

KIC 006861400

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006861400-01 | OBS | No | 358.719785 | 155.095885 | 1011.8 | 2.231 | 82.3 | 3.5 | 1.53 | 6735 | 5.12 | 3.67 |
| 006861400-02 | OBS | No | 334.145465 | 180.777742 | 10935.0 | 4.214 | 55.1 | 46.3 | 1.53 | 6735 | 24.00 | 4.03 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 006861400-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006861400-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS |

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

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

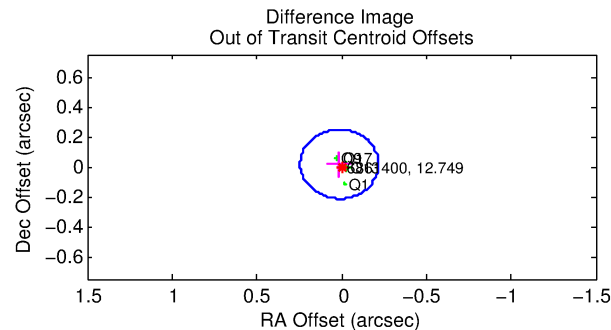
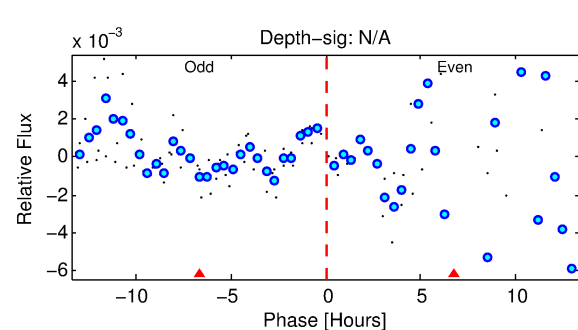
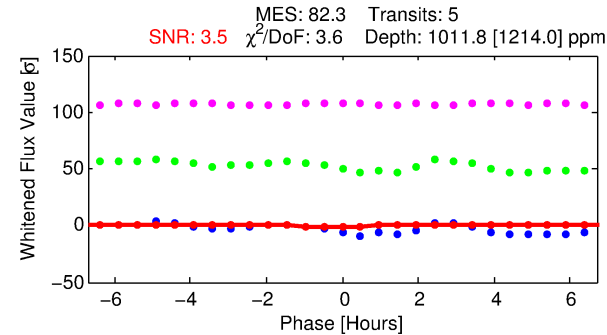
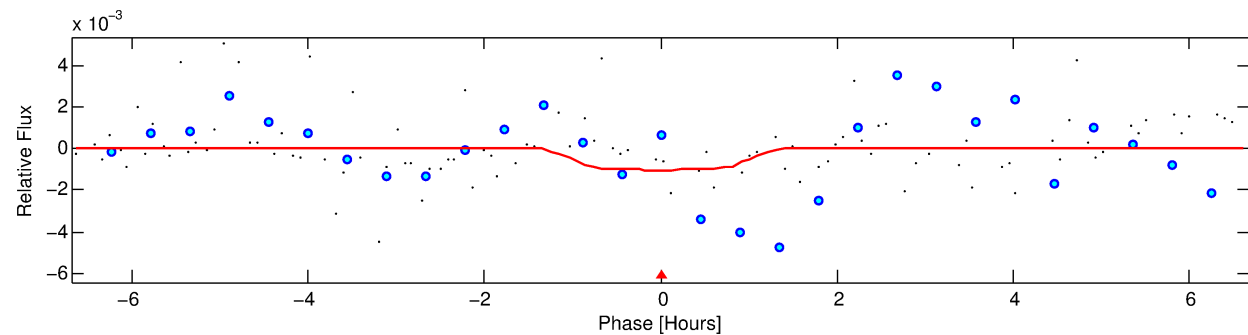
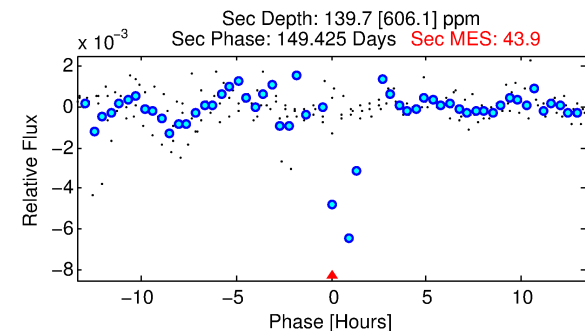
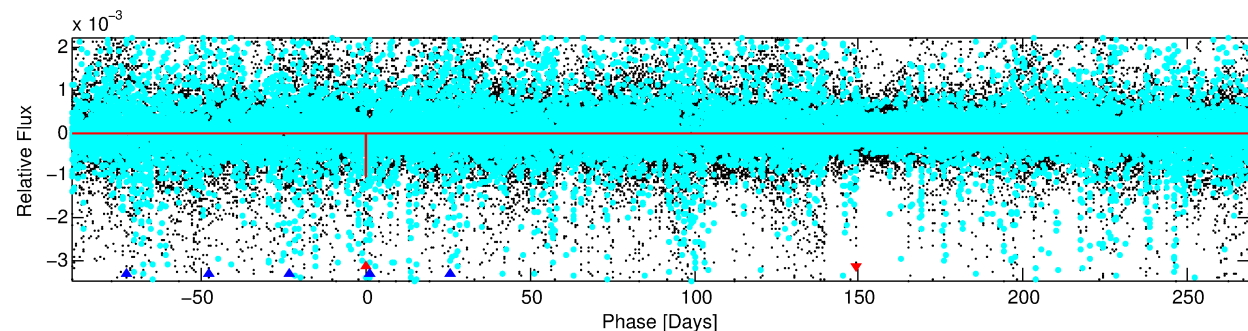
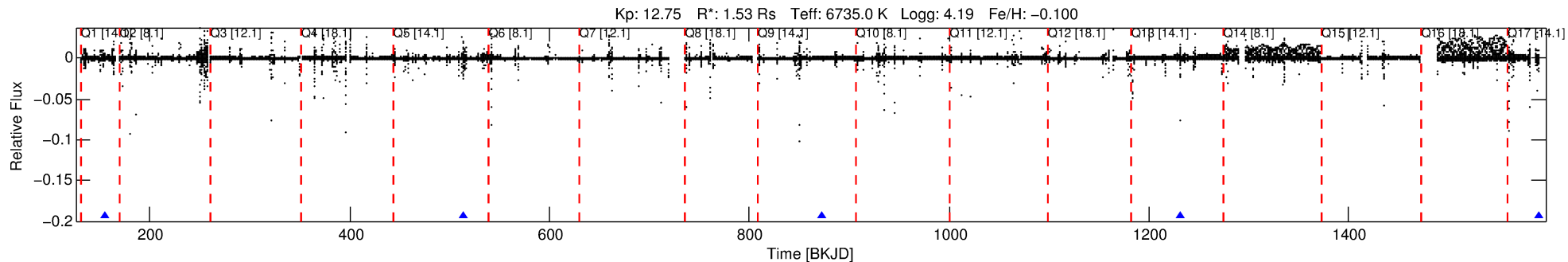
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 006861400-01

No Significant Match Found

DV One-Page Summary

KIC: 6861400 Candidate: 1 of 2 Period: 358.720 d



DV Fit Results:

Period = 358.71979 [0.01928] d
Epoch = 155.0959 [0.0366] BKJD
Rp/R* = 0.0306 [0.3305]
a/R* = 1029.35 [61564.65]
b = 0.60 [64.25]
Seff = 3.67 [1.45]
Teff = 353 [35] K
Rp = 5.11 [55.19] Re
a = 1.0847 [0.2785] AU
Ag = 3457.55 [76098.33] [0.05σ]
Teffp = 4184 [23017] K [0.17σ]

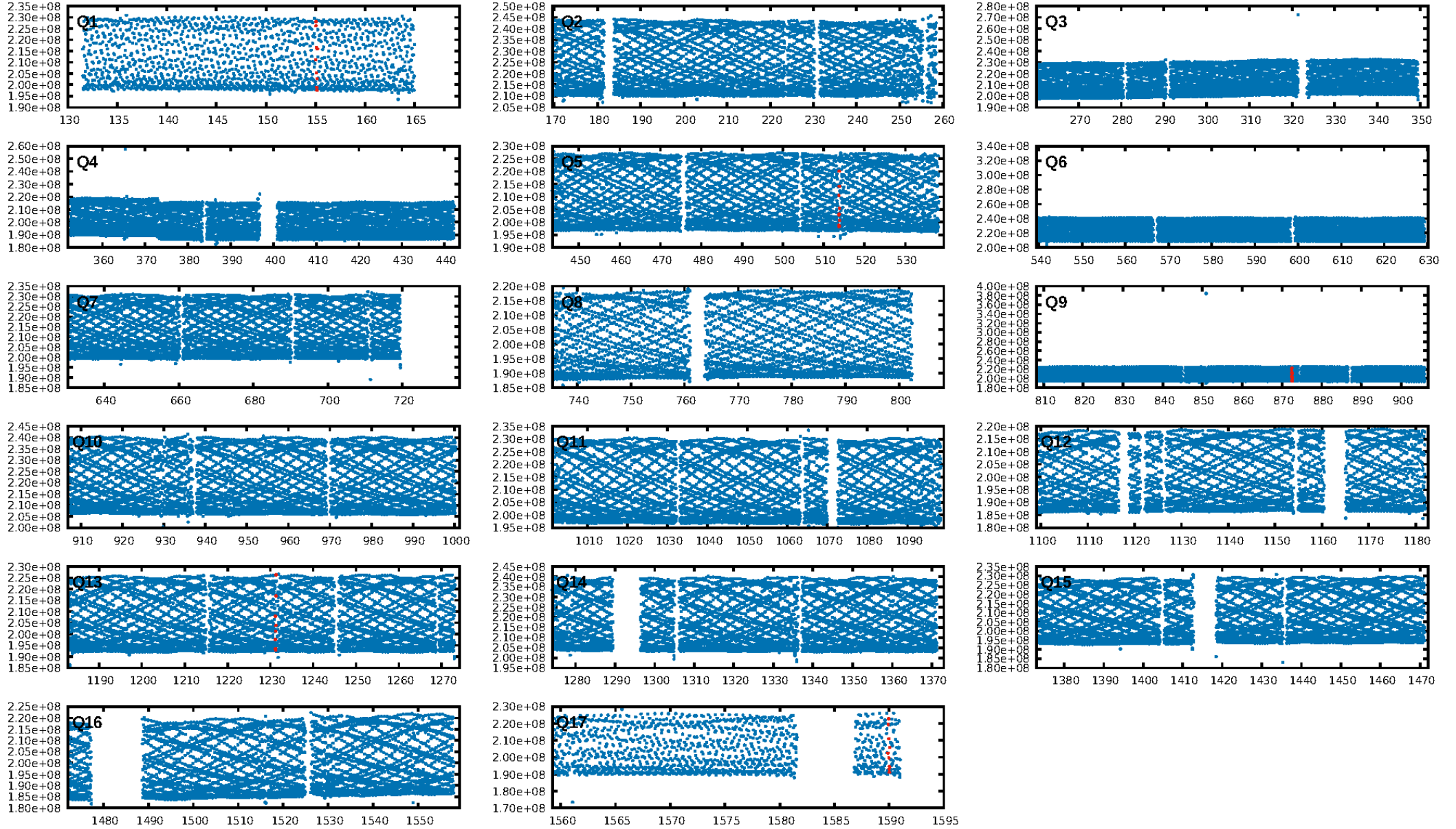
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [123.70σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 0.3%
Bootstrap-pfa: 3.64e-12
RollingBand-fgt: 1.00 [3/3]
GhostDiagnostic-chr: 2.236
Centroid-sig: 74.6%
Centroid-so: 0.112 arcsec [0.39σ]
OotOffset-rm: 0.022 arcsec [0.28σ]
KicOffset-rm: 0.027 arcsec [0.39σ]
OotOffset-st: 0/0/0/4 [4]
KicOffset-st: 0/0/0/4 [4]
DiffImageQuality-fgm: 0.75 [3/4]
DiffImageOverlap-fno: 1.00 [5/5]

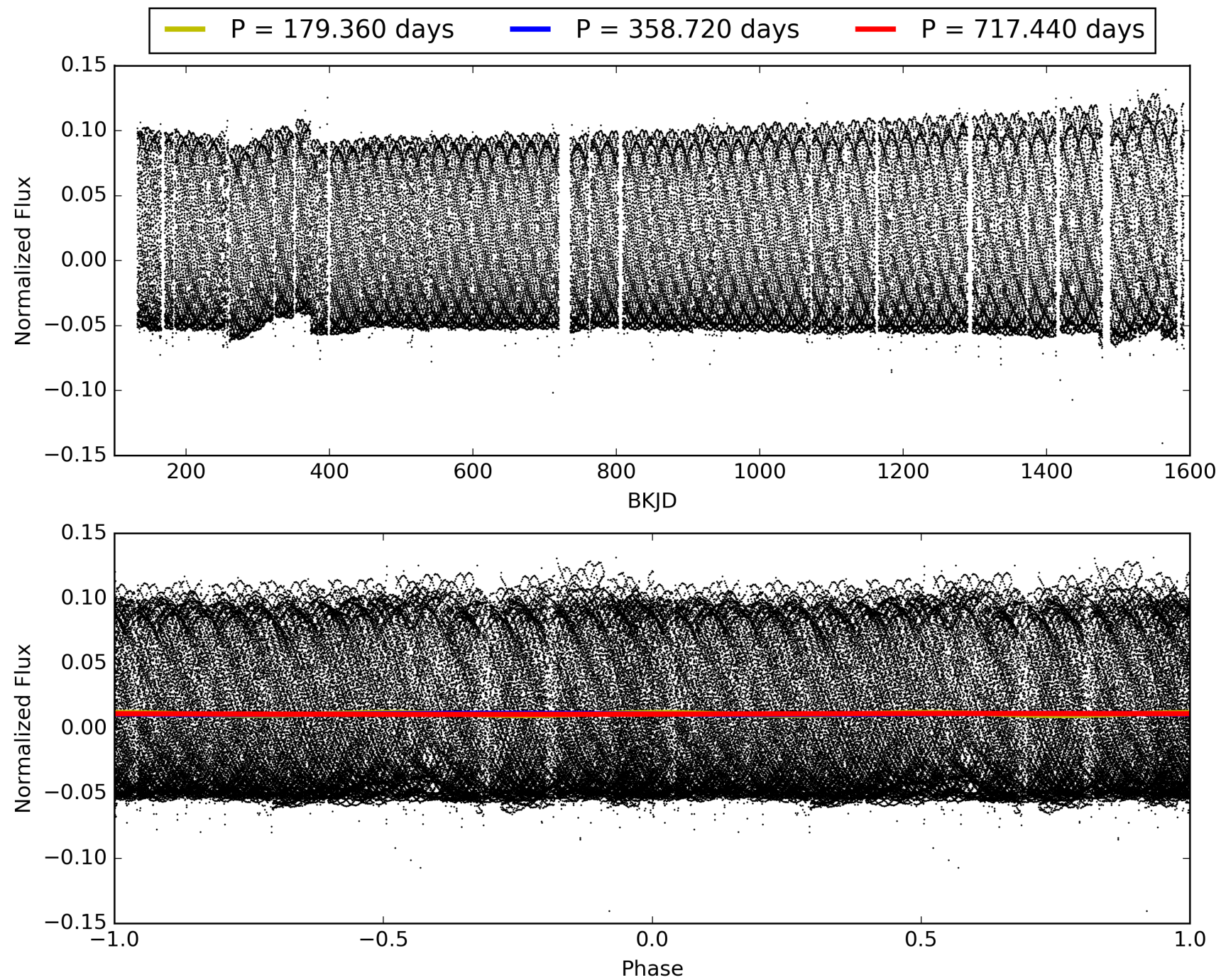
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 12:21:33 Z

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

TCE 006861400-01, PDC Light Curves

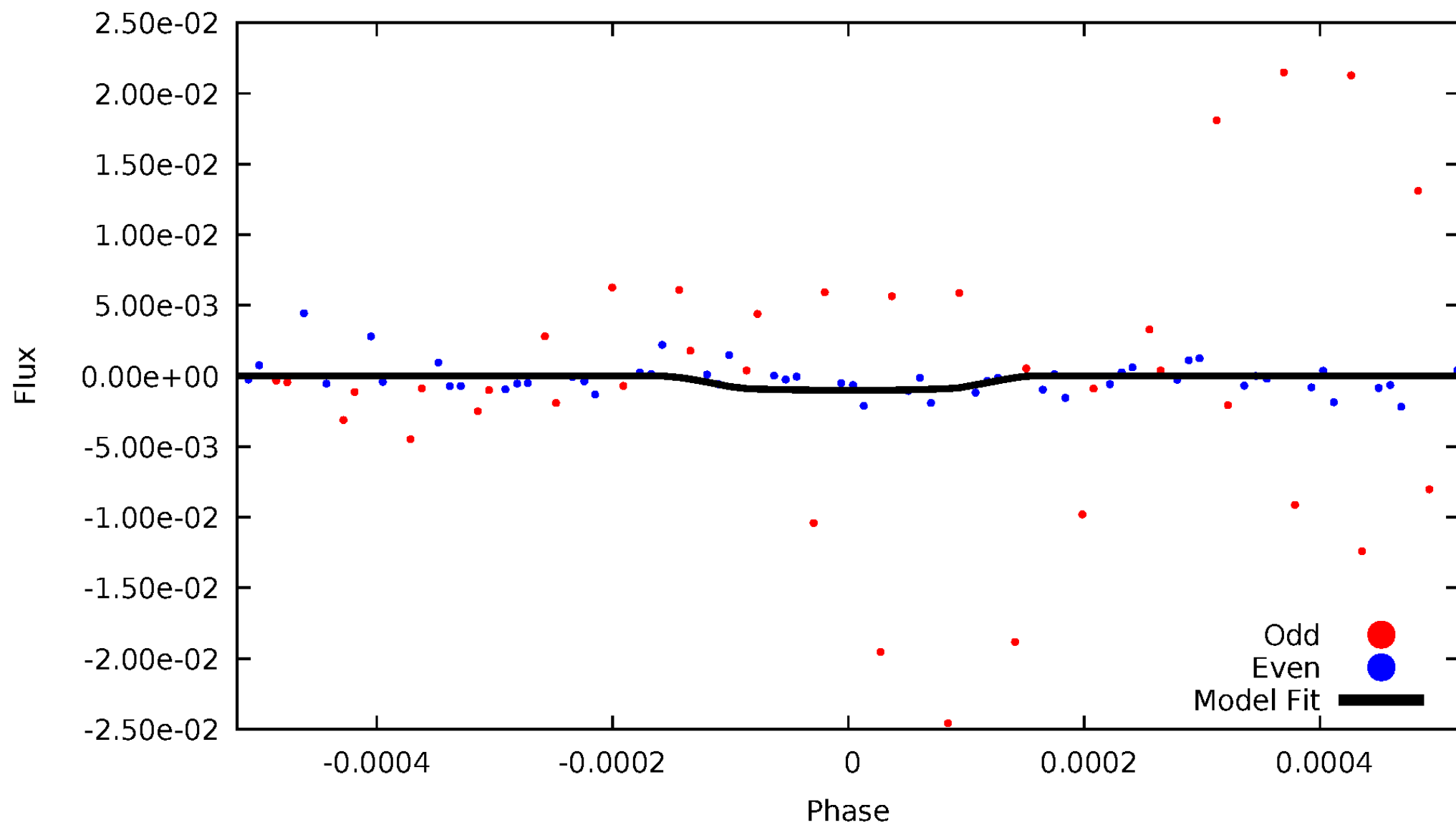


TCE 006861400-01



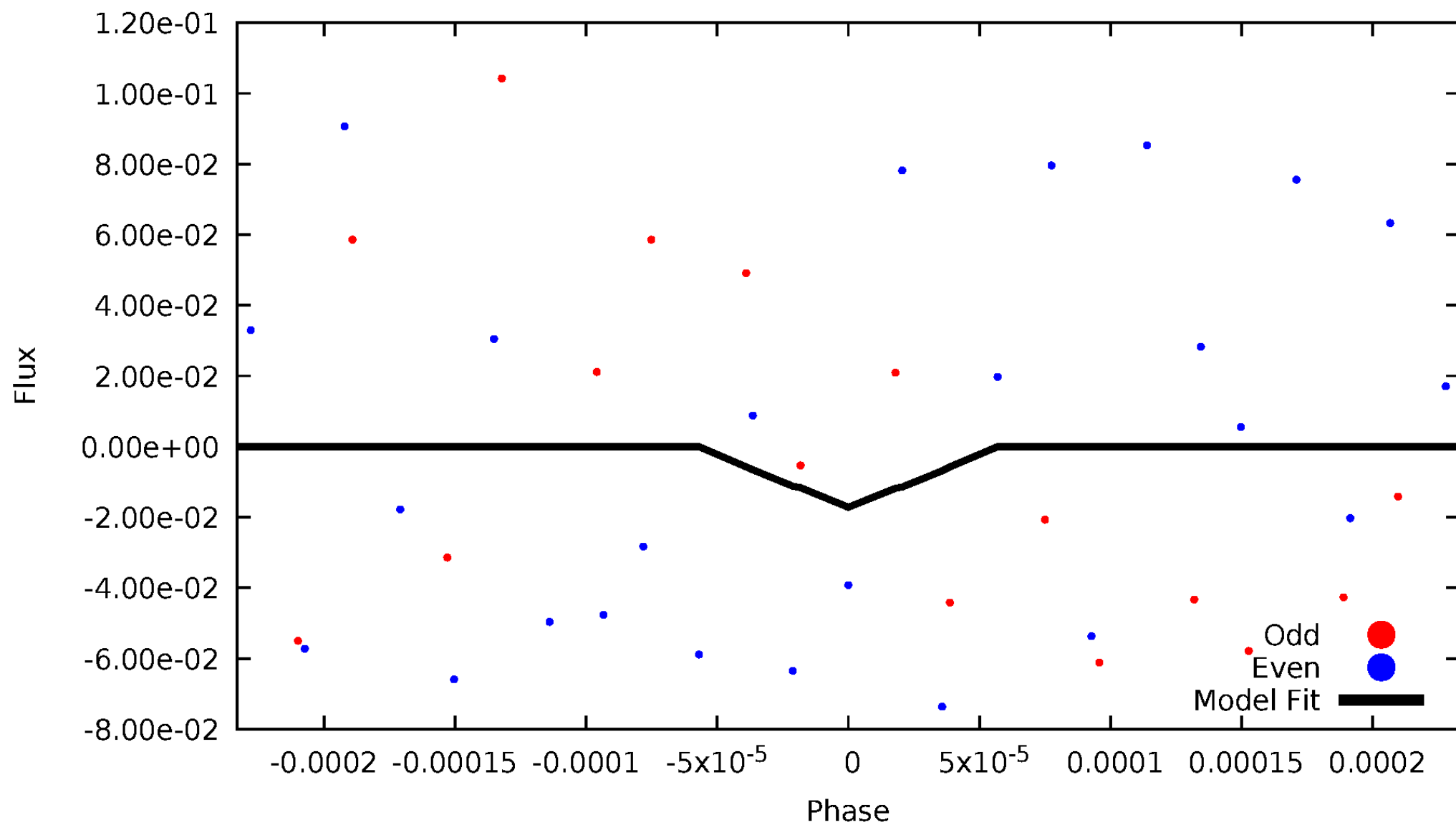
DV Odd/Even

TCE 006861400-01



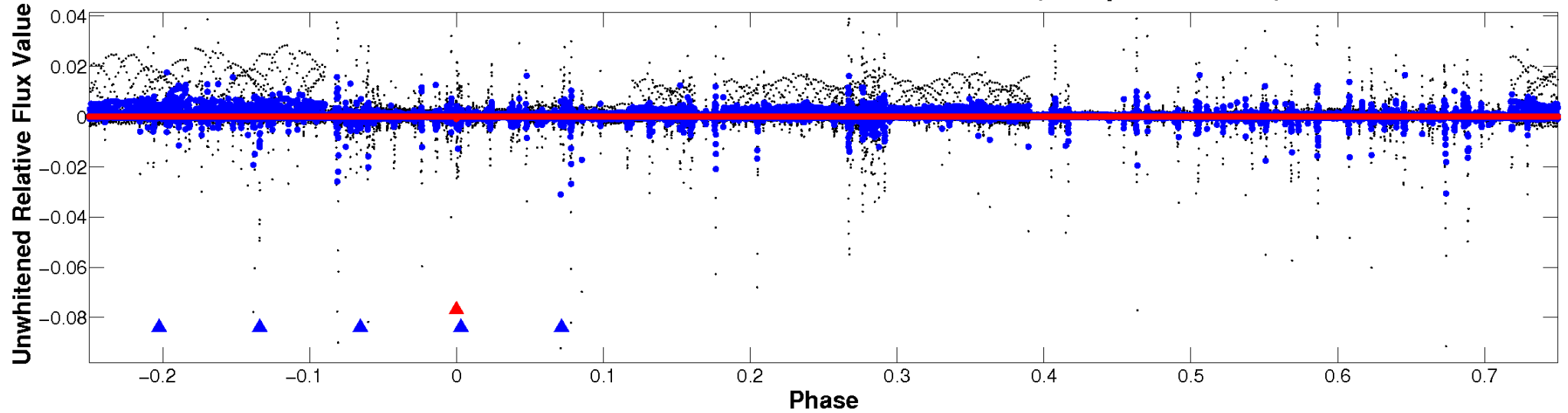
ALT Odd/Even

TCE 006861400-01

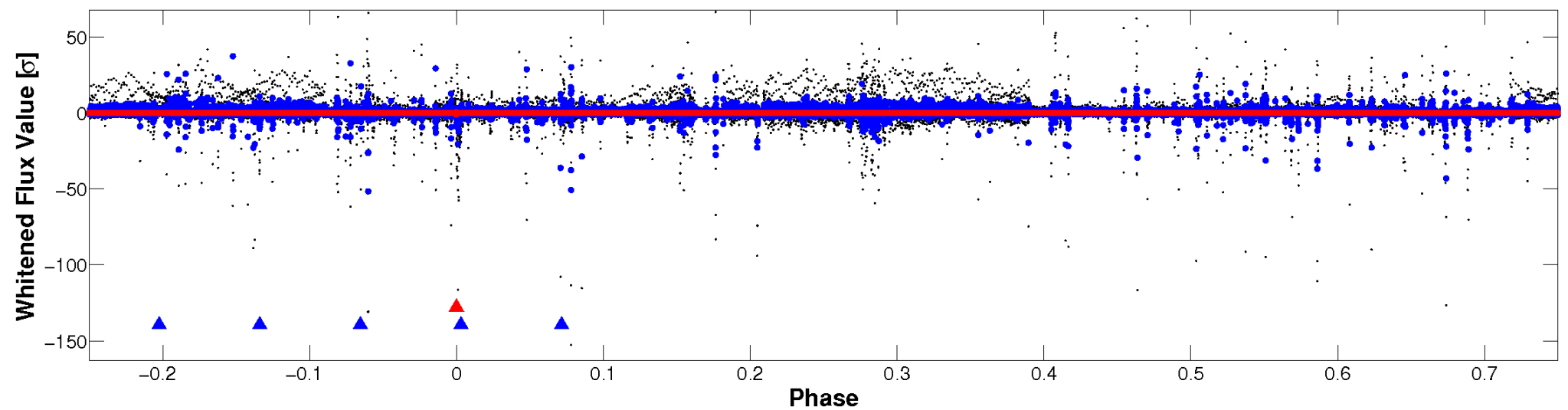


Non-Whitened Vs. Whitened Light Curve

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

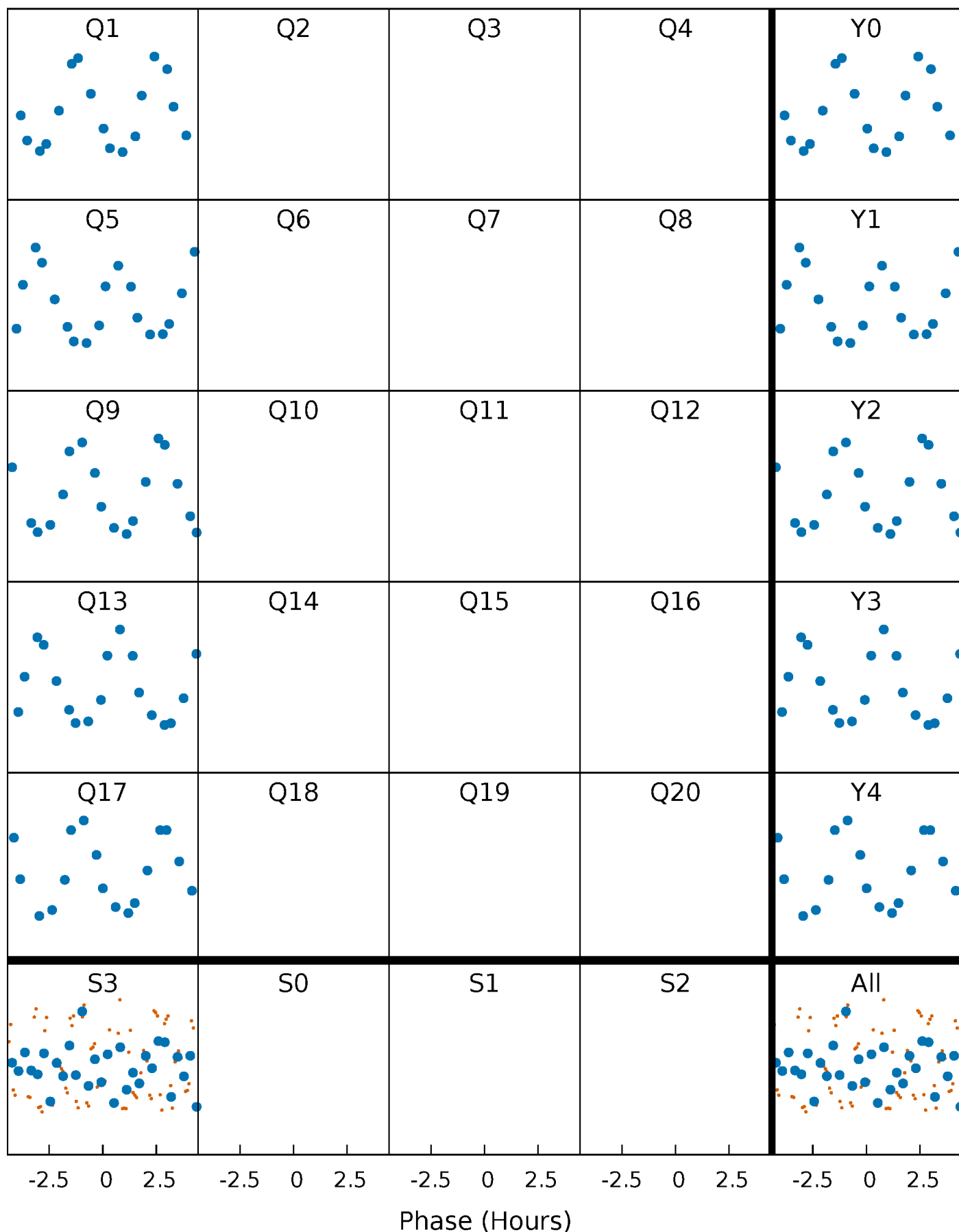


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



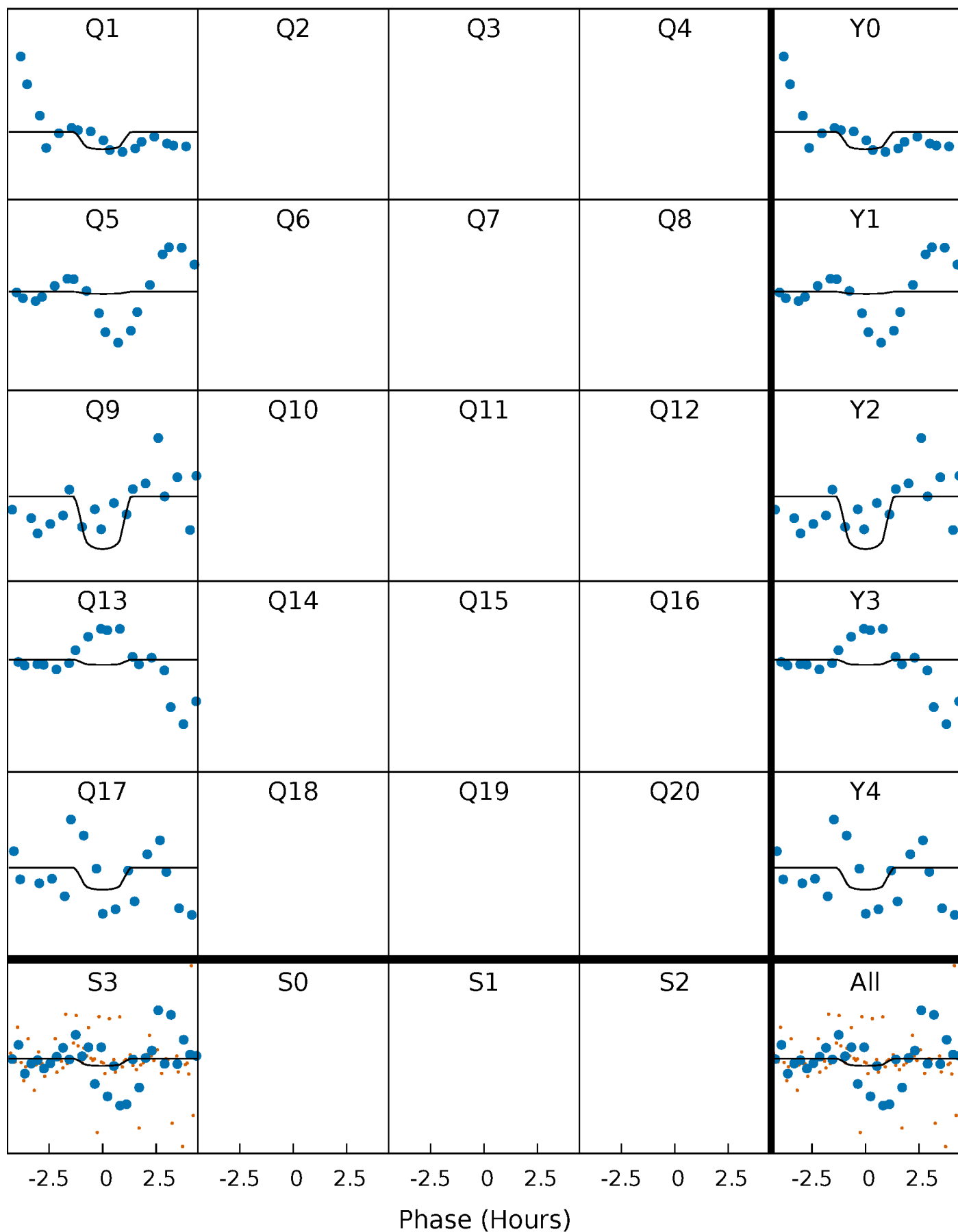
PDC Quarter-Phased Transit Curves

TCE 006861400-01 P=358.719785 Days $T_0=155.095885$ (BKJD)



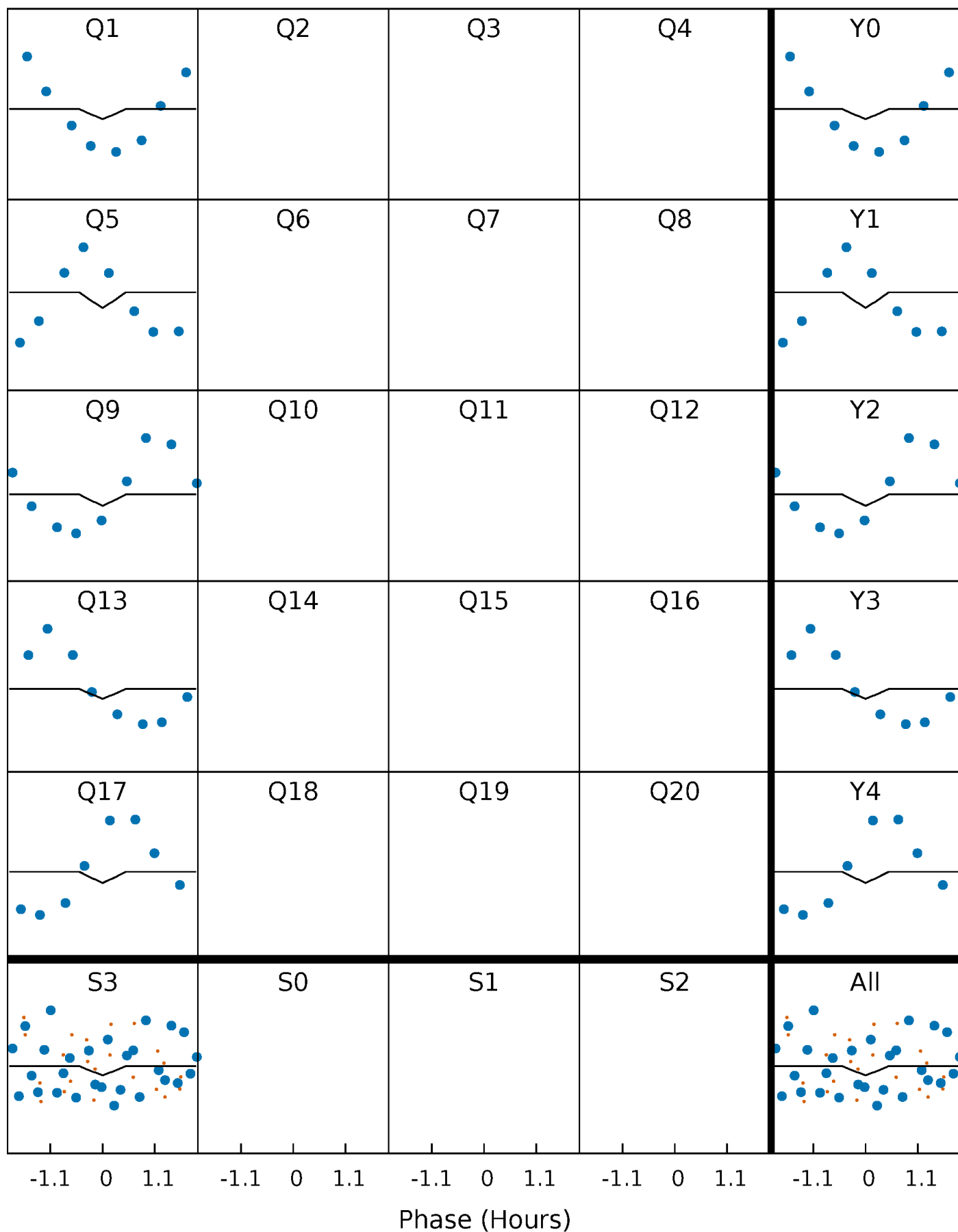
DV Quarter-Phased Transit Curves

TCE 006861400-01 P=358.719785 Days $T_0=155.095885$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

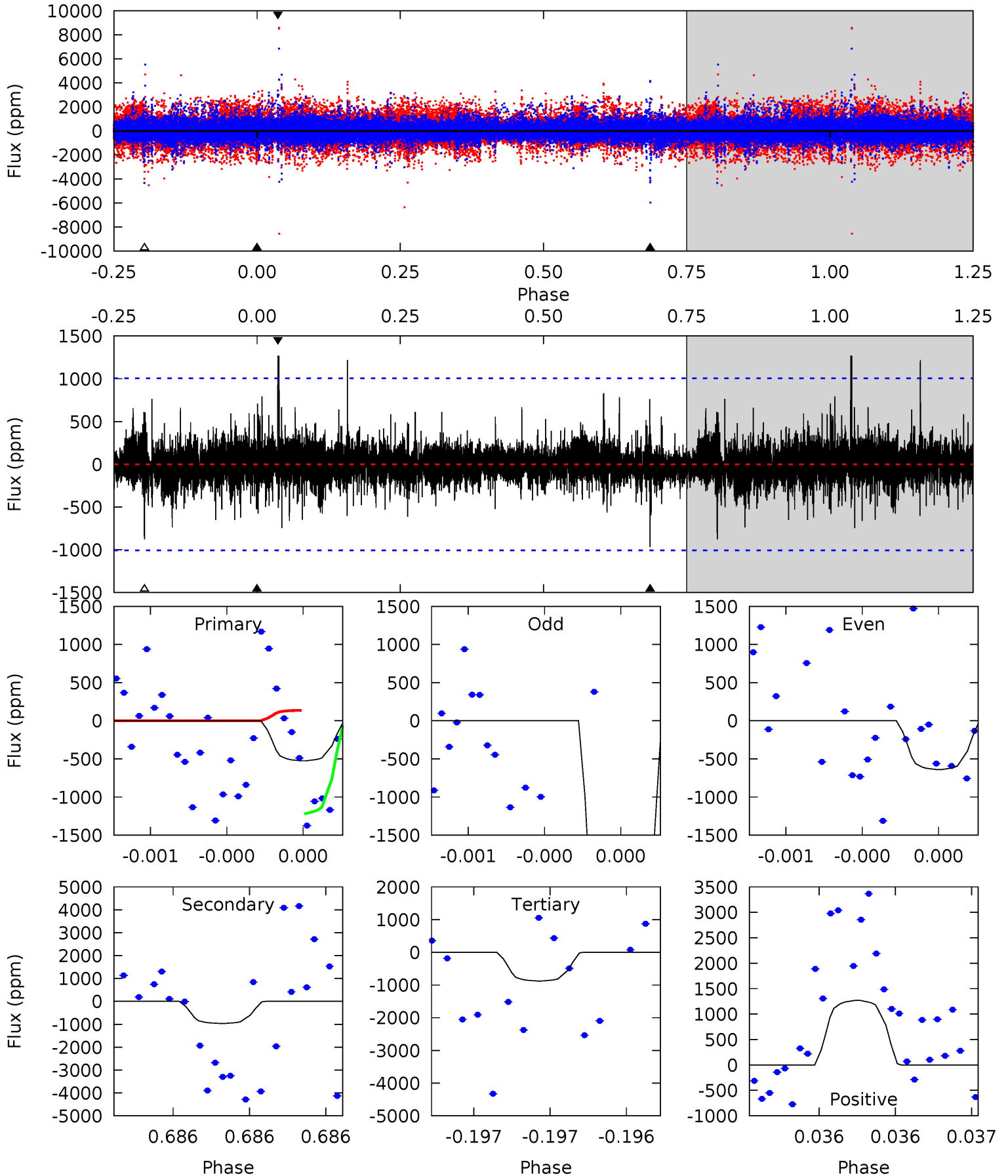
TCE 006861400-01 P=358.738185 Days $T_0=155.121778$ (BKJD)



DV Model-Shift Uniqueness Test

006861400-01, P = 358.719785 Days, E = 155.095885 Days

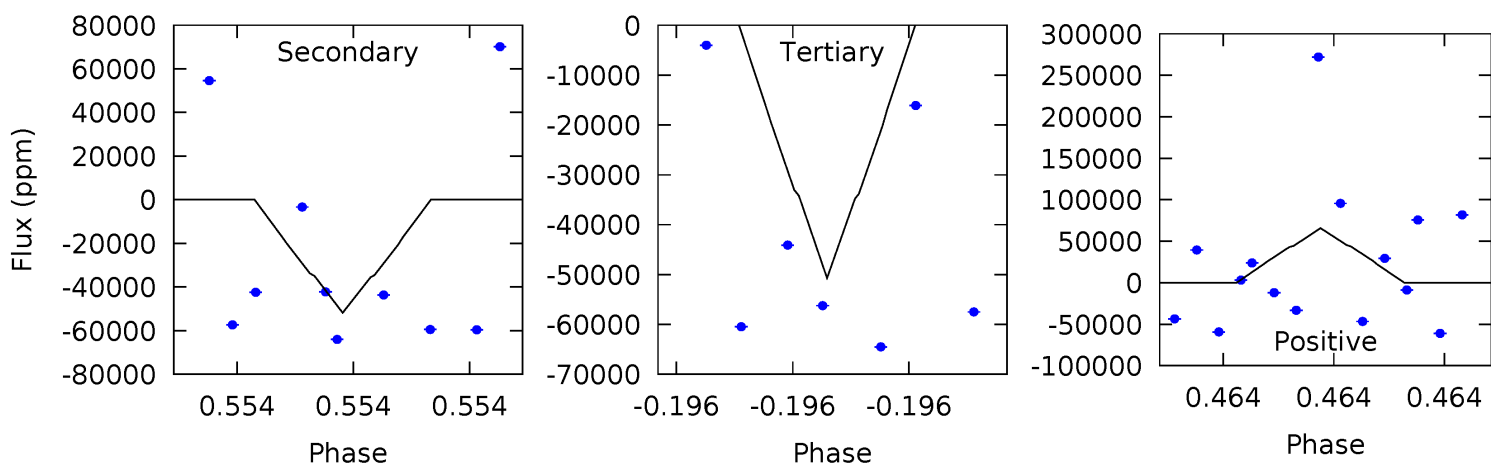
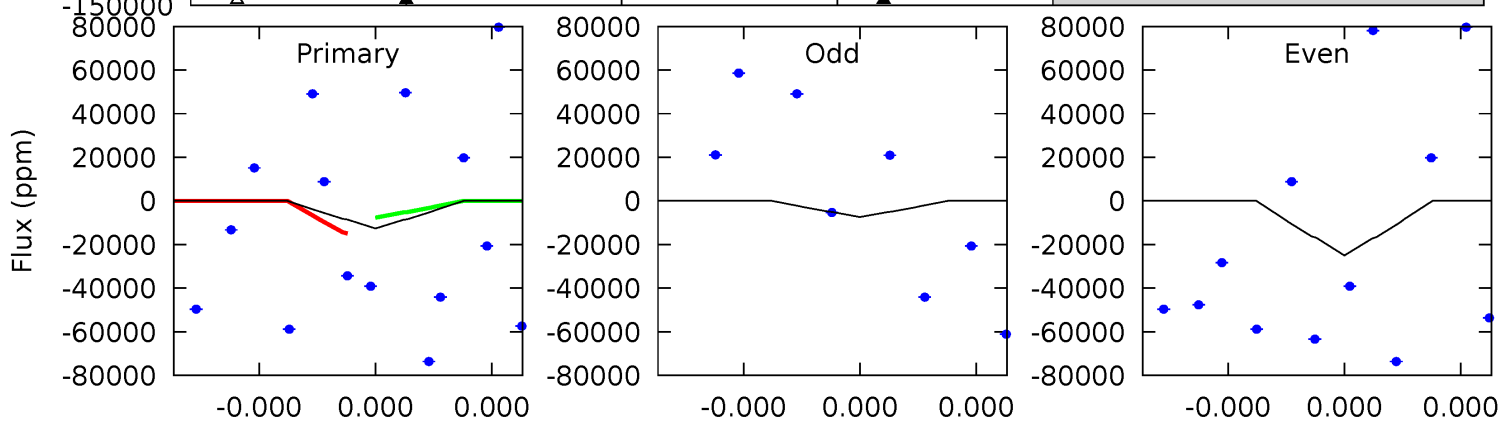
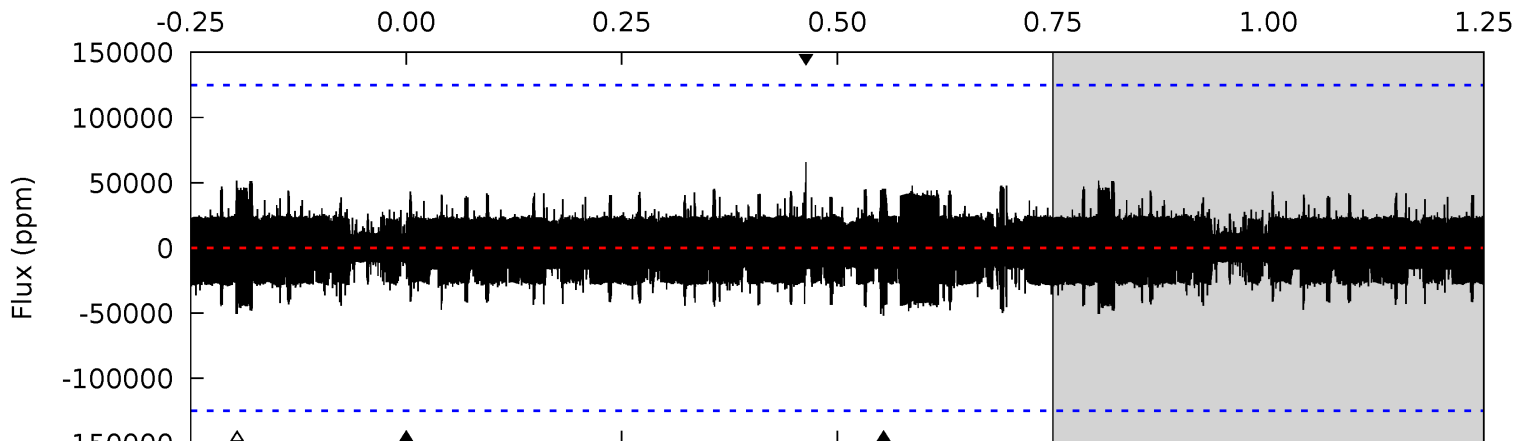
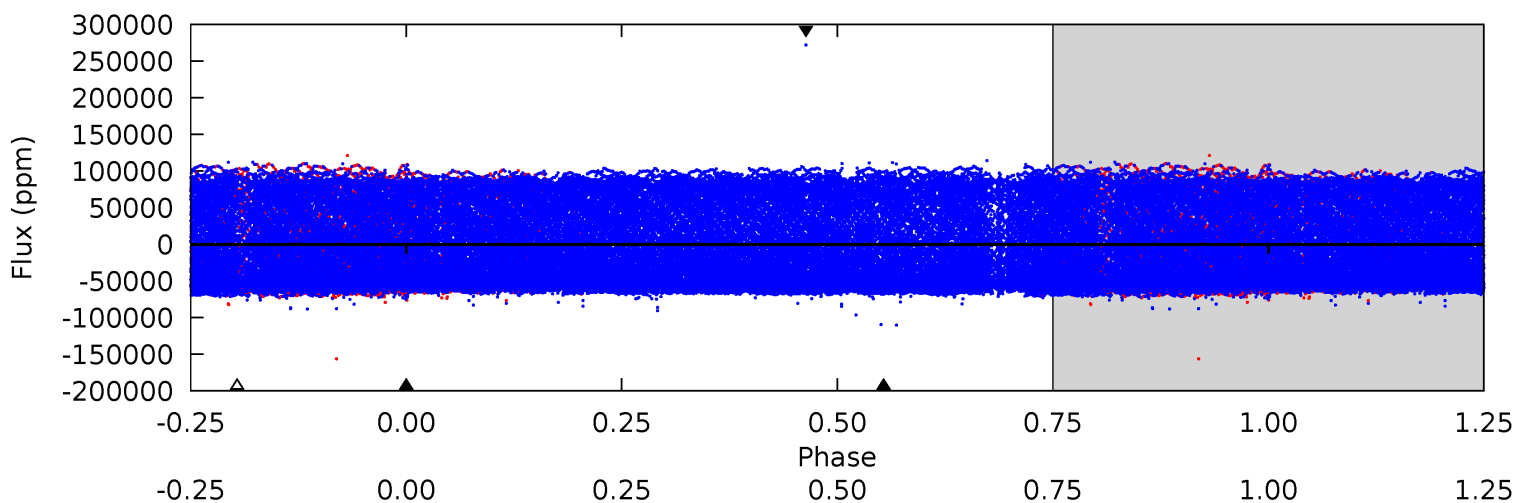
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 2.96 | 5.44 | 4.94 | 7.16 | 5.67 | 3.63 | 0.89 | -1.98 | -4.20 | 0.50 | -1.72 | 6.50 | 3.44 | 0.57 | 3.09 |



Alt Model-Shift Uniqueness Test

006861400-01, P = 358.738185 Days, E = 155.121778 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|-------|-------|------|
| 0.60 | 2.45 | 2.39 | 3.11 | 5.89 | 3.96 | 0.71 | -1.80 | -2.51 | 0.05 | -0.66 | 0.39 | -0.16 | 0.56 | 0.16 |



Stellar Parameters For KIC 006861400

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6735^{+162}_{-243} | $4.190^{+0.132}_{-0.198}$ | $-0.100^{+0.250}_{-0.300}$ | $1.530^{+0.475}_{-0.317}$ | $1.328^{+0.184}_{-0.224}$ | $0.522^{+0.406}_{-0.265}$ |
| | +2%/-4% | +3%/-5% | +250%/-300% | +31%/-21% | +14%/-17% | +78%/-51% |
| 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 006861400-01 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------------|---------------------------|----------------------|------------------------|----------------------------|
| DV | -965 ± 177 | $39.78^{+43.50}_{-27.71}$ | 500^{+40}_{-32} | 3085^{+1555}_{-544} | 391^{+3815}_{-303} |
| Alt. | -51810 ± 21182 | $47.47^{+48.98}_{-32.05}$ | 498^{+37}_{-33} | 5835^{+6784}_{-1497} | $13124^{+128923}_{-10020}$ |

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

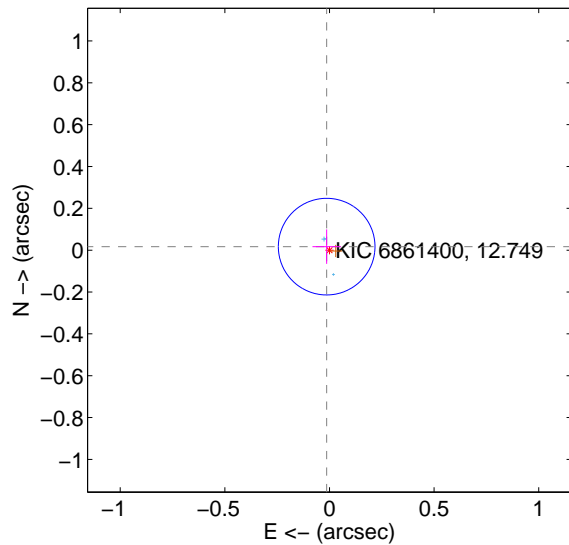
Supplemental centroid analysis for 006861400-01. Kepler magnitude: 12.75. Transit SNR 3.50

There are 3 quarters with good PRF difference image offsets

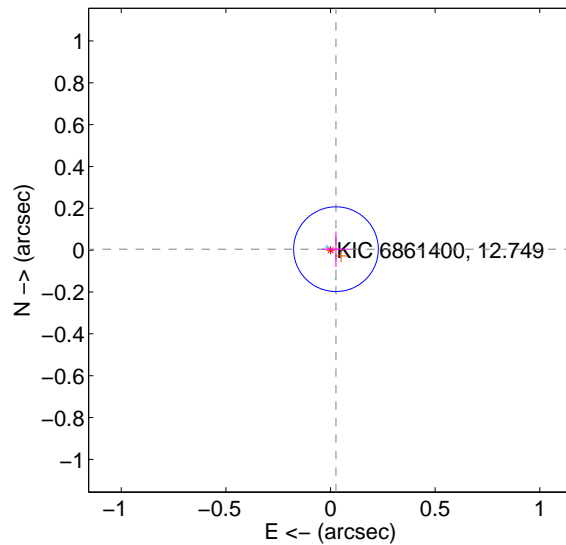
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 0.022 ± 0.077 | 0.28 | 0.013 ± 0.068 | 0.017 ± 0.082 |
| PRF-fit source offset from KIC position | 0.027 ± 0.067 | 0.39 | -0.026 ± 0.067 | 0.005 ± 0.085 |
| photometric centroid source offset | 0.11 ± 0.28 | 0.39 | 0.11 ± 0.28 | -0.01 ± 0.27 |

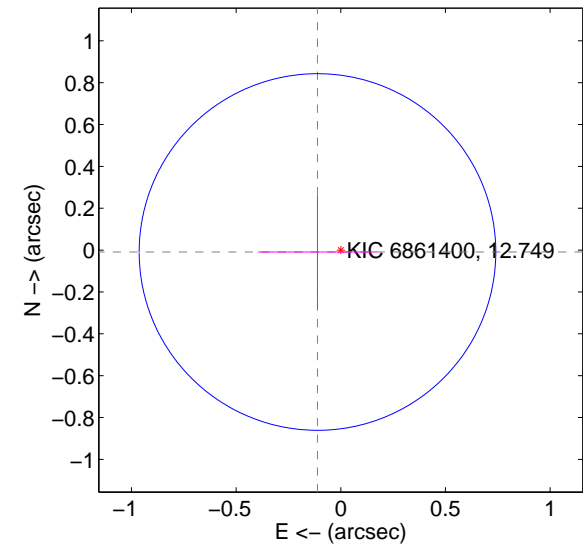
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

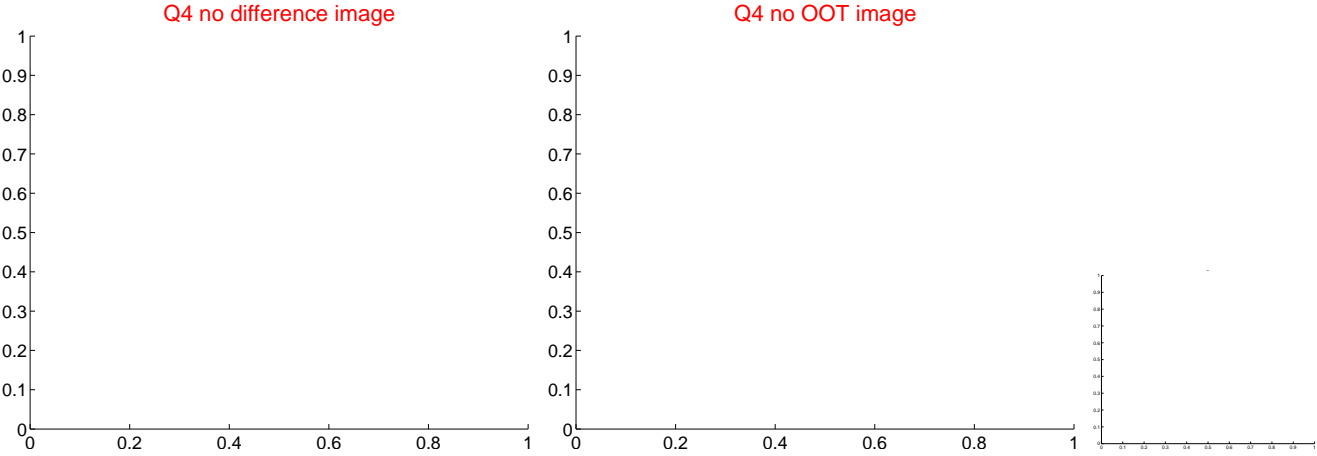
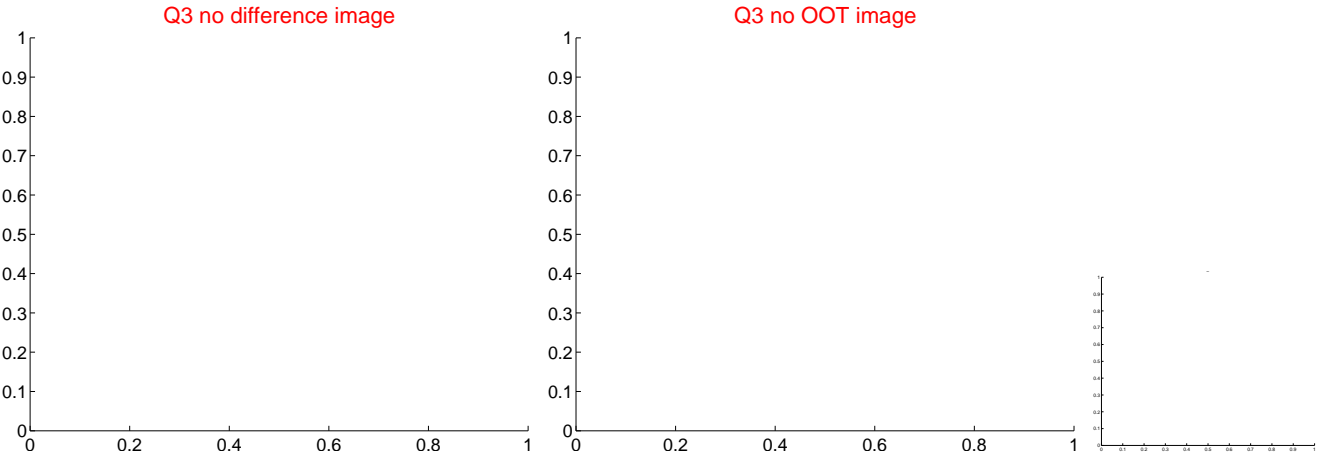
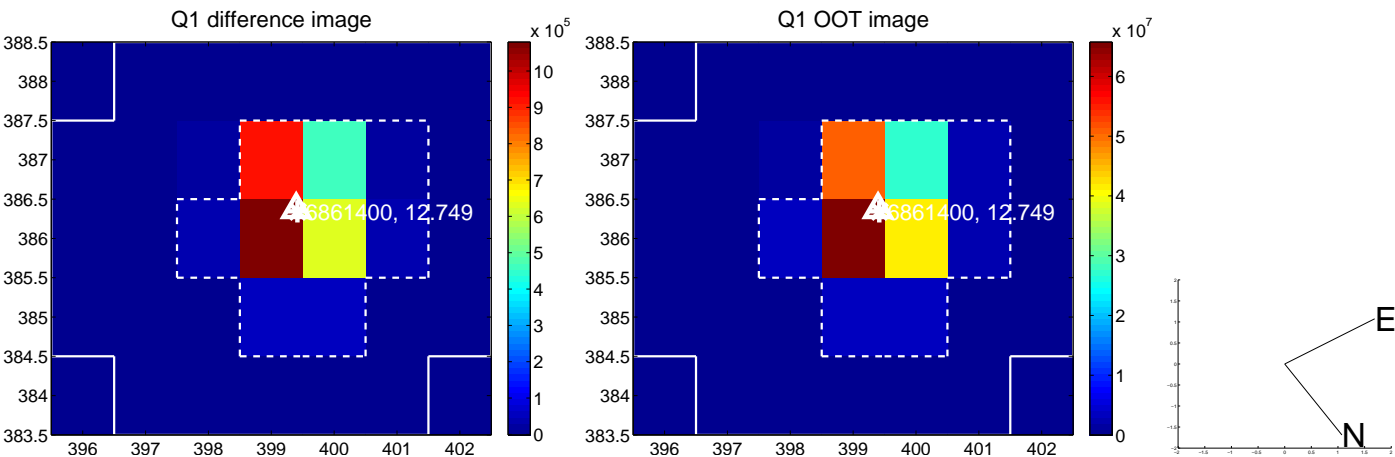


offset from photometric centroids

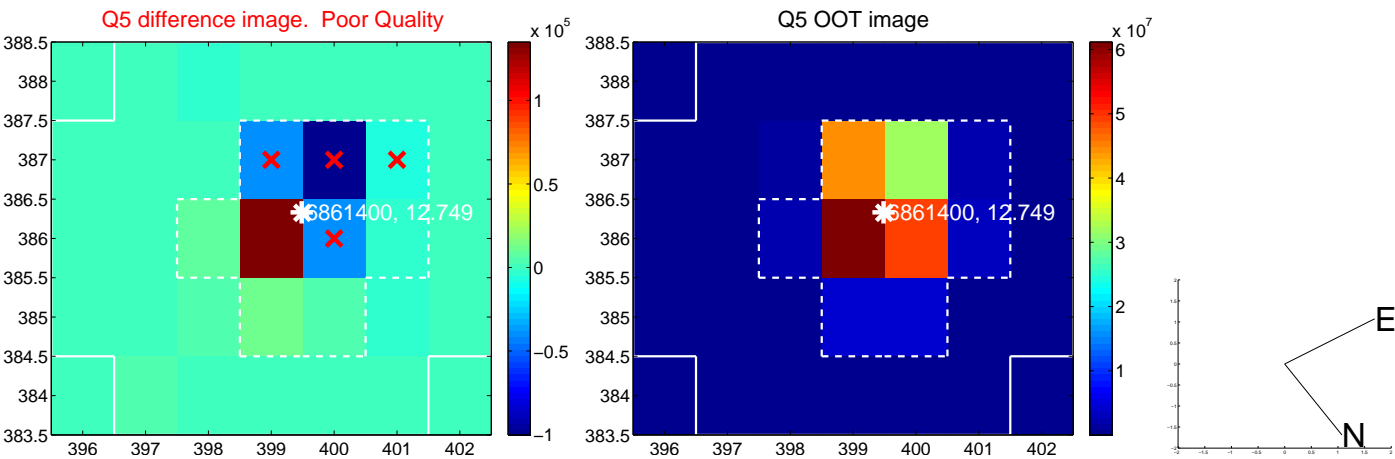


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ . Red *: target star. Blue *: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

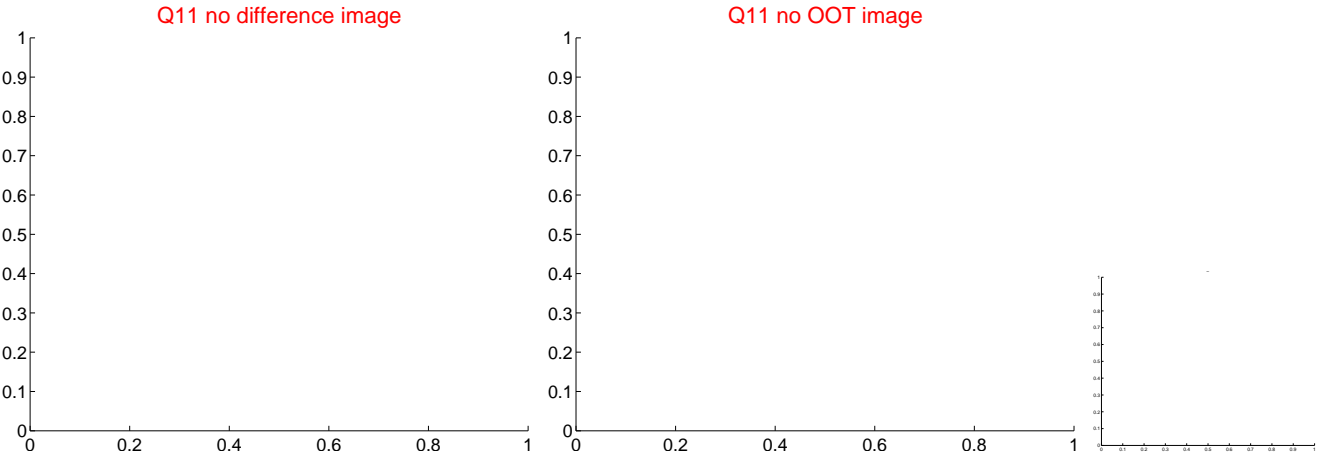
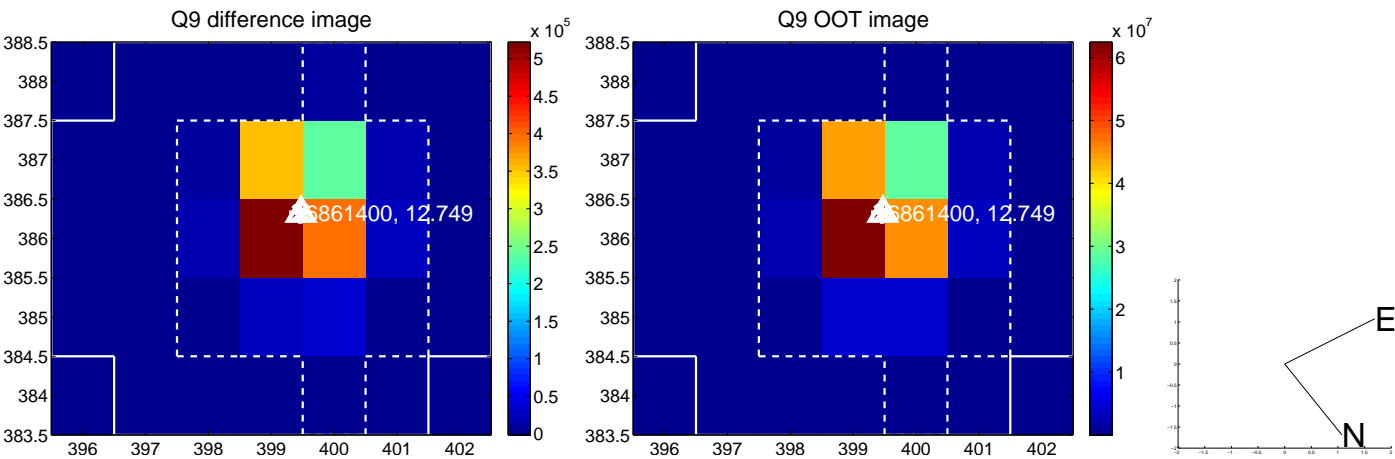
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



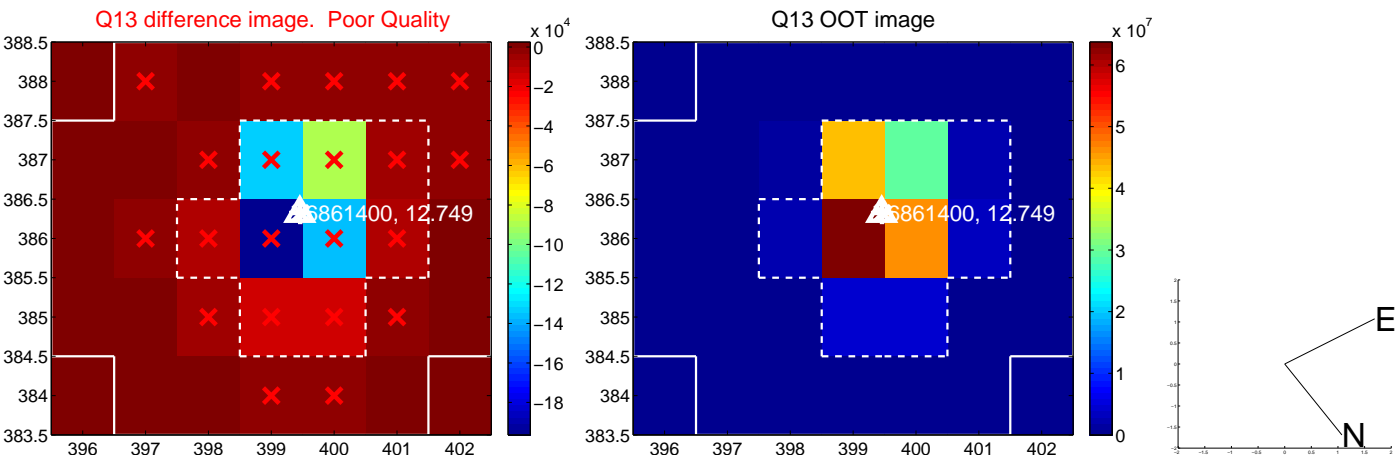
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



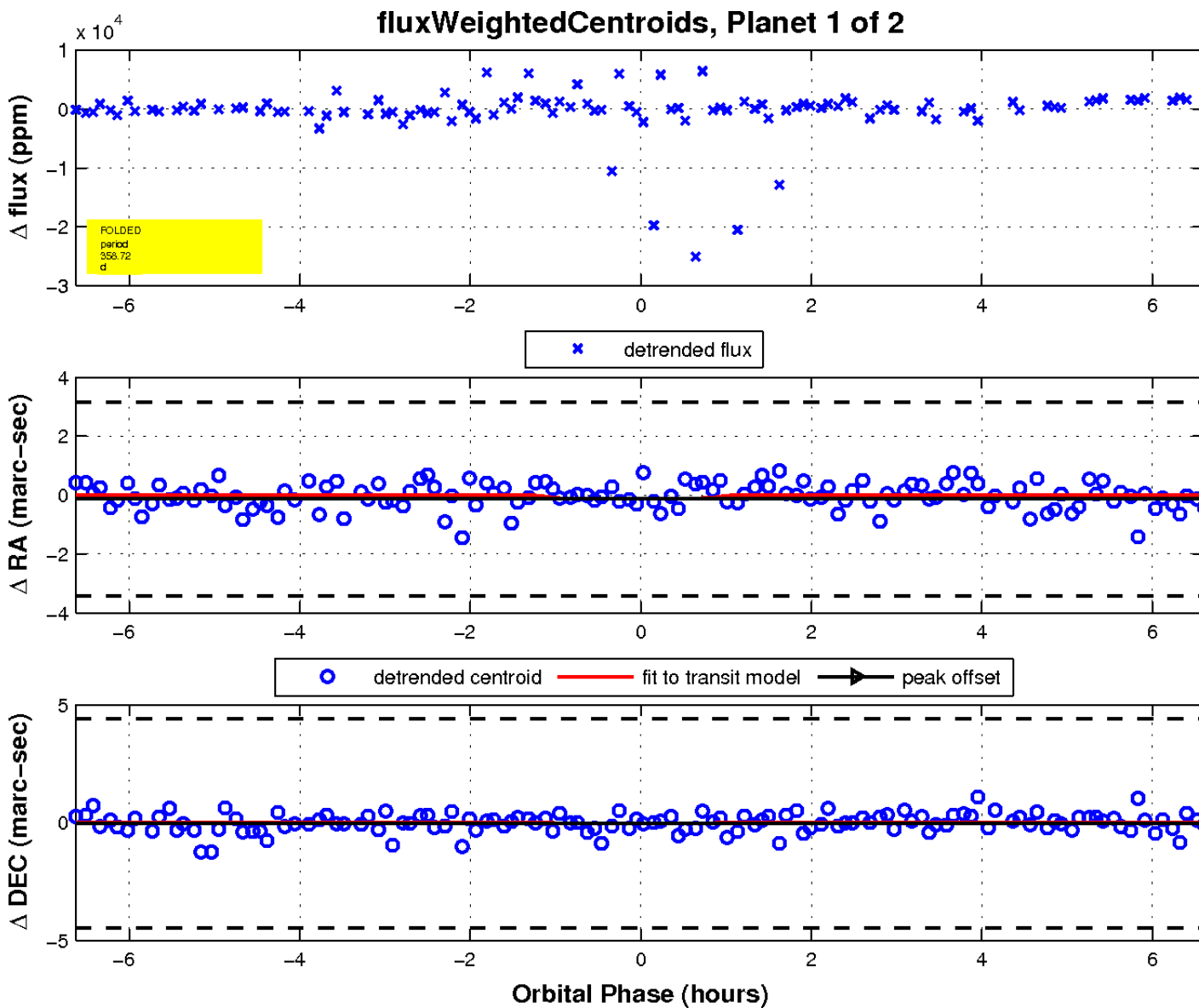
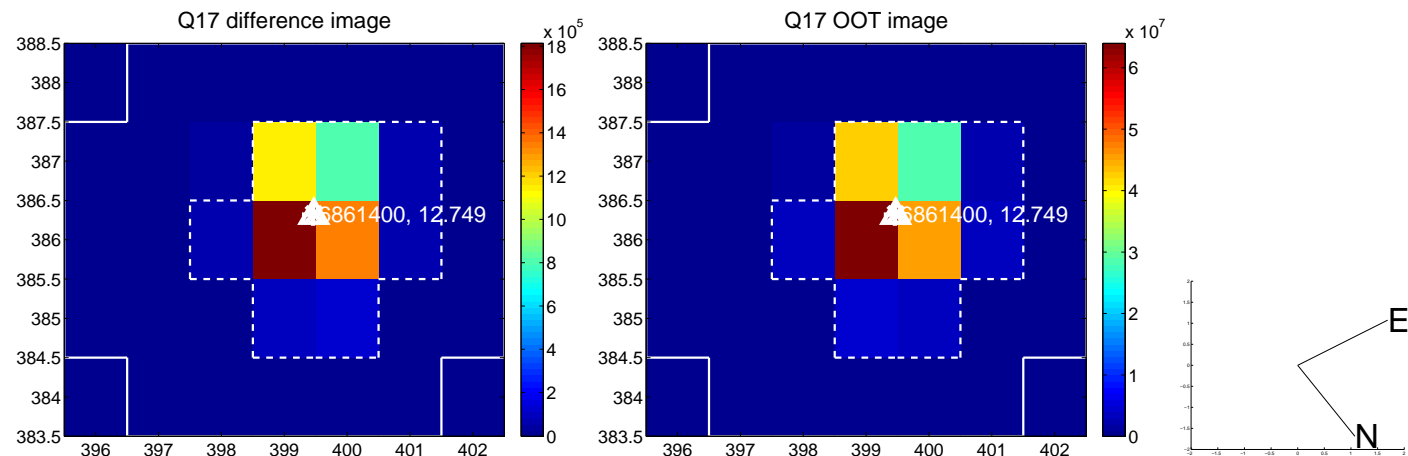
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



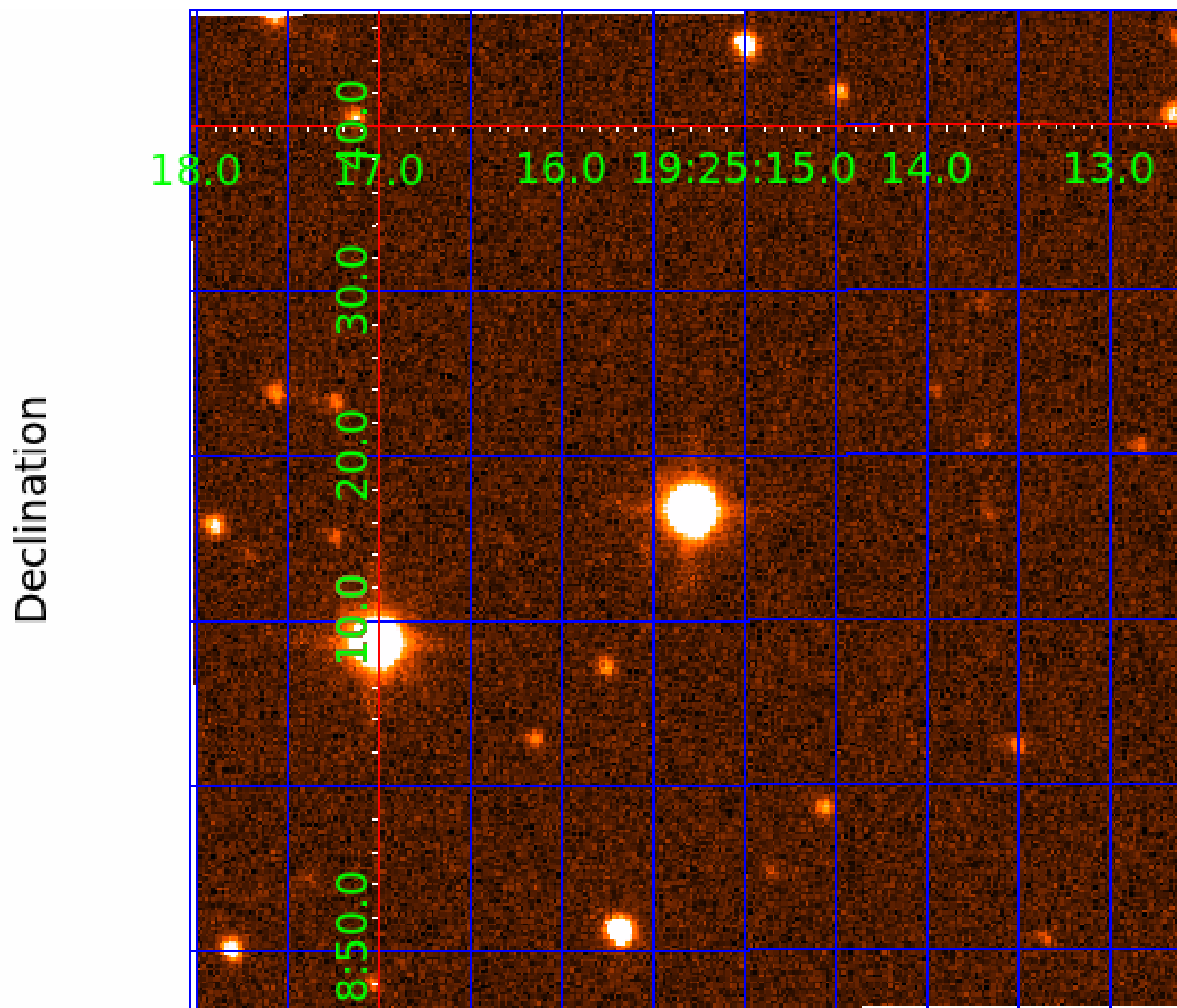
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



UKIRT Image



KIC 006861400

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}) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 006861400-01 | OBS | No | 358.719785 | 155.095885 | 1011.8 | 2.231 | 82.3 | 3.5 | 1.53 | 6735 | 5.12 | 3.67 |
| 006861400-02 | OBS | No | 334.145465 | 180.777742 | 10935.0 | 4.214 | 55.1 | 46.3 | 1.53 | 6735 | 24.00 | 4.03 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 006861400-01 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_ZUMA_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS |
| 006861400-02 | OBS | FP | 0.00 | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_SKYE—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS |

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

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

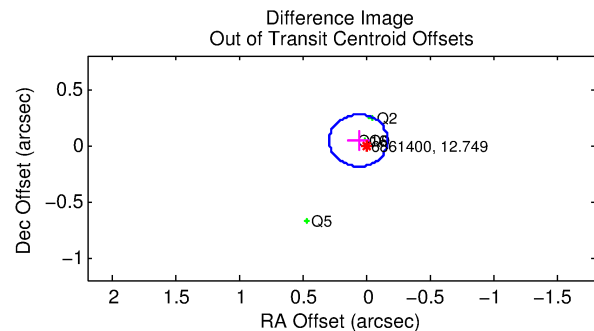
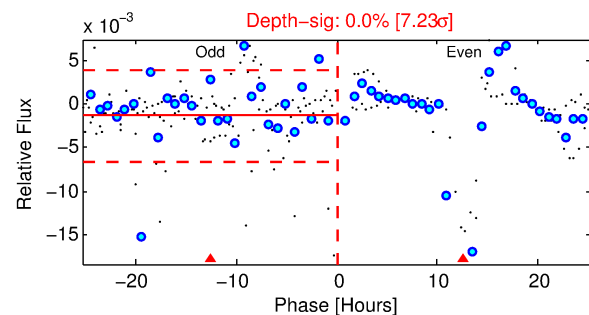
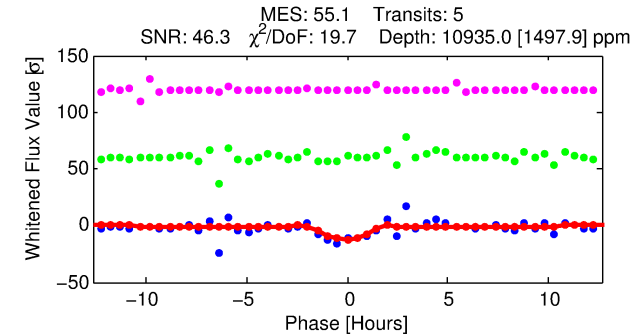
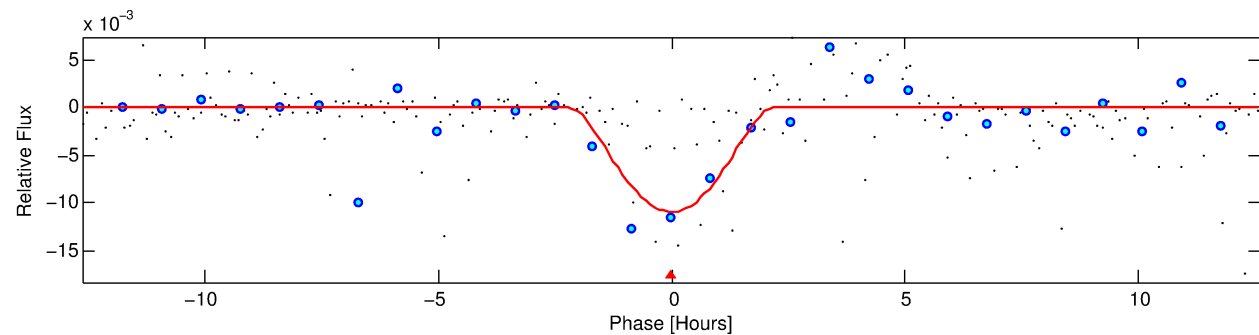
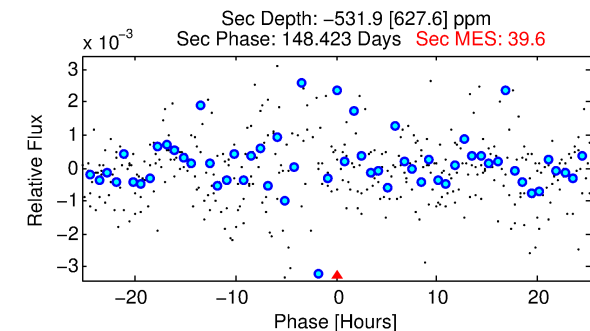
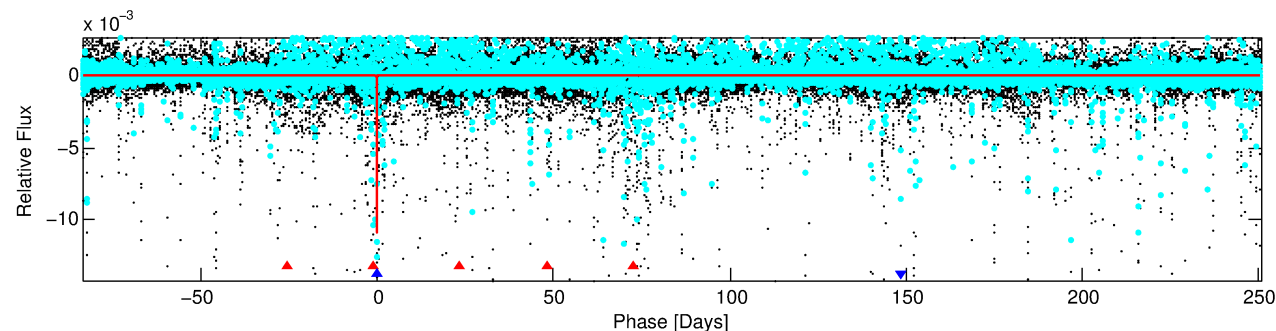
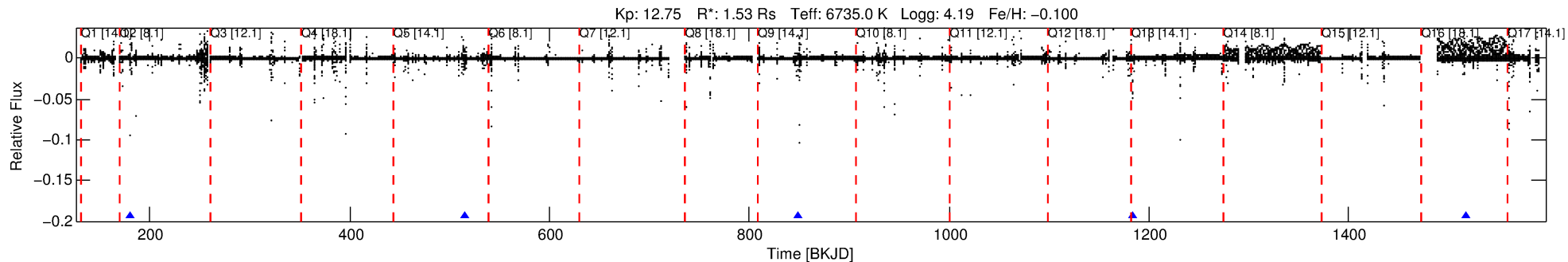
See http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col for comment definitions.

Ephemeris Match Information For 006861400-02

No Significant Match Found

DV One-Page Summary

KIC: 6861400 Candidate: 2 of 2 Period: 334.145 d



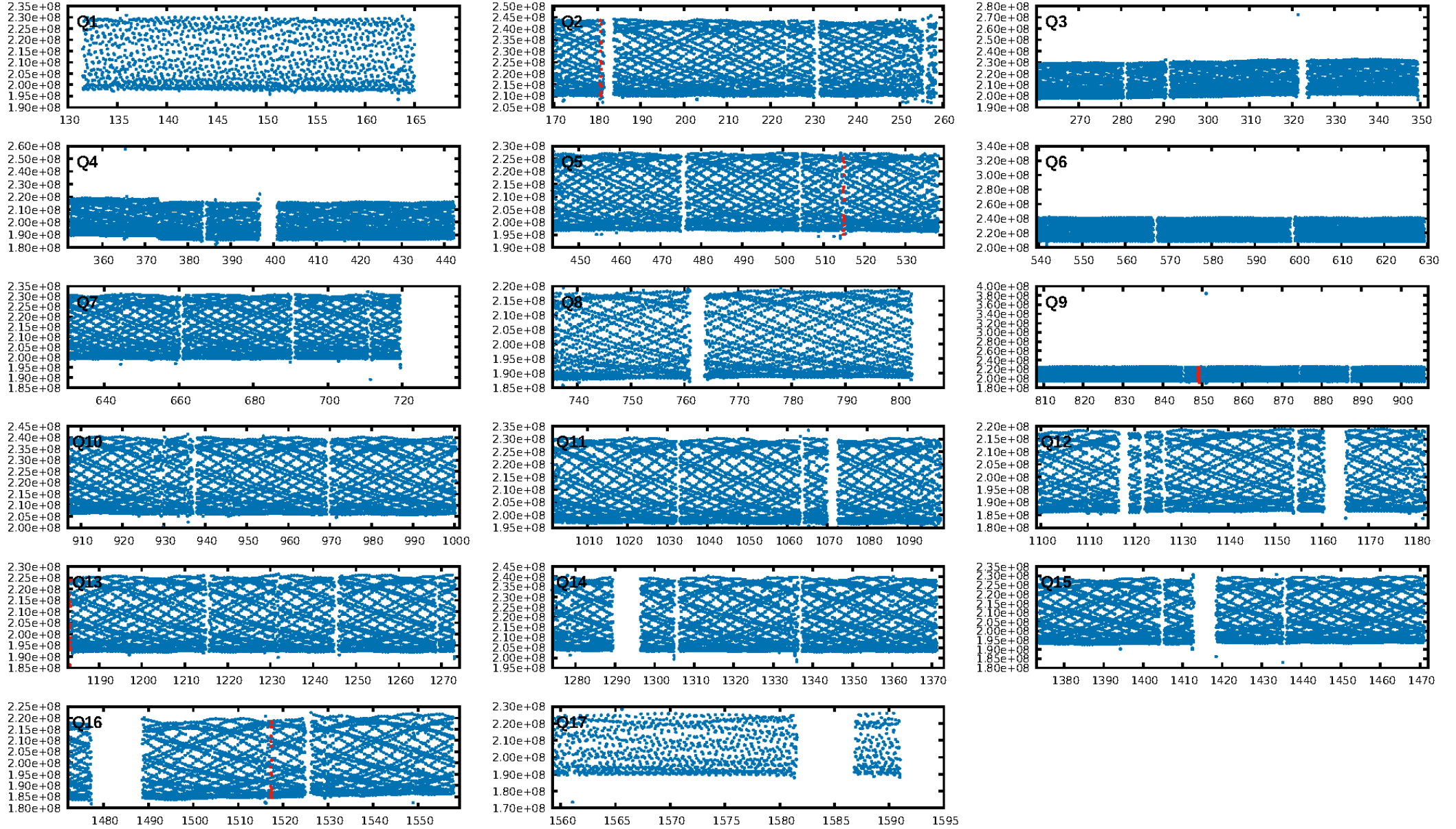
DV Fit Results:

Period = 334.14546 [0.00523] d
Epoch = 180.7777 [0.0117] BKJD
Rp/R* = 0.1437 [0.3210]
a/R* = 375.00 [189.76]
b = 0.96 [0.53]
Seff = 4.03 [1.59]
Teq = 361 [36] K
Rp = 24.00 [54.10] Re
a = 1.0346 [0.2657] AU
Ag = N/A
Teffp = N/A

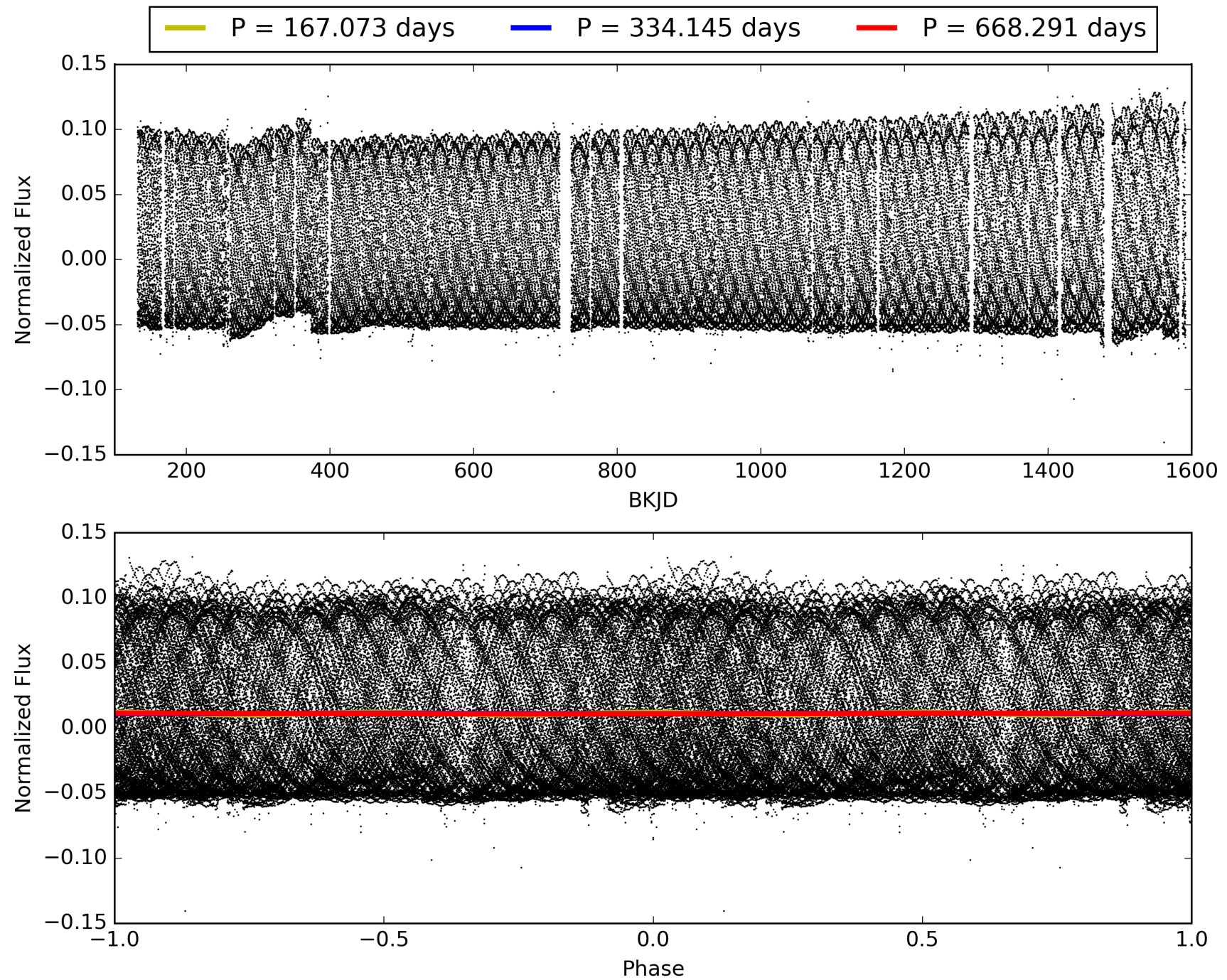
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [123.70σ]
ModelChiSquare2-sig: 0.0%
ModelChiSquareGof-sig: 0.0%
Bootstrap-pfa: 1.81e-08
RollingBand-fgt: 1.00 [5/5]
GhostDiagnostic-chr: -0.2571
Centroid-sig: 24.4%
Centroid-so: 0.051 arcsec [2.00σ]
OotOffset-rm: 0.079 arcsec [1.03σ]
KicOffset-rm: 0.070 arcsec [0.80σ]
OotOffset-st: 1/0/1/2 [4]
KicOffset-st: 1/0/1/2 [4]
DiffImageQuality-fgm: 0.25 [1/4]
DiffImageOverlap-fno: 1.00 [4/4]

TCE 006861400-02, PDC Light Curves

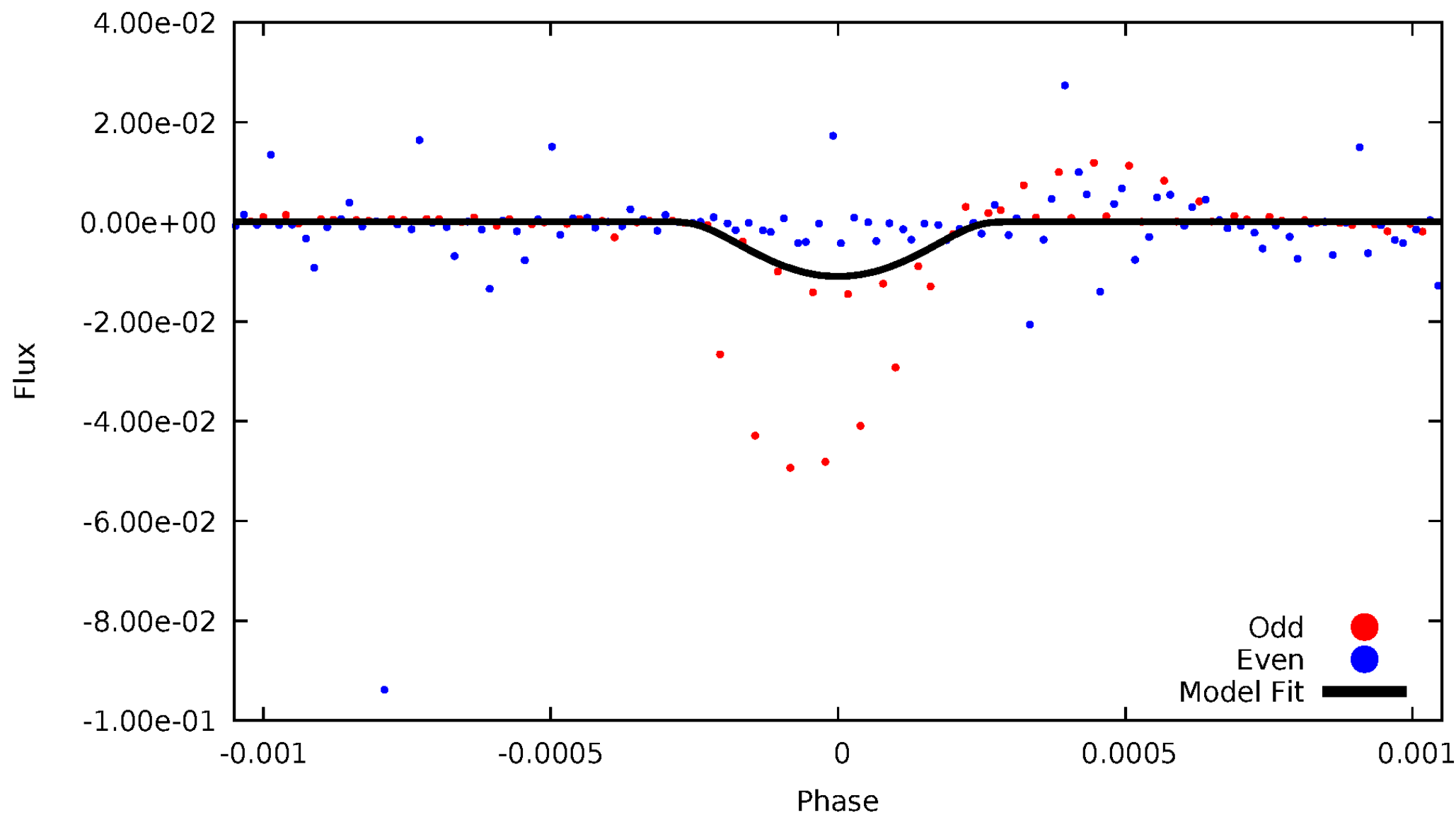


TCE 006861400-02



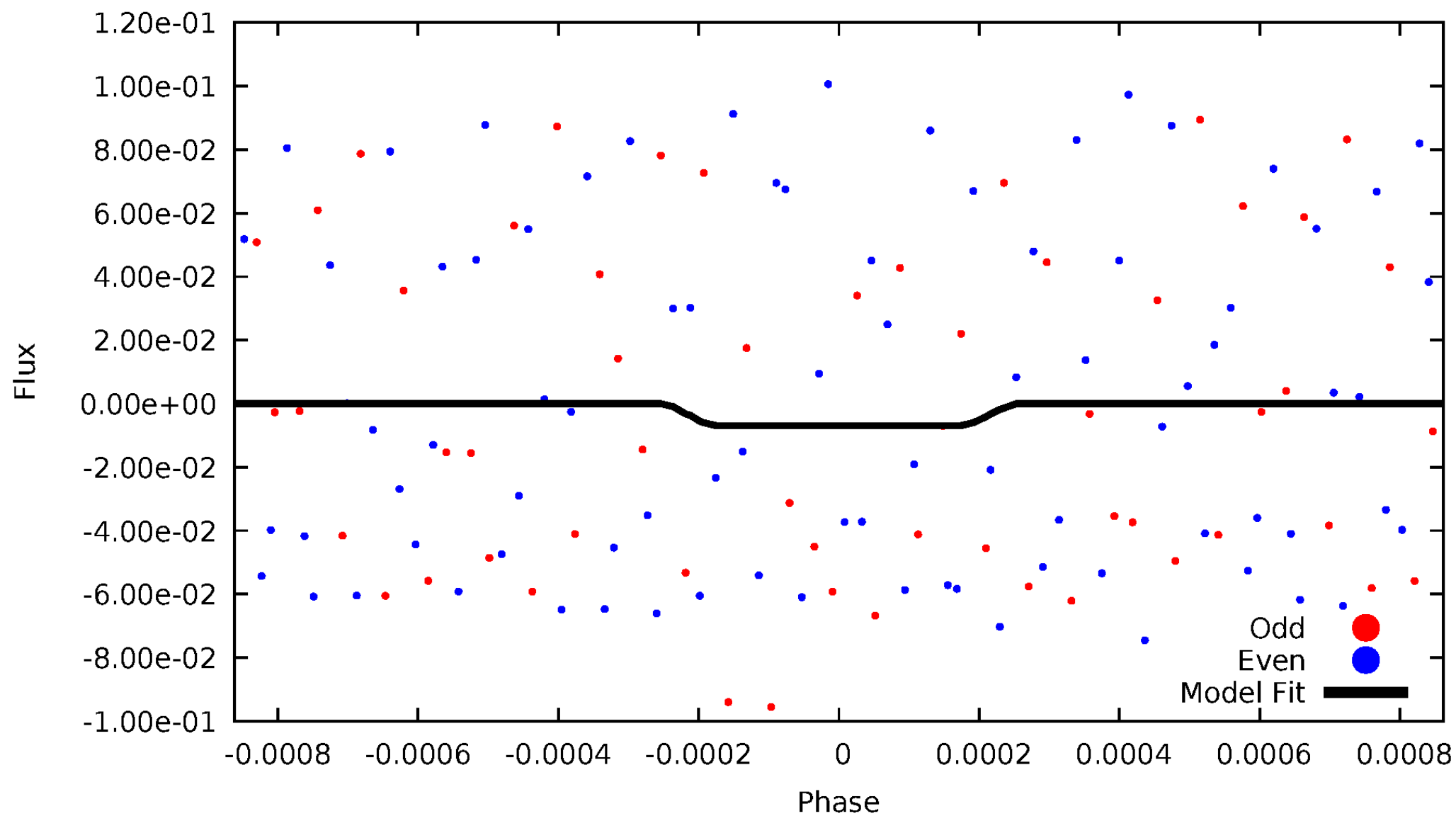
DV Odd/Even

TCE 006861400-02



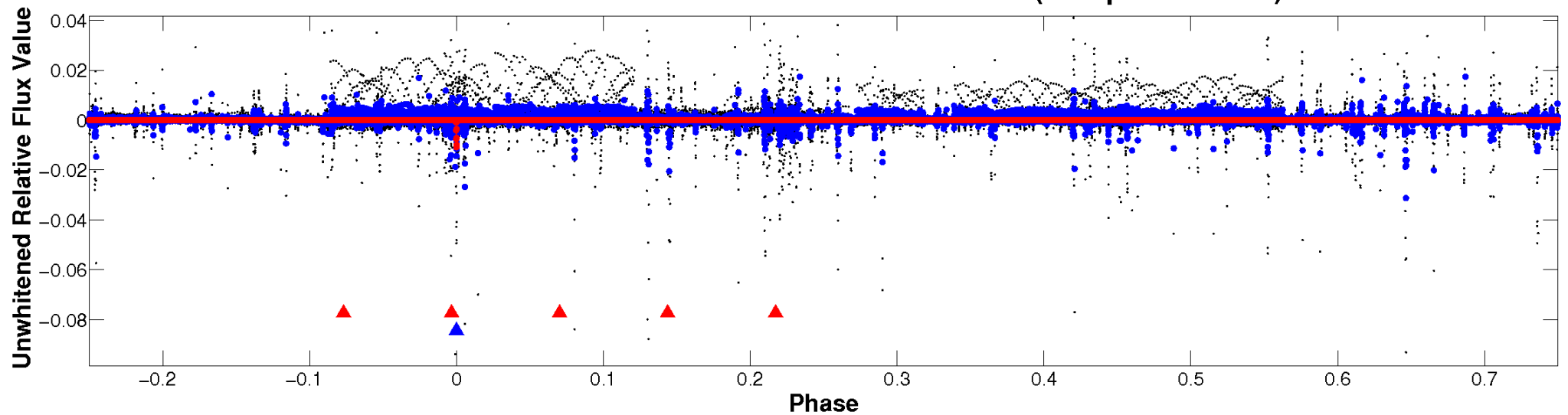
ALT Odd/Even

TCE 006861400-02

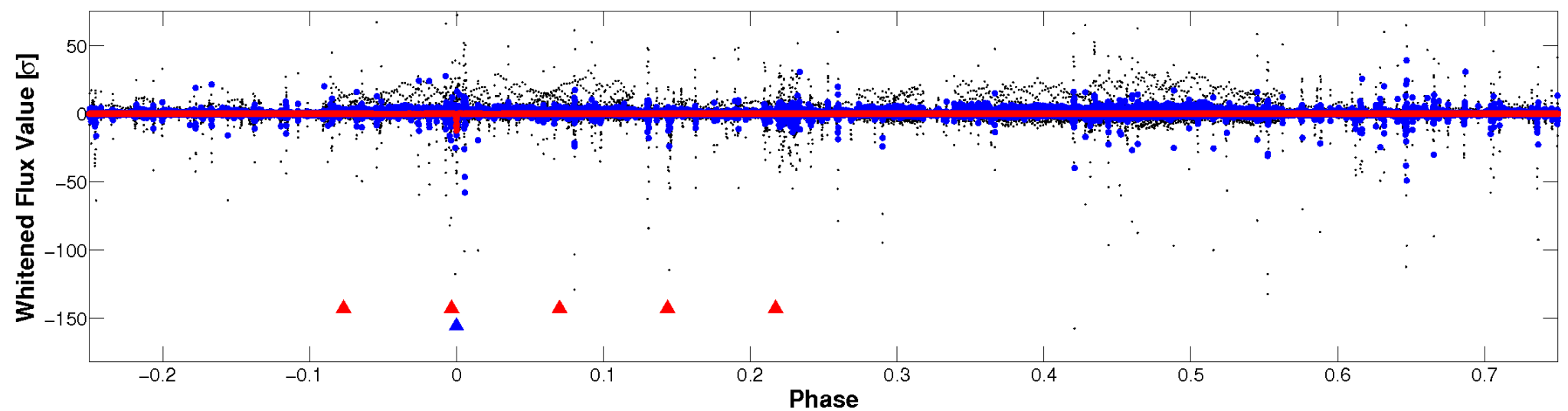


Non-Whitened Vs. Whitened Light Curve

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

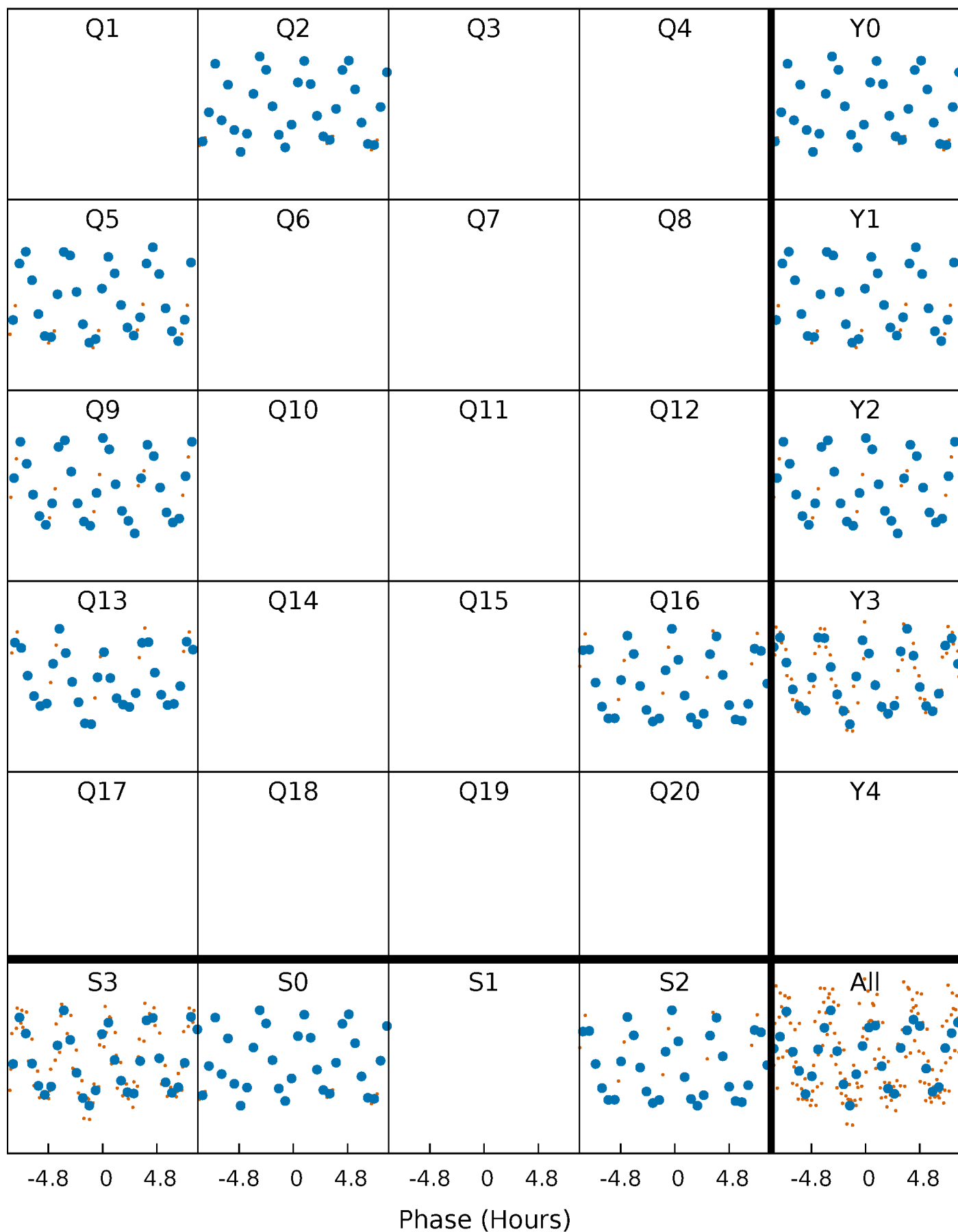


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



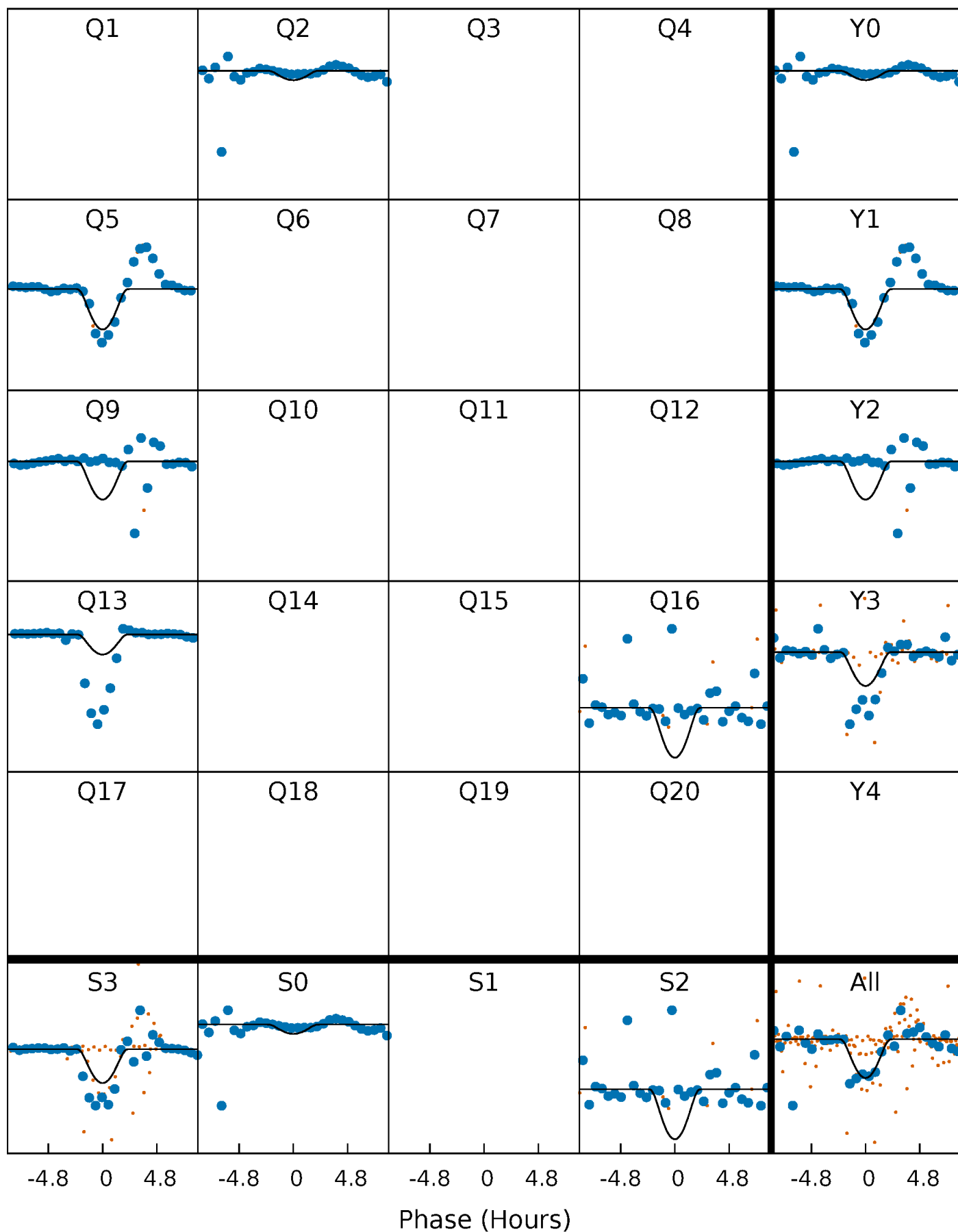
PDC Quarter-Phased Transit Curves

TCE 006861400-02 $P=334.145465$ Days $T_0=180.777742$ (BKJD)



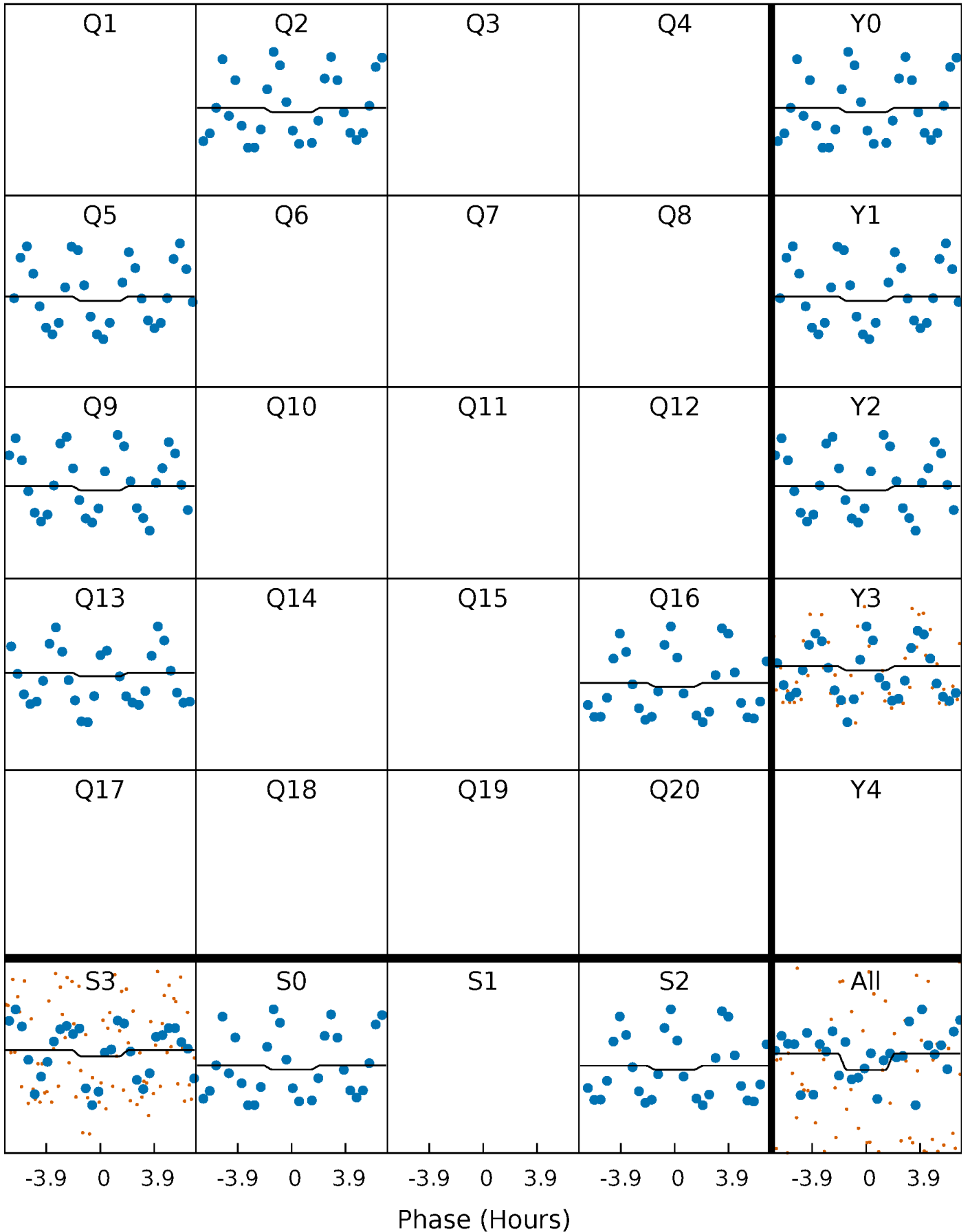
DV Quarter-Phased Transit Curves

TCE 006861400-02 P=334.145465 Days $T_0=180.777742$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

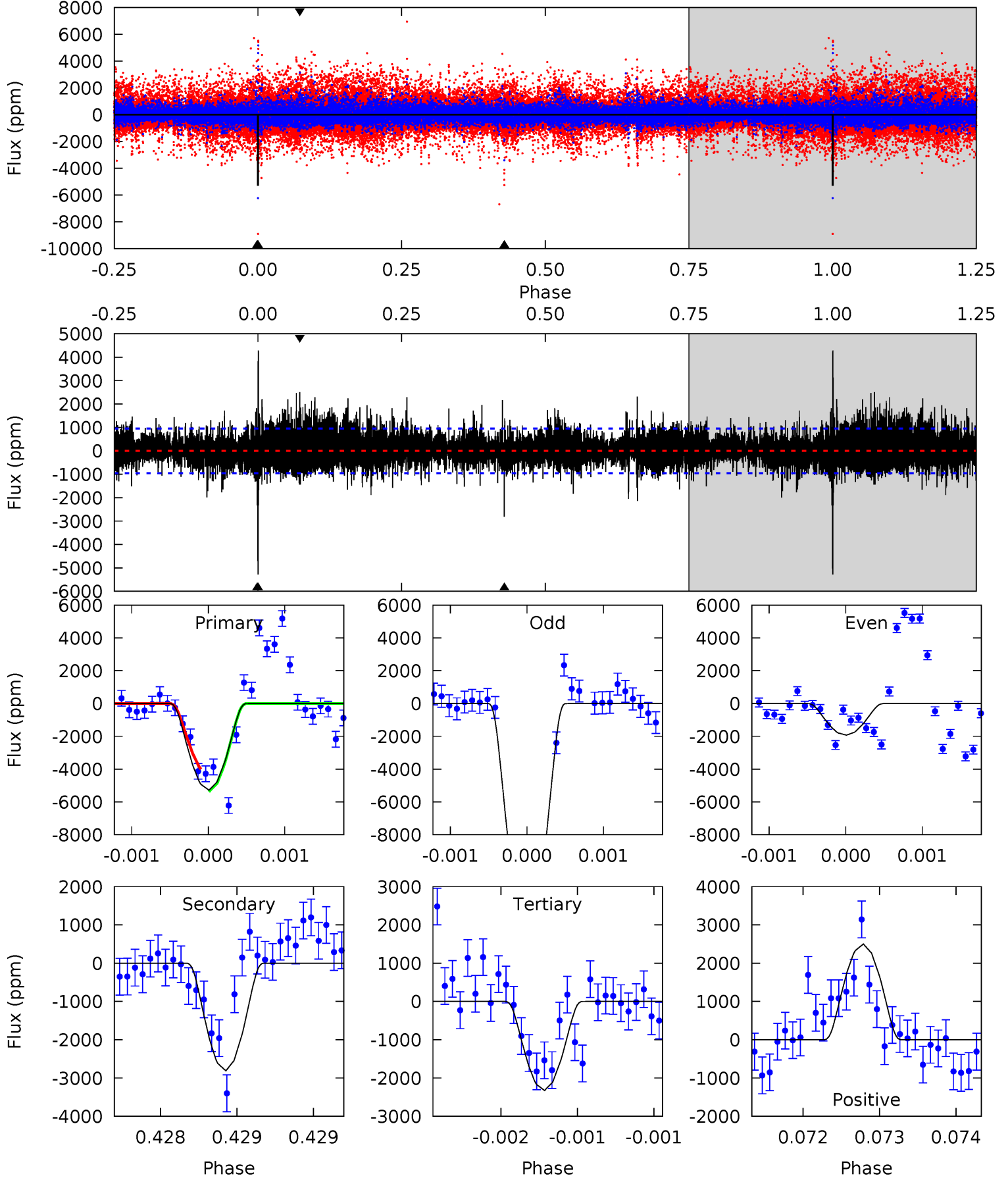
TCE 006861400-02 P=334.163629 Days $T_0=180.707160$ (BKJD)



DV Model-Shift Uniqueness Test

006861400-02, P = 334.145465 Days, E = 180.777742 Days

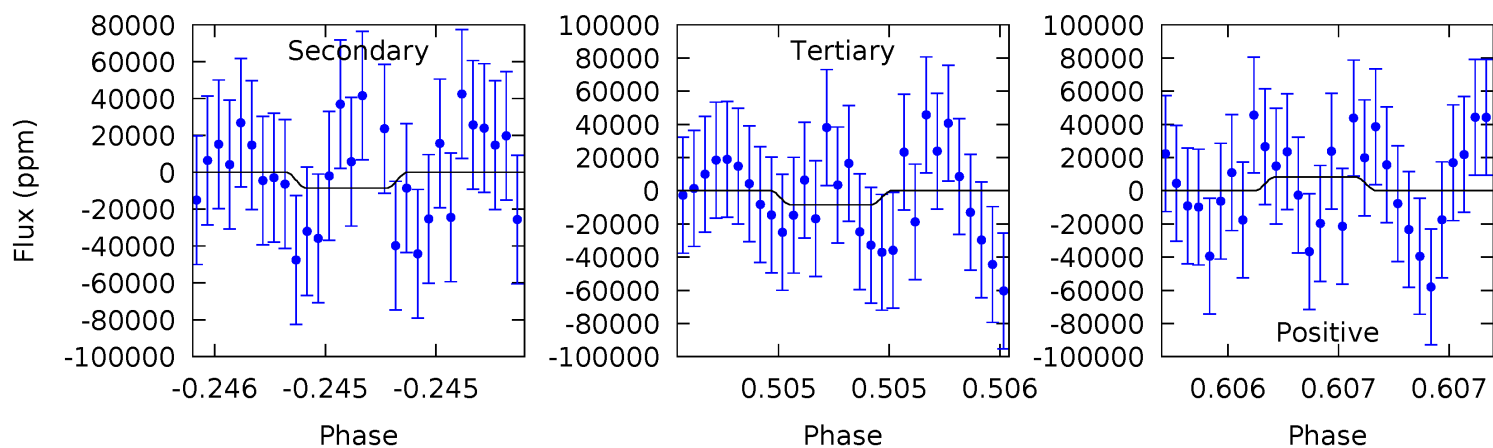
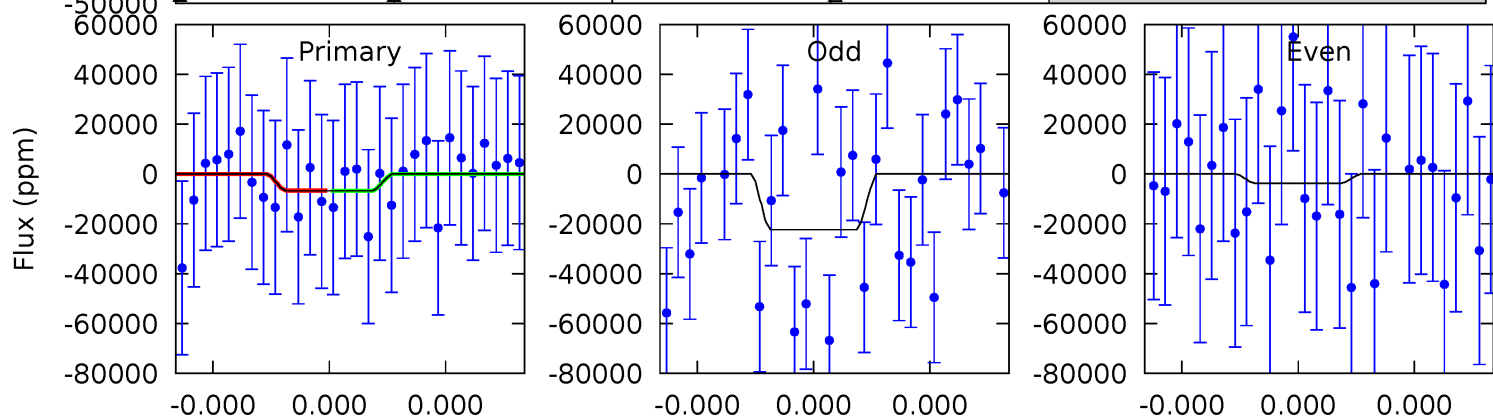
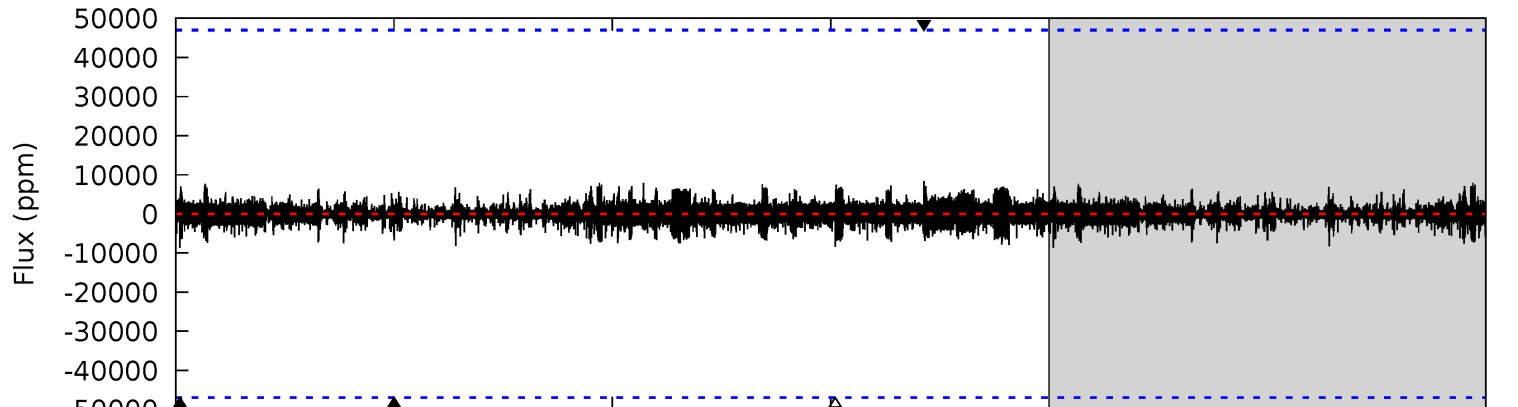
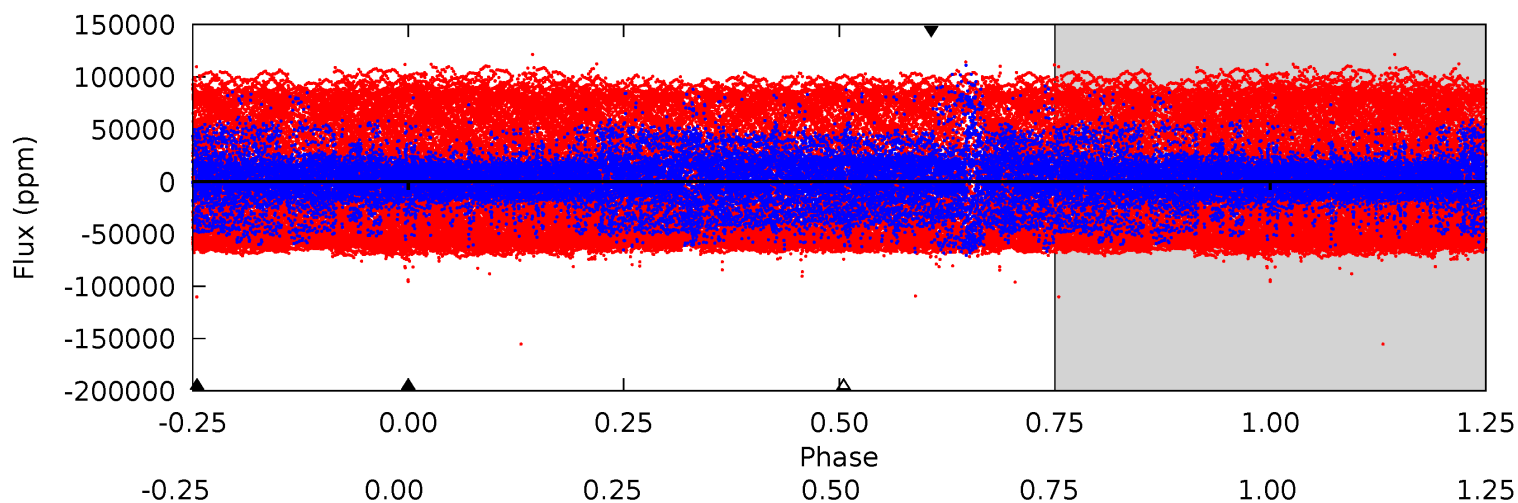
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|-----|
| 30.8 | 16.4 | 13.6 | 14.6 | 5.55 | 3.44 | 2.96 | 17.2 | 16.2 | 2.83 | 1.81 | 25.8 | 2.88 | 0.45 | 0 |



Alt Model-Shift Uniqueness Test

006861400-02, P = 334.163629 Days, E = 180.707160 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 0.80 | 1.02 | 1.00 | 0.99 | 5.58 | 3.50 | 0.23 | -0.20 | -0.19 | 0.02 | 0.03 | 1.09 | 17.0 | 0.49 | 0.01 |



Stellar Parameters For KIC 006861400

| | $T_{\text{eff}}(K)$ | $\log(g)$ | [Fe/H] | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6735^{+162}_{-243} | $4.190^{+0.132}_{-0.198}$ | $-0.100^{+0.250}_{-0.300}$ | $1.530^{+0.475}_{-0.317}$ | $1.328^{+0.184}_{-0.224}$ | $0.522^{+0.406}_{-0.265}$ |
| | +2%/-4% | +3%/-5% | +250%/-300% | +31%/-21% | +14%/-17% | +78%/-51% |
| 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 006861400-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|------------------|---------------------------|-------------------|------------------------|-------------------------|
| DV | -2812 ± 172 | $48.45^{+46.25}_{-32.03}$ | 506^{+39}_{-29} | 3389^{+1627}_{-574} | 718^{+5216}_{-538} |
| Alt. | -8602 ± 8414 | $41.19^{+41.93}_{-26.51}$ | 508^{+36}_{-34} | 4123^{+2702}_{-1555} | 2101^{+19752}_{-2019} |

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 $A_{obs} \gg 1.0$

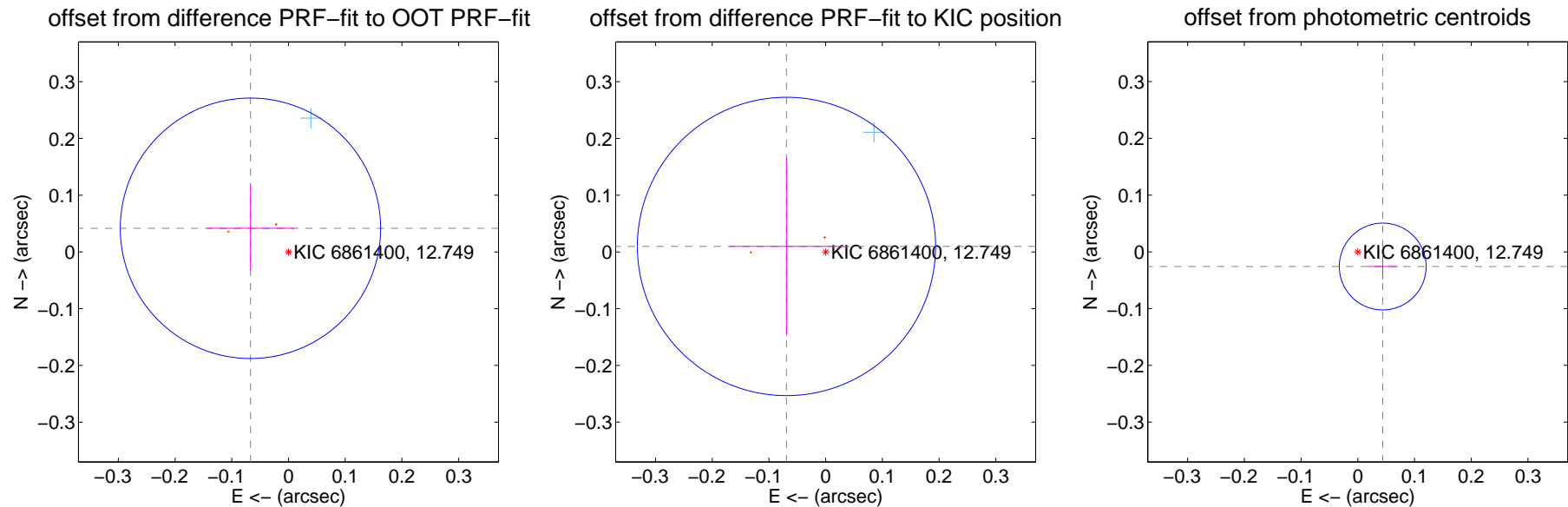
DV Centroid Data

Supplemental centroid analysis for 006861400-02. Kepler magnitude: 12.75. Transit SNR 46.34

There are 1 quarters with good PRF difference image offsets

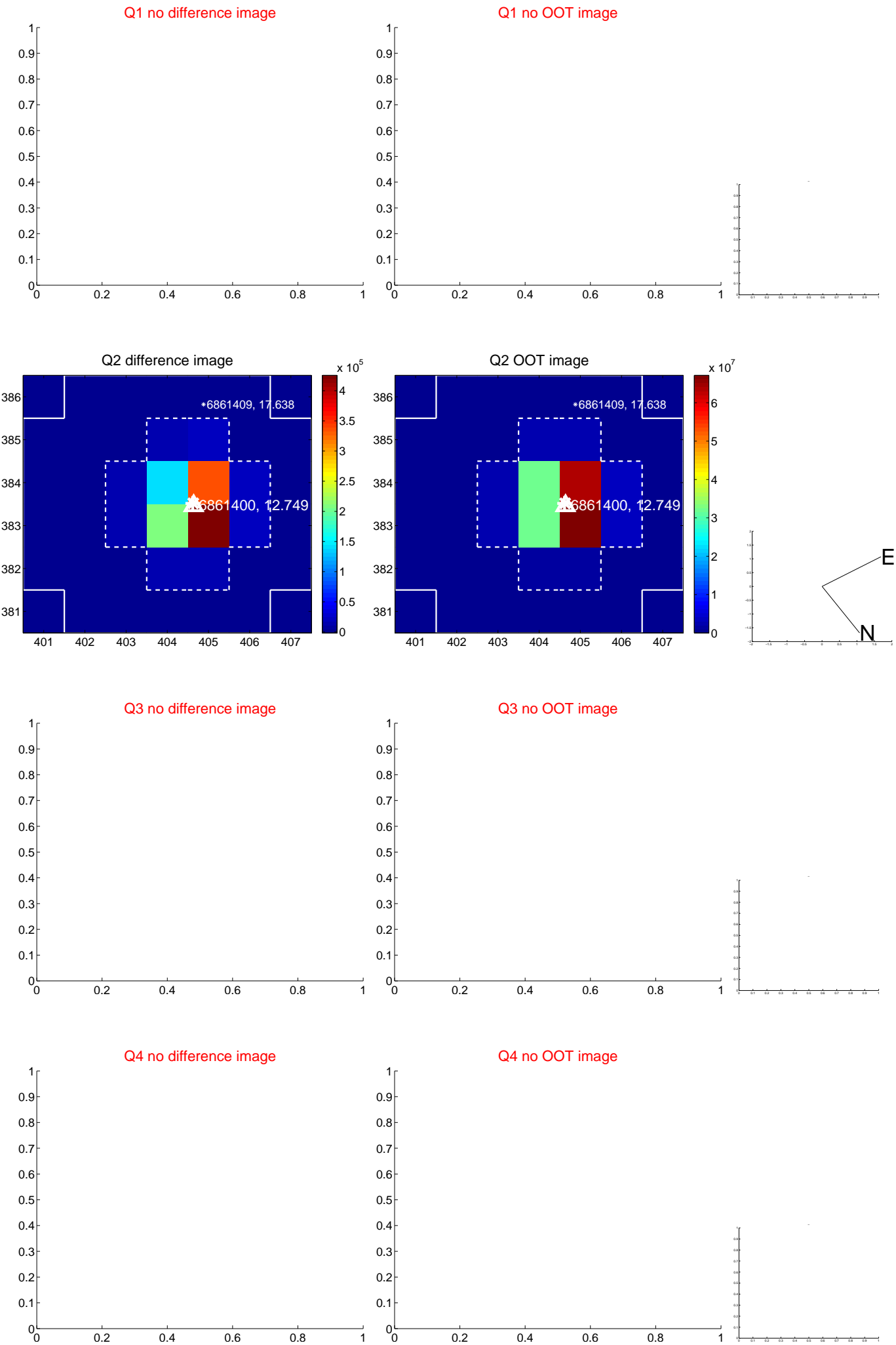
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 0.079 ± 0.077 | 1.03 | 0.067 ± 0.077 | 0.042 ± 0.075 |
| PRF-fit source offset from KIC position | 0.070 ± 0.088 | 0.80 | 0.069 ± 0.101 | 0.010 ± 0.157 |
| photometric centroid source offset | 0.05 ± 0.03 | 2.00 | -0.04 ± 0.03 | -0.03 ± 0.02 |

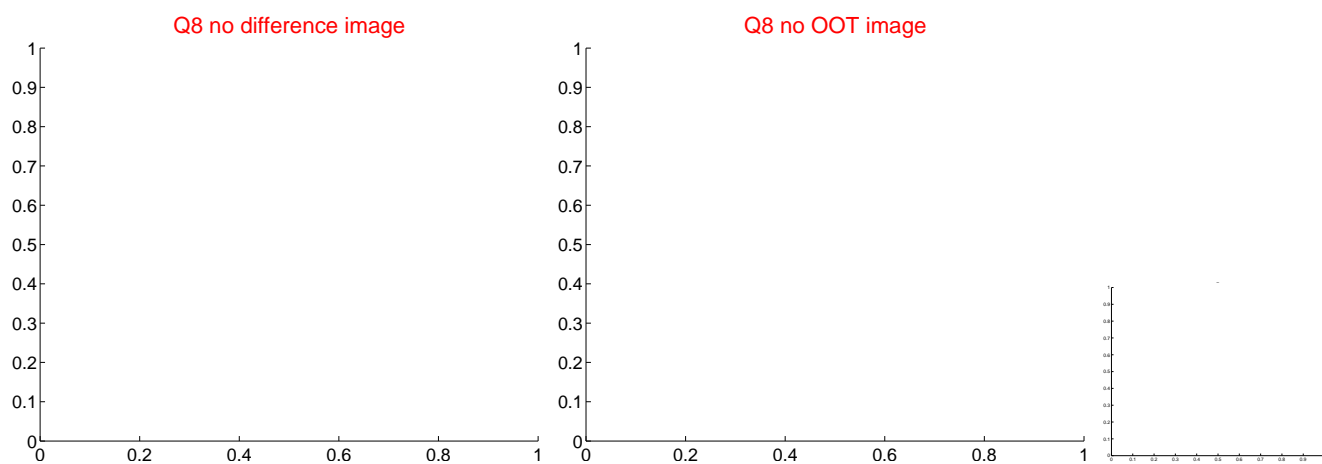
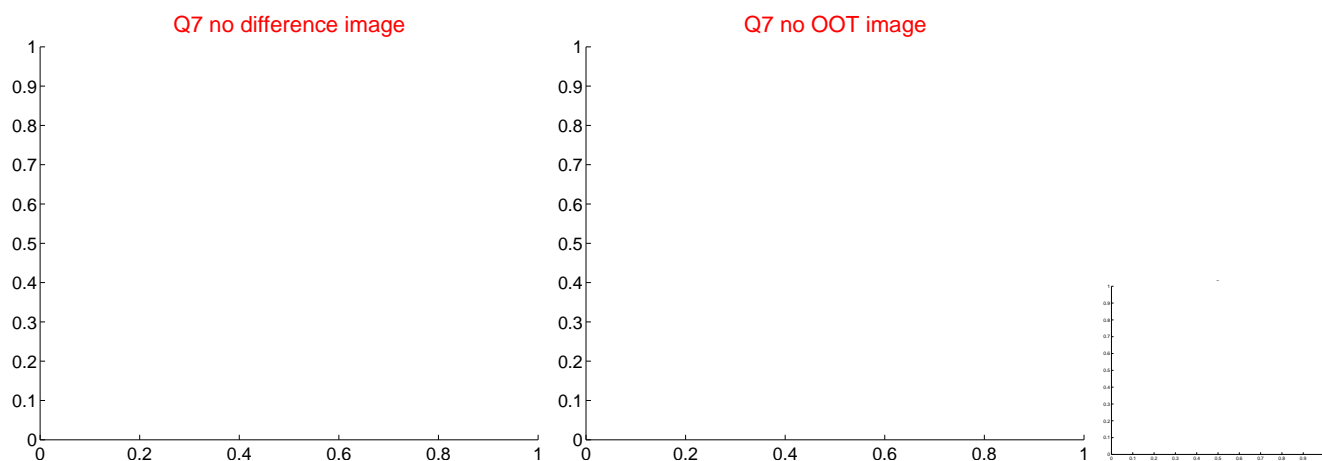
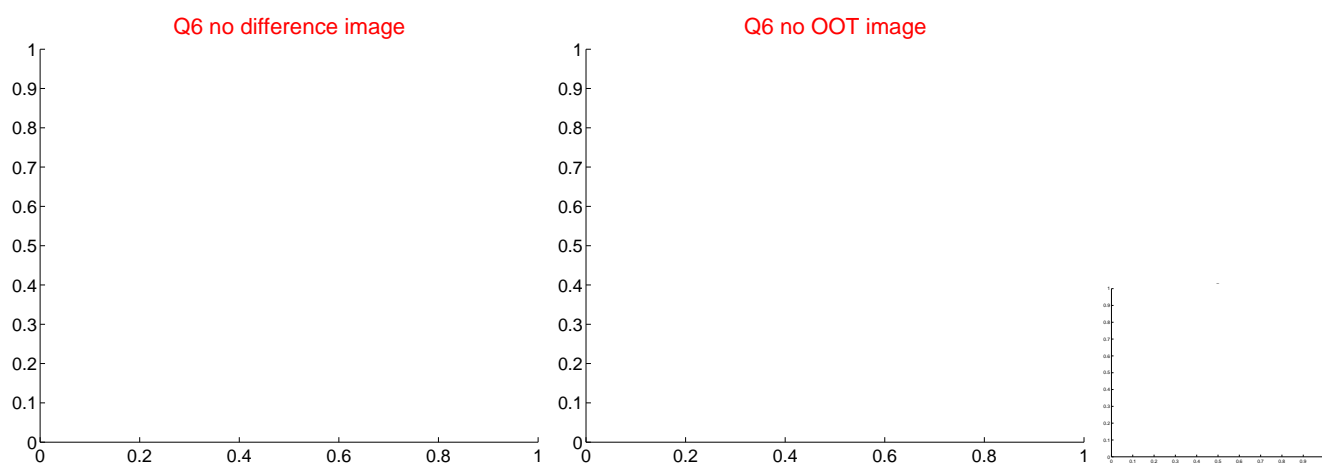
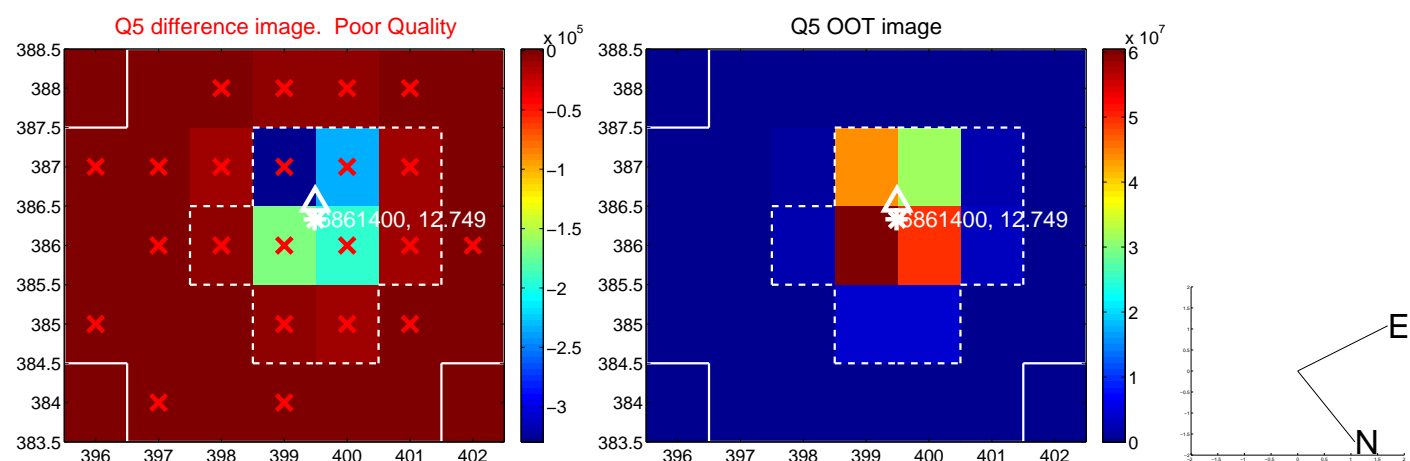


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

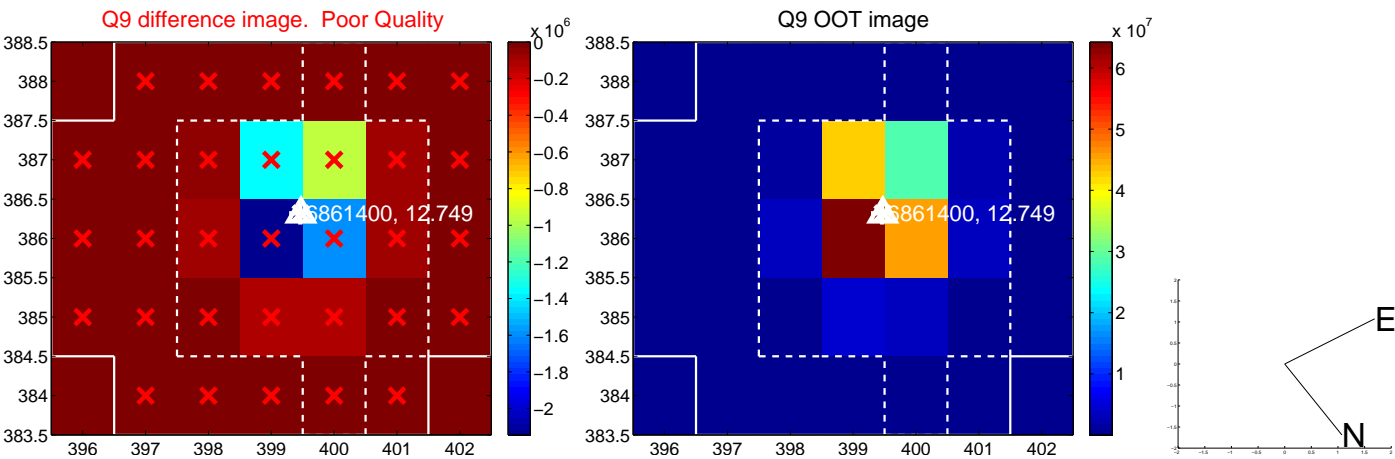
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



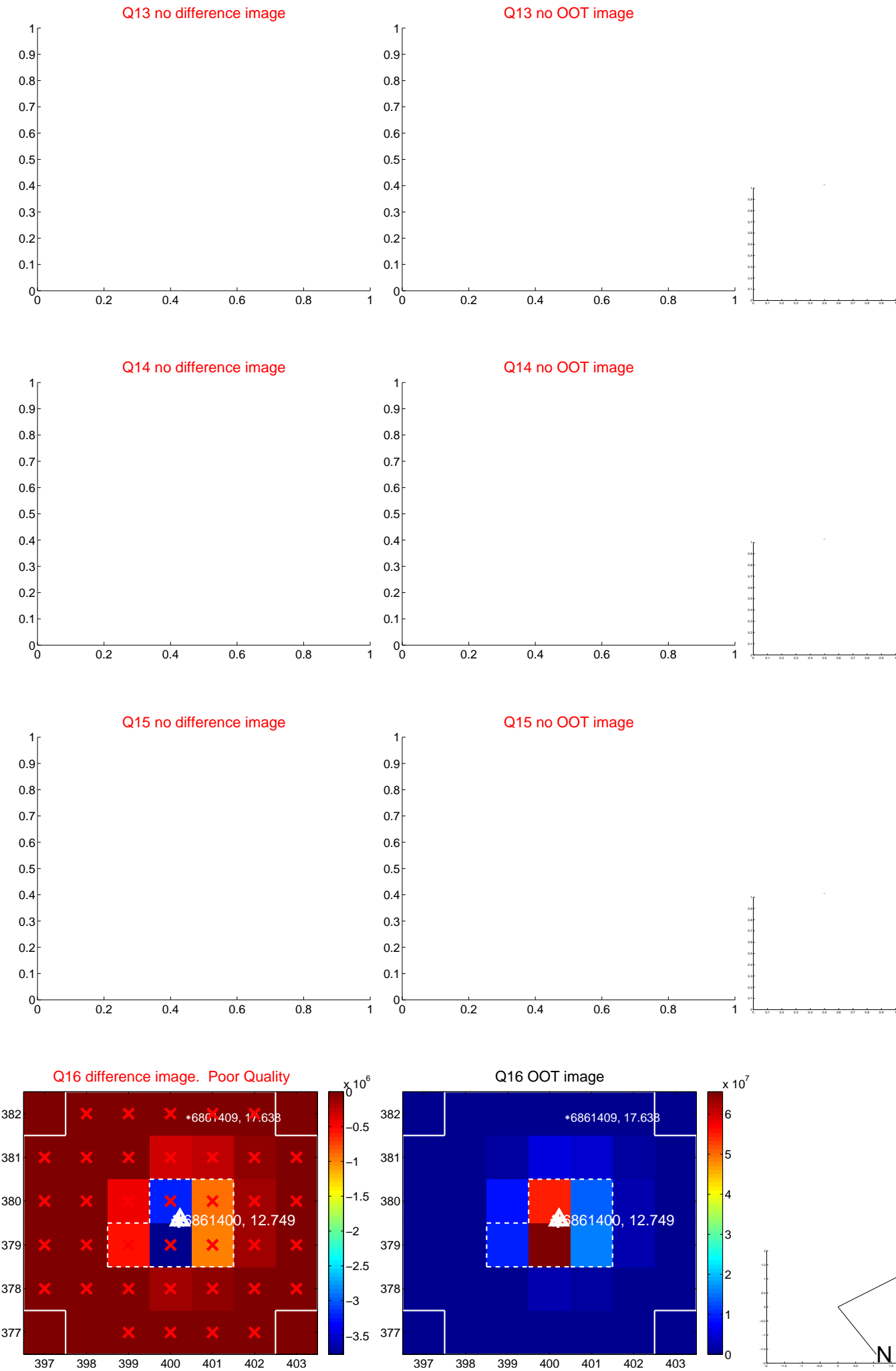
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



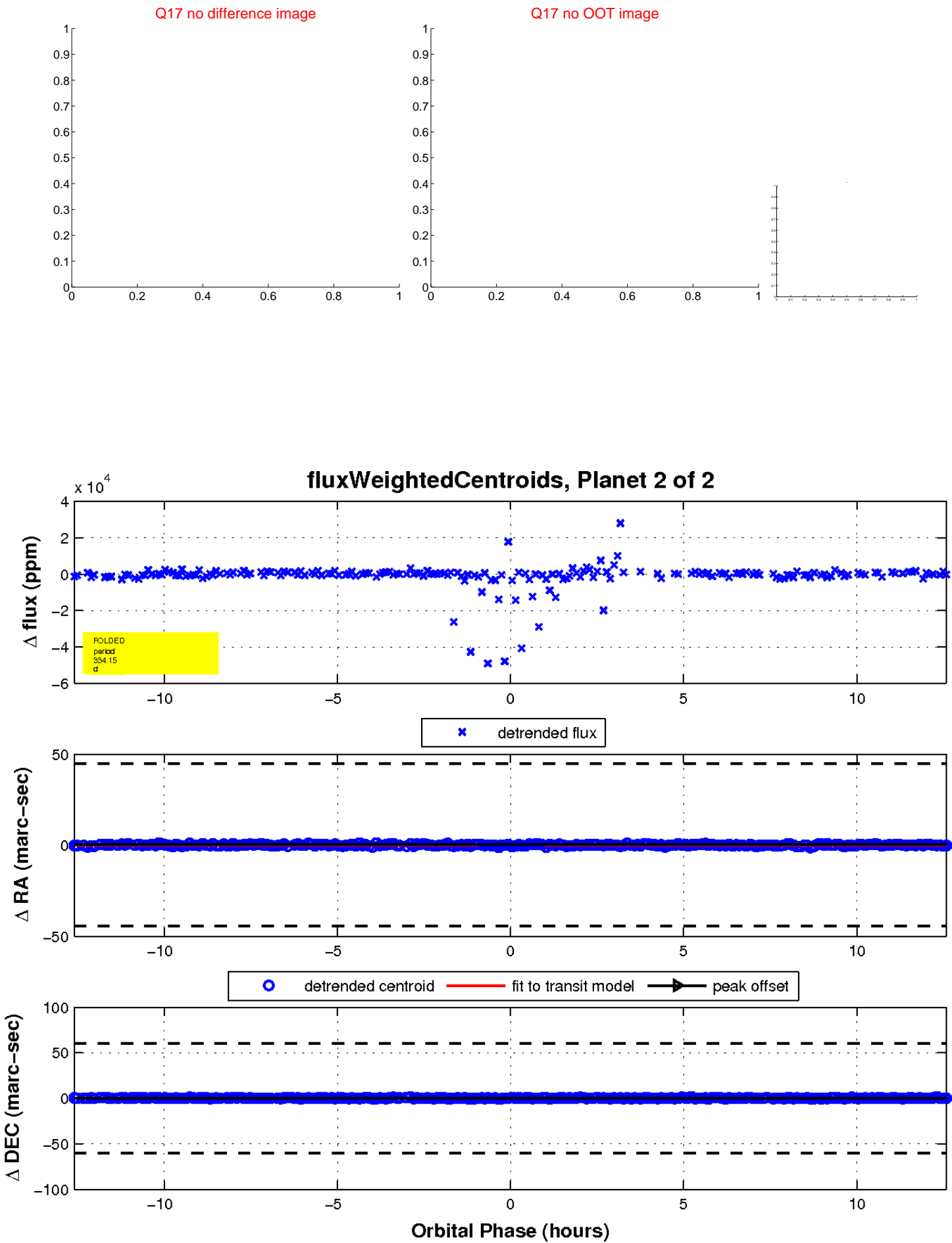
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

