

KIC 008180020

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|--------|--------|-----------------------------|-----------------|------------------------|------------------------|
| 008180020-01 | OBS | 1741.01 | 5.803122 | 136.101981 | 58595.0 | 4.922 | 1853.4 | 1567.0 | 0.80 | 5533 | 19.03 | 145.69 |
| 008180020-02 | OBS | No | 5.803105 | 133.246534 | 1583.6 | 4.570 | 54.0 | 58.3 | 0.80 | 5533 | 3.42 | 145.69 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------|
| 008180020-01 | OBS | FP | 0.00 | 0 | 1 | 0 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE |
| 008180020-02 | OBS | FP | 0.00 | 1 | 1 | 0 | 0 | IS_SEC_TCE |

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 008180020-01

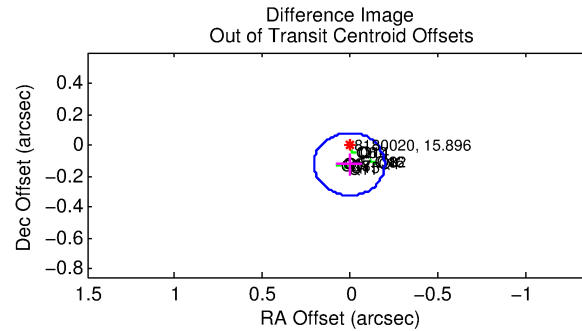
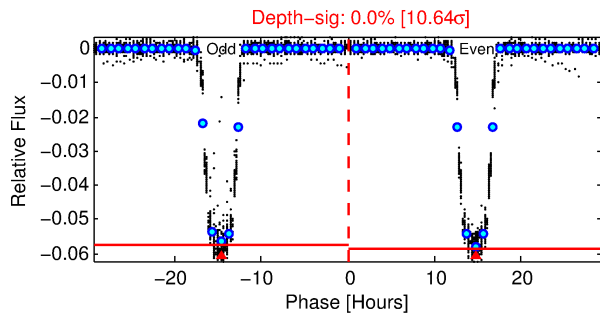
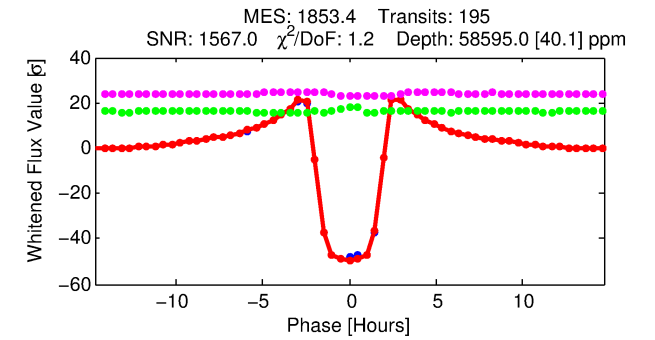
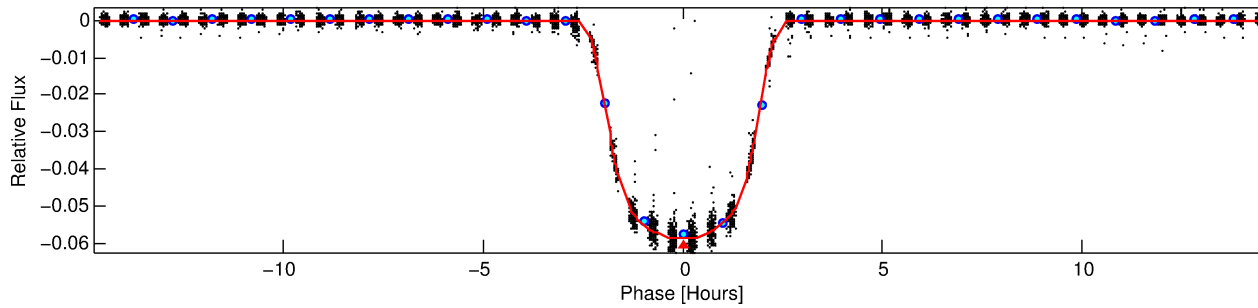
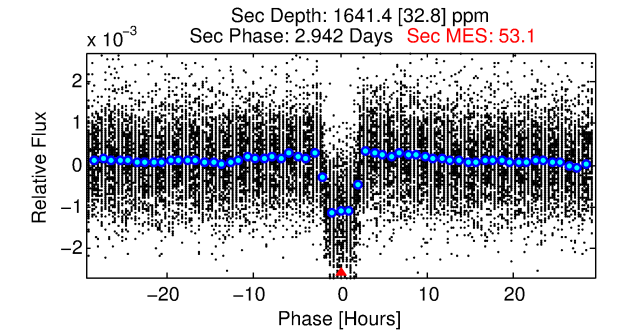
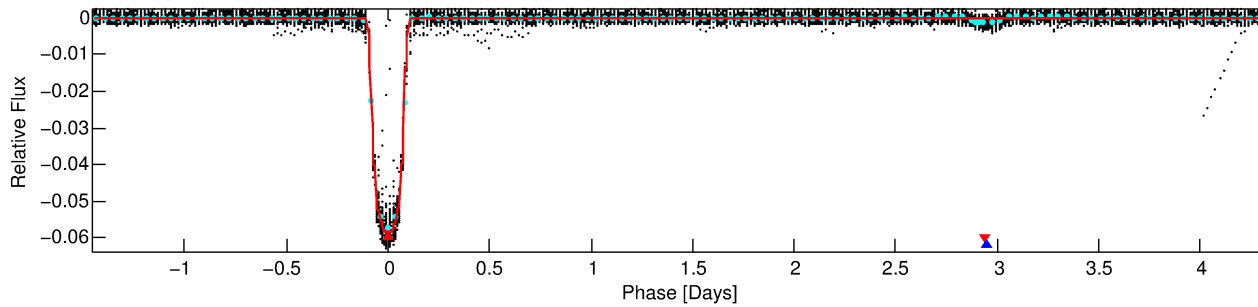
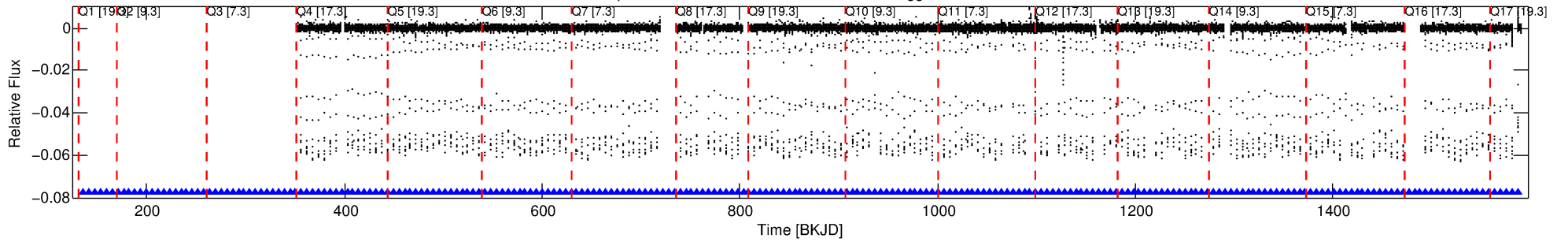
No Significant Match Found

DV One-Page Summary

KIC: 8180020 Candidate: 1 of 2 Period: 5.803 d

KOI: K01741.01 Corr: 0.995

Kp: 15.90 R*: 0.80 Rs Teff: 5533.0 K Logg: 4.58 Fe/H: -0.200



DV Fit Results:

Period = 5.80312 [0.00000] d
Epoch = 136.1020 [0.0001] BKJD
Rp/R* = 0.2193 [0.0001]
a/R* = 11.01 [0.02]
b = 0.00 [0.75]
Seff = 145.69 [45.28]
Teq = 886 [69] K
Rp = 19.03 [4.50] Re
a = 0.0604 [0.0118] AU
Ag = 9.09 [2.56] [3.15σ]
Teffp = 2378 [79] K [14.23σ]

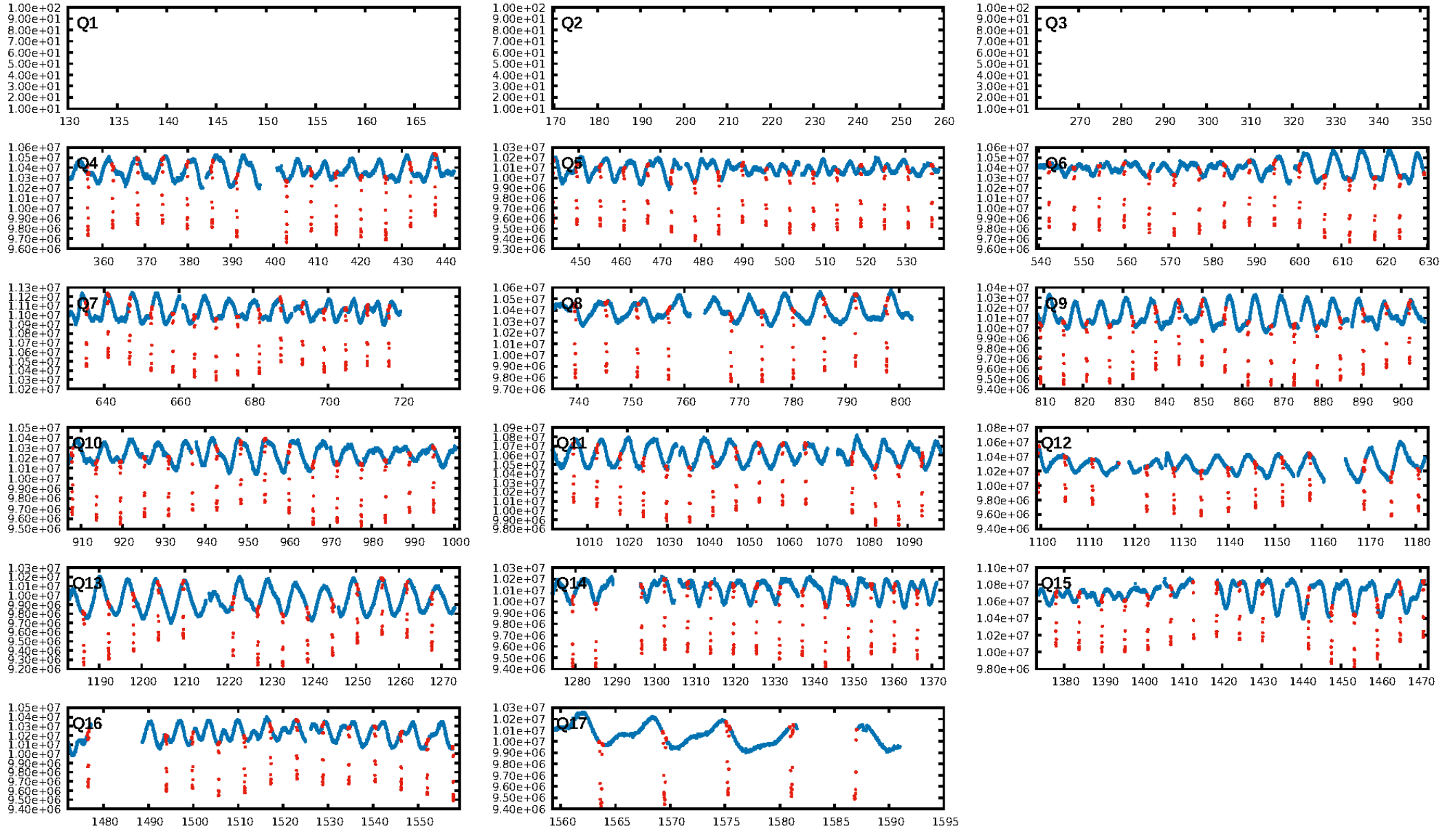
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 0.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [190/190]
GhostDiagnostic-chr: 3.235
Centroid-sig: 0.0%
Centroid-so: 0.272 arcsec [60.49σ]
OotOffset-rm: 0.122 arcsec [1.81σ]
KicOffset-rm: 0.090 arcsec [1.33σ]
OotOffset-st: 3/3/4/4 [14]
KicOffset-st: 3/3/4/4 [14]
DiffImageQuality-fgm: 1.00 [14/14]
DiffImageOverlap-fno: 1.00 [14/14]

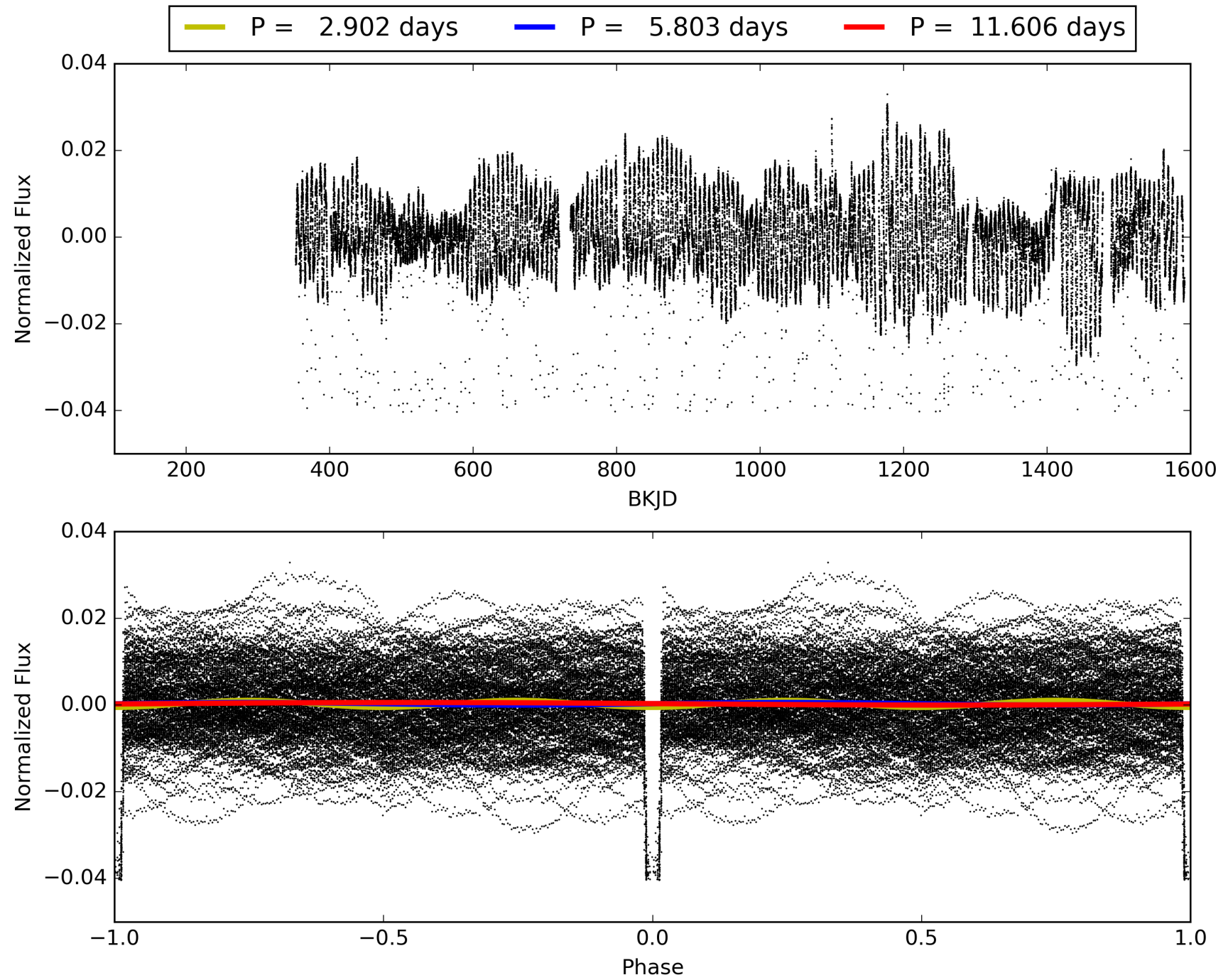
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 06:08:59 Z

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

TCE 008180020-01, PDC Light Curves

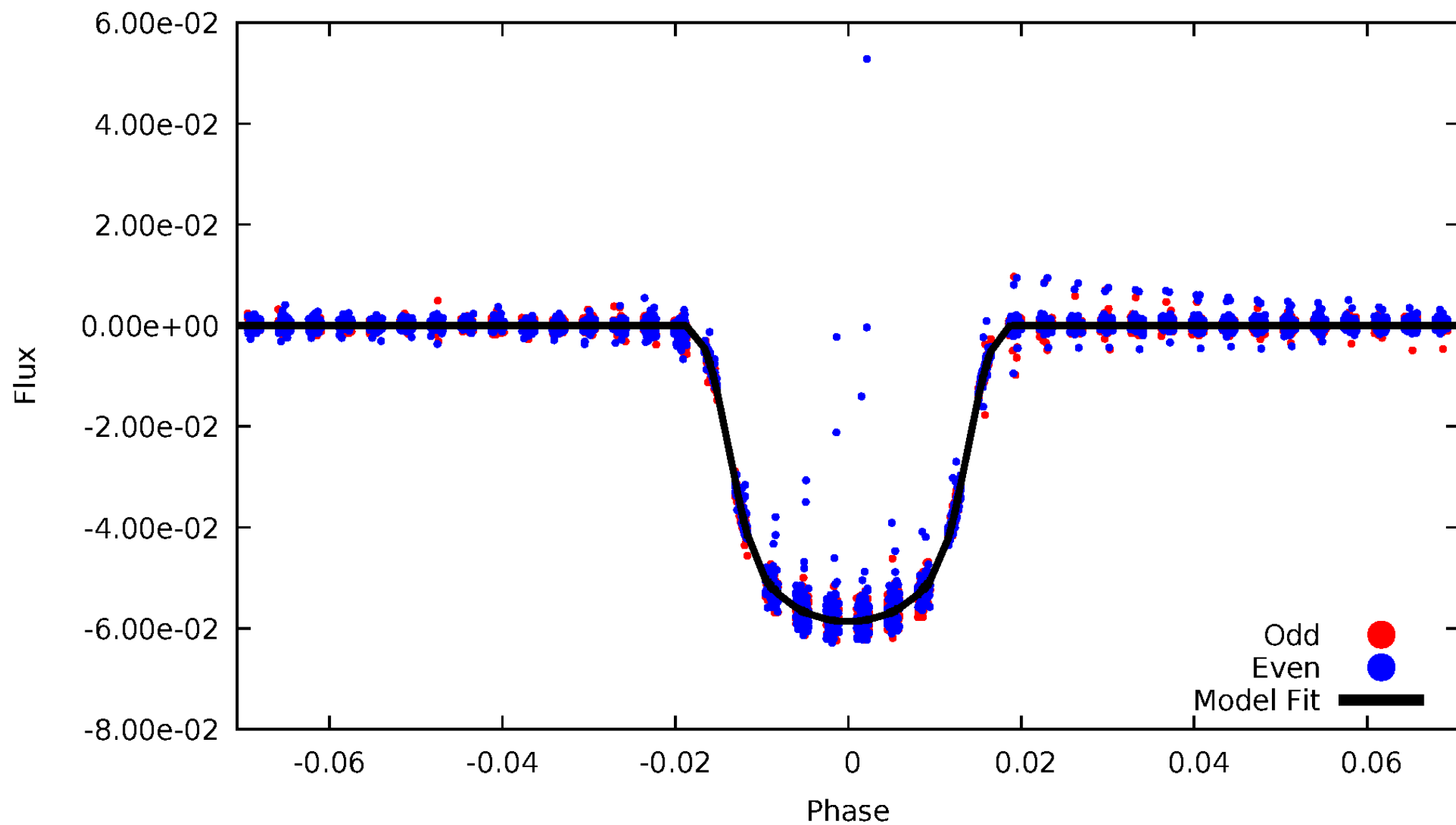


TCE 008180020-01



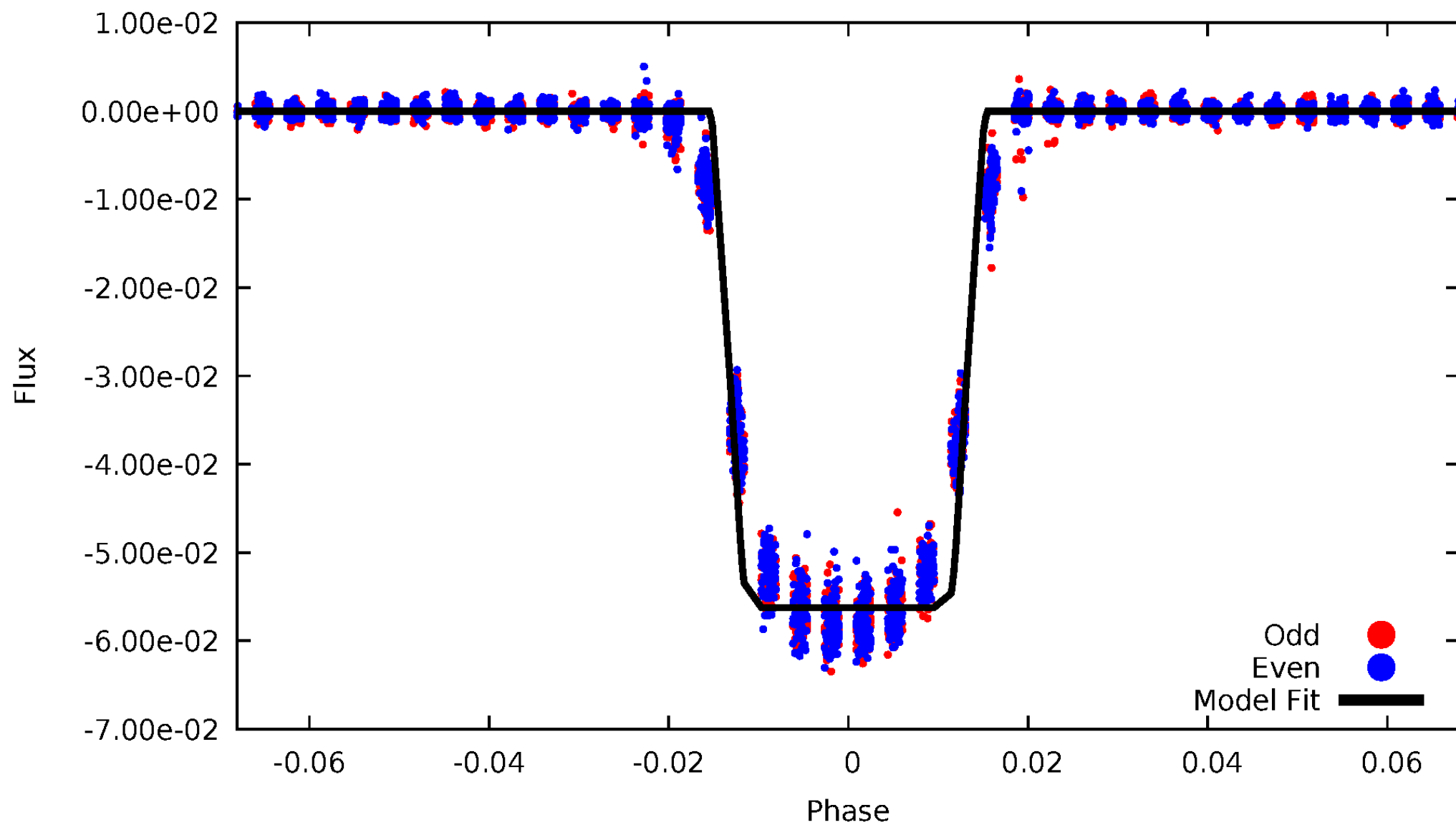
DV Odd/Even

TCE 008180020-01



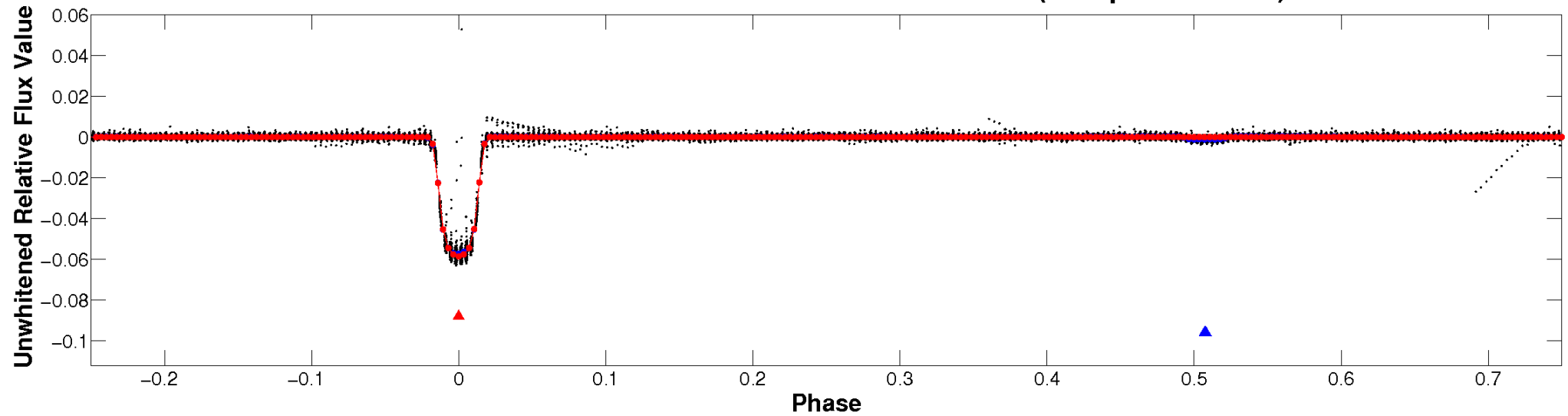
ALT Odd/Even

TCE 008180020-01

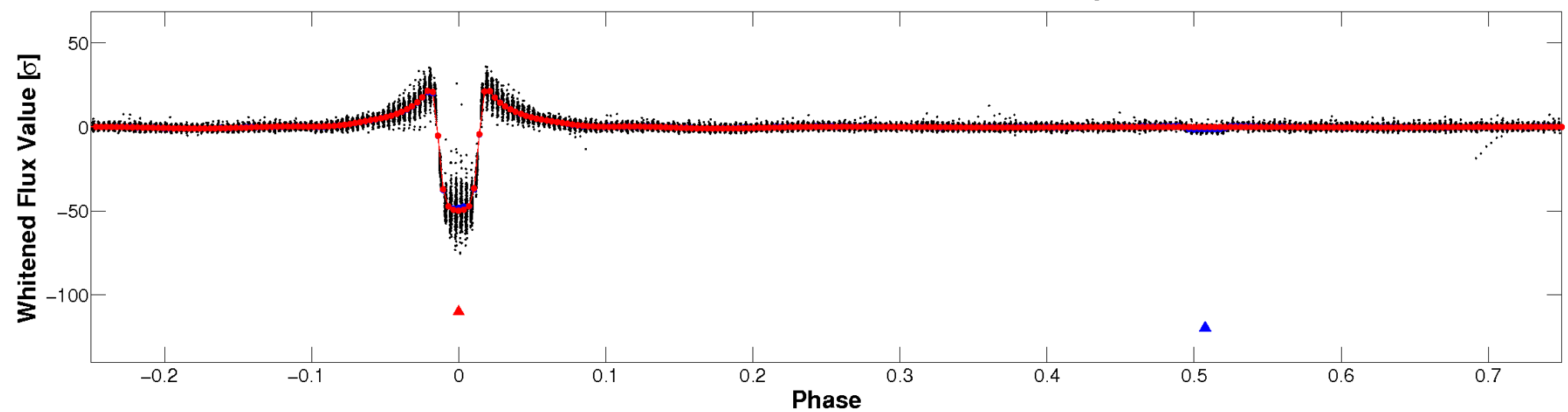


Non-Whitened Vs. Whitened Light Curve

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

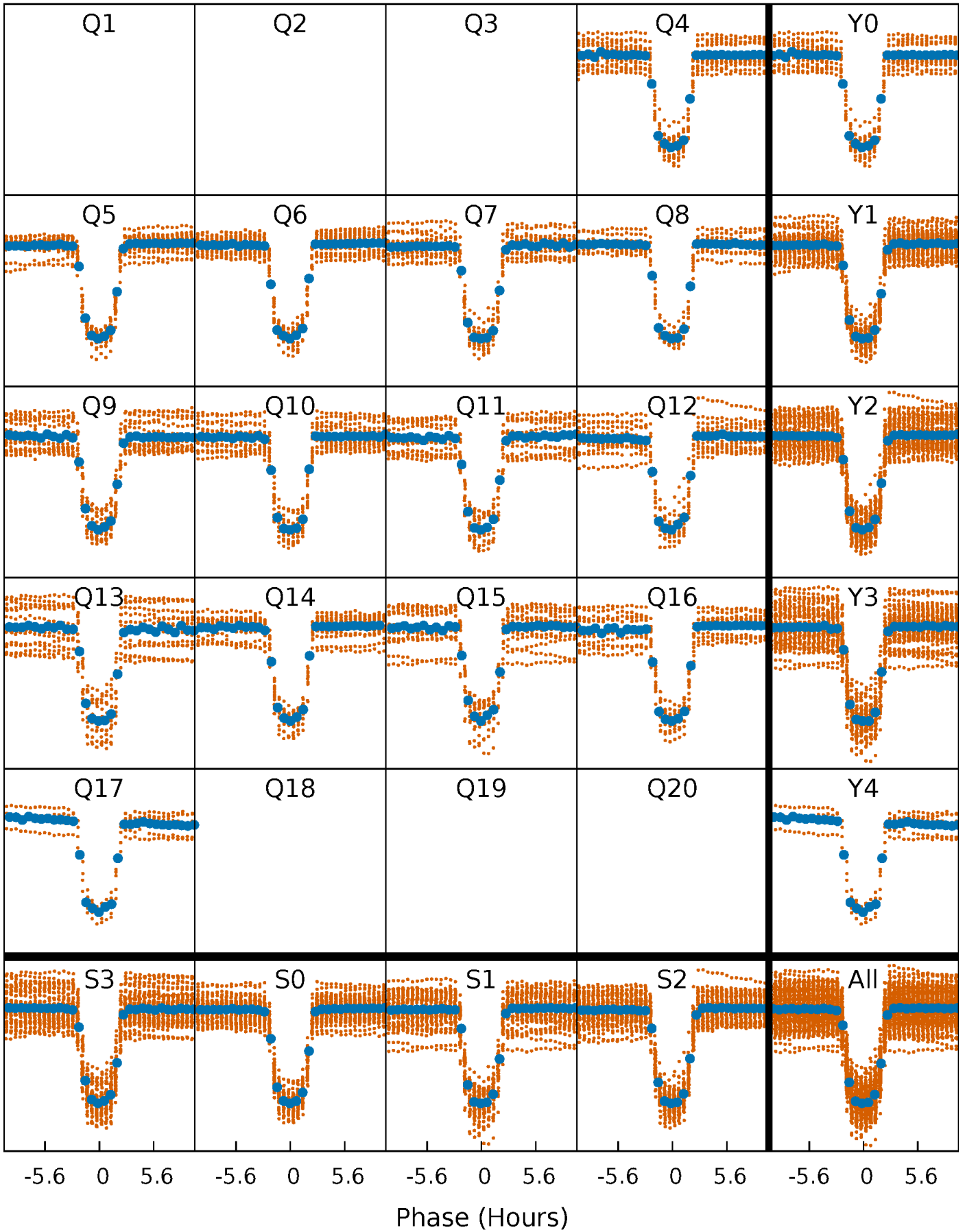


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



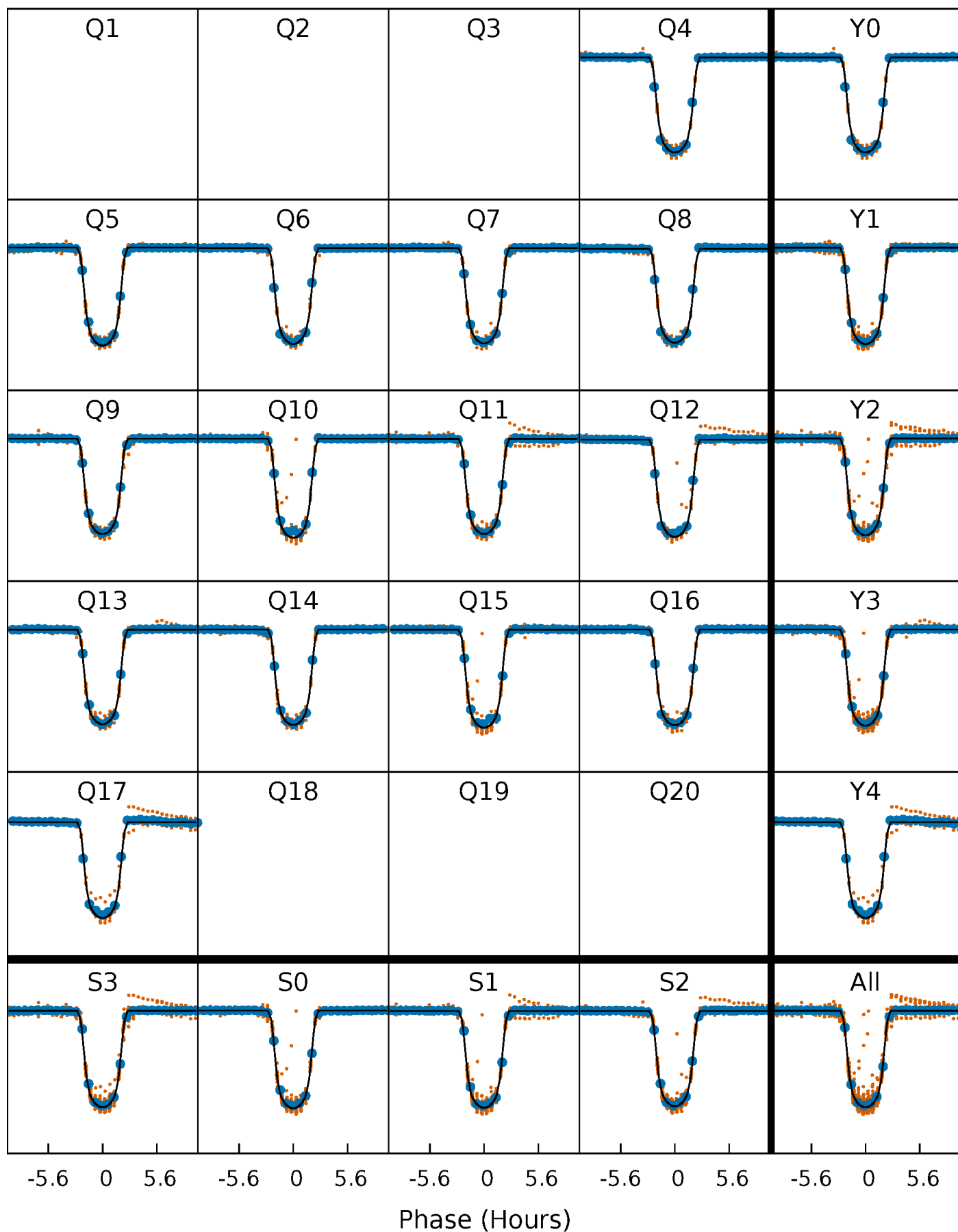
PDC Quarter-Phased Transit Curves

TCE 008180020-01 P= 5.803122 Days $T_0=136.101981$ (BKJD)



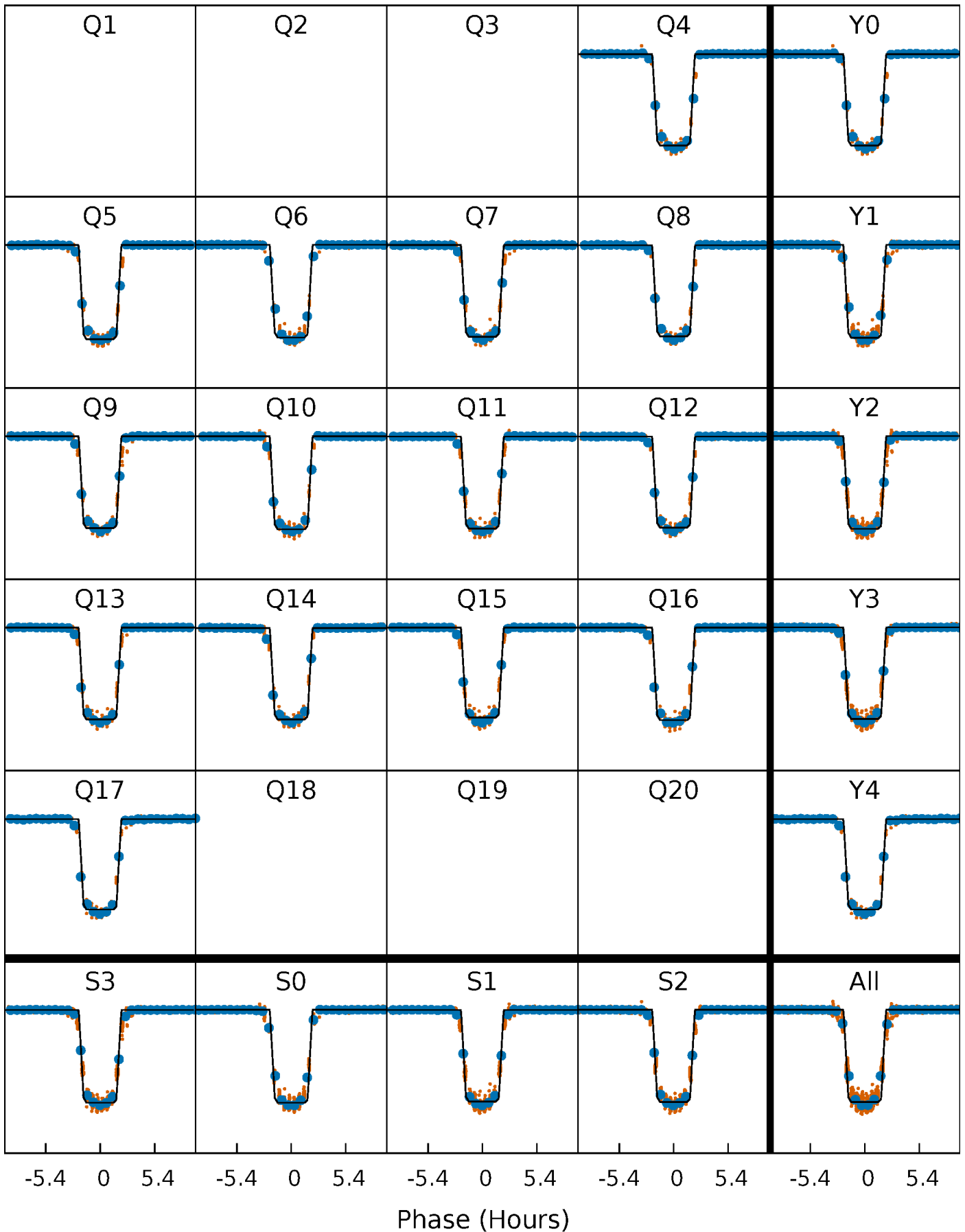
DV Quarter-Phased Transit Curves

TCE 008180020-01 P= 5.803122 Days $T_0=136.101981$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

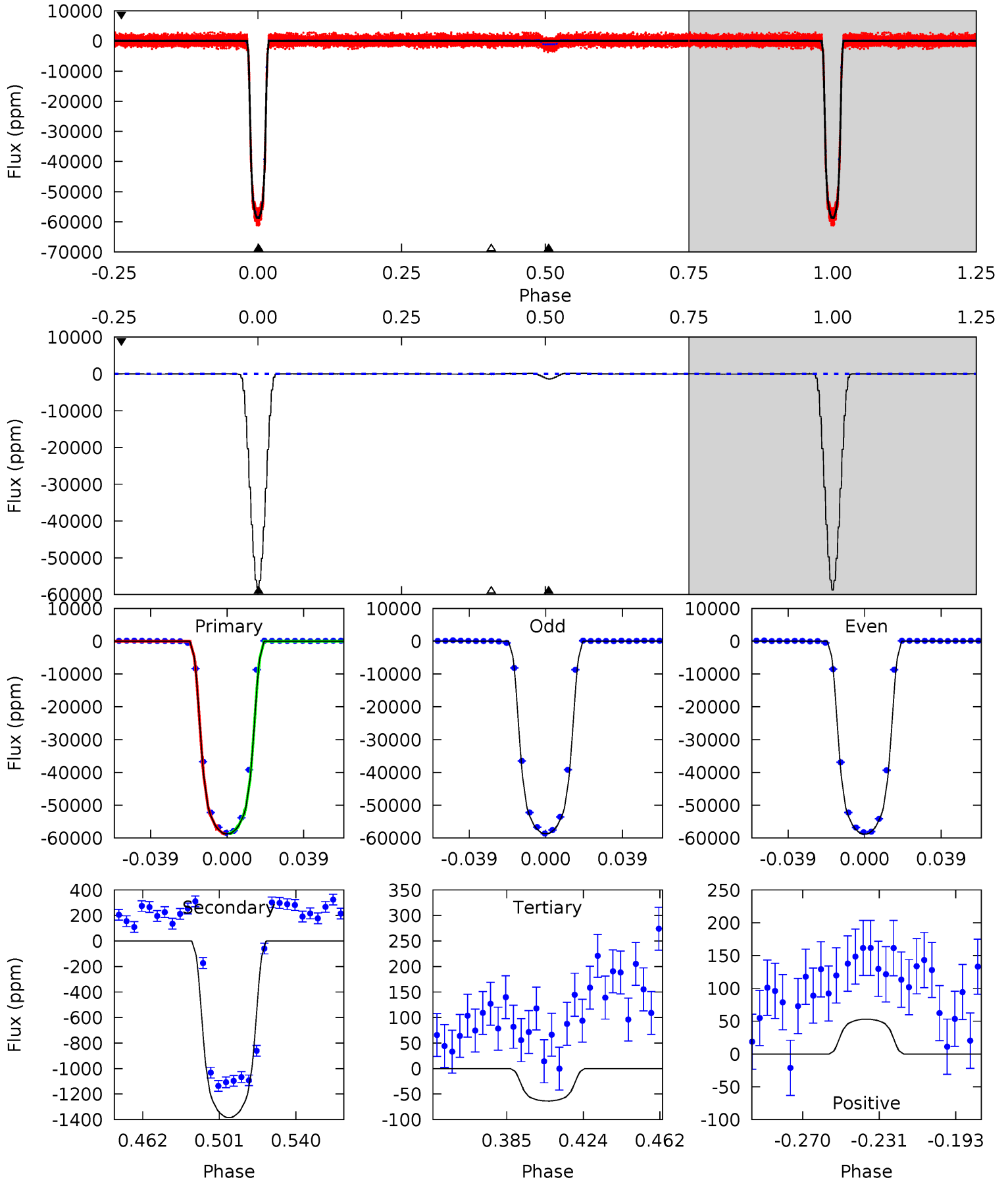
TCE 008180020-01 P= 5.803167 Days $T_0=136.095652$ (BKJD)



DV Model-Shift Uniqueness Test

008180020-01, P = 5.803122 Days, E = 136.101981 Days

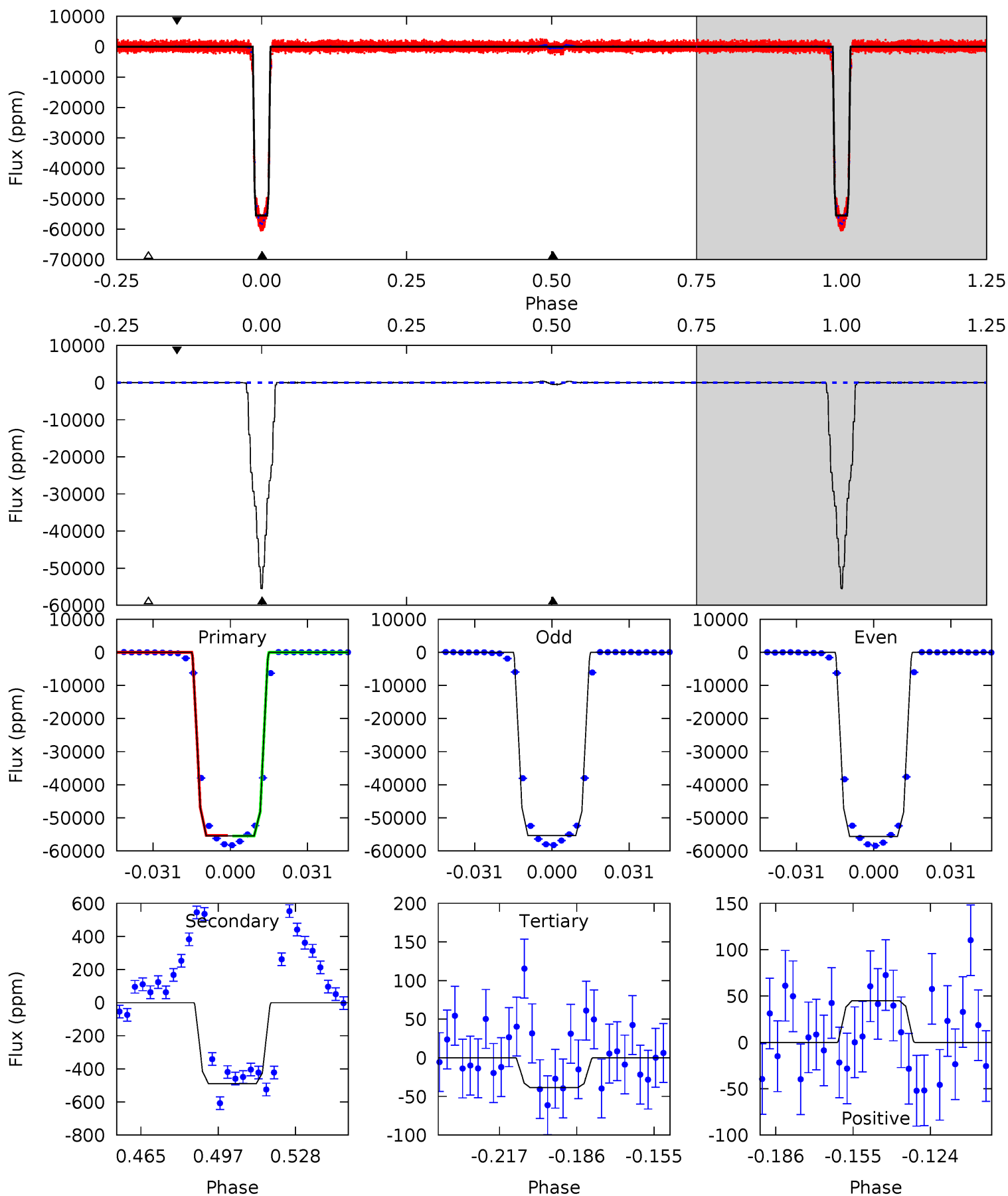
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 3569 | 84.0 | 3.86 | 3.22 | 4.76 | 2.07 | 2.78 | 3565 | 3566 | 80.2 | 80.8 | 3.83 | 0.99 | 0.00 | 0 |



Alt Model-Shift Uniqueness Test

008180020-01, P = 5.803167 Days, E = 136.095652 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 3066 | 27.0 | 2.13 | 2.48 | 4.80 | 2.16 | 1.50 | 3064 | 3064 | 24.9 | 24.6 | 7.26 | 1.00 | 0.01 | 5.35 |



Stellar Parameters For KIC 008180020

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5533^{+182}_{-182} | $4.577^{+0.038}_{-0.152}$ | $-0.200^{+0.300}_{-0.300}$ | $0.795^{+0.188}_{-0.063}$ | $0.876^{+0.092}_{-0.102}$ | $2.452^{+0.490}_{-1.029}$ |
| | +3%/-3% | +1%/-3% | +150%/-150% | +24%/-8% | +11%/-12% | +20%/-42% |
| Source | KIC0 | 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 008180020-01 / KOI 1741.01

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|----------------|-------------------------|--------------------|--------------------|---------------------------|
| DV | -1383 ± 16 | $19.28^{+2.65}_{-0.98}$ | 1263^{+66}_{-56} | 2938^{+58}_{-58} | $7.264^{+0.736}_{-1.392}$ |
| Alt. | -489 ± 18 | $20.85^{+2.80}_{-1.10}$ | 1260^{+68}_{-56} | 2482^{+44}_{-46} | $2.201^{+0.230}_{-0.416}$ |

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 $A_{obs} \gg 1.0$

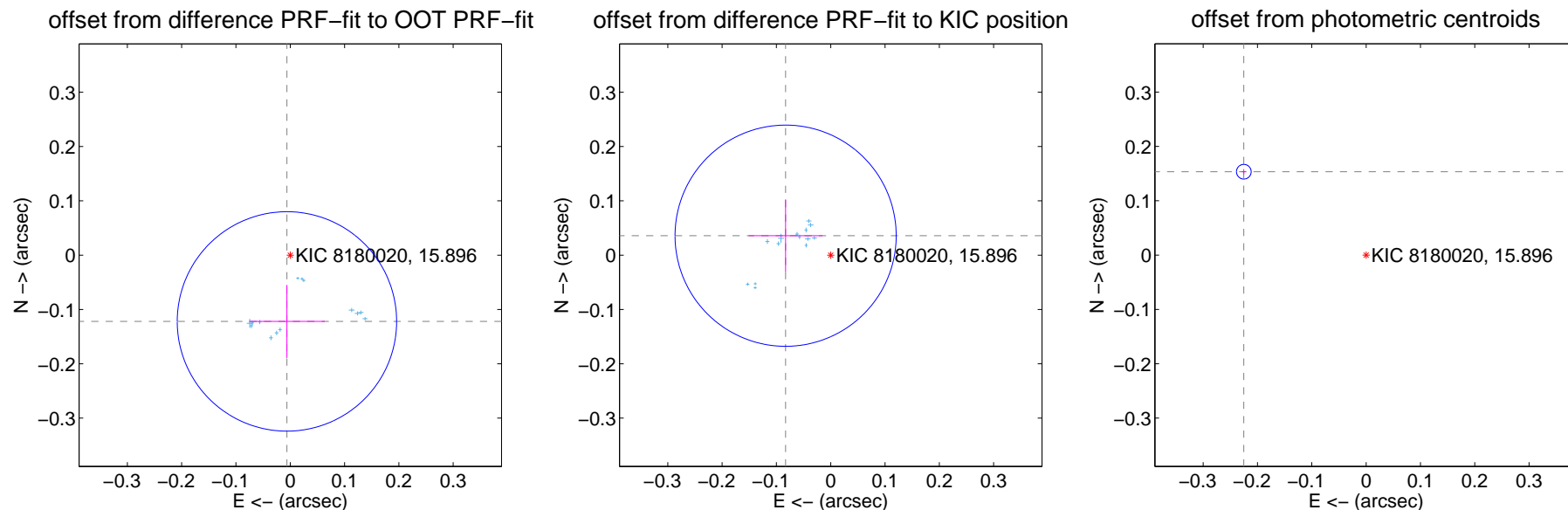
DV Centroid Data

Supplemental centroid analysis for 008180020-01. Kepler magnitude: 15.90. Transit SNR 1566.96

There are 14 quarters with good PRF difference image offsets

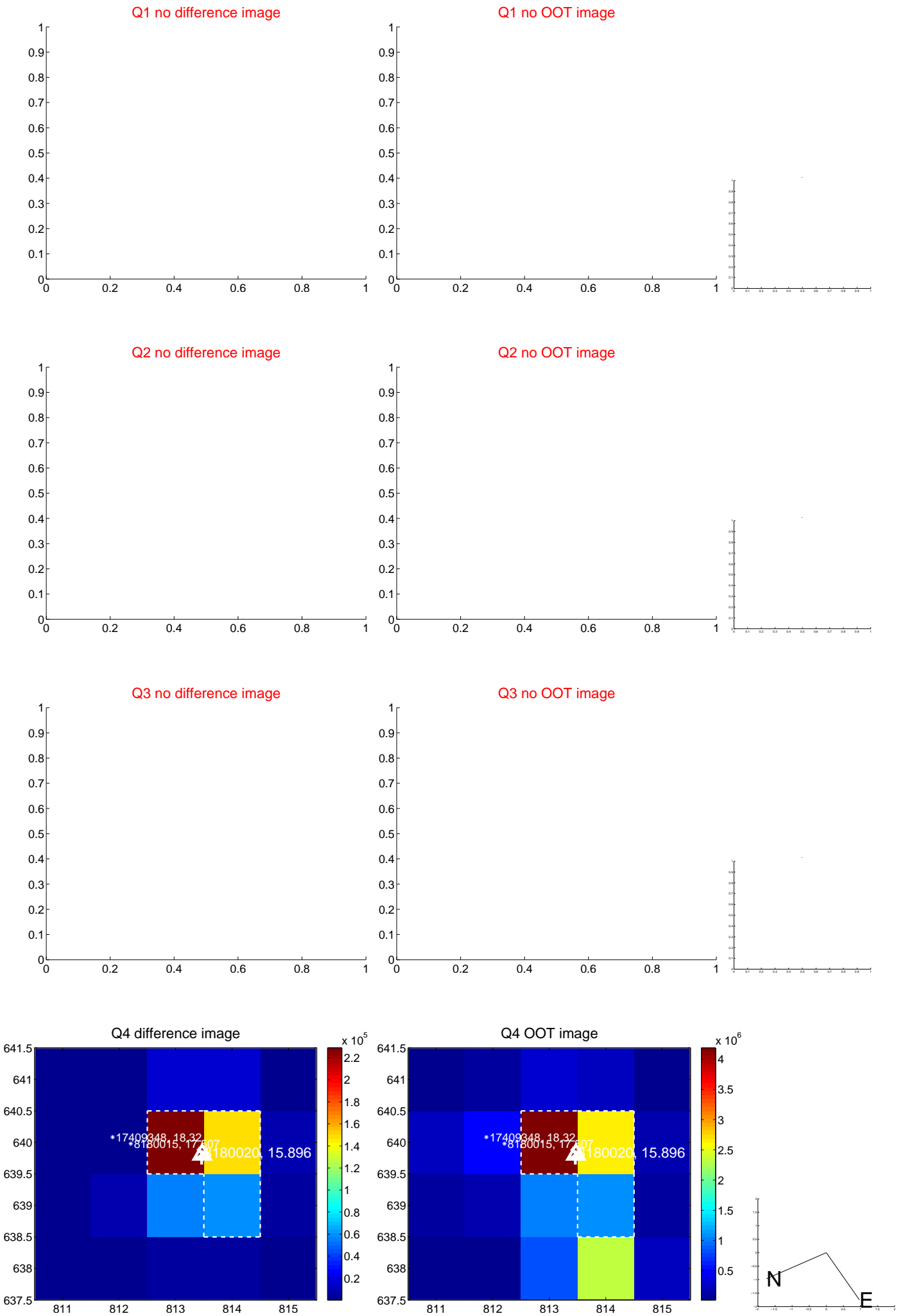
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 0.122 ± 0.067 | 1.81 | 0.006 ± 0.070 | -0.122 ± 0.067 |
| PRF-fit source offset from KIC position | 0.090 ± 0.068 | 1.33 | 0.083 ± 0.068 | 0.036 ± 0.067 |
| photometric centroid source offset | 0.27 ± 0.00 | 60.49 | 0.23 ± 0.00 | 0.15 ± 0.00 |

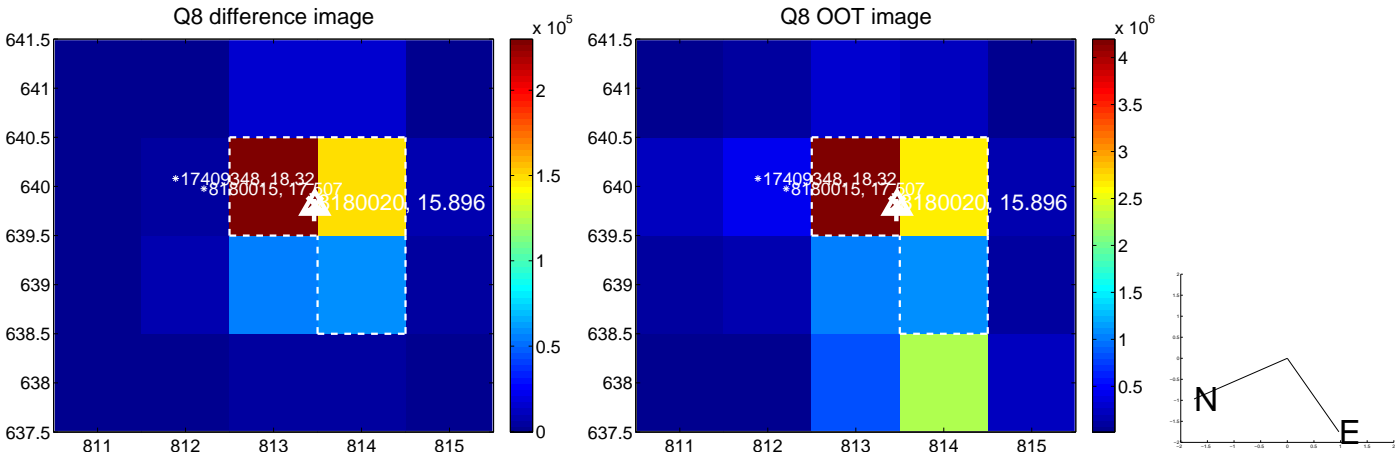
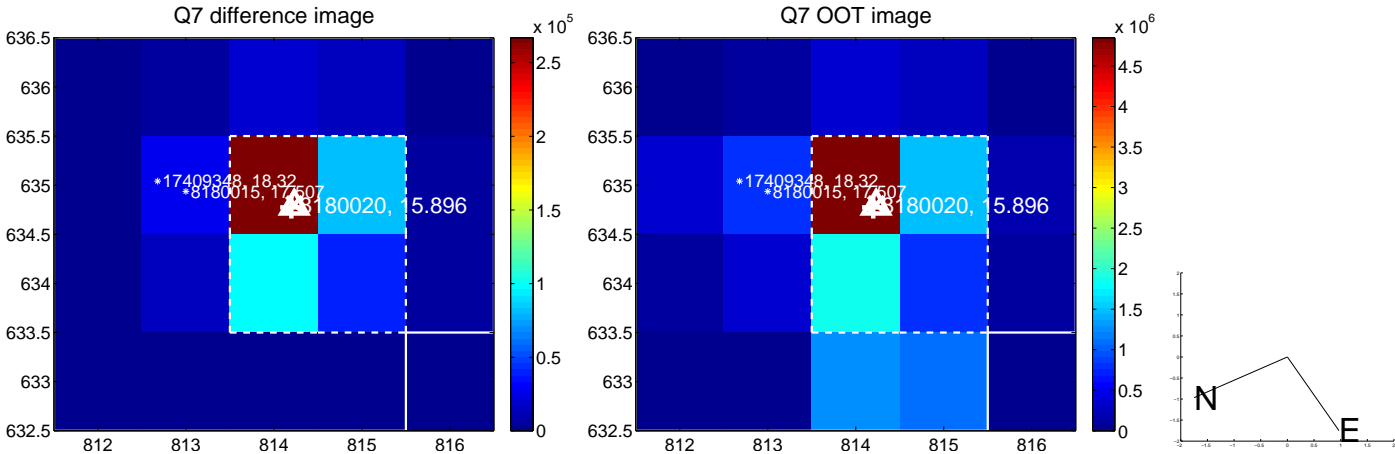
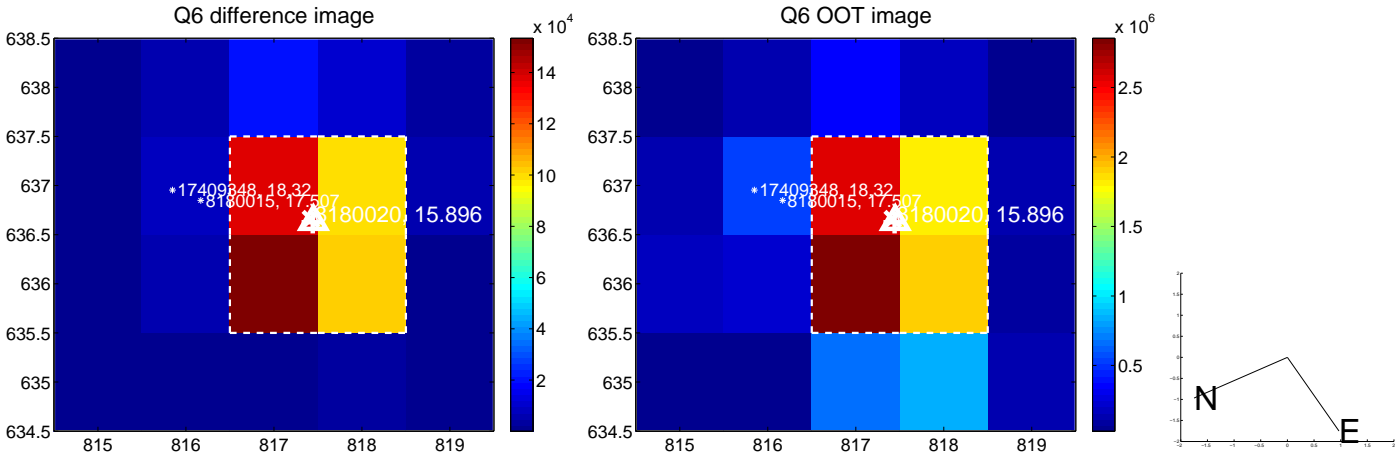
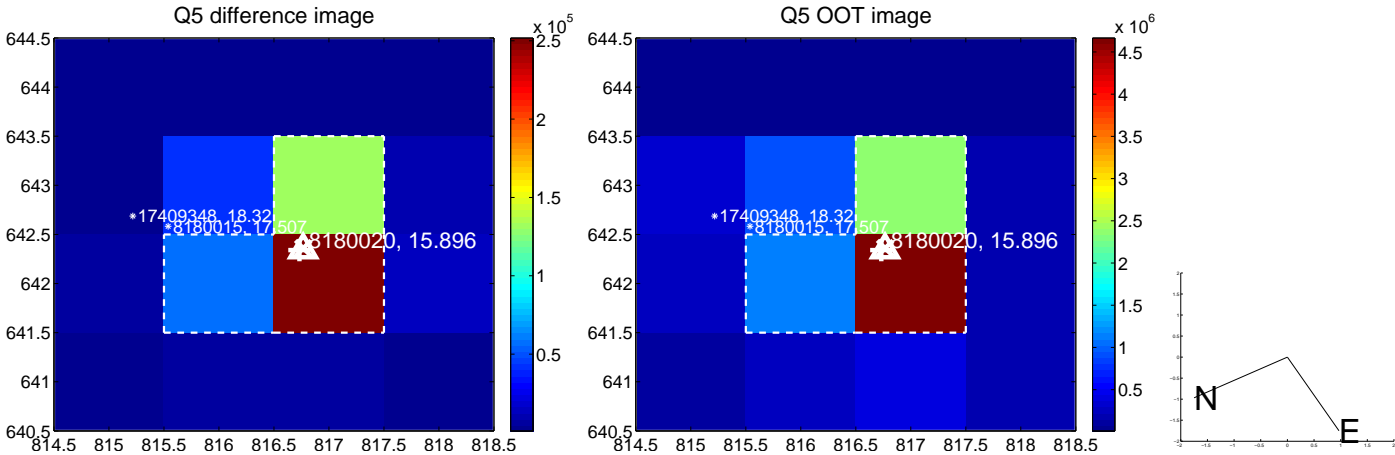


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

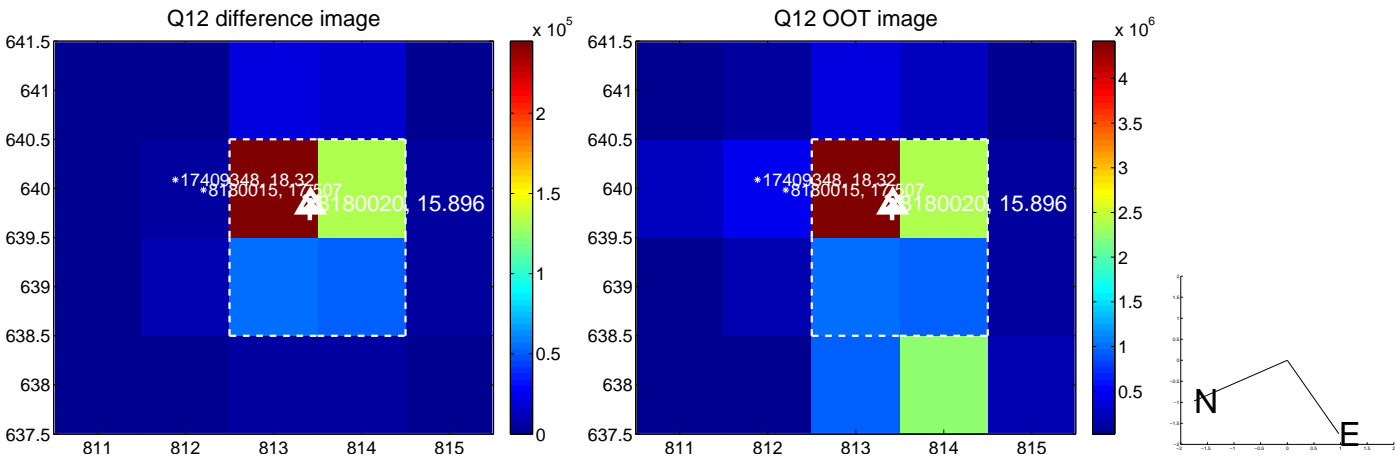
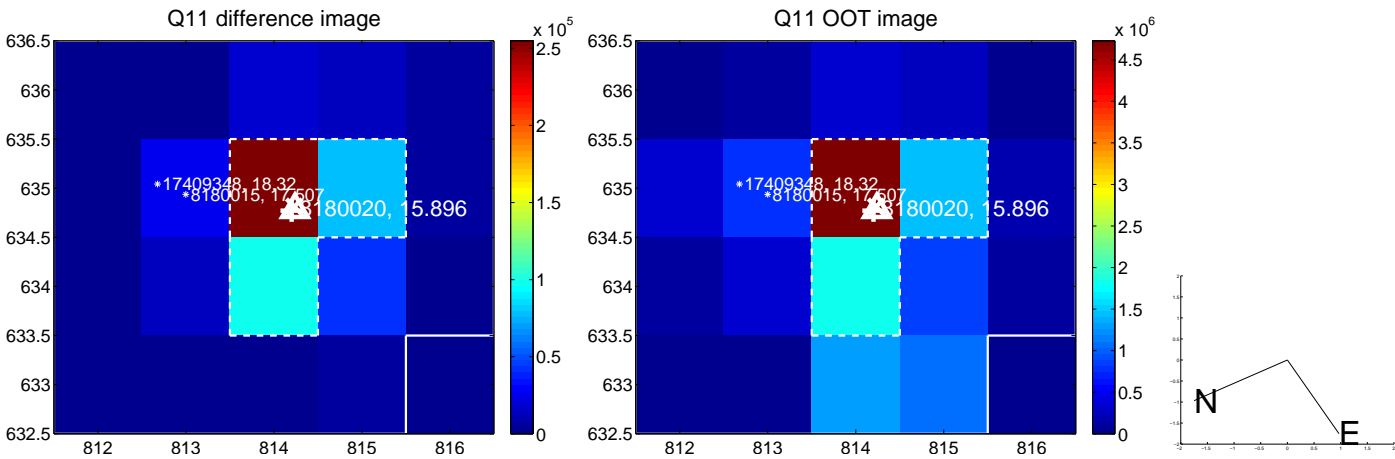
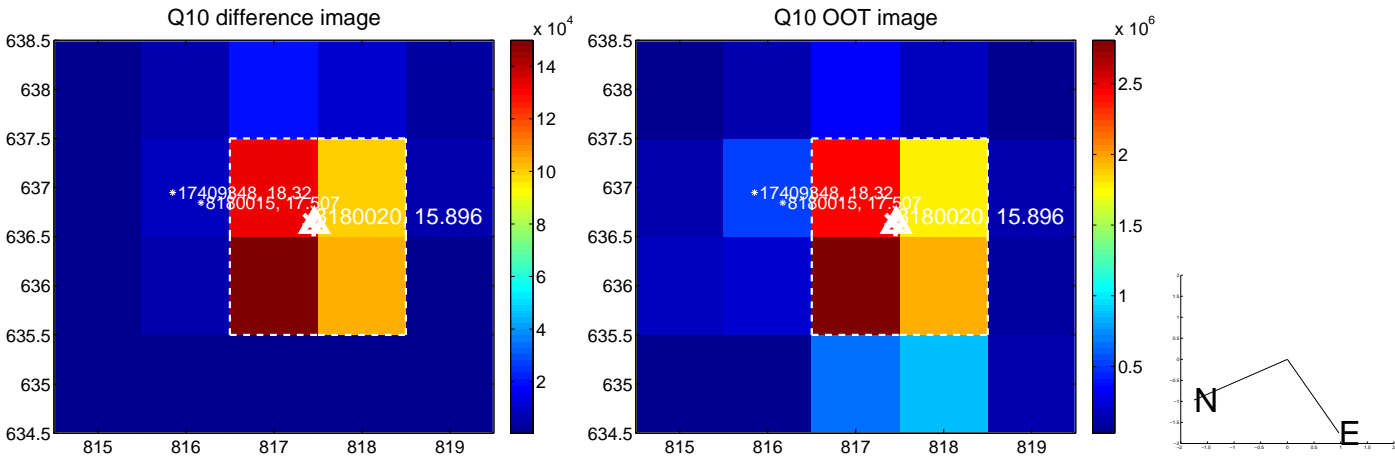
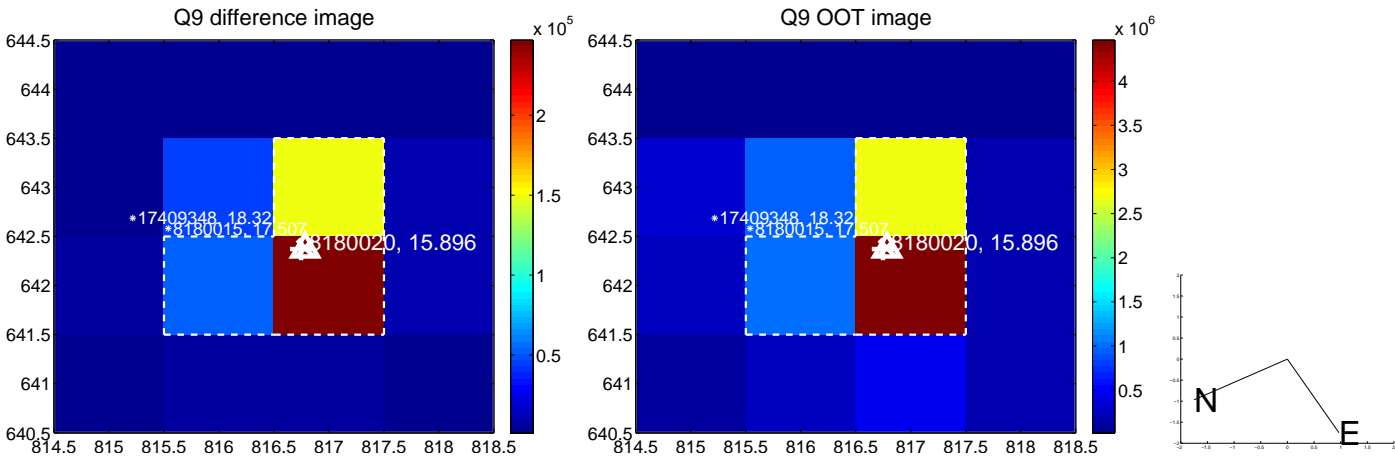
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



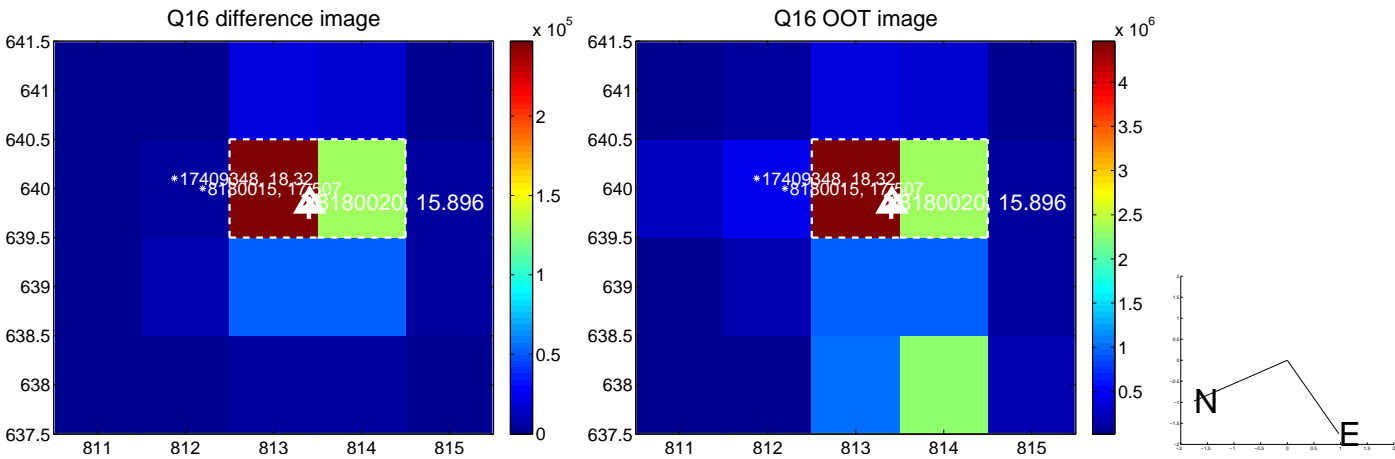
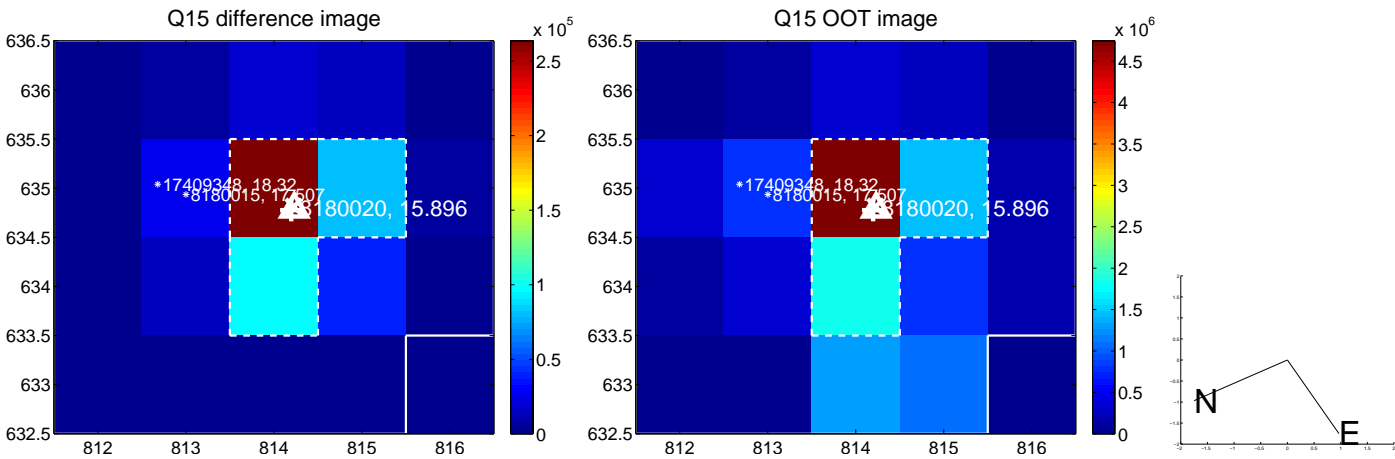
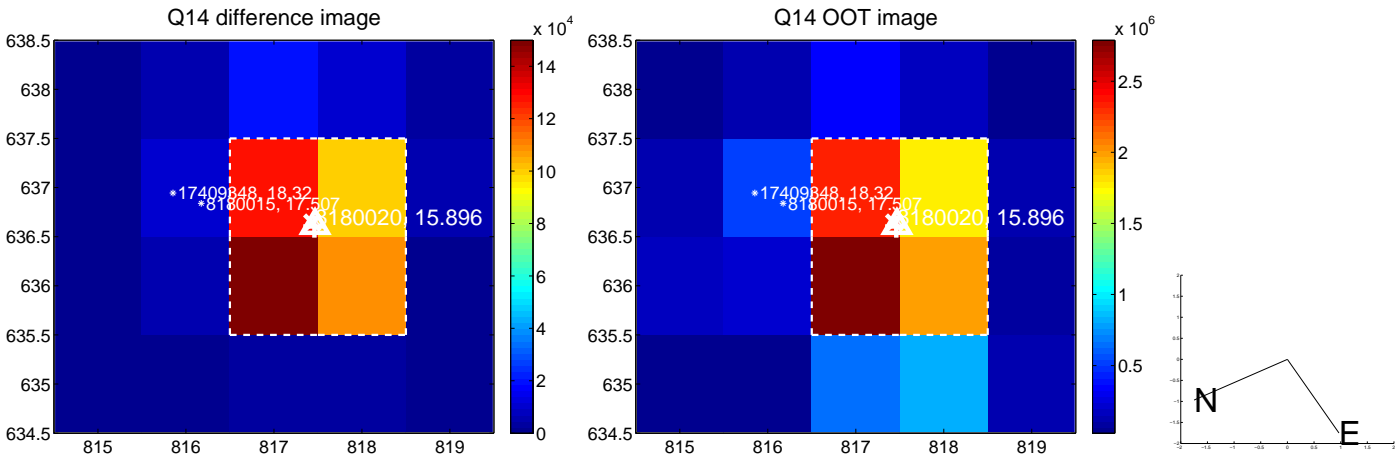
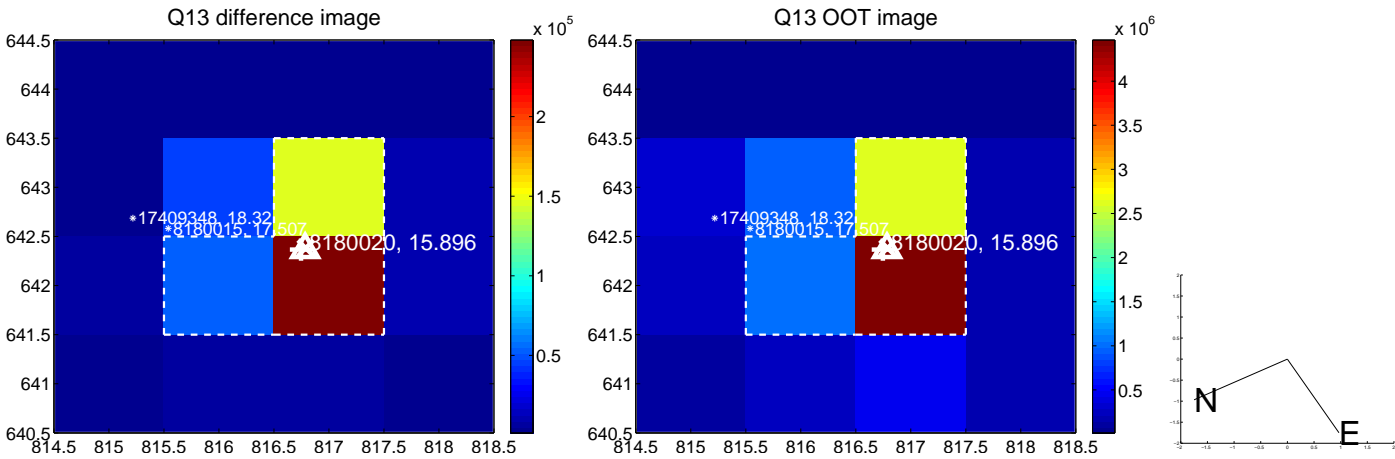
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



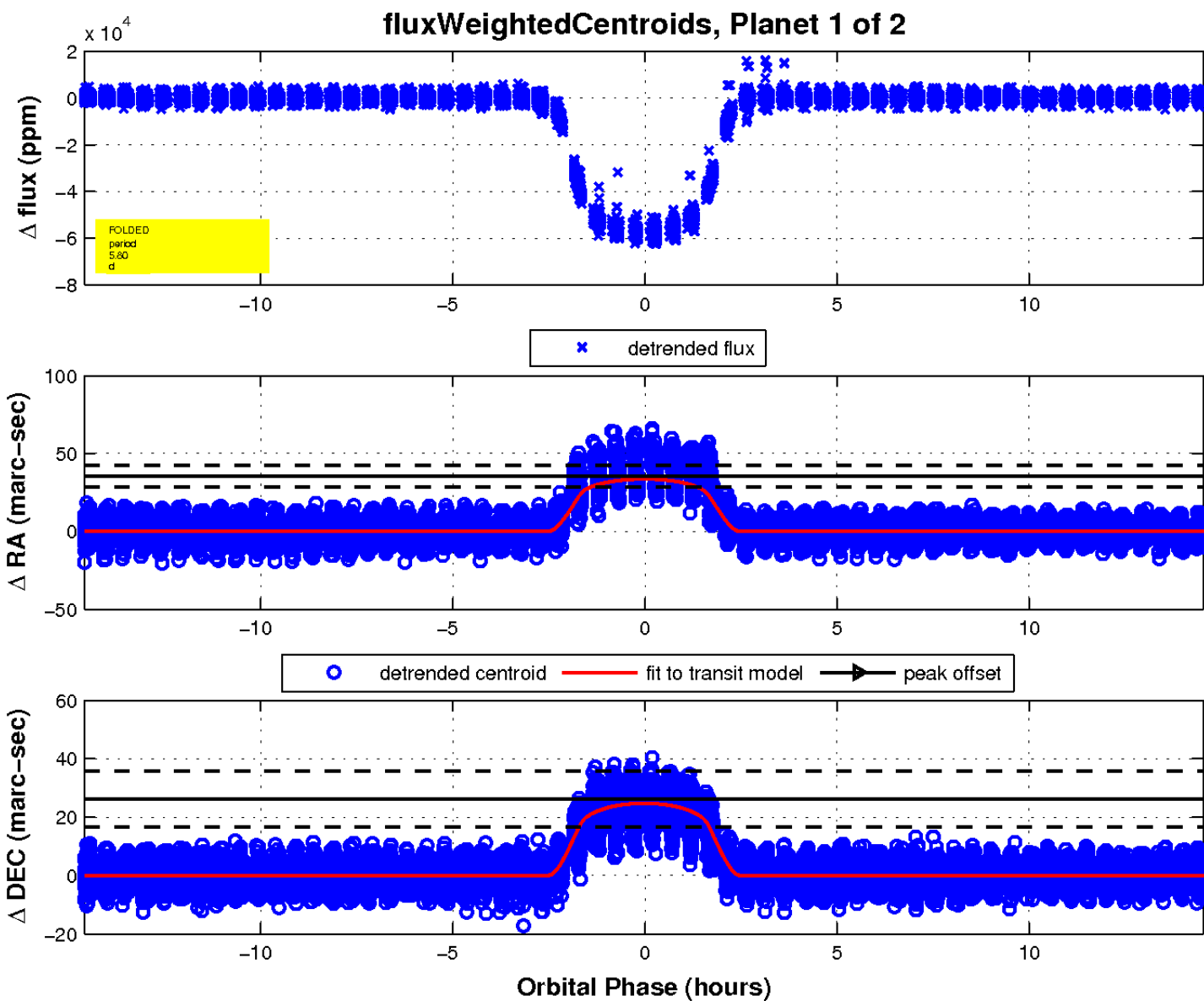
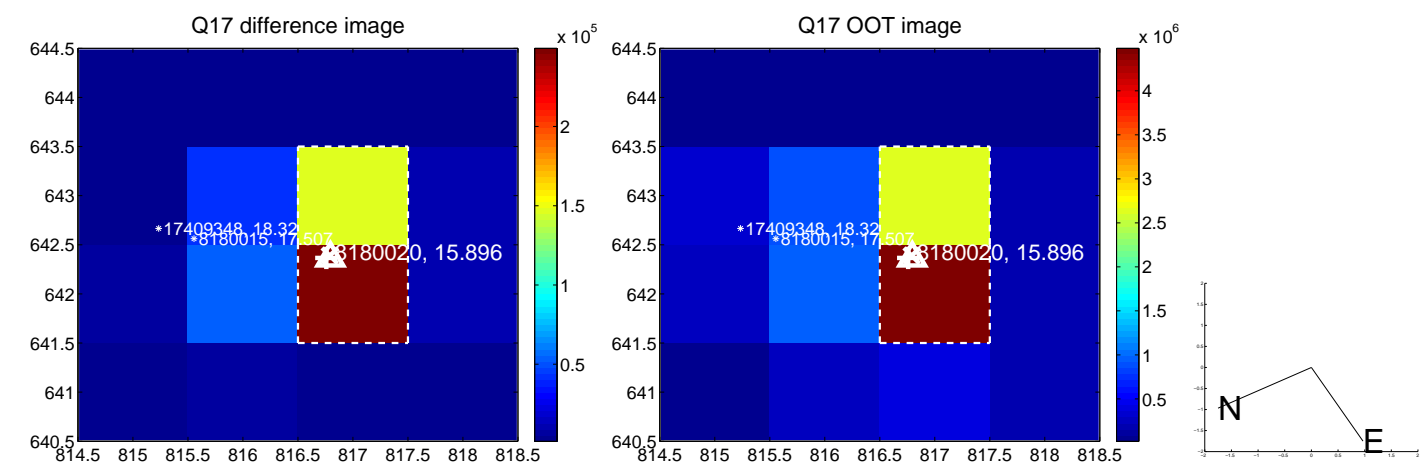
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

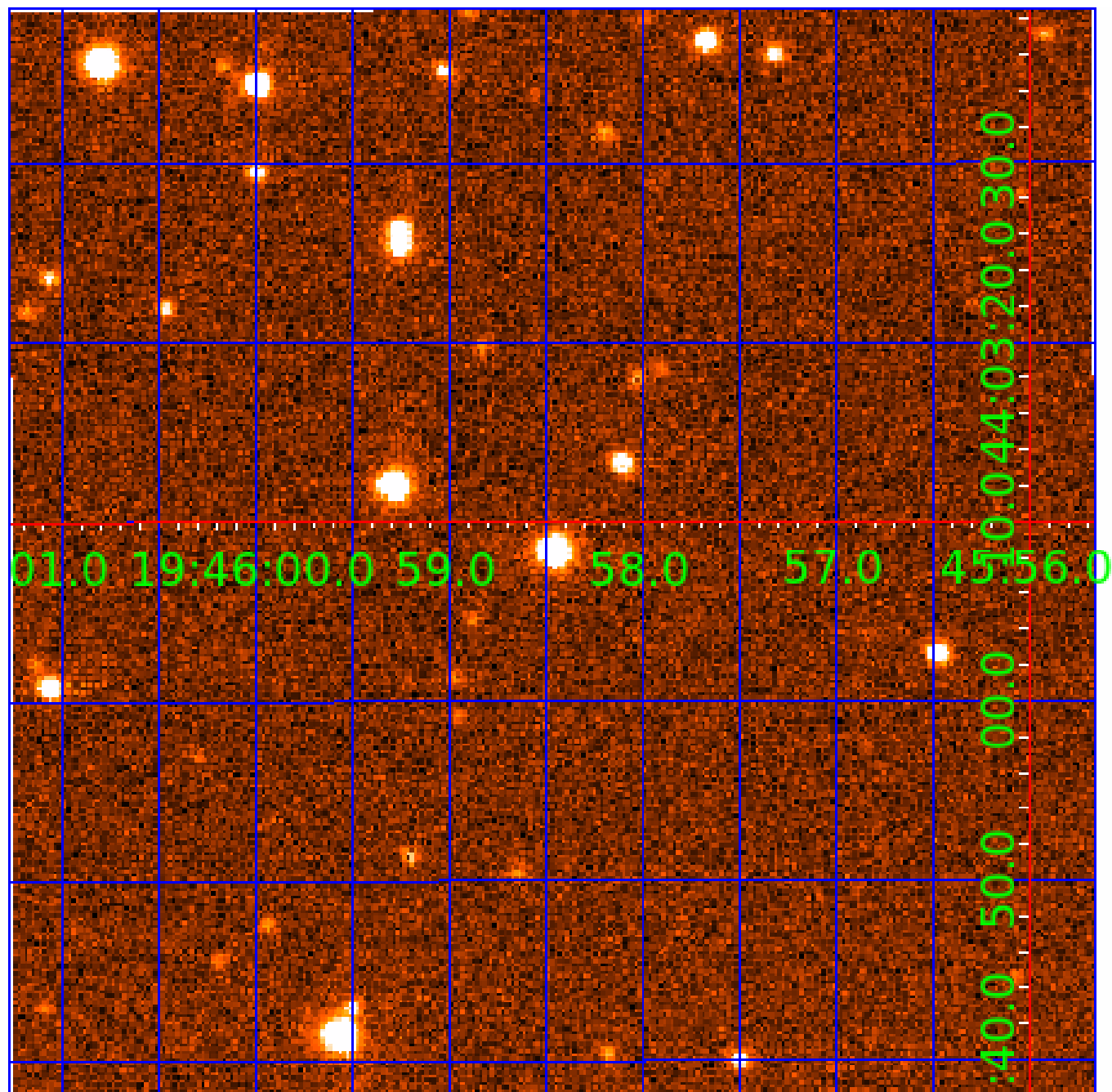


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008180020

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|--------|--------|-----------------------------|-----------------|------------------------|------------------------|
| 008180020-01 | OBS | 1741.01 | 5.803122 | 136.101981 | 58595.0 | 4.922 | 1853.4 | 1567.0 | 0.80 | 5533 | 19.03 | 145.69 |
| 008180020-02 | OBS | No | 5.803105 | 133.246534 | 1583.6 | 4.570 | 54.0 | 58.3 | 0.80 | 5533 | 3.42 | 145.69 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------|
| 008180020-01 | OBS | FP | 0.00 | 0 | 1 | 0 | 0 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE |
| 008180020-02 | OBS | FP | 0.00 | 1 | 1 | 0 | 0 | IS_SEC_TCE |

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.

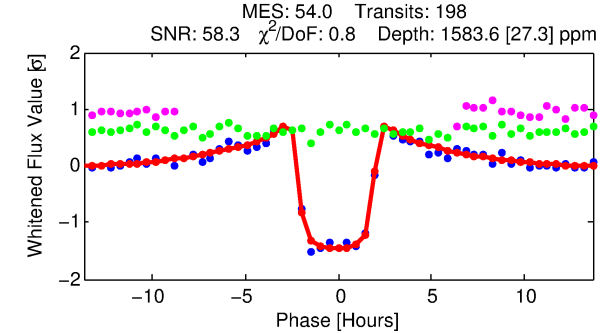
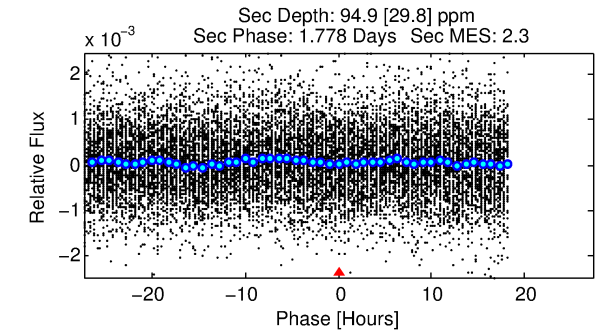
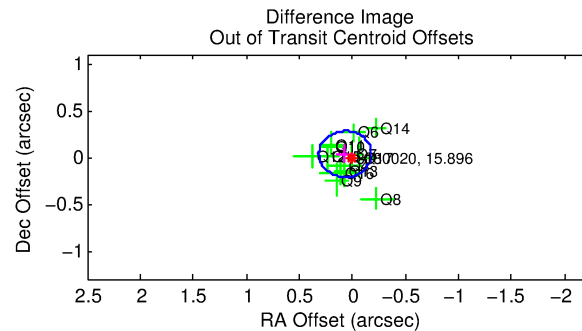
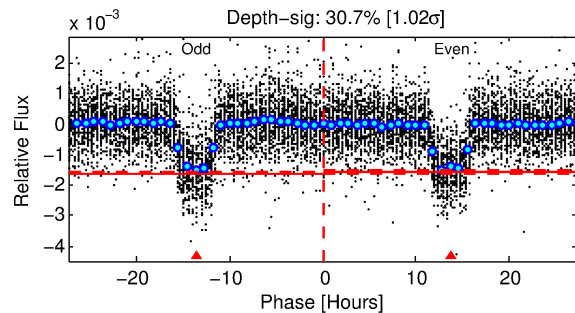
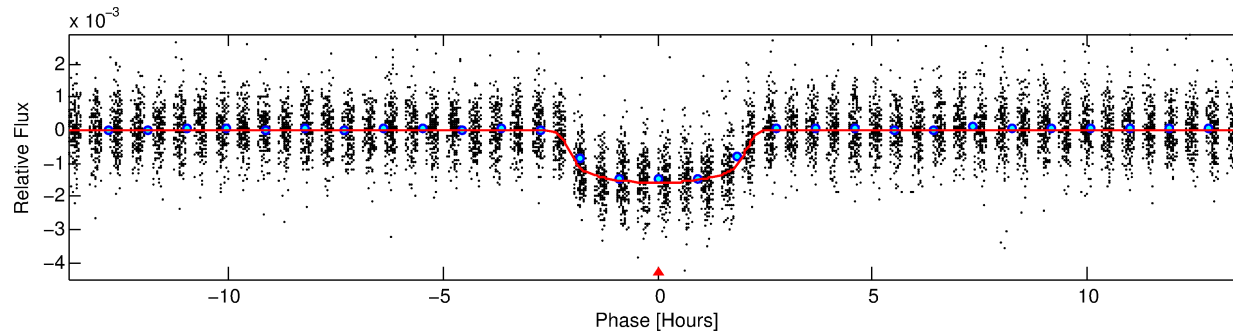
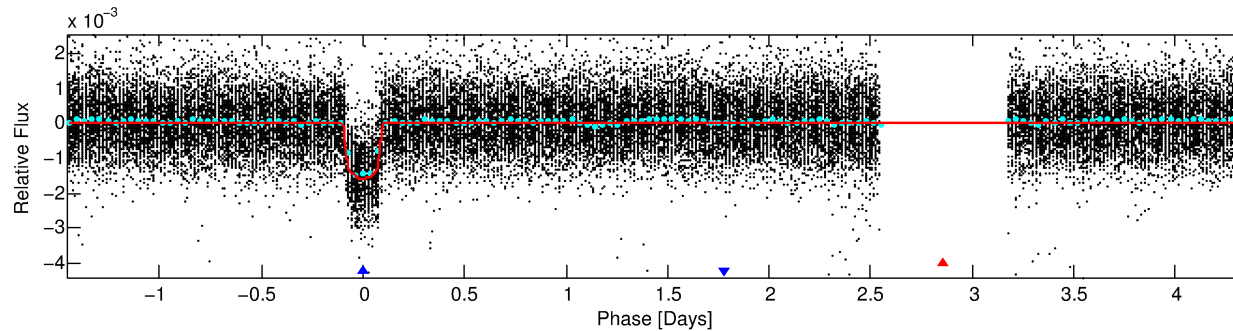
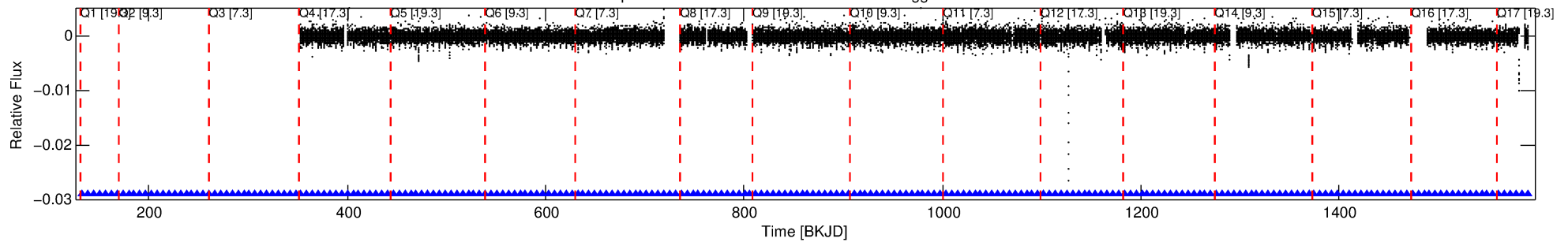
Ephemeris Match Information For 008180020-02

No Significant Match Found

DV One-Page Summary

KIC: 8180020 Candidate: 2 of 2 Period: 5.803 d
KOI: K01741 Corr: No Ephemeris Match

Kp: 15.90 R*: 0.80 Rs Teff: 5533.0 K Logg: 4.58 Fe/H: -0.200



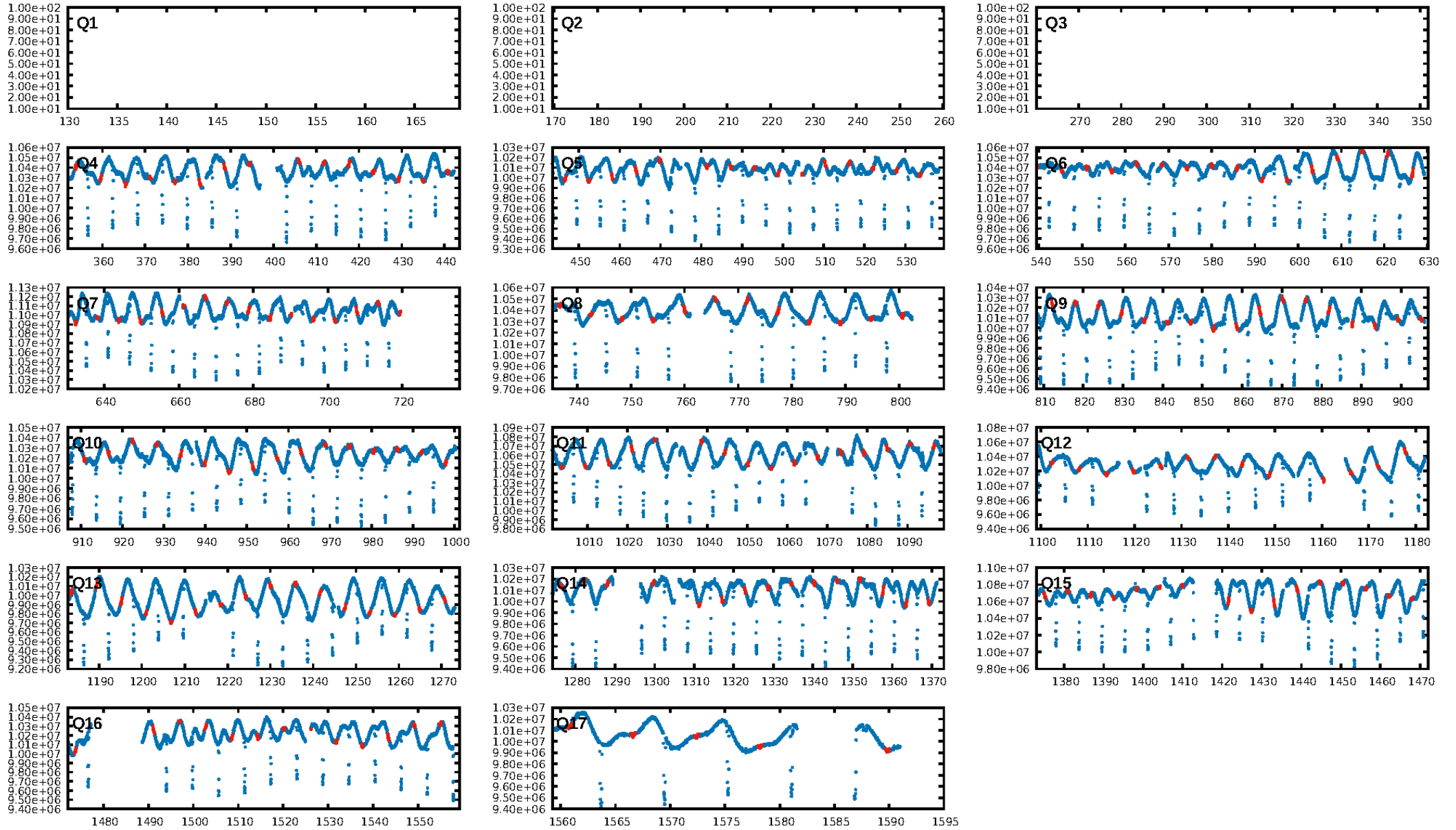
DV Fit Results:

Period = 5.80311 [0.00001] d
Epoch = 133.2465 [0.0011] BKJD
Rp/R* = 0.0394 [0.0024]
a/R* = 7.18 [1.74]
b = 0.74 [0.16]
Seff = 145.69 [45.28]
Teff = 886 [69] K
Rp = 3.42 [0.84] Re
a = 0.0604 [0.0118] AU
Ag = 16.26 [7.14] [2.14σ]
Teffp = 2751 [249] K [7.22σ]

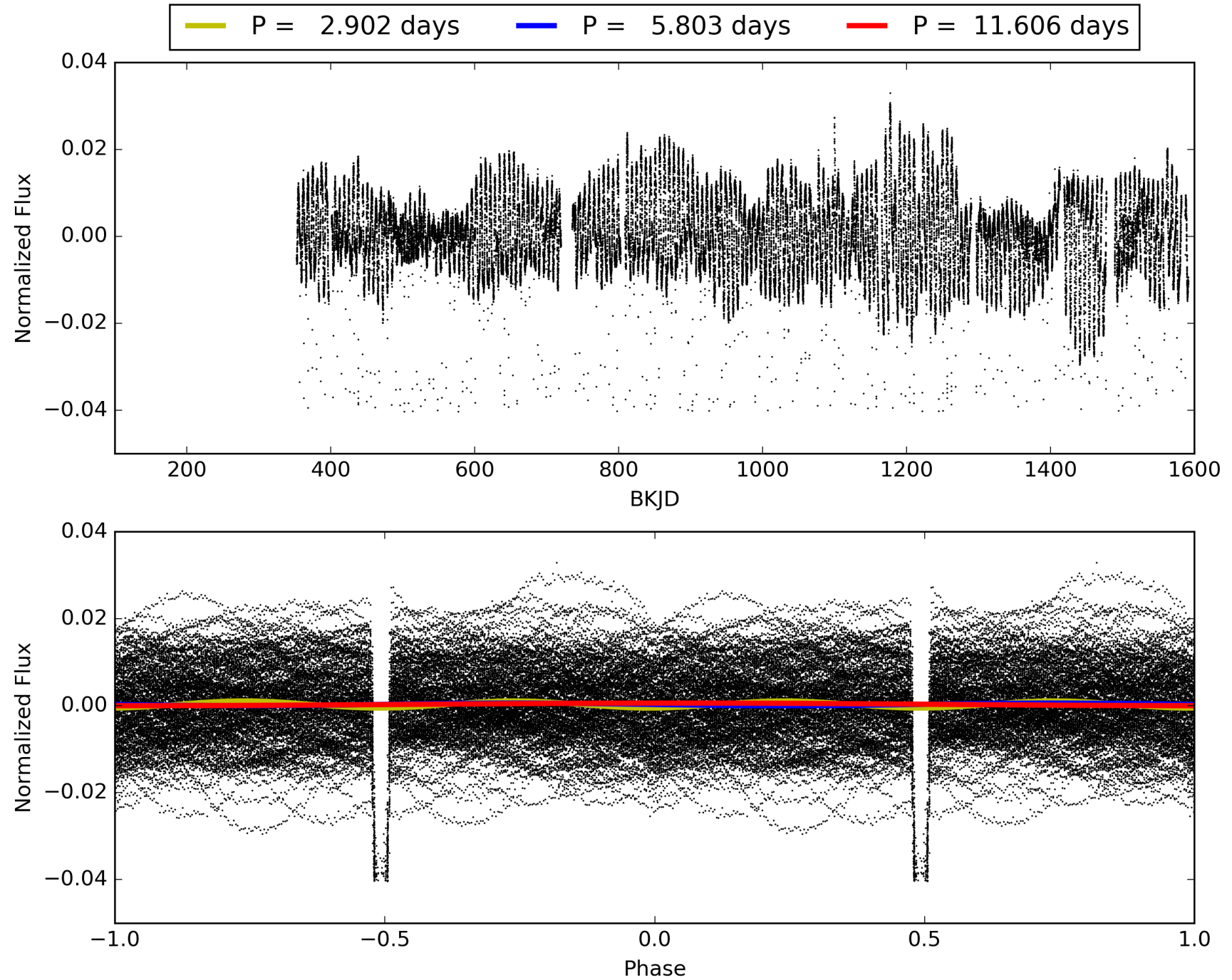
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 99.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 1.00 [193/193]
GhostDiagnostic-chr: 3.25
Centroid-sig: 0.0%
Centroid-so: 0.596 arcsec [3.90σ]
OotOffset-rm: 0.075 arcsec [0.91σ]
KicOffset-rm: 0.203 arcsec [2.43σ]
OotOffset-st: 3/3/4/4 [14]
KicOffset-st: 3/3/4/4 [14]
DiffImageQuality-fgm: 1.00 [14/14]
DiffImageOverlap-fno: 1.00 [14/14]

TCE 008180020-02, PDC Light Curves

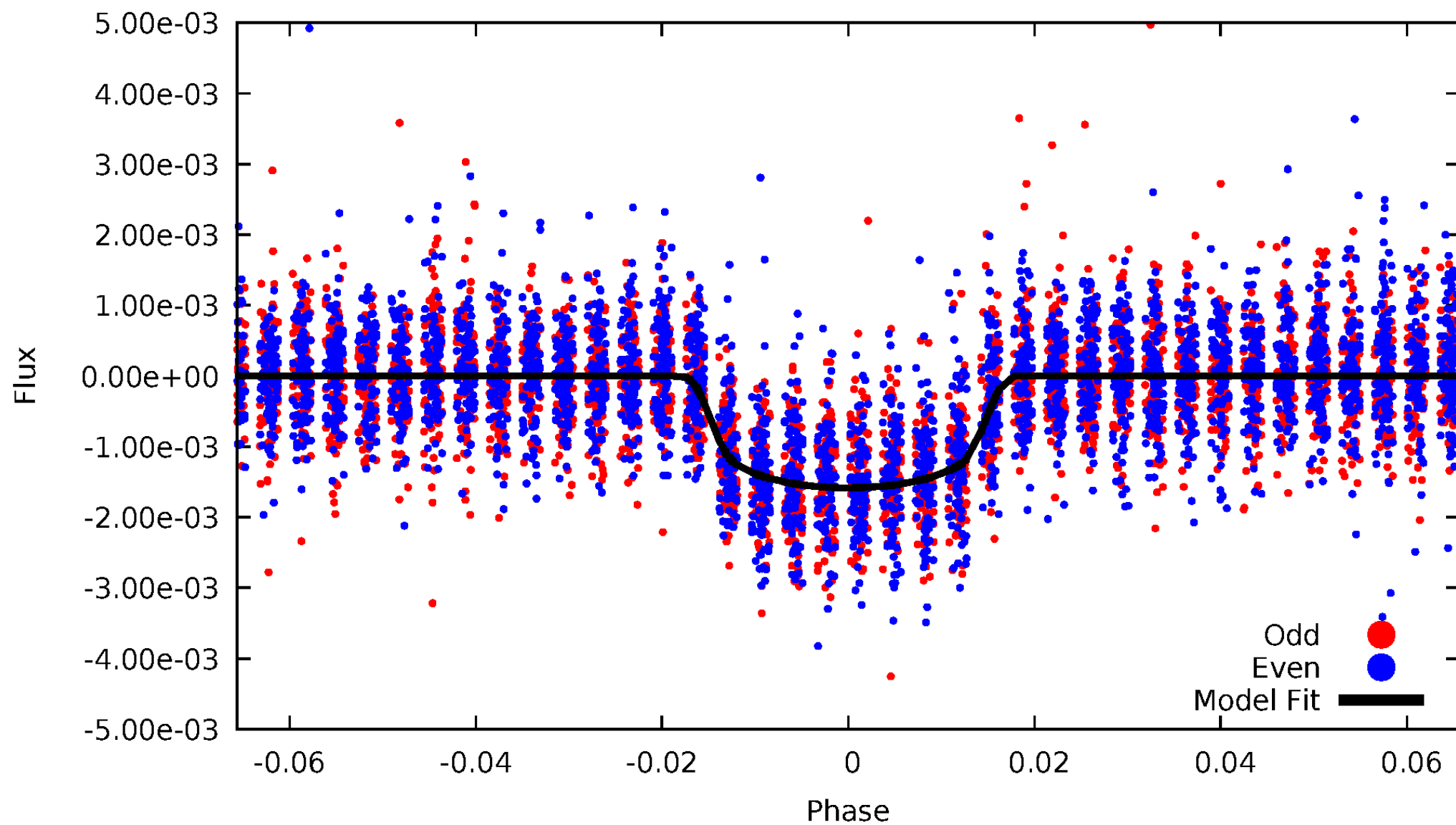


TCE 008180020-02



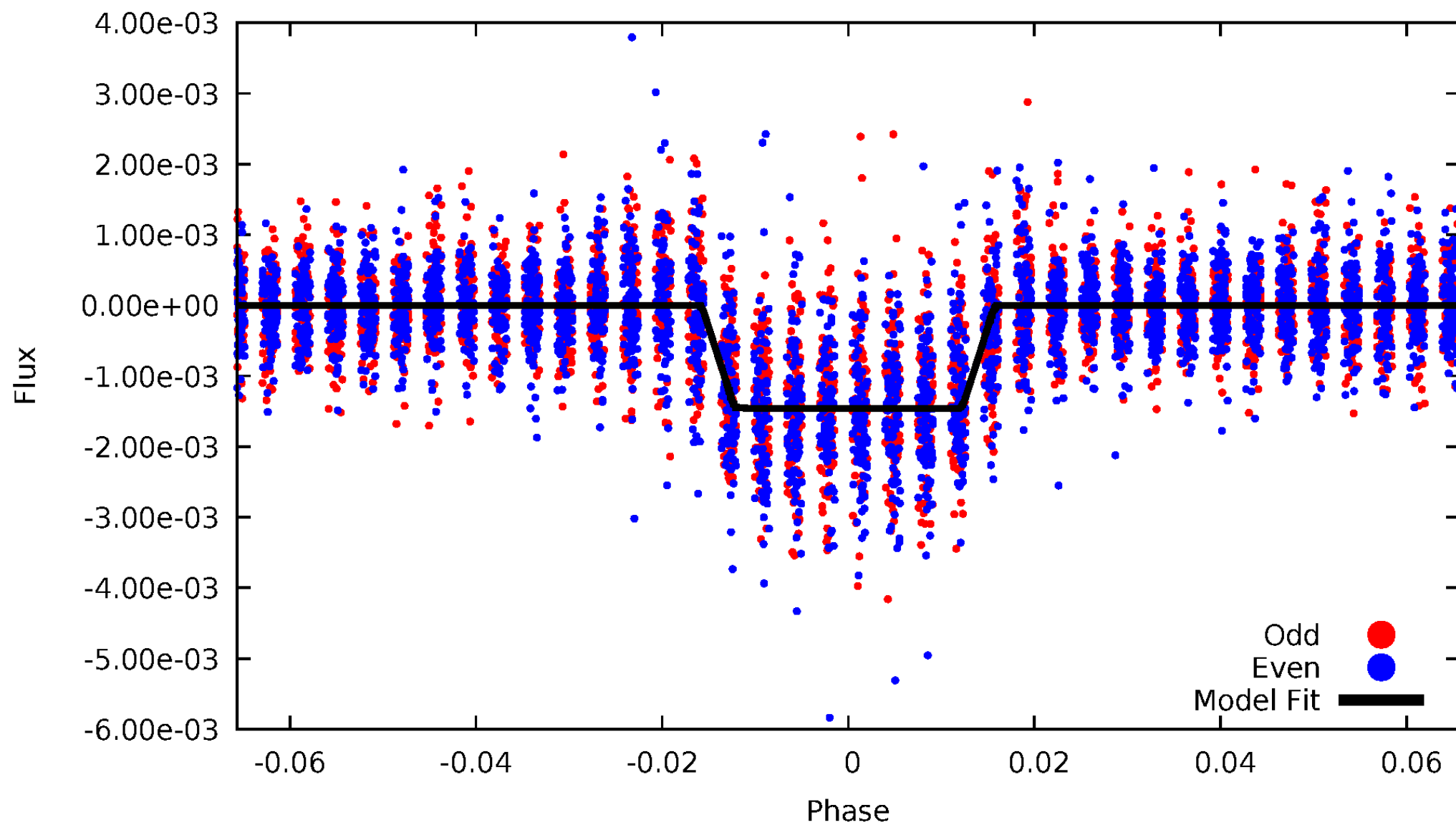
DV Odd/Even

TCE 008180020-02



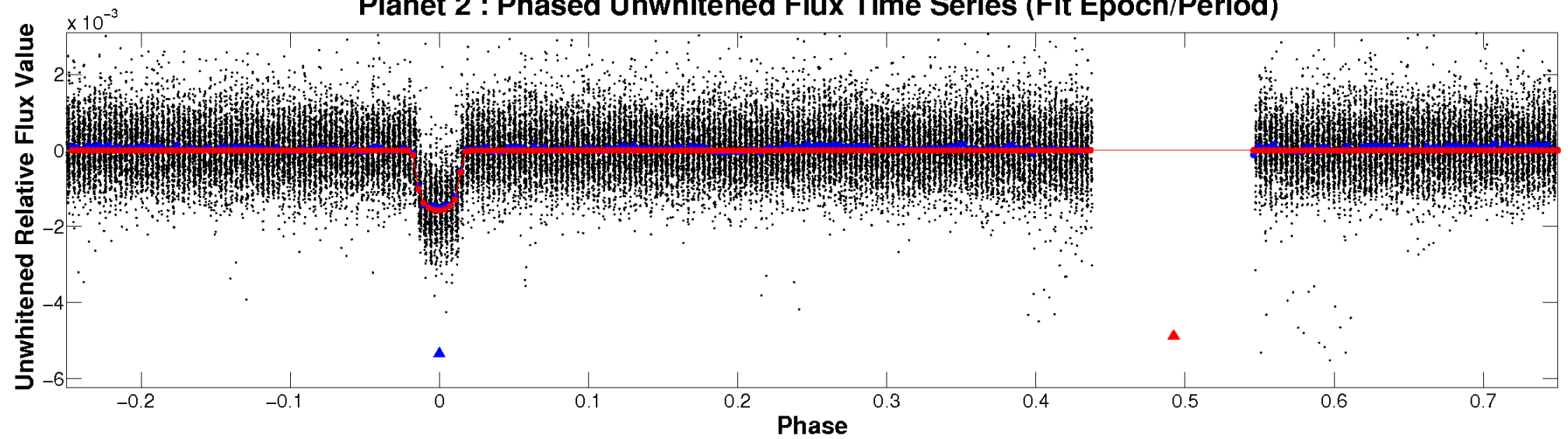
ALT Odd/Even

TCE 008180020-02

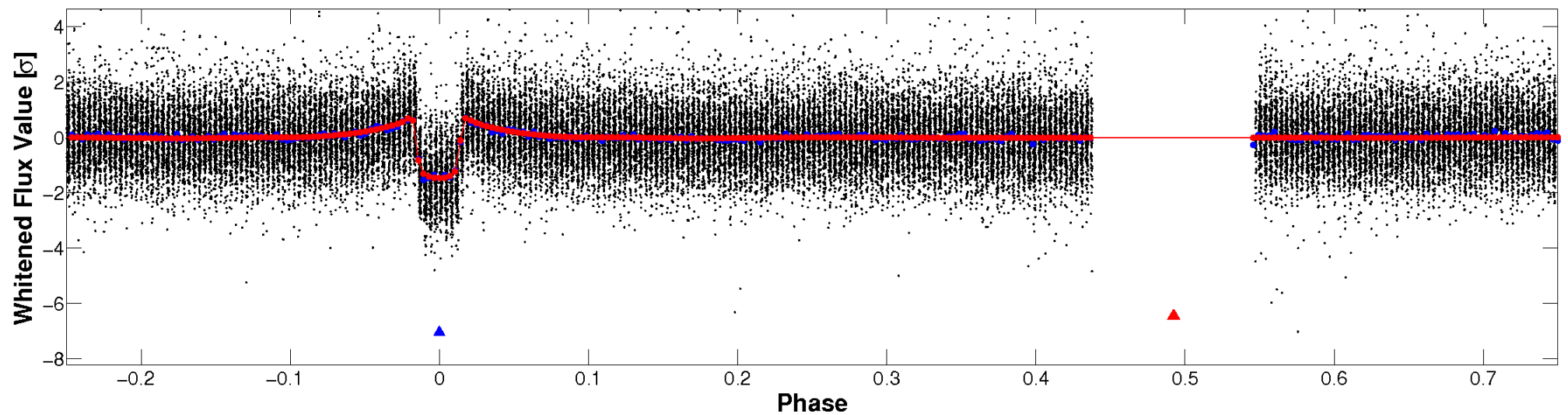


Non-Whitened Vs. Whitened Light Curve

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

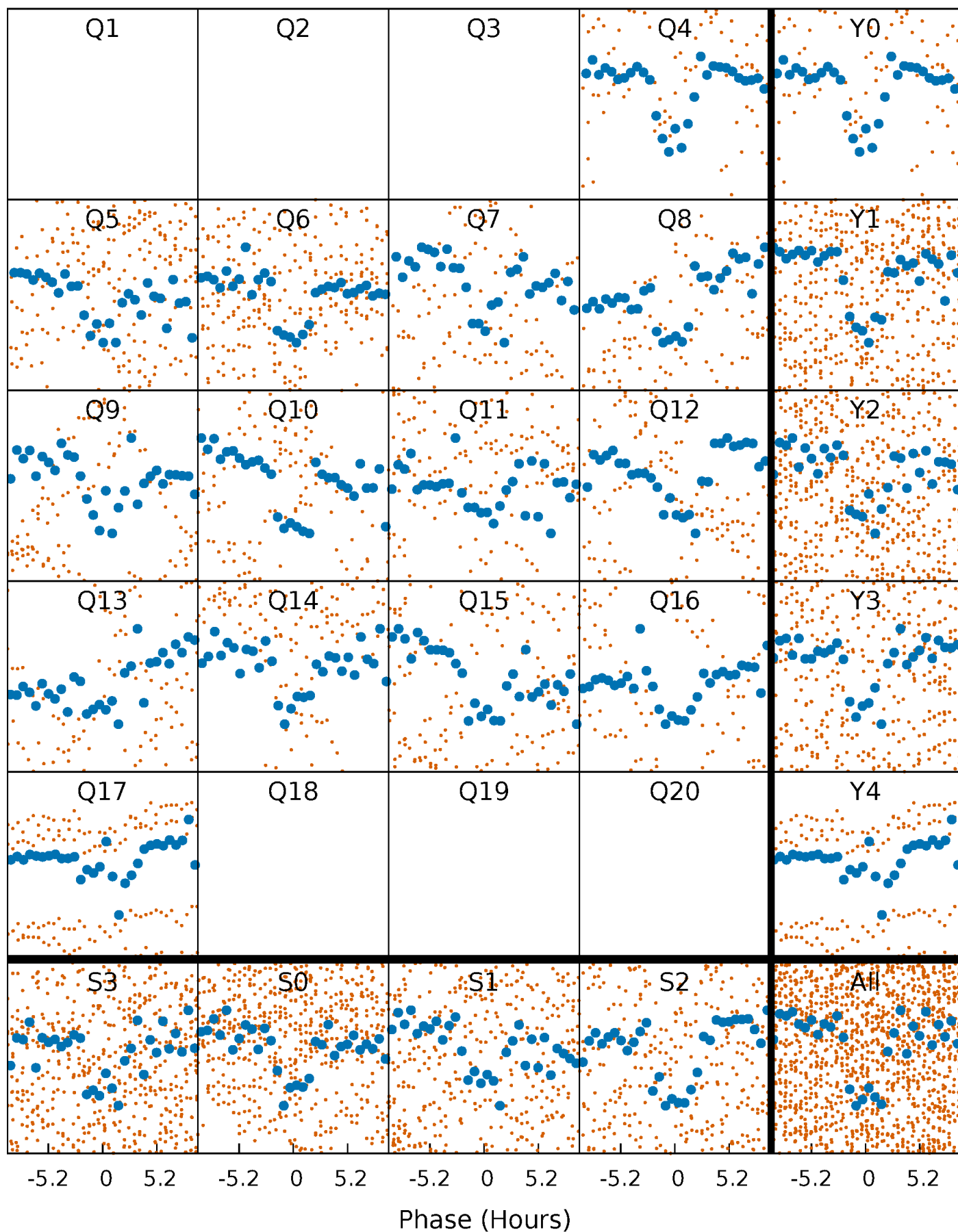


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



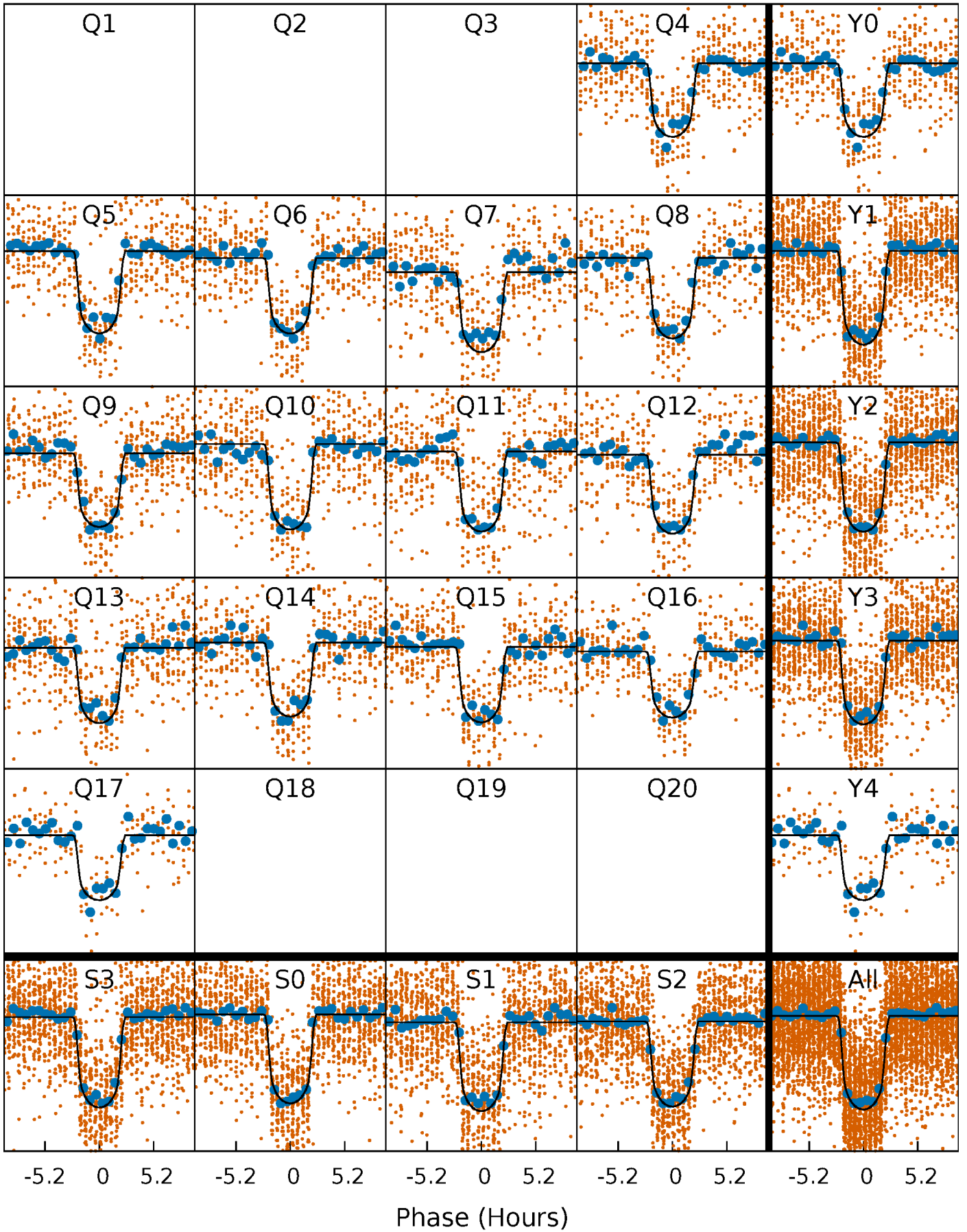
PDC Quarter-Phased Transit Curves

TCE 008180020-02 P= 5.803105 Days $T_0=133.246534$ (BKJD)



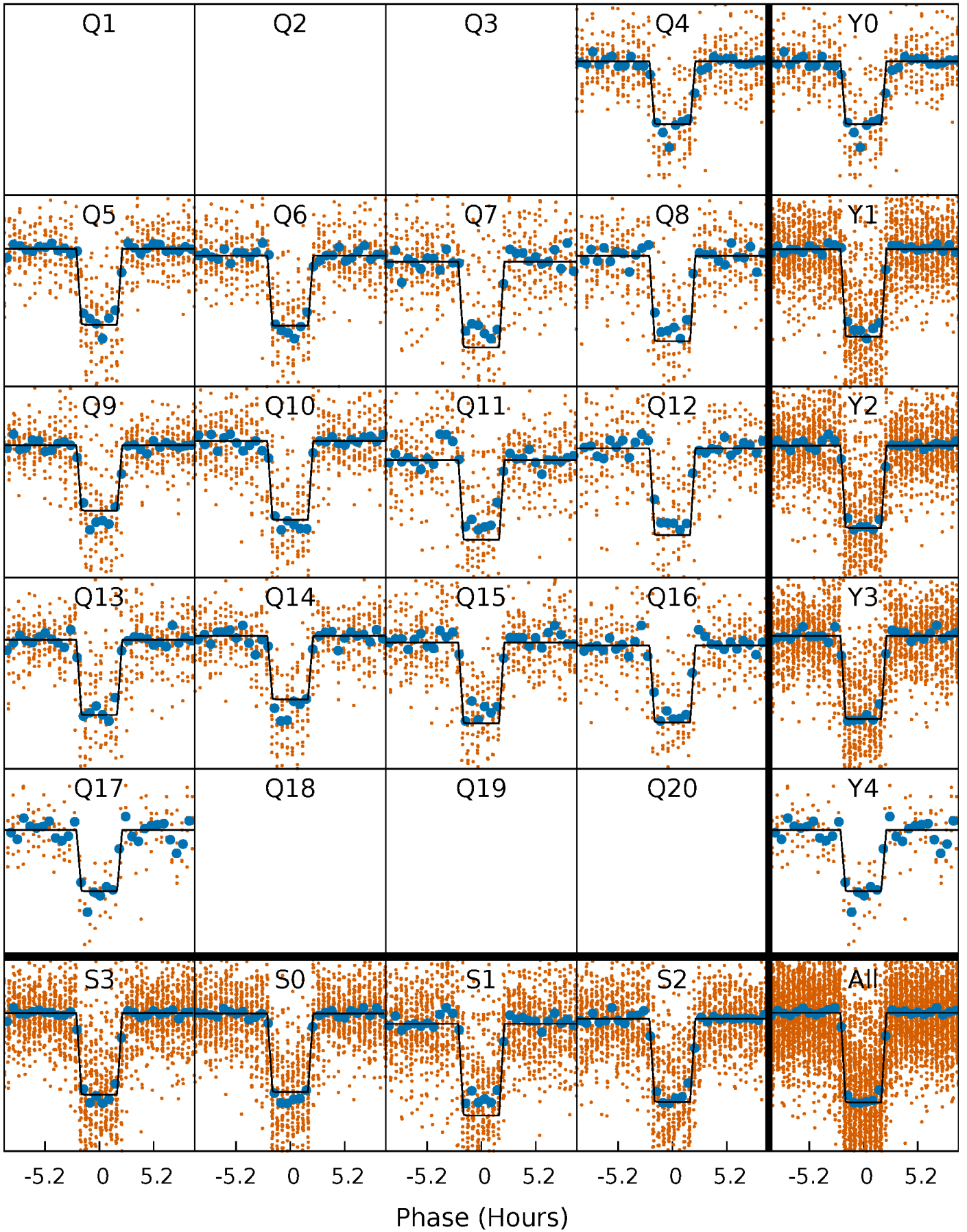
DV Quarter-Phased Transit Curves

TCE 008180020-02 P= 5.803105 Days $T_0=133.246534$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

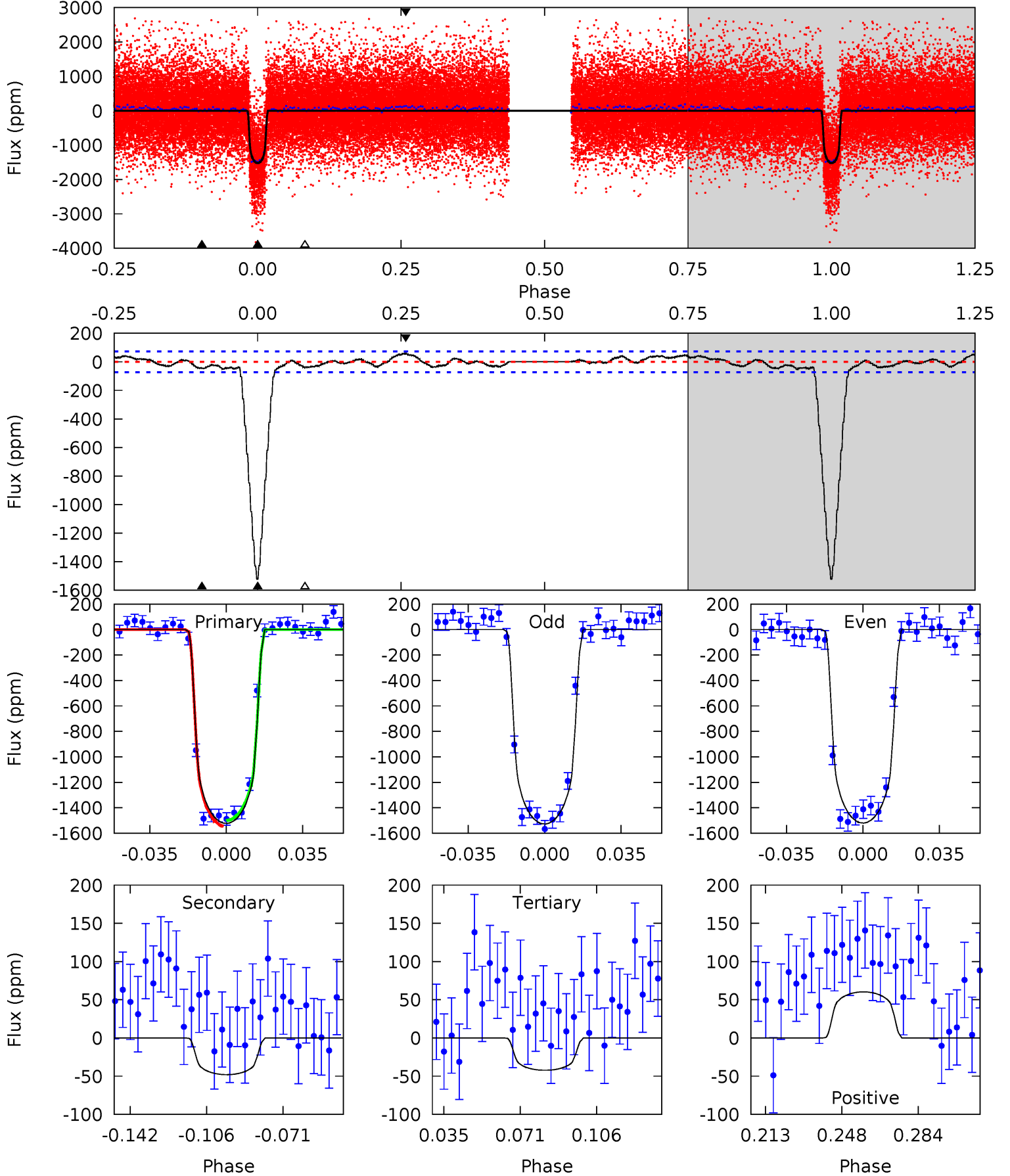
TCE 008180020-02 P= 5.803167 Days $T_0=133.237482$ (BKJD)



DV Model-Shift Uniqueness Test

008180020-02, P = 5.803105 Days, E = 133.246534 Days

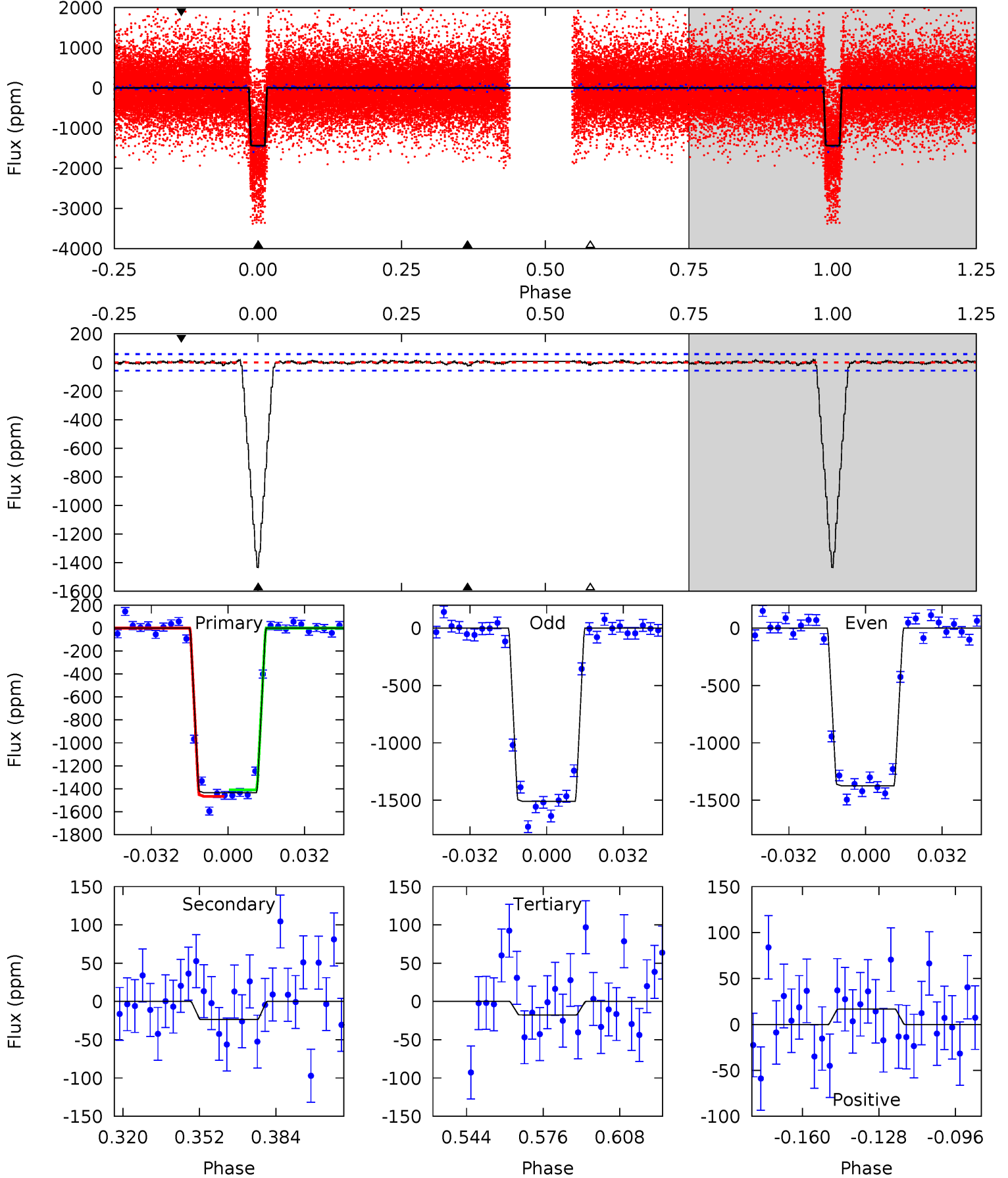
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 99.9 | 3.15 | 2.77 | 3.96 | 4.78 | 2.10 | 1.67 | 97.1 | 95.9 | 0.38 | -0.81 | 0.25 | 1.00 | 0.04 | 1.54 |



Alt Model-Shift Uniqueness Test

008180020-02, P = 5.803167 Days, E = 133.237482 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 118.8 | 1.96 | 1.46 | 1.39 | 4.80 | 2.14 | 0.49 | 117.3 | 117.4 | 0.50 | 0.57 | 5.66 | 1.00 | 0.01 | 2.36 |



Stellar Parameters For KIC 008180020

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5533^{+182}_{-182} | $4.577^{+0.038}_{-0.152}$ | $-0.200^{+0.300}_{-0.300}$ | $0.795^{+0.188}_{-0.063}$ | $0.876^{+0.092}_{-0.102}$ | $2.452^{+0.490}_{-1.029}$ |
| | +3%/-3% | +1%/-3% | +150%/-150% | +24%/-8% | +11%/-12% | +20%/-42% |
| Source | KIC0 | 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 008180020-02 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|--------------|------------------------|--------------------|----------------------|---------------------------|
| DV | -48 ± 15 | $3.51^{+0.45}_{-0.30}$ | 1259^{+73}_{-53} | 2956^{+158}_{-182} | $7.174^{+3.005}_{-2.371}$ |
| Alt. | -24 ± 12 | $3.42^{+0.43}_{-0.33}$ | 1264^{+68}_{-54} | 2709^{+179}_{-286} | $3.953^{+2.255}_{-2.191}$ |

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 $A_{obs} \gg 1.0$

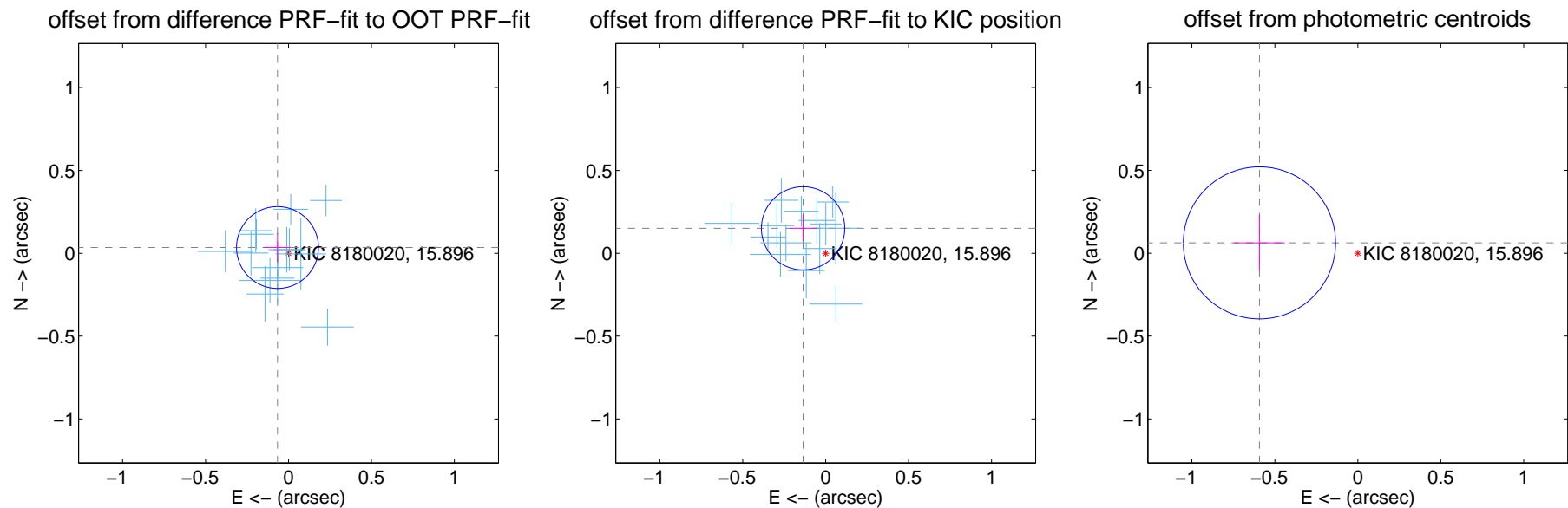
DV Centroid Data

Supplemental centroid analysis for 008180020-02. Kepler magnitude: 15.90. Transit SNR 58.26

There are 14 quarters with good PRF difference image offsets

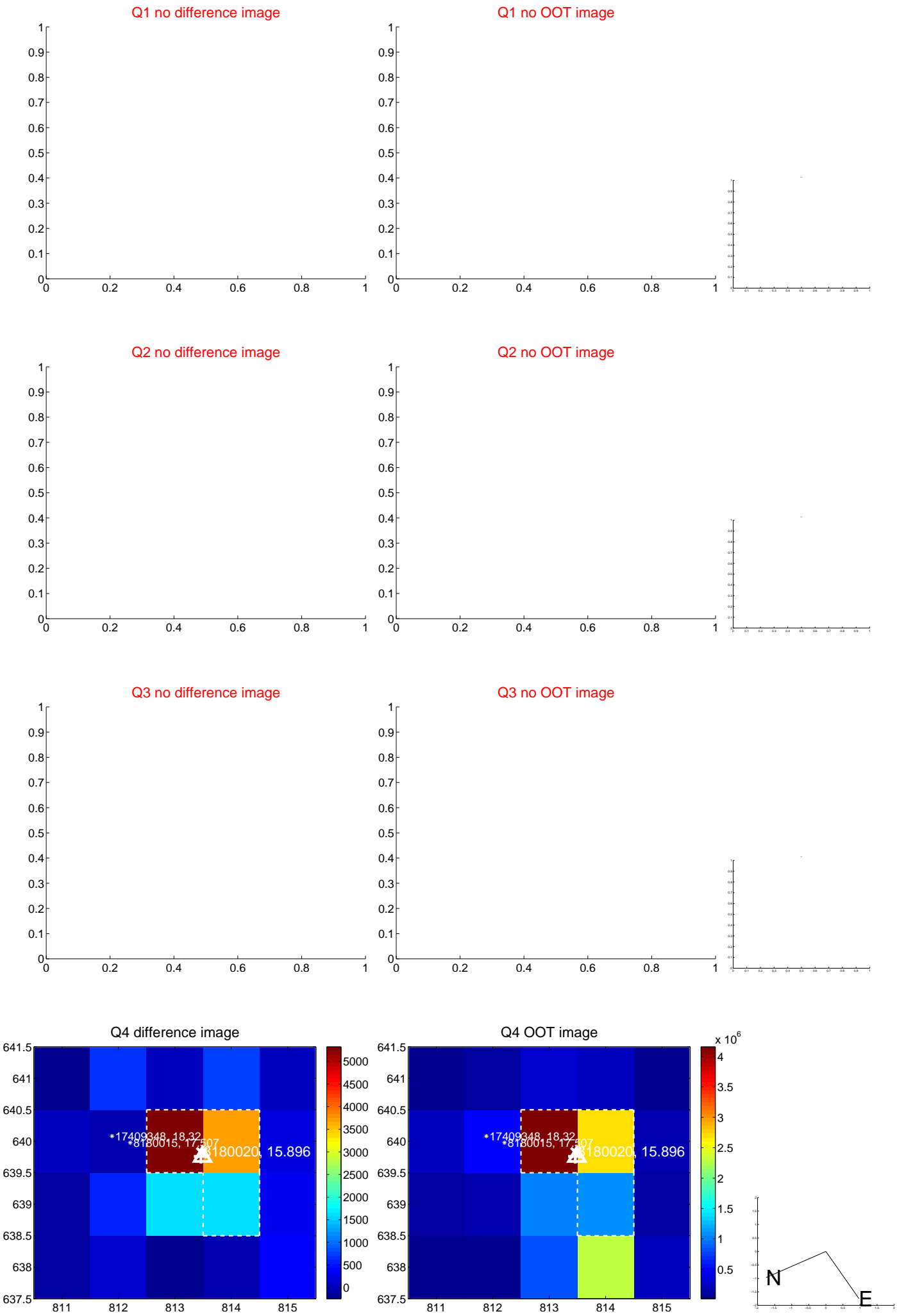
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 0.075 ± 0.082 | 0.91 | 0.066 ± 0.081 | 0.035 ± 0.088 |
| PRF-fit source offset from KIC position | 0.203 ± 0.084 | 2.43 | 0.136 ± 0.081 | 0.151 ± 0.081 |
| photometric centroid source offset | 0.60 ± 0.15 | 3.90 | 0.59 ± 0.15 | 0.06 ± 0.17 |

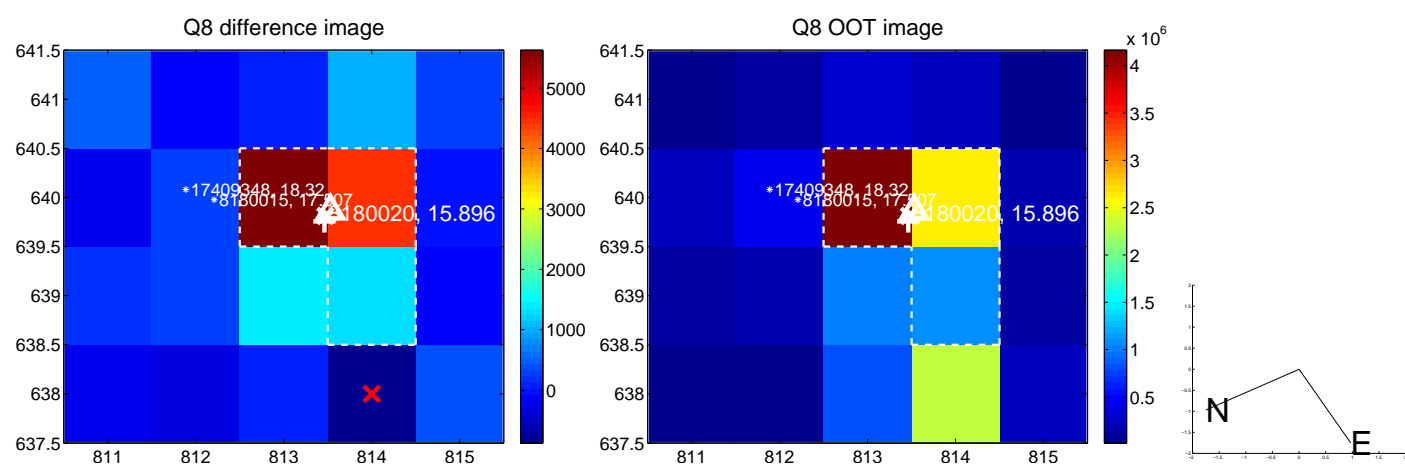
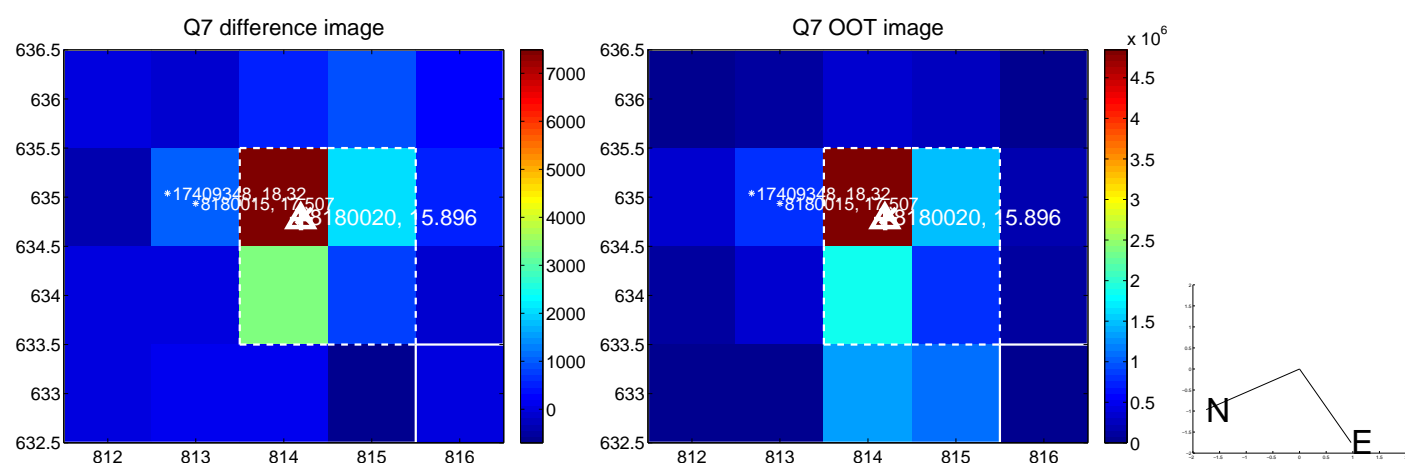
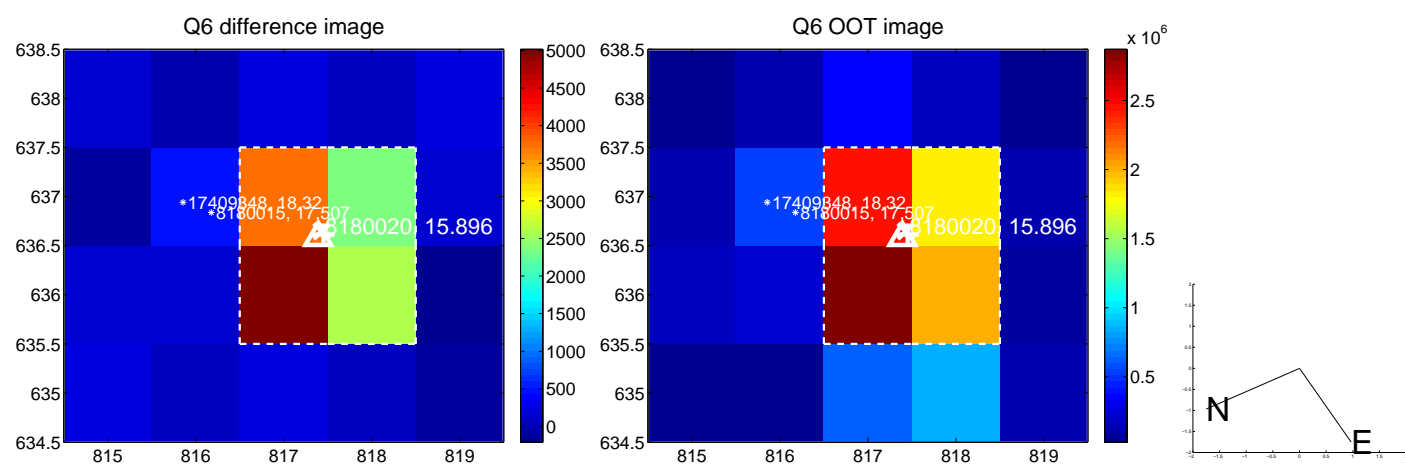
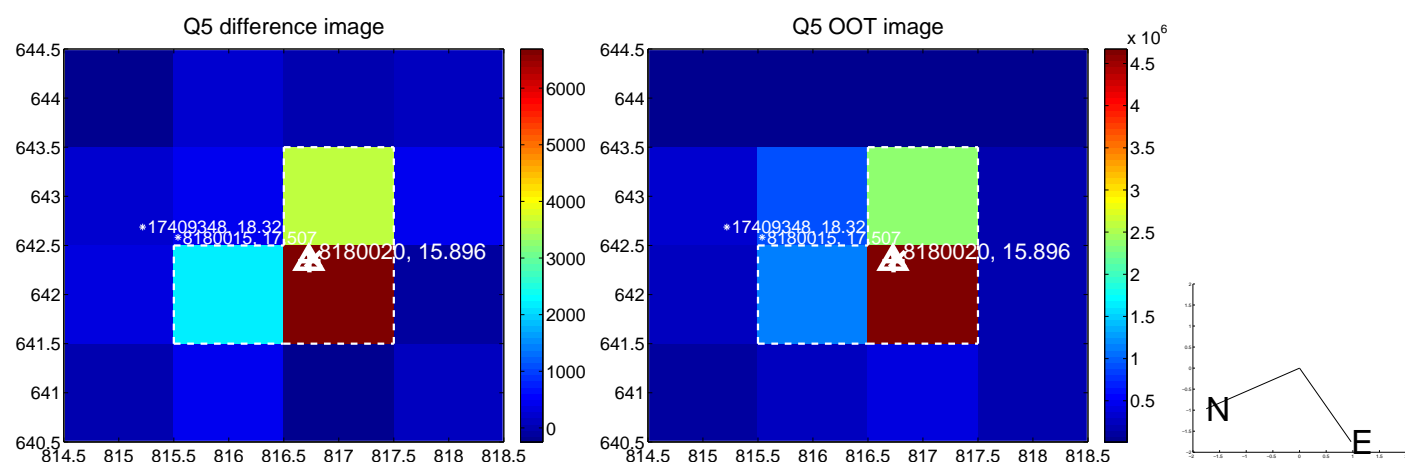


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

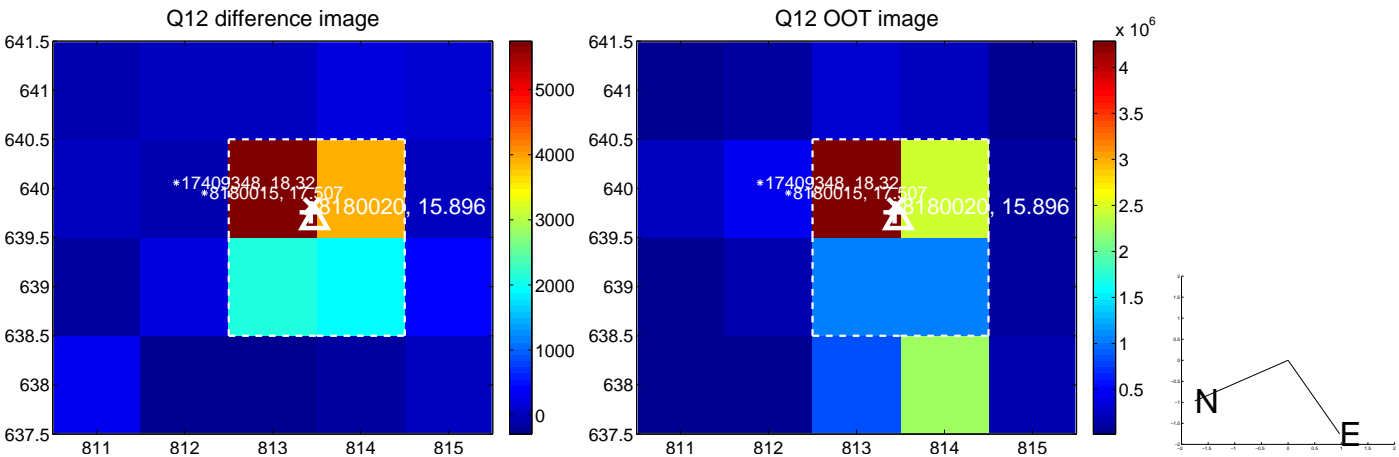
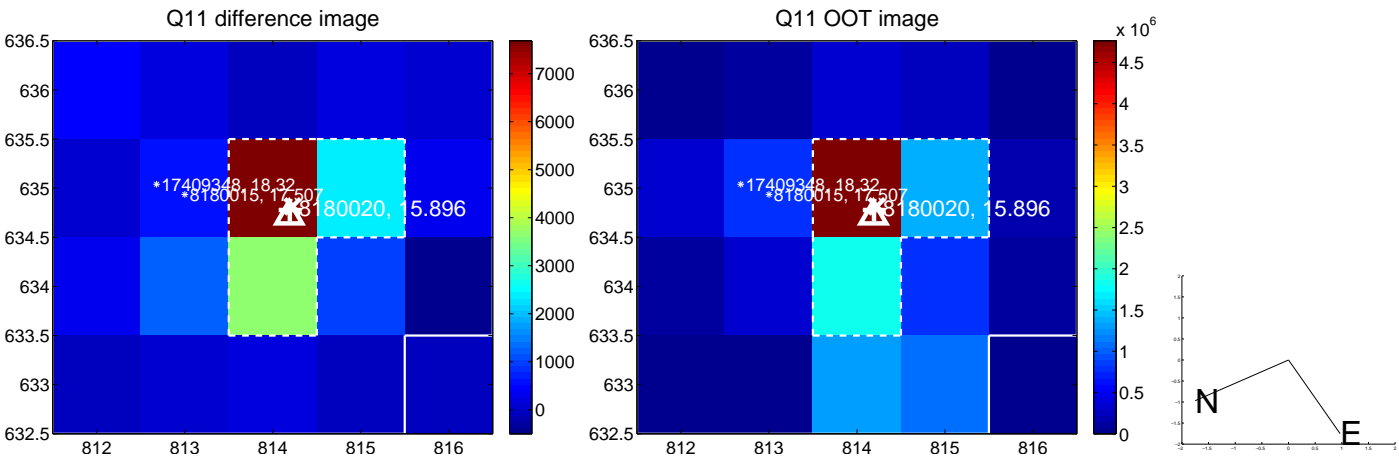
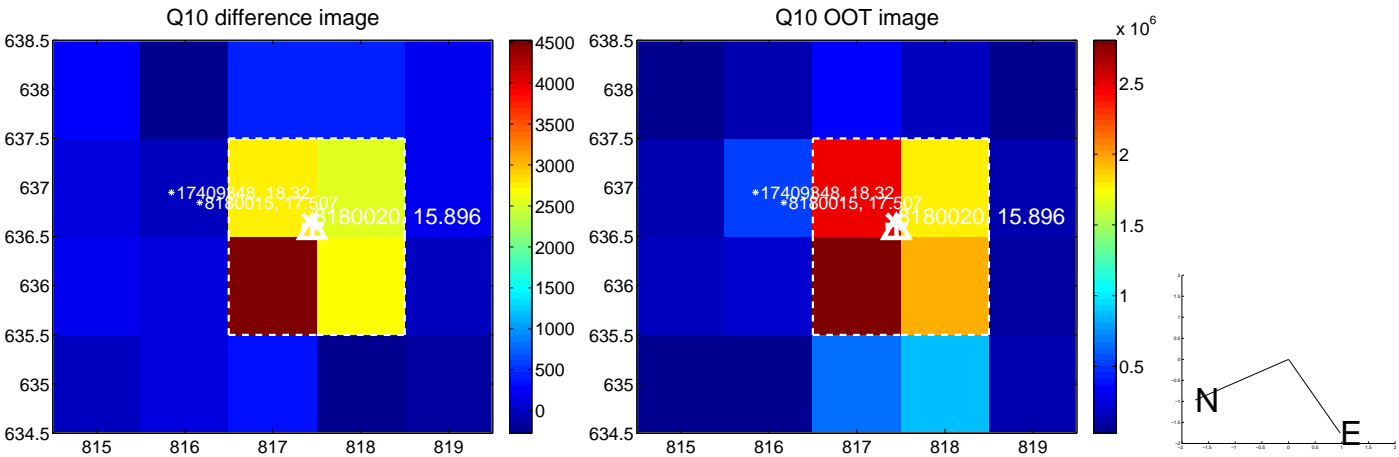
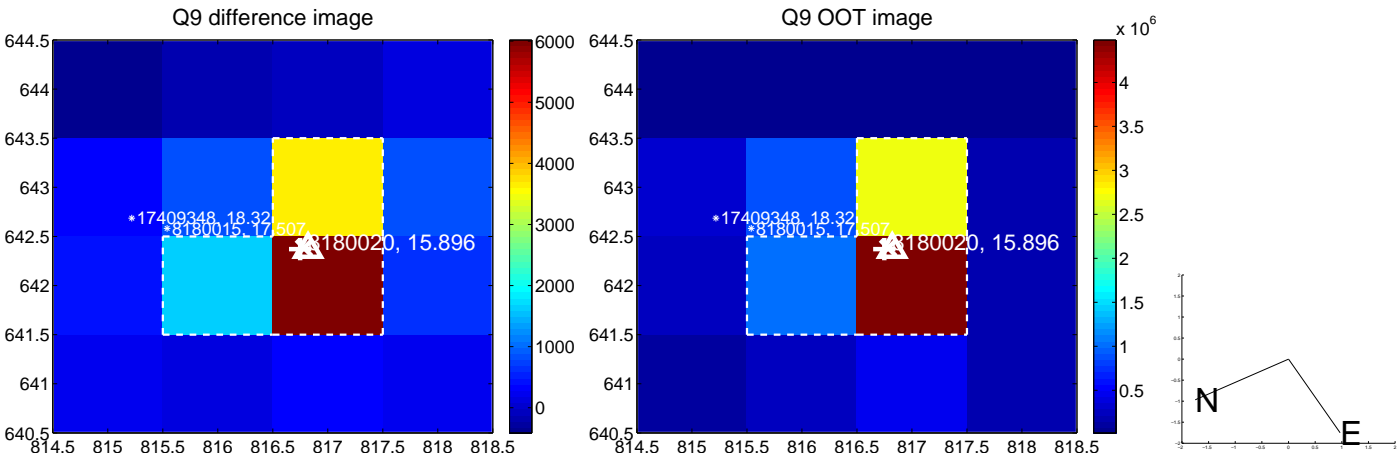
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



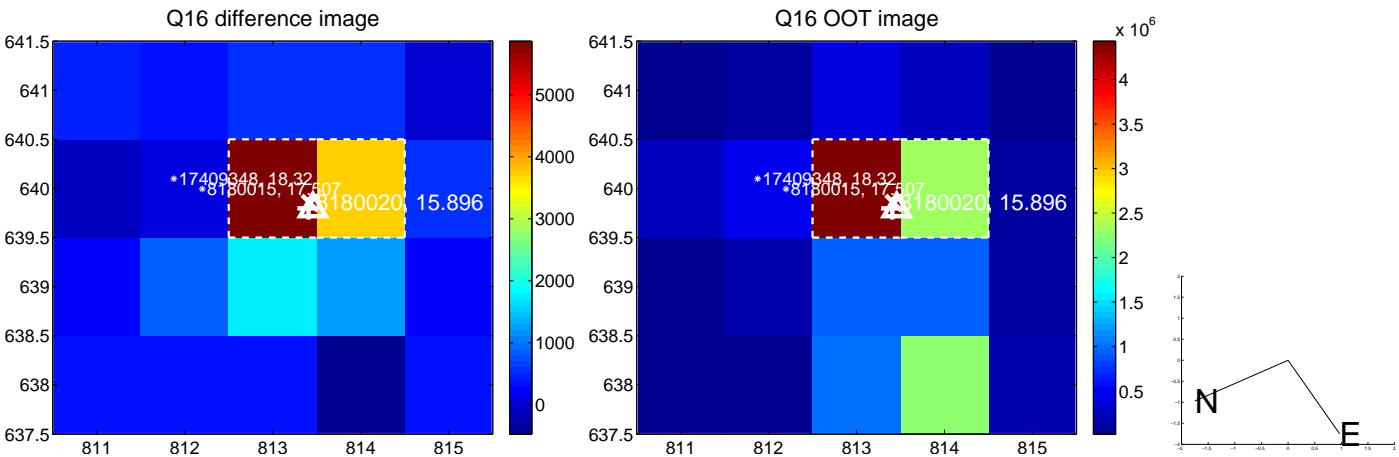
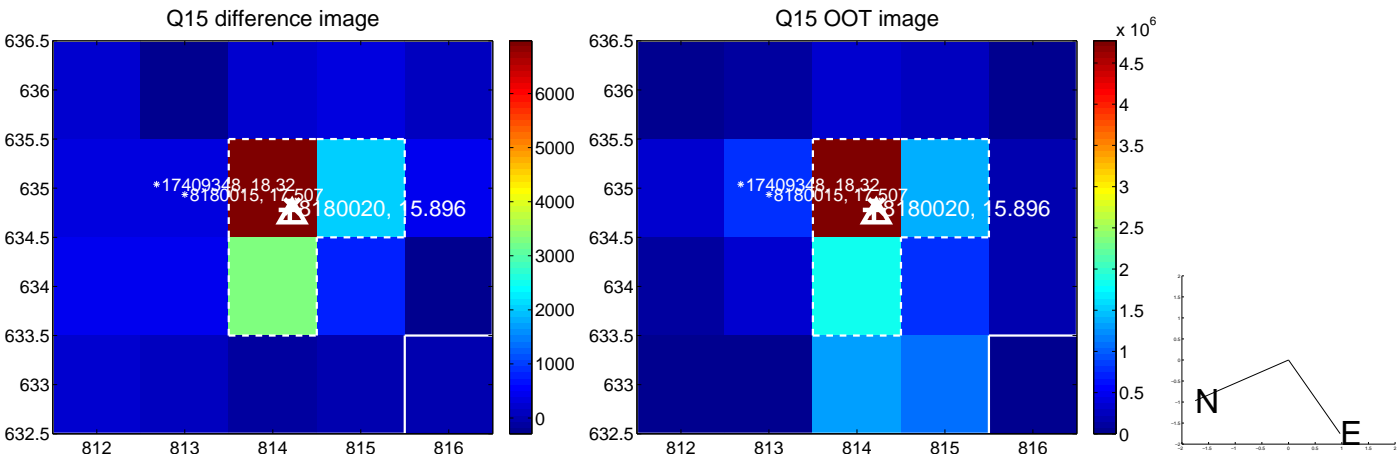
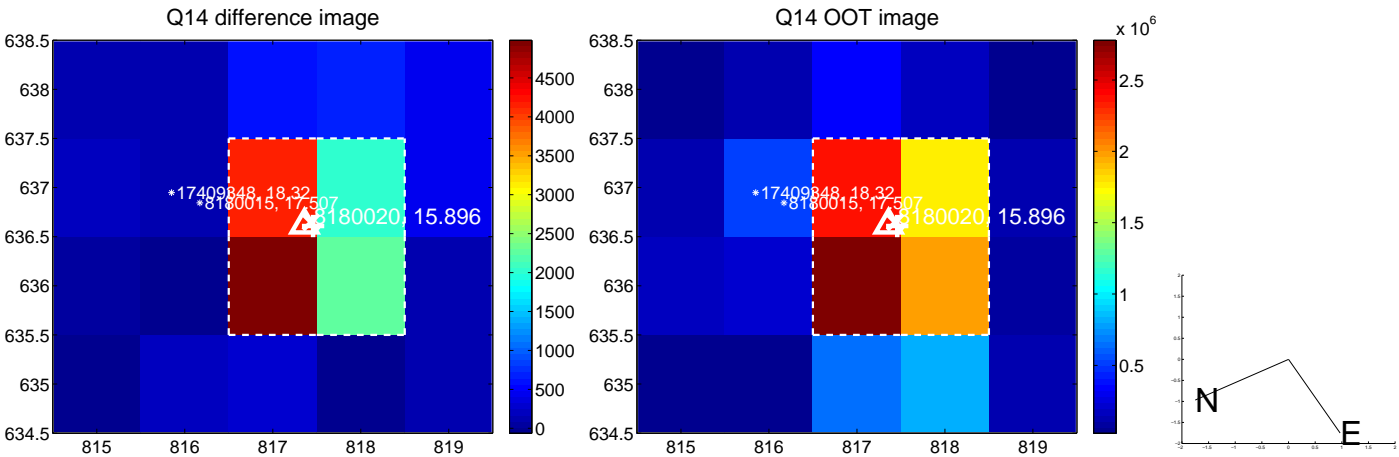
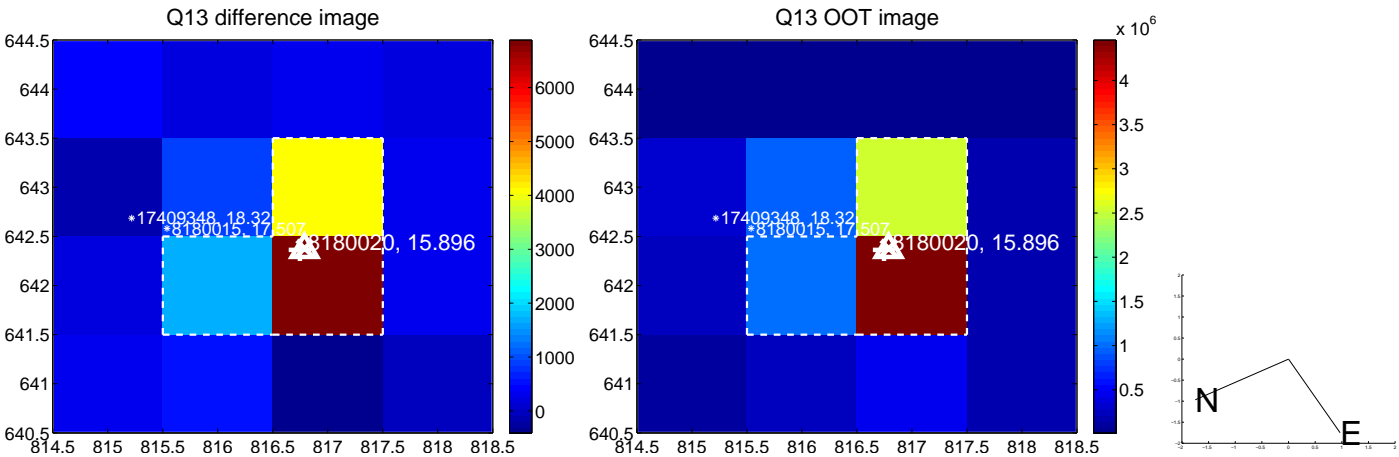
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



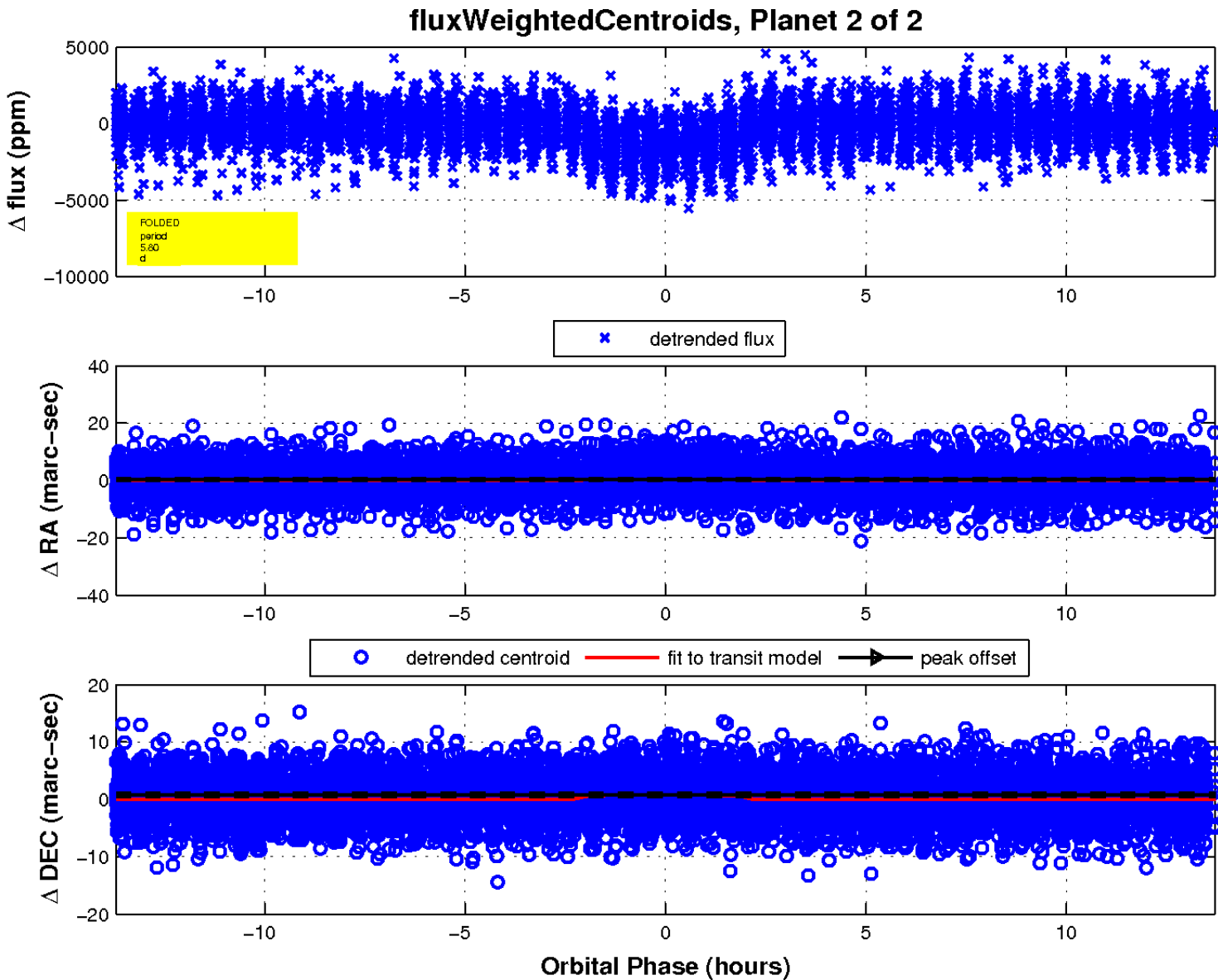
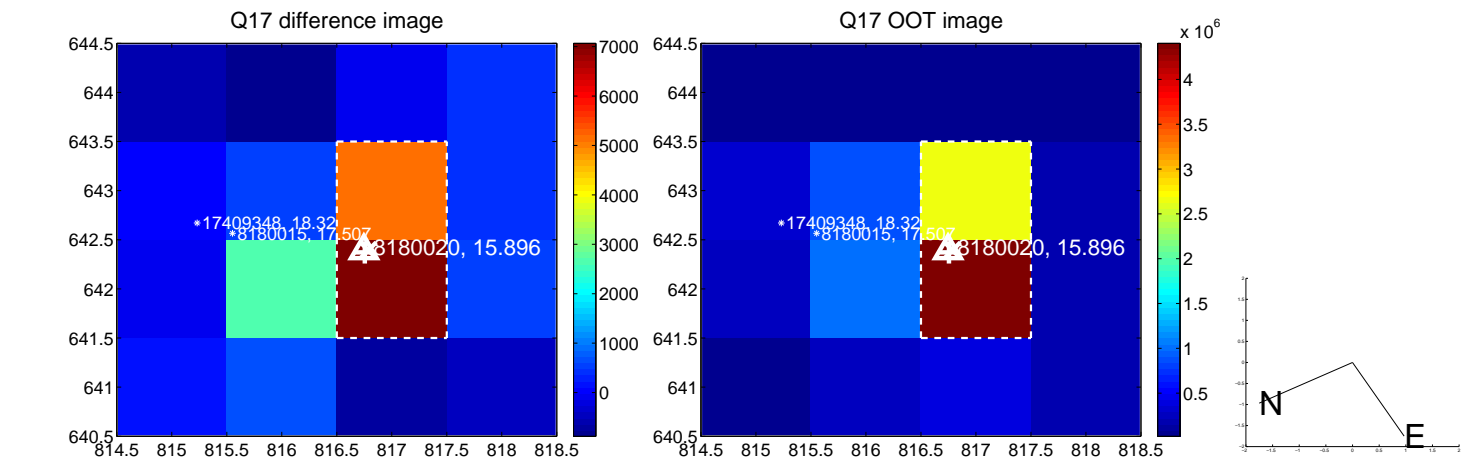
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



UKIRT Image

Declination

