

KIC 008360640

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008360640-01 | OBS | 2982.01 | 4.022291 | 135.176009 | 202.8 | 1.062 | 14.1 | 17.5 | 0.83 | 5516 | 1.42 | 253.38 |
| 008360640-02 | OBS | No | 416.855287 | 497.387863 | 510.6 | 6.301 | 9.5 | 5.6 | 0.83 | 5516 | 2.10 | 0.52 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008360640-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 008360640-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS |

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

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

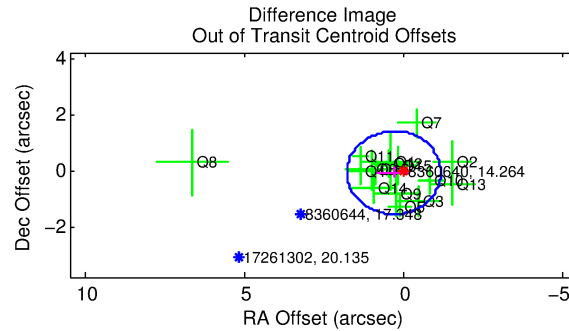
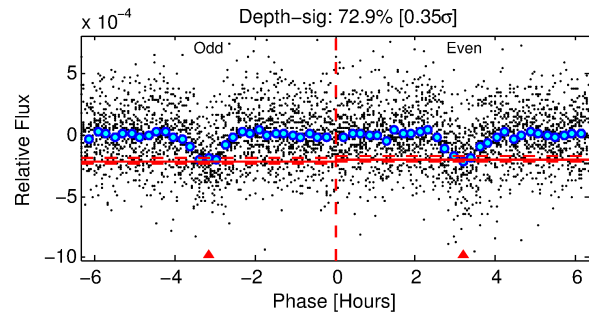
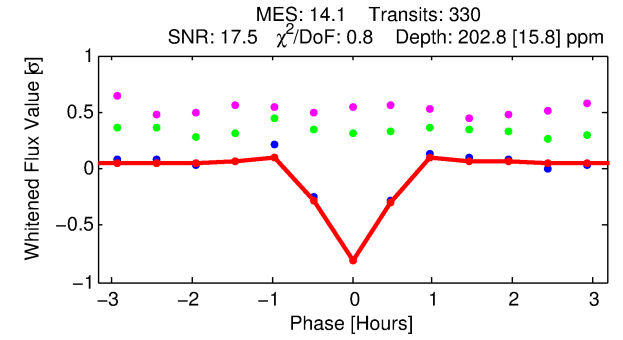
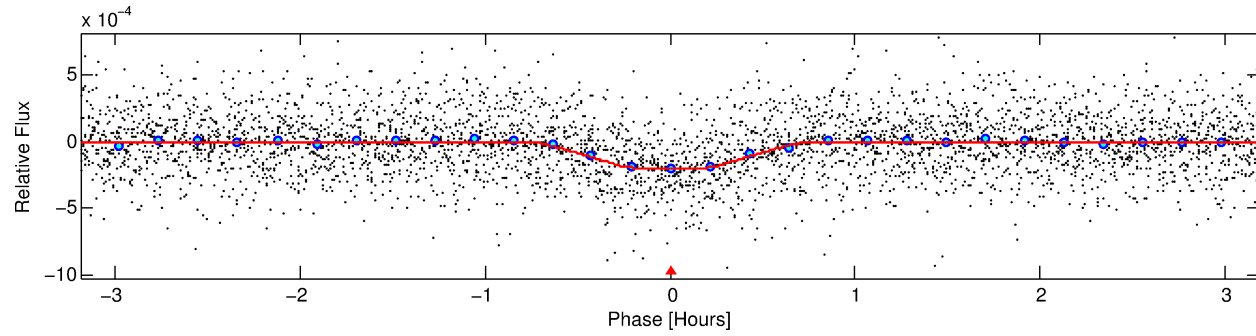
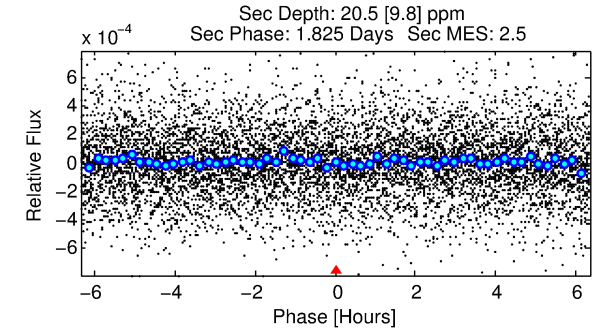
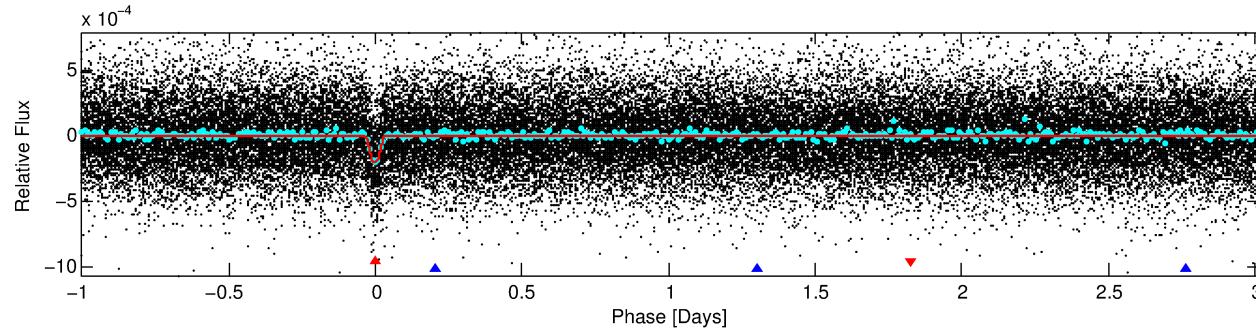
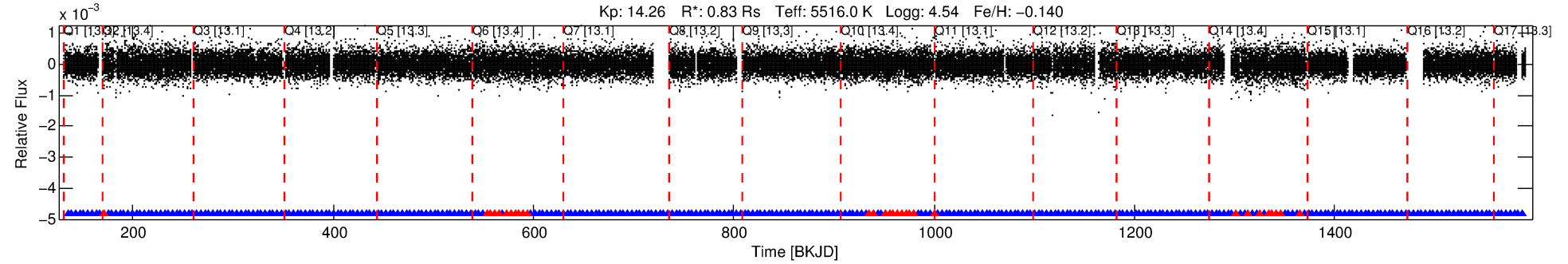
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008360640-01

No Significant Match Found

DV One-Page Summary

KIC: 8360640 Candidate: 1 of 2 Period: 4.022 d
KOI: K02982.01 Corr: 0.900



DV Fit Results:

Period = 4.02229 [0.00001] d
Epoch = 135.1760 [0.0012] BKJD
Rp/R* = 0.0157 [0.0066]
a/R* = 13.64 [25.79]
b = 0.90 [0.41]
Seff = 253.37 [72.81]
Teq = 1017 [73] K
Rp = 1.42 [0.68] Re
a = 0.0473 [0.0088] AU
Ag = 12.52 [12.58] [0.92σ]
Teffp = 2959 [721] K [2.68σ]

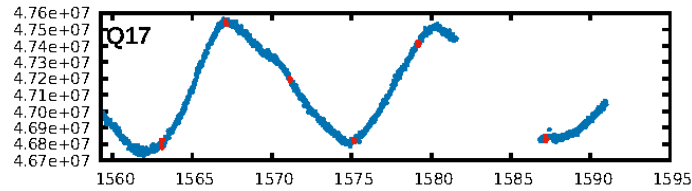
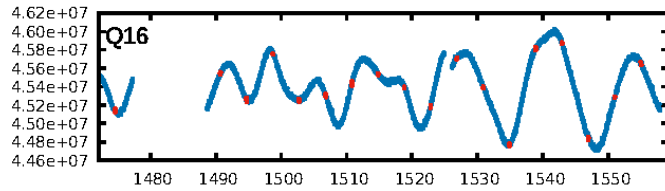
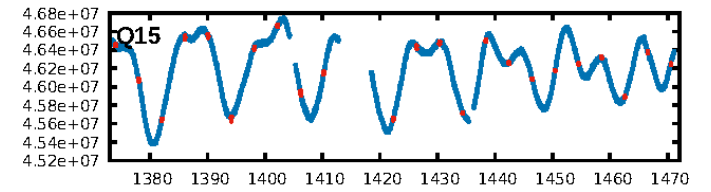
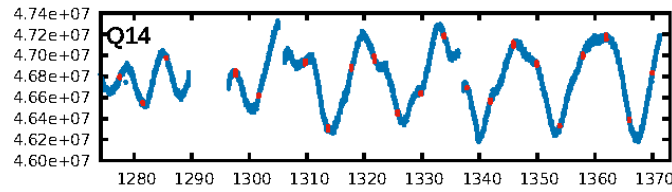
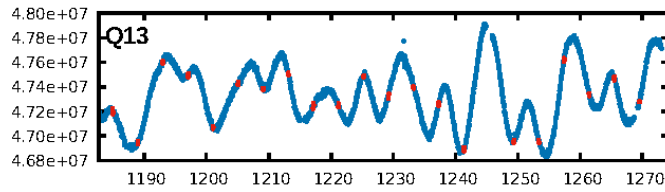
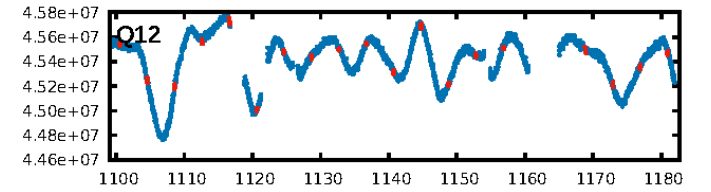
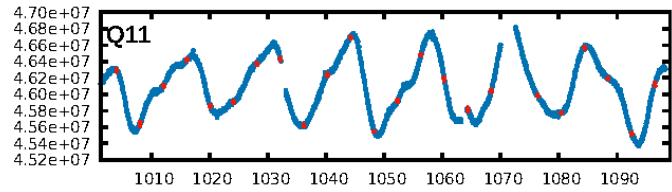
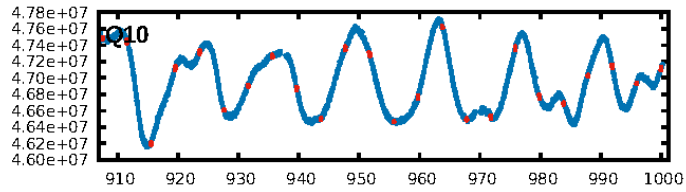
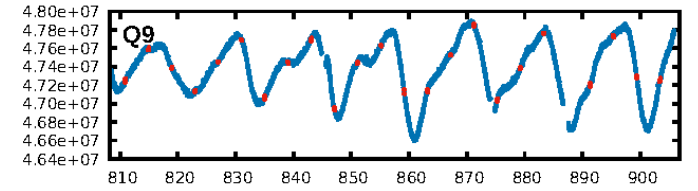
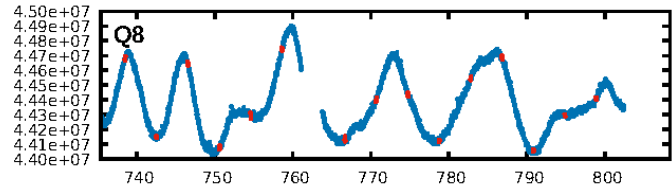
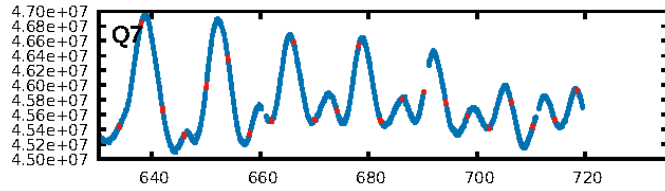
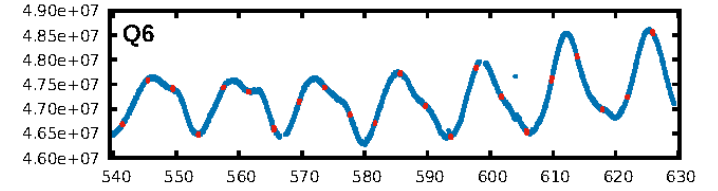
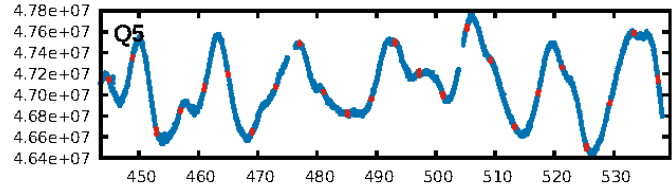
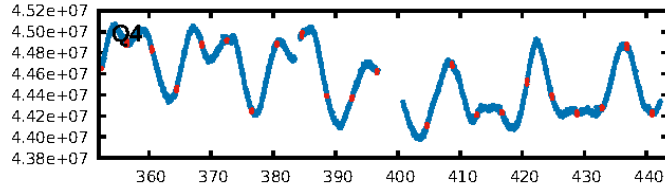
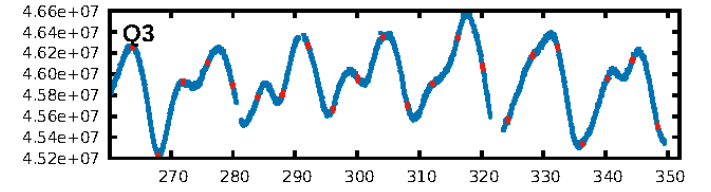
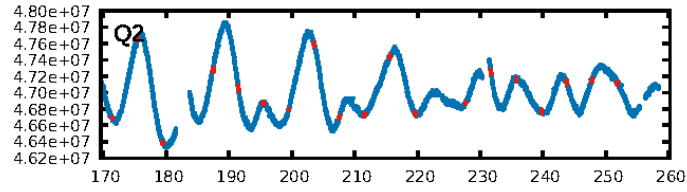
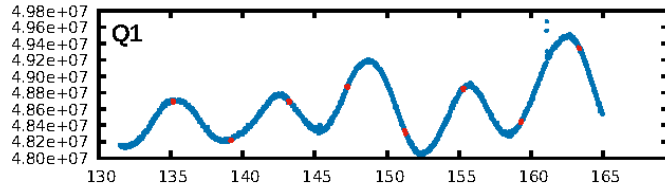
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [1550.48σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 2.00e-43
RollingBand-fgt: 0.91 [286/316]
GhostDiagnostic-chr: 1.877
Centroid-sig: 5.3%
Centroid-so: 1.054 arcsec [1.54σ]
OotOffset-rm: 0.315 arcsec [0.64σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-rm: 0.347 arcsec [1.06σ]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 0.94 [15/16]
DiffImageOverlap-fno: 1.00 [17/17]

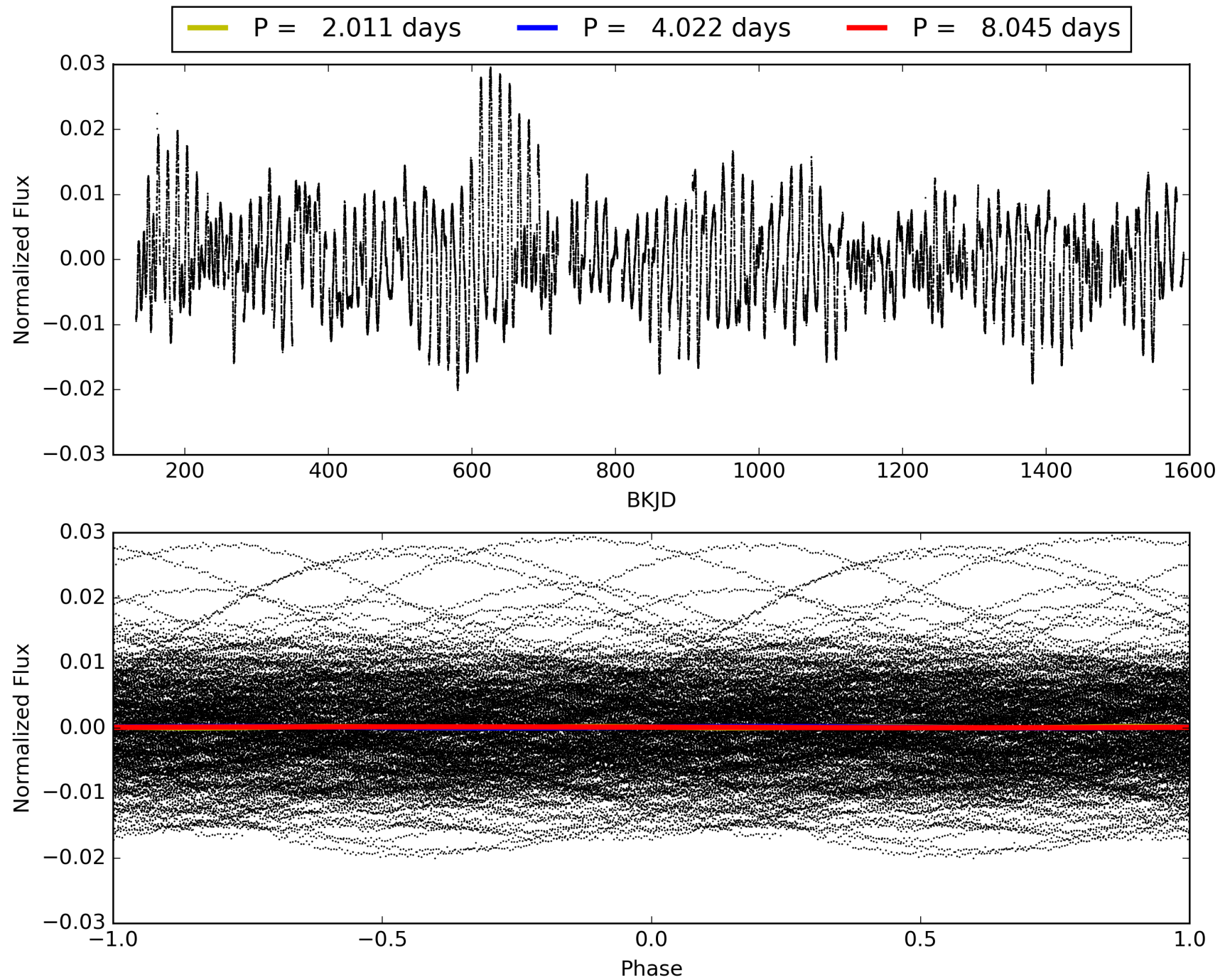
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 20:45:31 Z

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

TCE 008360640-01, PDC Light Curves

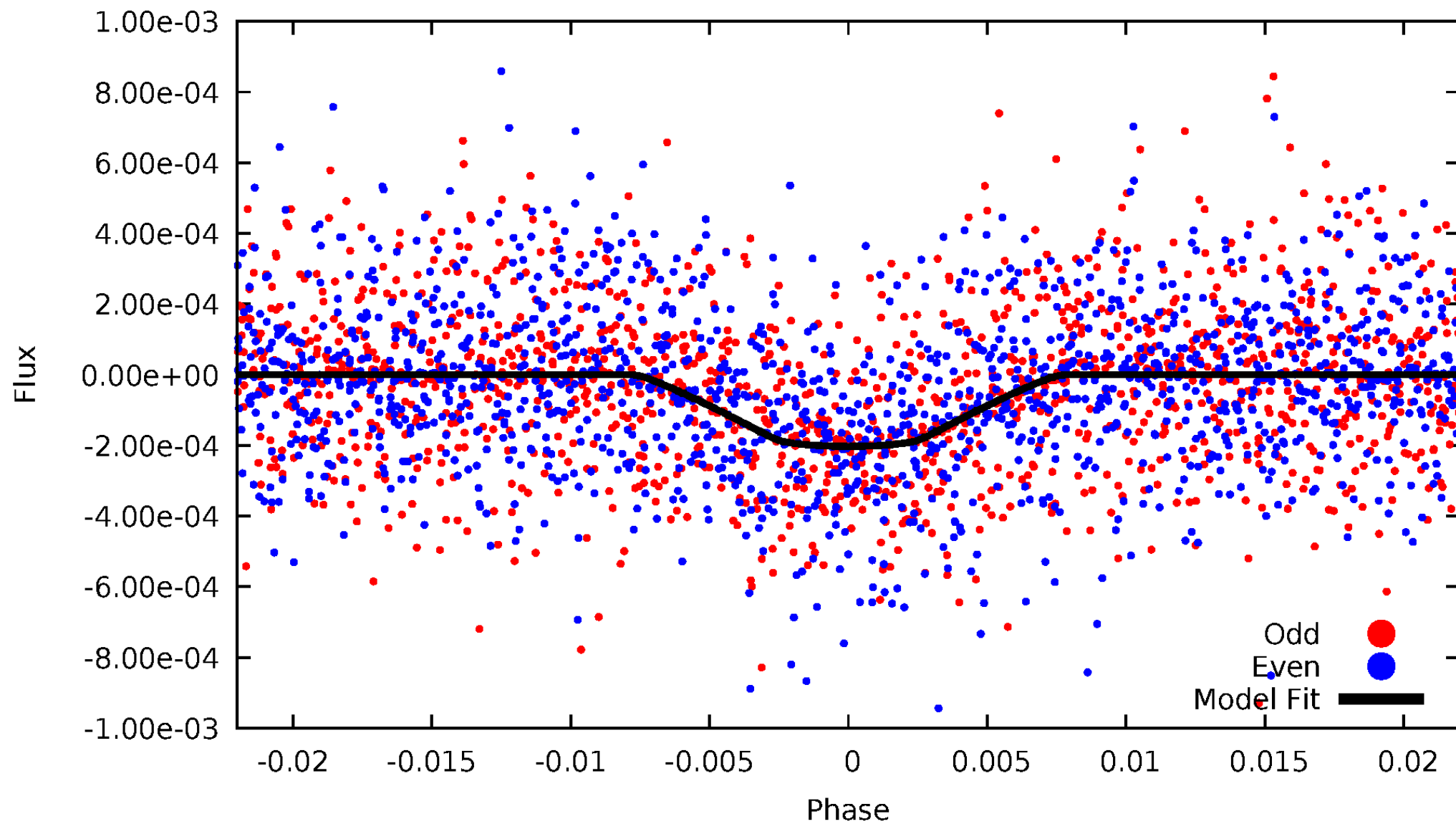


TCE 008360640-01



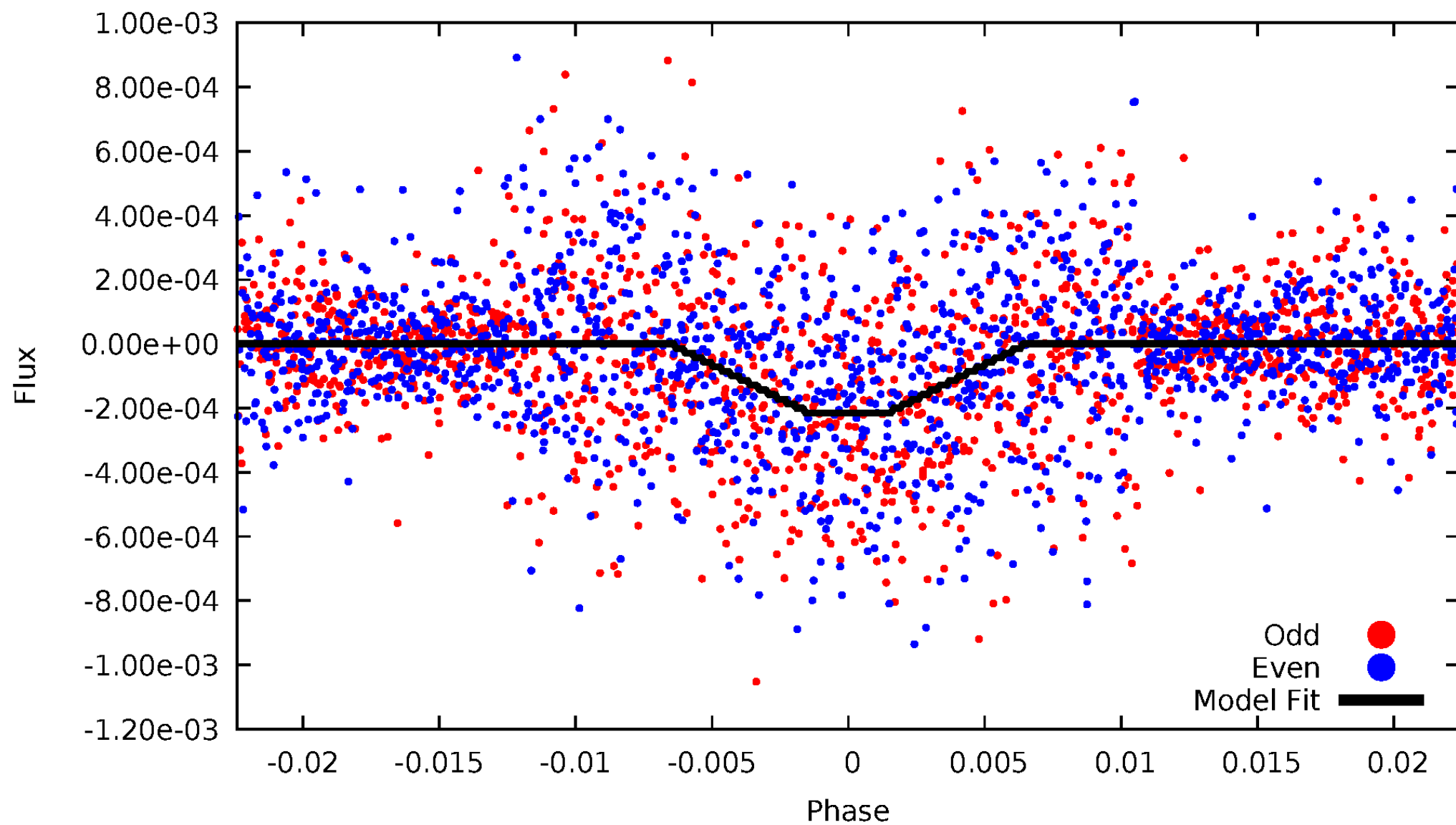
DV Odd/Even

TCE 008360640-01



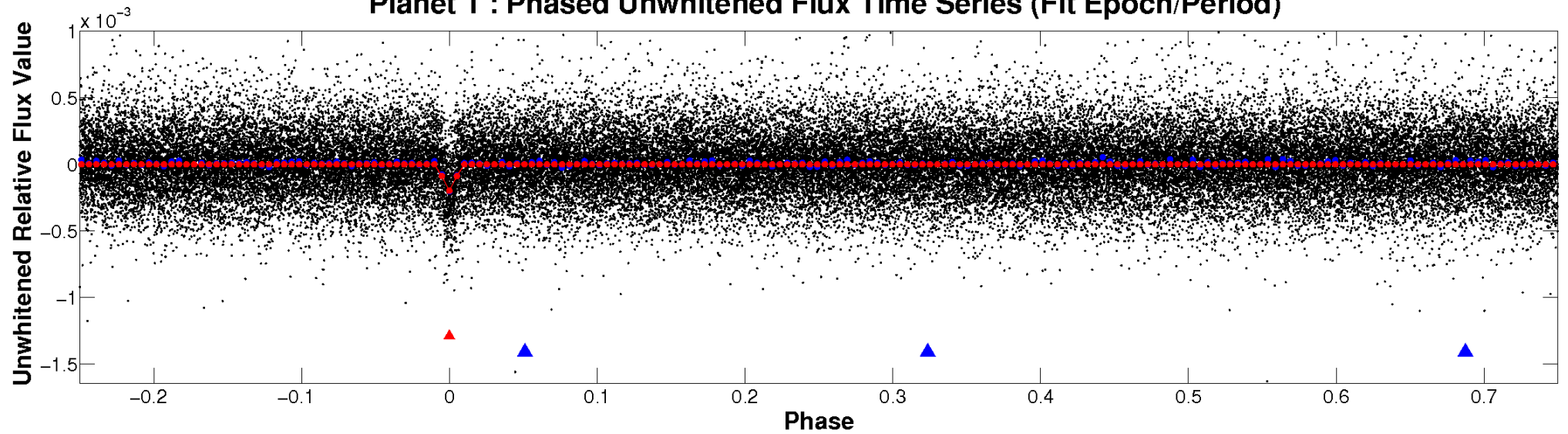
ALT Odd/Even

TCE 008360640-01

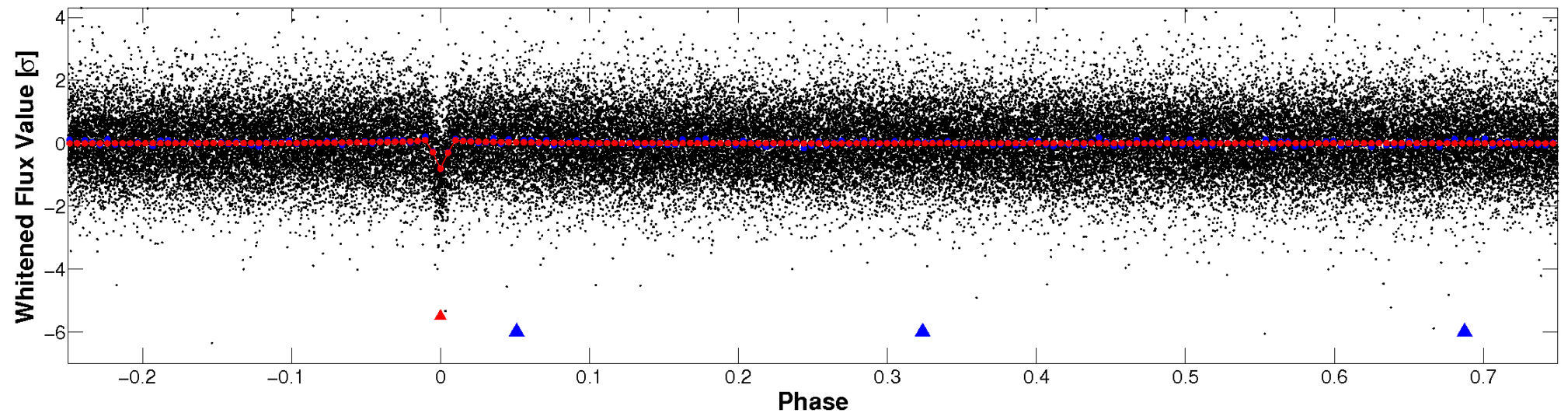


Non-Whitened Vs. Whitened Light Curve

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

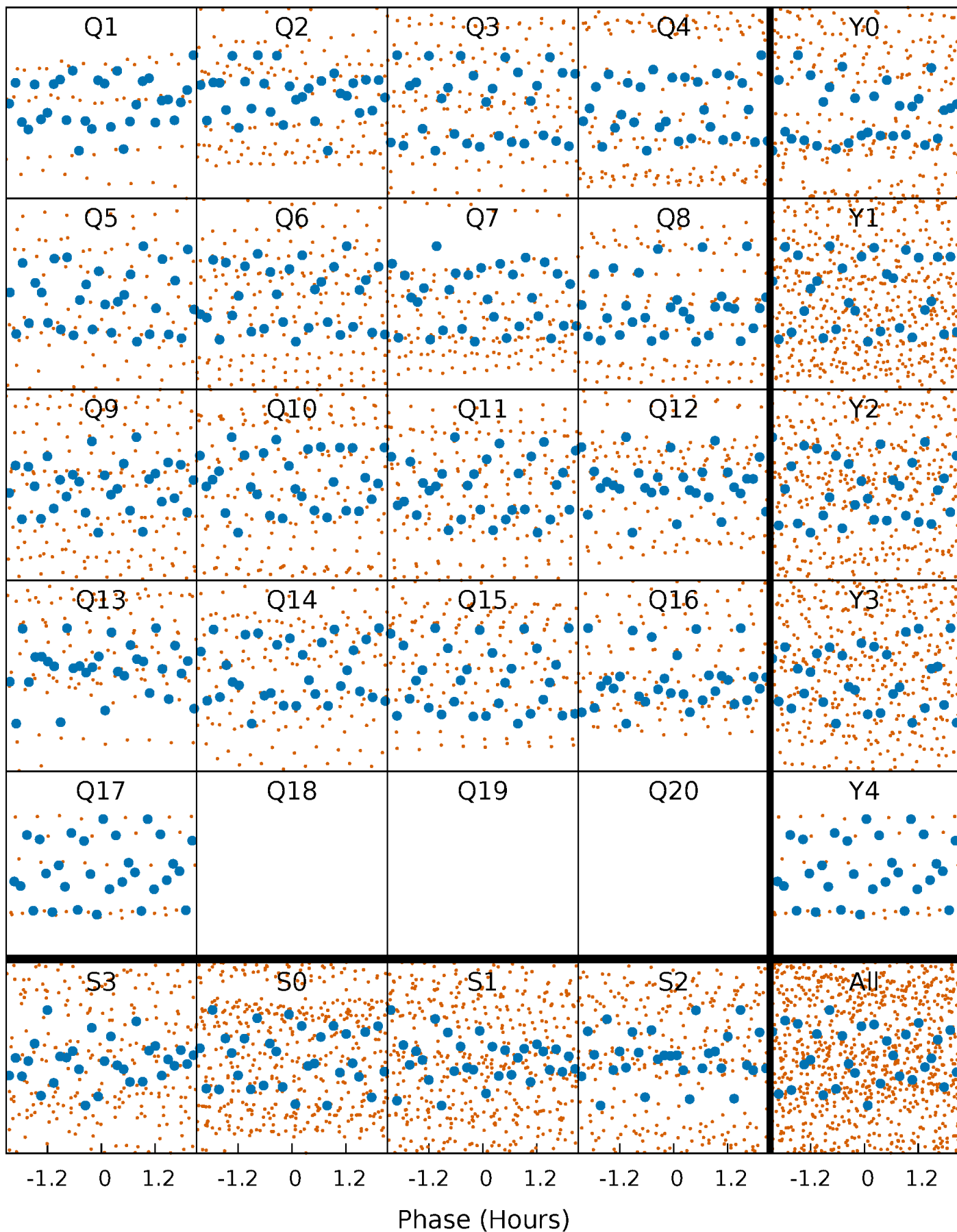


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



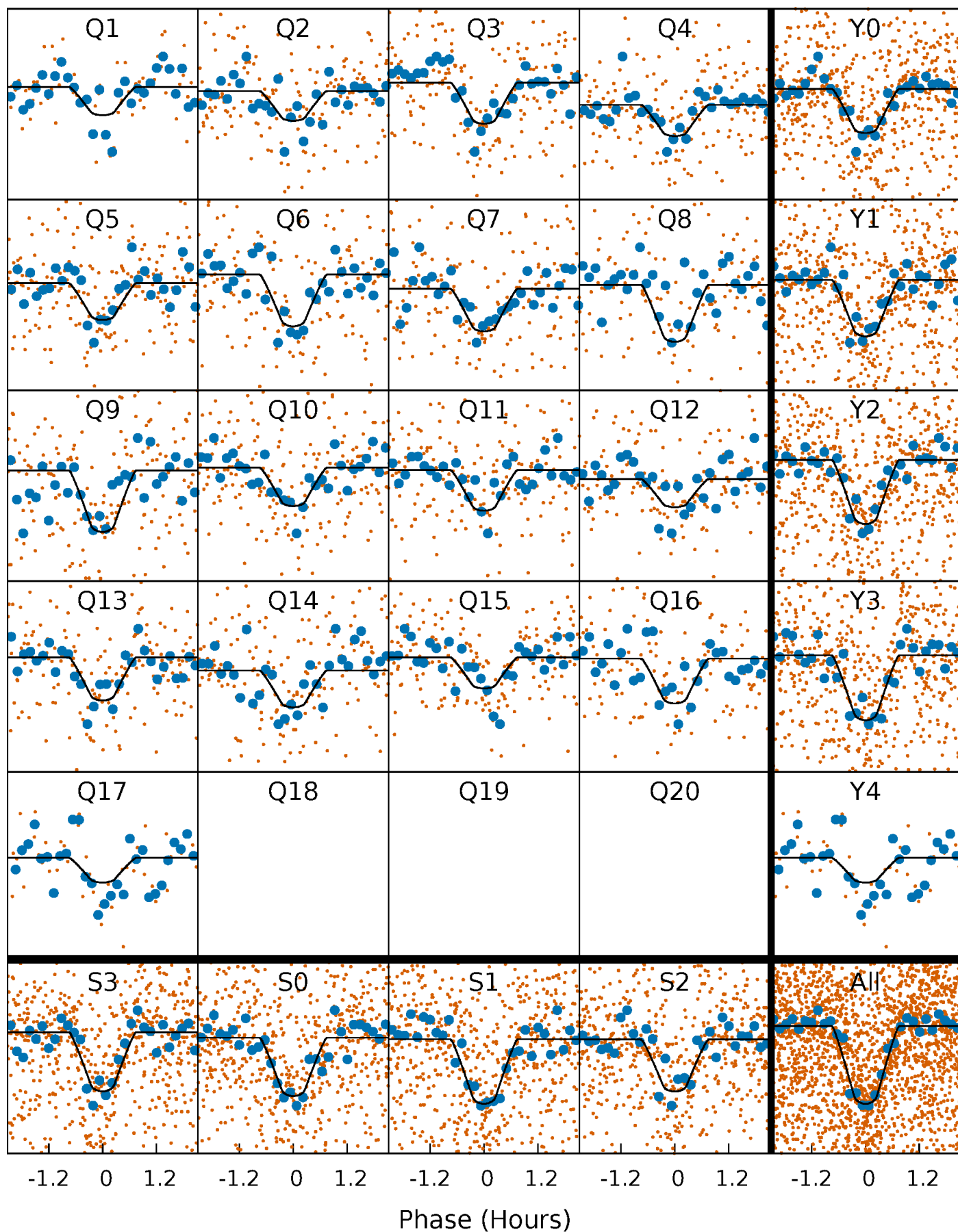
PDC Quarter-Phased Transit Curves

TCE 008360640-01 P= 4.022291 Days $T_0=135.176009$ (BKJD)



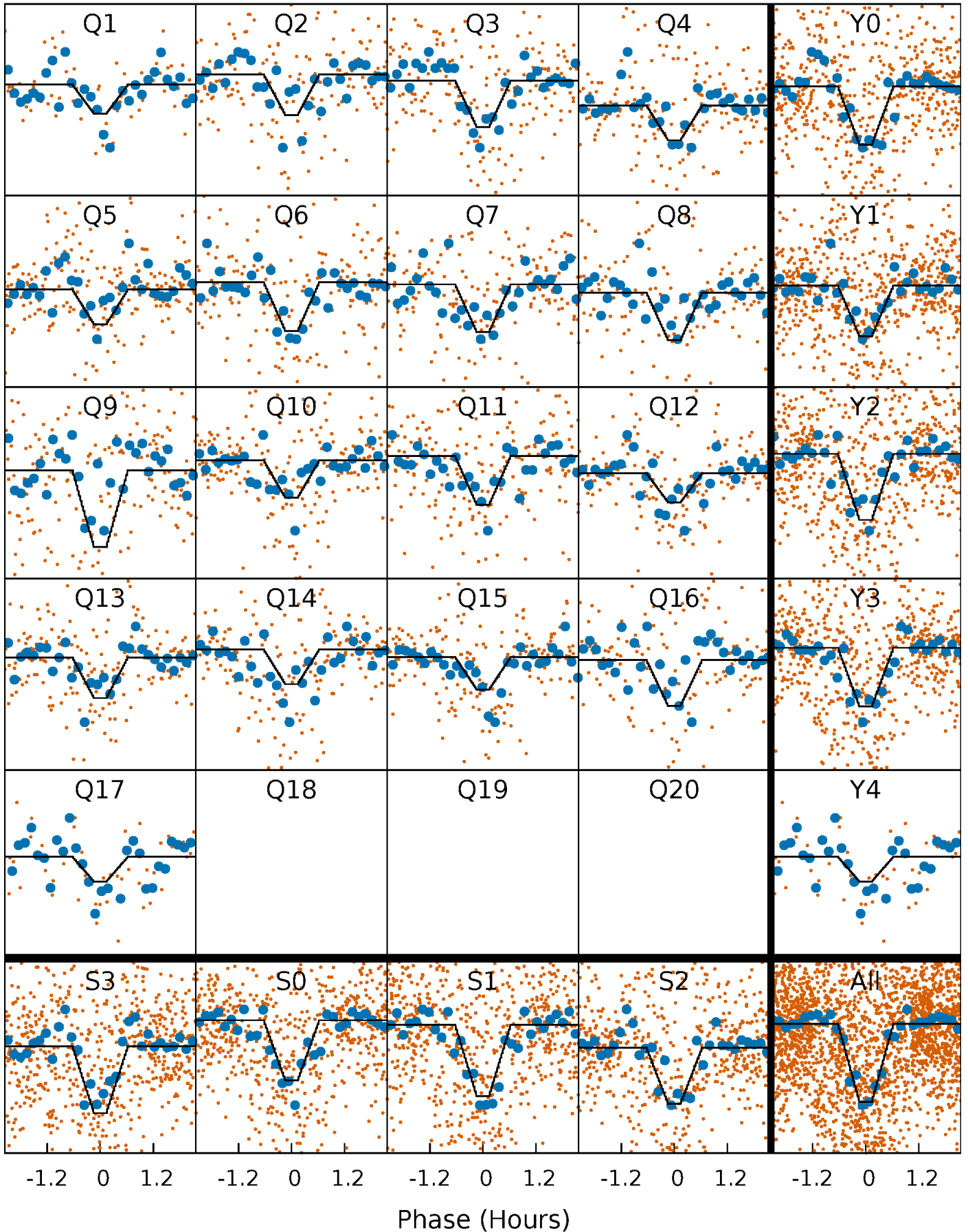
DV Quarter-Phased Transit Curves

TCE 008360640-01 P= 4.022291 Days $T_0=135.176009$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

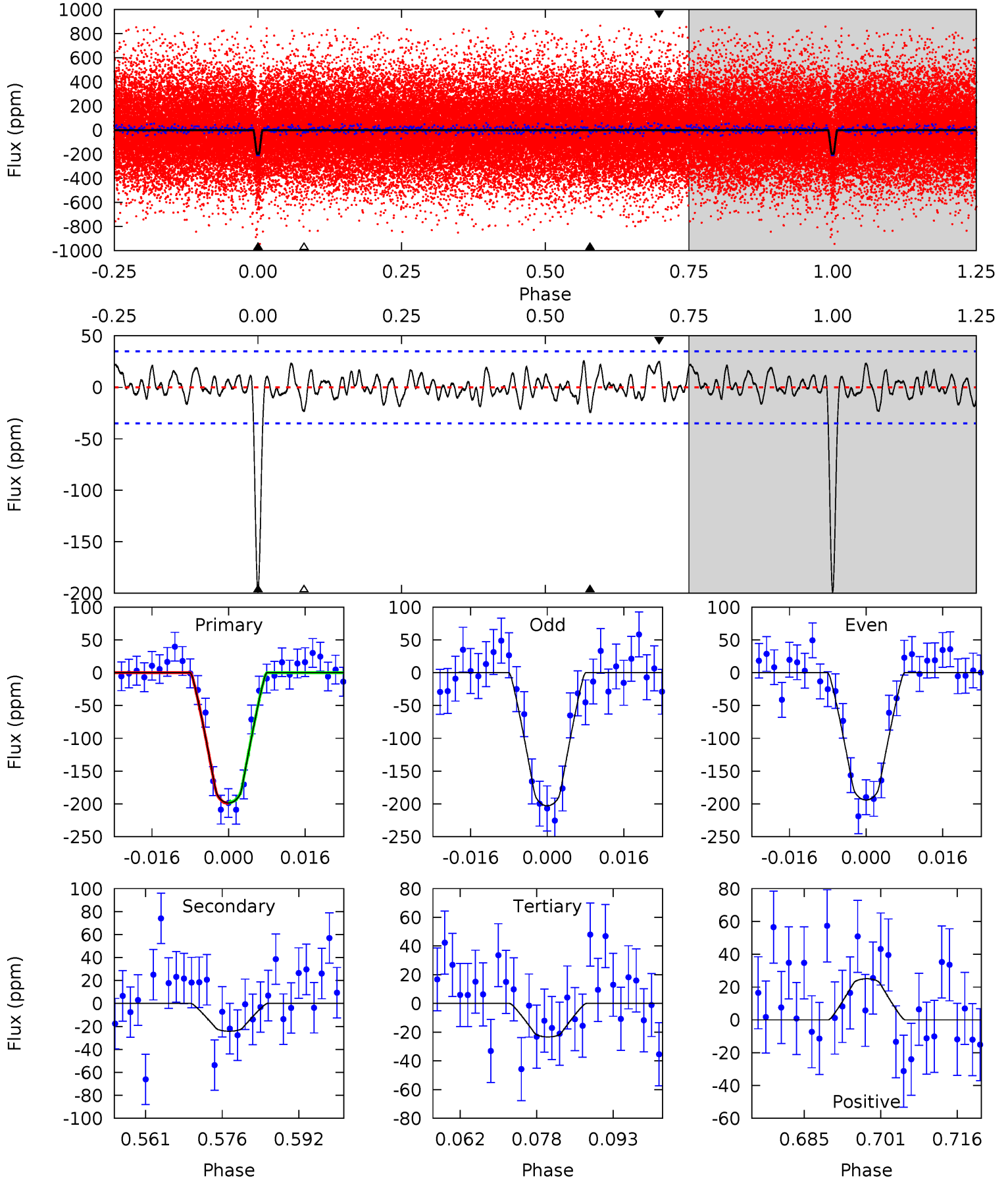
TCE 008360640-01 P= 4.022302 Days $T_0=135.174202$ (BKJD)



DV Model-Shift Uniqueness Test

008360640-01, P = 4.022291 Days, E = 131.153718 Days

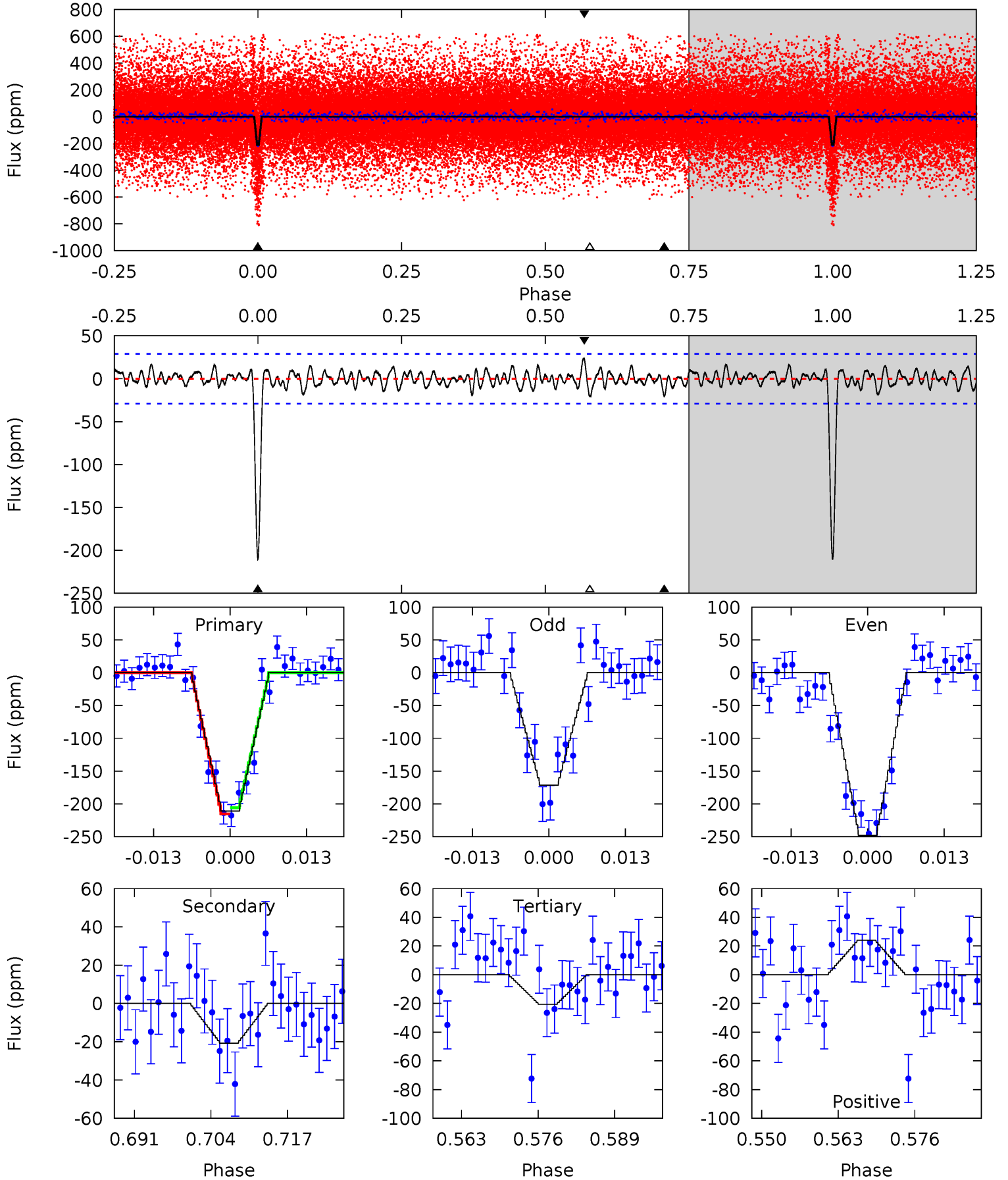
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 28.1 | 3.42 | 3.30 | 3.55 | 4.94 | 2.42 | 1.29 | 24.8 | 24.6 | 0.12 | -0.13 | 0.63 | 1.02 | 0.11 | 0.09 |



Alt Model-Shift Uniqueness Test

008360640-01, P = 4.022302 Days, E = 131.151900 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 36.2 | 3.56 | 3.55 | 4.12 | 4.98 | 2.49 | 1.21 | 32.7 | 32.1 | 0.02 | -0.56 | 6.59 | 0.98 | 0.10 | 0.78 |



Stellar Parameters For KIC 008360640

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5516^{+149}_{-149} | $4.544^{+0.048}_{-0.143}$ | $-0.140^{+0.300}_{-0.300}$ | $0.827^{+0.187}_{-0.080}$ | $0.873^{+0.092}_{-0.092}$ | $2.174^{+0.536}_{-0.873}$ |
| | +3%/-3% | +1%/-3% | +214%/-214% | +23%/-10% | +11%/-11% | +25%/-40% |
| 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 008360640-01 / KOI 2982.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|-------------|------------------------|--------------------|----------------------|-----------------|
| DV | -24 ± 7 | $1.50^{+0.61}_{-0.61}$ | 1443^{+74}_{-57} | 3488^{+713}_{-393} | 13^{+24}_{-7} |
| Alt. | -21 ± 6 | $1.34^{+0.67}_{-0.58}$ | 1437^{+78}_{-56} | 3524^{+788}_{-443} | 14^{+29}_{-8} |

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

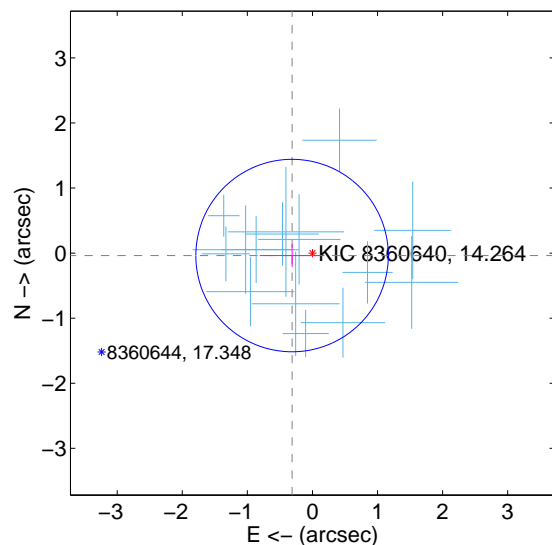
Supplemental centroid analysis for 008360640-01. Kepler magnitude: 14.26. Transit SNR 17.55

There are 15 quarters with good PRF difference image offsets

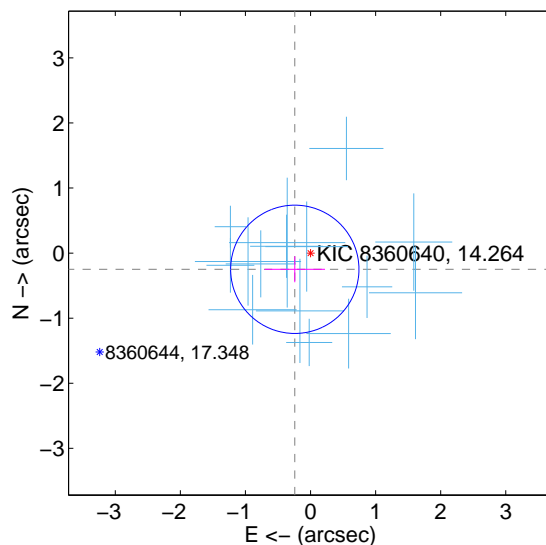
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 0.315 ± 0.493 | 0.64 | 0.313 ± 0.497 | -0.038 ± 0.175 |
| PRF-fit source offset from KIC position | 0.347 ± 0.329 | 1.06 | 0.242 ± 0.464 | -0.249 ± 0.199 |
| photometric centroid source offset | 1.05 ± 0.68 | 1.54 | 0.54 ± 0.72 | -0.90 ± 0.67 |

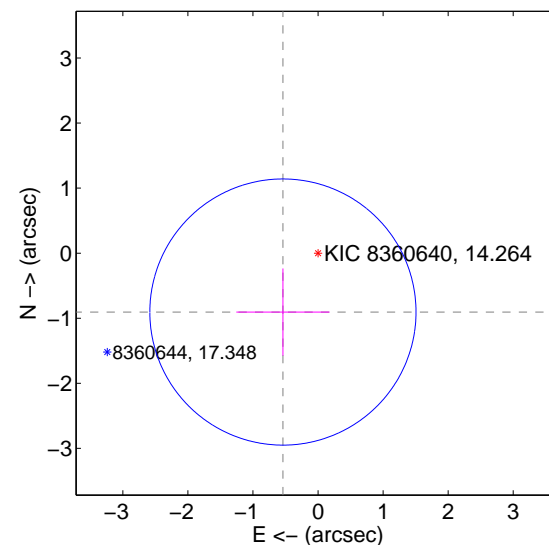
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

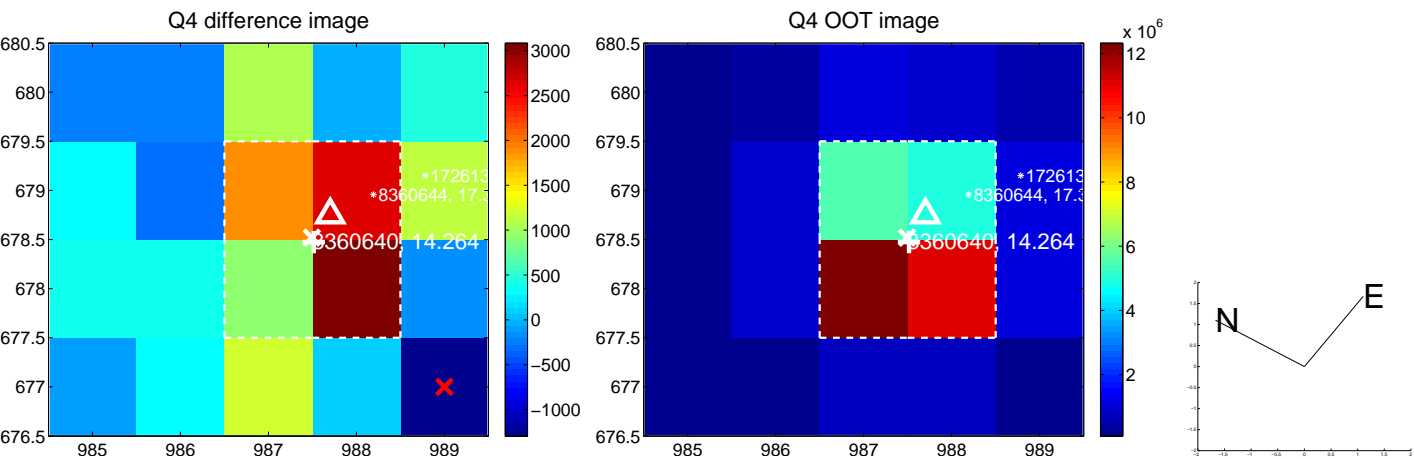
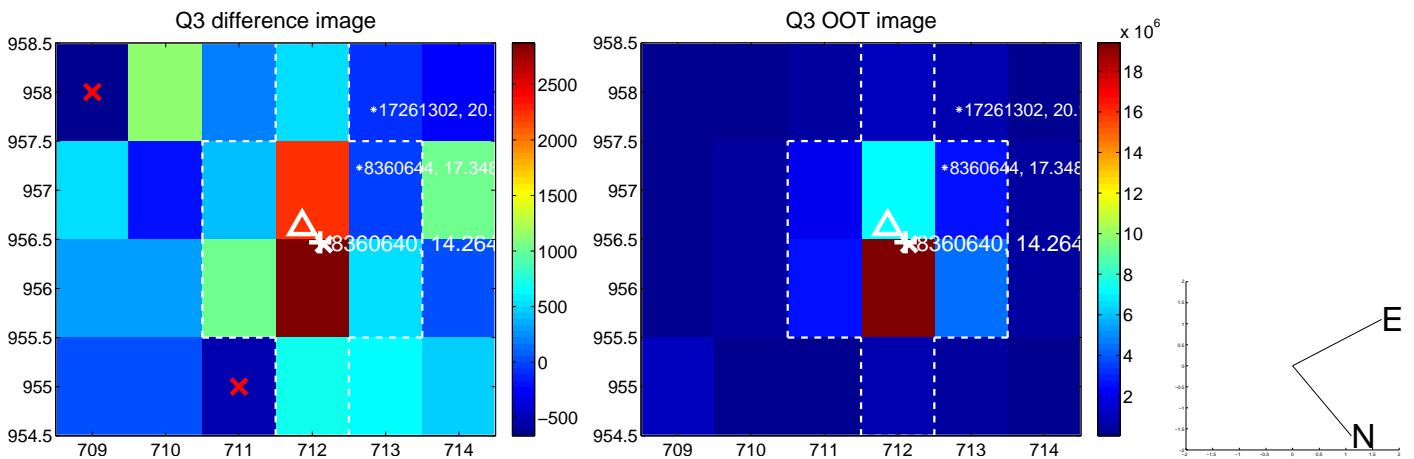
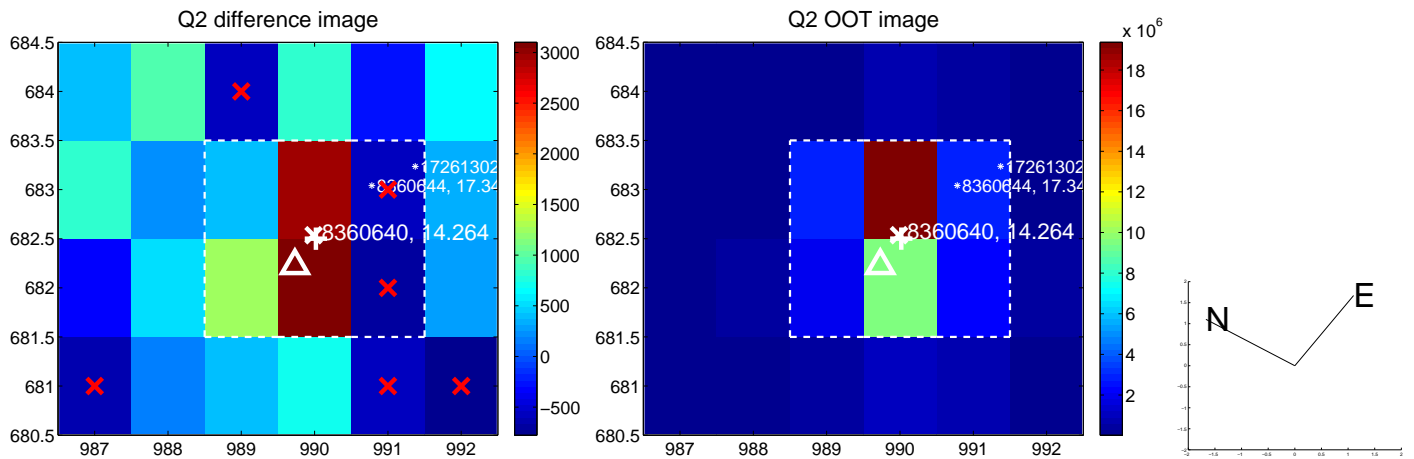
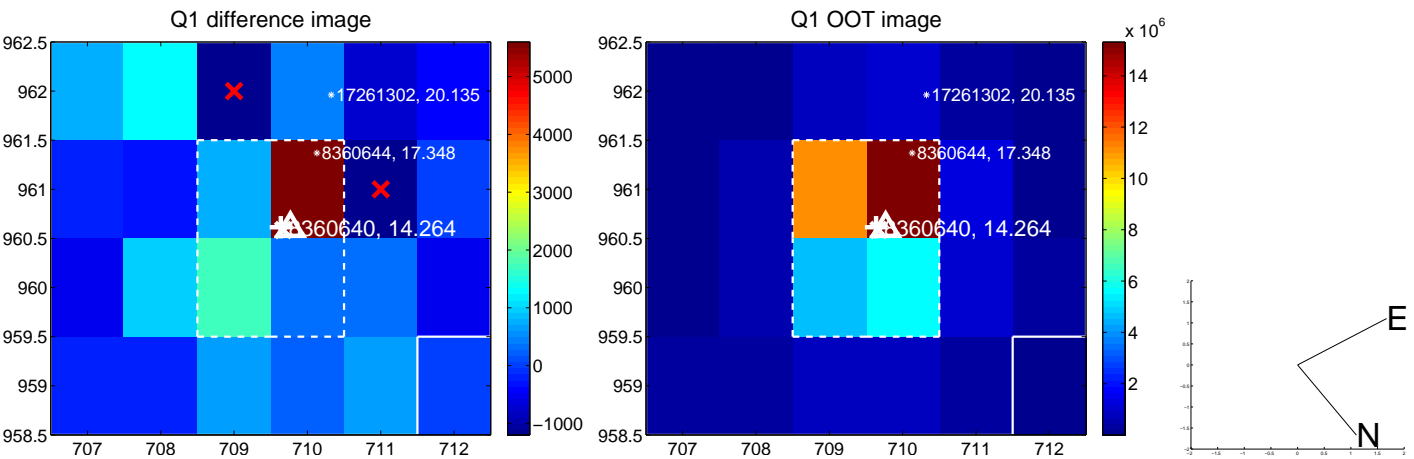


offset from photometric centroids

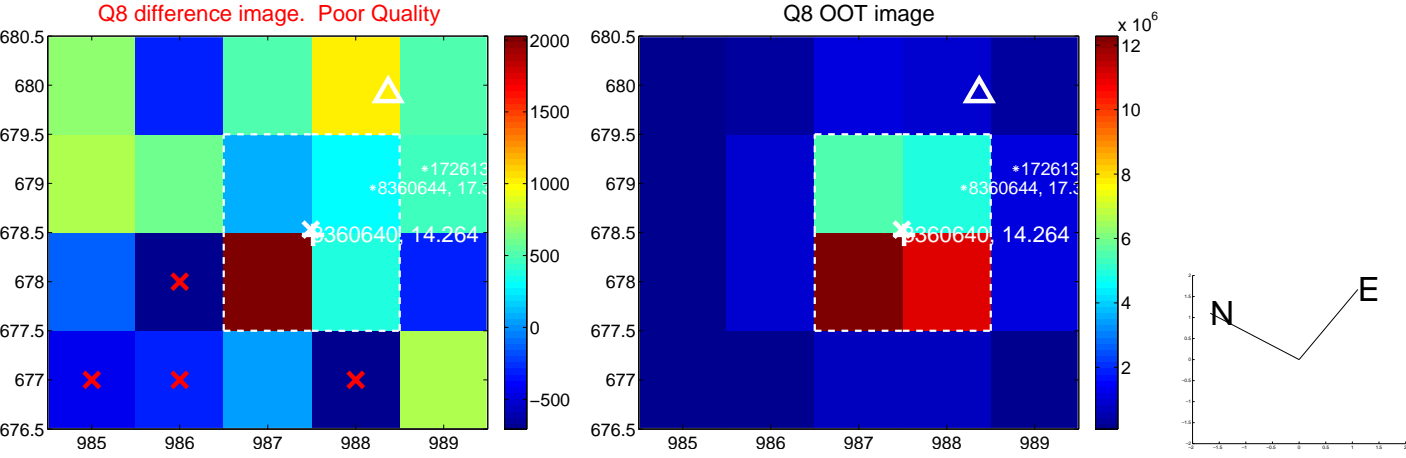
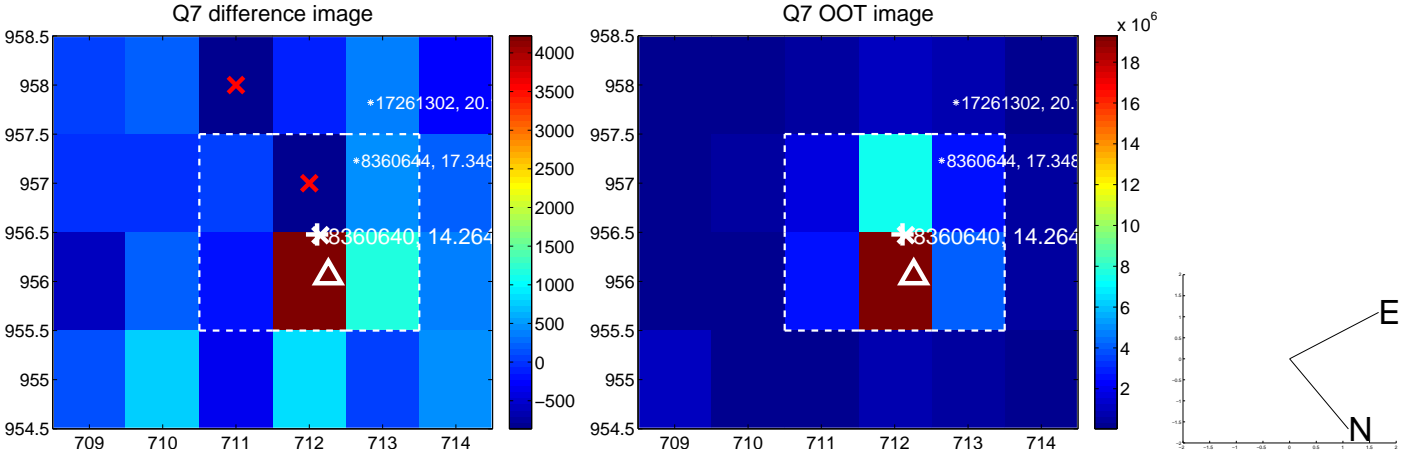
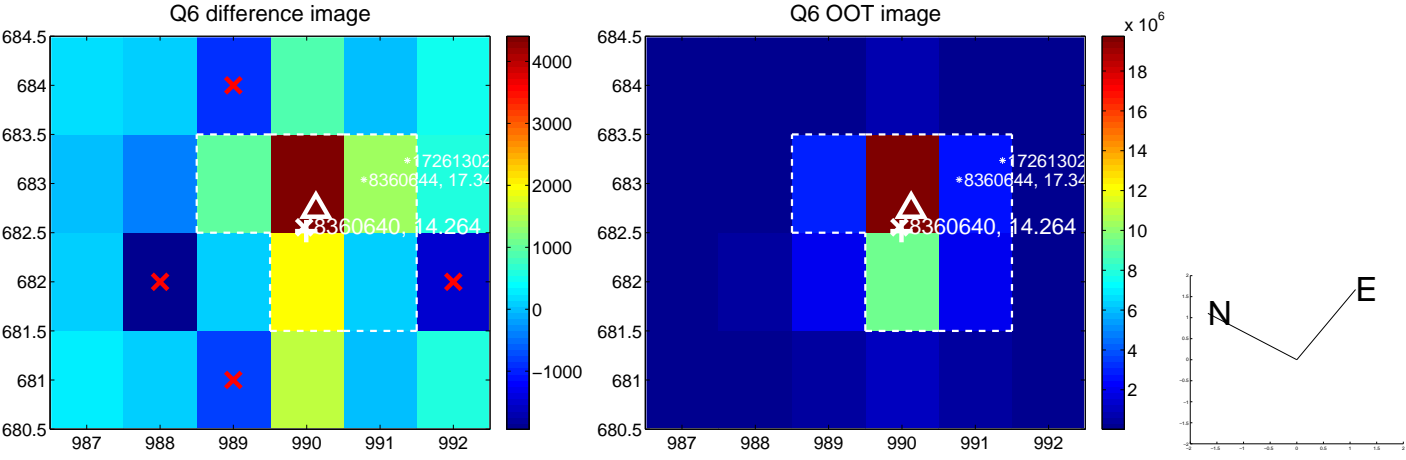
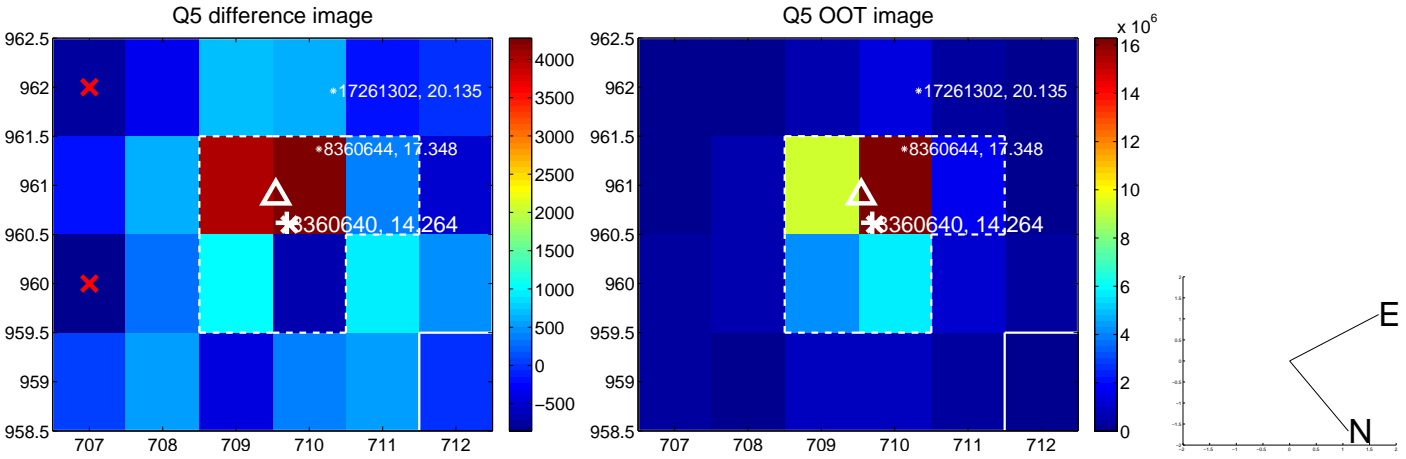


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

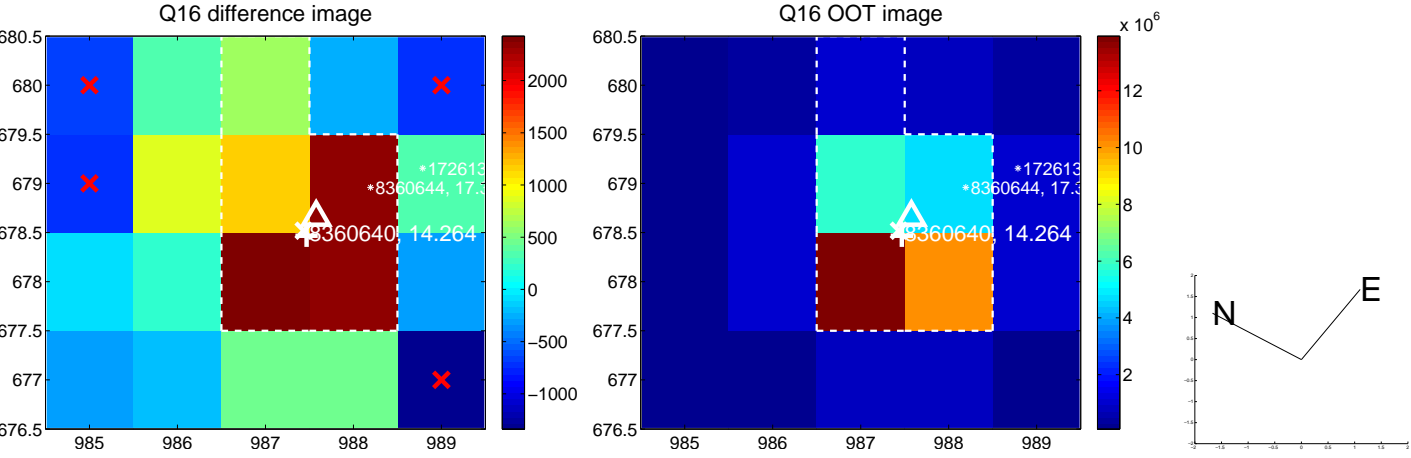
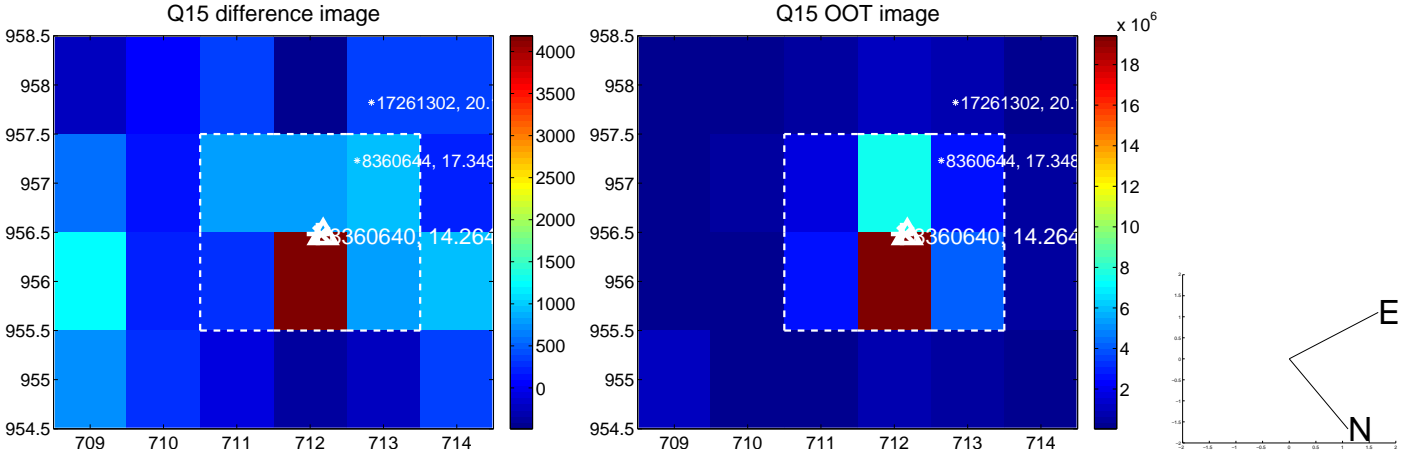
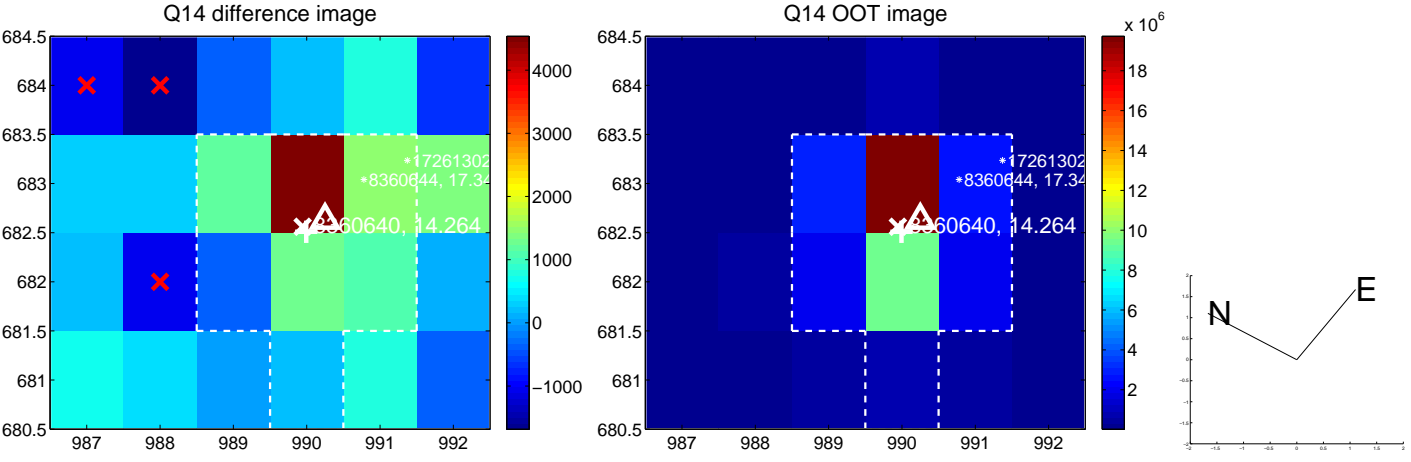
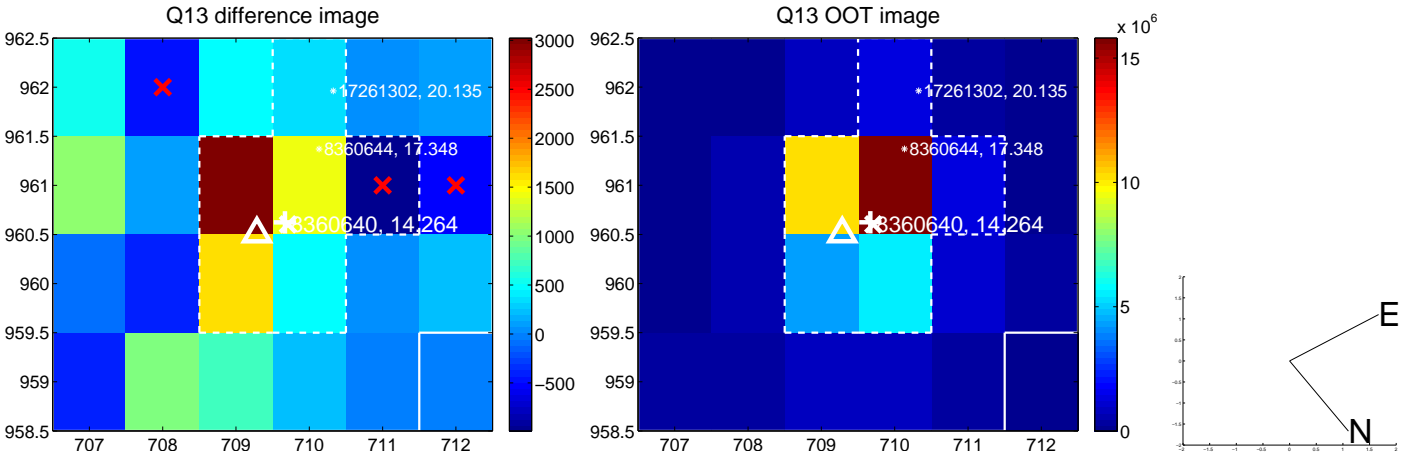
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



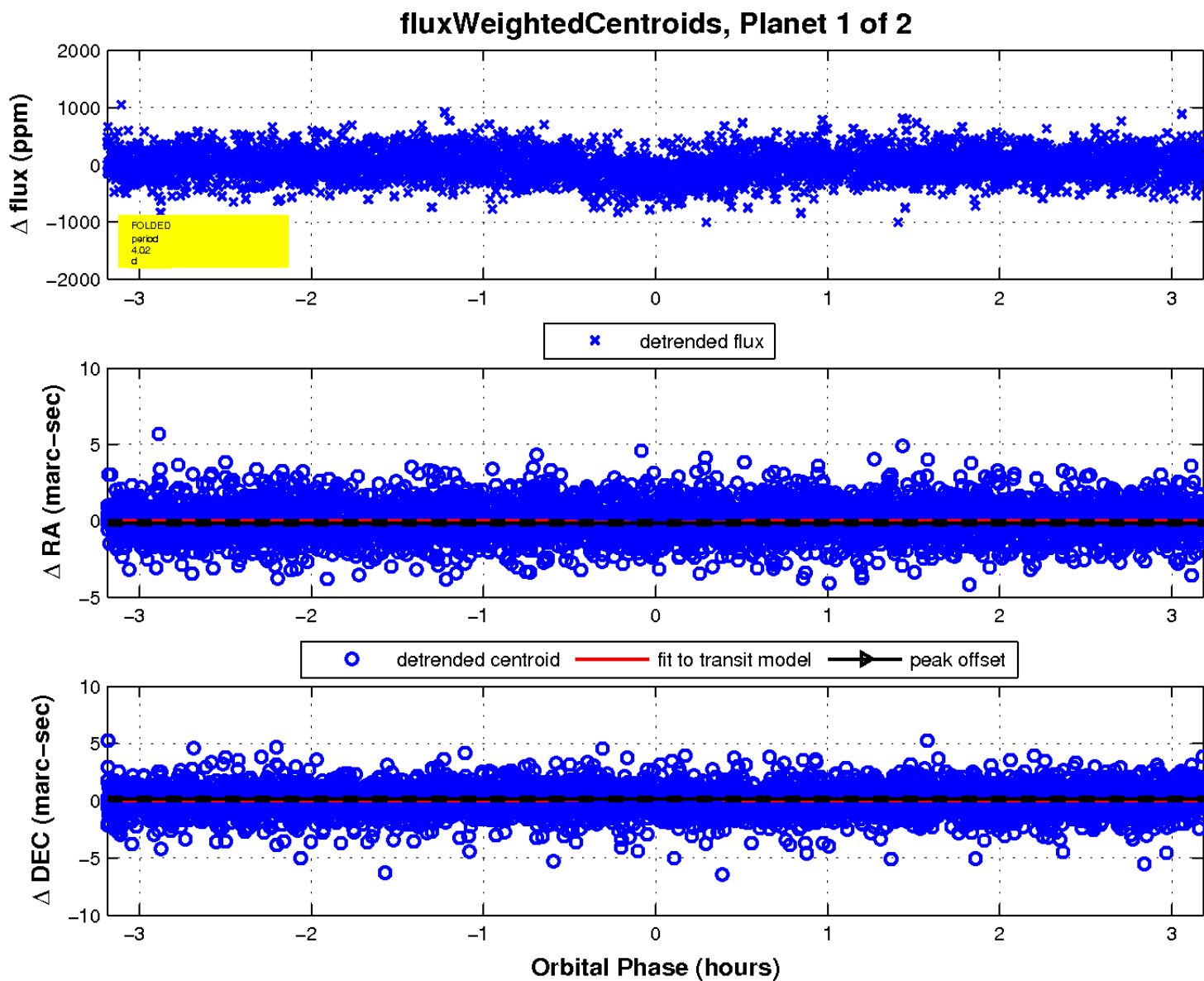
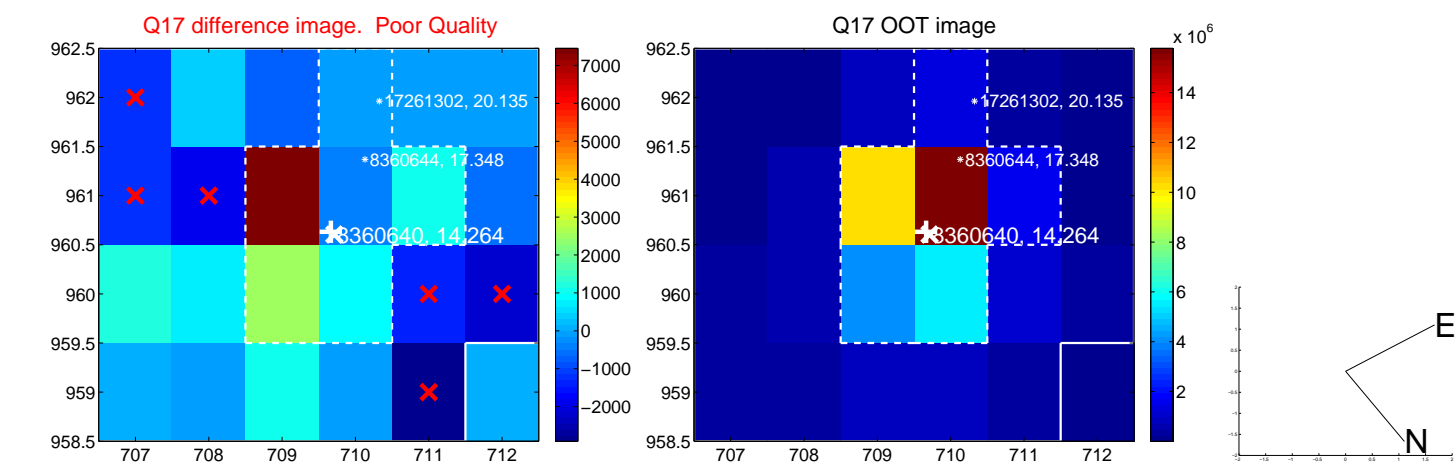
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white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.

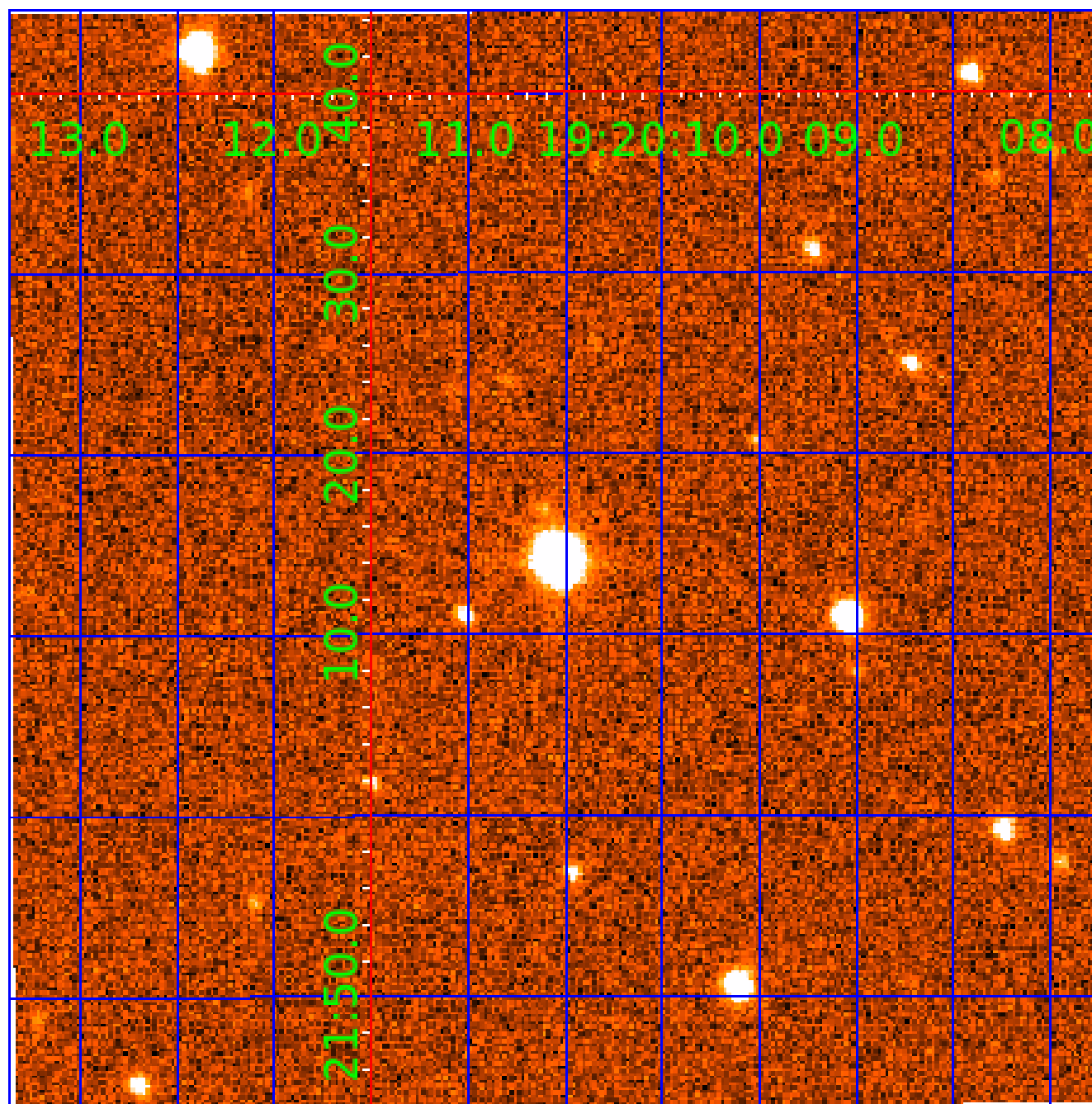


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008360640

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 008360640-01 | OBS | 2982.01 | 4.022291 | 135.176009 | 202.8 | 1.062 | 14.1 | 17.5 | 0.83 | 5516 | 1.42 | 253.38 |
| 008360640-02 | OBS | No | 416.855287 | 497.387863 | 510.6 | 6.301 | 9.5 | 5.6 | 0.83 | 5516 | 2.10 | 0.52 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008360640-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 008360640-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_RUBBLE_CHASES_MARSHALL—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS |

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.

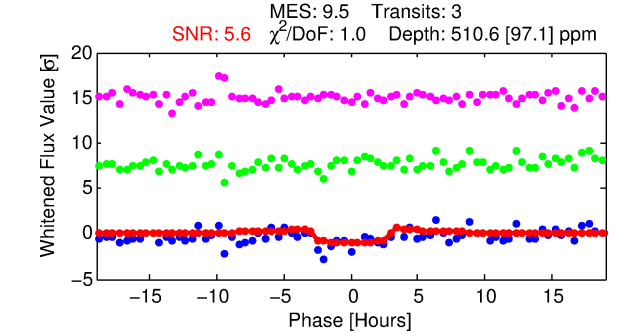
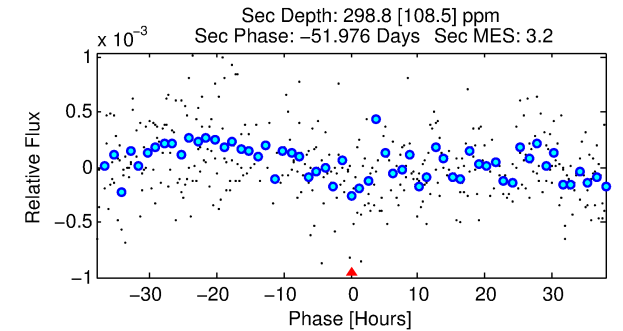
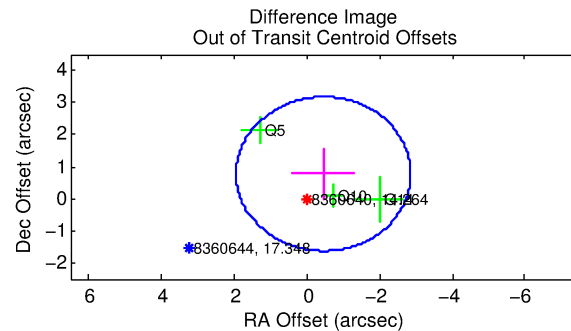
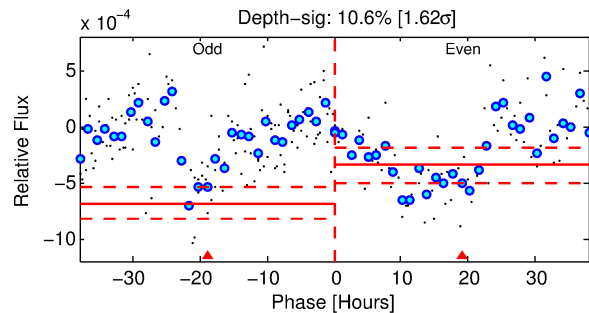
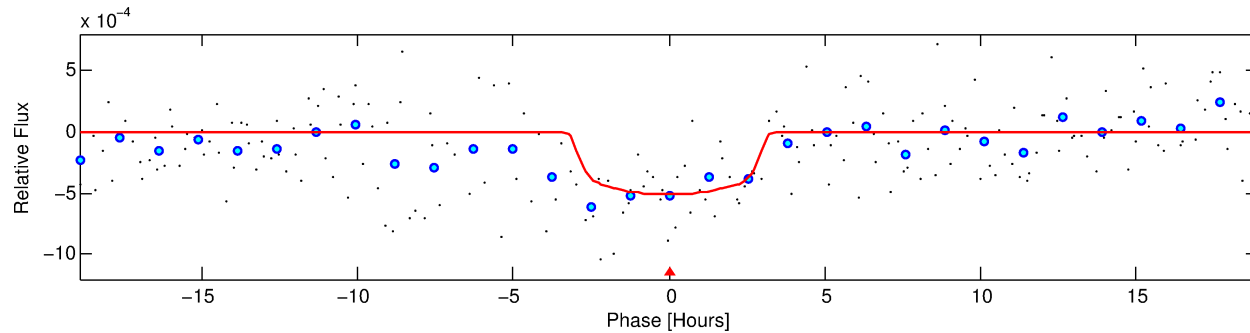
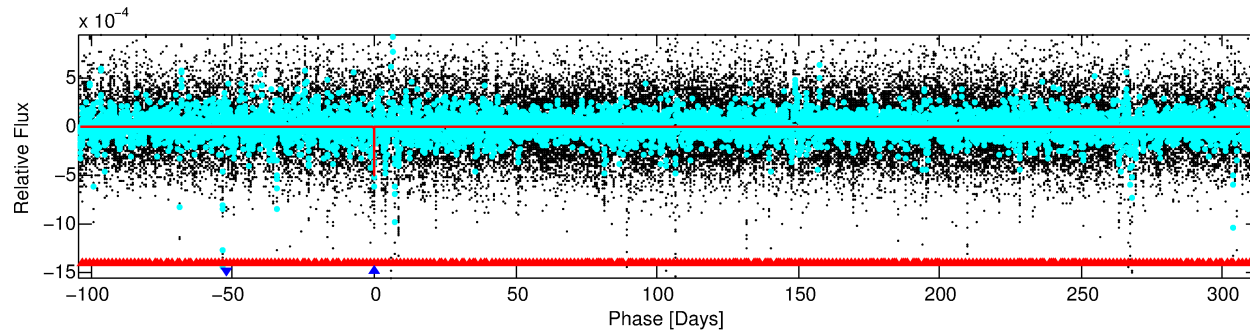
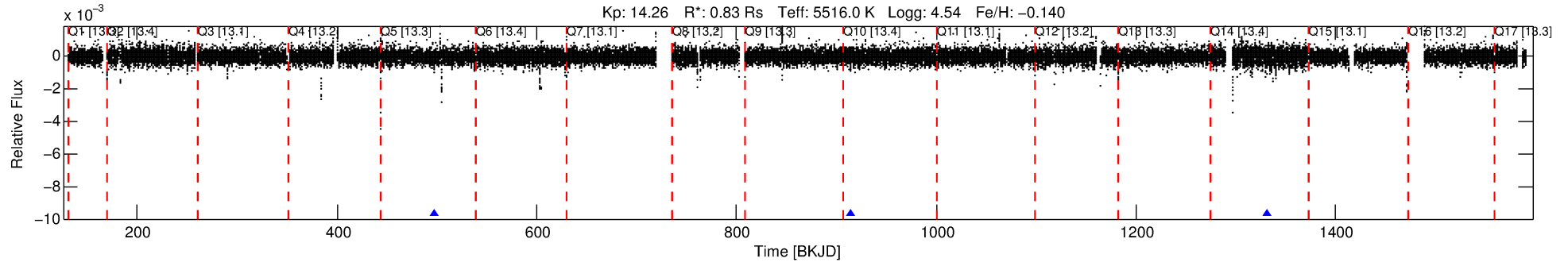
Ephemeris Match Information For 008360640-02

No Significant Match Found

DV One-Page Summary

KIC: 8360640 Candidate: 2 of 2 Period: 416.855 d

KOI: K02982 Corr: No Ephemeris Match



DV Fit Results:

Period = 416.85529 [0.01344] d
Epoch = 497.3879 [0.0171] BKJD
Rp/R* = 0.0233 [0.0093]
a/R* = 307.39 [501.87]
b = 0.82 [0.64]
Seff = 0.52 [0.15]
Teq = 217 [16] K
Rp = 2.10 [0.97] Re
a = 1.0440 [0.1947] AU
Ag = 40440.80 [37164.29] [1.09 σ]
Teffp = 4749 [1052] K [4.31 σ]

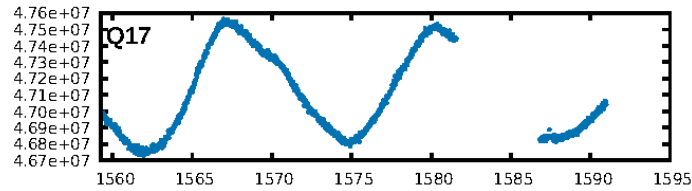
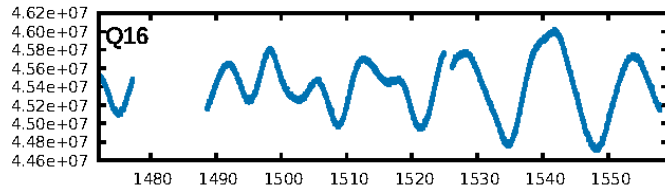
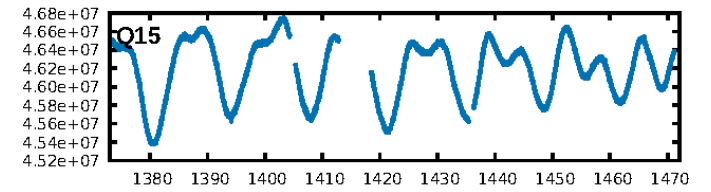
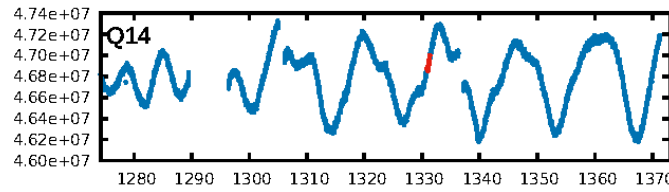
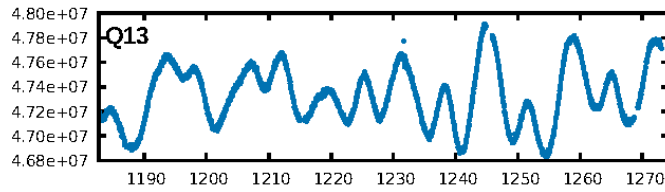
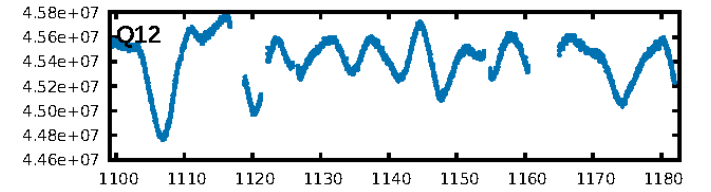
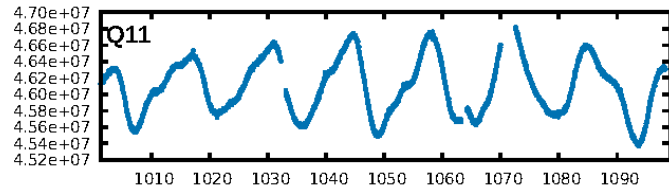
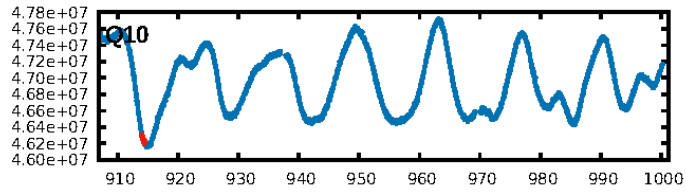
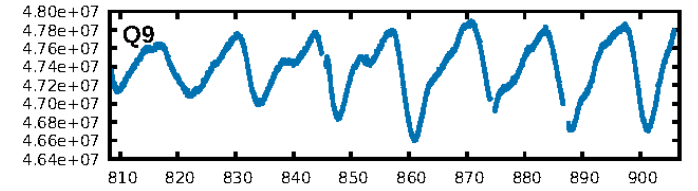
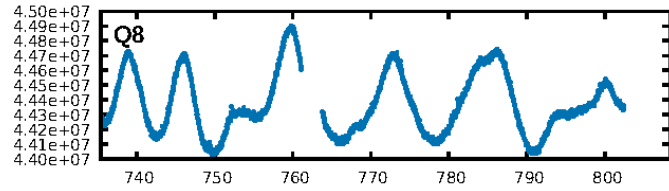
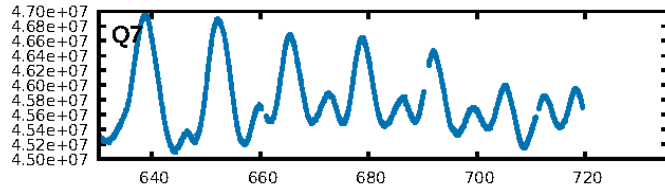
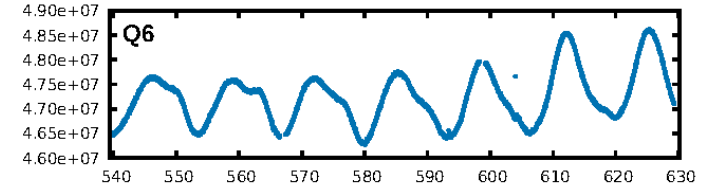
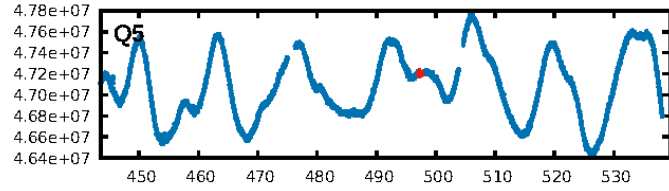
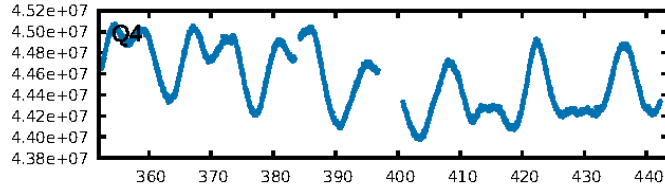
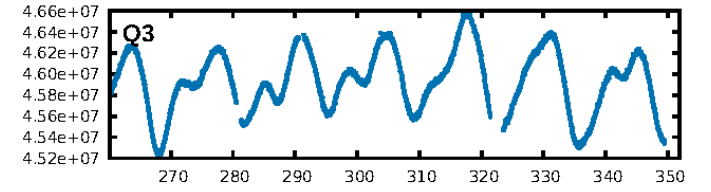
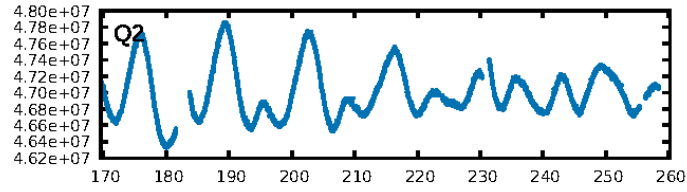
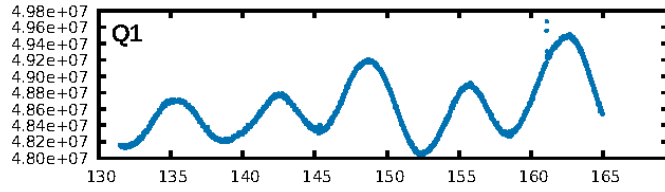
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1550.48 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 11.3%
ModelChiSquareGof-sig: 97.2%
Bootstrap-pfa: 2.77e-07
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 0.568
Centroid-sig: 37.8%
Centroid-so: 1.097 arcsec [0.80 σ]
OotOffset-rm: 0.898 arcsec [1.12 σ]
KicOffset-rm: 0.751 arcsec [0.92 σ]
OotOffset-st: 2/0/0/1 [3]
KicOffset-st: 2/0/0/1 [3]
DiffImageQuality-fgm: 0.67 [2/3]
DiffImageOverlap-fno: 0.67 [2/3]

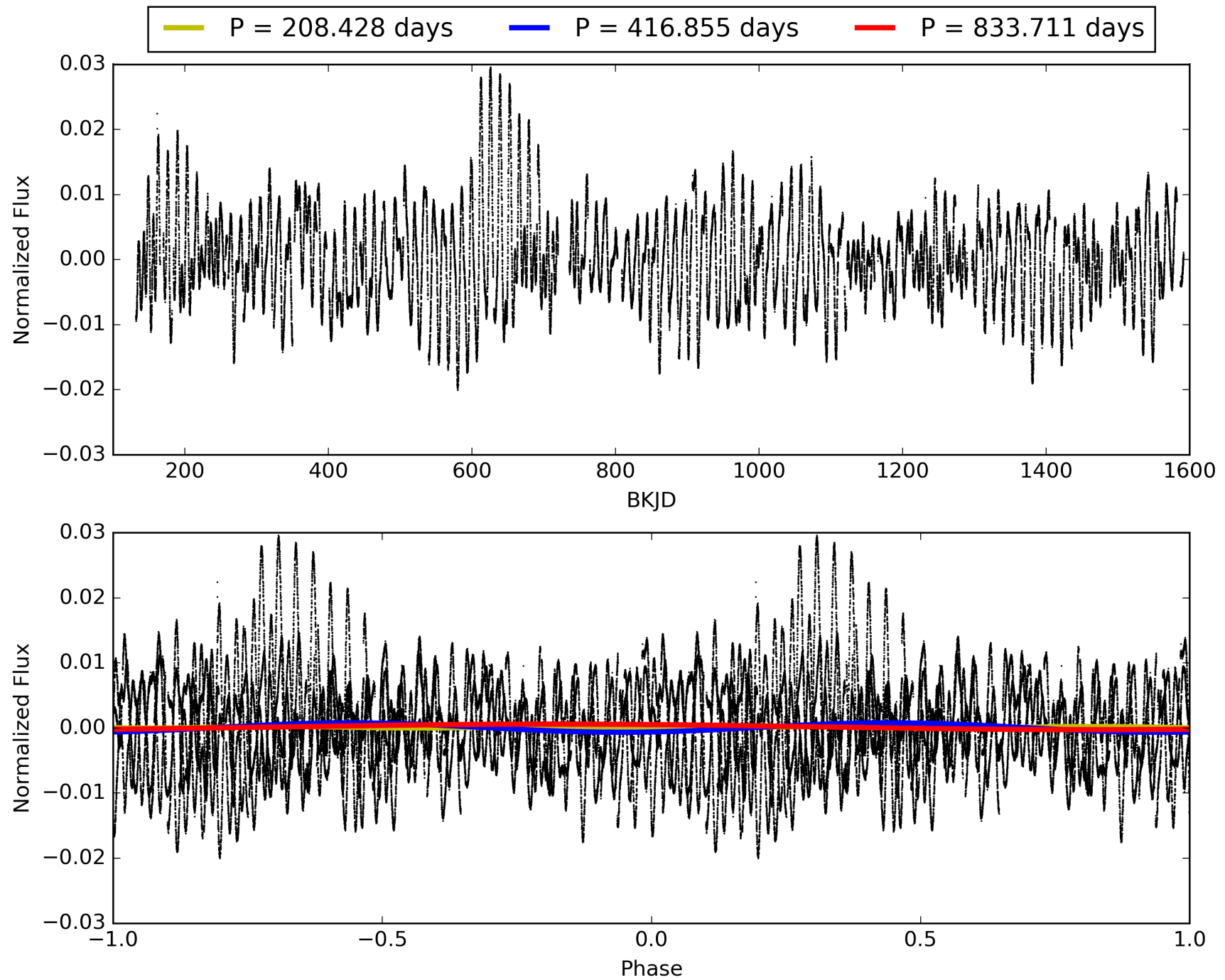
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 20:45:44 Z

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

TCE 008360640-02, PDC Light Curves

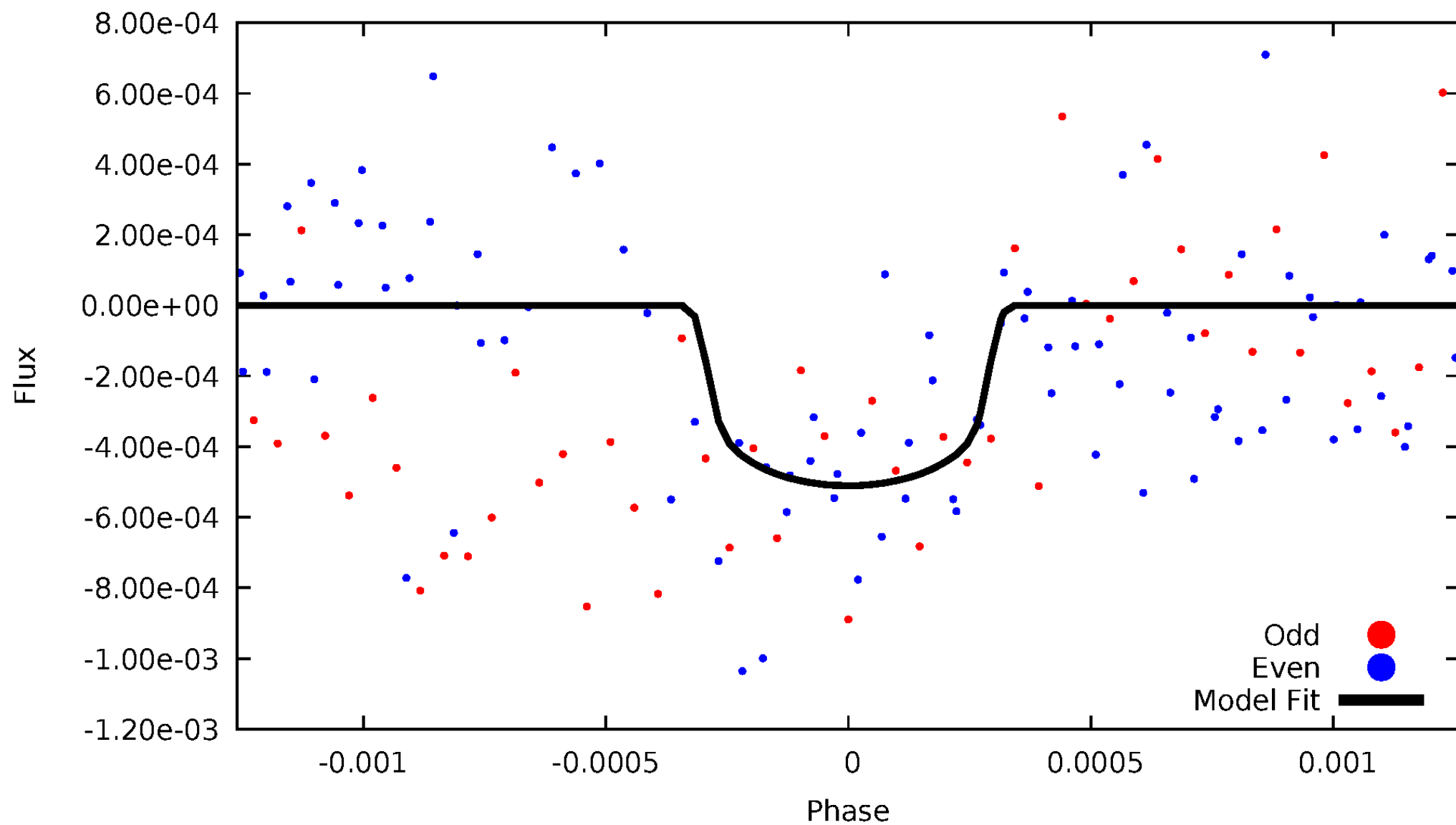


TCE 008360640-02



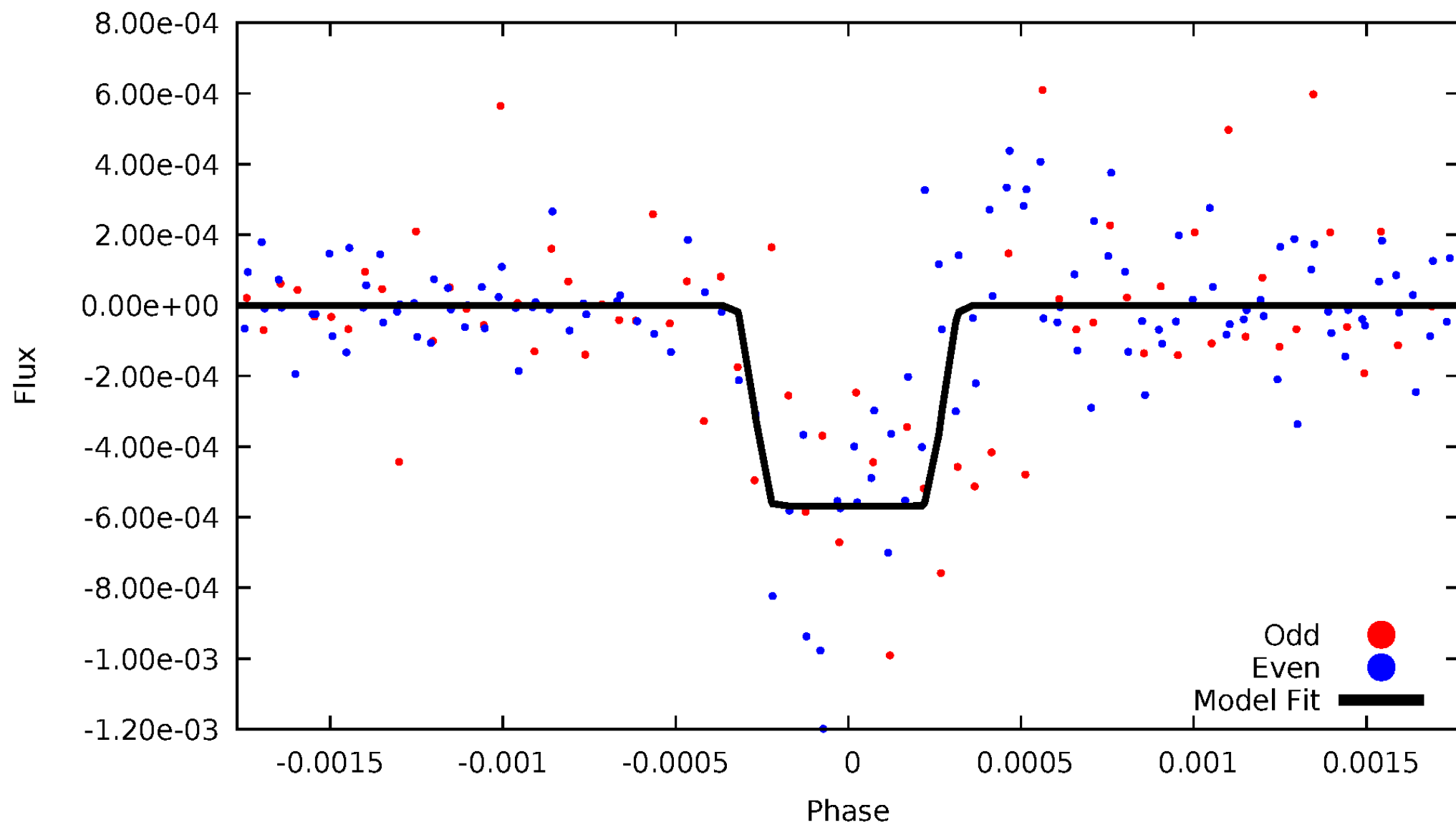
DV Odd/Even

TCE 008360640-02



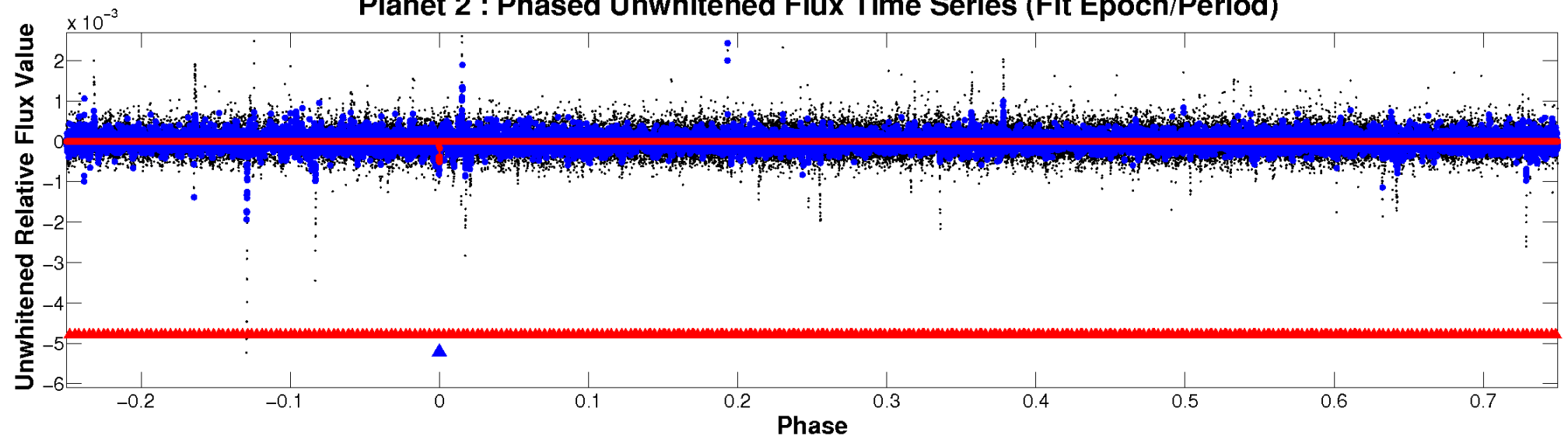
ALT Odd/Even

TCE 008360640-02

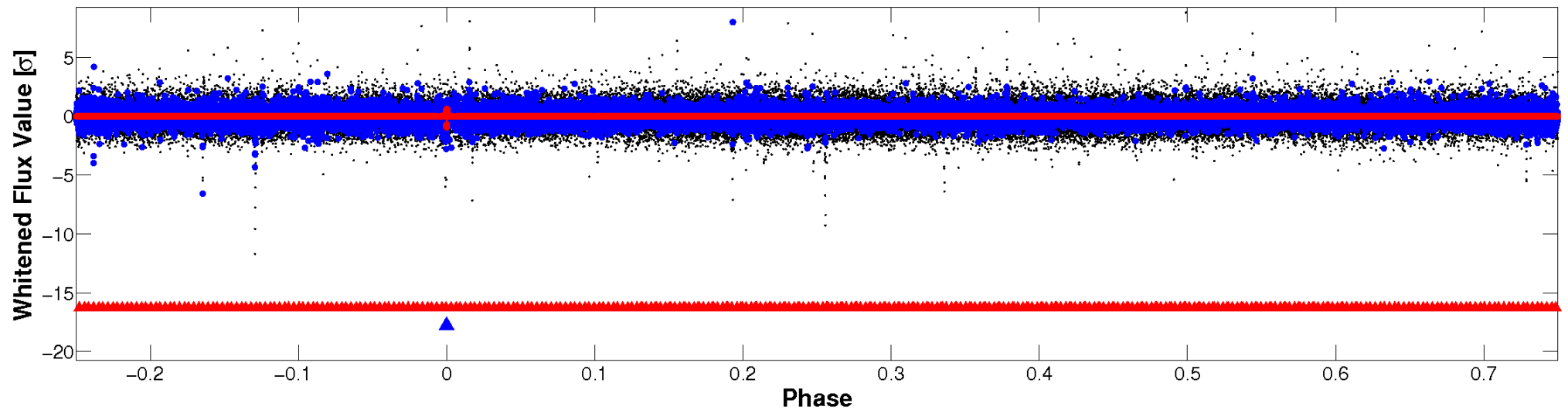


Non-Whitened Vs. Whitened Light Curve

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

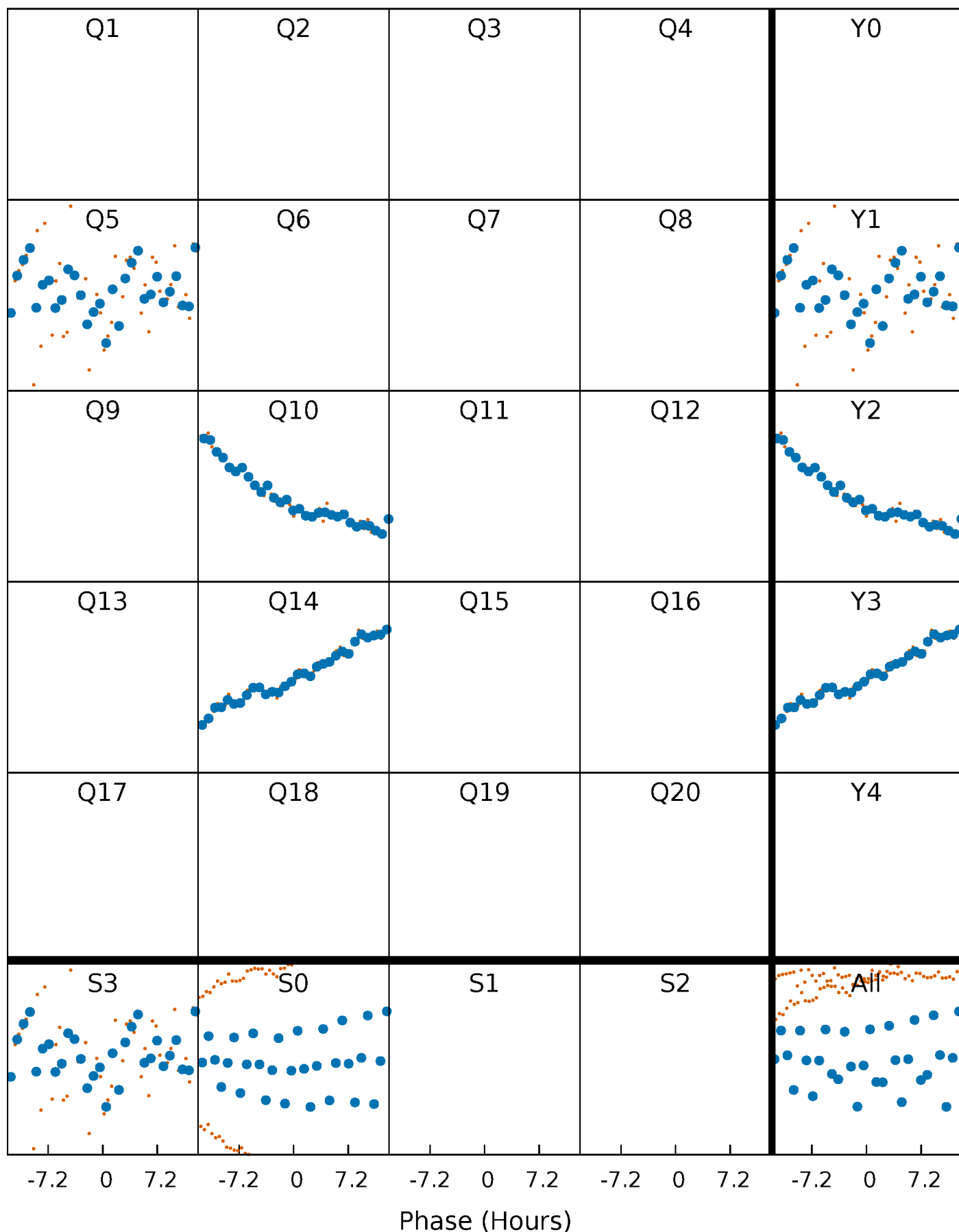


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



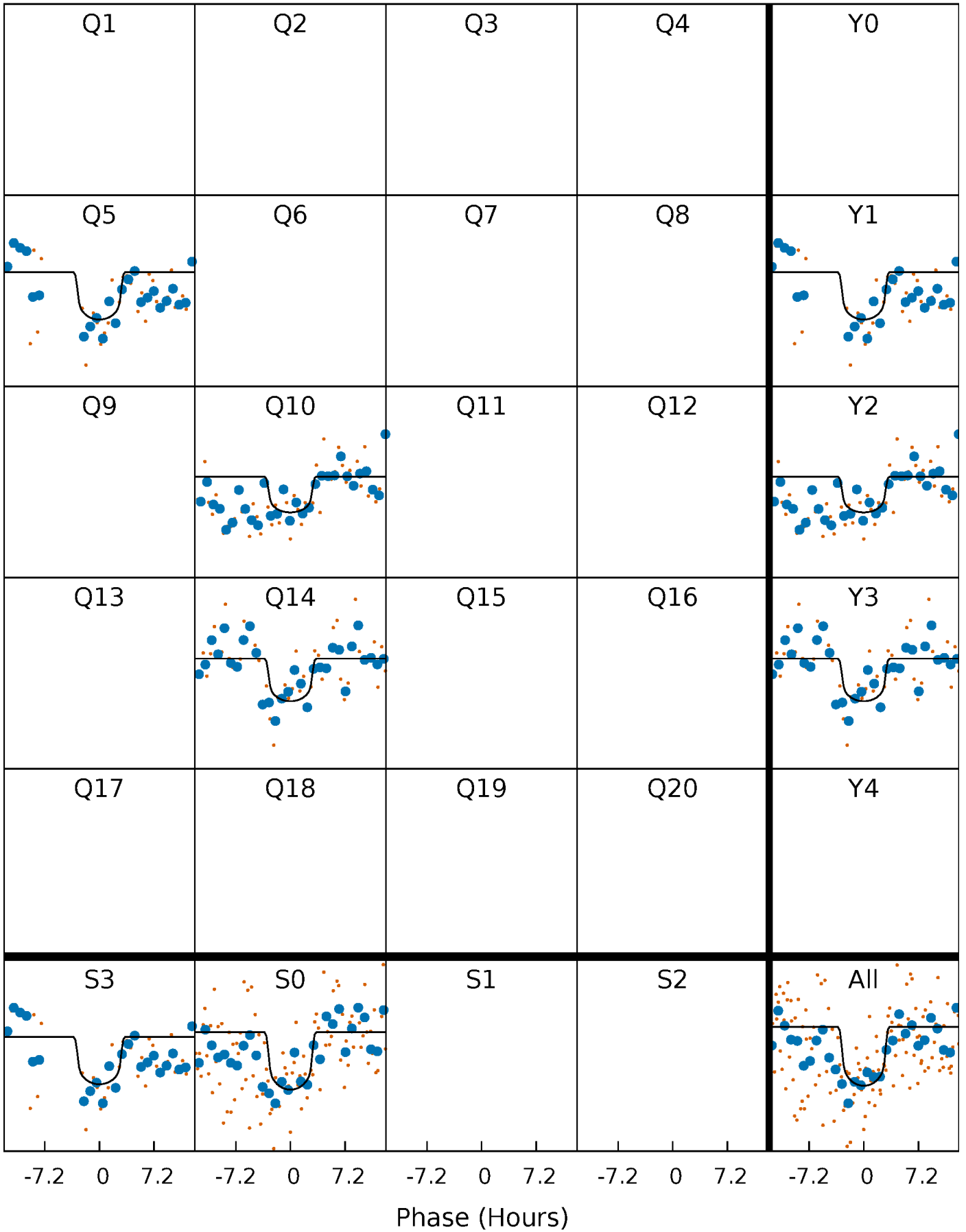
PDC Quarter-Phased Transit Curves

TCE 008360640-02 P=416.855287 Days $T_0=497.387863$ (BKJD)



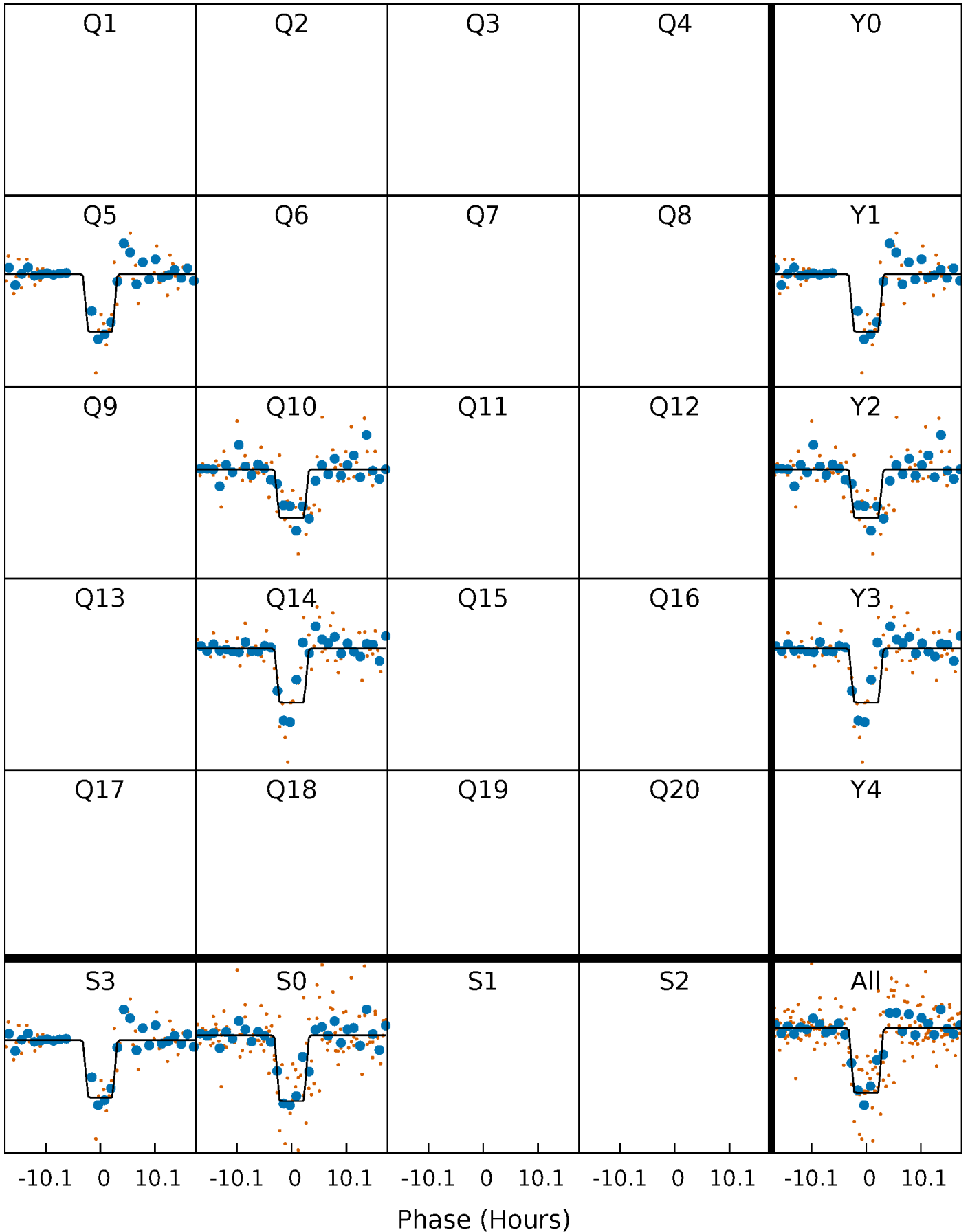
DV Quarter-Phased Transit Curves

TCE 008360640-02 $P=416.855287$ Days $T_0=497.387863$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

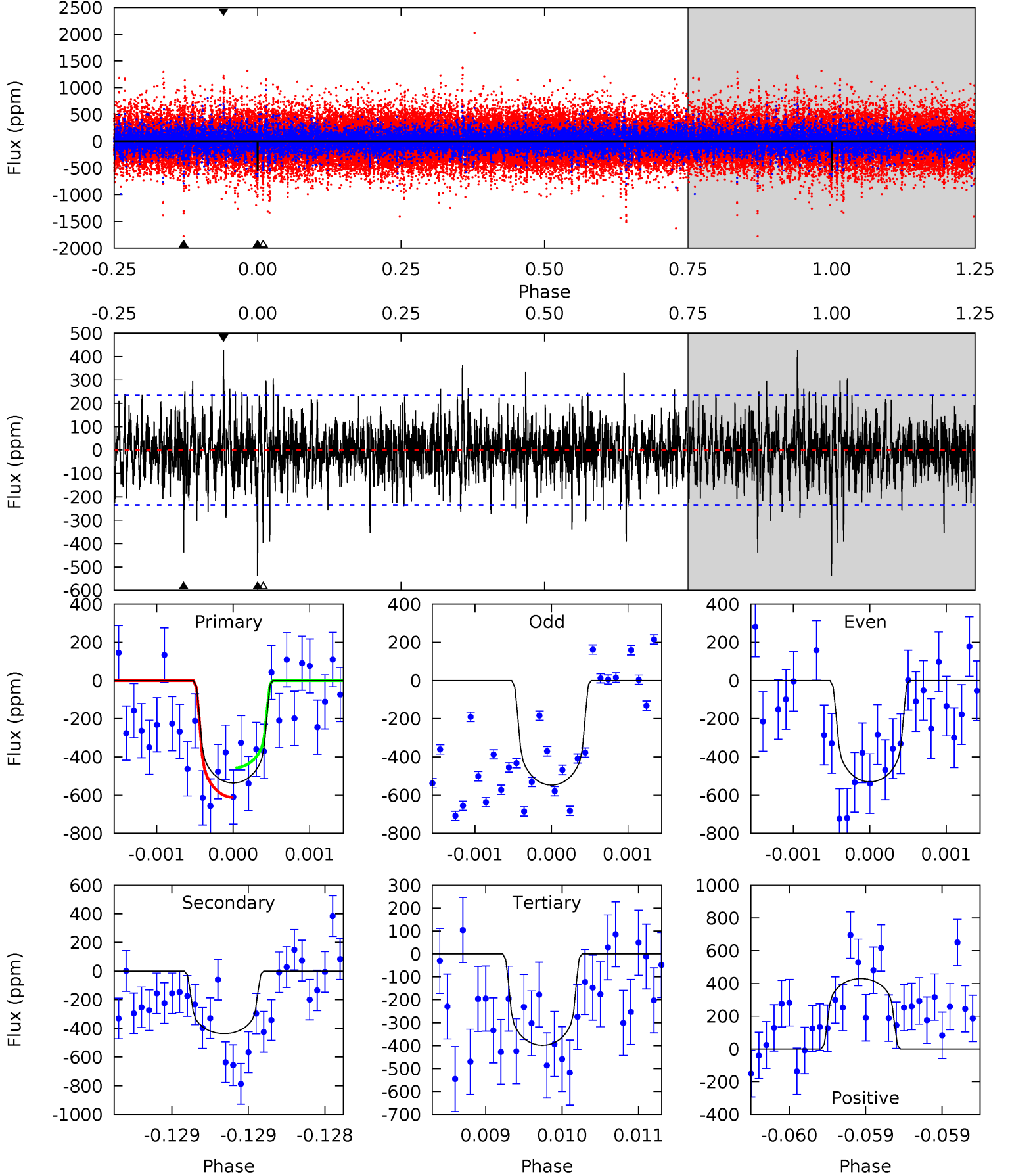
TCE 008360640-02 $P=416.844624$ Days $T_0=497.348232$ (BKJD)



DV Model-Shift Uniqueness Test

008360640-02, P = 416.855287 Days, E = 80.532576 Days

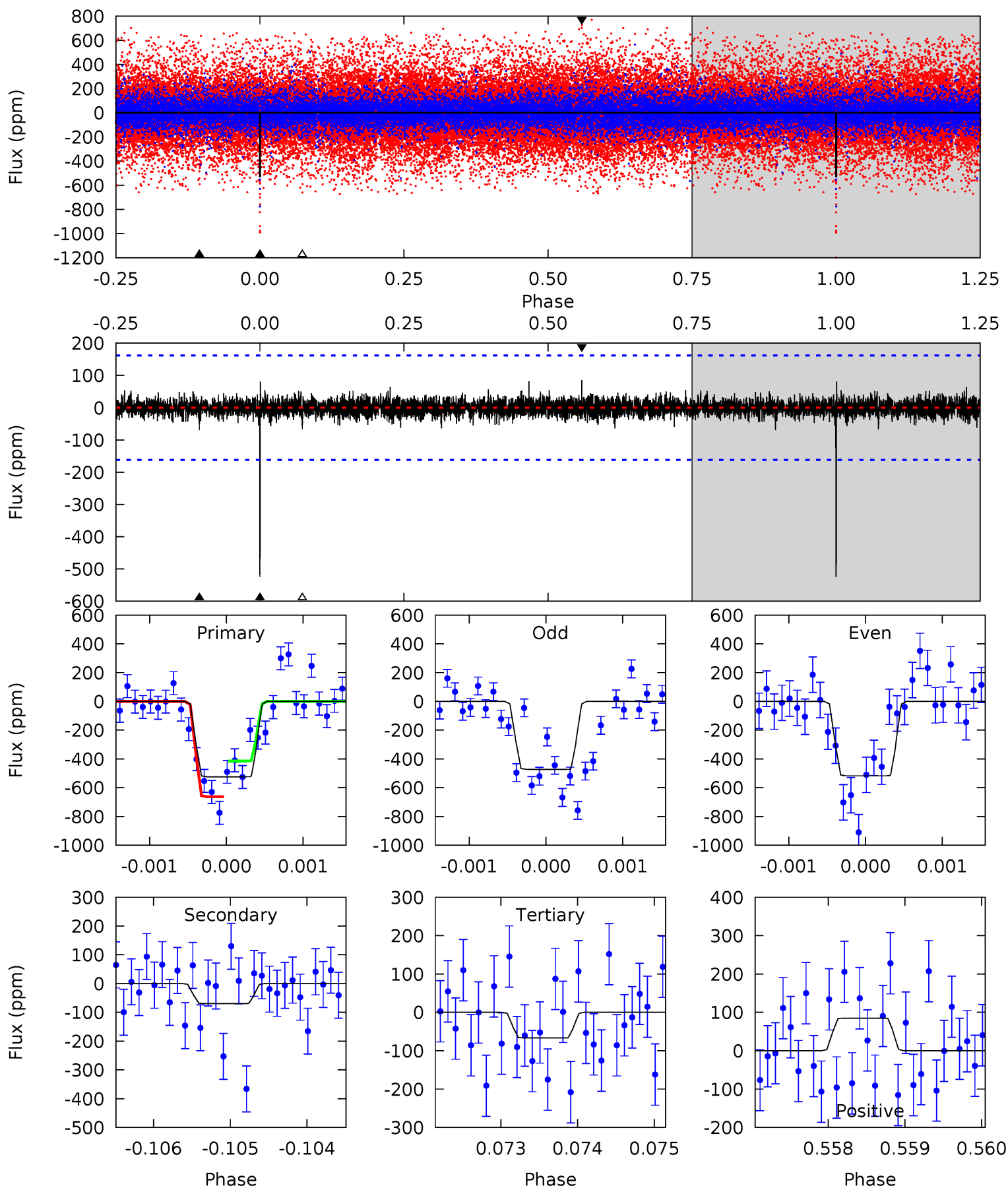
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.6 | 10.3 | 9.38 | 10.1 | 5.52 | 3.41 | 2.00 | 3.25 | 2.53 | 0.89 | 0.17 | 0.18 | 0.98 | 0.44 | 1.81 |



Alt Model-Shift Uniqueness Test

008360640-02, P = 416.844624 Days, E = 80.503608 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 17.9 | 2.36 | 2.26 | 2.89 | 5.52 | 3.40 | 0.51 | 15.6 | 15.0 | 0.10 | -0.53 | 0.75 | 0.98 | 0.14 | 4.14 |



Stellar Parameters For KIC 008360640

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5516^{+149}_{-149} | $4.544^{+0.048}_{-0.143}$ | $-0.140^{+0.300}_{-0.300}$ | $0.827^{+0.187}_{-0.080}$ | $0.873^{+0.092}_{-0.092}$ | $2.174^{+0.536}_{-0.873}$ |
| | +3%/-3% | +1%/-3% | +214%/-214% | +23%/-10% | +11%/-11% | +25%/-40% |
| 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 008360640-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|---------------|------------------------|-------------------|-----------------------|----------------------------|
| DV | -437 ± 43 | $2.19^{+0.90}_{-0.93}$ | 307^{+16}_{-12} | 5231^{+1598}_{-704} | $54559^{+105530}_{-27955}$ |
| Alt. | -69 ± 29 | $2.25^{+0.94}_{-0.84}$ | 306^{+17}_{-12} | 3631^{+755}_{-438} | 7975^{+14326}_{-4613} |

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

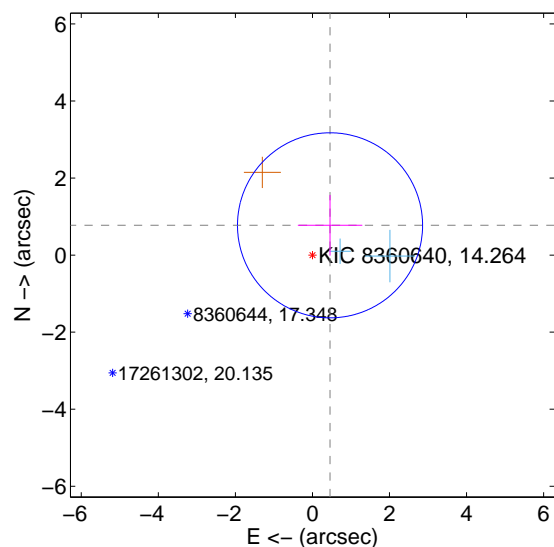
Supplemental centroid analysis for 008360640-02. Kepler magnitude: 14.26. Transit SNR 5.63

There are 2 quarters with good PRF difference image offsets

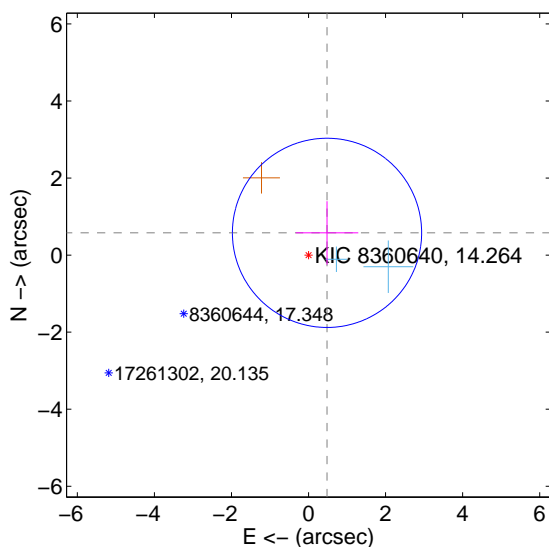
The direct PRF centroid is offset from the target star catalog position by about 0.28 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 0.898 ± 0.800 | 1.12 | -0.457 ± 0.836 | 0.773 ± 0.788 |
| PRF-fit source offset from KIC position | 0.751 ± 0.818 | 0.92 | -0.480 ± 0.812 | 0.577 ± 0.823 |
| photometric centroid source offset | 1.10 ± 1.38 | 0.80 | -0.17 ± 1.46 | -1.08 ± 1.38 |

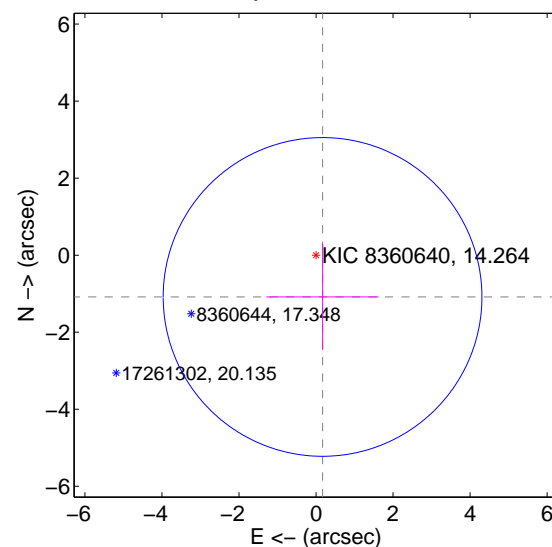
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

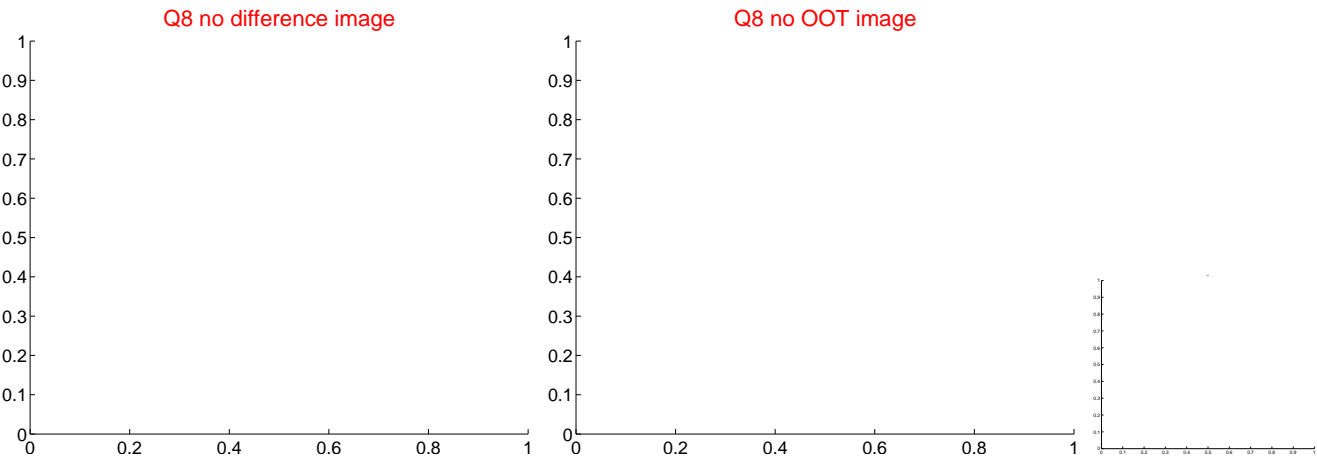
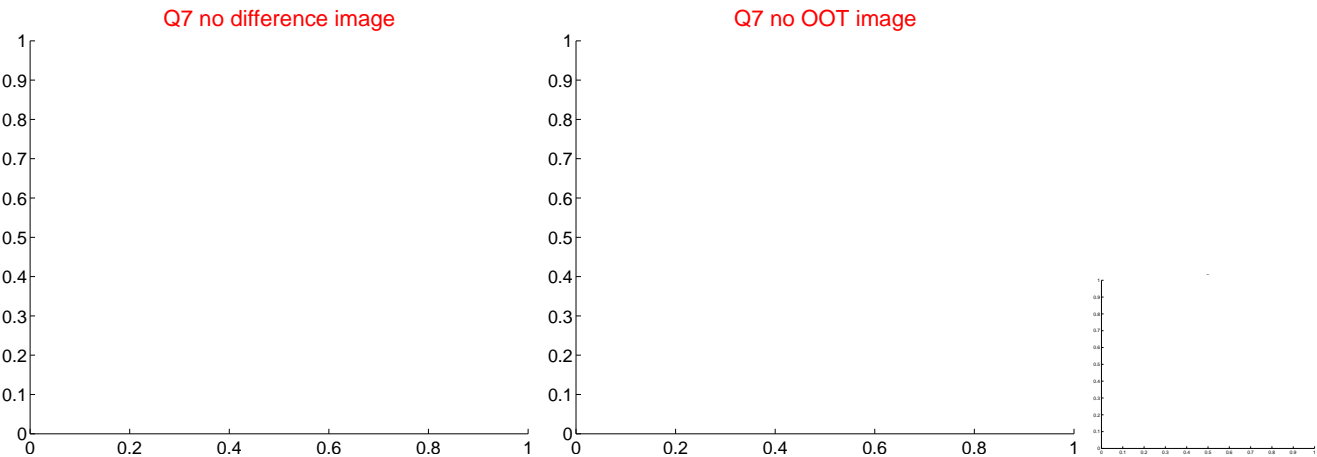
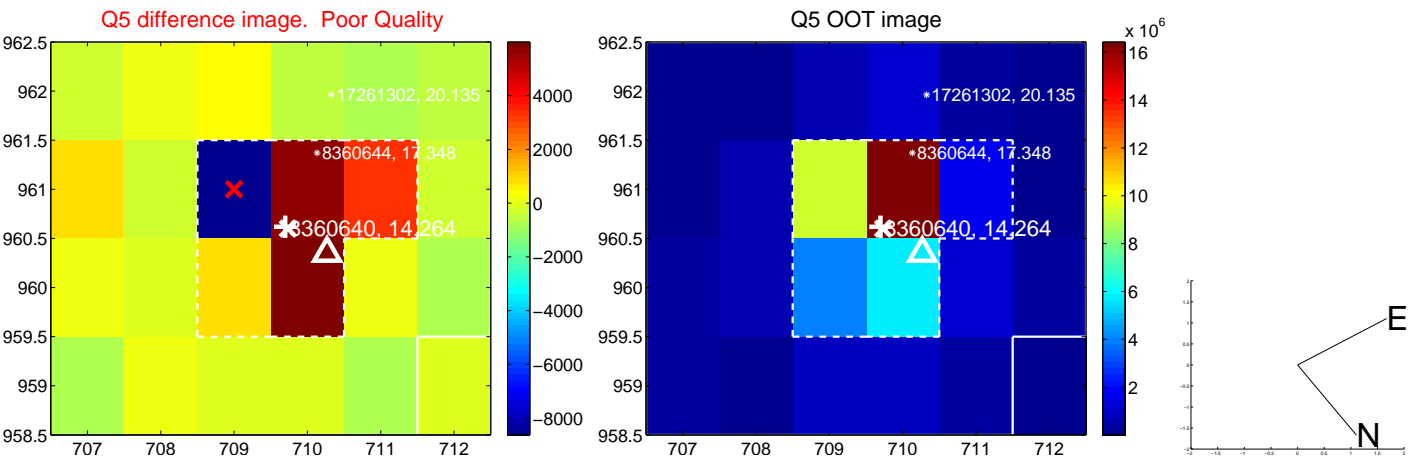


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

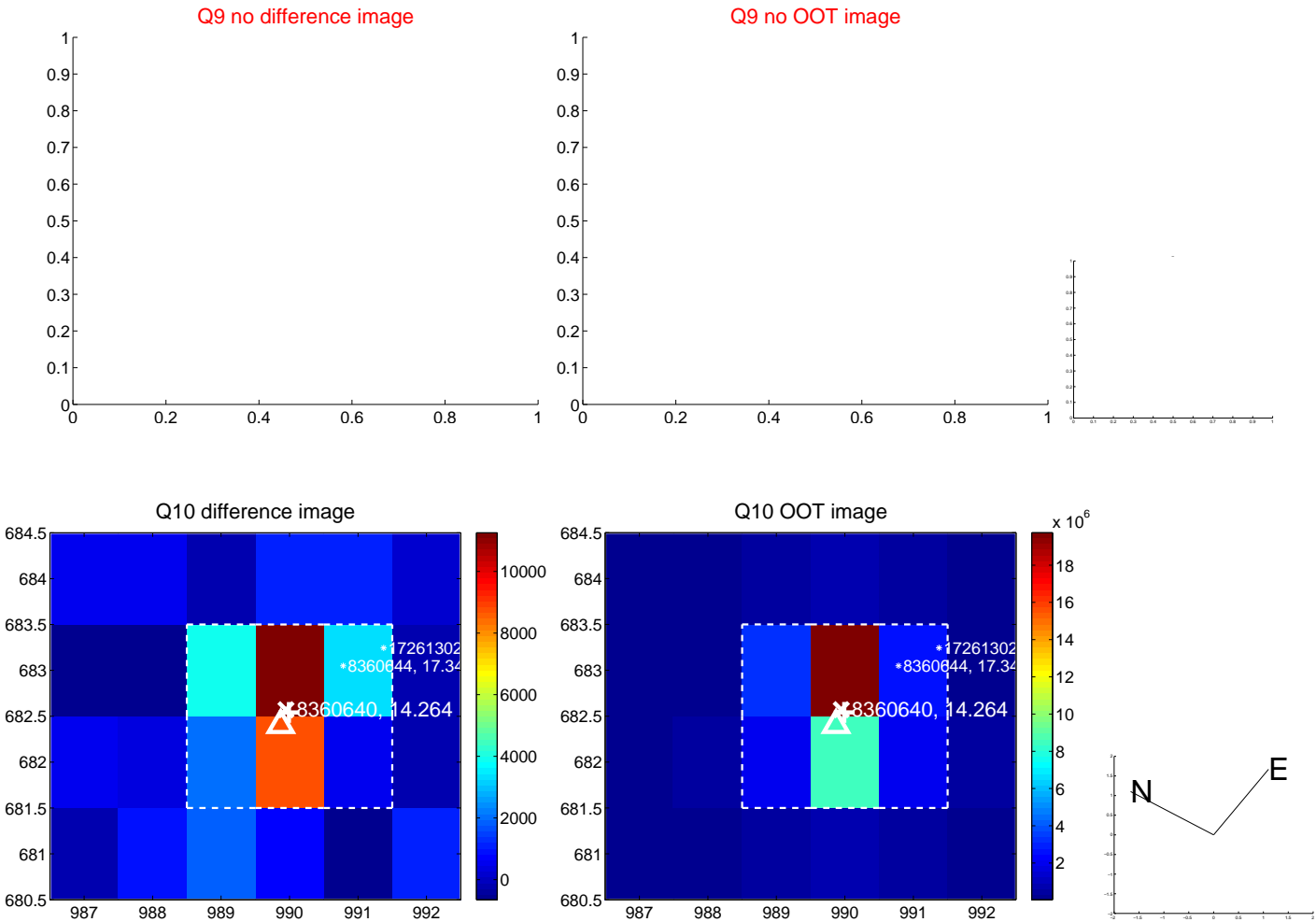
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



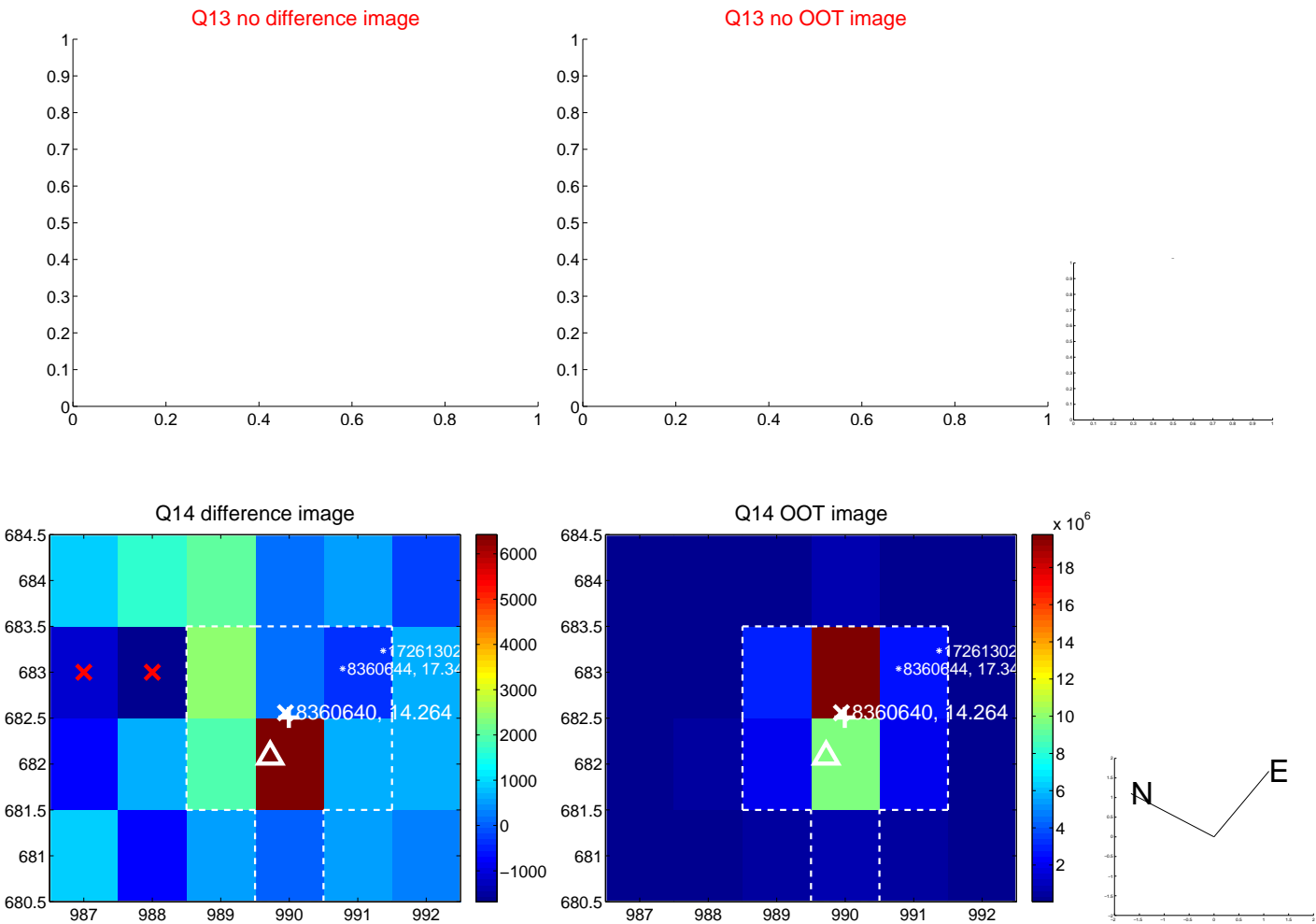
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



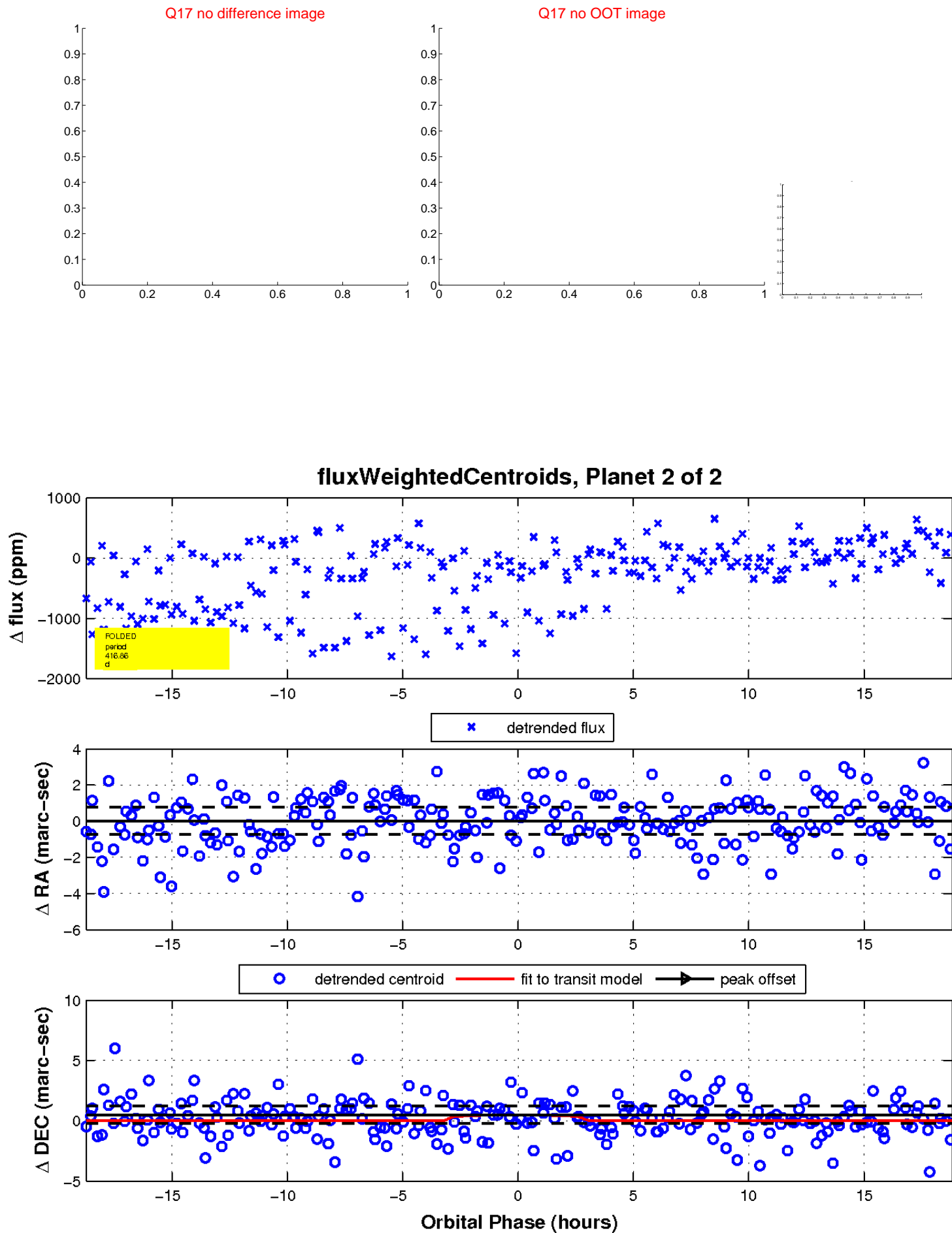
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

