

KIC 008442040

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008442040-01 | OBS | No | 1.919976 | 133.020015 | 90.9 | 7.667 | 11.9 | 14.1 | 1.49 | 6507 | 1.67 | 3356.36 |
| 008442040-02 | OBS | No | 0.869781 | 132.249166 | 48.0 | 6.786 | 8.3 | 6.9 | 1.49 | 6507 | 1.20 | 9646.80 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 008442040-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008442040-02 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST |

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

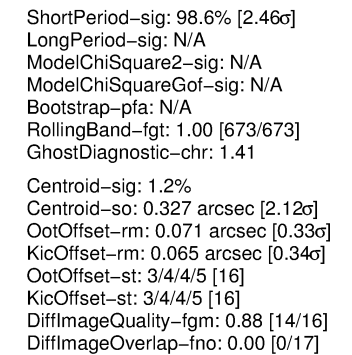
N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

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

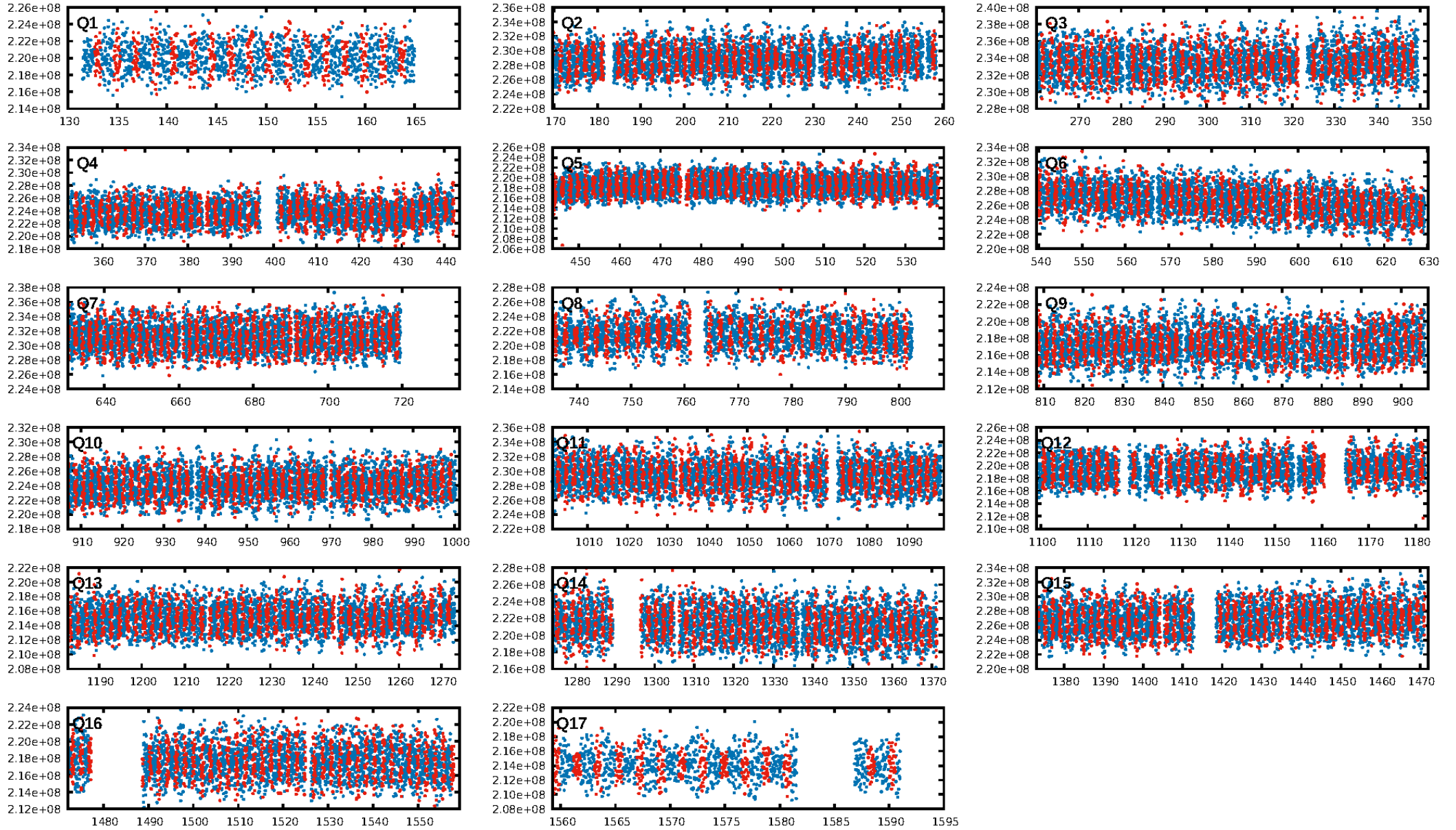
Ephemeris Match Information For 008442040-01

No Significant Match Found

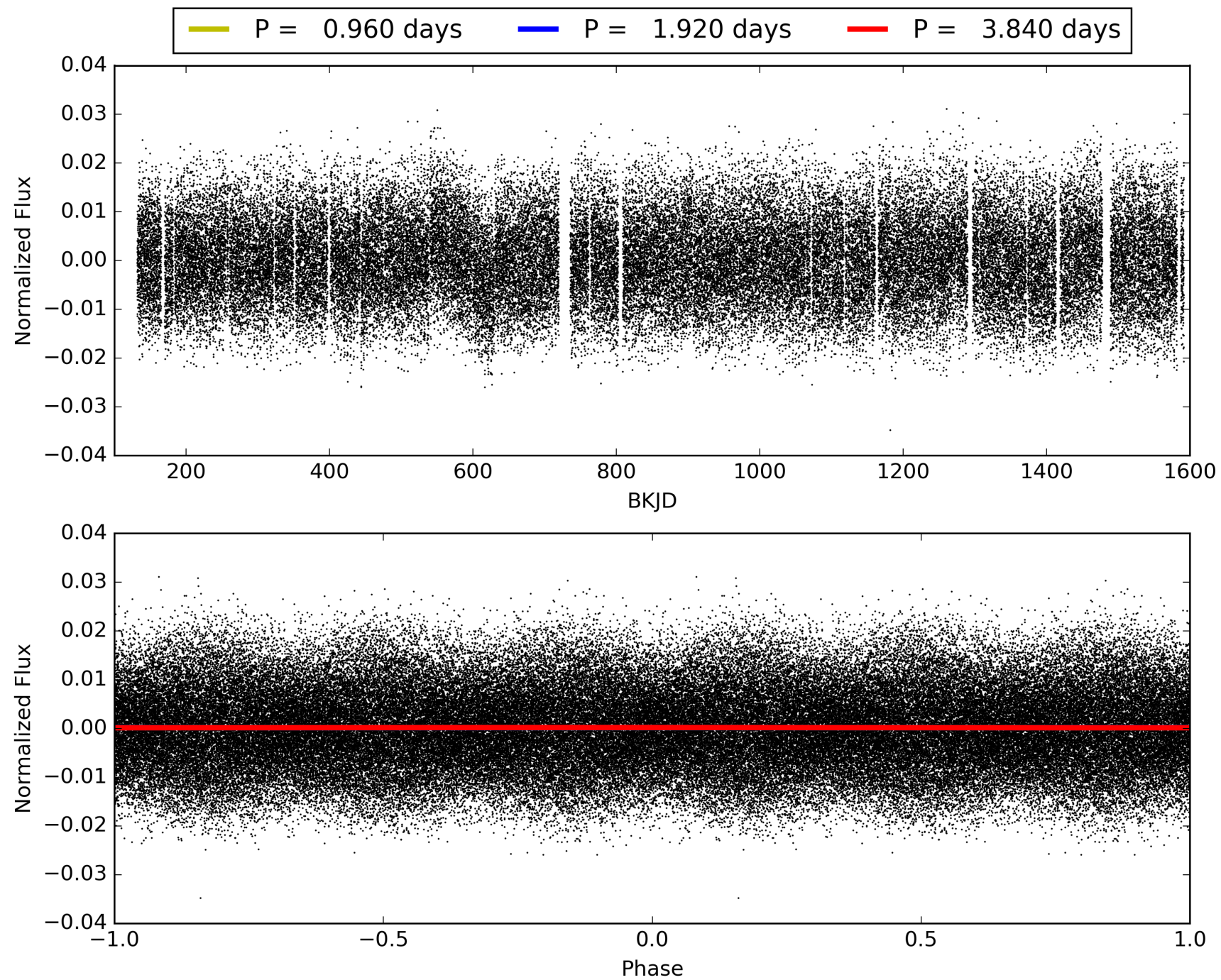
KIC: 8442040 Candidate: 1 of 2 Period: 1.920 d



TCE 008442040-01, PDC Light Curves

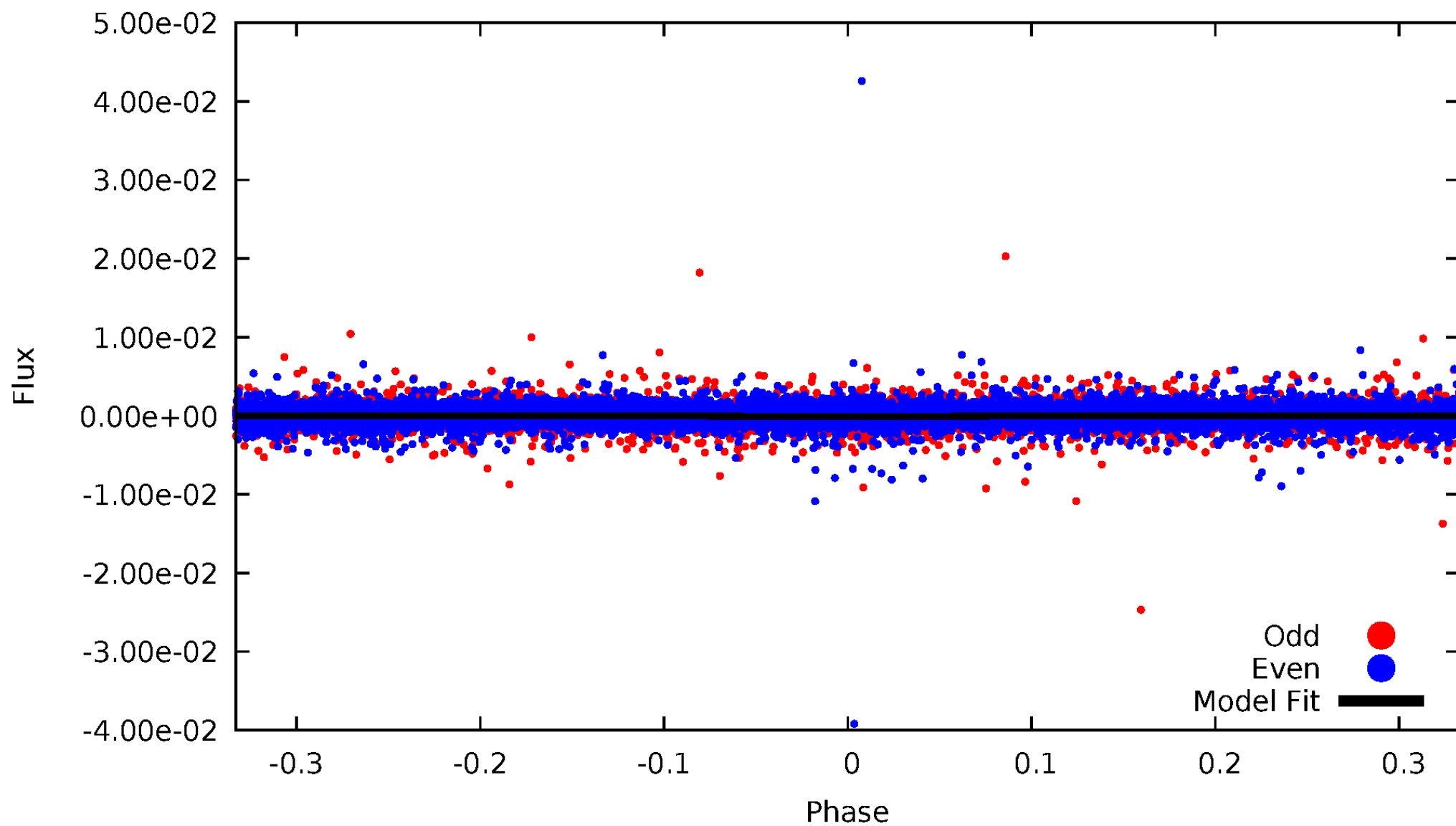


TCE 008442040-01



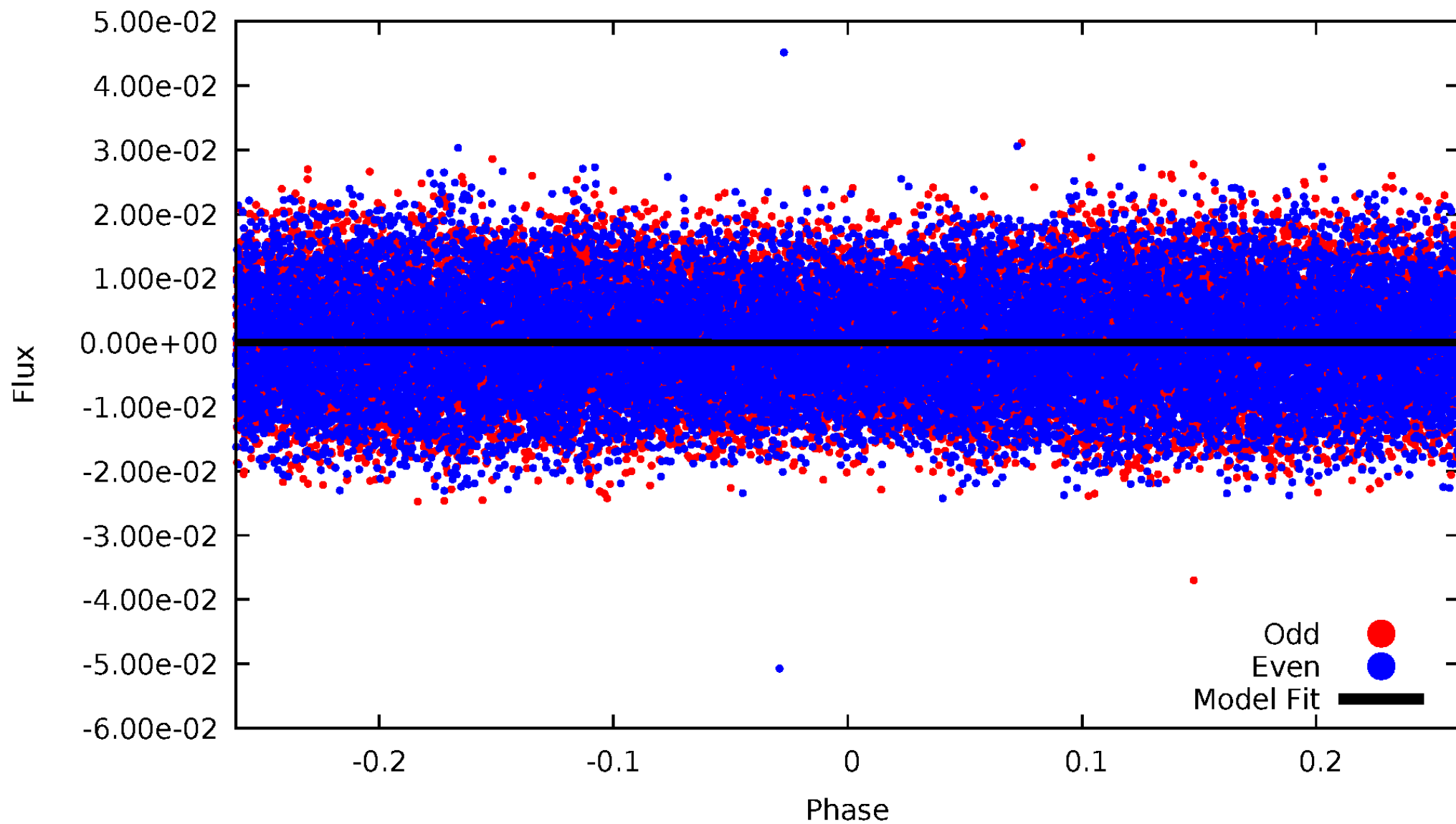
DV Odd/Even

TCE 008442040-01



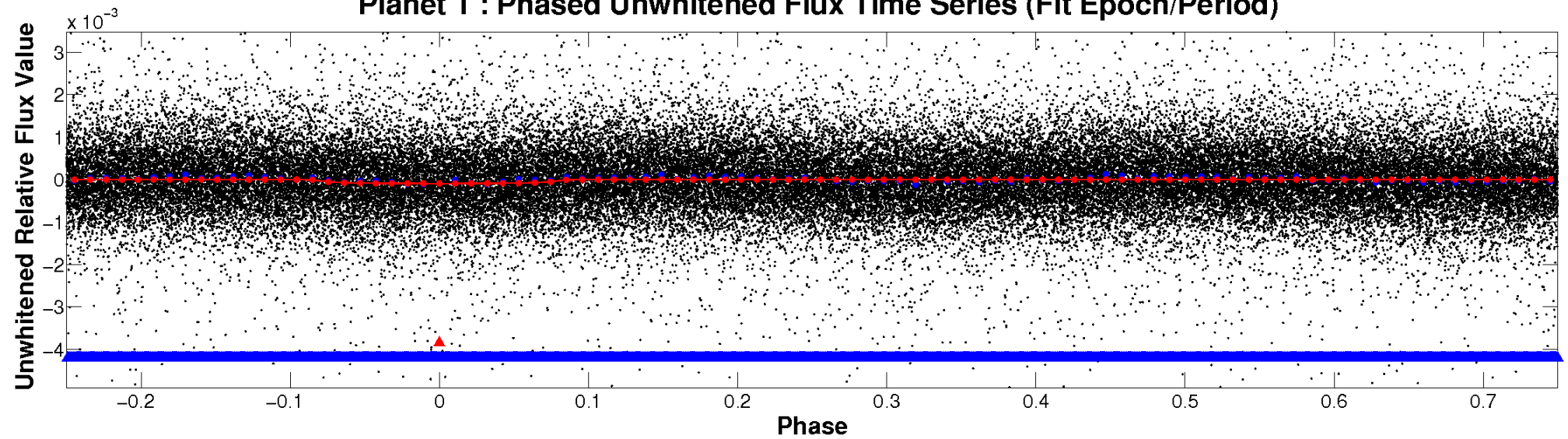
ALT Odd/Even

TCE 008442040-01

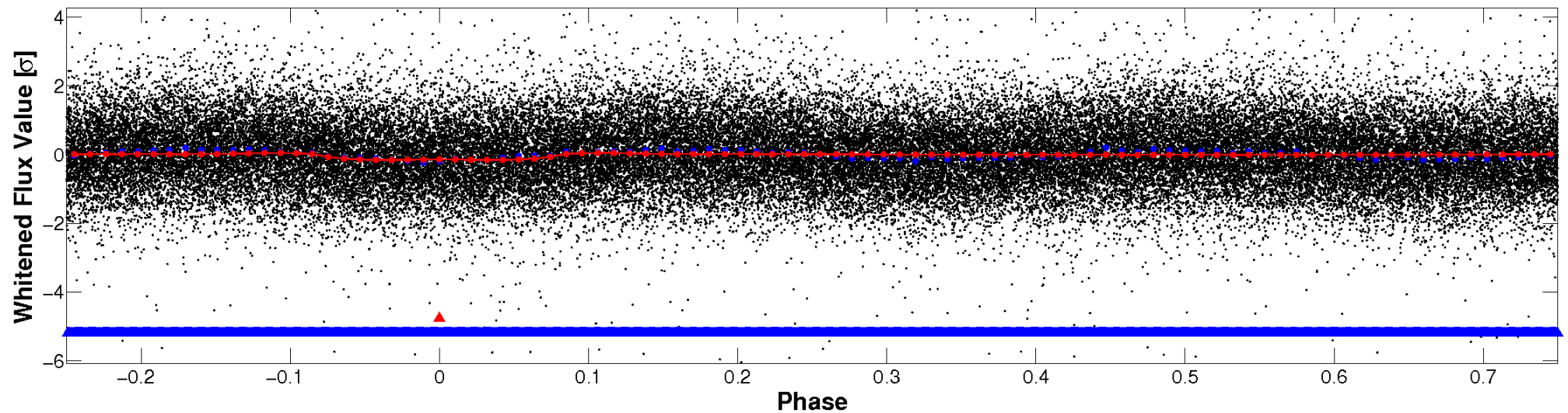


Non-Whitened Vs. Whitened Light Curve

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

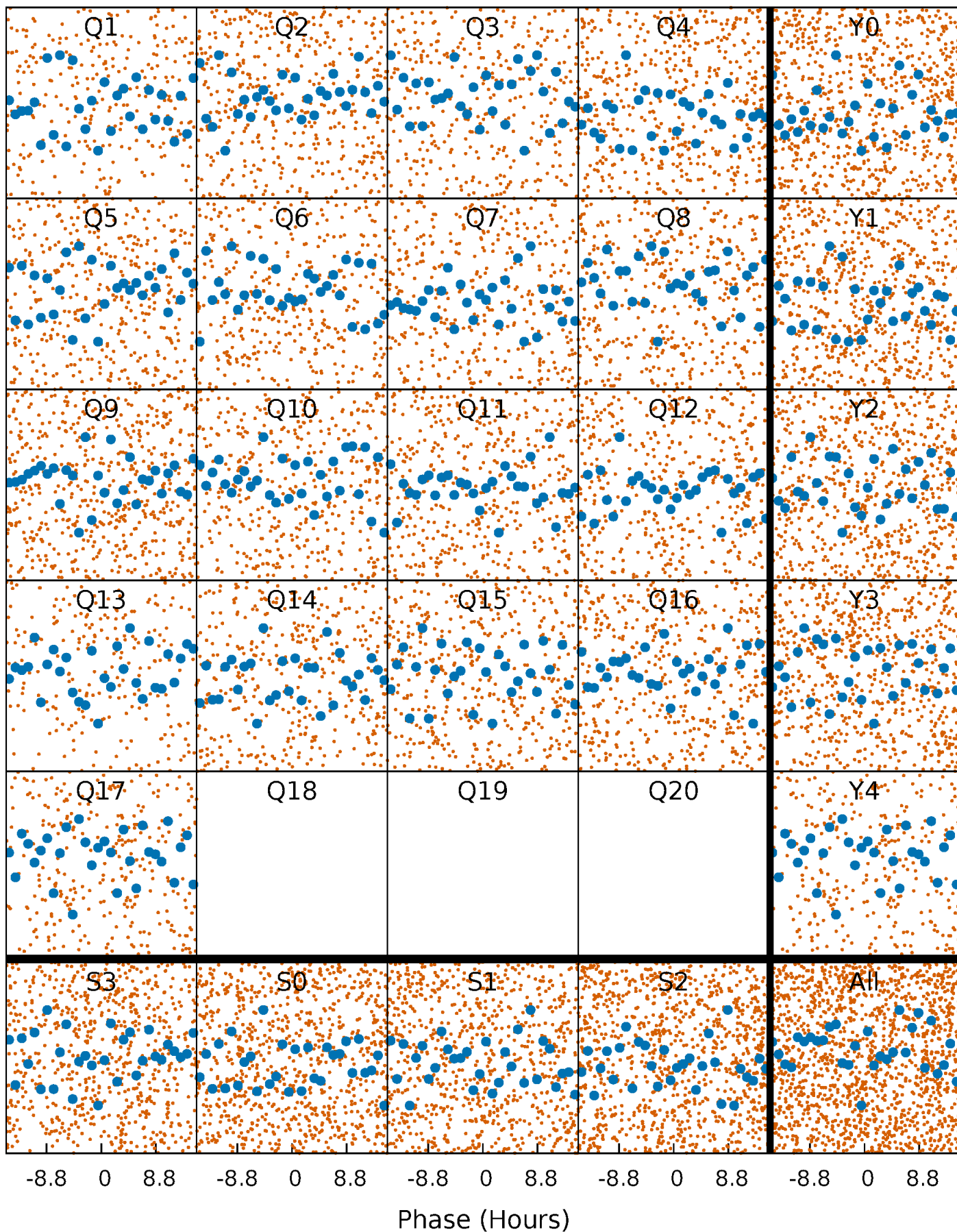


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



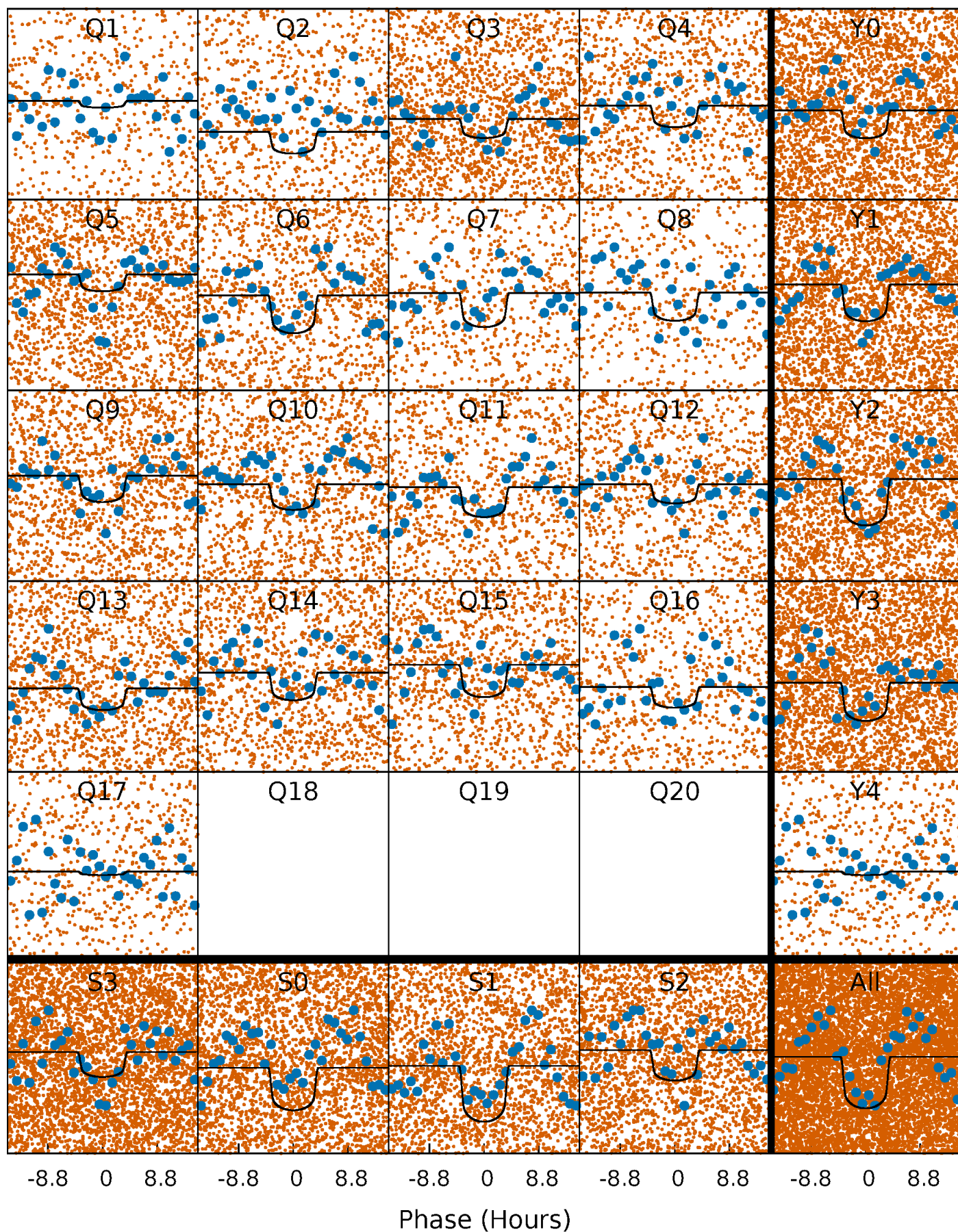
PDC Quarter-Phased Transit Curves

TCE 008442040-01 P= 1.919976 Days $T_0=133.020015$ (BKJD)



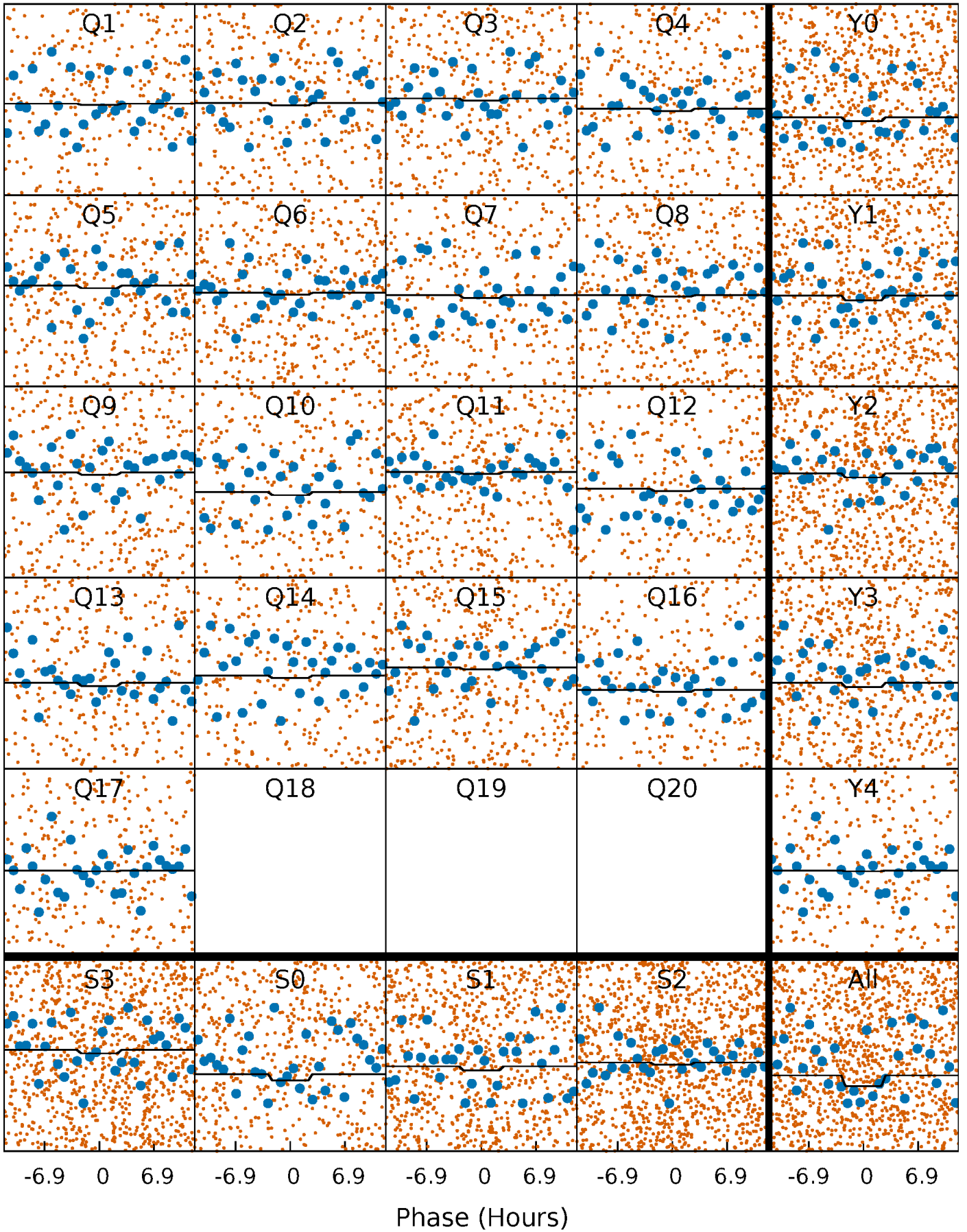
DV Quarter-Phased Transit Curves

TCE 008442040-01 P= 1.919976 Days $T_0=133.020015$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

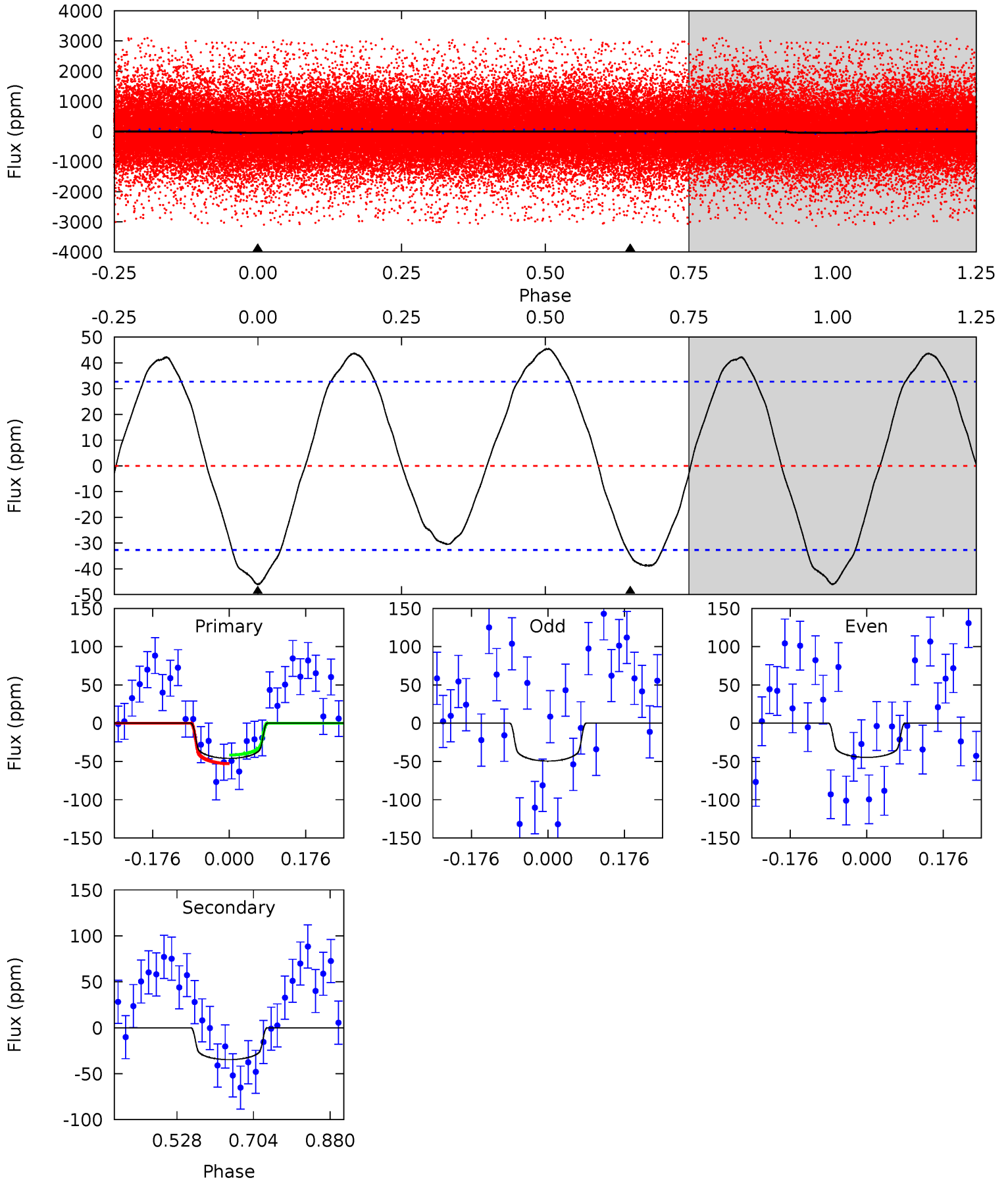
TCE 008442040-01 P= 1.919871 Days $T_0=133.099731$ (BKJD)



DV Model-Shift Uniqueness Test

008442040-01, P = 1.919976 Days, E = 131.100039 Days

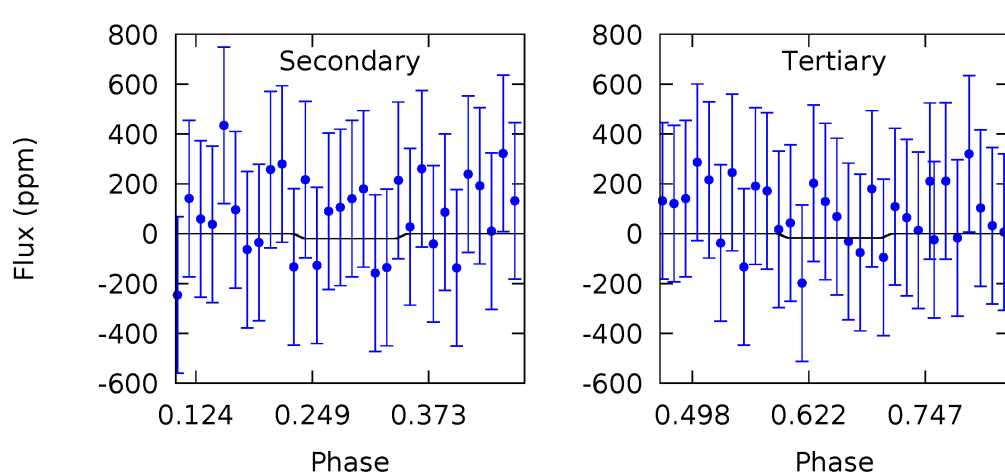
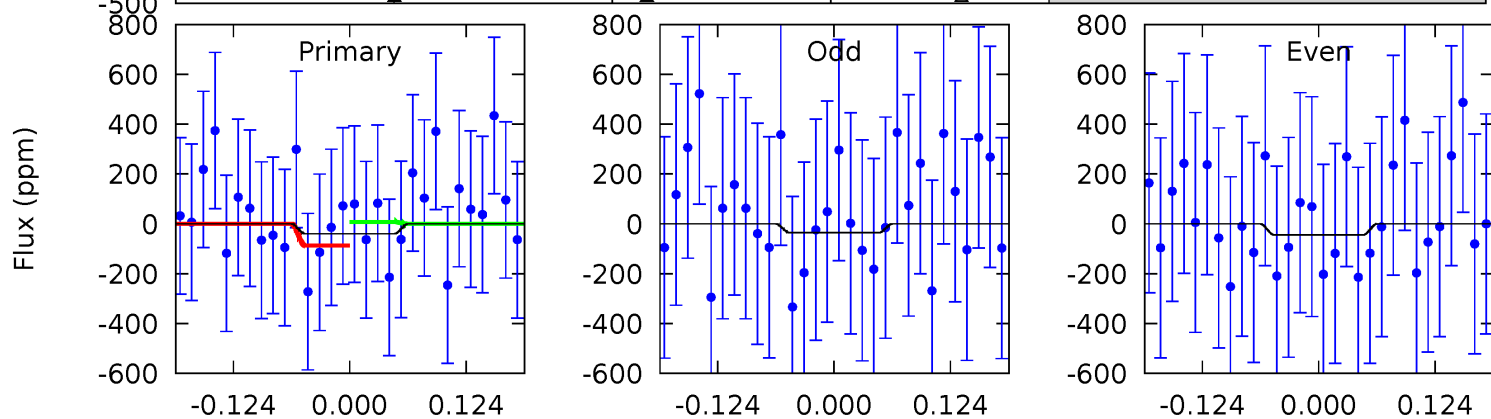
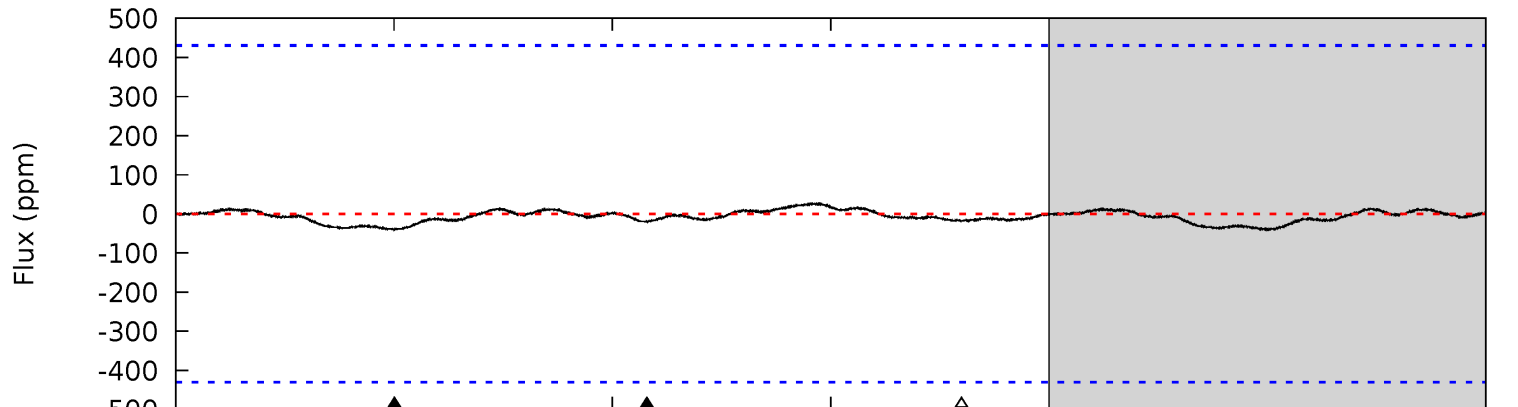
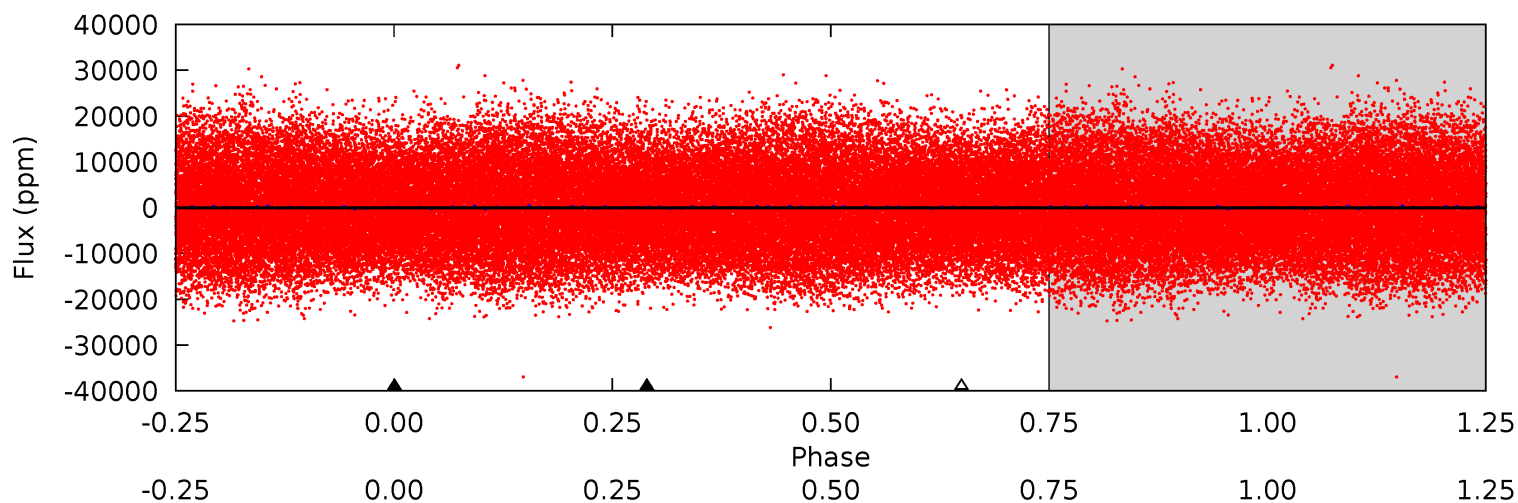
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 6.25 | 4.72 | 0 | 0 | 4.44 | 1.35 | 3.29 | 6.25 | 6.25 | 4.72 | 4.72 | 0.33 | 1.21 | 0.50 | 0.76 |



Alt Model-Shift Uniqueness Test

008442040-01, P = 1.919871 Days, E = 131.179860 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 0.42 | 0.21 | 0.19 | 0 | 4.52 | 1.54 | 0.12 | 0.23 | 0.42 | 0.02 | 0.21 | 0.05 | 0.49 | 0.39 | 0.44 |



Stellar Parameters For KIC 008442040

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6507^{+146}_{-194} | $4.190^{+0.158}_{-0.193}$ | $-0.080^{+0.250}_{-0.300}$ | $1.492^{+0.442}_{-0.322}$ | $1.259^{+0.181}_{-0.201}$ | $0.534^{+0.442}_{-0.279}$ |
| | +2%/-3% | +4%/-5% | +312%/-375% | +30%/-22% | +14%/-16% | +83%/-52% |
| 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 008442040-01 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|-------------------------|-----------------------------|
| DV | -35 ± 7 | $1.70^{+0.45}_{-0.41}$ | 2715^{+205}_{-168} | 4915^{+611}_{-432} | $6.921^{+5.367}_{-2.792}$ |
| Alt. | -20 ± 95 | $1.05^{+0.39}_{-0.37}$ | 2710^{+203}_{-168} | 4896^{+4087}_{-12828} | $6.845^{+62.068}_{-54.093}$ |

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 $A_{obs} \gg 1.0$

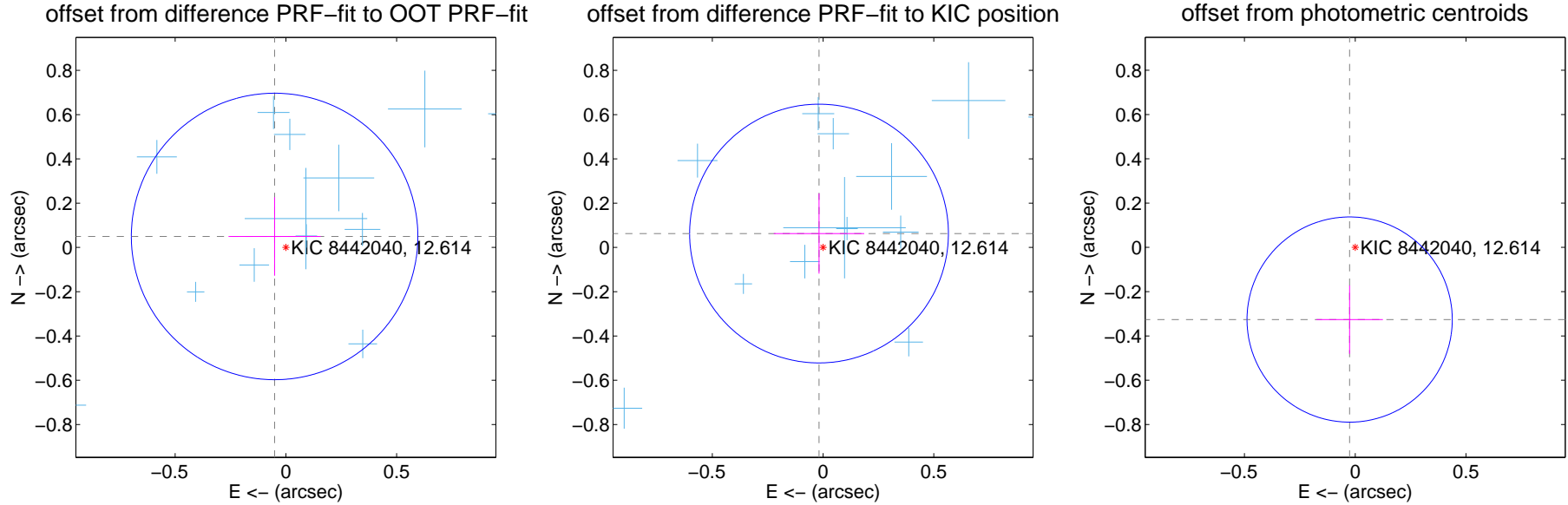
DV Centroid Data

Supplemental centroid analysis for 008442040-01. Kepler magnitude: 12.61. Transit SNR 14.12

There are 14 quarters with good PRF difference image offsets

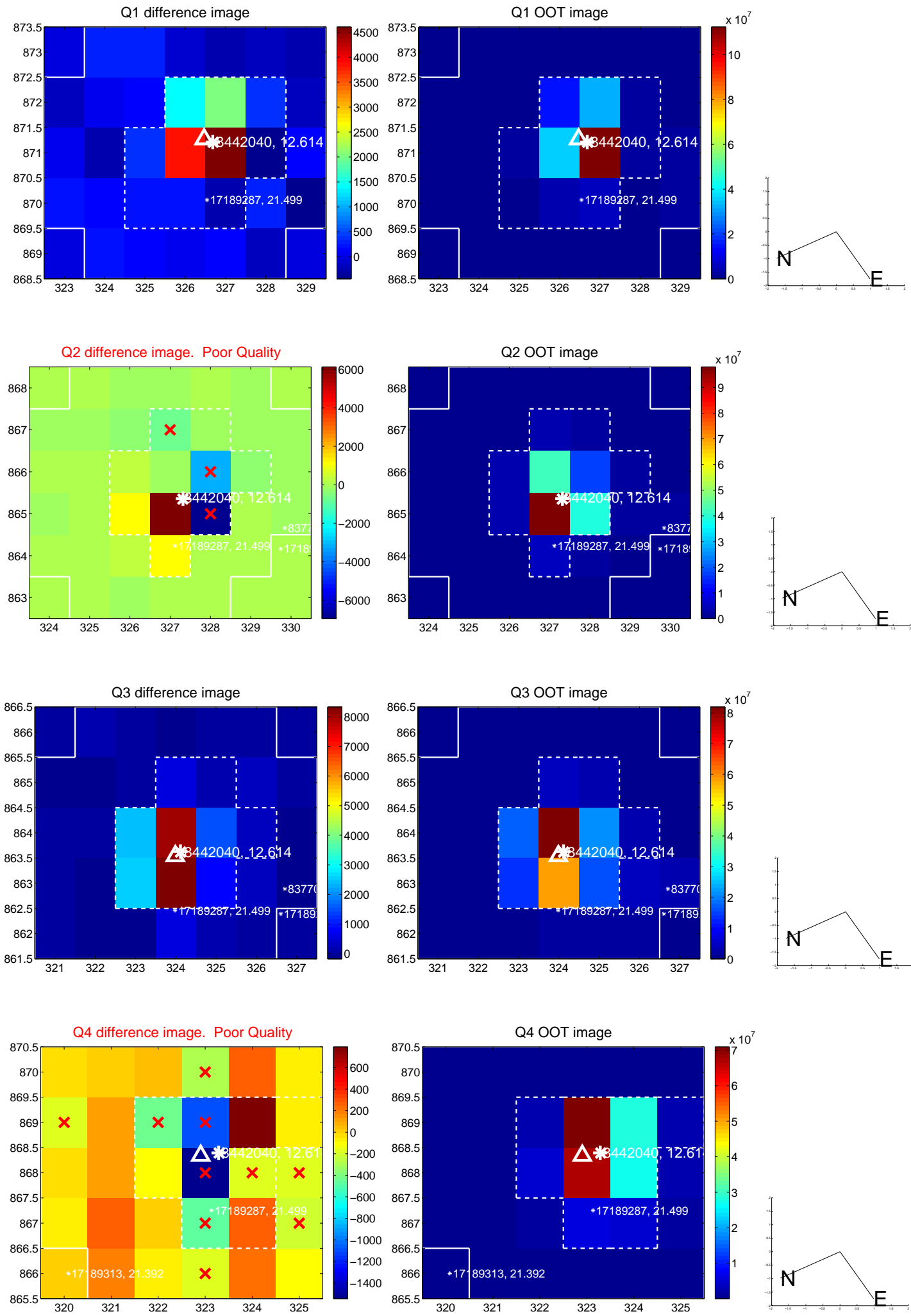
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 0.071 ± 0.216 | 0.33 | 0.051 ± 0.208 | 0.050 ± 0.177 |
| PRF-fit source offset from KIC position | 0.065 ± 0.195 | 0.34 | 0.018 ± 0.204 | 0.063 ± 0.181 |
| photometric centroid source offset | 0.33 ± 0.15 | 2.12 | 0.03 ± 0.15 | -0.33 ± 0.15 |

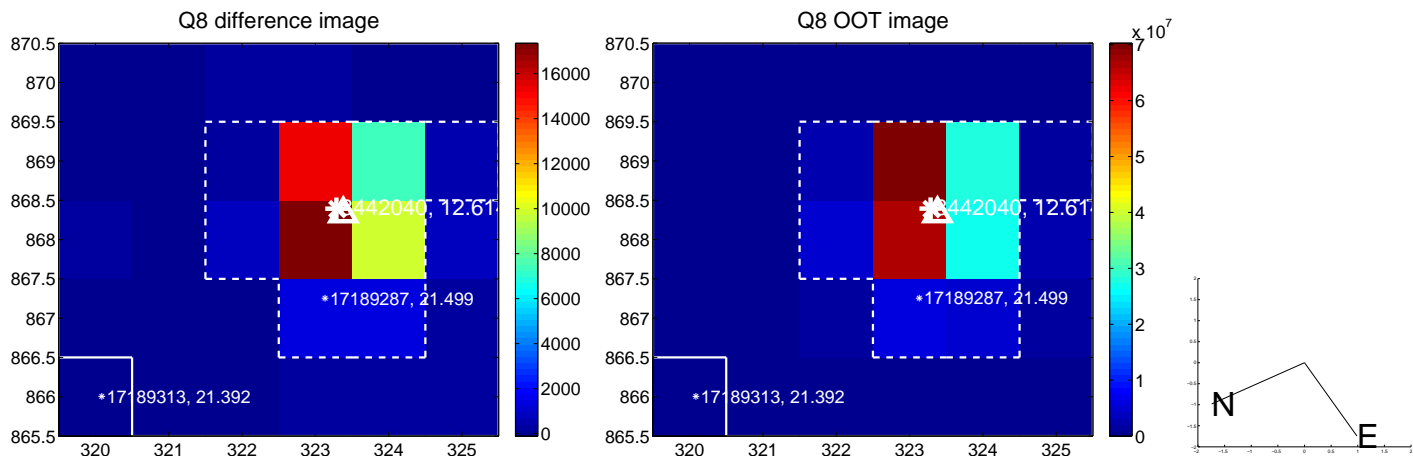
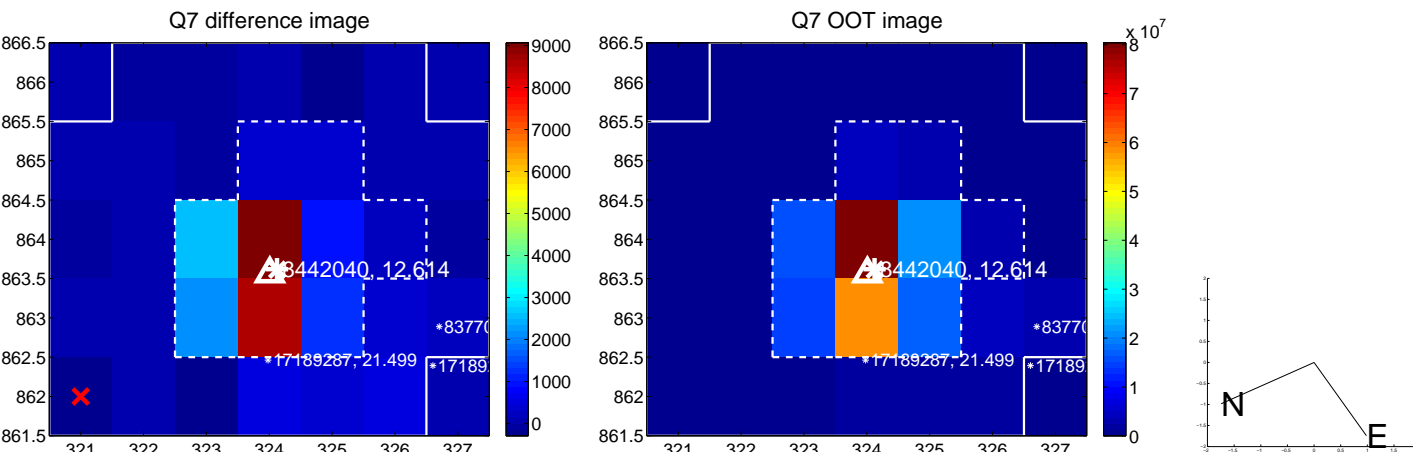
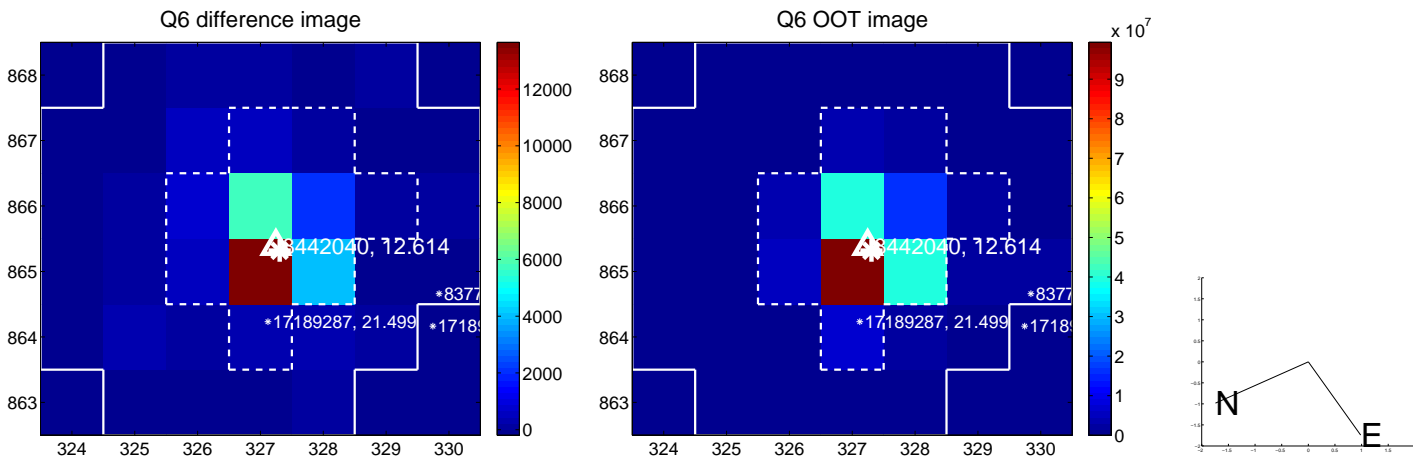
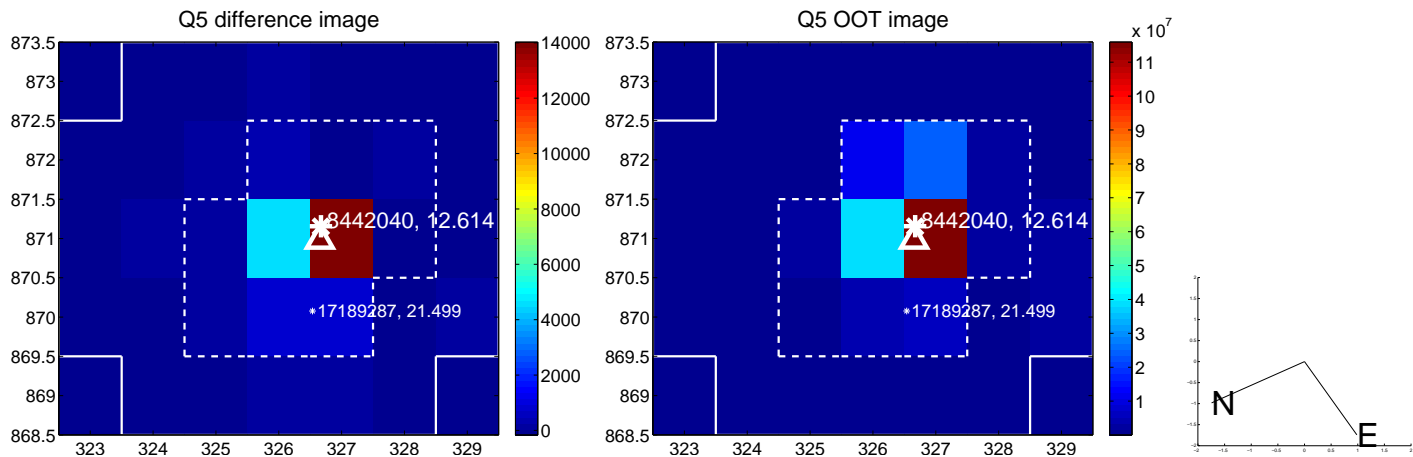


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

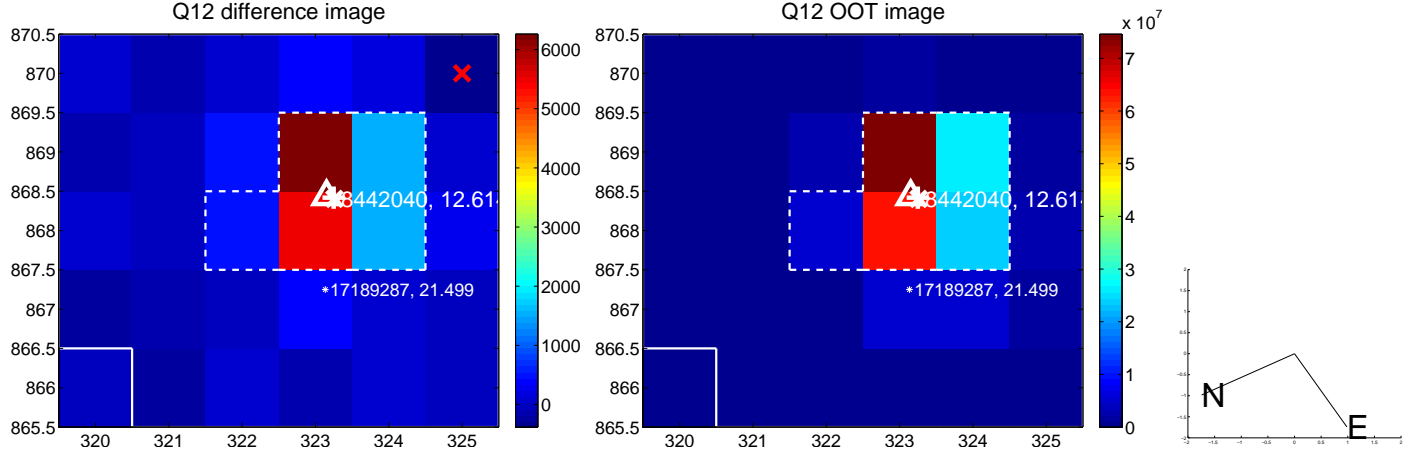
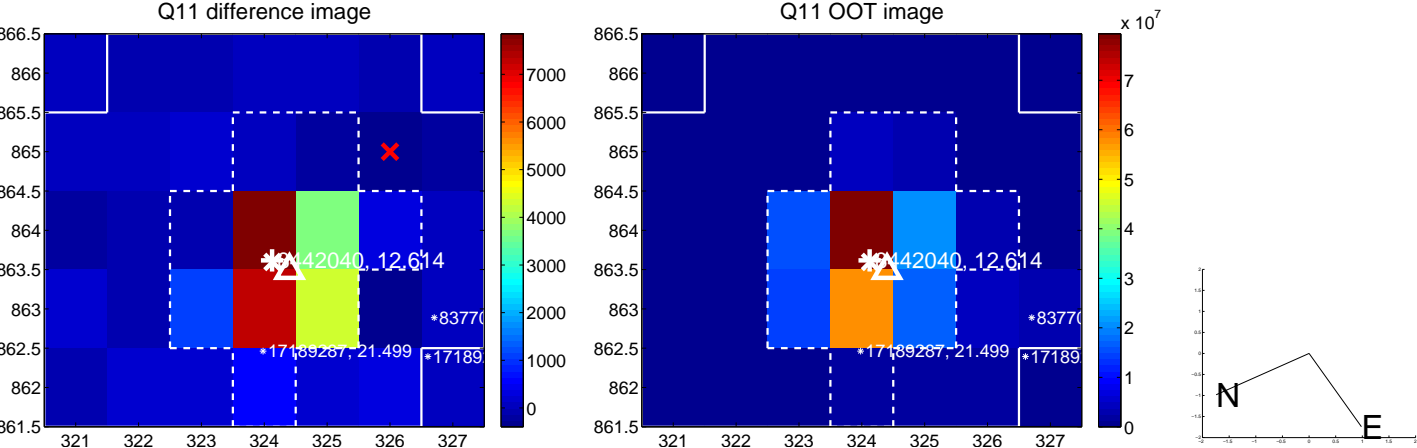
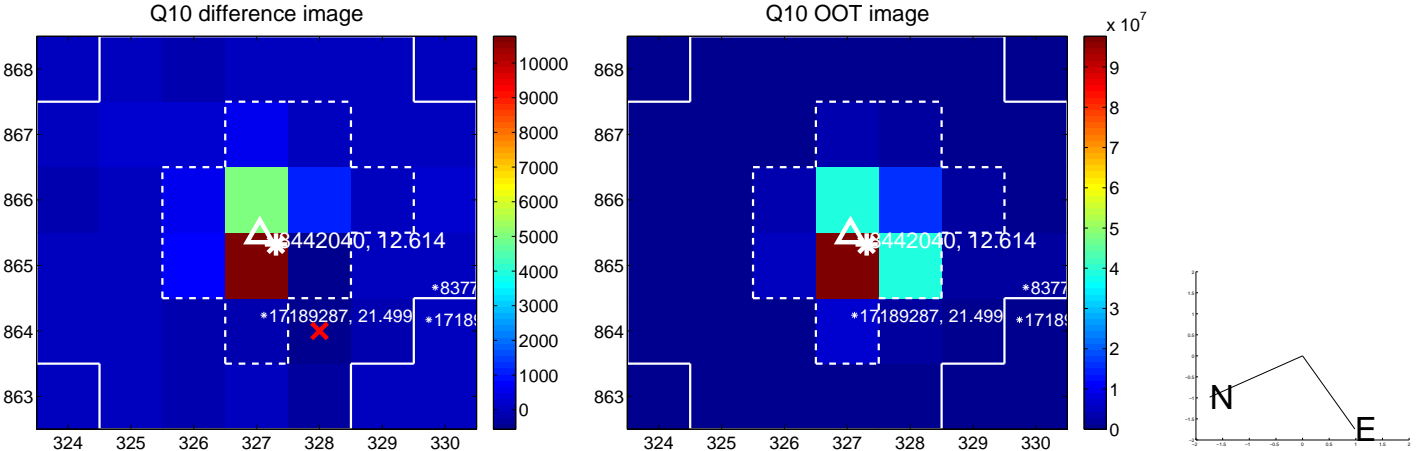
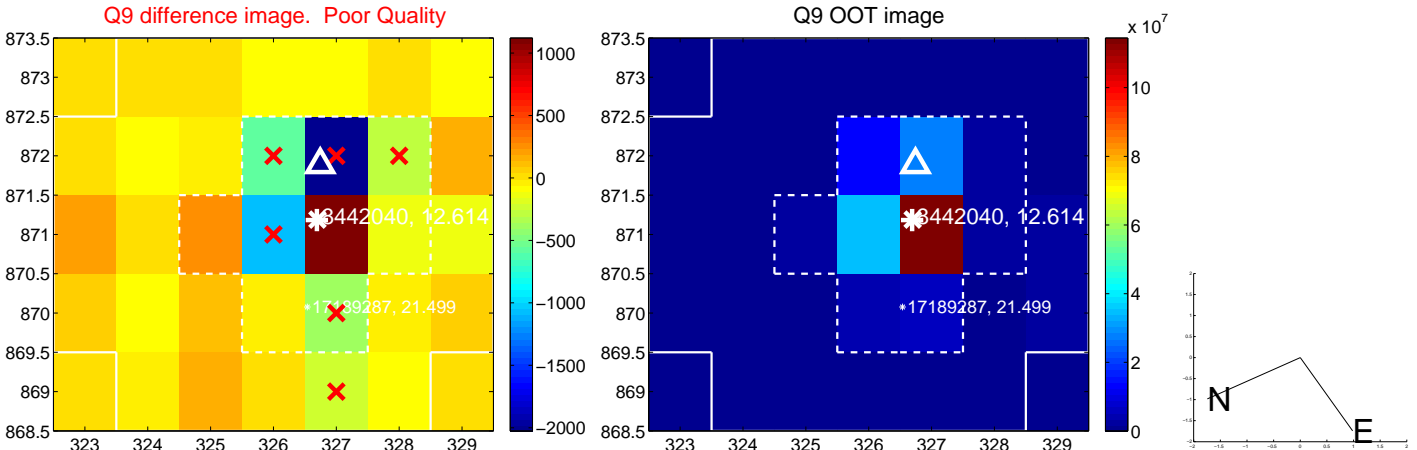
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



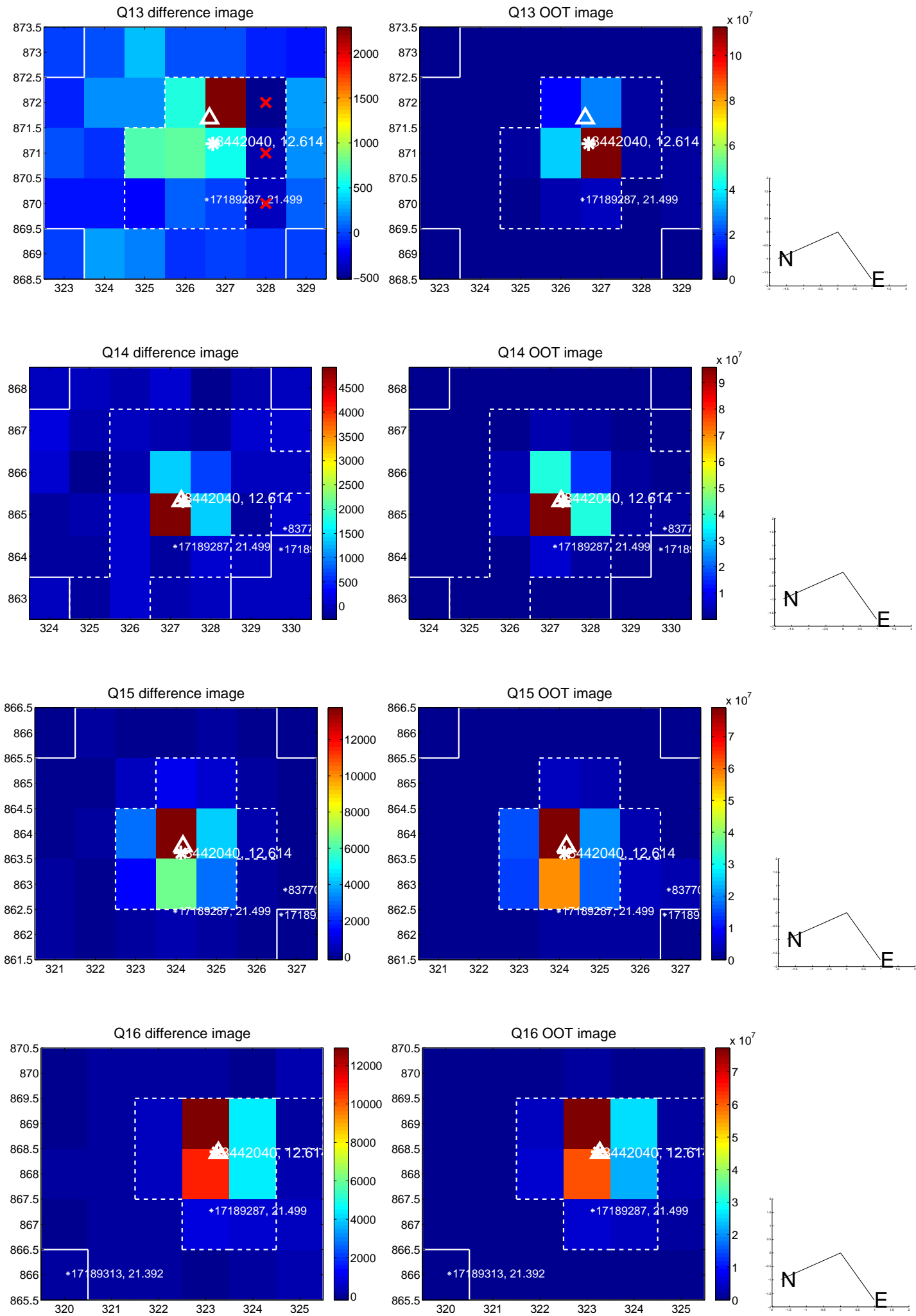
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



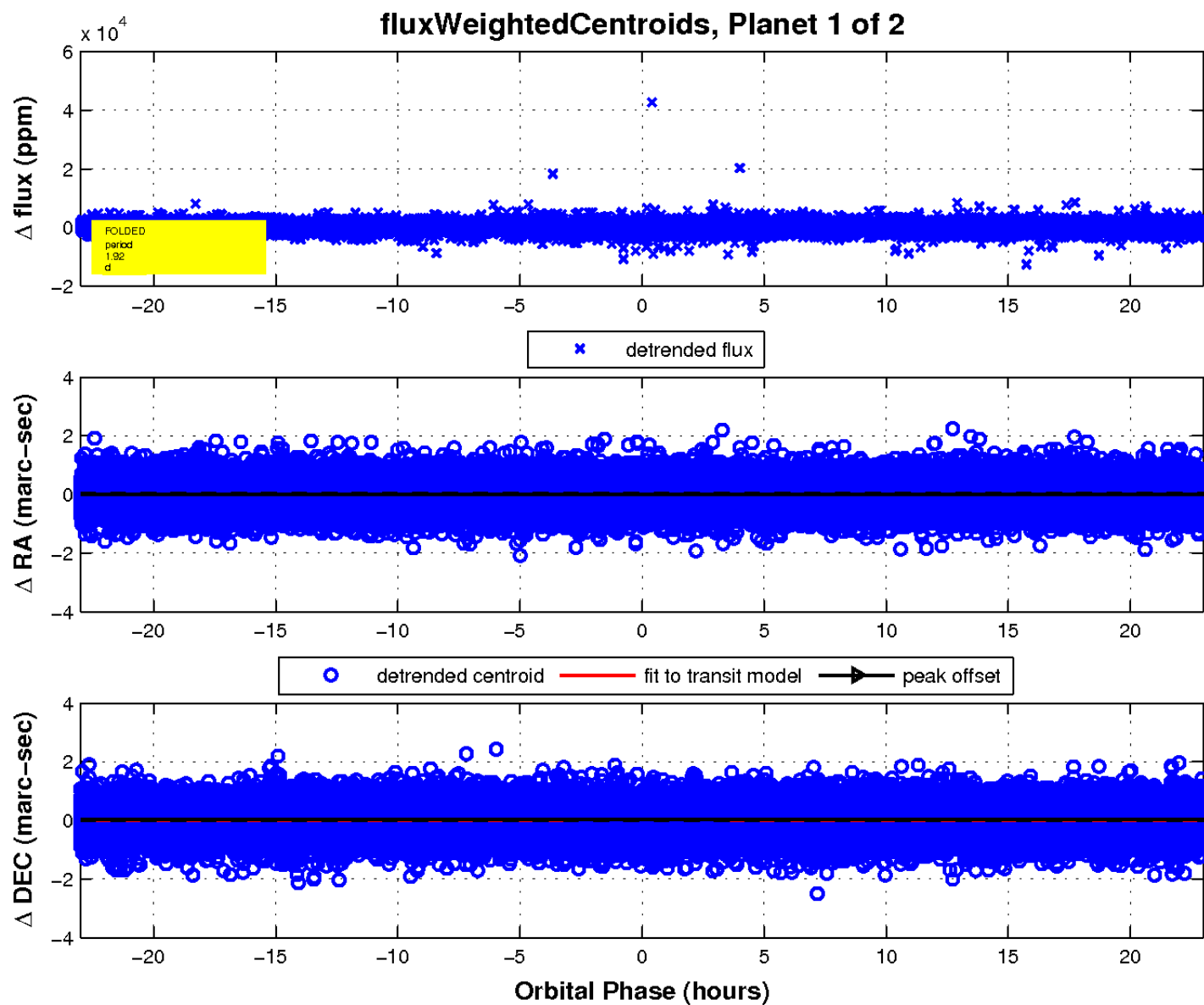
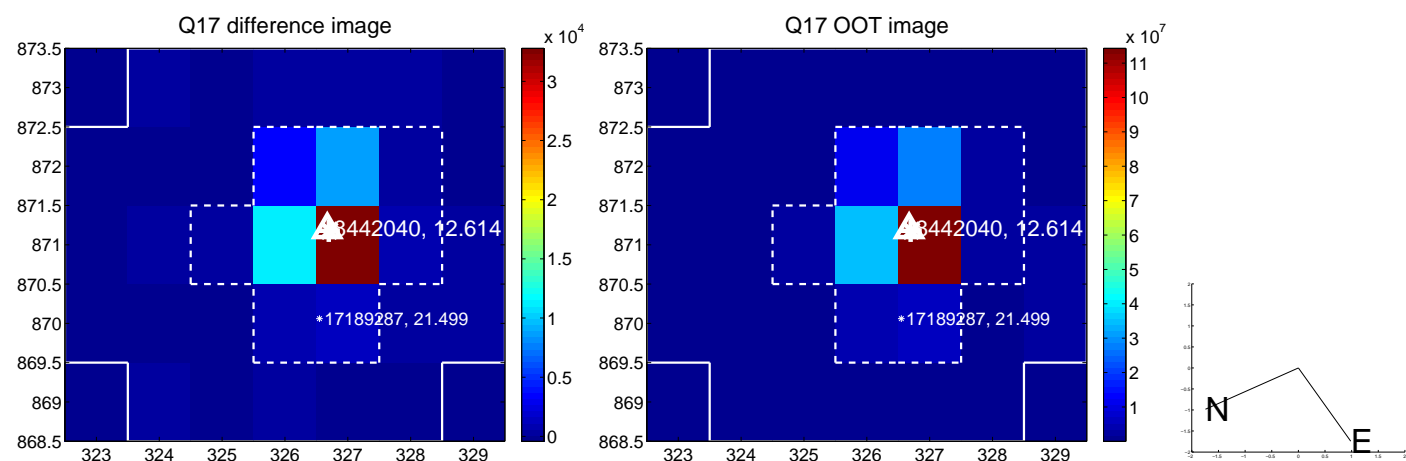
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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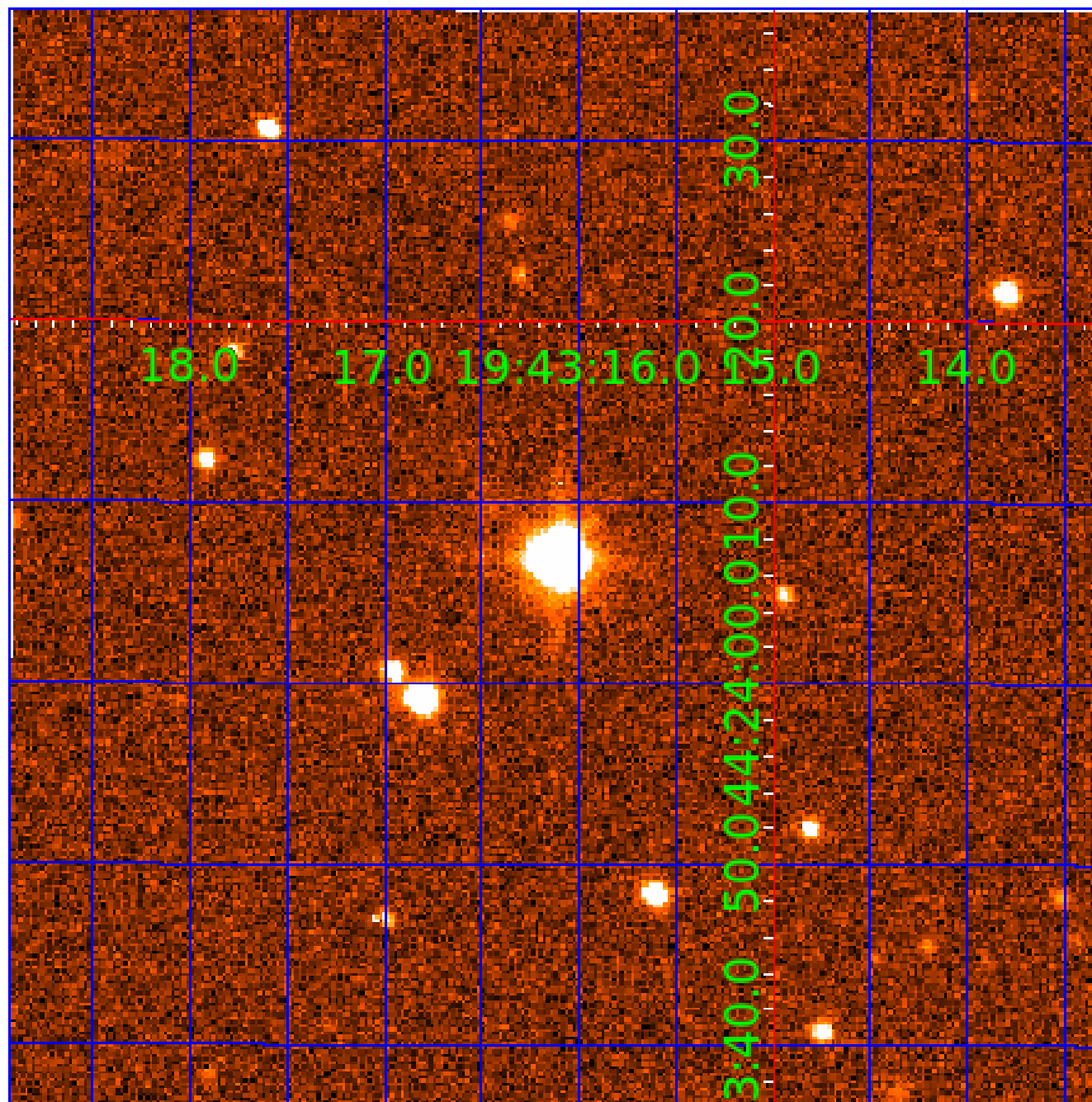


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008442040

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008442040-01 | OBS | No | 1.919976 | 133.020015 | 90.9 | 7.667 | 11.9 | 14.1 | 1.49 | 6507 | 1.67 | 3356.36 |
| 008442040-02 | OBS | No | 0.869781 | 132.249166 | 48.0 | 6.786 | 8.3 | 6.9 | 1.49 | 6507 | 1.20 | 9646.80 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 008442040-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008442040-02 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—HALO_GHOST |

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

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

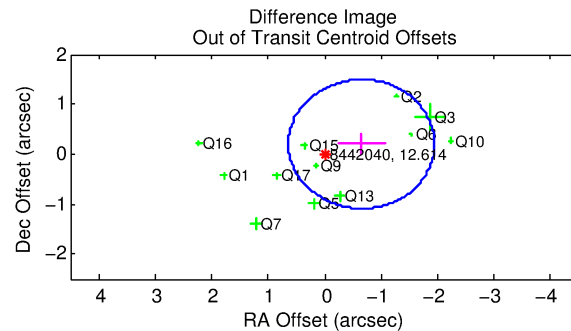
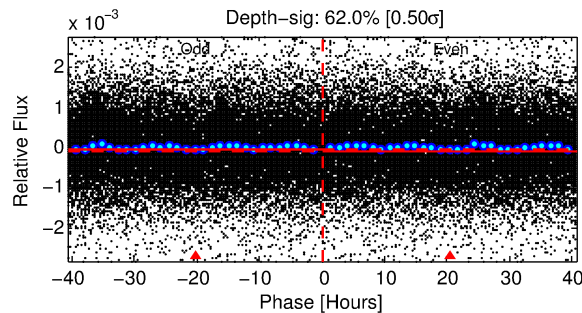
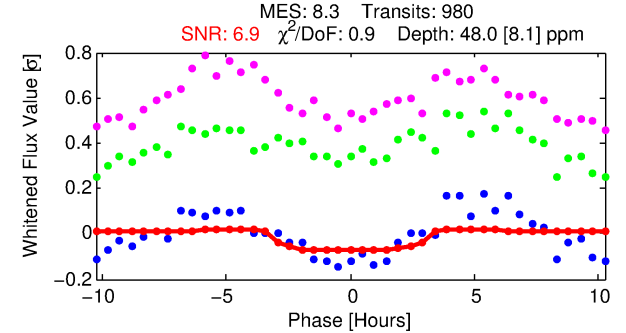
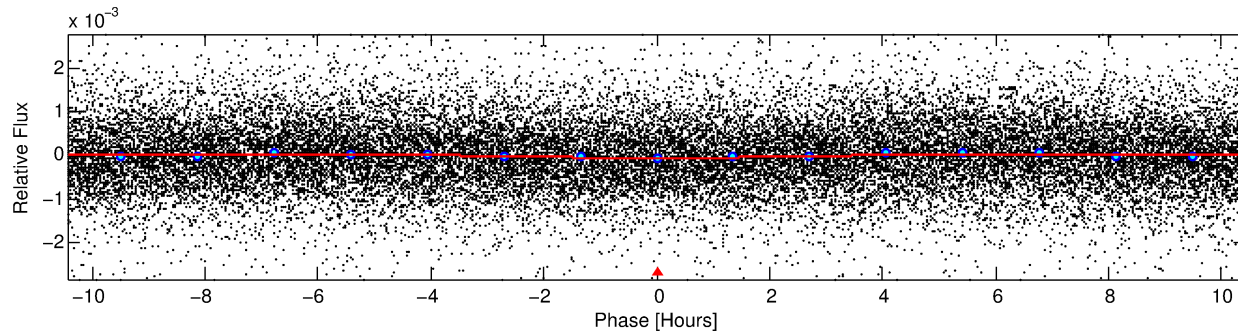
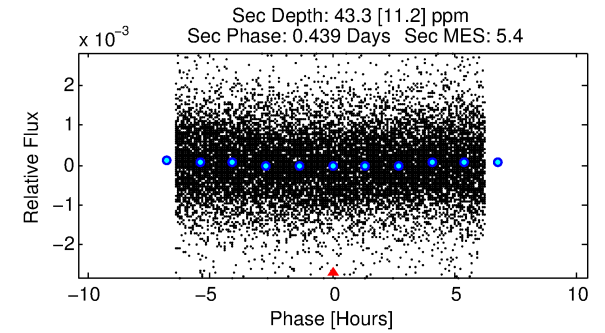
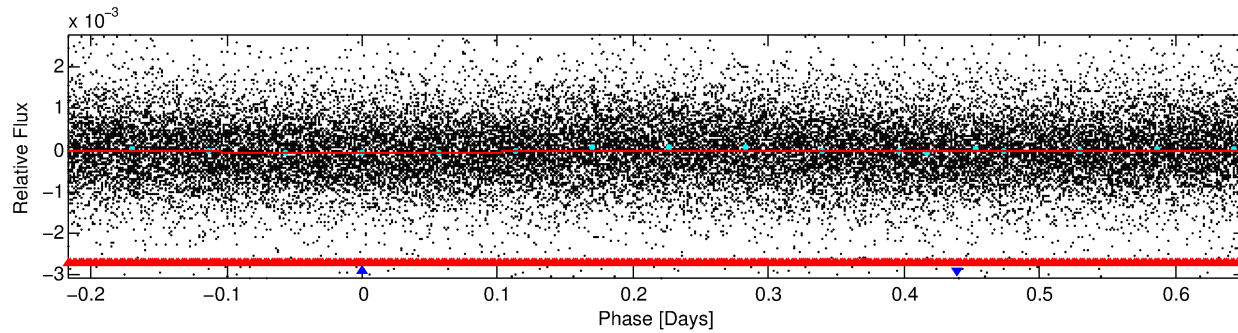
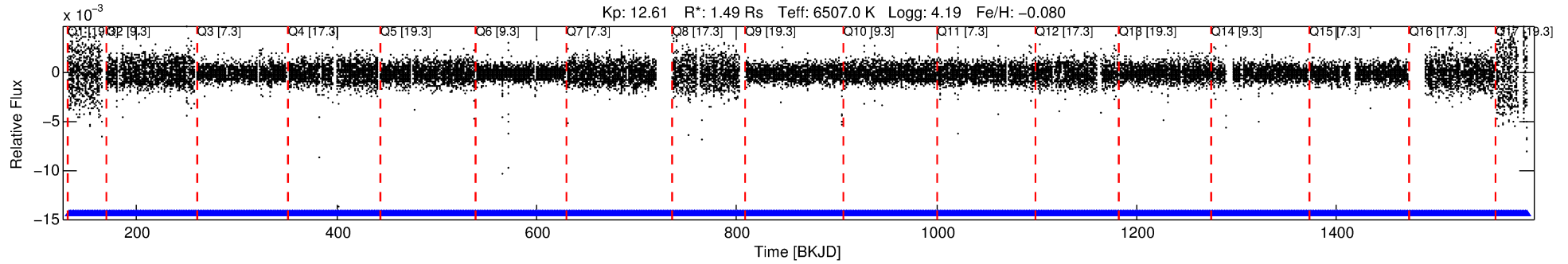
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008442040-02

No Significant Match Found

DV One-Page Summary

KIC: 8442040 Candidate: 2 of 2 Period: 0.870 d



DV Fit Results:

Period = 0.86978 [0.00002] d
Epoch = 132.2492 [0.0104] BKJD
Rp/R* = 0.0074 [0.0055]
a/R* = 1.05 [0.40]
b = 0.89 [1.04]
Seff = 9646.80 [3622.38]
Teff = 2527 [237] K
Rp = 1.20 [0.97] Re
a = 0.0193 [0.0048] AU
Ag = 6.16 [9.64] [0.54σ]
Teffp = 6156 [2352] K [1.54σ]

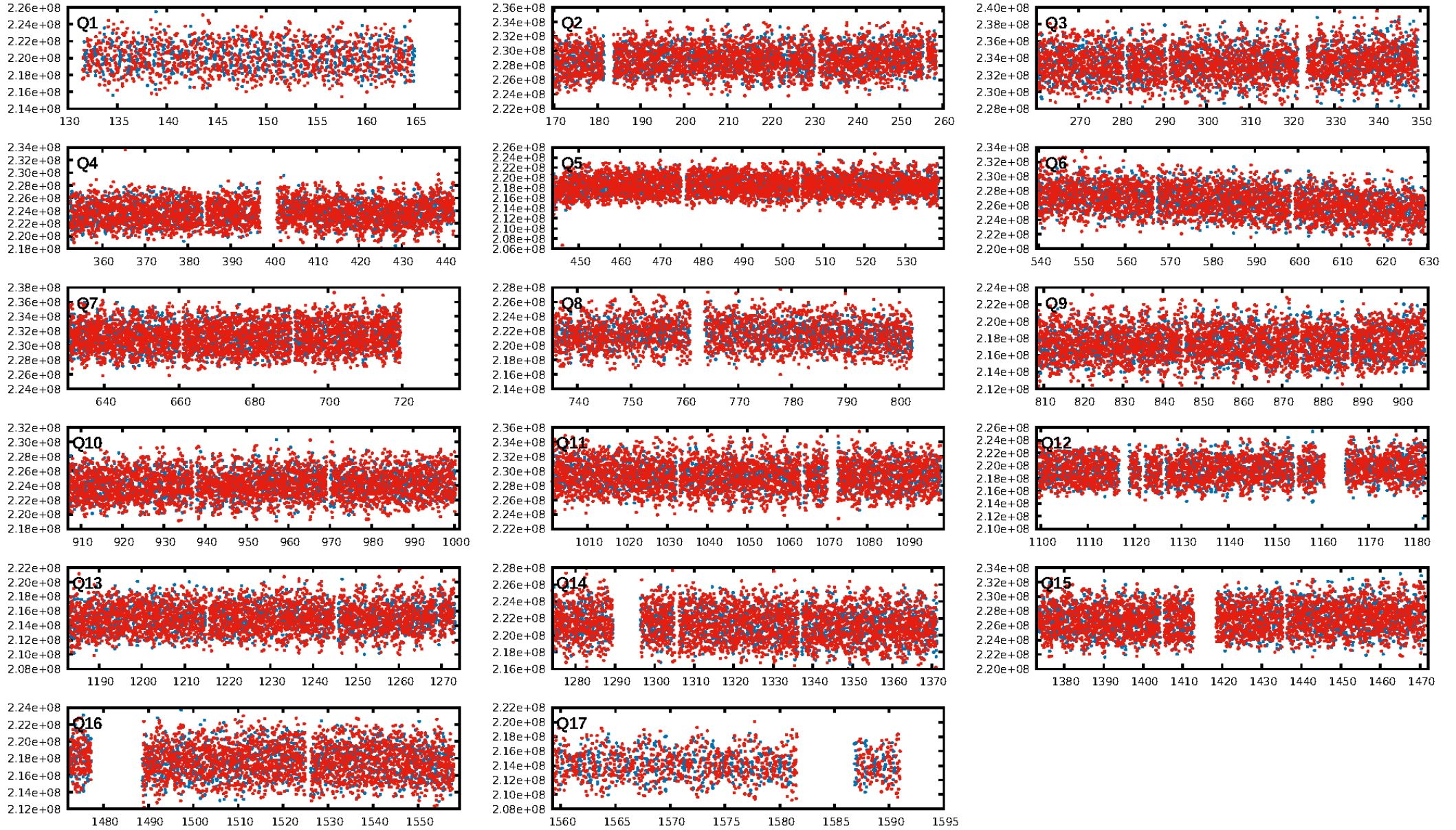
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 98.6% [2.46σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 1.00 [937/937]
GhostDiagnostic-chr: 0.1914
Centroid-sig: 9.9%
Centroid-so: 0.253 arcsec [1.28σ]
OotOffset-rm: 0.682 arcsec [1.58σ]
OotOffset-st: 3/3/1/5 [12]
KicOffset-rm: 0.699 arcsec [1.59σ]
KicOffset-st: 3/3/1/5 [12]
DiffImageQuality-fgm: 0.83 [10/12]
DiffImageOverlap-fno: 1.00 [17/17]

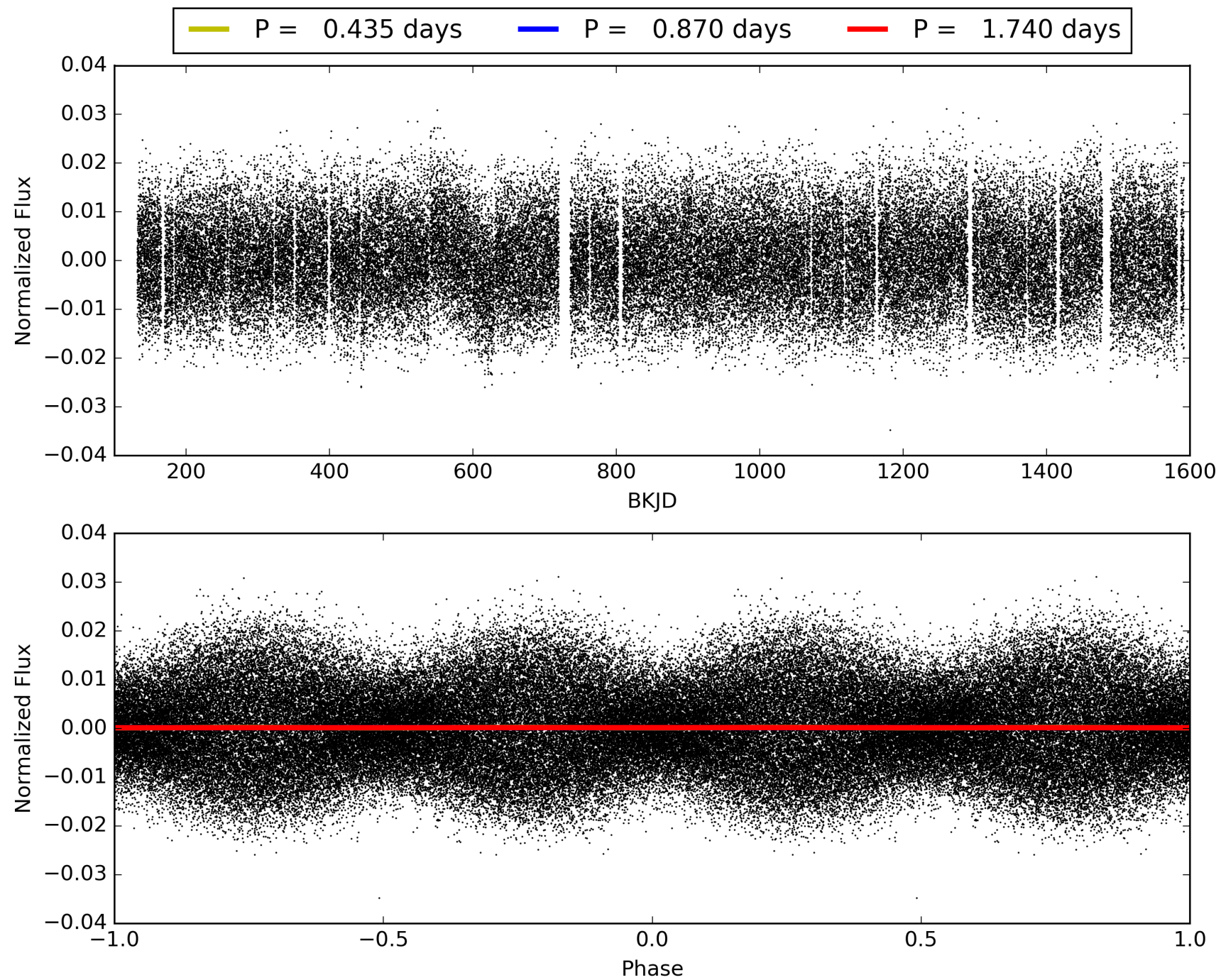
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 10:16:48 Z

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

TCE 008442040-02, PDC Light Curves

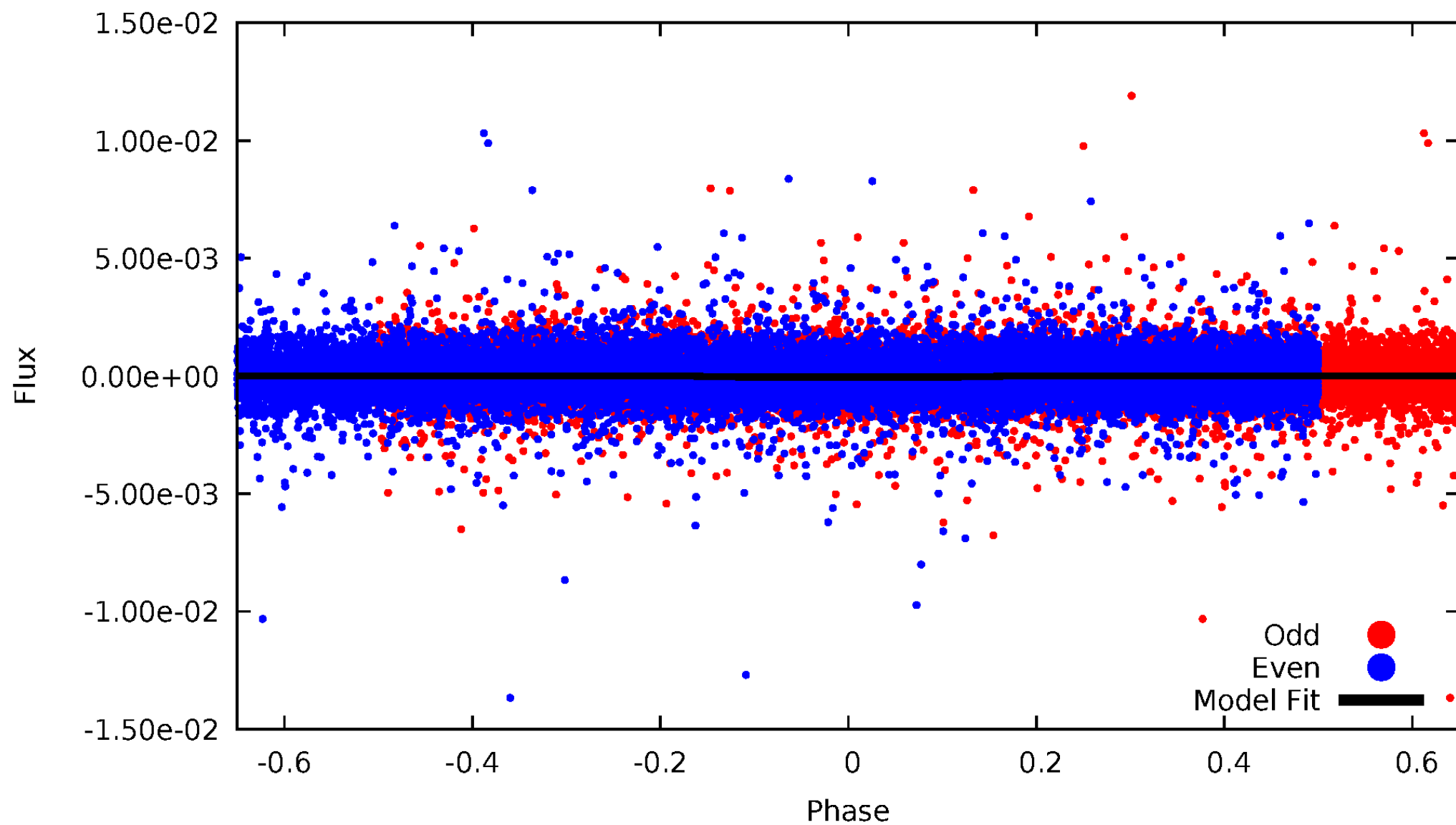


TCE 008442040-02



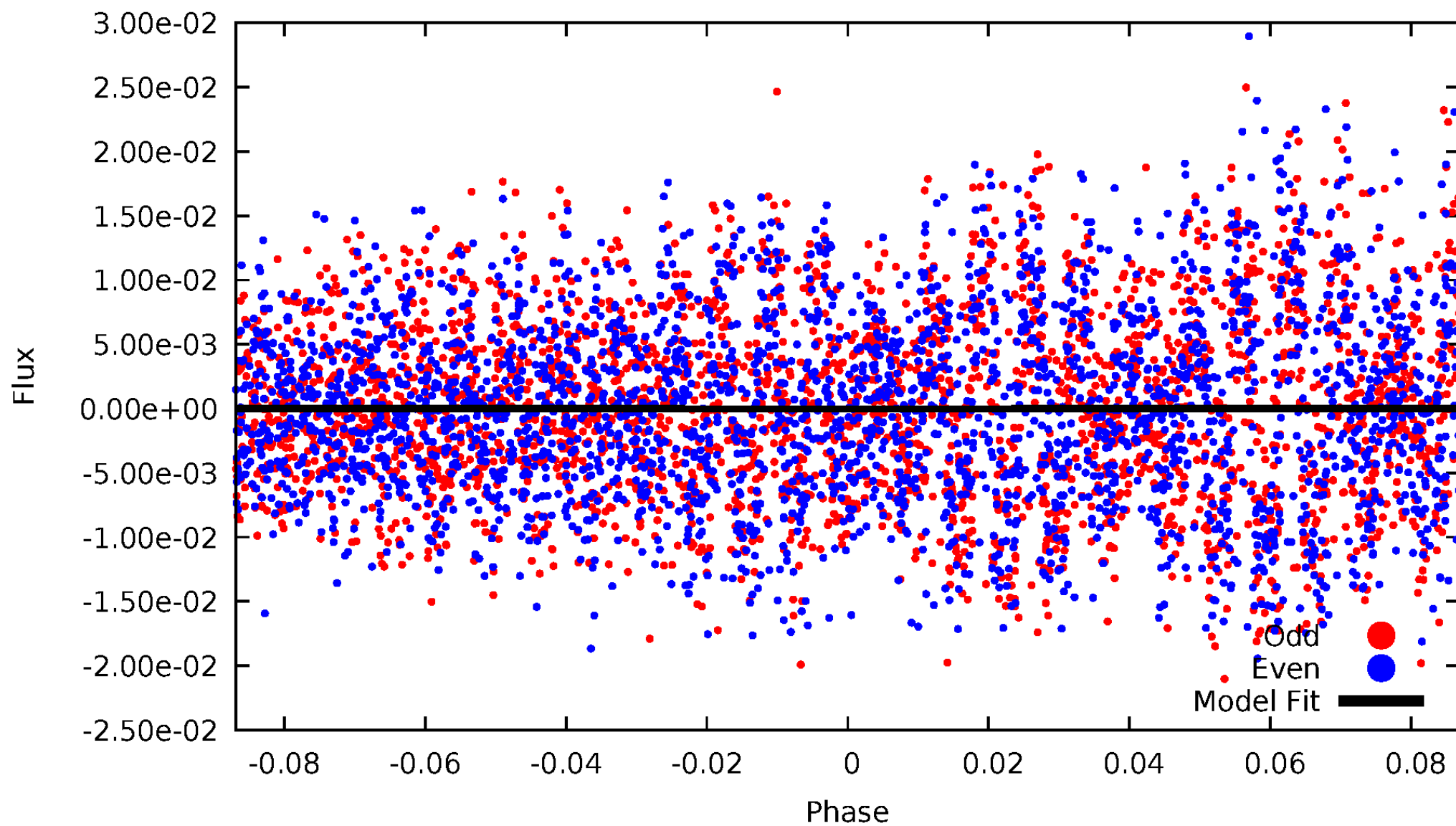
DV Odd/Even

TCE 008442040-02



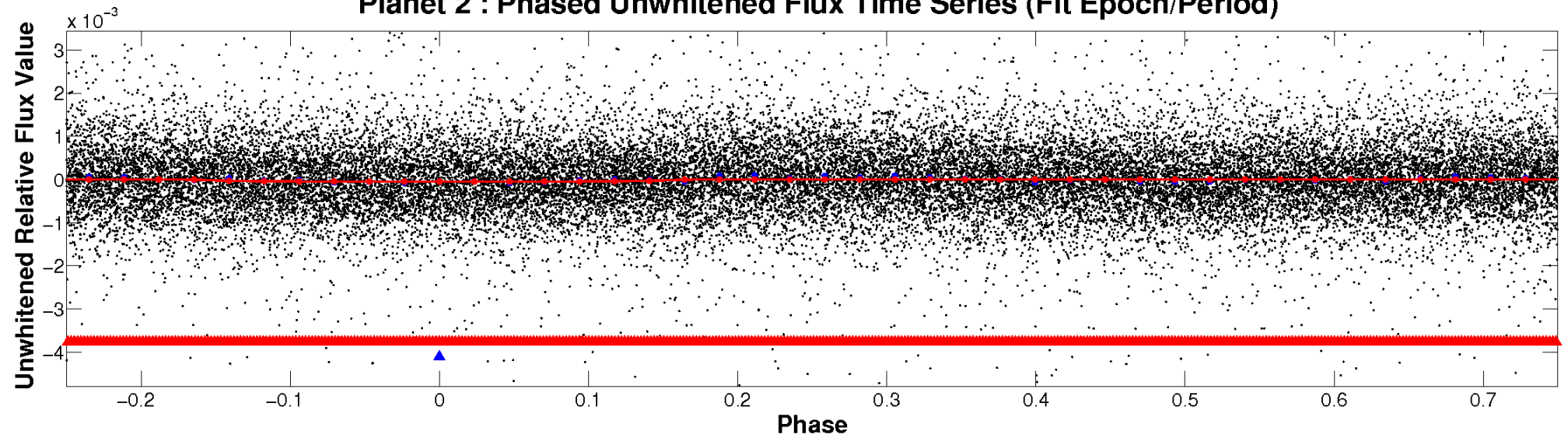
ALT Odd/Even

TCE 008442040-02

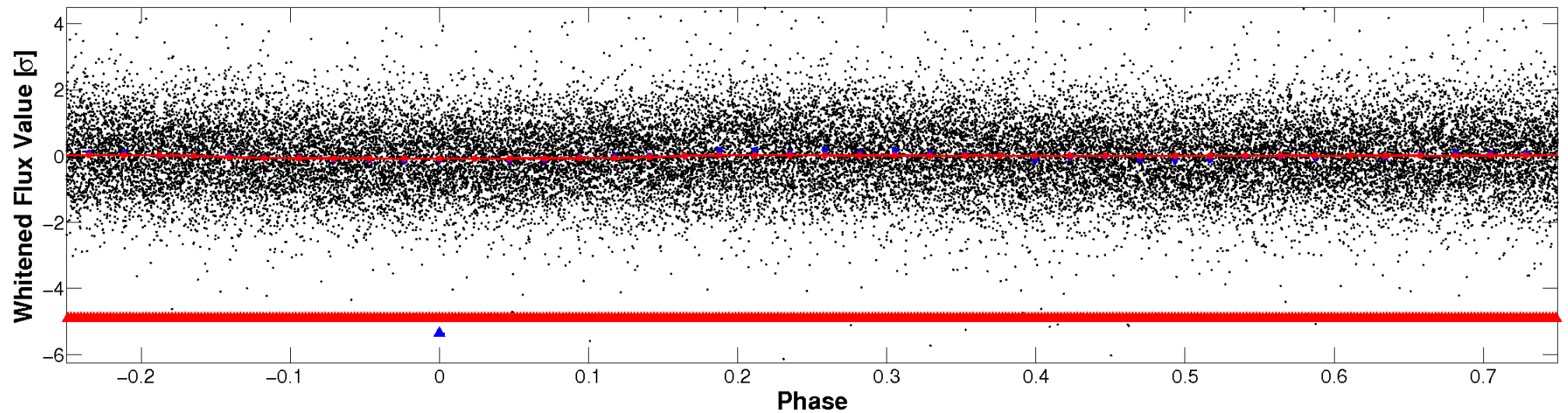


Non-Whitened Vs. Whitened Light Curve

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

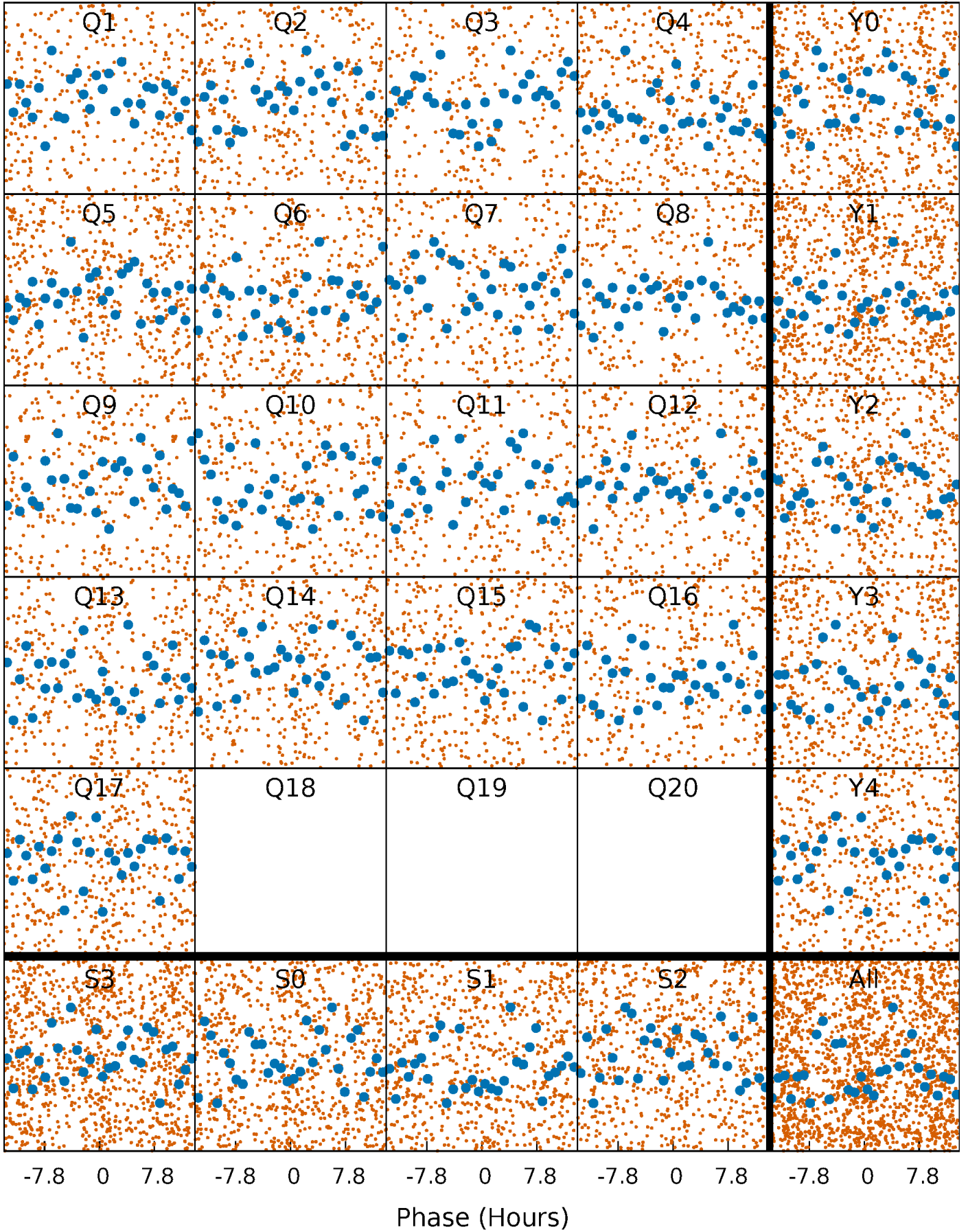


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



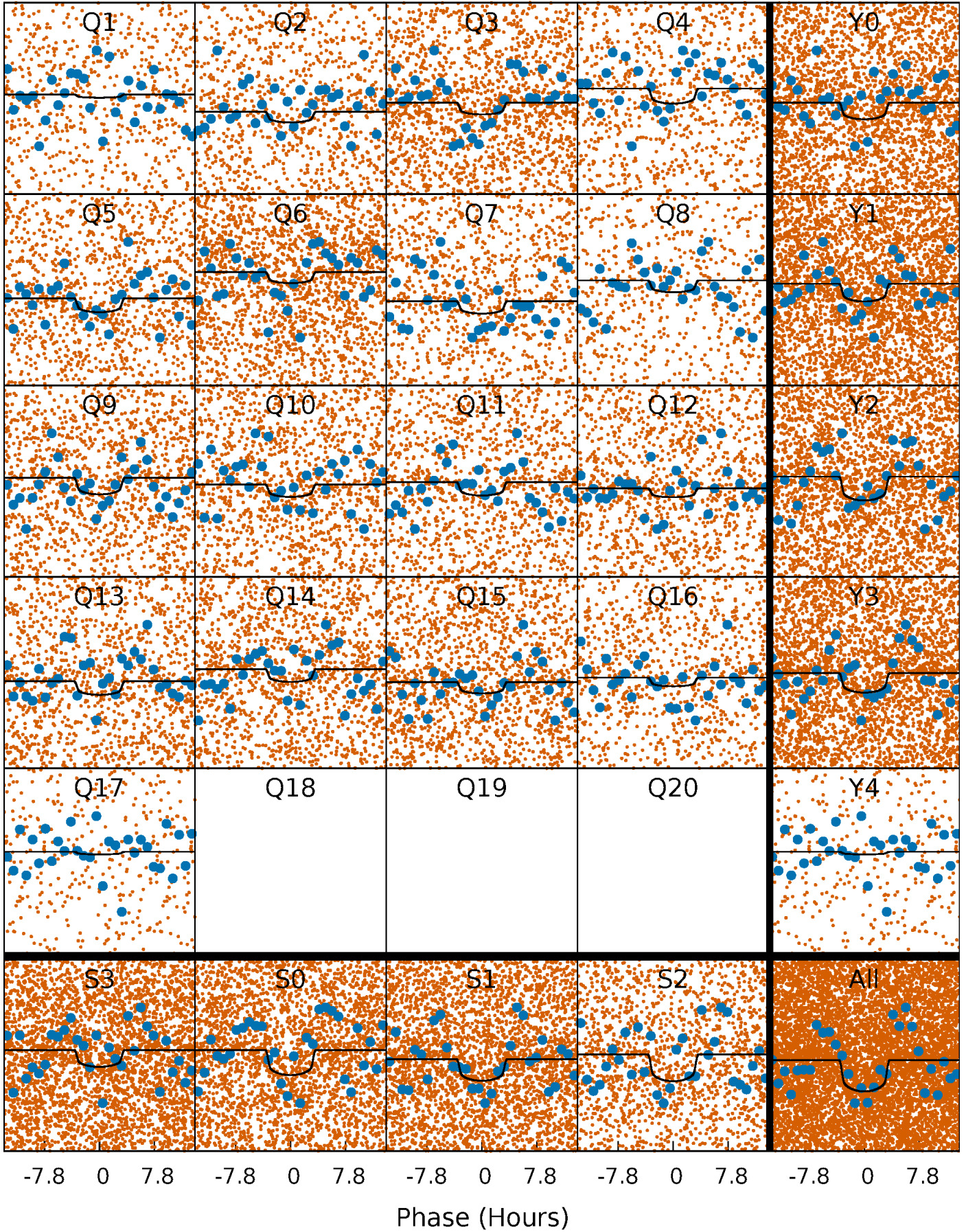
PDC Quarter-Phased Transit Curves

TCE 008442040-02 P= 0.869781 Days $T_0=132.249166$ (BKJD)



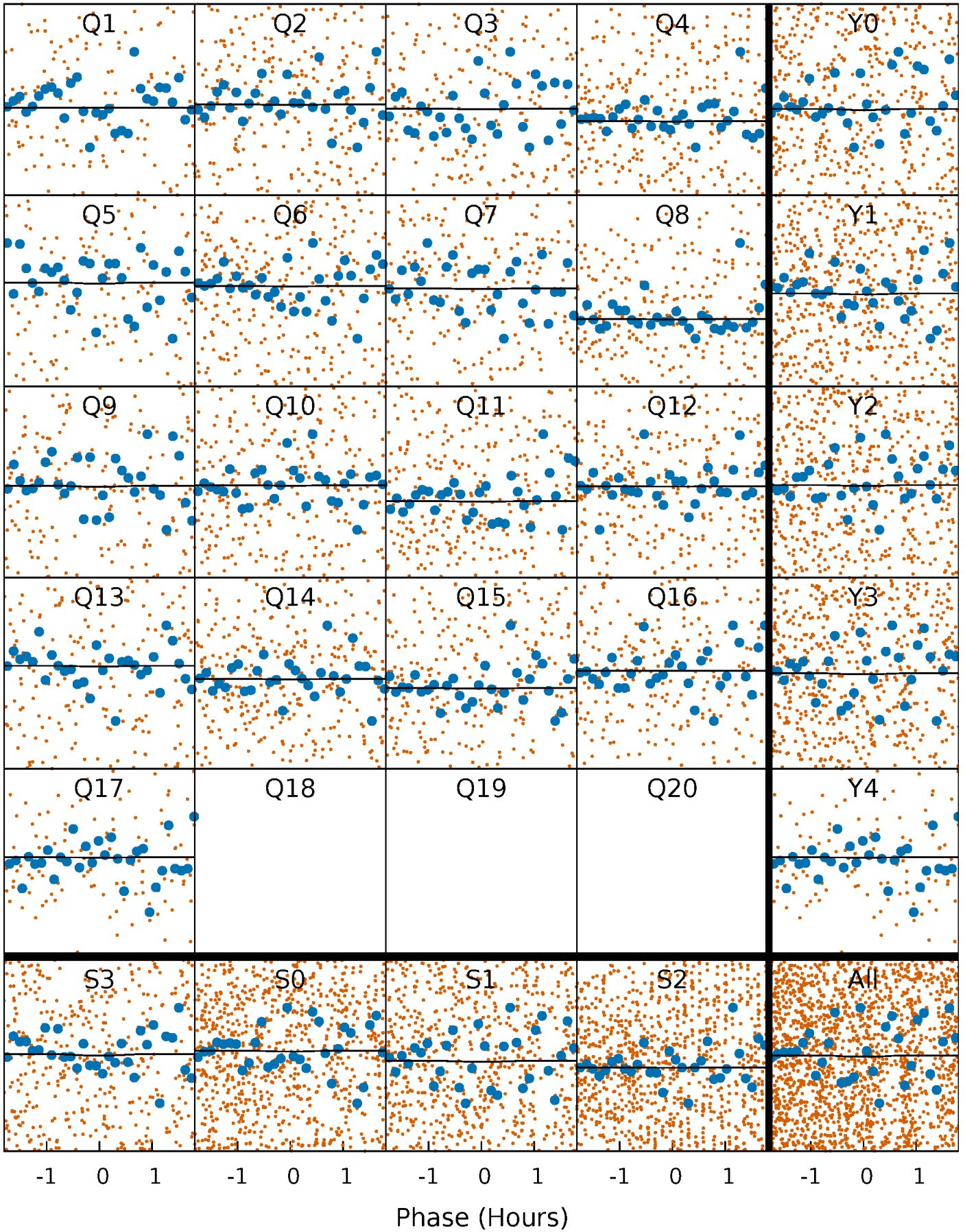
DV Quarter-Phased Transit Curves

TCE 008442040-02 P= 0.869781 Days $T_0=132.249166$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

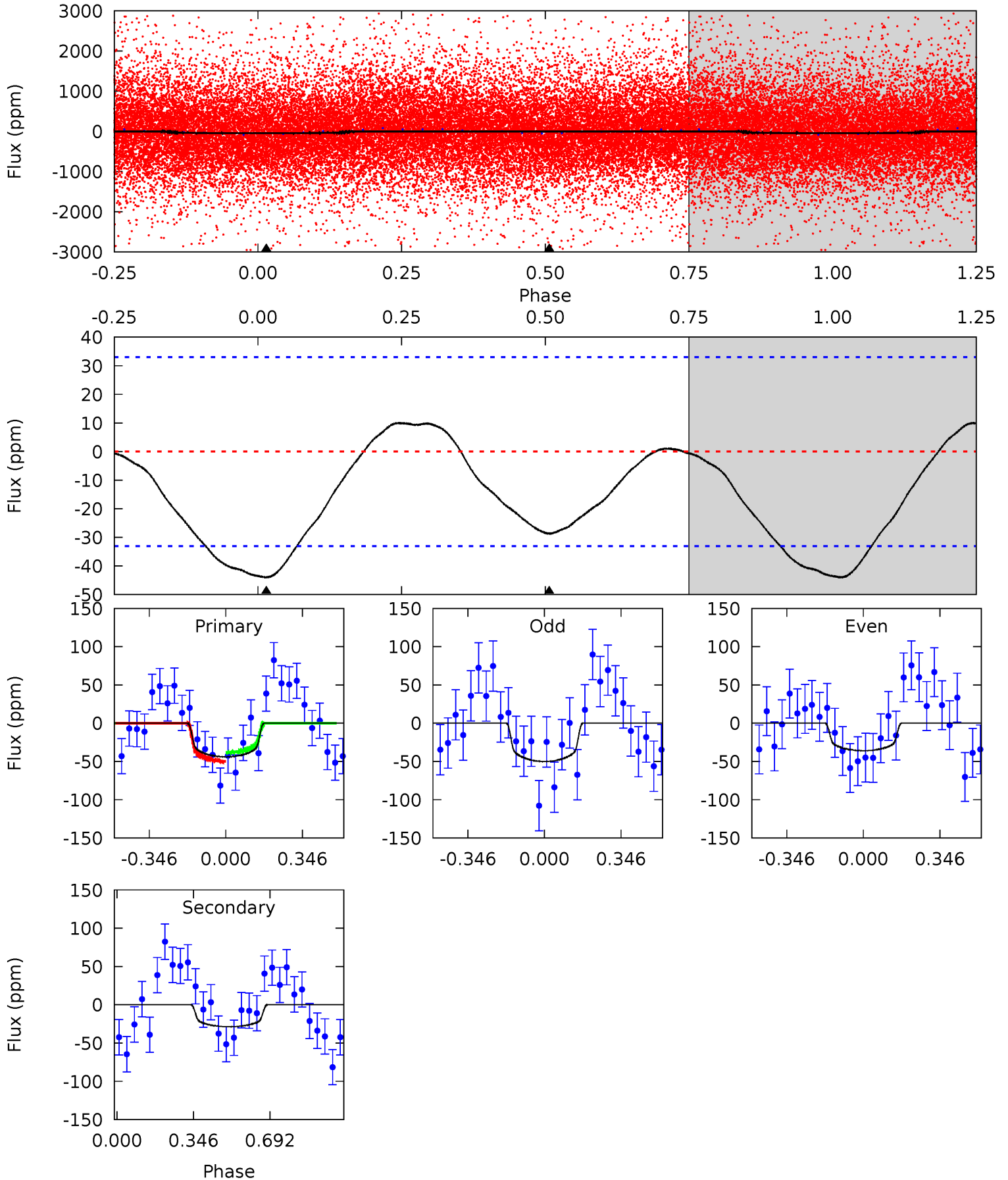
TCE 008442040-02 P= 0.869874 Days $T_0=132.262222$ (BKJD)



DV Model-Shift Uniqueness Test

008442040-02, P = 0.869781 Days, E = 131.379385 Days

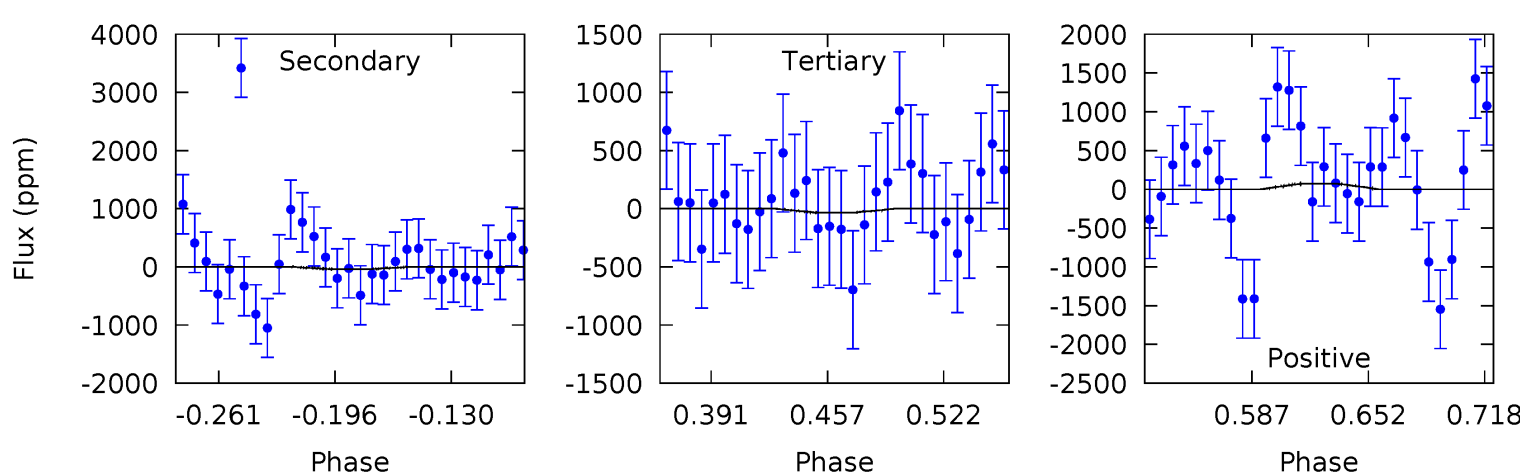
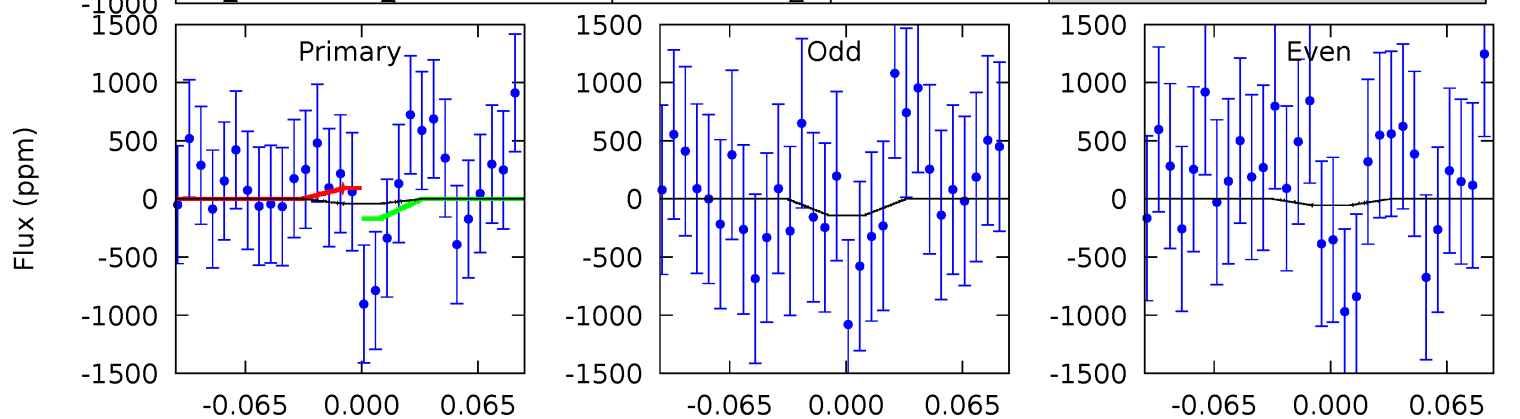
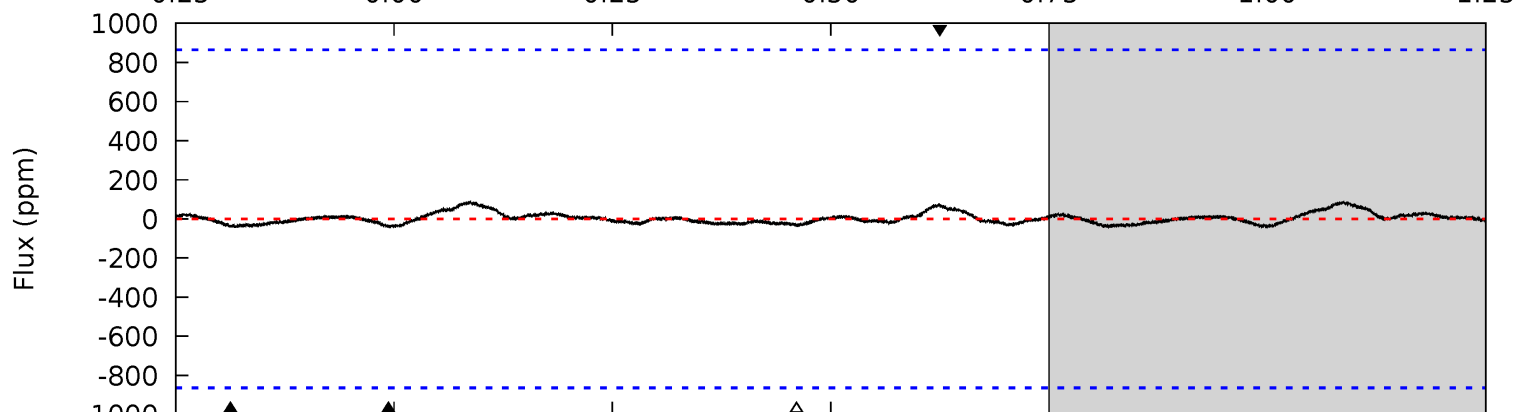
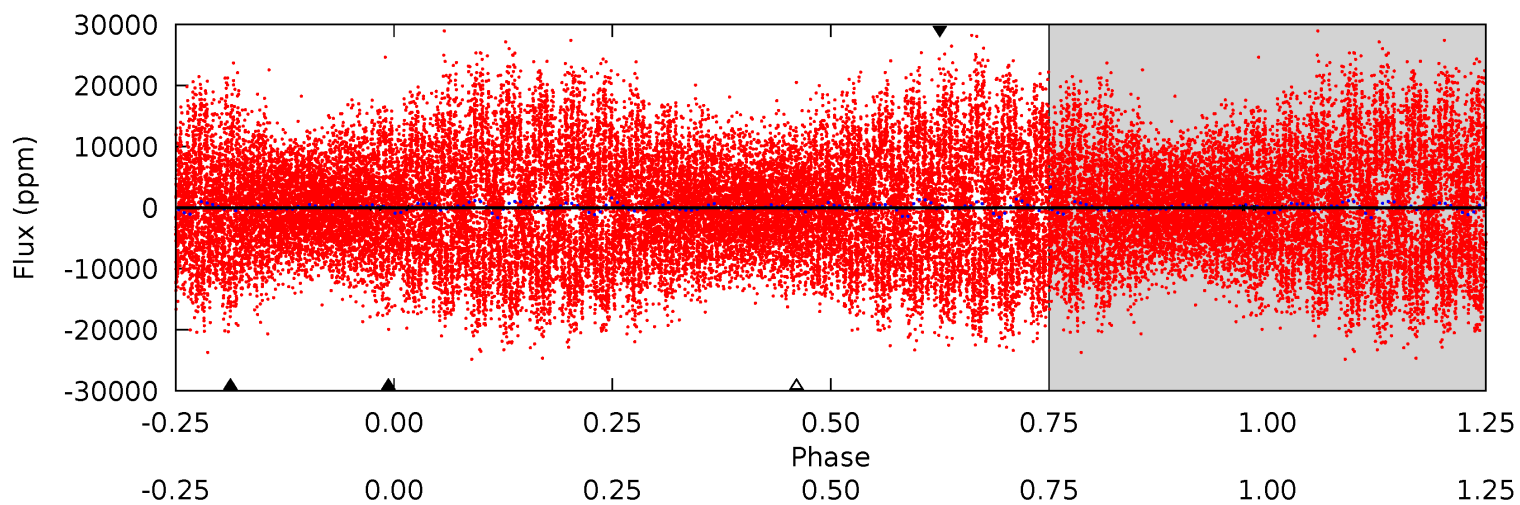
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 5.72 | 3.73 | 0 | 0 | 4.30 | 0.94 | 0.74 | 5.72 | 5.72 | 3.73 | 3.73 | 0.93 | 1.10 | 0.18 | 0.81 |



Alt Model-Shift Uniqueness Test

008442040-02, P = 0.869874 Days, E = 131.392348 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 0.22 | 0.22 | 0.18 | 0.40 | 4.65 | 1.84 | 0.14 | 0.04 | -0.17 | 0.03 | -0.18 | 0.24 | 0.47 | 0.67 | 0.23 |



Stellar Parameters For KIC 008442040

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6507^{+146}_{-194} | $4.190^{+0.158}_{-0.193}$ | $-0.080^{+0.250}_{-0.300}$ | $1.492^{+0.442}_{-0.322}$ | $1.259^{+0.181}_{-0.201}$ | $0.534^{+0.442}_{-0.279}$ |
| | +2%/-3% | +4%/-5% | +312%/-375% | +30%/-22% | +14%/-16% | +83%/-52% |
| 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 008442040-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|-------------------------|-----------------------------|
| DV | -29±8 | $1.28^{+0.93}_{-0.75}$ | 3527^{+271}_{-216} | 5266^{+3200}_{-1194} | $3.396^{+15.569}_{-2.251}$ |
| Alt. | -40±186 | $1.11^{+0.92}_{-0.62}$ | 3540^{+256}_{-242} | 5356^{+8526}_{-15337} | $3.666^{+62.776}_{-32.943}$ |

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 $A_{obs} \gg 1.0$

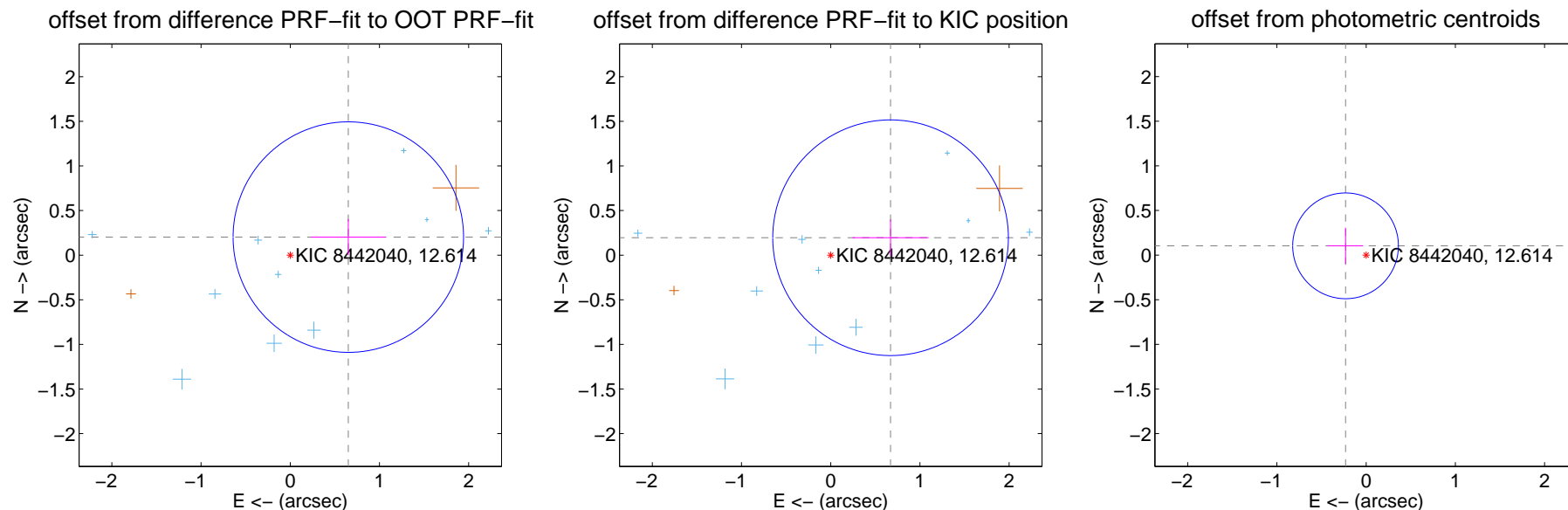
DV Centroid Data

Supplemental centroid analysis for 008442040-02. Kepler magnitude: 12.61. Transit SNR 6.92

There are 10 quarters with good PRF difference image offsets

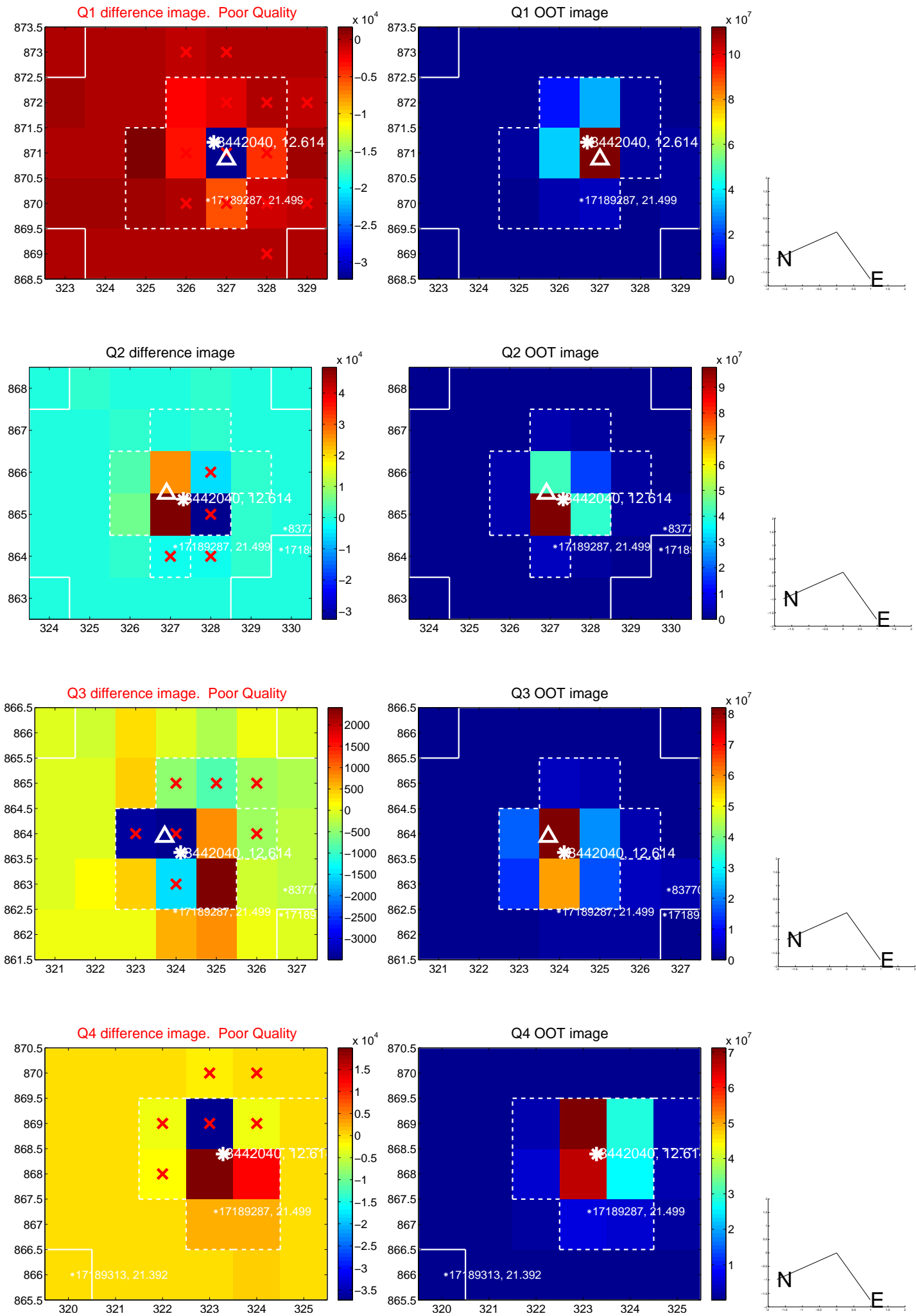
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 0.682 ± 0.431 | 1.58 | -0.651 ± 0.418 | 0.202 ± 0.201 |
| PRF-fit source offset from KIC position | 0.699 ± 0.440 | 1.59 | -0.671 ± 0.426 | 0.195 ± 0.206 |
| photometric centroid source offset | 0.25 ± 0.20 | 1.28 | 0.23 ± 0.20 | 0.10 ± 0.20 |

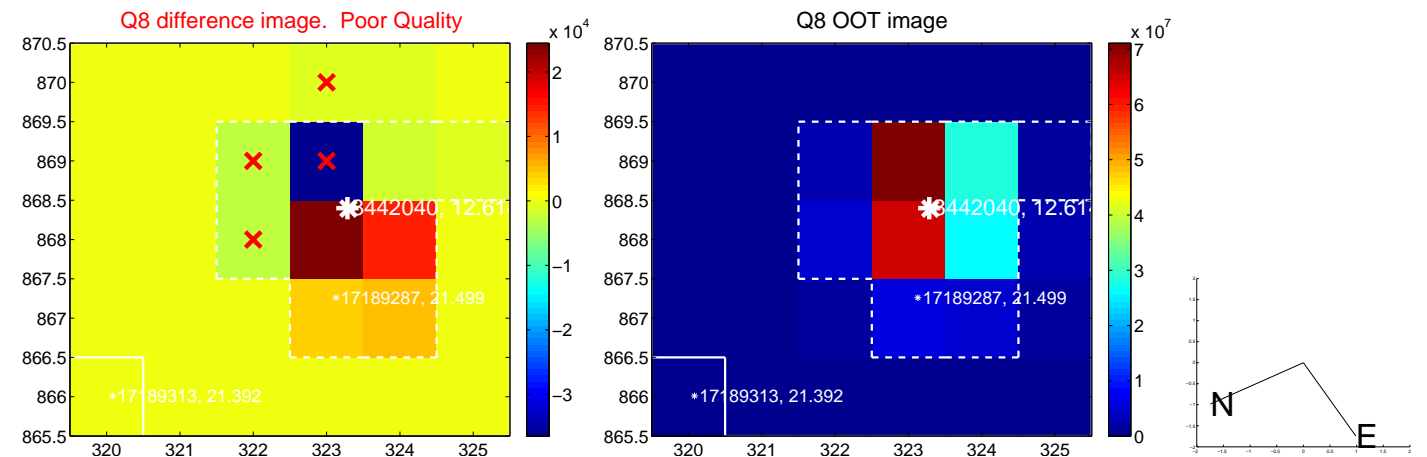
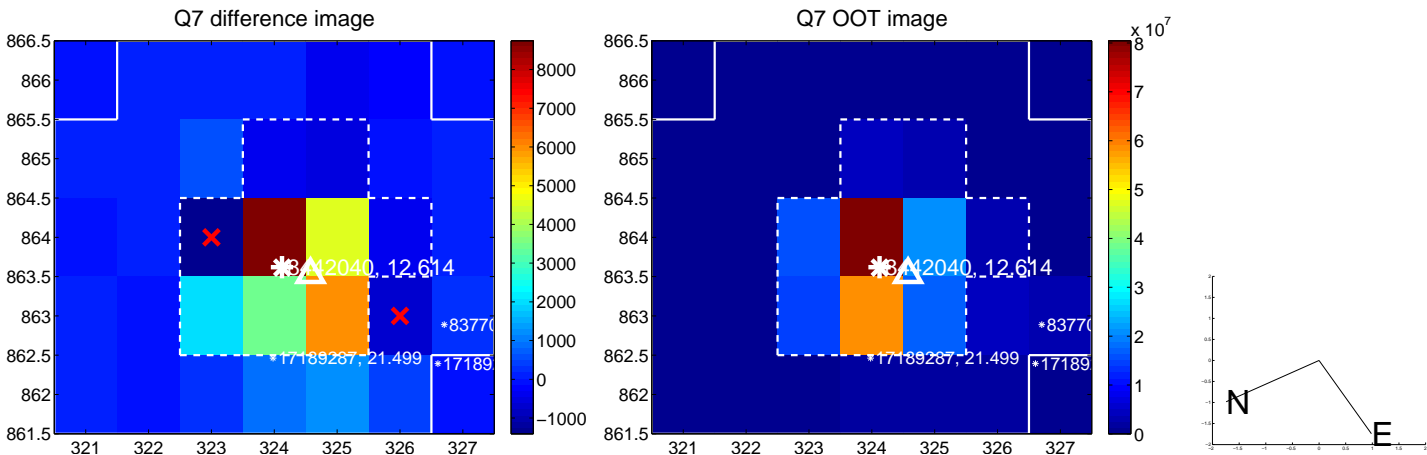
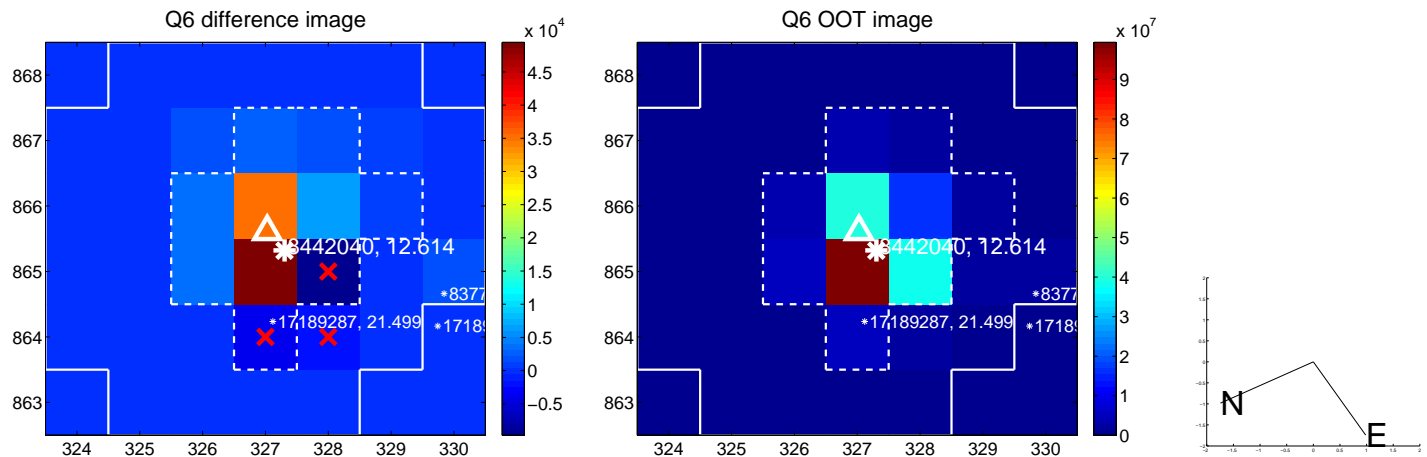
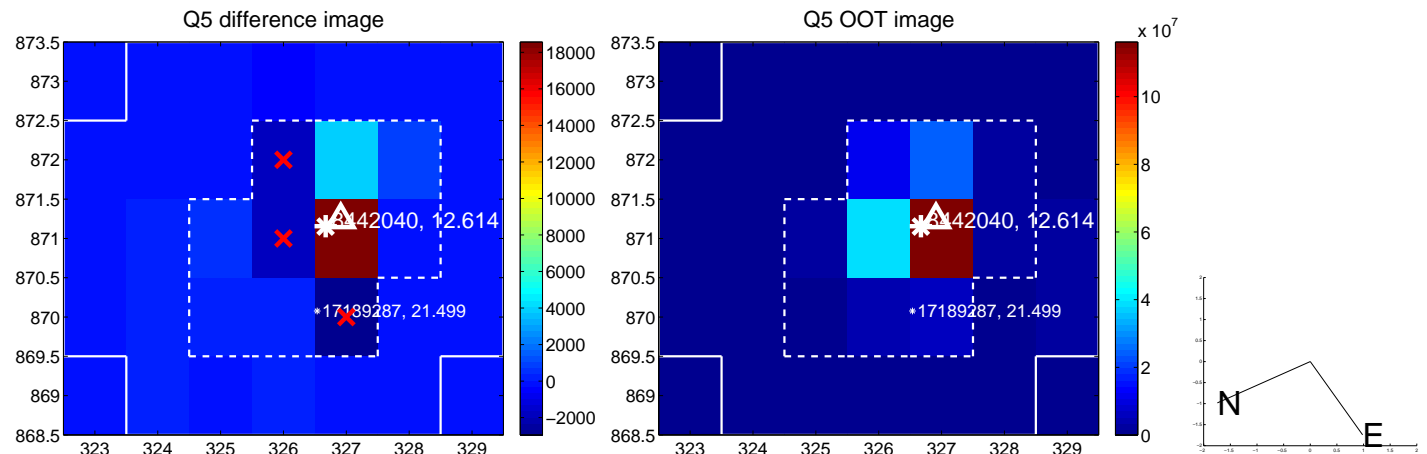


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

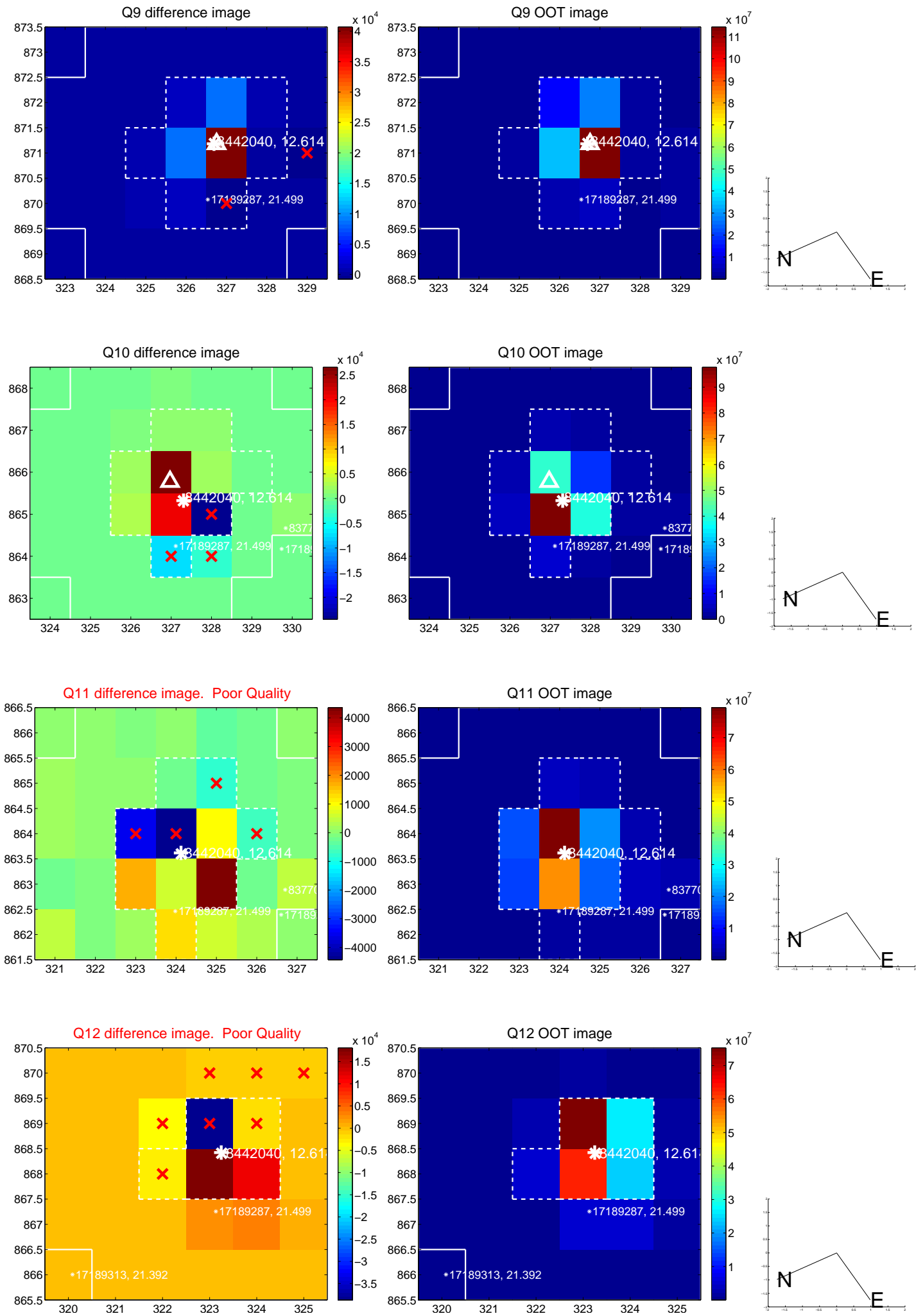
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



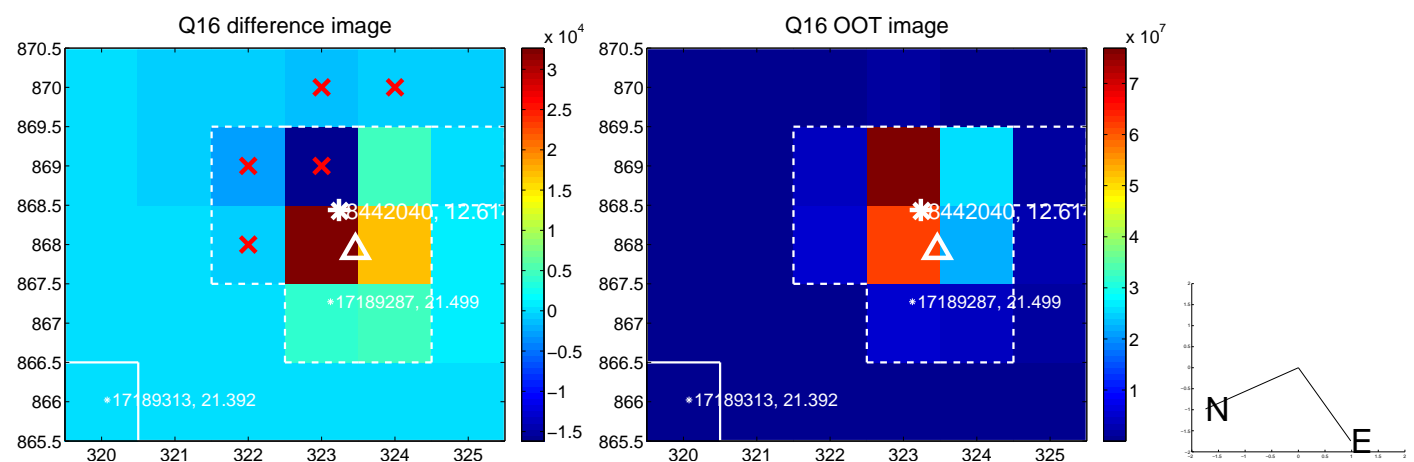
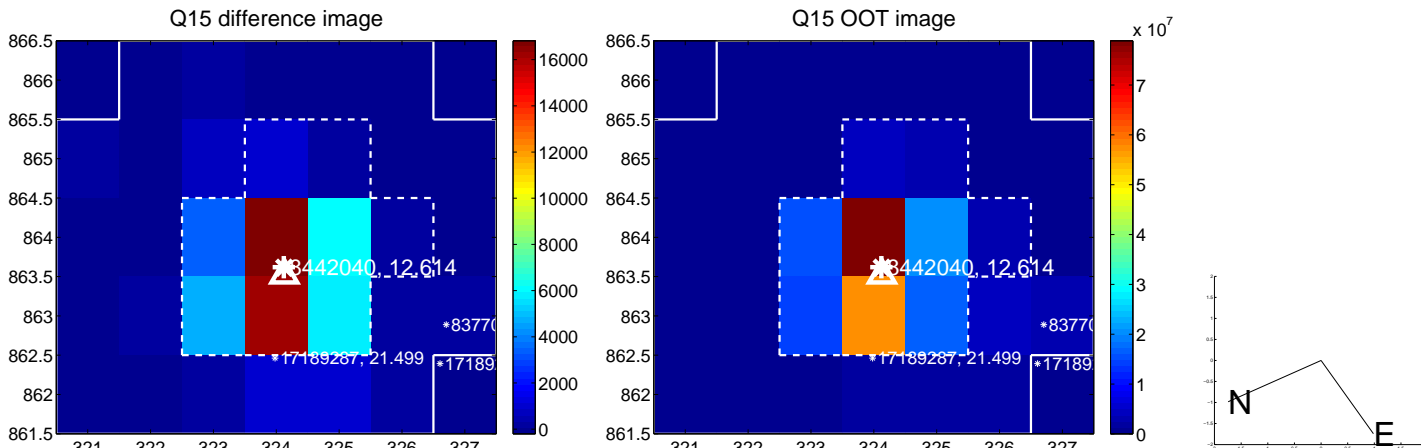
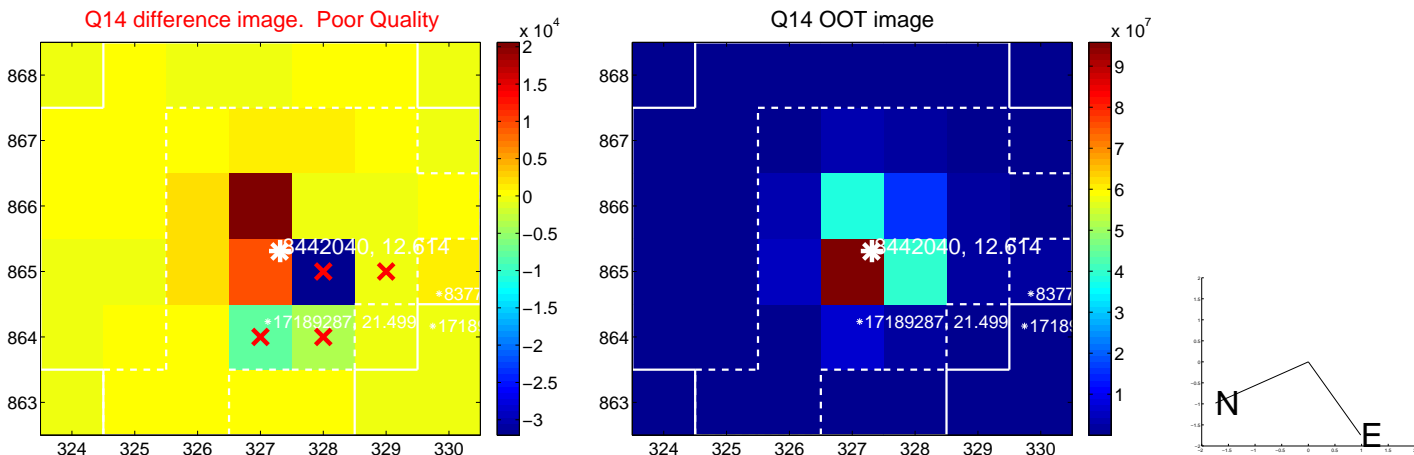
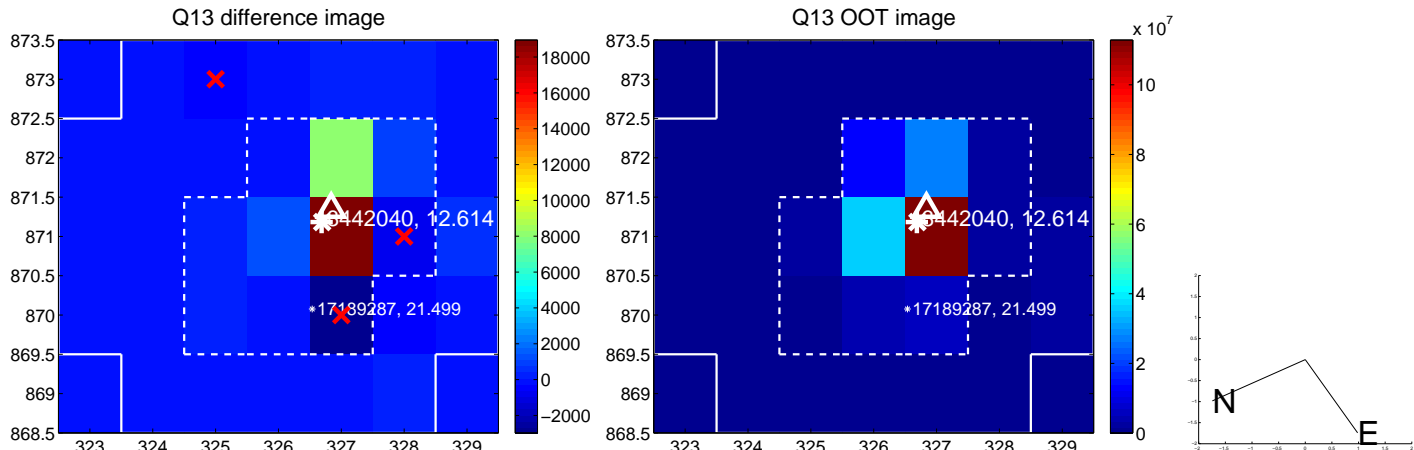
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



UKIRT Image

Declination

