

KIC 009664387

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009664387-01 | OBS | No | 0.581494 | 131.780540 | 244.8 | 0.532 | 43.3 | 28.3 | 1.10 | 6398 | 2.27 | 8971.59 |
| 009664387-02 | OBS | No | 0.581502 | 132.060994 | 5289.1 | 1.500 | 72.9 | -1.0 | 1.10 | 6398 | 8.07 | 8971.41 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 009664387-01 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET |
| 009664387-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 1 | LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS—EPHEM_MATCH |

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

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

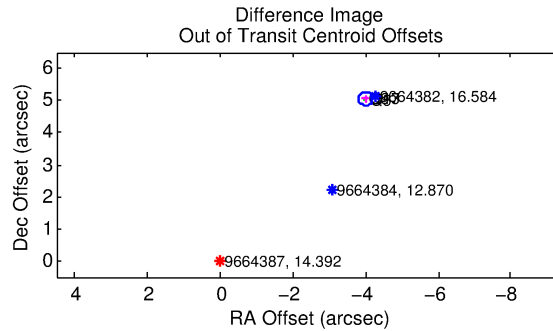
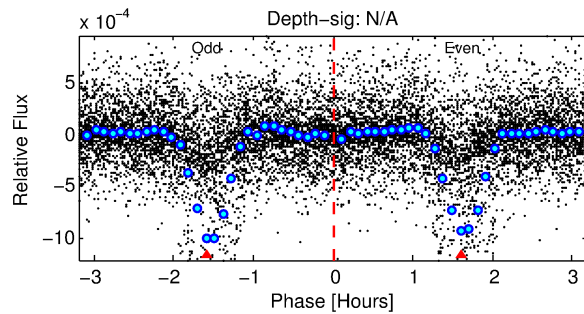
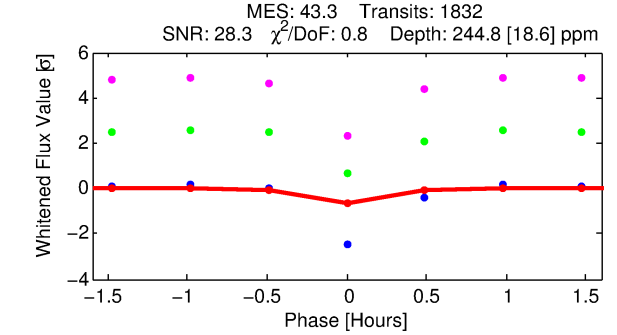
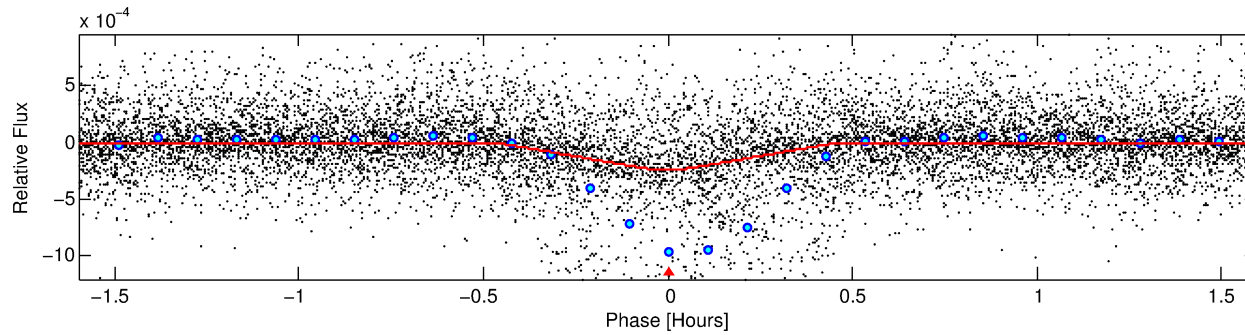
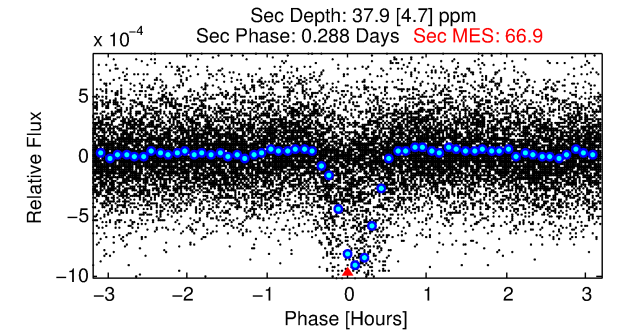
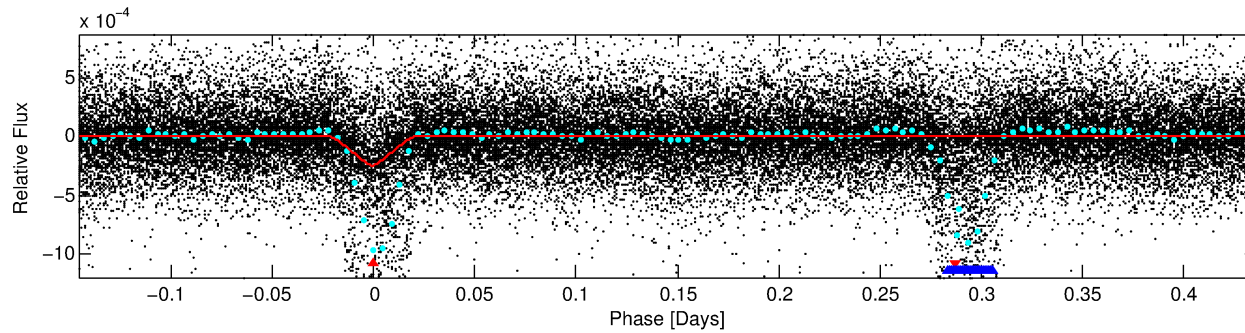
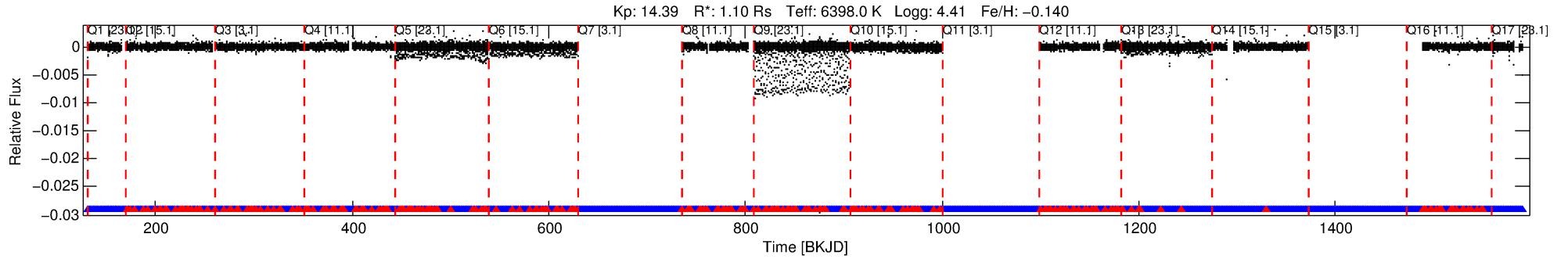
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009664387-01

No Significant Match Found

DV One-Page Summary

KIC: 9664387 Candidate: 1 of 2 Period: 0.581 d



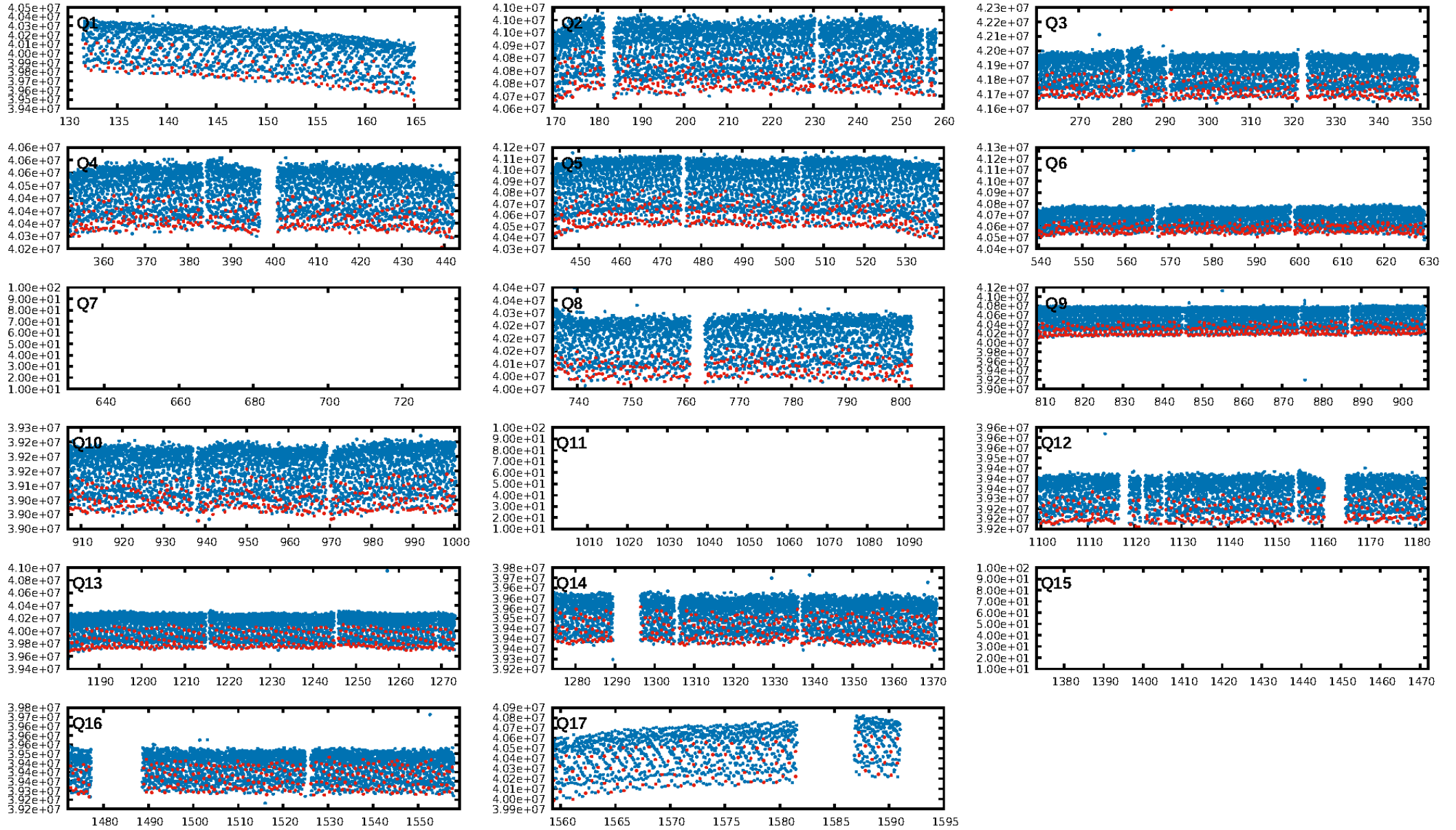
DV Fit Results:

Period = 0.58149 [0.00000] d
Epoch = 131.7805 [0.0004] BKJD
Rp/R* = 0.0189 [0.0035]
a/R* = 3.40 [3.05]
b = 0.94 [0.12]
Seff = 8971.60 [3504.20]
Teff = 2482 [242] K
Rp = 2.27 [0.81] Re
a = 0.0142 [0.0036] AU
Ag = 0.82 [0.44] [-0.41σ]
Teffp = 3651 [374] K [2.62σ]

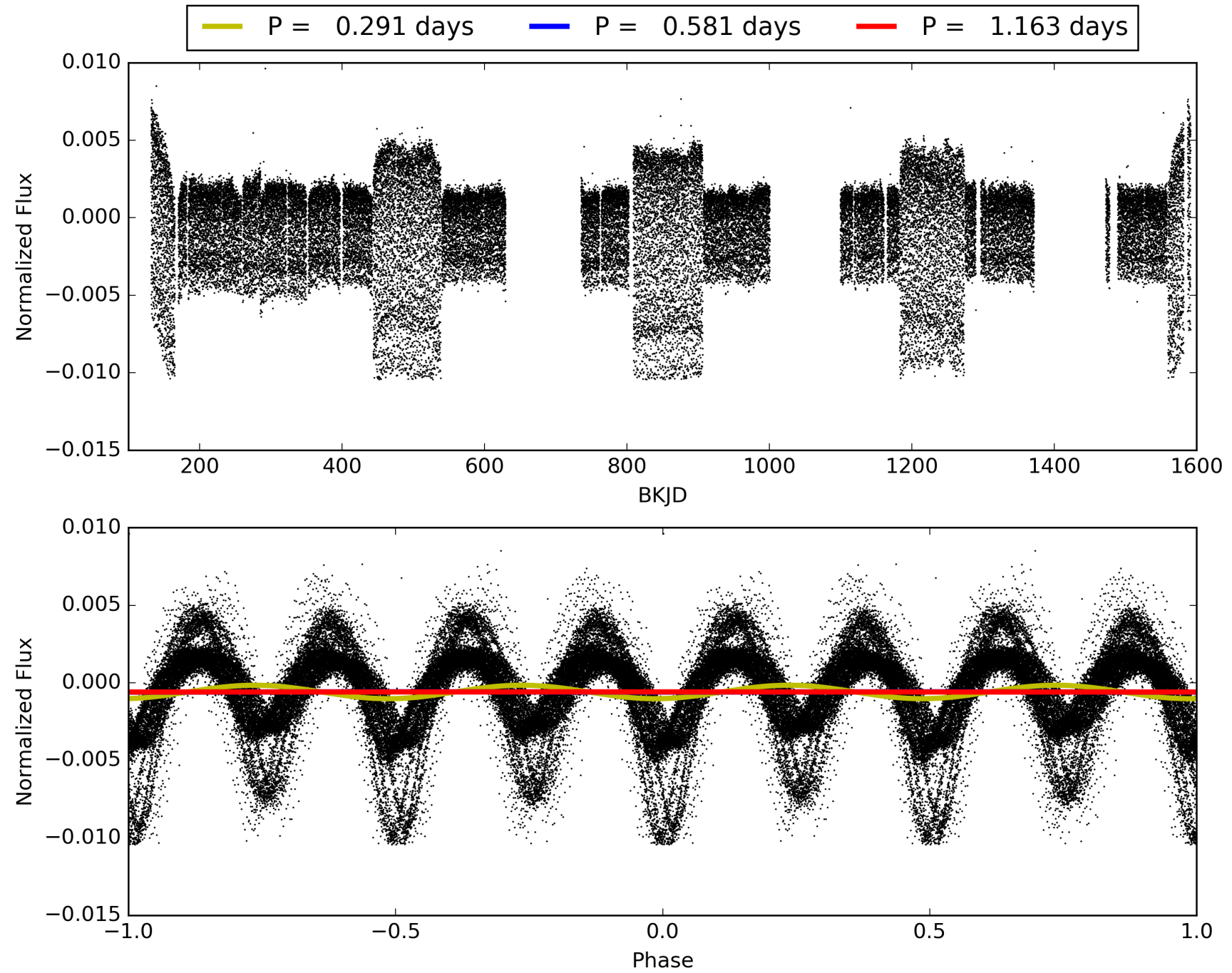
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.0% [0.00σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.86 [1481/1728]
GhostDiagnostic-chr: -0.4397
Centroid-sig: N/A
Centroid-so: N/A
OotOffset-rm: 6.435 arcsec [96.27σ]
KicOffset-rm: 6.652 arcsec [99.17σ]
OotOffset-st: 0/0/0/5 [5]
KicOffset-st: 0/0/0/5 [5]
DiffImageQuality-fgm: 1.00 [5/5]
DiffImageOverlap-fno: 1.00 [14/14]

TCE 009664387-01, PDC Light Curves

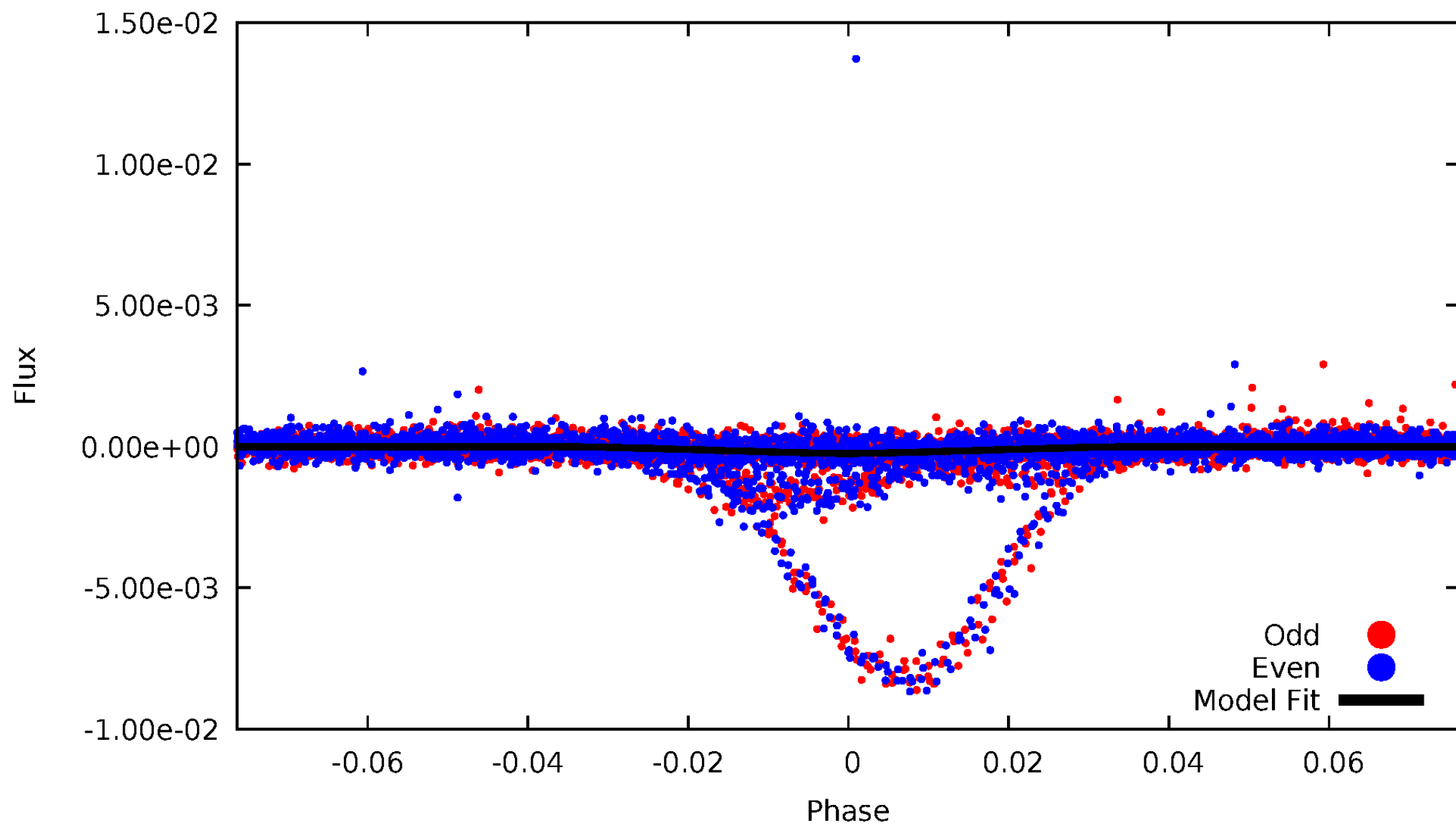


TCE 009664387-01



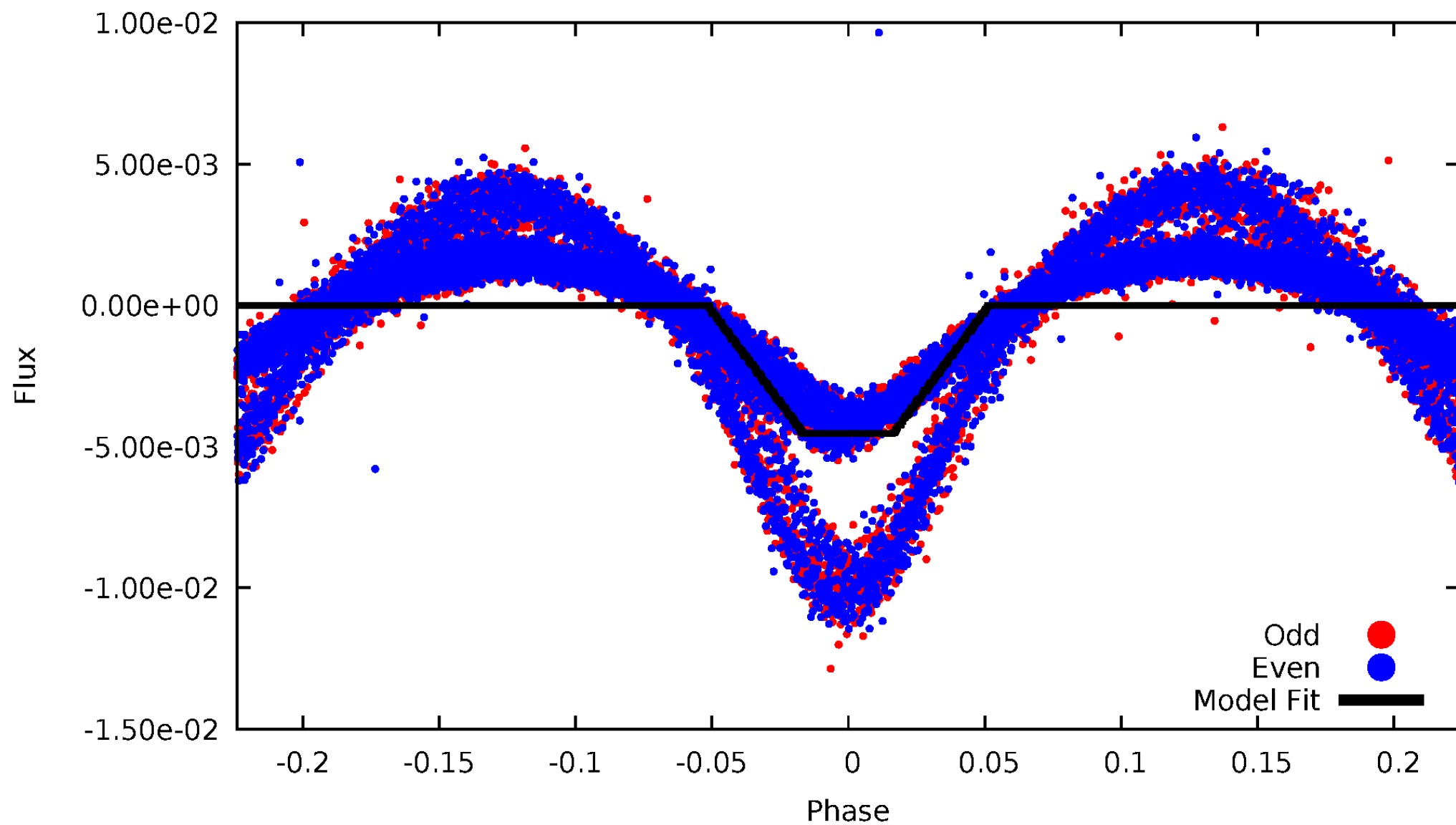
DV Odd/Even

TCE 009664387-01



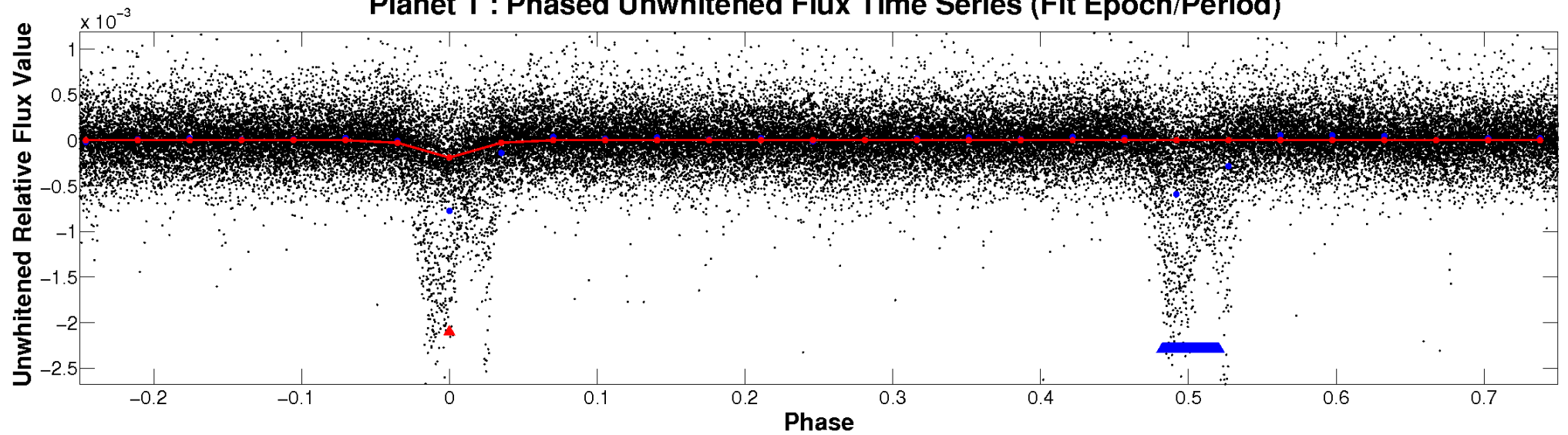
ALT Odd/Even

TCE 009664387-01

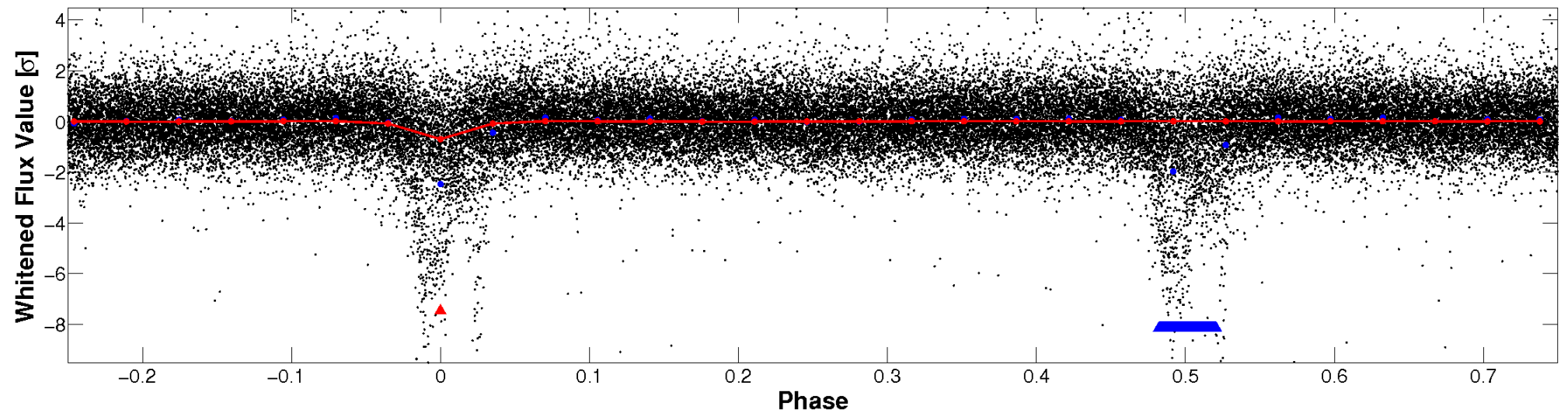


Non-Whitened Vs. Whitened Light Curve

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

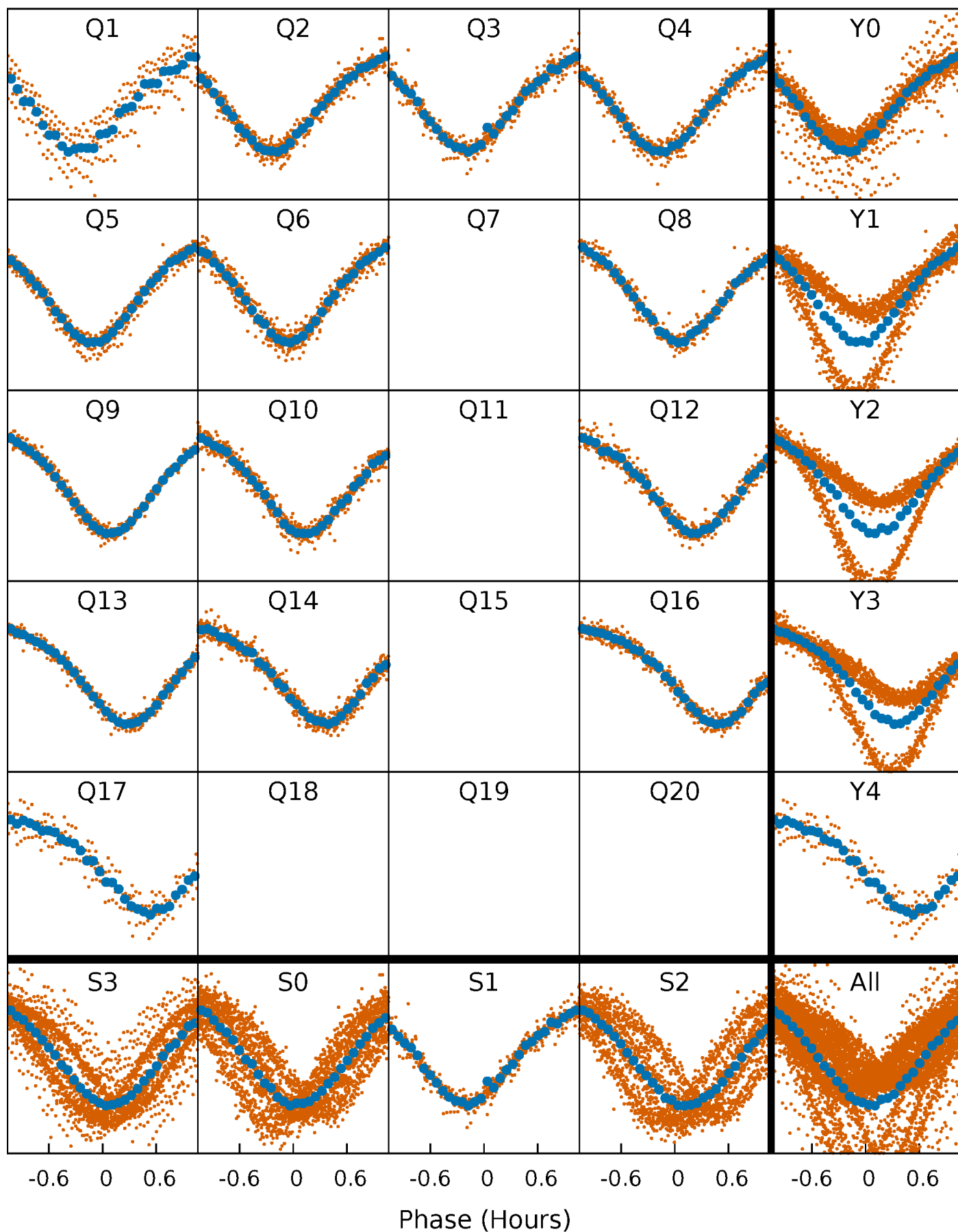


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



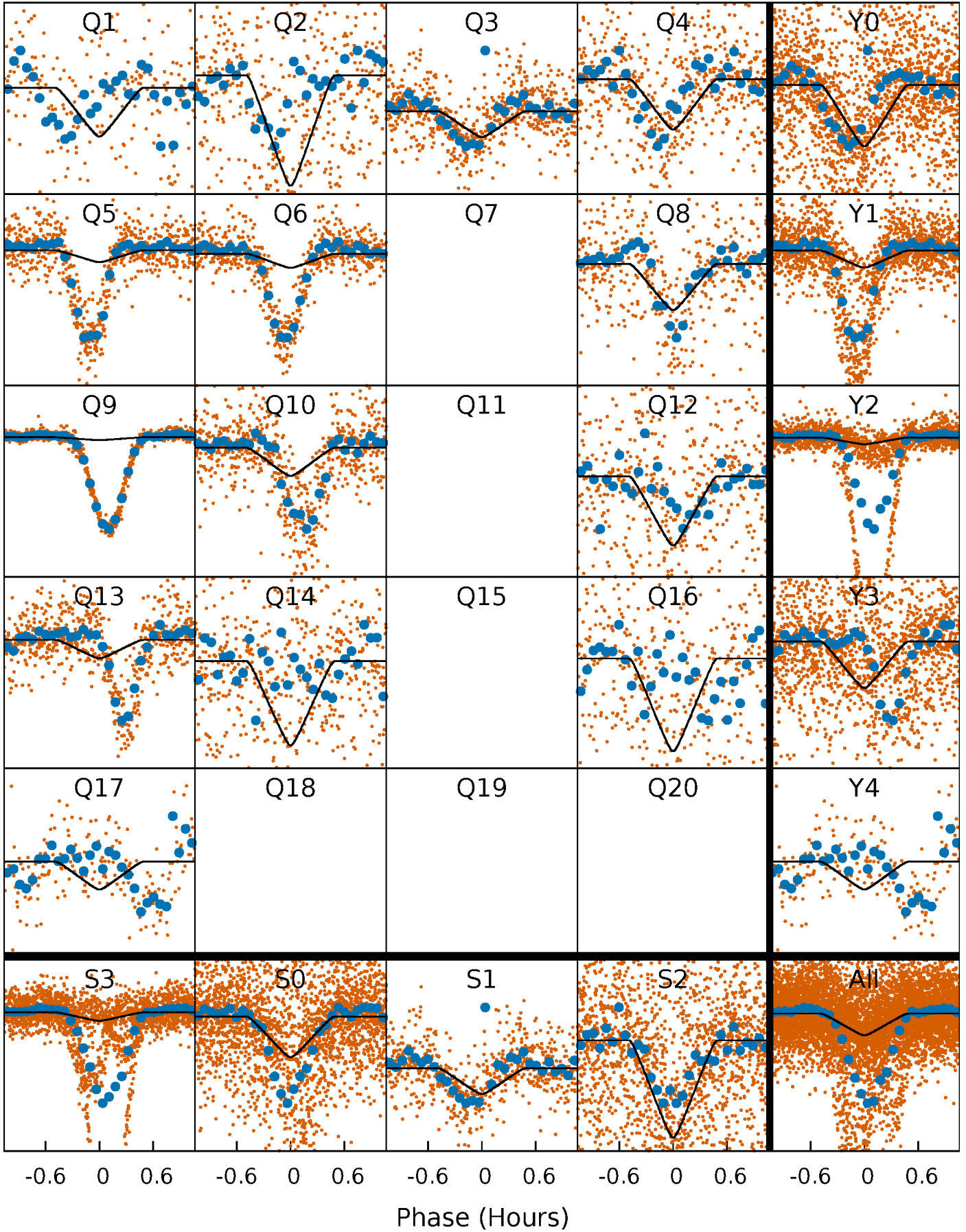
PDC Quarter-Phased Transit Curves

TCE 009664387-01 P= 0.581494 Days $T_0=131.780540$ (BKJD)



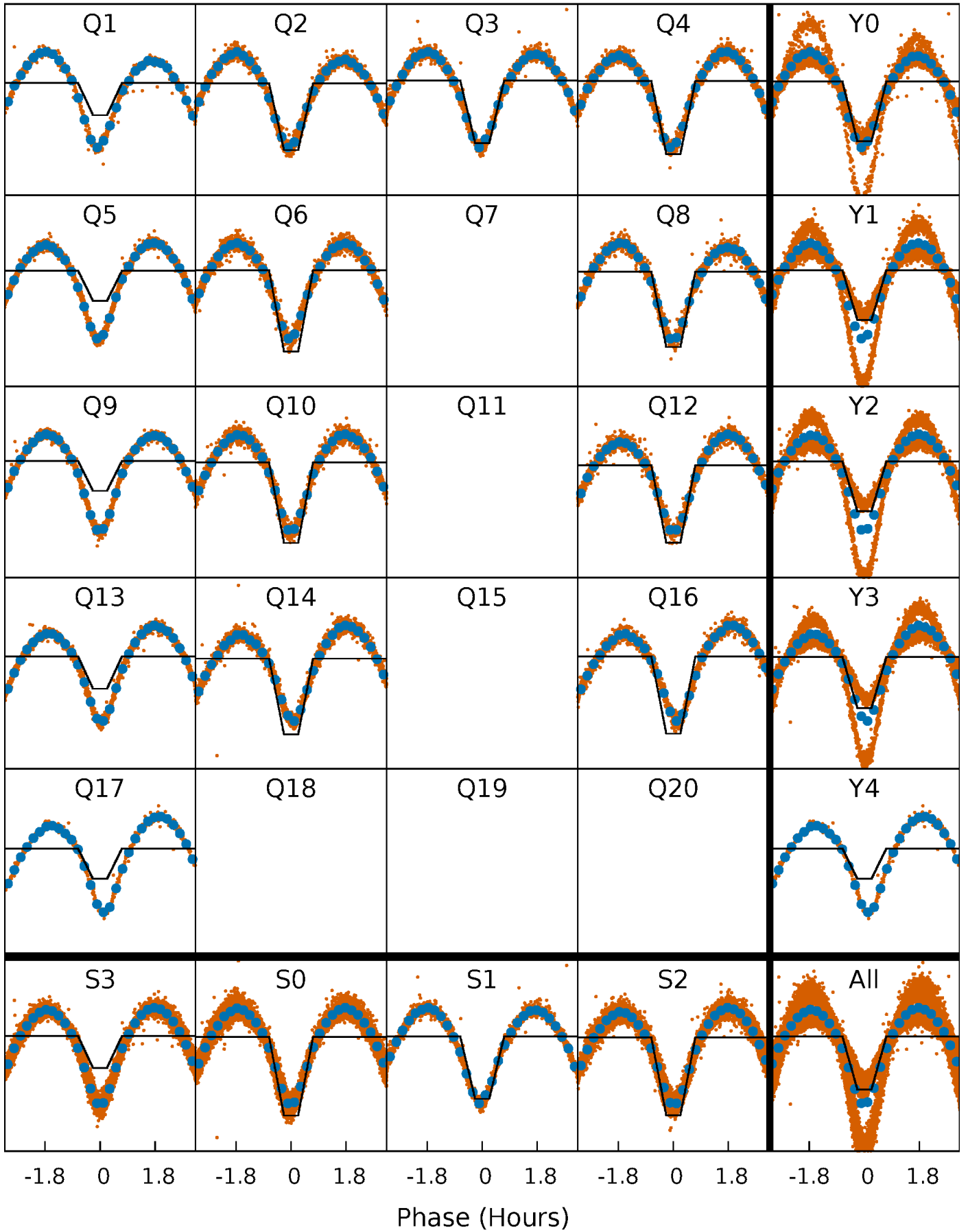
DV Quarter-Phased Transit Curves

TCE 009664387-01 P= 0.581494 Days $T_0=131.780540$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

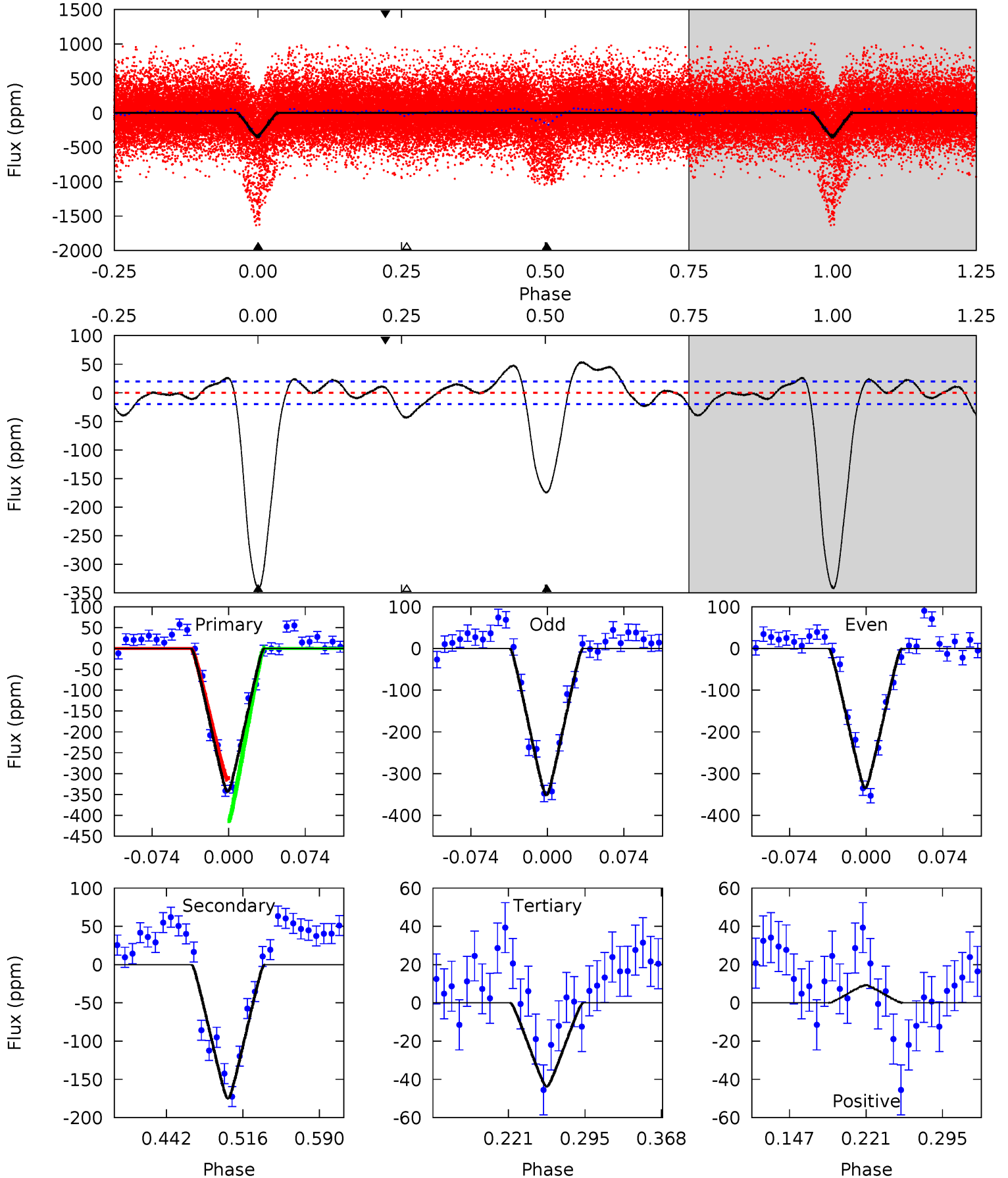
TCE 009664387-01 P= 0.581504 Days $T_0=131.771828$ (BKJD)



DV Model-Shift Uniqueness Test

009664387-01, P = 0.581494 Days, E = 131.199046 Days

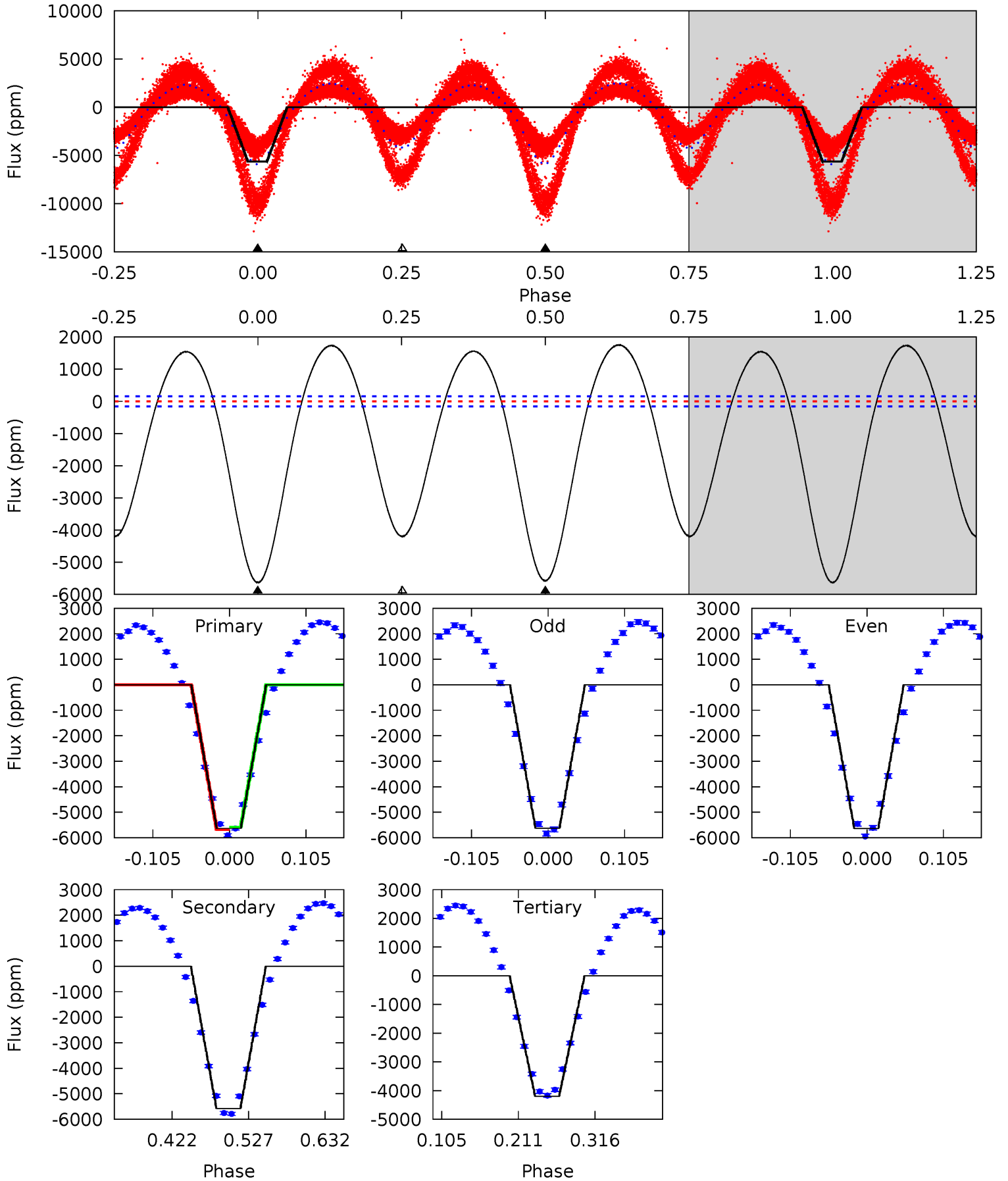
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 80.0 | 40.8 | 10.2 | 2.17 | 4.63 | 1.79 | 4.45 | 69.8 | 77.8 | 30.6 | 38.6 | 2.00 | 3.04 | 0.14 | 12.9 |



Alt Model-Shift Uniqueness Test

009664387-01, P = 0.581504 Days, E = 131.190324 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|-------|-------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 161.7 | 160.1 | 120.6 | 0 | 4.55 | 1.62 | 60.4 | 41.2 | 161.7 | 39.6 | 160.1 | 0.13 | 1.36 | 0.24 | 1.34 |



Stellar Parameters For KIC 009664387

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6398^{+160}_{-208} | $4.411^{+0.062}_{-0.200}$ | $-0.140^{+0.250}_{-0.300}$ | $1.101^{+0.336}_{-0.134}$ | $1.141^{+0.150}_{-0.150}$ | $1.204^{+0.402}_{-0.588}$ |
| | +3%/-3% | +1%/-5% | +179%/-214% | +31%/-12% | +13%/-13% | +33%/-49% |
| Source | PHO1 | KIC0 | KIC0 | DSEP | | |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 009664387-01 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|----------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -175 ± 4 | $2.37^{+0.56}_{-0.48}$ | 3520^{+248}_{-158} | 5240^{+586}_{-433} | $3.413^{+1.915}_{-1.127}$ |
| Alt. | -5575 ± 35 | $8.37^{+1.22}_{-0.88}$ | 3539^{+233}_{-183} | 6685^{+305}_{-266} | $8.891^{+1.795}_{-2.037}$ |

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 $A_{obs} \gg 1.0$

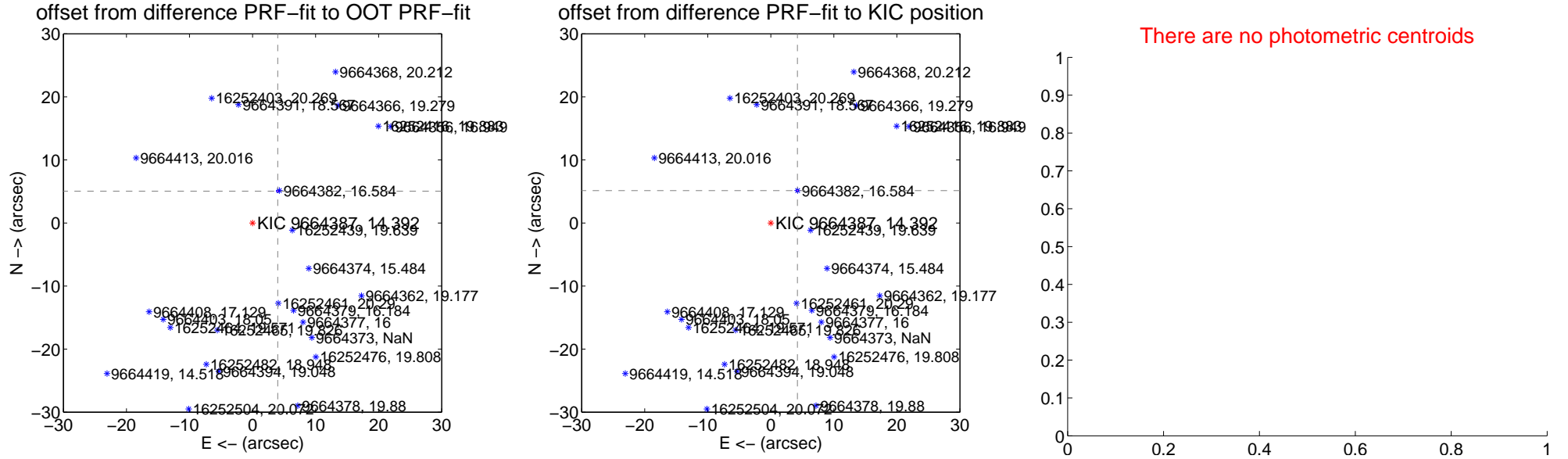
DV Centroid Data

Supplemental centroid analysis for 009664387-01. Kepler magnitude: 14.39. Transit SNR 28.30

There are 5 quarters with good PRF difference image offsets

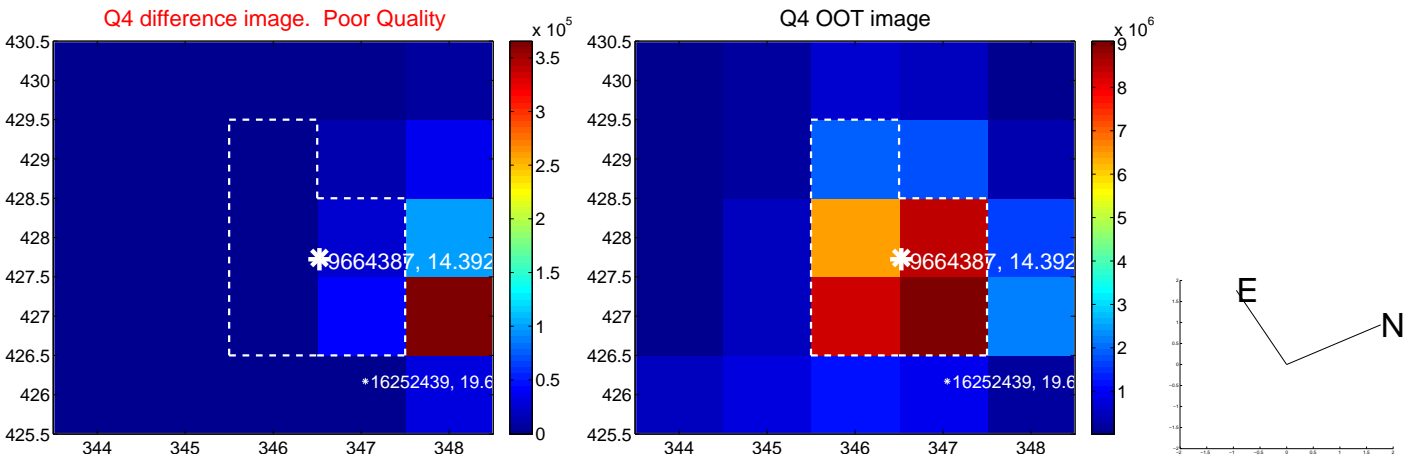
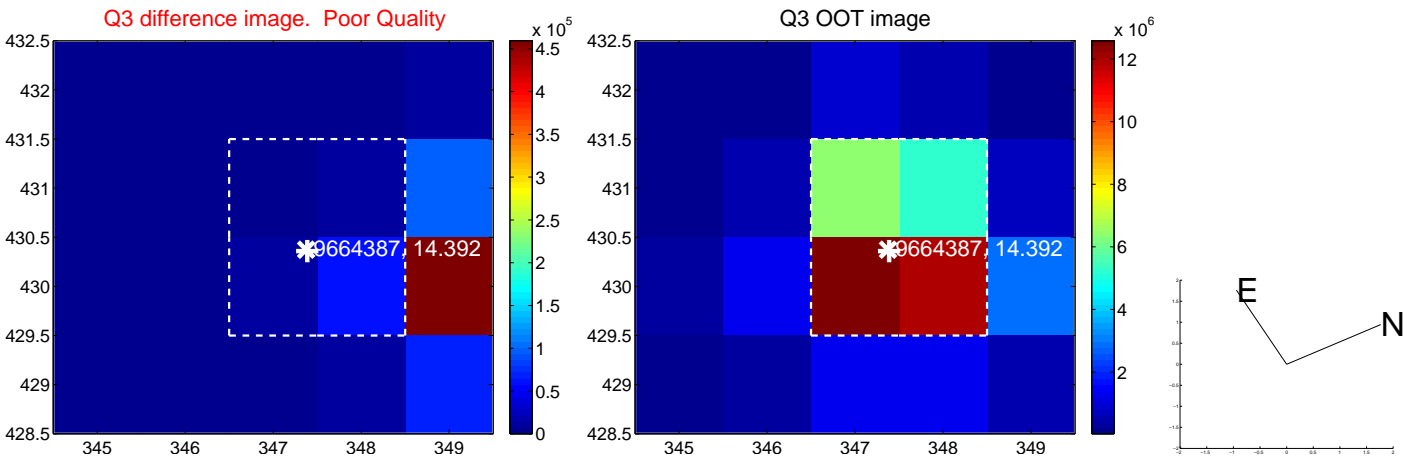
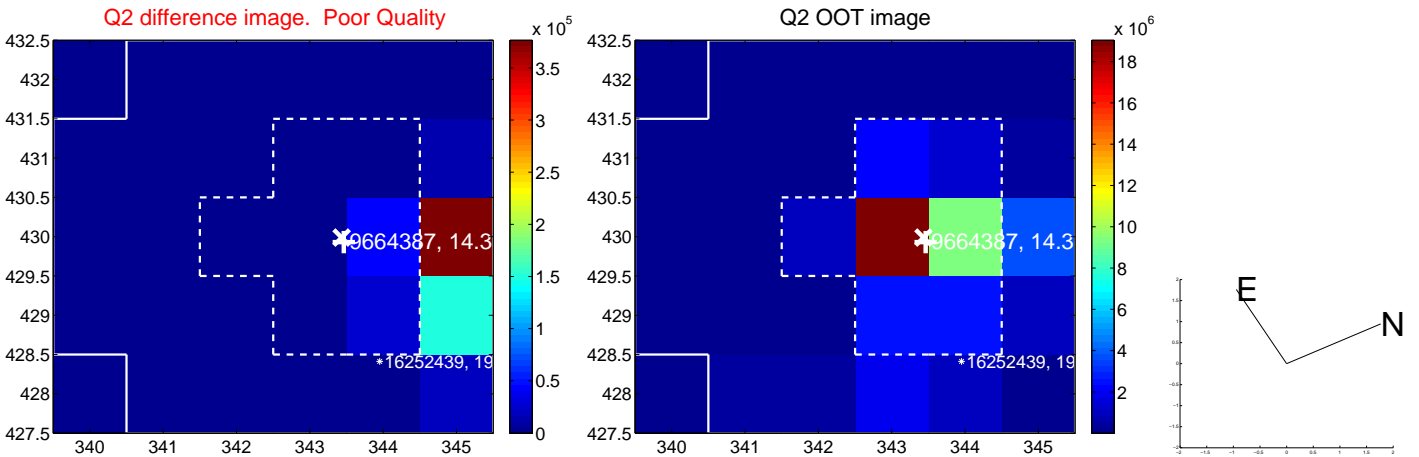
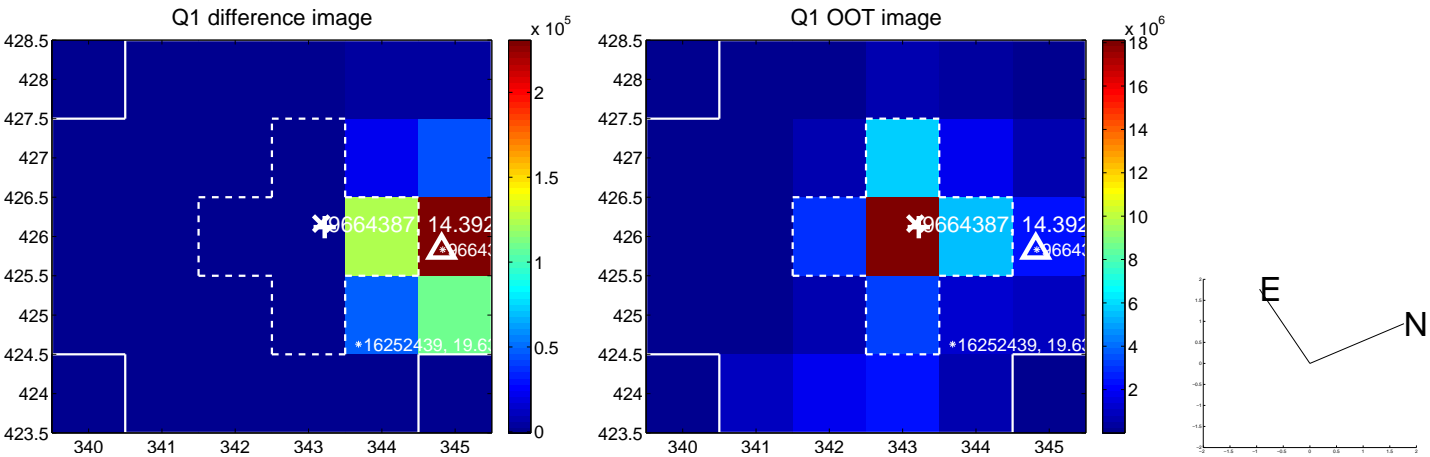
The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 6.435 \pm 0.067 | 96.27 | -3.993 \pm 0.067 | 5.046 \pm 0.067 |
| PRF-fit source offset from KIC position | 6.652 \pm 0.067 | 99.17 | -4.223 \pm 0.067 | 5.139 \pm 0.067 |
| photometric centroid source offset | — | — | — | — |

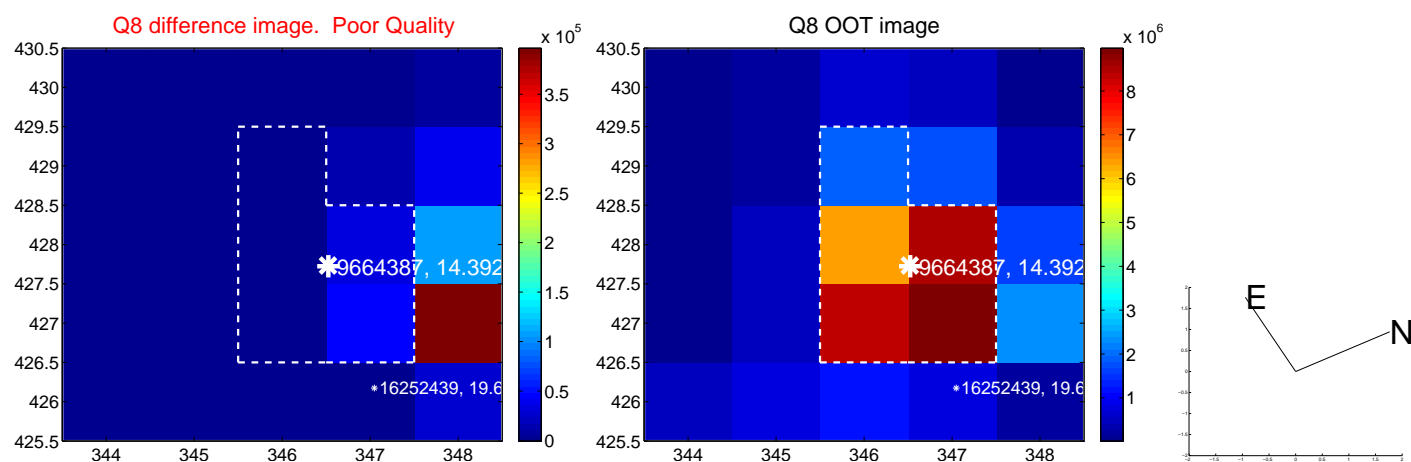
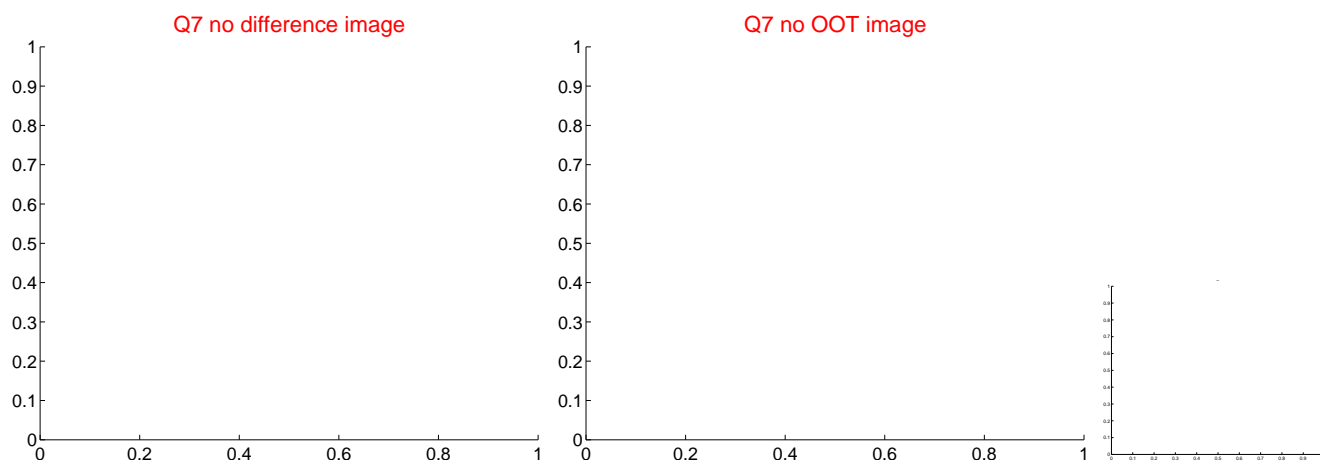
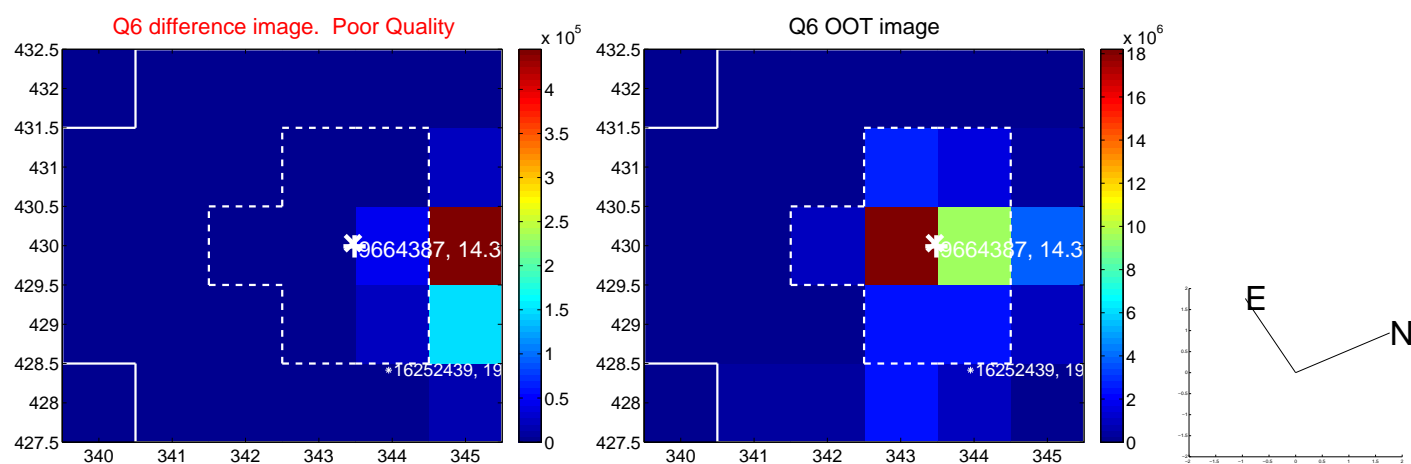
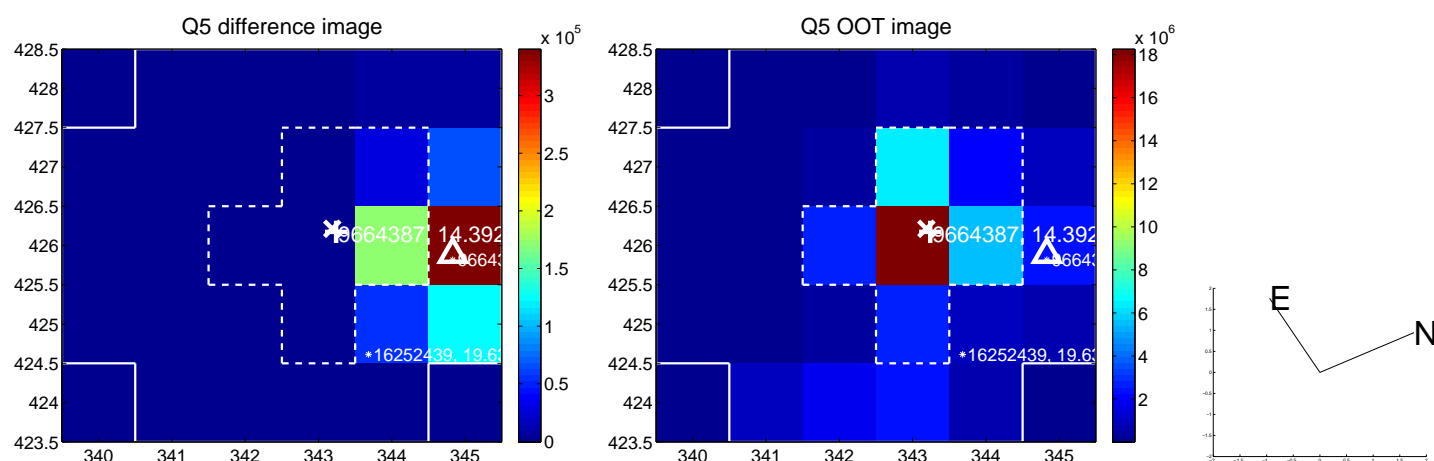


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

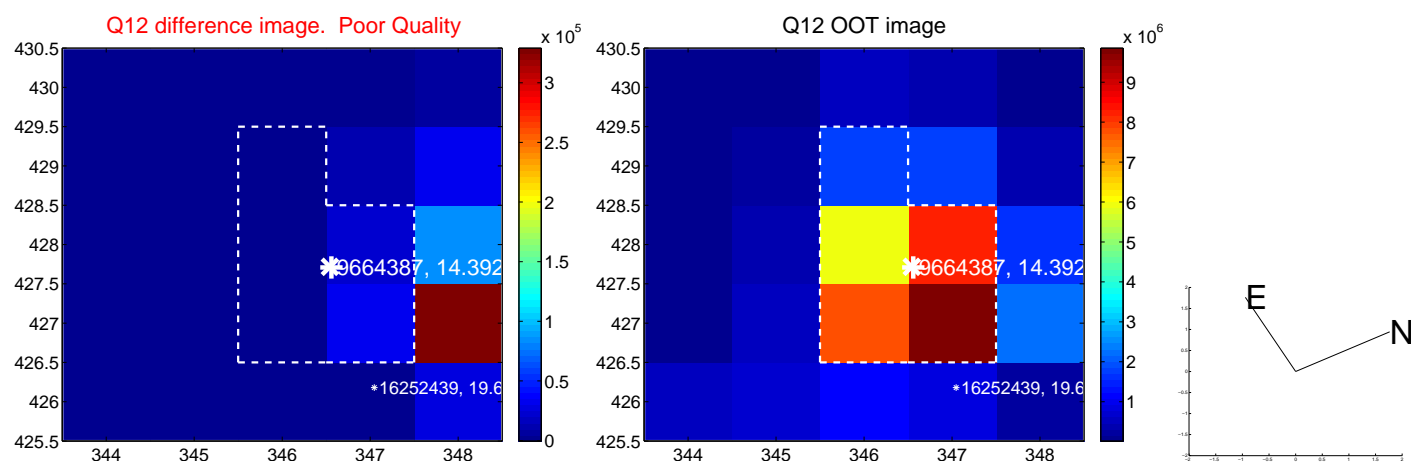
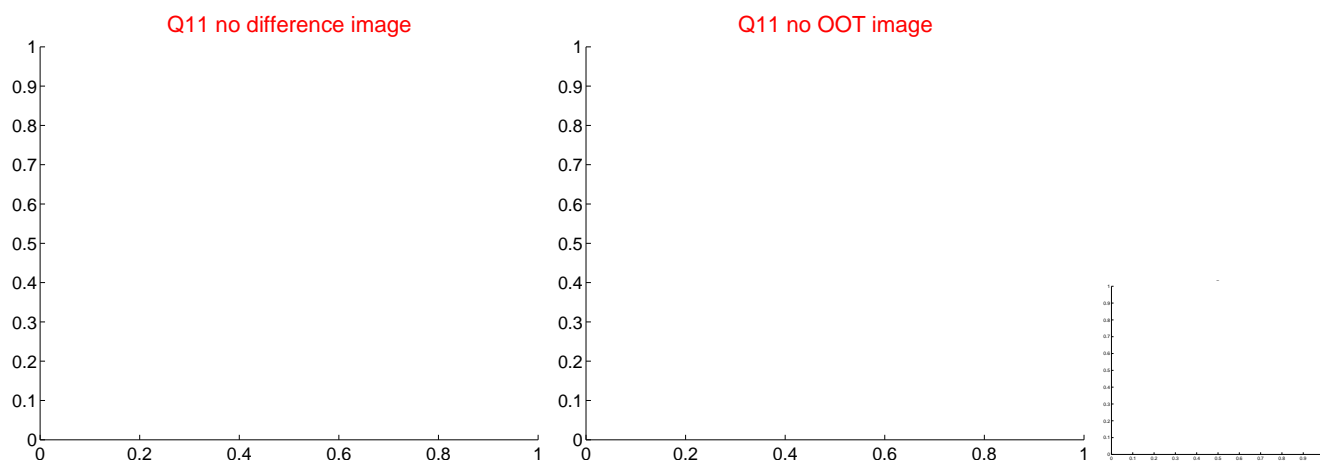
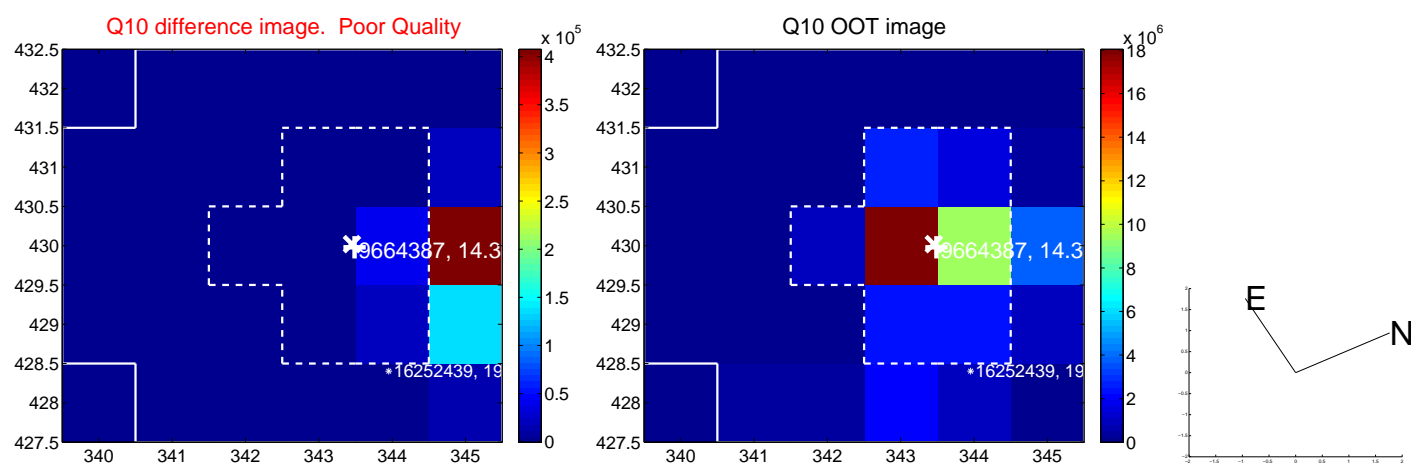
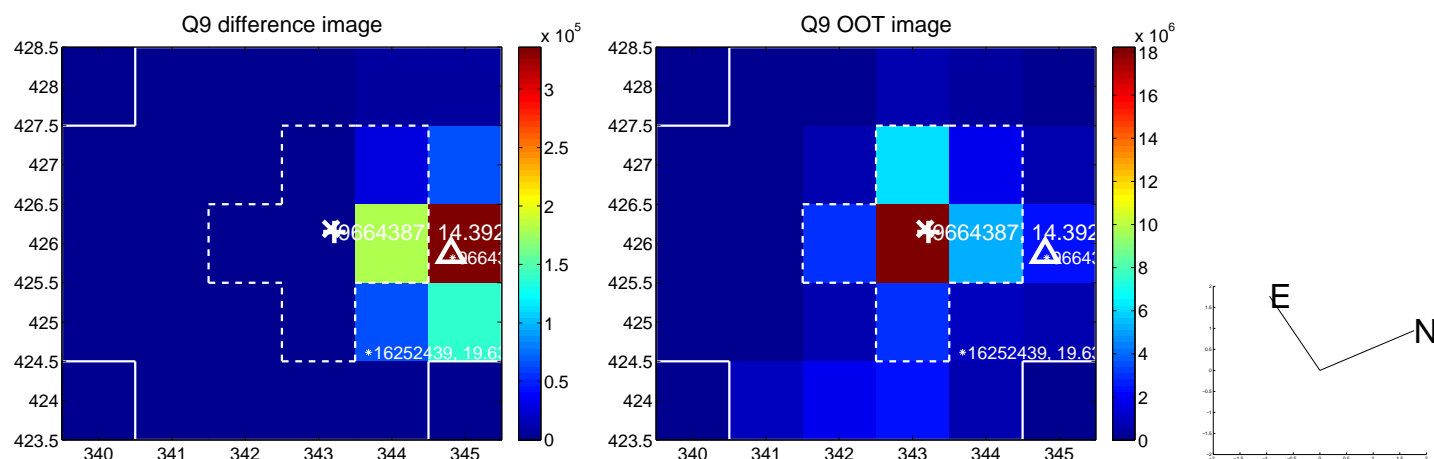
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



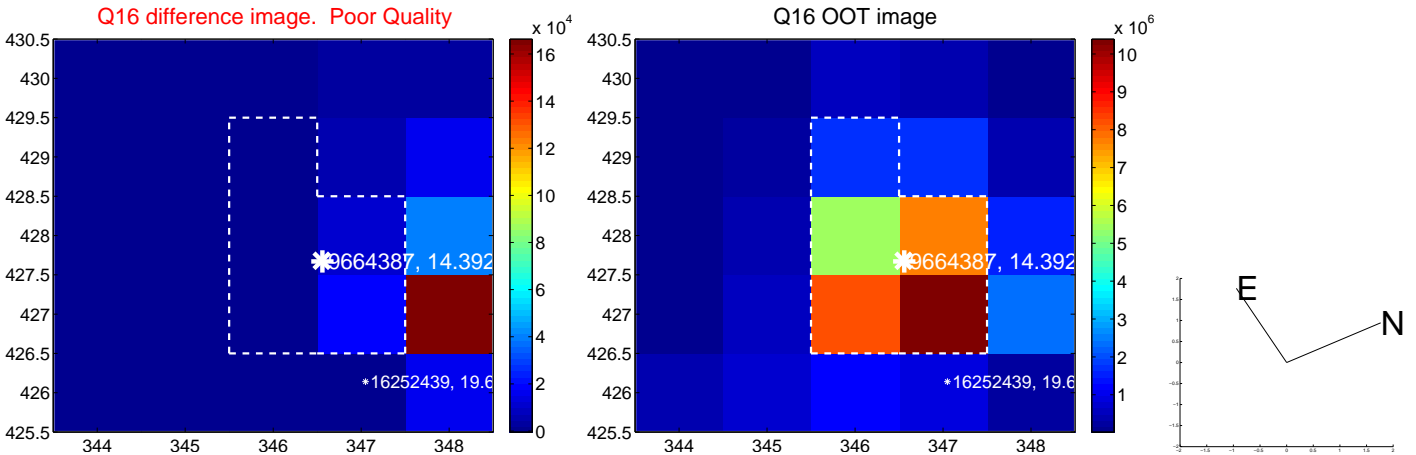
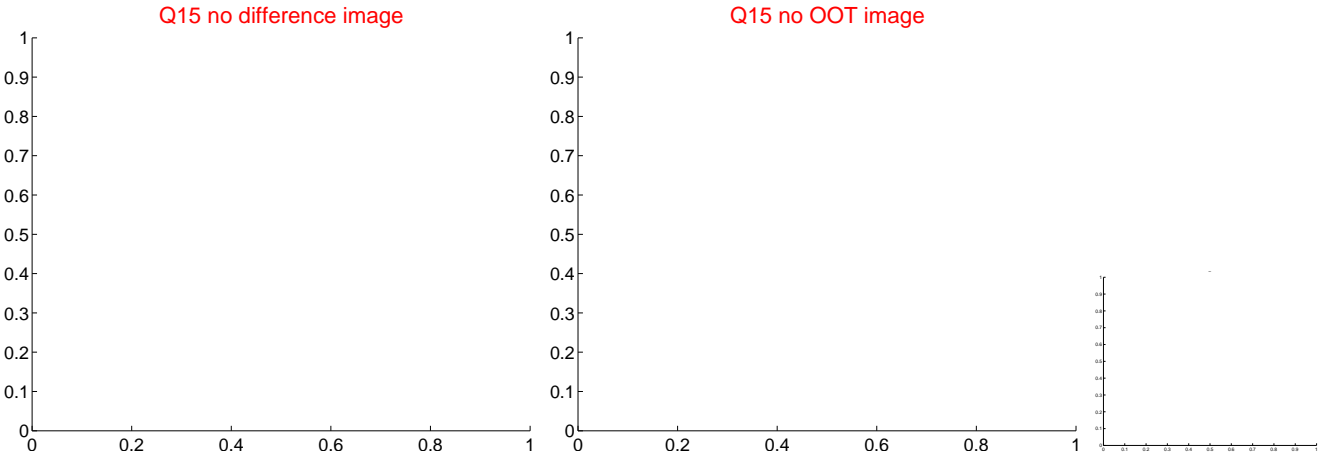
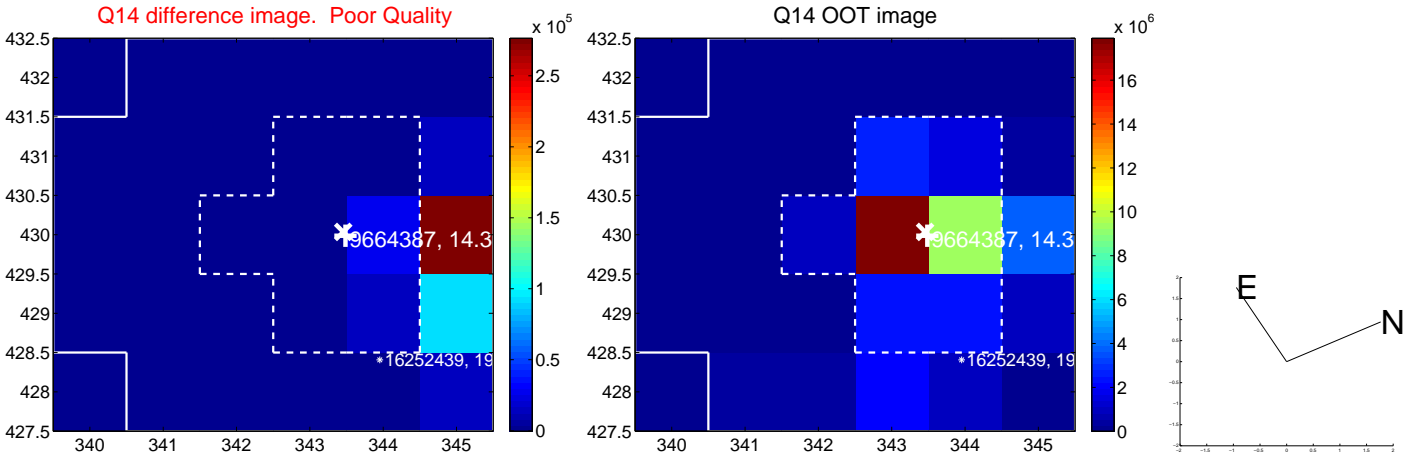
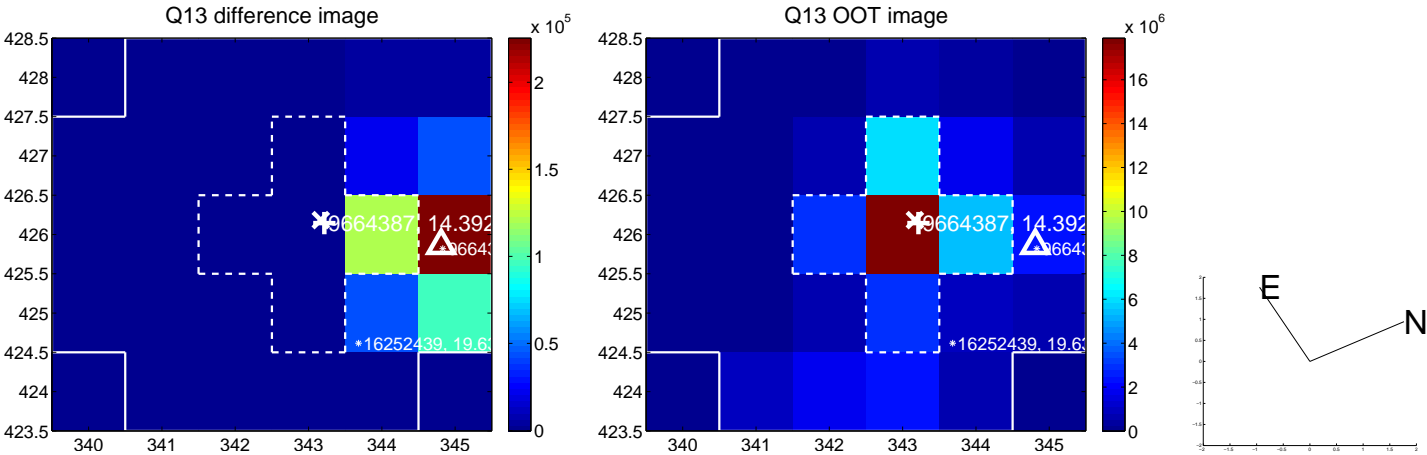
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



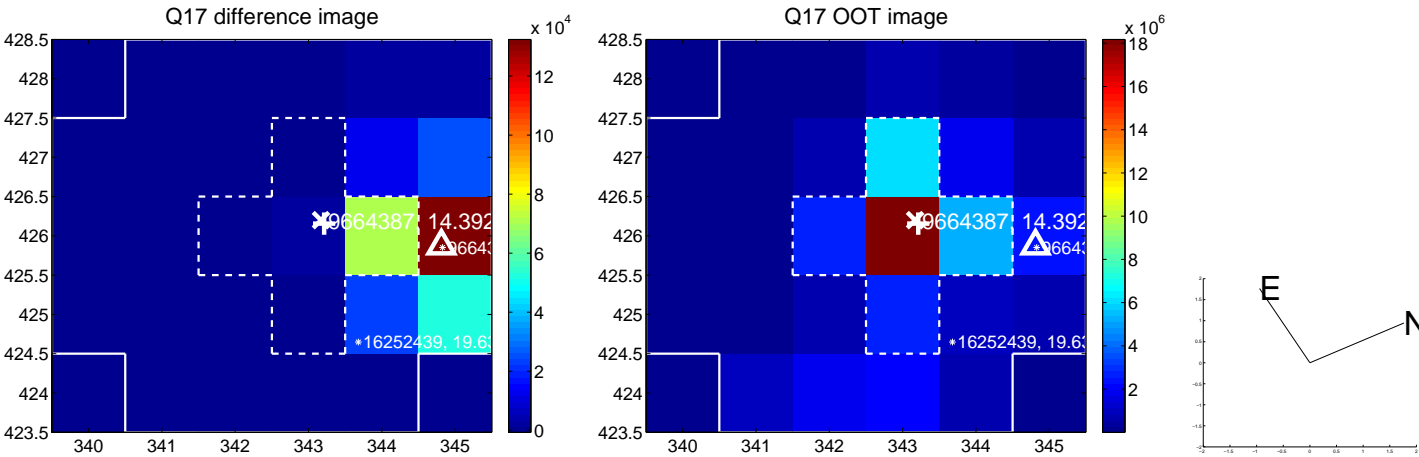
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

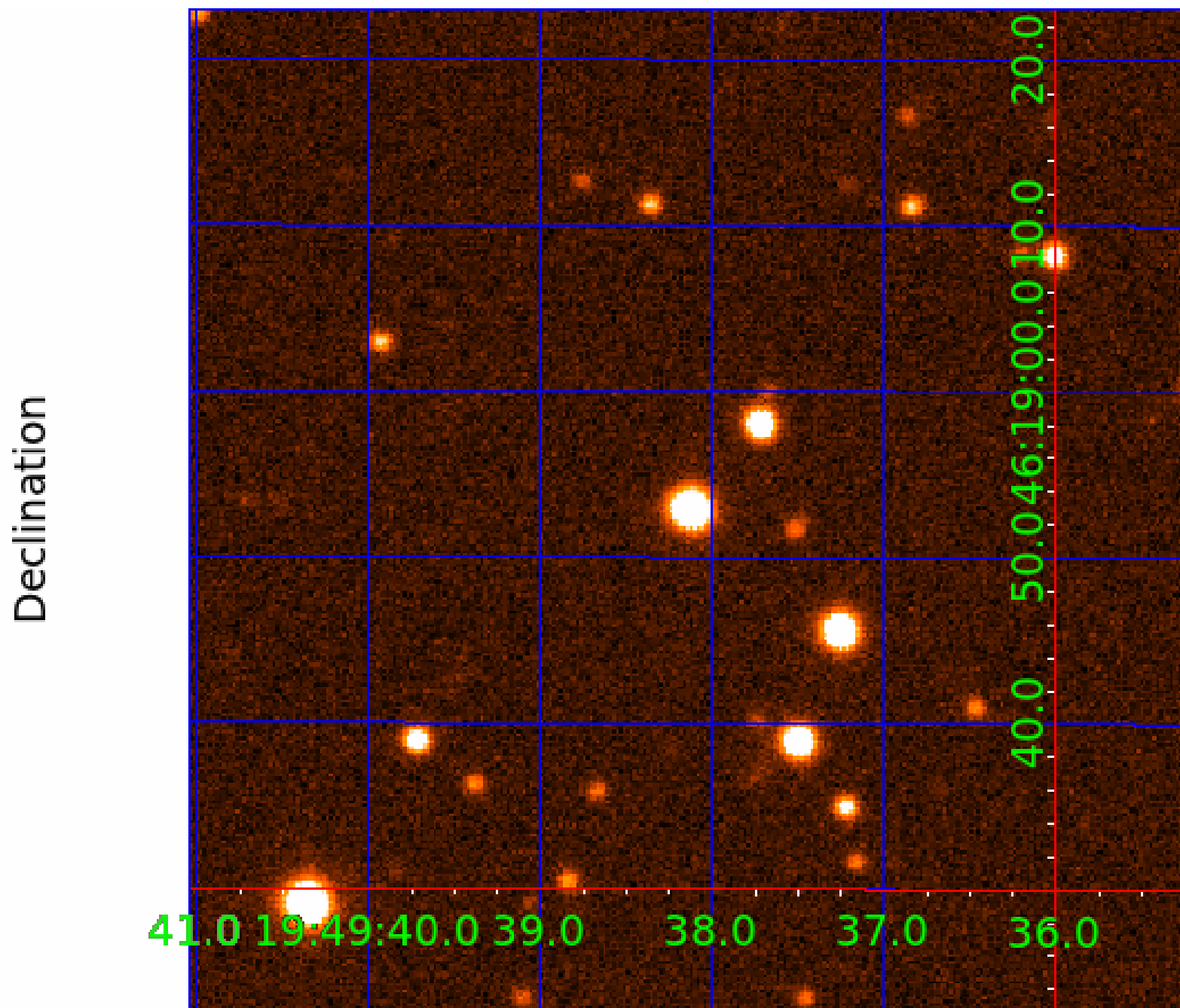


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



folded centroid time series figure for this object.

UKIRT Image



KIC 009664387

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009664387-01 | OBS | No | 0.581494 | 131.780540 | 244.8 | 0.532 | 43.3 | 28.3 | 1.10 | 6398 | 2.27 | 8971.59 |
| 009664387-02 | OBS | No | 0.581502 | 132.060994 | 5289.1 | 1.500 | 72.9 | -1.0 | 1.10 | 6398 | 8.07 | 8971.41 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 009664387-01 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET |
| 009664387-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 1 | LPP_ALT—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_NOFITS—EPHEM_MATCH |

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.

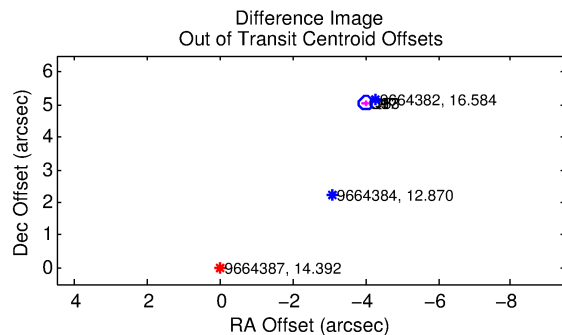
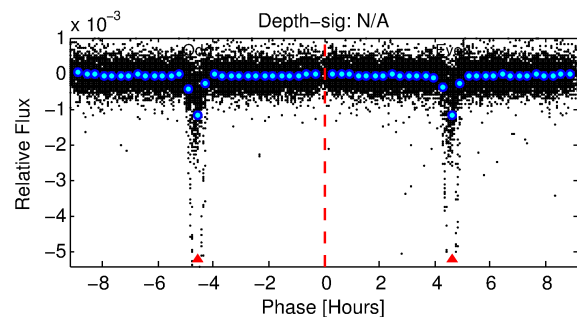
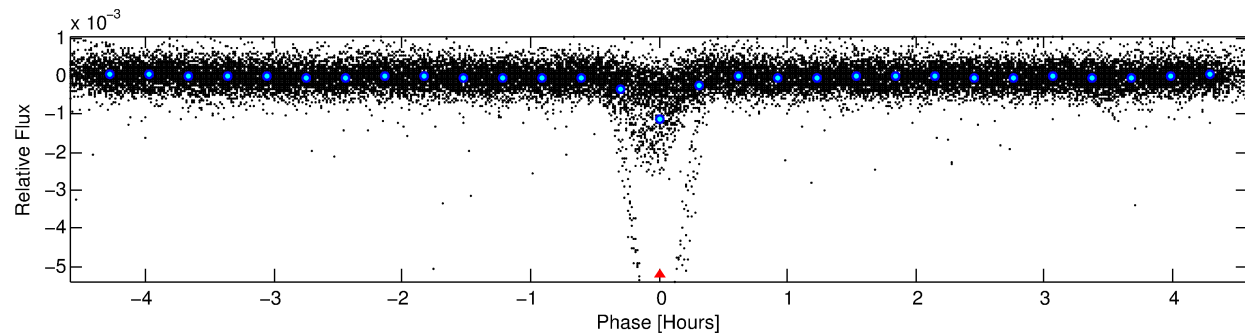
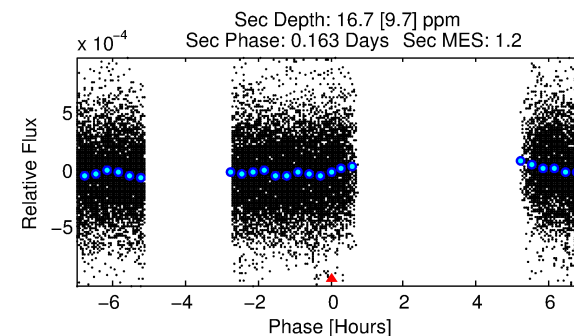
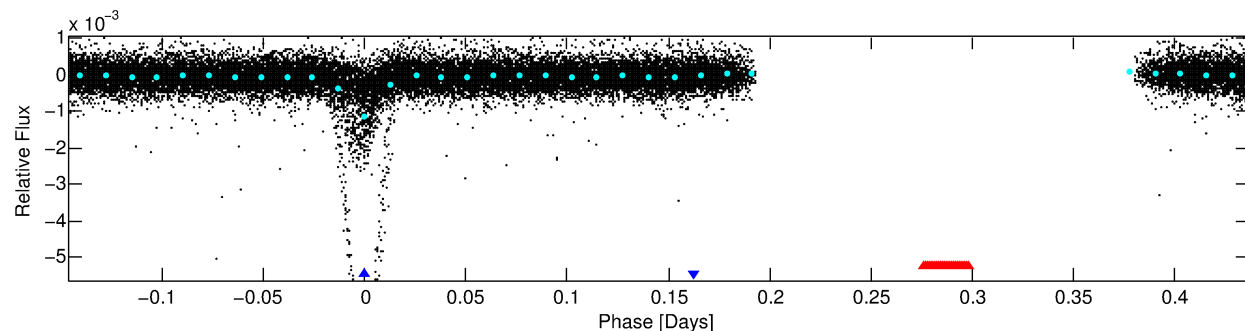
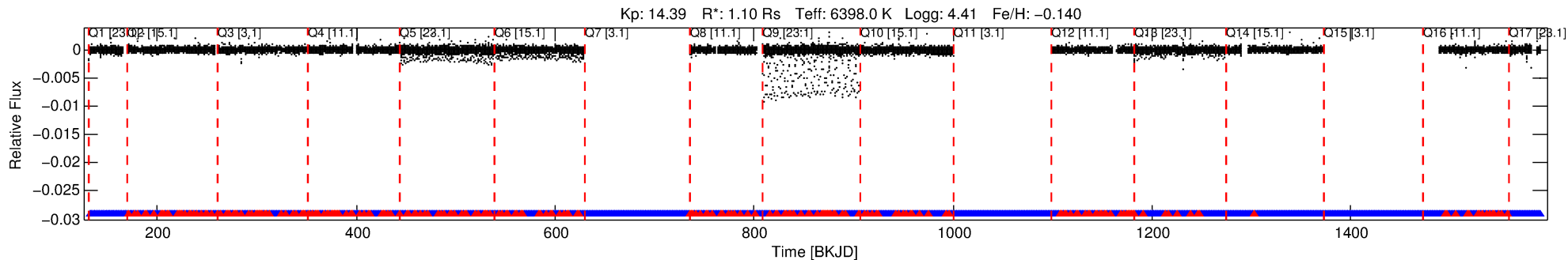
Ephemeris Match Information For 009664387-02

| TCE (1) | KIC | Parent (2) | Parent KIC | $P_1:P_2$ | Dist ($''$) | Δ Row | Δ Col | m_2 | m_1 | D_2/D_1 | Mechanism | Flag | σ_P | σ_T |
|--------------|---------|---------------|------------|-----------|---------------|--------------|--------------|-------|-------|-----------|------------|------|------------|------------|
| 009664387-02 | 9664387 | 009664382-pri | 9664382 | 2:1 | 6.7 | 0 | -2 | 16.58 | 14.39 | 68.95 | Direct-PRF | 0 | 2.85 | 0.55 |

Notes: $P_1:P_2$ is the period ratio. Dist is the distance in arcseconds. Δ Row and Δ Col are the number of pixels apart in row and column. m_2 and m_1 are the magnitudes of the parent and child. D_2/D_1 is the parent's transit depth divided by the child's. σ_P and σ_T are the significance of the match in period and epoch. For a match to be considered significant $\sigma_P < 5.0$ and $\sigma_T < 5.0$. Matches which have σ_P and σ_T very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

DV One-Page Summary

KIC: 9664387 Candidate: 2 of 2 Period: 0.582 d



TPS TCE Results:

Period = 0.58150 d
Epoch = 132.0610 BKJD

DV fit results are unavailable

DV Diagnostic Results:

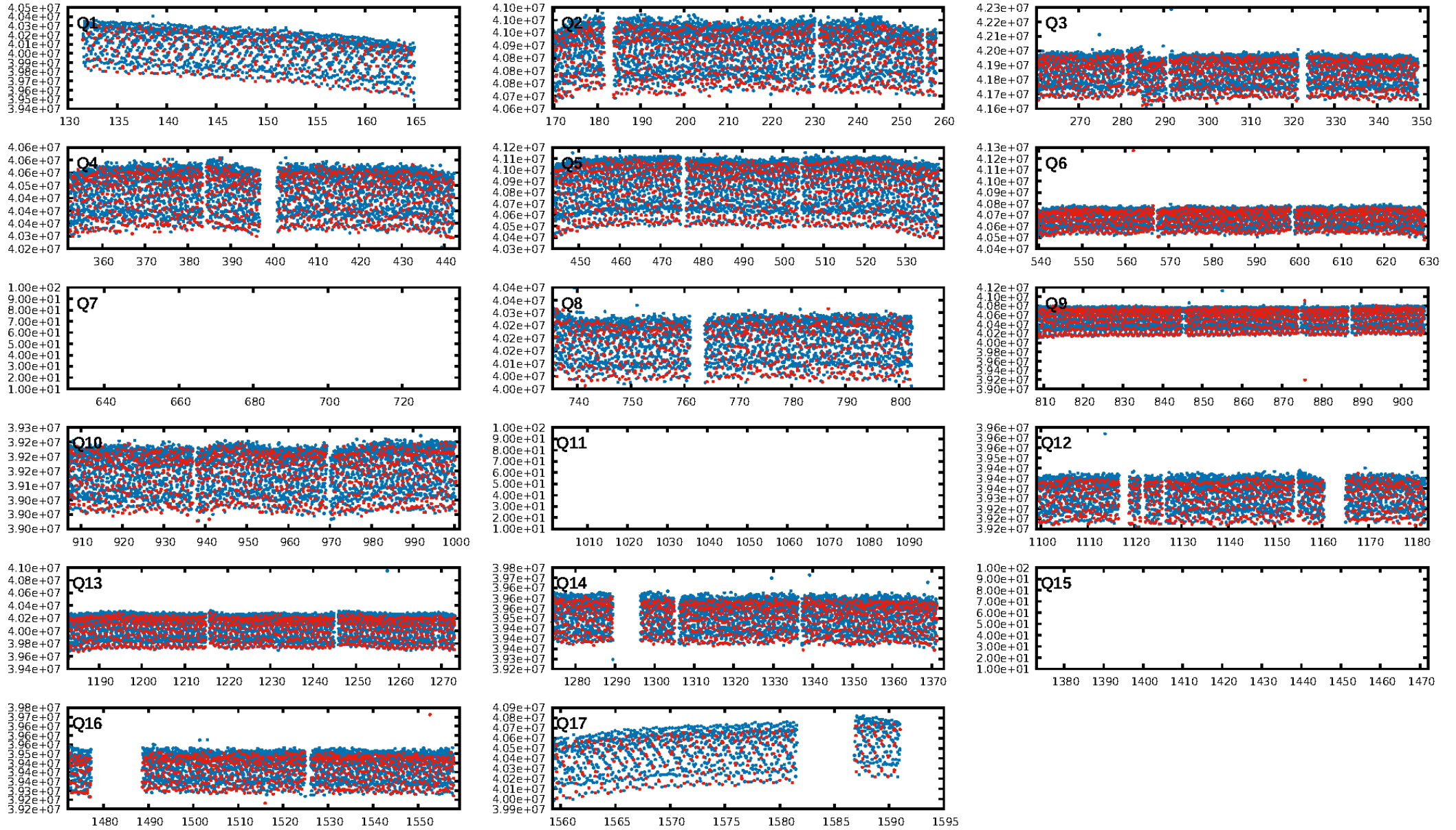
ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.85 [1476/1731]
GhostDiagnostic-chr: -0.6217

Centroid-sig: N/A
Centroid-so: N/A
OotOffset-rm: 6.438 arcsec [96.39σ]
KicOffset-rm: 6.651 arcsec [99.00σ]
OotOffset-st: 0/0/0/5 [5]
KicOffset-st: 0/0/0/5 [5]
DiffImageQuality-fgm: 1.00 [5/5]
DiffImageOverlap-fno: 1.00 [14/14]

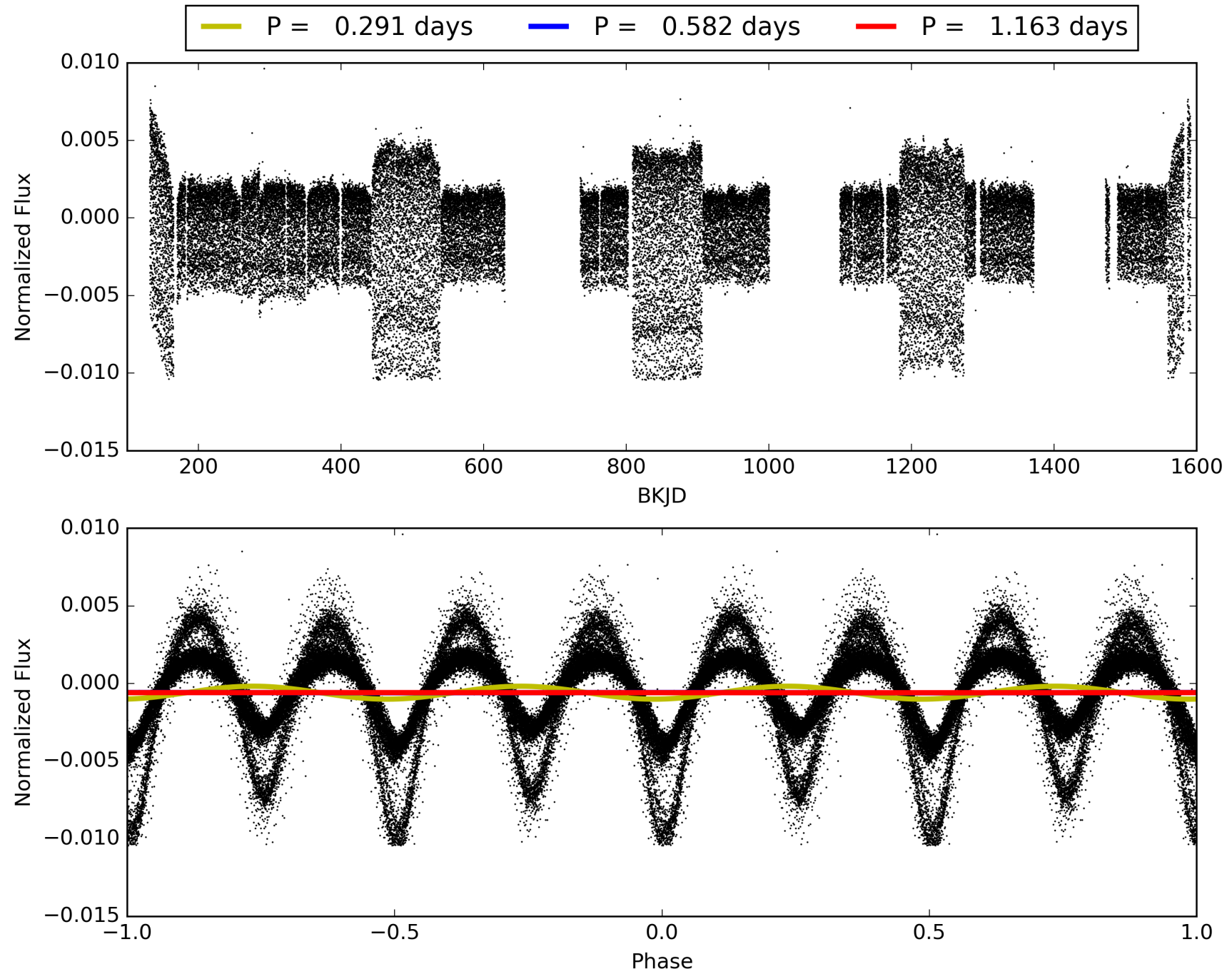
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 20:24:08 Z

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

TCE 009664387-02, PDC Light Curves

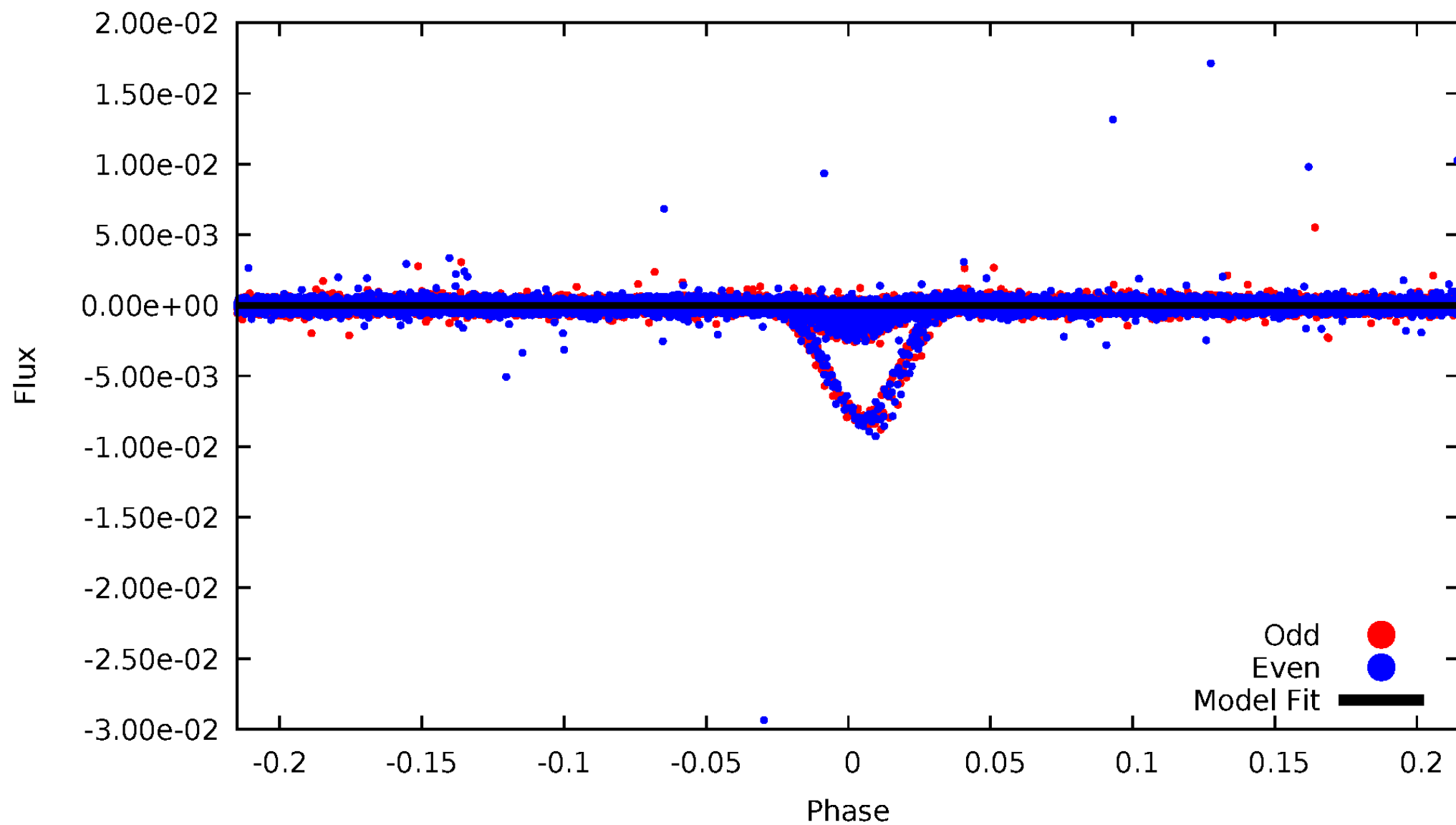


TCE 009664387-02



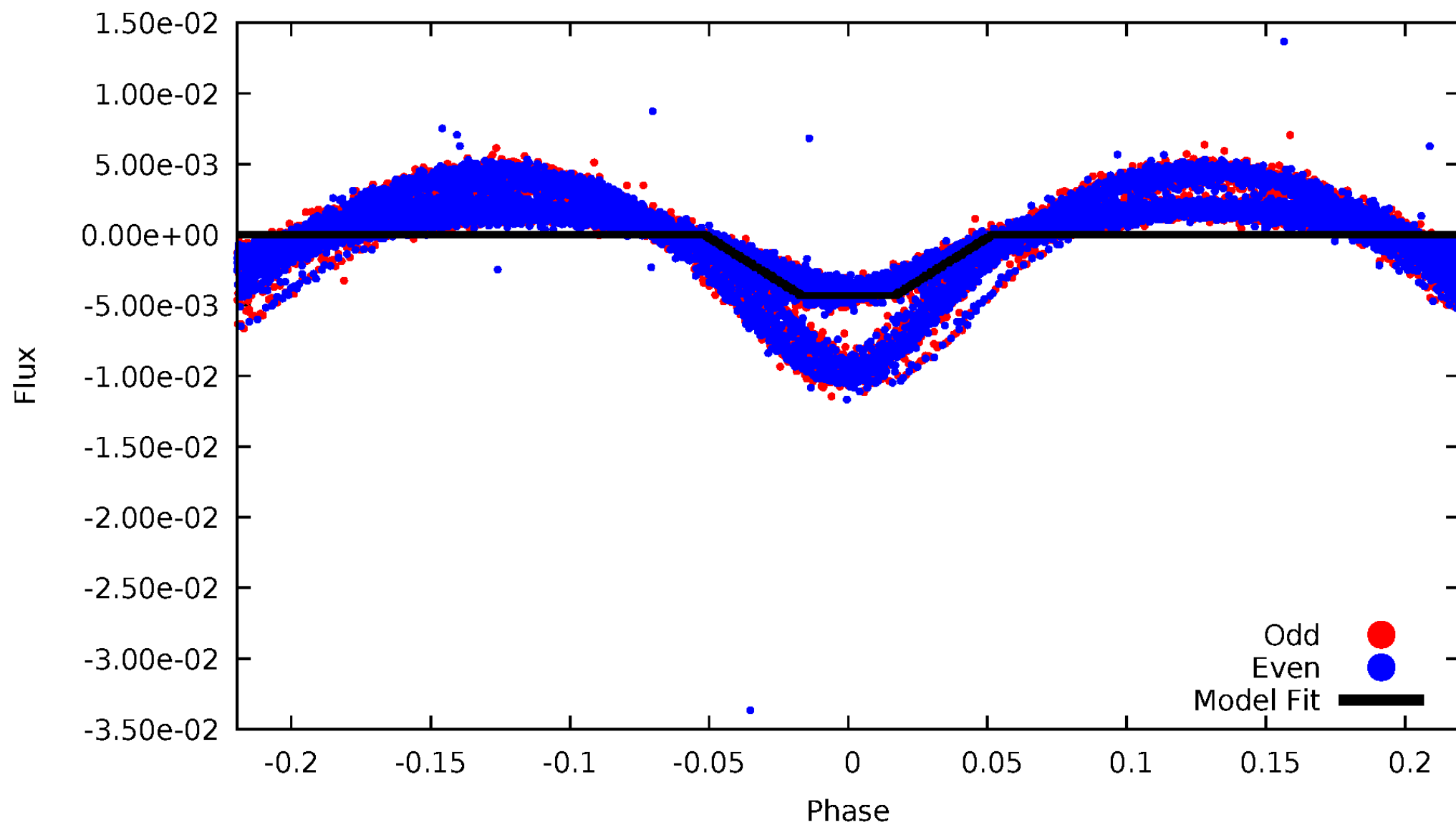
DV Odd/Even

TCE 009664387-02



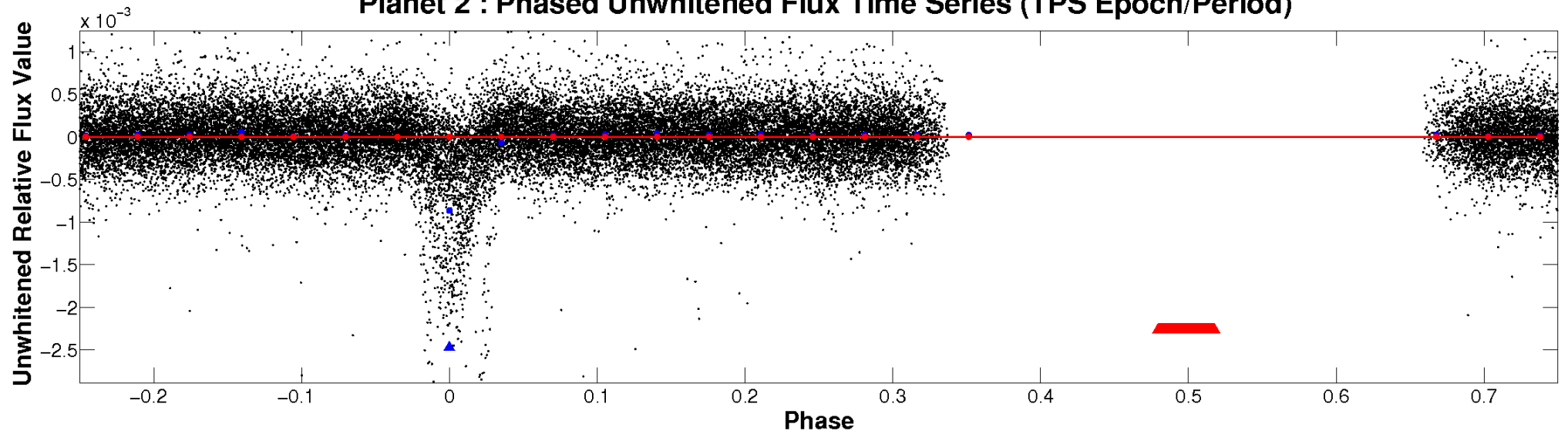
ALT Odd/Even

TCE 009664387-02

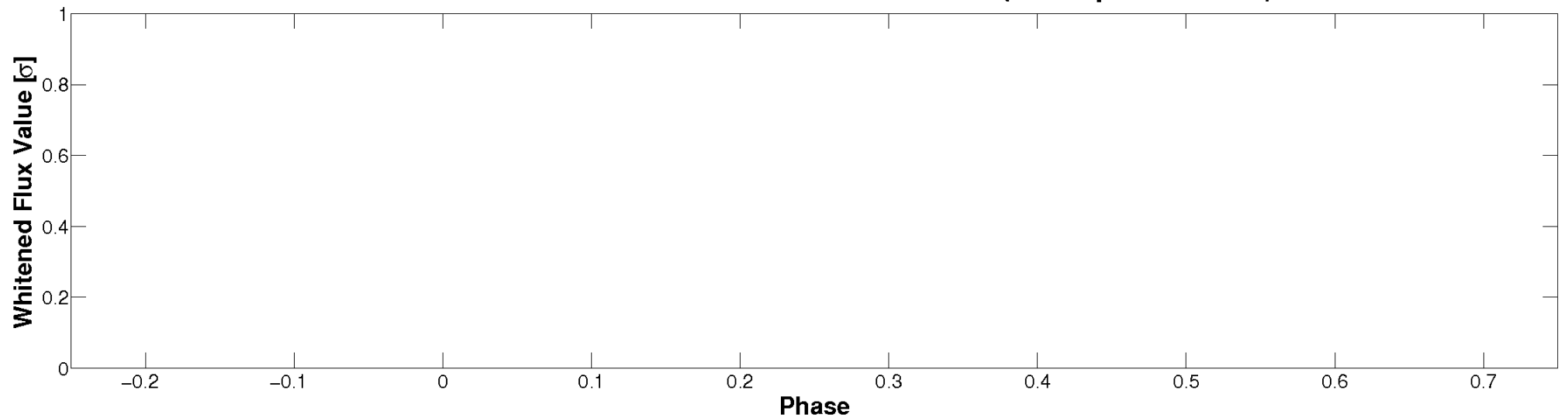


Non-Whitened Vs. Whitened Light Curve

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

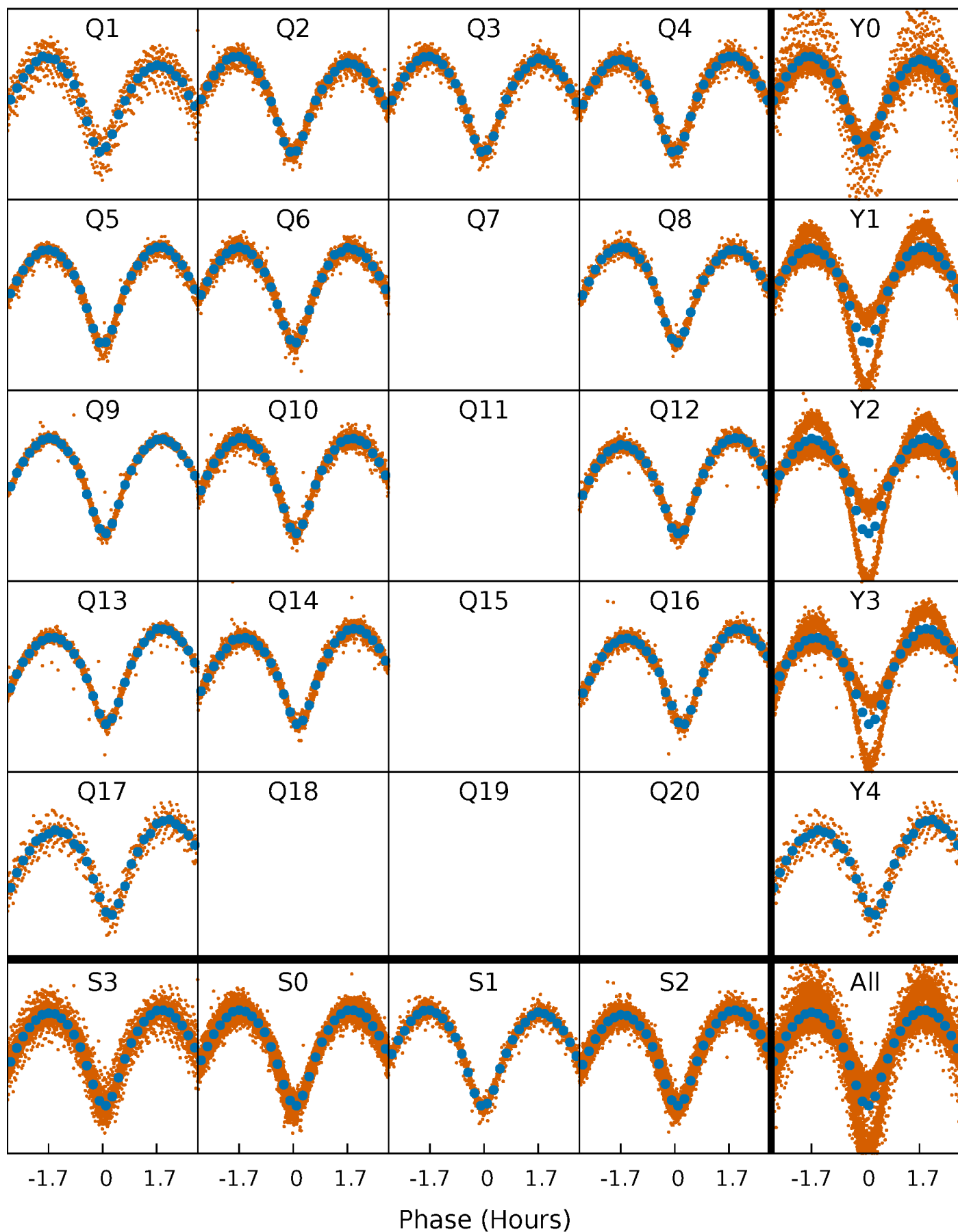


Planet 2 : Phased Whitened Flux Time Series (TPS Epoch/Period)



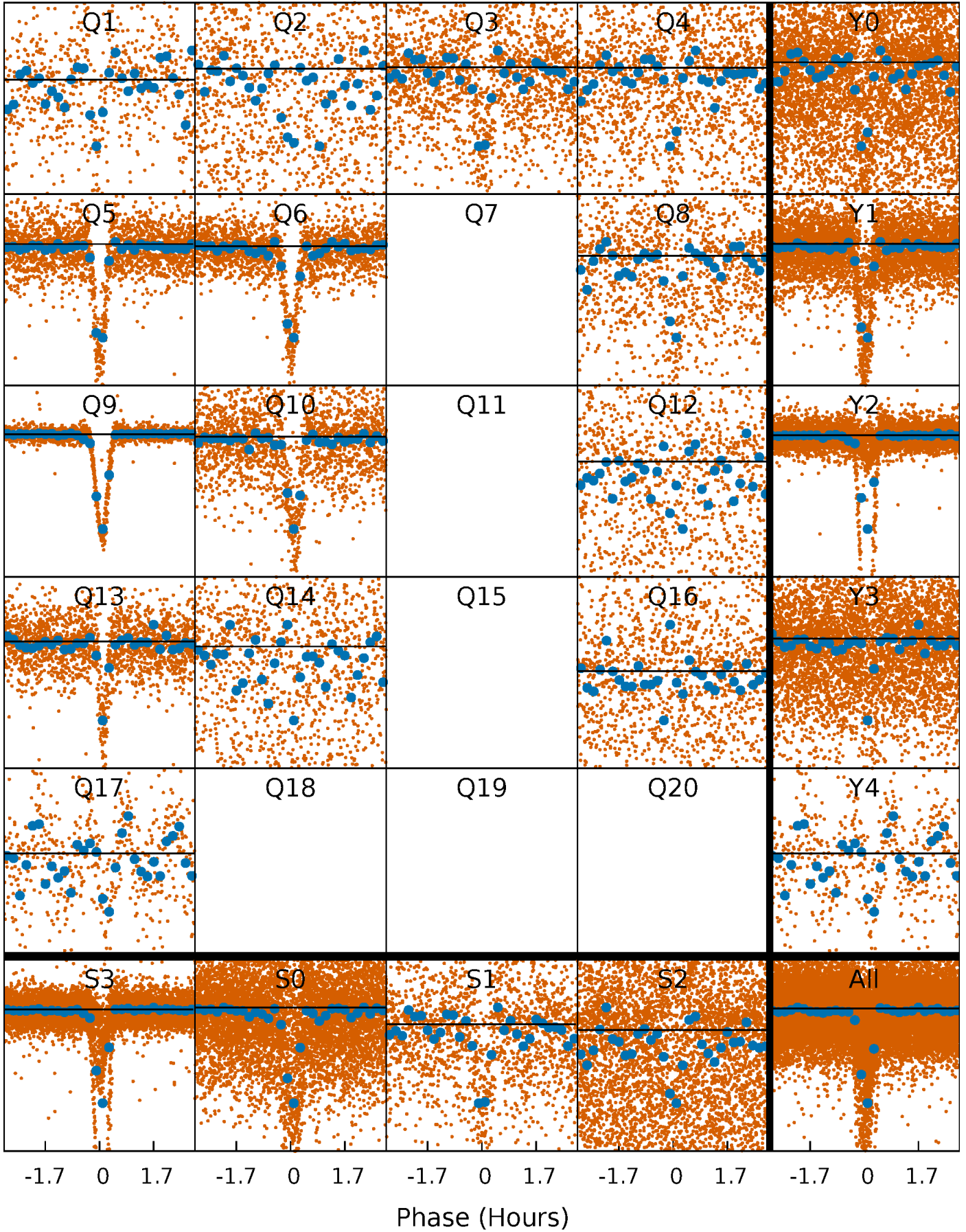
PDC Quarter-Phased Transit Curves

TCE 009664387-02 P= 0.581502 Days $T_0=132.060994$ (BKJD)



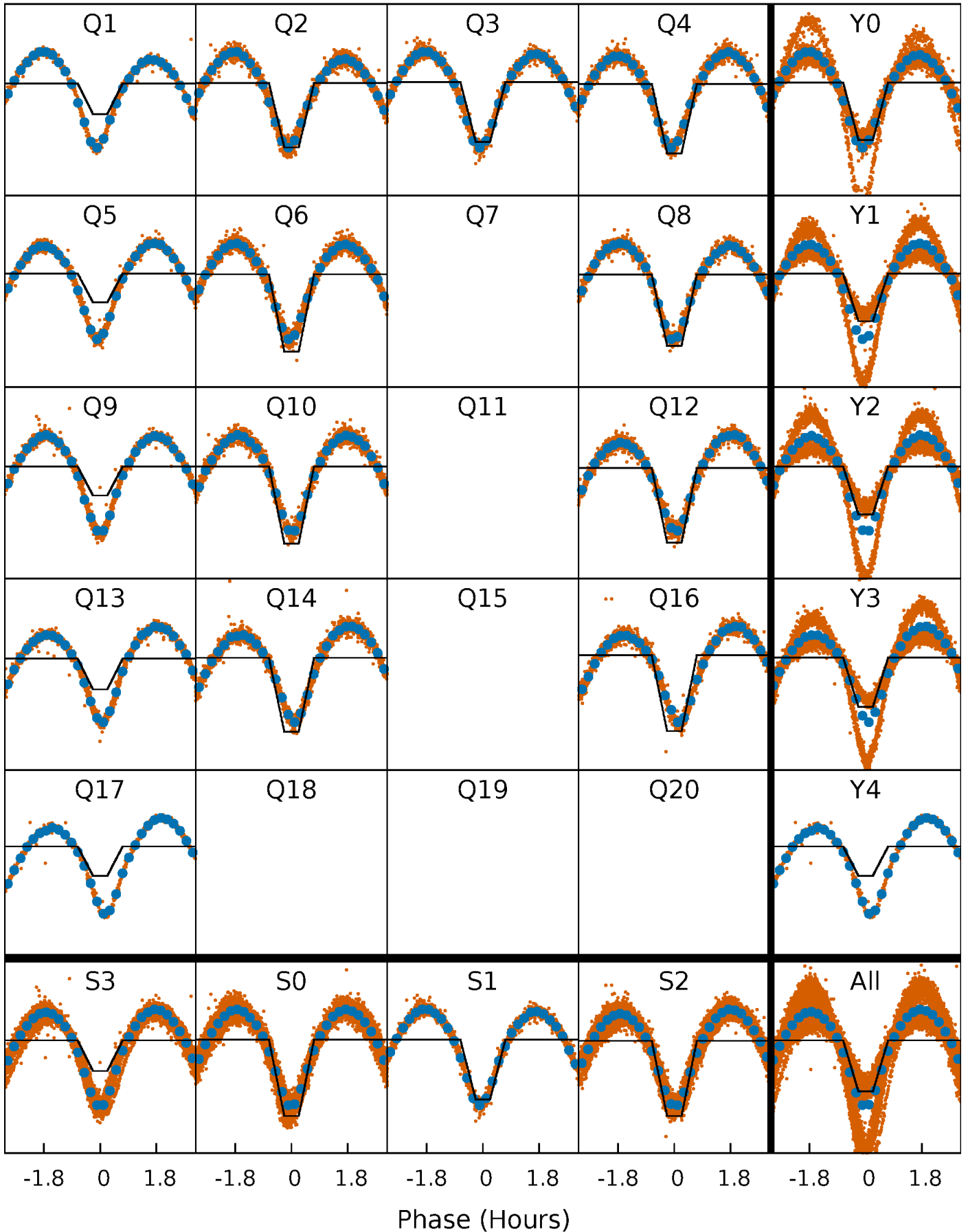
DV Quarter-Phased Transit Curves

TCE 009664387-02 P= 0.581502 Days $T_0=132.060994$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

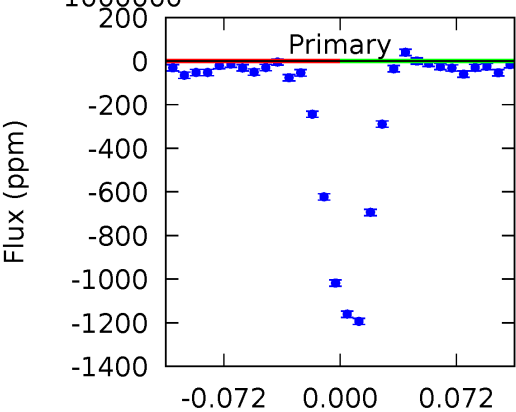
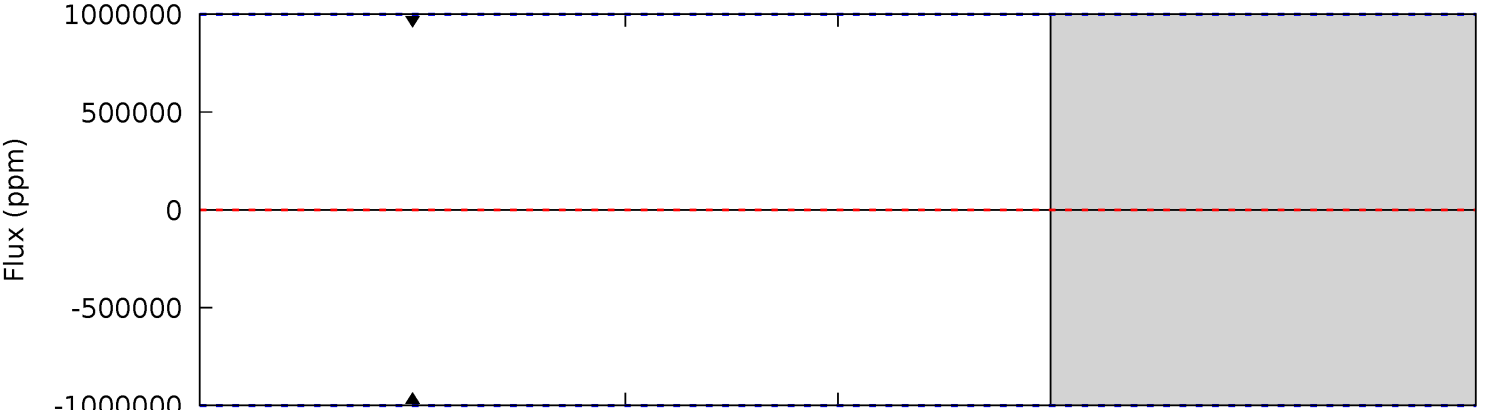
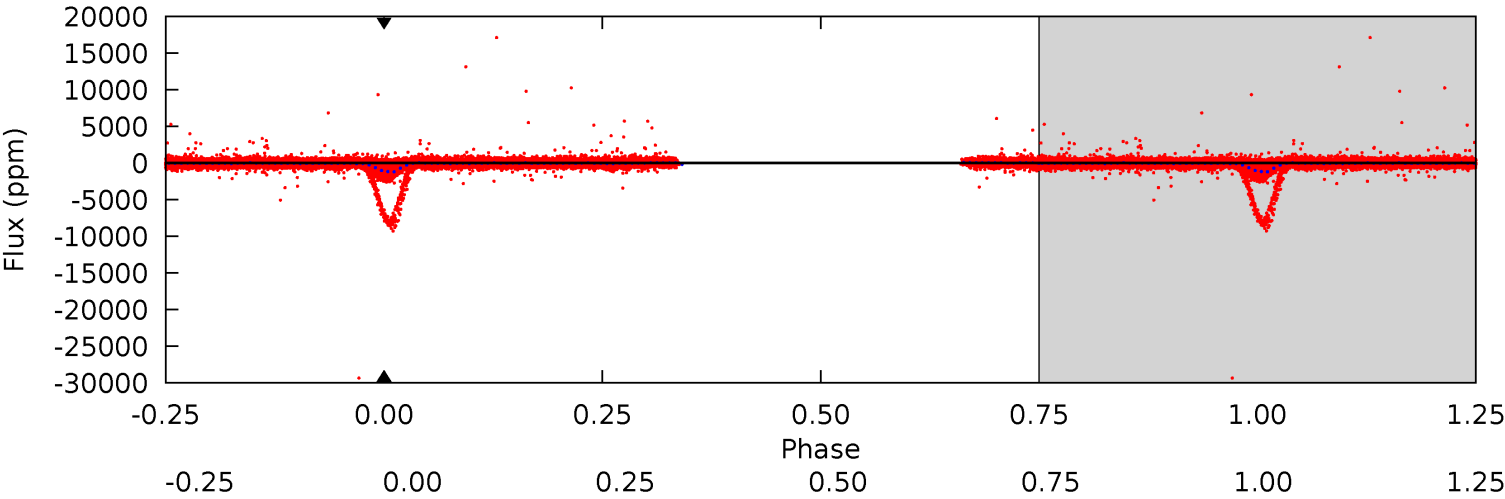
TCE 009664387-02 $P = 0.581502$ Days $T_0 = 132.064198$ (BKJD)



DV Model-Shift Uniqueness Test

009664387-02, P = 0.581502 Days, E = 131.479492 Days

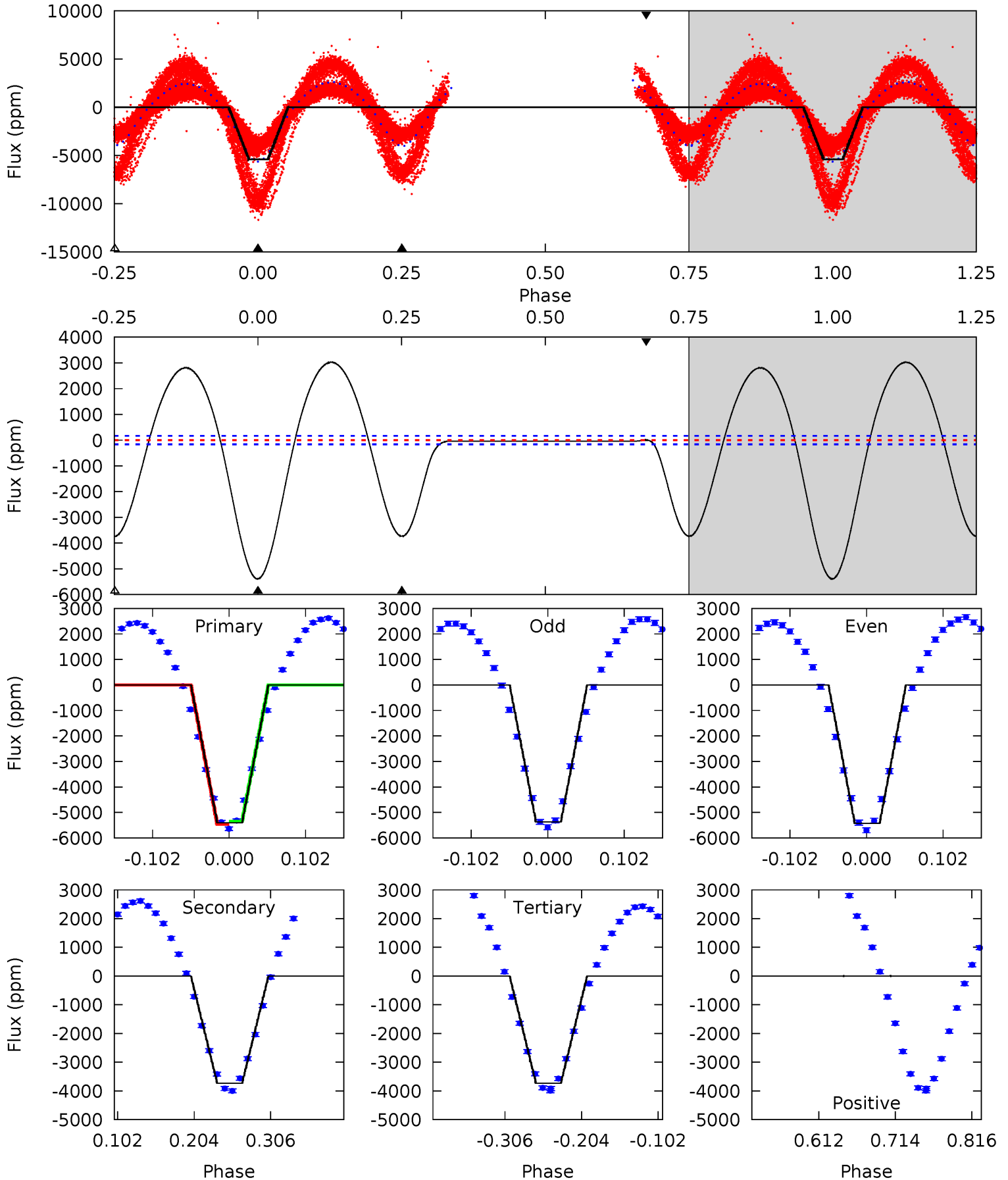
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-----|-----|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-----|-------|-----|
| 0 | 0 | 0 | 0 | 1.00 | 1.00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



Alt Model-Shift Uniqueness Test

009664387-02, P = 0.581502 Days, E = 131.482696 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|-------|-------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 149.4 | 103.4 | 103.3 | 0.03 | 4.56 | 1.64 | 67.1 | 46.1 | 149.4 | 0.05 | 103.4 | 0.73 | 1.36 | 0.36 | 2.04 |



Stellar Parameters For KIC 009664387

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6398^{+160}_{-208} | $4.411^{+0.062}_{-0.200}$ | $-0.140^{+0.250}_{-0.300}$ | $1.101^{+0.336}_{-0.134}$ | $1.141^{+0.150}_{-0.150}$ | $1.204^{+0.402}_{-0.588}$ |
| | +3%/-3% | +1%/-5% | +179%/-214% | +31%/-12% | +13%/-13% | +33%/-49% |
| Source | PHO1 | KIC0 | KIC0 | DSEP | | |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

Secondary Eclipse Parameters for KIC 009664387-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-----------------|--------------------------|----------------------|---------------------------|-------------------------------|
| DV | 0 ± 1000000 | $12.55^{+10.66}_{-8.02}$ | 3514^{+234}_{-160} | -4409^{+22644}_{-11794} | $-1.077^{+121.760}_{-96.690}$ |
| Alt. | -3736 ± 36 | $13.14^{+11.14}_{-8.50}$ | 3514^{+257}_{-160} | 4850^{+3750}_{-1238} | $2.423^{+16.670}_{-1.709}$ |

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

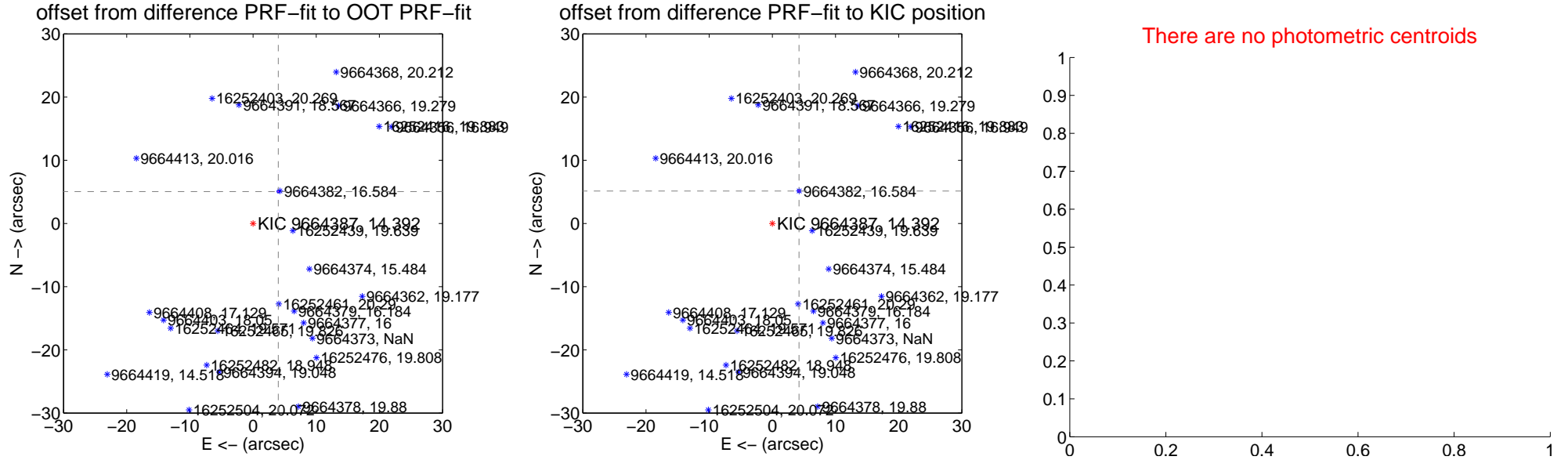
DV Centroid Data

Supplemental centroid analysis for 009664387-02. Kepler magnitude: 14.39. Transit SNR -1.00

There are 5 quarters with good PRF difference image offsets

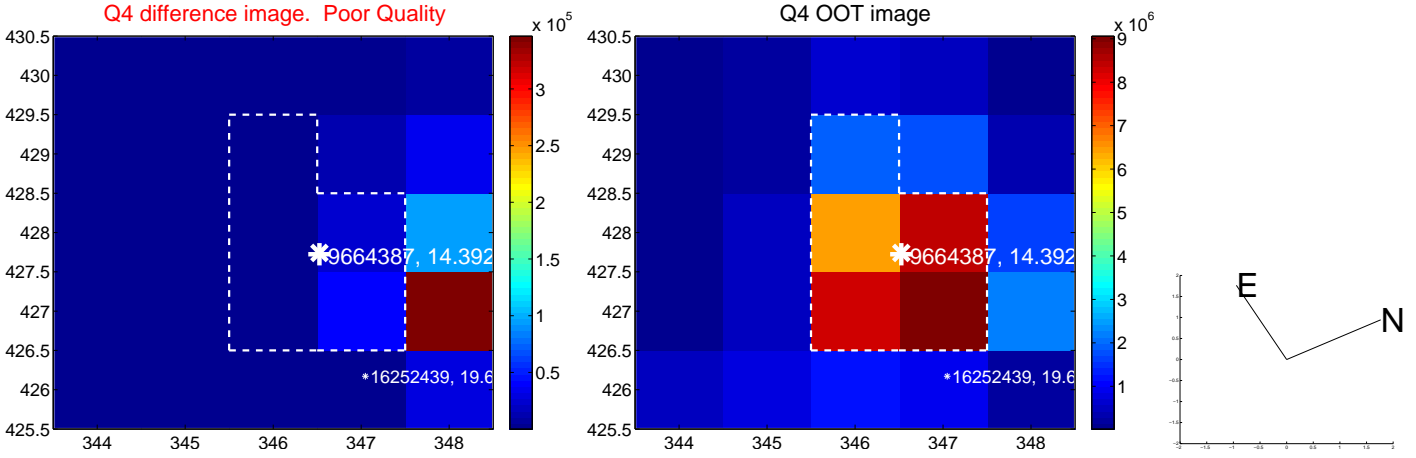
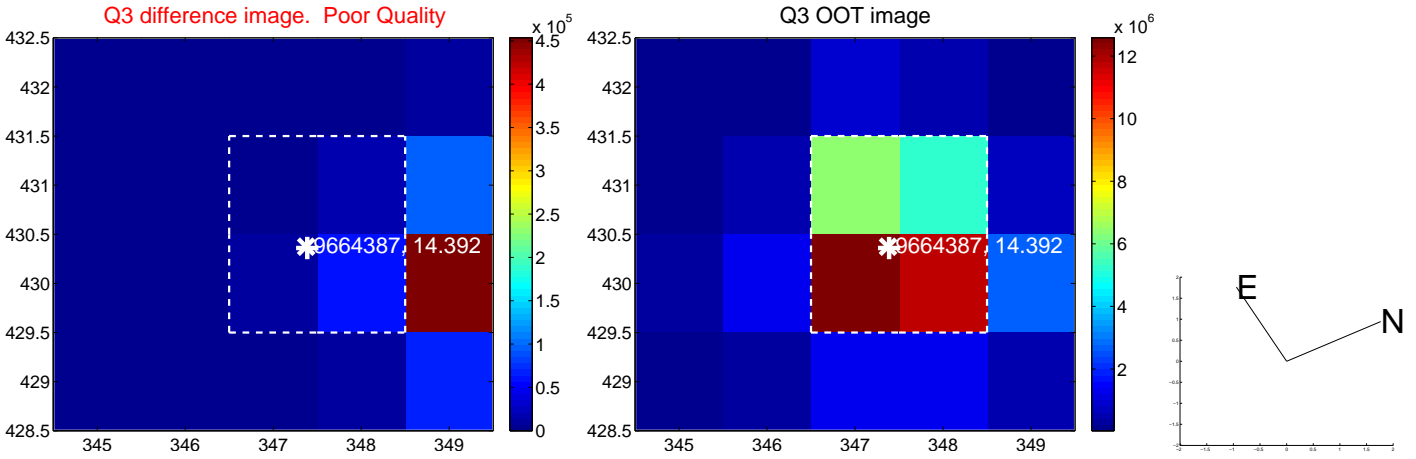
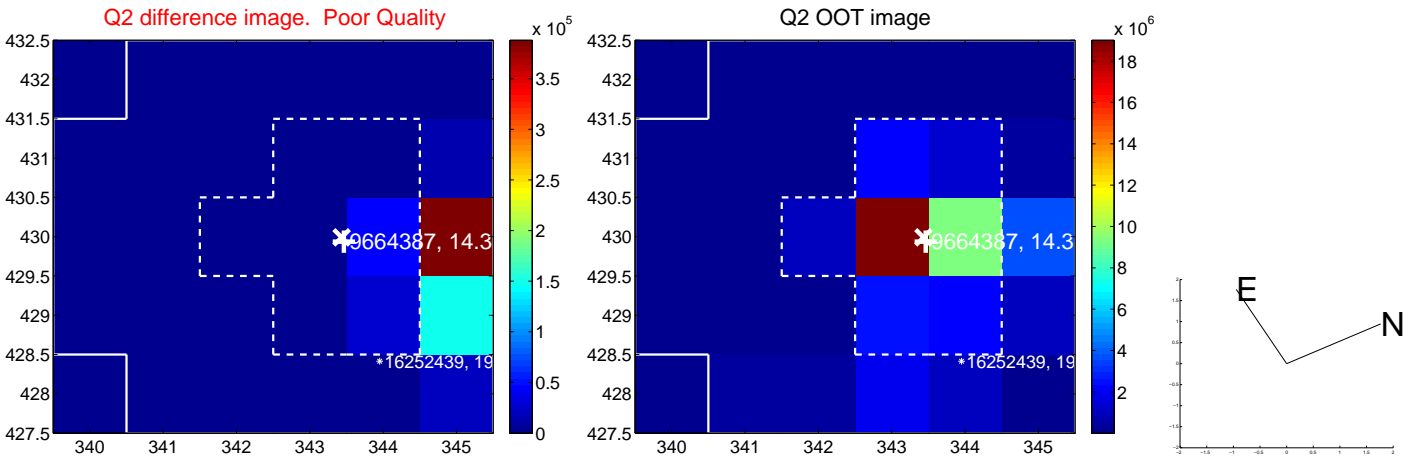
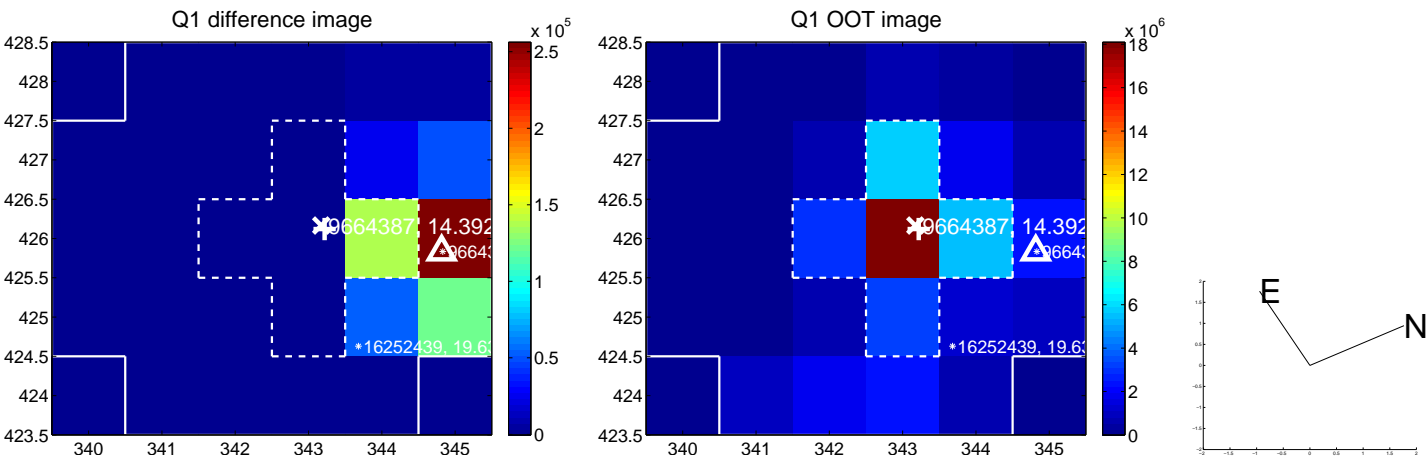
The direct PRF centroid is offset from the target star catalog position by about 0.23 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|-------------------------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 6.438 \pm 0.067 | 96.39 | -3.993 \pm 0.067 | 5.050 \pm 0.067 |
| PRF-fit source offset from KIC position | 6.651 \pm 0.067 | 99.00 | -4.221 \pm 0.067 | 5.139 \pm 0.067 |
| photometric centroid source offset | — | — | — | — |

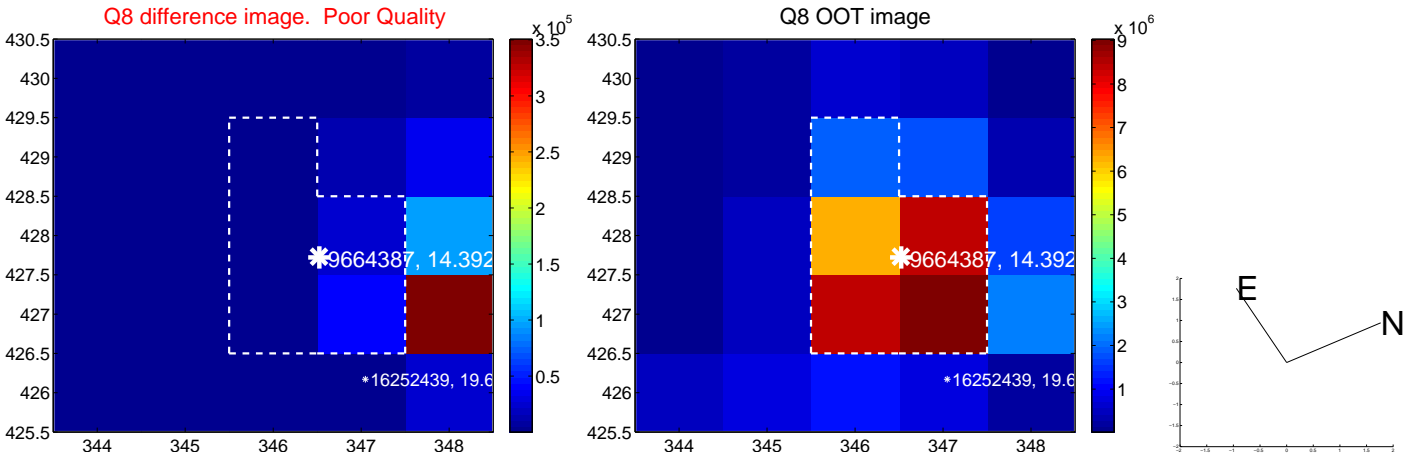
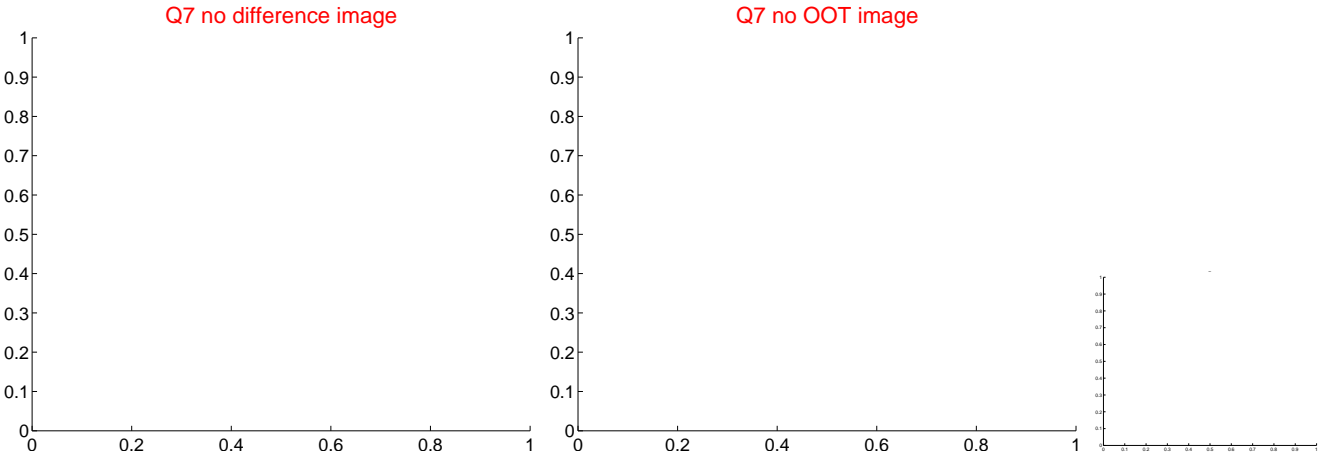
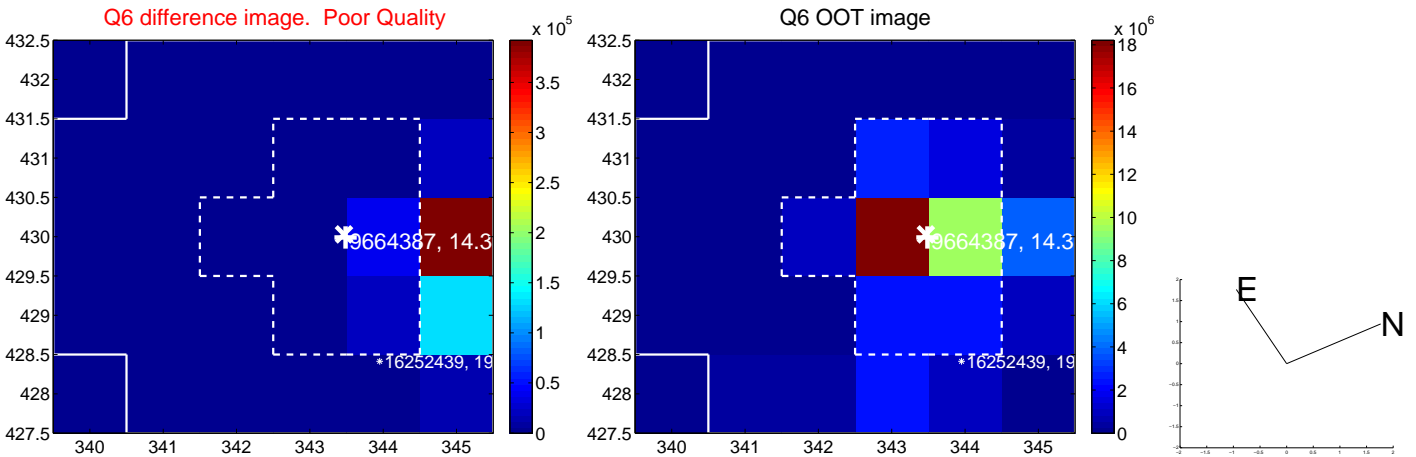
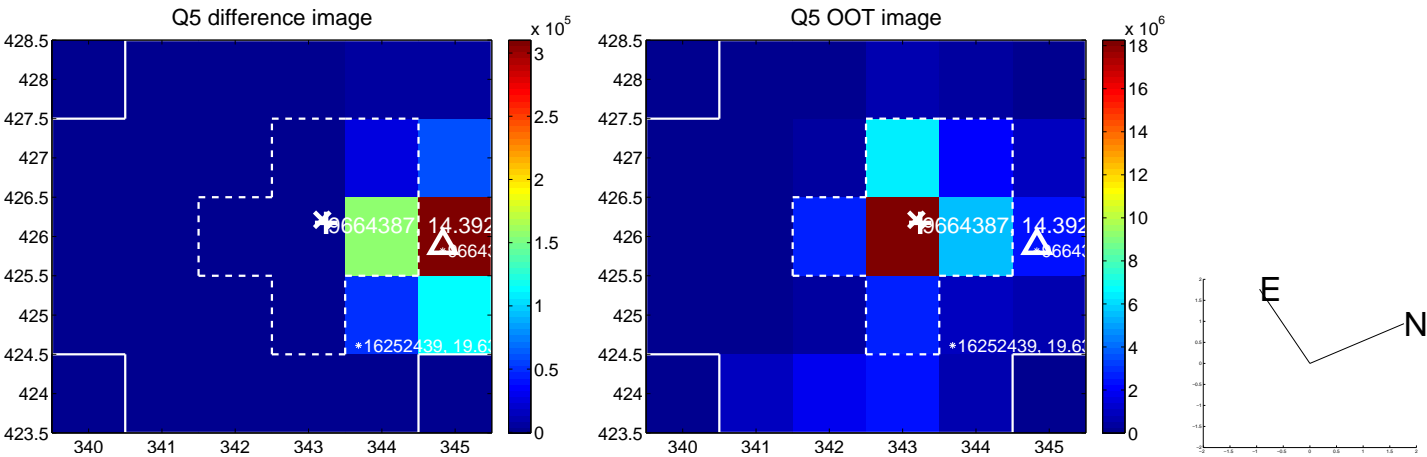


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

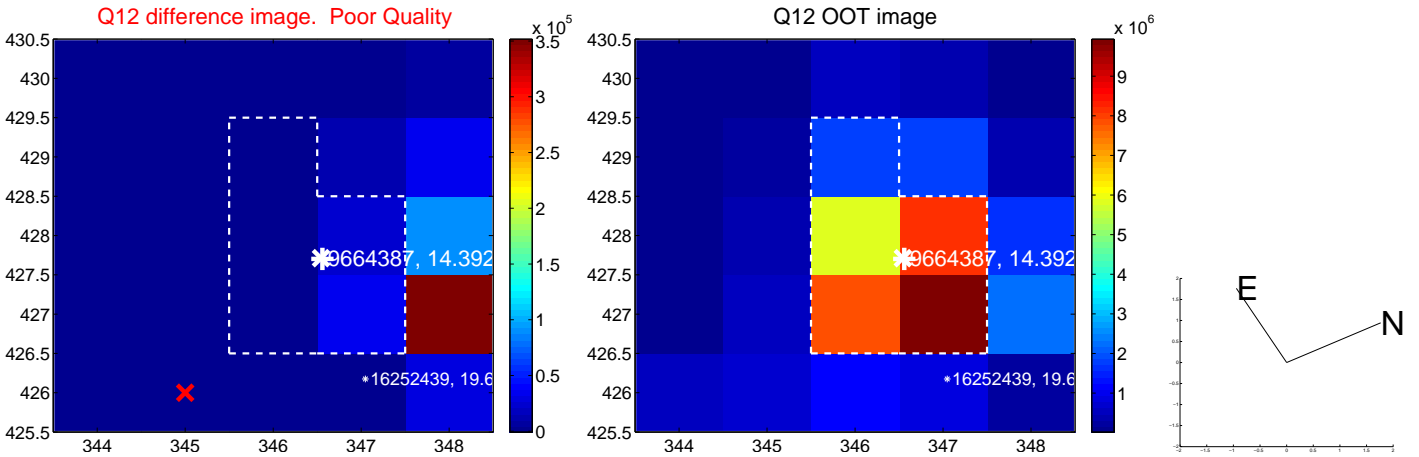
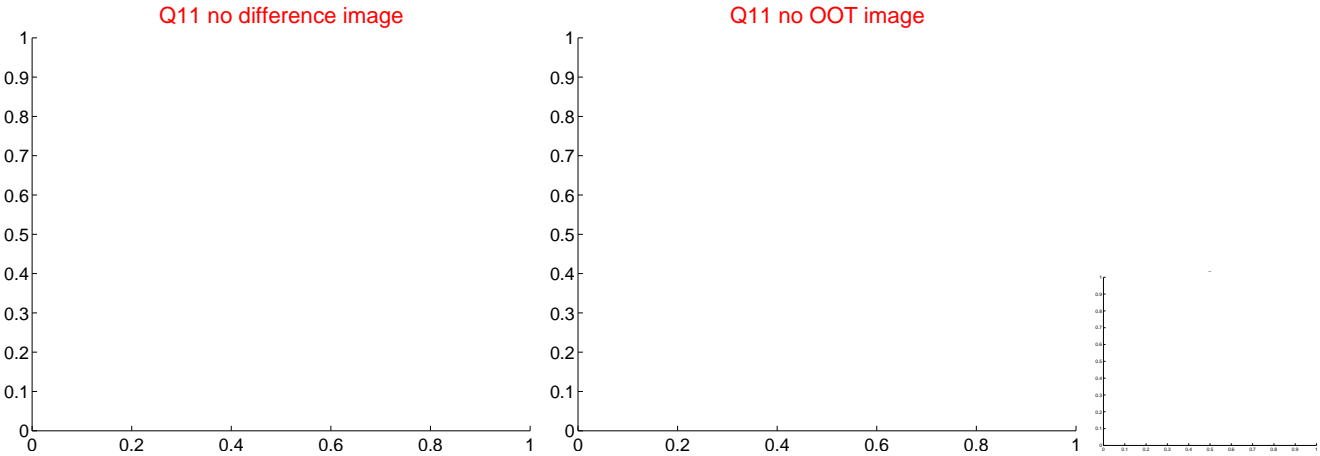
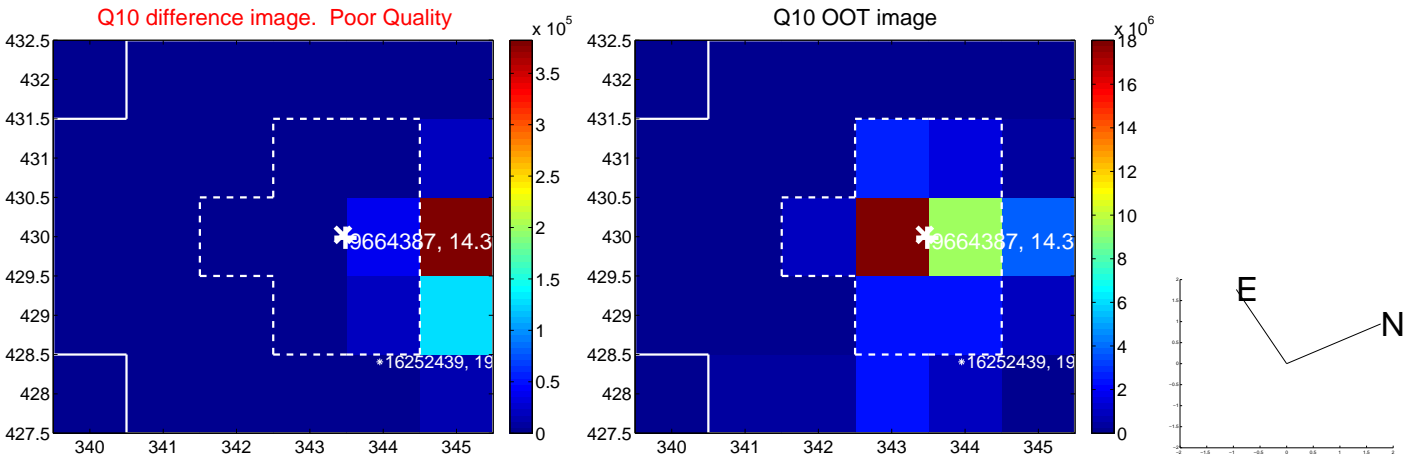
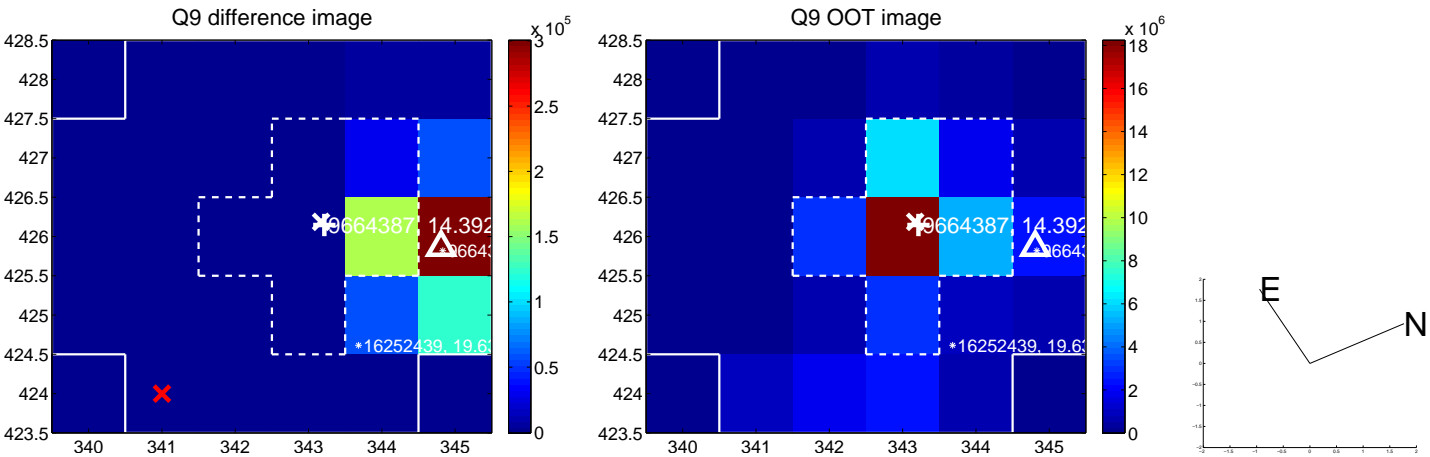
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



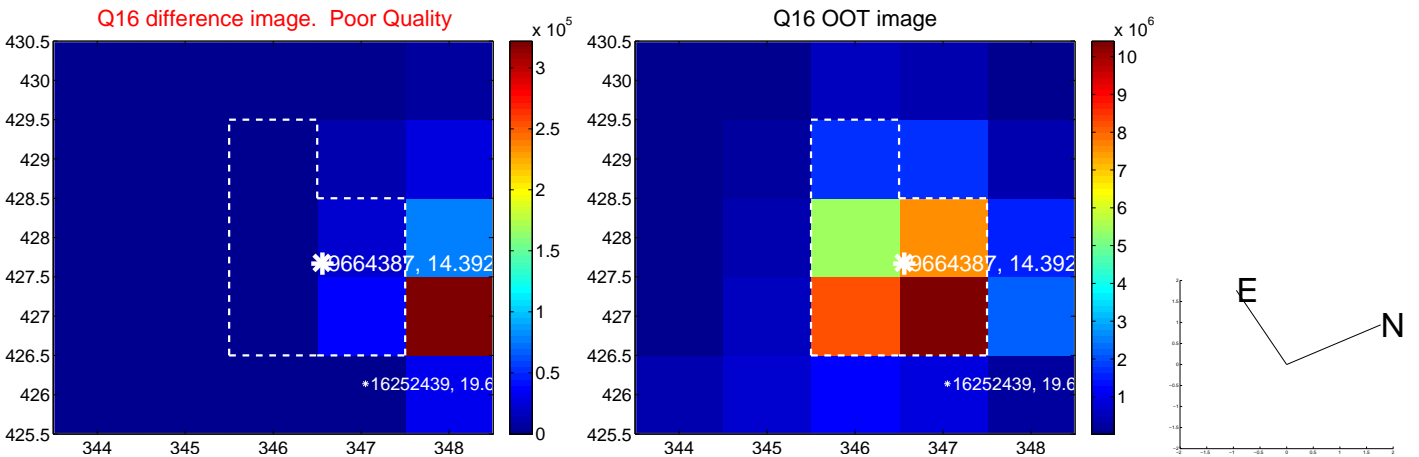
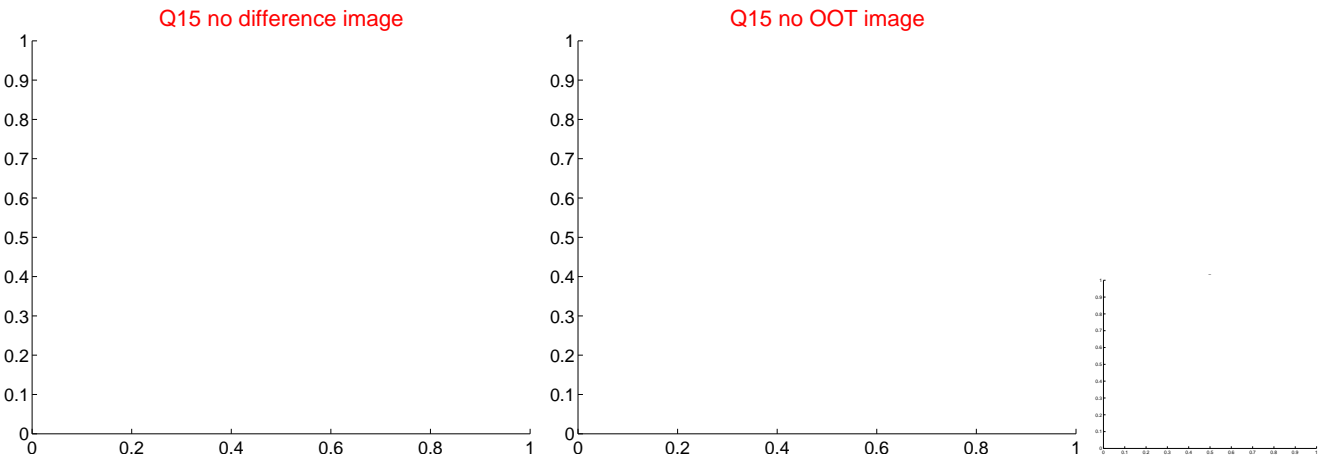
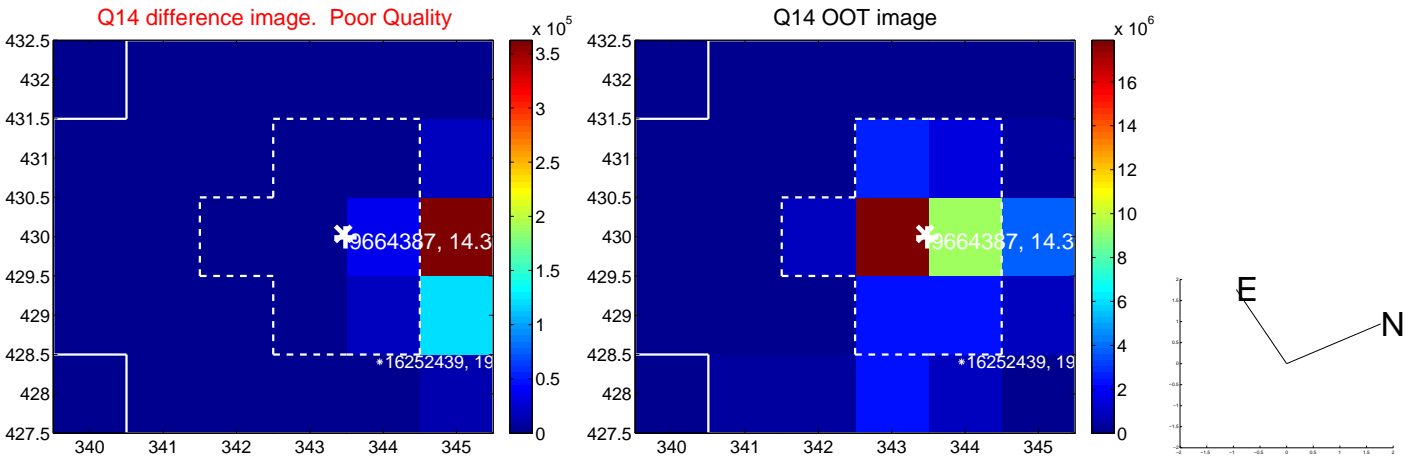
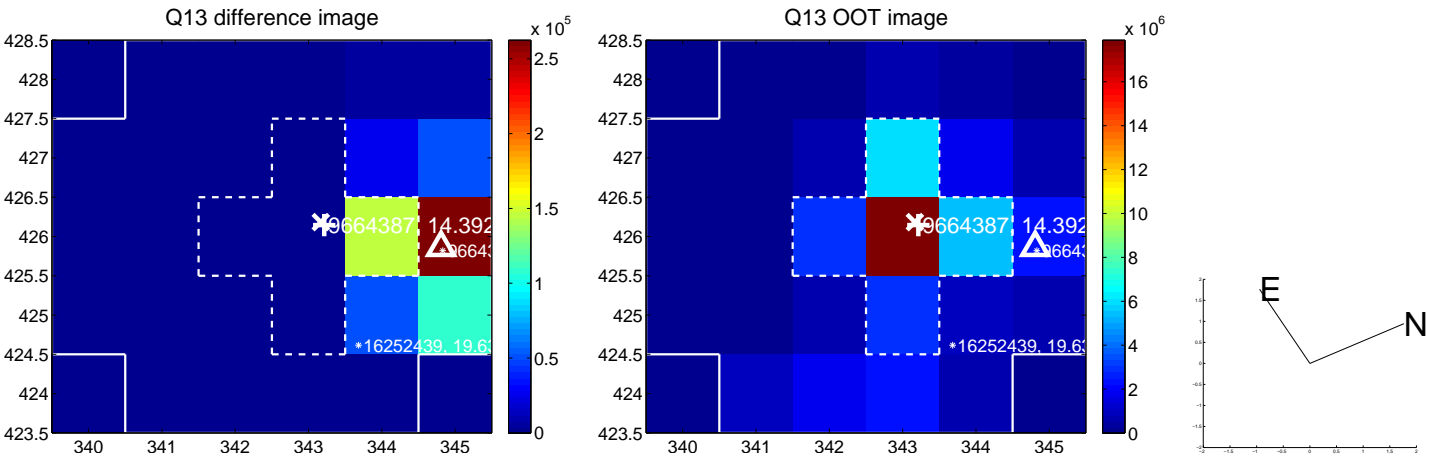
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



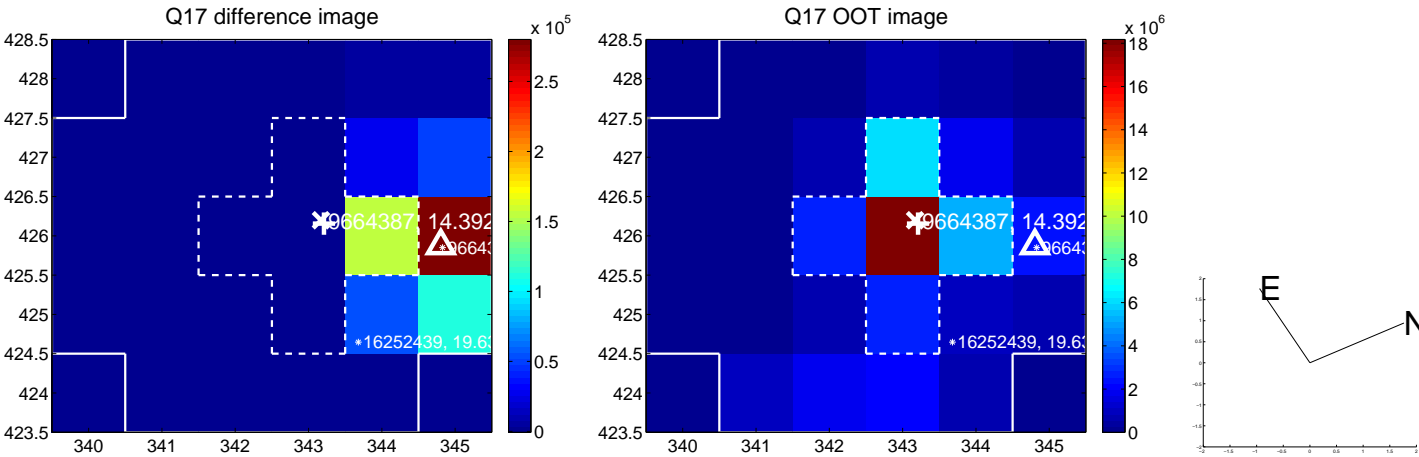
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



folded centroid time series figure for this object.

UKIRT Image

