

KIC 008940640

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008940640-01 | OBS | No | 0.671305 | 132.159837 | 73.2 | 2.381 | 11.0 | 4.3 | 3.25 | 7244 | 2.88 | 82792.73 |
| 008940640-02 | OBS | No | 2.264009 | 132.521420 | 633.8 | 11.049 | 9.9 | 11.4 | 3.25 | 7244 | 15.09 | 16369.97 |
| 008940640-03 | OBS | No | 81.796827 | 148.567984 | 3071.6 | 10.071 | 19.4 | 4.7 | 3.25 | 7244 | 23.68 | 137.06 |
| 008940640-04 | OBS | No | 2.263947 | 133.327814 | 907.6 | 10.204 | 12.4 | 16.8 | 3.25 | 7244 | 17.83 | 16370.57 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008940640-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008940640-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT |
| 008940640-03 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT |
| 008940640-04 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD |

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

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

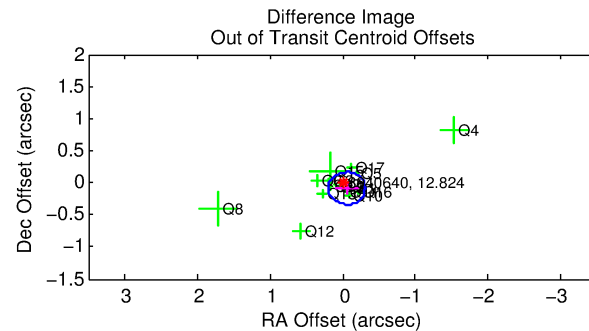
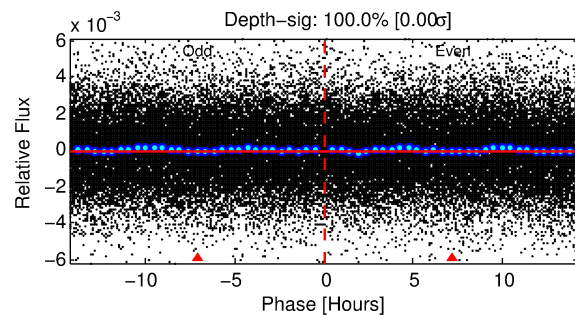
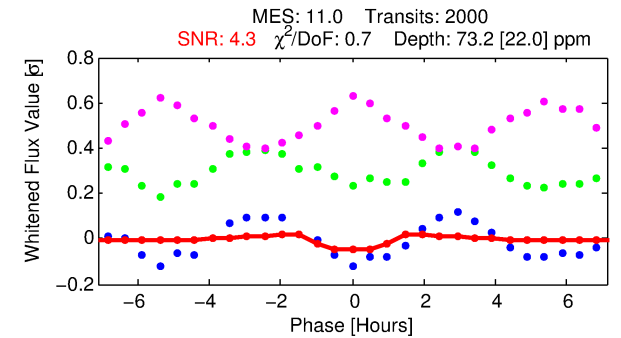
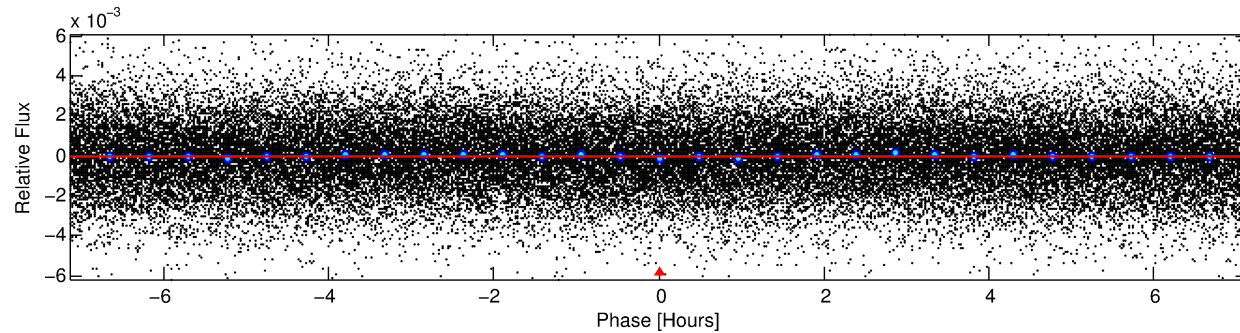
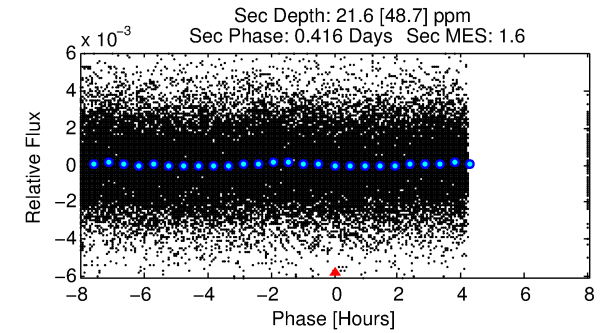
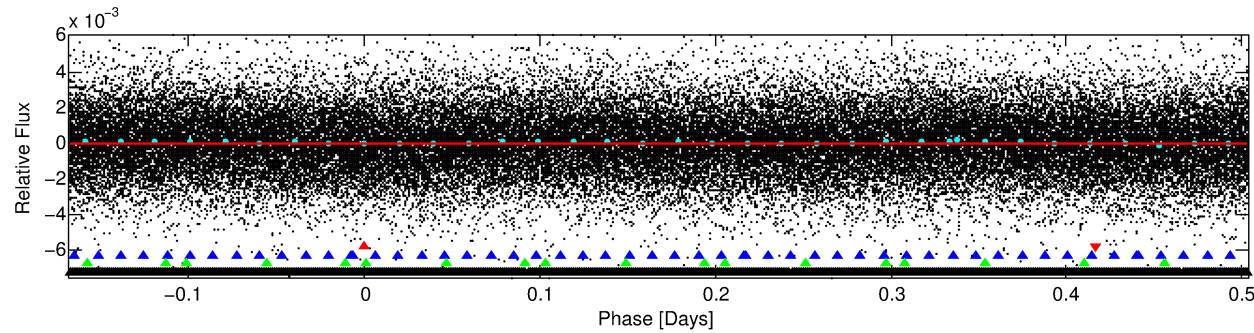
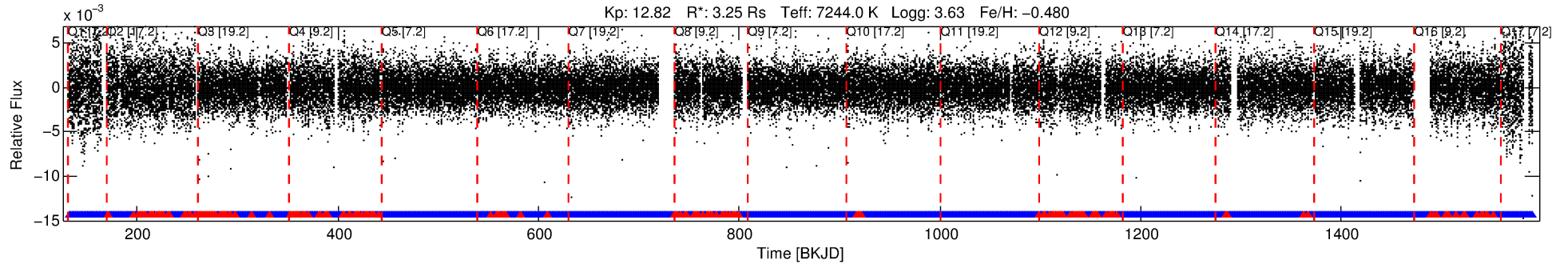
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008940640-01

No Significant Match Found

DV One-Page Summary

KIC: 8940640 Candidate: 1 of 4 Period: 0.671 d



DV Fit Results:

Period = 0.67131 [0.00002] d
Epoch = 132.1598 [0.0055] BKJD
Rp/R* = 0.0081 [0.0077]
a/R* = 2.02 [8.29]
b = 0.50 [8.23]
Seff = 82792.73 [84103.86]
Teff = 4325 [1098] K
Rp = 2.88 [3.18] Re
a = 0.0177 [0.0106] AU
Ag = 0.45 [1.39] [-0.40σ]
Teffp = 5471 [4034] K [0.27σ]

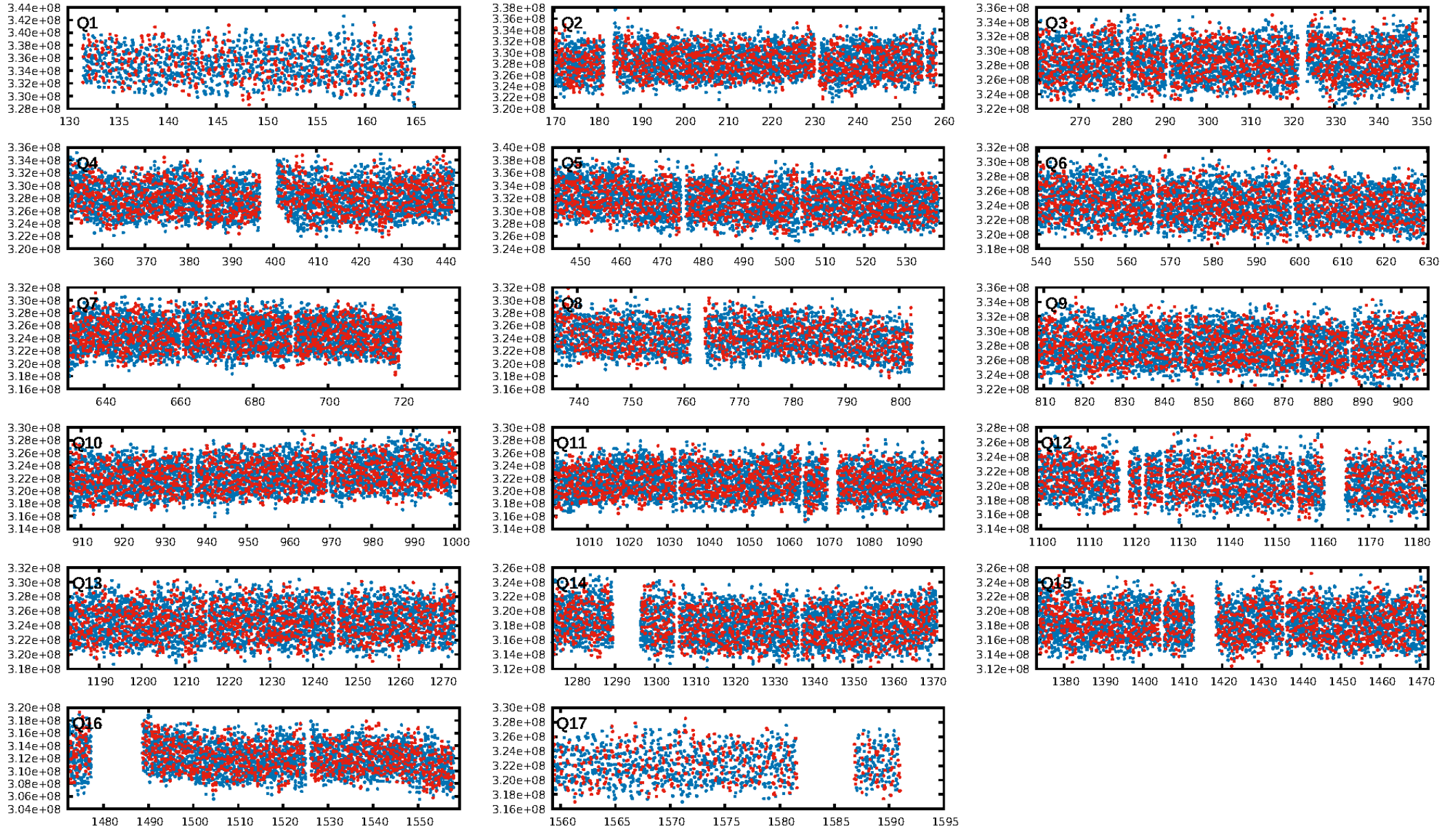
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [3.65σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.89 [1707/1909]
GhostDiagnostic-chr: 1.267
Centroid-sig: 58.5%
Centroid-so: 0.059 arcsec [0.40σ]
OotOffset-rm: 0.105 arcsec [1.25σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-rm: 0.160 arcsec [1.21σ]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.71 [12/17]
DiffImageOverlap-fno: 1.00 [17/17]

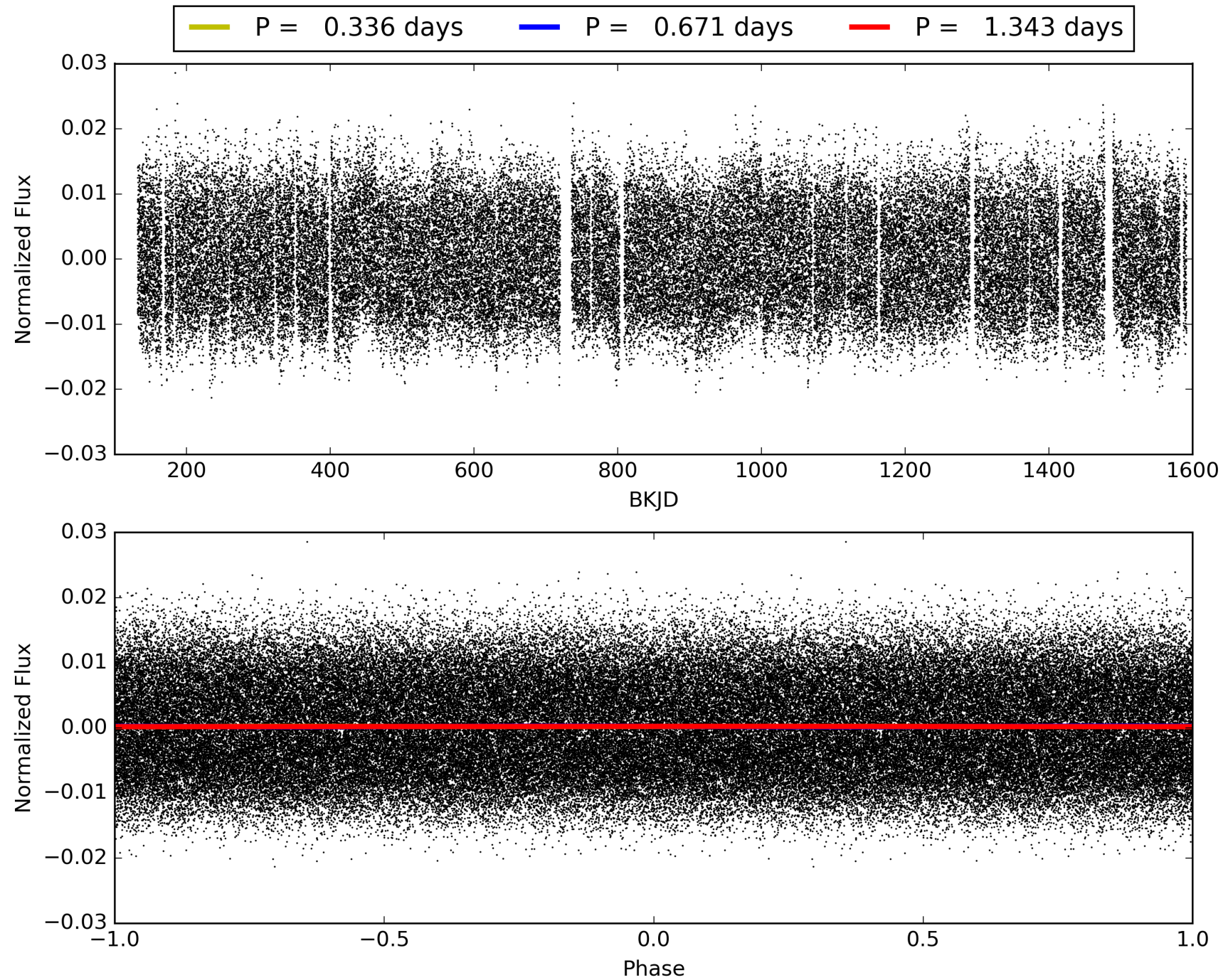
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:11:41 Z

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

TCE 008940640-01, PDC Light Curves

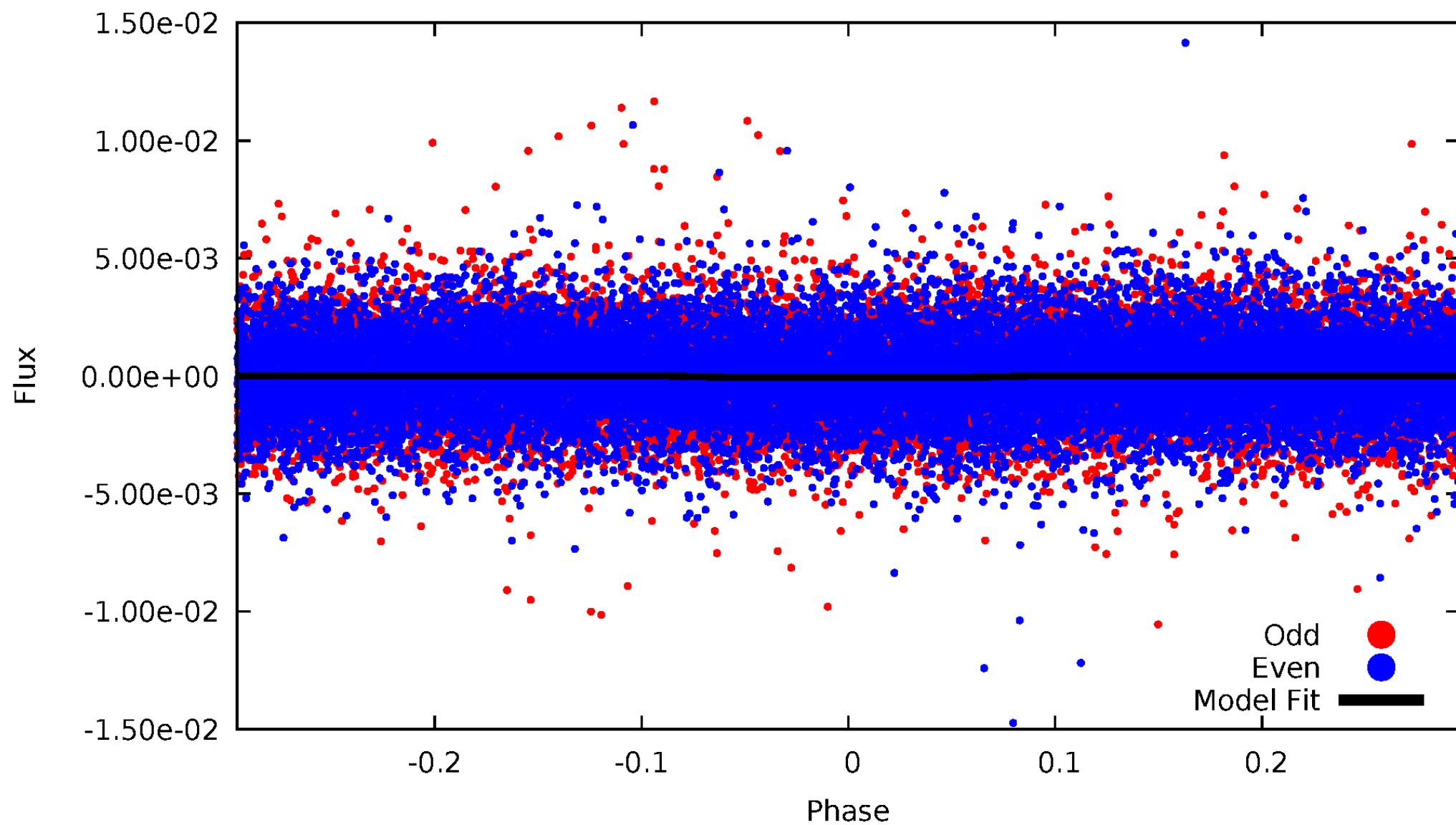


TCE 008940640-01



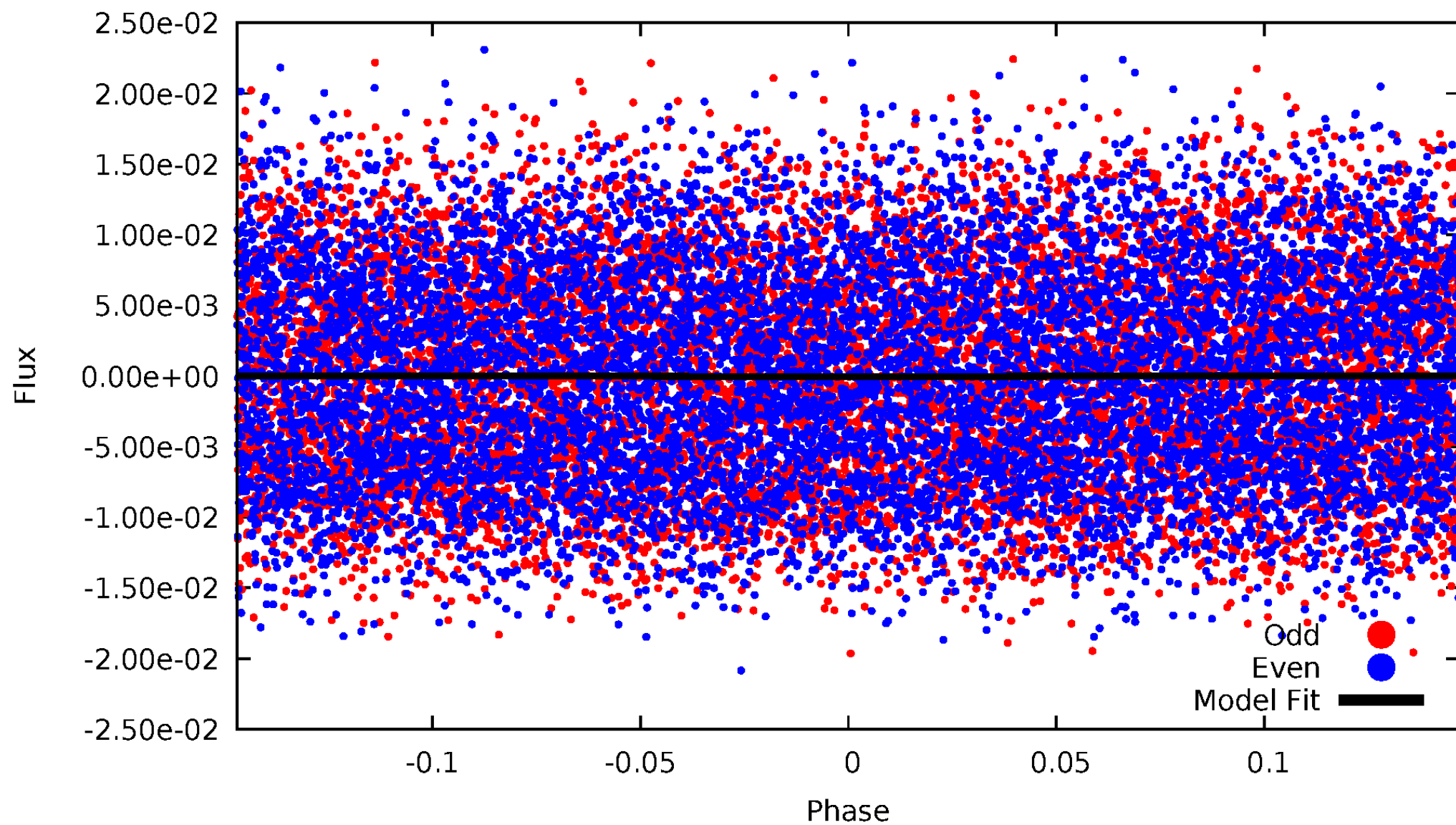
DV Odd/Even

TCE 008940640-01

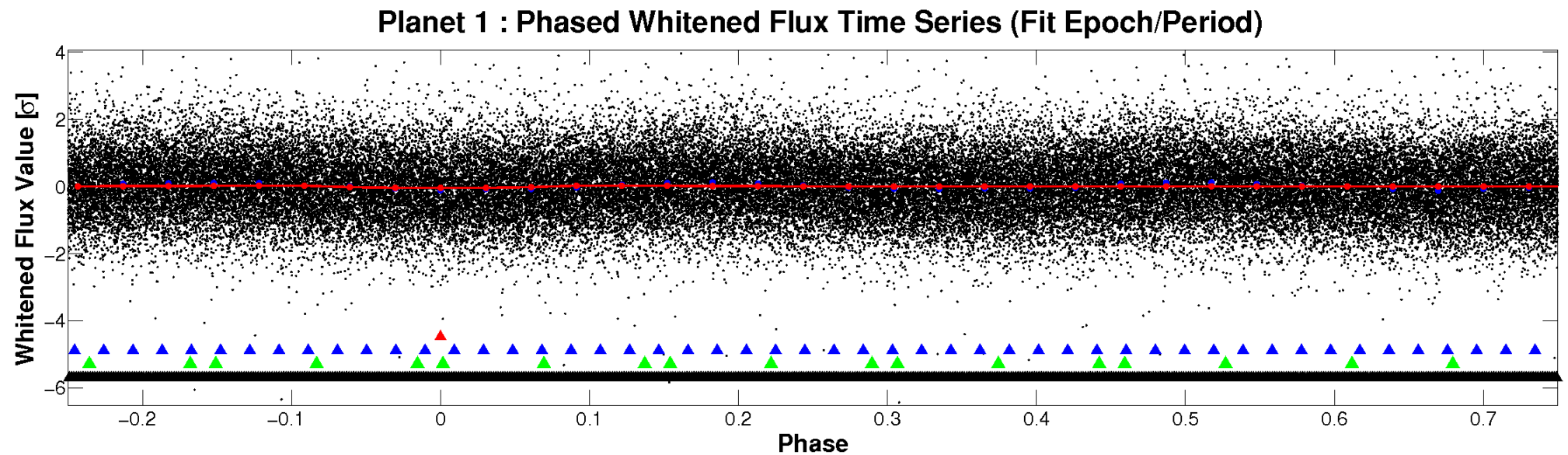
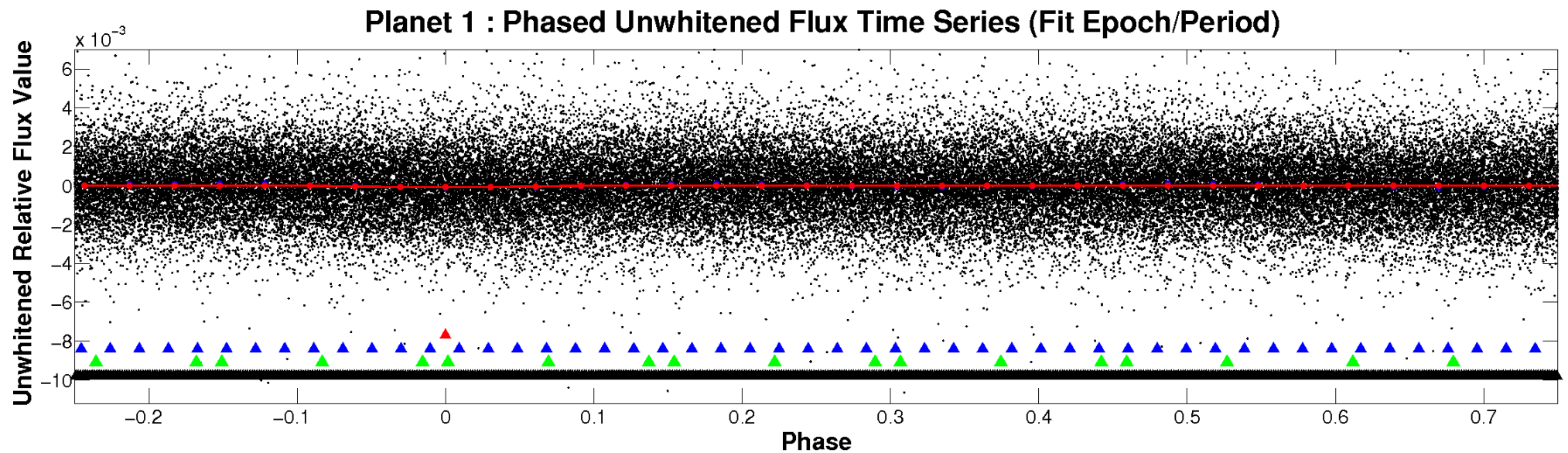


ALT Odd/Even

TCE 008940640-01

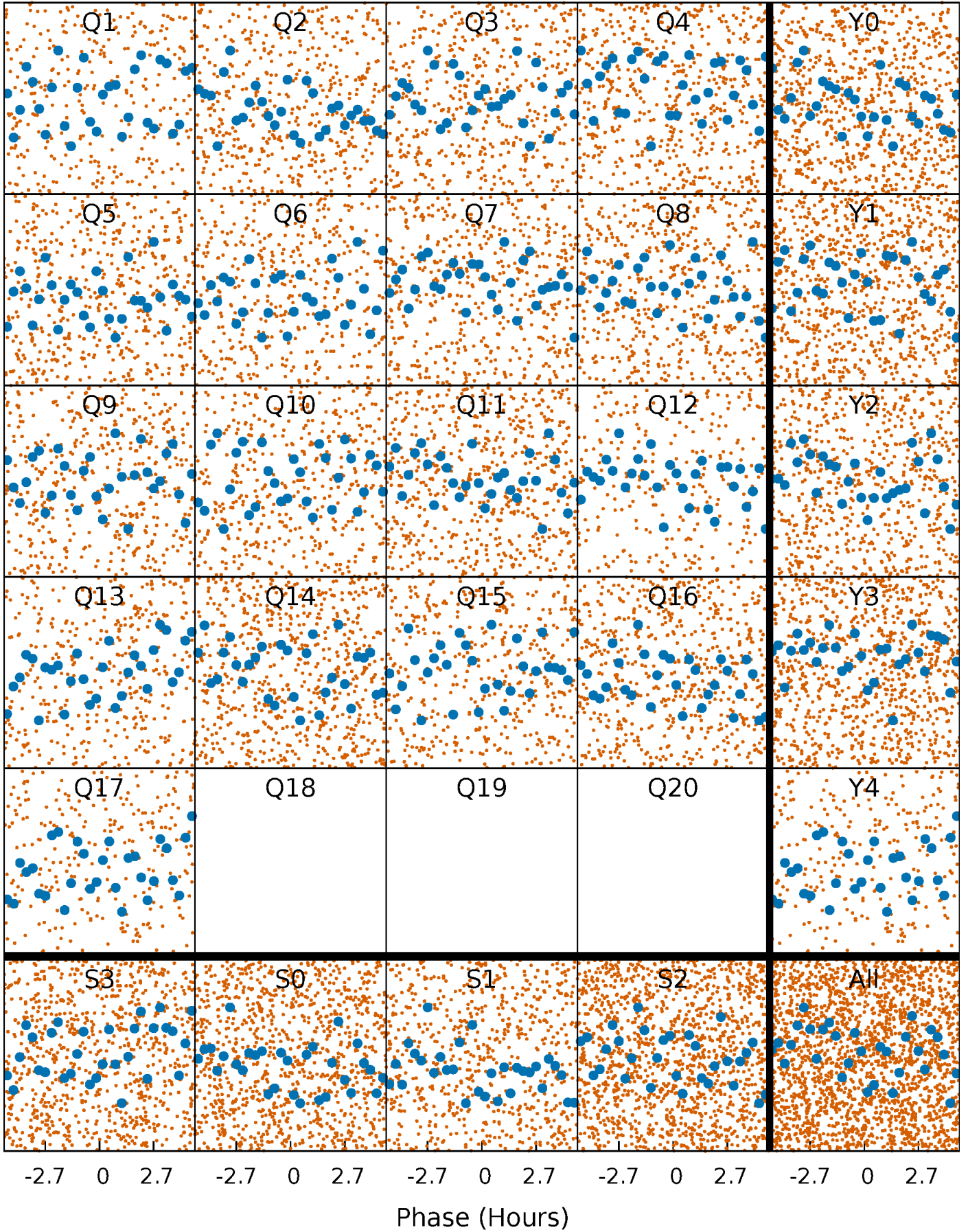


Non-Whitened Vs. Whitened Light Curve



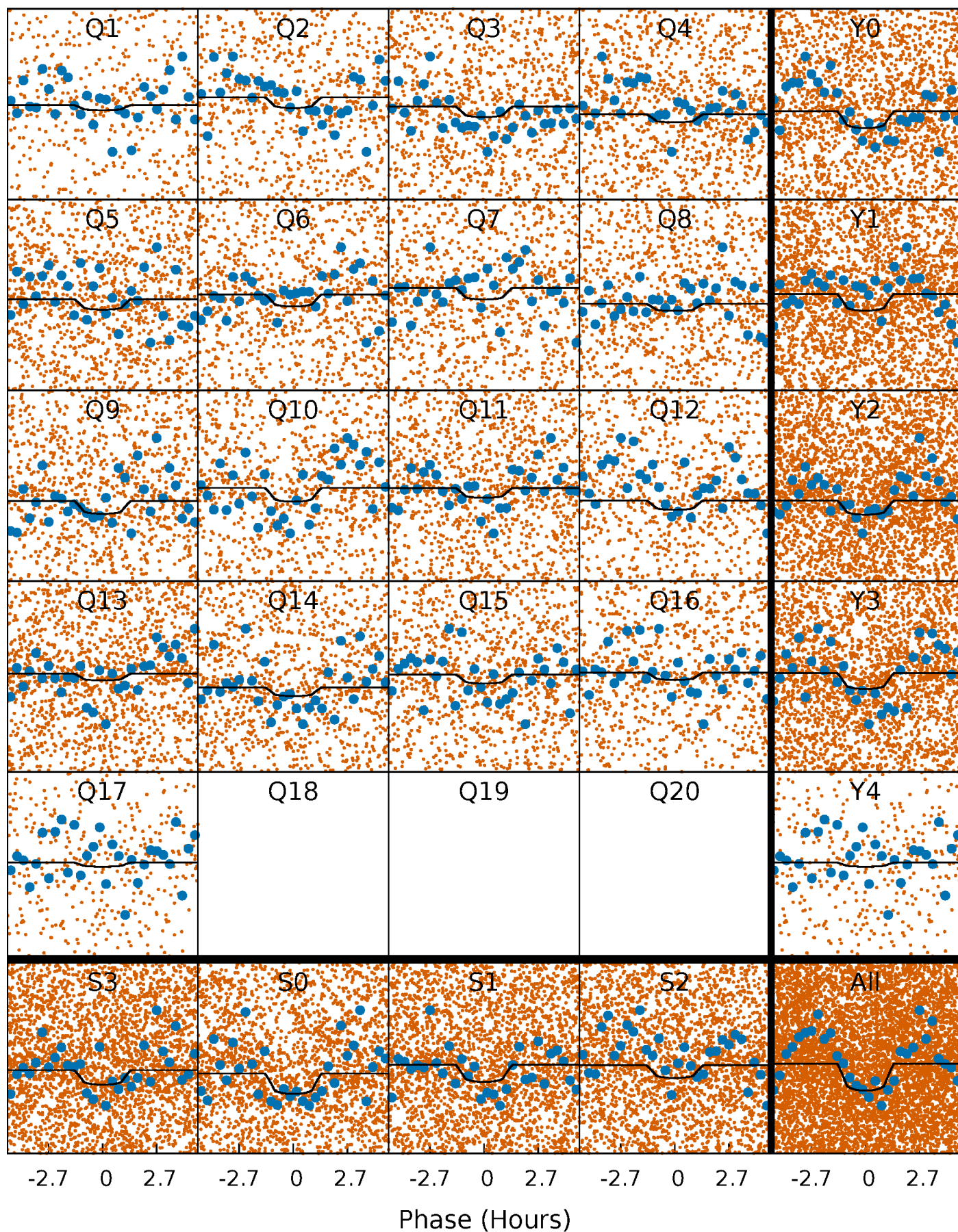
PDC Quarter-Phased Transit Curves

TCE 008940640-01 P= 0.671305 Days $T_0=132.159837$ (BKJD)



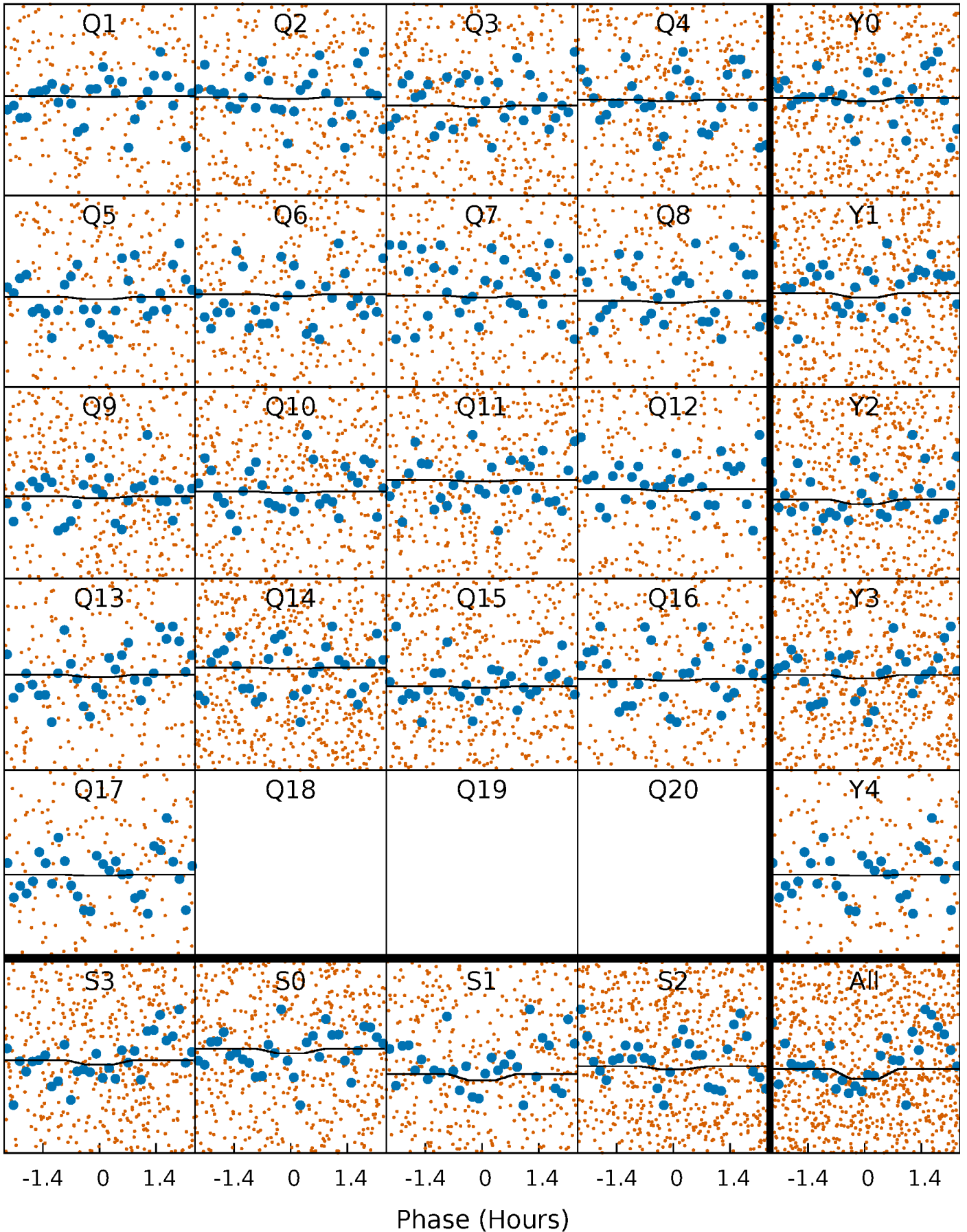
DV Quarter-Phased Transit Curves

TCE 008940640-01 P= 0.671305 Days $T_0=132.159837$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

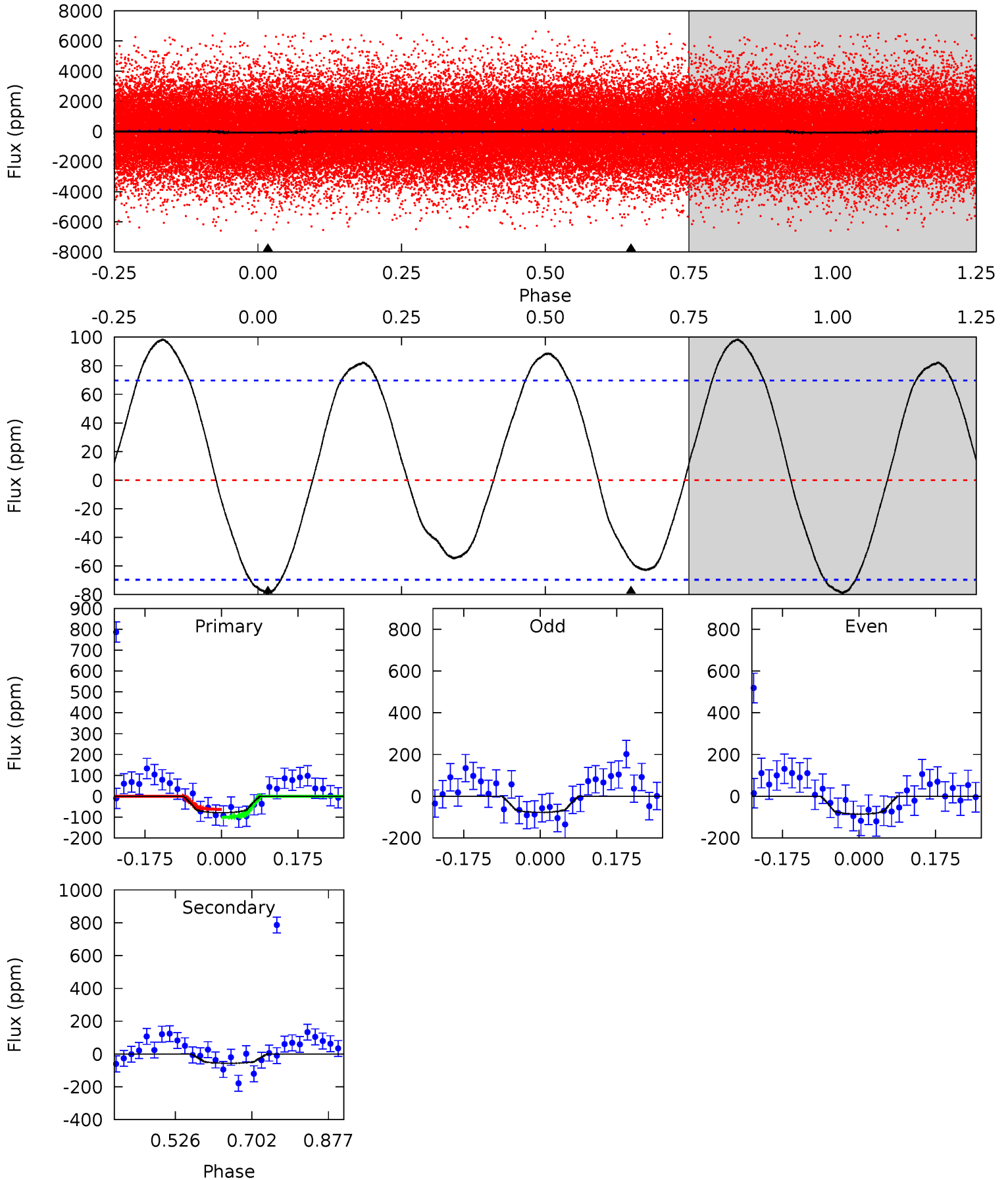
TCE 008940640-01 P= 0.671327 Days $T_0=132.176887$ (BKJD)



DV Model-Shift Uniqueness Test

008940640-01, P = 0.671305 Days, E = 131.488532 Days

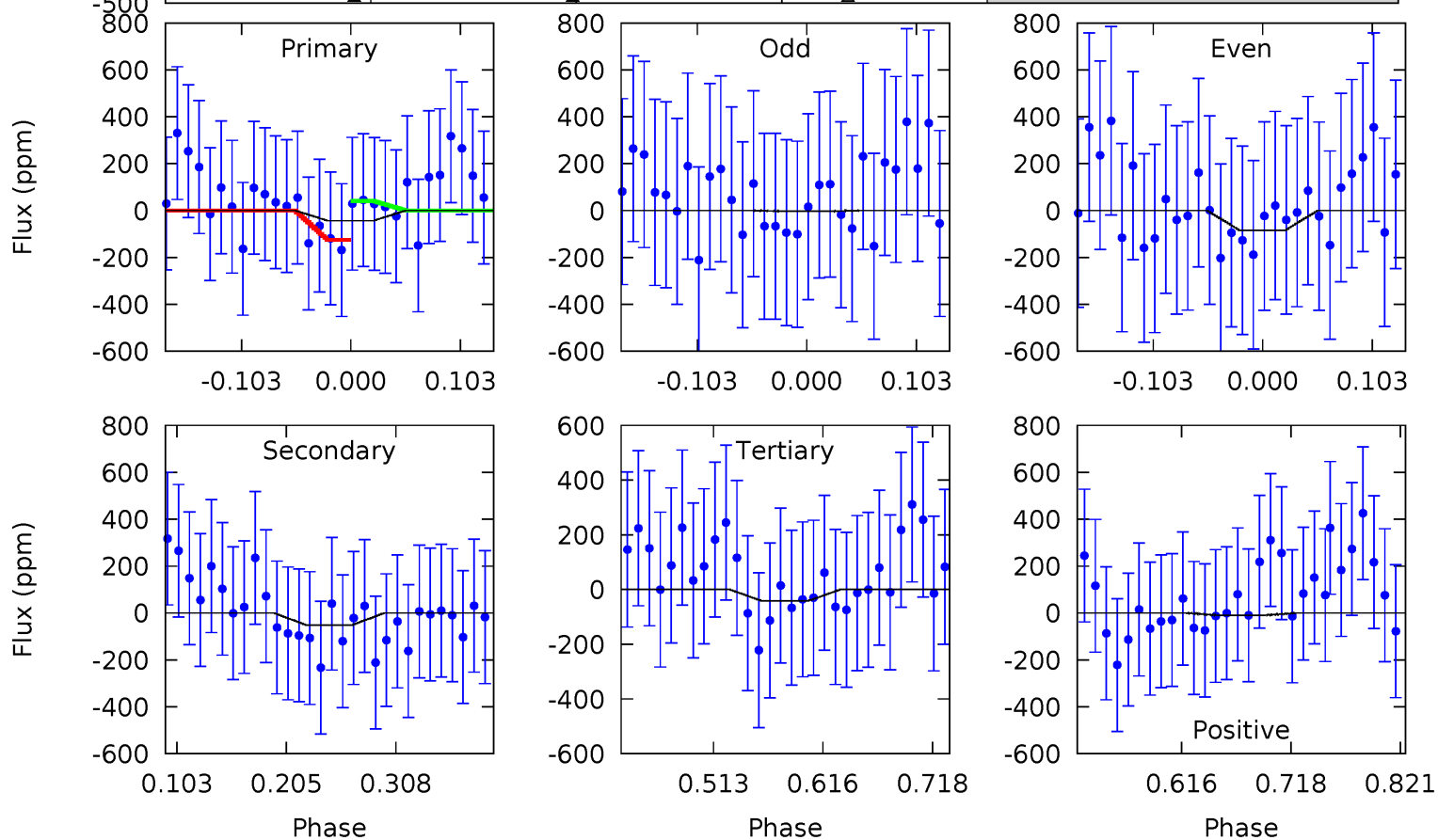
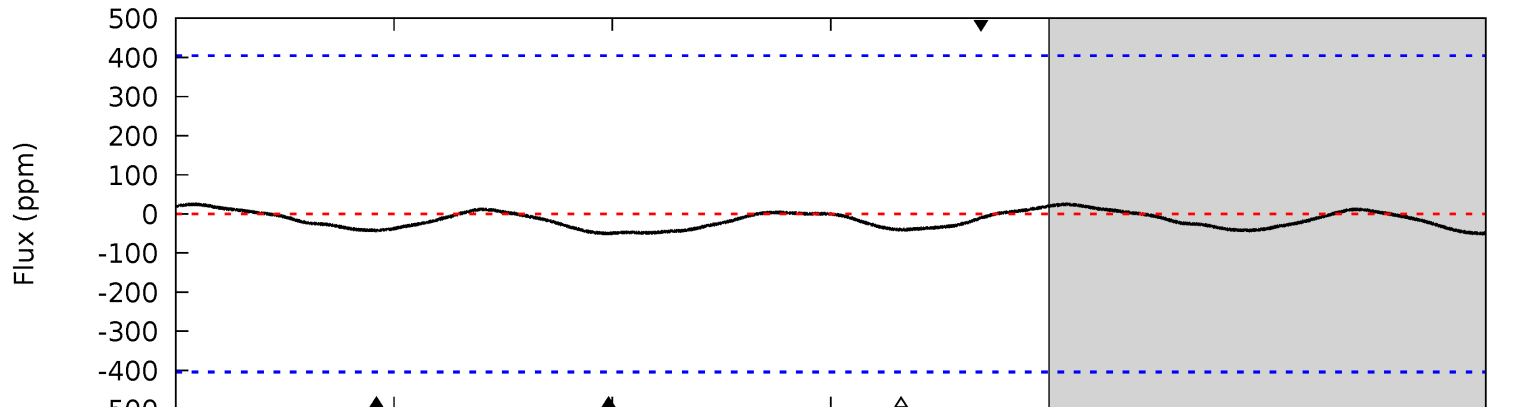
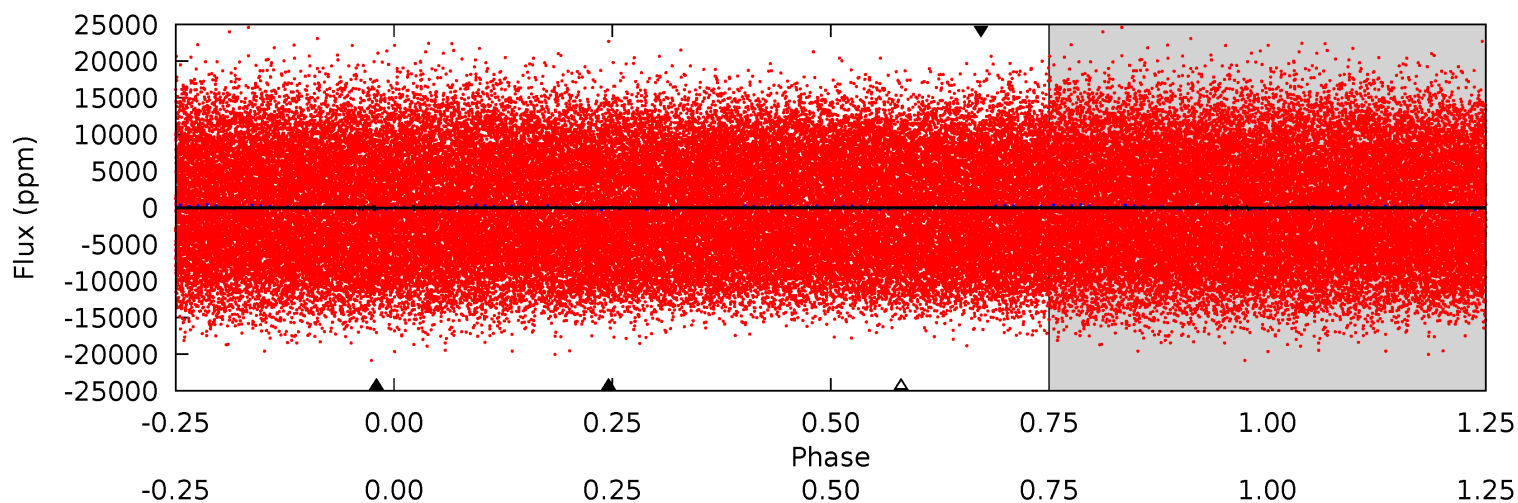
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 5.03 | 3.61 | 0 | 0 | 4.45 | 1.36 | 3.09 | 5.03 | 5.03 | 3.61 | 3.61 | 0.27 | 0.78 | 0.55 | 1.21 |



Alt Model-Shift Uniqueness Test

008940640-01, P = 0.671327 Days, E = 131.505560 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 0.49 | 0.57 | 0.47 | -0.11 | 4.56 | 1.63 | 0.21 | 0.02 | 0.60 | 0.10 | 0.68 | 0.46 | 0.42 | 0.33 | 0.47 |



Stellar Parameters For KIC 008940640

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 7244^{+205}_{-307} | $3.632^{+0.603}_{-0.100}$ | $-0.480^{+0.300}_{-0.300}$ | $3.248^{+0.329}_{-1.864}$ | $1.650^{+0.163}_{-0.488}$ | $0.068^{+0.525}_{-0.020}$ |
| | +3%/-4% | +17%/-3% | +62%/-62% | +10%/-57% | +10%/-30% | +773%/-29% |
| Source | PHO54 | PHO54 | PHO54 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 008940640-01 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|--------------|------------------------|----------------------|-------------------------|---------------------------|
| DV | -57 ± 16 | $3.00^{+2.36}_{-1.94}$ | 5863^{+417}_{-796} | 5681^{+5893}_{-2767} | $1.048^{+6.655}_{-0.736}$ |
| Alt. | -51 ± 89 | $2.75^{+2.36}_{-1.80}$ | 5888^{+407}_{-853} | 5005^{+6679}_{-11675} | $0.708^{+7.678}_{-1.713}$ |

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

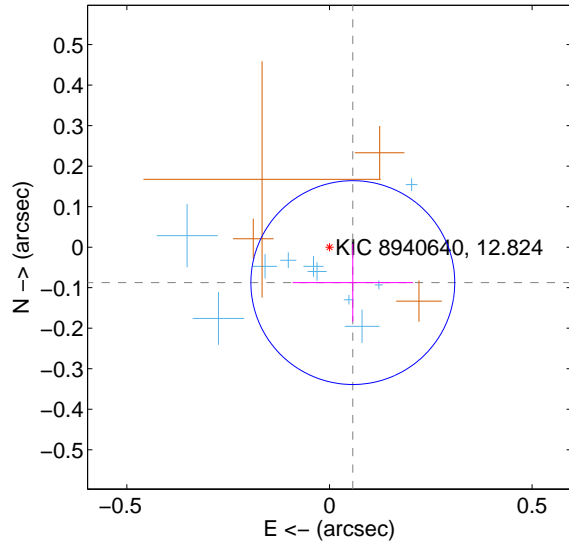
Supplemental centroid analysis for 008940640-01. Kepler magnitude: 12.82. Transit SNR 4.26

There are 12 quarters with good PRF difference image offsets

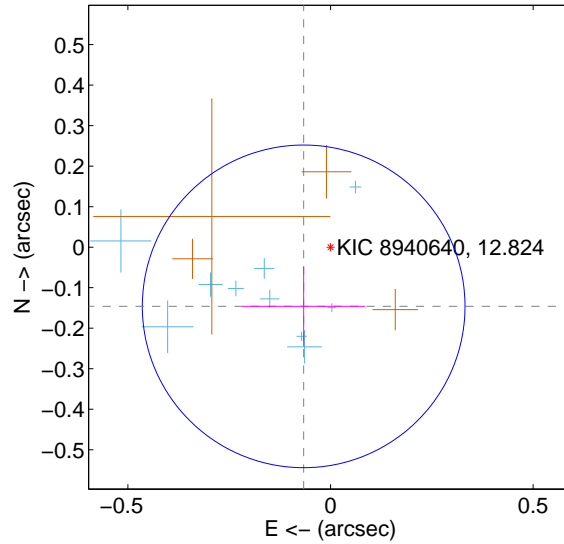
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.105 ± 0.084 | 1.25 | -0.058 ± 0.149 | -0.087 ± 0.096 |
| PRF-fit source offset from KIC position | 0.160 ± 0.133 | 1.21 | 0.066 ± 0.152 | -0.146 ± 0.099 |
| photometric centroid source offset | 0.06 ± 0.15 | 0.40 | 0.00 ± 0.12 | -0.06 ± 0.15 |

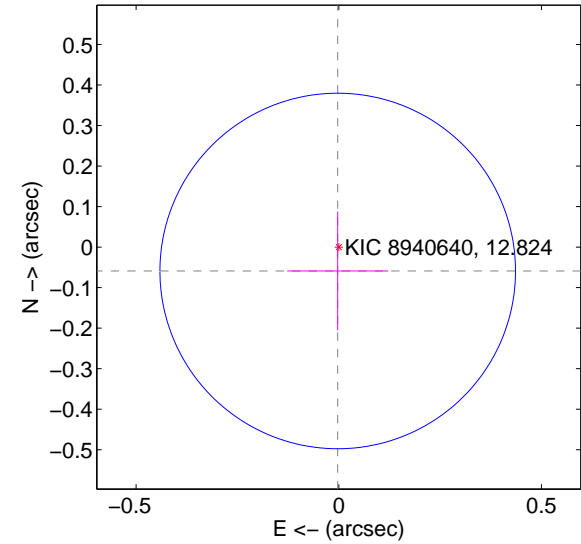
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

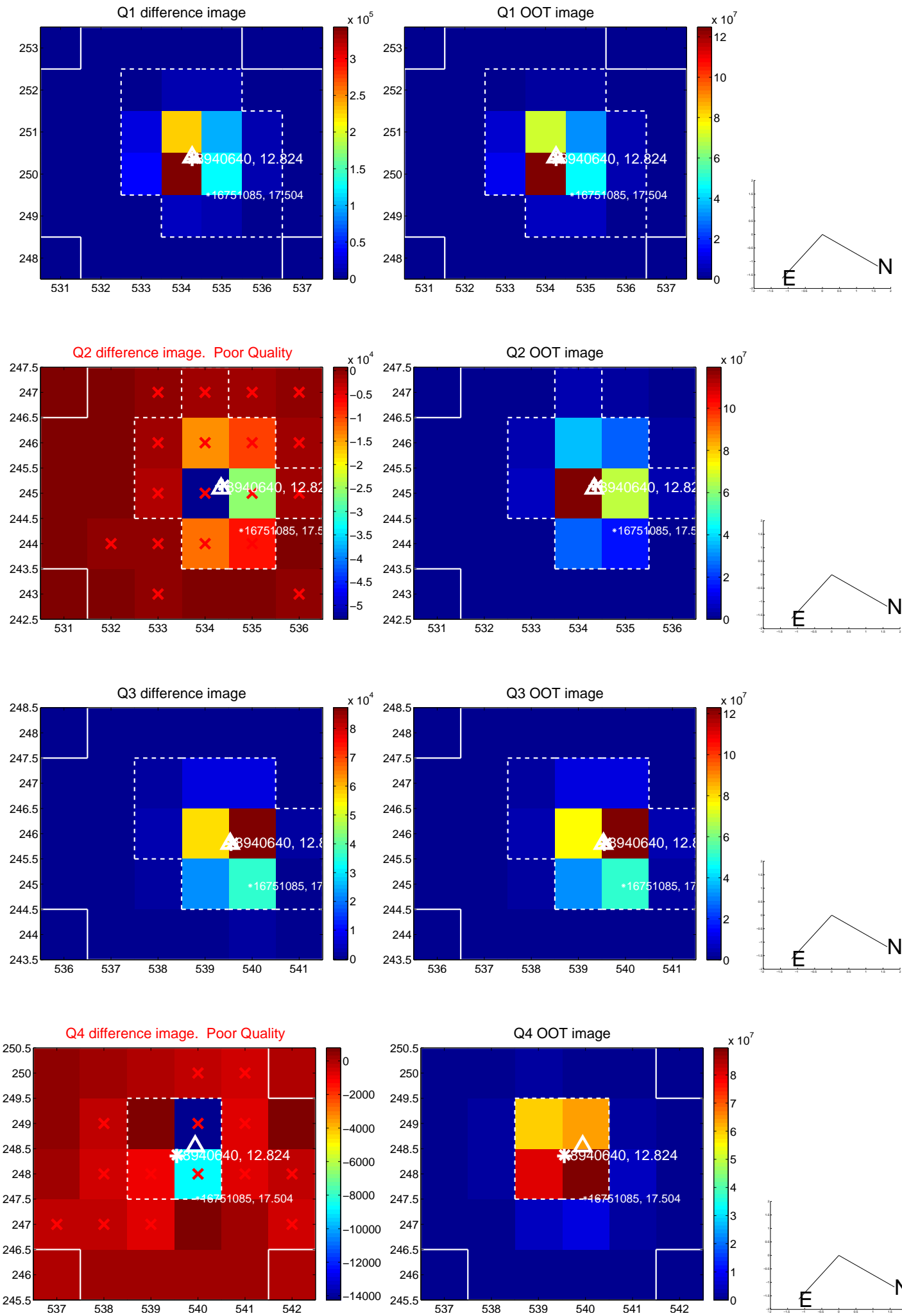


offset from photometric centroids

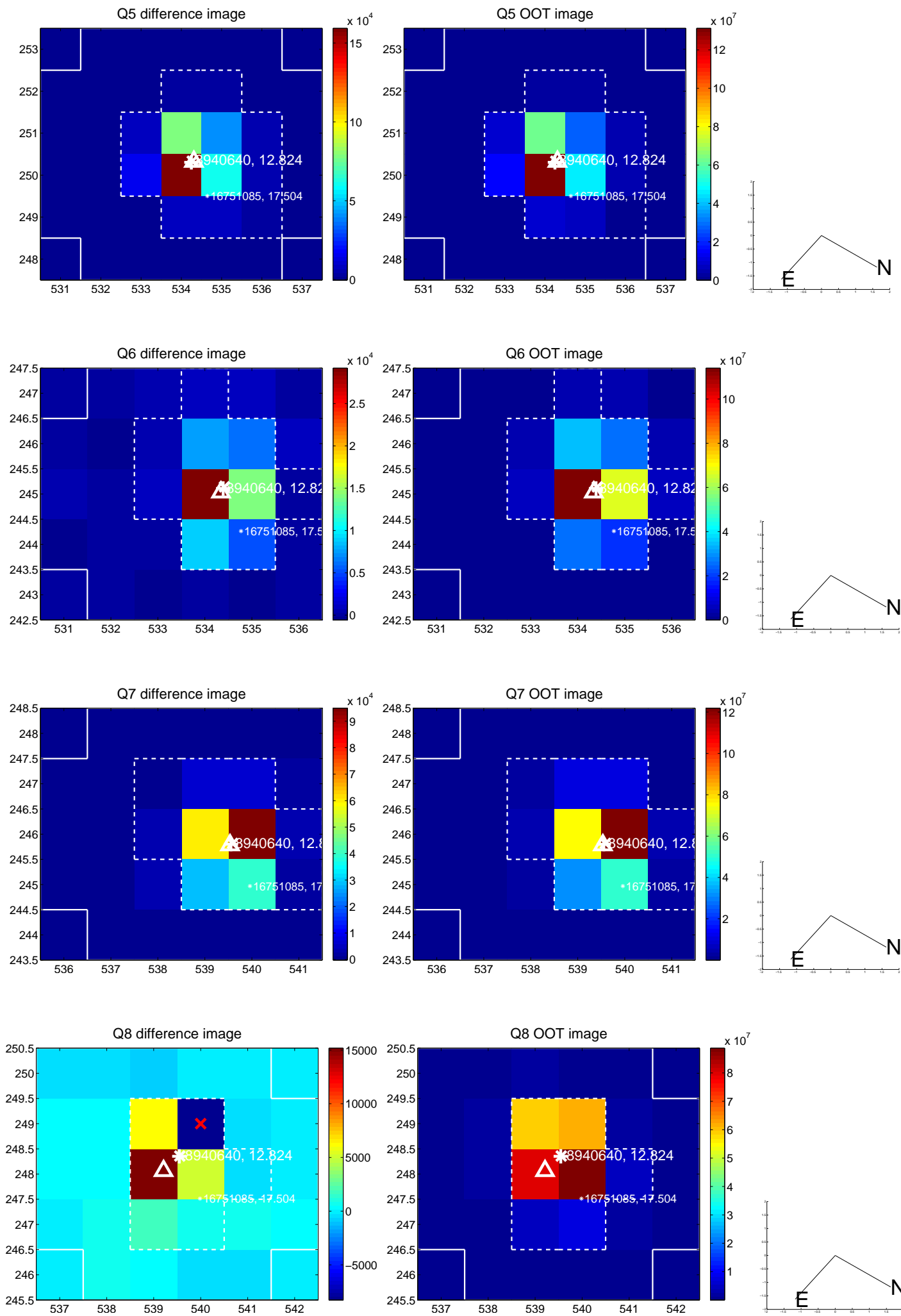


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

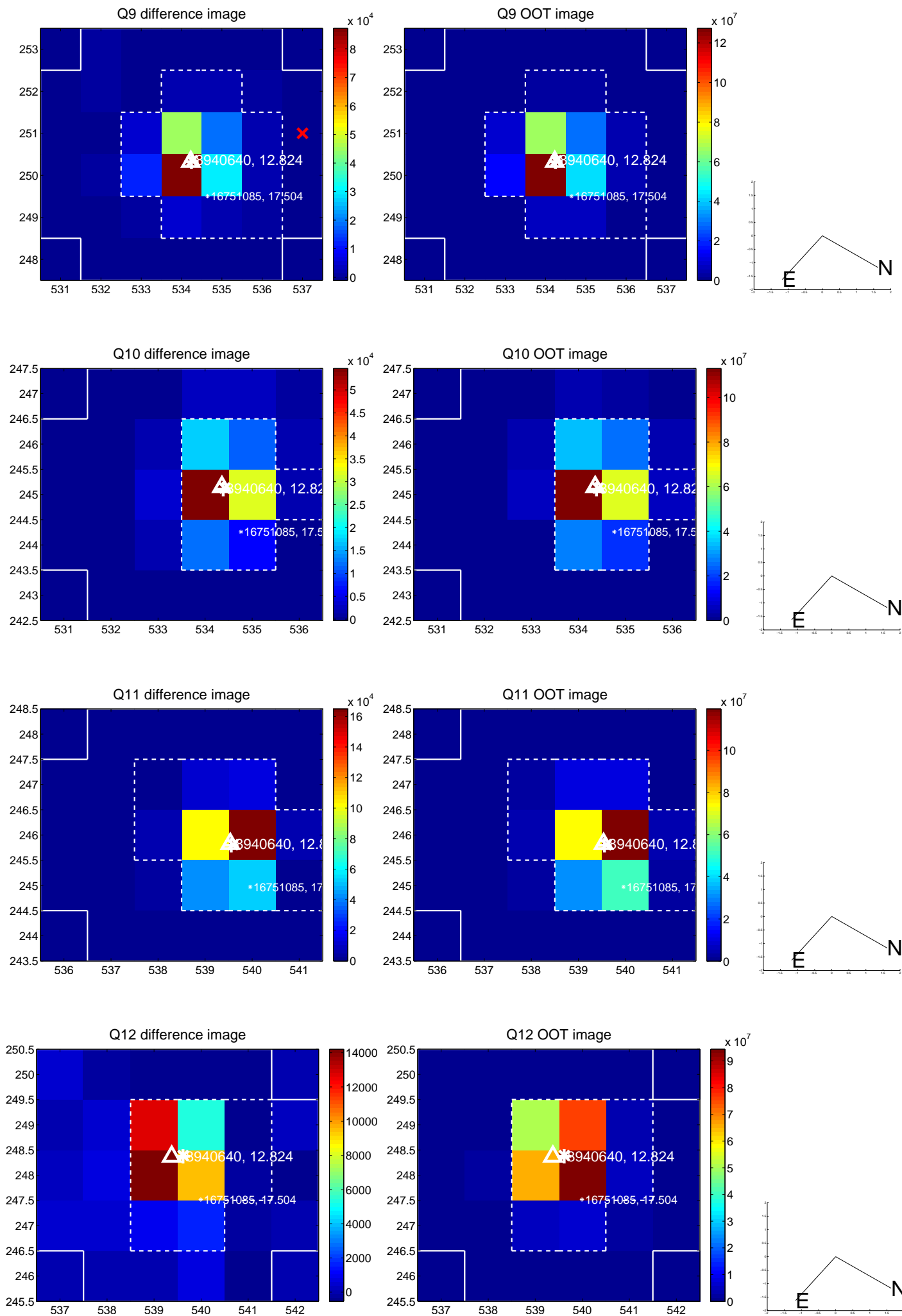
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



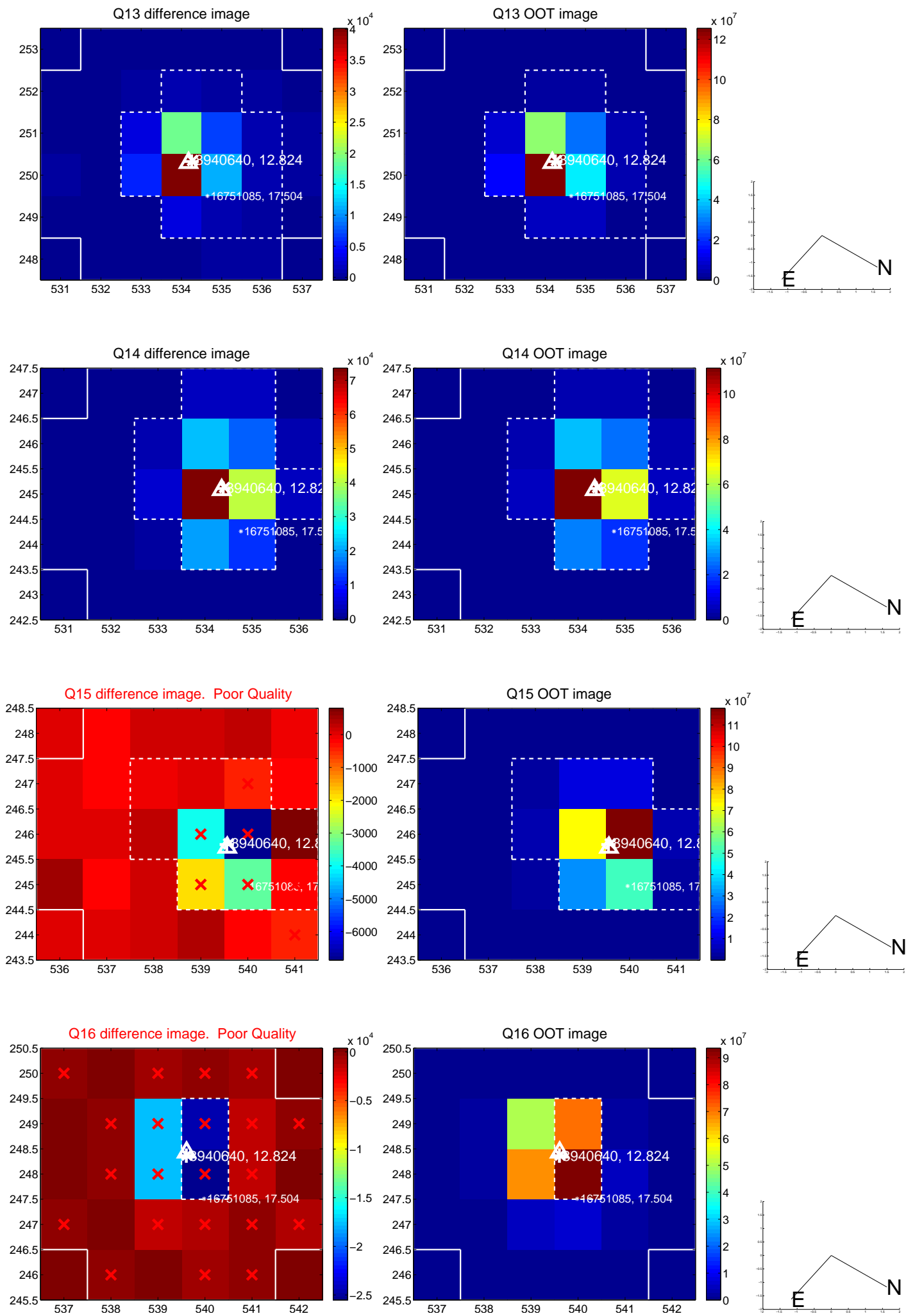
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



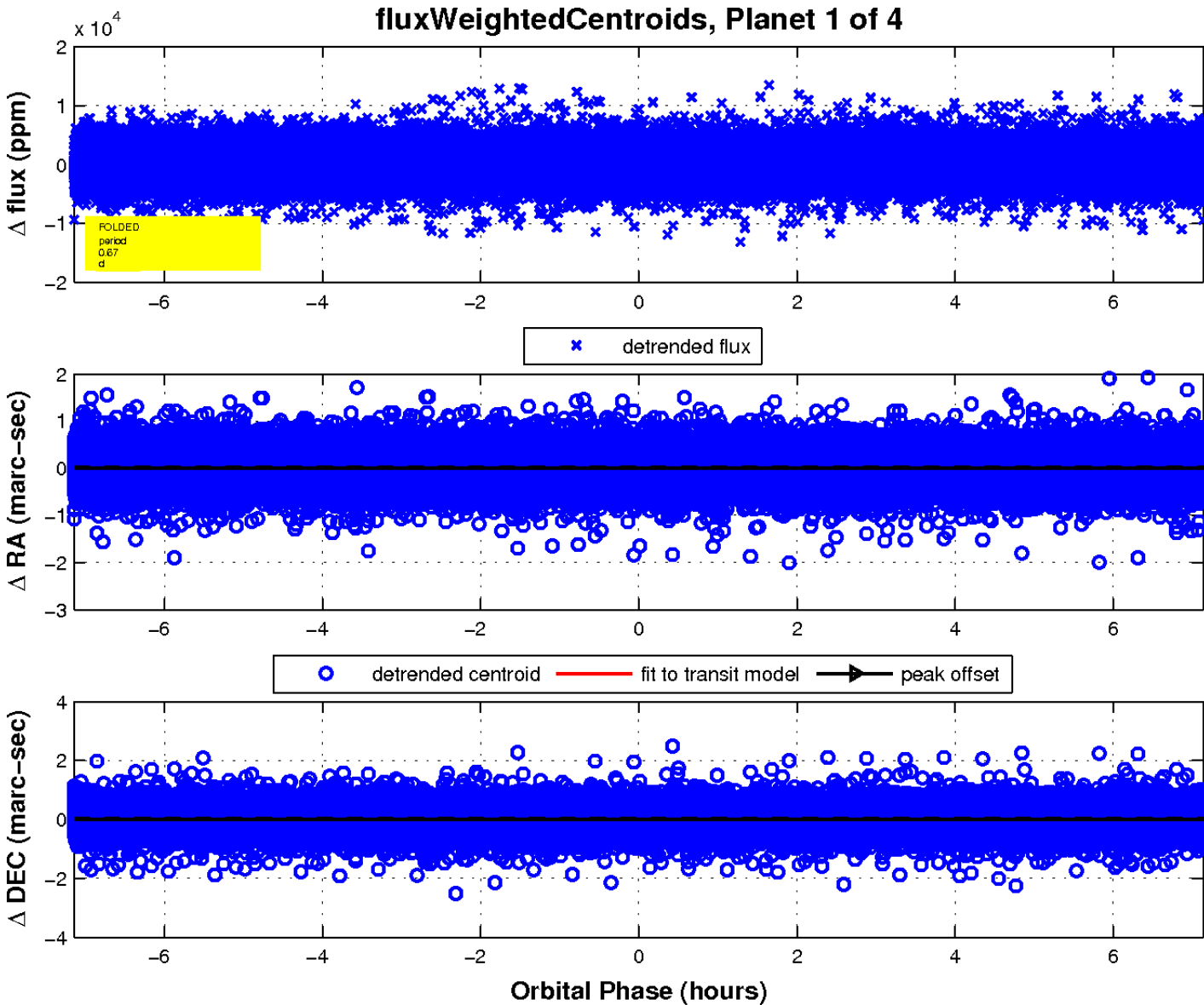
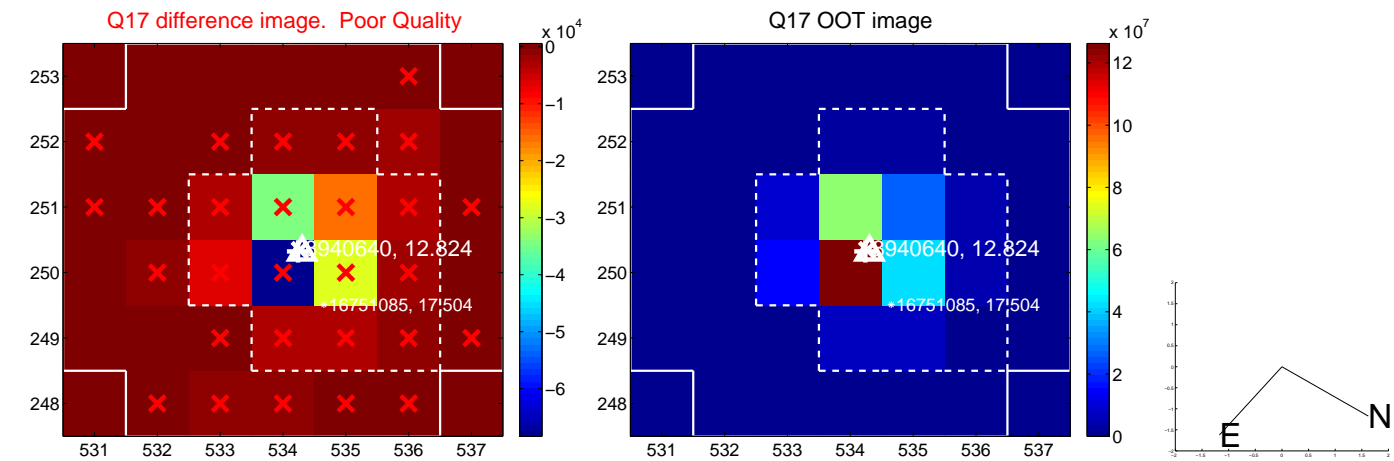
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

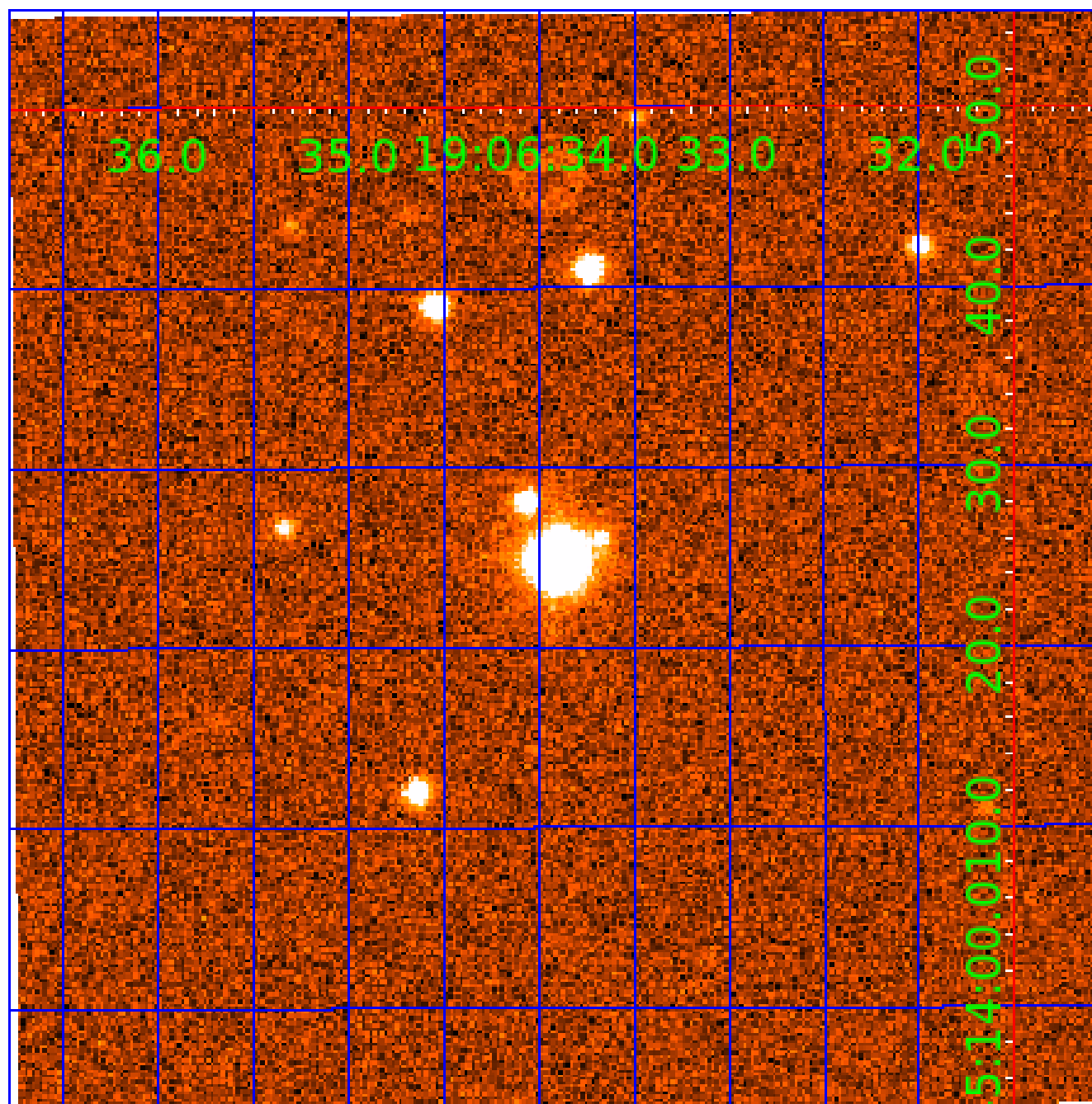


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008940640

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008940640-01 | OBS | No | 0.671305 | 132.159837 | 73.2 | 2.381 | 11.0 | 4.3 | 3.25 | 7244 | 2.88 | 82792.73 |
| 008940640-02 | OBS | No | 2.264009 | 132.521420 | 633.8 | 11.049 | 9.9 | 11.4 | 3.25 | 7244 | 15.09 | 16369.97 |
| 008940640-03 | OBS | No | 81.796827 | 148.567984 | 3071.6 | 10.071 | 19.4 | 4.7 | 3.25 | 7244 | 23.68 | 137.06 |
| 008940640-04 | OBS | No | 2.263947 | 133.327814 | 907.6 | 10.204 | 12.4 | 16.8 | 3.25 | 7244 | 17.83 | 16370.57 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008940640-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008940640-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT |
| 008940640-03 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT |
| 008940640-04 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD |

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

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

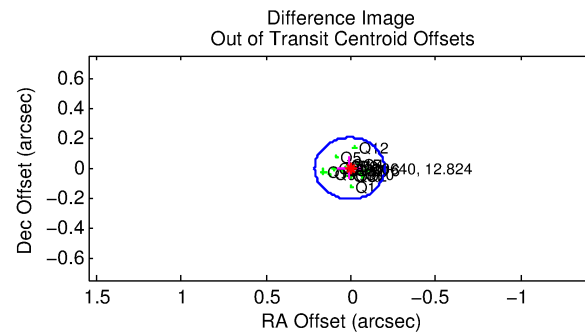
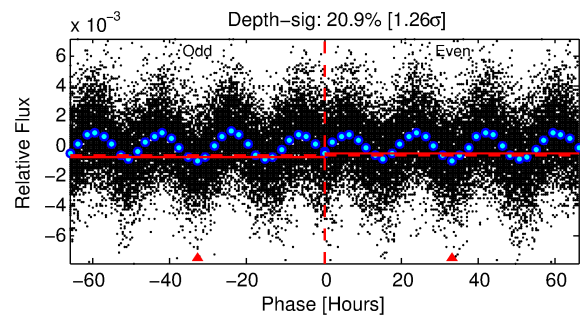
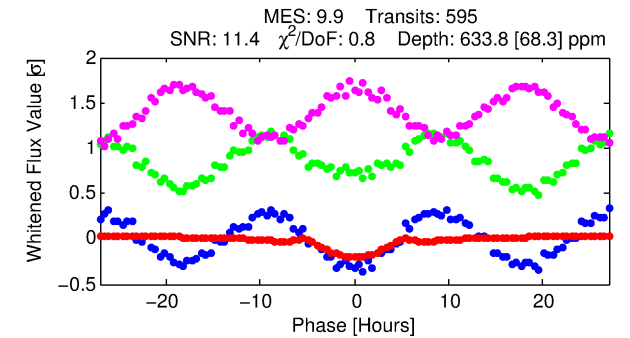
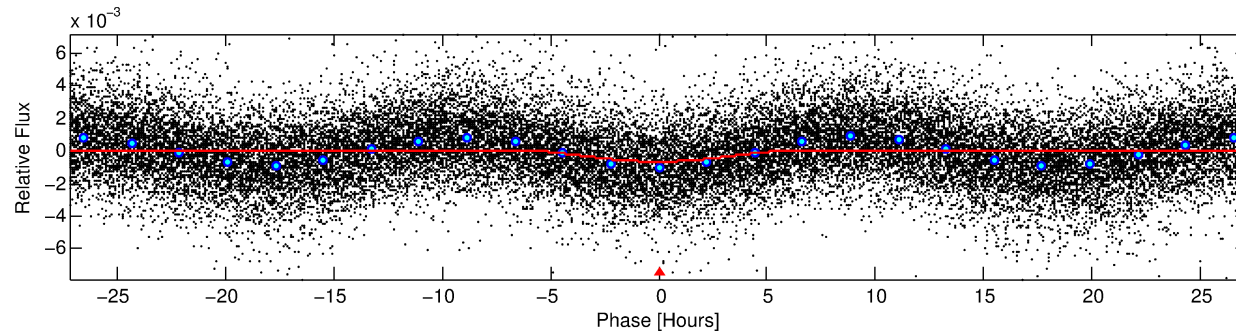
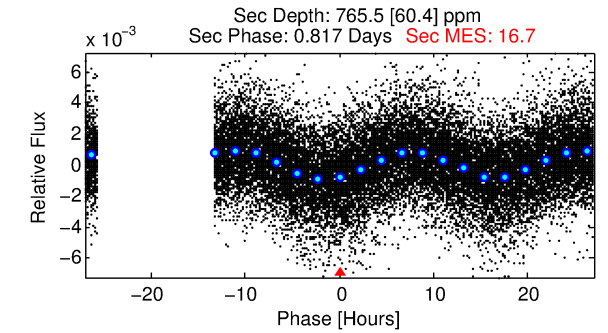
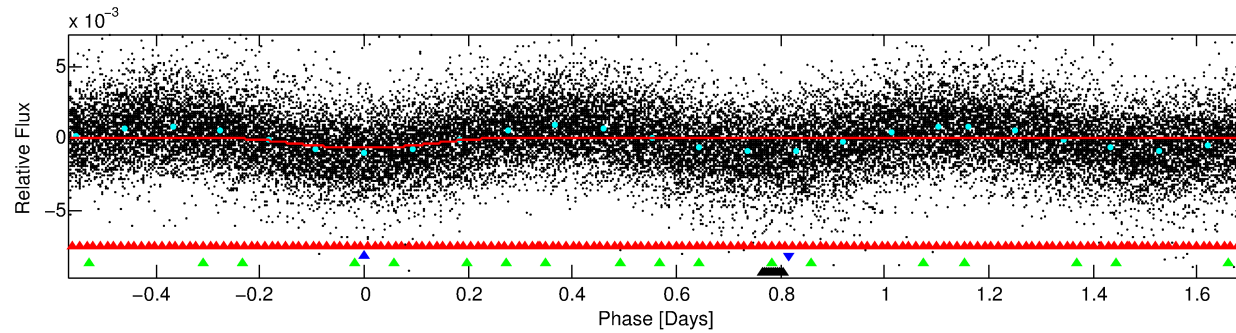
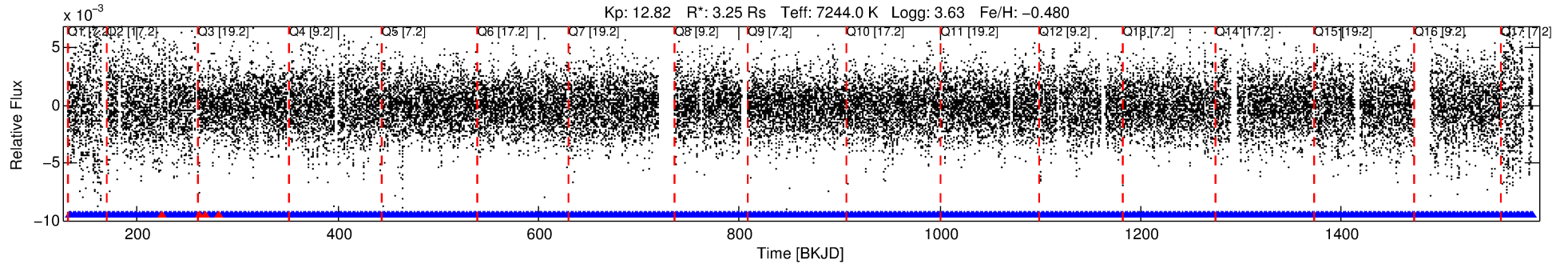
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008940640-02

No Significant Match Found

DV One-Page Summary

KIC: 8940640 Candidate: 2 of 4 Period: 2.264 d



DV Fit Results:

Period = 2.26401 [0.00006] d
Epoch = 132.5214 [0.0197] BKJD
Rp/R* = 0.0426 [0.0563]
a/R* = 1.12 [0.01]
b = 1.00 [0.09]
Seff = 16369.97 [16629.21]
Teq = 2884 [732] K
Rp = 15.09 [21.76] Re
a = 0.0399 [0.0239] AU
Ag = 2.94 [8.33] [0.23σ]
Teffp = 5840 [3875] K [0.75σ]

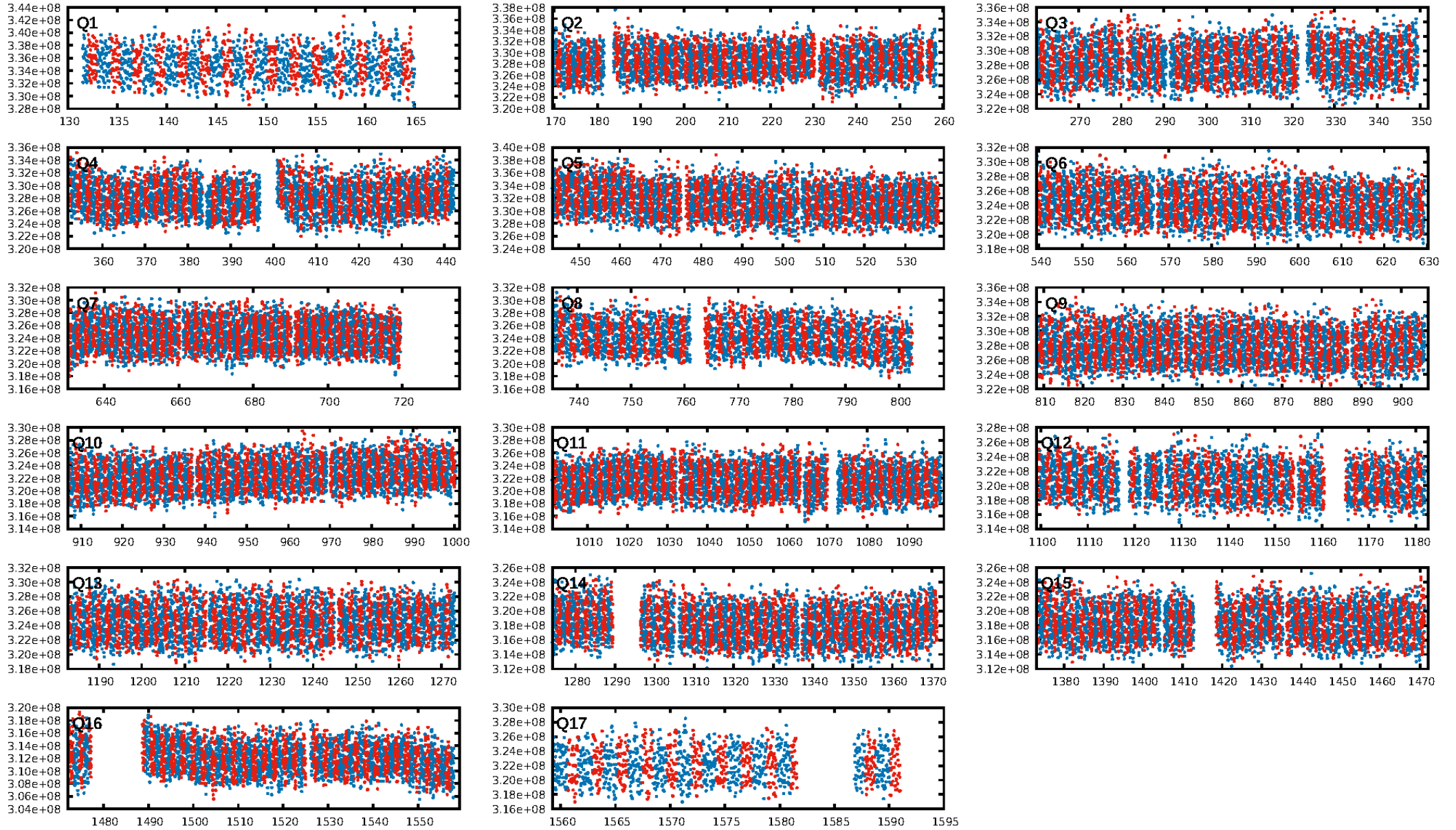
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: 100.0% [127.68σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGoF-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.99 [564/568]
GhostDiagnostic-chr: 3.103
Centroid-sig: 0.0%
Centroid-so: 0.085 arcsec [4.11σ]
OotOffset-rm: 0.011 arcsec [0.16σ]
KicOffset-rm: 0.152 arcsec [2.16σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 0.00 [0/17]

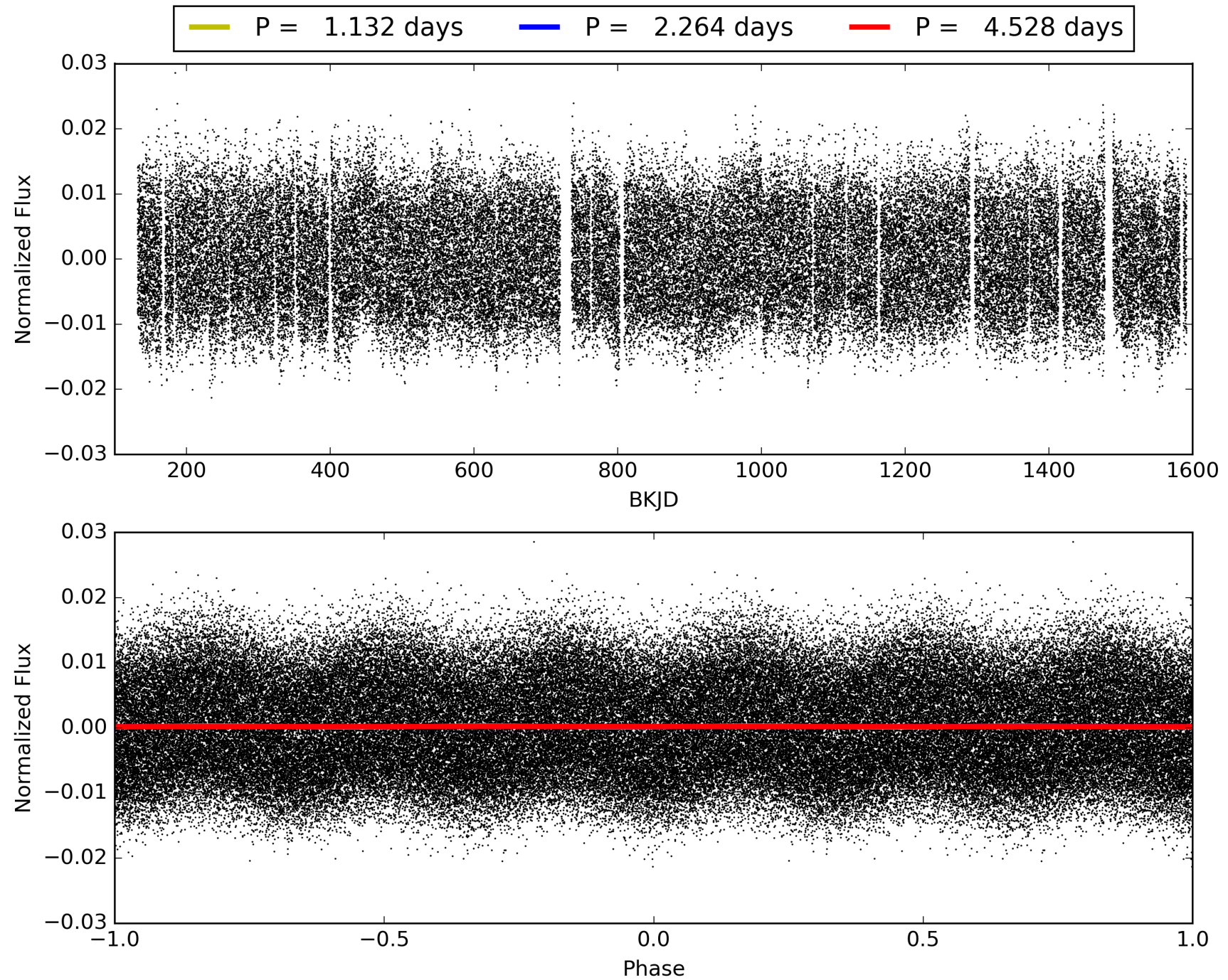
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:11:54 Z

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

TCE 008940640-02, PDC Light Curves

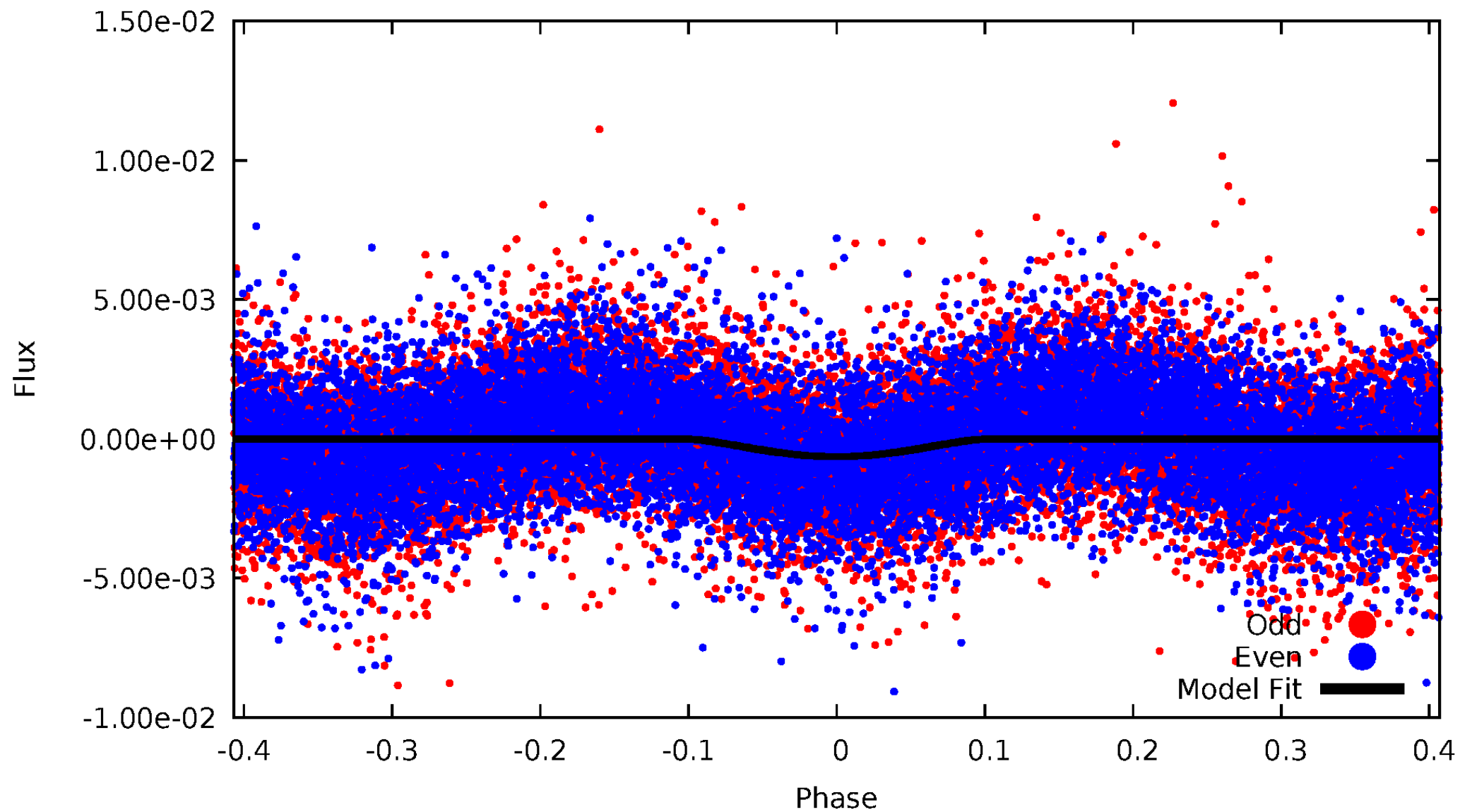


TCE 008940640-02



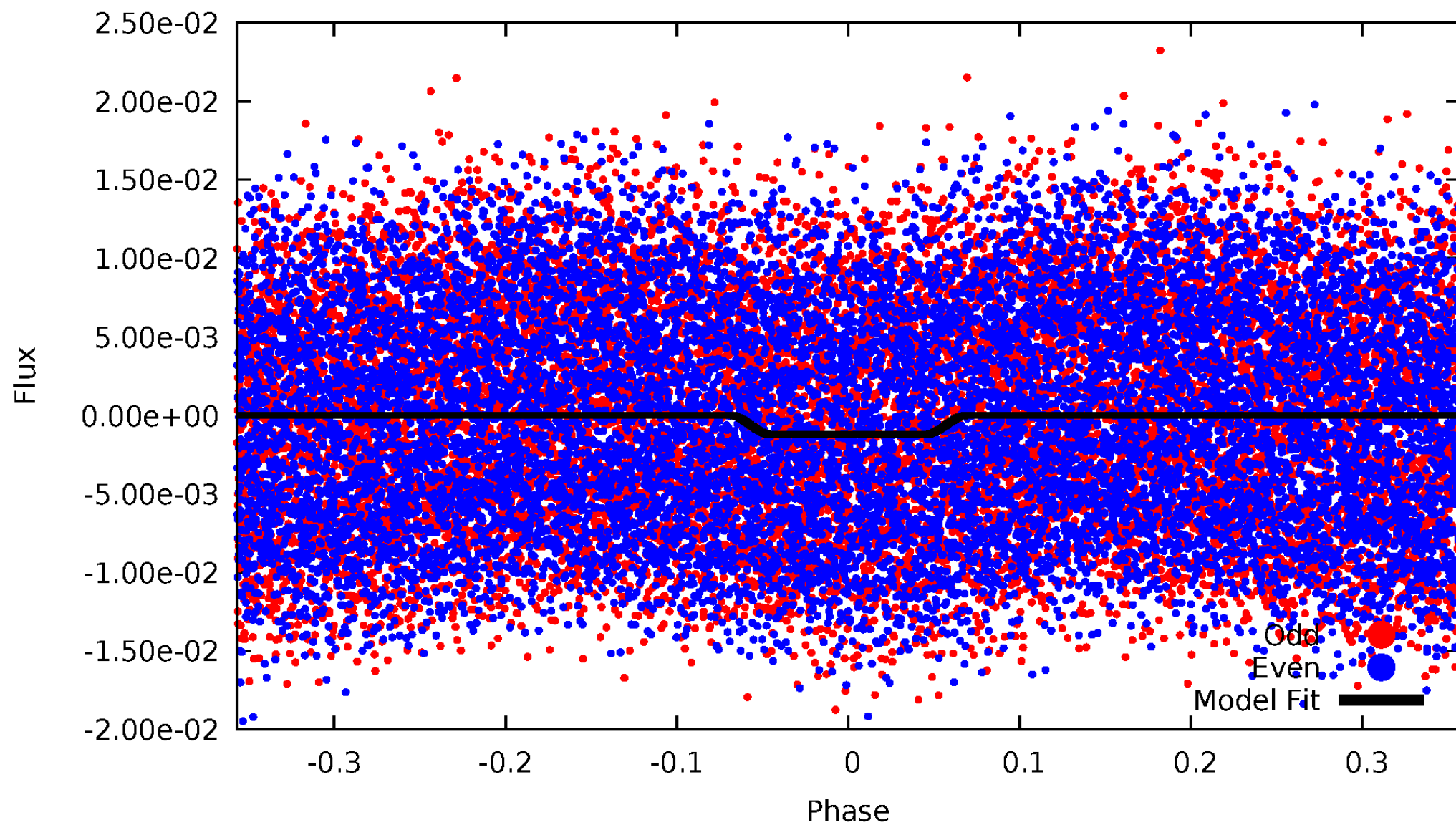
DV Odd/Even

TCE 008940640-02



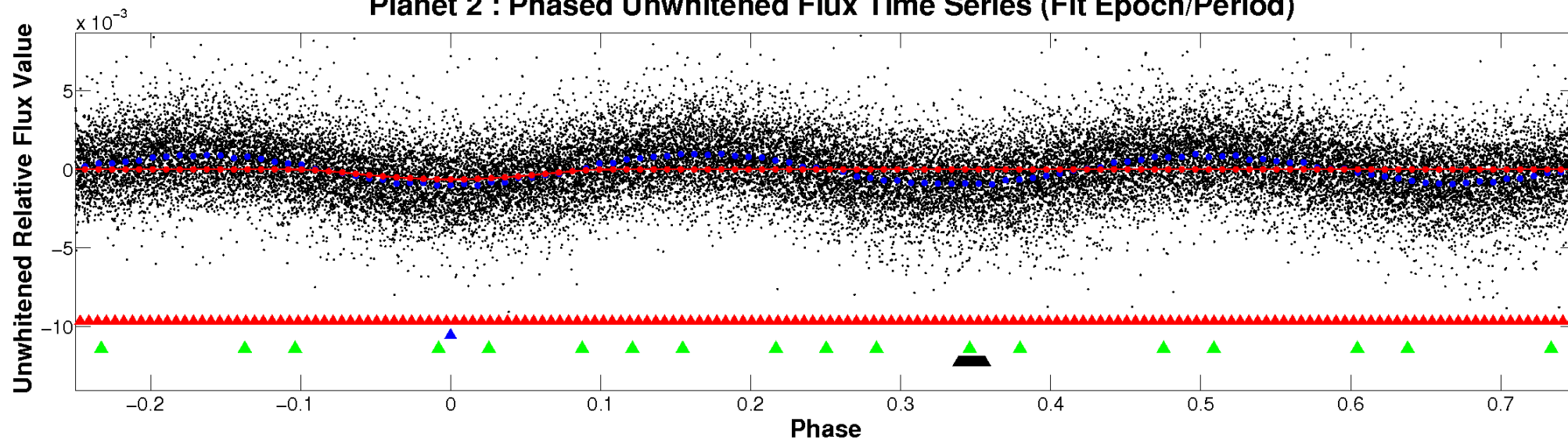
ALT Odd/Even

TCE 008940640-02

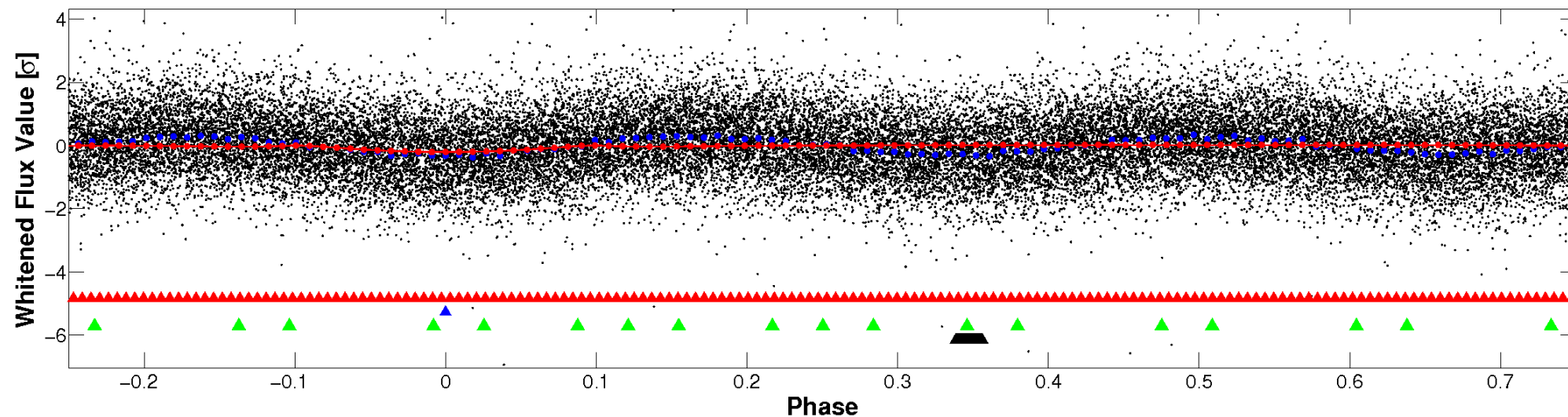


Non-Whitened Vs. Whitened Light Curve

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

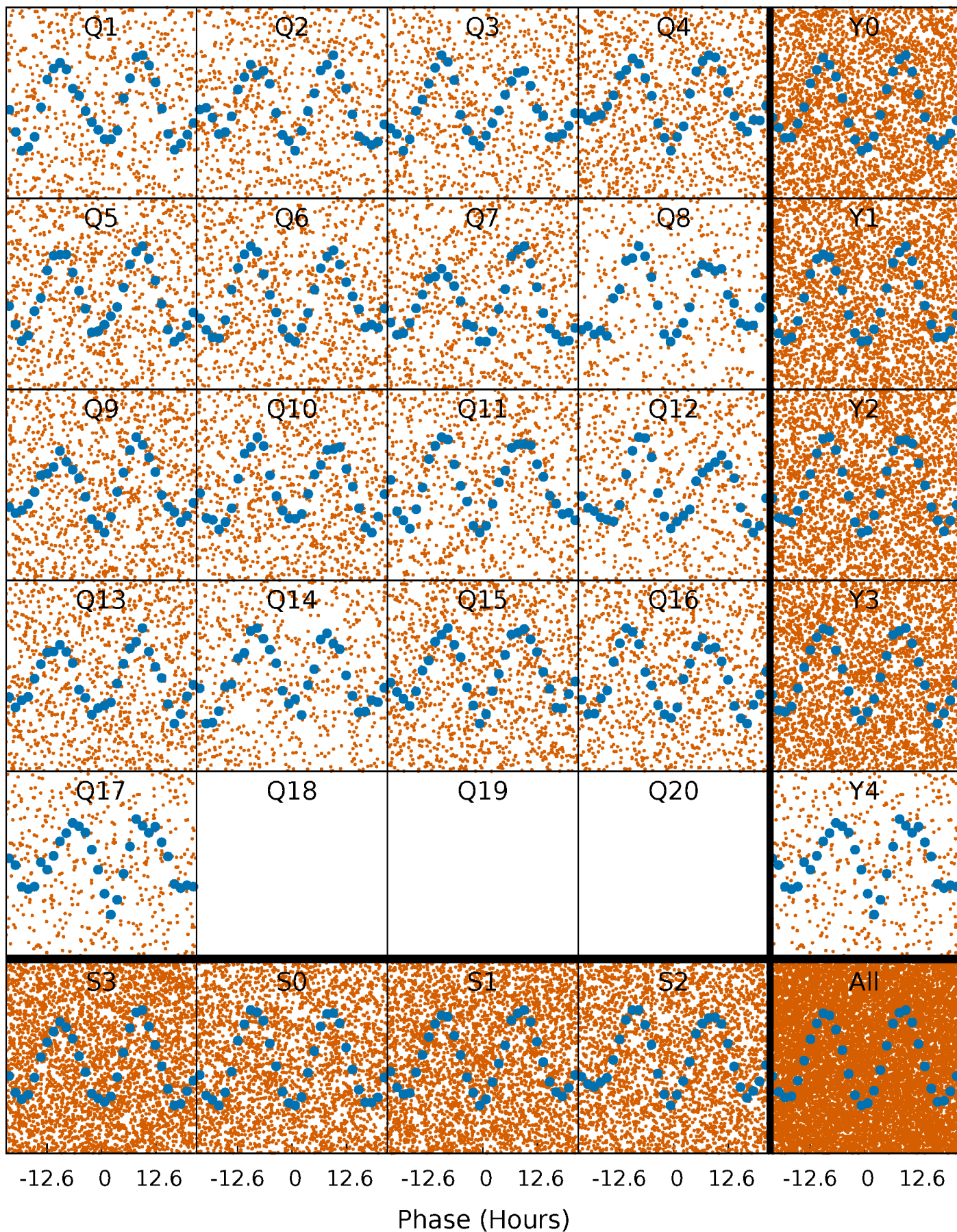


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



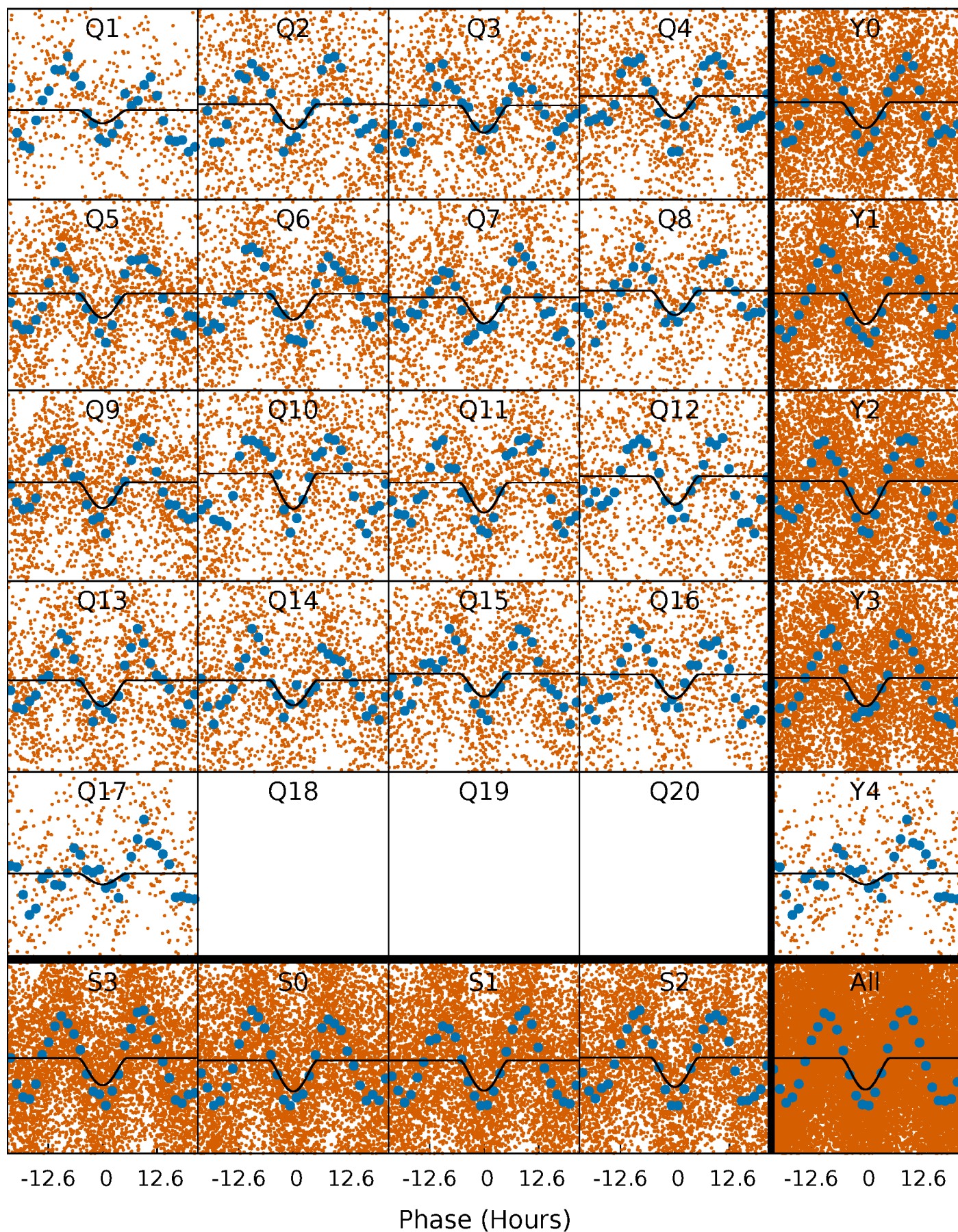
PDC Quarter-Phased Transit Curves

TCE 008940640-02 P= 2.264009 Days $T_0=132.521420$ (BKJD)



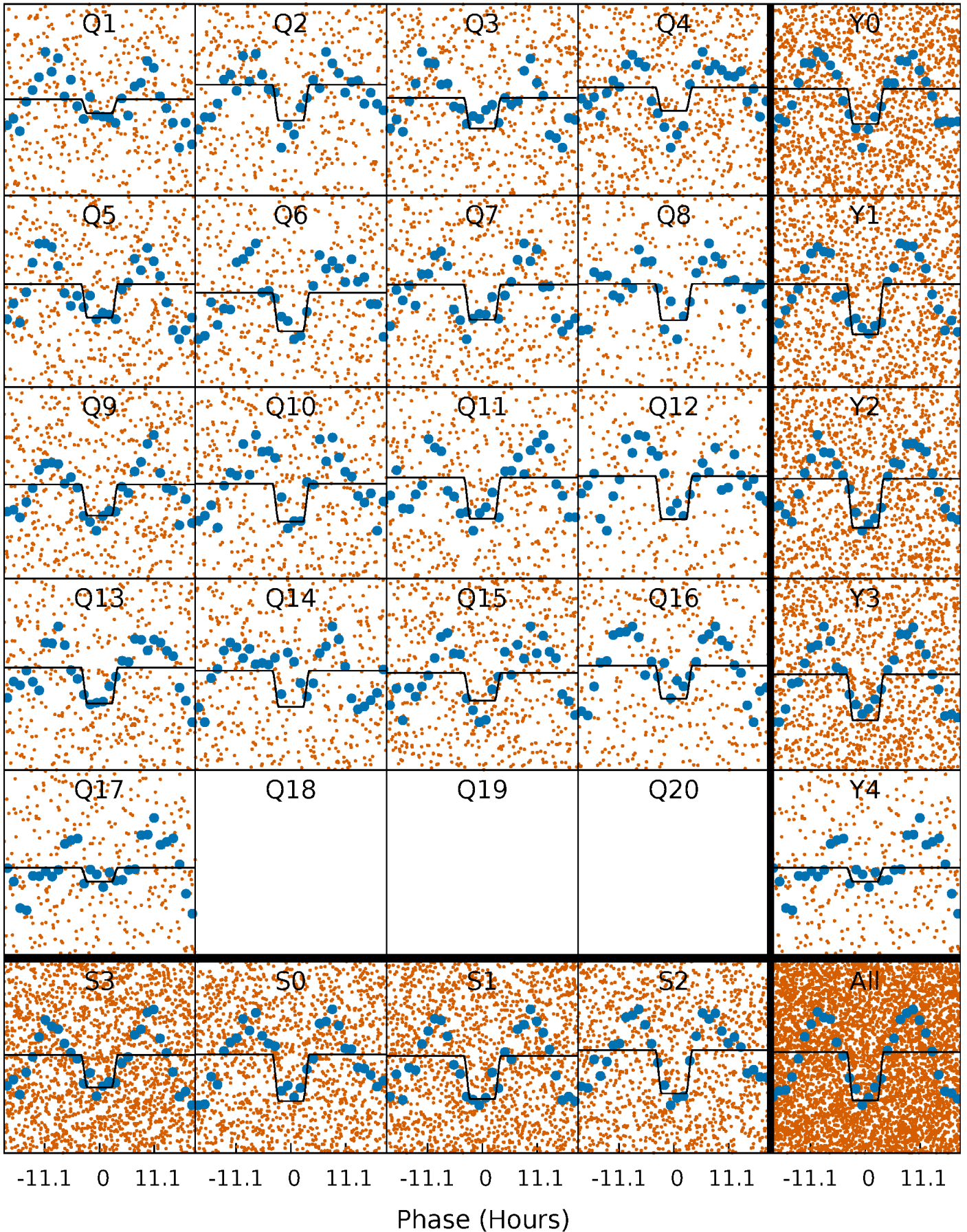
DV Quarter-Phased Transit Curves

TCE 008940640-02 P= 2.264009 Days $T_0=132.521420$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

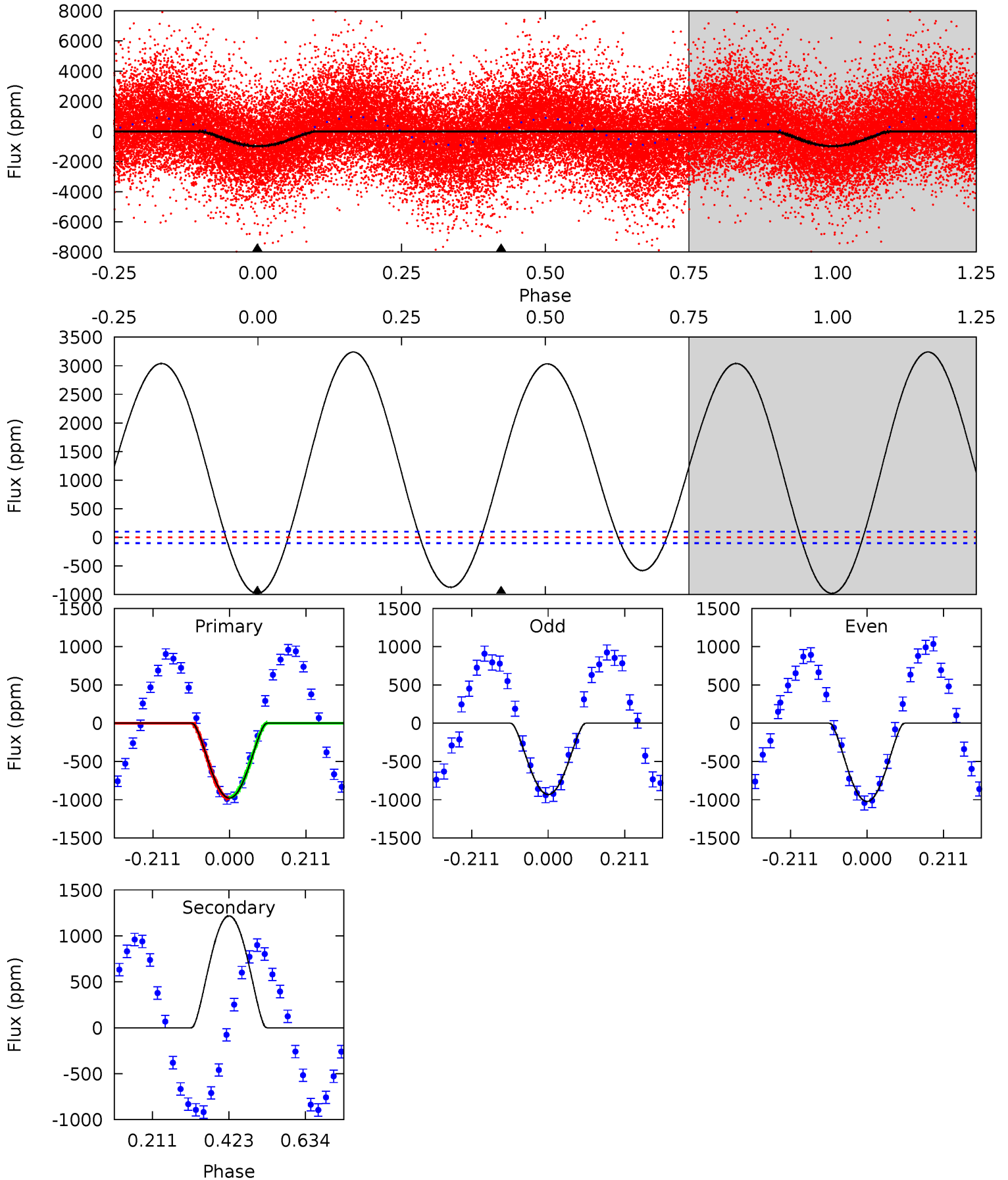
TCE 008940640-02 P= 2.263929 Days $T_0=132.537047$ (BKJD)



DV Model-Shift Uniqueness Test

008940640-02, P = 2.264009 Days, E = 130.257411 Days

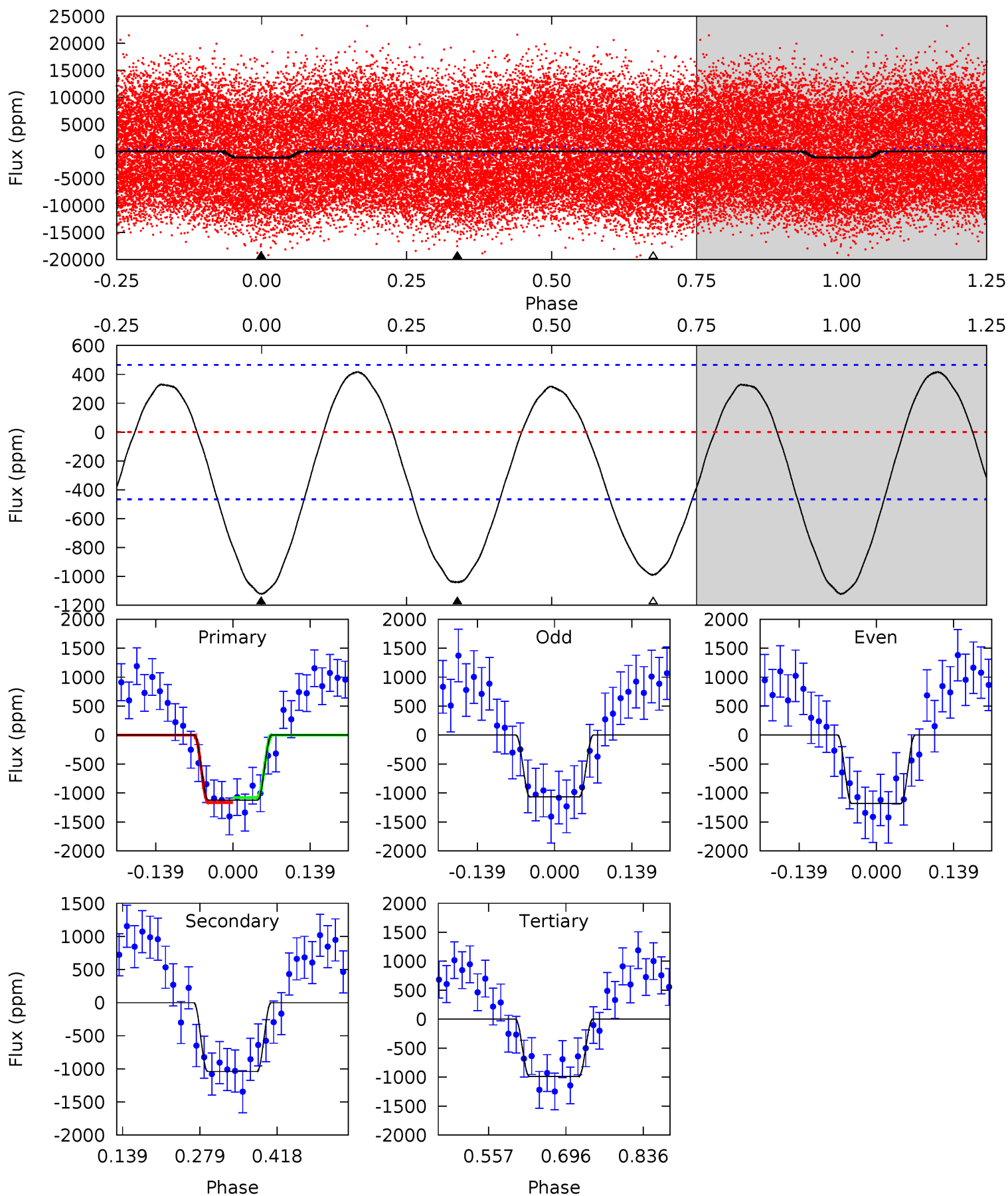
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|-------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 43.5 | -54.1 | 0 | 0 | 4.41 | 1.25 | 43.4 | 43.5 | 43.5 | -54.1 | -54.1 | 2.06 | 1.15 | 0.77 | 0.48 |



Alt Model-Shift Uniqueness Test

008940640-02, P = 2.263929 Days, E = 130.273118 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 10.8 | 10.0 | 9.54 | 0 | 4.49 | 1.48 | 4.74 | 1.28 | 10.8 | 0.49 | 10.0 | 0.54 | 1.12 | 0.27 | 0.42 |



Stellar Parameters For KIC 008940640

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 7244^{+205}_{-307} | $3.632^{+0.603}_{-0.100}$ | $-0.480^{+0.300}_{-0.300}$ | $3.248^{+0.329}_{-1.864}$ | $1.650^{+0.163}_{-0.488}$ | $0.068^{+0.525}_{-0.020}$ |
| | +3%/-4% | +17%/-3% | +62%/-62% | +10%/-57% | +10%/-30% | +773%/-29% |
| Source | PHO54 | PHO54 | PHO54 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 008940640-02 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|-----------------|---------------------------|----------------------|-------------------------|-----------------------------|
| DV | 1217 ± 22 | $17.46^{+17.62}_{-11.47}$ | 3915^{+277}_{-608} | -5717^{+1177}_{-4121} | $-3.418^{+2.584}_{-25.493}$ |
| Alt. | -1040 ± 104 | $16.27^{+15.80}_{-11.13}$ | 3927^{+251}_{-573} | 5412^{+5657}_{-1429} | $3.306^{+30.147}_{-2.433}$ |

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 $A_{obs} \gg 1.0$

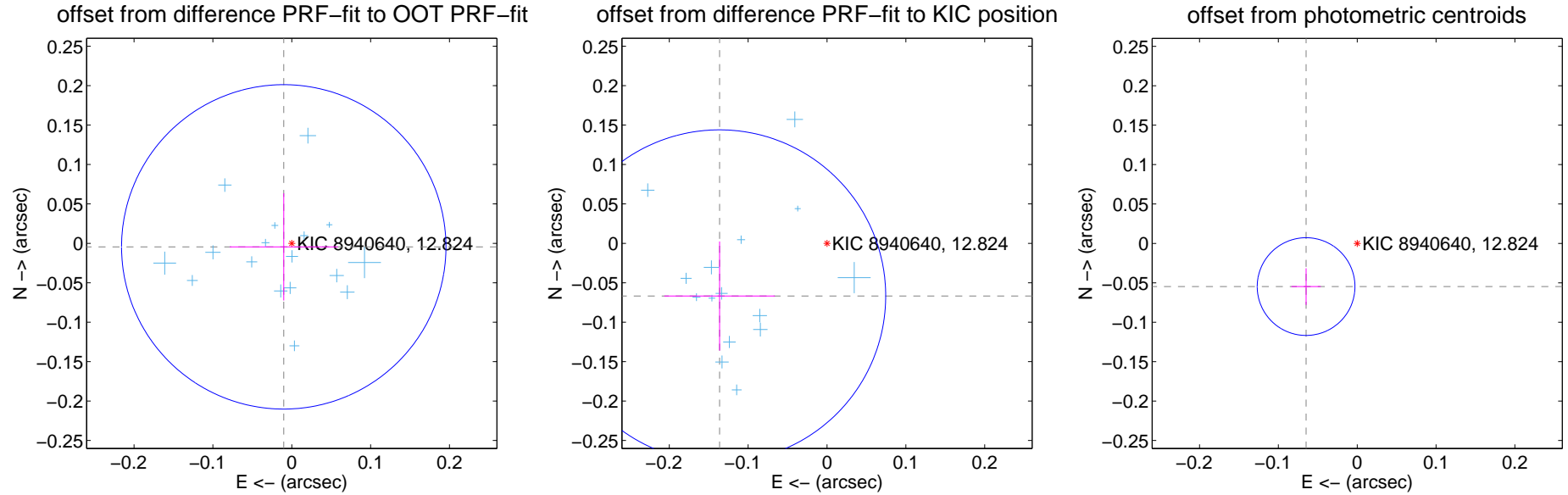
DV Centroid Data

Supplemental centroid analysis for 008940640-02. Kepler magnitude: 12.82. Transit SNR 11.36

There are 17 quarters with good PRF difference image offsets

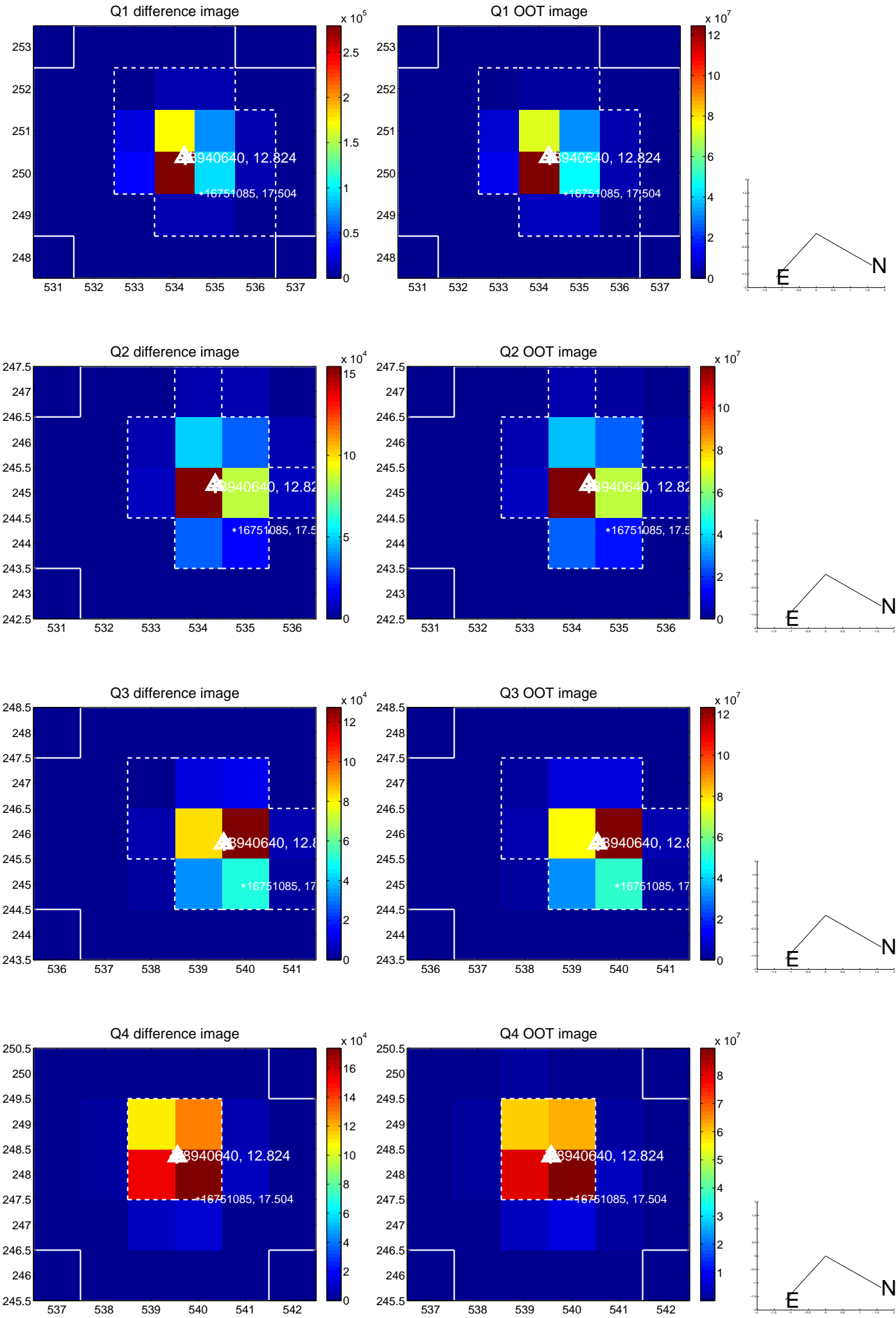
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 0.011 ± 0.069 | 0.16 | 0.010 ± 0.069 | -0.004 ± 0.068 |
| PRF-fit source offset from KIC position | 0.152 ± 0.070 | 2.16 | 0.136 ± 0.070 | -0.067 ± 0.069 |
| photometric centroid source offset | 0.08 ± 0.02 | 4.11 | 0.06 ± 0.02 | -0.05 ± 0.02 |

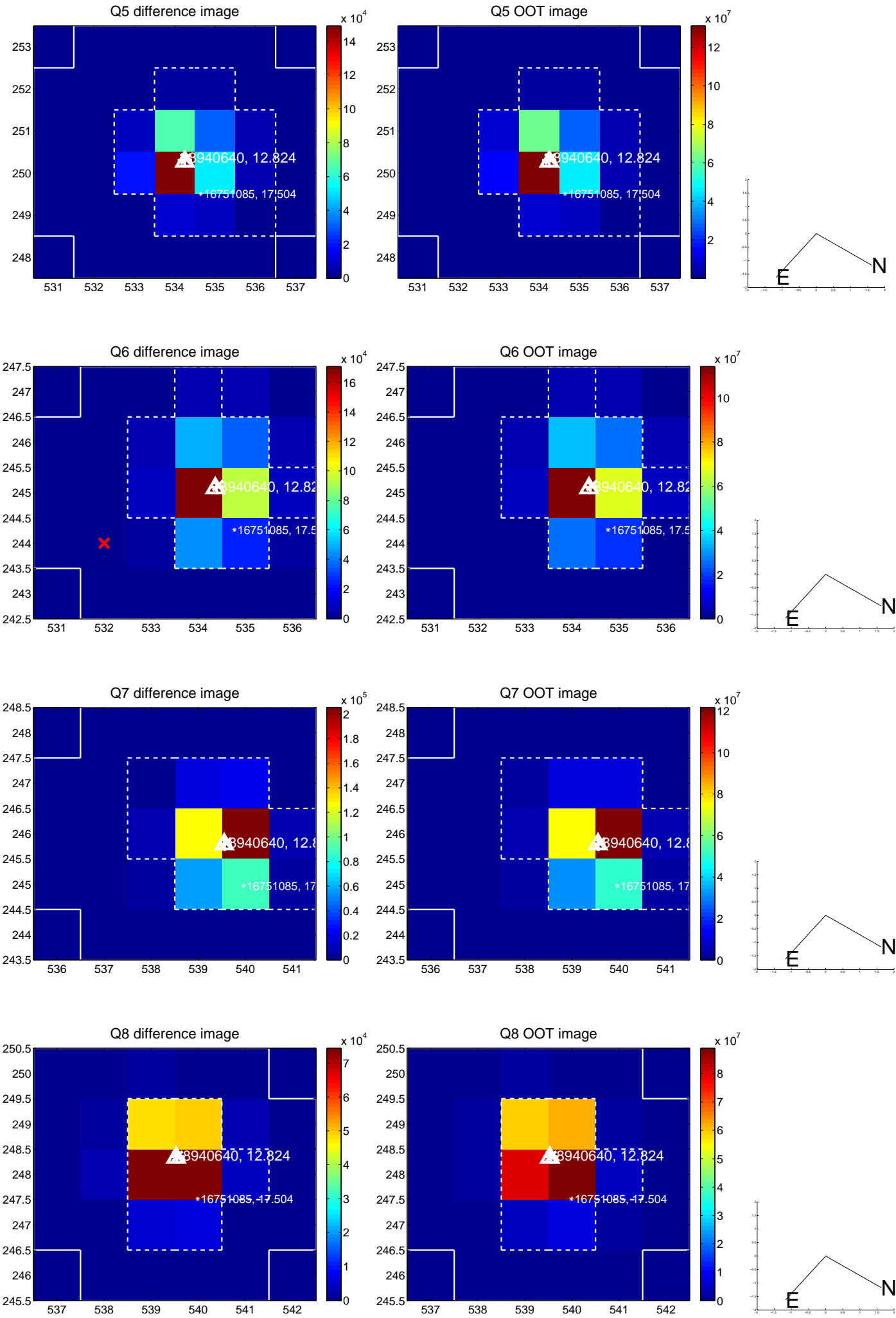


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

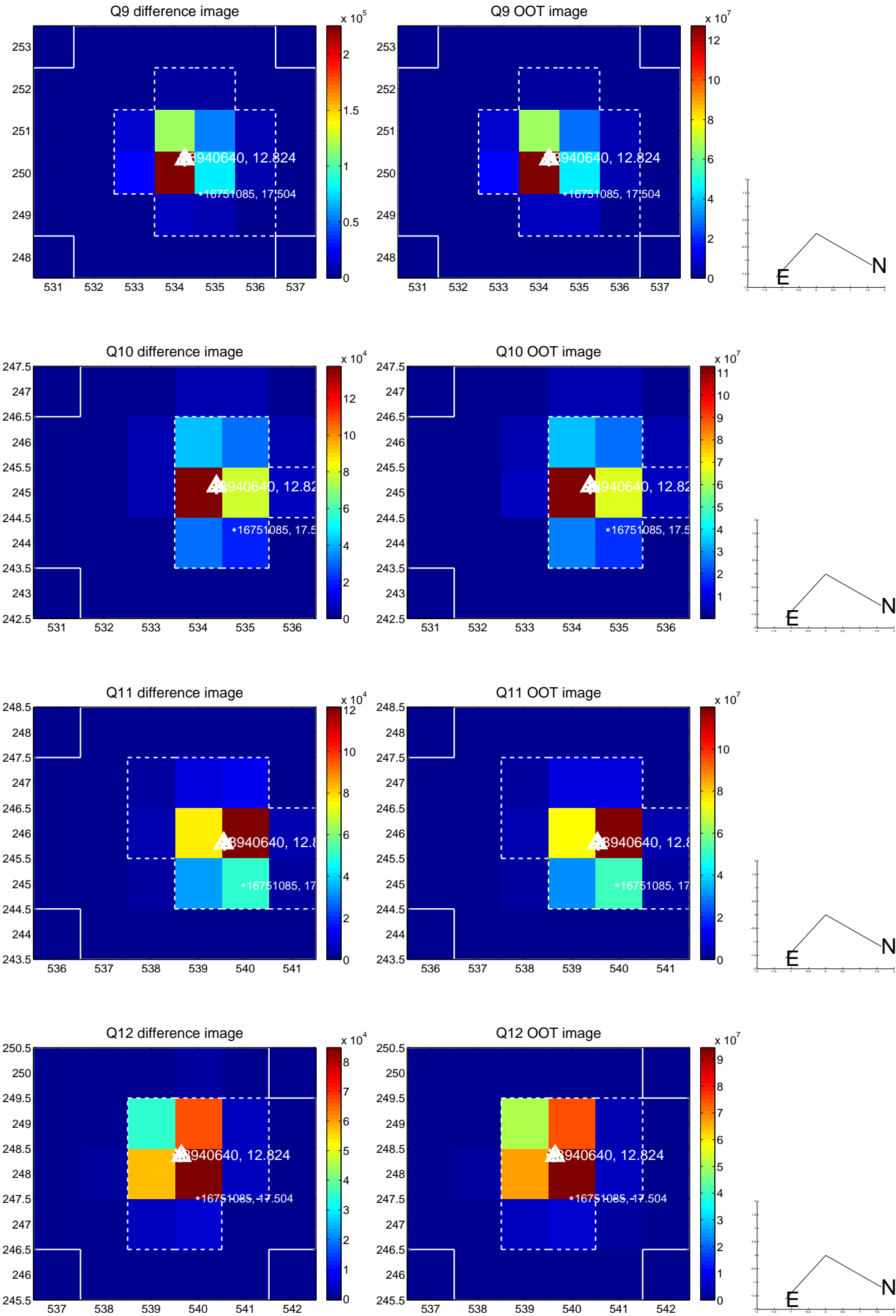
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



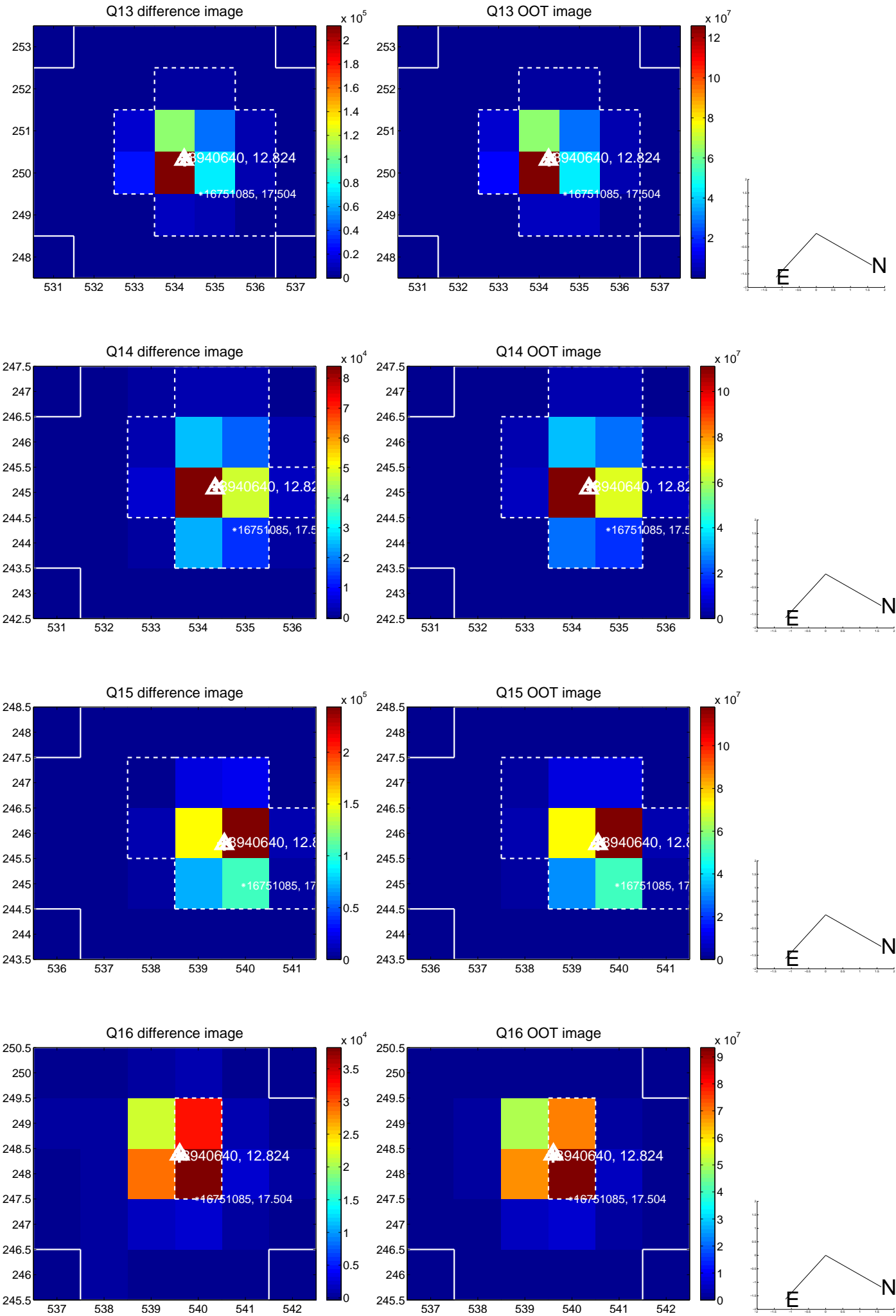
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



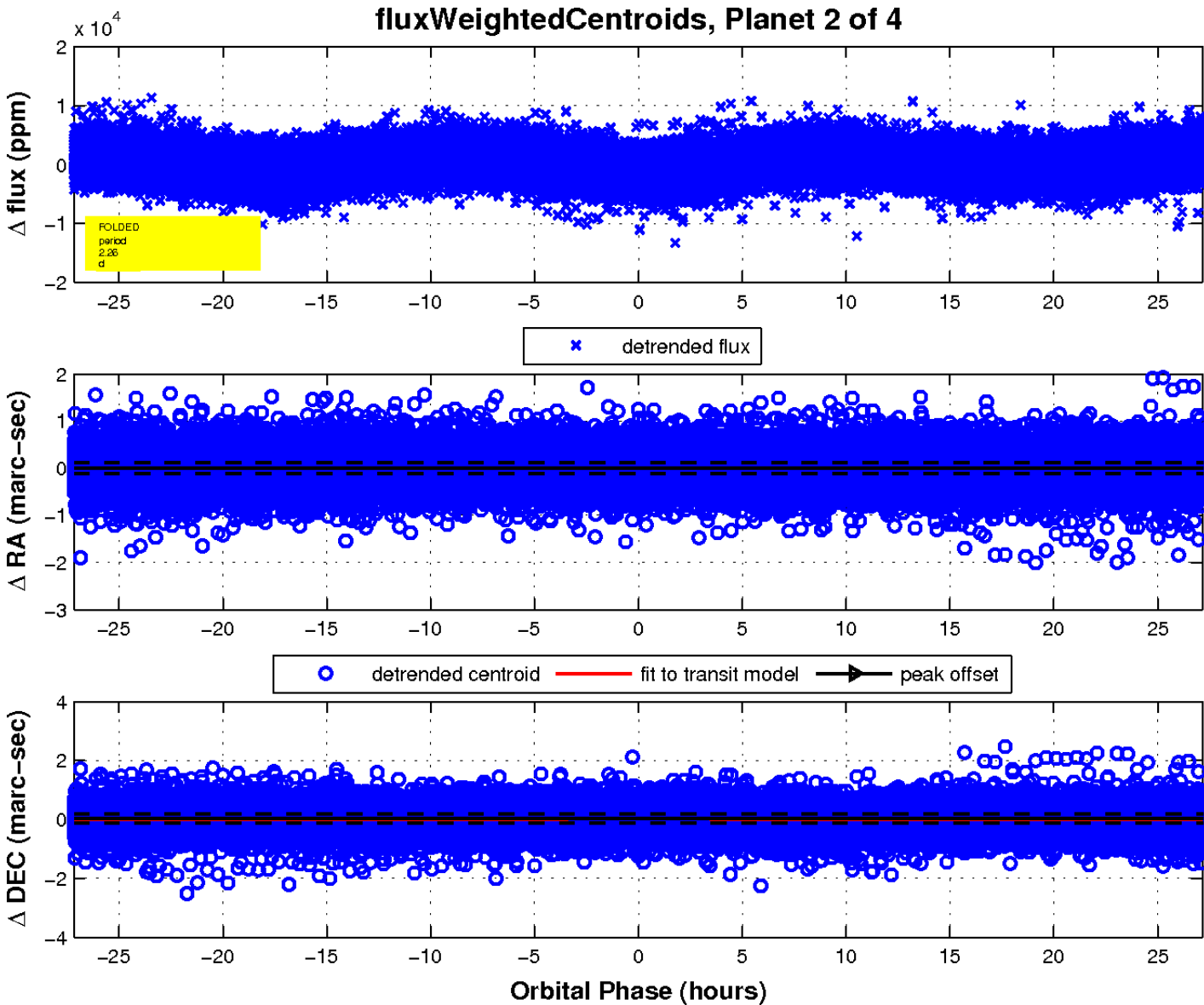
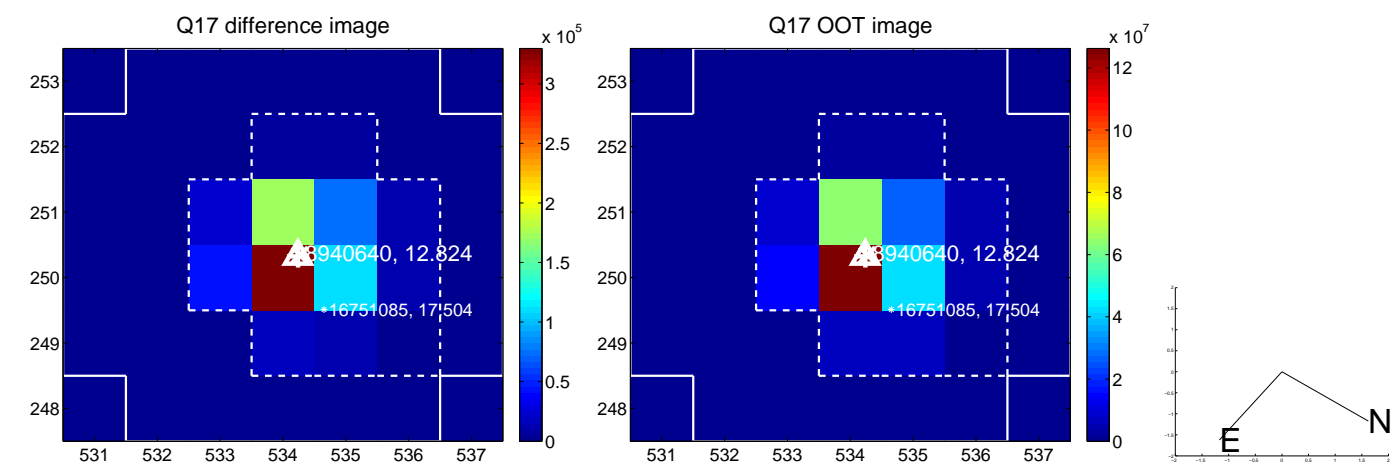
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

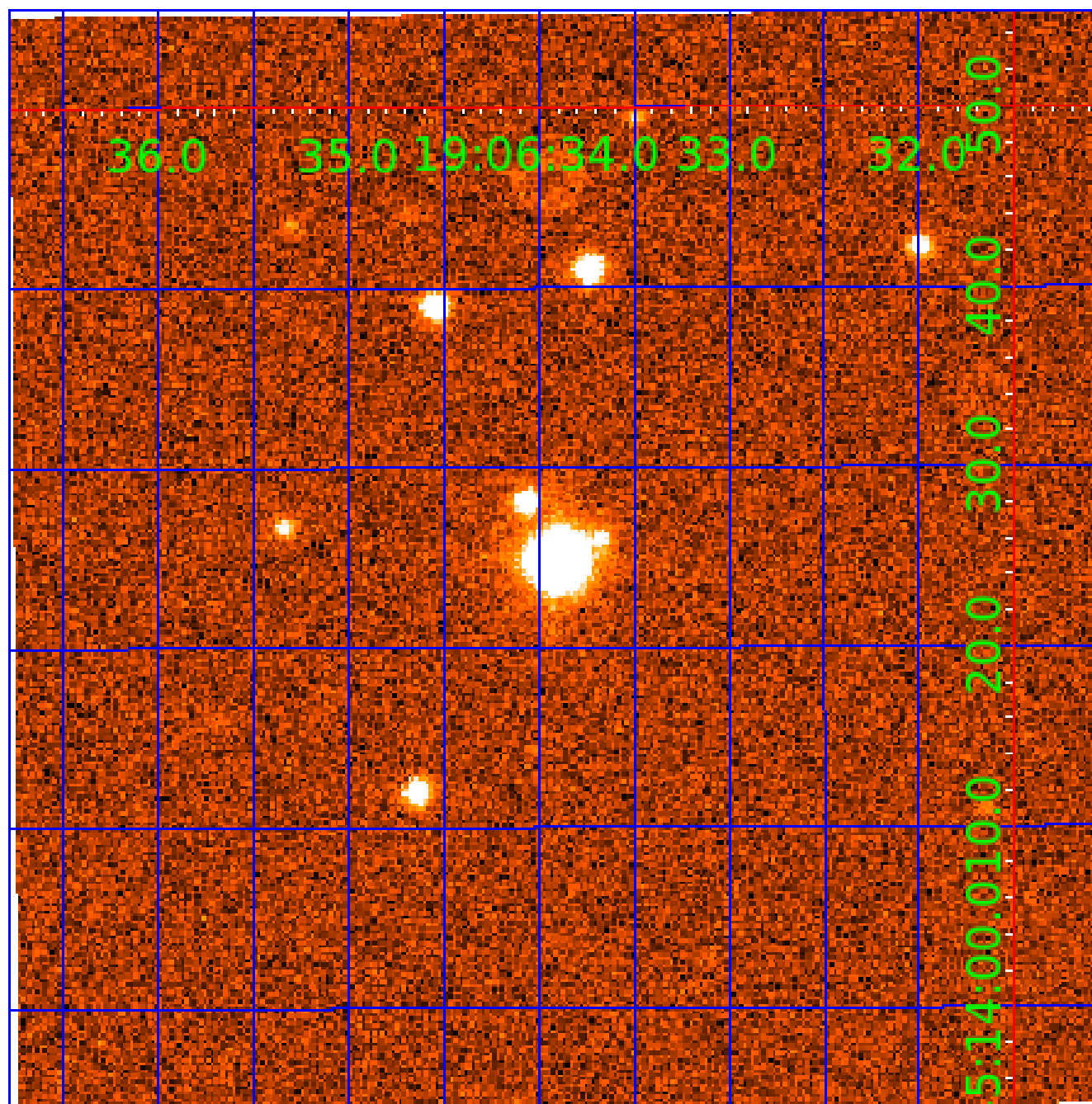


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008940640

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008940640-01 | OBS | No | 0.671305 | 132.159837 | 73.2 | 2.381 | 11.0 | 4.3 | 3.25 | 7244 | 2.88 | 82792.73 |
| 008940640-02 | OBS | No | 2.264009 | 132.521420 | 633.8 | 11.049 | 9.9 | 11.4 | 3.25 | 7244 | 15.09 | 16369.97 |
| 008940640-03 | OBS | No | 81.796827 | 148.567984 | 3071.6 | 10.071 | 19.4 | 4.7 | 3.25 | 7244 | 23.68 | 137.06 |
| 008940640-04 | OBS | No | 2.263947 | 133.327814 | 907.6 | 10.204 | 12.4 | 16.8 | 3.25 | 7244 | 17.83 | 16370.57 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008940640-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008940640-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT |
| 008940640-03 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT |
| 008940640-04 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD |

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

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

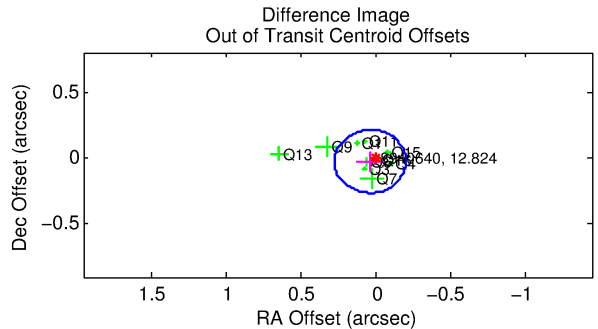
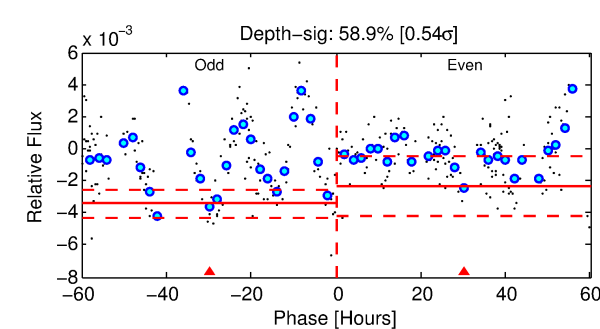
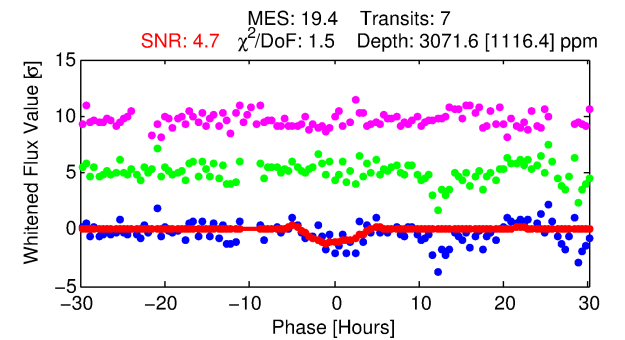
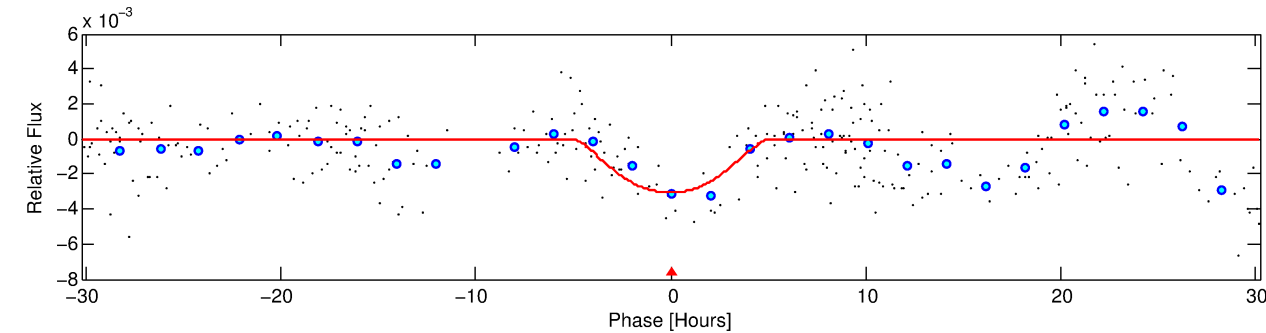
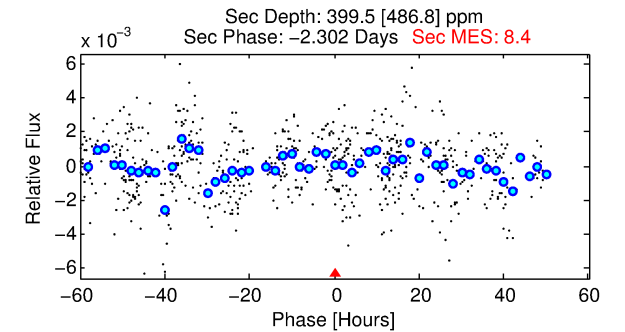
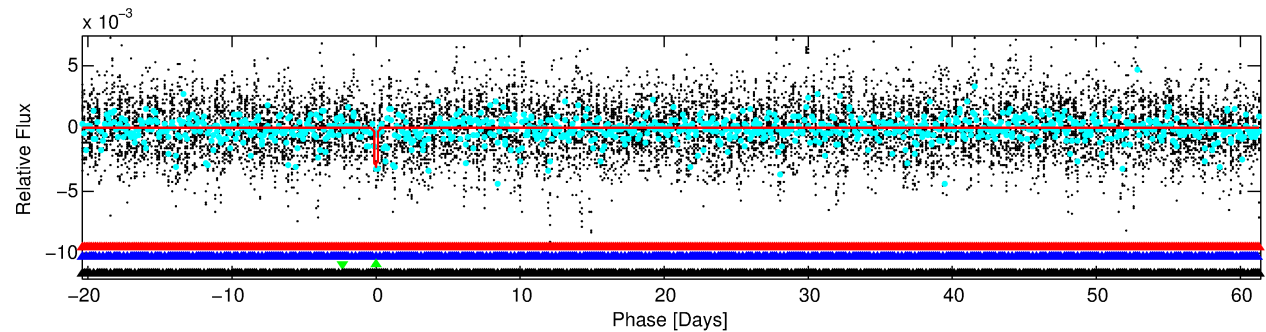
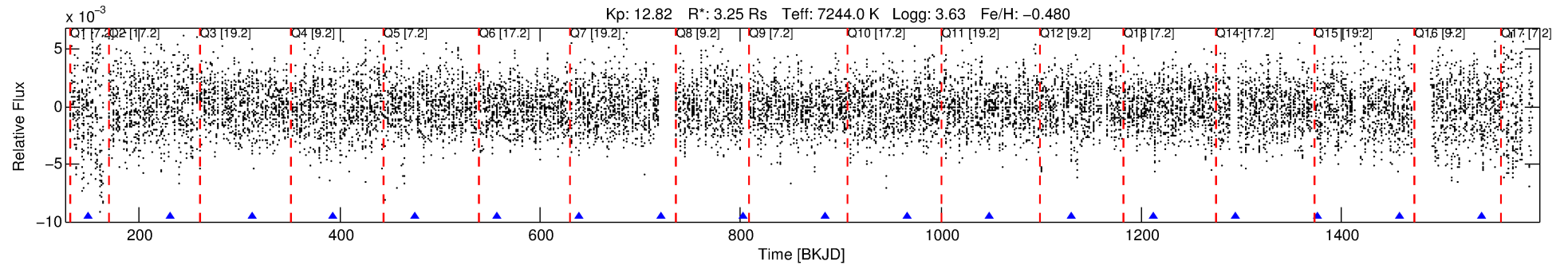
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008940640-03

No Significant Match Found

DV One-Page Summary

KIC: 8940640 Candidate: 3 of 4 Period: 81.797 d



DV Fit Results:

Period = 81.79683 [0.00577] d
Epoch = 148.5680 [0.0475] BKJD
Rp/R* = 0.0668 [0.0541]
a/R* = 29.42 [10.90]
b = 0.96 [0.12]
Seff = 137.06 [139.23]
Teq = 872 [222] K
Rp = 23.68 [23.49] Re
a = 0.4358 [0.2617] AU
Ag = 74.42 [168.17] [0.44σ]
Teffp = 3962 [2013] K [1.53σ]

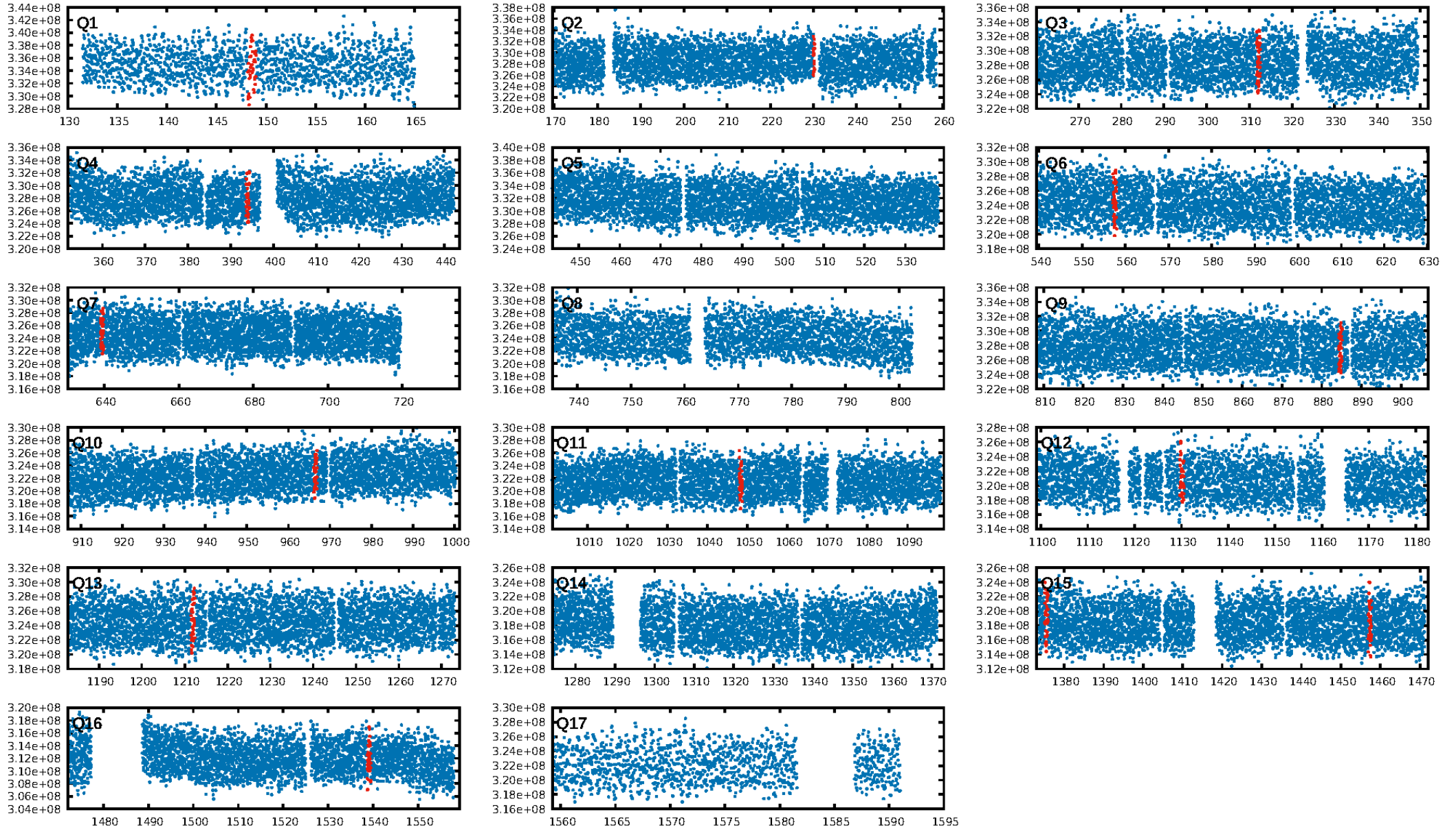
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [127.68σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 53.4%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [7/7]
GhostDiagnostic-chr: -0.432
Centroid-sig: 54.5%
Centroid-so: 0.066 arcsec [2.57σ]
OotOffset-rm: 0.042 arcsec [0.53σ]
OotOffset-st: 1/4/2/3 [10]
KicOffset-rm: 0.138 arcsec [1.45σ]
KicOffset-st: 1/4/2/3 [10]
DiffImageQuality-fgm: 0.50 [5/10]
DiffImageOverlap-fno: 0.00 [0/10]

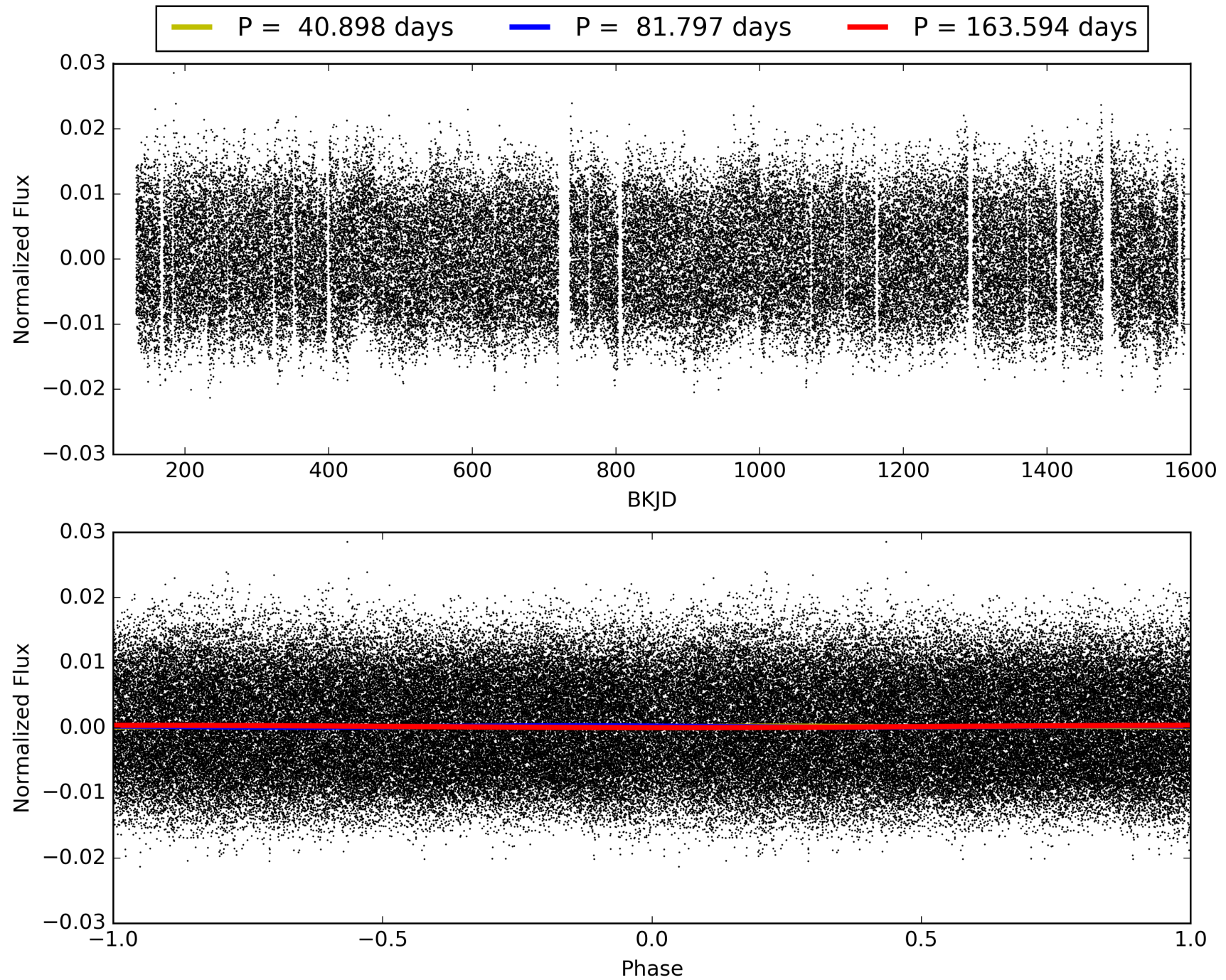
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:12:02 Z

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

TCE 008940640-03, PDC Light Curves

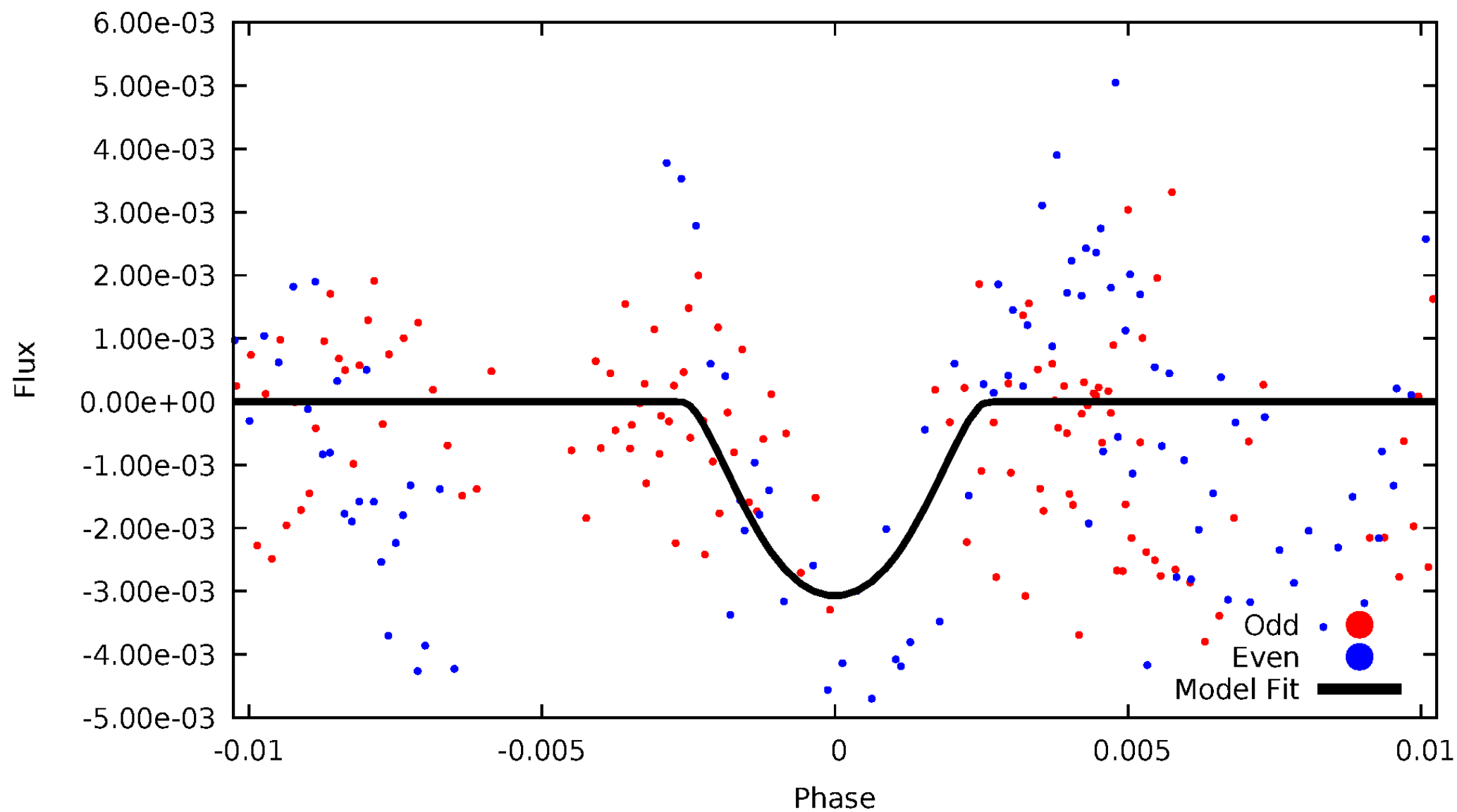


TCE 008940640-03



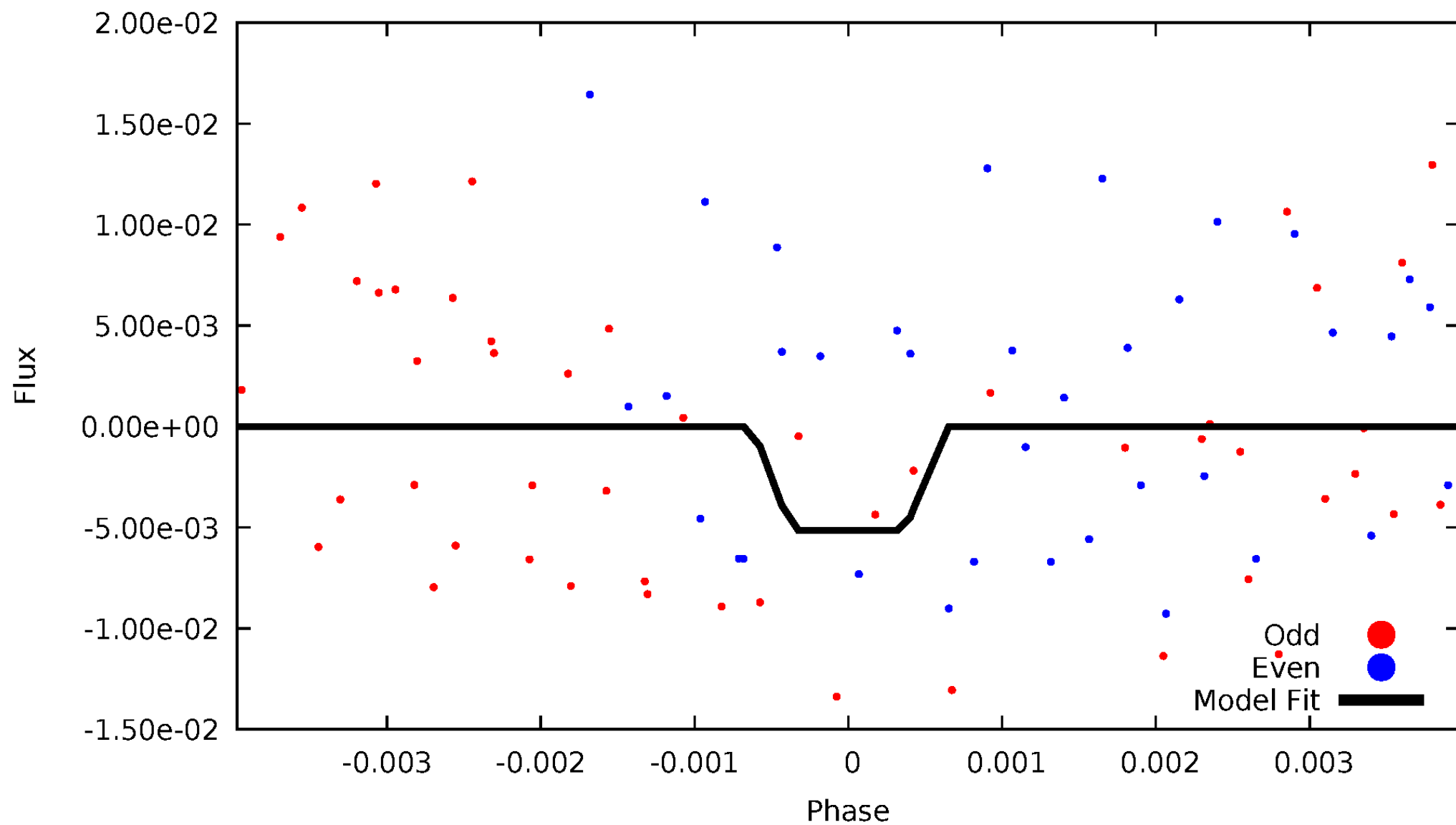
DV Odd/Even

TCE 008940640-03



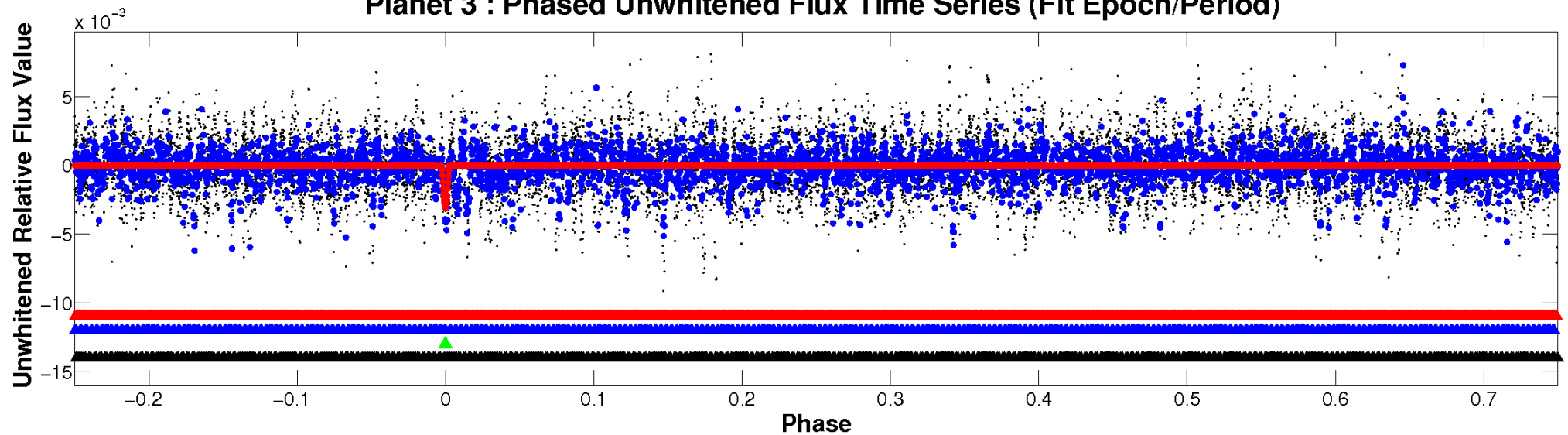
ALT Odd/Even

TCE 008940640-03

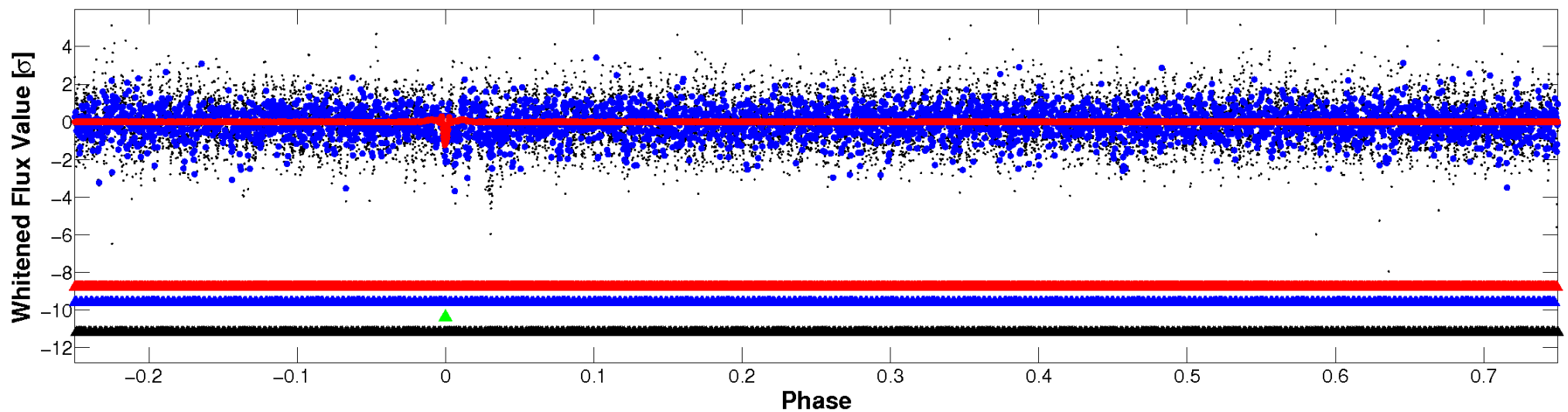


Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

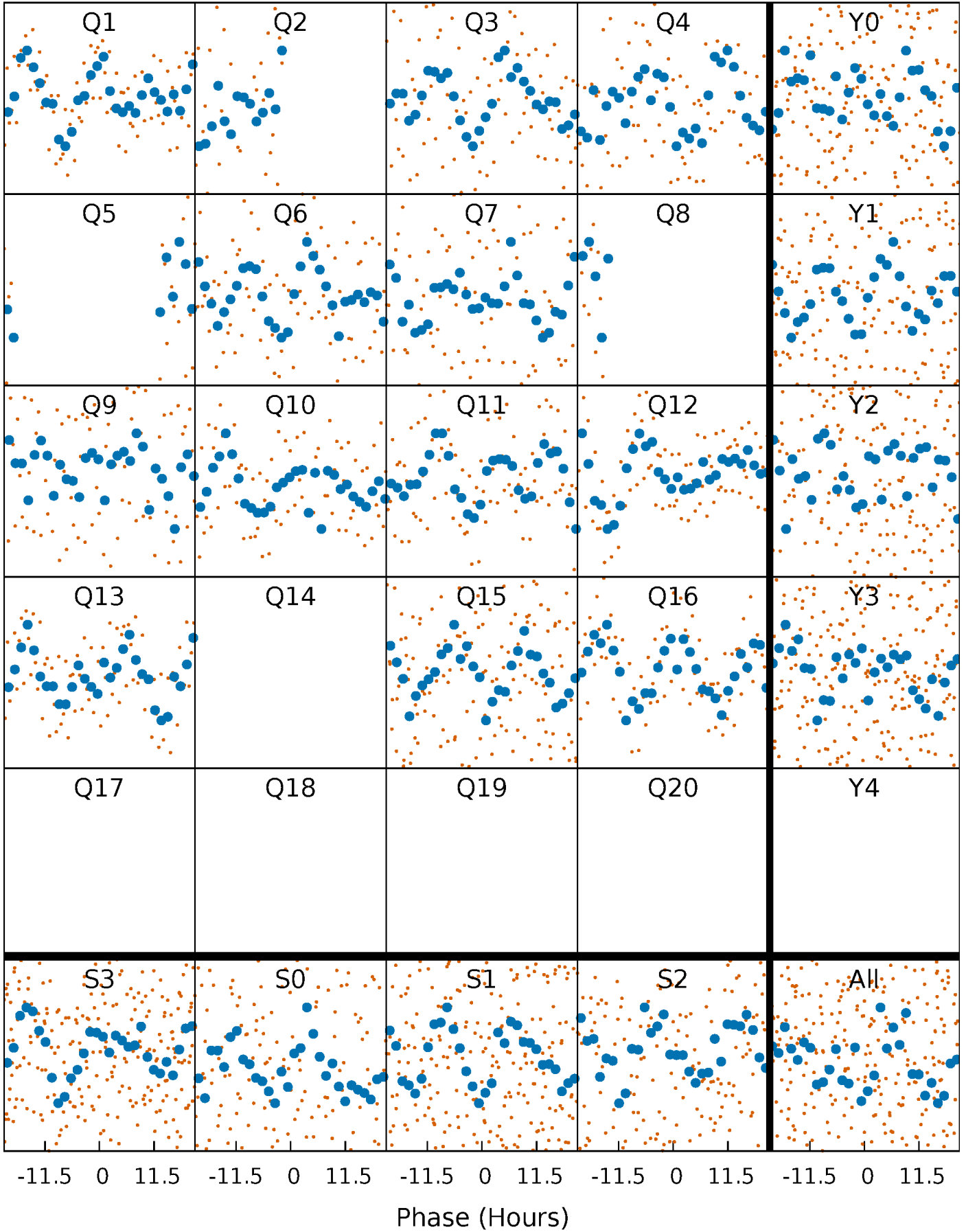


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



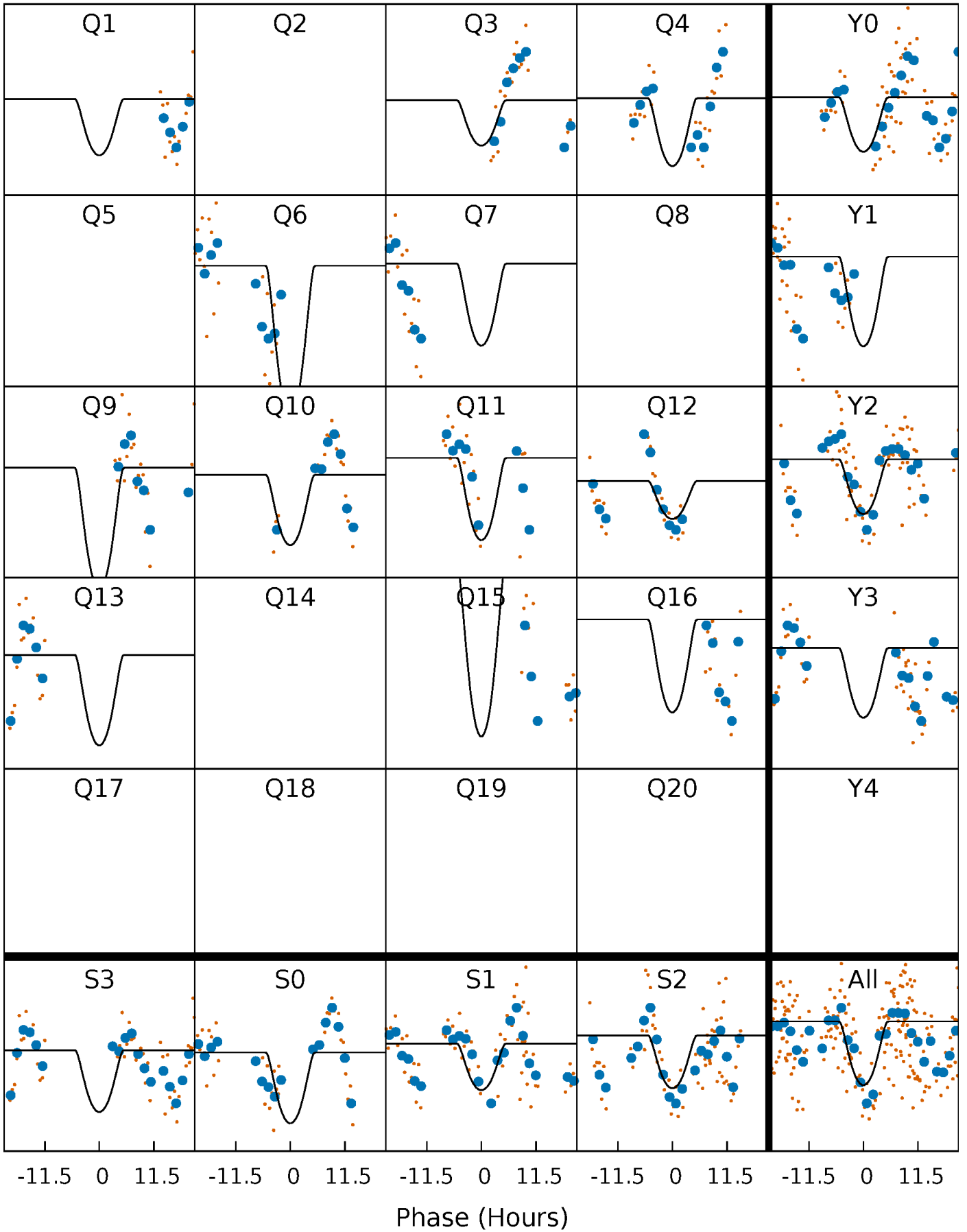
PDC Quarter-Phased Transit Curves

TCE 008940640-03 P= 81.796827 Days $T_0=148.567984$ (BKJD)



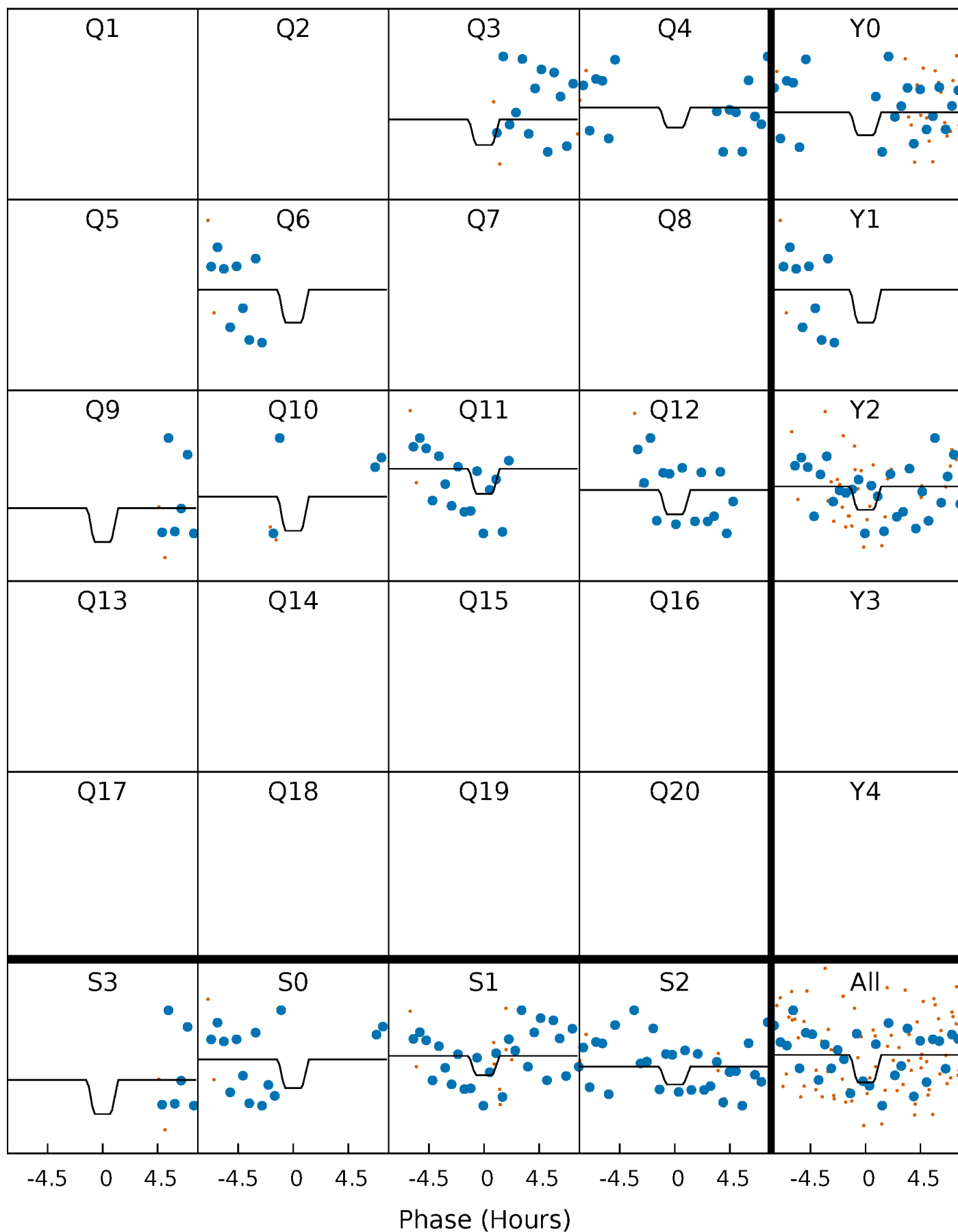
DV Quarter-Phased Transit Curves

TCE 008940640-03 P= 81.796827 Days $T_0=148.567984$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

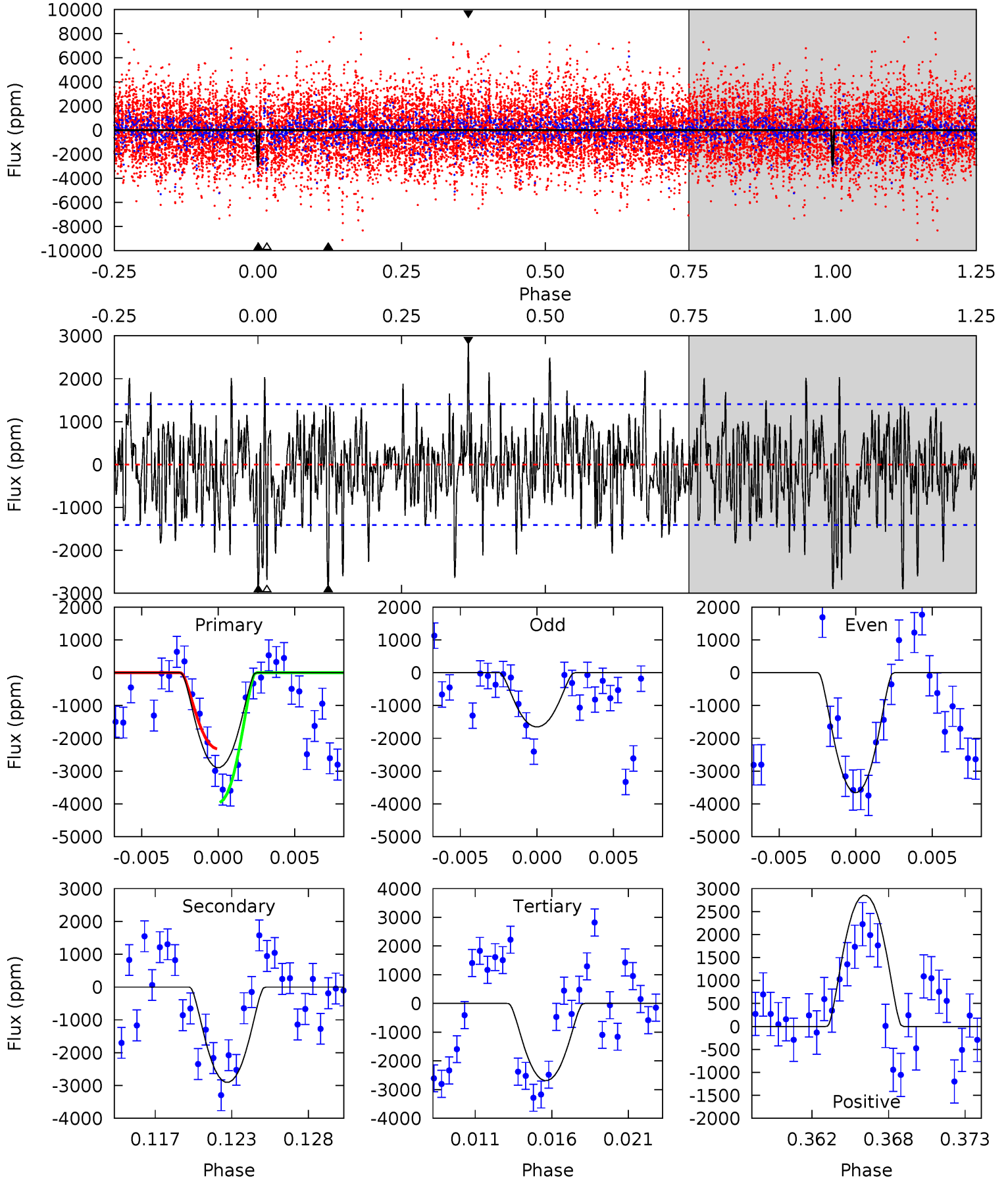
TCE 008940640-03 $P = 81.781918$ Days $T_0 = 148.649575$ (BKJD)



DV Model-Shift Uniqueness Test

008940640-03, P = 81.796827 Days, E = 66.771157 Days

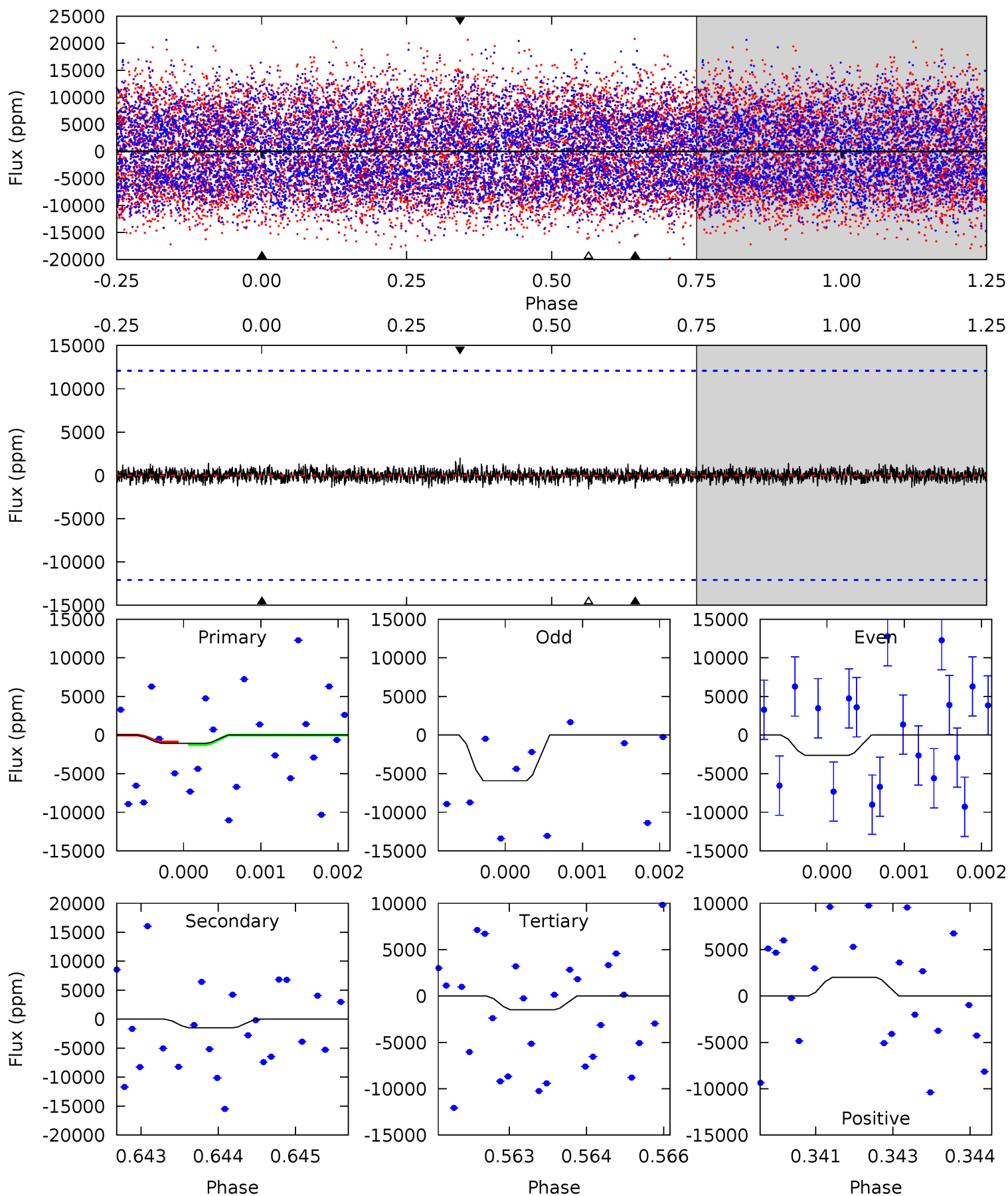
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 10.6 | 10.6 | 9.82 | 10.4 | 5.15 | 2.79 | 2.72 | 0.76 | 0.15 | 0.80 | 0.18 | 3.67 | 0.99 | 0.50 | 2.85 |



Alt Model-Shift Uniqueness Test

008940640-03, P = 81.781918 Days, E = 66.867657 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-------|-------|------|
| 0.49 | 0.68 | 0.67 | 0.91 | 5.43 | 3.25 | 0.20 | -0.18 | -0.42 | 0.00 | -0.23 | 0.72 | -0.24 | 0.57 | 0.08 |



Stellar Parameters For KIC 008940640

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 7244^{+205}_{-307} | $3.632^{+0.603}_{-0.100}$ | $-0.480^{+0.300}_{-0.300}$ | $3.248^{+0.329}_{-1.864}$ | $1.650^{+0.163}_{-0.488}$ | $0.068^{+0.525}_{-0.020}$ |
| | +3%/-4% | +17%/-3% | +62%/-62% | +10%/-57% | +10%/-30% | +773%/-29% |
| Source | PHO54 | PHO54 | PHO54 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 008940640-03 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|------------------|---------------------------|---------------------|------------------------|----------------------|
| DV | -2905 ± 274 | $22.77^{+18.11}_{-13.43}$ | 1177^{+83}_{-166} | 6024^{+3929}_{-1230} | 562^{+2898}_{-378} |
| Alt. | -1502 ± 2223 | $22.81^{+20.63}_{-13.36}$ | 1184^{+79}_{-151} | 4847^{+3126}_{-9206} | 202^{+1240}_{-305} |

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 $A_{obs} \gg 1.0$

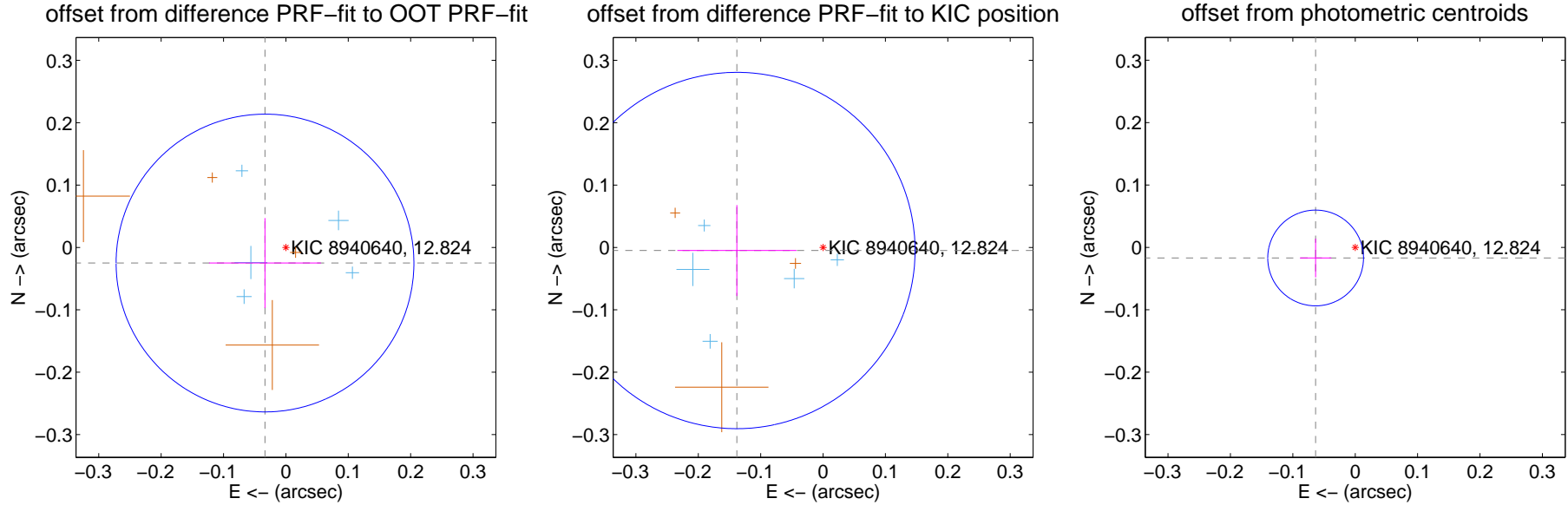
DV Centroid Data

Supplemental centroid analysis for 008940640-03. Kepler magnitude: 12.82. Transit SNR 4.71

There are 5 quarters with good PRF difference image offsets

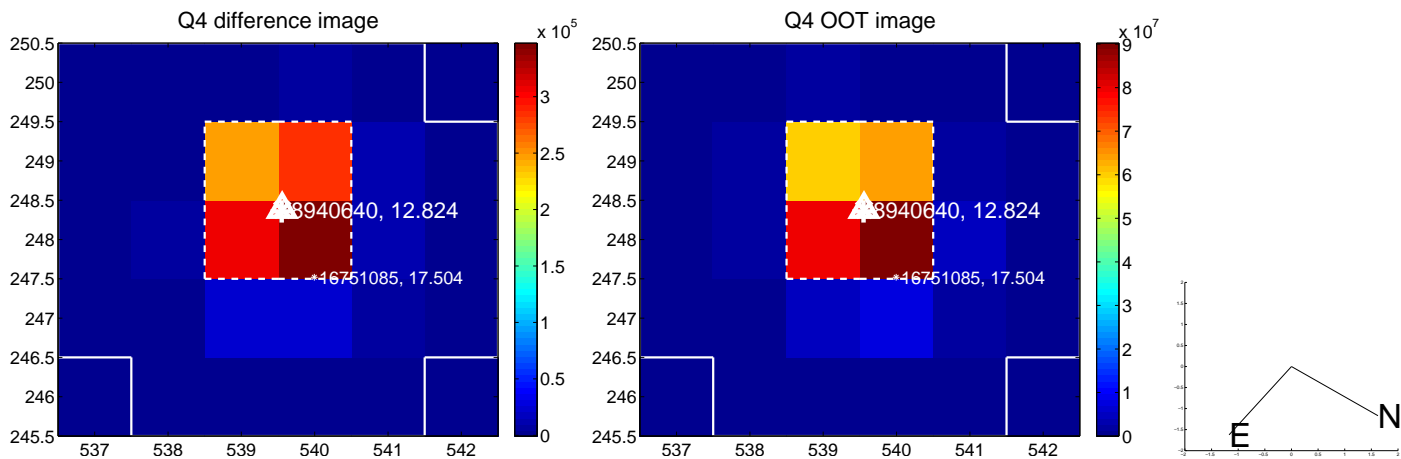
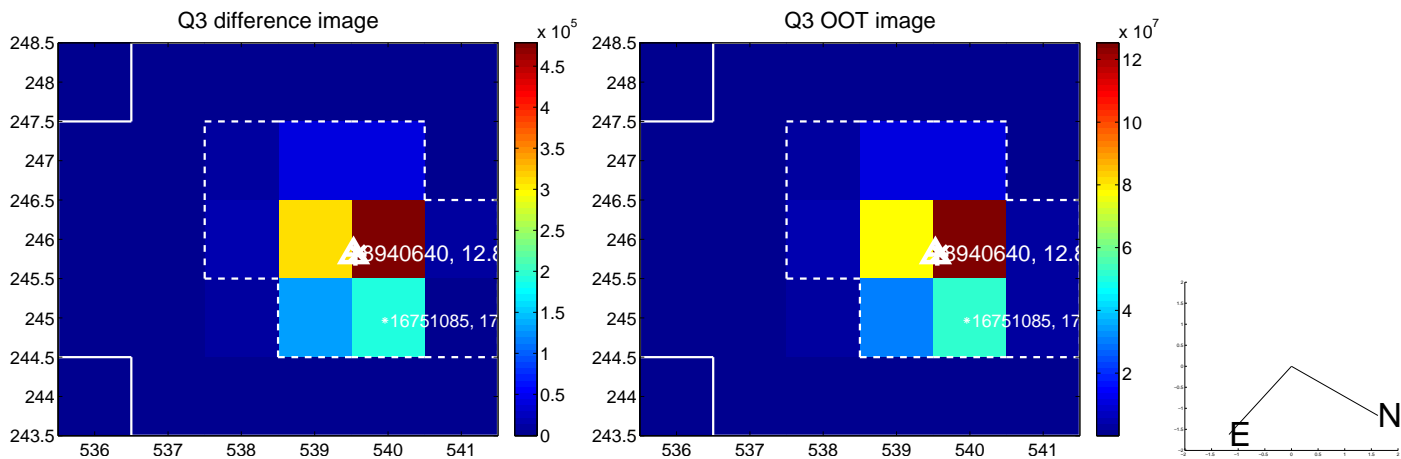
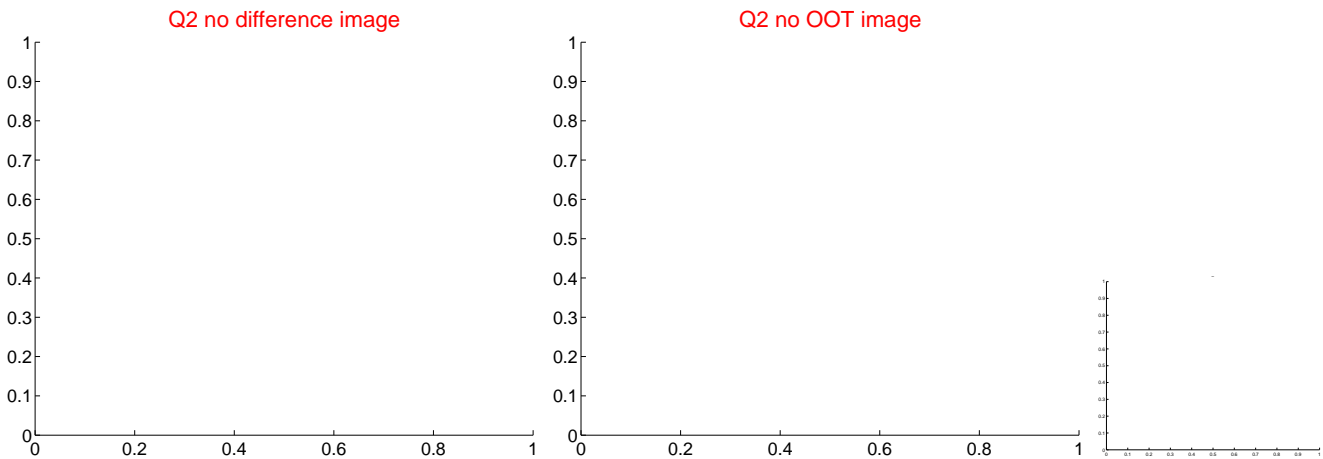
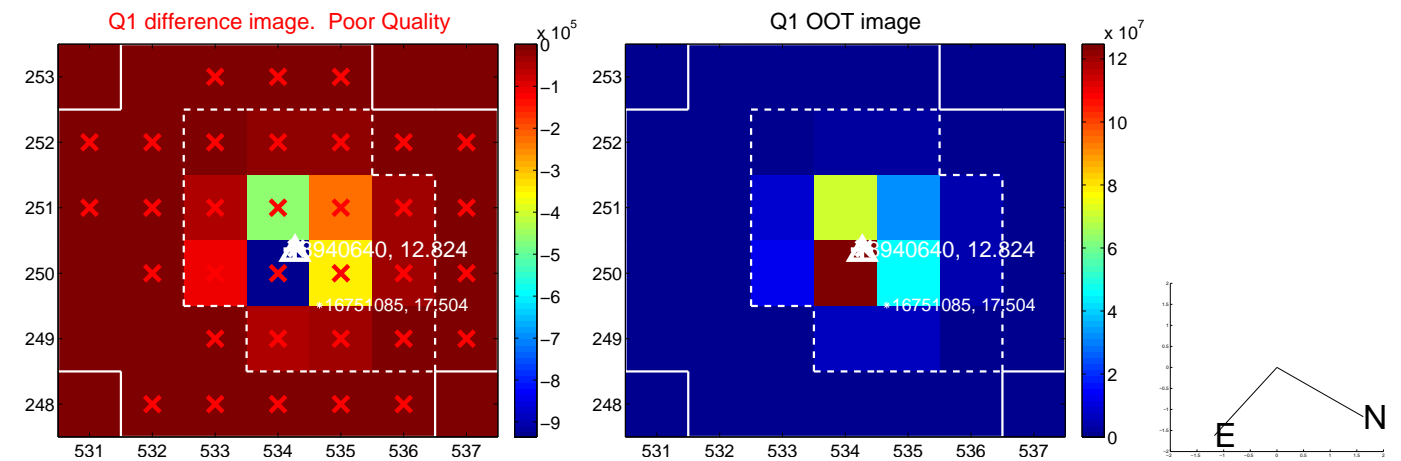
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 0.042 ± 0.080 | 0.53 | 0.033 ± 0.090 | -0.025 ± 0.072 |
| PRF-fit source offset from KIC position | 0.138 ± 0.095 | 1.45 | 0.138 ± 0.095 | -0.005 ± 0.073 |
| photometric centroid source offset | 0.07 ± 0.03 | 2.57 | 0.06 ± 0.03 | -0.02 ± 0.03 |

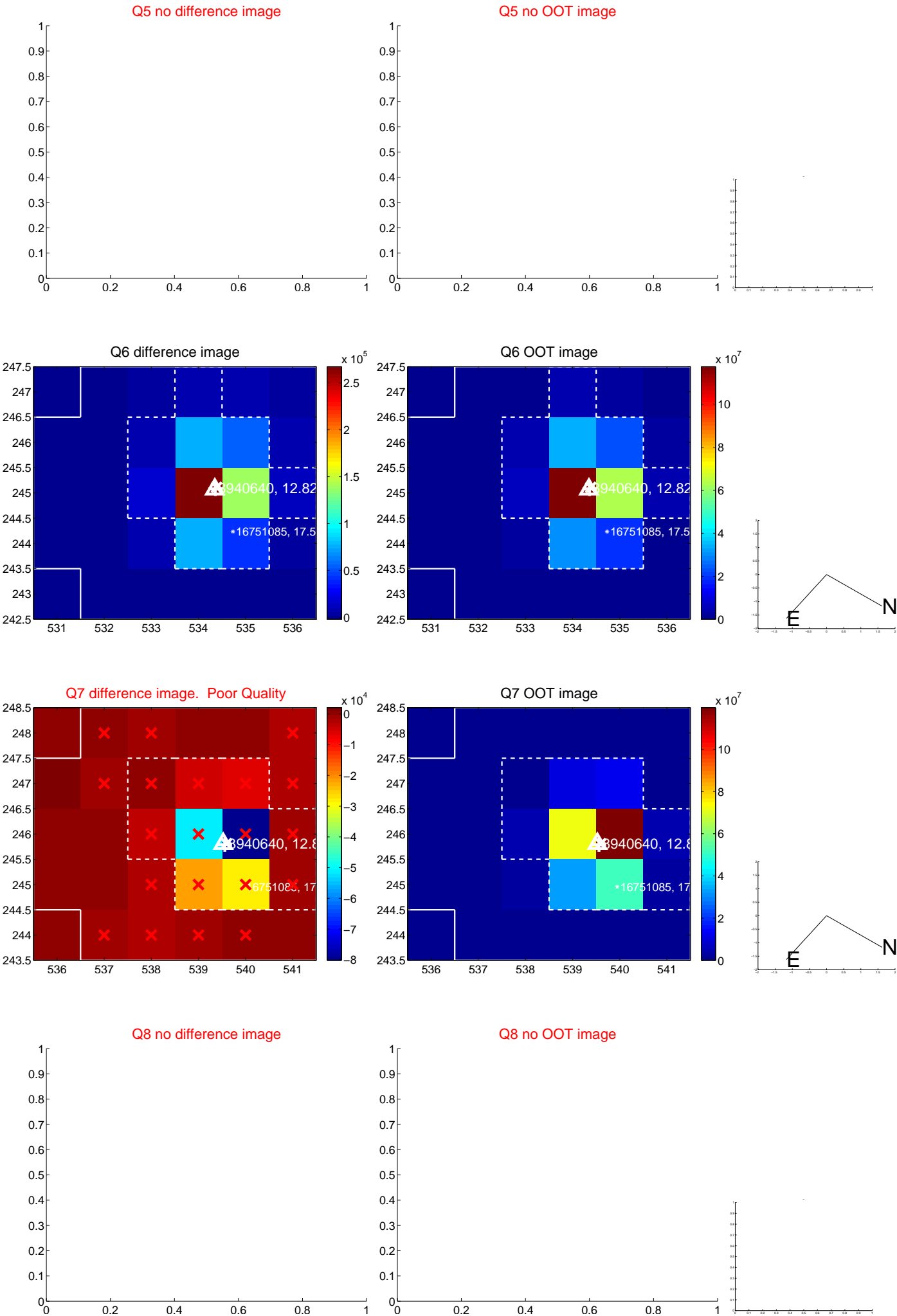


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

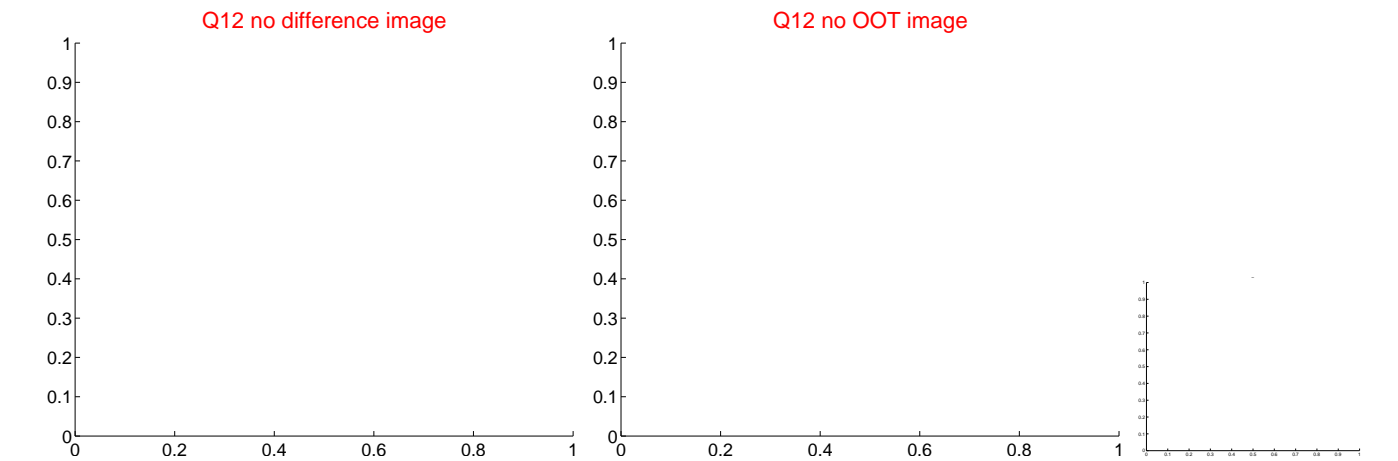
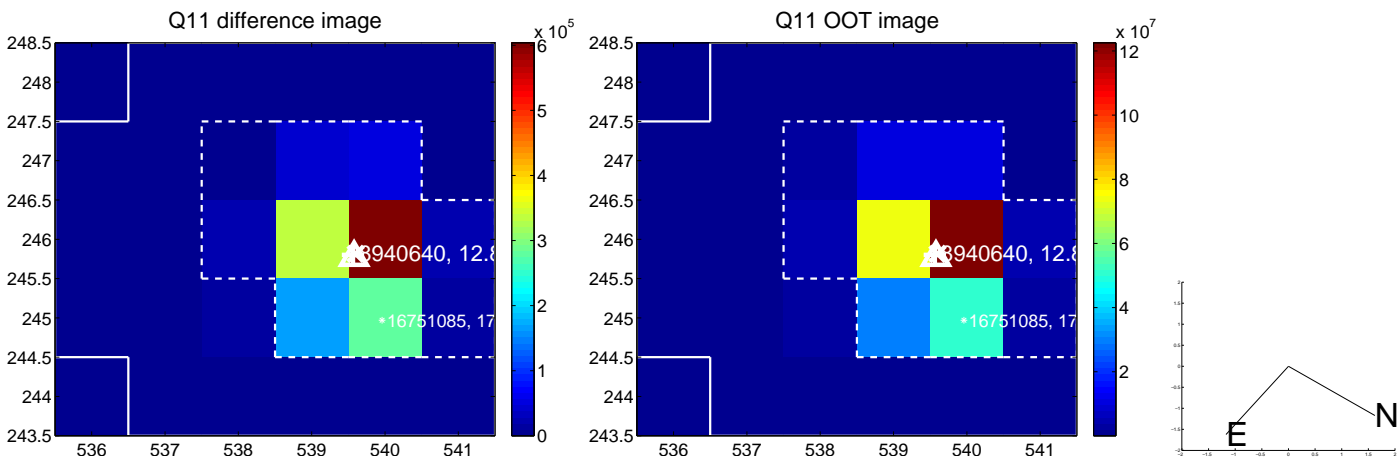
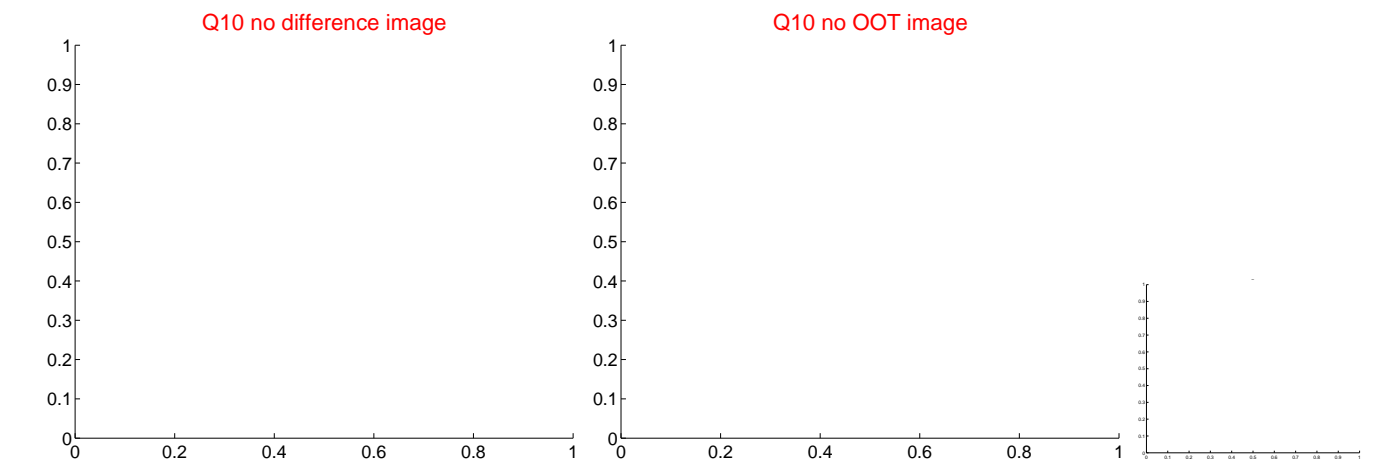
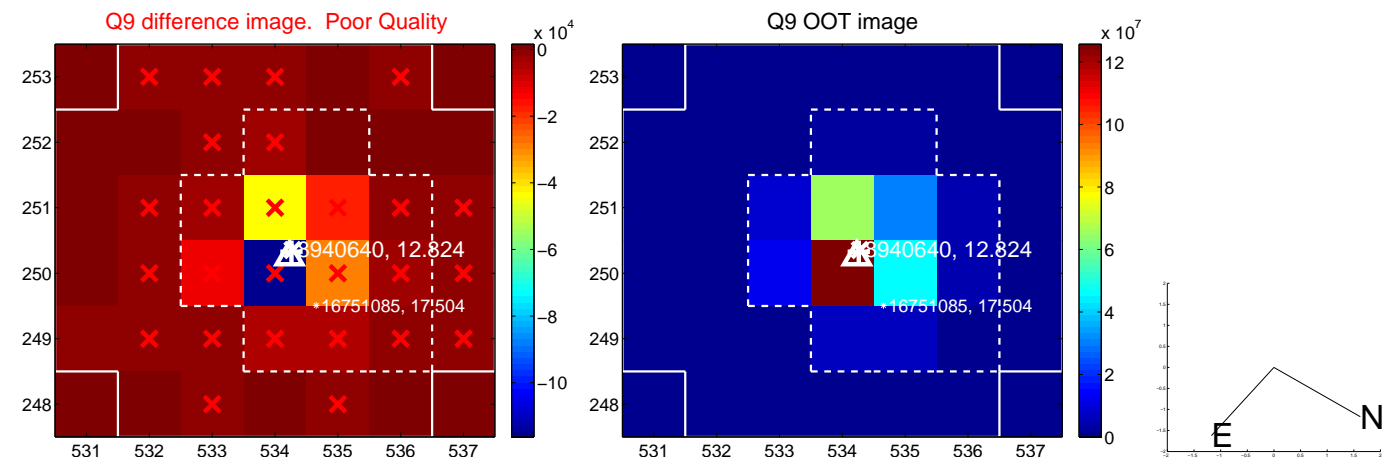
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



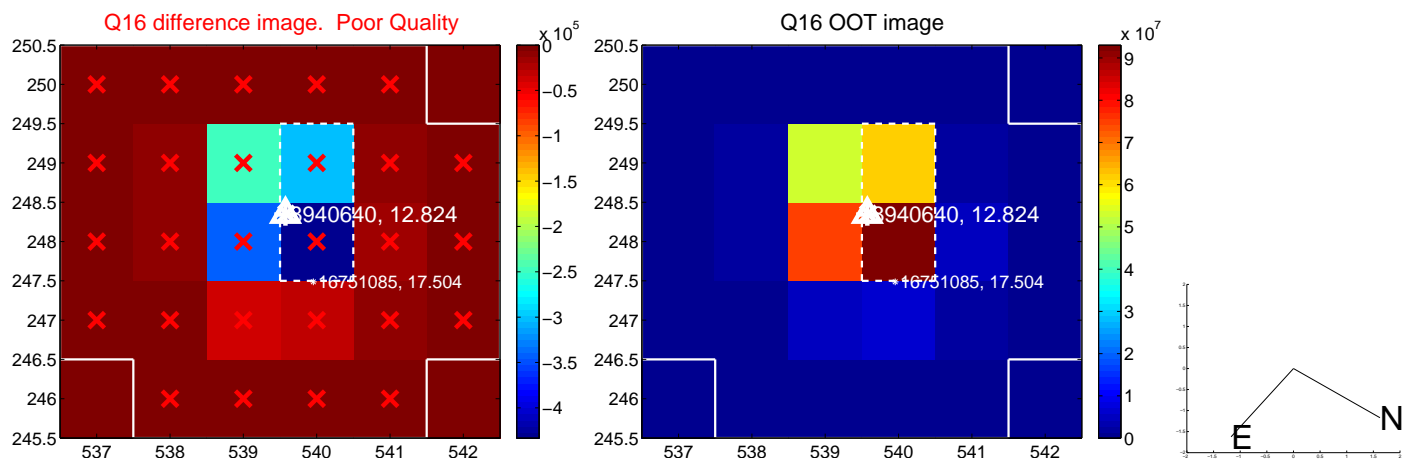
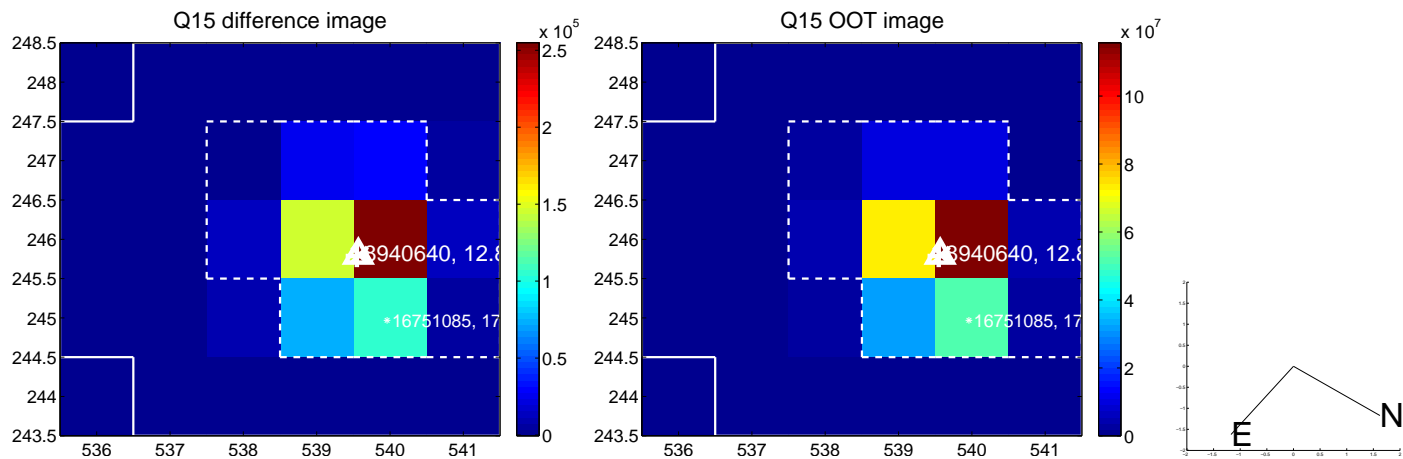
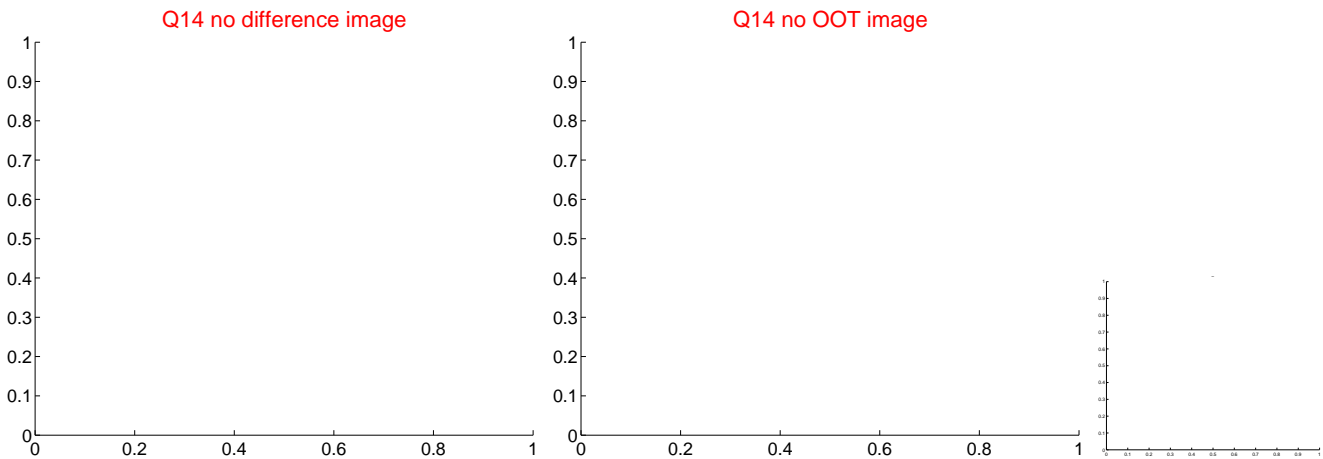
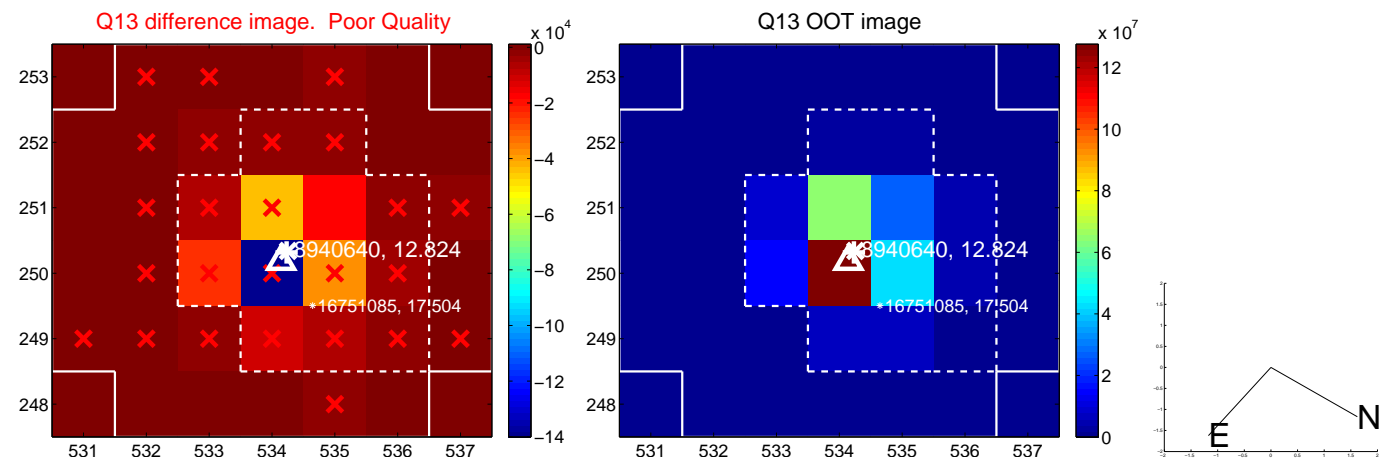
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



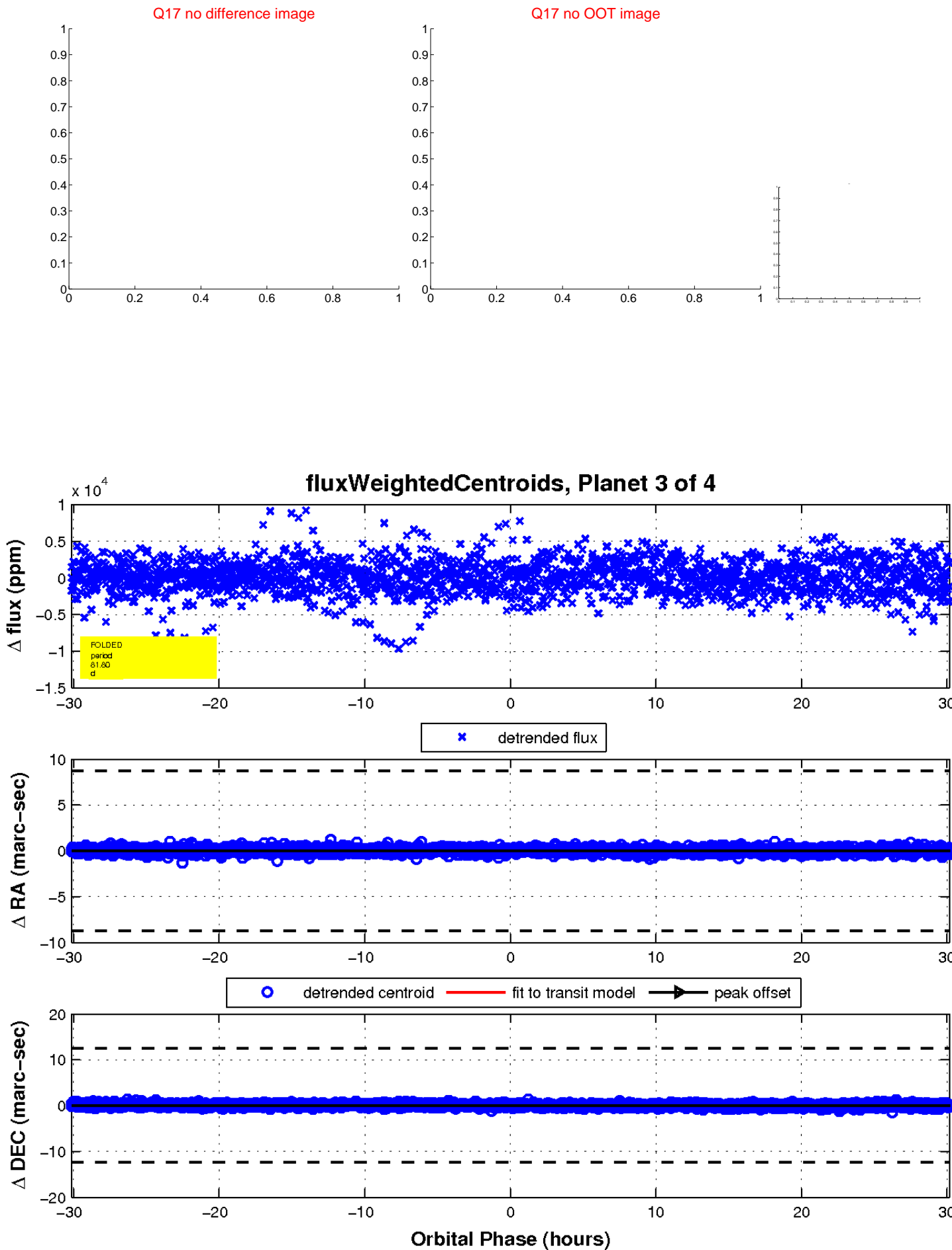
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

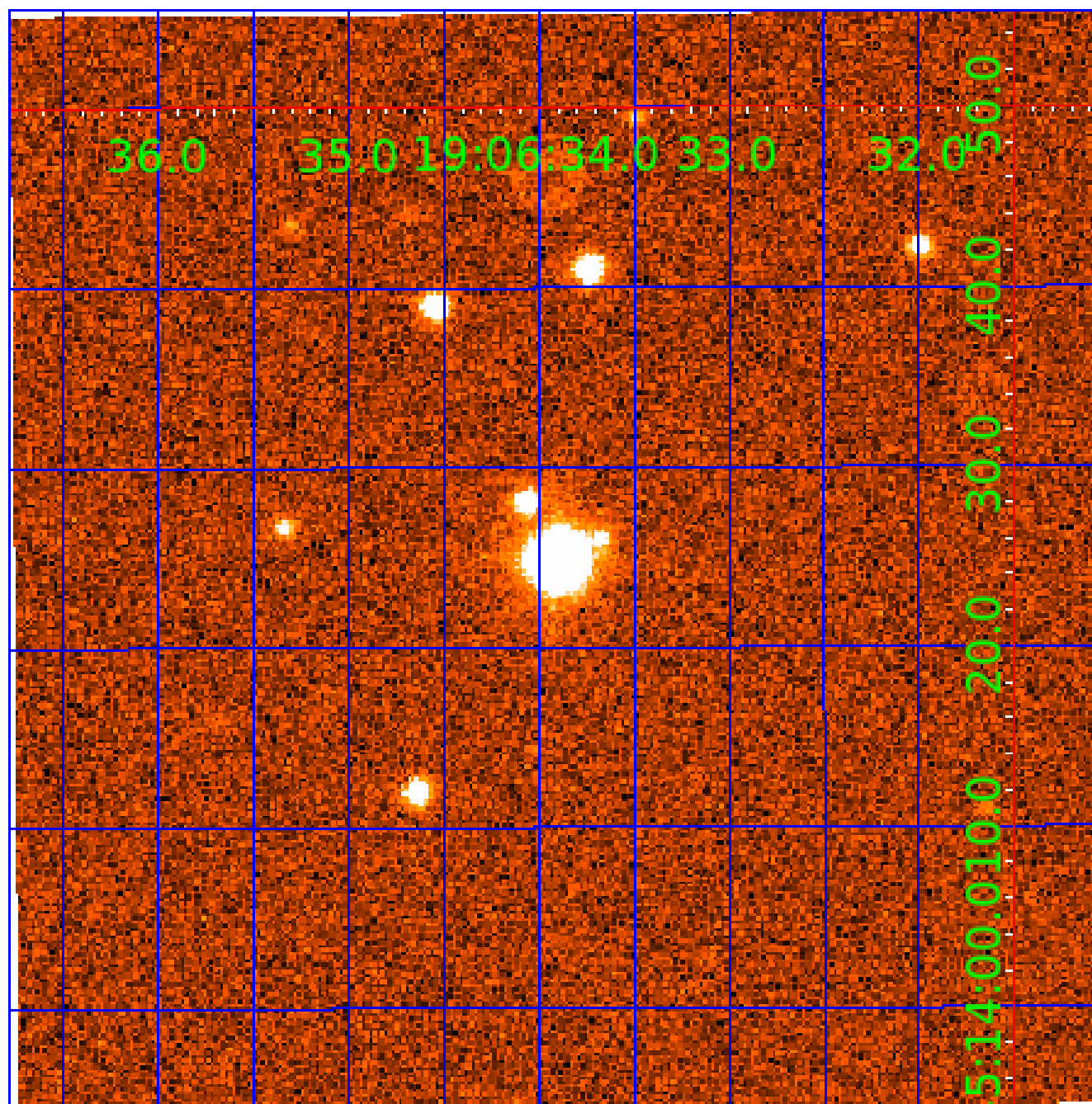


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008940640

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008940640-01 | OBS | No | 0.671305 | 132.159837 | 73.2 | 2.381 | 11.0 | 4.3 | 3.25 | 7244 | 2.88 | 82792.73 |
| 008940640-02 | OBS | No | 2.264009 | 132.521420 | 633.8 | 11.049 | 9.9 | 11.4 | 3.25 | 7244 | 15.09 | 16369.97 |
| 008940640-03 | OBS | No | 81.796827 | 148.567984 | 3071.6 | 10.071 | 19.4 | 4.7 | 3.25 | 7244 | 23.68 | 137.06 |
| 008940640-04 | OBS | No | 2.263947 | 133.327814 | 907.6 | 10.204 | 12.4 | 16.8 | 3.25 | 7244 | 17.83 | 16370.57 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008940640-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008940640-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT |
| 008940640-03 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_TRACKER—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT |
| 008940640-04 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD |

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

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

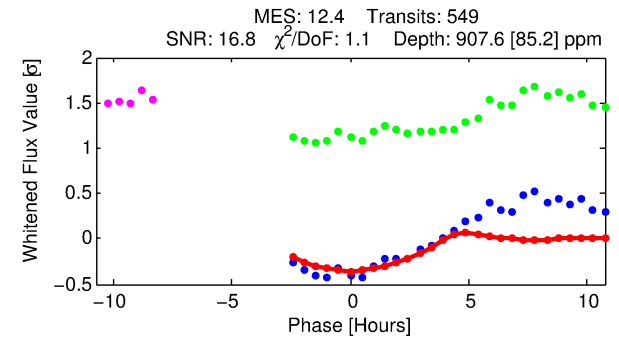
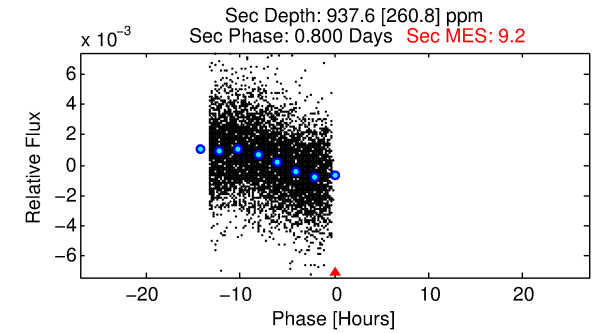
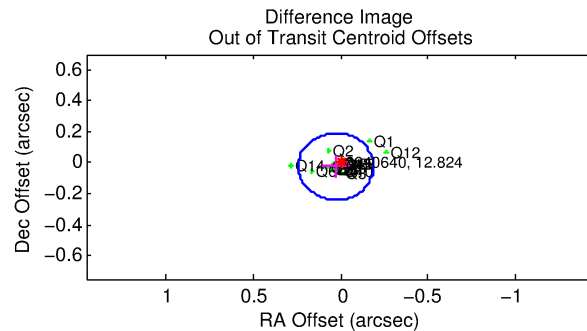
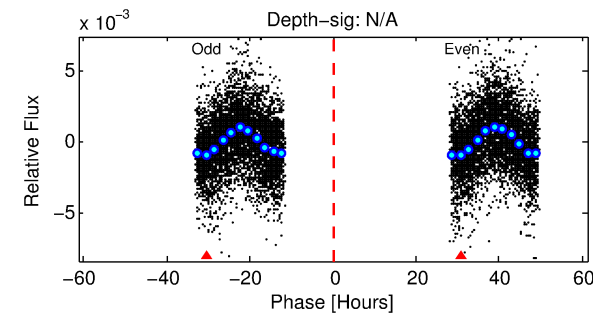
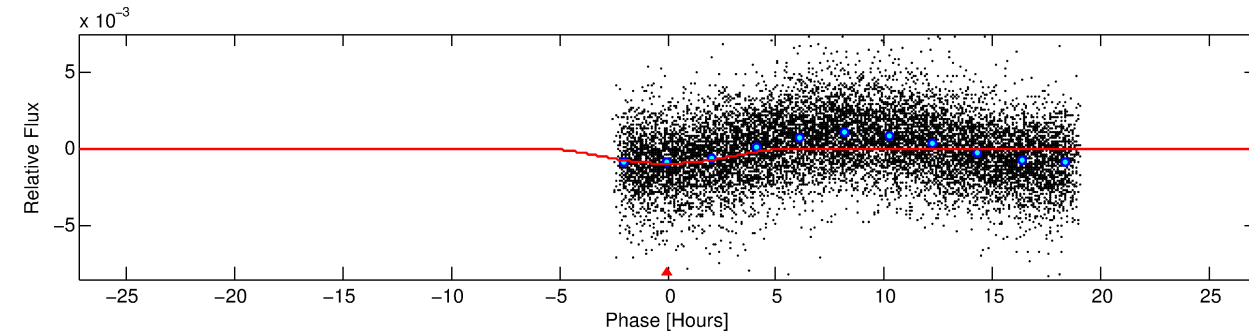
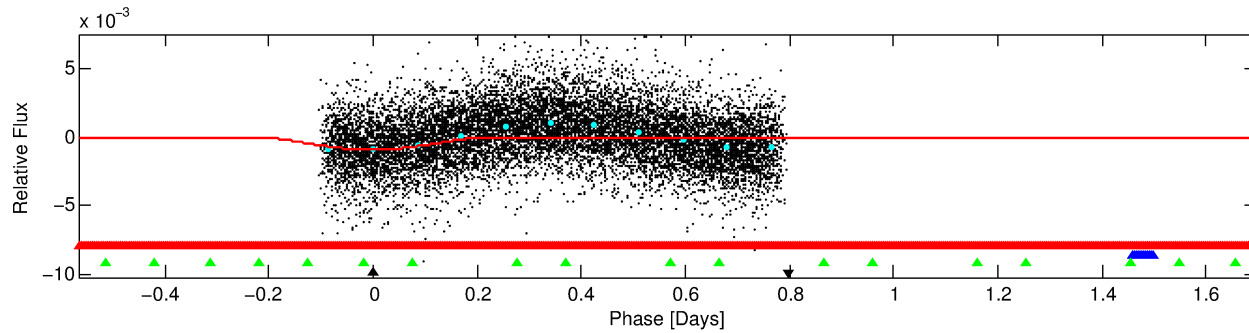
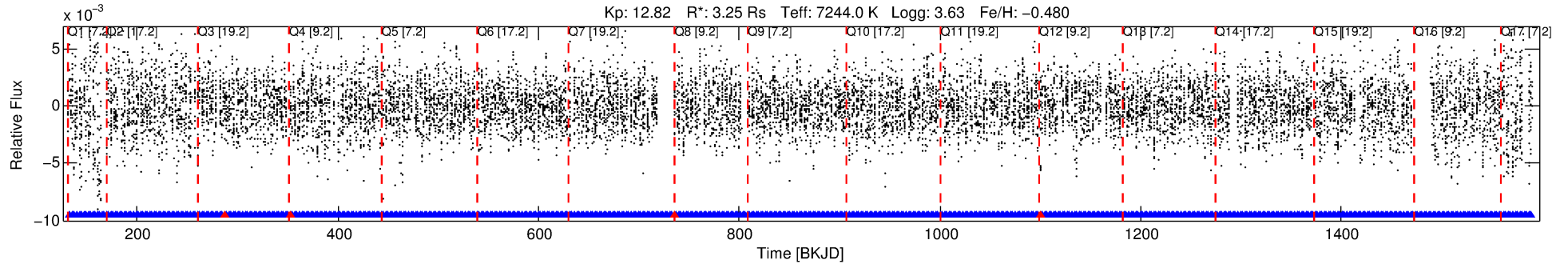
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008940640-04

No Significant Match Found

DV One-Page Summary

KIC: 8940640 Candidate: 4 of 4 Period: 2.264 d



DV Fit Results:

Period = 2.26395 [0.00004] d
Epoch = 133.3278 [0.0182] BKJD
Rp/R* = 0.0503 [0.0628]
a/R* = 1.16 [0.03]
b = 1.00 [0.10]
Seff = 16370.57 [16629.81]
Teff = 2884 [732] K
Rp = 17.83 [24.50] Re
a = 0.0399 [0.0239] AU
Ag = 2.58 [6.98] [0.23σ]
Teffp = 5652 [3558] K [0.76σ]

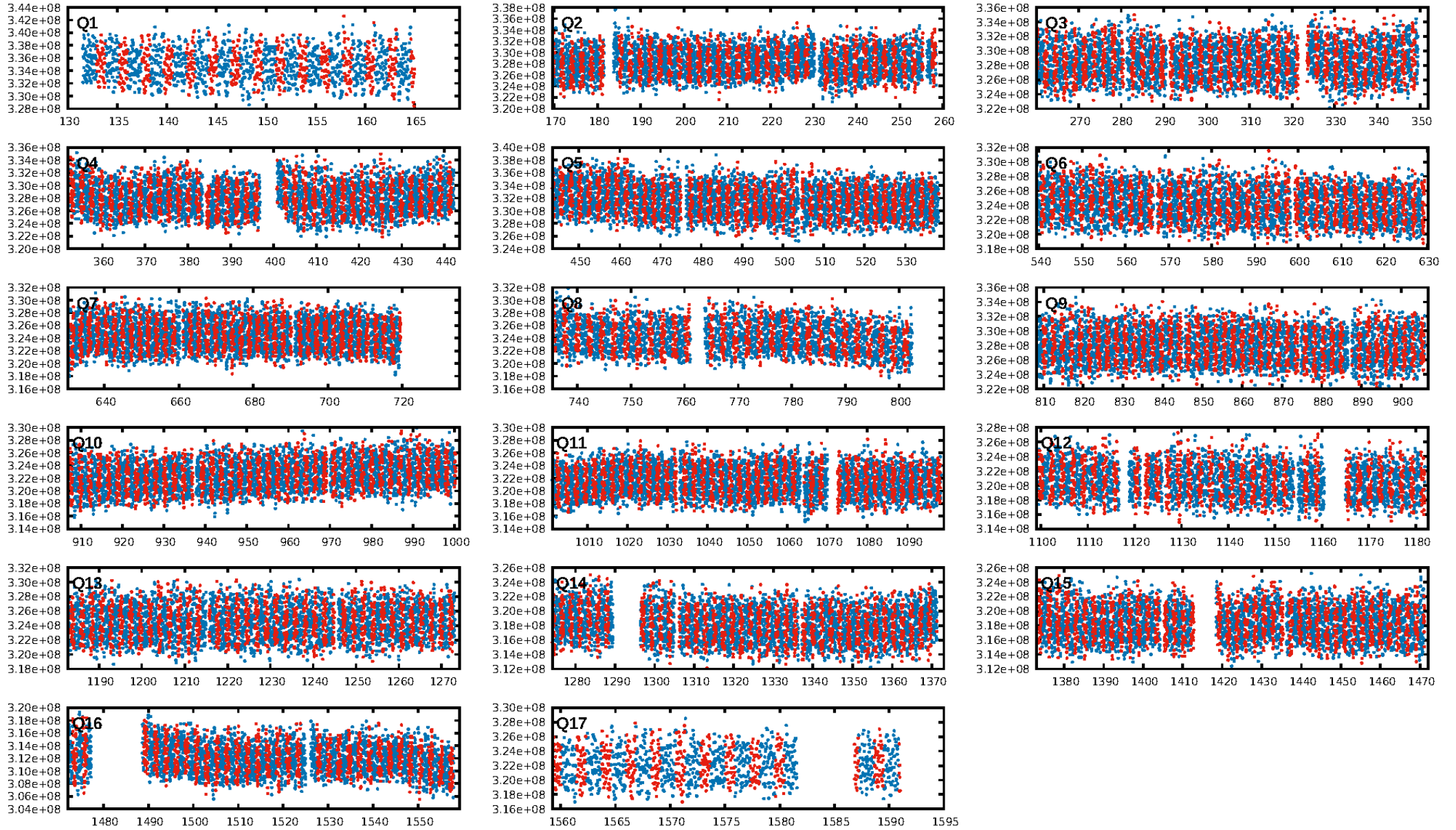
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [3.65σ]
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.99 [521/525]
GhostDiagnostic-chr: 2.889
Centroid-sig: 0.0%
Centroid-so: 0.101 arcsec [6.42σ]
OotOffset-rm: 0.037 arcsec [0.51σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-rm: 0.156 arcsec [2.09σ]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 0.00 [0/17]

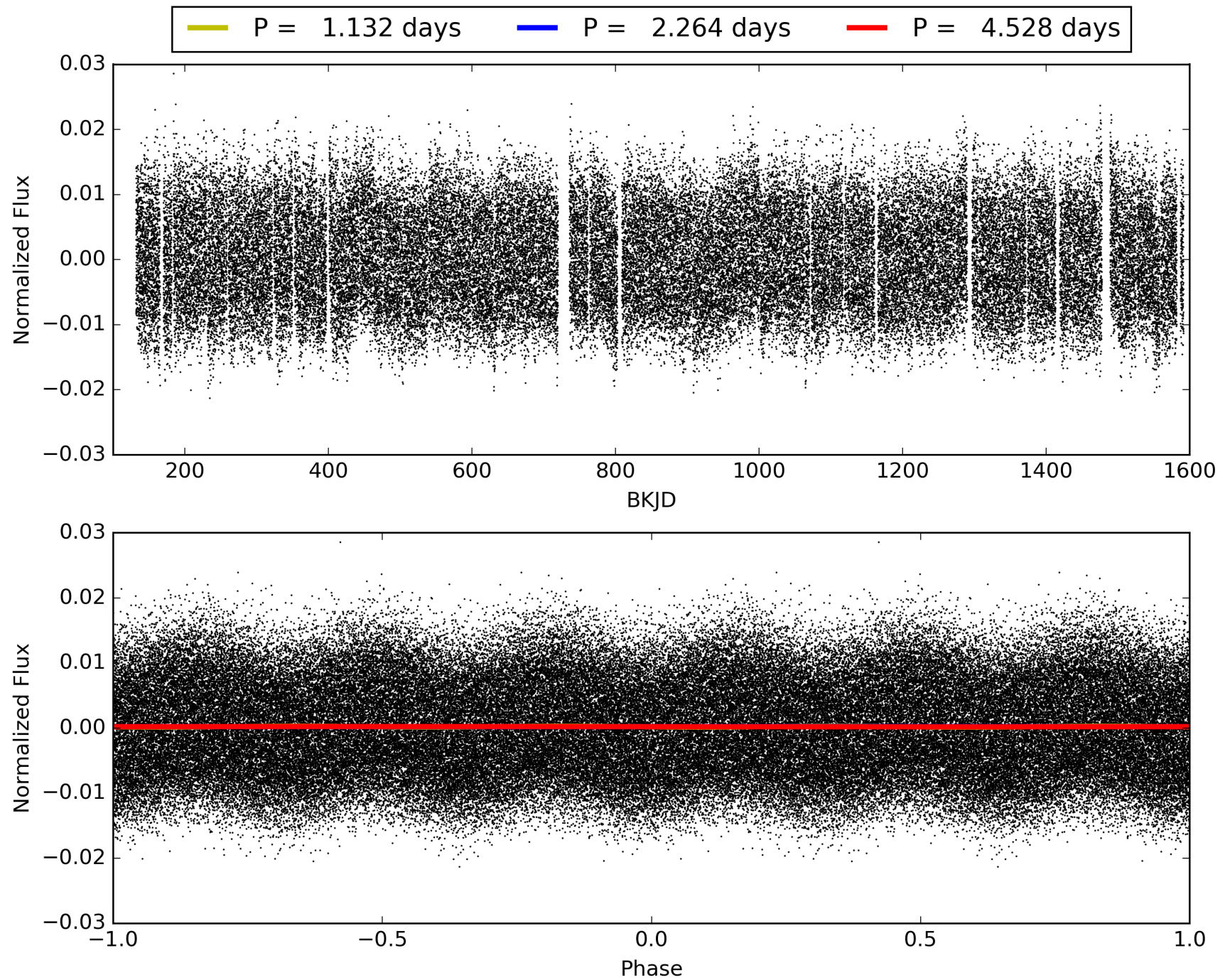
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 06:12:08 Z

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

TCE 008940640-04, PDC Light Curves

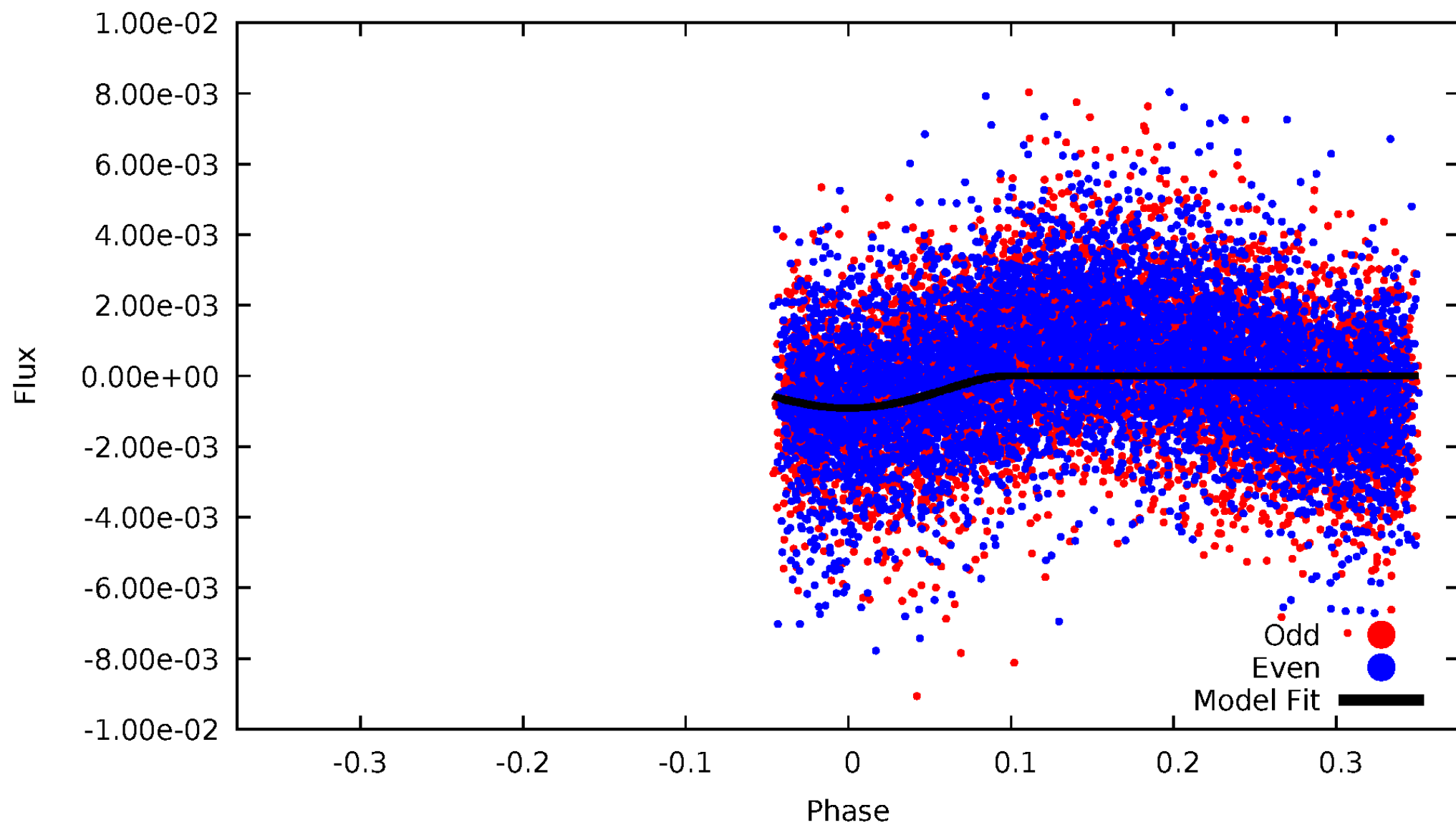


TCE 008940640-04



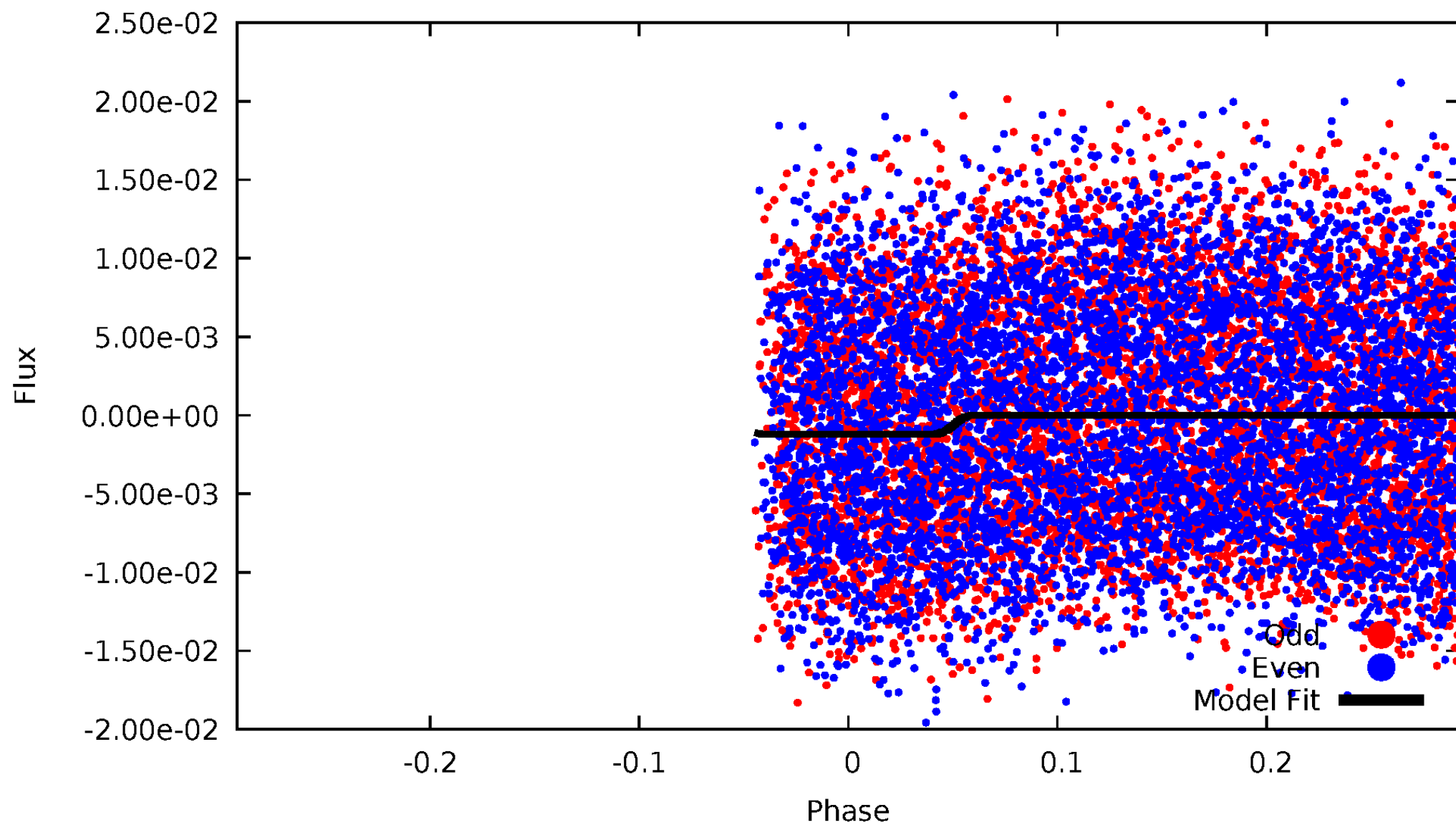
DV Odd/Even

TCE 008940640-04



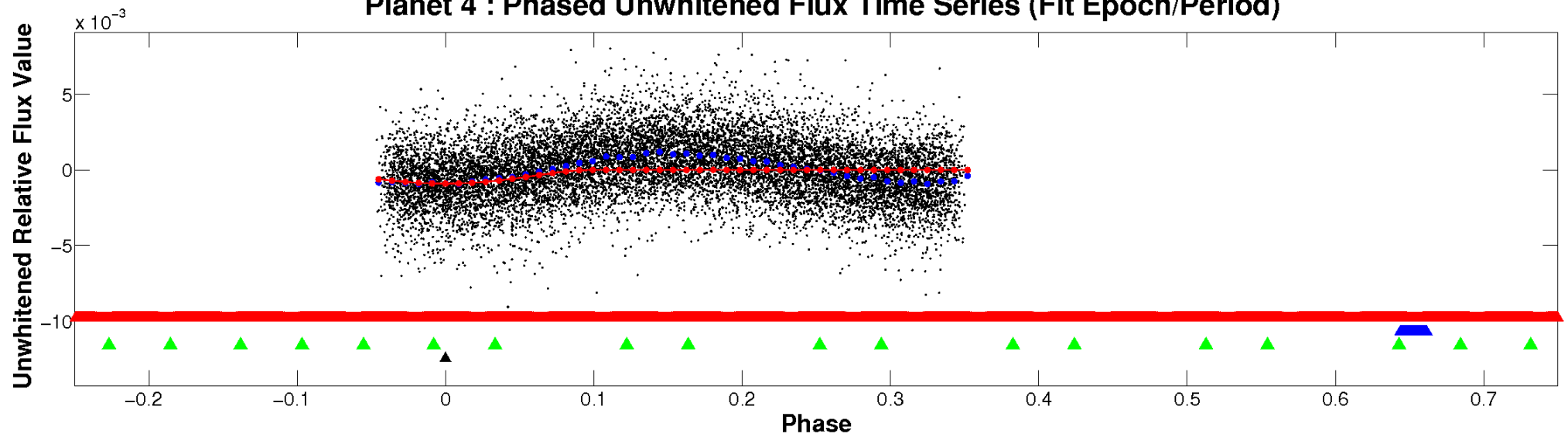
ALT Odd/Even

TCE 008940640-04

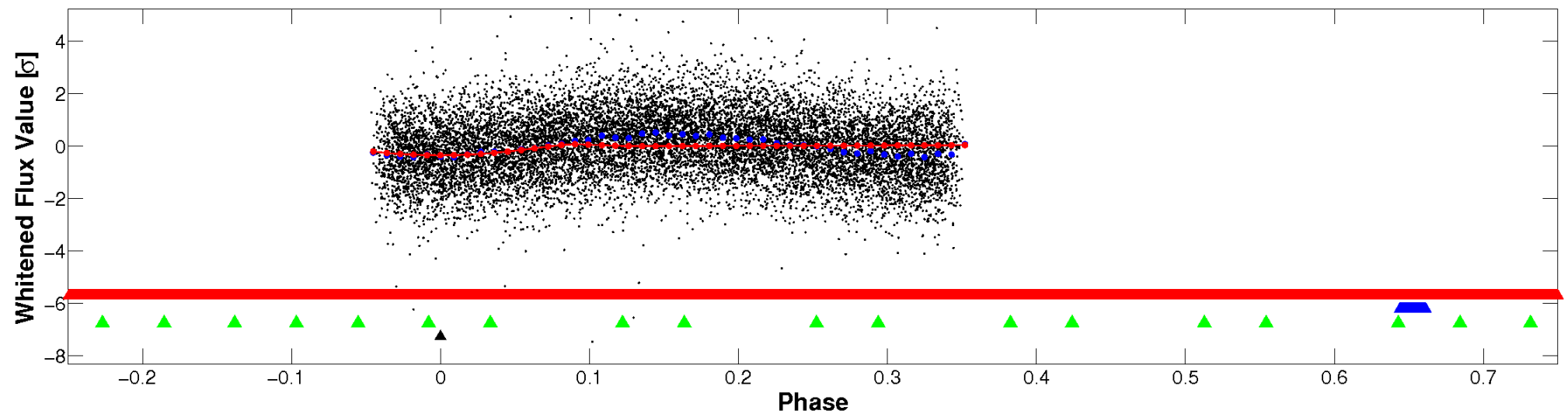


Non-Whitened Vs. Whitened Light Curve

Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

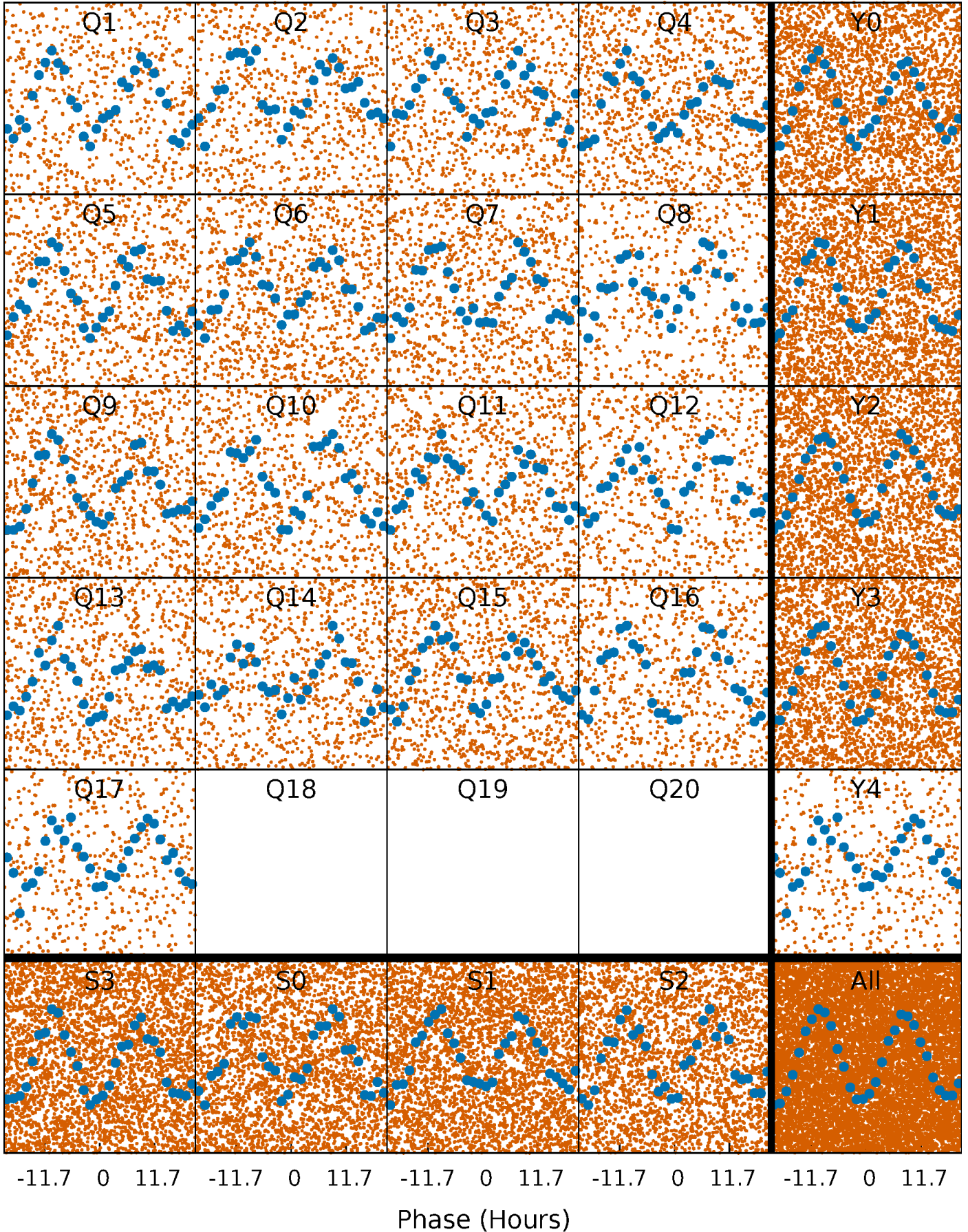


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



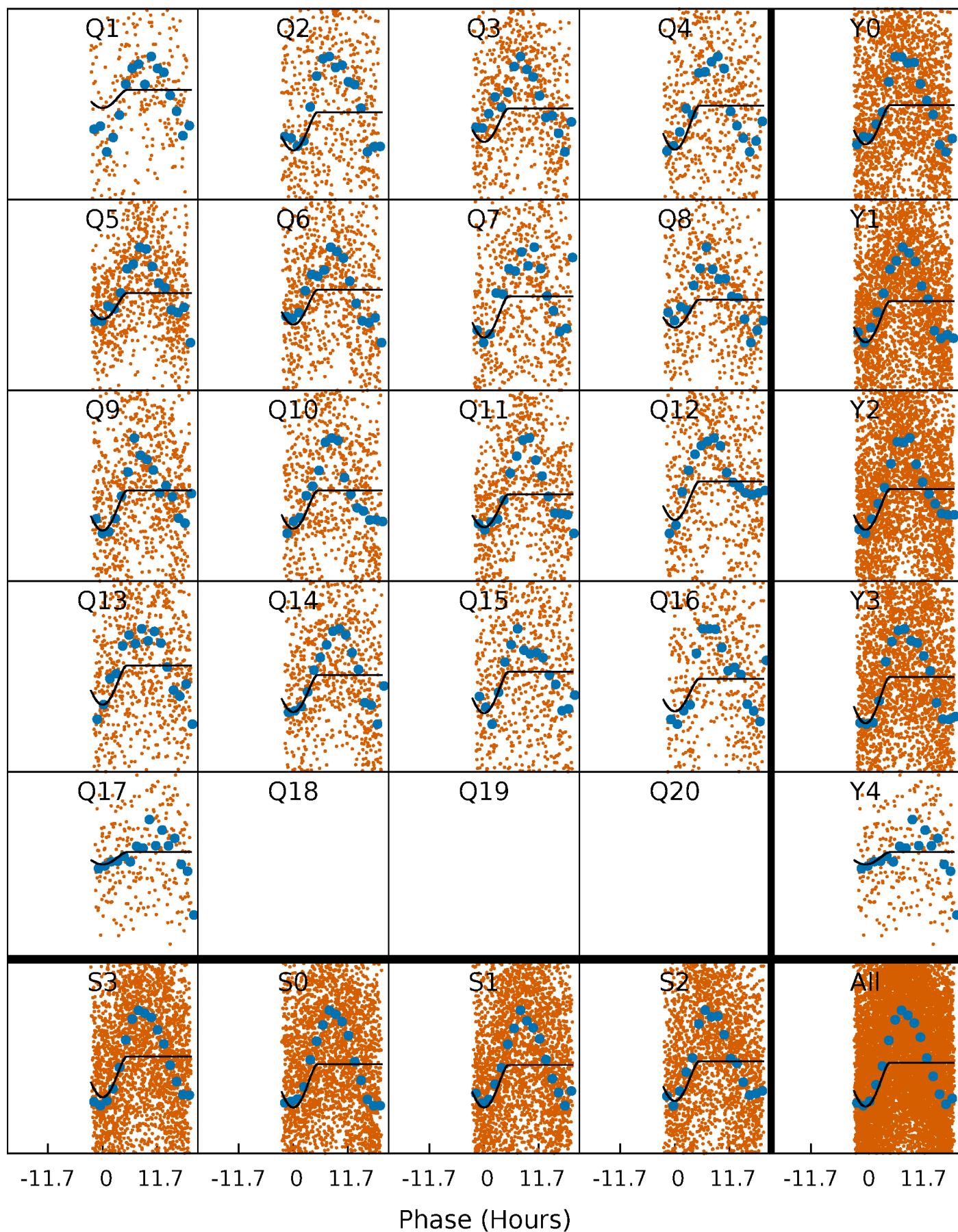
PDC Quarter-Phased Transit Curves

TCE 008940640-04 P= 2.263947 Days $T_0=133.327814$ (BKJD)



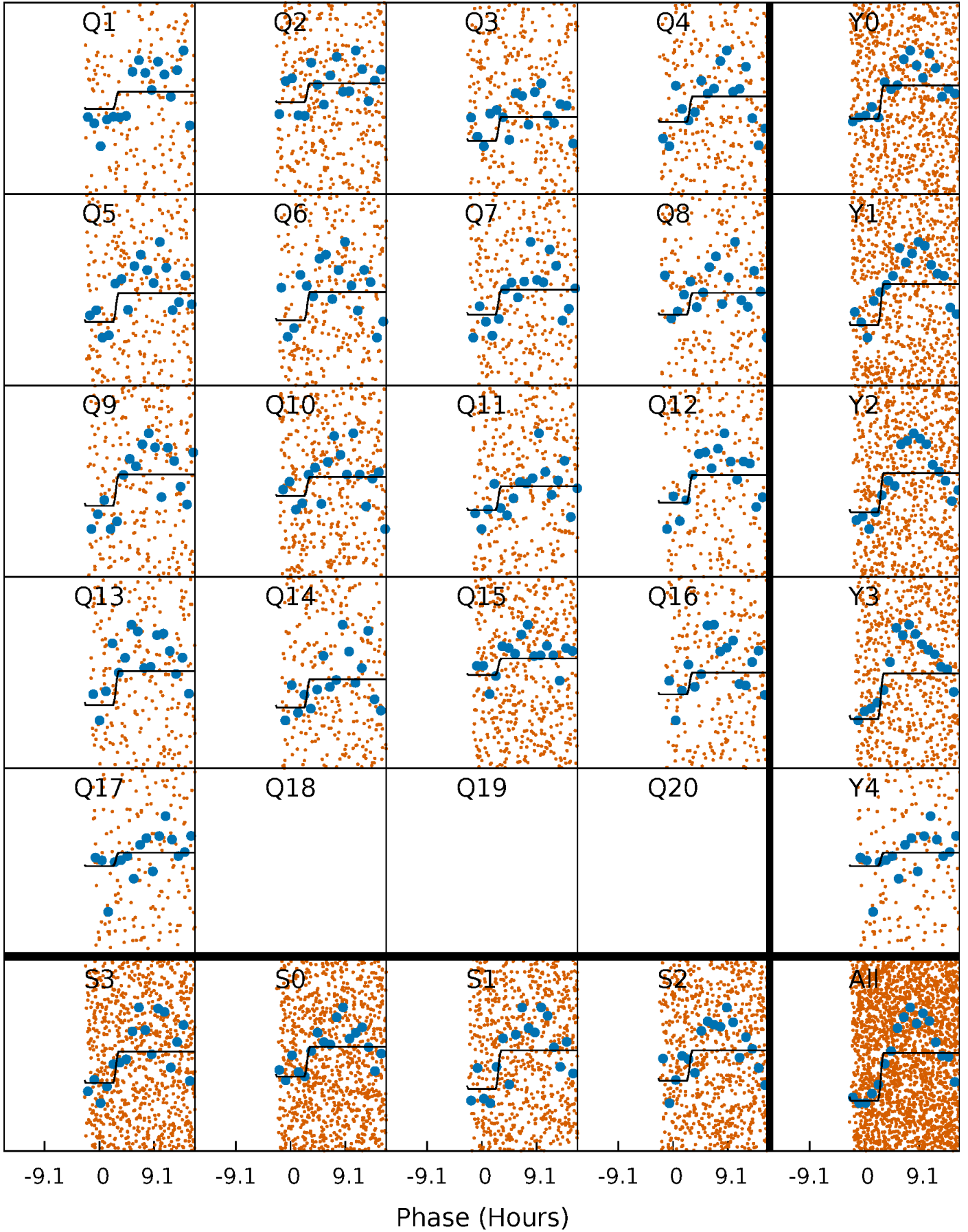
DV Quarter-Phased Transit Curves

TCE 008940640-04 $P = 2.263947$ Days $T_0 = 133.327814$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

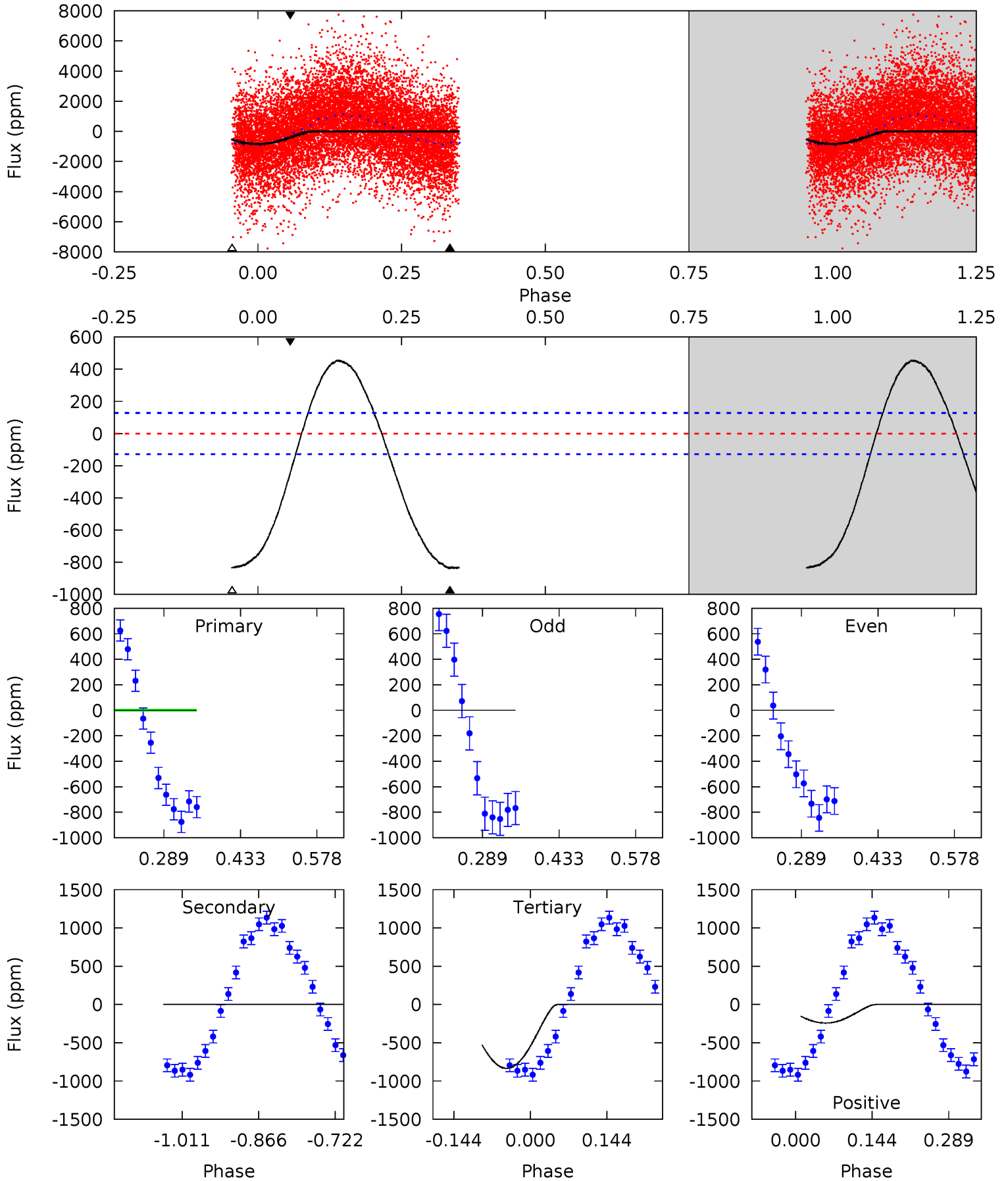
TCE 008940640-04 P= 2.263929 Days $T_0=133.324555$ (BKJD)



DV Model-Shift Uniqueness Test

008940640-04, P = 2.263947 Days, E = 131.063867 Days

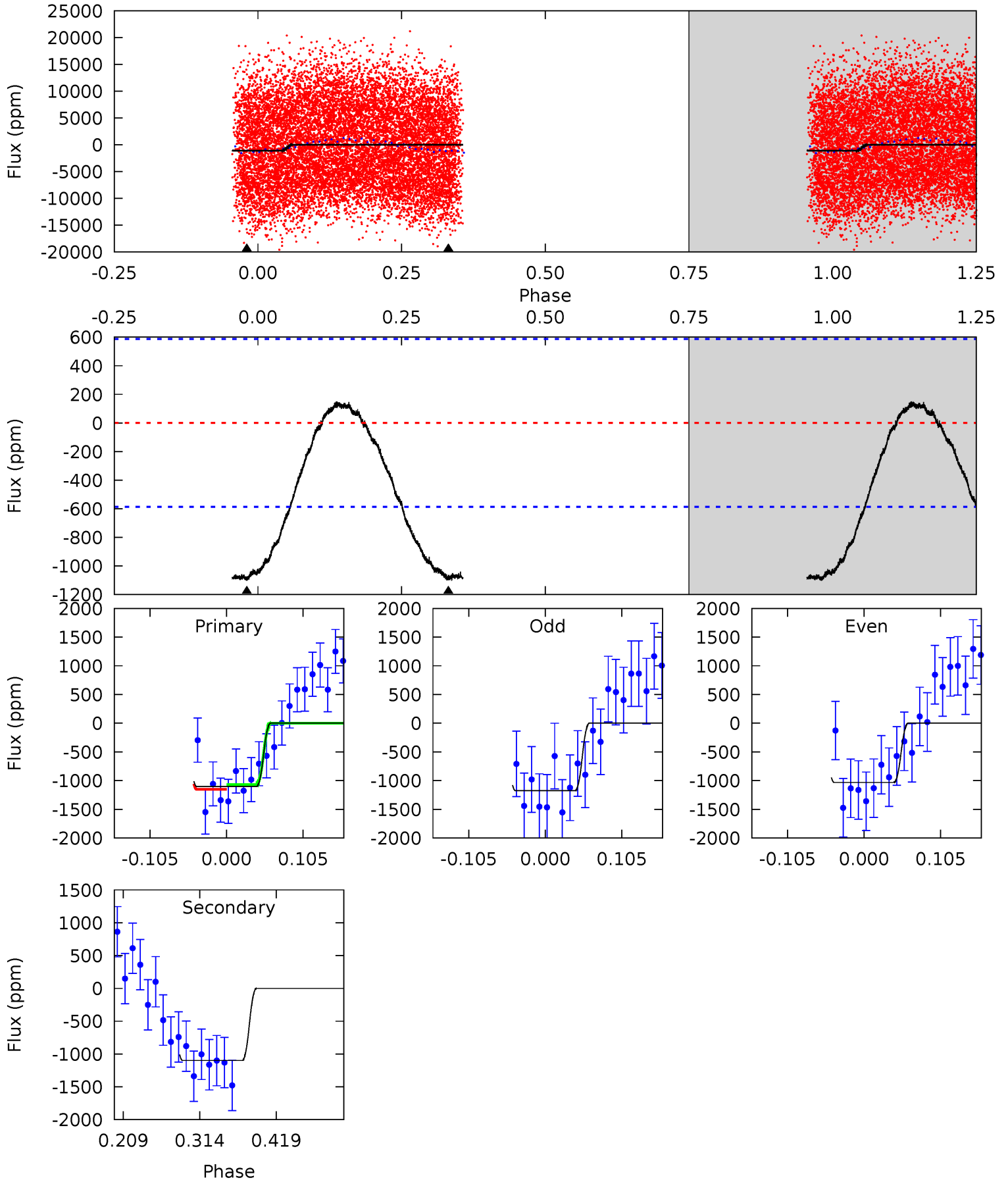
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|-----|------|-------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 29.3 | 0 | 29.2 | -8.50 | 4.49 | 1.46 | 15.5 | 0.11 | 37.8 | -29.2 | 8.50 | 0.31 | 0.60 | 0.35 | 2.25 |



Alt Model-Shift Uniqueness Test

008940640-04, P = 2.263929 Days, E = 131.060626 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 8.56 | 8.53 | 0 | 0 | 4.56 | 1.62 | 1.39 | 8.56 | 8.56 | 8.53 | 8.53 | 0.56 | 0.94 | 0.12 | 0.30 |



Stellar Parameters For KIC 008940640

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 7244^{+205}_{-307} | $3.632^{+0.603}_{-0.100}$ | $-0.480^{+0.300}_{-0.300}$ | $3.248^{+0.329}_{-1.864}$ | $1.650^{+0.163}_{-0.488}$ | $0.068^{+0.525}_{-0.020}$ |
| | +3%/-4% | +17%/-3% | +62%/-62% | +10%/-57% | +10%/-30% | +773%/-29% |
| Source | PHO54 | PHO54 | PHO54 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 008940640-04 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|-----------------|---------------------------|----------------------|------------------------|----------------------------|
| DV | 0 ± 29 | $19.93^{+18.54}_{-12.91}$ | 3902^{+283}_{-516} | -3586^{+636}_{-244} | $0.003^{+0.133}_{-0.081}$ |
| Alt. | -1099 ± 129 | $17.80^{+18.67}_{-11.69}$ | 3906^{+267}_{-531} | 5203^{+4816}_{-1399} | $3.004^{+22.297}_{-2.281}$ |

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

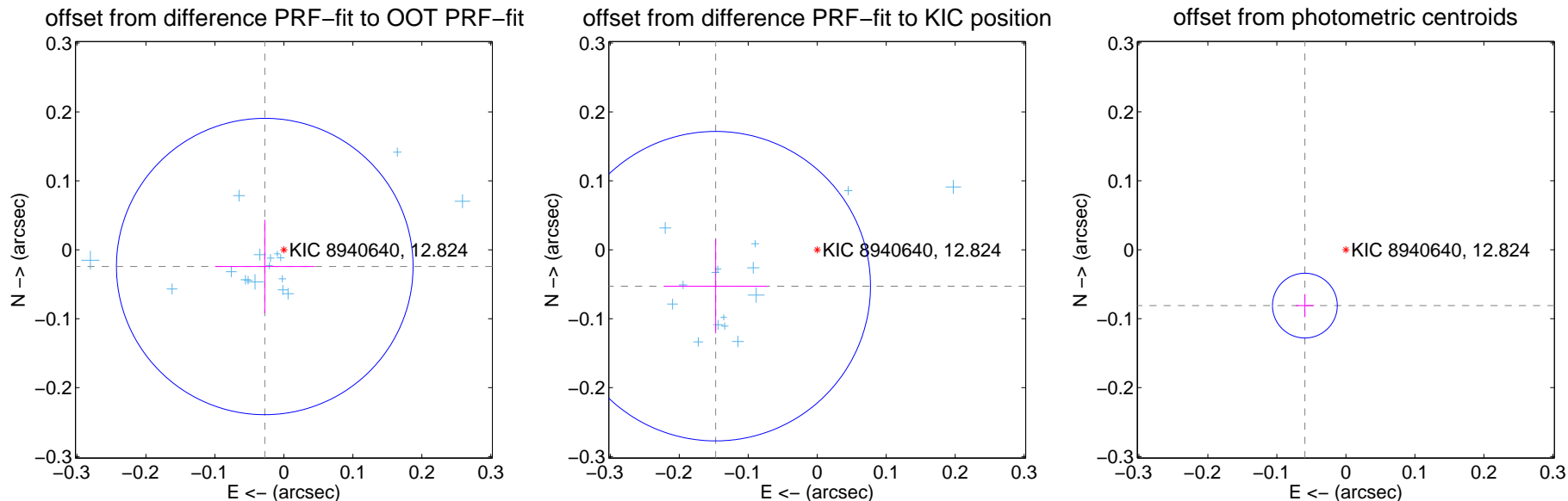
DV Centroid Data

Supplemental centroid analysis for 008940640-04. Kepler magnitude: 12.82. Transit SNR 16.81

There are 17 quarters with good PRF difference image offsets

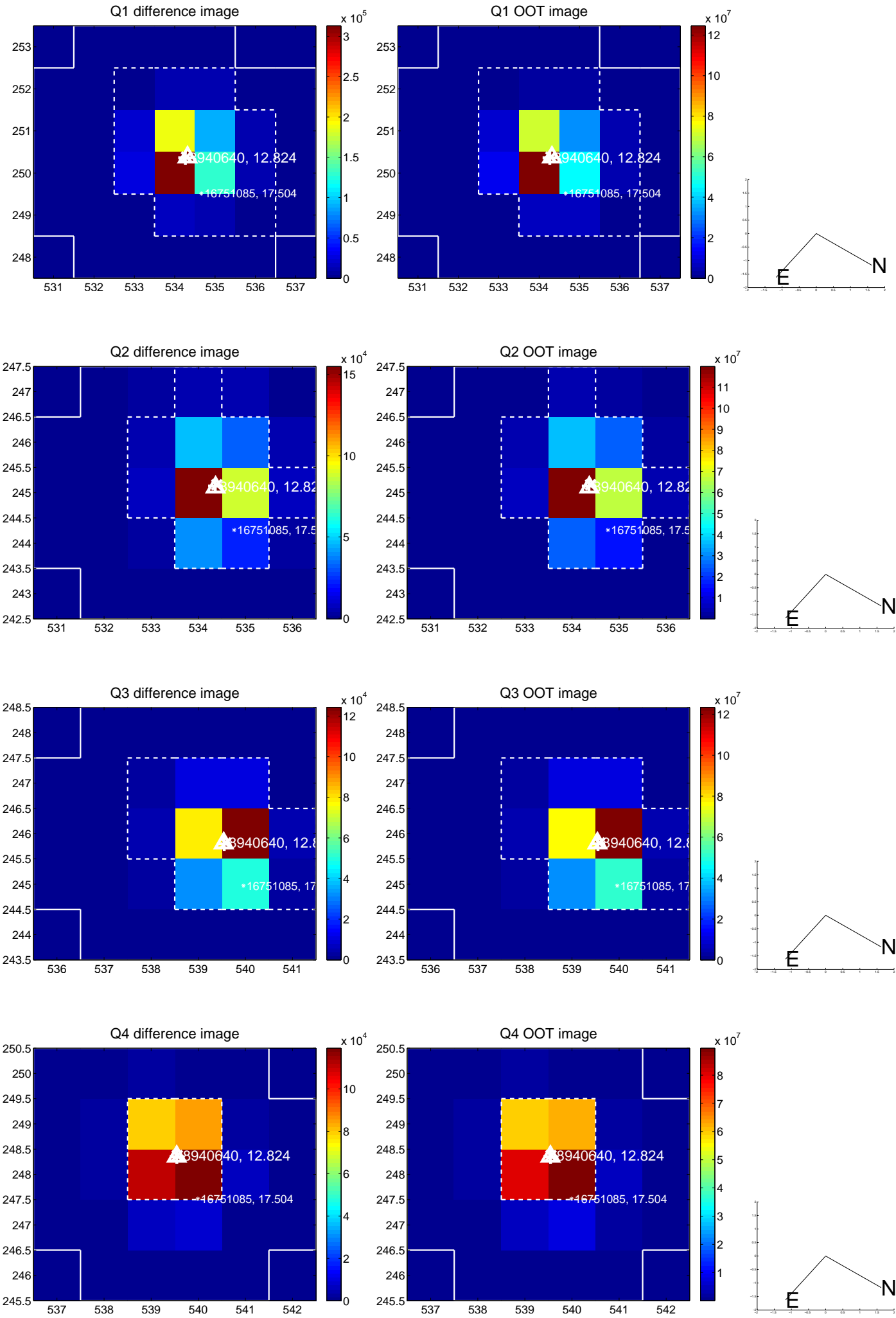
The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 0.037 ± 0.072 | 0.51 | 0.028 ± 0.072 | -0.024 ± 0.068 |
| PRF-fit source offset from KIC position | 0.156 ± 0.075 | 2.09 | 0.147 ± 0.074 | -0.053 ± 0.068 |
| photometric centroid source offset | 0.10 ± 0.02 | 6.42 | 0.06 ± 0.01 | -0.08 ± 0.02 |

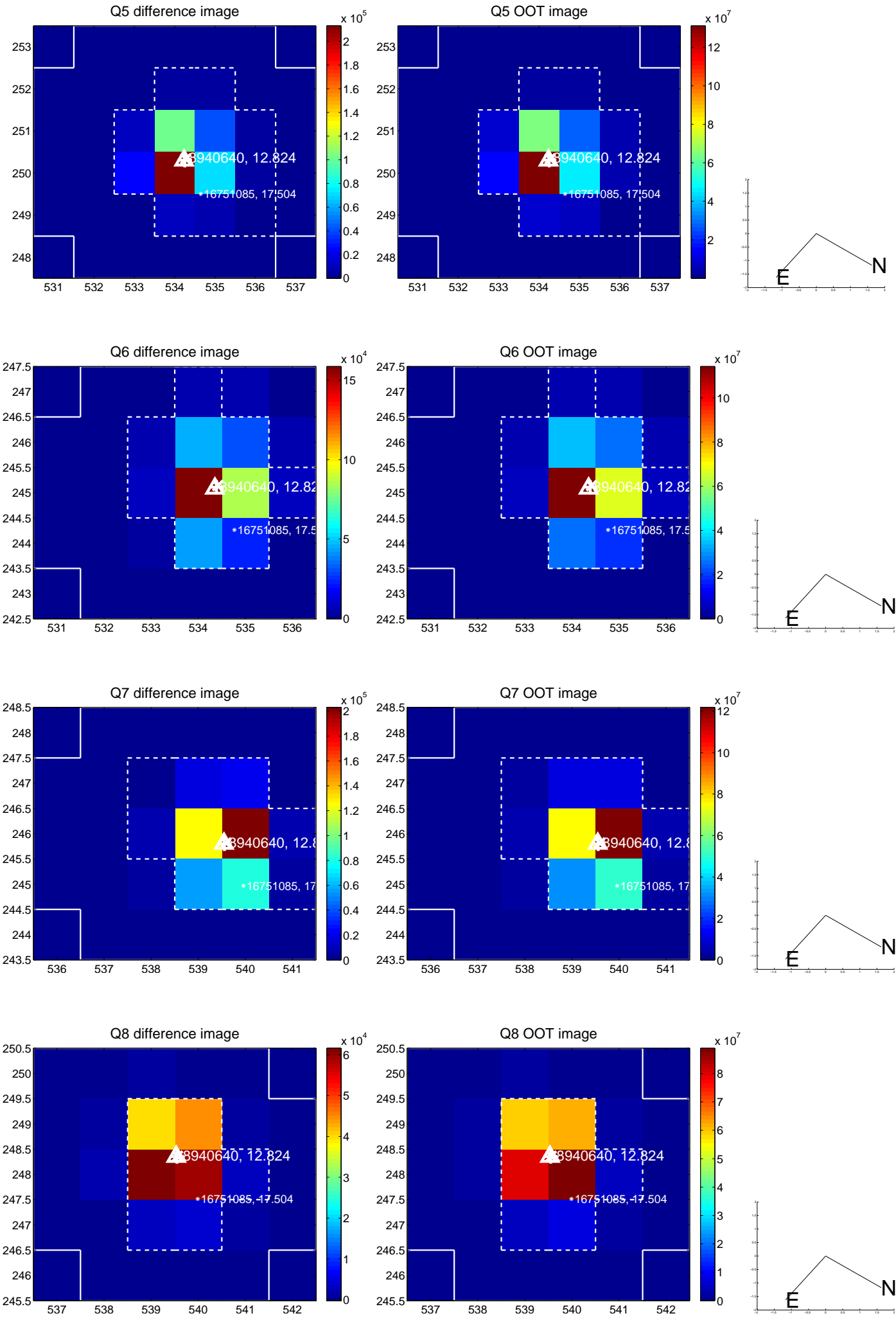


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

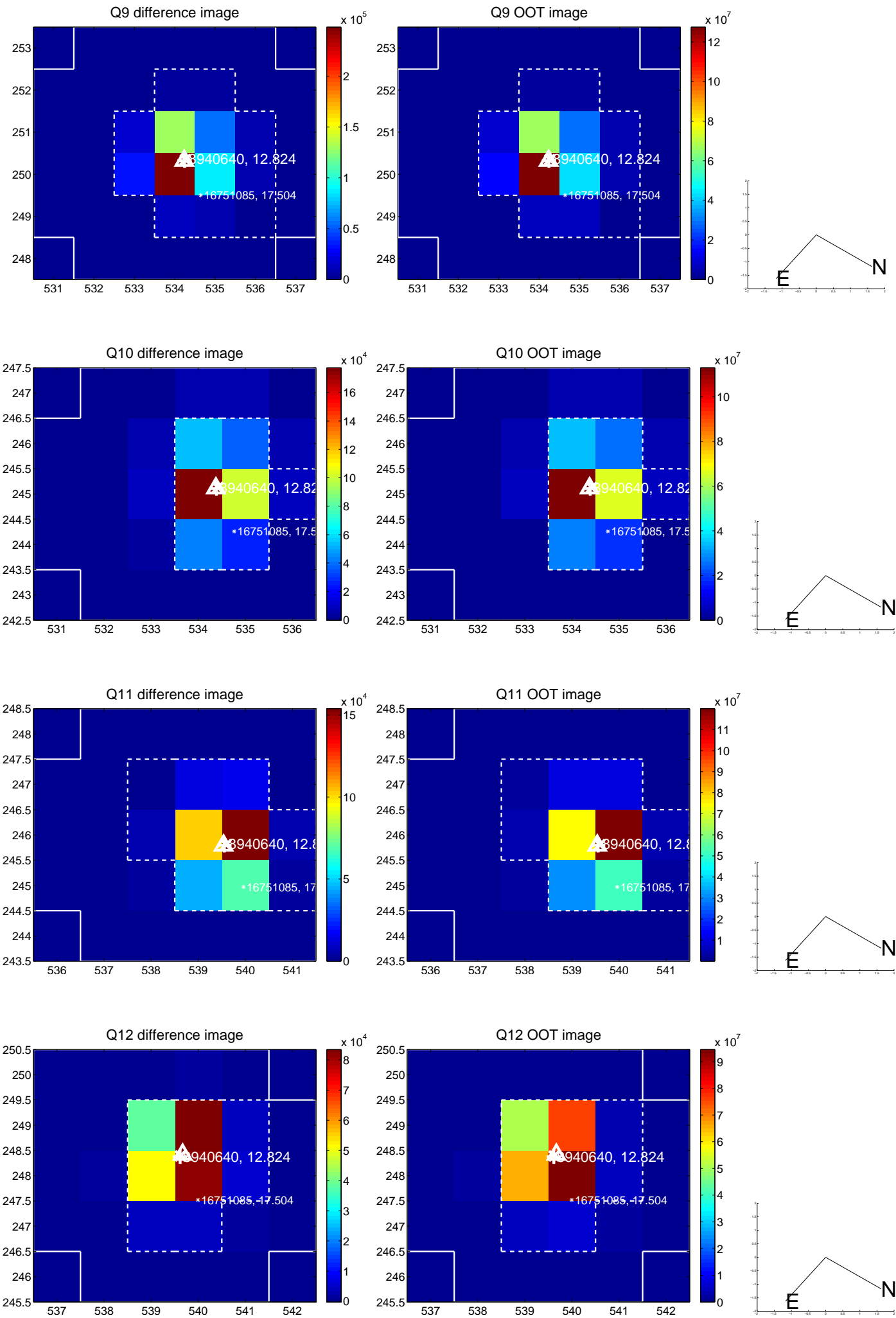
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



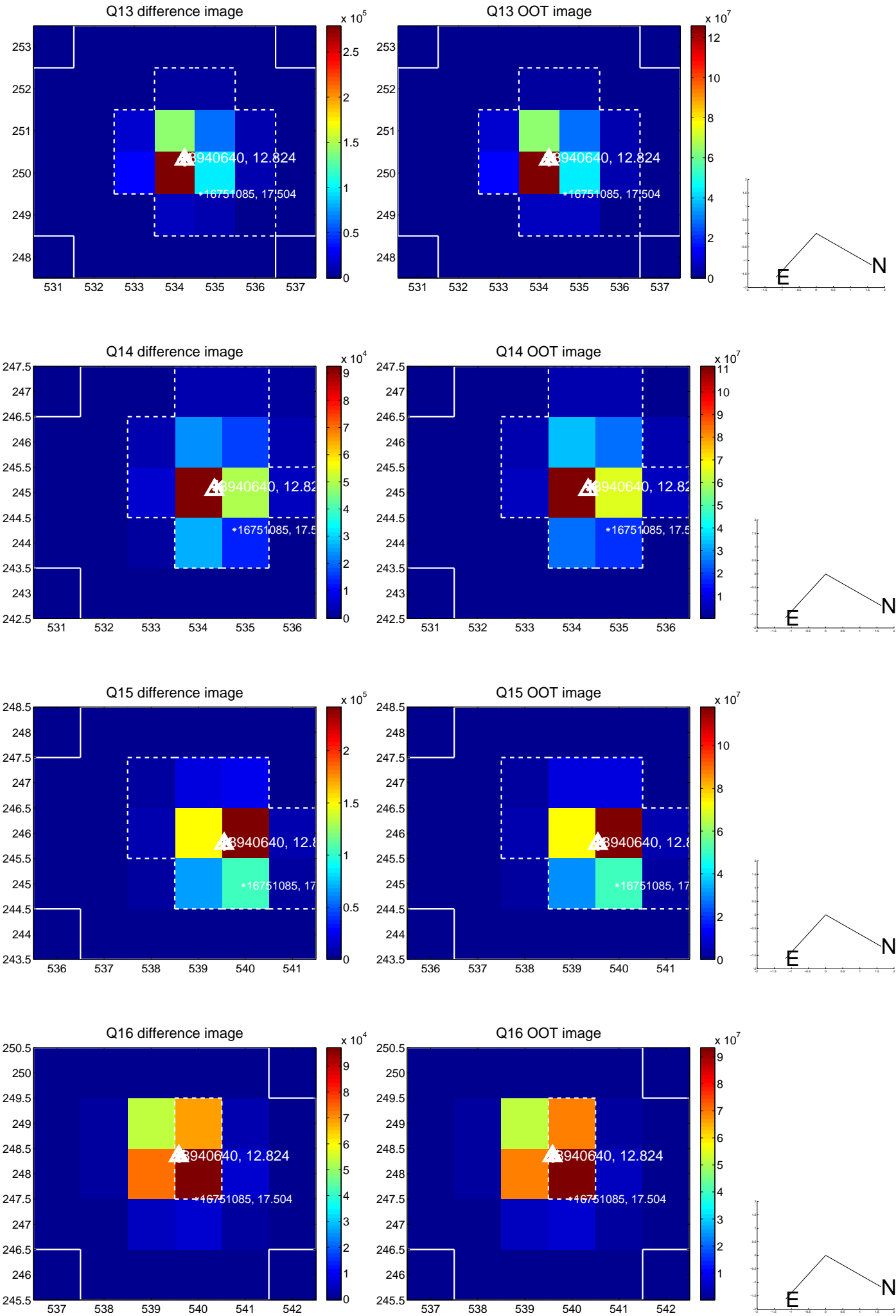
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



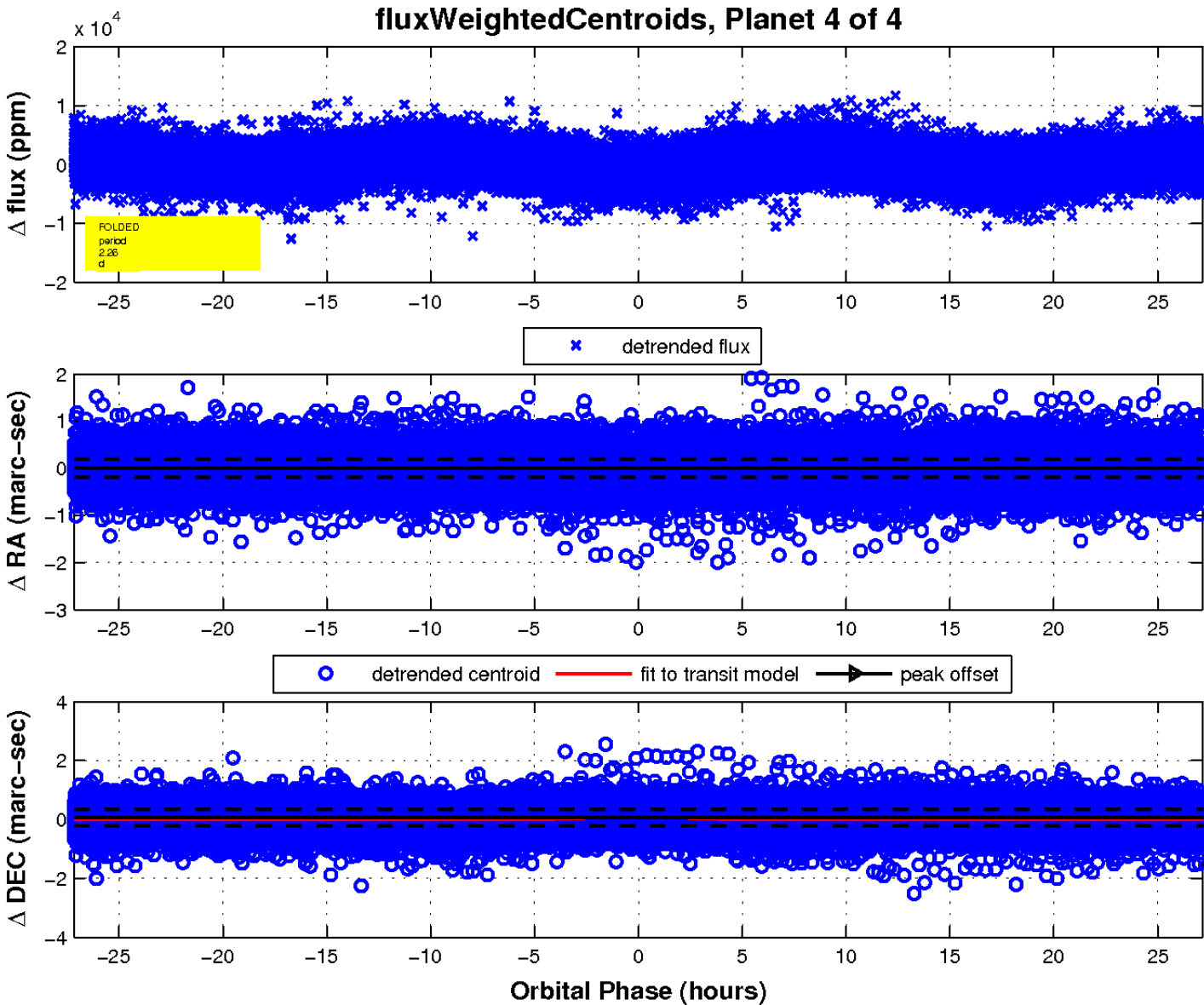
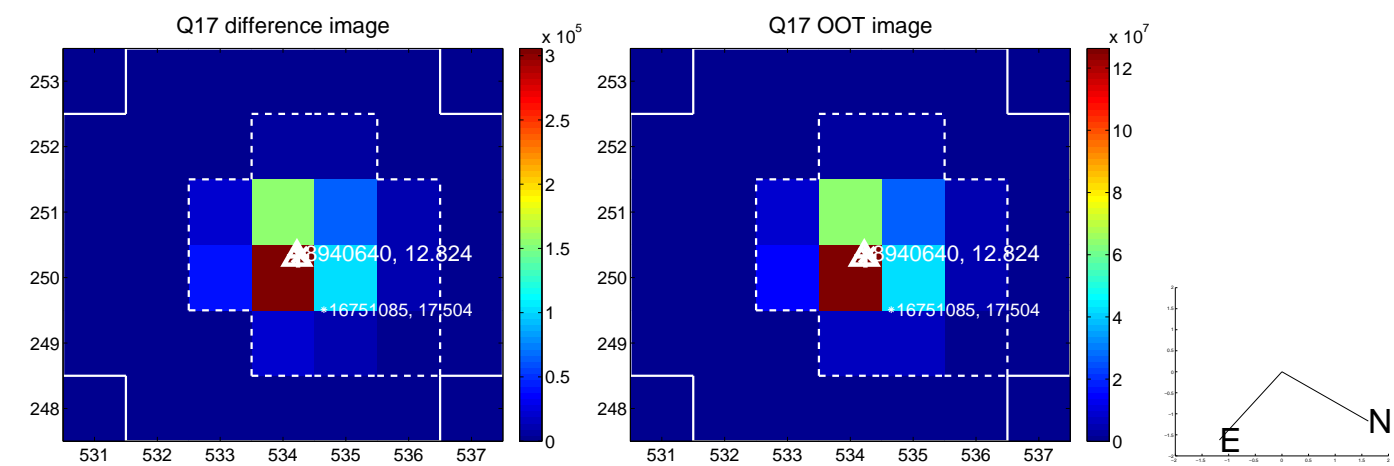
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

