

KIC 012455315

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 012455315-01 | OBS | No | 4.187112 | 133.540727 | 54.6 | 12.500 | 12.5 | -1.0 | 2.91 | 6865 | 2.17 | 4528.63 |
| 012455315-02 | OBS | No | 4.186851 | 135.149091 | 41.9 | 15.102 | 13.6 | 12.9 | 2.91 | 6865 | 2.25 | 4529.00 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 012455315-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—CENT_NOFITS |
| 012455315-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD |

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

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

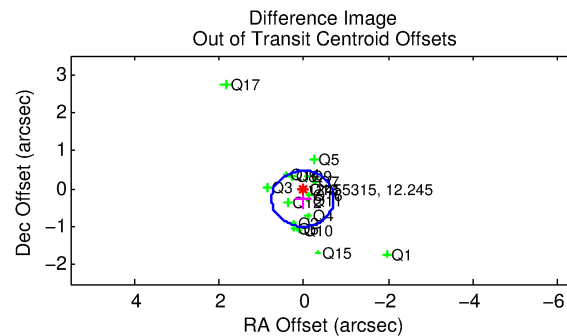
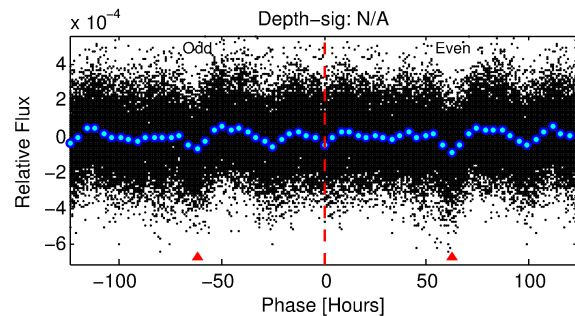
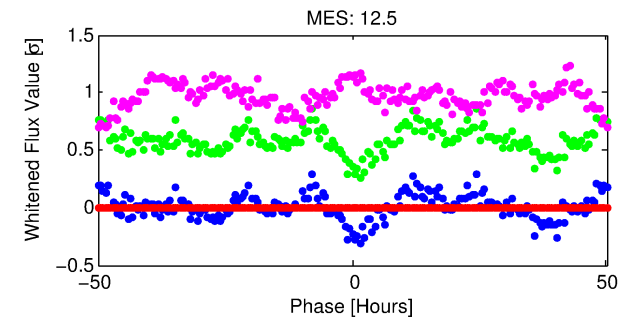
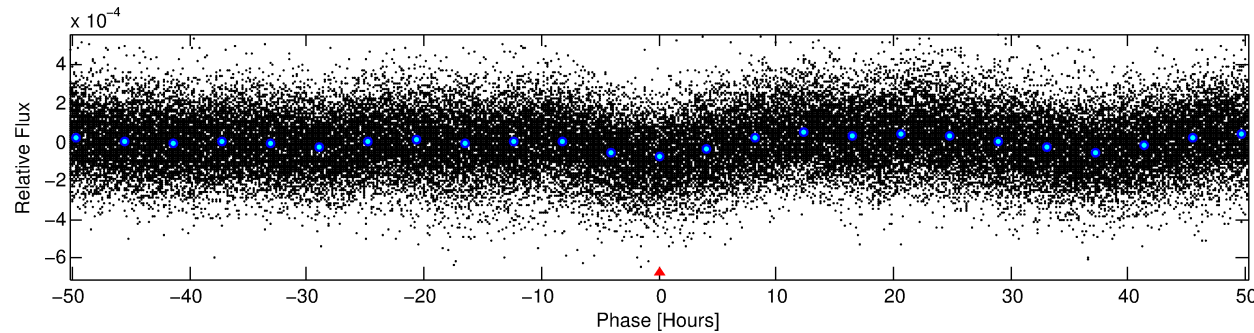
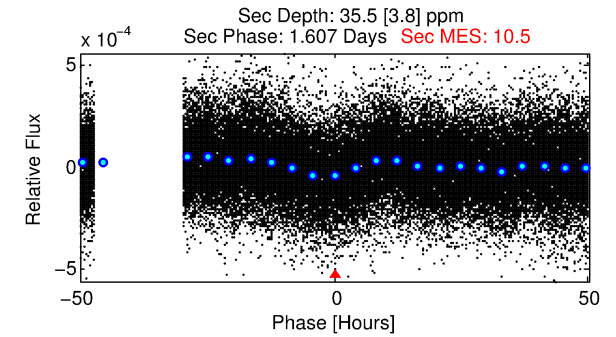
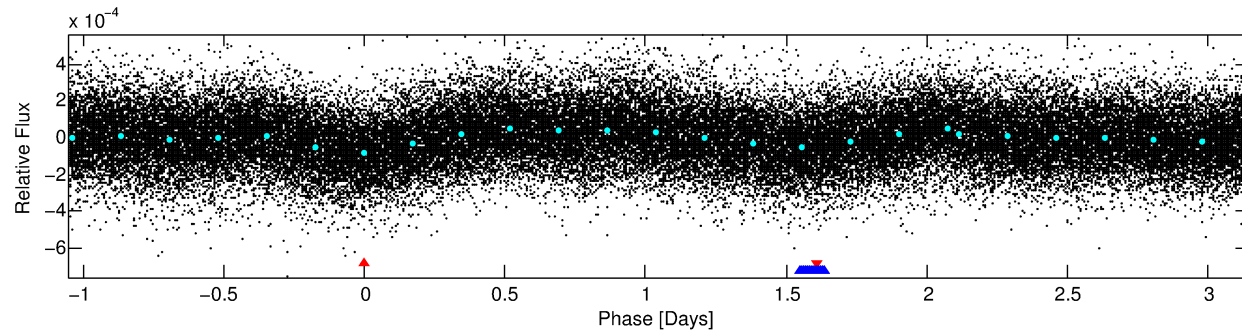
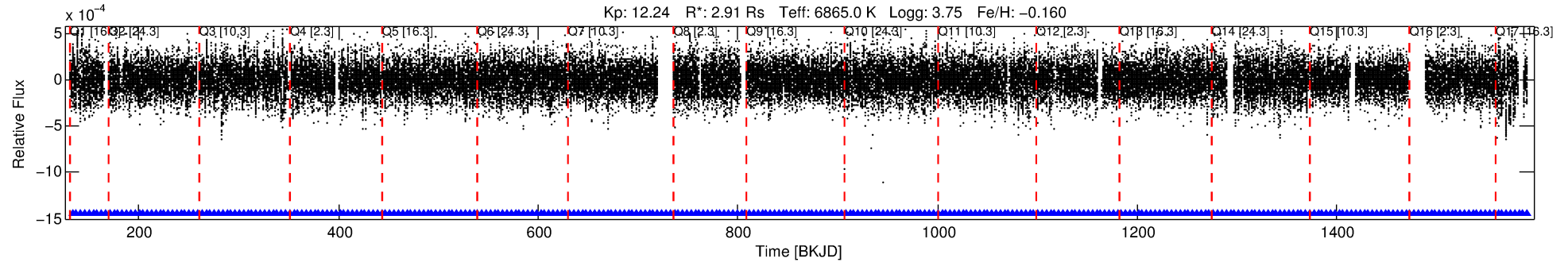
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012455315-01

No Significant Match Found

DV One-Page Summary

KIC: 12455315 Candidate: 1 of 2 Period: 4.187 d



TPS TCE Results:

Period = 4.18711 d
Epoch = 133.5407 BKJD

DV fit results are unavailable

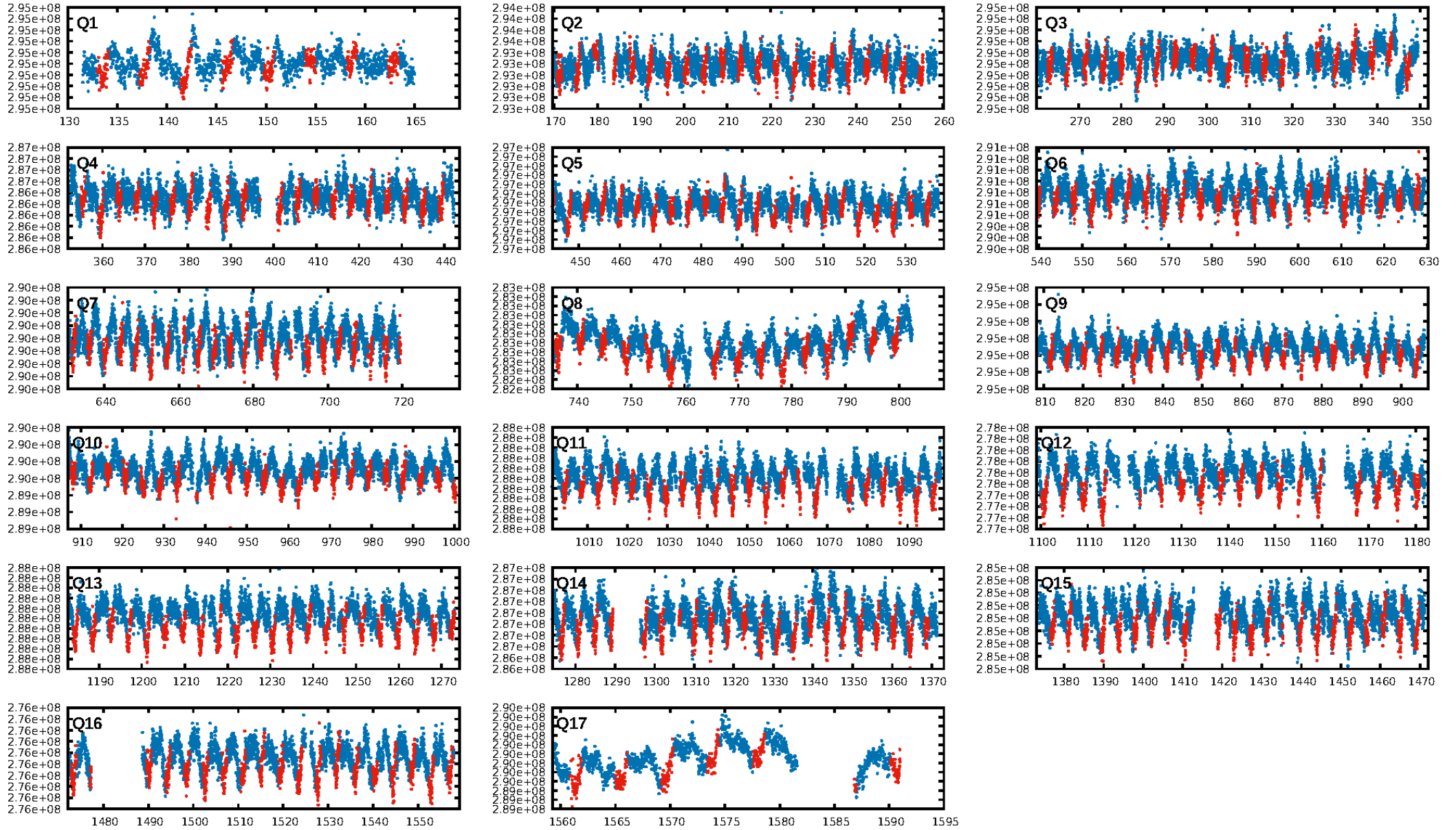
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 6.99e-13
RollingBand-fgt: 1.00 [312/312]
GhostDiagnostic-chr: 1.684
Centroid-sig: 26.9%
Centroid-so: 0.062 arcsec [0.46σ]
OotOffset-rm: 0.262 arcsec [1.07σ]
KicOffset-rm: 0.448 arcsec [1.63σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.94 [16/17]
DiffImageOverlap-fno: 0.00 [0/17]

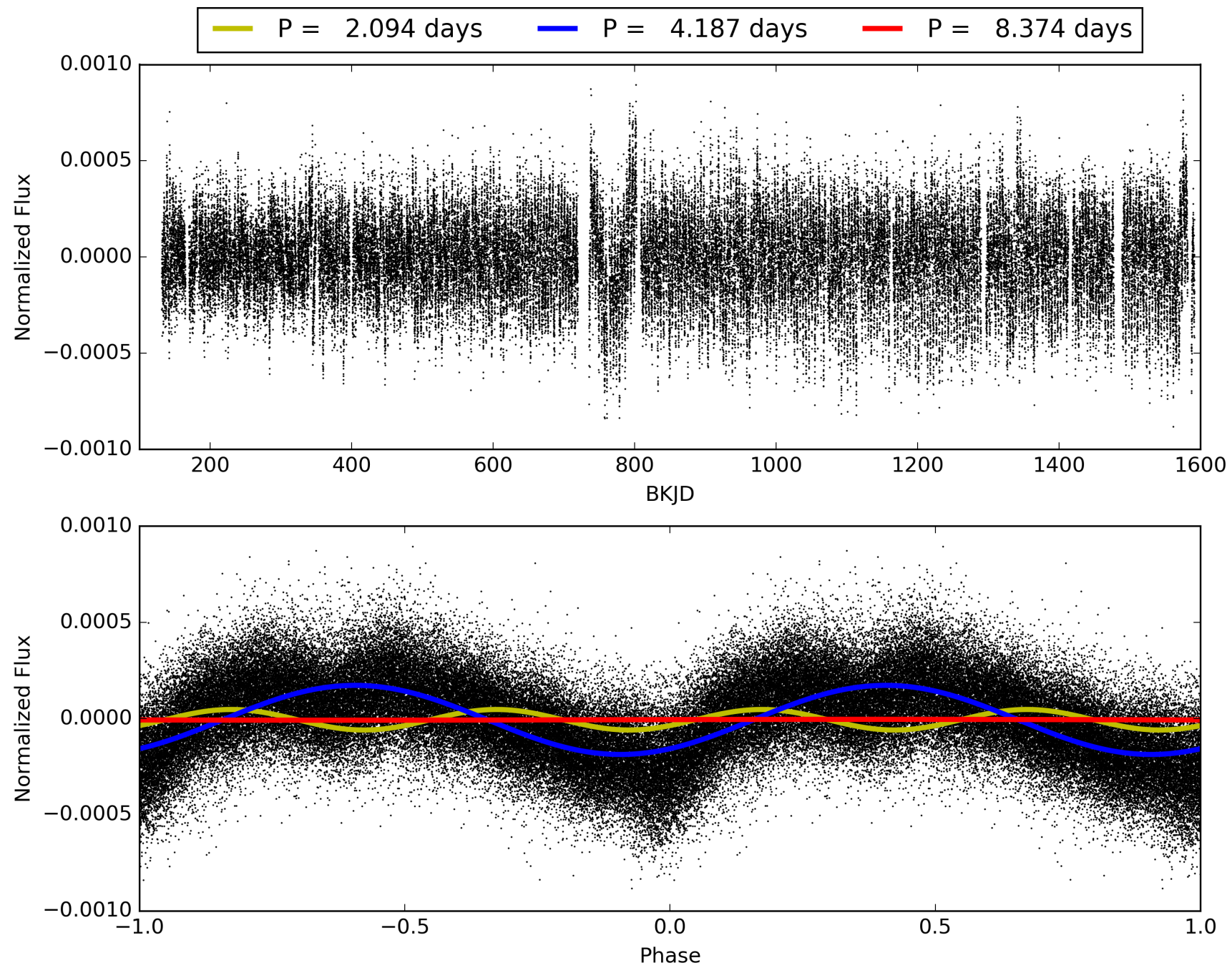
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:07:53 Z

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

TCE 012455315-01, PDC Light Curves

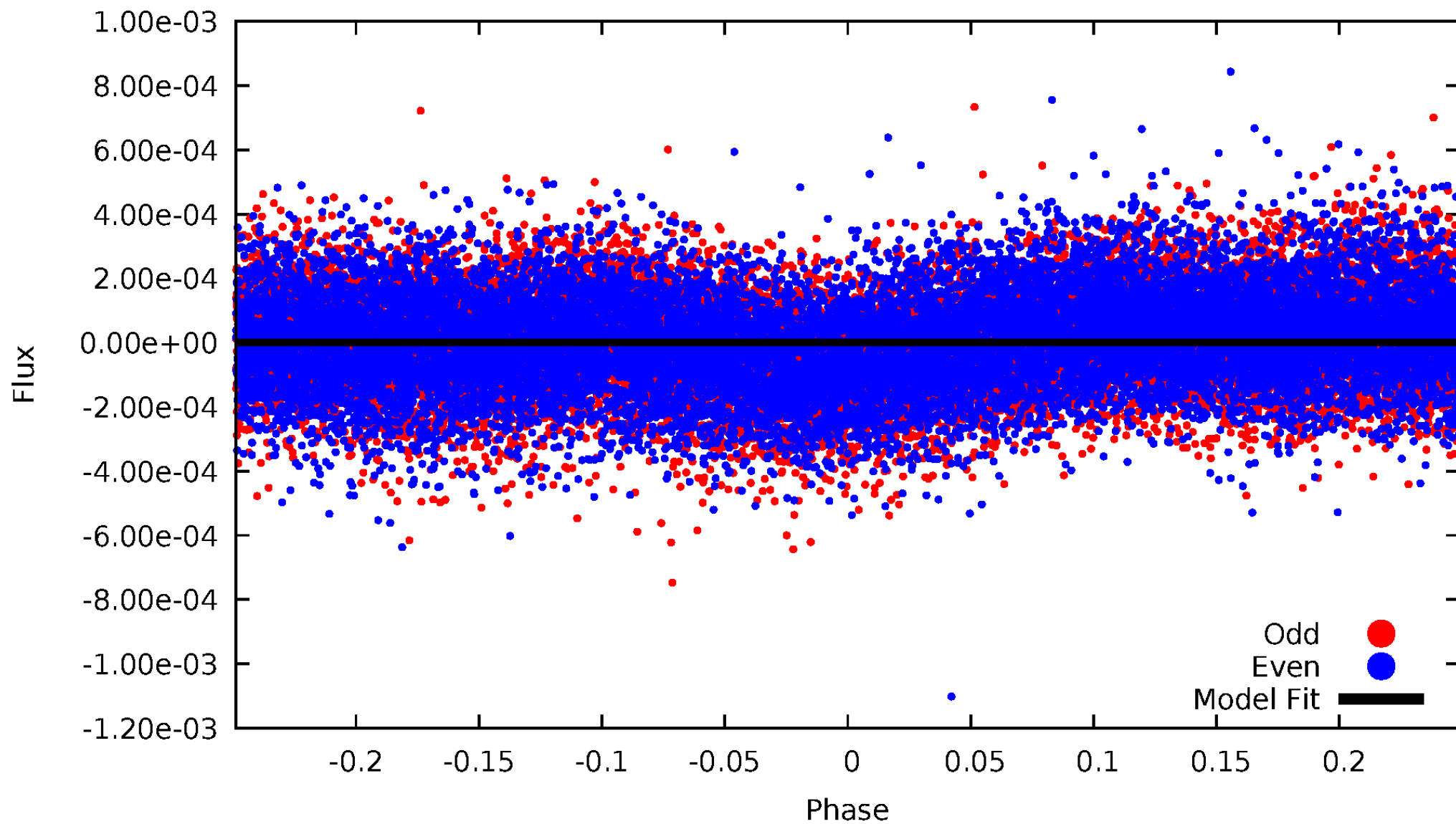


TCE 012455315-01



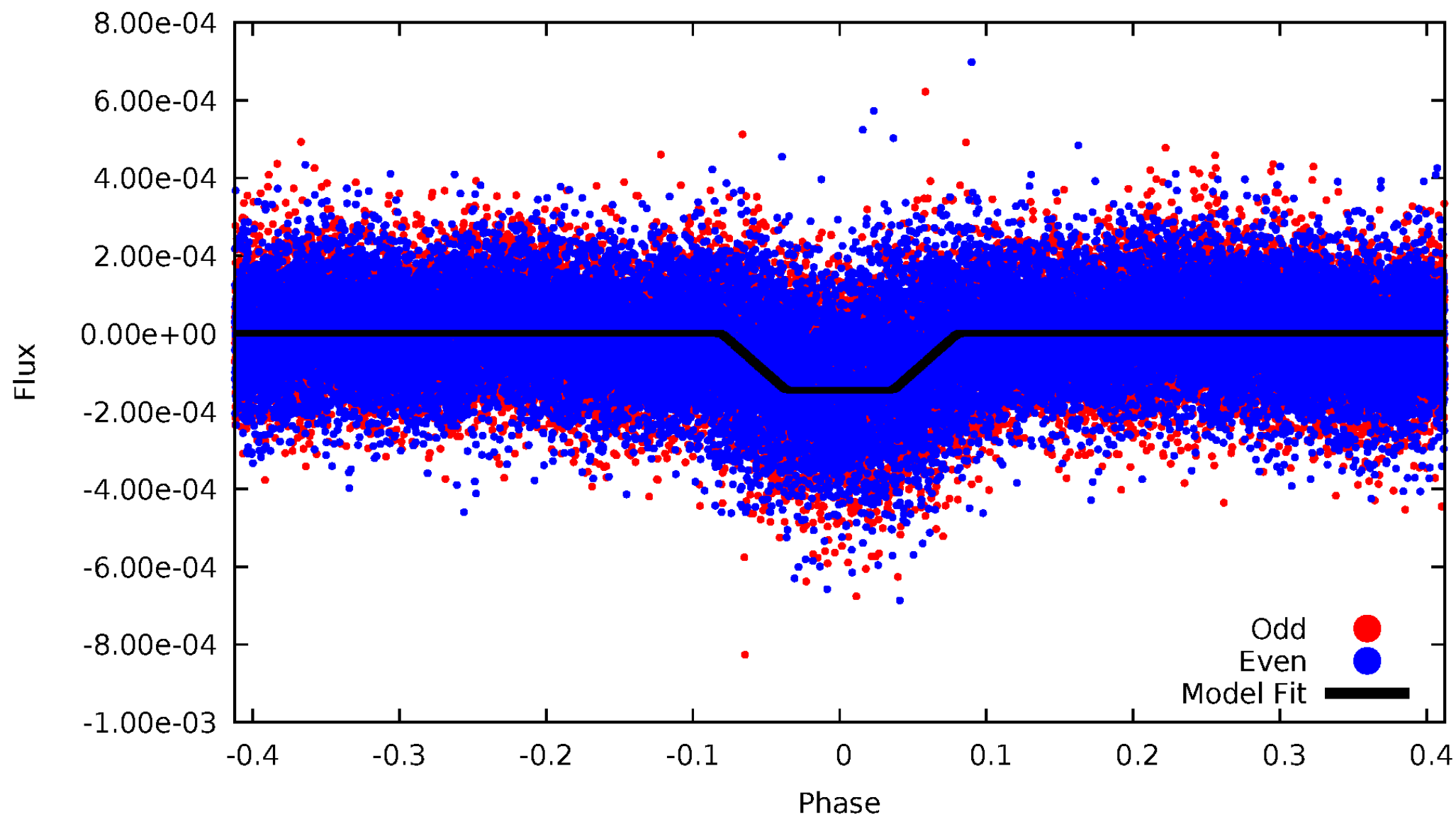
DV Odd/Even

TCE 012455315-01



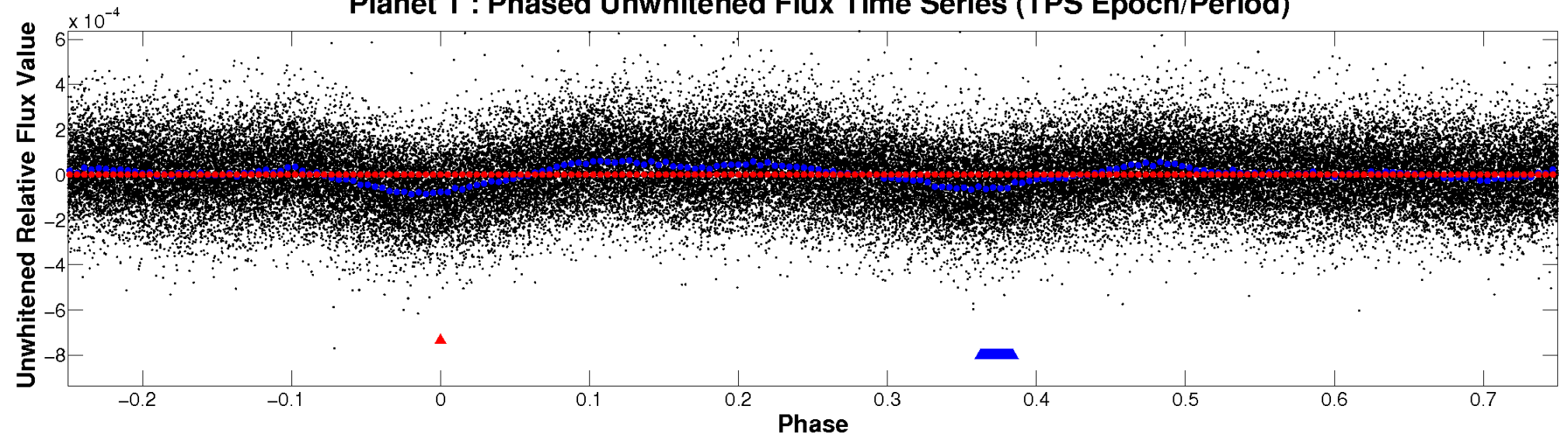
ALT Odd/Even

TCE 012455315-01



Non-Whitened Vs. Whitened Light Curve

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

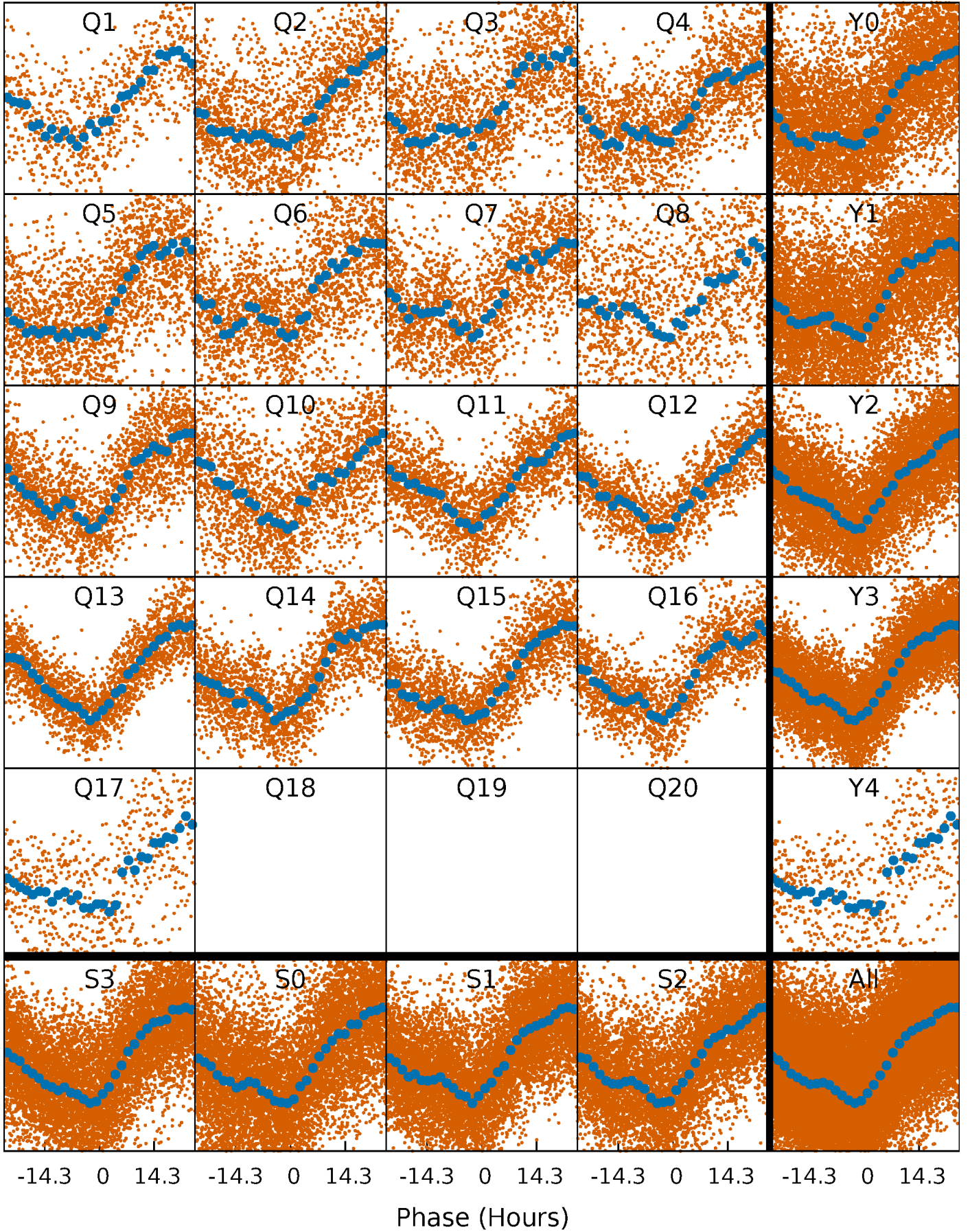


Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)



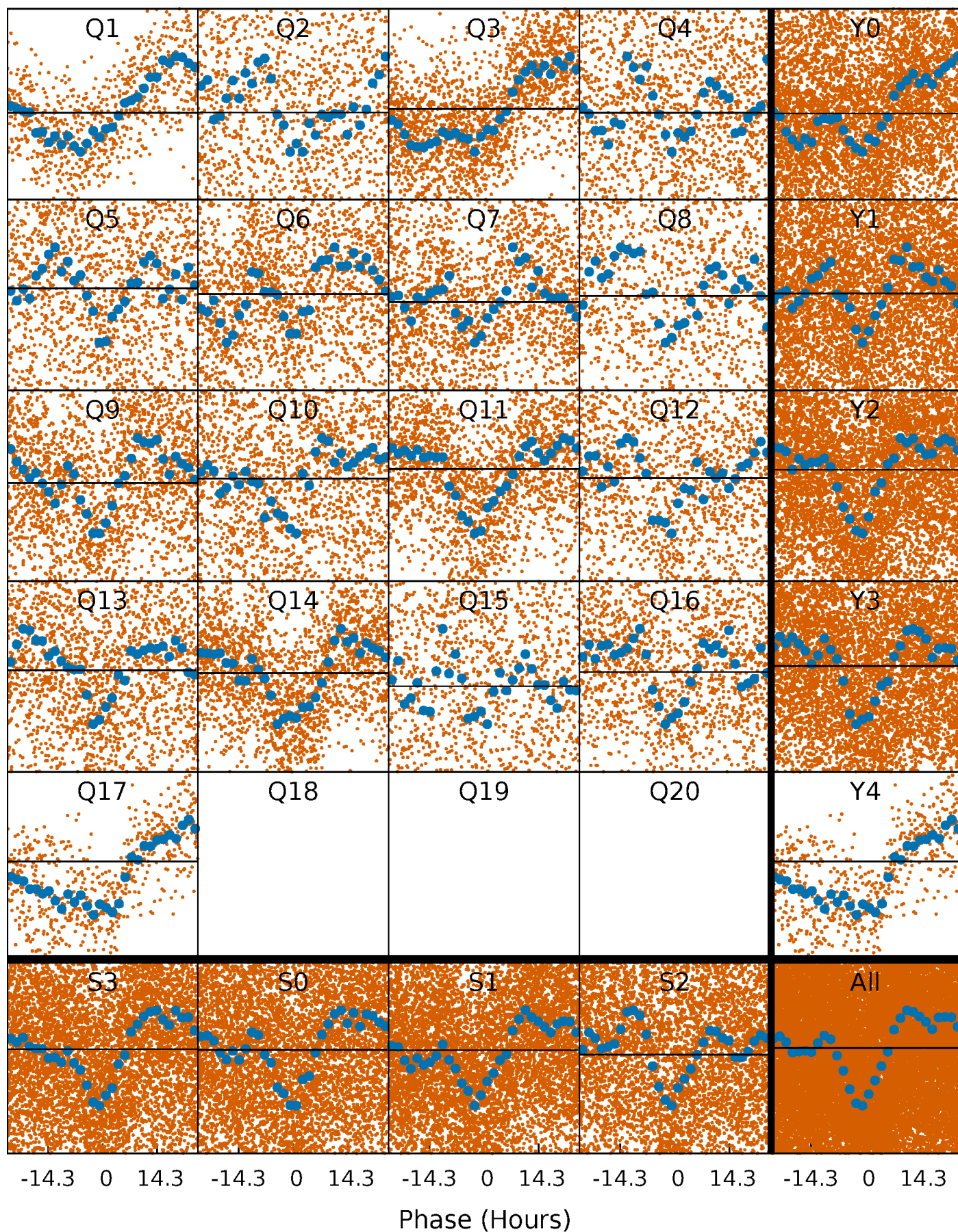
PDC Quarter-Phased Transit Curves

TCE 012455315-01 P= 4.187112 Days $T_0=133.540727$ (BKJD)



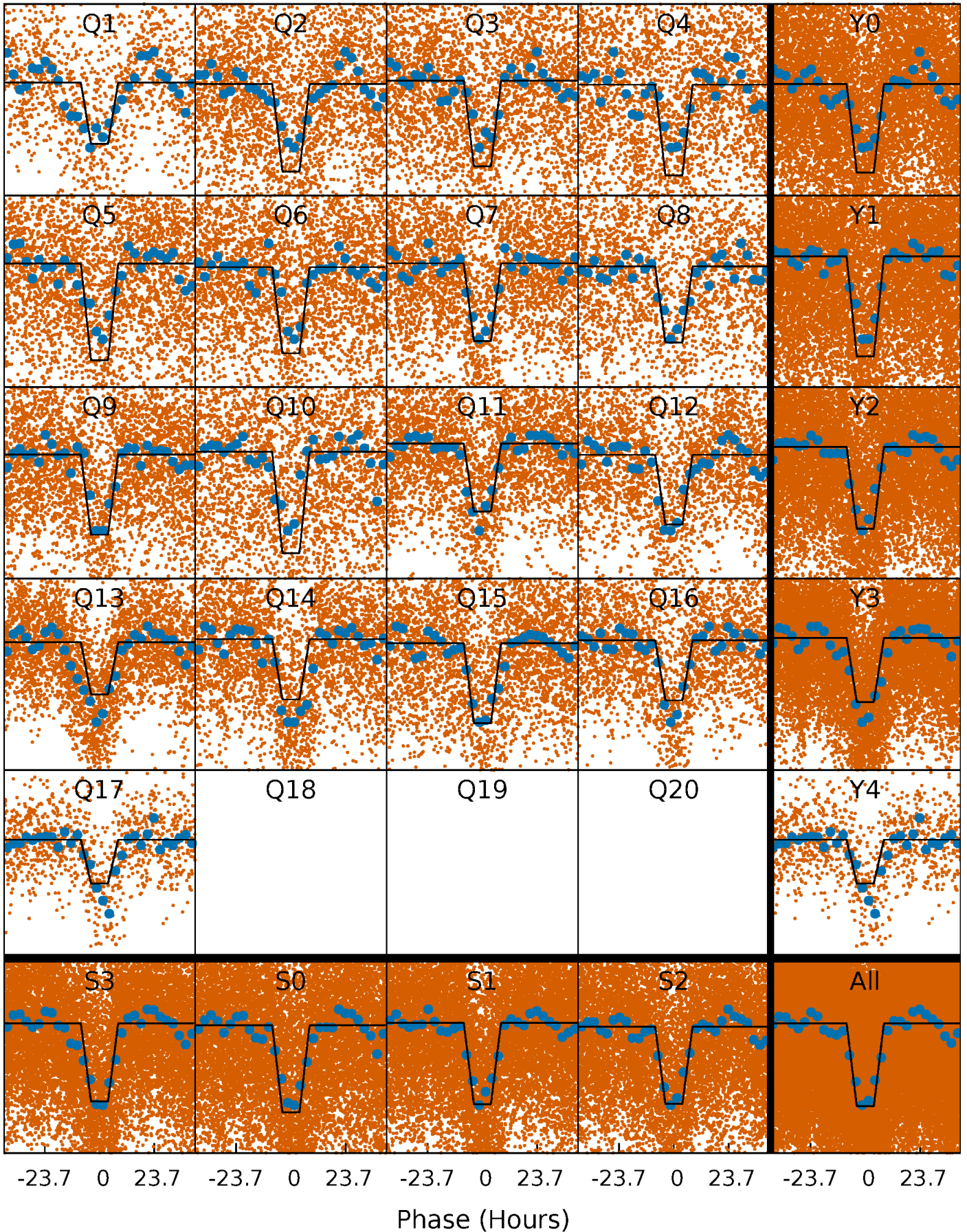
DV Quarter-Phased Transit Curves

TCE 012455315-01 P= 4.187112 Days $T_0=133.540727$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

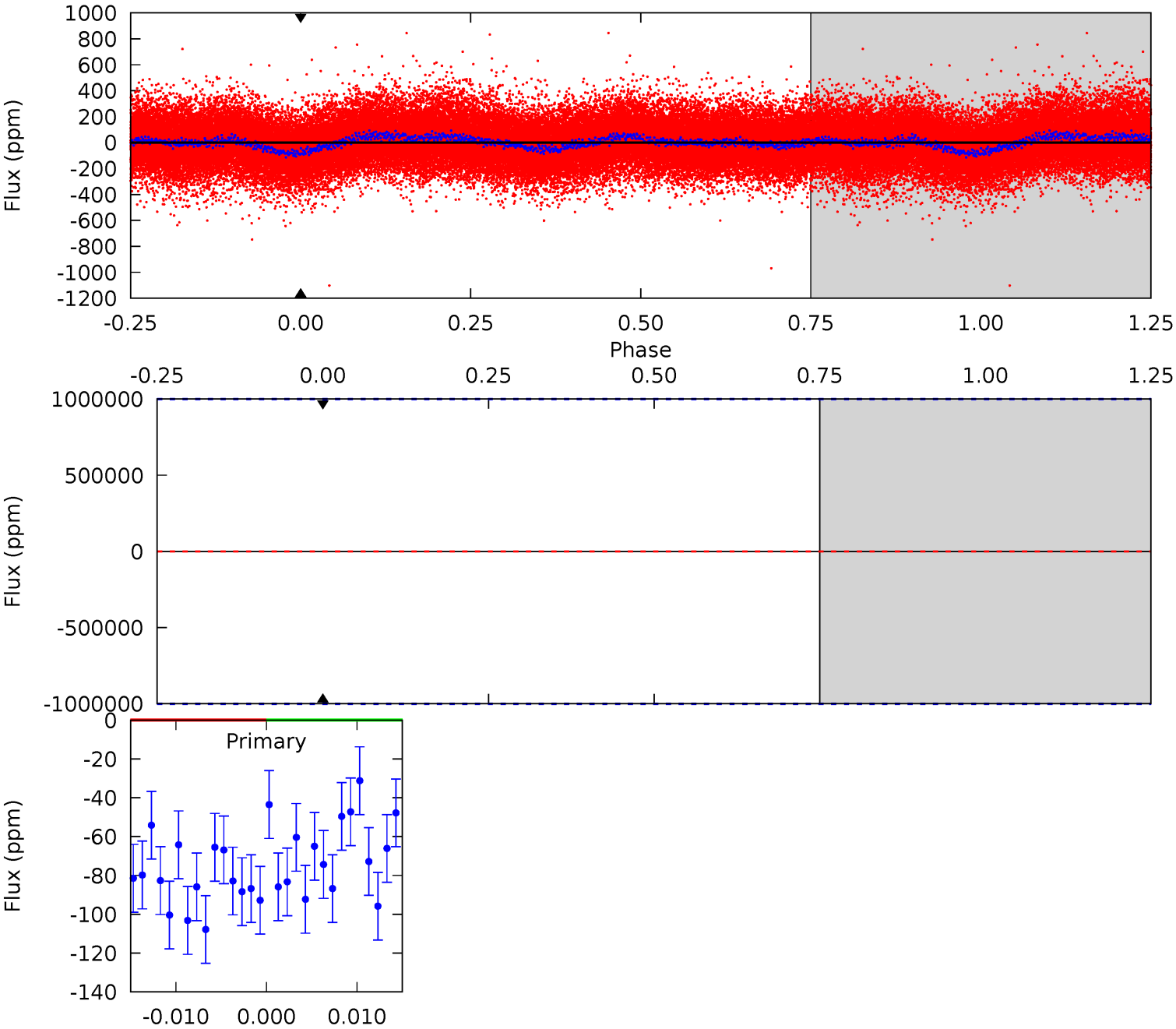
TCE 012455315-01 P= 4.187112 Days $T_0=133.512017$ (BKJD)



DV Model-Shift Uniqueness Test

012455315-01, P = 4.187112 Days, E = 129.353615 Days

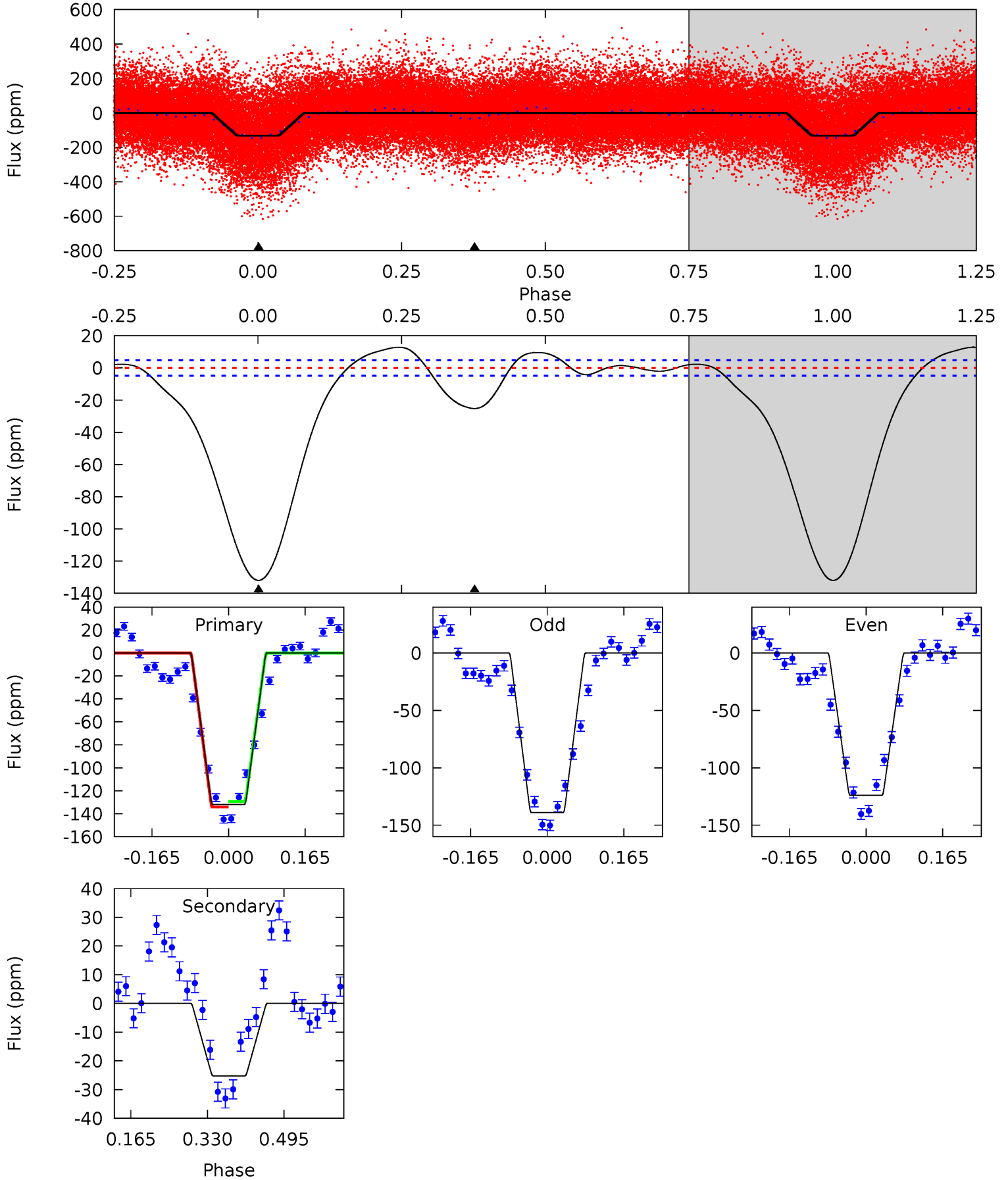
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-----|-----|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|
| 0 | 0 | 0 | 0 | 1.00 | 1.00 | 1.00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |



Alt Model-Shift Uniqueness Test

012455315-01, P = 4.187112 Days, E = 129.324905 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 121.5 | 23.2 | 0 | 0 | 4.46 | 1.39 | 3.81 | 121.5 | 121.5 | 23.2 | 23.2 | 6.92 | 1.12 | 0.09 | 2.21 |



Stellar Parameters For KIC 012455315

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6865^{+163}_{-204} | $3.747^{+0.292}_{-0.097}$ | $-0.160^{+0.300}_{-0.250}$ | $2.908^{+0.452}_{-1.129}$ | $1.723^{+0.163}_{-0.380}$ | $0.099^{+0.204}_{-0.031}$ |
| | +2%/-3% | +8%/-3% | +188%/-156% | +16%/-39% | +9%/-22% | +207%/-32% |
| Source | PHO1 | FLK73 | 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 012455315-01 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|-----------------|---------------------------|----------------------|--------------------------|-------------------------------|
| DV | 0 ± 1000000 | $20.64^{+24.53}_{-14.83}$ | 2870^{+172}_{-238} | 4010^{+33114}_{-36876} | $1.662^{+915.870}_{-783.399}$ |
| Alt. | -25 ± 1 | $21.08^{+22.87}_{-14.16}$ | 2870^{+168}_{-243} | -2753^{+6192}_{-243} | $0.115^{+0.903}_{-0.089}$ |

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 $A_{obs} \gg 1.0$

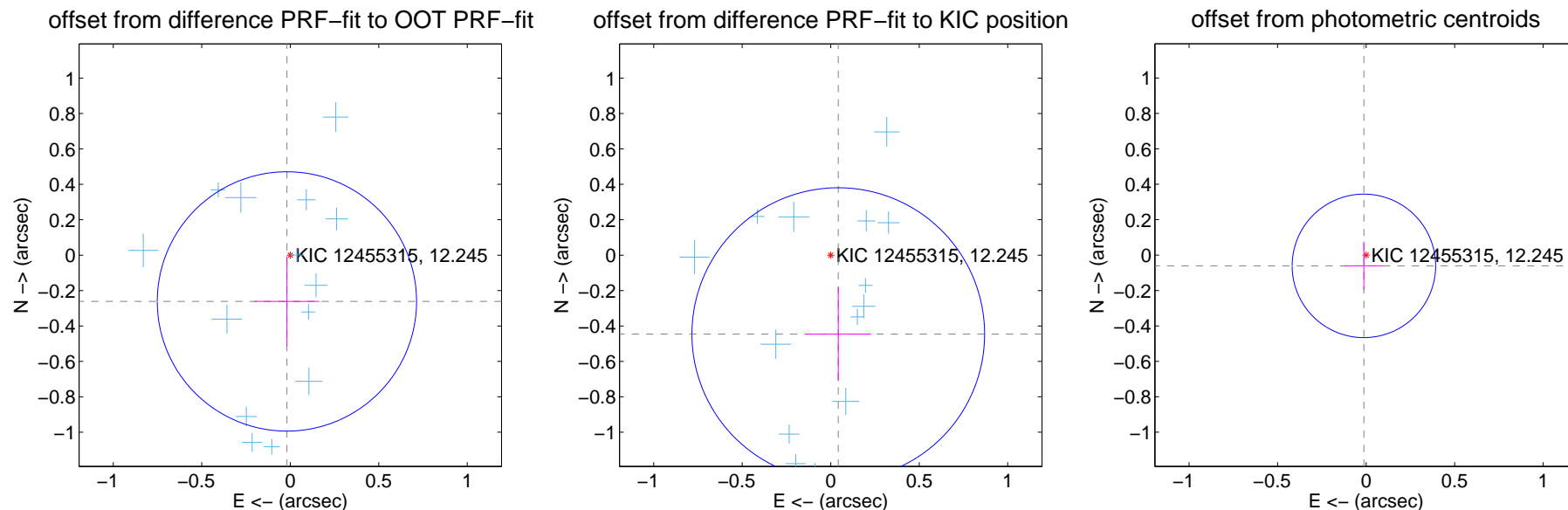
DV Centroid Data

Supplemental centroid analysis for 012455315-01. Kepler magnitude: 12.24. Transit SNR -1.00

There are 16 quarters with good PRF difference image offsets

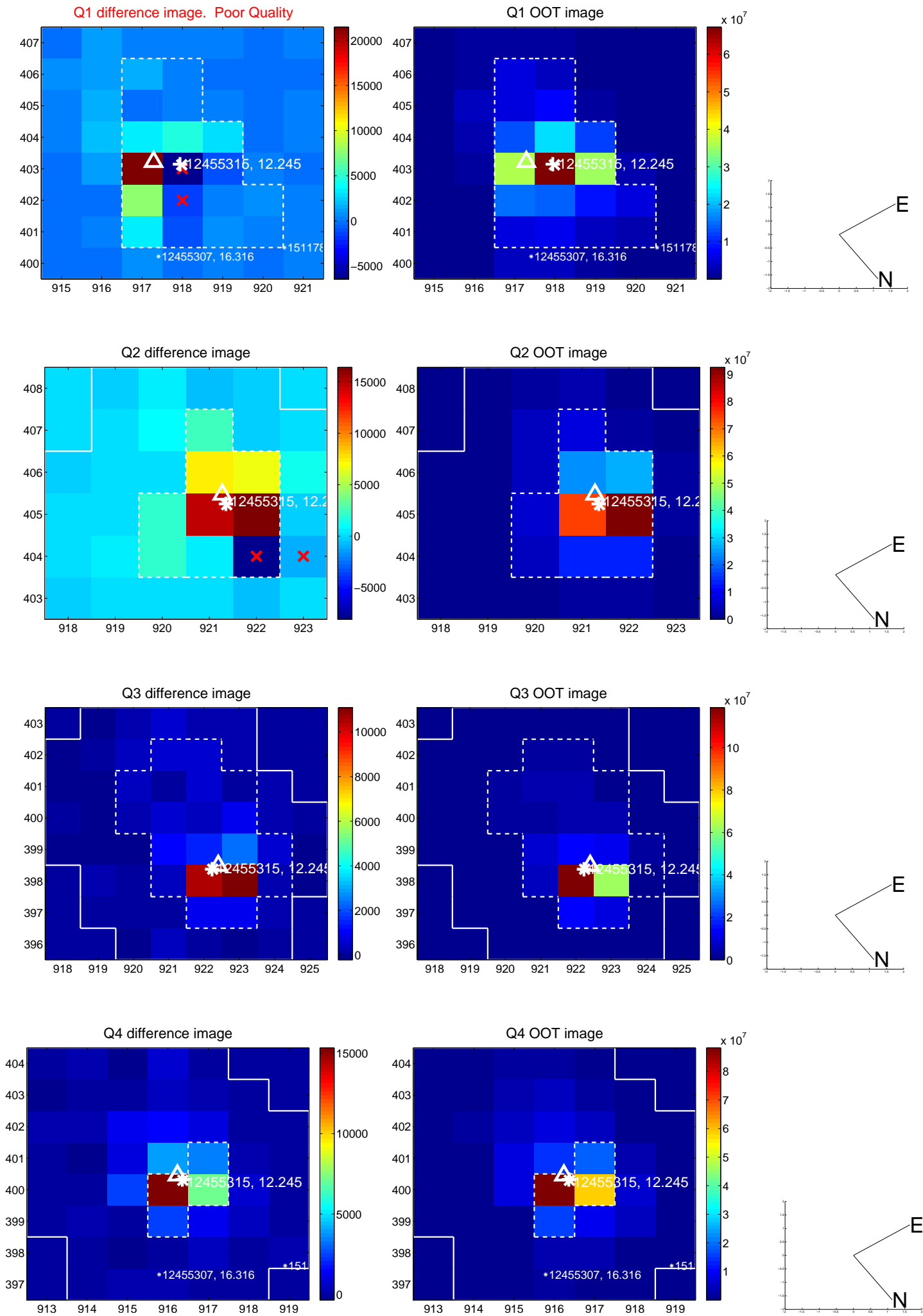
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.262 ± 0.244 | 1.07 | 0.019 ± 0.184 | -0.261 ± 0.253 |
| PRF-fit source offset from KIC position | 0.448 ± 0.276 | 1.63 | -0.043 ± 0.186 | -0.446 ± 0.265 |
| photometric centroid source offset | 0.06 ± 0.14 | 0.46 | 0.01 ± 0.11 | -0.06 ± 0.14 |

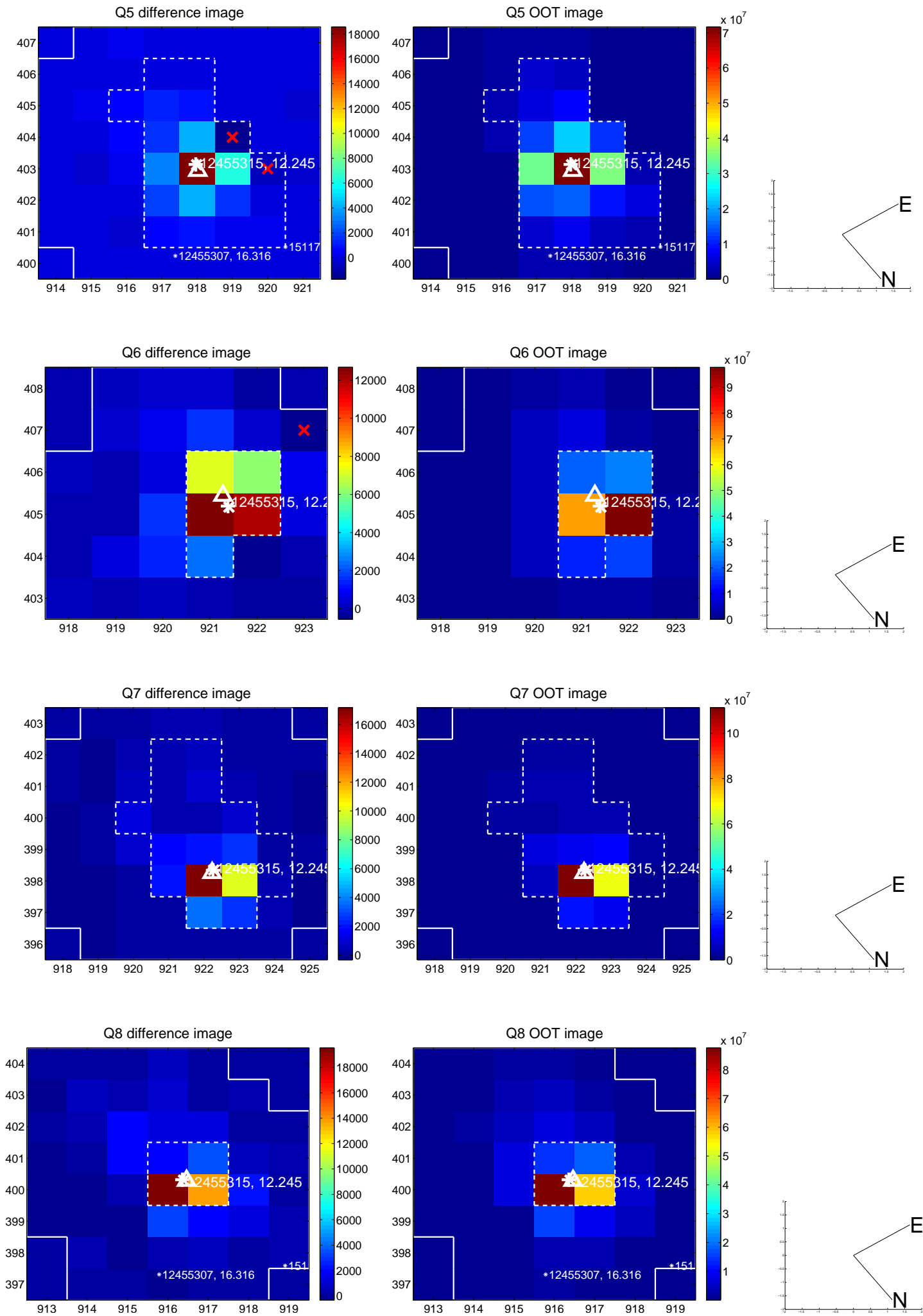


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

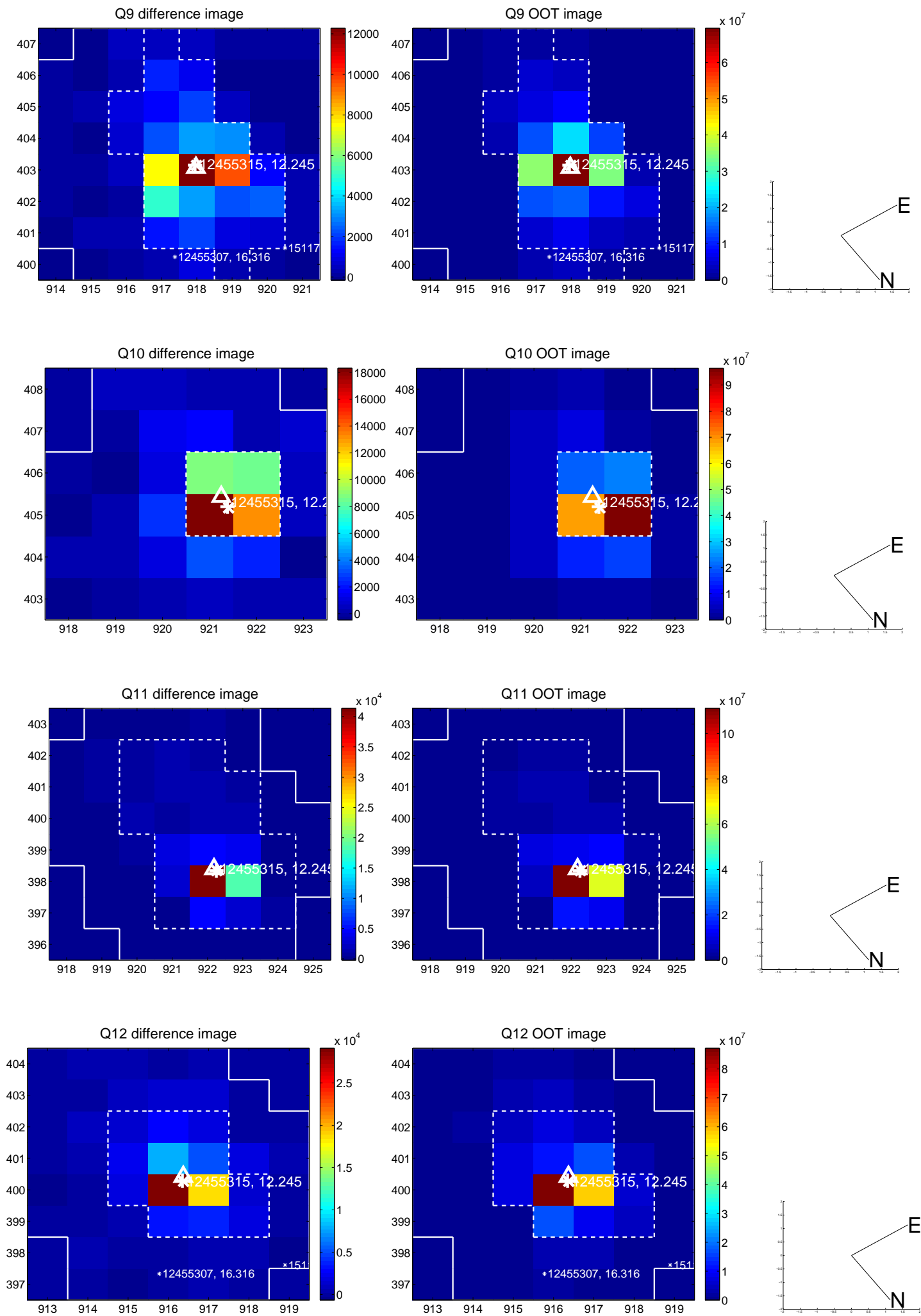
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



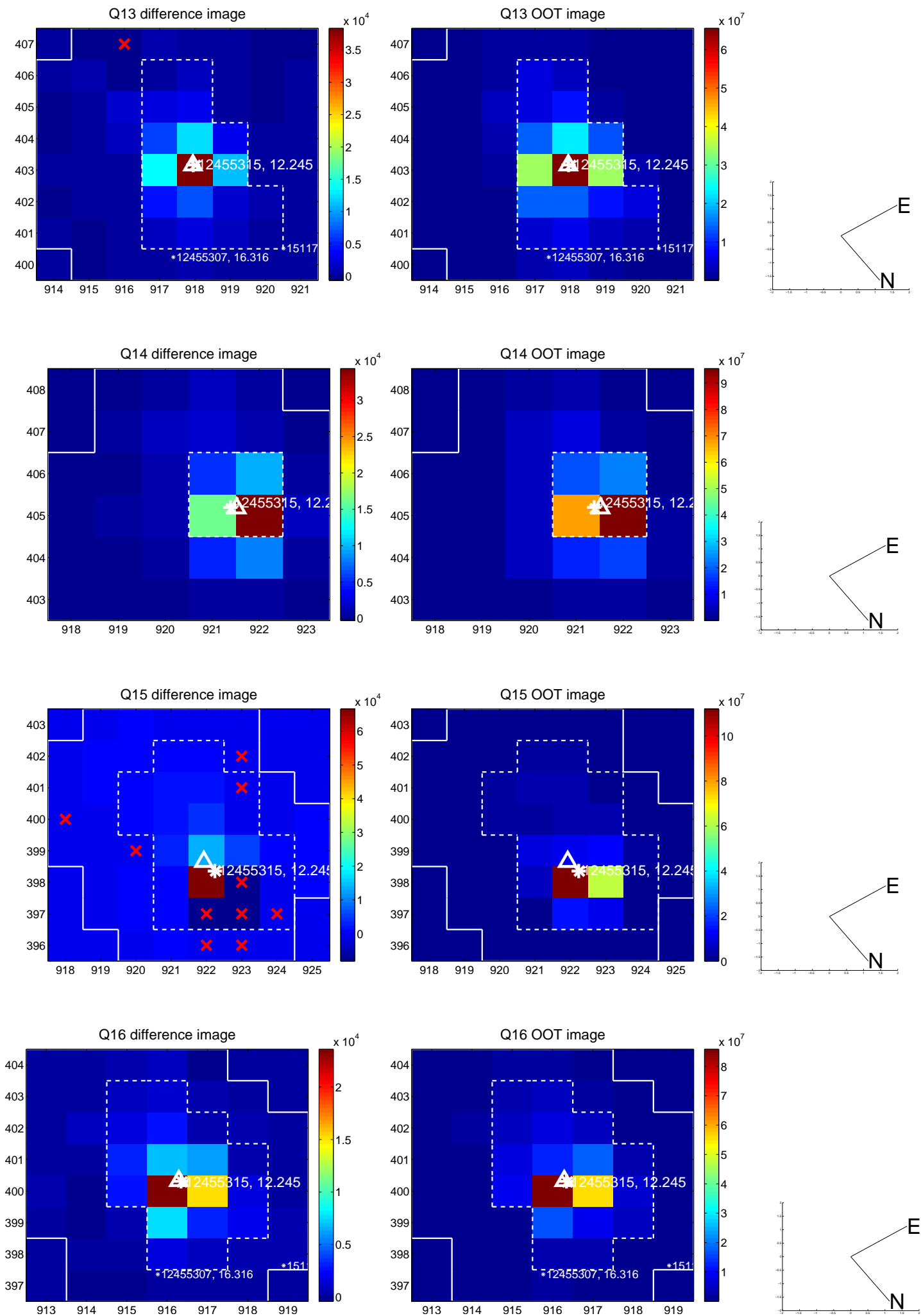
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



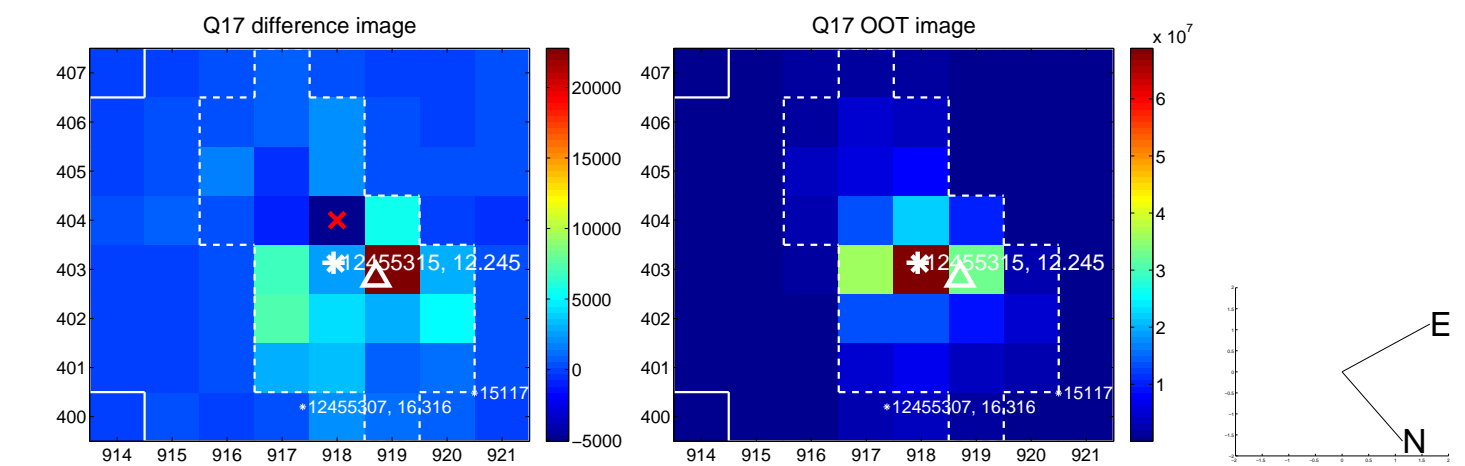
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



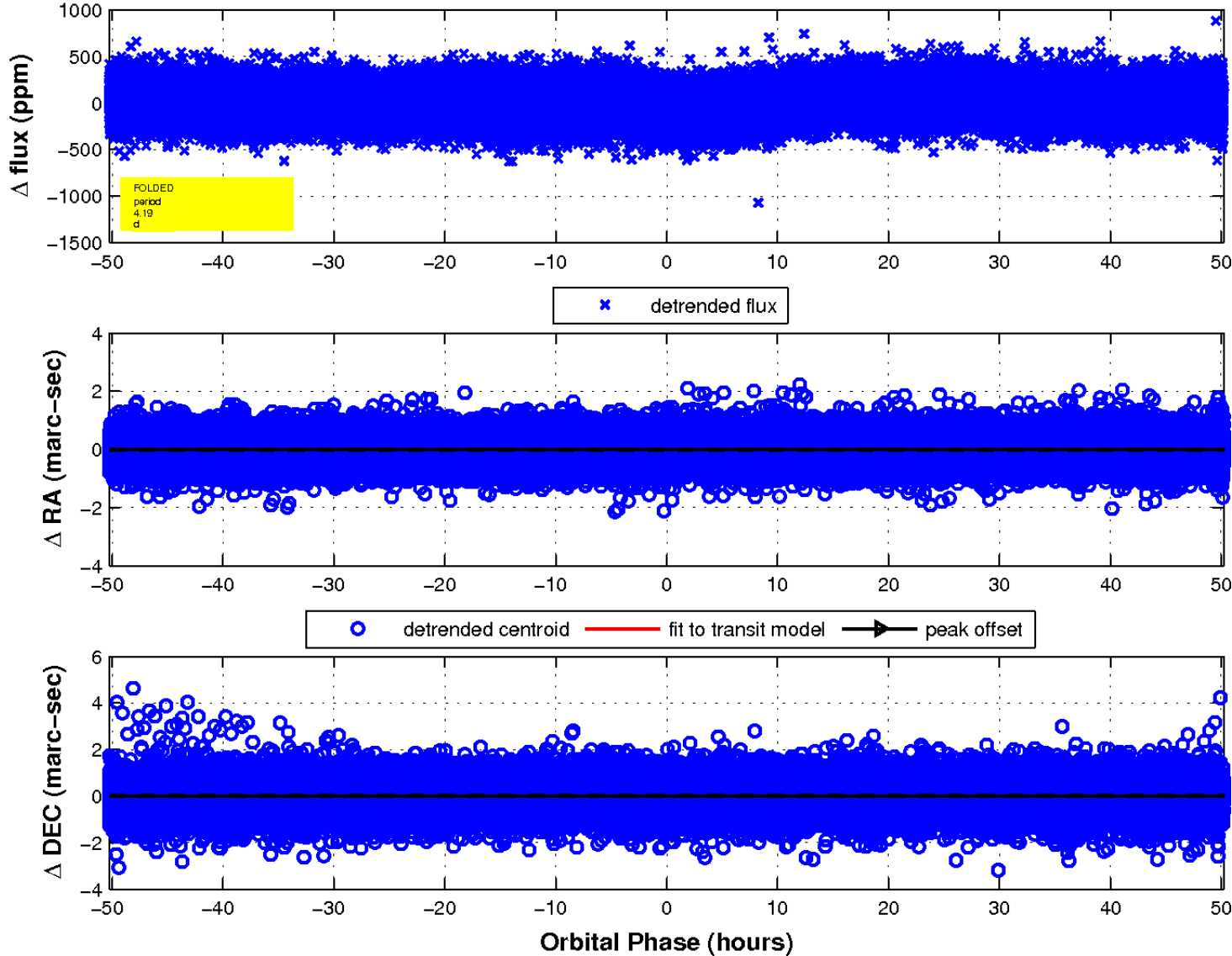
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

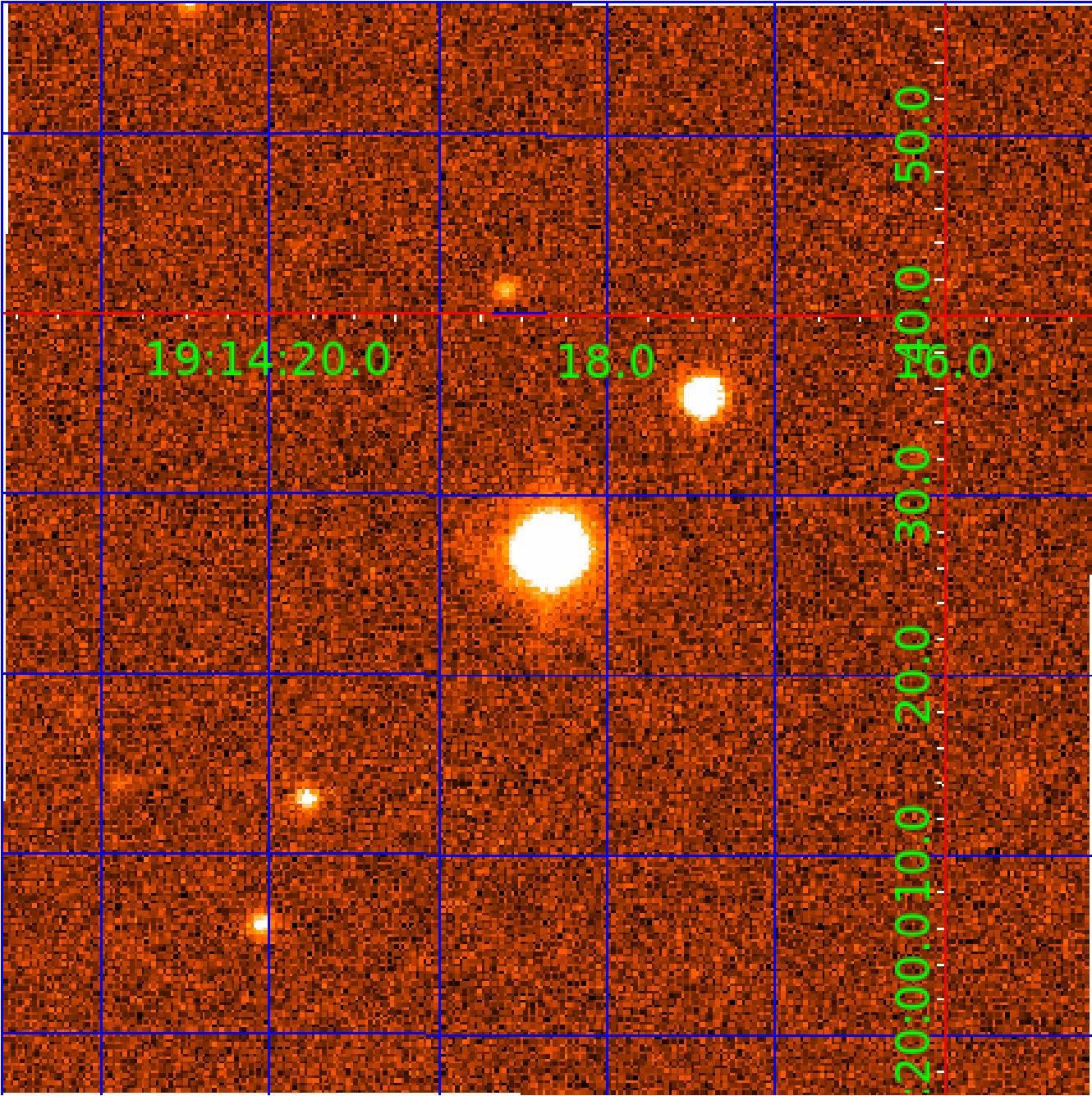


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 012455315

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 012455315-01 | OBS | No | 4.187112 | 133.540727 | 54.6 | 12.500 | 12.5 | -1.0 | 2.91 | 6865 | 2.17 | 4528.63 |
| 012455315-02 | OBS | No | 4.186851 | 135.149091 | 41.9 | 15.102 | 13.6 | 12.9 | 2.91 | 6865 | 2.25 | 4529.00 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|--|
| 012455315-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—CENT_NOFITS |
| 012455315-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD |

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

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

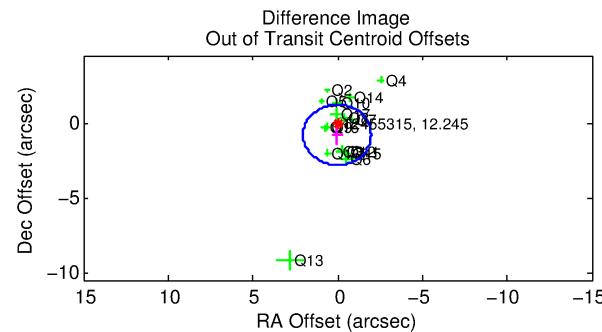
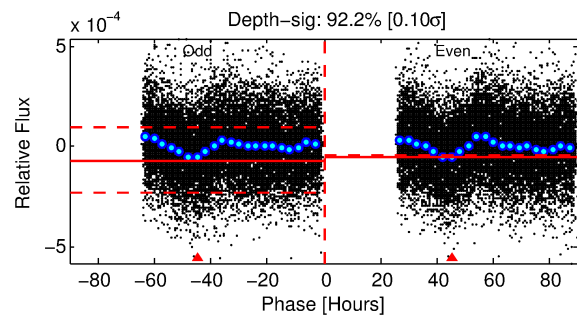
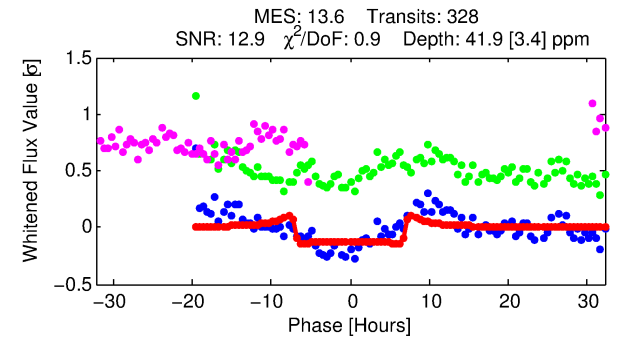
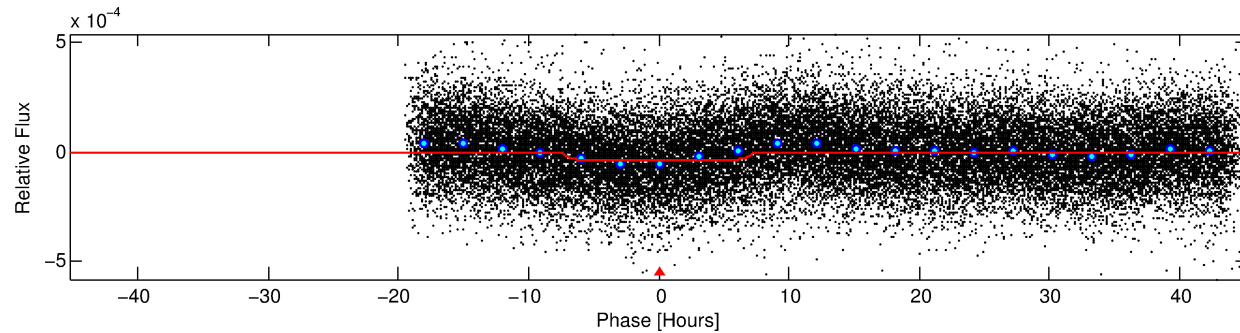
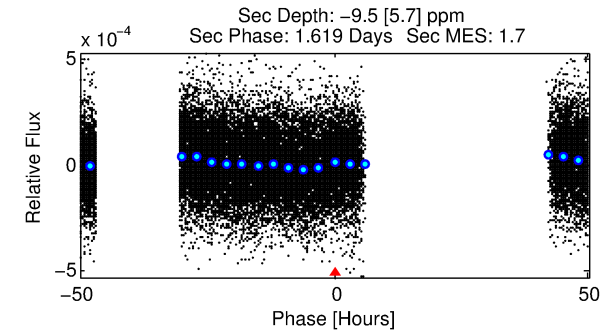
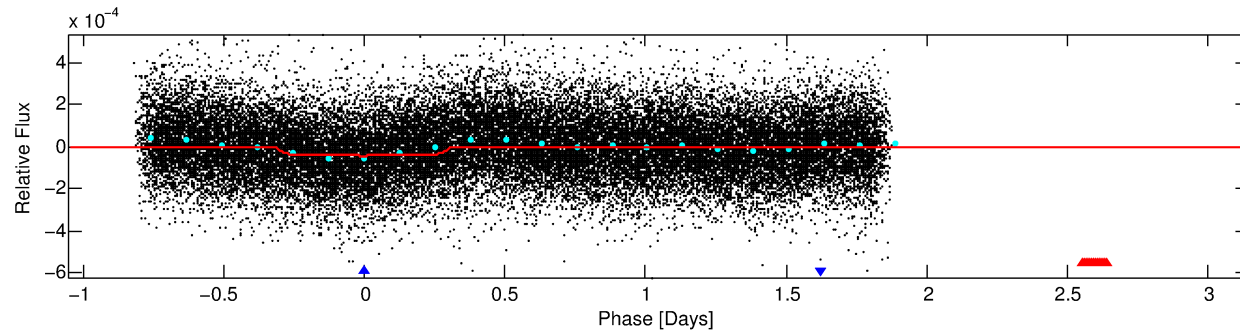
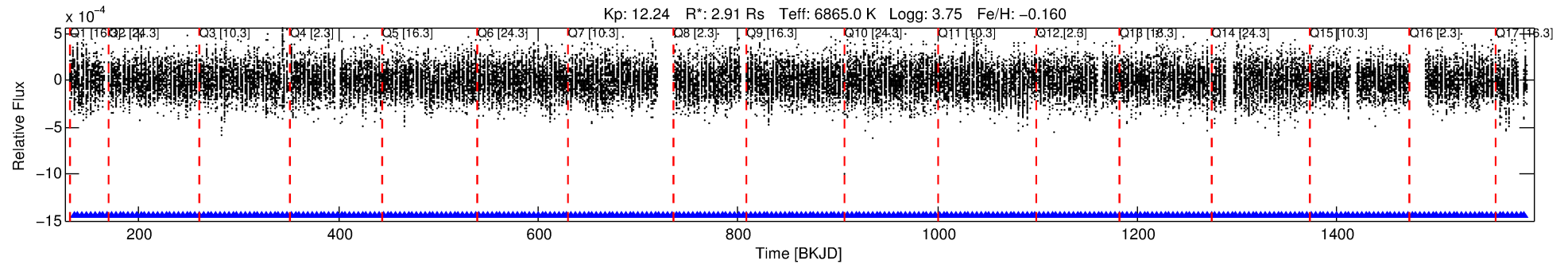
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 012455315-02

No Significant Match Found

DV One-Page Summary

KIC: 12455315 Candidate: 2 of 2 Period: 4.187 d



DV Fit Results:

Period = 4.18685 [0.00004] d
Epoch = 135.1491 [0.0065] BKJD
Rp/R* = 0.0071 [0.0004]
a/R* = 1.26 [0.12]
b = 0.93 [0.04]
Seff = 4529.00 [2405.22]
Teq = 2092 [278] K
Rp = 2.25 [0.88] Re
a = 0.0610 [0.0209] AU
Ag = N/A
Teffp = N/A

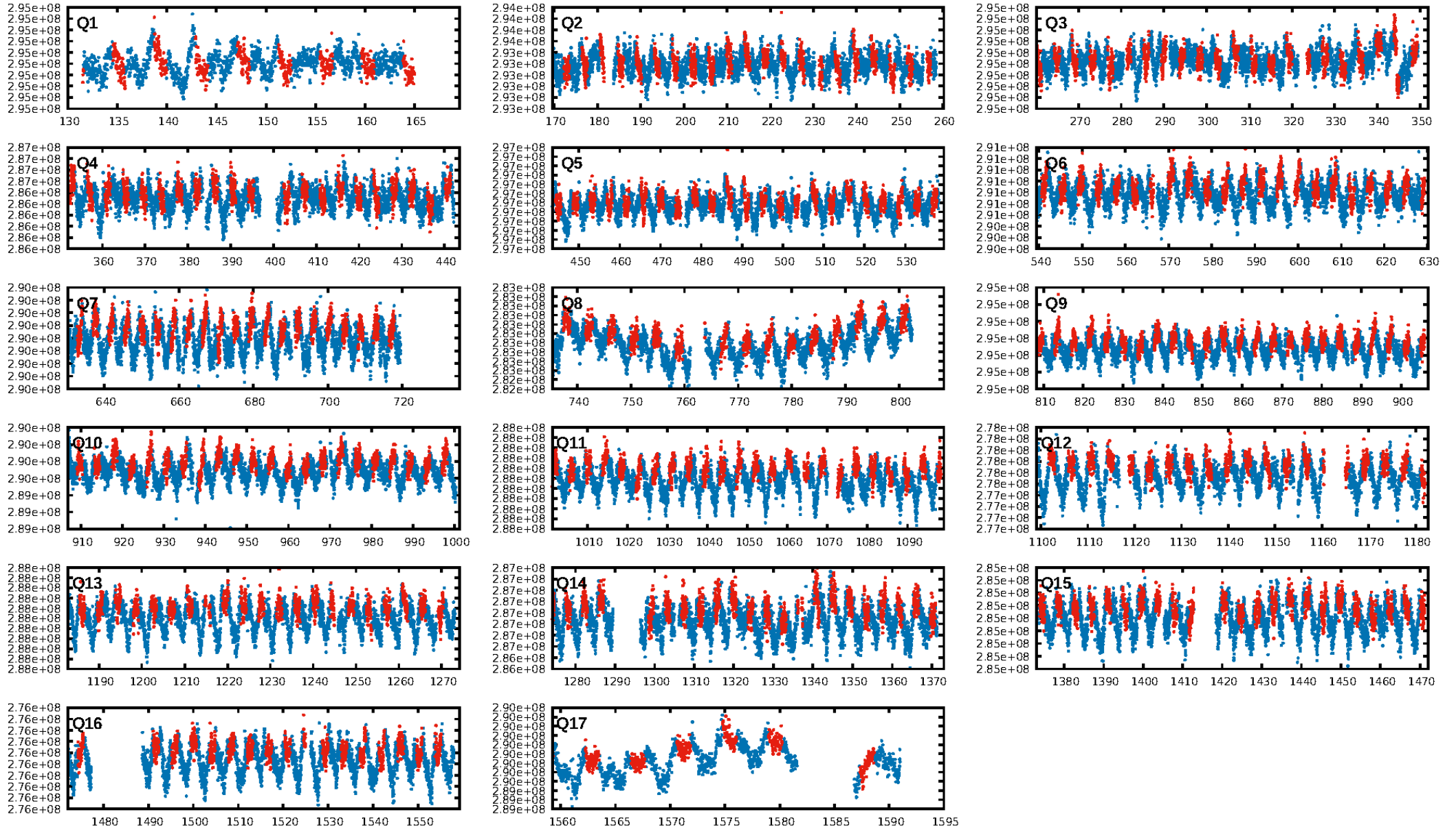
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.06e-14
RollingBand-fgt: 1.00 [314/314]
GhostDiagnostic-chr: 2.258
Centroid-sig: 30.2%
Centroid-so: 0.384 arcsec [0.89σ]
OotOffset-rm: 0.806 arcsec [1.20σ]
KicOffset-rm: 0.909 arcsec [1.37σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.53 [9/17]
DiffImageOverlap-fno: 1.00 [17/17]

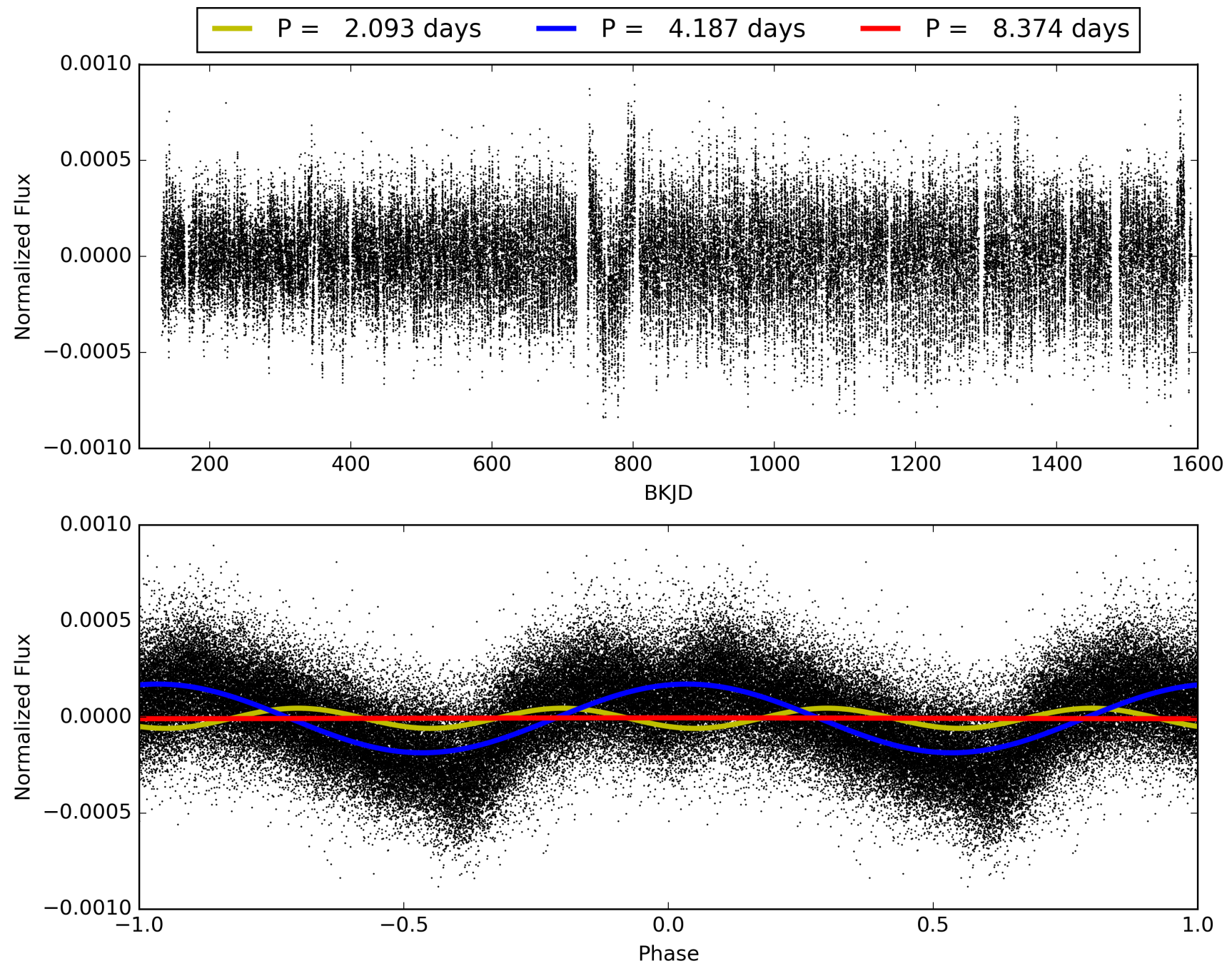
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:08:06 Z

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

TCE 012455315-02, PDC Light Curves

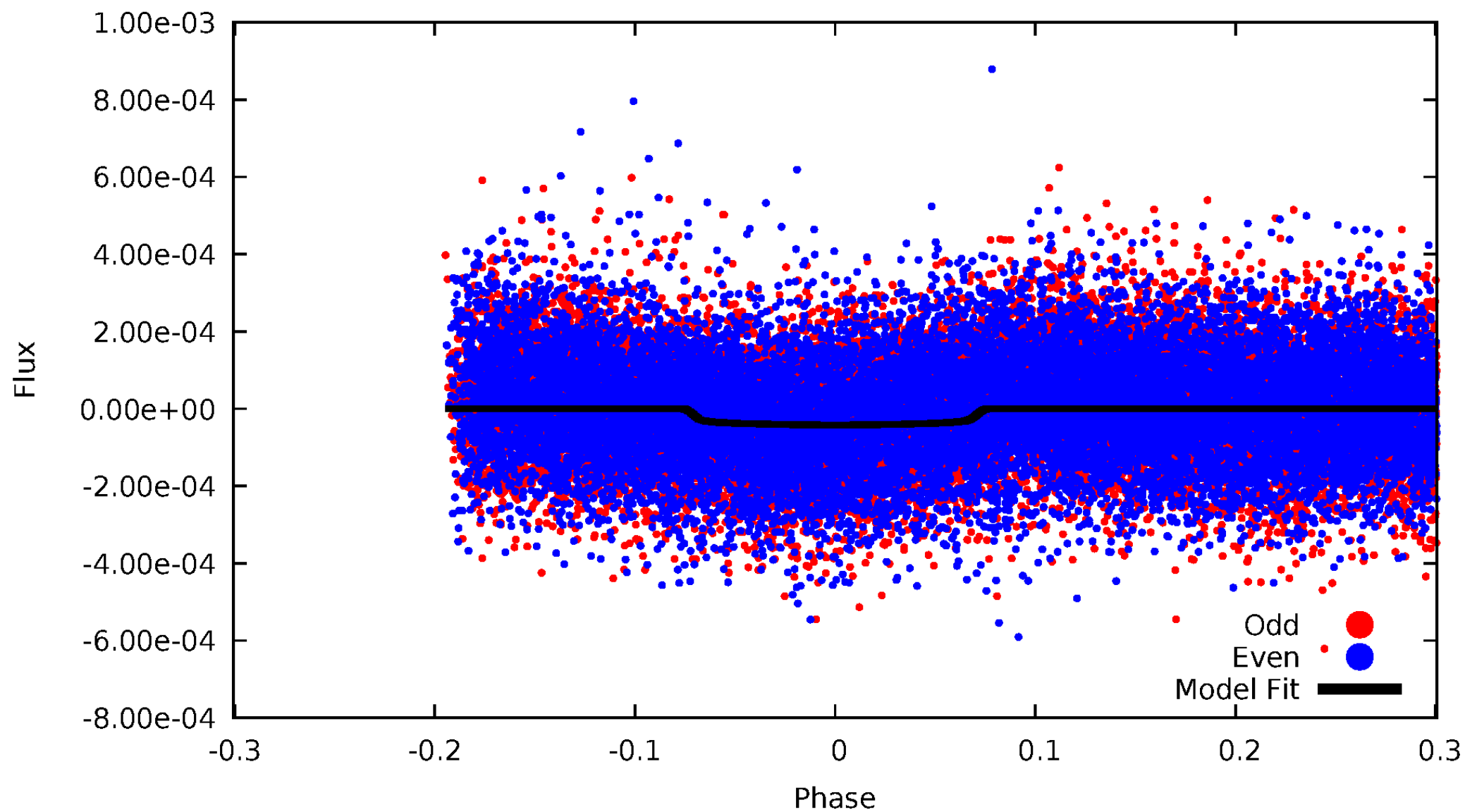


TCE 012455315-02



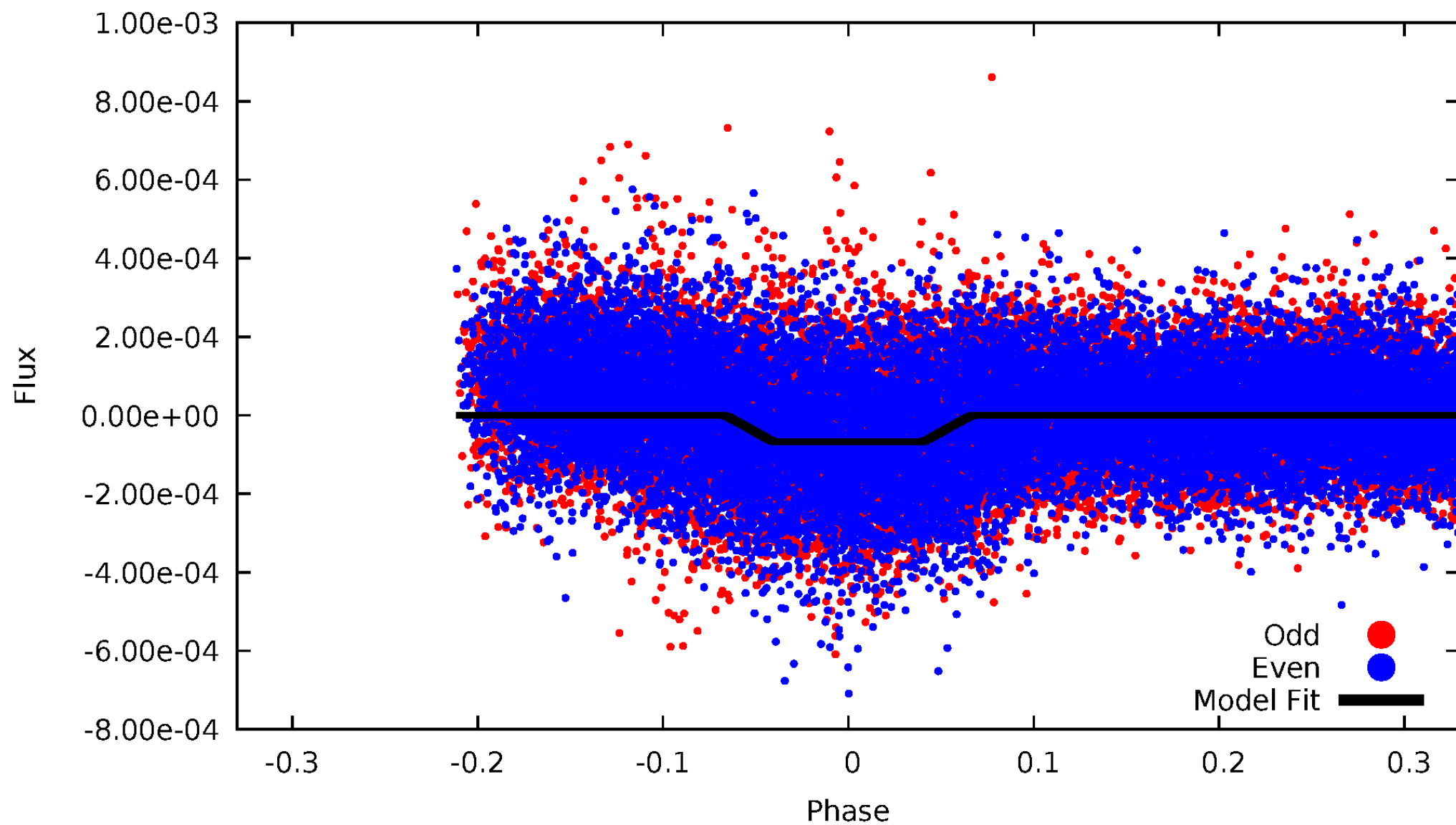
DV Odd/Even

TCE 012455315-02



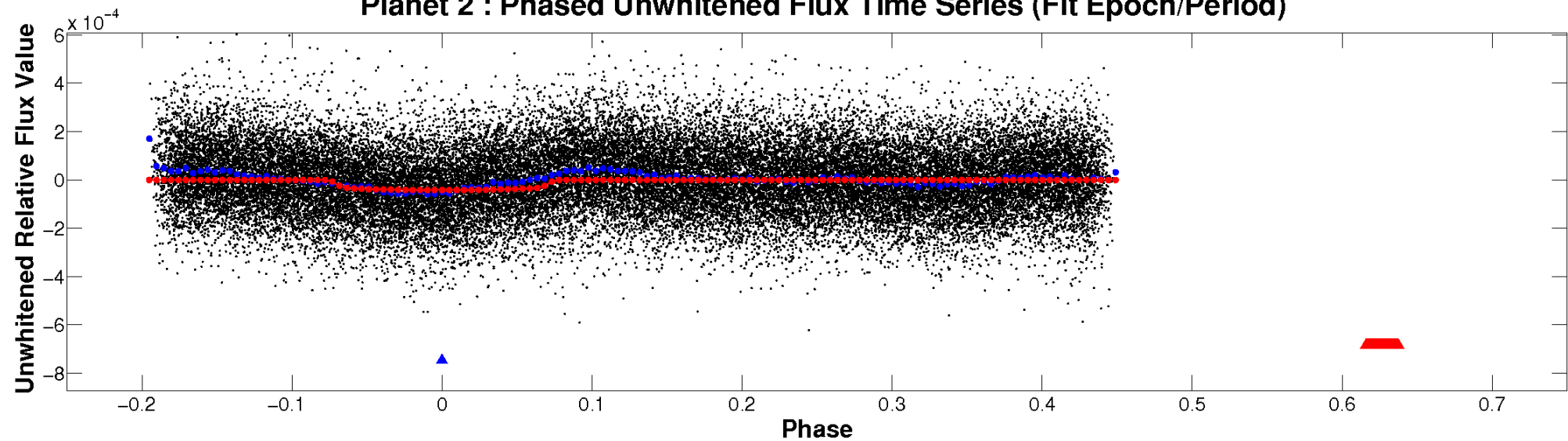
ALT Odd/Even

TCE 012455315-02

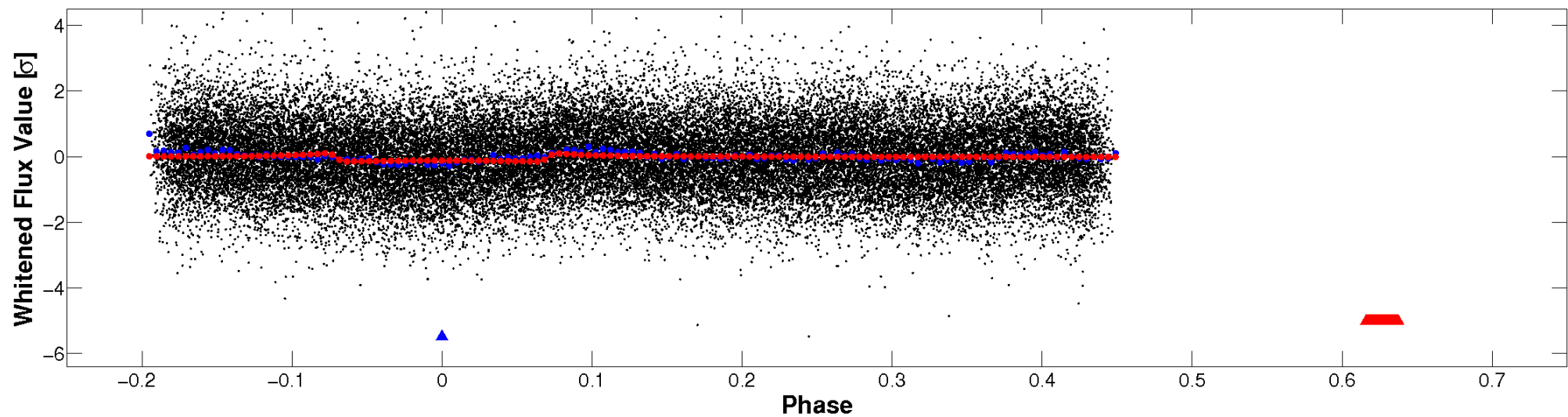


Non-Whitened Vs. Whitened Light Curve

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

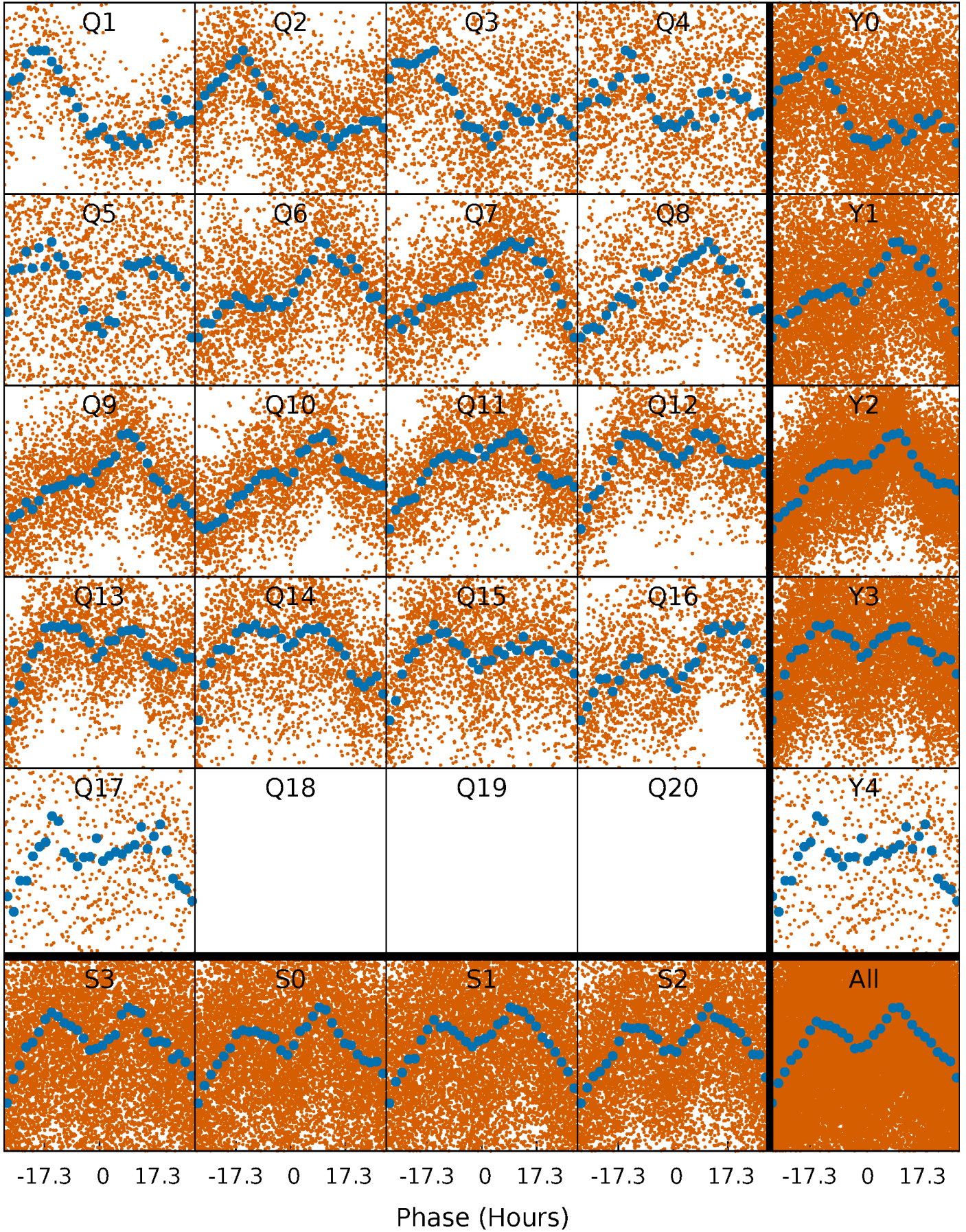


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



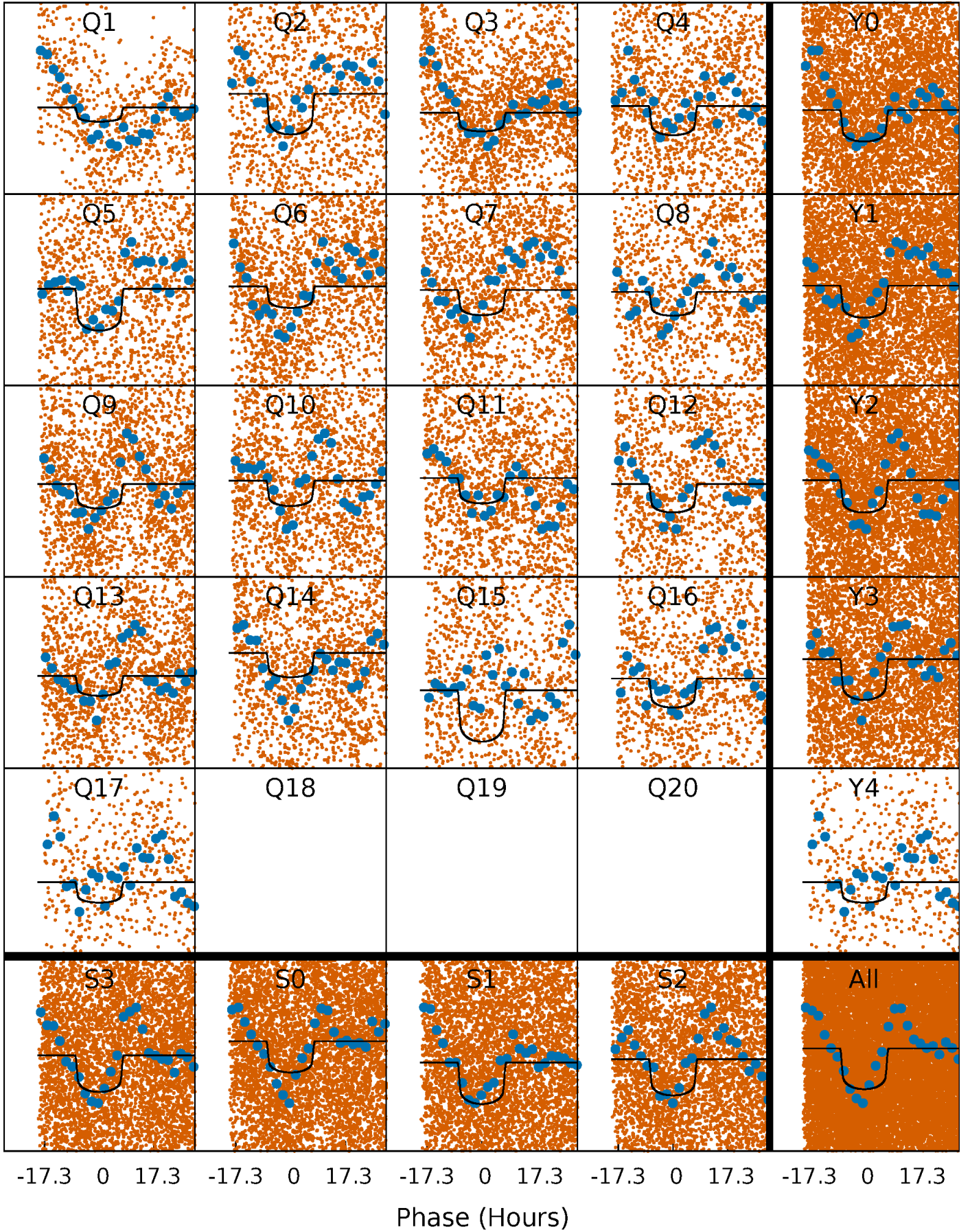
PDC Quarter-Phased Transit Curves

TCE 012455315-02 $P = 4.186851$ Days $T_0 = 135.149091$ (BKJD)



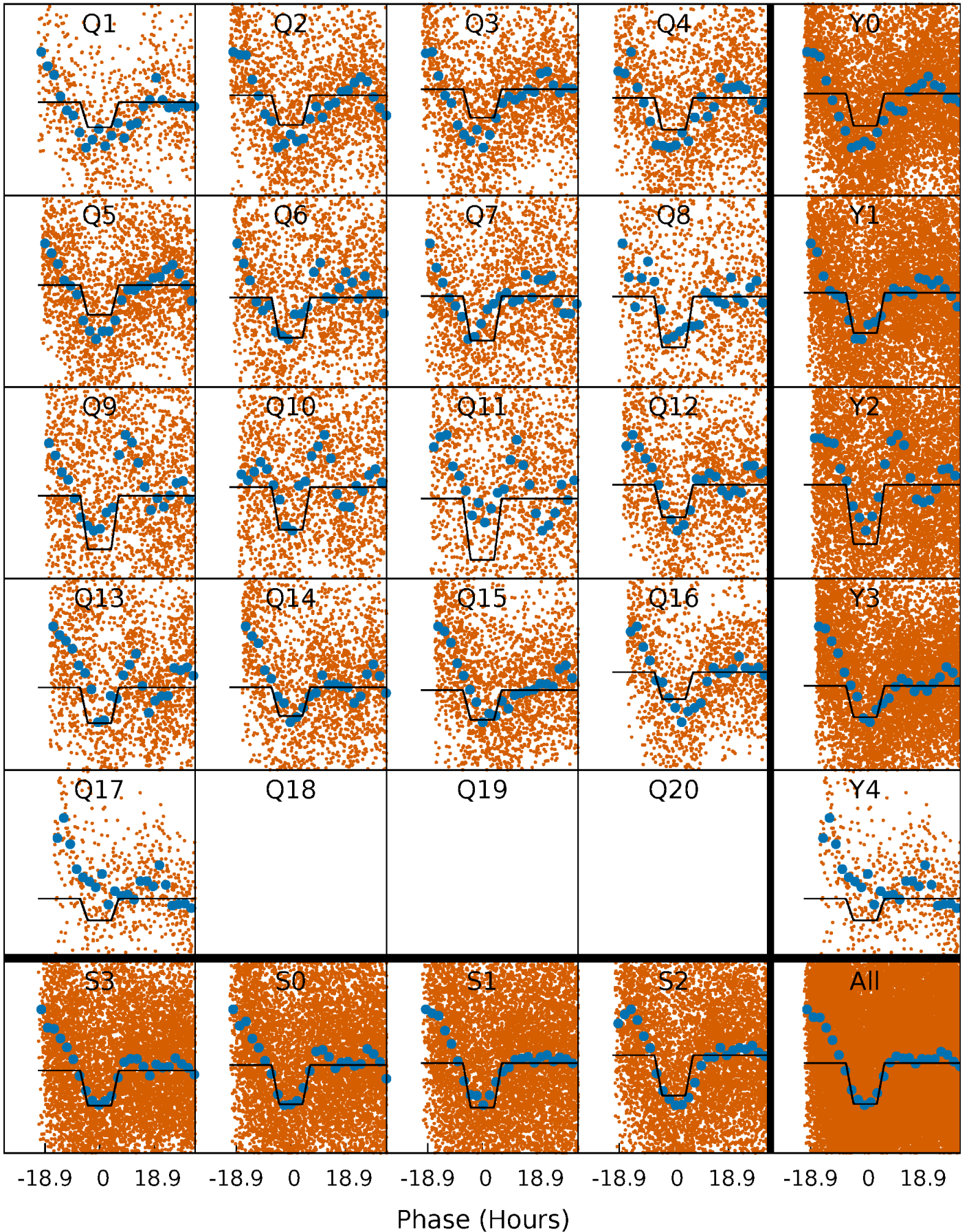
DV Quarter-Phased Transit Curves

TCE 012455315-02 P= 4.186851 Days $T_0=135.149091$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

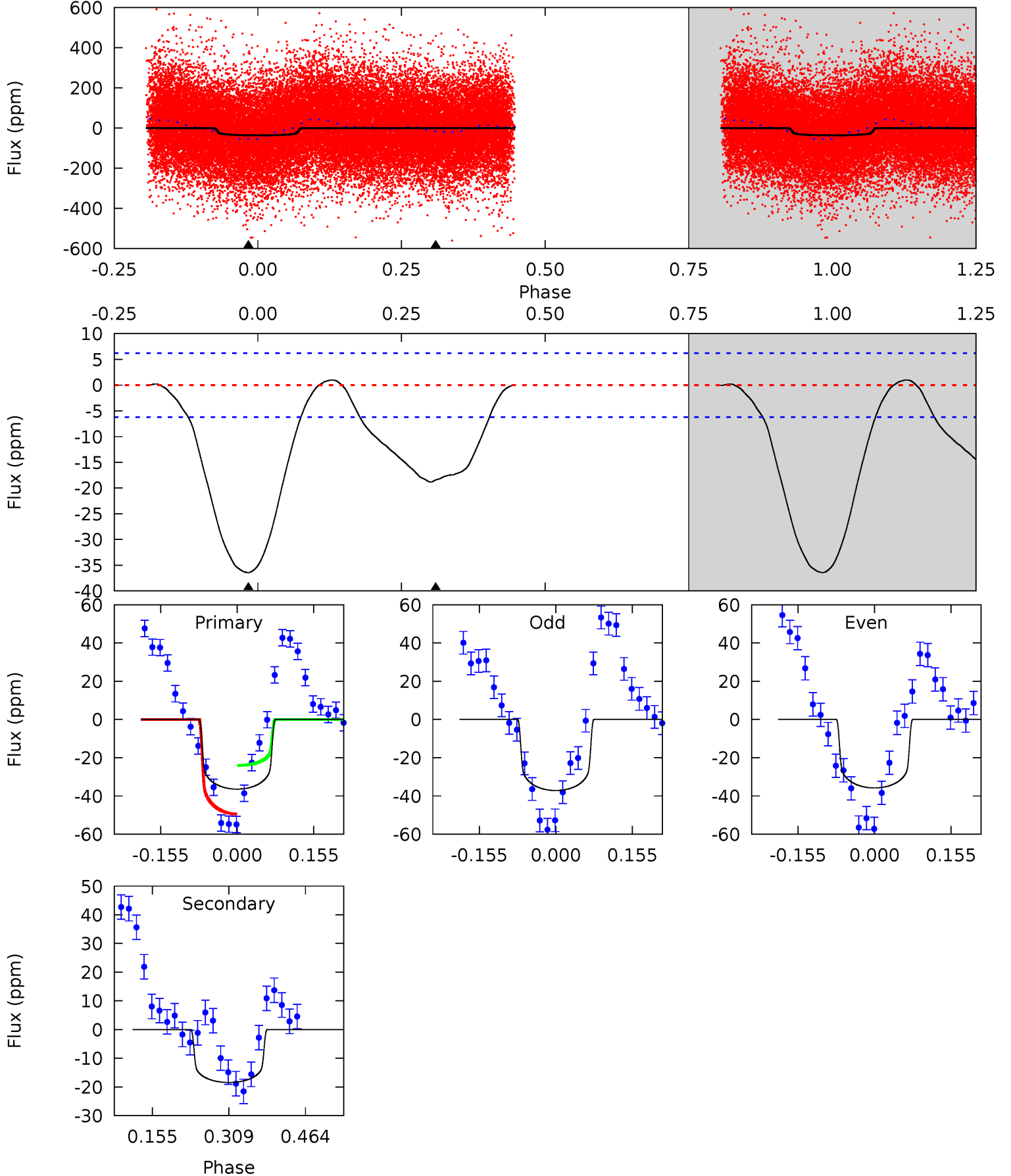
TCE 012455315-02 $P = 4.186443$ Days $T_0 = 135.219119$ (BKJD)



DV Model-Shift Uniqueness Test

012455315-02, P = 4.186851 Days, E = 130.962240 Days

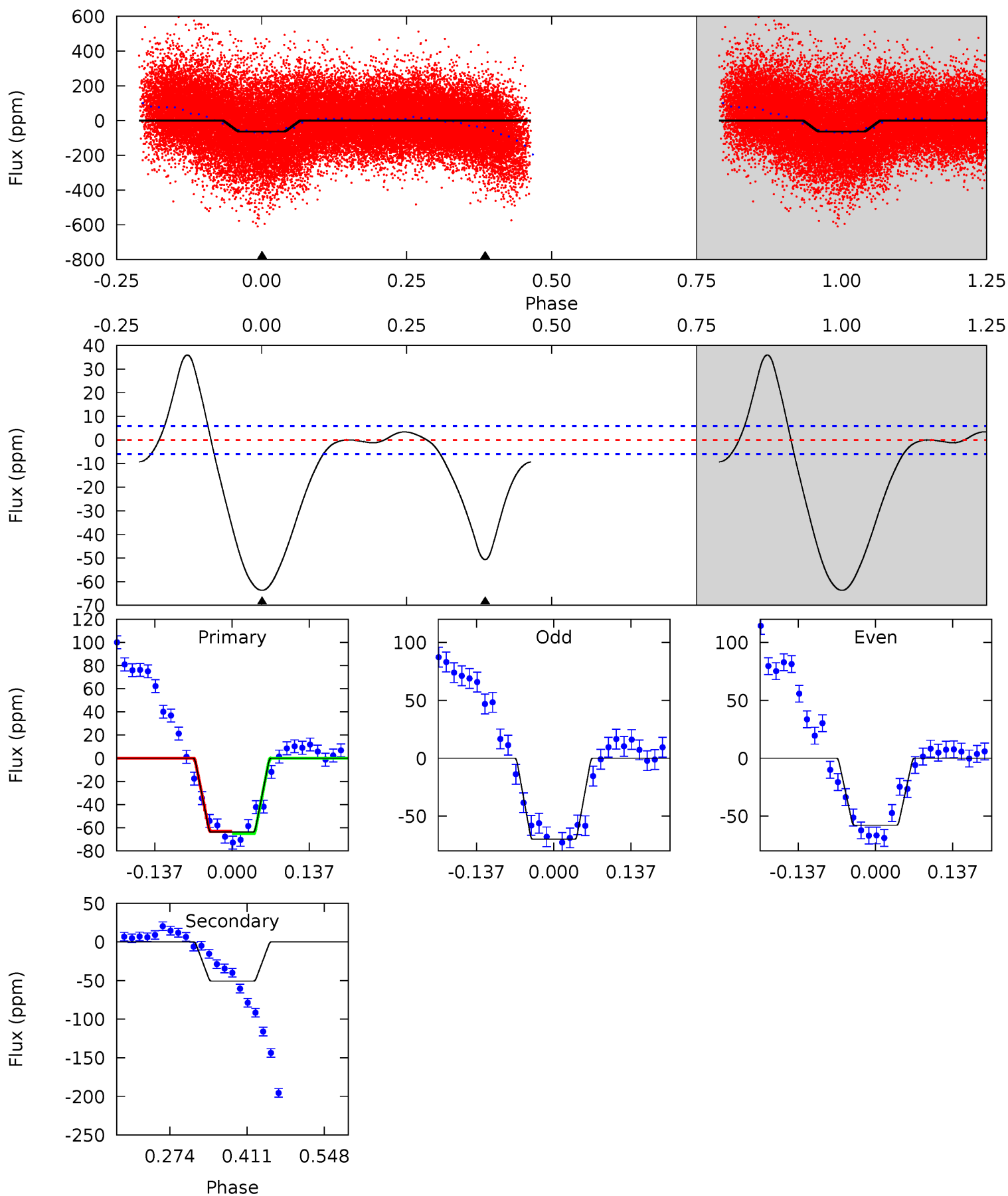
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 26.2 | 13.3 | 0 | 0 | 4.47 | 1.42 | 0.84 | 26.2 | 26.2 | 13.3 | 13.3 | 0.50 | 1.12 | 0.03 | 9.36 |



Alt Model-Shift Uniqueness Test

012455315-02, P = 4.186443 Days, E = 131.032676 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 48.4 | 38.5 | 0 | 0 | 4.50 | 1.49 | 6.75 | 48.4 | 48.4 | 38.5 | 38.5 | 4.59 | 1.00 | 0.36 | 0.64 |



Stellar Parameters For KIC 012455315

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6865^{+163}_{-204} | $3.747^{+0.292}_{-0.097}$ | $-0.160^{+0.300}_{-0.250}$ | $2.908^{+0.452}_{-1.129}$ | $1.723^{+0.163}_{-0.380}$ | $0.099^{+0.204}_{-0.031}$ |
| | +2%/-3% | +8%/-3% | +188%/-156% | +16%/-39% | +9%/-22% | +207%/-32% |
| Source | PHO1 | FLK73 | 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 012455315-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -18 ± 1 | $2.17^{+0.31}_{-0.43}$ | 2864^{+168}_{-258} | 5309^{+198}_{-215} | $8.019^{+3.892}_{-1.743}$ |
| Alt. | -51 ± 1 | $2.56^{+0.31}_{-0.48}$ | 2870^{+164}_{-247} | 6293^{+239}_{-220} | 16^{+7}_{-3} |

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

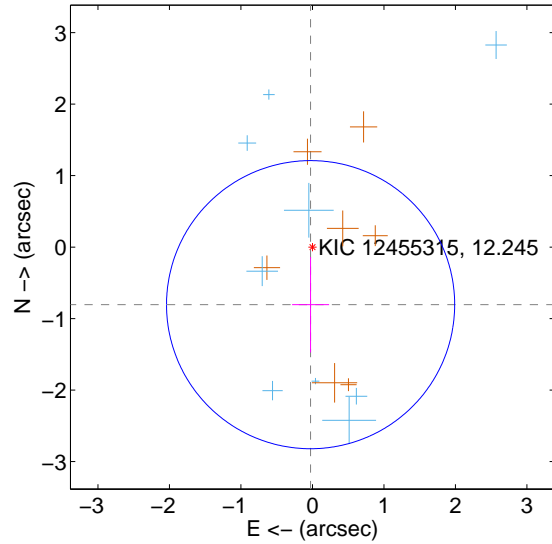
Supplemental centroid analysis for 012455315-02. Kepler magnitude: 12.24. Transit SNR 12.85

There are 9 quarters with good PRF difference image offsets

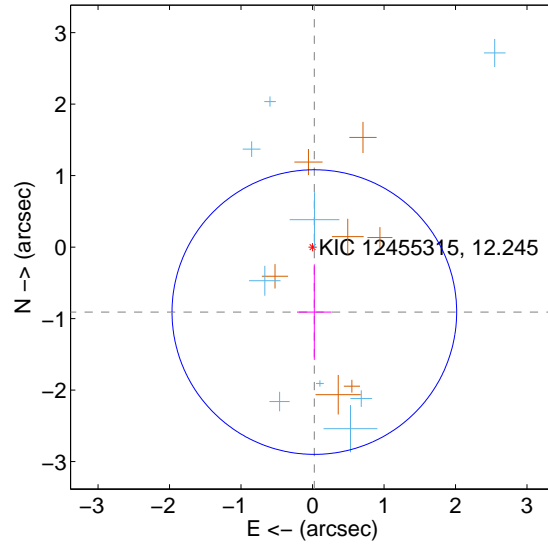
The direct PRF centroid is offset from the target star catalog position by about 0.15 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.806 ± 0.672 | 1.20 | 0.026 ± 0.258 | -0.805 ± 0.667 |
| PRF-fit source offset from KIC position | 0.909 ± 0.664 | 1.37 | -0.025 ± 0.242 | -0.909 ± 0.668 |
| photometric centroid source offset | 0.38 ± 0.43 | 0.89 | 0.02 ± 0.35 | 0.38 ± 0.43 |

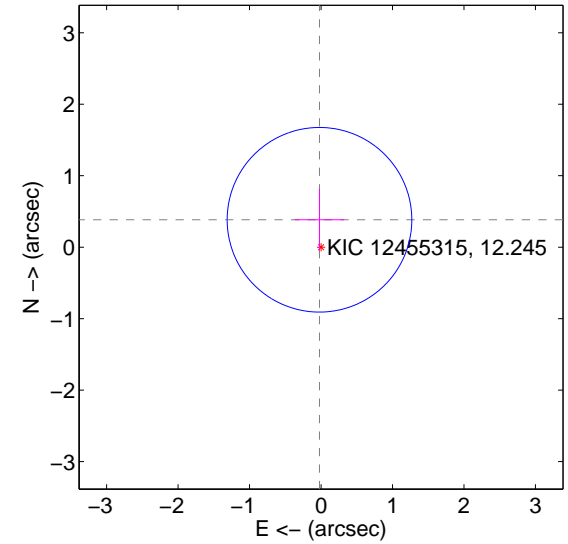
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

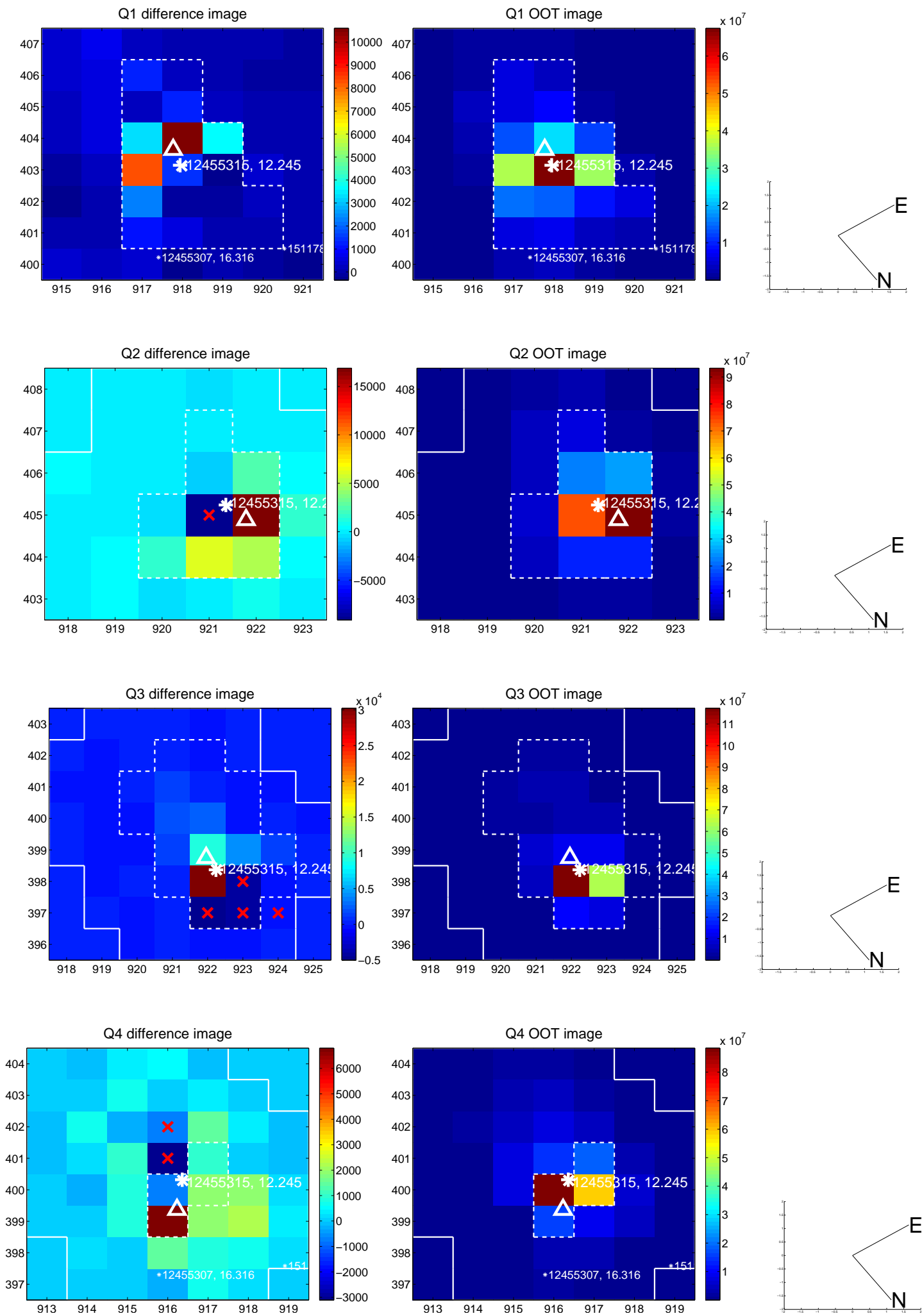


offset from photometric centroids

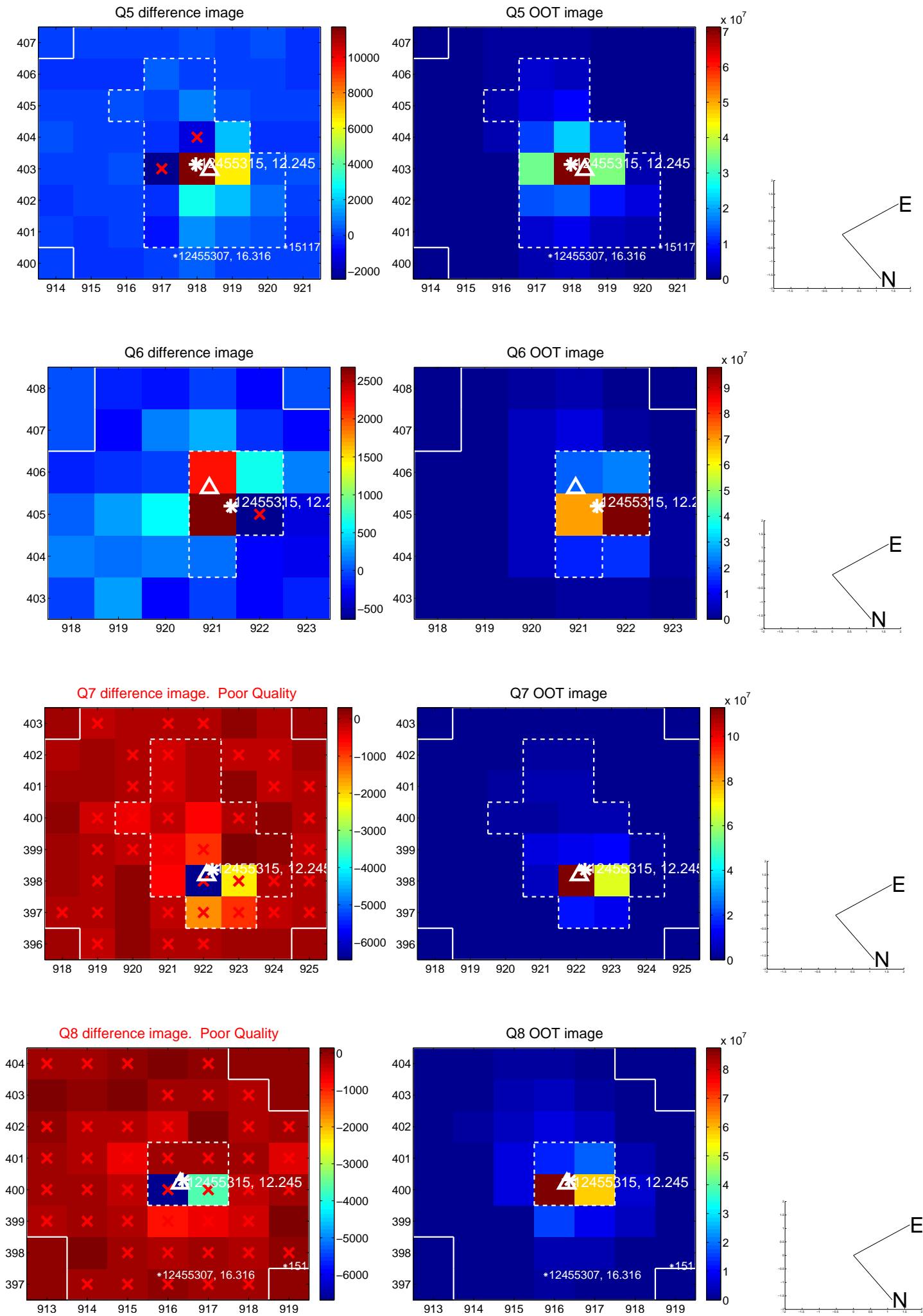


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

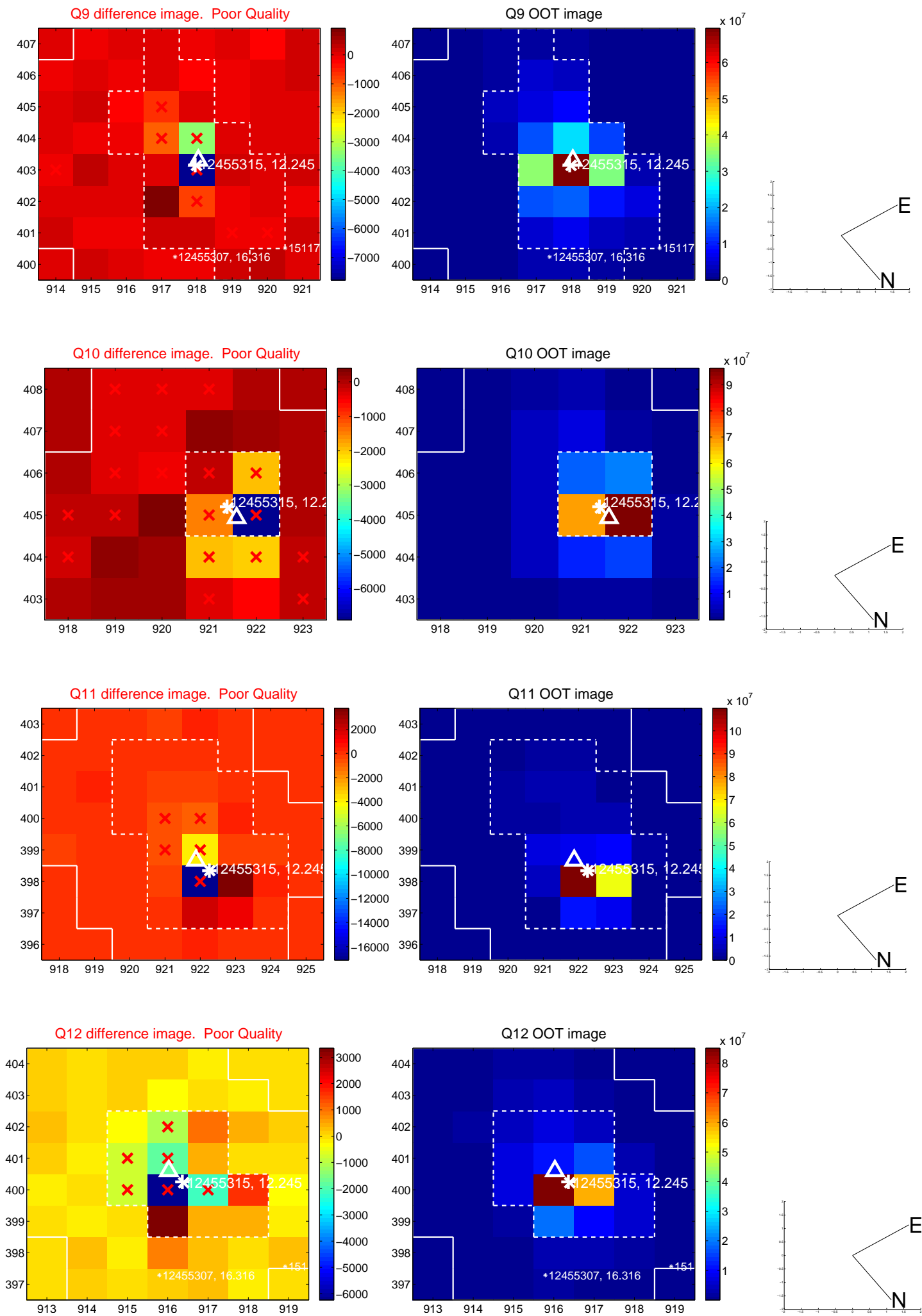
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



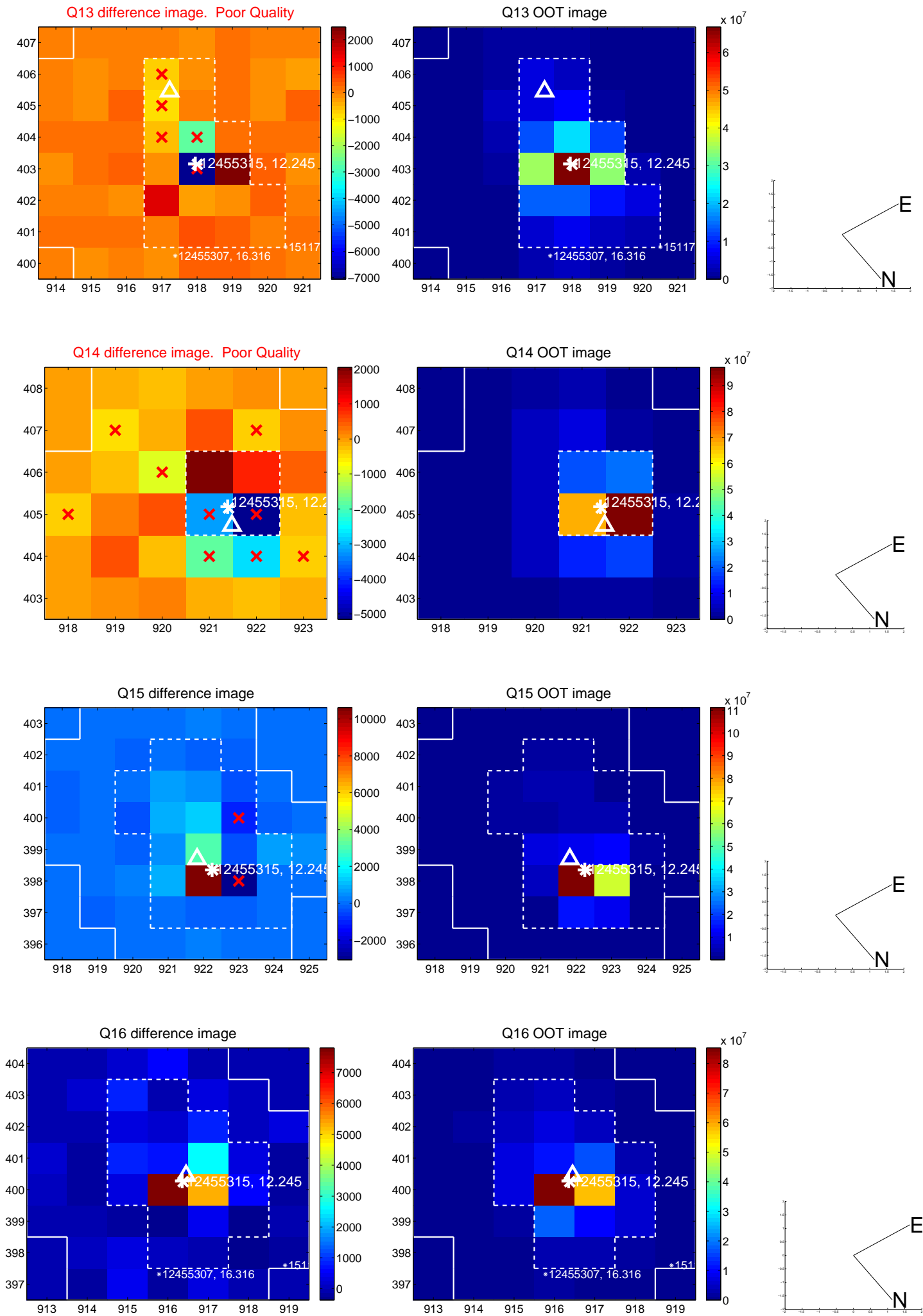
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



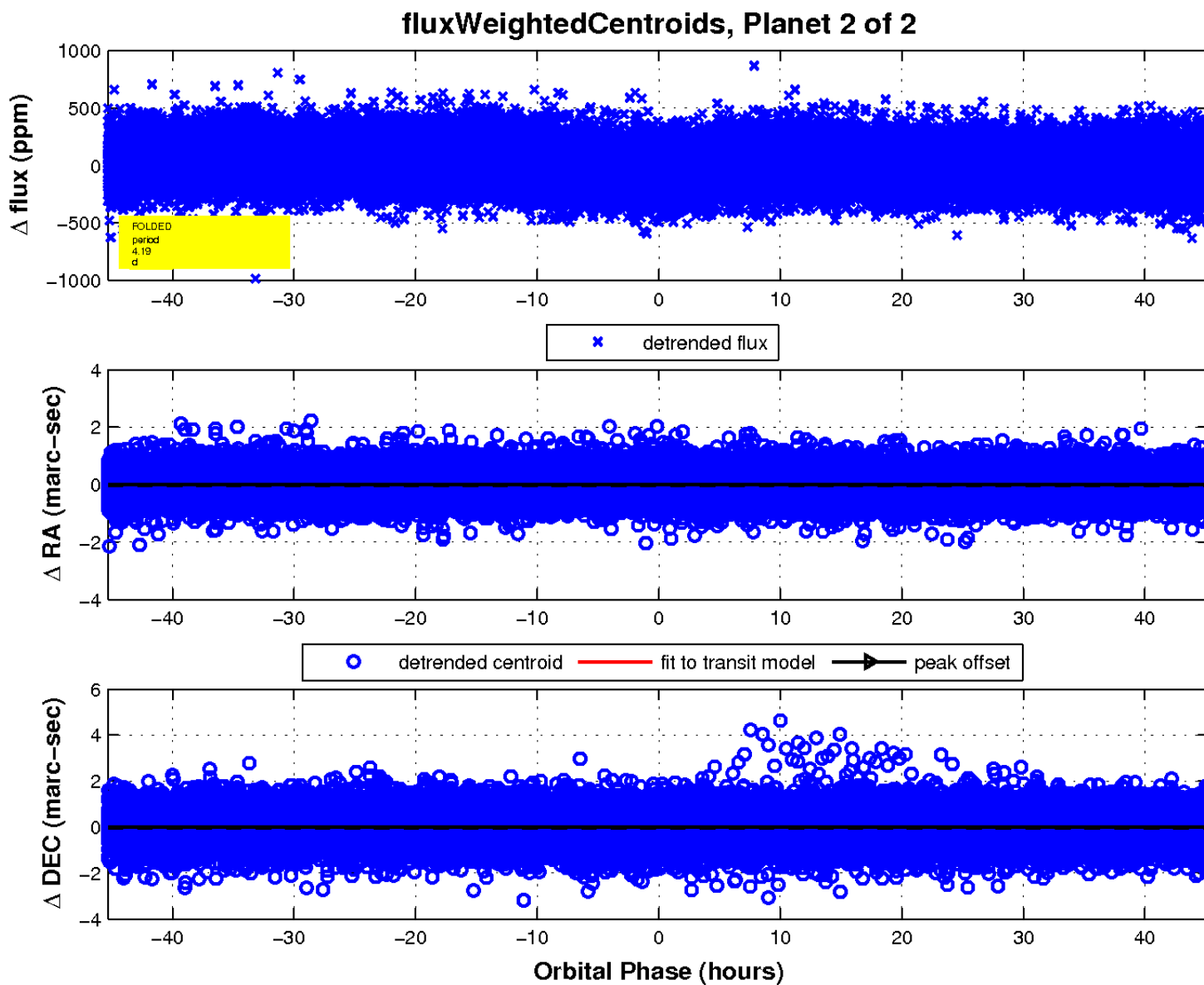
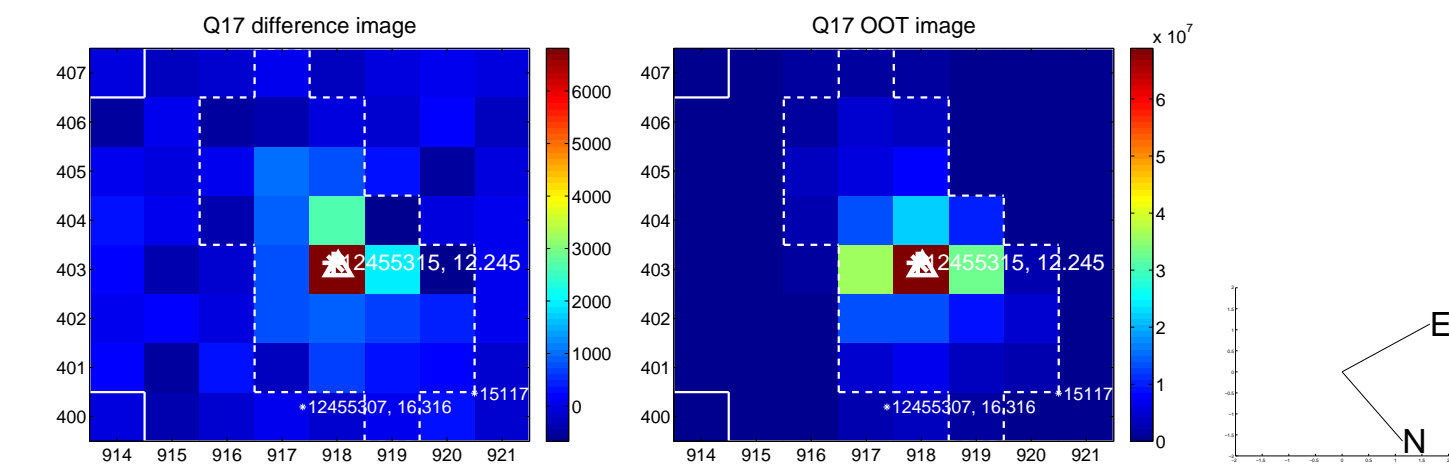
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

