

KIC 003234598

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 003234598-01 | OBS | 2413.01 | 12.904721 | 144.318302 | 400.7 | 3.410 | 16.9 | 18.2 | 0.72 | 4513 | 1.71 | 20.93 |
| 003234598-02 | OBS | 2413.02 | 31.201249 | 140.067638 | 348.7 | 4.154 | 11.0 | 11.5 | 0.72 | 4513 | 1.58 | 6.45 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 003234598-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 003234598-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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.

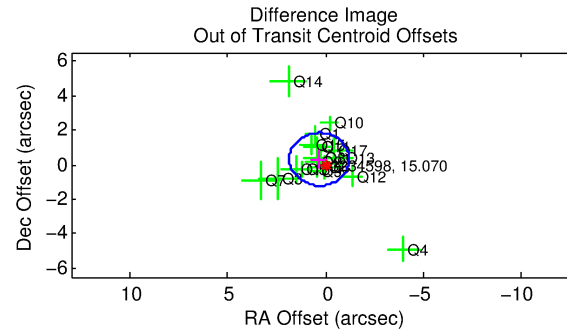
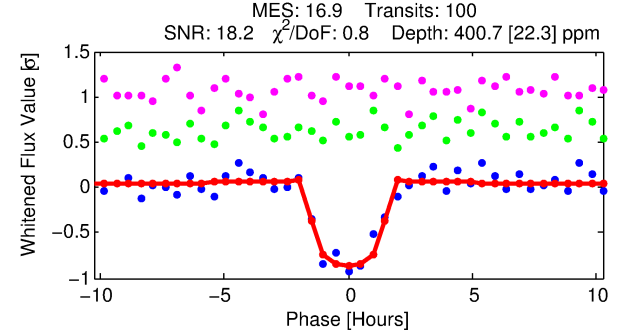
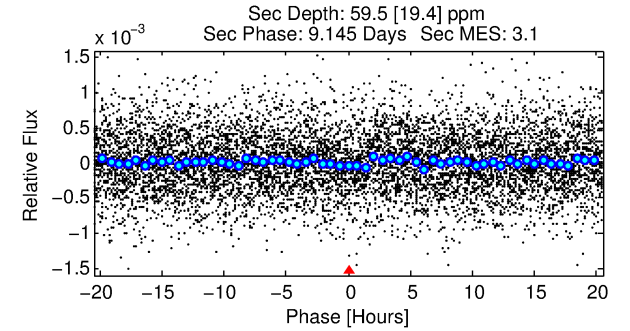
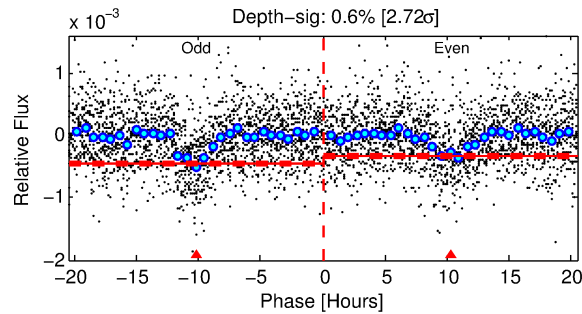
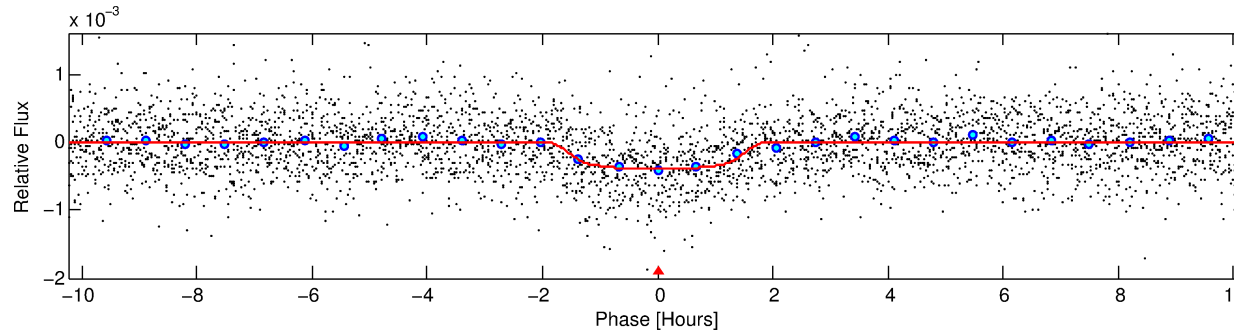
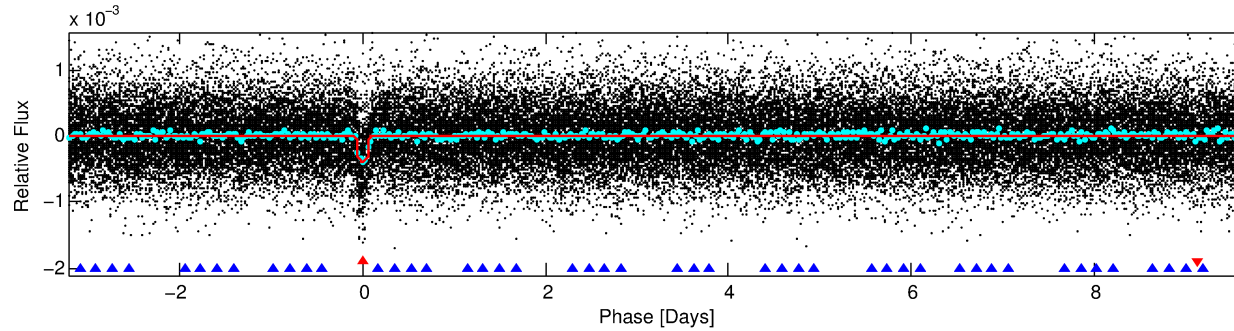
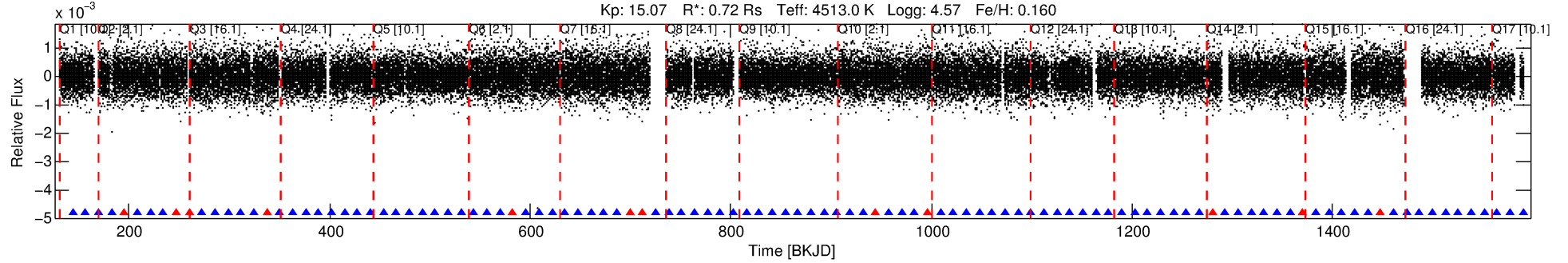
Ephemeris Match Information For 003234598-01

No Significant Match Found

DV One-Page Summary

KIC: 3234598 Candidate: 1 of 2 Period: 12.905 d
KOI: K02413.01 Name: Kepler-383b Corr: 0.979

Kp: 15.07 R*: 0.72 Rs Teff: 4513.0 K Logg: 4.57 Fe/H: 0.160



DV Fit Results:

Period = 12.90472 [0.00006] d
Epoch = 144.3183 [0.0039] BKJD
Rp/R* = 0.0217 [0.0082]
a/R* = 15.95 [20.47]
b = 0.86 [0.40]
Seff = 20.93 [2.26]
Teq = 545 [15] K
Rp = 1.71 [0.65] Re
a = 0.0962 [0.0049] AU
Ag = 103.23 [84.90] [1.20σ]
Teffp = 2688 [552] K [3.88σ]

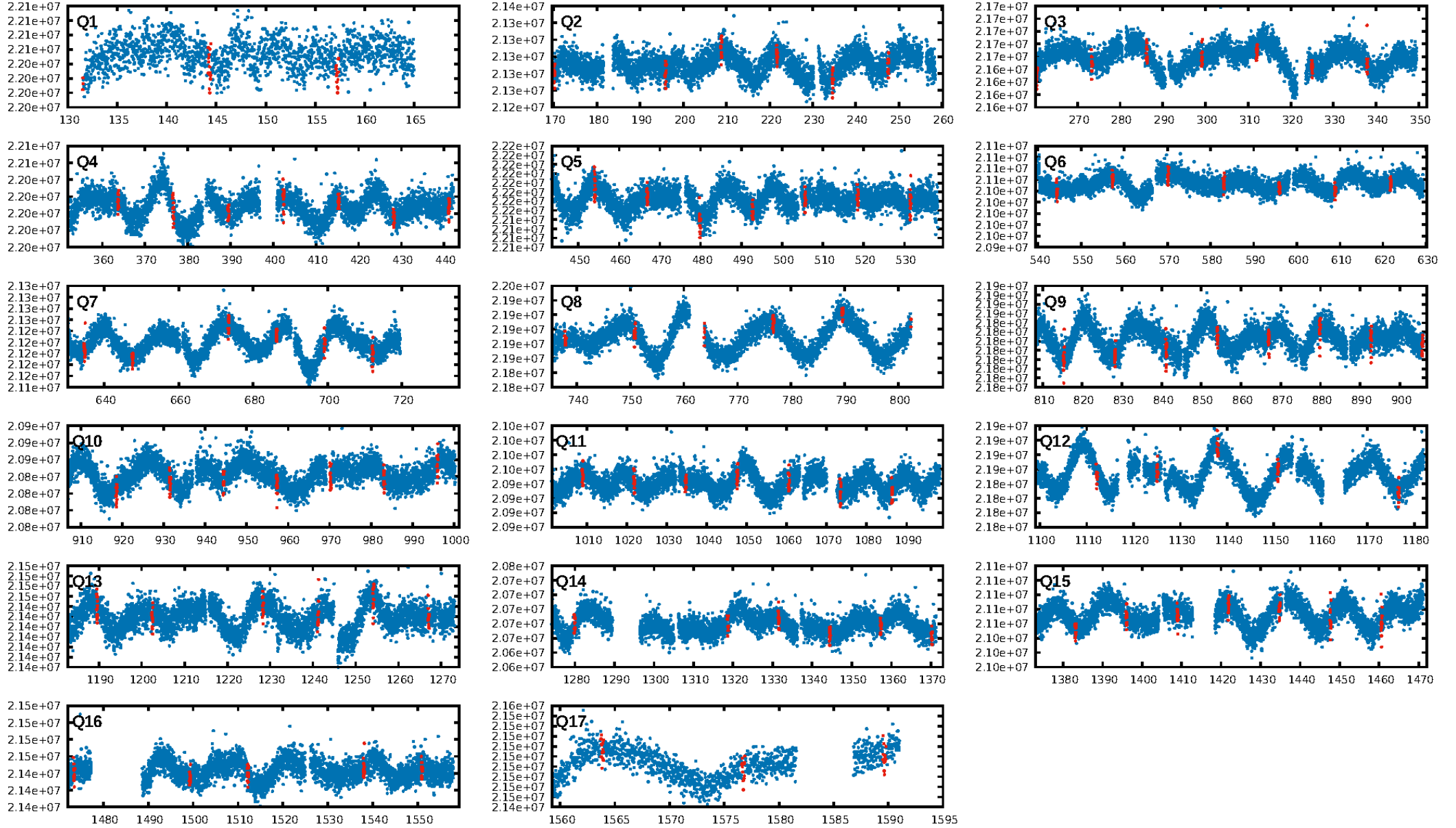
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [81.70σ]
ModelChiSquare2-sig: 100.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.76e-62
RollingBand-fgt: 0.87 [83/95]
GhostDiagnostic-chr: 1.288
Centroid-sig: 0.3%
Centroid-so: 0.900 arcsec [1.68σ]
OotOffset-rm: 0.454 arcsec [0.89σ]
KicOffset-rm: 0.512 arcsec [1.44σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.76 [13/17]
DiffImageOverlap-fno: 1.00 [17/17]

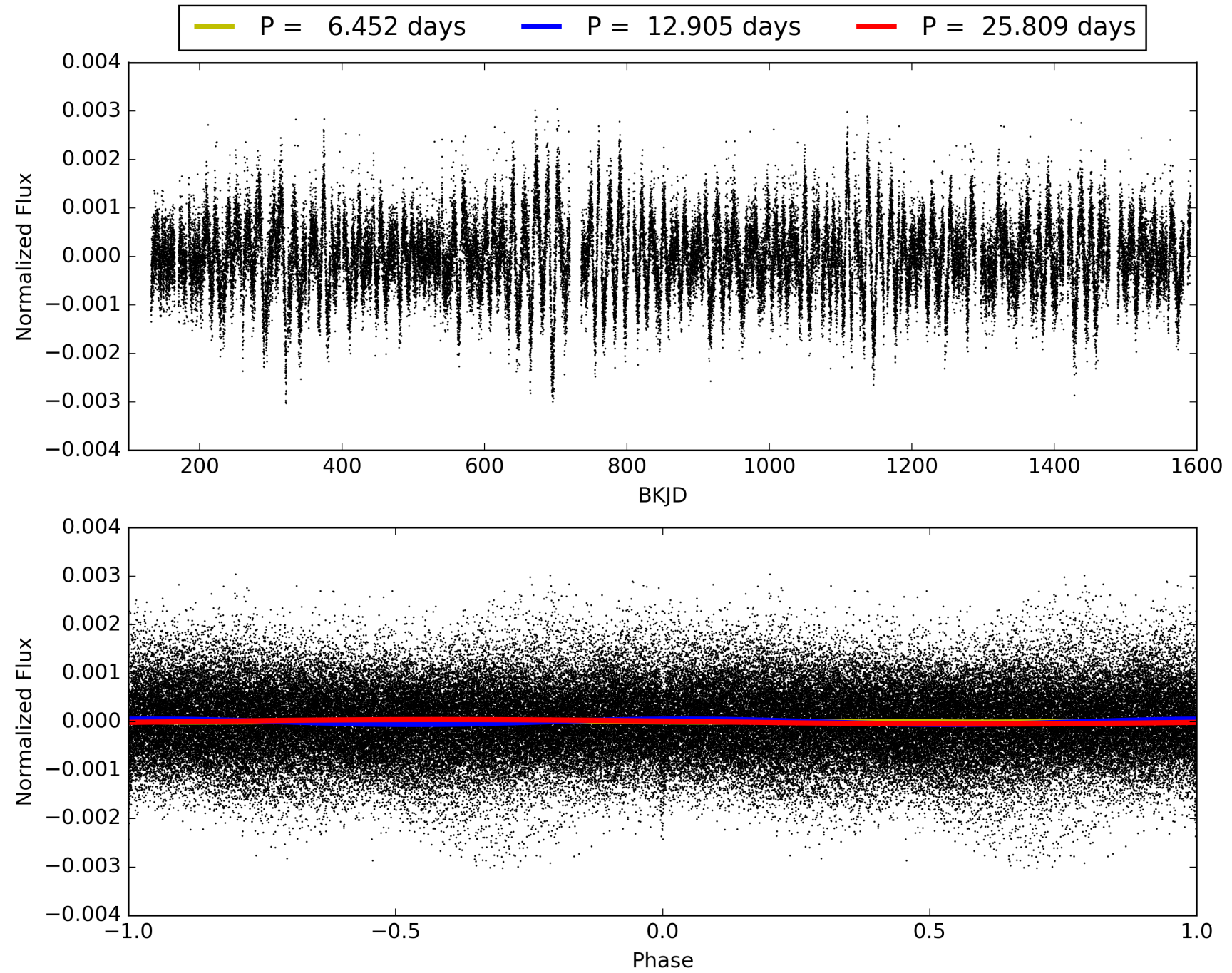
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 15:40:38 Z

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

TCE 003234598-01, PDC Light Curves

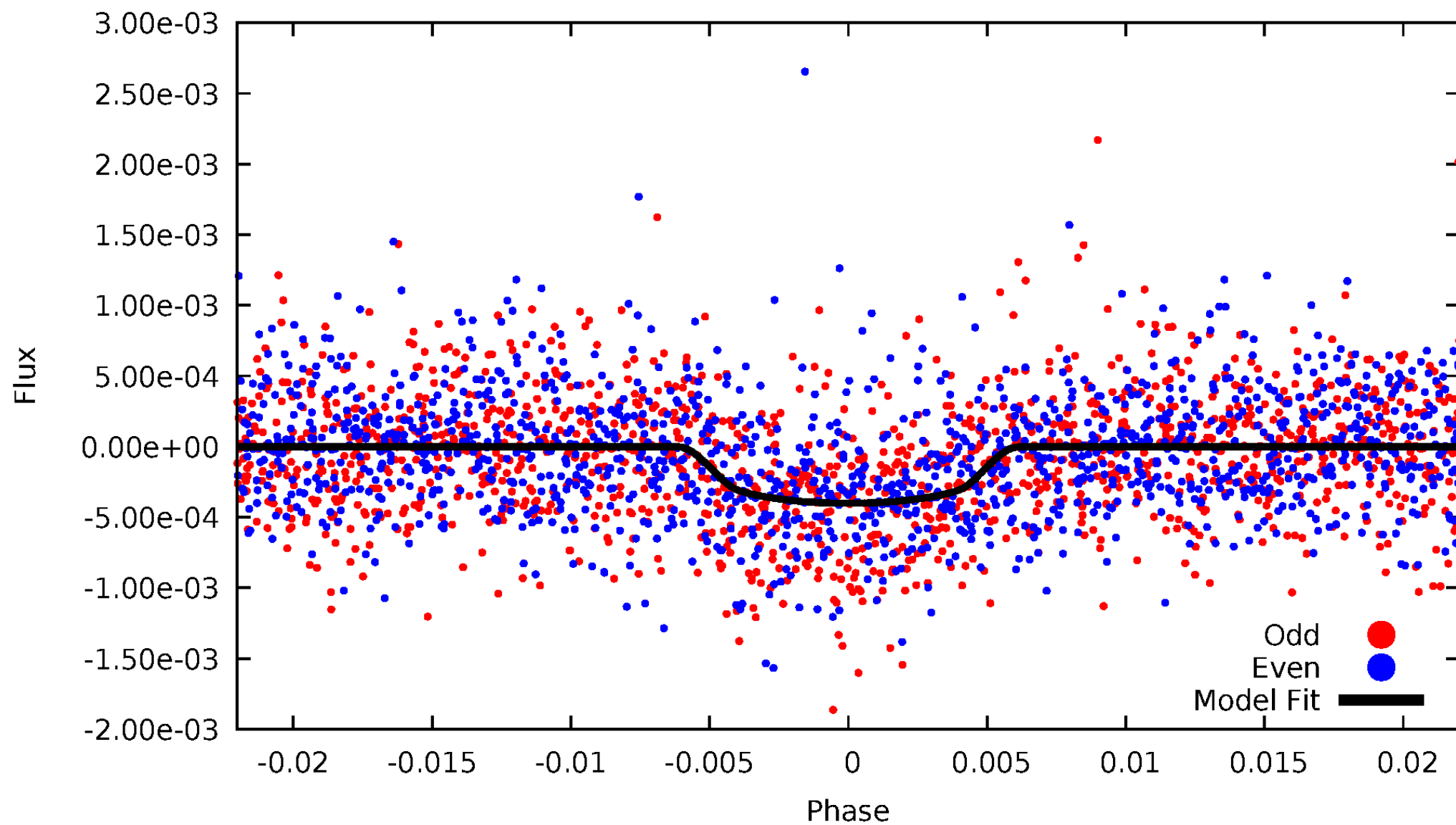


TCE 003234598-01



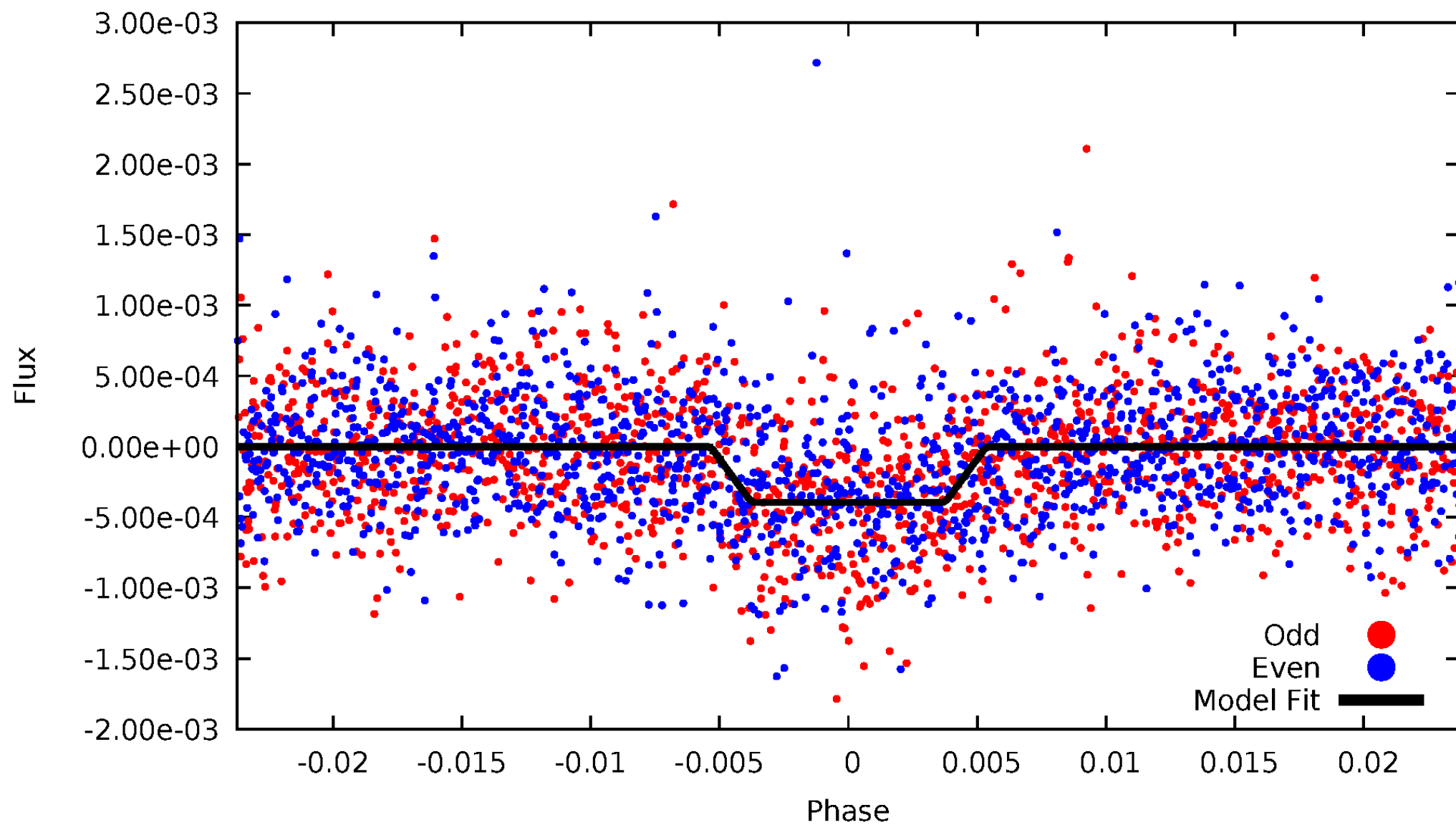
DV Odd/Even

TCE 003234598-01



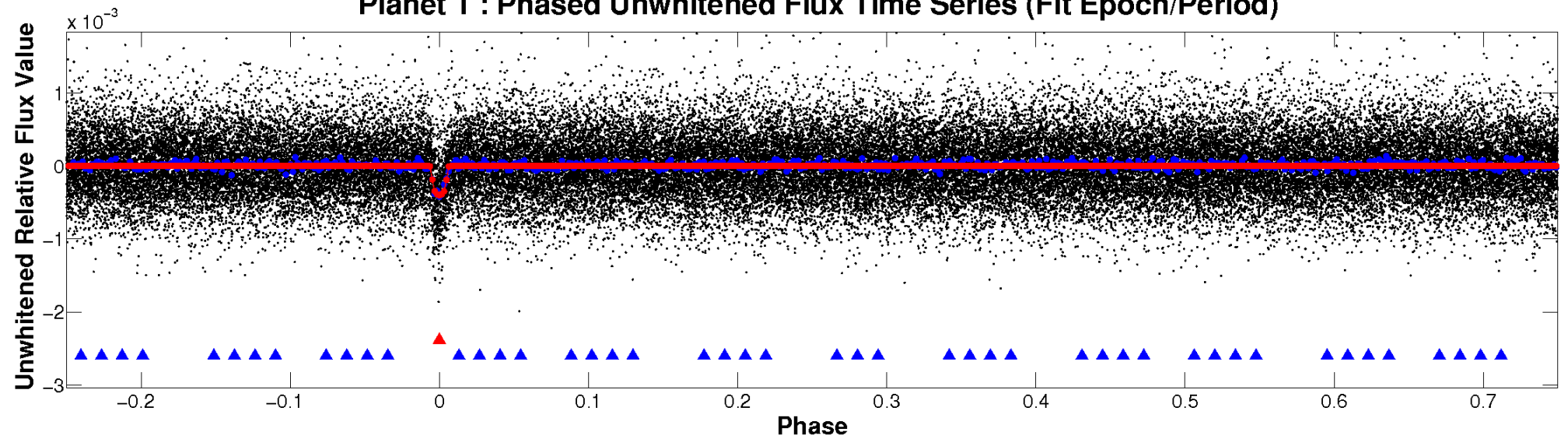
ALT Odd/Even

TCE 003234598-01

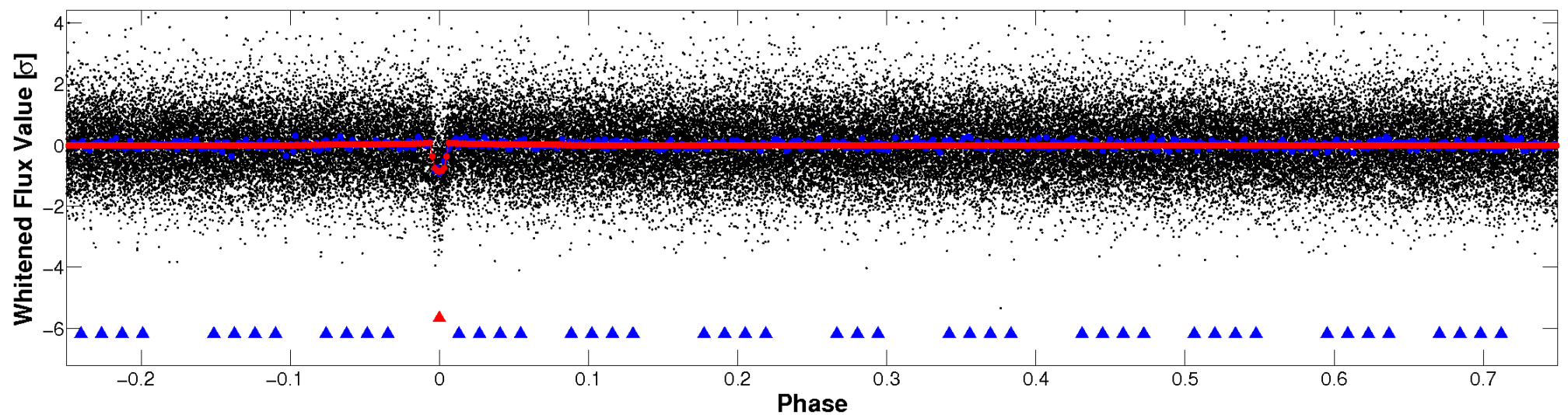


Non-Whitened Vs. Whitened Light Curve

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

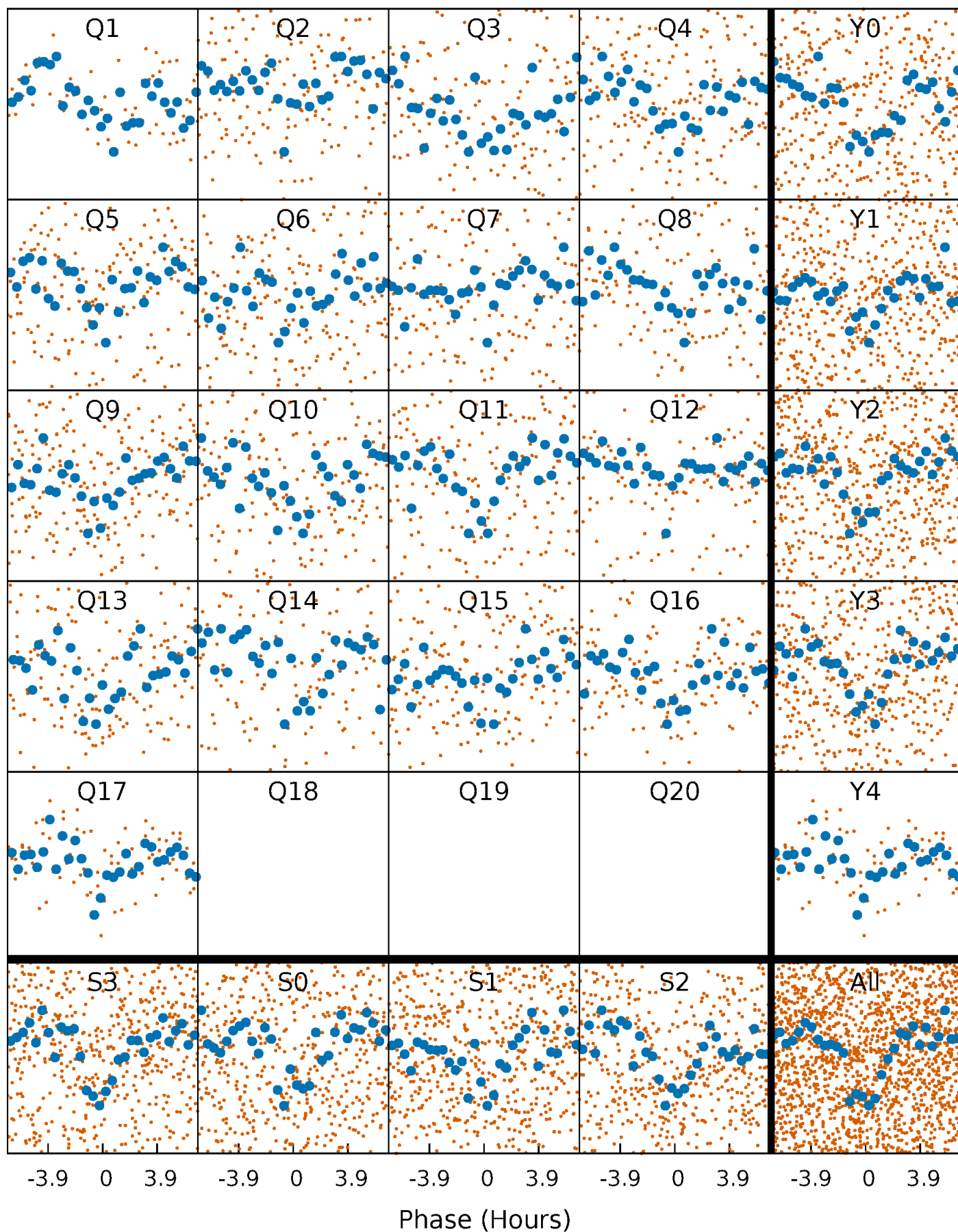


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



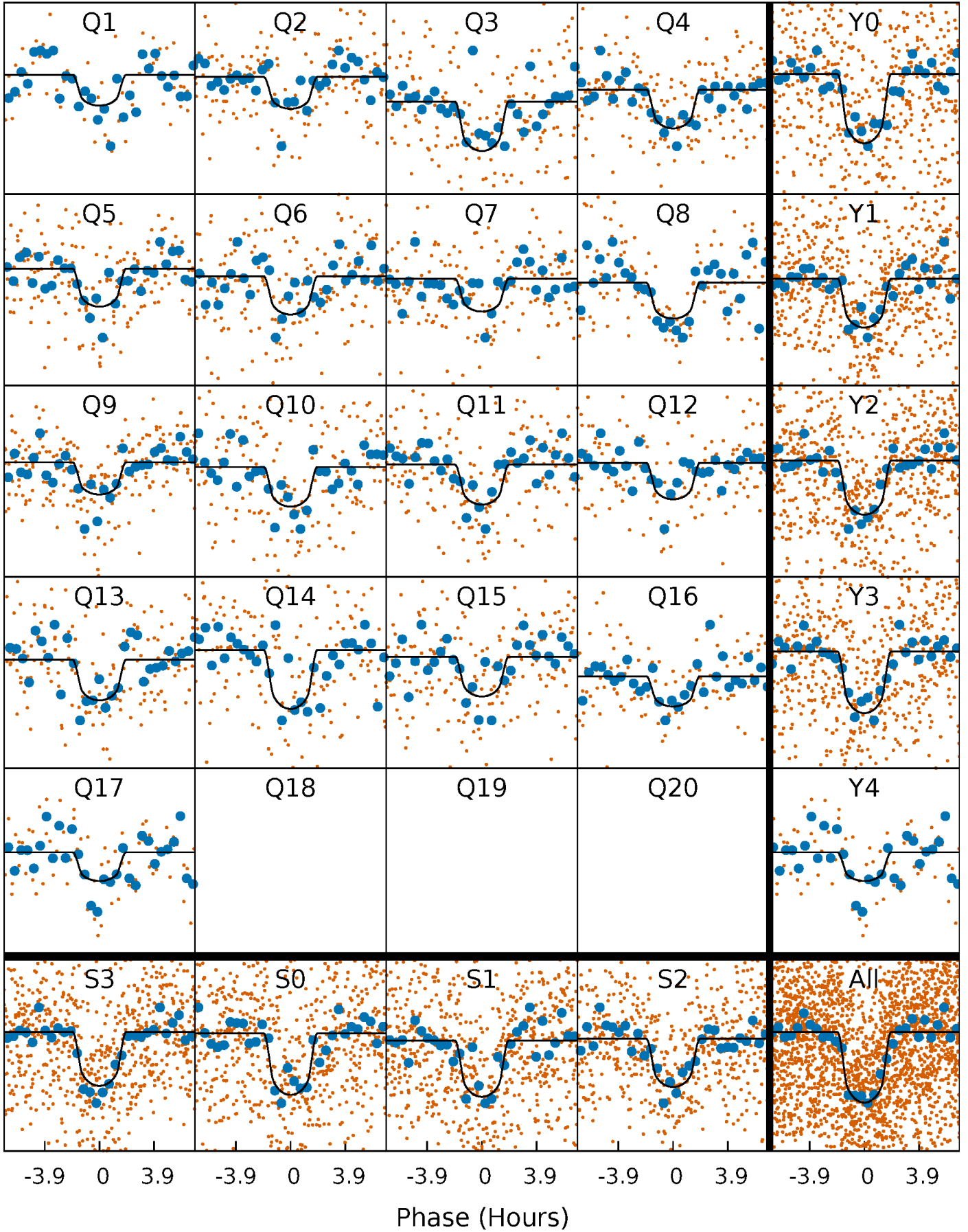
PDC Quarter-Phased Transit Curves

TCE 003234598-01 P= 12.904721 Days $T_0=144.318302$ (BKJD)



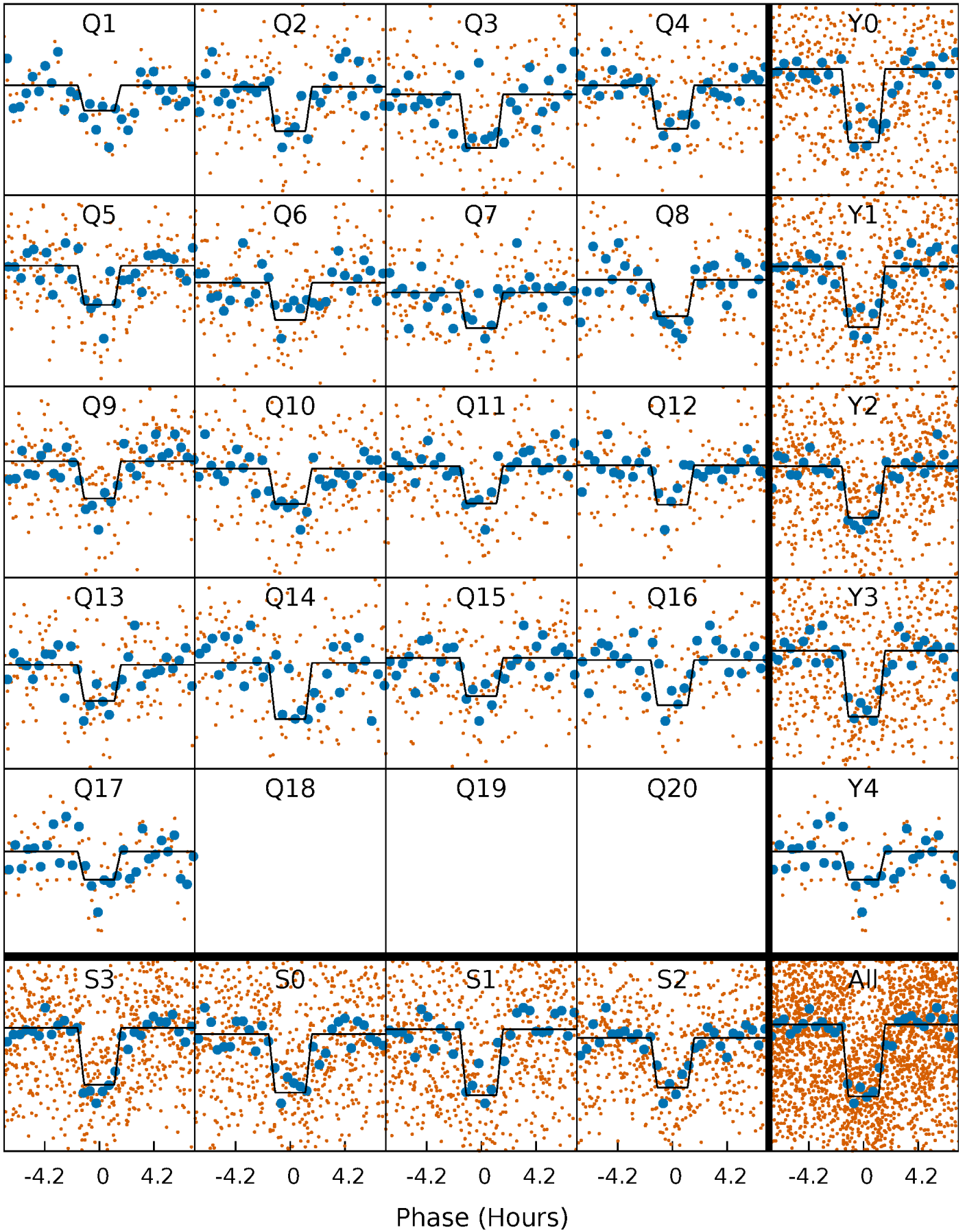
DV Quarter-Phased Transit Curves

TCE 003234598-01 P= 12.904721 Days $T_0=144.318302$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

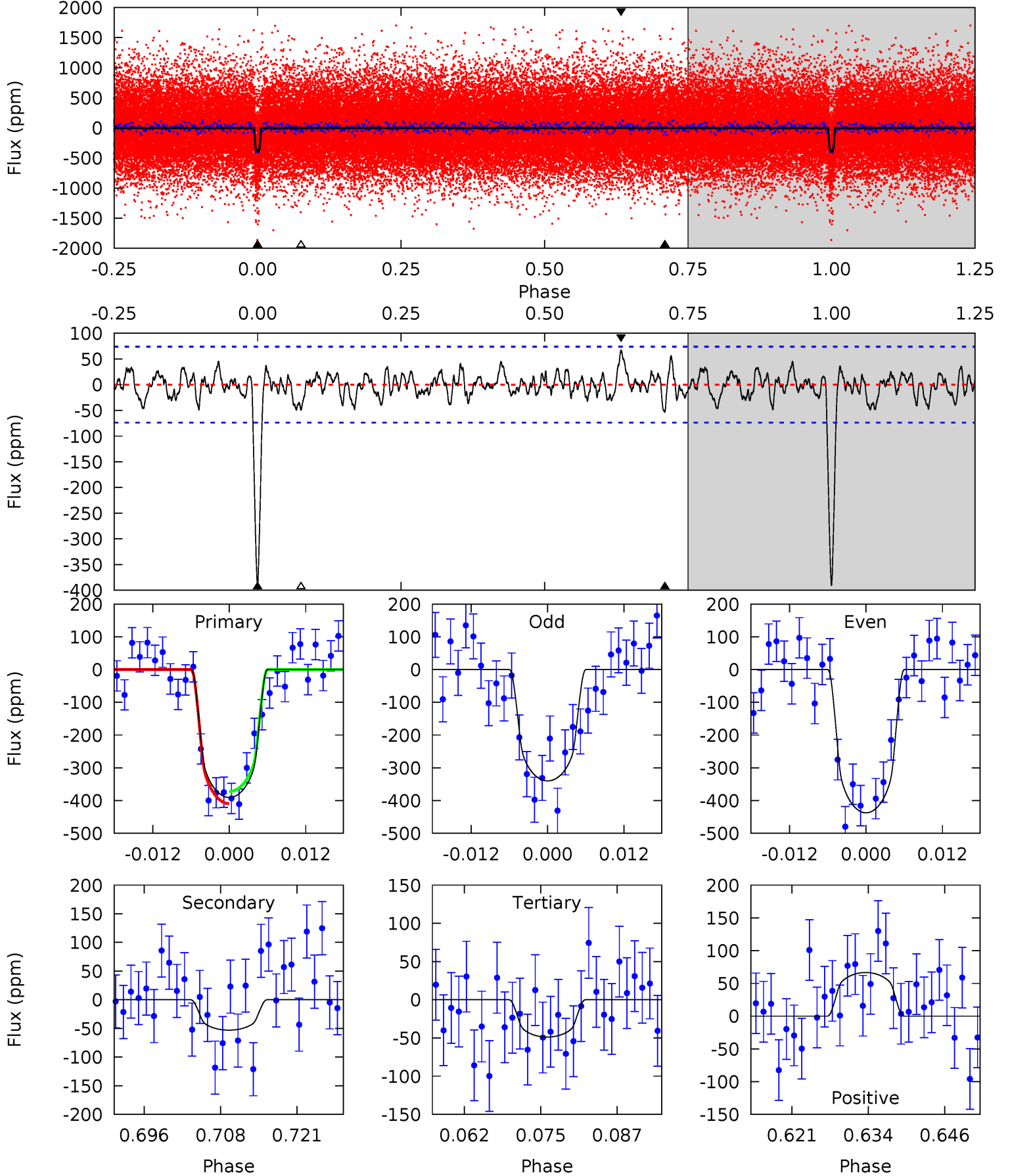
TCE 003234598-01 $P = 12.904756$ Days $T_0 = 144.313618$ (BKJD)



DV Model-Shift Uniqueness Test

003234598-01, P = 12.904721 Days, E = 131.413581 Days

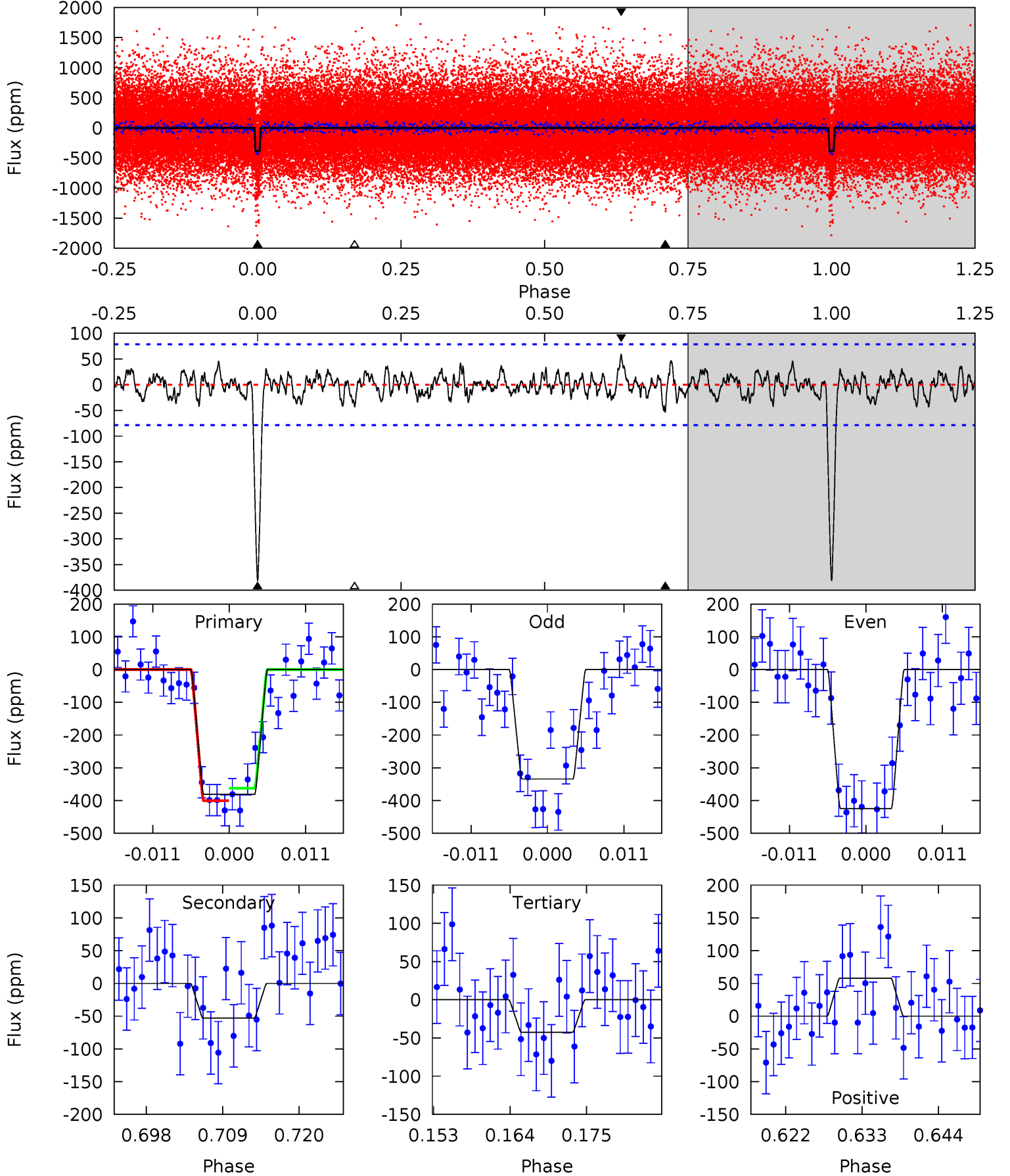
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 26.3 | 3.58 | 3.29 | 4.49 | 4.98 | 2.50 | 1.29 | 23.0 | 21.8 | 0.29 | -0.91 | 3.29 | 0.93 | 0.15 | 1.25 |



Alt Model-Shift Uniqueness Test

003234598-01, P = 12.904756 Days, E = 131.408862 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 24.3 | 3.39 | 2.72 | 3.70 | 5.01 | 2.55 | 1.08 | 21.6 | 20.6 | 0.66 | -0.31 | 2.87 | 0.92 | 0.13 | 1.24 |



Stellar Parameters For KIC 003234598

| | $T_{\text{eff}}(K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|---------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 4513^{+71}_{-80} | $4.574^{+0.048}_{-0.012}$ | $0.160^{+0.150}_{-0.150}$ | $0.722^{+0.021}_{-0.038}$ | $0.712^{+0.041}_{-0.026}$ | $2.668^{+0.451}_{-0.135}$ |
| | +2%/-2% | +1%/-0% | +94%/-94% | +3%/-5% | +6%/-4% | +17%/-5% |
| Source | SPE90 | SPE90 | SPE90 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 003234598-01 / KOI 2413.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|--------------------|
| DV | -53 ± 15 | $1.71^{+0.60}_{-0.61}$ | 756^{+15}_{-16} | 3114^{+484}_{-301} | 94^{+142}_{-48} |
| Alt. | -53 ± 16 | $1.55^{+0.61}_{-0.67}$ | 757^{+14}_{-16} | 3199^{+589}_{-332} | 113^{+209}_{-61} |

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

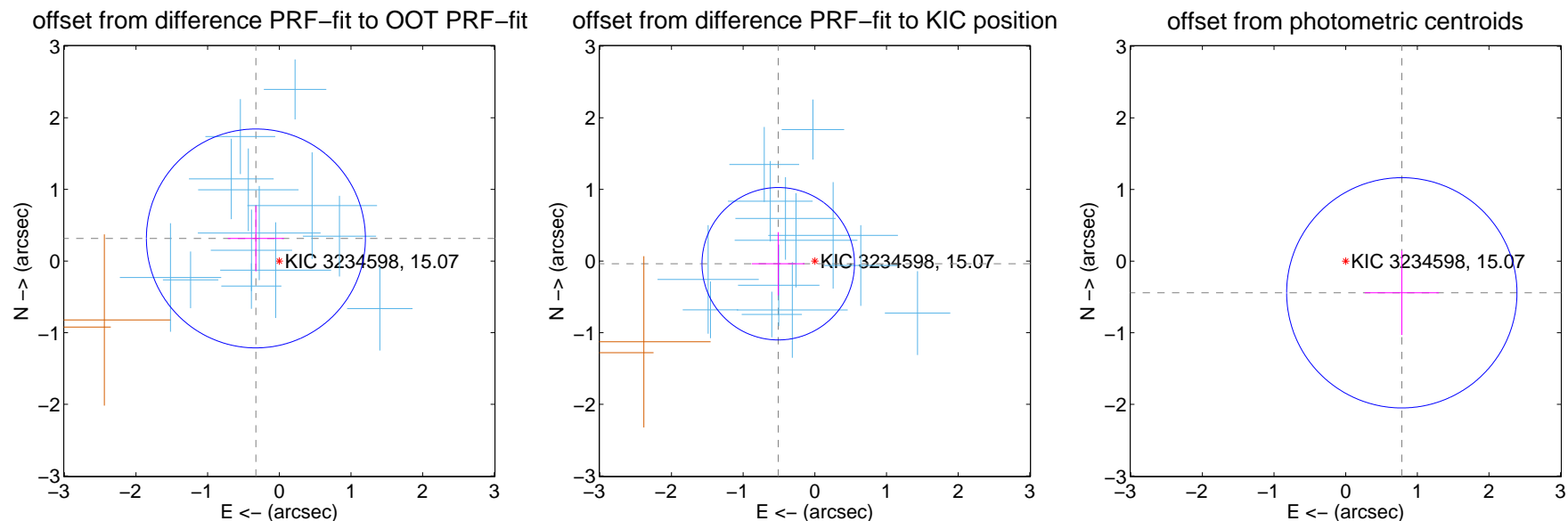
DV Centroid Data

Supplemental centroid analysis for 003234598-01. Kepler magnitude: 15.07. Transit SNR 18.24

There are 13 quarters with good PRF difference image offsets

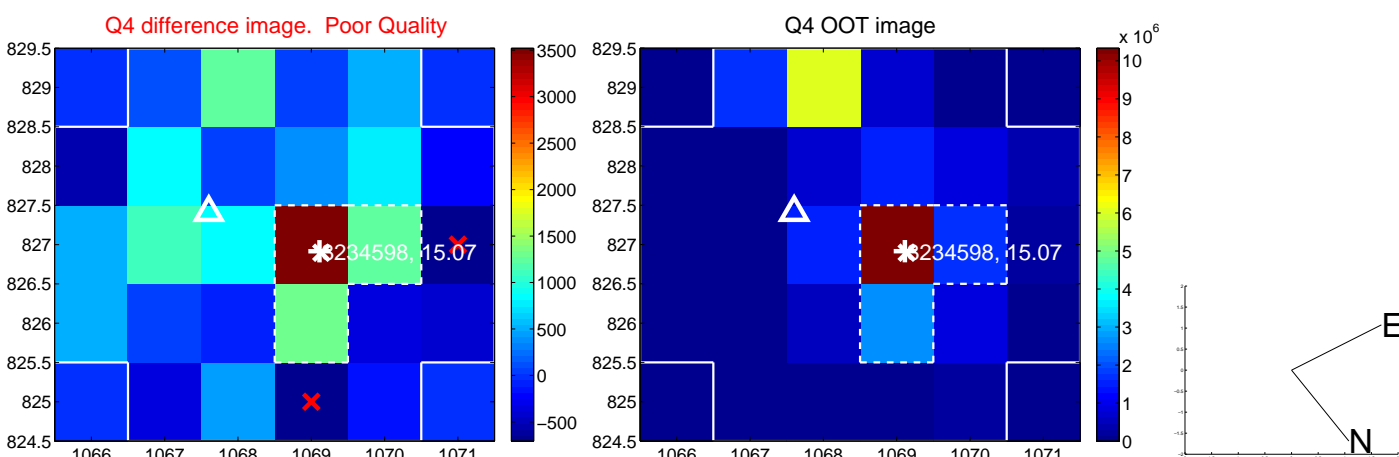
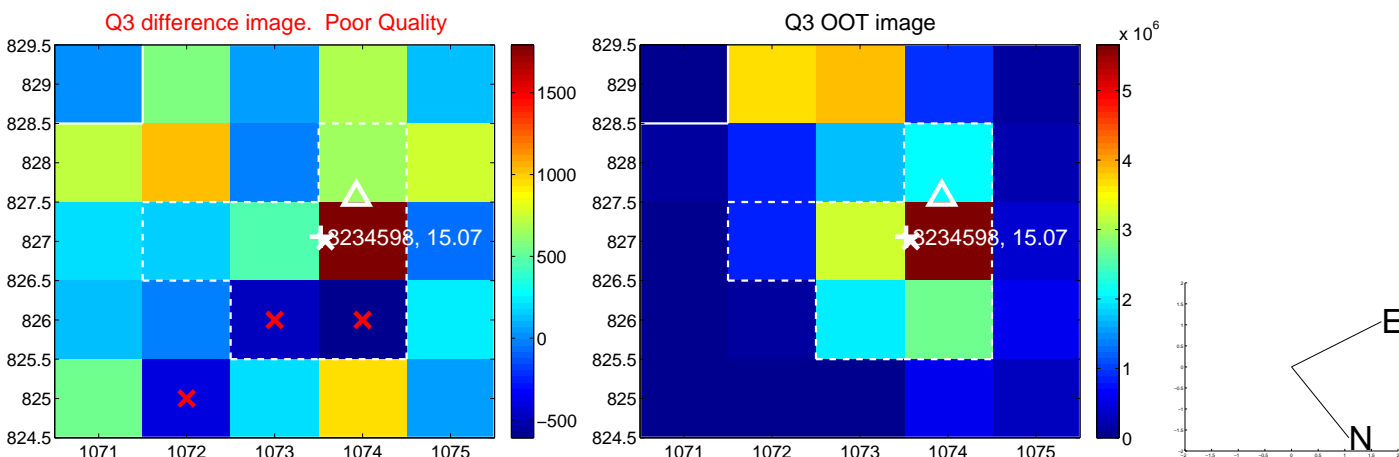
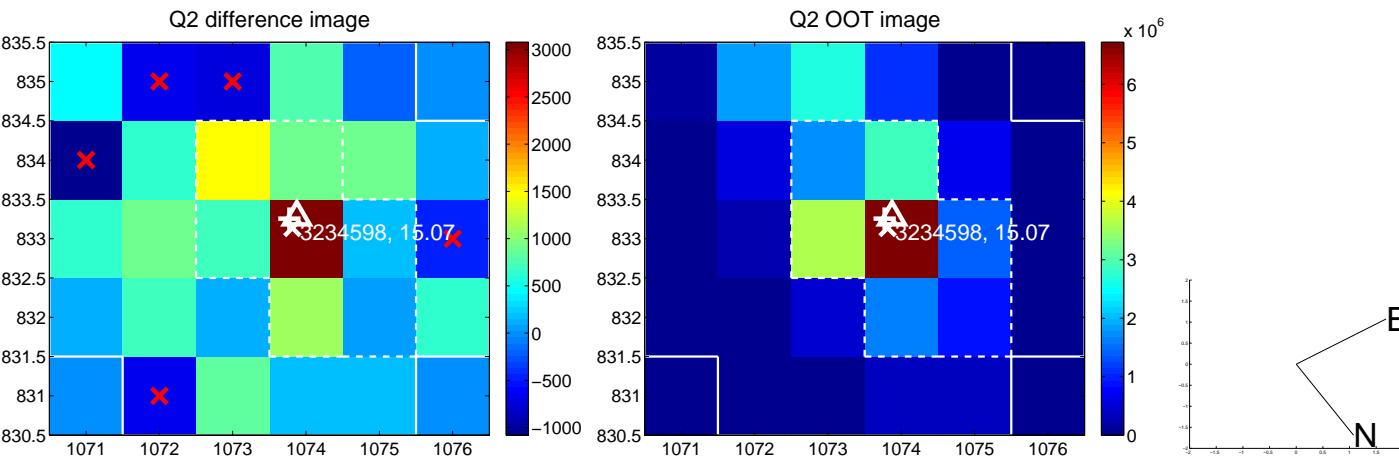
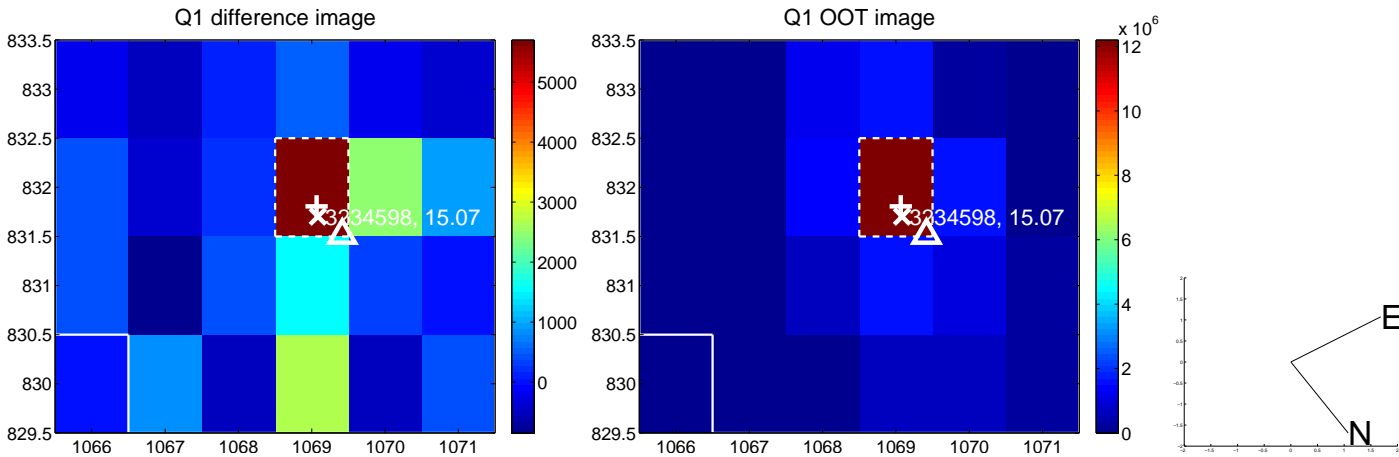
The direct PRF centroid is offset from the target star catalog position by about 0.46 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 0.454 ± 0.509 | 0.89 | 0.327 ± 0.391 | 0.315 ± 0.458 |
| PRF-fit source offset from KIC position | 0.512 ± 0.355 | 1.44 | 0.510 ± 0.367 | -0.038 ± 0.441 |
| photometric centroid source offset | 0.90 ± 0.54 | 1.68 | -0.78 ± 0.52 | -0.44 ± 0.59 |

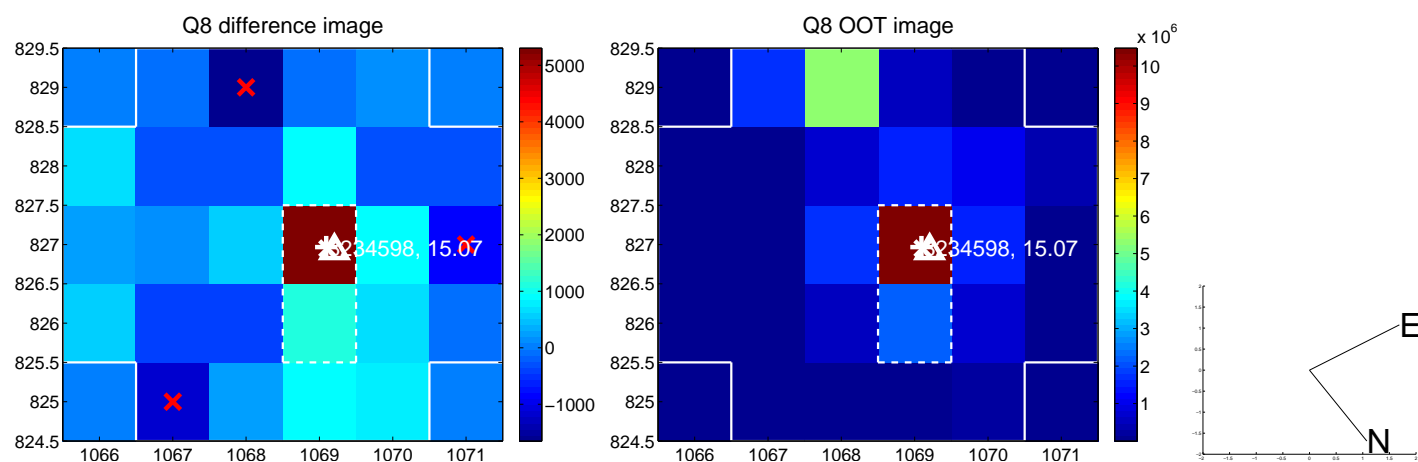
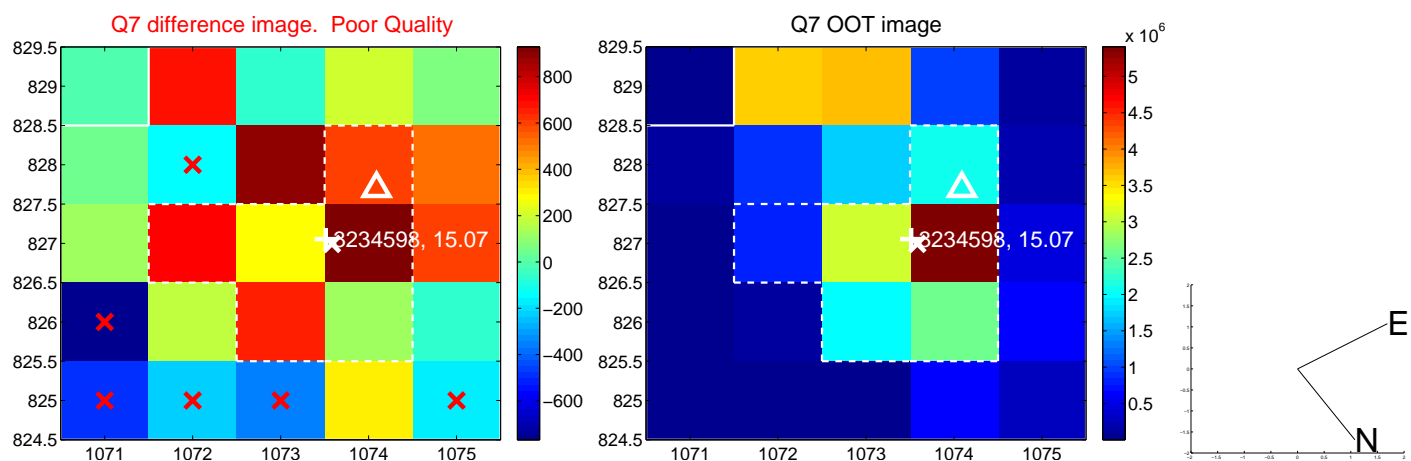
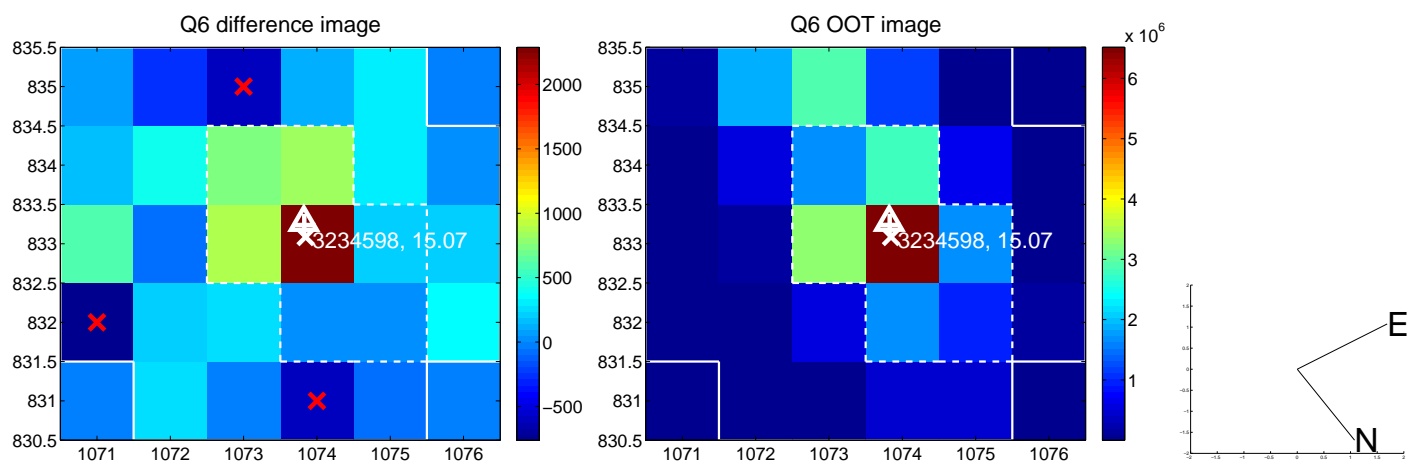
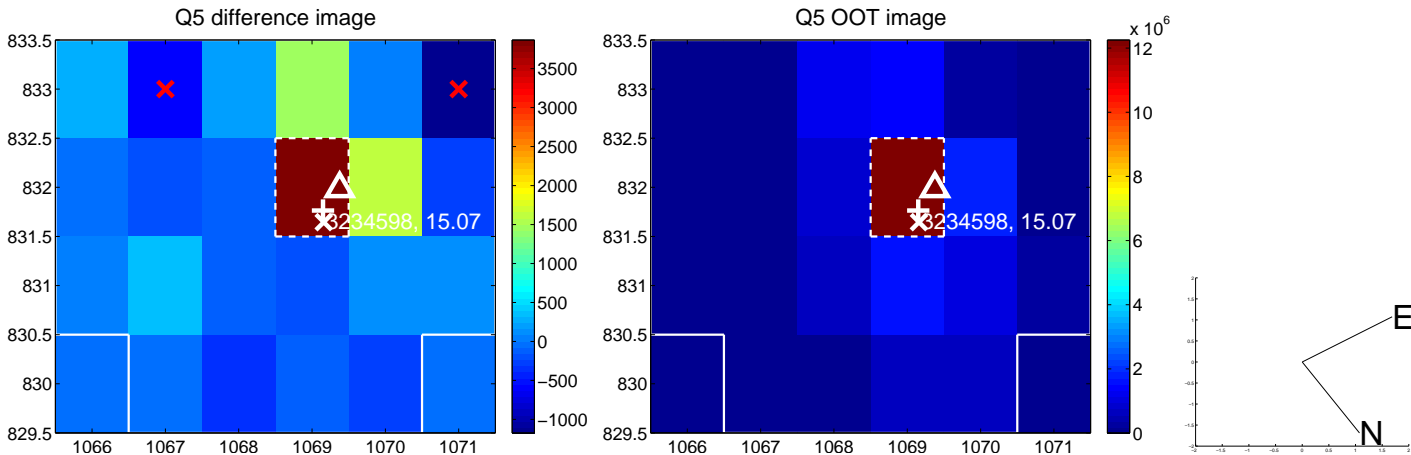


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

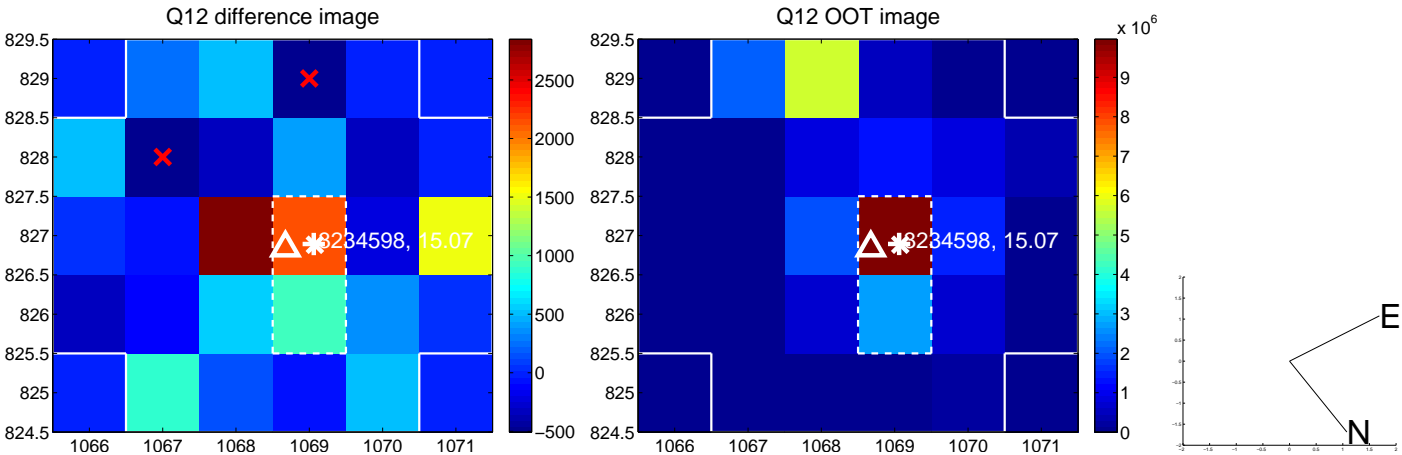
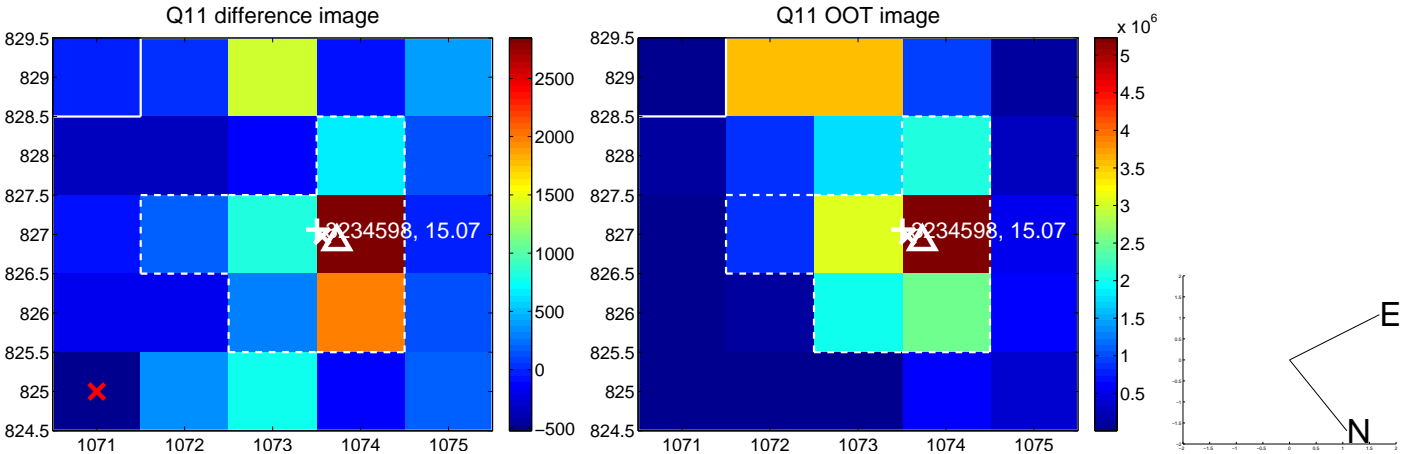
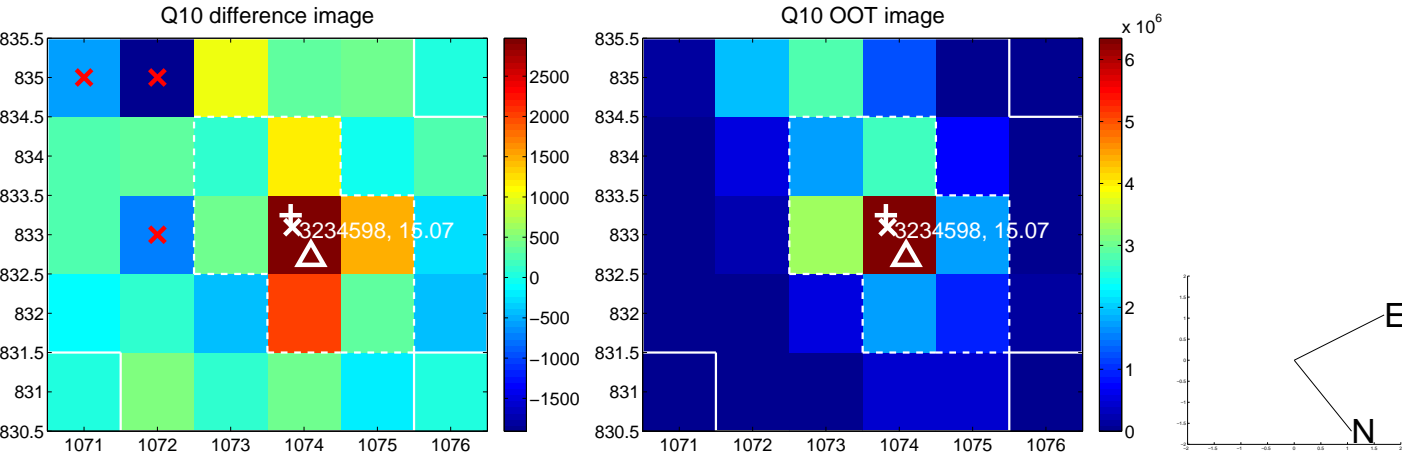
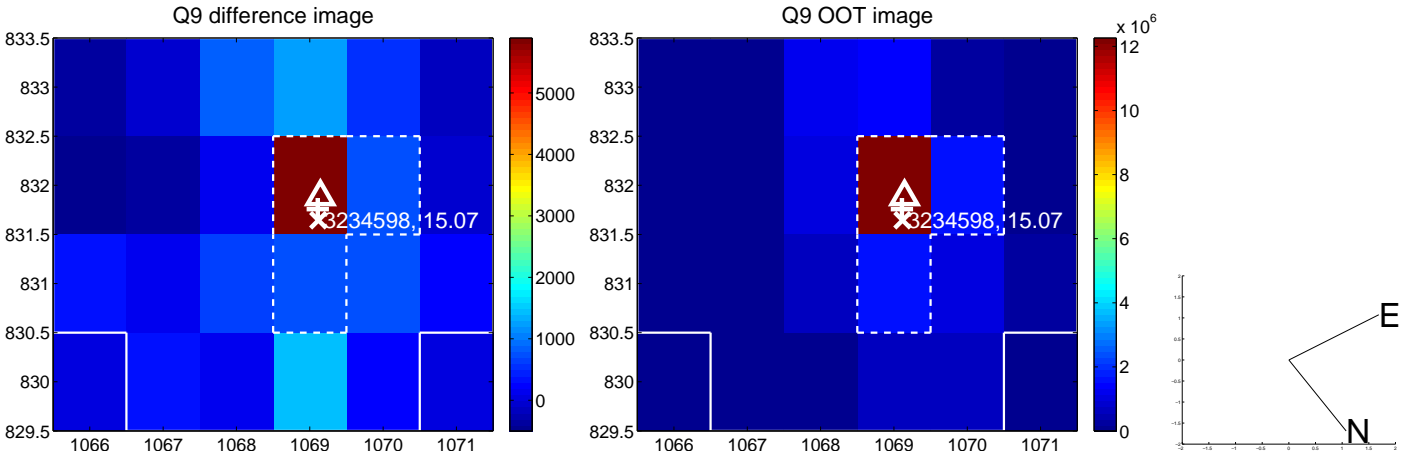
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



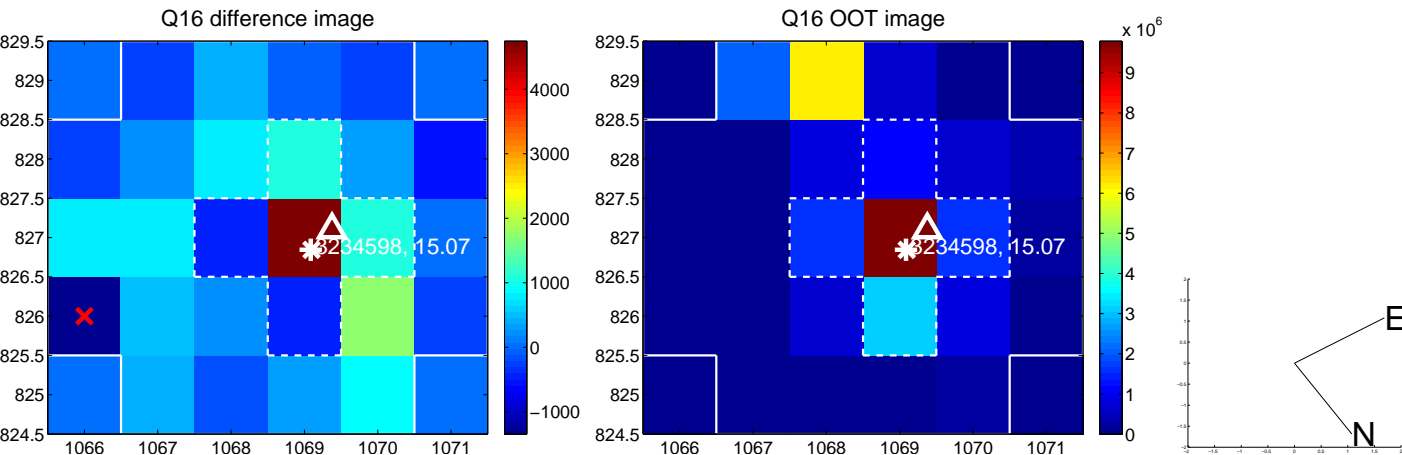
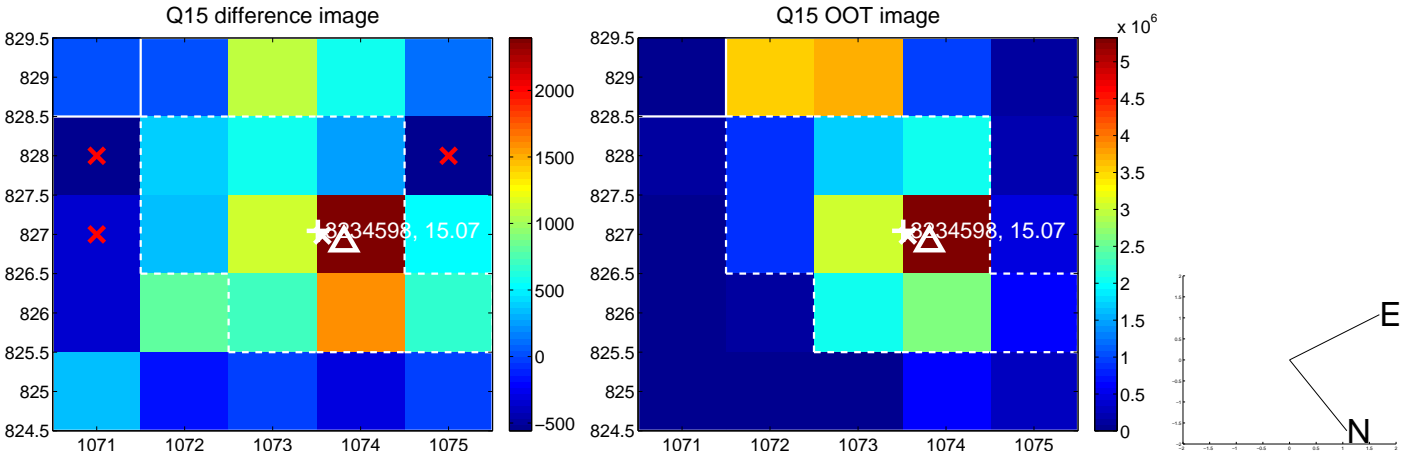
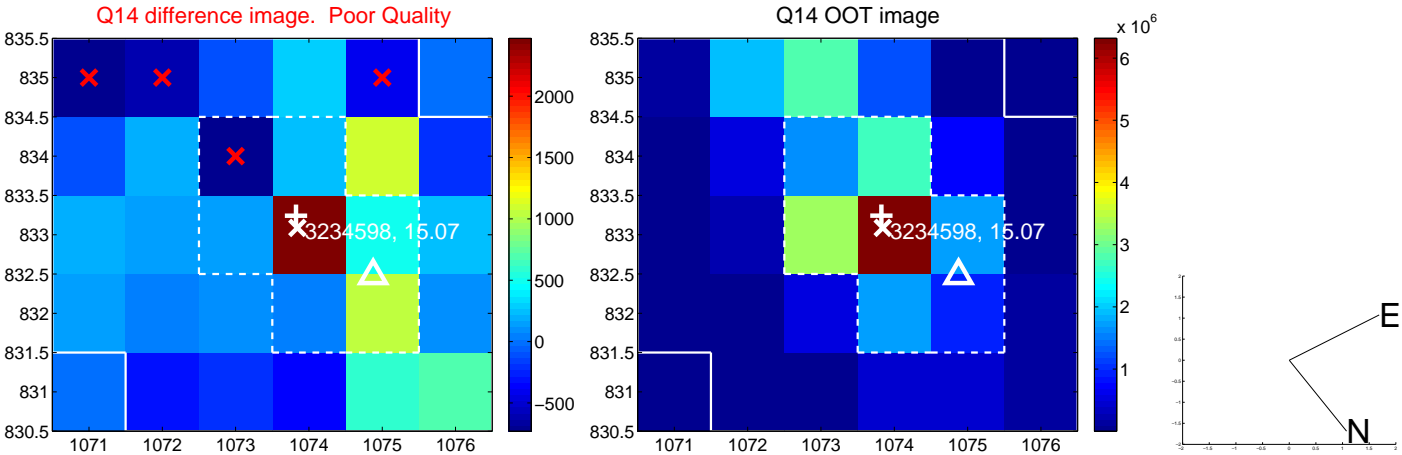
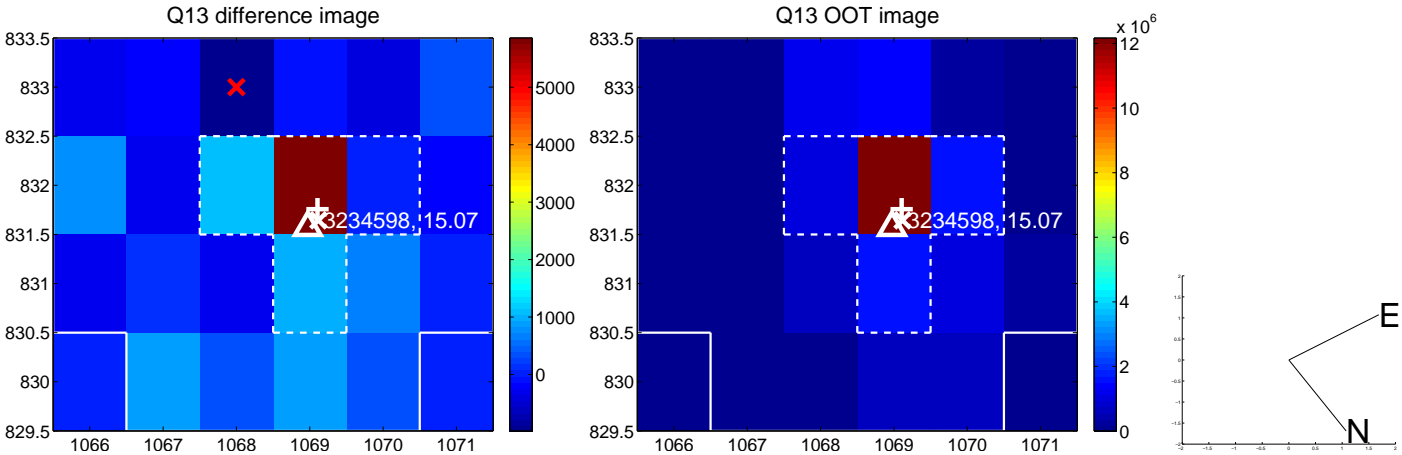
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



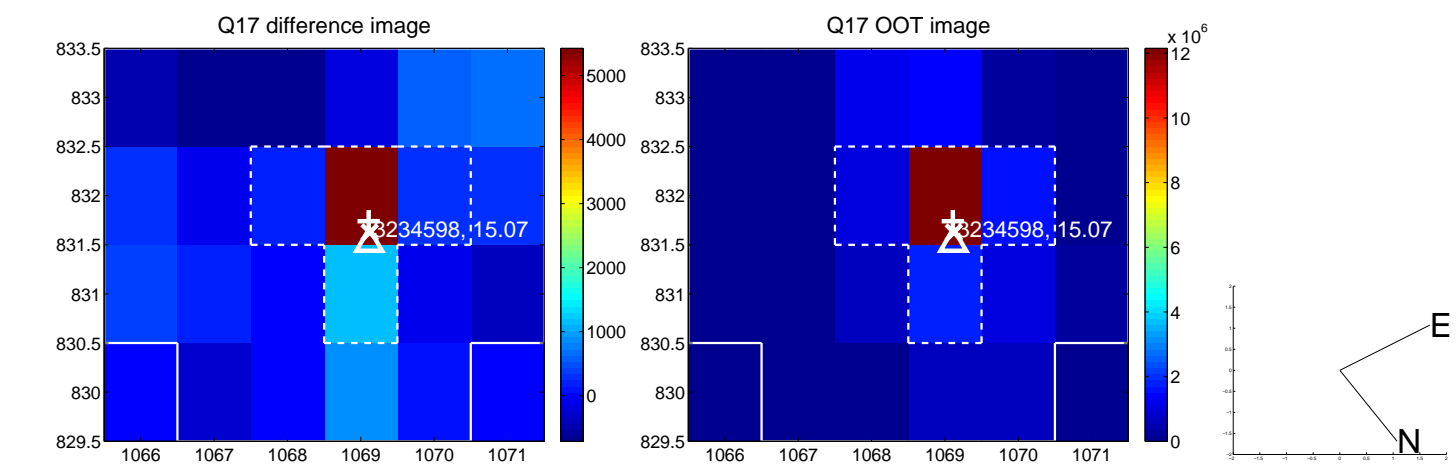
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



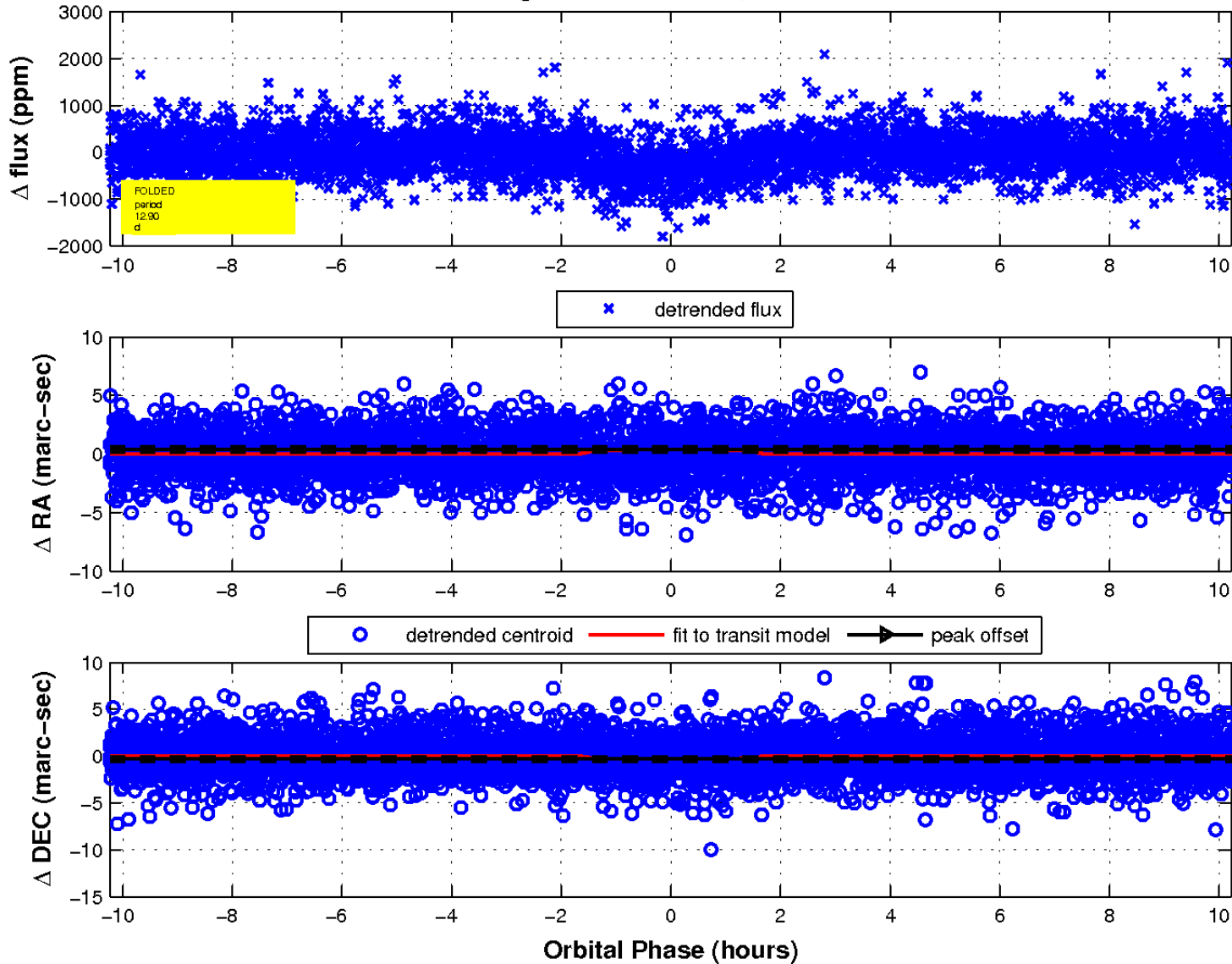
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

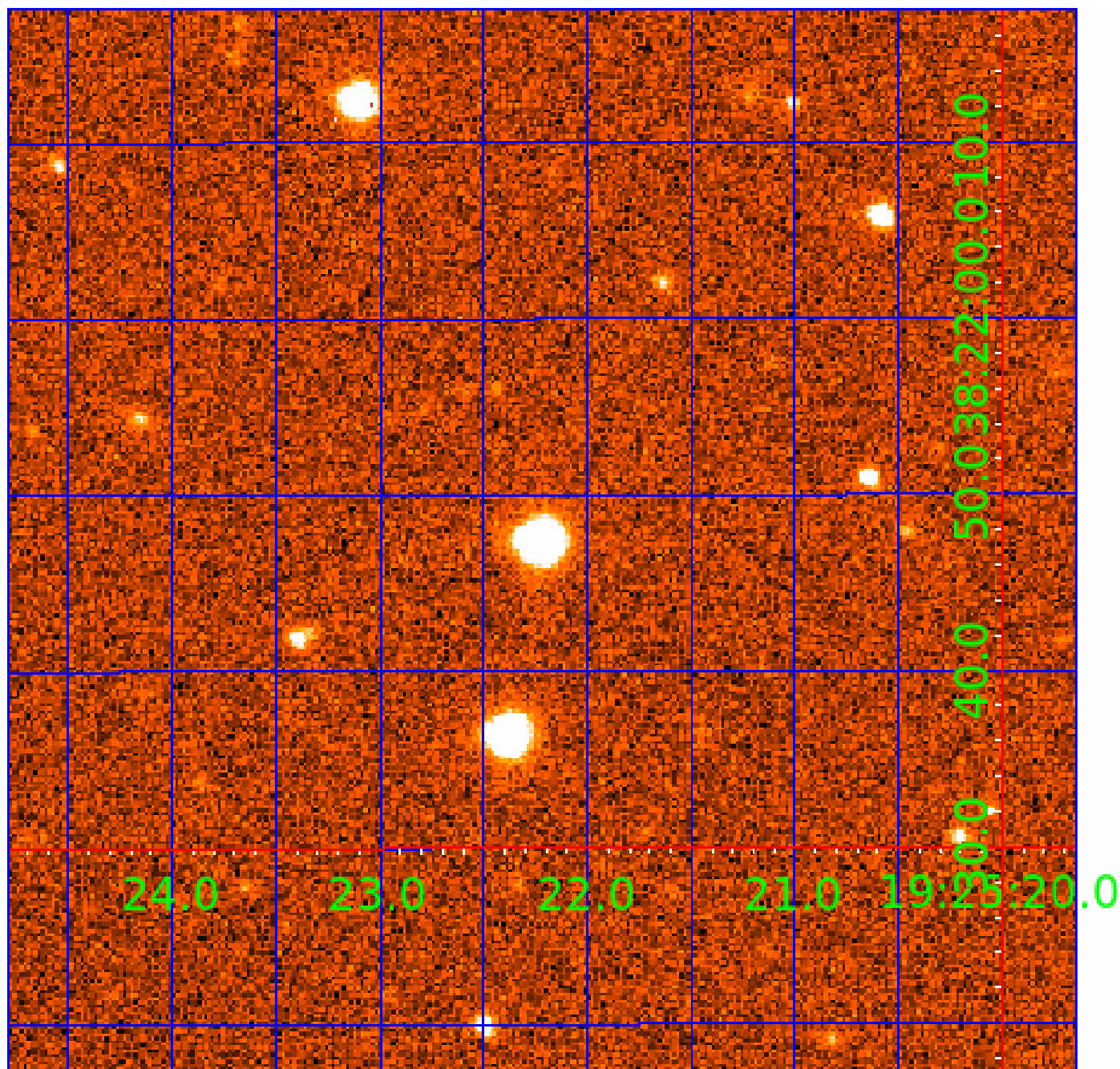


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination



KIC 003234598

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 003234598-01 | OBS | 2413.01 | 12.904721 | 144.318302 | 400.7 | 3.410 | 16.9 | 18.2 | 0.72 | 4513 | 1.71 | 20.93 |
| 003234598-02 | OBS | 2413.02 | 31.201249 | 140.067638 | 348.7 | 4.154 | 11.0 | 11.5 | 0.72 | 4513 | 1.58 | 6.45 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 003234598-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 003234598-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

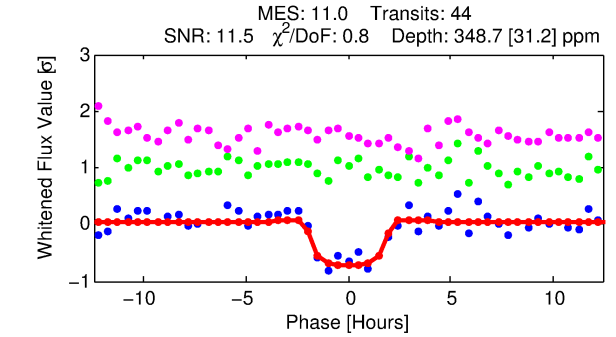
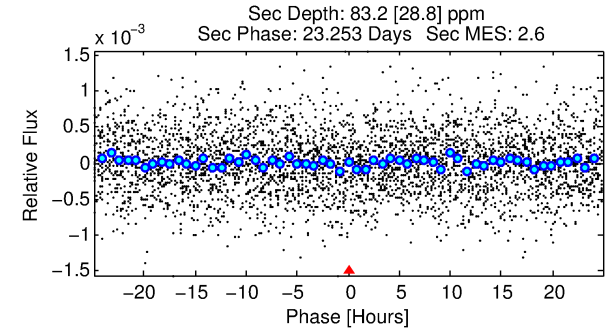
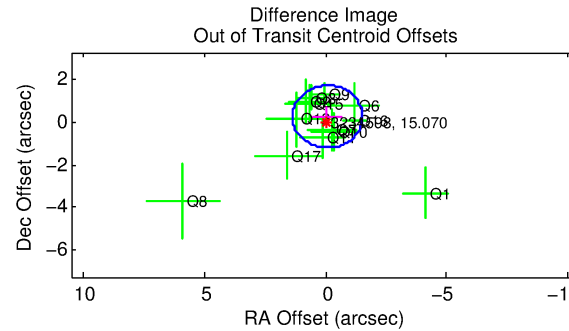
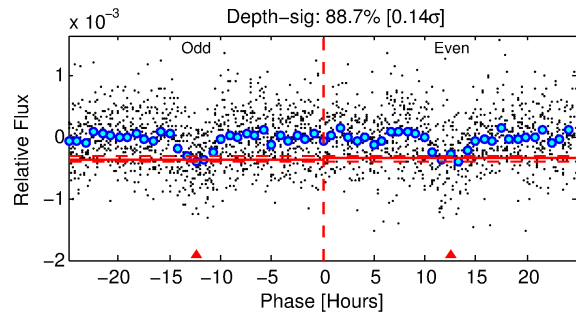
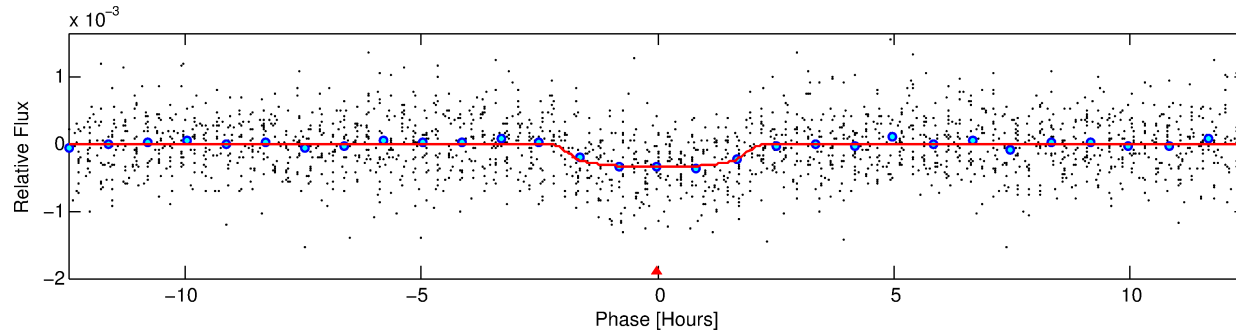
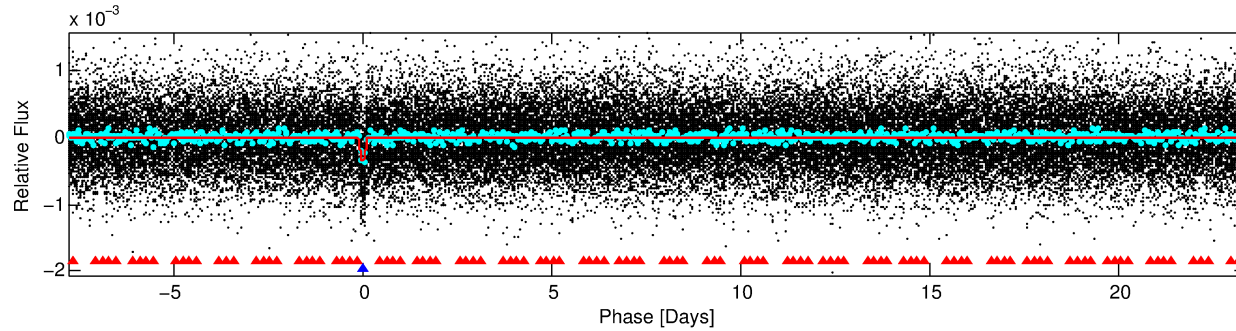
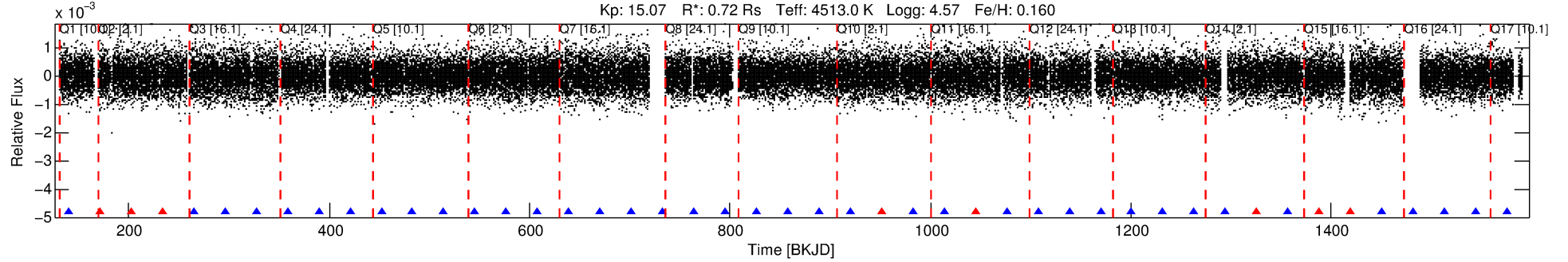
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 003234598-02

No Significant Match Found

DV One-Page Summary

KIC: 3234598 Candidate: 2 of 2 Period: 31.201 d
KOI: K02413.02 Name: Kepler-383c Corr: 0.967



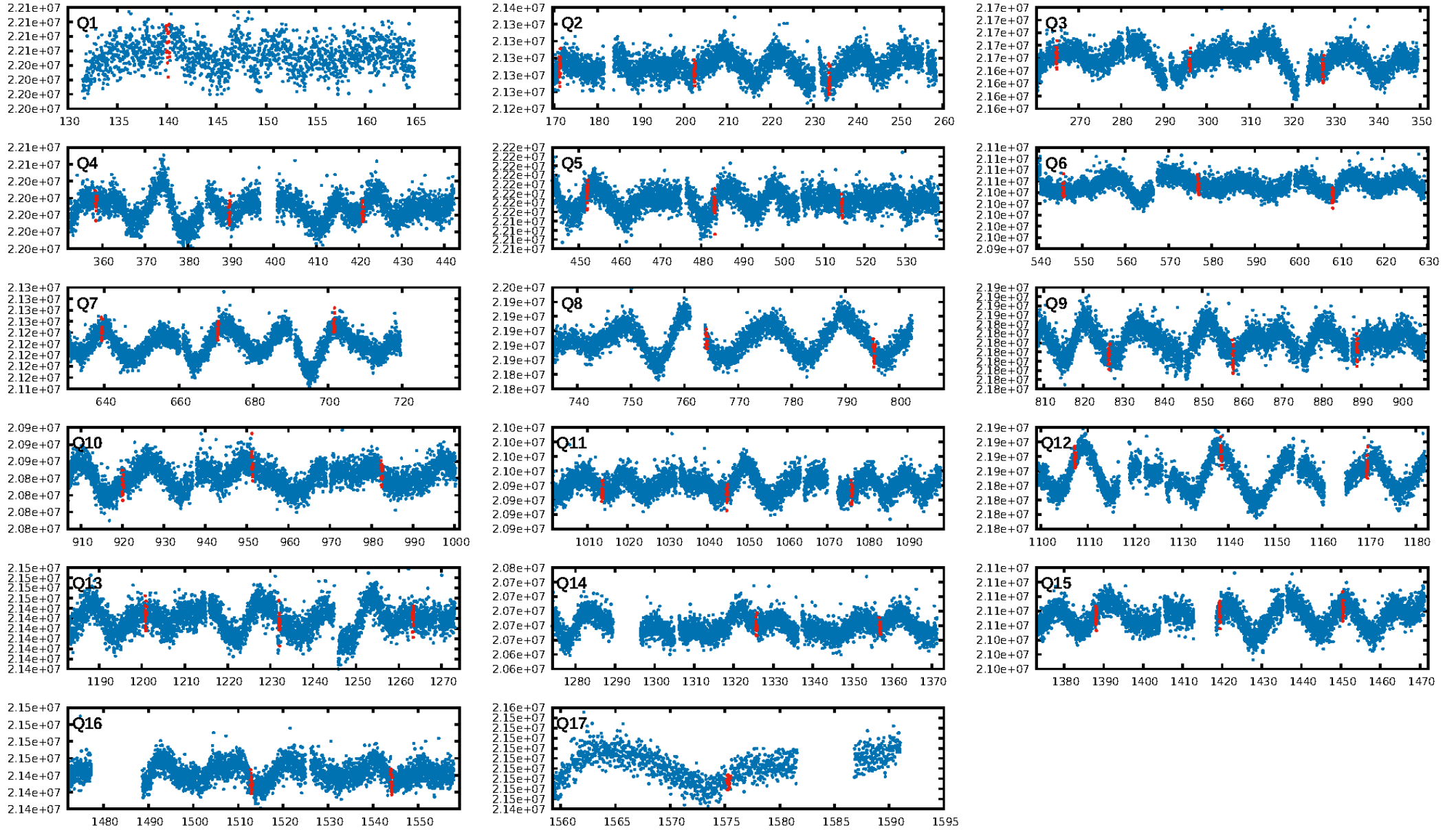
DV Fit Results:

Period = 31.20125 [0.00029] d
Epoch = 140.0676 [0.0076] BKJD
Rp/R* = 0.0201 [0.0110]
a/R* = 32.37 [60.41]
b = 0.85 [0.63]
Seff = 6.45 [0.70]
Teq = 406 [11] K
Rp = 1.58 [0.87] Re
a = 0.1733 [0.0088] AU
Ag = 550.00 [632.11] [0.87 σ]
Teffp = 3043 [874] K [3.02 σ]

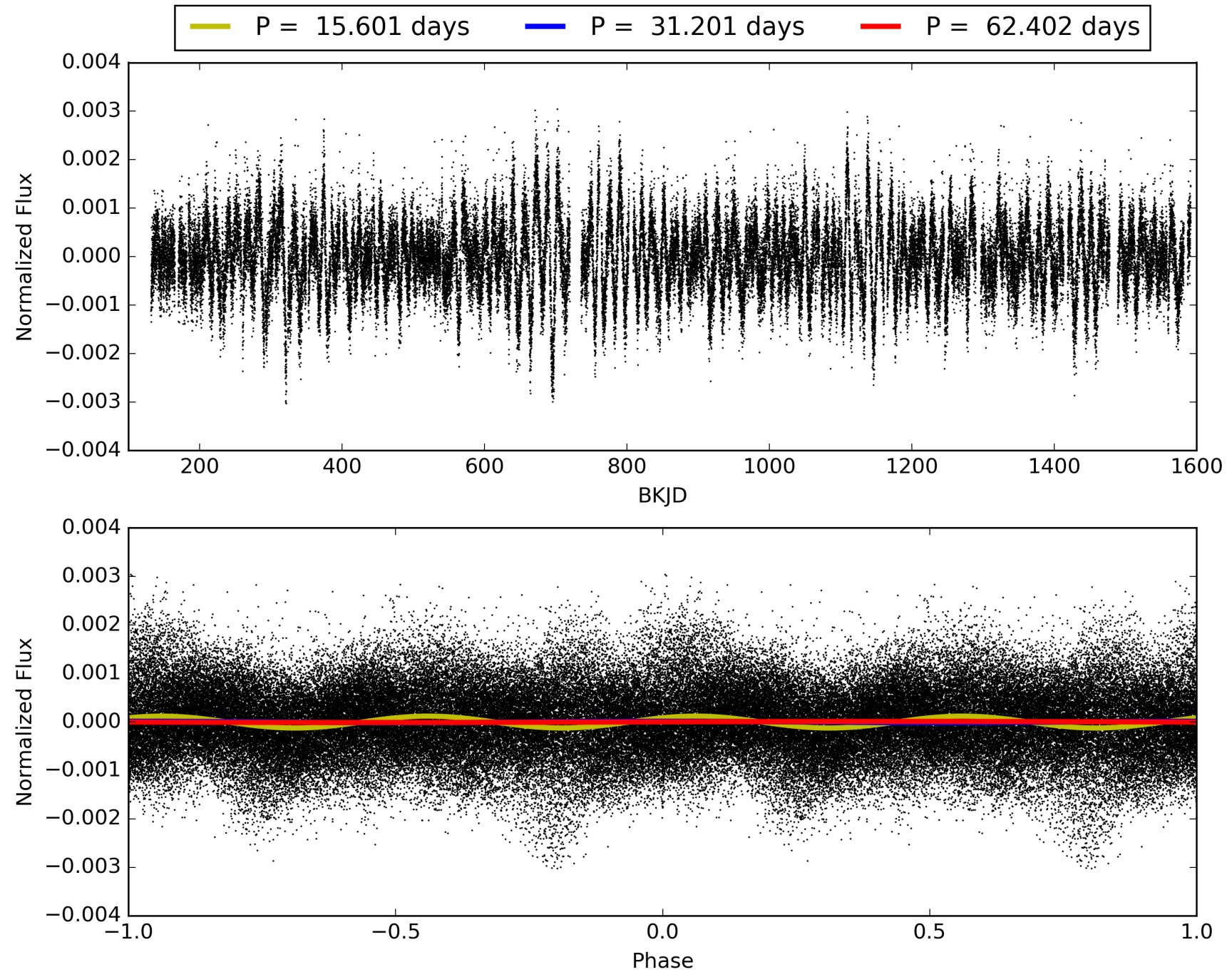
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [81.70 σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 97.6%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 1.25e-27
RollingBand-fgt: 0.81 [34/42]
GhostDiagnostic-chr: 11.08
Centroid-sig: 62.8%
Centroid-so: 1.353 arcsec [1.46 σ]
OotOffset-rm: 0.253 arcsec [0.52 σ]
KicOffset-rm: 0.343 arcsec [0.59 σ]
OotOffset-st: 3/4/3/3 [13]
KicOffset-st: 3/4/3/3 [13]
DiffImageQuality-fgm: 0.46 [6/13]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 003234598-02, PDC Light Curves

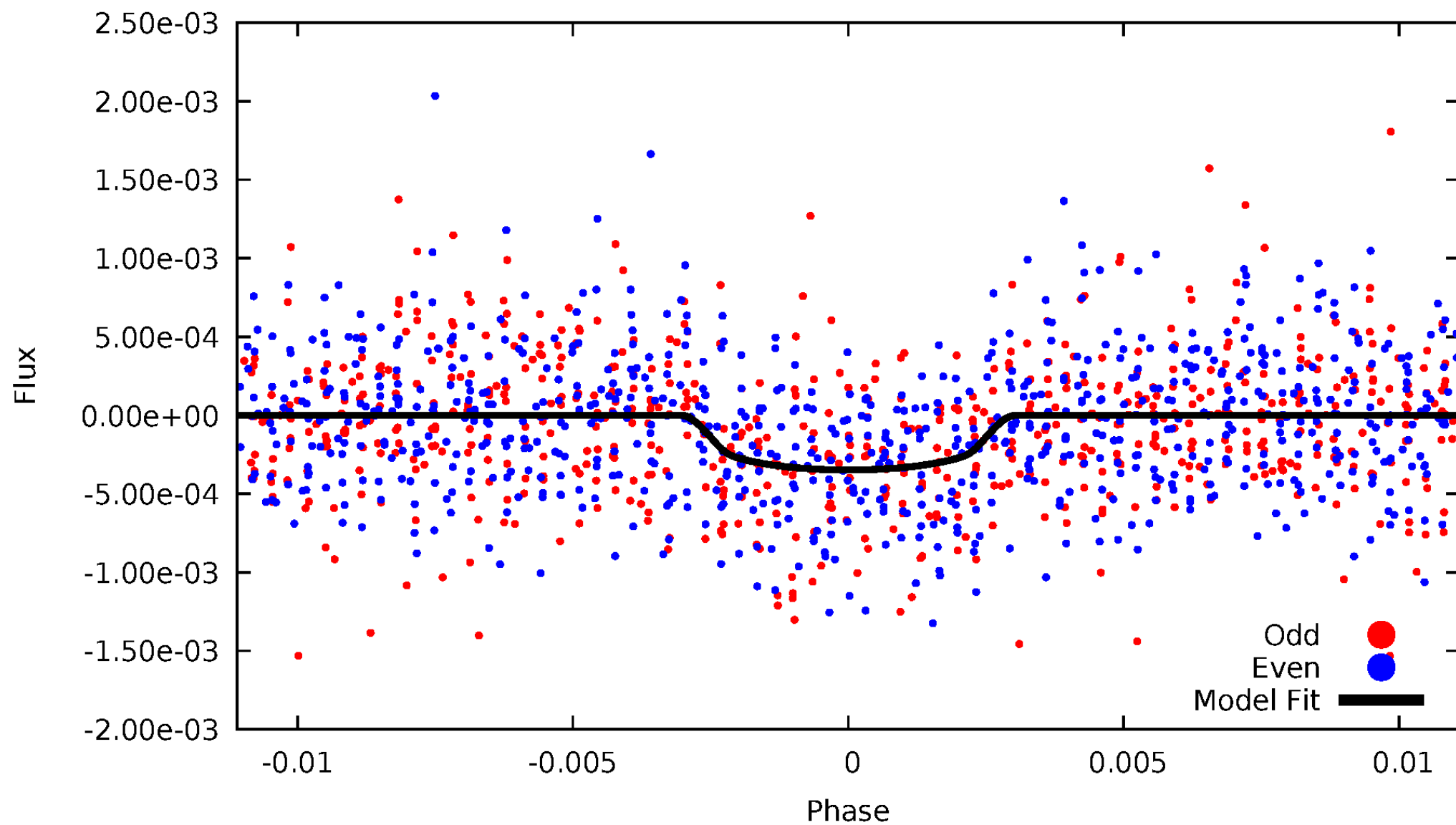


TCE 003234598-02



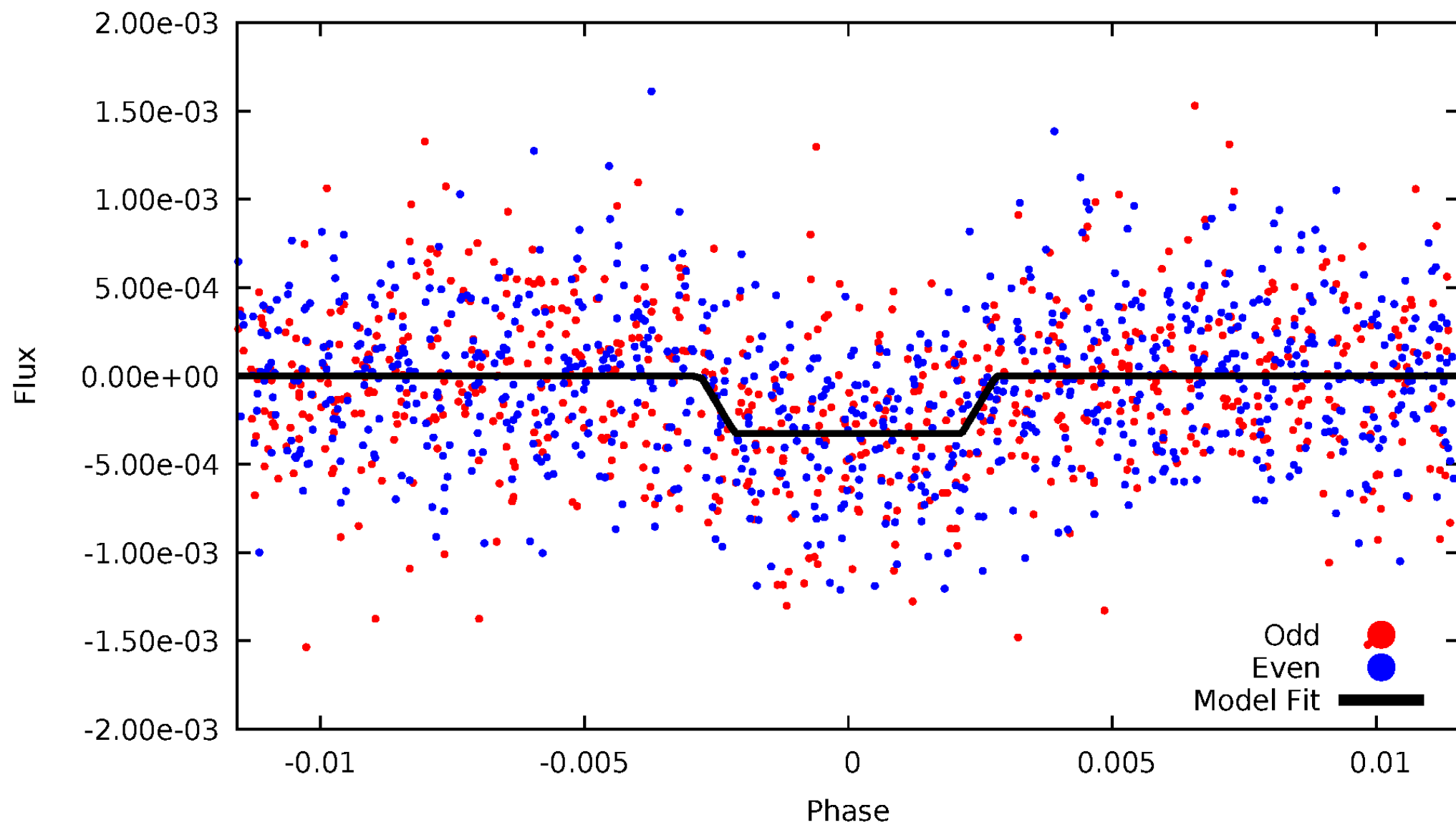
DV Odd/Even

TCE 003234598-02



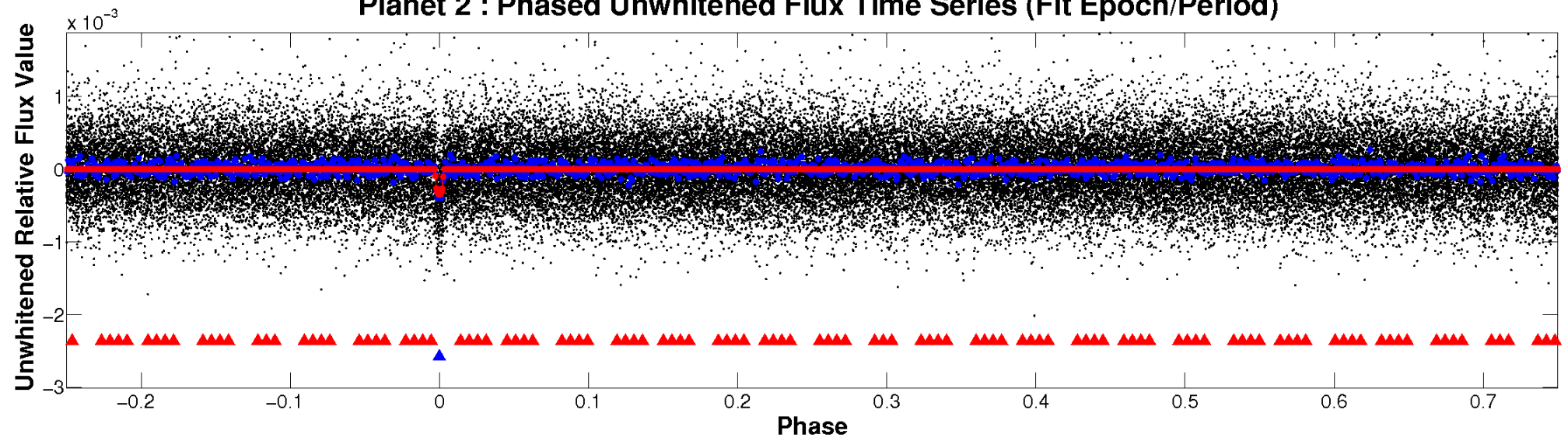
ALT Odd/Even

TCE 003234598-02

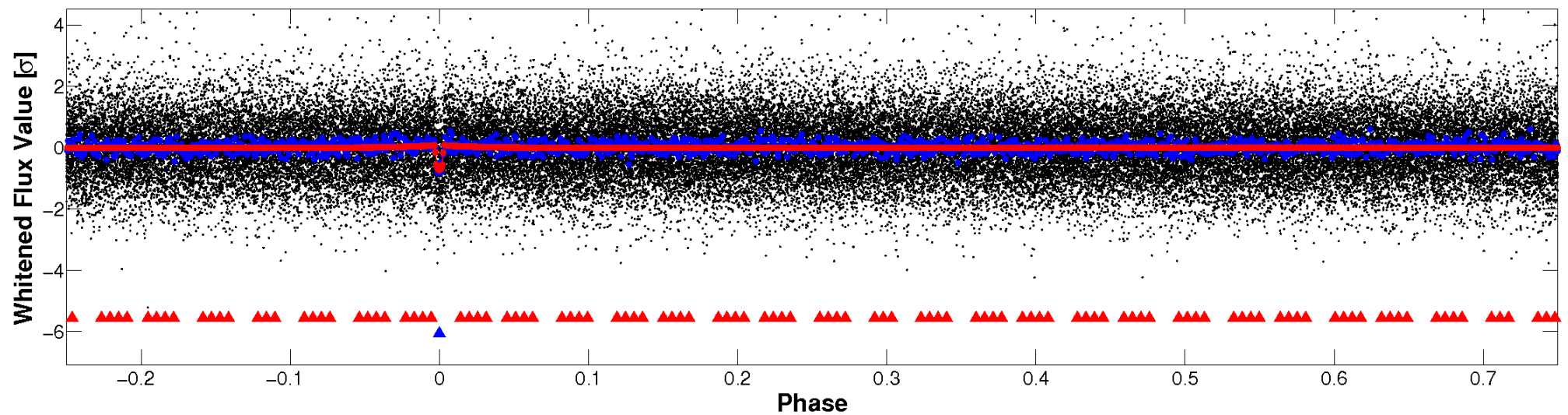


Non-Whitened Vs. Whitened Light Curve

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

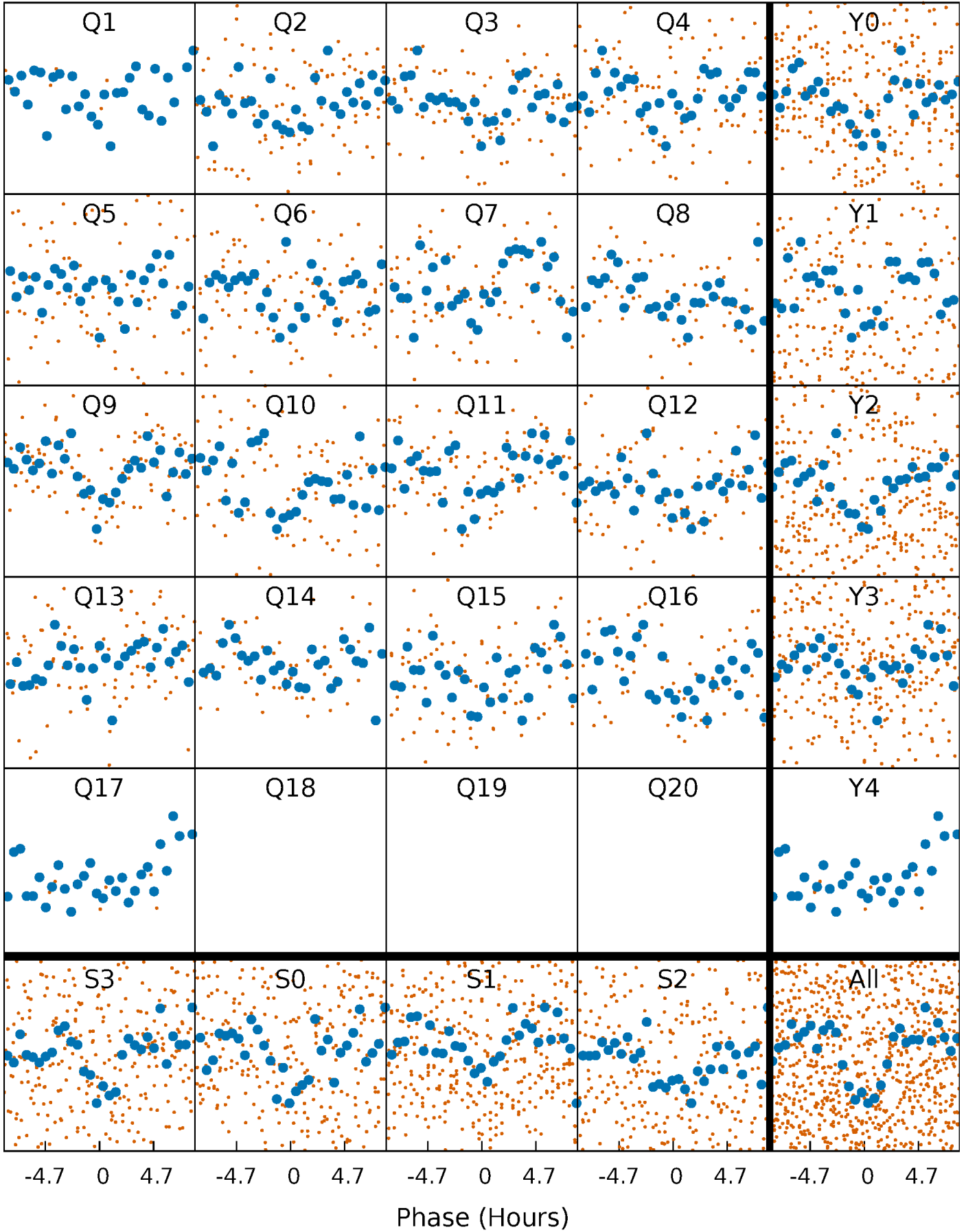


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



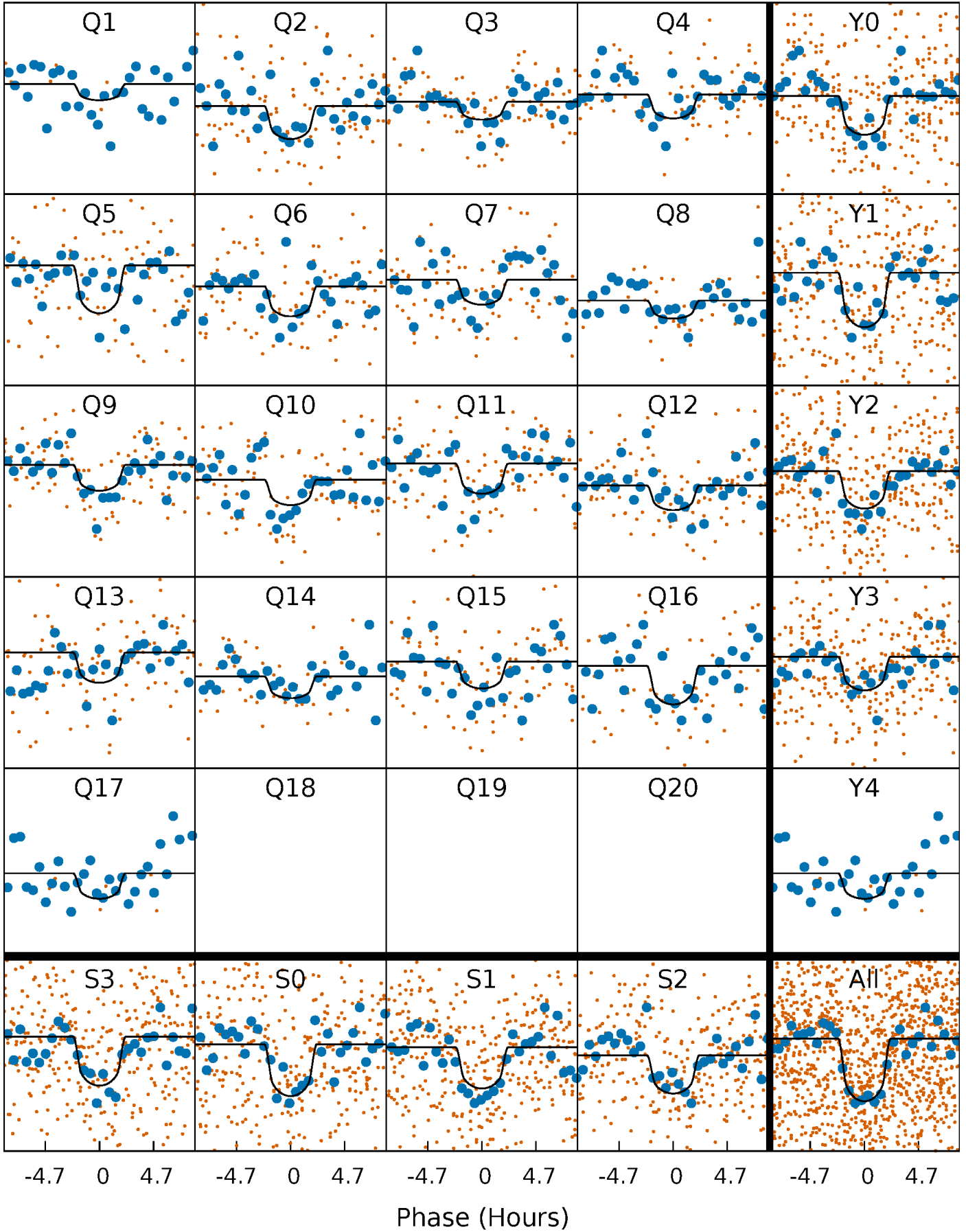
PDC Quarter-Phased Transit Curves

TCE 003234598-02 P= 31.201249 Days $T_0=140.067638$ (BKJD)



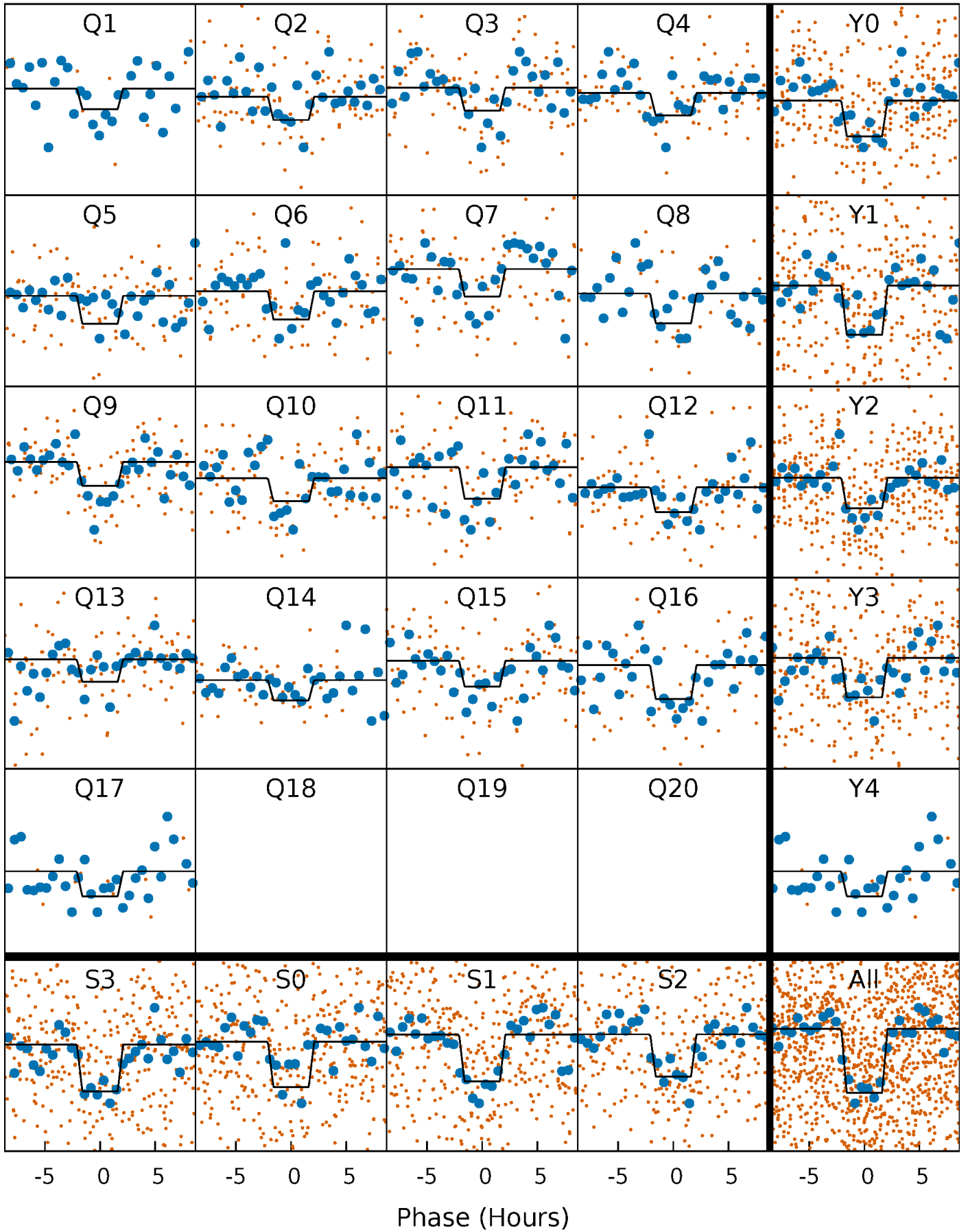
DV Quarter-Phased Transit Curves

TCE 003234598-02 P= 31.201249 Days $T_0=140.067638$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

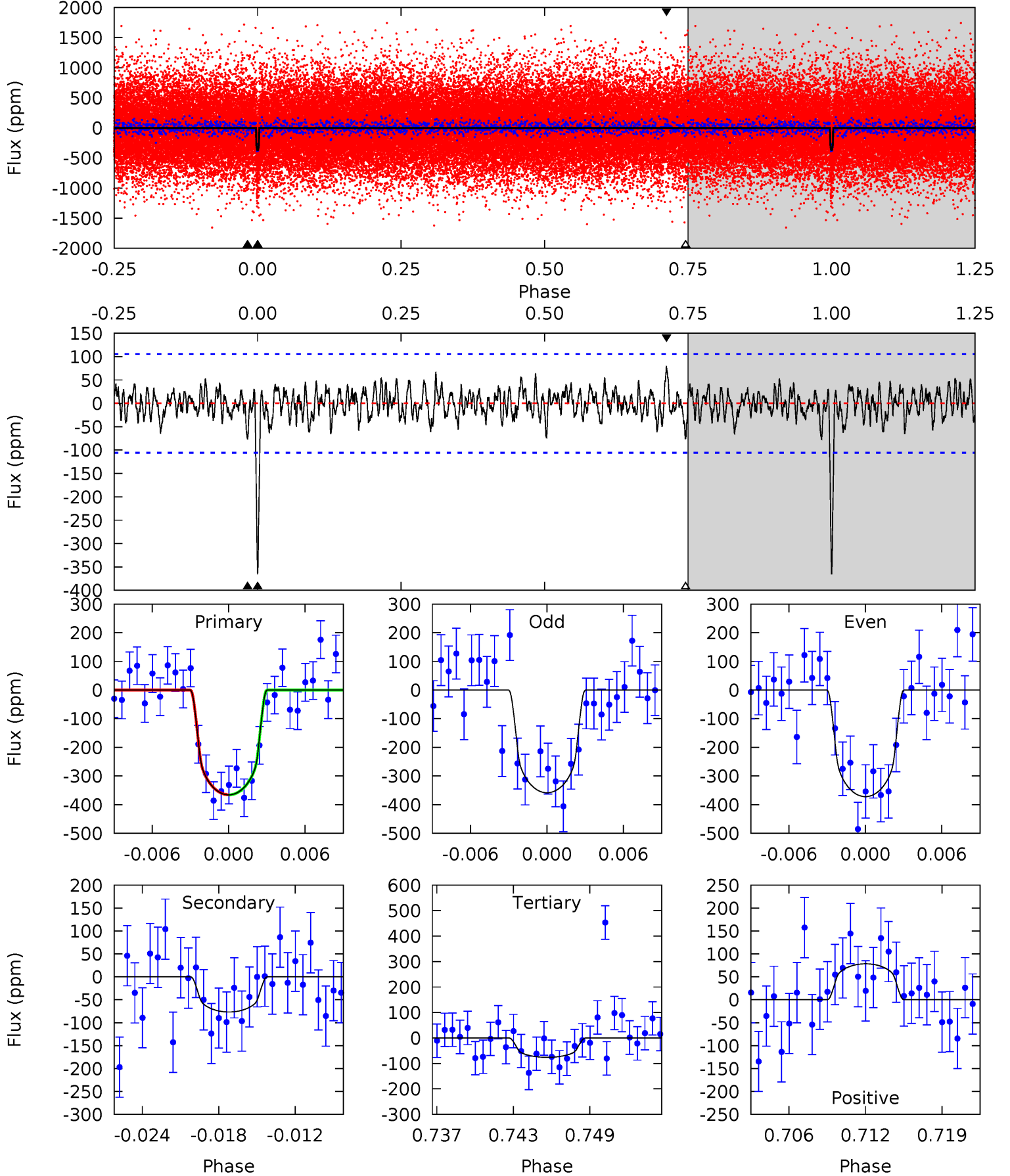
TCE 003234598-02 P= 31.201766 Days $T_0=140.058578$ (BKJD)



DV Model-Shift Uniqueness Test

003234598-02, P = 31.201249 Days, E = 108.866389 Days

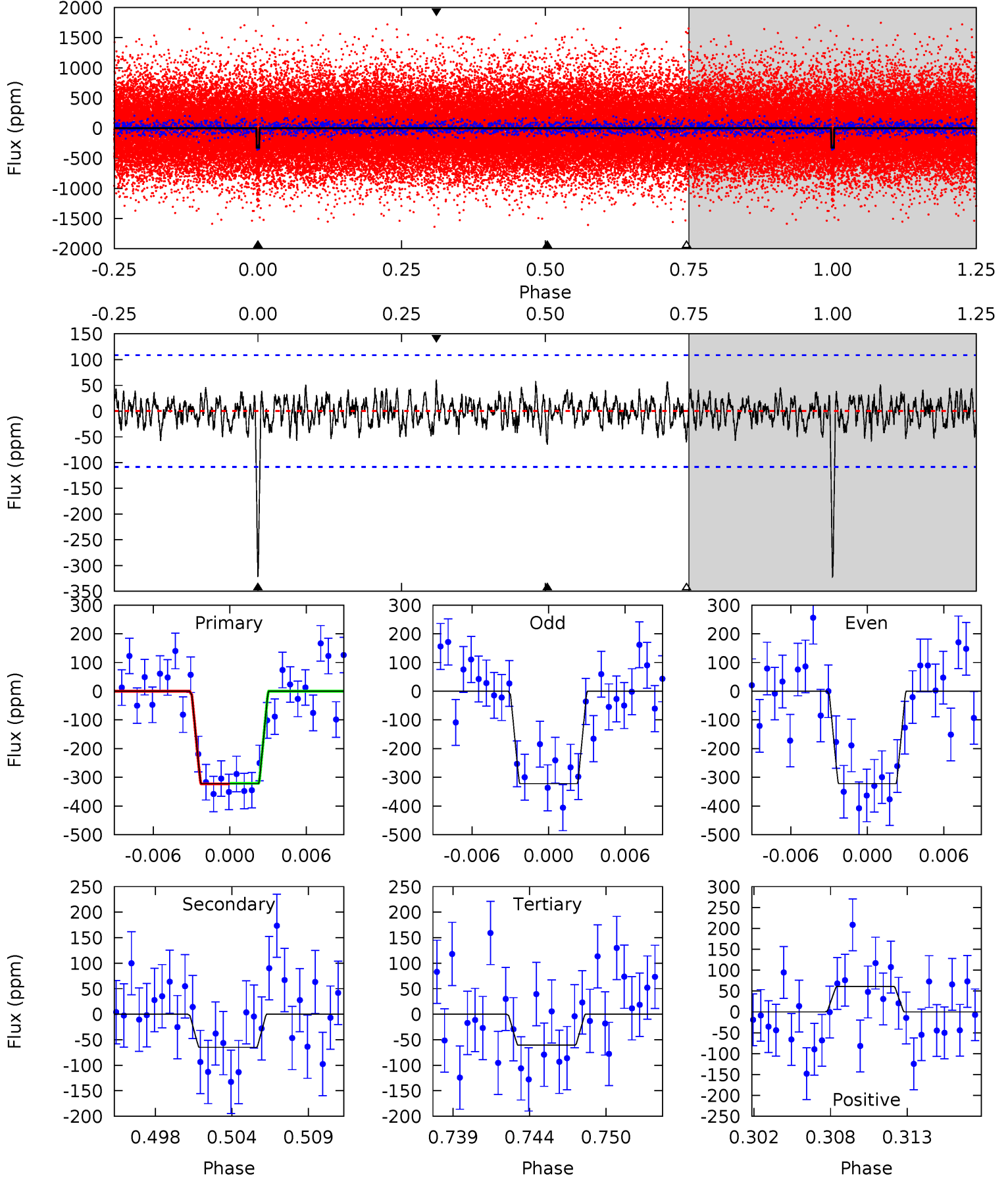
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 17.7 | 3.72 | 3.69 | 3.80 | 5.12 | 2.74 | 1.19 | 14.0 | 13.9 | 0.03 | -0.08 | 0.33 | 1.02 | 0.18 | 0.01 |



Alt Model-Shift Uniqueness Test

003234598-02, P = 31.201766 Days, E = 108.856812 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 15.2 | 3.07 | 2.86 | 2.87 | 5.14 | 2.77 | 0.97 | 12.4 | 12.4 | 0.21 | 0.20 | 0.00 | 1.02 | 0.16 | 0.04 |



Stellar Parameters For KIC 003234598

| | $T_{\text{eff}}(K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|---------------------|---------------------------|---------------------------|---------------------------|---------------------------|---|
| | 4513^{+71}_{-80} | $4.574^{+0.048}_{-0.012}$ | $0.160^{+0.150}_{-0.150}$ | $0.722^{+0.021}_{-0.038}$ | $0.712^{+0.041}_{-0.026}$ | $2.668^{+0.451}_{-0.135}$ |
| | +2%/-2% | +1%/-0% | +94%/-94% | +3%/-5% | +6%/-4% | +17%/-5% |
| Source | SPE90 | SPE90 | SPE90 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 003234598-02 / KOI 2413.02

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|--------------|------------------------|-------------------|-----------------------|----------------------|
| DV | -77 ± 21 | $1.63^{+0.83}_{-0.83}$ | 565^{+11}_{-12} | 3335^{+892}_{-403} | 475^{+1535}_{-278} |
| Alt. | -65 ± 21 | $1.45^{+0.73}_{-0.79}$ | 564^{+11}_{-12} | 3346^{+1014}_{-423} | 493^{+1854}_{-302} |

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 $A_{obs} \gg 1.0$

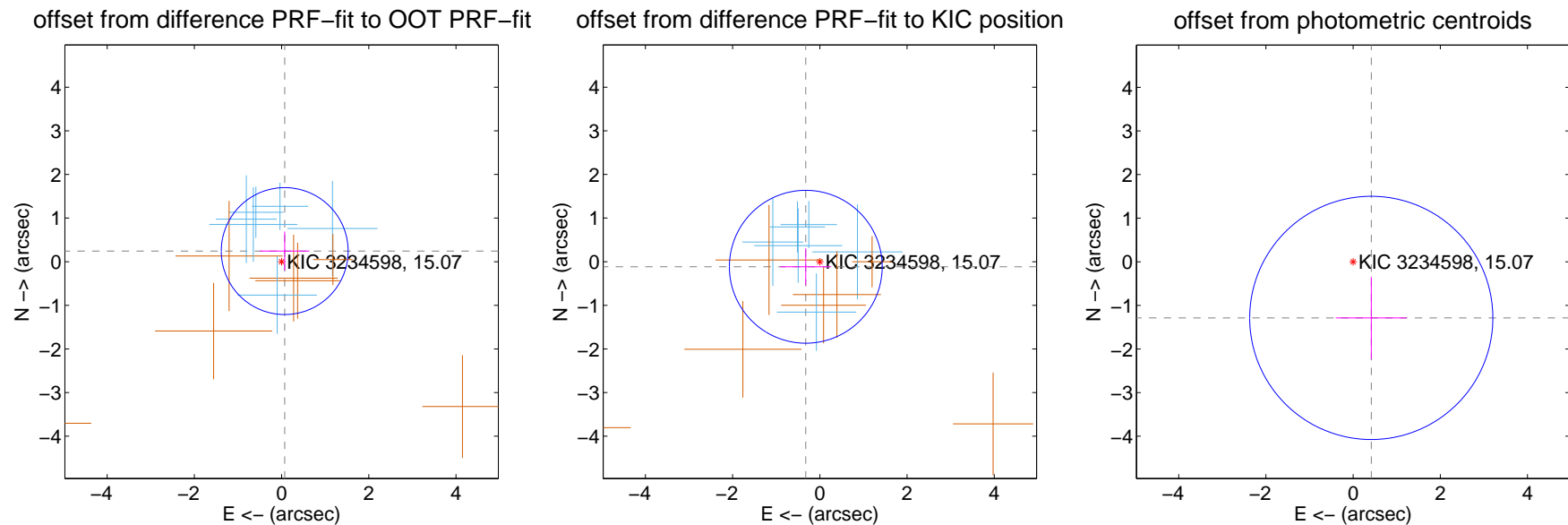
DV Centroid Data

Supplemental centroid analysis for 003234598-02. Kepler magnitude: 15.07. Transit SNR 11.46

There are 6 quarters with good PRF difference image offsets

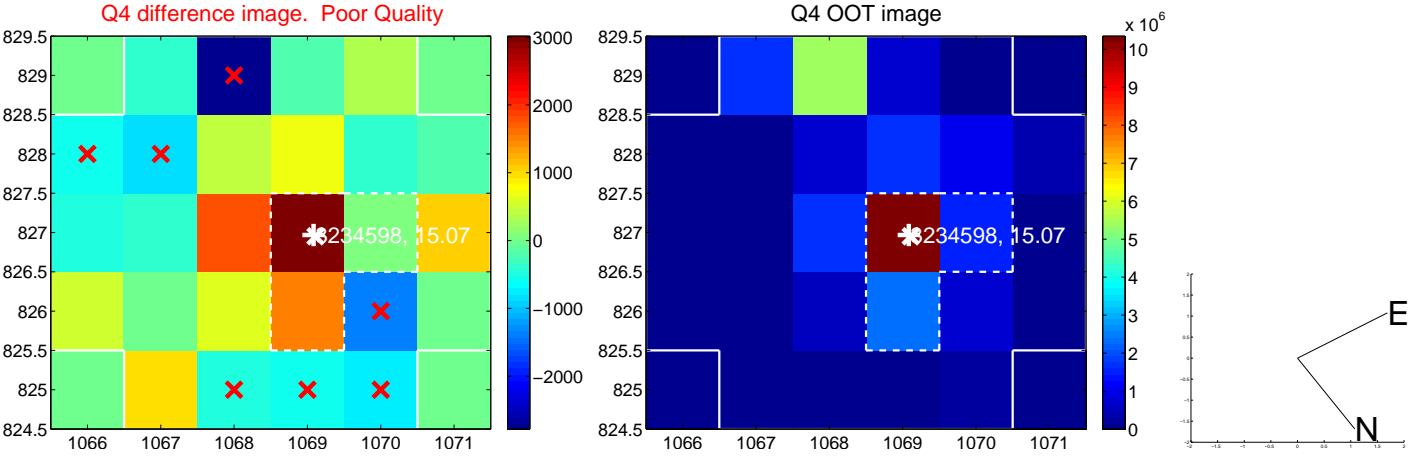
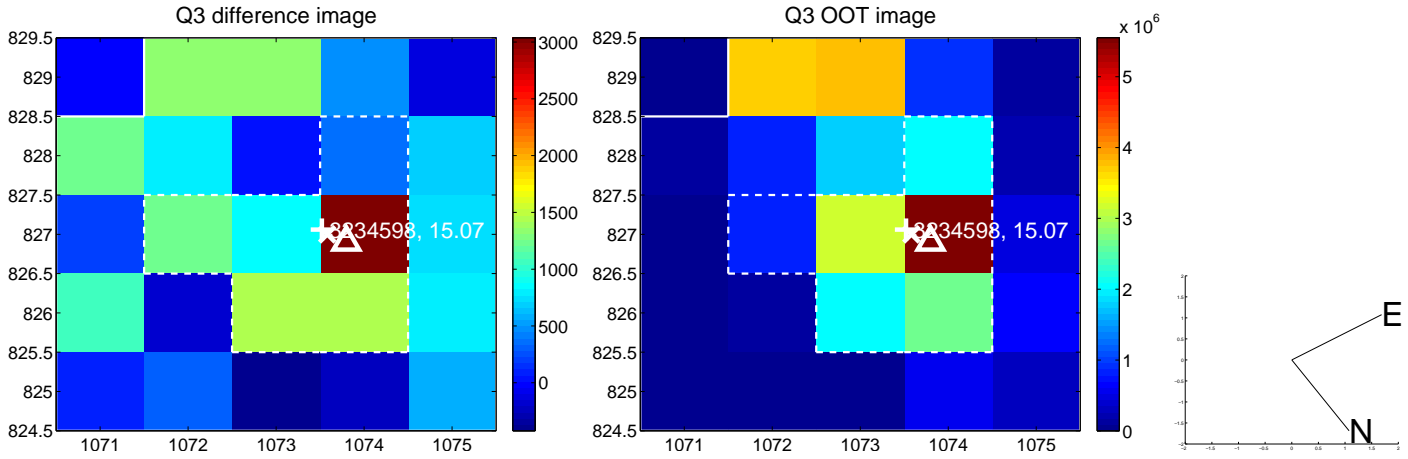
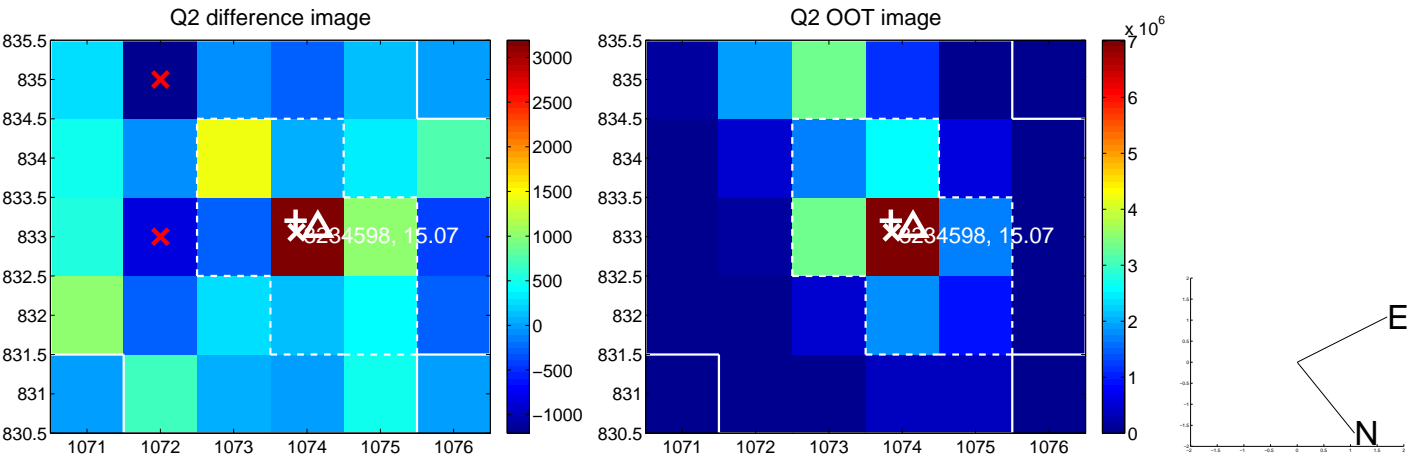
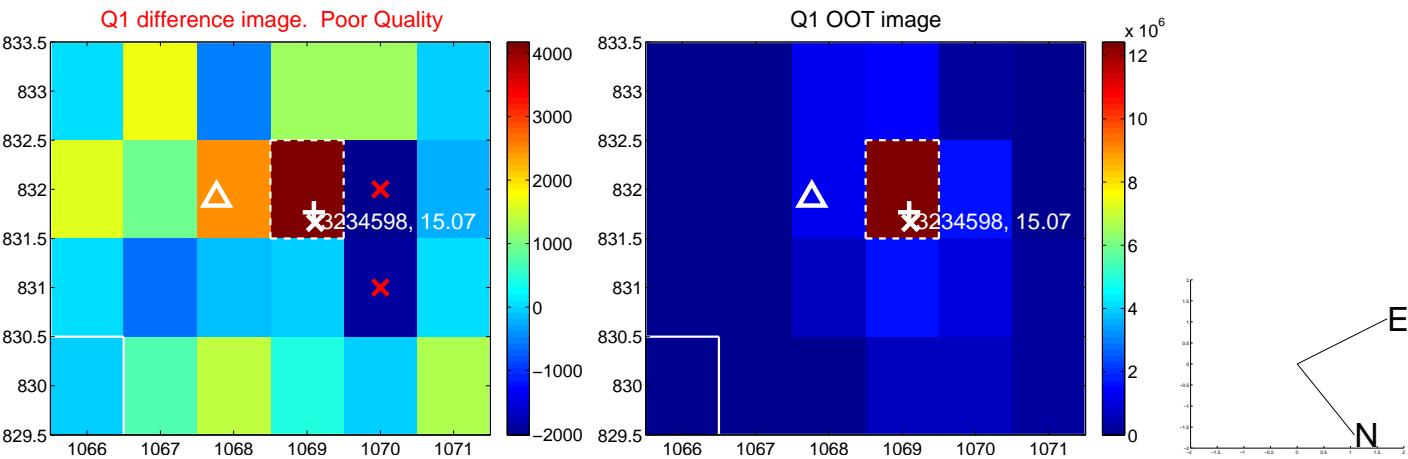
The direct PRF centroid is offset from the target star catalog position by about 0.47 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.253 ± 0.485 | 0.52 | -0.072 ± 0.565 | 0.243 ± 0.447 |
| PRF-fit source offset from KIC position | 0.343 ± 0.584 | 0.59 | 0.322 ± 0.579 | -0.116 ± 0.423 |
| photometric centroid source offset | 1.35 ± 0.93 | 1.46 | -0.42 ± 0.82 | -1.29 ± 0.94 |

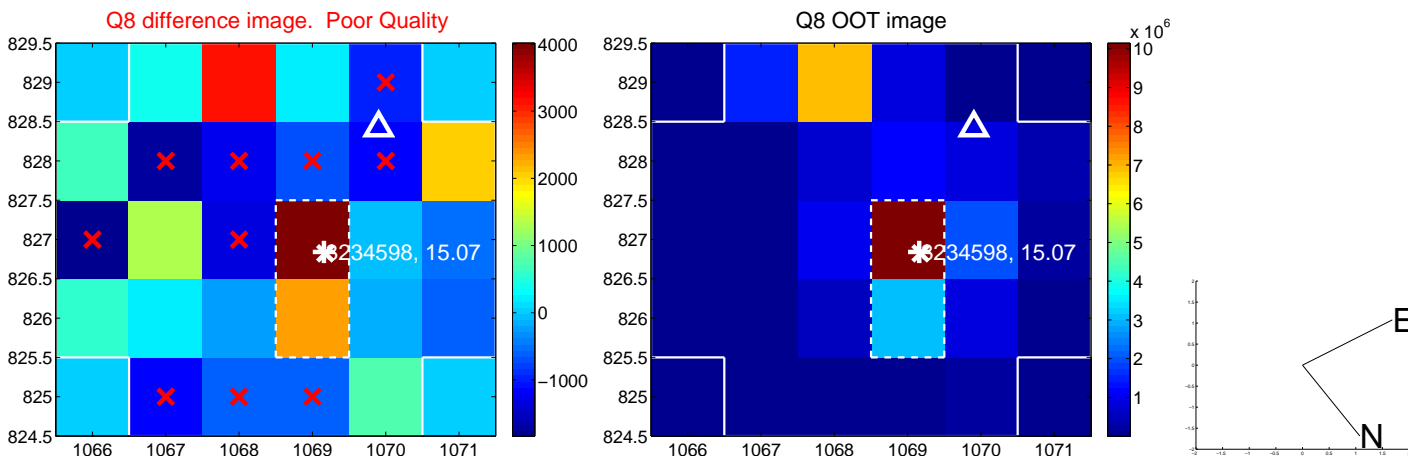
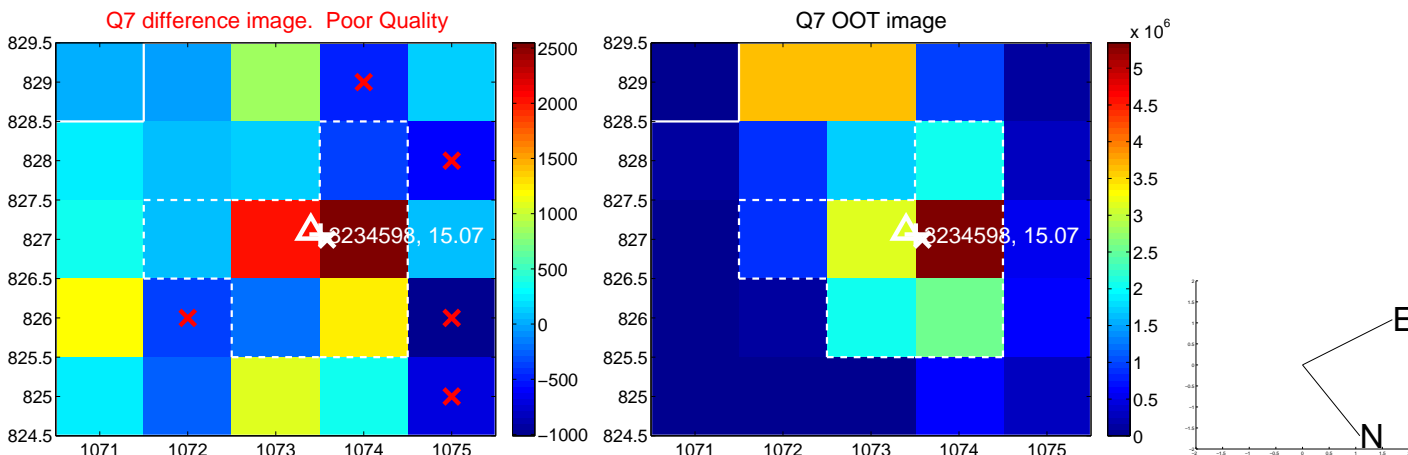
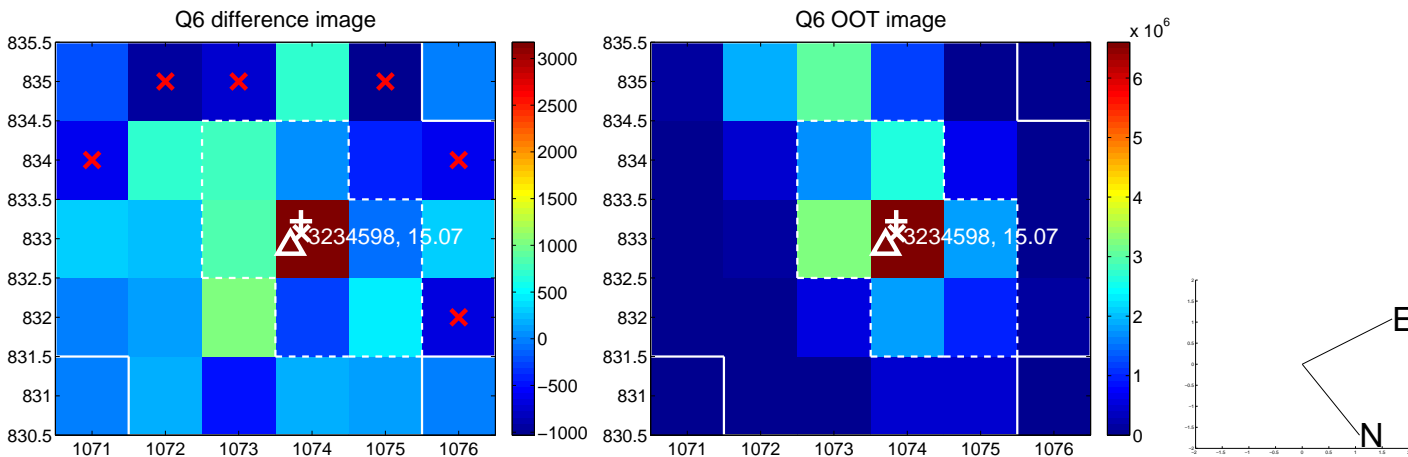
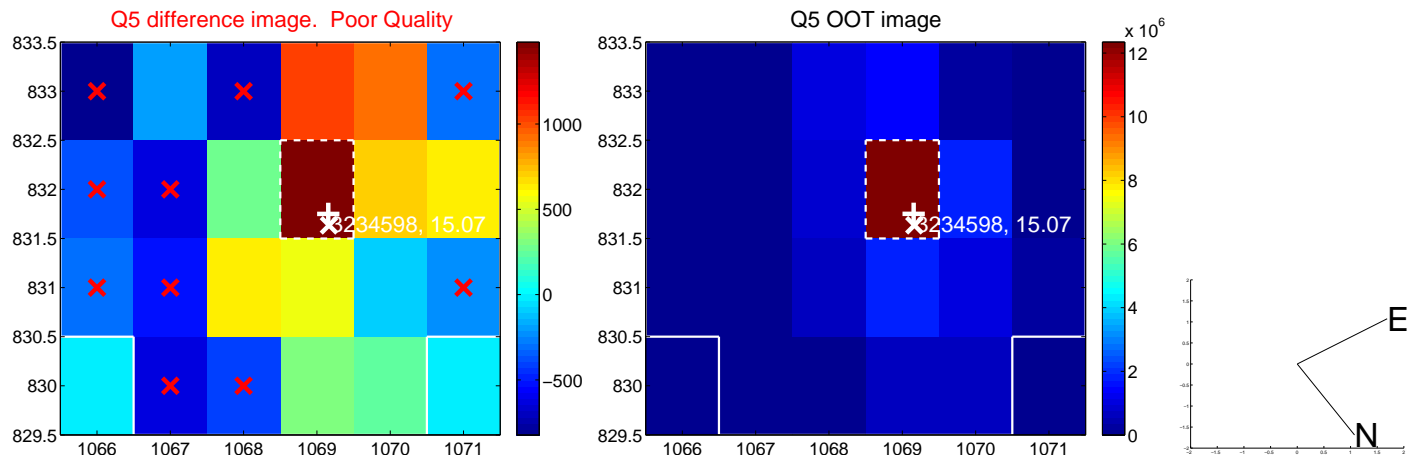


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

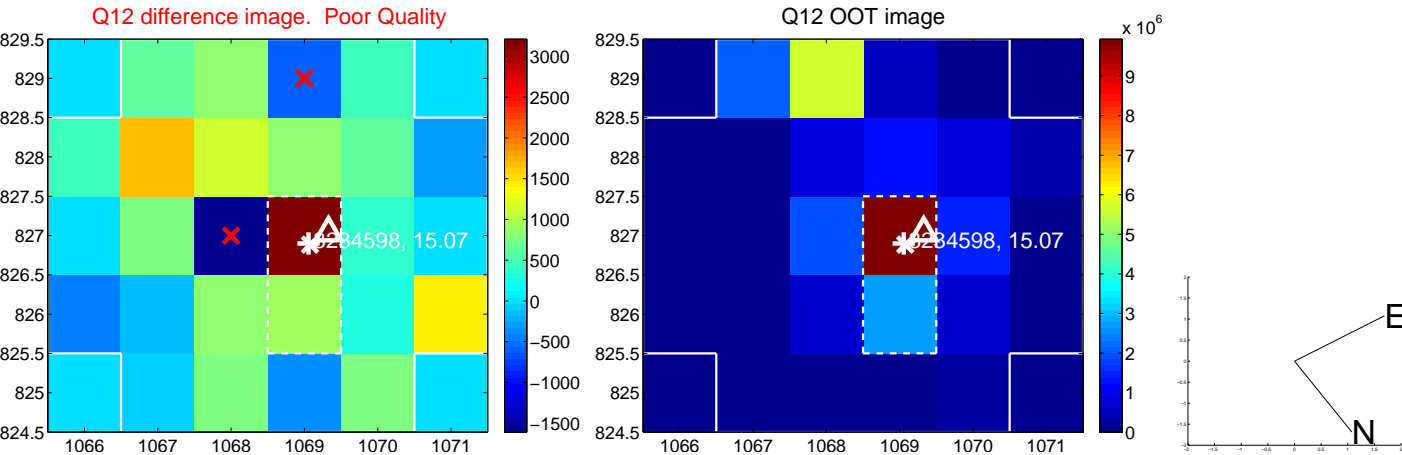
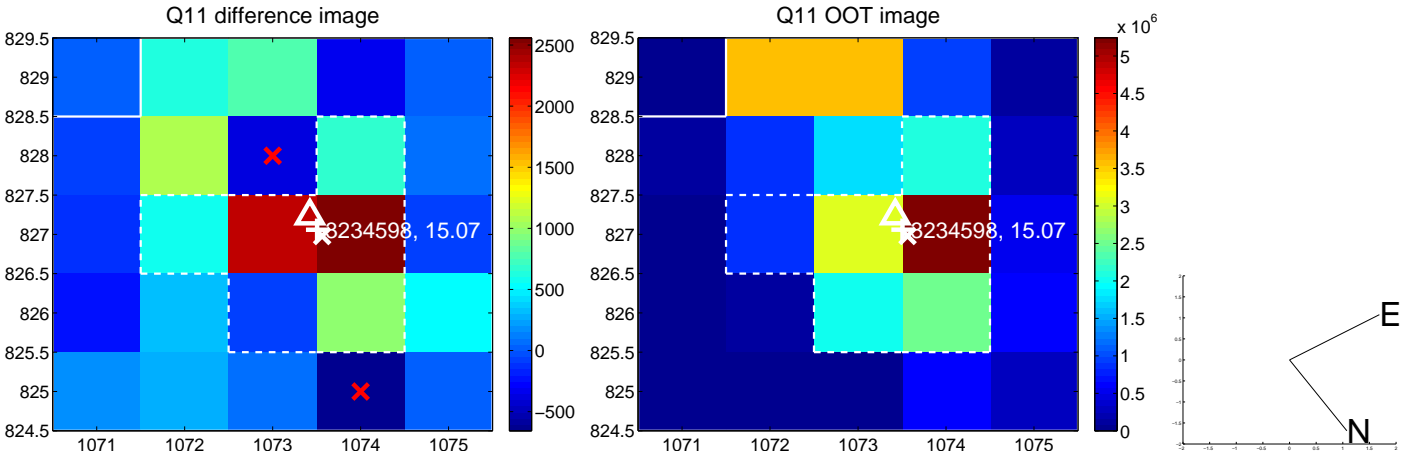
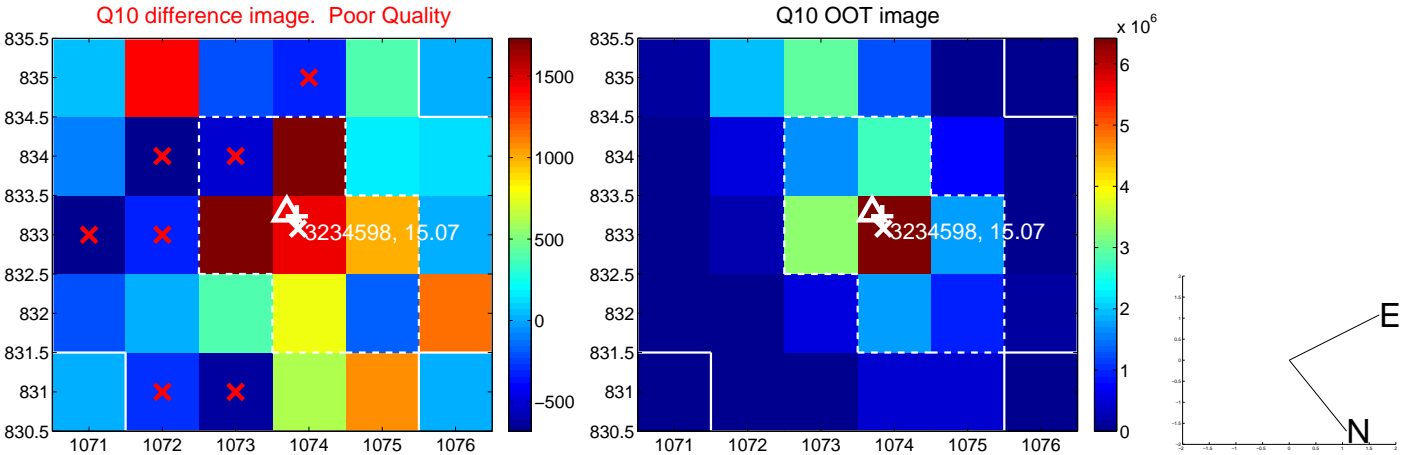
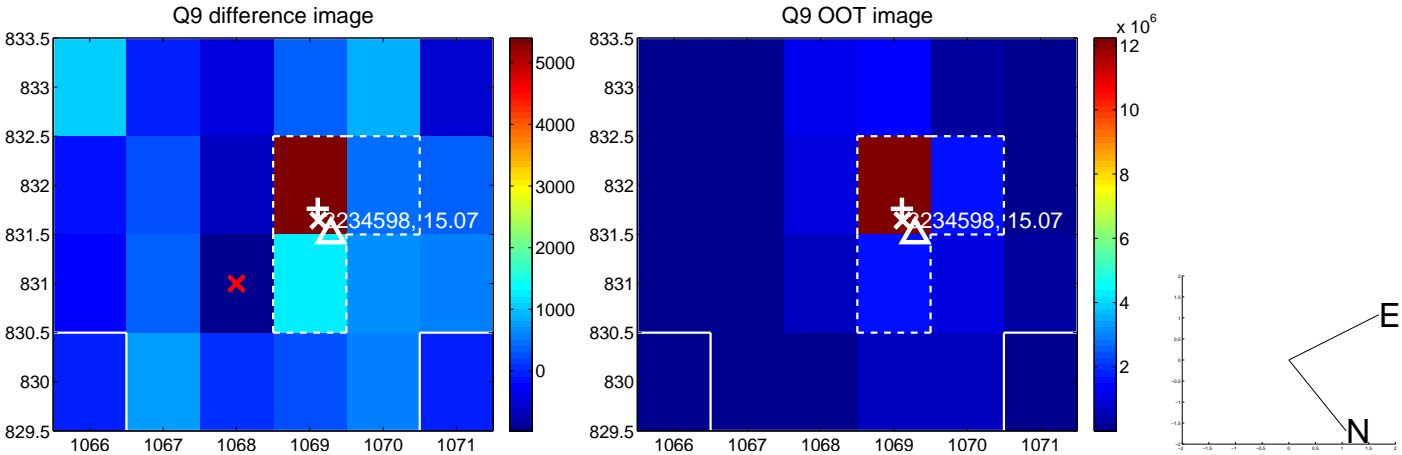
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



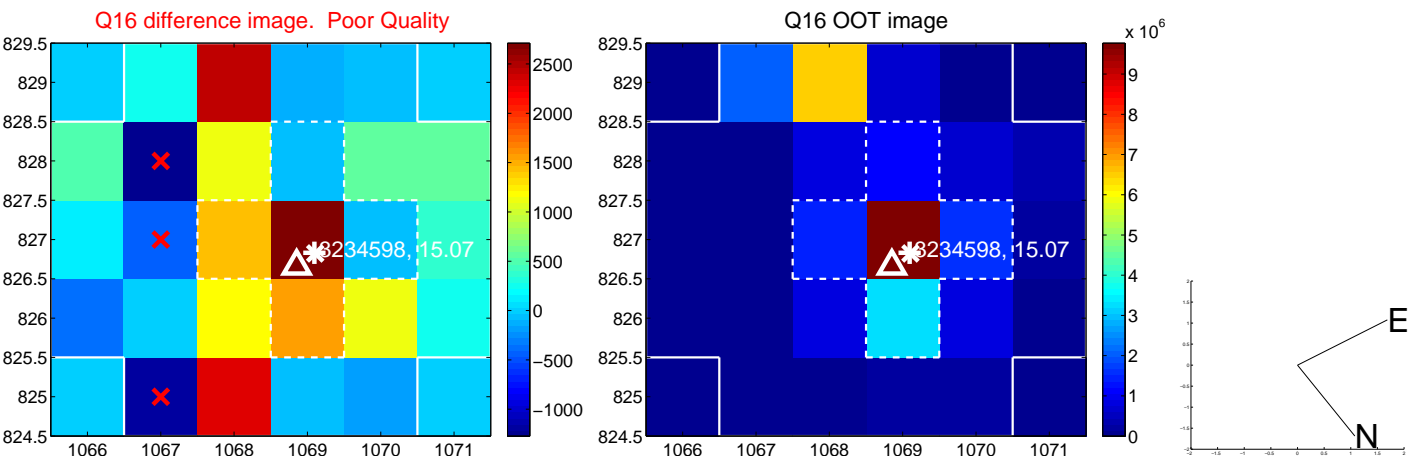
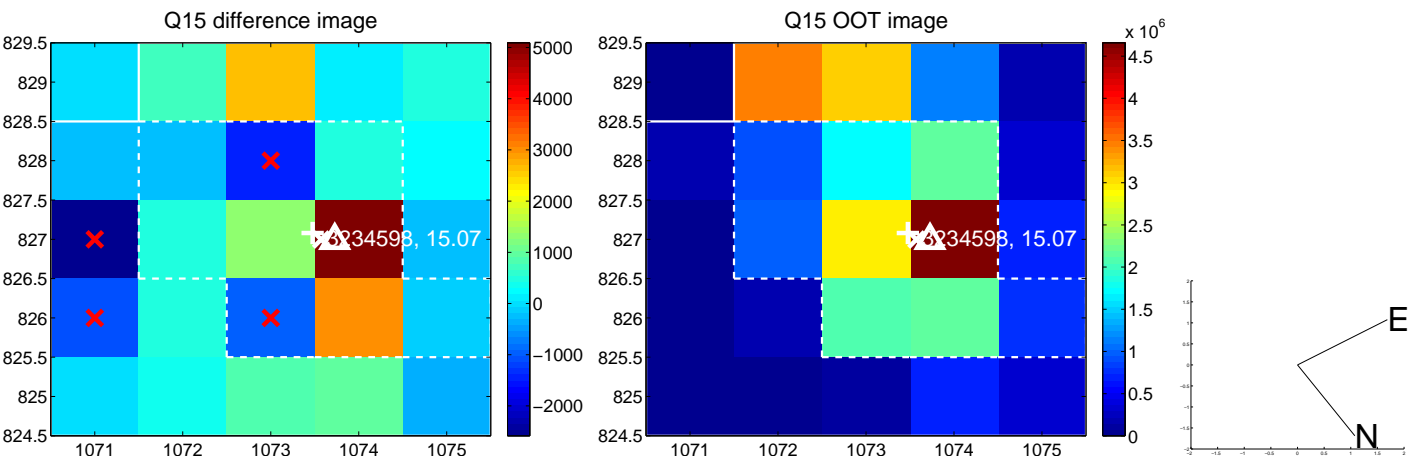
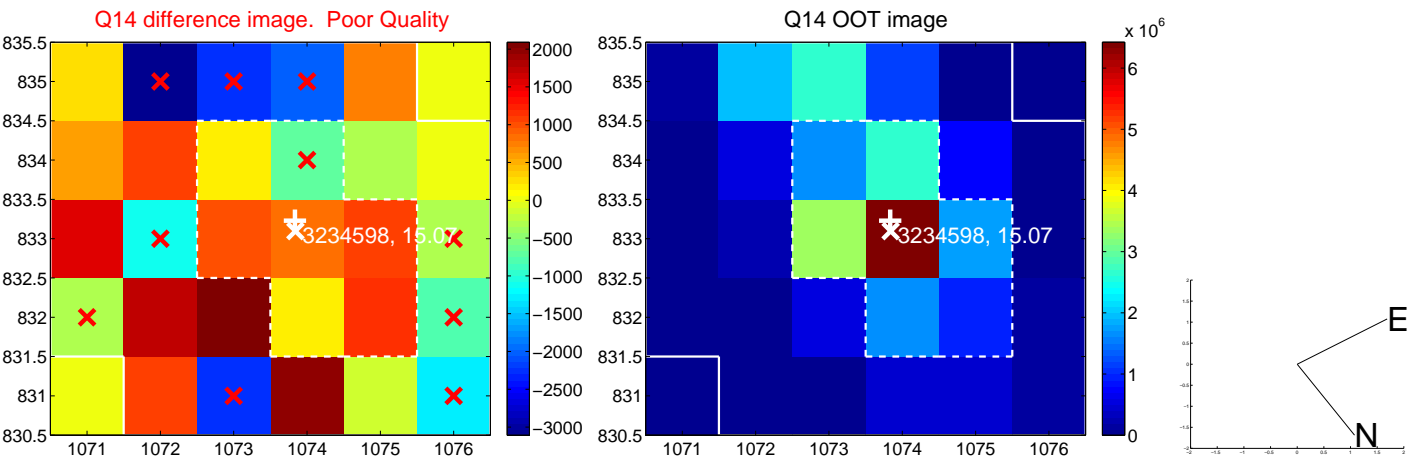
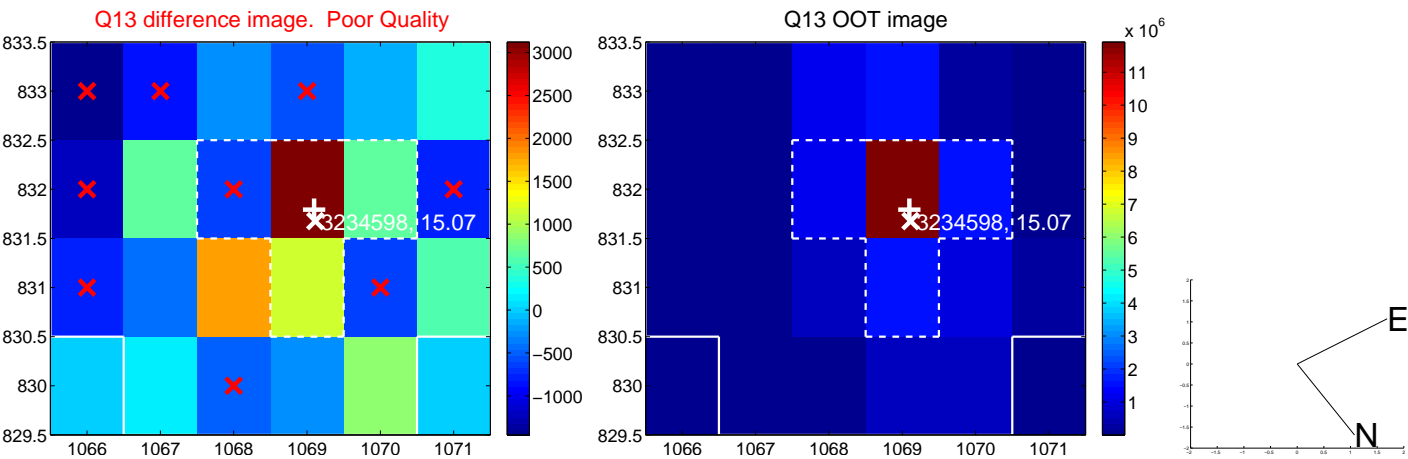
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



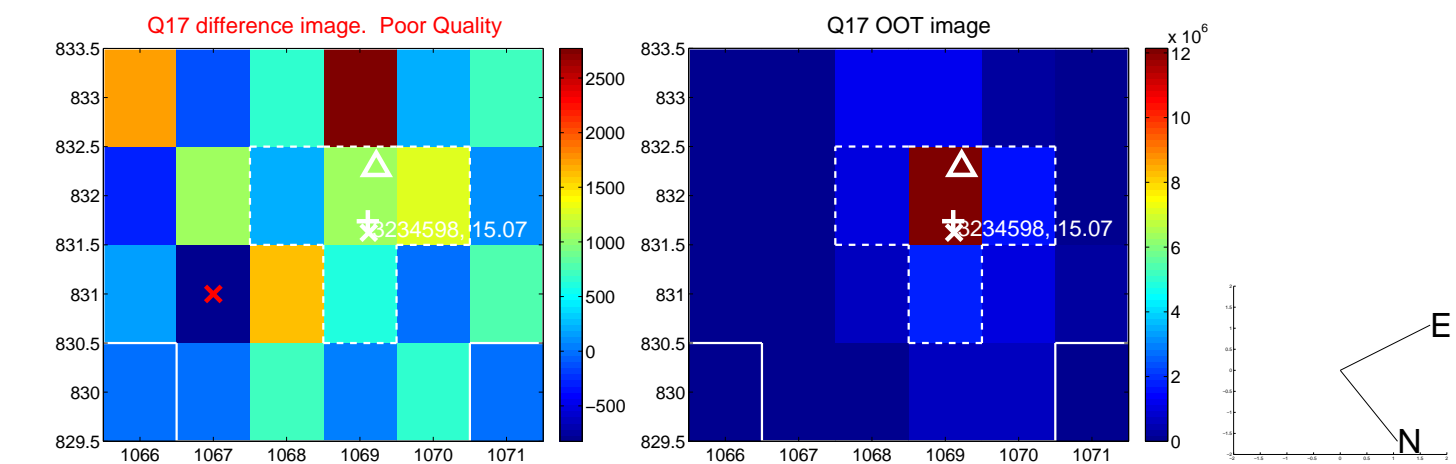
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



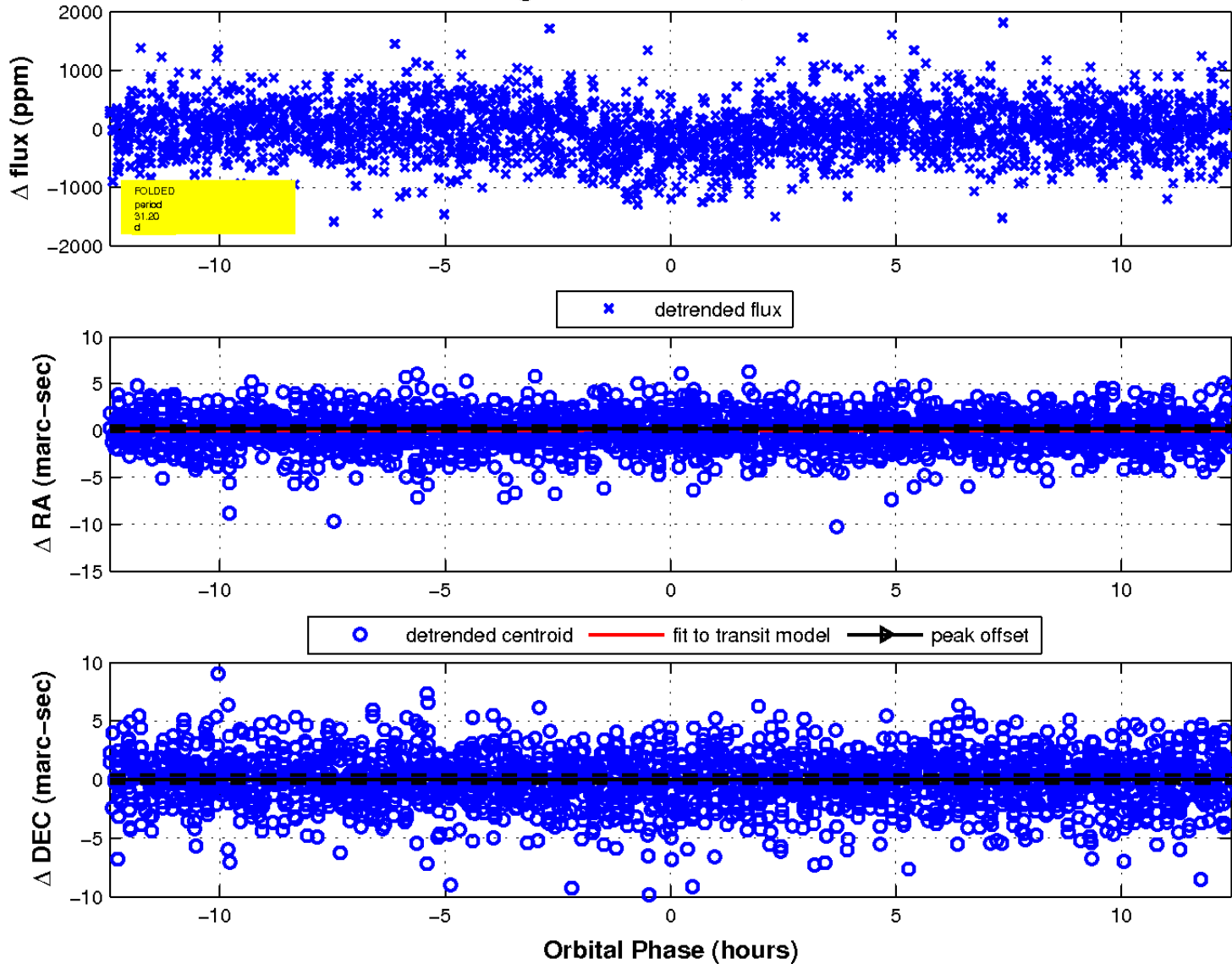
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 2 of 2



UKIRT Image

Declination

