

KIC 006117415

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|--------|--------|-----------------------------|-----------------|------------------------|------------------------|
| 006117415-01 | OBS | 6019.01 | 19.741607 | 136.447491 | 88097.5 | 3.063 | 8271.7 | 7484.9 | 1.53 | 6535 | 67.02 | 156.91 |
| 006117415-02 | OBS | No | 19.741578 | 136.421070 | 1587.9 | 20.018 | 57.3 | 47.9 | 1.53 | 6535 | 7.48 | 156.91 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 006117415-01 | OBS | FP | 0.00 | 0 | 1 | 0 | 0 | MOD_ODDEVEN_DV—DEEP_V_SHAPED—CENT_SATURATED |
| 006117415-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—RESIDUAL_TCE—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 006117415-01

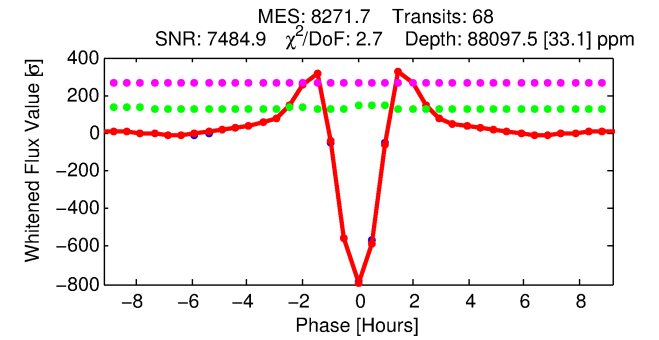
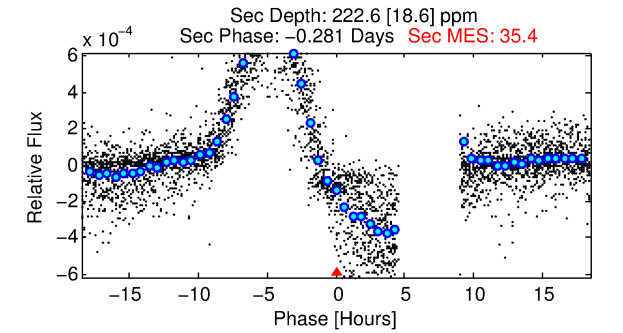
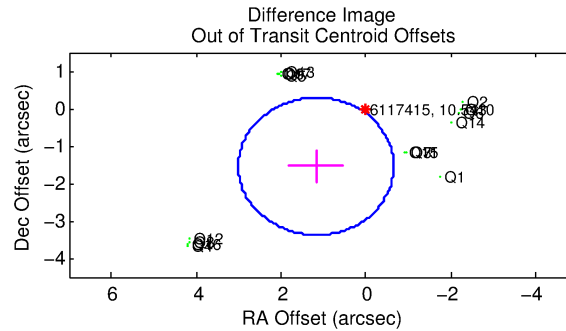
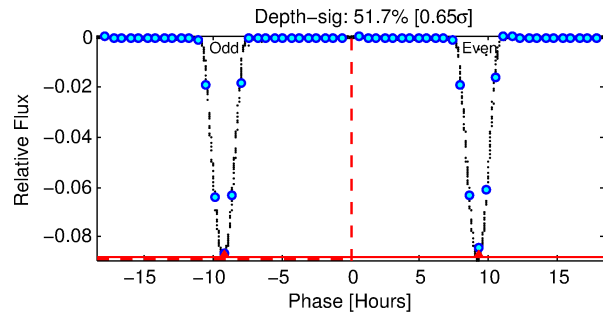
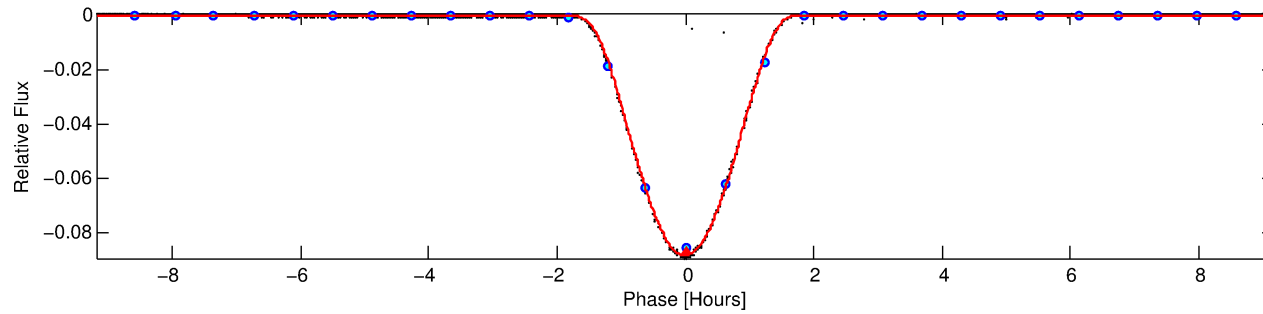
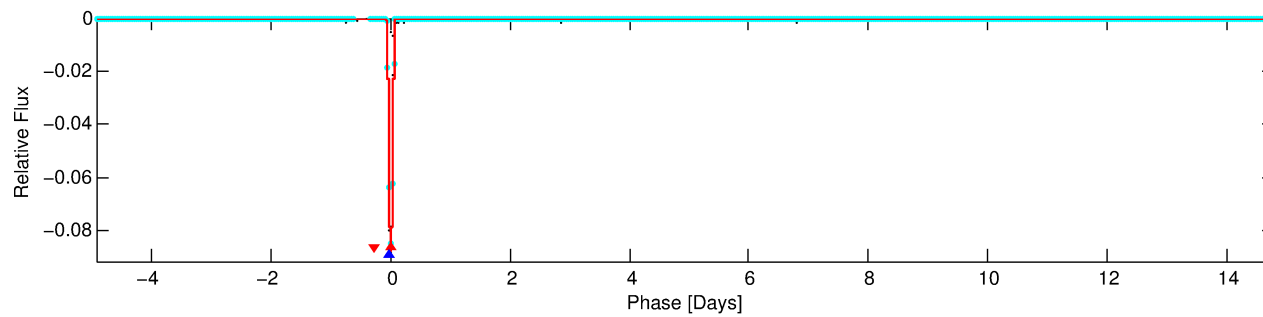
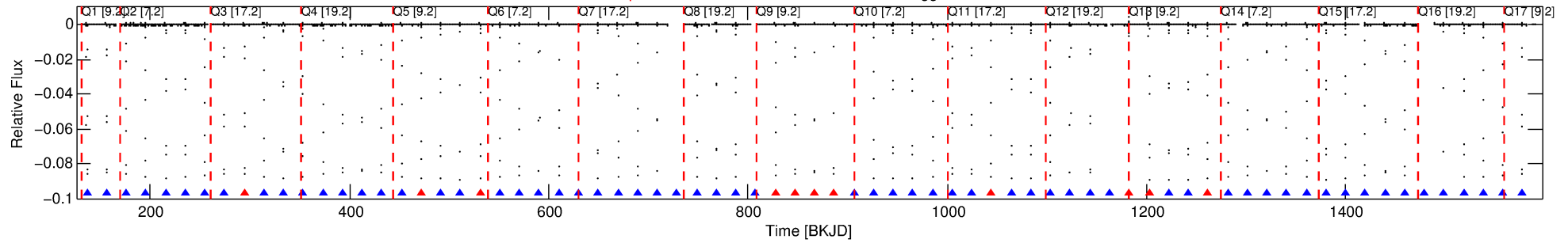
No Significant Match Found

DV One-Page Summary

KIC: 6117415 Candidate: 1 of 2 Period: 19.742 d

KOI: K06019.01 Corr: 0.997

Kp: 10.54 R*: 1.53 Rs Teff: 6535.0 K Logg: 4.18 Fe/H: 0.000



DV Fit Results:

Period = 19.74161 [0.00000] d
Epoch = 136.4475 [0.0000] BKJD
Rp/R* = 0.4017 [0.0085]
a/R* = 52.33 [0.02]
b = 0.91 [0.01]
Seff = 156.91 [44.04]
Teq = 902 [63] K
Rp = 67.02 [14.45] Re
a = 0.1560 [0.0279] AU
Ag = 0.66 [0.18] [-1.85σ]
Teffp = 1259 [46] K [4.58σ]

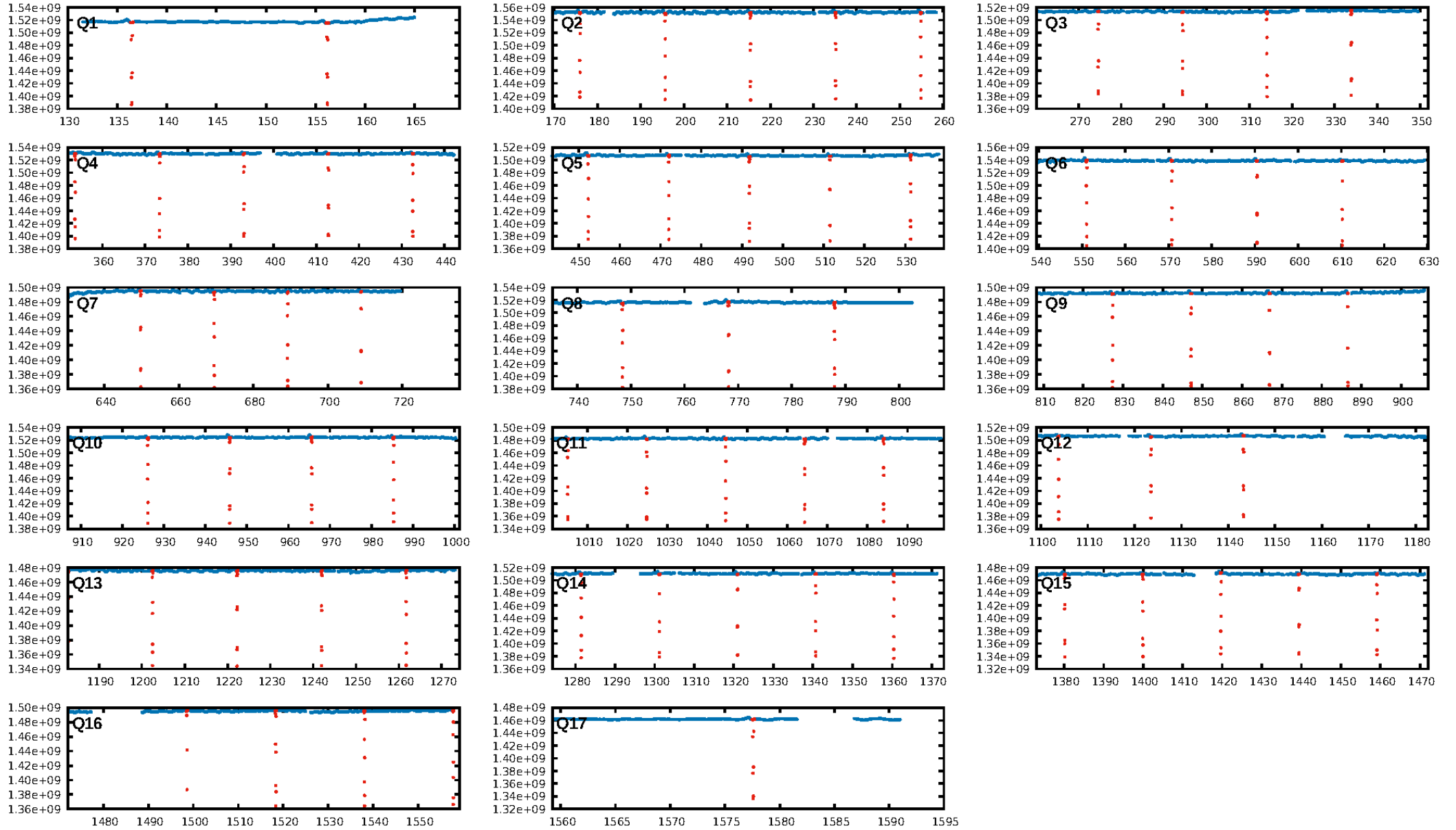
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 0.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 0.83 [54/65]
GhostDiagnostic-chr: 8.154
Centroid-sig: N/A
Centroid-so: 0.387 arcsec [731.22σ]
OotOffset-rm: 1.939 arcsec [3.17σ]
KicOffset-rm: 2.064 arcsec [2.60σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.00 [0/17]
DiffImageOverlap-fno: 0.00 [0/17]

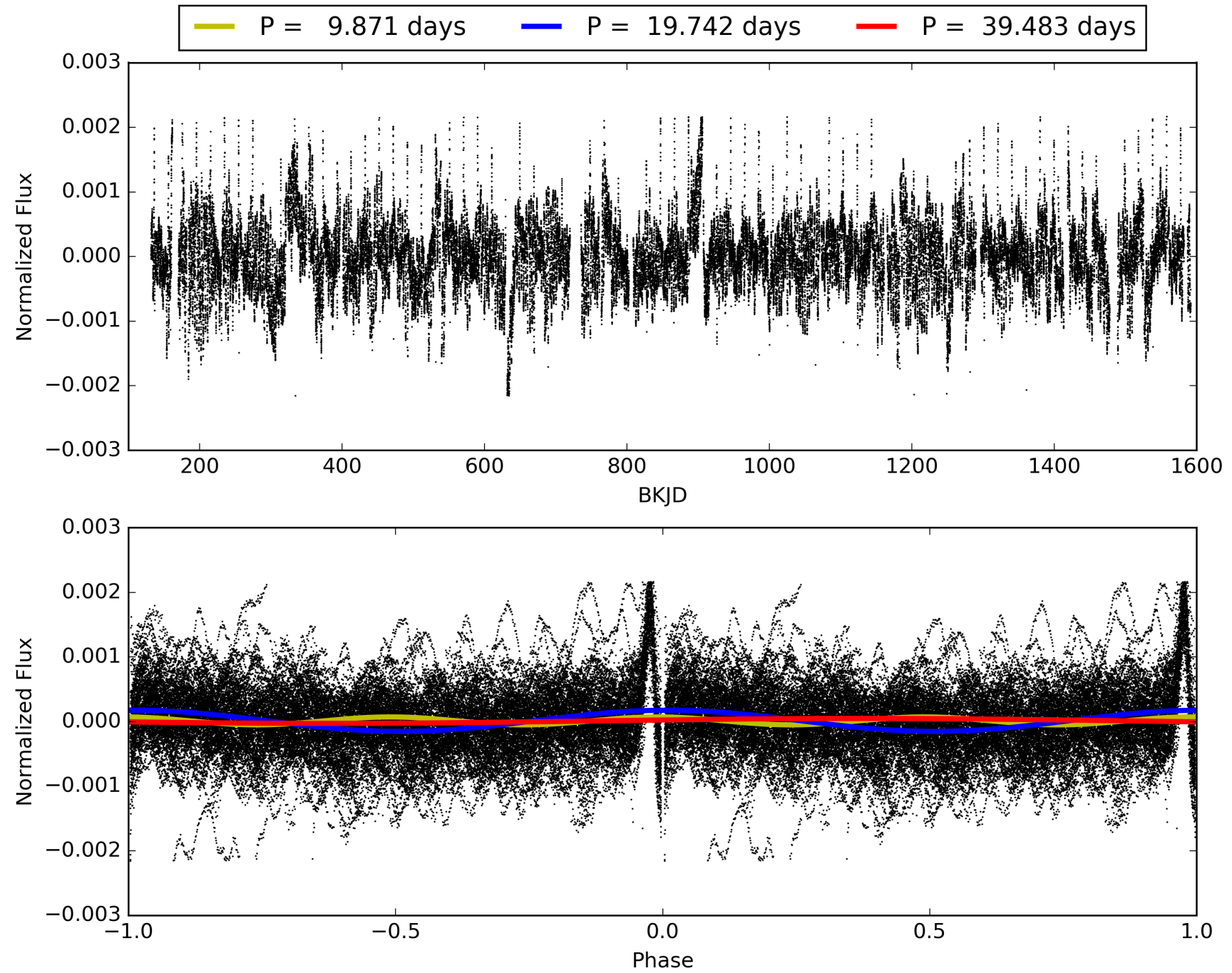
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:57:26 Z

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

TCE 006117415-01, PDC Light Curves

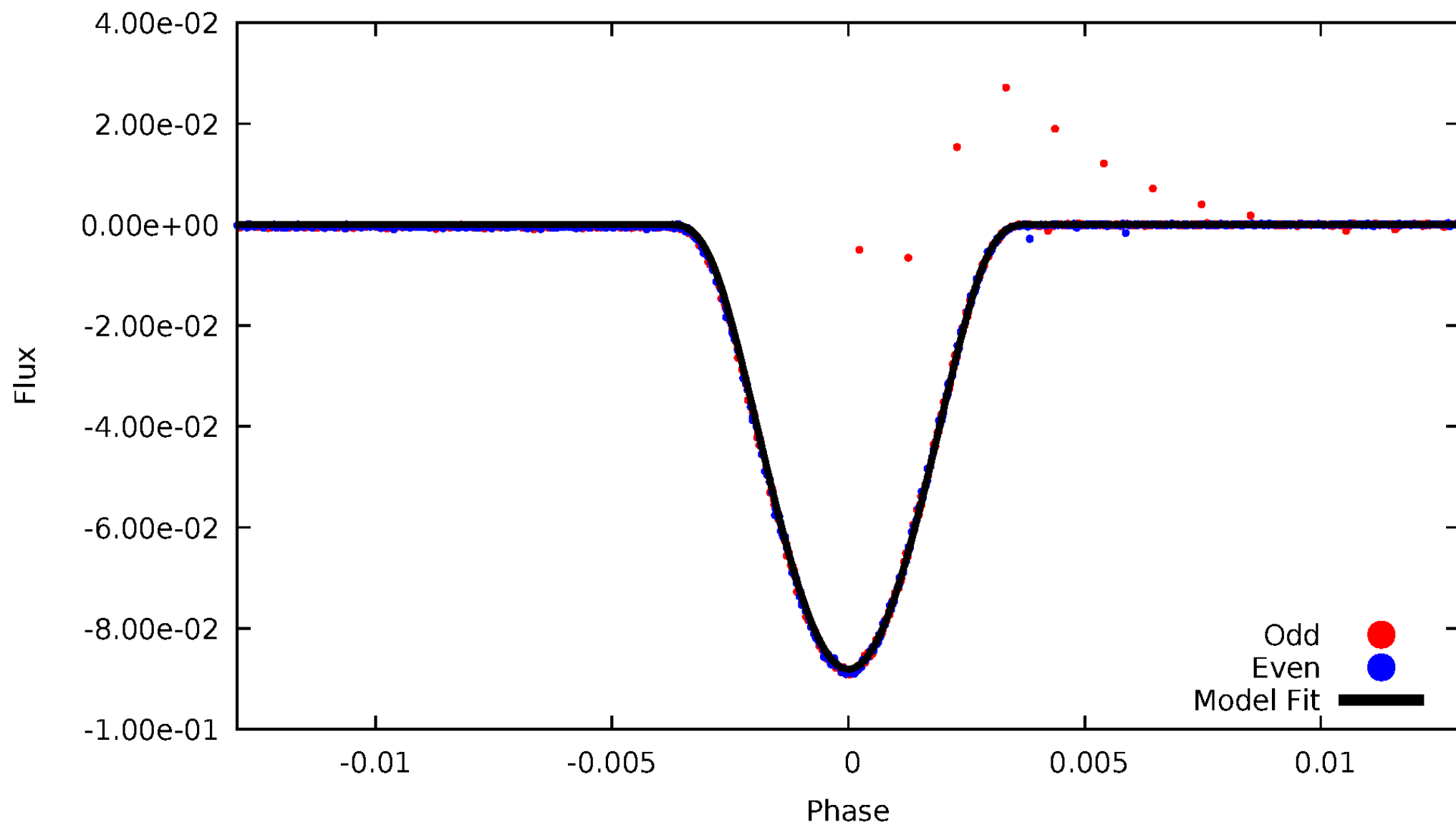


TCE 006117415-01



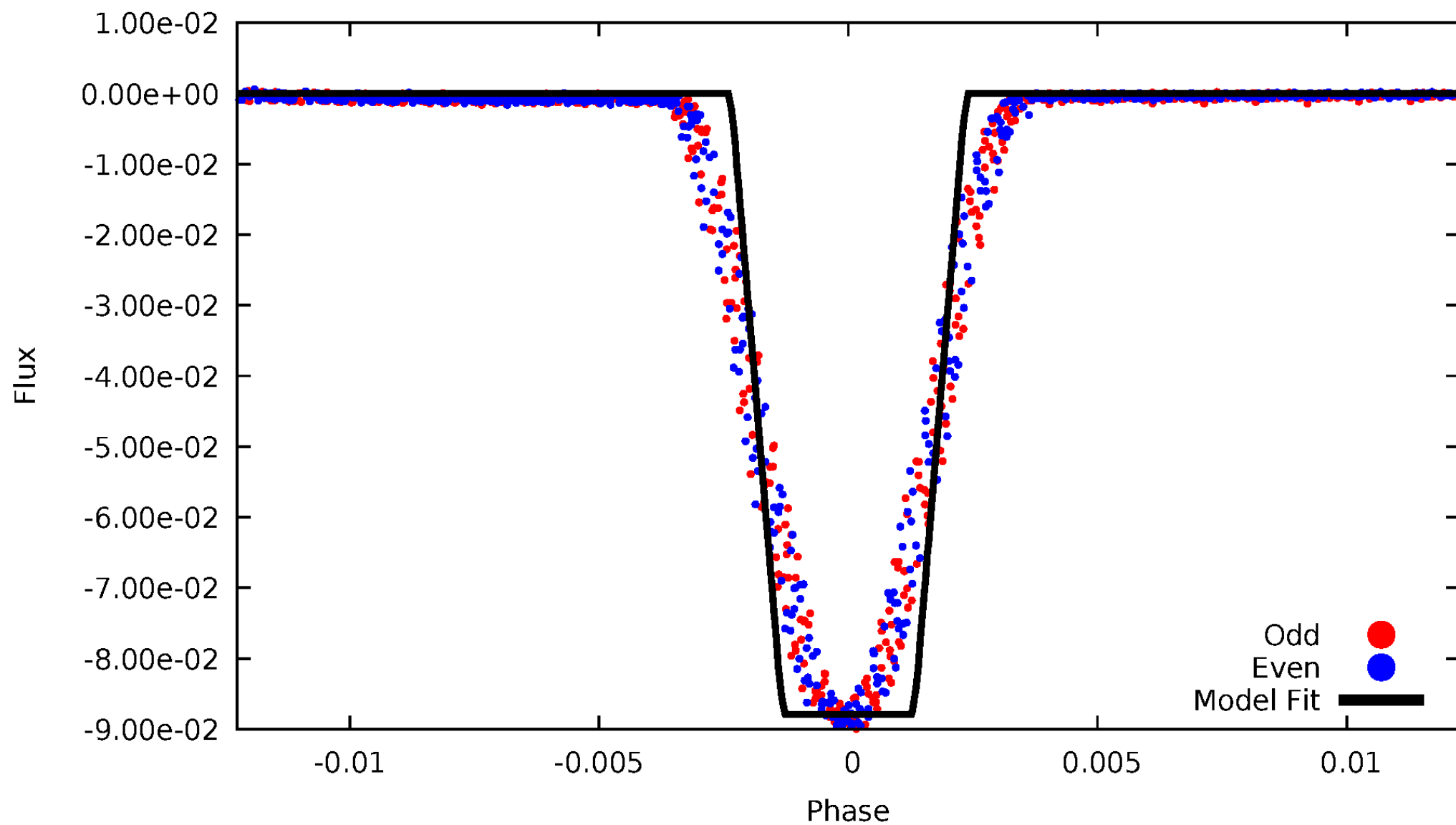
DV Odd/Even

TCE 006117415-01



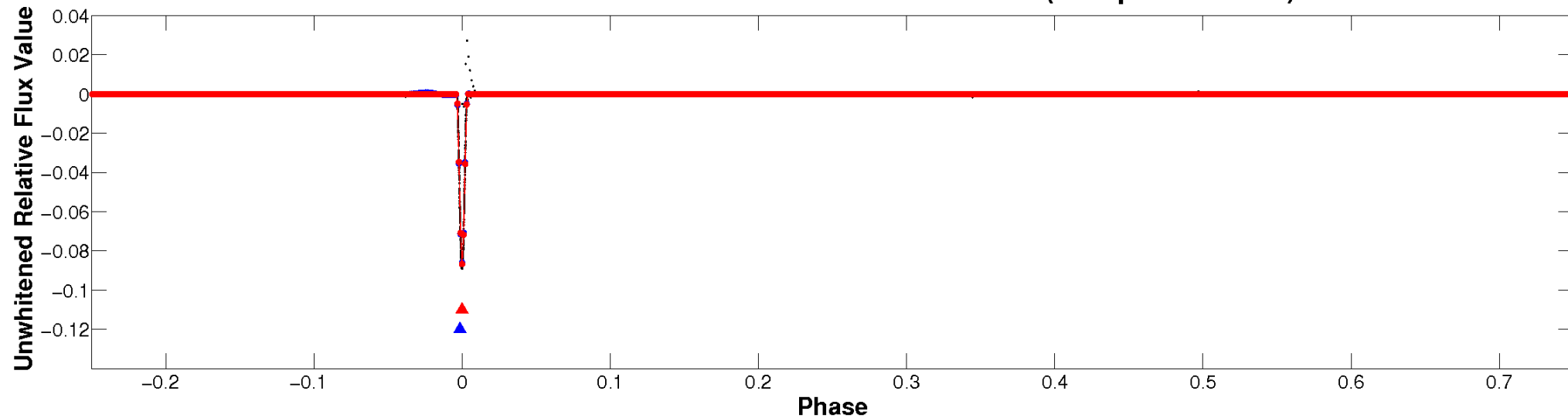
ALT Odd/Even

TCE 006117415-01

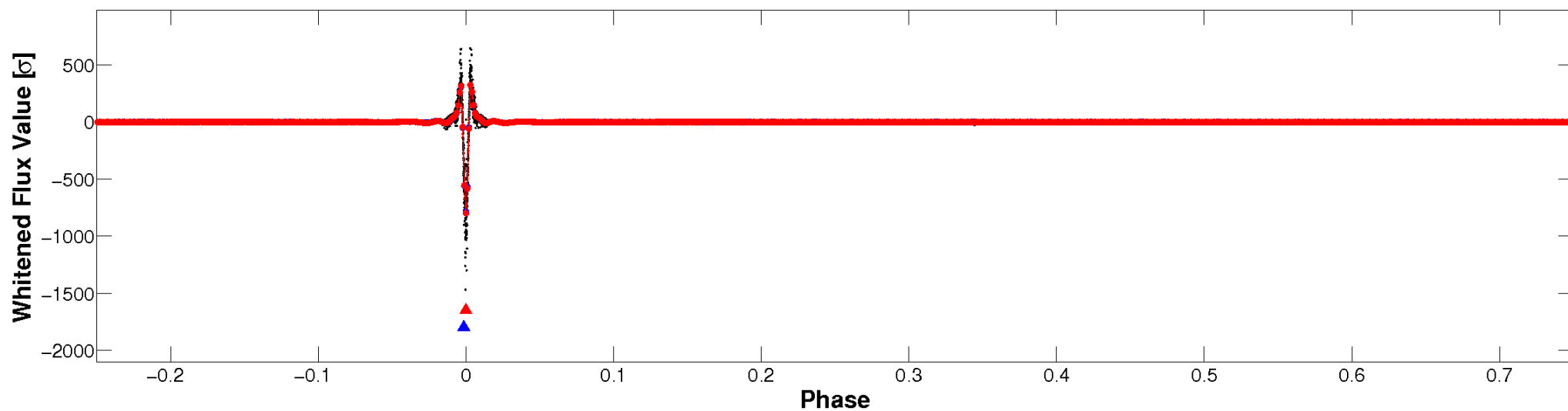


Non-Whitened Vs. Whitened Light Curve

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

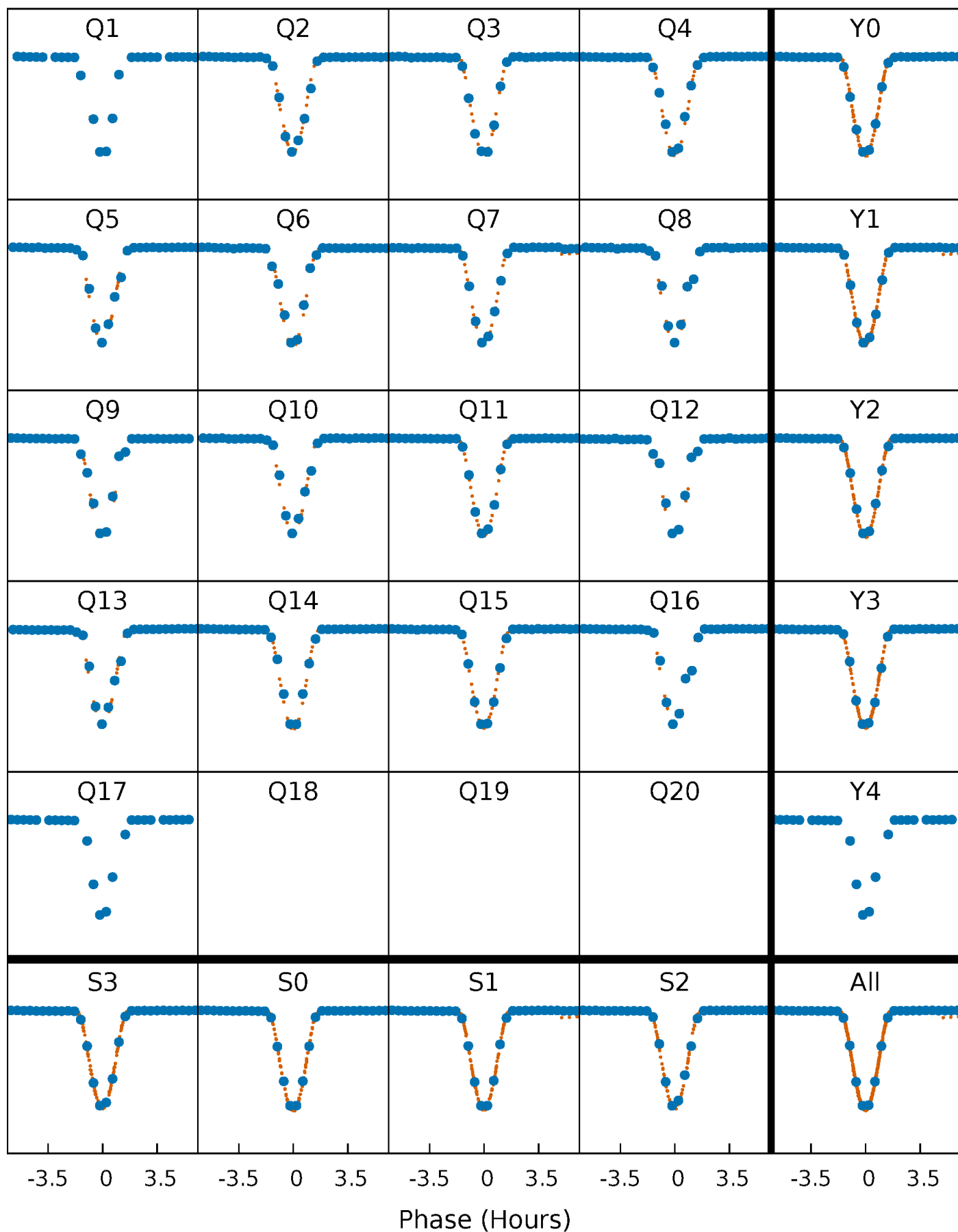


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



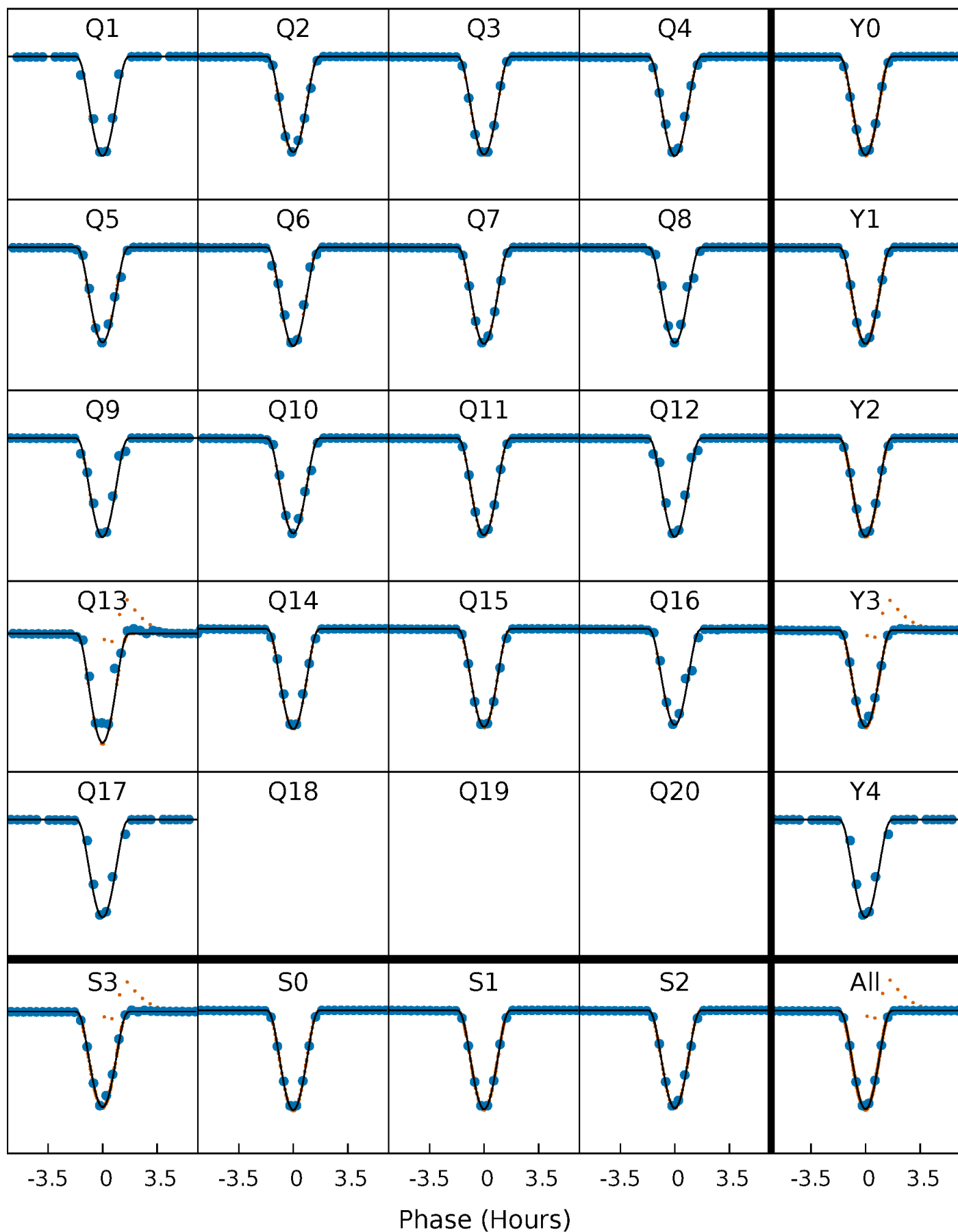
PDC Quarter-Phased Transit Curves

TCE 006117415-01 P= 19.741607 Days $T_0=136.447491$ (BKJD)



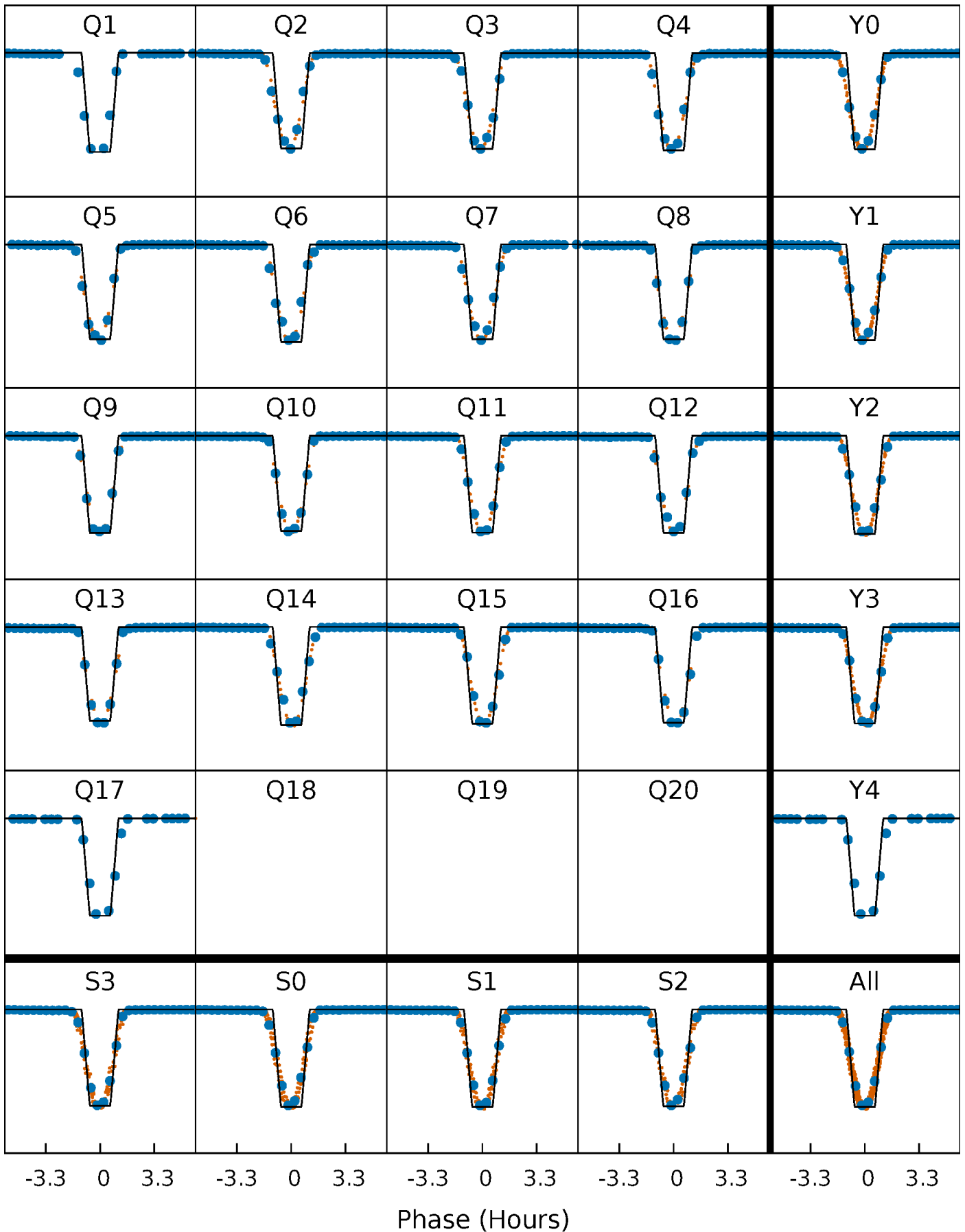
DV Quarter-Phased Transit Curves

TCE 006117415-01 P= 19.741607 Days $T_0=136.447491$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

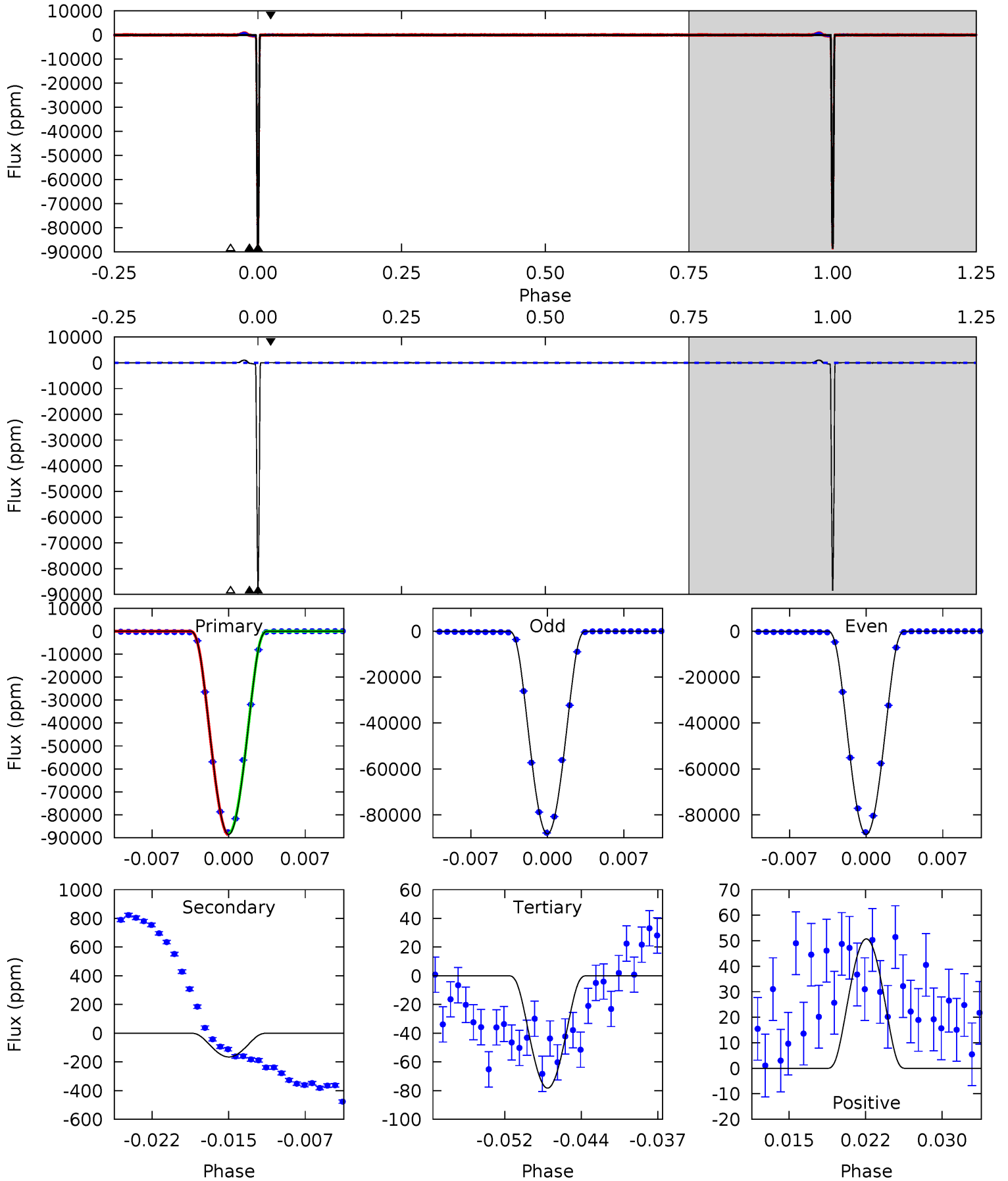
TCE 006117415-01 P= 19.741450 Days $T_0=136.453690$ (BKJD)



DV Model-Shift Uniqueness Test

006117415-01, P = 19.741607 Days, E = 116.705884 Days

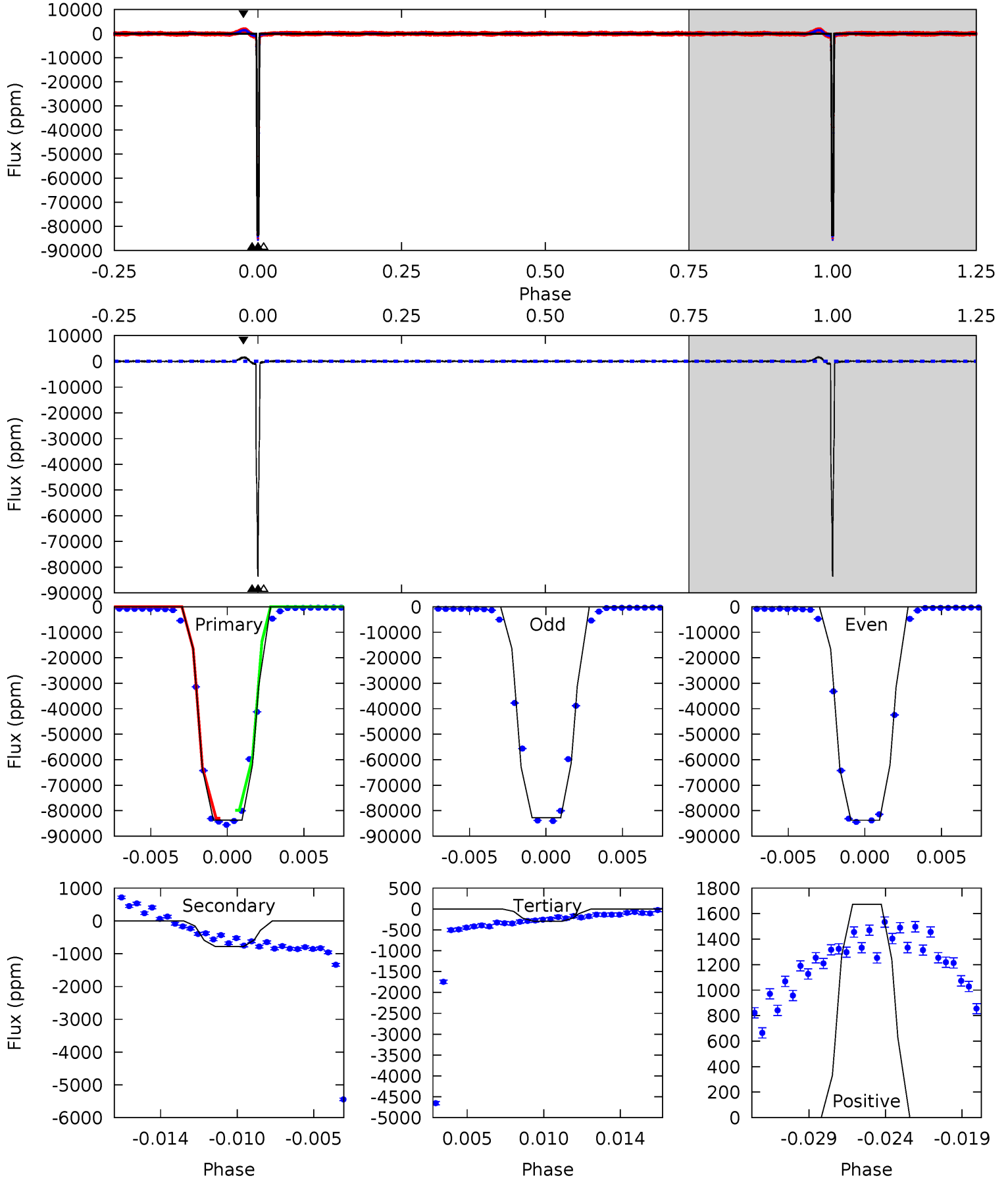
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 12352 | 23.1 | 10.9 | 7.08 | 5.08 | 2.68 | 11.5 | 12341 | 12345 | 12.2 | 16.0 | 19.1 | 0.99 | 0.01 | 0 |



Alt Model-Shift Uniqueness Test

006117415-01, P = 19.741450 Days, E = 116.712240 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 1630 | 15.2 | 5.72 | 32.6 | 5.16 | 2.82 | 3.39 | 1624 | 1597 | 9.44 | -17.4 | 8.78 | 1.00 | 0.02 | 0 |



Stellar Parameters For KIC 006117415

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 6535^{+147}_{-180} | $4.183^{+0.140}_{-0.140}$ | $0.000^{+0.250}_{-0.300}$ | $1.529^{+0.328}_{-0.295}$ | $1.301^{+0.142}_{-0.213}$ | $0.513^{+0.376}_{-0.219}$ |
| | +2%/-3% | +3%/-3% | +inf%/-inf% | +21%/-19% | +11%/-16% | +73%/-43% |
| 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 006117415-01 / KOI 6019.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|---------------|-------------------------|--------------------|--------------------|---------------------------|
| DV | -166 ± 7 | $66.73^{+8.92}_{-7.68}$ | 1262^{+77}_{-68} | 1936^{+62}_{-98} | $0.492^{+0.112}_{-0.100}$ |
| Alt. | -779 ± 51 | $49.57^{+6.41}_{-6.10}$ | 1261^{+83}_{-74} | 2733^{+46}_{-48} | $4.197^{+1.091}_{-0.839}$ |

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

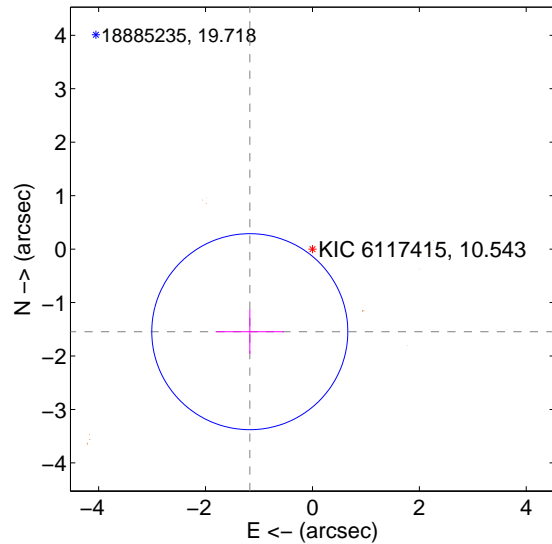
Supplemental centroid analysis for 006117415-01. **Kepler magnitude: 10.54.** Transit SNR 7484.92

There are 0 quarters with good PRF difference image offsets

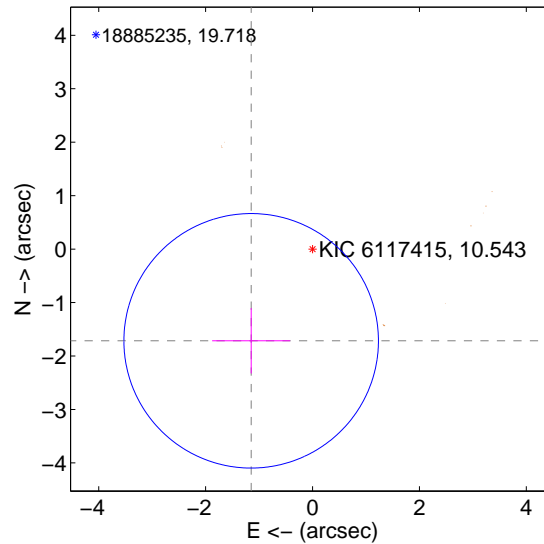
The direct PRF centroid is offset from the target star catalog position by about 1.05 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|-------------------------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 1.939 ± 0.611 | 3.17 | 1.172 ± 0.639 | -1.545 ± 0.412 |
| PRF-fit source offset from KIC position | 2.064 ± 0.794 | 2.60 | 1.148 ± 0.729 | -1.716 ± 0.611 |
| photometric centroid source offset | 0.39 ± 0.00 | 731.22 | -0.27 ± 0.00 | 0.28 ± 0.00 |

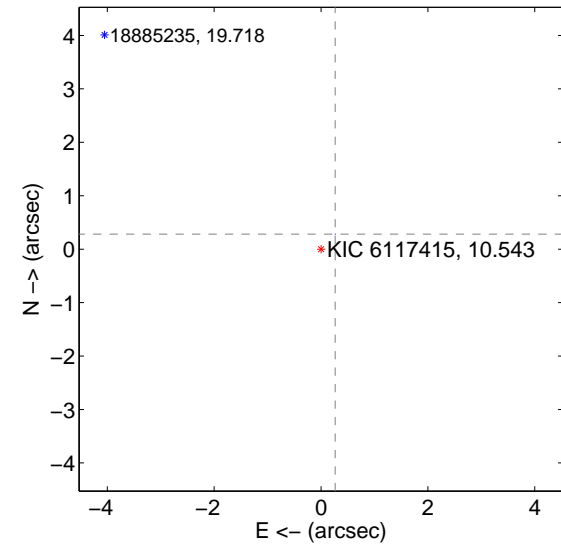
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

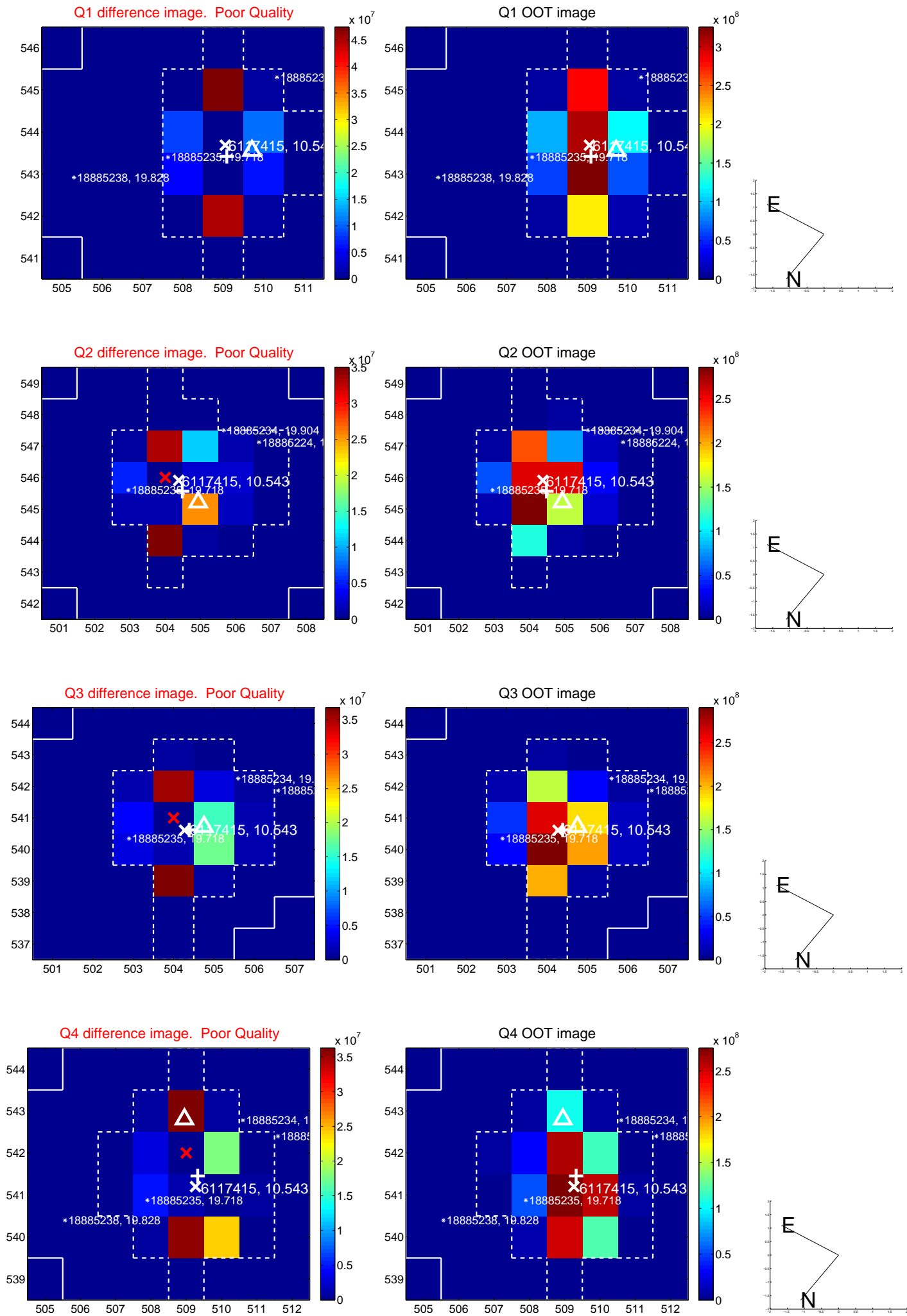


offset from photometric centroids

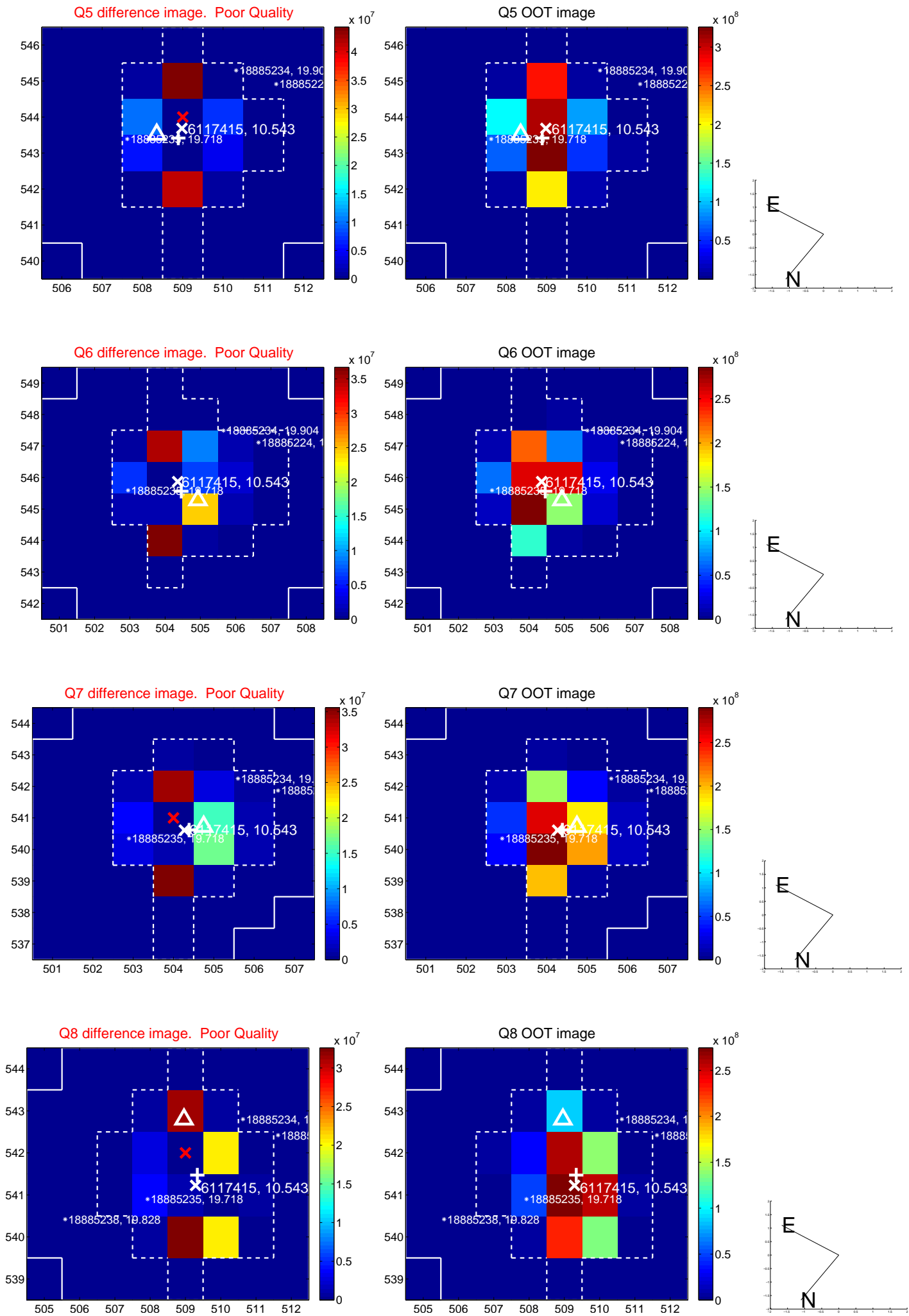


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

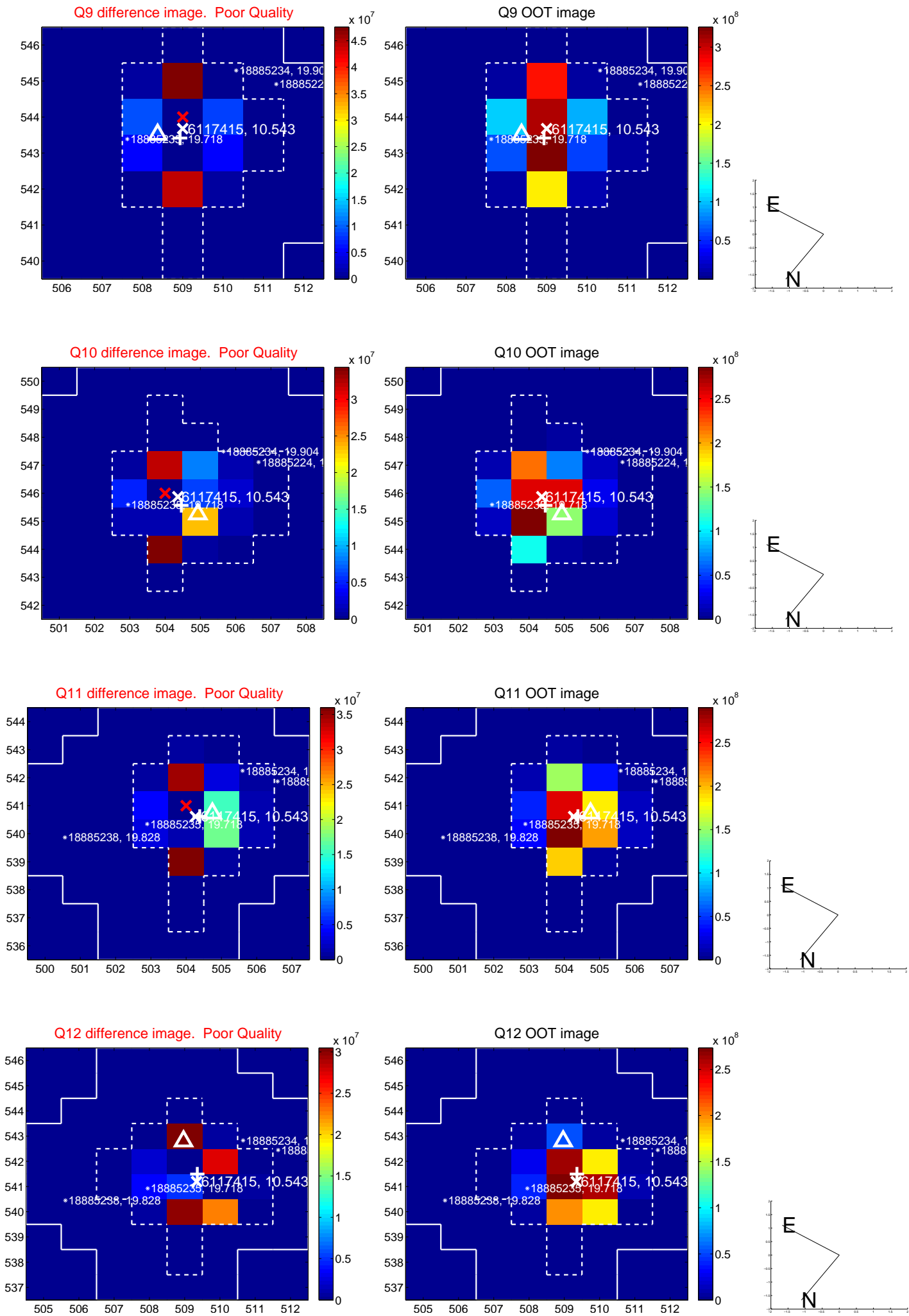
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



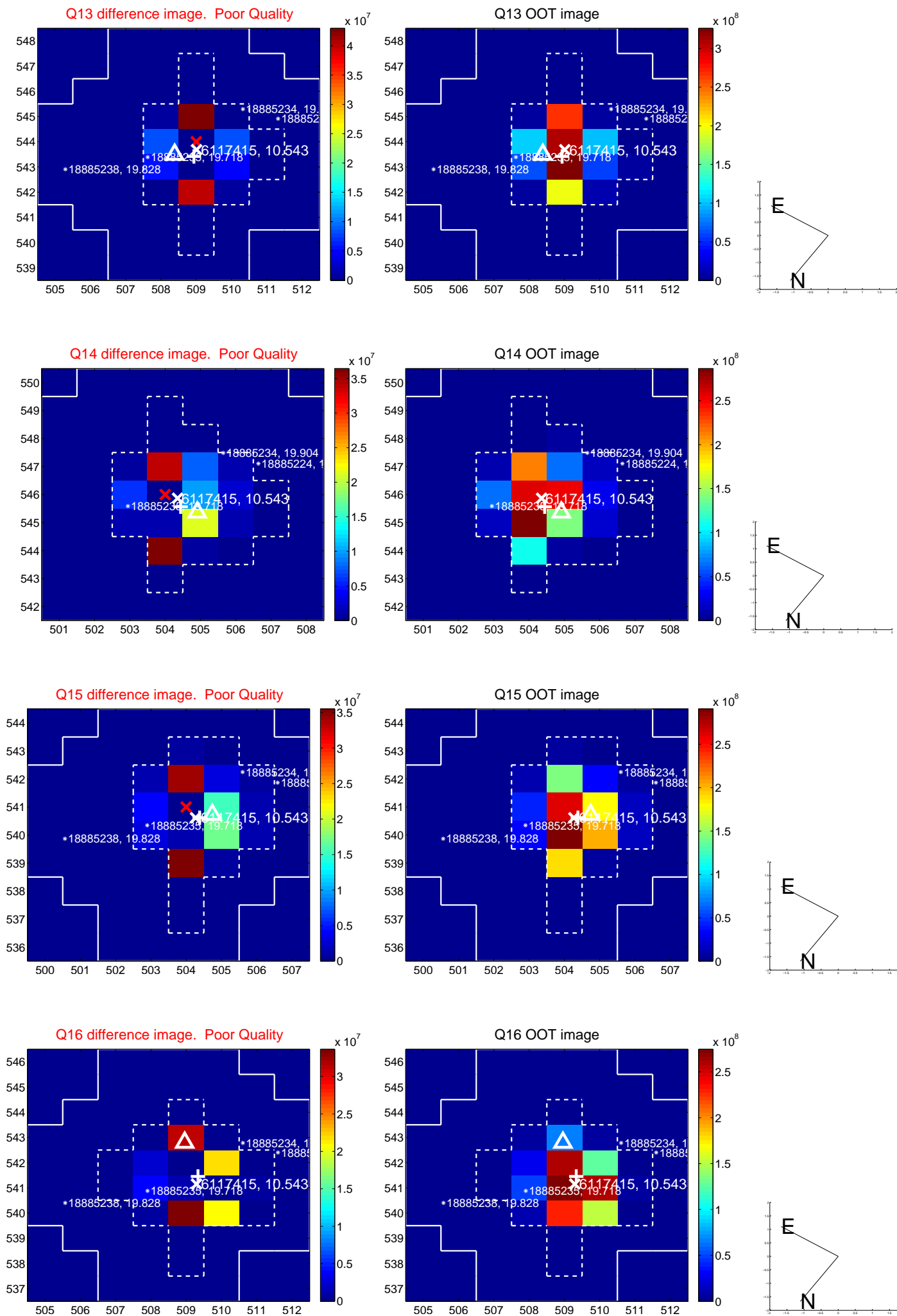
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



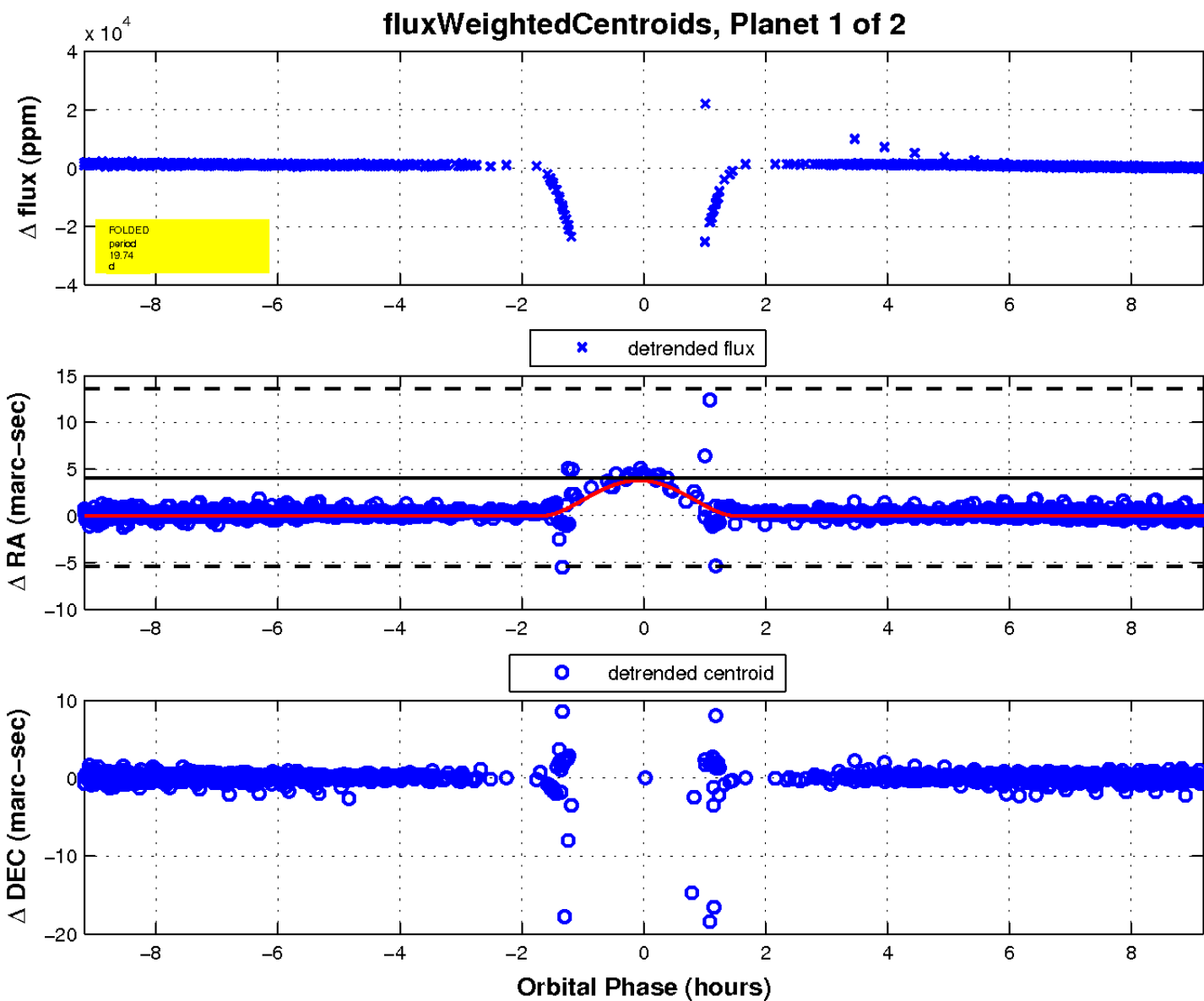
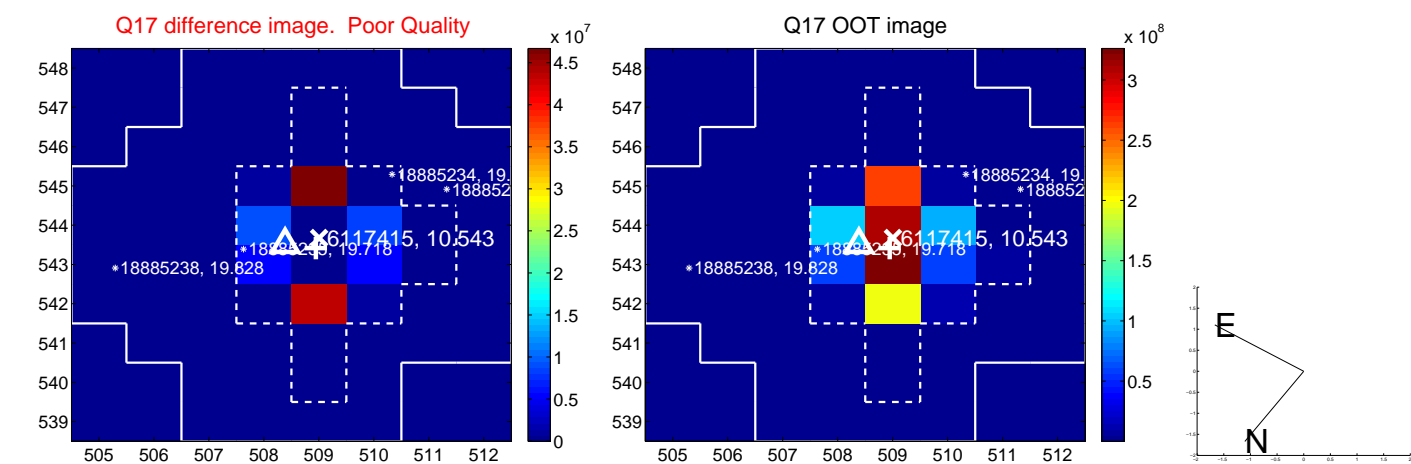
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

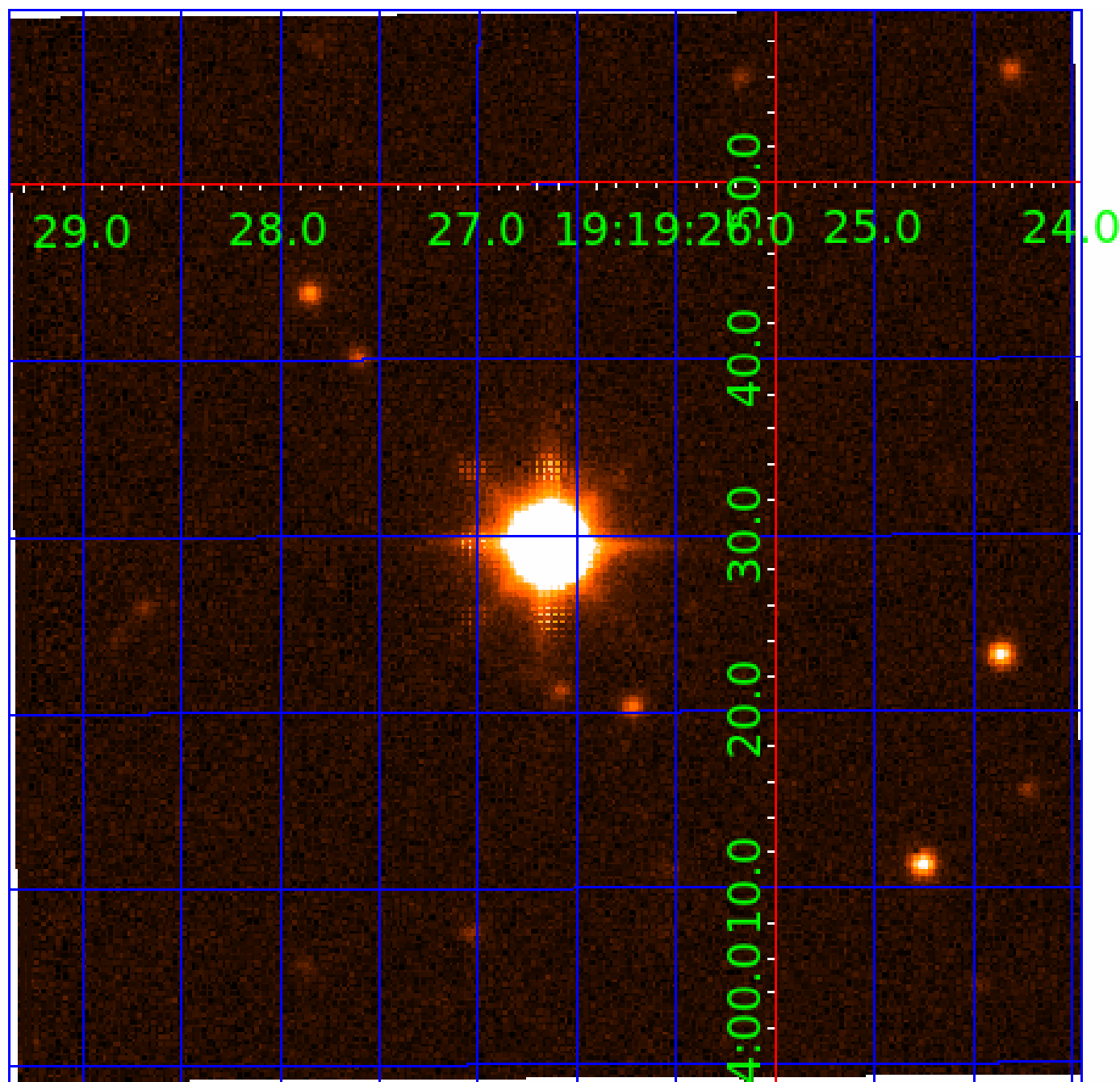


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 006117415

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|--------|--------|-----------------------------|-----------------|------------------------|------------------------|
| 006117415-01 | OBS | 6019.01 | 19.741607 | 136.447491 | 88097.5 | 3.063 | 8271.7 | 7484.9 | 1.53 | 6535 | 67.02 | 156.91 |
| 006117415-02 | OBS | No | 19.741578 | 136.421070 | 1587.9 | 20.018 | 57.3 | 47.9 | 1.53 | 6535 | 7.48 | 156.91 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 006117415-01 | OBS | FP | 0.00 | 0 | 1 | 0 | 0 | MOD_ODDEVEN_DV—DEEP_V_SHAPED—CENT_SATURATED |
| 006117415-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—RESIDUAL_TCE—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 006117415-02

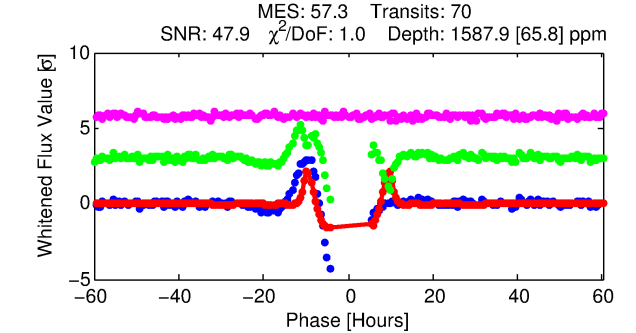
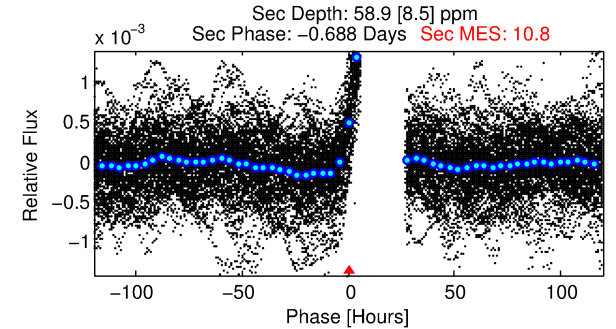
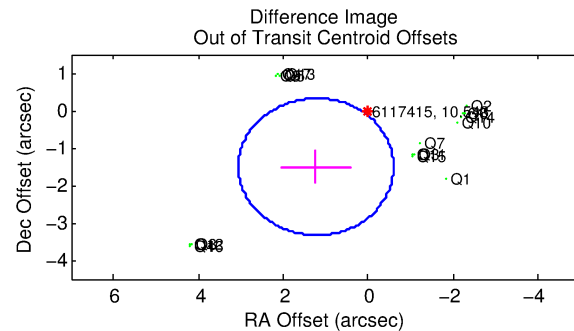
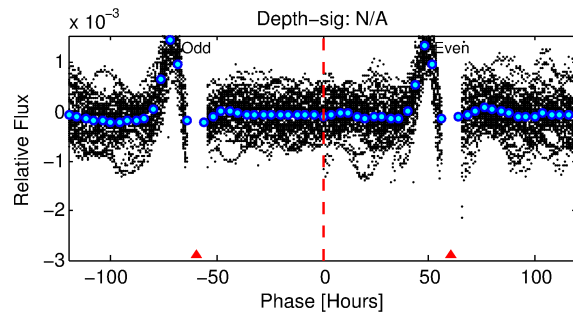
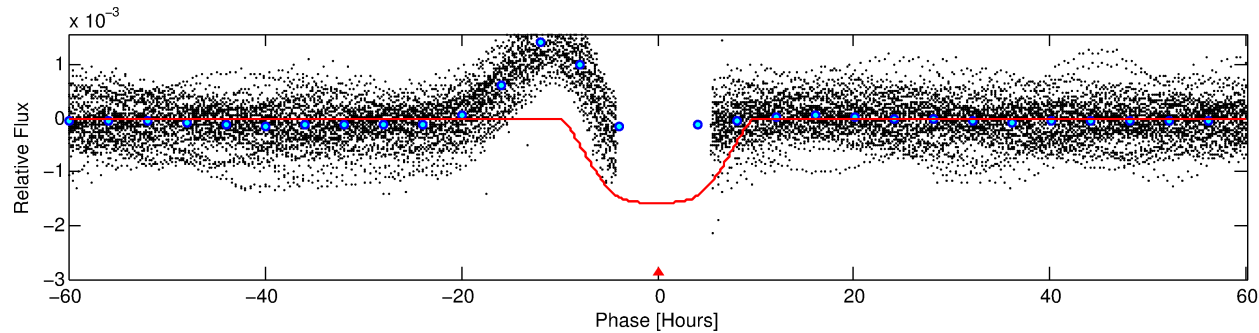
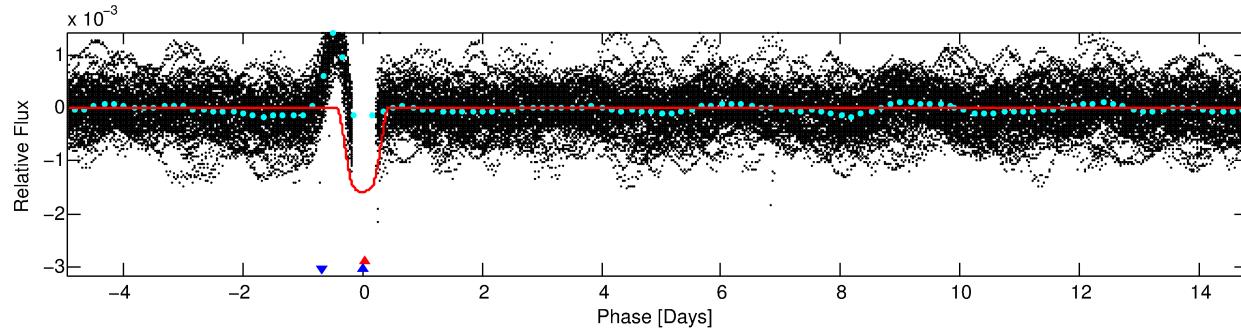
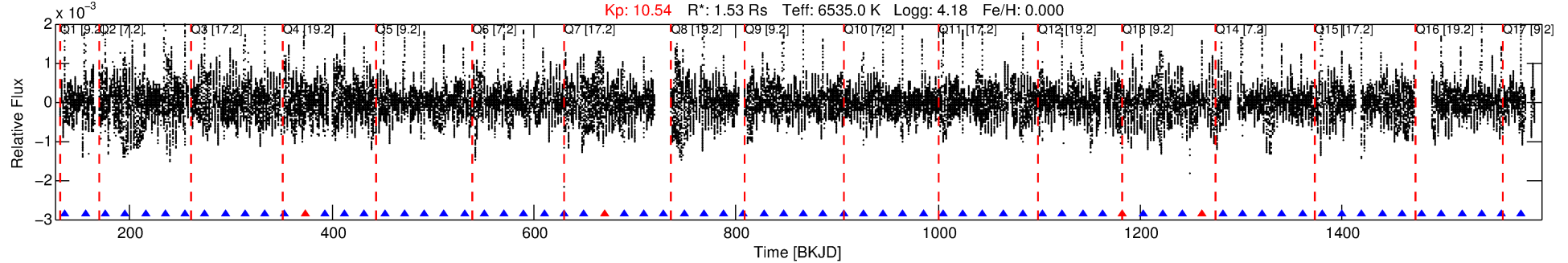
No Significant Match Found

DV One-Page Summary

KIC: 6117415 Candidate: 2 of 2 Period: 19.742 d

KOI: K06019 Corr: No Ephemeris Match

Kp: 10.54 R*: 1.53 Rs Teff: 6535.0 K Logg: 4.18 Fe/H: 0.000



DV Fit Results:

Period = 19.74158 [0.00005] d
Epoch = 136.4211 [0.0022] BKJD
Rp/R* = 0.0448 [0.0010]
a/R* = 3.54 [0.02]
b = 0.94 [0.00]
Seff = 156.91 [44.04]
Teq = 902 [63] K
Rp = 7.48 [1.61] Re
a = 0.1560 [0.0279] AU
Ag = 14.11 [4.22] [3.11σ]
Teffp = 2704 [126] K [12.74σ]

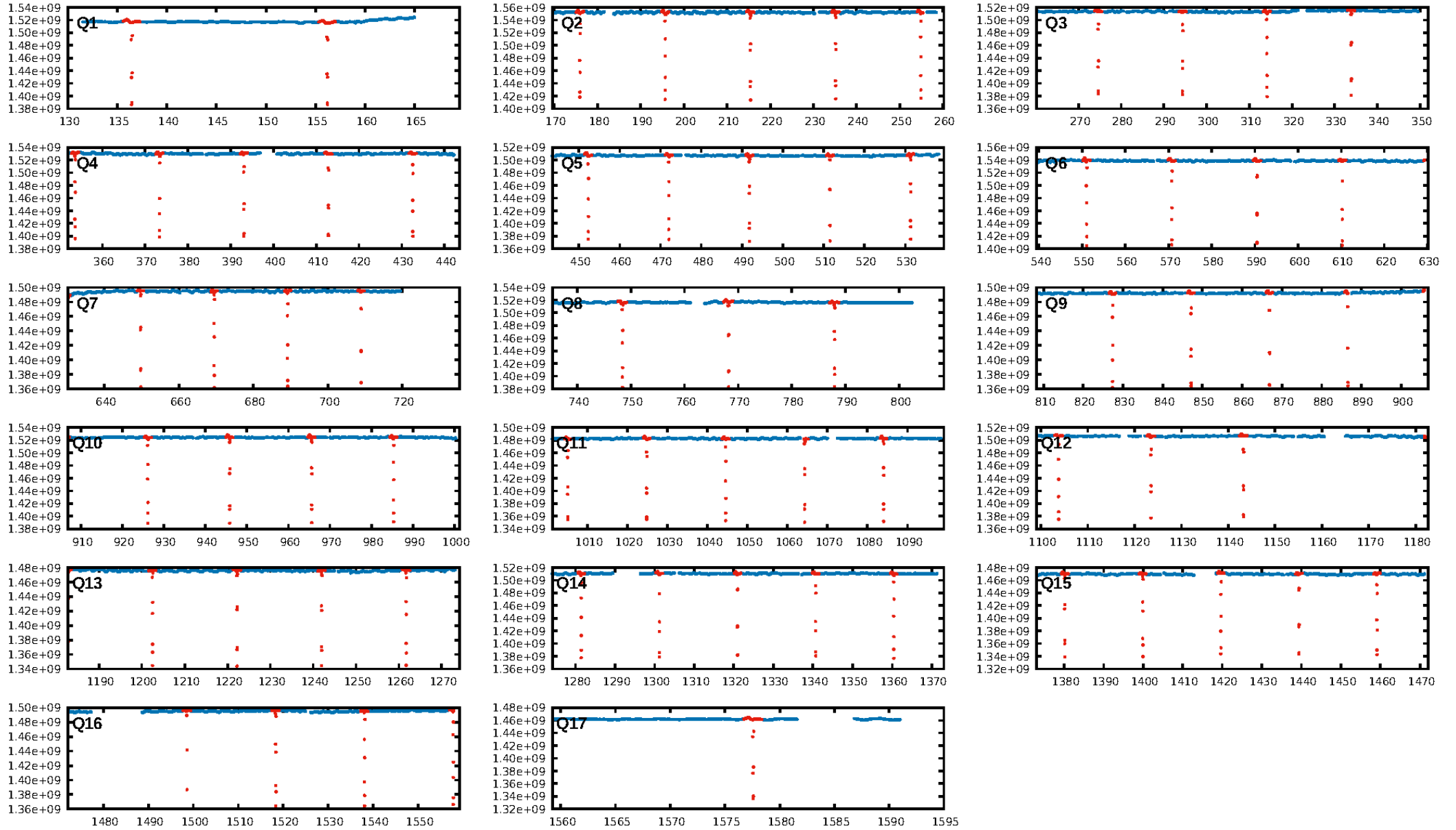
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: N/A
RollingBand-fgt: 0.94 [63/67]
GhostDiagnostic-chr: 0.4449
Centroid-sig: N/A
Centroid-so: 0.258 arcsec [8.90σ]
OotOffset-rm: 1.938 arcsec [3.18σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-rm: 1.932 arcsec [2.41σ]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.00 [0/17]
DiffImageOverlap-fno: 0.00 [0/17]

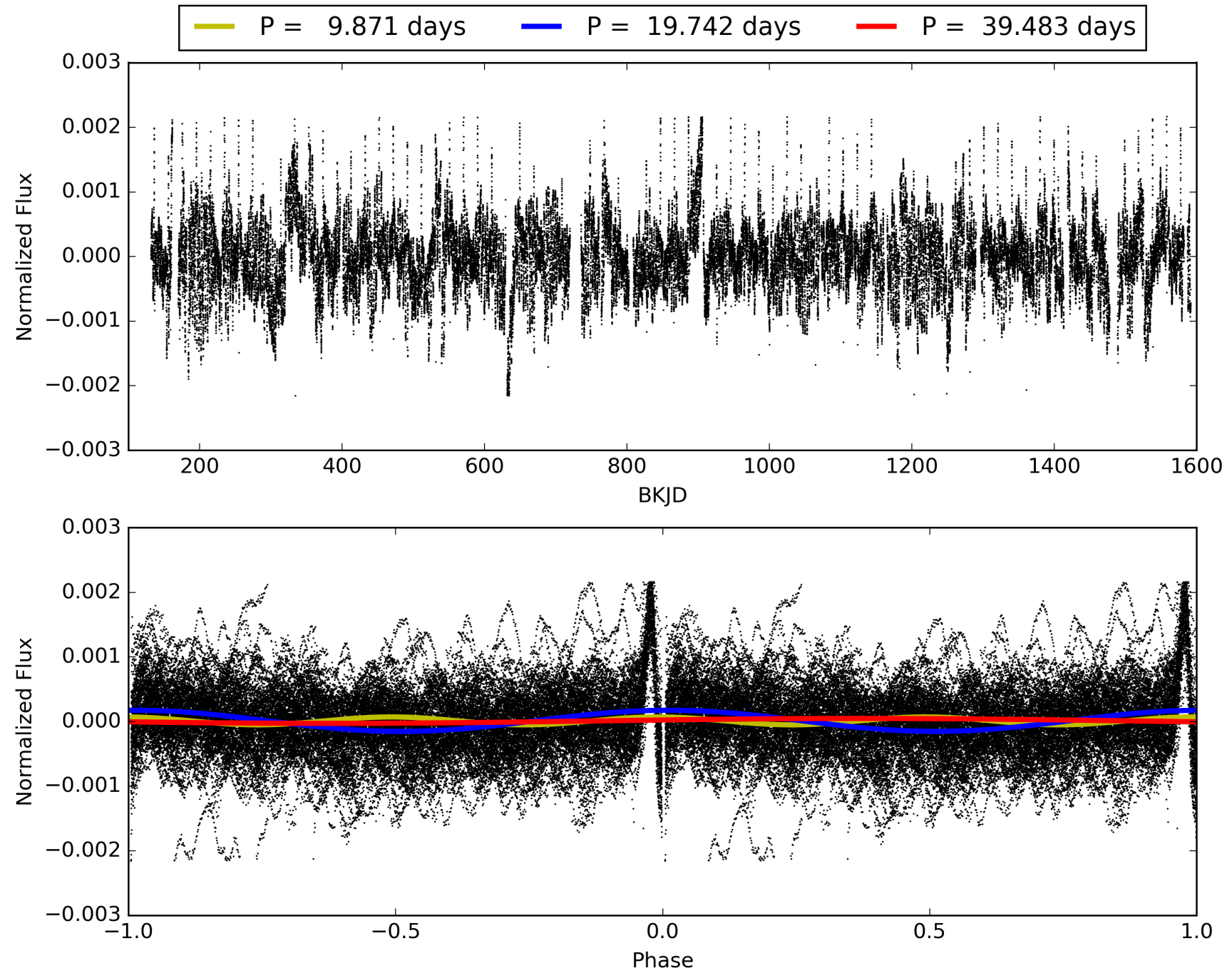
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:57:31 Z

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

TCE 006117415-02, PDC Light Curves

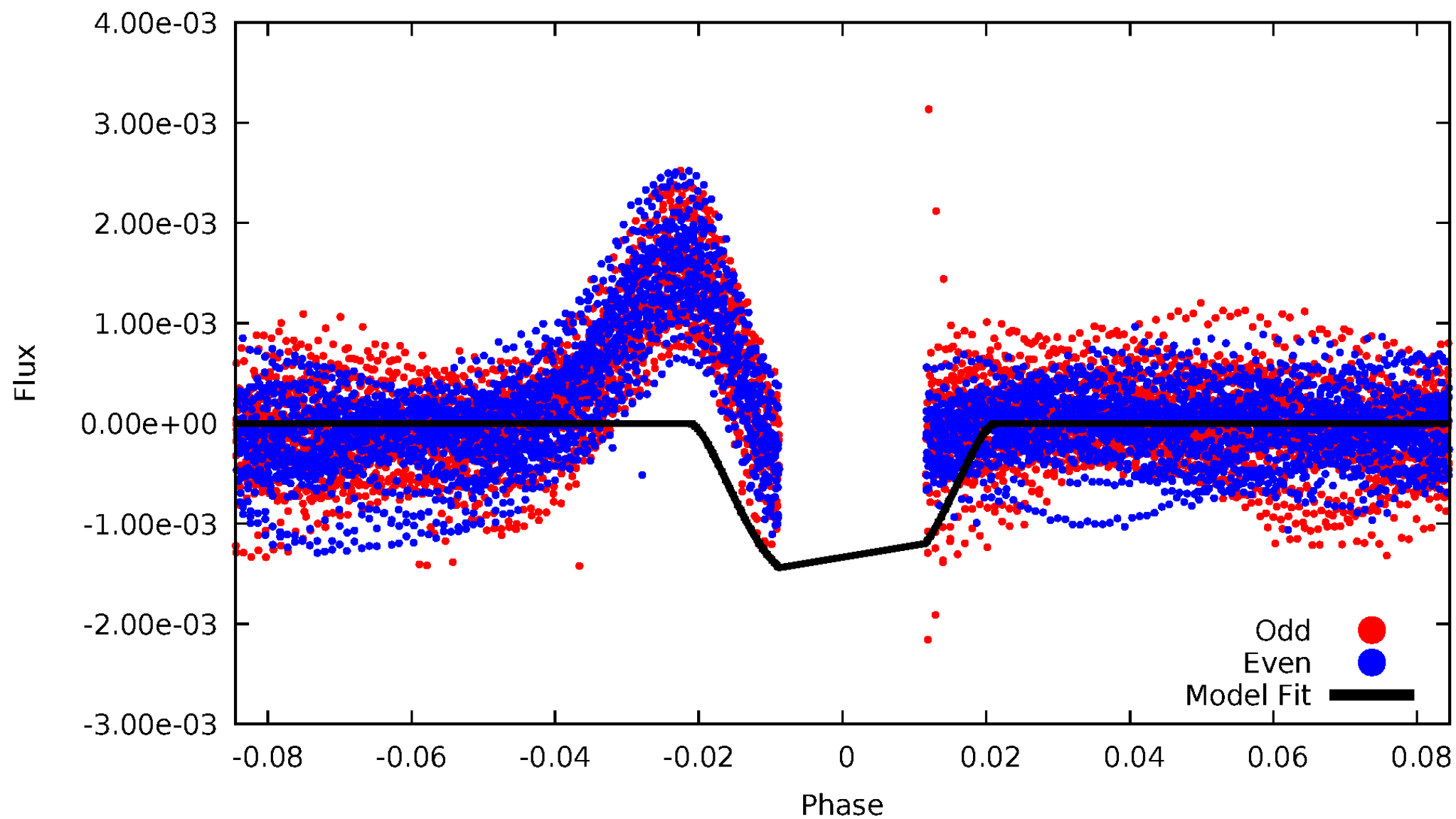


TCE 006117415-02



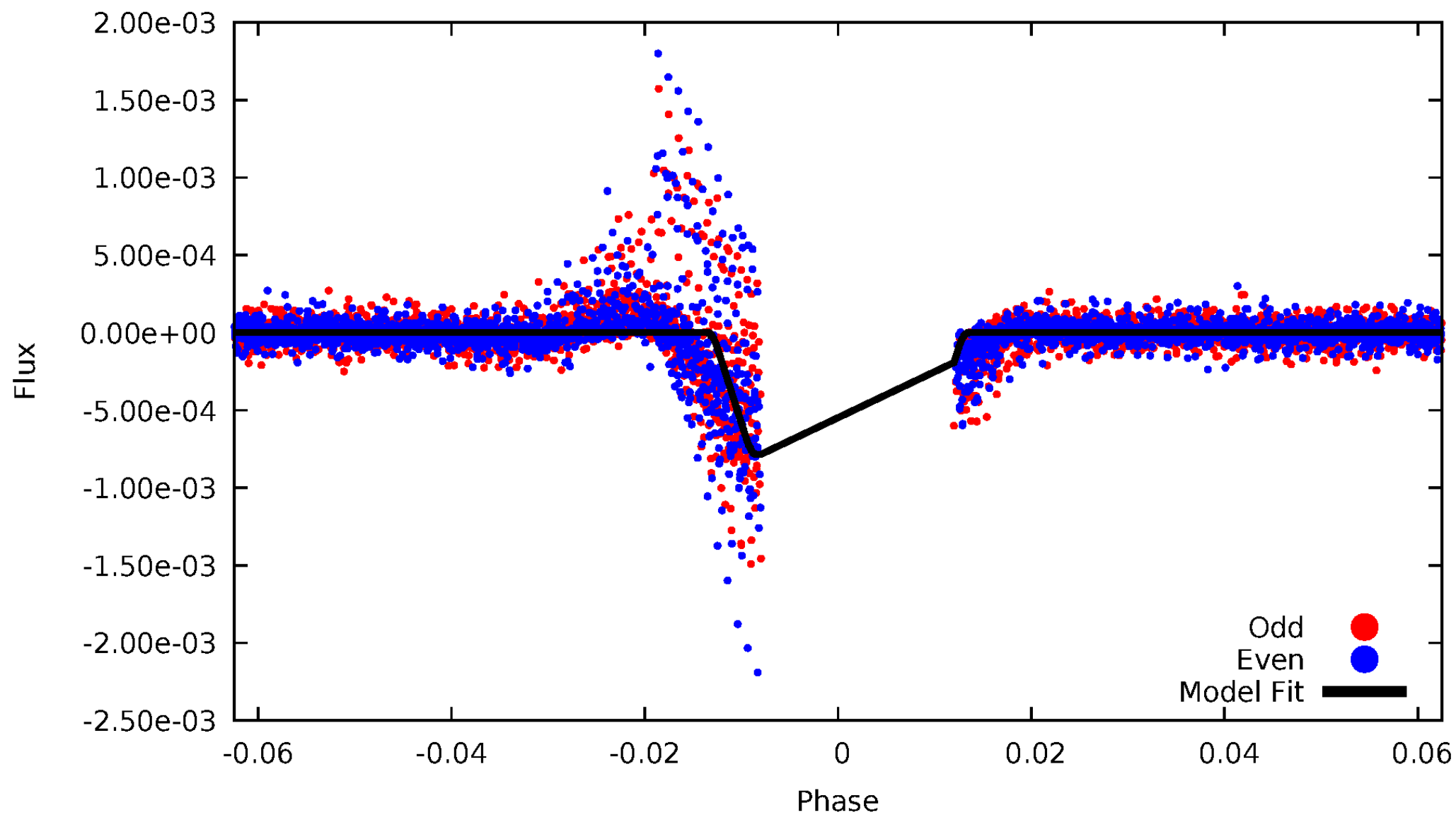
DV Odd/Even

TCE 006117415-02



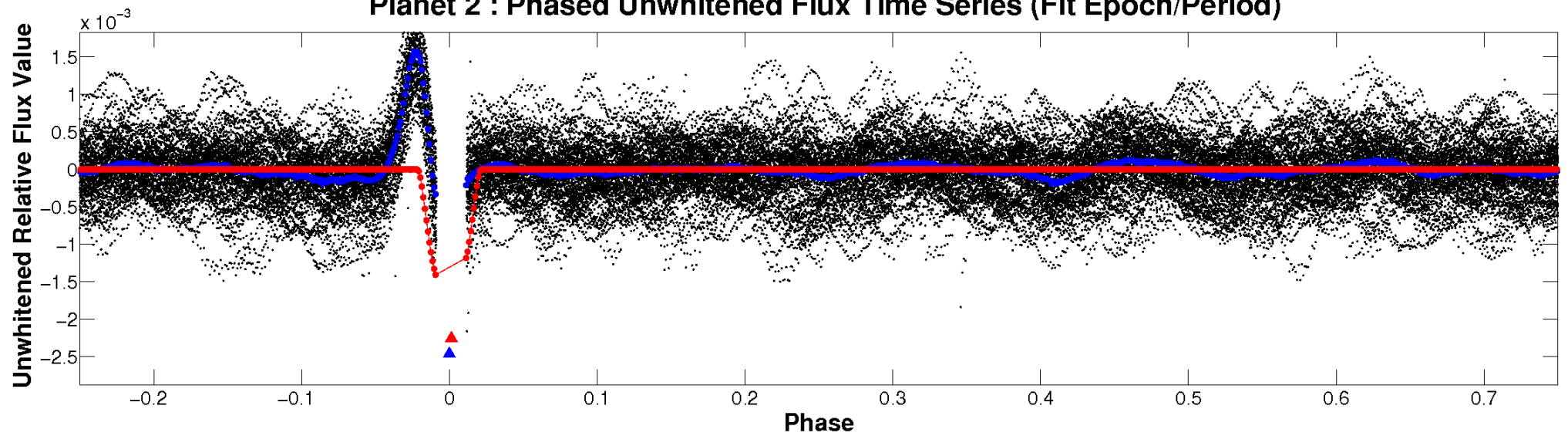
ALT Odd/Even

TCE 006117415-02

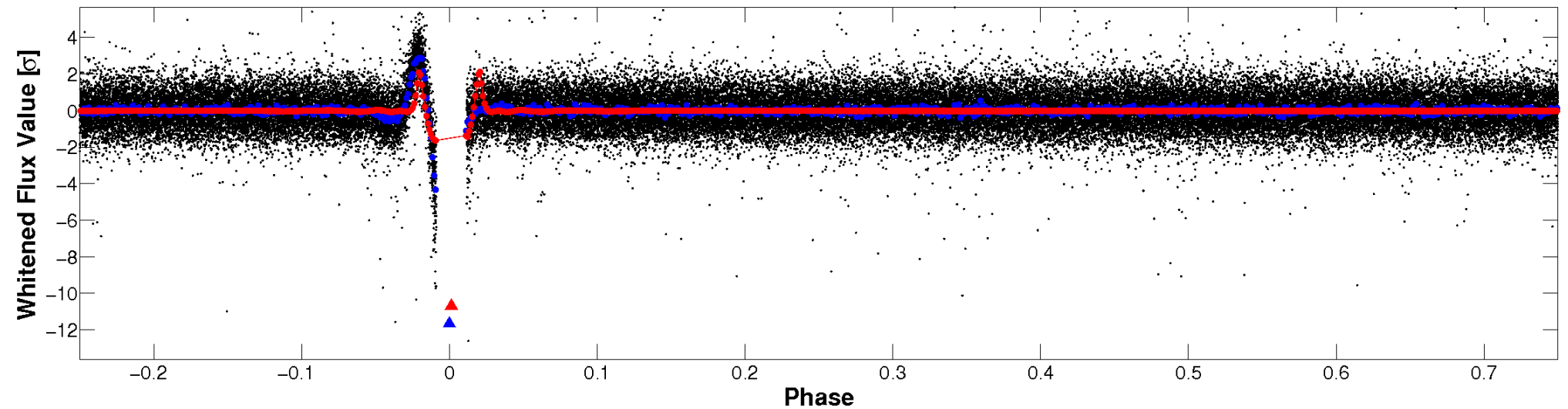


Non-Whitened Vs. Whitened Light Curve

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

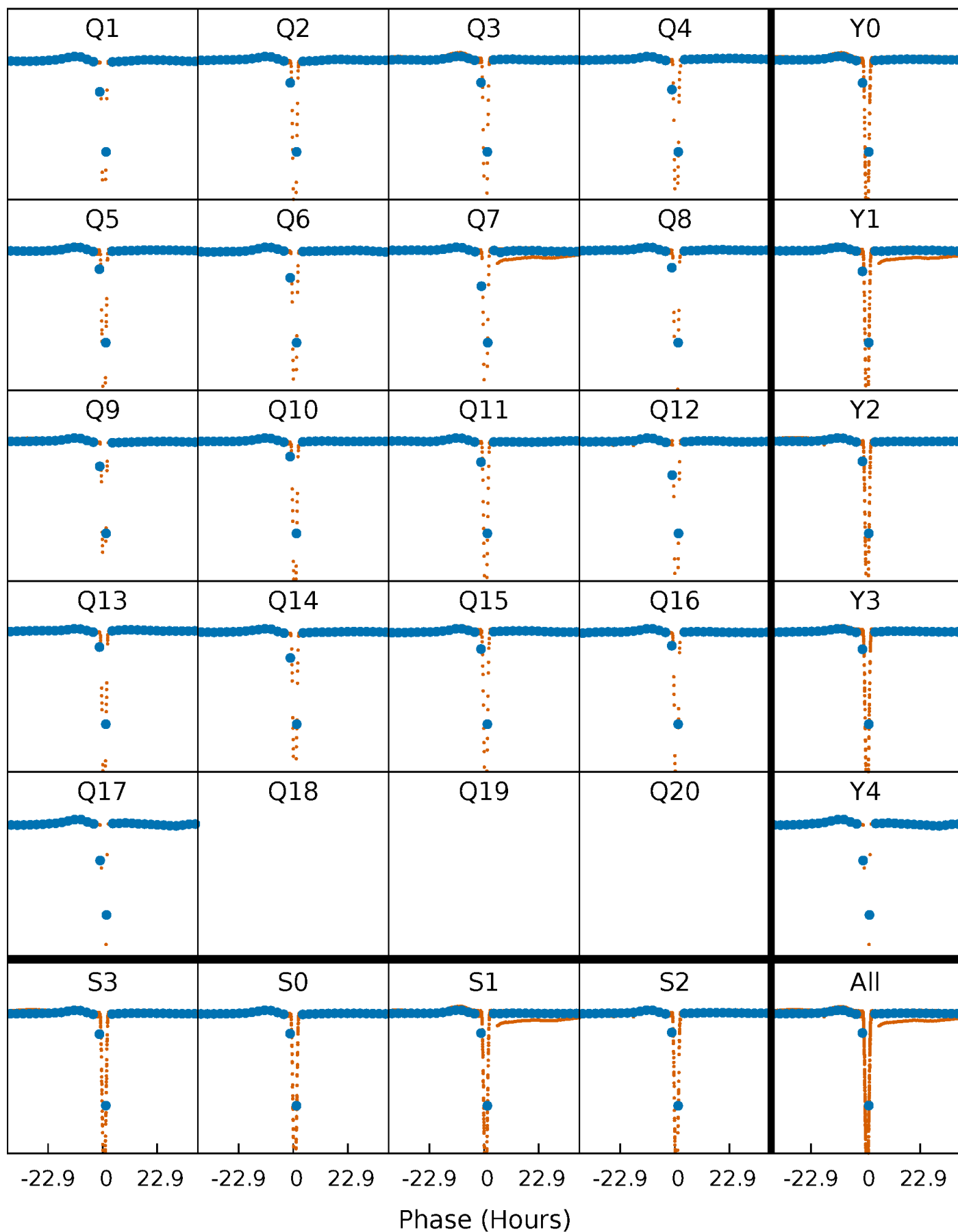


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



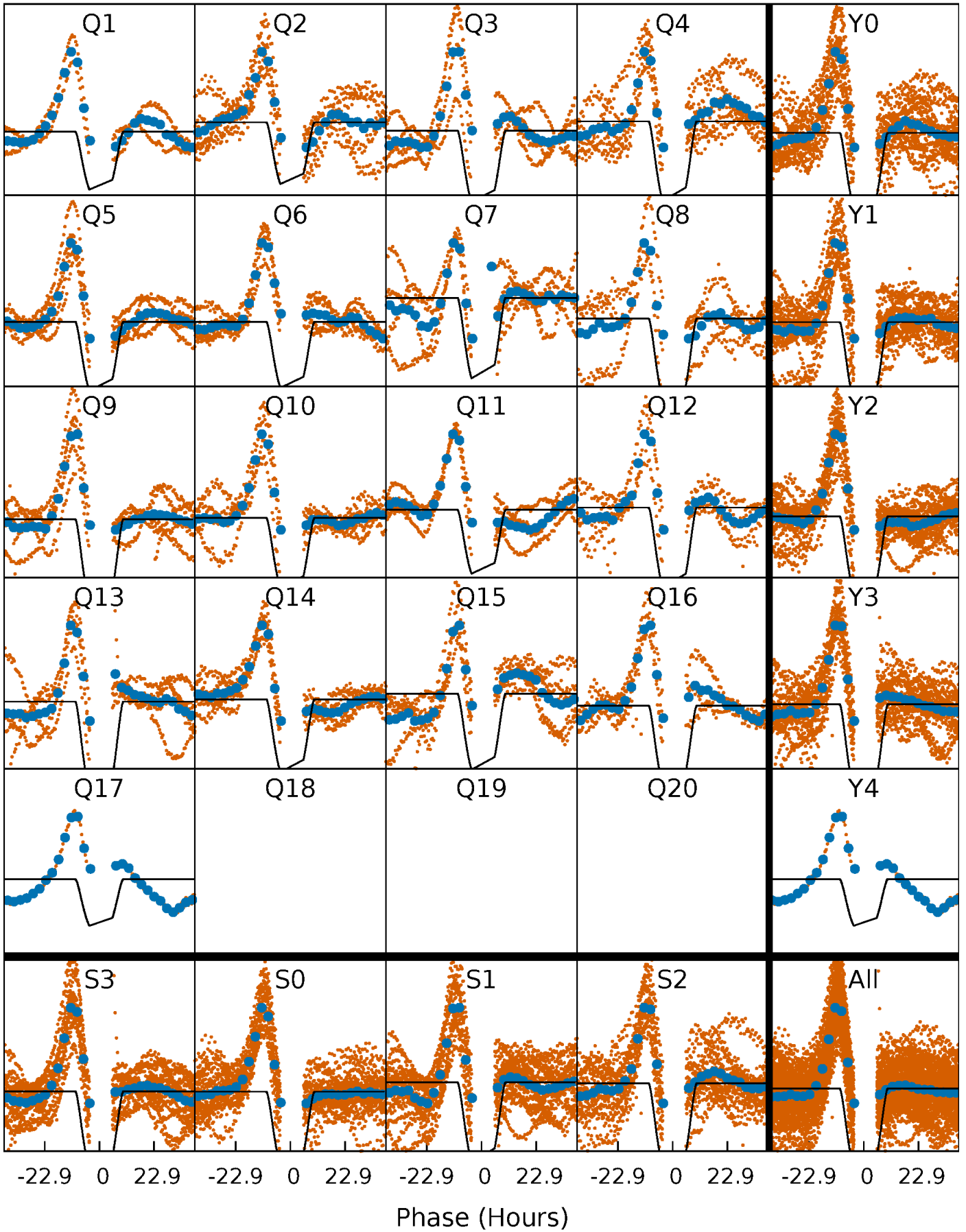
PDC Quarter-Phased Transit Curves

TCE 006117415-02 P= 19.741578 Days $T_0=136.421069$ (BKJD)



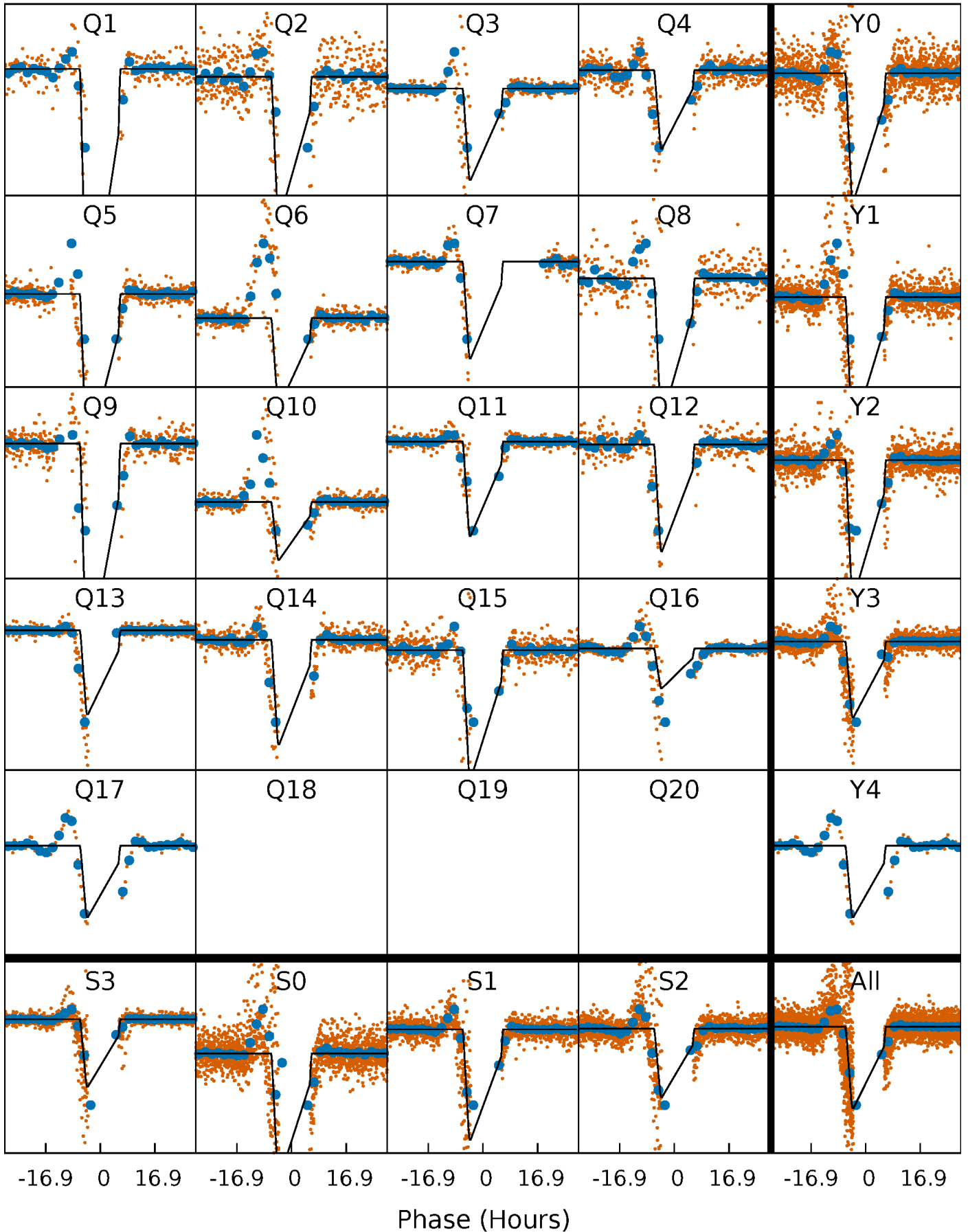
DV Quarter-Phased Transit Curves

TCE 006117415-02 P= 19.741578 Days $T_0=136.421069$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

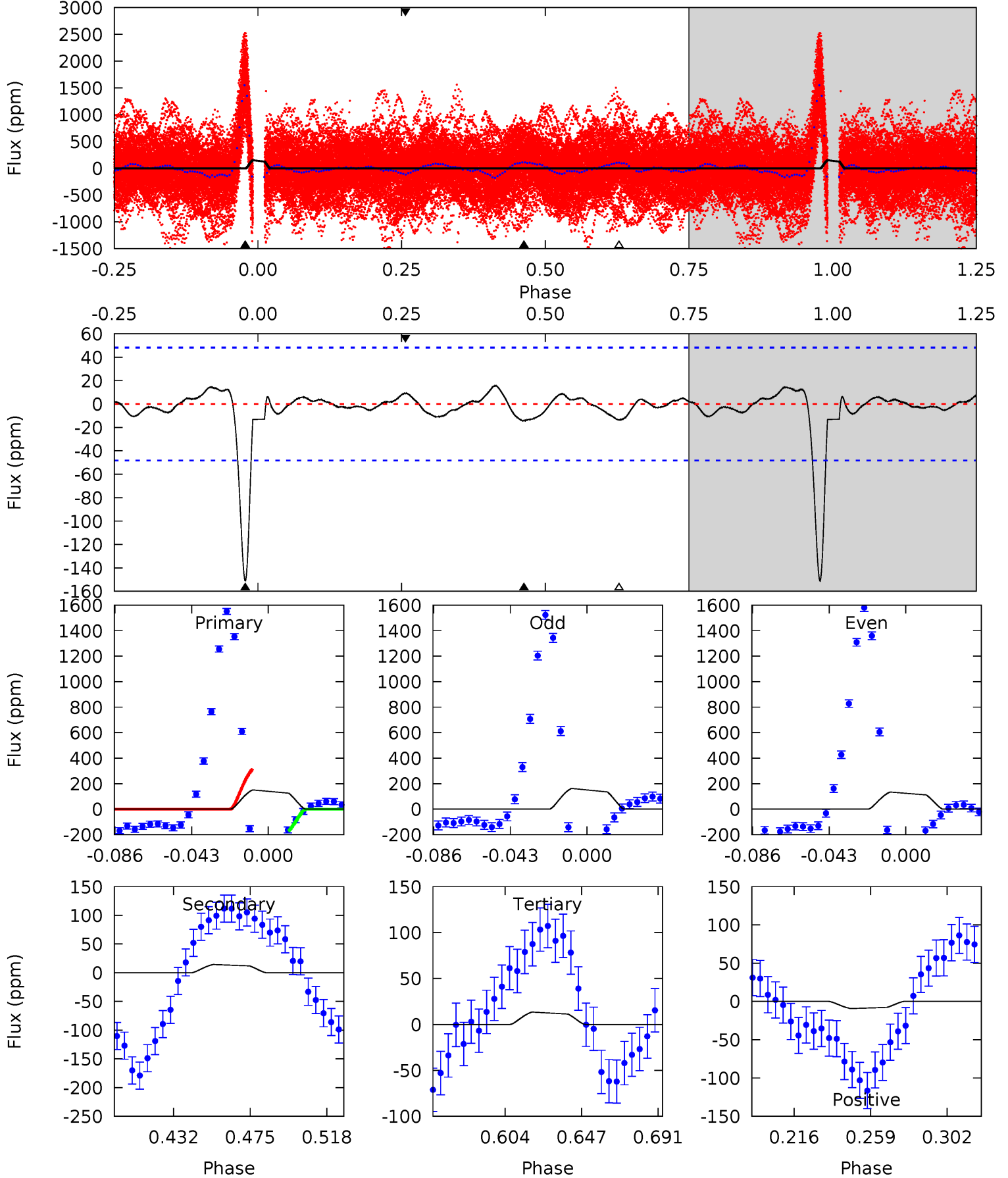
TCE 006117415-02 P= 19.741427 Days $T_0=136.413734$ (BKJD)



DV Model-Shift Uniqueness Test

006117415-02, P = 19.741578 Days, E = 116.679491 Days

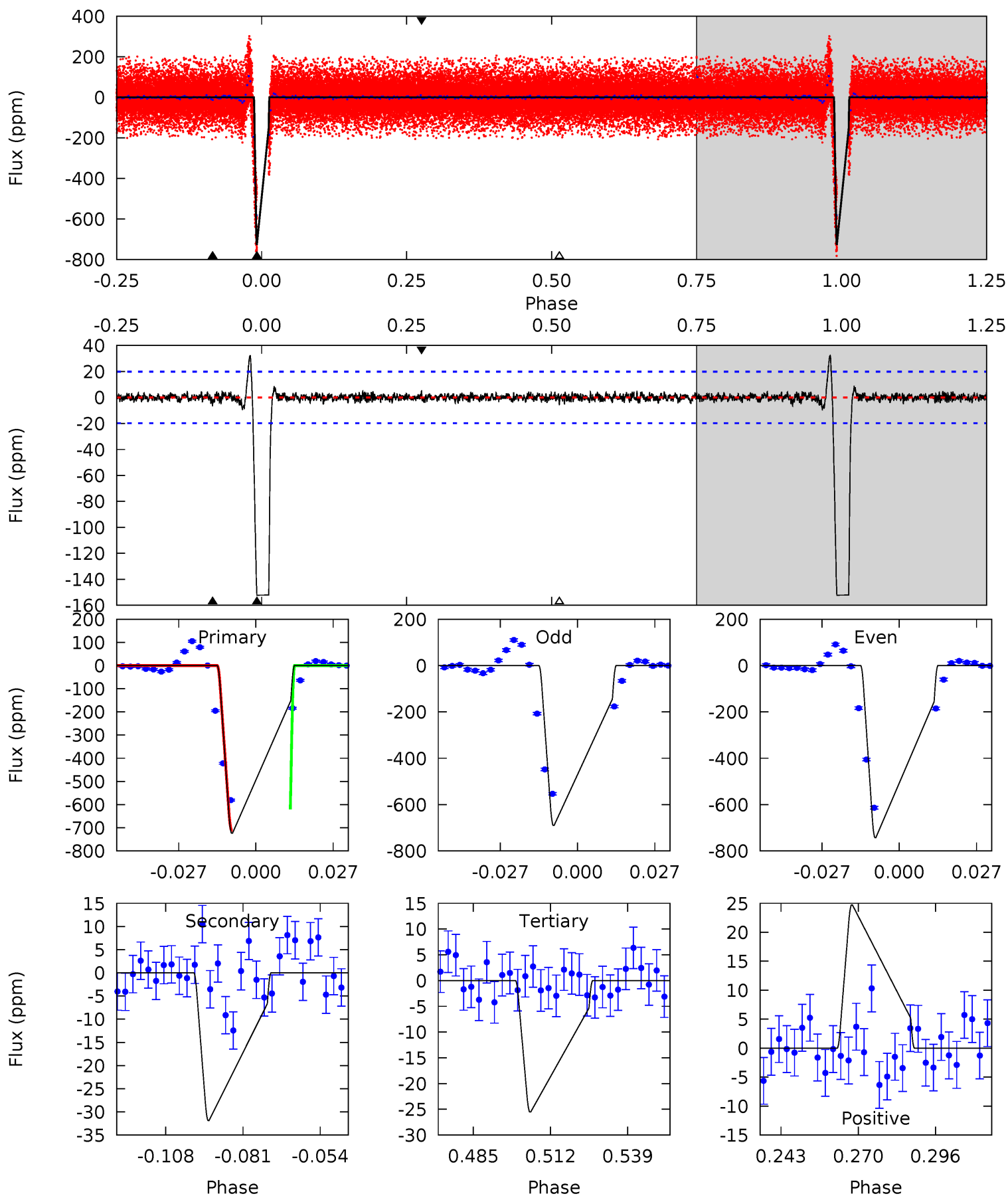
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 14.8 | 1.42 | 1.33 | 0.91 | 4.74 | 2.02 | 0.60 | 13.5 | 13.9 | 0.09 | 0.50 | 1.38 | 0.93 | 0.09 | 7.01 |



Alt Model-Shift Uniqueness Test

006117415-02, P = 19.741427 Days, E = 116.672307 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 37.1 | 1.63 | 1.31 | 1.27 | 4.83 | 2.21 | 0.41 | 35.8 | 35.9 | 0.33 | 0.37 | 1.33 | 0.95 | 0.18 | 0 |



Stellar Parameters For KIC 006117415

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 6535^{+147}_{-180} | $4.183^{+0.140}_{-0.140}$ | $0.000^{+0.250}_{-0.300}$ | $1.529^{+0.328}_{-0.295}$ | $1.301^{+0.142}_{-0.213}$ | $0.513^{+0.376}_{-0.219}$ |
| | +2%/-3% | +3%/-3% | +inf%/-inf% | +21%/-19% | +11%/-16% | +73%/-43% |
| 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 006117415-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -14 ± 10 | $7.47^{+0.94}_{-0.85}$ | 1260^{+74}_{-73} | 2662^{+197}_{-400} | $3.380^{+2.566}_{-2.263}$ |
| Alt. | -7 ± 4 | $4.65^{+0.53}_{-0.55}$ | 1257^{+76}_{-68} | 2728^{+178}_{-325} | $4.106^{+2.674}_{-2.451}$ |

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

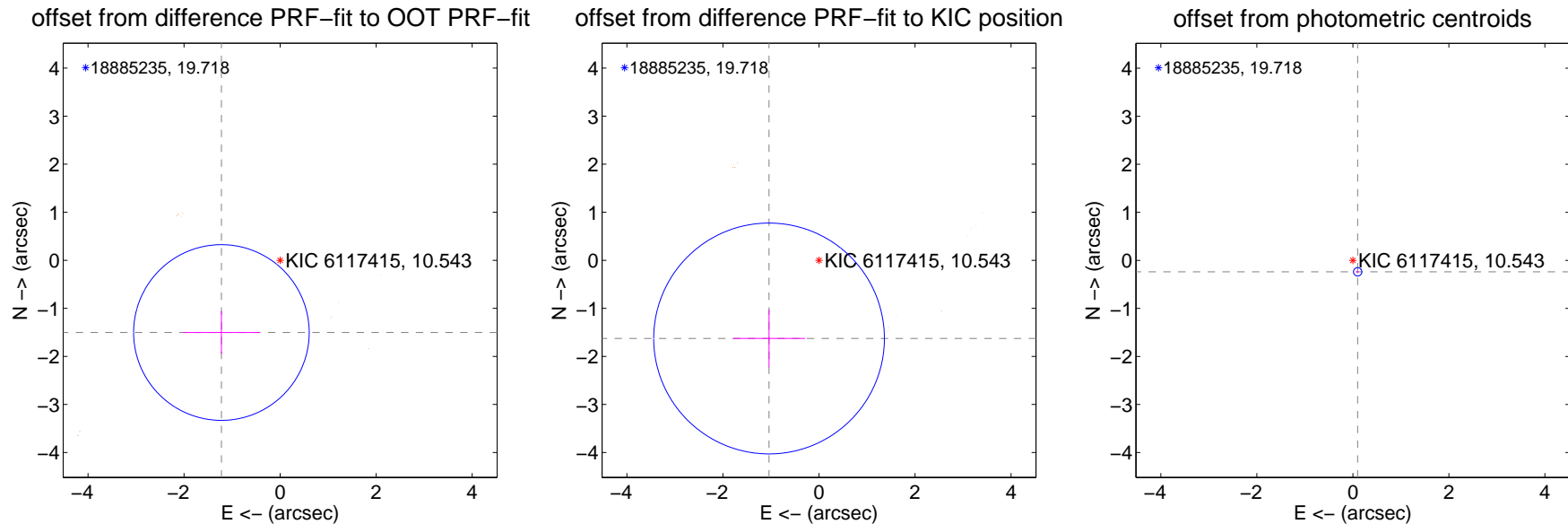
DV Centroid Data

Supplemental centroid analysis for 006117415-02. **Kepler magnitude: 10.54.** Transit SNR 47.86

There are 0 quarters with good PRF difference image offsets

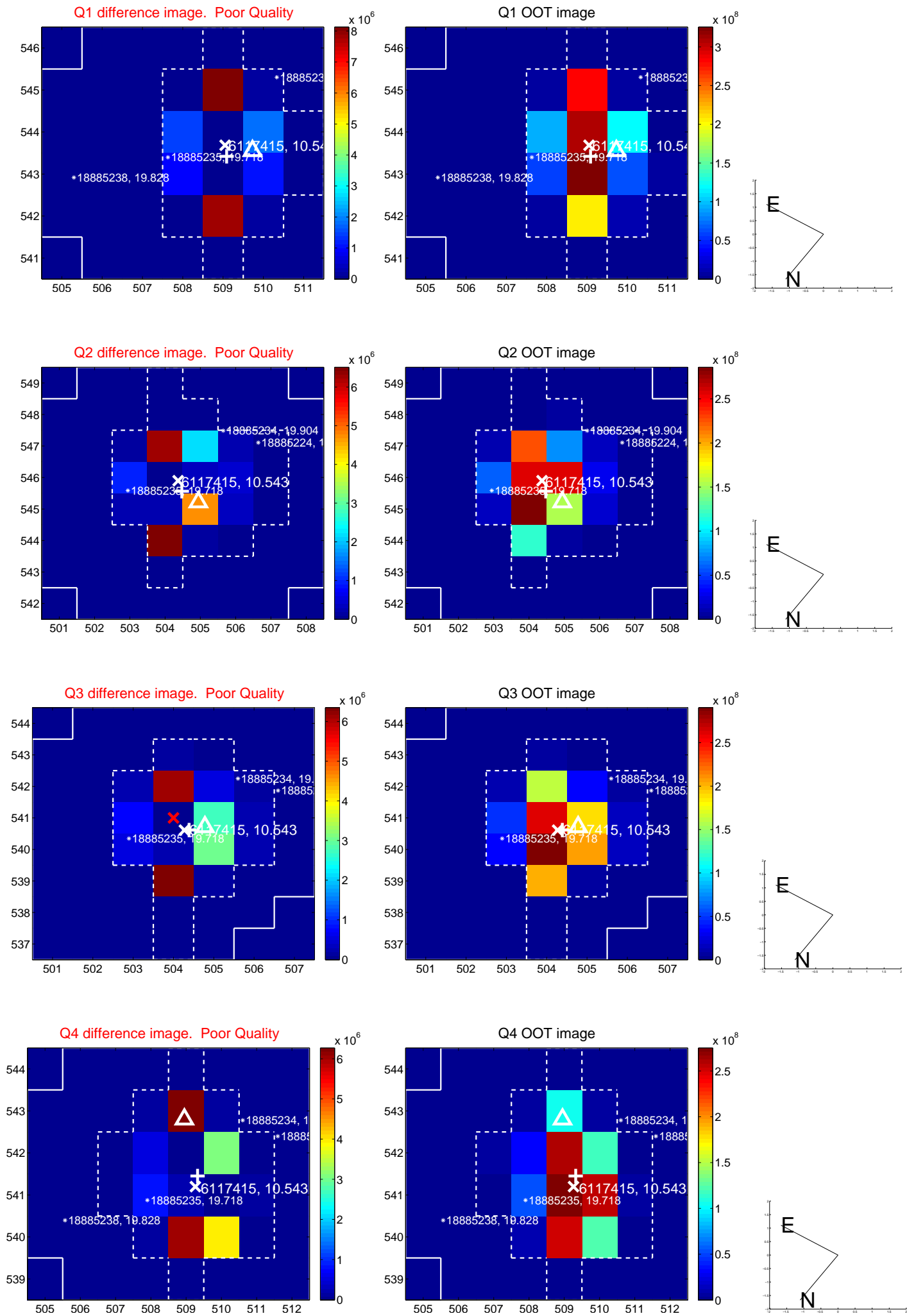
The direct PRF centroid is offset from the target star catalog position by about 1.05 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|-------------------------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 1.938 ± 0.610 | 3.18 | 1.223 ± 0.796 | -1.503 ± 0.445 |
| PRF-fit source offset from KIC position | 1.932 ± 0.801 | 2.41 | 1.040 ± 0.753 | -1.628 ± 0.599 |
| photometric centroid source offset | 0.26 ± 0.03 | 8.90 | -0.10 ± 0.02 | -0.24 ± 0.03 |

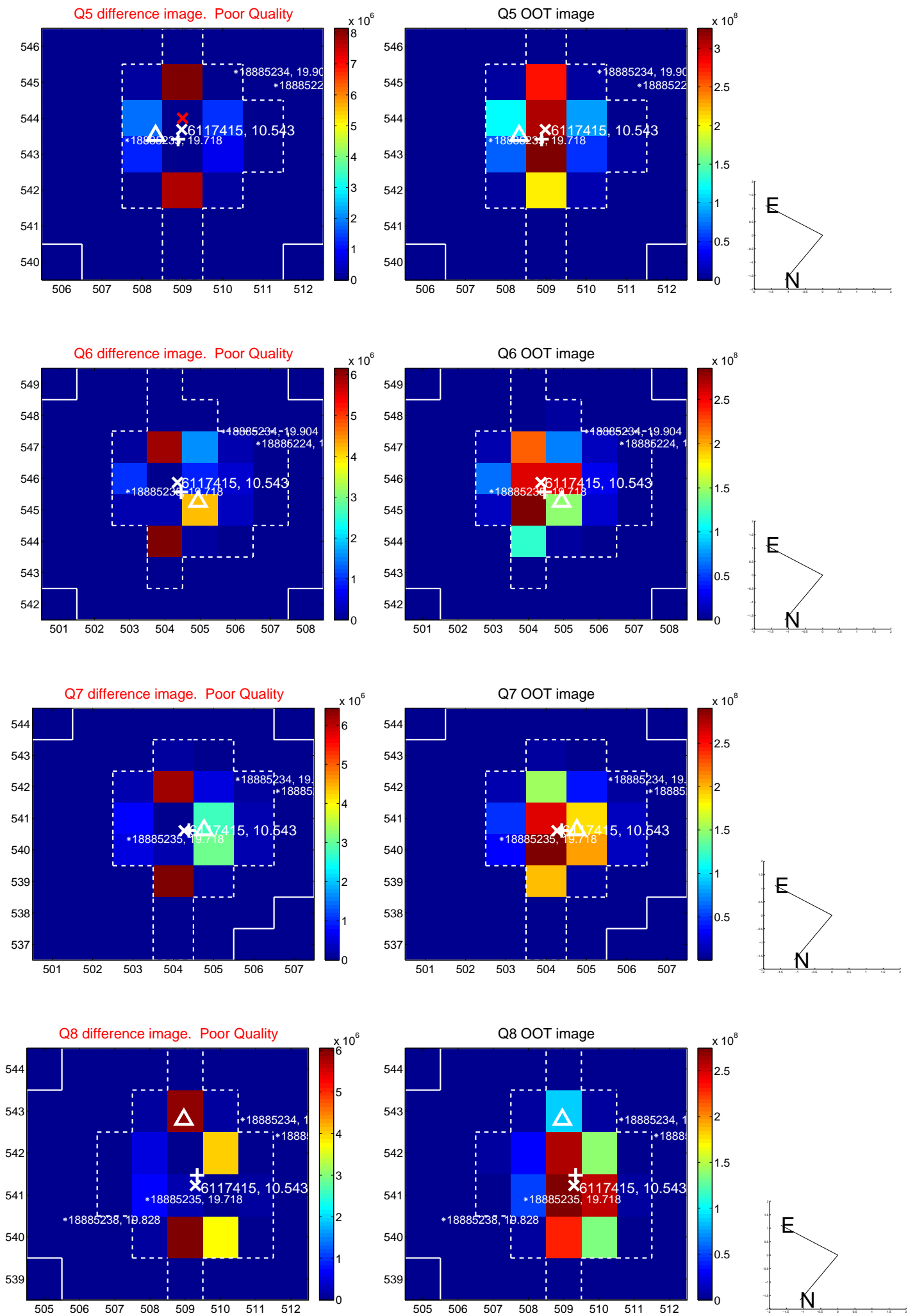


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

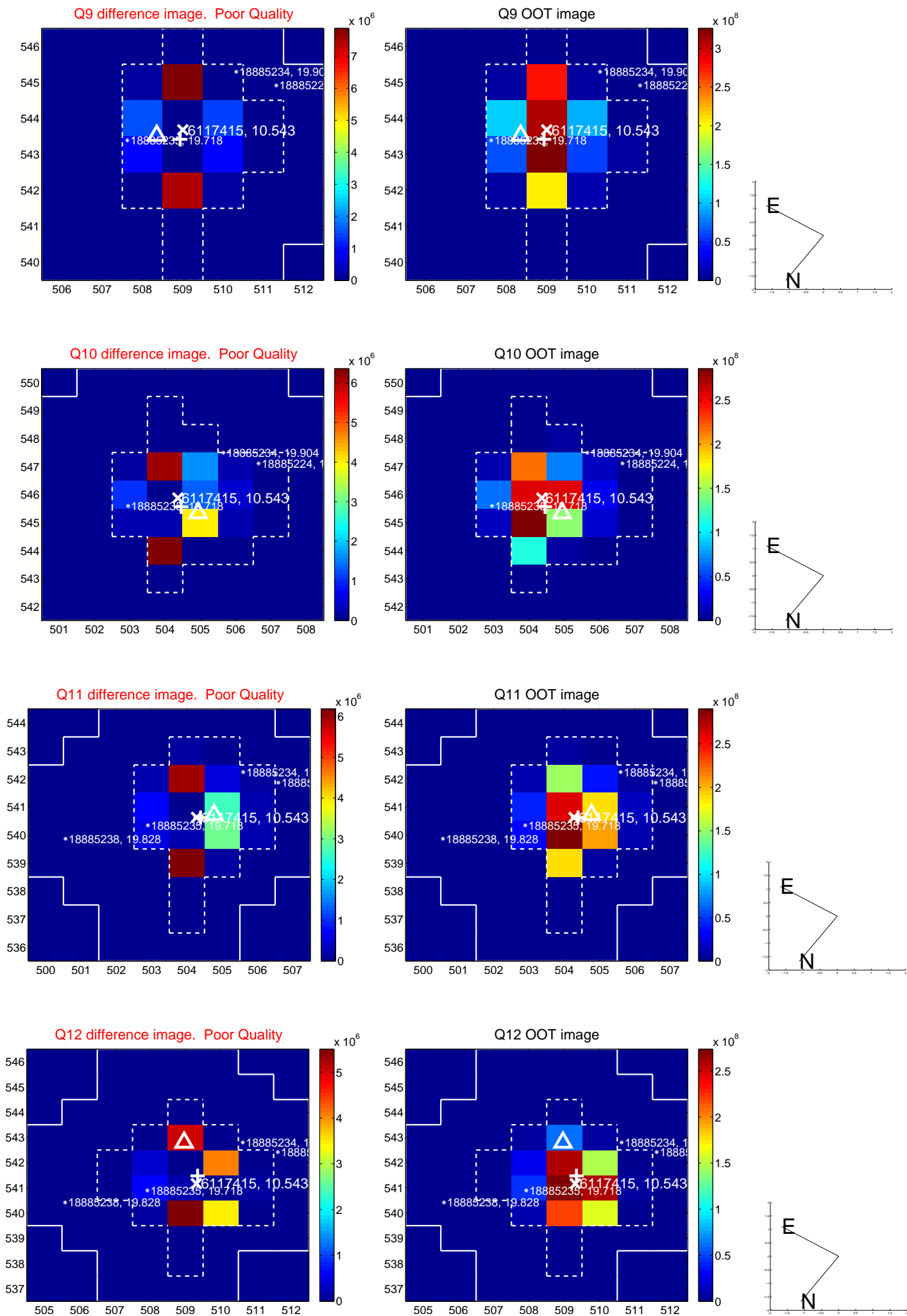
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



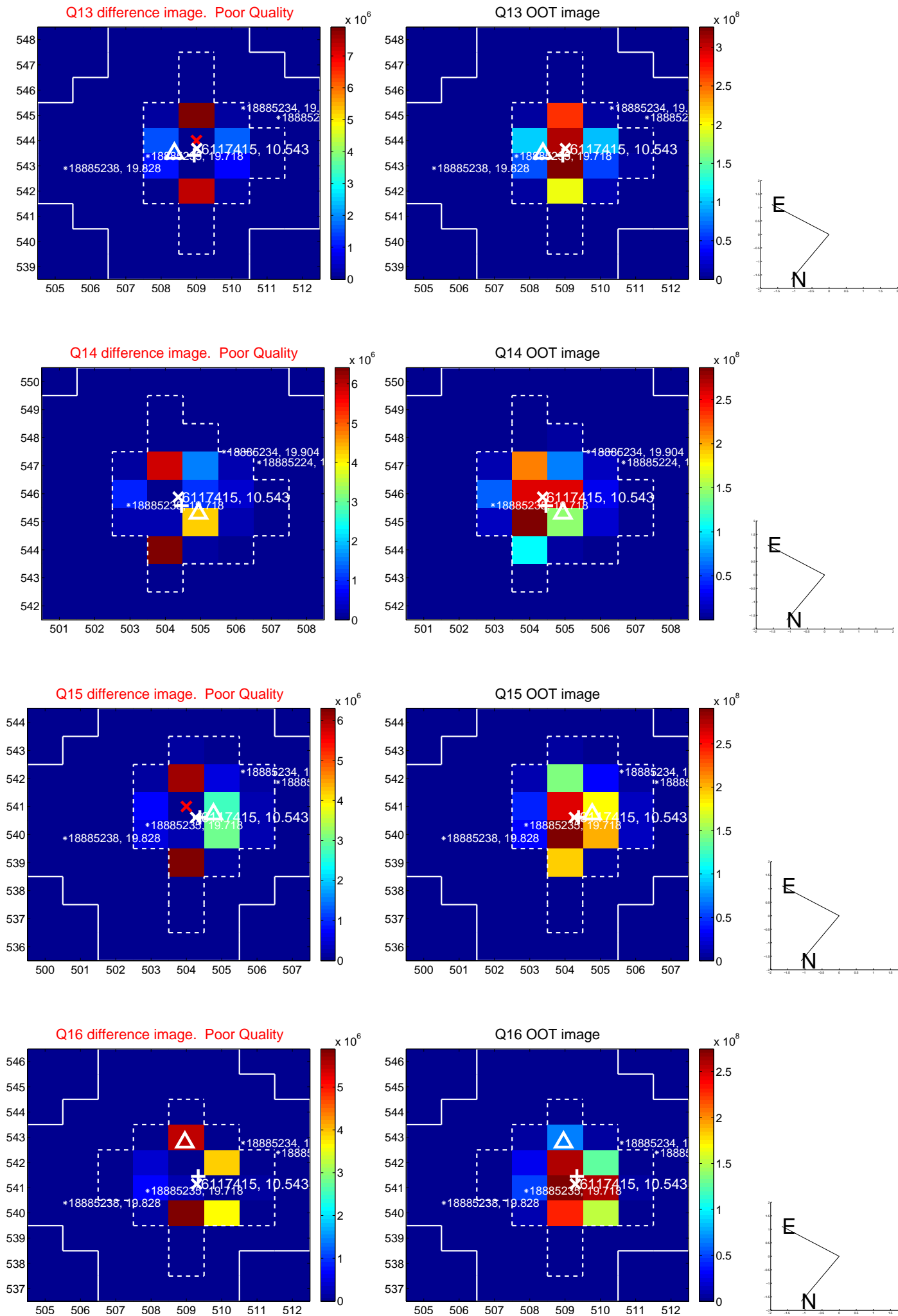
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



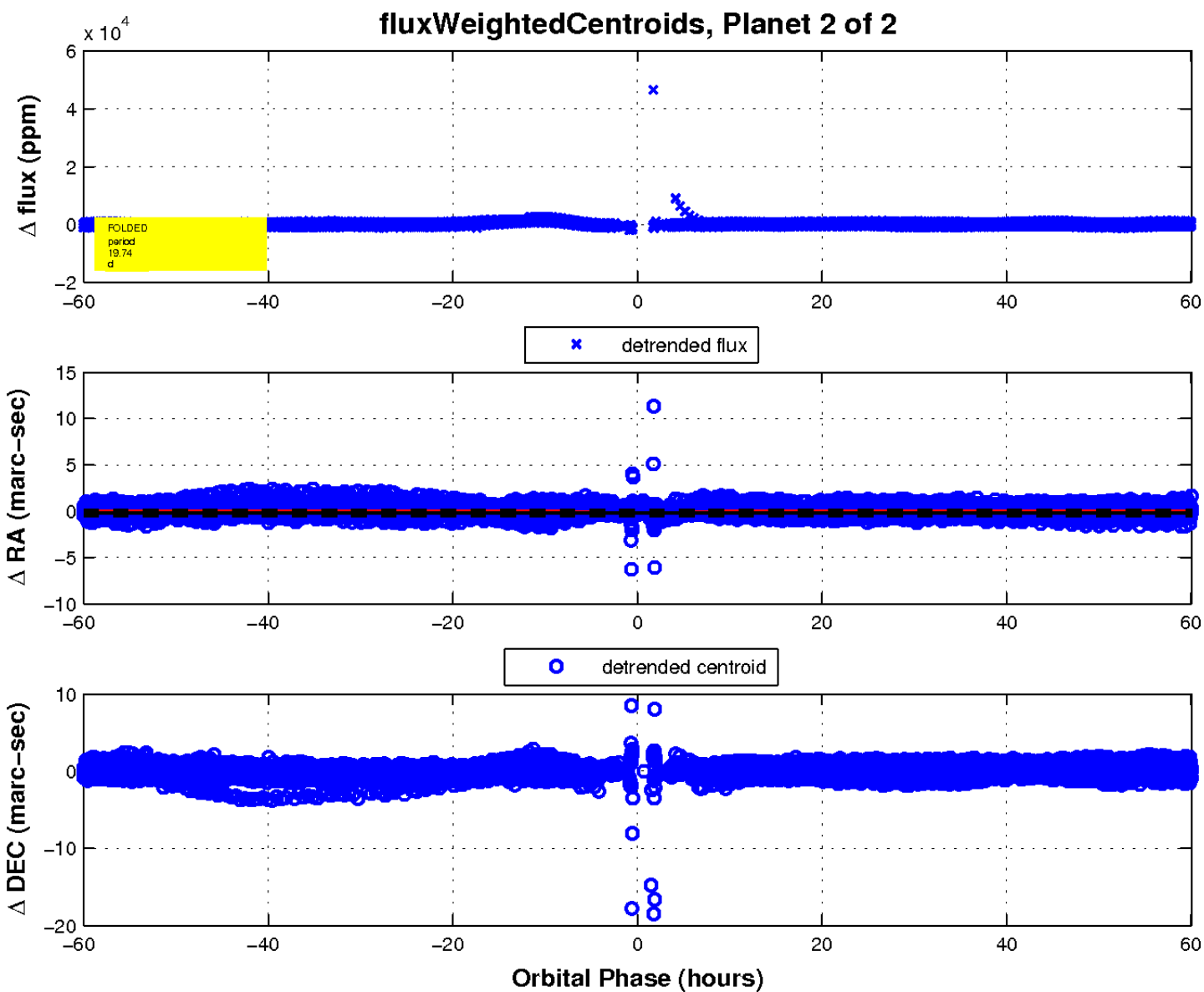
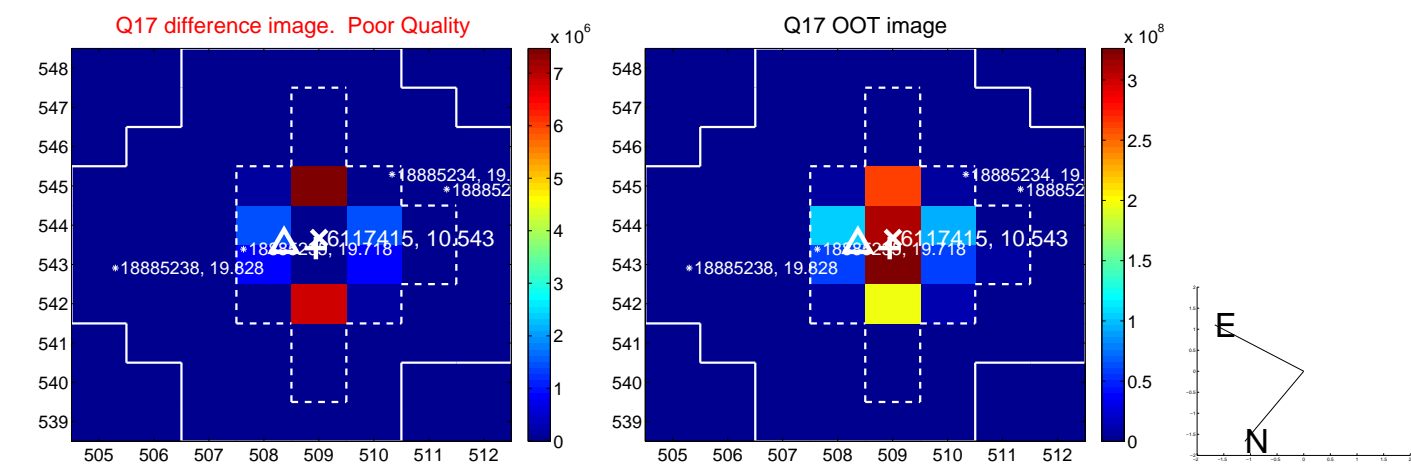
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

