

KIC 009593757

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009593757-01 | OBS | 2774.01 | 2.494215 | 133.653979 | 4796.1 | 2.788 | 128.1 | 34.2 | 1.00 | 5780 | 10.48 | 771.54 |
| 009593757-02 | OBS | No | 2.494242 | 132.398918 | 1541.3 | 2.027 | 13.6 | 14.4 | 1.00 | 5780 | 4.59 | 771.53 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 009593757-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 1 | MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—SEASONAL_DEPTH_DV—SEASONAL_DEPTH_ALT—CENT_RESOLVED_OFFSET—EPHEM_MATCH |
| 009593757-02 | OBS | FP | 0.00 | 1 | 1 | 1 | 1 | IS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH |

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 009593757-01

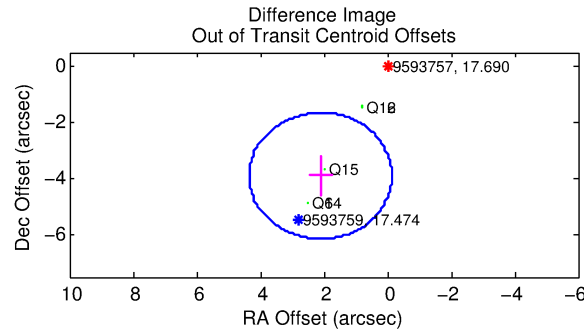
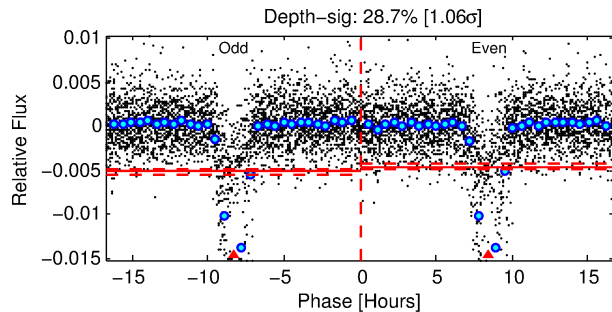
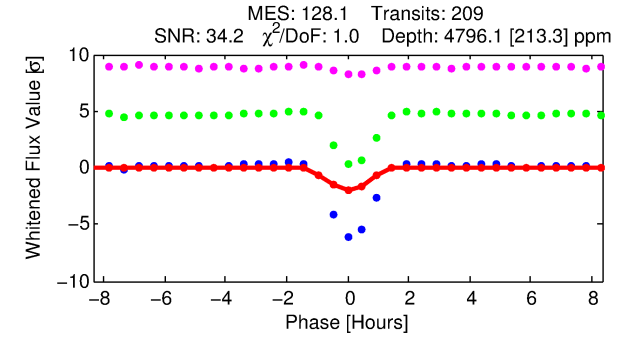
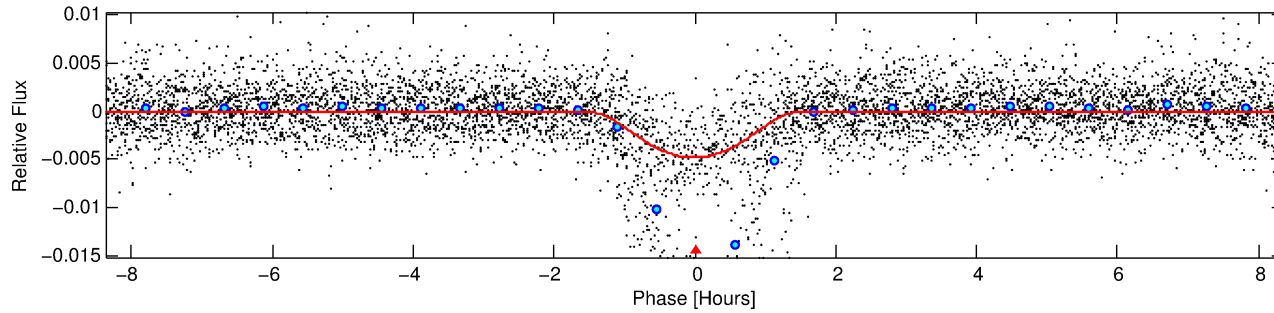
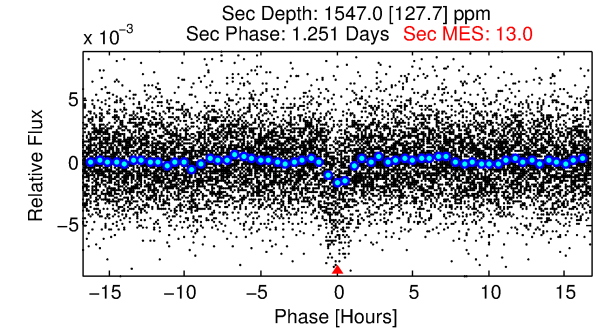
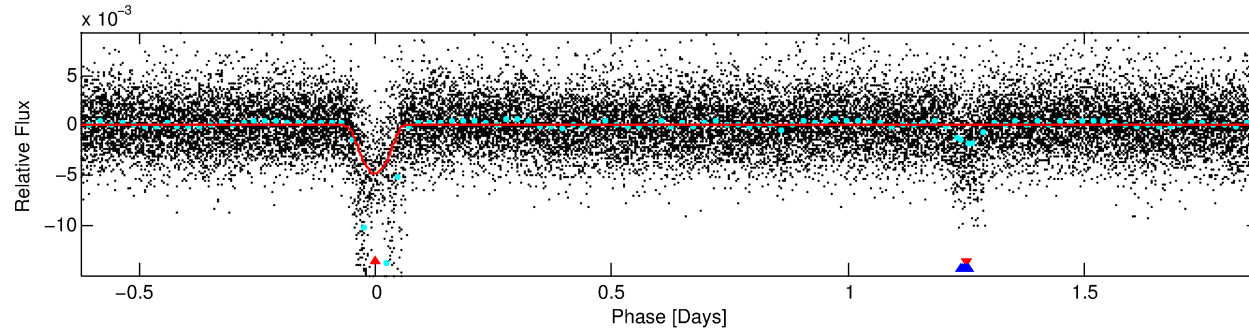
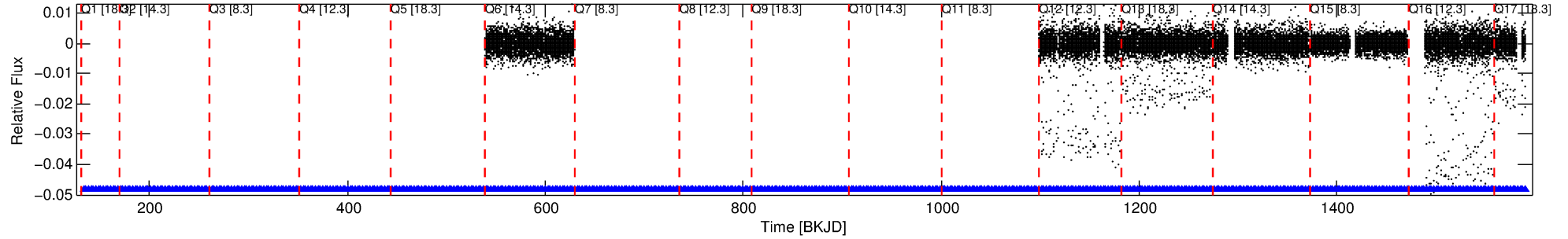
| TCE (1) | KIC | Parent (2) | Parent KIC | $P_1:P_2$ | Dist ($''$) | Δ Row | Δ Col | m_2 | m_1 | D_2/D_1 | Mechanism | Flag | σ_P | σ_T |
|--------------|---------|--------------|------------|-----------|---------------|--------------|--------------|-------|-------|-----------|------------|------|------------|------------|
| 009593757-01 | 9593757 | 009593759-01 | 9593759 | 1:1 | 6.2 | 0 | -2 | 17.47 | 17.69 | 47.15 | Direct-PRF | 0 | 2.57 | 2.10 |

Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 9593757 Candidate: 1 of 2 Period: 2.494 d
KOI: K02774.01 Corr: 0.846

Kp: 17.69 R*: 1.00 Rs Teff: 5780.0 K Logg: 4.44 Fe/H: 0.000



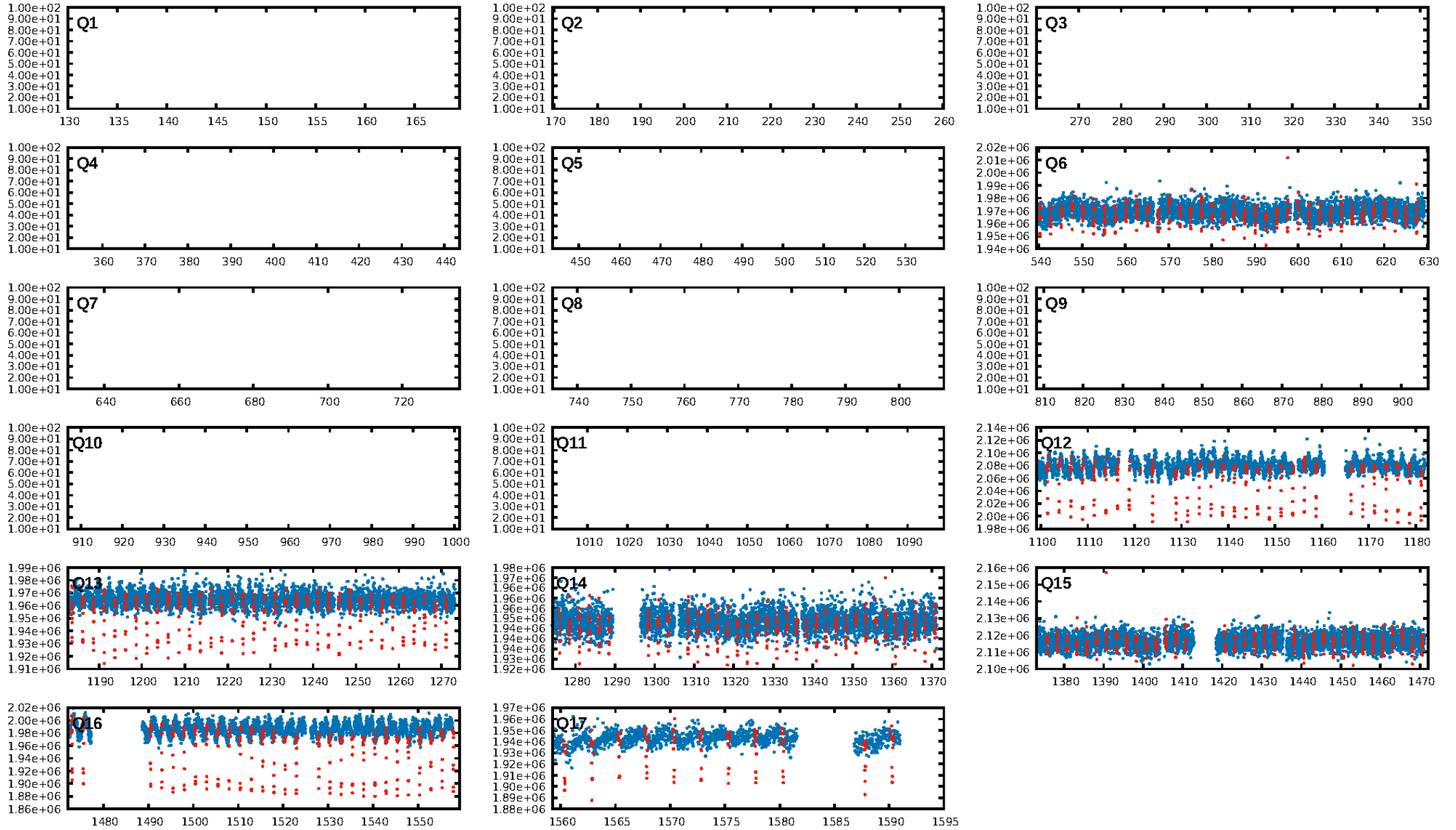
DV Fit Results:

Period = 2.49422 [0.00000] d
Epoch = 133.6540 [0.0013] BKJD
Rp/R* = 0.0961 [0.0578]
a/R* = 3.69 [0.61]
b = 0.96 [0.10]
Seff = 771.54 [0.00]
Teq = 1344 [0] K
Rp = 10.48 [6.30] Re
a = 0.0360 [0.0000] AU
Ag = 10.04 [12.11] [0.75σ]
Teffp = 3699 [1115] K [2.11σ]

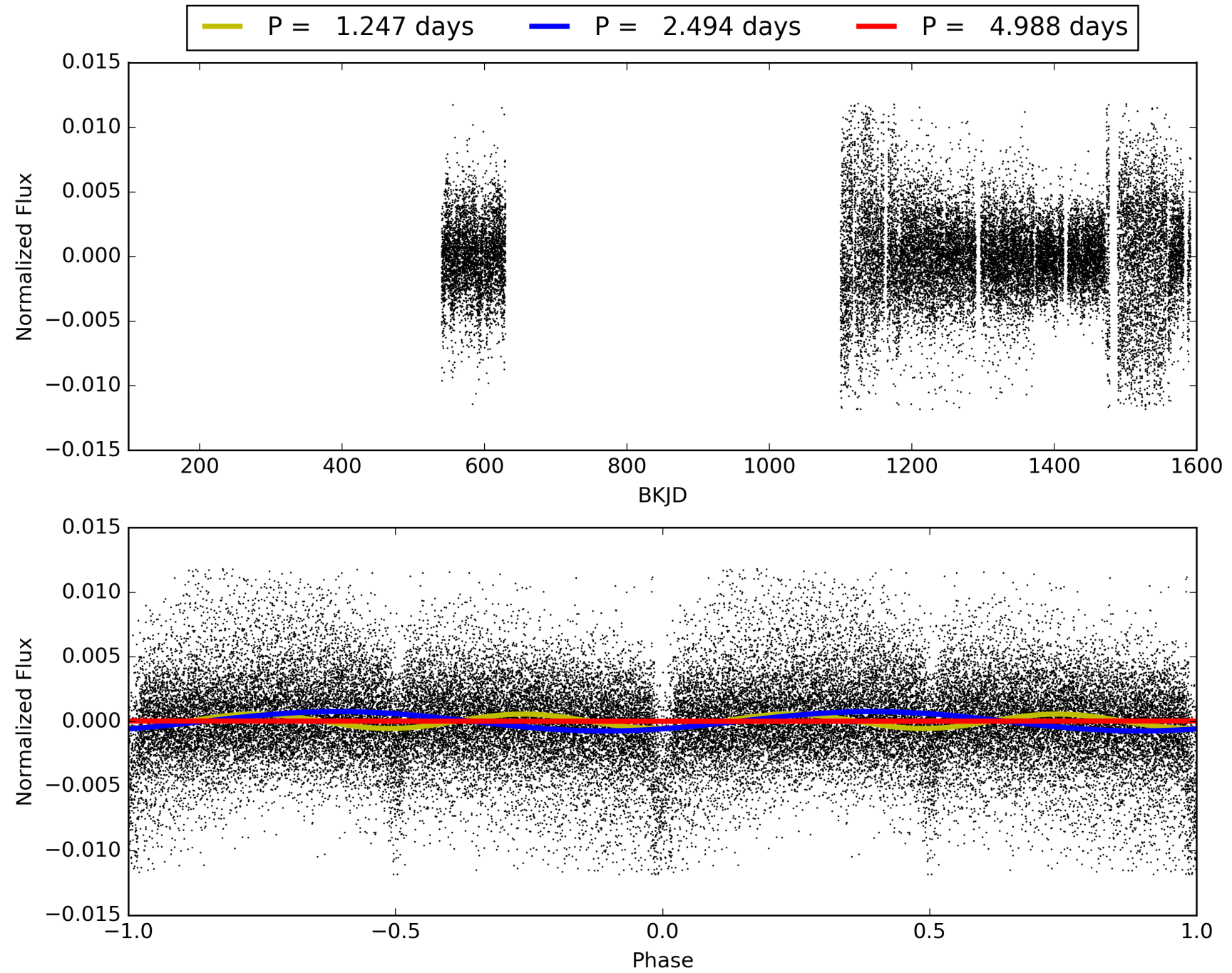
DV Diagnostic Results:

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 [198/198]
GhostDiagnostic-chr: -0.281
Centroid-sig: N/A
Centroid-so: 37.699 arcsec [137.28σ]
OotOffset-rm: 4.431 arcsec [5.92σ]
KicOffset-rm: 6.345 arcsec [83.37σ]
OotOffset-st: 2/1/2/0 [5]
KicOffset-st: 2/1/2/2 [7]
DiffImageQuality-fgm: 1.00 [7/7]
DiffImageOverlap-fno: 1.00 [7/7]

TCE 009593757-01, PDC Light Curves

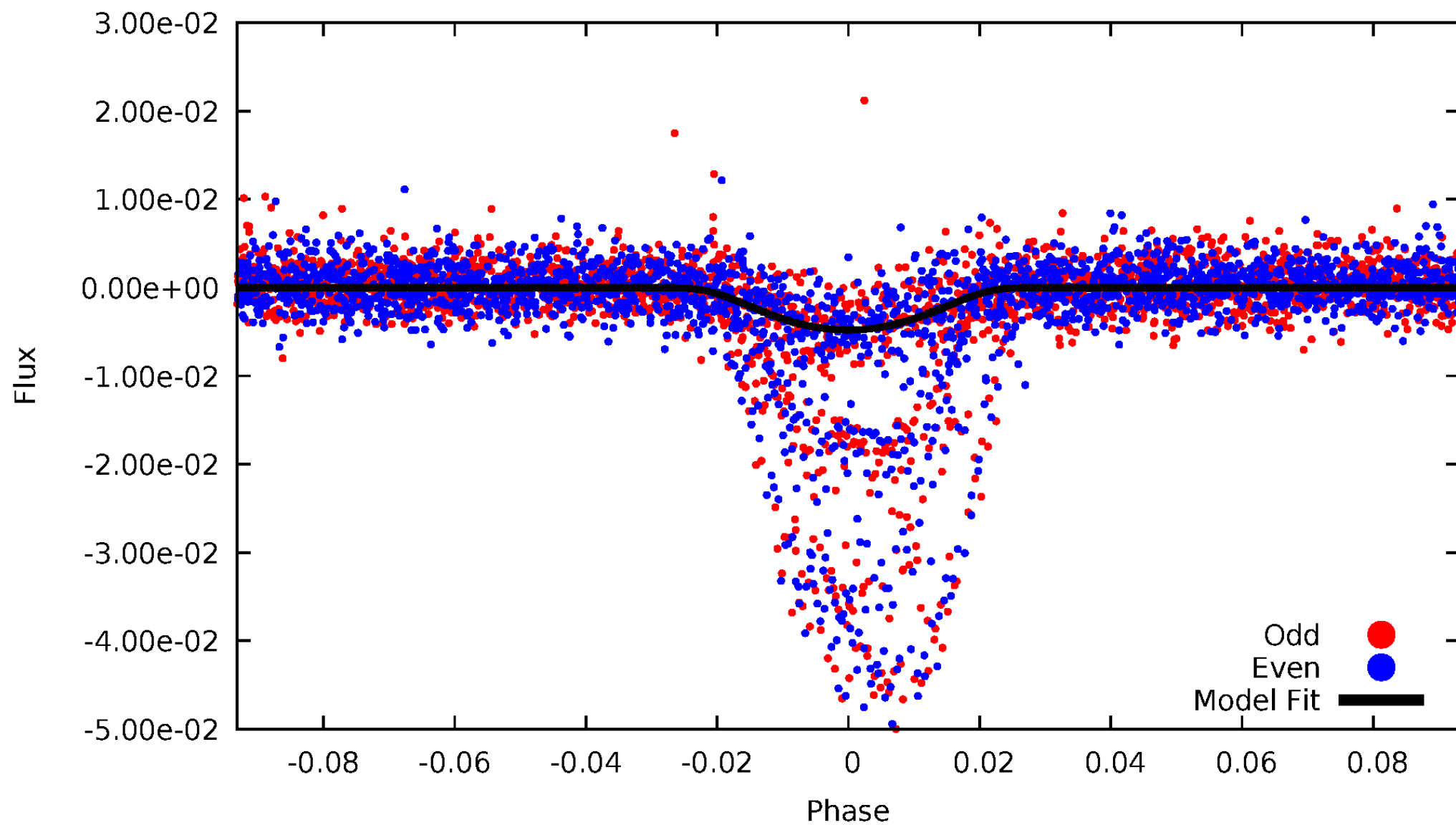


TCE 009593757-01



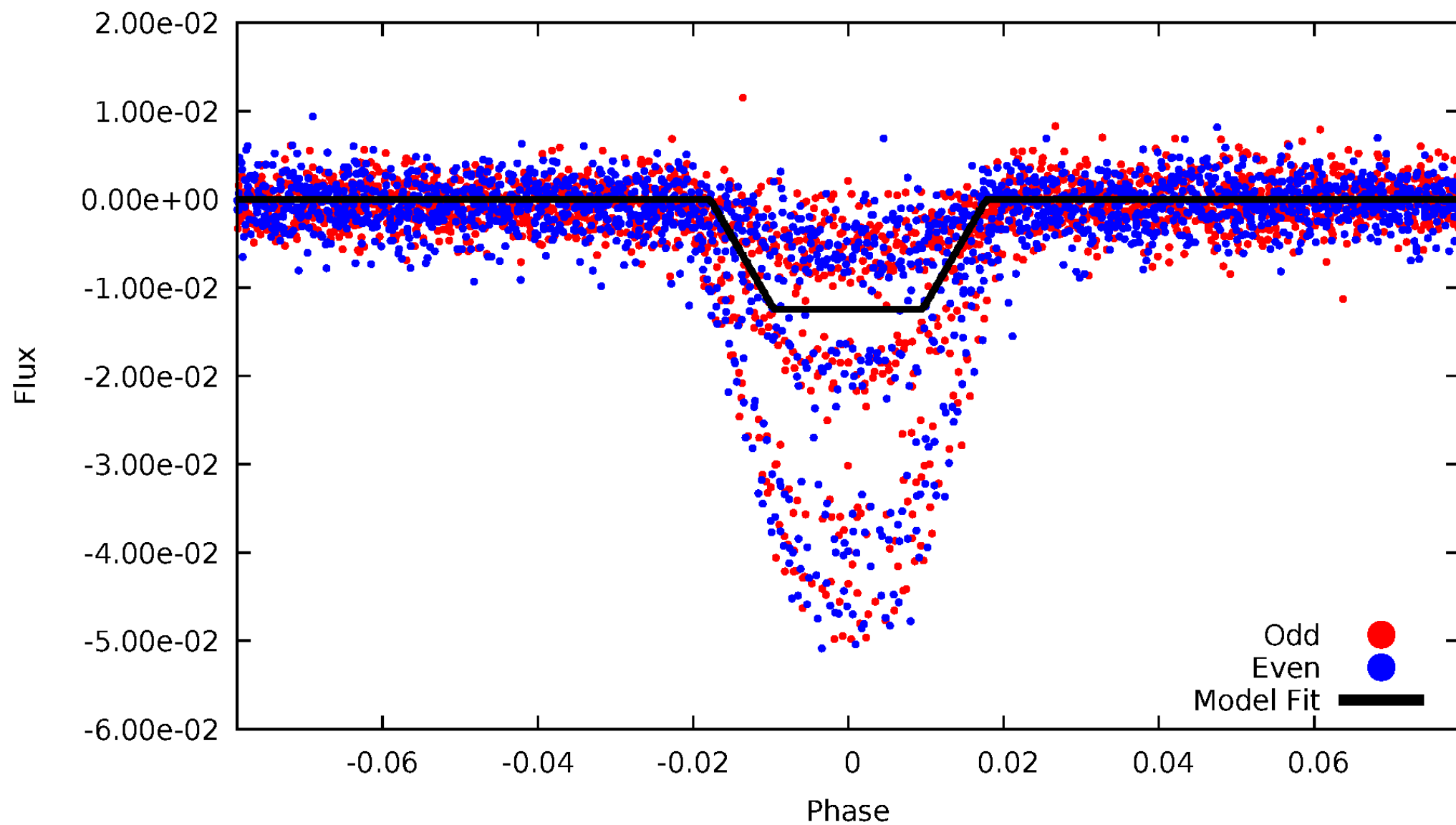
DV Odd/Even

TCE 009593757-01



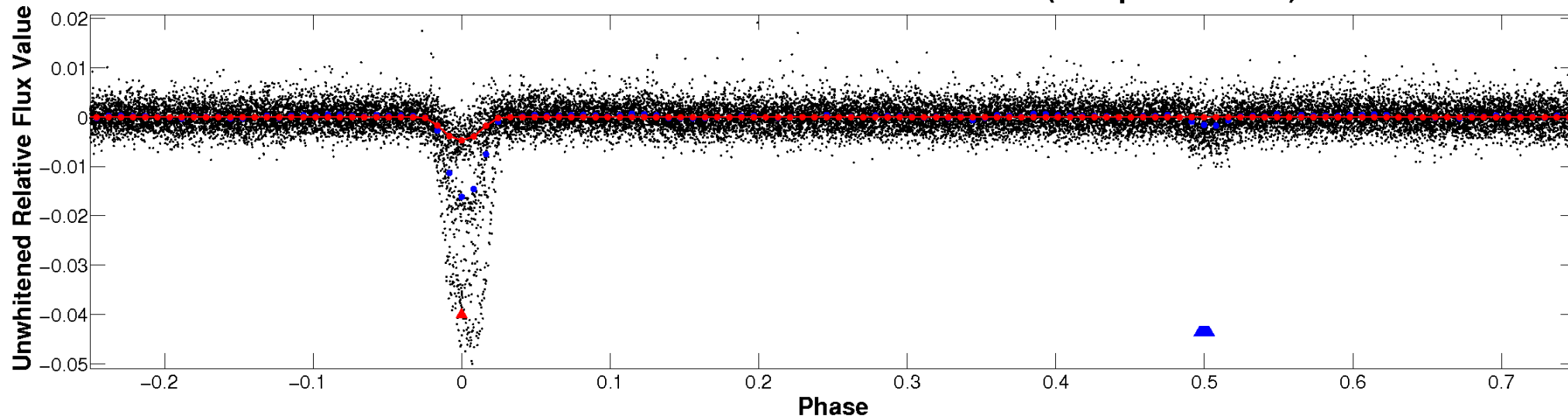
ALT Odd/Even

TCE 009593757-01

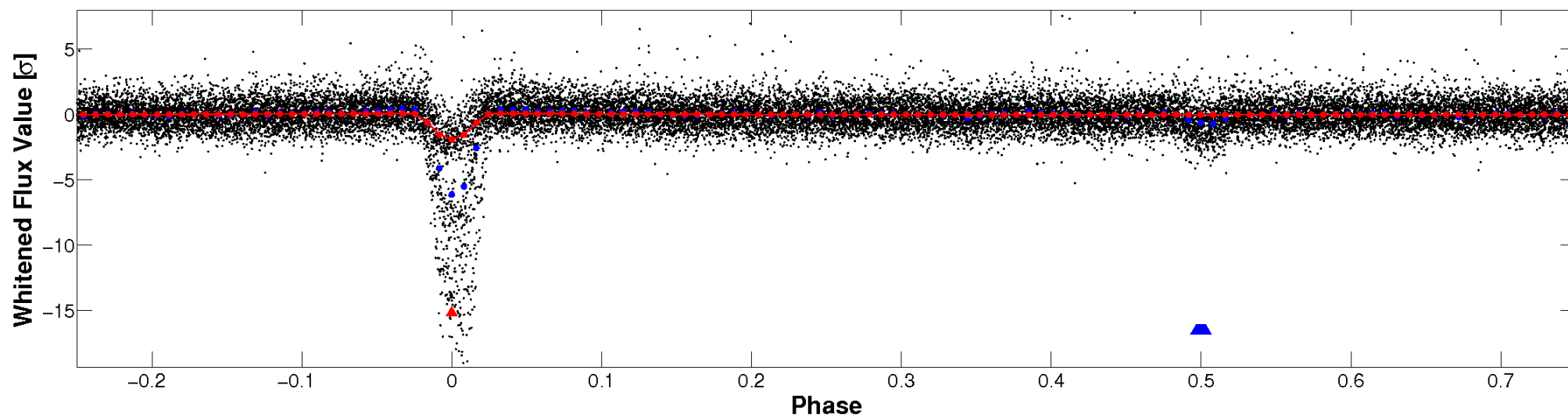


Non-Whitened Vs. Whitened Light Curve

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

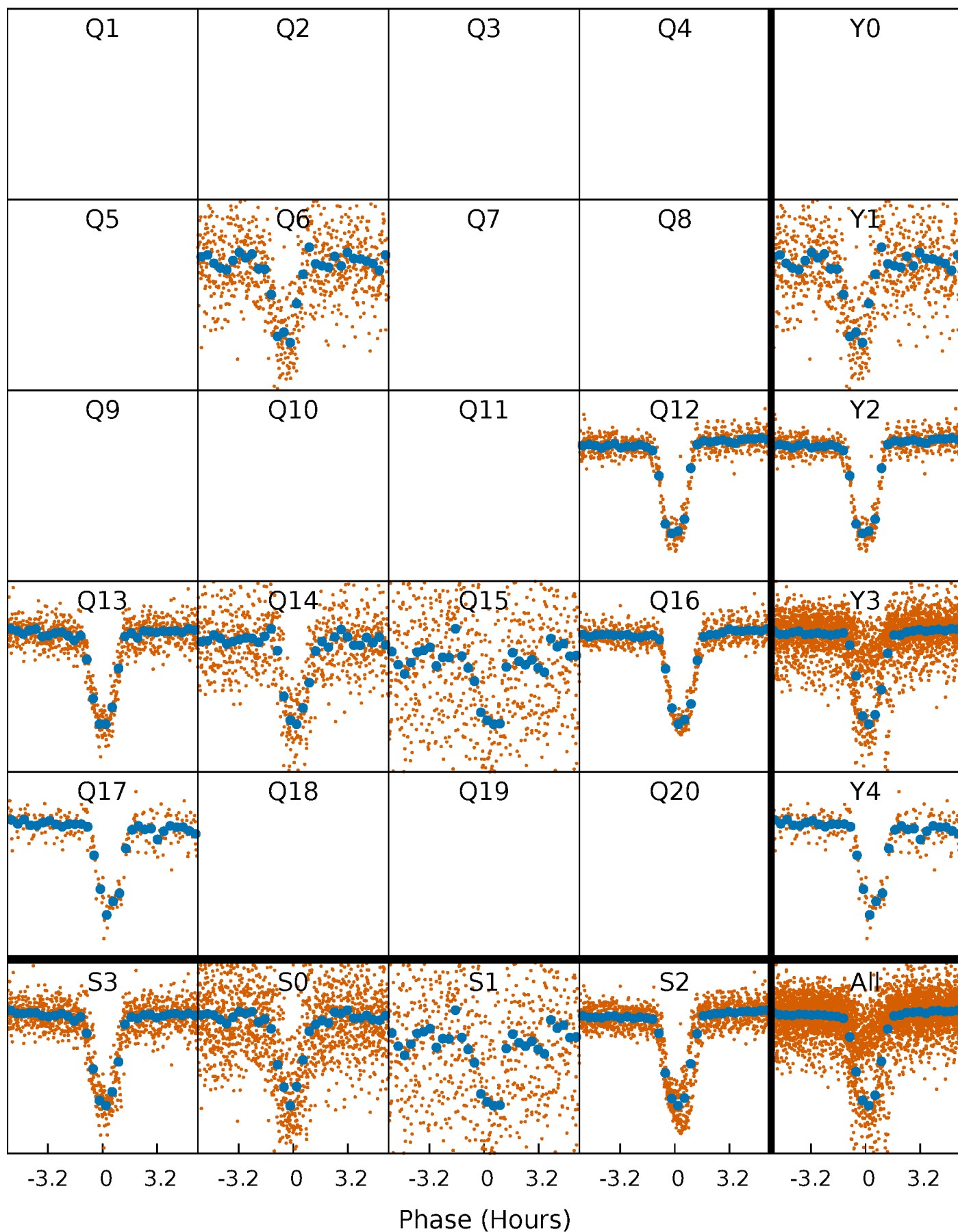


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



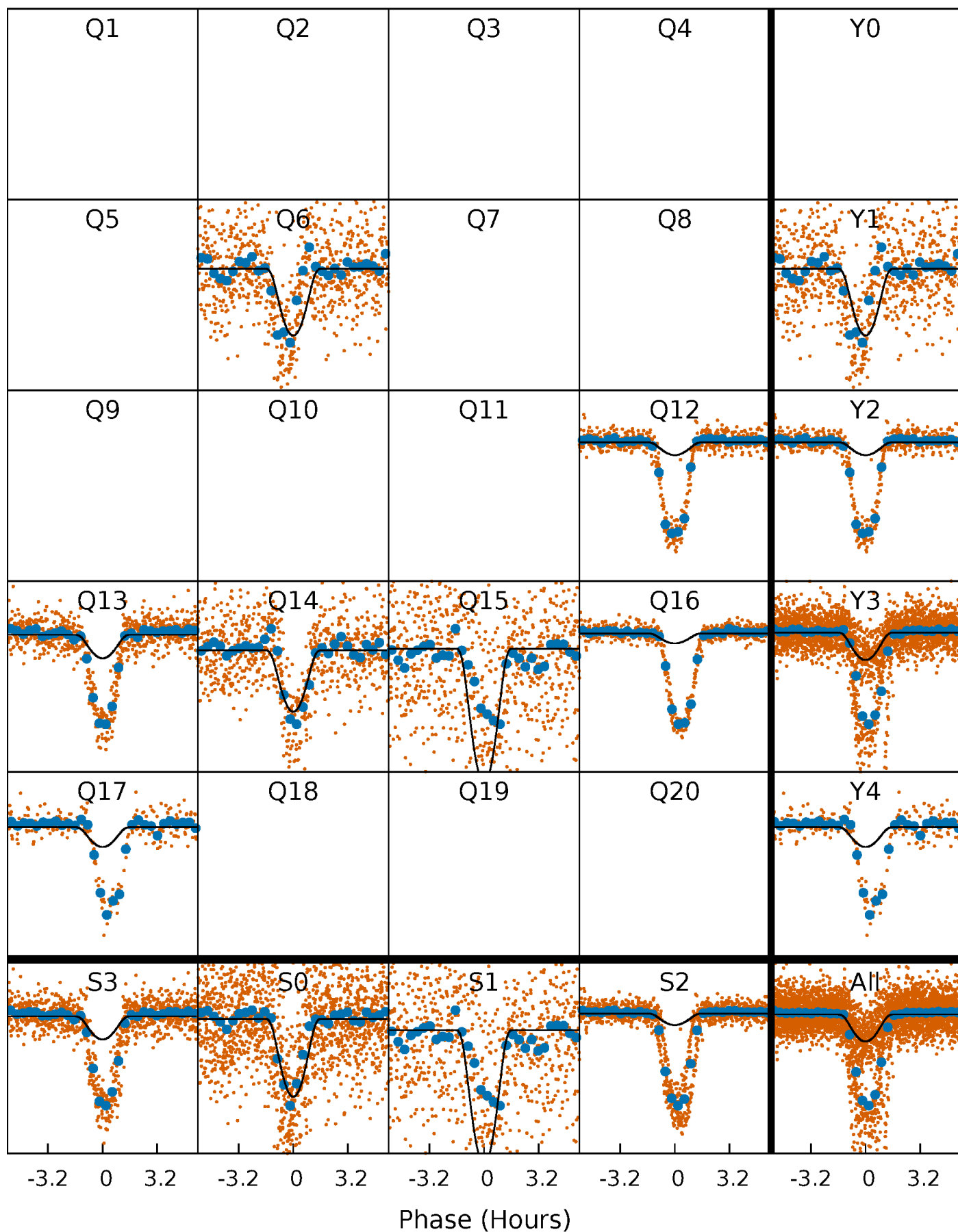
PDC Quarter-Phased Transit Curves

TCE 009593757-01 P= 2.494215 Days $T_0=133.653979$ (BKJD)



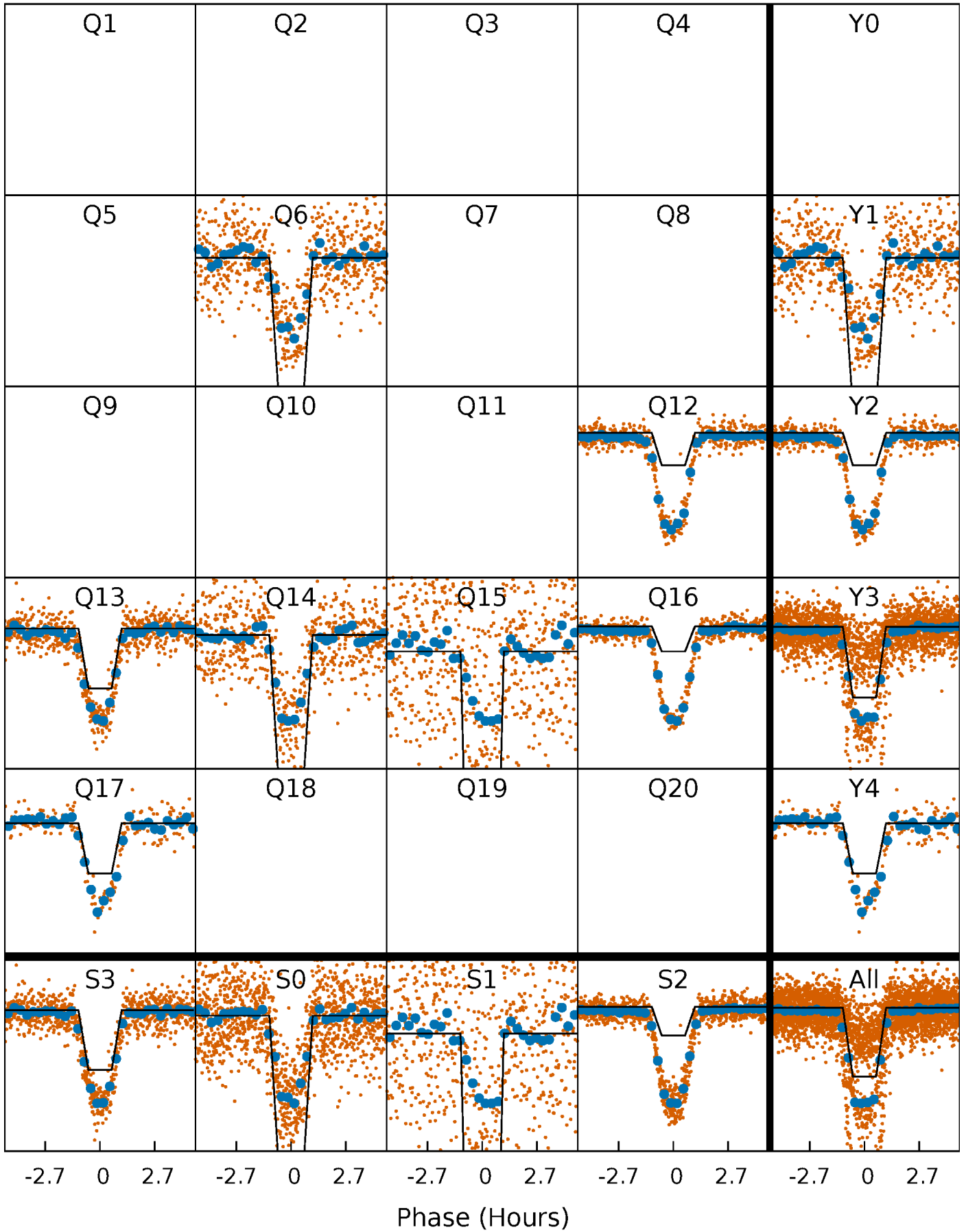
DV Quarter-Phased Transit Curves

TCE 009593757-01 P= 2.494215 Days $T_0=133.653979$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

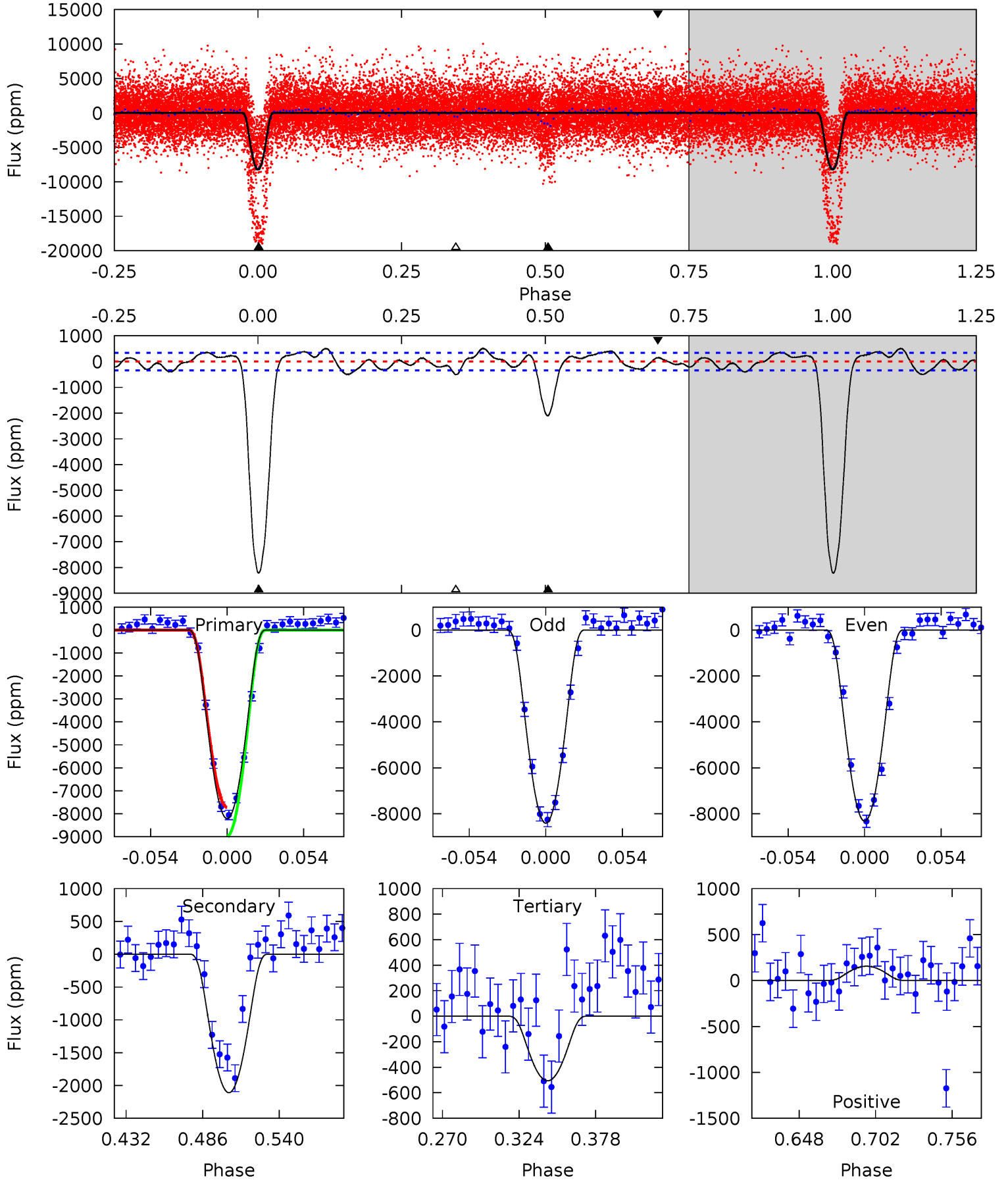
TCE 009593757-01 P= 2.494300 Days $T_0=133.620100$ (BKJD)



DV Model-Shift Uniqueness Test

009593757-01, P = 2.494215 Days, E = 133.653979 Days

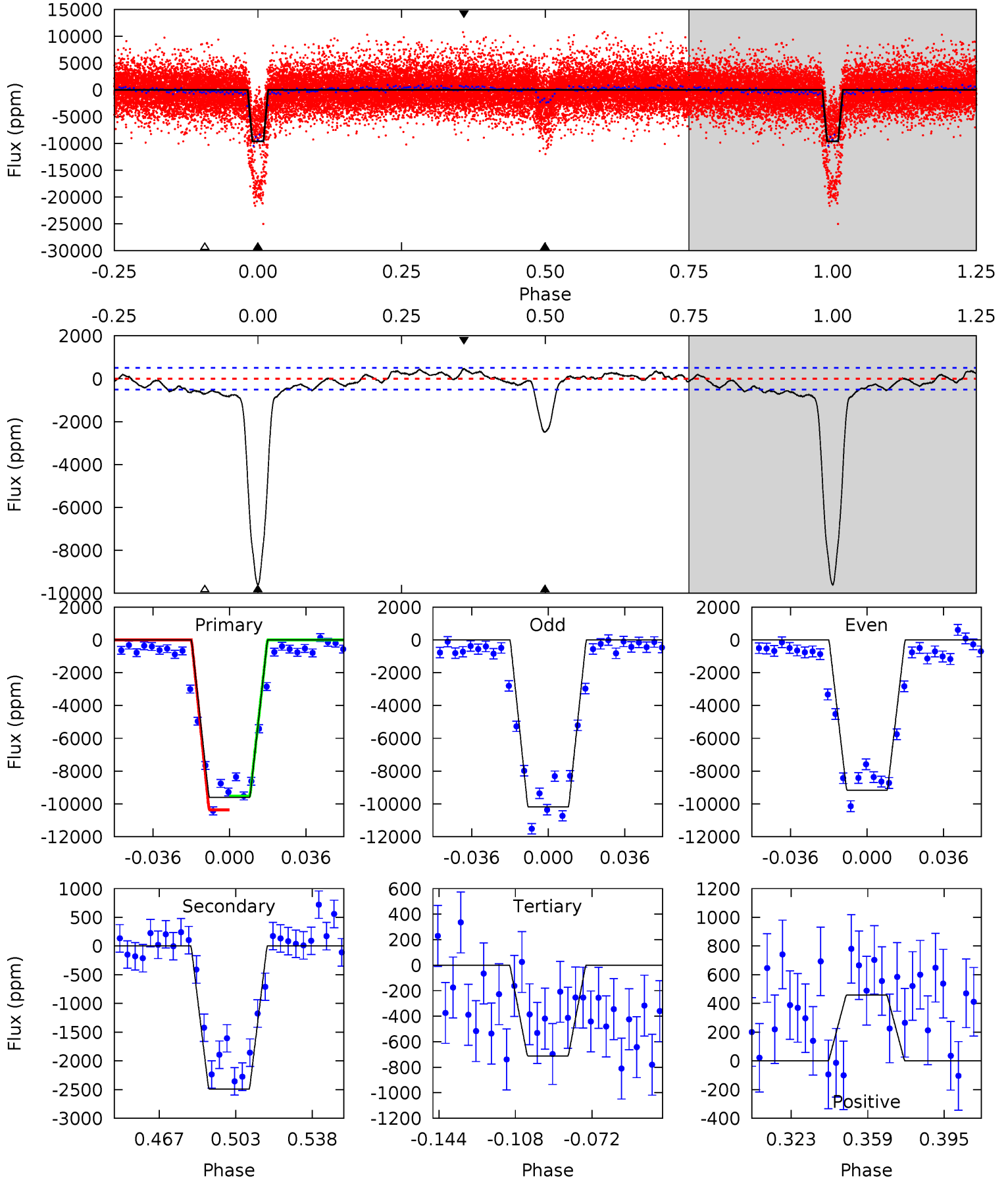
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 112.9 | 29.0 | 6.96 | 2.13 | 4.69 | 1.93 | 3.31 | 106.0 | 110.8 | 22.0 | 26.9 | 0.63 | 2.12 | 0.06 | 8.53 |



Alt Model-Shift Uniqueness Test

009593757-01, P = 2.494300 Days, E = 133.620100 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 90.4 | 23.4 | 6.69 | 4.31 | 4.78 | 2.10 | 2.93 | 83.7 | 86.1 | 16.7 | 19.1 | 4.79 | 1.98 | 0.05 | 3.90 |



Stellar Parameters For KIC 009593757

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|---------------------|---------------------------|---------------------------|---------------------------|----------------------------|---|
| | 5780^{+1}_{-1} | $4.438^{+1.000}_{-1.000}$ | $0.000^{+1.000}_{-1.000}$ | $1.000^{+1.000}_{-1.000}$ | $-1.000^{+1.000}_{-1.000}$ | $-1.000^{+1.000}_{-1.000}$ |
| | +0%/-0% | +23%/-23% | +inf%/-inf% | +100%/-100% | +100%/-100% | +100%/-100% |
| Source | Solar | Solar | Solar | Solar | | |

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

Secondary Eclipse Parameters for KIC 009593757-01 / KOI 2774.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-----------------|-------------------------|----------------------|-----------------------|------------------|
| DV | -2109 ± 73 | $10.88^{+6.16}_{-5.94}$ | 1882^{+87}_{-84} | 4179^{+1676}_{-621} | 13^{+47}_{-8} |
| Alt. | -2490 ± 106 | $12.09^{+6.54}_{-5.85}$ | 1872^{+96}_{-88} | 4110^{+1338}_{-569} | 12^{+34}_{-7} |

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

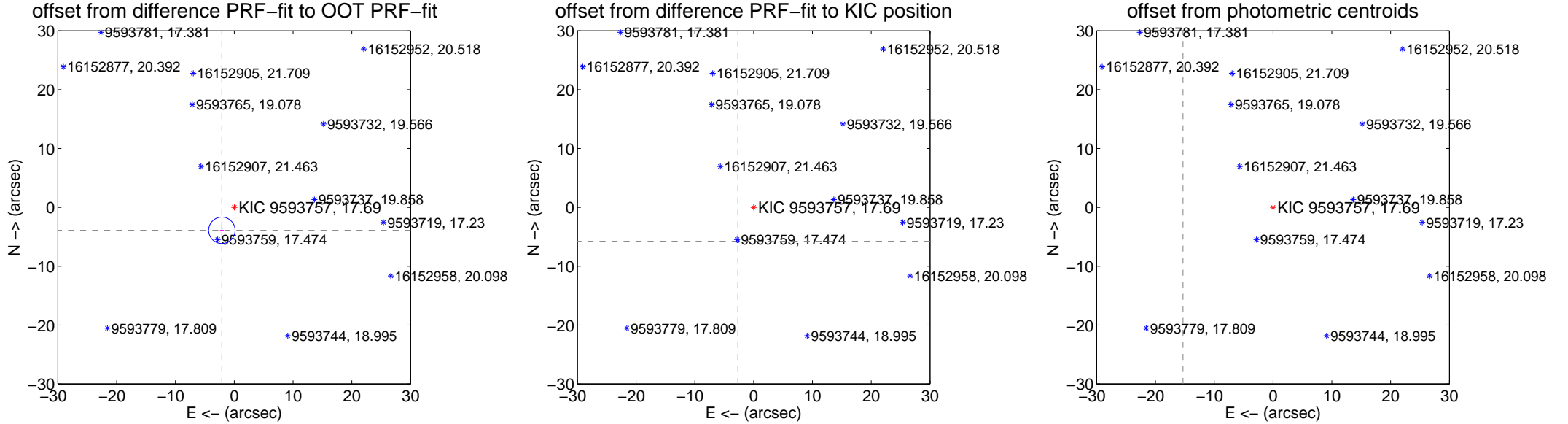
DV Centroid Data

Supplemental centroid analysis for 009593757-01. Kepler magnitude: 17.69. Transit SNR 34.21

There are 7 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 4.65 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 4.431 \pm 0.749 | 5.92 | 2.106 \pm 0.343 | -3.898 \pm 0.669 |
| PRF-fit source offset from KIC position | 6.345 \pm 0.076 | 83.37 | 2.679 \pm 0.071 | -5.751 \pm 0.076 |
| photometric centroid source offset | 37.70 \pm 0.27 | 137.28 | 15.32 \pm 0.23 | -34.45 \pm 0.28 |

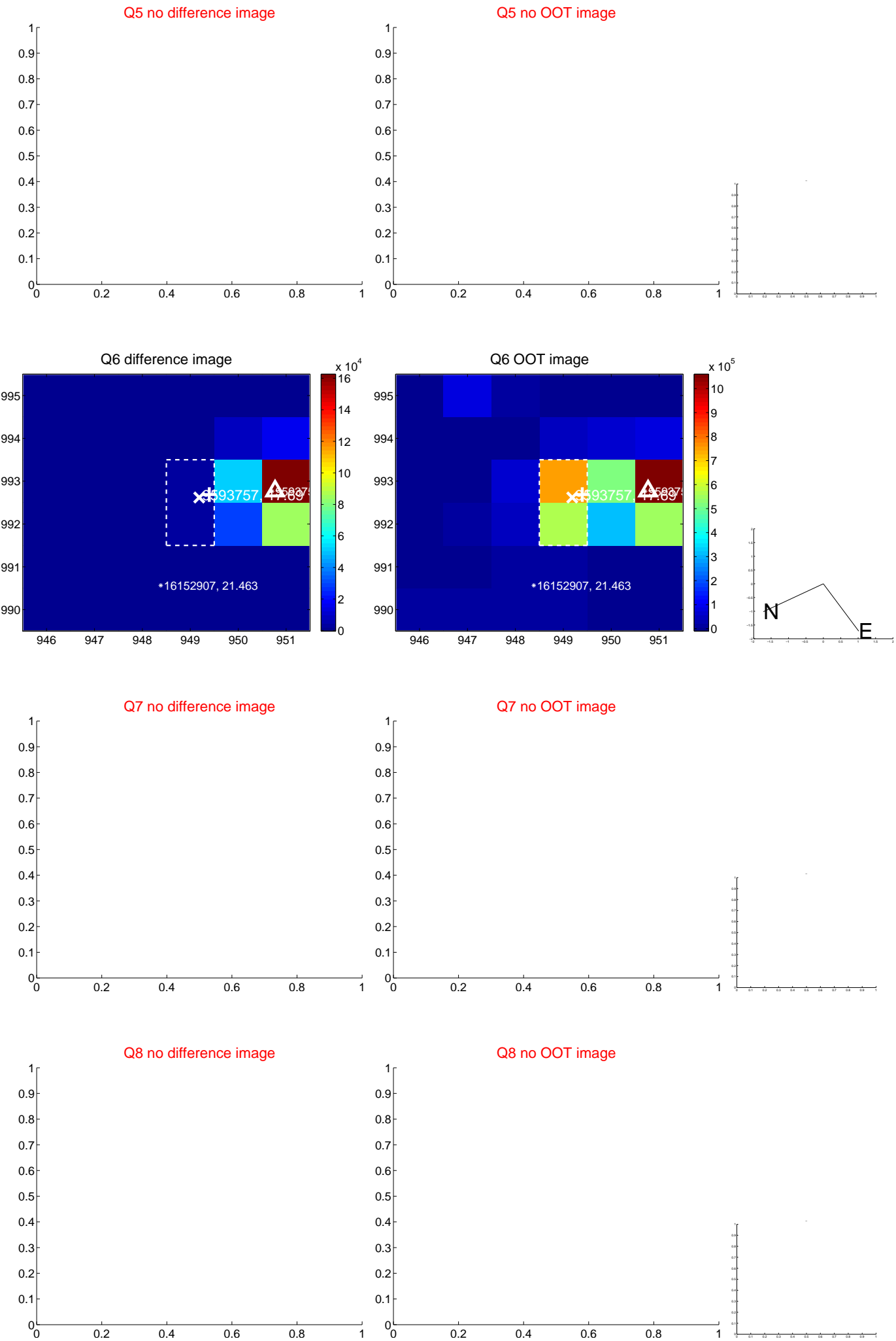


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

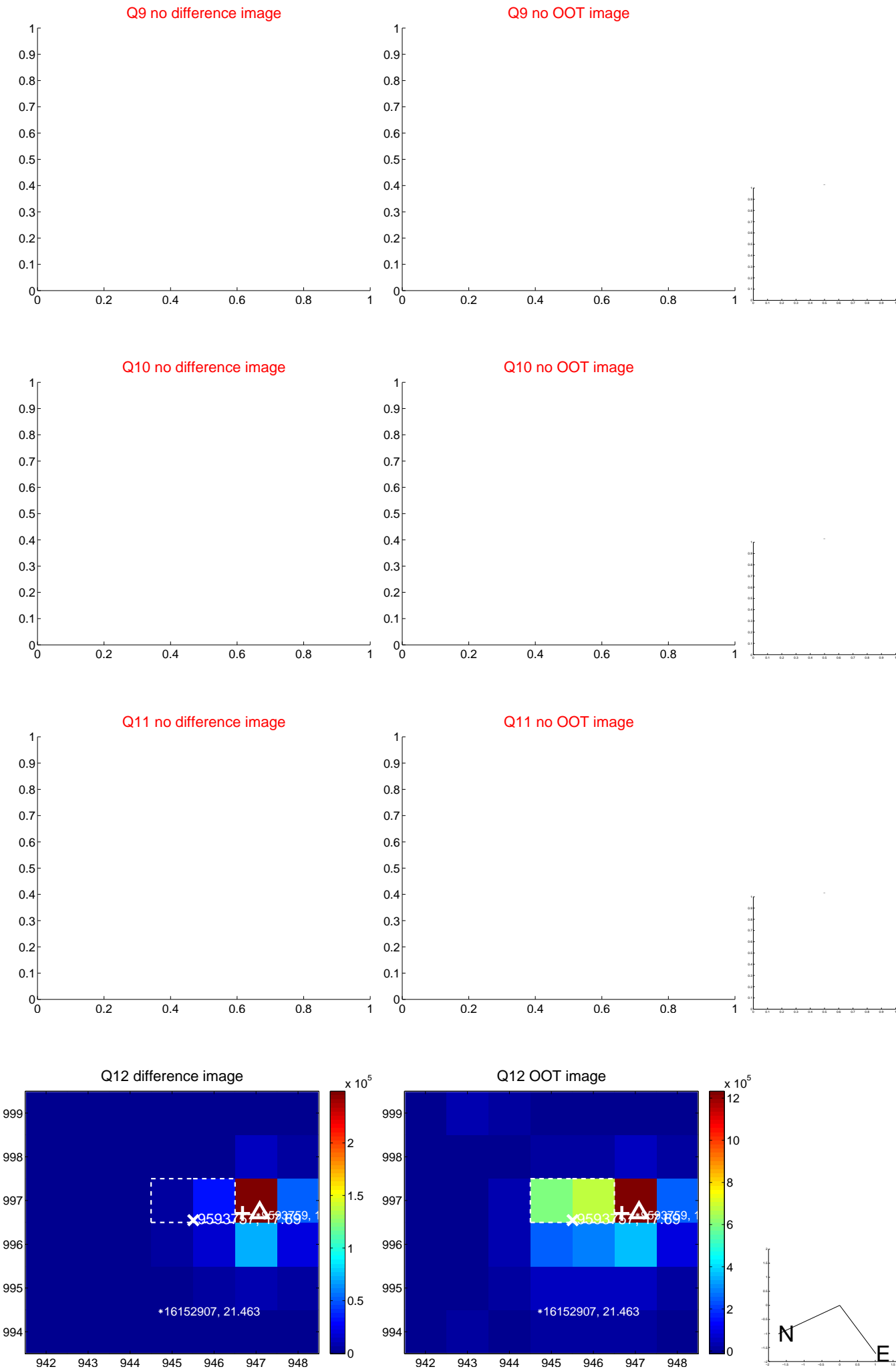
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



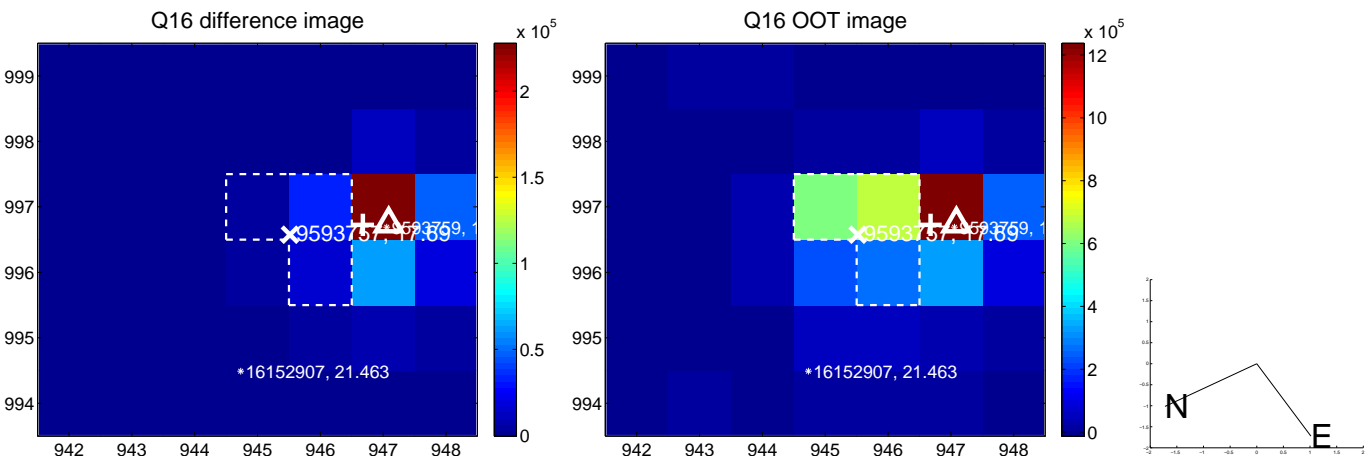
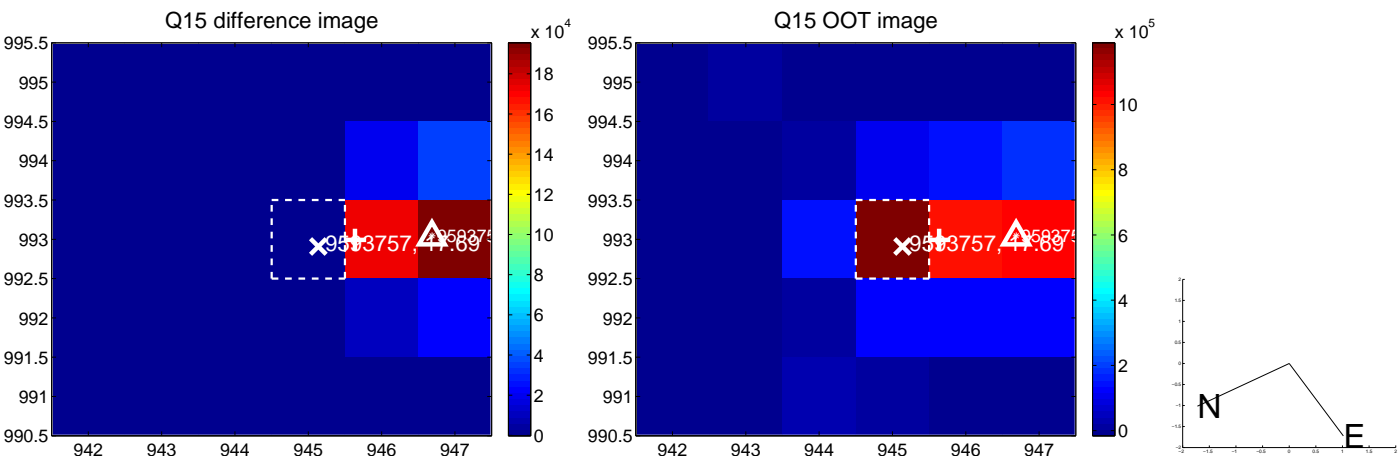
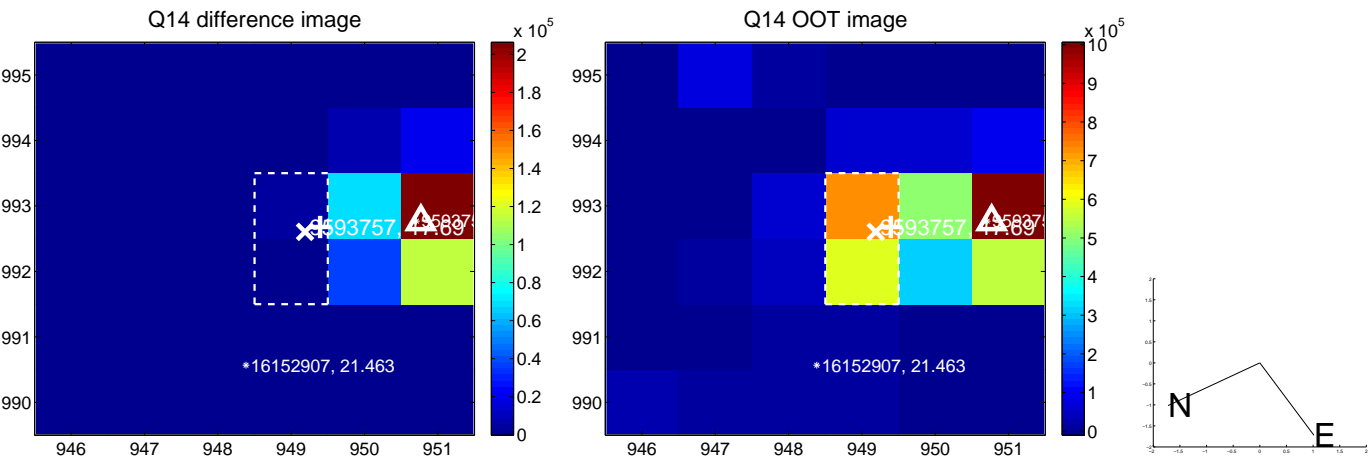
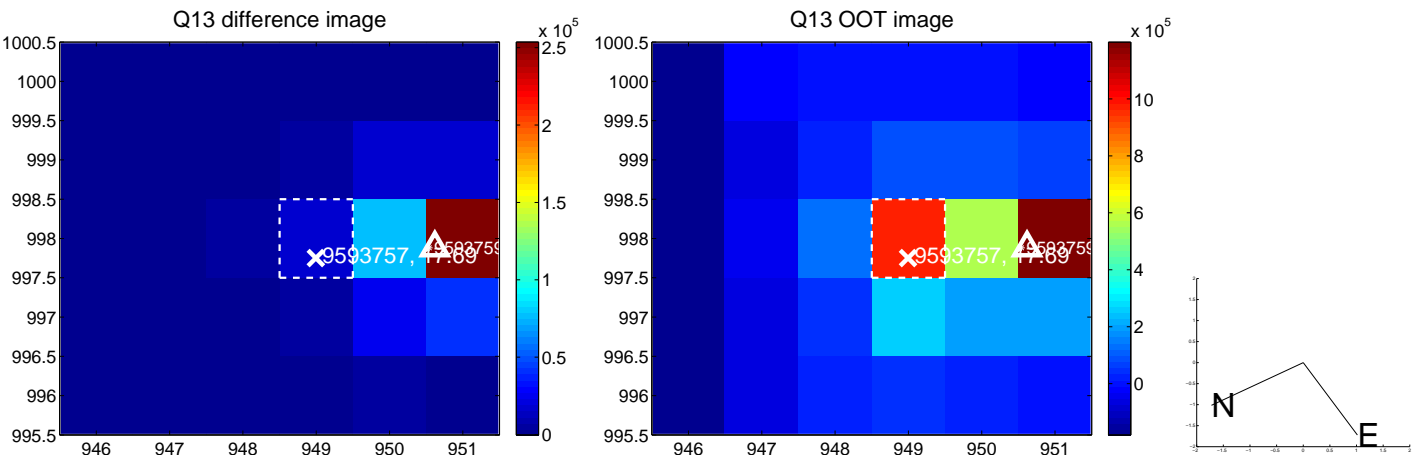
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



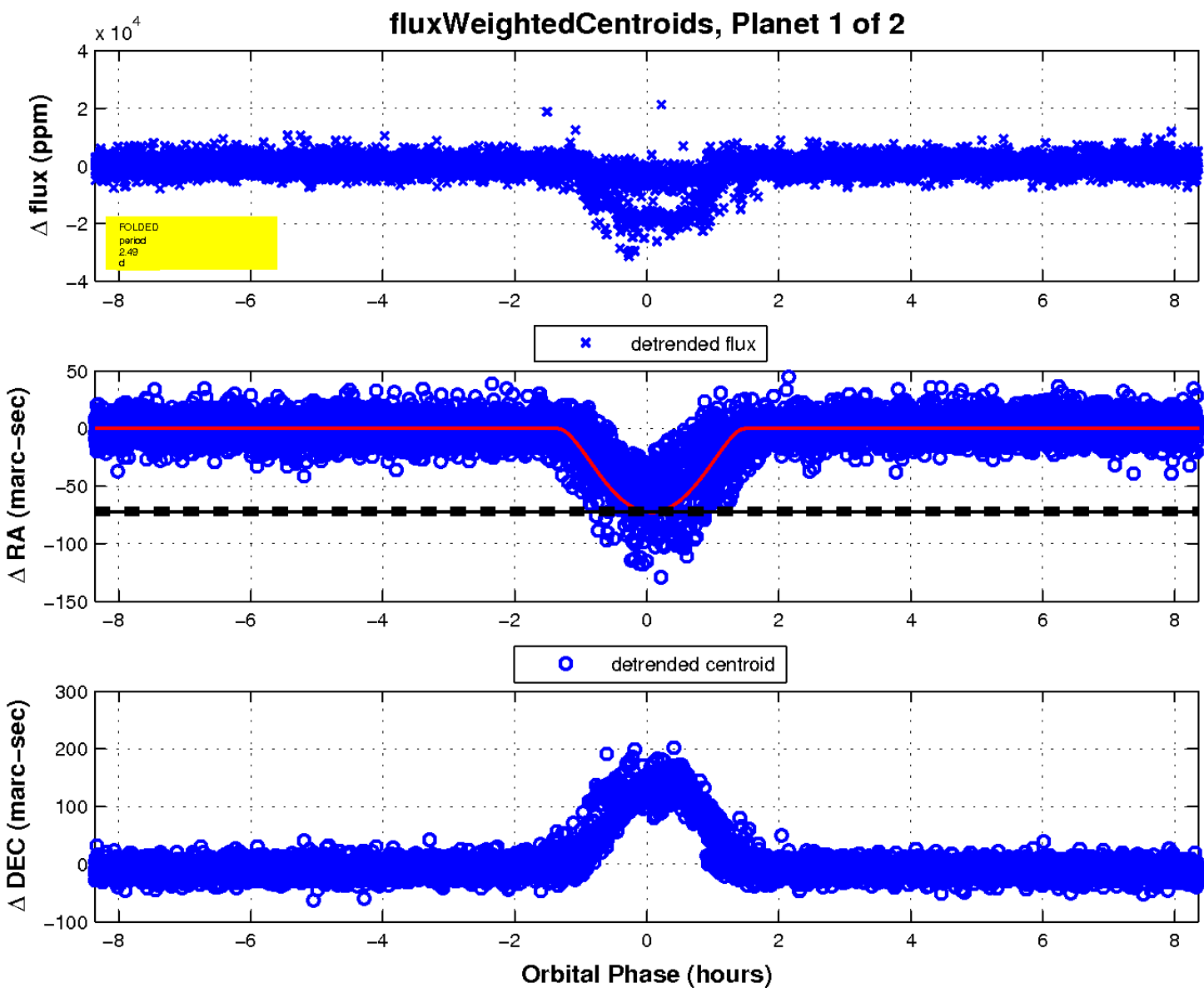
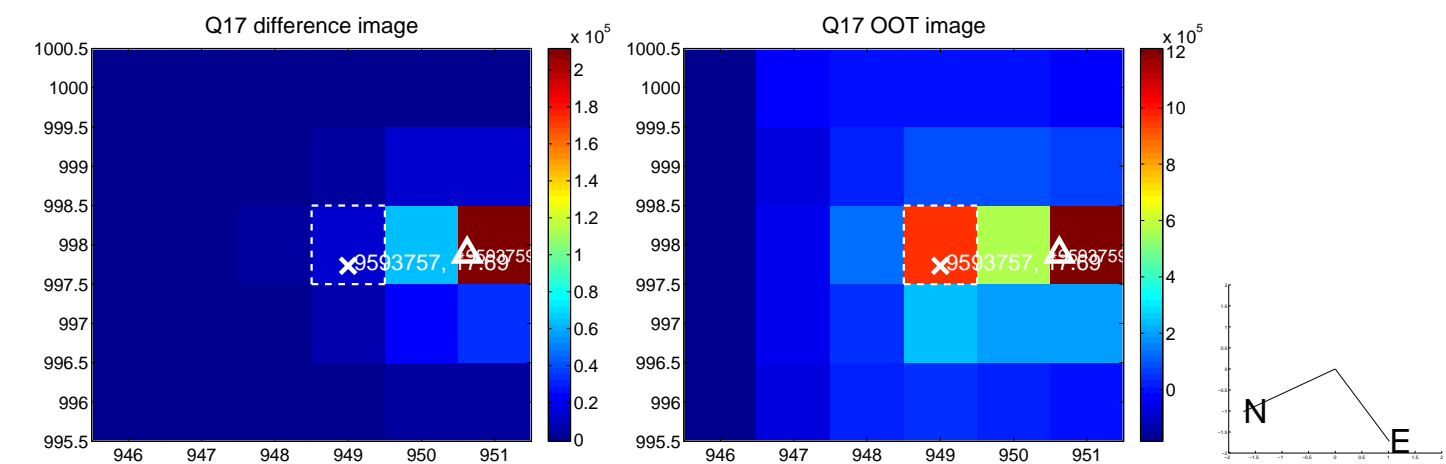
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

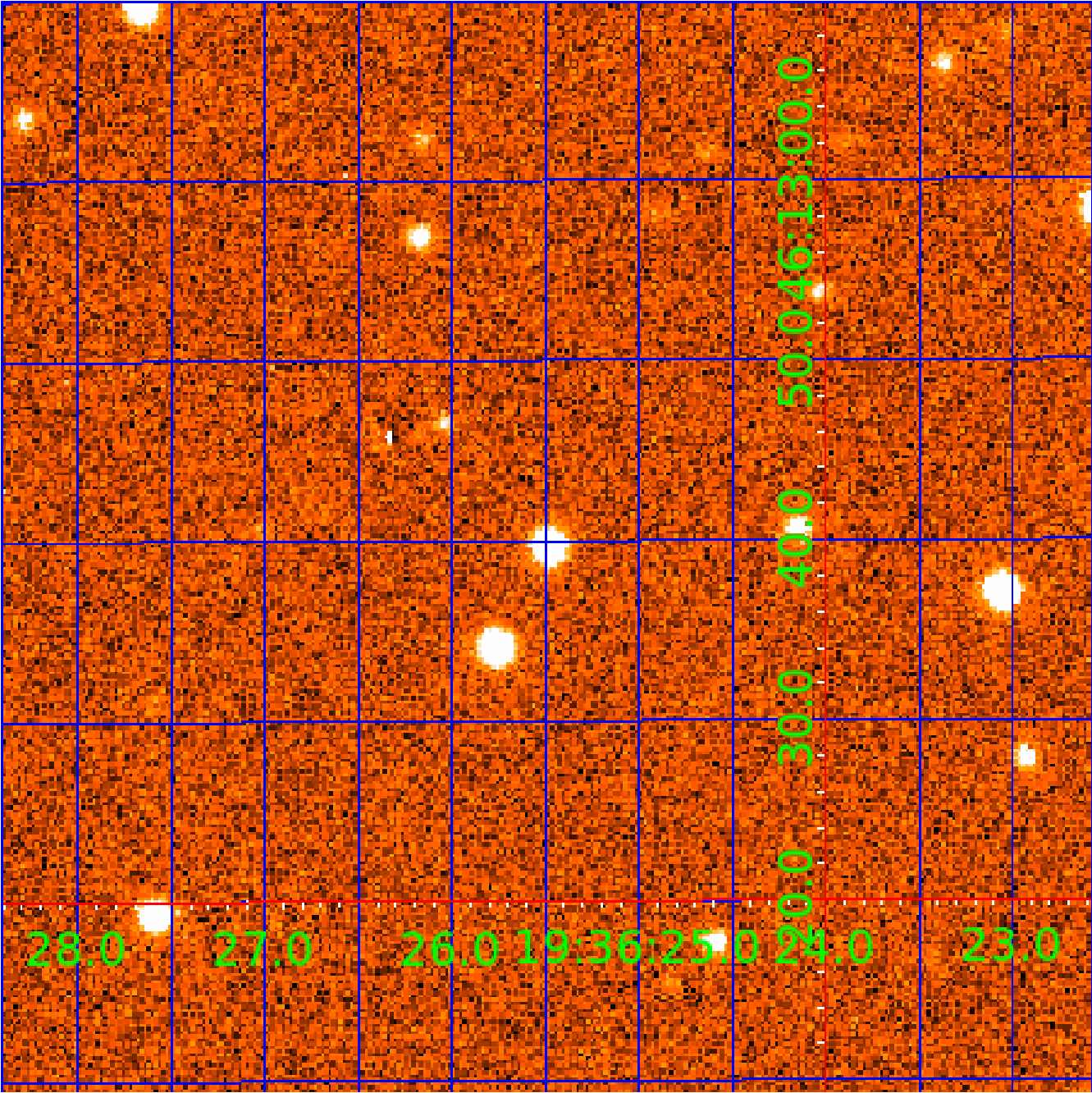


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009593757

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009593757-01 | OBS | 2774.01 | 2.494215 | 133.653979 | 4796.1 | 2.788 | 128.1 | 34.2 | 1.00 | 5780 | 10.48 | 771.54 |
| 009593757-02 | OBS | No | 2.494242 | 132.398918 | 1541.3 | 2.027 | 13.6 | 14.4 | 1.00 | 5780 | 4.59 | 771.53 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 009593757-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 1 | MOD_SEC_DV—MOD_SEC_ALT—DEEP_V_SHAPED—HAS_SEC_TCE—SEASONAL_DEPTH_DV—SEASONAL_DEPTH_ALT—CENT_RESOLVED_OFFSET—EPHEM_MATCH |
| 009593757-02 | OBS | FP | 0.00 | 1 | 1 | 1 | 1 | IS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH |

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 009593757-02

| TCE (1) | KIC | Parent (2) | Parent KIC | $P_1:P_2$ | Dist ($''$) | Δ Row | Δ Col | m_2 | m_1 | D_2/D_1 | Mechanism | Flag | σ_P | σ_T |
|--------------|---------|--------------|------------|-----------|---------------|--------------|--------------|-------|-------|-----------|------------|------|------------|------------|
| 009593757-02 | 9593757 | 009593759-02 | 9593759 | 1:1 | 6.2 | 0 | -2 | 17.47 | 17.69 | 15.64 | Direct-PRF | 0 | 0.86 | 0.93 |

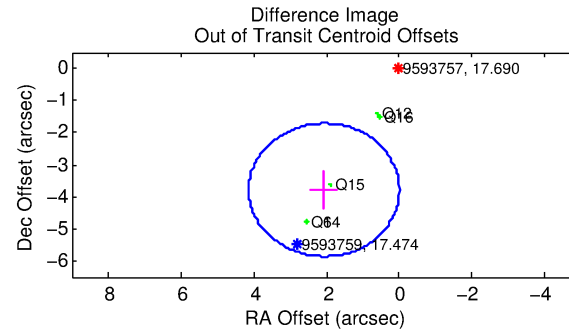
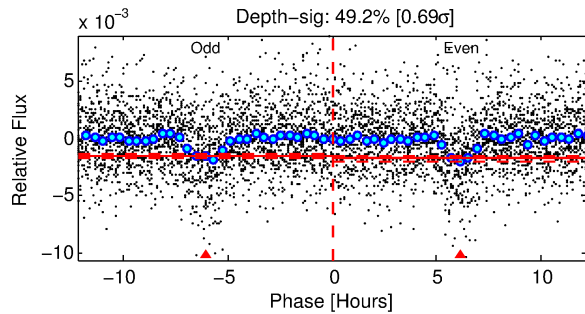
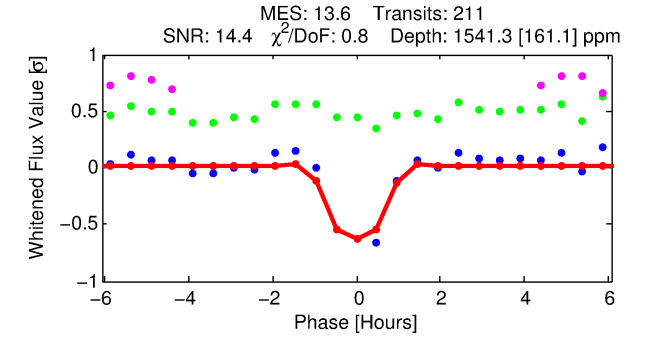
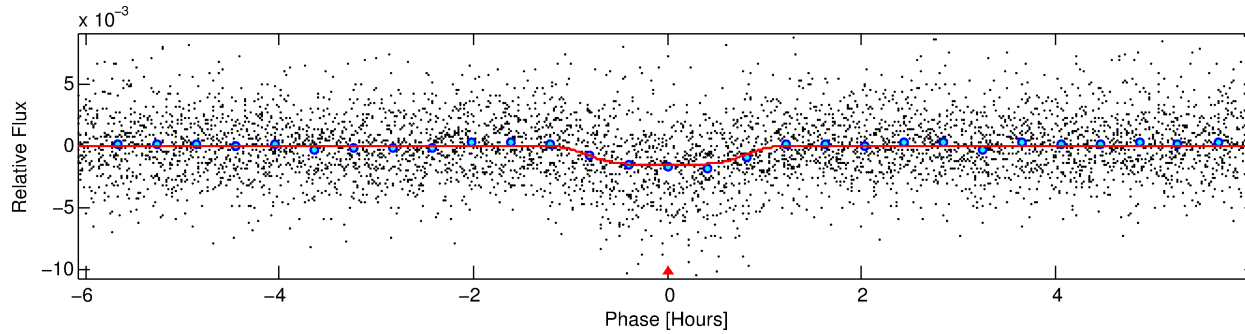
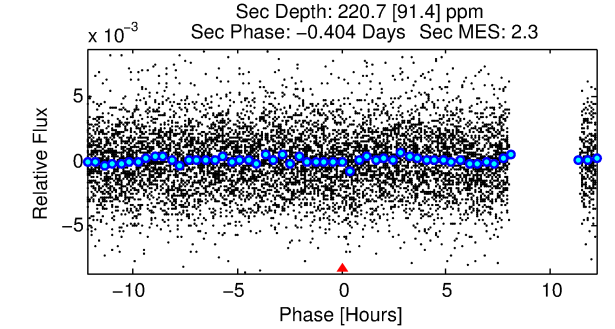
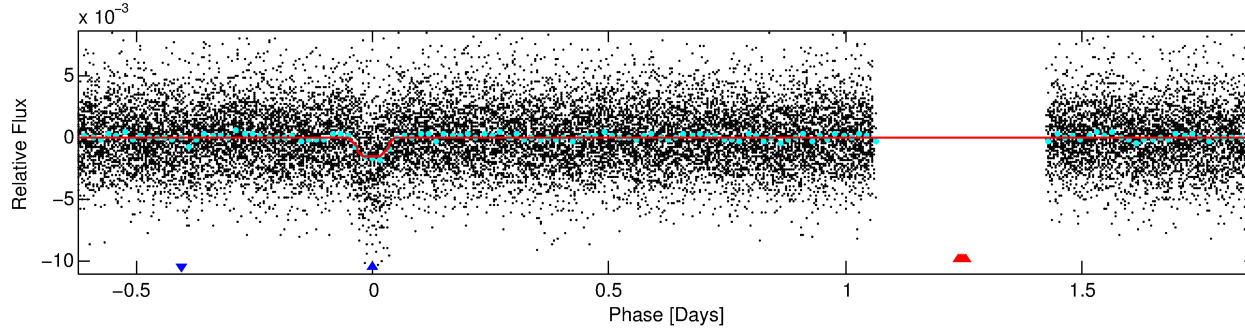
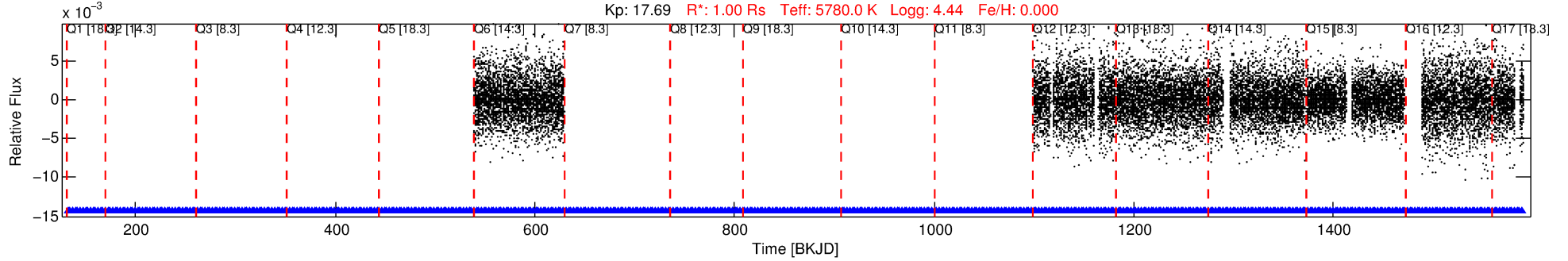
Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 9593757 Candidate: 2 of 2 Period: 2.494 d

KOI: K02774 Corr: No Ephemeris Match

Kp: 17.69 R*: 1.00 Rs Teff: 5780.0 K Logg: 4.44 Fe/H: 0.000



DV Fit Results:

Period = 2.49424 [0.00001] d
Epoch = 132.3989 [0.0022] BKJD
Rp/R* = 0.0421 [0.0092]
a/R* = 5.37 [4.78]
b = 0.88 [0.25]
Seff = 771.53 [0.00]
Teq = 1344 [0] K
Rp = 4.59 [1.01] Re
a = 0.0360 [0.0000] AU
Ag = 7.47 [4.50] [1.44σ]
Teffp = 3435 [518] K [4.04σ]

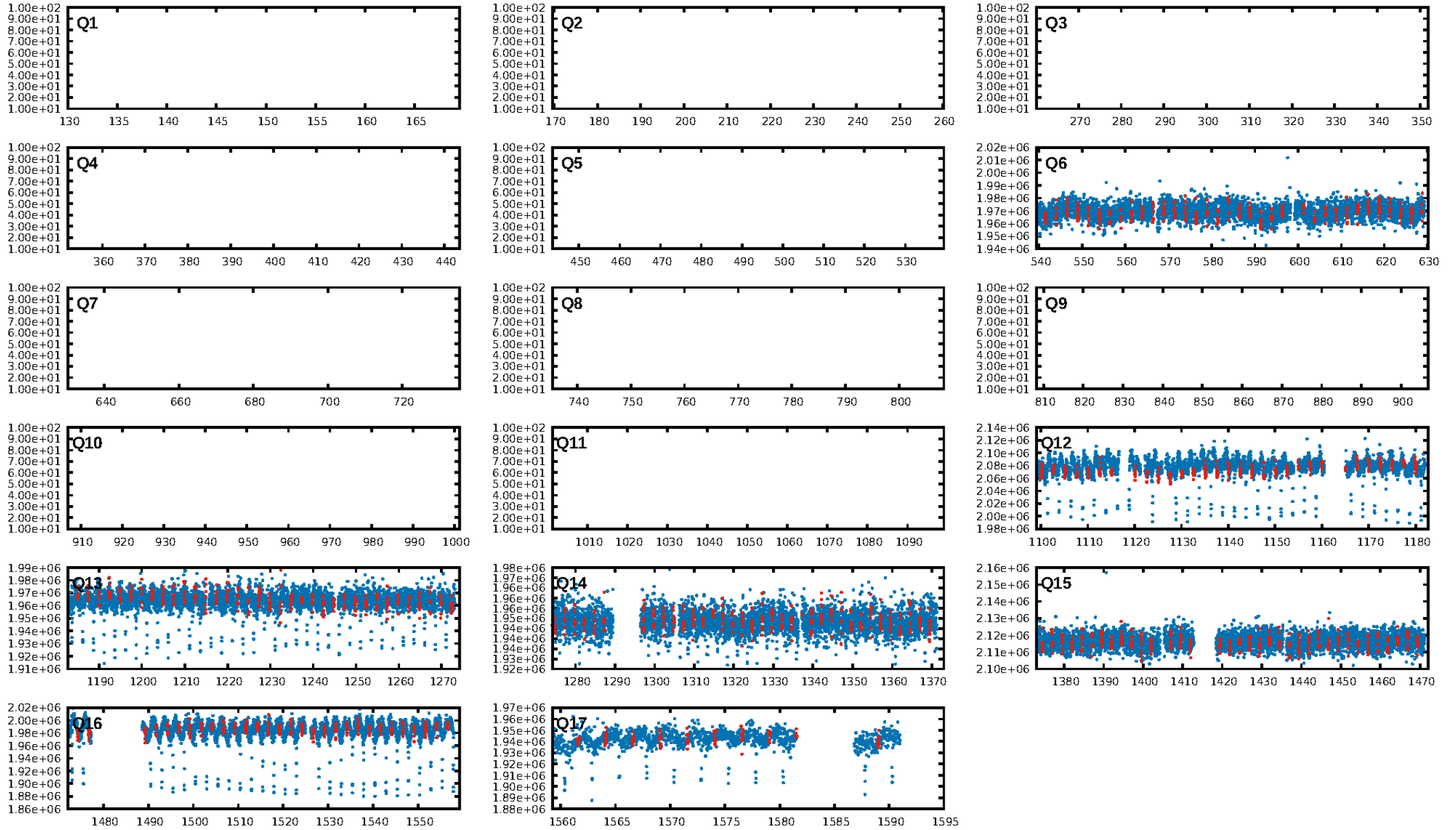
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 3.91e-44
RollingBand-fgt: 1.00 [201/201]
GhostDiagnostic-chr: -0.2949
Centroid-sig: N/A
Centroid-so: 12.830 arcsec [15.74σ]
OotOffset-rm: 4.314 arcsec [6.24σ]
KicOffset-rm: 6.294 arcsec [74.97σ]
OotOffset-st: 2/1/2/0 [5]
KicOffset-st: 2/1/2/2 [7]
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DiffImageOverlap-fno: 1.00 [7/7]

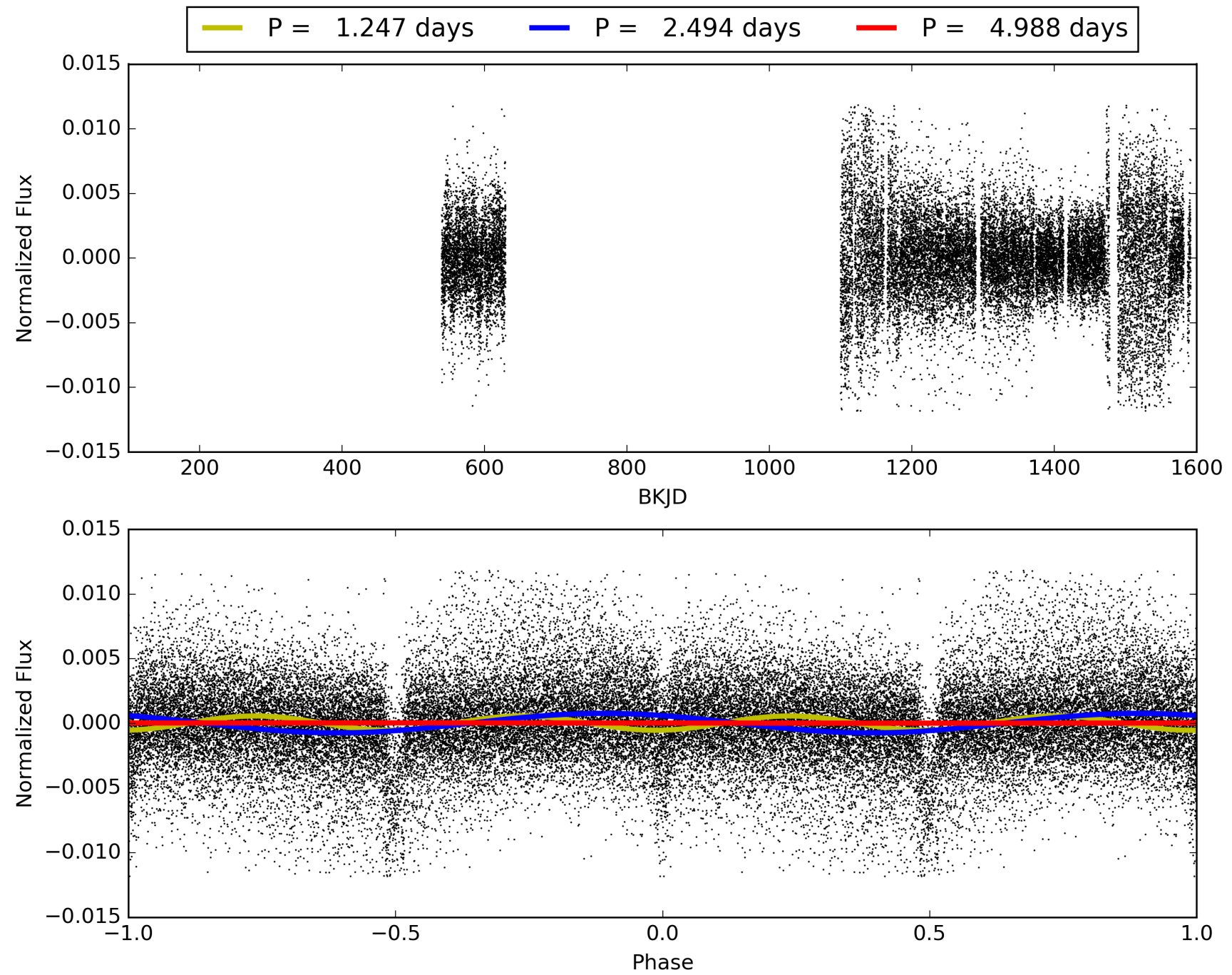
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 09:27:24 Z

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

TCE 009593757-02, PDC Light Curves

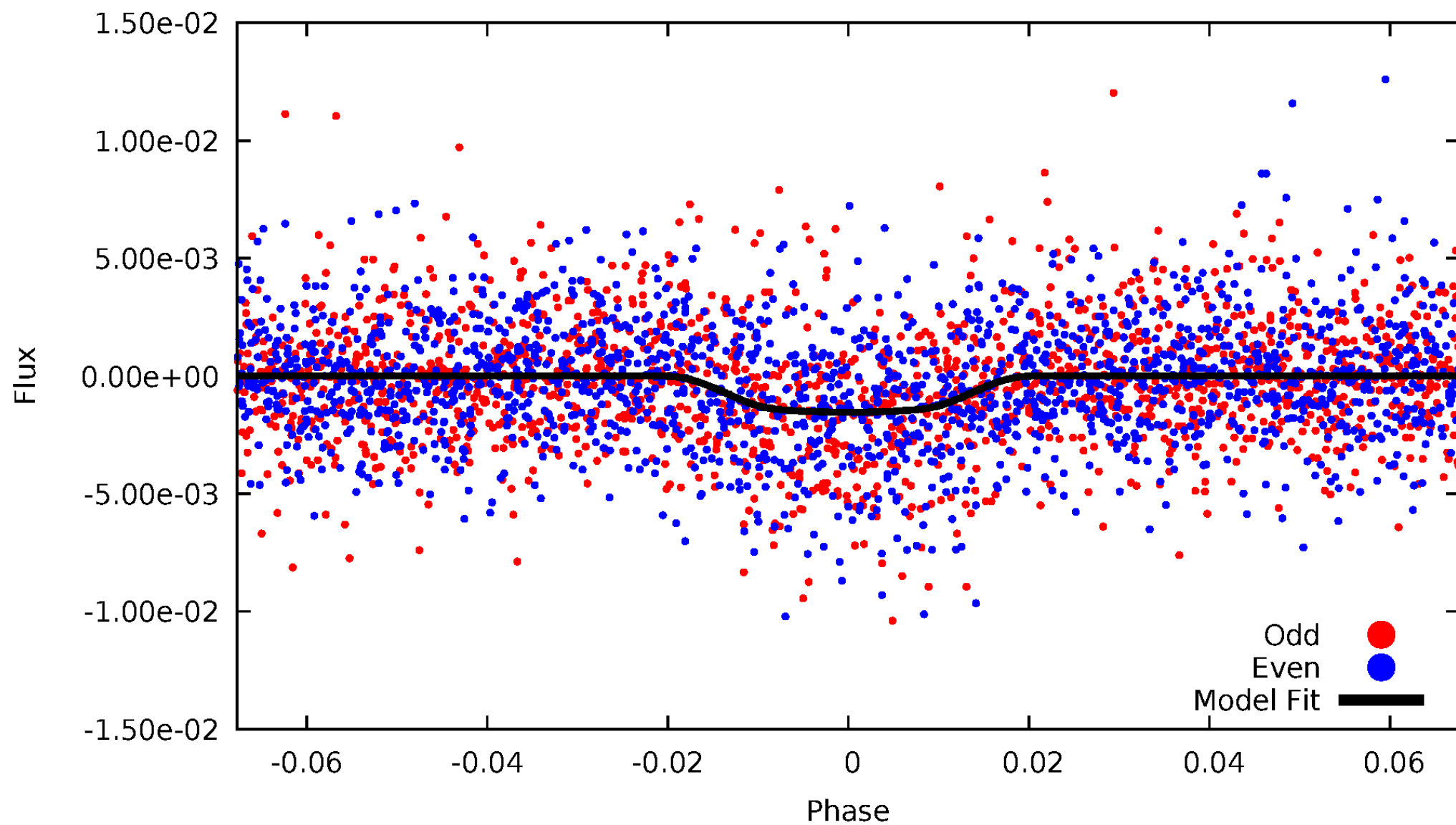


TCE 009593757-02



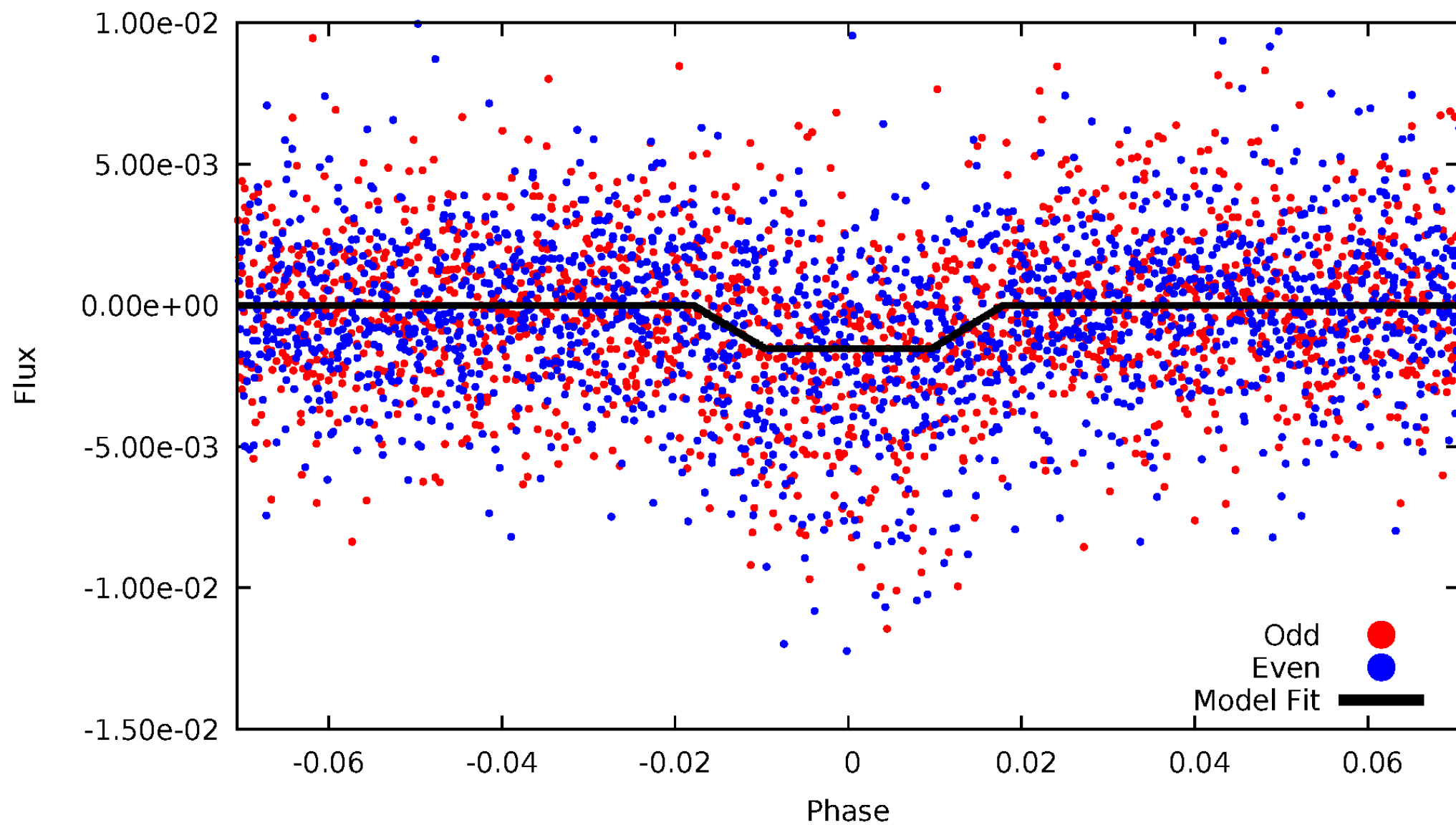
DV Odd/Even

TCE 009593757-02



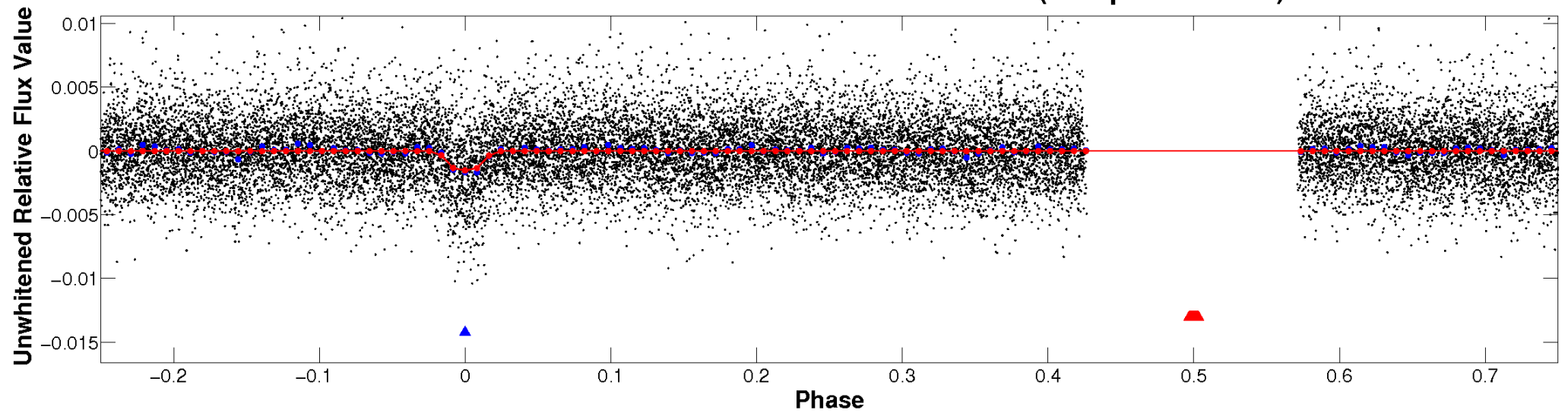
ALT Odd/Even

TCE 009593757-02

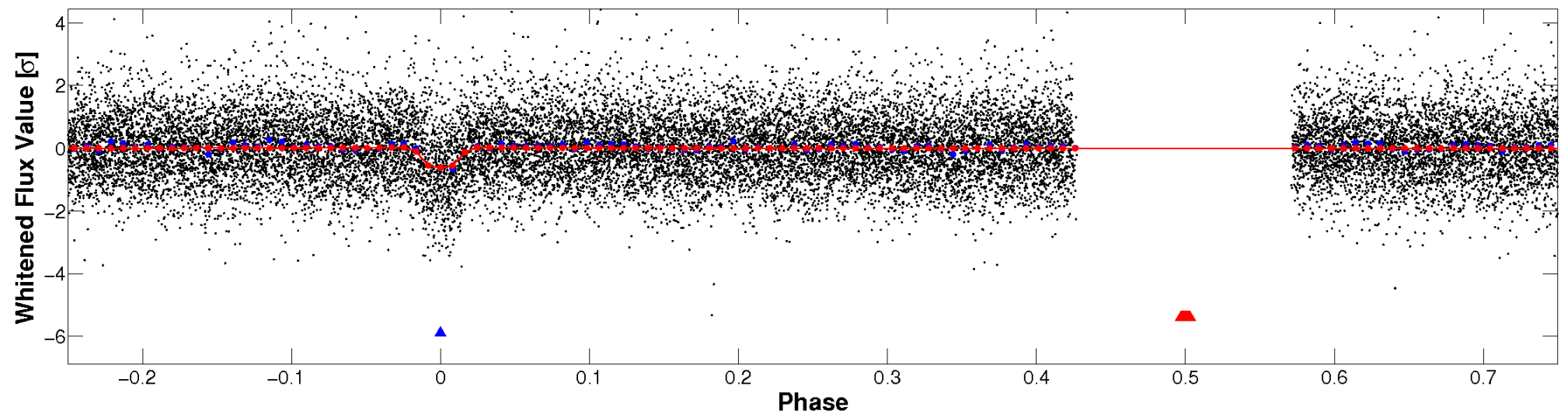


Non-Whitened Vs. Whitened Light Curve

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

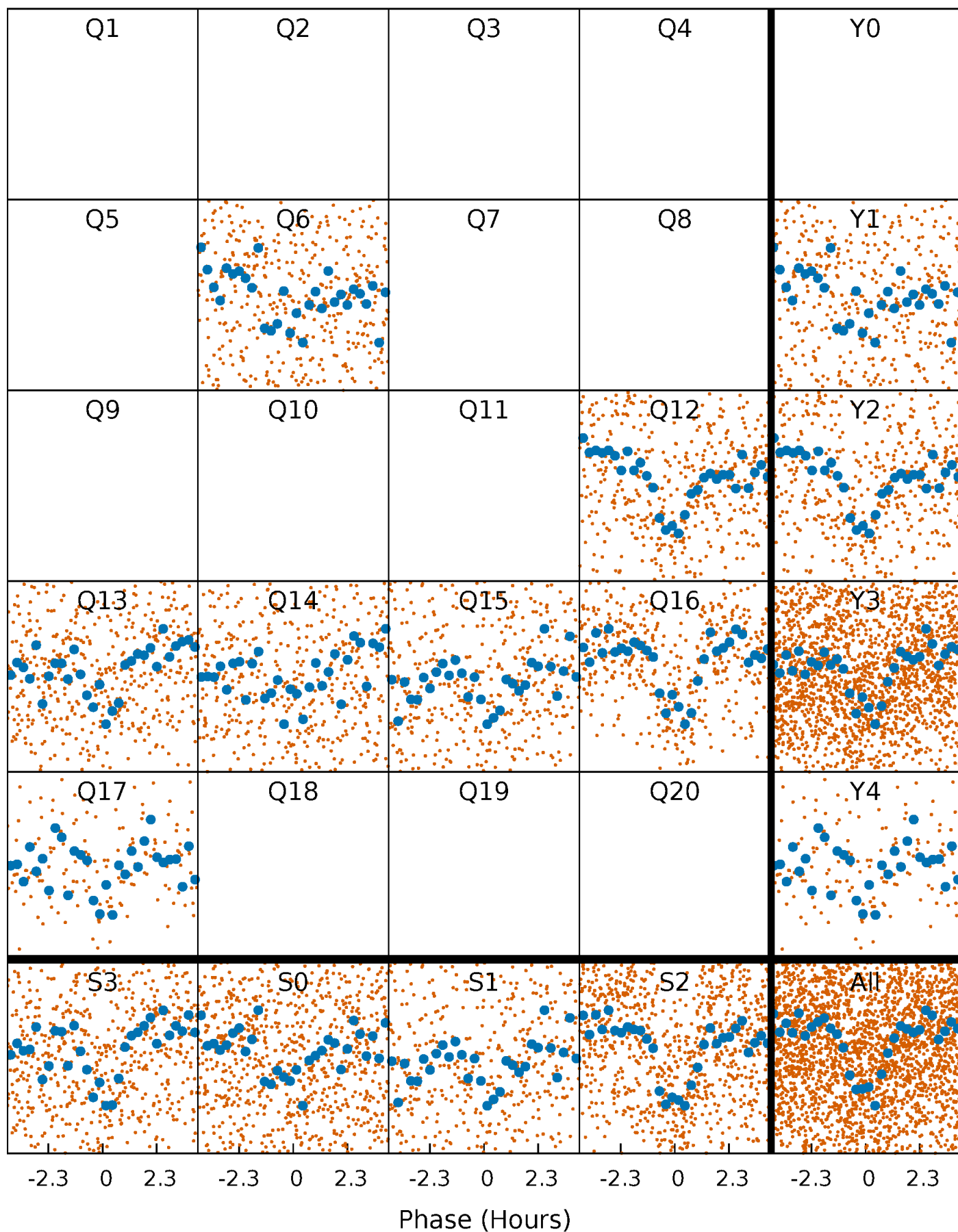


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



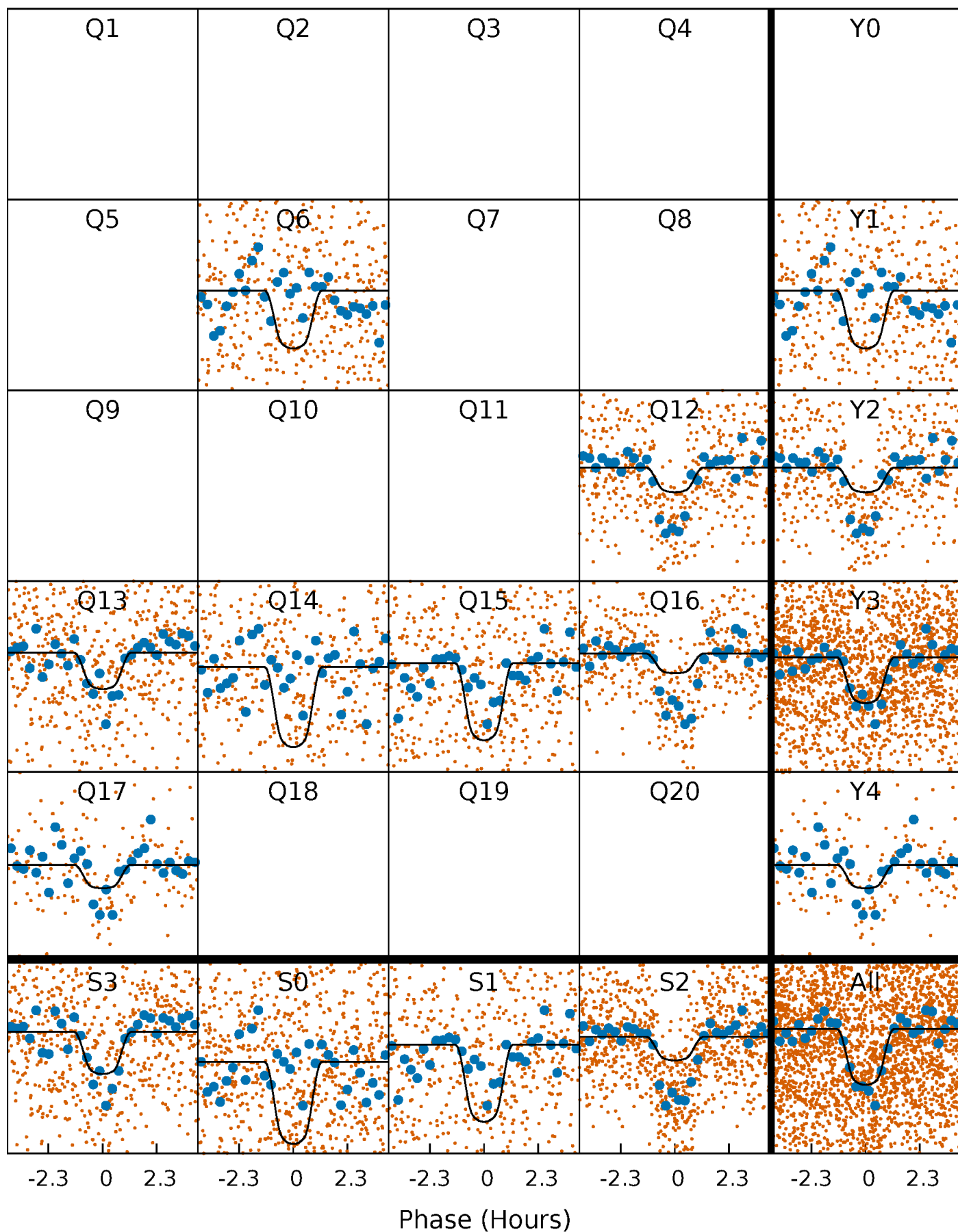
PDC Quarter-Phased Transit Curves

TCE 009593757-02 $P = 2.494242$ Days $T_0 = 132.398918$ (BKJD)



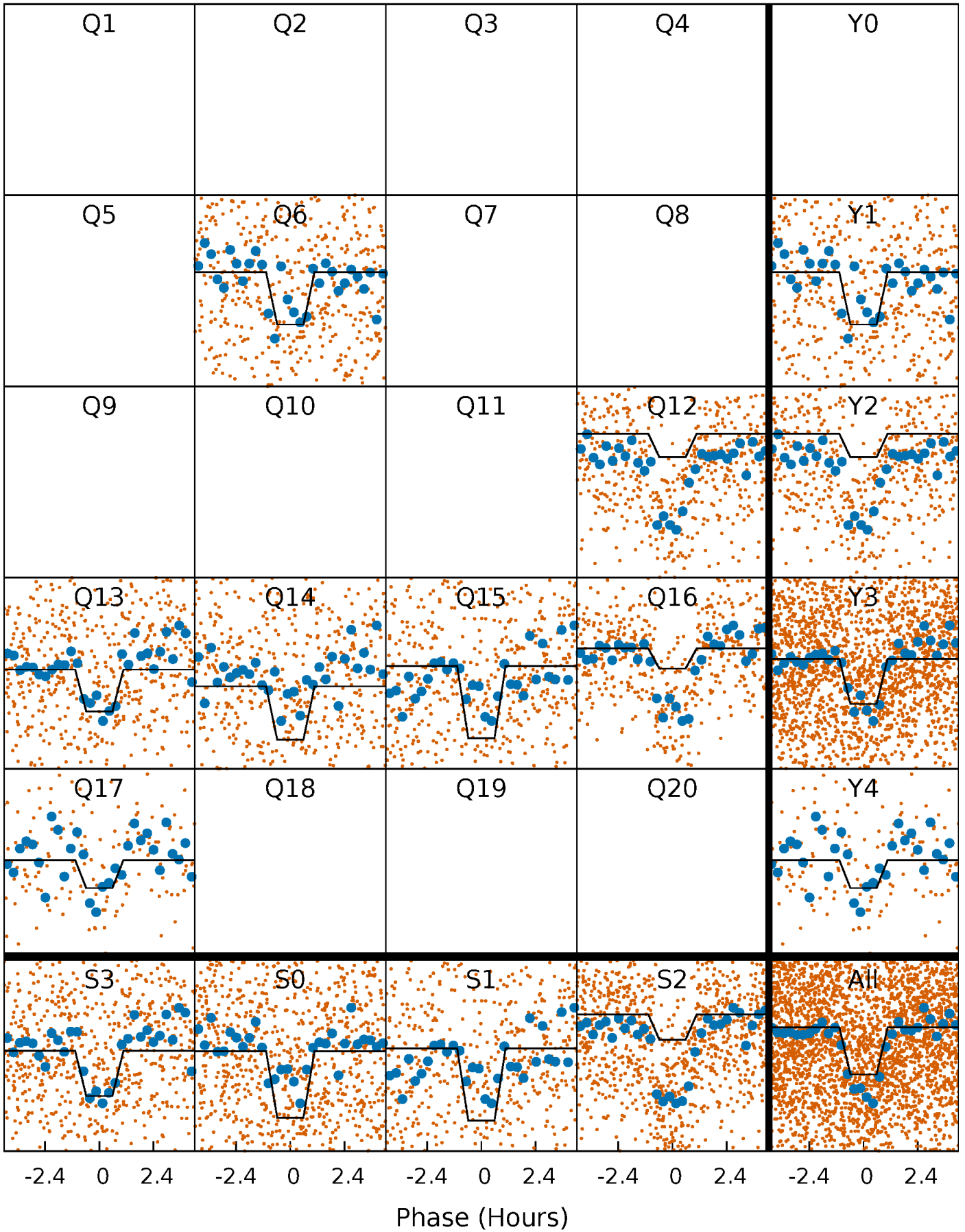
DV Quarter-Phased Transit Curves

TCE 009593757-02 $P = 2.494242$ Days $T_0 = 132.398918$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

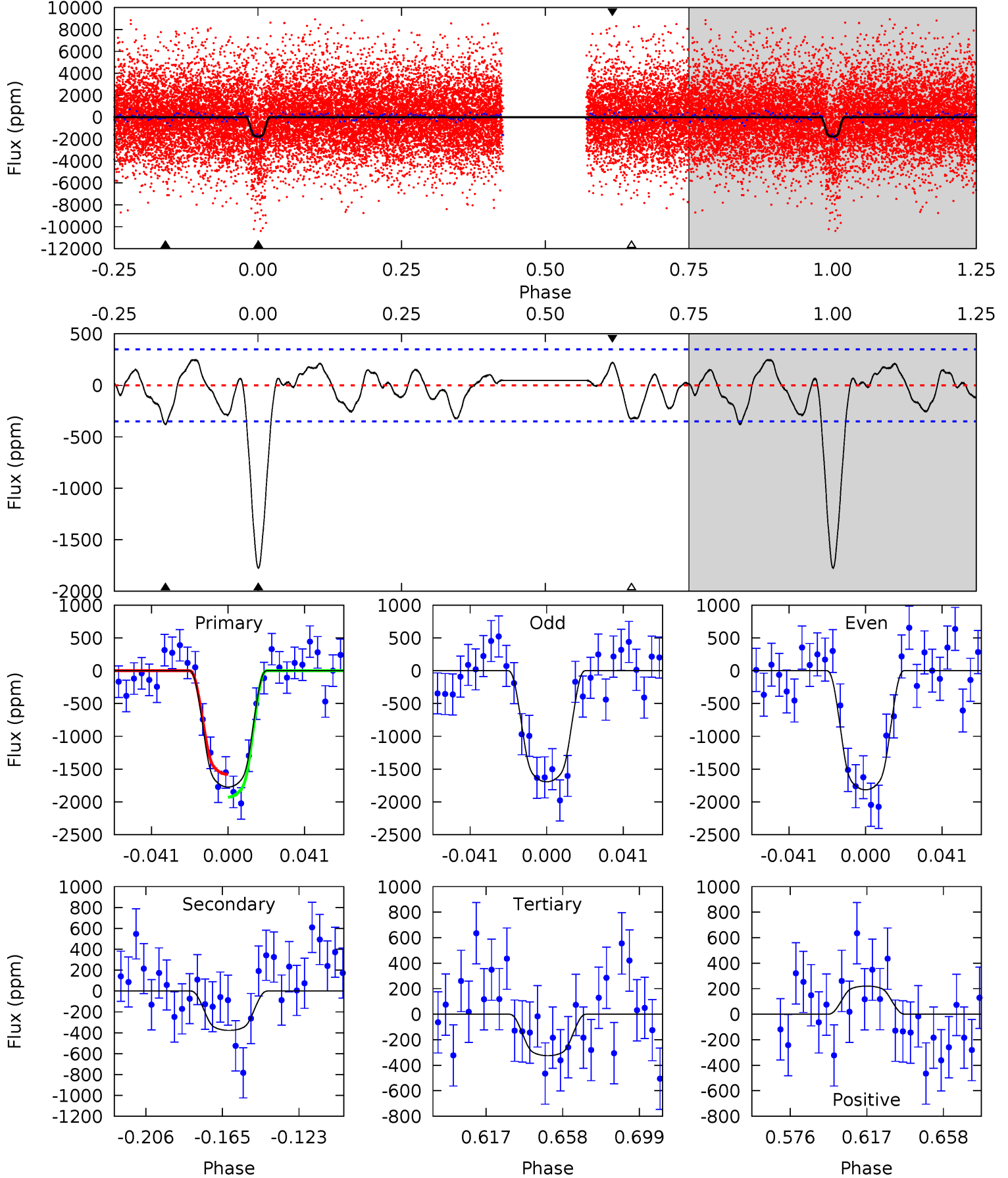
TCE 009593757-02 P= 2.494257 Days $T_0=132.391390$ (BKJD)



DV Model-Shift Uniqueness Test

009593757-02, P = 2.494242 Days, E = 132.398918 Days

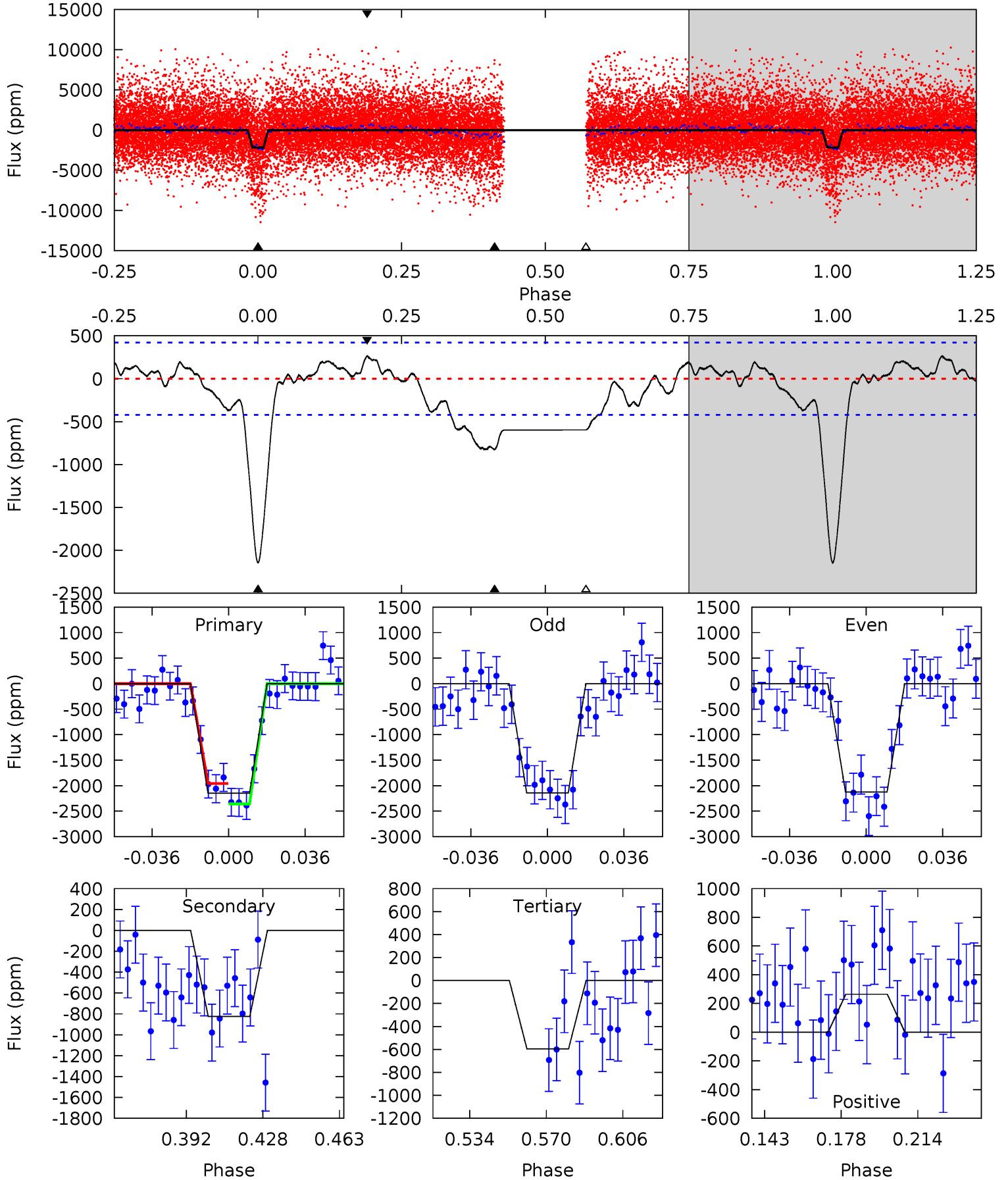
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 24.1 | 5.12 | 4.41 | 2.99 | 4.75 | 2.04 | 1.91 | 19.7 | 21.1 | 0.71 | 2.13 | 0.82 | 1.28 | 0.12 | 2.35 |



Alt Model-Shift Uniqueness Test

009593757-02, P = 2.494257 Days, E = 132.391390 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 24.3 | 9.36 | 6.76 | 2.99 | 4.78 | 2.10 | 2.46 | 17.6 | 21.4 | 2.60 | 6.37 | 0.09 | 1.34 | 0.11 | 0 |



Stellar Parameters For KIC 009593757

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|---------------------|---------------------------|---------------------------|---------------------------|----------------------------|---|
| | 5780^{+1}_{-1} | $4.438^{+1.000}_{-1.000}$ | $0.000^{+1.000}_{-1.000}$ | $1.000^{+1.000}_{-1.000}$ | $-1.000^{+1.000}_{-1.000}$ | $-1.000^{+1.000}_{-1.000}$ |
| | +0%/-0% | +23%/-23% | +inf%/-inf% | +100%/-100% | +100%/-100% | +100%/-100% |
| Source | Solar | Solar | Solar | Solar | | |

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

Secondary Eclipse Parameters for KIC 009593757-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|---------------|------------------------|---------------------|----------------------|------------------|
| DV | -377 ± 74 | $4.56^{+1.11}_{-1.00}$ | 1877^{+95}_{-82} | 4157^{+464}_{-317} | 13^{+9}_{-5} |
| Alt. | -825 ± 88 | $4.20^{+1.08}_{-1.04}$ | 1885^{+100}_{-92} | 5059^{+733}_{-474} | 33^{+26}_{-12} |

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 $A_{obs} \gg 1.0$

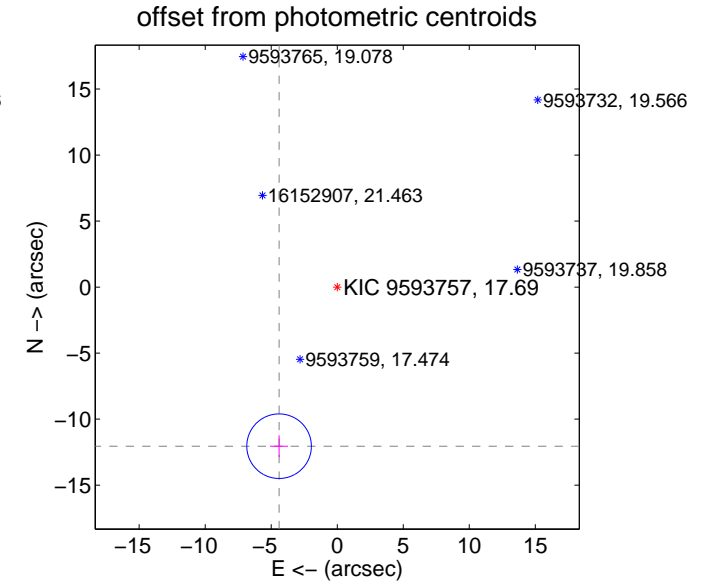
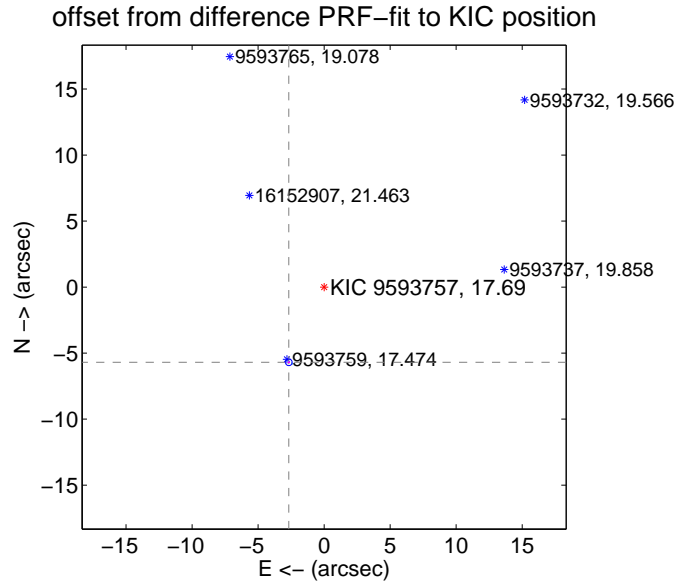
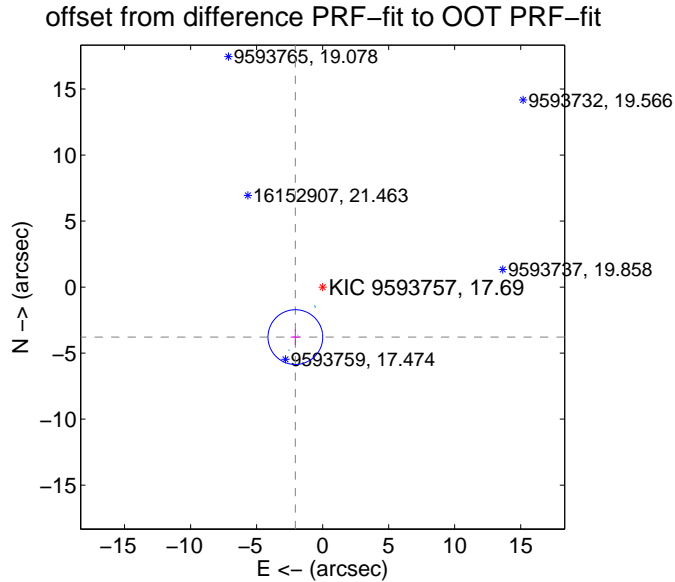
DV Centroid Data

Supplemental centroid analysis for 009593757-02. Kepler magnitude: 17.69. Transit SNR 14.36

There are 7 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 4.68 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 4.314 ± 0.691 | 6.24 | 2.066 ± 0.357 | -3.788 ± 0.596 |
| PRF-fit source offset from KIC position | 6.294 ± 0.084 | 74.97 | 2.674 ± 0.096 | -5.698 ± 0.080 |
| photometric centroid source offset | 12.83 ± 0.82 | 15.74 | 4.41 ± 0.68 | -12.05 ± 0.83 |

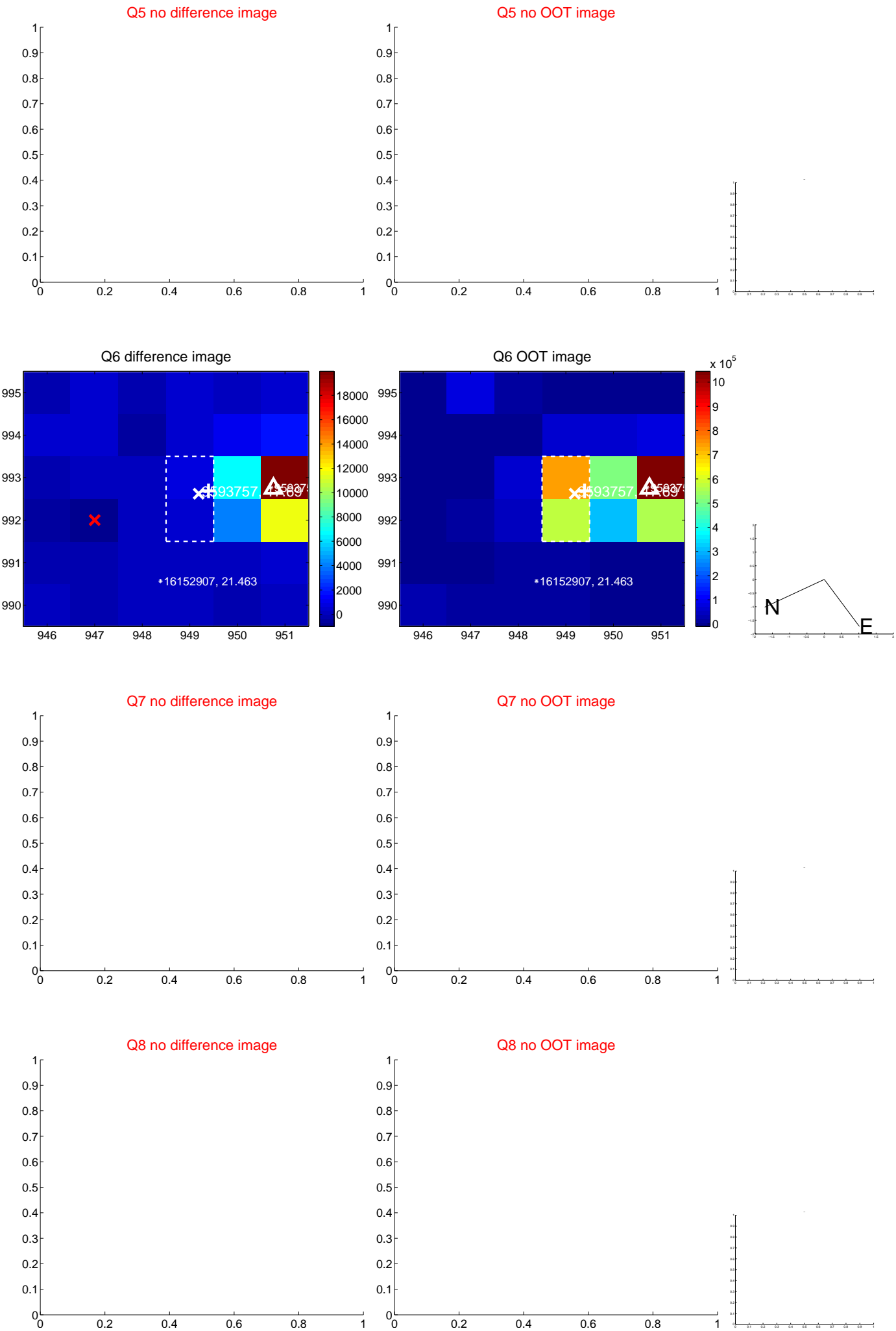


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

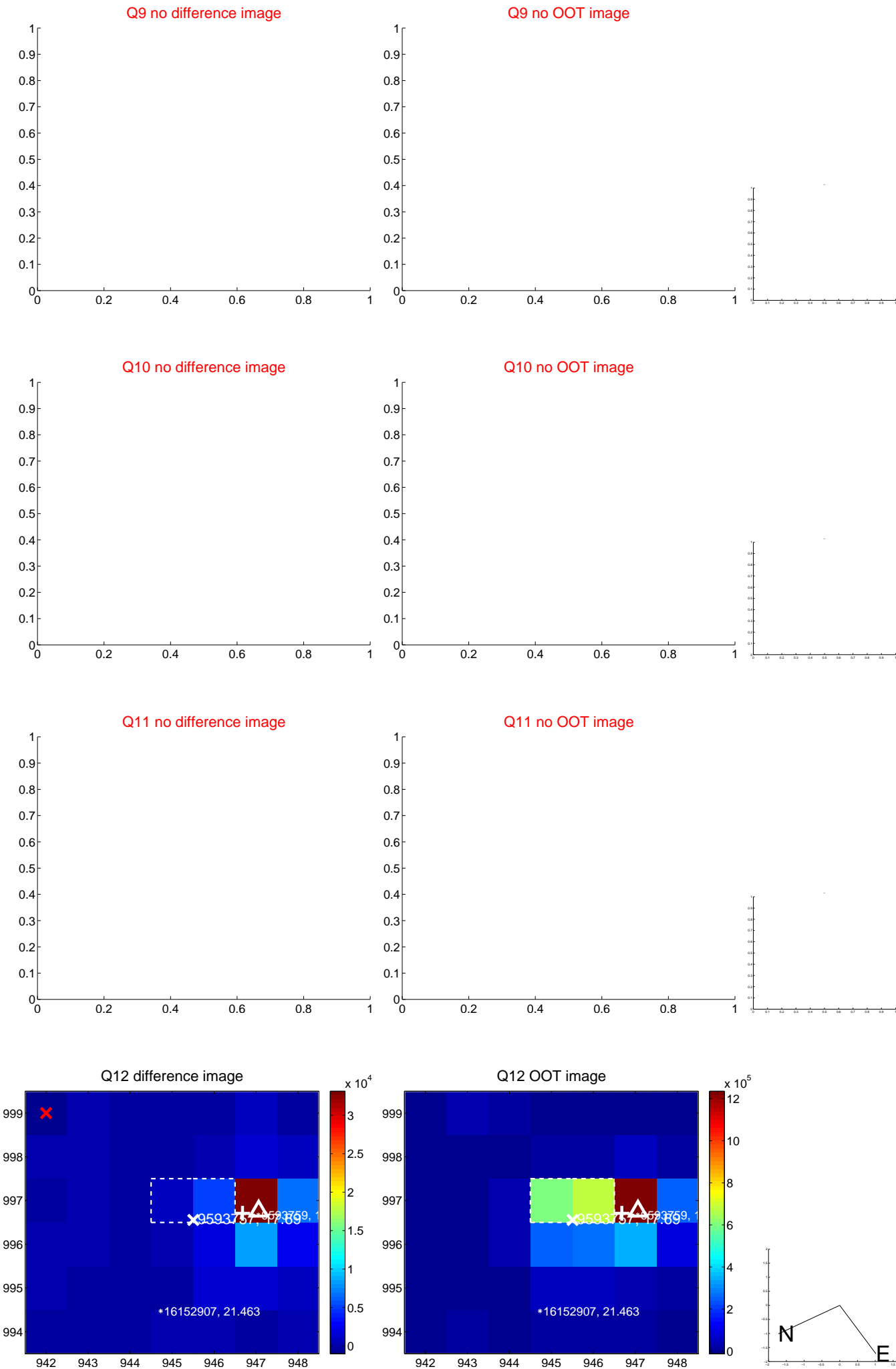
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



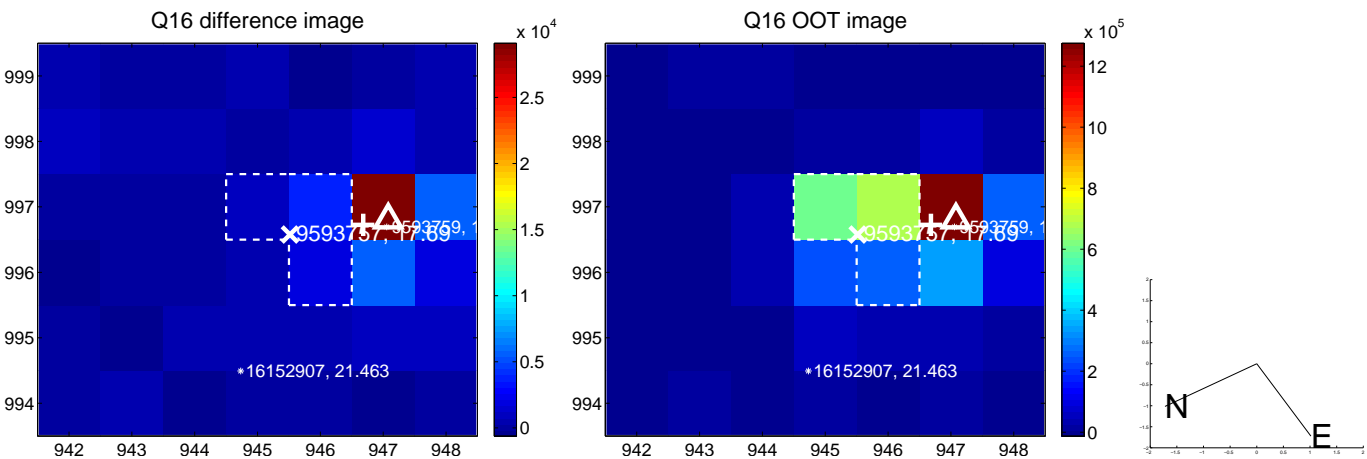
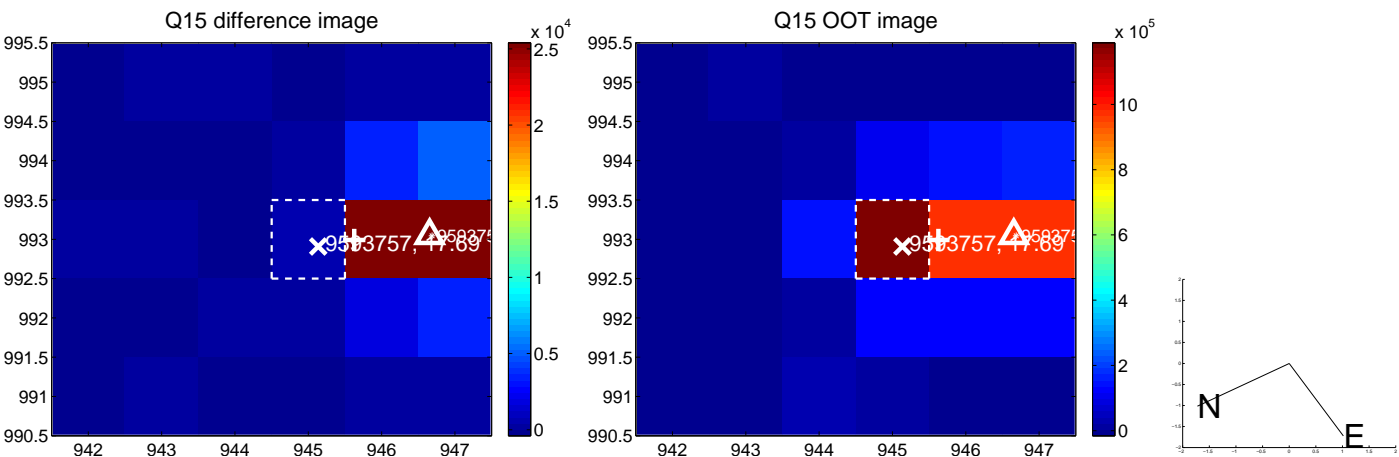
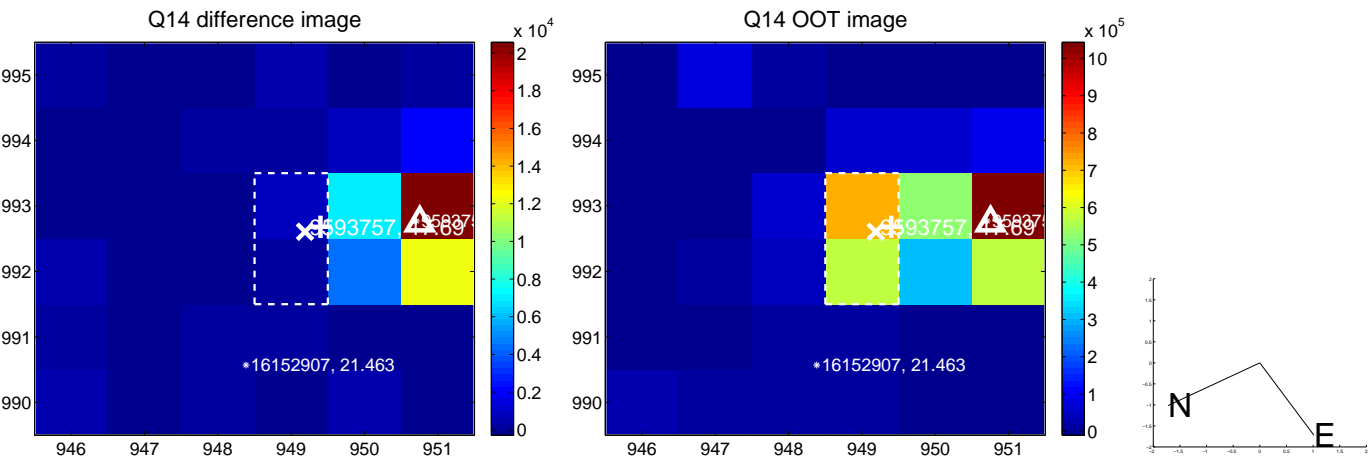
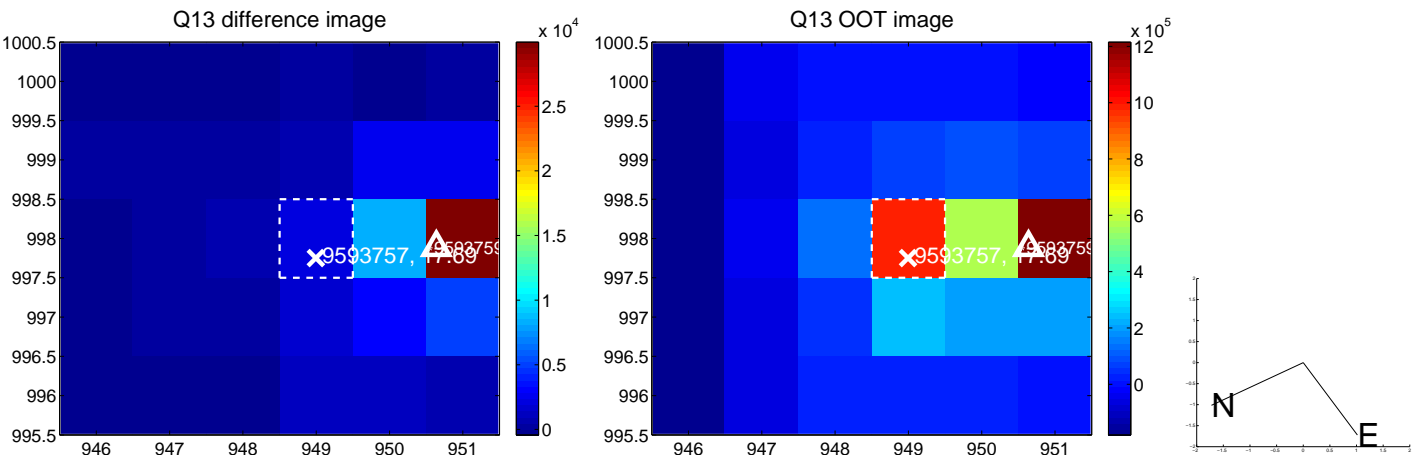
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



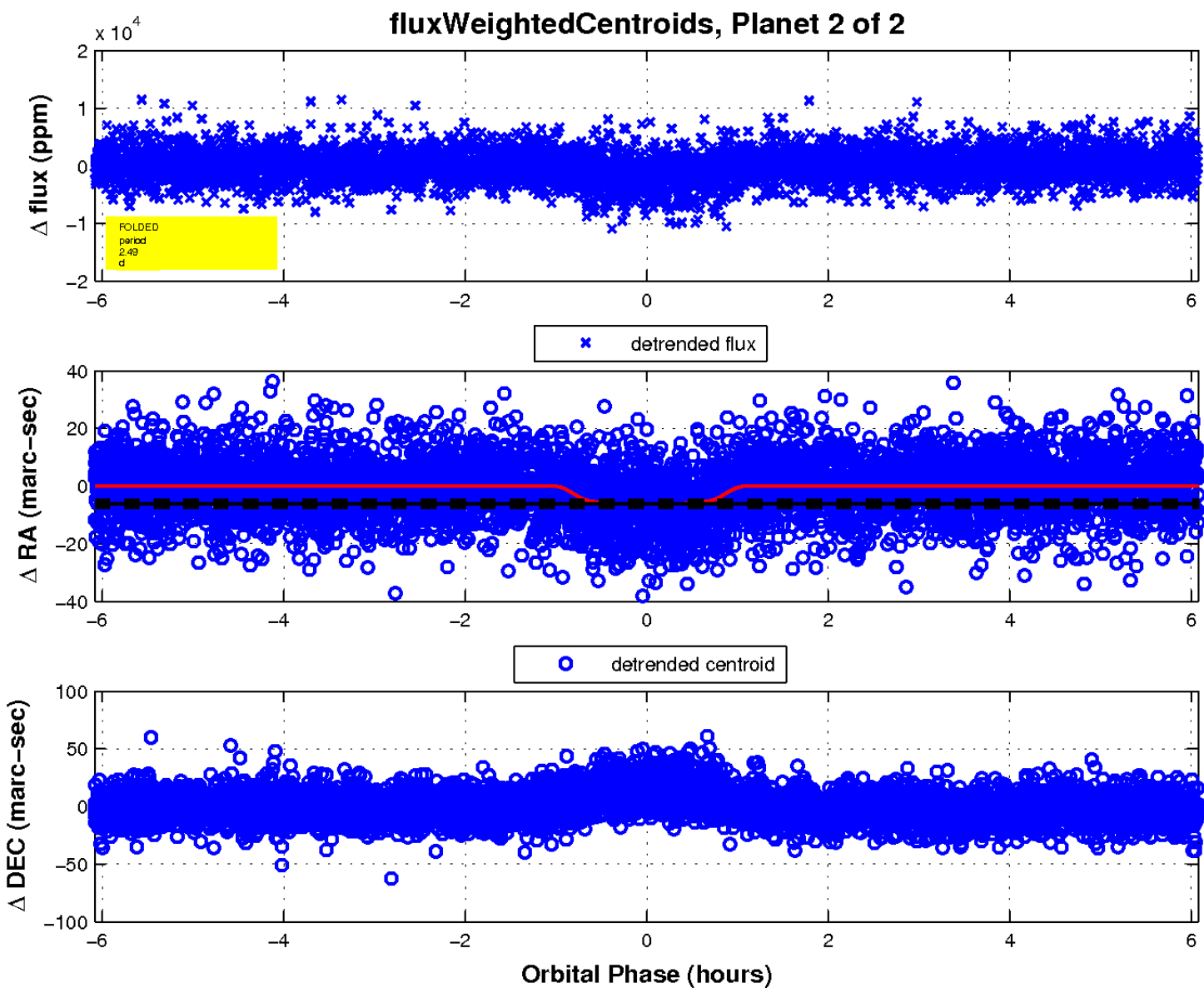
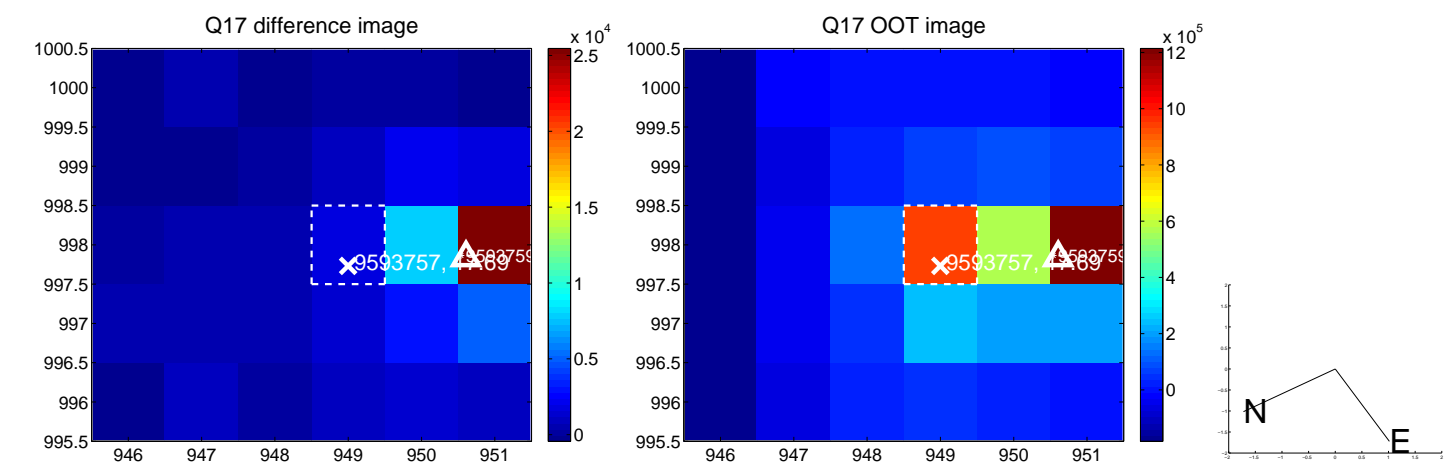
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image

Declination

