

KIC 008645191

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-----|------|-----------------------------|-----------------|------------------------|------------------------|
| 008645191-01 | OBS | 4311.01 | 0.918920 | 131.679668 | 201.2 | 0.770 | 9.6 | 13.4 | 0.83 | 5655 | 1.43 | 1961.93 |
| 008645191-02 | OBS | No | 0.918903 | 132.149853 | 149.9 | 0.936 | 9.3 | 11.3 | 0.83 | 5655 | 1.23 | 1961.98 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008645191-01 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET |
| 008645191-02 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_UNRESOLVED_OFFSET |

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 008645191-01

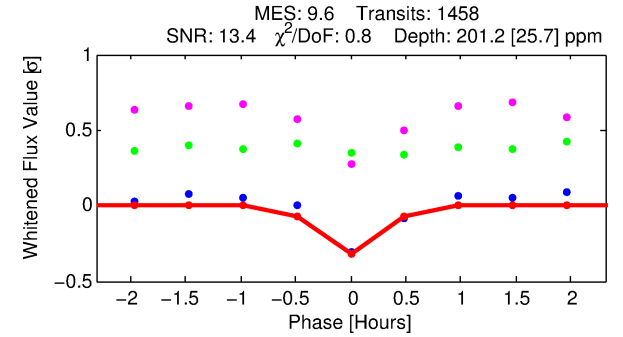
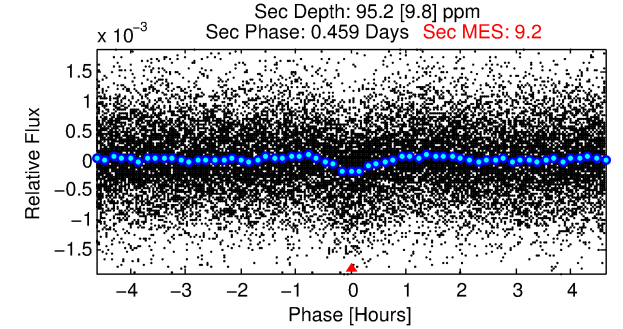
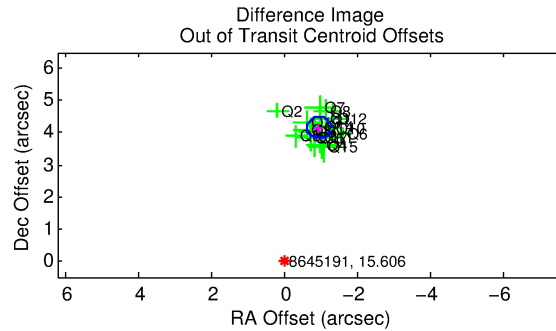
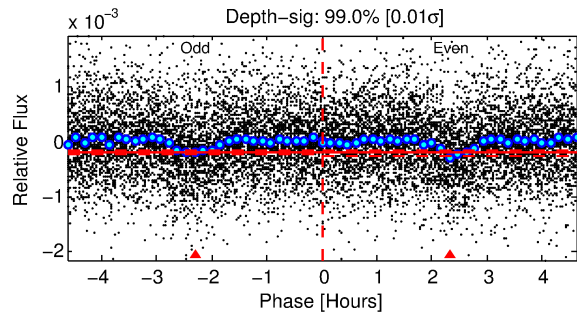
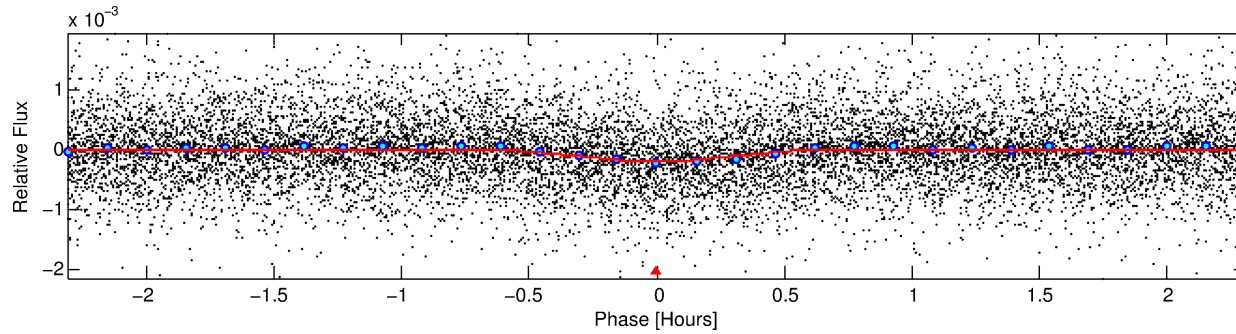
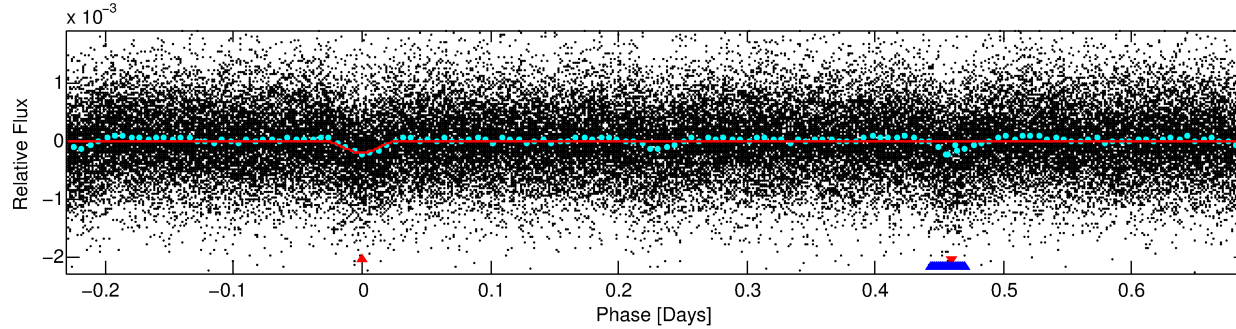
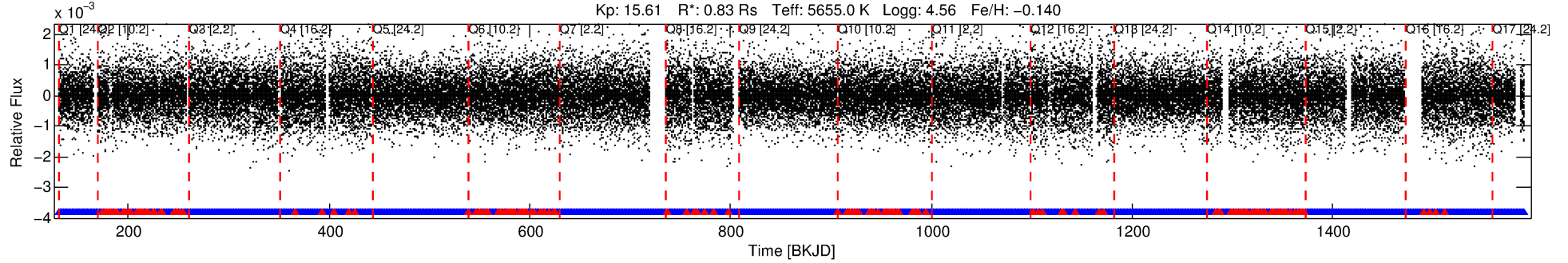
No Significant Match Found

DV One-Page Summary

KIC: 8645191 Candidate: 1 of 2 Period: 0.919 d

KOI: K04311.01 Corr: 0.890

Kp: 15.61 R*: 0.83 Rs Teff: 5655.0 K Logg: 4.56 Fe/H: -0.140



DV Fit Results:

Period = 0.91892 [0.00001] d
Epoch = 131.6797 [0.0011] BKJD
Rp/R* = 0.0158 [0.0086]
a/R* = 4.40 [10.63]
b = 0.90 [0.55]
Seff = 1961.94 [681.87]
Teq = 1697 [147] K
Rp = 1.43 [0.87] Re
a = 0.0180 [0.0040] AU
Ag = 8.27 [9.48] [0.77σ]
Teff = 4449 [1230] K [2.22σ]

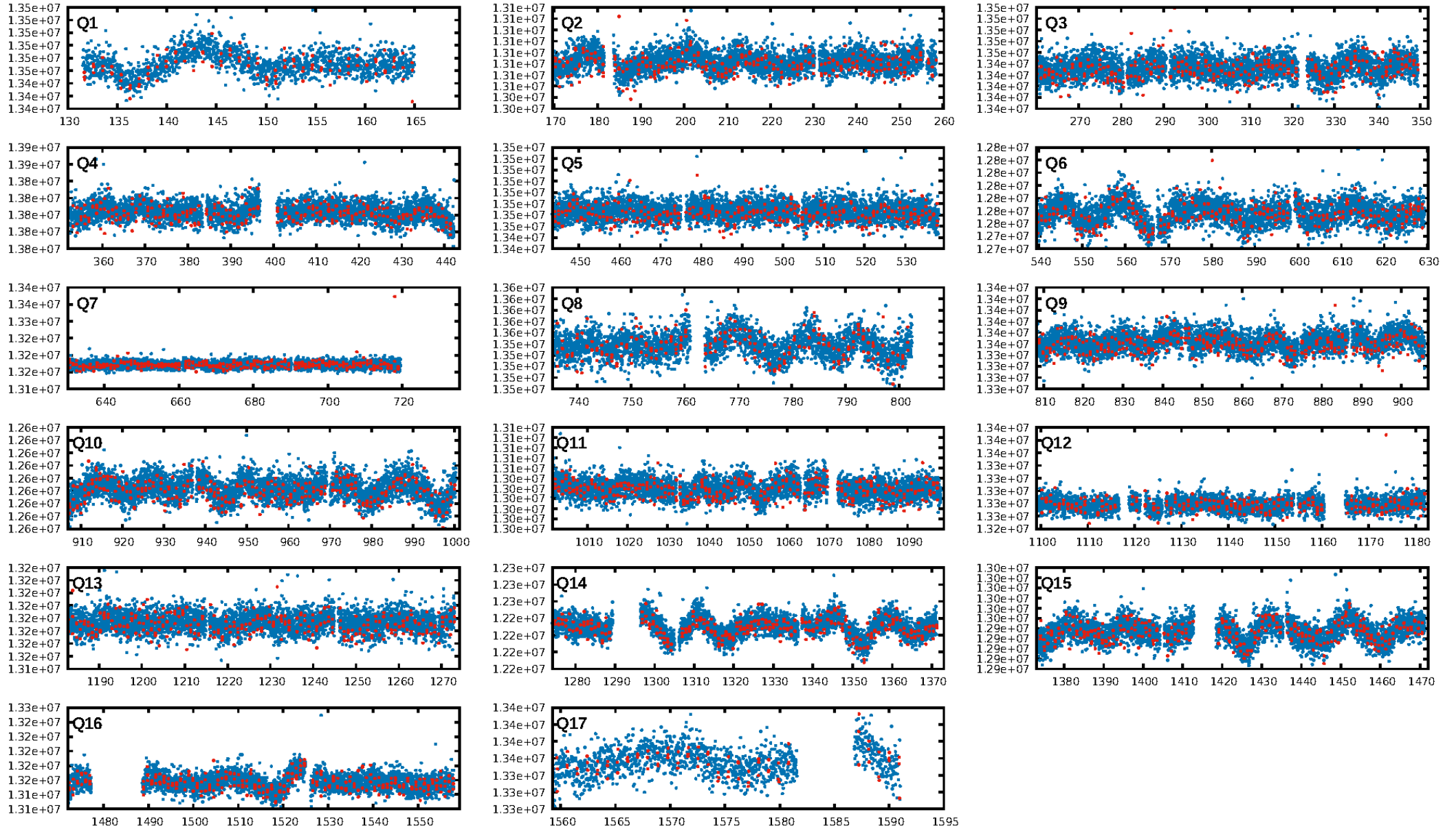
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.17e-23
RollingBand-fgt: 0.88 [1222/1392]
GhostDiagnostic-chr: 0.3272
Centroid-sig: 0.0%
Centroid-so: 6.953 arcsec [6.49σ]
OotOffset-rm: 4.262 arcsec [37.95σ]
KicOffset-rm: 4.256 arcsec [37.89σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

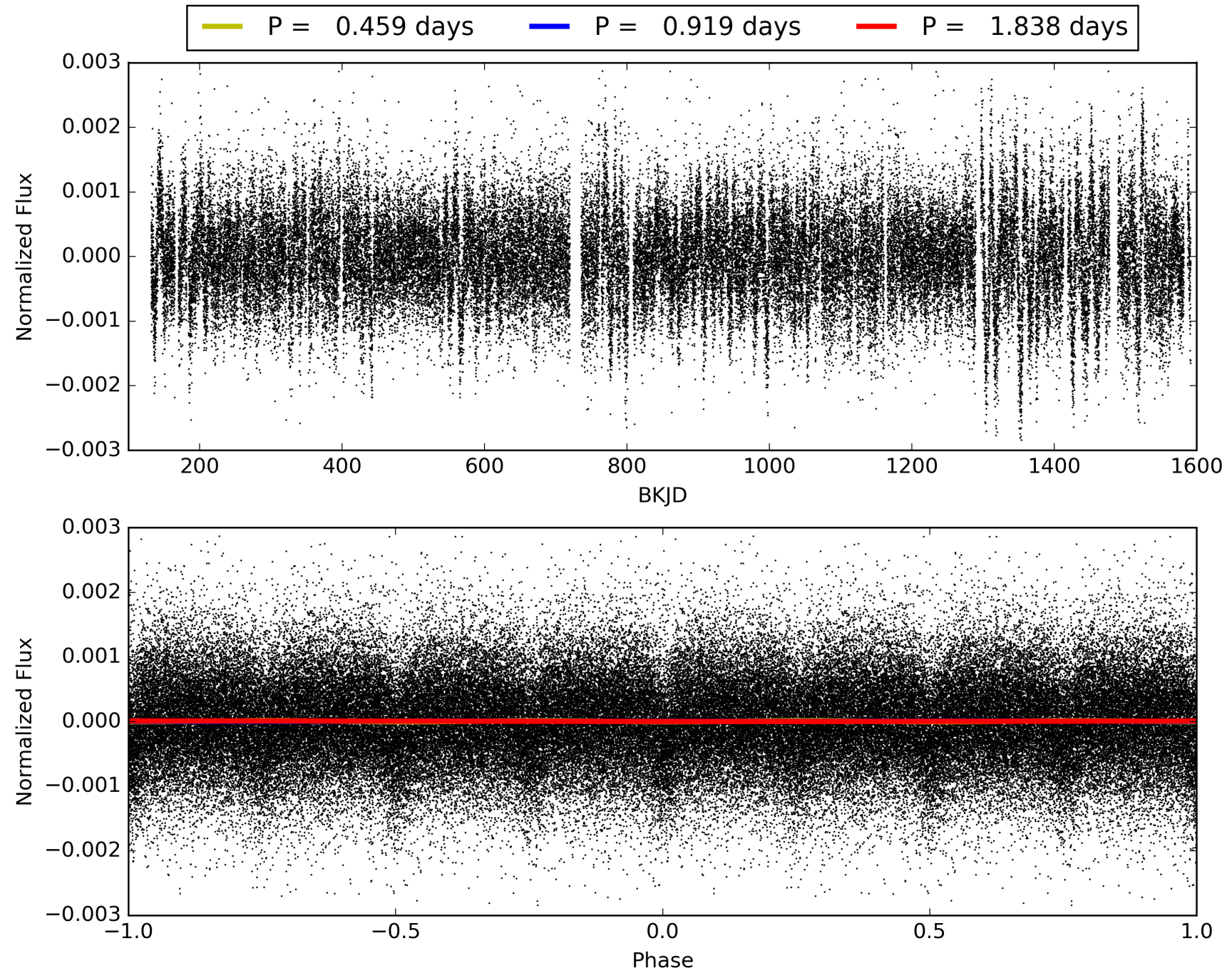
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 04:46:08 Z

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

TCE 008645191-01, PDC Light Curves

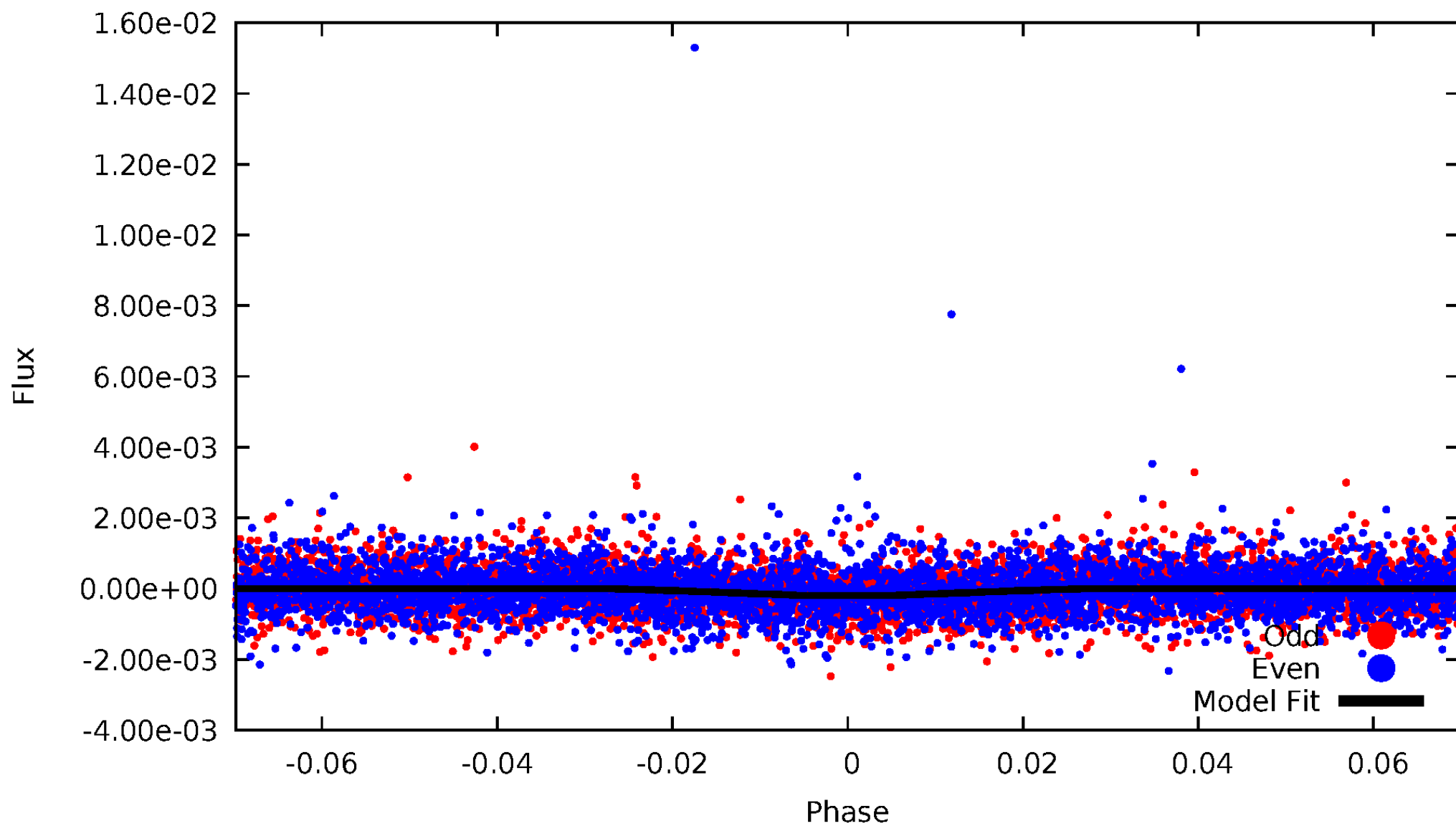


TCE 008645191-01



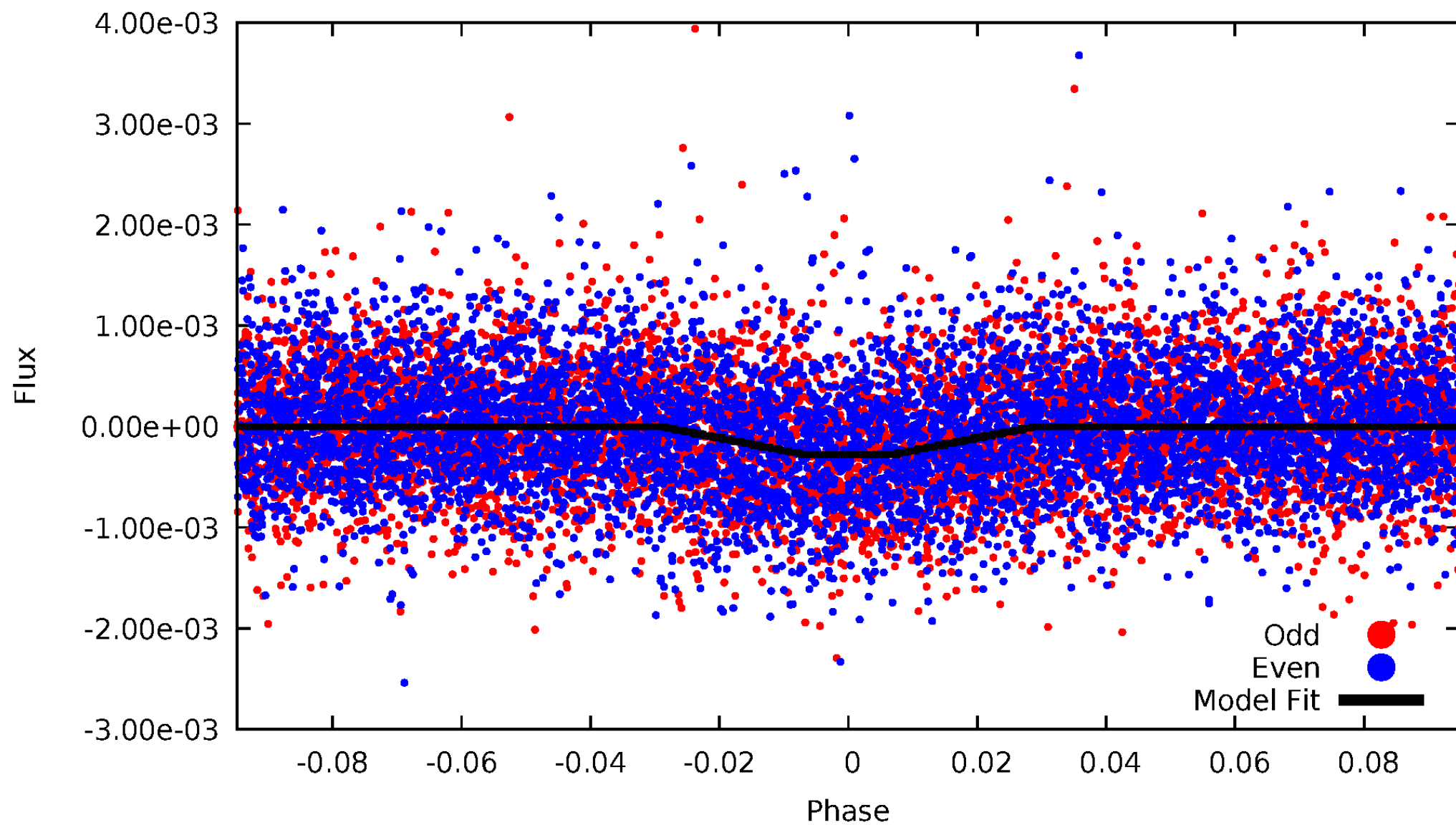
DV Odd/Even

TCE 008645191-01



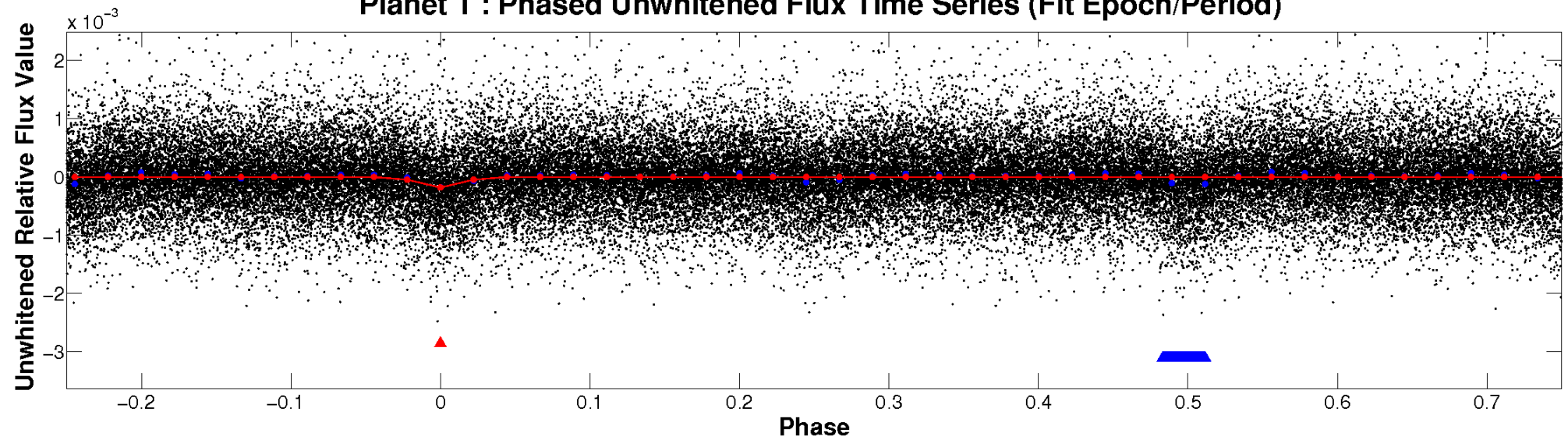
ALT Odd/Even

TCE 008645191-01

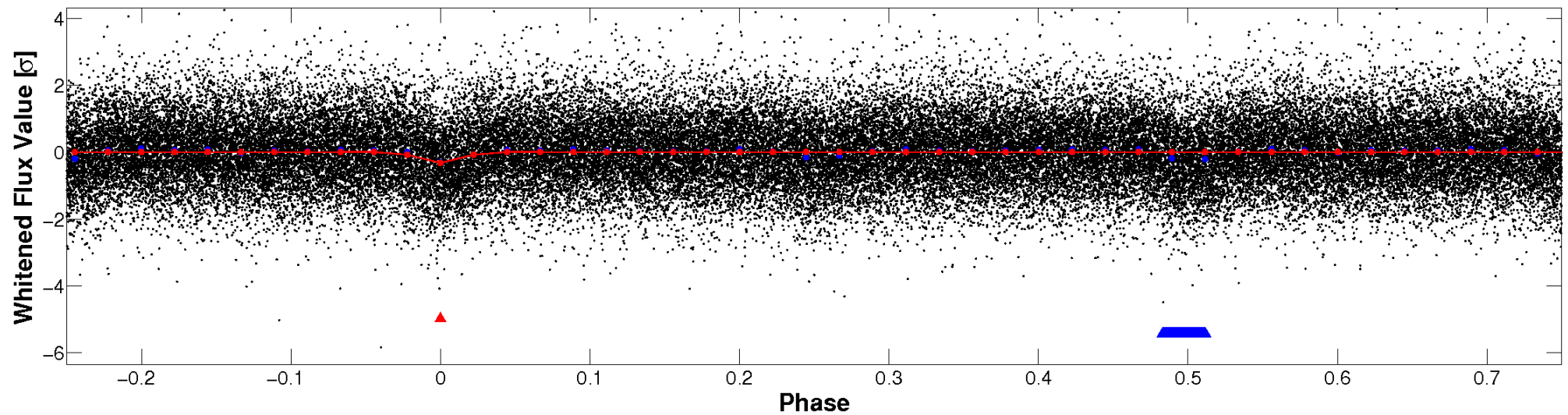


Non-Whitened Vs. Whitened Light Curve

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

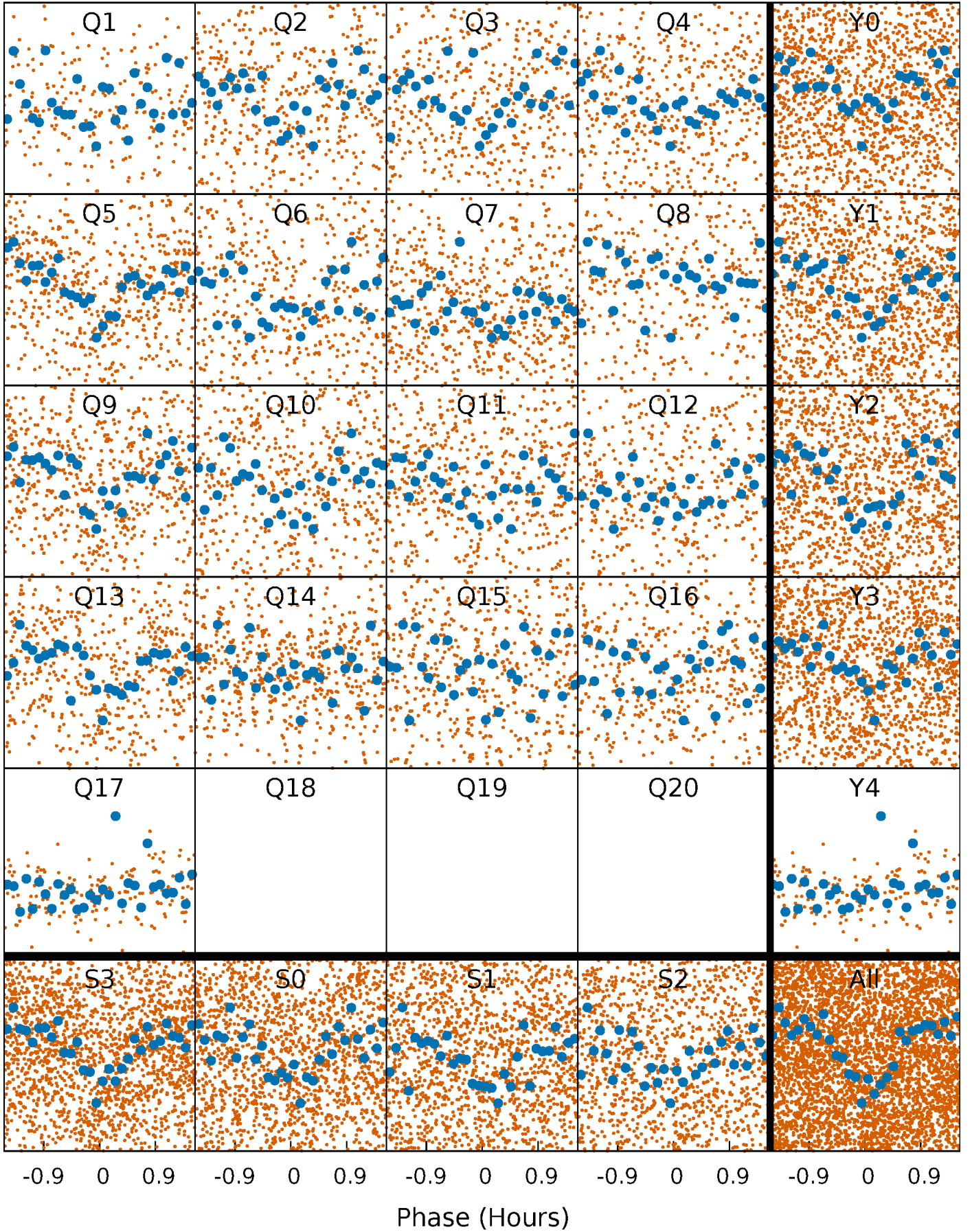


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



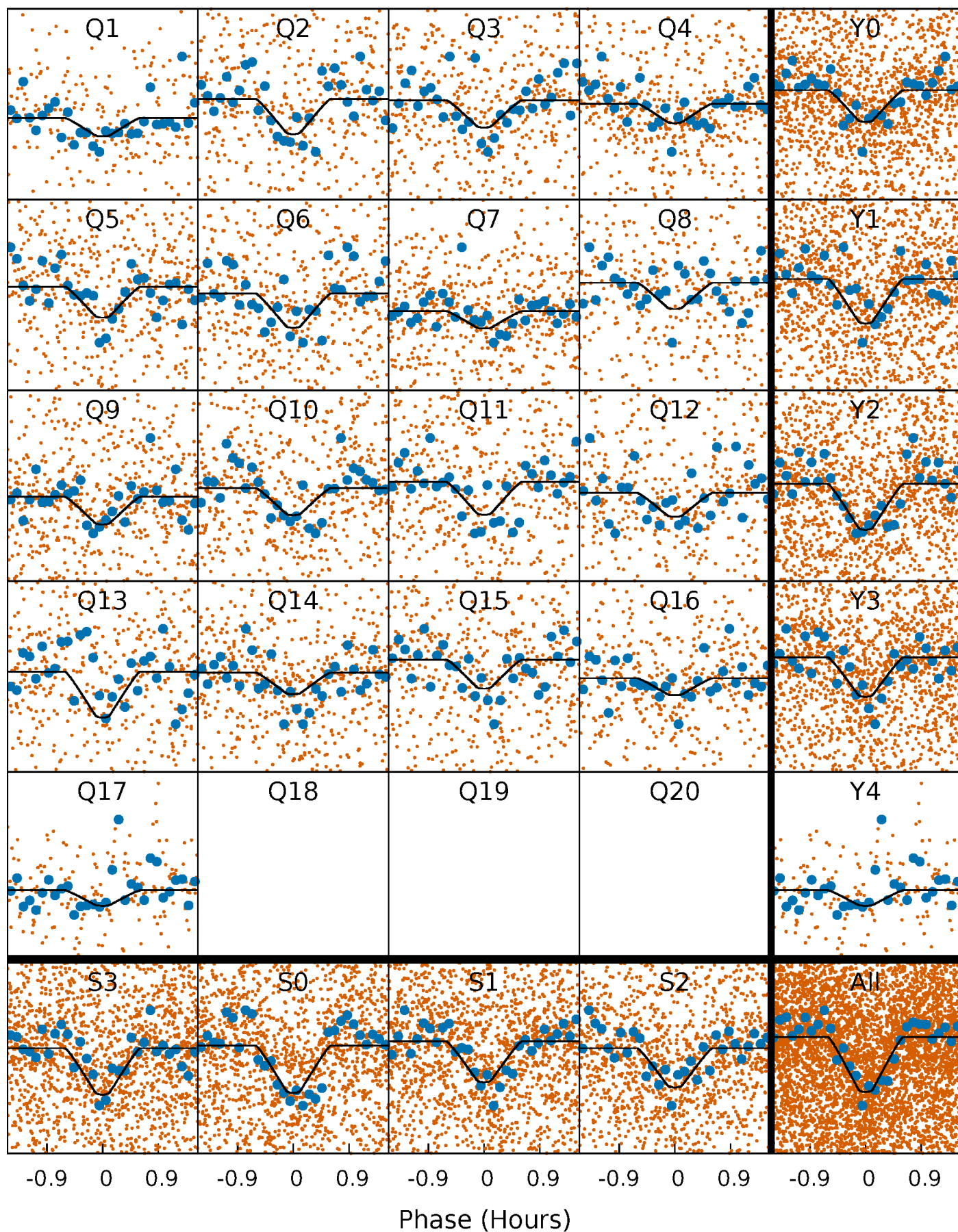
PDC Quarter-Phased Transit Curves

TCE 008645191-01 P= 0.918920 Days $T_0=131.679668$ (BKJD)



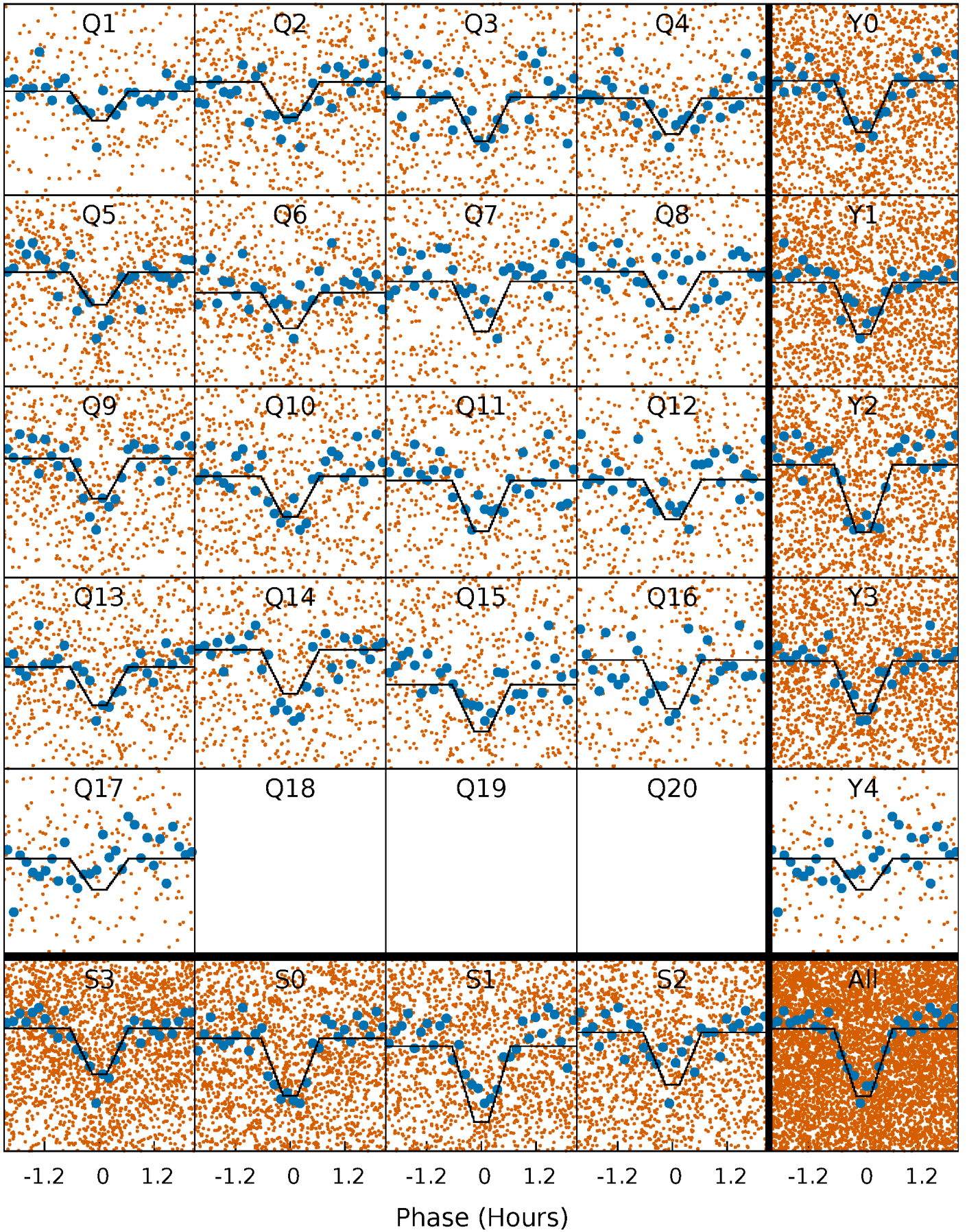
DV Quarter-Phased Transit Curves

TCE 008645191-01 P= 0.918920 Days $T_0=131.679668$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

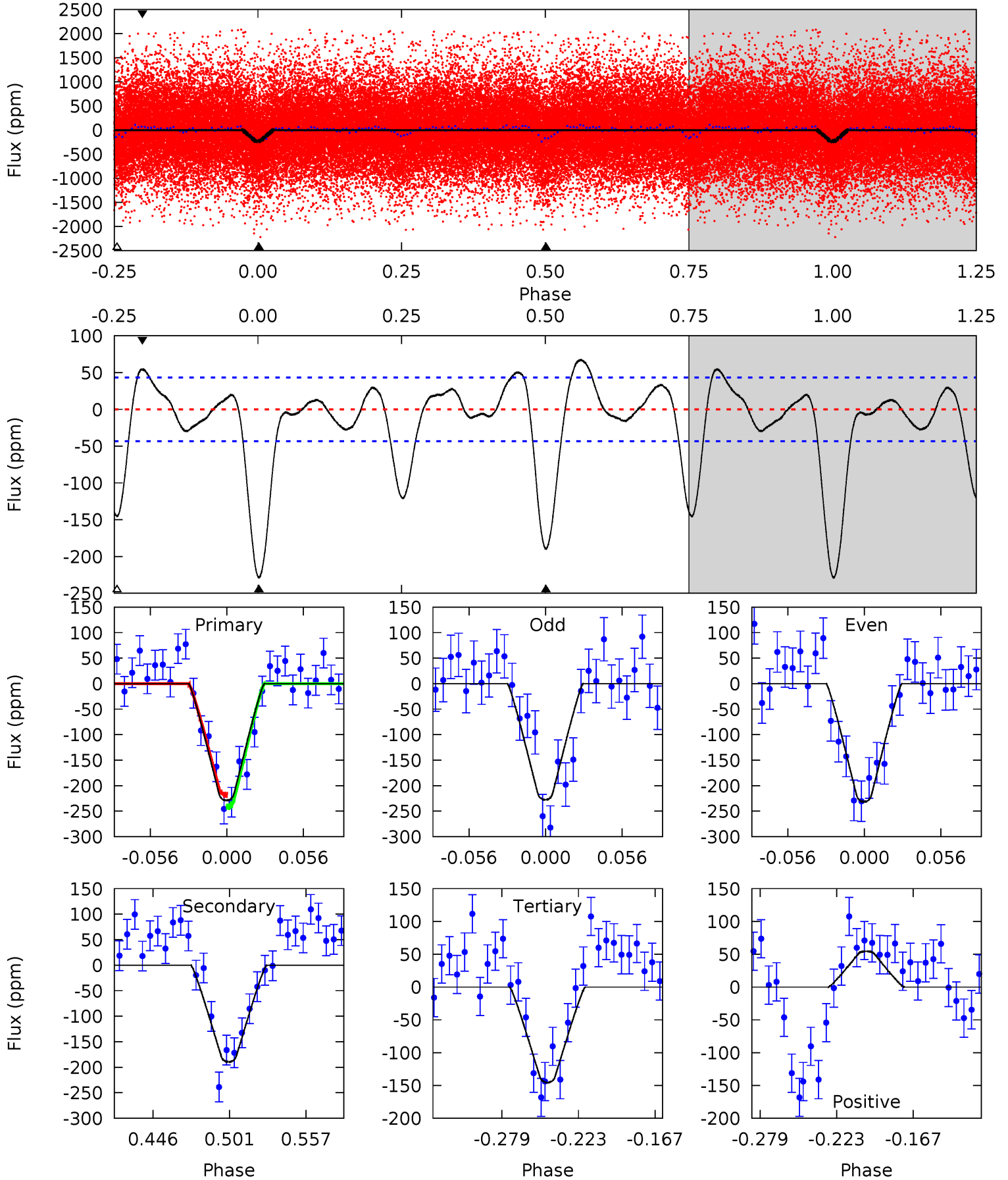
TCE 008645191-01 P= 0.918924 Days $T_0=131.678498$ (BKJD)



DV Model-Shift Uniqueness Test

008645191-01, P = 0.918920 Days, E = 130.760748 Days

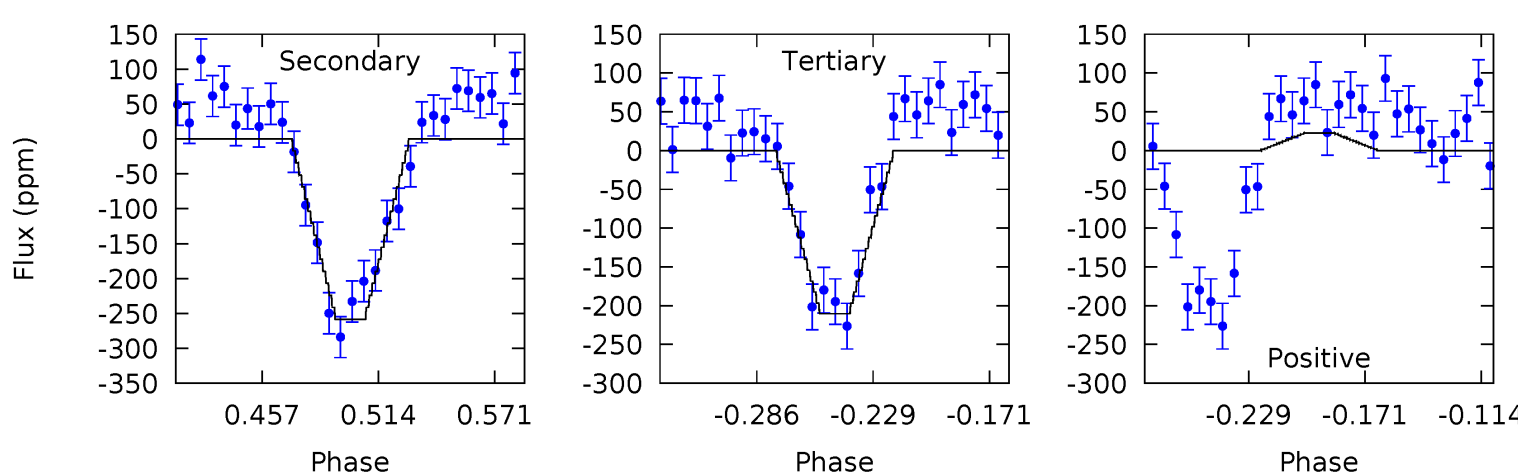
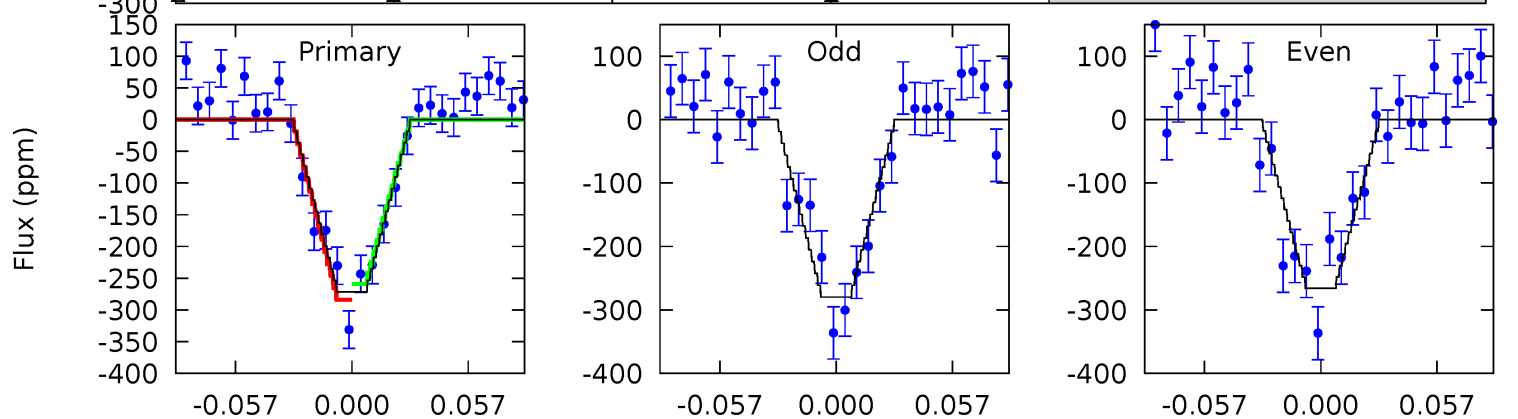
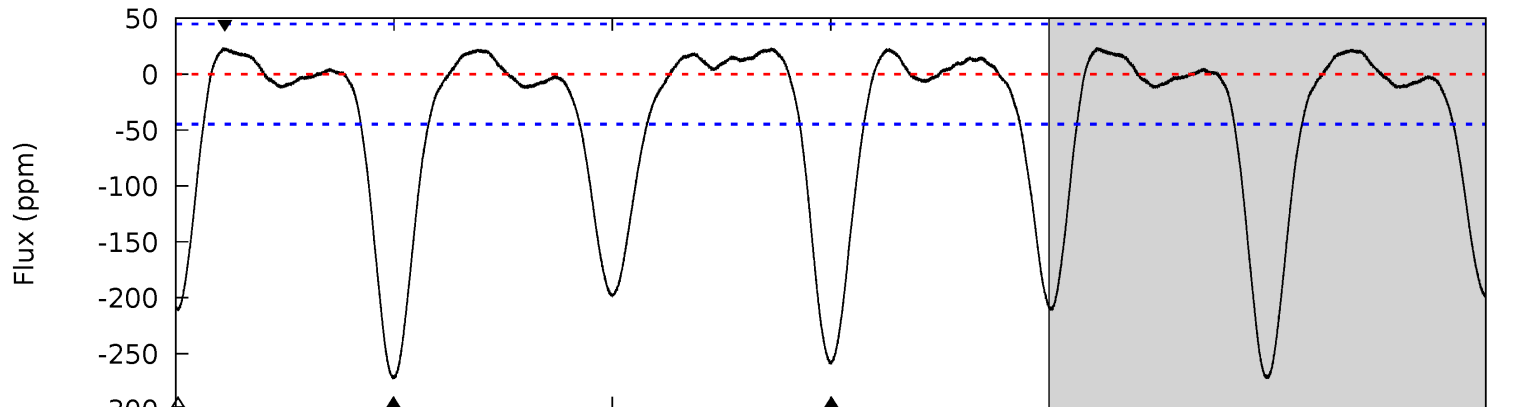
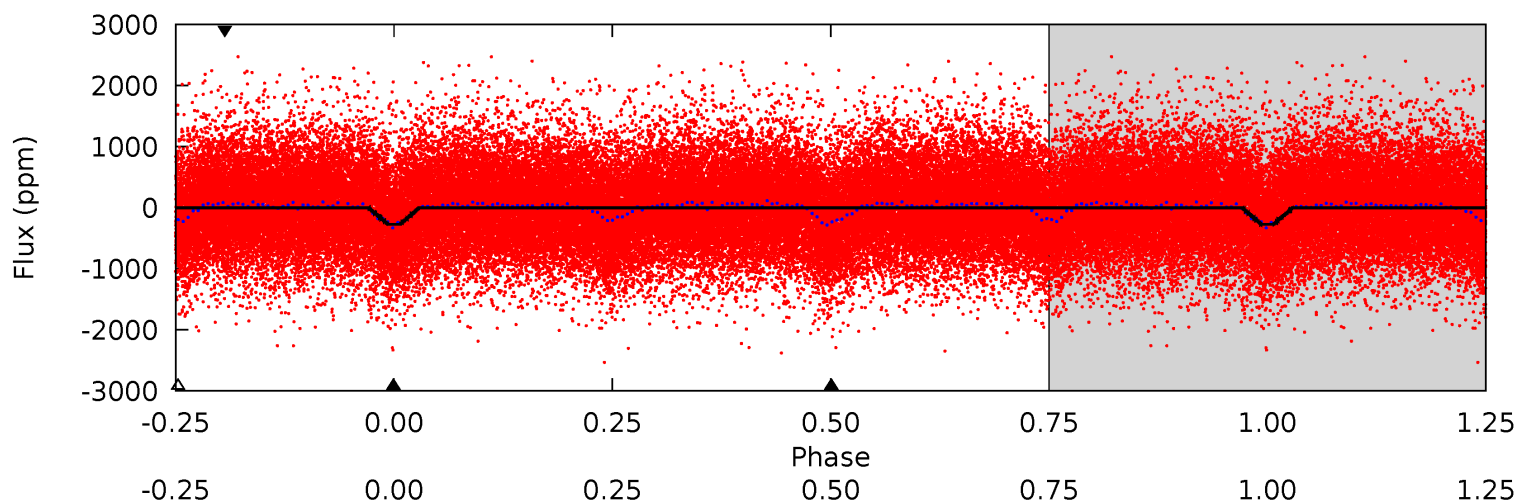
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 24.8 | 20.5 | 15.7 | 5.90 | 4.69 | 1.91 | 4.39 | 9.04 | 18.9 | 4.78 | 14.6 | 0.21 | 0.96 | 0.23 | 1.30 |



Alt Model-Shift Uniqueness Test

008645191-01, P = 0.918924 Days, E = 130.759574 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 28.4 | 27.0 | 22.0 | 2.37 | 4.68 | 1.90 | 6.19 | 6.39 | 26.0 | 5.02 | 24.6 | 0.73 | 0.96 | 0.08 | 1.32 |



Stellar Parameters For KIC 008645191

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5655^{+169}_{-169} | $4.561^{+0.042}_{-0.179}$ | $-0.140^{+0.300}_{-0.300}$ | $0.833^{+0.220}_{-0.073}$ | $0.926^{+0.094}_{-0.104}$ | $2.253^{+0.401}_{-1.089}$ |
| | +3%/-3% | +1%/-4% | +214%/-214% | +26%/-9% | +10%/-11% | +18%/-48% |
| 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 008645191-01 / KOI 4311.01

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|---------------|------------------------|----------------------|-----------------------|------------------|
| DV | -190 ± 9 | $1.52^{+0.83}_{-0.76}$ | 2412^{+163}_{-104} | 5254^{+2300}_{-873} | 15^{+43}_{-8} |
| Alt. | -259 ± 10 | $1.67^{+0.80}_{-0.80}$ | 2424^{+149}_{-106} | 5423^{+2233}_{-864} | 16^{+44}_{-9} |

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

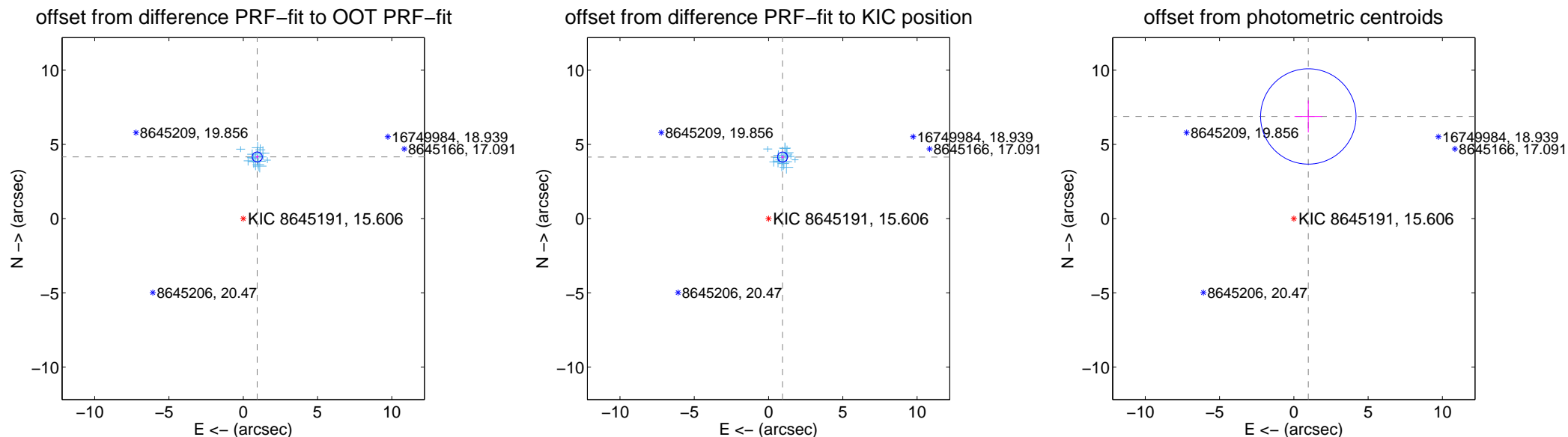
DV Centroid Data

Supplemental centroid analysis for 008645191-01. Kepler magnitude: 15.61. Transit SNR 13.38

There are 17 quarters with good PRF difference image offsets

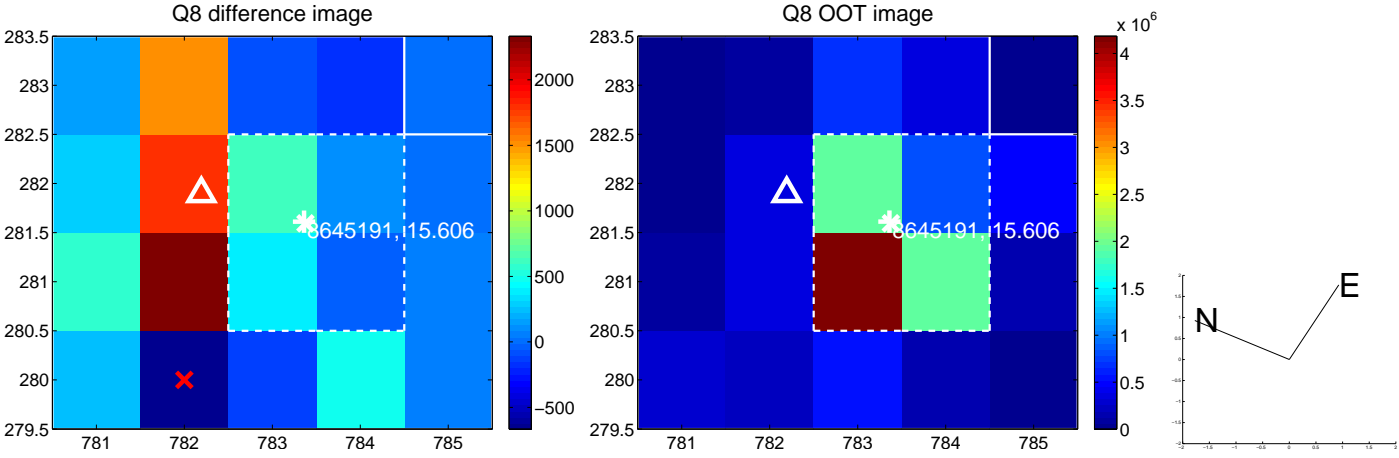
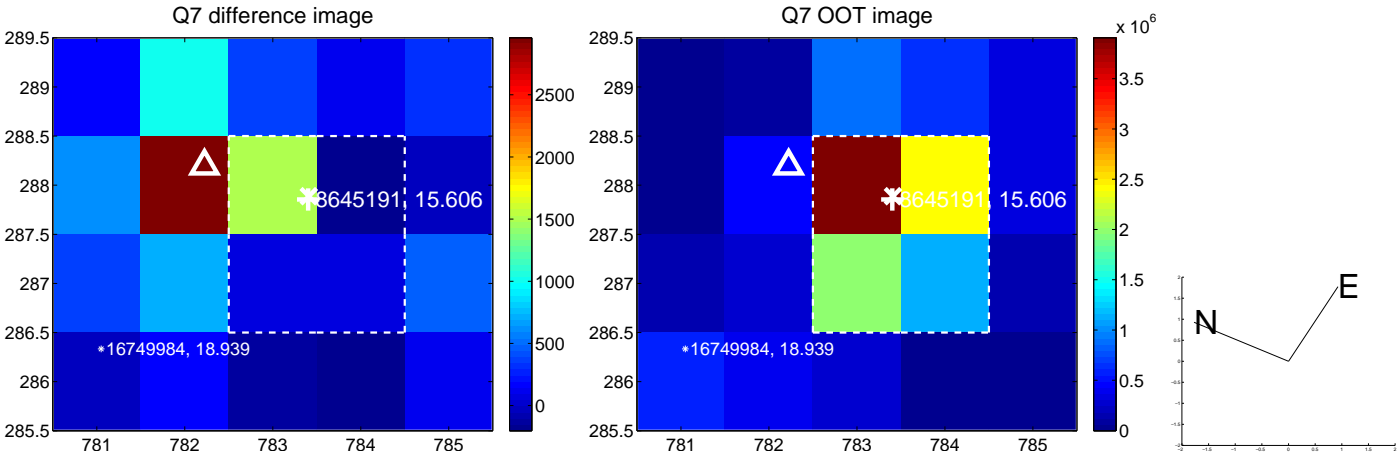
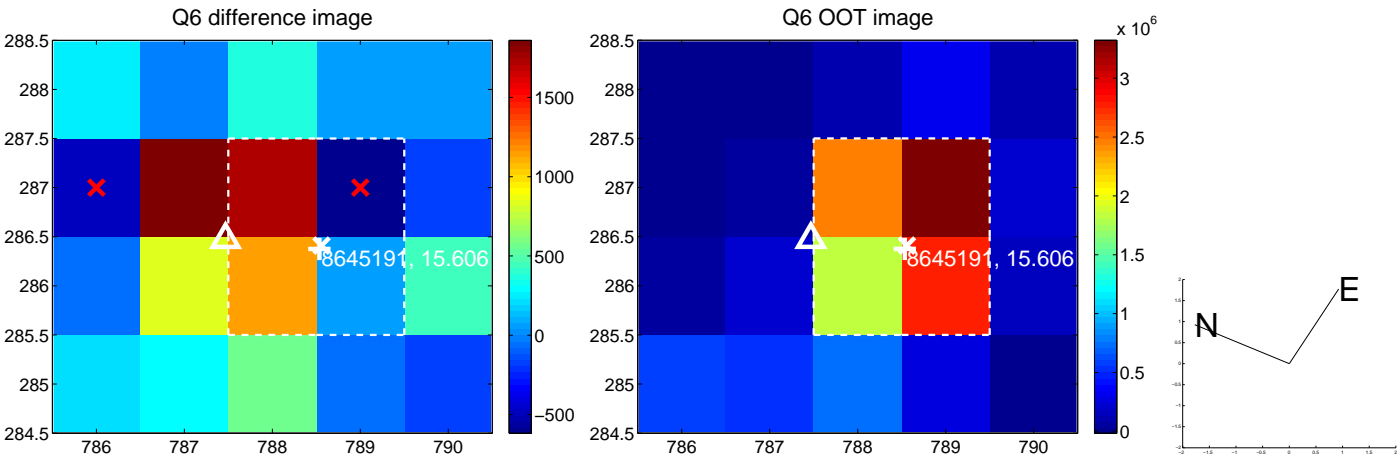
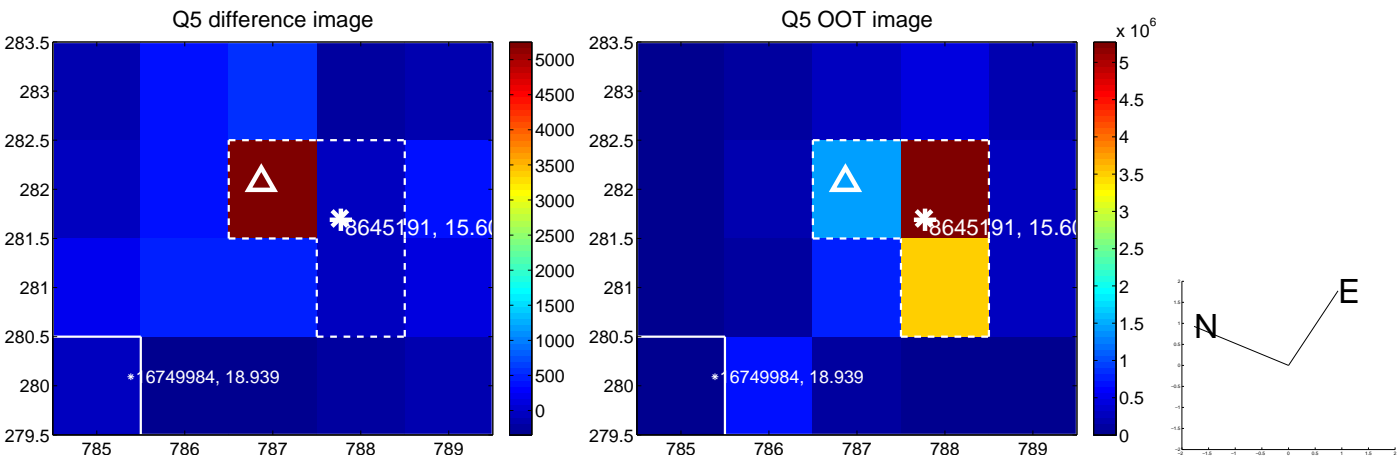
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 4.262 ± 0.112 | 37.95 | -0.941 ± 0.113 | 4.157 ± 0.112 |
| PRF-fit source offset from KIC position | 4.256 ± 0.112 | 37.89 | -0.945 ± 0.113 | 4.149 ± 0.112 |
| photometric centroid source offset | 6.95 ± 1.07 | 6.49 | -0.97 ± 0.93 | 6.88 ± 1.07 |

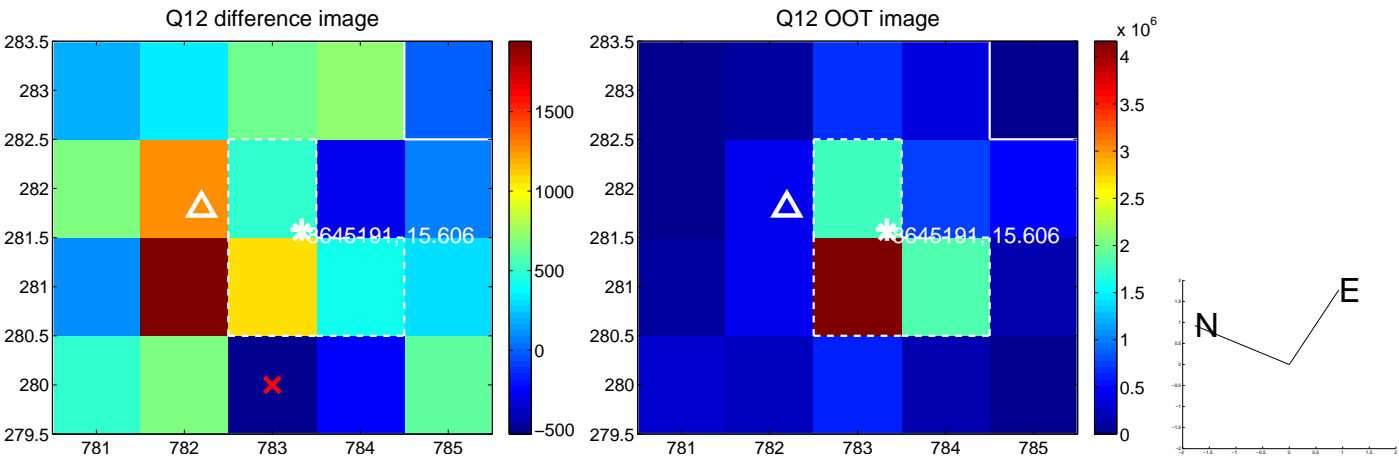
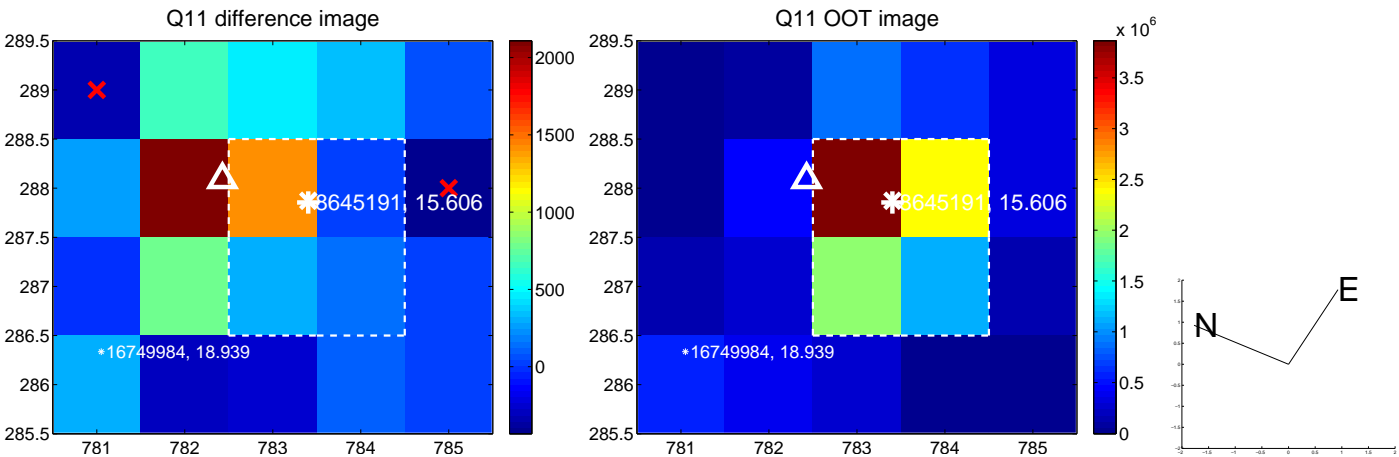
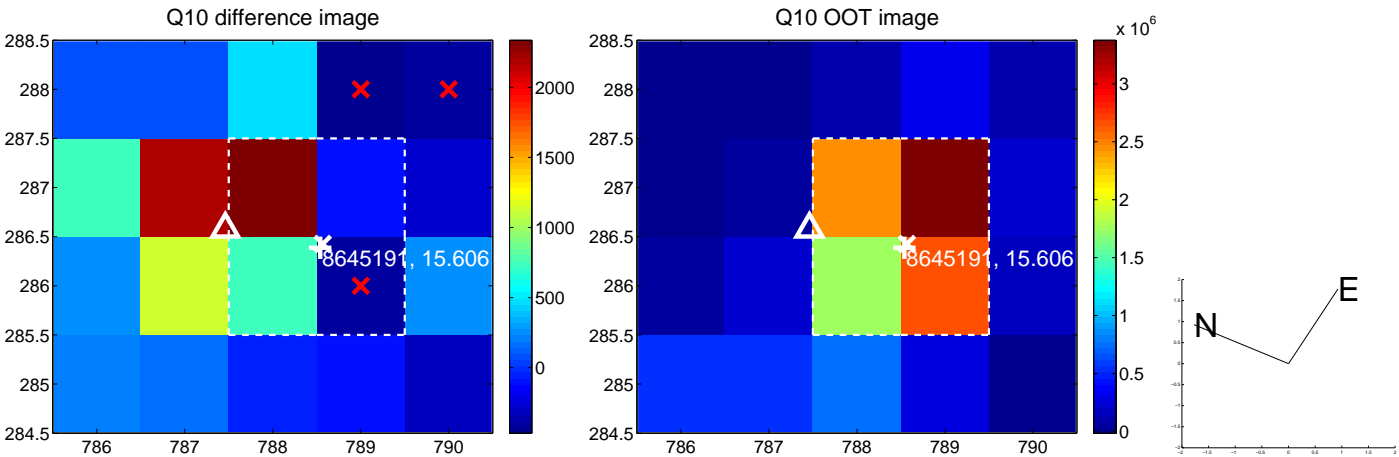
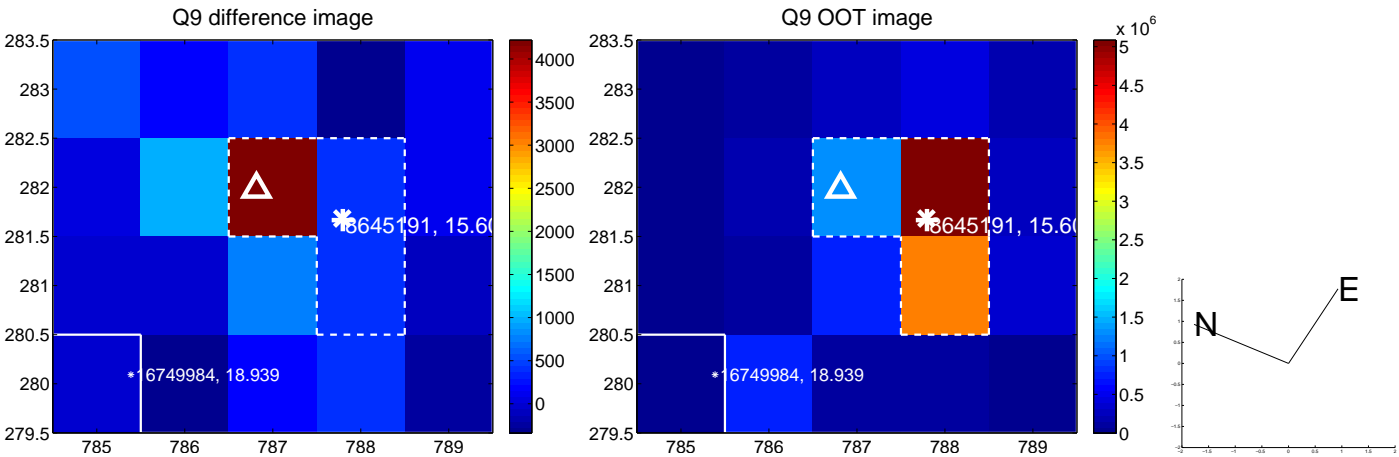


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

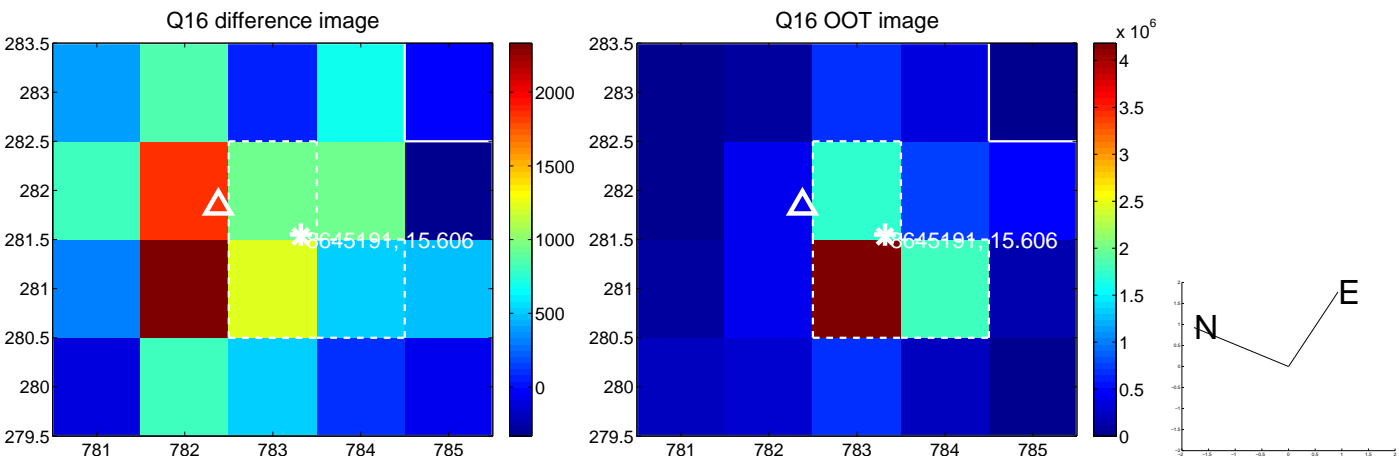
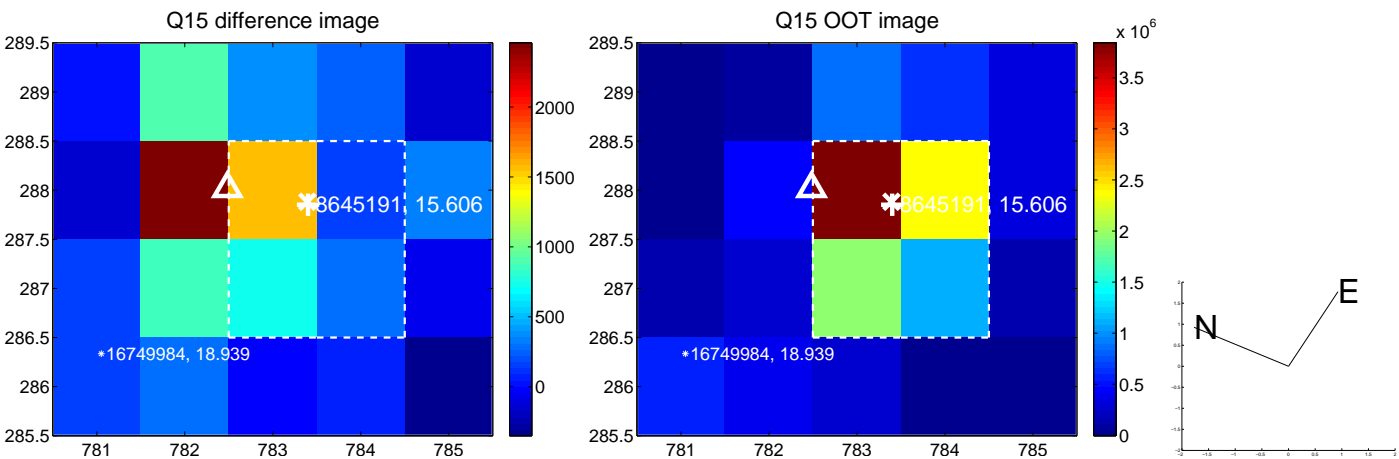
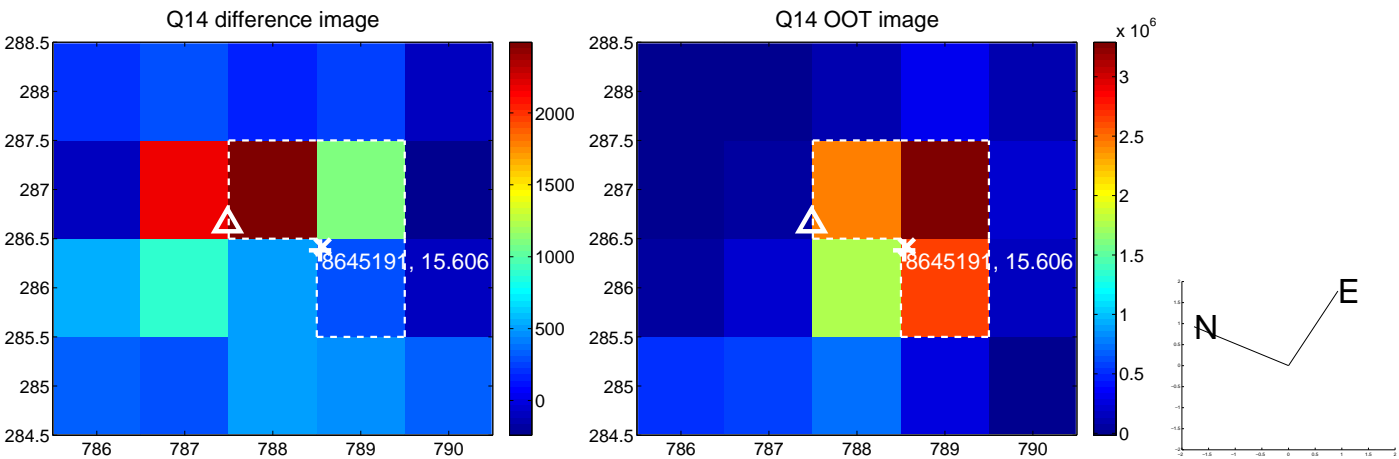
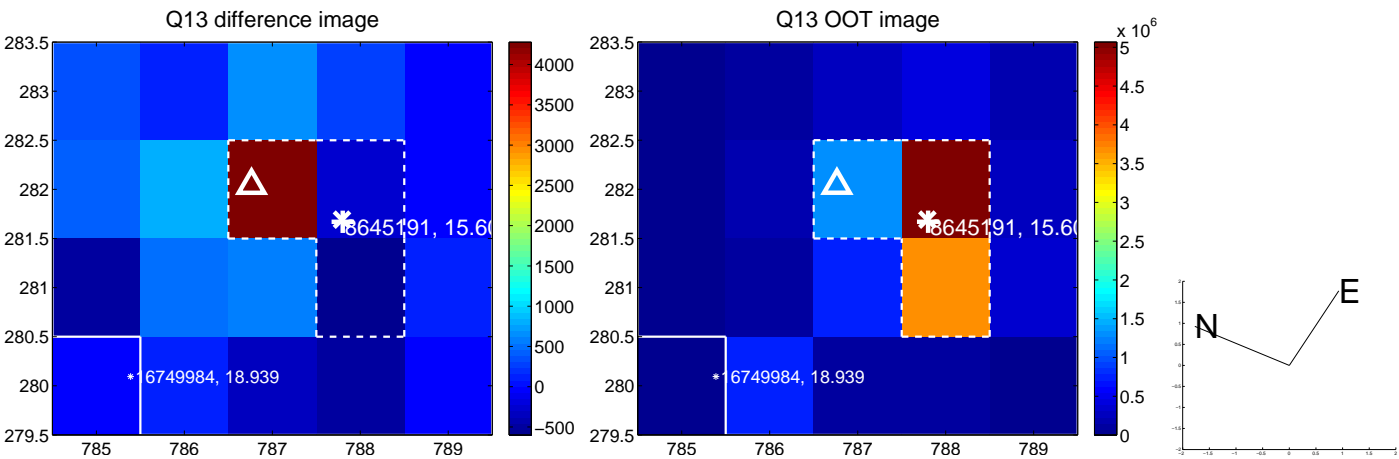
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



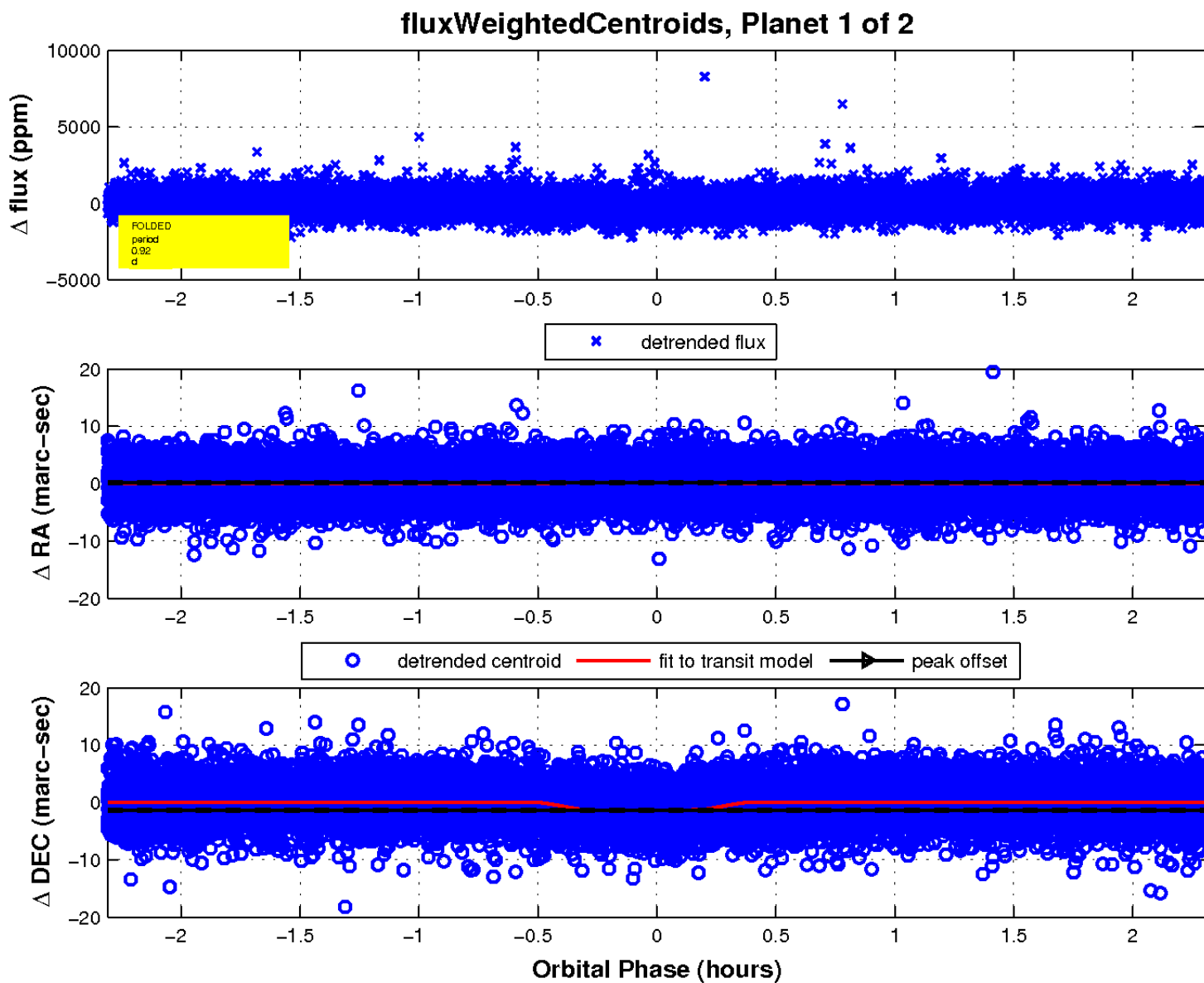
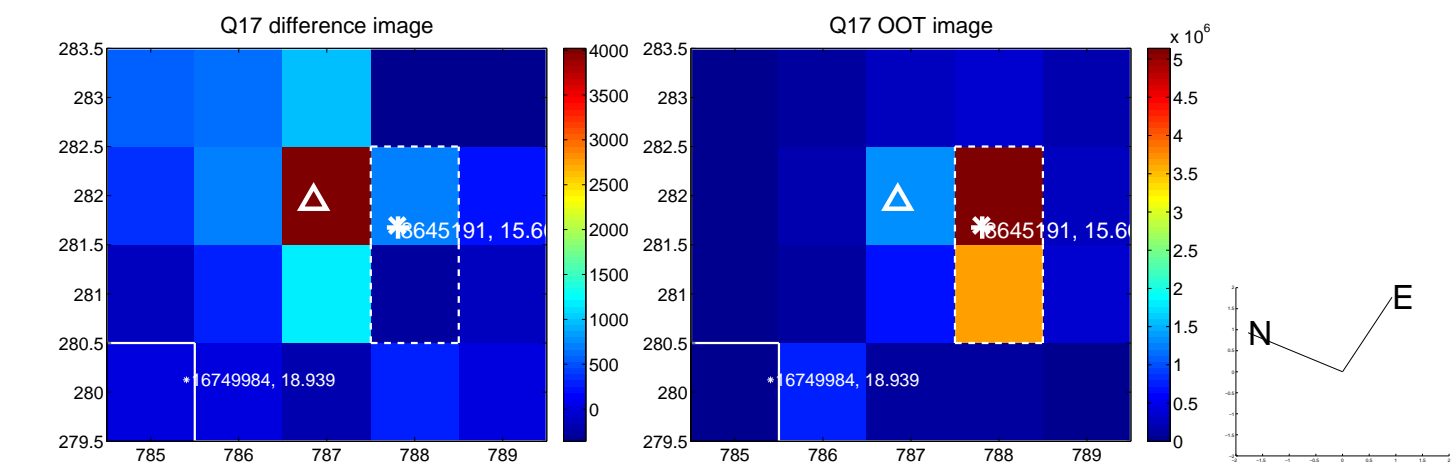
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

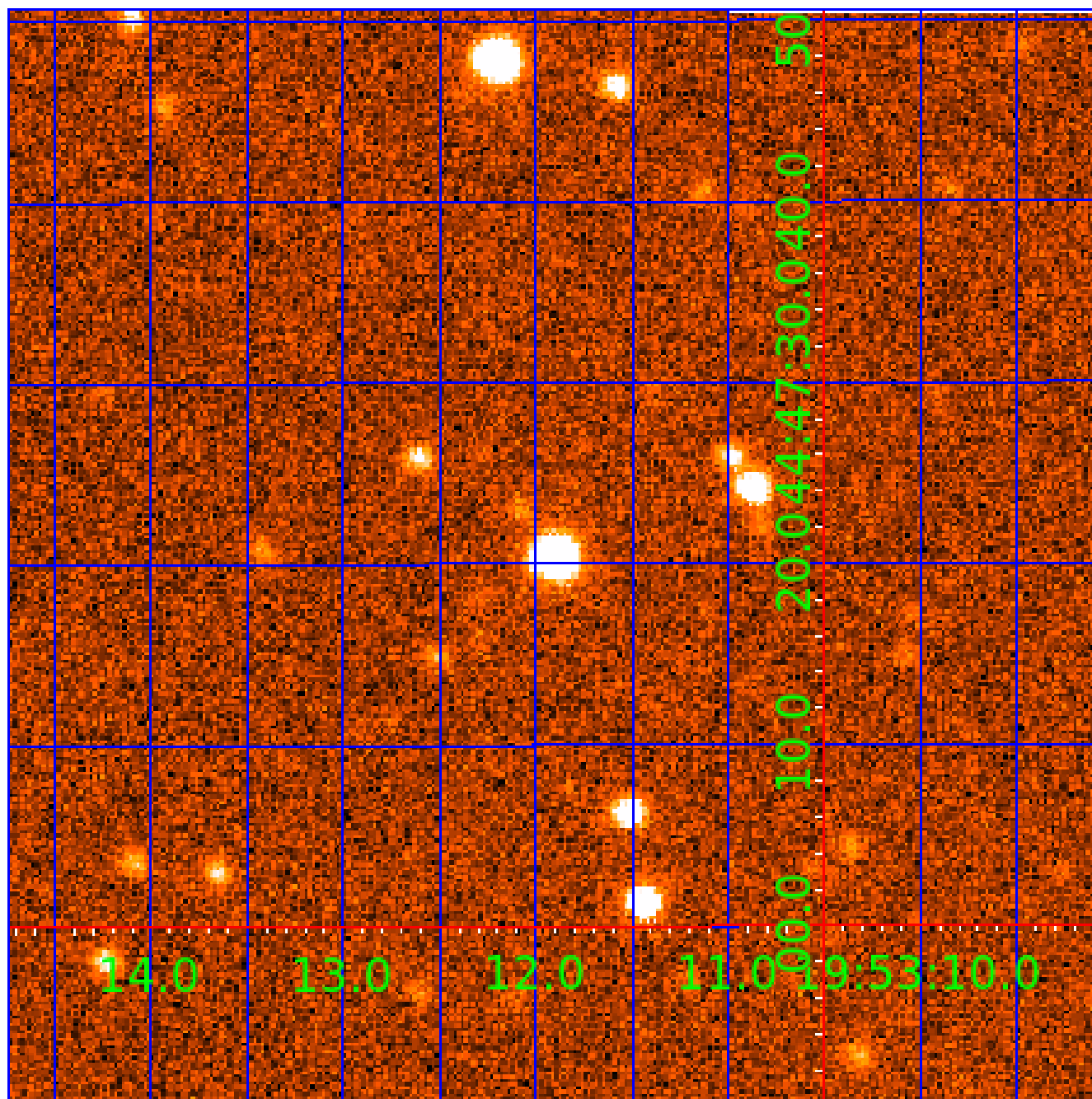


white \times : KIC target position; $+$: OOT centroid; Δ : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008645191

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|-----|------|-----------------------------|-----------------|------------------------|------------------------|
| 008645191-01 | OBS | 4311.01 | 0.918920 | 131.679668 | 201.2 | 0.770 | 9.6 | 13.4 | 0.83 | 5655 | 1.43 | 1961.93 |
| 008645191-02 | OBS | No | 0.918903 | 132.149853 | 149.9 | 0.936 | 9.3 | 11.3 | 0.83 | 5655 | 1.23 | 1961.98 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008645191-01 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | MOD_NONUNIQ_ALT—CENT_UNRESOLVED_OFFSET |
| 008645191-02 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_UNRESOLVED_OFFSET |

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.

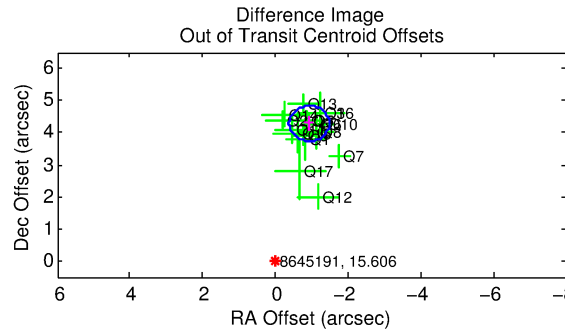
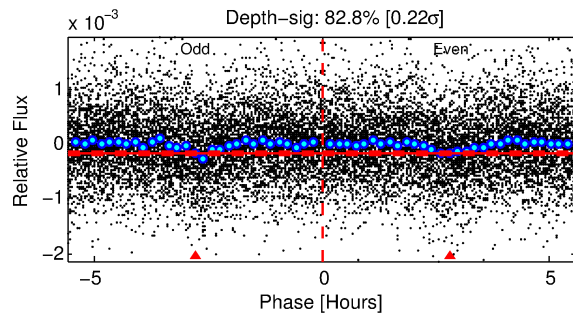
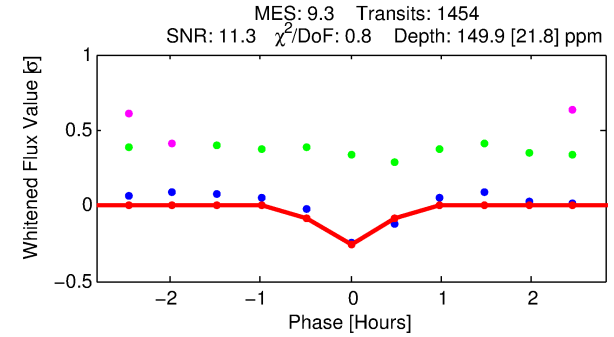
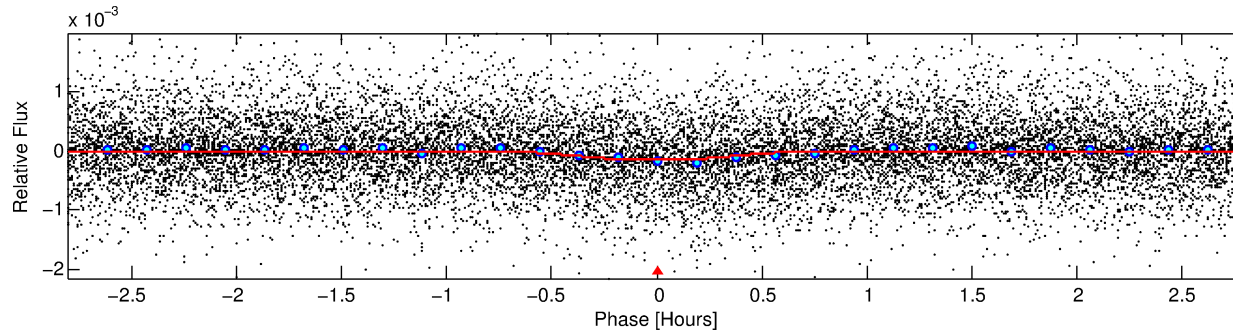
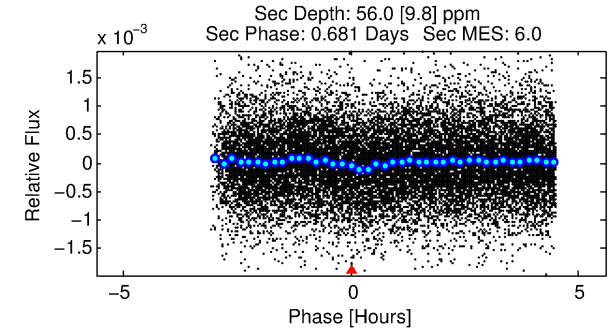
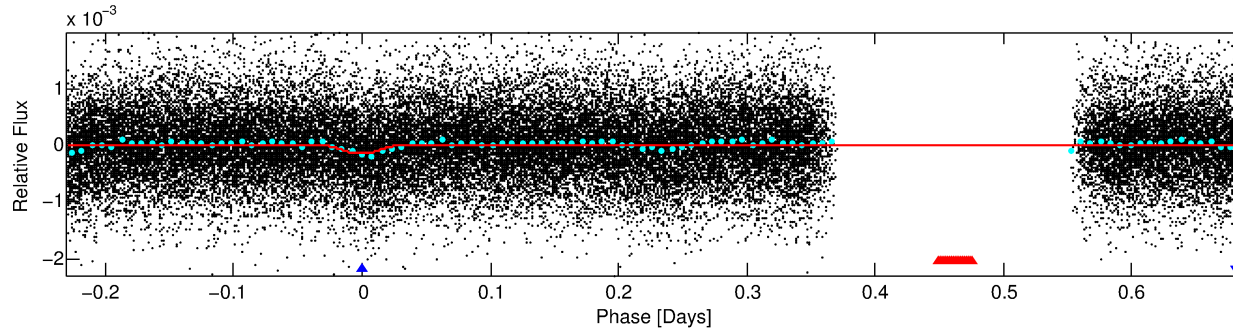
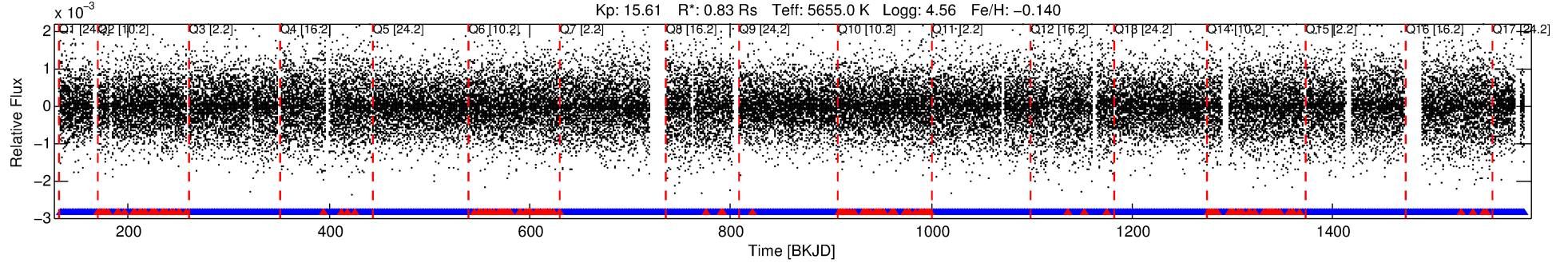
Ephemeris Match Information For 008645191-02

No Significant Match Found

DV One-Page Summary

KIC: 8645191 Candidate: 2 of 2 Period: 0.919 d
KOI: K04311 Corr: No Ephemeris Match

Kp: 15.61 R*: 0.83 Rs Teff: 5655.0 K Logg: 4.56 Fe/H: -0.140



DV Fit Results:

Period = 0.91890 [0.00001] d
Epoch = 132.1499 [0.0015] BKJD
Rp/R* = 0.0135 [0.0111]
a/R* = 3.58 [12.72]
b = 0.90 [0.81]
Seff = 1961.98 [681.89]
Teq = 1697 [147] K
Rp = 1.23 [1.06] Re
a = 0.0180 [0.0040] AU
Ag = 6.58 [11.05] [0.51σ]
Teff = 4202 [1735] K [1.44σ]

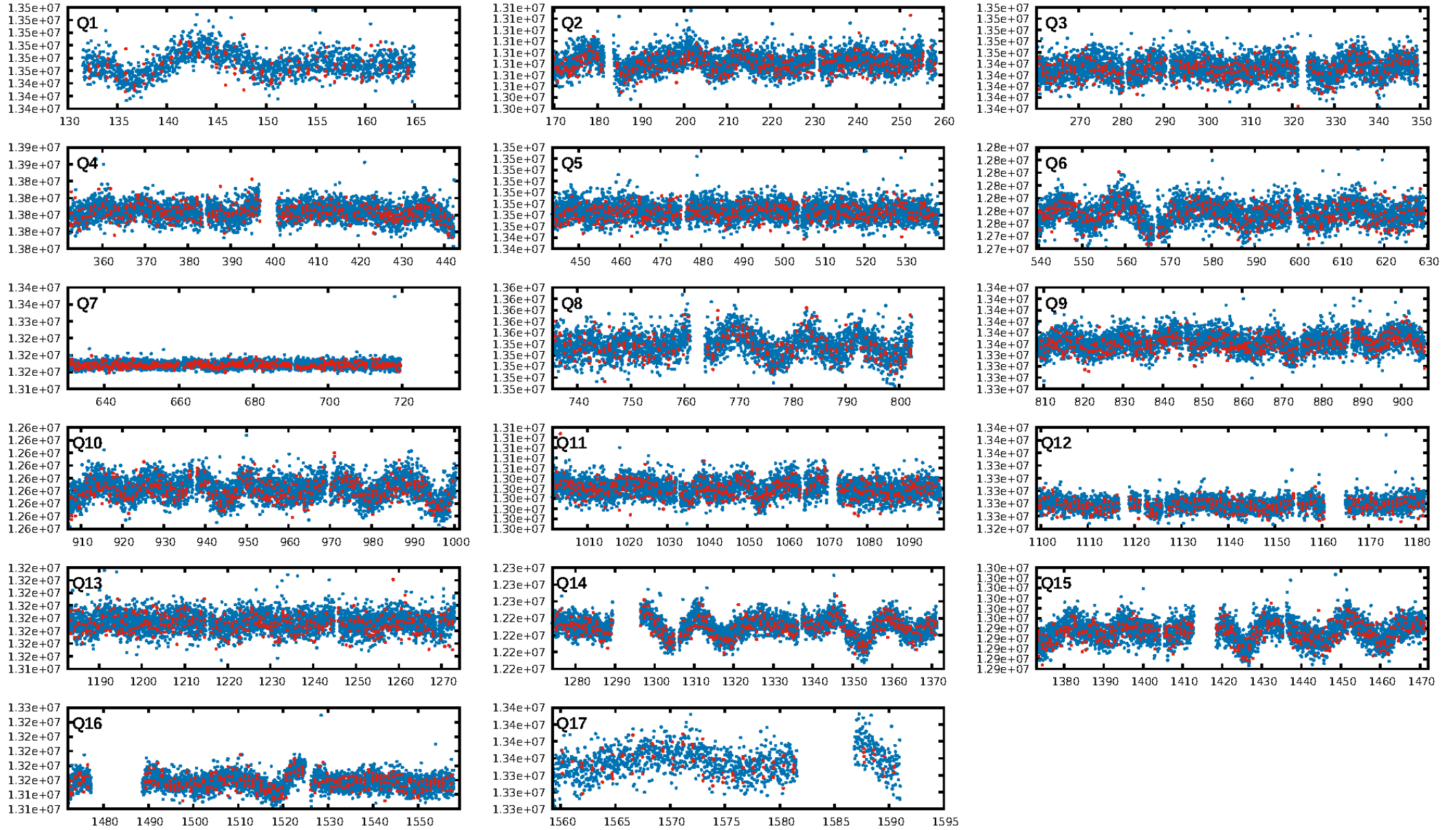
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 3.09e-22
RollingBand-fgt: 0.88 [1228/1389]
GhostDiagnostic-chr: 0.5951
Centroid-sig: 0.0%
Centroid-so: 9.597 arcsec [7.50σ]
OotOffset-rm: 4.383 arcsec [23.81σ]
KicOffset-rm: 4.379 arcsec [24.83σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
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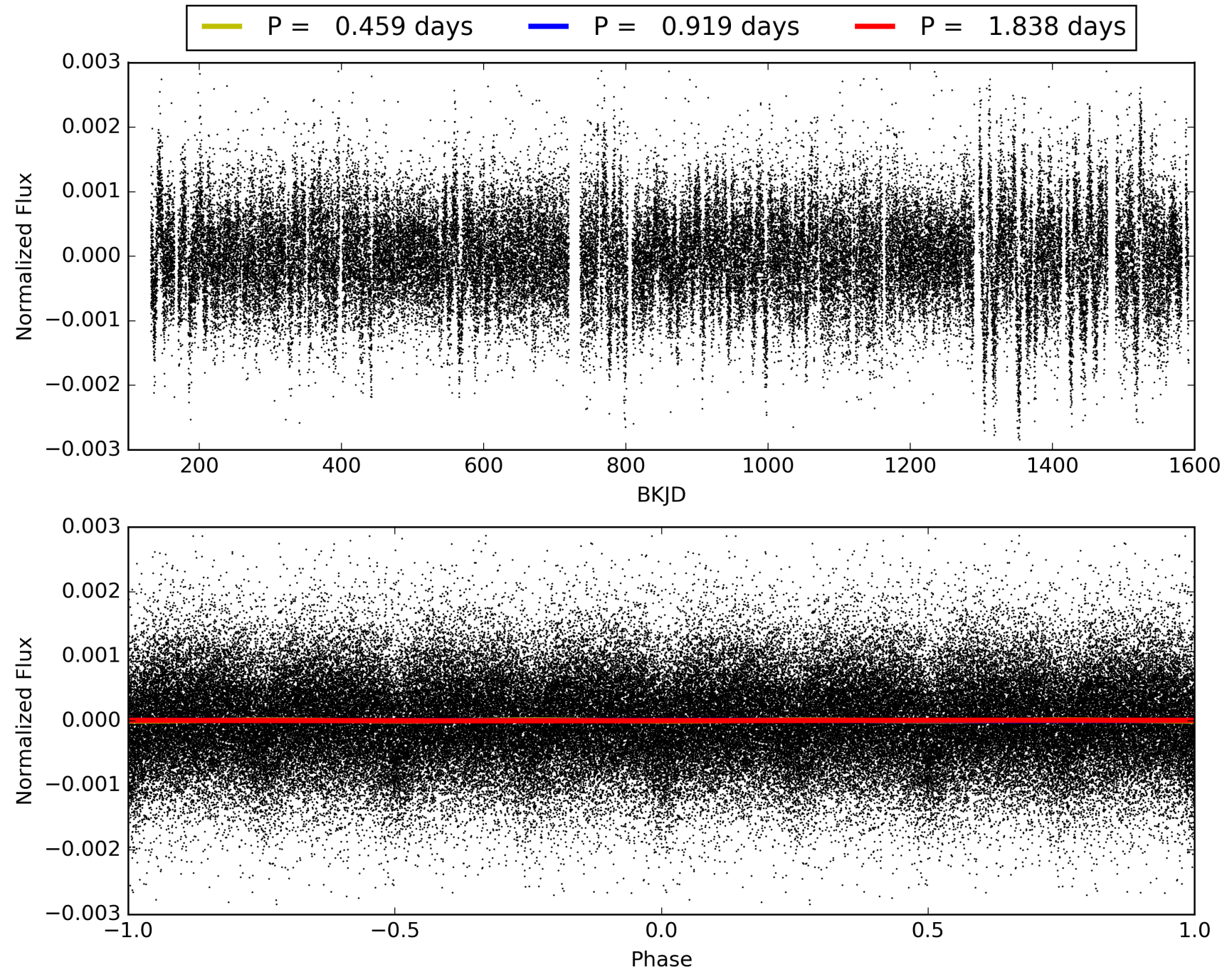
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 04:46:16 Z

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

TCE 008645191-02, PDC Light Curves

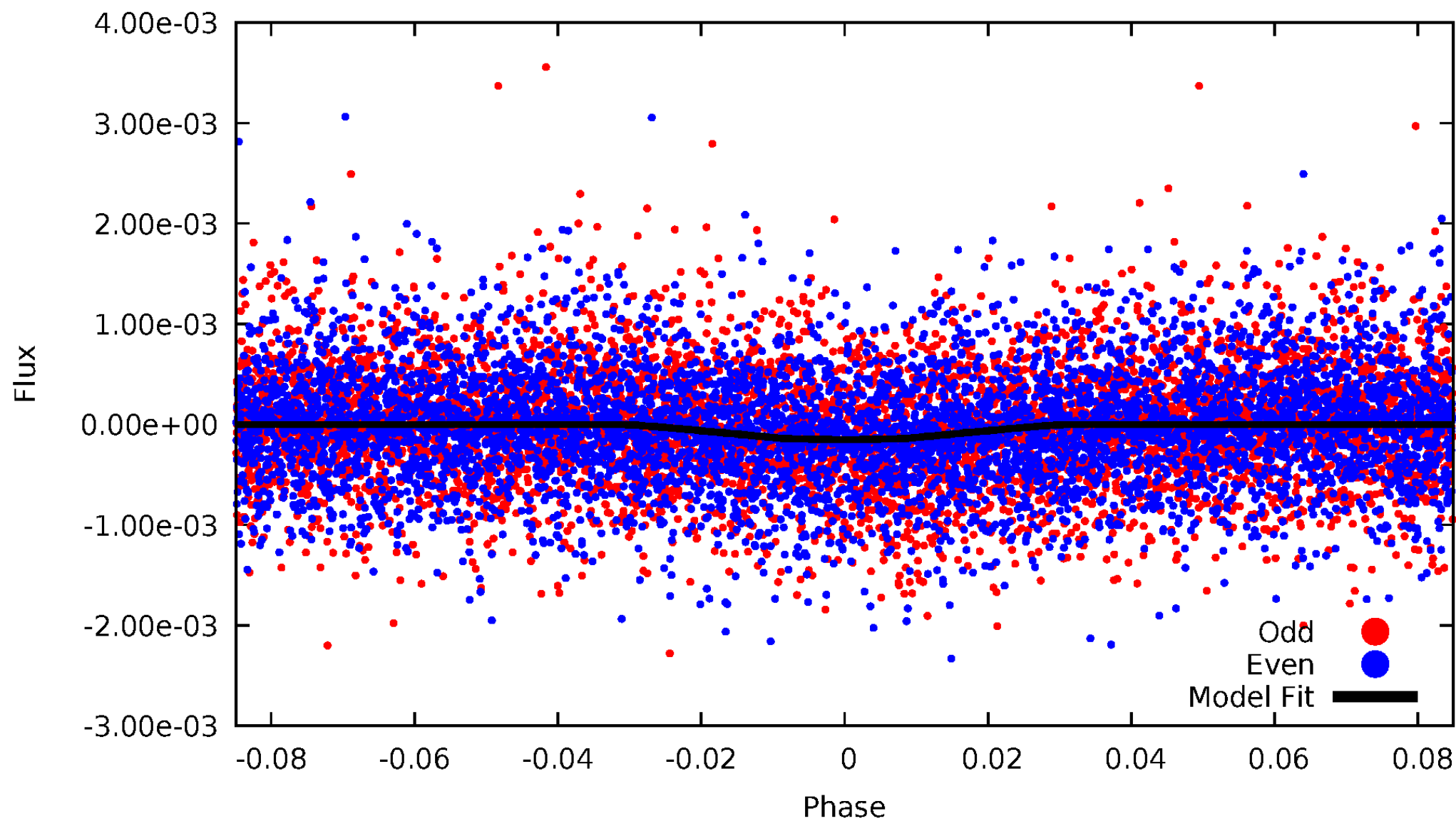


TCE 008645191-02



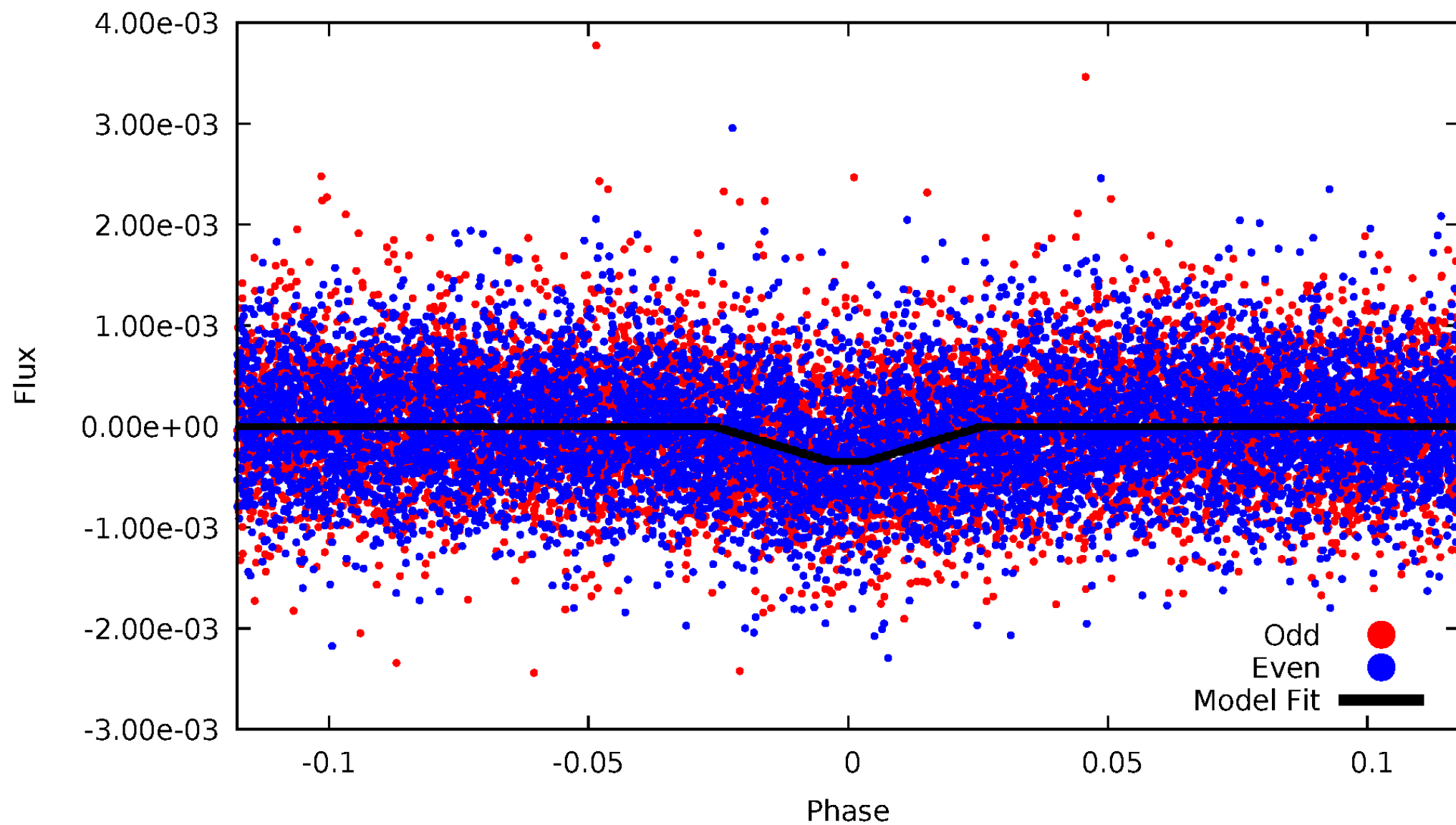
DV Odd/Even

TCE 008645191-02



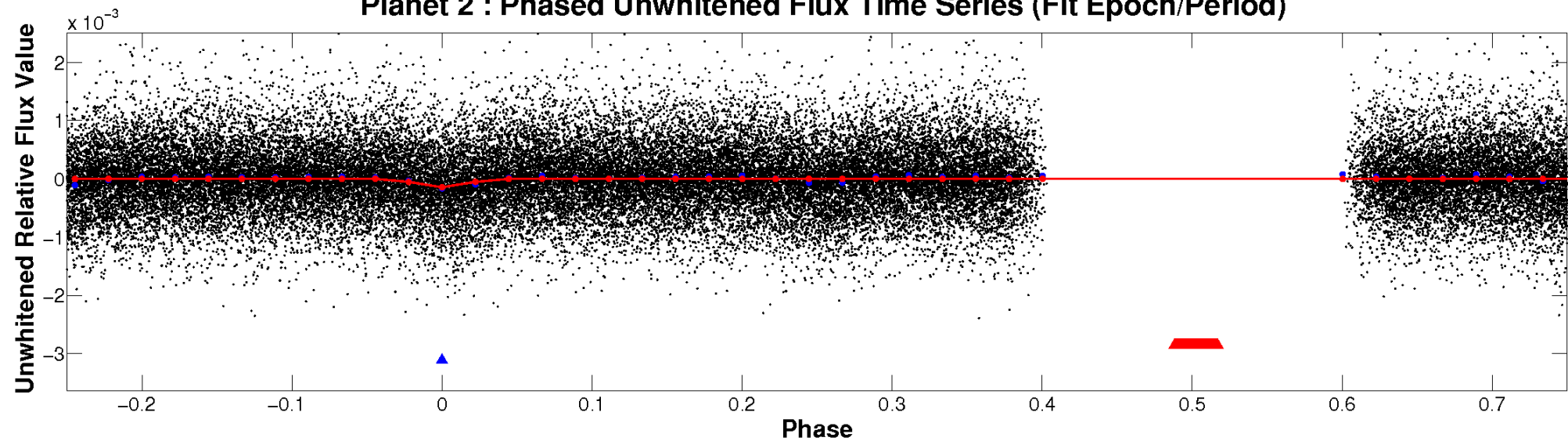
ALT Odd/Even

TCE 008645191-02

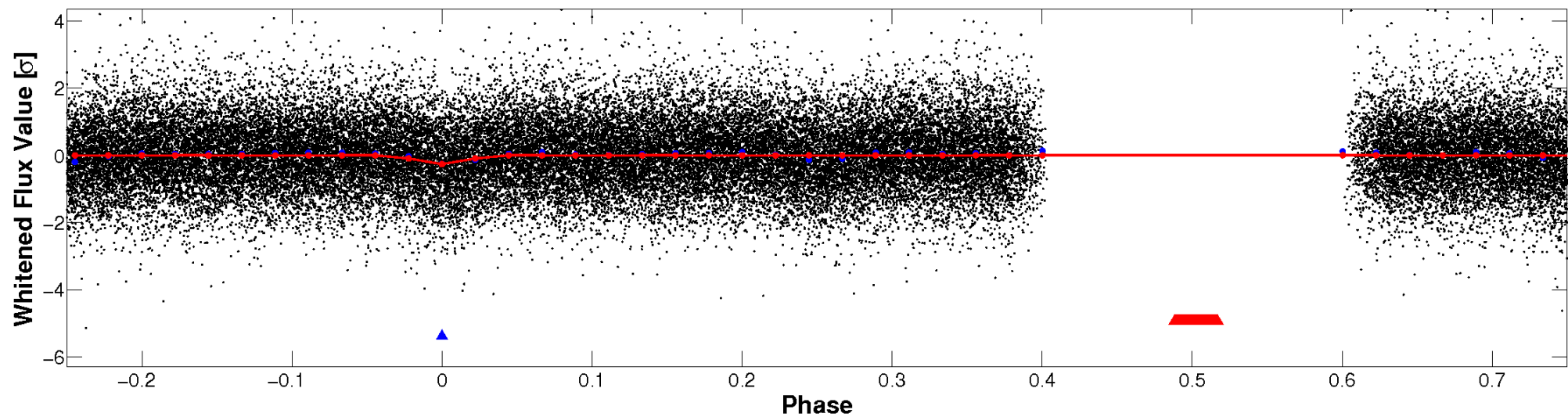


Non-Whitened Vs. Whitened Light Curve

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

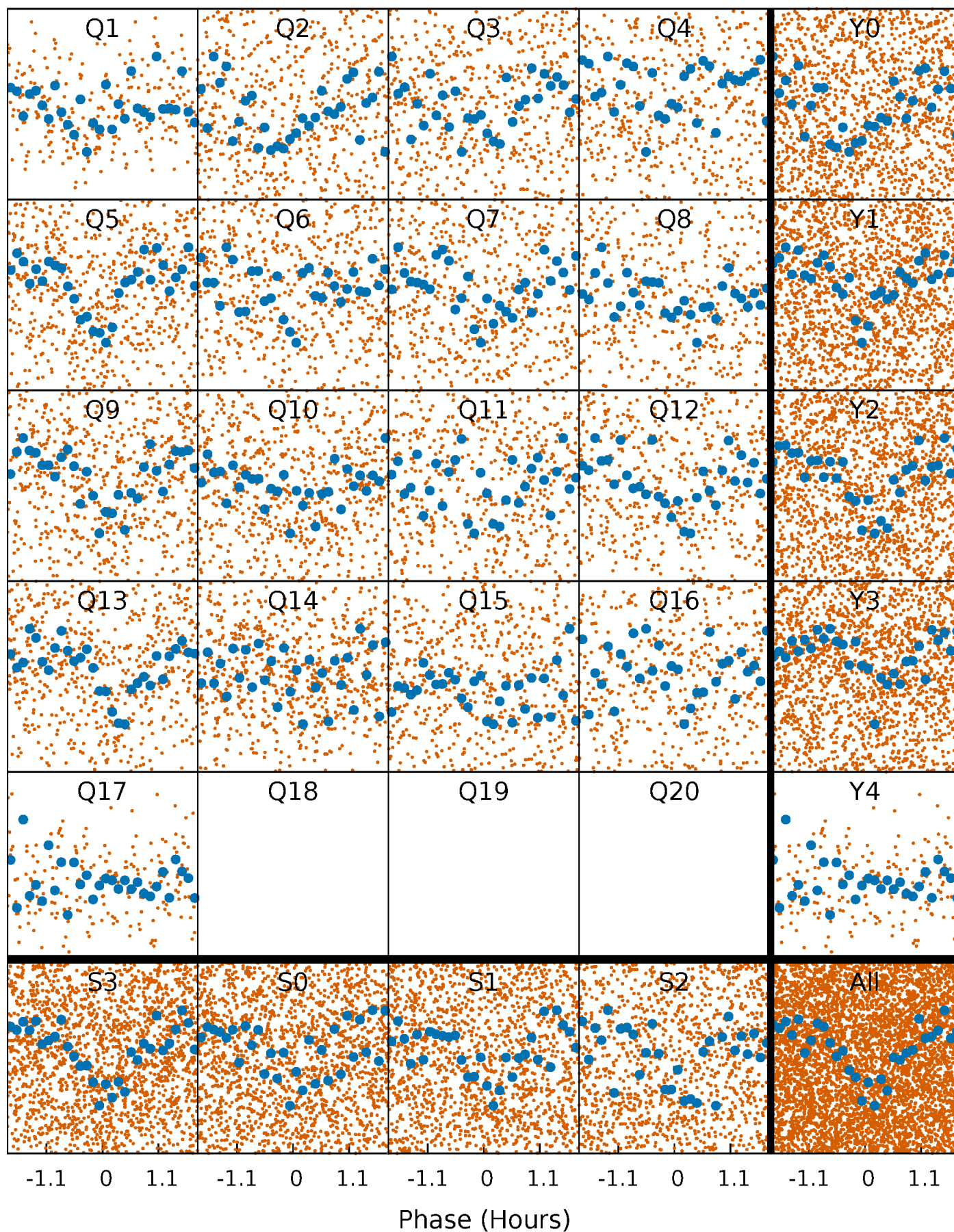


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



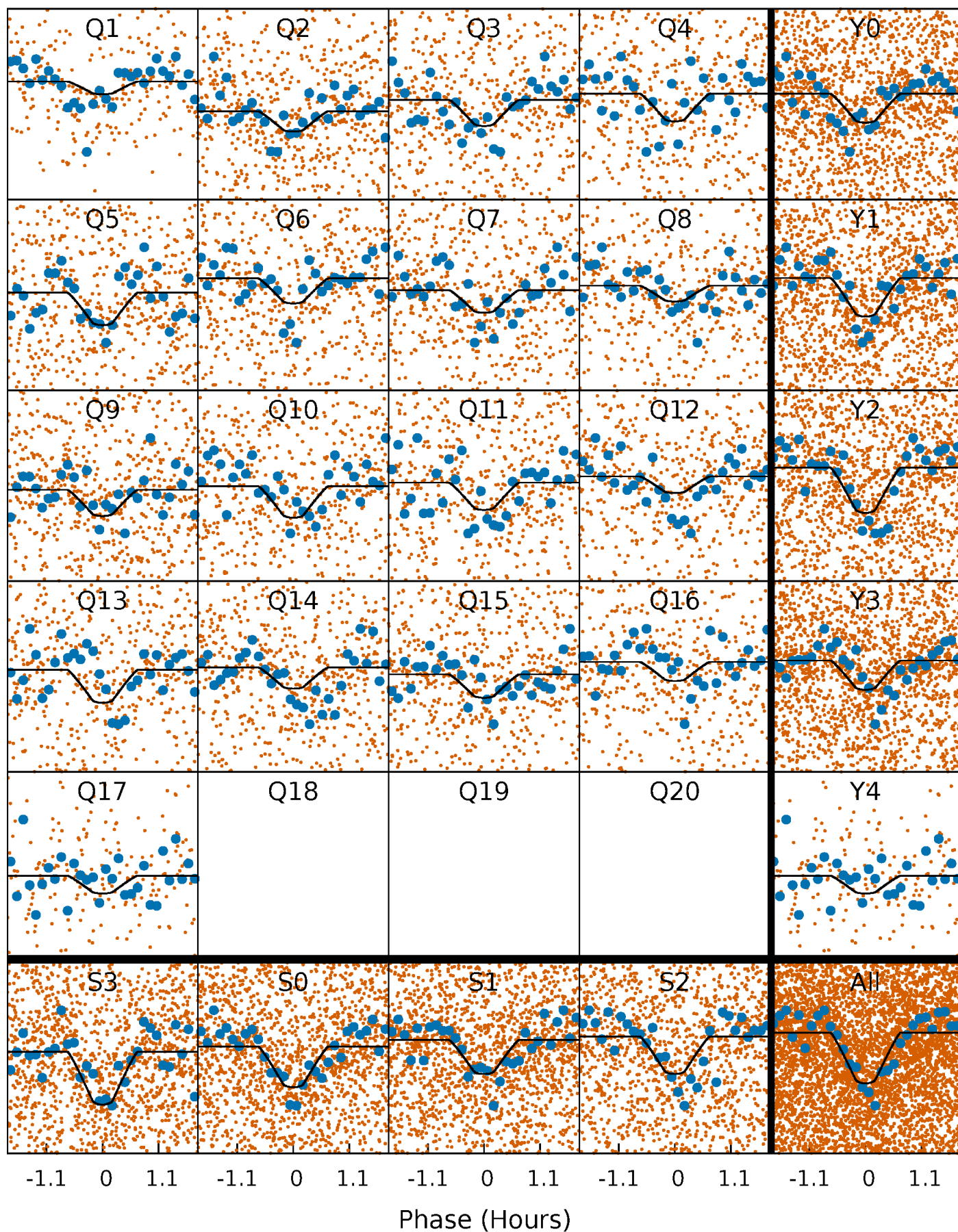
PDC Quarter-Phased Transit Curves

TCE 008645191-02 P= 0.918903 Days $T_0=132.149853$ (BKJD)



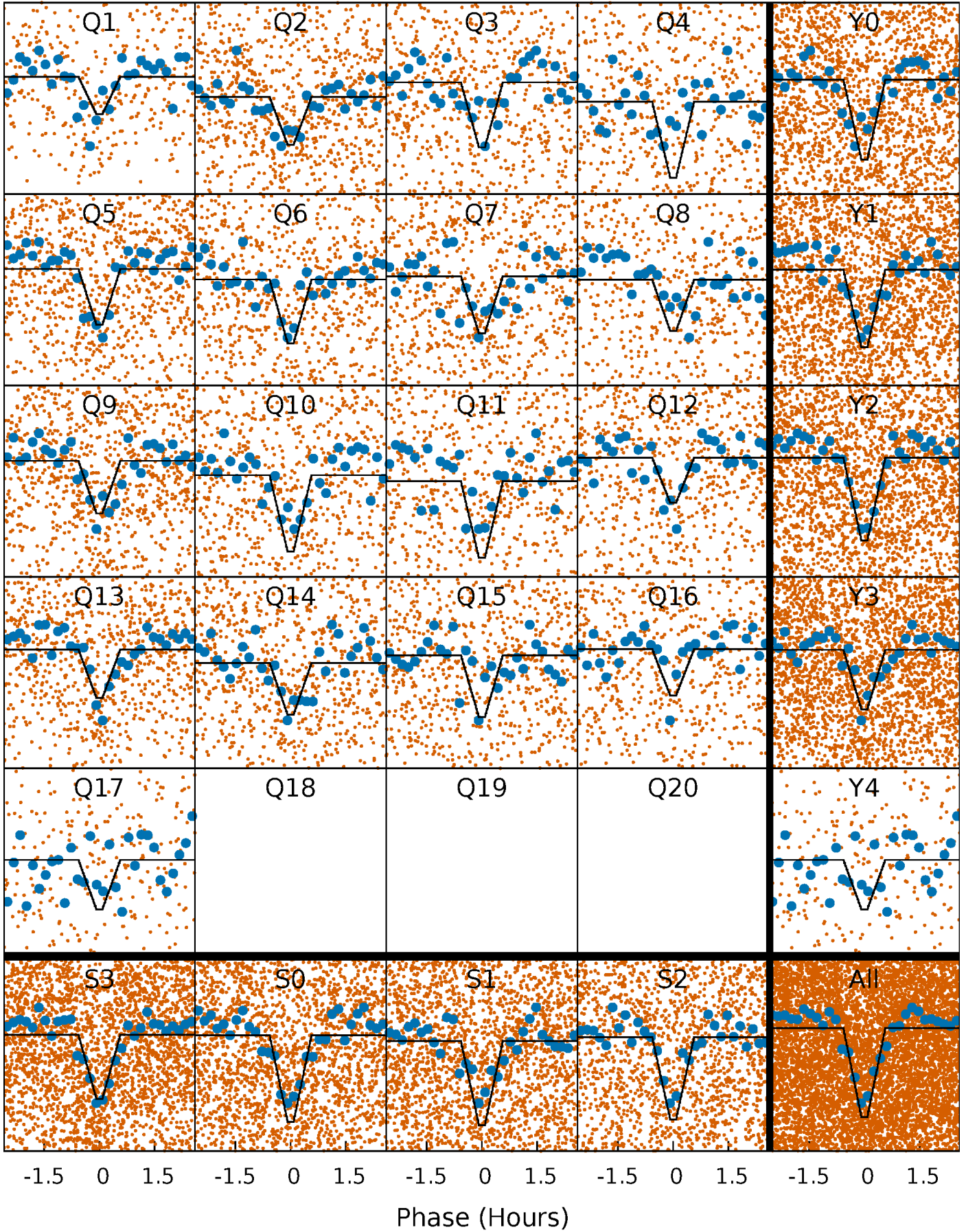
DV Quarter-Phased Transit Curves

TCE 008645191-02 P= 0.918903 Days $T_0=132.149853$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

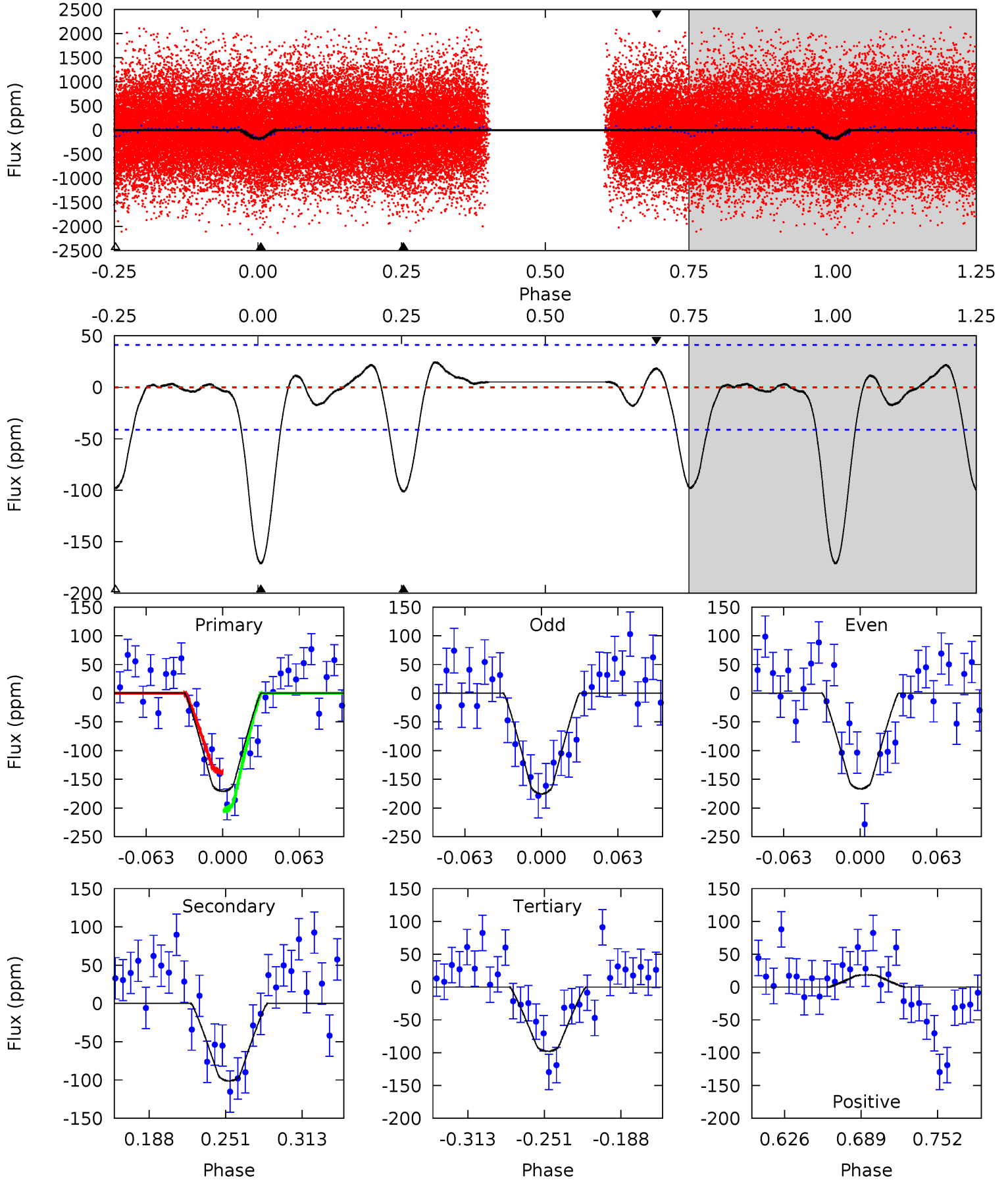
TCE 008645191-02 P= 0.918916 Days $T_0=132.143960$ (BKJD)



DV Model-Shift Uniqueness Test

008645191-02, P = 0.918903 Days, E = 131.230950 Days

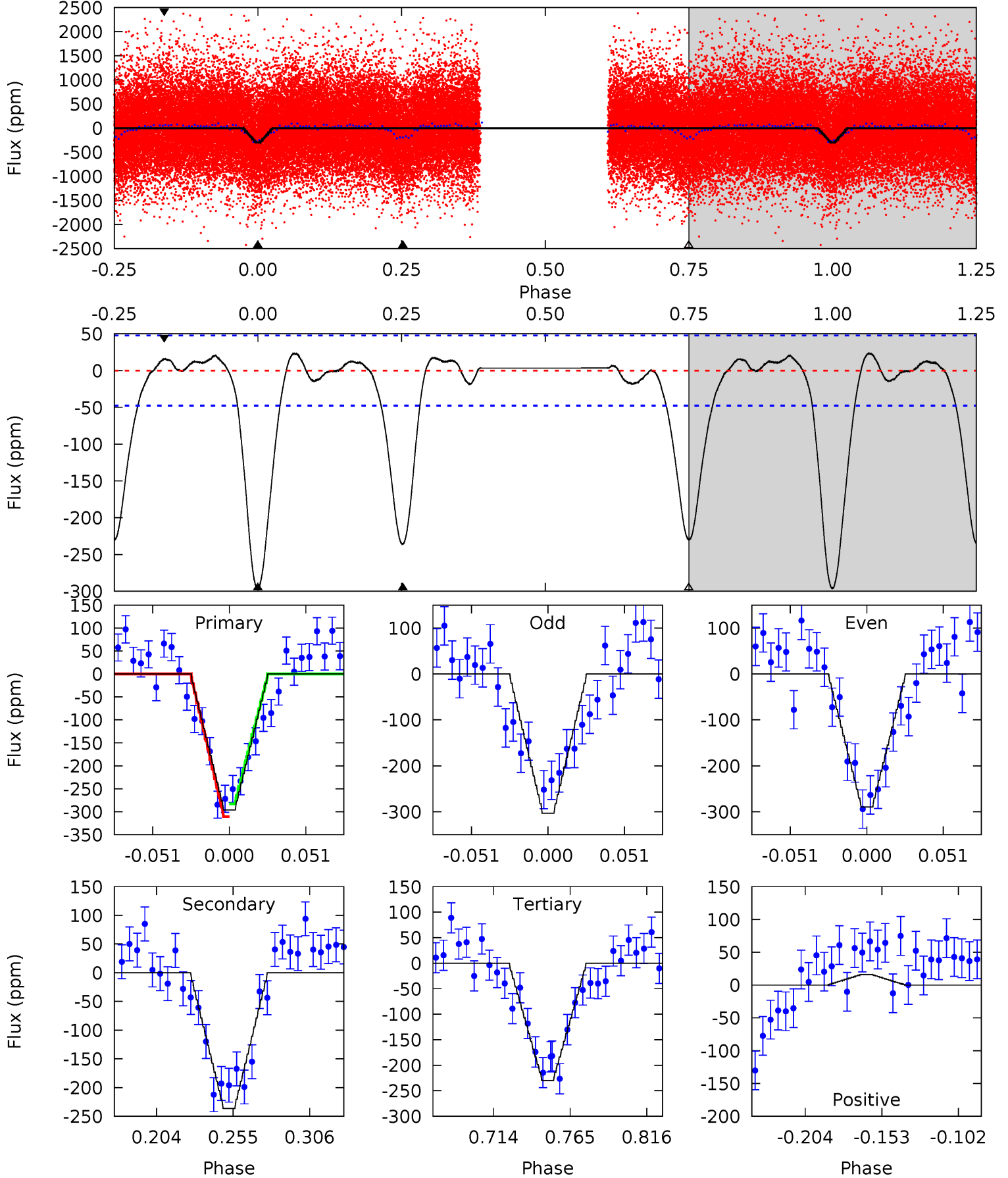
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 19.3 | 11.4 | 11.1 | 2.09 | 4.66 | 1.86 | 2.97 | 8.27 | 17.3 | 0.37 | 9.36 | 0.49 | 1.07 | 0.12 | 3.79 |



Alt Model-Shift Uniqueness Test

008645191-02, P = 0.918916 Days, E = 131.225044 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 29.2 | 23.3 | 22.7 | 1.58 | 4.70 | 1.95 | 5.63 | 6.54 | 27.6 | 0.65 | 21.7 | 0.65 | 0.97 | 0.07 | 1.35 |



Stellar Parameters For KIC 008645191

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5655^{+169}_{-169} | $4.561^{+0.042}_{-0.179}$ | $-0.140^{+0.300}_{-0.300}$ | $0.833^{+0.220}_{-0.073}$ | $0.926^{+0.094}_{-0.104}$ | $2.253^{+0.401}_{-1.089}$ |
| | +3%/-3% | +1%/-4% | +214%/-214% | +26%/-9% | +10%/-11% | +18%/-48% |
| 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 008645191-02 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|---------------|------------------------|----------------------|-----------------------|----------------------------|
| DV | -101 ± 9 | $1.47^{+0.97}_{-0.82}$ | 2426^{+146}_{-117} | 4656^{+2140}_{-835} | $8.292^{+35.117}_{-5.359}$ |
| Alt. | -236 ± 10 | $1.86^{+1.02}_{-0.96}$ | 2421^{+148}_{-109} | 5039^{+2278}_{-808} | 12^{+40}_{-7} |

T_{max} = Theoretical Maximum Planetary Temperature

T_{obs} = Observed Planetary Temperature (Assuming $A=0.3$)

A_{obs} = Observed Albedo (Assuming $T=0$)

If a secondary eclipse is present, the system is likely an EB if $T_{obs} \gg T_{max}$ AND $A_{obs} \gg 1.0$

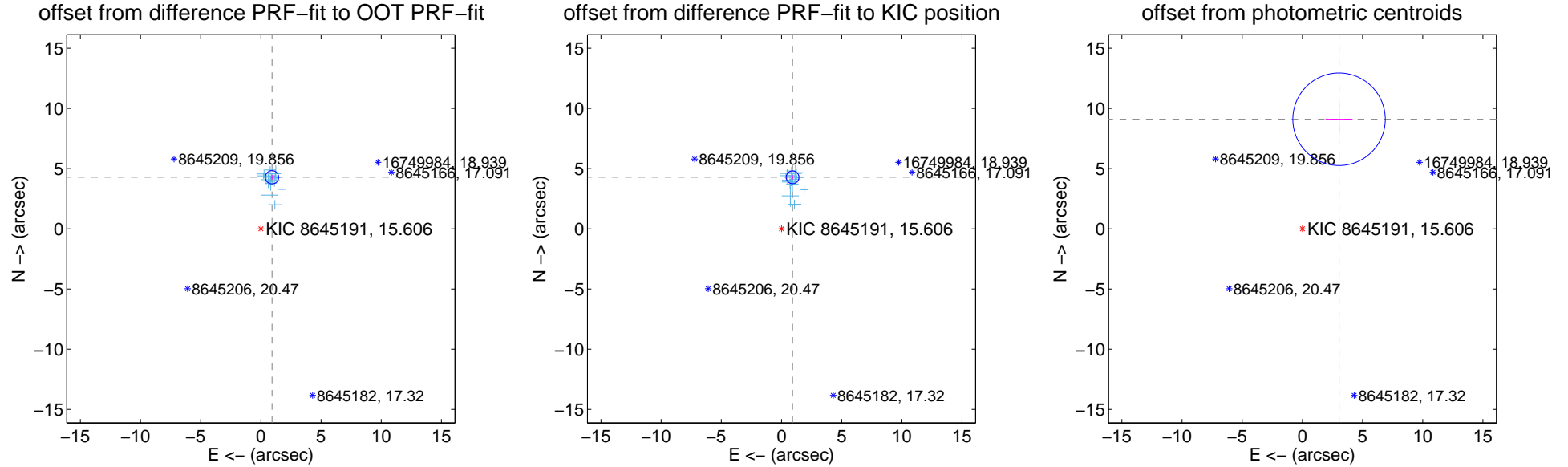
DV Centroid Data

Supplemental centroid analysis for 008645191-02. Kepler magnitude: 15.61. Transit SNR 11.33

There are 17 quarters with good PRF difference image offsets

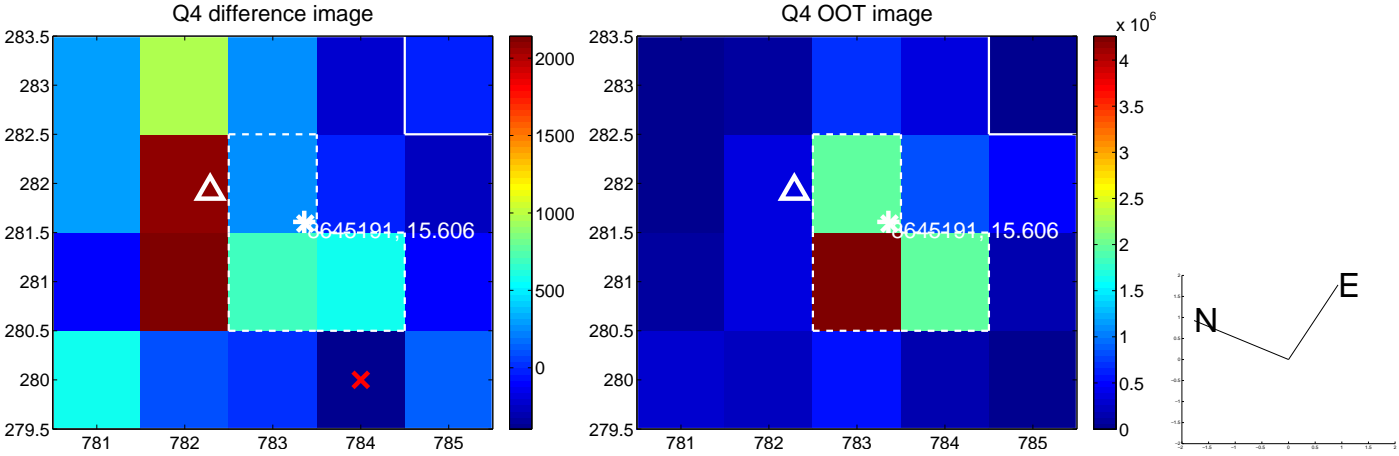
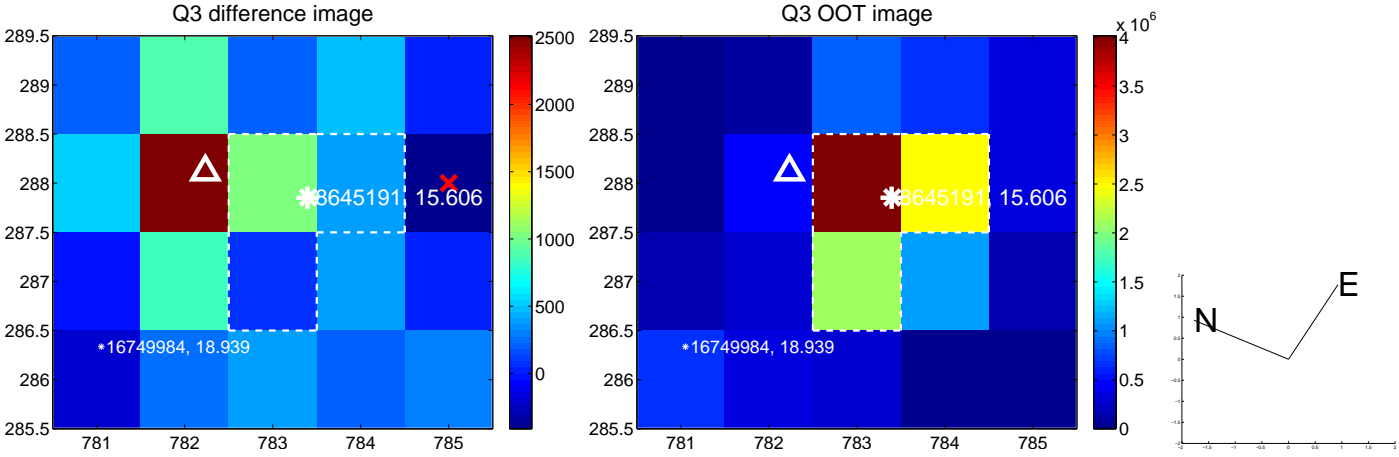
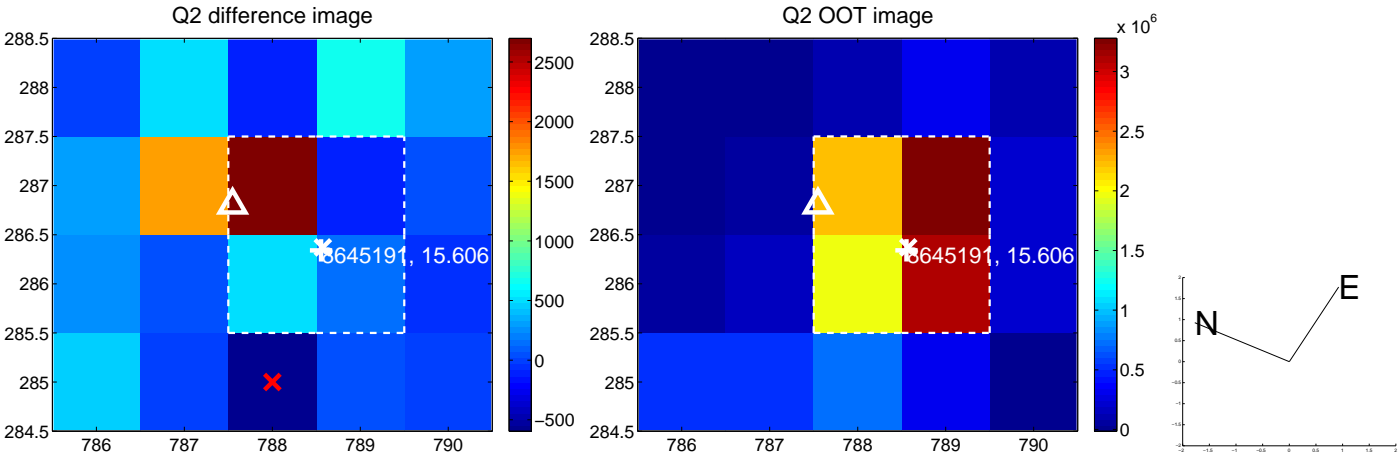
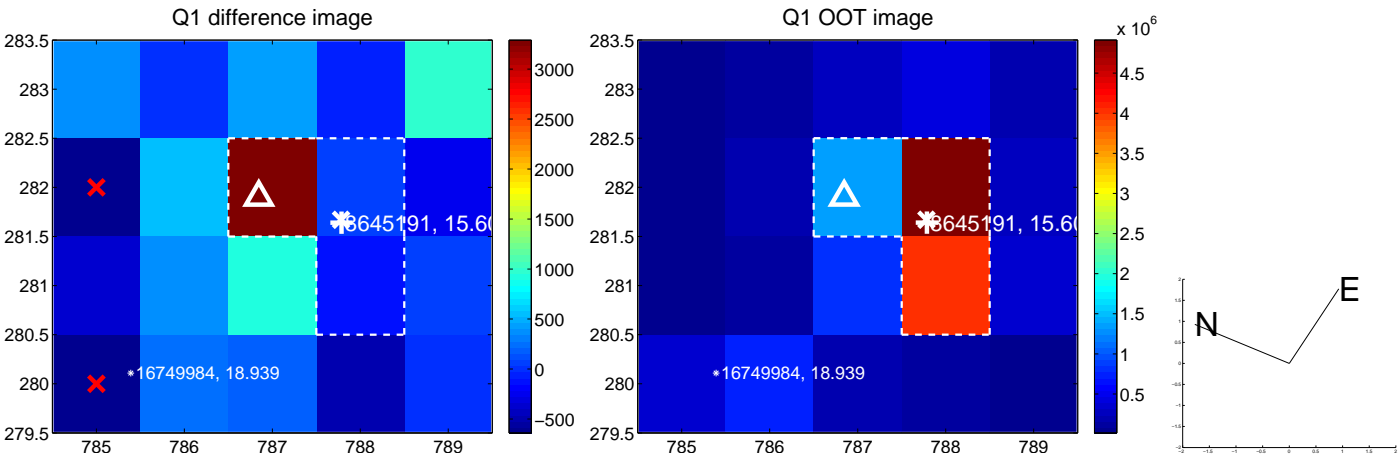
The direct PRF centroid is offset from the target star catalog position by about 0.09 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 4.383 ± 0.184 | 23.81 | -0.925 ± 0.115 | 4.284 ± 0.191 |
| PRF-fit source offset from KIC position | 4.379 ± 0.176 | 24.83 | -0.920 ± 0.115 | 4.282 ± 0.182 |
| photometric centroid source offset | 9.60 ± 1.28 | 7.50 | -3.05 ± 1.12 | 9.10 ± 1.30 |

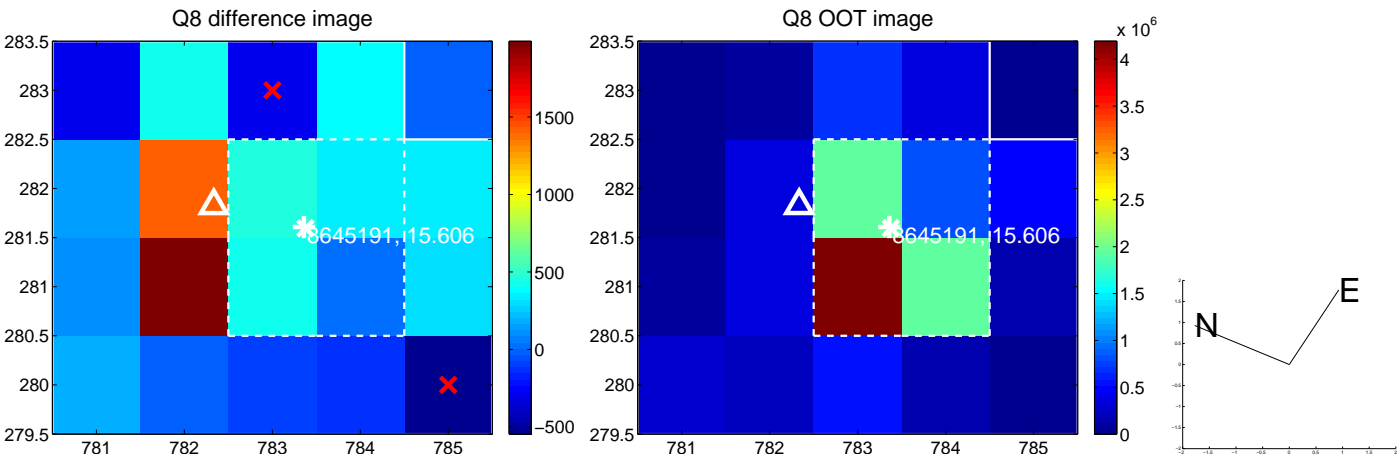
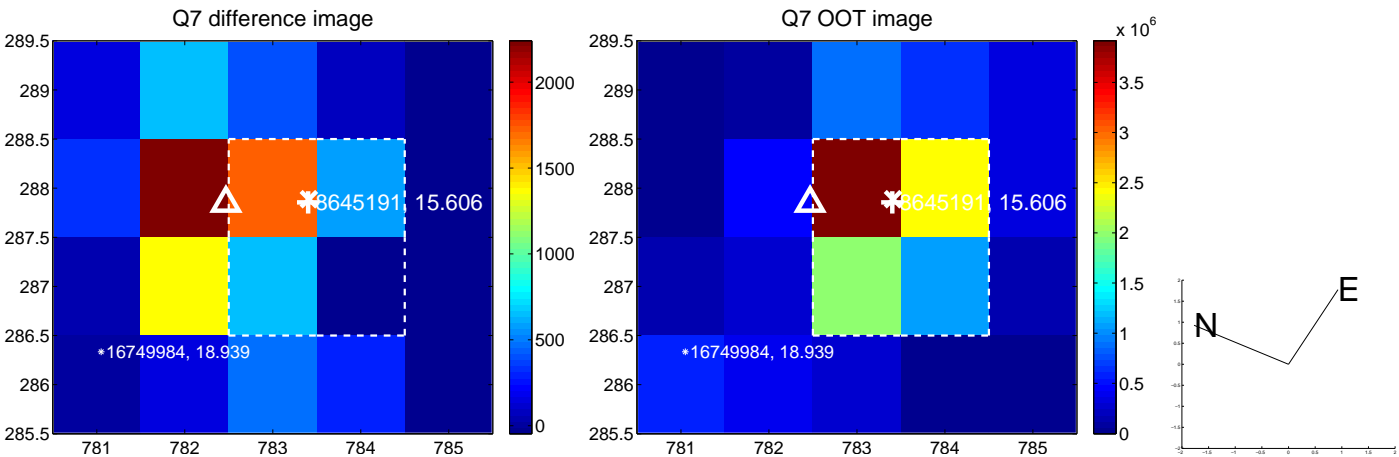
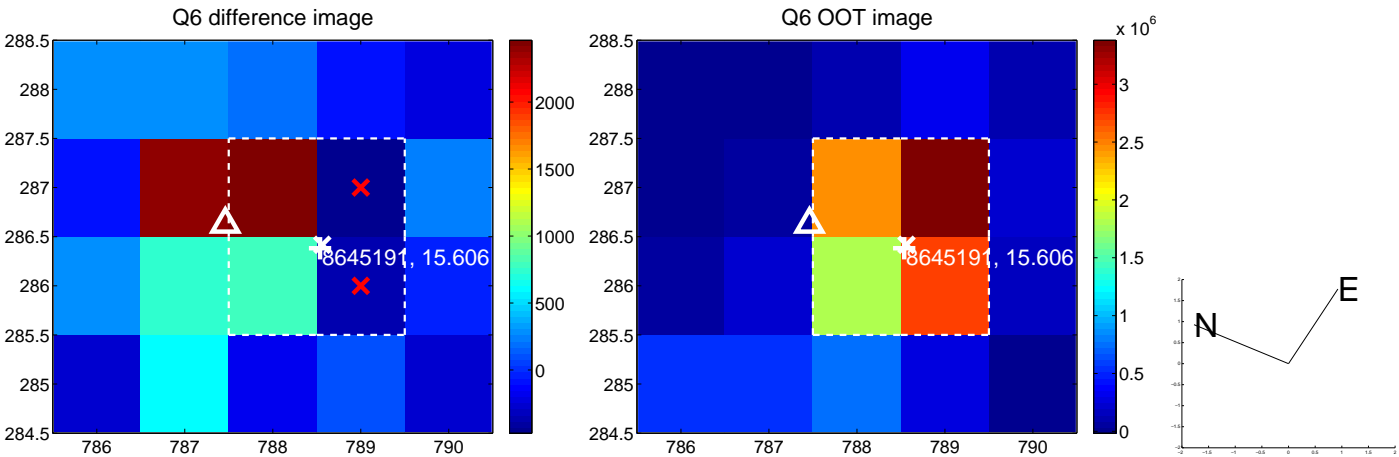
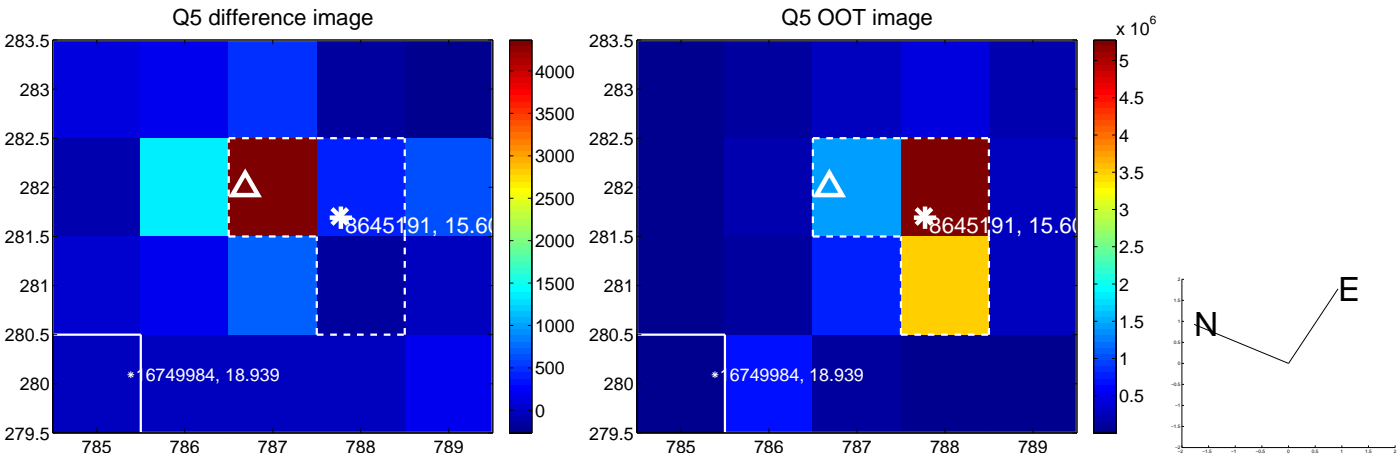


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

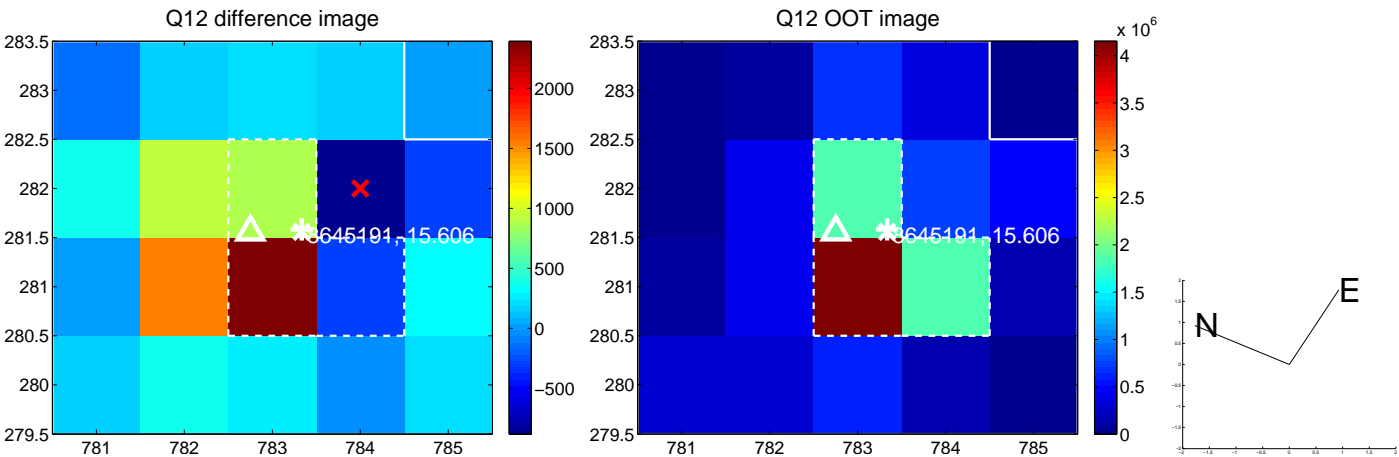
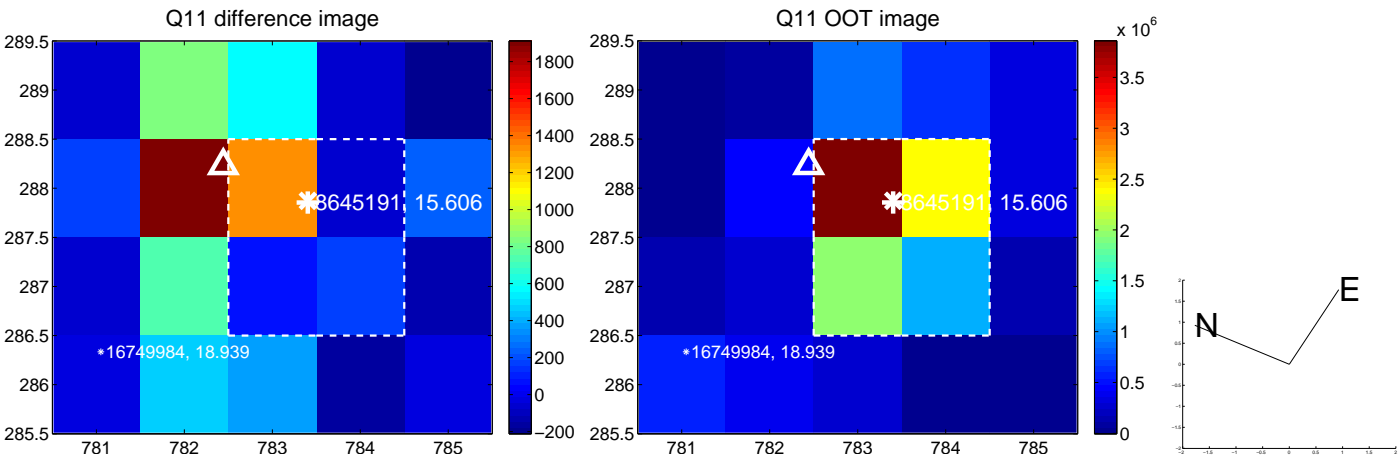
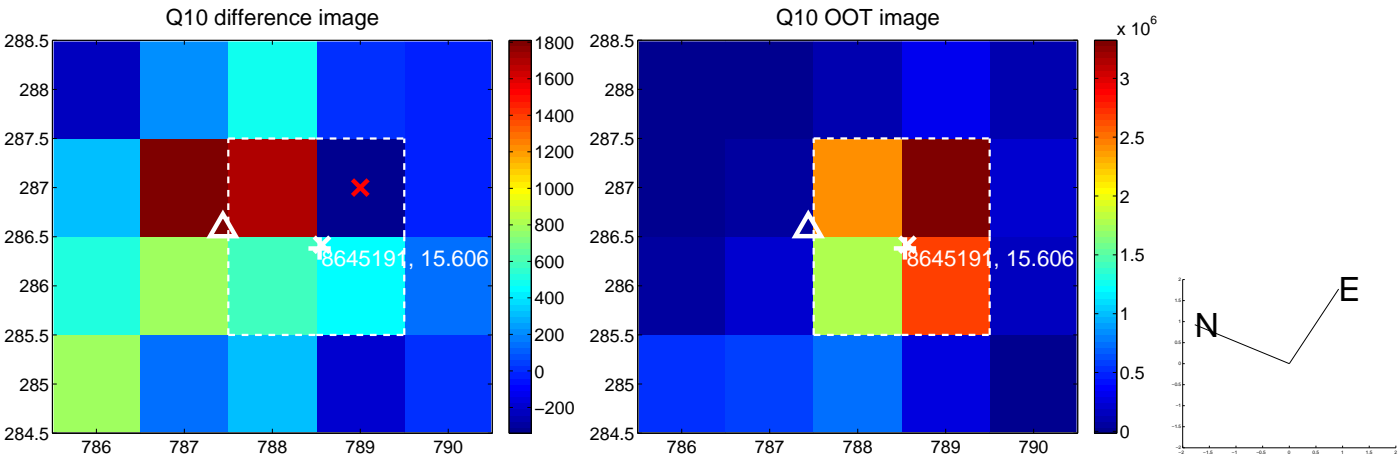
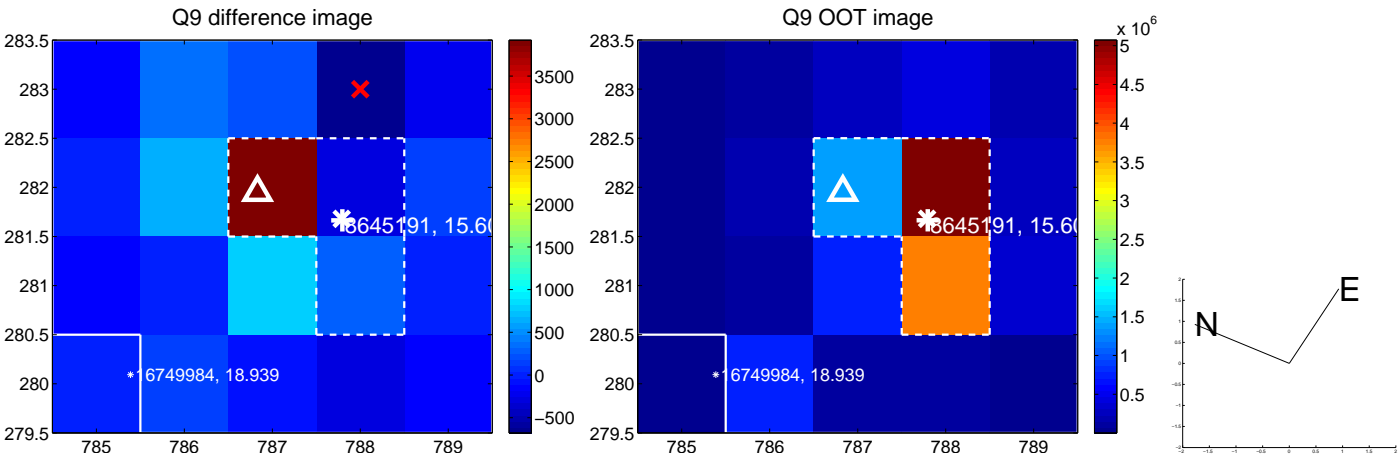
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



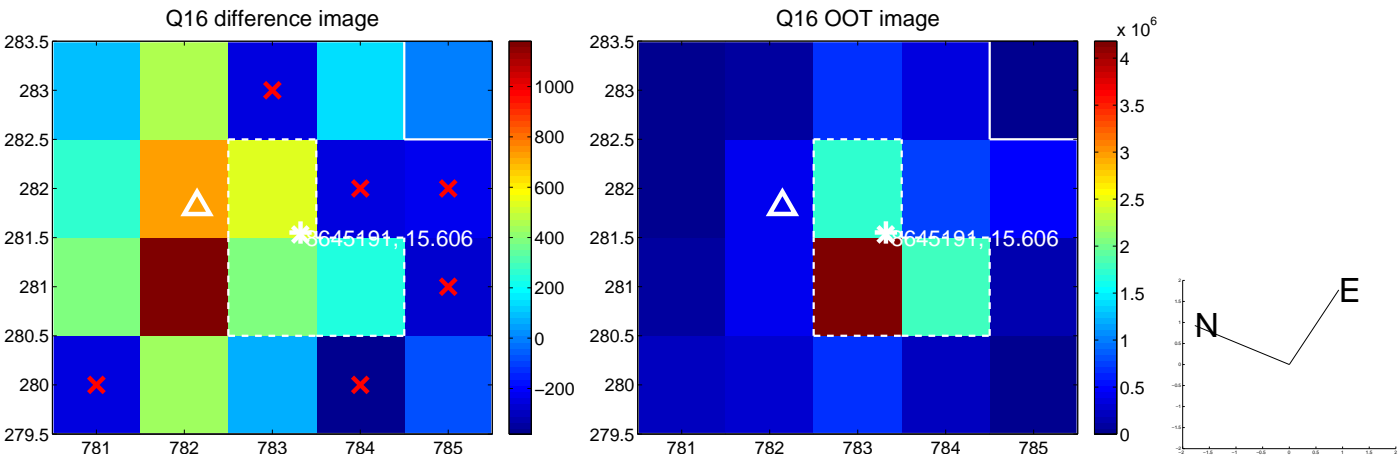
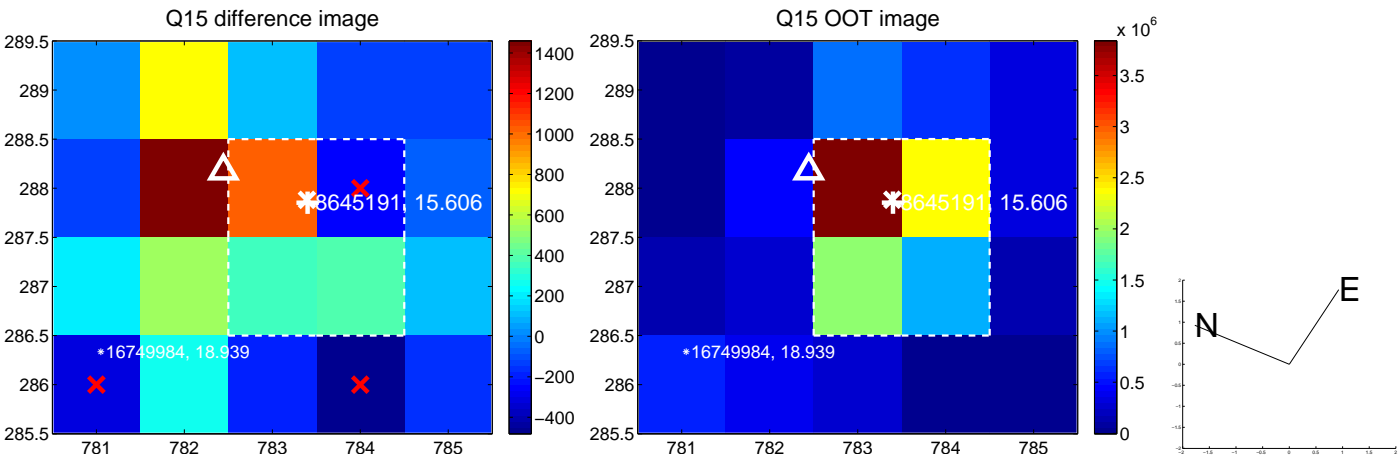
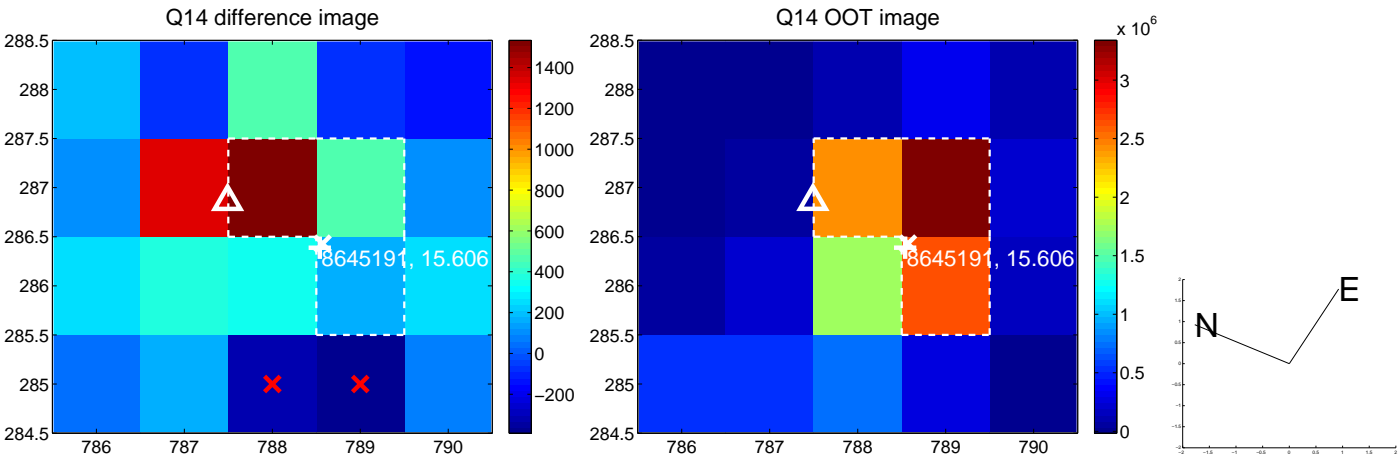
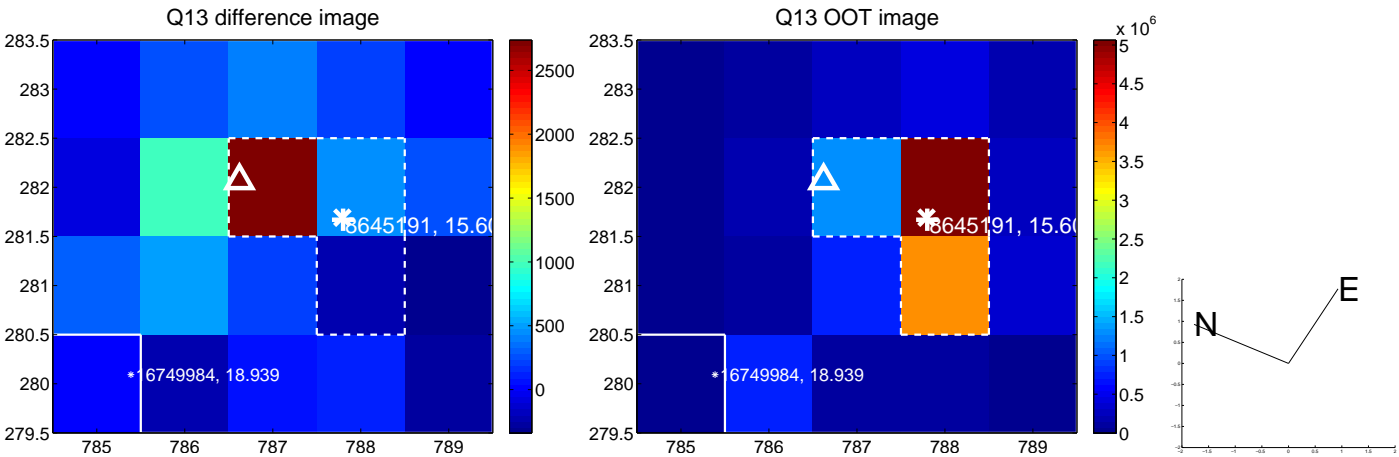
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



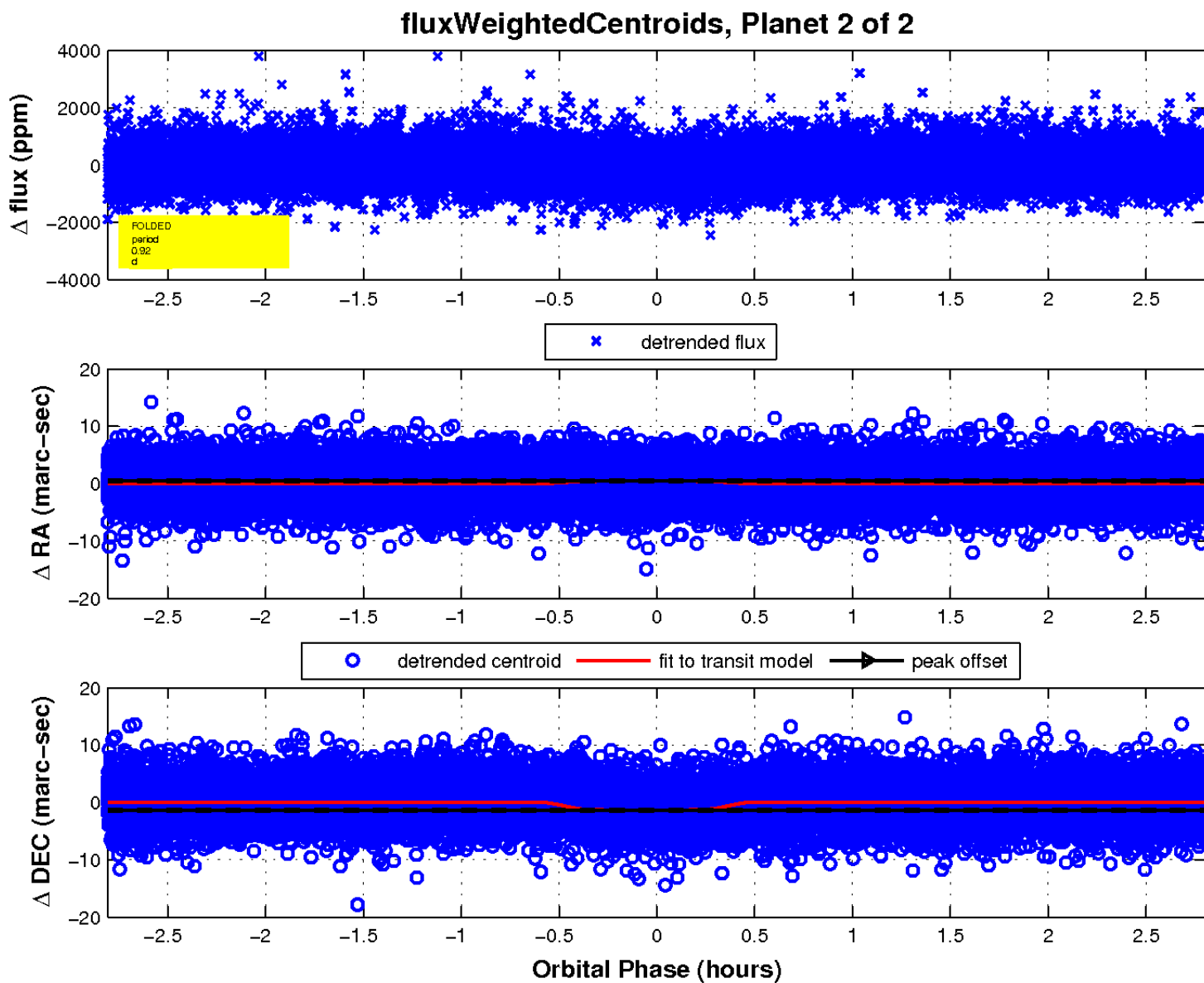
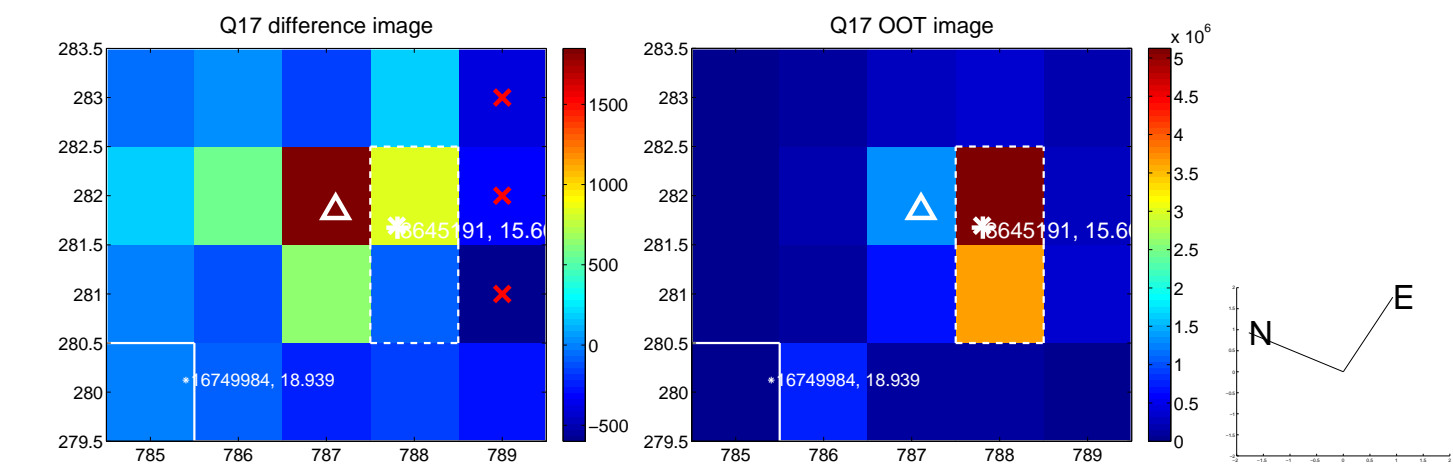
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image

Declination

