

KIC 008330910

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|-----|-----|-----------------------------|-----------------|------------------------|------------------------|
| 008330910-01 | OBS | No | 0.551299 | 131.953047 | 20.2 | 1.875 | 8.5 | 7.5 | 1.90 | 7599 | 1.00 | 46214.87 |
| 008330910-02 | OBS | No | 2.302004 | 132.949816 | 46.2 | 5.052 | 8.1 | 9.4 | 1.90 | 7599 | 1.49 | 6873.17 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008330910-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008330910-02 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET |

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

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

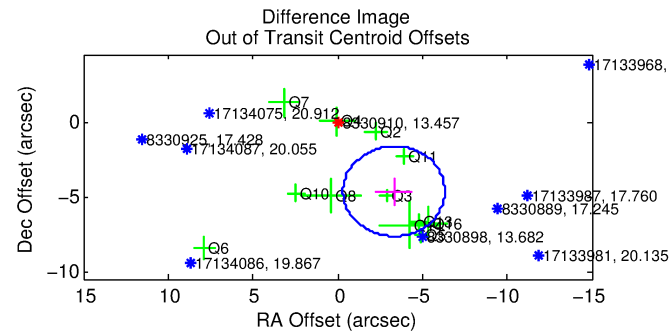
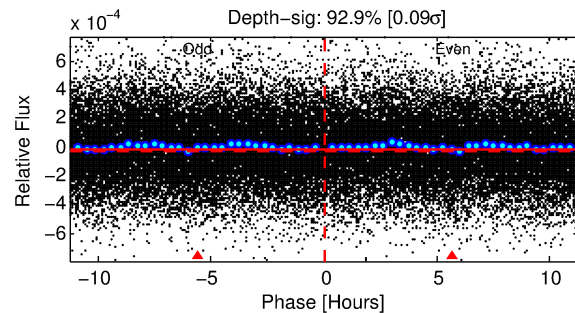
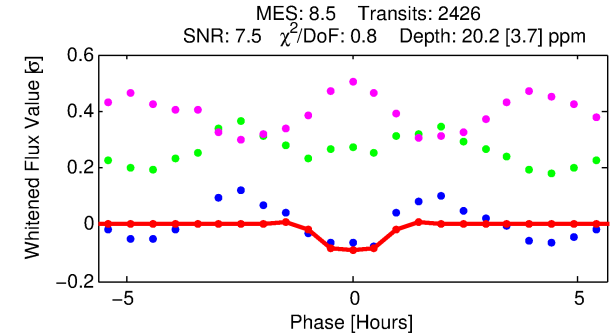
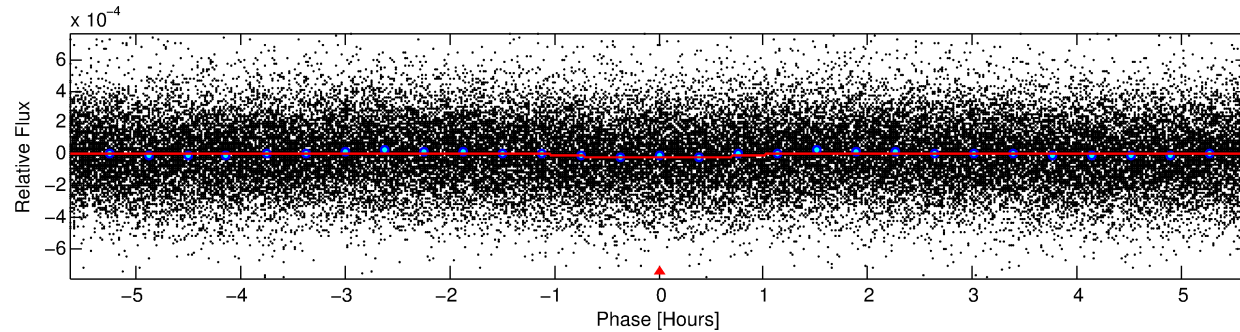
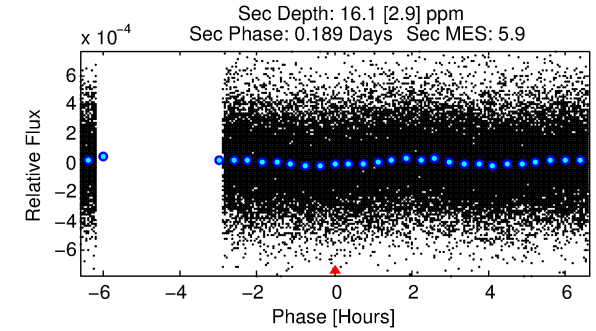
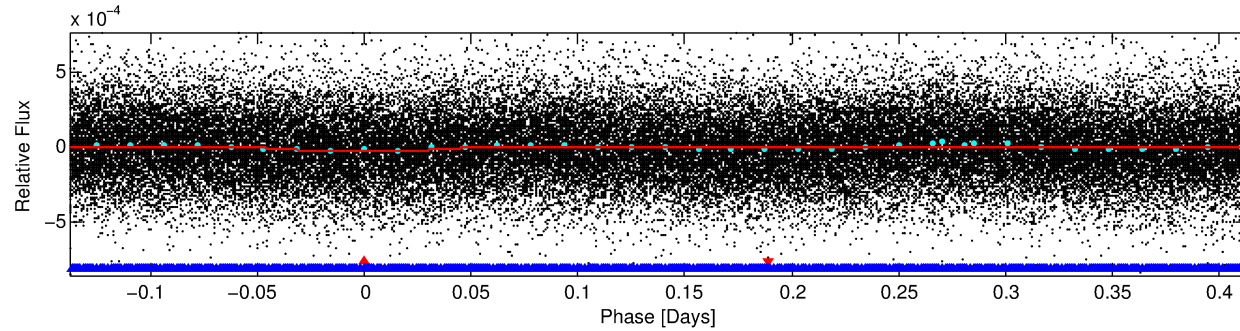
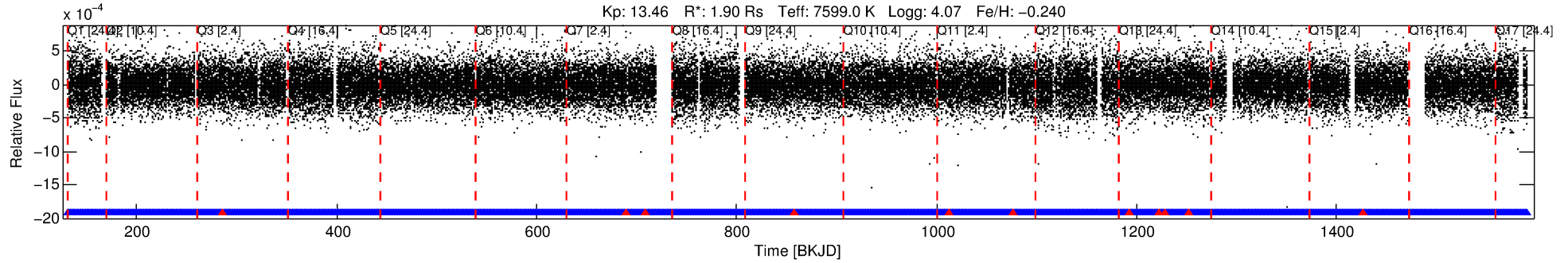
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008330910-01

No Significant Match Found

DV One-Page Summary

KIC: 8330910 Candidate: 1 of 2 Period: 0.551 d



DV Fit Results:

Period = 0.55130 [0.00001] d
Epoch = 131.9530 [0.0033] BKJD
Rp/R* = 0.0048 [0.0021]
a/R* = 1.37 [1.64]
b = 0.90 [0.55]
Seff = 46214.87 [17671.77]
Teff = 3739 [357] K
Rp = 1.00 [0.52] Re
a = 0.0153 [0.0036] AU
Ag = 2.07 [1.96] [0.55σ]
Teffp = 6933 [1553] K [2.00σ]

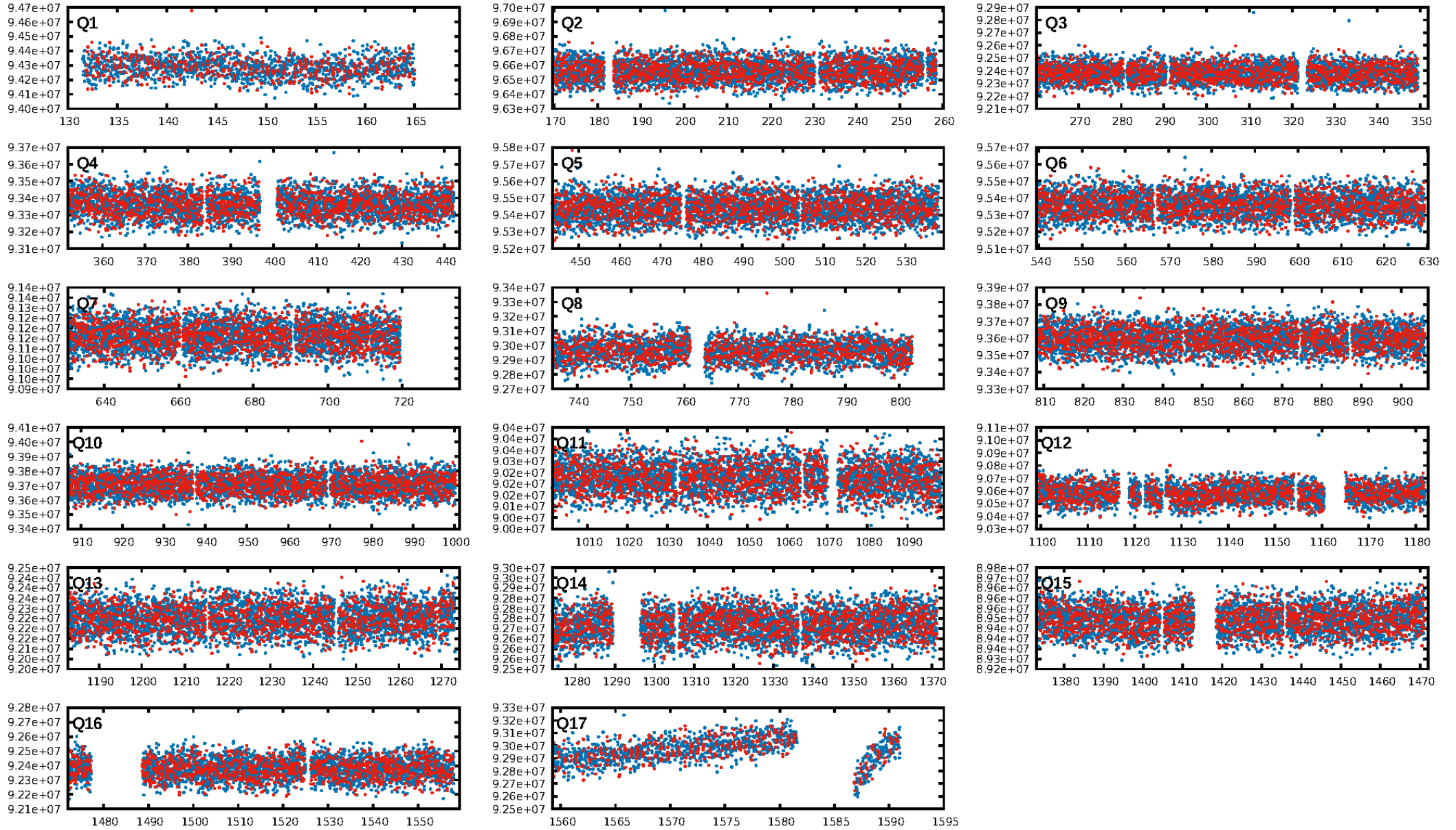
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [7.80σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.49e-15
RollingBand-fgt: 0.99 [2304/2316]
GhostDiagnostic-chr: 4.189
Centroid-sig: 4.2%
Centroid-so: 2.083 arcsec [1.45σ]
OotOffset-rm: 5.711 arcsec [5.71σ]
KicOffset-rm: 6.031 arcsec [5.36σ]
OotOffset-st: 4/3/3/2 [12]
KicOffset-st: 4/3/3/2 [12]
DiffImageQuality-fgm: 0.25 [3/12]
DiffImageOverlap-fno: 1.00 [17/17]

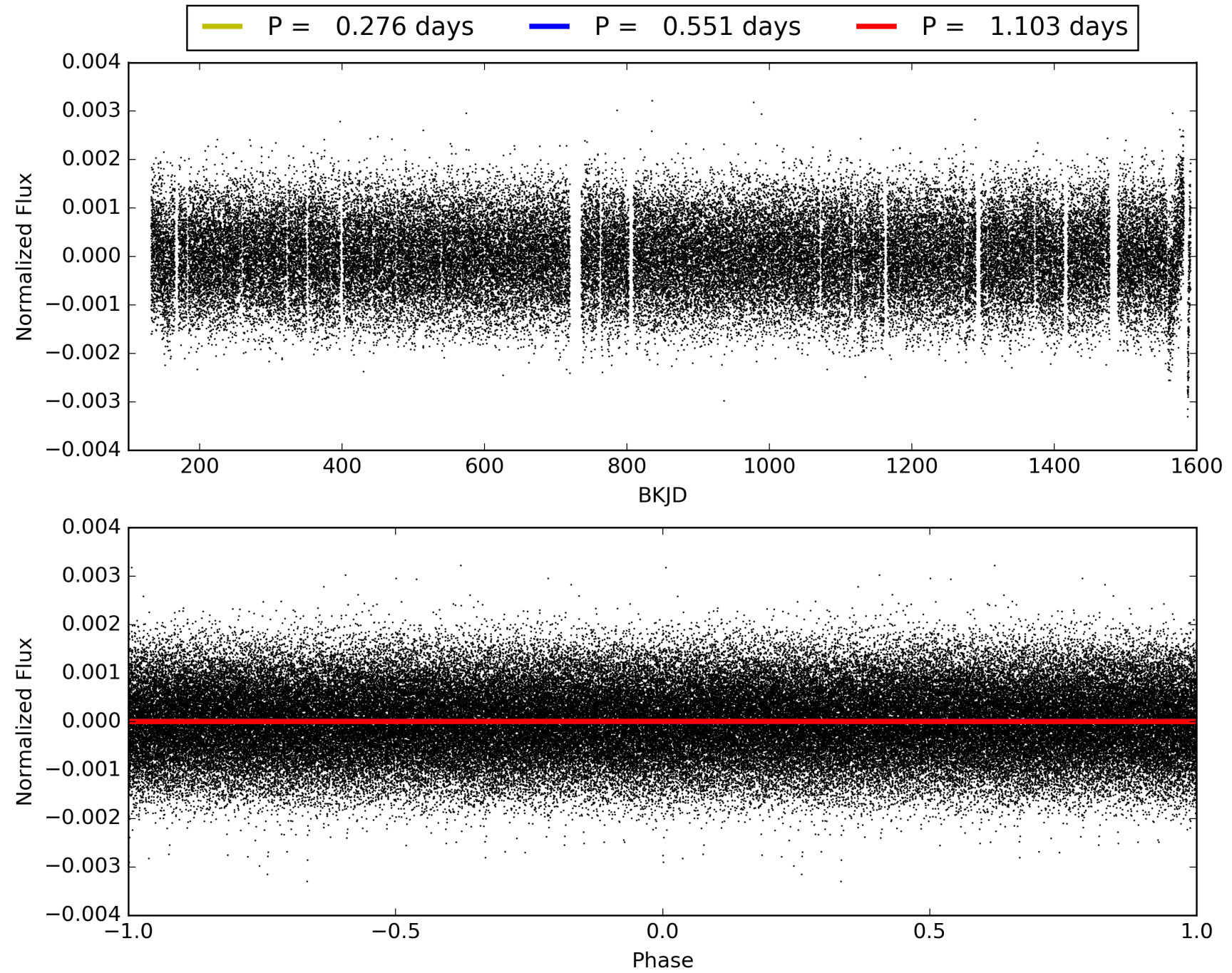
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 13:39:44 Z

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

TCE 008330910-01, PDC Light Curves

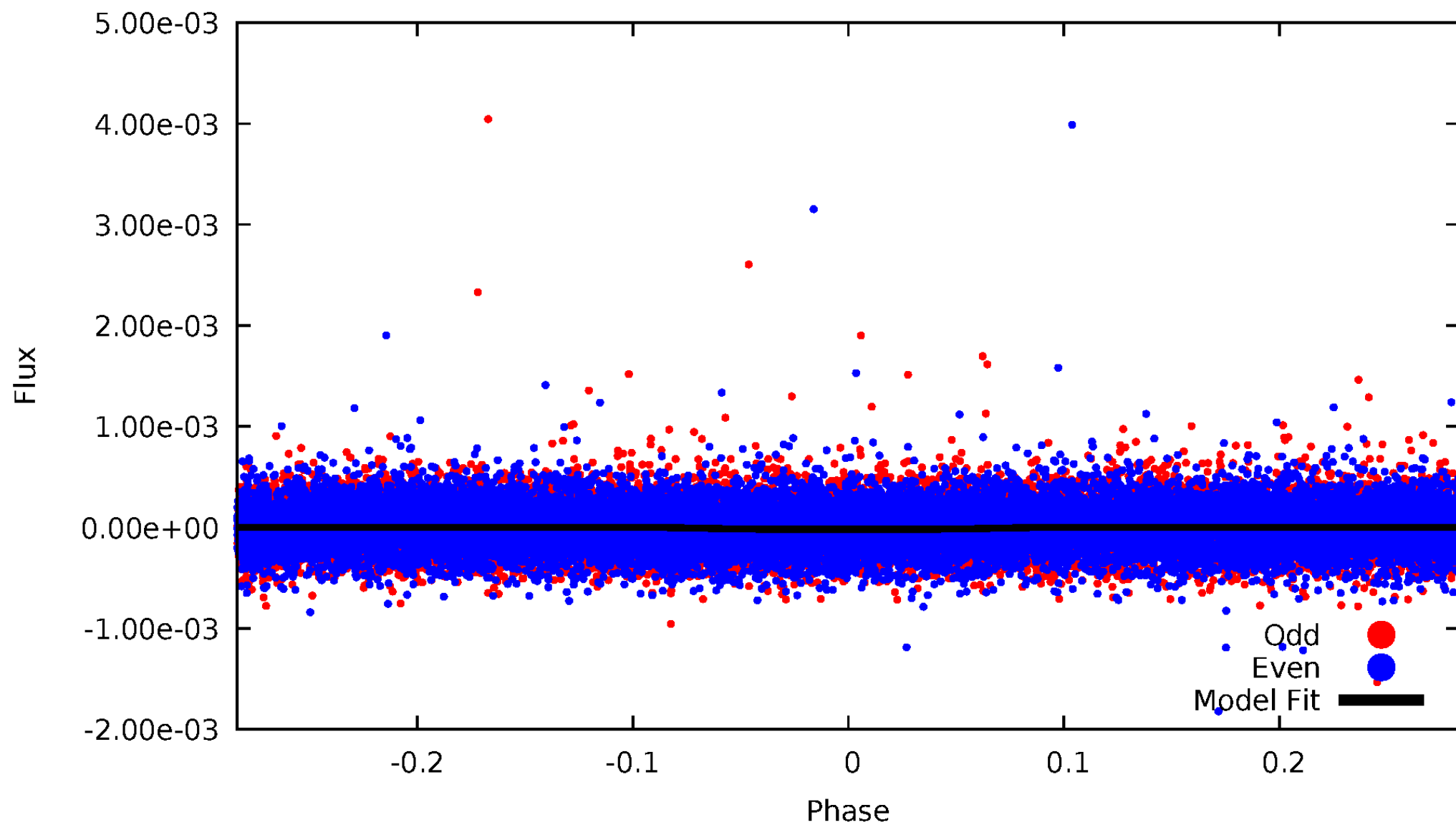


TCE 008330910-01



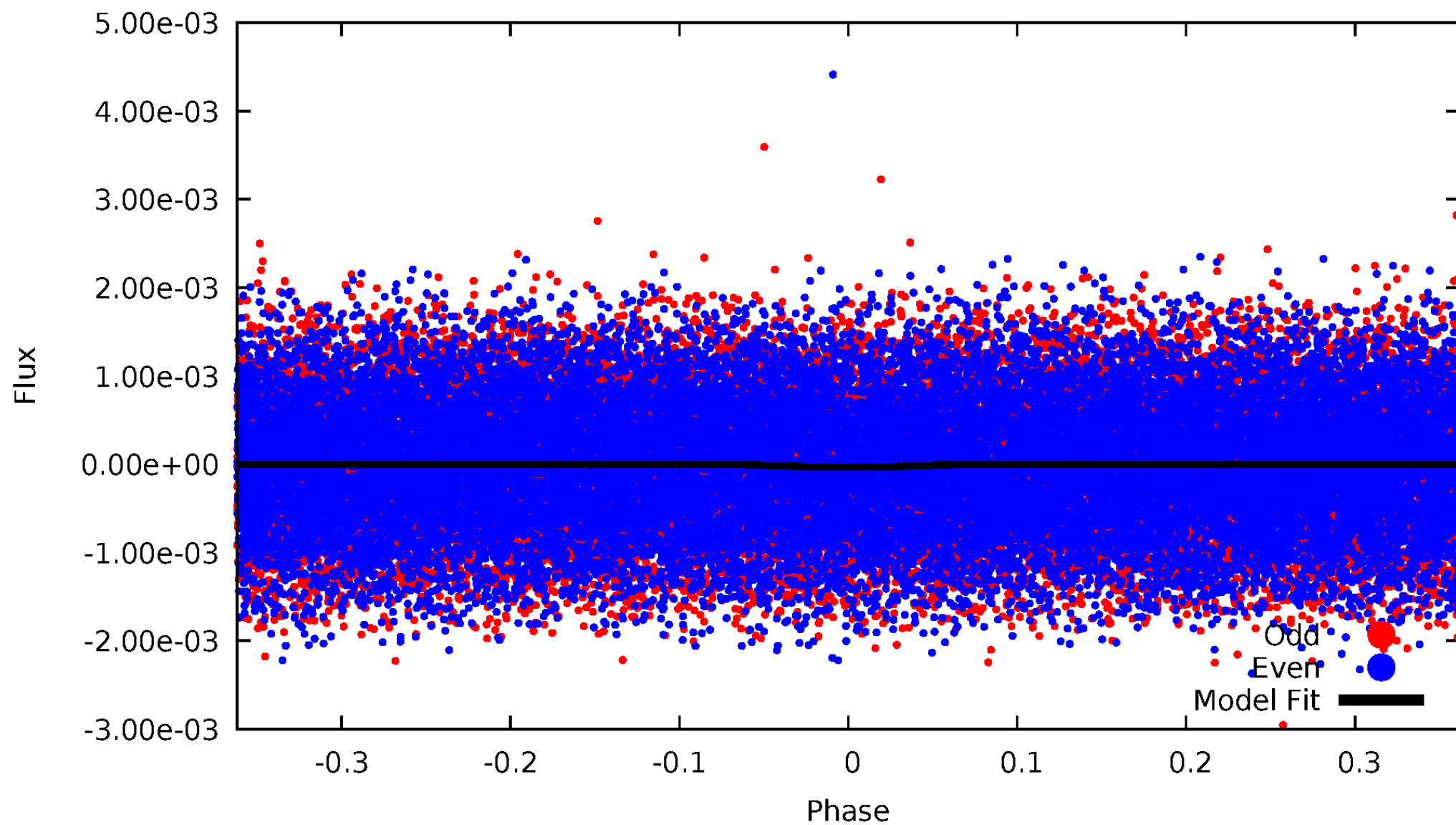
DV Odd/Even

TCE 008330910-01



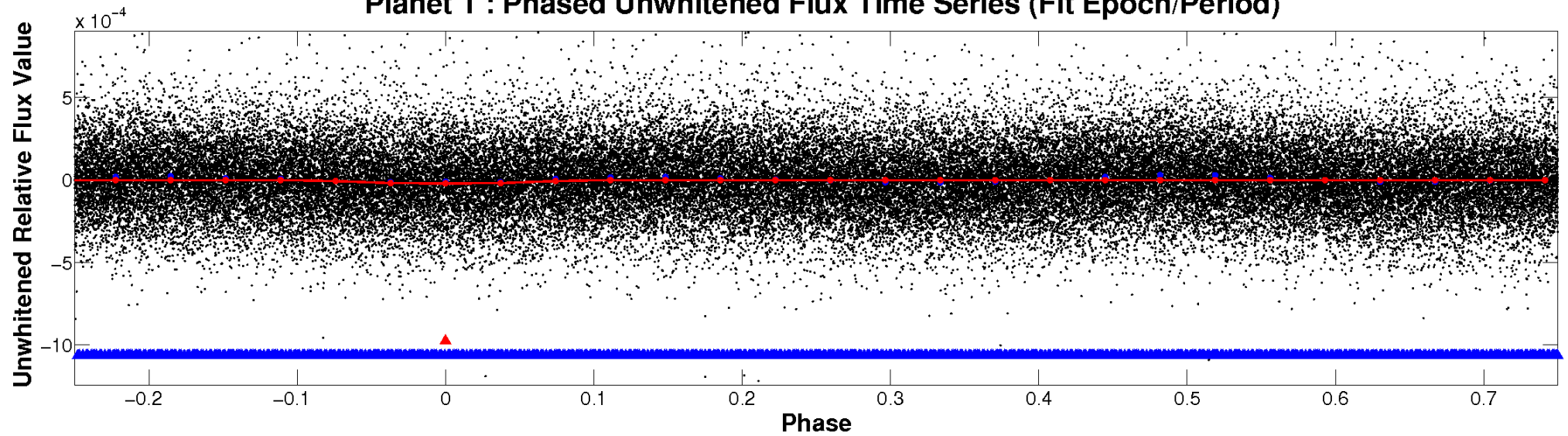
ALT Odd/Even

TCE 008330910-01

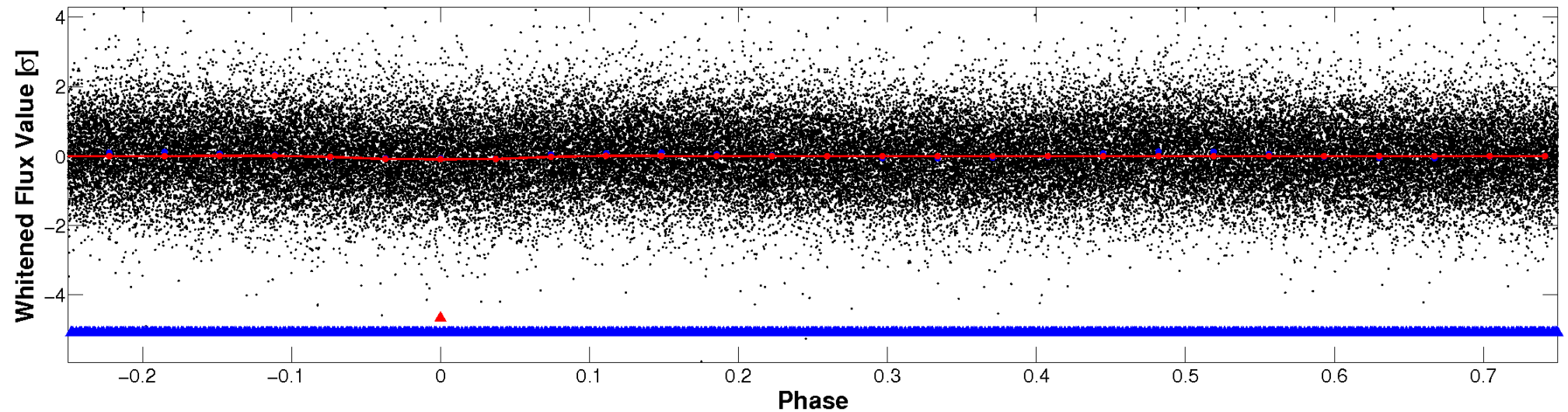


Non-Whitened Vs. Whitened Light Curve

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

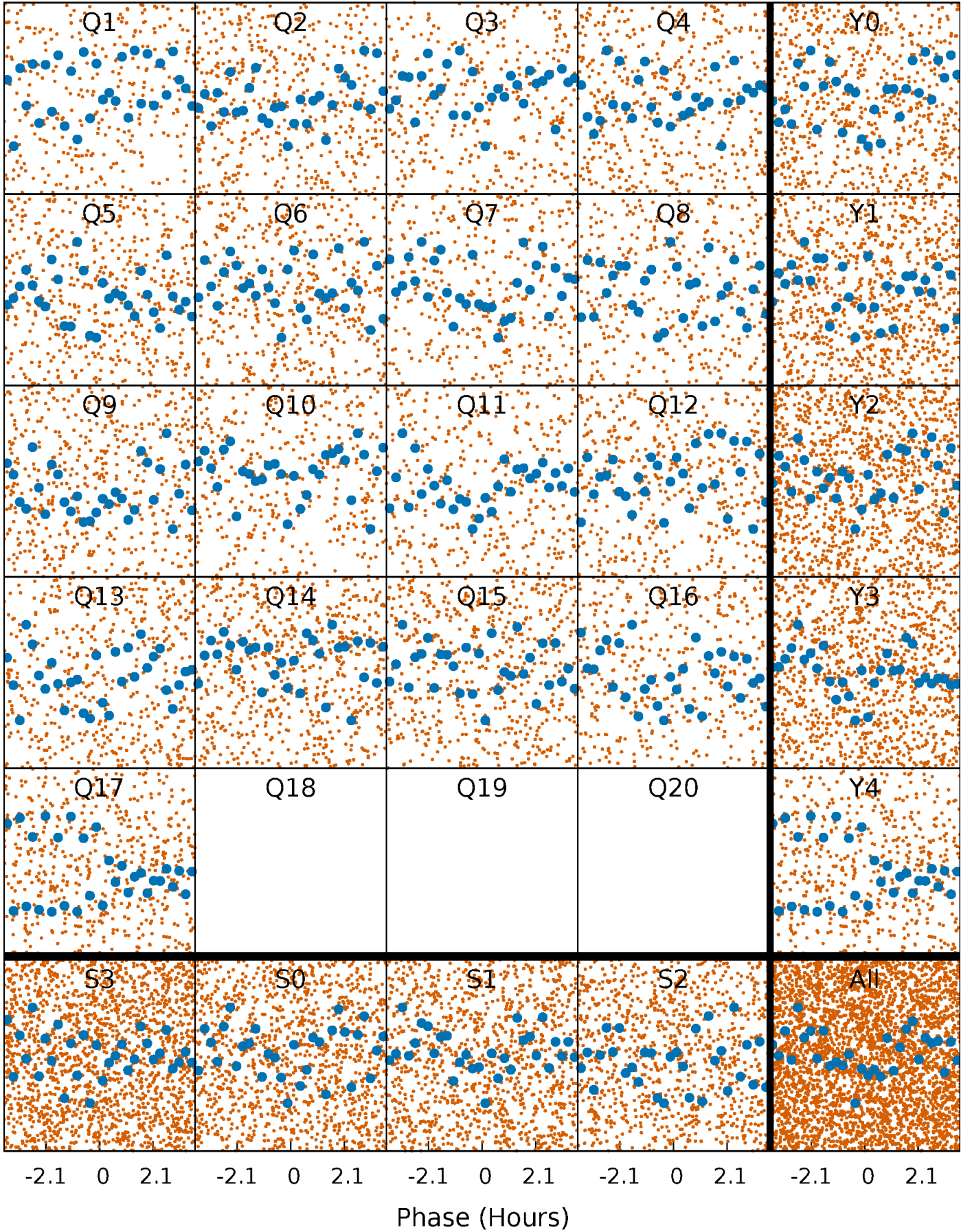


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



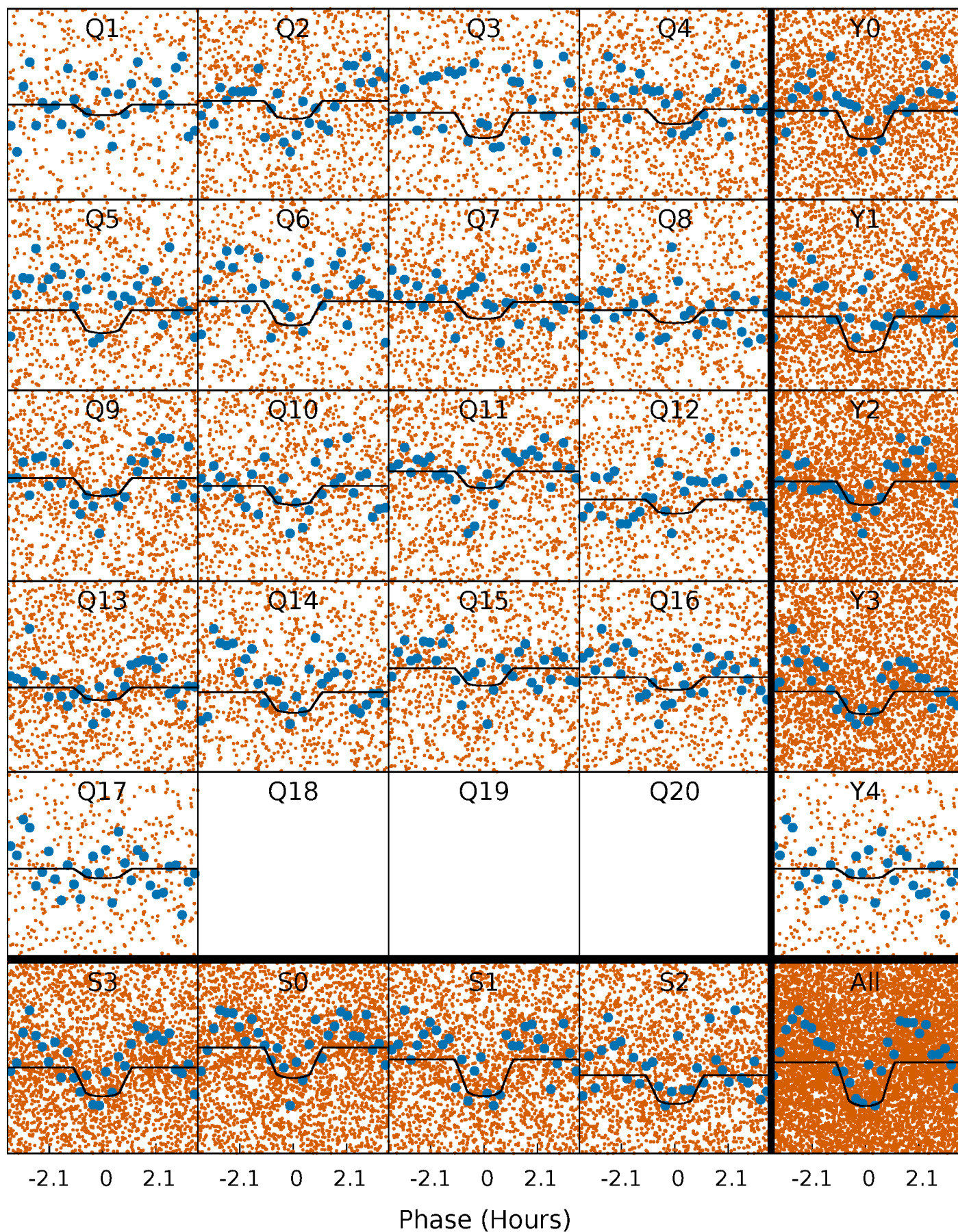
PDC Quarter-Phased Transit Curves

TCE 008330910-01 P= 0.551299 Days $T_0=131.953047$ (BKJD)



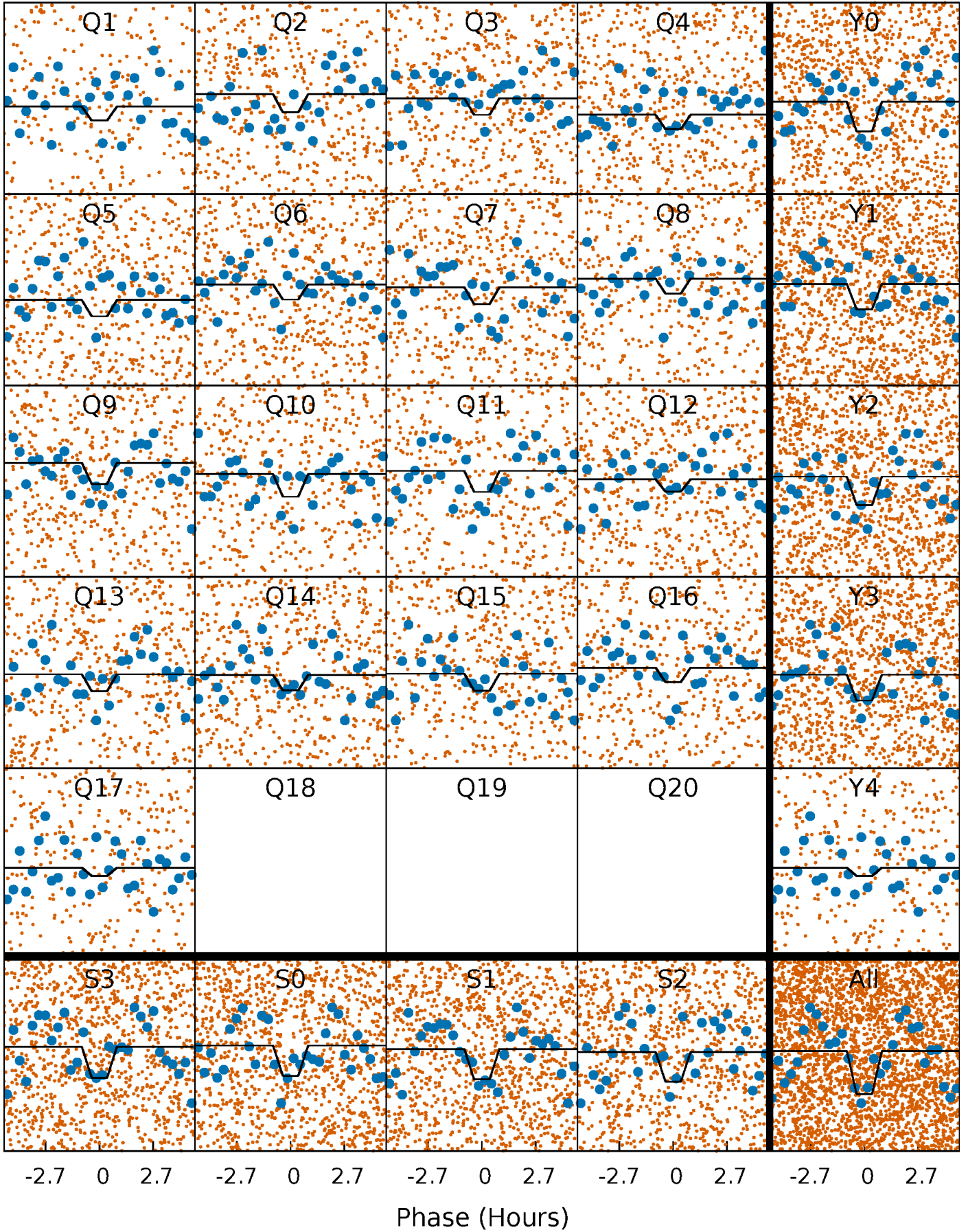
DV Quarter-Phased Transit Curves

TCE 008330910-01 P= 0.551299 Days $T_0=131.953047$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

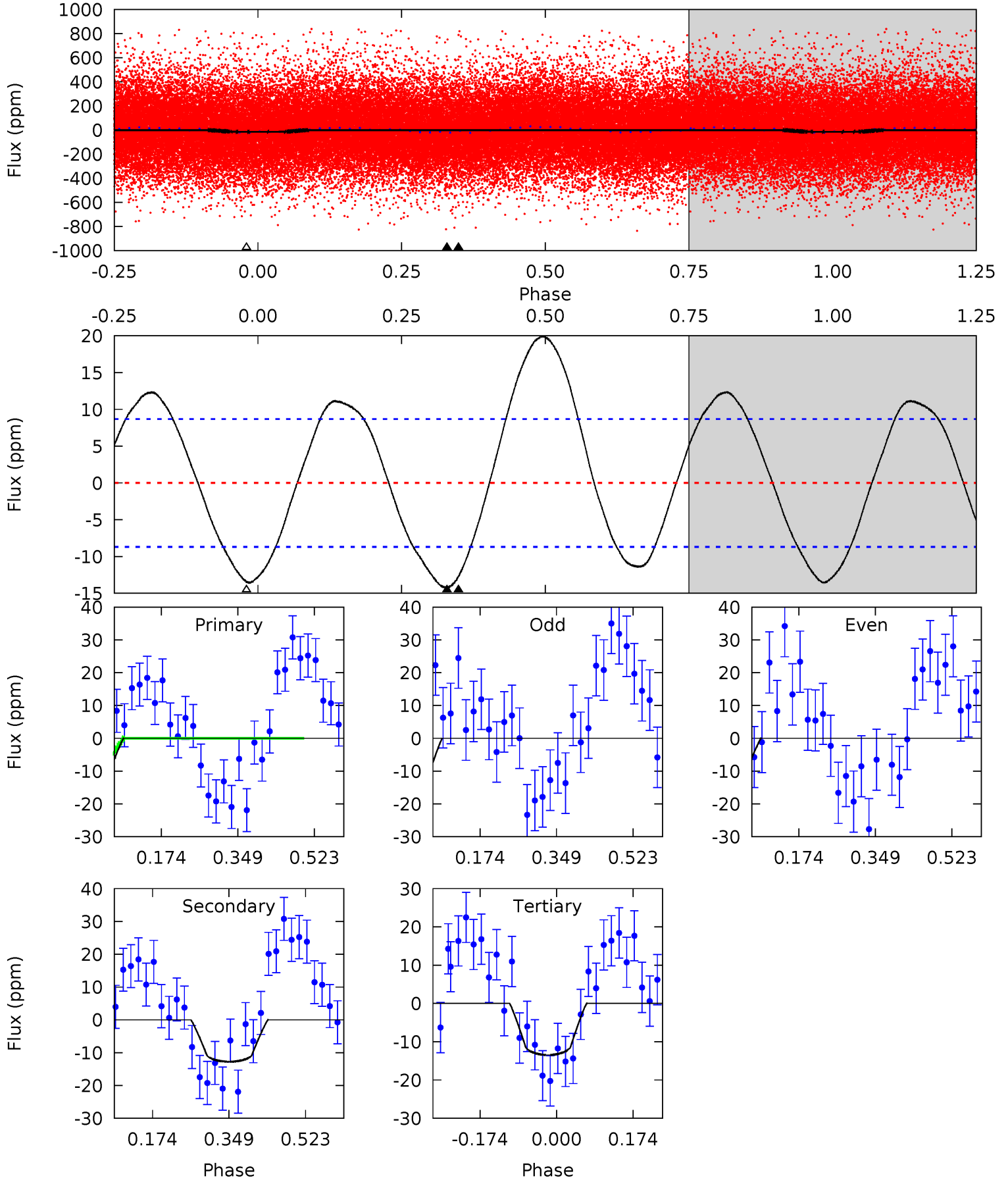
TCE 008330910-01 P= 0.551289 Days $T_0=131.960653$ (BKJD)



DV Model-Shift Uniqueness Test

008330910-01, P = 0.551299 Days, E = 131.401748 Days

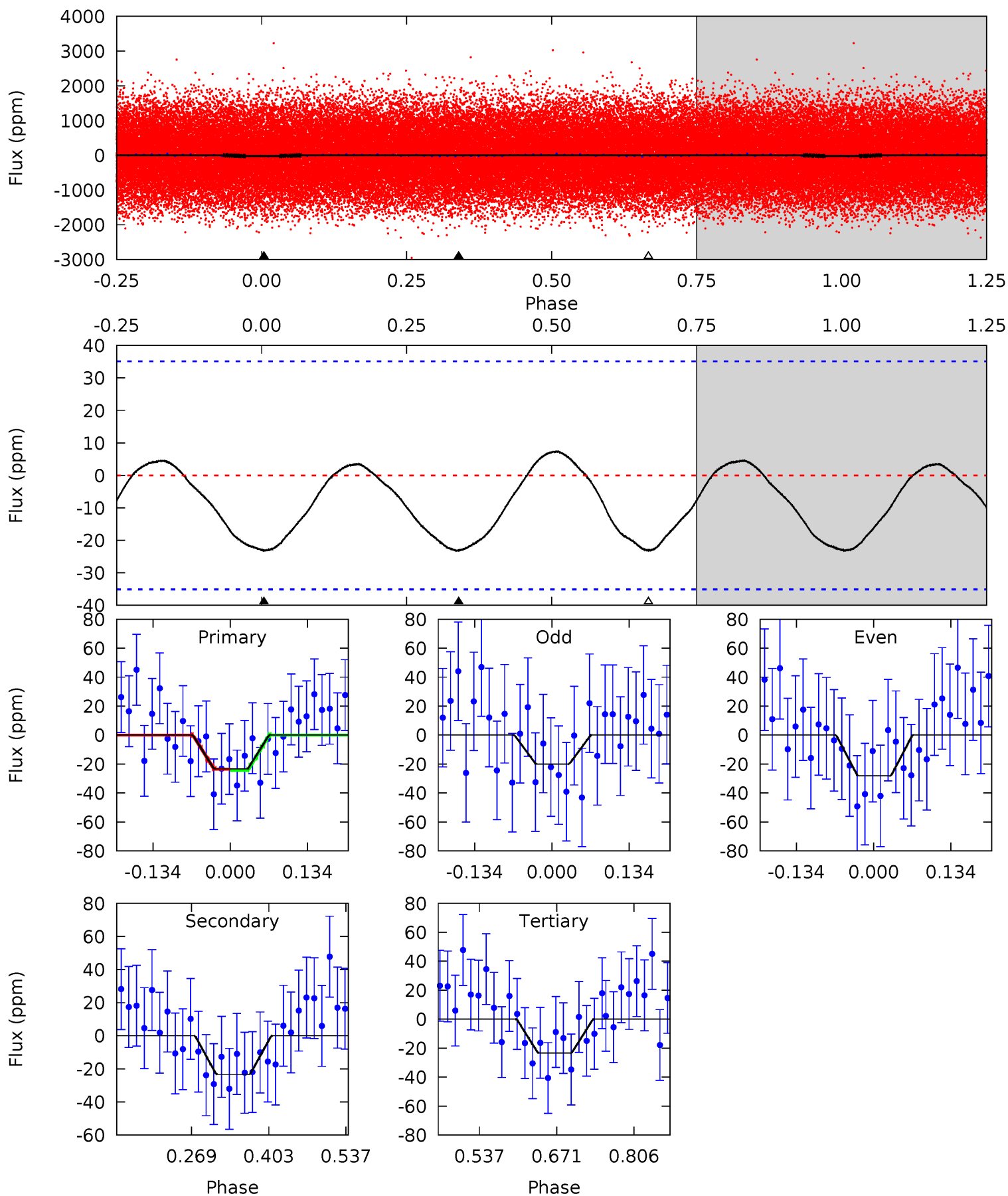
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 7.28 | 6.52 | 6.89 | 0 | 4.45 | 1.36 | 4.56 | 0.39 | 7.28 | -0.37 | 6.52 | 0.75 | 0.83 | 0.58 | 2.71 |



Alt Model-Shift Uniqueness Test

008330910-01, P = 0.551289 Days, E = 131.409364 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 3.01 | 3.00 | 3.00 | 0 | 4.50 | 1.50 | 1.28 | 0.01 | 3.01 | 0.01 | 3.00 | 0.52 | 0.90 | 0.24 | 0.07 |



Stellar Parameters For KIC 008330910

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|--|
| | 7599^{+237}_{-316} | $4.074^{+0.187}_{-0.153}$ | $-0.240^{+0.250}_{-0.350}$ | $1.897^{+0.541}_{-0.443}$ | $1.554^{+0.210}_{-0.233}$ | $0.321^{+0.339}_{-0.143}$ |
| | +3%/-4% | +5%/-4% | +104%/-146% | +29%/-23% | +14%/-15% | +106%/-45% |
| 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 008330910-01 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|------------------------|---------------------------|
| DV | -13 ± 2 | $1.01^{+0.44}_{-0.42}$ | 5198^{+373}_{-374} | 5972^{+2548}_{-1202} | $1.562^{+3.414}_{-0.788}$ |
| Alt. | -23 ± 8 | $1.05^{+0.48}_{-0.44}$ | 5198^{+382}_{-387} | 7036^{+3093}_{-1550} | $2.700^{+5.263}_{-1.550}$ |

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

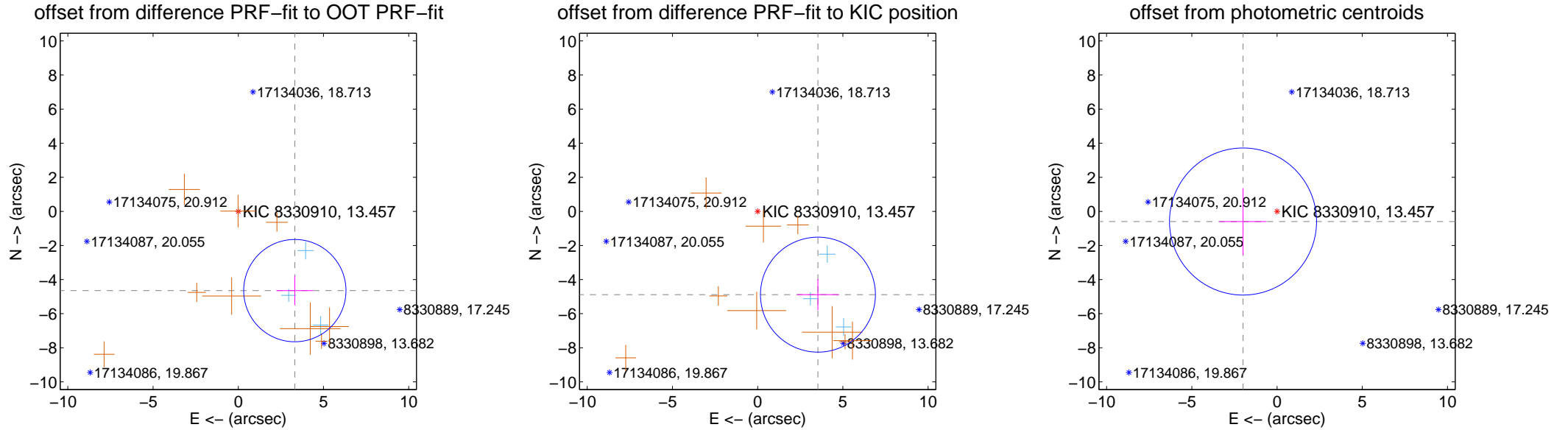
DV Centroid Data

Supplemental centroid analysis for 008330910-01. Kepler magnitude: 13.46. Transit SNR 7.46

There are 3 quarters with good PRF difference image offsets

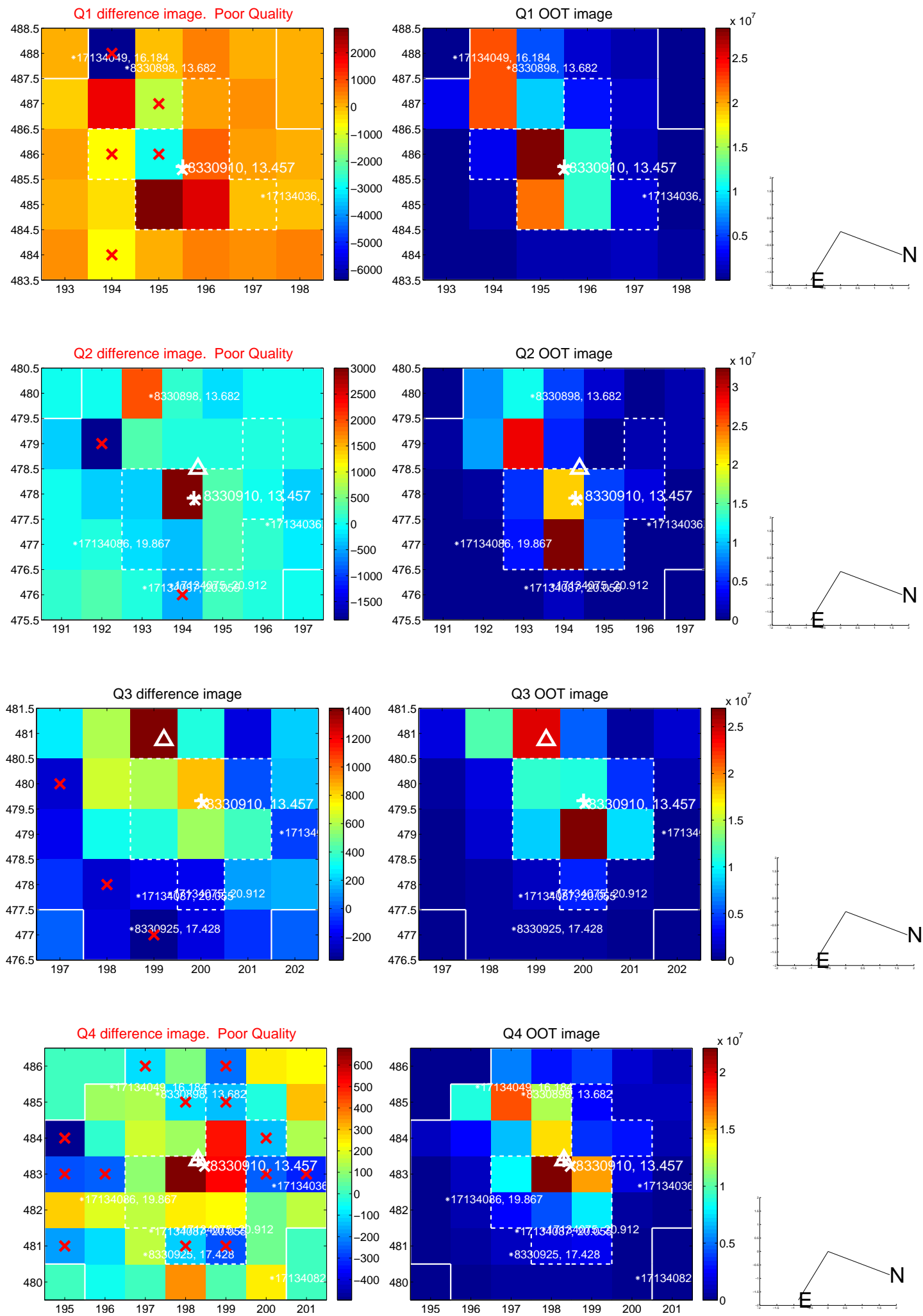
The direct PRF centroid is offset from the target star catalog position by about 0.85 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 5.711 ± 1.000 | 5.71 | -3.318 ± 1.079 | -4.648 ± 0.863 |
| PRF-fit source offset from KIC position | 6.031 ± 1.124 | 5.36 | -3.537 ± 1.228 | -4.885 ± 0.912 |
| photometric centroid source offset | 2.08 ± 1.44 | 1.45 | 2.00 ± 1.38 | -0.59 ± 1.96 |

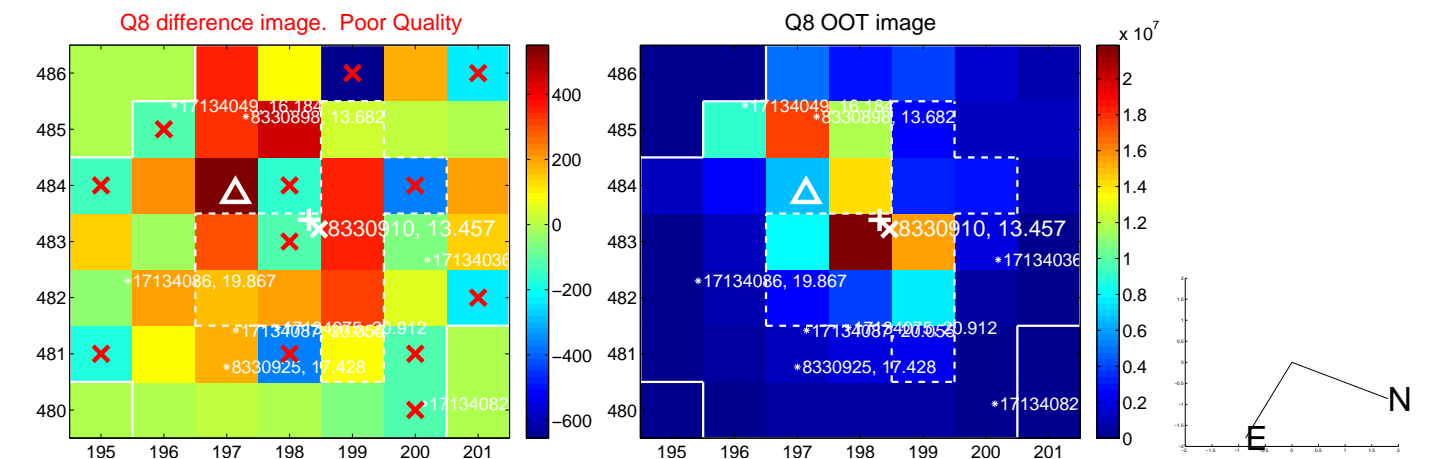
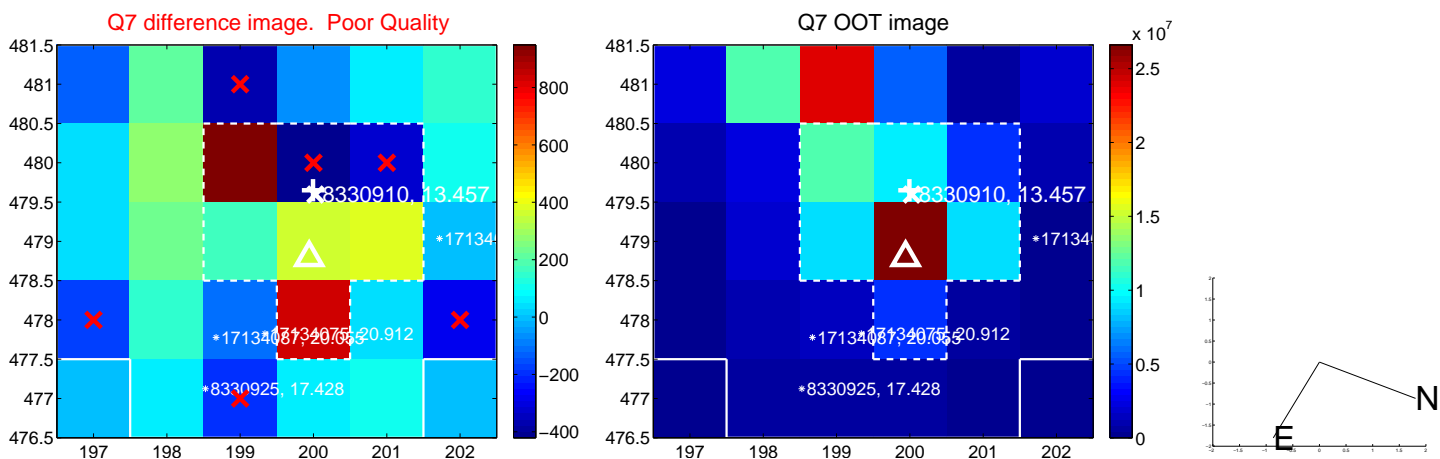
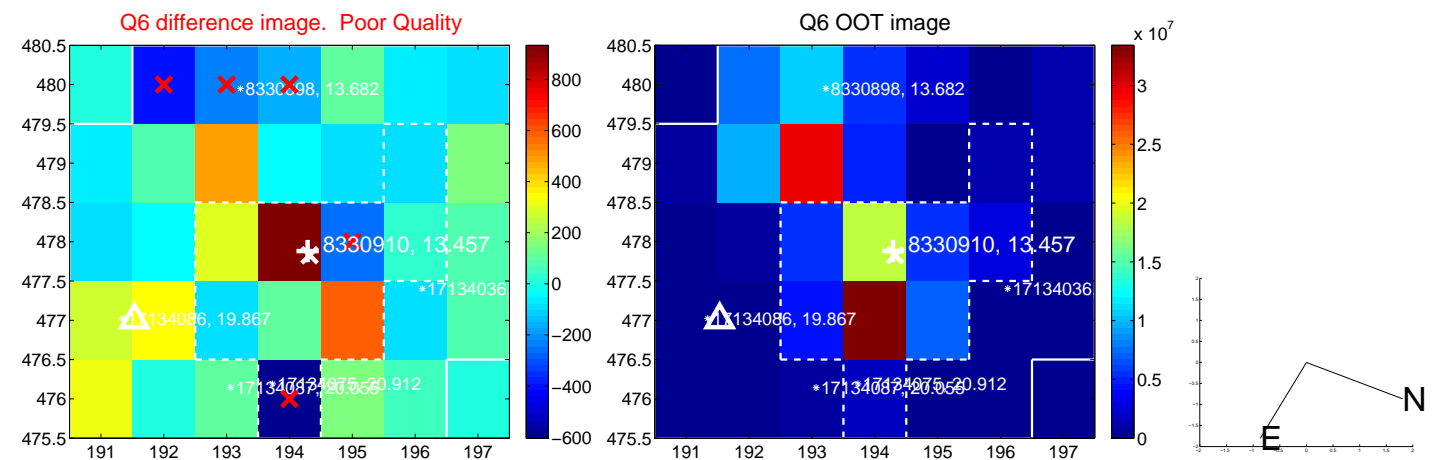
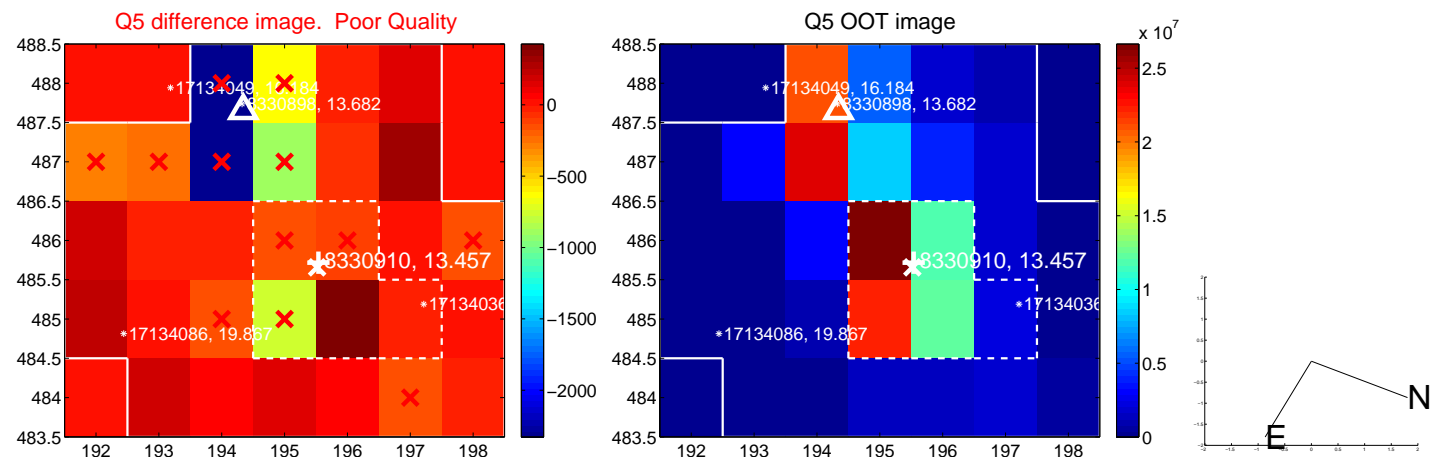


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

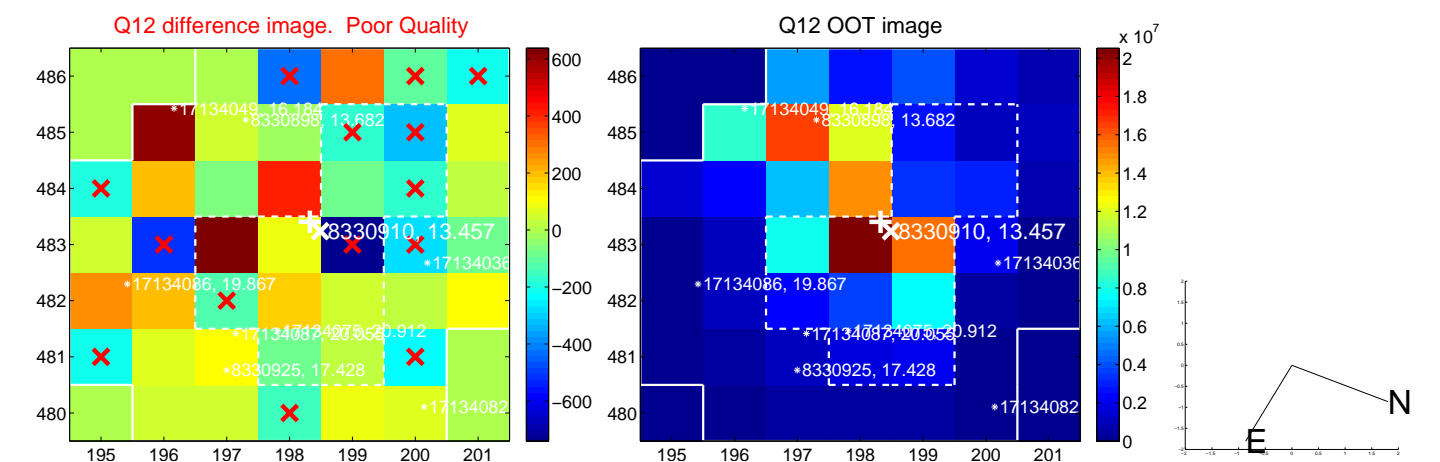
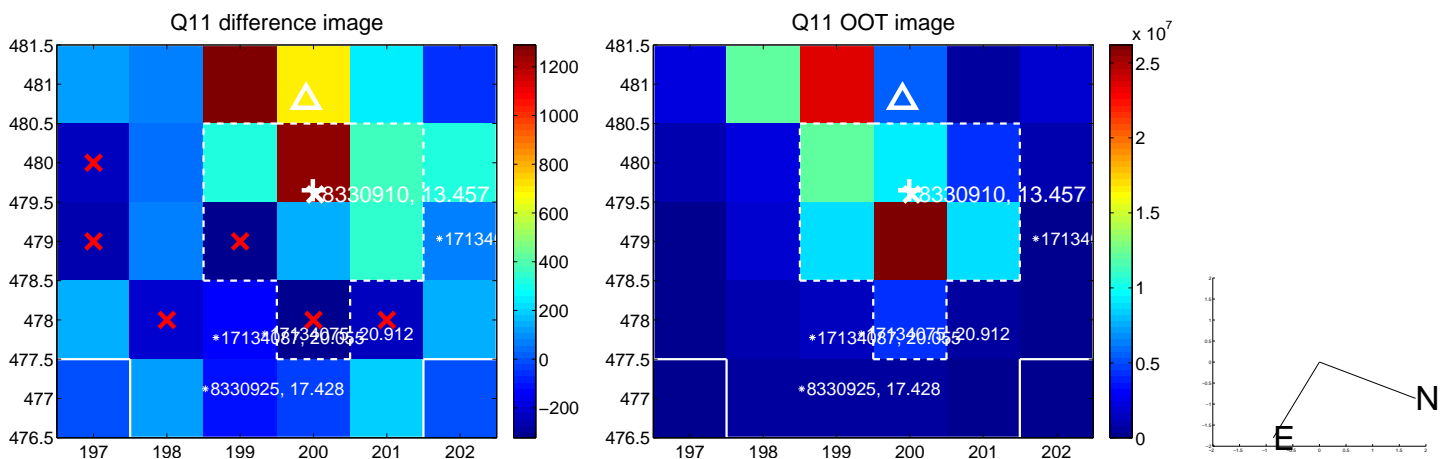
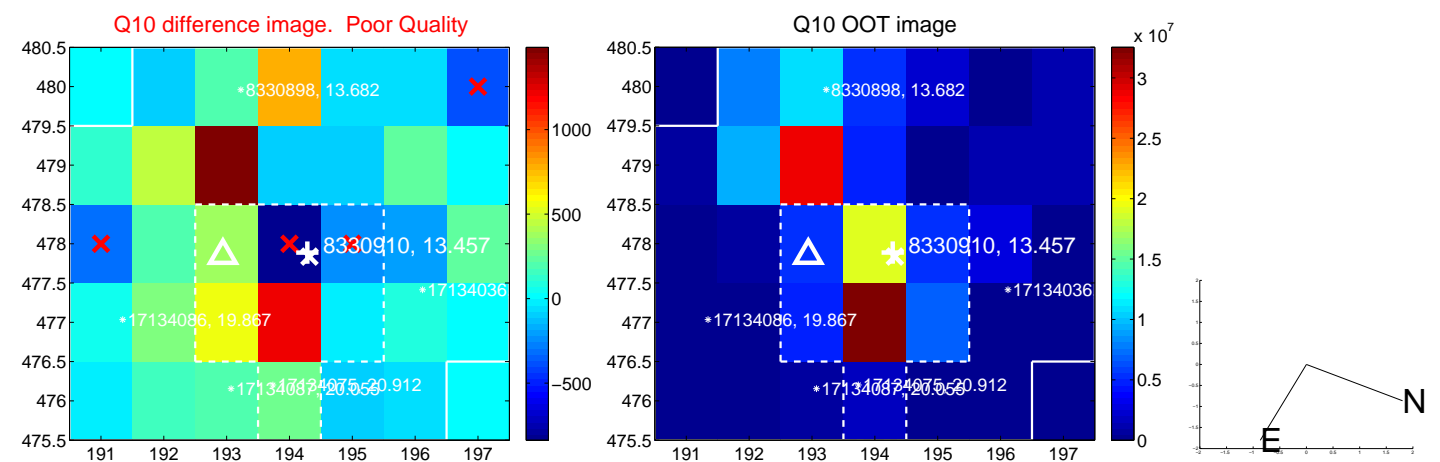
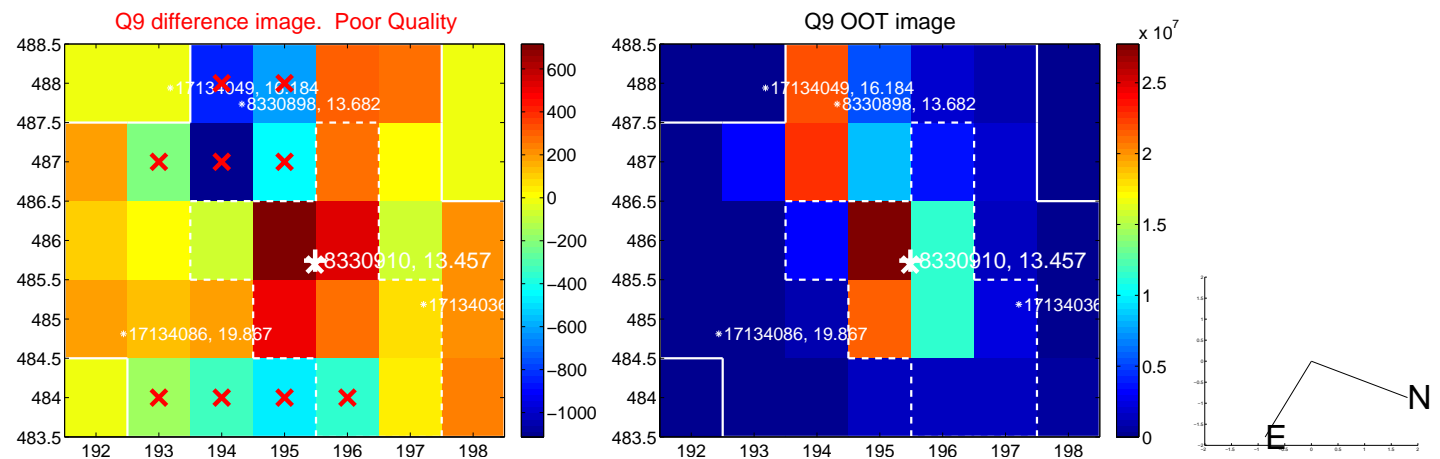
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



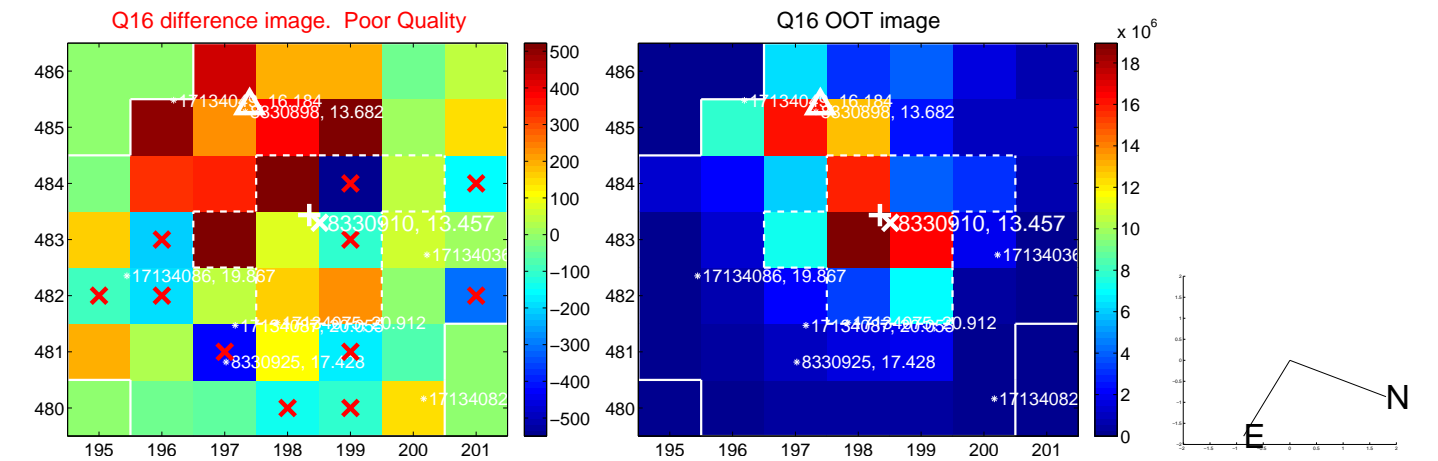
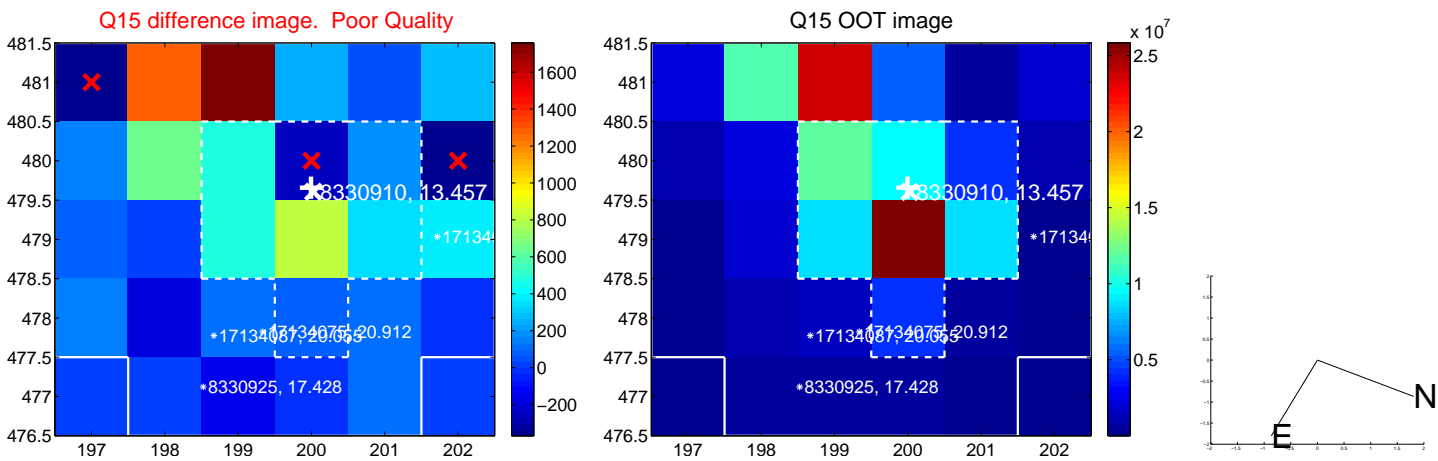
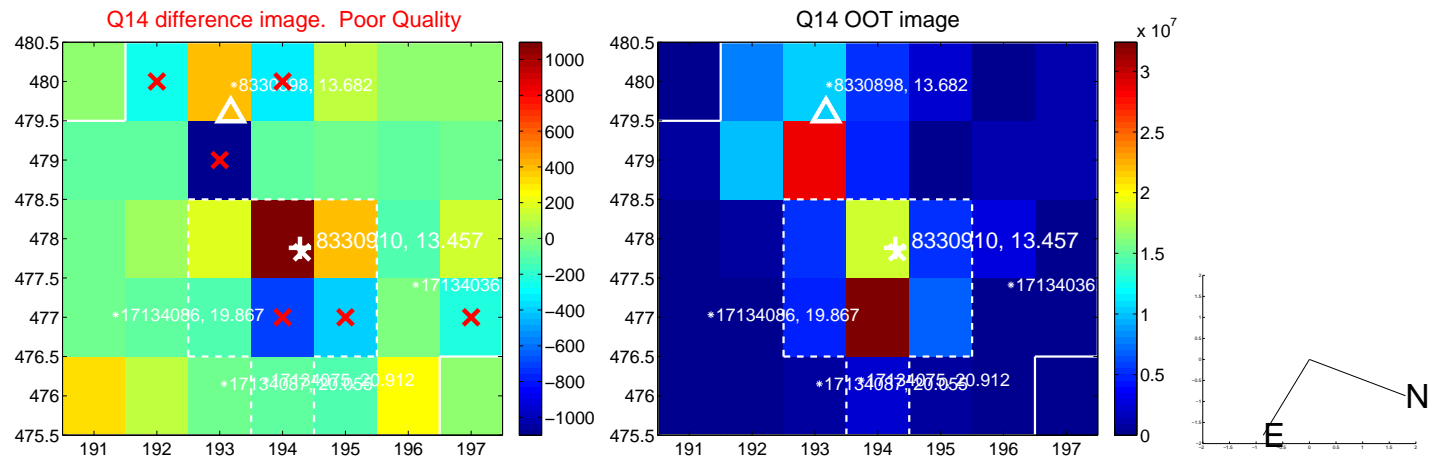
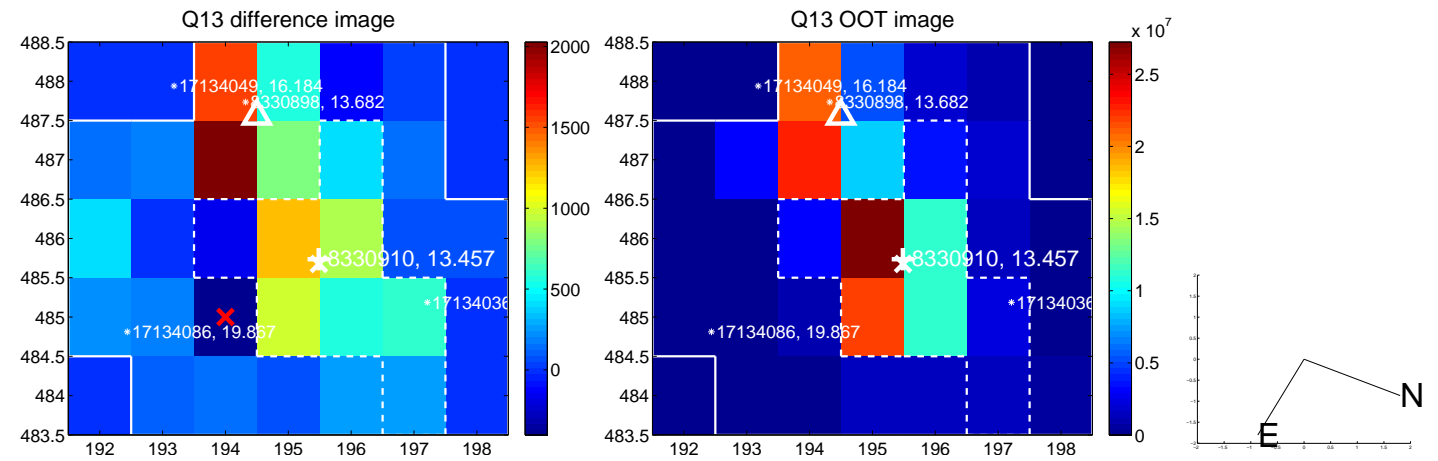
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



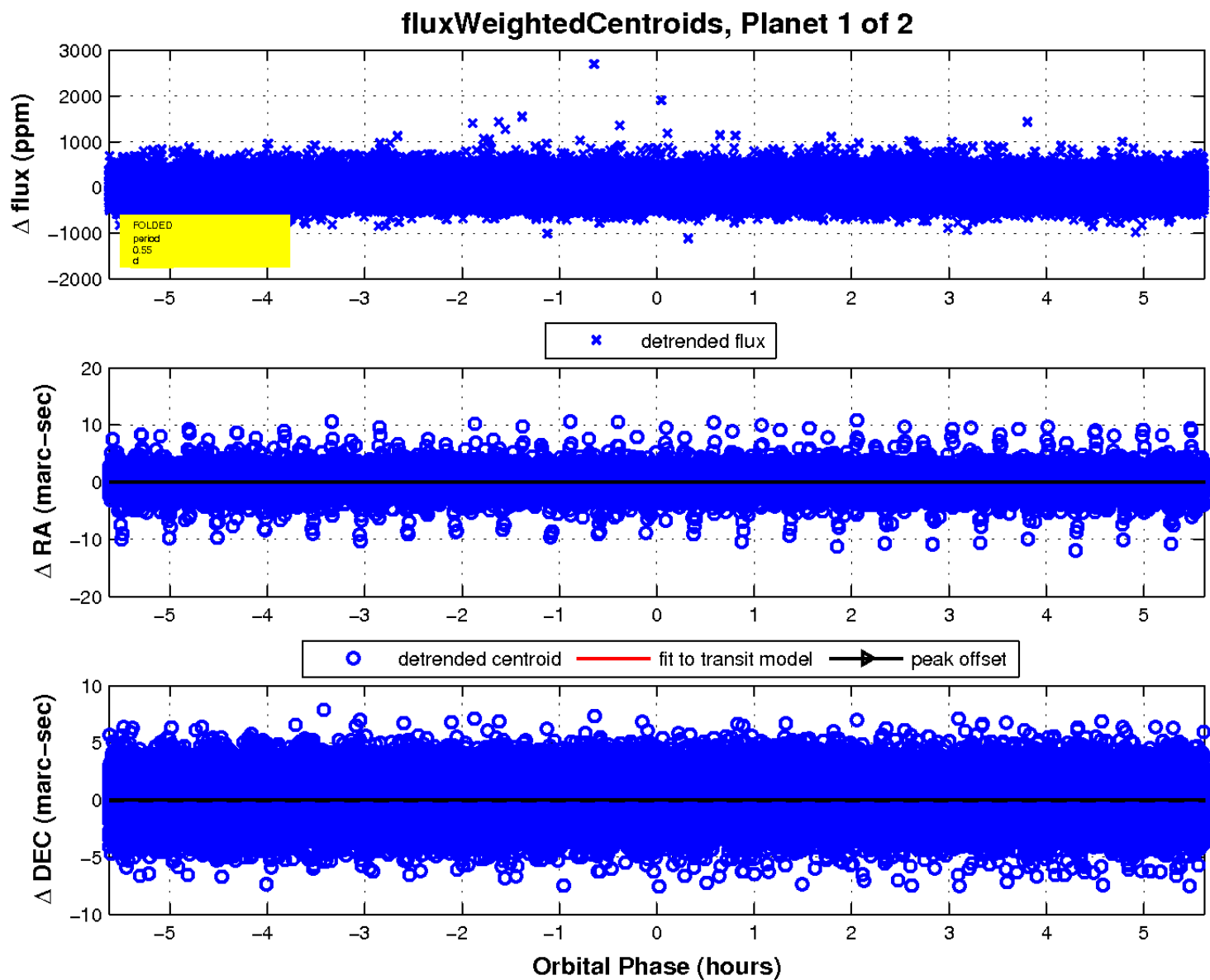
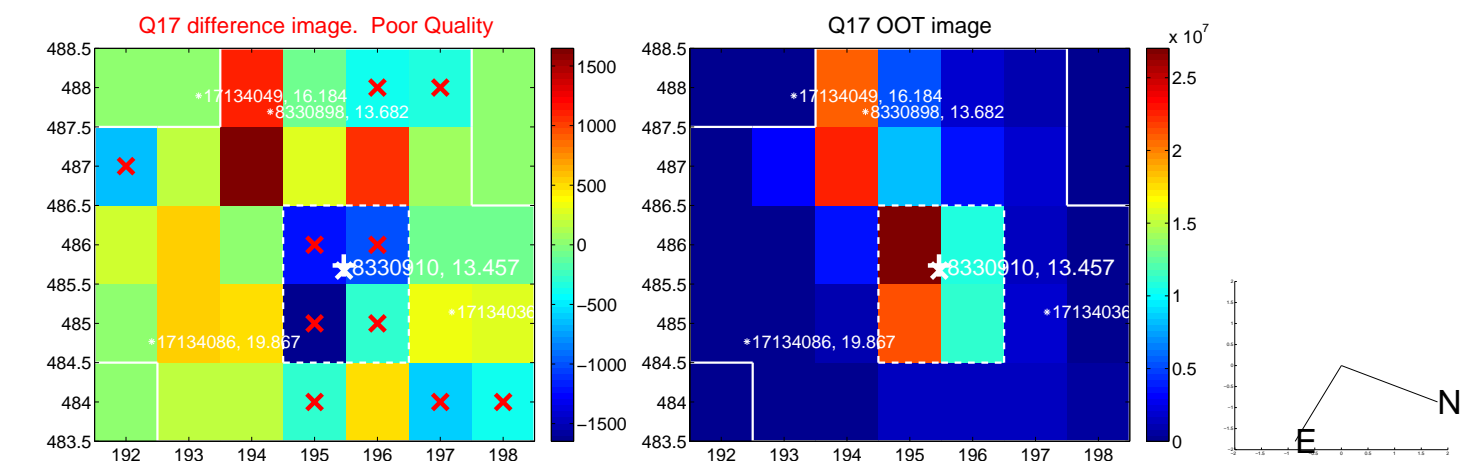
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

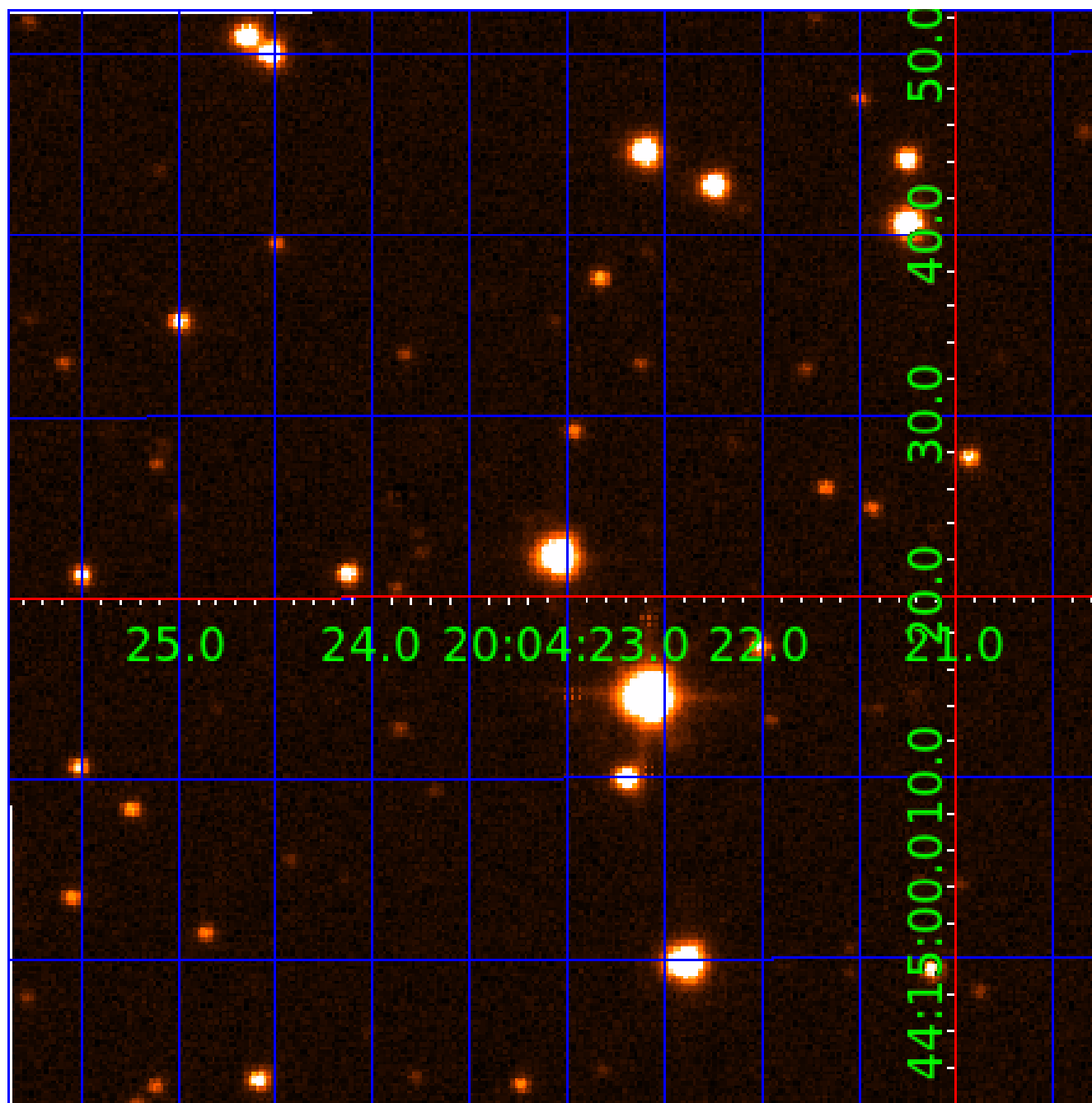


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 008330910

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|-----|-----|-----------------------------|-----------------|------------------------|------------------------|
| 008330910-01 | OBS | No | 0.551299 | 131.953047 | 20.2 | 1.875 | 8.5 | 7.5 | 1.90 | 7599 | 1.00 | 46214.87 |
| 008330910-02 | OBS | No | 2.302004 | 132.949816 | 46.2 | 5.052 | 8.1 | 9.4 | 1.90 | 7599 | 1.49 | 6873.17 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 008330910-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT |
| 008330910-02 | OBS | FP | 0.00 | 1 | 0 | 1 | 0 | INDIV_TRANS_RUBBLE_SKYE_ZUMA—TRANS_GAPPED—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_RESOLVED_OFFSET |

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

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

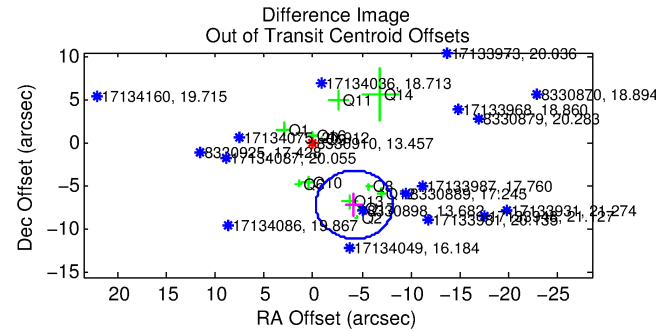
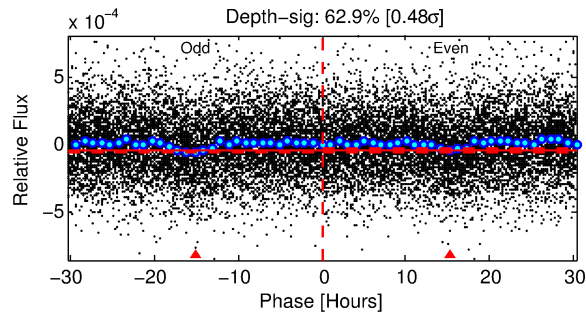
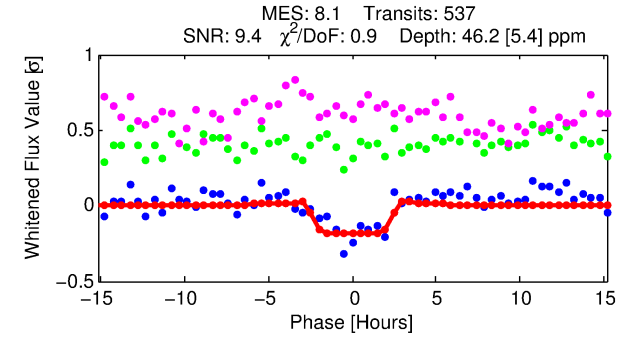
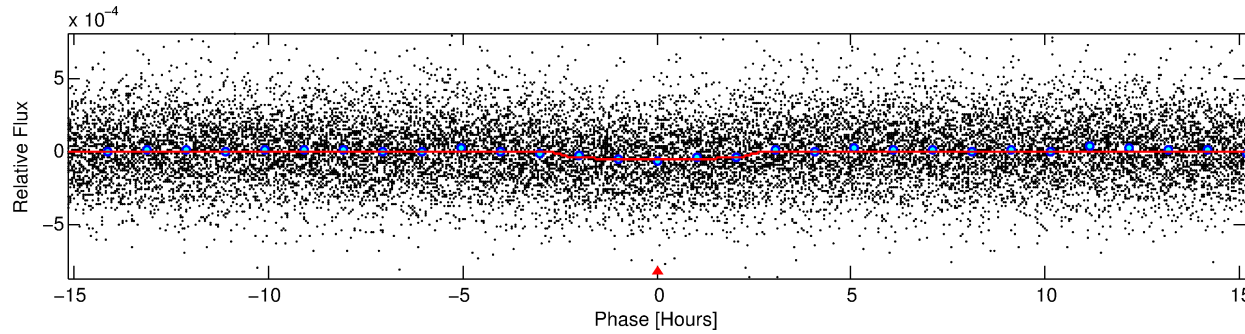
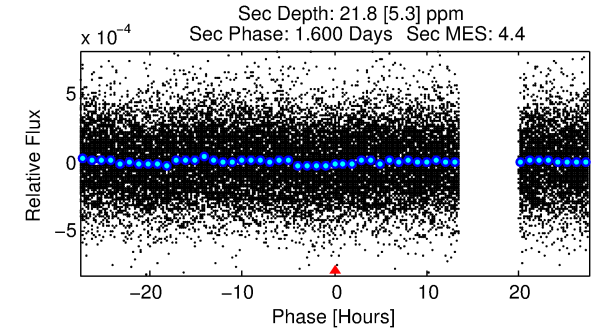
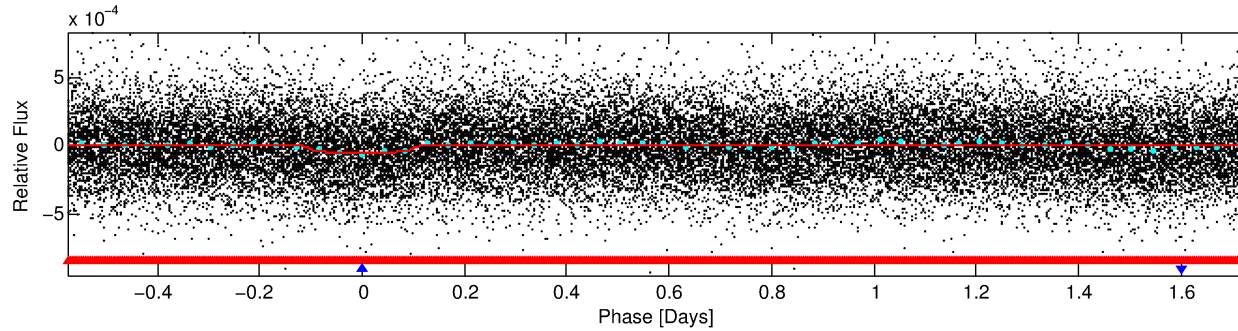
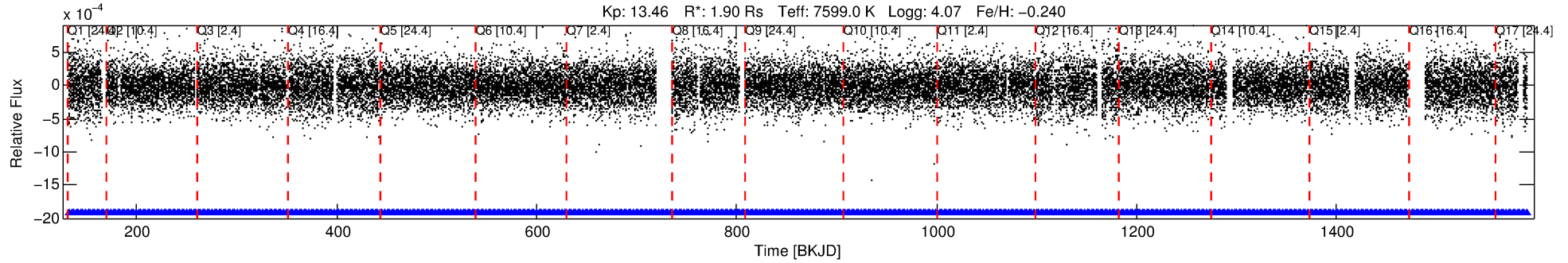
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 008330910-02

No Significant Match Found

DV One-Page Summary

KIC: 8330910 Candidate: 2 of 2 Period: 2.302 d



DV Fit Results:

Period = 2.30200 [0.00002] d
Epoch = 132.9498 [0.0059] BKJD
Rp/R* = 0.0072 [0.0028]
a/R* = 1.92 [3.19]
b = 0.88 [0.57]
Seff = 6873.17 [2628.18]
Teq = 2322 [222] K
Rp = 1.49 [0.71] Re
a = 0.0395 [0.0094] AU
Ag = 8.48 [7.47] [1.00σ]
Teffp = 6125 [1269] K [2.95σ]

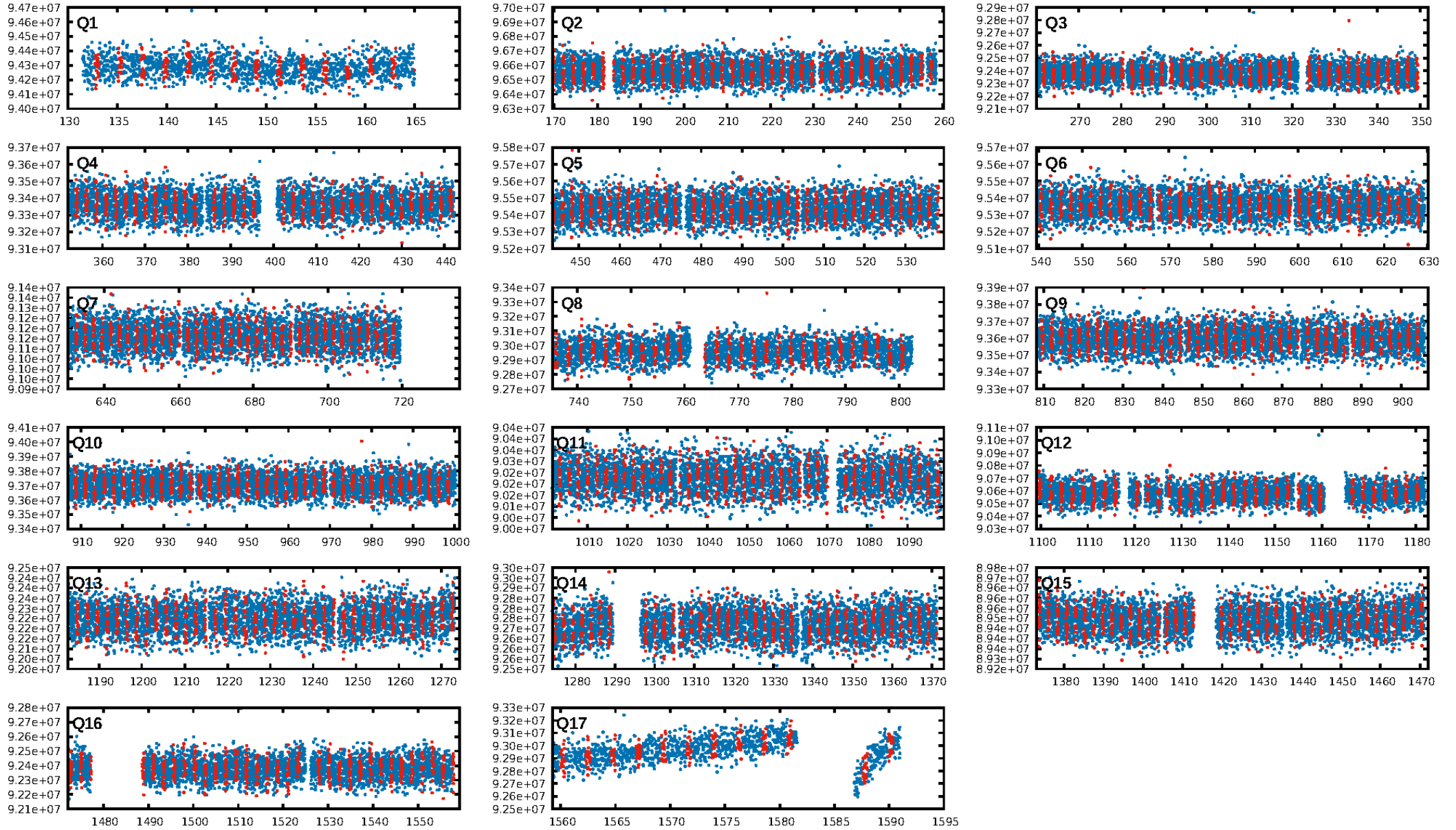
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [7.80σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.68e-14
RollingBand-fgt: 1.00 [515/515]
GhostDiagnostic-chr: -3.075
Centroid-sig: 47.1%
Centroid-so: 0.860 arcsec [0.49σ]
OotOffset-rm: 8.286 arcsec [6.30σ]
KicOffset-rm: 8.577 arcsec [6.10σ]
OotOffset-st: 4/2/3/3 [12]
KicOffset-st: 4/2/3/3 [12]
DiffImageQuality-fgm: 0.25 [3/12]
DiffImageOverlap-fno: 0.00 [0/17]

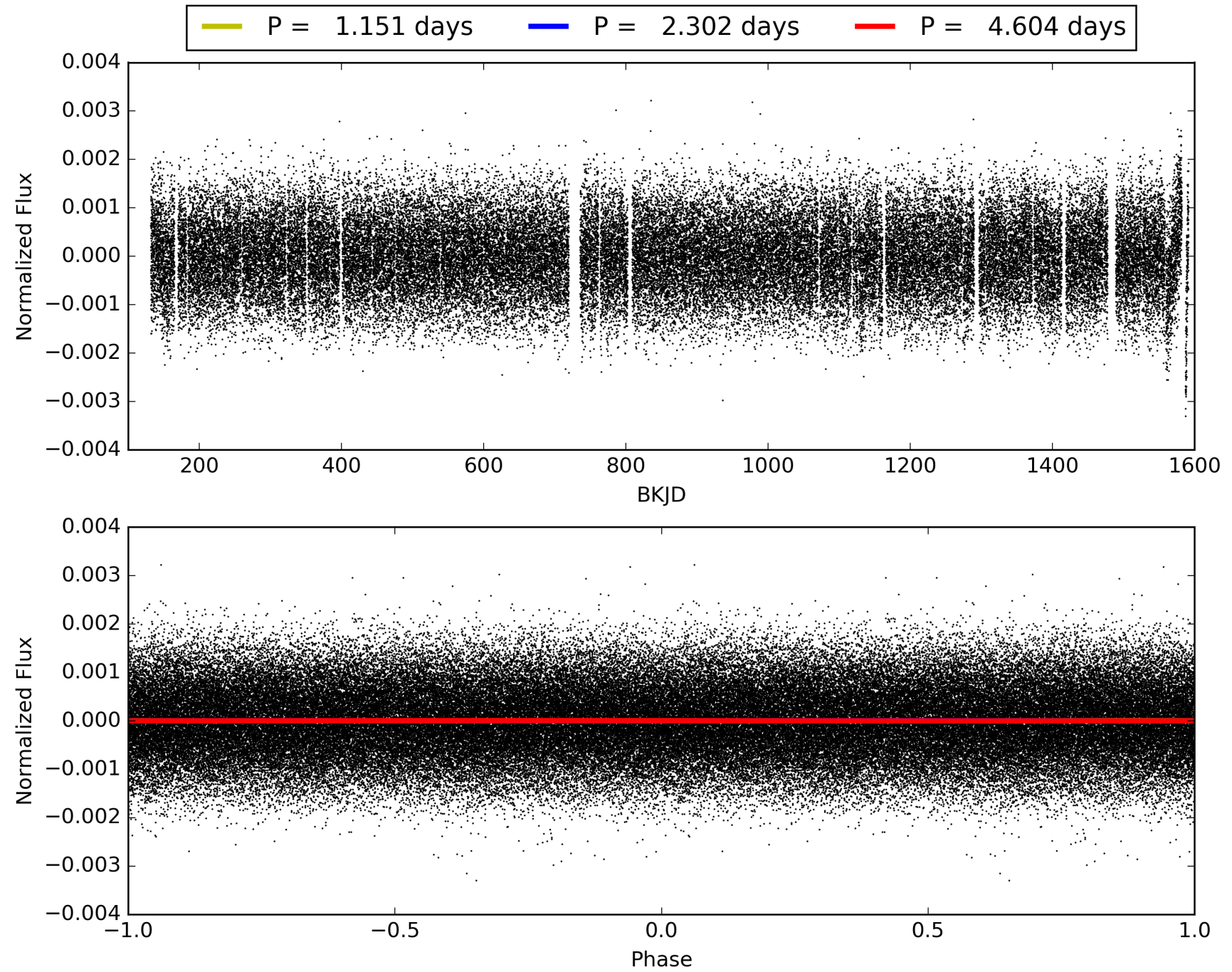
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 13:39:55 Z

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

TCE 008330910-02, PDC Light Curves

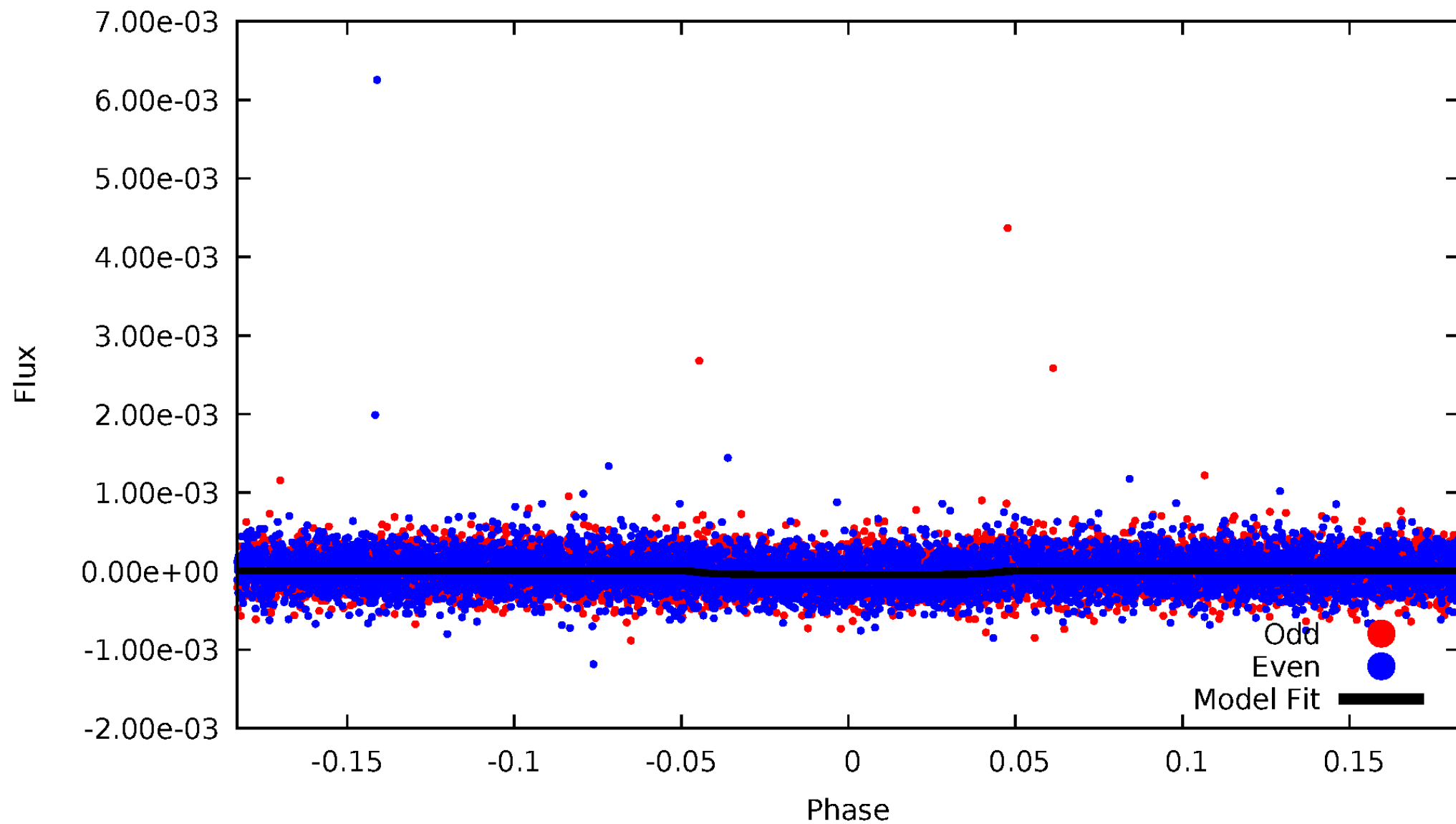


TCE 008330910-02



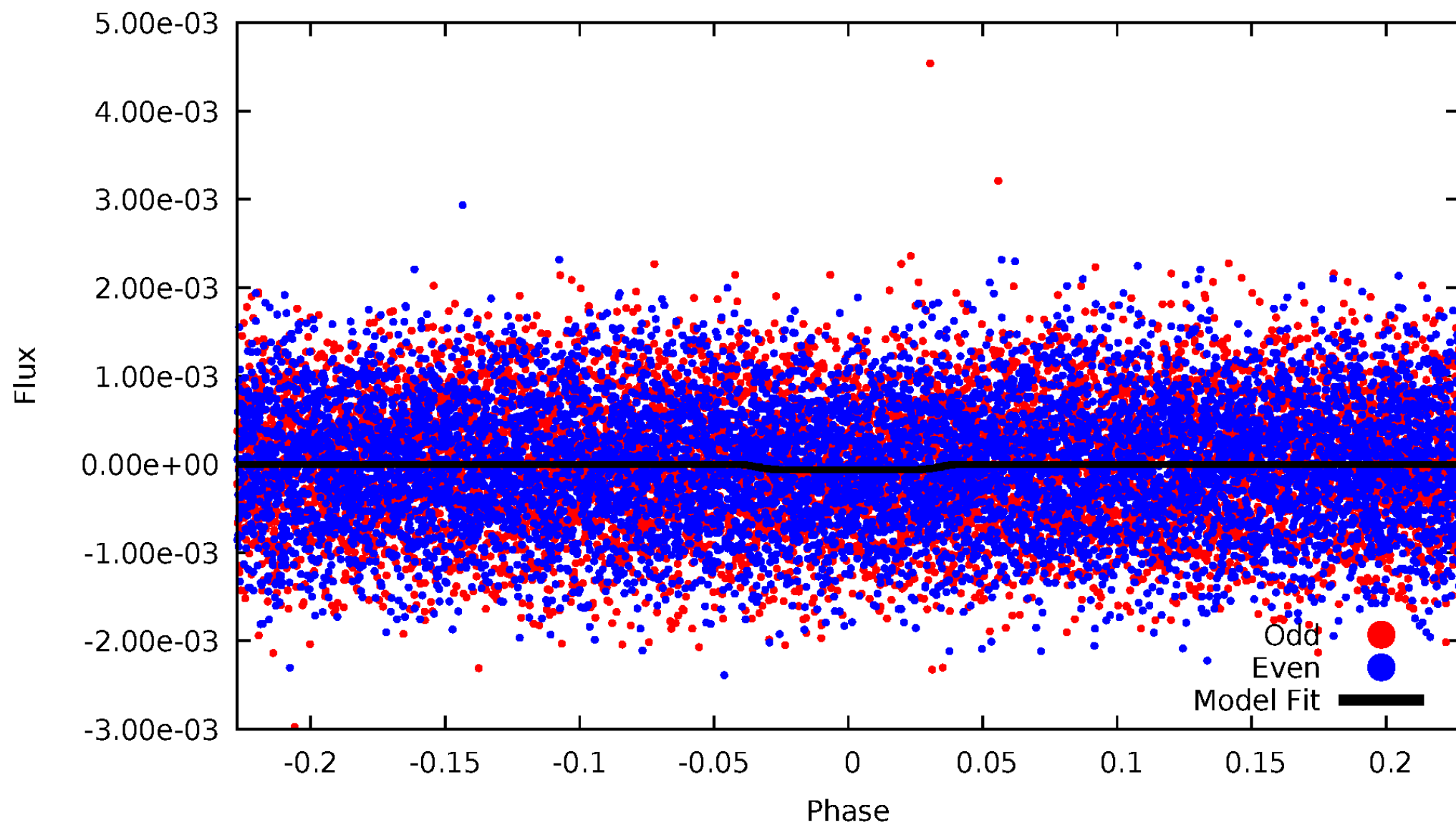
DV Odd/Even

TCE 008330910-02



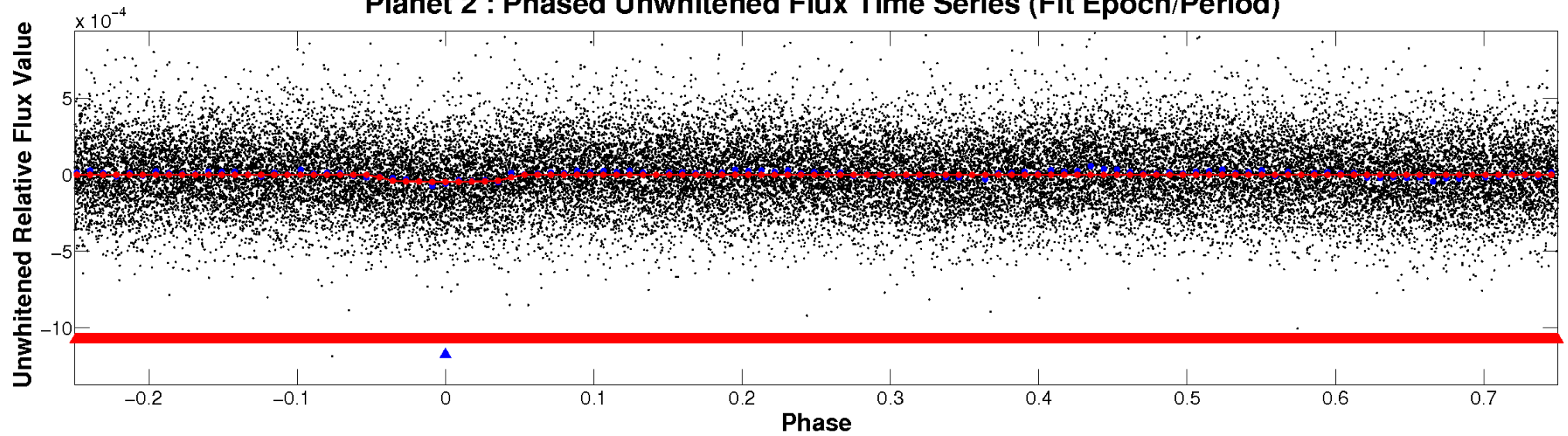
ALT Odd/Even

TCE 008330910-02

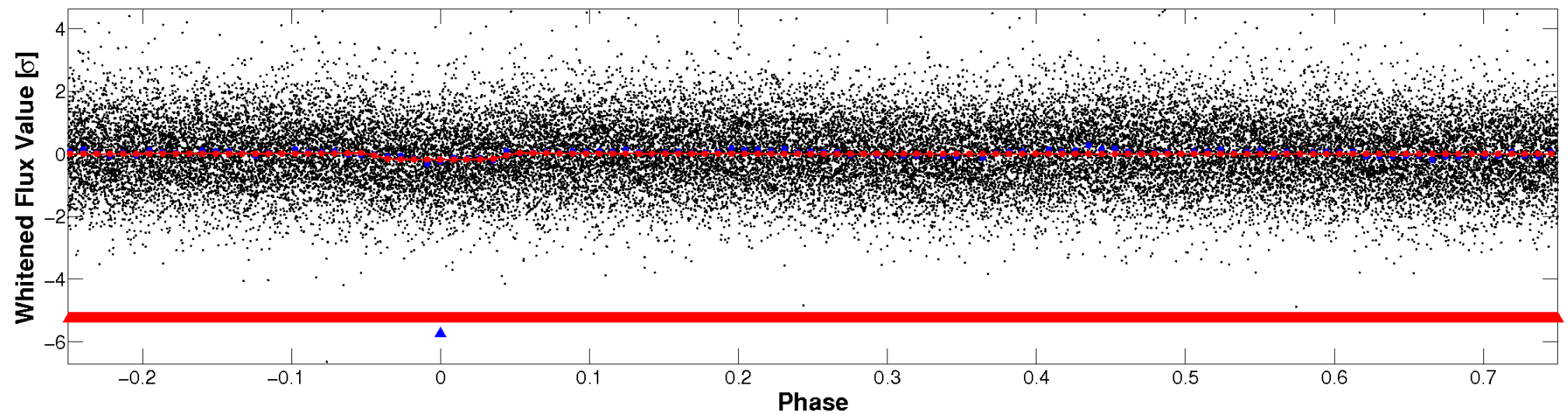


Non-Whitened Vs. Whitened Light Curve

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

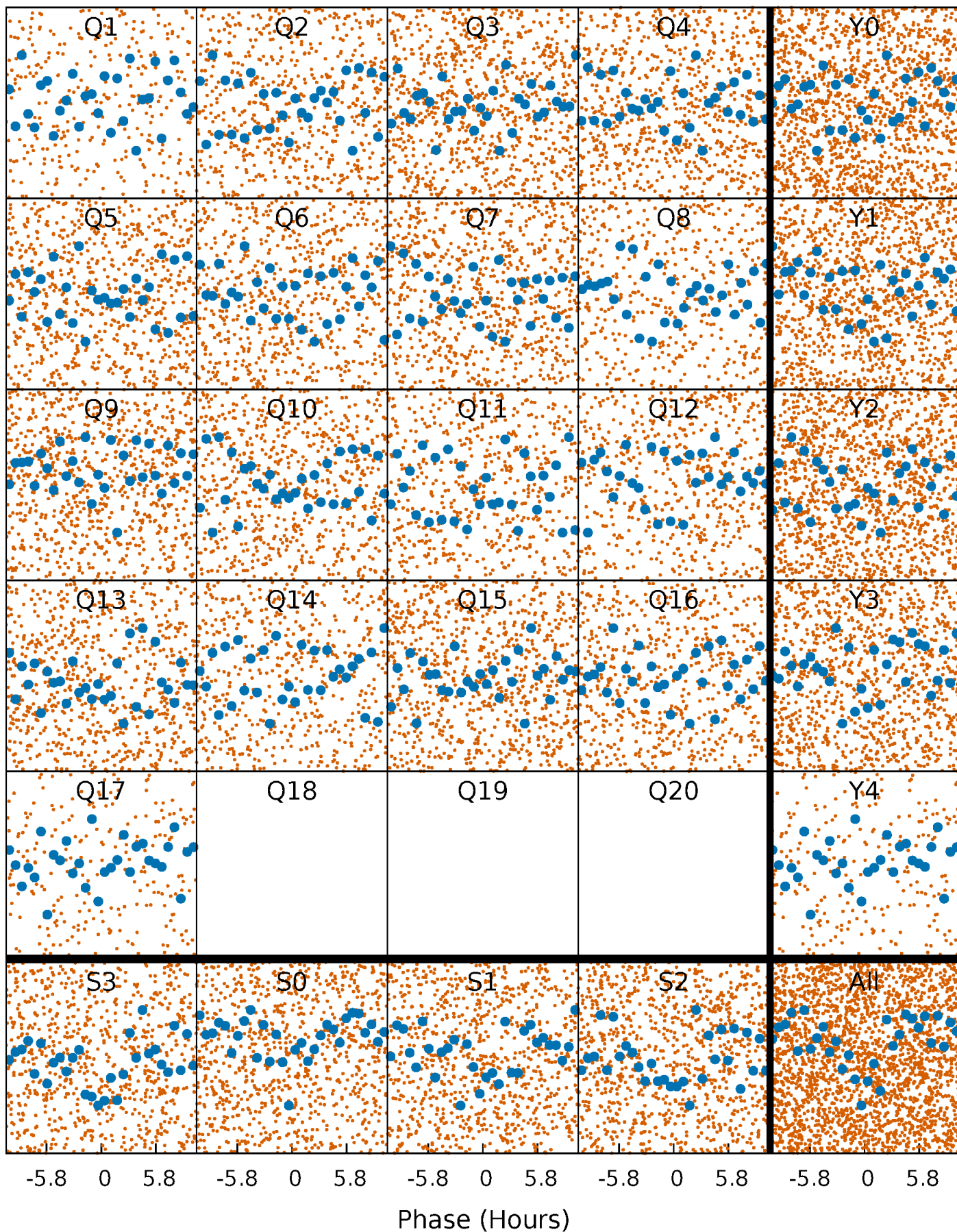


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



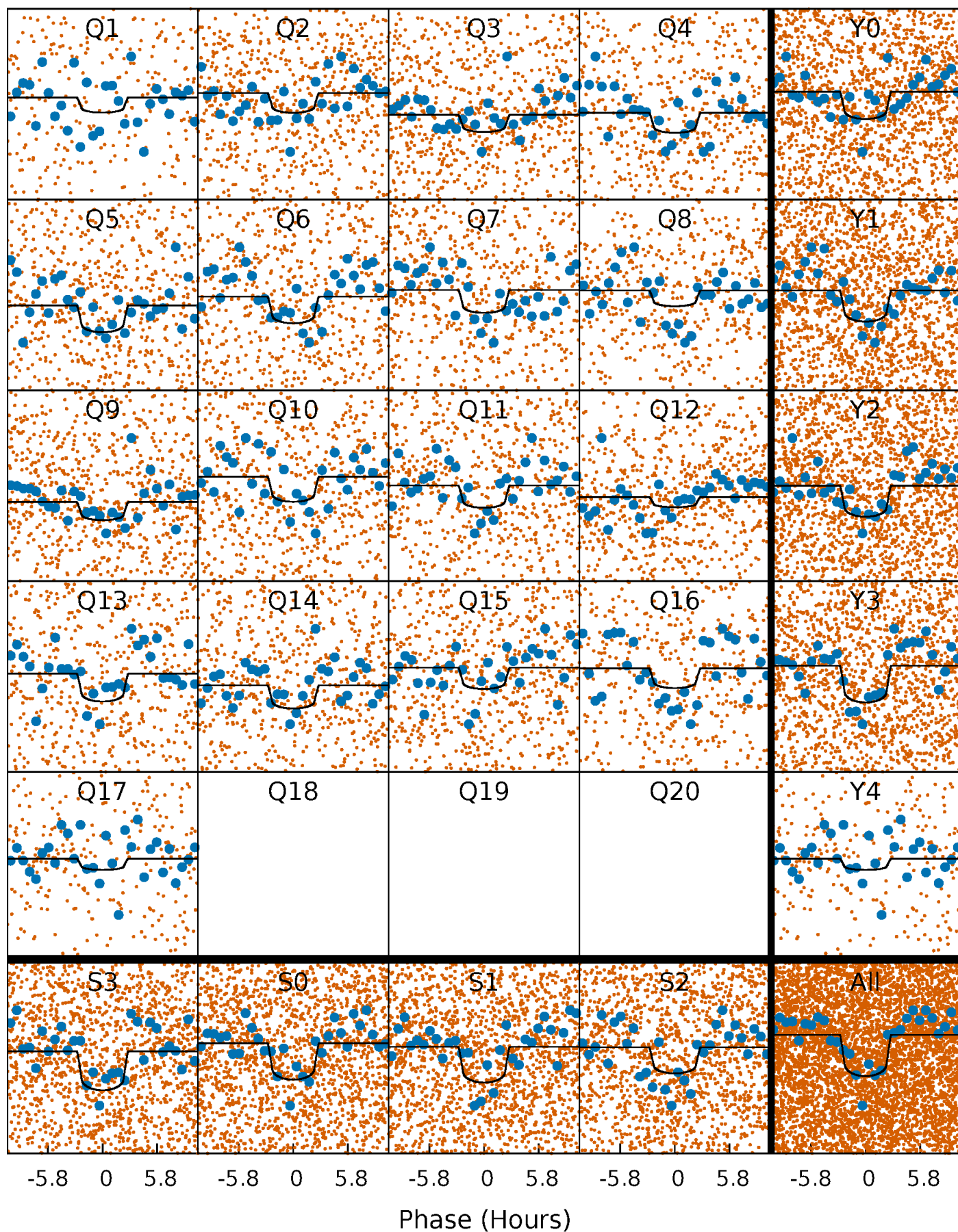
PDC Quarter-Phased Transit Curves

TCE 008330910-02 P= 2.302004 Days $T_0=132.949816$ (BKJD)



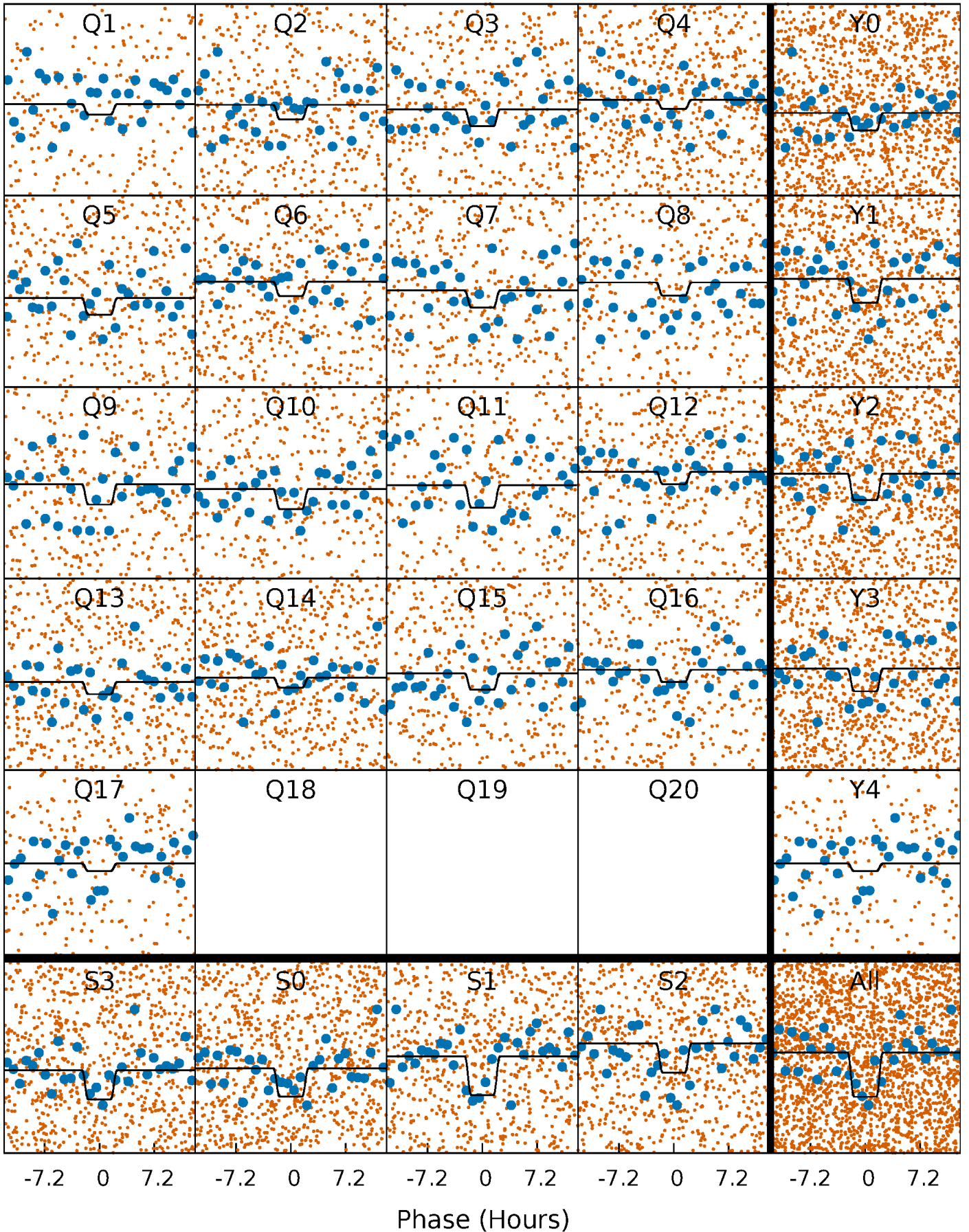
DV Quarter-Phased Transit Curves

TCE 008330910-02 P= 2.302004 Days $T_0=132.949816$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

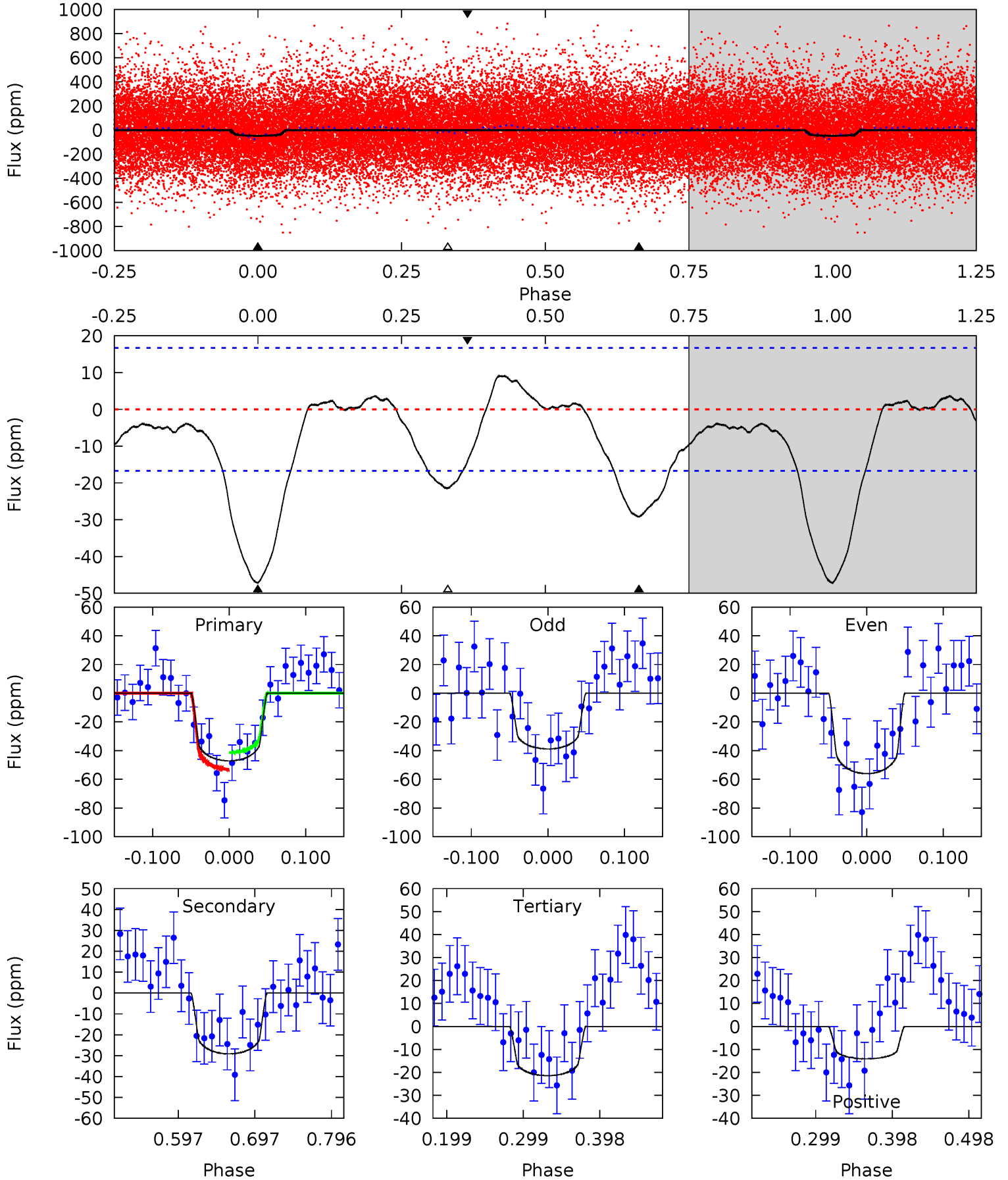
TCE 008330910-02 P= 2.301882 Days $T_0=133.000059$ (BKJD)



DV Model-Shift Uniqueness Test

008330910-02, P = 2.302004 Days, E = 130.647812 Days

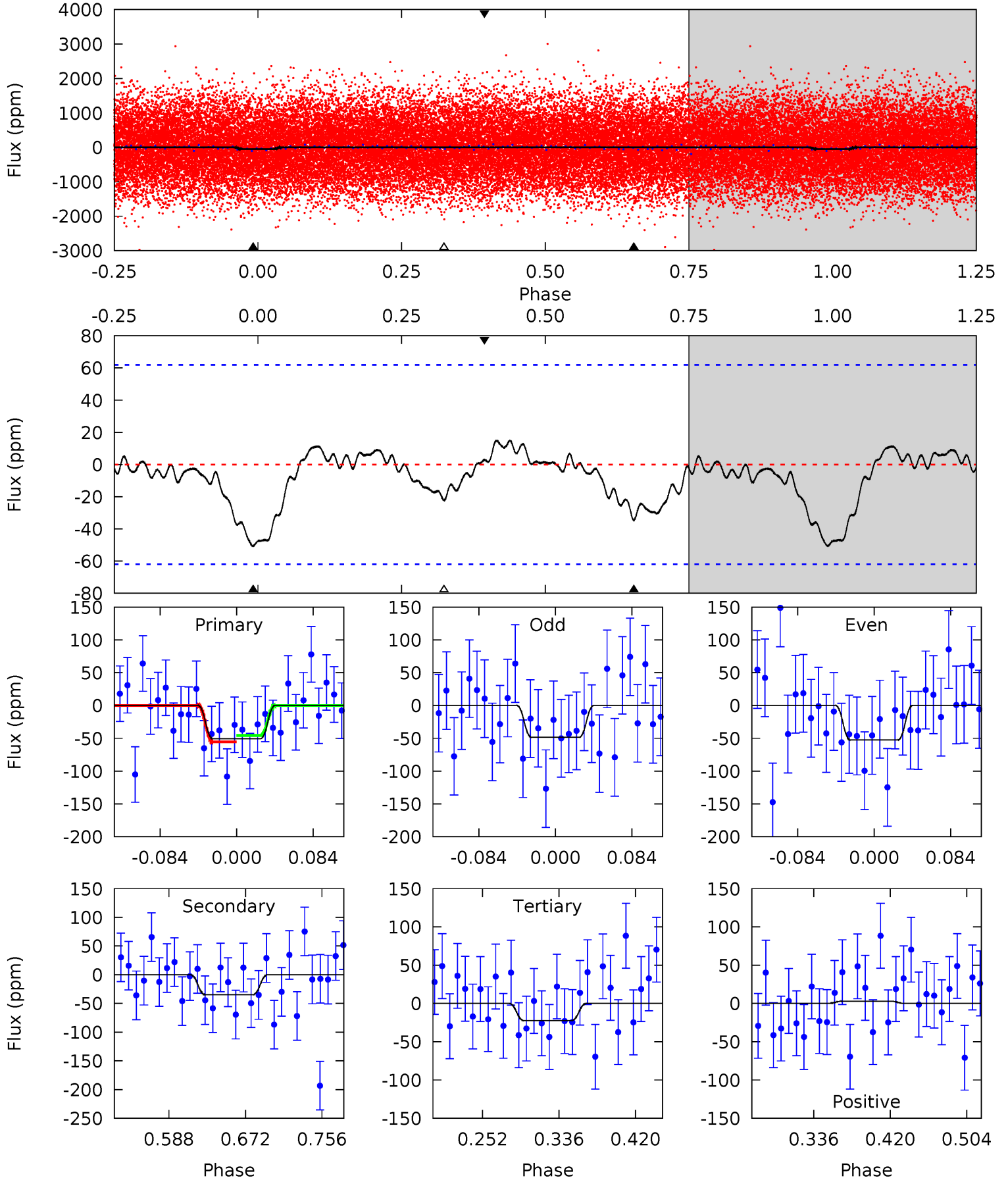
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 12.9 | 7.95 | 5.85 | -3.85 | 4.57 | 1.65 | 2.07 | 7.03 | 16.7 | 2.10 | 11.8 | 2.35 | 0.91 | 0.16 | 1.59 |



Alt Model-Shift Uniqueness Test

008330910-02, P = 2.301882 Days, E = 130.698177 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 3.76 | 2.58 | 1.66 | 0.22 | 4.60 | 1.73 | 0.58 | 2.10 | 3.53 | 0.91 | 2.35 | 0.15 | 0.82 | 0.23 | 0.37 |



Stellar Parameters For KIC 008330910

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 7599^{+237}_{-316} | $4.074^{+0.187}_{-0.153}$ | $-0.240^{+0.250}_{-0.350}$ | $1.897^{+0.541}_{-0.443}$ | $1.554^{+0.210}_{-0.233}$ | $0.321^{+0.339}_{-0.143}$ |
| | +3%/-4% | +5%/-4% | +104%/-146% | +29%/-23% | +14%/-15% | +106%/-45% |
| 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 008330910-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|------------------------|------------------|
| DV | -29 ± 4 | $1.45^{+0.65}_{-0.57}$ | 3226^{+239}_{-247} | 6423^{+2083}_{-1000} | 11^{+21}_{-6} |
| Alt. | -35 ± 13 | $1.55^{+0.65}_{-0.57}$ | 3220^{+253}_{-233} | 6487^{+2031}_{-1243} | 12^{+19}_{-7} |

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

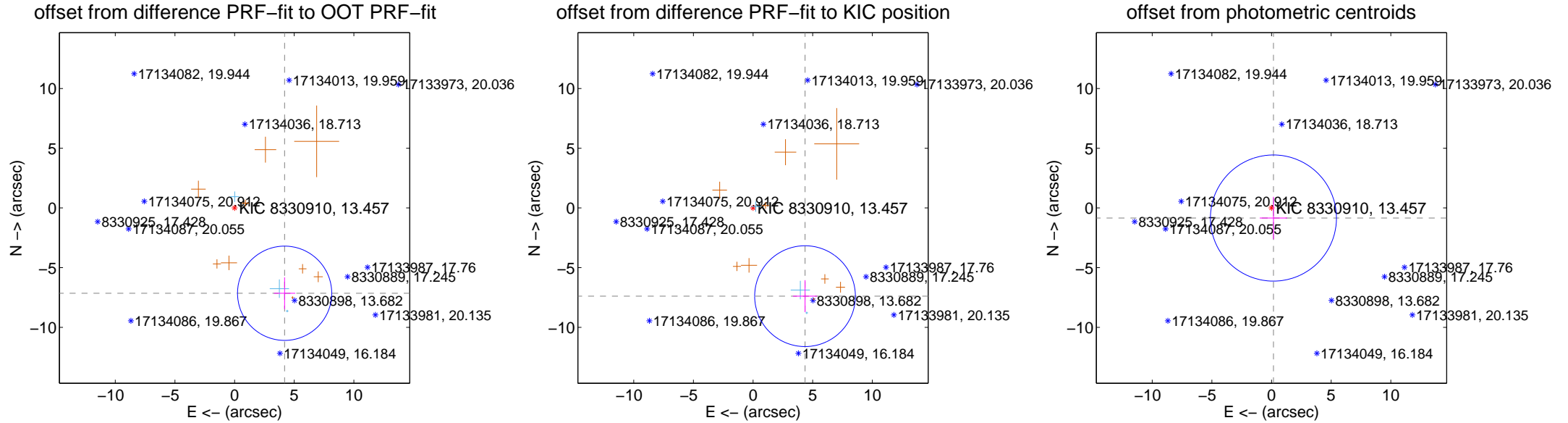
DV Centroid Data

Supplemental centroid analysis for 008330910-02. Kepler magnitude: 13.46. Transit SNR 9.44

There are 3 quarters with good PRF difference image offsets

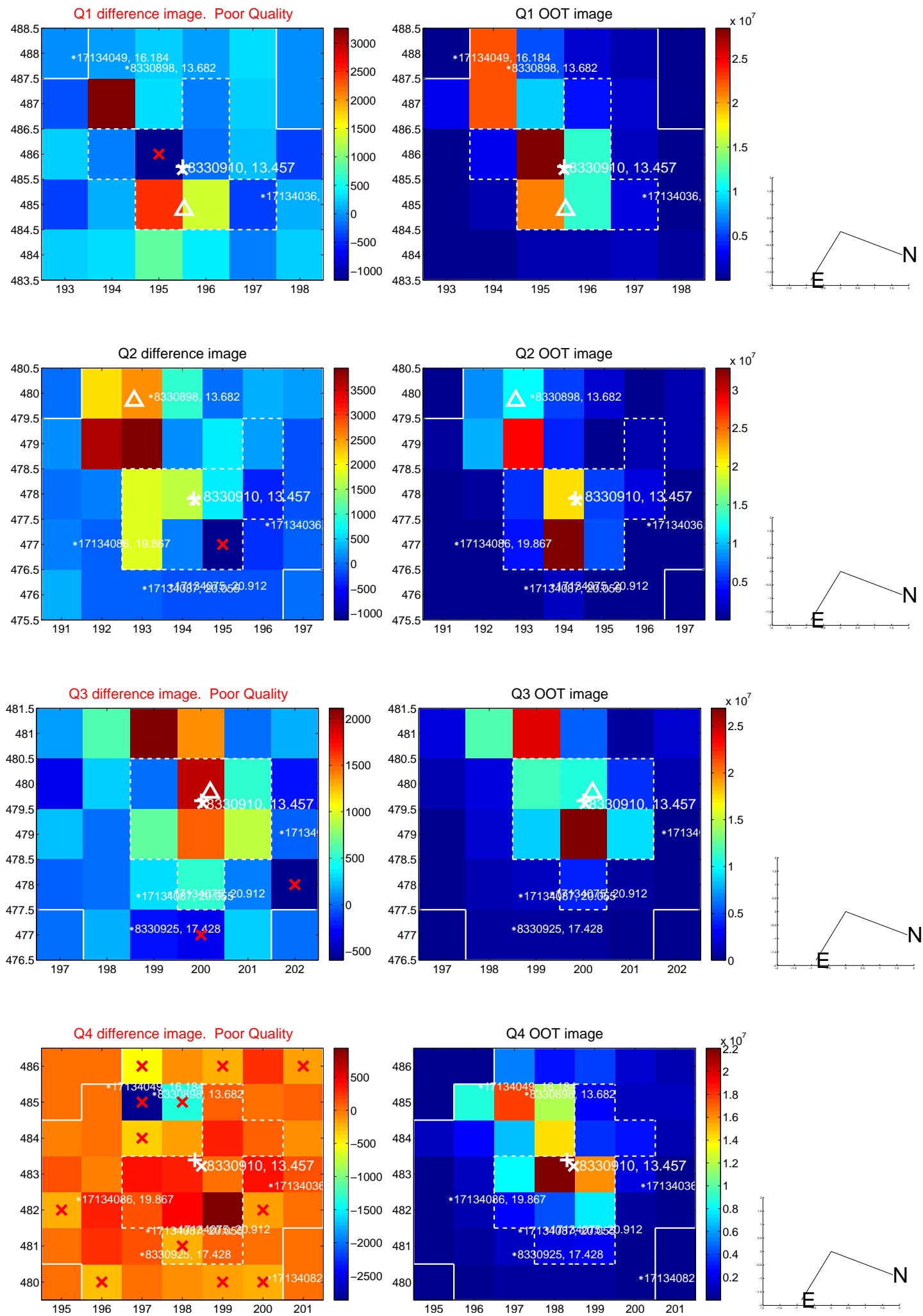
The direct PRF centroid is offset from the target star catalog position by about 0.26 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 8.286 ± 1.316 | 6.30 | -4.196 ± 0.896 | -7.145 ± 1.331 |
| PRF-fit source offset from KIC position | 8.577 ± 1.407 | 6.10 | -4.358 ± 1.014 | -7.388 ± 1.338 |
| photometric centroid source offset | 0.86 ± 1.76 | 0.49 | -0.16 ± 1.15 | -0.85 ± 1.78 |

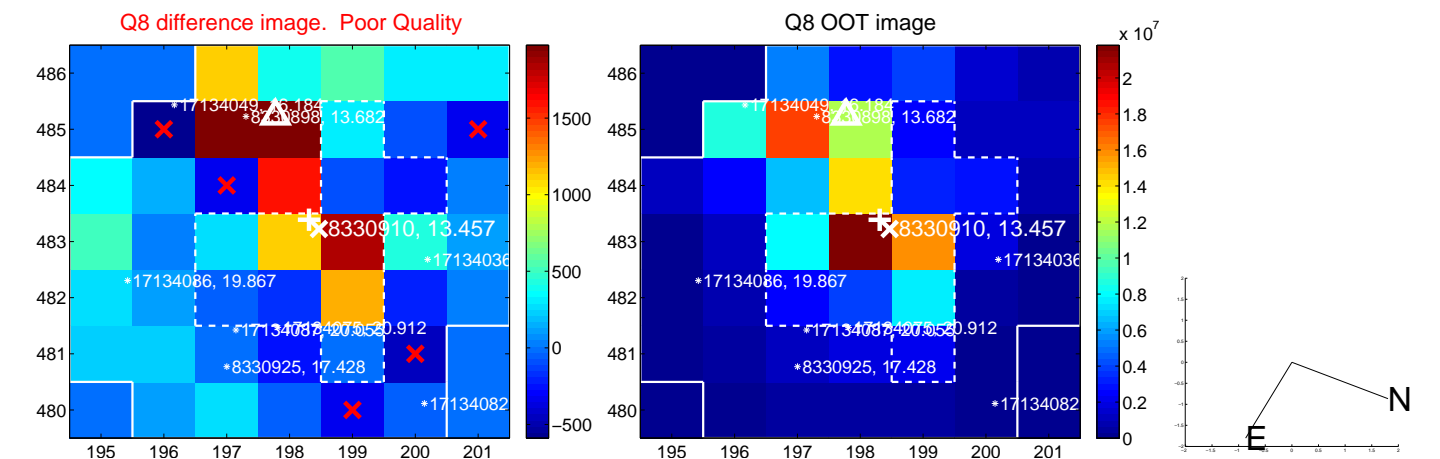
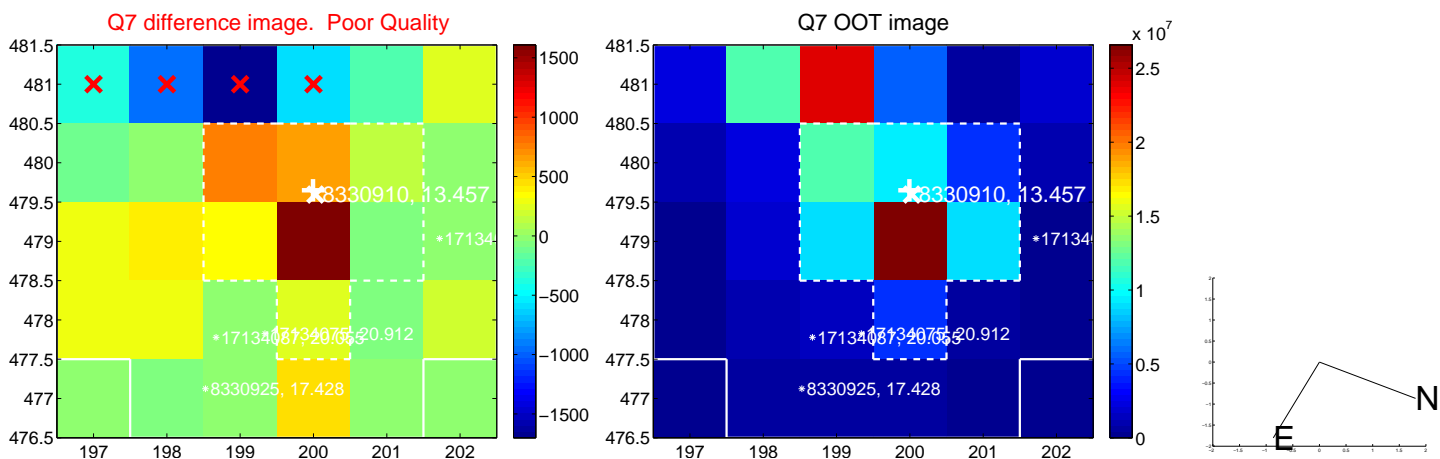
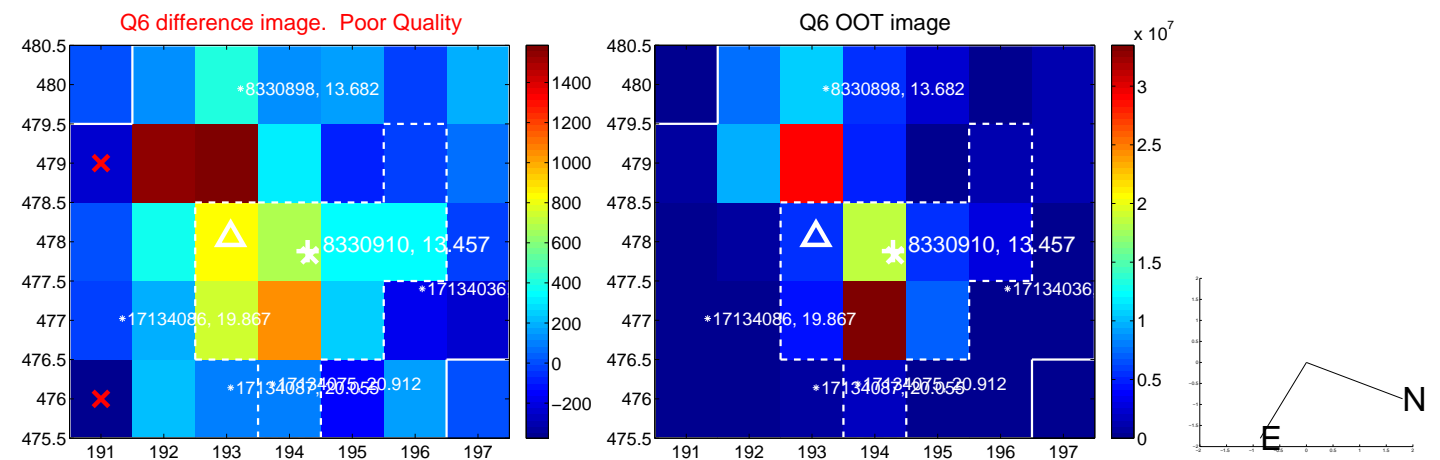
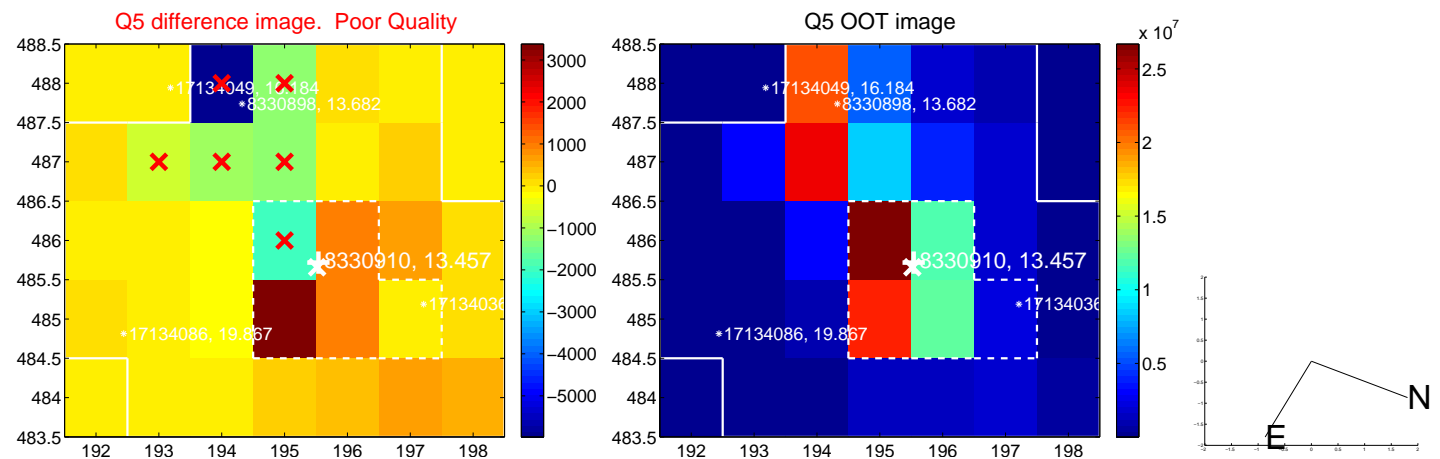


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

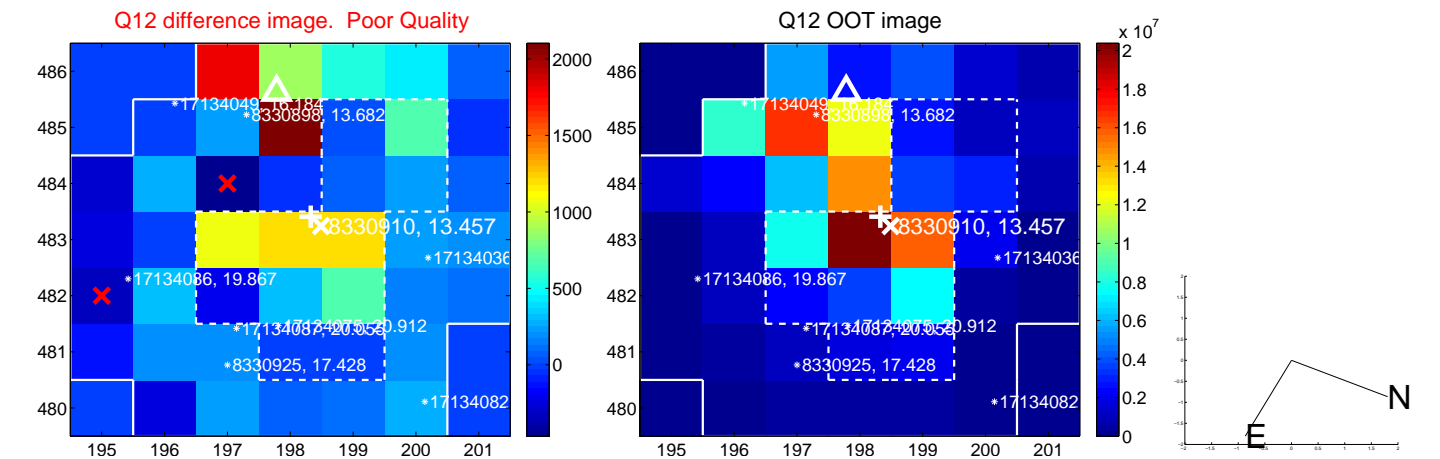
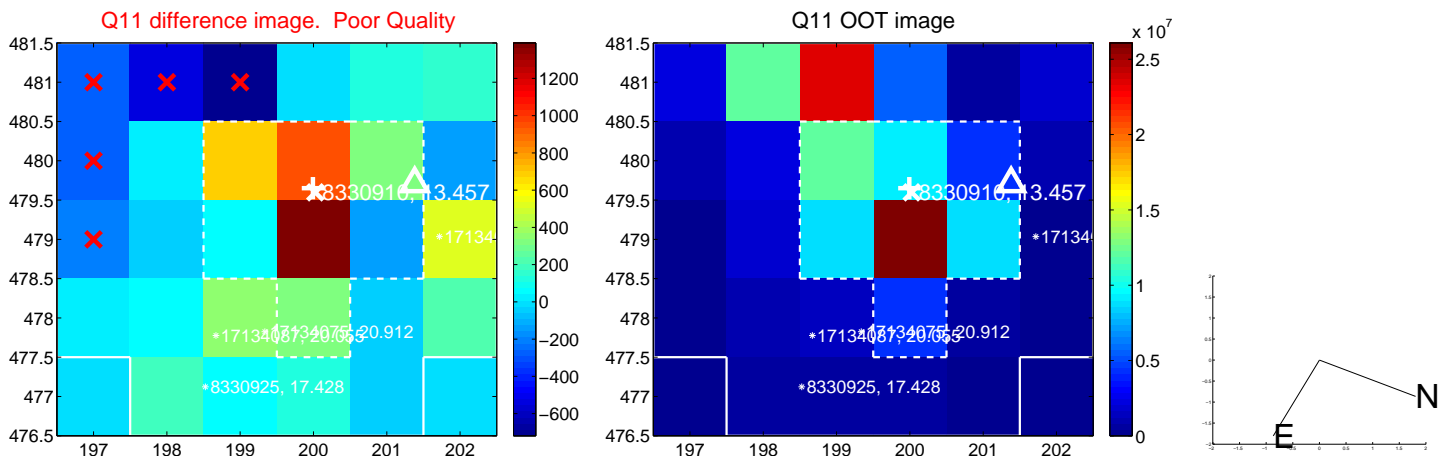
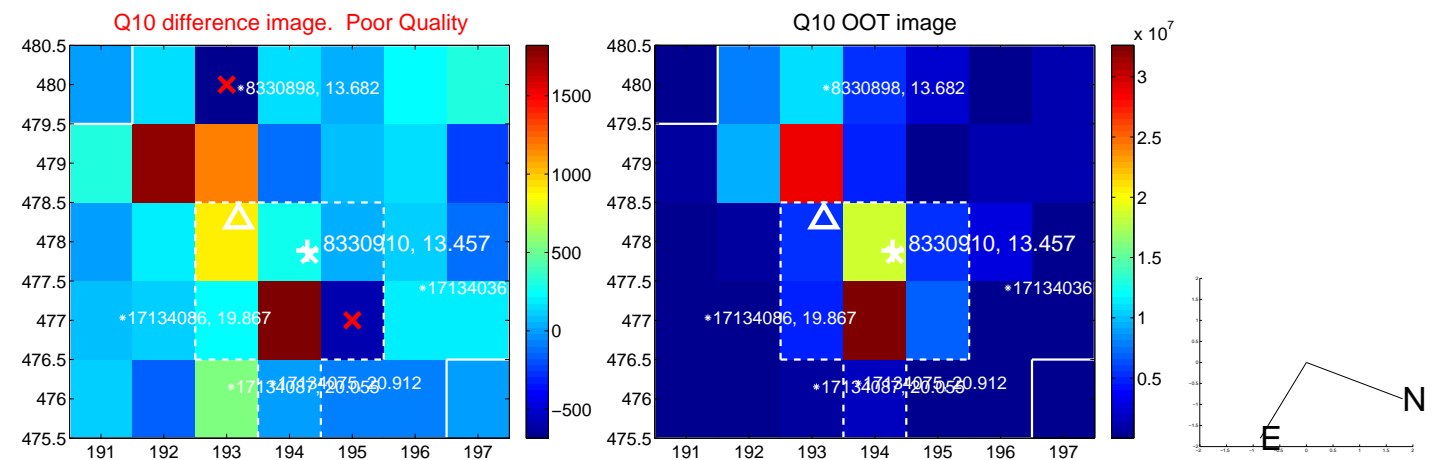
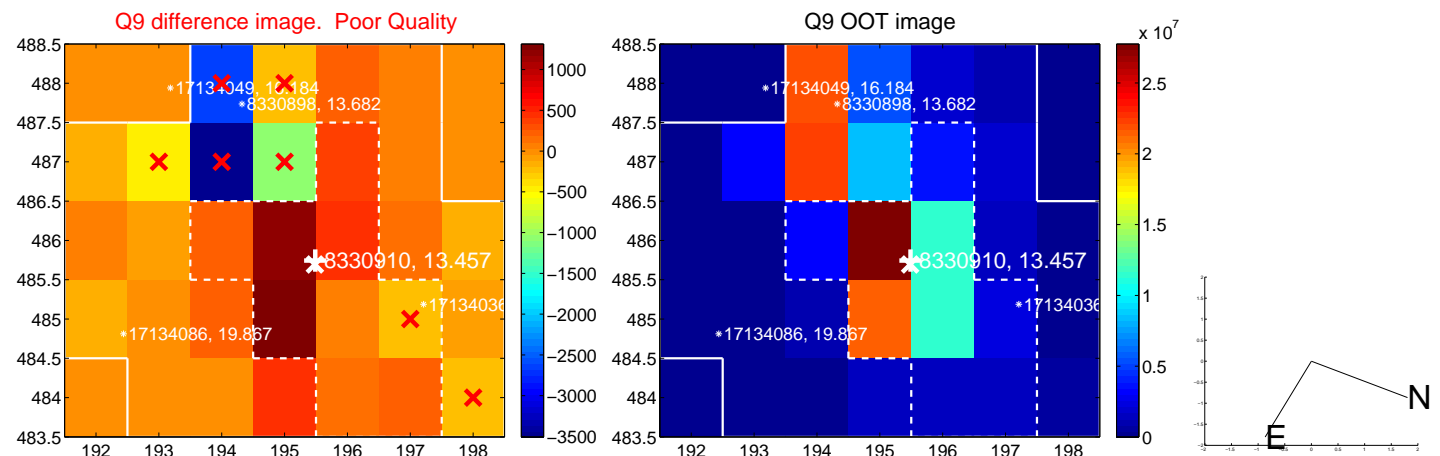
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



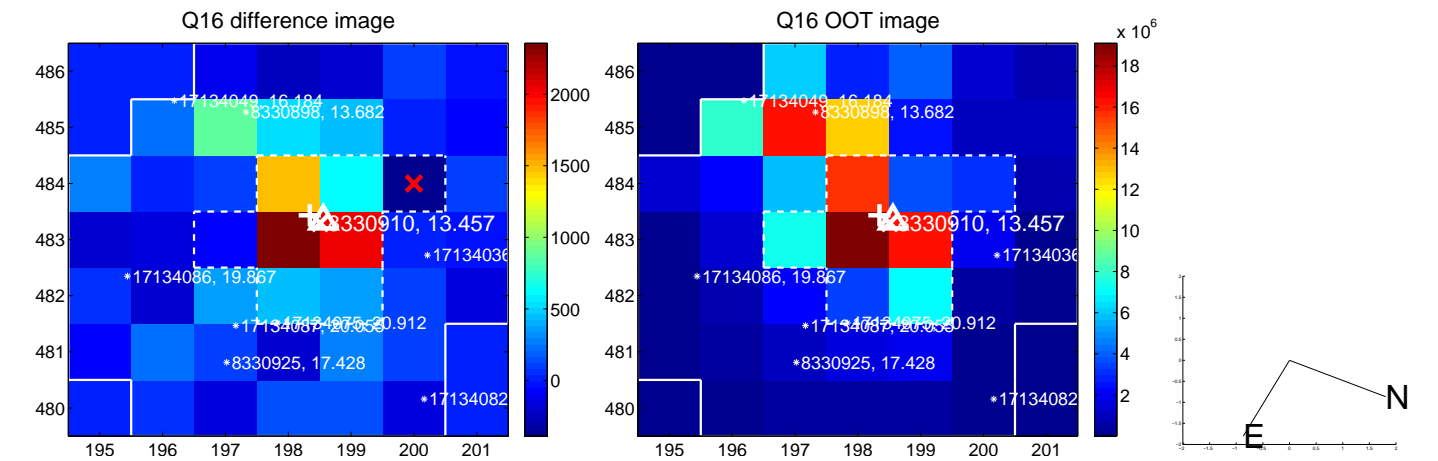
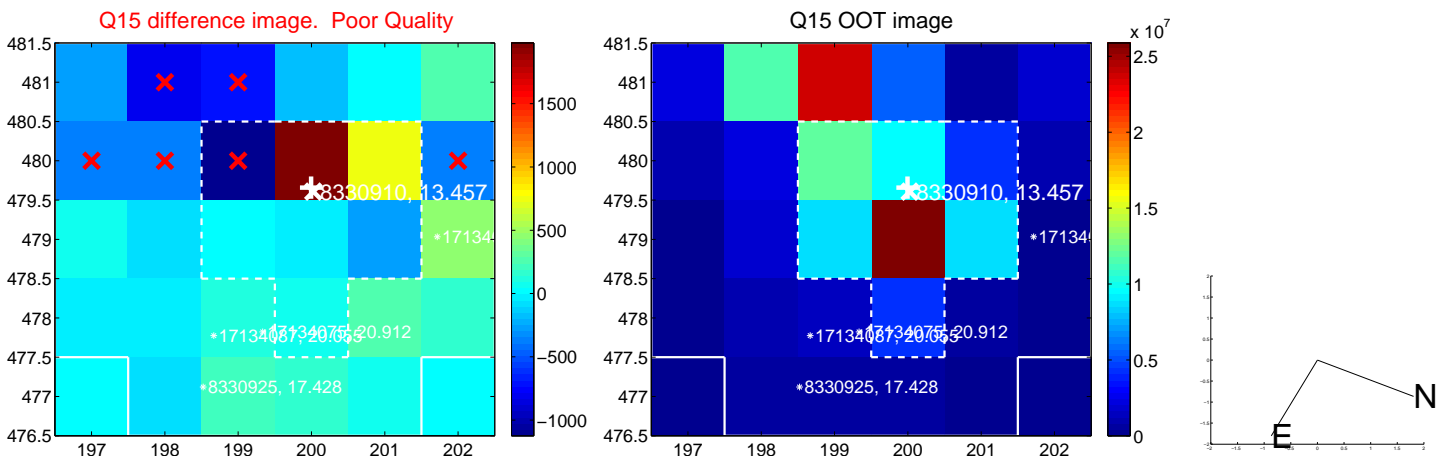
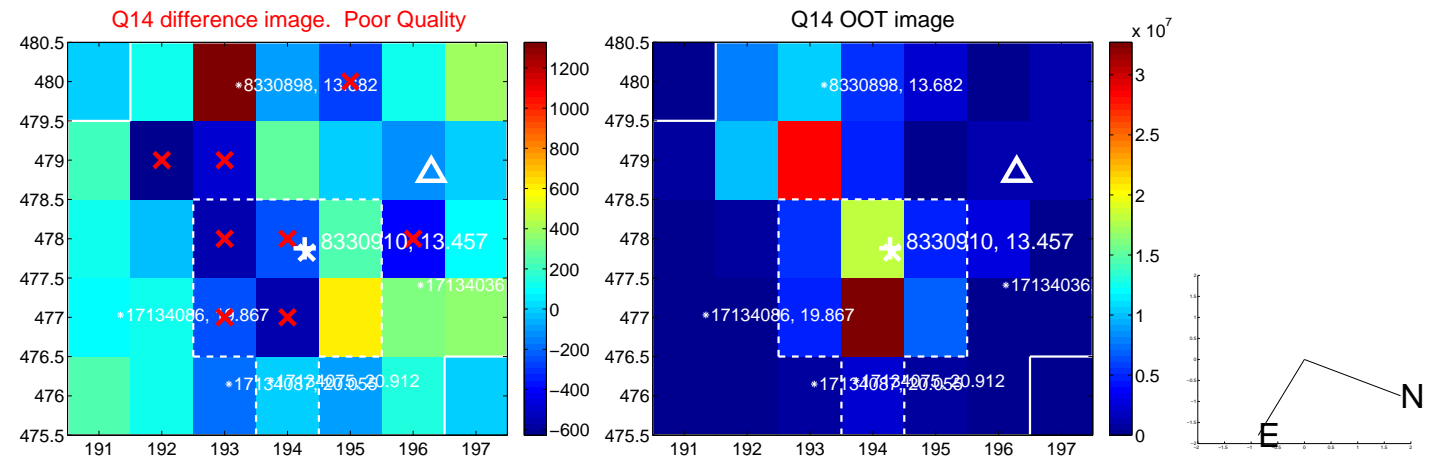
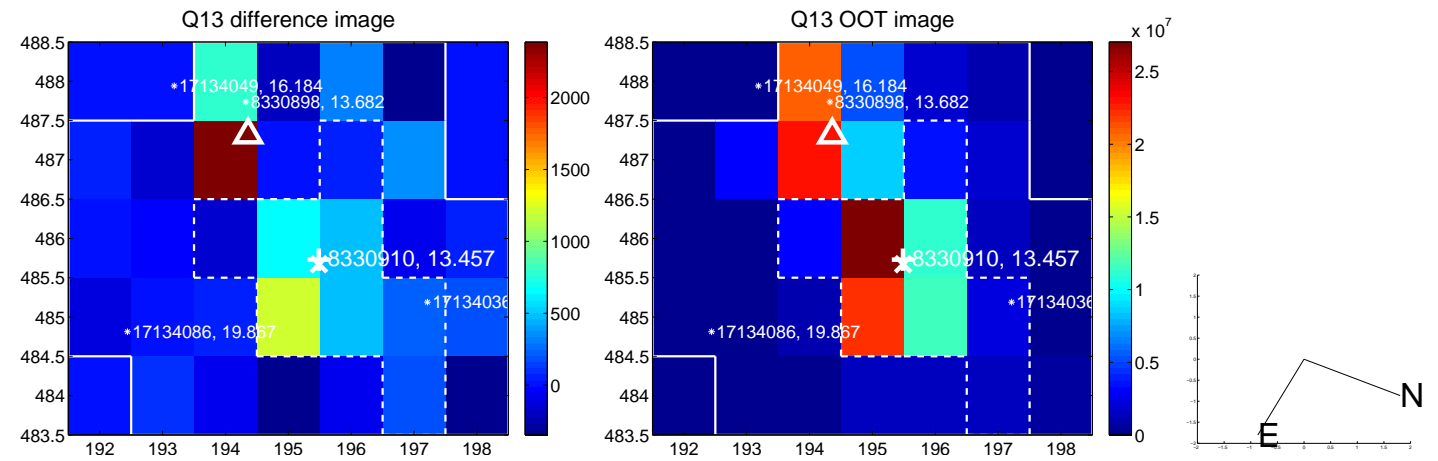
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



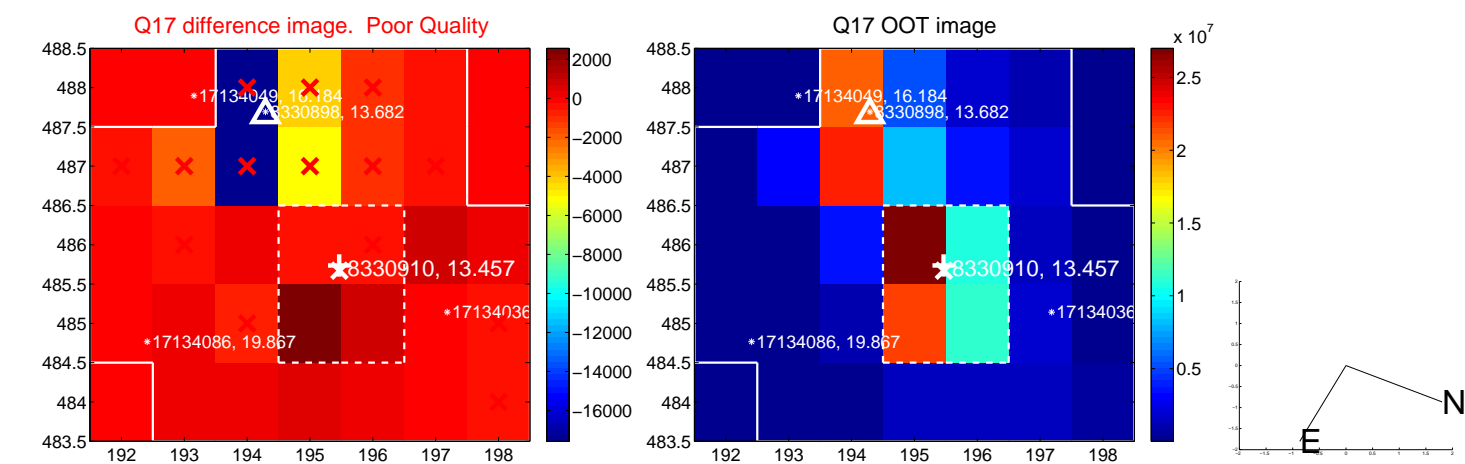
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



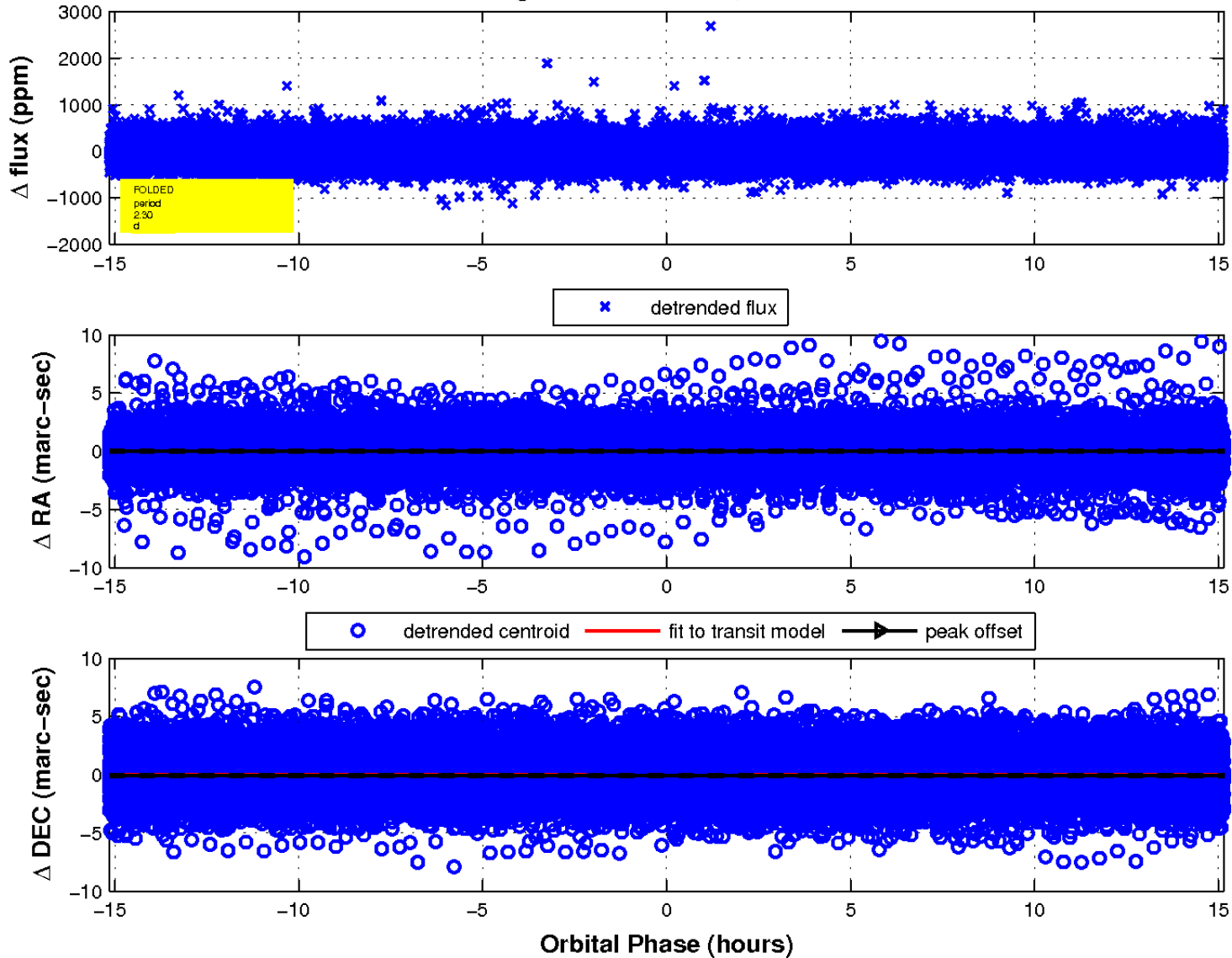
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

