

KIC 009974087

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009974087-01 | OBS | No | 0.592625 | 131.618959 | 52.2 | 1.284 | 12.9 | 12.0 | 8.62 | 5478 | 7.33 | 0.00 |
| 009974087-02 | OBS | No | 0.592579 | 131.725893 | 0.0 | 5.028 | 10.7 | 0.0 | 8.62 | 5478 | 0.13 | 0.00 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 009974087-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED |
| 009974087-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED |

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

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

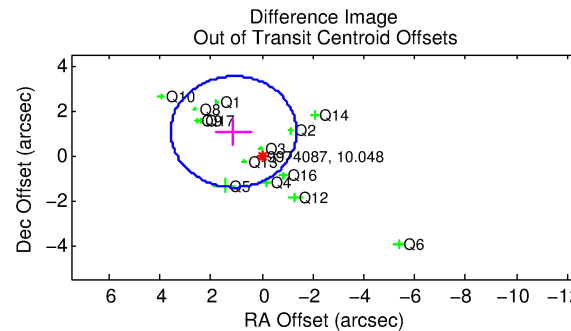
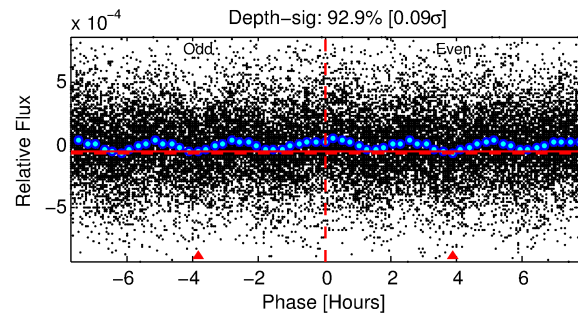
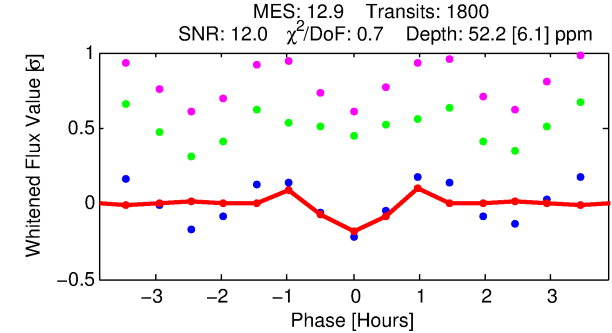
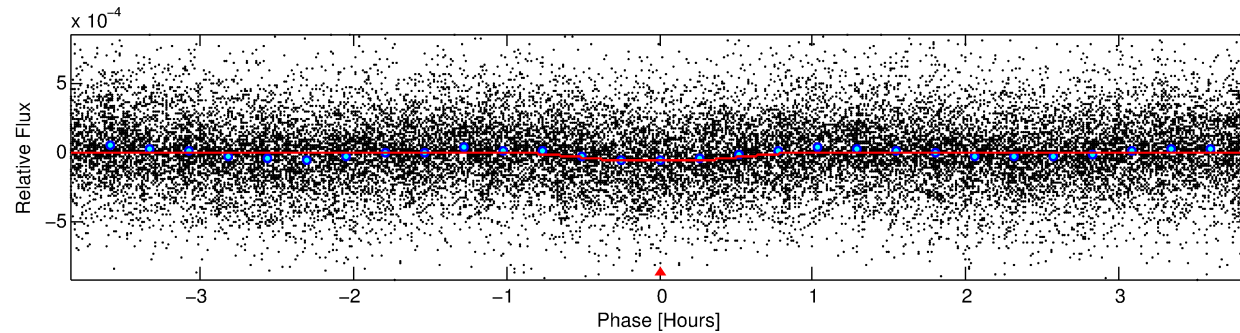
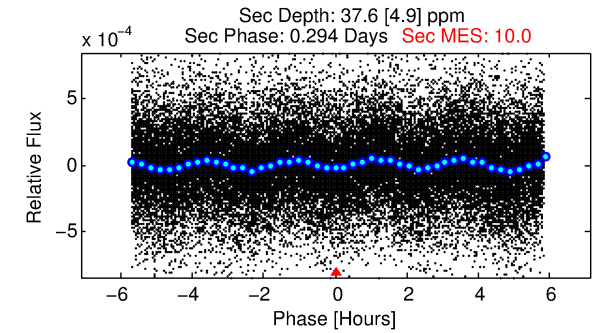
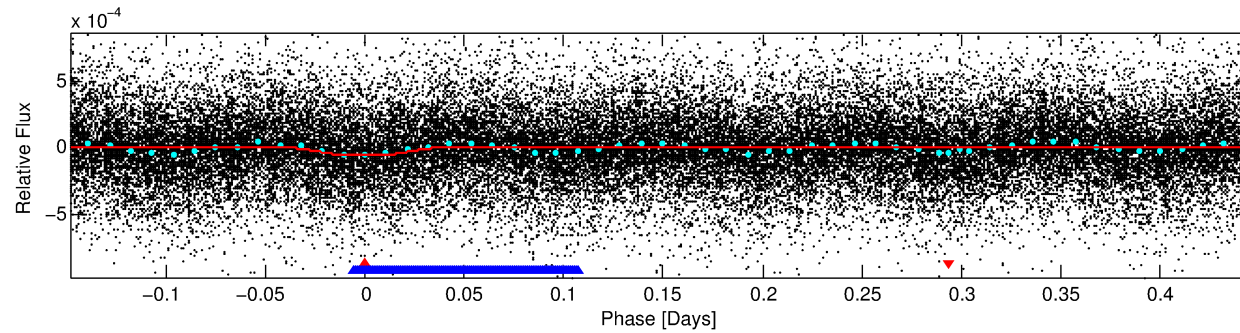
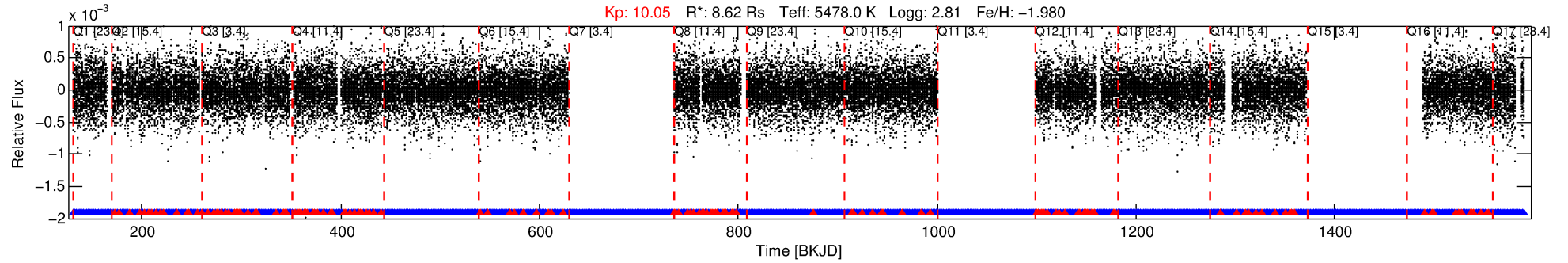
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009974087-01

No Significant Match Found

DV One-Page Summary

KIC: 9974087 Candidate: 1 of 2 Period: 0.593 d



DV Fit Results:

Period = 0.59262 [0.00001] d
Epoch = 131.6190 [0.0009] BKJD
 $R_p/R^* = 0.0078$ [0.0014]
 $a/R^* = 1.87$ [1.26]
 $b = 0.90$ [0.21]
 $S_{\text{eff}} = \text{N/A}$
 $T_{\text{eq}} = \text{N/A}$
 $R_p = 7.33$ [2.87] R_e
 $a = \text{N/A}$
 $A_g = \text{N/A}$
 $T_{\text{eff}} = \text{N/A}$

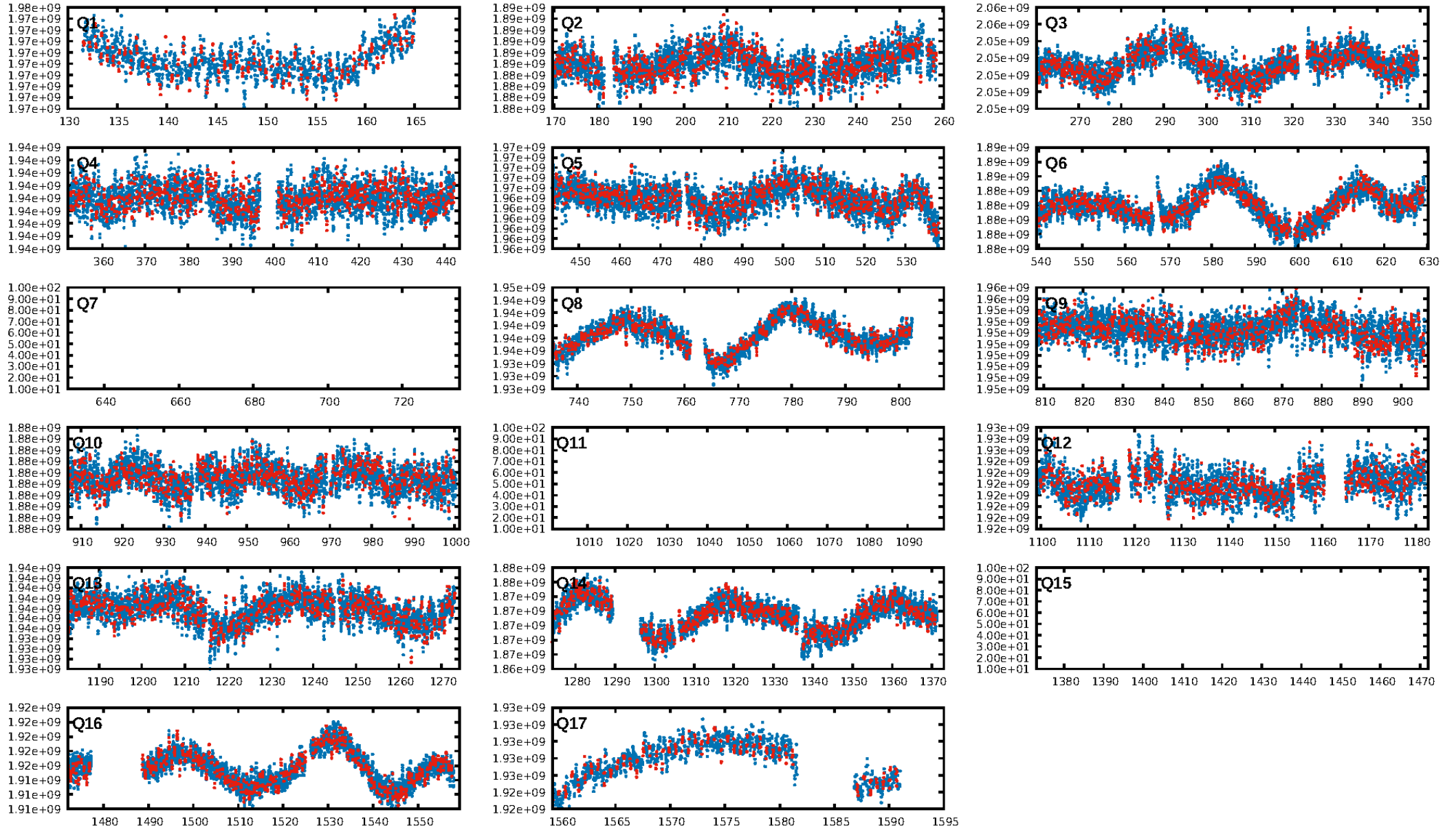
DV Diagnostic Results:

ShortPeriod-sig: 0.0% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: N/A
RollingBand-fgt: 0.91 [1542/1698]
GhostDiagnostic-chr: N/A
Centroid-sig: 0.0%
Centroid-so: 0.751 arcsec [2.68σ]
OotOffset-rm: 1.527 arcsec [1.85σ]
KicOffset-rm: 1.130 arcsec [1.59σ]
OotOffset-st: 4/1/4/5 [14]
KicOffset-st: 4/1/4/5 [14]
DiffImageQuality-fgm: 0.43 [6/14]
DiffImageOverlap-fno: 0.00 [0/14]

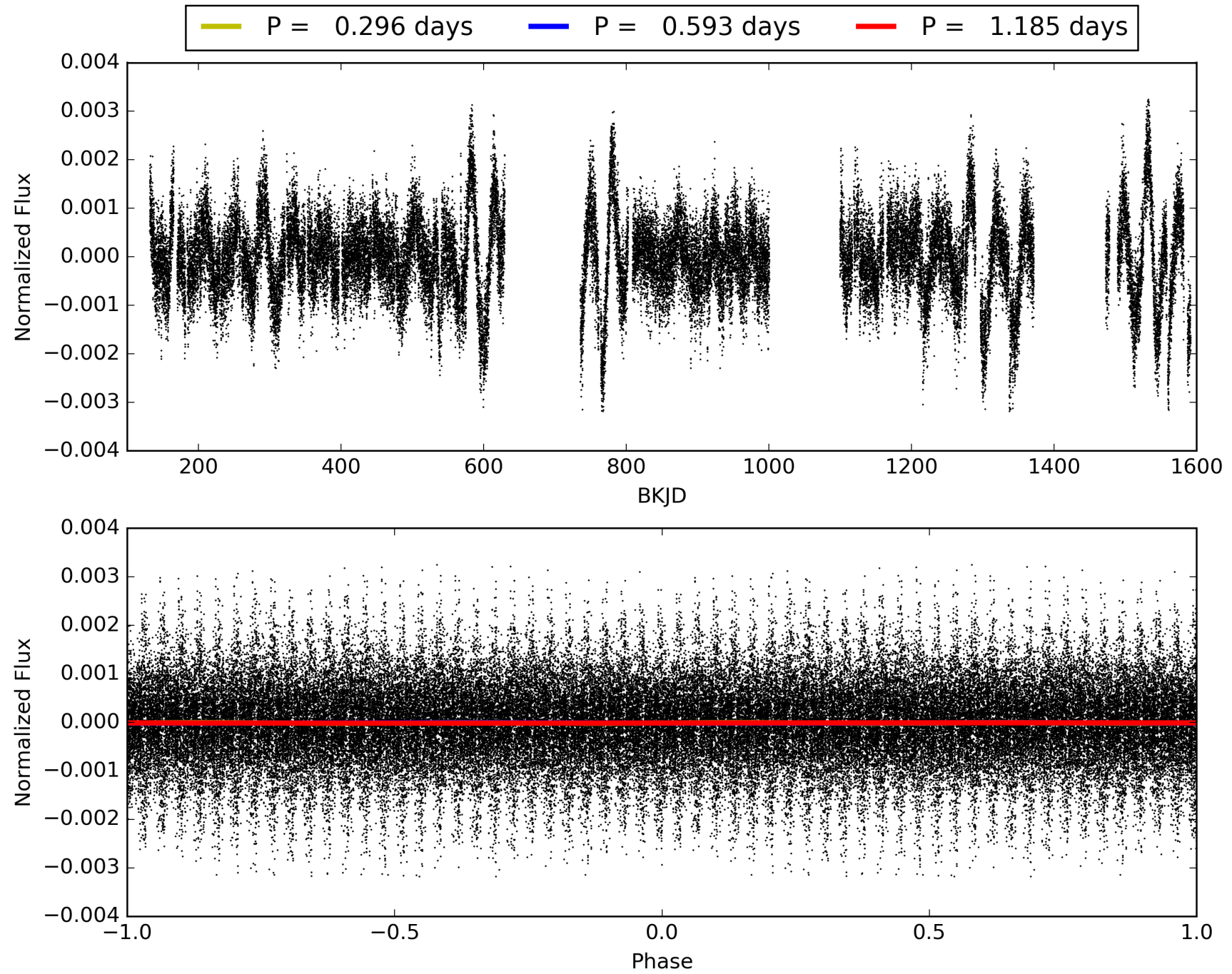
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:25:08 Z

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

TCE 009974087-01, PDC Light Curves

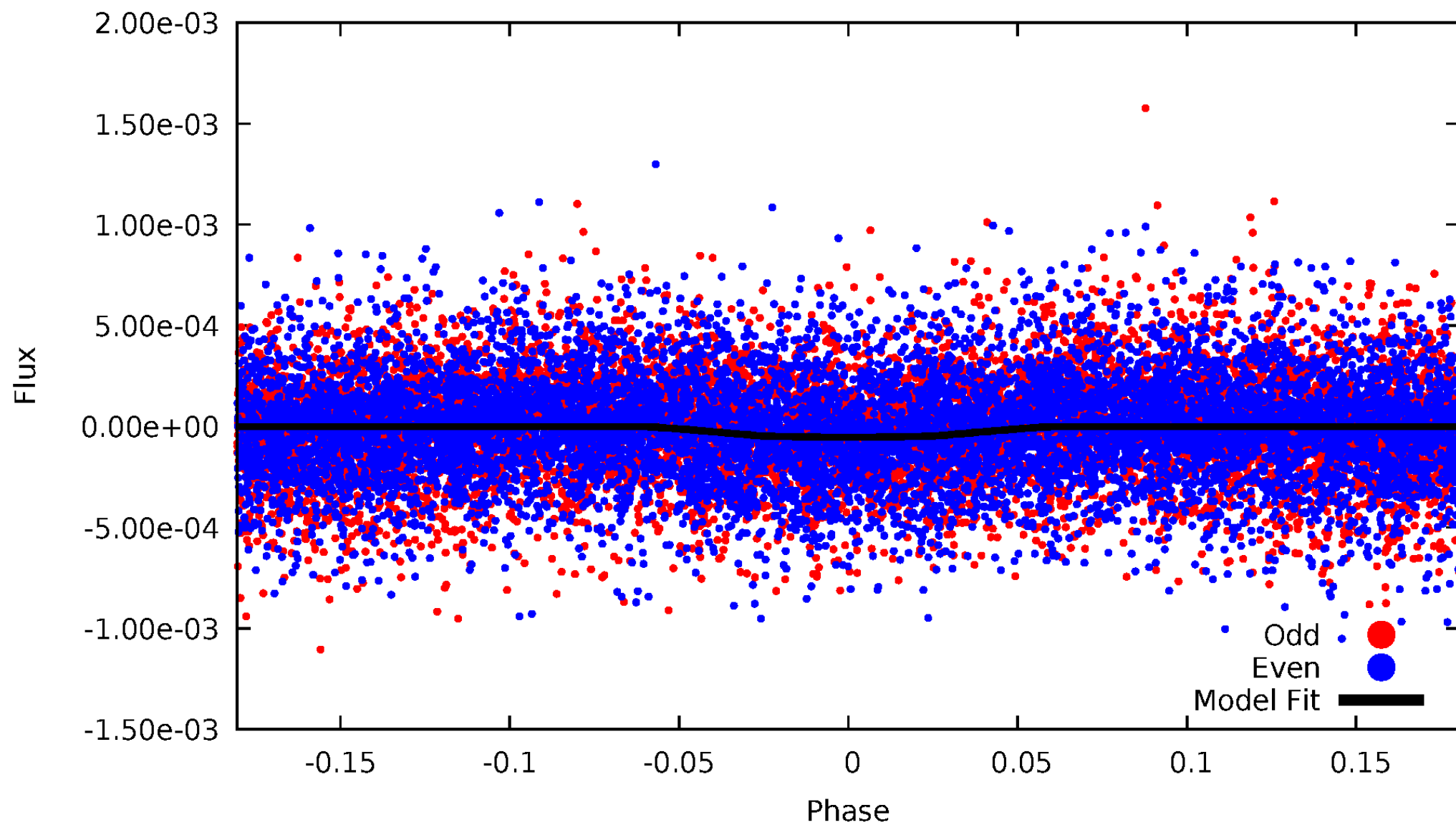


TCE 009974087-01



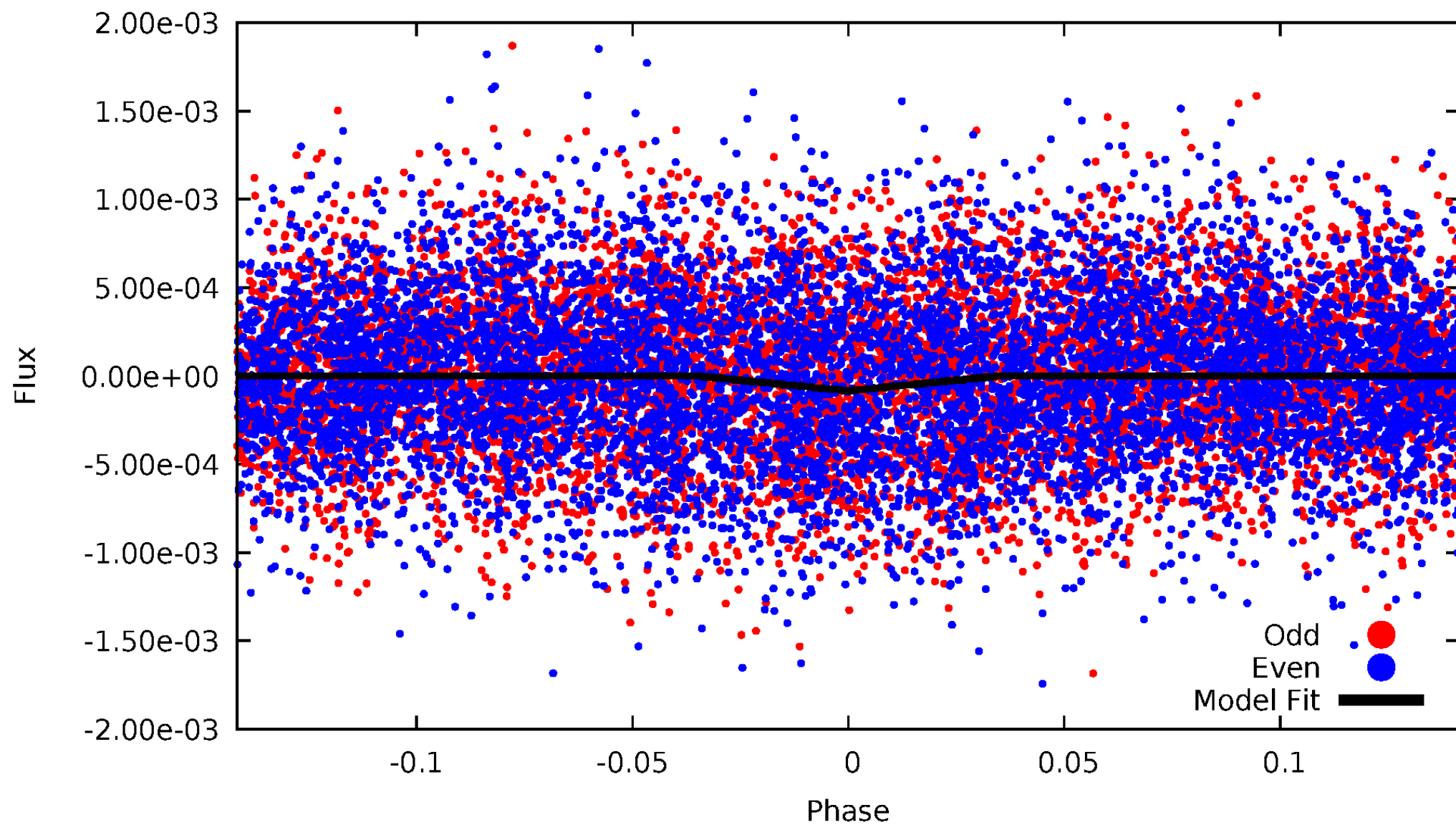
DV Odd/Even

TCE 009974087-01



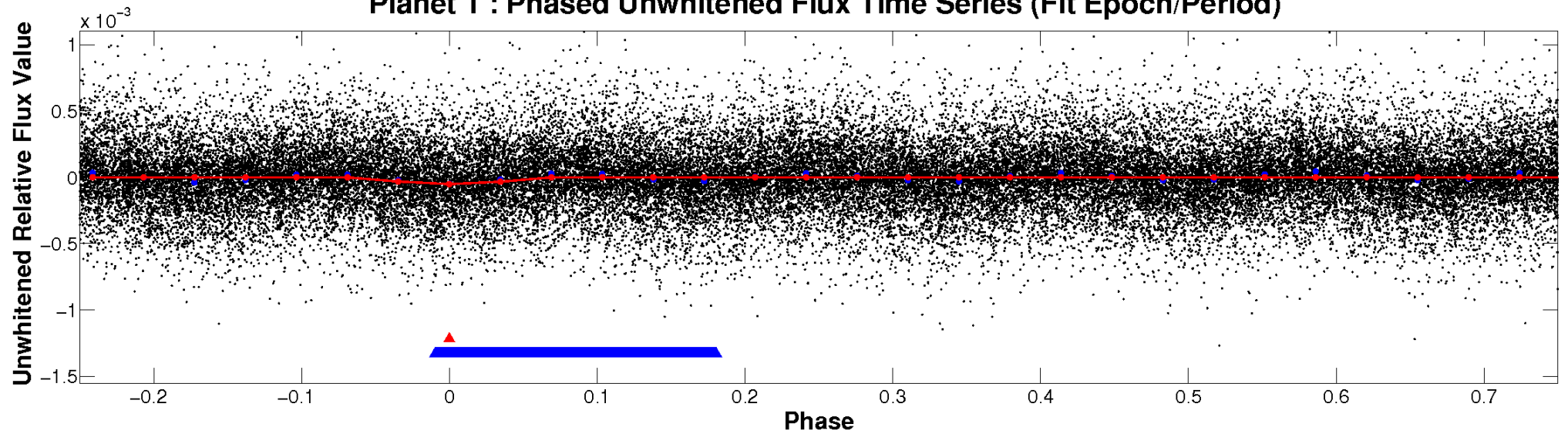
ALT Odd/Even

TCE 009974087-01

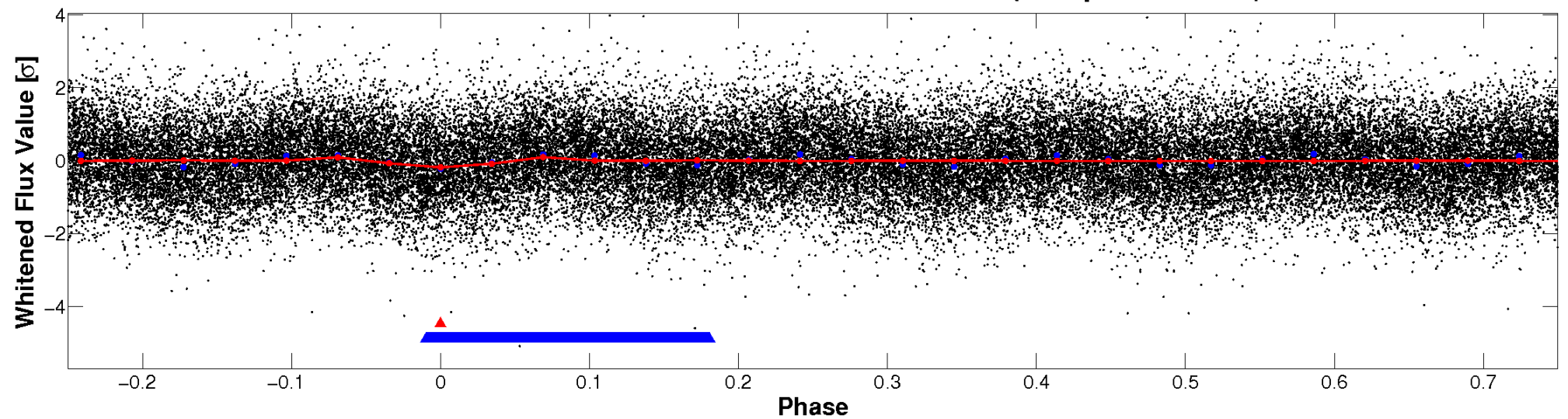


Non-Whitened Vs. Whitened Light Curve

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

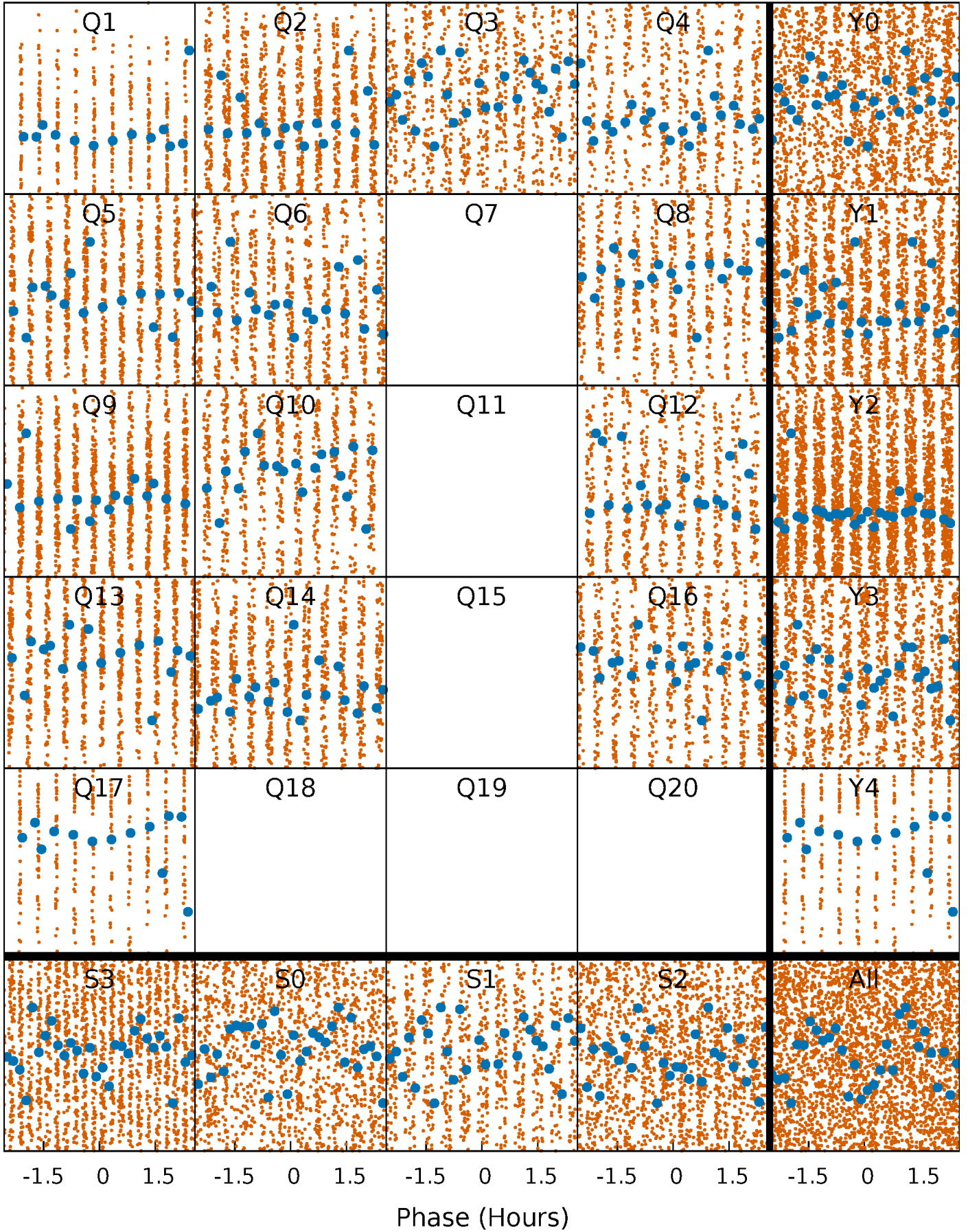


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



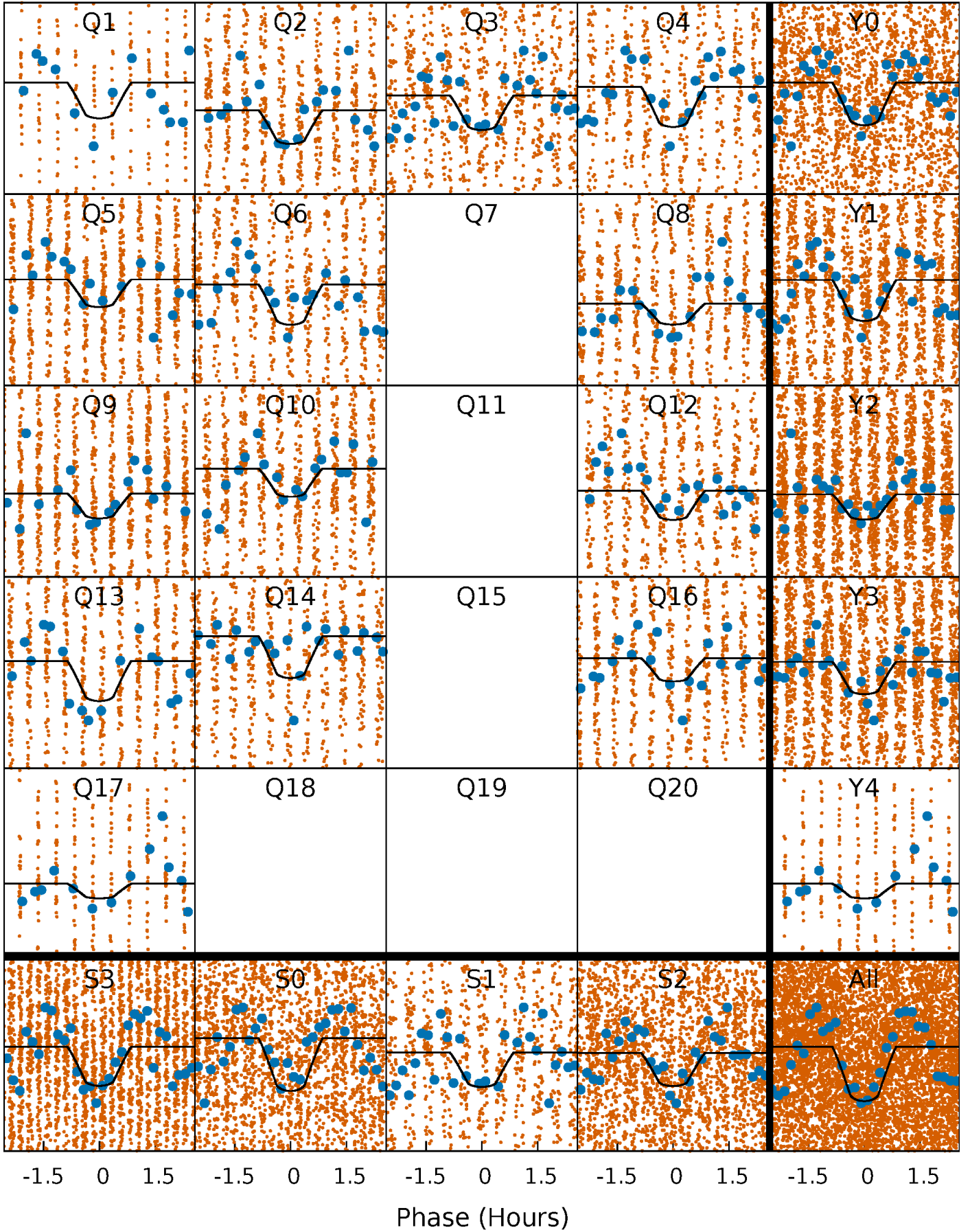
PDC Quarter-Phased Transit Curves

TCE 009974087-01 P= 0.592625 Days $T_0=131.618959$ (BKJD)



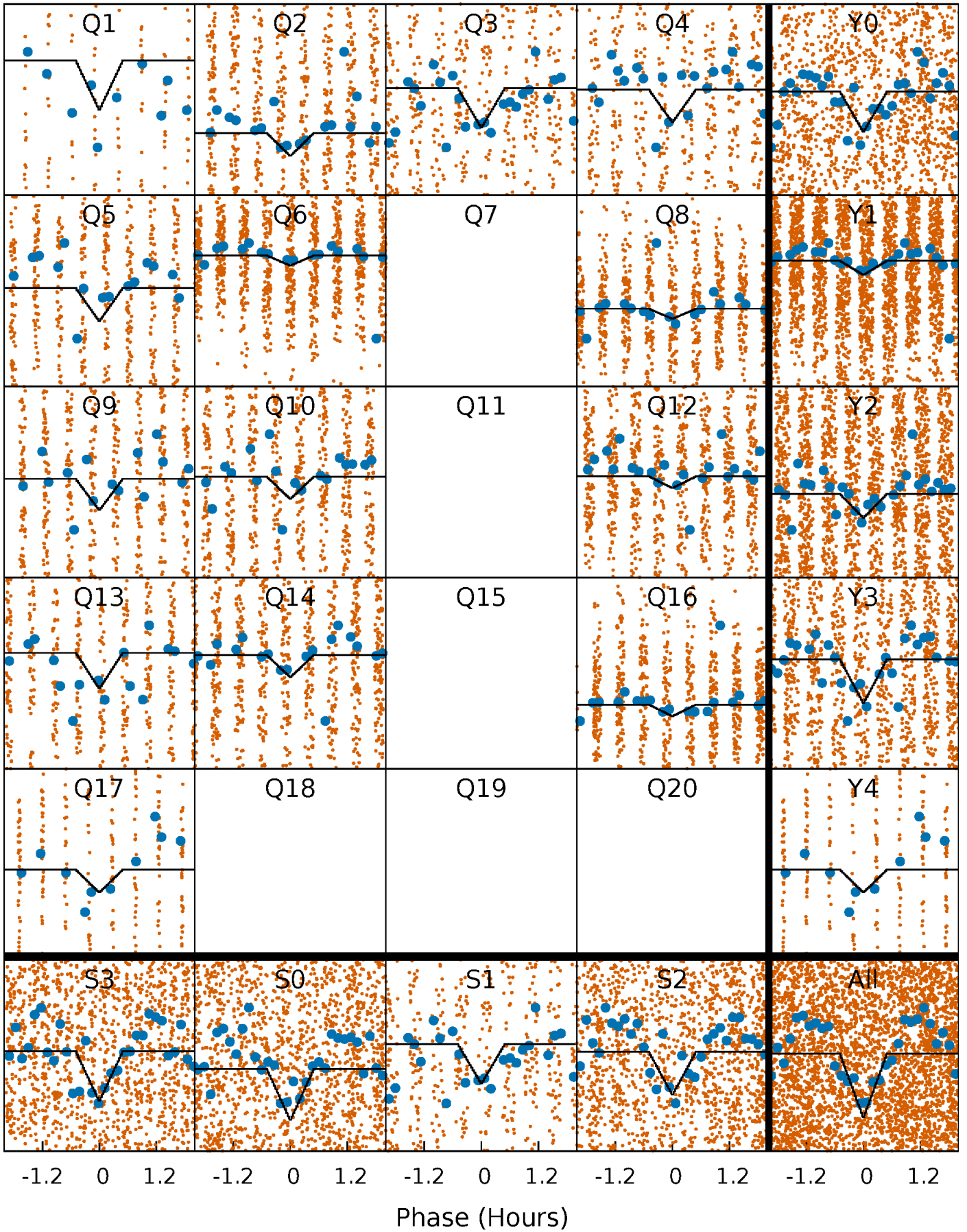
DV Quarter-Phased Transit Curves

TCE 009974087-01 P= 0.592625 Days $T_0=131.618959$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

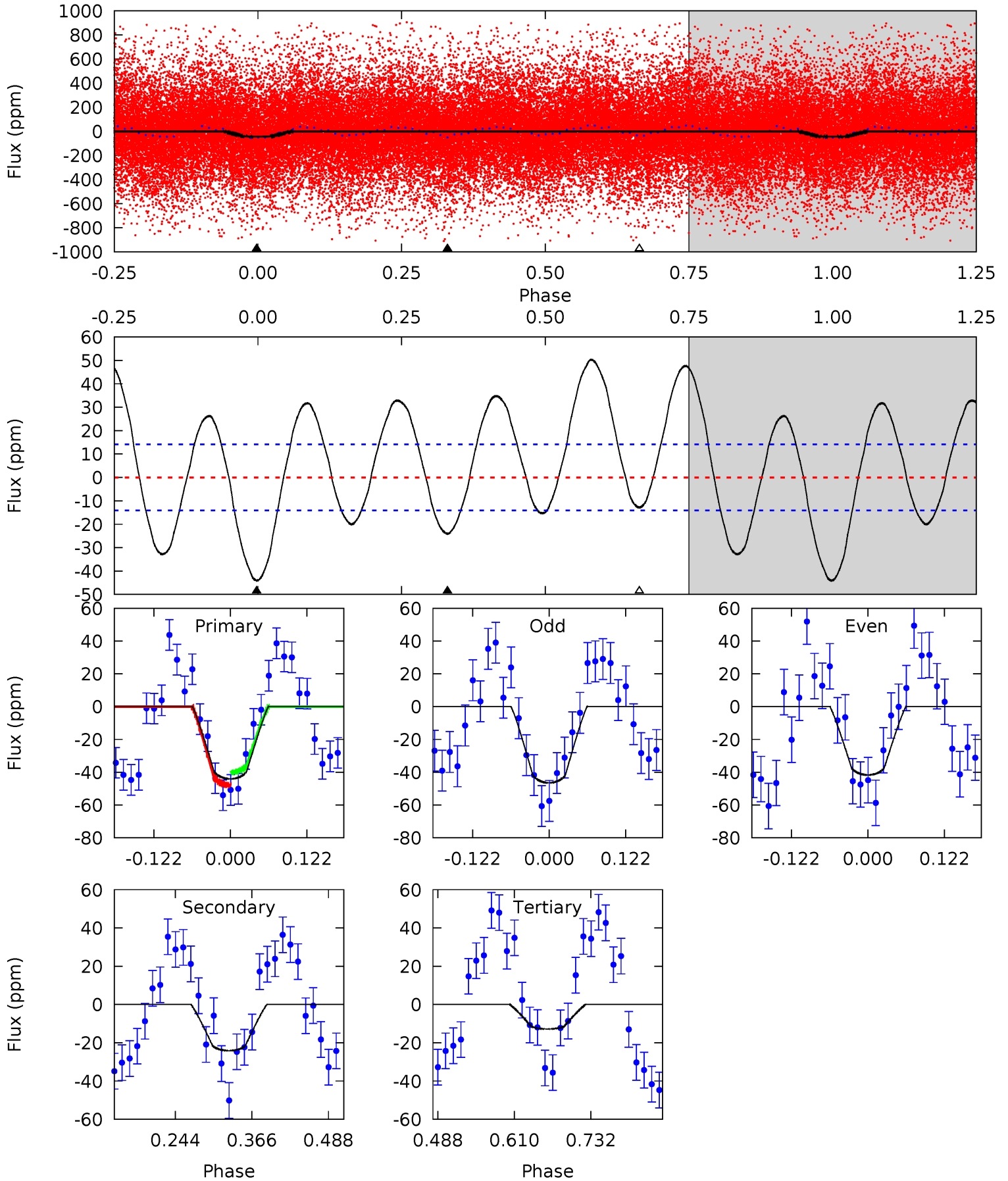
TCE 009974087-01 $P = 0.592627$ Days $T_0 = 131.616635$ (BKJD)



DV Model-Shift Uniqueness Test

009974087-01, P = 0.592625 Days, E = 131.026334 Days

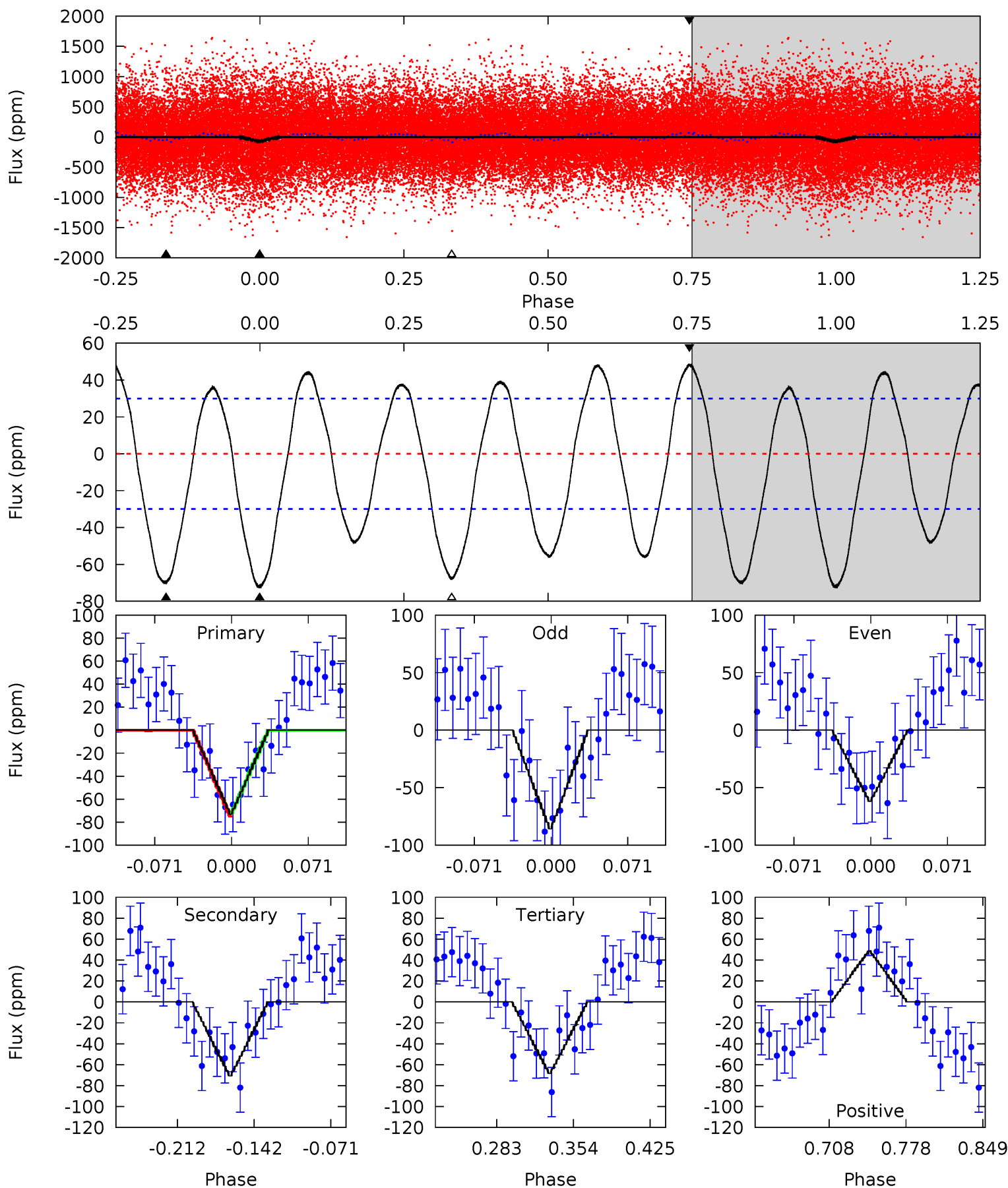
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 14.1 | 7.72 | 4.11 | 0 | 4.52 | 1.55 | 7.78 | 10.0 | 14.1 | 3.62 | 7.72 | 0.78 | 0.93 | 0.53 | 1.27 |



Alt Model-Shift Uniqueness Test

009974087-01, P = 0.592627 Days, E = 131.024008 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 11.3 | 11.0 | 10.6 | 7.56 | 4.64 | 1.81 | 5.59 | 0.70 | 3.74 | 0.36 | 3.40 | 1.83 | 0.79 | 0.40 | 0.11 |



Stellar Parameters For KIC 009974087

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | M (M_{\odot}) | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|---------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5478^{+81}_{-149} | $2.805^{+0.203}_{-0.166}$ | $-1.980^{+0.150}_{-0.050}$ | $8.624^{+1.380}_{-2.989}$ | $1.732^{+0.039}_{-0.736}$ | $0.004^{+0.006}_{-0.001}$ |
| | +1%/-3% | +7%/-6% | +8%/-3% | +16%/-35% | +2%/-42% | +146%/-39% |
| 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 009974087-01 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|-------------|------------------------|----------------------|------------------------|---------------------------|
| DV | -24 ± 3 | $7.19^{+1.76}_{-1.67}$ | 7734^{+436}_{-605} | -5889^{+623}_{-435} | $0.067^{+0.042}_{-0.023}$ |
| Alt. | -71 ± 6 | $8.40^{+1.77}_{-1.86}$ | 7746^{+443}_{-595} | -5366^{+1124}_{-583} | $0.145^{+0.092}_{-0.048}$ |

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

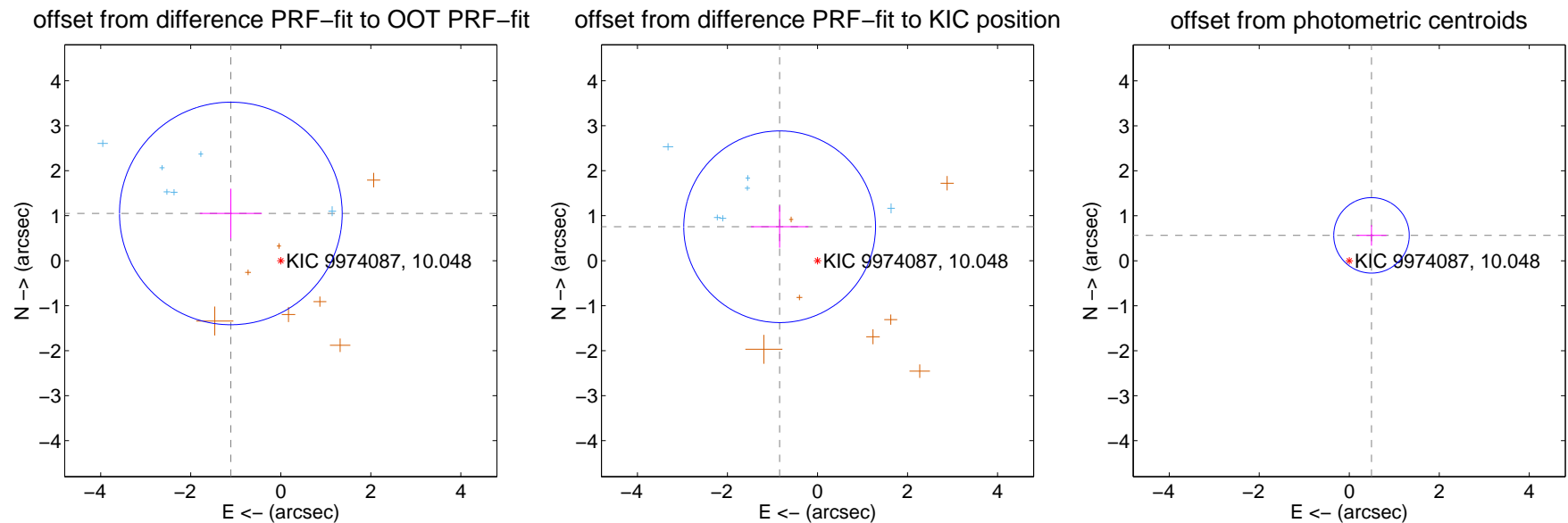
DV Centroid Data

Supplemental centroid analysis for 009974087-01. **Kepler magnitude: 10.05.** Transit SNR 12.00

There are 6 quarters with good PRF difference image offsets

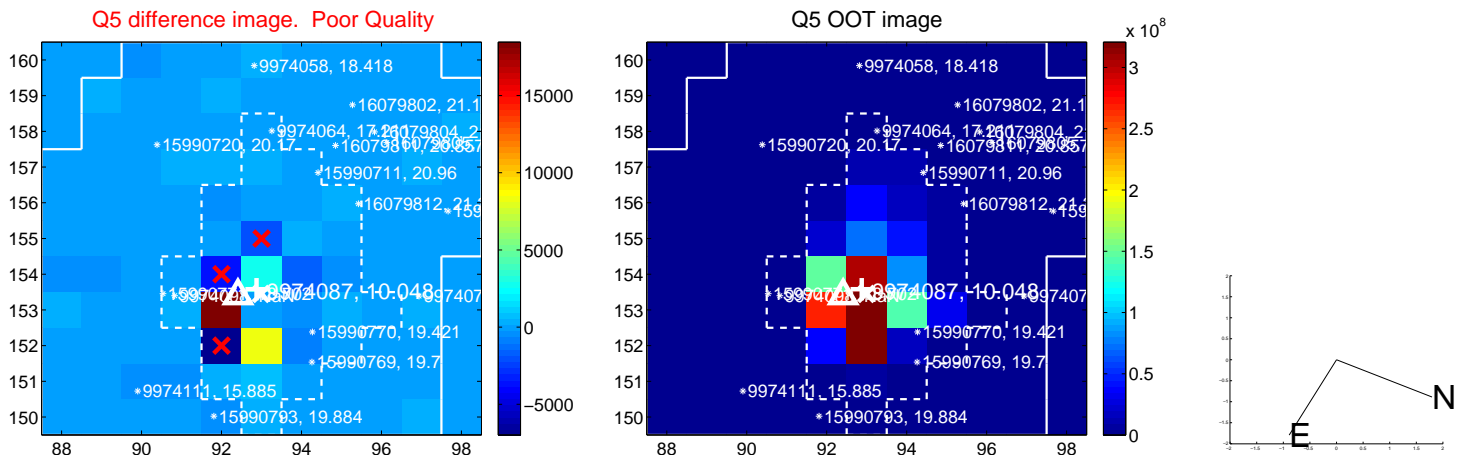
The direct PRF centroid is offset from the target star catalog position by about 0.64 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 1.527 ± 0.824 | 1.85 | 1.109 ± 0.690 | 1.050 ± 0.551 |
| PRF-fit source offset from KIC position | 1.130 ± 0.710 | 1.59 | 0.841 ± 0.637 | 0.755 ± 0.468 |
| photometric centroid source offset | 0.75 ± 0.28 | 2.68 | -0.49 ± 0.33 | 0.56 ± 0.23 |

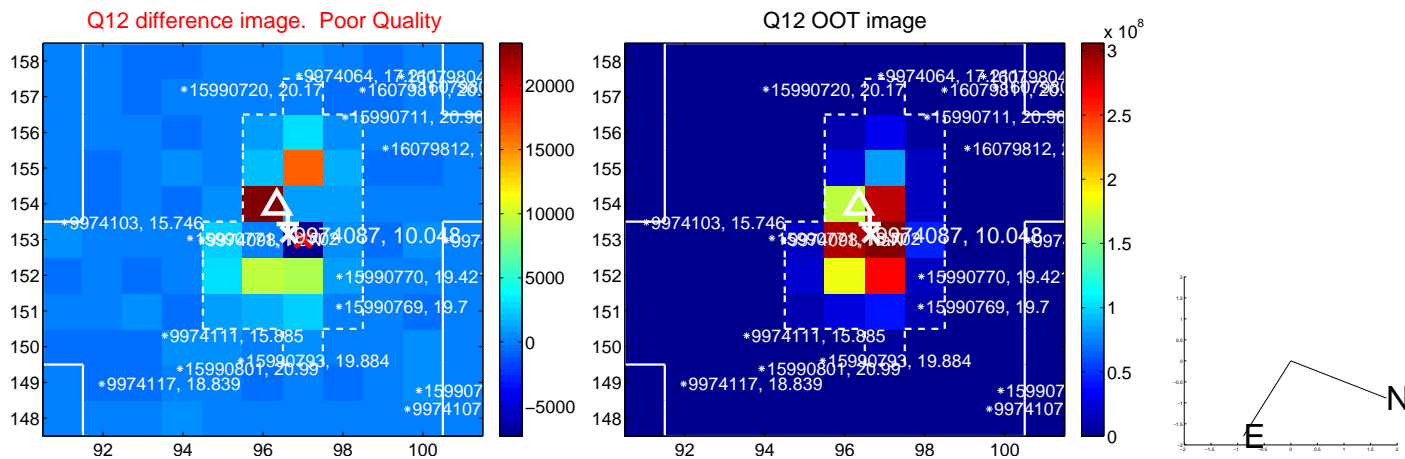
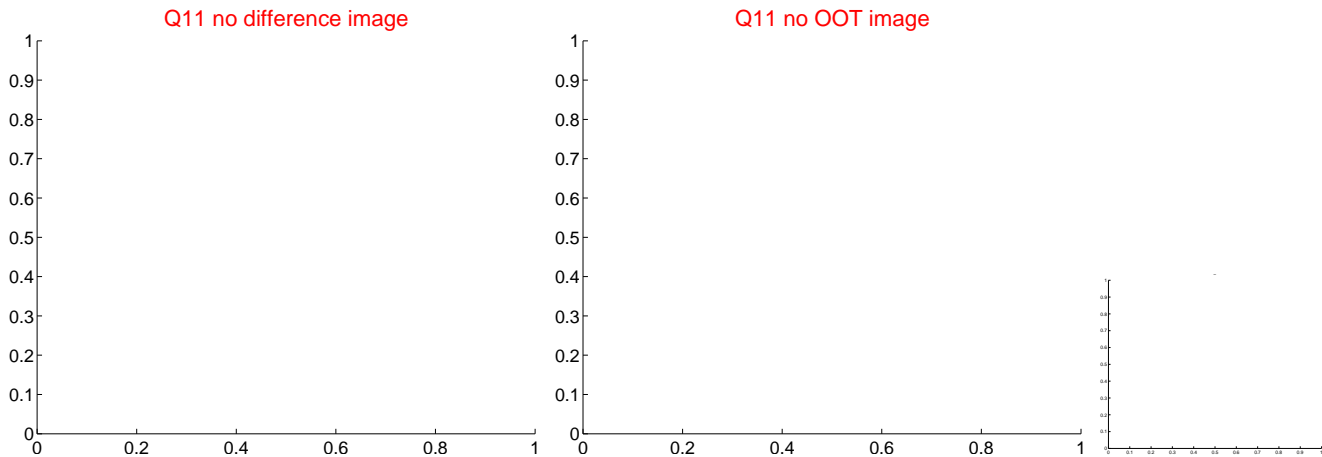
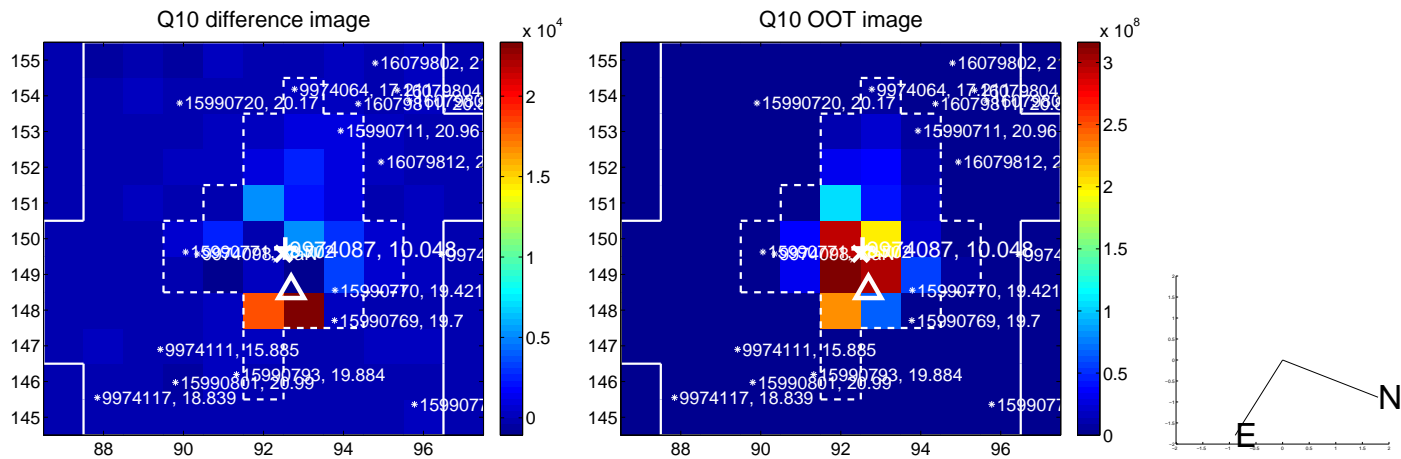
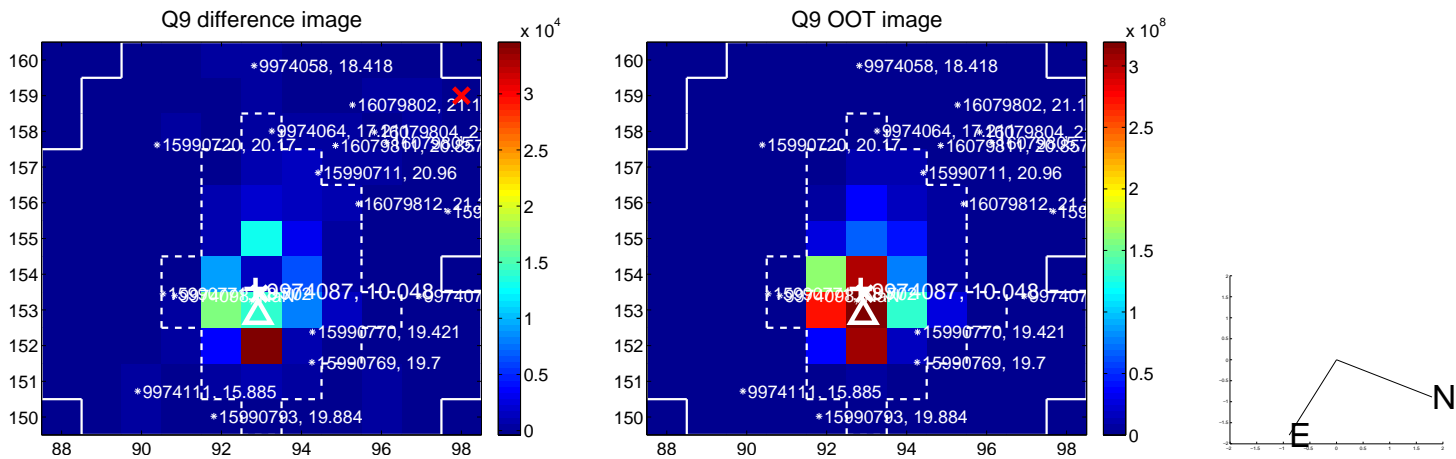


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

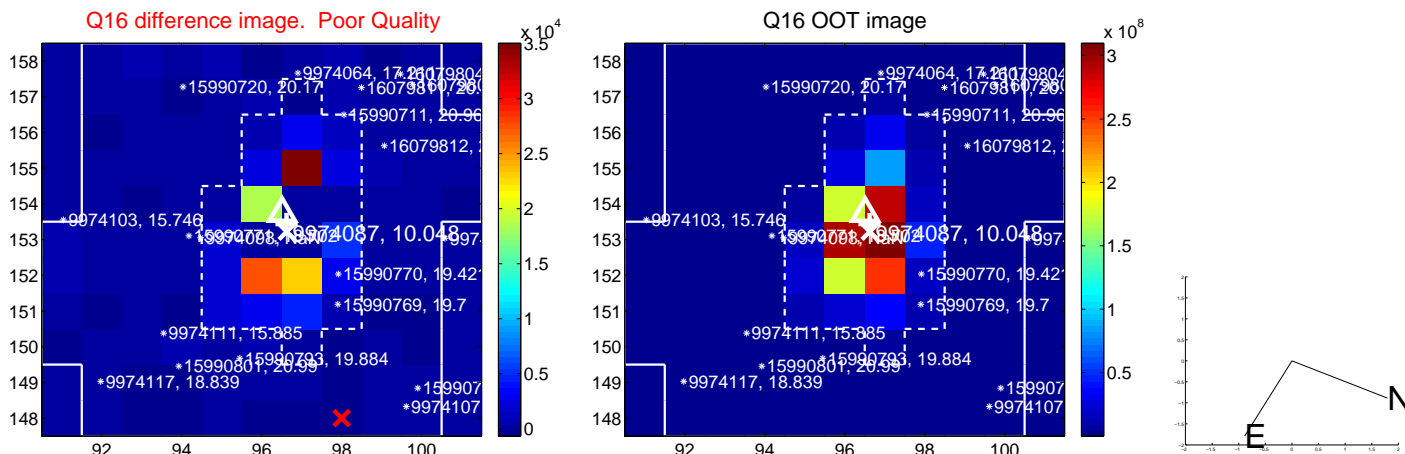
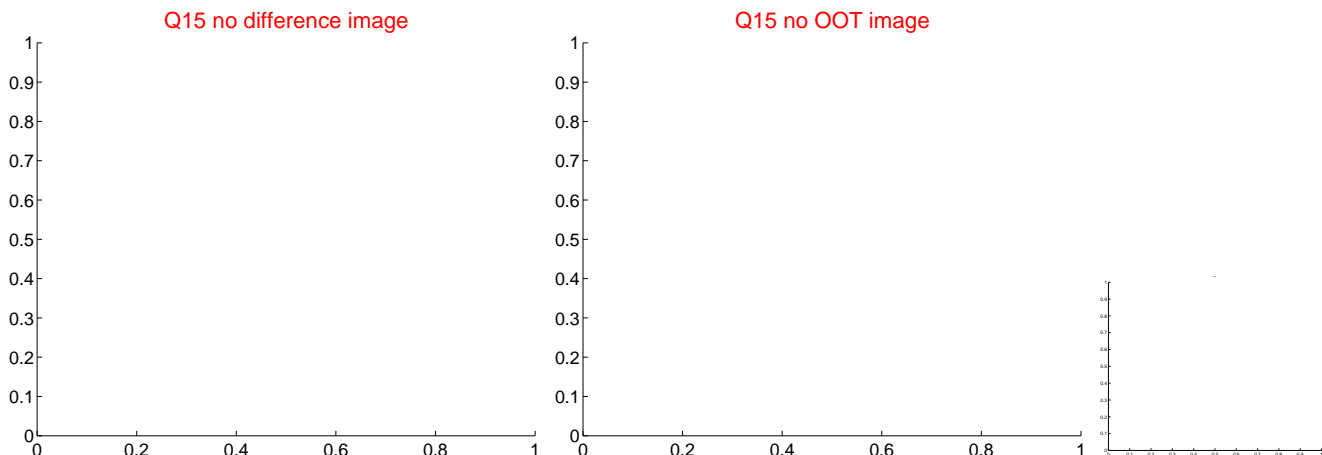
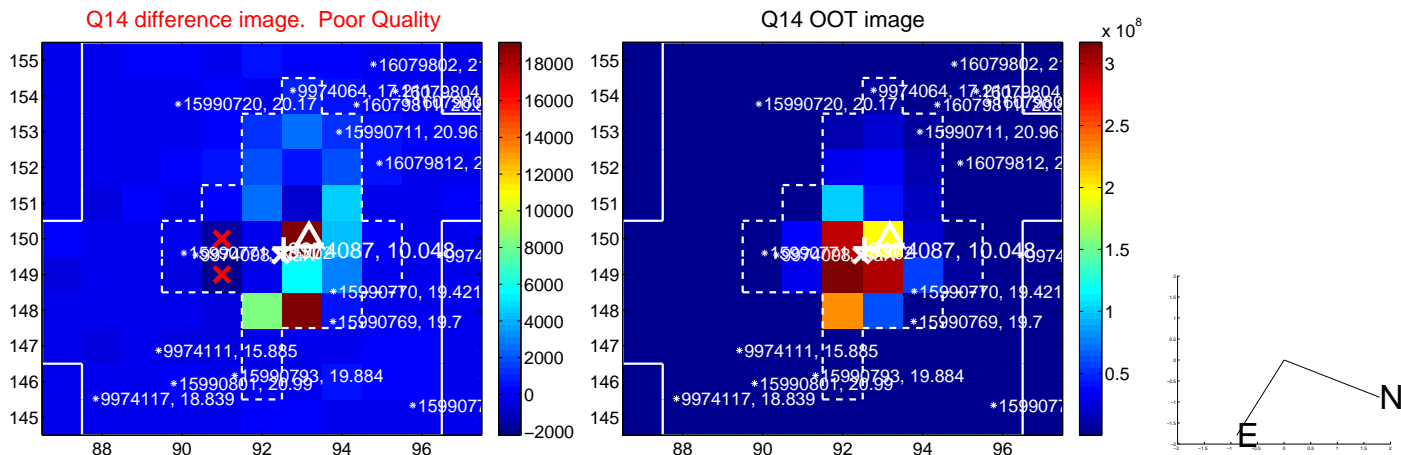
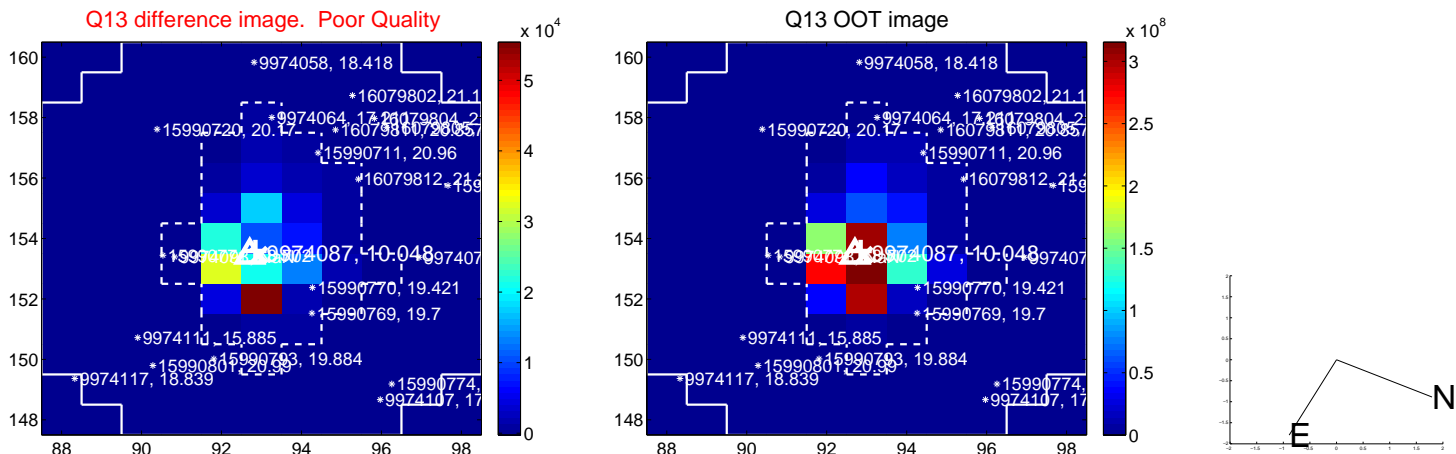
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



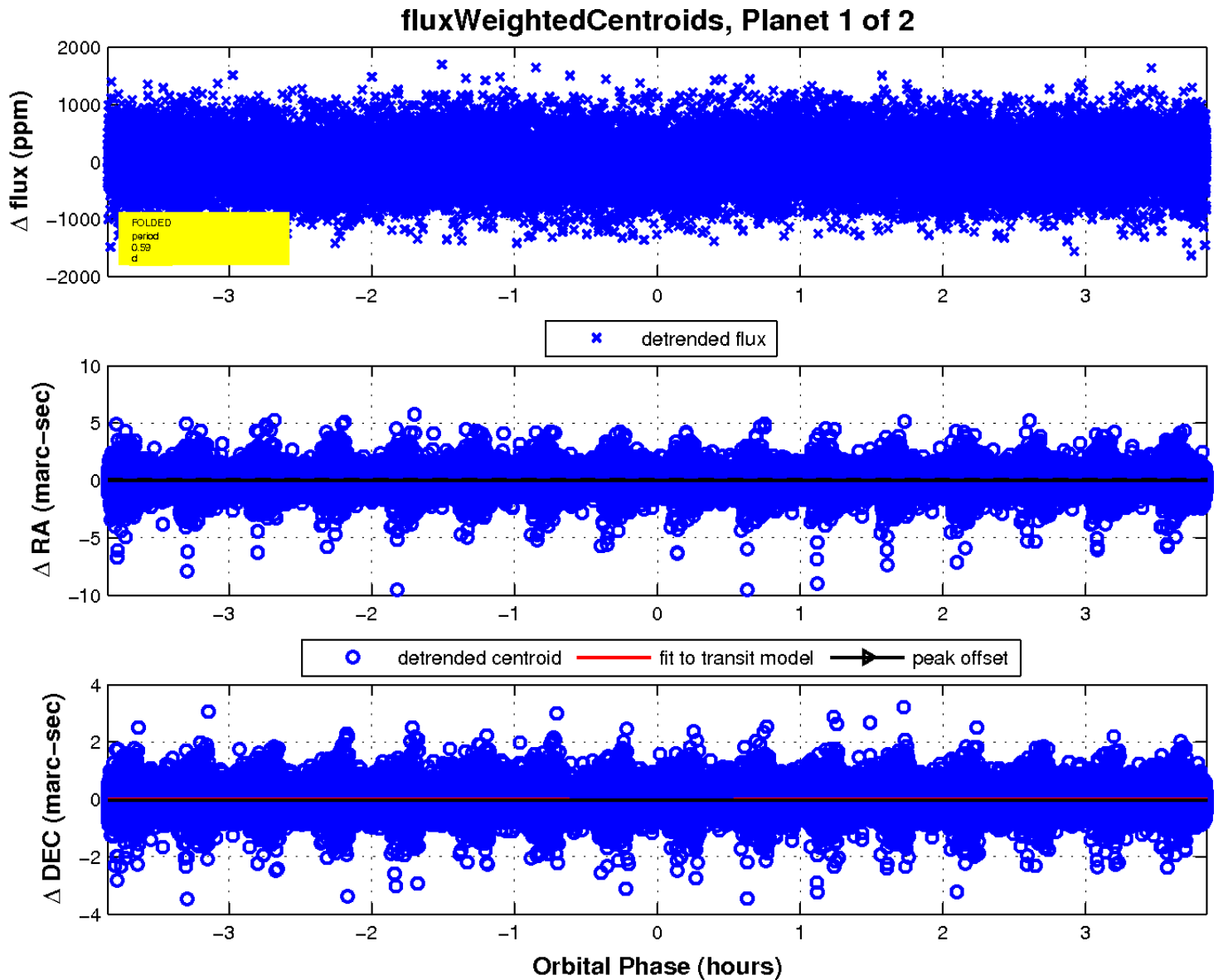
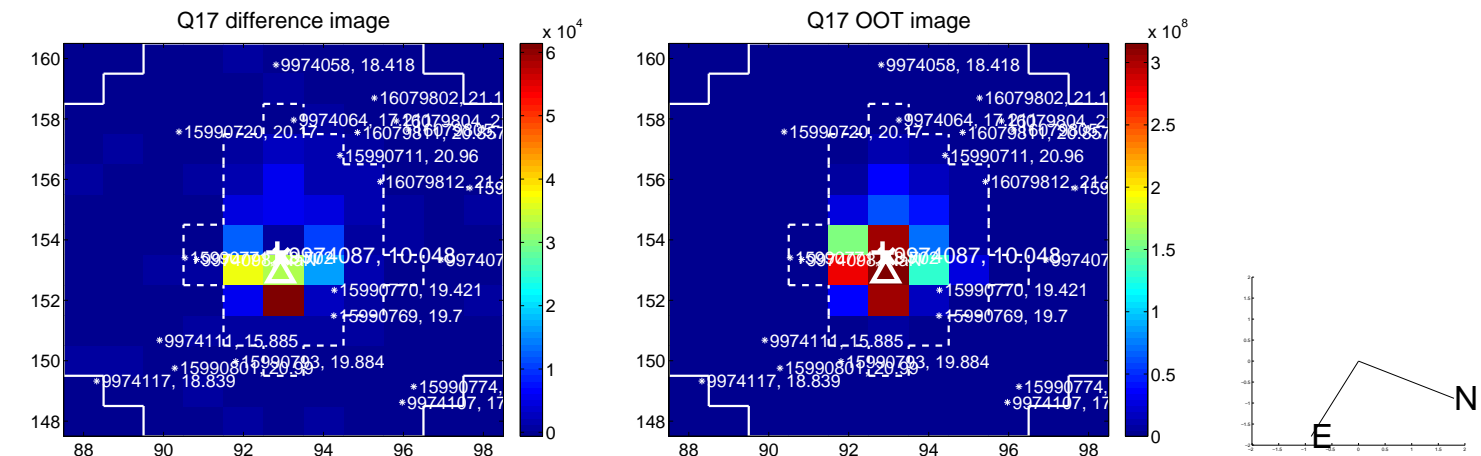
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



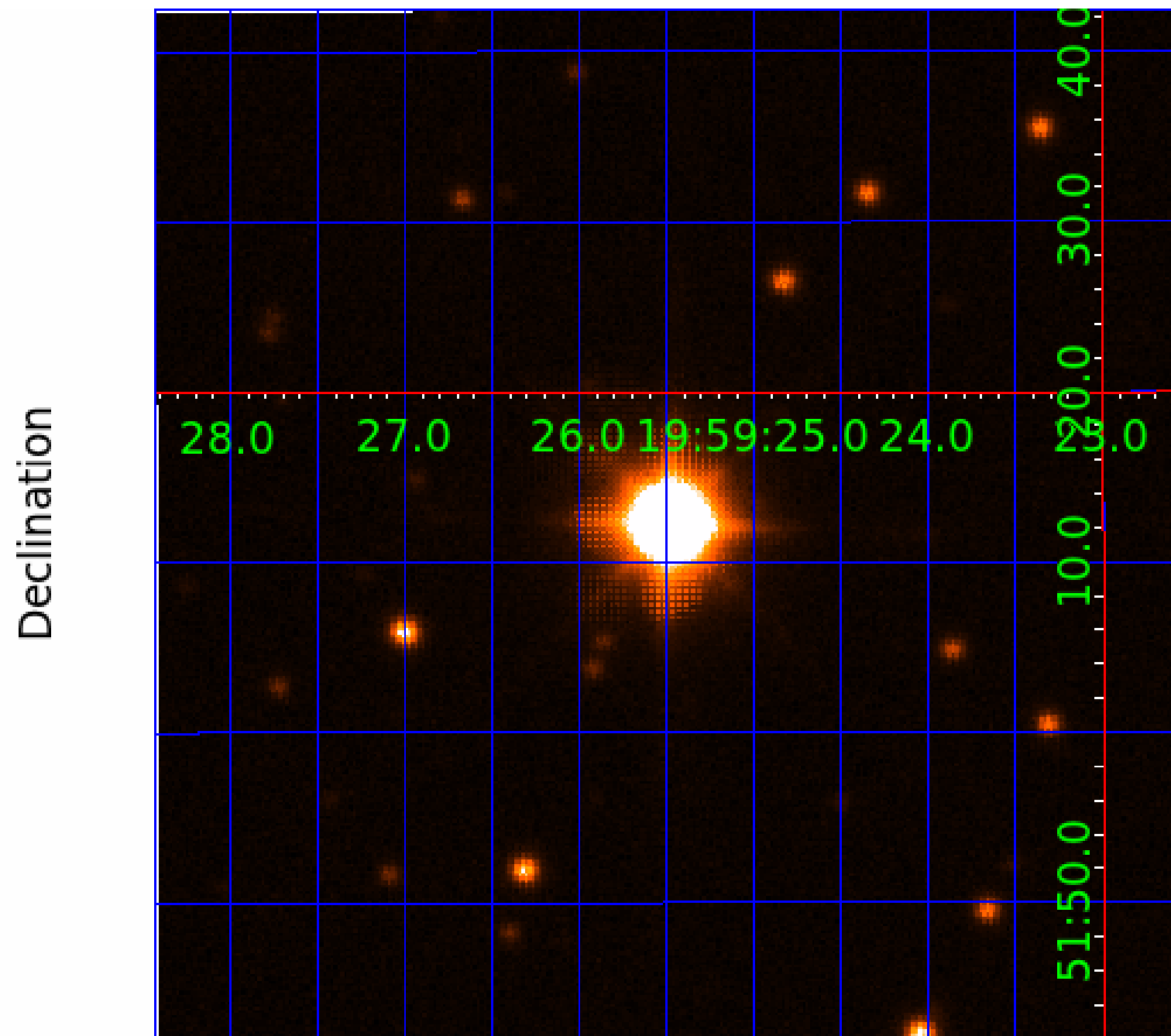
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 009974087

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009974087-01 | OBS | No | 0.592625 | 131.618959 | 52.2 | 1.284 | 12.9 | 12.0 | 8.62 | 5478 | 7.33 | 0.00 |
| 009974087-02 | OBS | No | 0.592579 | 131.725893 | 0.0 | 5.028 | 10.7 | 0.0 | 8.62 | 5478 | 0.13 | 0.00 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 009974087-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—CENT_SATURATED |
| 009974087-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_SKYE_ZUMA_TRACKER—LPP_DV—MOD_NONUNIQ_ALT—SAME_NTL_PERIOD—CENT_SATURATED |

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

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

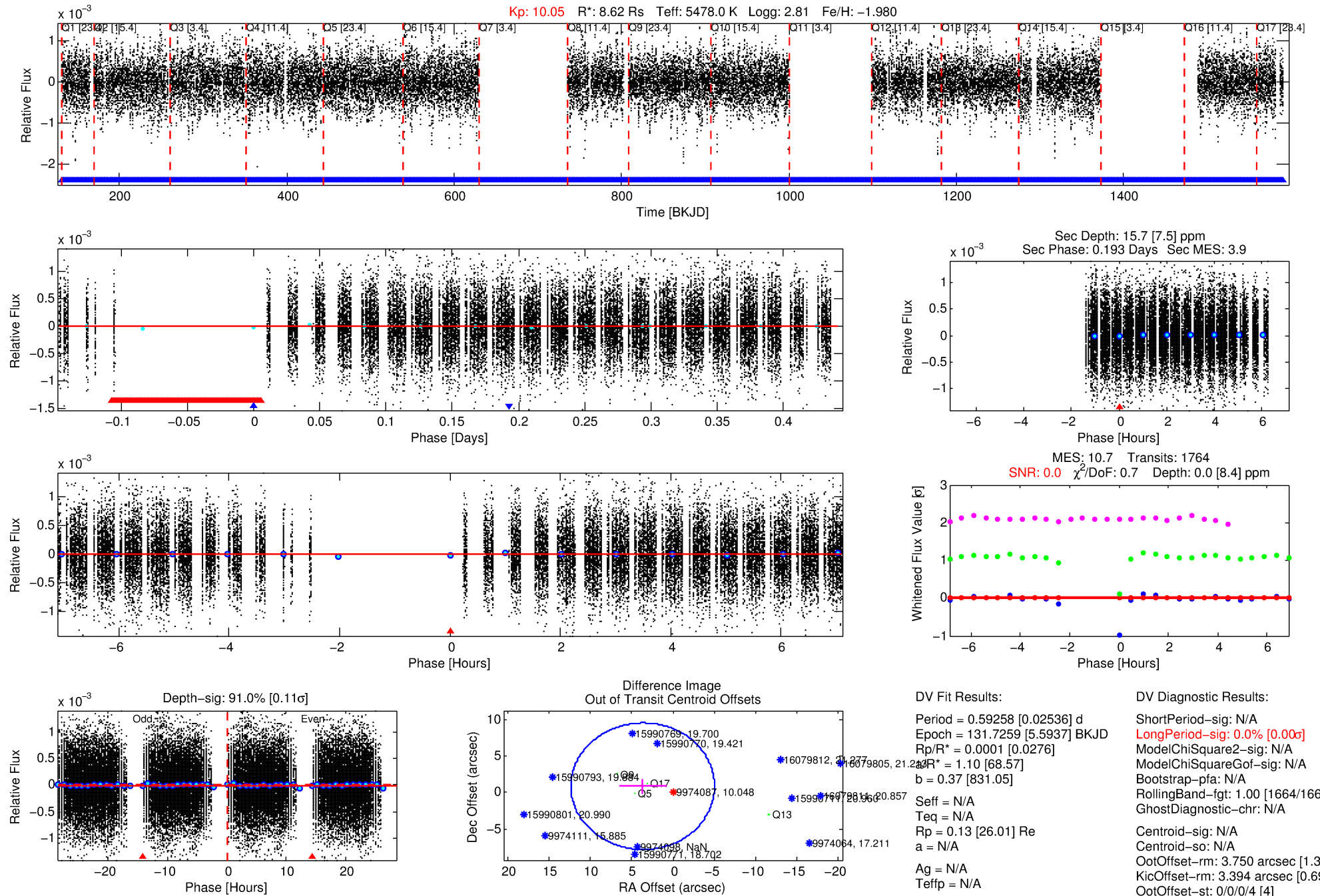
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 009974087-02

No Significant Match Found

DV One-Page Summary

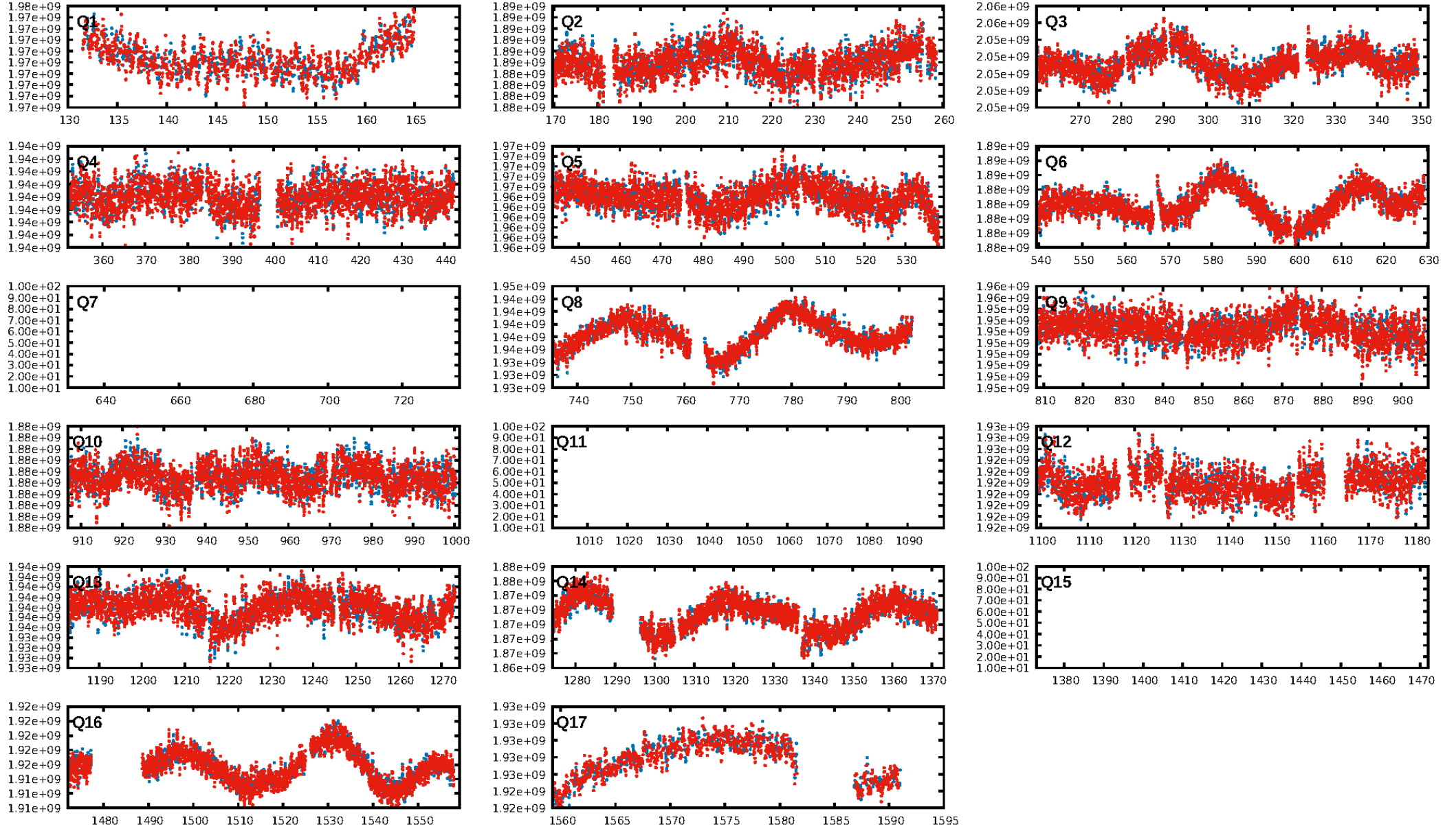
KIC: 9974087 Candidate: 2 of 2 Period: 0.593 d



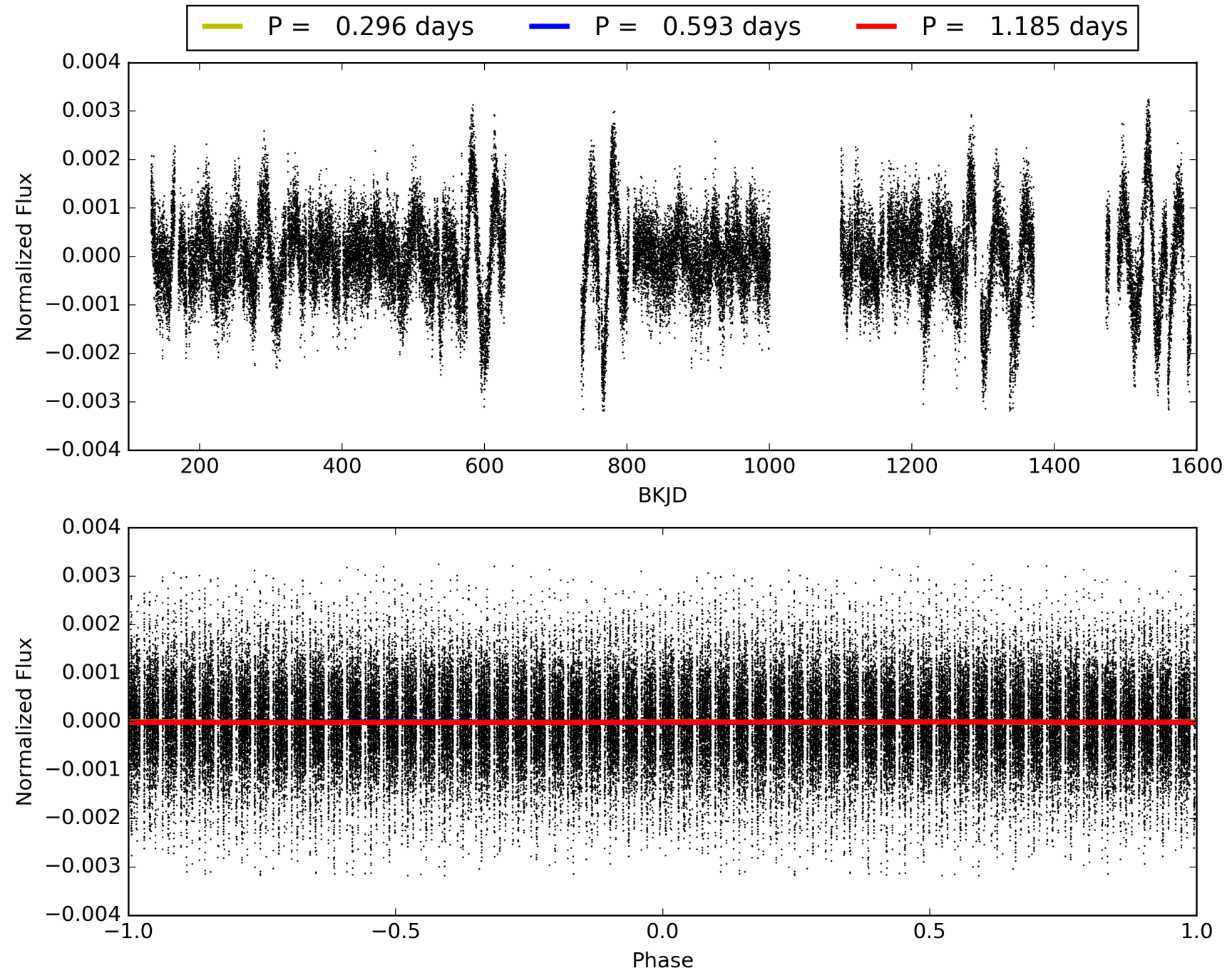
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 19:25:21 Z

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

TCE 009974087-02, PDC Light Curves

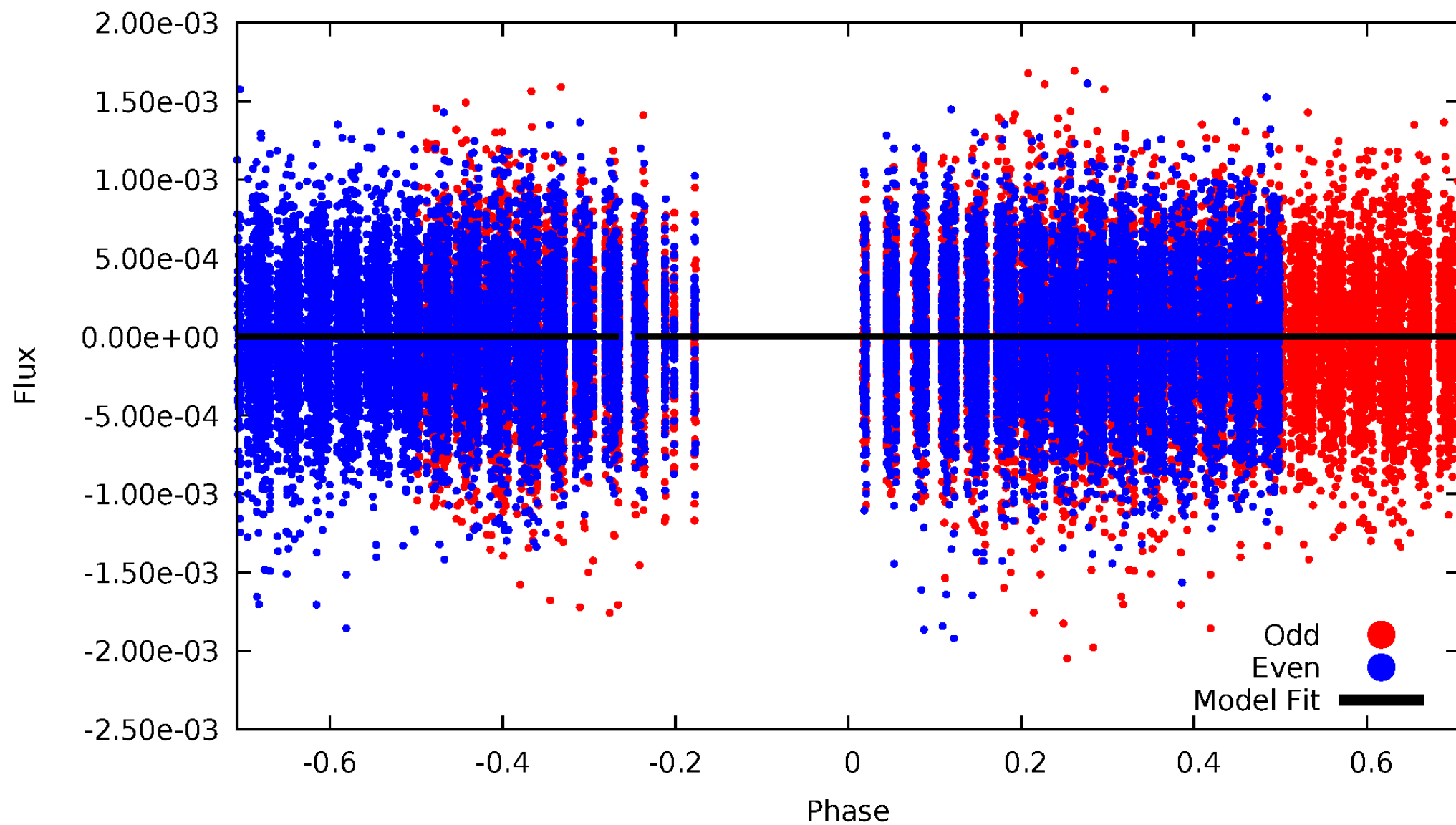


TCE 009974087-02



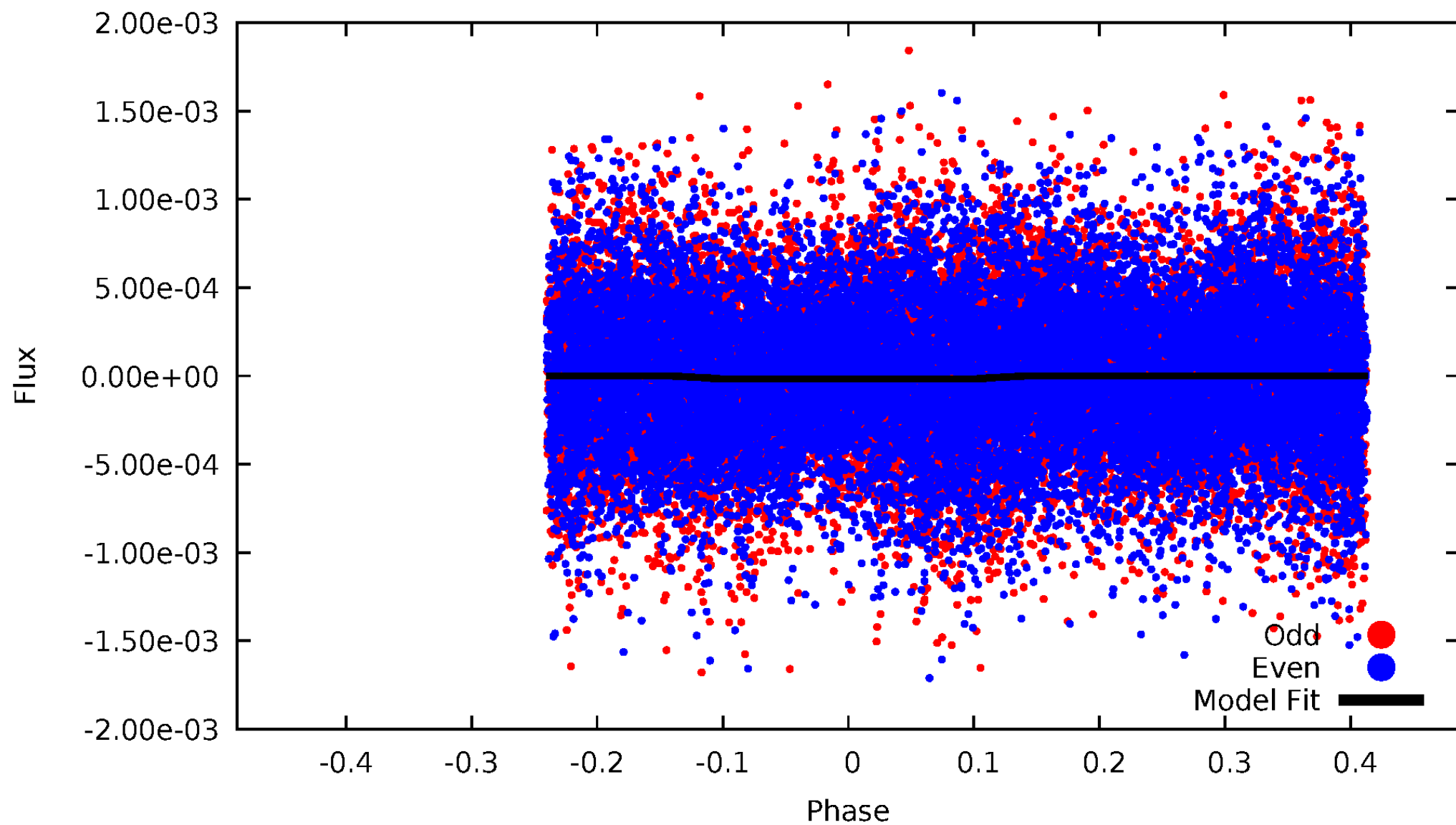
DV Odd/Even

TCE 009974087-02



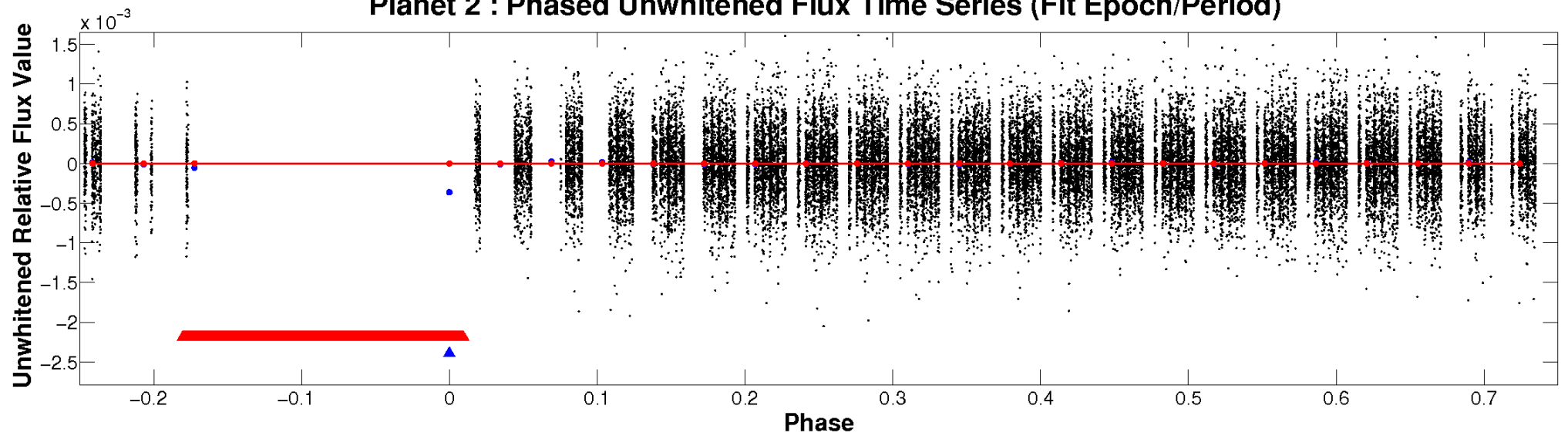
ALT Odd/Even

TCE 009974087-02

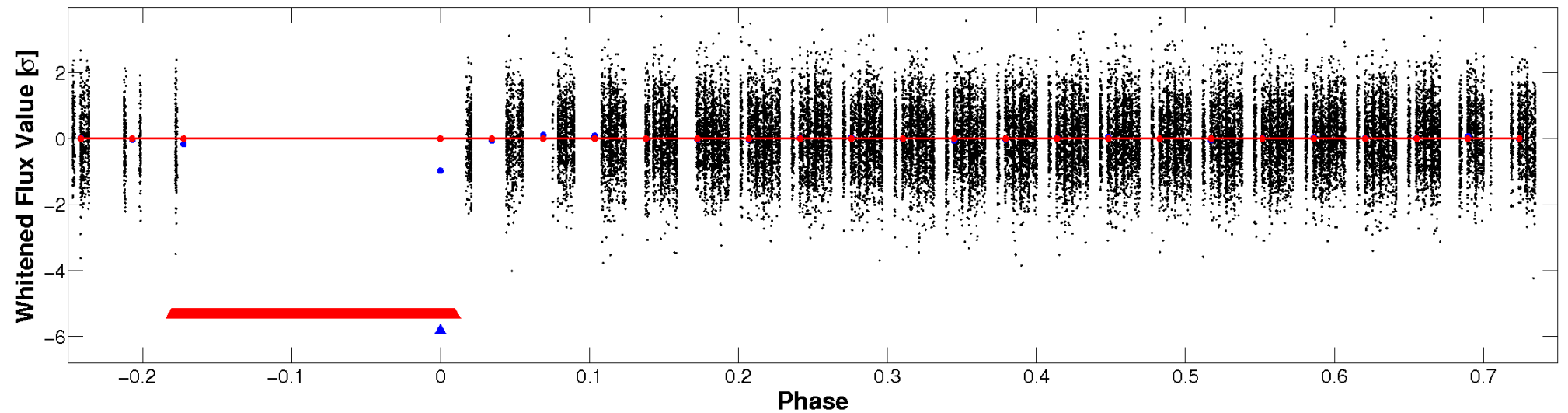


Non-Whitened Vs. Whitened Light Curve

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

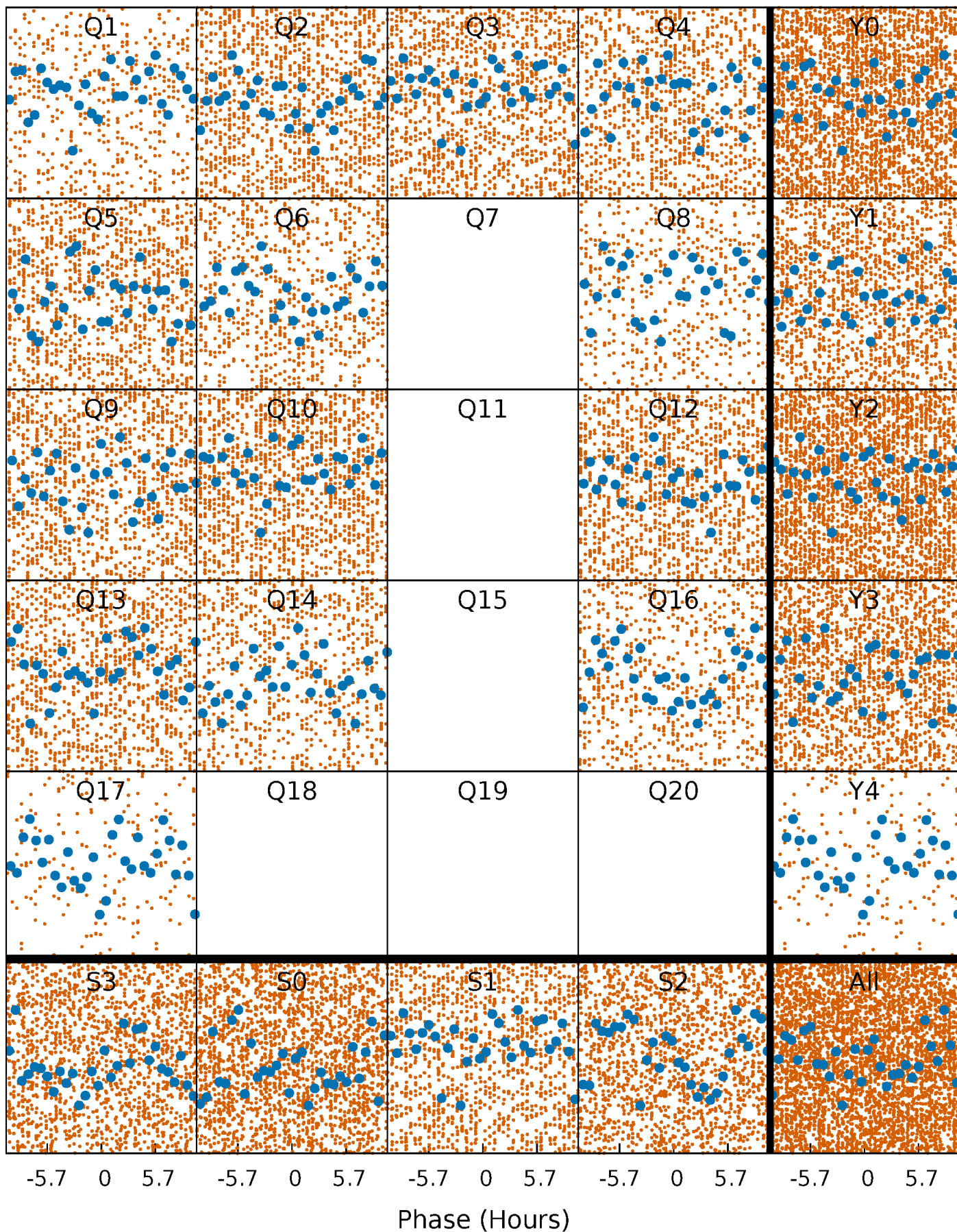


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



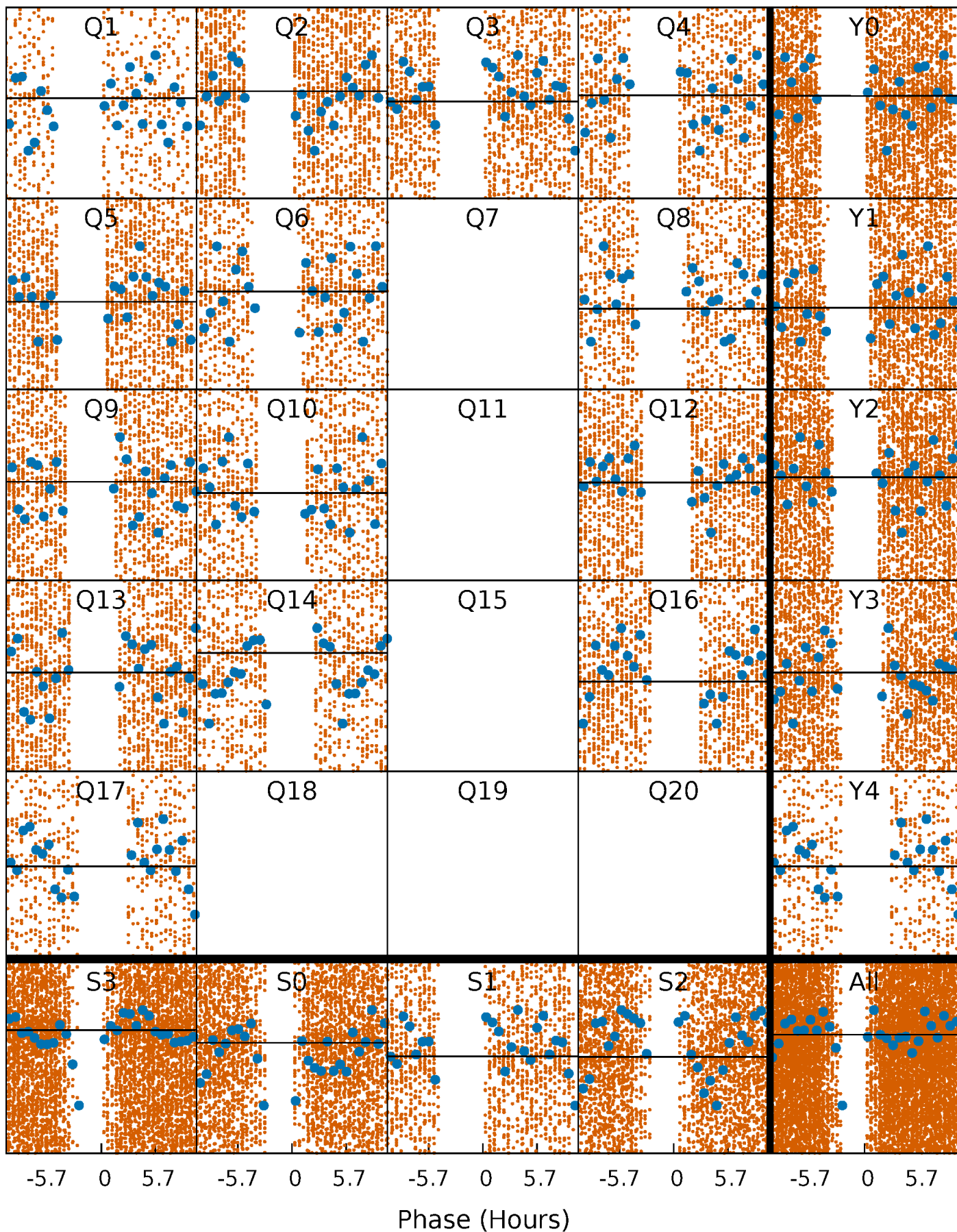
PDC Quarter-Phased Transit Curves

TCE 009974087-02 P= 0.592579 Days $T_0=131.725893$ (BKJD)



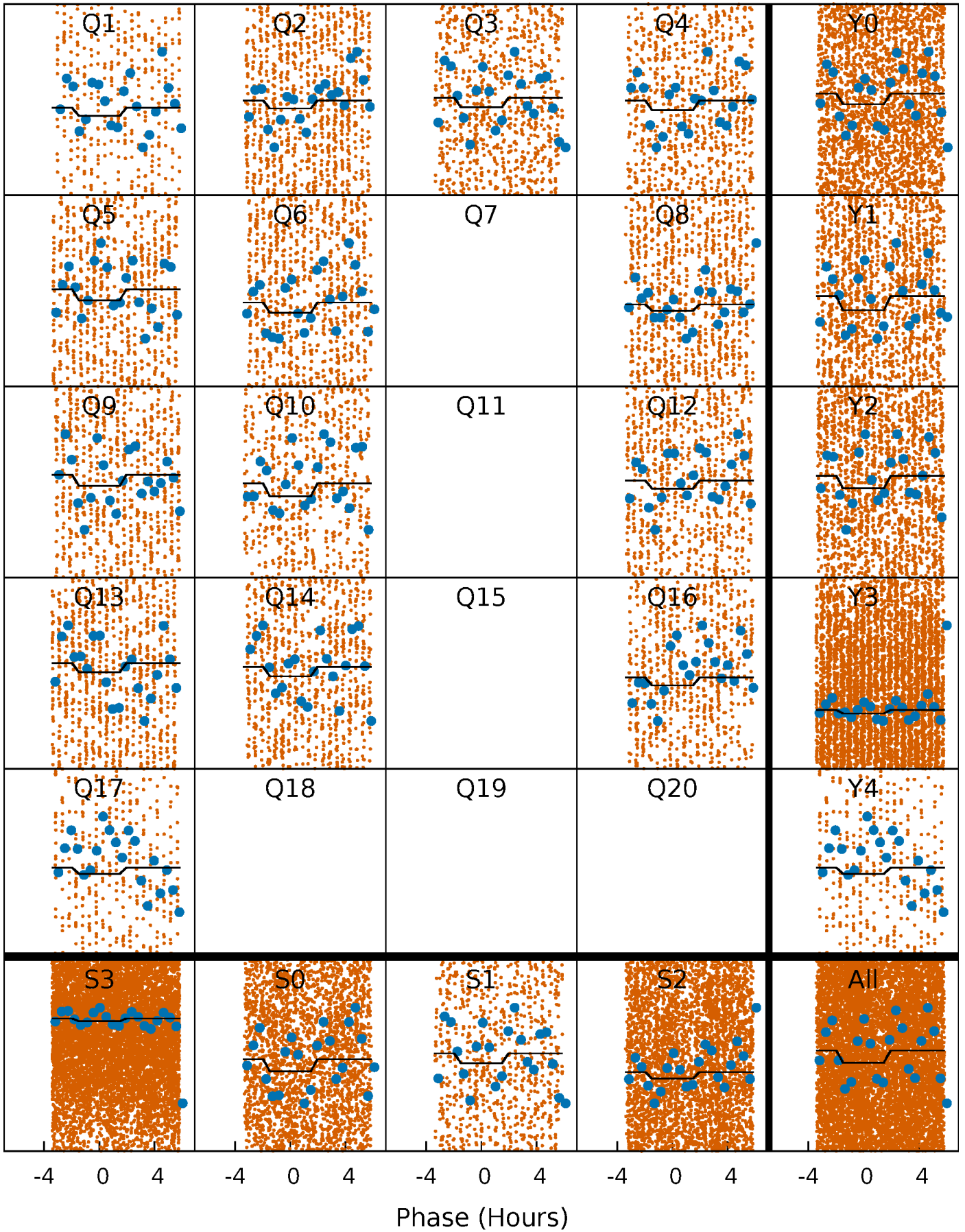
DV Quarter-Phased Transit Curves

TCE 009974087-02 P= 0.592579 Days $T_0=131.725893$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

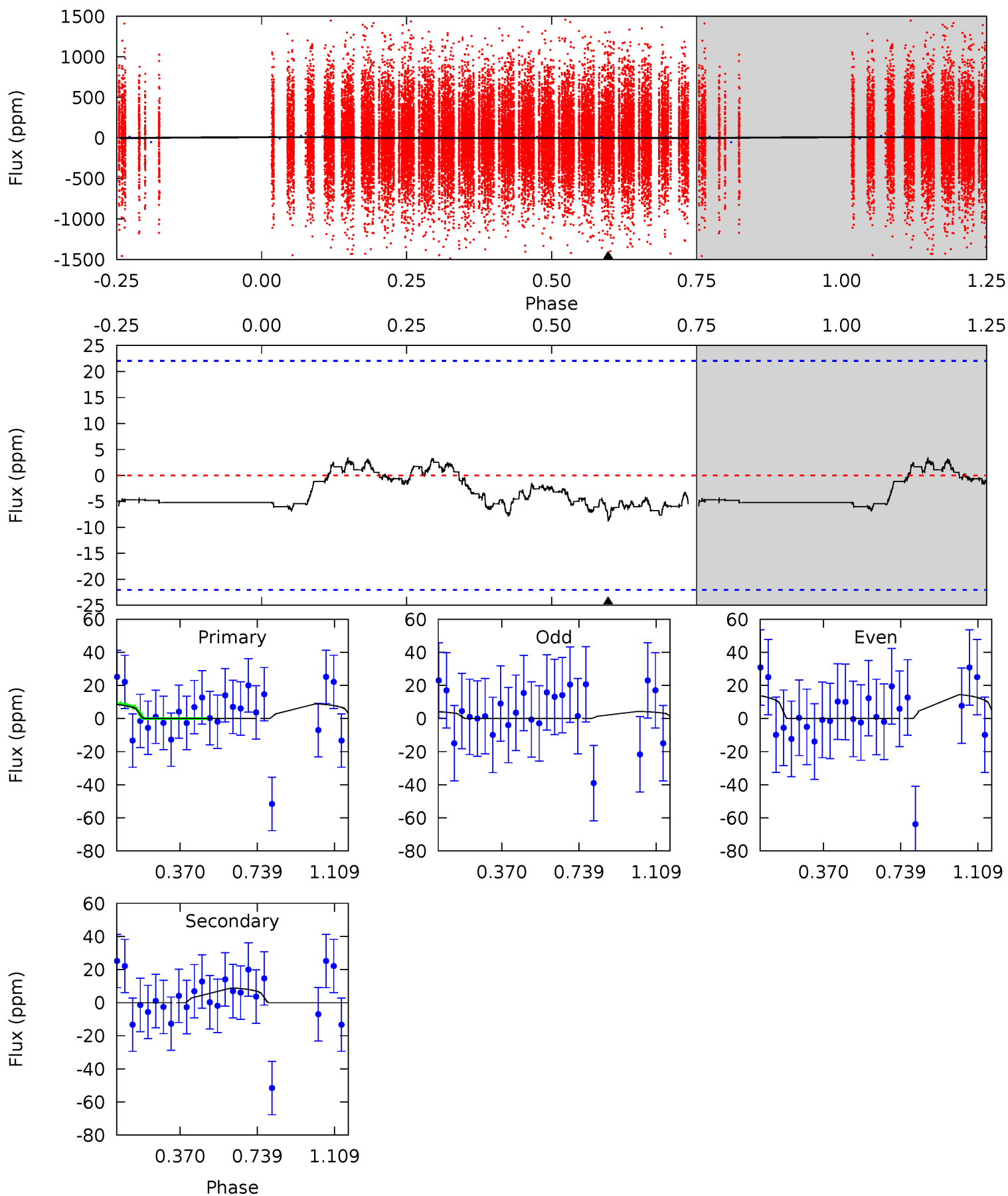
TCE 009974087-02 $P = 0.592627$ Days $T_0 = 131.862119$ (BKJD)



DV Model-Shift Uniqueness Test

009974087-02, P = 0.592579 Days, E = 131.133314 Days

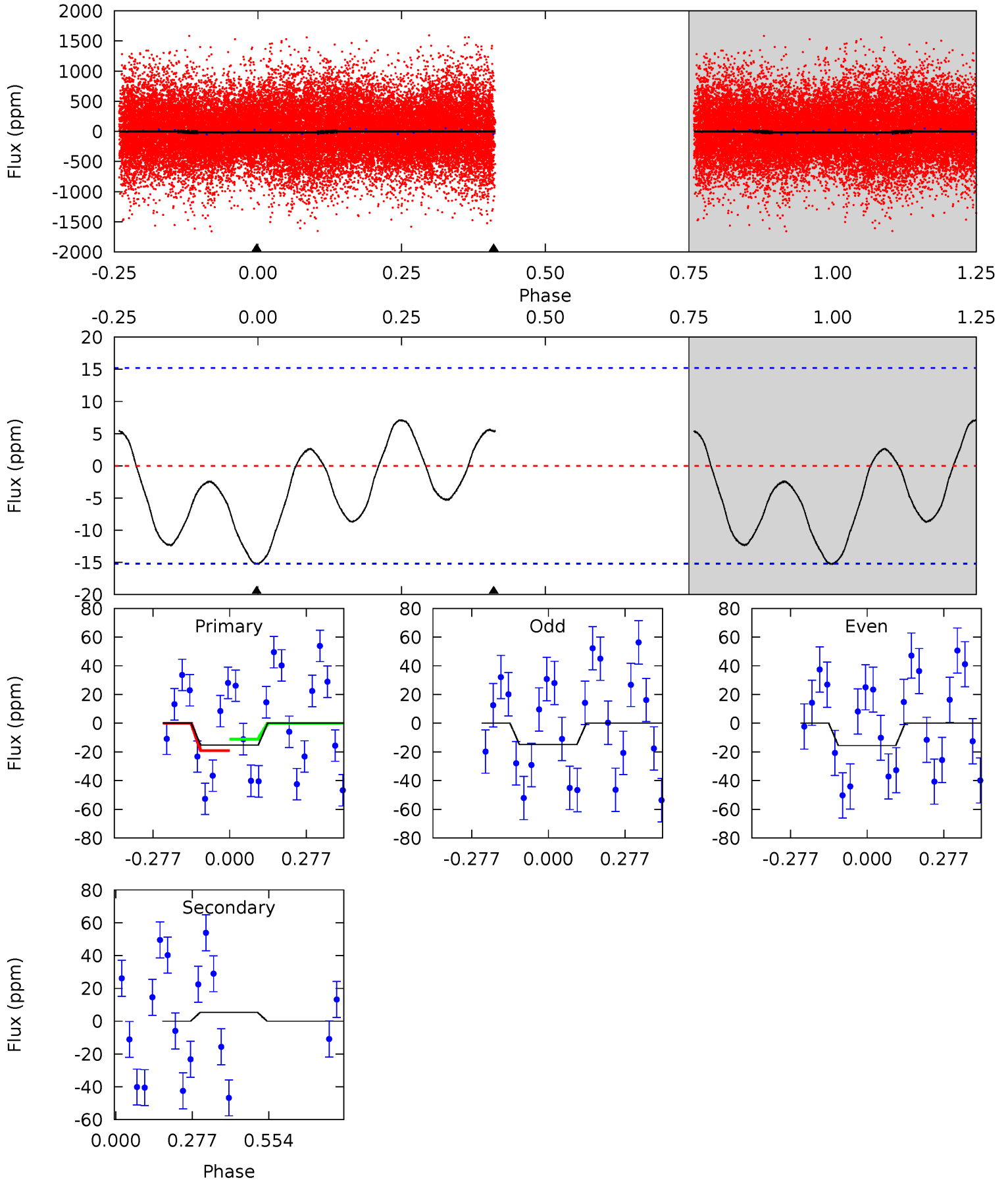
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-------|-------|------|
| 1.72 | 1.72 | 0 | 0 | 4.28 | 0.90 | 0.53 | 1.72 | 1.72 | 1.72 | 1.72 | 1.01 | -0.93 | 0.28 | 1.52 |



Alt Model-Shift Uniqueness Test

009974087-02, P = 0.592627 Days, E = 131.269492 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|-------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 4.37 | -1.52 | 0 | 0 | 4.35 | 1.09 | 0.90 | 4.37 | 4.37 | -1.52 | -1.52 | 0.10 | 1.24 | 0.32 | 1.15 |



Stellar Parameters For KIC 009974087

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | R (R_{\odot}) | $M(M_{\odot})$ | p_{\star} ($\text{g}\cdot\text{cm}^{-3}$) |
|--------|---------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5478^{+81}_{-149} | $2.805^{+0.203}_{-0.166}$ | $-1.980^{+0.150}_{-0.050}$ | $8.624^{+1.380}_{-2.989}$ | $1.732^{+0.039}_{-0.736}$ | $0.004^{+0.006}_{-0.001}$ |
| | +1%/-3% | +7%/-6% | +8%/-3% | +16%/-35% | +2%/-42% | +146%/-39% |
| 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 009974087-02 / KOI

| Detrend | Depth (ppm) | R_p (R_{\oplus}) | T_{max} (K) | T_{obs} (K) | A_{obs} |
|---------|-------------|---------------------------|----------------------|-----------------------|----------------------------|
| DV | -9 ± 5 | $17.40^{+20.47}_{-11.94}$ | 7720^{+477}_{-557} | -6181^{+662}_{-464} | $0.004^{+0.039}_{-0.003}$ |
| Alt. | 5 ± 3 | $19.27^{+19.36}_{-12.83}$ | 7735^{+471}_{-606} | -6359^{+503}_{-487} | $-0.002^{+0.001}_{-0.016}$ |

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

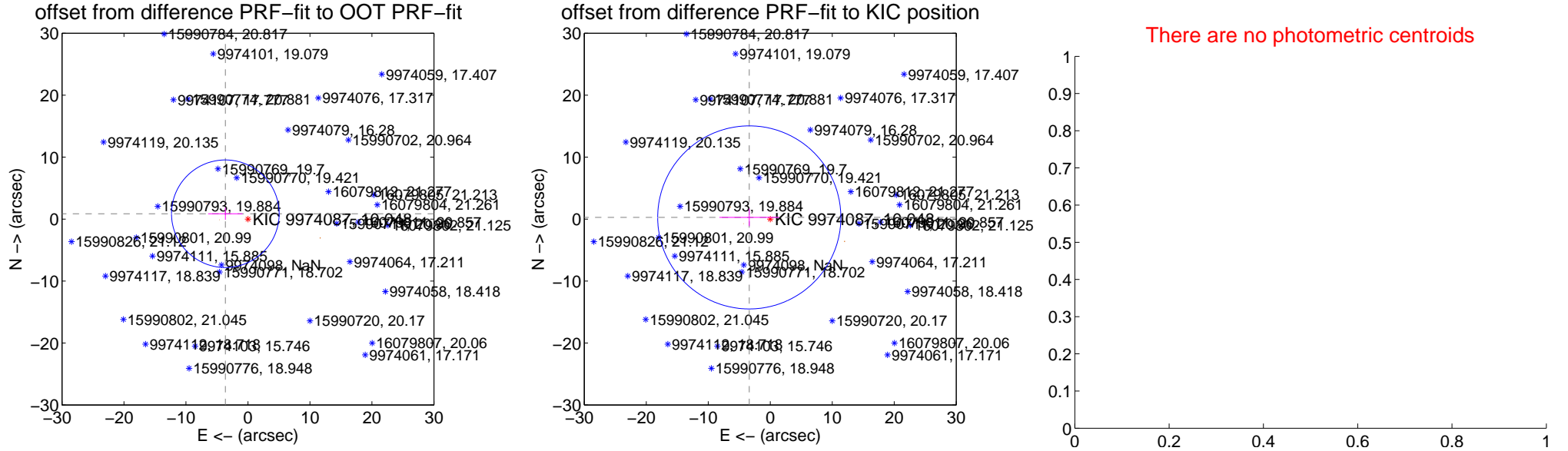
DV Centroid Data

Supplemental centroid analysis for 009974087-02. **Kepler magnitude: 10.05**. Transit SNR 0.00

There are 0 quarters with good PRF difference image offsets

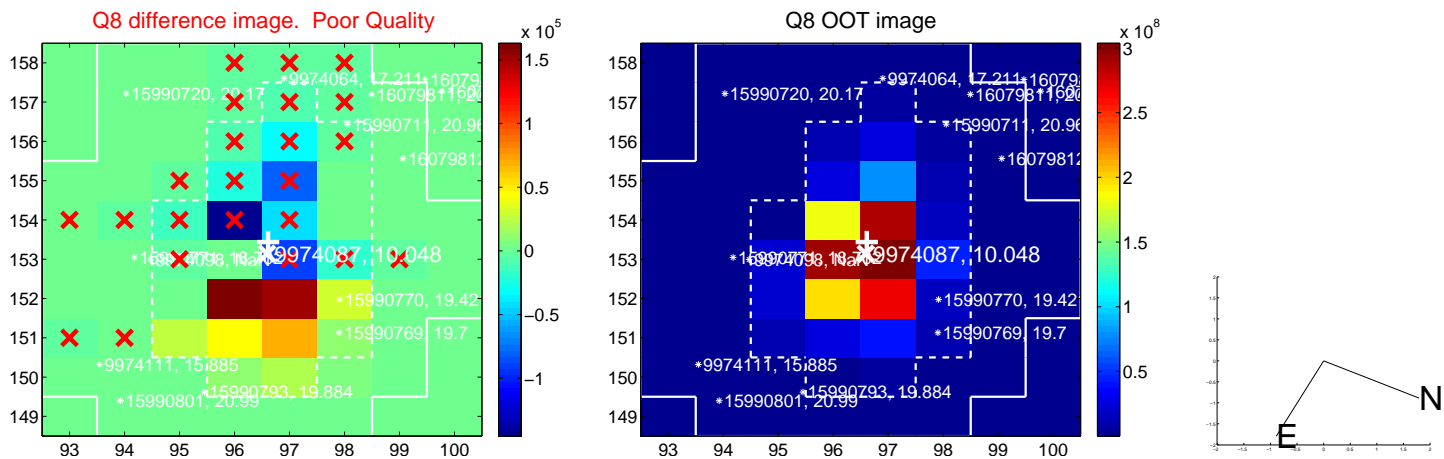
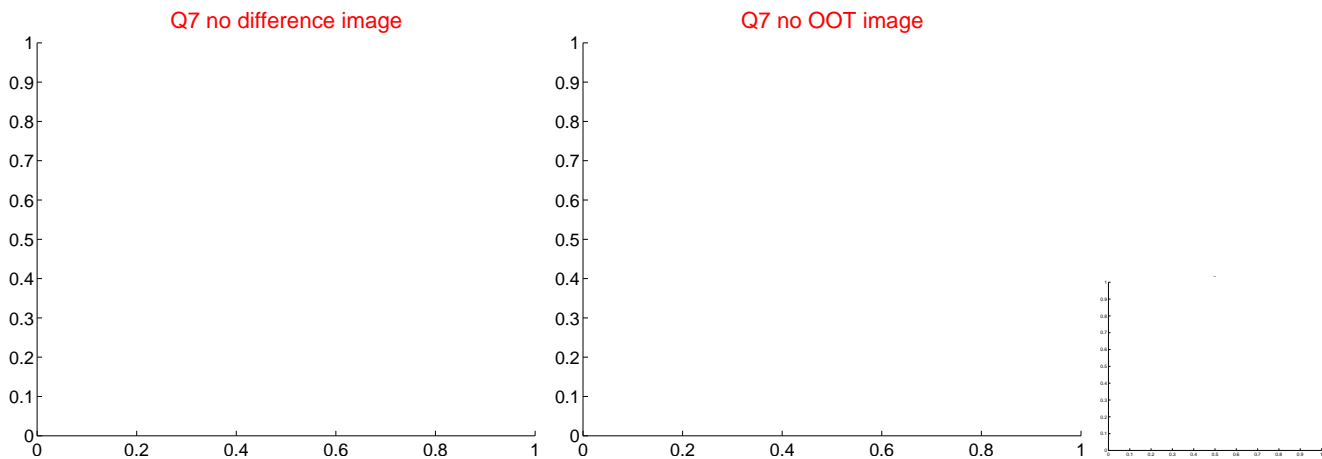
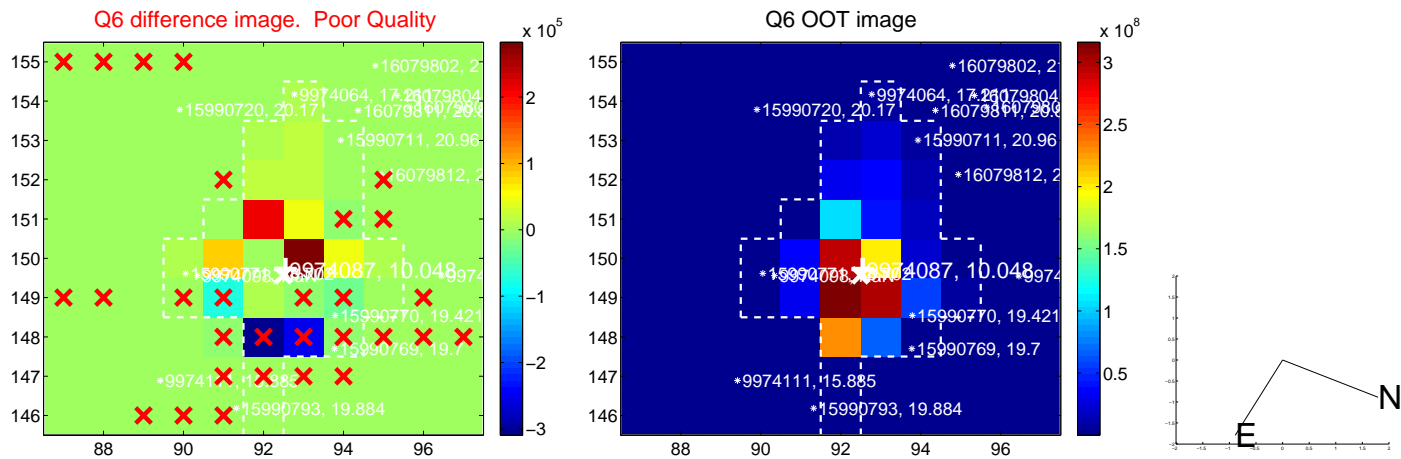
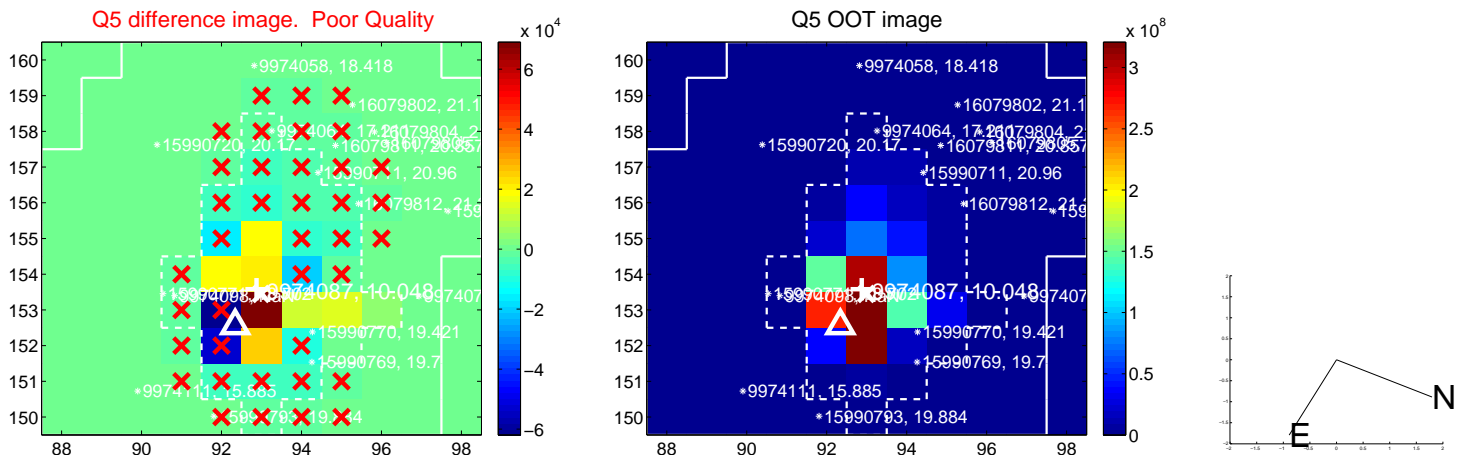
The direct PRF centroid is offset from the target star catalog position by about 0.64 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 3.750 ± 2.894 | 1.30 | 3.649 ± 2.769 | 0.865 ± 0.970 |
| PRF-fit source offset from KIC position | 3.394 ± 4.924 | 0.69 | 3.383 ± 4.834 | 0.273 ± 1.393 |
| photometric centroid source offset | — | — | — | — |

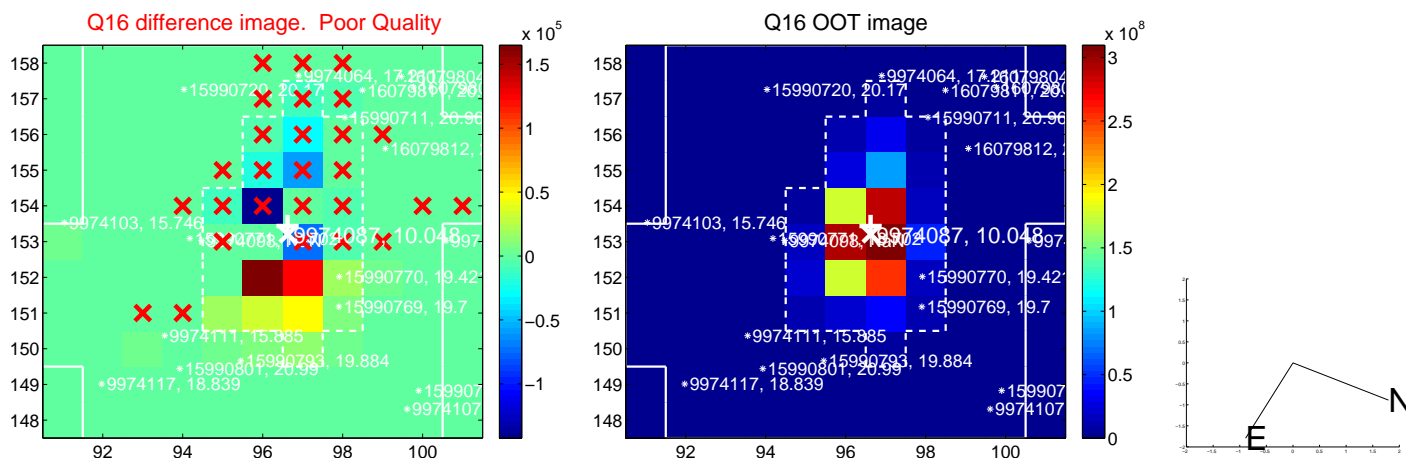
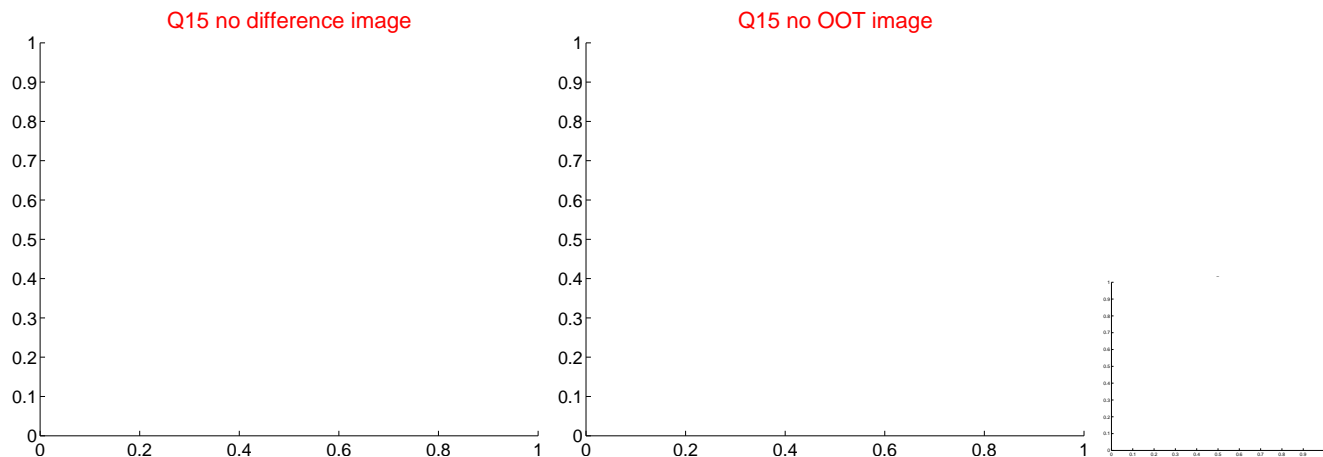
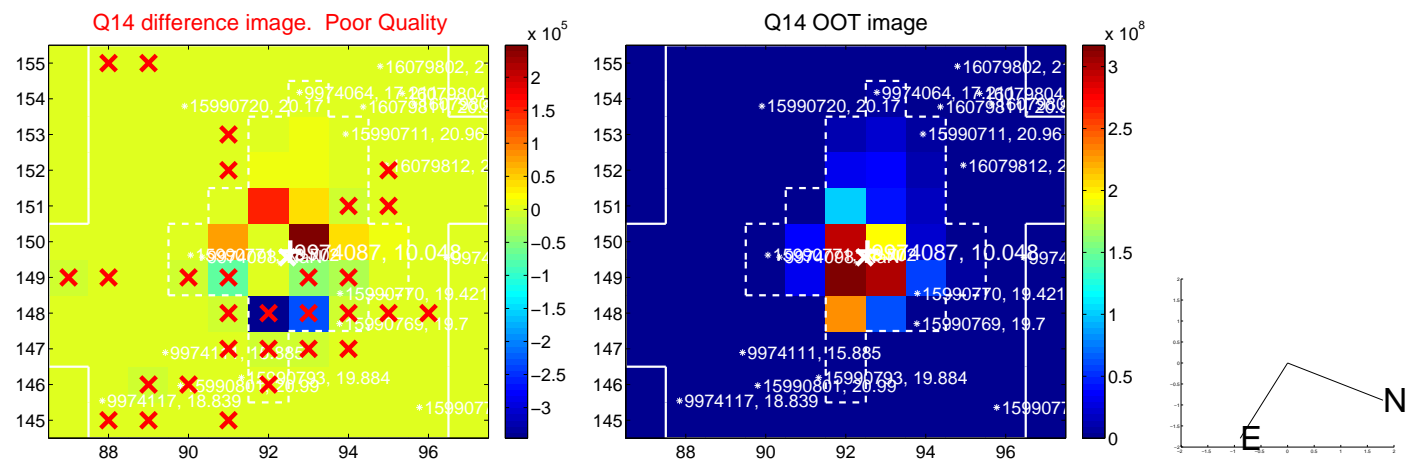
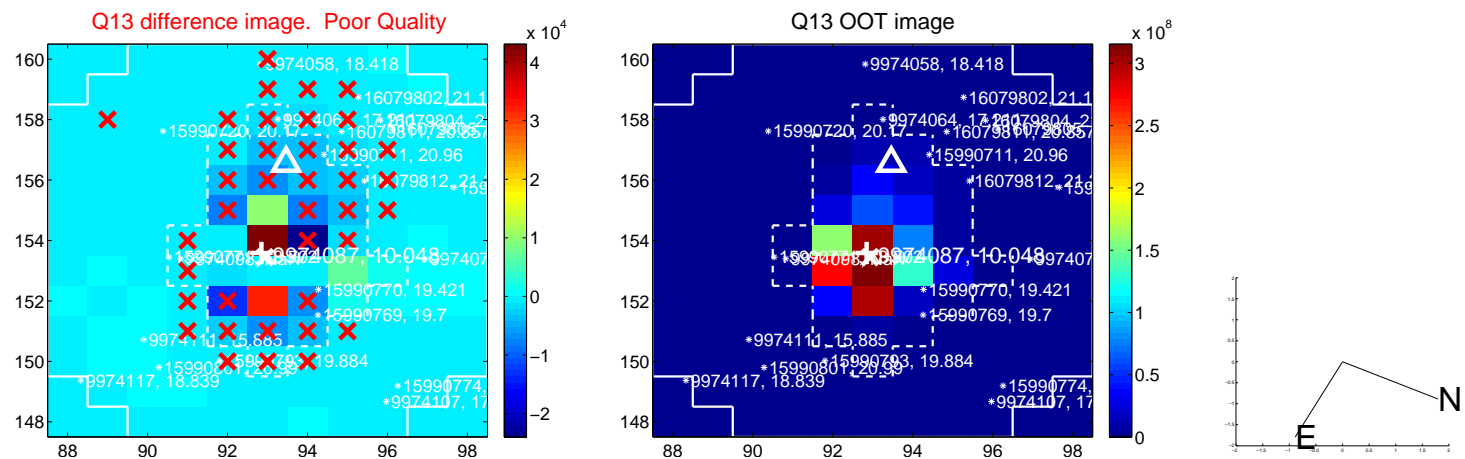


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

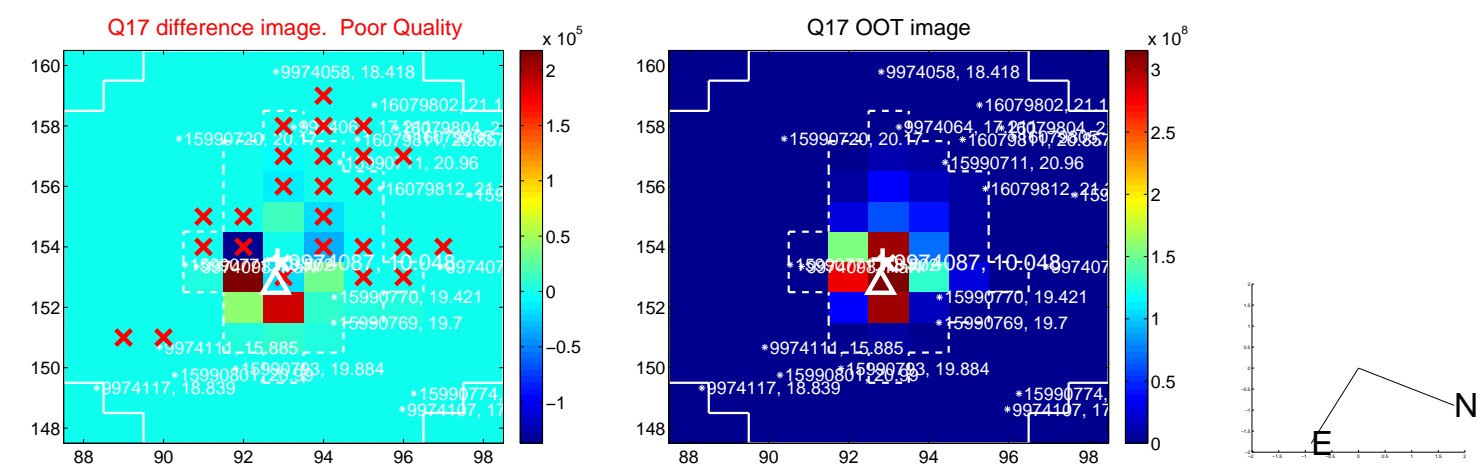
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



folded centroid time series figure for this object.

UKIRT Image

