

KIC 009451127

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|--------|--------|-----------------------------|-----------------|------------------------|------------------------|
| 009451127-01 | OBS | 1381.01 | 5.117400 | 134.586767 | 62840.1 | 4.300 | 2408.6 | 2070.8 | 1.05 | 6161 | 28.43 | 385.82 |
| 009451127-02 | OBS | No | 5.117402 | 132.028242 | 1796.5 | 4.192 | 67.5 | 73.5 | 1.05 | 6161 | 5.53 | 385.82 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------|
| 009451127-01 | OBS | FP | 0.01 | 0 | 1 | 0 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE |
| 009451127-02 | 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.

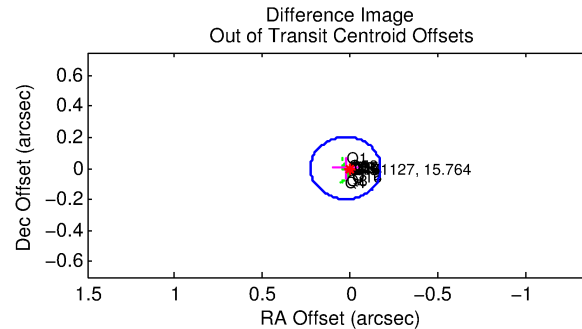
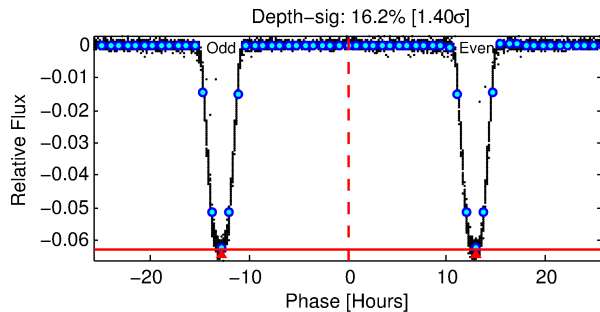
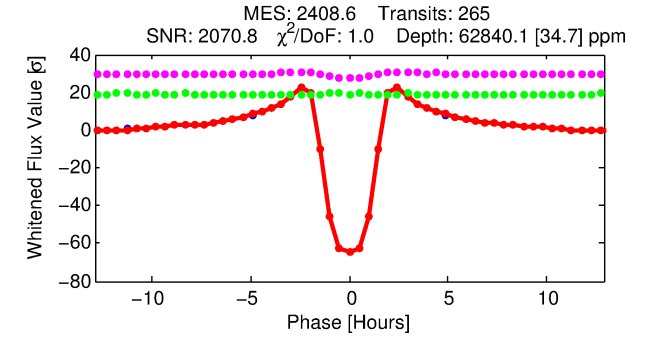
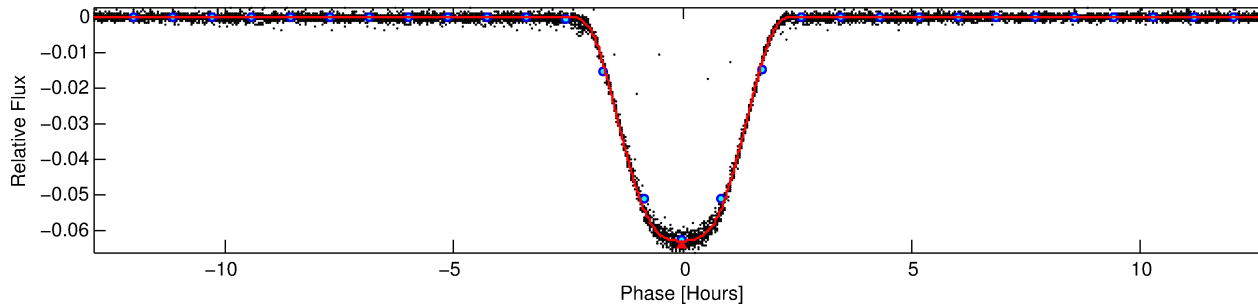
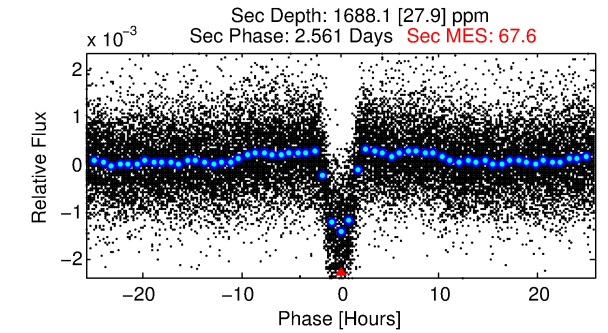
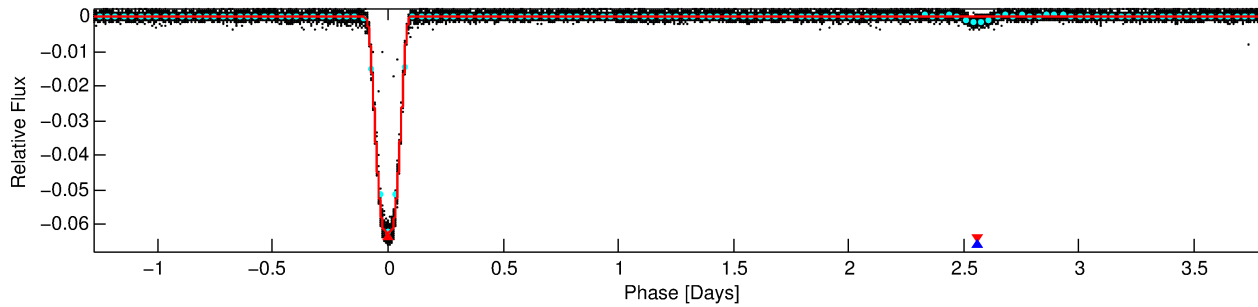
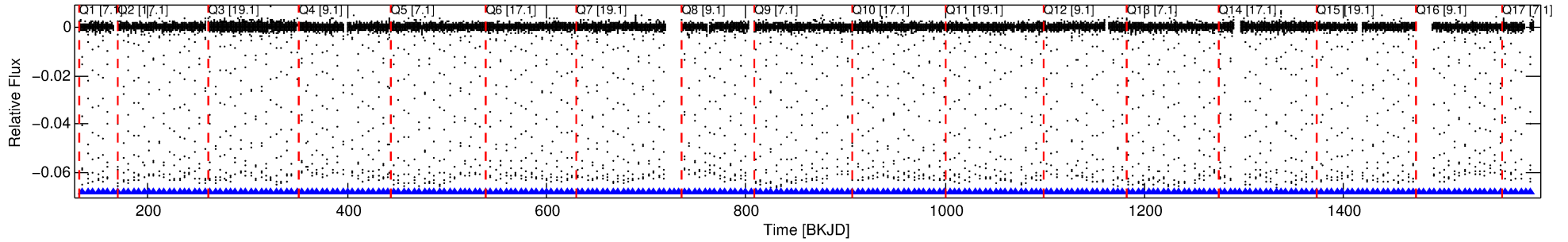
Ephemeris Match Information For 009451127-01

No Significant Match Found

DV One-Page Summary

KIC: 9451127 Candidate: 1 of 2 Period: 5.117 d
KOI: K01381.01 Corr: 1.000

Kp: 15.76 R*: 1.05 Rs Teff: 6161.0 K Logg: 4.45 Fe/H: 0.070



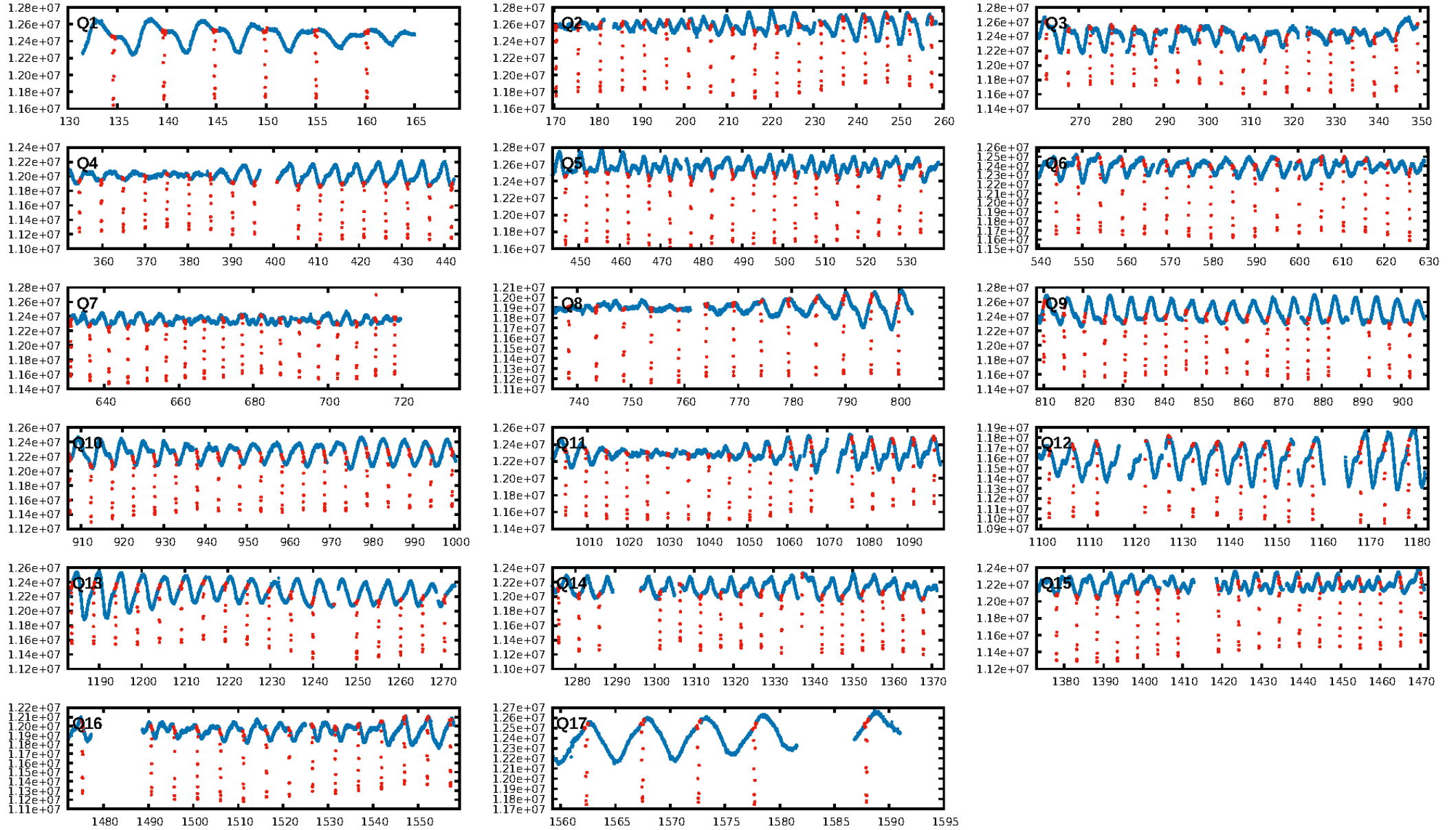
DV Fit Results:

Period = 5.11740 [0.00000] d
Epoch = 134.5868 [0.0000] BKJD
Rp/R* = 0.2475 [0.0001]
a/R* = 9.52 [0.01]
b = 0.69 [0.00]
Seff = 385.82 [163.70]
Teq = 1130 [120] K
Rp = 28.44 [9.21] Re
a = 0.0609 [0.0166] AU
Ag = 4.26 [1.69] [1.93σ]
Teffp = 2510 [97] K [8.96σ]

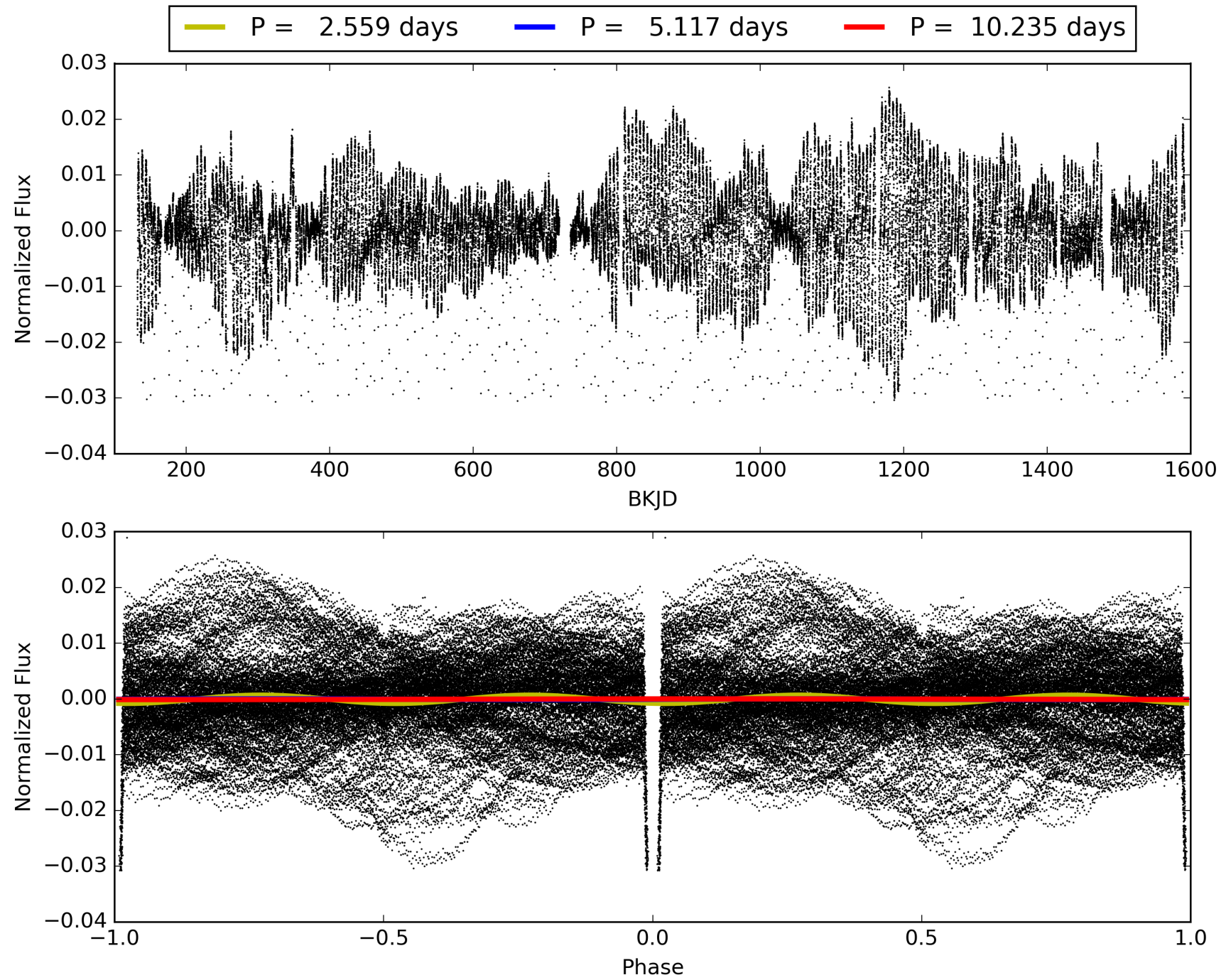
DV Diagnostic Results:

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 [254/254]
GhostDiagnostic-chr: 2.498
Centroid-sig: 0.0%
Centroid-so: 0.114 arcsec [30.69σ]
OotOffset-rm: 0.028 arcsec [0.41σ]
KicOffset-rm: 0.032 arcsec [0.47σ]
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 009451127-01, PDC Light Curves

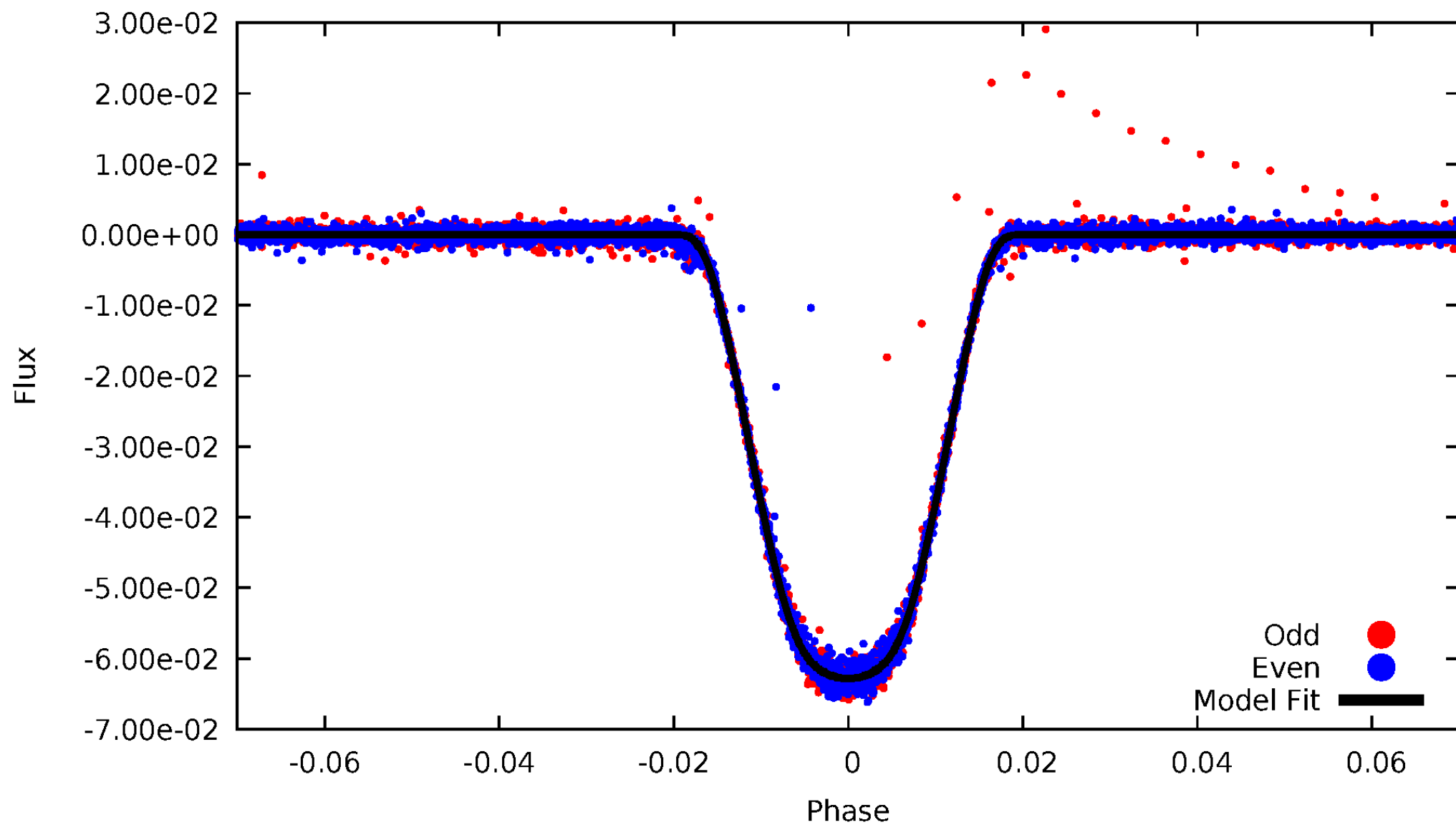


TCE 009451127-01



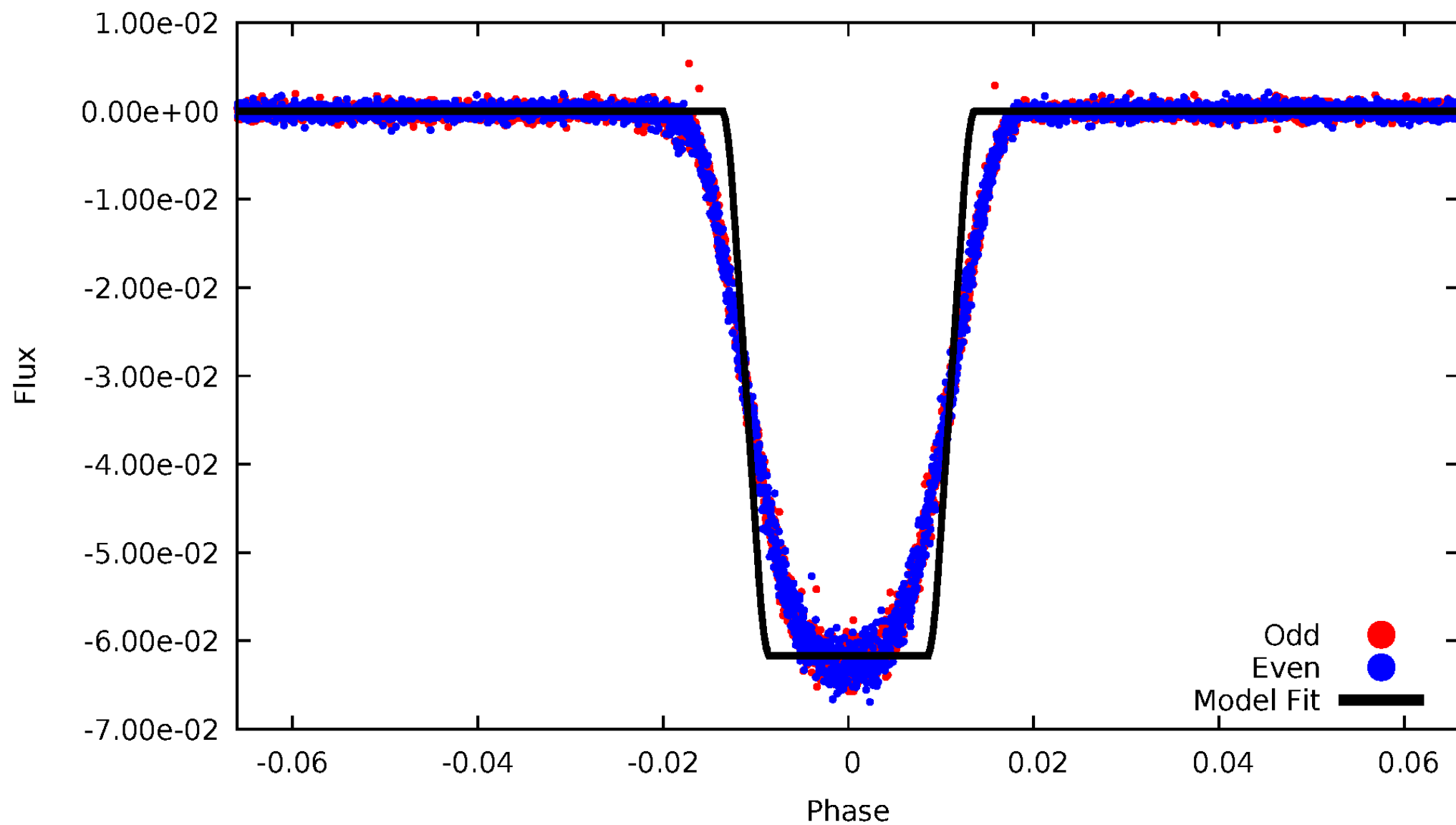
DV Odd/Even

TCE 009451127-01



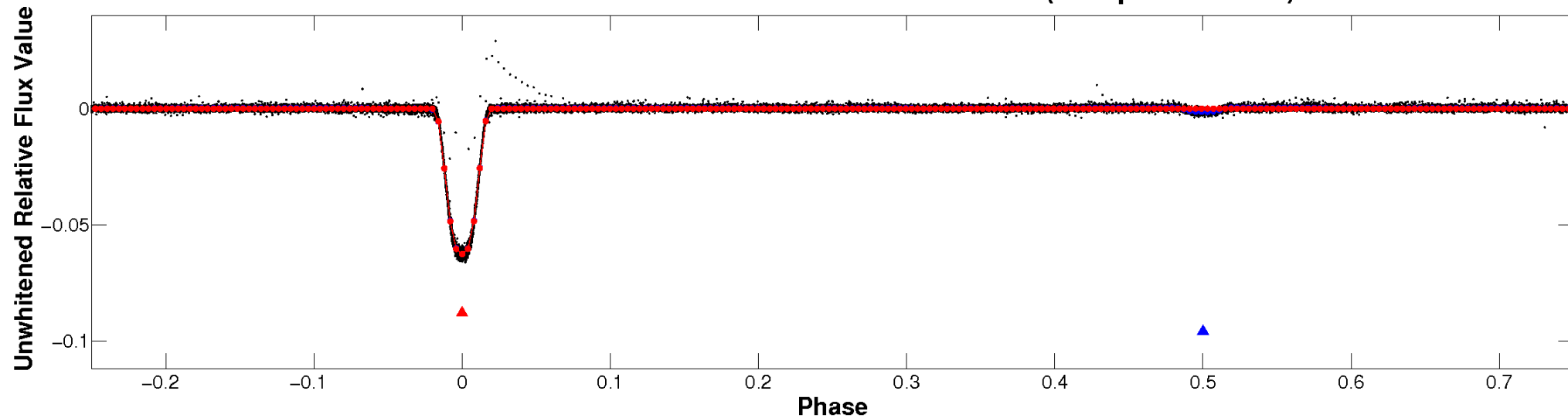
ALT Odd/Even

TCE 009451127-01

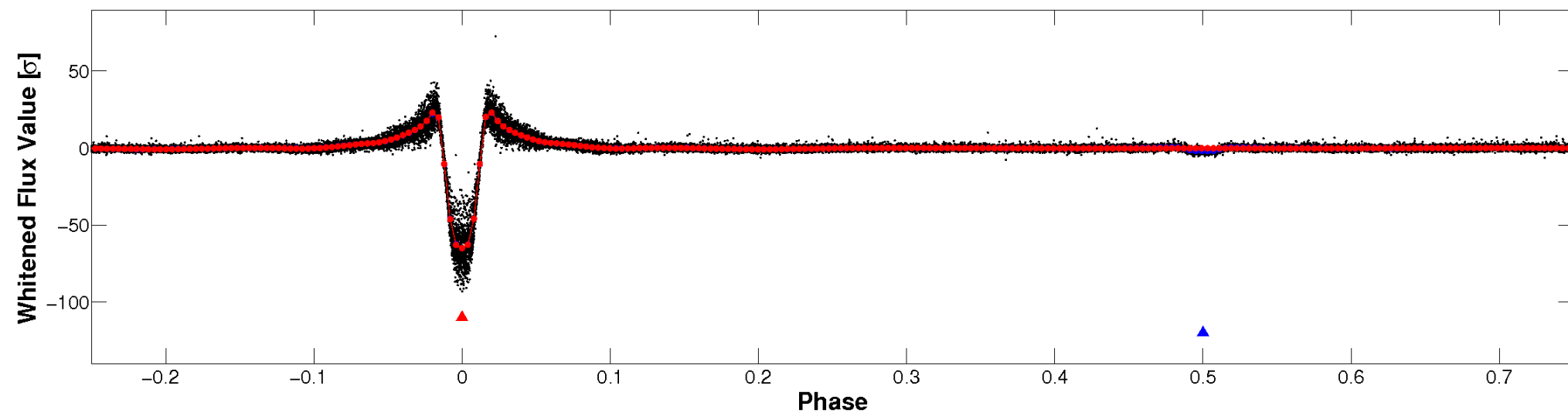


Non-Whitened Vs. Whitened Light Curve

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

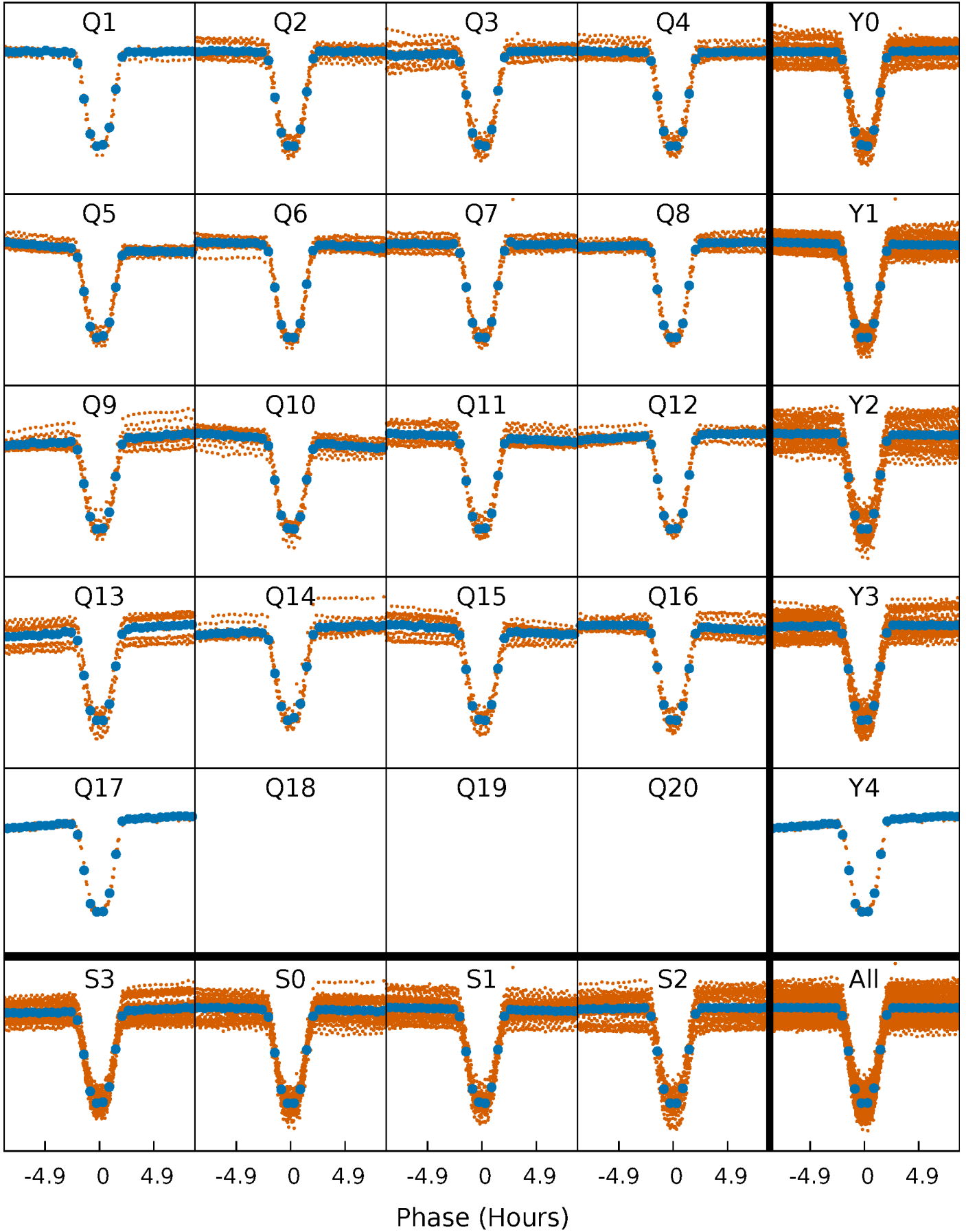


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



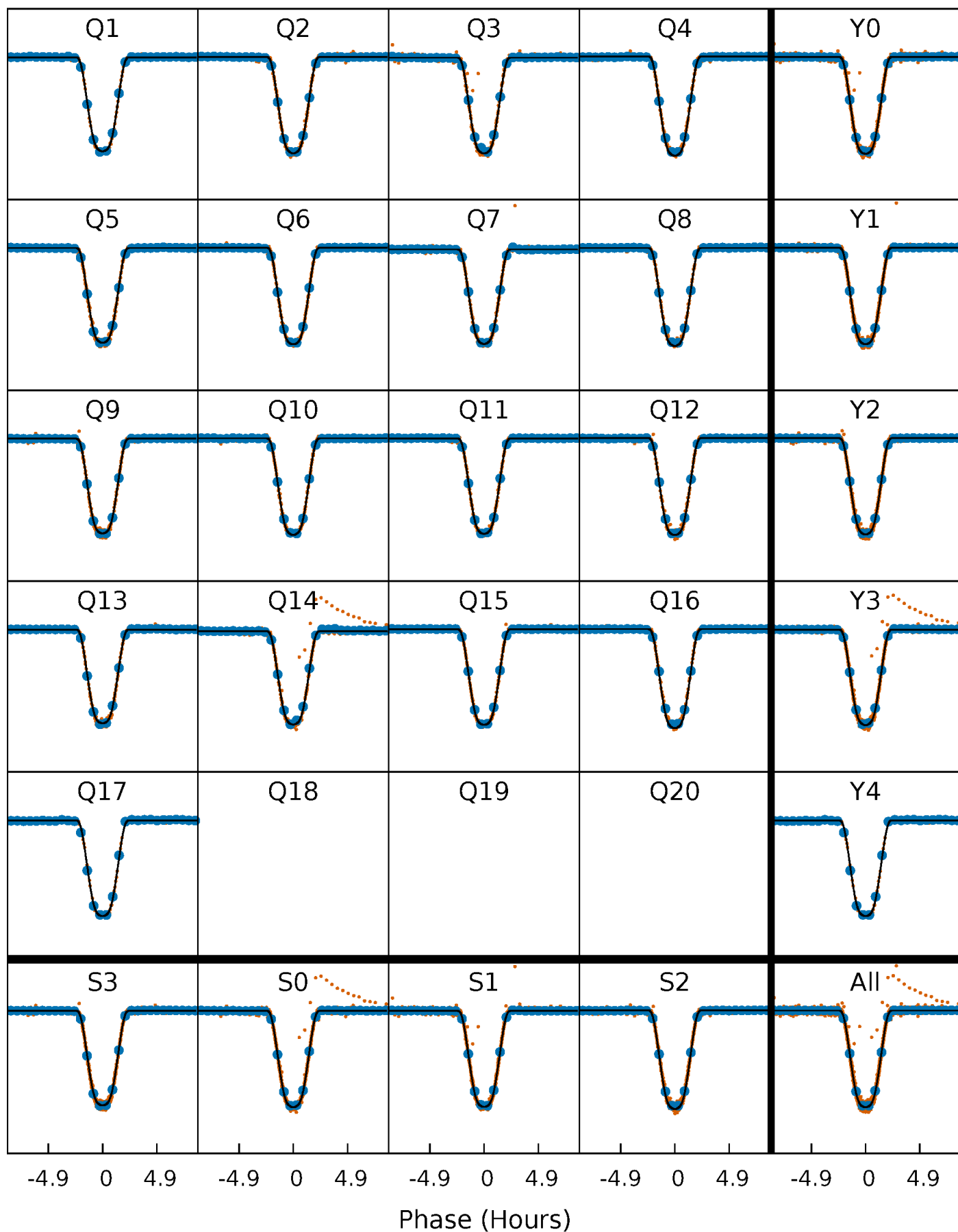
PDC Quarter-Phased Transit Curves

TCE 009451127-01 P= 5.117400 Days $T_0=134.586767$ (BKJD)



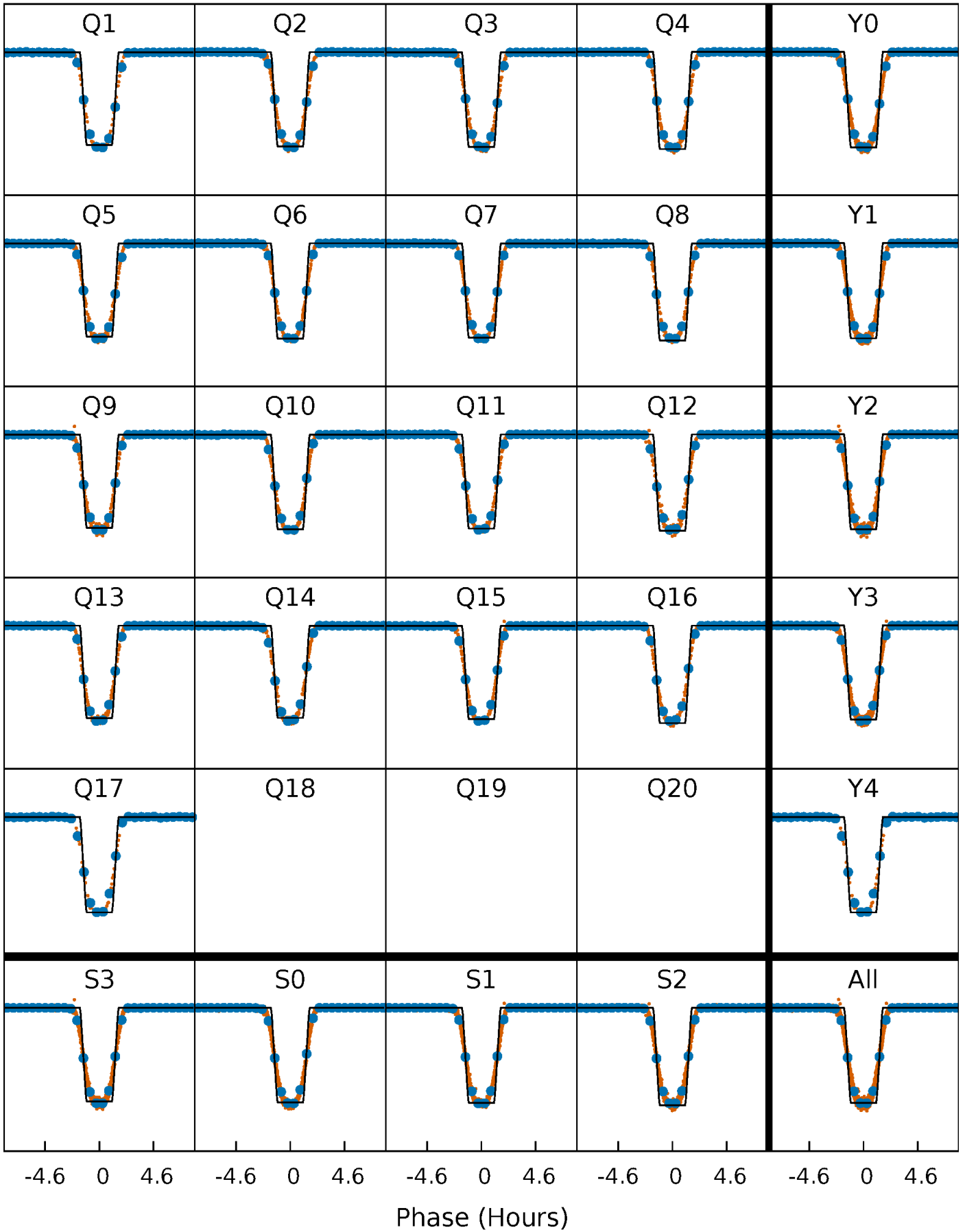
DV Quarter-Phased Transit Curves

TCE 009451127-01 P= 5.117400 Days $T_0=134.586767$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

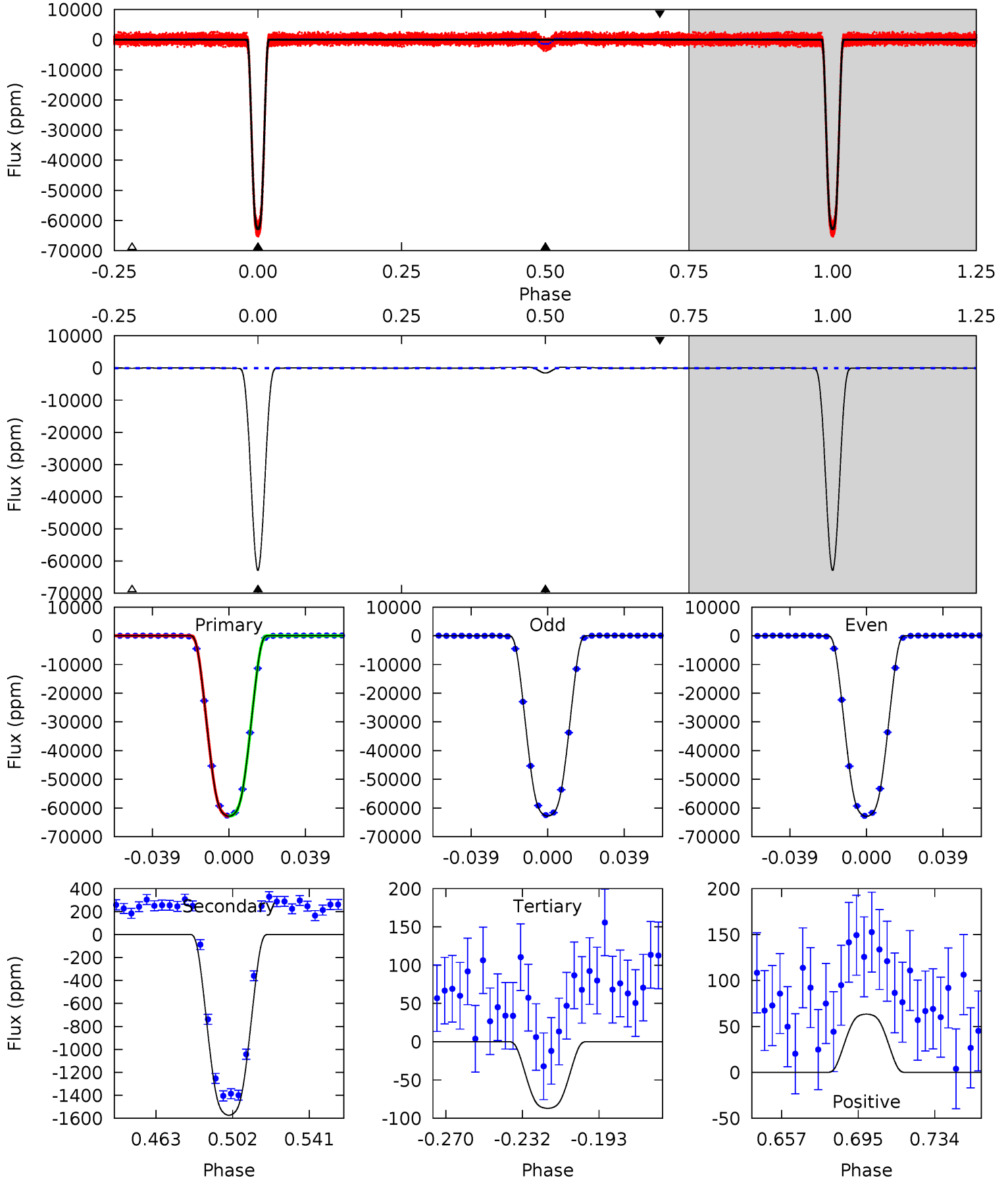
TCE 009451127-01 P= 5.117416 Days $T_0=134.584404$ (BKJD)



DV Model-Shift Uniqueness Test

009451127-01, P = 5.117400 Days, E = 129.469367 Days

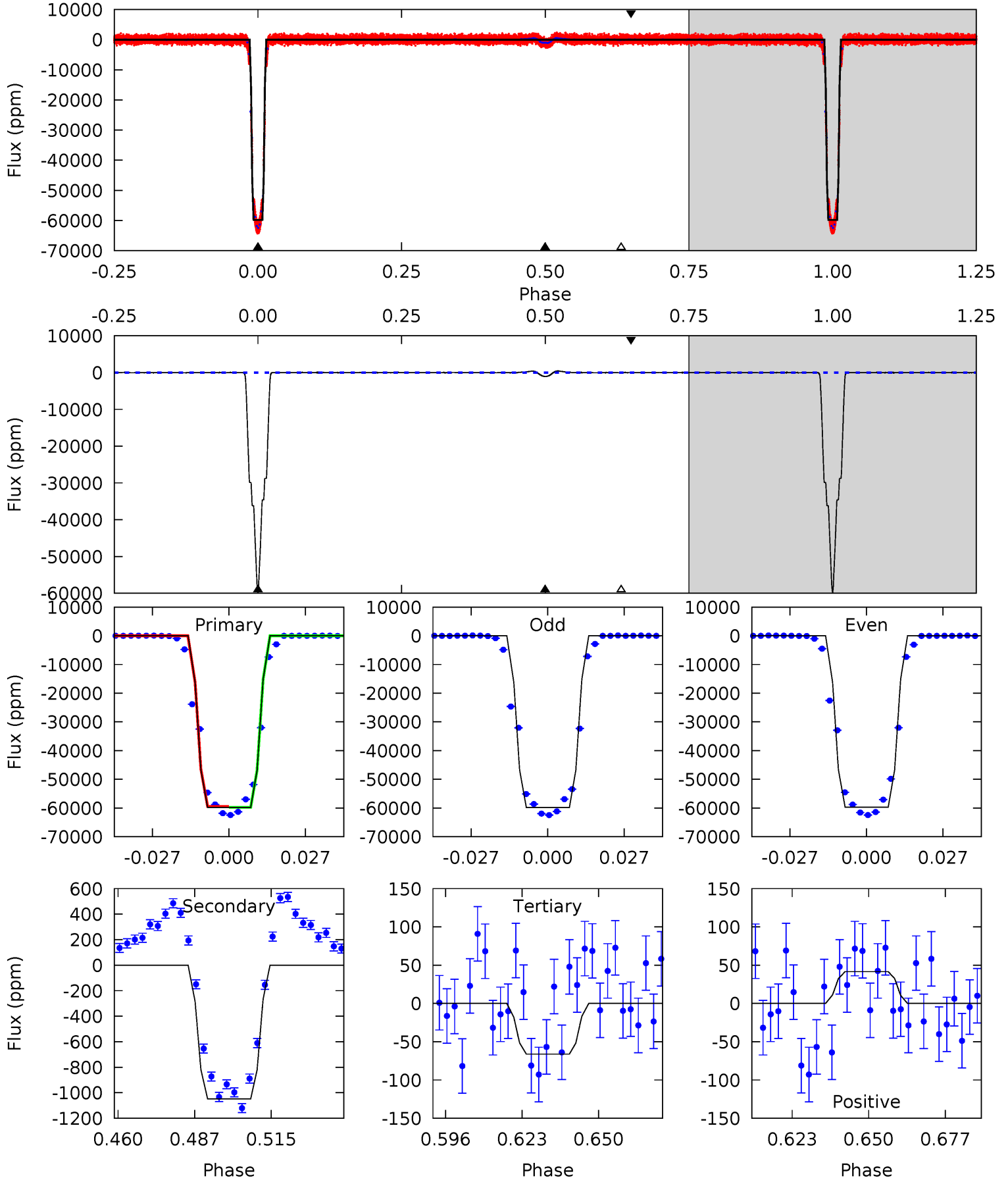
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|-------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 4994 | 125.0 | 6.91 | 5.03 | 4.76 | 2.07 | 5.30 | 4987 | 4989 | 118.1 | 120.0 | 4.15 | 0.99 | 0.00 | 0.83 |



Alt Model-Shift Uniqueness Test

009451127-01, P = 5.117416 Days, E = 129.466988 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 3605 | 63.2 | 3.98 | 2.51 | 4.83 | 2.21 | 2.64 | 3601 | 3603 | 59.2 | 60.7 | 2.68 | 1.00 | 0.01 | 8.87 |



Stellar Parameters For KIC 009451127

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 6161^{+171}_{-236} | $4.454^{+0.054}_{-0.216}$ | $0.070^{+0.200}_{-0.350}$ | $1.053^{+0.341}_{-0.114}$ | $1.150^{+0.135}_{-0.181}$ | $1.388^{+0.393}_{-0.766}$ |
| | +3%/-4% | +1%/-5% | +286%/-500% | +32%/-11% | +12%/-16% | +28%/-55% |
| 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 009451127-01 / KOI 1381.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|----------------|-------------------------|---------------------|--------------------|---------------------------|
| DV | -1573 ± 13 | $28.74^{+5.36}_{-2.08}$ | 1609^{+119}_{-82} | 3061^{+49}_{-66} | $3.703^{+0.597}_{-0.965}$ |
| Alt. | -1048 ± 17 | $29.38^{+4.93}_{-2.35}$ | 1614^{+122}_{-87} | 2863^{+47}_{-60} | $2.414^{+0.377}_{-0.565}$ |

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 $A_{obs} \gg 1.0$

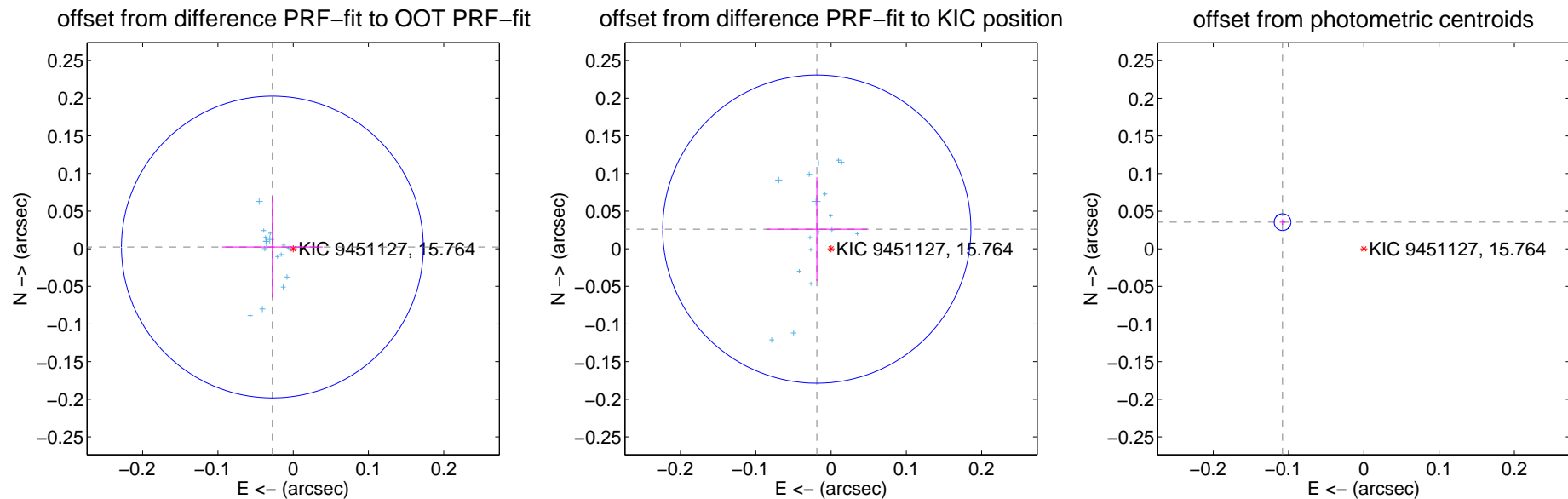
DV Centroid Data

Supplemental centroid analysis for 009451127-01. Kepler magnitude: 15.76. Transit SNR 2070.82

There are 17 quarters with good PRF difference image offsets

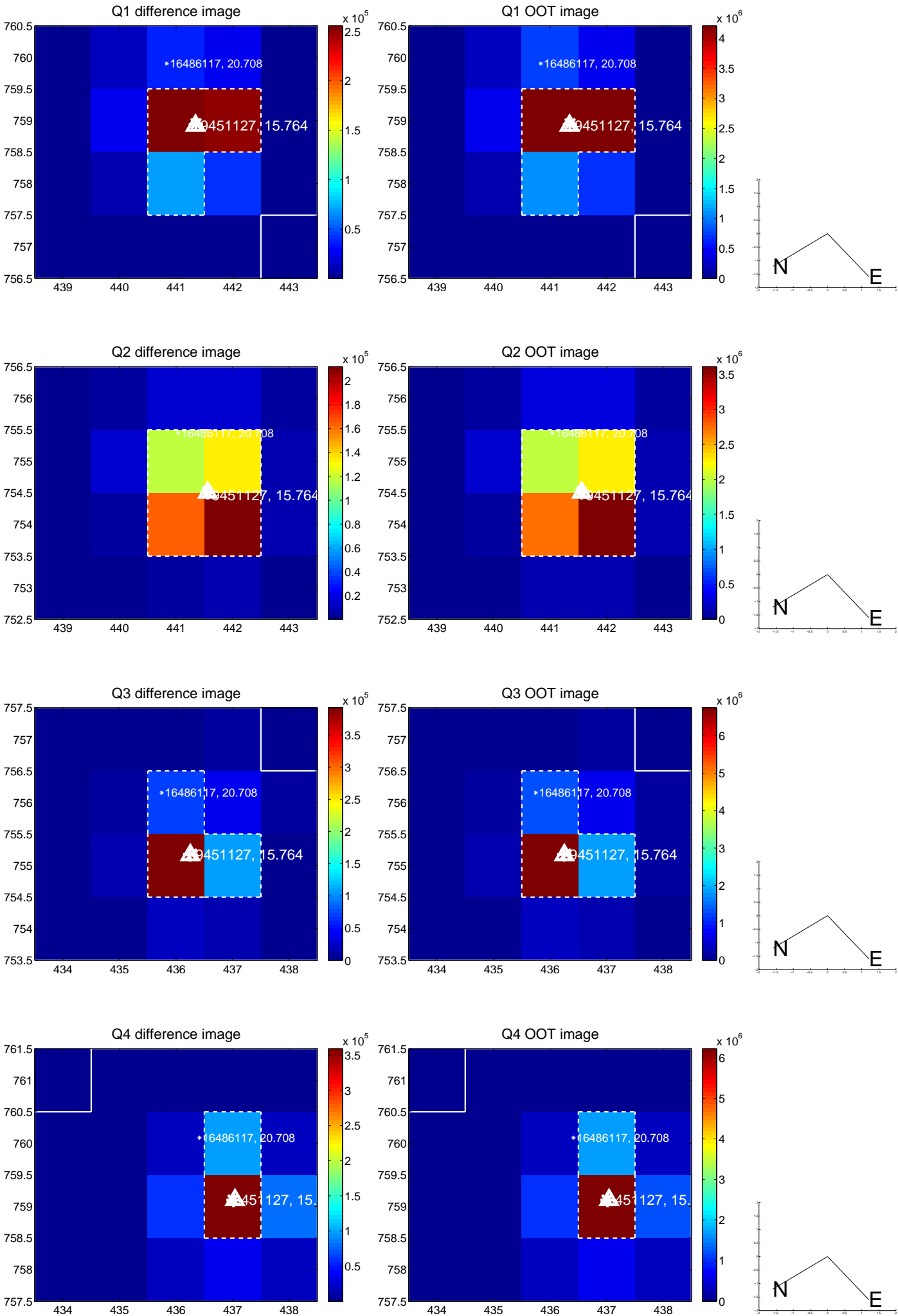
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 0.028 ± 0.067 | 0.41 | 0.028 ± 0.067 | 0.002 ± 0.067 |
| PRF-fit source offset from KIC position | 0.032 ± 0.068 | 0.47 | 0.019 ± 0.067 | 0.026 ± 0.069 |
| photometric centroid source offset | 0.11 ± 0.00 | 30.69 | 0.11 ± 0.00 | 0.04 ± 0.00 |

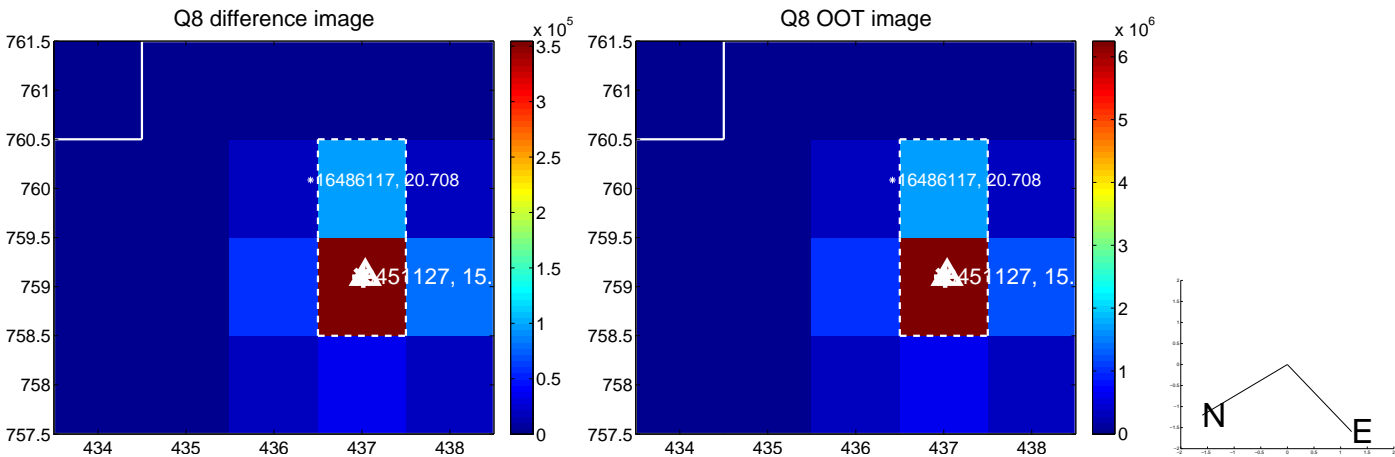
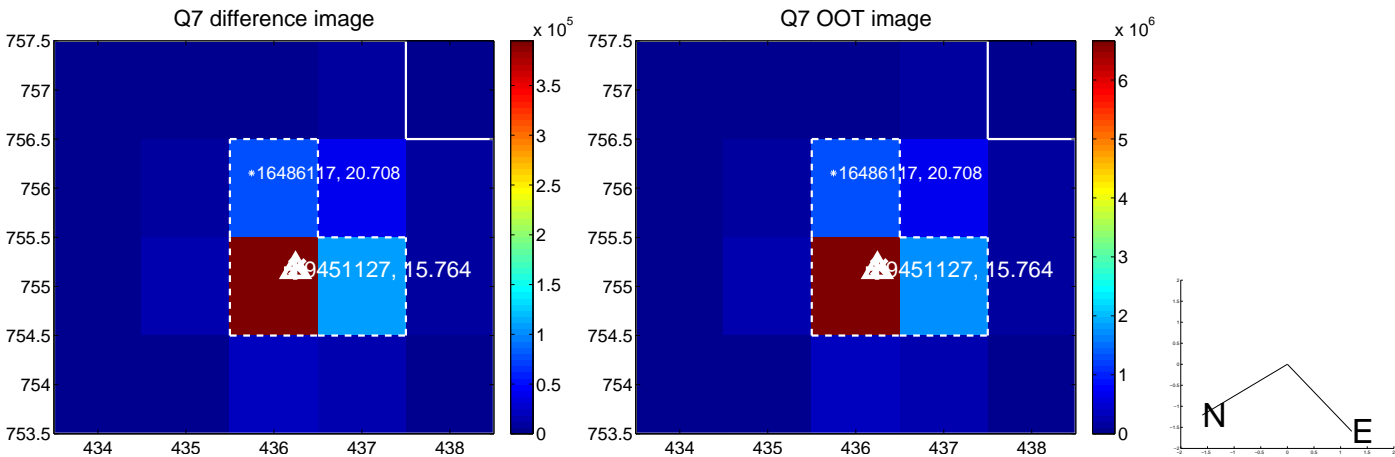
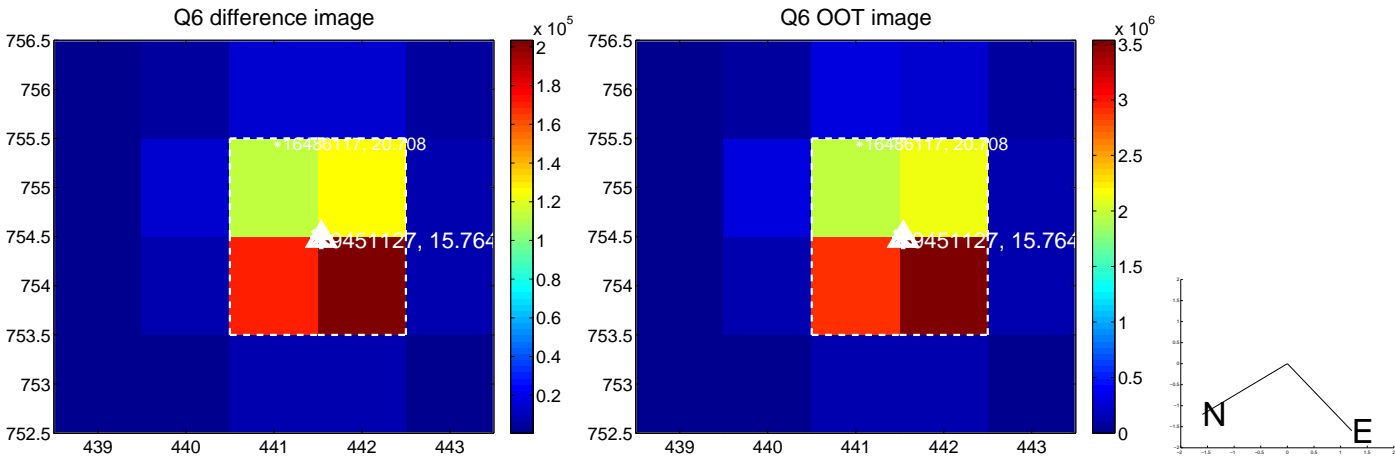
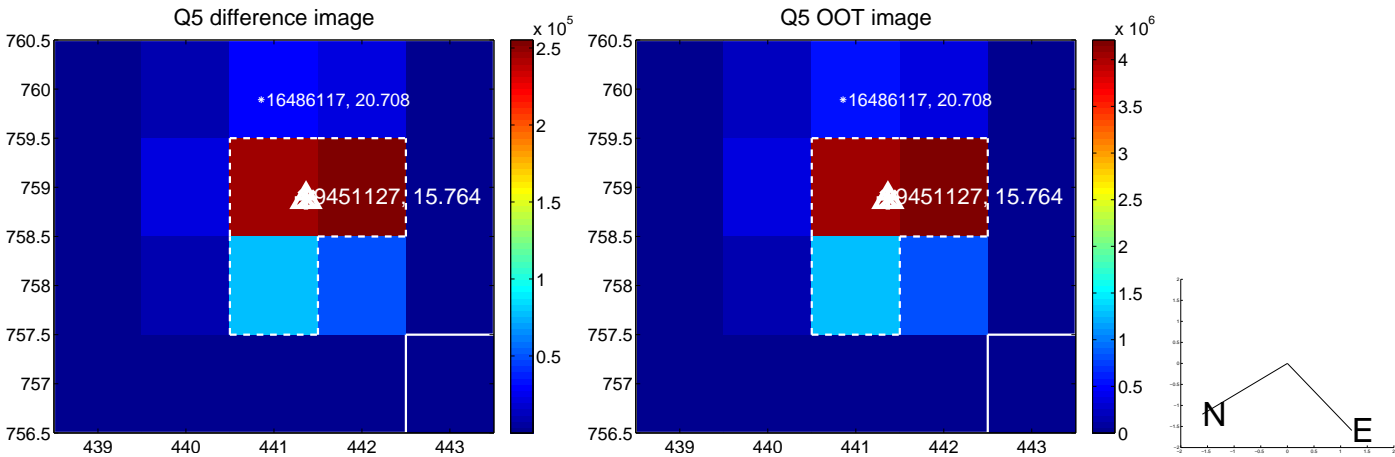


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

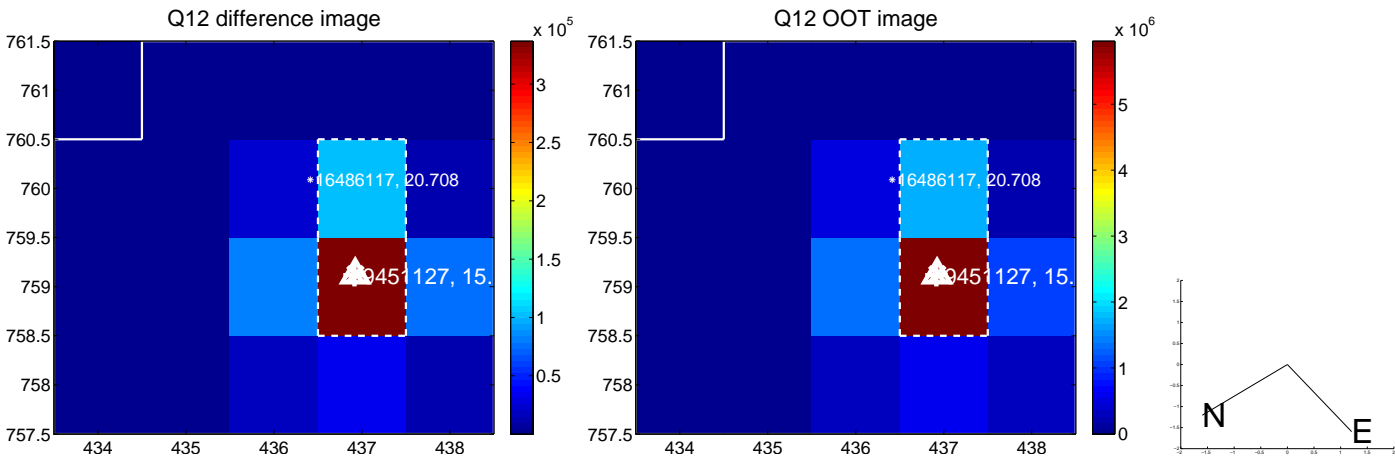
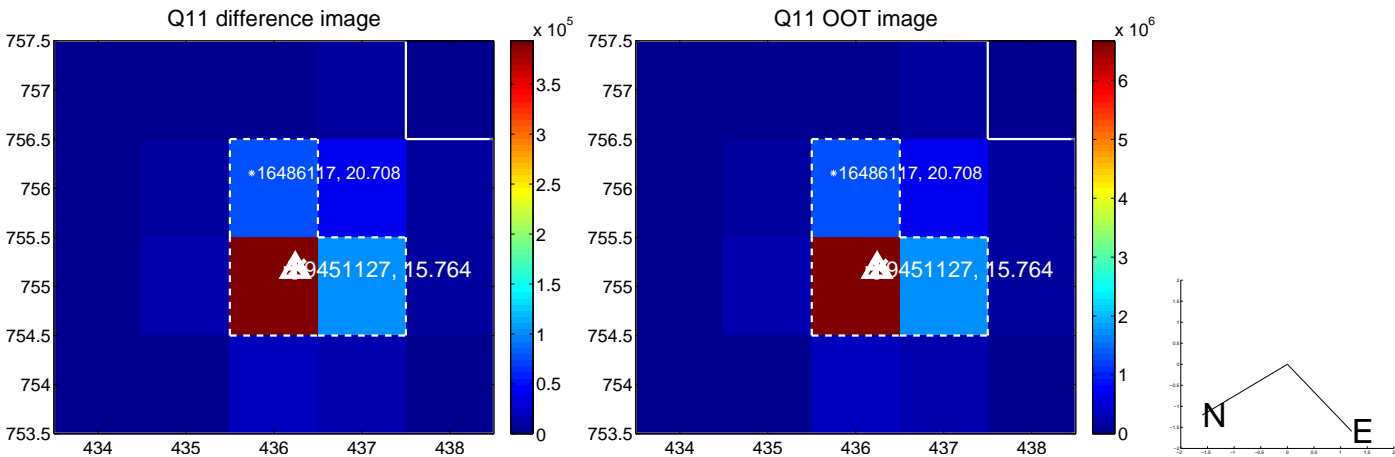
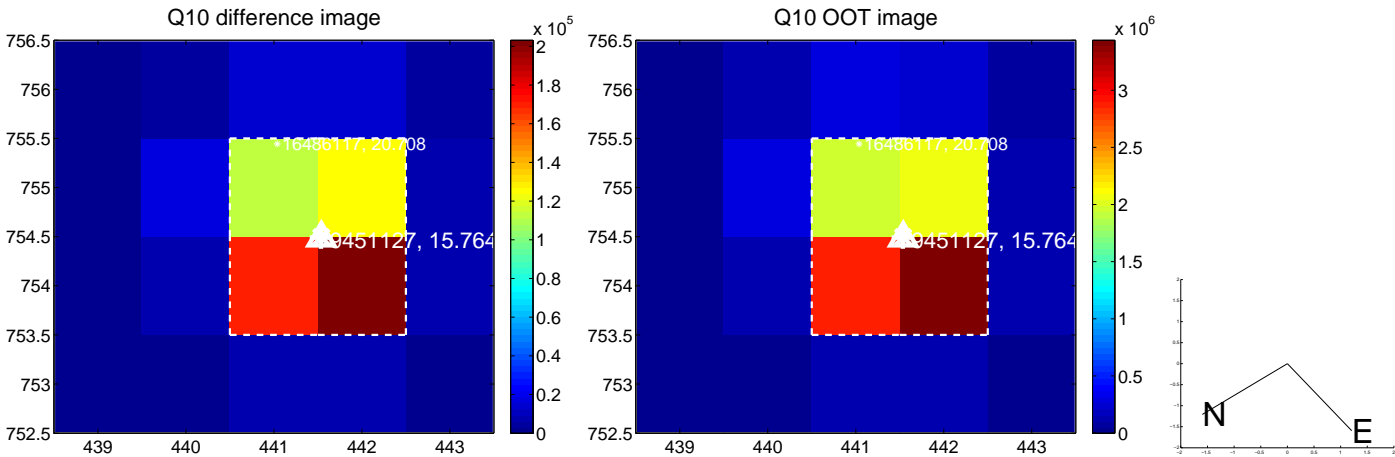
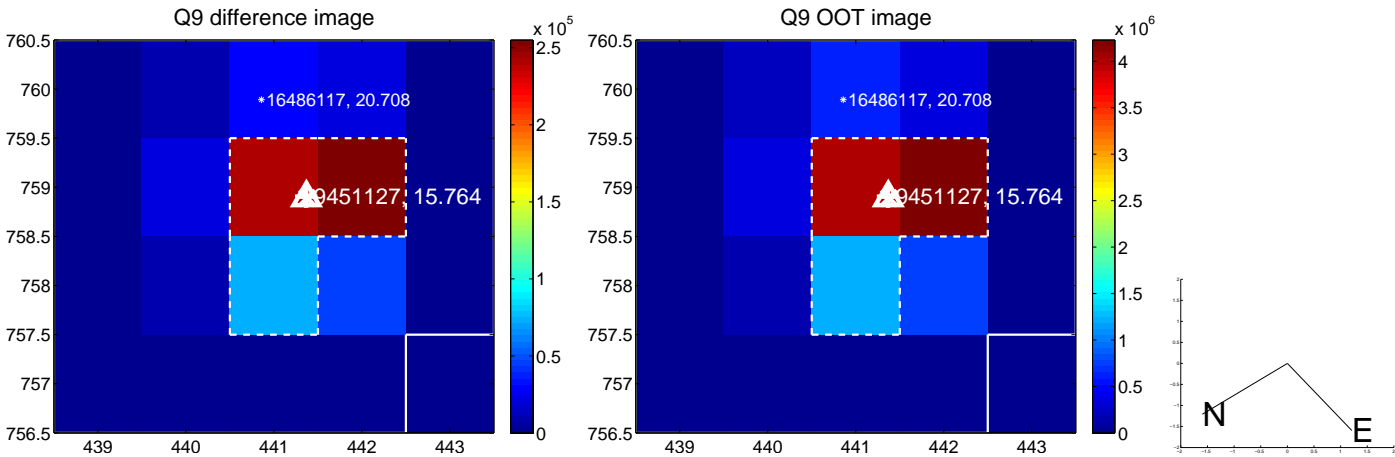
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



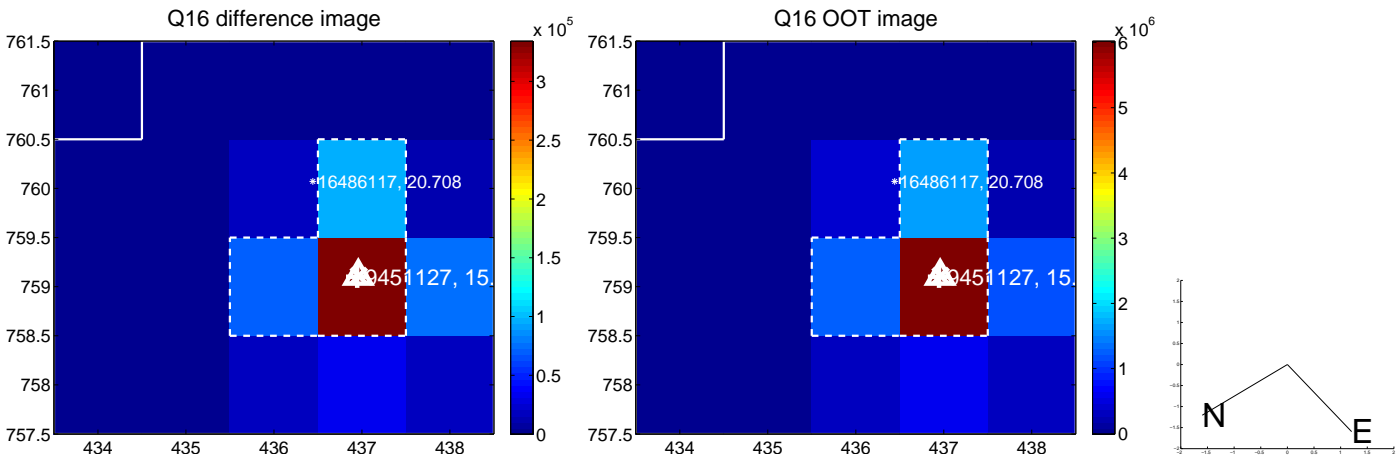
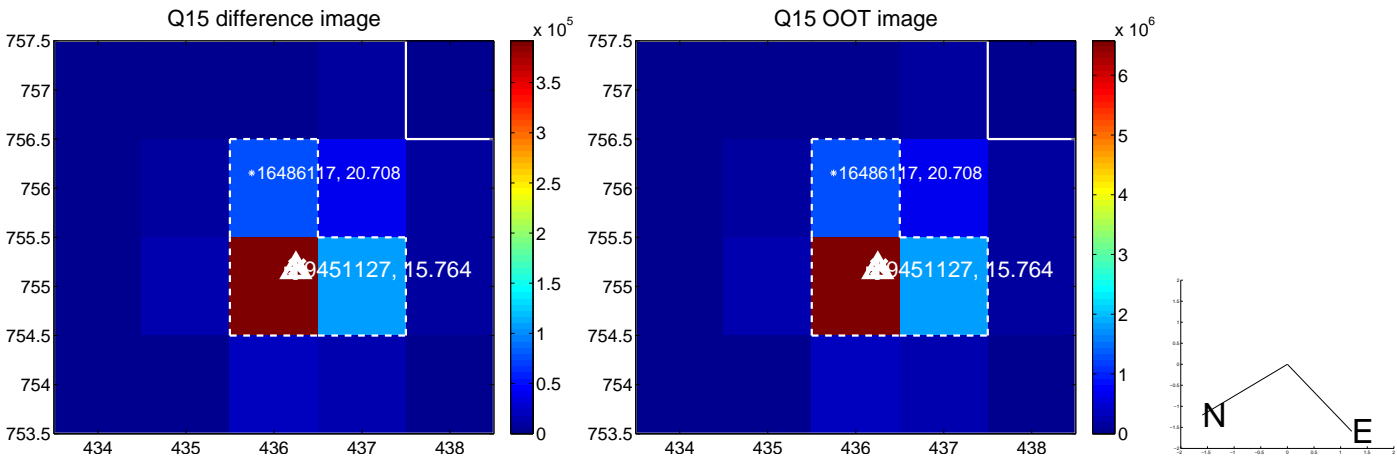
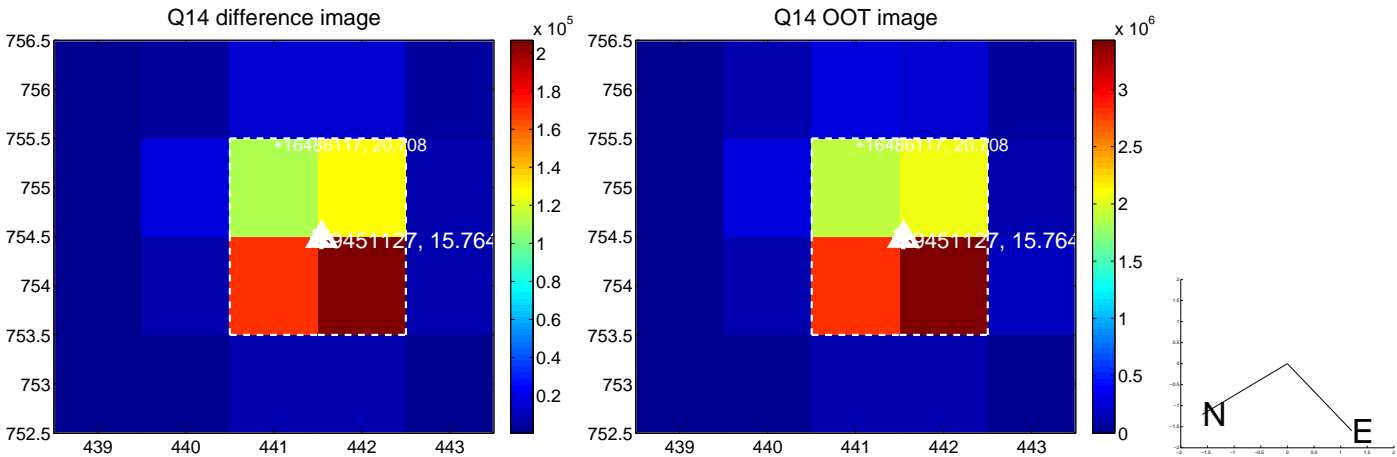
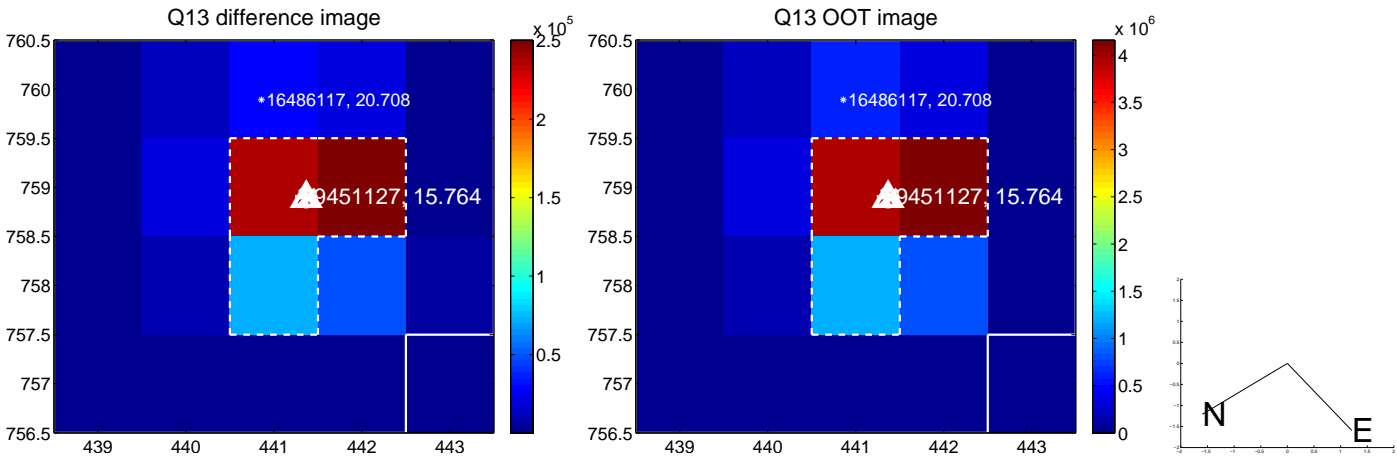
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



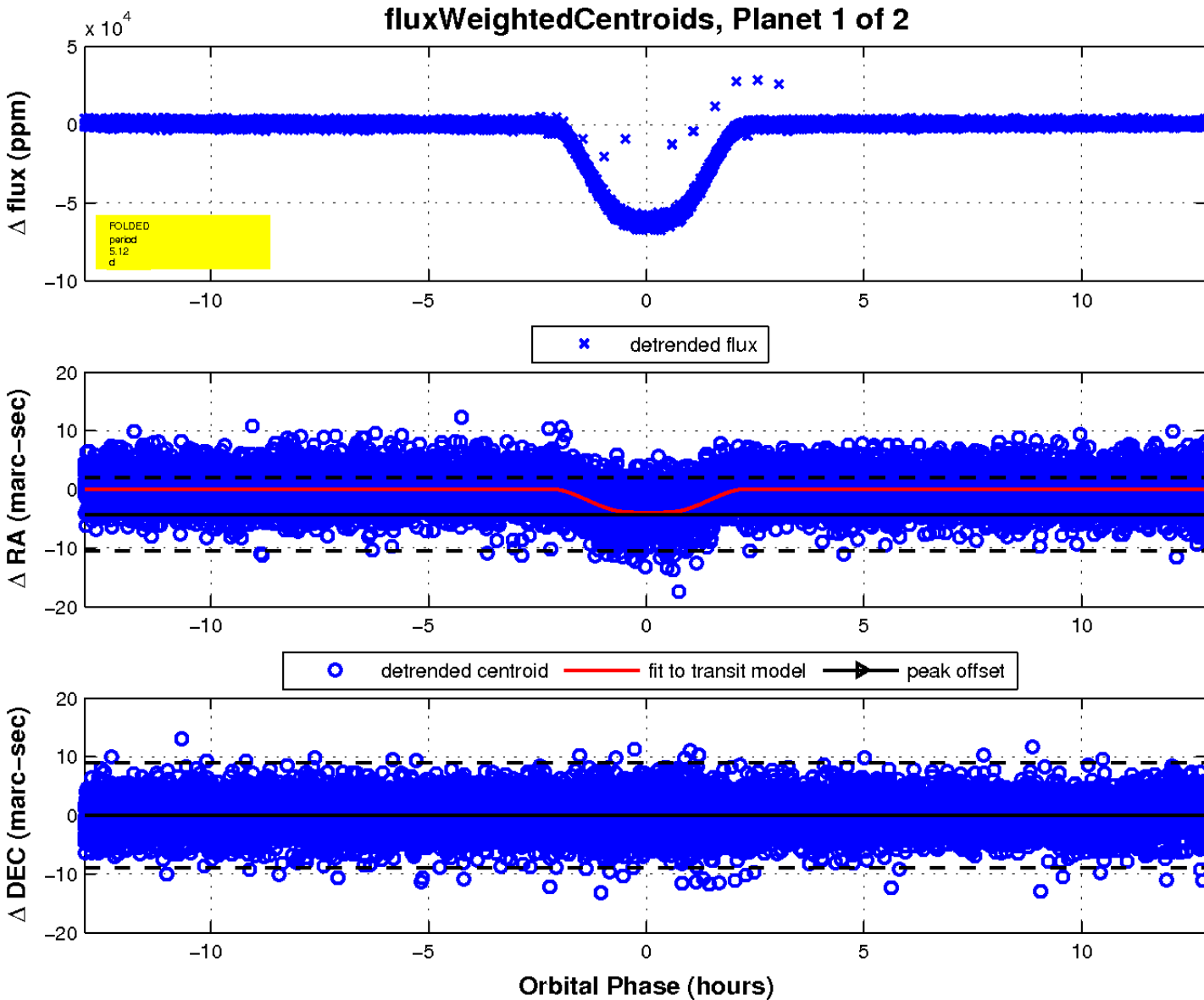
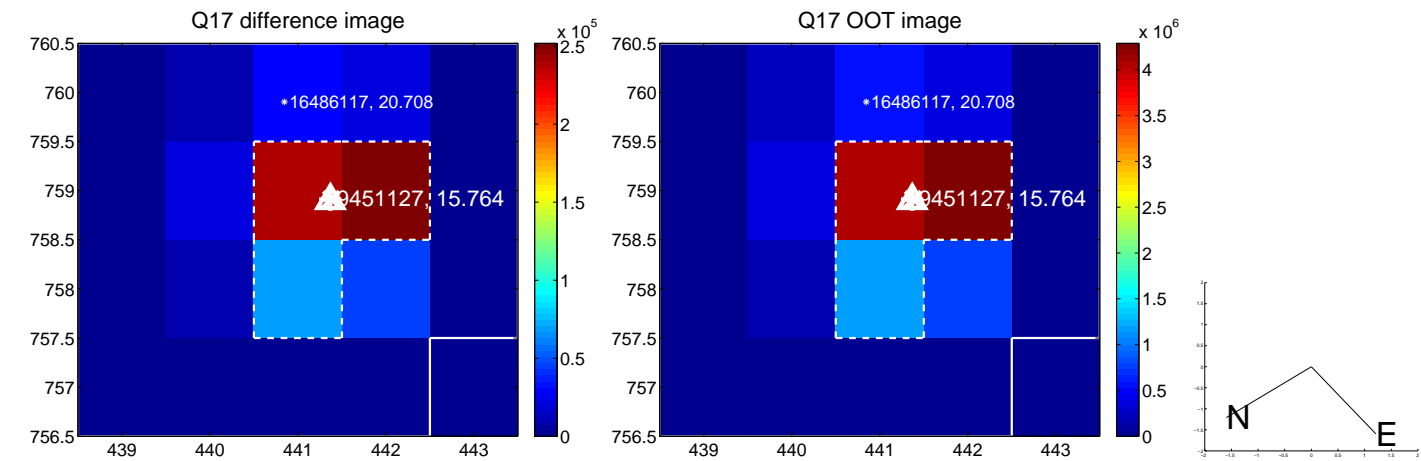
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

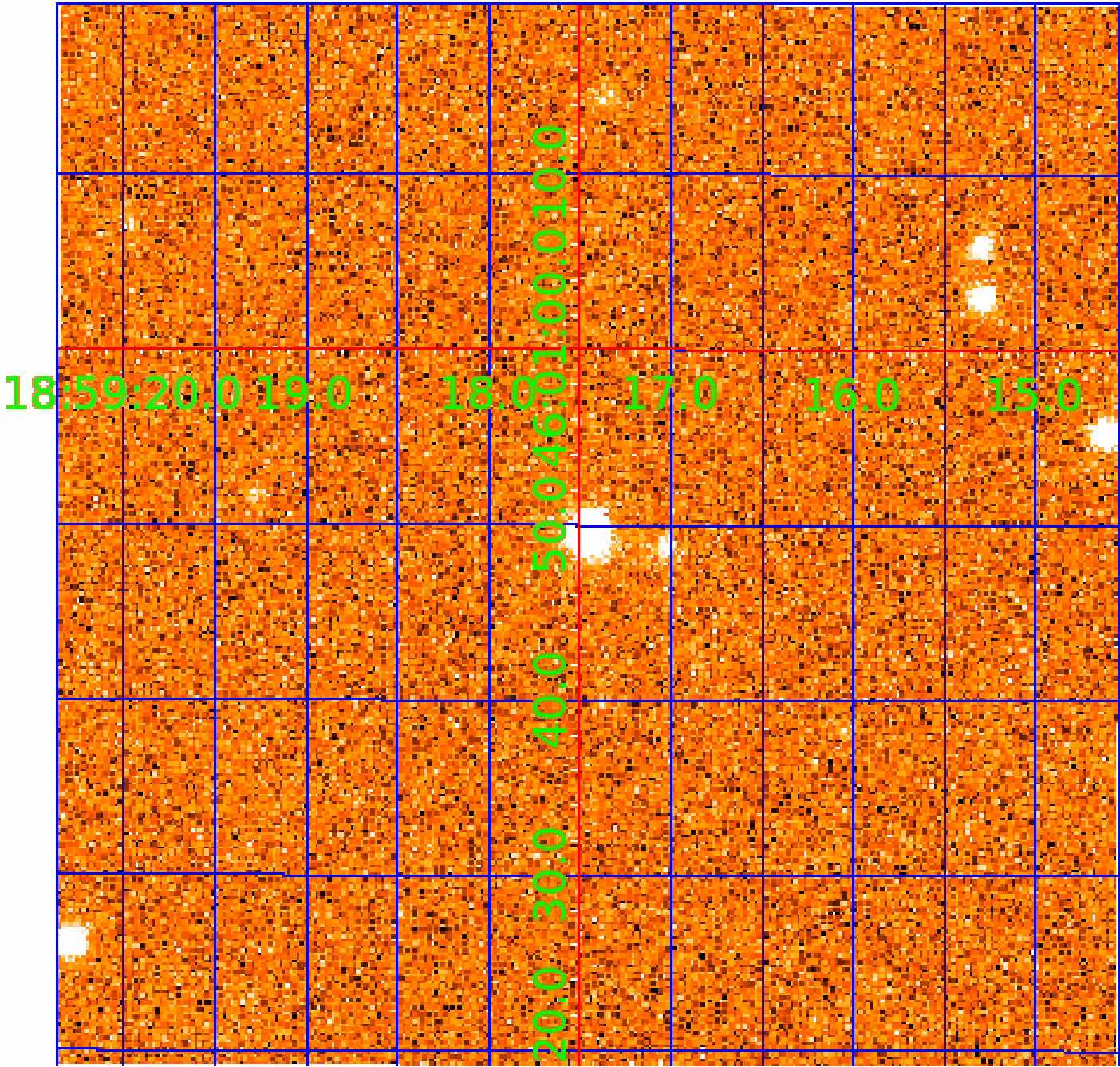


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009451127

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|--------|--------|-----------------------------|-----------------|------------------------|------------------------|
| 009451127-01 | OBS | 1381.01 | 5.117400 | 134.586767 | 62840.1 | 4.300 | 2408.6 | 2070.8 | 1.05 | 6161 | 28.43 | 385.82 |
| 009451127-02 | OBS | No | 5.117402 | 132.028242 | 1796.5 | 4.192 | 67.5 | 73.5 | 1.05 | 6161 | 5.53 | 385.82 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------|
| 009451127-01 | OBS | FP | 0.01 | 0 | 1 | 0 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE |
| 009451127-02 | 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.

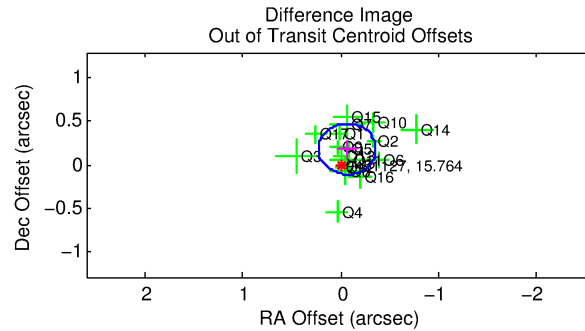
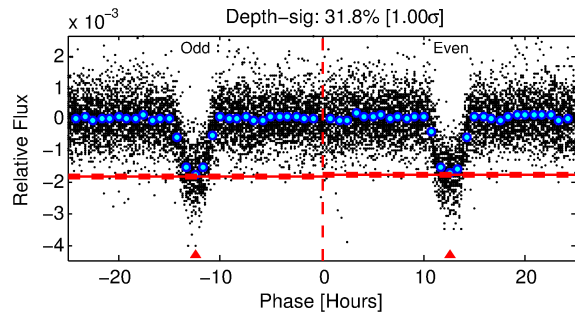
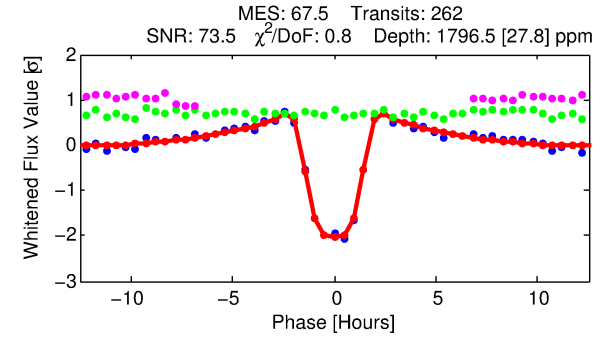
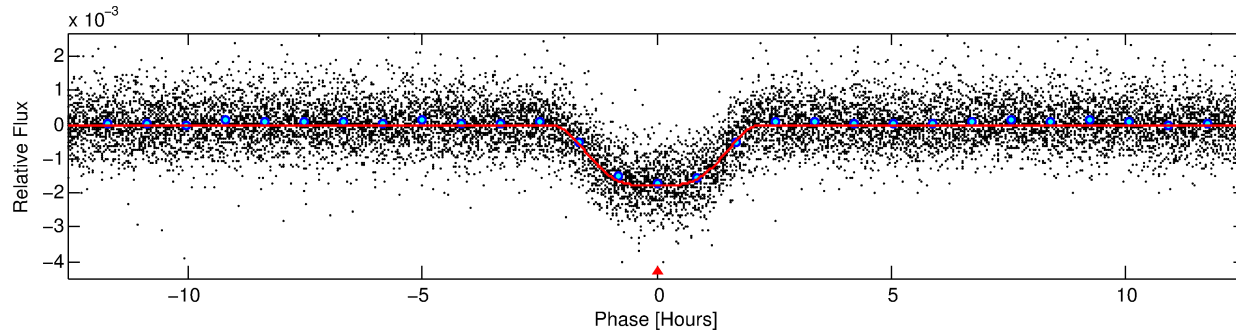
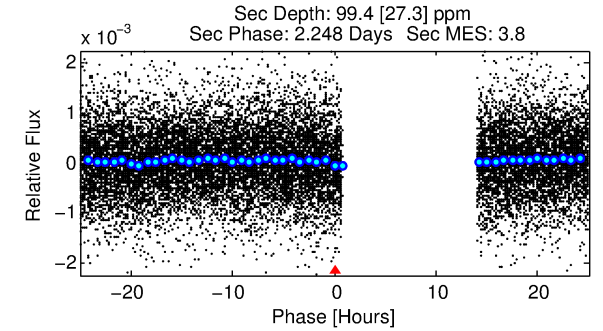
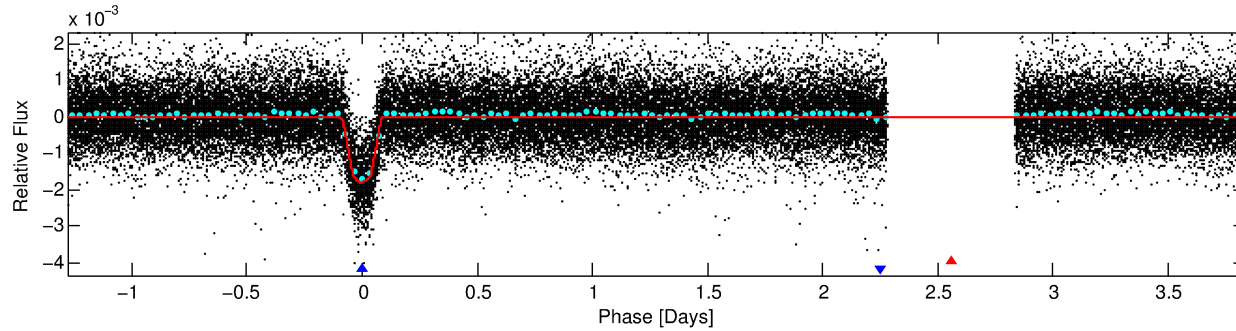
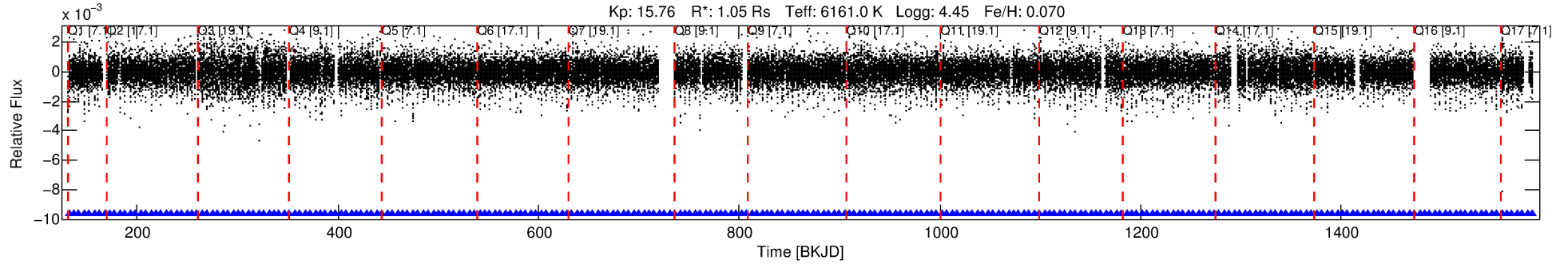
Ephemeris Match Information For 009451127-02

No Significant Match Found

DV One-Page Summary

KIC: 9451127 Candidate: 2 of 2 Period: 5.117 d

KOI: K01381 Corr: No Ephemeris Match



DV Fit Results:

Period = 5.11740 [0.00001] d
Epoch = 132.0282 [0.0009] BKJD
Rp/R* = 0.0481 [0.0005]
a/R* = 4.45 [0.10]
b = 0.94 [0.00]
Seff = 385.82 [163.70]
Teff = 1130 [120] K
Rp = 5.53 [1.79] Re
a = 0.0609 [0.0166] AU
Ag = 6.63 [3.20] [1.76σ]
Teffp = 2804 [221] K [6.65σ]

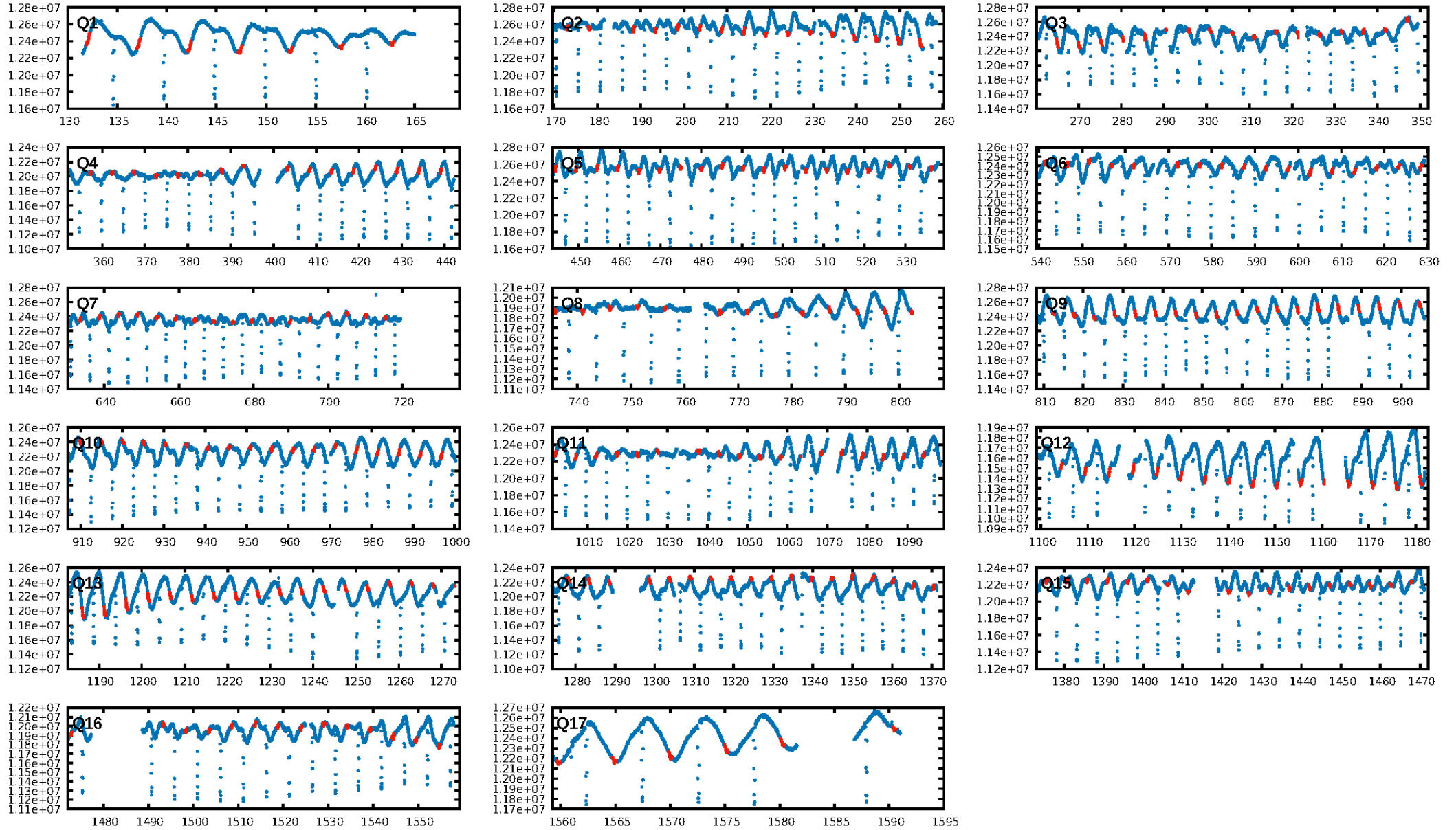
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [249/249]
GhostDiagnostic-chr: 2.833
Centroid-sig: 0.2%
Centroid-so: 0.267 arcsec [2.13σ]
OotOffset-rm: 0.192 arcsec [1.96σ]
KicOffset-rm: 0.218 arcsec [2.15σ]
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]

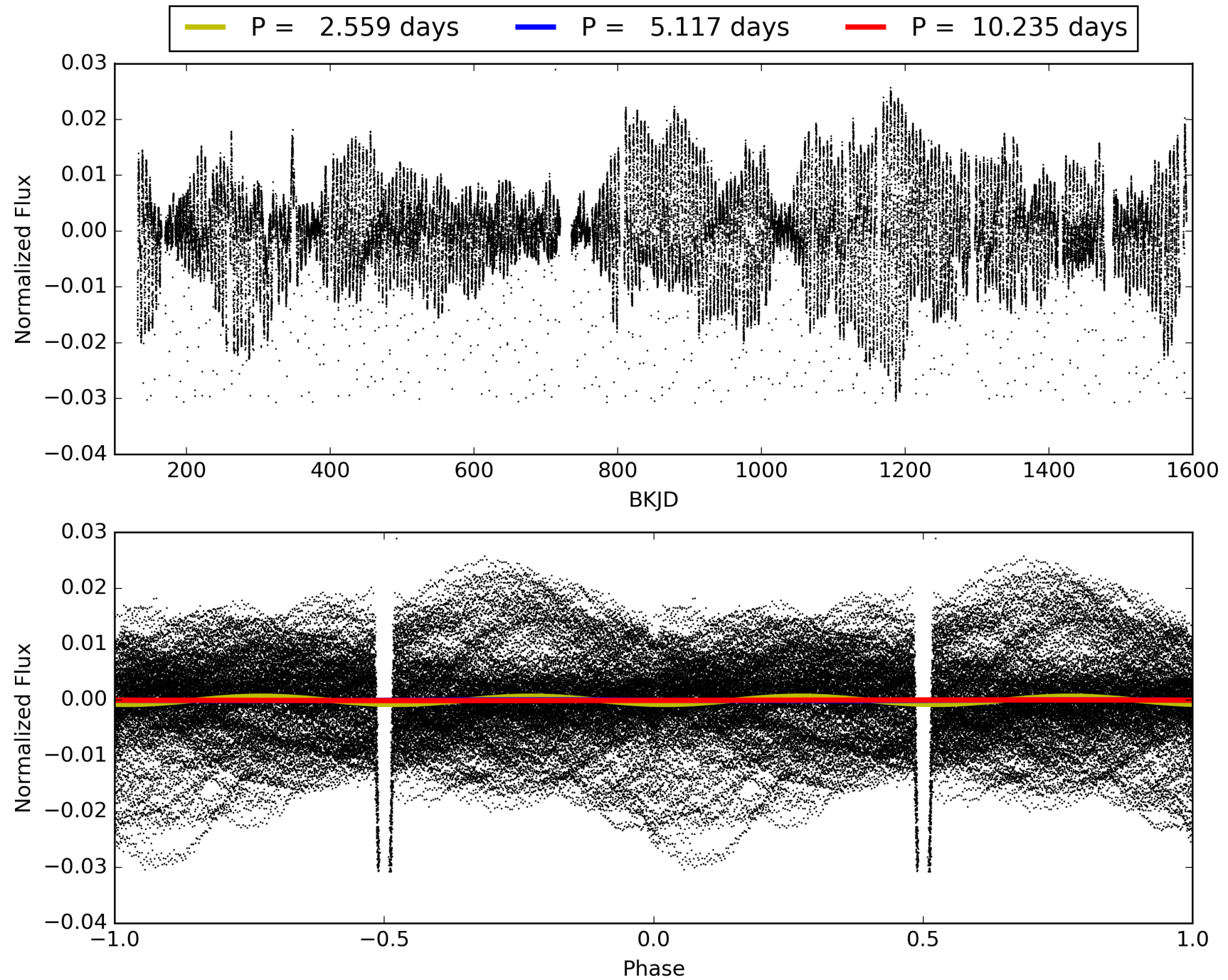
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

TCE 009451127-02, PDC Light Curves

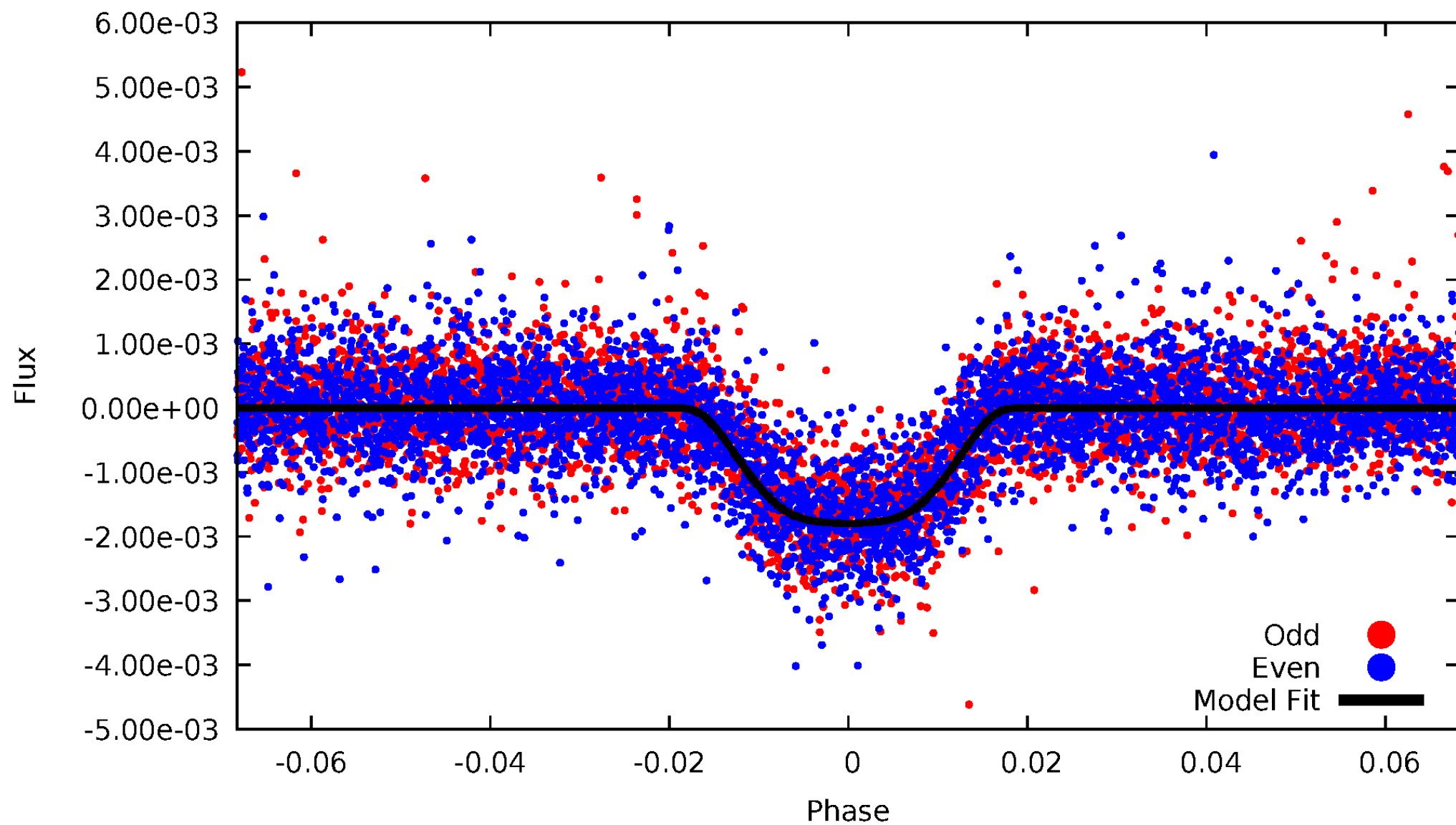


TCE 009451127-02



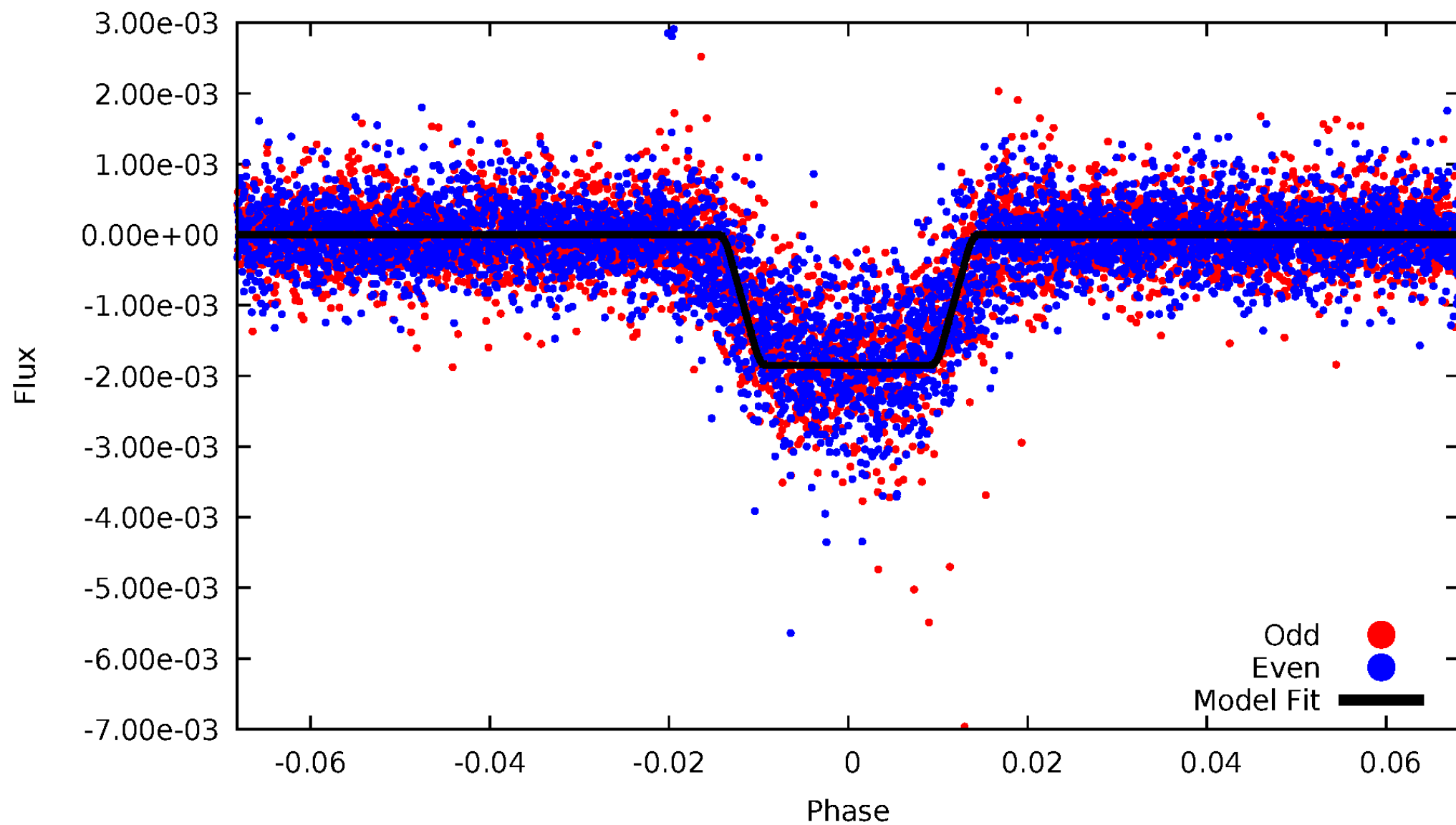
DV Odd/Even

TCE 009451127-02



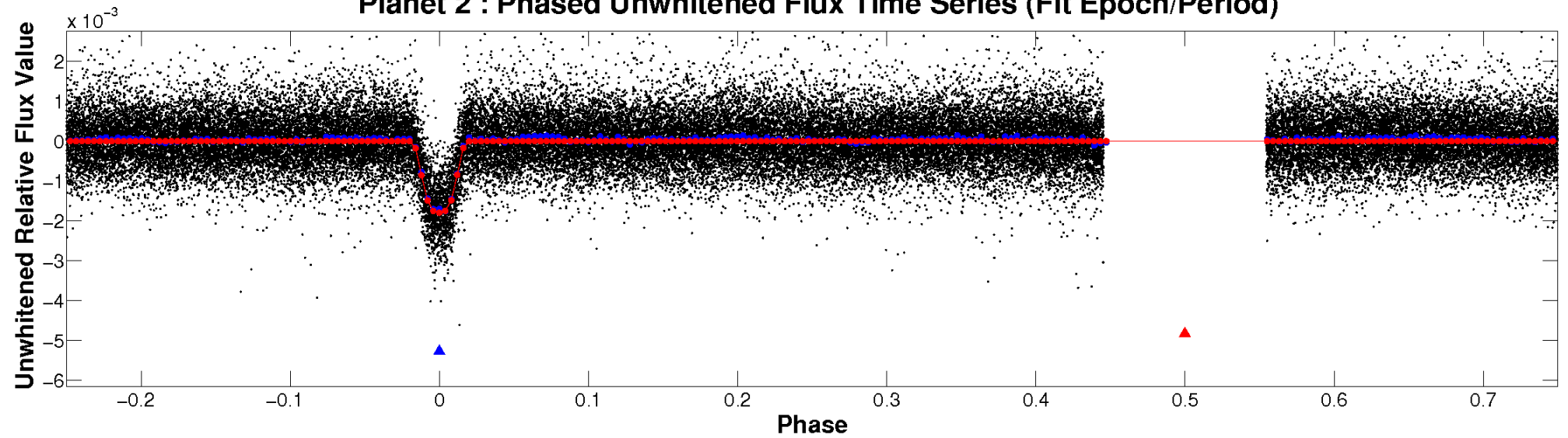
ALT Odd/Even

TCE 009451127-02

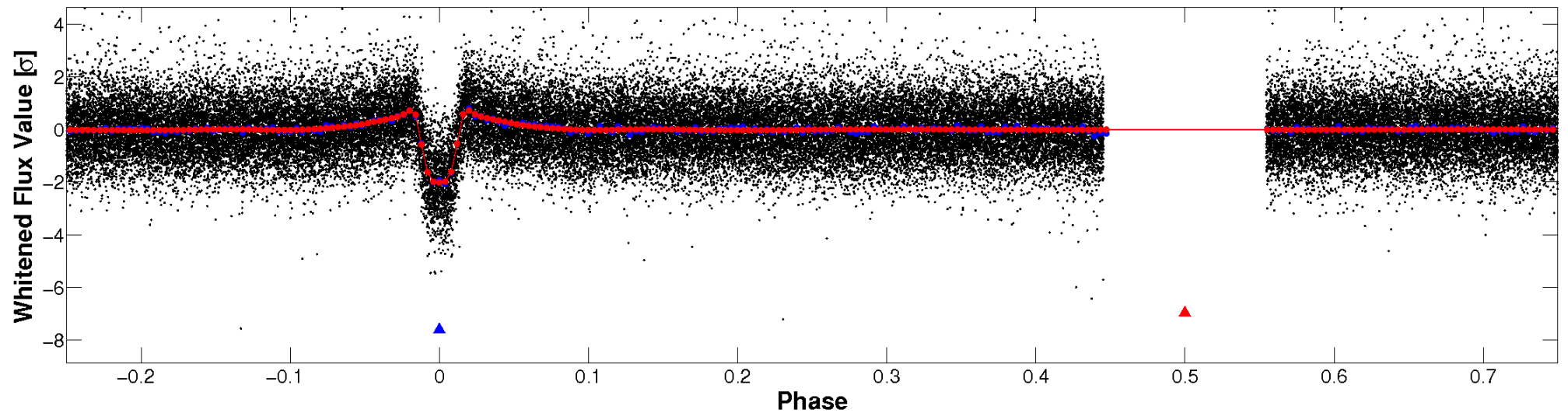


Non-Whitened Vs. Whitened Light Curve

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

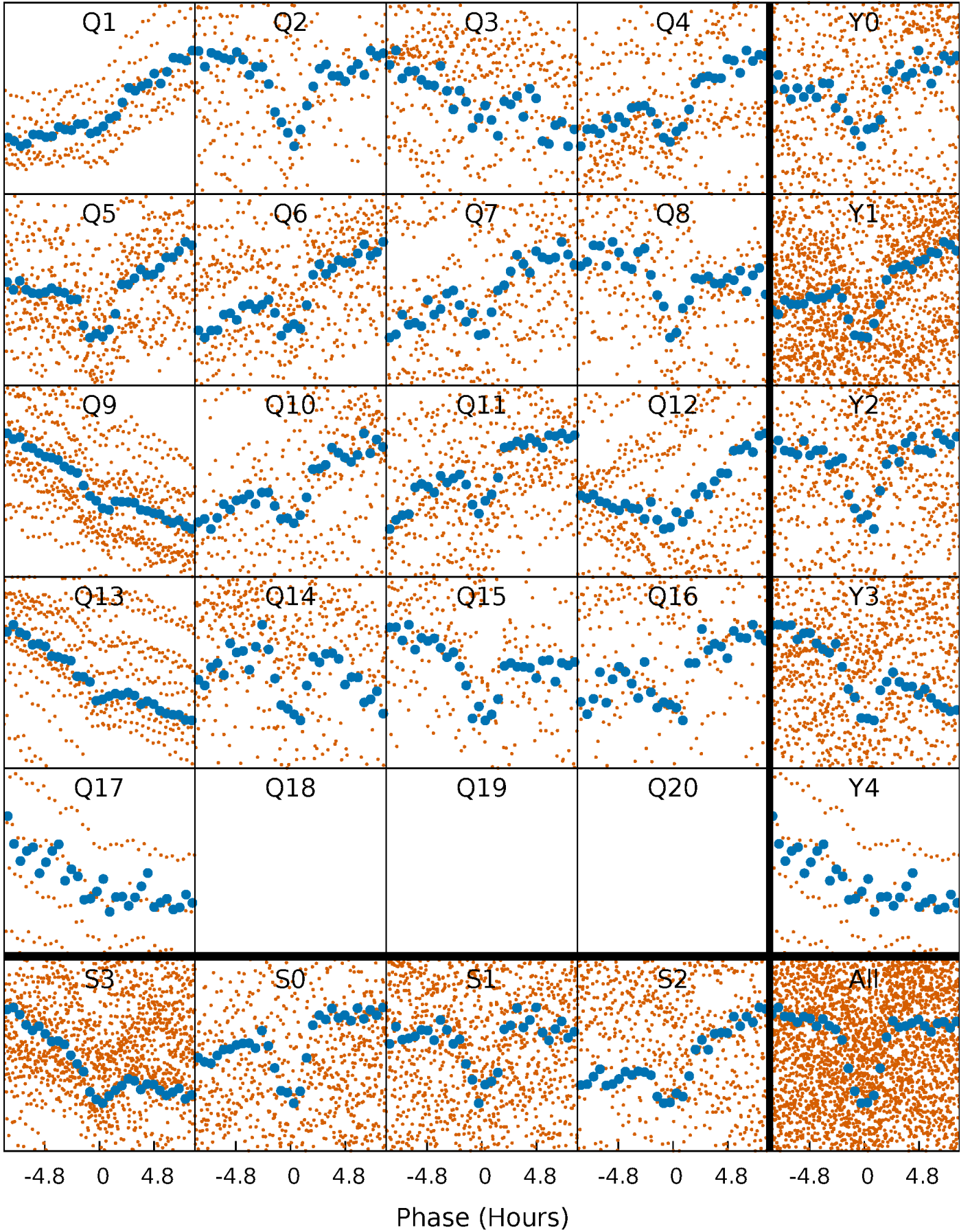


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



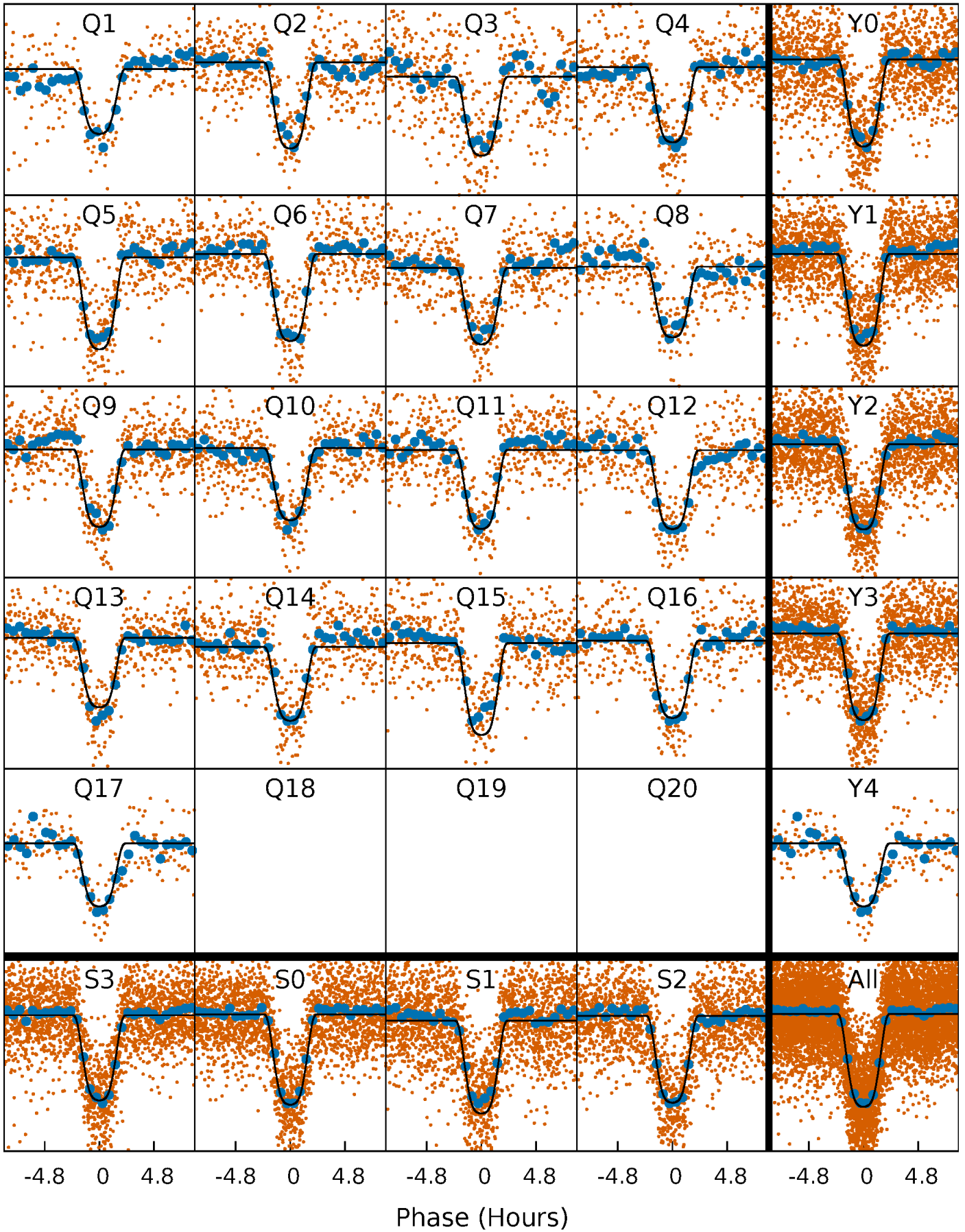
PDC Quarter-Phased Transit Curves

TCE 009451127-02 P= 5.117402 Days $T_0=132.028242$ (BKJD)



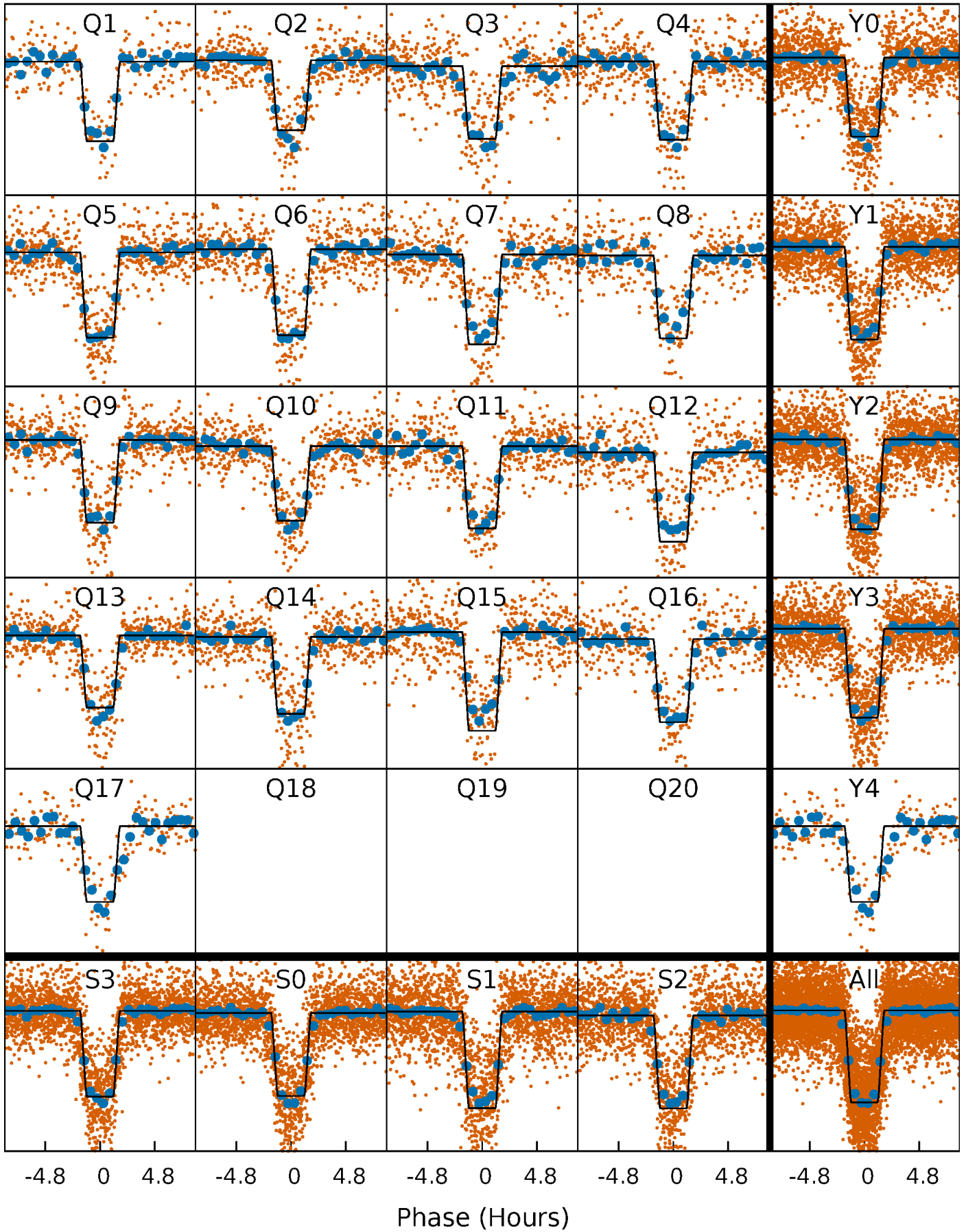
DV Quarter-Phased Transit Curves

TCE 009451127-02 P= 5.117402 Days $T_0=132.028242$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

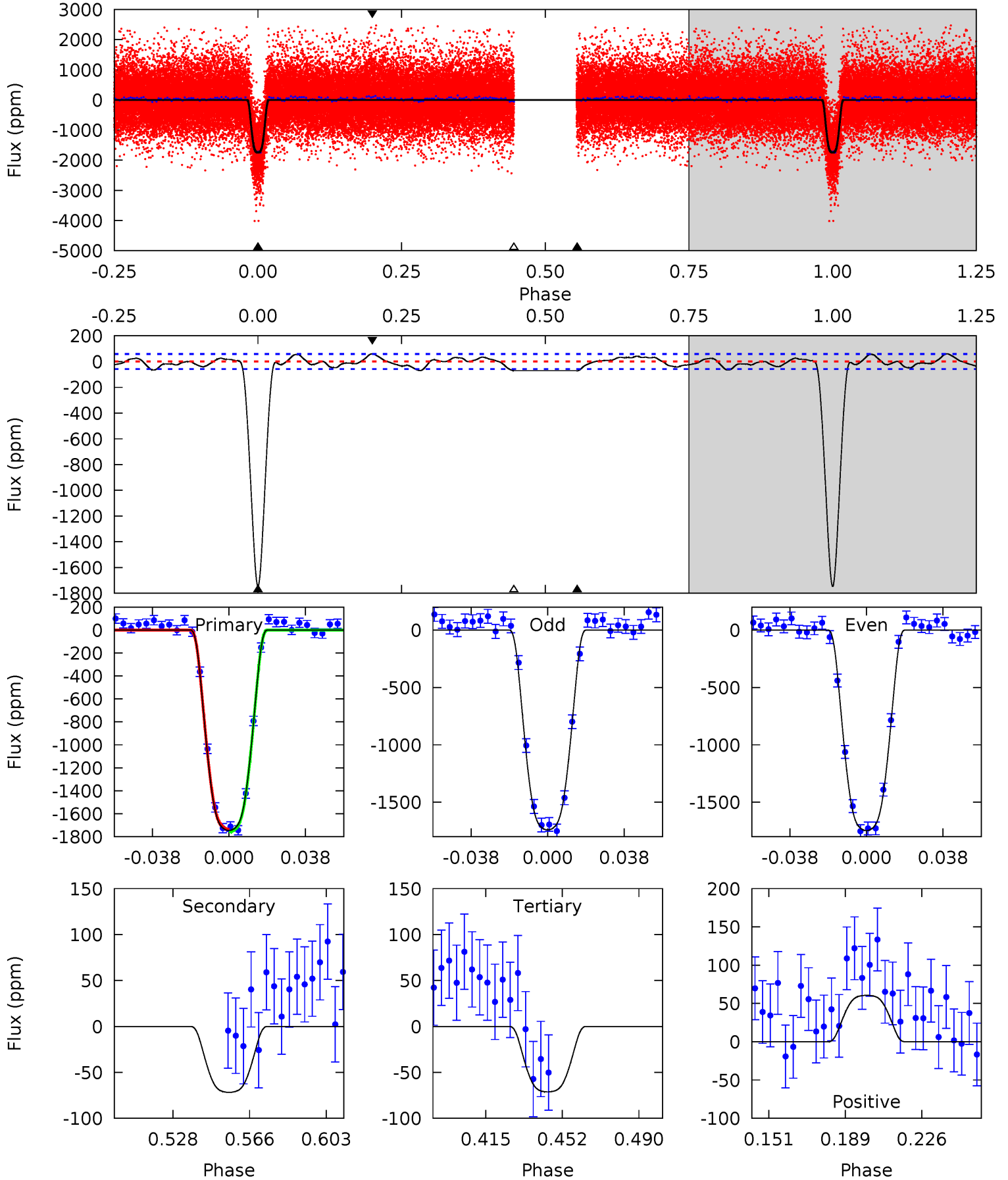
TCE 009451127-02 P= 5.117378 Days $T_0=132.031774$ (BKJD)



DV Model-Shift Uniqueness Test

009451127-02, P = 5.117402 Days, E = 126.910840 Days

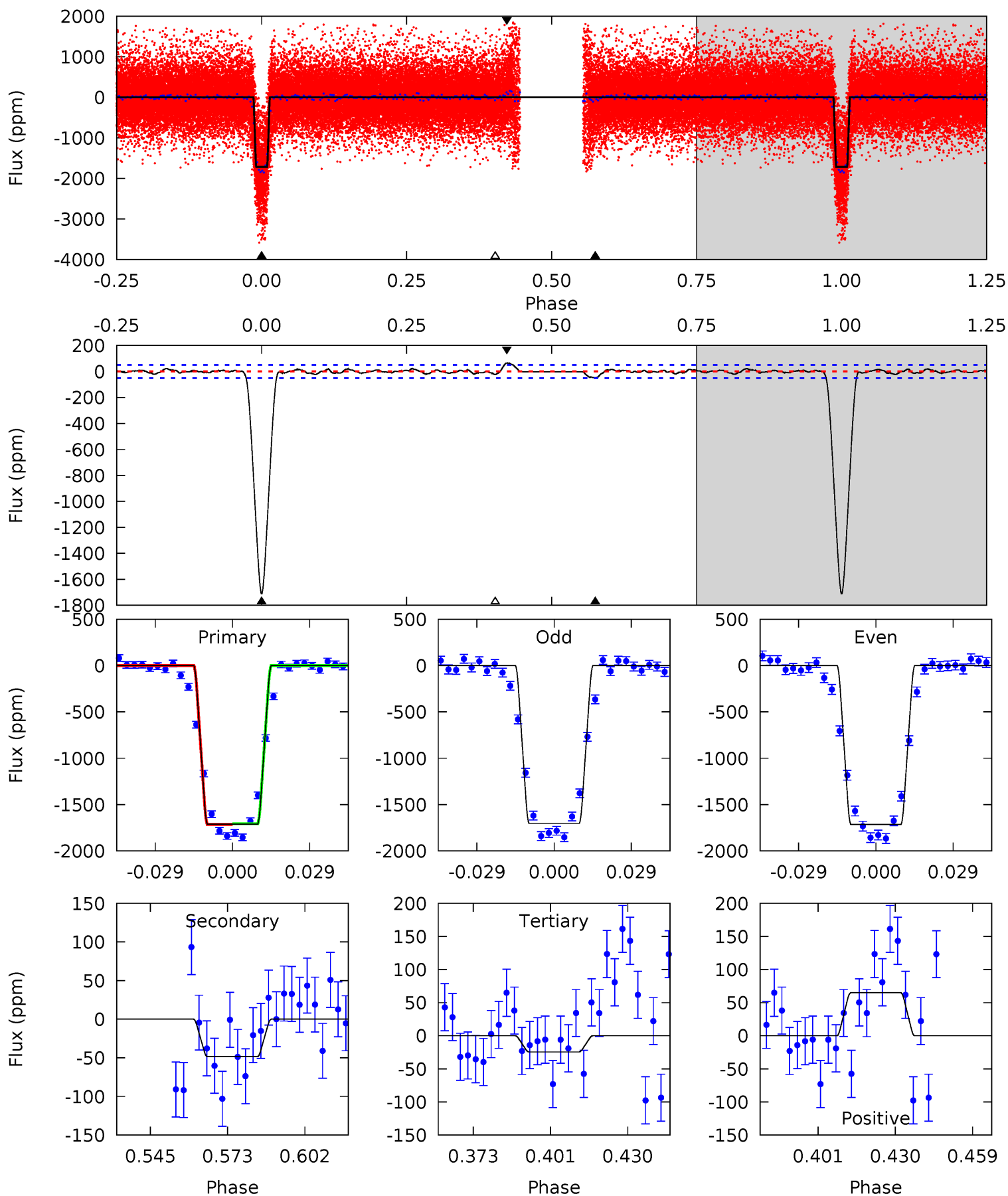
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 142.5 | 5.86 | 5.82 | 4.95 | 4.77 | 2.08 | 2.38 | 136.7 | 137.6 | 0.04 | 0.91 | 0.23 | 0.99 | 0.03 | 0.83 |



Alt Model-Shift Uniqueness Test

009451127-02, P = 5.117378 Days, E = 126.914396 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 162.1 | 4.61 | 2.32 | 6.14 | 4.82 | 2.19 | 1.24 | 159.8 | 156.0 | 2.29 | -1.54 | 0.55 | 1.00 | 0.04 | 0.39 |



Stellar Parameters For KIC 009451127

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 6161^{+171}_{-236} | $4.454^{+0.054}_{-0.216}$ | $0.070^{+0.200}_{-0.350}$ | $1.053^{+0.341}_{-0.114}$ | $1.150^{+0.135}_{-0.181}$ | $1.388^{+0.393}_{-0.766}$ |
| | +3%/-4% | +1%/-5% | +286%/-500% | +32%/-11% | +12%/-16% | +28%/-55% |
| 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 009451127-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -72 ± 12 | $5.67^{+1.05}_{-0.45}$ | 1613^{+117}_{-84} | 3136^{+101}_{-120} | $4.199^{+1.189}_{-1.174}$ |
| Alt. | -49 ± 11 | $5.01^{+0.86}_{-0.37}$ | 1609^{+113}_{-77} | 3065^{+113}_{-137} | $3.655^{+1.131}_{-1.083}$ |

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

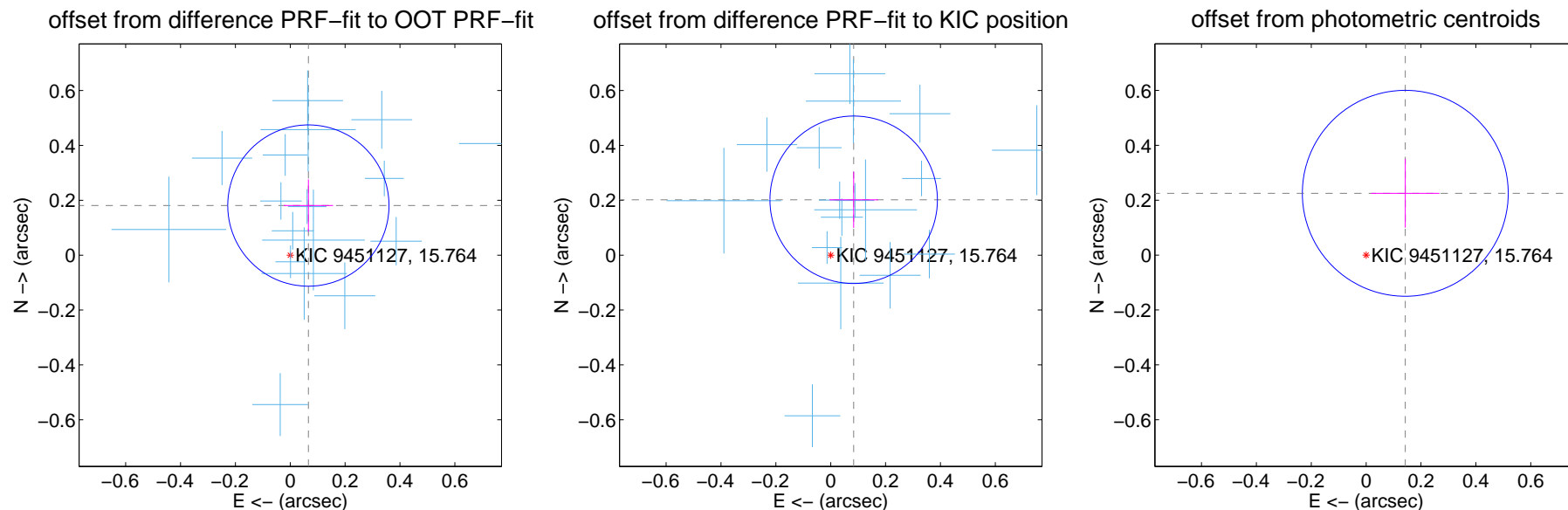
DV Centroid Data

Supplemental centroid analysis for 009451127-02. Kepler magnitude: 15.76. Transit SNR 73.45

There are 17 quarters with good PRF difference image offsets

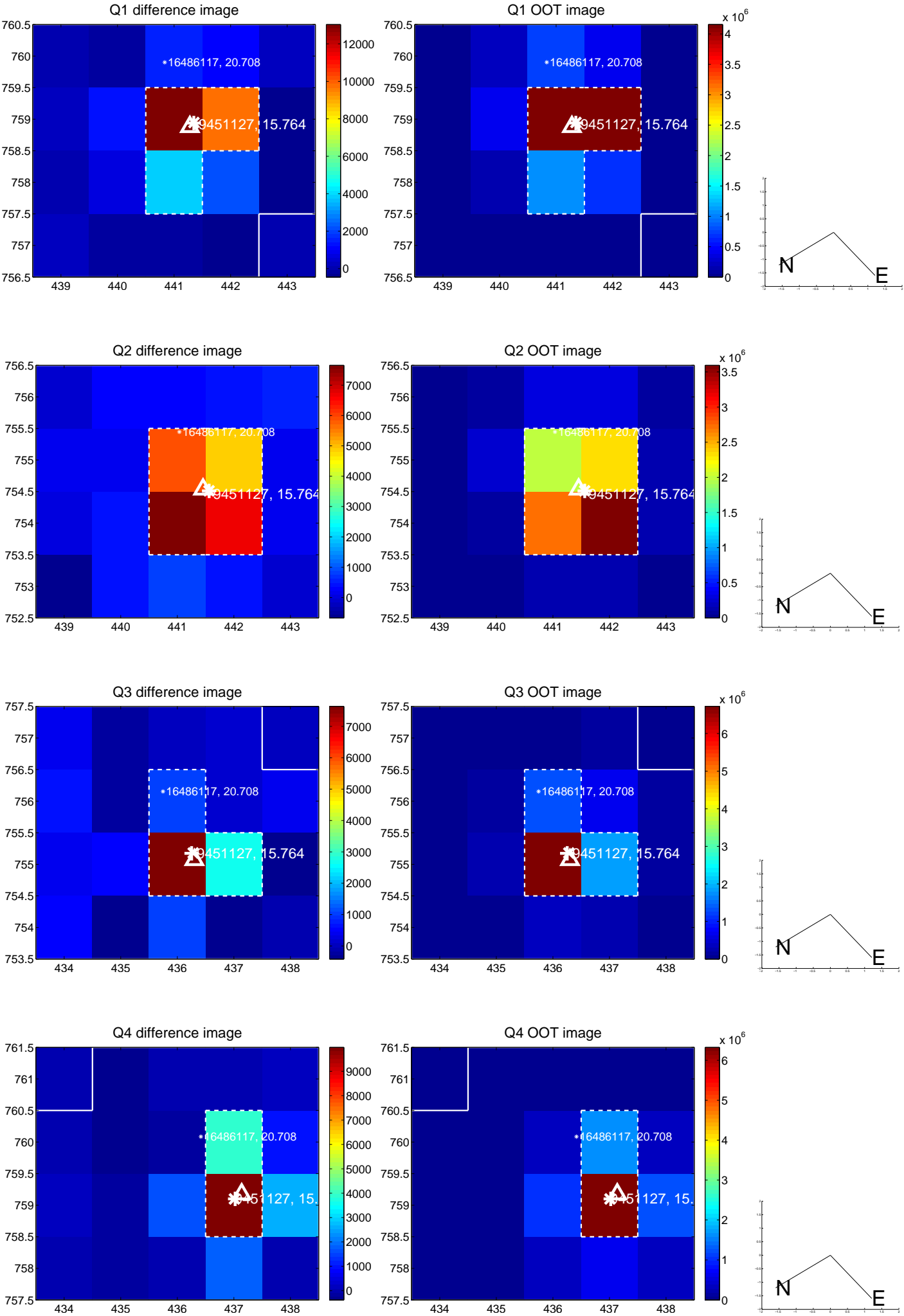
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 0.192 ± 0.098 | 1.96 | -0.066 ± 0.090 | 0.181 ± 0.095 |
| PRF-fit source offset from KIC position | 0.218 ± 0.102 | 2.15 | -0.084 ± 0.089 | 0.202 ± 0.102 |
| photometric centroid source offset | 0.27 ± 0.13 | 2.13 | -0.14 ± 0.12 | 0.23 ± 0.13 |

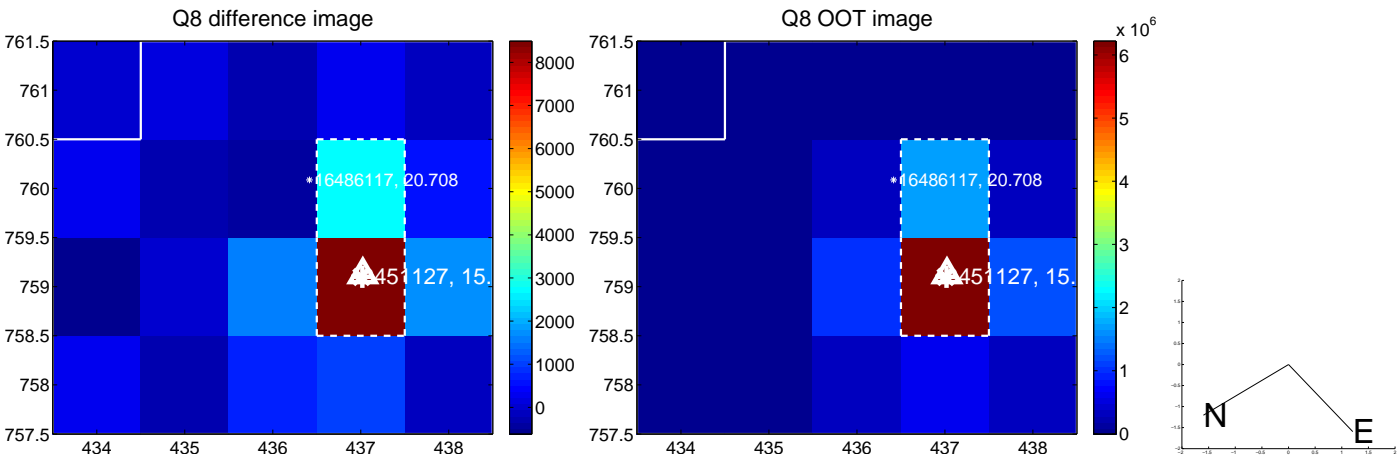
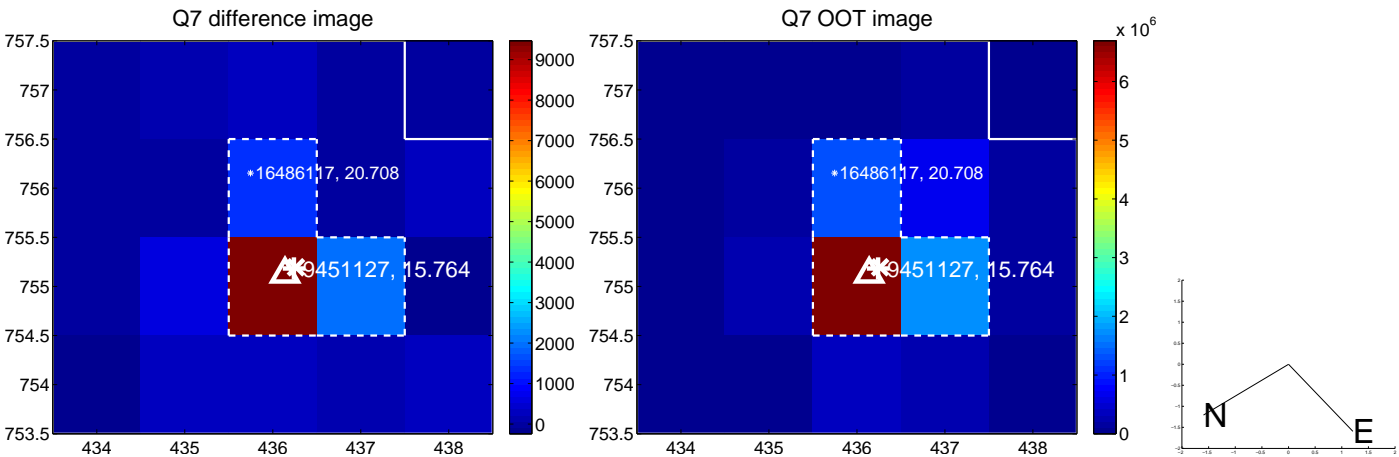
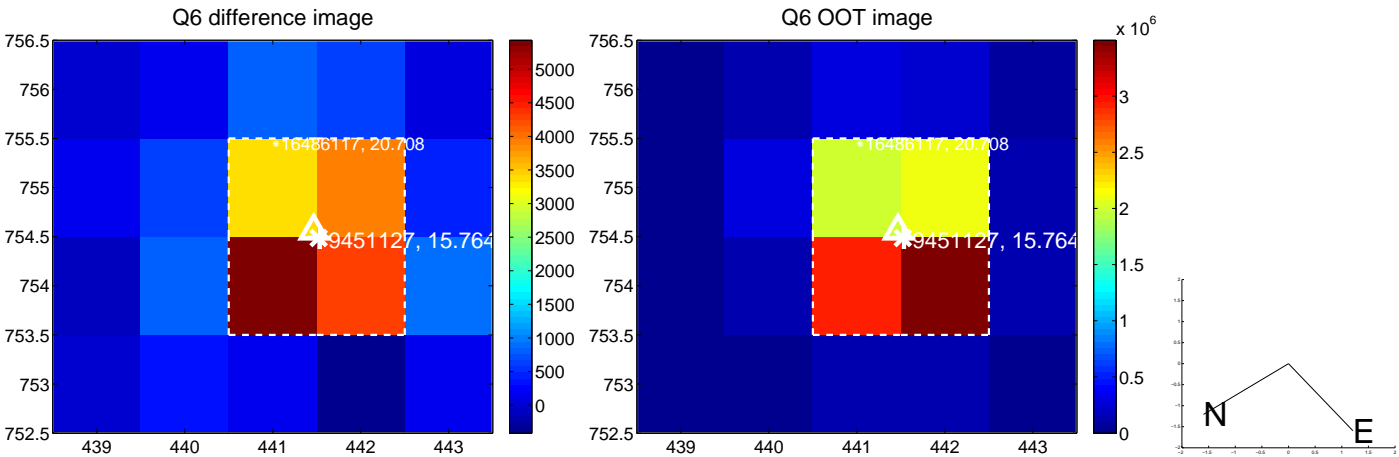
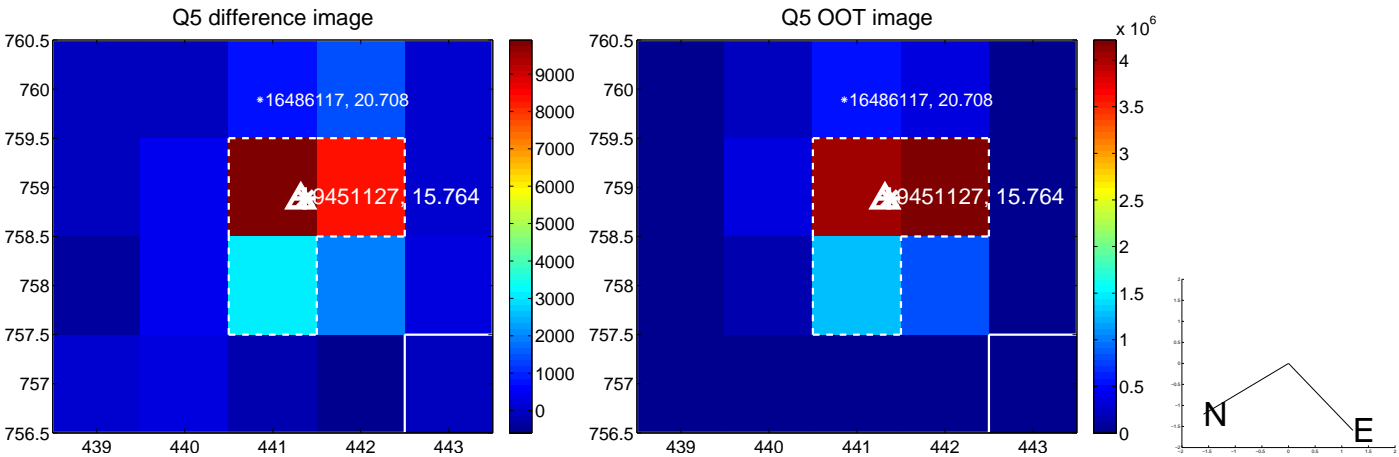


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

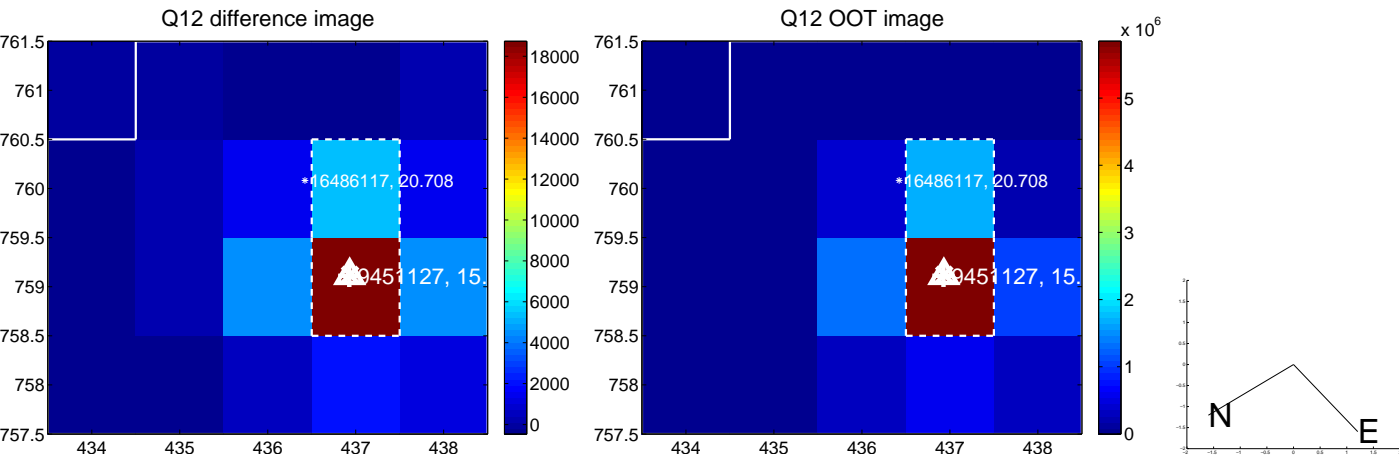
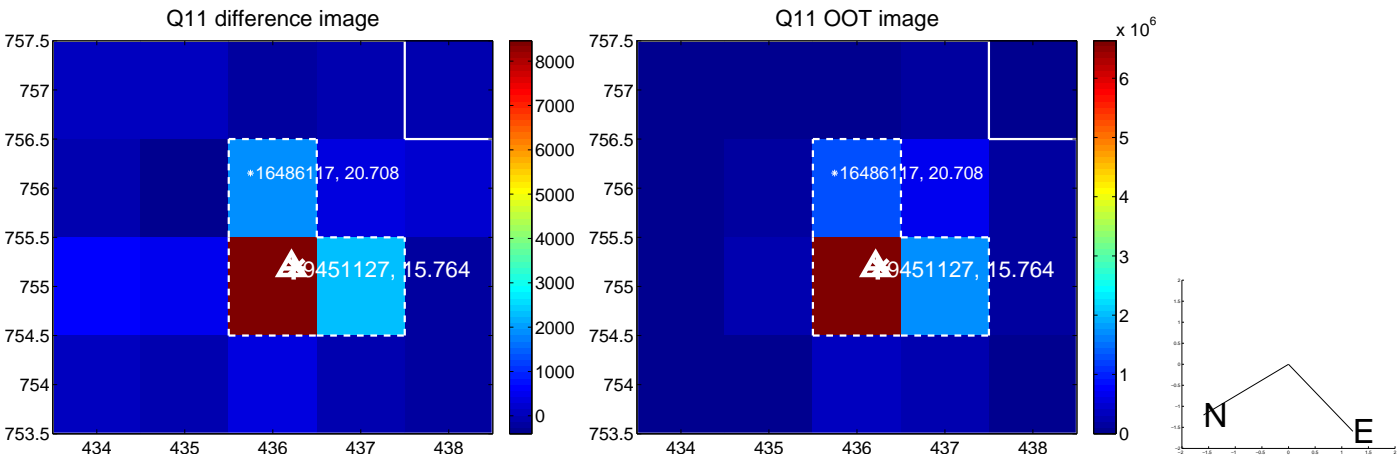
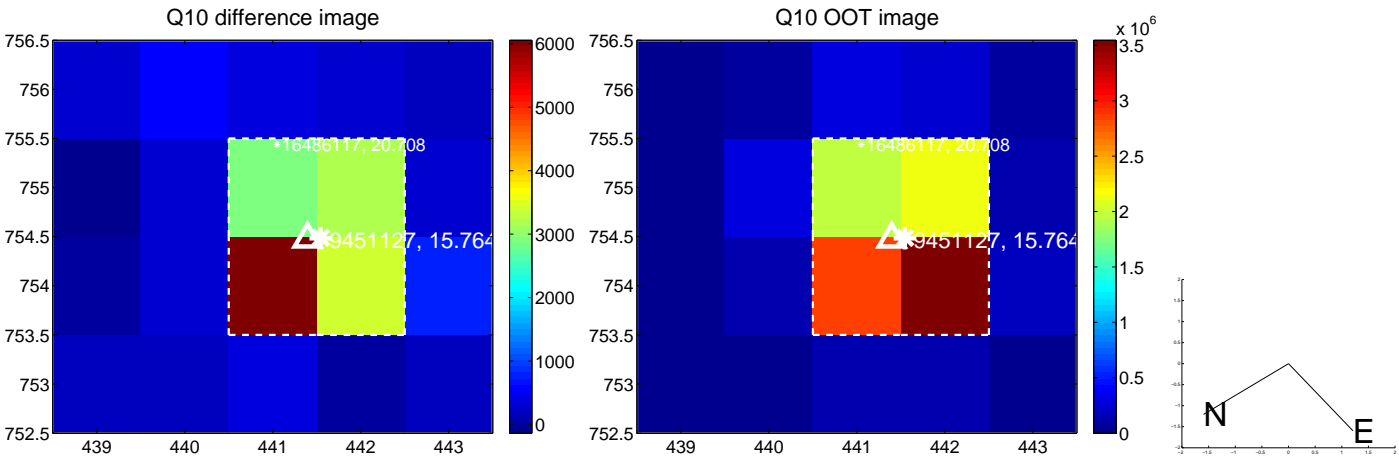
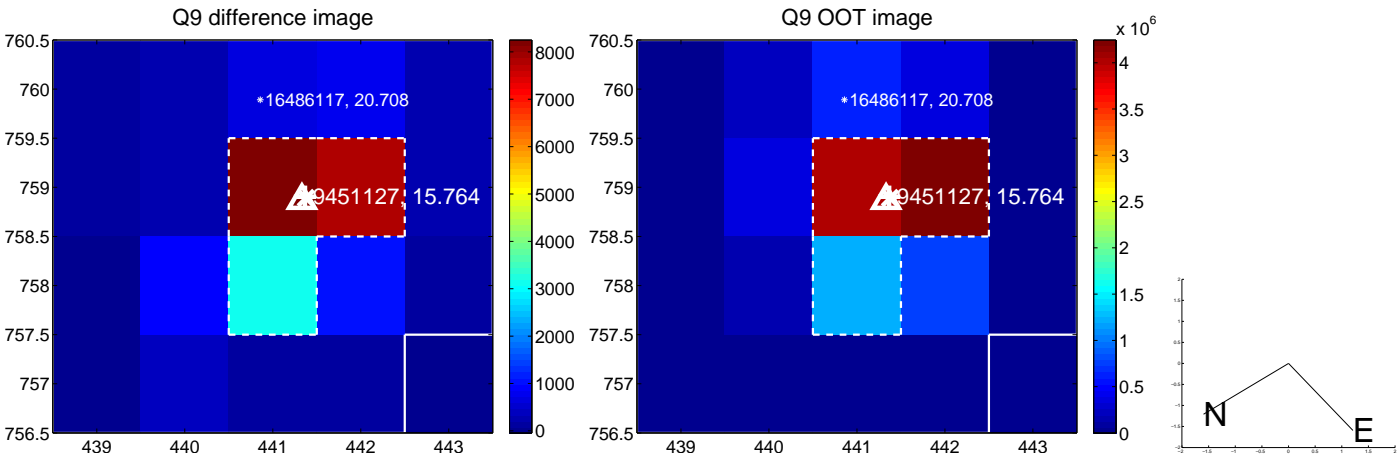
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



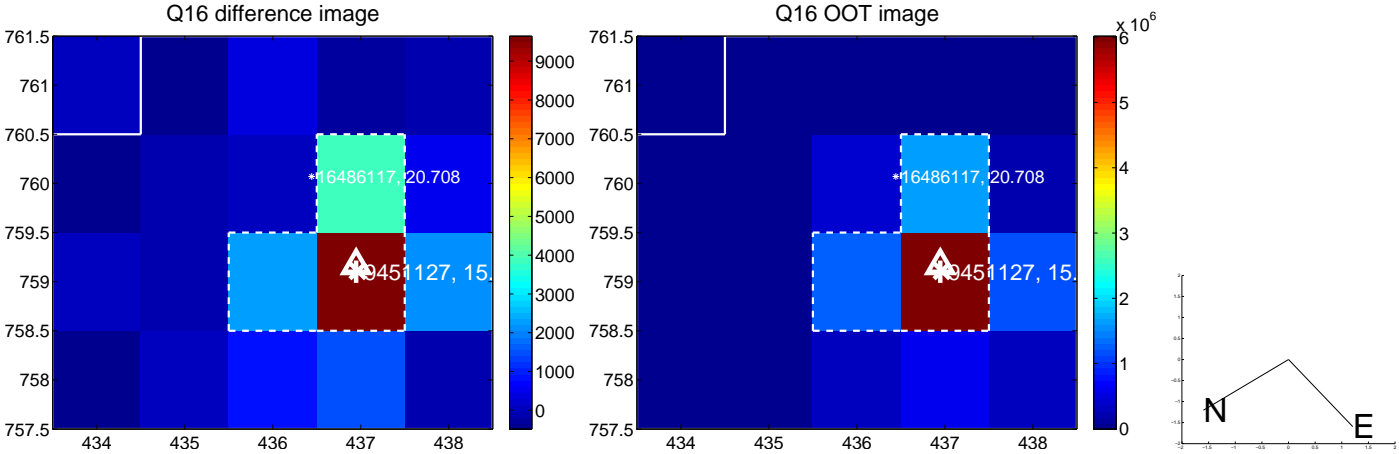
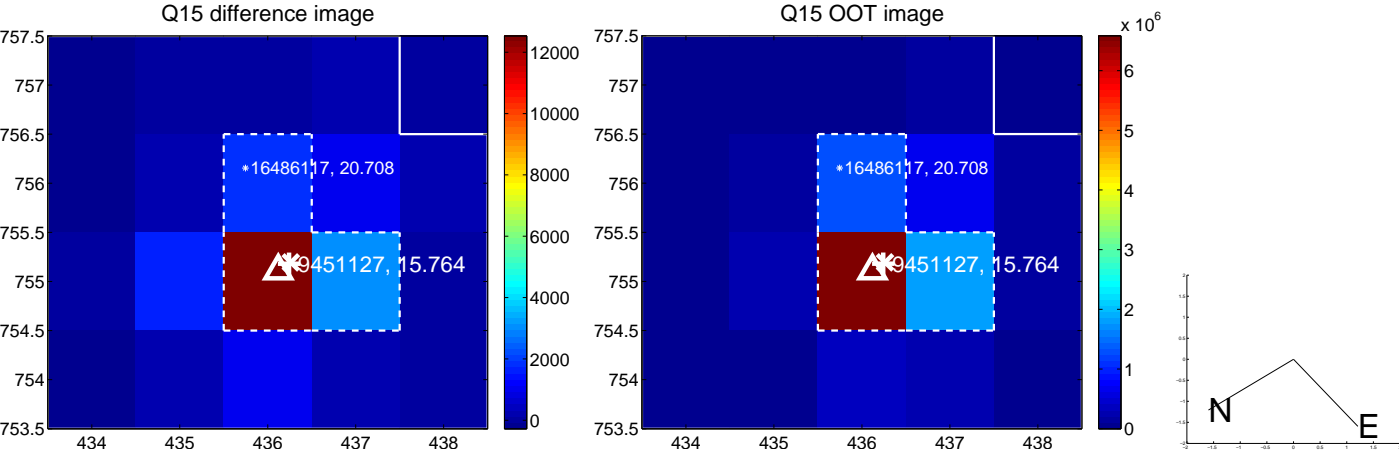
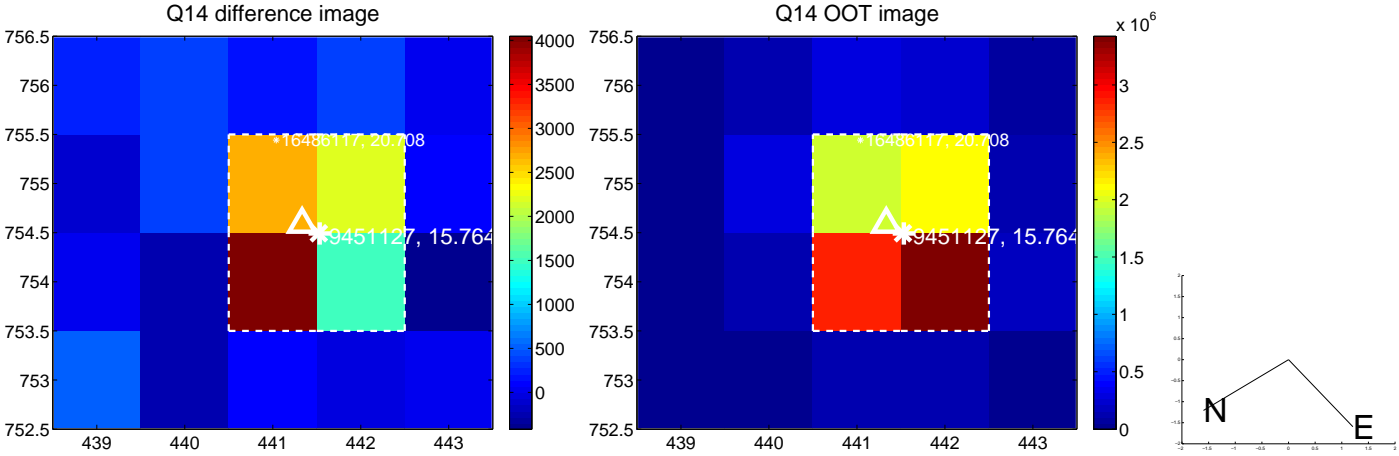
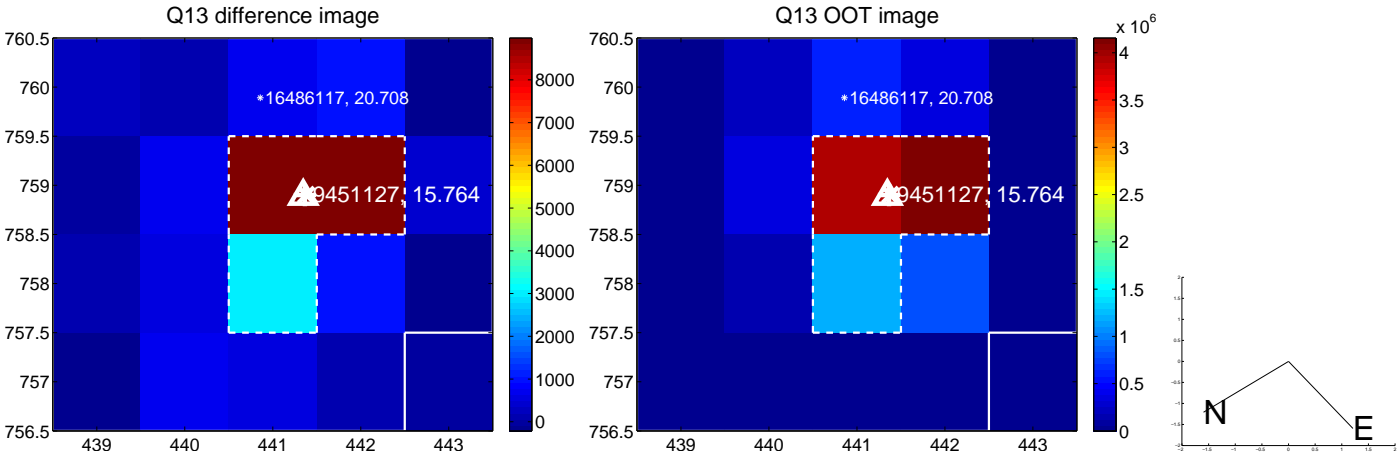
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



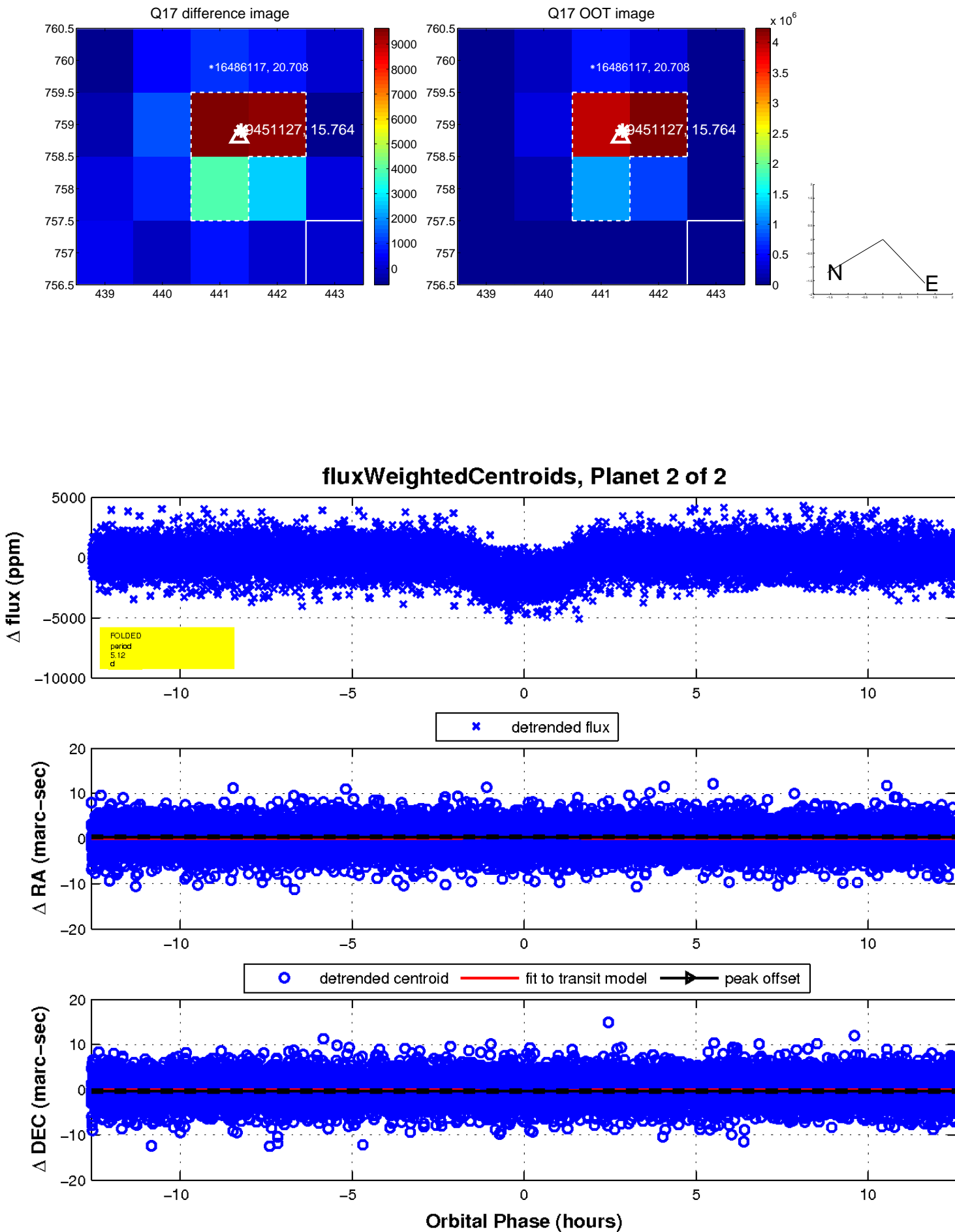
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

