

KIC 004180396

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004180396-01 | OBS | 6394.01 | 3.684391 | 132.602997 | 58.4 | 2.012 | 28.6 | 29.7 | 2.11 | 9609 | 1.86 | 8974.98 |
| 004180396-02 | OBS | No | 3.684330 | 133.734179 | 39.0 | 3.782 | 16.0 | 17.9 | 2.11 | 9609 | 2.54 | 8975.17 |
| 004180396-03 | OBS | No | 3.684310 | 131.608087 | 24.4 | 7.014 | 12.8 | 14.3 | 2.11 | 9609 | 1.32 | 8975.24 |
| 004180396-04 | OBS | No | 0.921171 | 132.090616 | 10.5 | 4.801 | 11.4 | 11.0 | 2.11 | 9609 | 0.78 | 56981.53 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 004180396-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—CENT_SATURATED |
| 004180396-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED |
| 004180396-03 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED |
| 004180396-04 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | TRANS_GAPPED—SWEET_NTL—LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED |

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

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

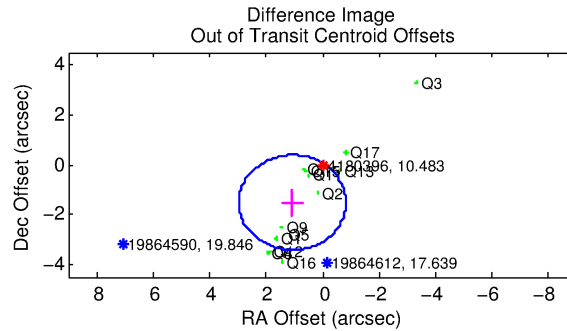
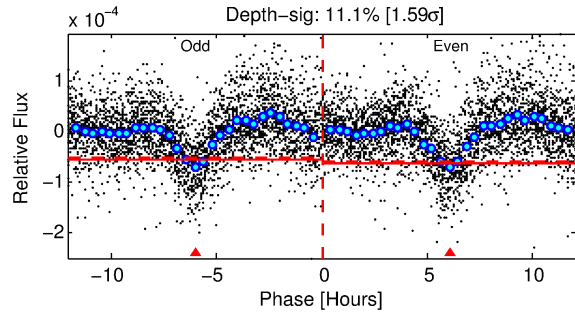
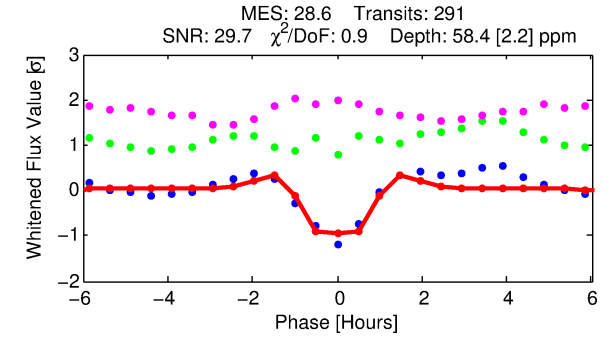
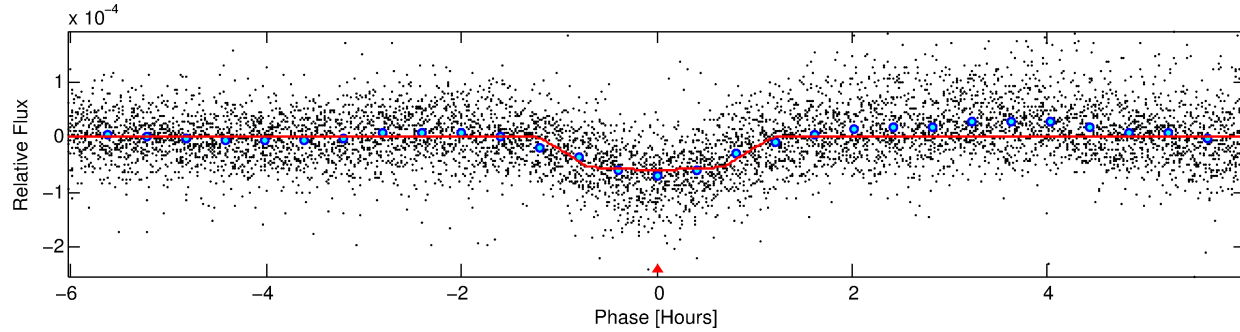
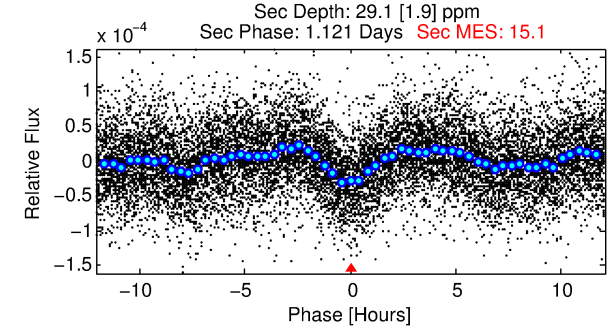
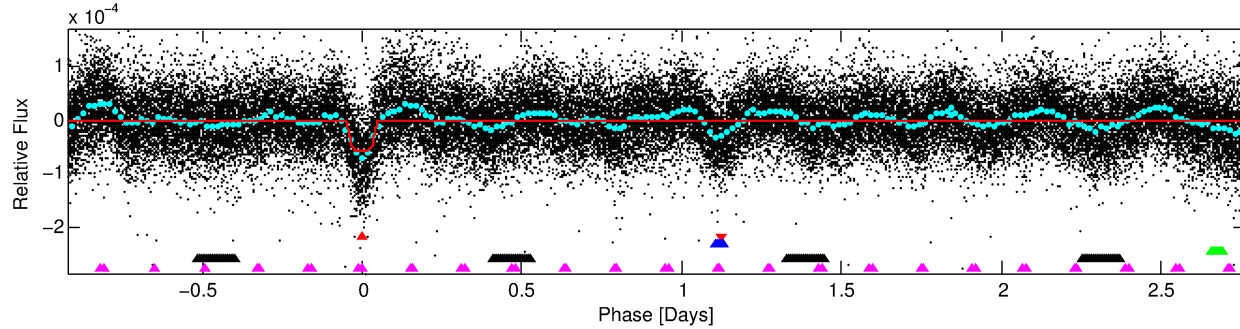
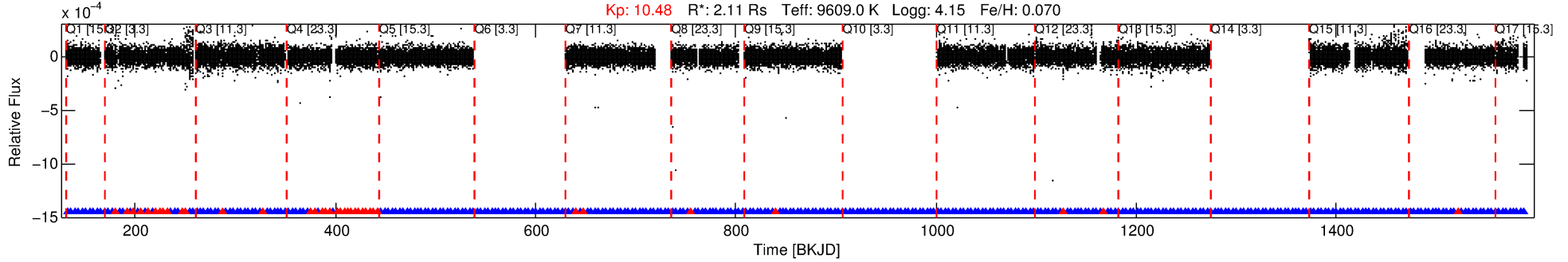
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 004180396-01

No Significant Match Found

DV One-Page Summary

KIC: 4180396 Candidate: 1 of 5 Period: 3.684 d
KOI: K06394.01 Corr: 0.793



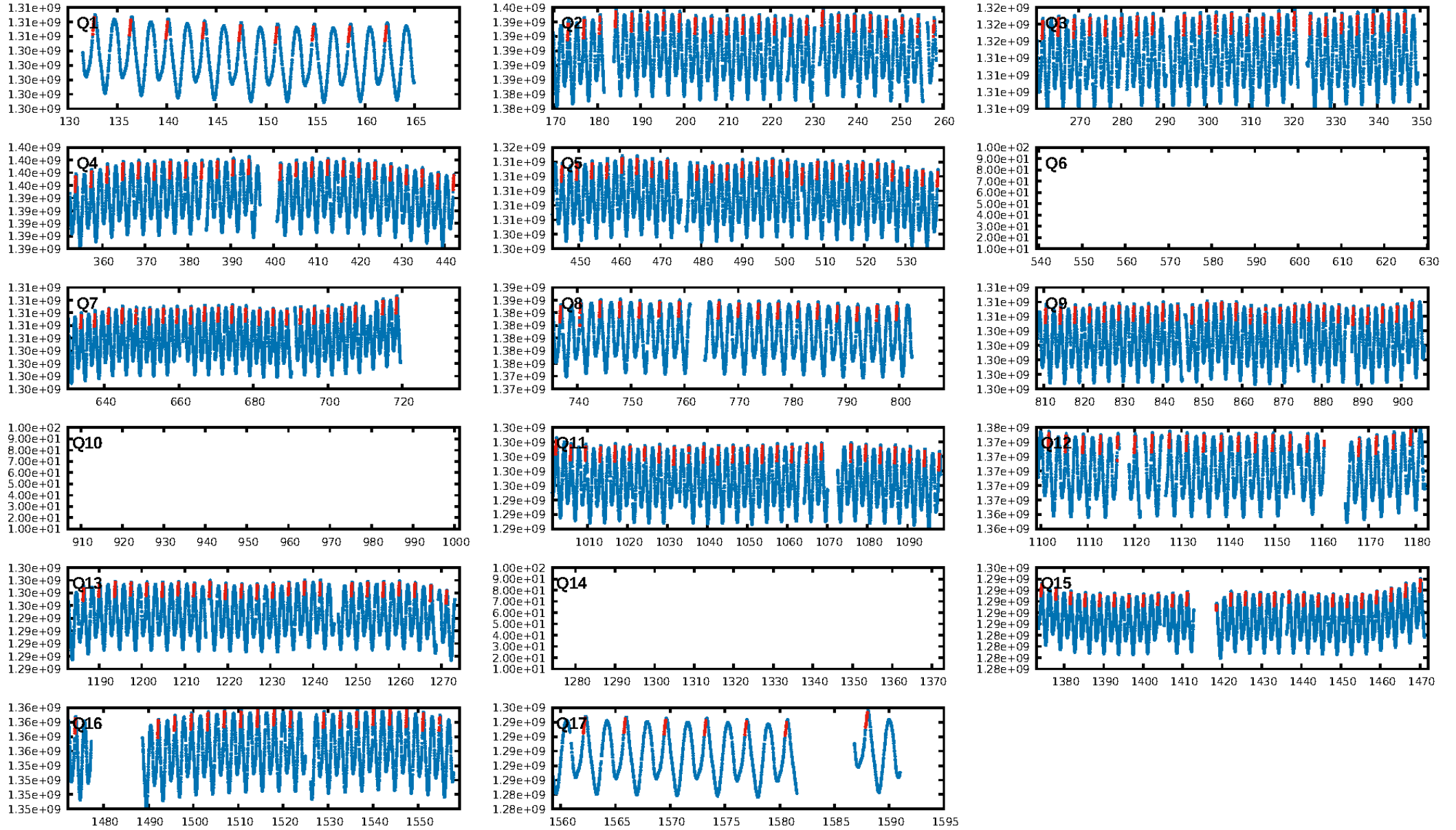
DV Fit Results:

Period = 3.68439 [0.00001] d
Epoch = 132.6030 [0.0009] BKJD
Rp/R* = 0.0081 [0.0006]
a/R* = 6.22 [3.26]
b = 0.91 [0.11]
Seff = 8974.98 [4266.58]
Teq = 2482 [295] K
Rp = 1.86 [0.76] Re
a = 0.0615 [0.0197] AU
Ag = 17.45 [8.17] [2.01σ]
Teffp = 7843 [466] K [9.72σ]

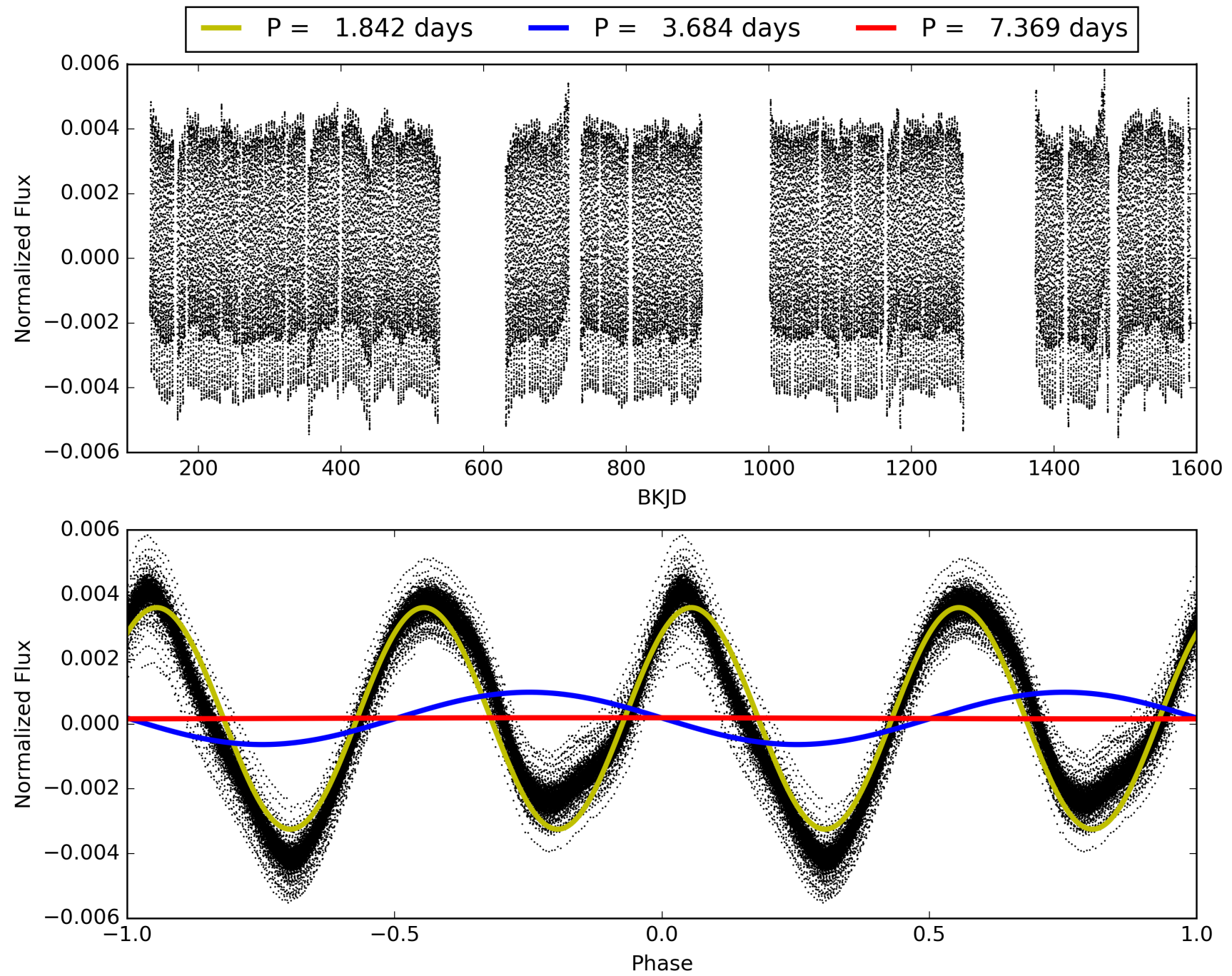
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: 100.0% [306.05σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.87 [238/275]
GhostDiagnostic-chr: N/A
Centroid-sig: 0.2%
Centroid-so: 1.146 arcsec [1.95σ]
OotOffset-rm: 1.858 arcsec [2.94σ]
KicOffset-rm: 1.813 arcsec [2.93σ]
OotOffset-st: 1/4/4/5 [14]
KicOffset-st: 1/4/4/5 [14]
DiffImageQuality-fgm: 0.00 [0/14]
DiffImageOverlap-fno: 1.00 [14/14]

TCE 004180396-01, PDC Light Curves

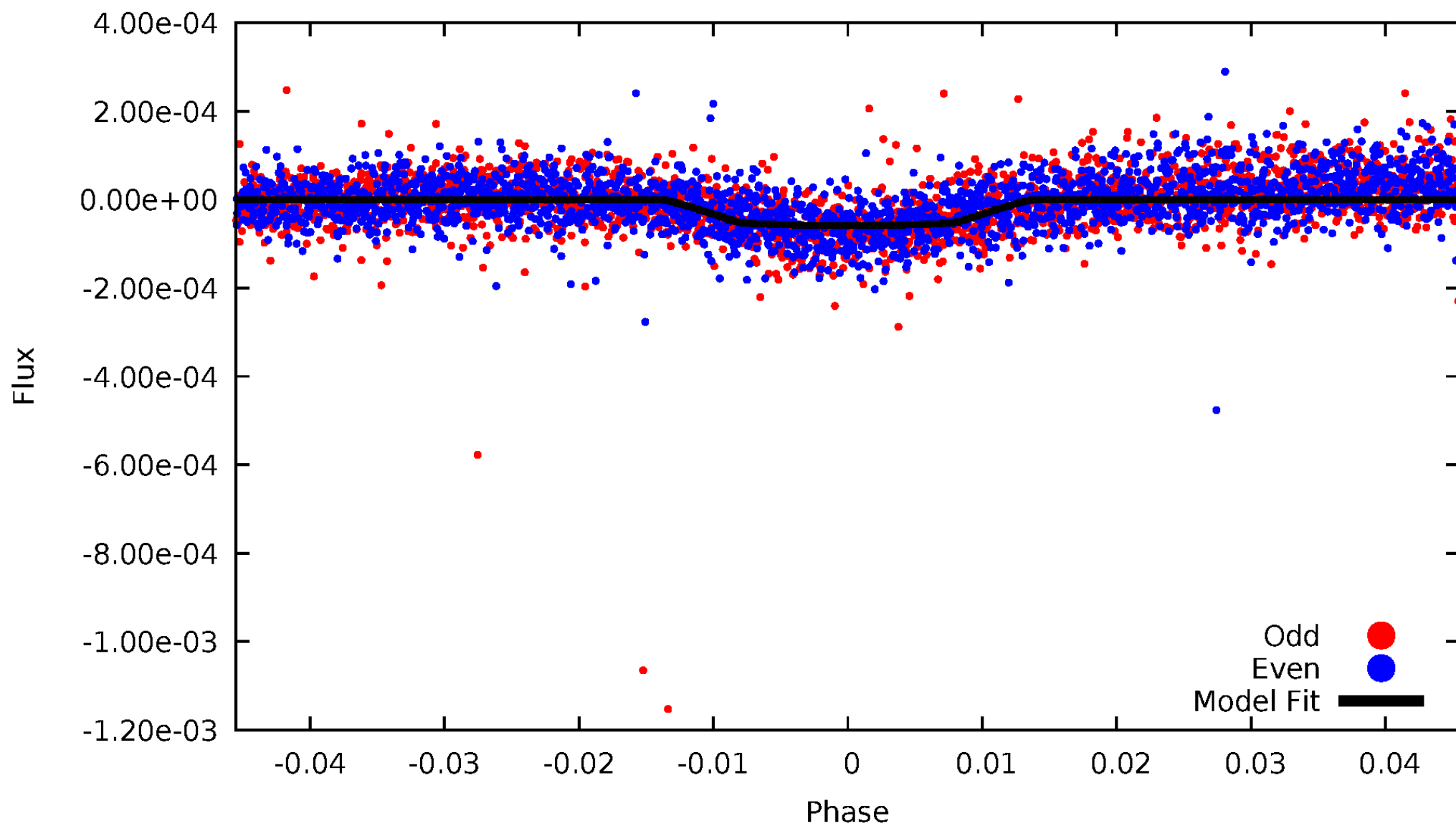


TCE 004180396-01



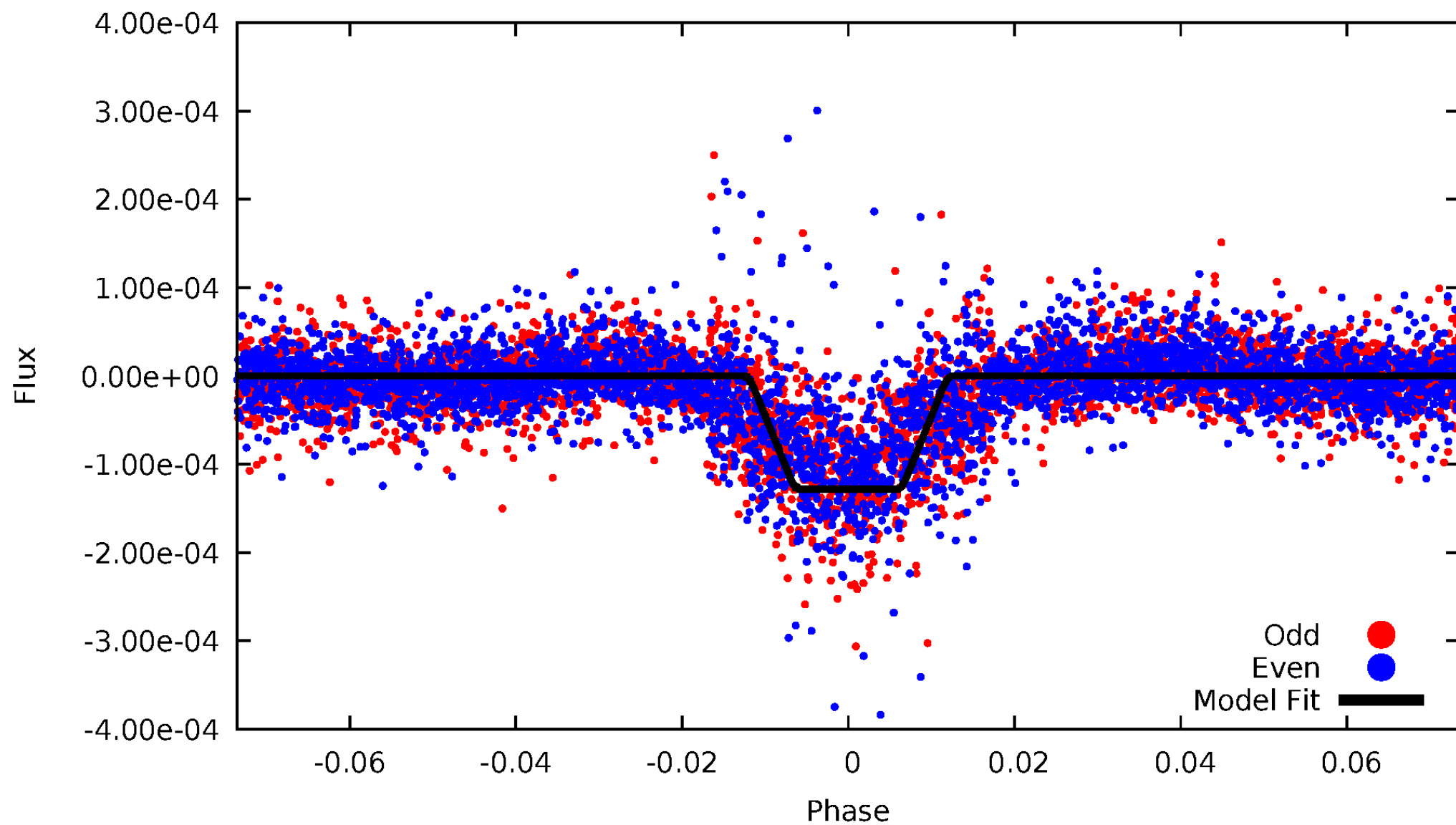
DV Odd/Even

TCE 004180396-01



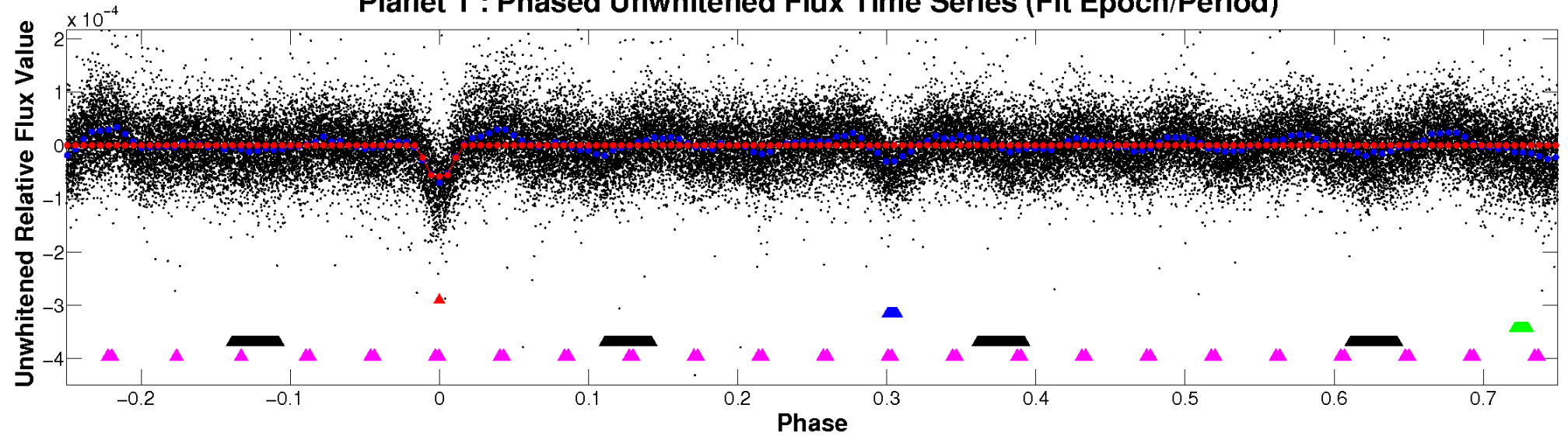
ALT Odd/Even

TCE 004180396-01

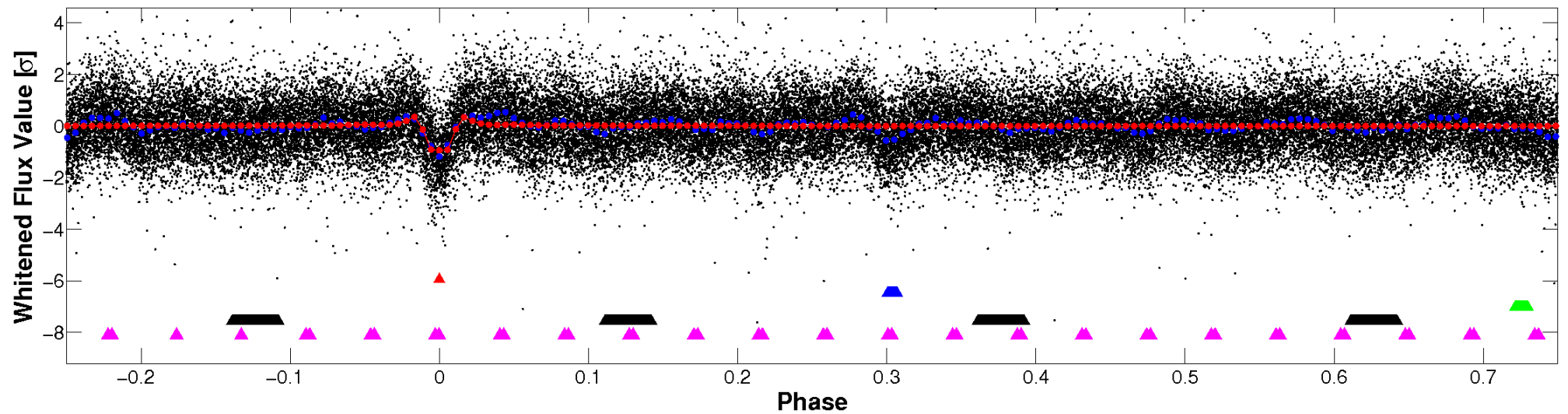


Non-Whitened Vs. Whitened Light Curve

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

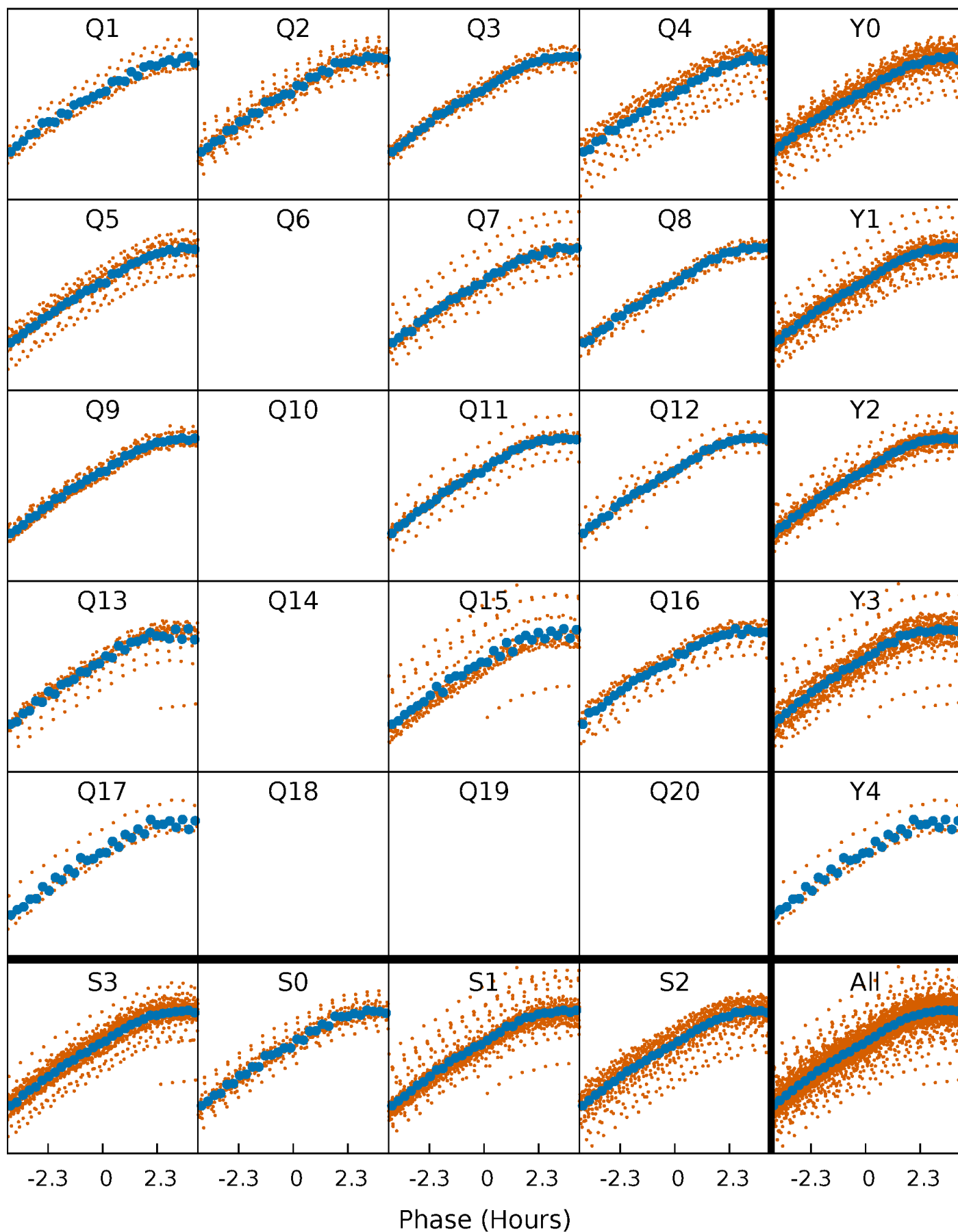


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



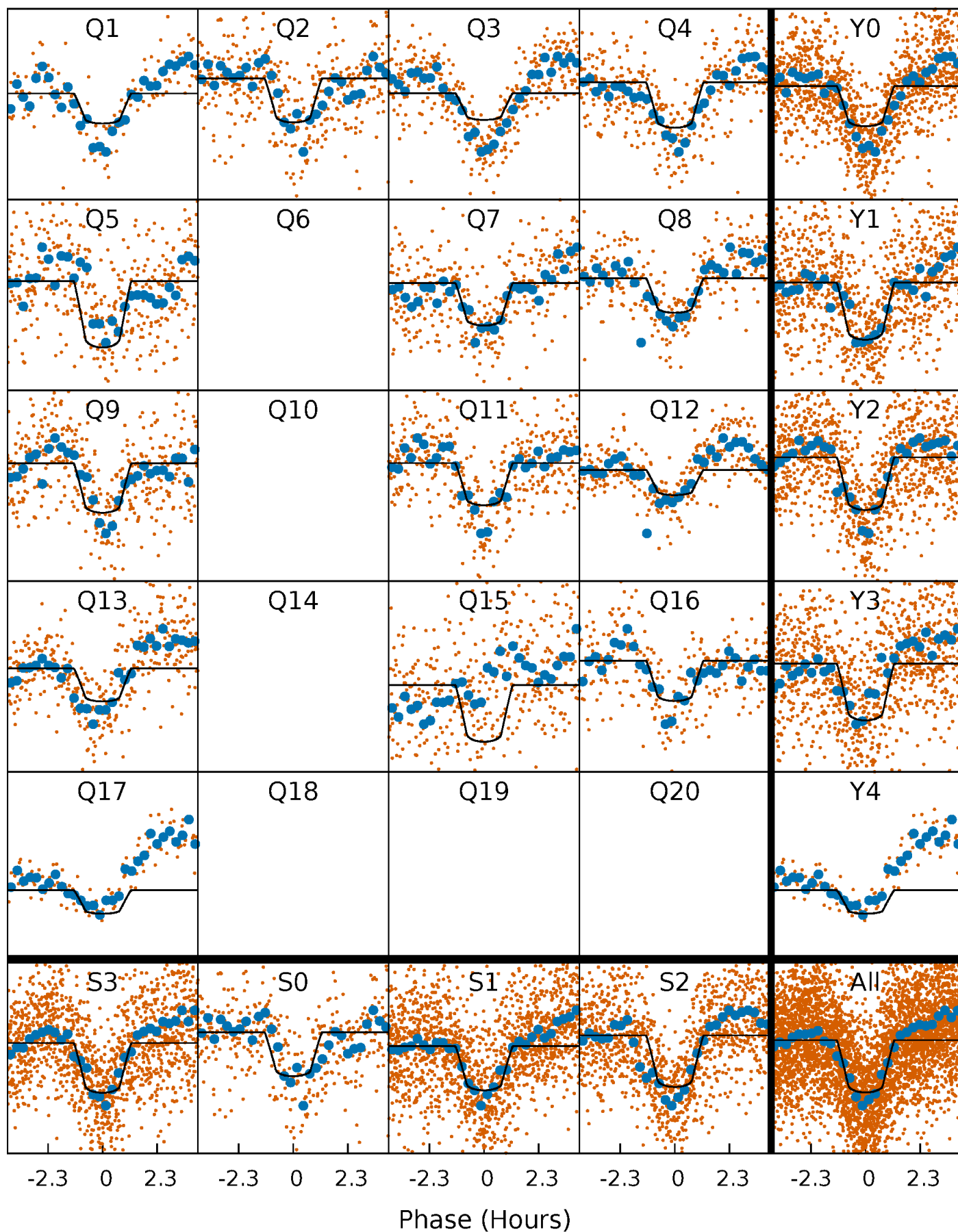
PDC Quarter-Phased Transit Curves

TCE 004180396-01 P= 3.684391 Days $T_0=132.602997$ (BKJD)



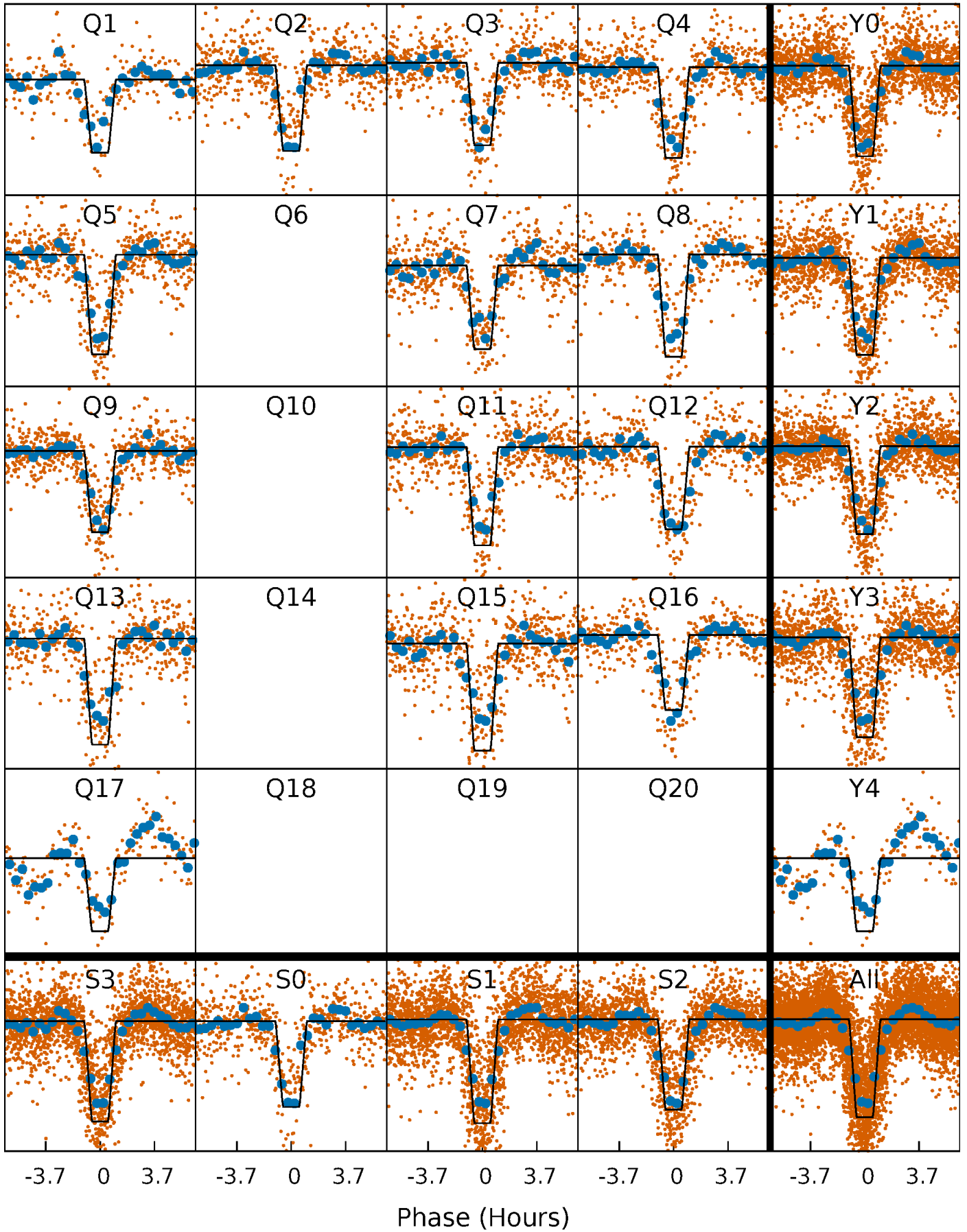
DV Quarter-Phased Transit Curves

TCE 004180396-01 P= 3.684391 Days $T_0=132.602997$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

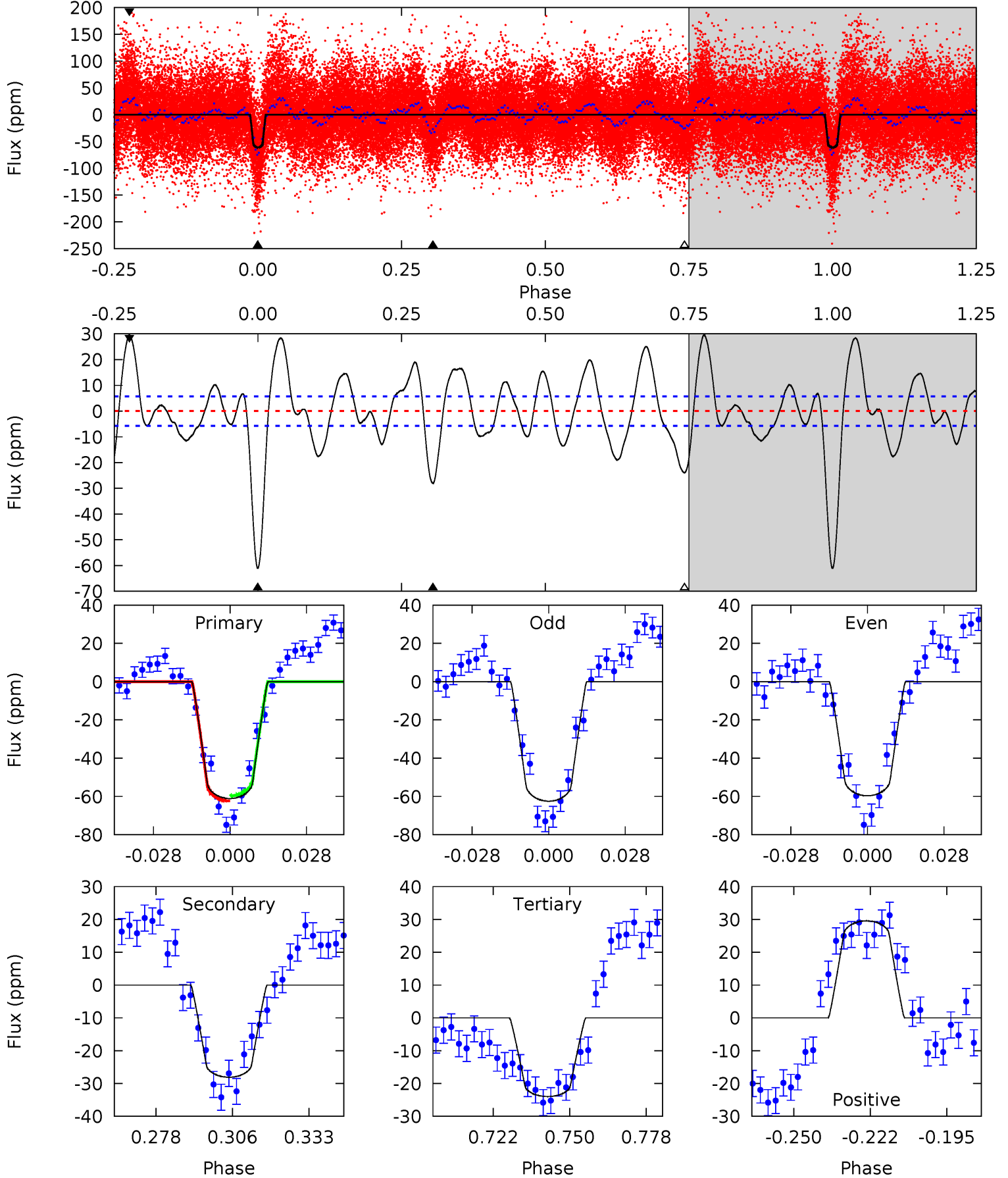
TCE 004180396-01 P= 3.684333 Days $T_0=132.614298$ (BKJD)



DV Model-Shift Uniqueness Test

004180396-01, P = 3.684391 Days, E = 128.918606 Days

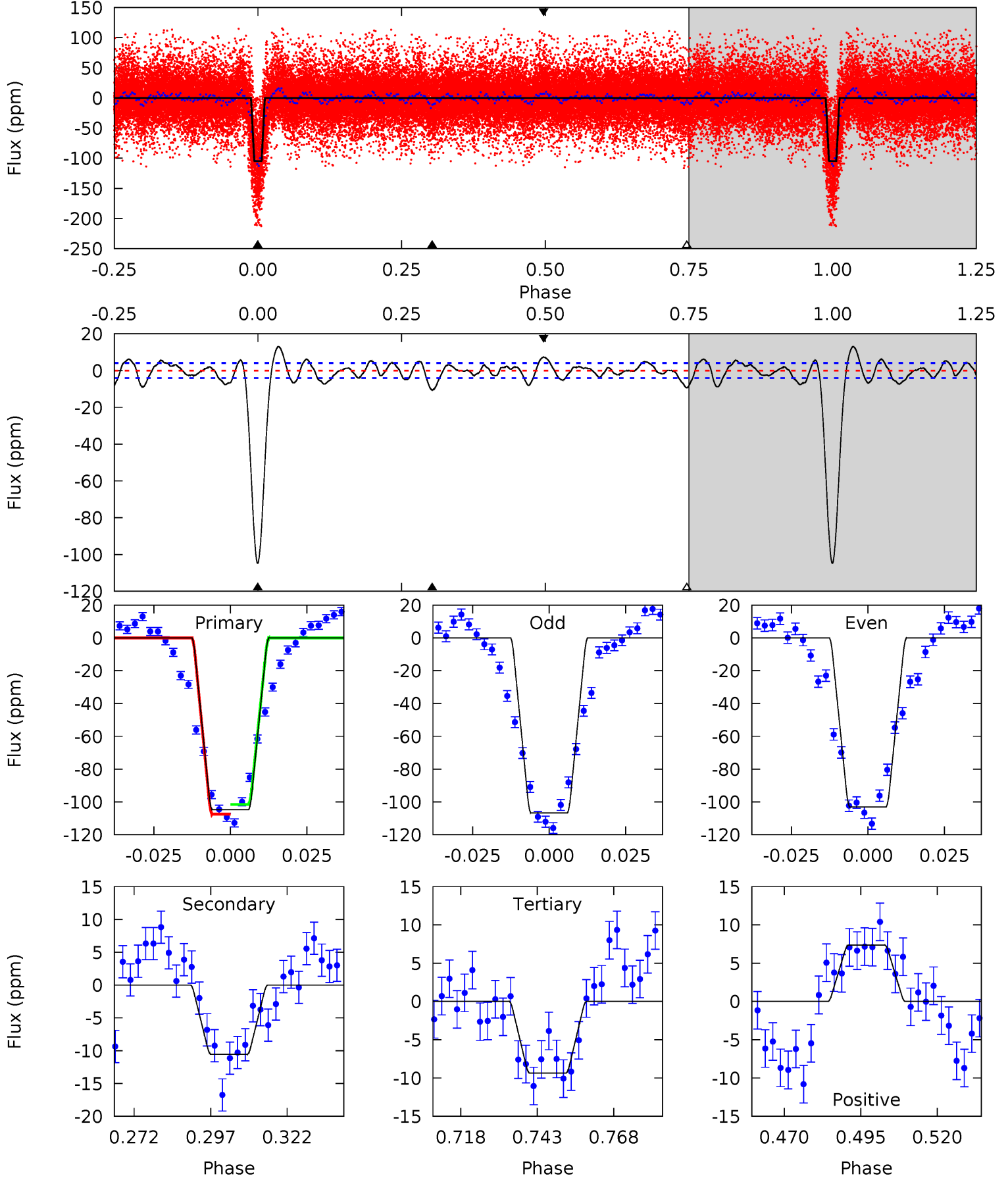
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 51.4 | 23.6 | 20.2 | 24.9 | 4.83 | 2.20 | 9.81 | 31.3 | 26.5 | 3.47 | -1.23 | 1.20 | 0.99 | 0.33 | 1.11 |



Alt Model-Shift Uniqueness Test

004180396-01, P = 3.684333 Days, E = 128.929965 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 123.9 | 12.5 | 11.1 | 8.70 | 4.85 | 2.25 | 4.55 | 112.8 | 115.2 | 1.43 | 3.79 | 2.19 | 1.00 | 0.11 | 3.49 |



Stellar Parameters For KIC 004180396

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 9609^{+272}_{-428} | $4.149^{+0.152}_{-0.228}$ | $0.070^{+0.150}_{-0.600}$ | $2.108^{+0.847}_{-0.565}$ | $2.284^{+0.396}_{-0.594}$ | $0.343^{+0.290}_{-0.209}$ |
| | +3%/-4% | +4%/-5% | +214%/-857% | +40%/-27% | +17%/-26% | +84%/-61% |
| 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 004180396-01 / KOI 6394.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -28 ± 1 | $1.89^{+0.43}_{-0.33}$ | 3489^{+349}_{-244} | 7248^{+415}_{-371} | 16^{+6}_{-5} |
| Alt. | -11 ± 1 | $2.66^{+0.57}_{-0.43}$ | 3500^{+336}_{-258} | 4771^{+182}_{-179} | $3.034^{+1.084}_{-0.932}$ |

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

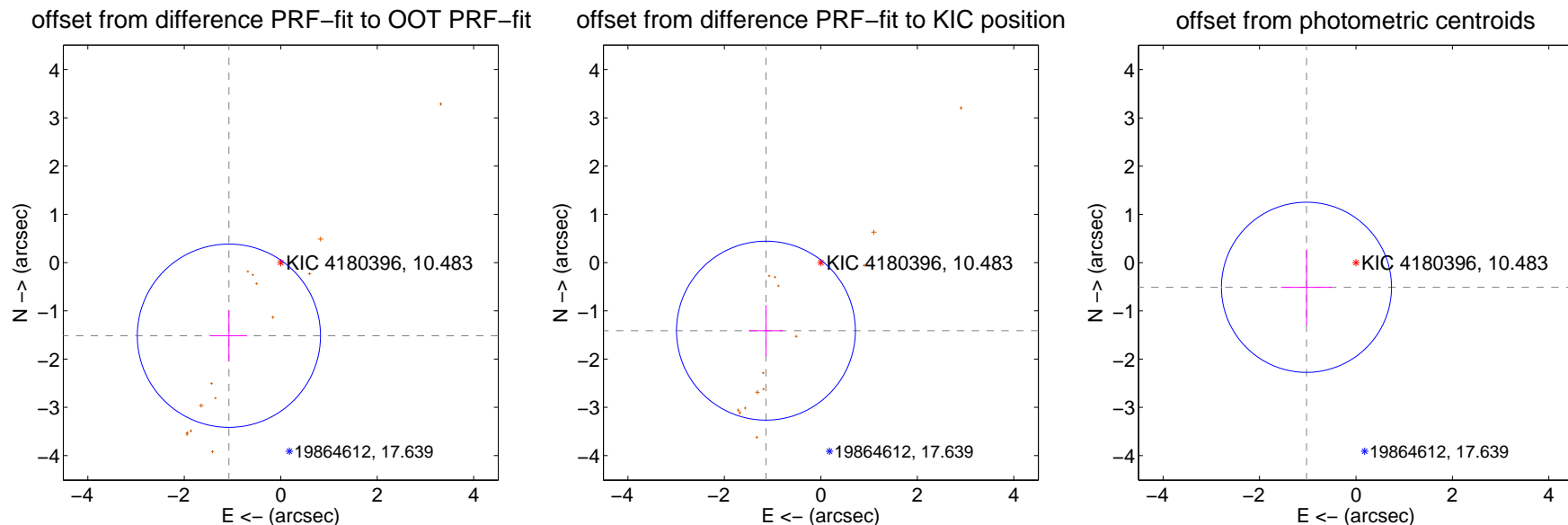
DV Centroid Data

Supplemental centroid analysis for 004180396-01. **Kepler magnitude: 10.48.** Transit SNR 29.71

There are 0 quarters with good PRF difference image offsets

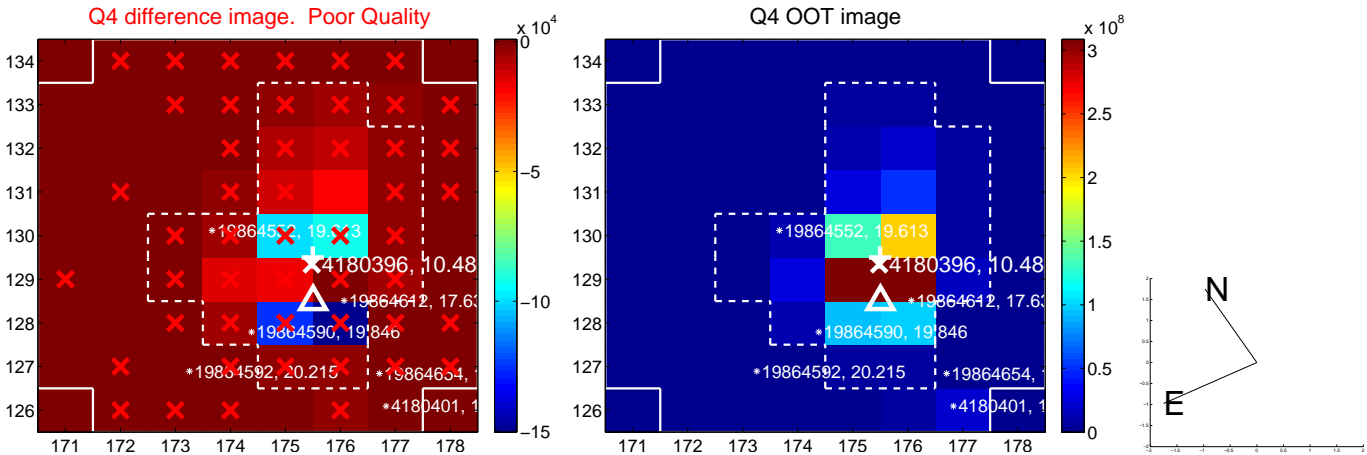
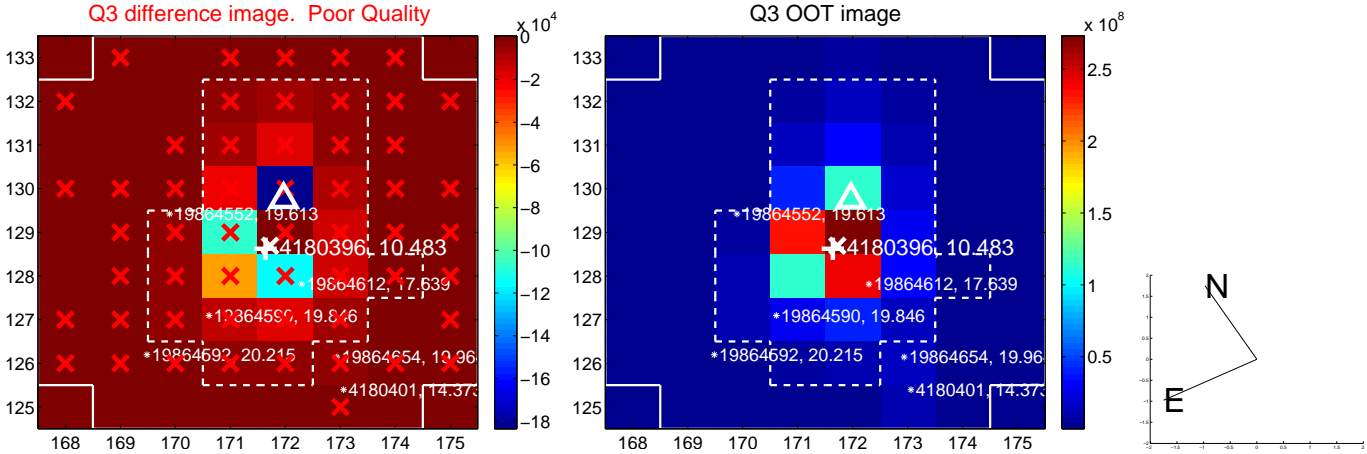
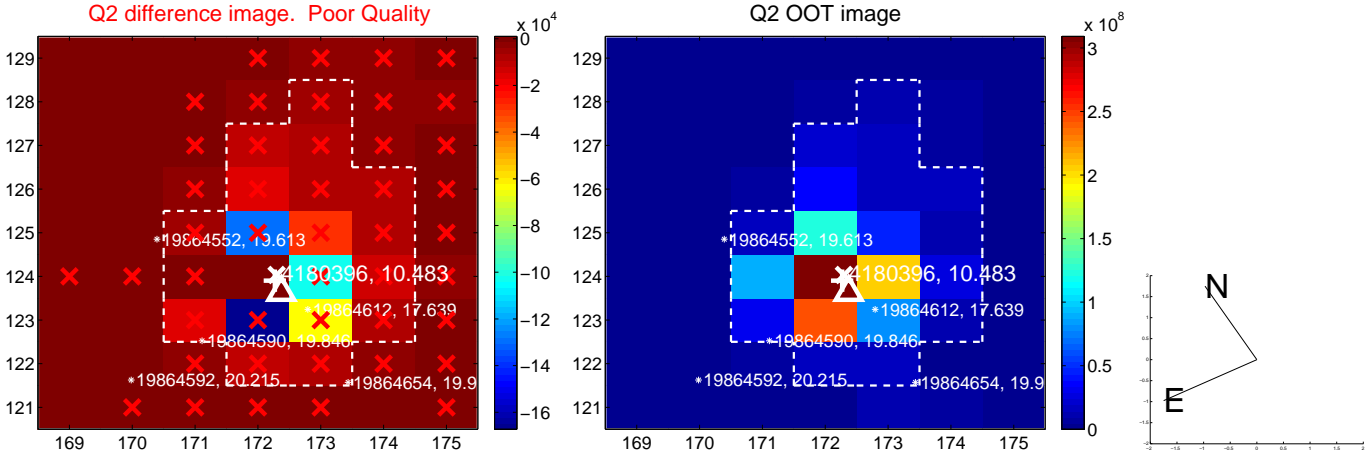
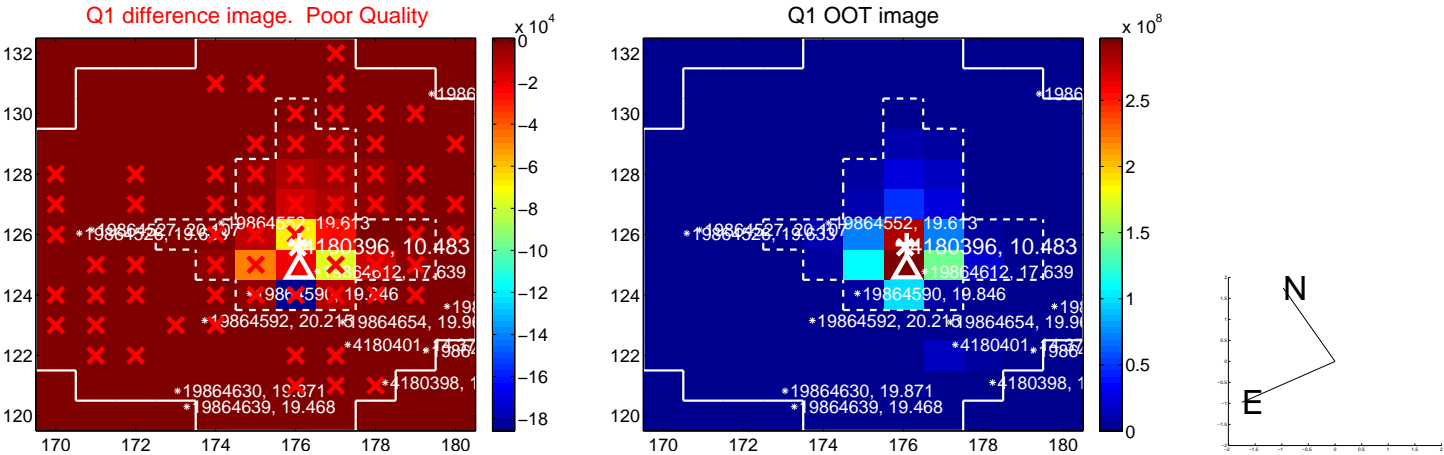
The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 1.858 ± 0.633 | 2.94 | 1.075 ± 0.380 | -1.516 ± 0.525 |
| PRF-fit source offset from KIC position | 1.813 ± 0.618 | 2.93 | 1.139 ± 0.354 | -1.411 ± 0.531 |
| photometric centroid source offset | 1.15 ± 0.59 | 1.95 | 1.03 ± 0.53 | -0.51 ± 0.79 |

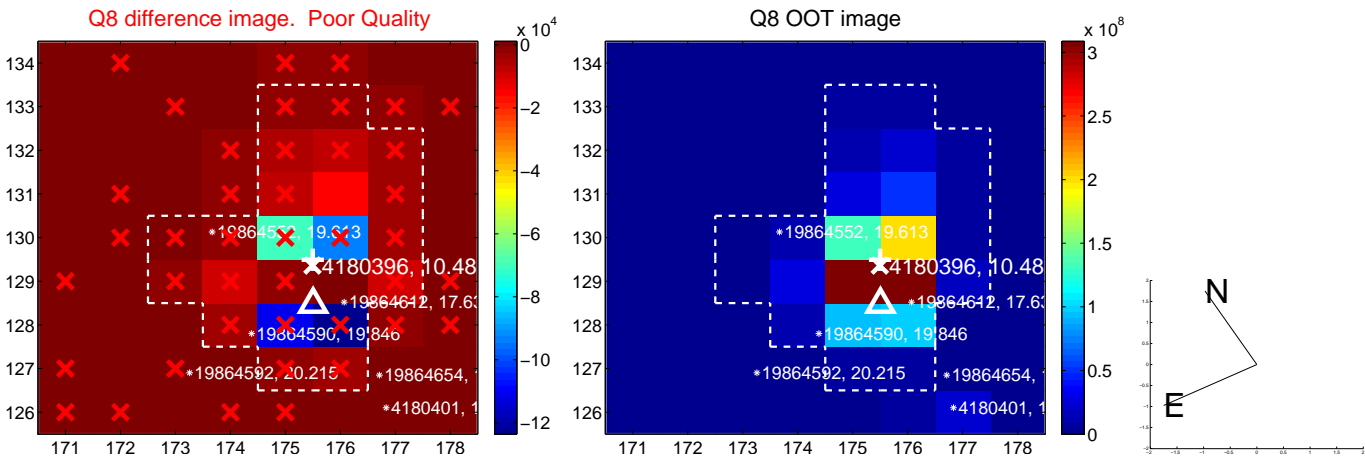
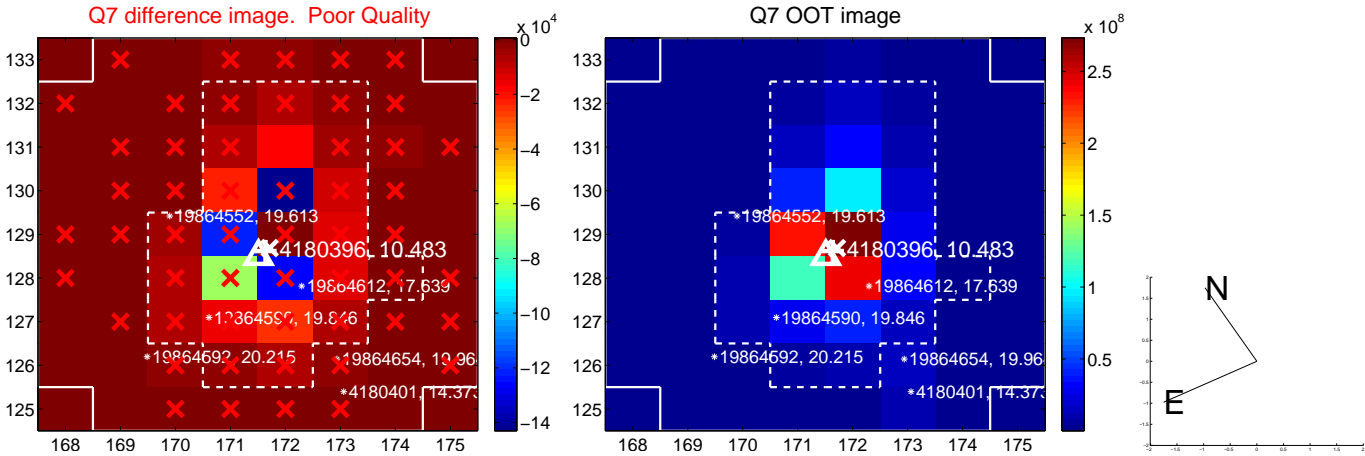
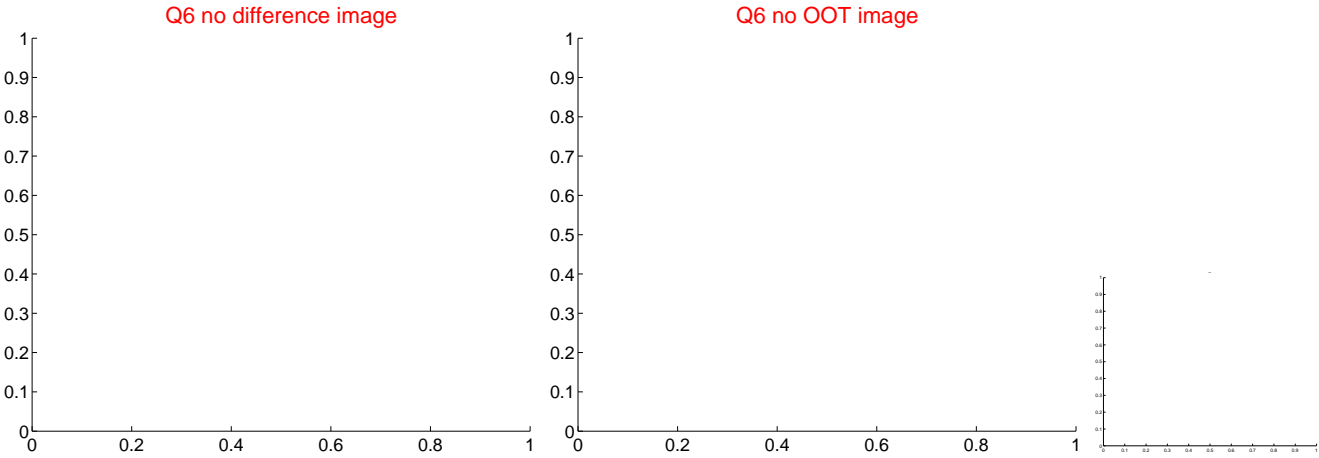
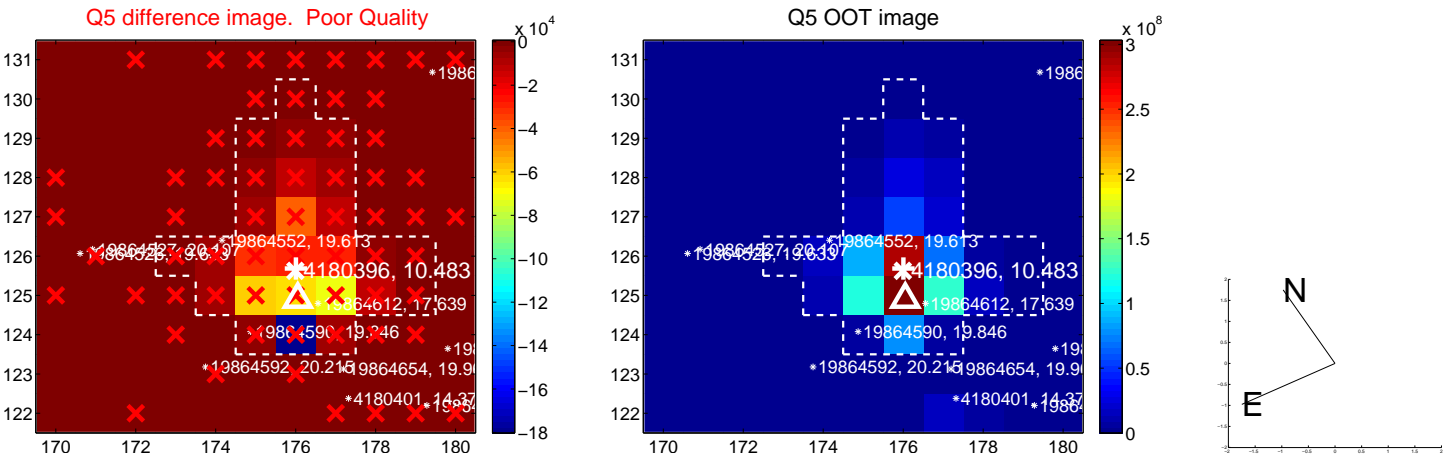


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

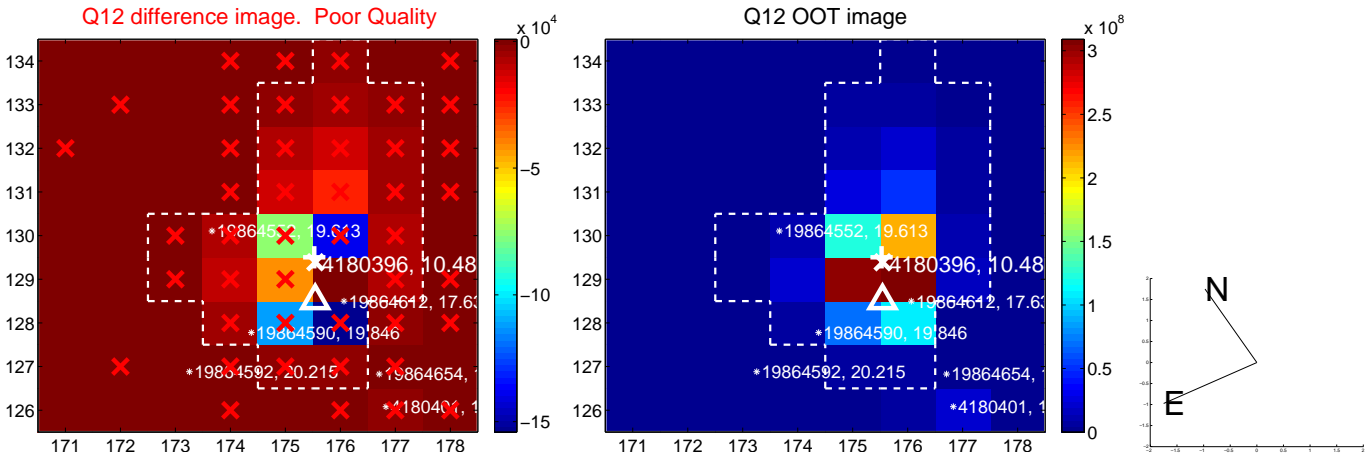
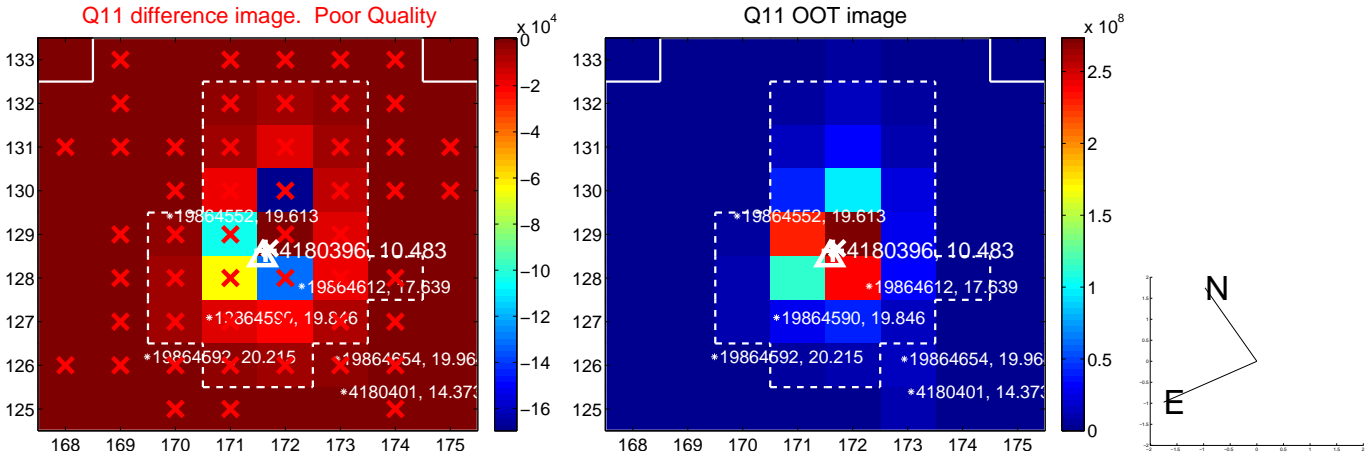
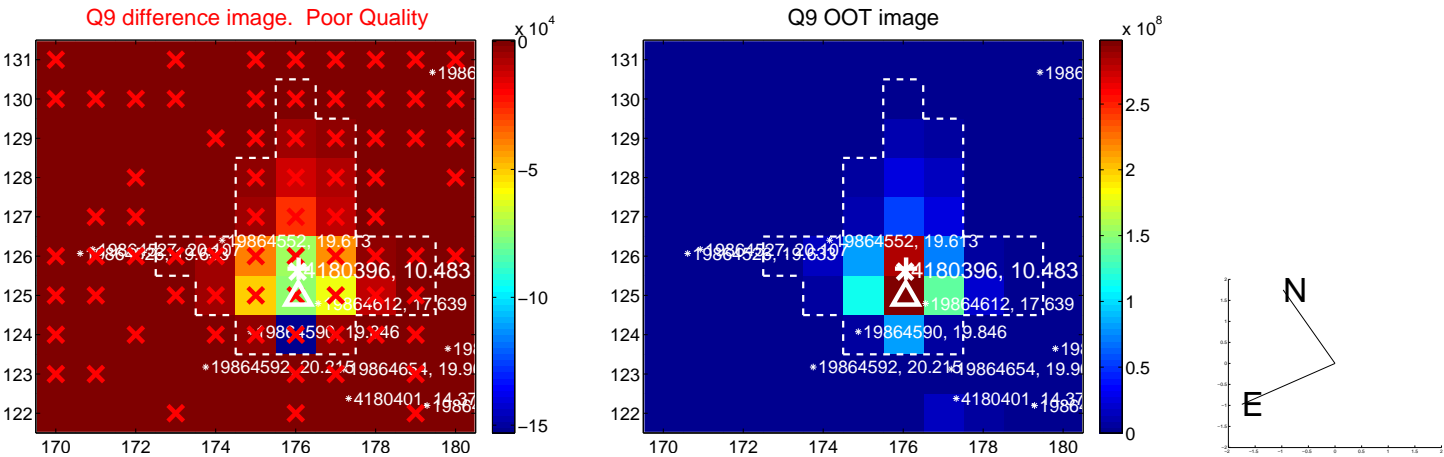
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



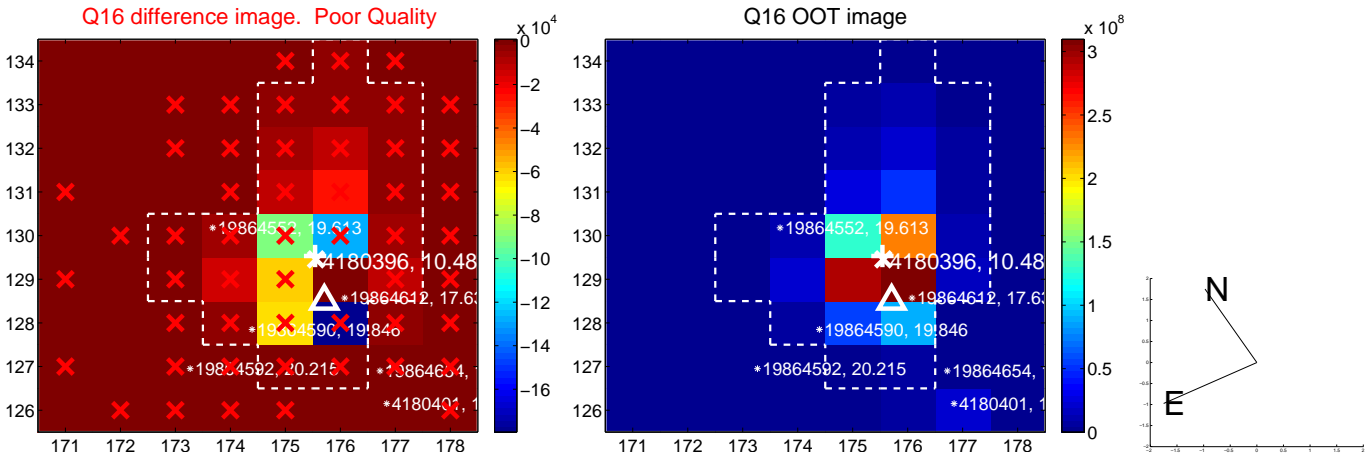
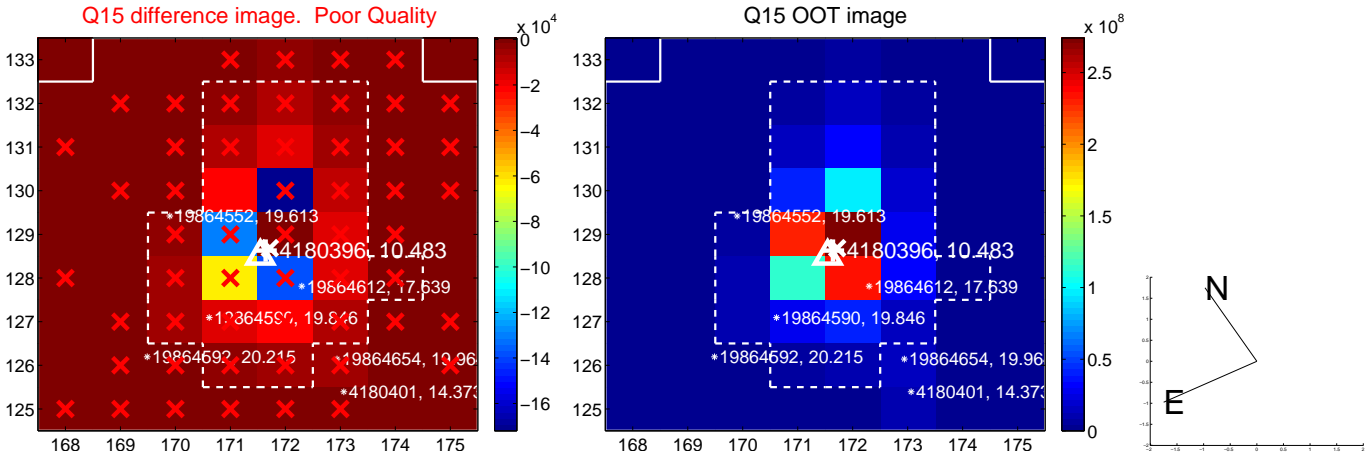
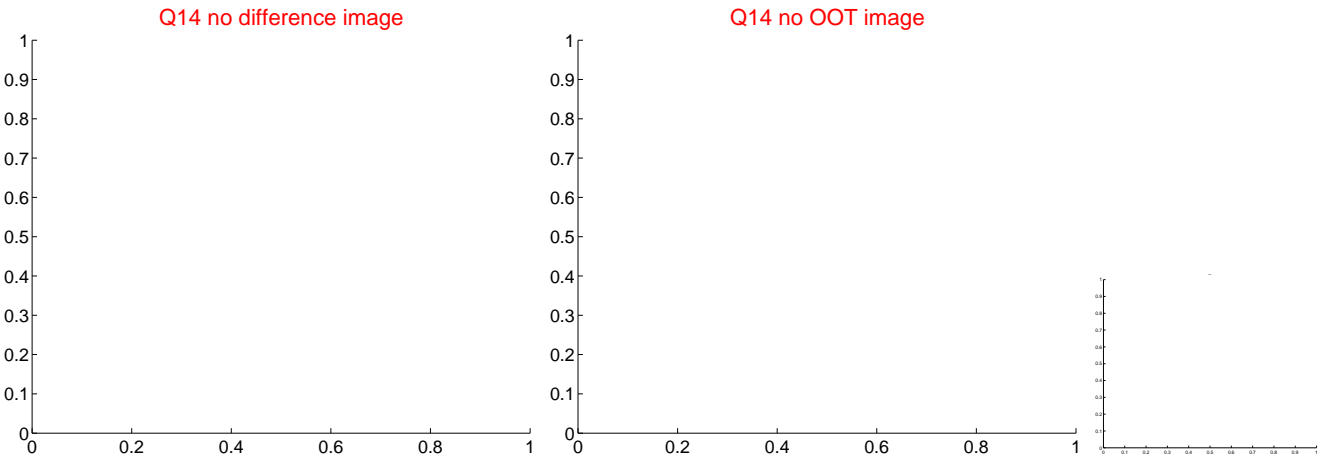
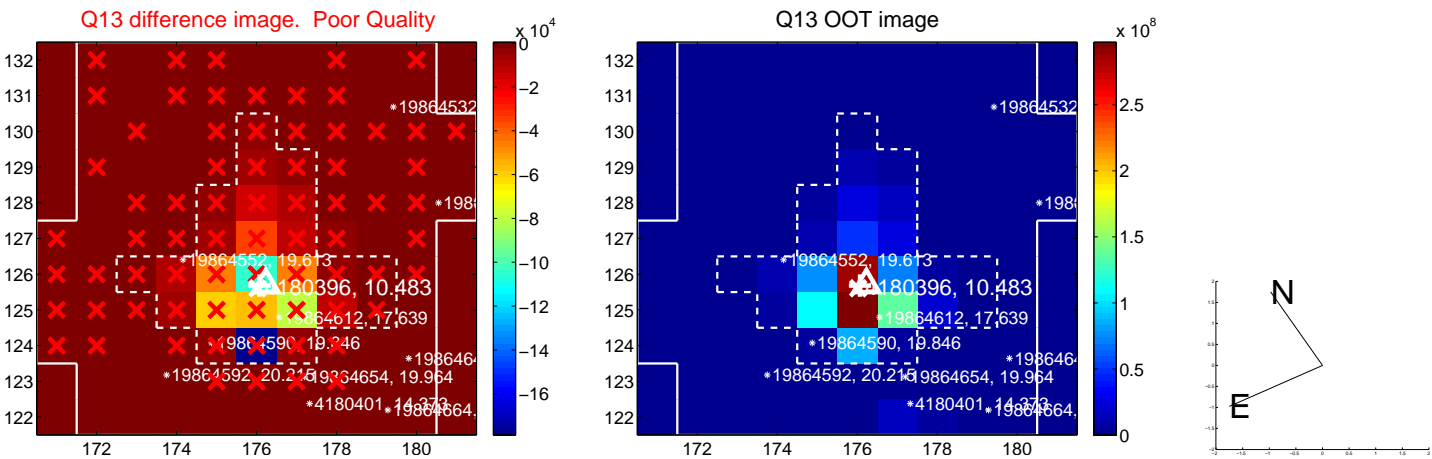
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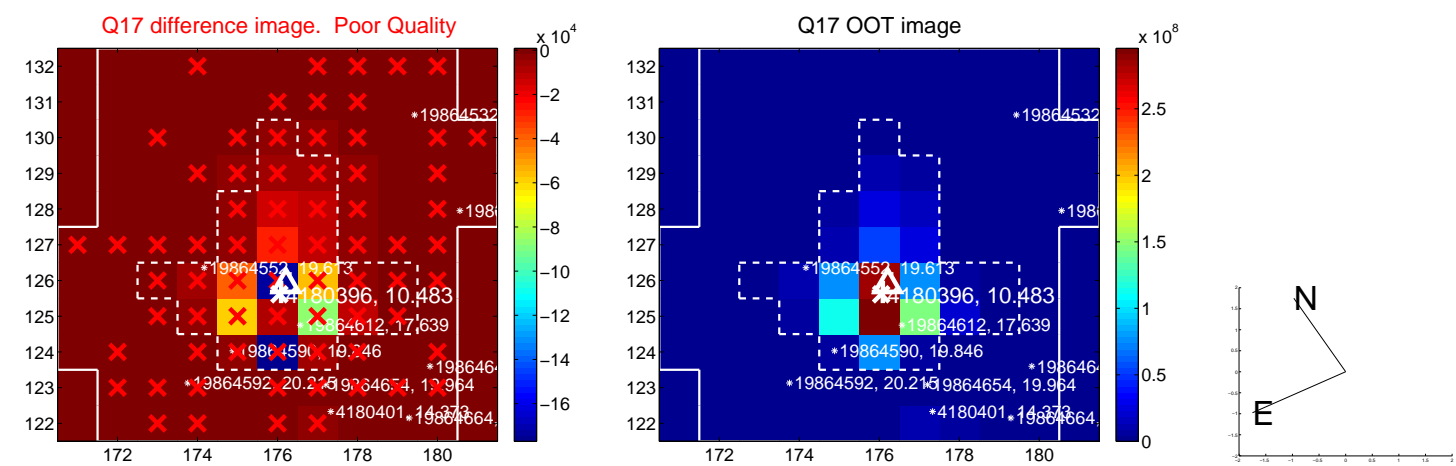
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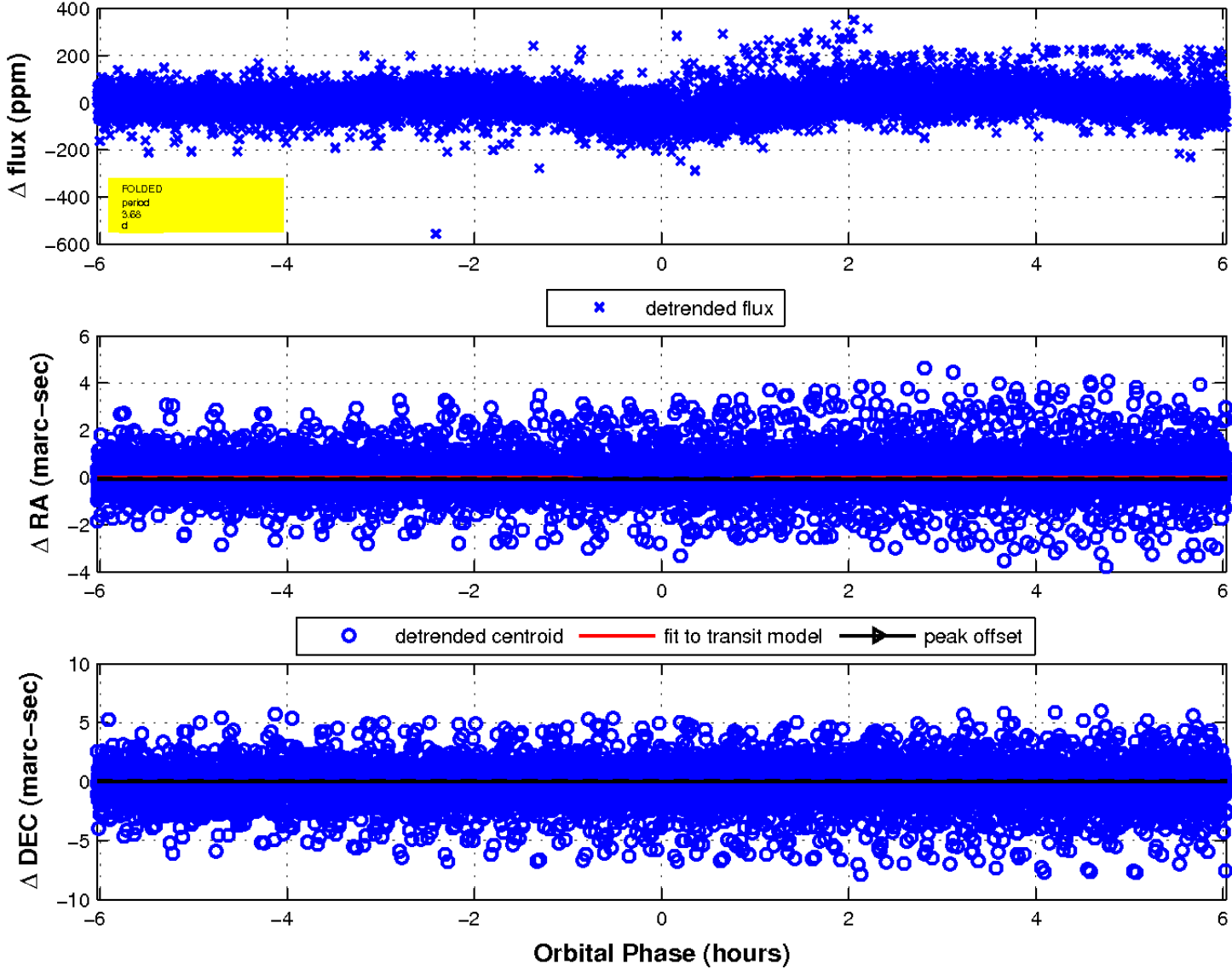
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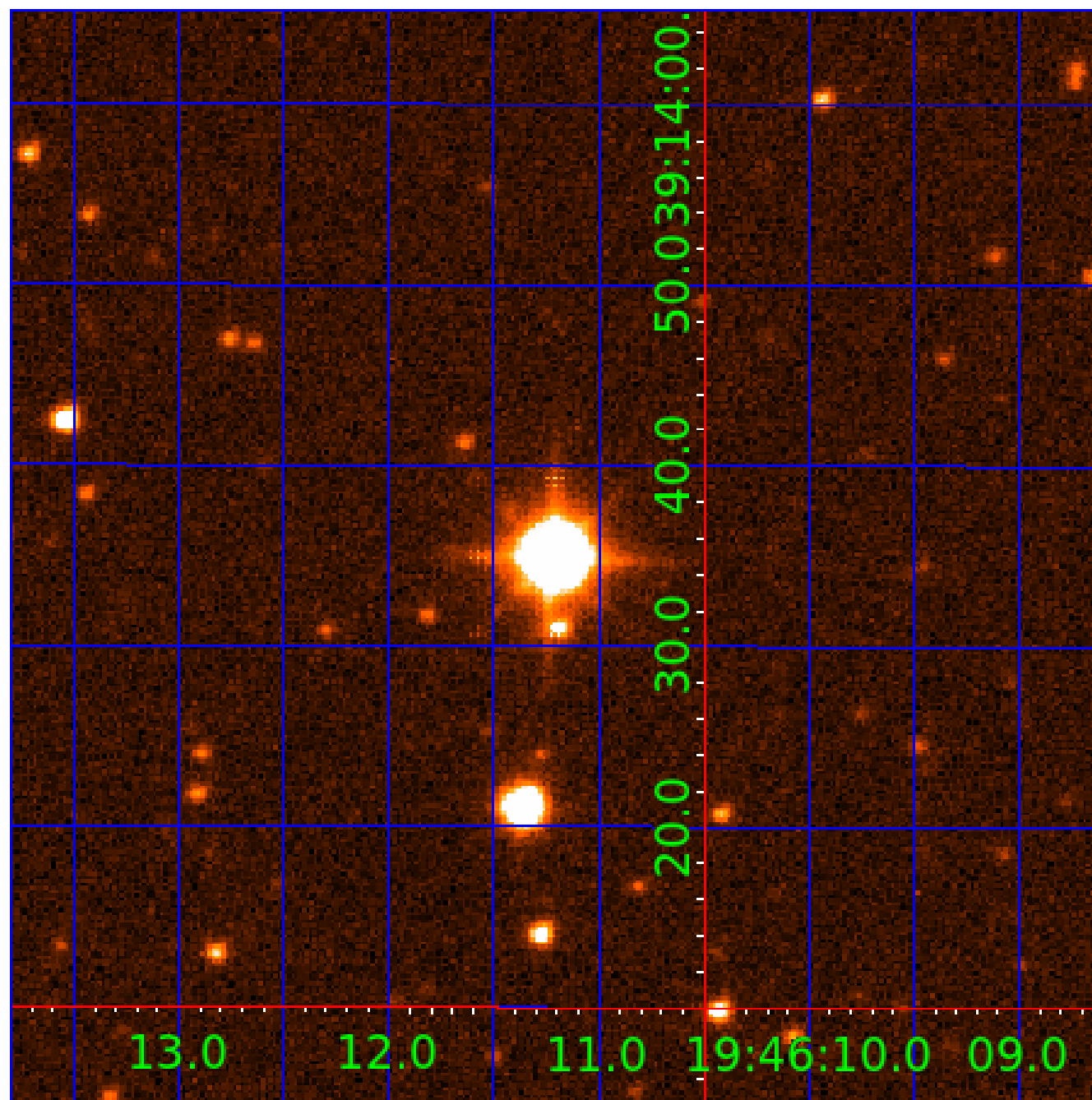


fluxWeightedCentroids, Planet 1 of 5



UKIRT Image

Declination



KIC 004180396

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Ephemeris Match Information For 004180396-02

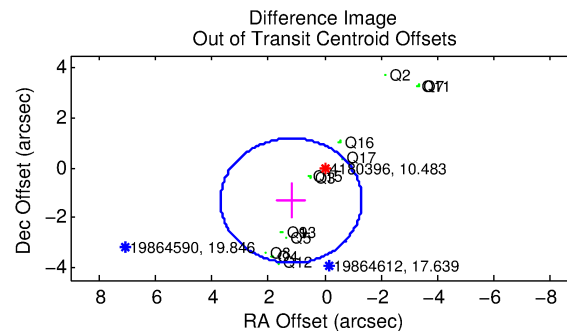
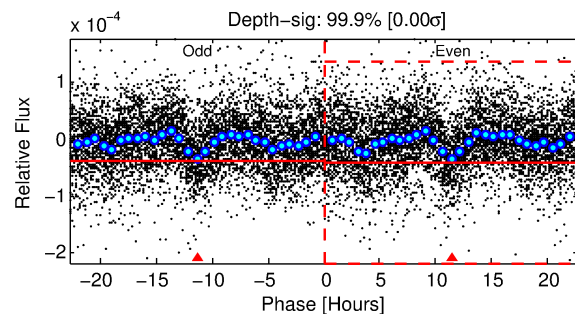
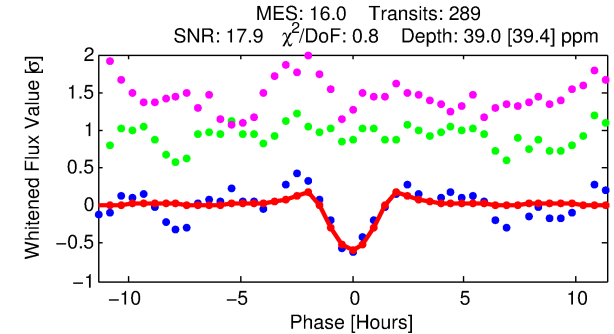
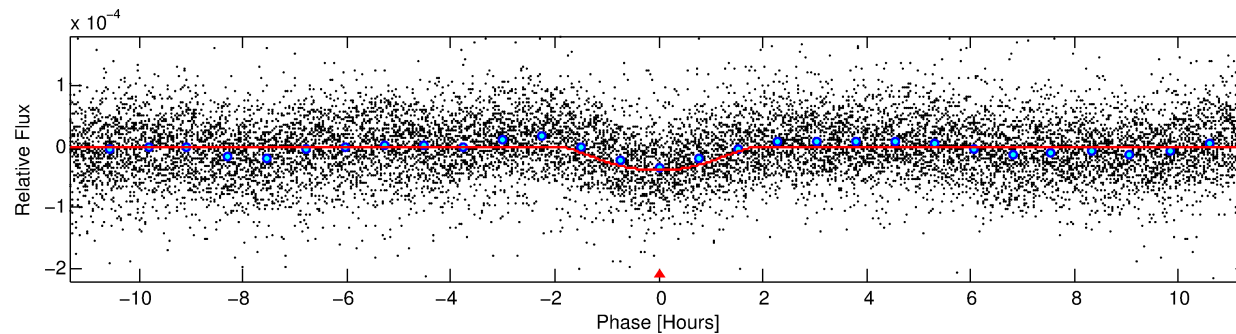
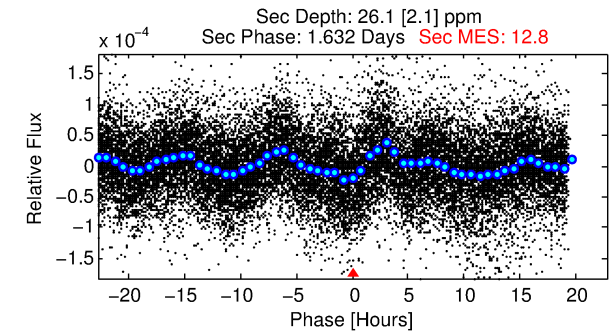
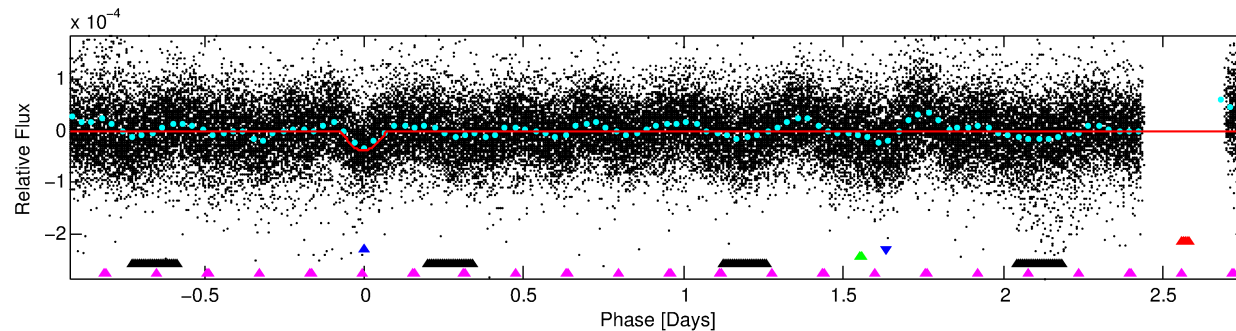
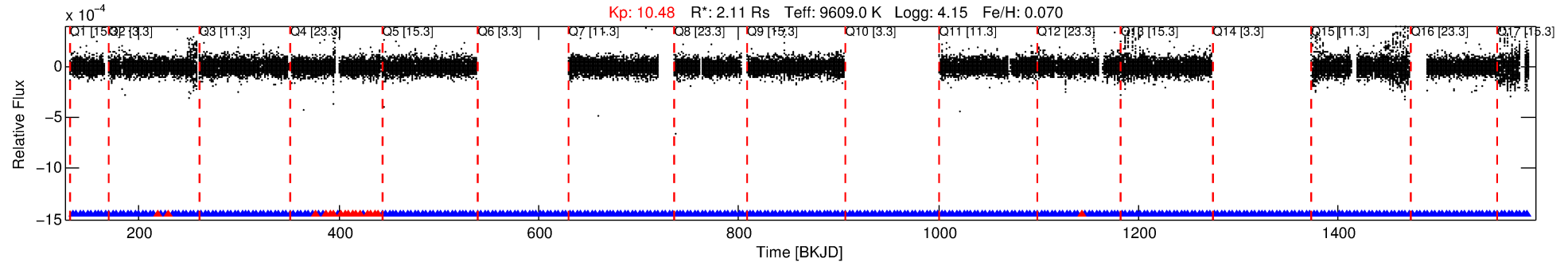
No Significant Match Found

DV One-Page Summary

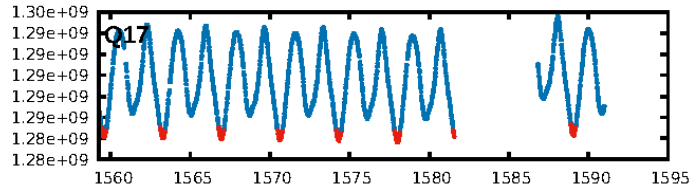
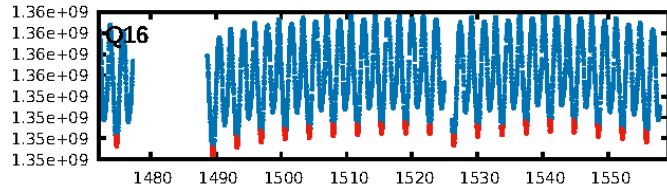
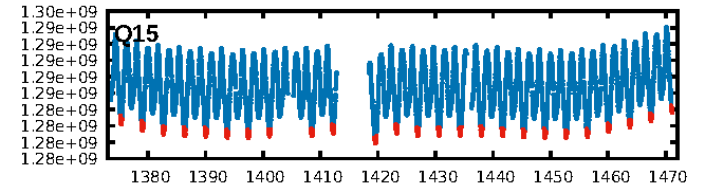
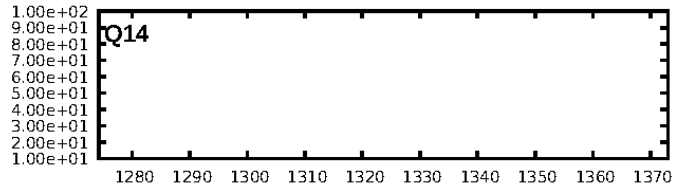
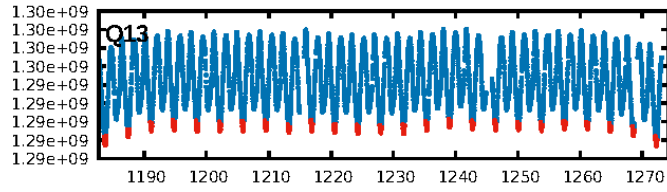
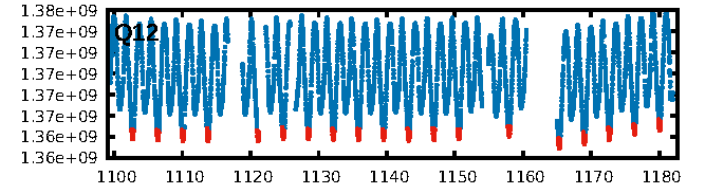
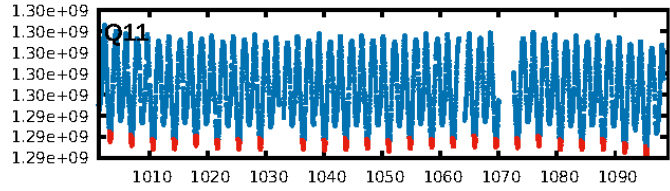
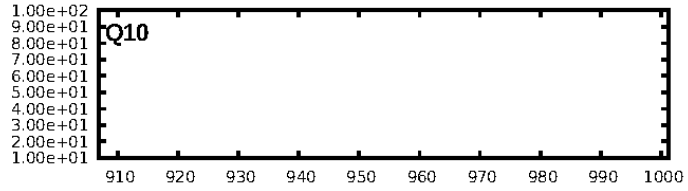
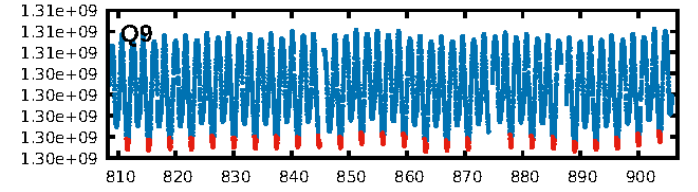
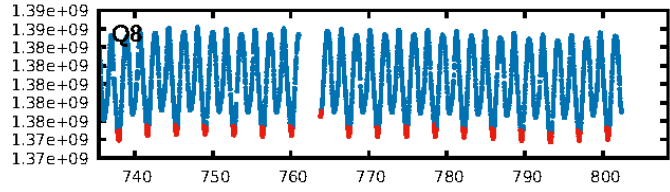
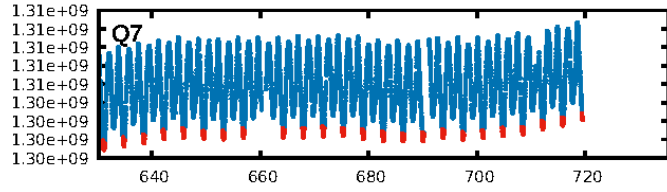
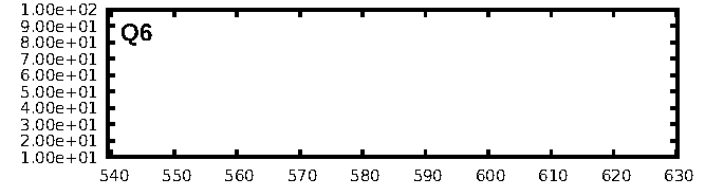
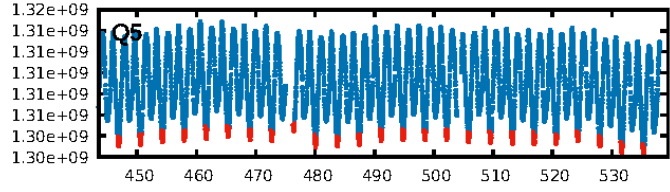
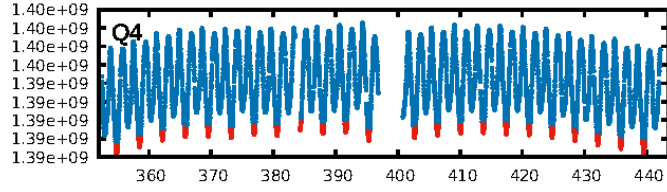
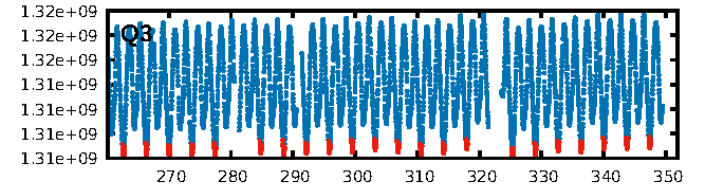
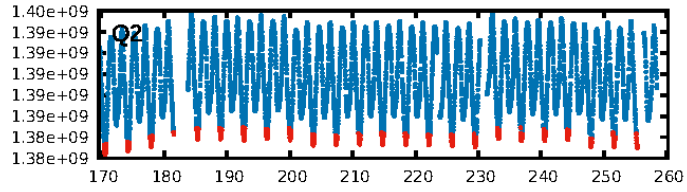
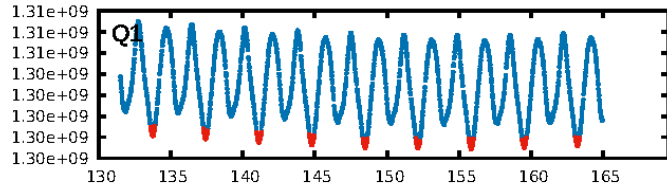
KIC: 4180396 Candidate: 2 of 5 Period: 3.684 d

KOI: K06394 Corr: No Ephemeris Match

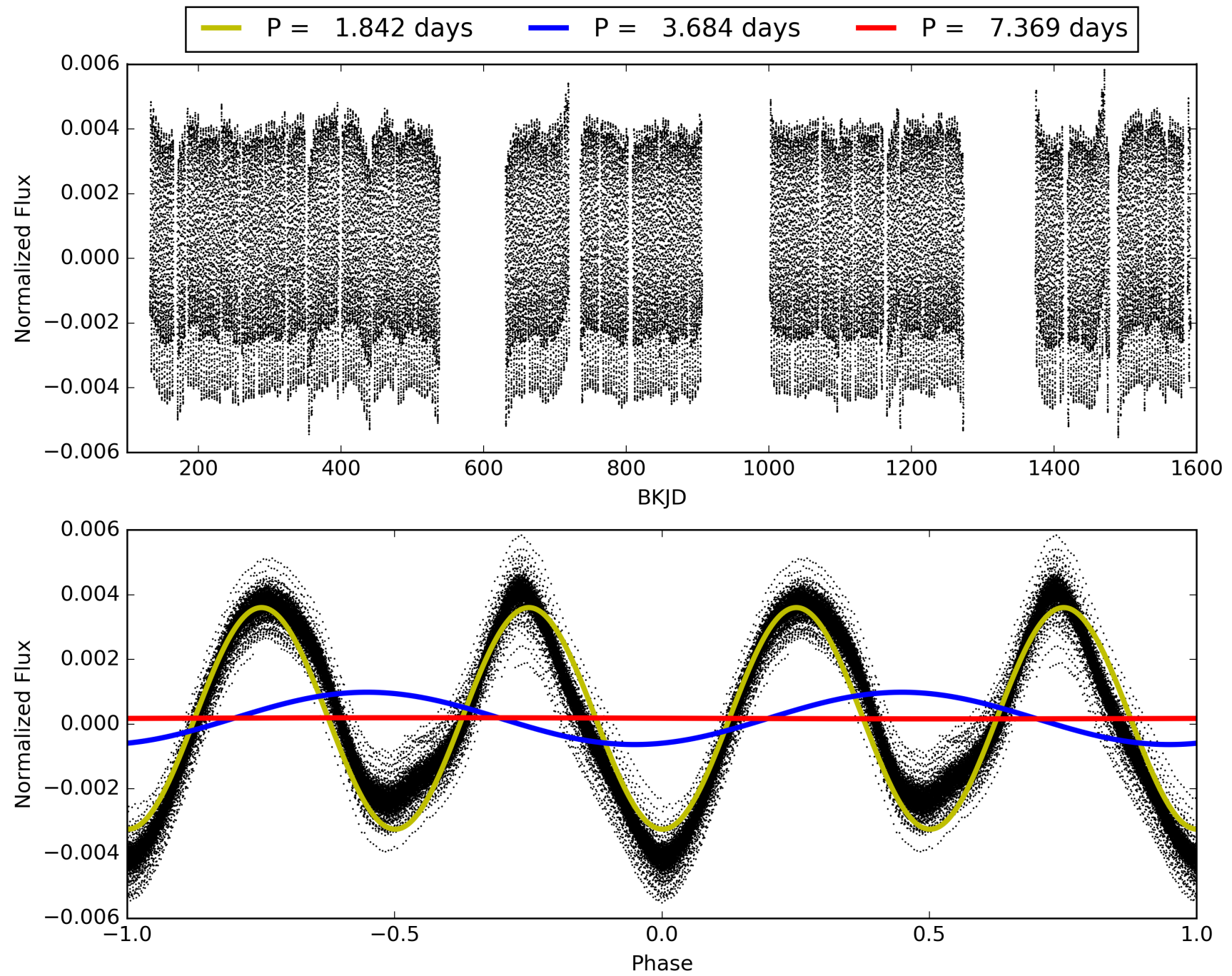
Kp: 10.48 R*: 2.11 Rs Teff: 9609.0 K Logg: 4.15 Fe/H: 0.070



TCE 004180396-02, PDC Light Curves

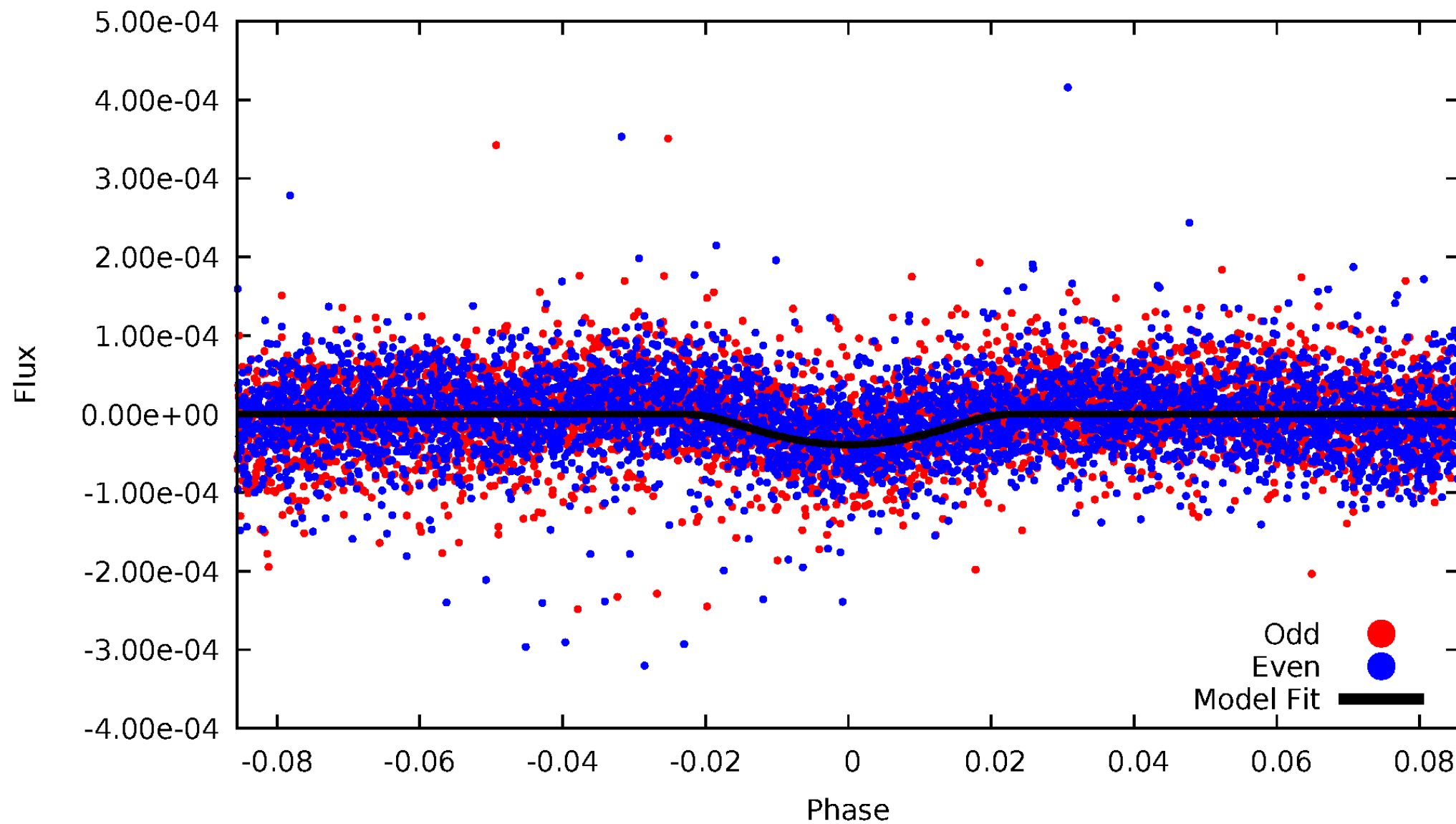


TCE 004180396-02



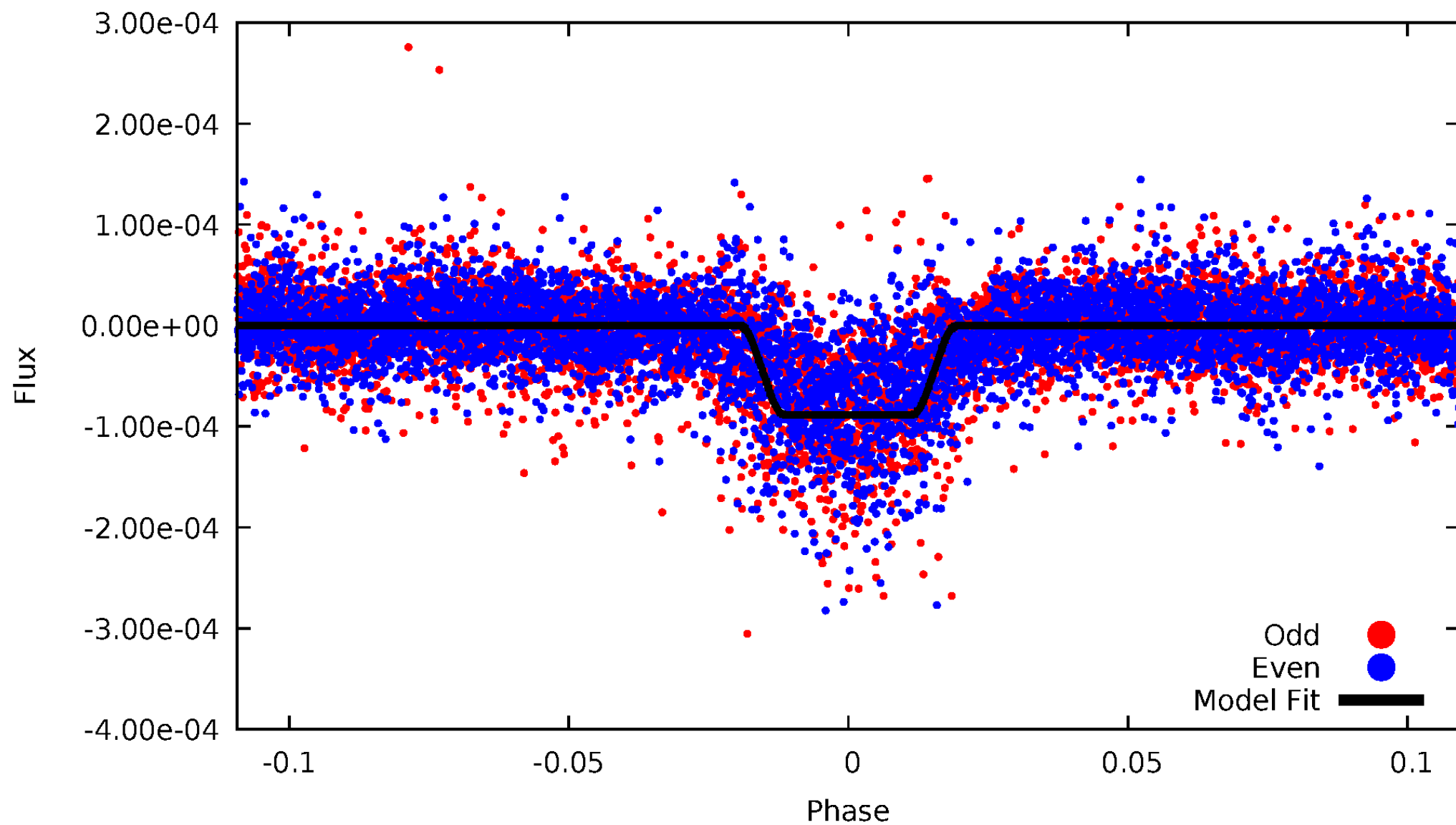
DV Odd/Even

TCE 004180396-02



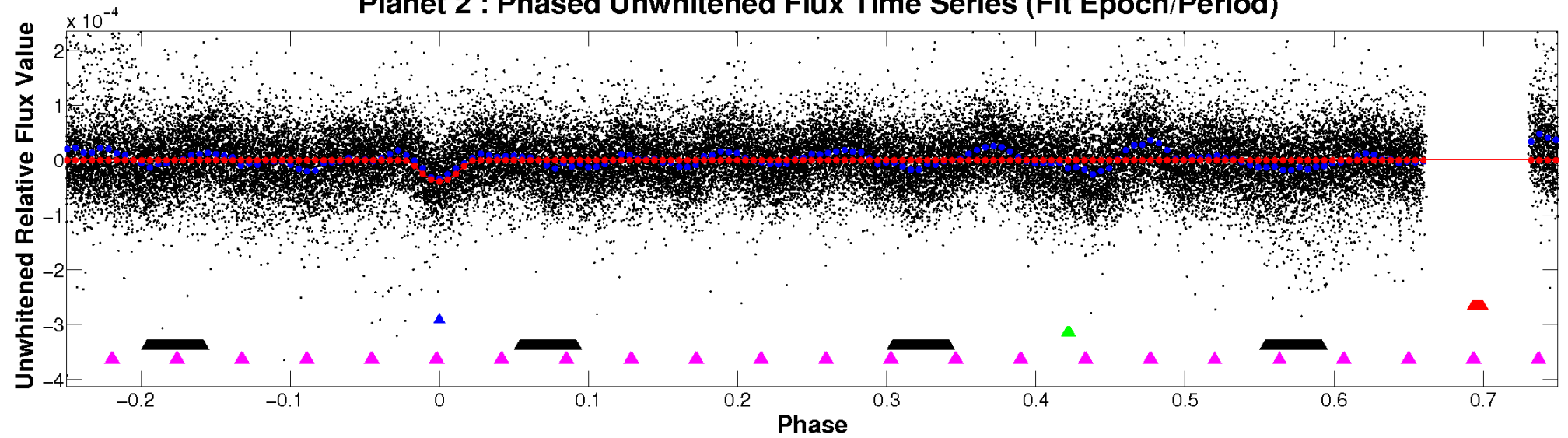
ALT Odd/Even

TCE 004180396-02

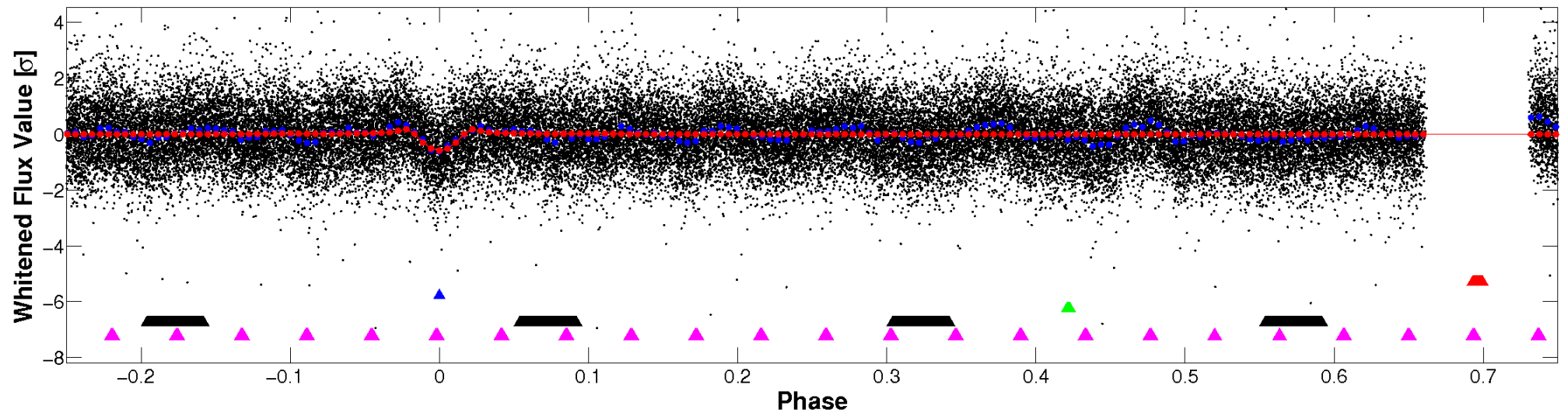


Non-Whitened Vs. Whitened Light Curve

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

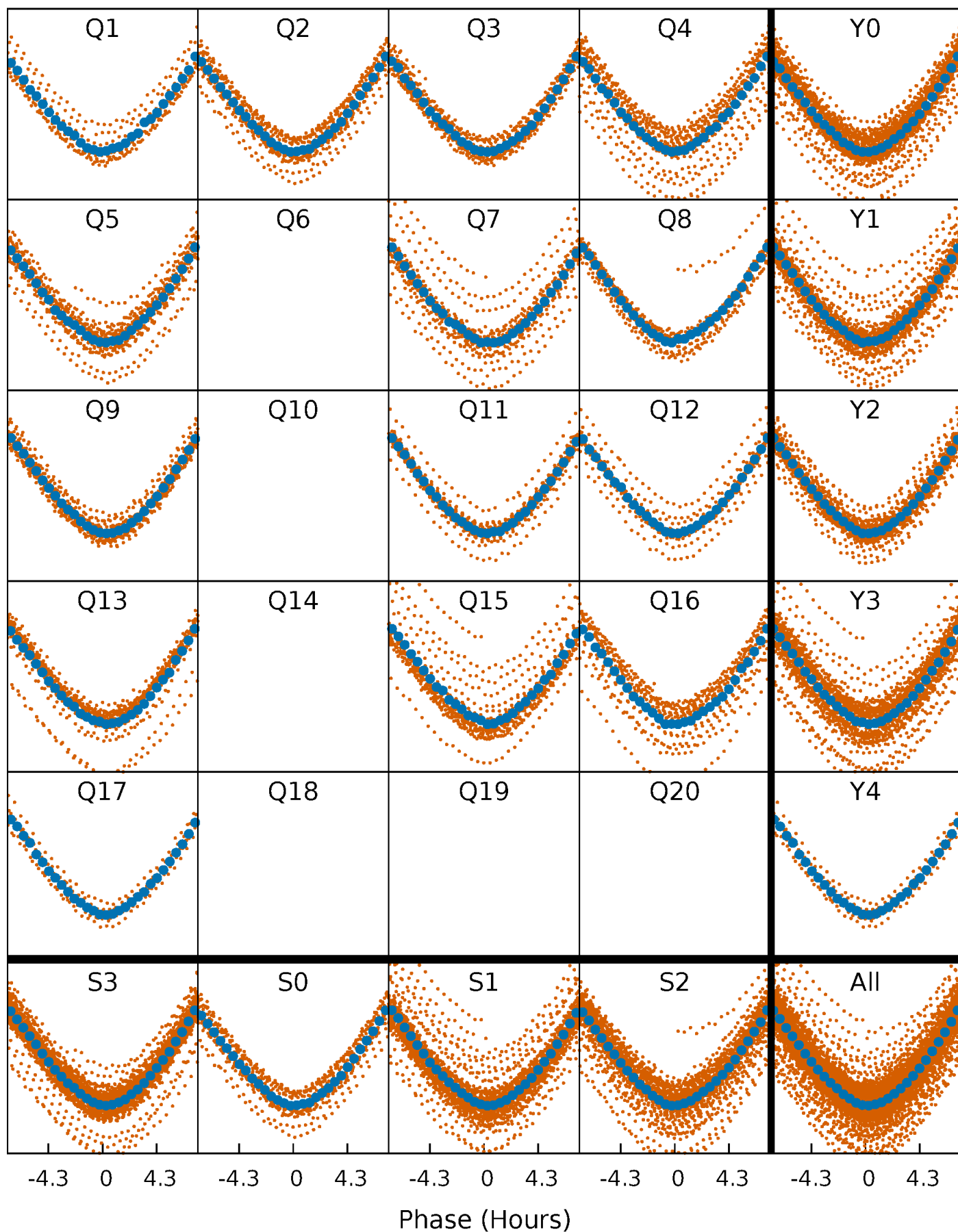


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



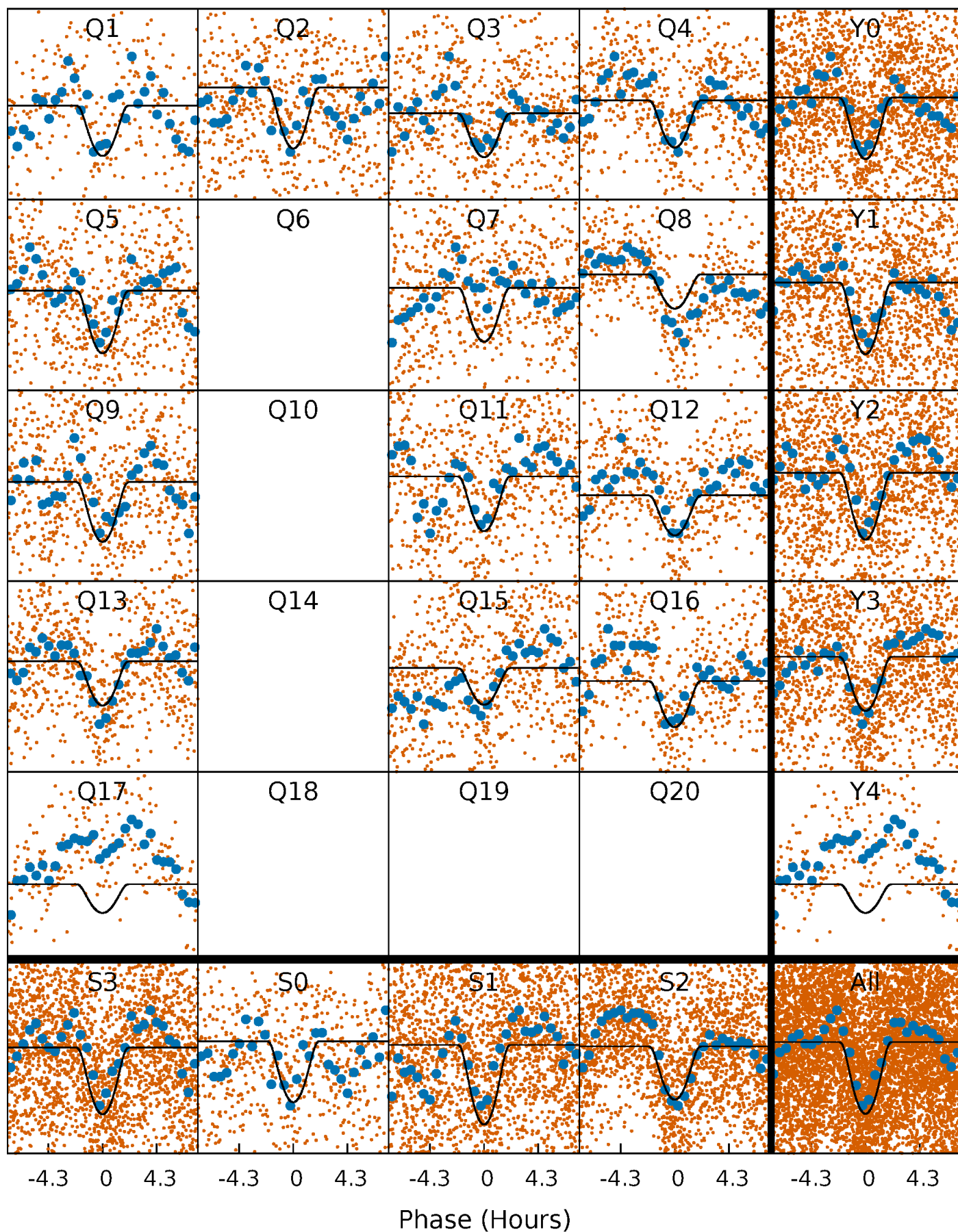
PDC Quarter-Phased Transit Curves

TCE 004180396-02 P= 3.684330 Days $T_0=133.734179$ (BKJD)



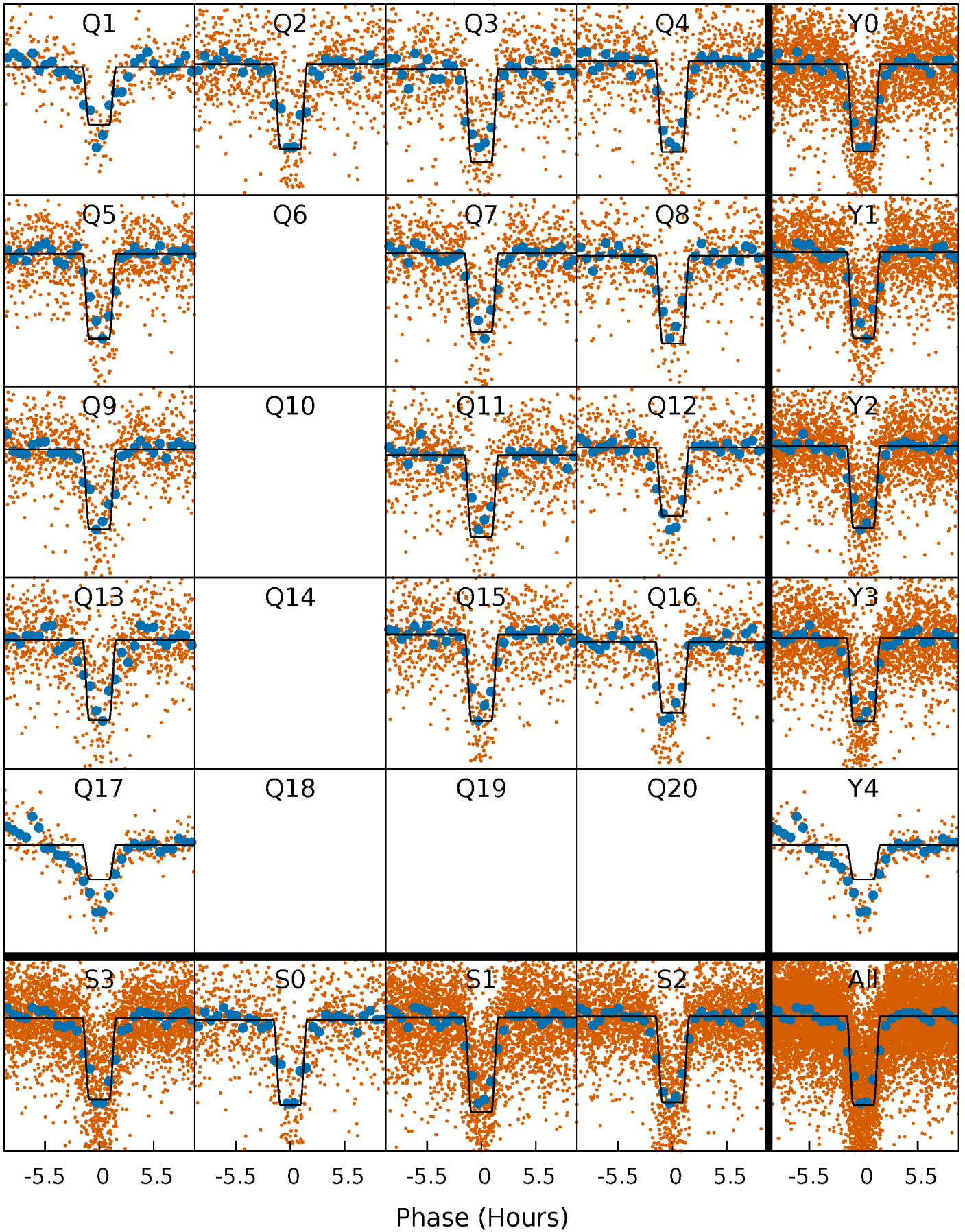
DV Quarter-Phased Transit Curves

TCE 004180396-02 P= 3.684330 Days $T_0=133.734179$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

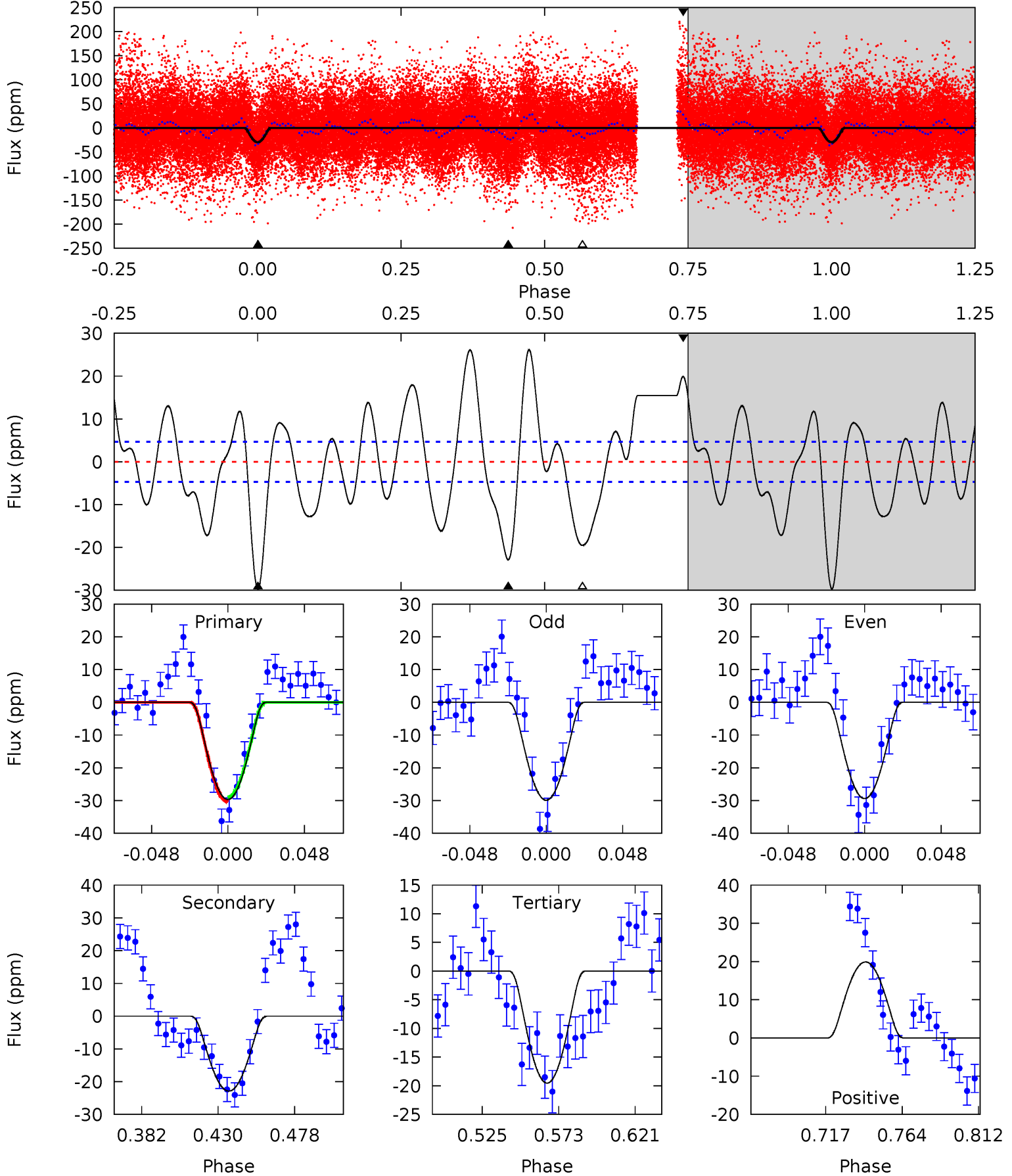
TCE 004180396-02 $P = 3.684368$ Days $T_0 = 133.726251$ (BKJD)



DV Model-Shift Uniqueness Test

004180396-02, P = 3.684330 Days, E = 130.049849 Days

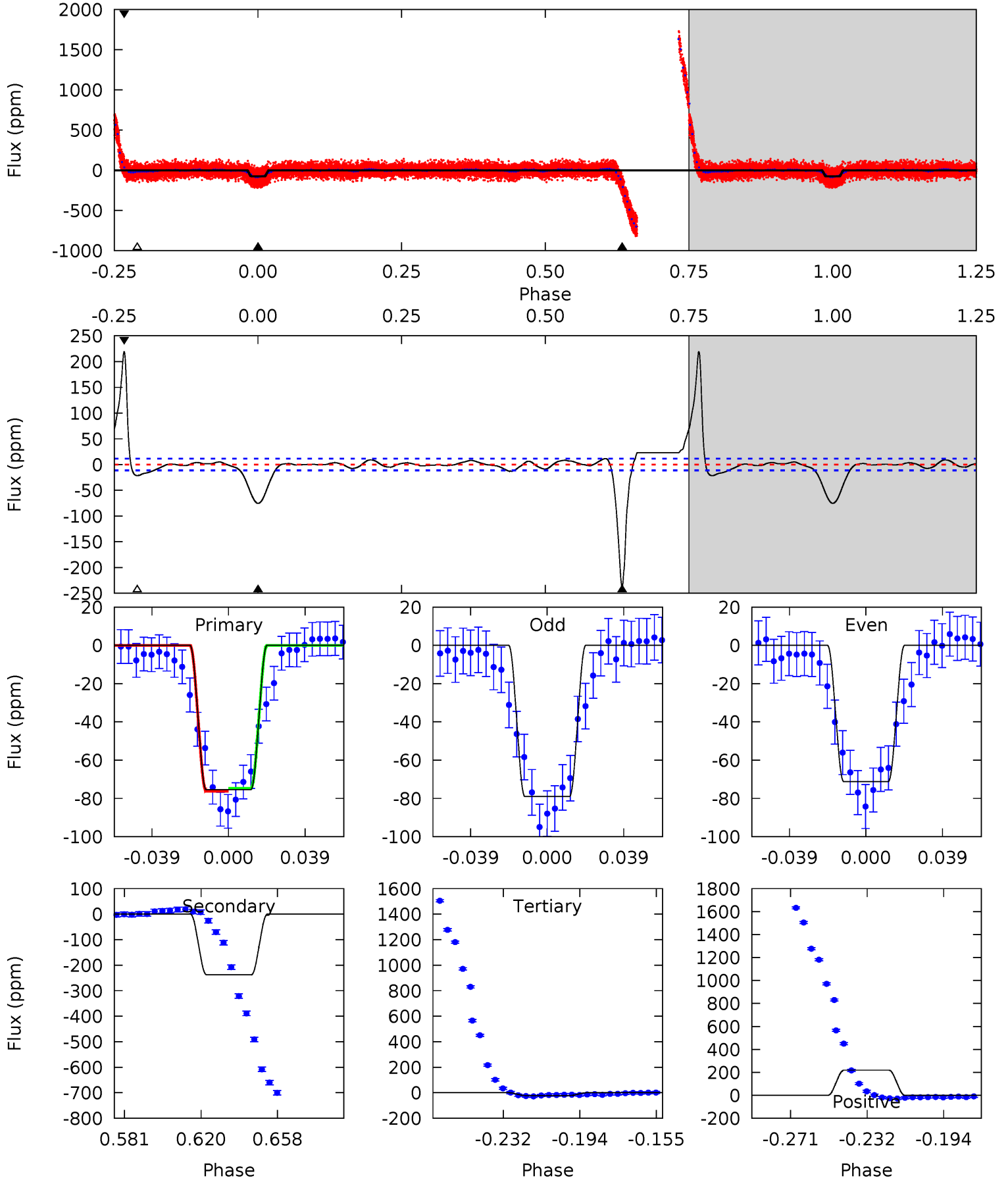
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 29.9 | 23.0 | 19.7 | 20.0 | 4.72 | 1.98 | 10.4 | 10.2 | 9.86 | 3.37 | 3.02 | 0.25 | 0.97 | 0.47 | 0.69 |



Alt Model-Shift Uniqueness Test

004180396-02, P = 3.684368 Days, E = 130.041883 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 31.7 | 99.9 | 9.02 | 92.0 | 4.76 | 2.07 | 9.94 | 22.6 | -60.3 | 90.9 | 7.92 | 1.62 | 1.10 | 0.48 | 0.28 |



Stellar Parameters For KIC 004180396

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 9609^{+272}_{-428} | $4.149^{+0.152}_{-0.228}$ | $0.070^{+0.150}_{-0.600}$ | $2.108^{+0.847}_{-0.565}$ | $2.284^{+0.396}_{-0.594}$ | $0.343^{+0.290}_{-0.209}$ |
| | +3%/-4% | +4%/-5% | +214%/-857% | +40%/-27% | +17%/-26% | +84%/-61% |
| 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 004180396-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|--------------------------|----------------------------|
| DV | -23 ± 1 | $3.26^{+2.93}_{-2.11}$ | 3491^{+304}_{-240} | 5131^{+4185}_{-1228} | $4.377^{+33.168}_{-3.190}$ |
| Alt. | -238 ± 2 | $3.13^{+2.88}_{-2.05}$ | 3498^{+308}_{-239} | 10358^{+22379}_{-3367} | 48^{+353}_{-35} |

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 $A_{obs} \gg 1.0$

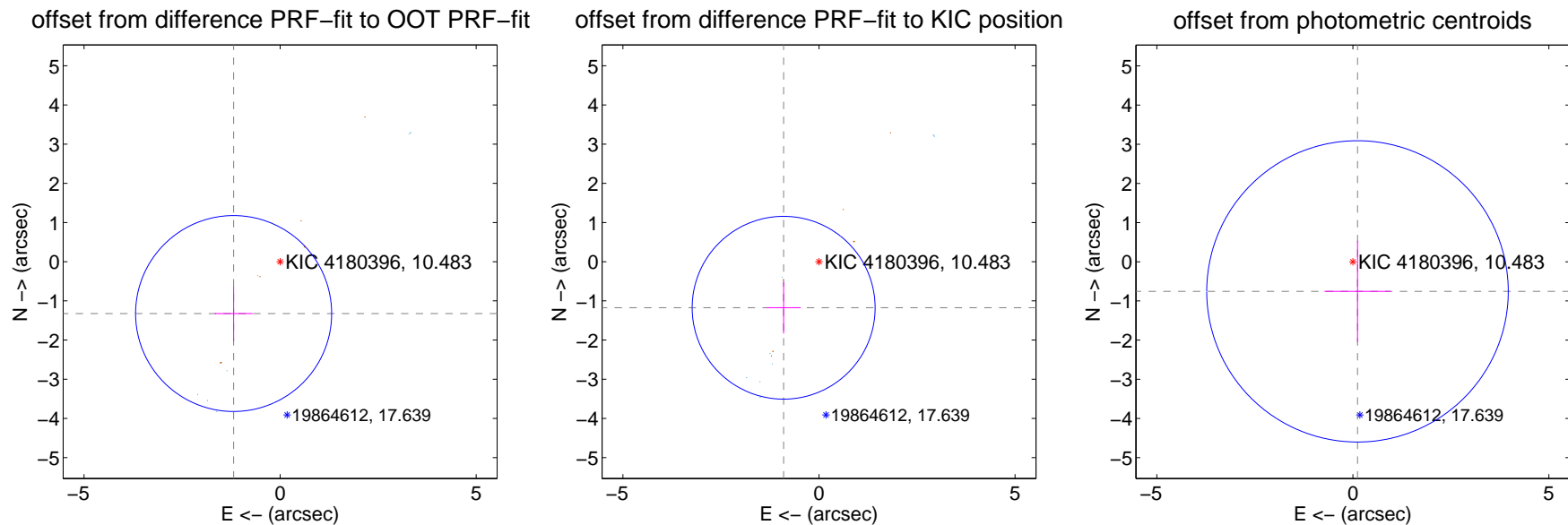
DV Centroid Data

Supplemental centroid analysis for 004180396-02. **Kepler magnitude: 10.48.** Transit SNR 17.94

There are 8 quarters with good PRF difference image offsets

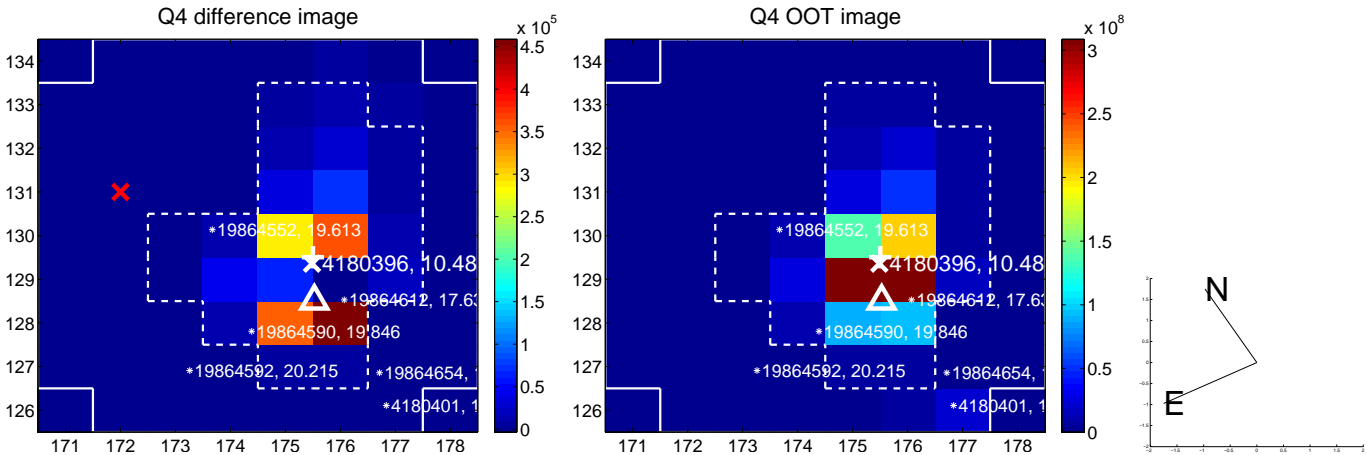
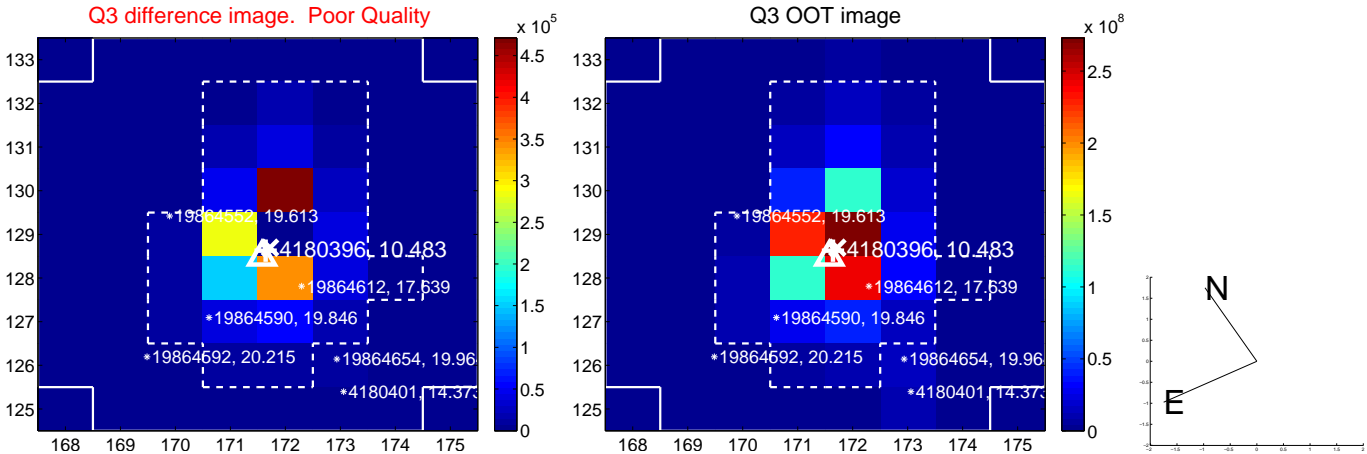
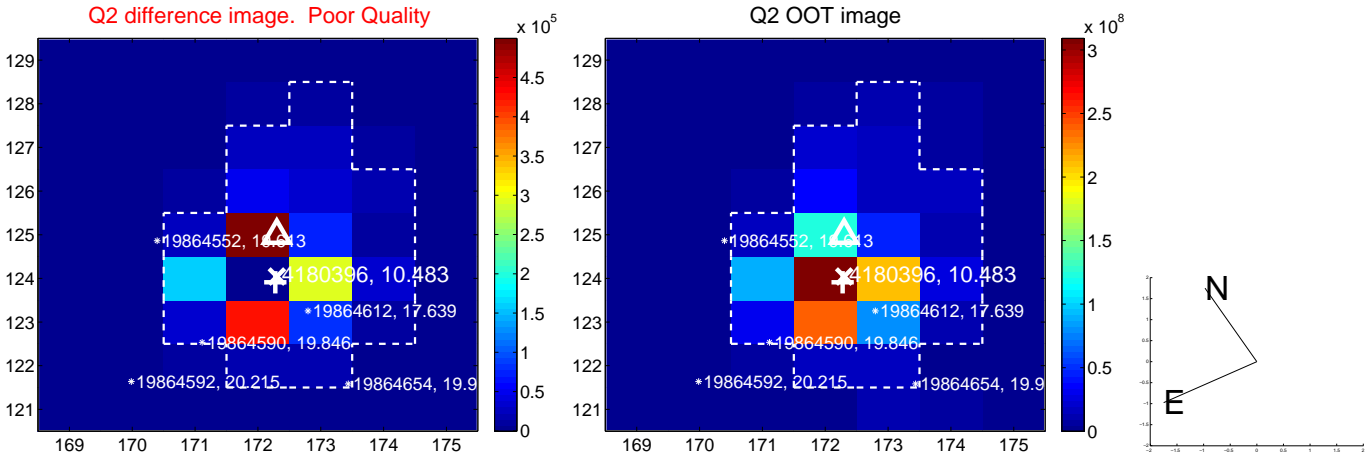
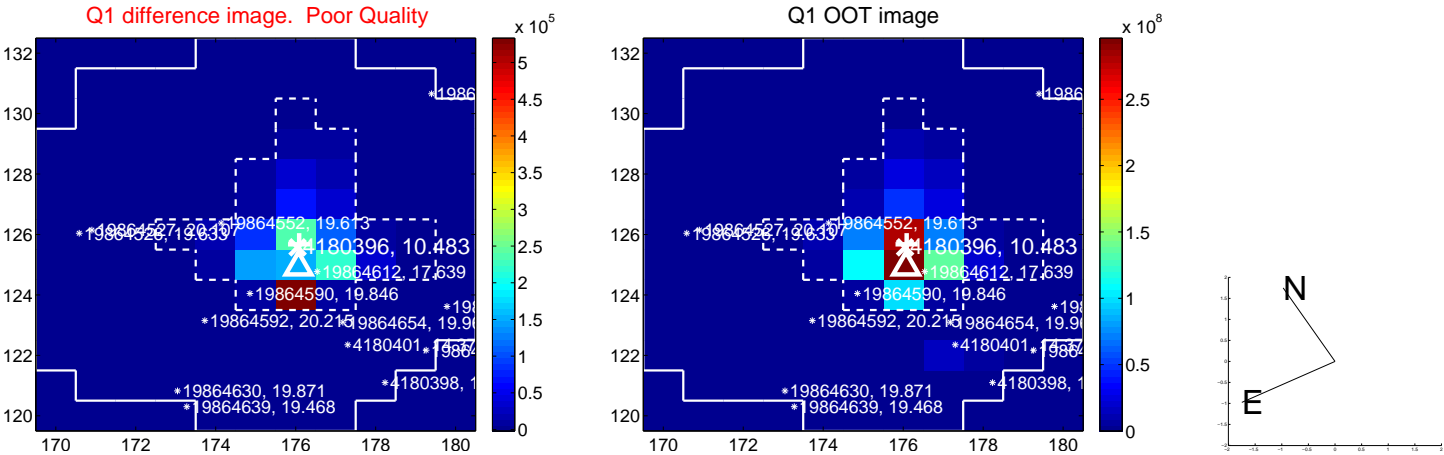
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 1.776 ± 0.833 | 2.13 | 1.185 ± 0.484 | -1.323 ± 0.698 |
| PRF-fit source offset from KIC position | 1.481 ± 0.777 | 1.90 | 0.901 ± 0.436 | -1.175 ± 0.659 |
| photometric centroid source offset | 0.77 ± 1.28 | 0.60 | -0.12 ± 0.84 | -0.76 ± 1.29 |

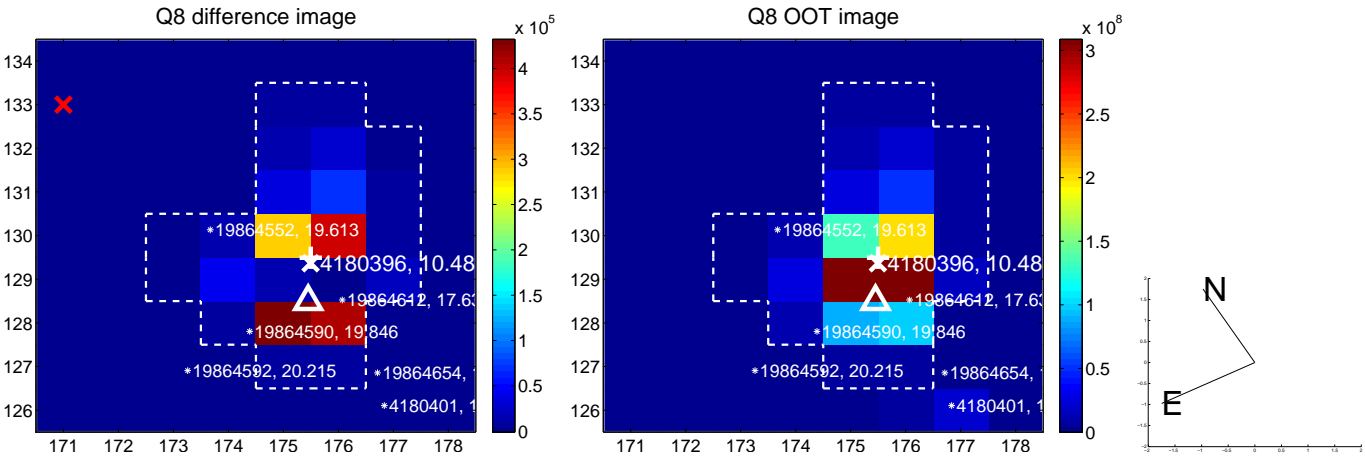
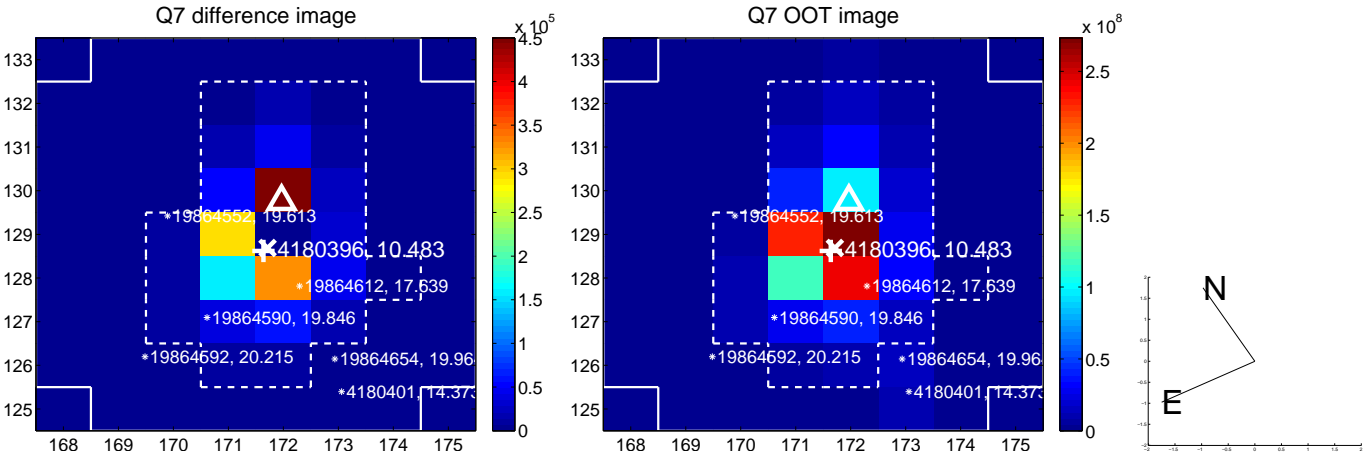
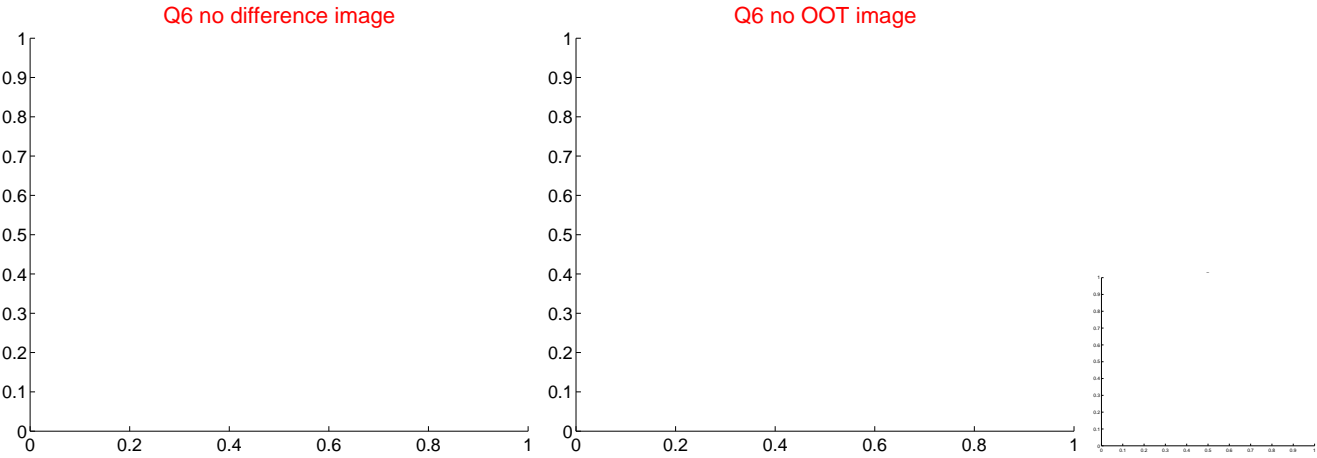
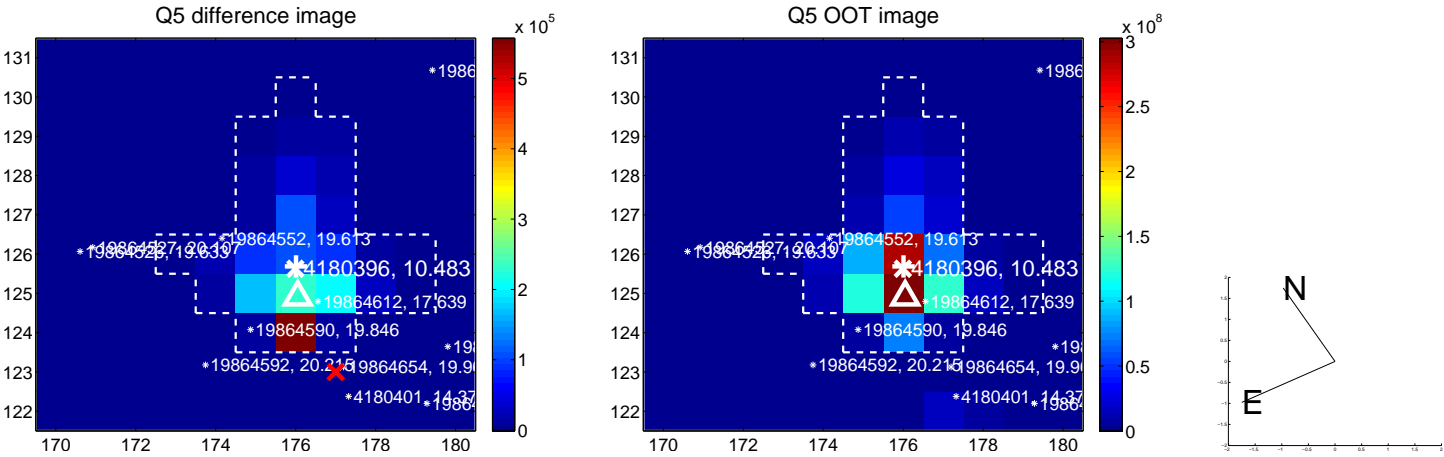


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

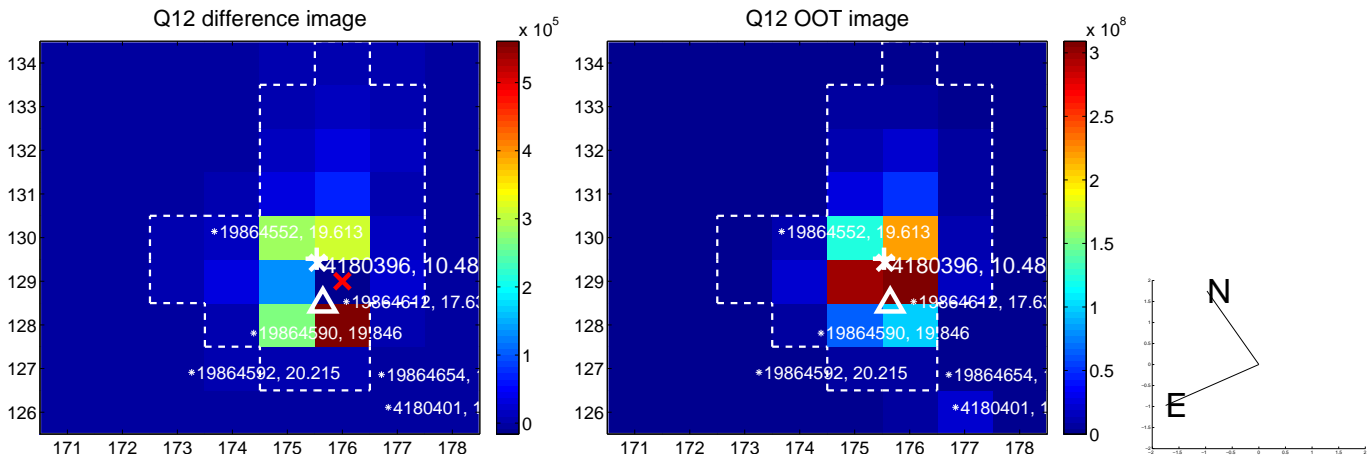
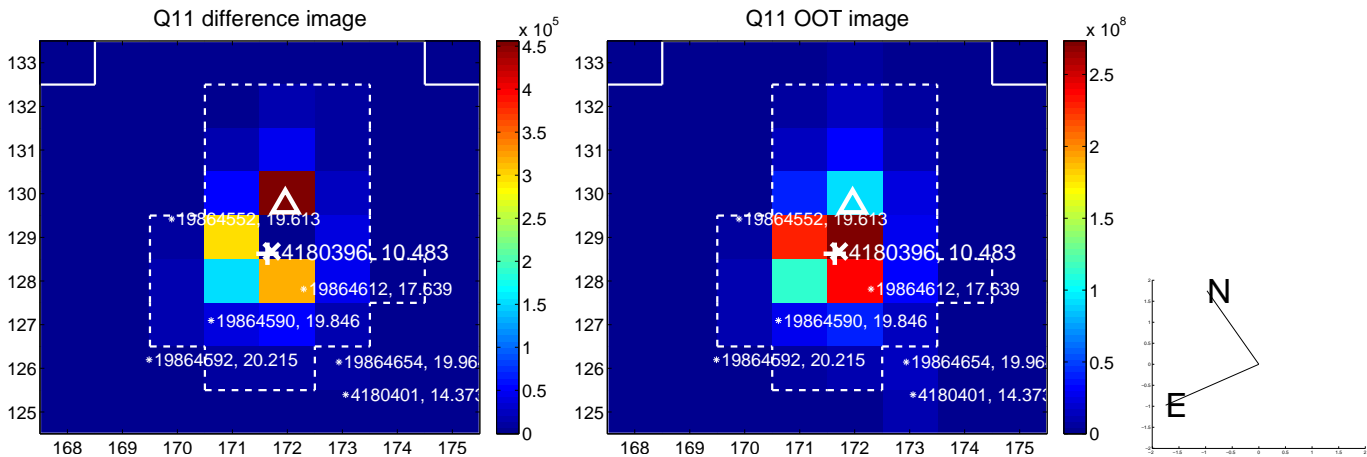
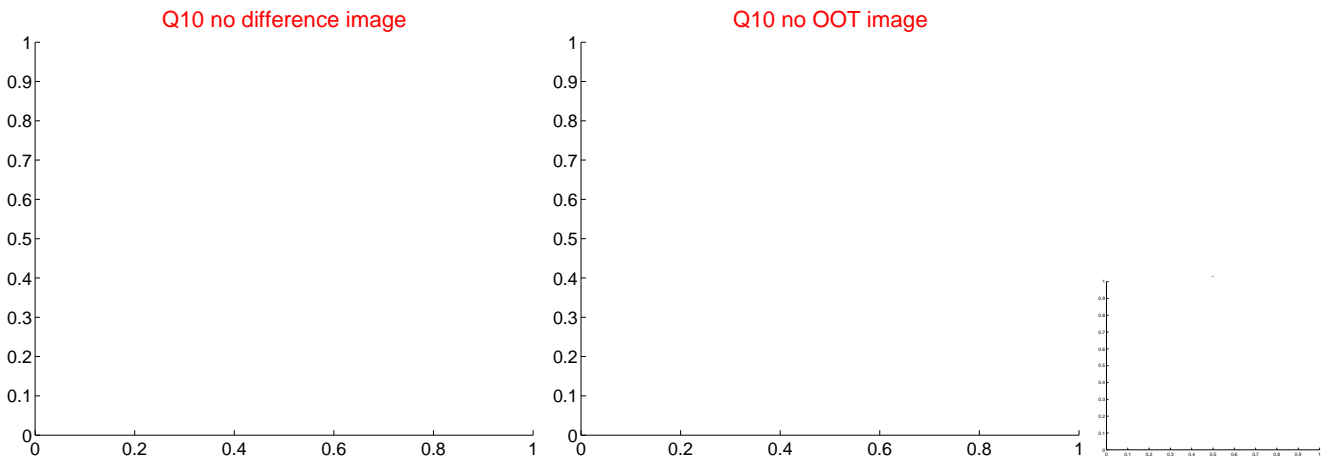
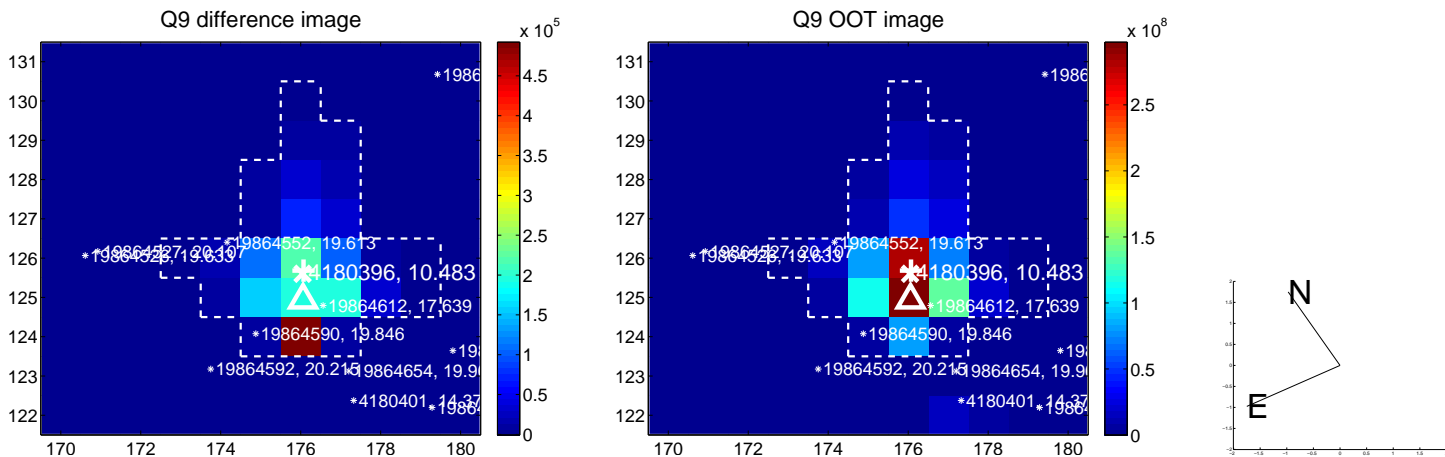
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



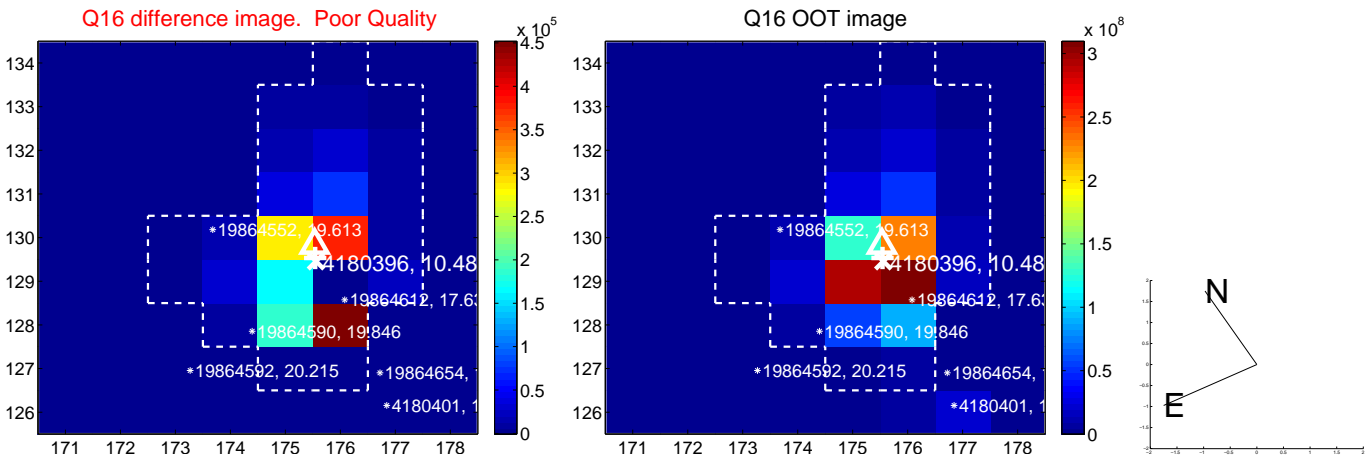
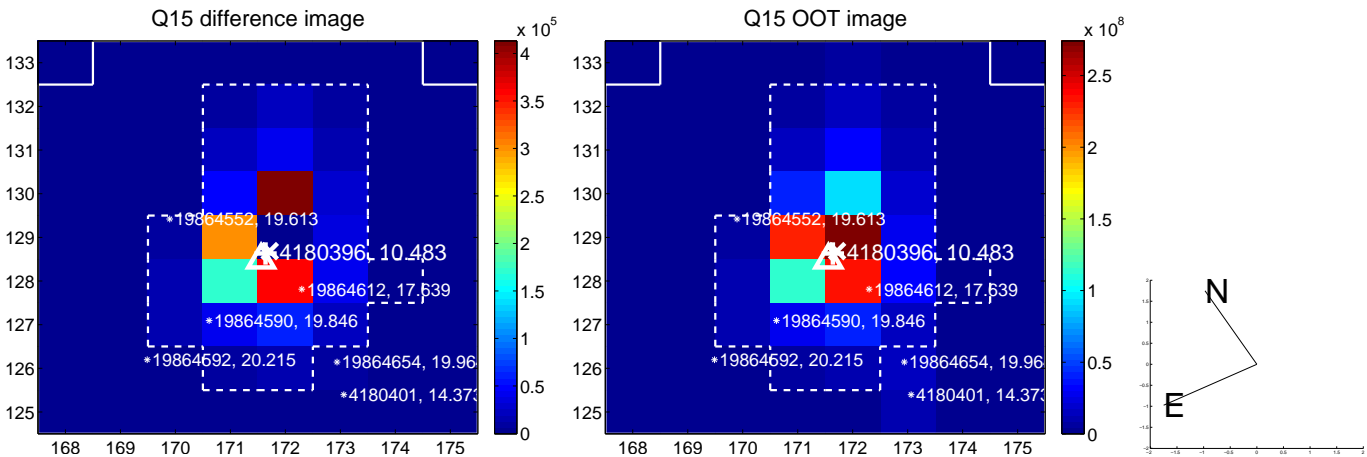
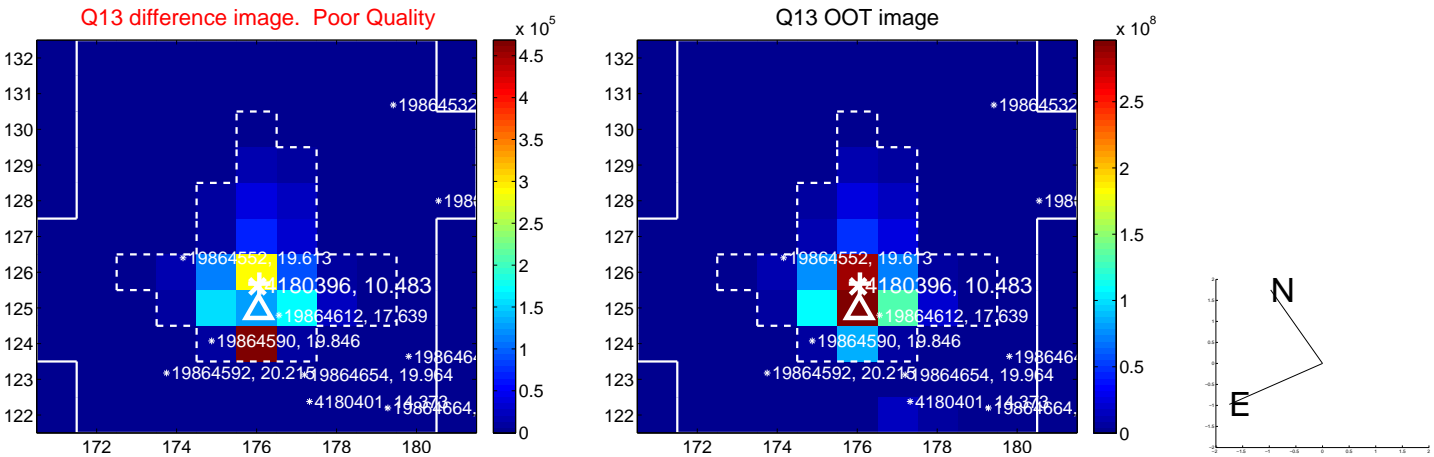
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



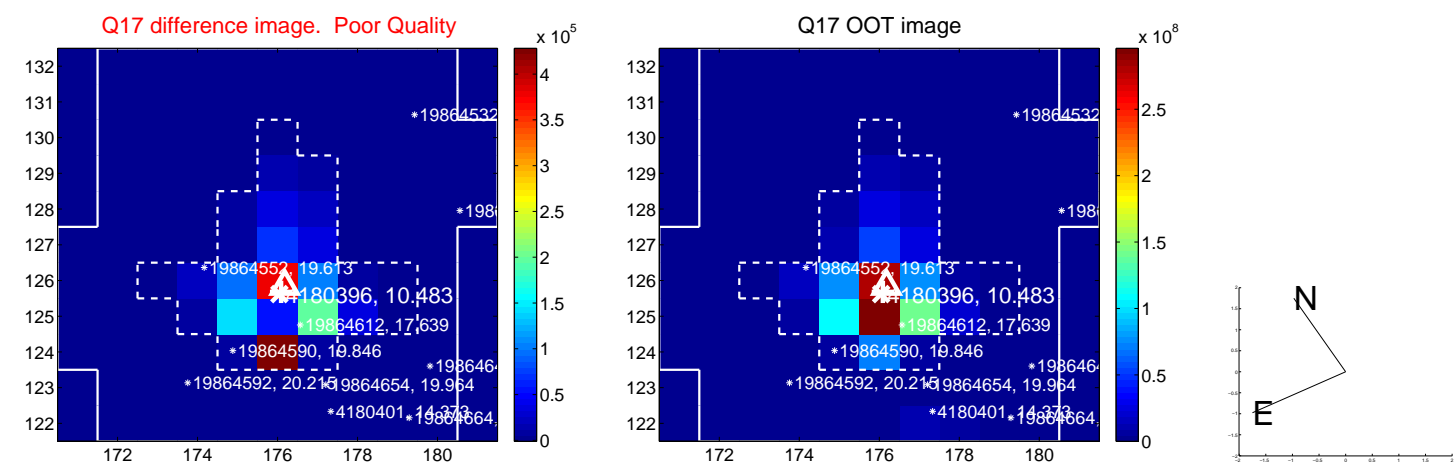
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



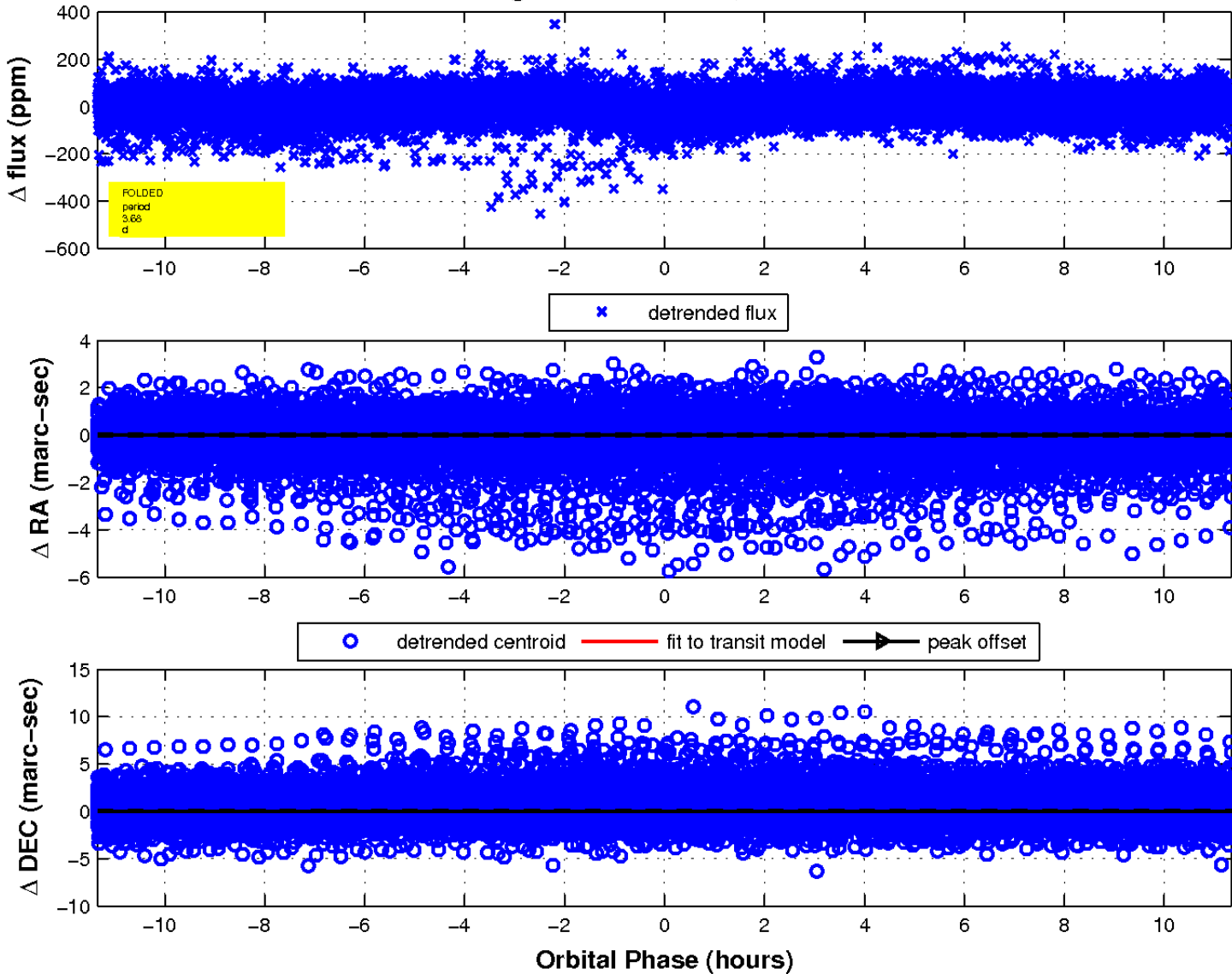
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

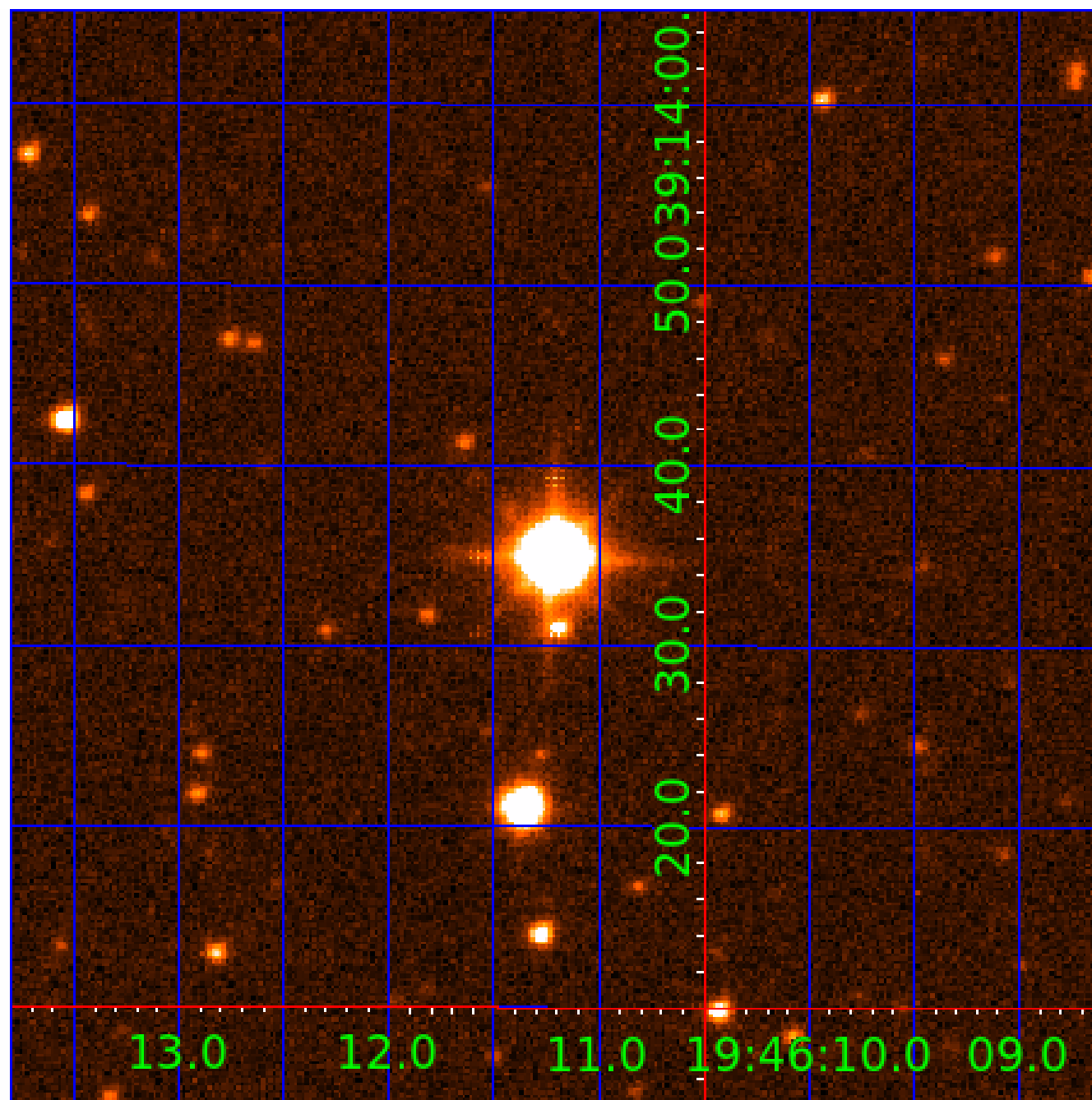


fluxWeightedCentroids, Planet 2 of 5



UKIRT Image

Declination



KIC 004180396

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004180396-01 | OBS | 6394.01 | 3.684391 | 132.602997 | 58.4 | 2.012 | 28.6 | 29.7 | 2.11 | 9609 | 1.86 | 8974.98 |
| 004180396-02 | OBS | No | 3.684330 | 133.734179 | 39.0 | 3.782 | 16.0 | 17.9 | 2.11 | 9609 | 2.54 | 8975.17 |
| 004180396-03 | OBS | No | 3.684310 | 131.608087 | 24.4 | 7.014 | 12.8 | 14.3 | 2.11 | 9609 | 1.32 | 8975.24 |
| 004180396-04 | OBS | No | 0.921171 | 132.090616 | 10.5 | 4.801 | 11.4 | 11.0 | 2.11 | 9609 | 0.78 | 56981.53 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 004180396-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—CENT_SATURATED |
| 004180396-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED |
| 004180396-03 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED |
| 004180396-04 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | TRANS_GAPPED—SWEET_NTL—LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED |

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 004180396-03

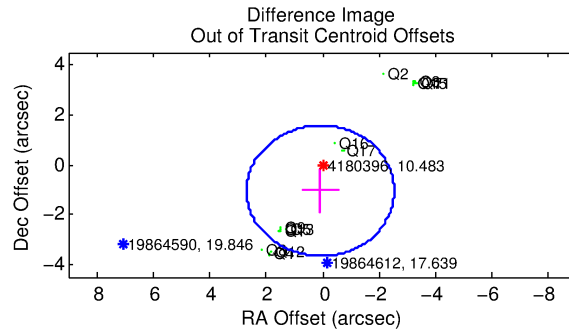
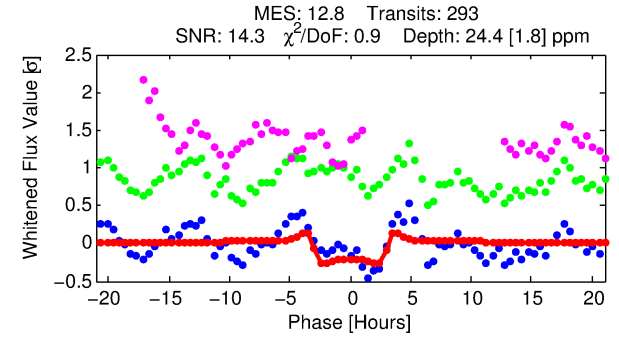
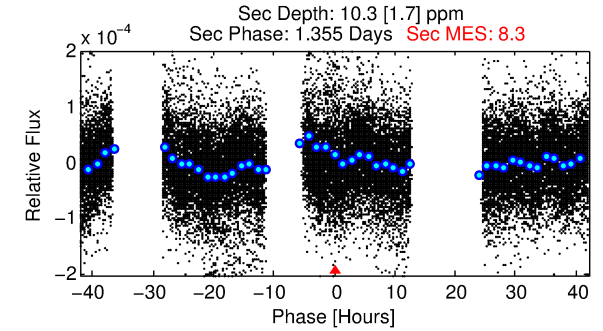
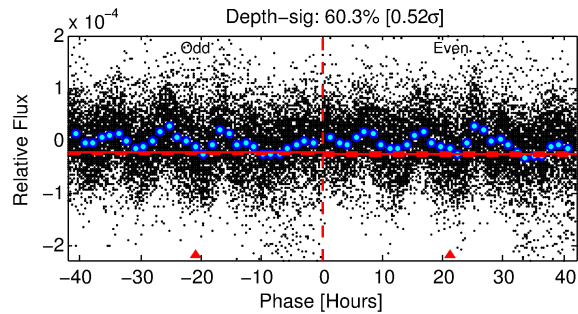
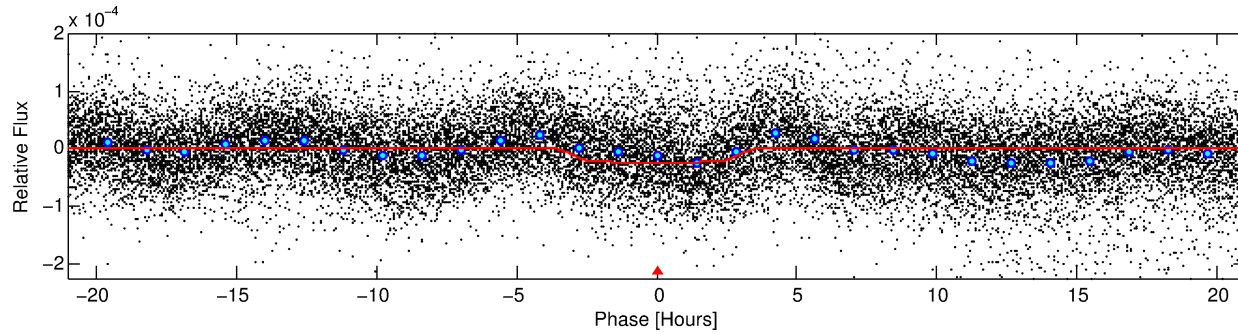
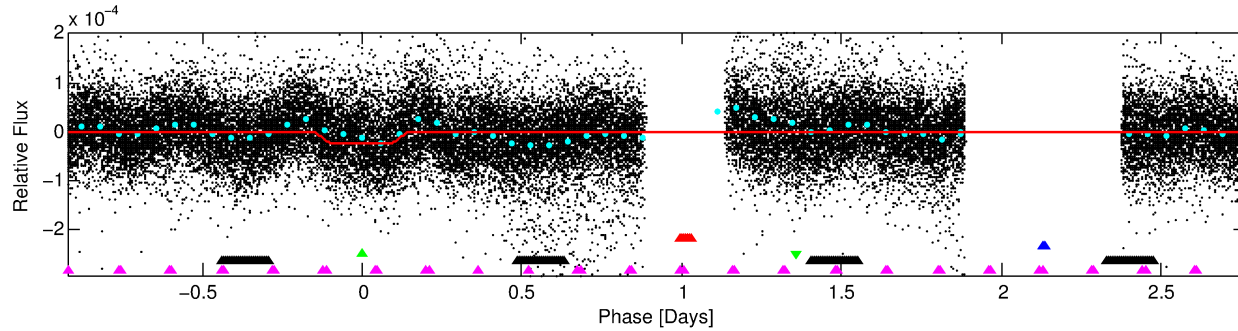
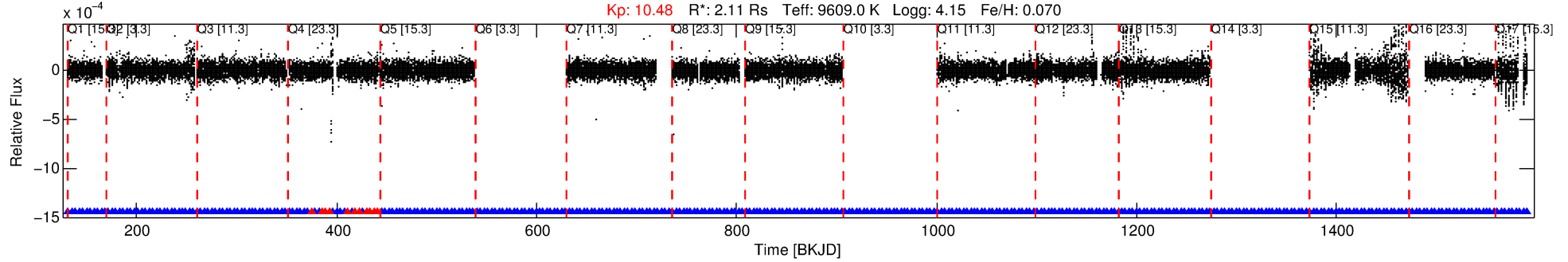
No Significant Match Found

DV One-Page Summary

KIC: 4180396 Candidate: 3 of 5 Period: 3.684 d

KOI: K06394 Corr: No Ephemeris Match

Kp: 10.48 R*: 2.11 Rs Teff: 9609.0 K Logg: 4.15 Fe/H: 0.070



DV Fit Results:

Period = 3.68431 [0.00002] d
Epoch = 131.6081 [0.0041] BKJD
Rp/R* = 0.0058 [0.0002]
a/R* = 1.30 [0.08]
b = 0.98 [0.00]
Seff = 8975.24 [4266.70]
Teq = 2482 [295] K
Rp = 1.32 [0.53] Re
a = 0.0615 [0.0197] AU
Ag = 12.25 [5.87] [1.92σ]
Teffp = 7180 [465] K [8.53σ]

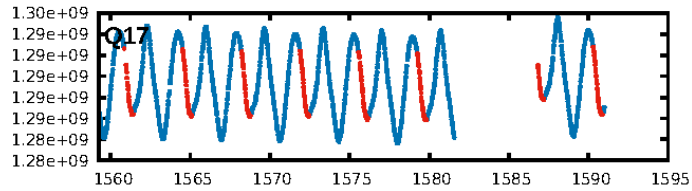
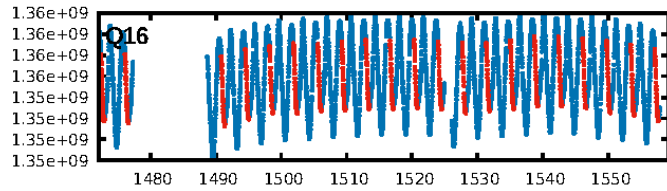
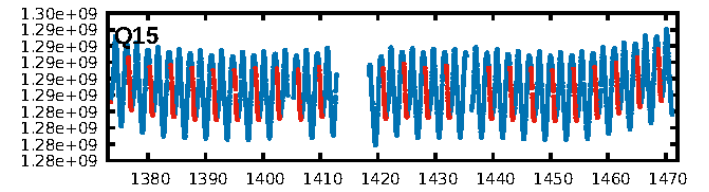
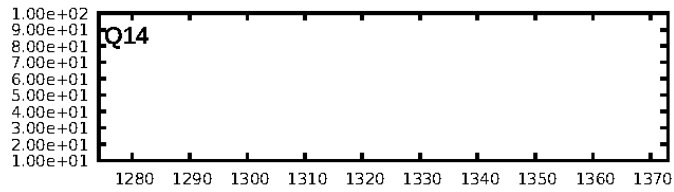
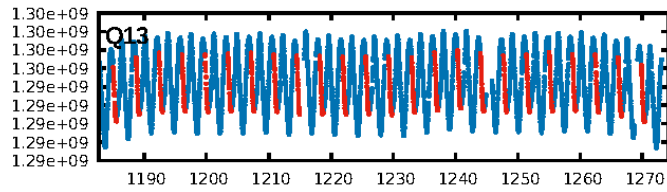
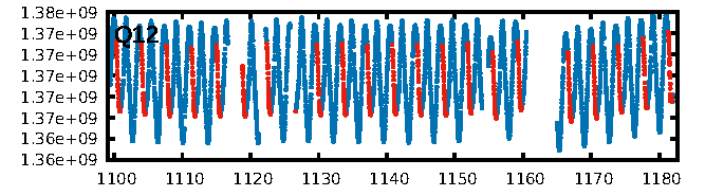
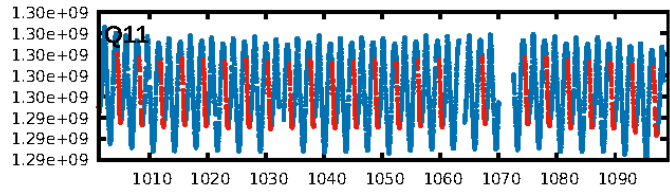
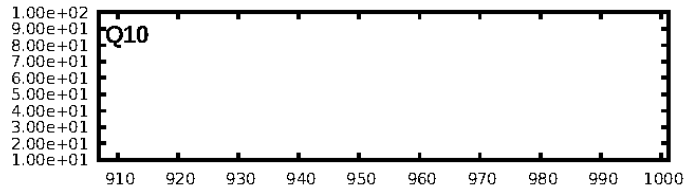
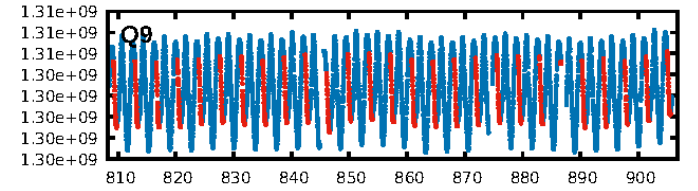
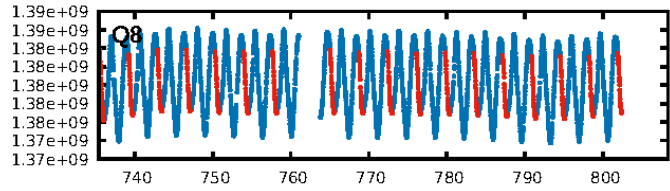
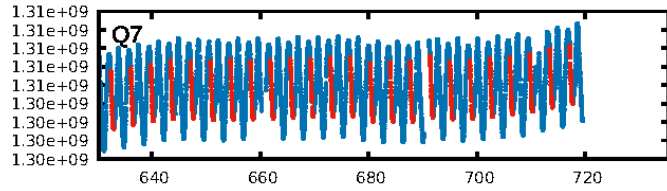
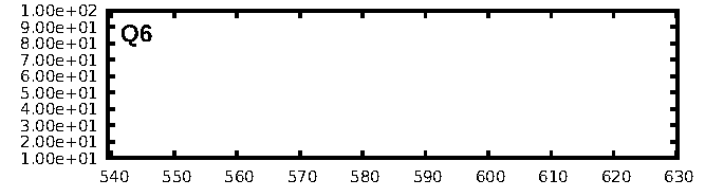
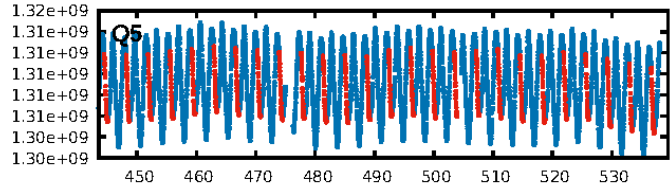
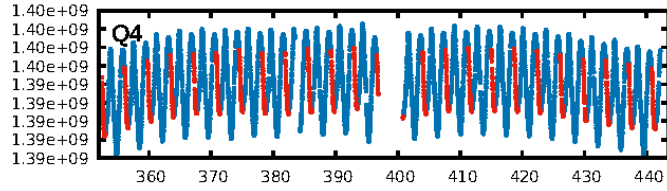
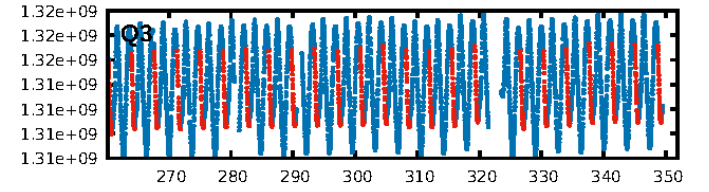
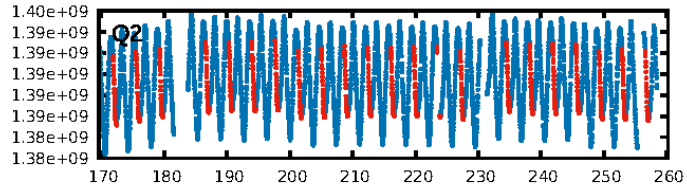
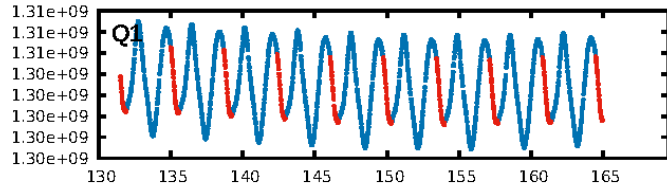
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.80σ]
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.96 [264/275]
GhostDiagnostic-chr: N/A
Centroid-sig: 31.3%
Centroid-so: 1.421 arcsec [0.82σ]
OotOffset-rm: 1.051 arcsec [1.21σ]
KicOffset-rm: 0.873 arcsec [1.08σ]
OotOffset-st: 1/4/4/5 [14]
KicOffset-st: 1/4/4/5 [14]
DiffImageQuality-fgm: 0.71 [10/14]
DiffImageOverlap-fno: 0.00 [0/14]

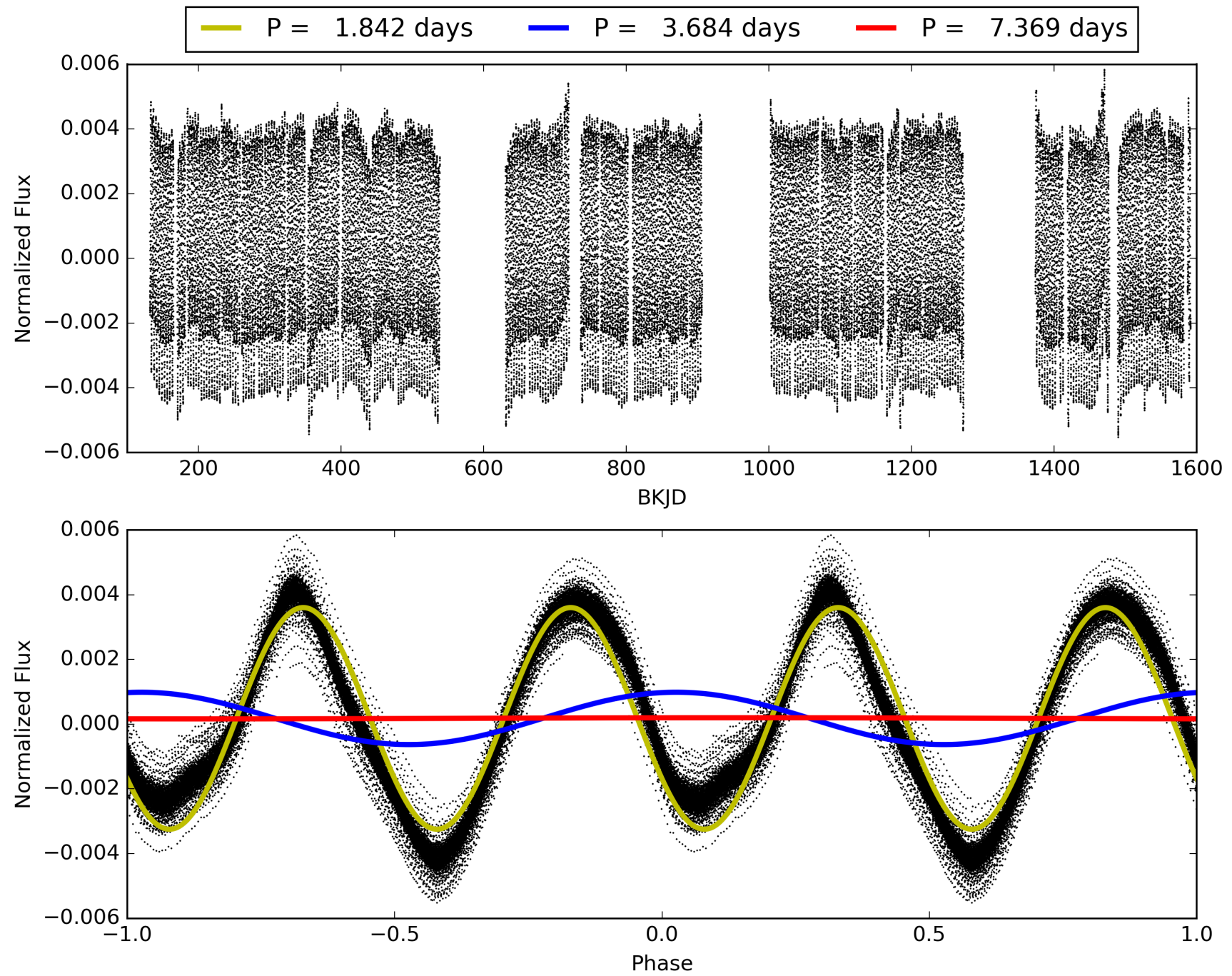
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 05:15:35 Z

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

TCE 004180396-03, PDC Light Curves

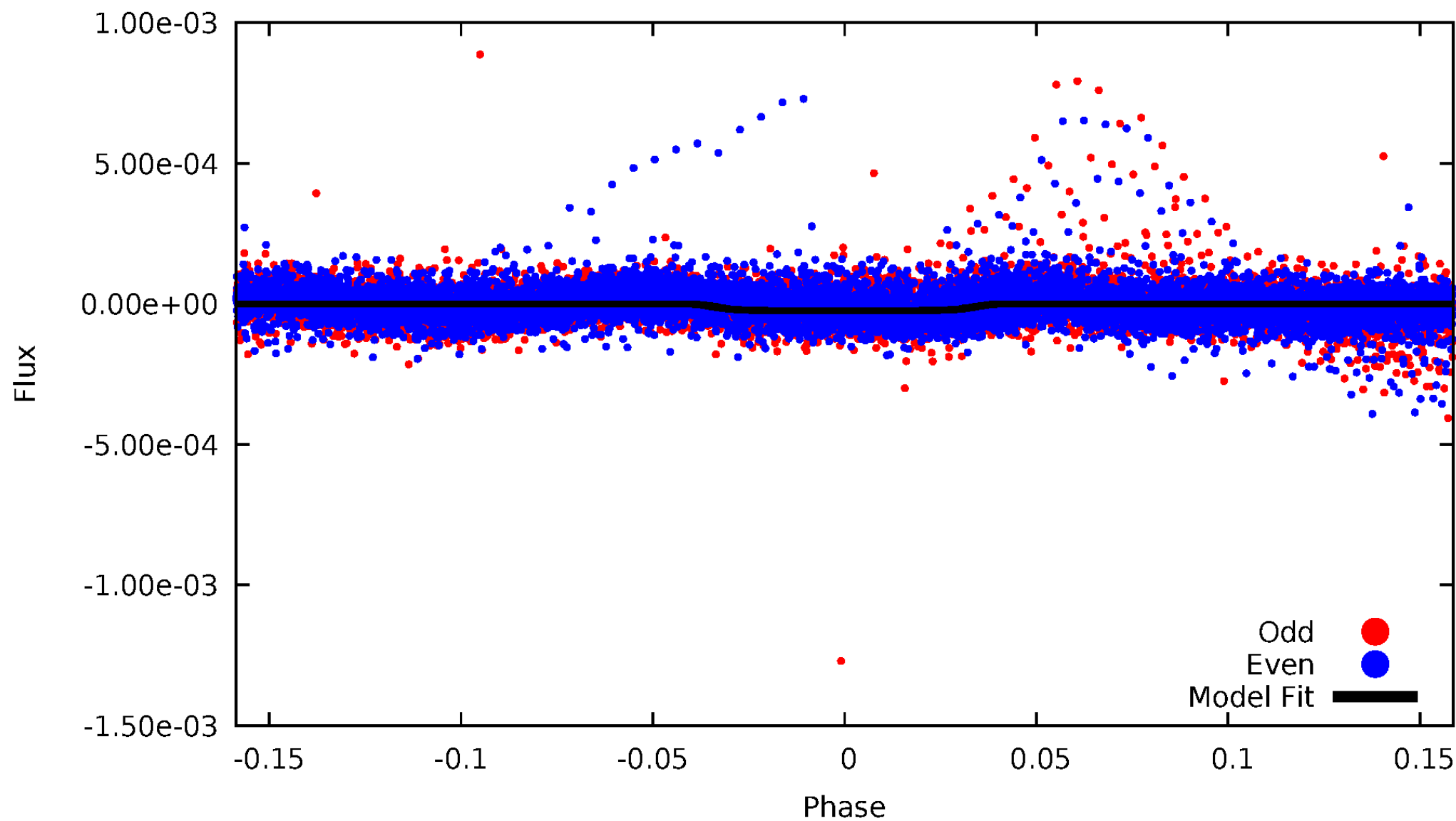


TCE 004180396-03



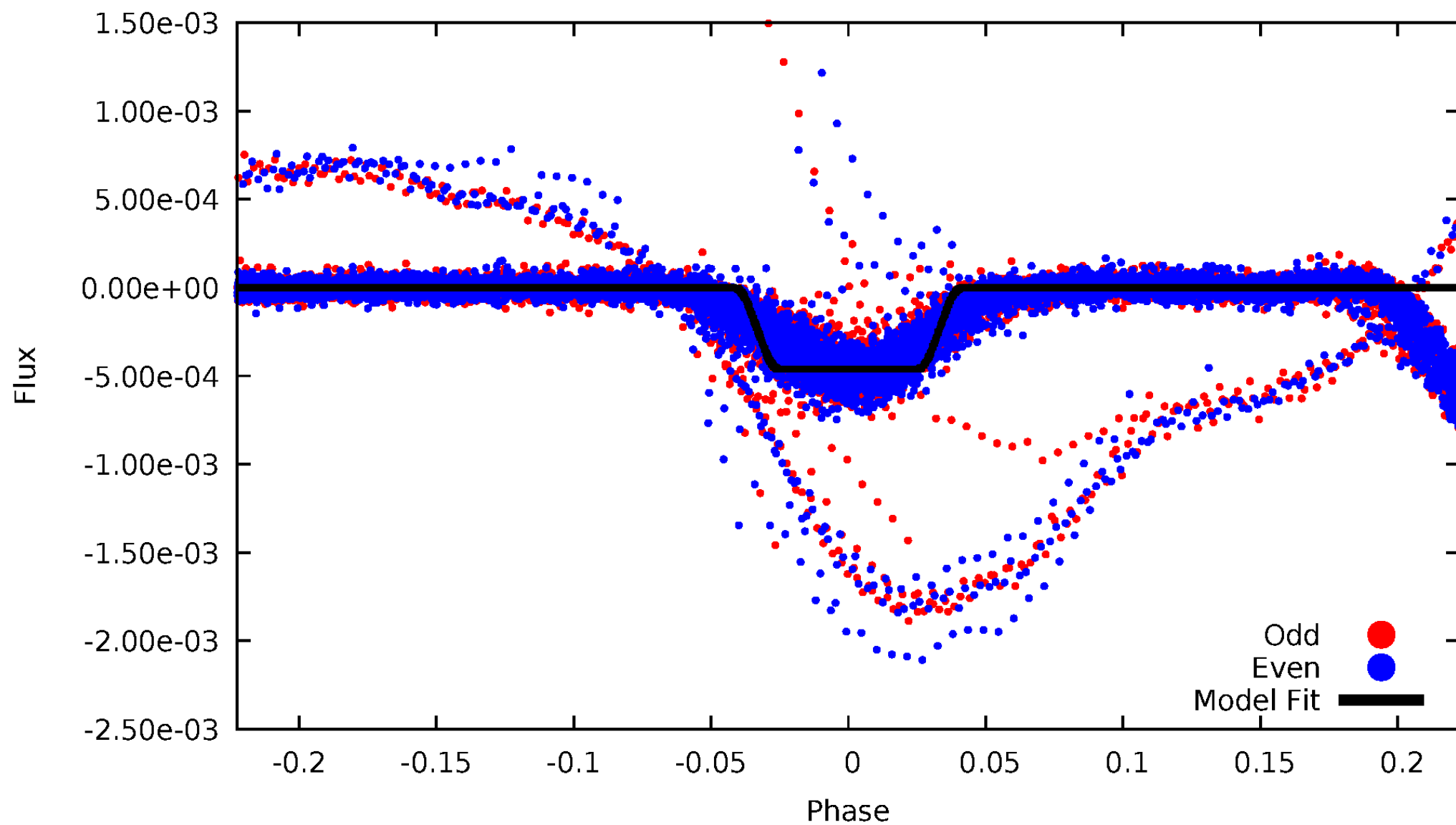
DV Odd/Even

TCE 004180396-03



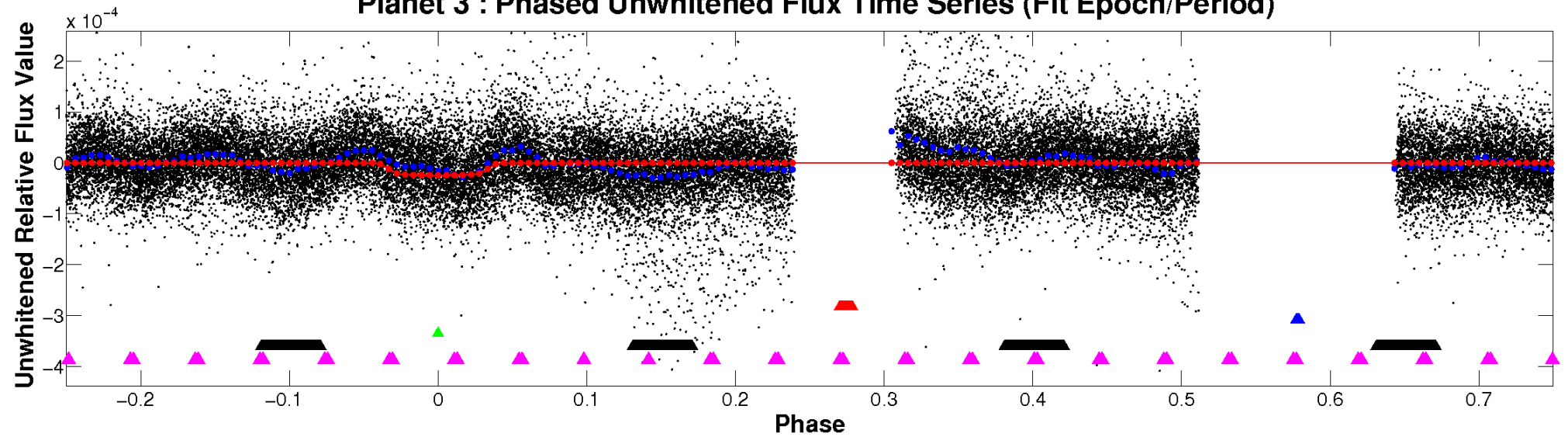
ALT Odd/Even

TCE 004180396-03

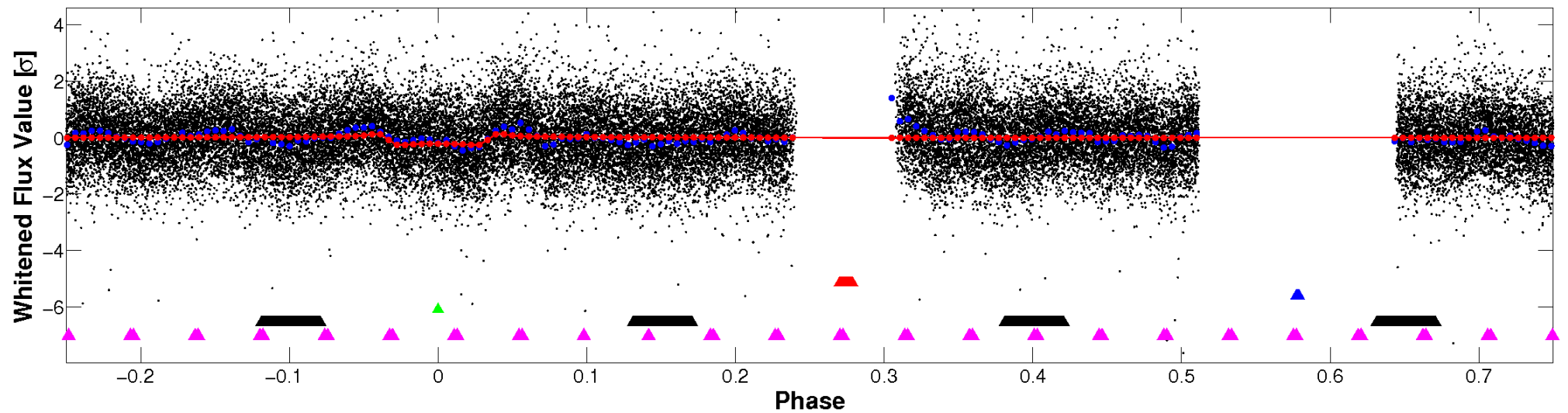


Non-Whitened Vs. Whitened Light Curve

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

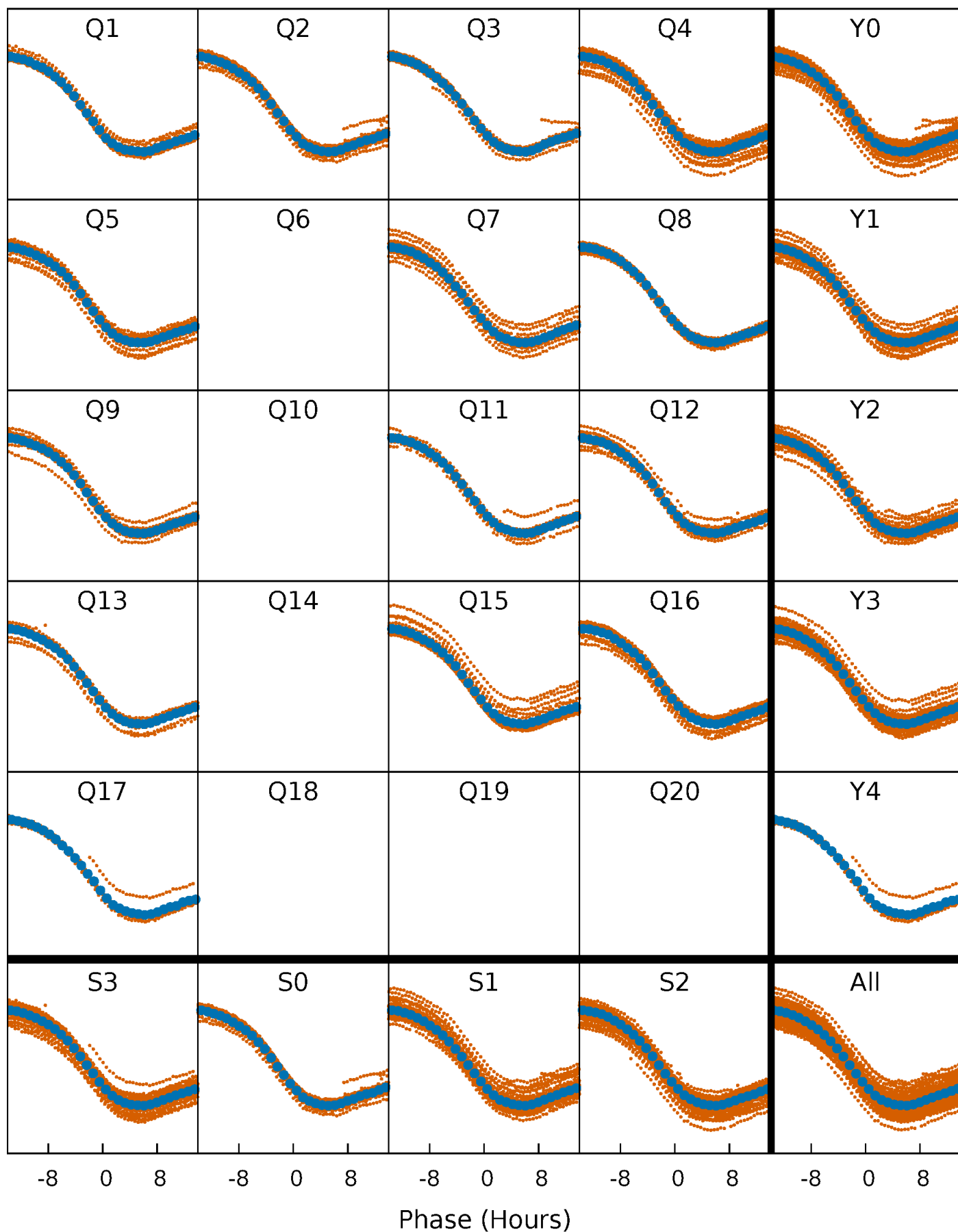


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



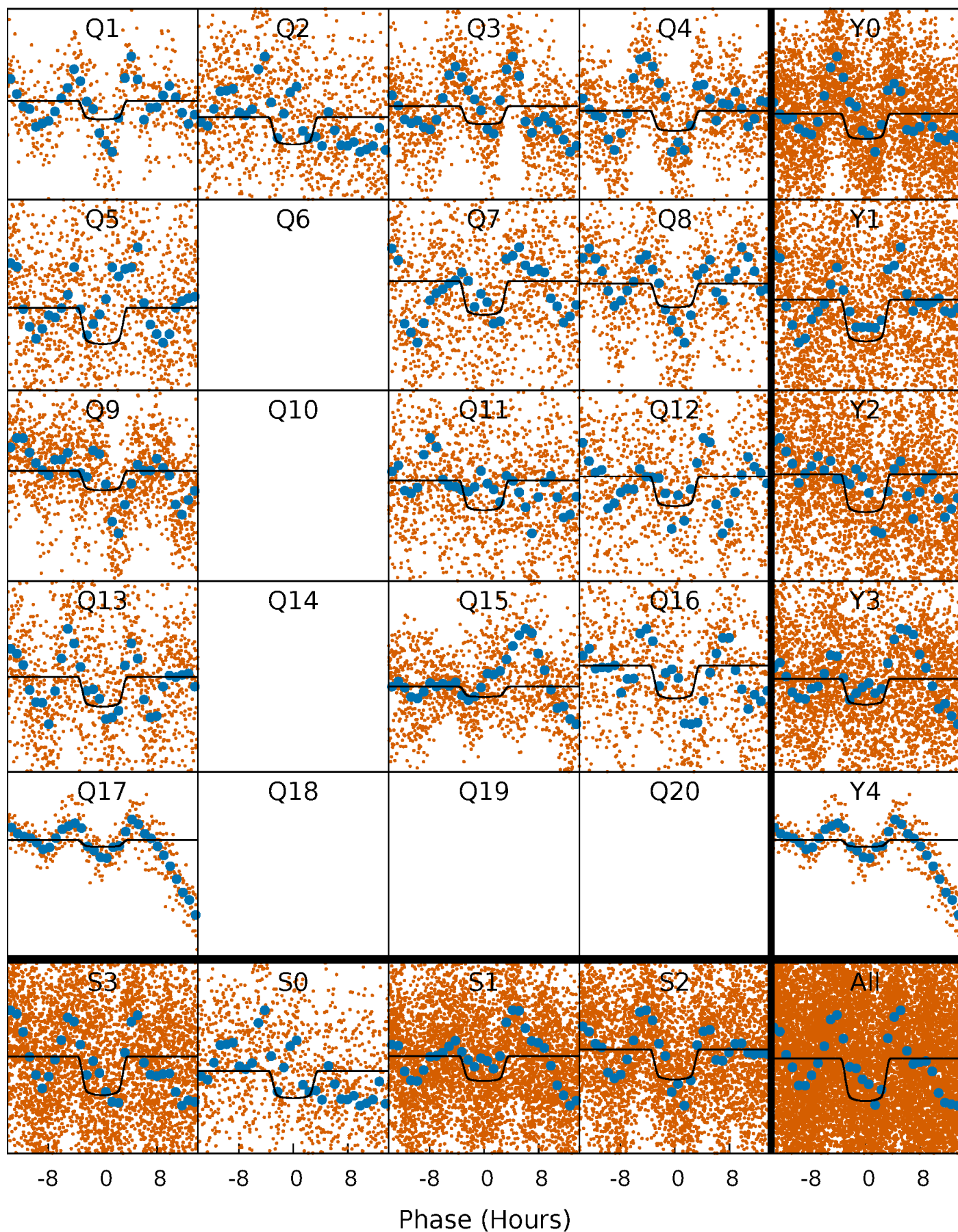
PDC Quarter-Phased Transit Curves

TCE 004180396-03 P= 3.684310 Days $T_0=131.608087$ (BKJD)



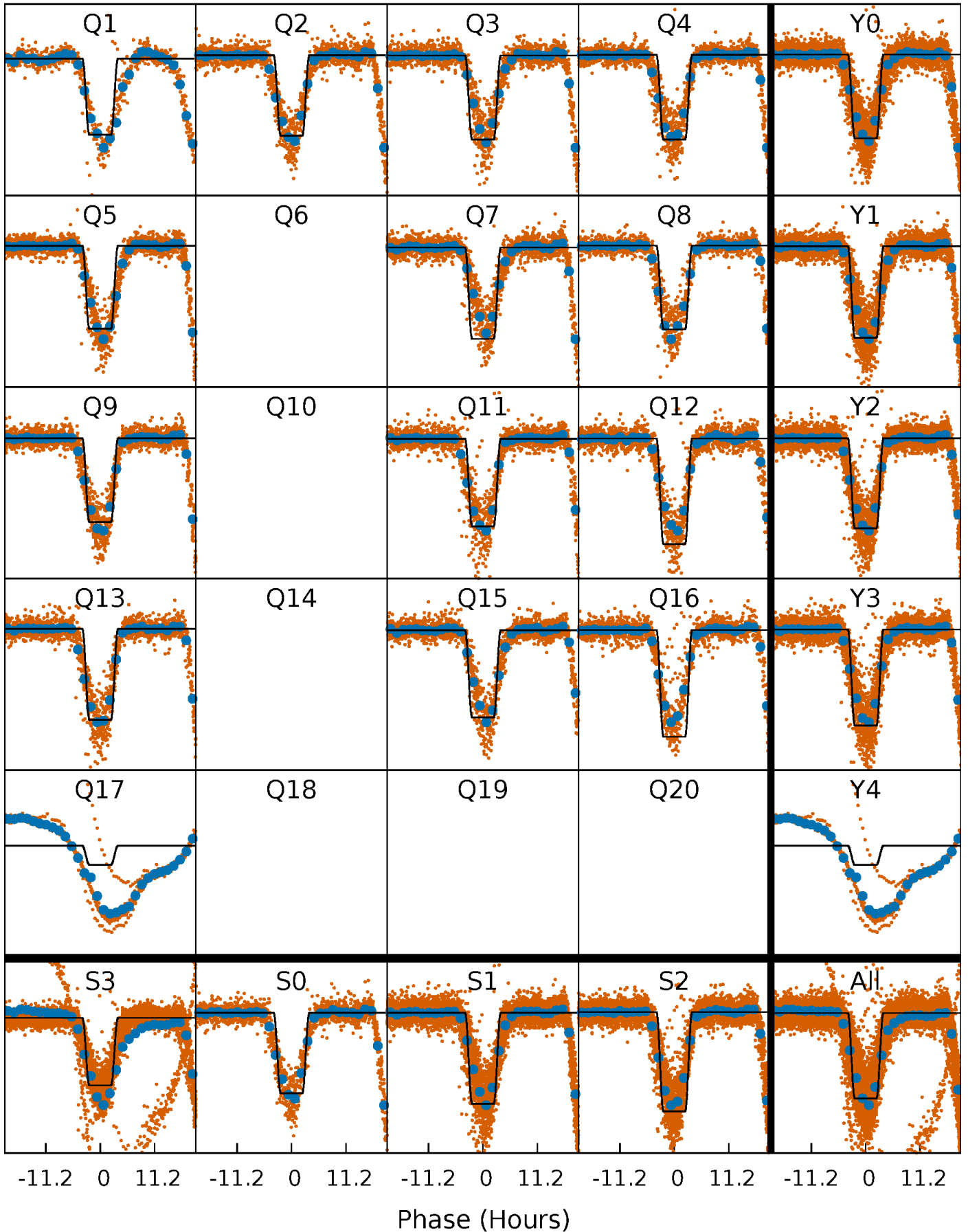
DV Quarter-Phased Transit Curves

TCE 004180396-03 P= 3.684310 Days $T_0=131.608087$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

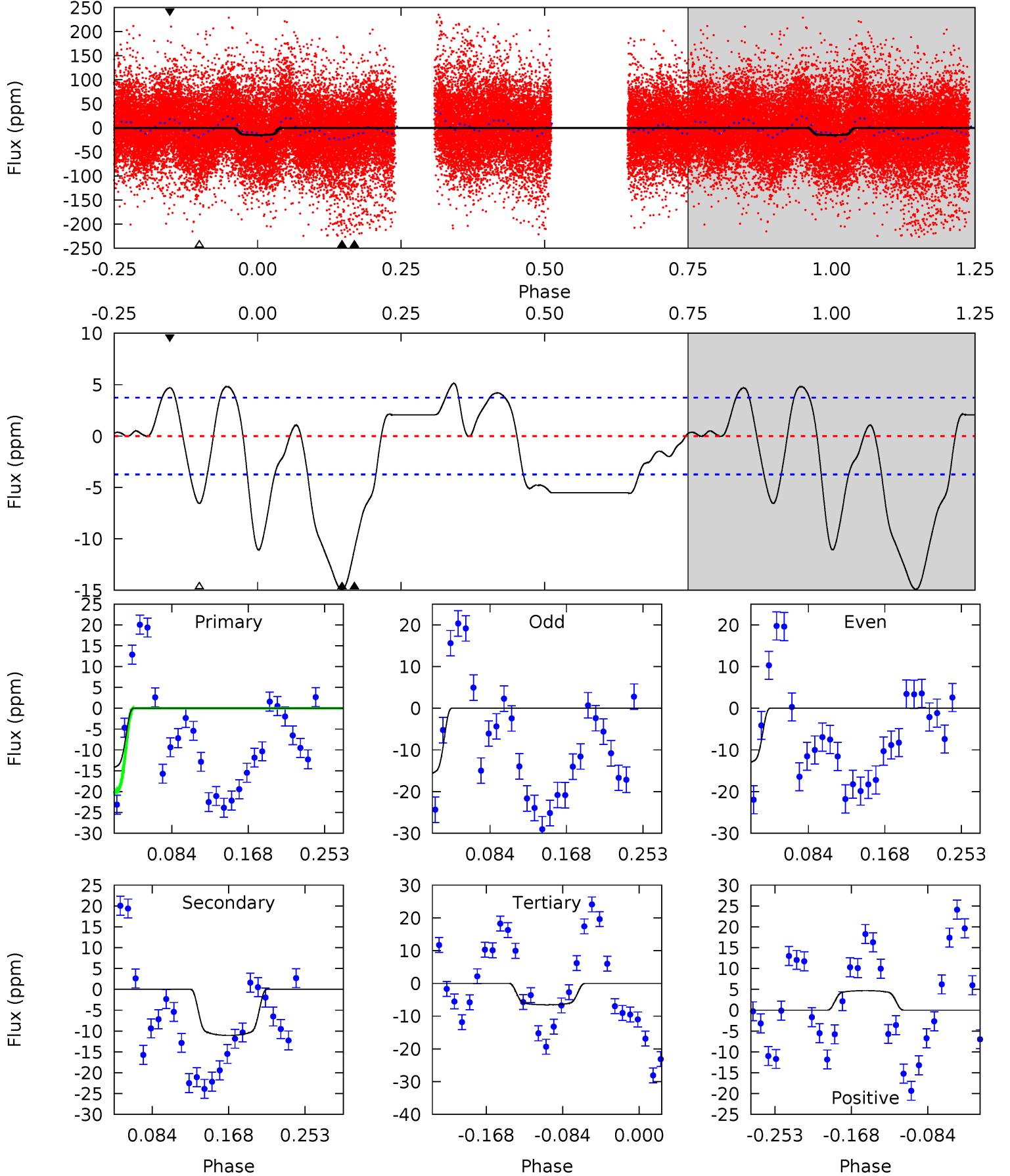
TCE 004180396-03 P= 3.684329 Days $T_0=131.629555$ (BKJD)



DV Model-Shift Uniqueness Test

004180396-03, P = 3.684310 Days, E = 127.923777 Days

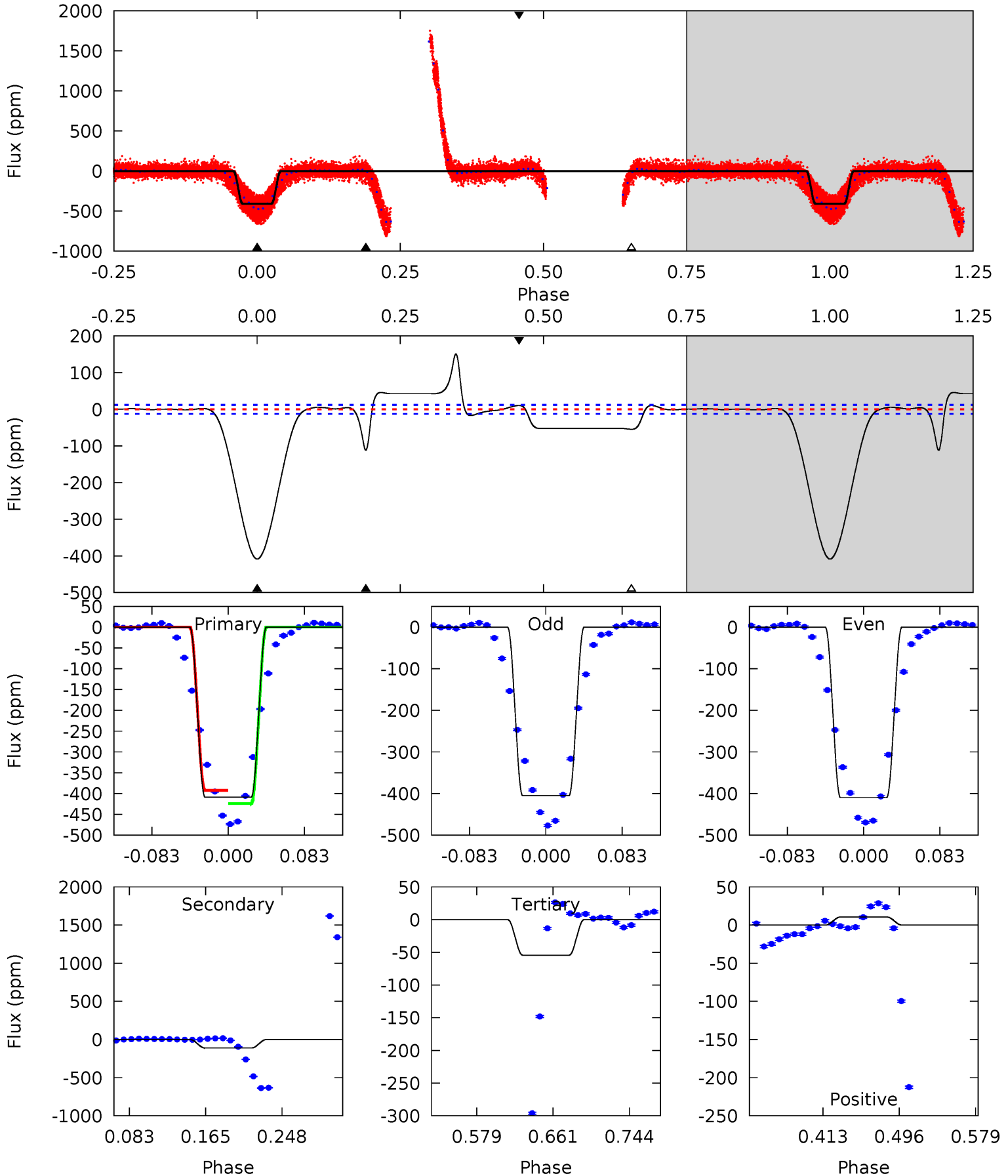
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 18.4 | 13.6 | 8.07 | 5.78 | 4.60 | 1.73 | 4.72 | 10.3 | 12.6 | 5.55 | 7.84 | 1.71 | 0.86 | 0.26 | 7.65 |



Alt Model-Shift Uniqueness Test

004180396-03, P = 3.684329 Days, E = 127.945226 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 152.6 | 41.7 | 20.4 | 3.94 | 4.60 | 1.74 | 11.9 | 132.2 | 148.6 | 21.3 | 37.7 | 0.81 | 1.07 | 0.27 | 5.11 |



Stellar Parameters For KIC 004180396

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 9609^{+272}_{-428} | $4.149^{+0.152}_{-0.228}$ | $0.070^{+0.150}_{-0.600}$ | $2.108^{+0.847}_{-0.565}$ | $2.284^{+0.396}_{-0.594}$ | $0.343^{+0.290}_{-0.209}$ |
| | +3%/-4% | +4%/-5% | +214%/-857% | +40%/-27% | +17%/-26% | +84%/-61% |
| 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 004180396-03 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -11 ± 1 | $1.35^{+0.25}_{-0.21}$ | 3483^{+332}_{-264} | 6758^{+274}_{-299} | 13^{+4}_{-4} |
| Alt. | -112 ± 3 | $4.96^{+0.96}_{-0.70}$ | 3483^{+329}_{-240} | 6208^{+147}_{-178} | $9.213^{+2.492}_{-2.535}$ |

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

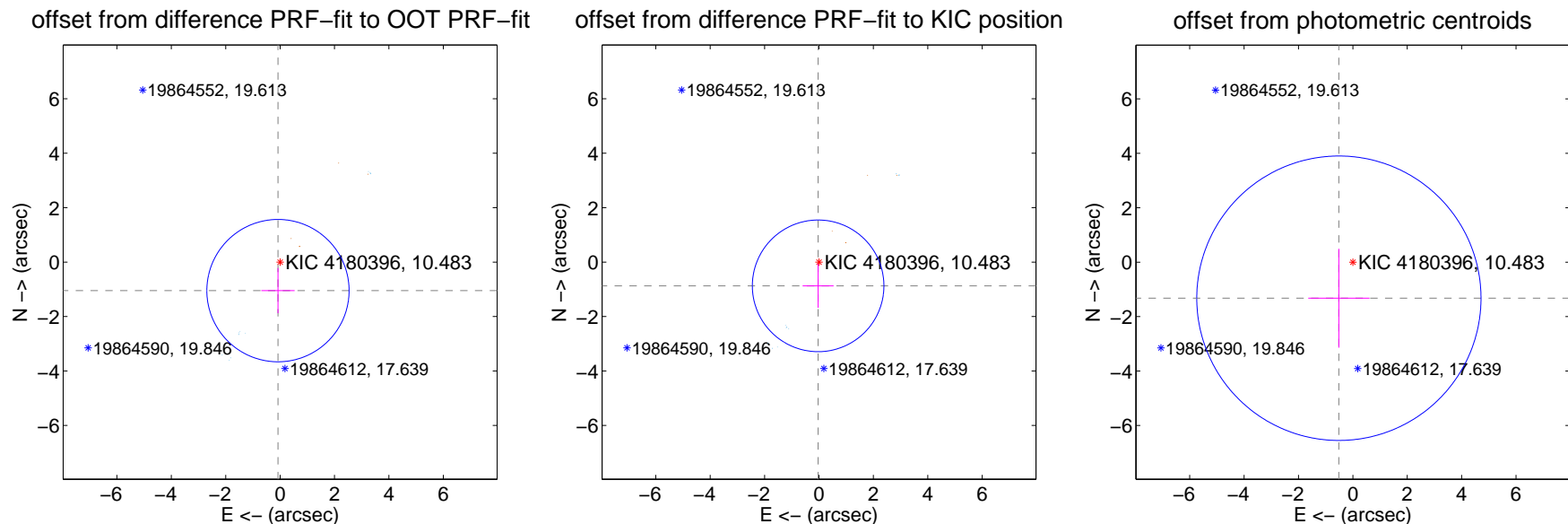
DV Centroid Data

Supplemental centroid analysis for 004180396-03. **Kepler magnitude: 10.48.** Transit SNR 14.25

There are 10 quarters with good PRF difference image offsets

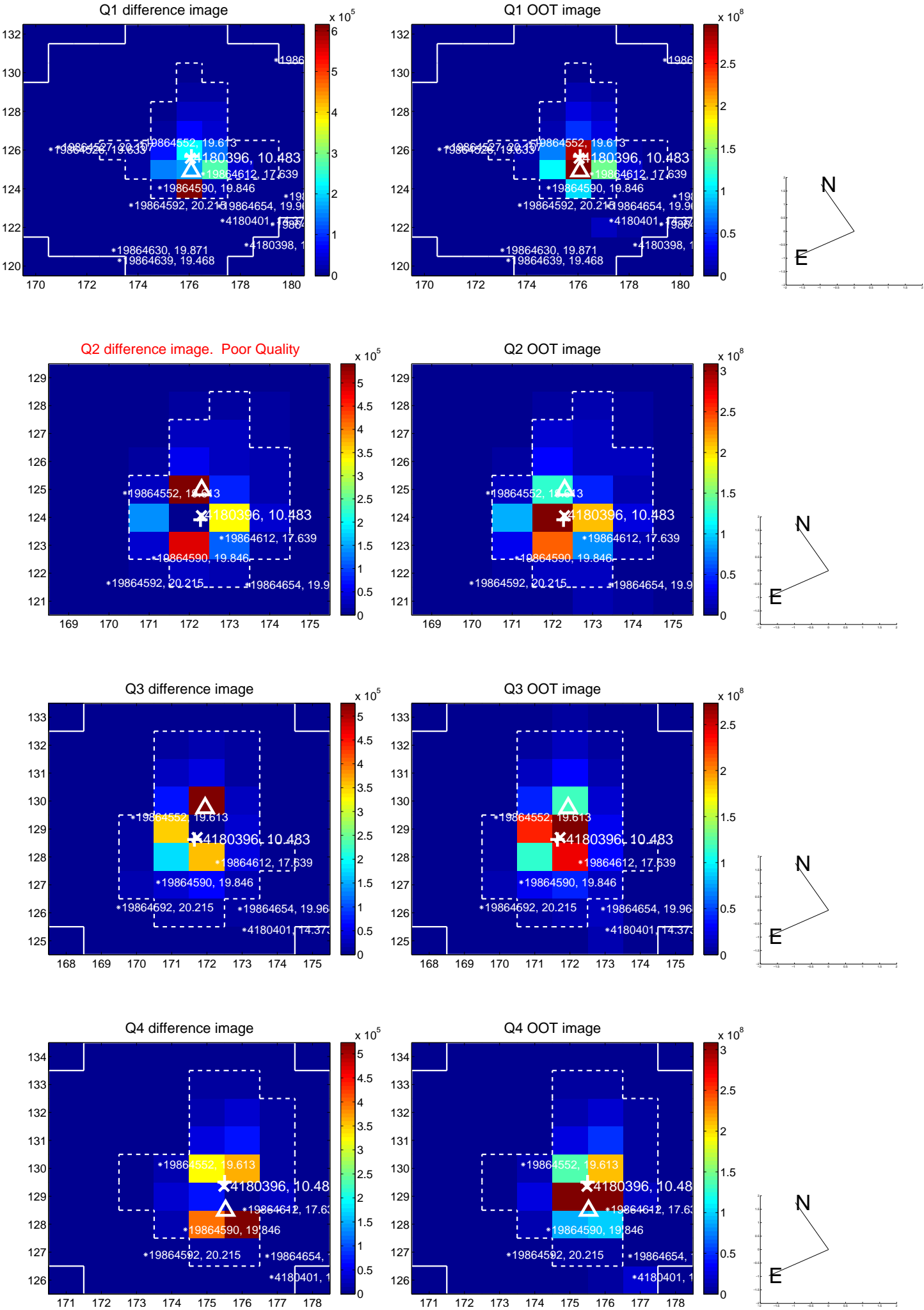
The direct PRF centroid is offset from the target star catalog position by about 0.31 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 1.051 ± 0.871 | 1.21 | 0.079 ± 0.611 | -1.048 ± 0.829 |
| PRF-fit source offset from KIC position | 0.873 ± 0.806 | 1.08 | 0.032 ± 0.570 | -0.873 ± 0.806 |
| photometric centroid source offset | 1.42 ± 1.74 | 0.82 | 0.51 ± 1.13 | -1.32 ± 1.82 |

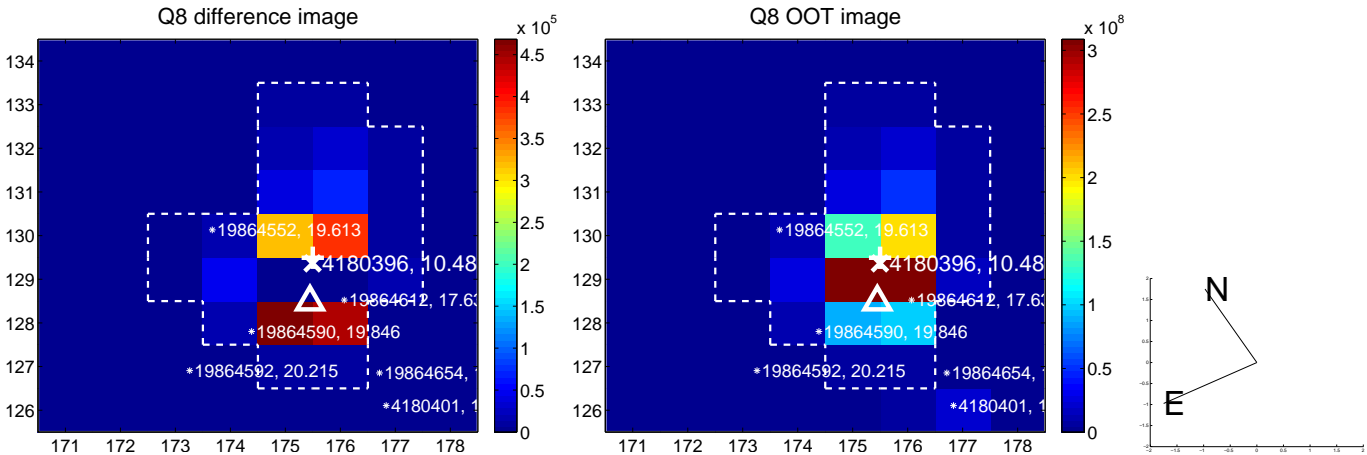
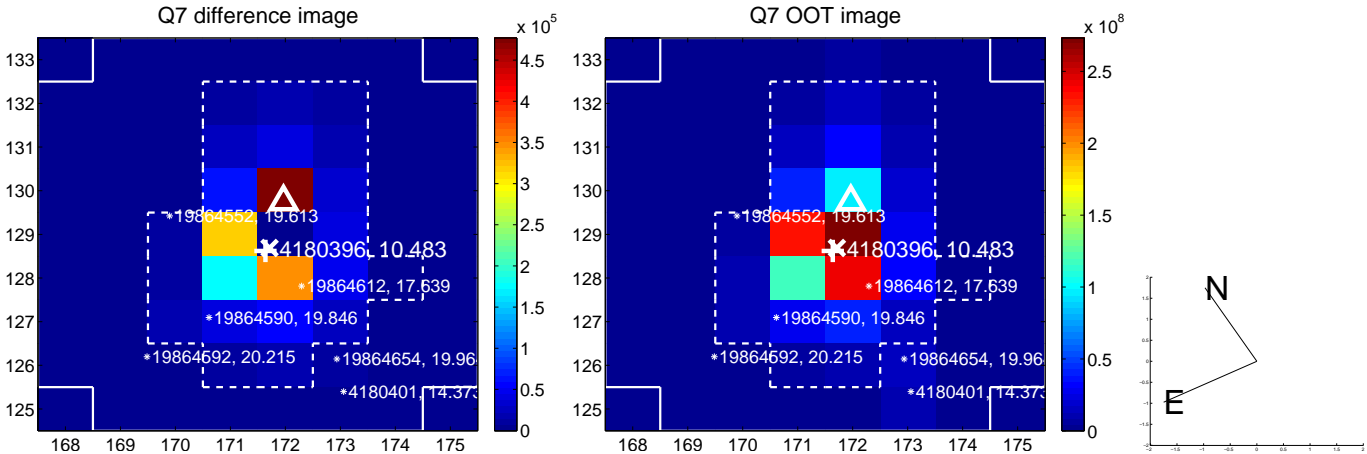
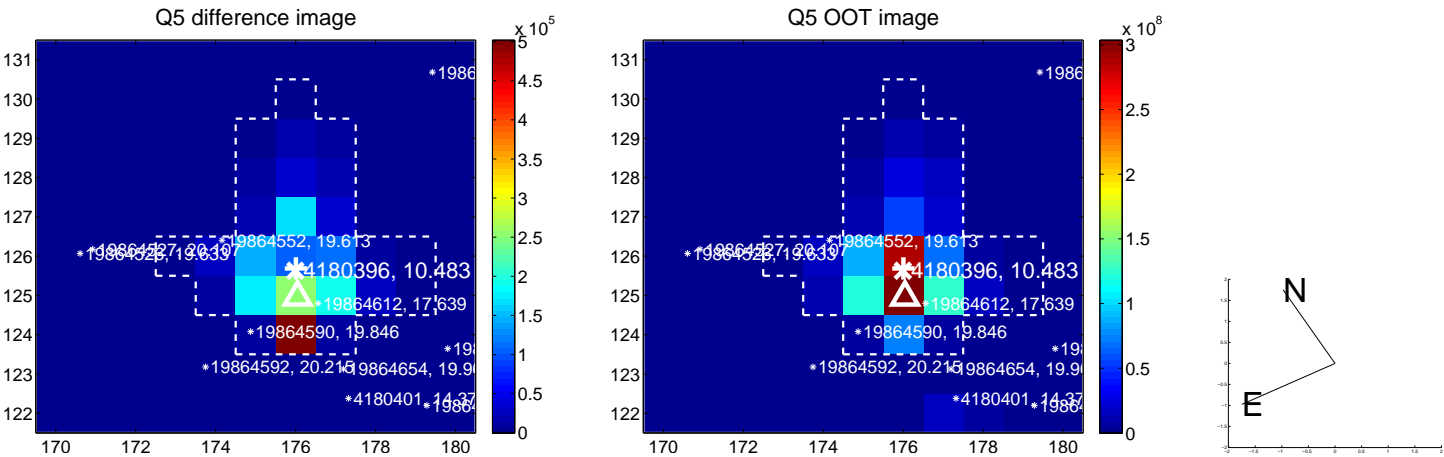


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

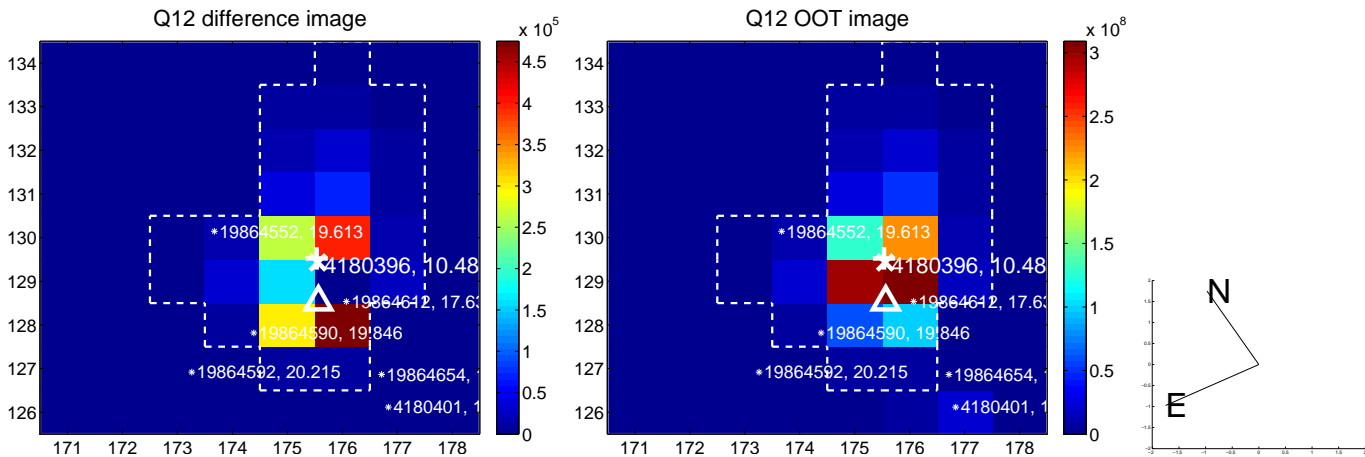
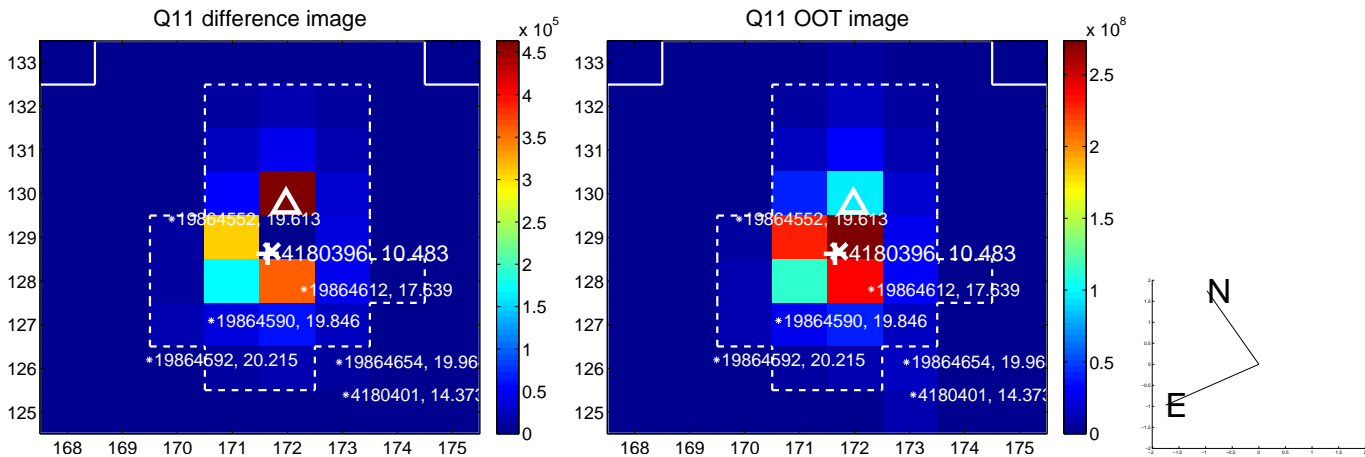
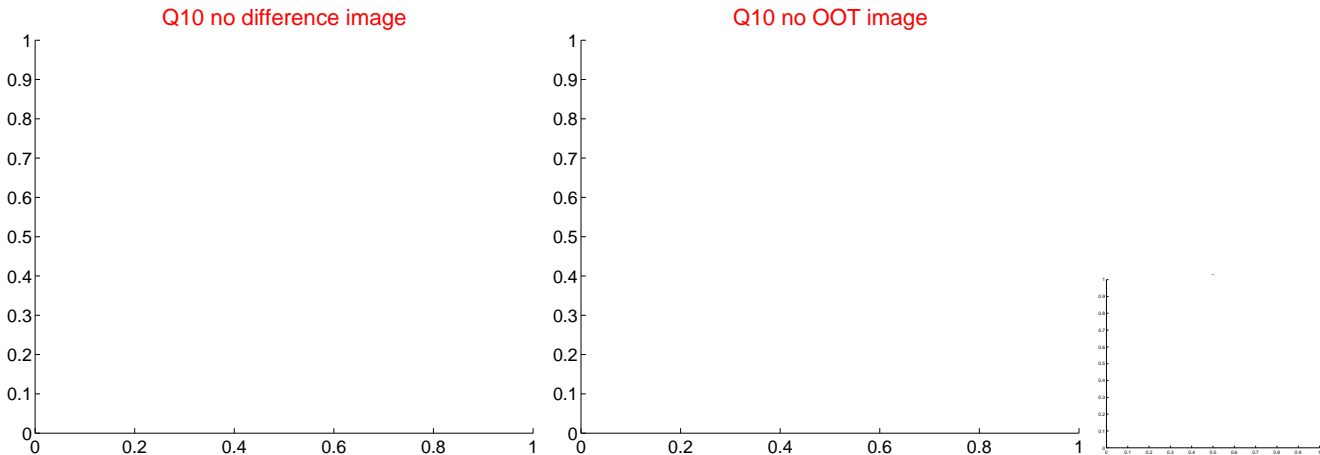
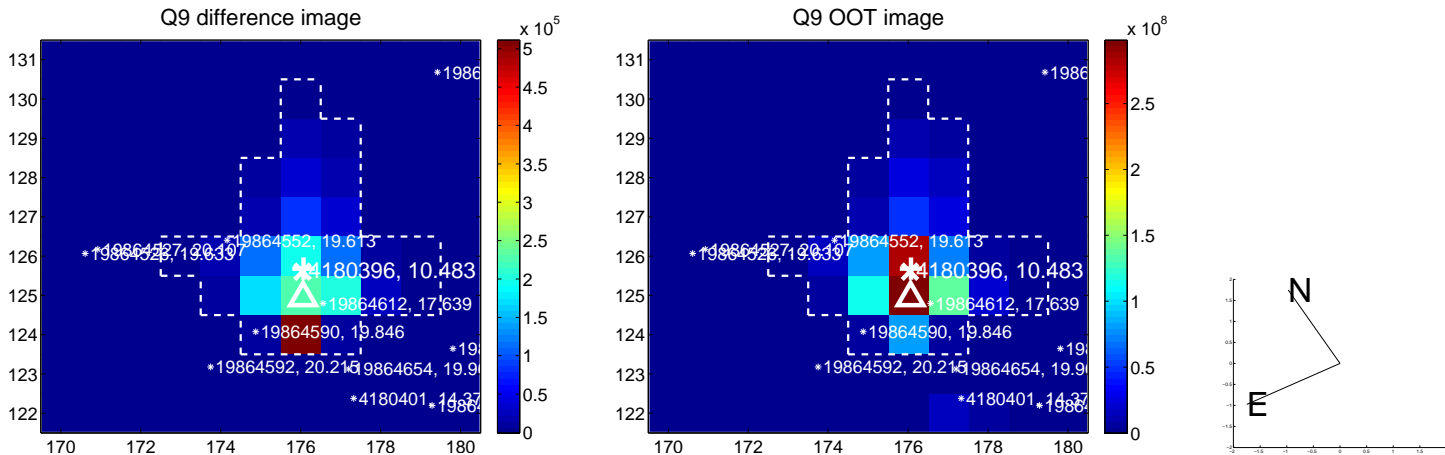
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



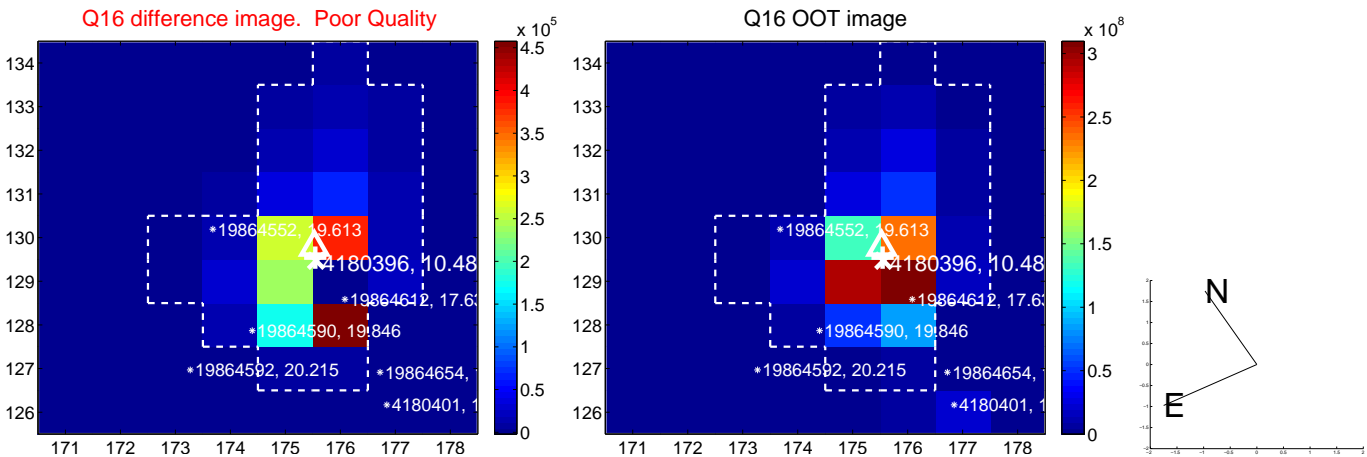
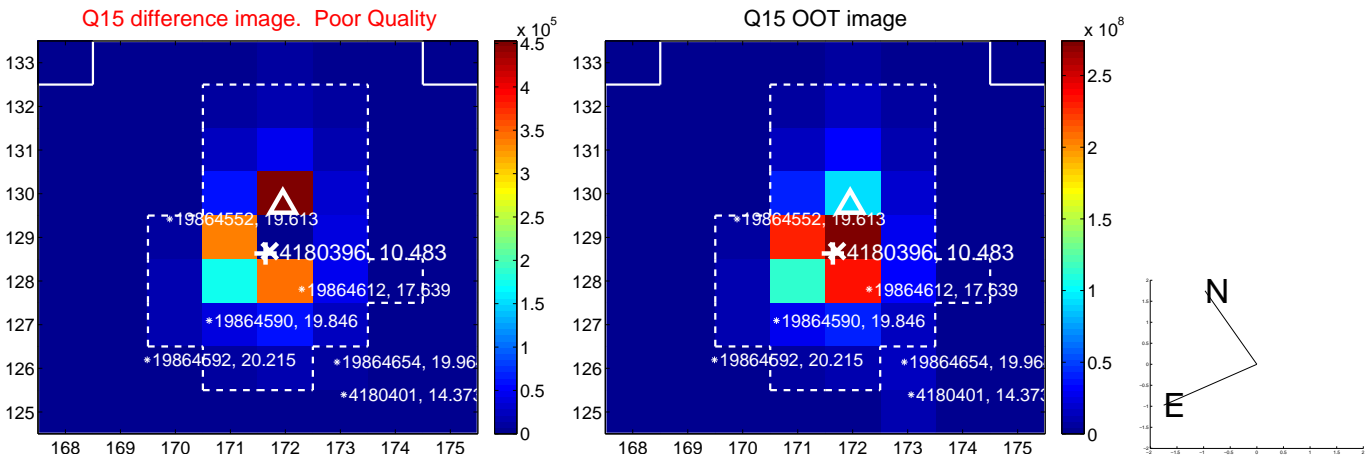
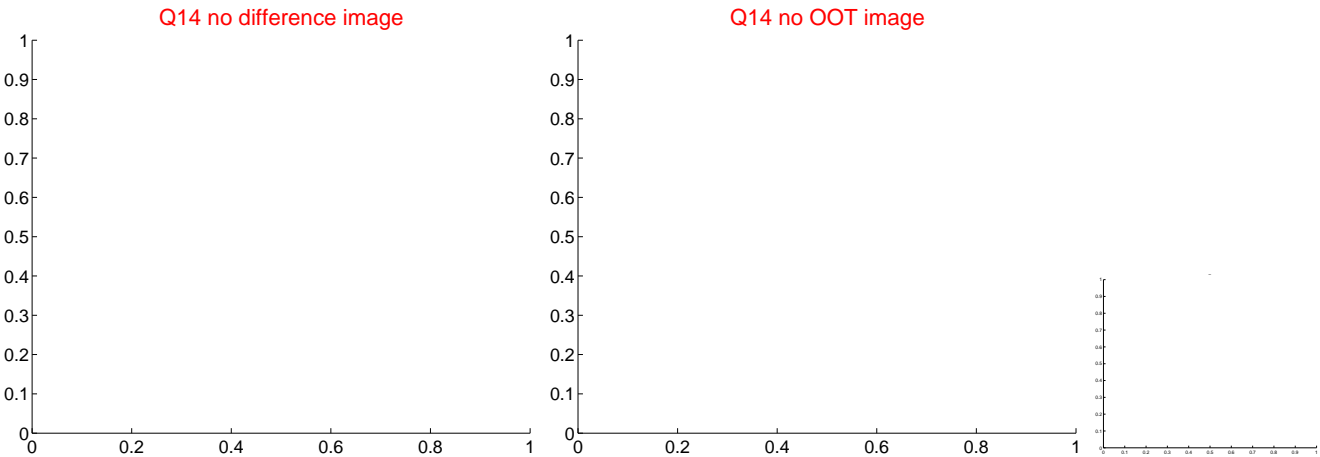
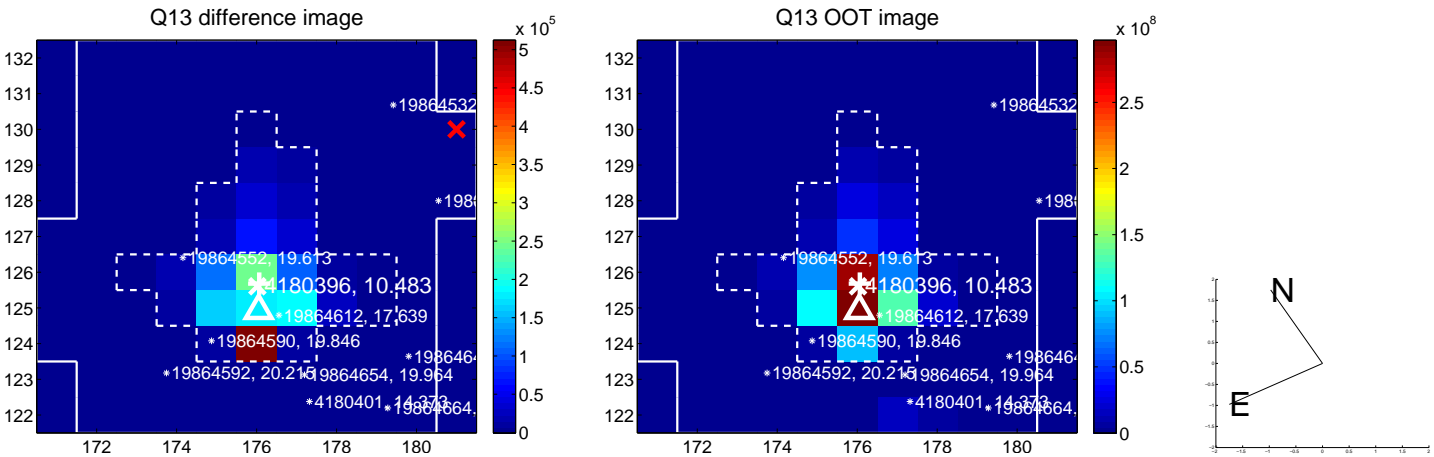
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



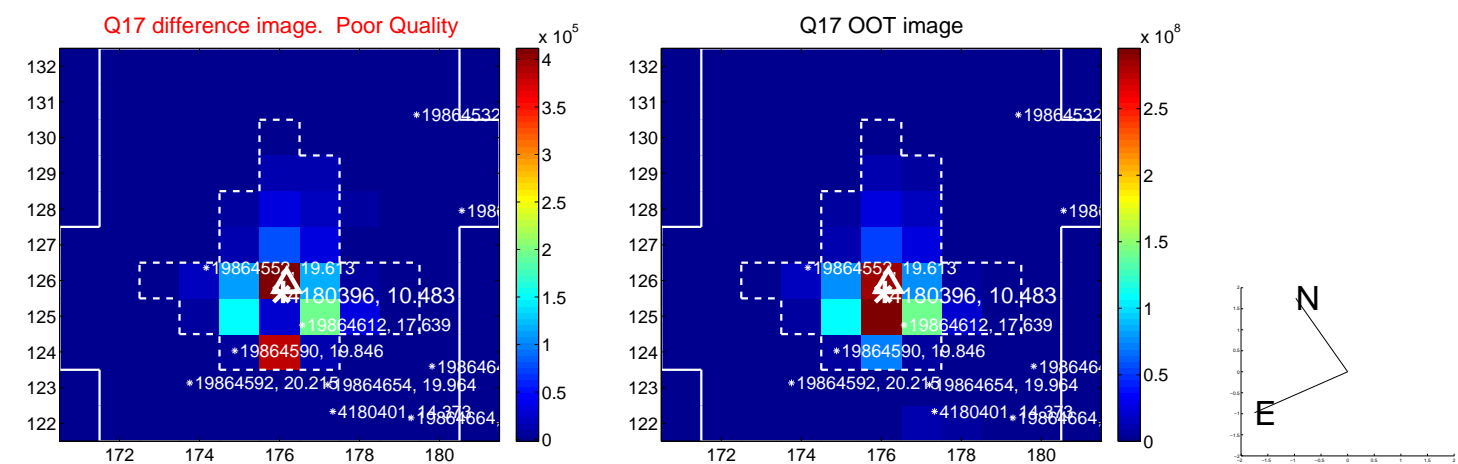
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



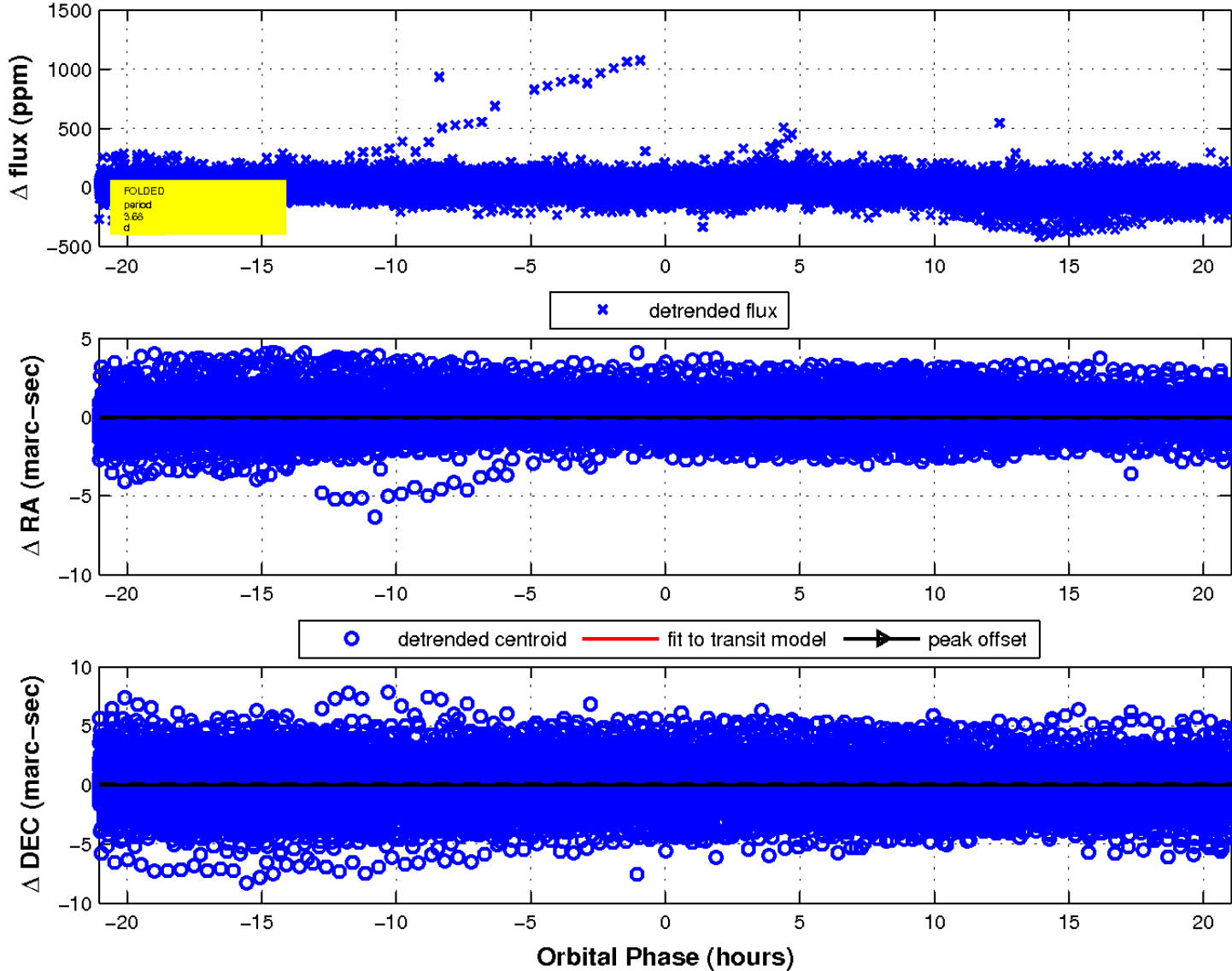
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

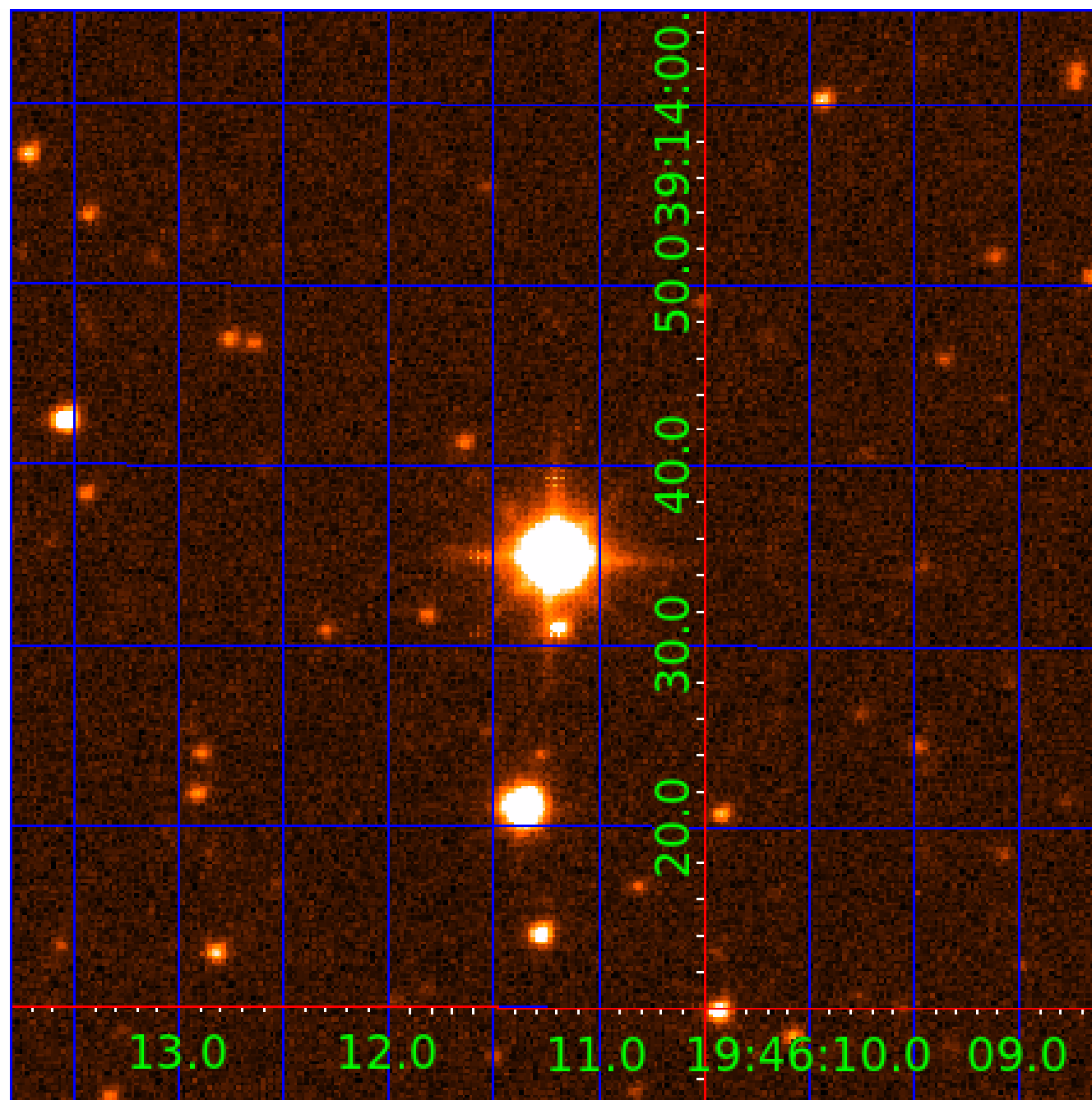


fluxWeightedCentroids, Planet 3 of 5



UKIRT Image

Declination



KIC 004180396

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004180396-01 | OBS | 6394.01 | 3.684391 | 132.602997 | 58.4 | 2.012 | 28.6 | 29.7 | 2.11 | 9609 | 1.86 | 8974.98 |
| 004180396-02 | OBS | No | 3.684330 | 133.734179 | 39.0 | 3.782 | 16.0 | 17.9 | 2.11 | 9609 | 2.54 | 8975.17 |
| 004180396-03 | OBS | No | 3.684310 | 131.608087 | 24.4 | 7.014 | 12.8 | 14.3 | 2.11 | 9609 | 1.32 | 8975.24 |
| 004180396-04 | OBS | No | 0.921171 | 132.090616 | 10.5 | 4.801 | 11.4 | 11.0 | 2.11 | 9609 | 0.78 | 56981.53 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 004180396-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—CENT_SATURATED |
| 004180396-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—SAME_NTL_PERIOD—CENT_SATURATED |
| 004180396-03 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—SAME_NTL_PERIOD—CENT_SATURATED |
| 004180396-04 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | TRANS_GAPPED—SWEET_NTL—LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED |

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 004180396-04

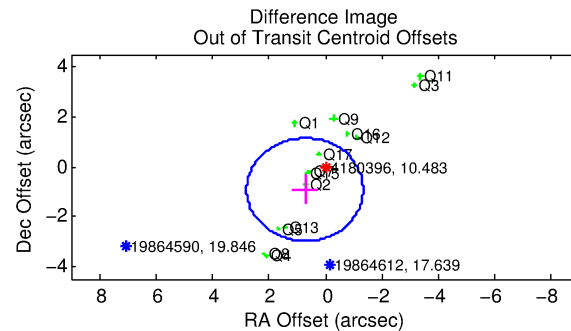
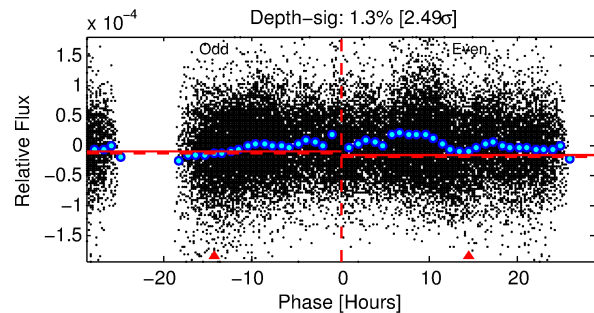
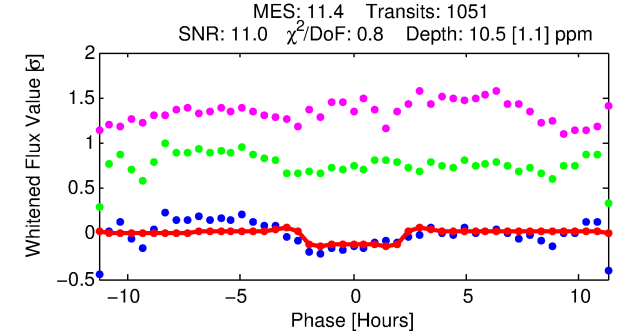
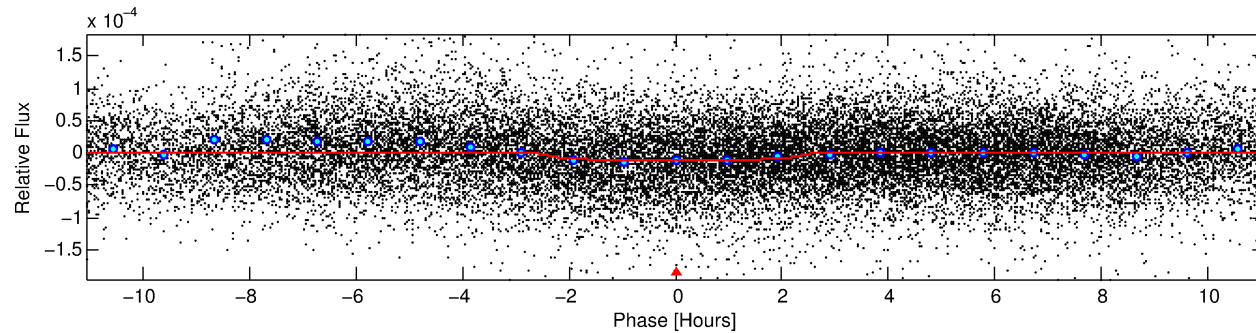
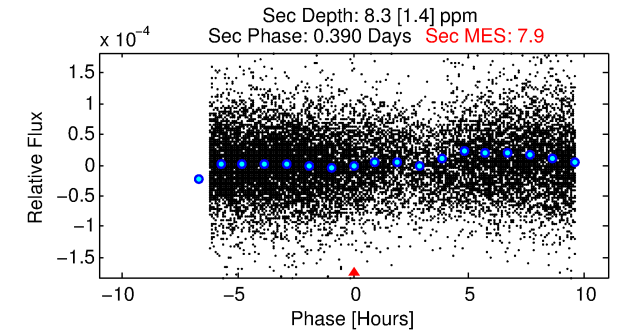
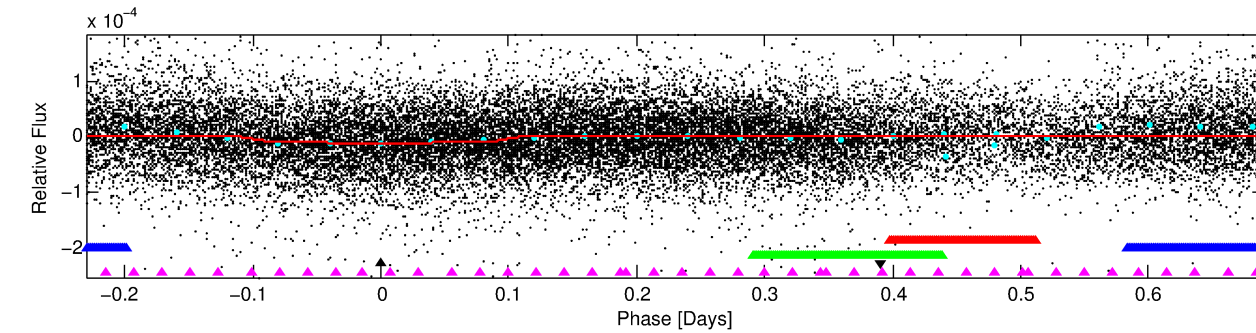
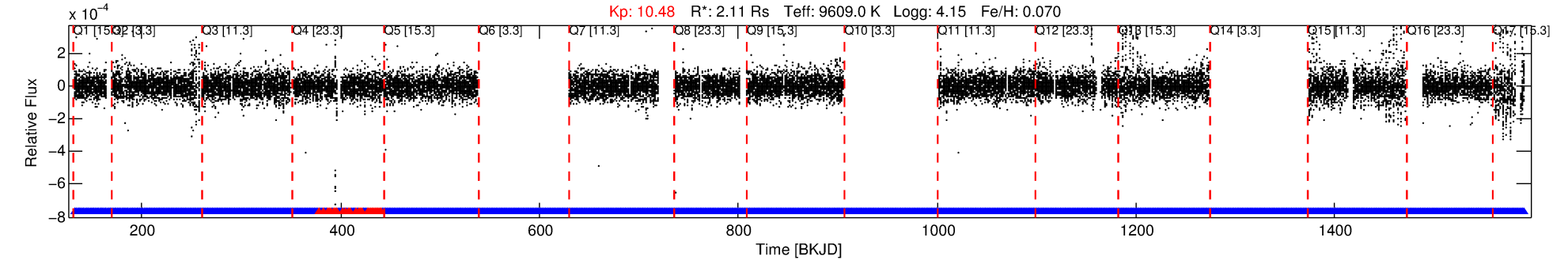
No Significant Match Found

DV One-Page Summary

KIC: 4180396 Candidate: 4 of 5 Period: 0.921 d

KOI: K06394 Corr: No Ephemeris Match

Kp: 10.48 R*: 2.11 Rs Teff: 9609.0 K Logg: 4.15 Fe/H: 0.070



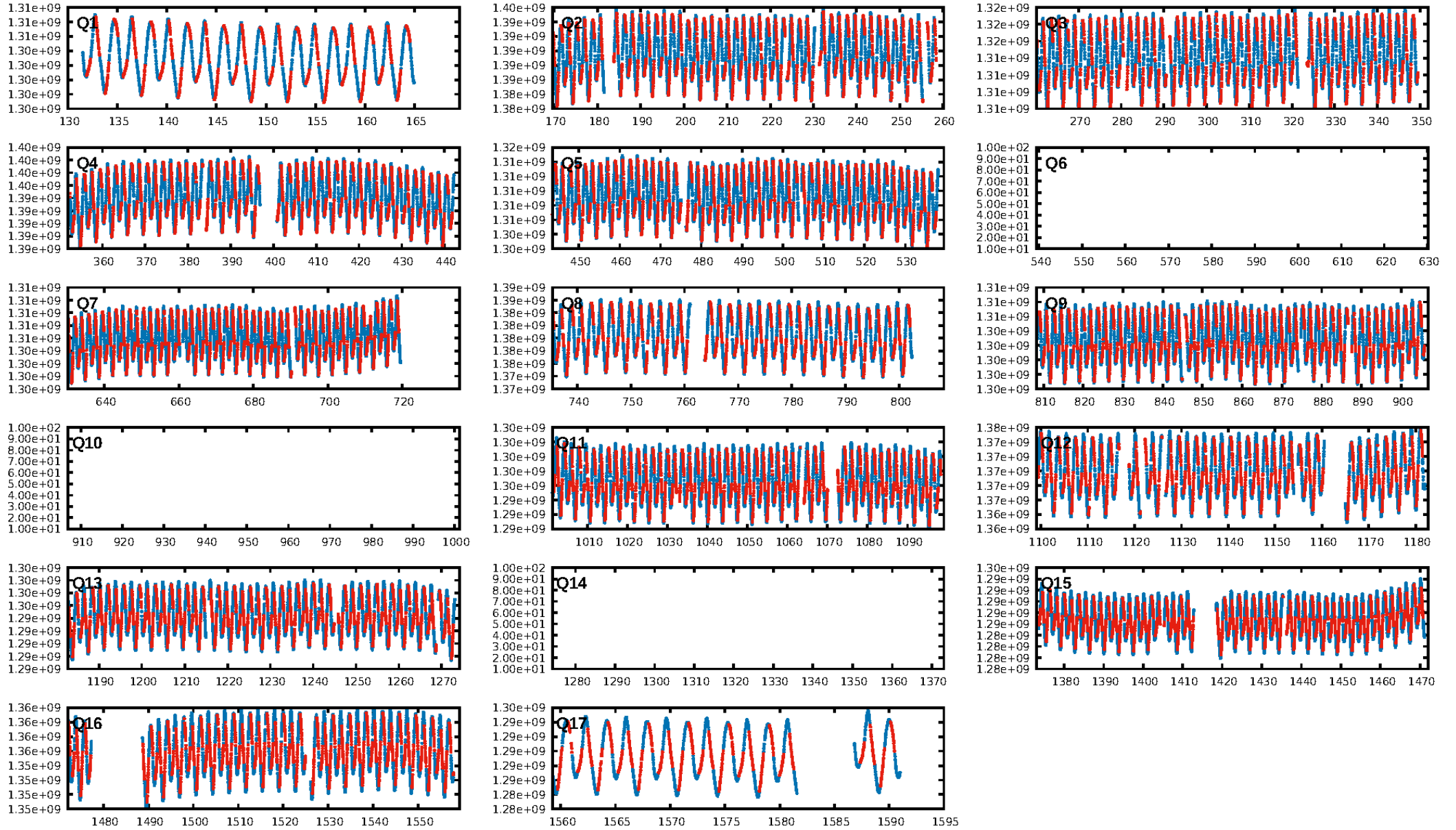
DV Fit Results:

Period = 0.92117 [0.00001] d
Epoch = 132.0906 [0.0029] BKJD
Rp/R* = 0.0034 [0.0005]
a/R* = 1.15 [0.33]
b = 0.89 [0.27]
Seff = 56981.53 [27088.22]
Teq = 3940 [468] K
Rp = 0.78 [0.34] Re
a = 0.0244 [0.0078] AU
Ag = 4.49 [2.55] [1.37σ]
Teffp = 8866 [884] K [4.92σ]

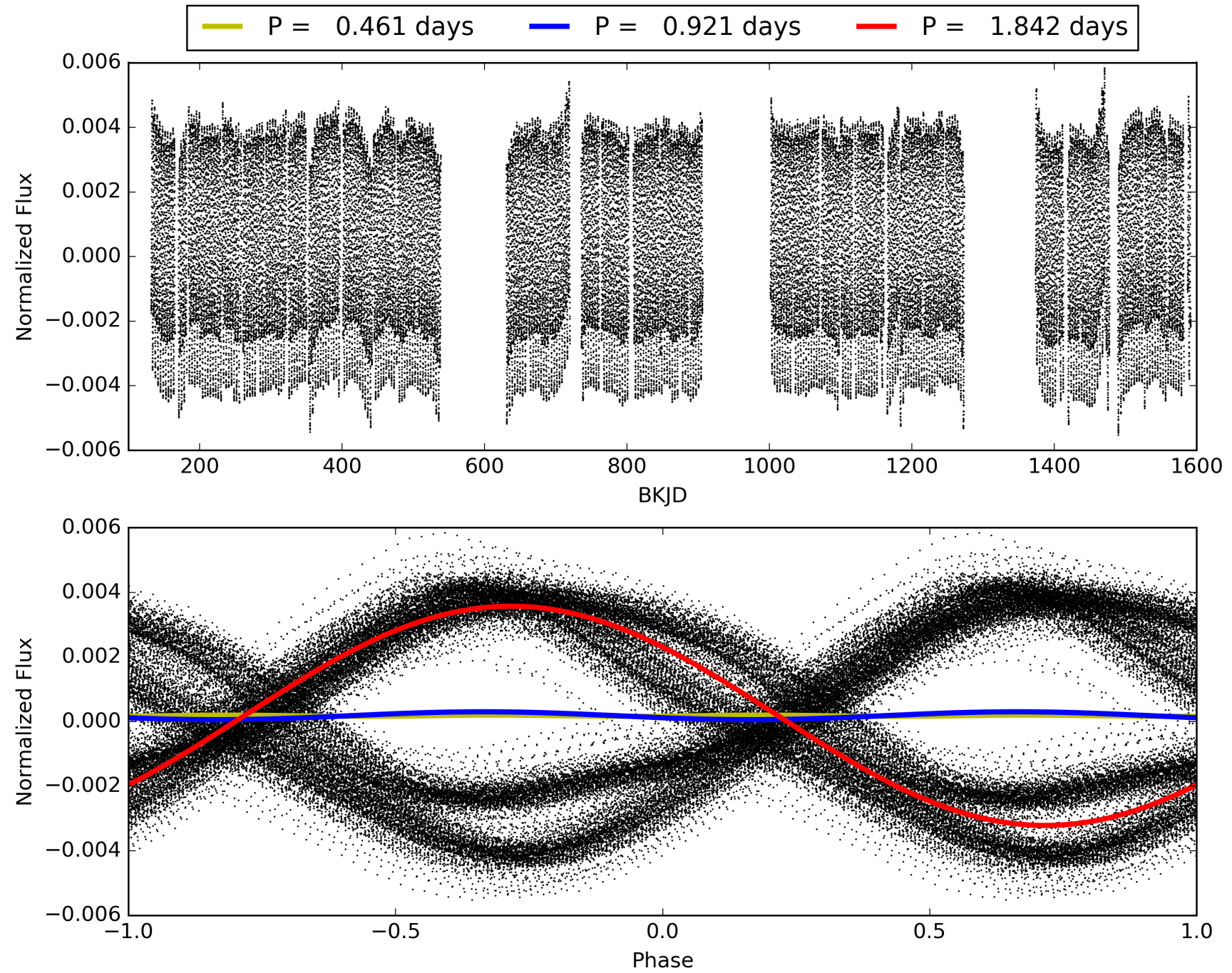
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [7.80σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.96 [959/994]
GhostDiagnostic-chr: N/A
Centroid-sig: 93.8%
Centroid-so: 0.447 arcsec [0.29σ]
OotOffset-rm: 1.172 arcsec [1.71σ]
KicOffset-rm: 1.112 arcsec [1.73σ]
OotOffset-st: 1/4/4/5 [14]
KicOffset-st: 1/4/4/5 [14]
DiffImageQuality-fgm: 0.86 [12/14]
DiffImageOverlap-fno: 0.50 [7/14]

TCE 004180396-04, PDC Light Curves

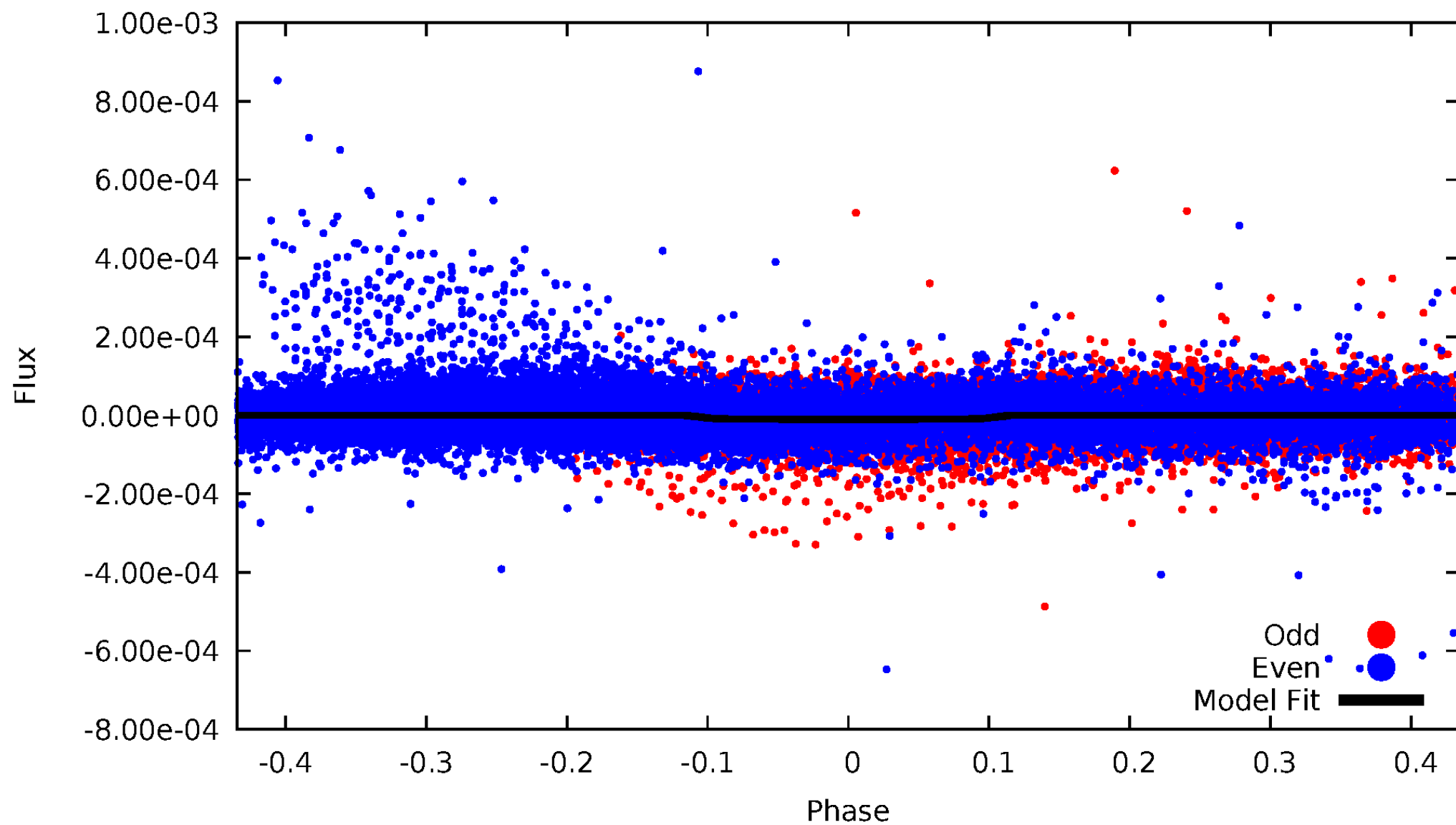


TCE 004180396-04



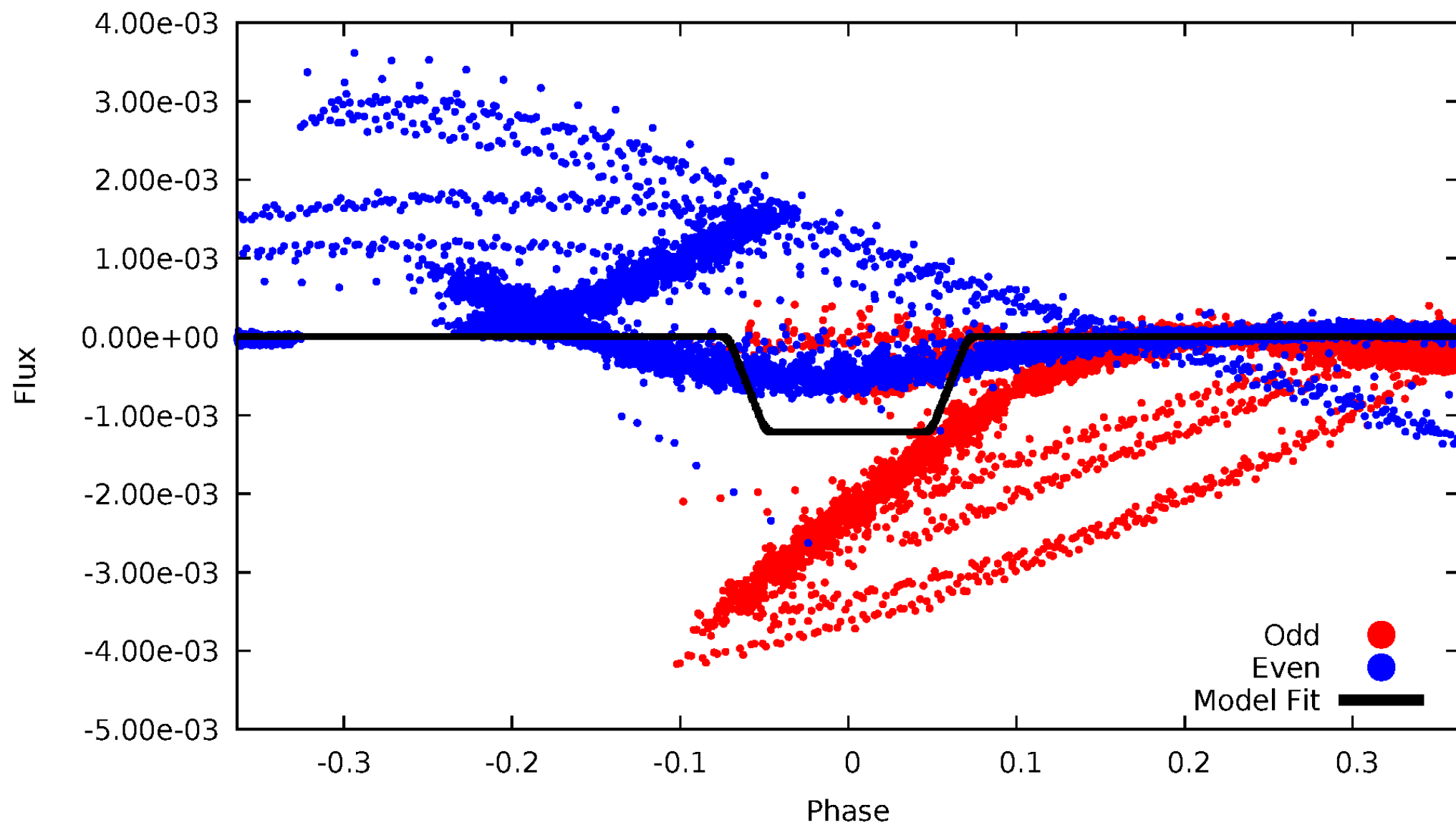
DV Odd/Even

TCE 004180396-04



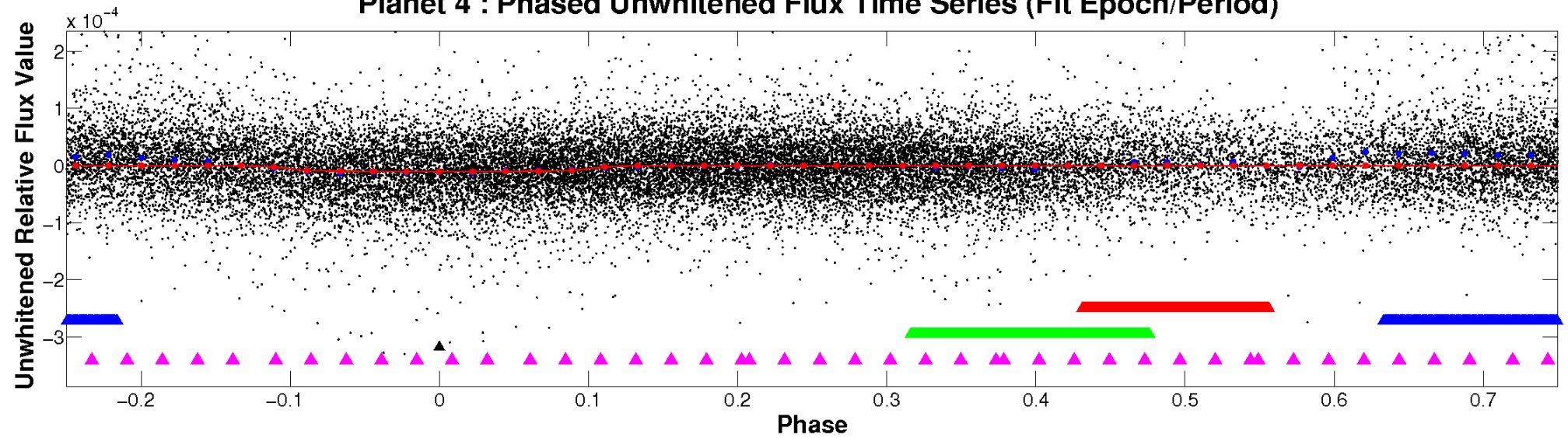
ALT Odd/Even

TCE 004180396-04

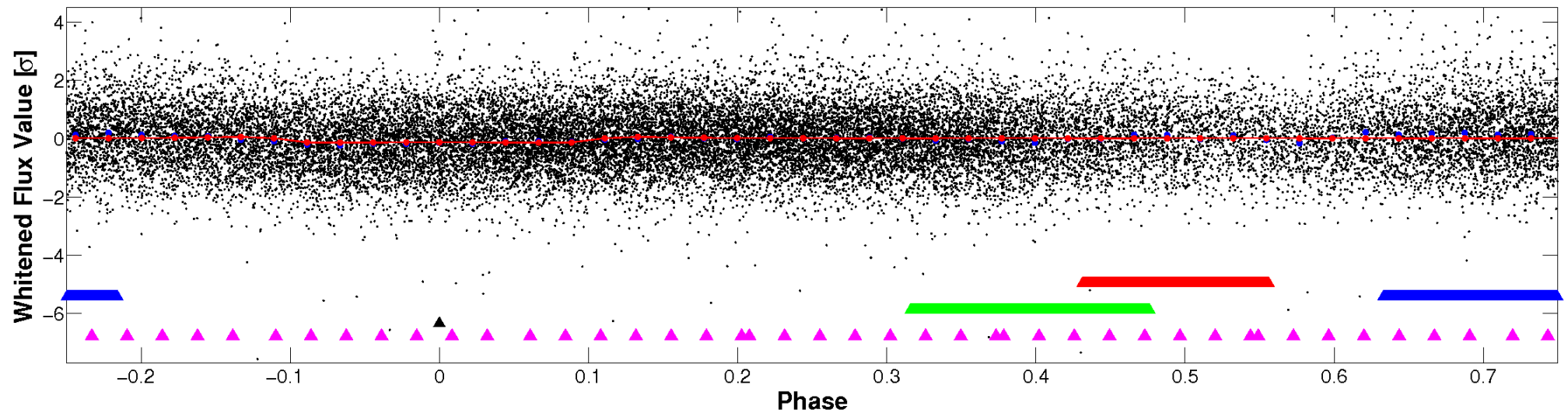


Non-Whitened Vs. Whitened Light Curve

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

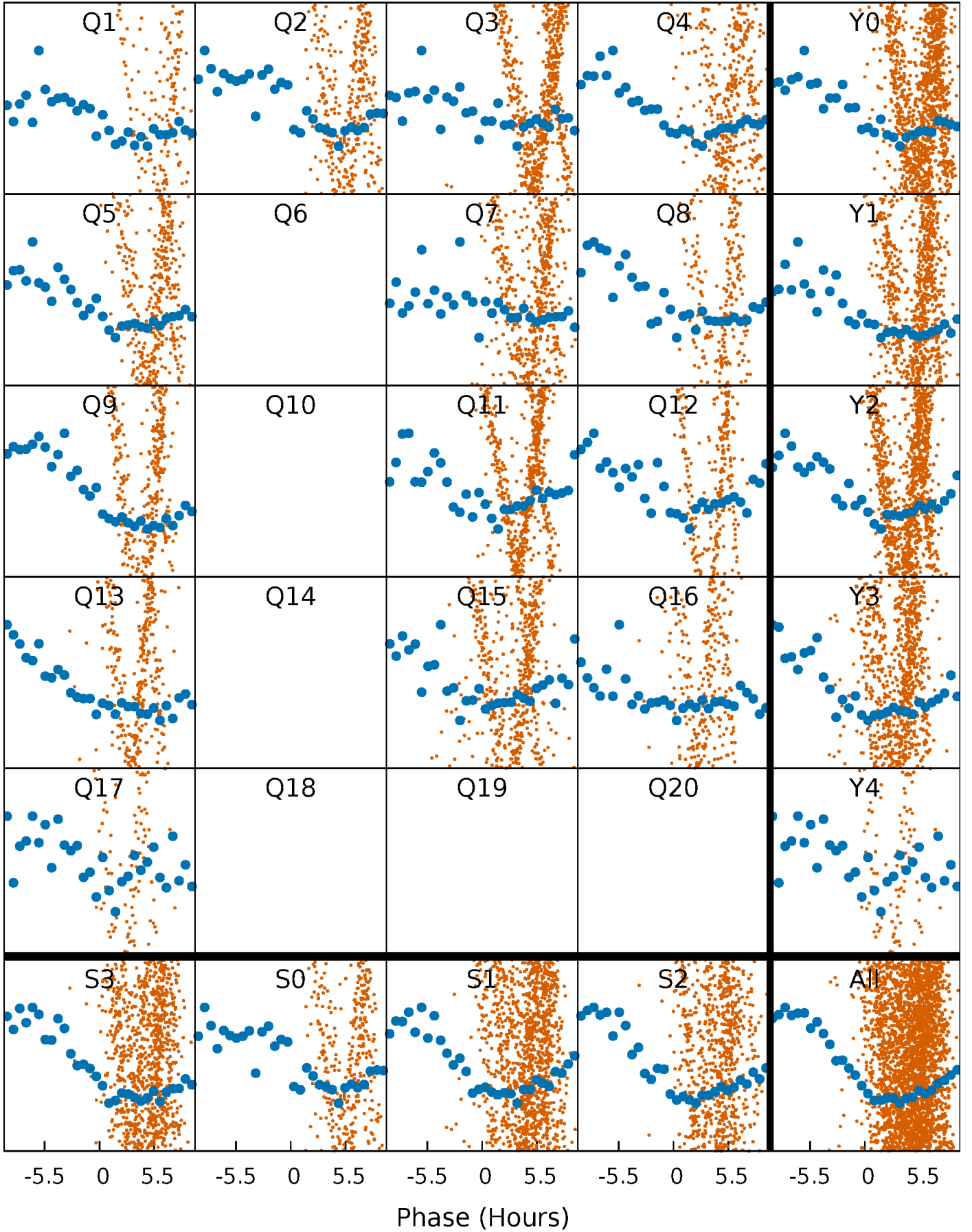


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



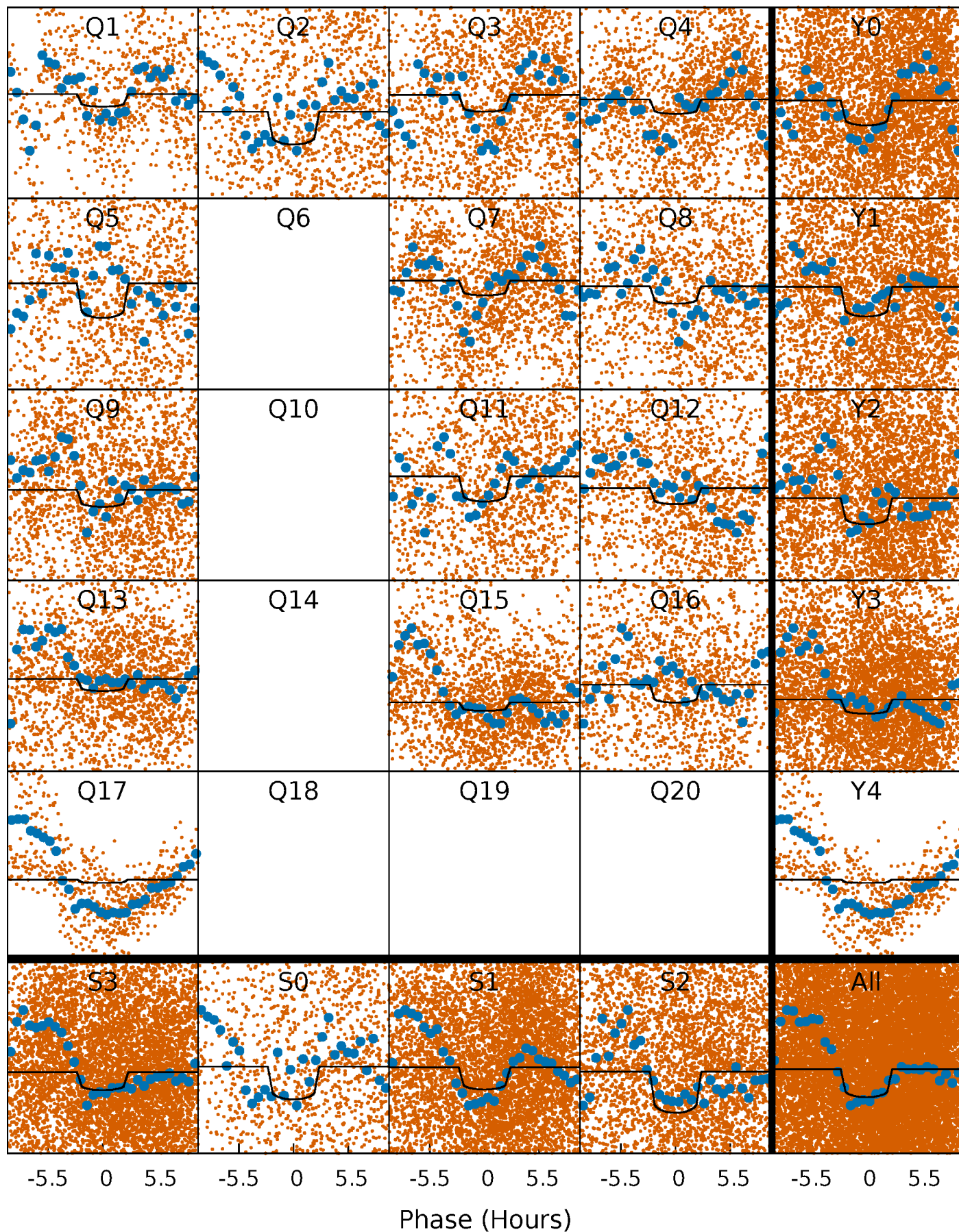
PDC Quarter-Phased Transit Curves

TCE 004180396-04 $P = 0.921171$ Days $T_0 = 132.090616$ (BKJD)



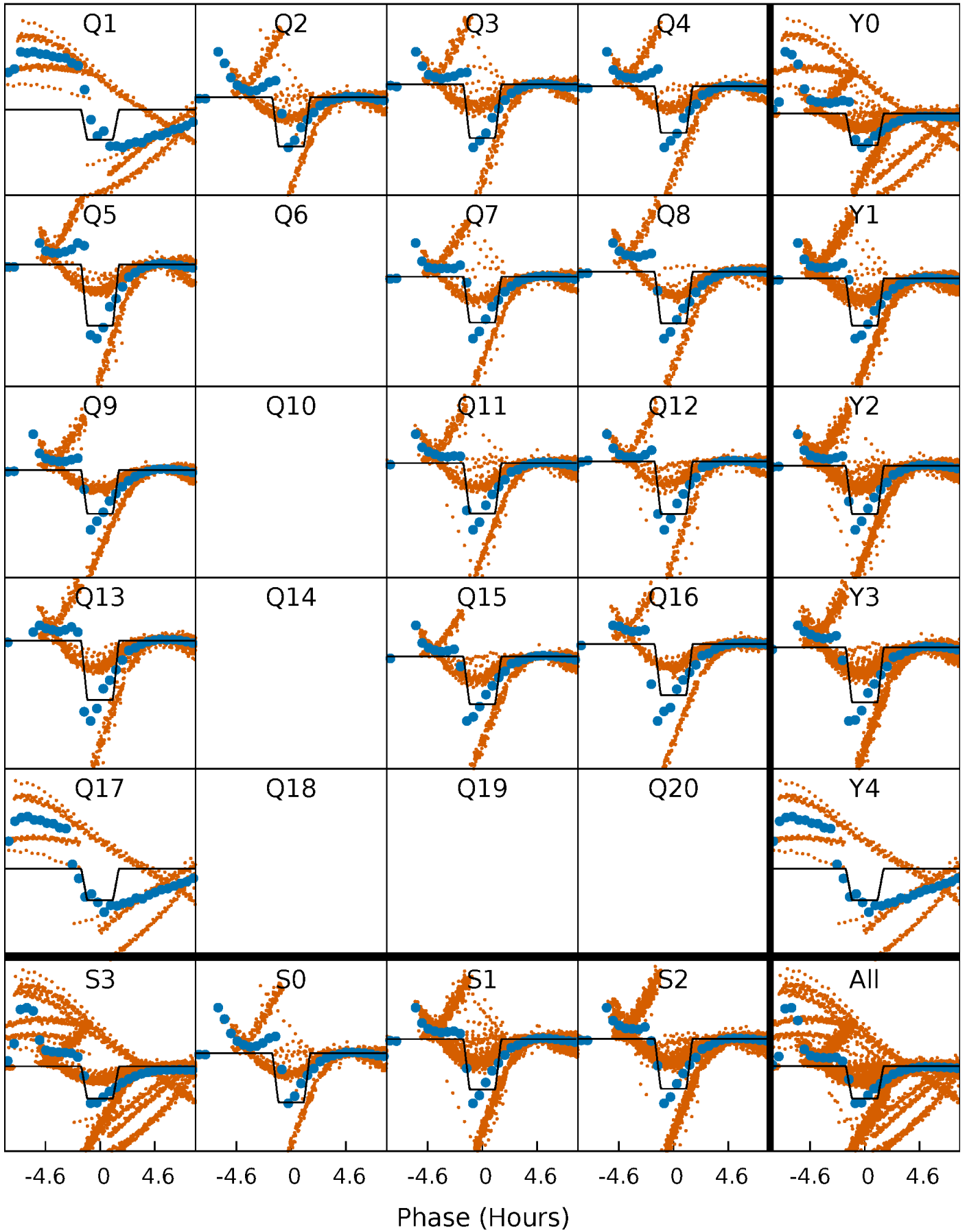
DV Quarter-Phased Transit Curves

TCE 004180396-04 $P = 0.921171$ Days $T_0 = 132.090616$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

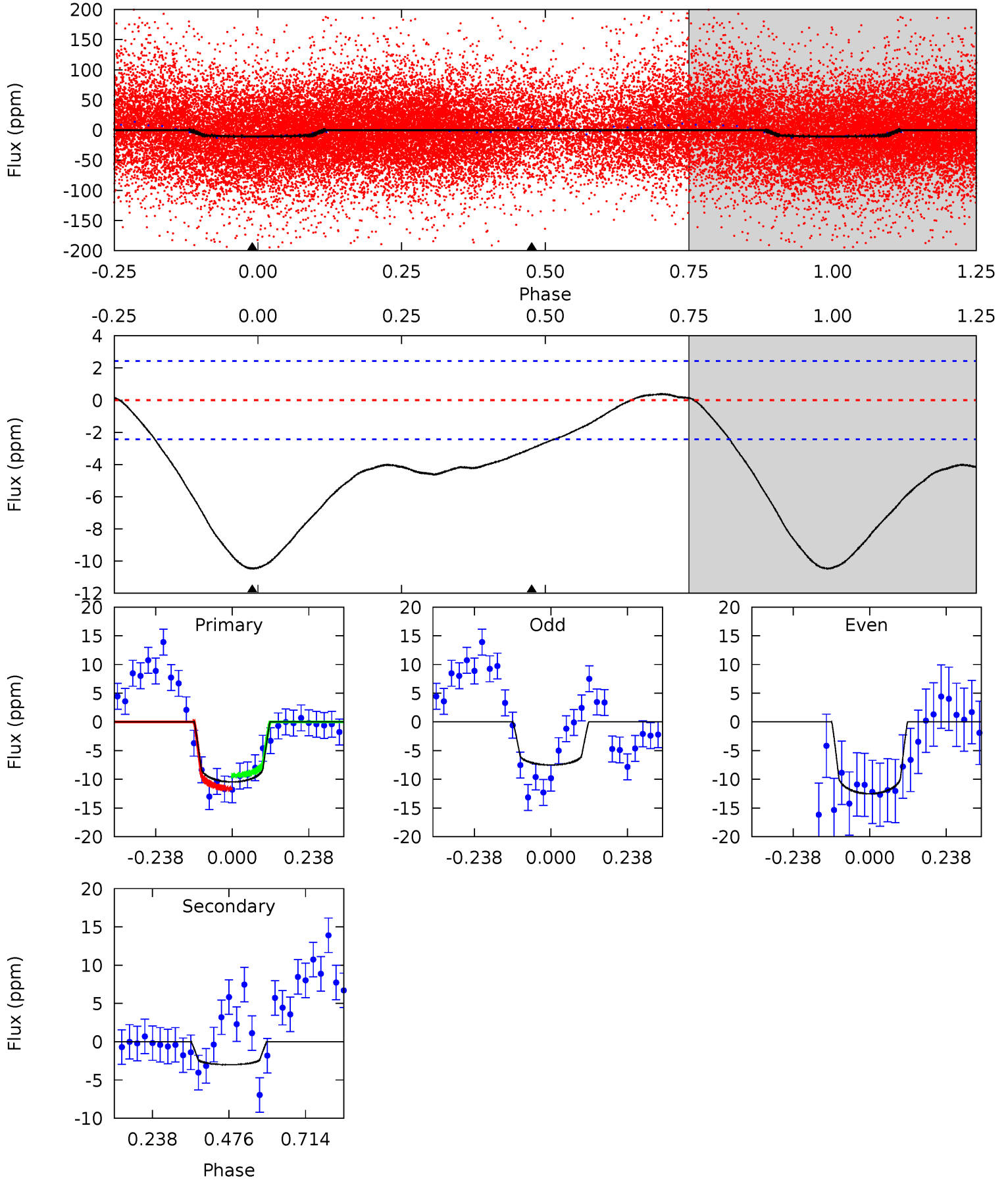
TCE 004180396-04 $P = 0.921105$ Days $T_0 = 132.108244$ (BKJD)



DV Model-Shift Uniqueness Test

004180396-04, P = 0.921171 Days, E = 131.169445 Days

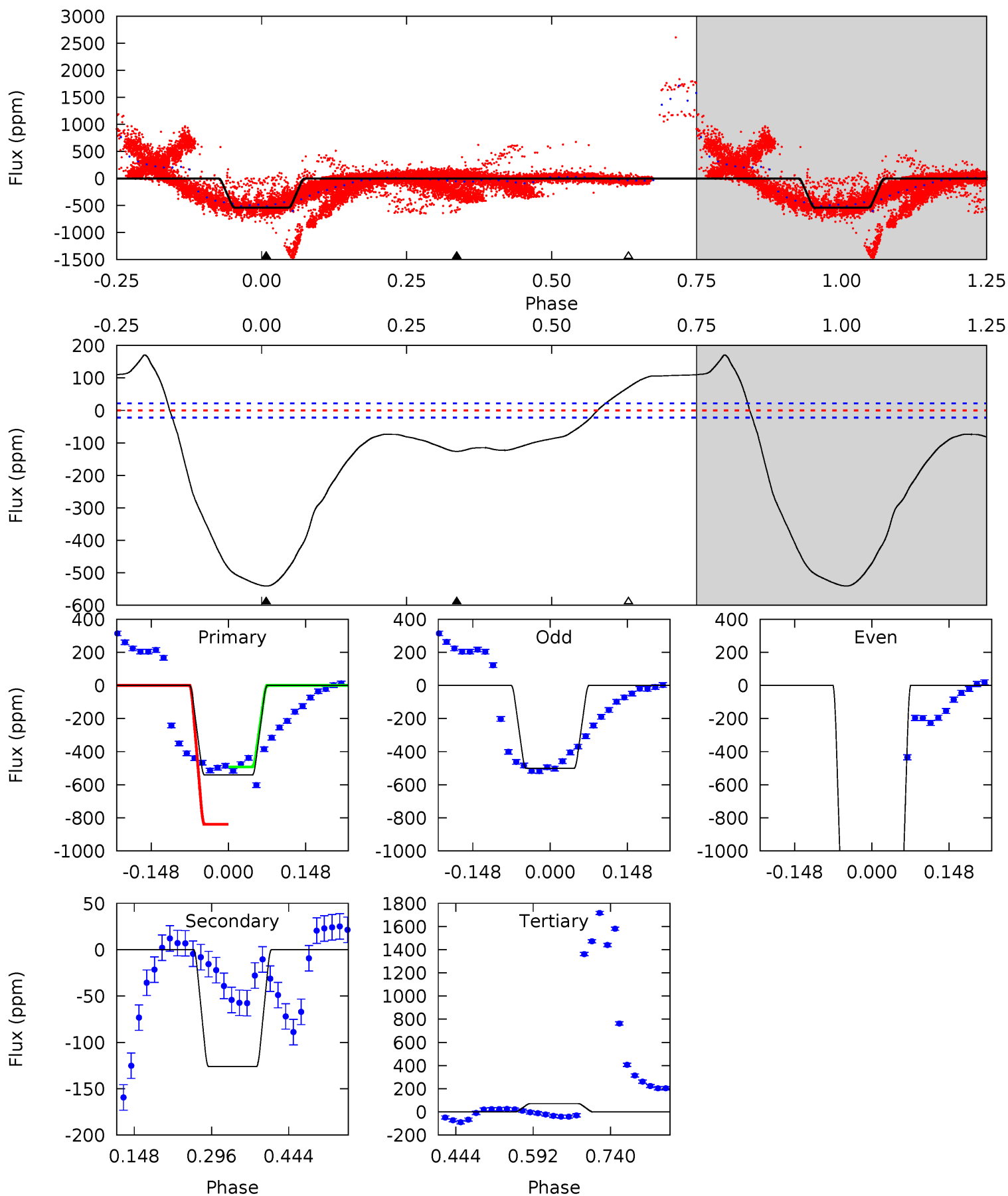
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 18.8 | 5.40 | 0 | 0 | 4.38 | 1.18 | 3.83 | 18.8 | 18.8 | 5.40 | 5.40 | 4.56 | 1.41 | 0.04 | 2.06 |



Alt Model-Shift Uniqueness Test

004180396-04, P = 0.921105 Days, E = 131.187139 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|-------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 110.5 | 25.8 | -14.5 | 0 | 4.48 | 1.45 | 19.9 | 125.0 | 110.5 | 40.3 | 25.8 | 246.2 | 1.72 | 0.24 | 20.2 |



Stellar Parameters For KIC 004180396

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 9609^{+272}_{-428} | $4.149^{+0.152}_{-0.228}$ | $0.070^{+0.150}_{-0.600}$ | $2.108^{+0.847}_{-0.565}$ | $2.284^{+0.396}_{-0.594}$ | $0.343^{+0.290}_{-0.209}$ |
| | +3%/-4% | +4%/-5% | +214%/-857% | +40%/-27% | +17%/-26% | +84%/-61% |
| 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 004180396-04 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -3 ± 1 | $0.79^{+0.22}_{-0.18}$ | 5544^{+519}_{-425} | 5994^{+815}_{-714} | $1.507^{+1.009}_{-0.604}$ |
| Alt. | -126 ± 5 | $8.14^{+1.76}_{-1.17}$ | 5565^{+496}_{-431} | 4446^{+231}_{-444} | $0.614^{+0.181}_{-0.190}$ |

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

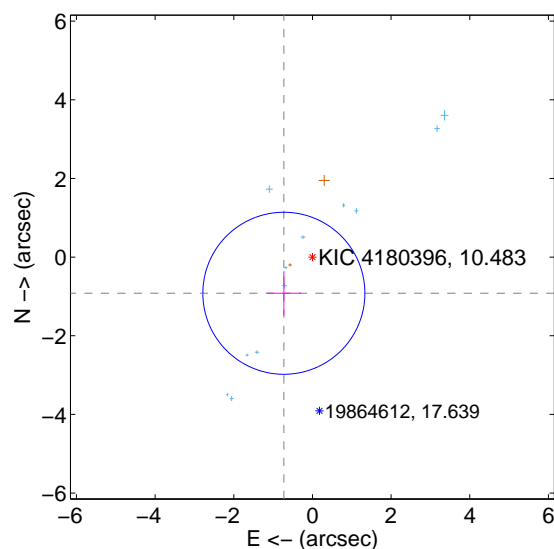
Supplemental centroid analysis for 004180396-04. **Kepler magnitude: 10.48.** Transit SNR 11.00

There are 12 quarters with good PRF difference image offsets

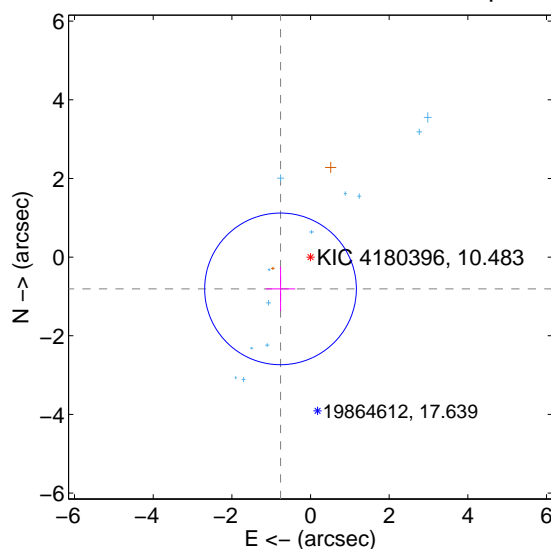
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 1.172 ± 0.687 | 1.71 | 0.726 ± 0.433 | -0.920 ± 0.562 |
| PRF-fit source offset from KIC position | 1.112 ± 0.643 | 1.73 | 0.763 ± 0.375 | -0.808 ± 0.563 |
| photometric centroid source offset | 0.45 ± 1.56 | 0.29 | -0.36 ± 1.25 | 0.27 ± 1.99 |

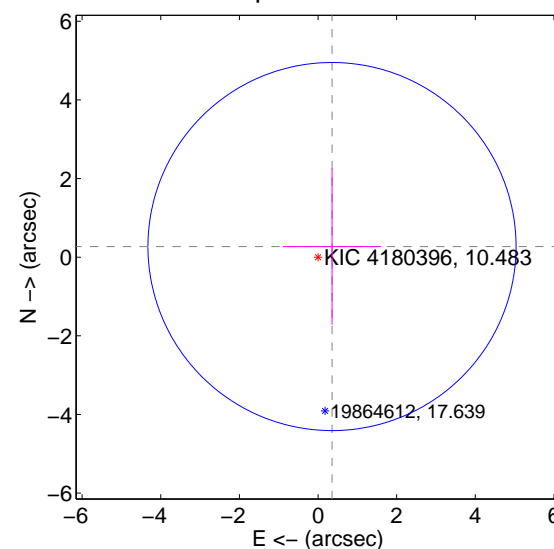
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

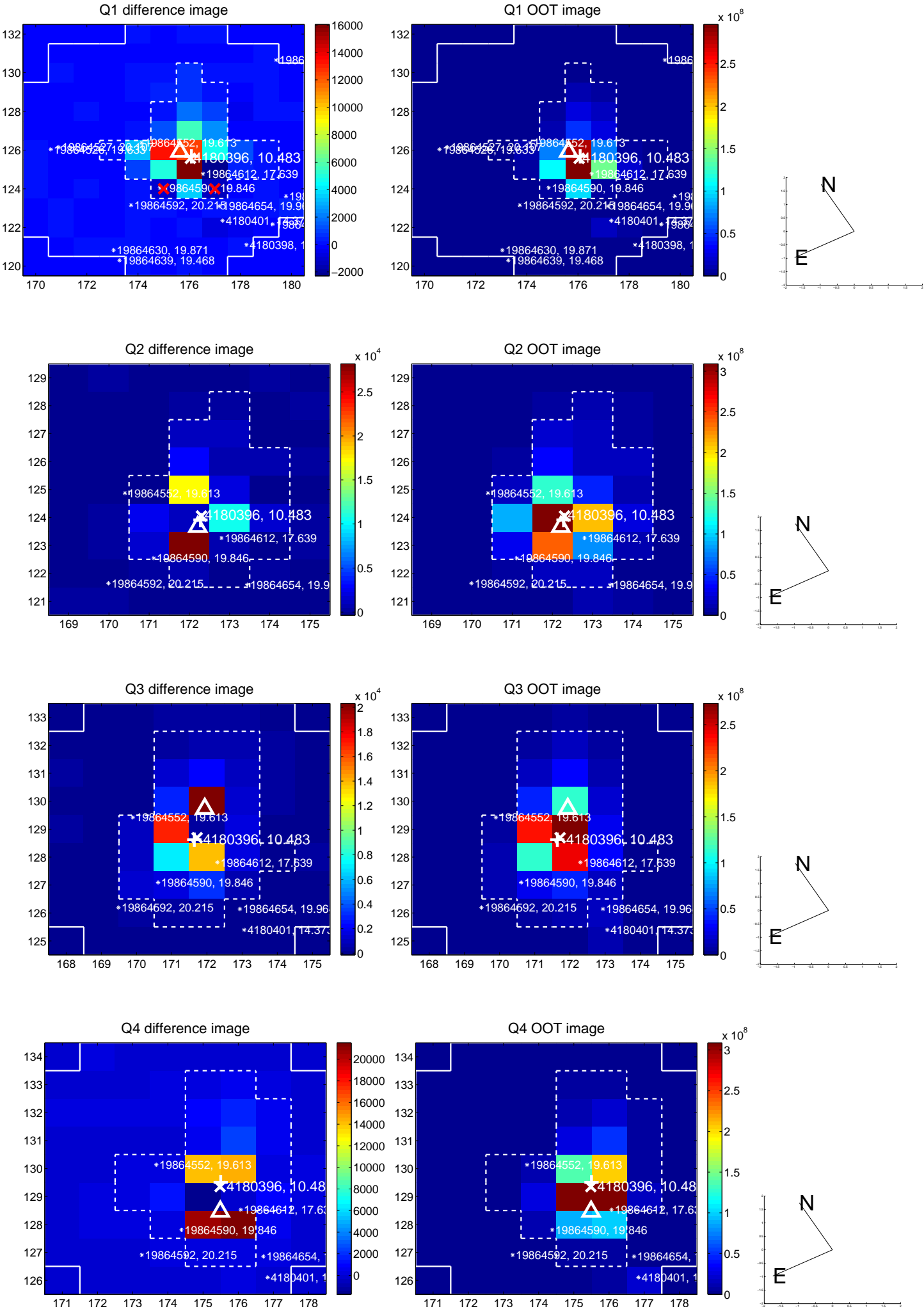


offset from photometric centroids

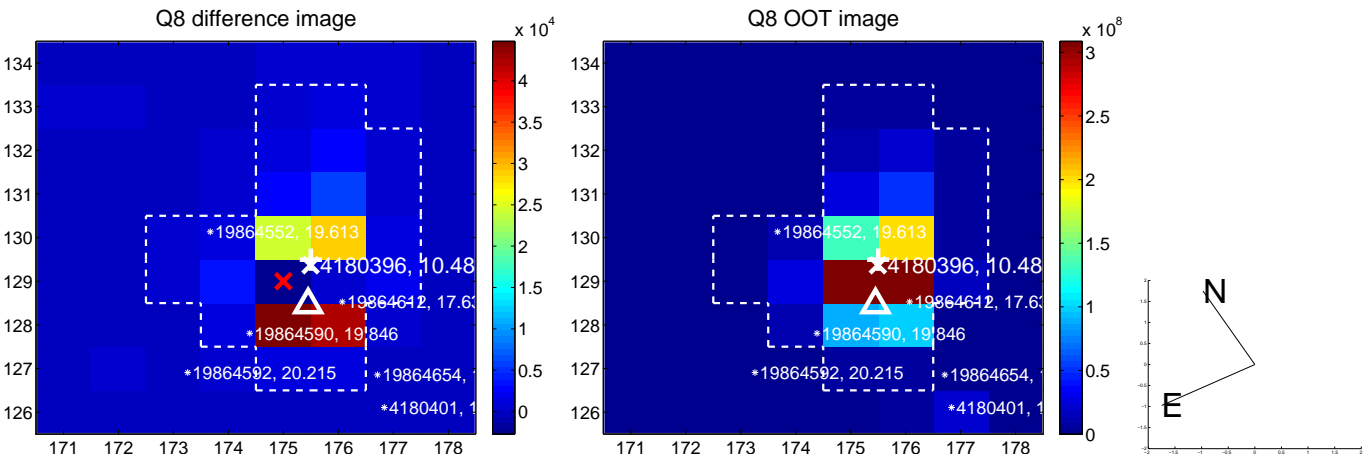
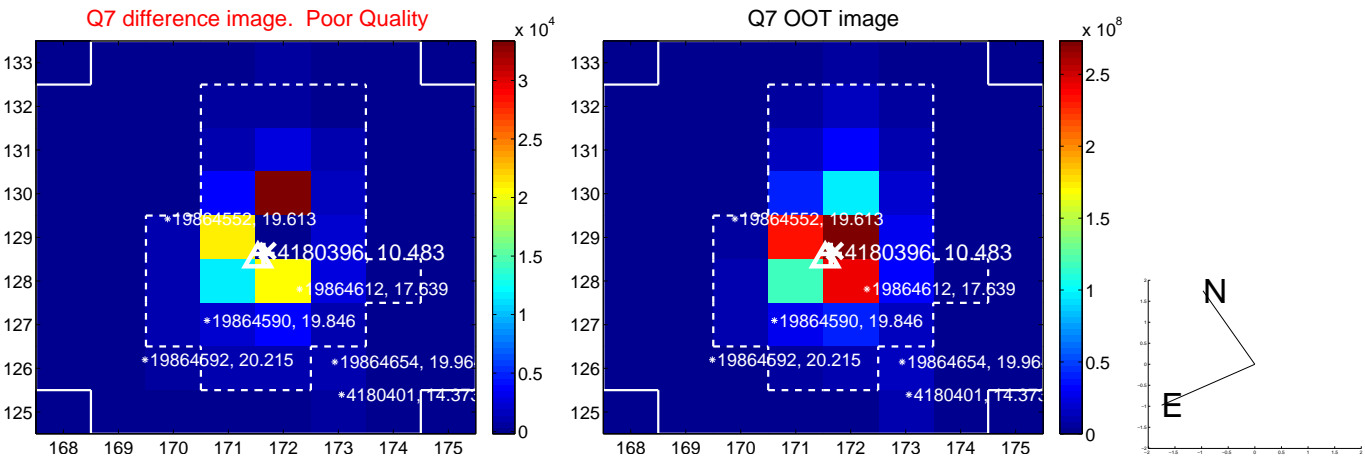
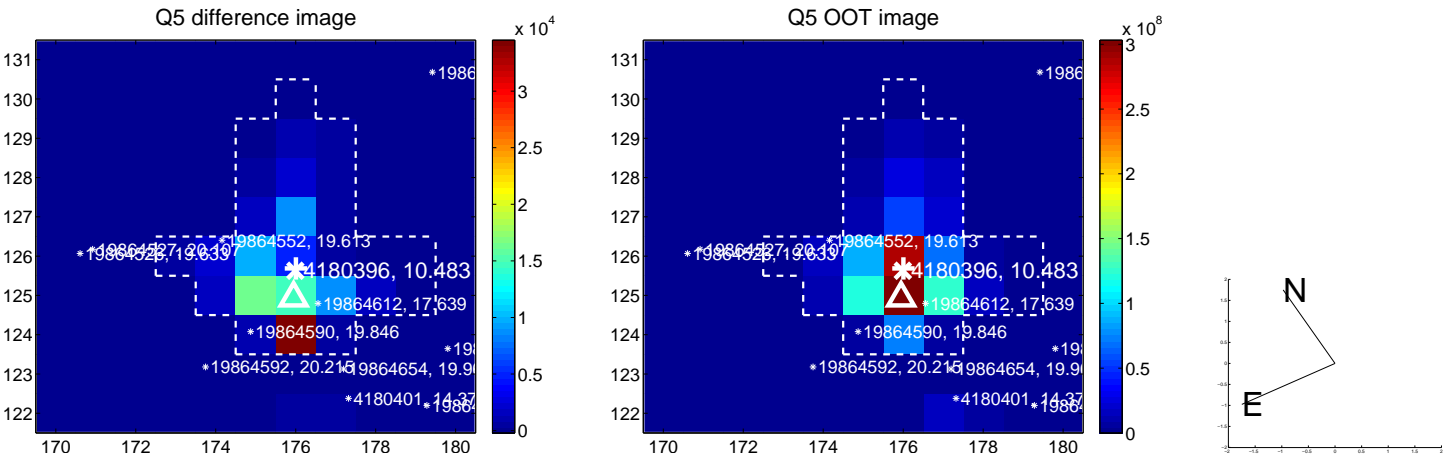


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

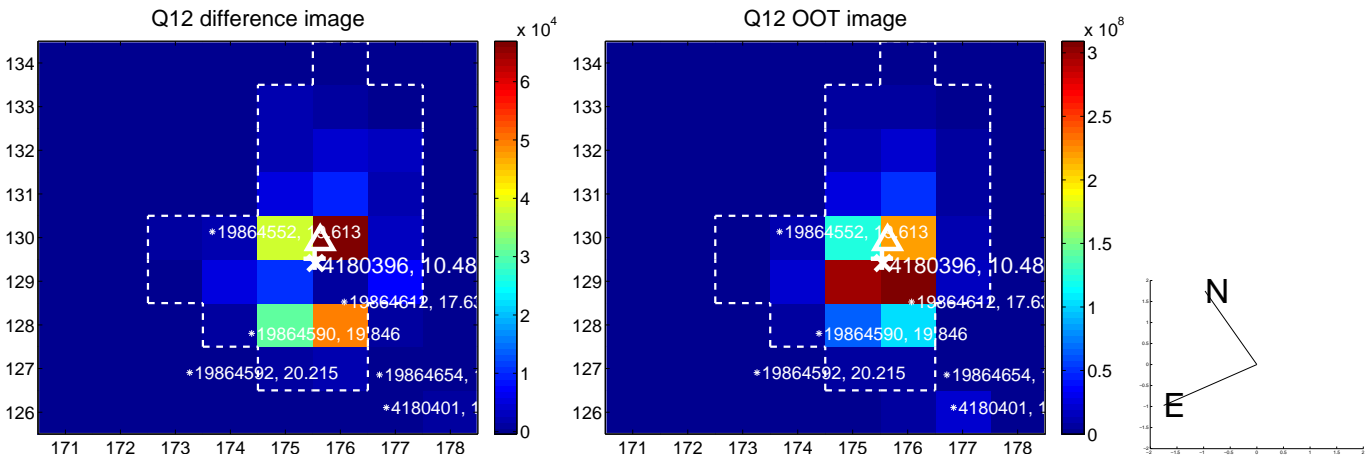
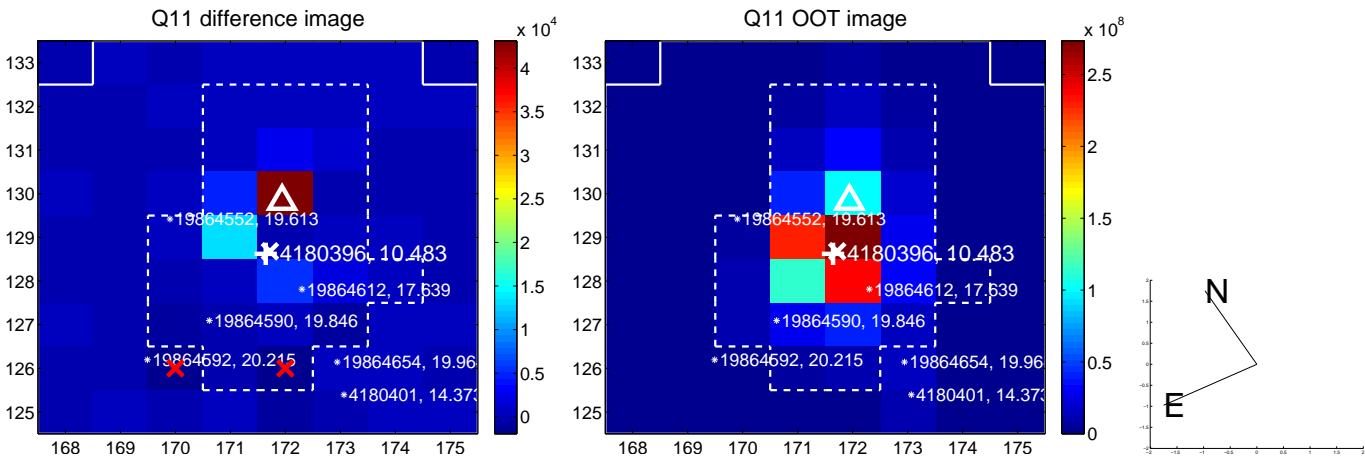
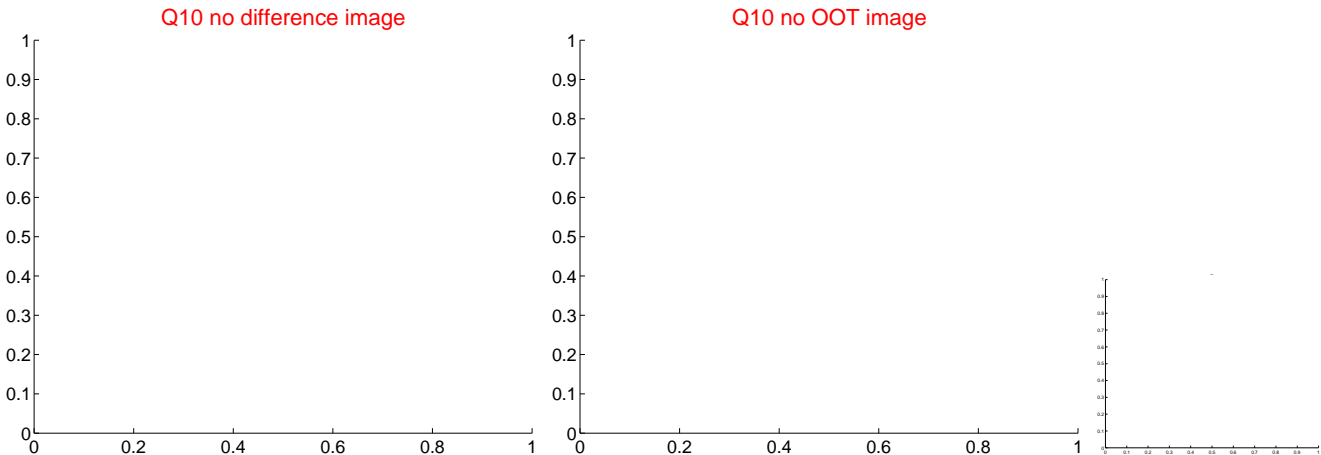
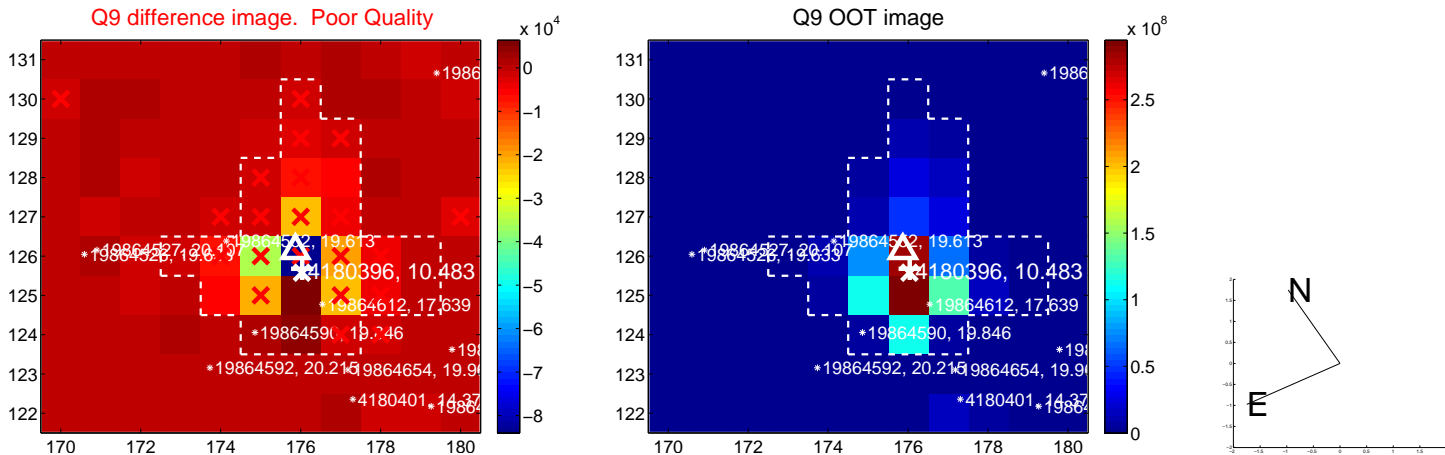
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



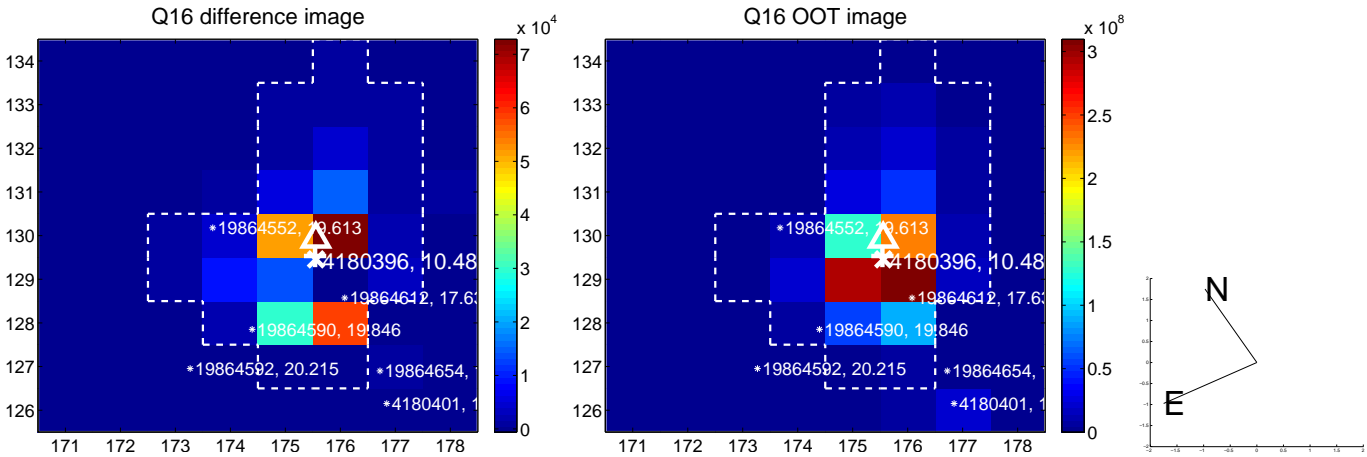
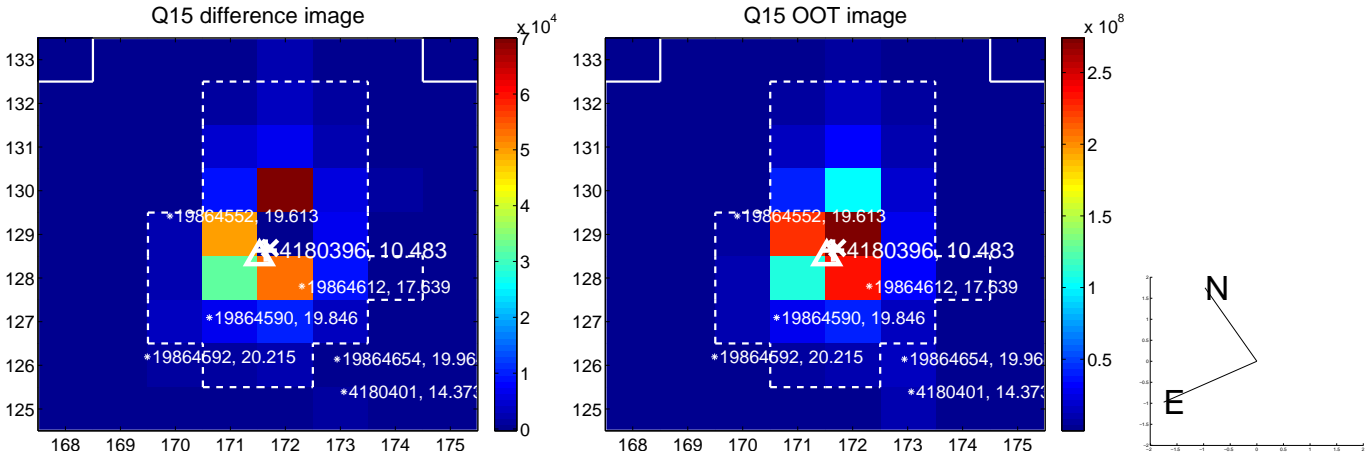
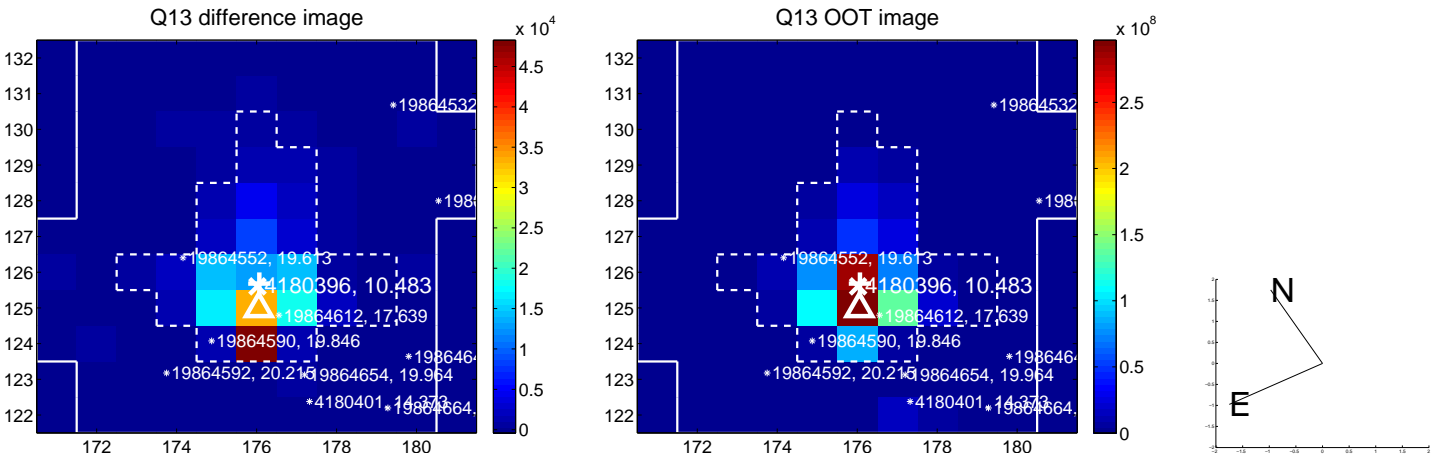
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



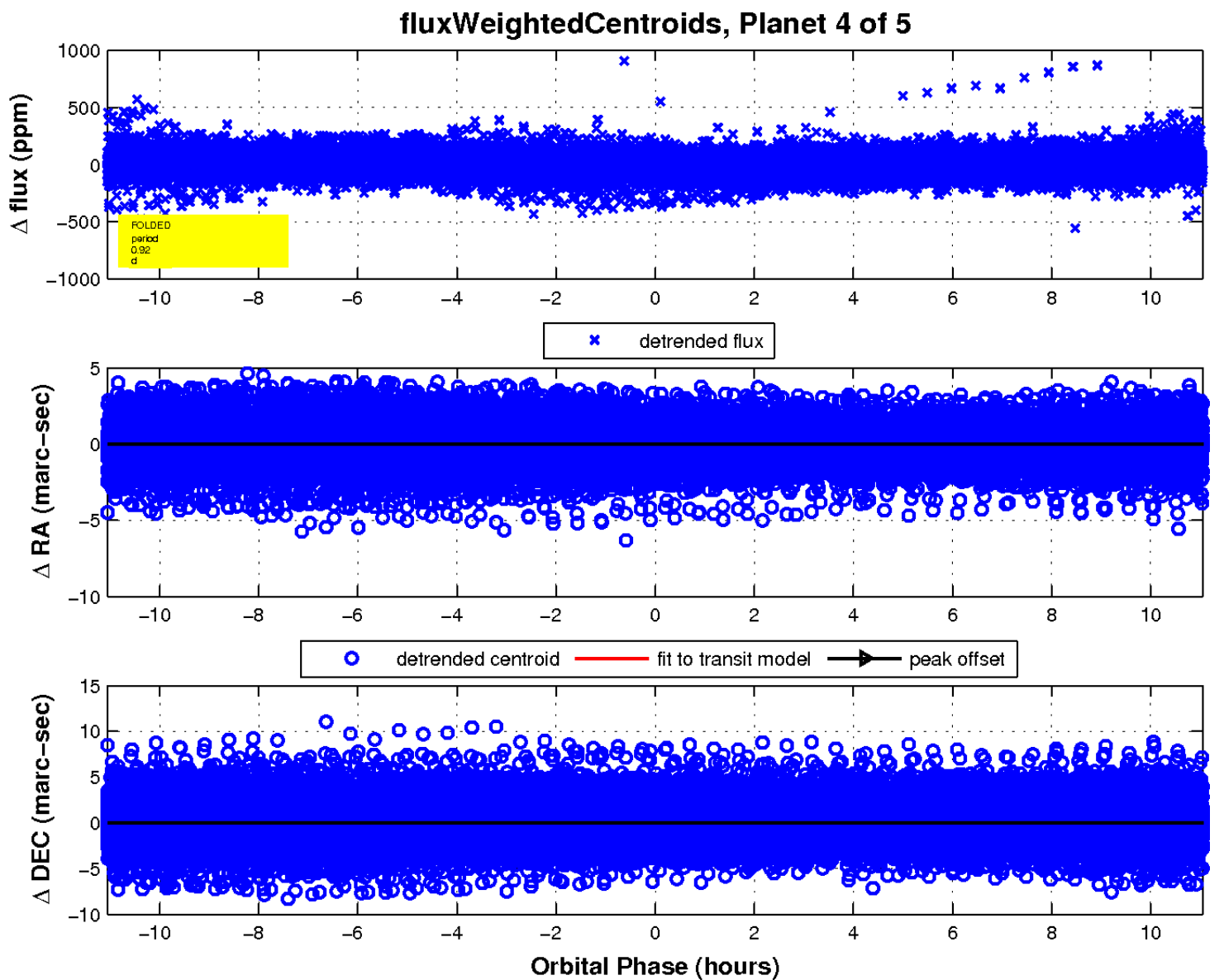
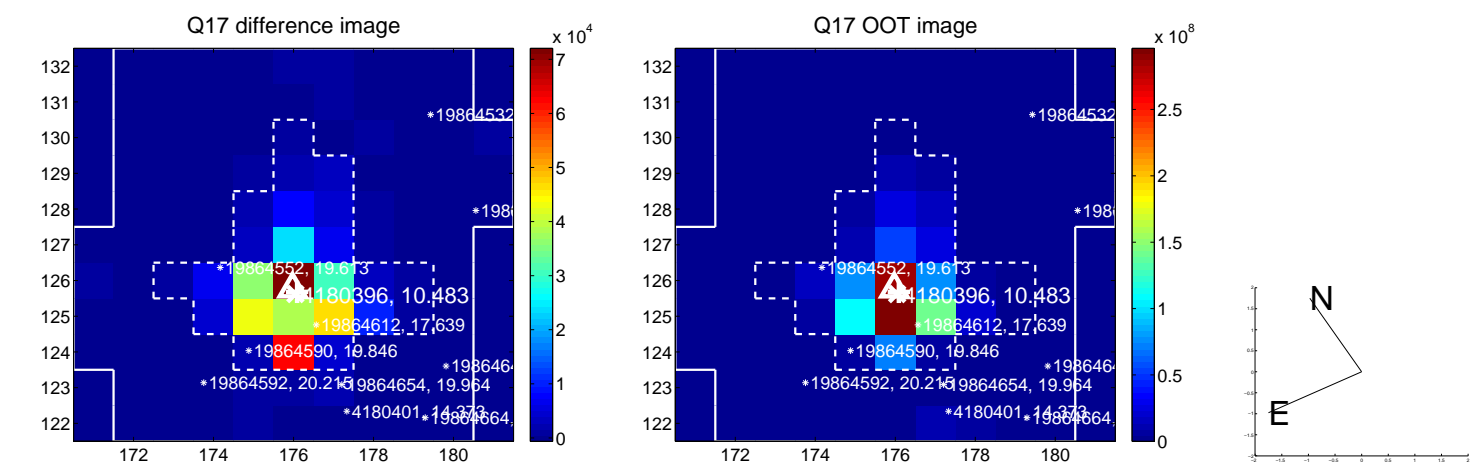
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

