

KIC 003934090

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 003934090-01 | OBS | No | 419.736574 | 218.870956 | 1187.4 | 10.694 | 11.9 | 6.3 | 0.52 | 3823 | 1.93 | 0.07 |
| 003934090-02 | OBS | No | 476.707044 | 561.746332 | 2477.2 | 13.404 | 10.2 | 11.0 | 0.52 | 3823 | 3.24 | 0.06 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 003934090-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES—LPP_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS |
| 003934090-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS |

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

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

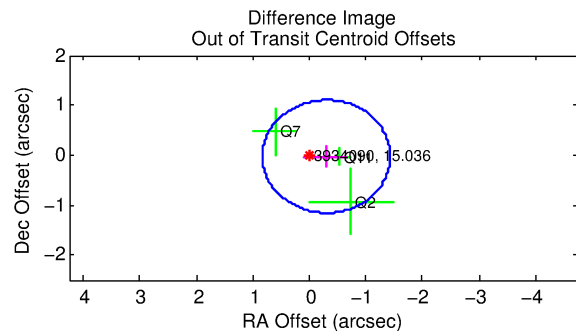
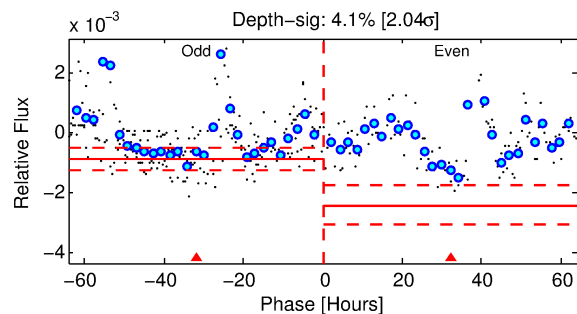
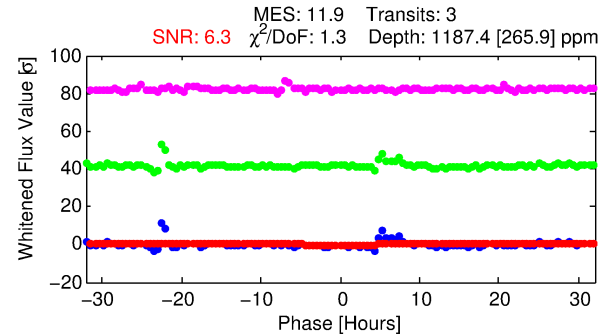
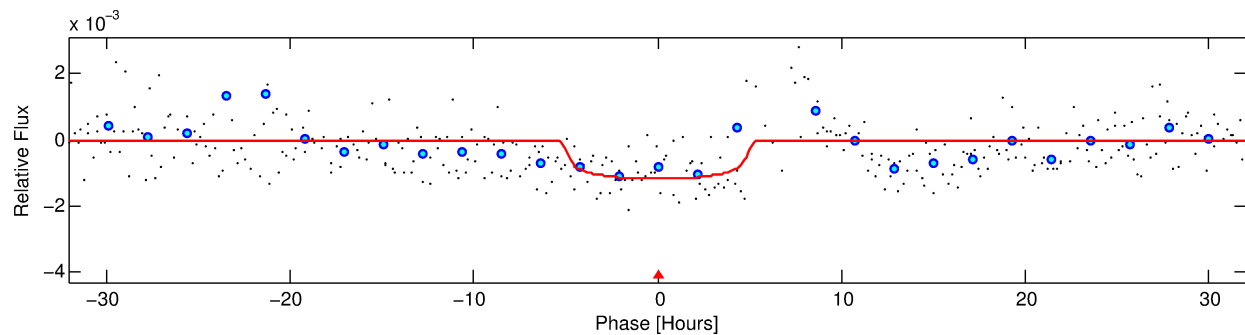
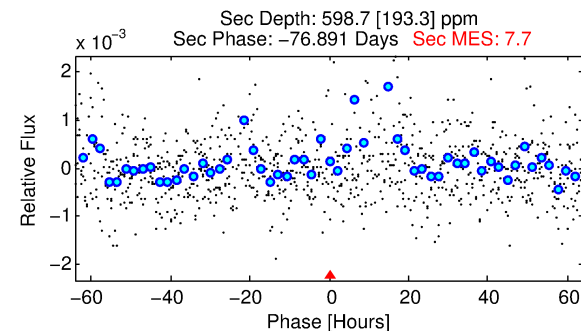
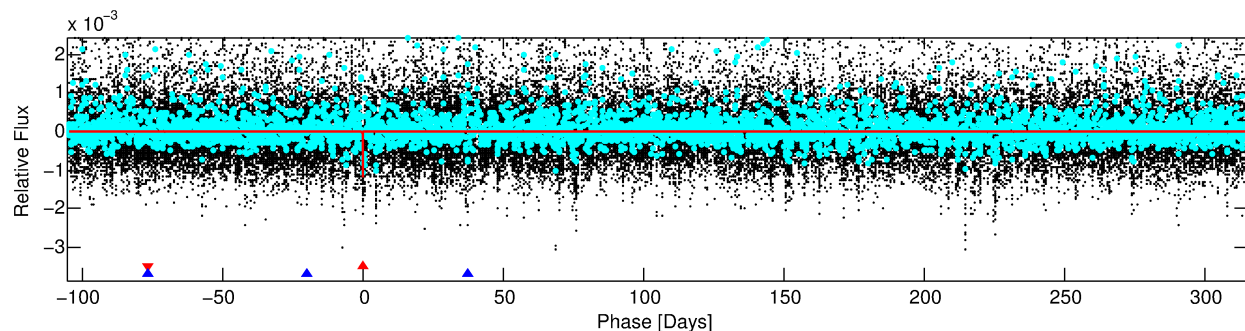
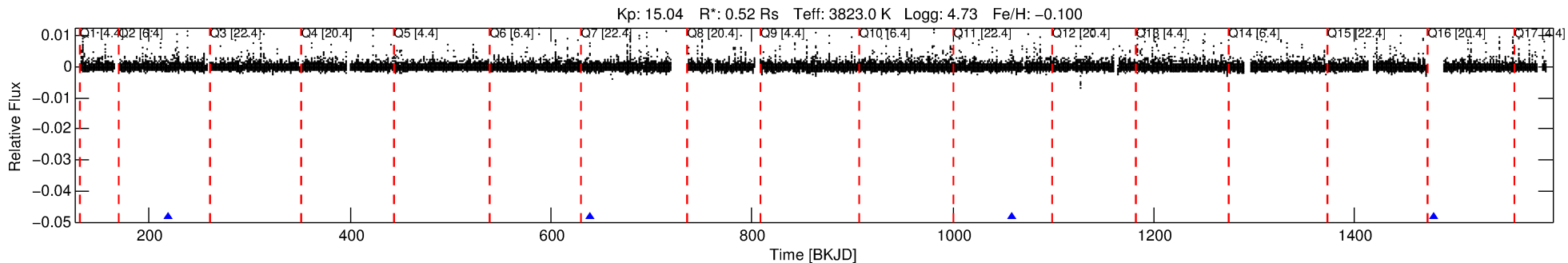
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003934090-01

No Significant Match Found

DV One-Page Summary

KIC: 3934090 Candidate: 1 of 2 Period: 419.737 d



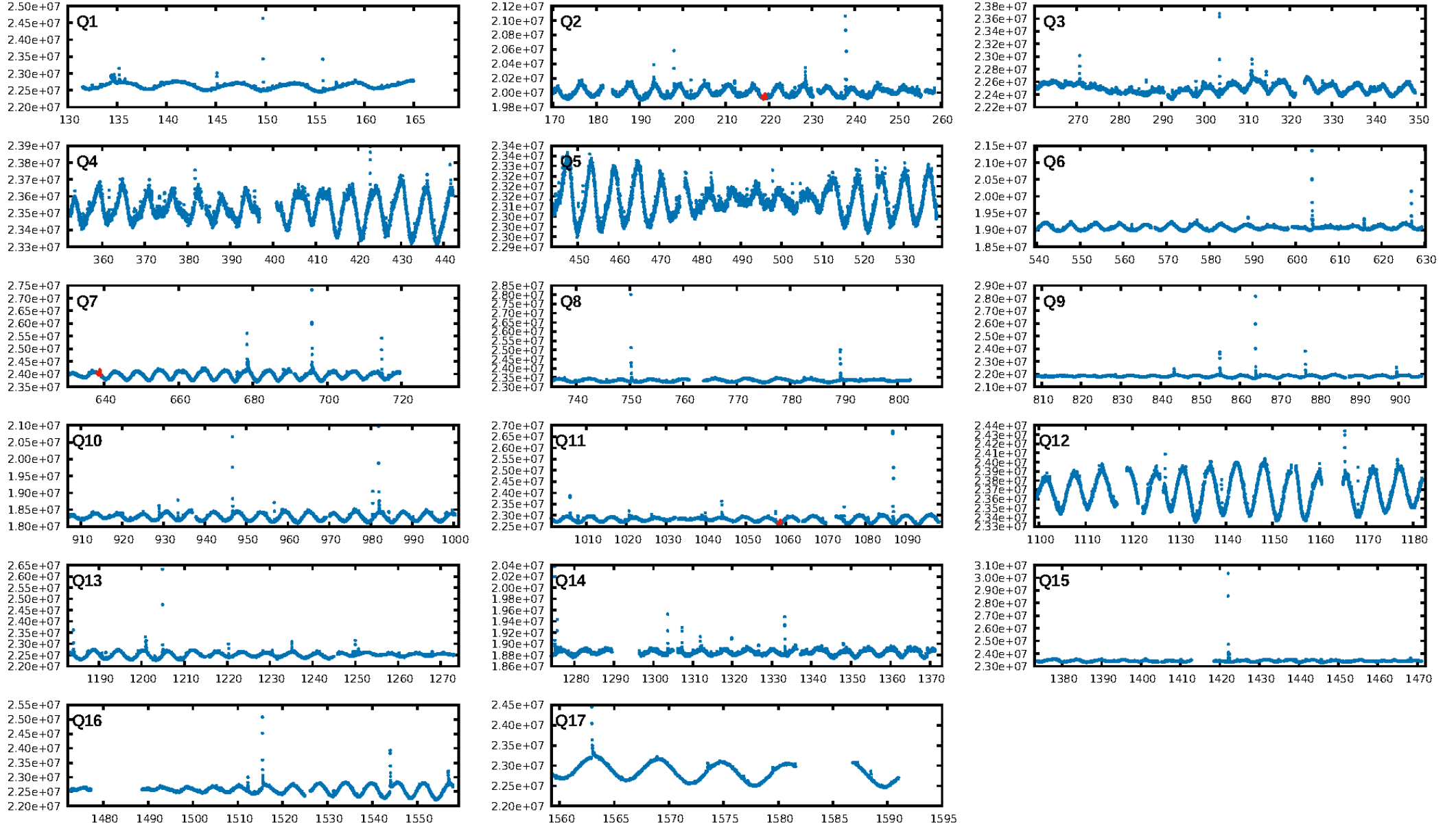
DV Fit Results:

Period = 419.73657 [0.01323] d
Epoch = 218.8710 [0.0174] BKJD
Rp/R* = 0.0341 [0.0092]
a/R* = 218.06 [221.74]
b = 0.74 [0.64]
Seff = 0.07 [0.01]
Teq = 129 [4] K
Rp = 1.93 [0.55] Re
a = 0.8856 [0.0618] AU
Ag = 69682.97 [44414.10] [1.57σ]
Teffp = 3240 [517] K [6.02σ]

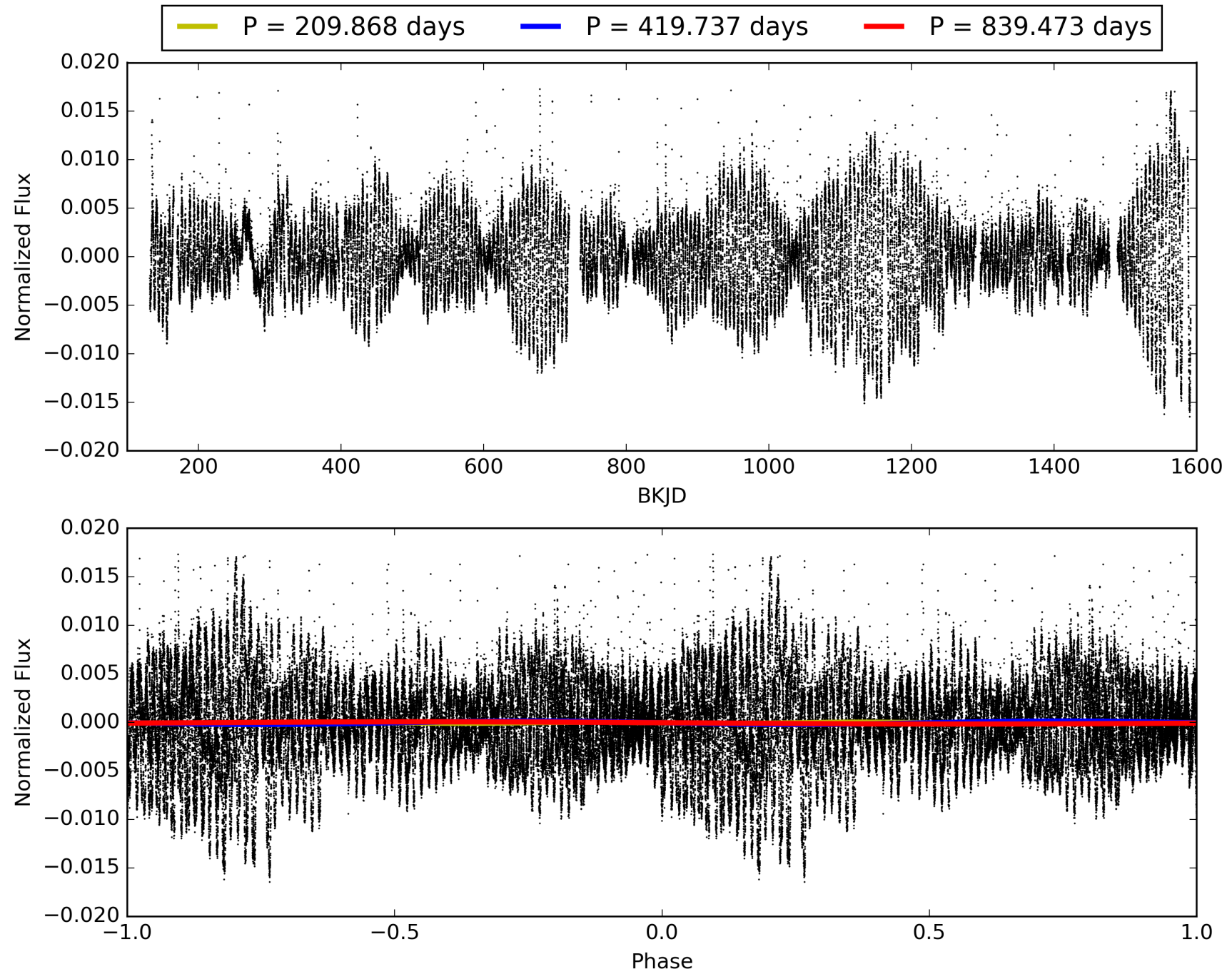
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [79.74σ]
ModelChiSquare2-sig: 1.5%
ModelChiSquareGof-sig: 86.6%
Bootstrap-pfa: 6.50e-11
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.7375
Centroid-sig: 7.1%
Centroid-so: 0.452 arcsec [0.56σ]
OotOffset-rm: 0.298 arcsec [0.79σ]
OotOffset-st: 1/2/0/0 [3]
KicOffset-rm: 0.477 arcsec [1.02σ]
KicOffset-st: 1/2/0/0 [3]
DiffImageQuality-fgm: 1.00 [3/3]
DiffImageOverlap-fno: 1.00 [3/3]

TCE 003934090-01, PDC Light Curves

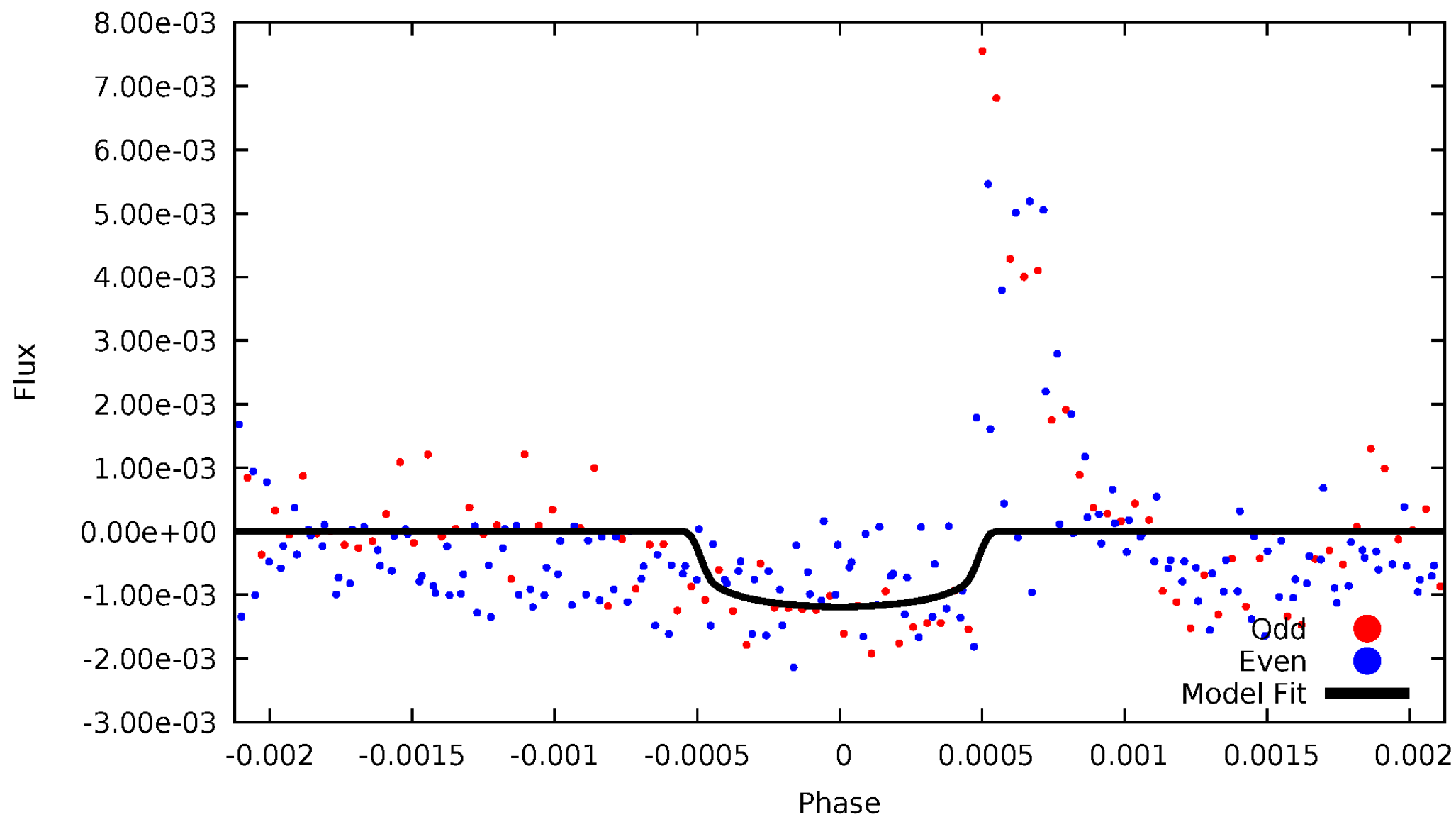


TCE 003934090-01



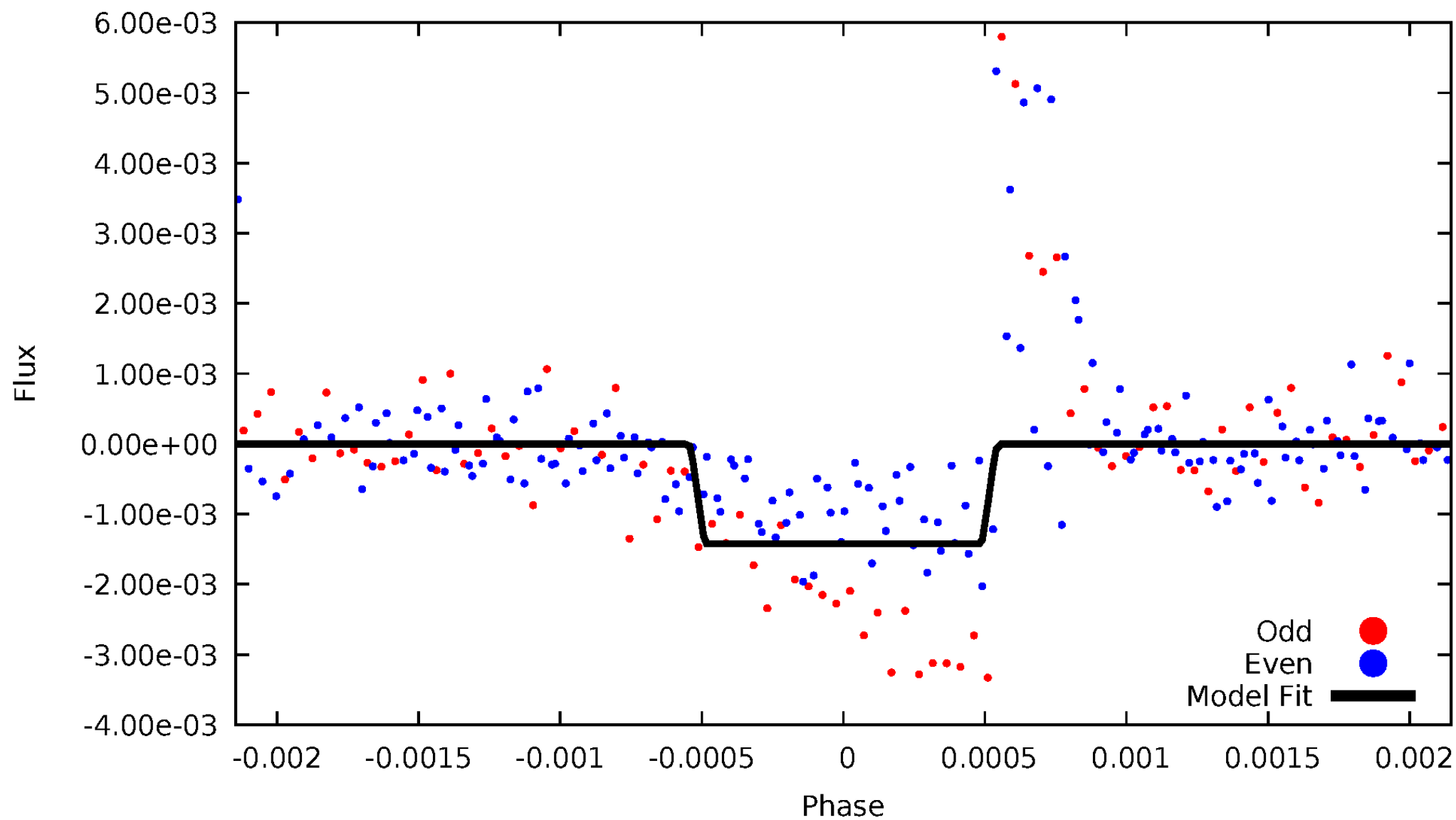
DV Odd/Even

TCE 003934090-01



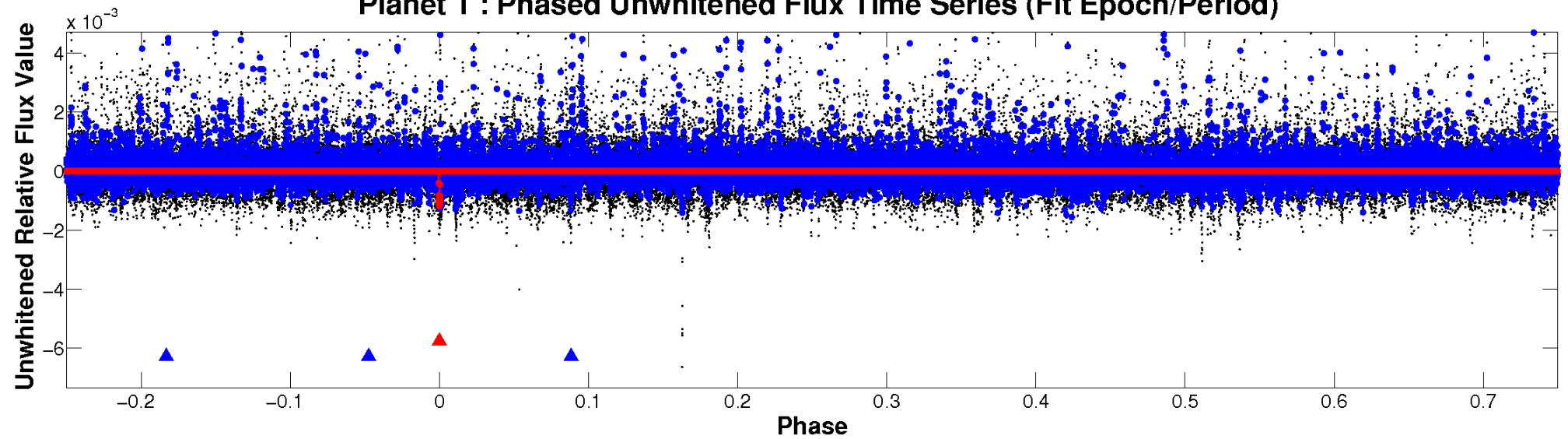
ALT Odd/Even

TCE 003934090-01

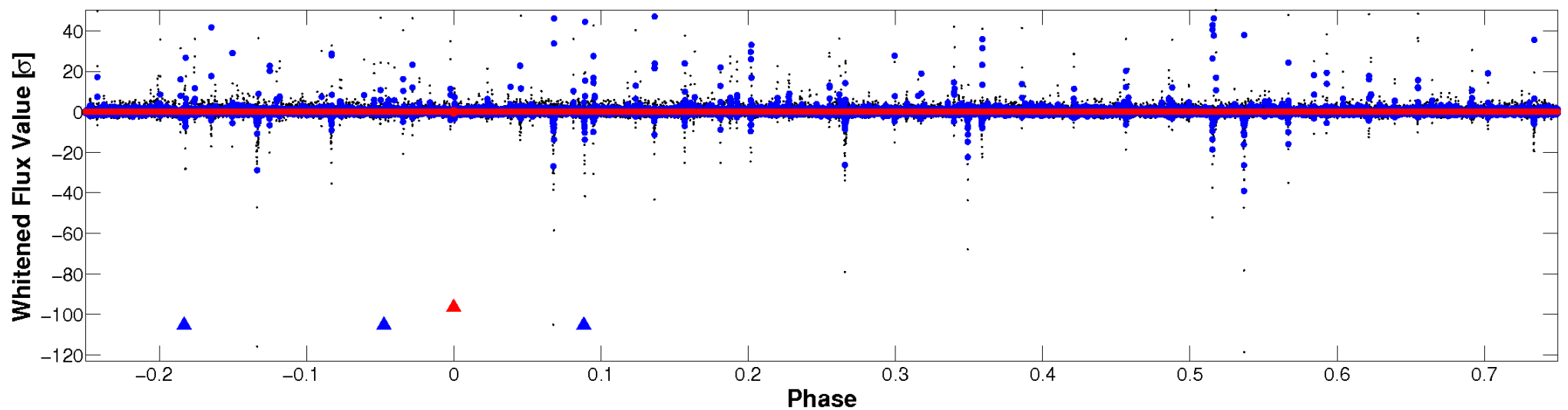


Non-Whitened Vs. Whitened Light Curve

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

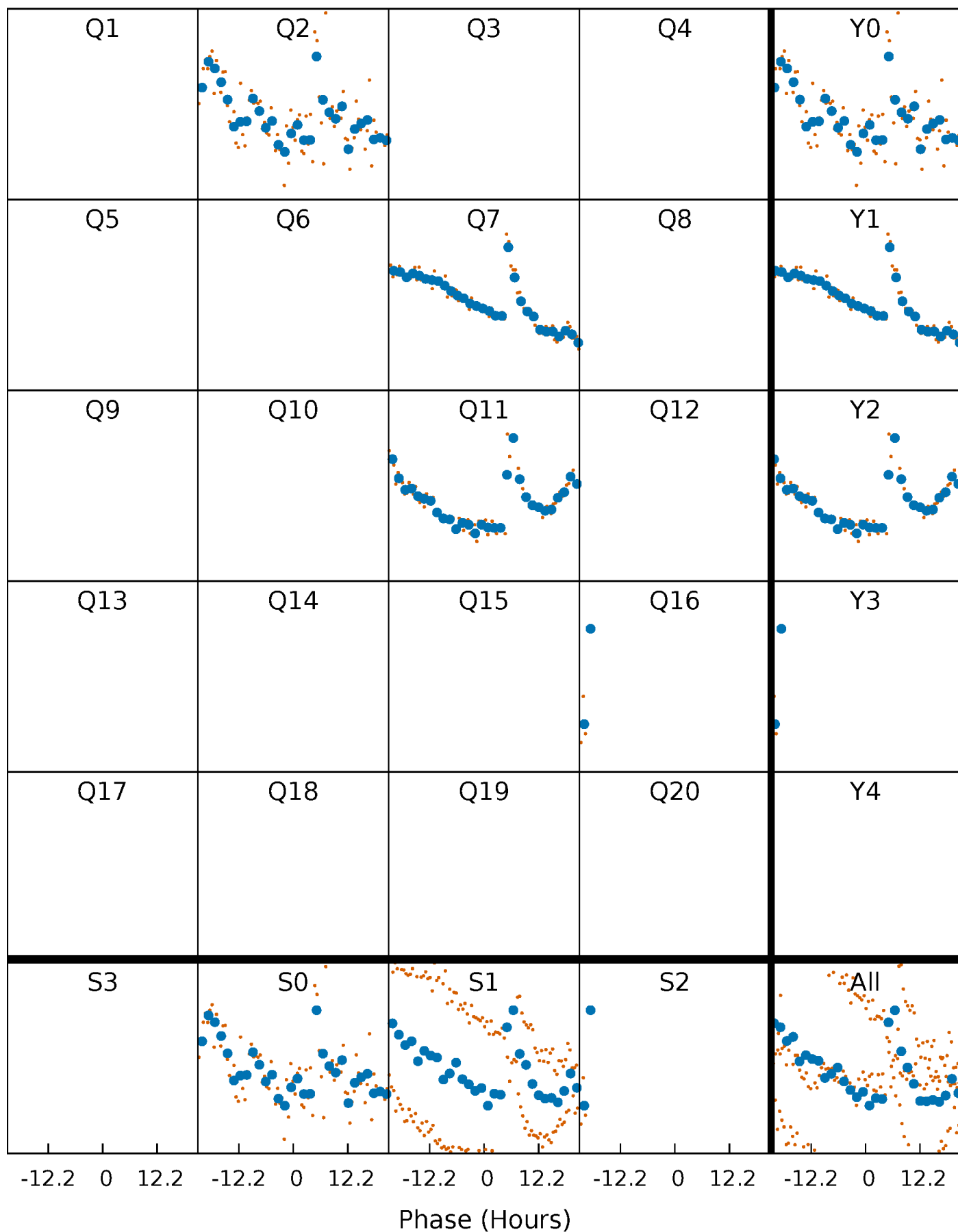


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



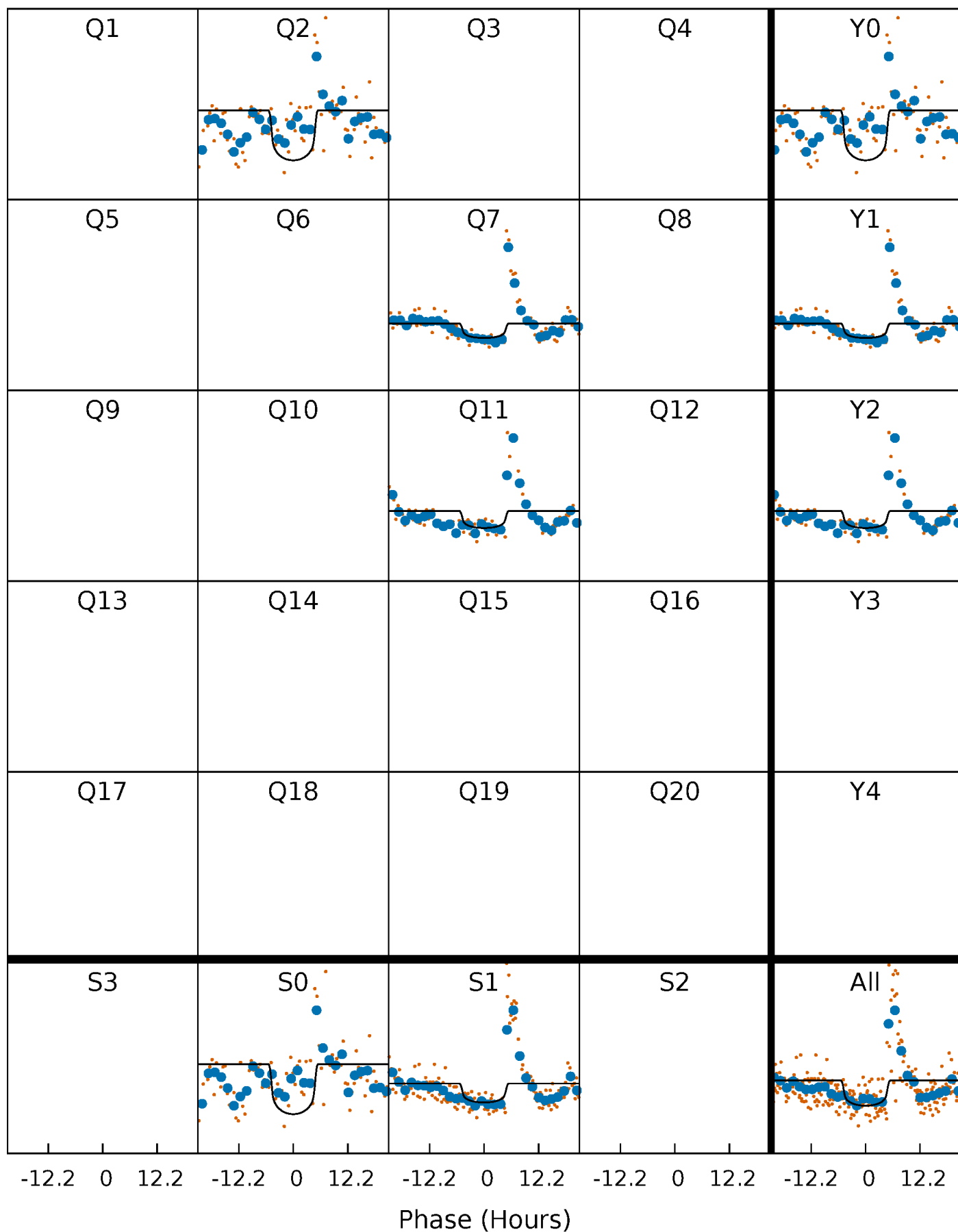
PDC Quarter-Phased Transit Curves

TCE 003934090-01 P=419.736574 Days $T_0=218.870956$ (BKJD)



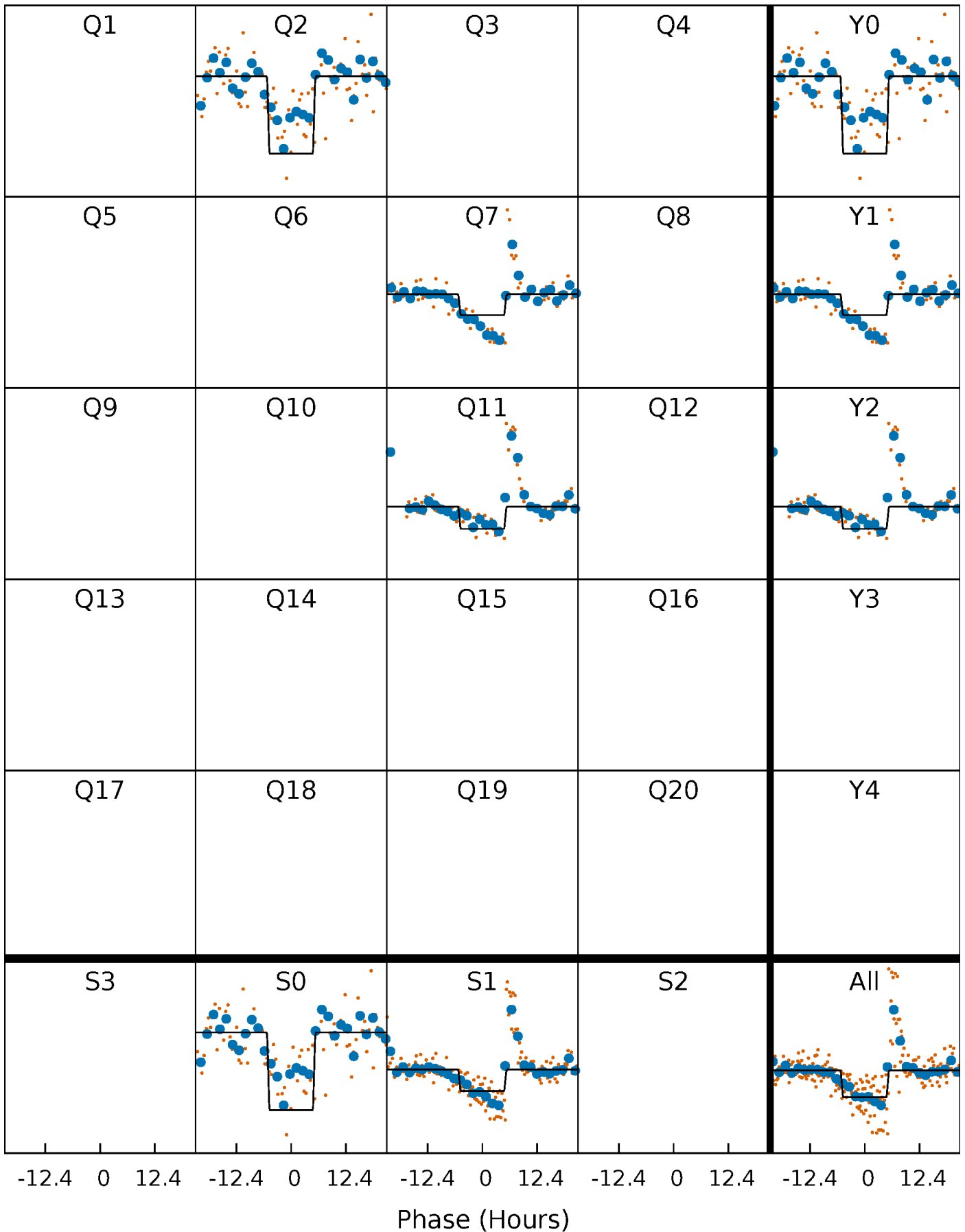
DV Quarter-Phased Transit Curves

TCE 003934090-01 P=419.736574 Days $T_0=218.870956$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

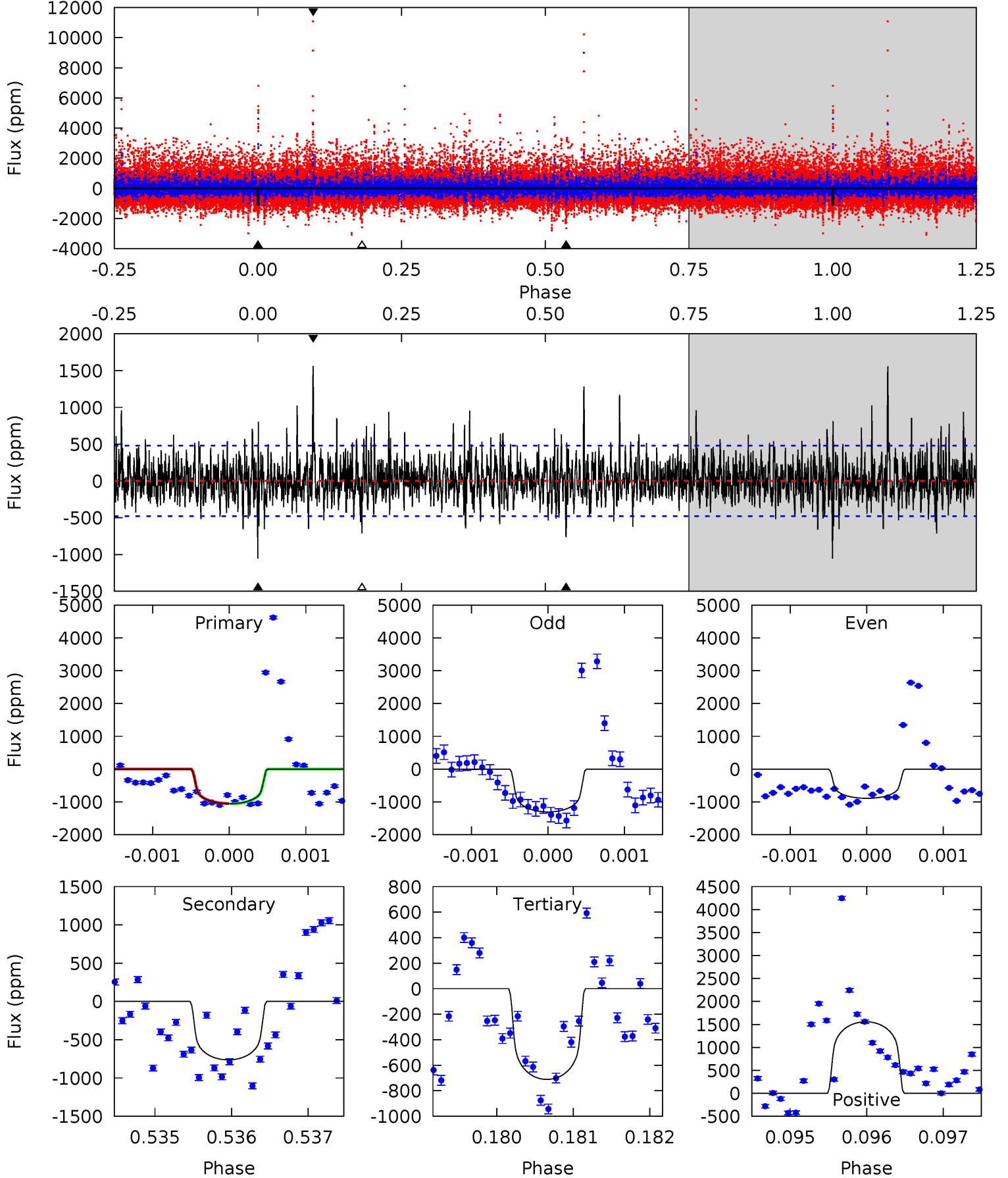
TCE 003934090-01 P=419.753001 Days $T_0=218.830256$ (BKJD)



DV Model-Shift Uniqueness Test

003934090-01, P = 419.736574 Days, E = 218.870956 Days

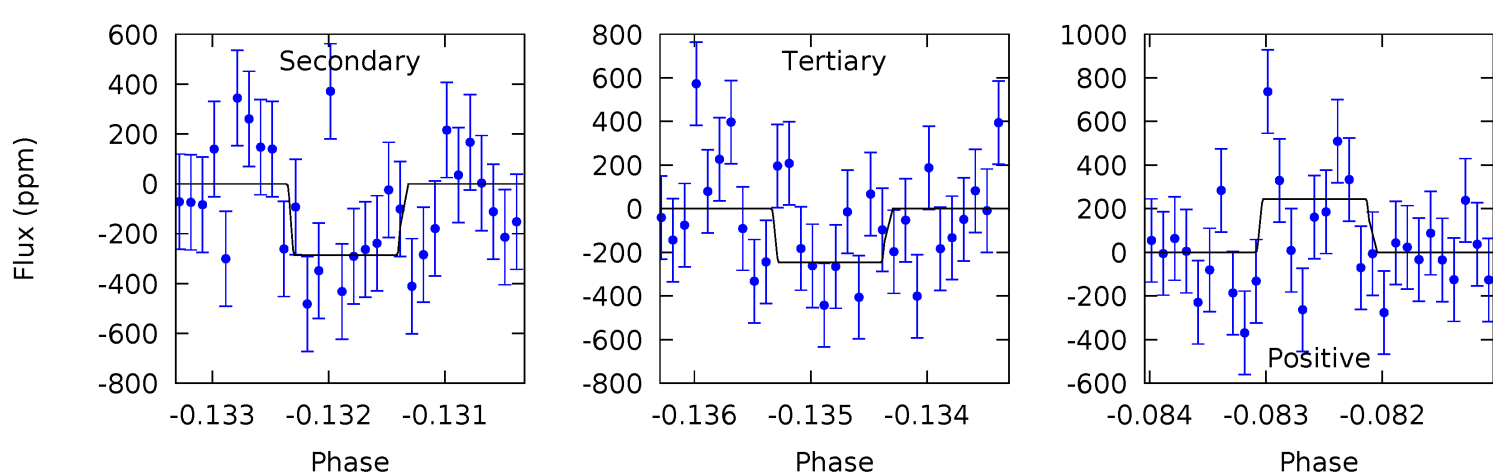
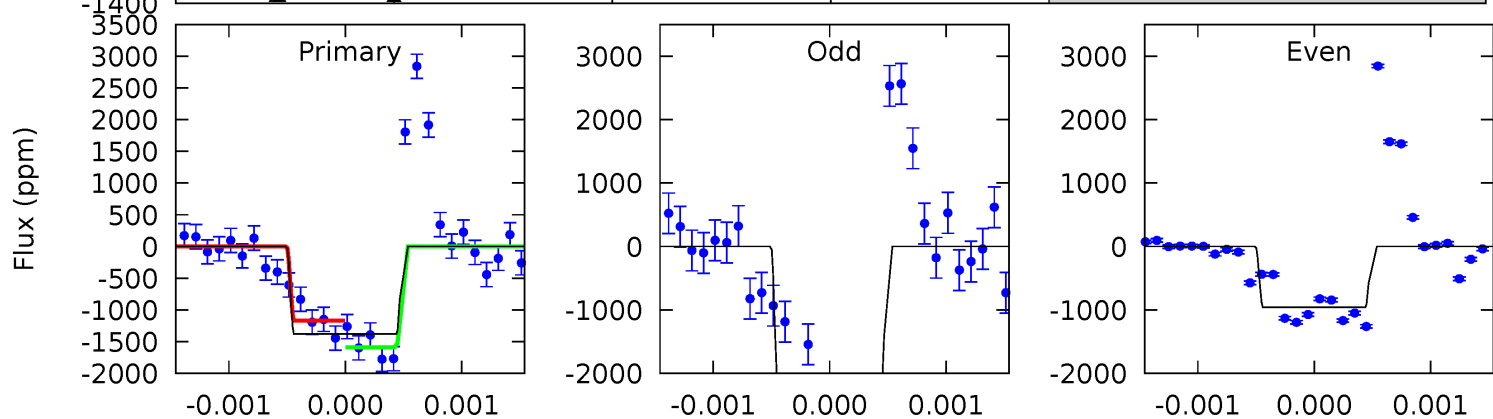
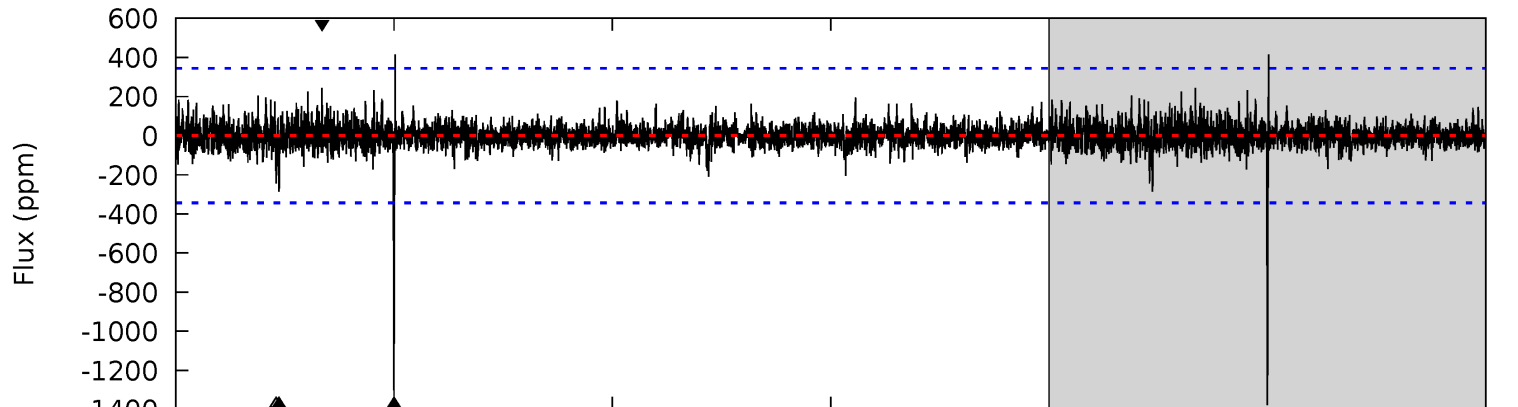
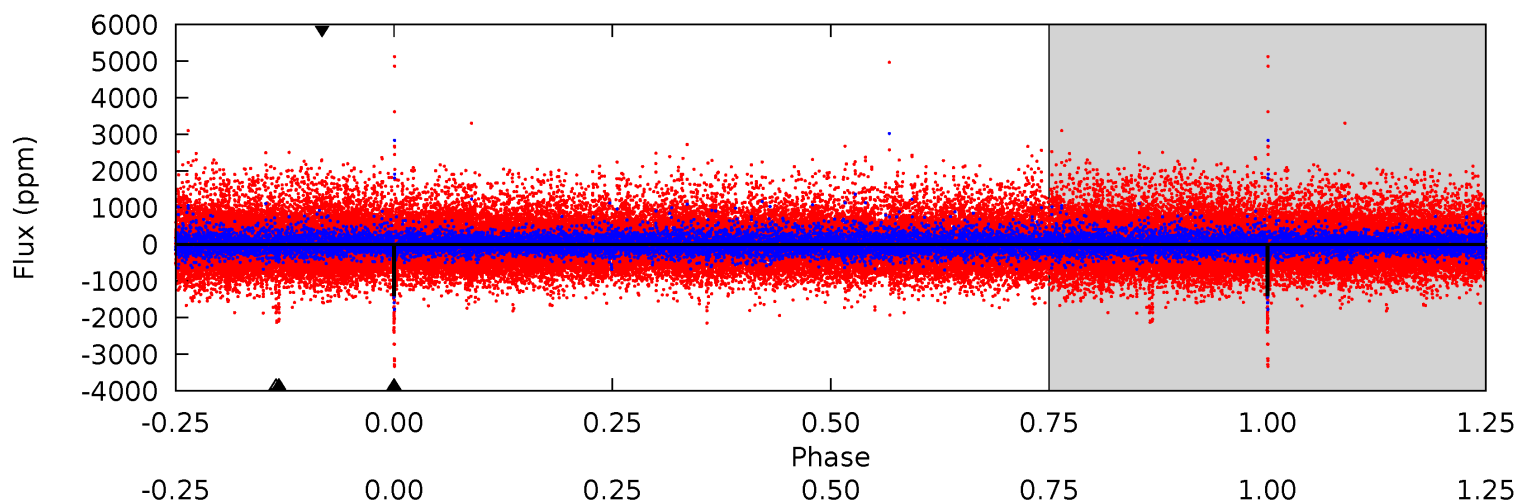
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.0 | 8.65 | 8.07 | 17.7 | 5.44 | 3.27 | 2.55 | 3.91 | -5.70 | 0.58 | -9.03 | 1.36 | 0.78 | 0.60 | 0.07 |



Alt Model-Shift Uniqueness Test

003934090-01, P = 419.753001 Days, E = 218.830256 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 21.8 | 4.53 | 3.88 | 3.85 | 5.44 | 3.27 | 0.72 | 17.9 | 18.0 | 0.64 | 0.67 | 9.84 | 1.28 | 0.23 | 3.27 |



Stellar Parameters For KIC 003934090

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|---------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 3823^{+84}_{-92} | $4.730^{+0.048}_{-0.028}$ | $-0.100^{+0.200}_{-0.200}$ | $0.518^{+0.038}_{-0.046}$ | $0.526^{+0.040}_{-0.044}$ | $5.321^{+1.224}_{-0.686}$ |
| | +2%/-2% | +1%/-1% | +200%/-200% | +7%/-9% | +8%/-8% | +23%/-13% |
| Source | PHO2 | PHO2 | PHO2 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 003934090-01 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|---------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -762 ± 88 | $1.92^{+0.52}_{-0.56}$ | 179^{+5}_{-5} | 3555^{+438}_{-294} | 89568^{+82687}_{-37261} |
| Alt. | -286 ± 63 | $2.12^{+0.51}_{-0.52}$ | 179^{+5}_{-5} | 2976^{+258}_{-200} | 27057^{+21156}_{-10238} |

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

DV Centroid Data

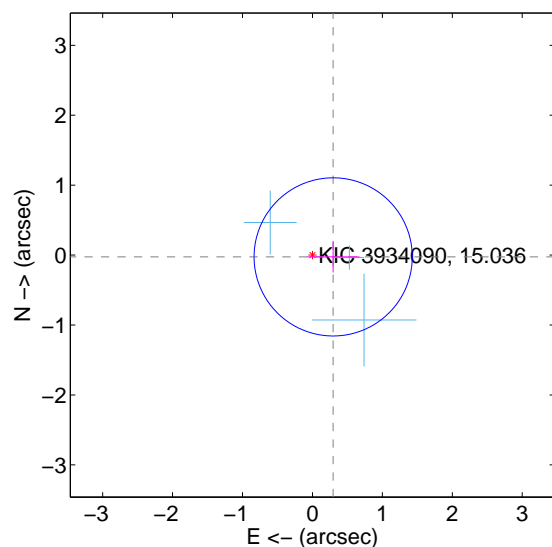
Supplemental centroid analysis for 003934090-01. Kepler magnitude: 15.04. Transit SNR 6.30

There are 3 quarters with good PRF difference image offsets

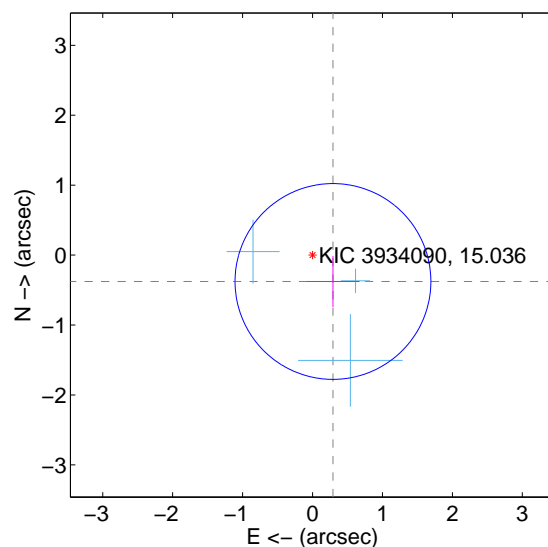
The direct PRF centroid is offset from the target star catalog position by about 0.34 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.298 ± 0.377 | 0.79 | -0.296 ± 0.378 | -0.026 ± 0.222 |
| PRF-fit source offset from KIC position | 0.477 ± 0.467 | 1.02 | -0.292 ± 0.380 | -0.377 ± 0.363 |
| photometric centroid source offset | 0.45 ± 0.81 | 0.56 | -0.13 ± 0.98 | 0.43 ± 0.79 |

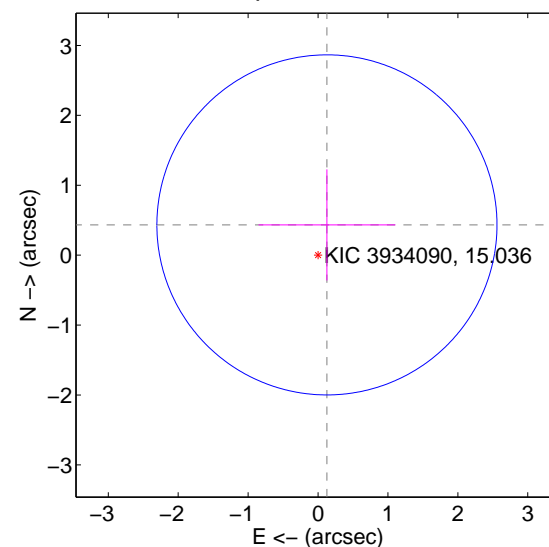
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

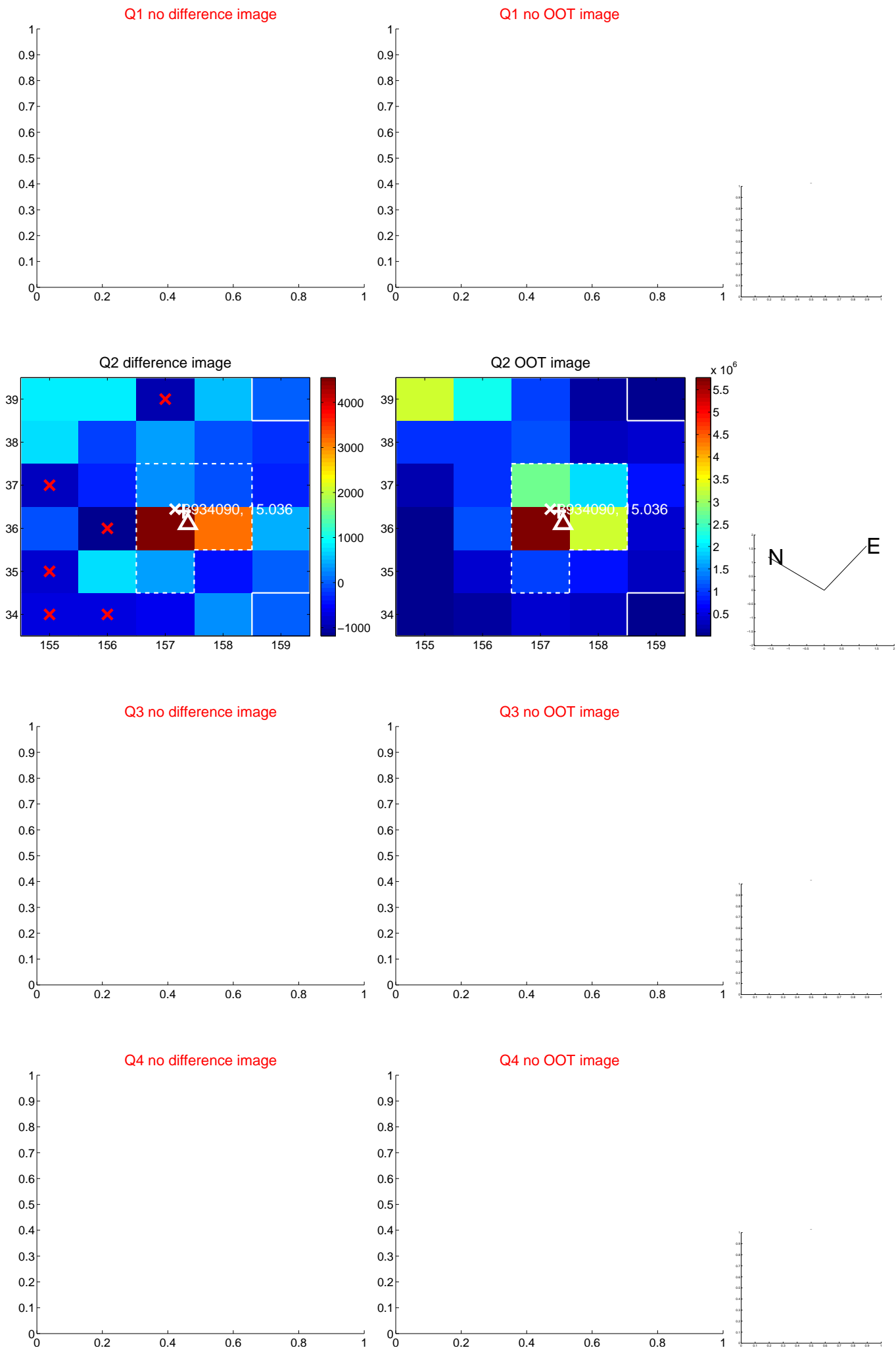


offset from photometric centroids



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.

Q5 no difference image



Q5 no OOT image



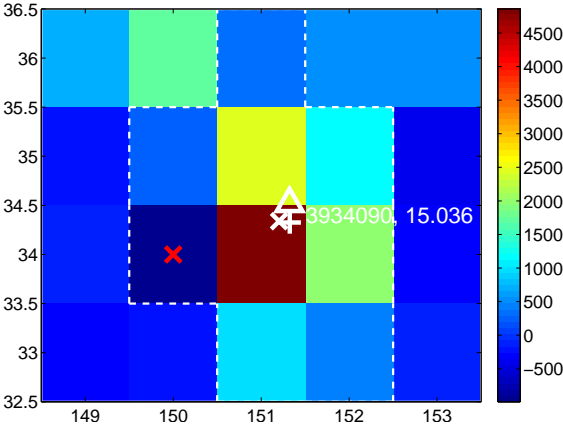
Q6 no difference image



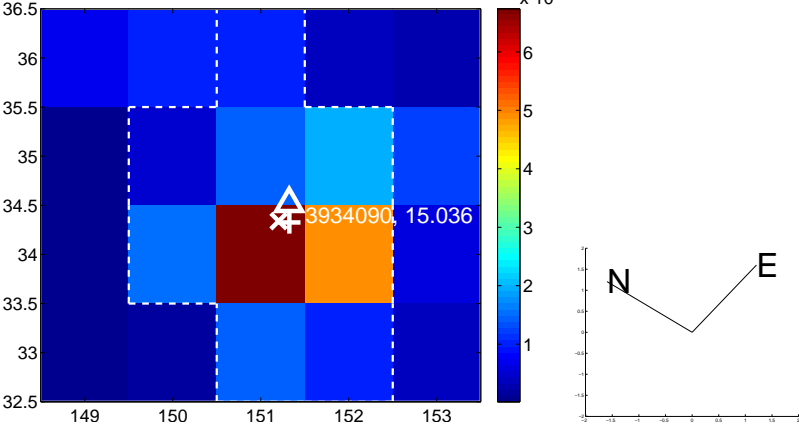
Q6 no OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image



Q8 no OOT image



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

Q9 no difference image



Q9 no OOT image



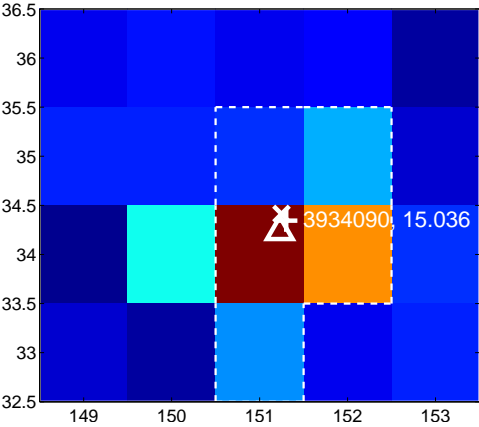
Q10 no difference image



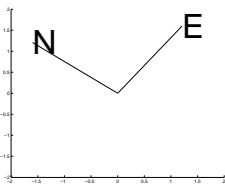
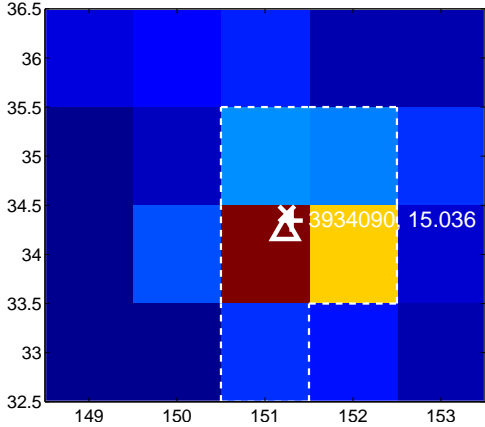
Q10 no OOT image



Q11 difference image



Q11 OOT image



Q12 no difference image



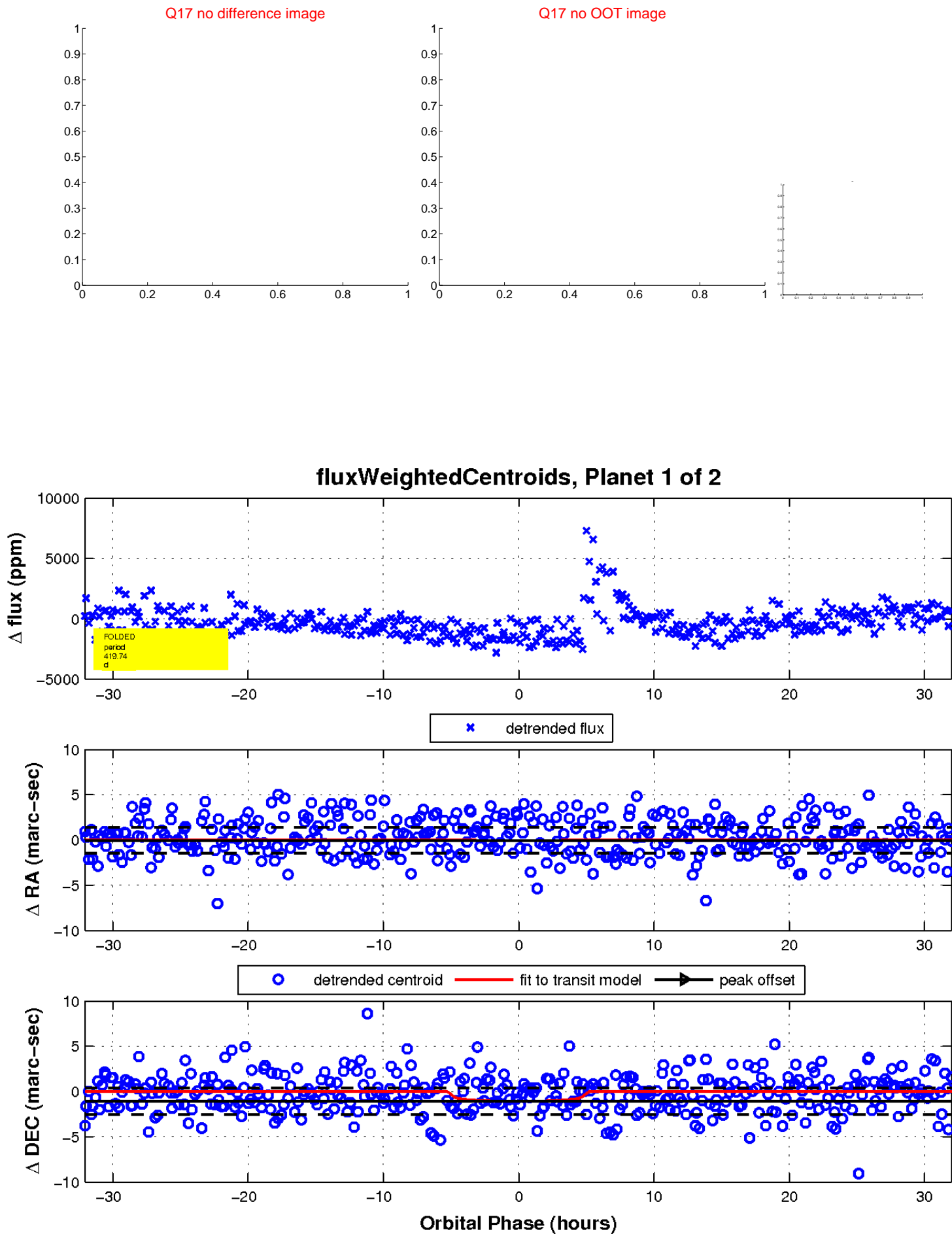
Q12 no OOT image



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

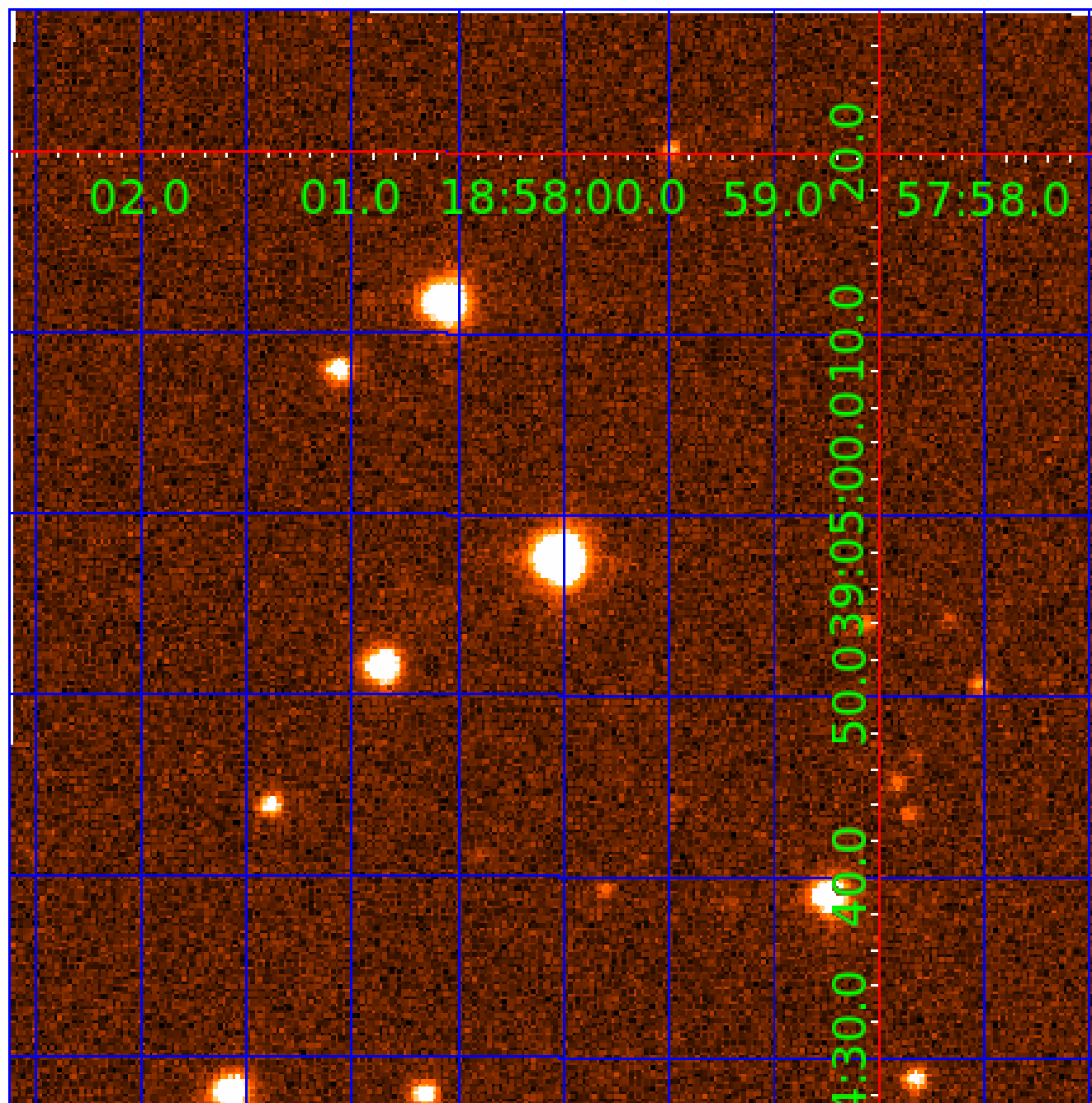


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 003934090

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 003934090-01 | OBS | No | 419.736574 | 218.870956 | 1187.4 | 10.694 | 11.9 | 6.3 | 0.52 | 3823 | 1.93 | 0.07 |
| 003934090-02 | OBS | No | 476.707044 | 561.746332 | 2477.2 | 13.404 | 10.2 | 11.0 | 0.52 | 3823 | 3.24 | 0.06 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 003934090-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES—LPP_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_KIC_POS |
| 003934090-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS |

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

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

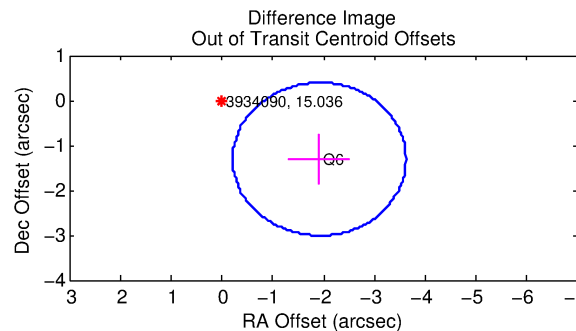
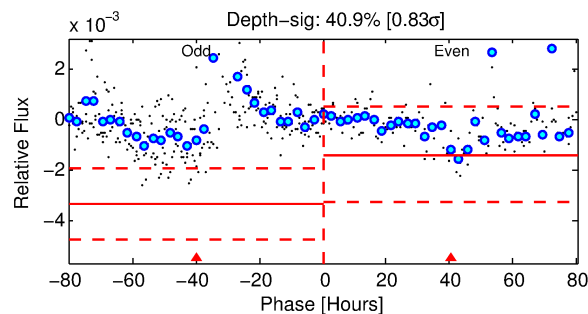
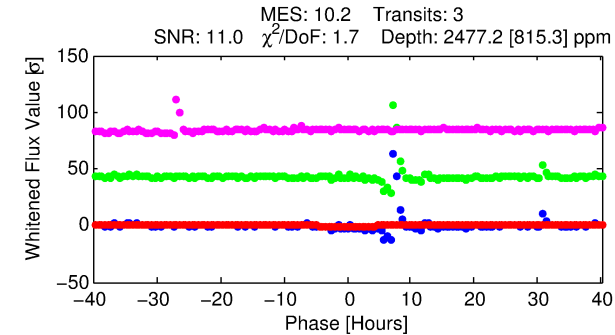
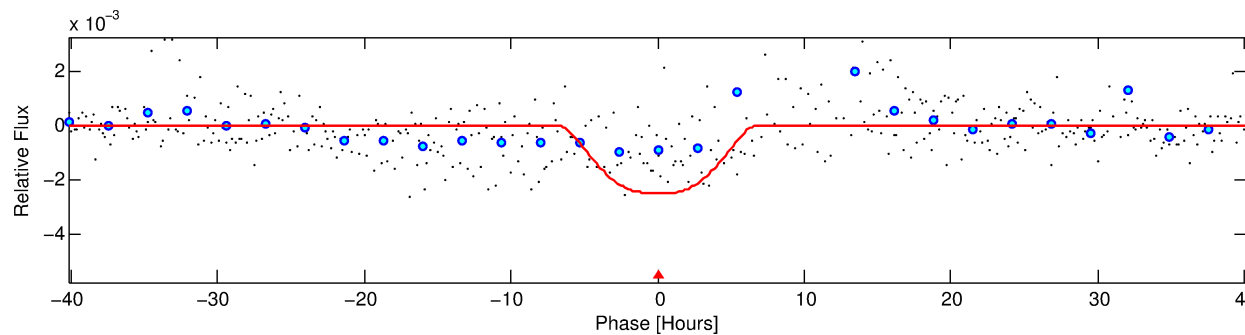
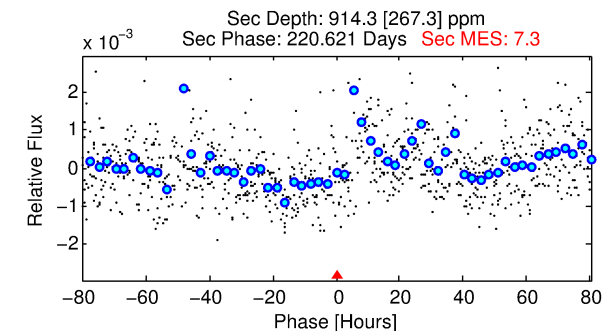
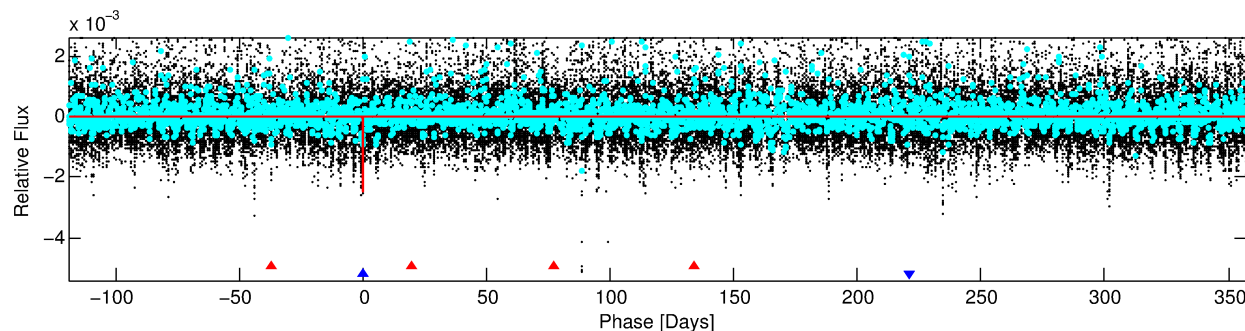
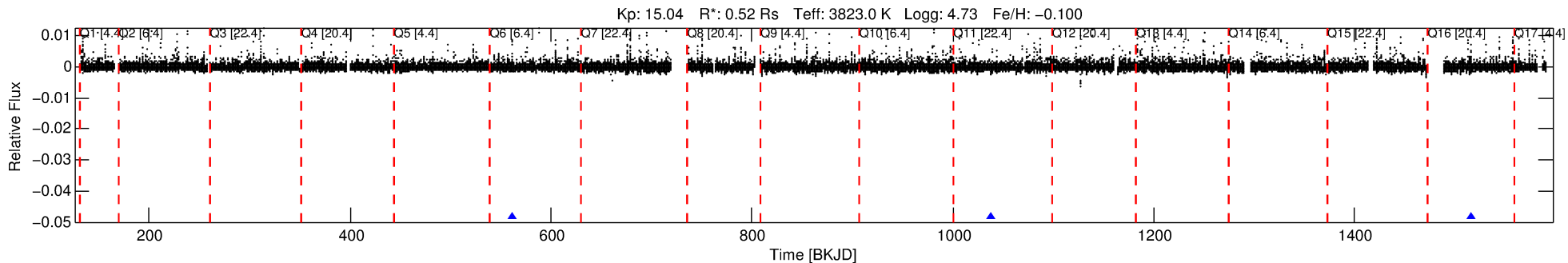
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003934090-02

No Significant Match Found

DV One-Page Summary

KIC: 3934090 Candidate: 2 of 2 Period: 476.707 d



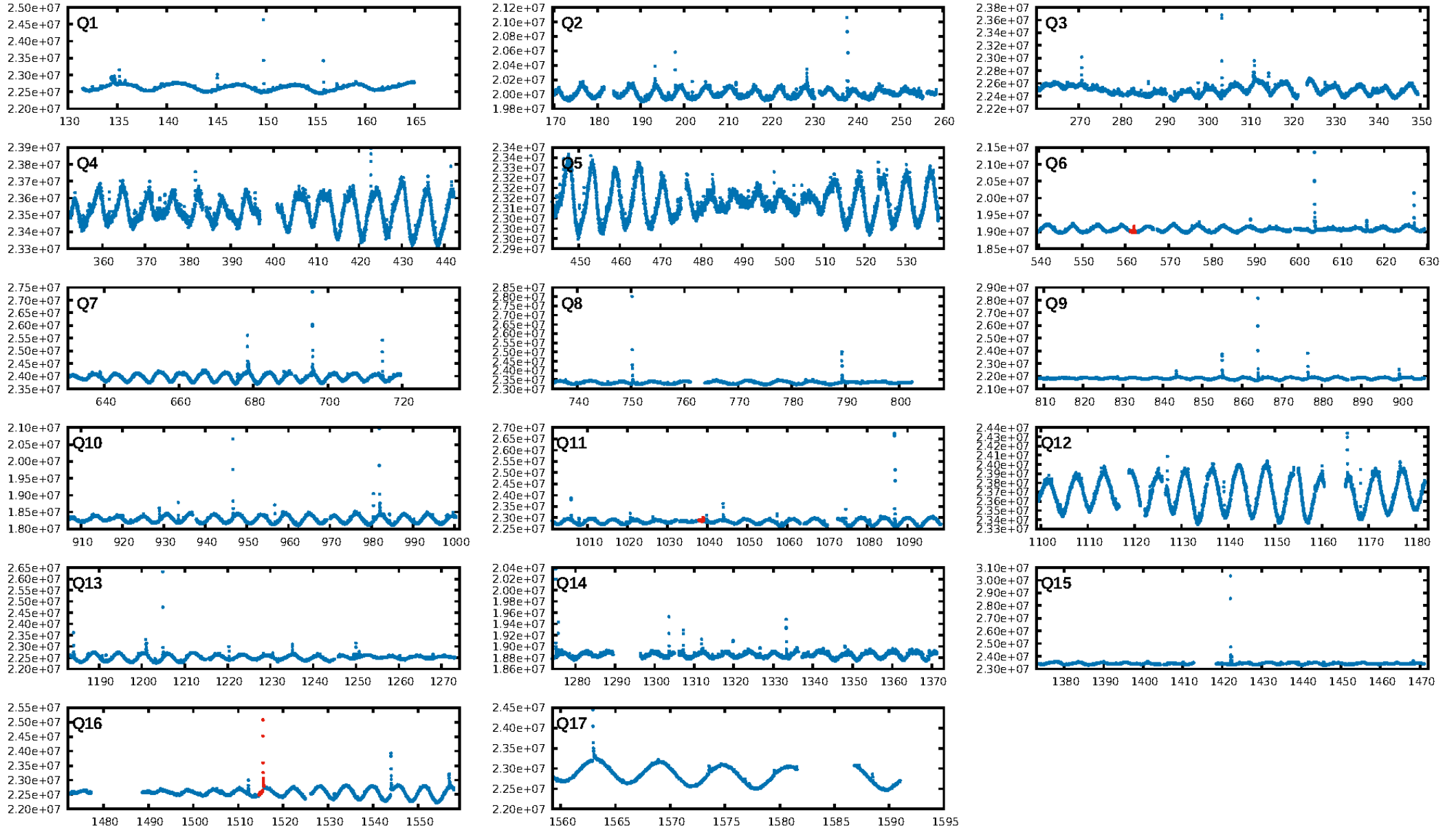
DV Fit Results:

Period = 476.70704 [0.03623] d
Epoch = 561.7463 [0.0465] BKJD
Rp/R* = 0.0574 [0.0131]
a/R* = 133.01 [40.73]
b = 0.94 [0.05]
Seff = 0.06 [0.01]
Teq = 124 [4] K
Rp = 3.24 [0.79] Re
a = 0.9640 [0.0672] AU
Ag = 44460.53 [24411.39] [1.82σ]
Teffp = 2776 [381] K [6.96σ]

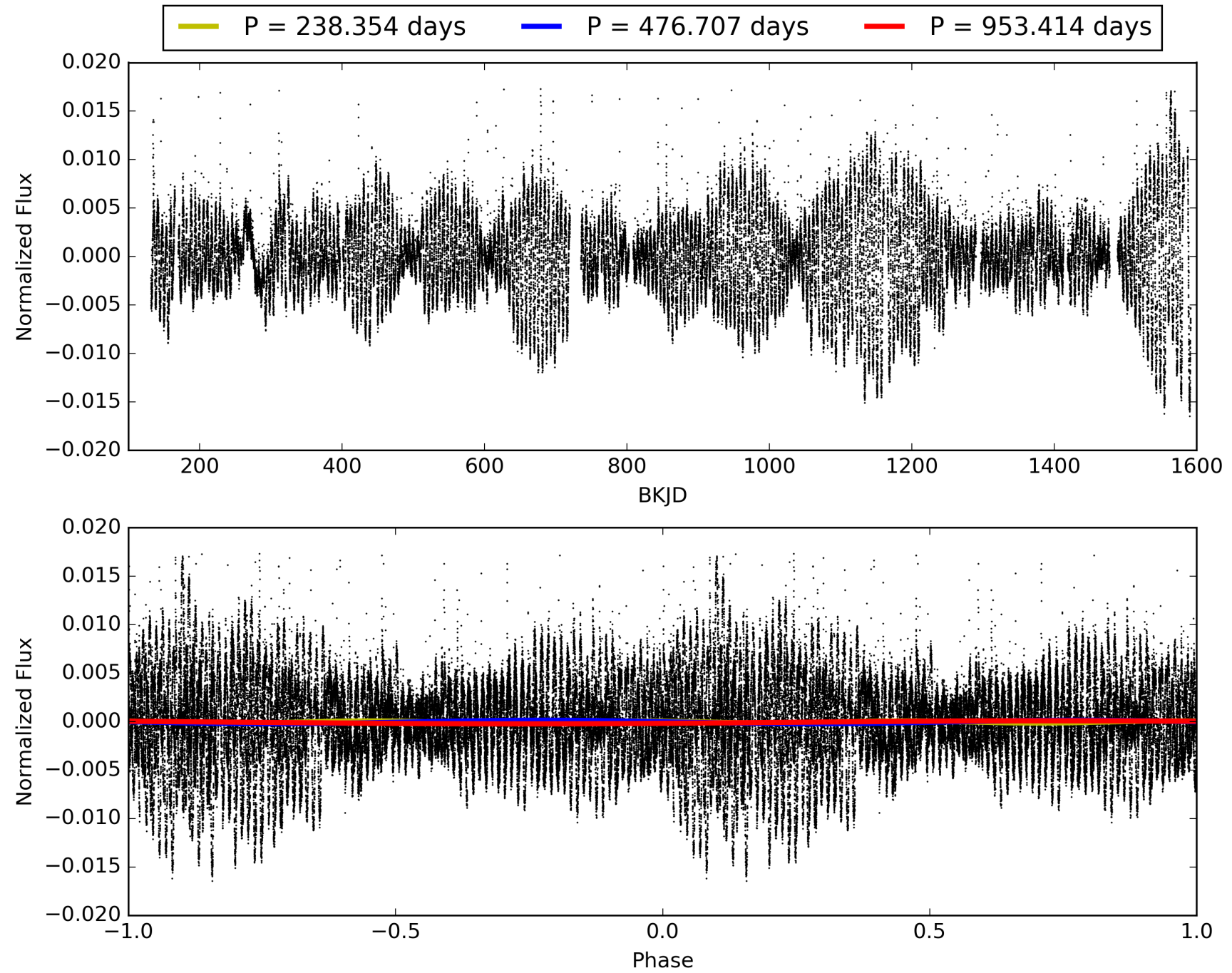
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [79.74σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 32.9%
Bootstrap-pfa: 1.84e-08
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 1.041
Centroid-sig: 67.4%
Centroid-so: 0.367 arcsec [0.71σ]
OotOffset-rm: 2.323 arcsec [4.09σ]
KicOffset-rm: 2.474 arcsec [4.43σ]
OotOffset-st: 1/0/0/0 [1]
KicOffset-st: 1/0/0/0 [1]
DiffImageQuality-fgm: 0.00 [0/1]
DiffImageOverlap-fno: 1.00 [1/1]

TCE 003934090-02, PDC Light Curves

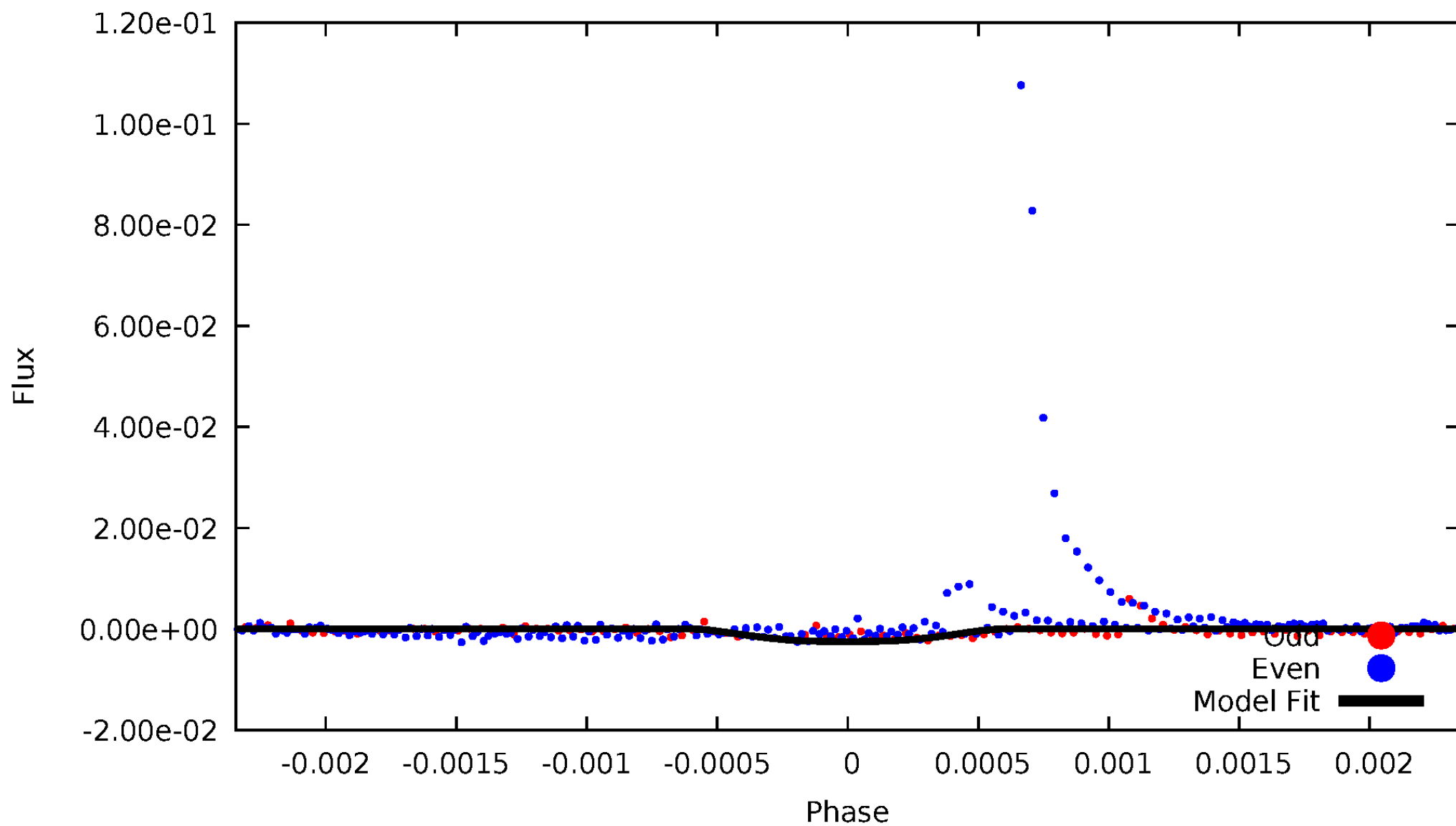


TCE 003934090-02



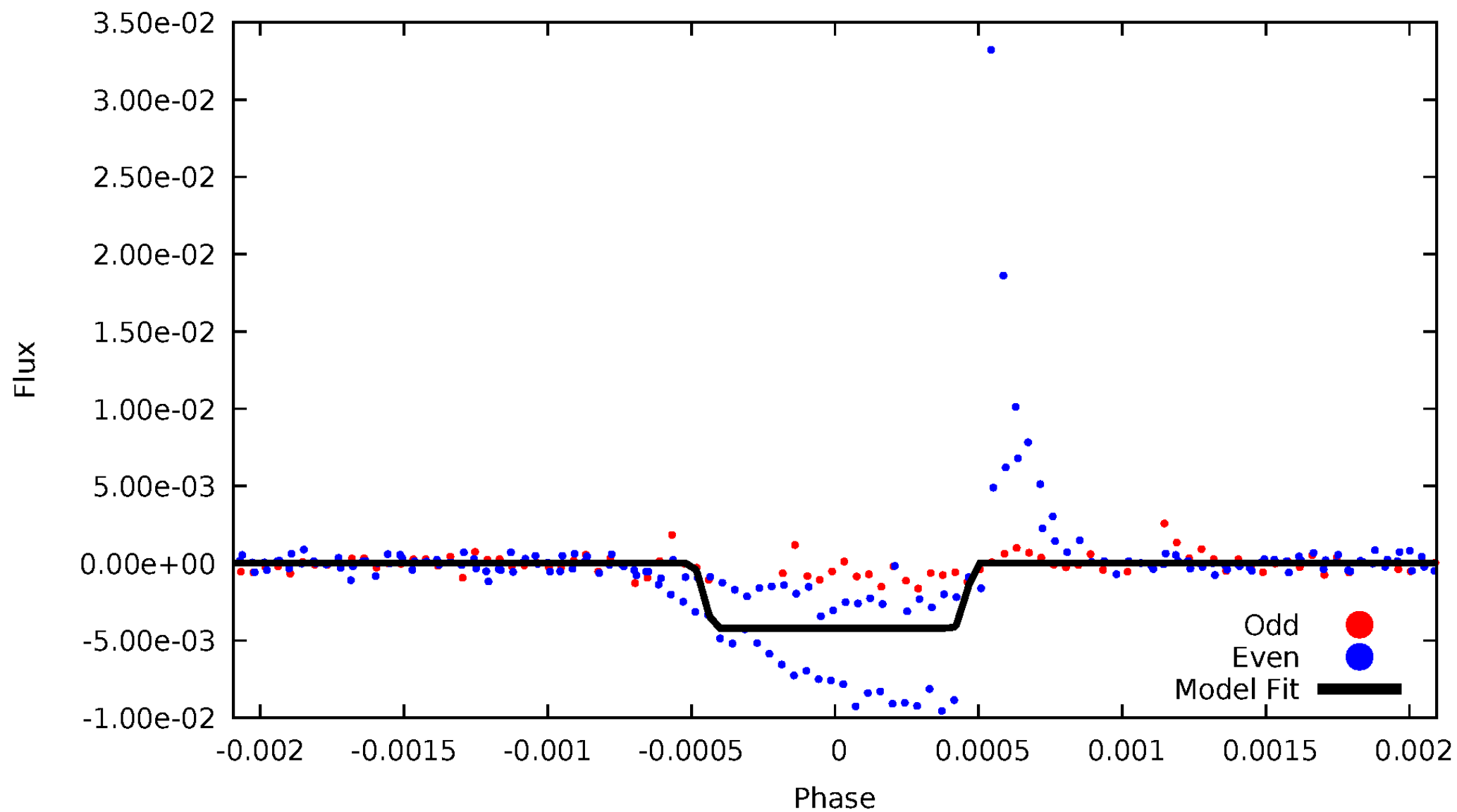
DV Odd/Even

TCE 003934090-02



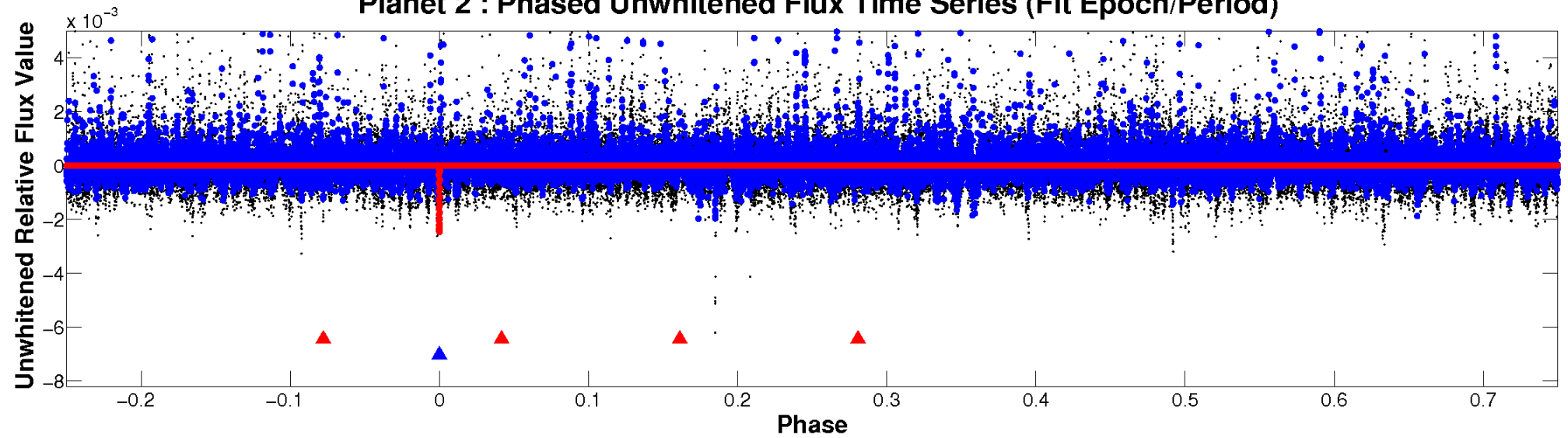
ALT Odd/Even

TCE 003934090-02

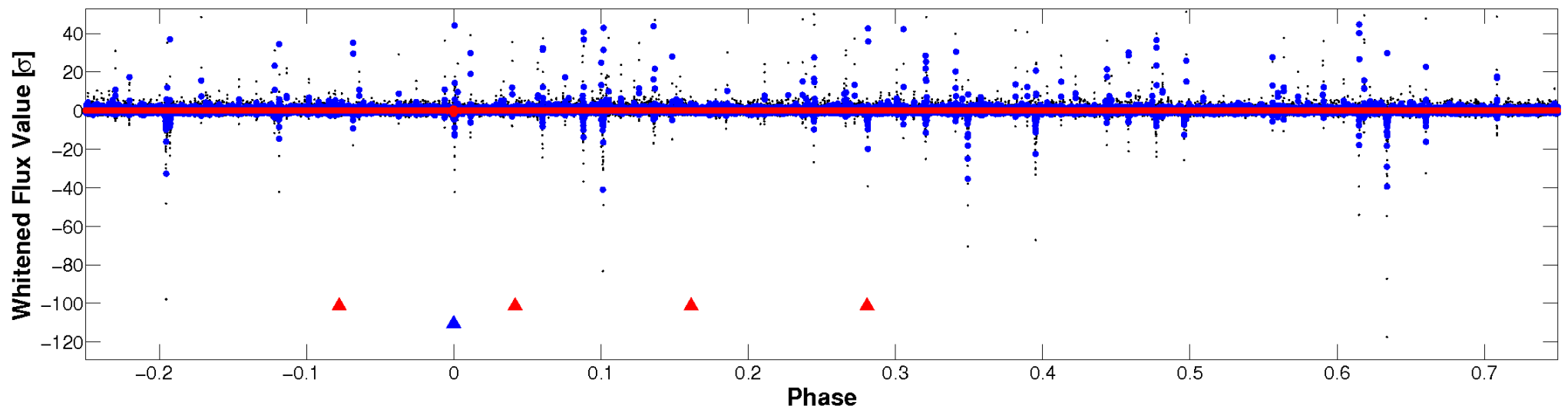


Non-Whitened Vs. Whitened Light Curve

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

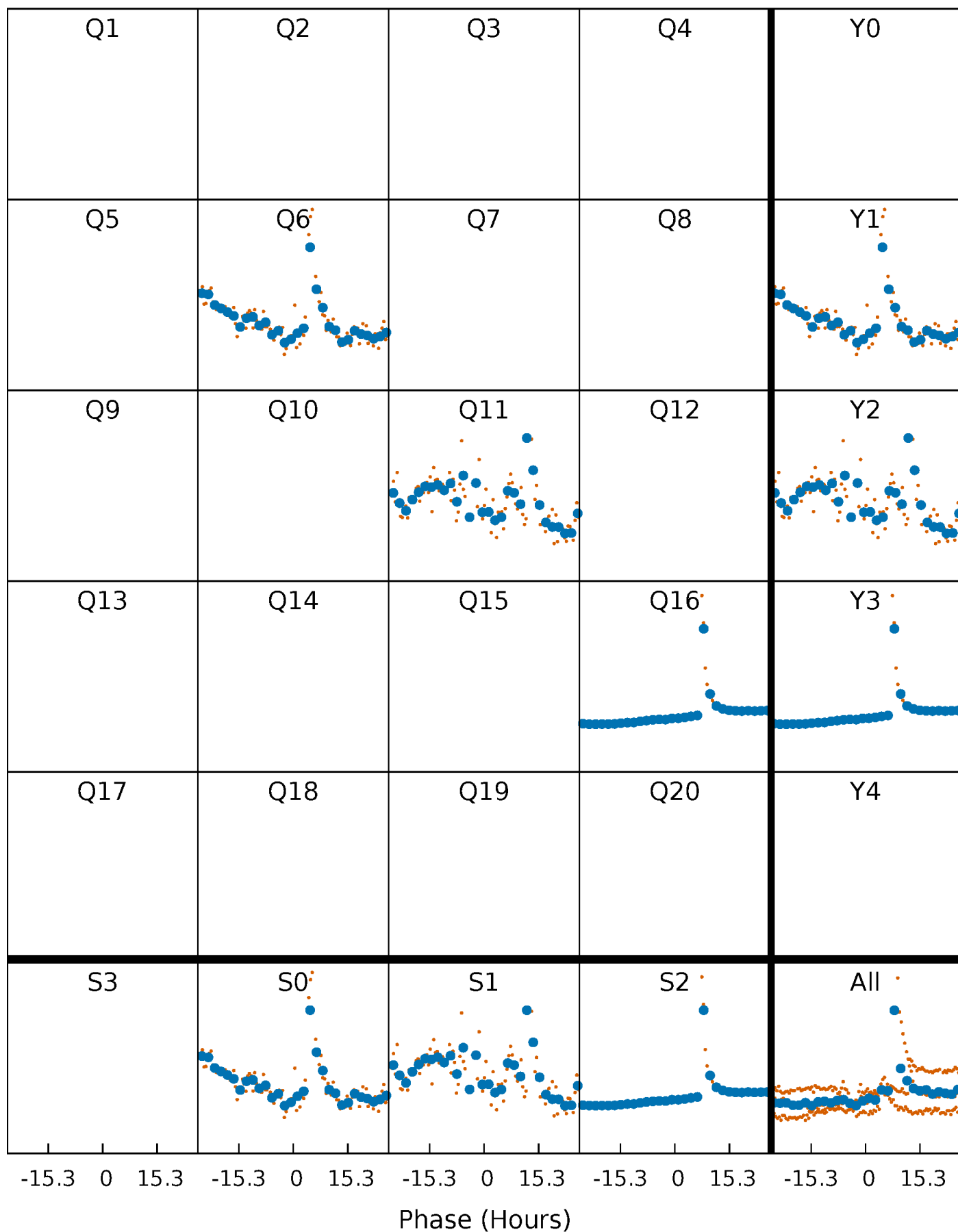


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



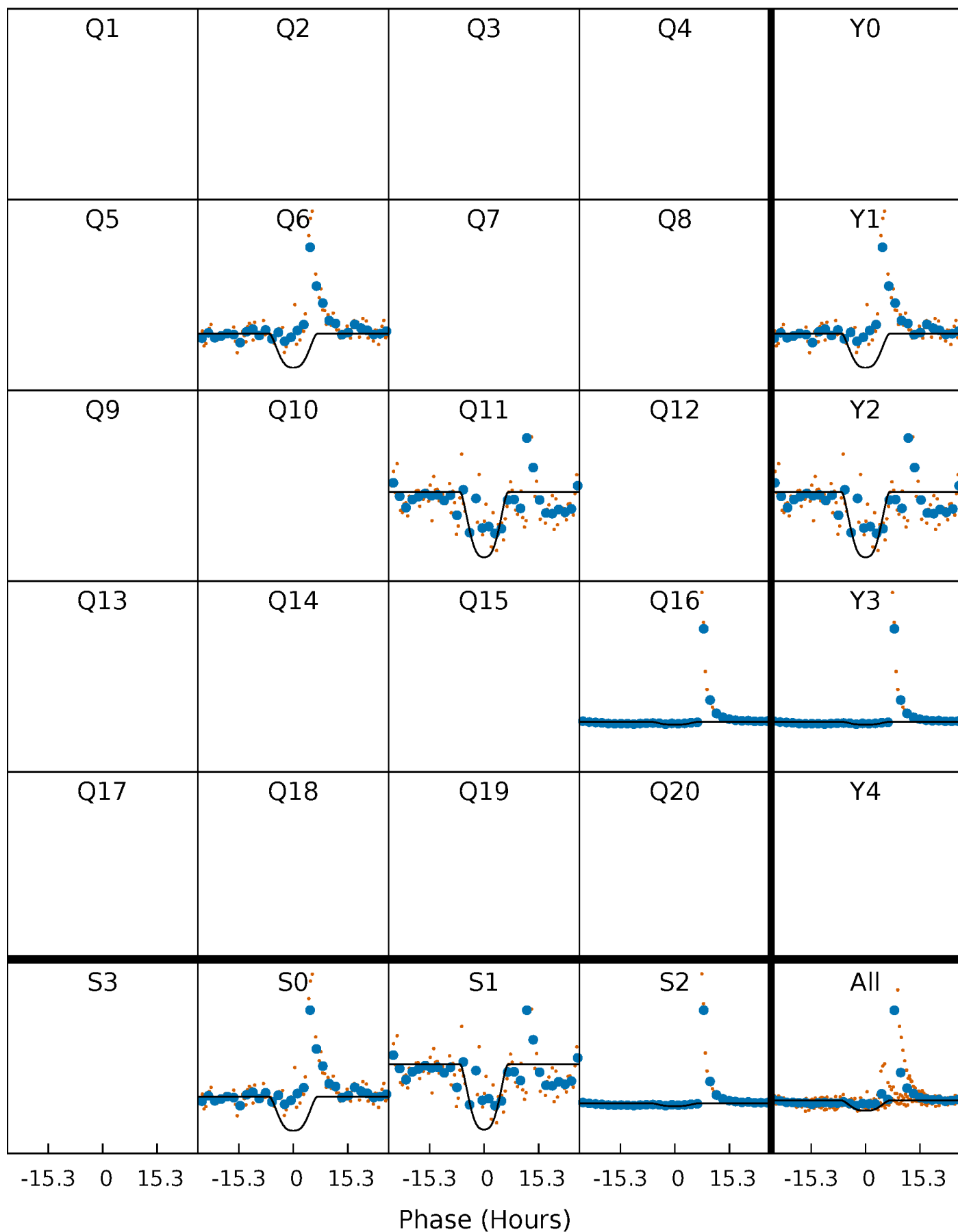
PDC Quarter-Phased Transit Curves

TCE 003934090-02 P=476.707043 Days $T_0=561.746332$ (BKJD)



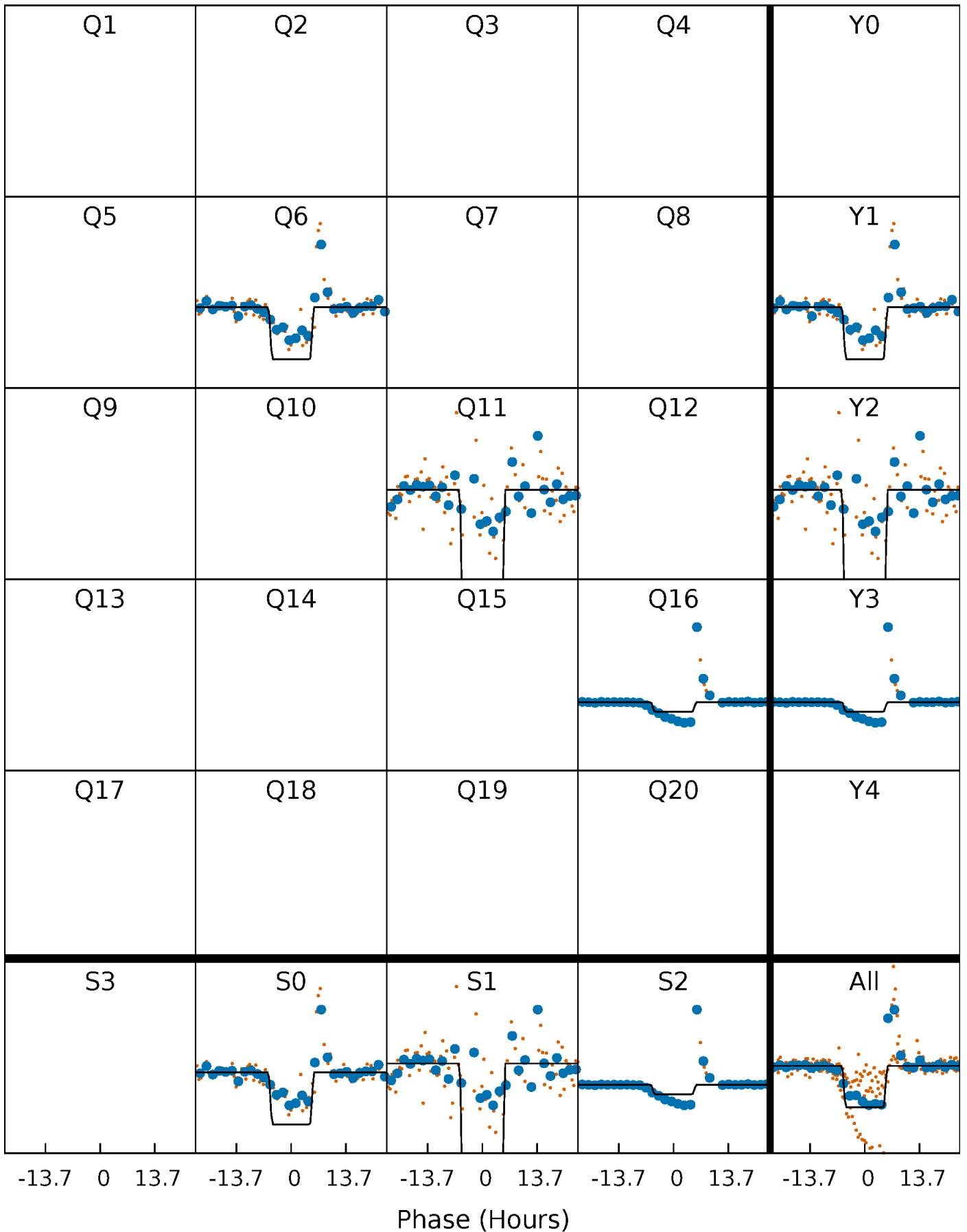
DV Quarter-Phased Transit Curves

TCE 003934090-02 $P=476.707043$ Days $T_0=561.746332$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

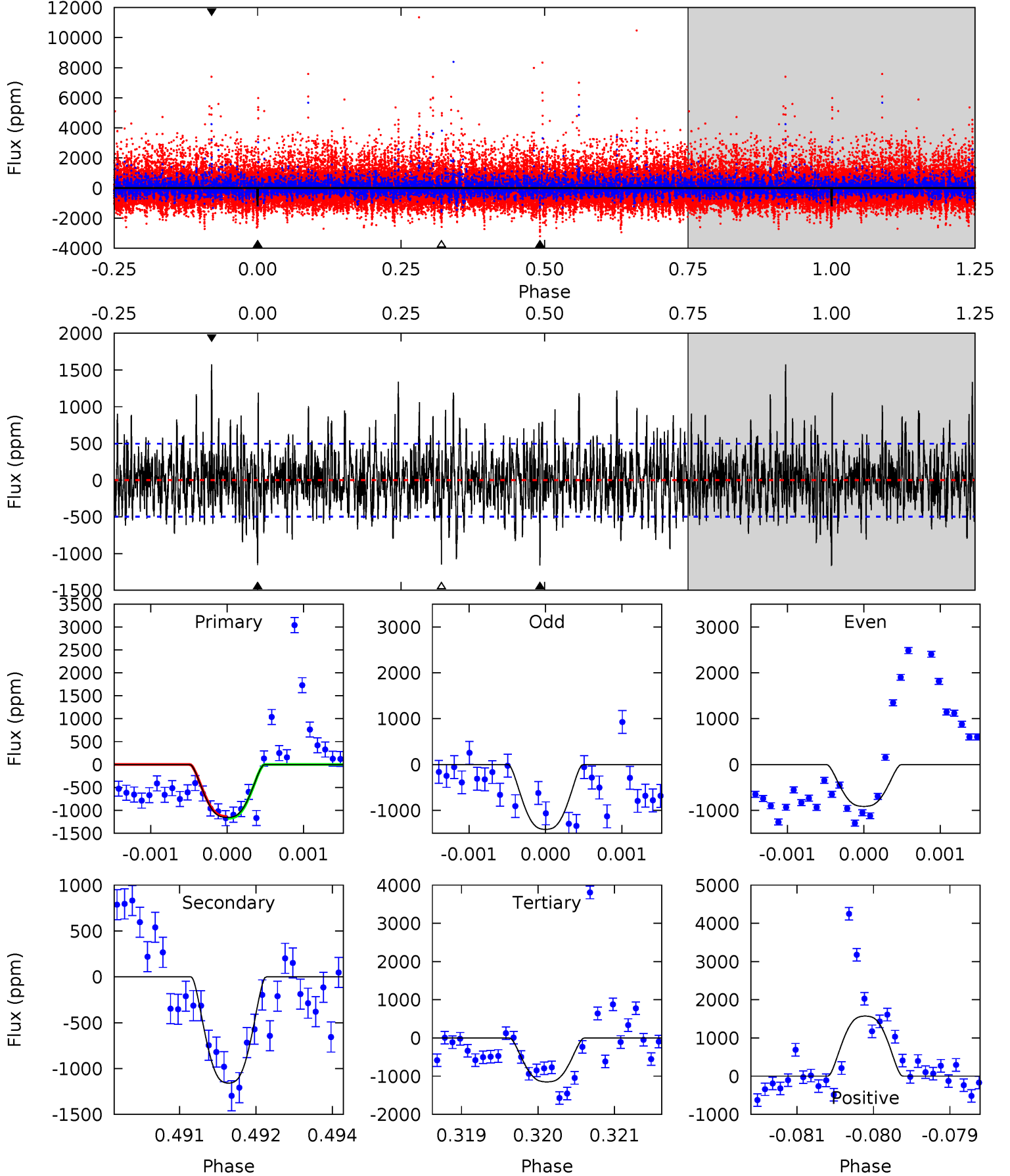
TCE 003934090-02 P=476.796689 Days $T_0=561.665145$ (BKJD)



DV Model-Shift Uniqueness Test

003934090-02, $P = 476.707043$ Days, $E = 85.039289$ Days

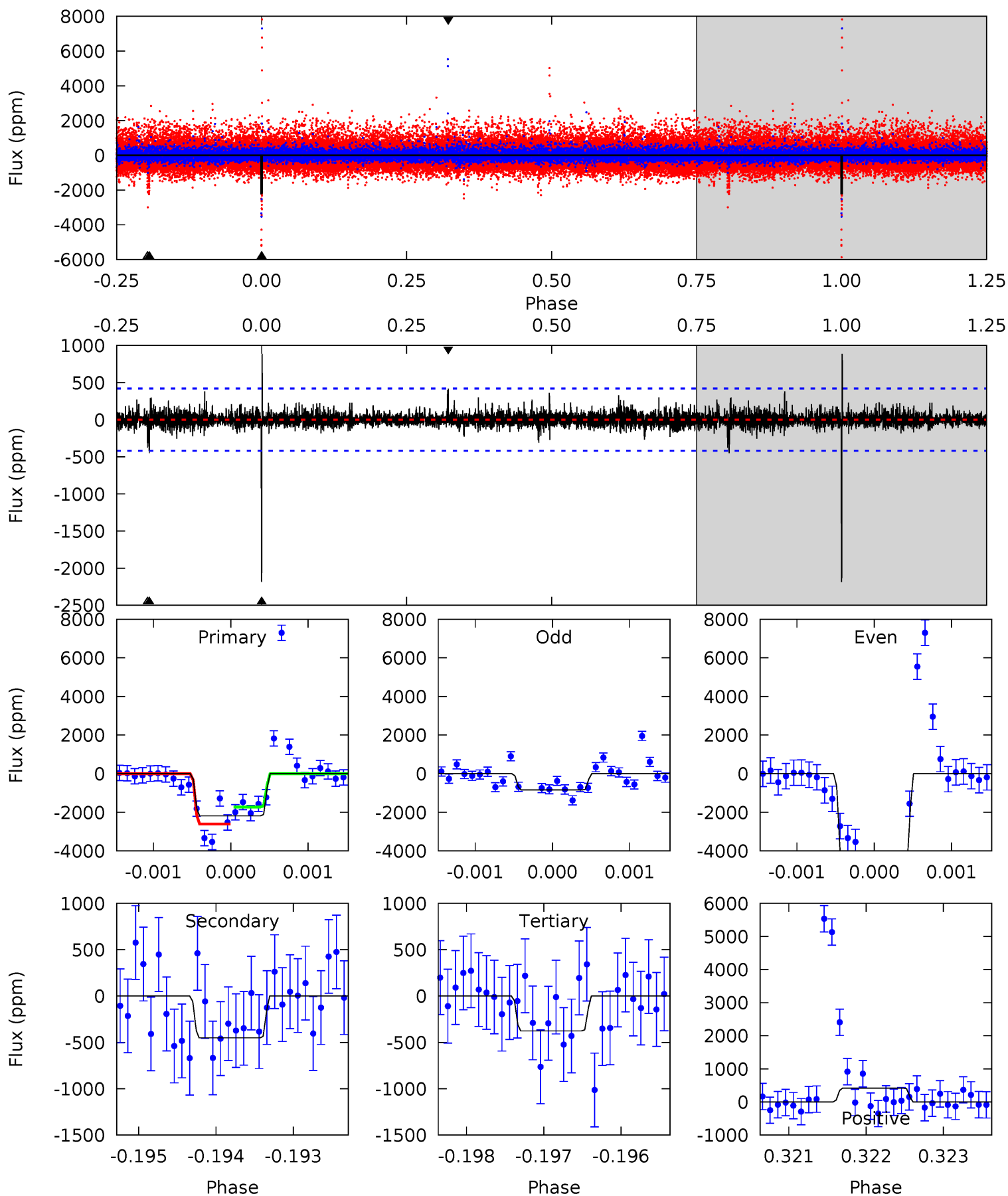
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.6 | 12.7 | 12.6 | 17.2 | 5.42 | 3.24 | 3.43 | 0.07 | -4.57 | 0.11 | -4.53 | 1.10 | 0.61 | 0.58 | 0.22 |



Alt Model-Shift Uniqueness Test

003934090-02, P = 476.796689 Days, E = 84.868456 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 28.4 | 5.86 | 4.90 | 5.42 | 5.45 | 3.29 | 0.85 | 23.5 | 23.0 | 0.96 | 0.45 | 24.7 | 1.62 | 0.29 | 5.73 |



Stellar Parameters For KIC 003934090

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|---------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 3823^{+84}_{-92} | $4.730^{+0.048}_{-0.028}$ | $-0.100^{+0.200}_{-0.200}$ | $0.518^{+0.038}_{-0.046}$ | $0.526^{+0.040}_{-0.044}$ | $5.321^{+1.224}_{-0.686}$ |
| | +2%/-2% | +1%/-1% | +200%/-200% | +7%/-9% | +8%/-8% | +23%/-13% |
| Source | PHO2 | PHO2 | PHO2 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 003934090-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|----------------|------------------------|-----------------|----------------------|---------------------------|
| DV | -1160 ± 92 | $3.23^{+0.78}_{-0.77}$ | 172^{+5}_{-5} | 3235^{+290}_{-201} | 56056^{+43001}_{-18426} |
| Alt. | -451 ± 77 | $3.63^{+0.77}_{-0.80}$ | 172^{+5}_{-5} | 2738^{+206}_{-152} | 17293^{+11876}_{-5589} |

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

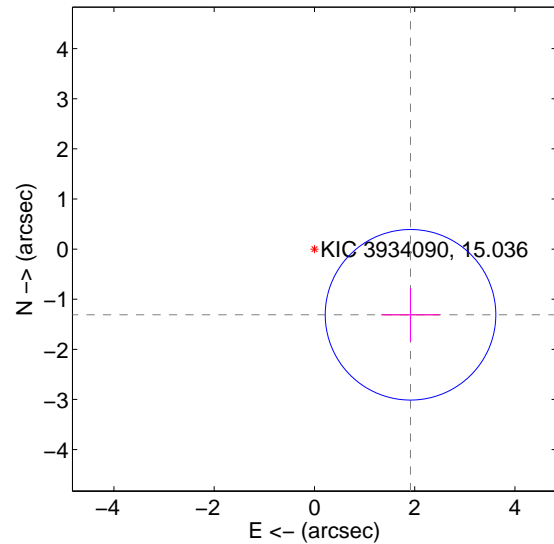
Supplemental centroid analysis for 003934090-02. Kepler magnitude: 15.04. Transit SNR 11.02

There are 0 quarters with good PRF difference image offsets

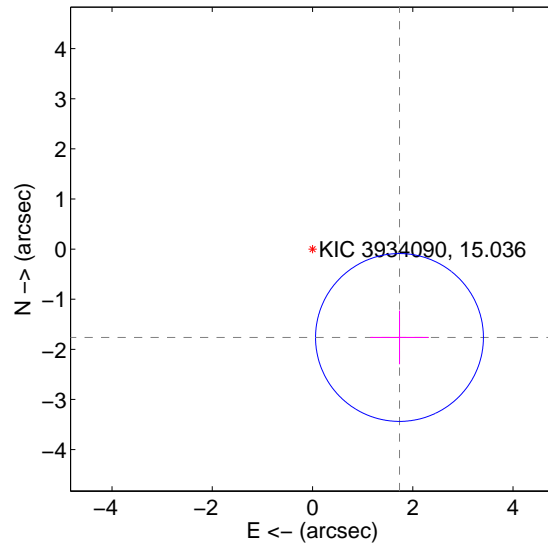
The direct PRF centroid is offset from the target star catalog position by about 0.49 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 2.323 ± 0.567 | 4.09 | -1.917 ± 0.582 | -1.311 ± 0.534 |
| PRF-fit source offset from KIC position | 2.474 ± 0.558 | 4.43 | -1.735 ± 0.582 | -1.764 ± 0.534 |
| photometric centroid source offset | 0.37 ± 0.52 | 0.71 | -0.24 ± 0.56 | -0.28 ± 0.48 |

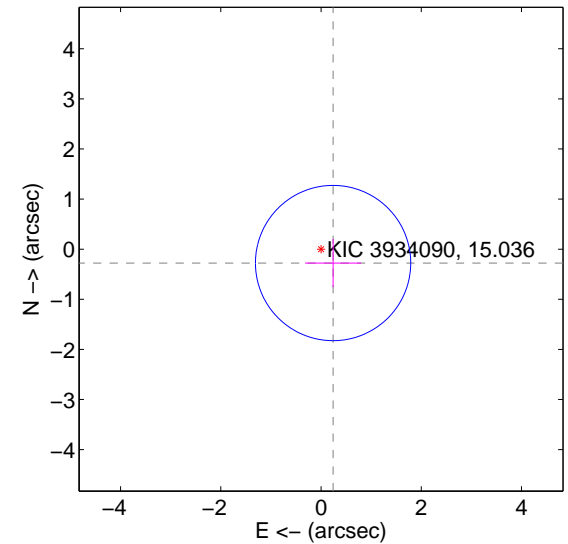
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

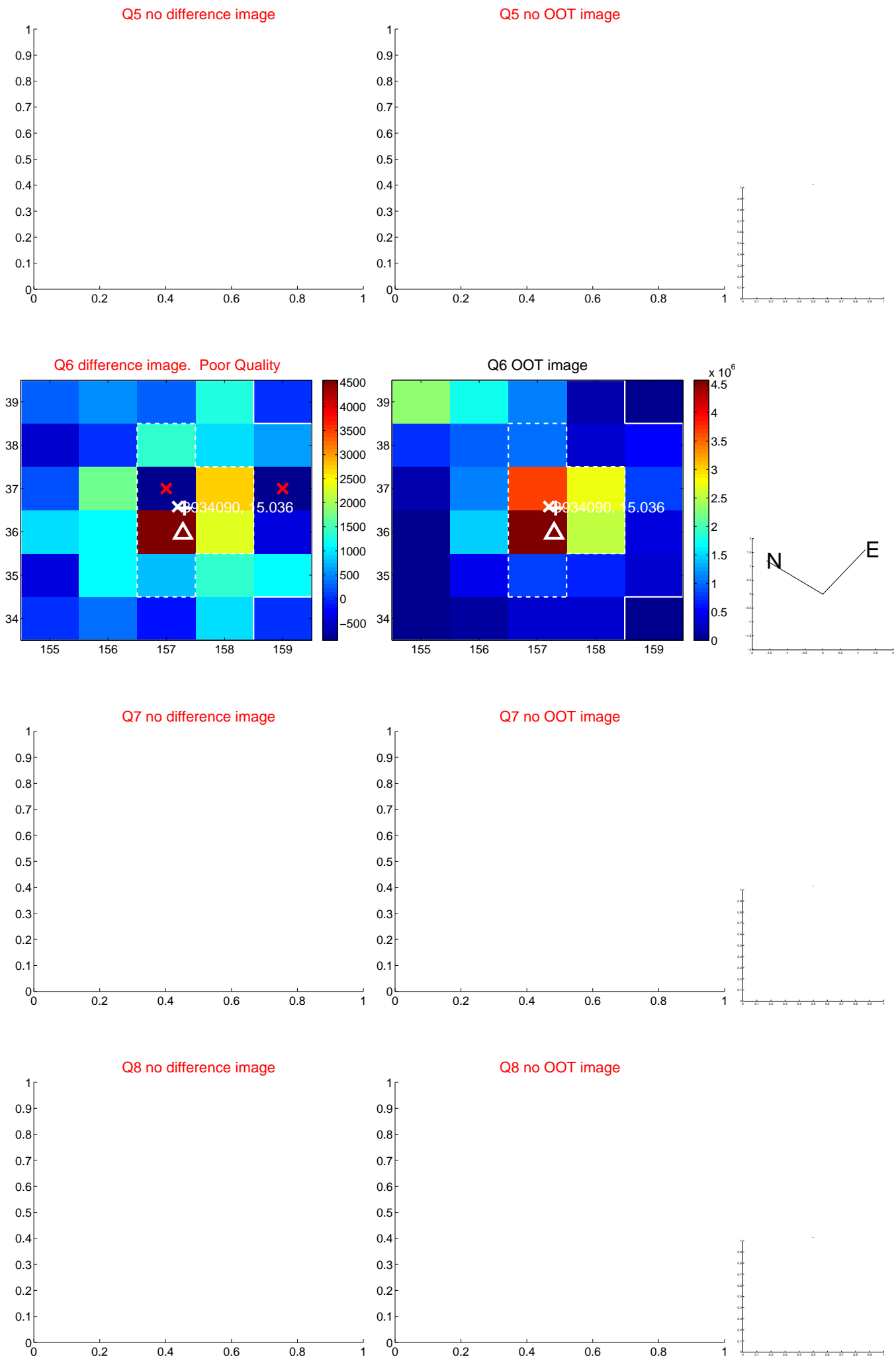


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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



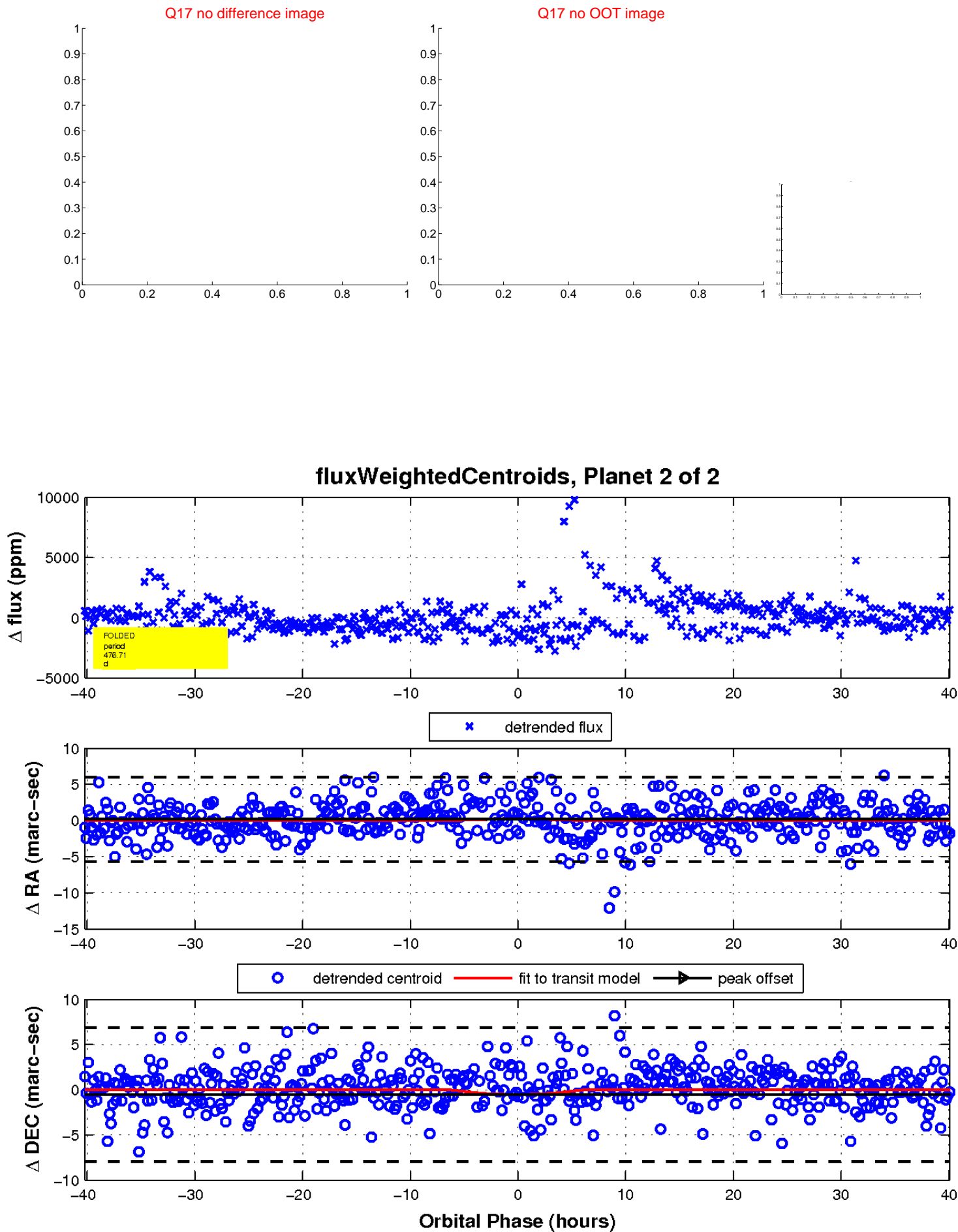
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

Declination

