

KIC 012354215

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 012354215-01 | OBS | No | 359.821112 | 251.128640 | 284.2 | 10.617 | 13.1 | 10.4 | 1.83 | 5324 | 3.35 | 2.29 |
| 012354215-02 | OBS | No | 376.863706 | 184.885721 | 257.6 | 15.712 | 8.6 | 9.7 | 1.83 | 5324 | 3.16 | 2.16 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 012354215-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—INCONSISTENT_TRANS—CENT_SATURATED |
| 012354215-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_SATURATED |

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

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

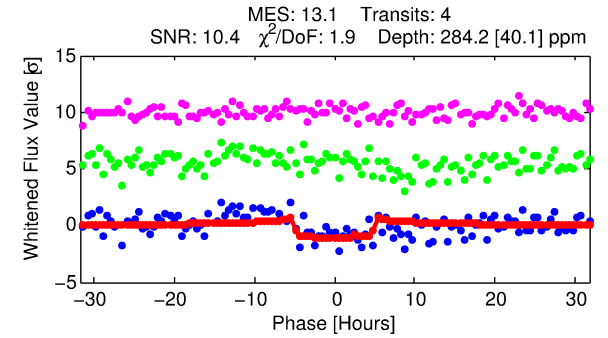
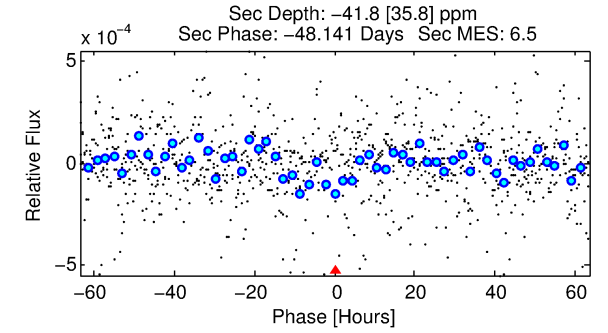
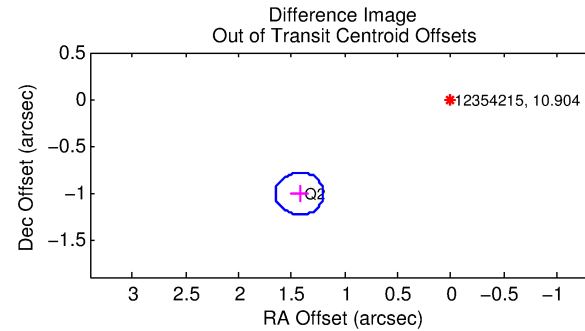
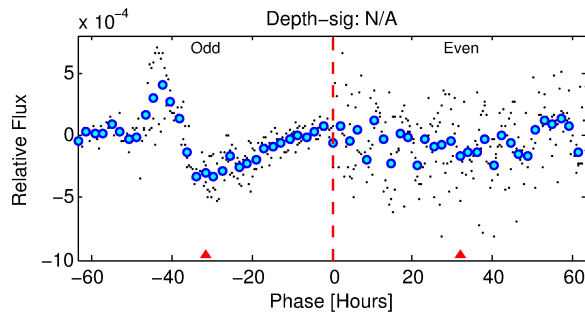
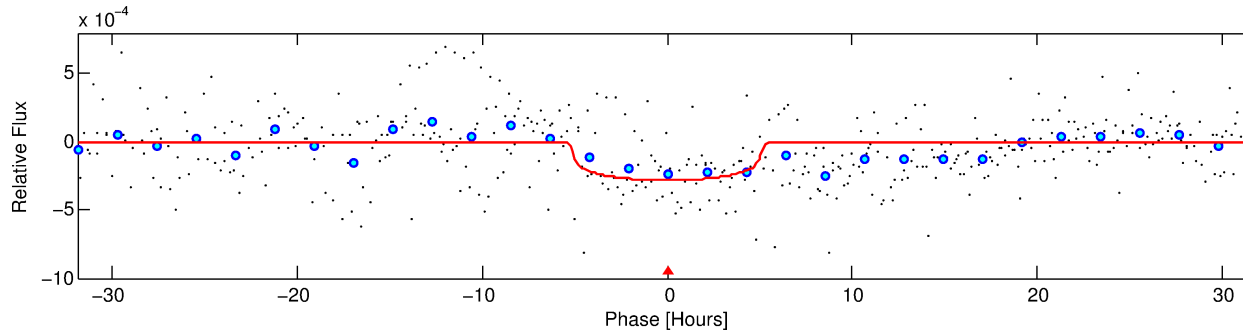
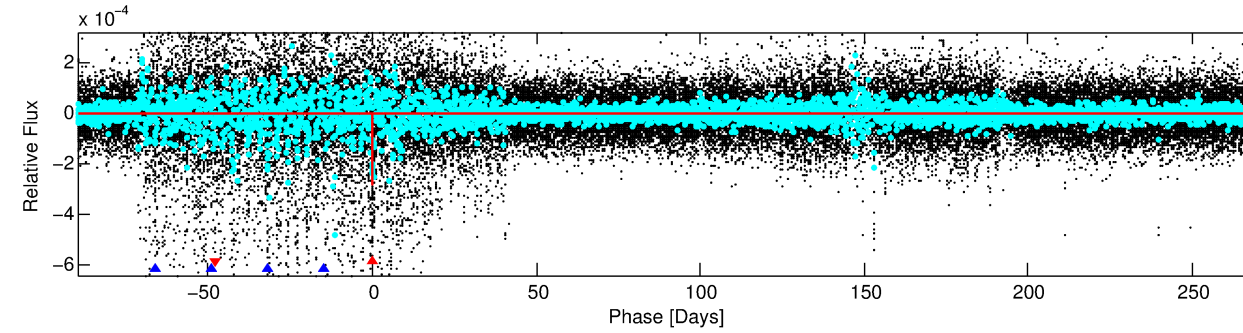
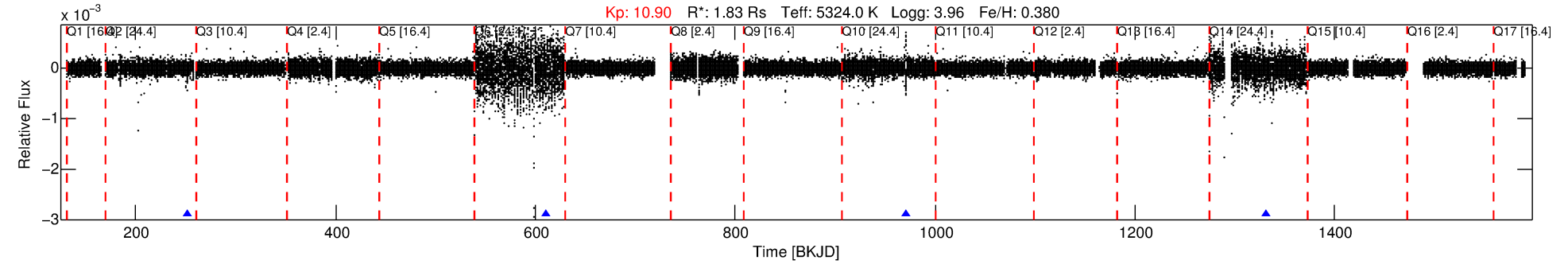
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012354215-01

No Significant Match Found

DV One-Page Summary

KIC: 12354215 Candidate: 1 of 2 Period: 359.821 d



DV Fit Results:

Period = 359.82111 [0.00567] d
Epoch = 251.1286 [0.0110] BKJD
Rp/R* = 0.0168 [0.0065]
a/R* = 179.17 [254.24]
b = 0.74 [0.86]
Seff = 2.29 [2.01]
Teq = 314 [69] K
Rp = 3.35 [2.15] Re
a = 1.0250 [0.5368] AU
Ag = N/A
Teffp = N/A

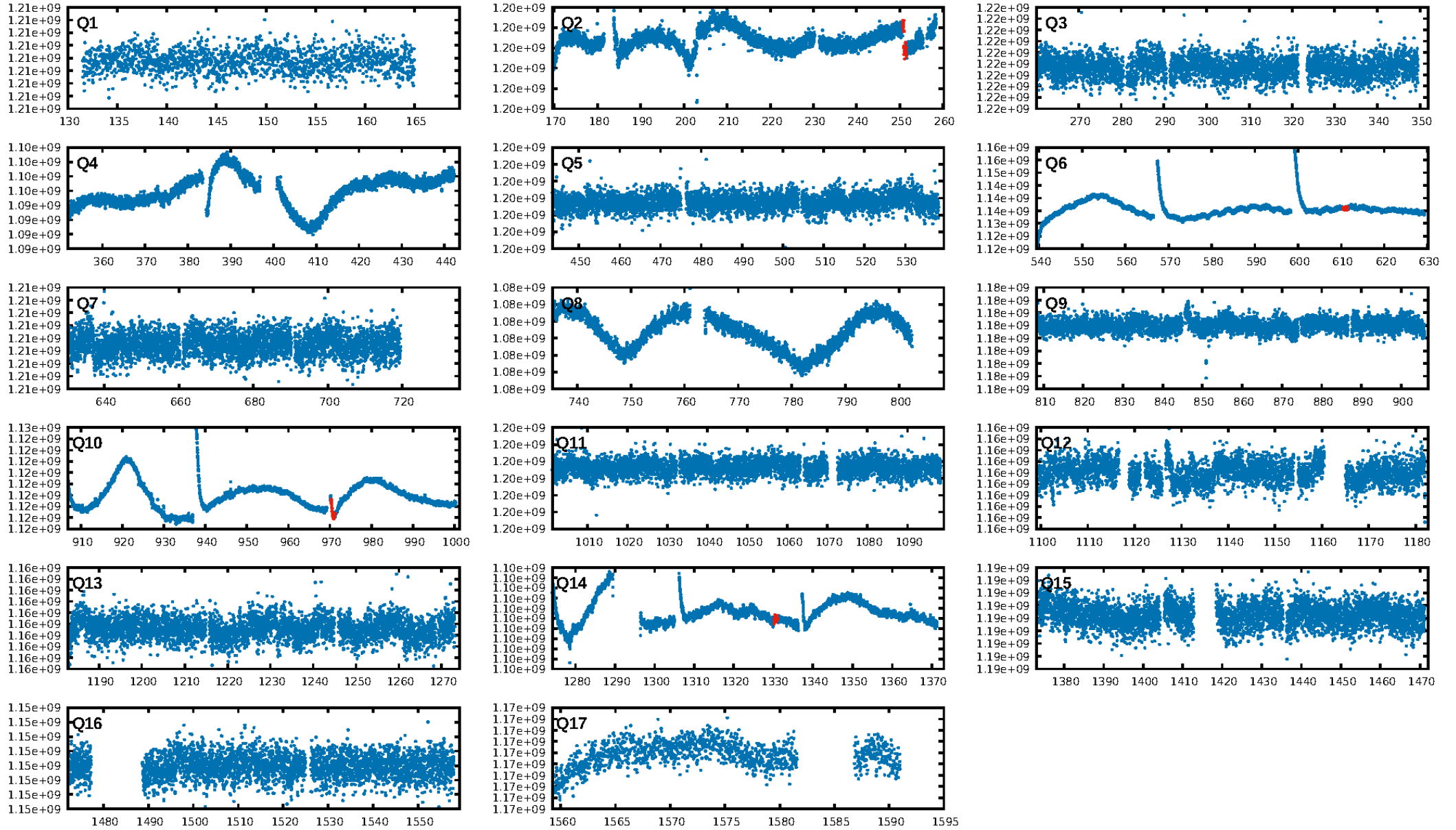
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [21.57σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 12.0%
Bootstrap-pfa: 1.76e-19
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: N/A
Centroid-sig: 30.1%
Centroid-so: 1.534 arcsec [1.21σ]
OotOffset-rm: 1.744 arcsec [23.05σ]
KicOffset-rm: 1.651 arcsec [21.83σ]
OotOffset-st: 1/0/0/0 [1]
KicOffset-st: 1/0/0/0 [1]
DiffImageQuality-fgm: 1.00 [1/1]
DiffImageOverlap-fno: 1.00 [3/3]

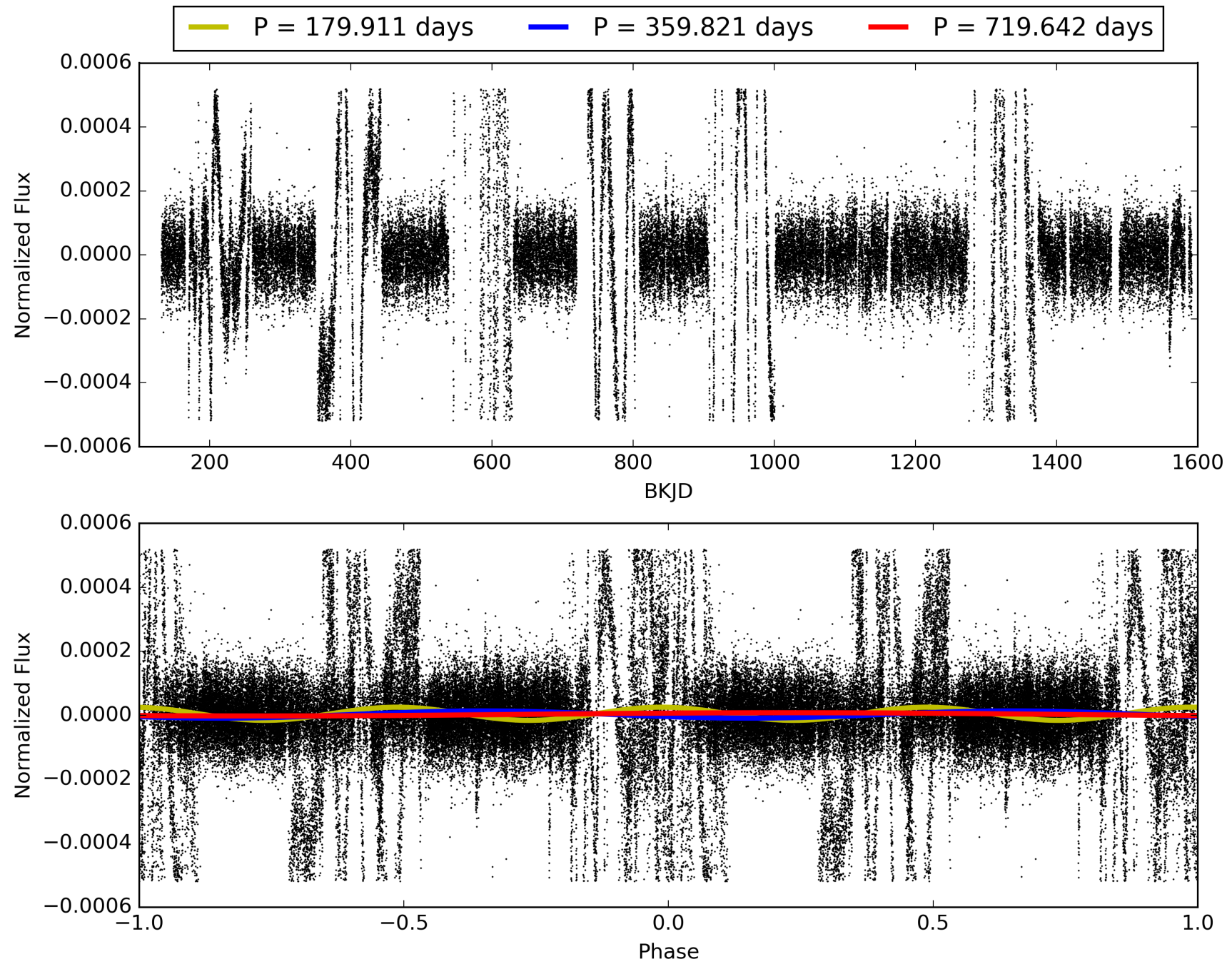
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:37:33 Z

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

TCE 012354215-01, PDC Light Curves

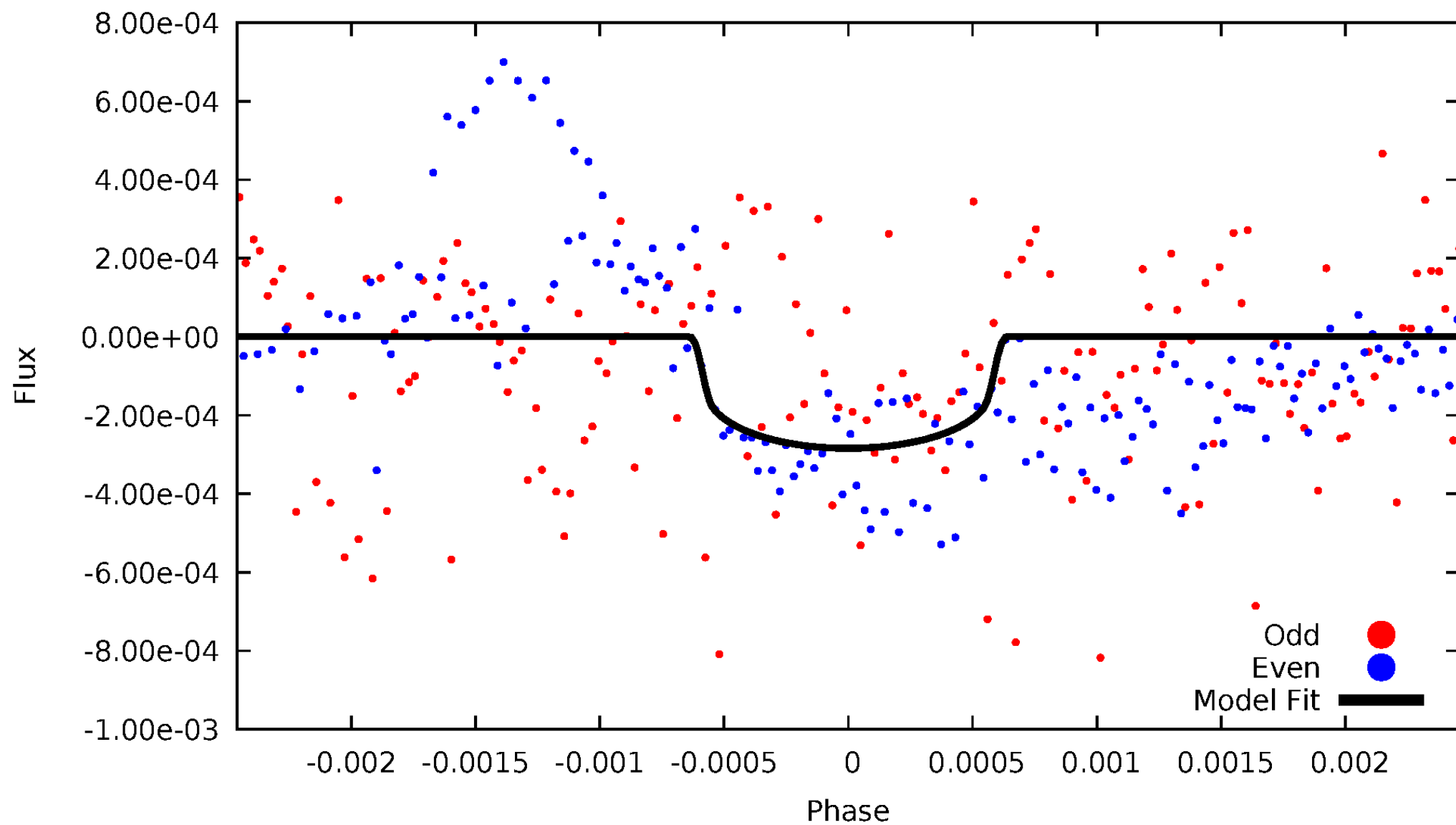


TCE 012354215-01



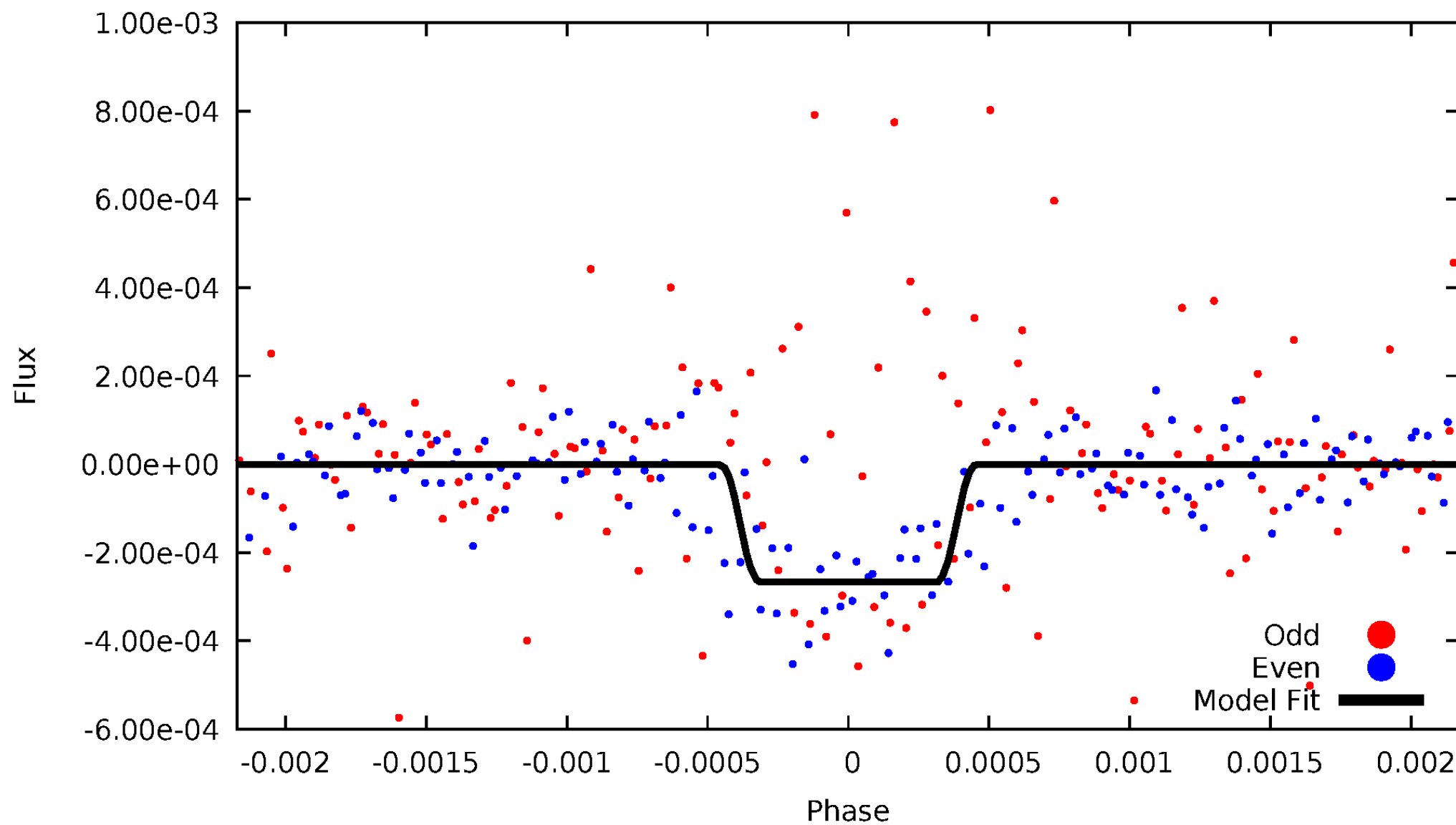
DV Odd/Even

TCE 012354215-01

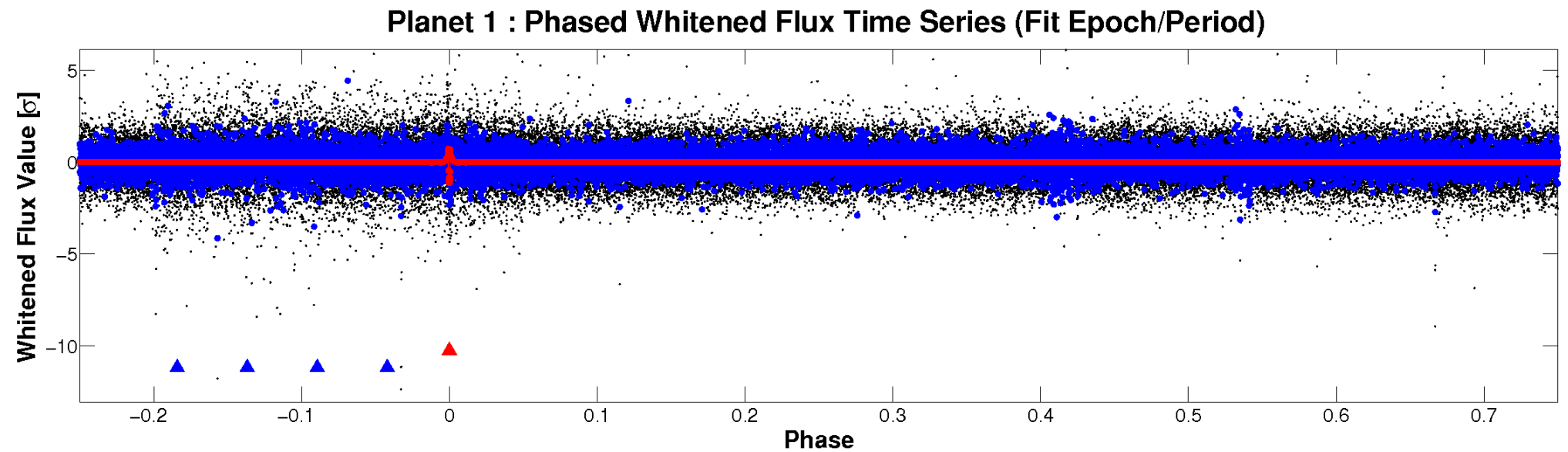
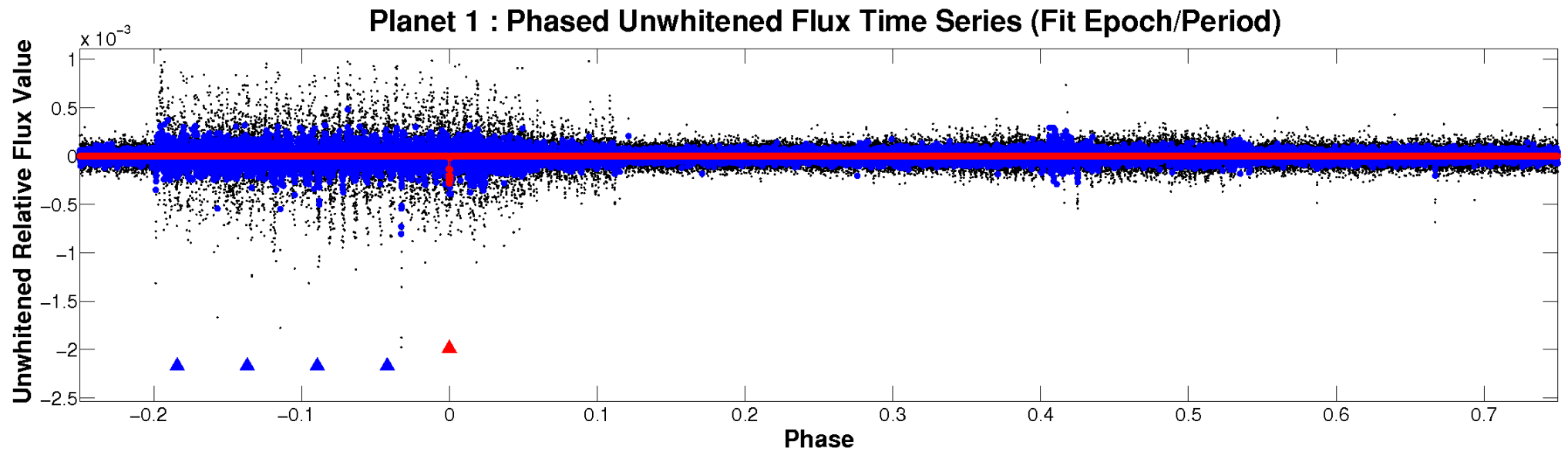


ALT Odd/Even

TCE 012354215-01

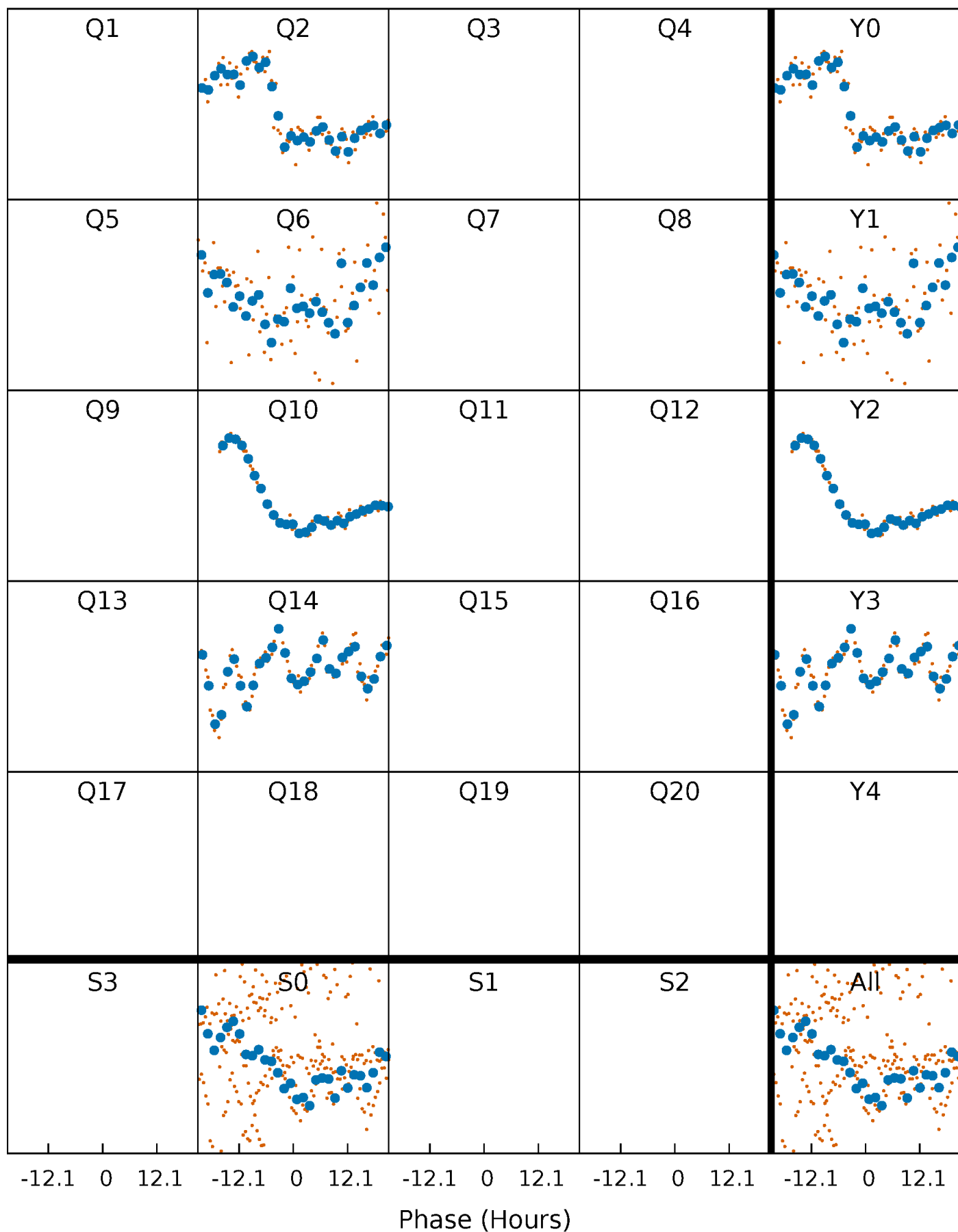


Non-Whitened Vs. Whitened Light Curve



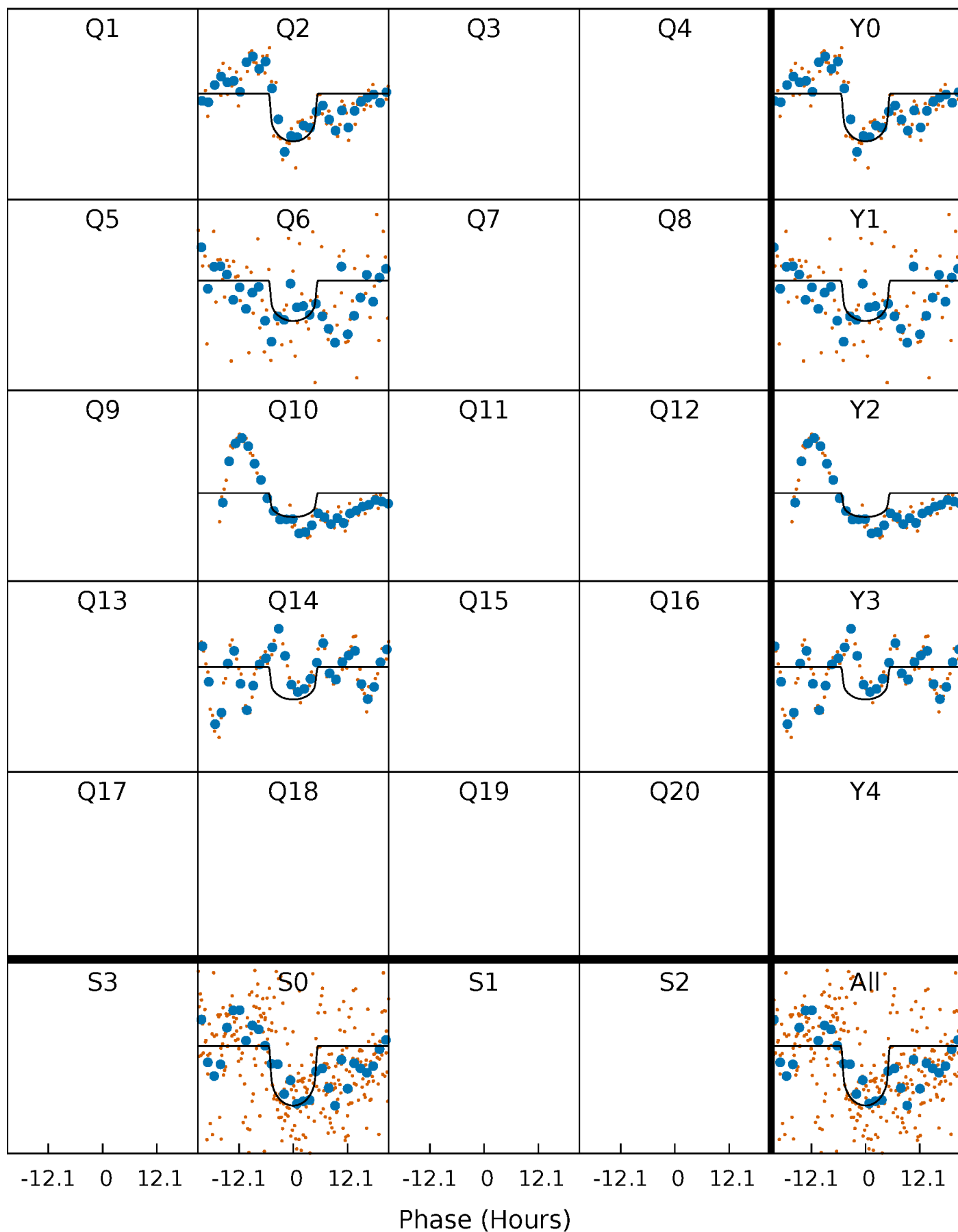
PDC Quarter-Phased Transit Curves

TCE 012354215-01 P=359.821112 Days $T_0=251.128640$ (BKJD)



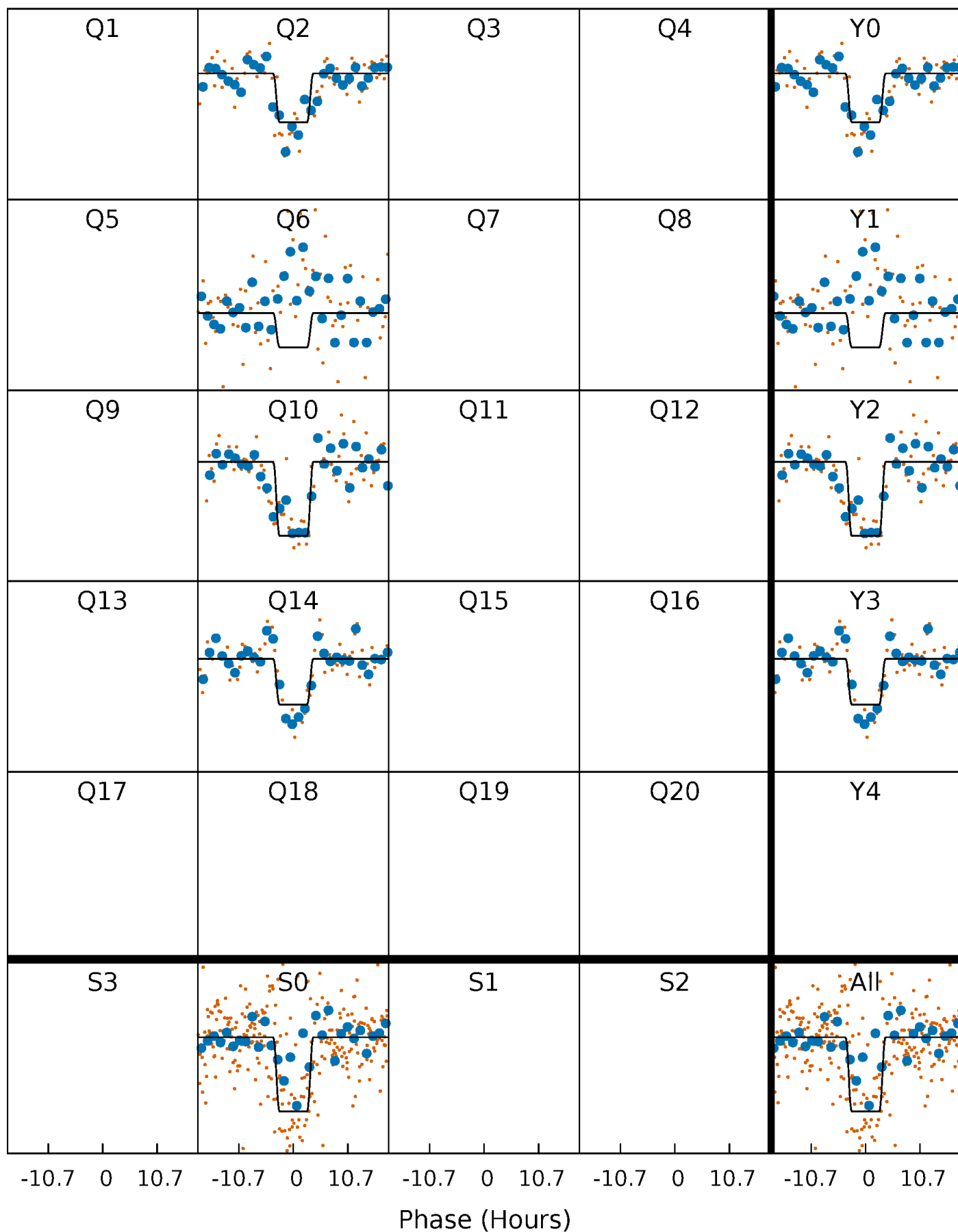
DV Quarter-Phased Transit Curves

TCE 012354215-01 P=359.821112 Days $T_0=251.128640$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

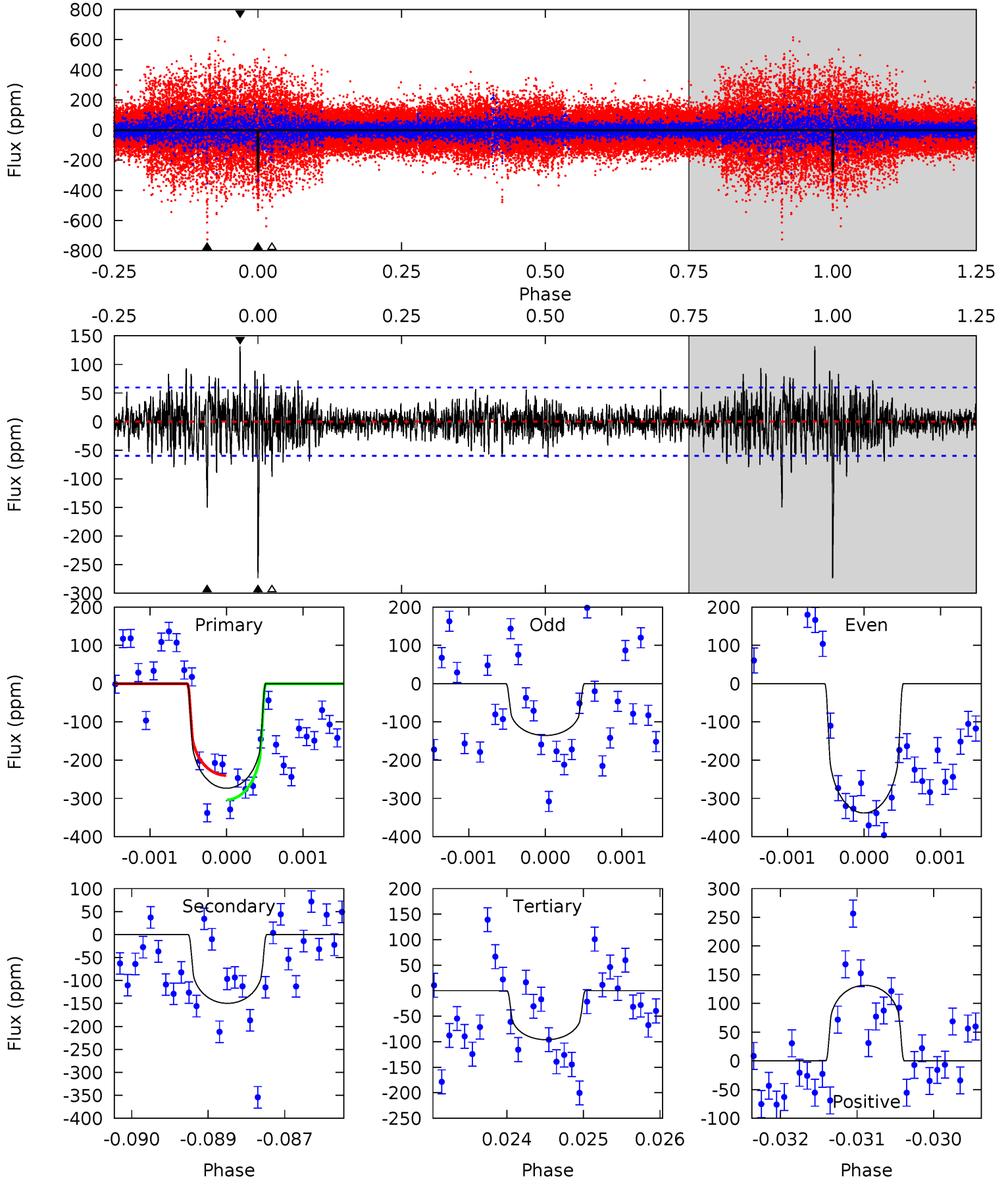
TCE 012354215-01 P=359.848614 Days $T_0=251.100812$ (BKJD)



DV Model-Shift Uniqueness Test

012354215-01, P = 359.821112 Days, E = 251.128640 Days

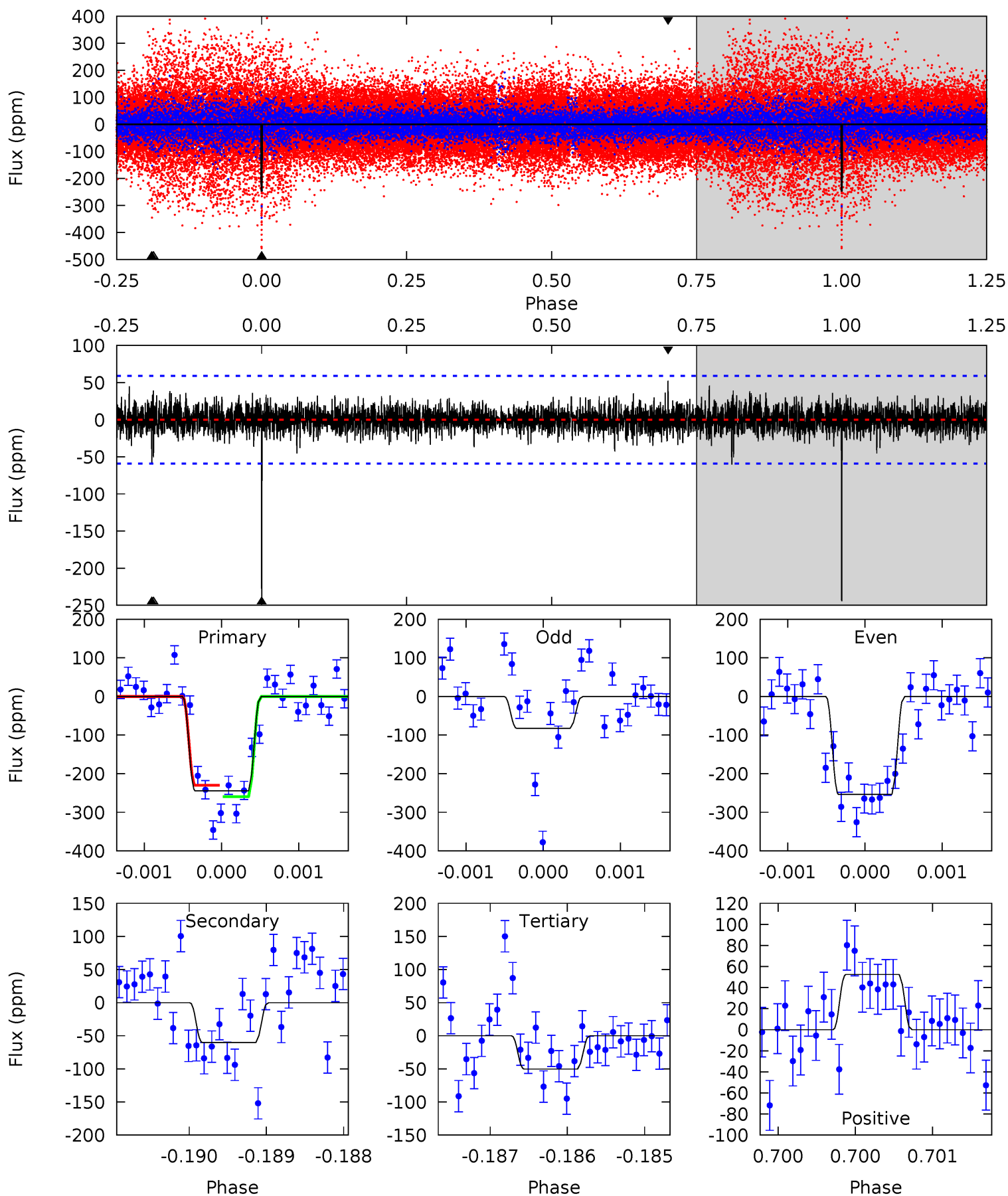
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 24.8 | 13.6 | 8.72 | 11.9 | 5.41 | 3.23 | 1.93 | 16.1 | 12.9 | 4.87 | 1.66 | 8.26 | 0.93 | 0.32 | 2.88 |



Alt Model-Shift Uniqueness Test

012354215-01, P = 359.848614 Days, E = 251.100812 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 22.6 | 5.58 | 4.66 | 4.85 | 5.47 | 3.32 | 1.04 | 18.0 | 17.8 | 0.92 | 0.73 | 5.59 | 0.48 | 0.18 | 0 |



Stellar Parameters For KIC 012354215

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 5324^{+186}_{-168} | $3.958^{+0.517}_{-0.172}$ | $0.380^{+0.100}_{-0.250}$ | $1.830^{+0.505}_{-0.938}$ | $1.107^{+0.142}_{-0.213}$ | $0.255^{+1.455}_{-0.120}$ |
| | +3%/-3% | +13%/-4% | +26%/-66% | +28%/-51% | +13%/-19% | +572%/-47% |
| Source | PHO54 | PHO54 | PHO54 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 012354215-01 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|---------------|------------------------|-------------------|-----------------------|-------------------------|
| DV | -150 ± 11 | $3.02^{+1.55}_{-1.33}$ | 432^{+42}_{-57} | 4706^{+1208}_{-587} | 9479^{+19599}_{-5293} |
| Alt. | -60 ± 11 | $2.86^{+1.53}_{-1.20}$ | 432^{+41}_{-56} | 4021^{+786}_{-493} | 4144^{+8155}_{-2380} |

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

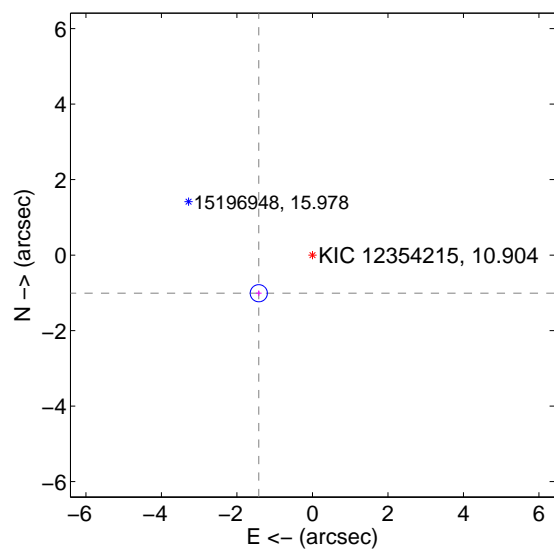
Supplemental centroid analysis for 012354215-01. **Kepler magnitude: 10.90.** Transit SNR 10.37

There are 1 quarters with good PRF difference image offsets

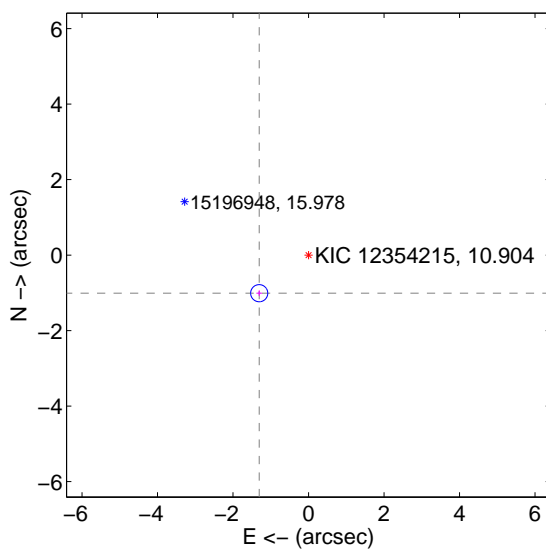
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|-------------------------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 1.744 \pm 0.076 | 23.05 | 1.421 \pm 0.076 | -1.010 \pm 0.075 |
| PRF-fit source offset from KIC position | 1.651 \pm 0.076 | 21.83 | 1.307 \pm 0.076 | -1.009 \pm 0.075 |
| photometric centroid source offset | 1.53 \pm 1.27 | 1.21 | 0.35 \pm 0.91 | 1.49 \pm 1.29 |

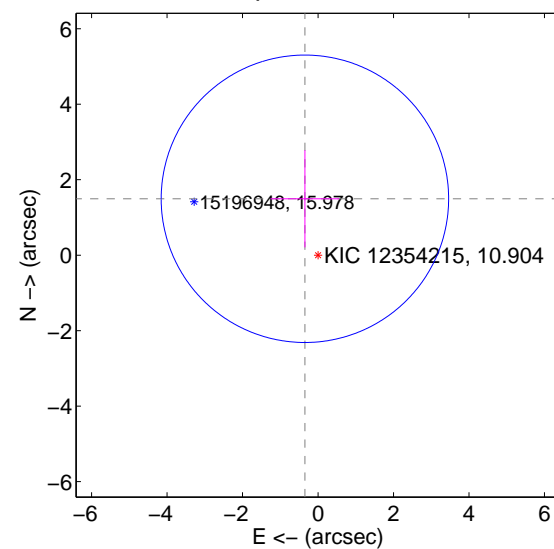
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

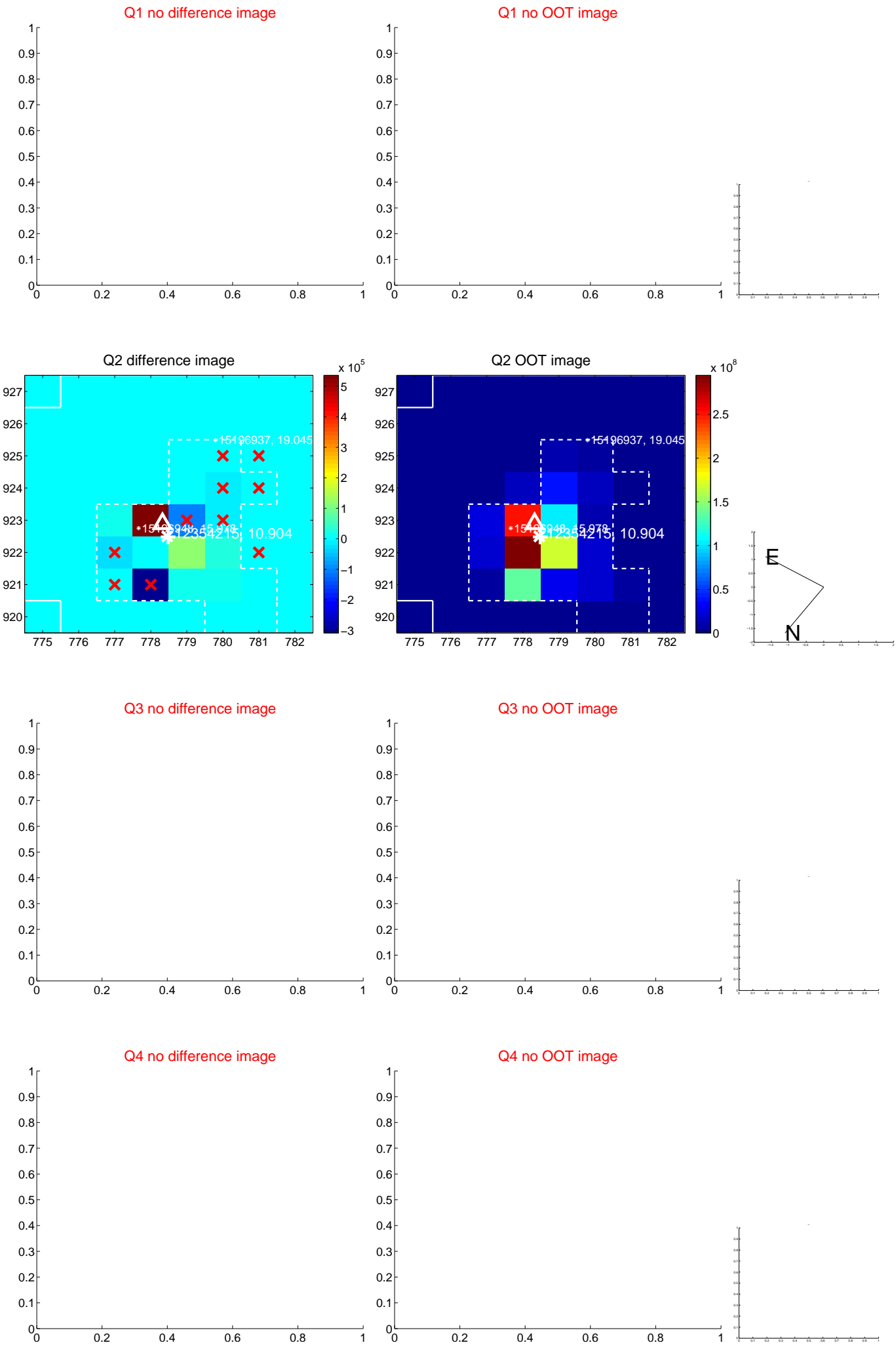


offset from photometric centroids

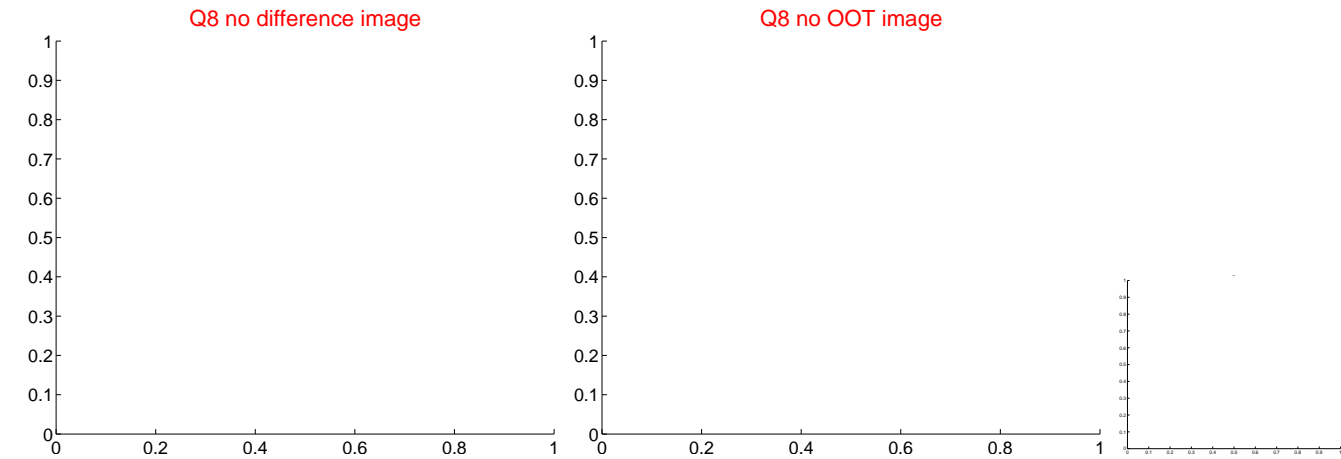
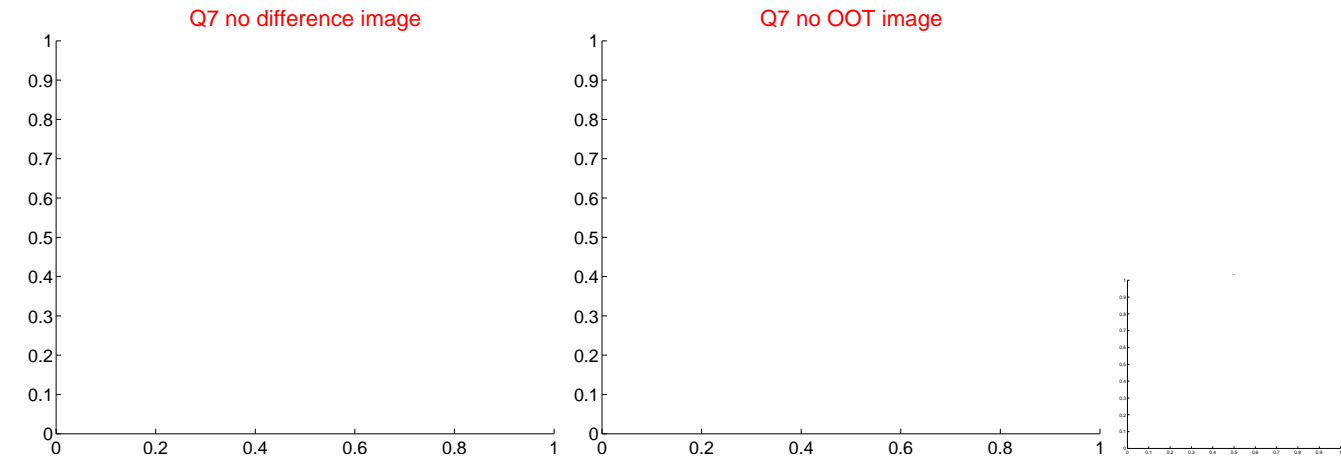
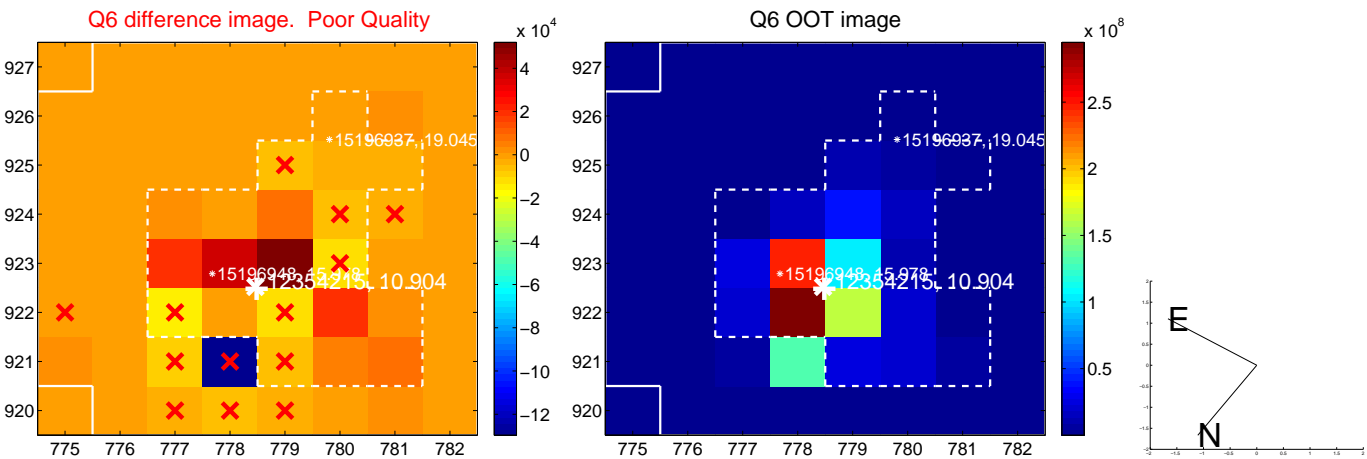
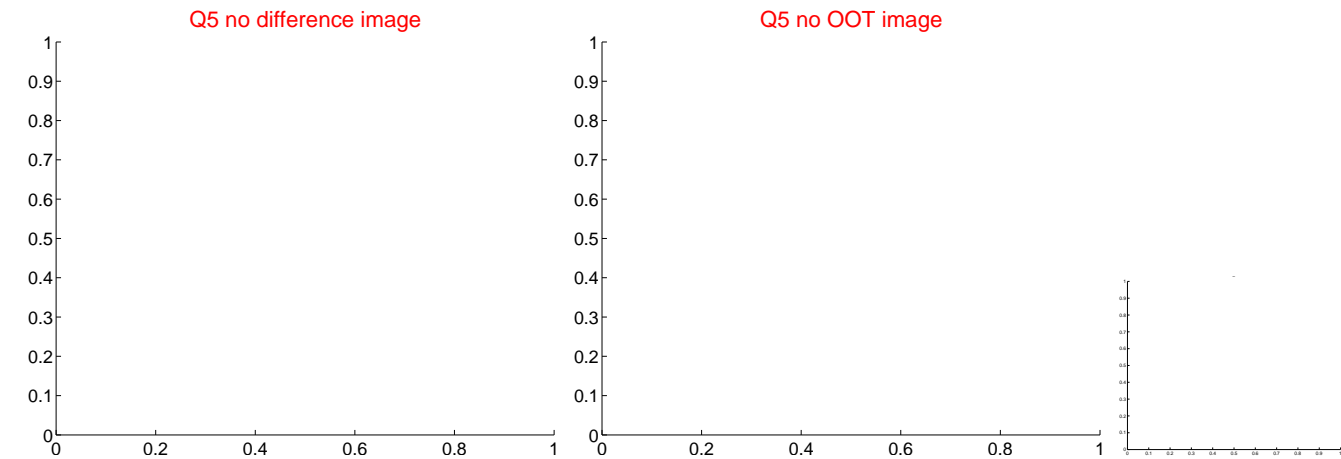


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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



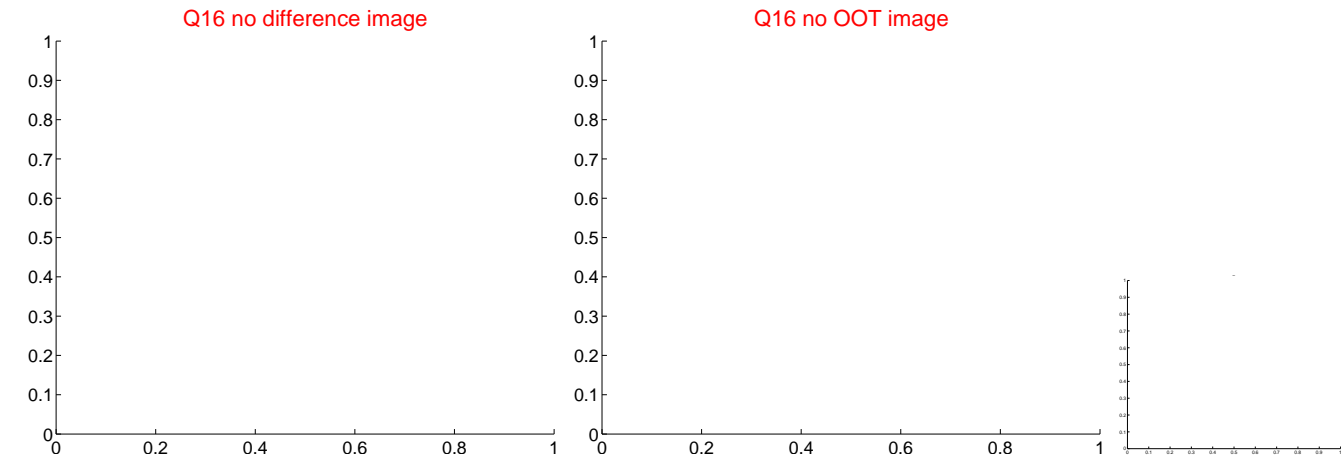
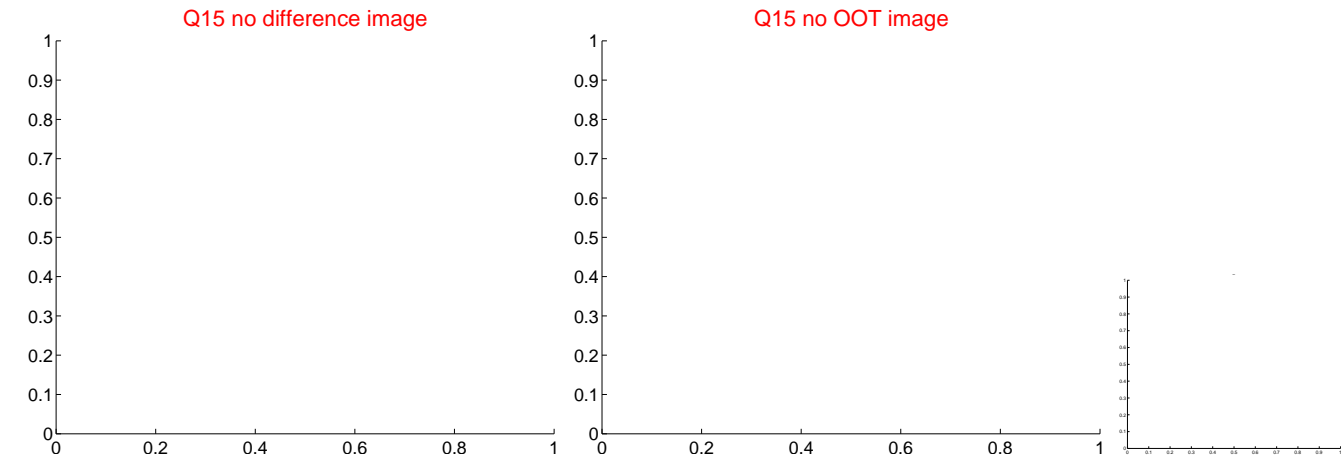
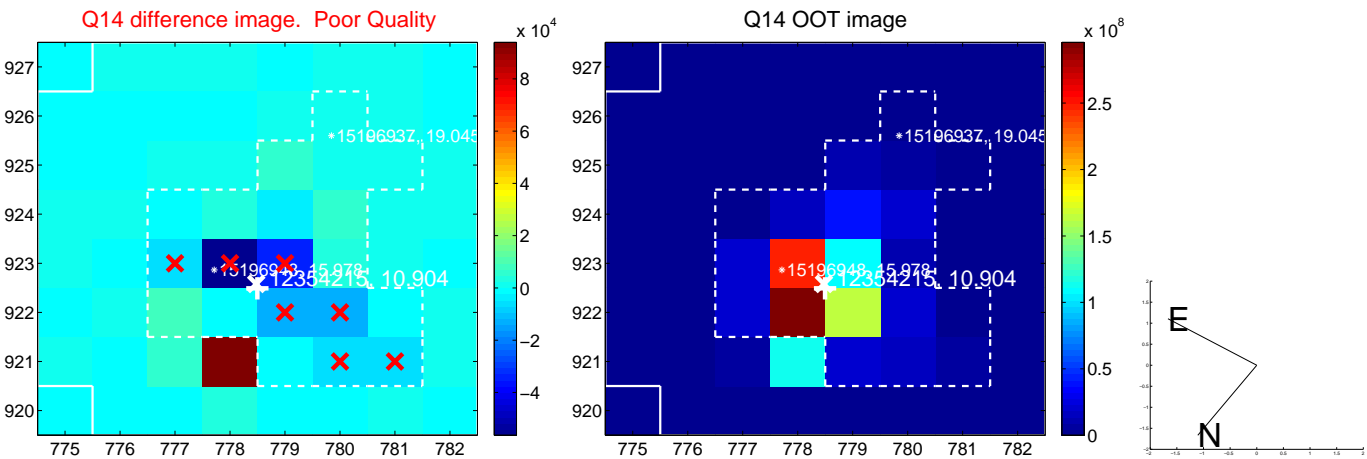
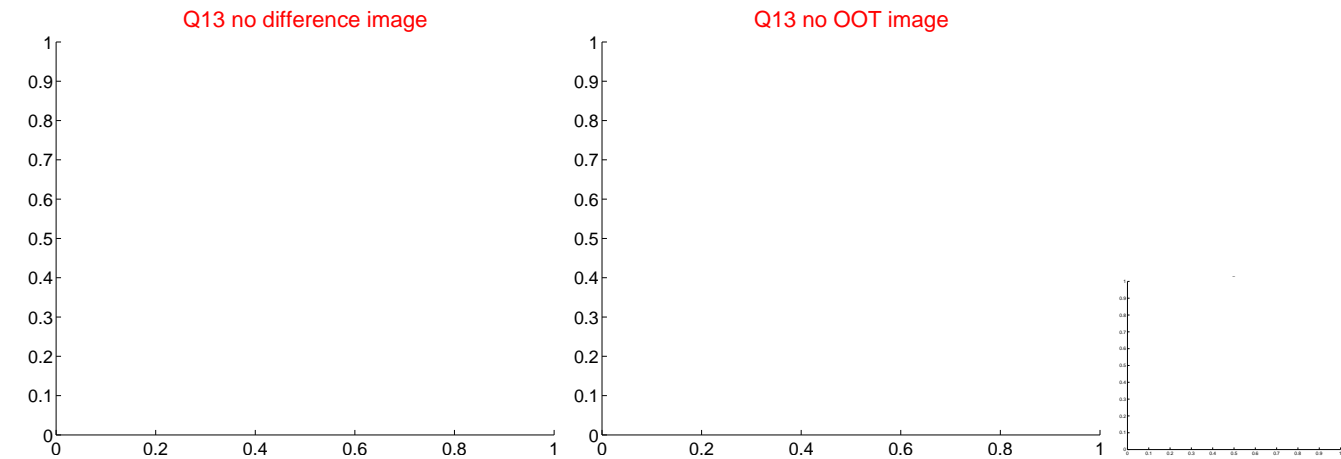
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



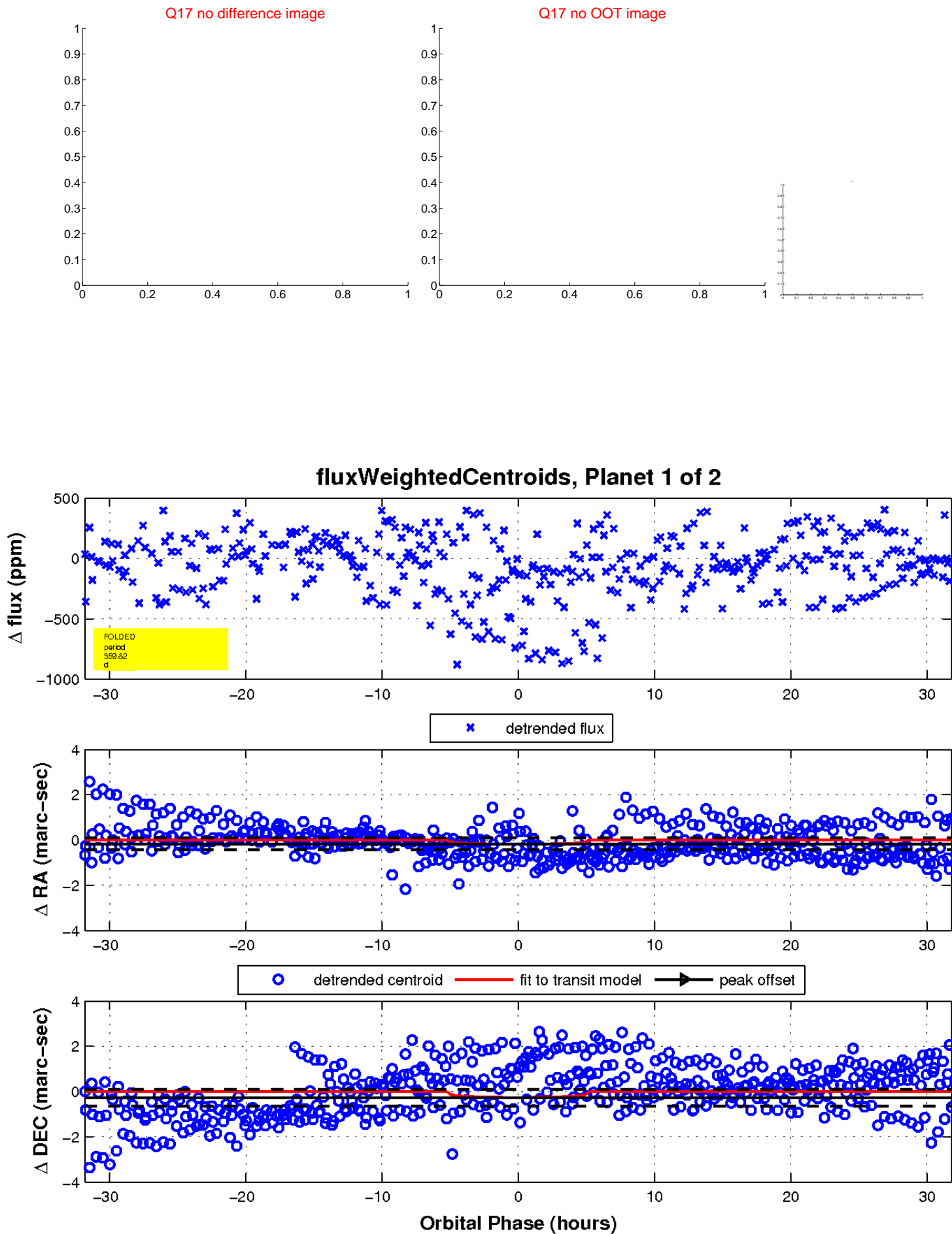
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



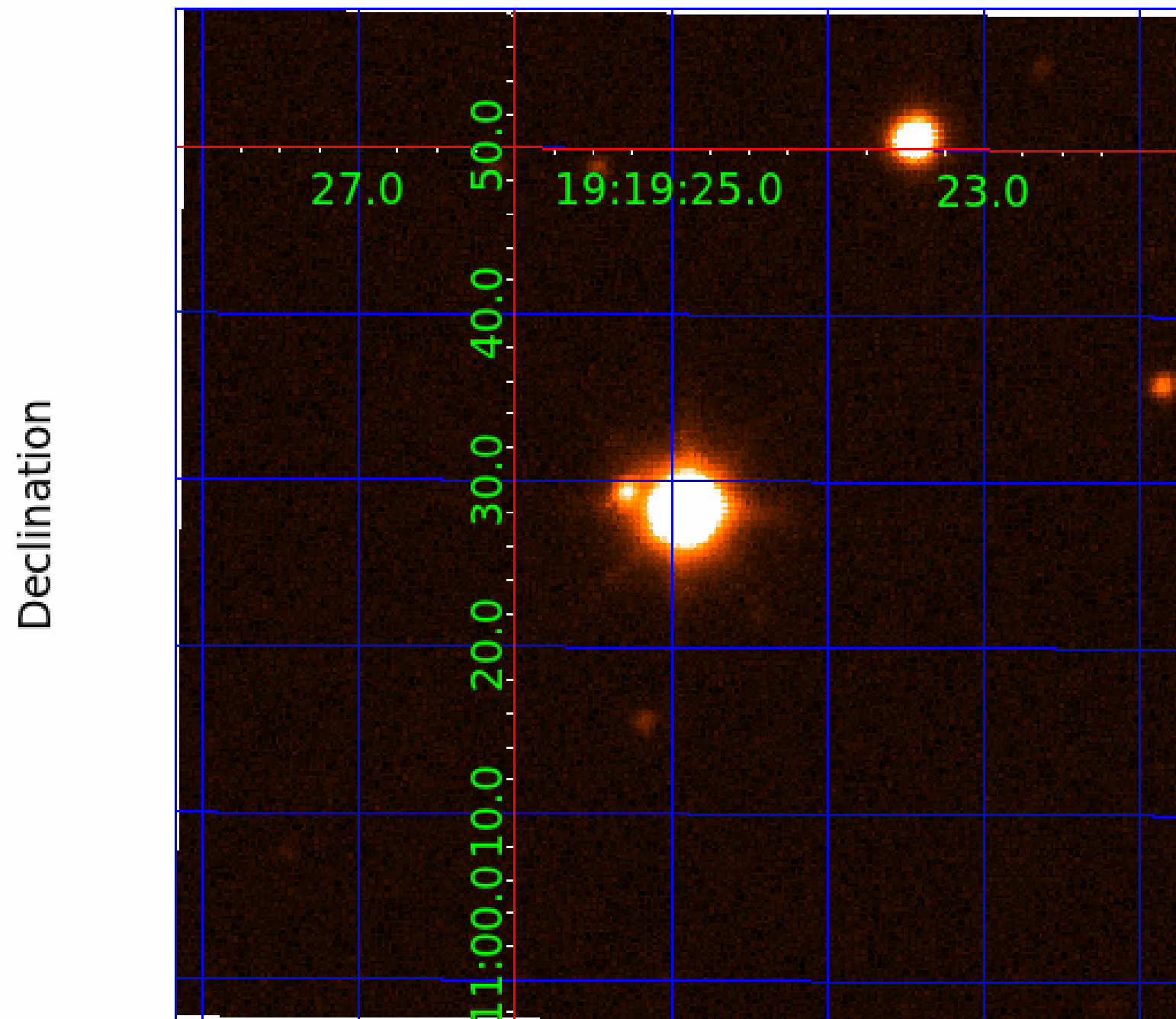
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 012354215

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 012354215-01 | OBS | No | 359.821112 | 251.128640 | 284.2 | 10.617 | 13.1 | 10.4 | 1.83 | 5324 | 3.35 | 2.29 |
| 012354215-02 | OBS | No | 376.863706 | 184.885721 | 257.6 | 15.712 | 8.6 | 9.7 | 1.83 | 5324 | 3.16 | 2.16 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 012354215-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—INCONSISTENT_TRANS—CENT_SATURATED |
| 012354215-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—INCONSISTENT_TRANS—CENT_SATURATED |

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

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

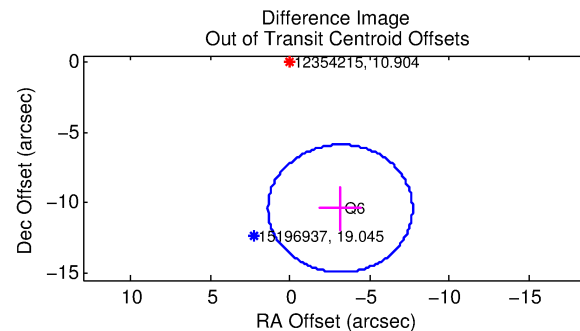
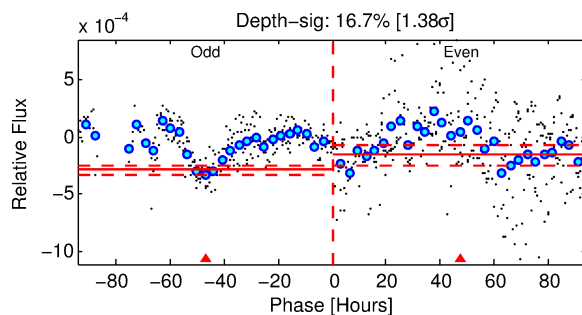
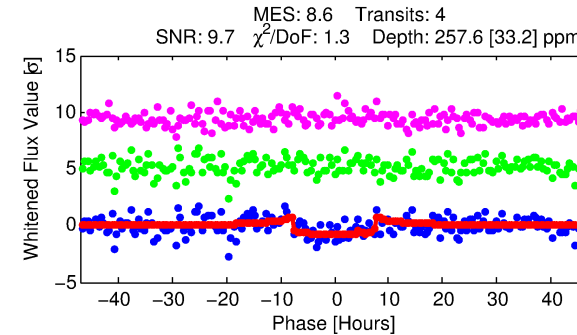
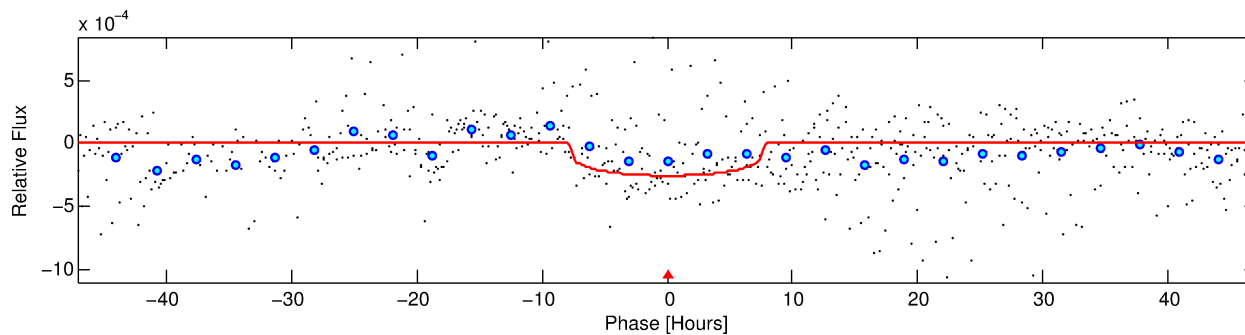
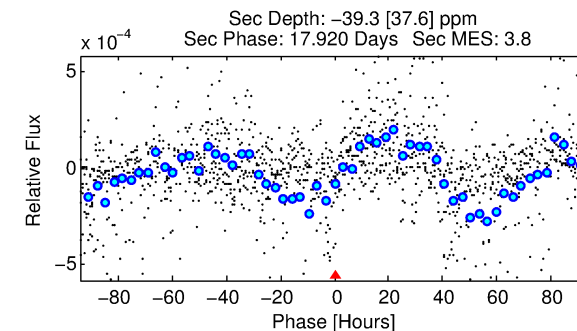
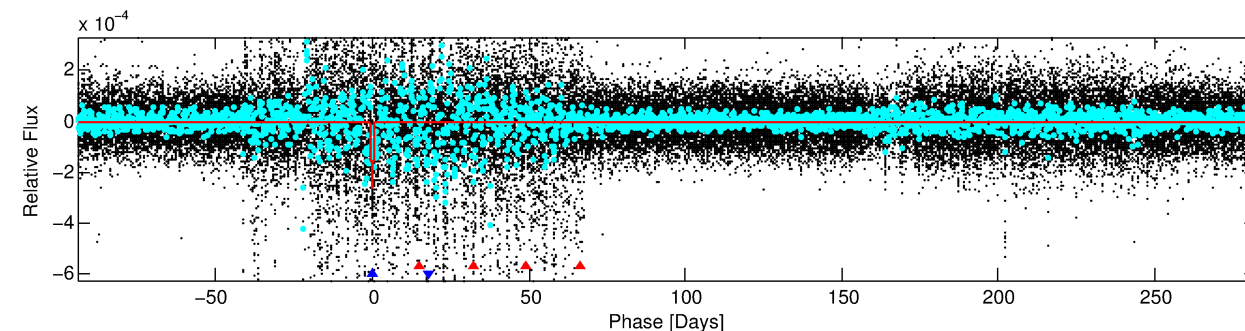
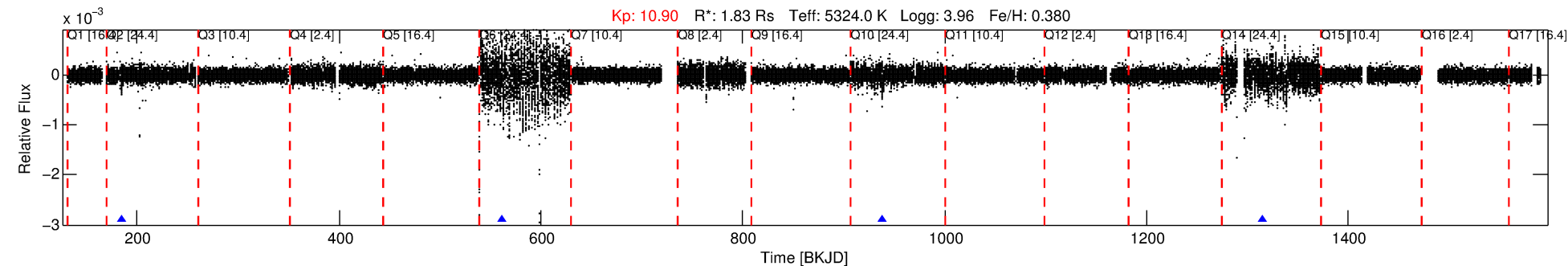
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012354215-02

No Significant Match Found

DV One-Page Summary

KIC: 12354215 Candidate: 2 of 2 Period: 376.864 d



DV Fit Results:

Period = 376.86371 [0.00716] d
Epoch = 184.8857 [0.0127] BKJD
Rp/R* = 0.0158 [0.0034]
a/R* = 130.31 [97.28]
b = 0.73 [0.49]
Seff = 2.16 [1.89]
Teq = 309 [68] K
Rp = 3.16 [1.75] Re
a = 1.0571 [0.5536] AU
Ag = N/A
Teffp = N/A

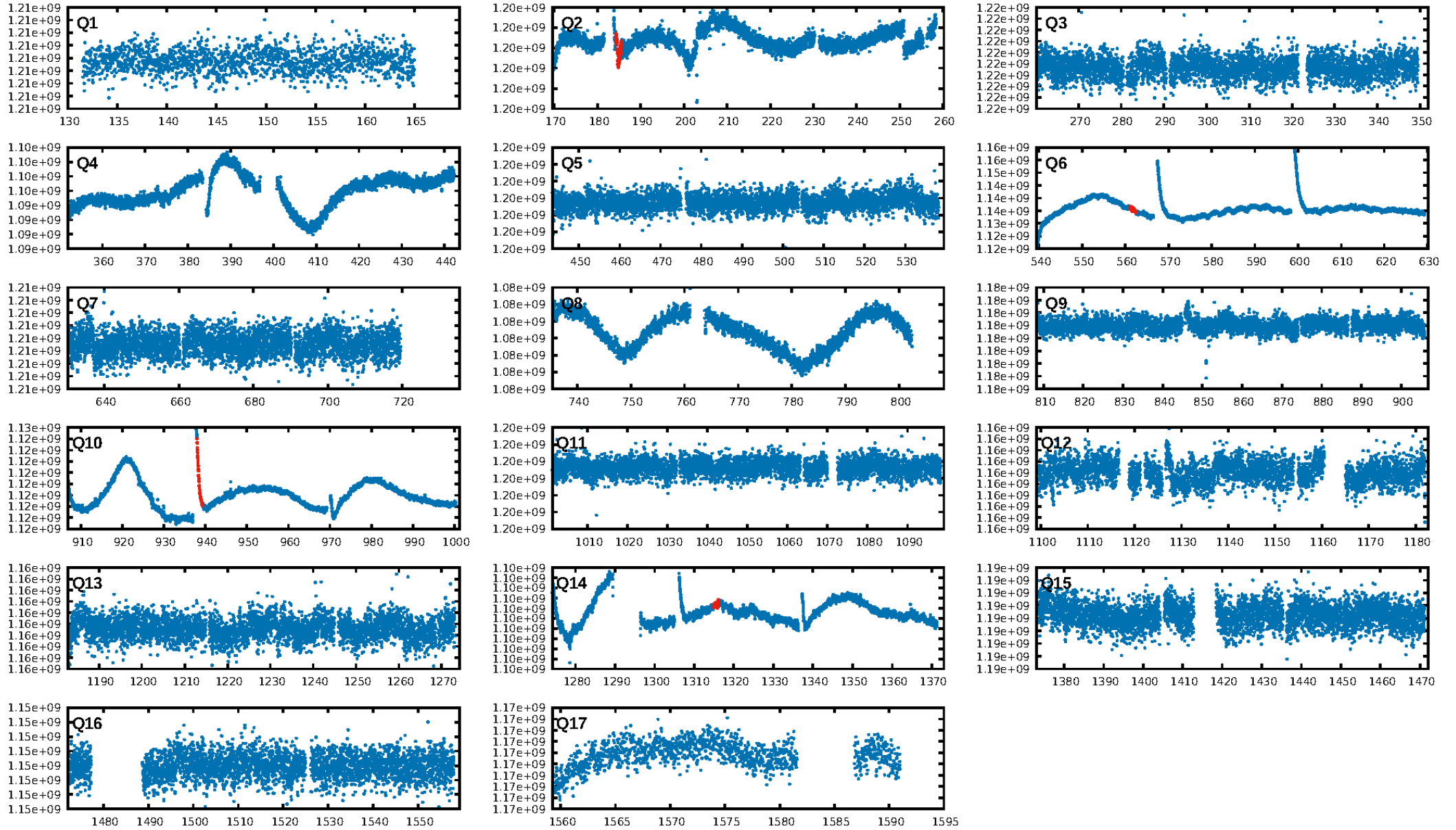
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [21.57σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 8.7%
ModelChiSquareGof-sig: 76.1%
Bootstrap-pfa: 2.11e-10
RollingBand-fgt: 1.00 [4/4]
GhostDiagnostic-chr: N/A
Centroid-sig: 9.5%
Centroid-so: 1.245 arcsec [0.82σ]
OotOffset-rm: 10.883 arcsec [7.19σ]
KicOffset-rm: 10.560 arcsec [6.99σ]
OotOffset-st: 1/0/0/0 [1]
KicOffset-st: 1/0/0/0 [1]
DiffImageQuality-fgm: 0.00 [0/1]
DiffImageOverlap-fno: 1.00 [2/2]

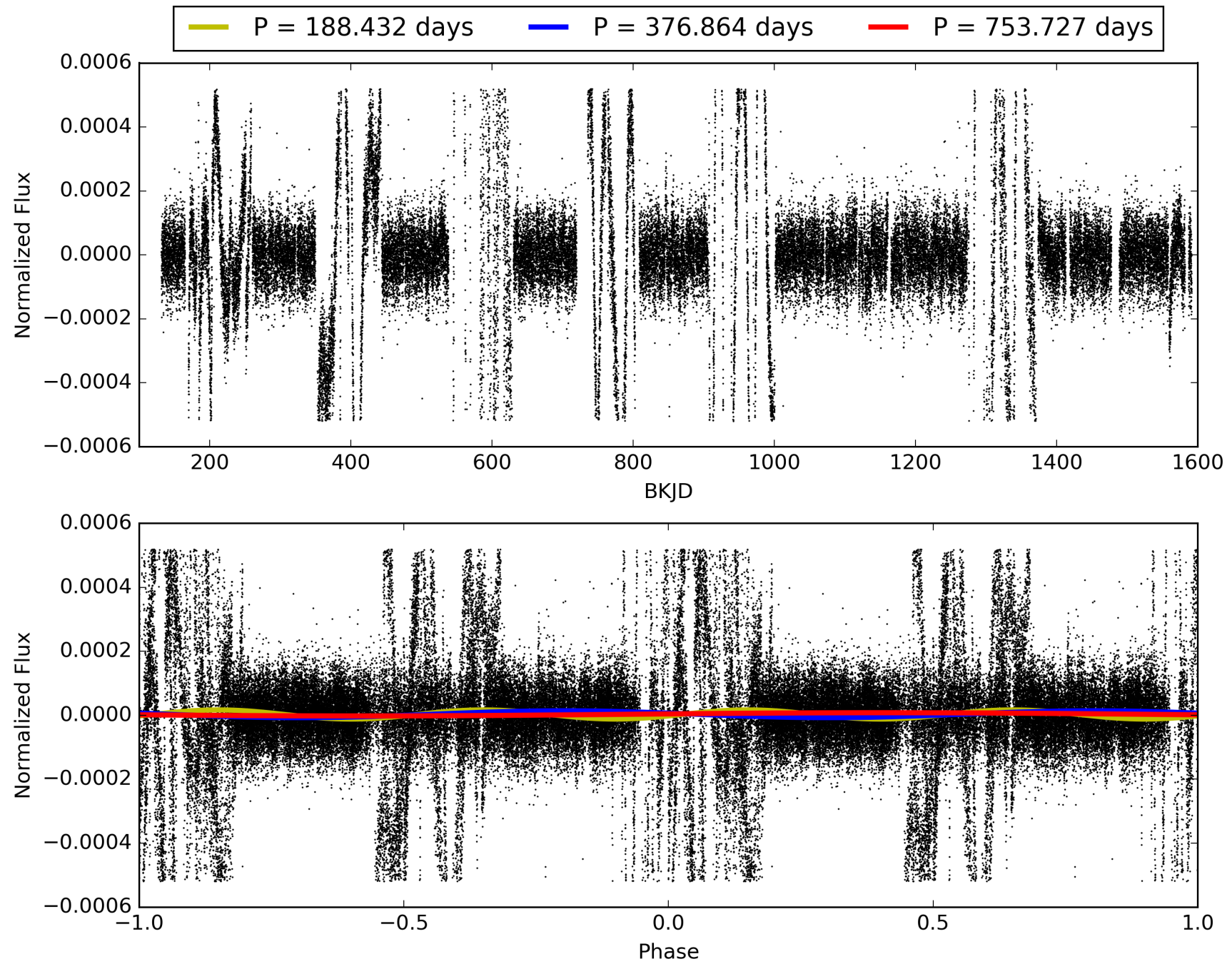
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:37:41 Z

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

TCE 012354215-02, PDC Light Curves

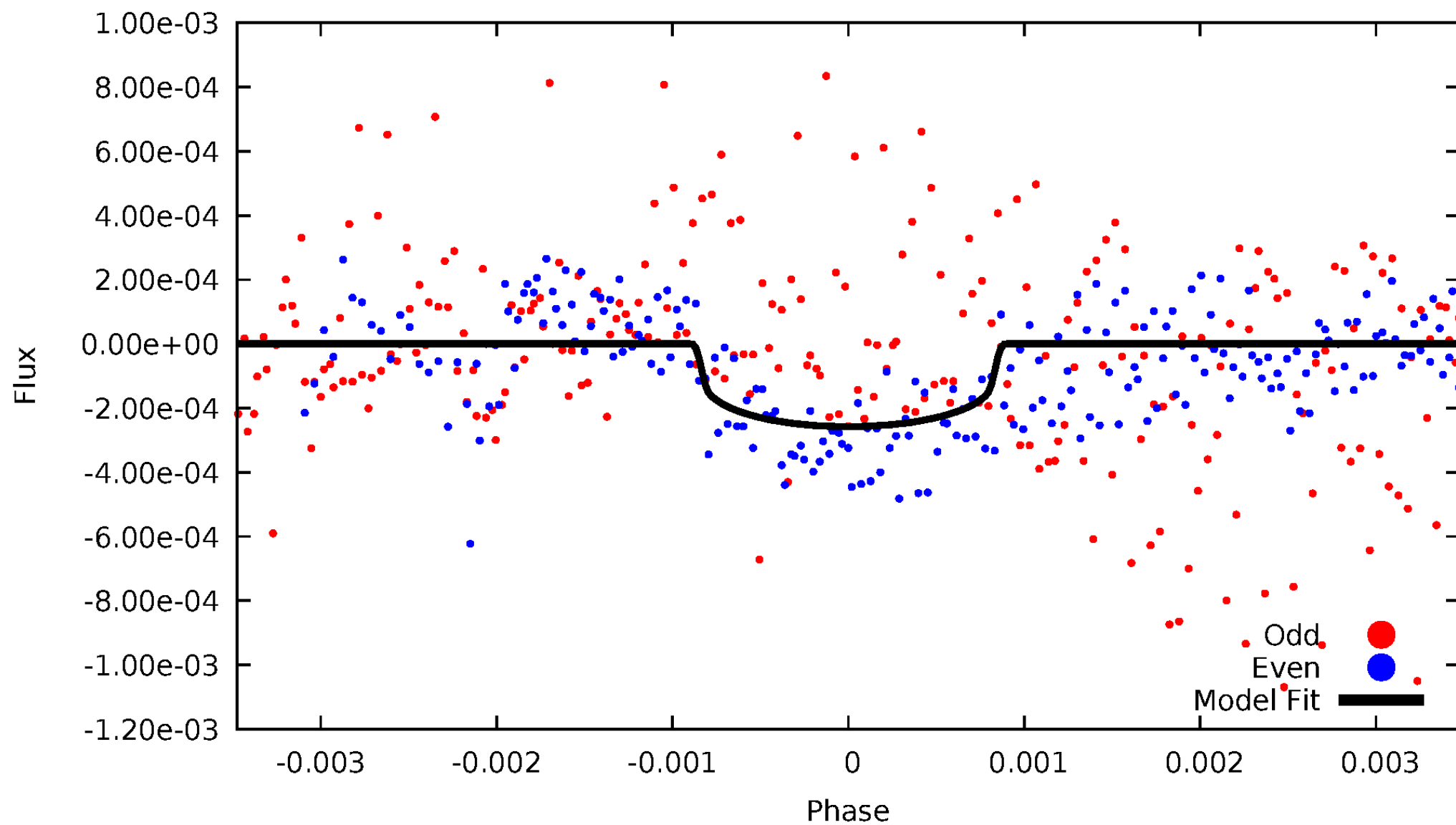


TCE 012354215-02



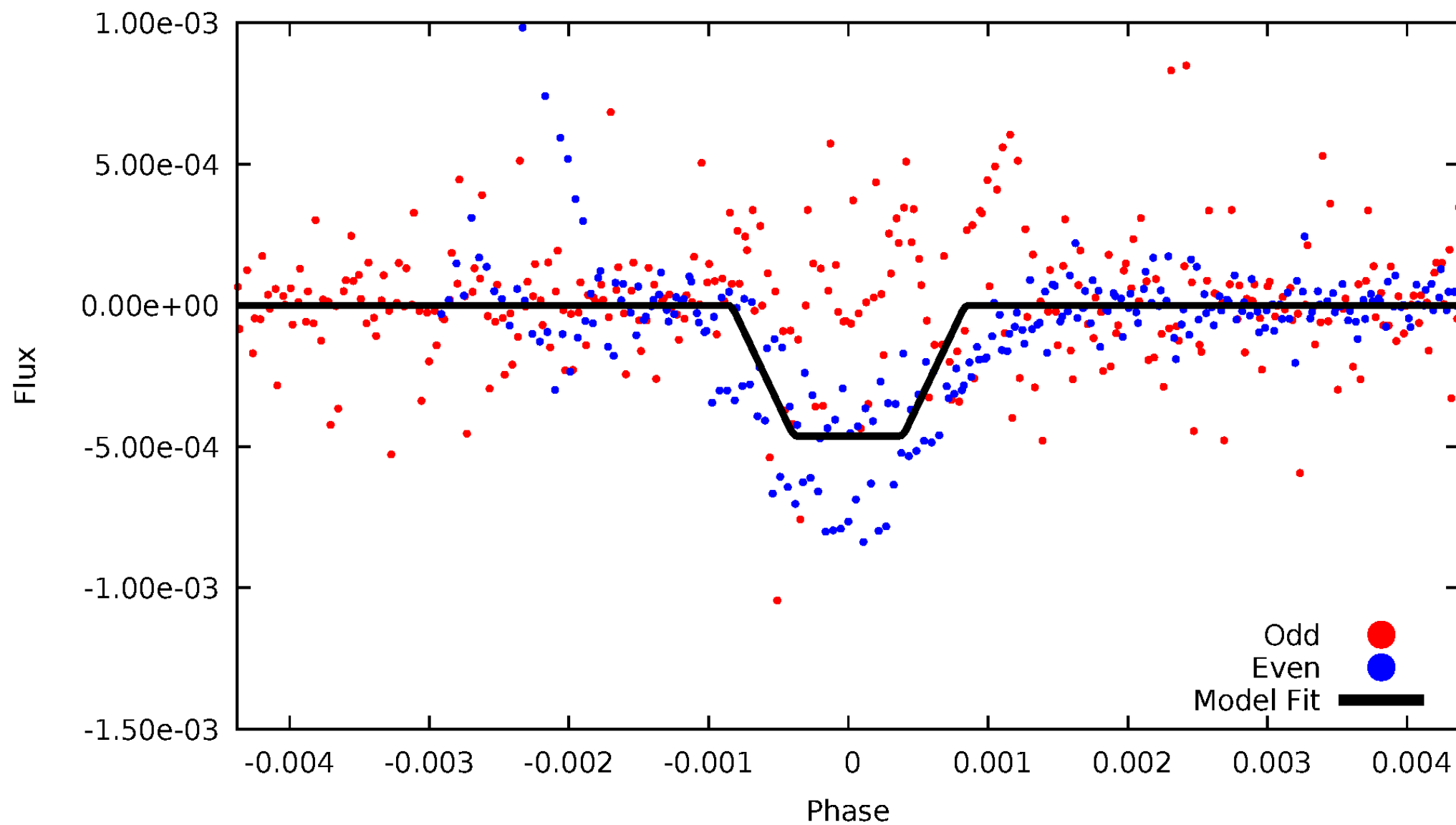
DV Odd/Even

TCE 012354215-02



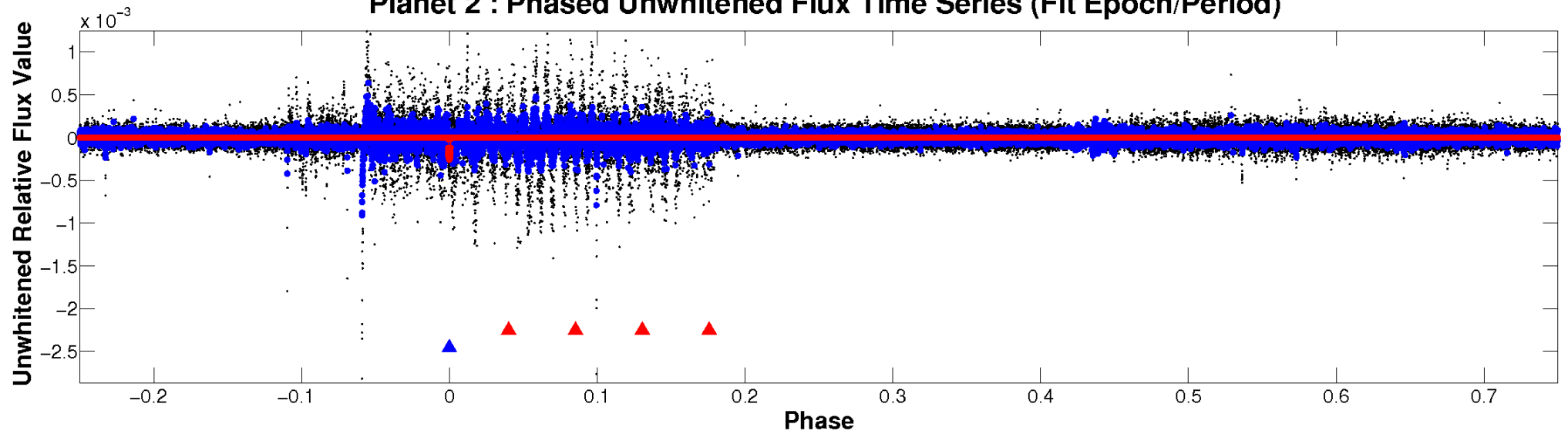
ALT Odd/Even

TCE 012354215-02

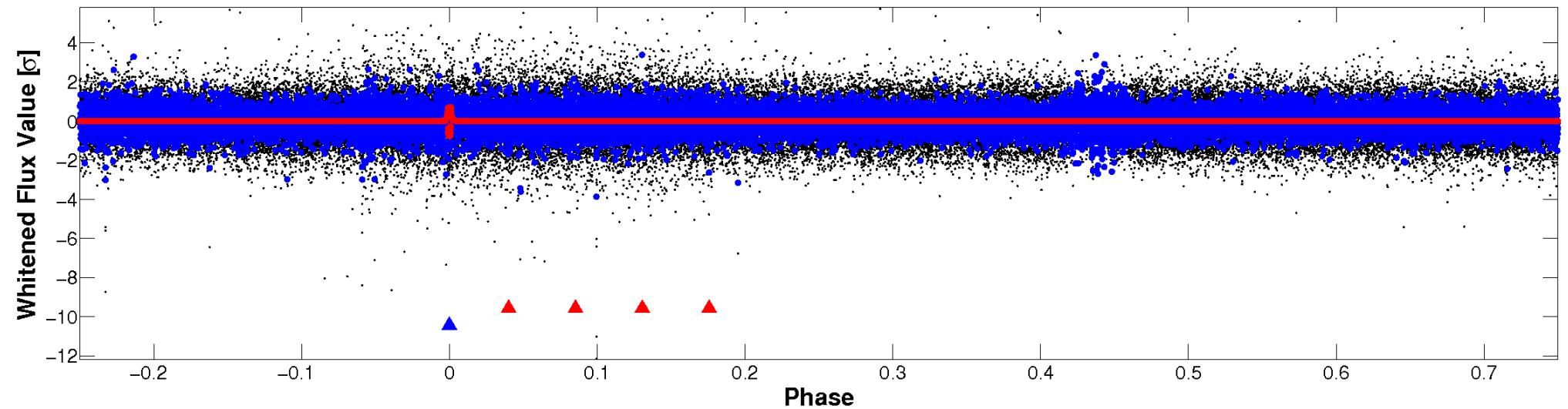


Non-Whitened Vs. Whitened Light Curve

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

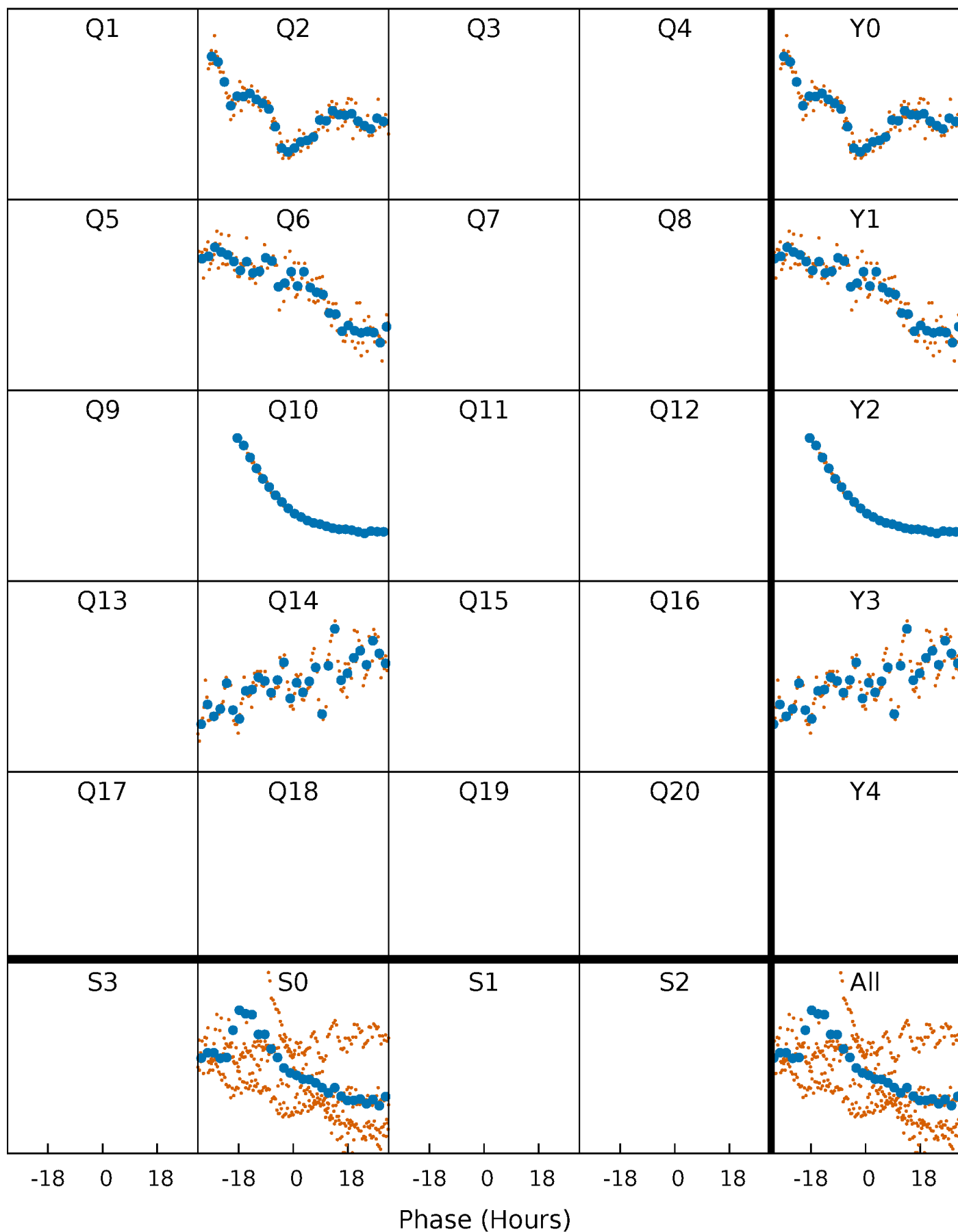


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



PDC Quarter-Phased Transit Curves

TCE 012354215-02 $P=376.863706$ Days $T_0=184.885721$ (BKJD)



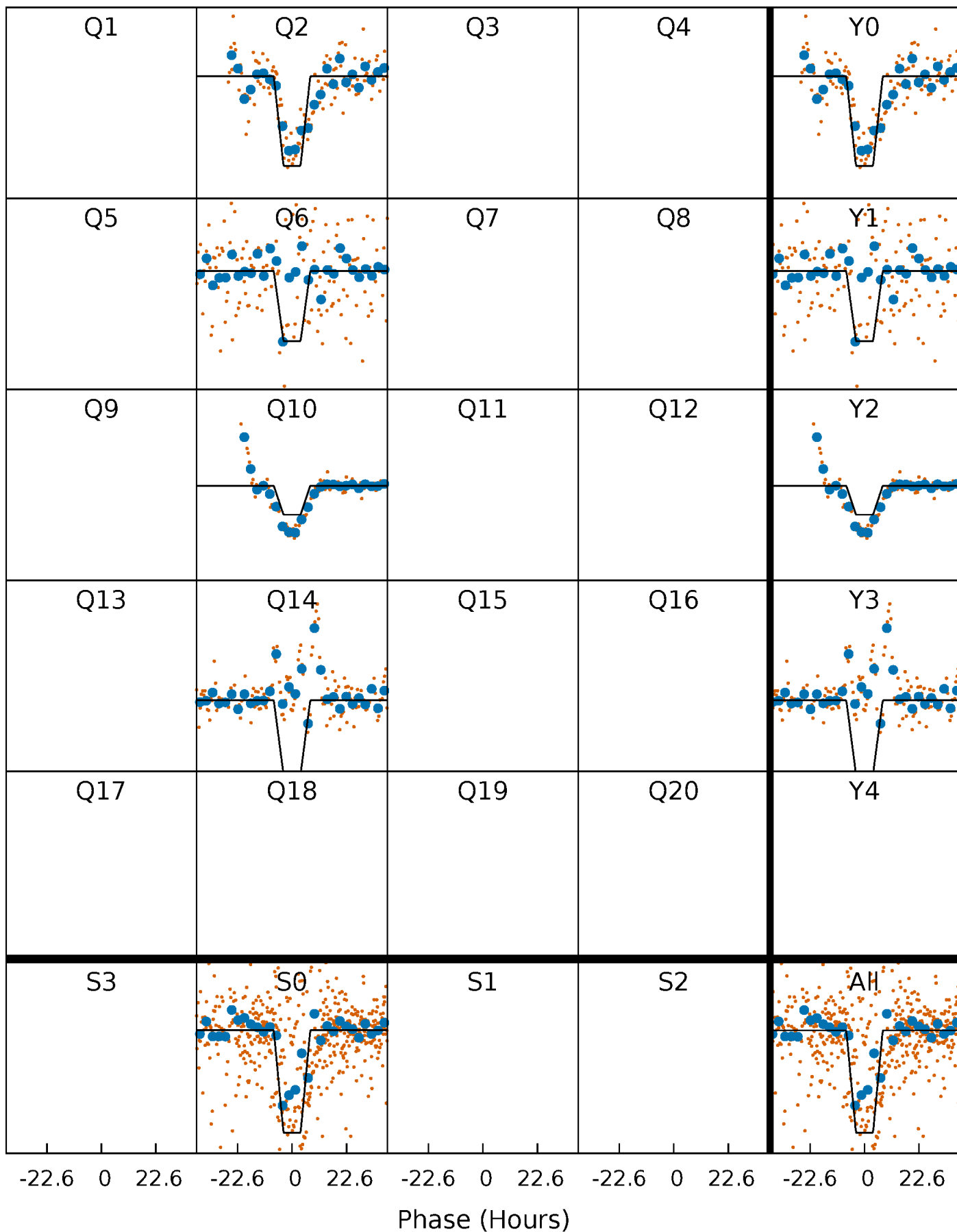
DV Quarter-Phased Transit Curves

TCE 012354215-02 $P=376.863706$ Days $T_0=184.885721$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

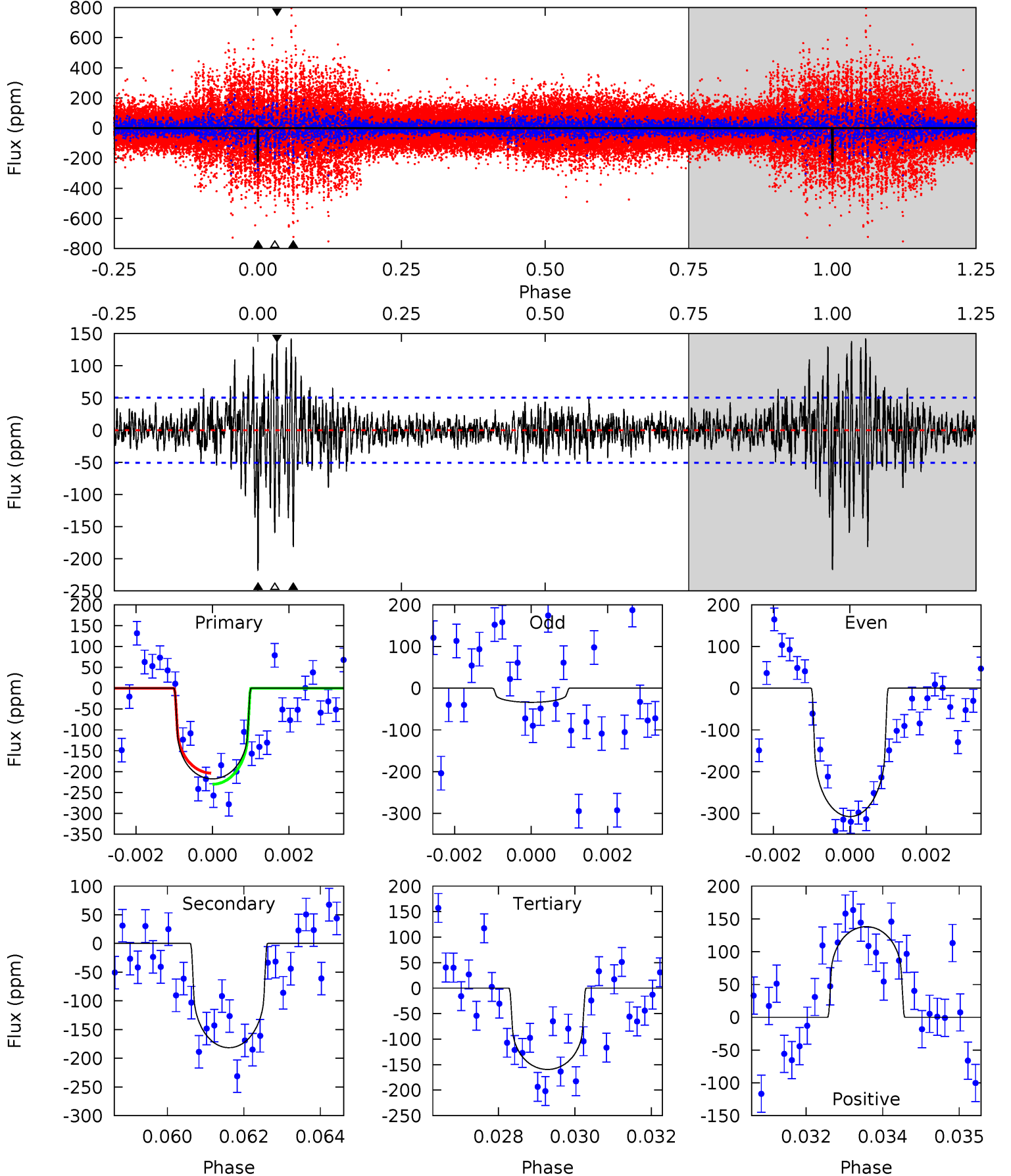
TCE 012354215-02 P=376.931070 Days $T_0=184.819356$ (BKJD)



DV Model-Shift Uniqueness Test

012354215-02, P = 376.863706 Days, E = 184.885721 Days

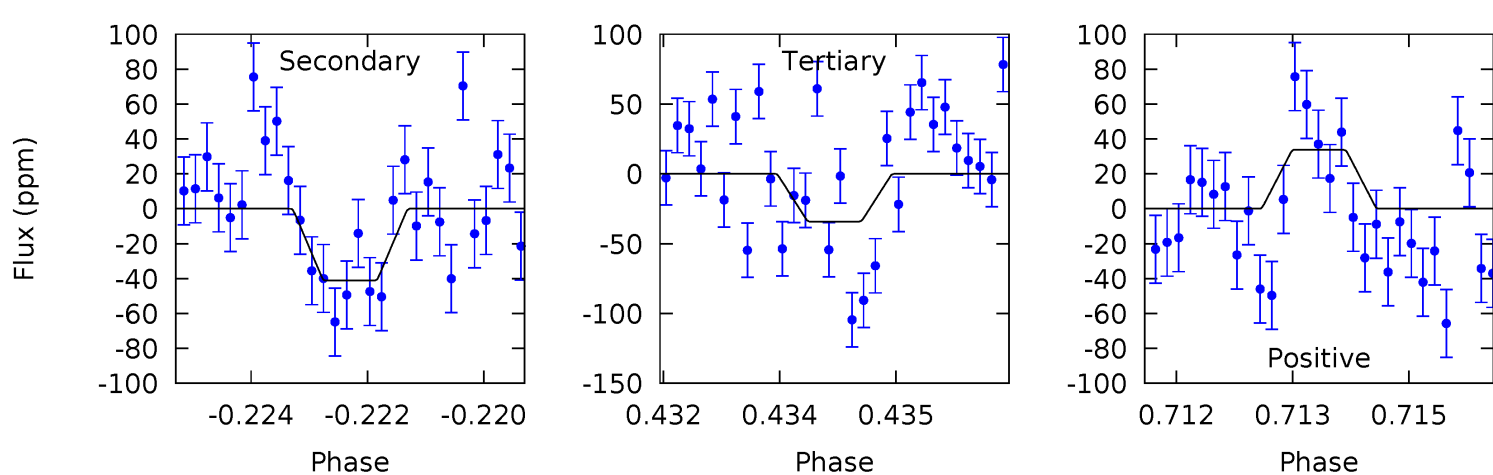
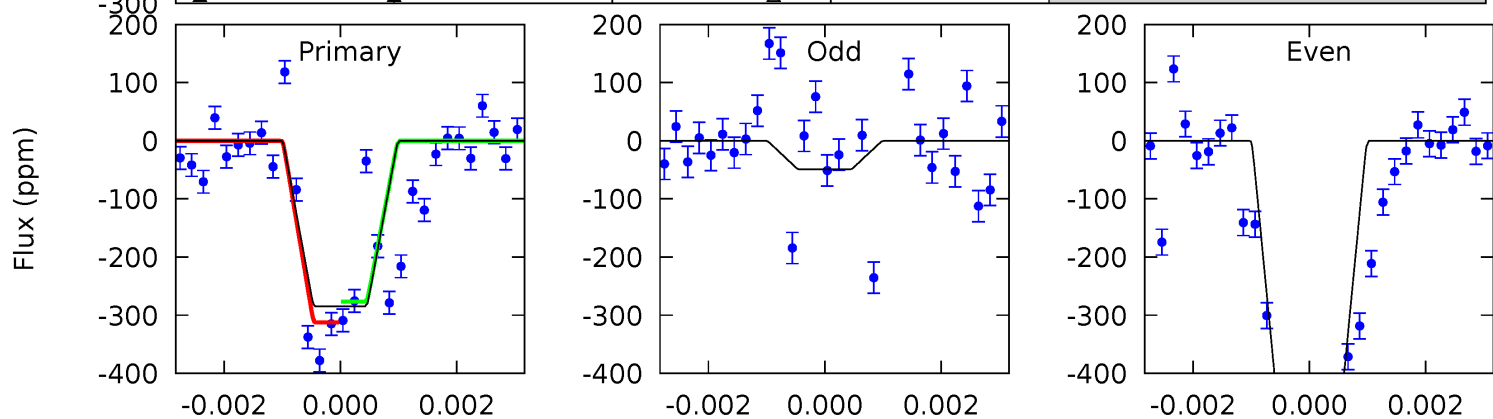
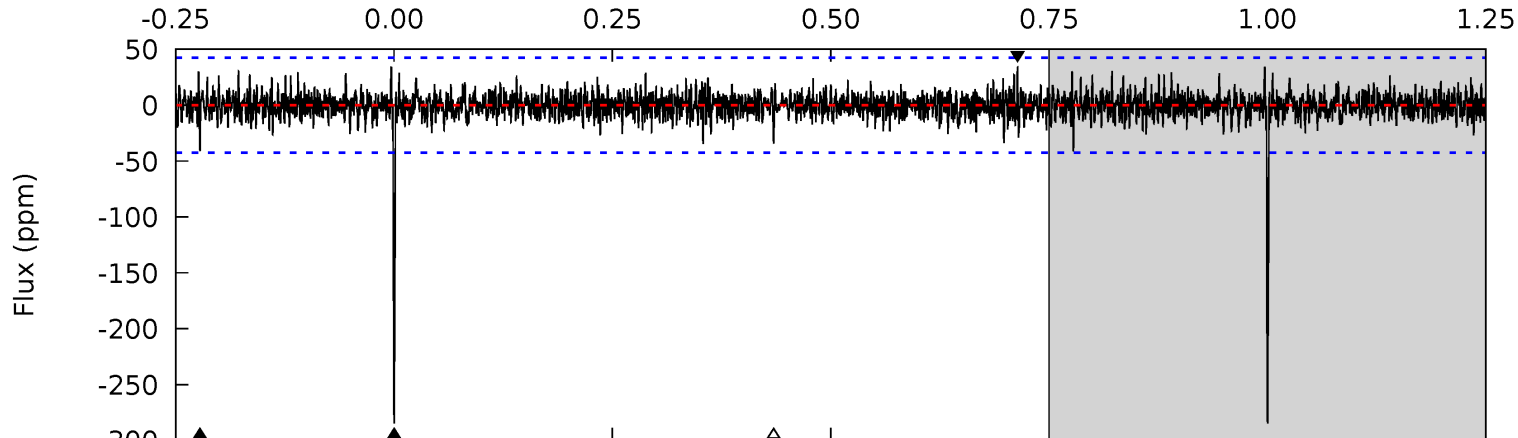
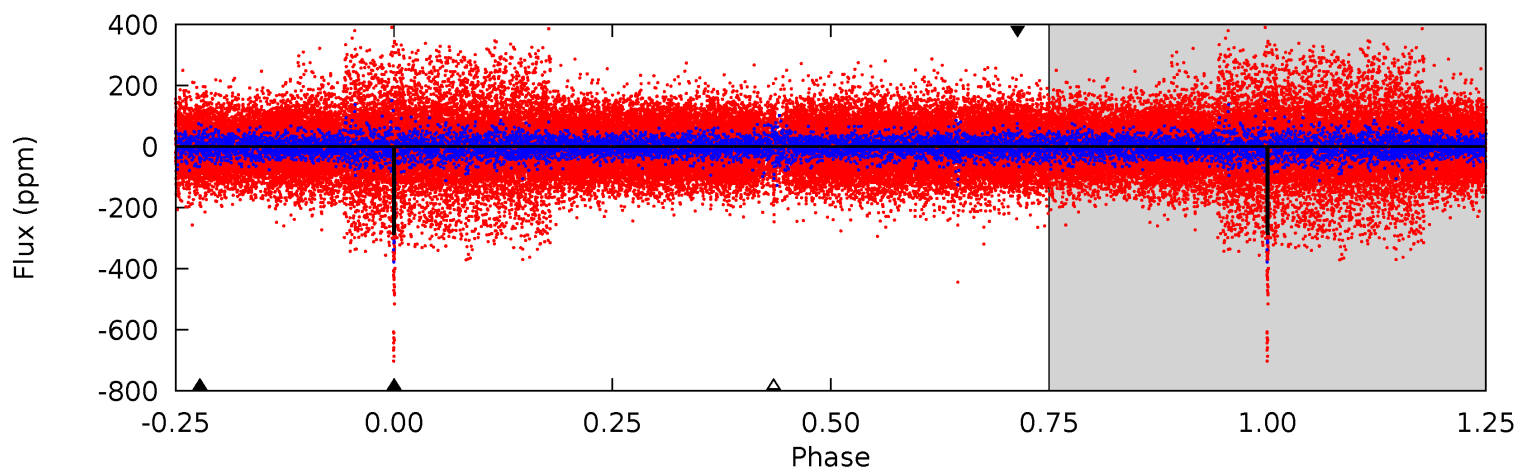
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 23.0 | 19.2 | 16.8 | 14.6 | 5.35 | 3.13 | 2.81 | 6.11 | 8.36 | 2.34 | 4.59 | 12.5 | 0.80 | 0.40 | 0 |



Alt Model-Shift Uniqueness Test

012354215-02, P = 376.931070 Days, E = 184.819356 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 35.9 | 5.19 | 4.31 | 4.26 | 5.36 | 3.14 | 1.10 | 31.6 | 31.7 | 0.88 | 0.93 | 19.1 | 1.24 | 0.11 | 2.17 |



Stellar Parameters For KIC 012354215

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 5324^{+186}_{-168} | $3.958^{+0.517}_{-0.172}$ | $0.380^{+0.100}_{-0.250}$ | $1.830^{+0.505}_{-0.938}$ | $1.107^{+0.142}_{-0.213}$ | $0.255^{+1.455}_{-0.120}$ |
| | +3%/-3% | +13%/-4% | +26%/-66% | +28%/-51% | +13%/-19% | +572%/-47% |
| Source | PHO54 | PHO54 | PHO54 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 012354215-02 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|--------------|------------------------|-------------------|----------------------|--------------------------|
| DV | -182 ± 9 | $3.01^{+0.89}_{-0.95}$ | 431^{+35}_{-58} | 4988^{+572}_{-411} | 12393^{+13611}_{-5095} |
| Alt. | -41 ± 8 | $4.06^{+1.12}_{-1.16}$ | 423^{+40}_{-56} | 3383^{+247}_{-183} | 1502^{+1428}_{-591} |

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

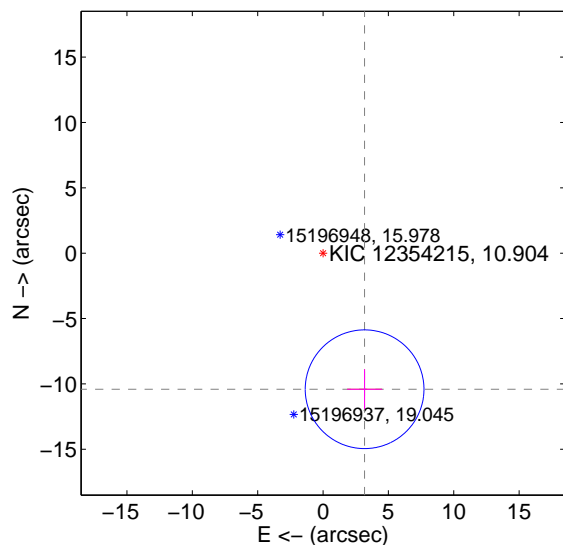
Supplemental centroid analysis for 012354215-02. **Kepler magnitude: 10.90.** Transit SNR 9.74

There are 0 quarters with good PRF difference image offsets

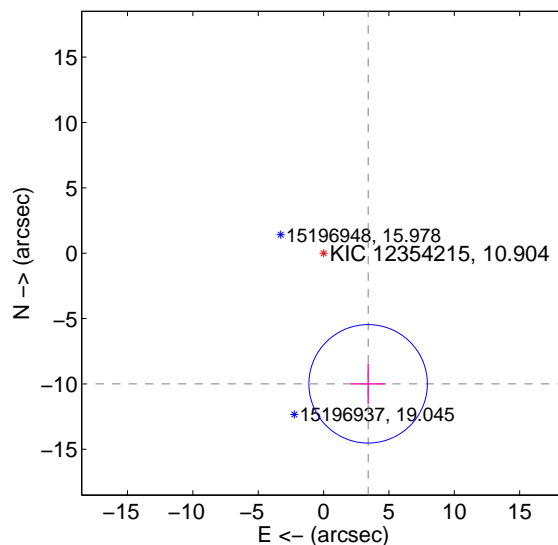
The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------------------------|---------------------|--------------------|---------------------|
| PRF-fit source offset from OOT | 10.883 ± 1.514 | 7.19 | -3.179 ± 1.334 | -10.408 ± 1.529 |
| PRF-fit source offset from KIC position | 10.560 ± 1.510 | 6.99 | -3.408 ± 1.334 | -9.995 ± 1.529 |
| photometric centroid source offset | 1.24 ± 1.52 | 0.82 | -0.26 ± 1.13 | -1.22 ± 1.53 |

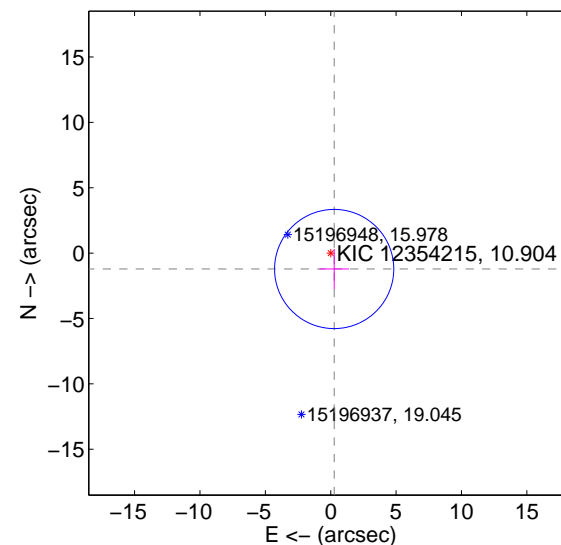
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

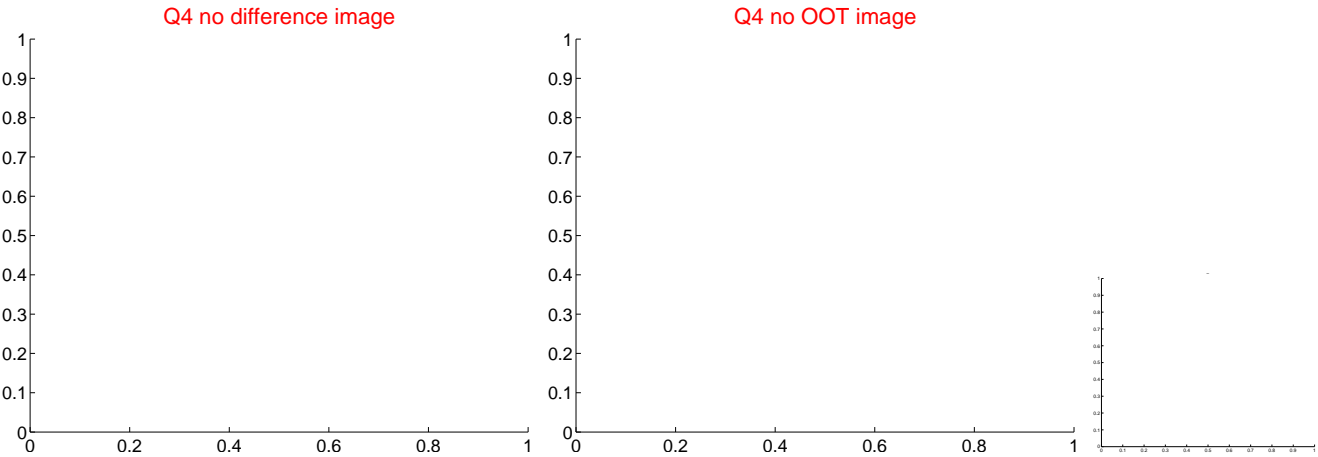
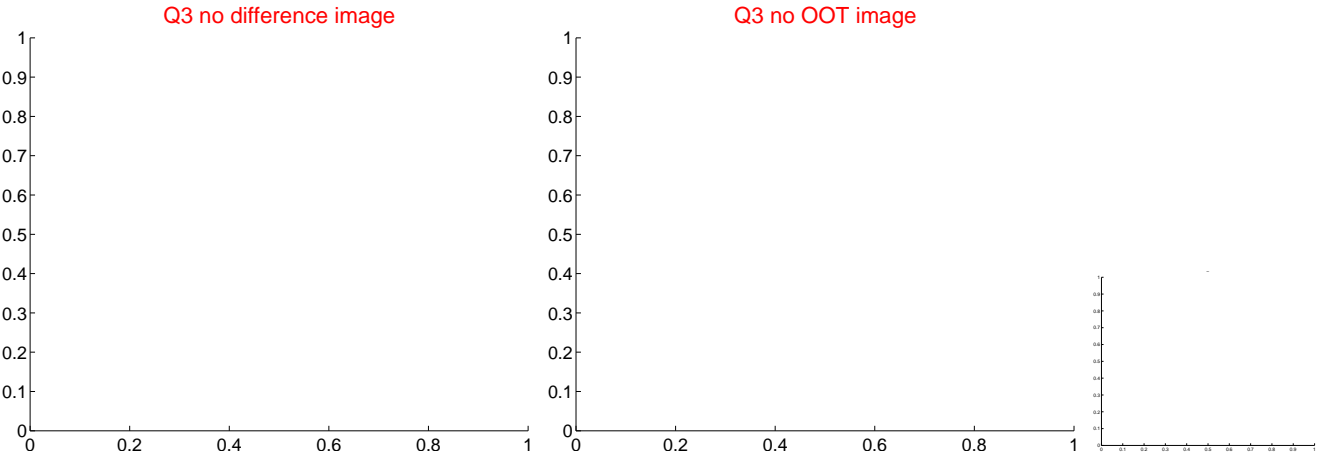
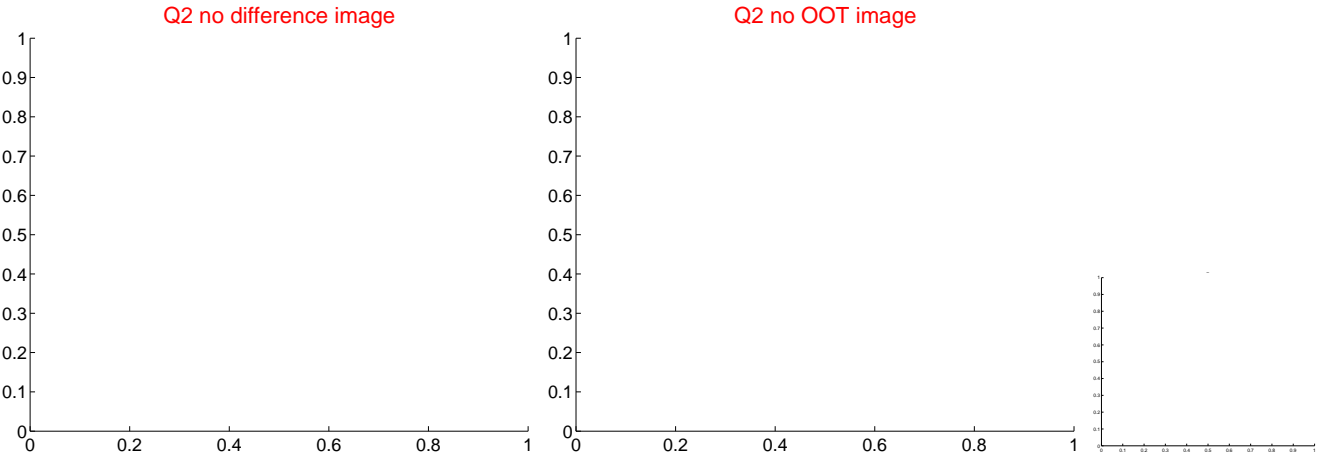
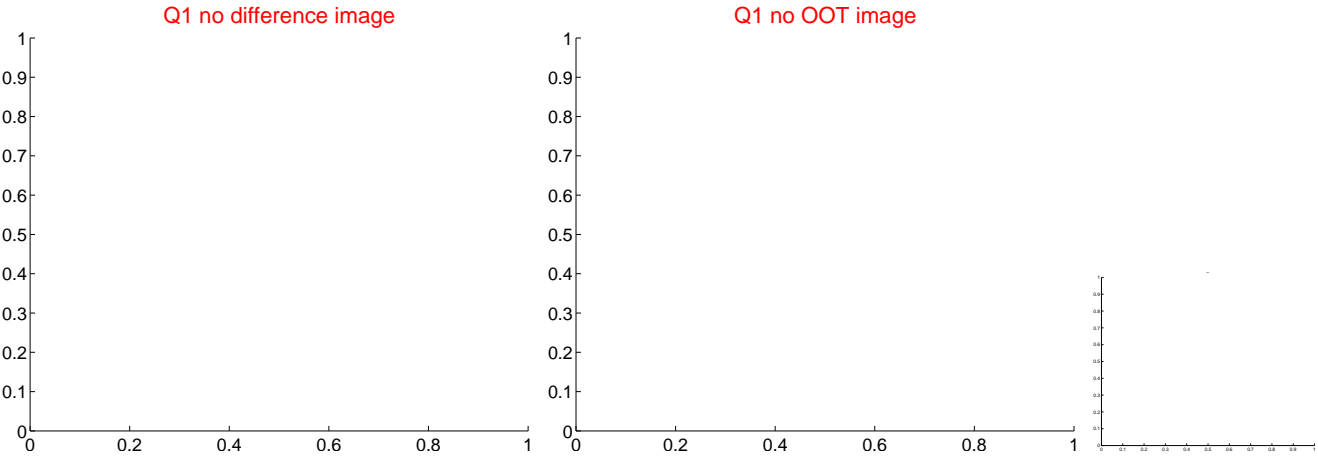


offset from photometric centroids

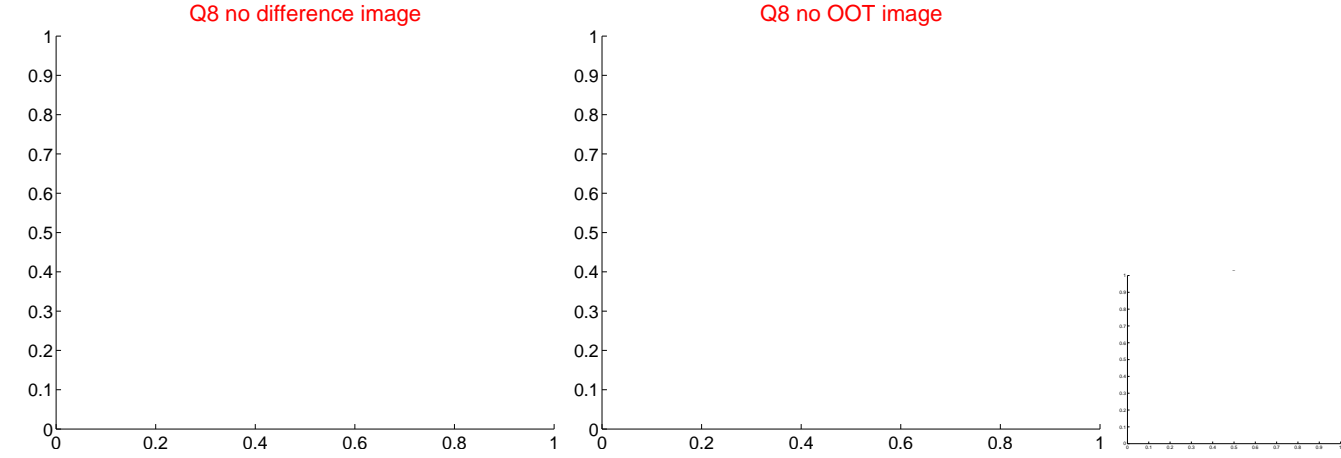
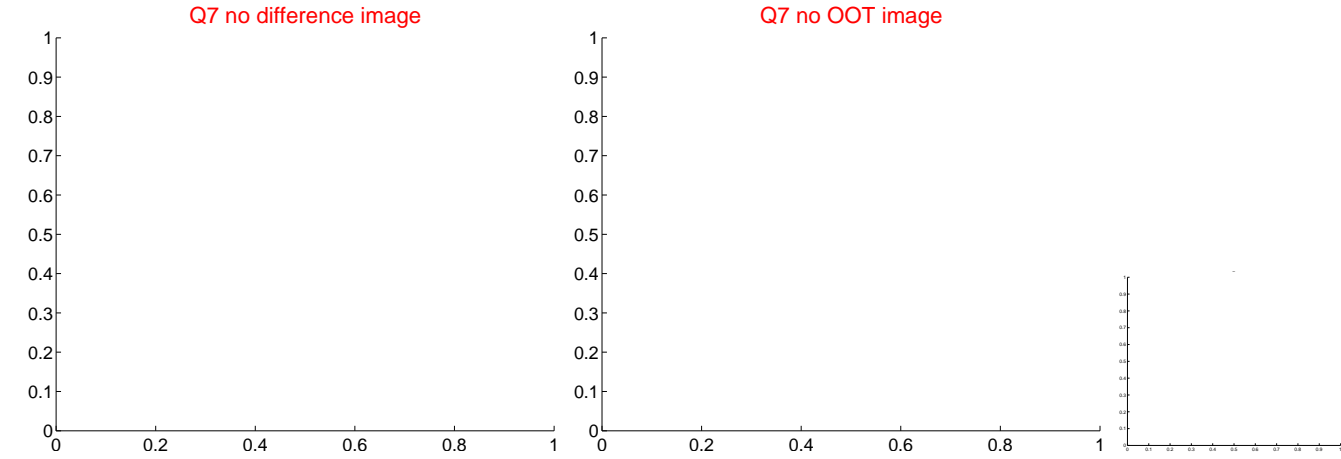
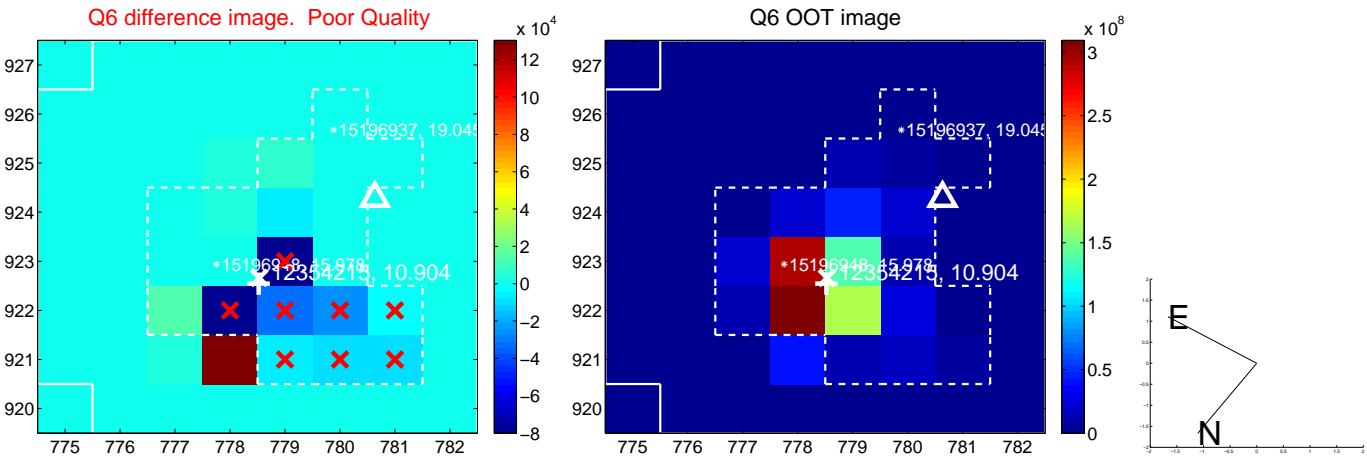
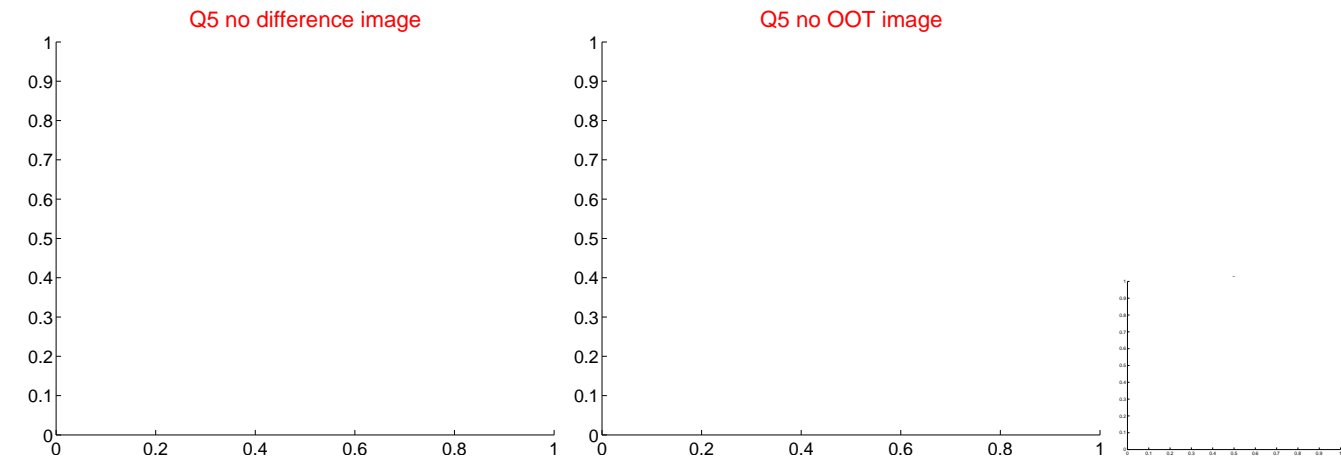


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

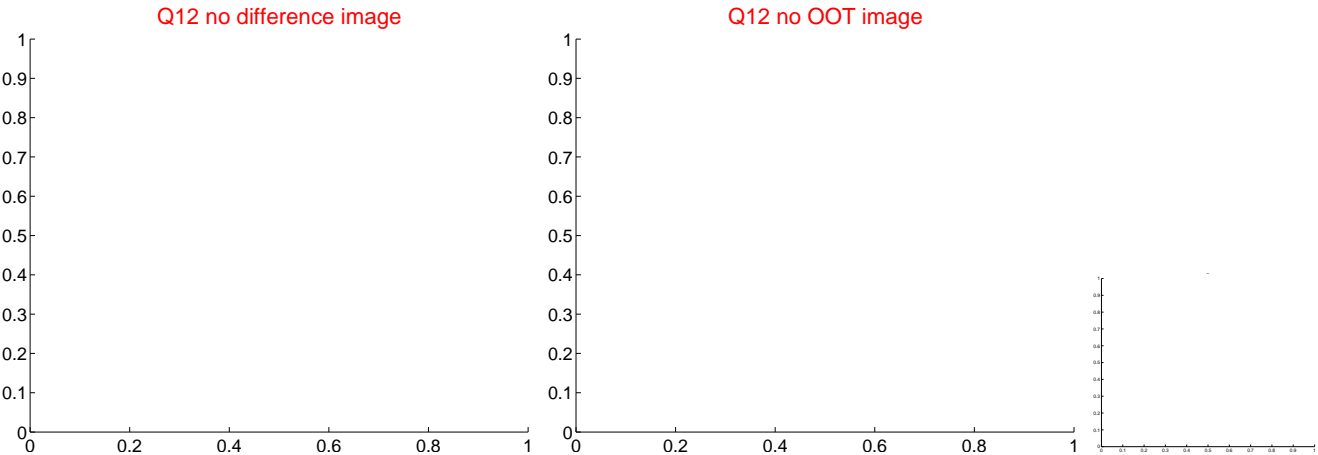
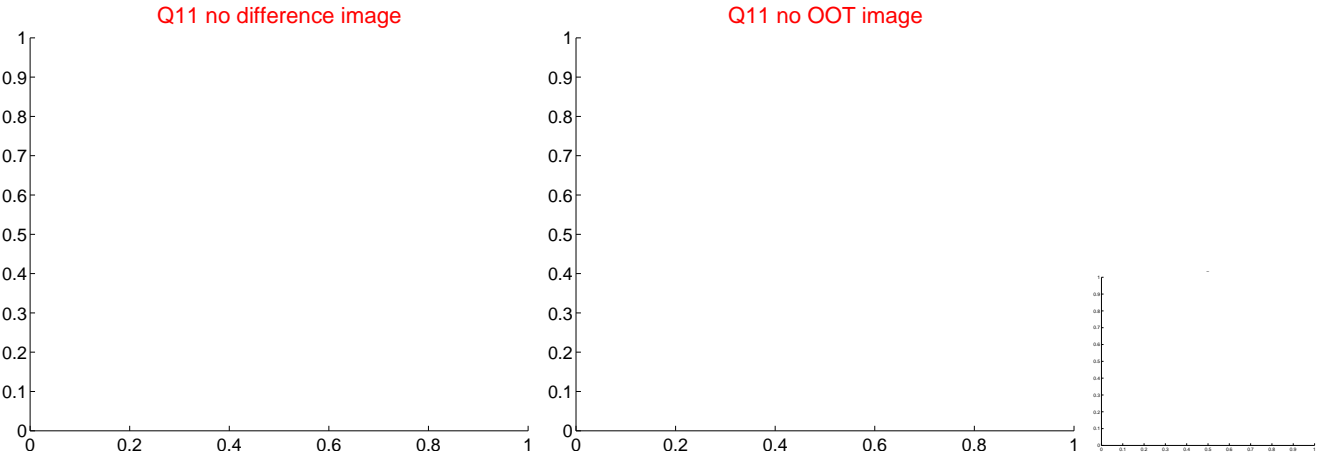
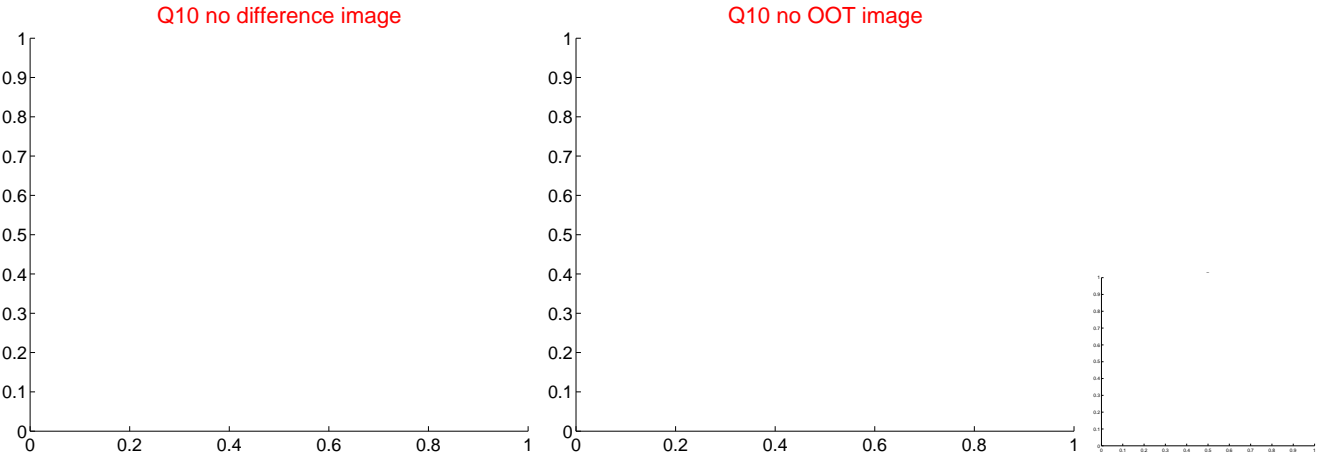
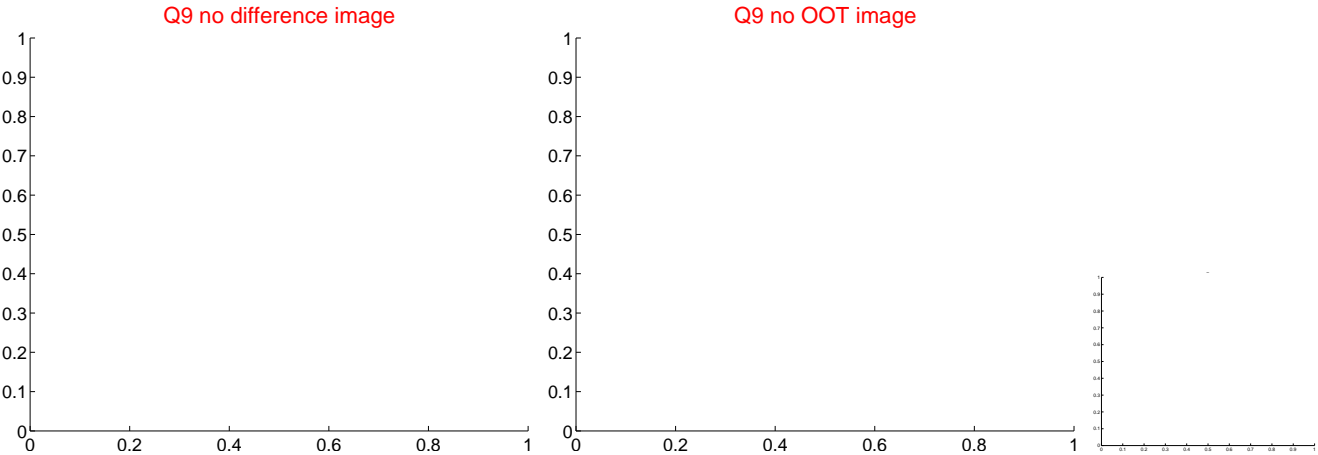
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



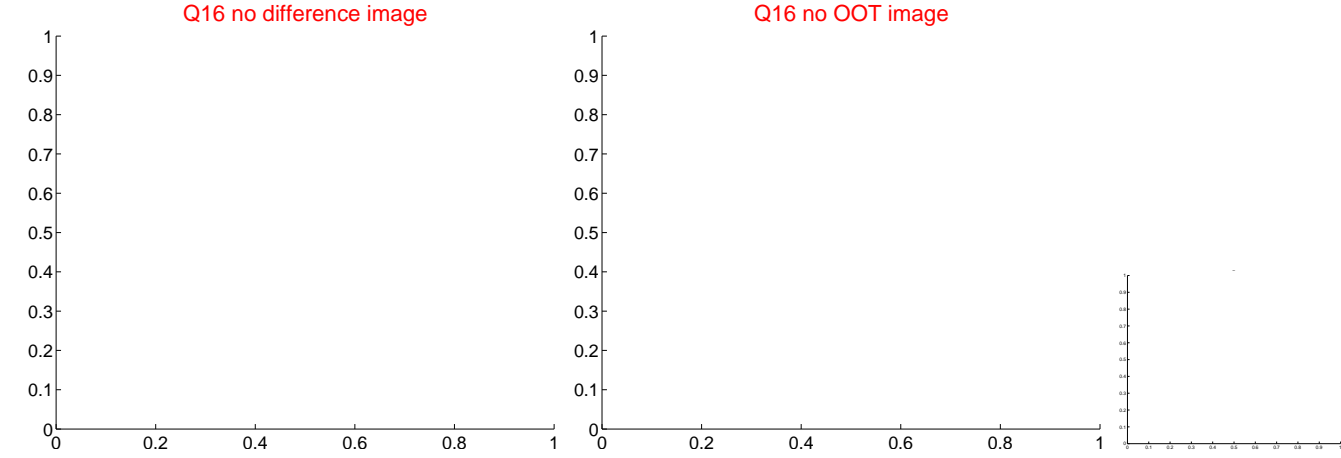
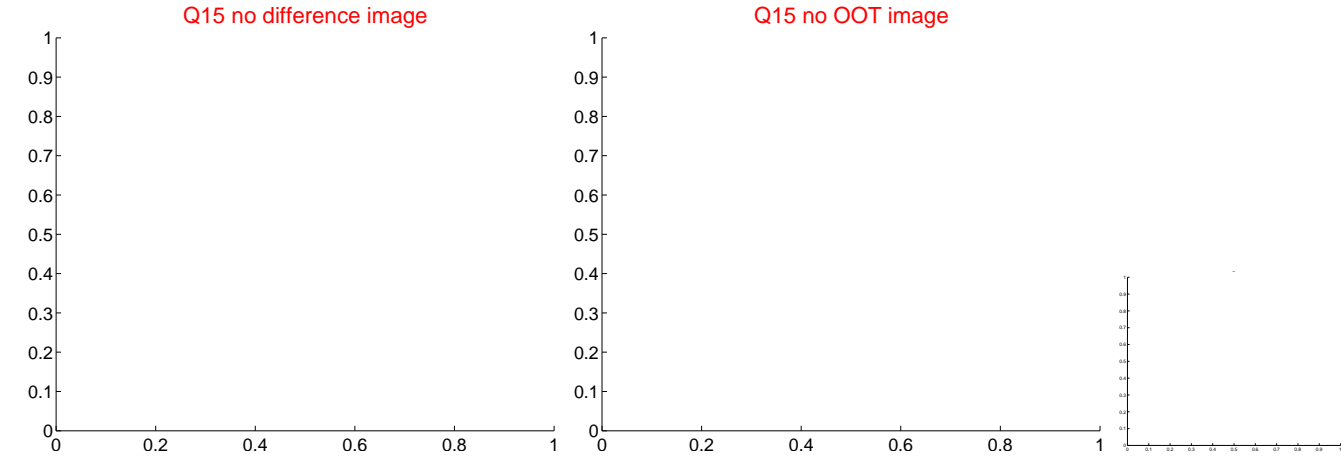
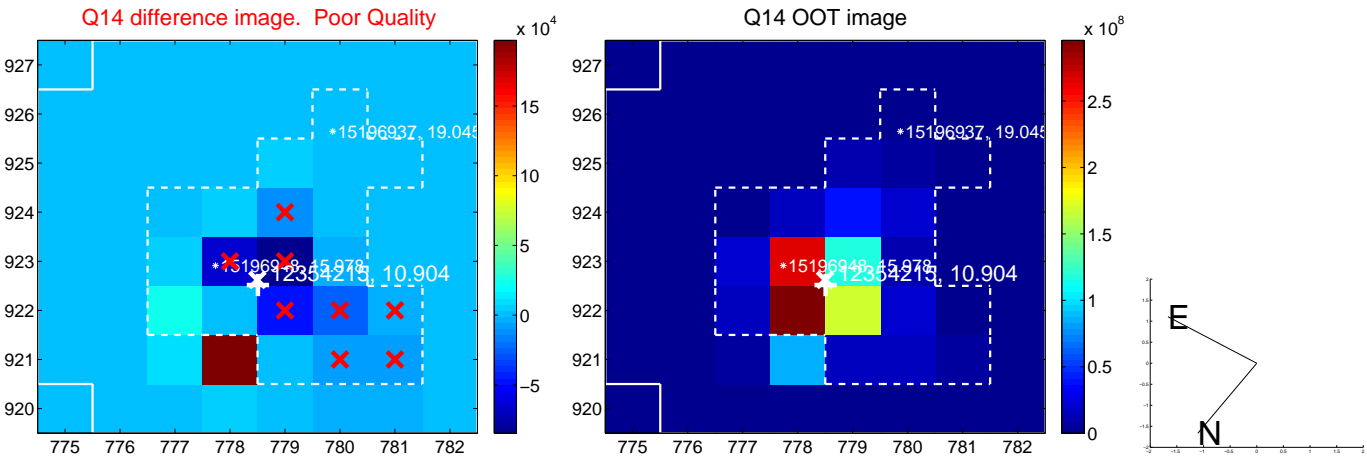
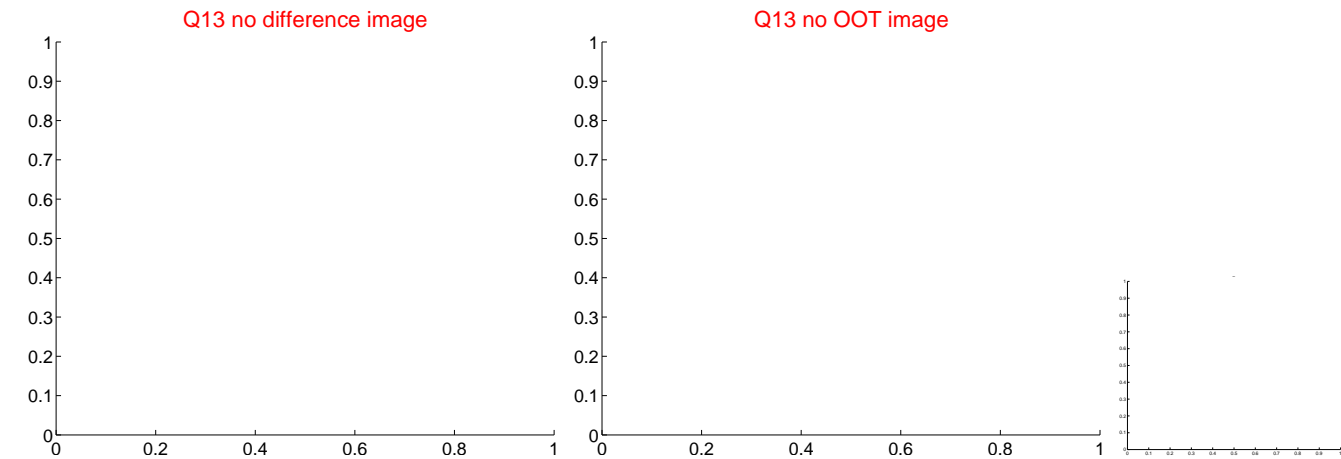
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



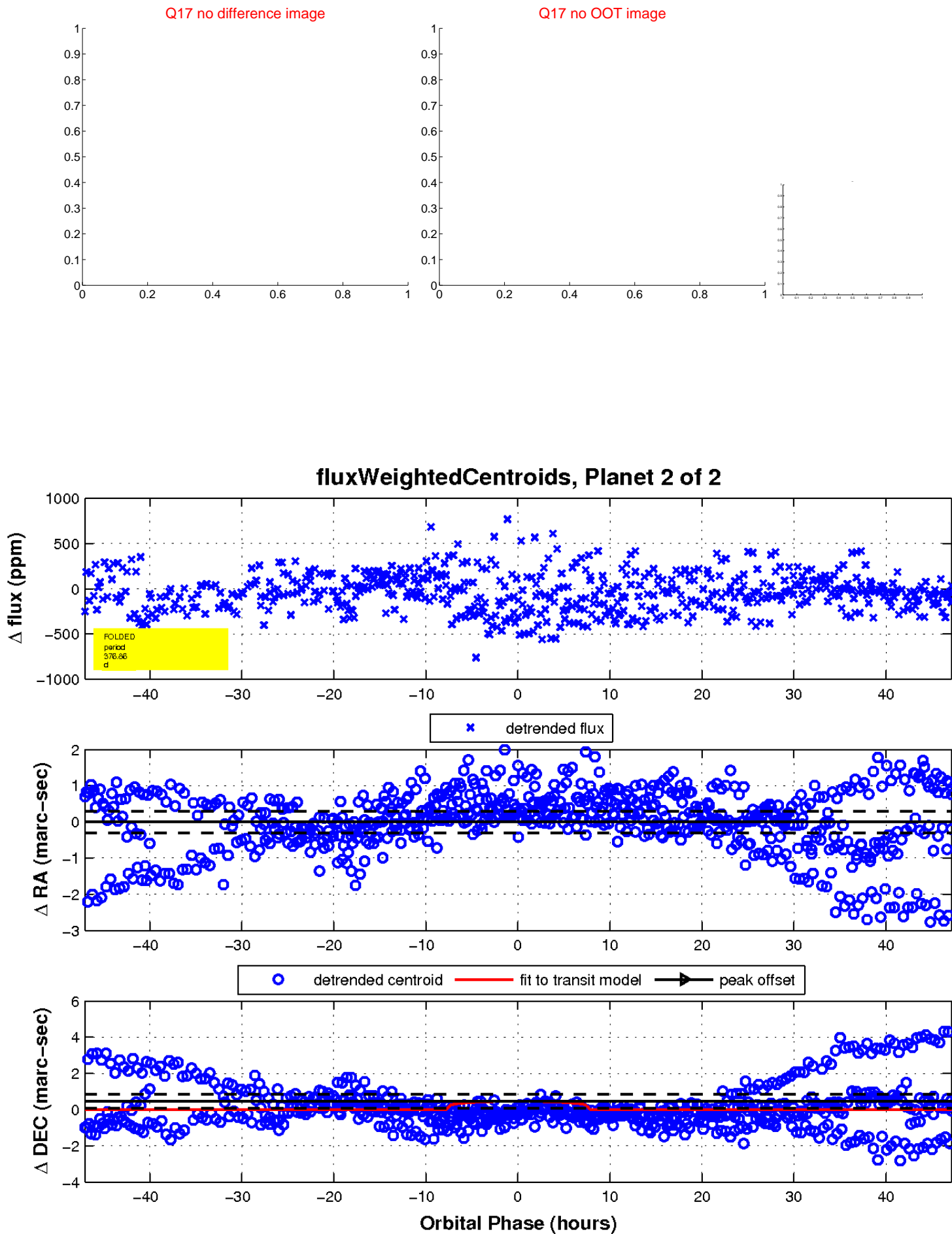
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

