

KIC 010514770

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-------|-------|-----------------------------|-----------------|------------------------|------------------------|
| 010514770-01 | OBS | 1156.01 | 1.872425 | 132.492727 | 2517.9 | 1.343 | 137.6 | 156.1 | 0.82 | 5337 | 5.03 | 671.71 |
| 010514770-02 | OBS | No | 1.872443 | 131.547237 | 451.6 | 1.036 | 18.8 | 27.1 | 0.82 | 5337 | 2.13 | 671.70 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------|
| 010514770-01 | OBS | FP | 0.00 | 0 | 1 | 0 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE |
| 010514770-02 | OBS | FP | 0.00 | 1 | 1 | 0 | 0 | IS_SEC_TCE |

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

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

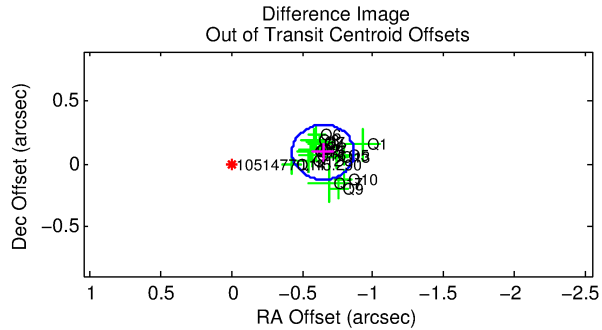
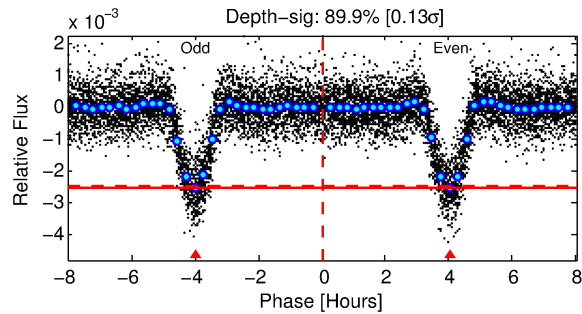
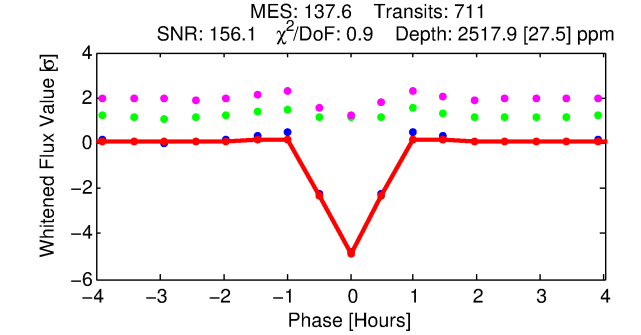
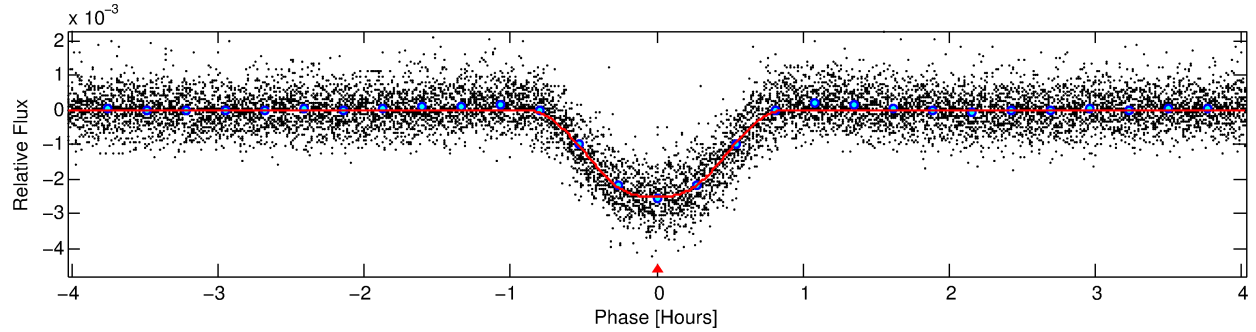
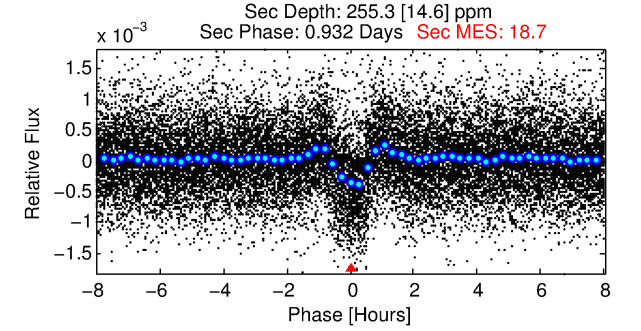
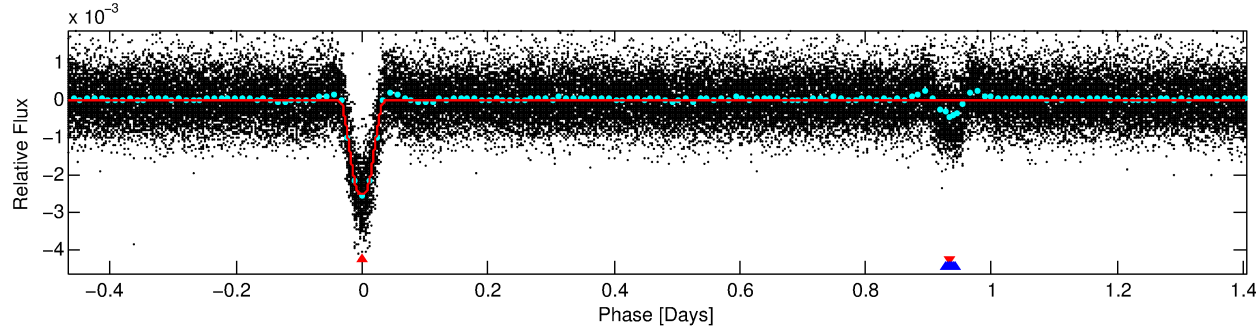
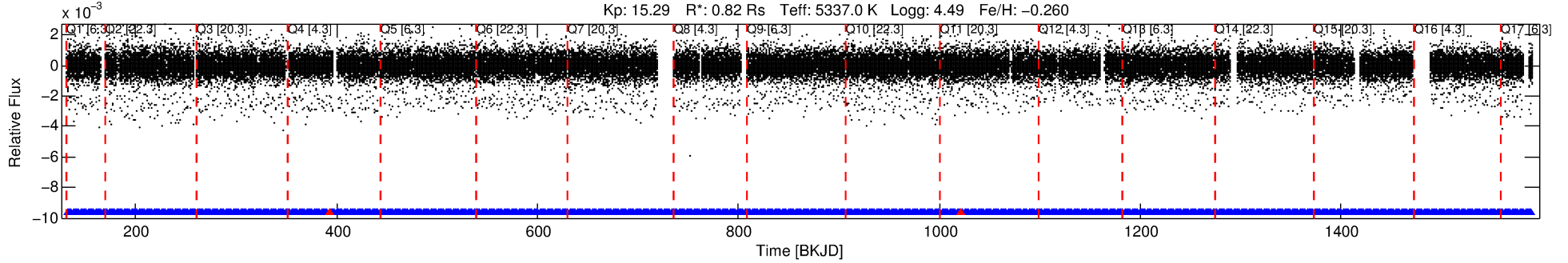
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 010514770-01

No Significant Match Found

DV One-Page Summary

KIC: 10514770 Candidate: 1 of 2 Period: 1.872 d
KOI: K01156.01 Corr: 0.931



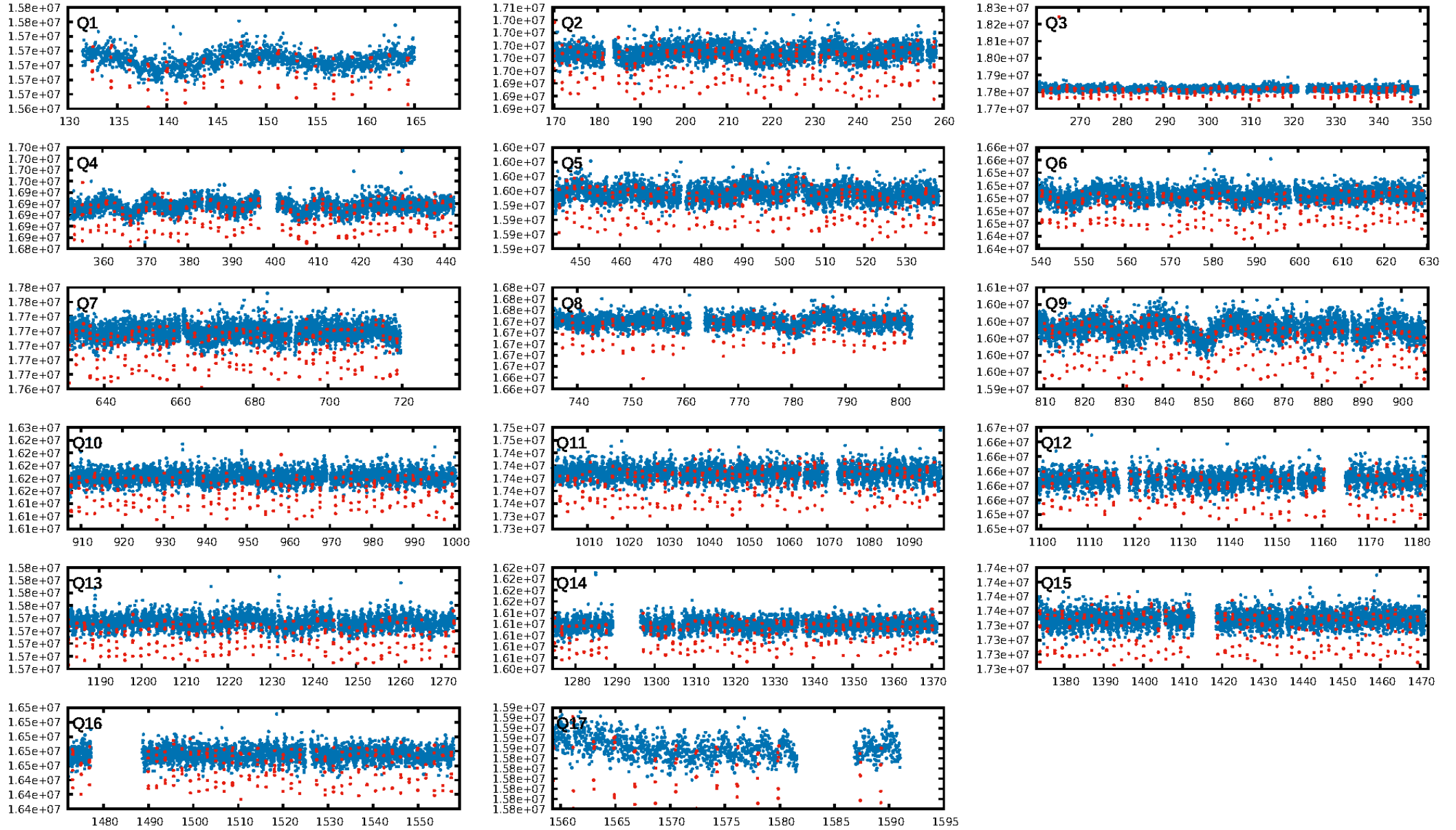
DV Fit Results:

Period = 1.87242 [0.00000] d
Epoch = 132.4927 [0.0001] BKJD
Rp/R* = 0.0558 [0.0011]
a/R* = 5.96 [0.40]
b = 0.90 [0.02]
Seff = 671.71 [149.10]
Teq = 1298 [72] K
Rp = 5.03 [0.73] Re
a = 0.0271 [0.0034] AU
Ag = 4.10 [0.82] [3.78σ]
Teffp = 2855 [99] K [12.74σ]

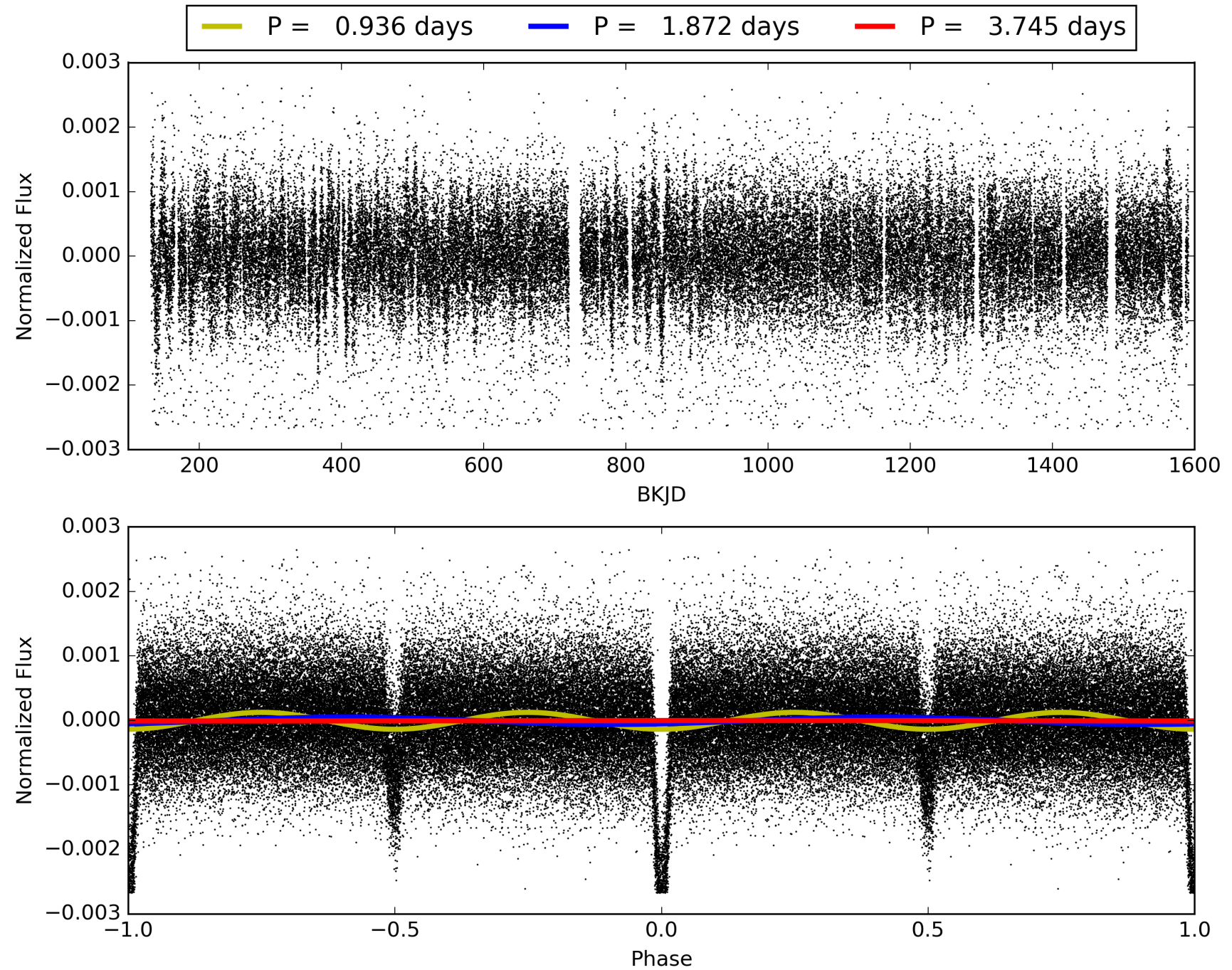
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [677/679]
GhostDiagnostic-chr: 2.99
Centroid-sig: 0.0%
Centroid-so: 1.124 arcsec [16.18σ]
OotOffset-rm: 0.652 arcsec [8.90σ]
KicOffset-rm: 0.696 arcsec [9.18σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 010514770-01, PDC Light Curves

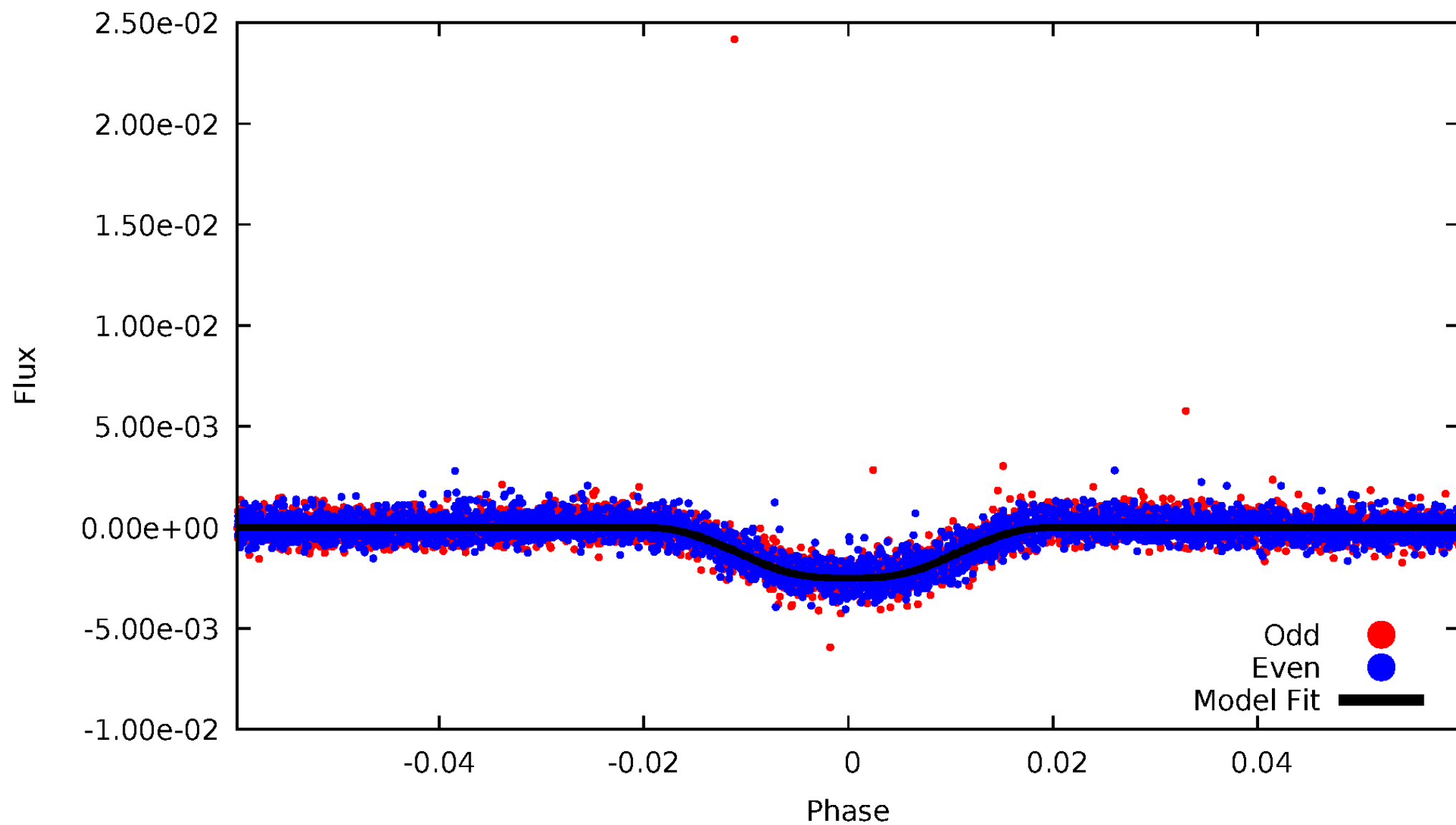


TCE 010514770-01



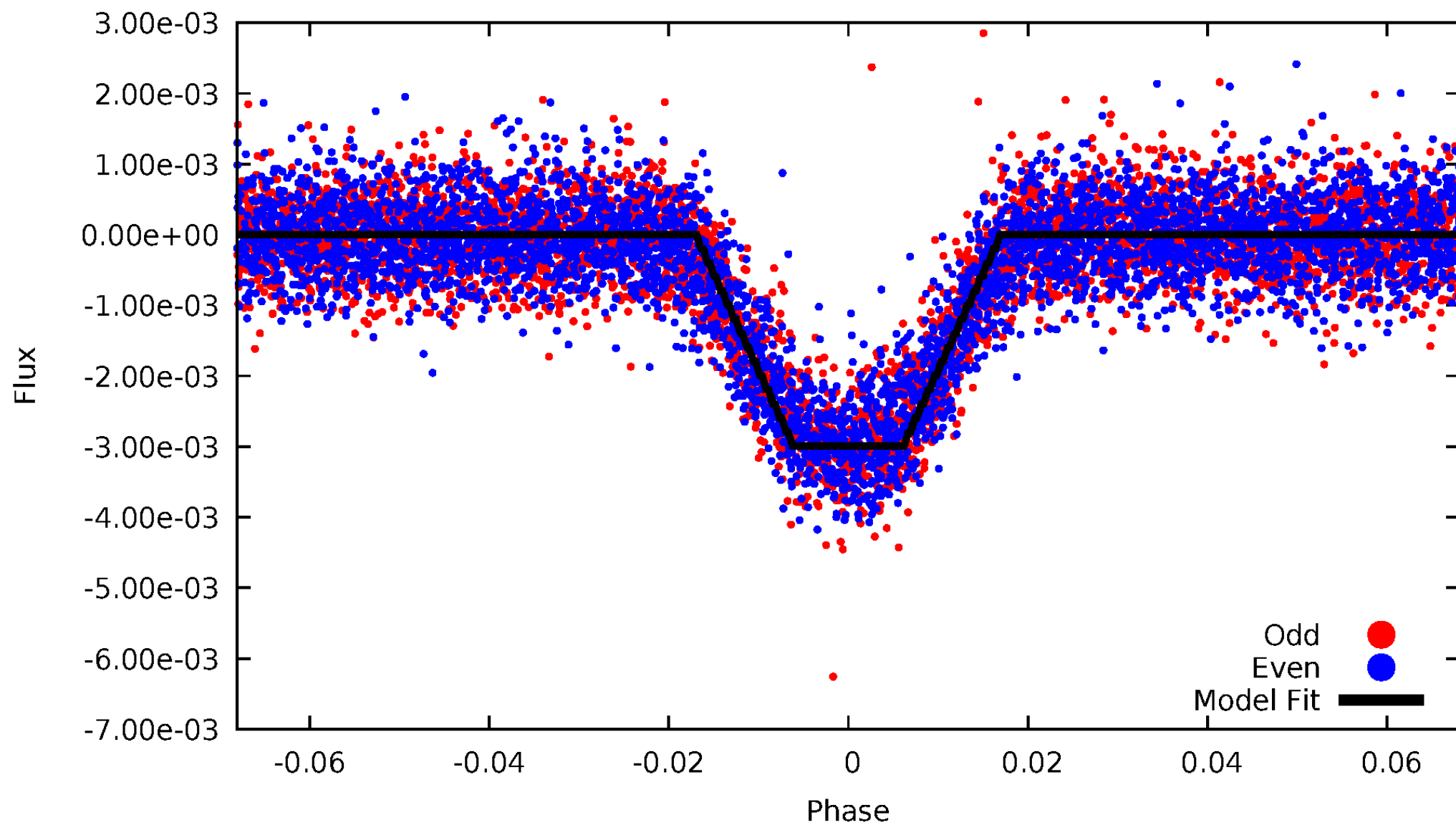
DV Odd/Even

TCE 010514770-01



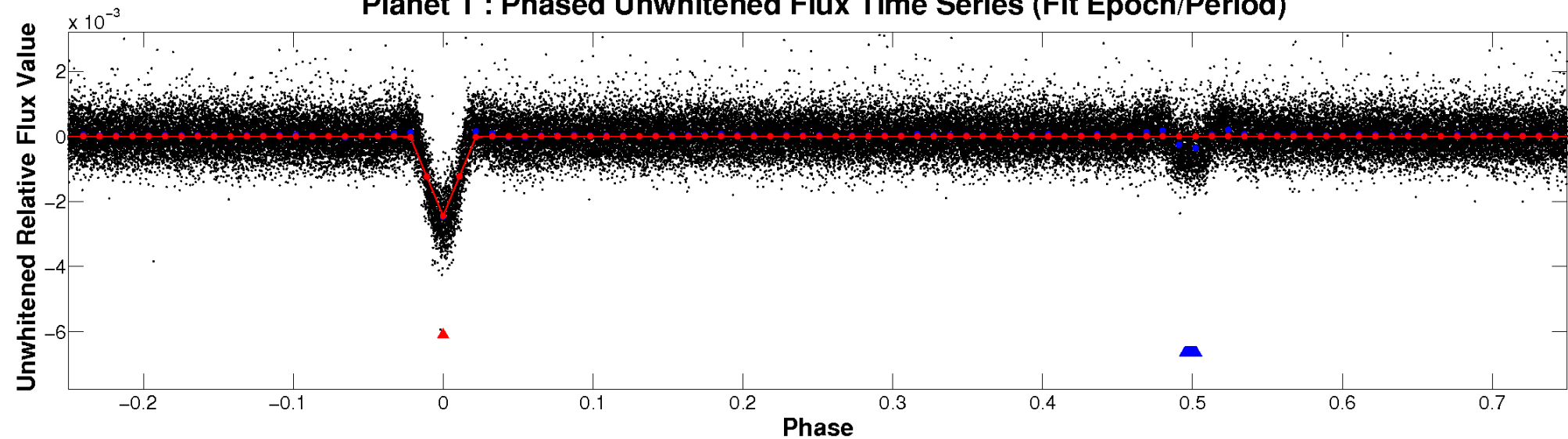
ALT Odd/Even

TCE 010514770-01

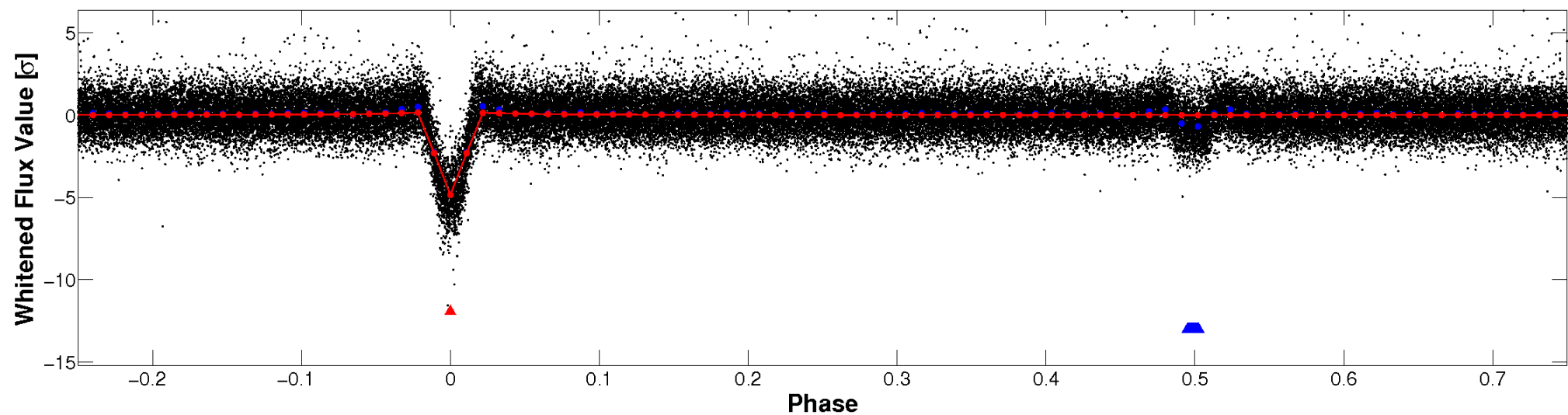


Non-Whitened Vs. Whitened Light Curve

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

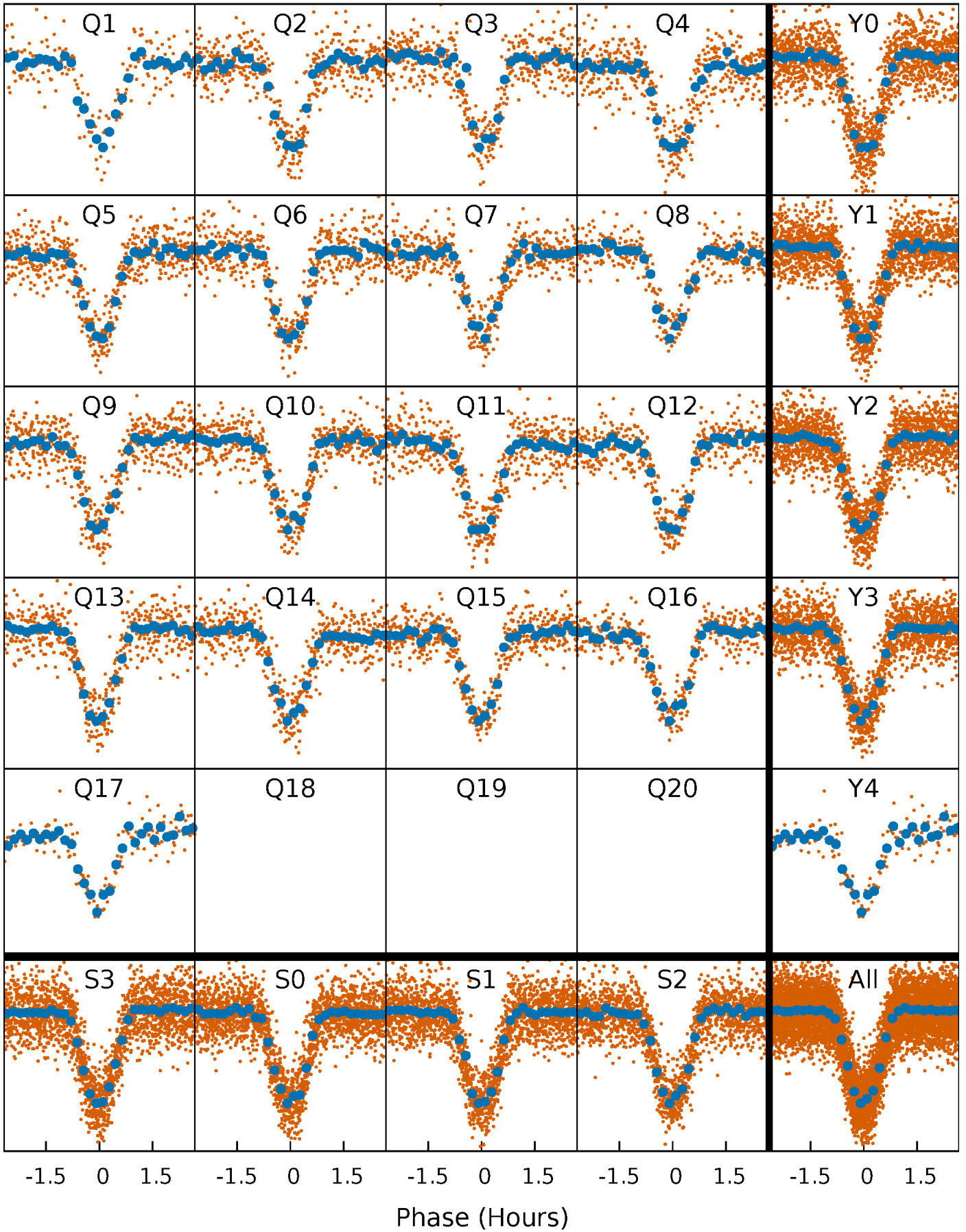


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



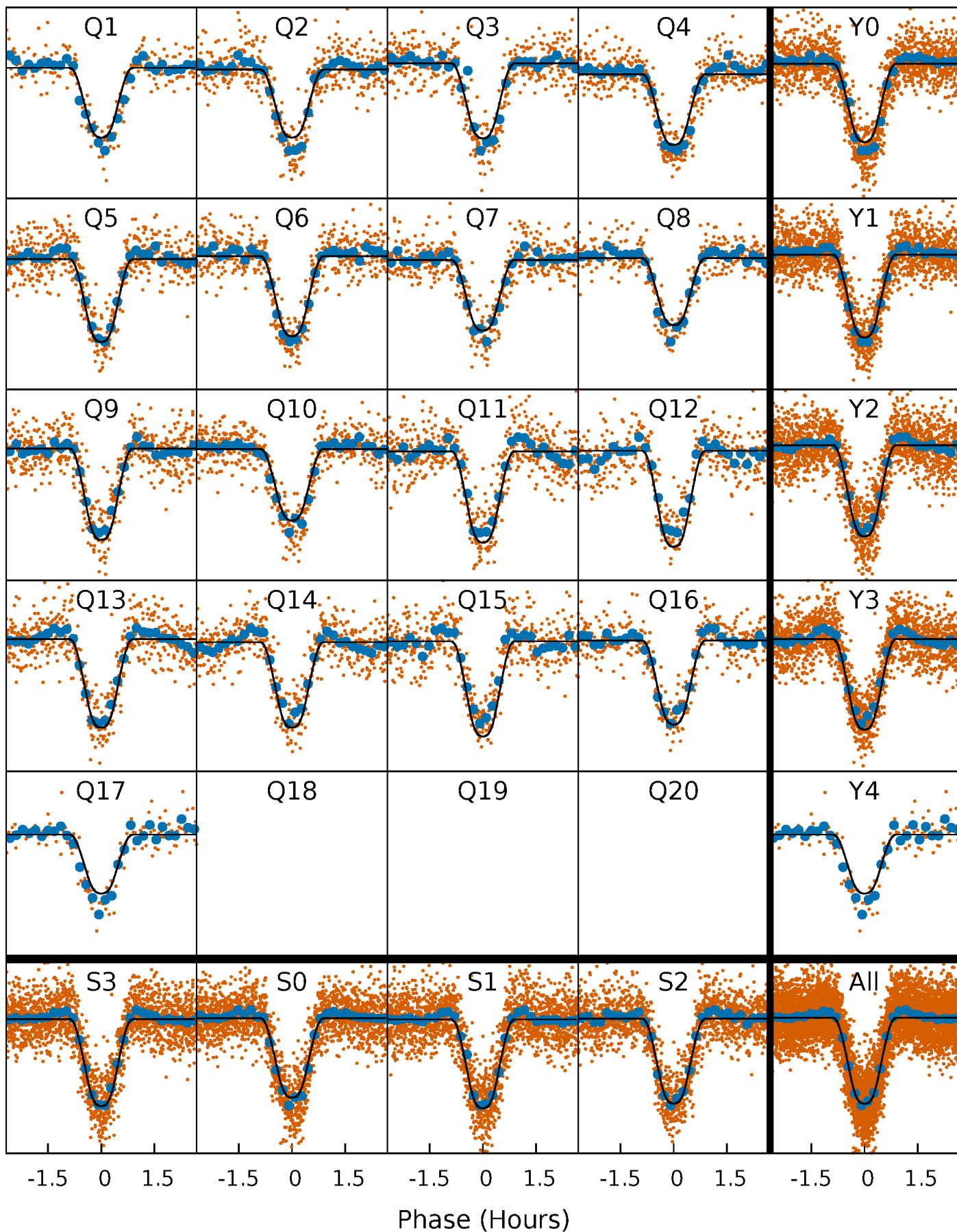
PDC Quarter-Phased Transit Curves

TCE 010514770-01 P= 1.872425 Days $T_0=132.492727$ (BKJD)



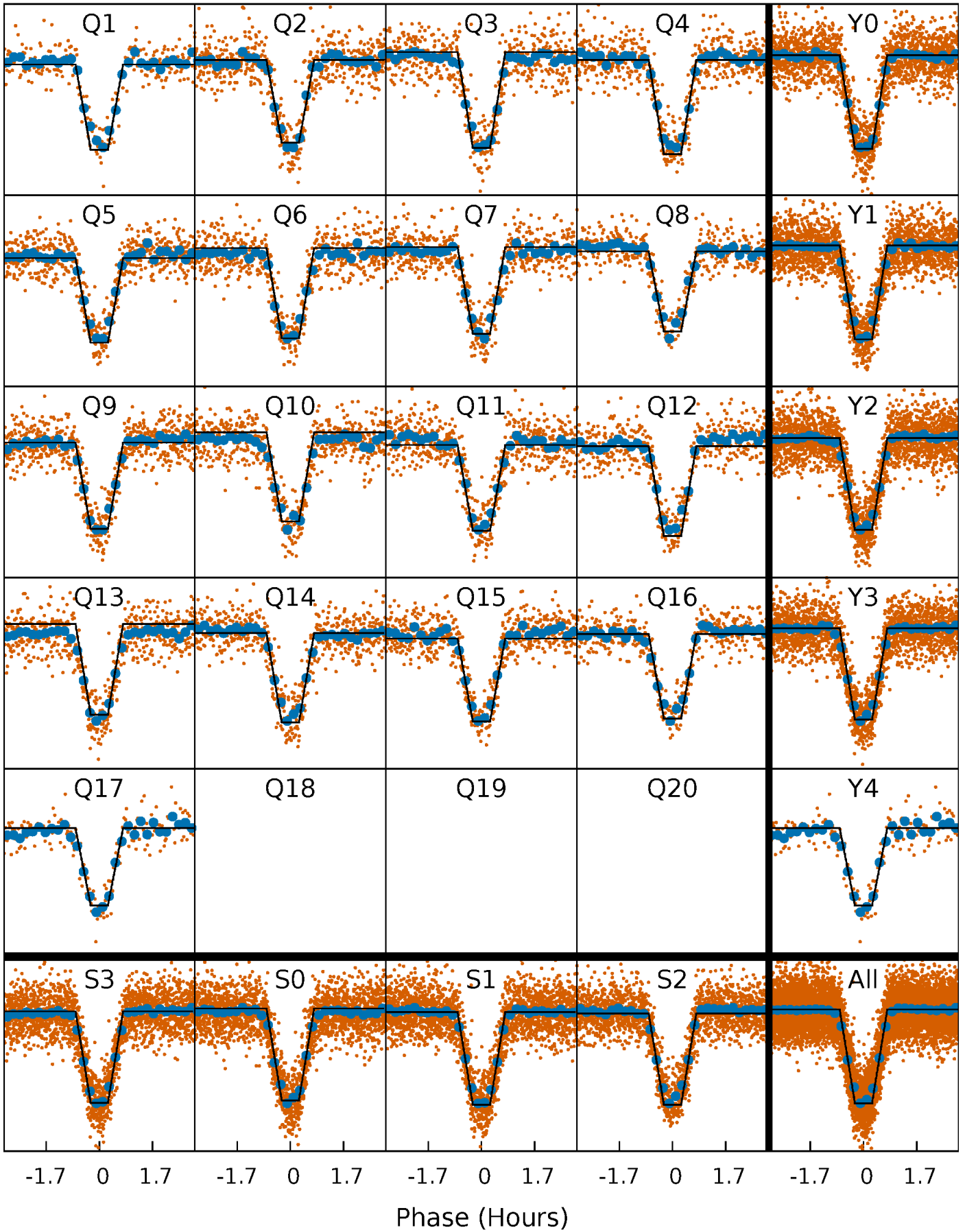
DV Quarter-Phased Transit Curves

TCE 010514770-01 P= 1.872425 Days $T_0=132.492727$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

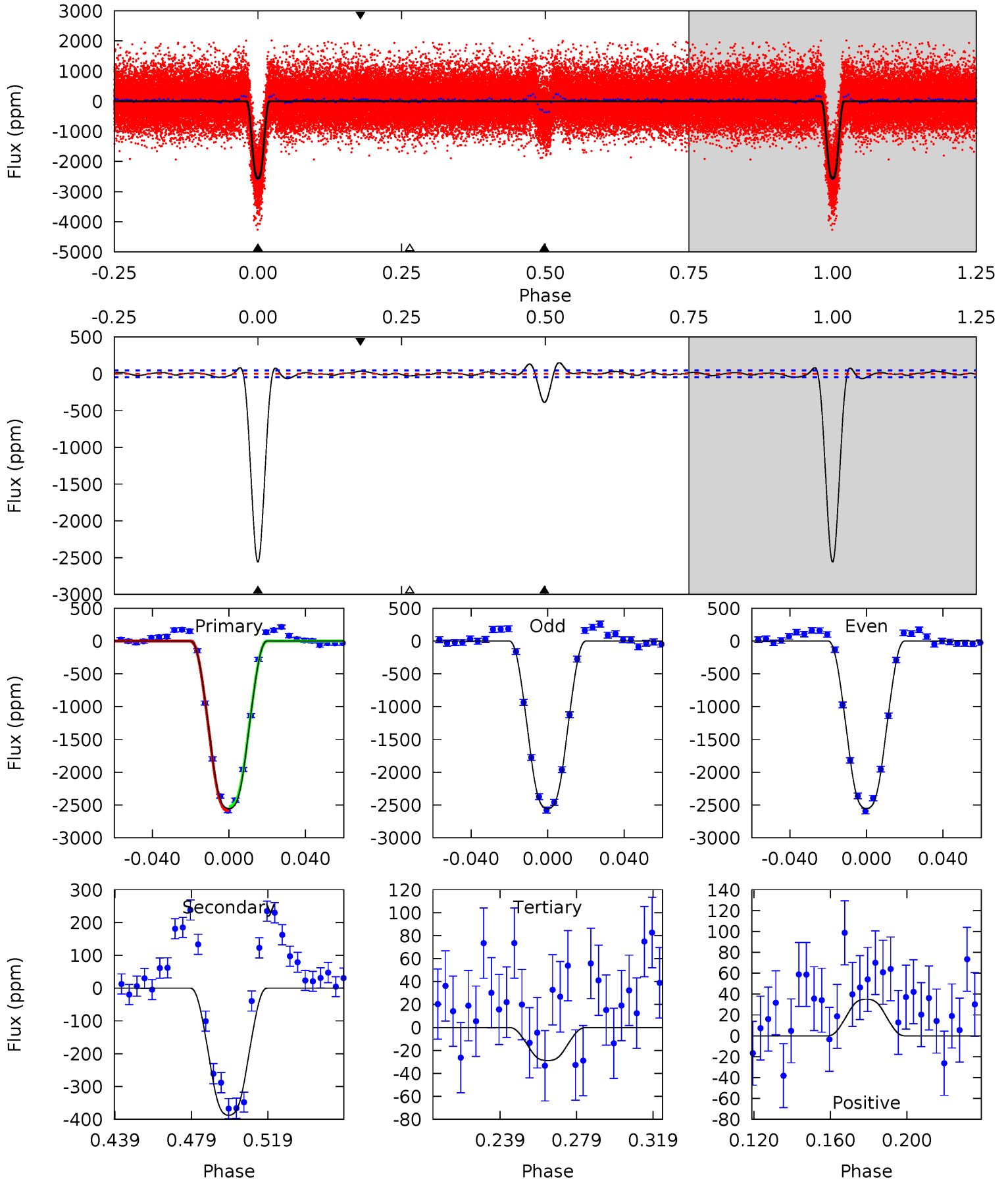
TCE 010514770-01 $P = 1.872423$ Days $T_0 = 132.493095$ (BKJD)



DV Model-Shift Uniqueness Test

010514770-01, P = 1.872425 Days, E = 130.620302 Days

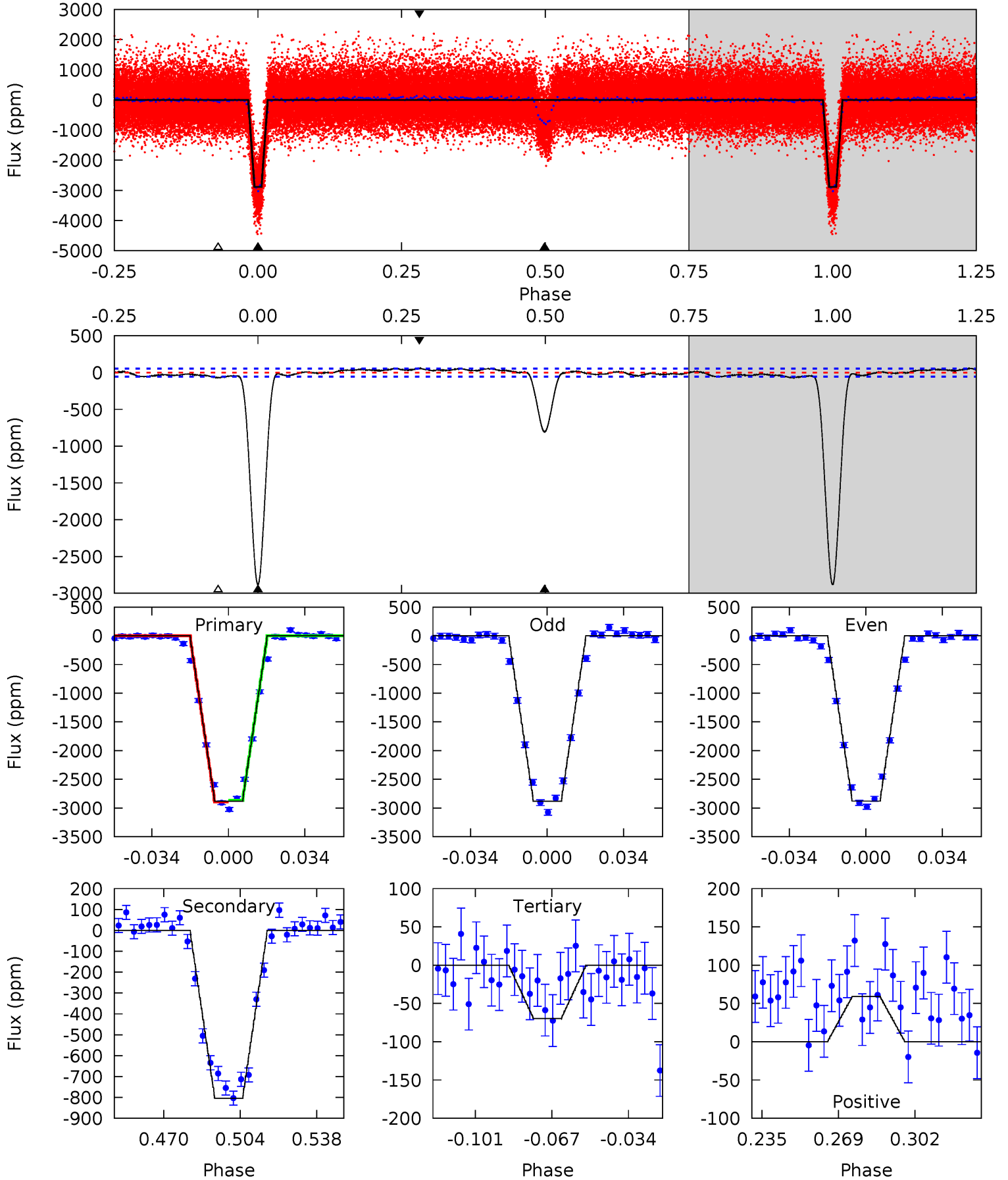
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 262.4 | 39.8 | 2.96 | 3.60 | 4.75 | 2.05 | 1.86 | 259.4 | 258.8 | 36.8 | 36.2 | 0.08 | 0.99 | 0.06 | 3.05 |



Alt Model-Shift Uniqueness Test

010514770-01, P = 1.872423 Days, E = 130.620672 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 253.5 | 70.8 | 6.13 | 5.19 | 4.79 | 2.12 | 2.86 | 247.4 | 248.3 | 64.7 | 65.6 | 0.22 | 0.99 | 0.02 | 1.19 |



Stellar Parameters For KIC 010514770

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5337^{+159}_{-159} | $4.486^{+0.105}_{-0.105}$ | $-0.260^{+0.300}_{-0.300}$ | $0.825^{+0.118}_{-0.106}$ | $0.760^{+0.113}_{-0.052}$ | $1.908^{+0.860}_{-0.595}$ |
| | +3%/-3% | +2%/-2% | +115%/-115% | +14%/-13% | +15%/-7% | +45%/-31% |
| 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 010514770-01 / KOI 1156.01

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|---------------|------------------------|--------------------|---------------------|---------------------------|
| DV | -388 ± 10 | $5.06^{+0.50}_{-0.37}$ | 1817^{+84}_{-84} | 3566^{+78}_{-84} | $6.200^{+1.029}_{-0.897}$ |
| Alt. | -805 ± 11 | $4.95^{+0.46}_{-0.40}$ | 1812^{+90}_{-88} | 4093^{+99}_{-107} | 13^{+2}_{-2} |

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 $A_{obs} \gg 1.0$

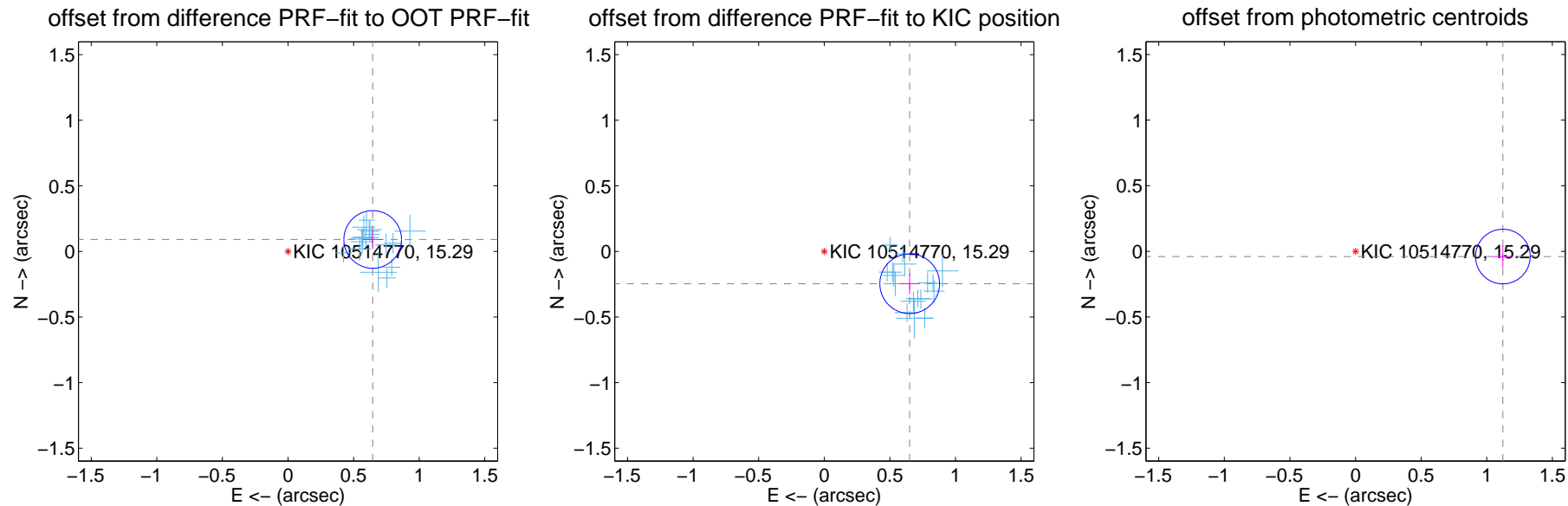
DV Centroid Data

Supplemental centroid analysis for 010514770-01. Kepler magnitude: 15.29. Transit SNR 156.14

There are 17 quarters with good PRF difference image offsets

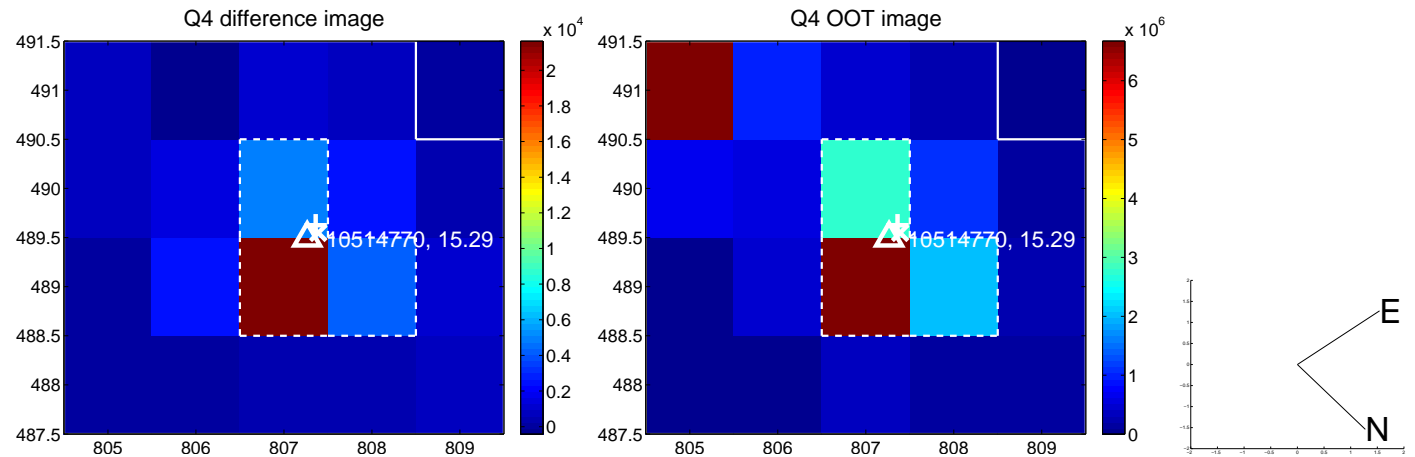
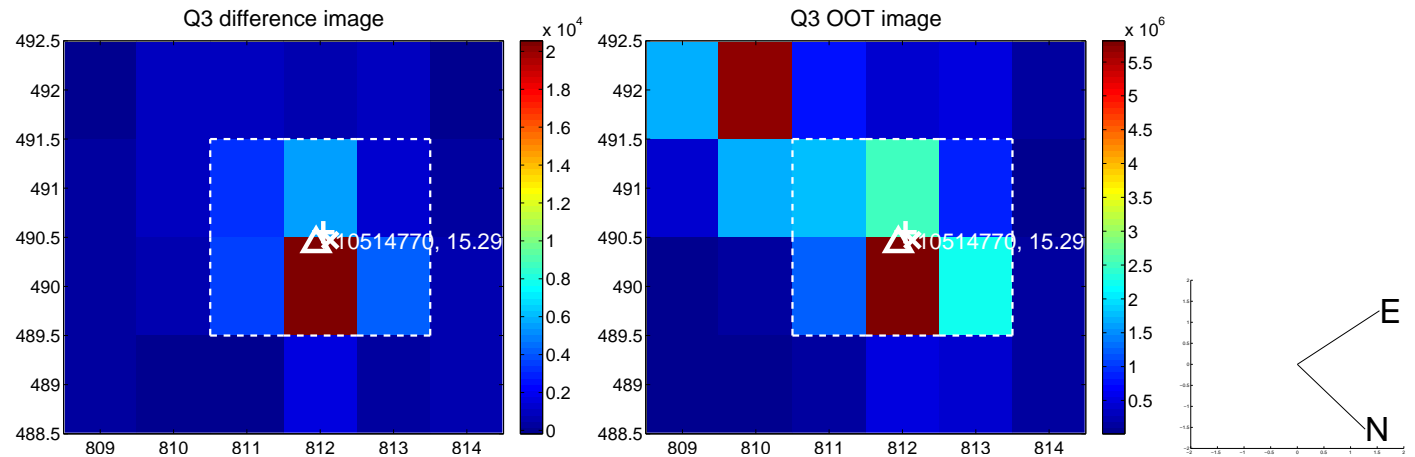
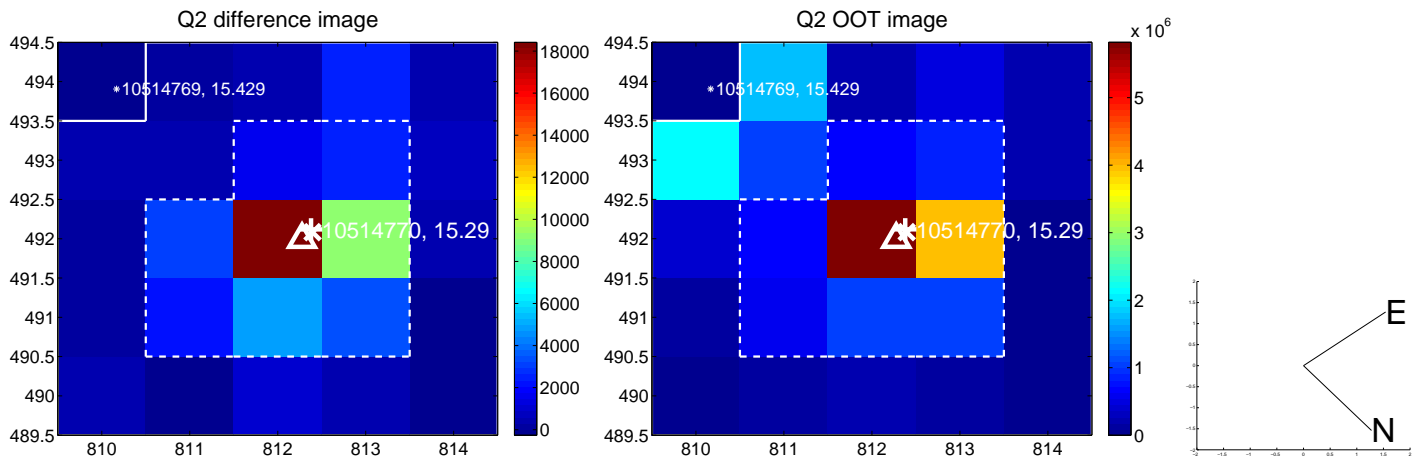
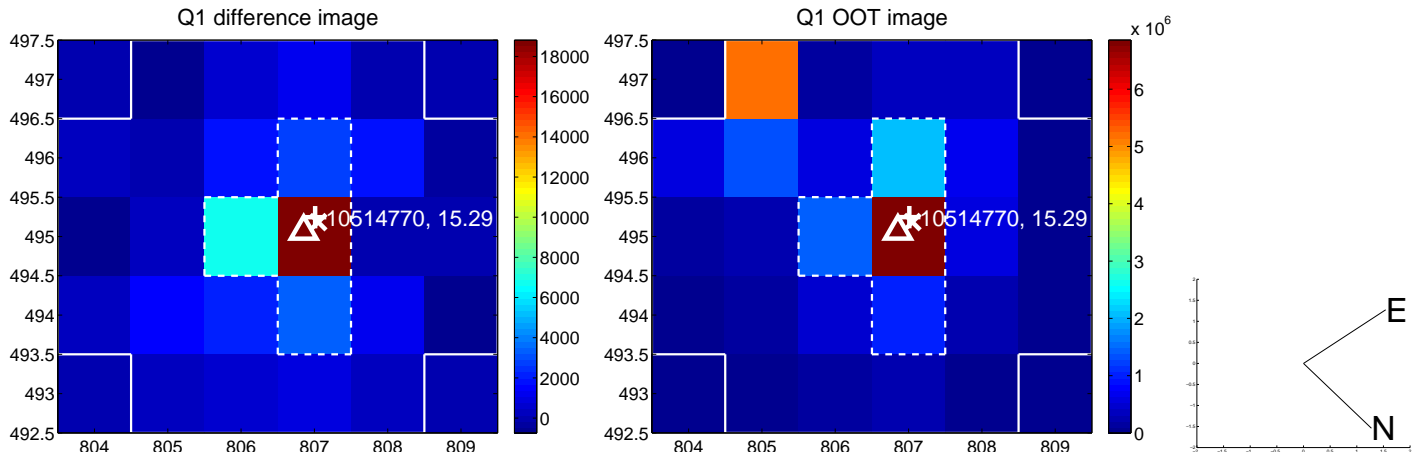
The direct PRF centroid is offset from the target star catalog position by about 0.35 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.652 ± 0.073 | 8.90 | -0.646 ± 0.073 | 0.091 ± 0.072 |
| PRF-fit source offset from KIC position | 0.696 ± 0.076 | 9.18 | -0.651 ± 0.075 | -0.246 ± 0.079 |
| photometric centroid source offset | 1.12 ± 0.07 | 16.18 | -1.12 ± 0.07 | -0.04 ± 0.09 |

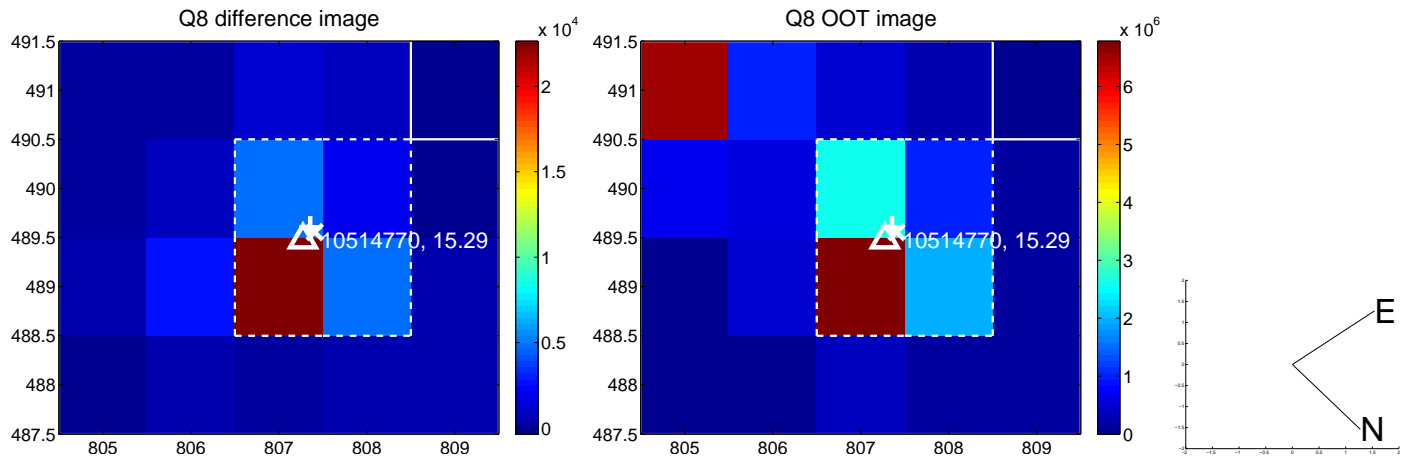
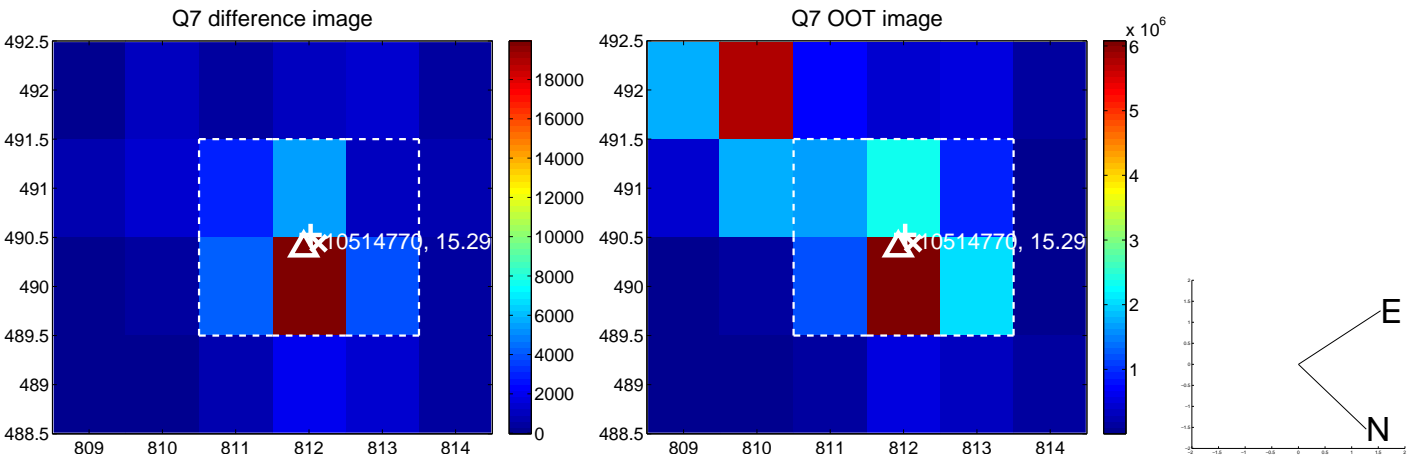
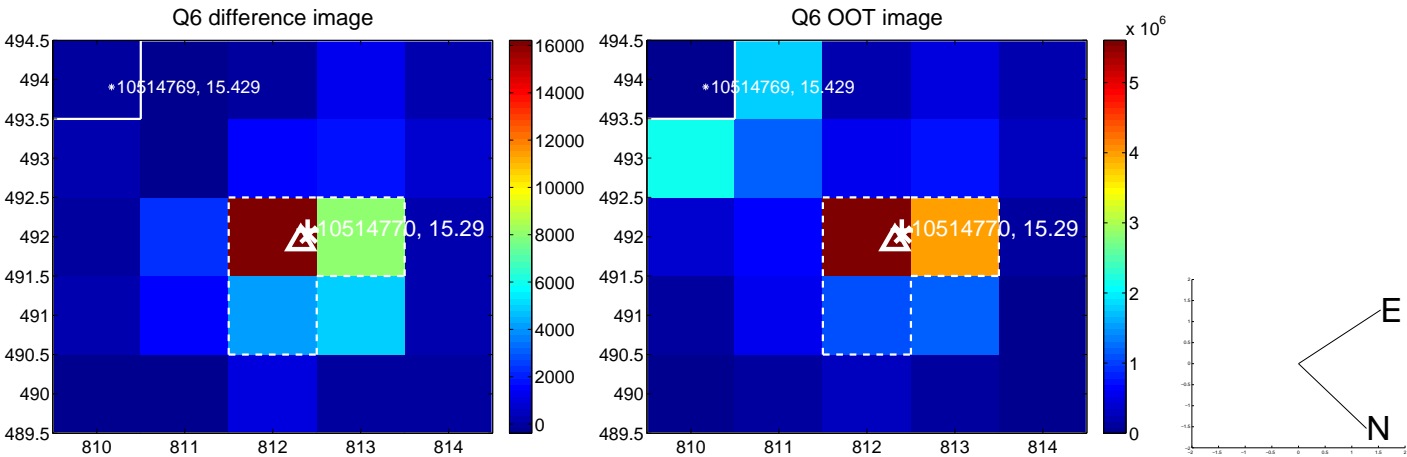
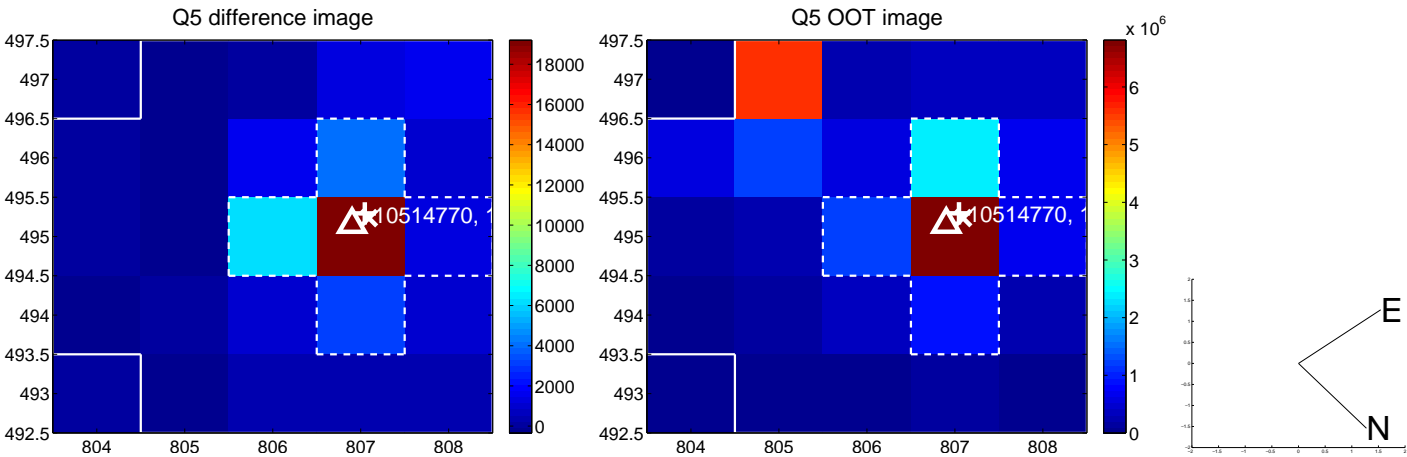


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

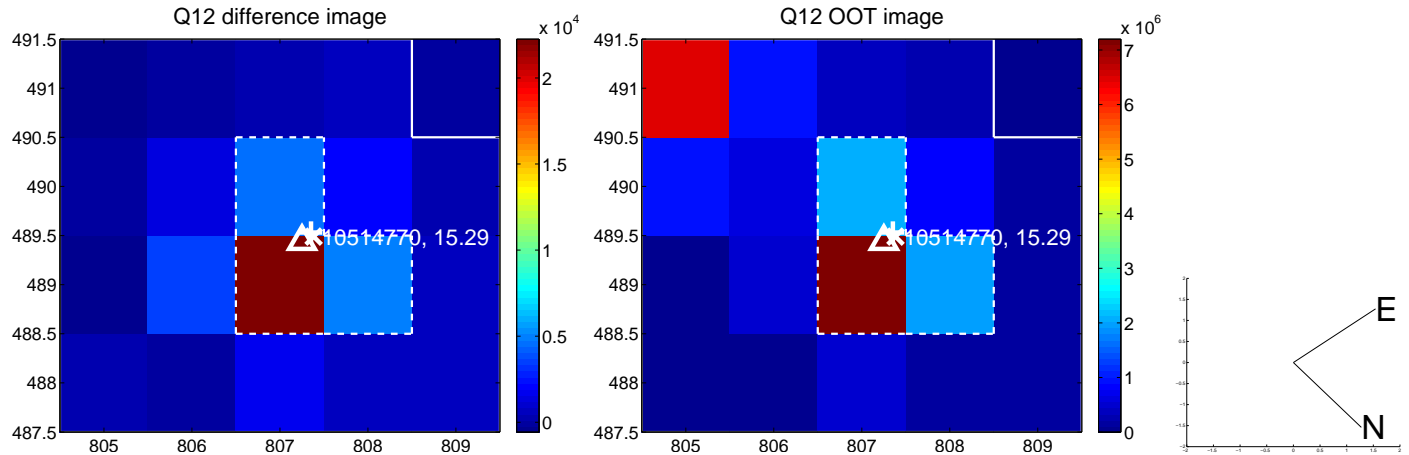
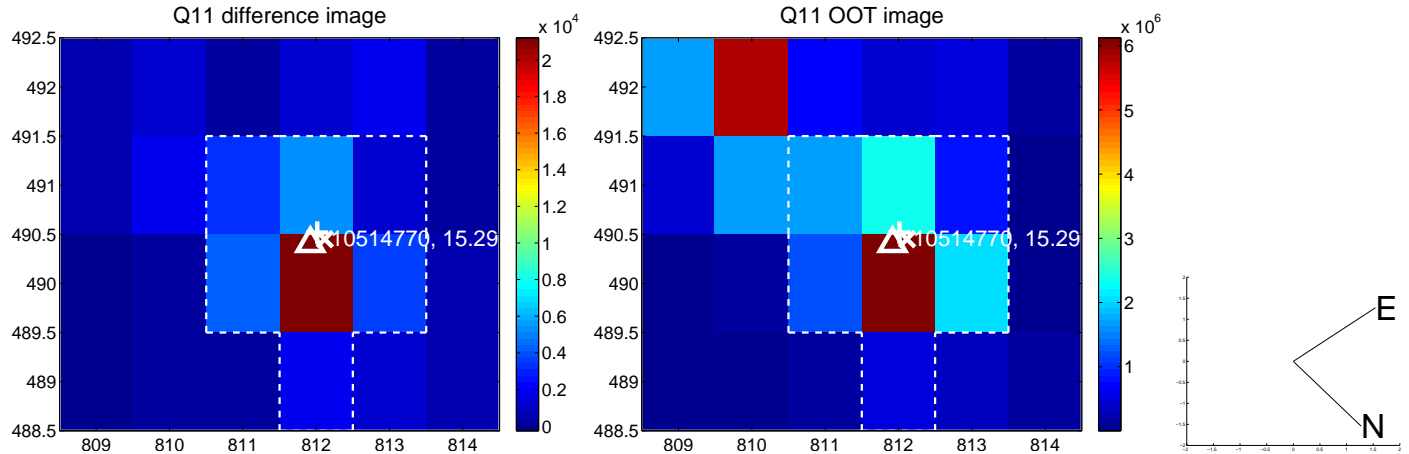
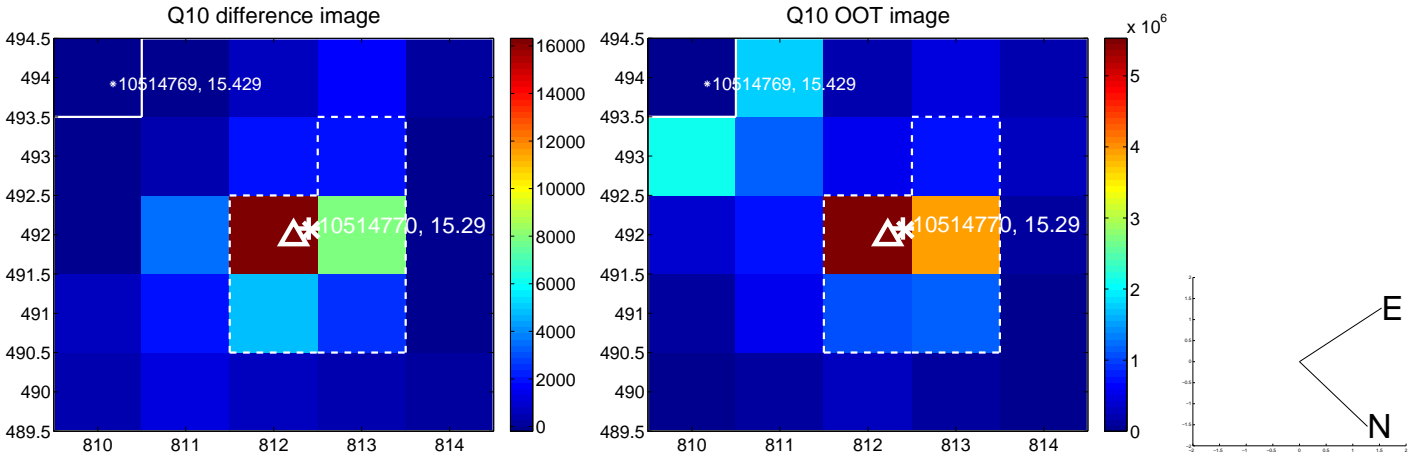
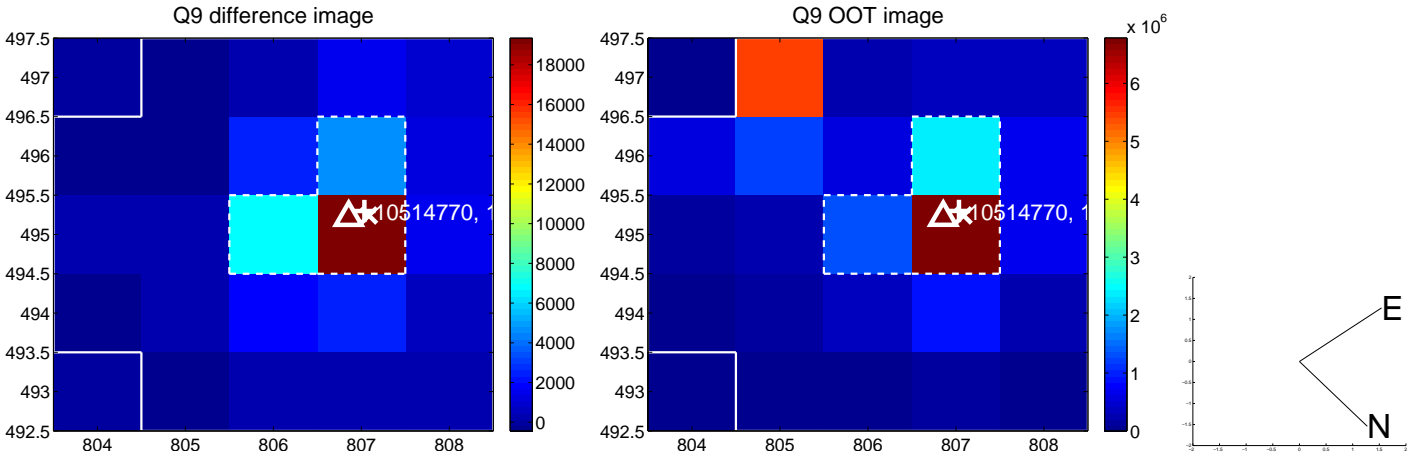
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value



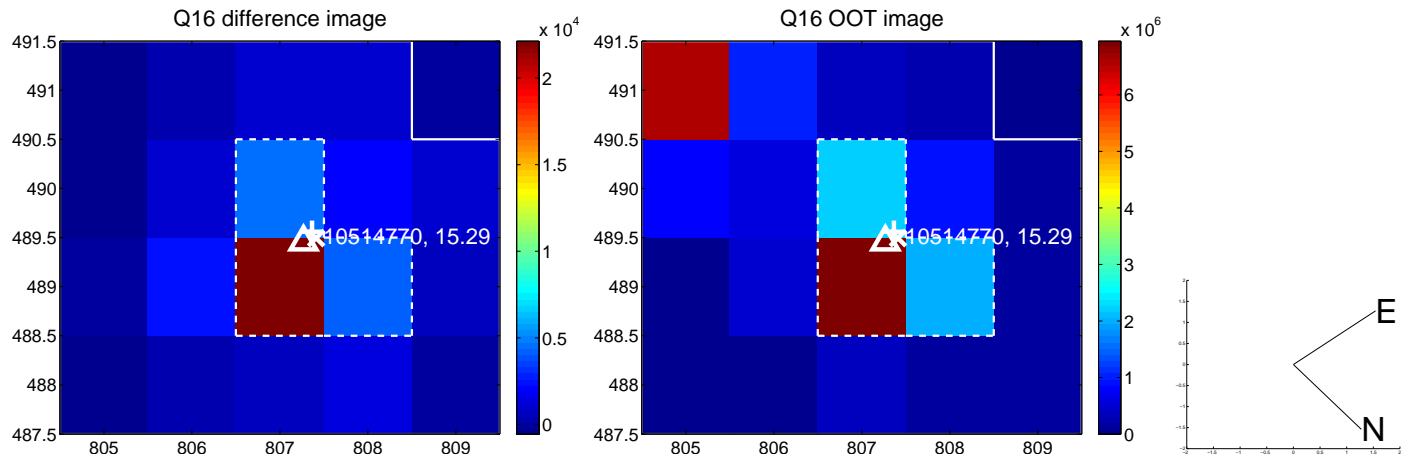
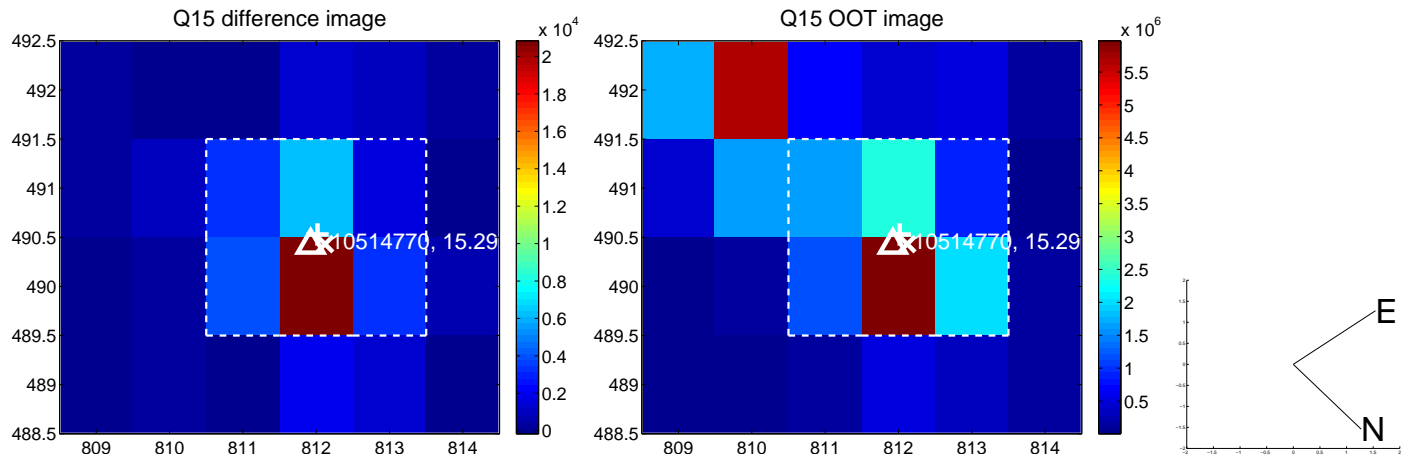
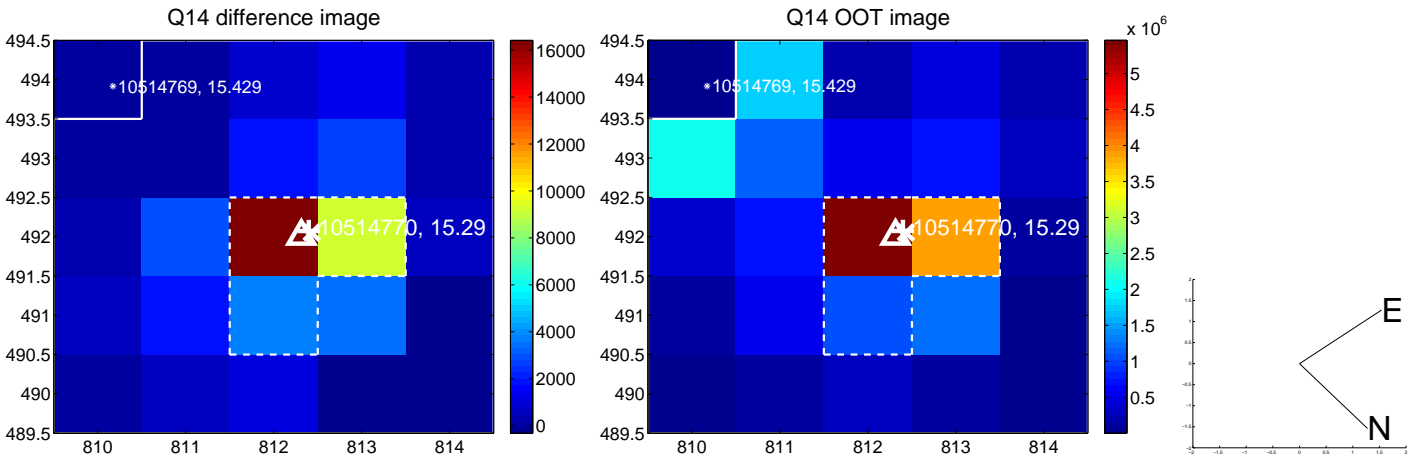
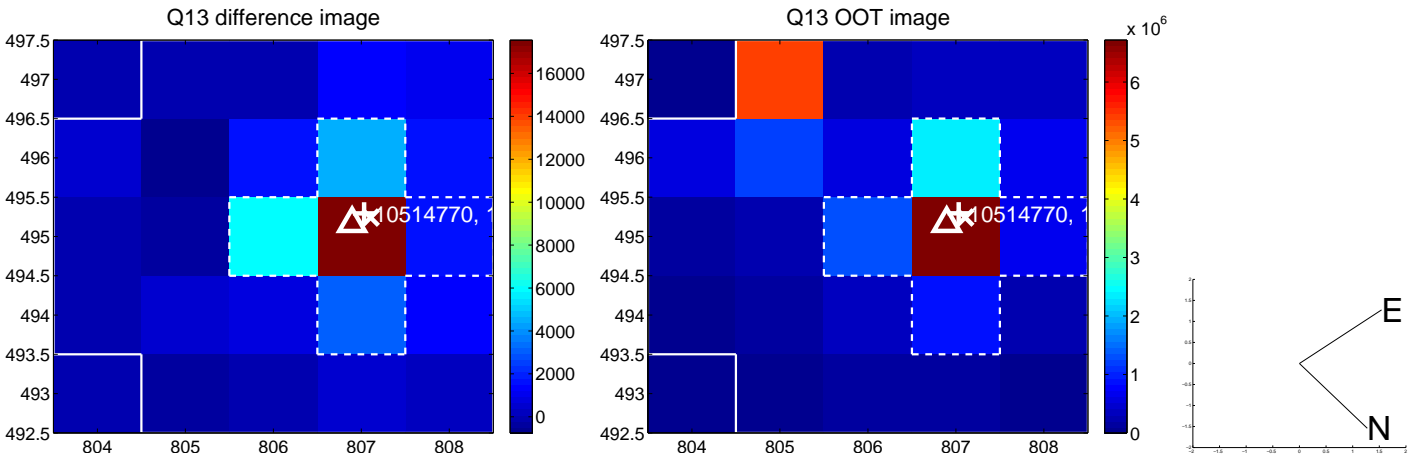
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



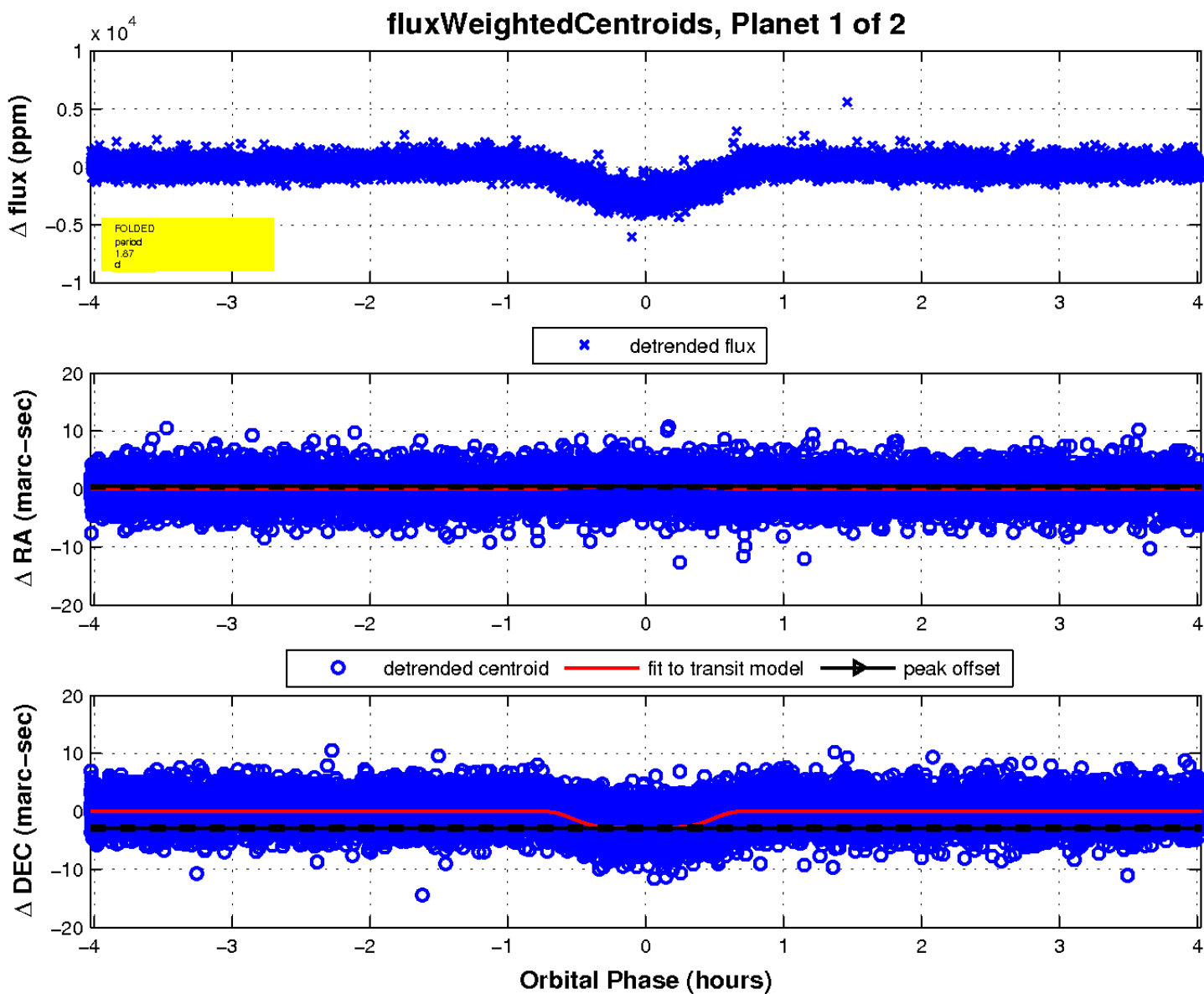
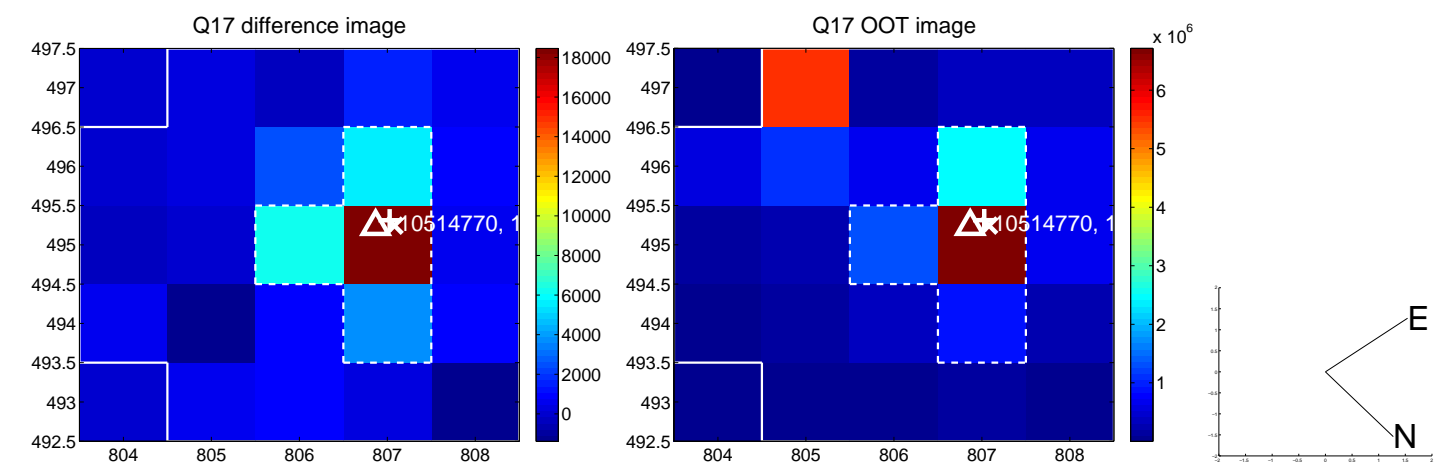
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

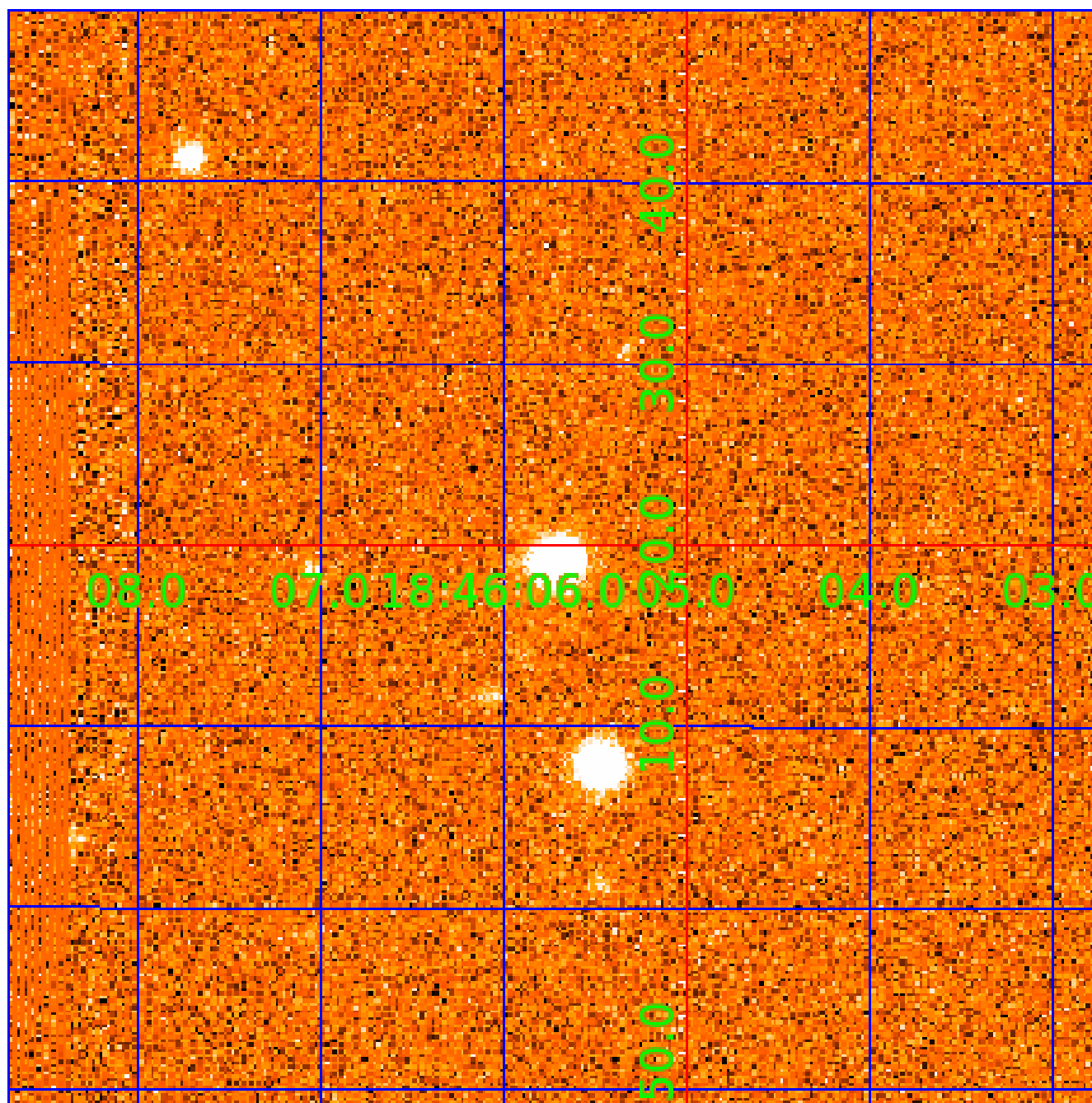


white \times : KIC target position; $+$: OOT centroid; Δ : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 010514770

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-------|-------|-----------------------------|-----------------|------------------------|------------------------|
| 010514770-01 | OBS | 1156.01 | 1.872425 | 132.492727 | 2517.9 | 1.343 | 137.6 | 156.1 | 0.82 | 5337 | 5.03 | 671.71 |
| 010514770-02 | OBS | No | 1.872443 | 131.547237 | 451.6 | 1.036 | 18.8 | 27.1 | 0.82 | 5337 | 2.13 | 671.70 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------|
| 010514770-01 | OBS | FP | 0.00 | 0 | 1 | 0 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE |
| 010514770-02 | OBS | FP | 0.00 | 1 | 1 | 0 | 0 | IS_SEC_TCE |

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.

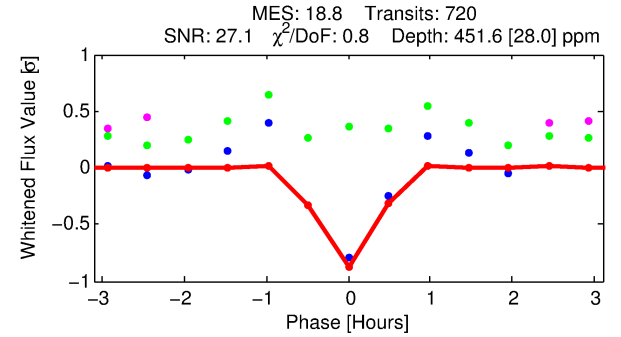
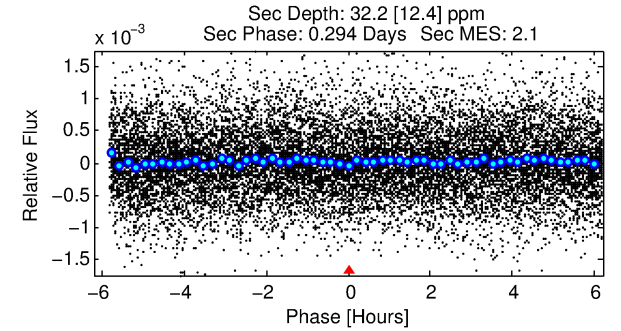
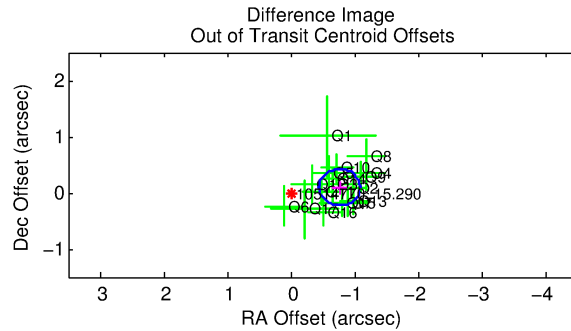
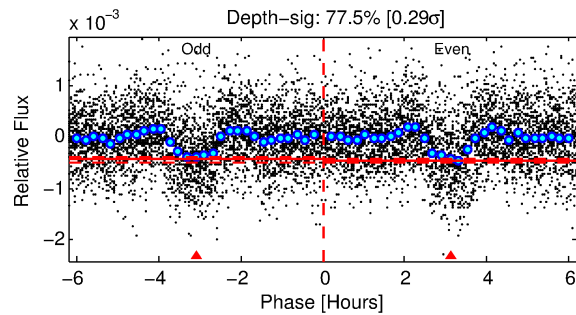
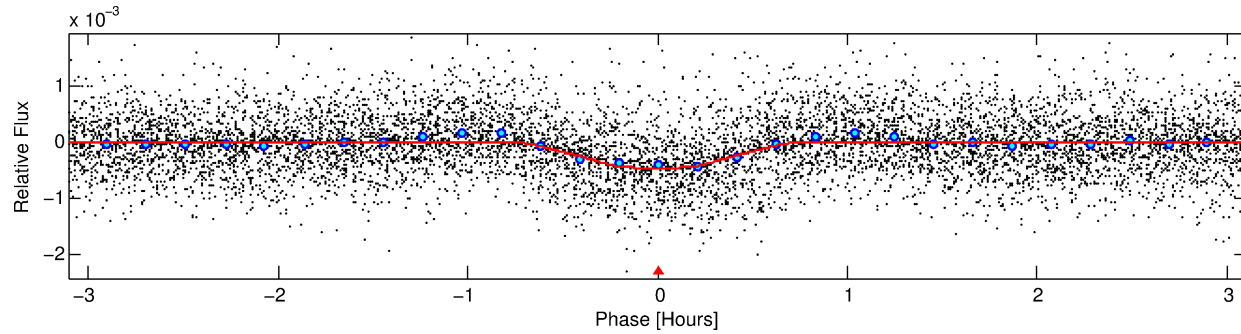
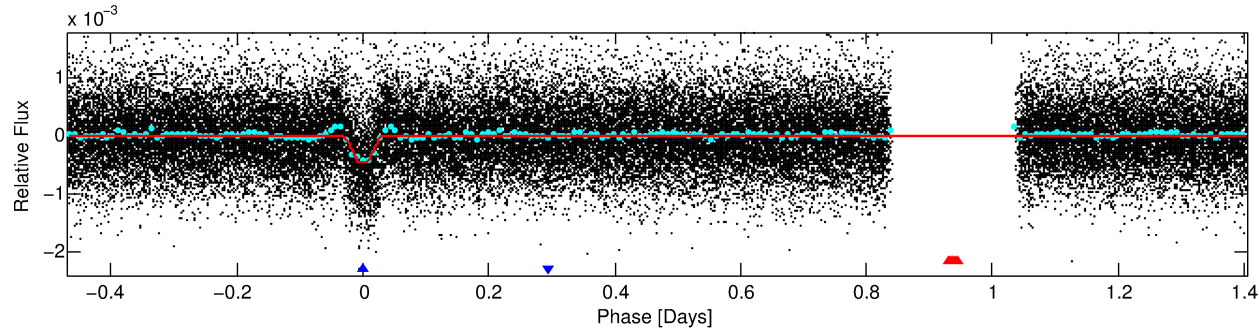
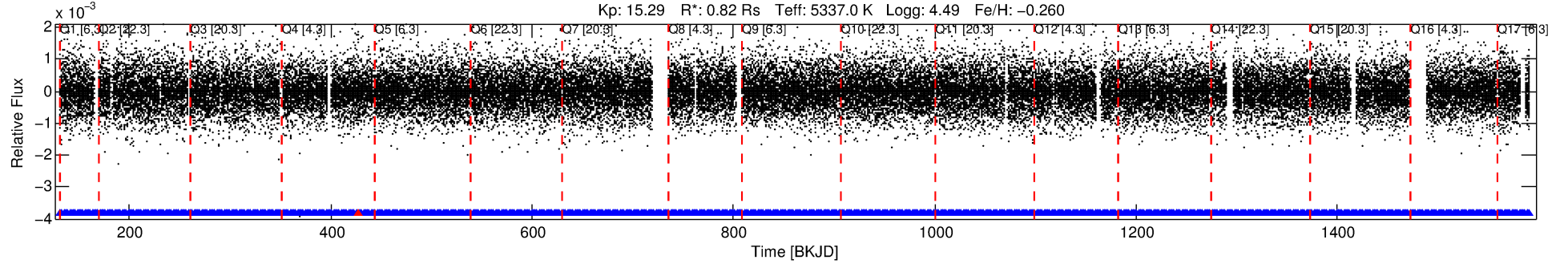
Ephemeris Match Information For 010514770-02

No Significant Match Found

DV One-Page Summary

KIC: 10514770 Candidate: 2 of 2 Period: 1.872 d
KOI: K01156 Corr: No Ephemeris Match

Kp: 15.29 R*: 0.82 Rs Teff: 5337.0 K Logg: 4.49 Fe/H: -0.260



DV Fit Results:

Period = 1.87244 [0.00000] d
Epoch = 131.5472 [0.0007] BKJD
Rp/R* = 0.0236 [0.0082]
a/R* = 6.80 [9.80]
b = 0.90 [0.32]
Seff = 671.70 [149.10]
Teff = 1298 [72] K
Rp = 2.13 [0.80] Re
a = 0.0271 [0.0034] AU
Ag = 2.88 [2.35] [0.80σ]
Teffp = 2614 [526] K [2.48σ]

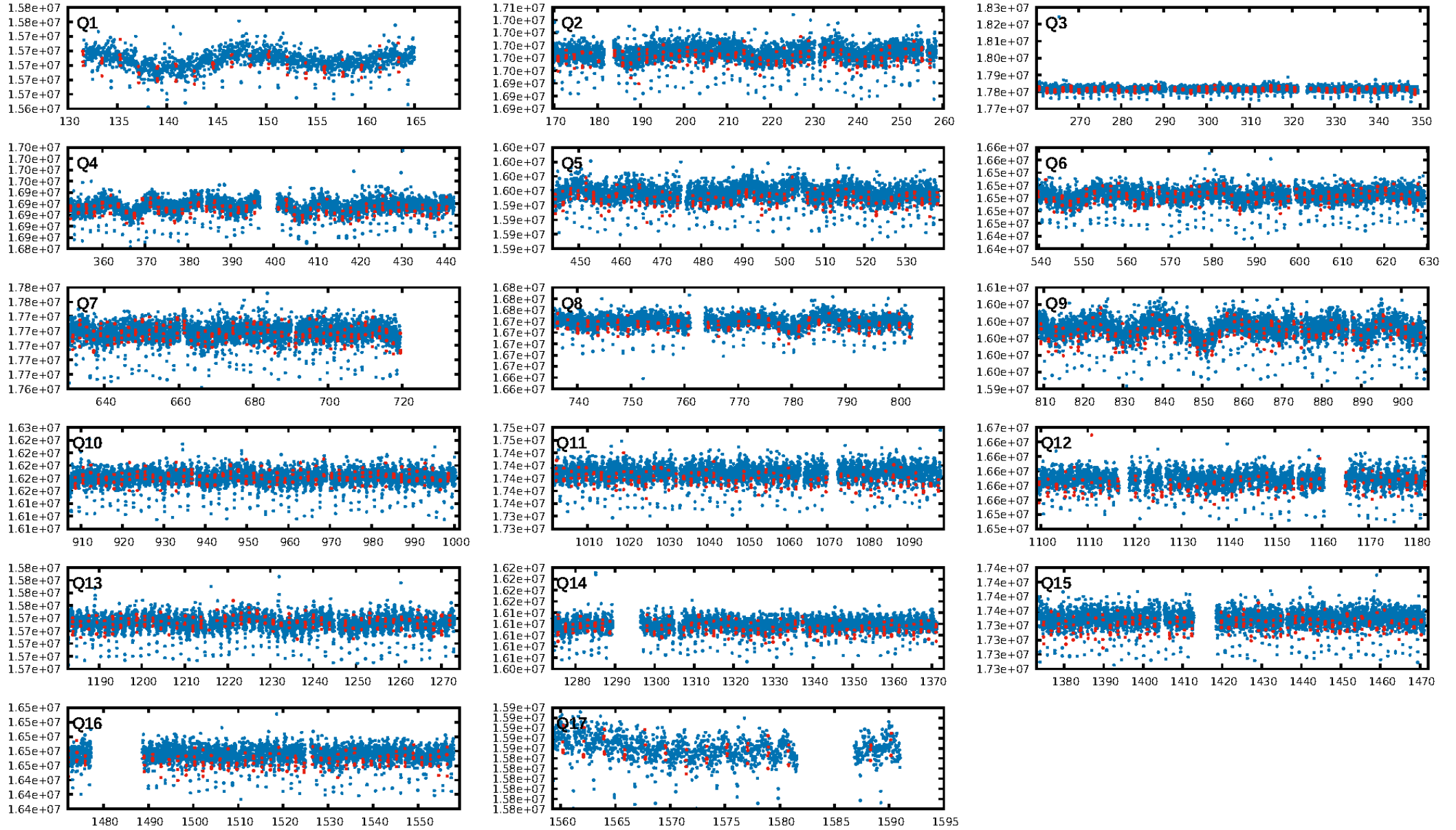
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 8.50e-75
RollingBand-fgt: 1.00 [687/688]
GhostDiagnostic-chr: 2.011
Centroid-sig: 0.0%
Centroid-so: 1.649 arcsec [3.97σ]
OotOffset-rm: 0.772 arcsec [7.13σ]
KicOffset-rm: 0.825 arcsec [7.64σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

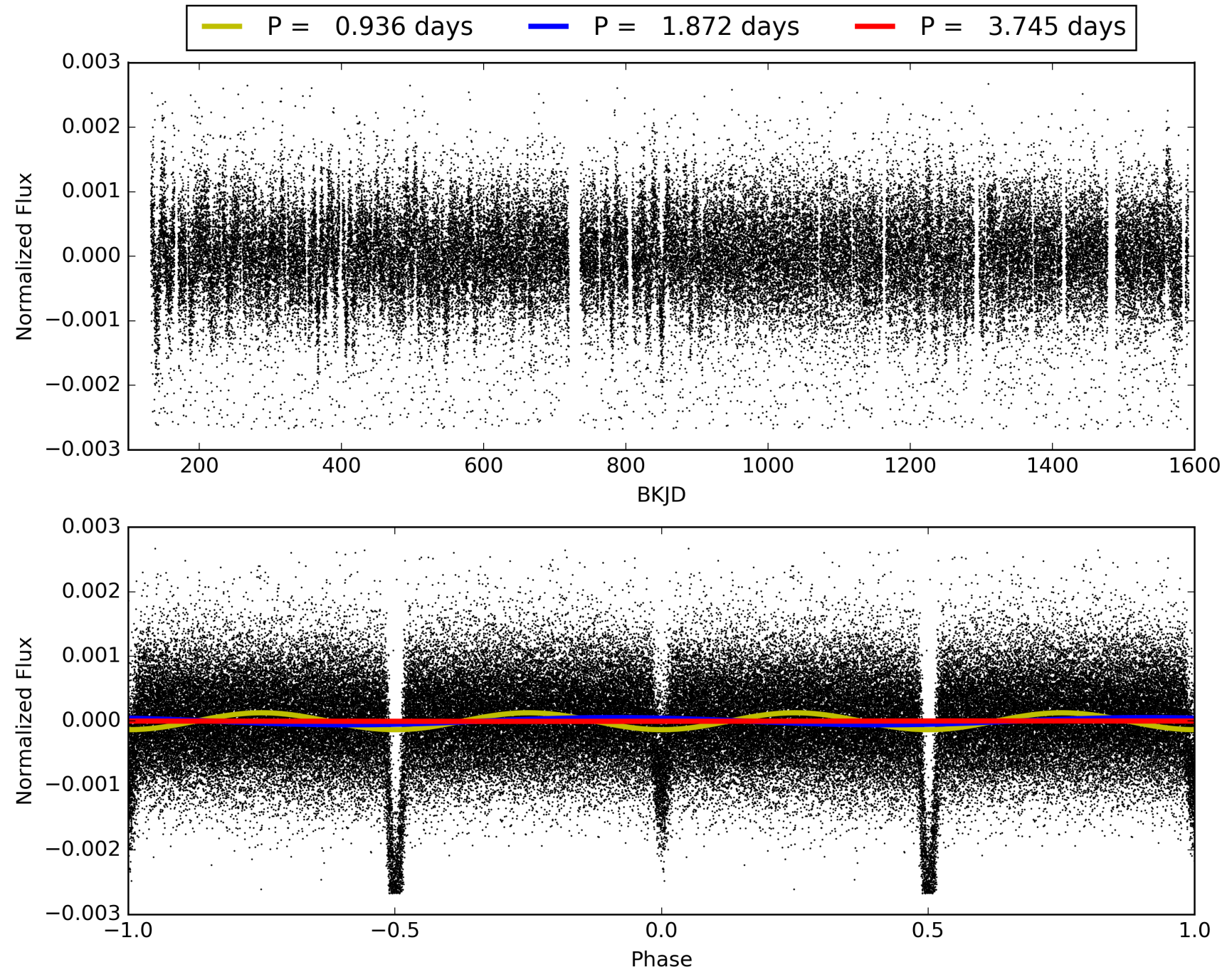
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:04:42 Z

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

TCE 010514770-02, PDC Light Curves

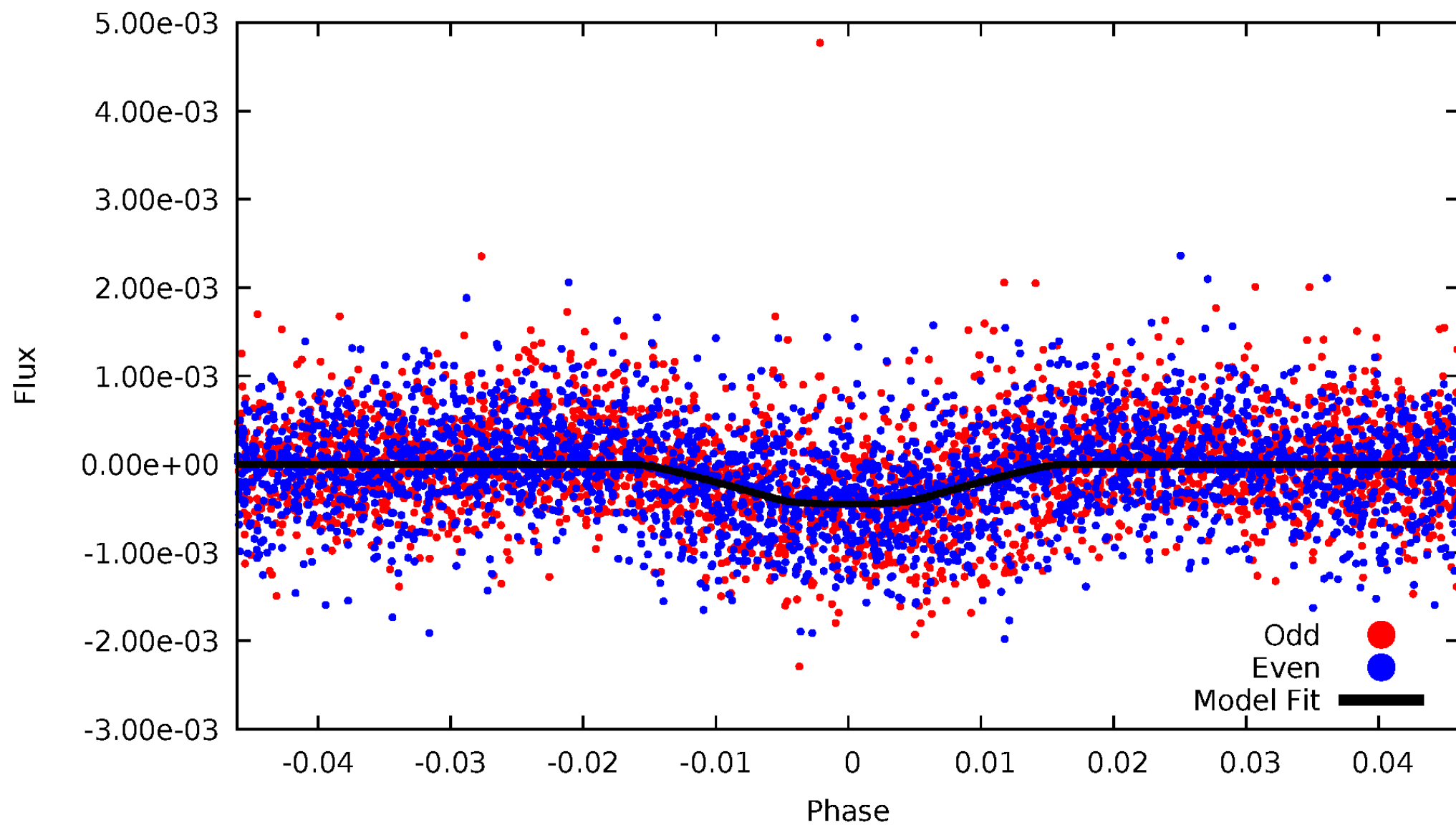


TCE 010514770-02



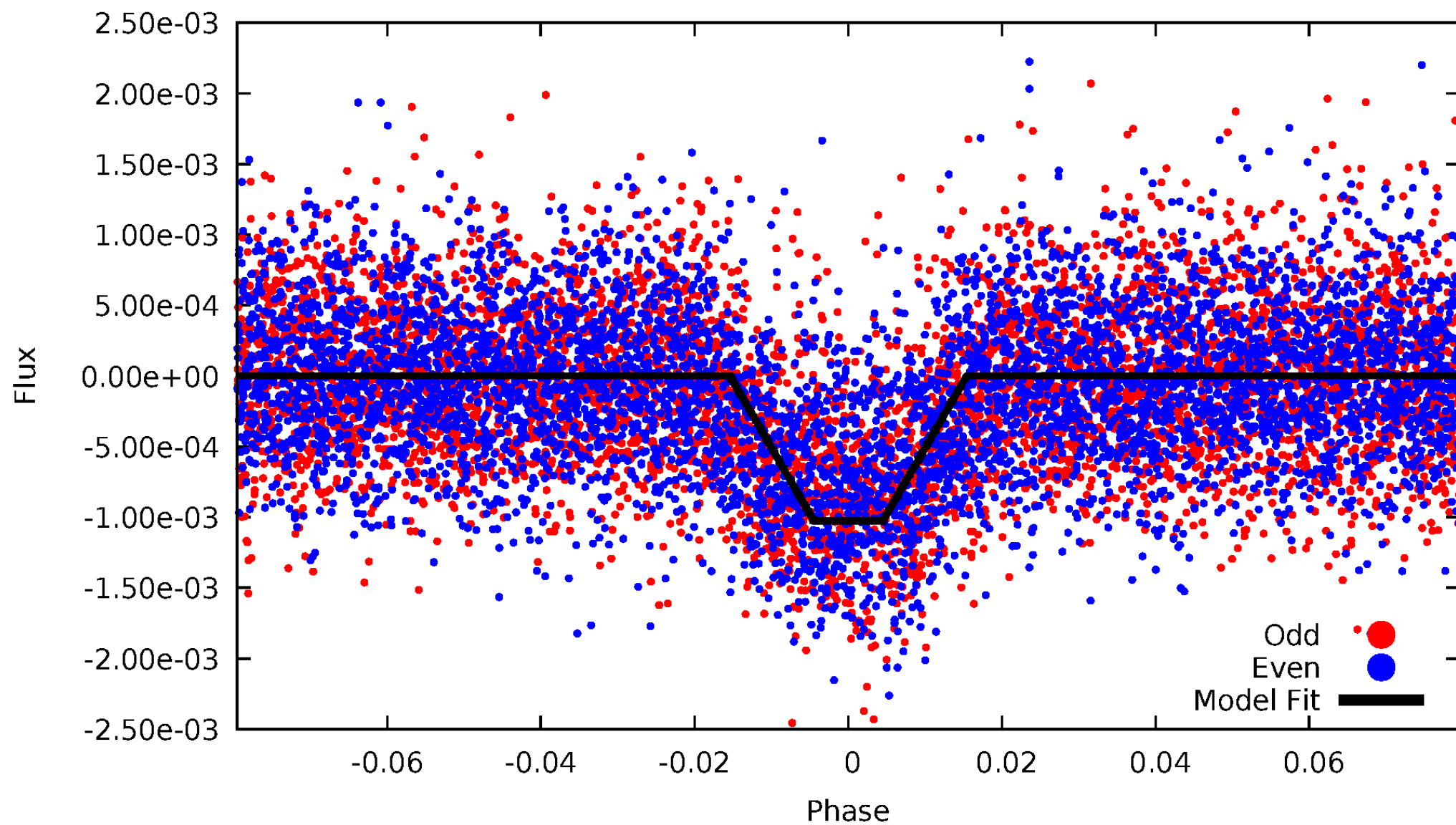
DV Odd/Even

TCE 010514770-02



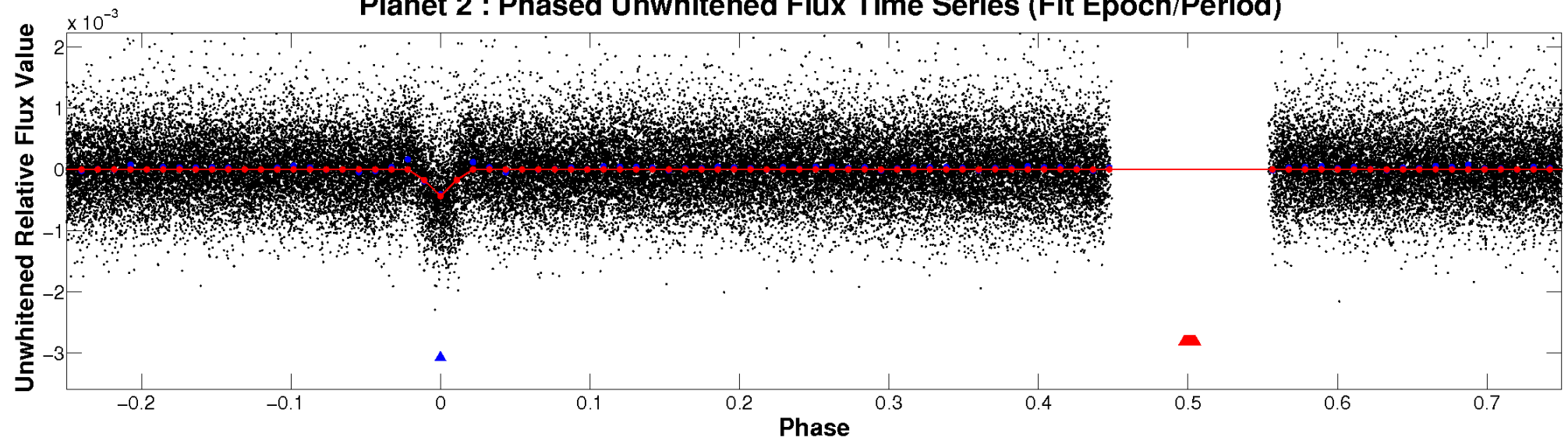
ALT Odd/Even

TCE 010514770-02

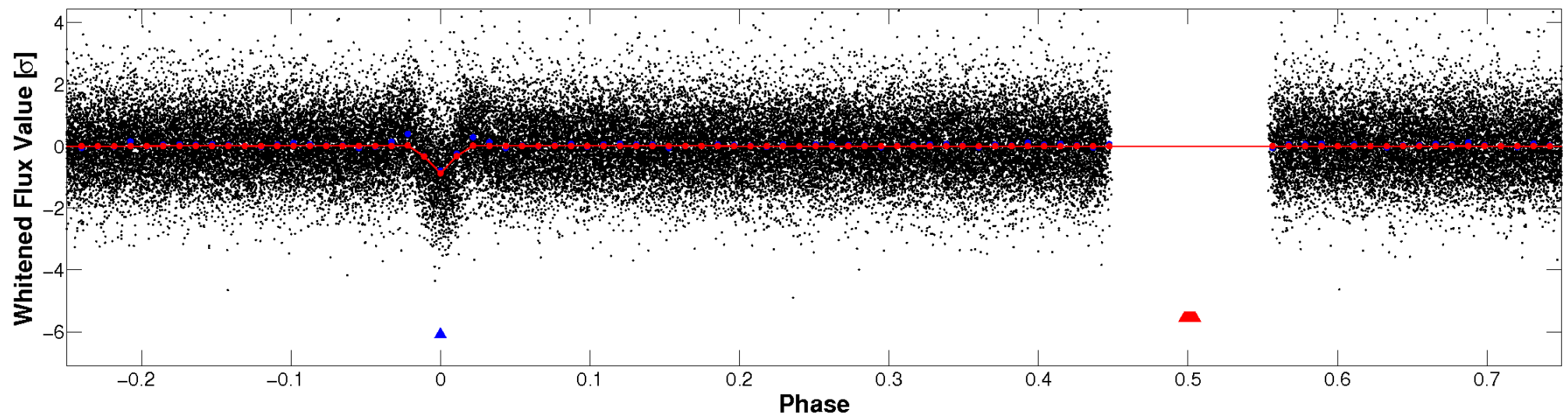


Non-Whitened Vs. Whitened Light Curve

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

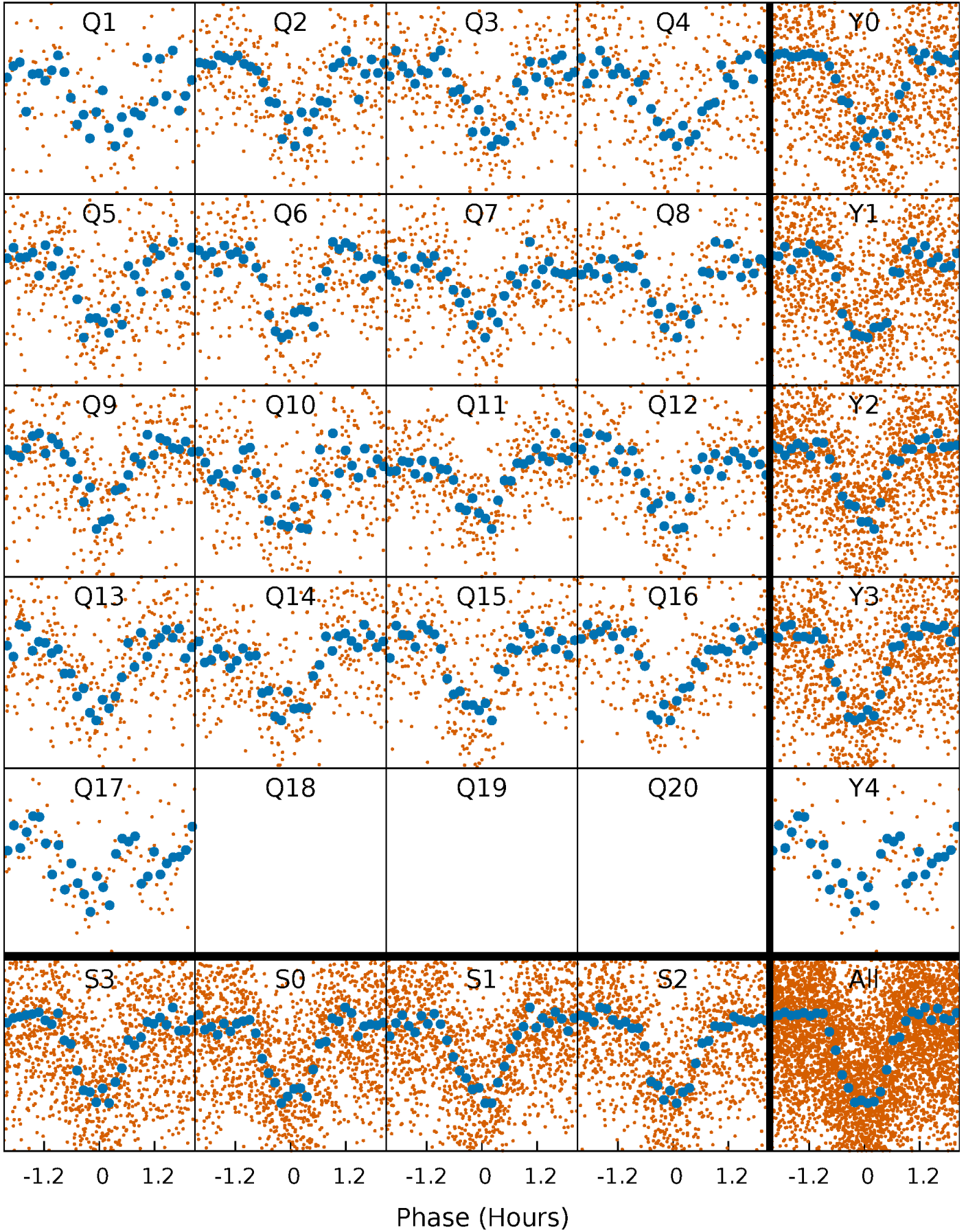


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



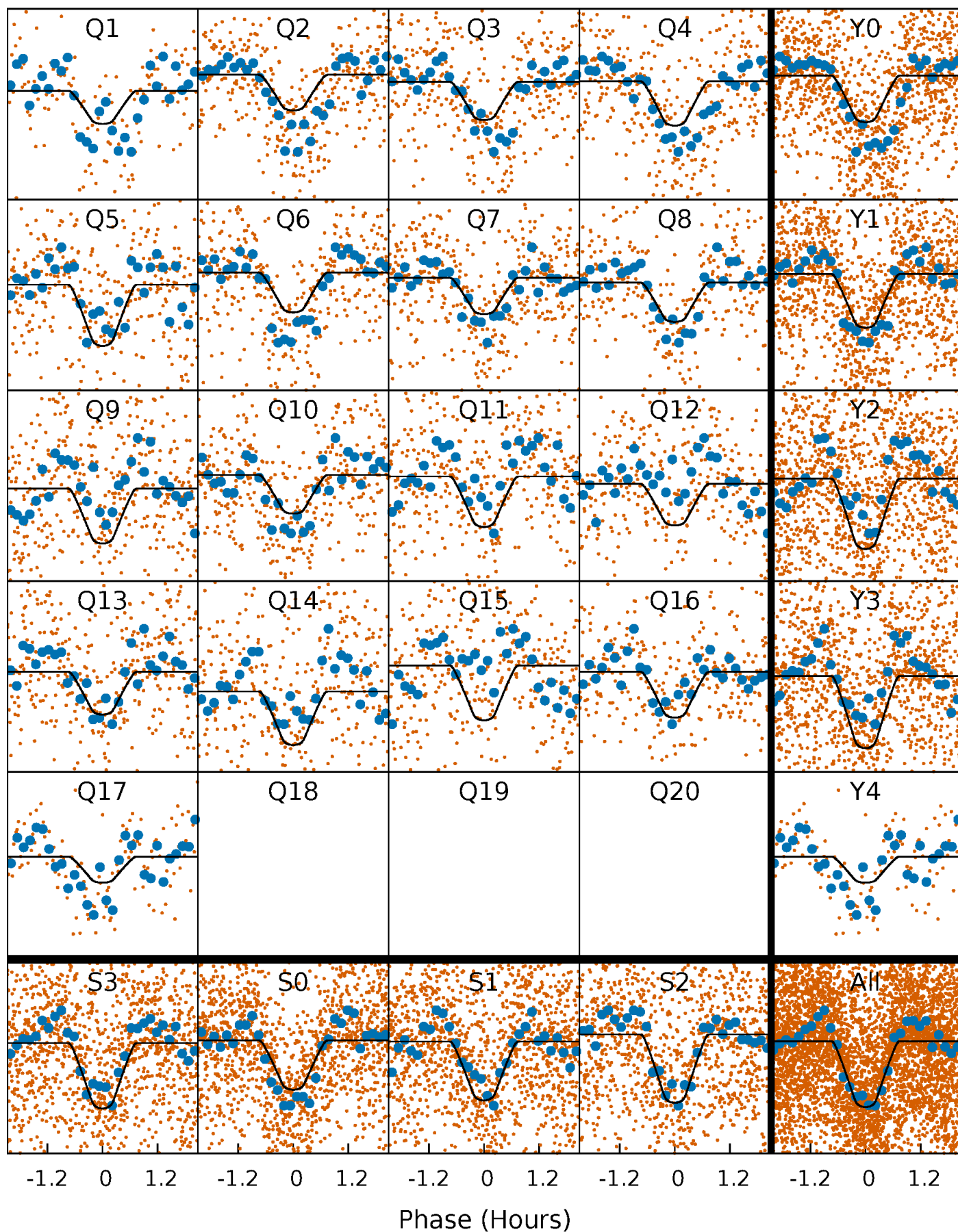
PDC Quarter-Phased Transit Curves

TCE 010514770-02 P= 1.872443 Days $T_0=131.547237$ (BKJD)



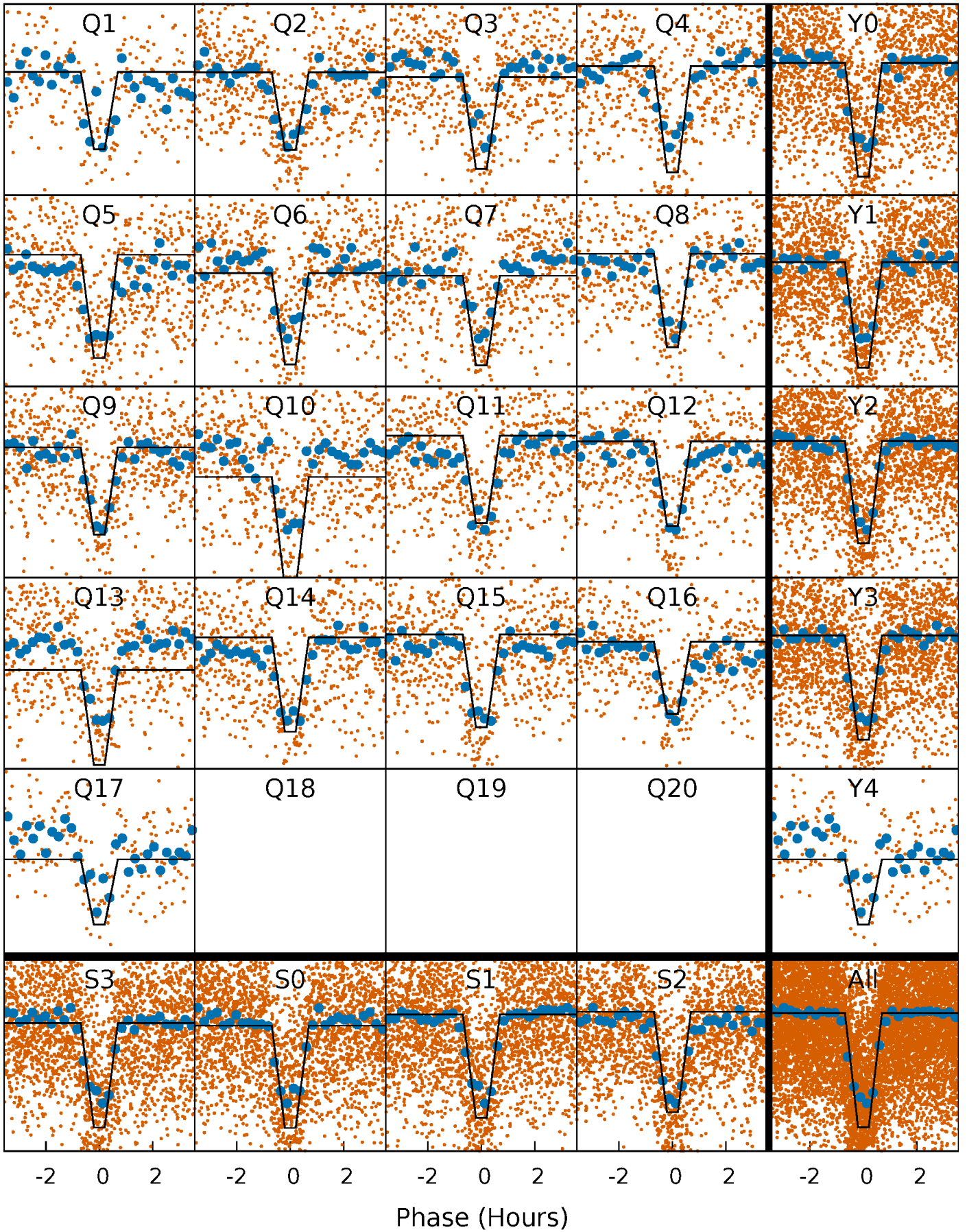
DV Quarter-Phased Transit Curves

TCE 010514770-02 P= 1.872443 Days $T_0=131.547237$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

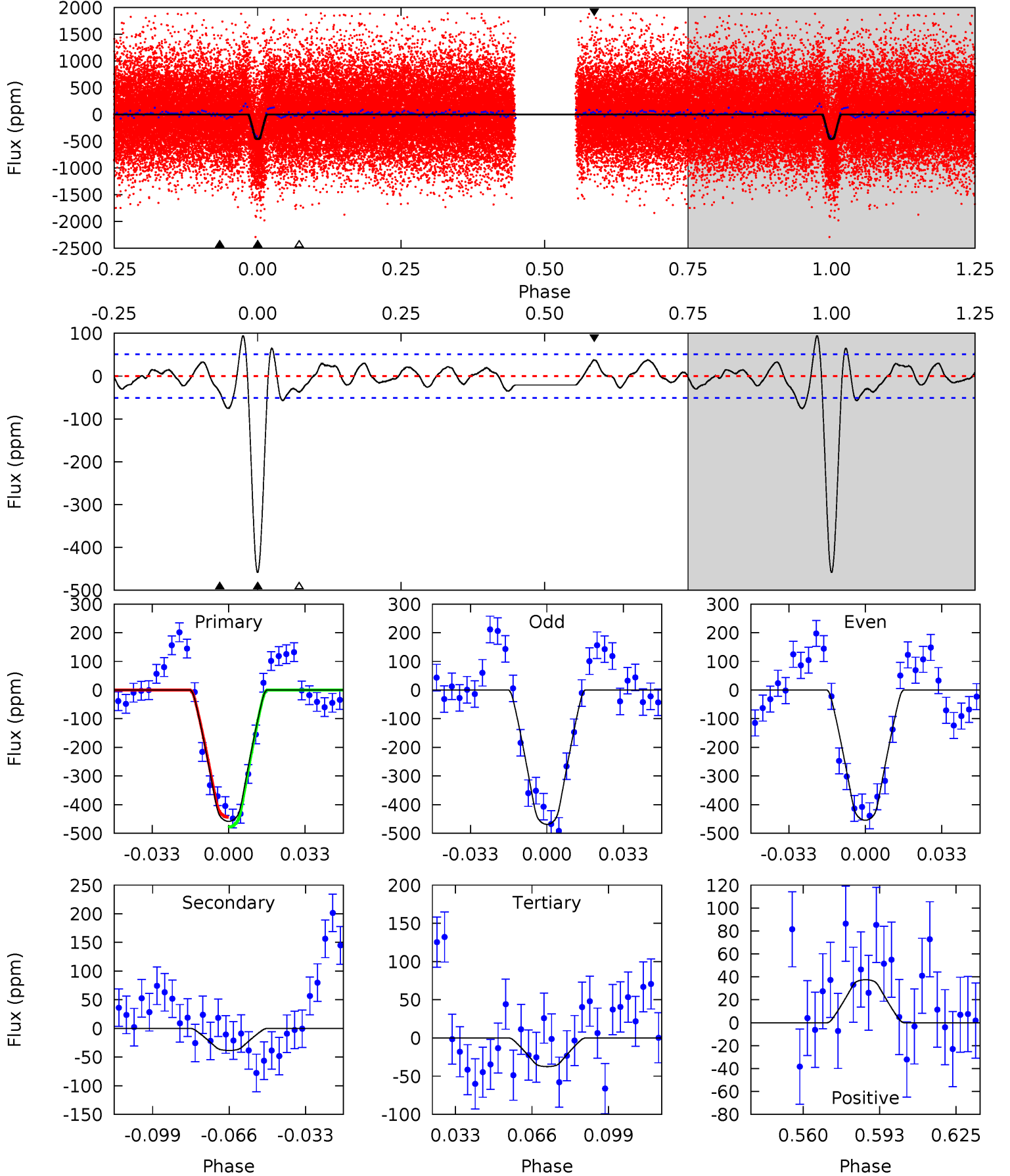
TCE 010514770-02 P= 1.872425 Days $T_0=131.554546$ (BKJD)



DV Model-Shift Uniqueness Test

010514770-02, P = 1.872443 Days, E = 129.674794 Days

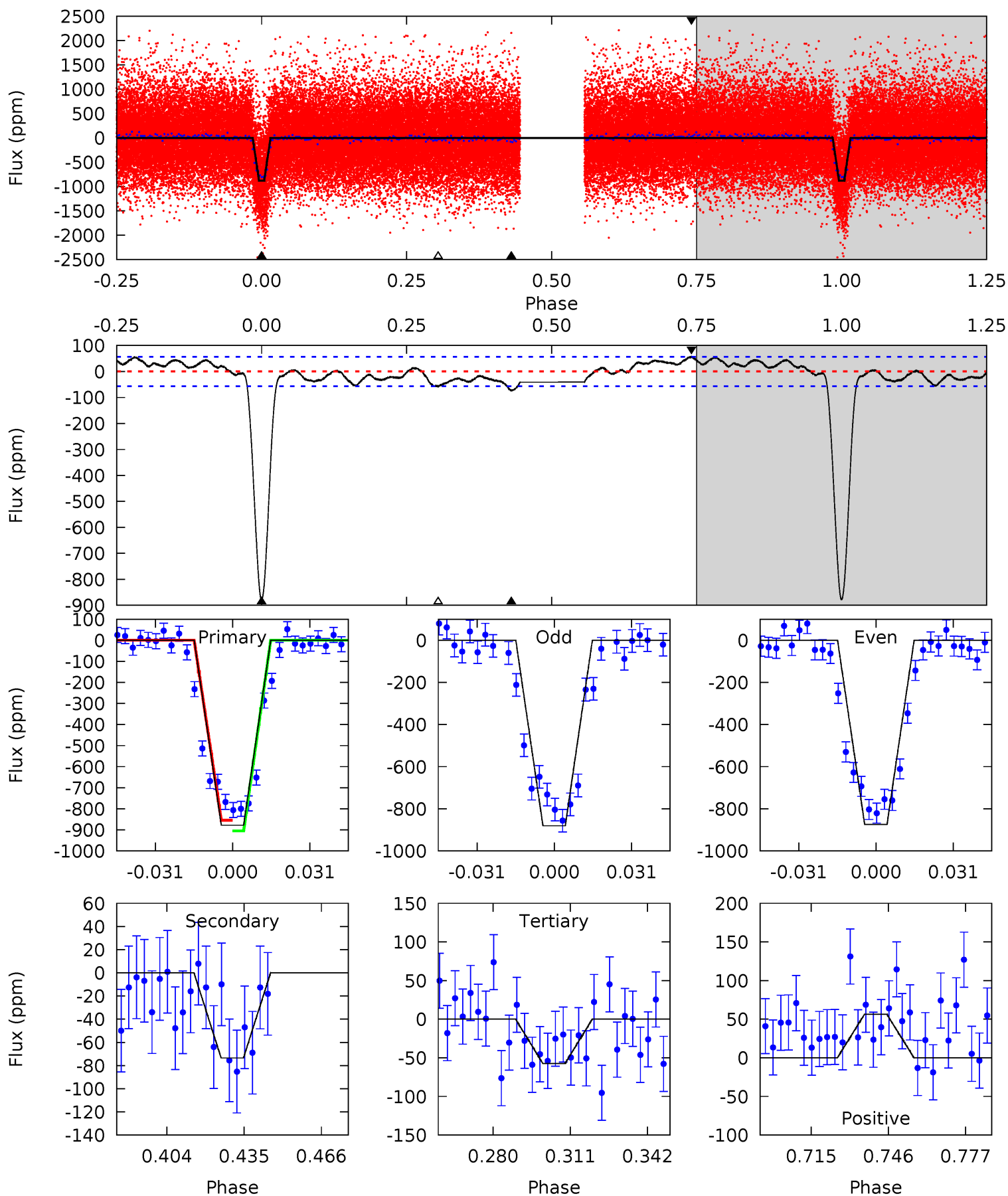
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 43.3 | 3.62 | 3.54 | 3.54 | 4.79 | 2.13 | 1.79 | 39.7 | 39.7 | 0.08 | 0.08 | 0.68 | 0.95 | 0.17 | 1.62 |



Alt Model-Shift Uniqueness Test

010514770-02, P = 1.872425 Days, E = 129.682121 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 74.4 | 6.23 | 4.86 | 4.78 | 4.80 | 2.16 | 2.50 | 69.6 | 69.6 | 1.37 | 1.44 | 0.25 | 0.98 | 0.06 | 2.15 |



Stellar Parameters For KIC 010514770

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5337^{+159}_{-159} | $4.486^{+0.105}_{-0.105}$ | $-0.260^{+0.300}_{-0.300}$ | $0.825^{+0.118}_{-0.106}$ | $0.760^{+0.113}_{-0.052}$ | $1.908^{+0.860}_{-0.595}$ |
| | +3%/-3% | +2%/-2% | +115%/-115% | +14%/-13% | +15%/-7% | +45%/-31% |
| 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 010514770-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -38 ± 11 | $2.11^{+0.76}_{-0.73}$ | 1811^{+94}_{-83} | 3255^{+500}_{-356} | $3.578^{+4.802}_{-1.844}$ |
| Alt. | -73 ± 12 | $2.90^{+0.80}_{-0.74}$ | 1811^{+87}_{-80} | 3243^{+360}_{-255} | $3.551^{+3.130}_{-1.399}$ |

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 $A_{\text{obs}} \gg 1.0$

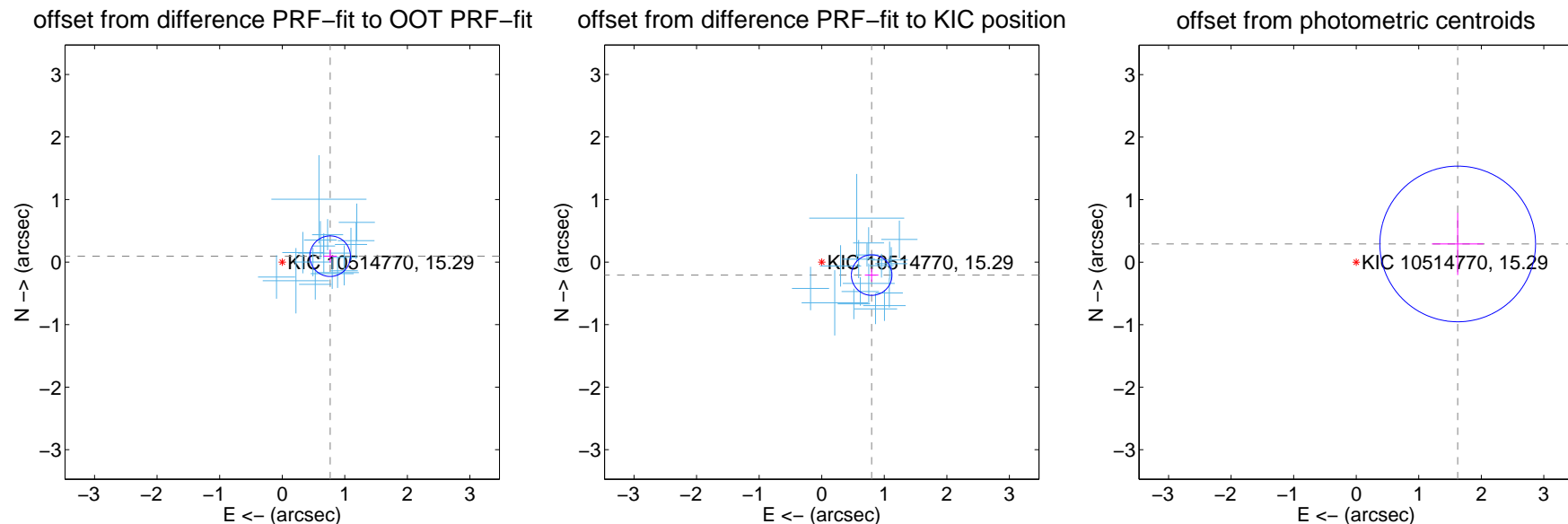
DV Centroid Data

Supplemental centroid analysis for 010514770-02. Kepler magnitude: 15.29. Transit SNR 27.15

There are 17 quarters with good PRF difference image offsets

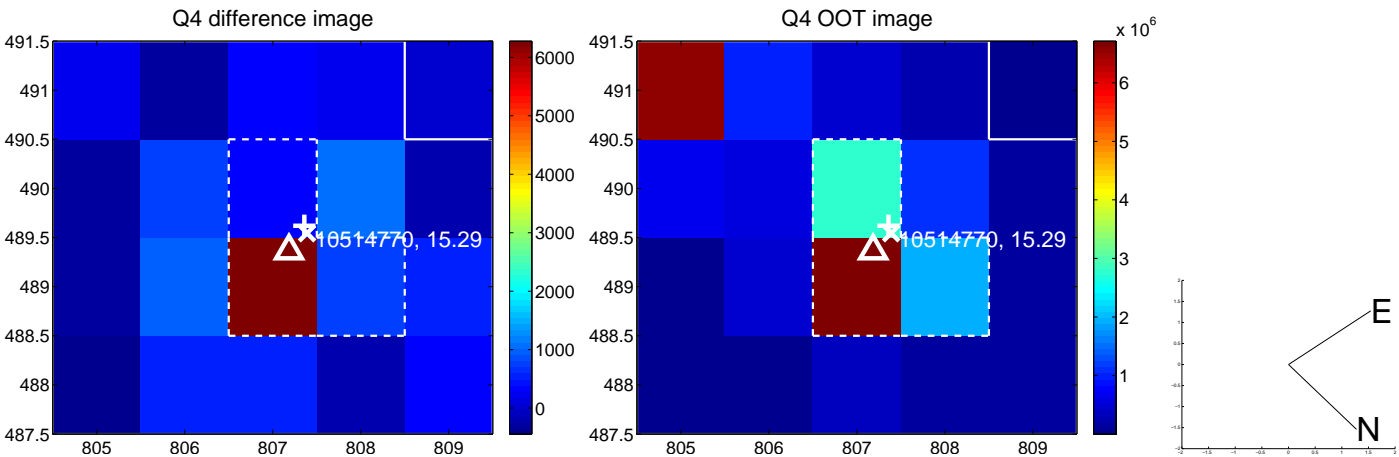
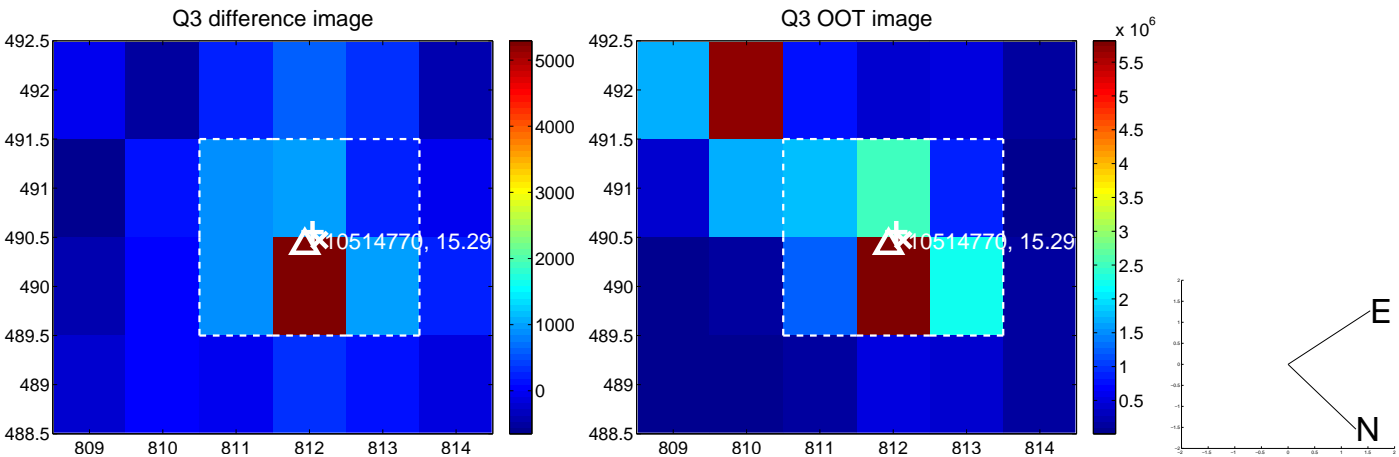
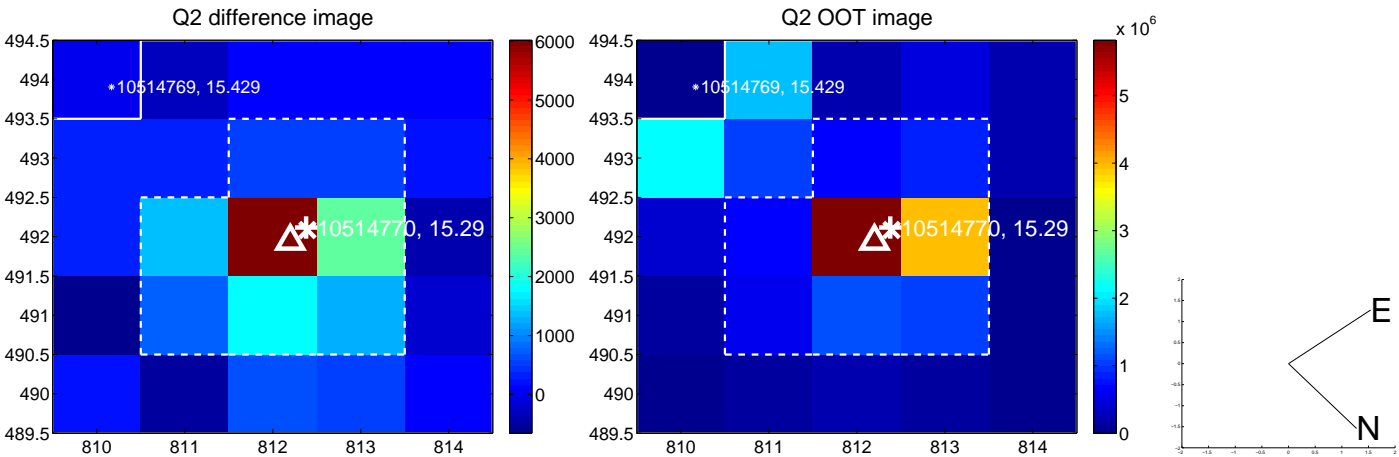
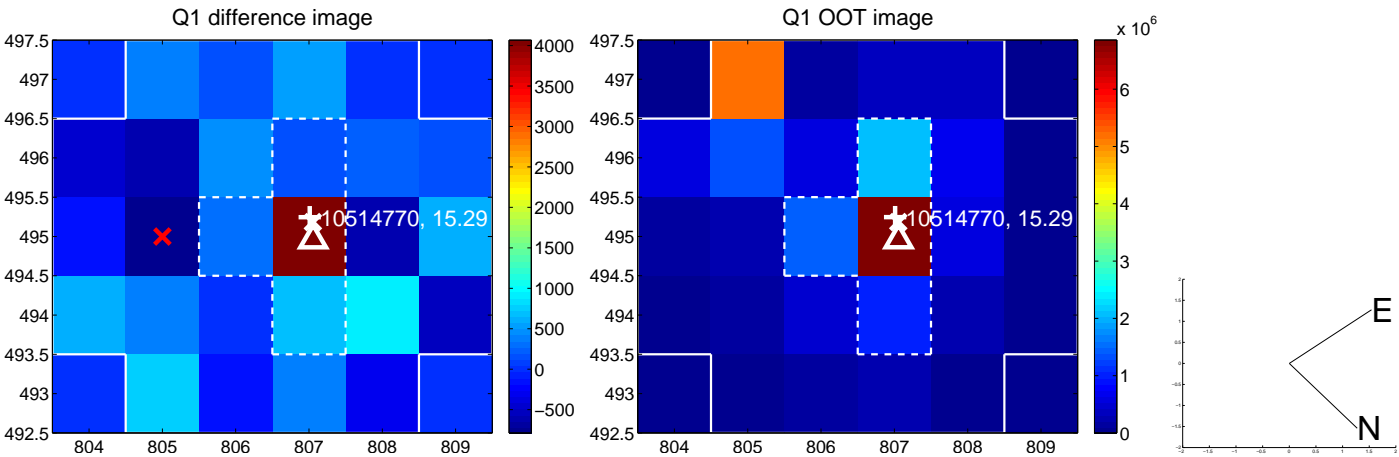
The direct PRF centroid is offset from the target star catalog position by about 0.35 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.772 ± 0.108 | 7.13 | -0.766 ± 0.108 | 0.095 ± 0.104 |
| PRF-fit source offset from KIC position | 0.825 ± 0.108 | 7.64 | -0.798 ± 0.108 | -0.208 ± 0.104 |
| photometric centroid source offset | 1.65 ± 0.41 | 3.97 | -1.62 ± 0.41 | 0.29 ± 0.50 |

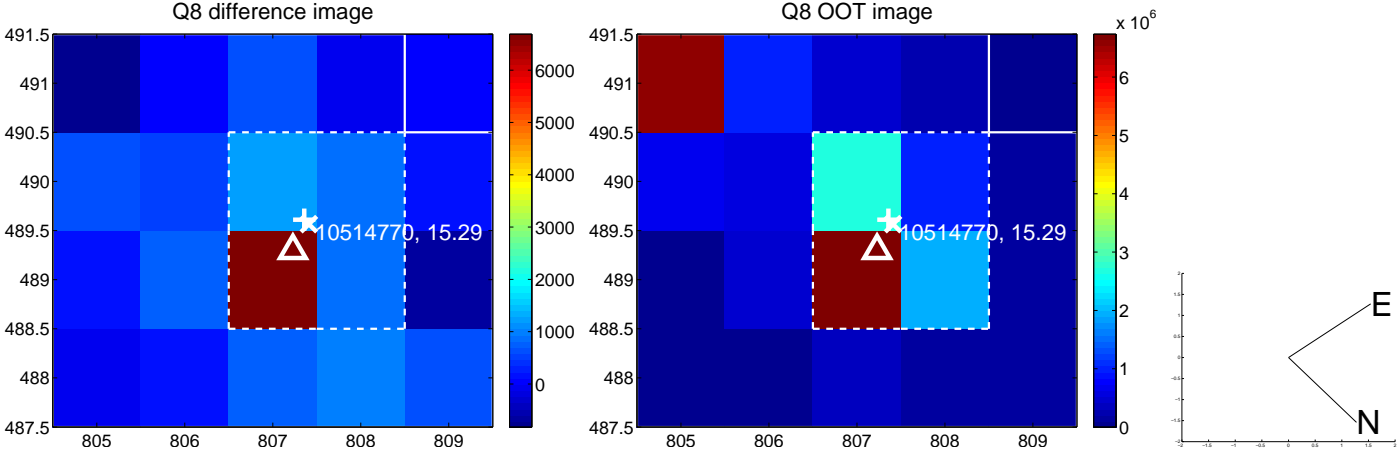
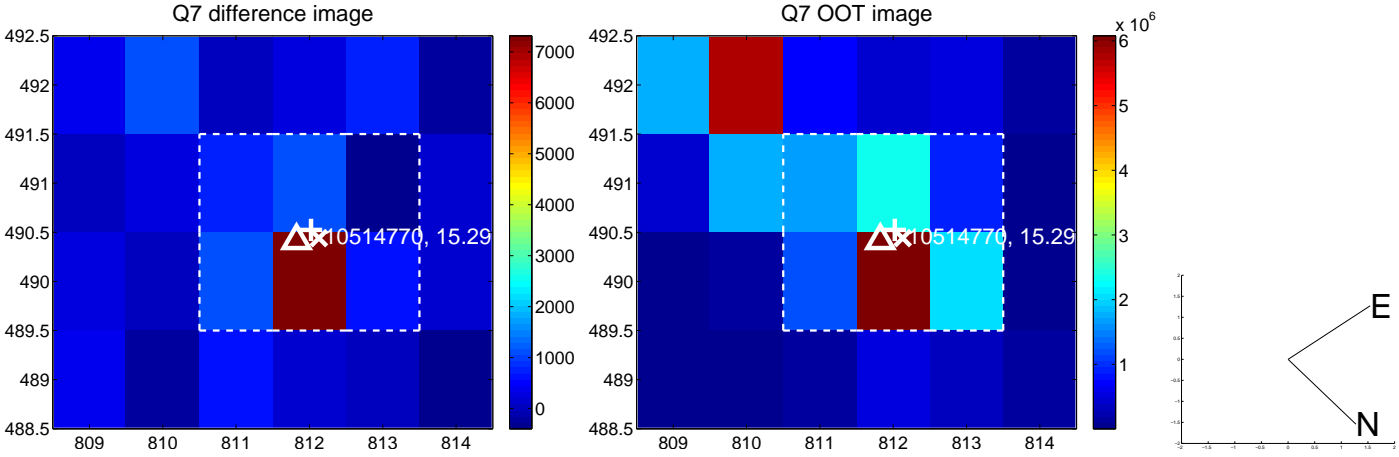
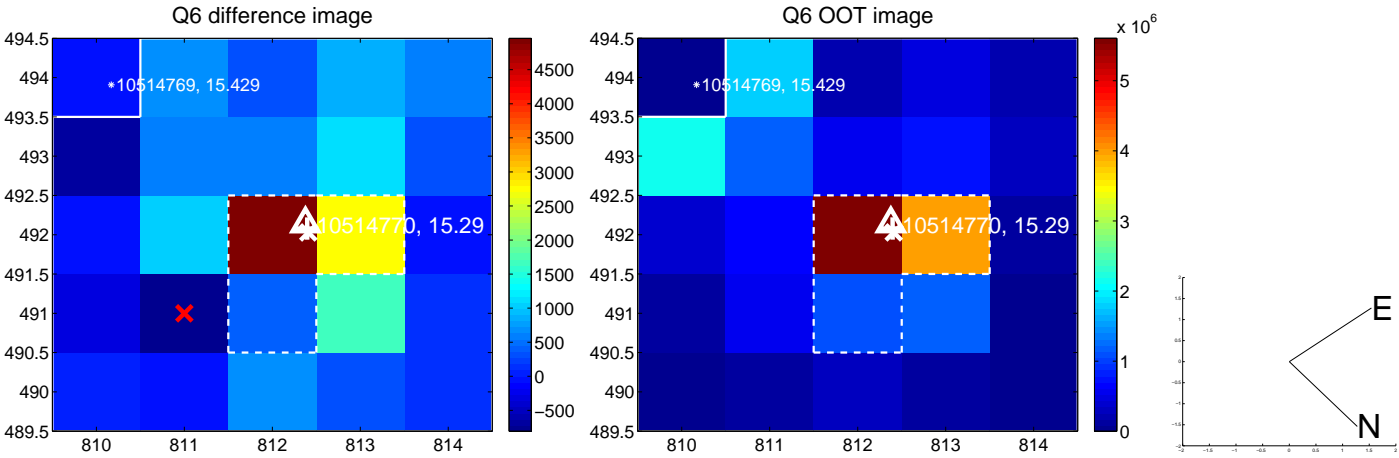
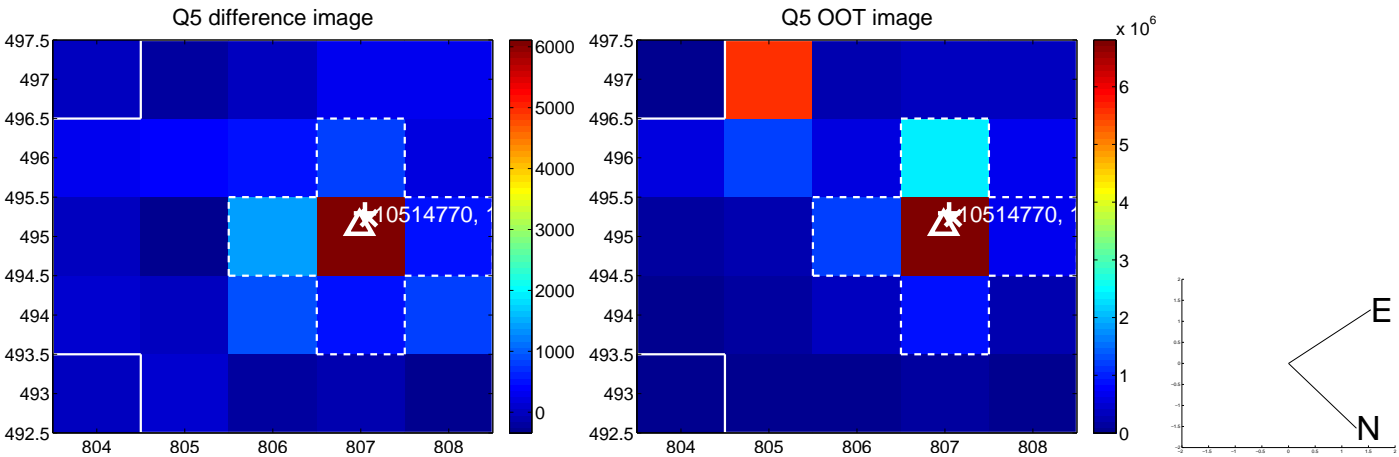


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

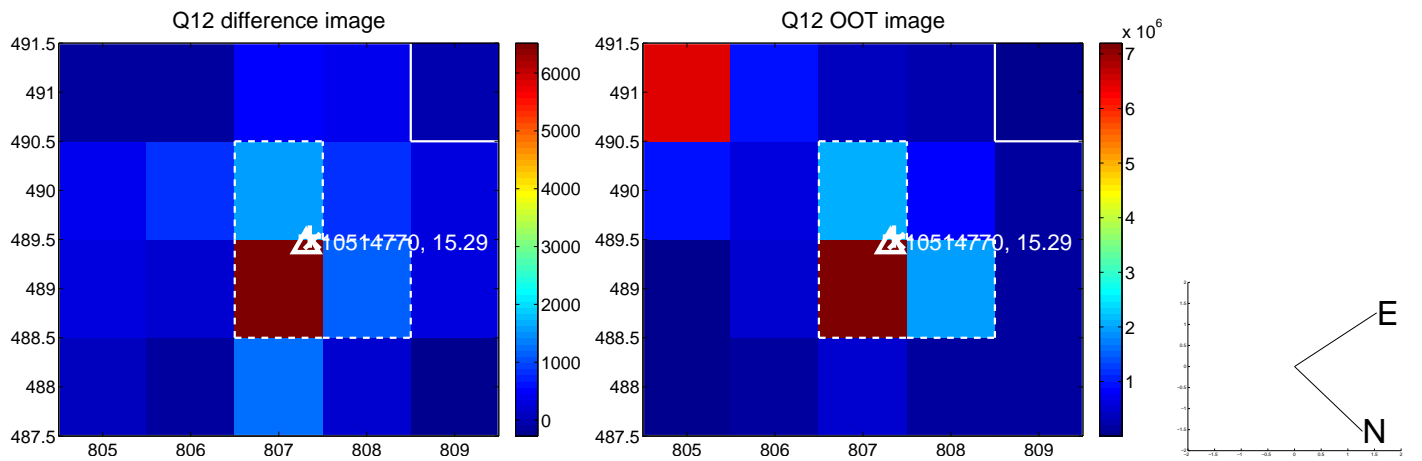
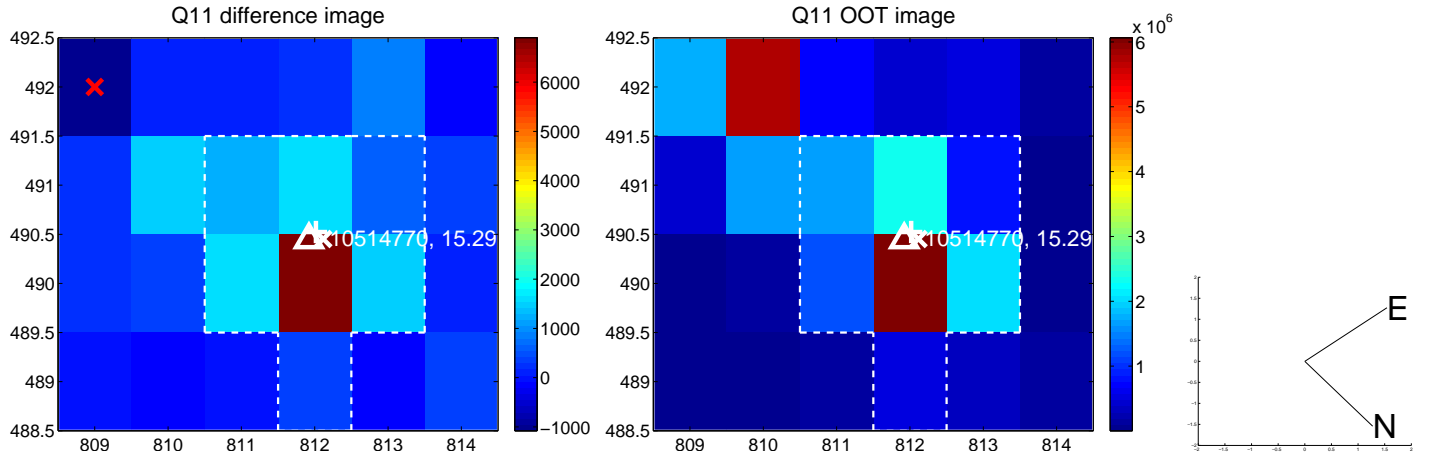
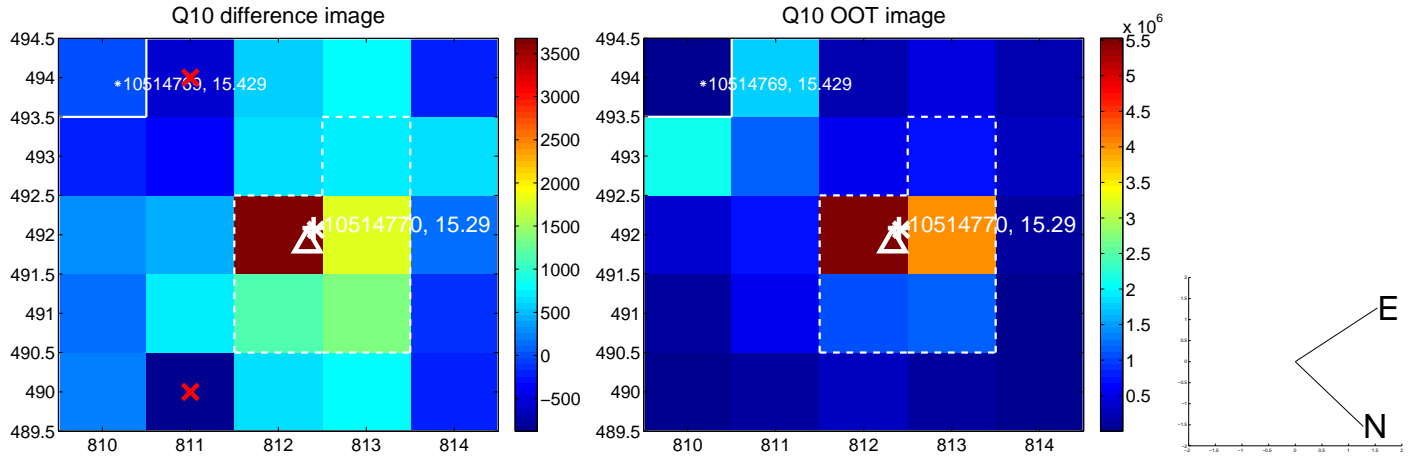
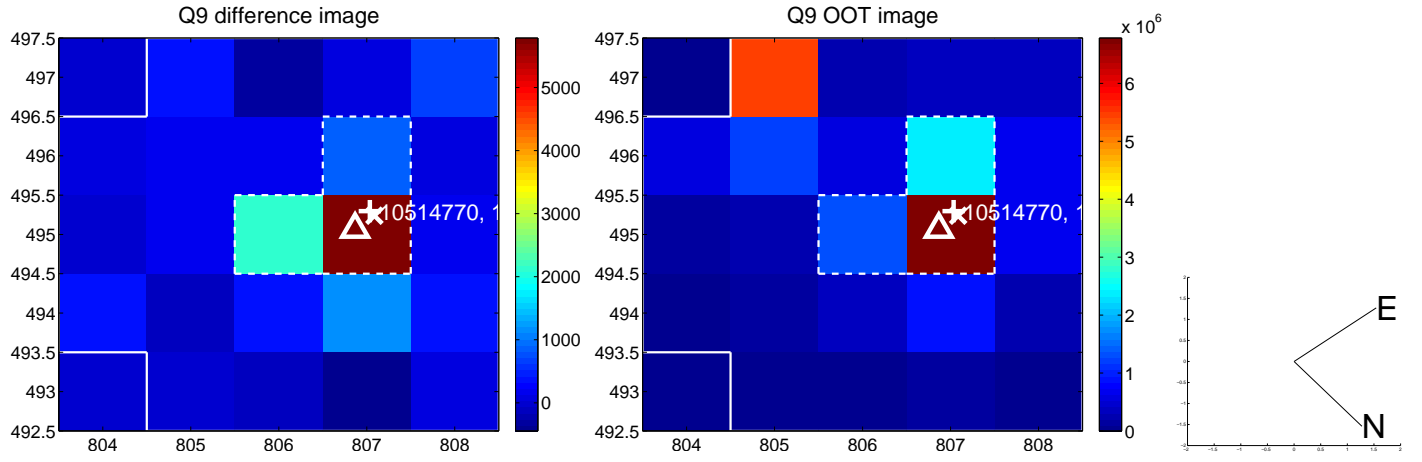
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



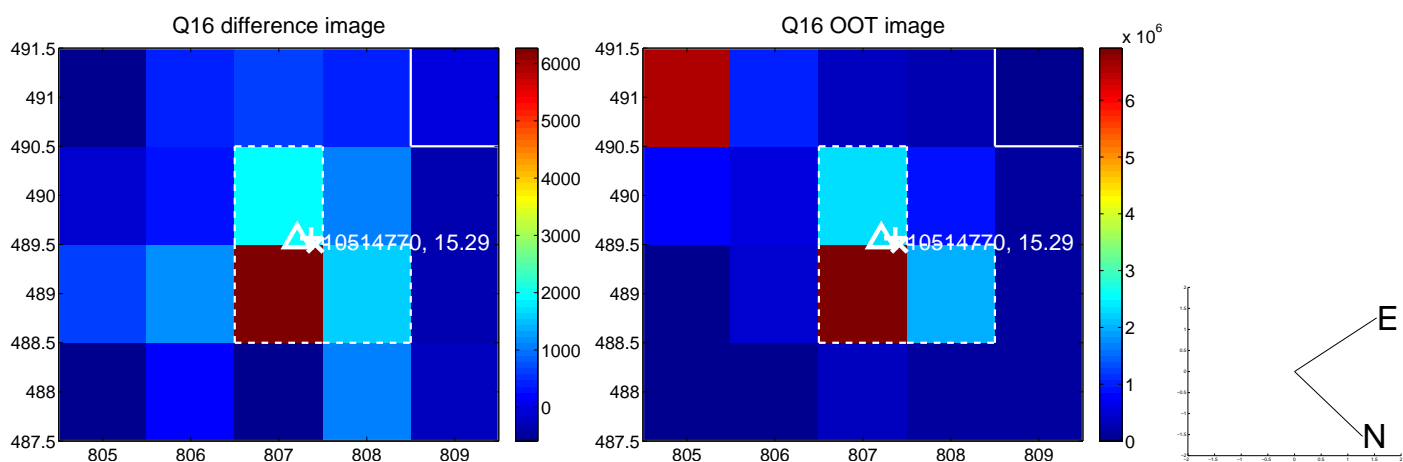
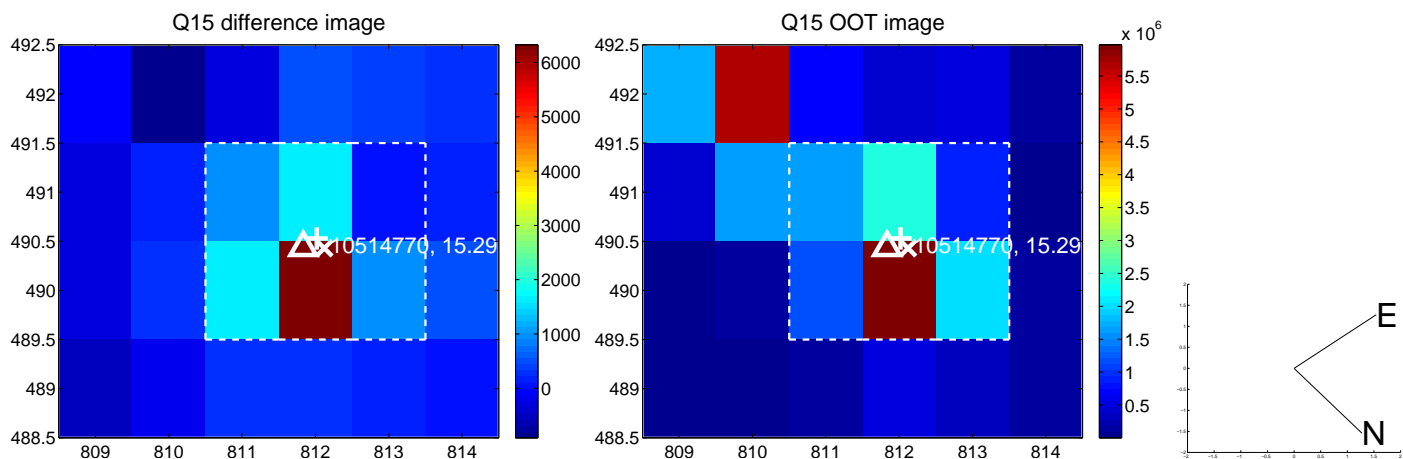
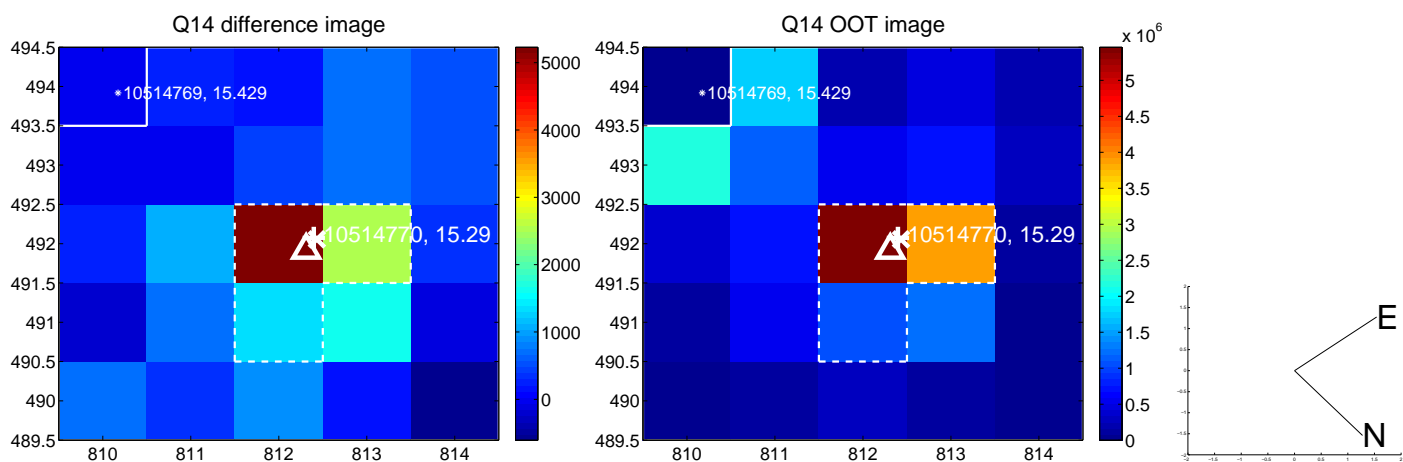
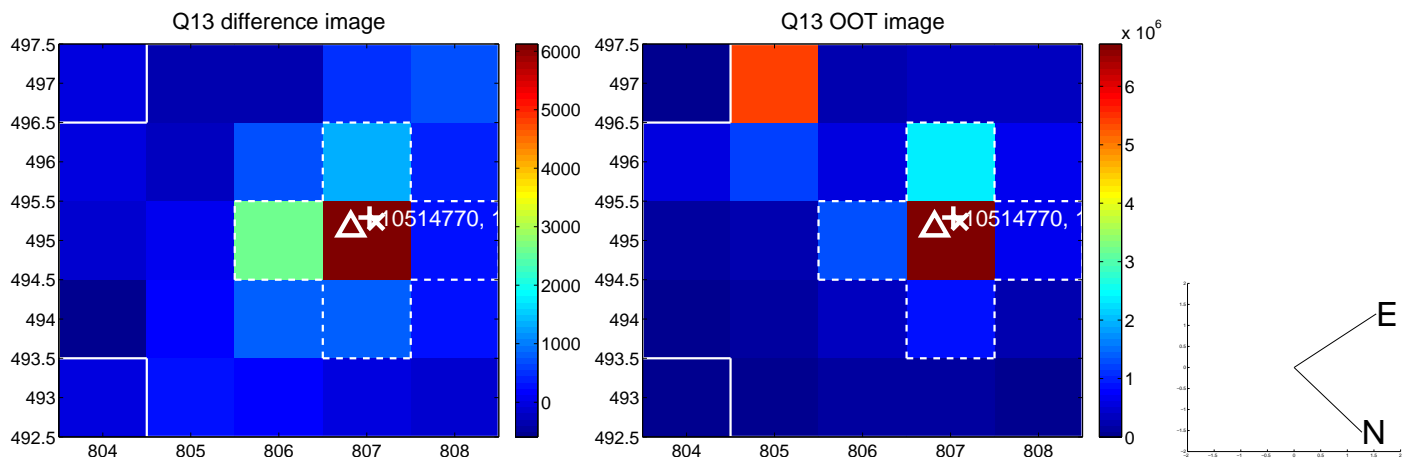
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



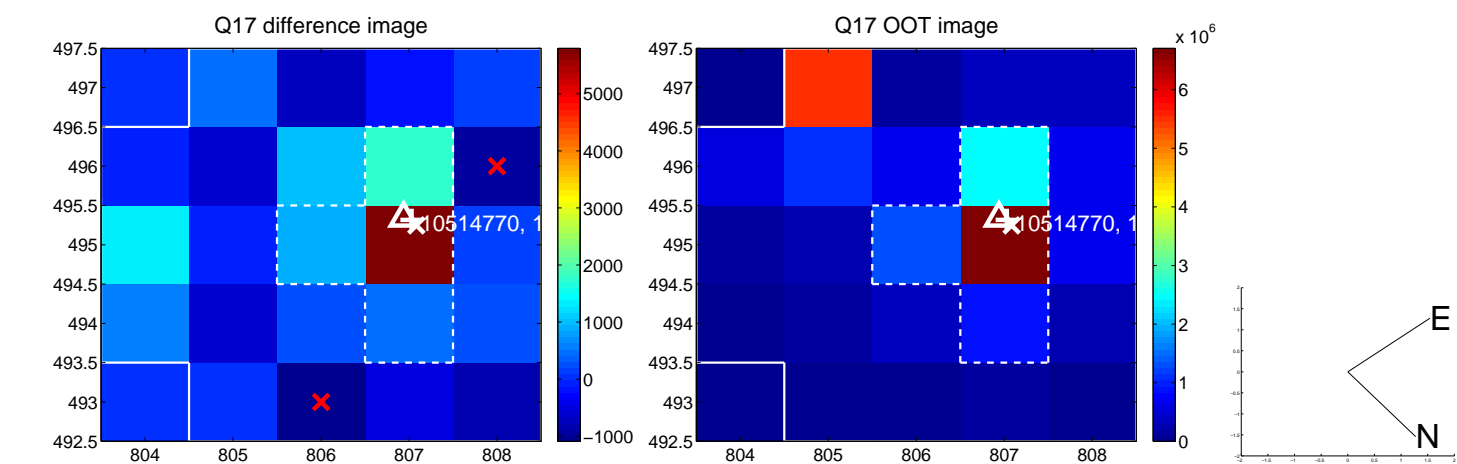
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



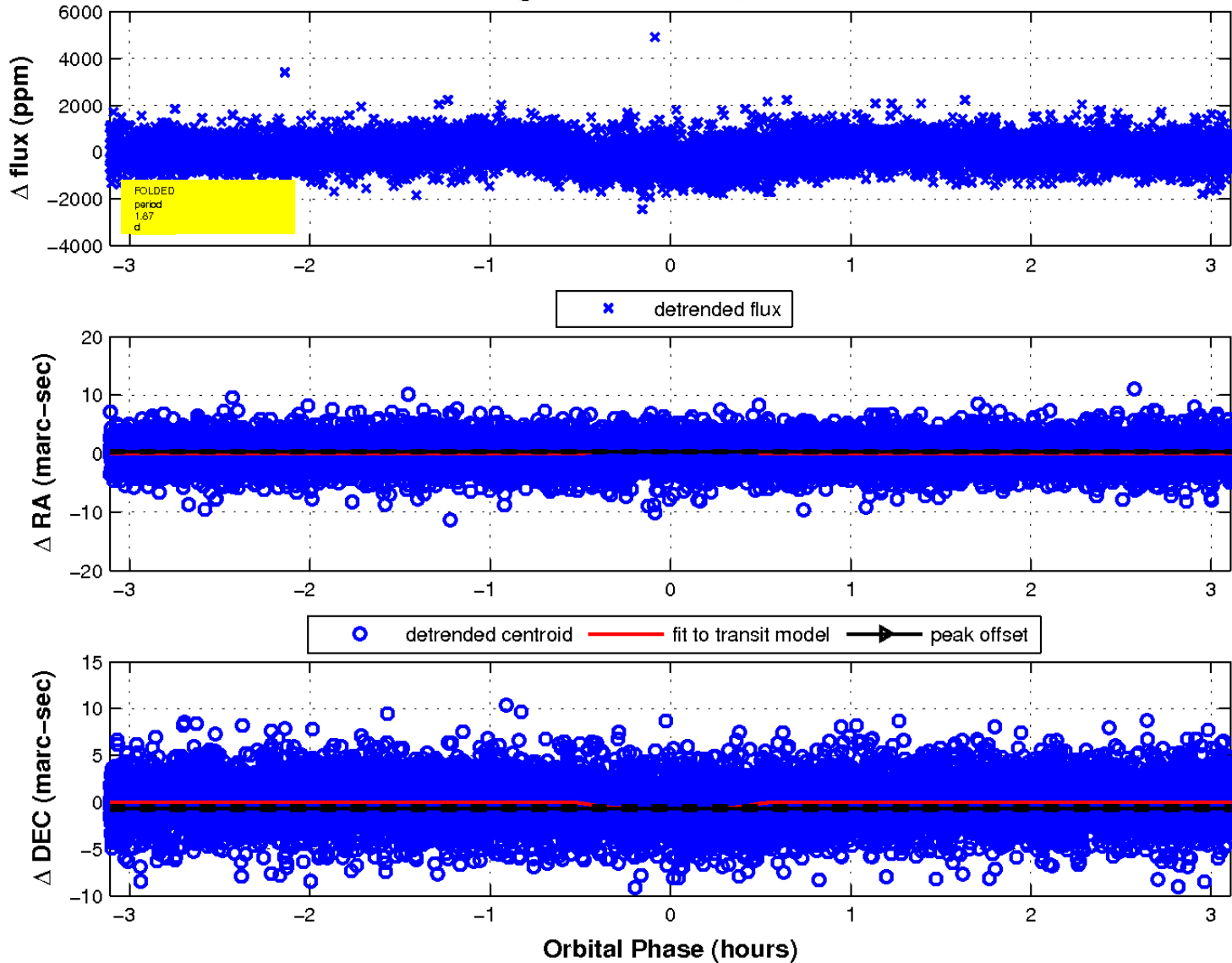
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

