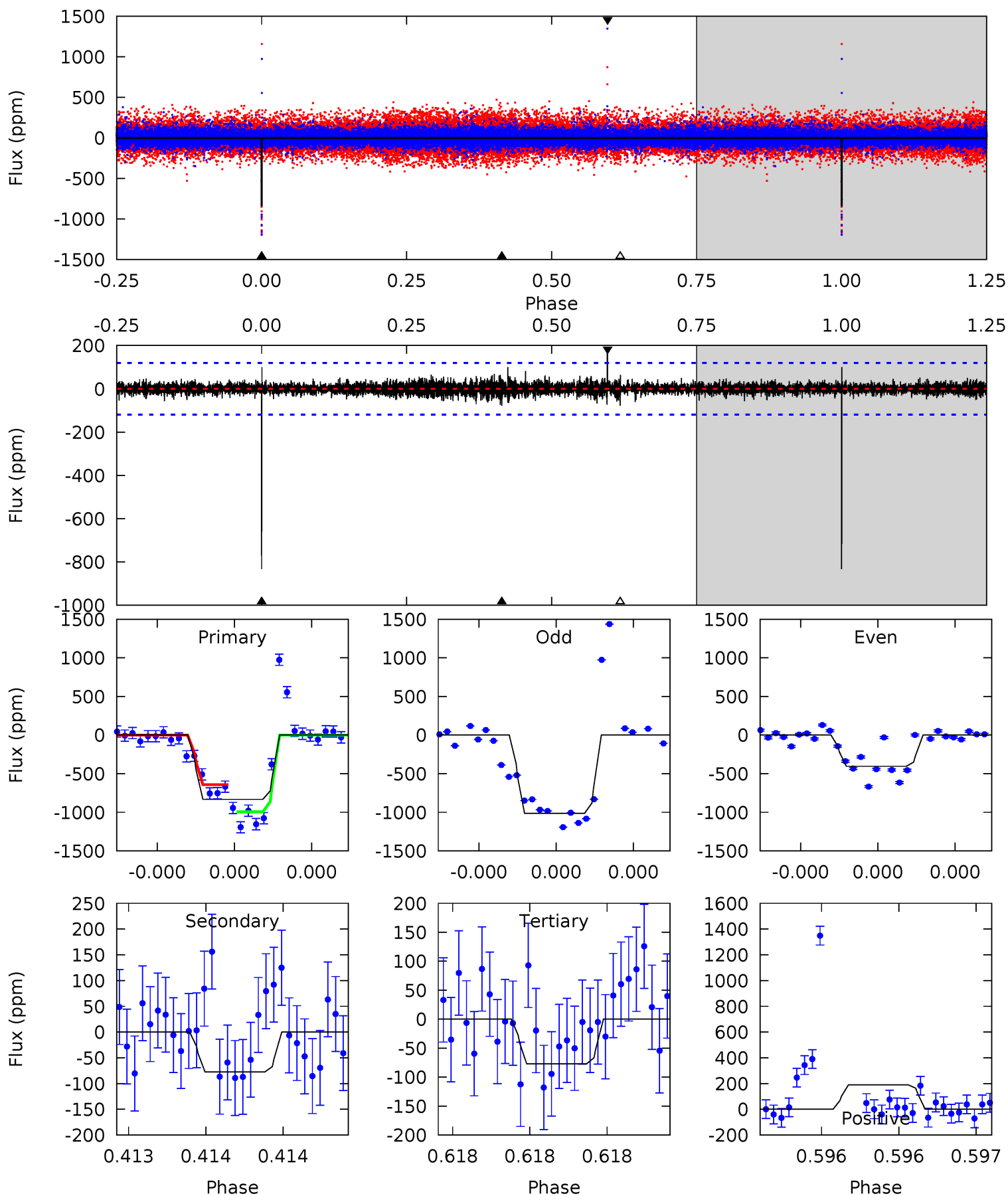
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 13.4 | 10.9 | 10.8 | 12.7 | 5.57            | 3.48            | 2.64             | 2.58    | 0.64    | 0.10    | -1.84   | 3.30    | 1.20 | 0.49  | 0.59 |



# Alt Model-Shift Uniqueness Test

004352328-05, P = 417.764134 Days, E = 79.239121 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 |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 38.9 | 3.61 | 3.60 | 8.85 | 5.59            | 3.51            | 0.72             | 35.3    | 30.1    | 0.01    | -5.24   | 14.5    | 0.76 | 0.19  | 0   |



### Stellar Parameters For KIC 004352328

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (g \cdot \text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------------------|
|        | $5332^{+159}_{-159}$ | $4.601^{+0.065}_{-0.058}$ | $-0.760^{+0.300}_{-0.300}$ | $0.680^{+0.072}_{-0.057}$ | $0.673^{+0.071}_{-0.033}$ | $3.013^{+0.789}_{-0.626}$            |
|        | +3%/-3%              | +1%/-1%                   | +39%/-39%                  | +11%/-8%                  | +11%/-5%                  | +26%/-21%                            |
| 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 004352328-05 / KOI

| Detrend | Depth (ppm)   | $R_p (R_{\oplus})$     | $T_{max} (K)$     | $T_{obs} (K)$         | $A_{obs}$                  |
|---------|---------------|------------------------|-------------------|-----------------------|----------------------------|
| DV      | $-587 \pm 54$ | $2.78^{+2.49}_{-1.97}$ | $276^{+11}_{-9}$  | $4467^{+3573}_{-906}$ | $38780^{+412521}_{-27672}$ |
| Alt.    | $-77 \pm 21$  | $2.95^{+2.59}_{-1.91}$ | $276^{+11}_{-11}$ | $3105^{+1328}_{-504}$ | $4455^{+33805}_{-3318}$    |

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

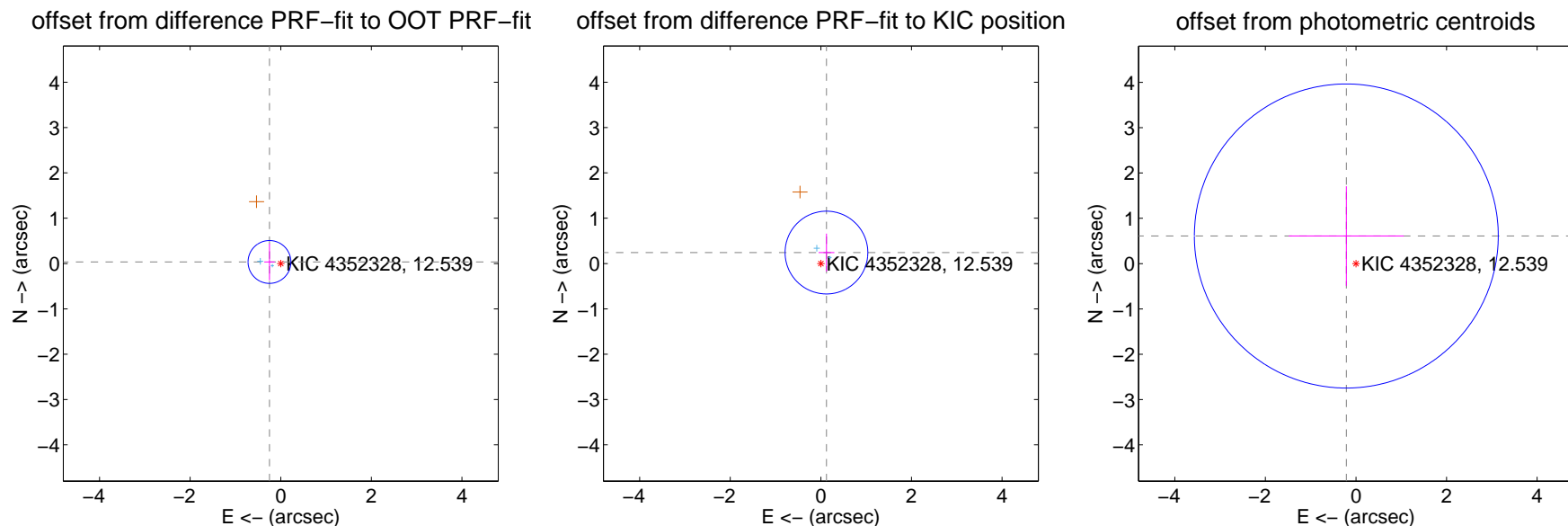
## DV Centroid Data

Supplemental centroid analysis for 004352328-05. Kepler magnitude: 12.54. Transit SNR 6.50

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.46 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec      |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT          | $0.251 \pm 0.158$  | 1.59                | $0.249 \pm 0.116$  | $0.035 \pm 0.404$ |
| PRF-fit source offset from KIC position | $0.272 \pm 0.304$  | 0.89                | $-0.123 \pm 0.174$ | $0.242 \pm 0.419$ |
| photometric centroid source offset      | $0.65 \pm 1.12$    | 0.58                | $0.21 \pm 1.27$    | $0.61 \pm 1.10$   |



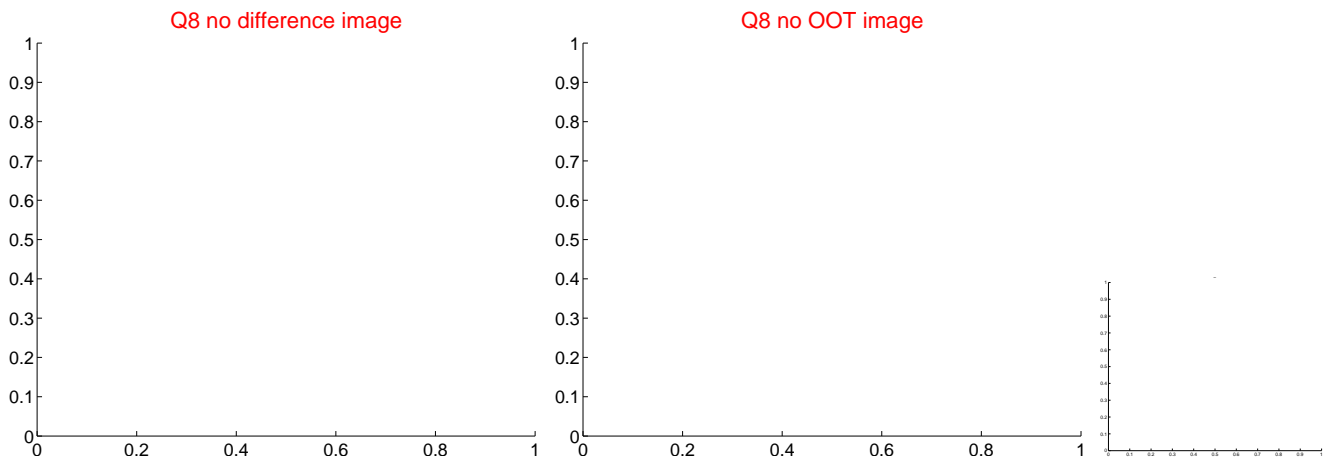
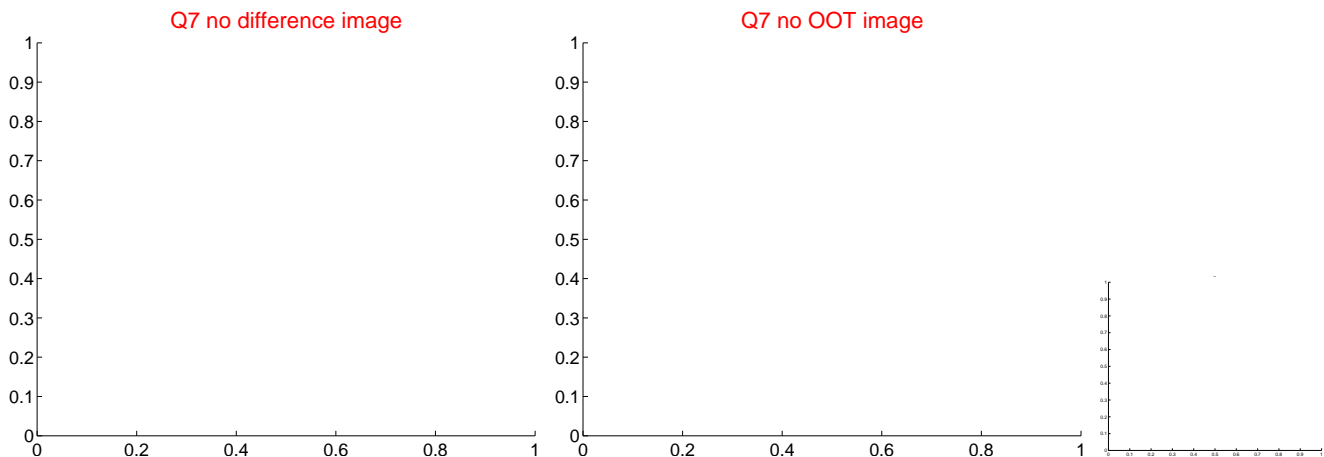
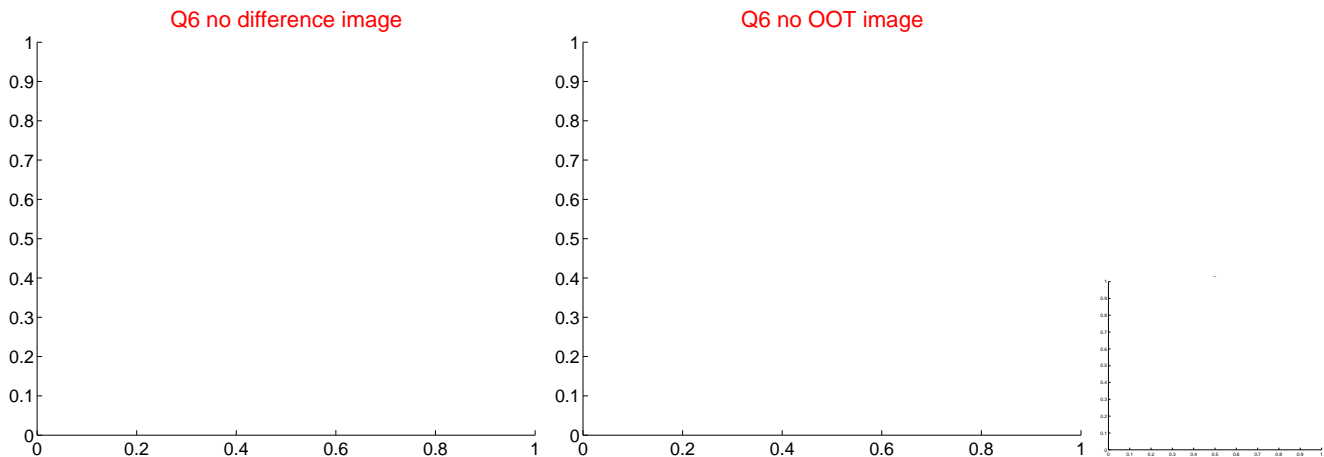
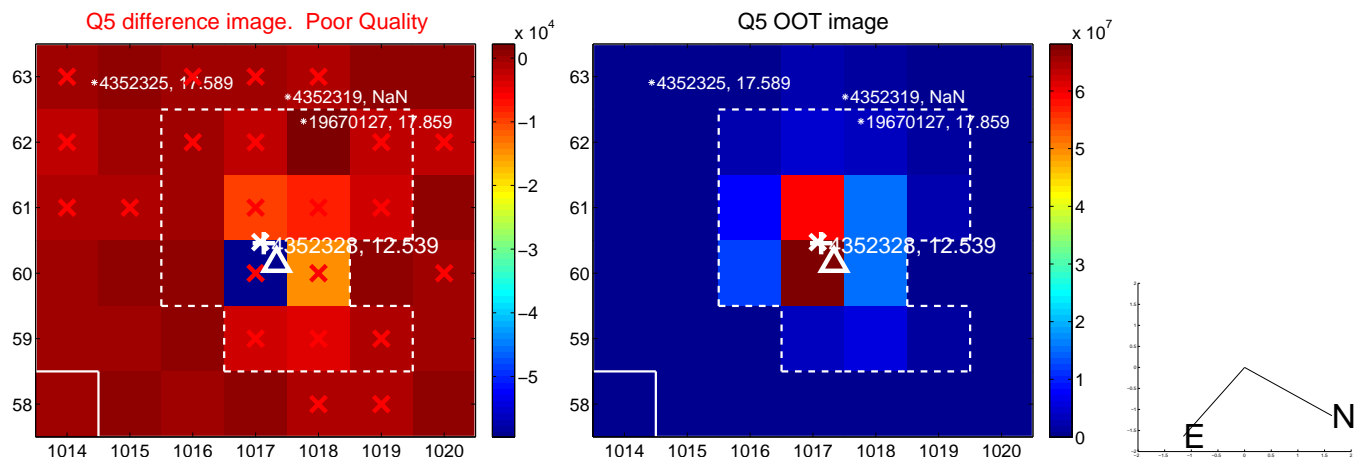
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

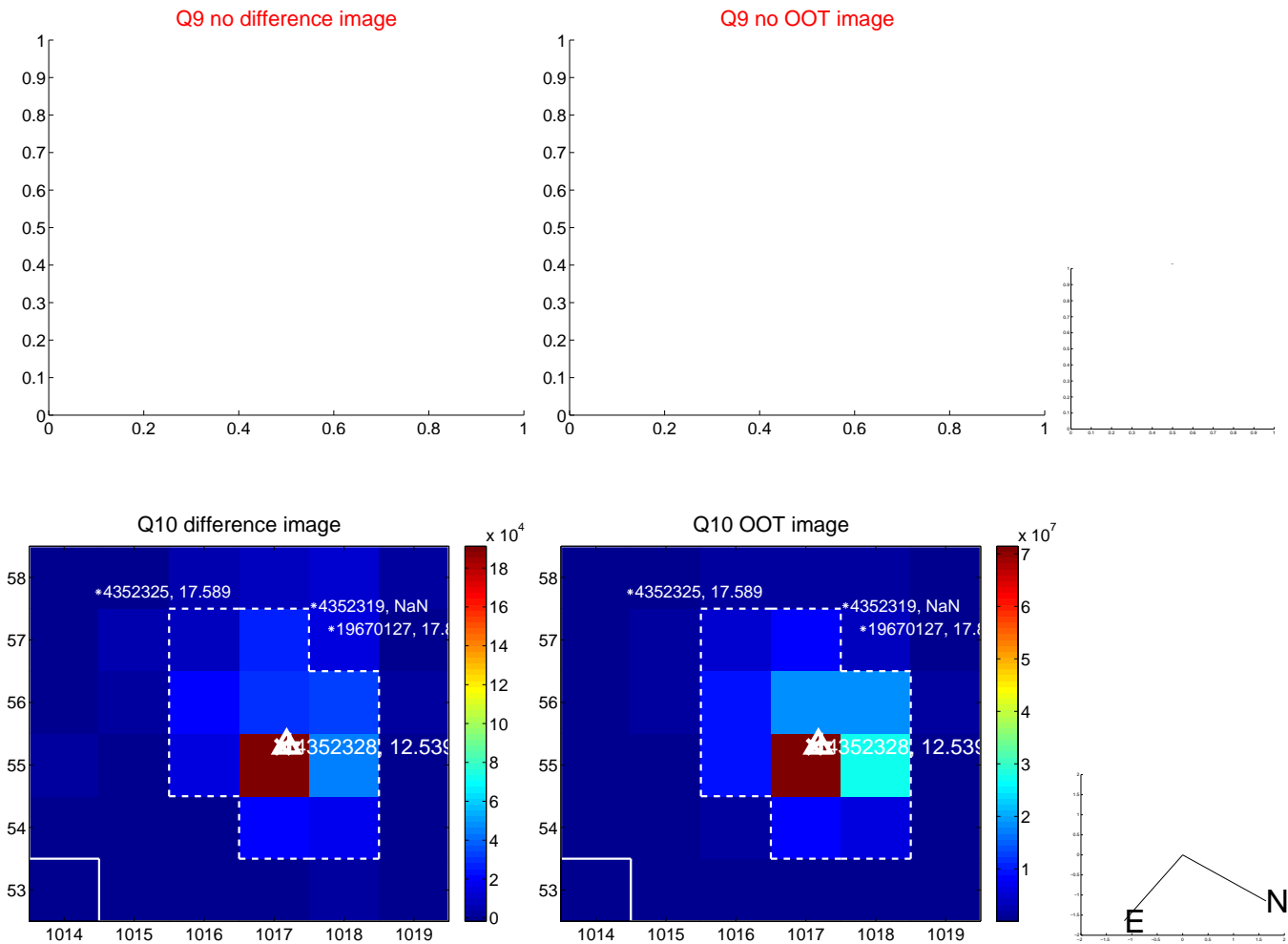




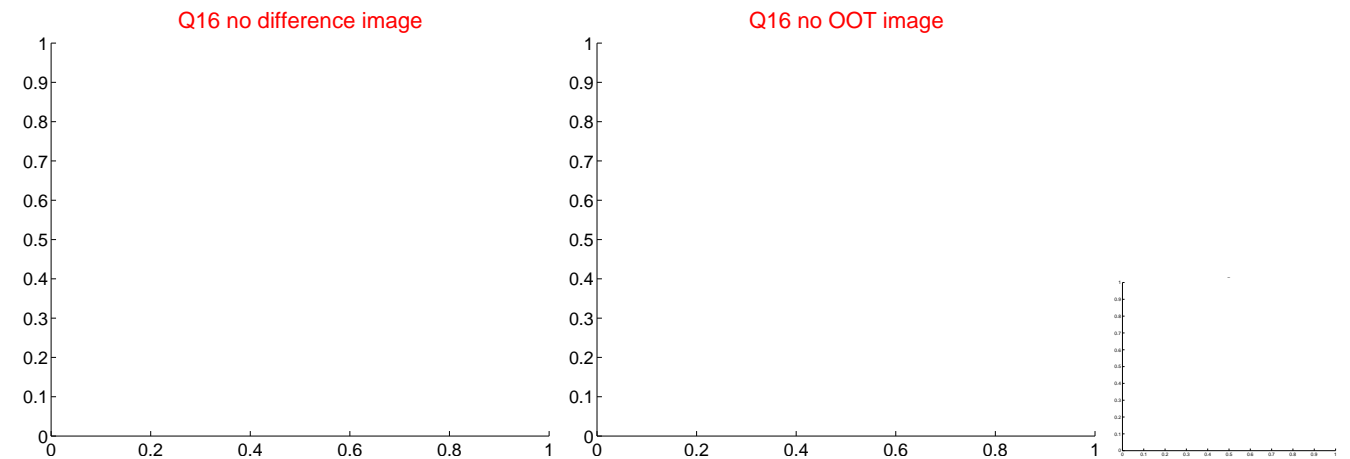
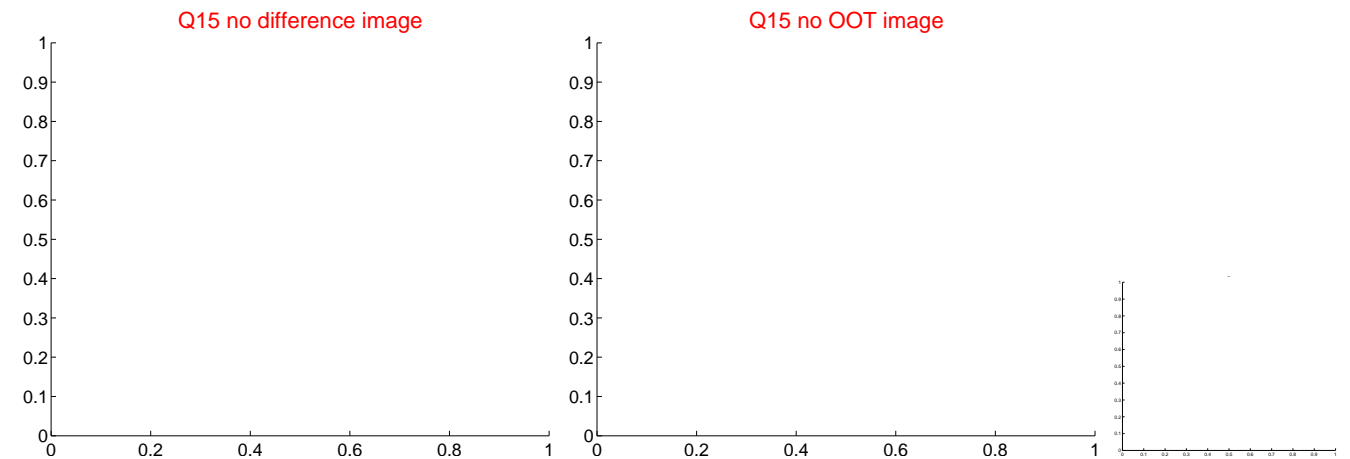
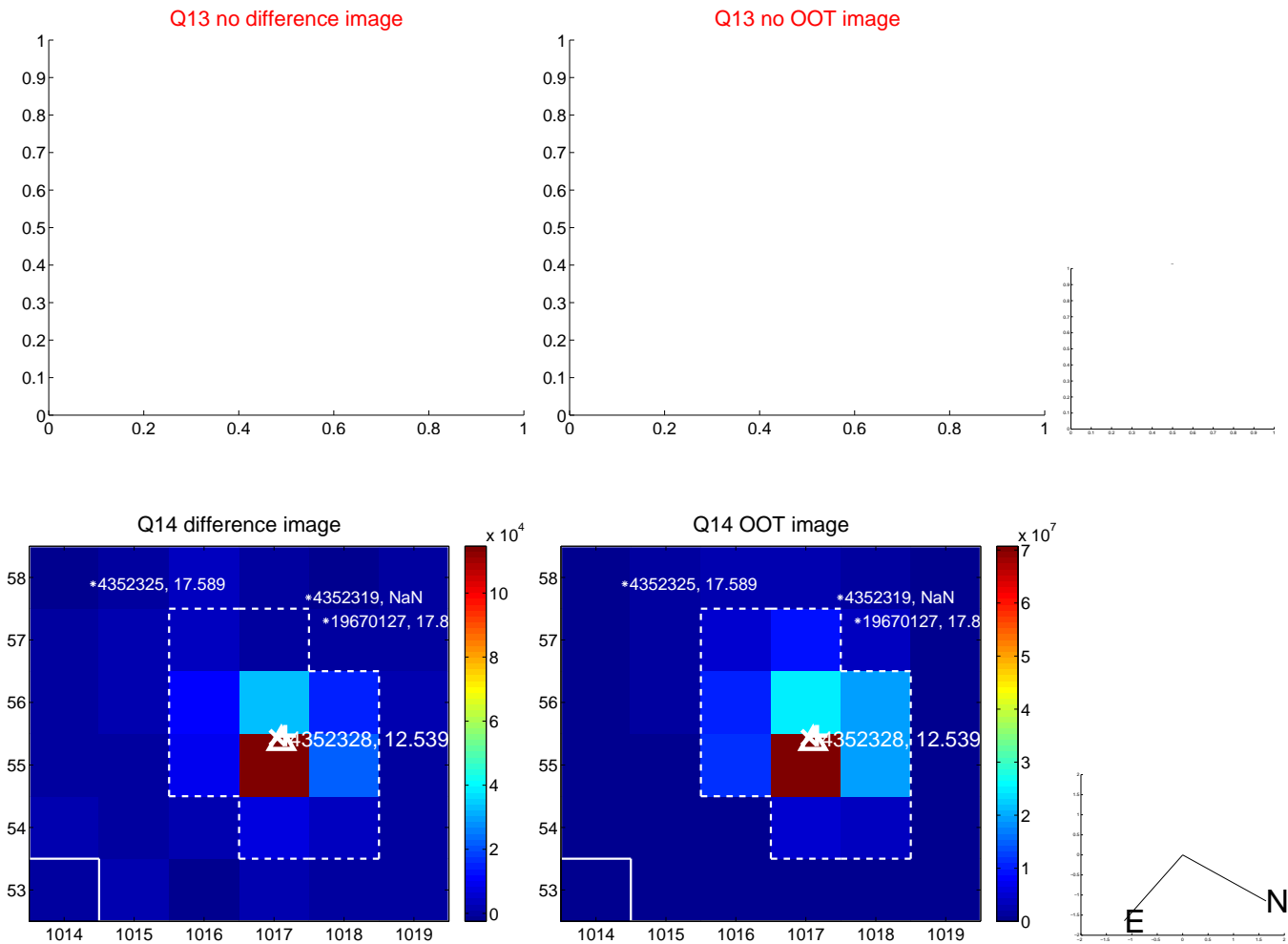
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



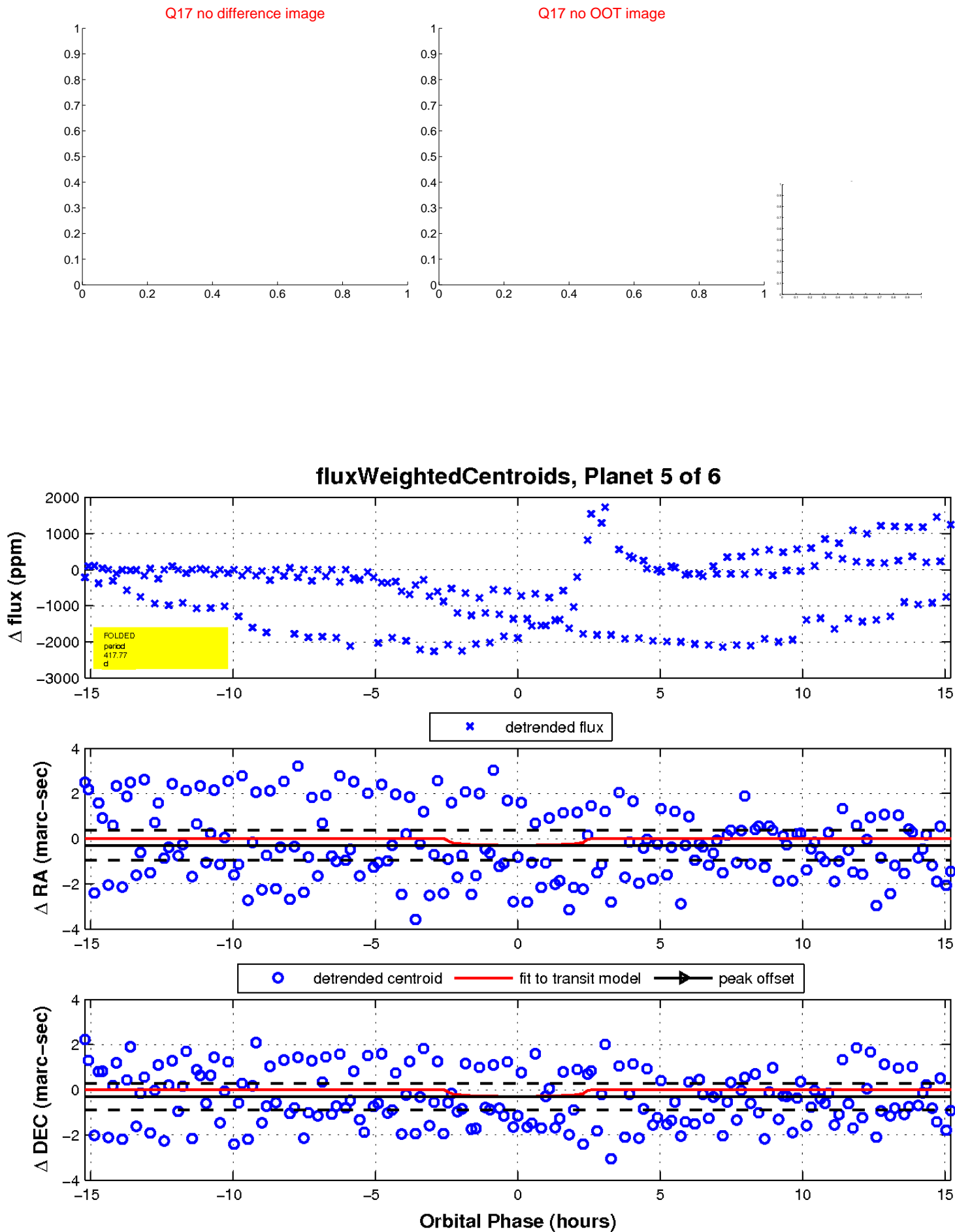
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

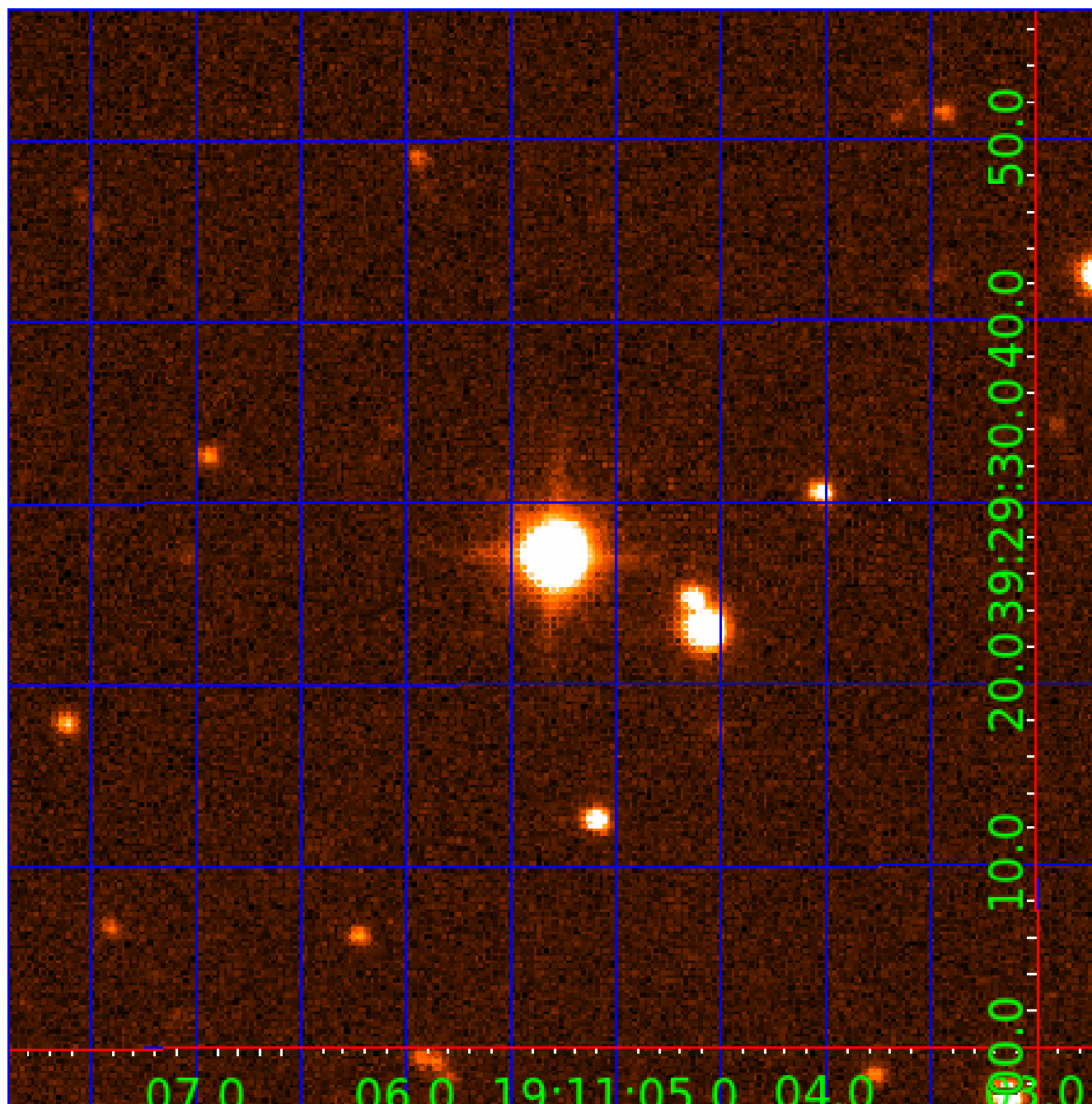


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004352328

## 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) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004352328-01 | OBS      | No   | 542.839585    | 294.326853   | 839.3       | 3.250            | 13.9 | 9.8  | 0.68                        | 5332            | 2.12                   | 0.26                   |
| 004352328-02 | OBS      | No   | 400.610780    | 181.734216   | 505.4       | 3.468            | 15.3 | 6.9  | 0.68                        | 5332            | 1.71                   | 0.39                   |
| 004352328-04 | OBS      | No   | 451.761487    | 187.600777   | 764.2       | 12.967           | 15.7 | 6.4  | 0.68                        | 5332            | 1.95                   | 0.33                   |
| 004352328-05 | OBS      | No   | 417.771793    | 497.001898   | 510.6       | 5.093            | 13.2 | 6.5  | 0.68                        | 5332            | 1.63                   | 0.36                   |
| 004352328-06 | OBS      | No   | 449.245439    | 491.523076   | 320.1       | 4.500            | 12.5 | -1.0 | 0.68                        | 5332            | 1.20                   | 0.33                   |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments  |
|--------------|----------|------|-------|---|---|---|---|---|
| 004352328-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS   |
| 004352328-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_POS_DV—CENT_KIC_POS |
| 004352328-04 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS                              |
| 004352328-05 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS       |
| 004352328-06 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_NOFITS          |

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

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

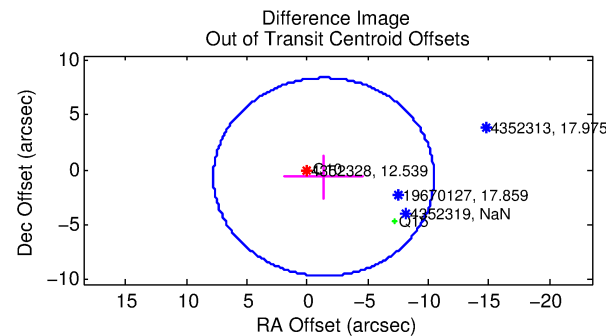
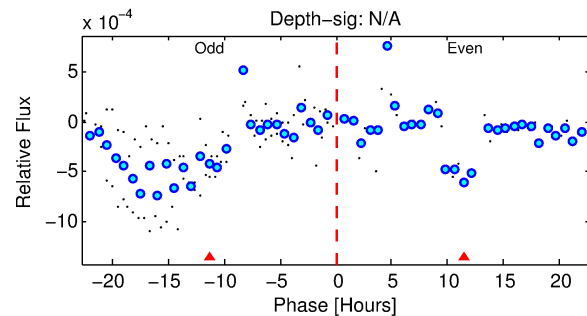
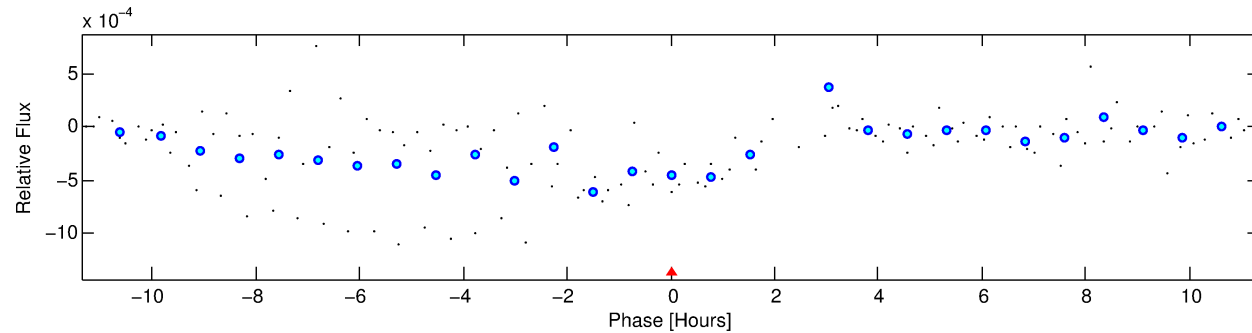
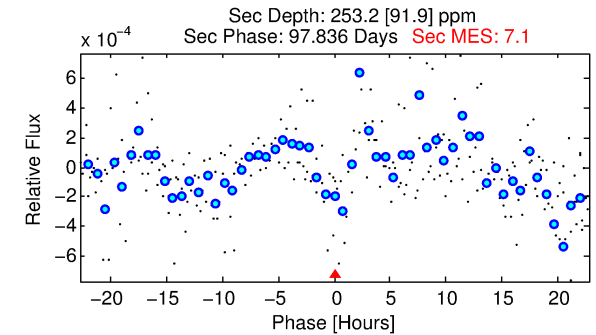
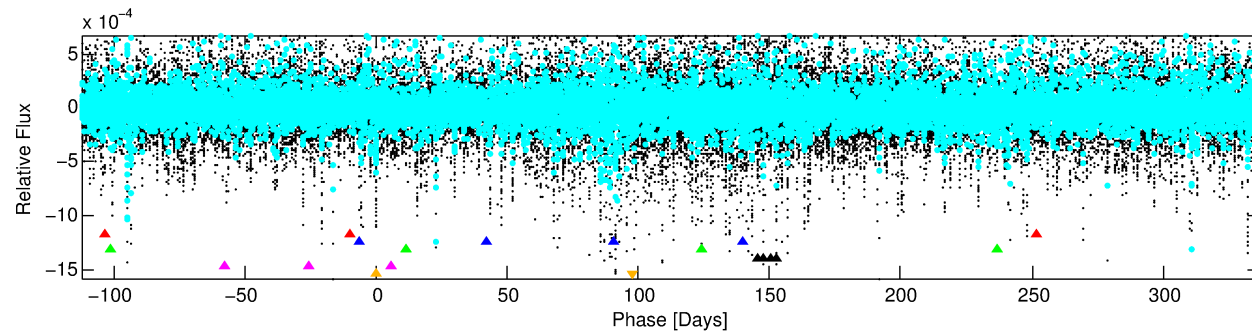
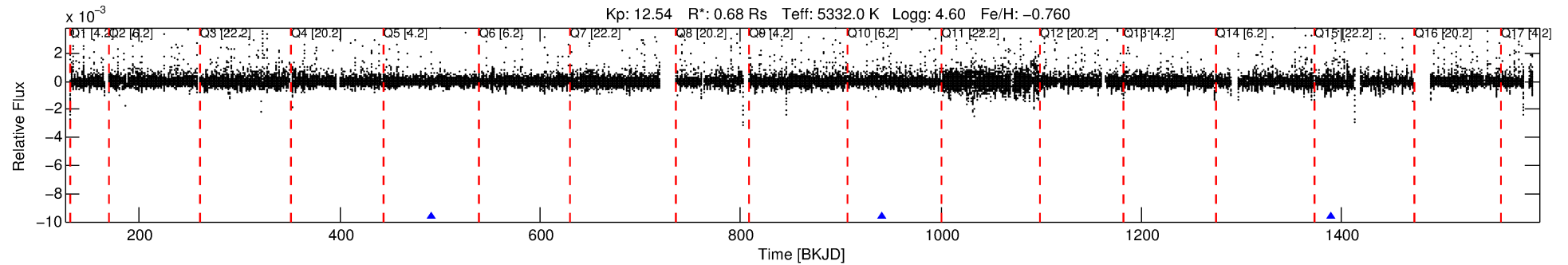
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 004352328-06

No Significant Match Found

# DV One-Page Summary

KIC: 4352328 Candidate: 6 of 6 Period: 449.245 d



## TPS TCE Results:

Period = 449.24544 d  
Epoch = 491.5231 BKJD

DV fit results are unavailable

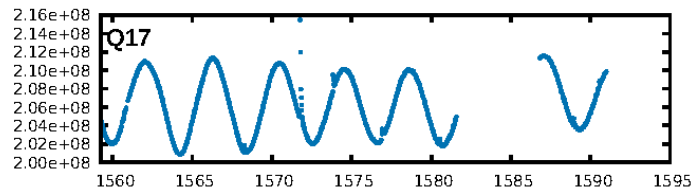
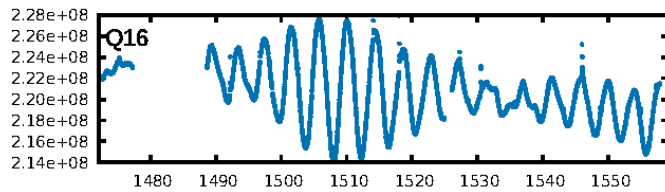
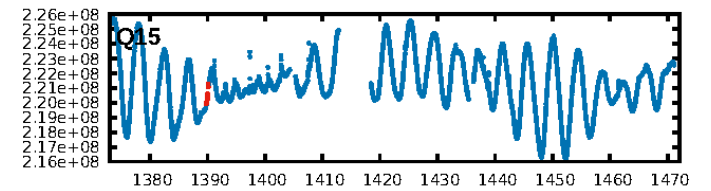
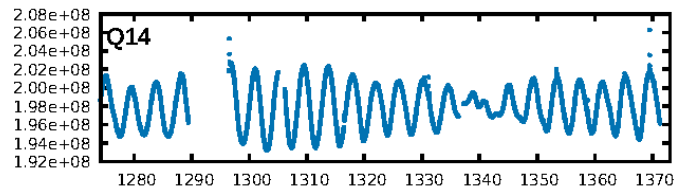
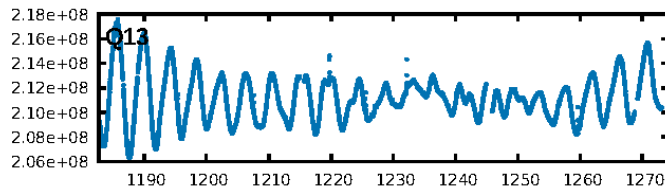
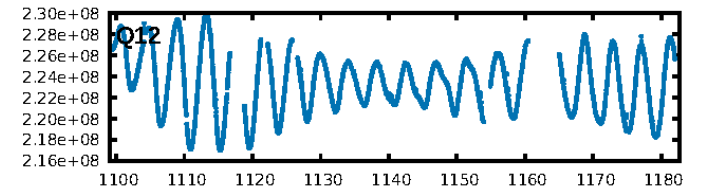
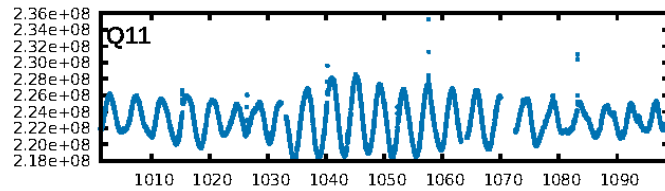
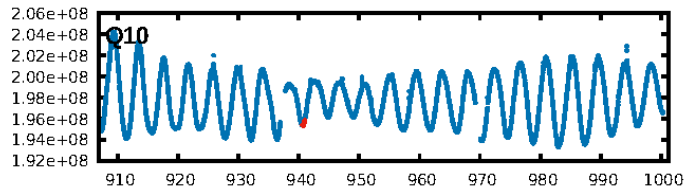
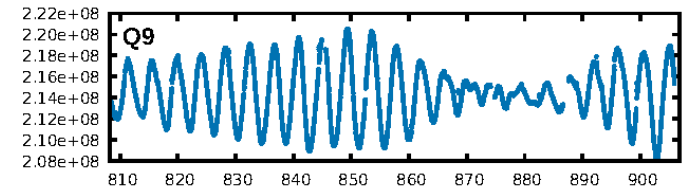
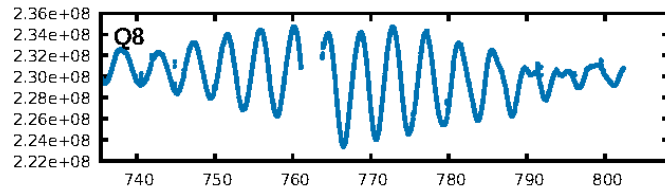
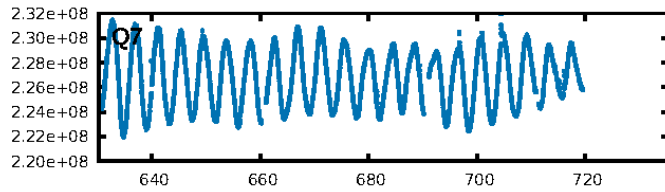
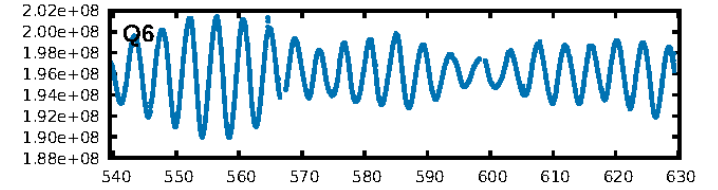
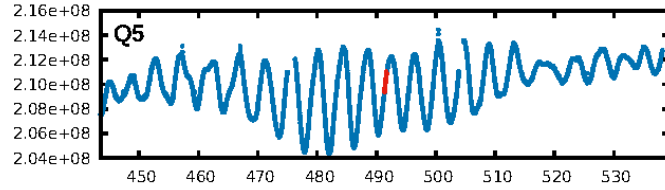
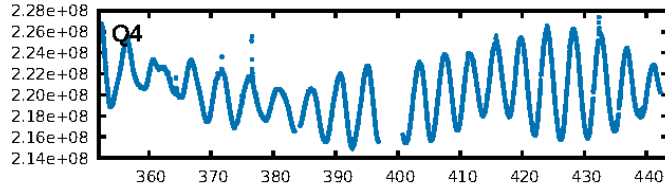
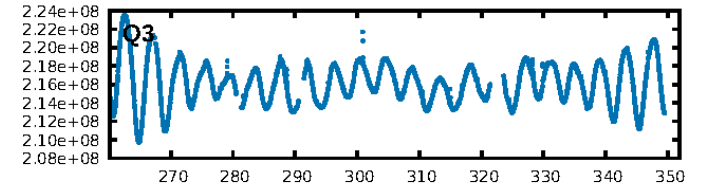
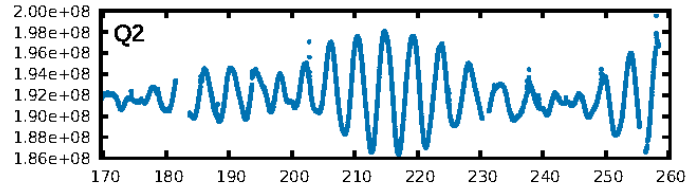
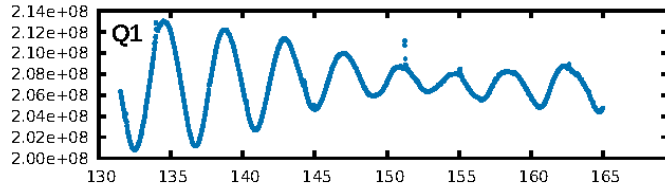
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [111.14 $\sigma$ ]  
LongPeriod-sig: 100.0% [4.40 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.98  
Centroid-sig: 1.7%  
Centroid-so: 1.936 arcsec [1.96 $\sigma$ ]  
OotOffset-rm: 1.514 arcsec [0.50 $\sigma$ ]  
KicOffset-rm: 1.772 arcsec [0.59 $\sigma$ ]  
OotOffset-st: 1/1/0/0 [2]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 02-Feb-2016 00:47:04 Z

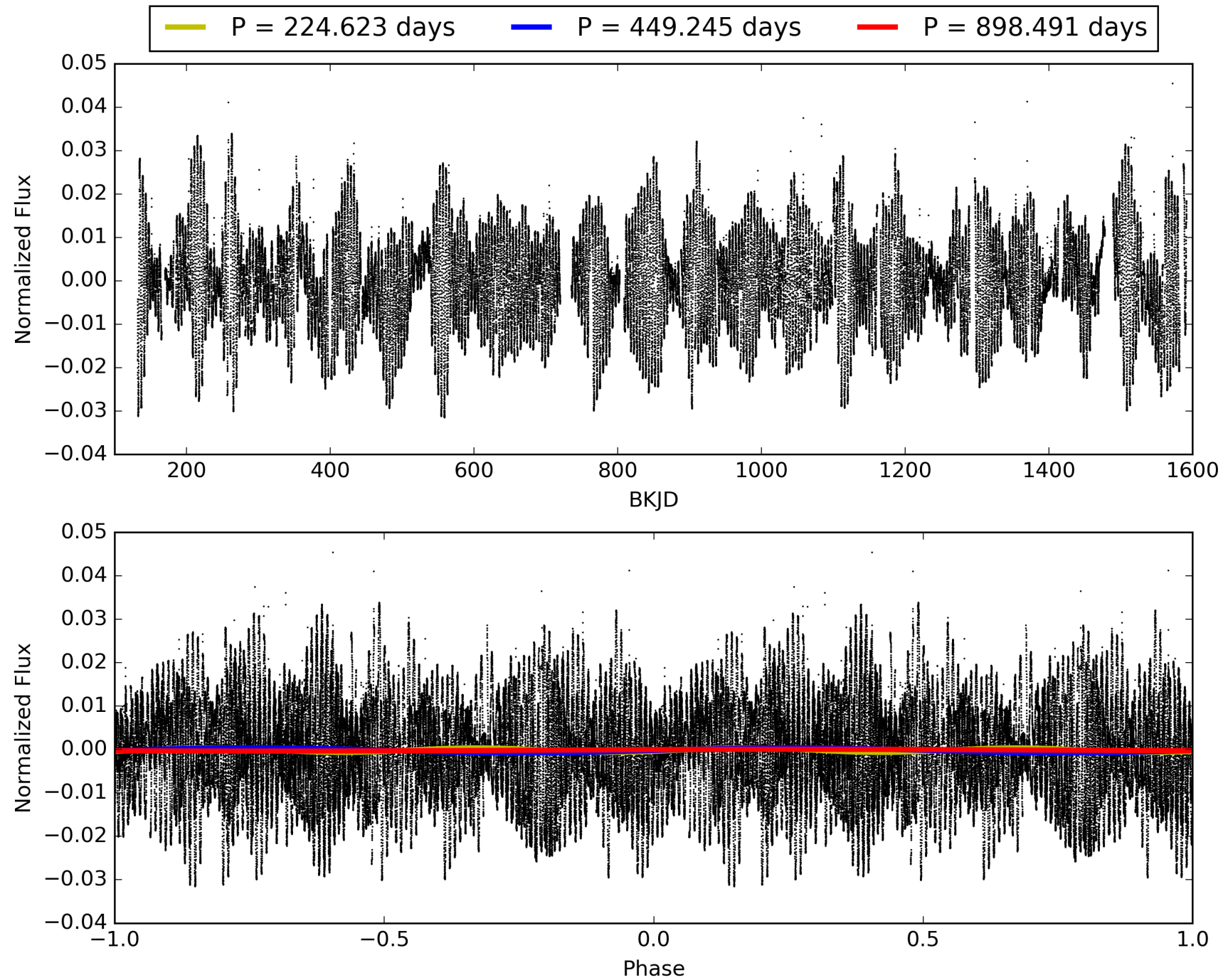
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 004352328-06, PDC Light Curves



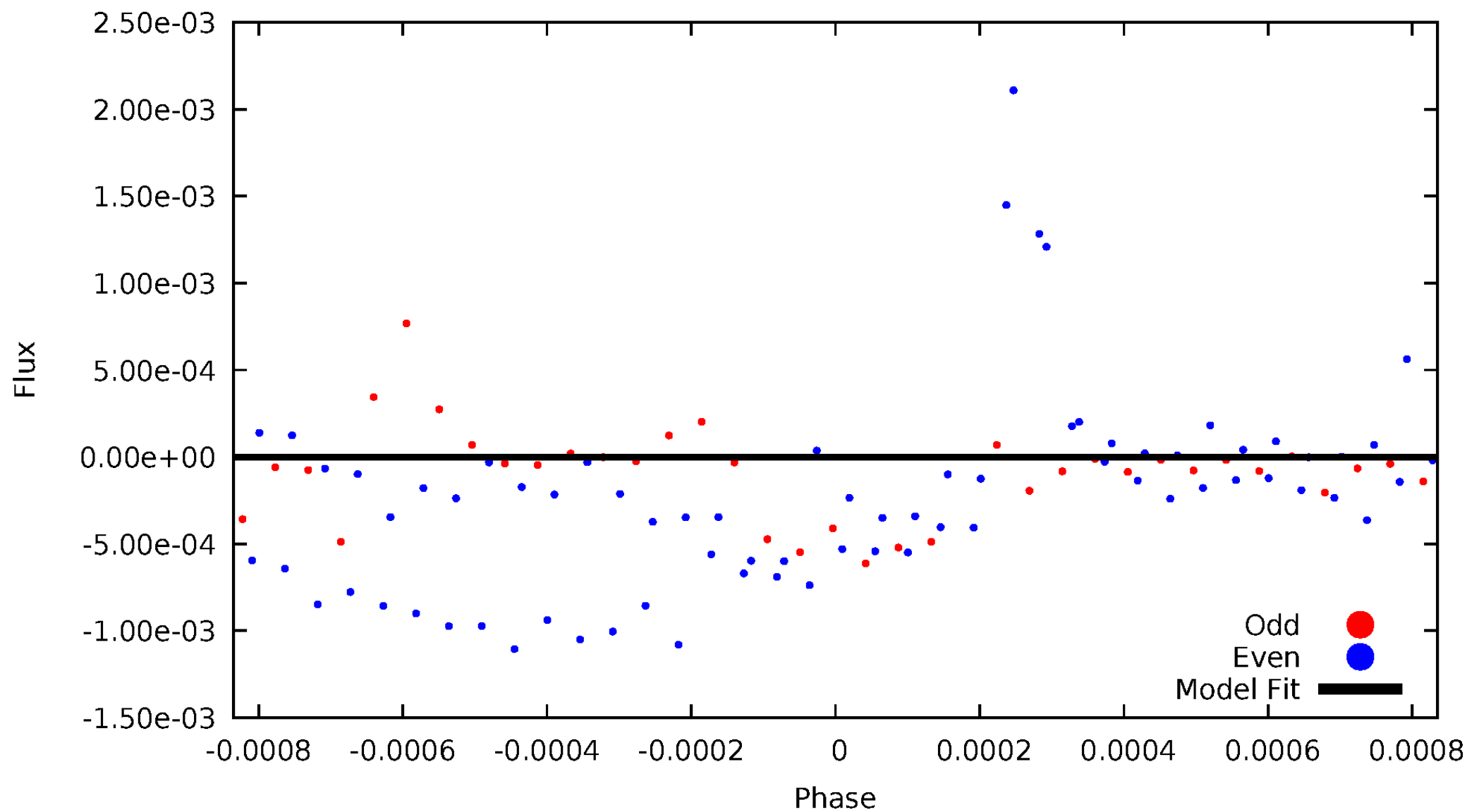


TCE 004352328-06



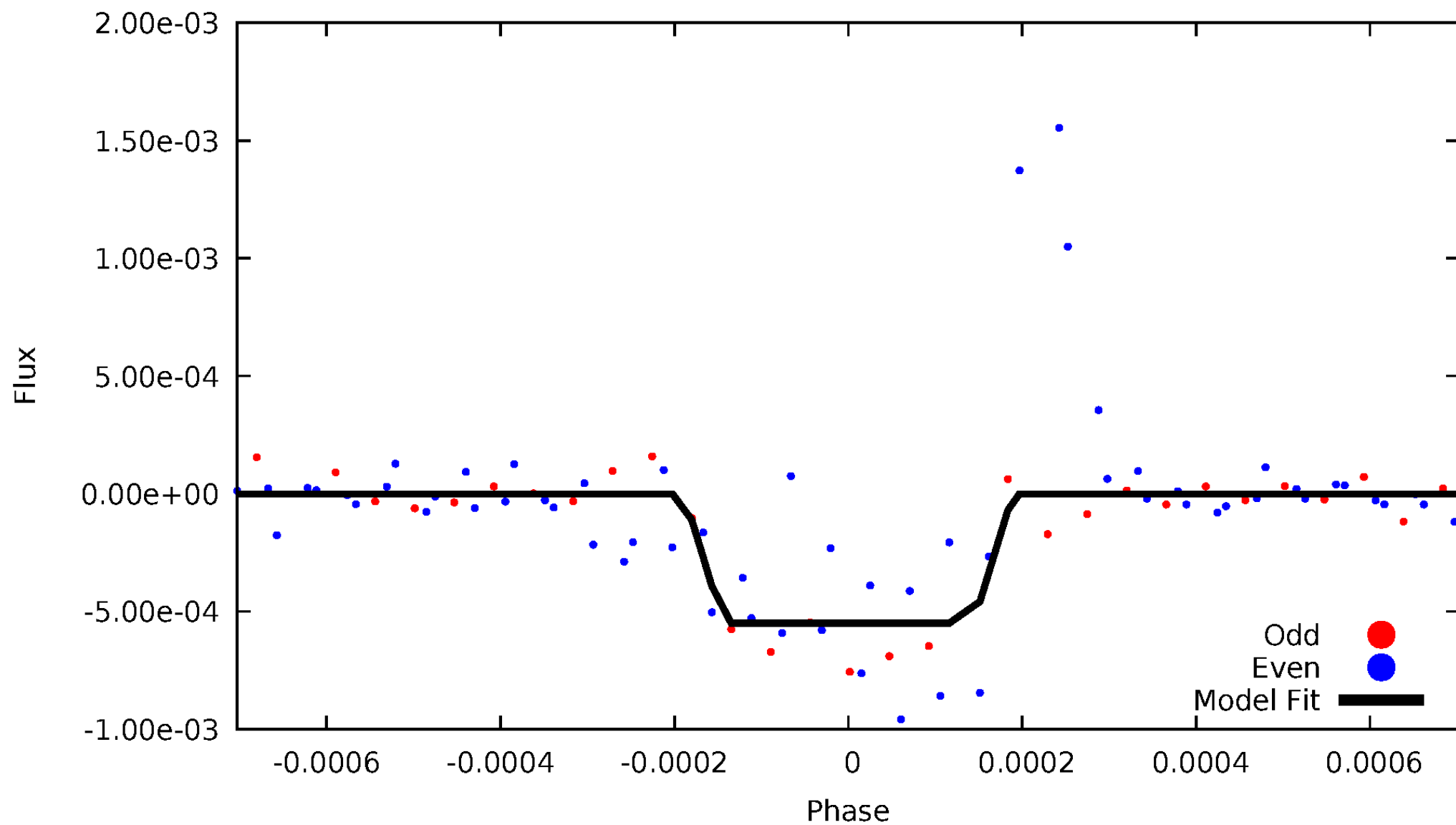
# DV Odd/Even

TCE 004352328-06



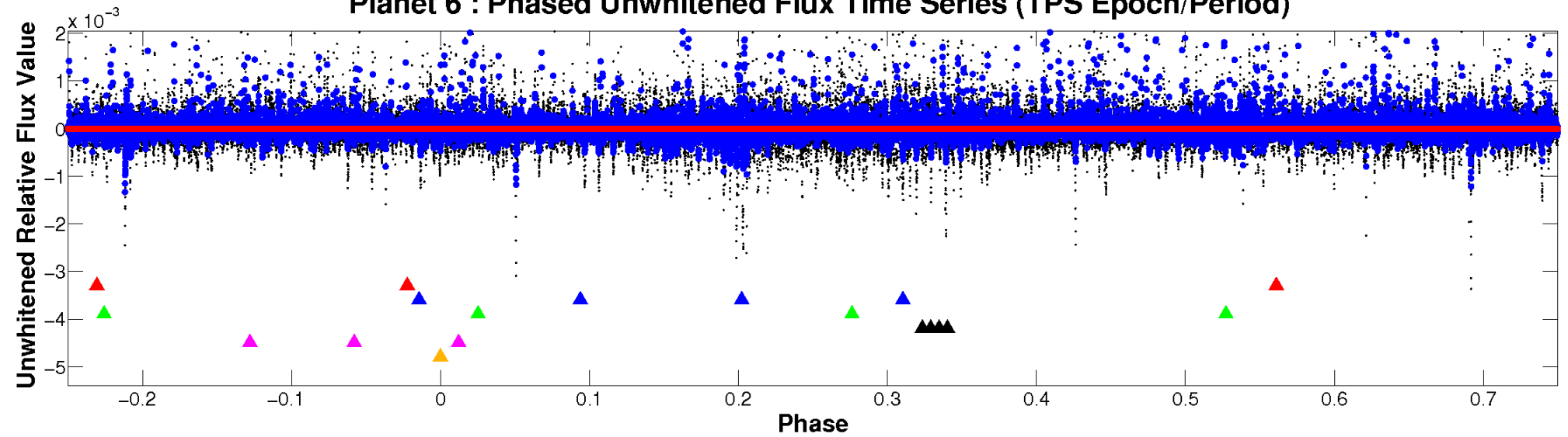
# ALT Odd/Even

TCE 004352328-06

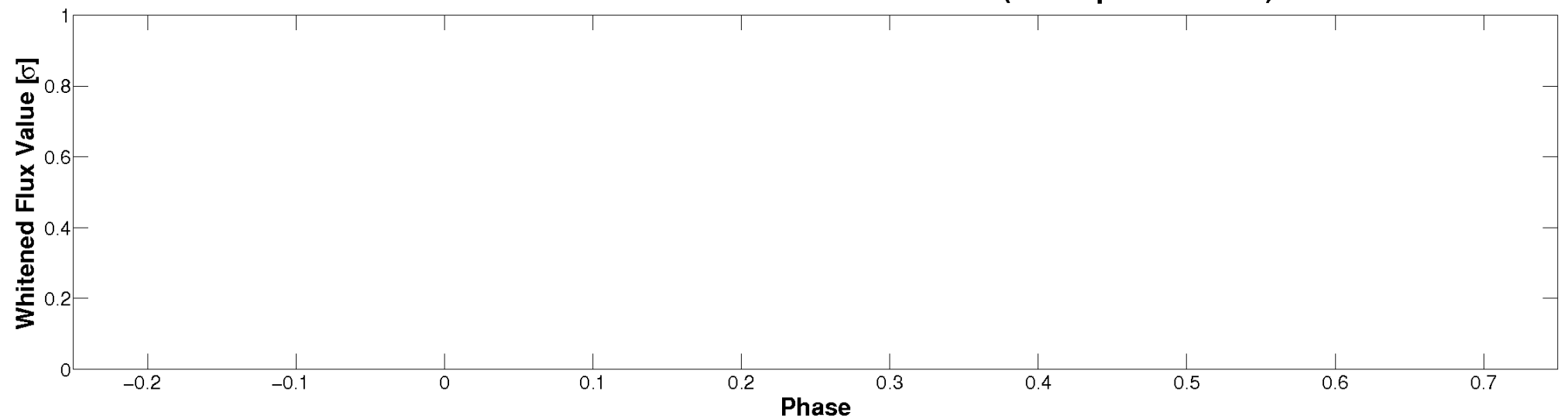


# Non-Whitened Vs. Whitened Light Curve

**Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

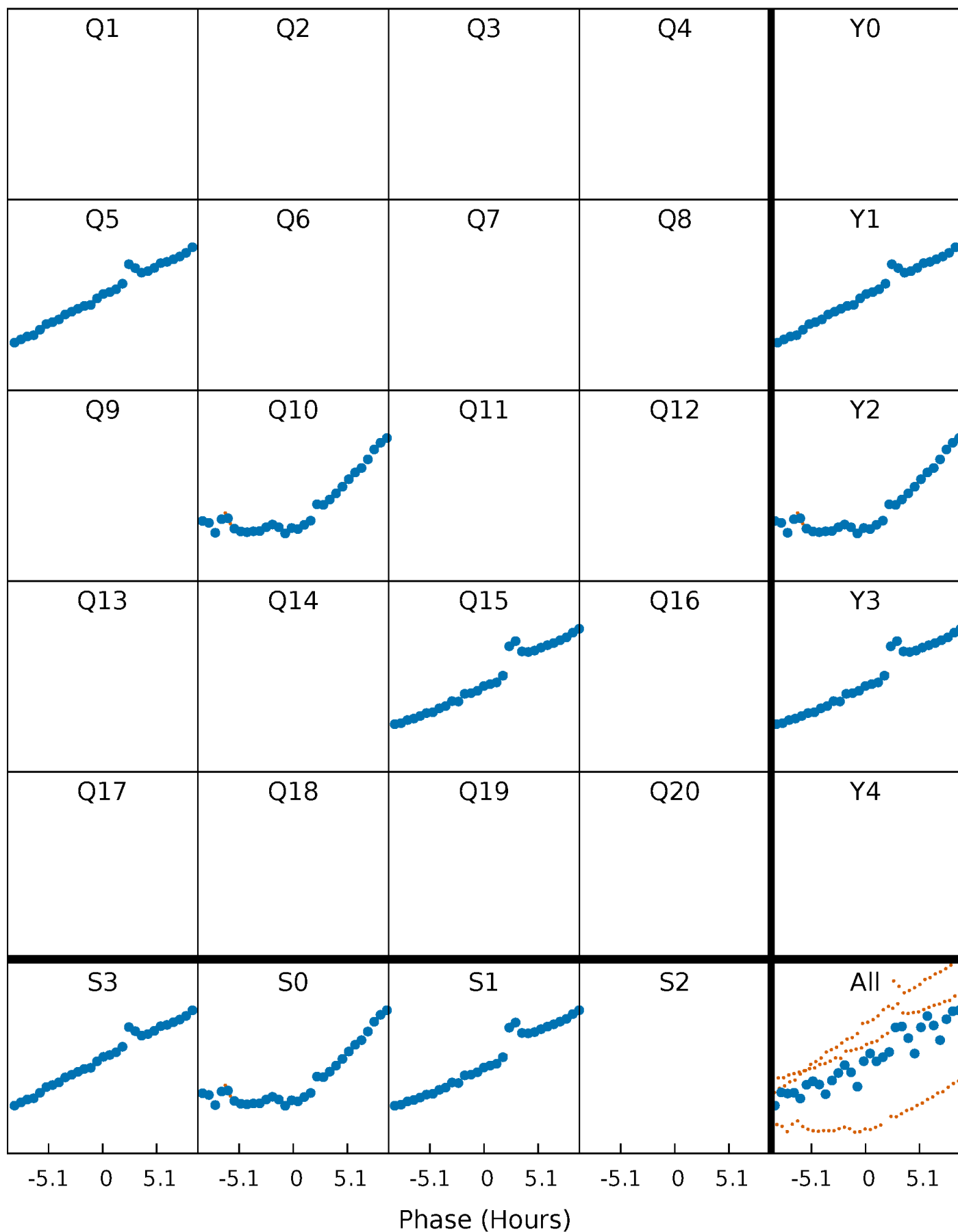


**Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



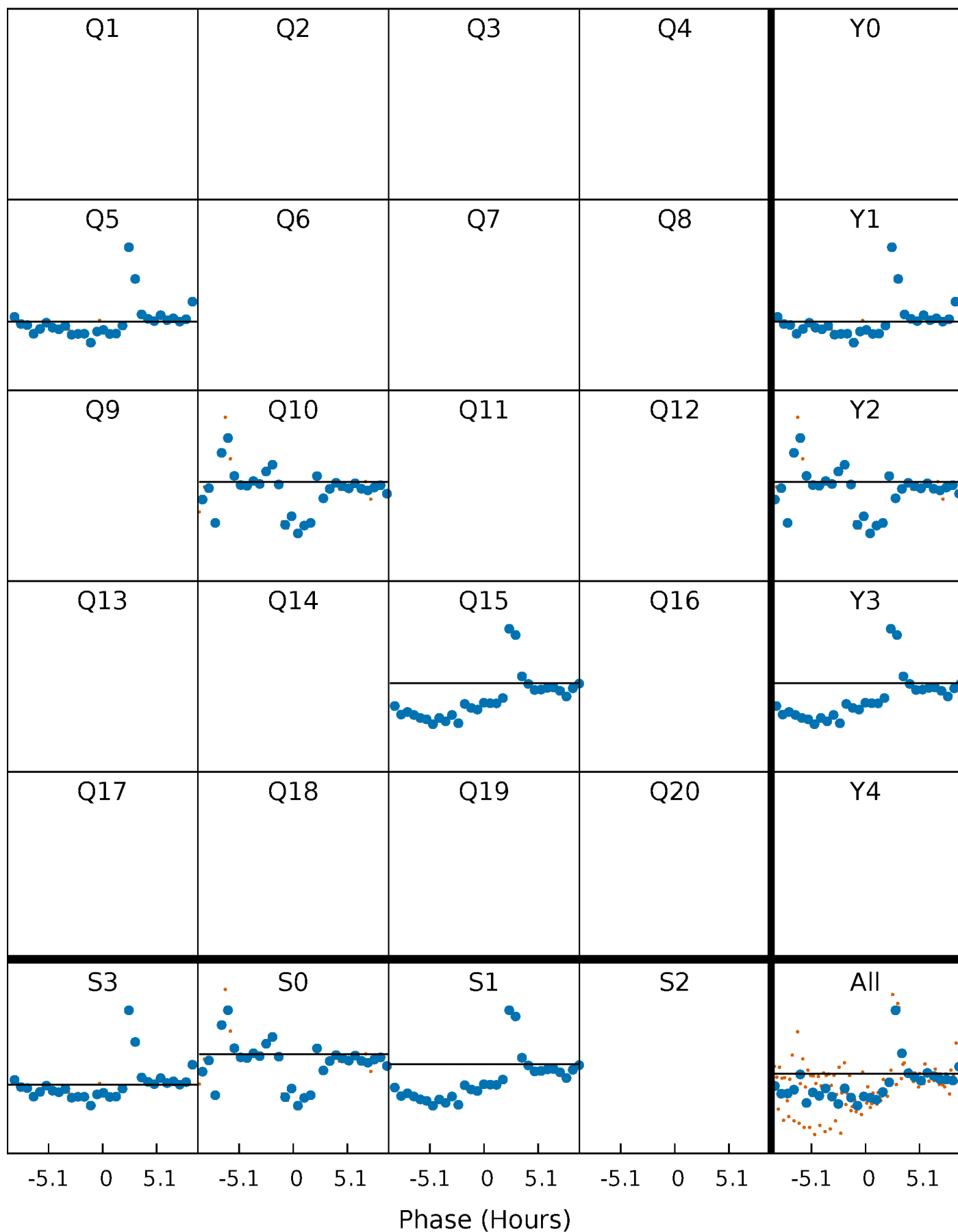
# PDC Quarter-Phased Transit Curves

TCE 004352328-06     $P=449.245439$  Days     $T_0=491.523076$  (BKJD)



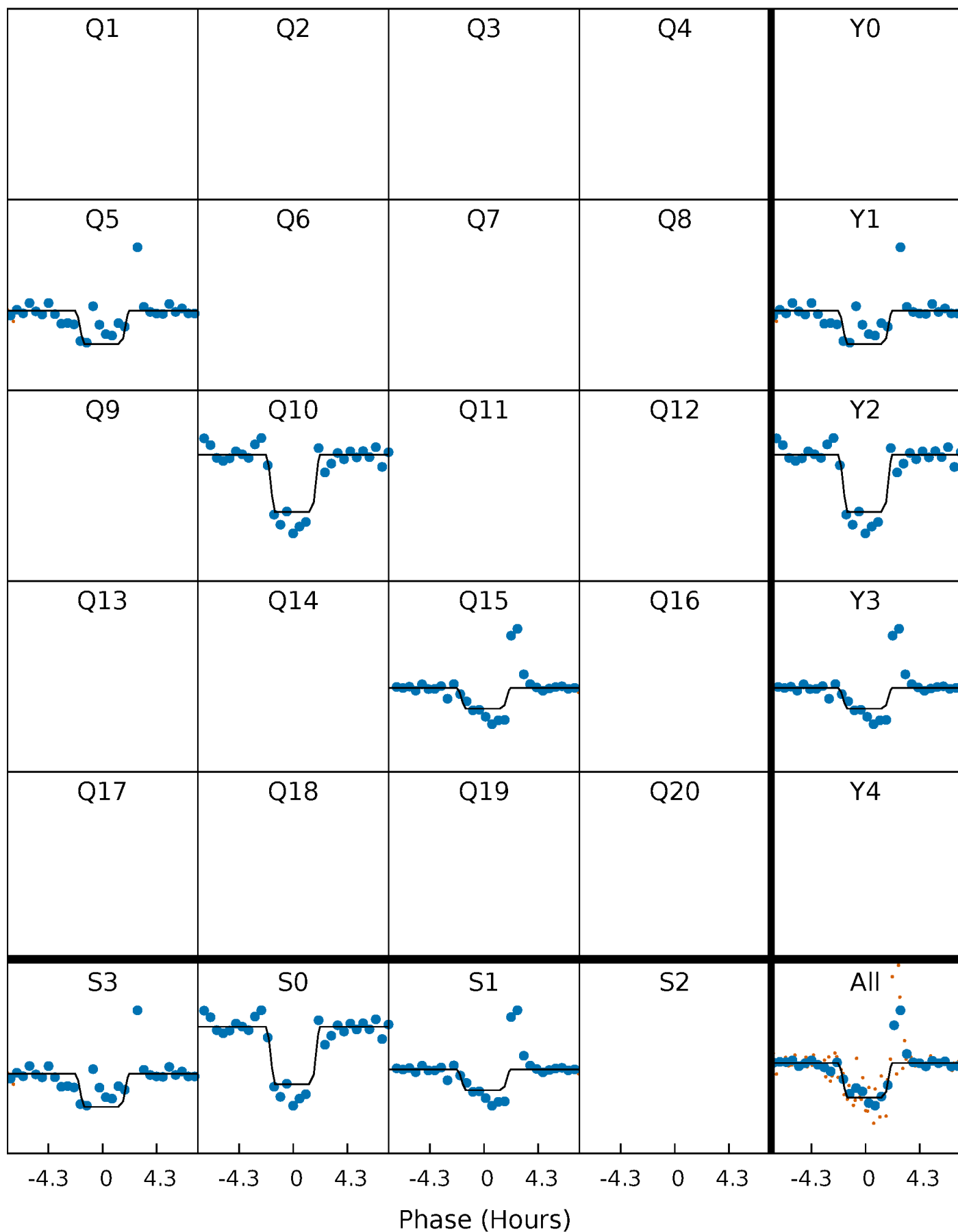
# DV Quarter-Phased Transit Curves

TCE 004352328-06     $P=449.245439$  Days     $T_0=491.523076$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

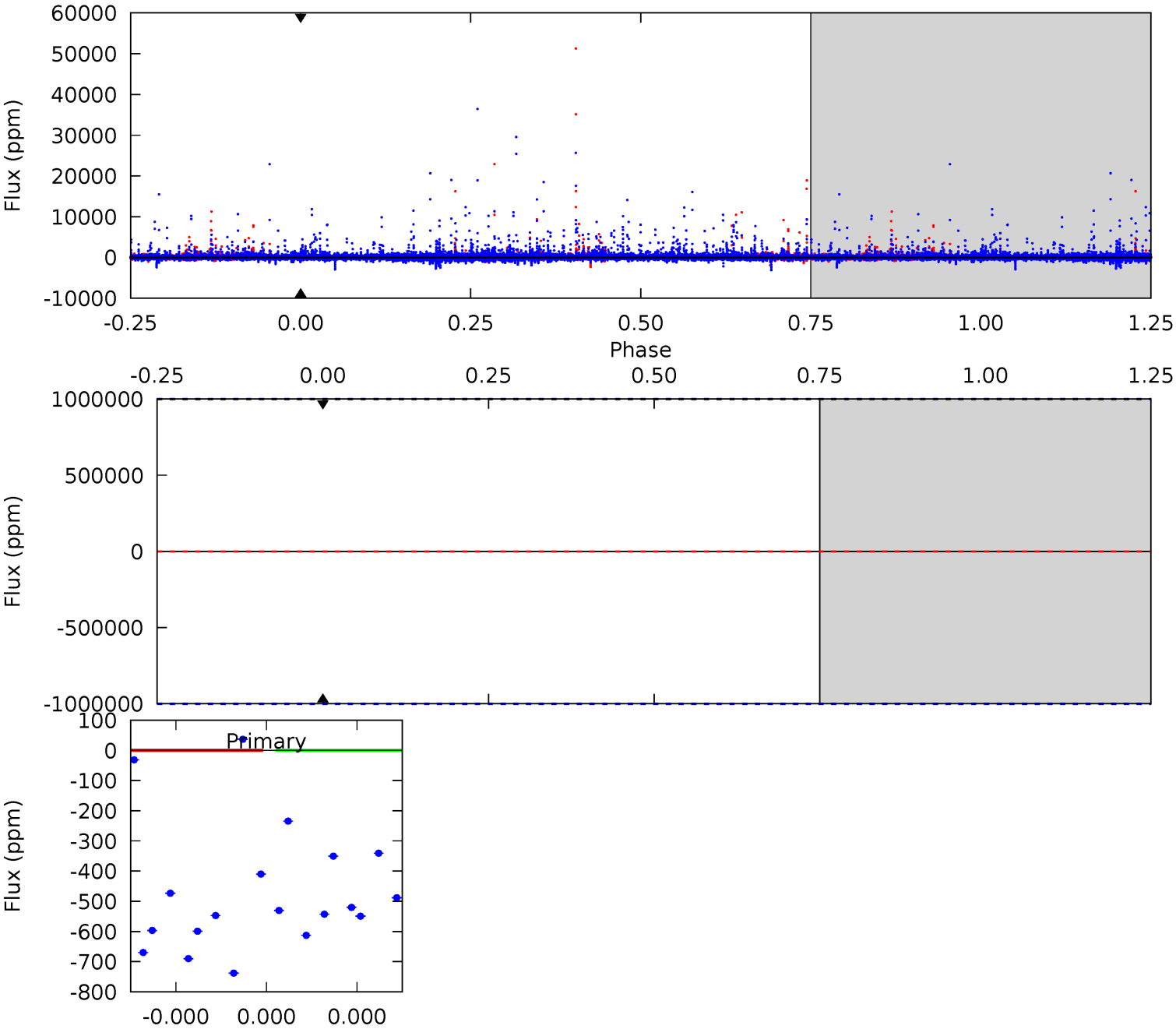
TCE 004352328-06 P=449.245439 Days  $T_0=491.541094$  (BKJD)



# DV Model-Shift Uniqueness Test

004352328-06, P = 449.245439 Days, E = 42.277637 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 |
|-----|-----|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|
| 0   | 0   | 0   | 0   | 1.00            | 1.00            | 1.00             | 0       | 0       | 0       | 0       | 0       | 0   | 0     | 0   |

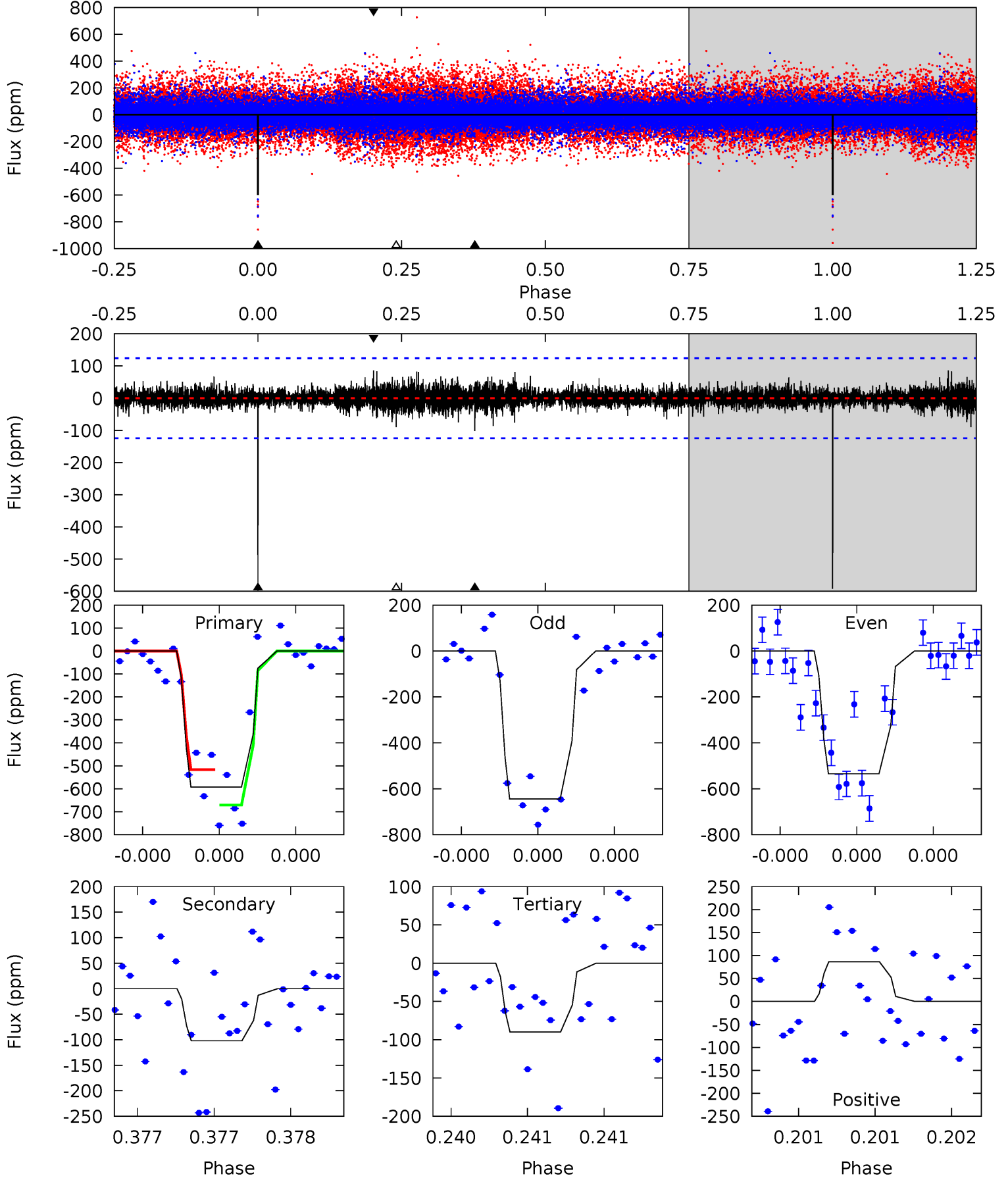




# Alt Model-Shift Uniqueness Test

004352328-06,  $P = 449.245439$  Days,  $E = 42.295655$  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  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 26.9 | 4.63 | 4.07 | 3.91 | 5.63            | 3.56            | 0.73             | 22.8    | 22.9    | 0.56    | 0.71    | 2.27    | 0.87 | 0.13  | 3.53 |



### Stellar Parameters For KIC 004352328

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5332^{+159}_{-159}$ | $4.601^{+0.065}_{-0.058}$ | $-0.760^{+0.300}_{-0.300}$ | $0.680^{+0.072}_{-0.057}$ | $0.673^{+0.071}_{-0.033}$ | $3.013^{+0.789}_{-0.626}$                     |
|        | +3%/-3%              | +1%/-1%                   | +39%/-39%                  | +11%/-8%                  | +11%/-5%                  | +26%/-21%                                     |
| 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 004352328-06 / KOI

| Detrend | Depth (ppm)     | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)     | $T_{obs}$ (K)             | $A_{obs}$                                  |
|---------|-----------------|------------------------|-------------------|---------------------------|--|
| DV      | $0 \pm 1000000$ | $5.24^{+6.17}_{-3.60}$ | $269^{+11}_{-9}$  | $-4372^{+23244}_{-11297}$ | $-37573.364^{+4019126.801}_{-3008066.326}$ |
| Alt.    | $-102 \pm 22$   | $5.79^{+6.63}_{-4.02}$ | $270^{+10}_{-10}$ | $2705^{+1162}_{-469}$     | $1690^{+17554}_{-1315}$                    |

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

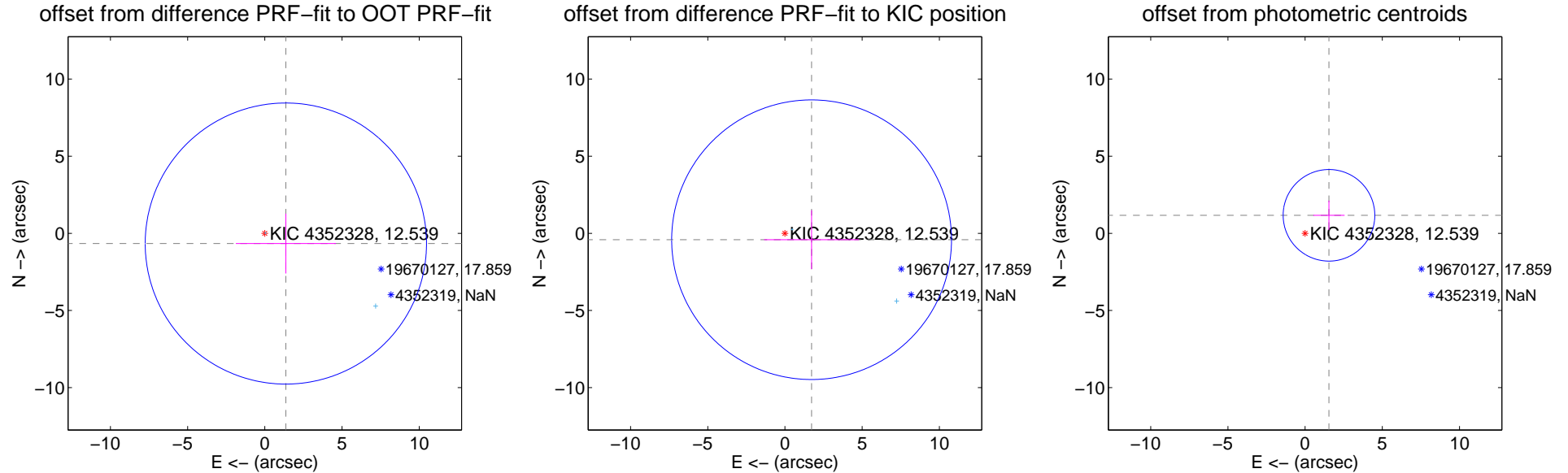
## DV Centroid Data

Supplemental centroid analysis for 004352328-06. Kepler magnitude: 12.54. Transit SNR -1.00

There are 2 quarters with good PRF difference image offsets

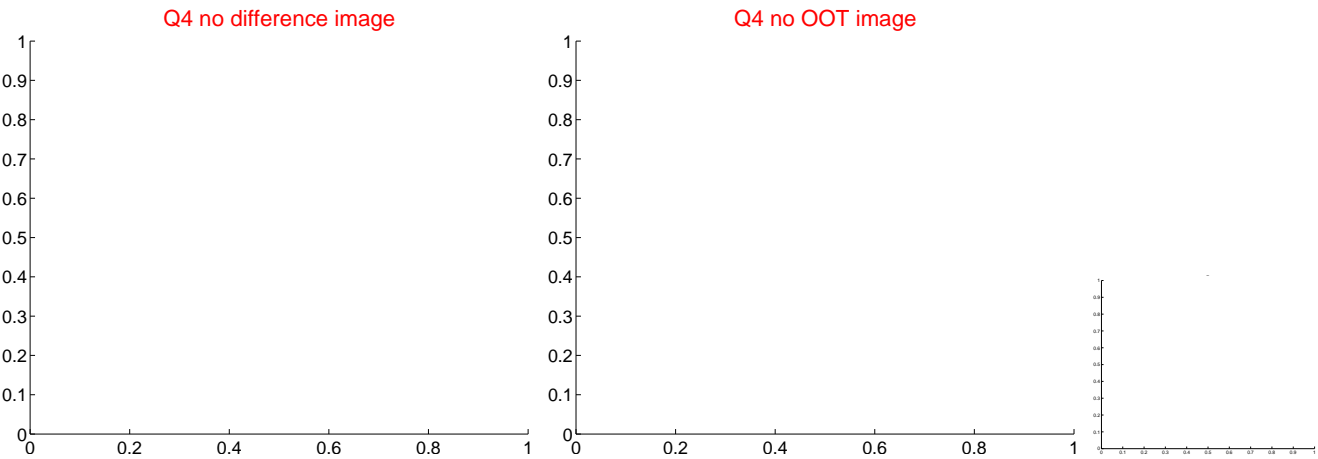
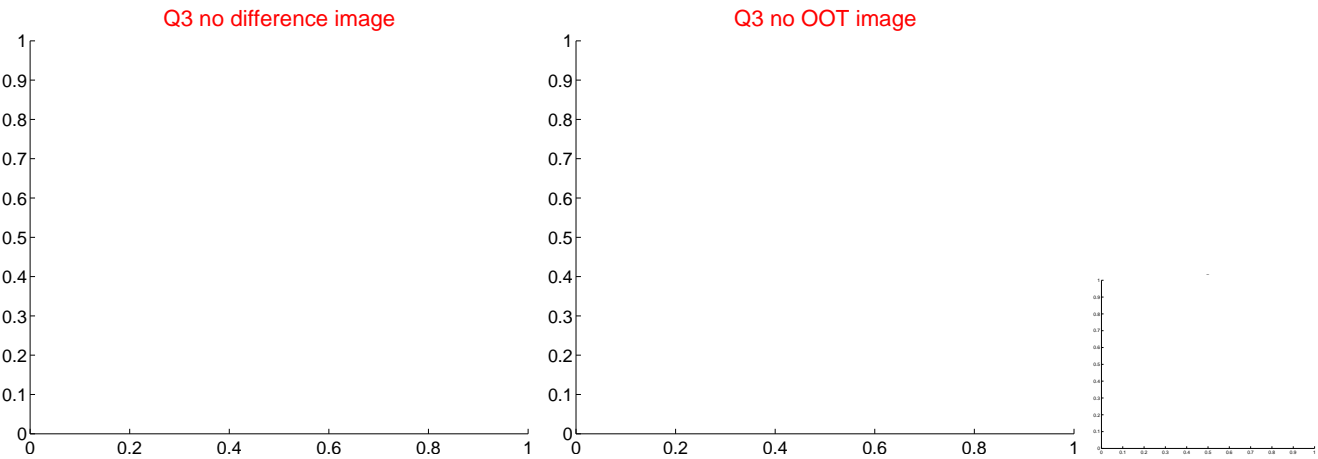
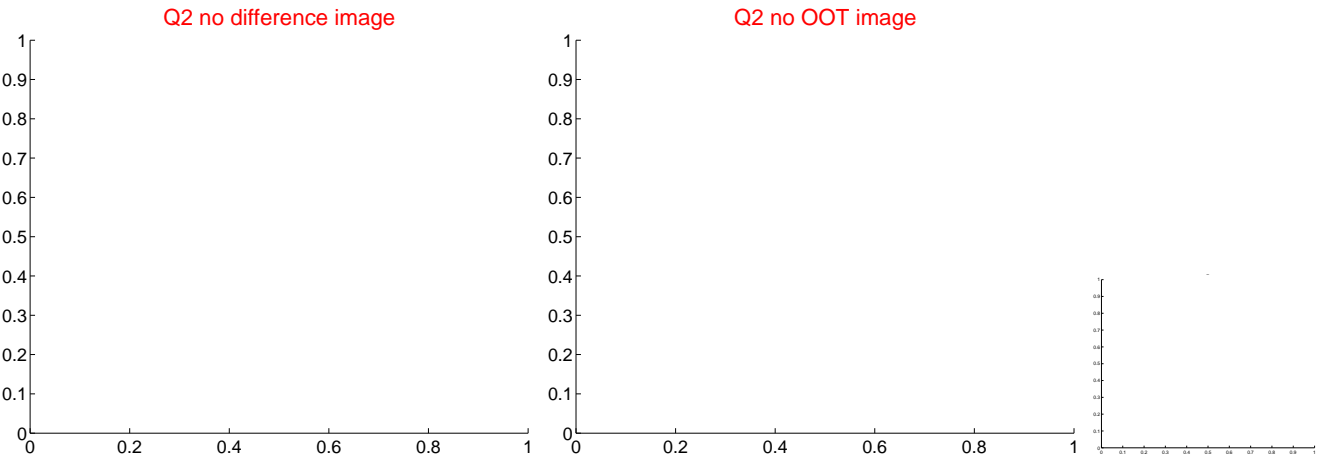
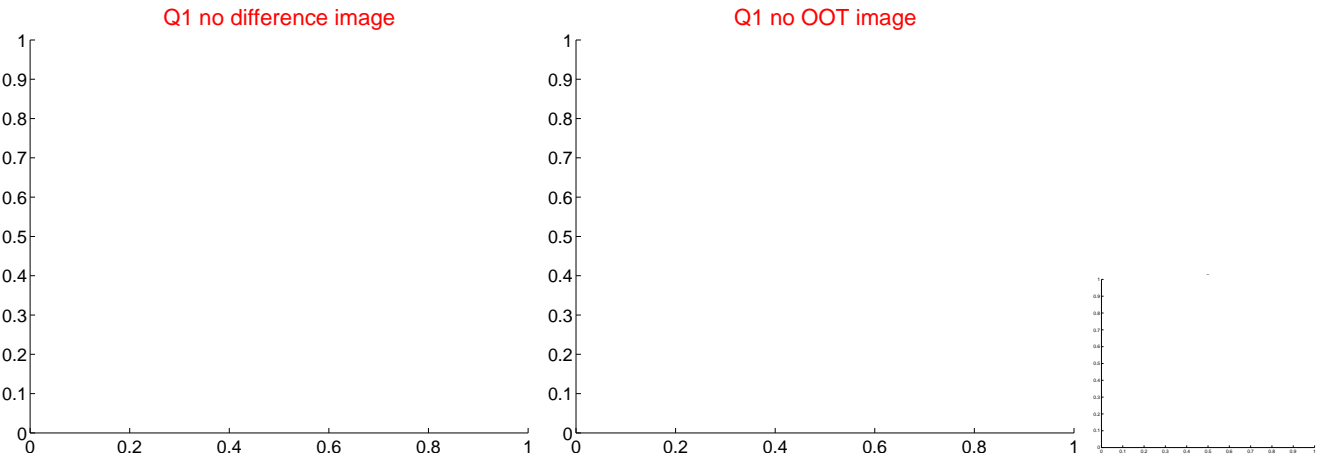
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $1.514 \pm 3.037$  | 0.50                | $-1.362 \pm 3.242$ | $-0.662 \pm 1.940$ |
| PRF-fit source offset from KIC position | $1.772 \pm 3.021$  | 0.59                | $-1.723 \pm 3.073$ | $-0.413 \pm 1.904$ |
| photometric centroid source offset      | $1.94 \pm 0.99$    | 1.96                | $-1.54 \pm 1.01$   | $1.17 \pm 0.96$    |

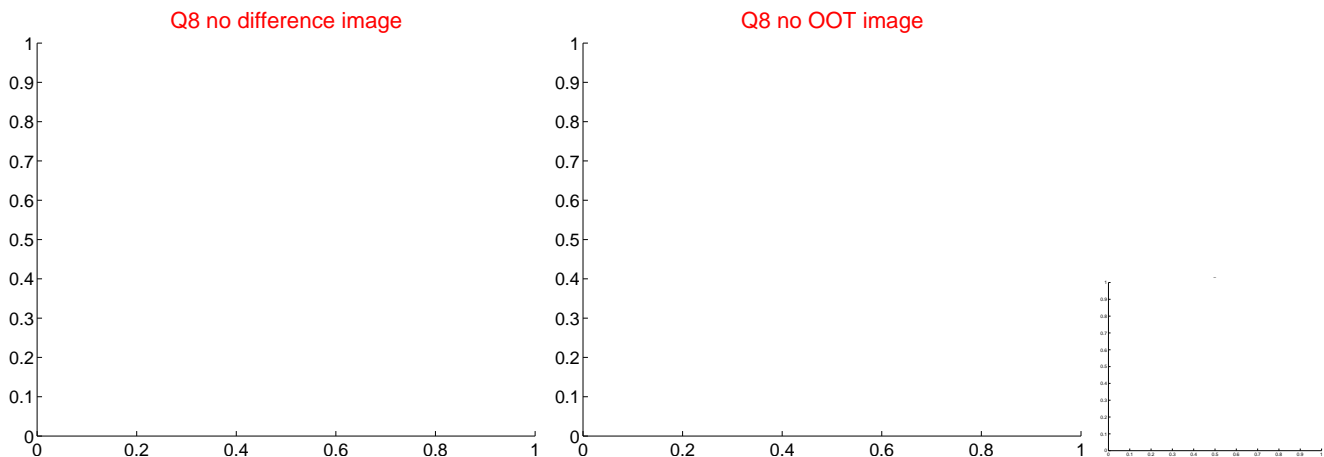
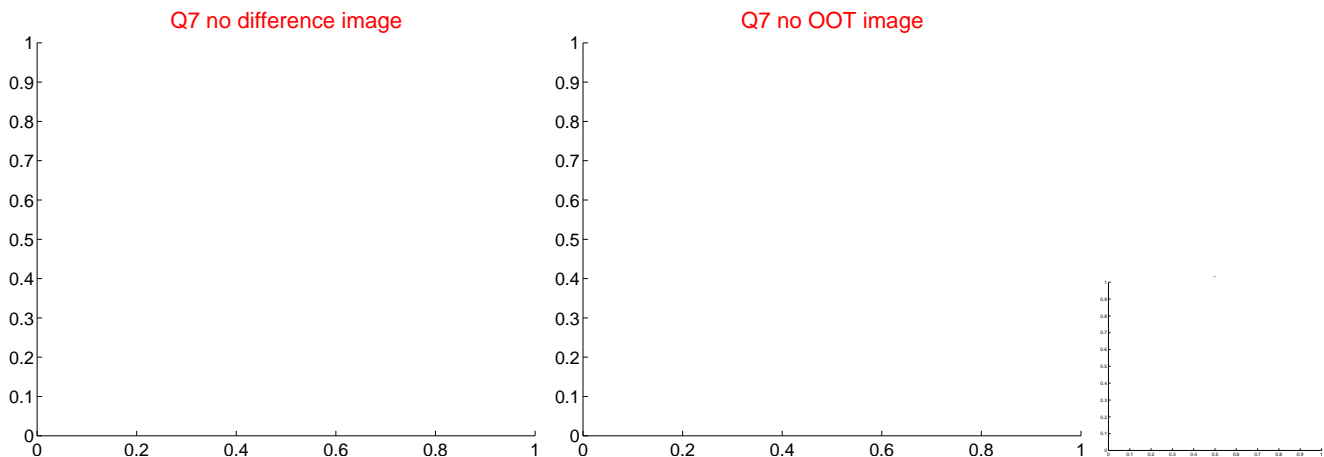
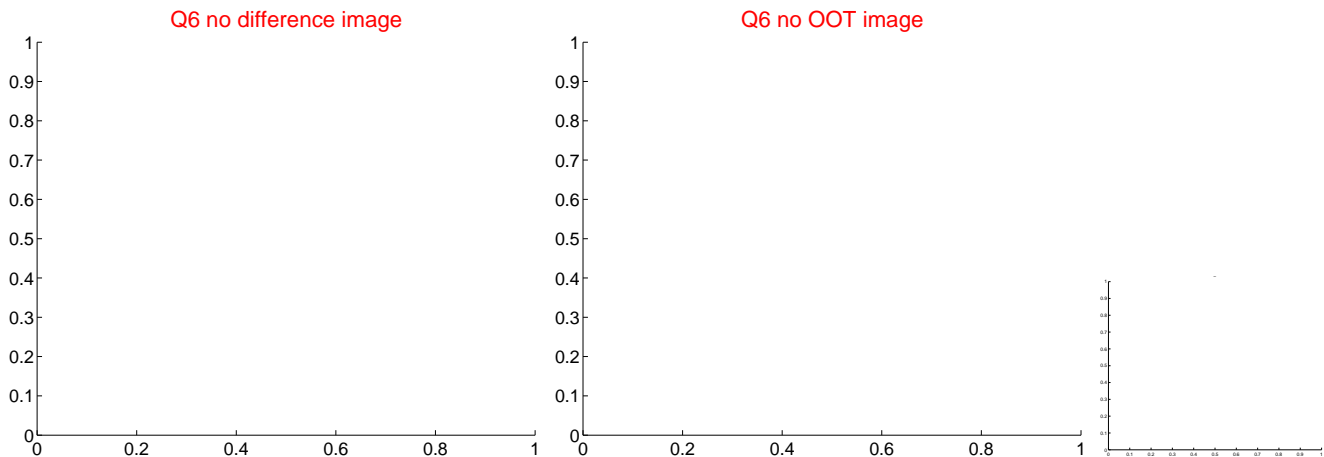
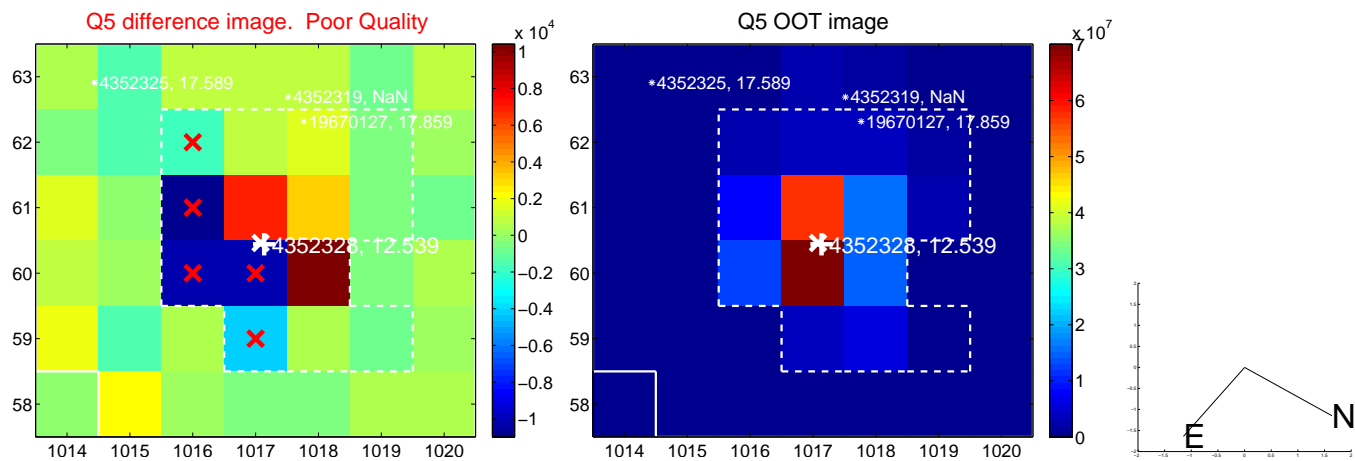


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

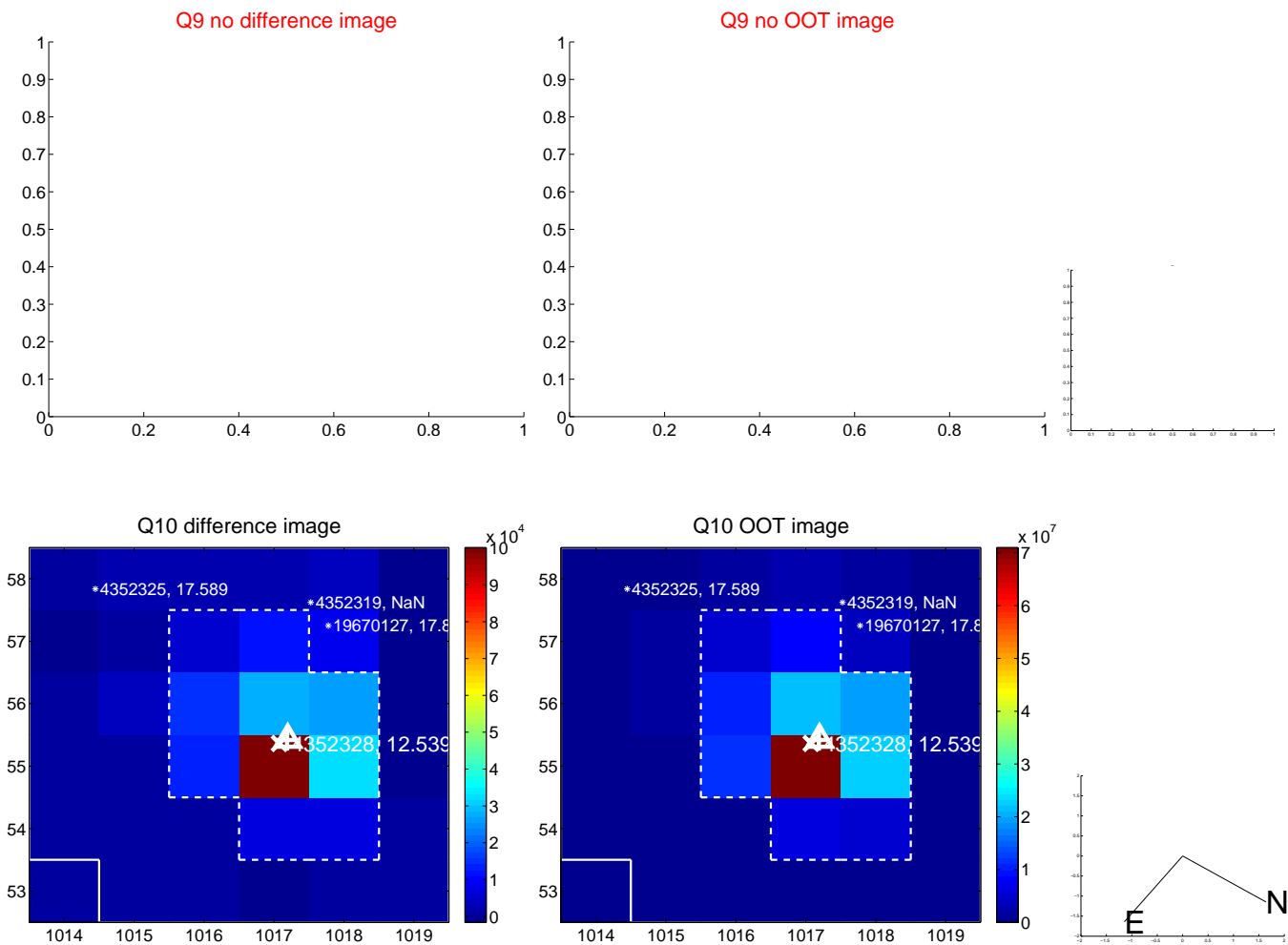
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



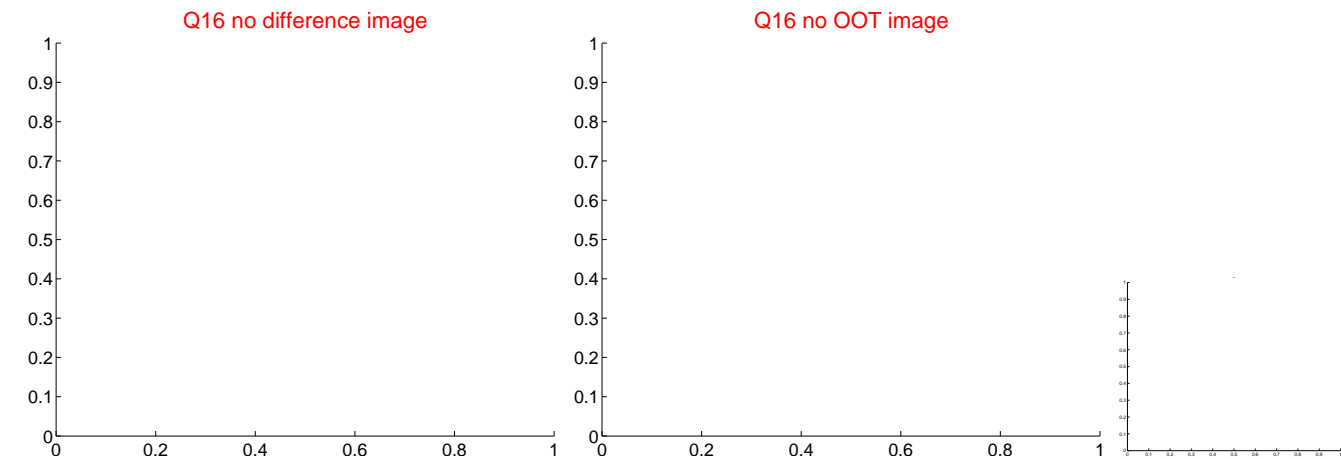
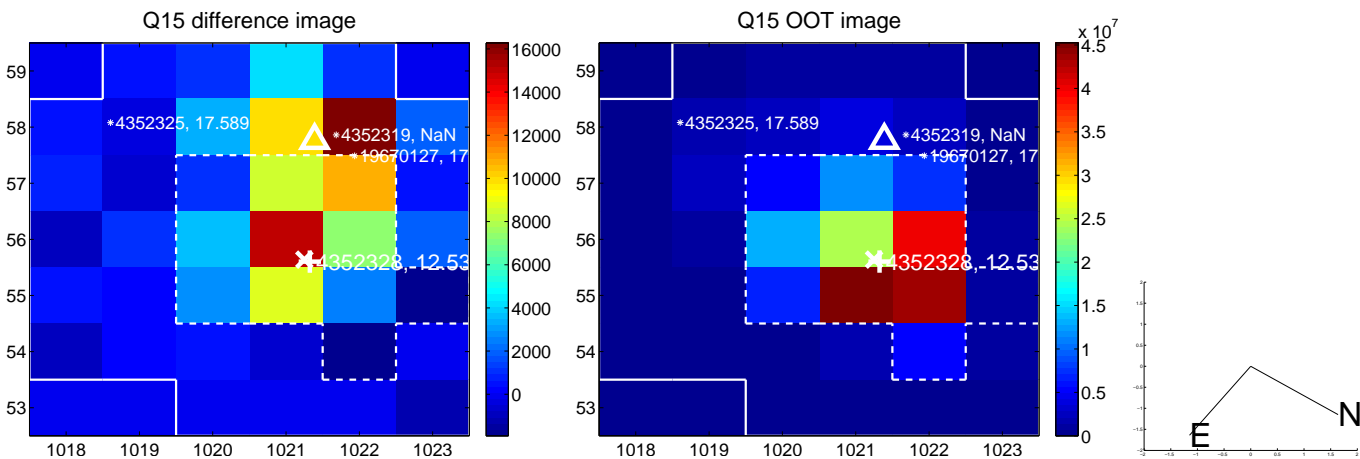
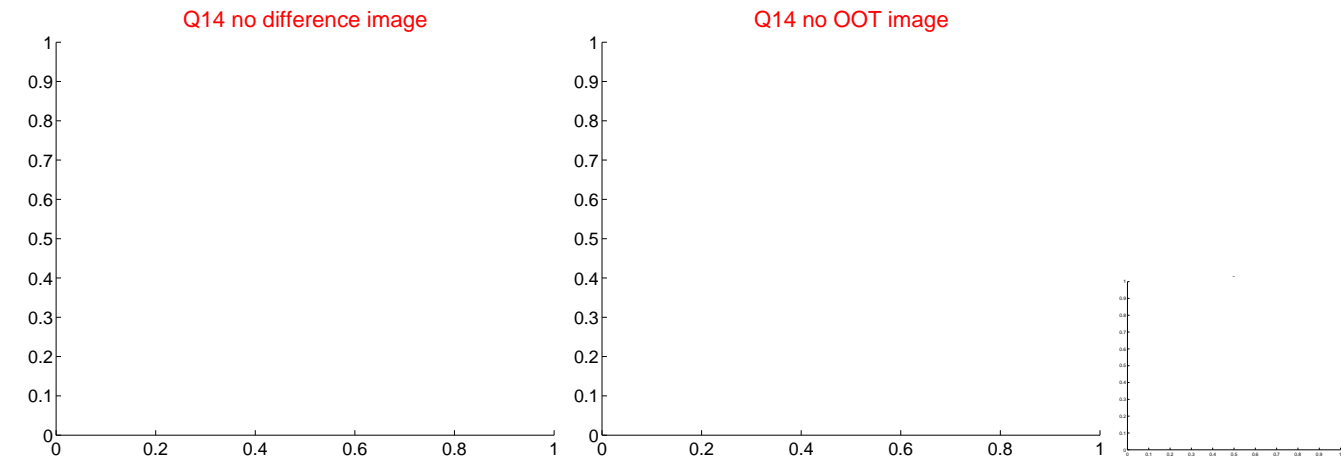
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



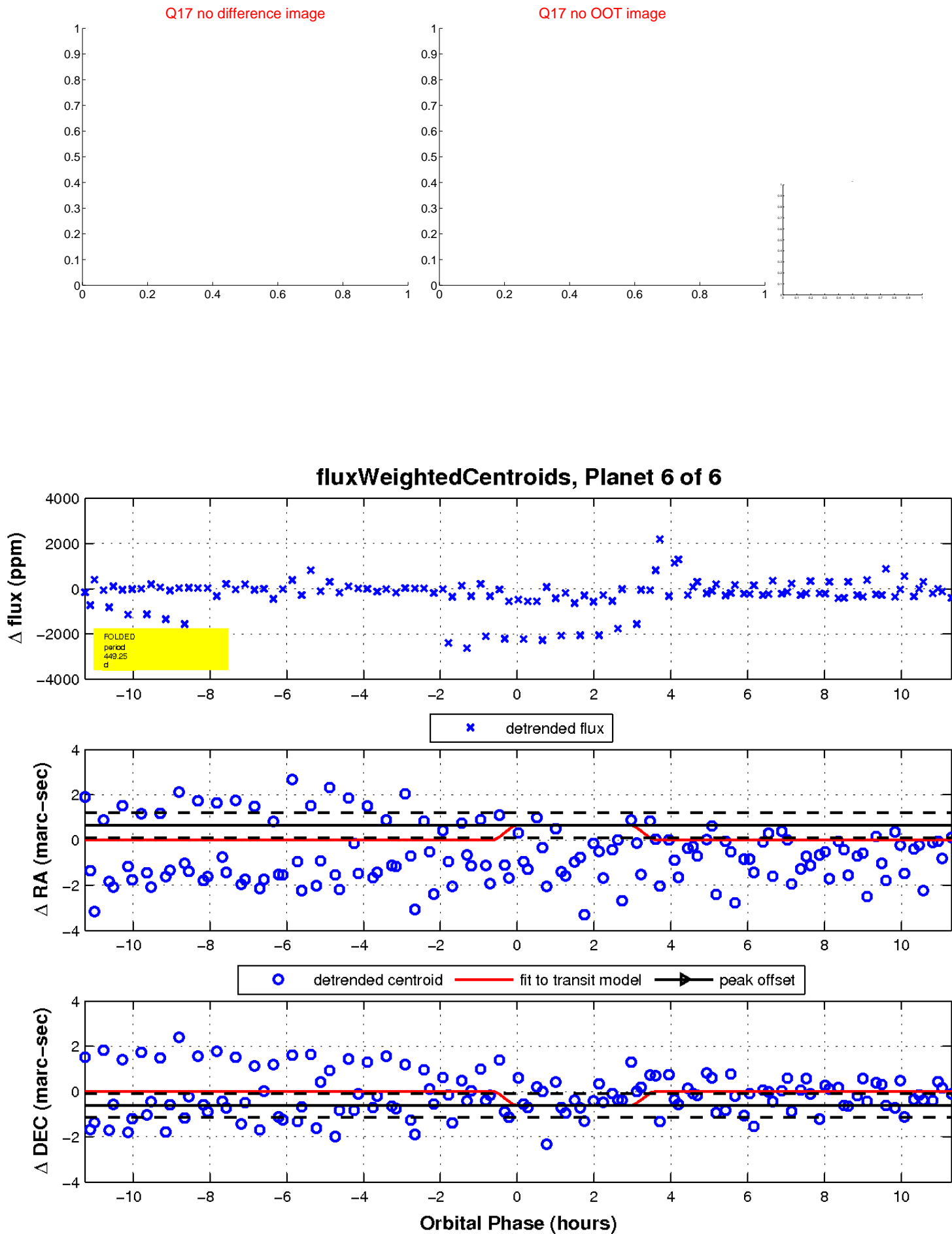
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

