

KIC 009641041

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009641041-01 | OBS | 0324.01 | 2.178119 | 132.033697 | 94.7 | 2.114 | 46.6 | 48.5 | 1.55 | 6280 | 1.77 | 2908.70 |
| 009641041-02 | OBS | No | 1.088890 | 132.039834 | 0.1 | 0.969 | 7.3 | 0.0 | 1.55 | 6280 | 0.04 | 7330.98 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------------------|
| 009641041-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 1 | MOD_SEC_ALT—HAS_SEC_TCE—HALO_GHOST—EPHEM_MATCH |
| 009641041-02 | OBS | FP | 0.00 | 1 | 1 | 0 | 0 | IS_SEC_TCE |

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 009641041-01

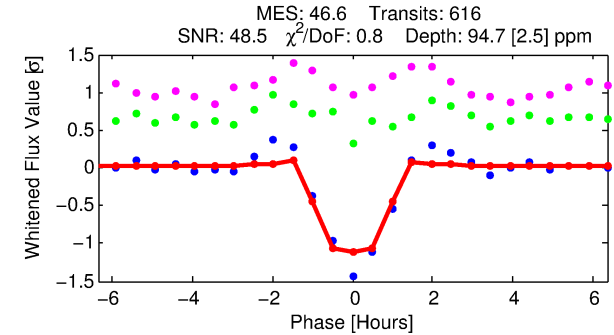
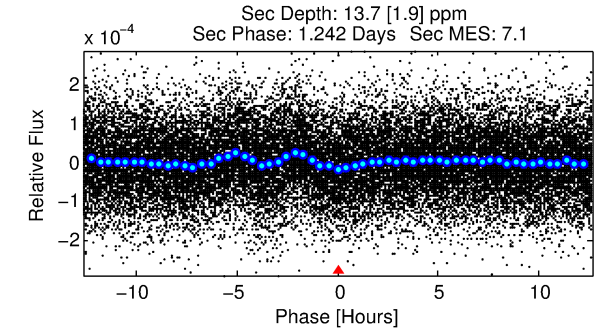
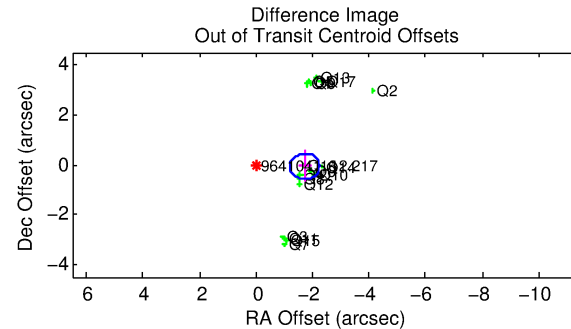
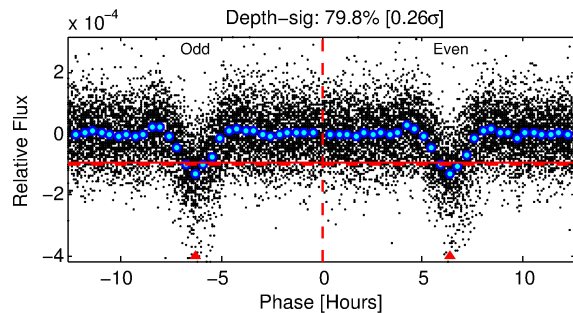
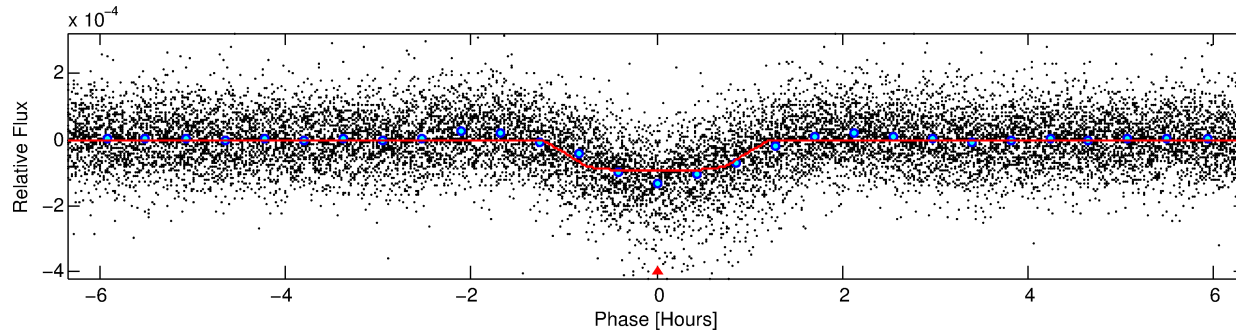
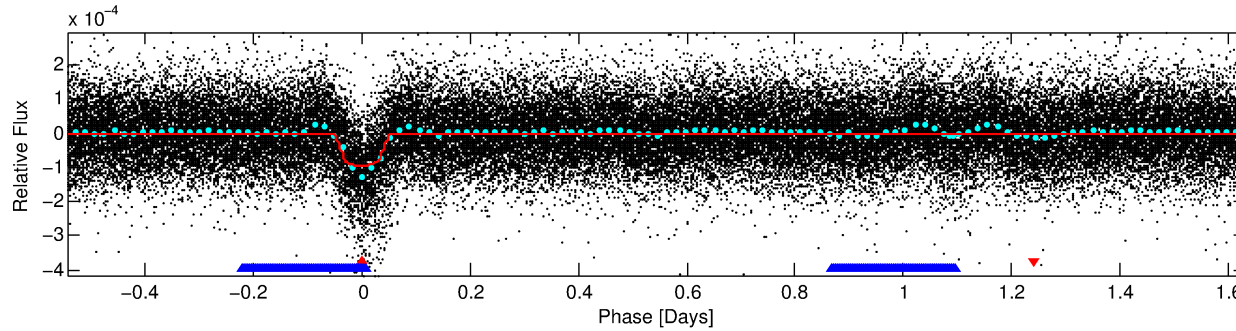
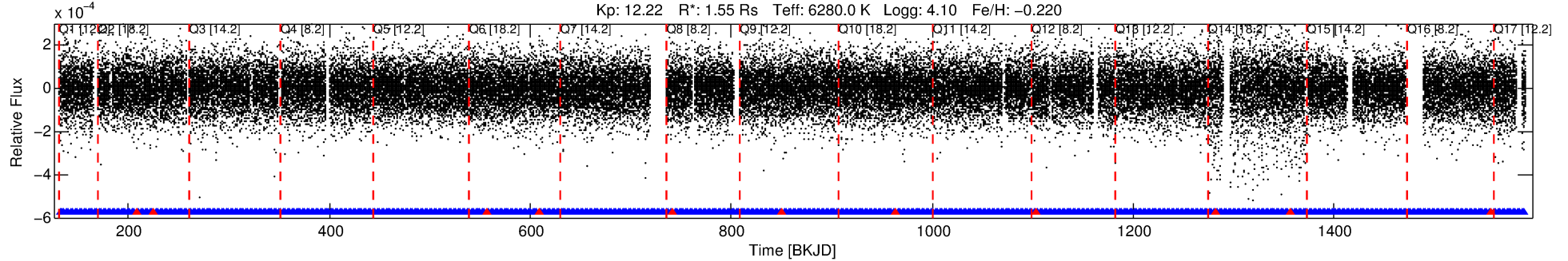
| TCE (1) | KIC | Parent (2) | Parent KIC | $P_1:P_2$ | Dist ($''$) | Δ Row | Δ Col | m_2 | m_1 | D_2/D_1 | Mechanism | Flag | σ_P | σ_T |
|--------------|---------|------------|------------|-----------|---------------|--------------|--------------|-------|-------|-----------|------------|------|------------|------------|
| 009641041-01 | 9641041 | FL-Lyr-pri | 9641031 | 1:1 | 66.6 | -15 | -7 | 9.18 | 12.22 | 4579.60 | Direct-PRF | 0 | 1.12 | 0.65 |

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

DV One-Page Summary

KIC: 9641041 Candidate: 1 of 2 Period: 2.178 d
KOI: K00324 Corr: No Ephemeris Match

Kp: 12.22 R*: 1.55 Rs Teff: 6280.0 K Logg: 4.10 Fe/H: -0.220



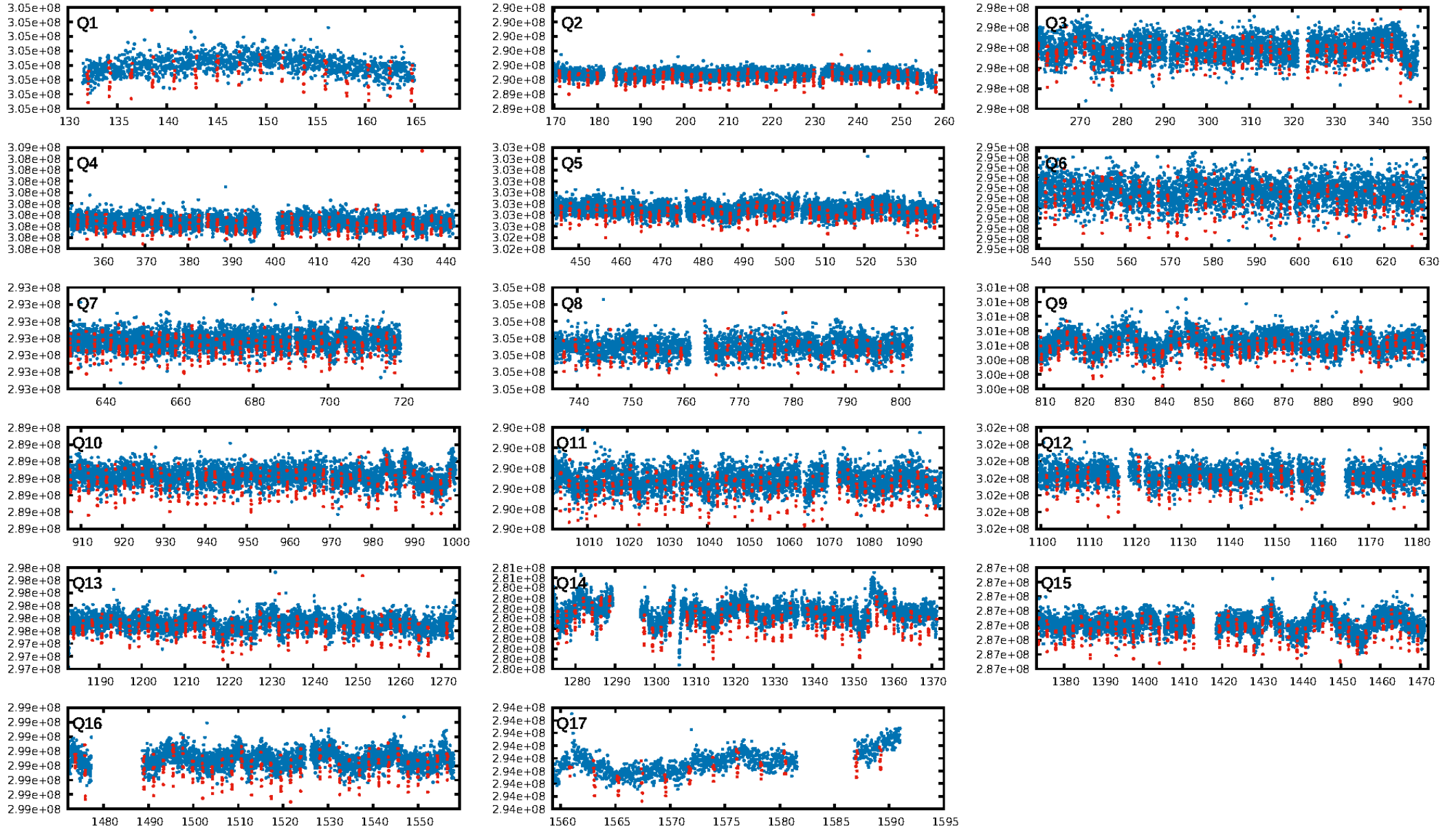
DV Fit Results:

Period = 2.17812 [0.00000] d
Epoch = 132.0337 [0.0007] BKJD
Rp/R* = 0.0105 [0.0014]
a/R* = 3.70 [2.53]
b = 0.90 [0.15]
Seff = 2908.70 [1192.80]
Teq = 1873 [192] K
Rp = 1.77 [0.54] Re
a = 0.0339 [0.0086] AU
Ag = 2.76 [1.37] [1.29σ]
Teffp = 3732 [298] K [5.25σ]

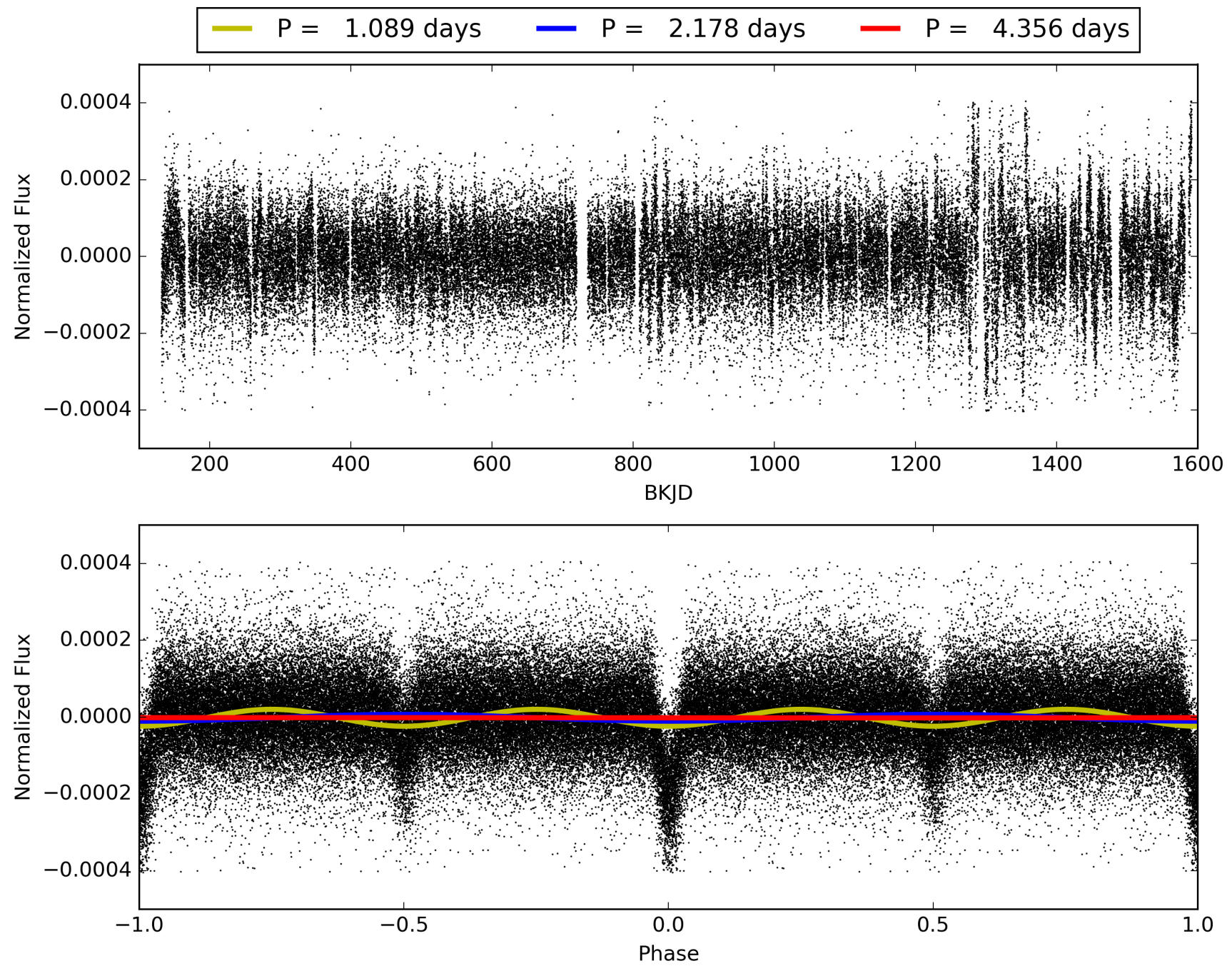
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [11.24σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 0.98 [577/588]
GhostDiagnostic-chr: -0.03214
Centroid-sig: 0.0%
Centroid-so: 1.233 arcsec [5.75σ]
OotOffset-rm: 1.720 arcsec [9.96σ]
KicOffset-rm: 1.804 arcsec [11.21σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 0.00 [0/17]
DiffImageOverlap-fno: 0.00 [0/17]

TCE 009641041-01, PDC Light Curves

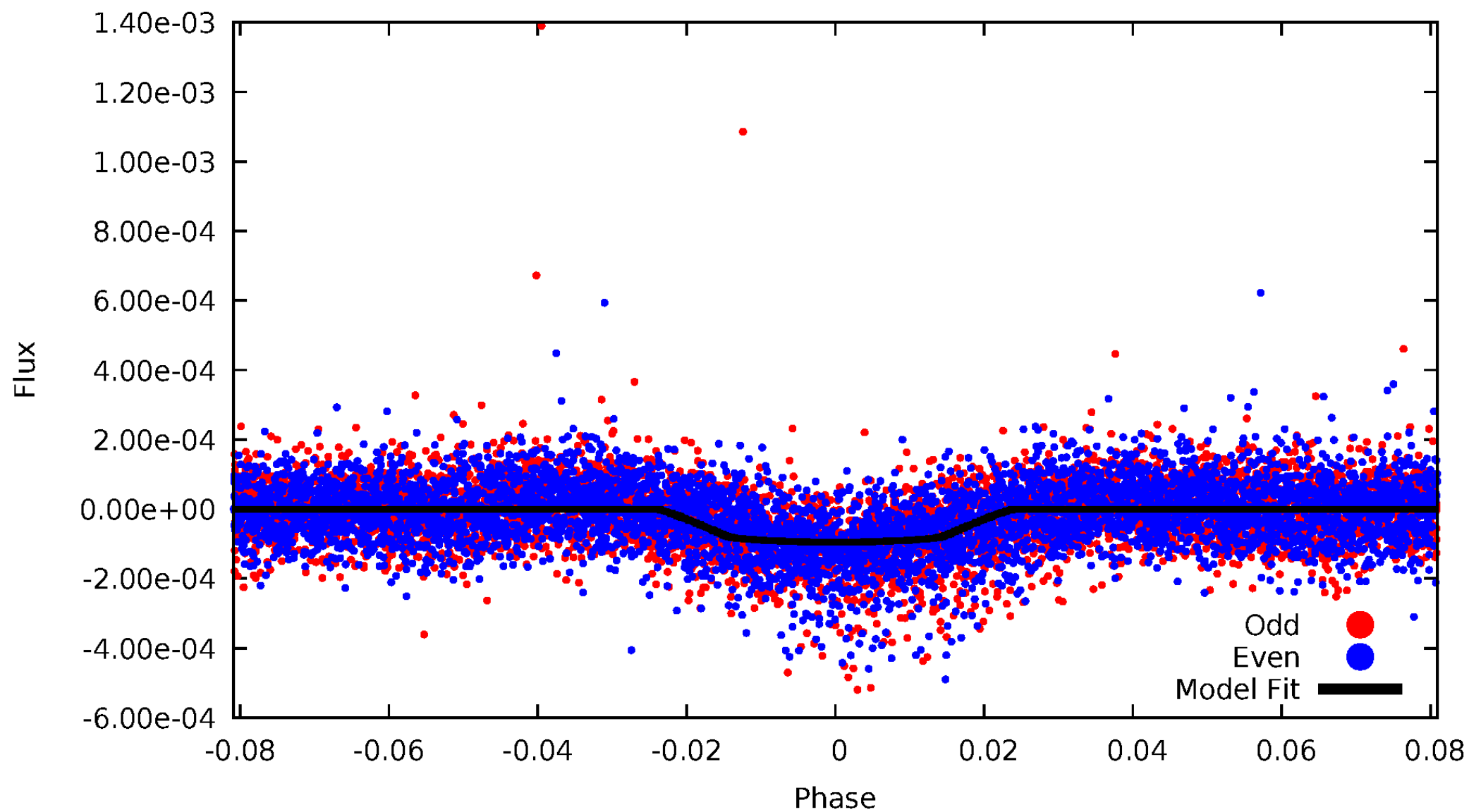


TCE 009641041-01



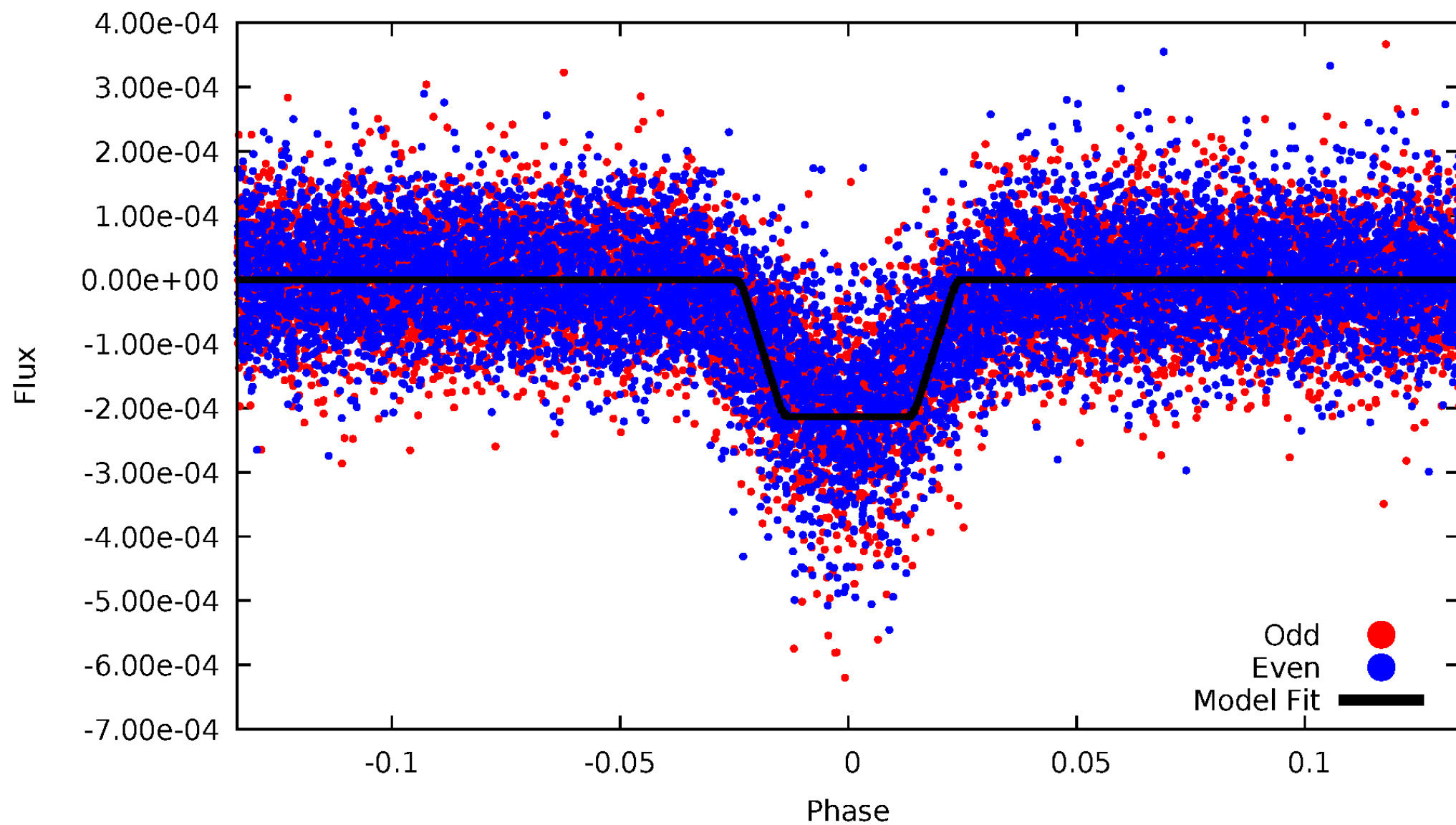
DV Odd/Even

TCE 009641041-01



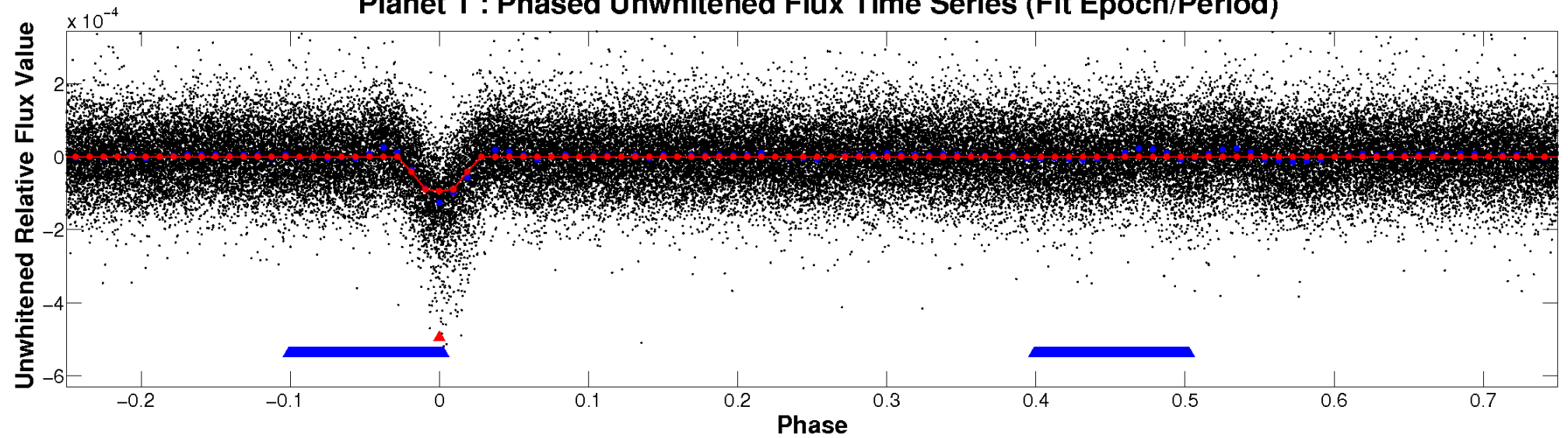
ALT Odd/Even

TCE 009641041-01

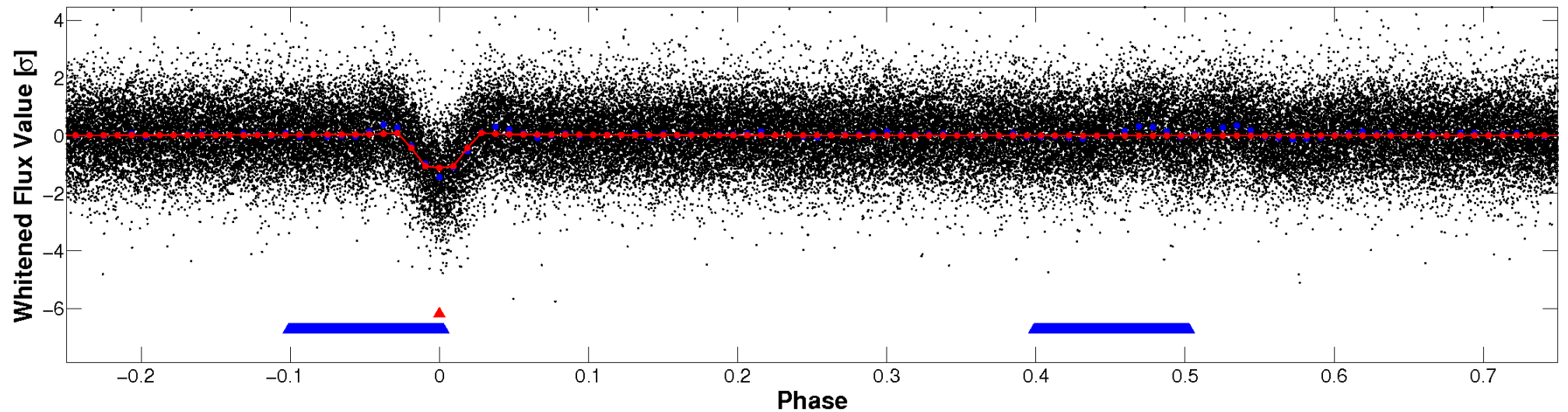


Non-Whitened Vs. Whitened Light Curve

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

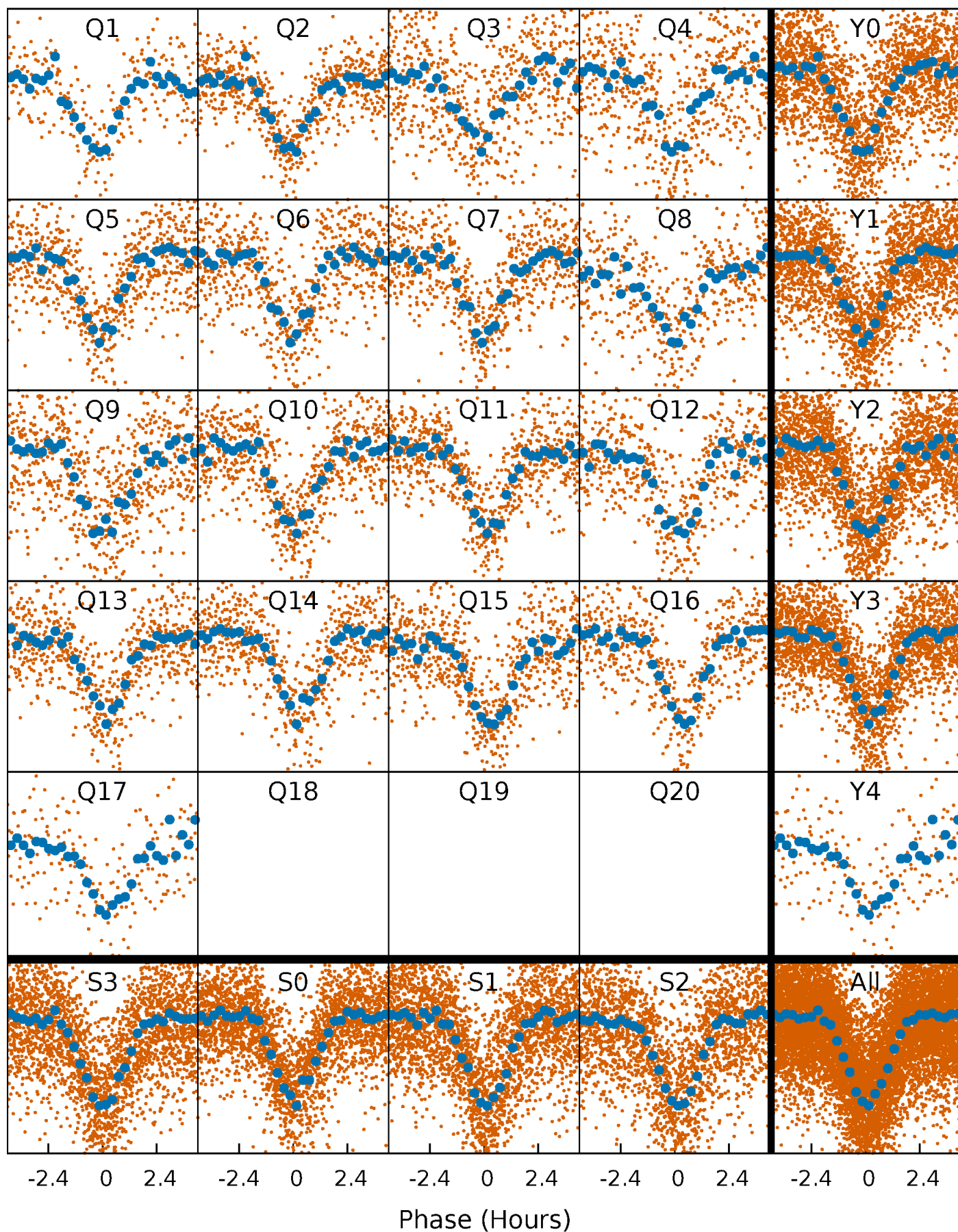


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



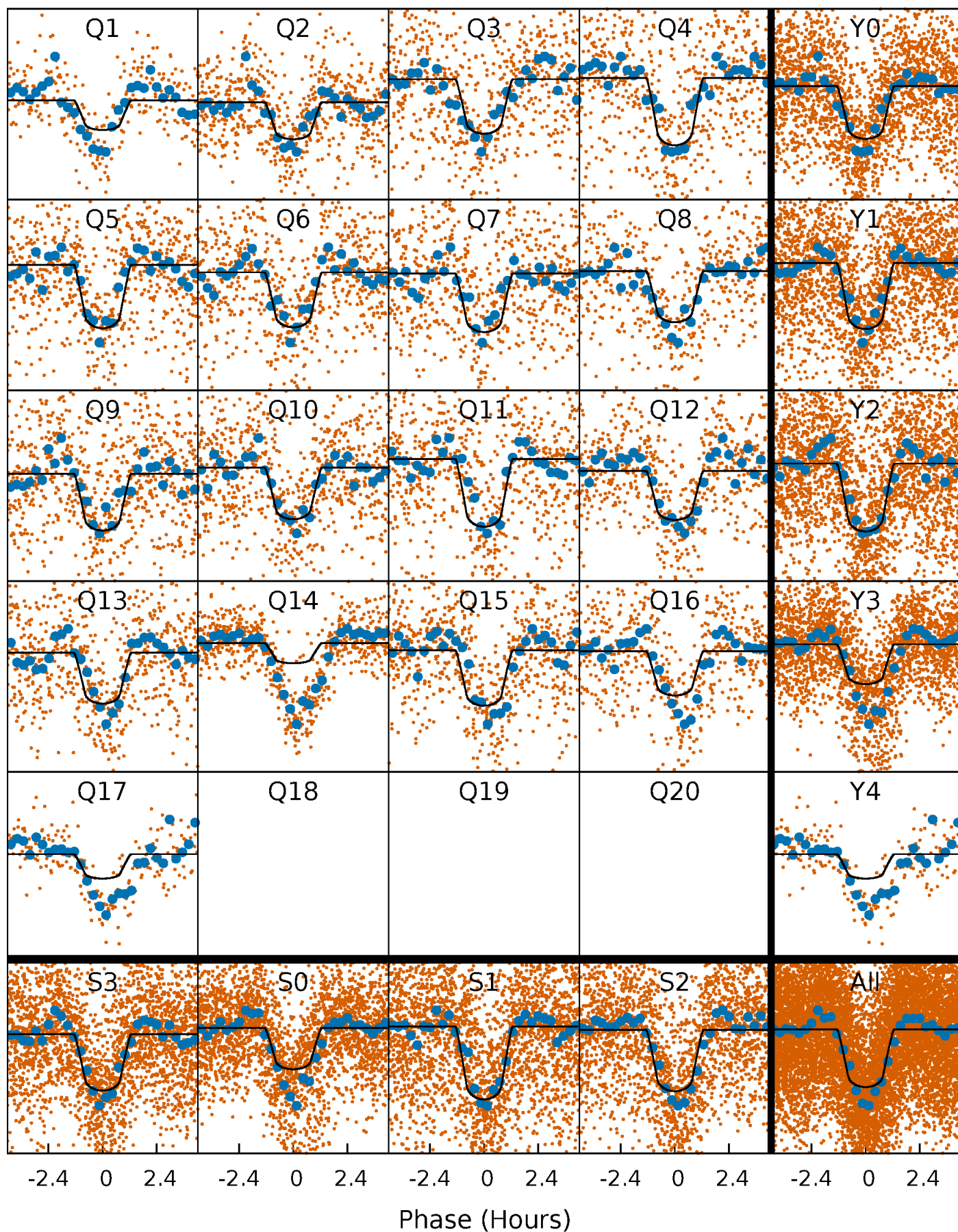
PDC Quarter-Phased Transit Curves

TCE 009641041-01 P= 2.178118 Days $T_0=132.033697$ (BKJD)



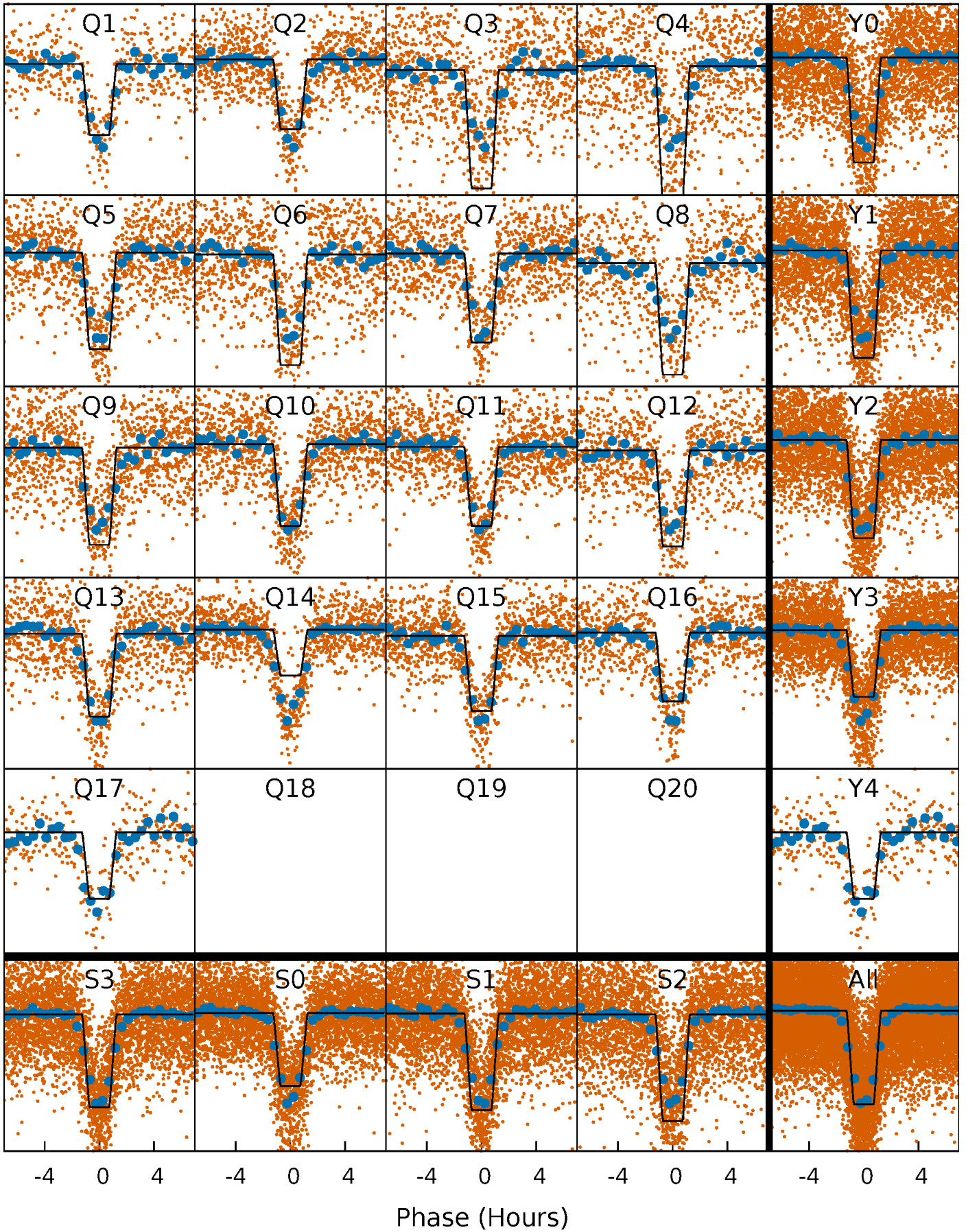
DV Quarter-Phased Transit Curves

TCE 009641041-01 P= 2.178118 Days $T_0=132.033697$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

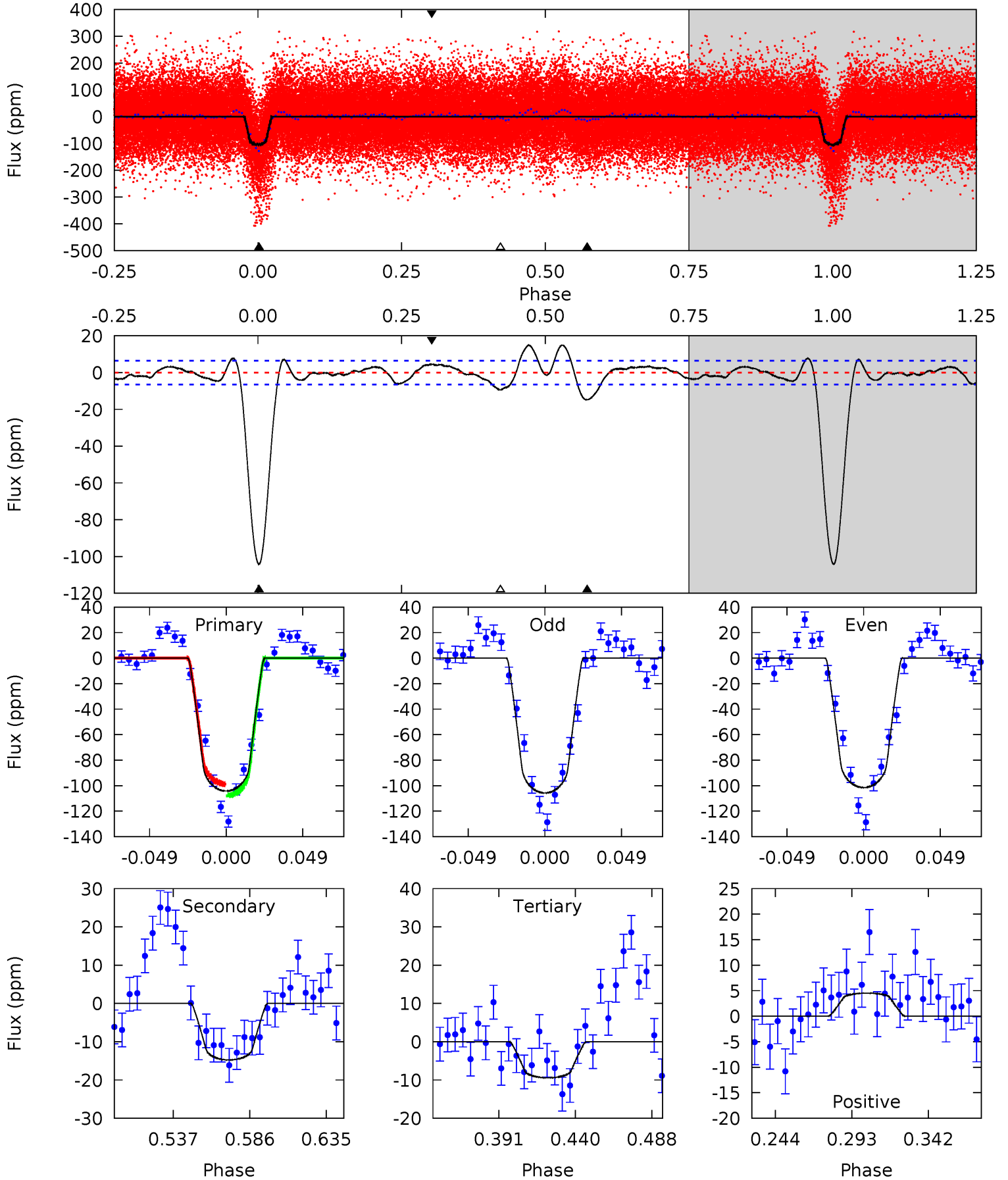
TCE 009641041-01 P= 2.178167 Days $T_0=132.019495$ (BKJD)



DV Model-Shift Uniqueness Test

009641041-01, P = 2.178118 Days, E = 129.855579 Days

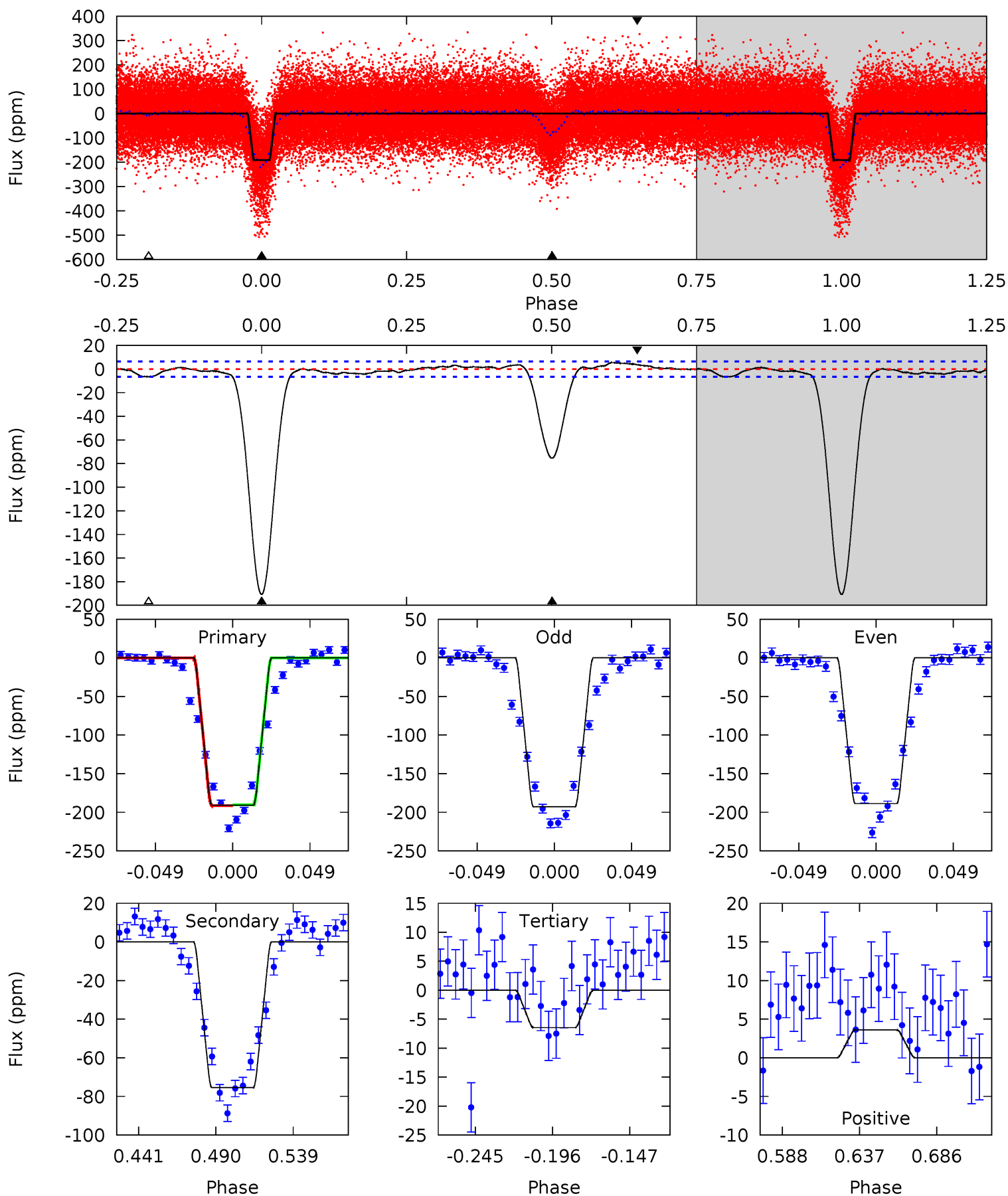
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 75.8 | 10.8 | 6.86 | 3.29 | 4.71 | 1.97 | 2.93 | 69.0 | 72.6 | 3.89 | 7.47 | 1.57 | 1.07 | 0.13 | 3.34 |



Alt Model-Shift Uniqueness Test

009641041-01, P = 2.178167 Days, E = 129.841328 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 138.5 | 54.8 | 4.68 | 2.64 | 4.71 | 1.97 | 1.95 | 133.8 | 135.9 | 50.1 | 52.1 | 1.46 | 1.02 | 0.03 | 0.43 |



Stellar Parameters For KIC 009641041

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------------------------|
| | 6280^{+157}_{-173} | $4.098^{+0.228}_{-0.123}$ | $-0.220^{+0.250}_{-0.300}$ | $1.551^{+0.319}_{-0.426}$ | $1.100^{+0.179}_{-0.146}$ | $0.415^{+0.490}_{-0.152}$ |
| | +2%/-3% | +6%/-3% | +114%/-136% | +21%/-27% | +16%/-13% | +118%/-37% |
| 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 009641041-01 / KOI 0324.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -15 ± 1 | $1.73^{+0.33}_{-0.32}$ | 2598^{+161}_{-190} | 4034^{+253}_{-206} | $3.139^{+1.640}_{-0.873}$ |
| Alt. | -75 ± 1 | $2.45^{+0.38}_{-0.38}$ | 2589^{+153}_{-182} | 4890^{+221}_{-209} | $8.088^{+3.259}_{-1.902}$ |

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

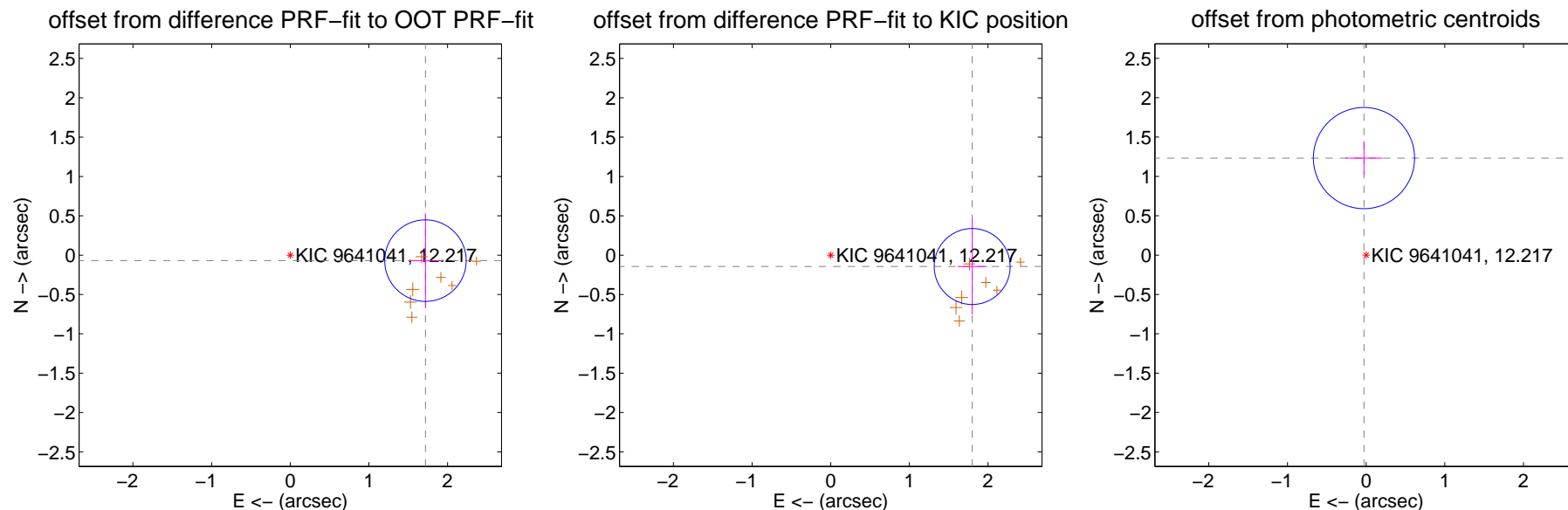
DV Centroid Data

Supplemental centroid analysis for 009641041-01. Kepler magnitude: 12.22. Transit SNR 48.50

There are 0 quarters with good PRF difference image offsets

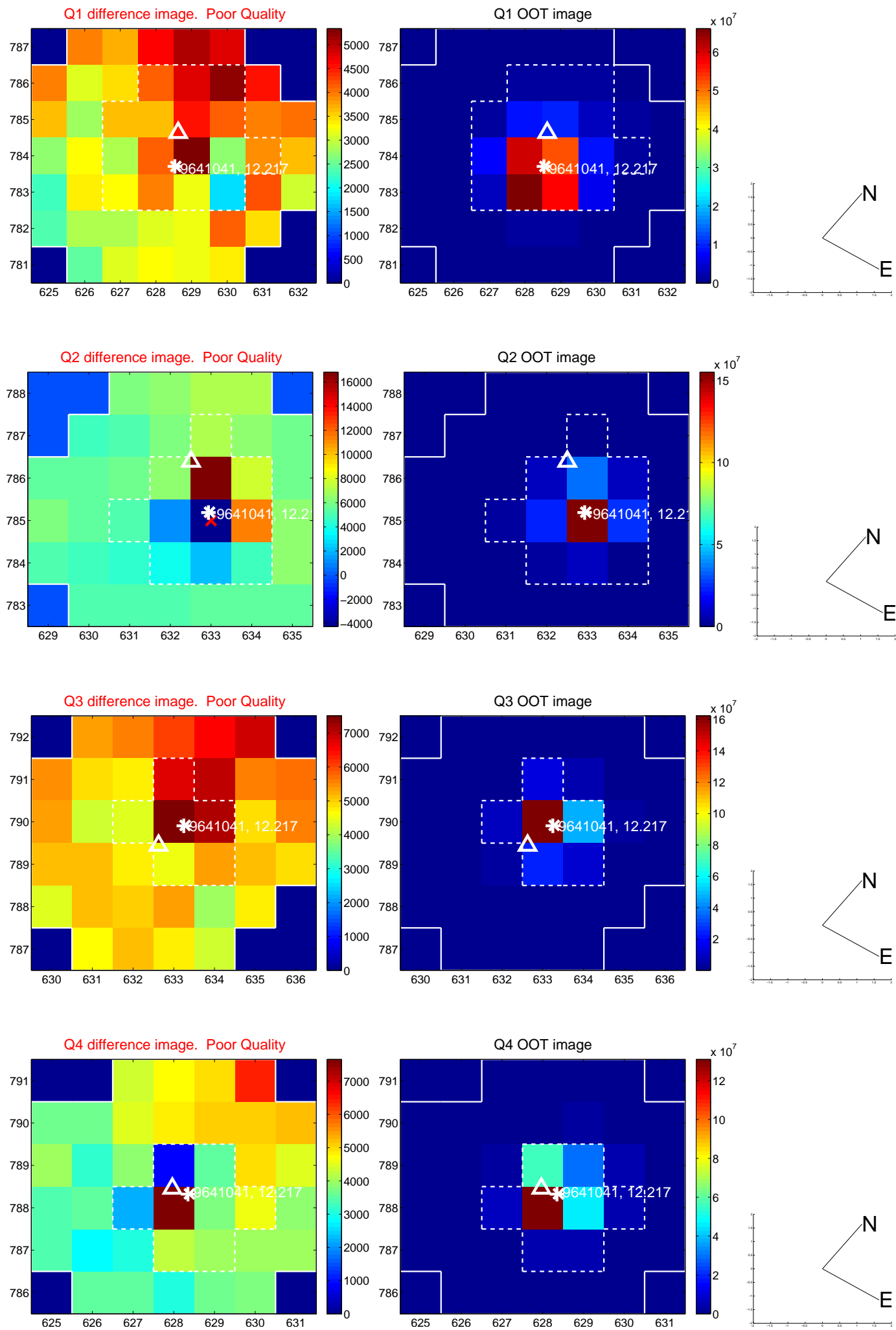
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|-----------------------------------------|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 1.720 ± 0.173 | 9.96 | -1.719 ± 0.188 | -0.070 ± 0.599 |
| PRF-fit source offset from KIC position | 1.804 ± 0.161 | 11.21 | -1.798 ± 0.186 | -0.144 ± 0.609 |
| photometric centroid source offset | 1.23 ± 0.21 | 5.75 | 0.03 ± 0.24 | 1.23 ± 0.21 |

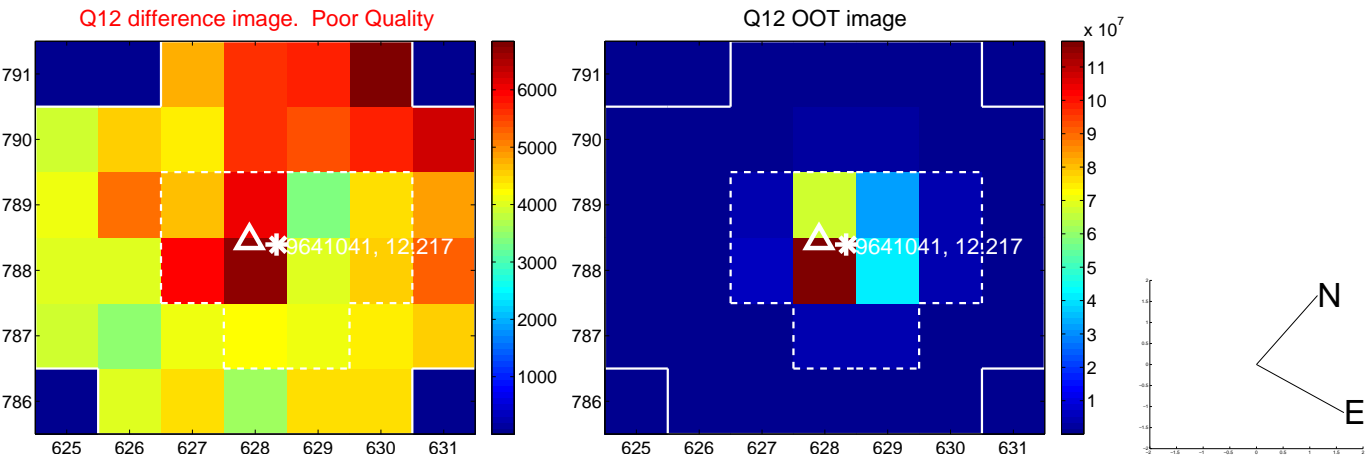
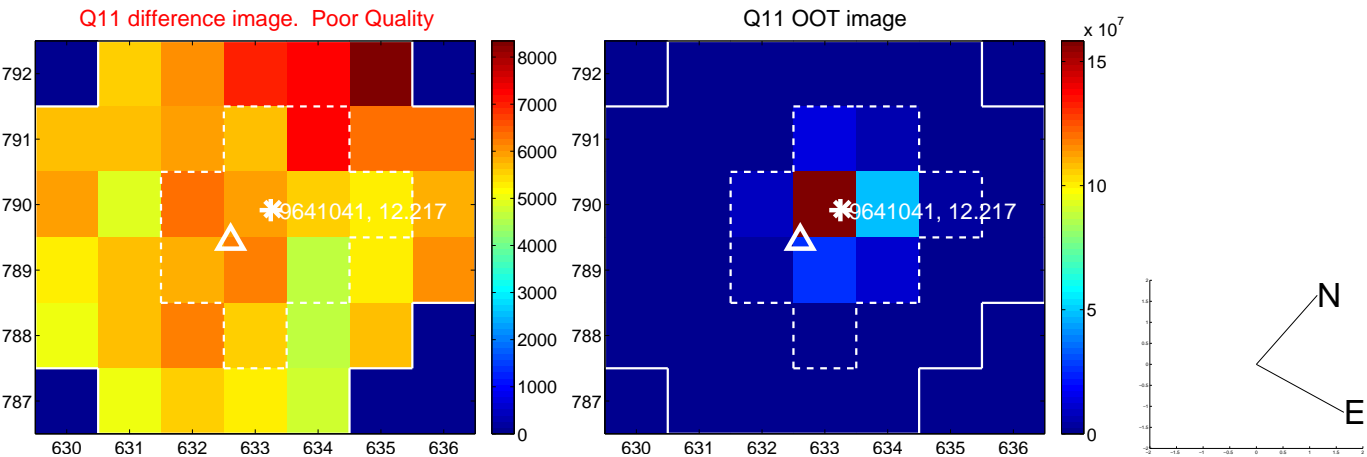
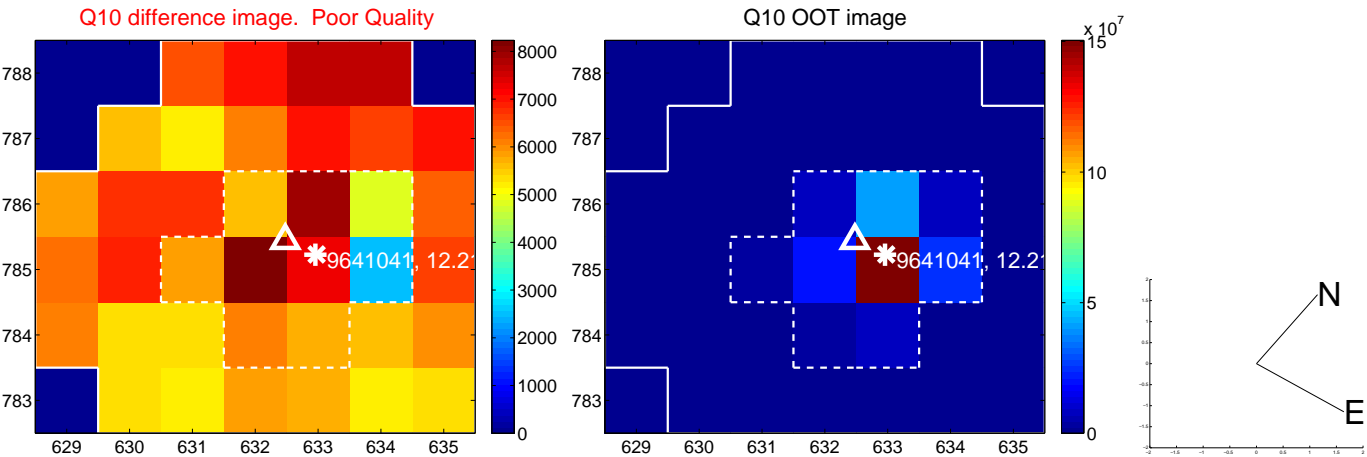
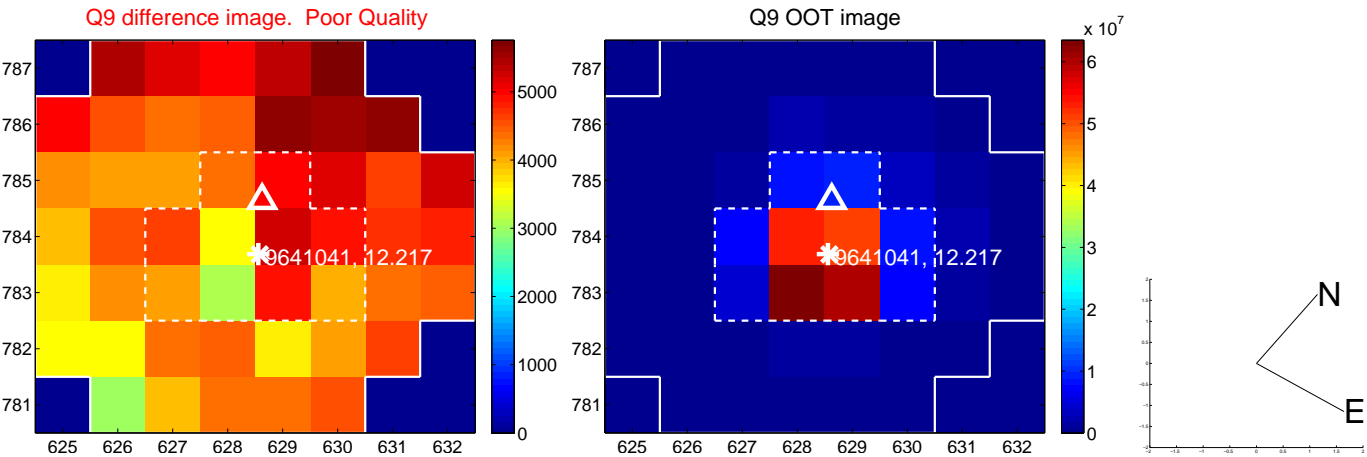


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

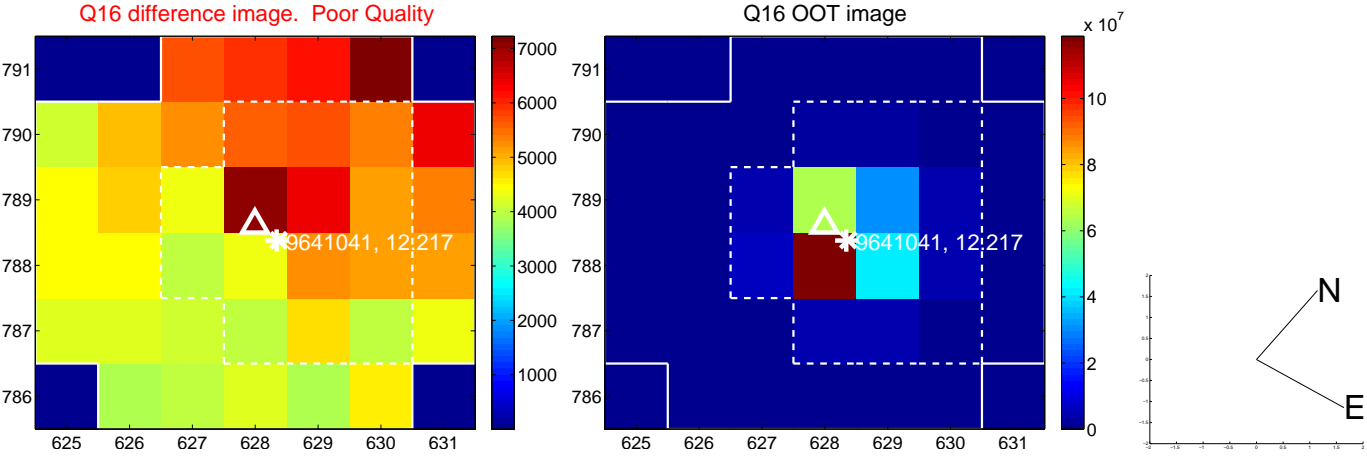
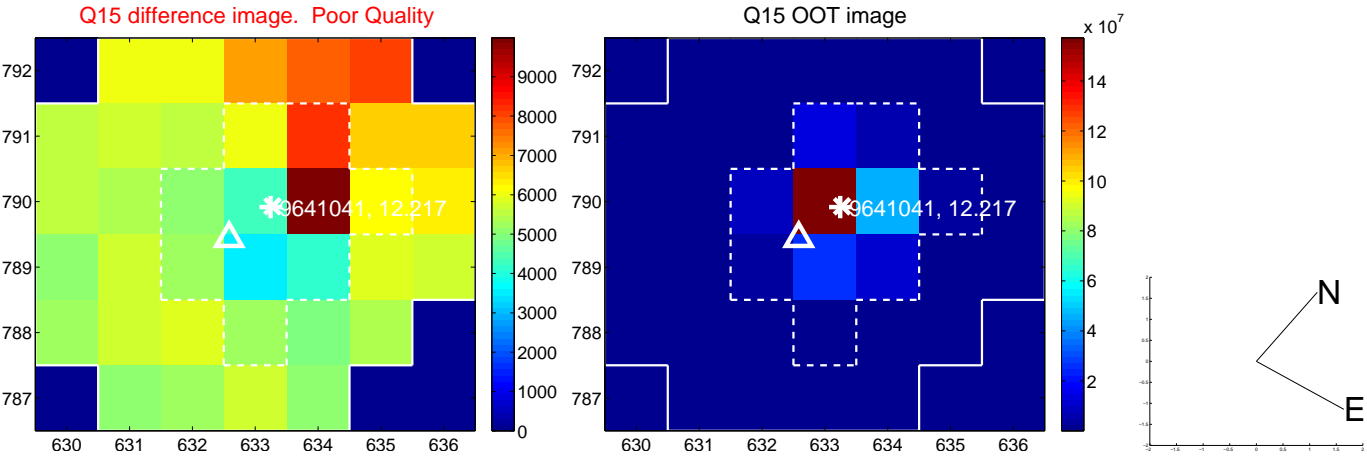
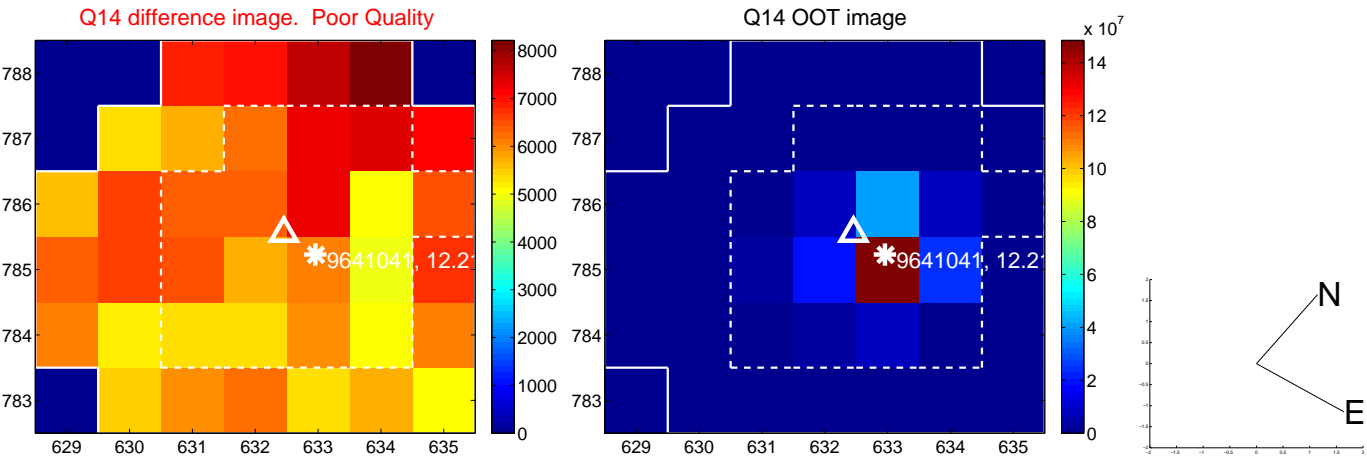
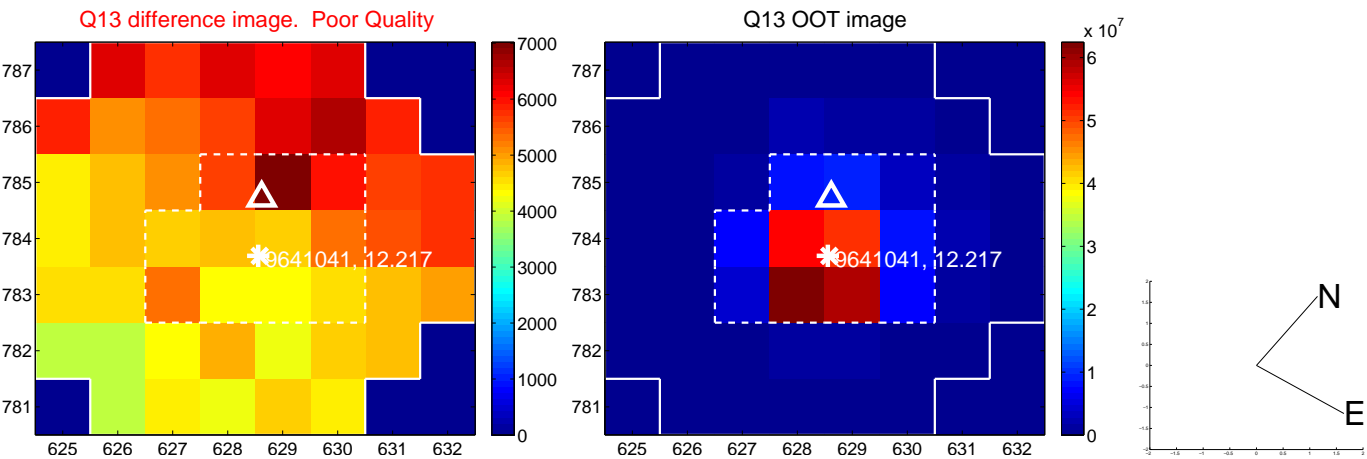
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



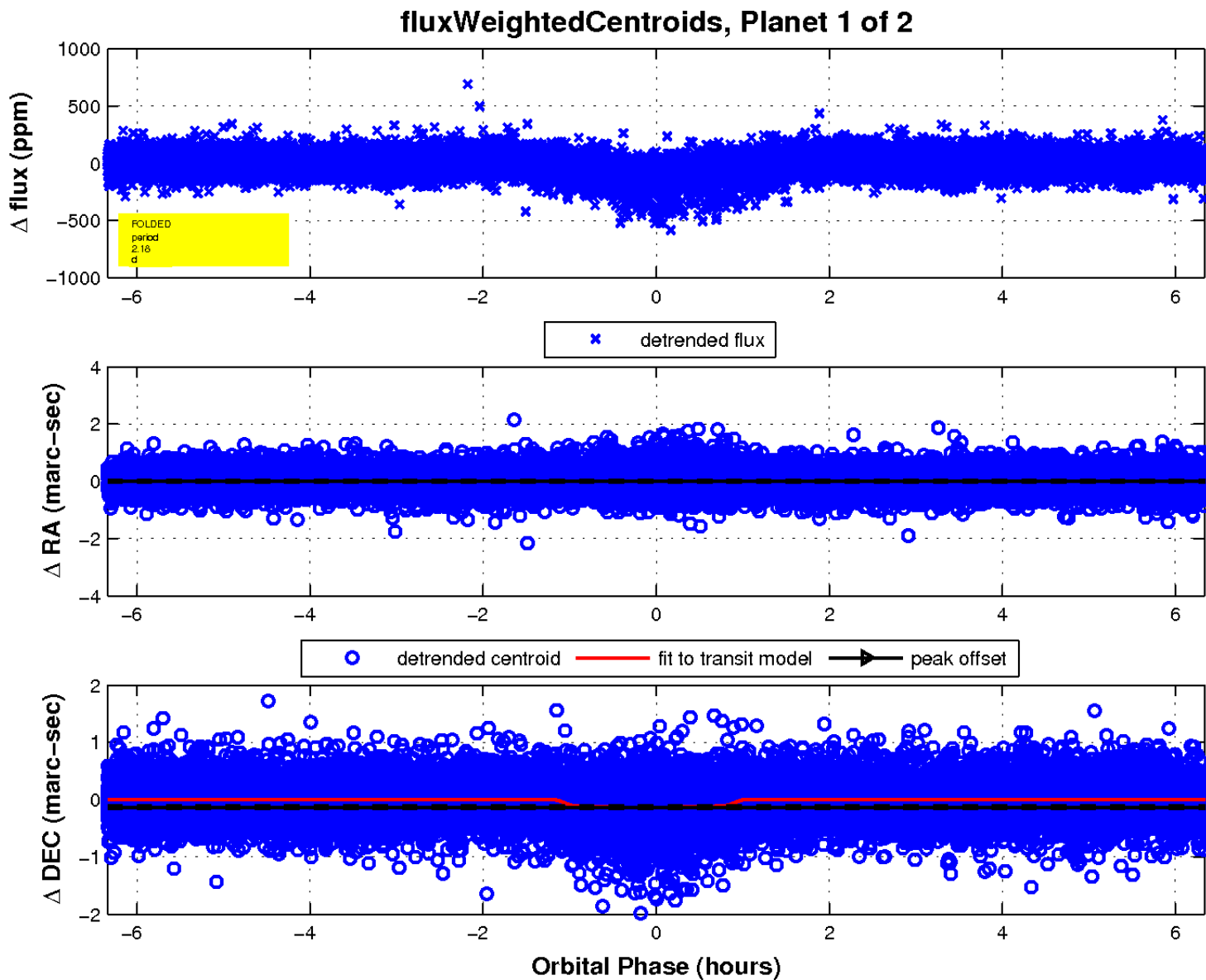
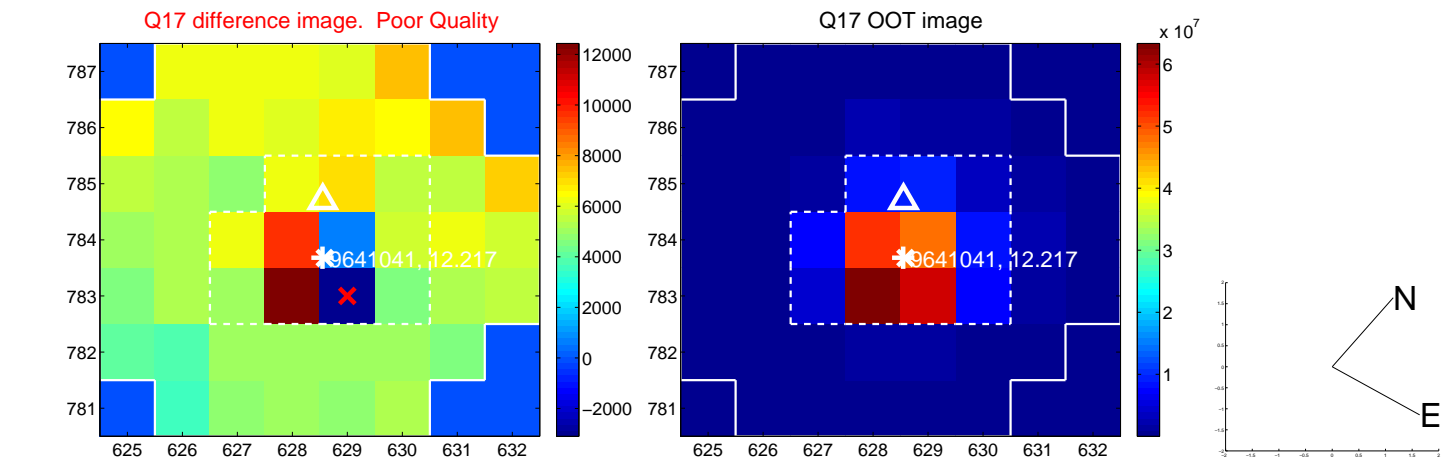
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

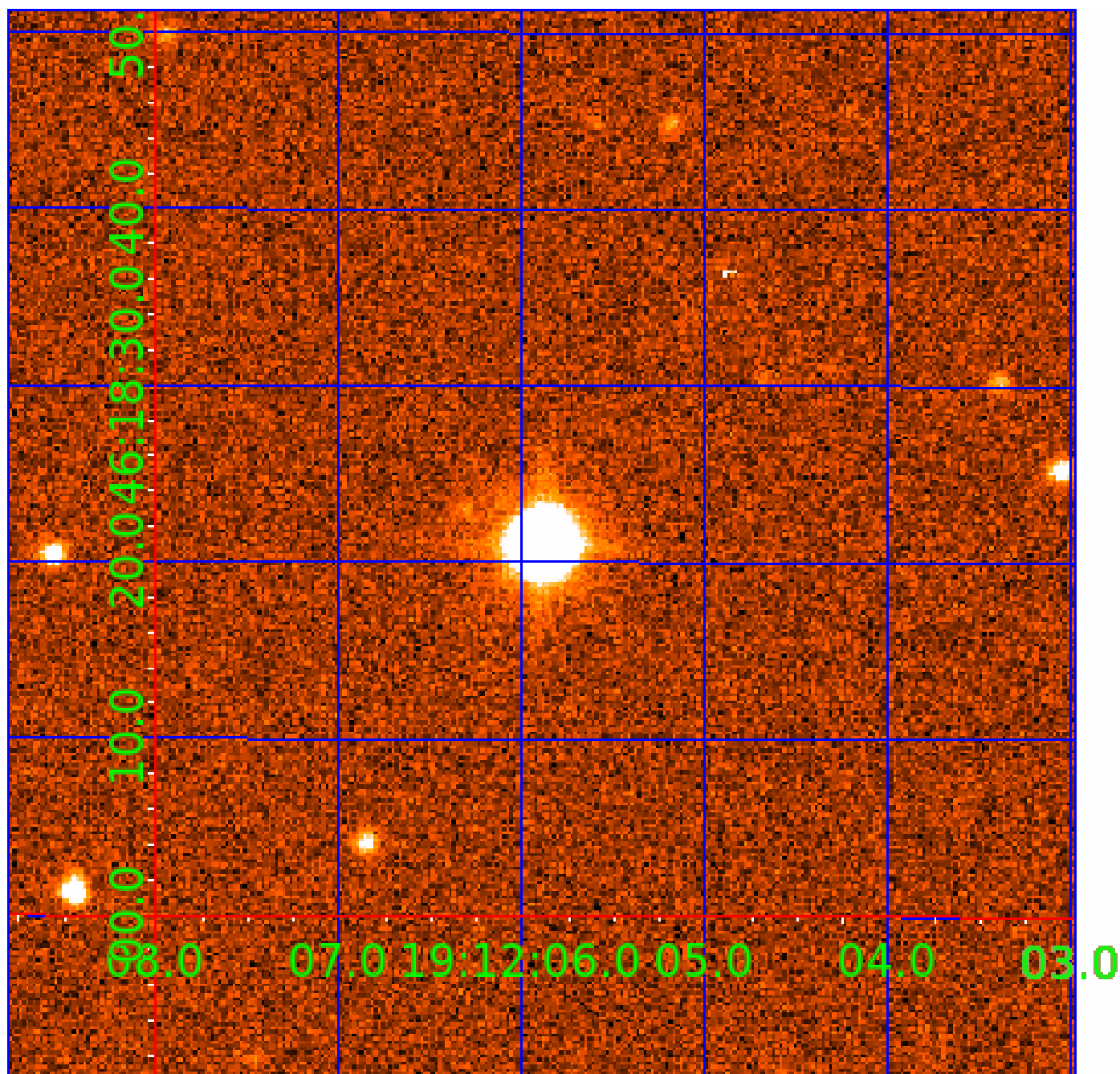


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 009641041

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 009641041-01 | OBS | 0324.01 | 2.178119 | 132.033697 | 94.7 | 2.114 | 46.6 | 48.5 | 1.55 | 6280 | 1.77 | 2908.70 |
| 009641041-02 | OBS | No | 1.088890 | 132.039834 | 0.1 | 0.969 | 7.3 | 0.0 | 1.55 | 6280 | 0.04 | 7330.98 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------------------------------------------|
| 009641041-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 1 | MOD_SEC_ALT—HAS_SEC_TCE—HALO_GHOST—EPHEM_MATCH |
| 009641041-02 | OBS | FP | 0.00 | 1 | 1 | 0 | 0 | IS_SEC_TCE |

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.

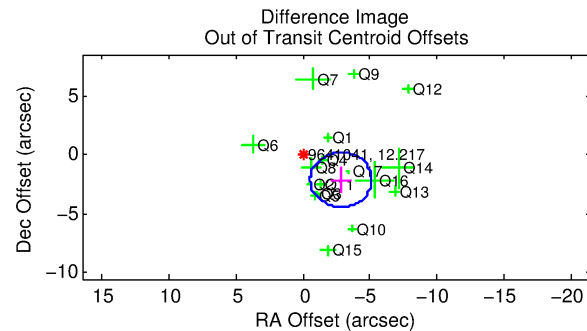
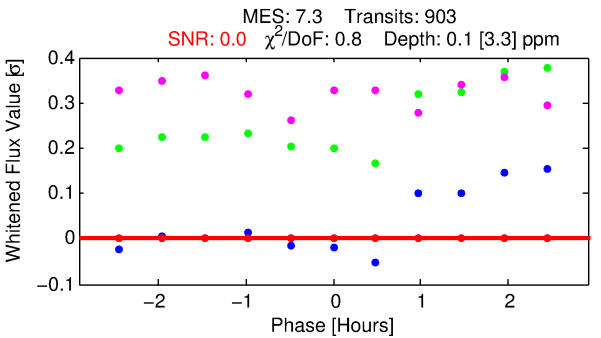
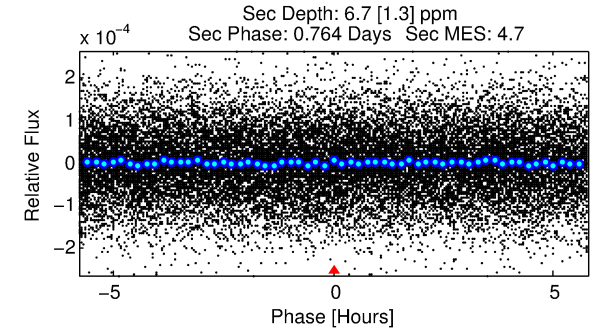
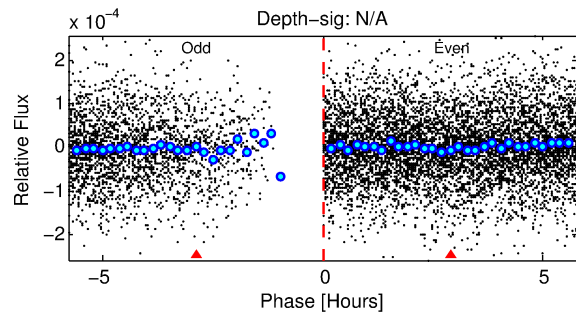
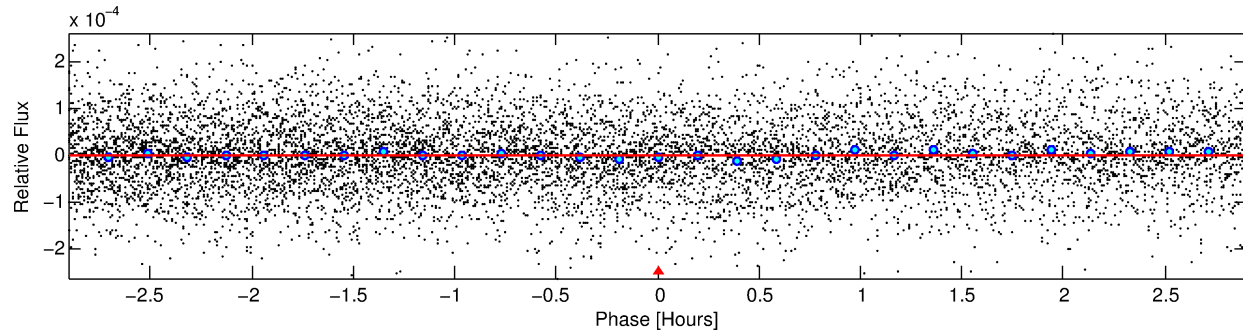
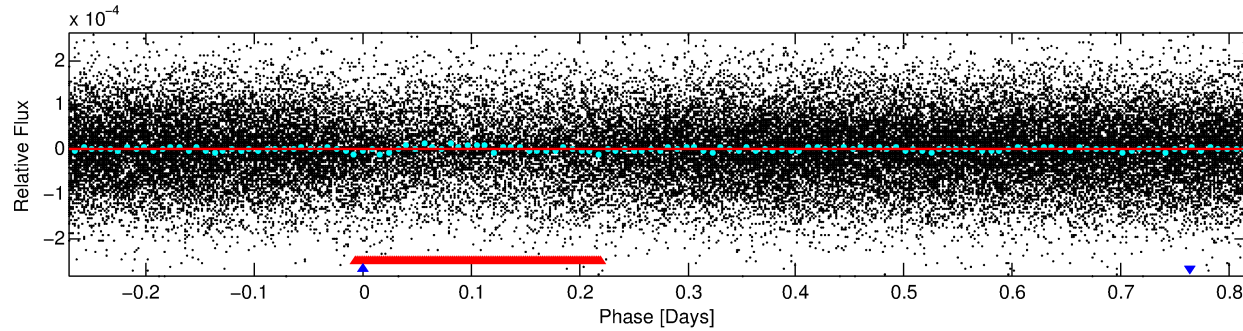
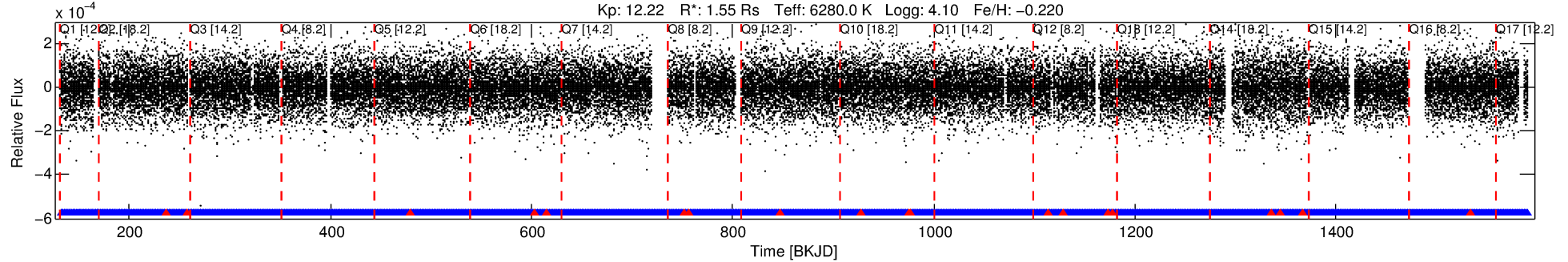
Ephemeris Match Information For 009641041-02

No Significant Match Found

DV One-Page Summary

KIC: 9641041 Candidate: 2 of 2 Period: 1.089 d
KOI: K00324 Corr: No Ephemeris Match

Kp: 12.22 R*: 1.55 Rs Teff: 6280.0 K Logg: 4.10 Fe/H: -0.220



DV Fit Results:

Period = 1.08889 [0.00463] d
Epoch = 132.0398 [0.7110] BKJD
Rp/R* = 0.0003 [0.0076]
a/R* = 3.86 [59.53]
b = 0.90 [3.81]
Seff = 7330.98 [3006.58]
Teq = 2359 [242] K
Rp = 0.04 [1.29] Re
a = 0.0214 [0.0054] AU
Ag = 864.14 [50209.59] [0.02σ]
Teffp = 19779 [287321] K [0.06σ]

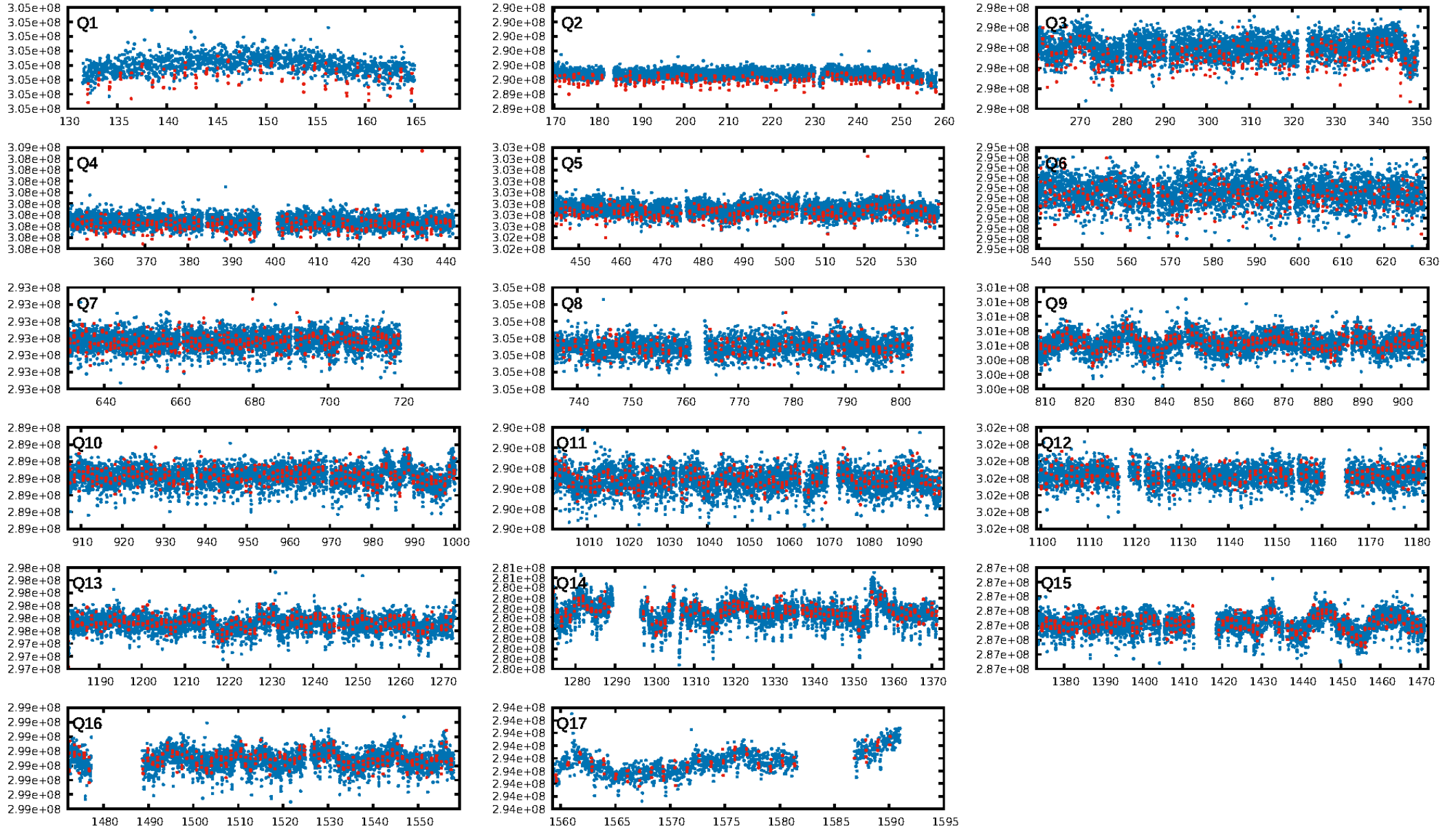
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [11.24σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.83e-13
RollingBand-fgt: 0.98 [844/863]
GhostDiagnostic-chr: N/A
Centroid-sig: N/A
Centroid-so: N/A
OotOffset-rm: 3.527 arcsec [4.60σ]
KicOffset-rm: 3.660 arcsec [5.12σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
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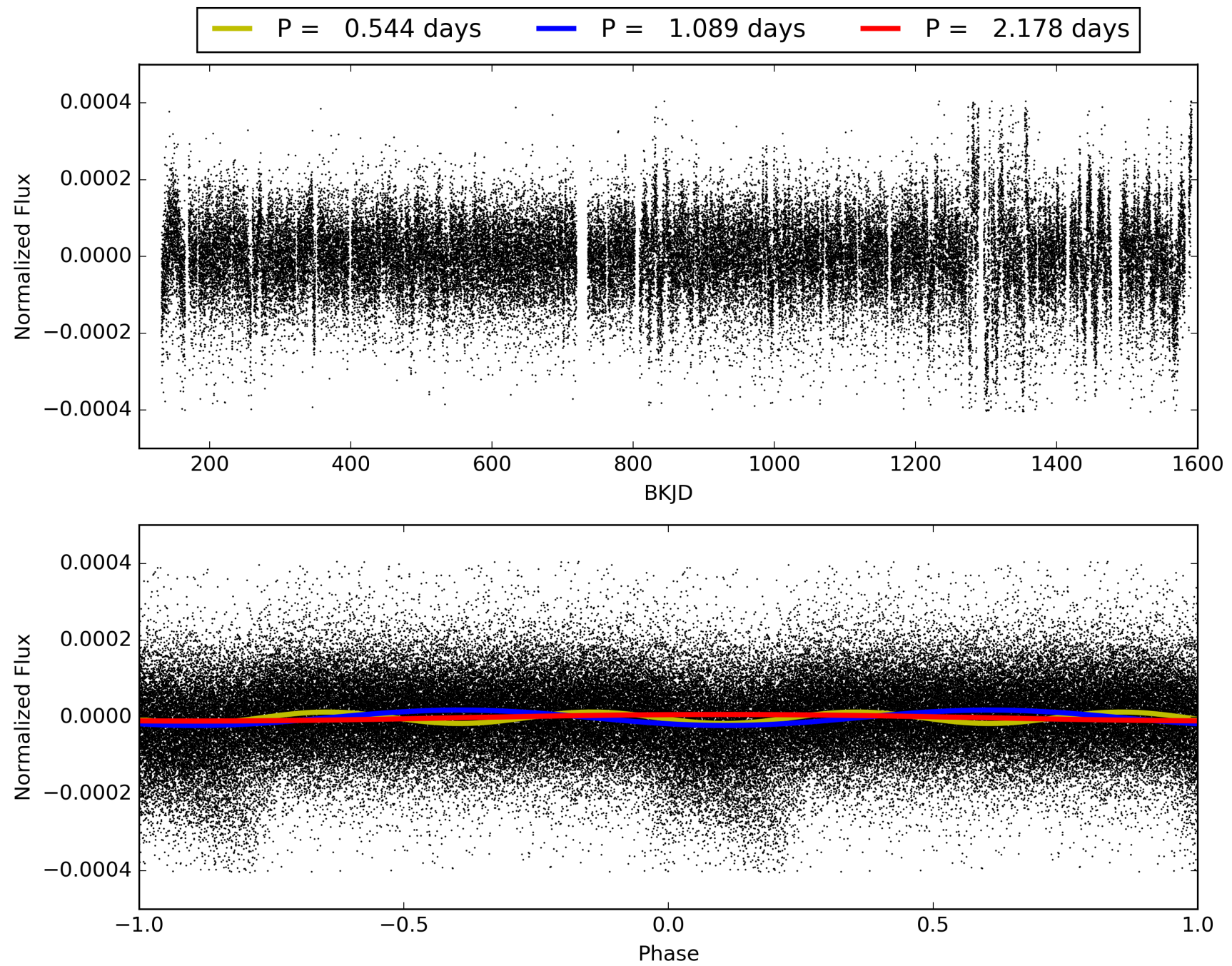
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:39:03 Z

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

TCE 009641041-02, PDC Light Curves

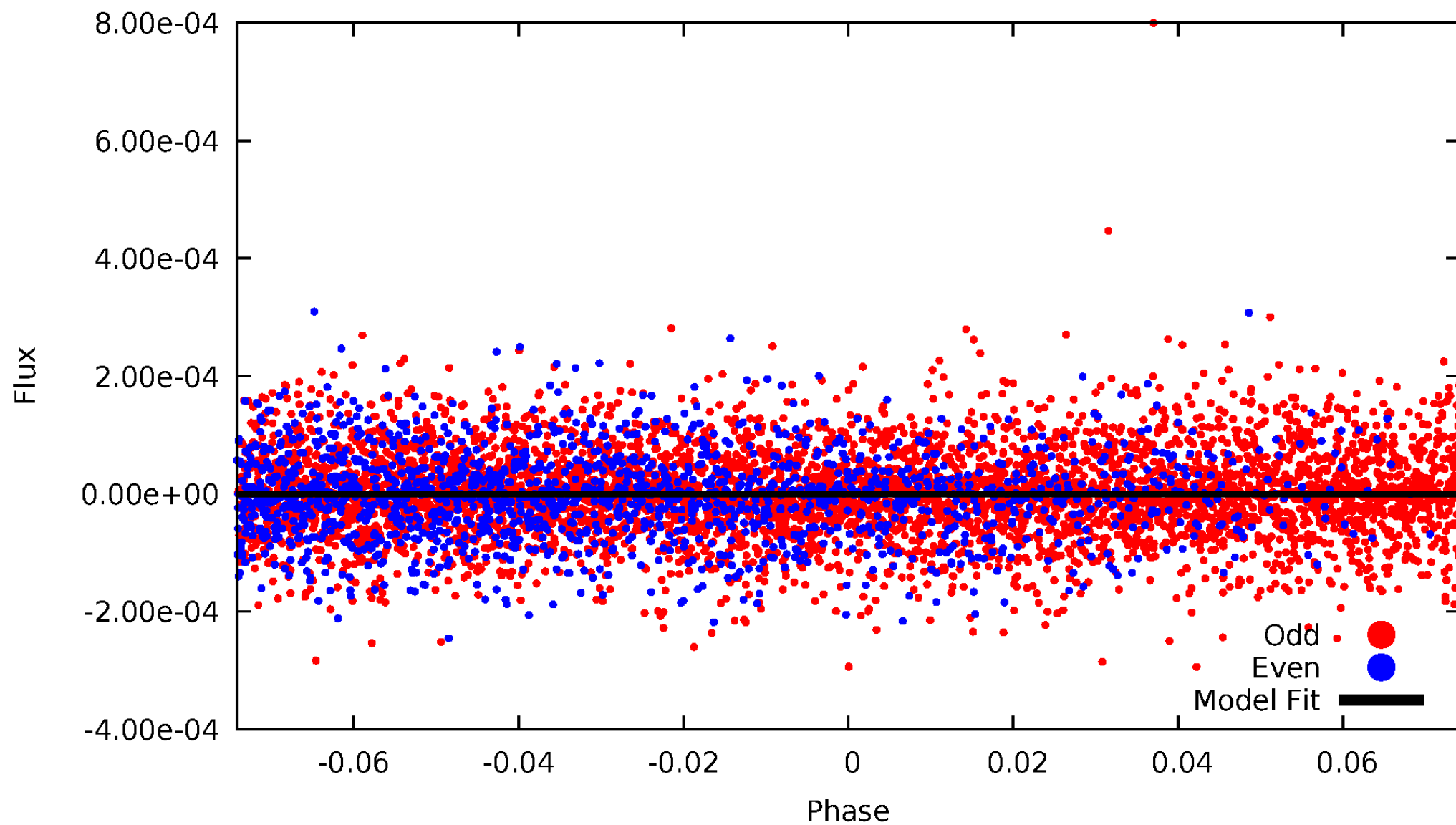


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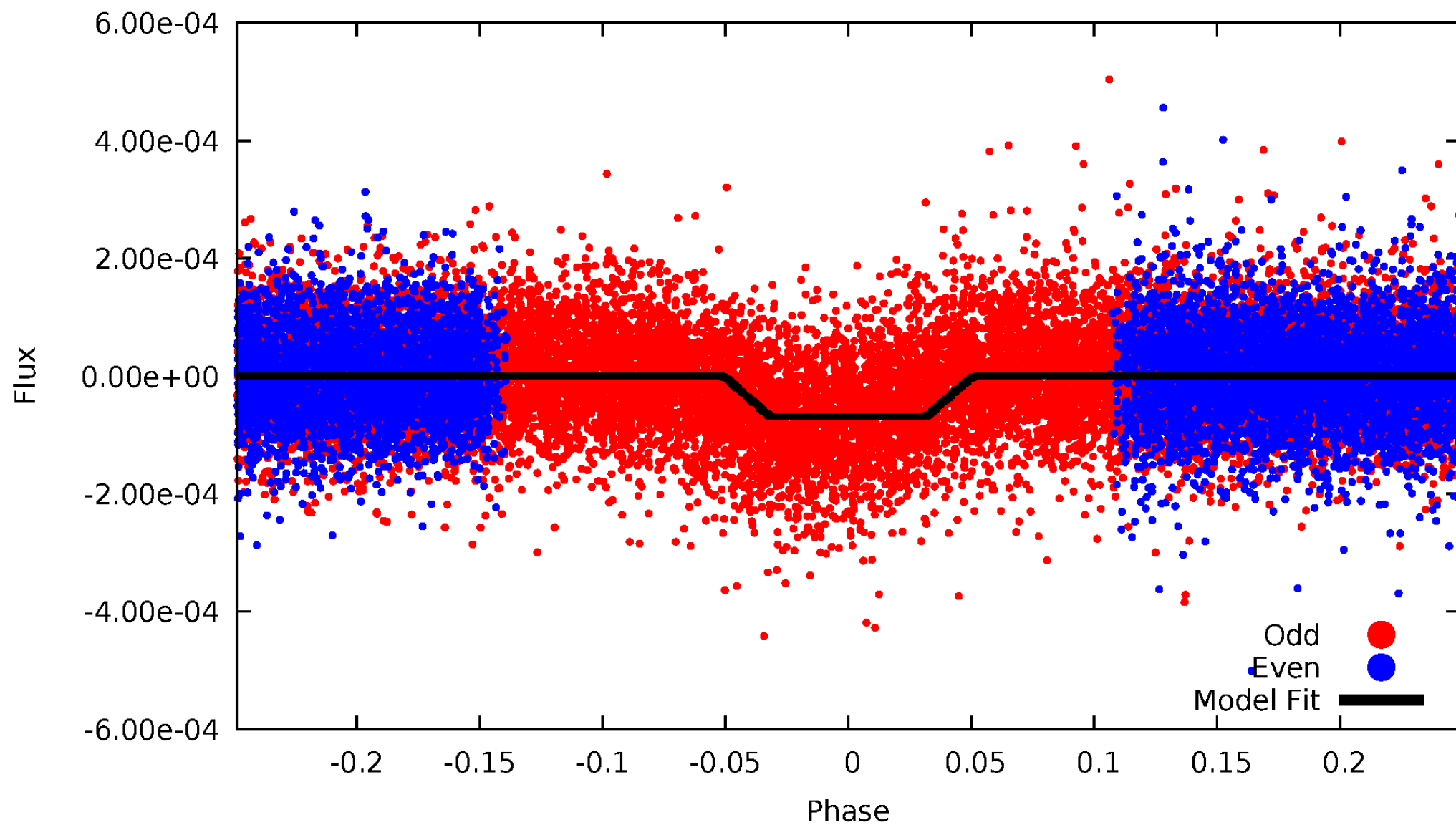
DV Odd/Even

TCE 009641041-02



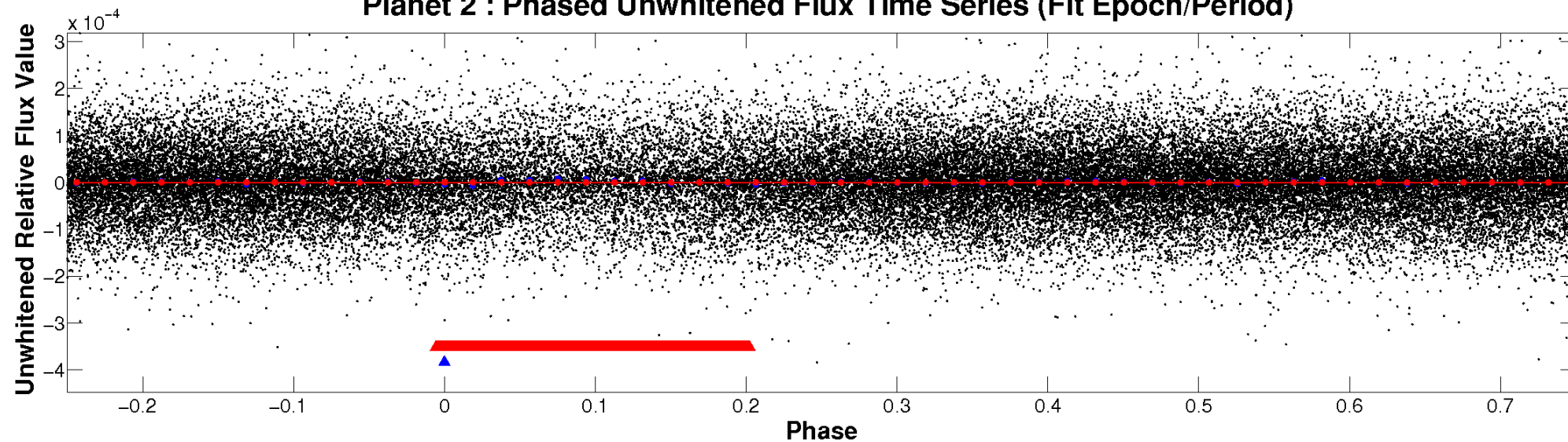
ALT Odd/Even

TCE 009641041-02

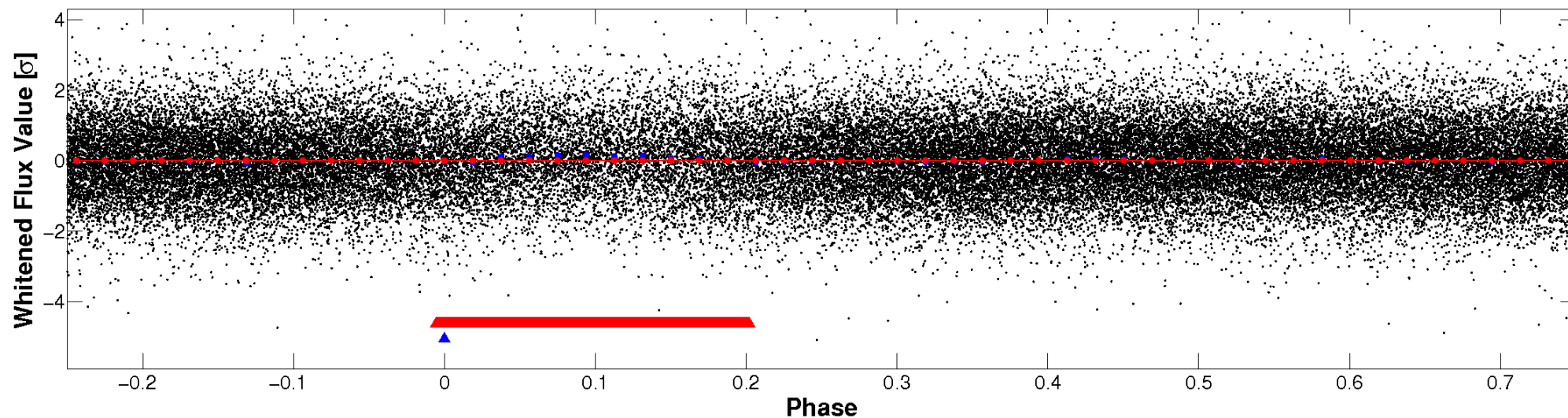


Non-Whitened Vs. Whitened Light Curve

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

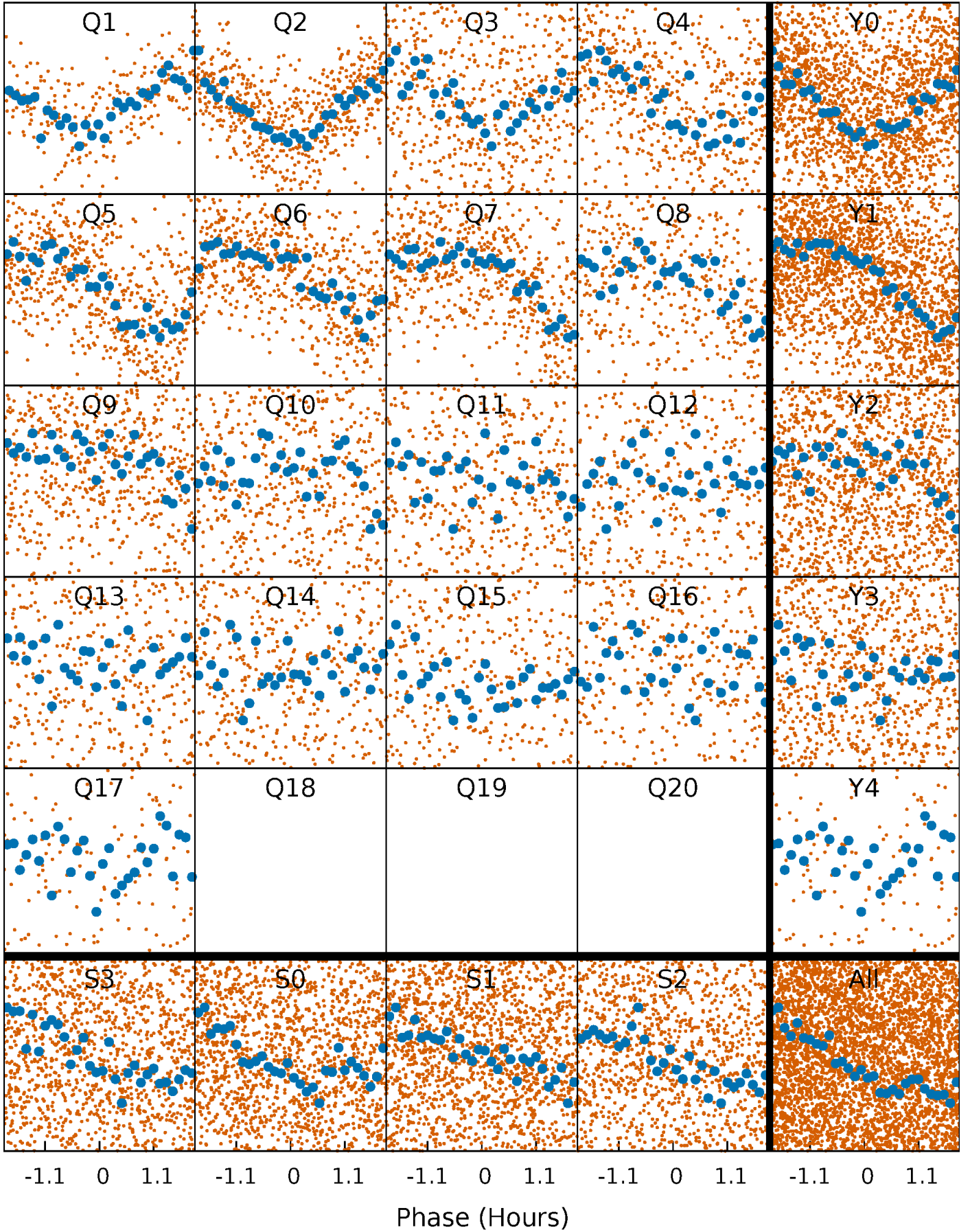


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



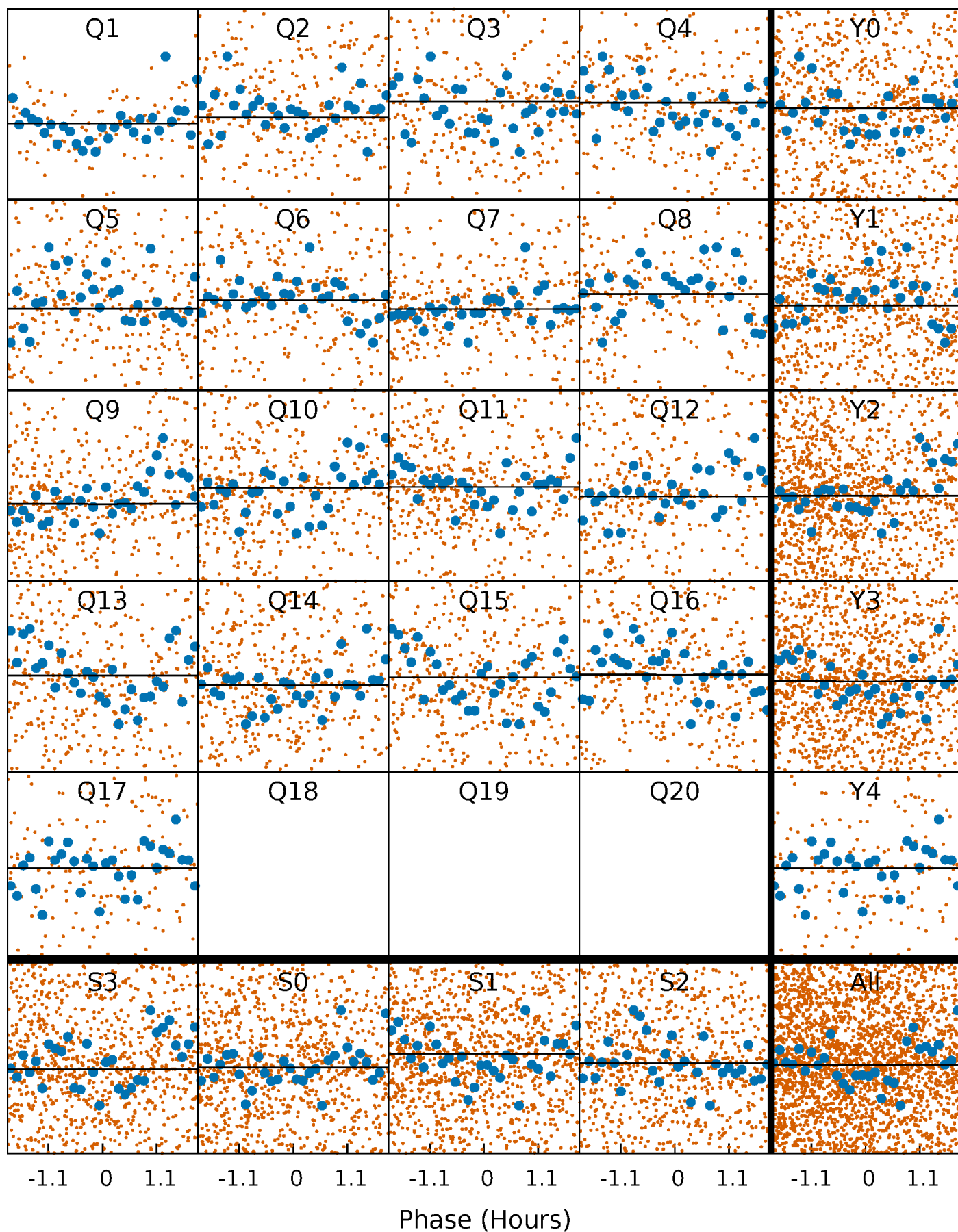
PDC Quarter-Phased Transit Curves

TCE 009641041-02 P= 1.088890 Days $T_0=132.039834$ (BKJD)



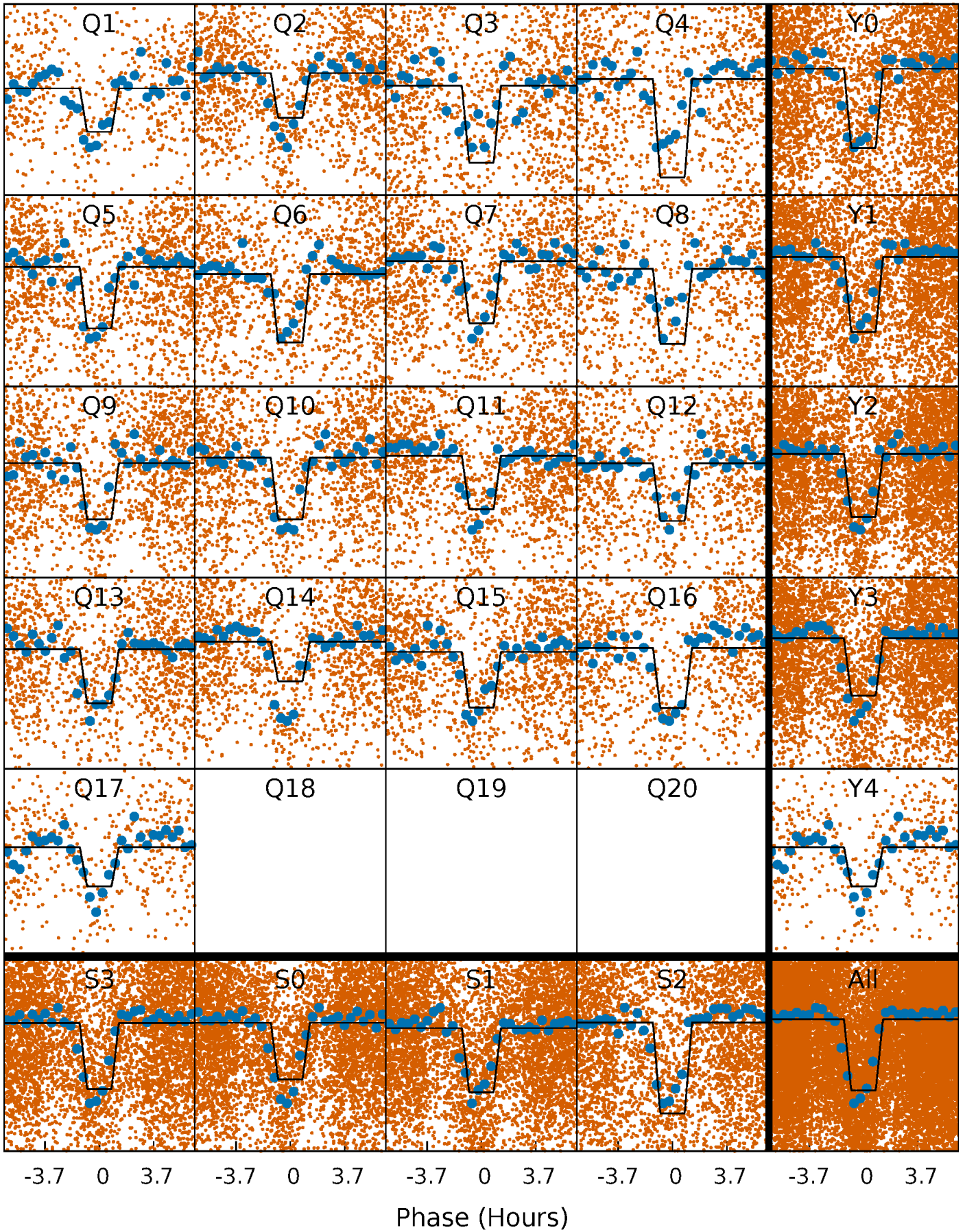
DV Quarter-Phased Transit Curves

TCE 009641041-02 P= 1.088890 Days $T_0=132.039834$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

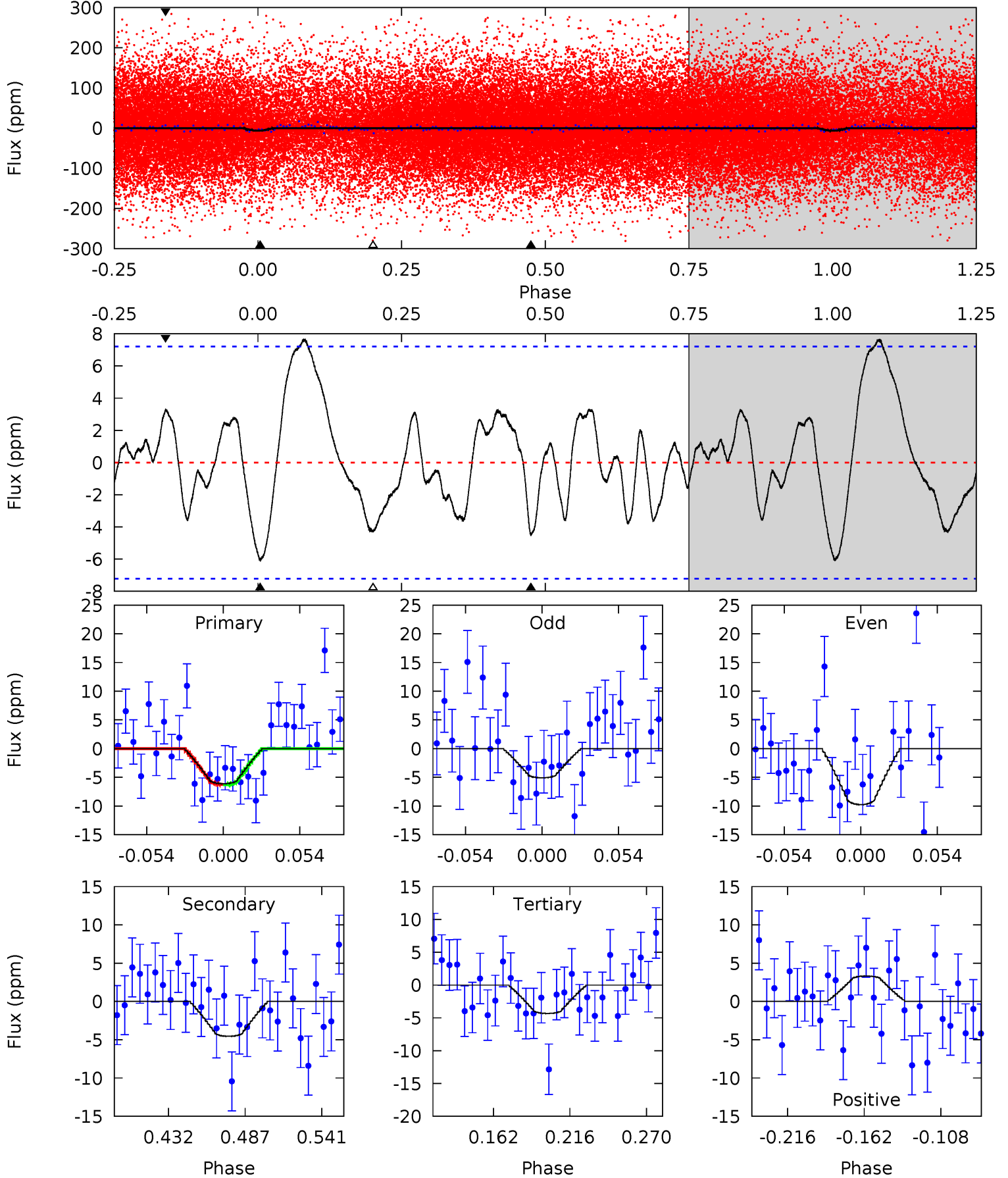
TCE 009641041-02 P= 1.089074 Days $T_0=132.041289$ (BKJD)



DV Model-Shift Uniqueness Test

009641041-02, P = 1.088890 Days, E = 130.950944 Days

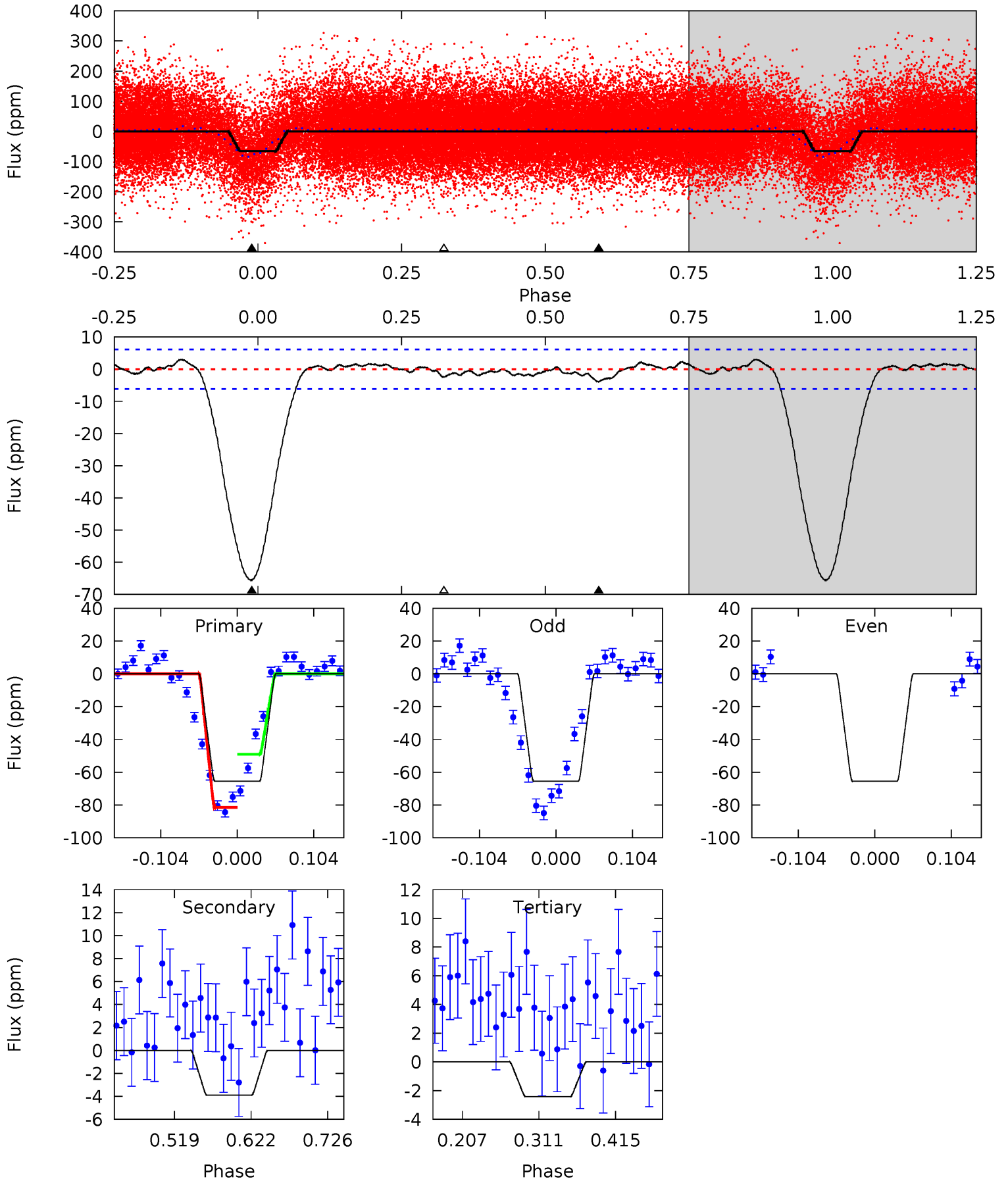
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 3.98 | 2.96 | 2.81 | 2.16 | 4.69 | 1.93 | 1.57 | 1.16 | 1.82 | 0.15 | 0.81 | 1.34 | 1.36 | 0.56 | 0.02 |



Alt Model-Shift Uniqueness Test

009641041-02, P = 1.089074 Days, E = 130.952215 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 48.7 | 2.89 | 1.79 | 0 | 4.56 | 1.63 | 0.87 | 46.9 | 48.7 | 1.09 | 2.89 | 0 | 1.03 | 0.04 | 12.0 |



Stellar Parameters For KIC 009641041

| | $T_{\text{eff}}(K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M(M_{\odot})$ | $\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------------------------------|
| | 6280^{+157}_{-173} | $4.098^{+0.228}_{-0.123}$ | $-0.220^{+0.250}_{-0.300}$ | $1.551^{+0.319}_{-0.426}$ | $1.100^{+0.179}_{-0.146}$ | $0.415^{+0.490}_{-0.152}$ |
| | +2%/-3% | +6%/-3% | +114%/-136% | +21%/-27% | +16%/-13% | +118%/-37% |
| 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 009641041-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|-------------|------------------------|----------------------|------------------------|----------------------------|
| DV | -5 ± 2 | $0.84^{+0.90}_{-0.59}$ | 3264^{+186}_{-247} | 4063^{+3233}_{-1603} | $1.568^{+16.346}_{-1.227}$ |
| Alt. | -4 ± 1 | $1.56^{+1.17}_{-0.94}$ | 3258^{+198}_{-232} | 2696^{+1878}_{-5712} | $0.382^{+2.247}_{-0.265}$ |

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

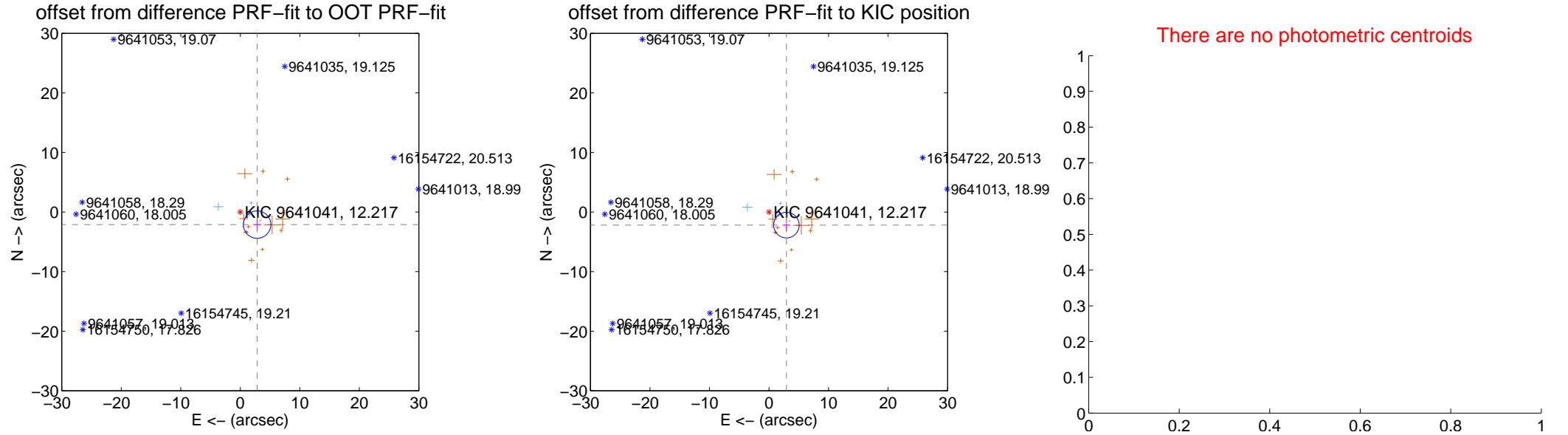
DV Centroid Data

Supplemental centroid analysis for 009641041-02. Kepler magnitude: 12.22. Transit SNR 0.02

There are 3 quarters with good PRF difference image offsets

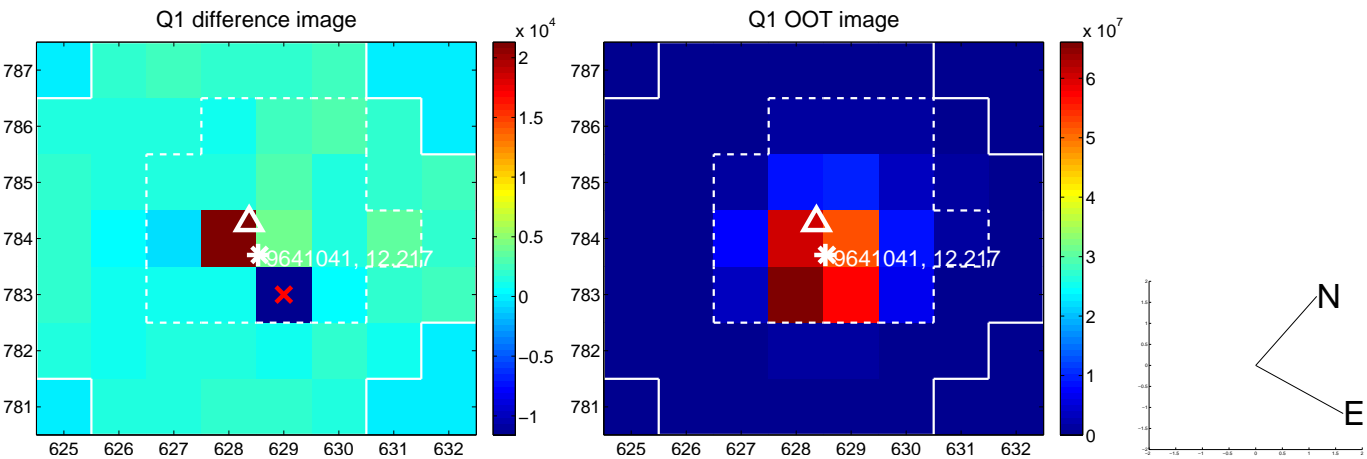
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|-----------------------------------------|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 3.527 ± 0.767 | 4.60 | -2.826 ± 0.696 | -2.110 ± 1.010 |
| PRF-fit source offset from KIC position | 3.660 ± 0.715 | 5.12 | -2.926 ± 0.651 | -2.199 ± 1.004 |
| photometric centroid source offset | — | — | — | — |

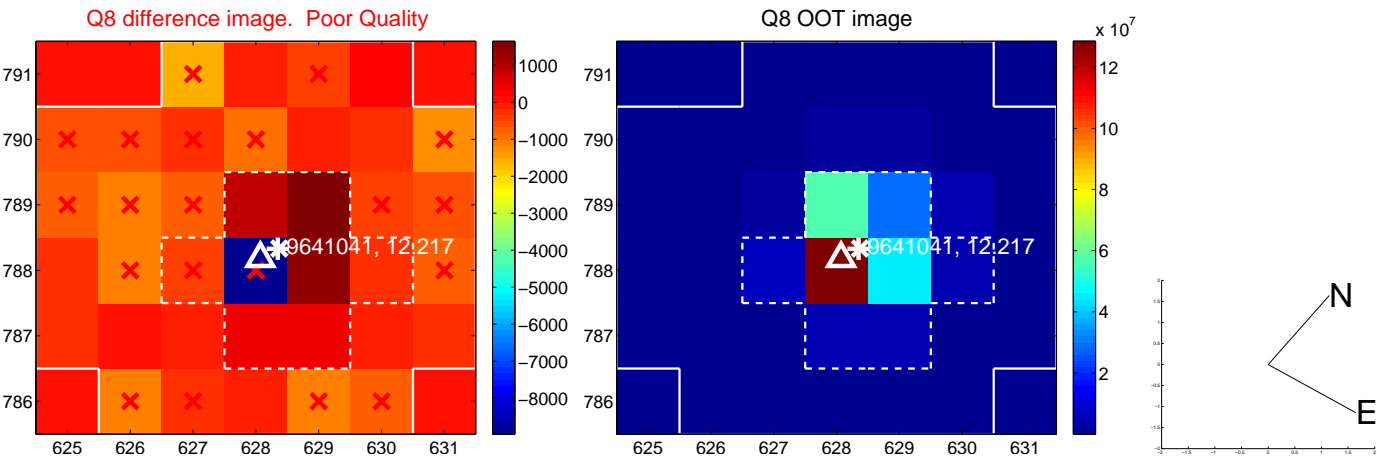
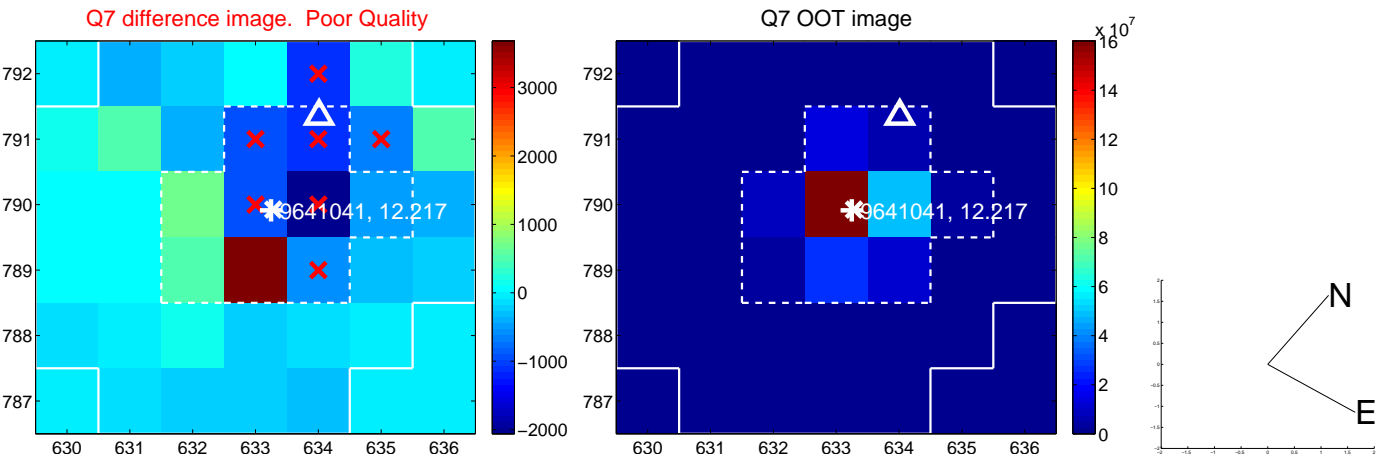
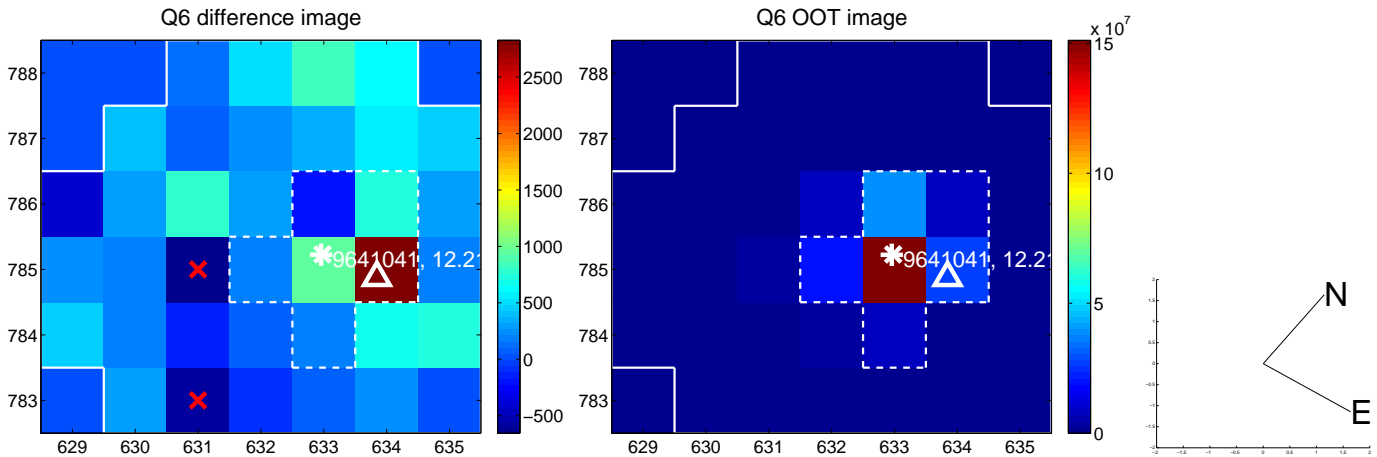
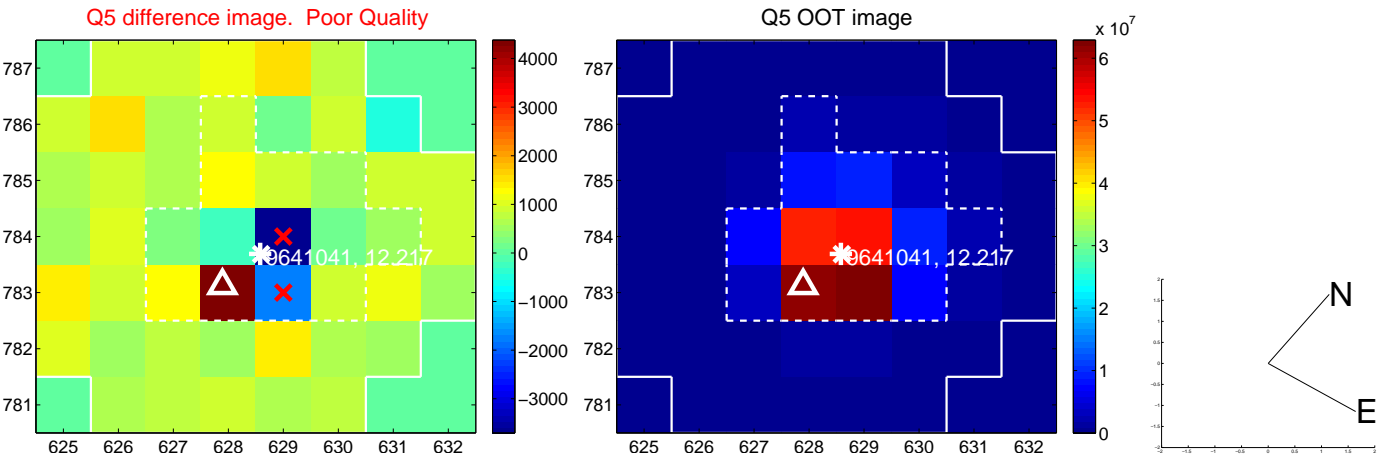


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

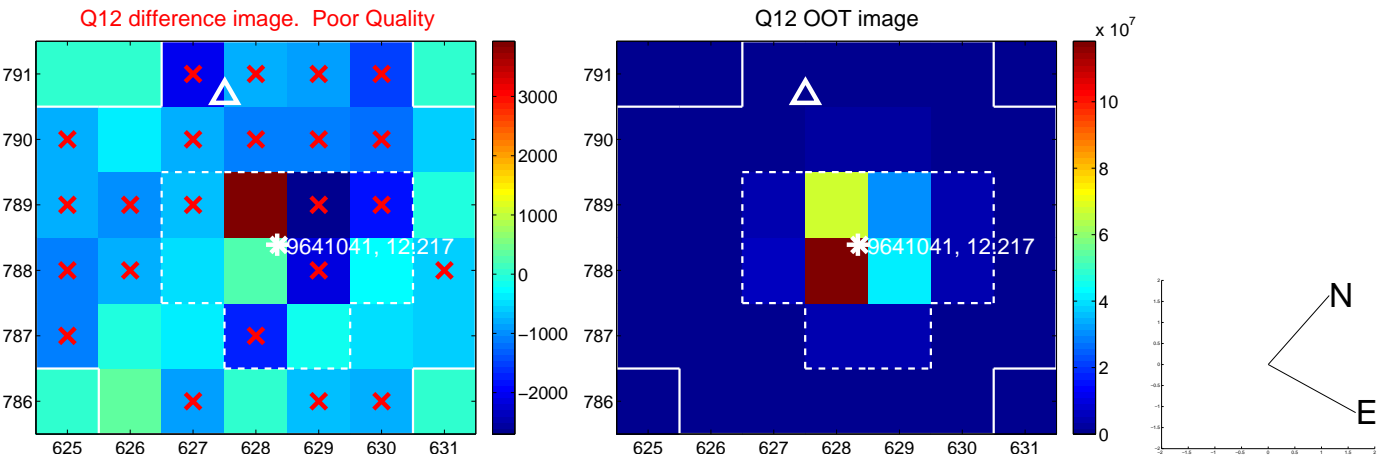
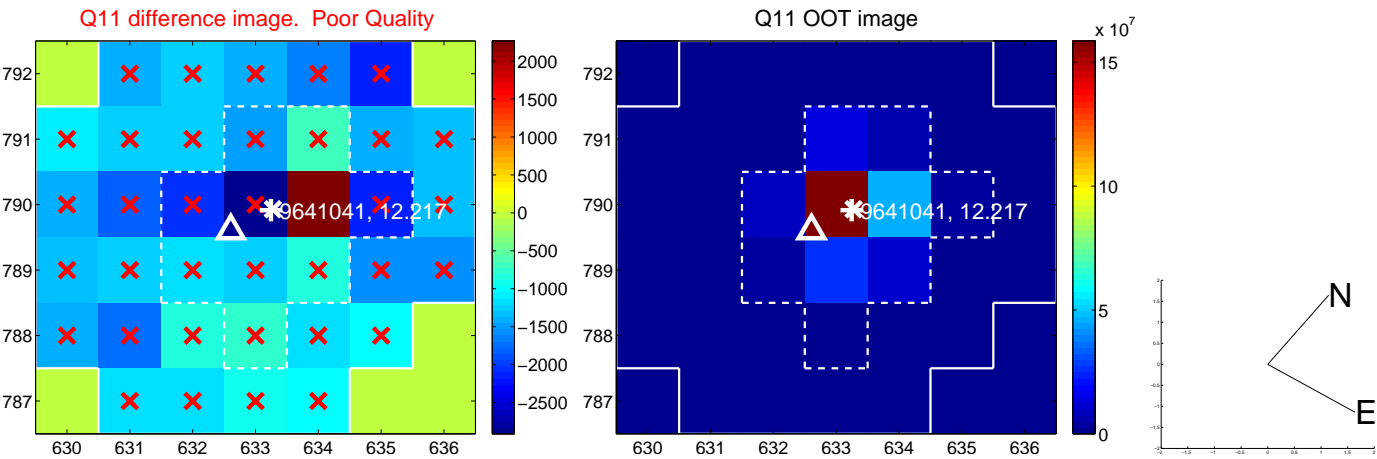
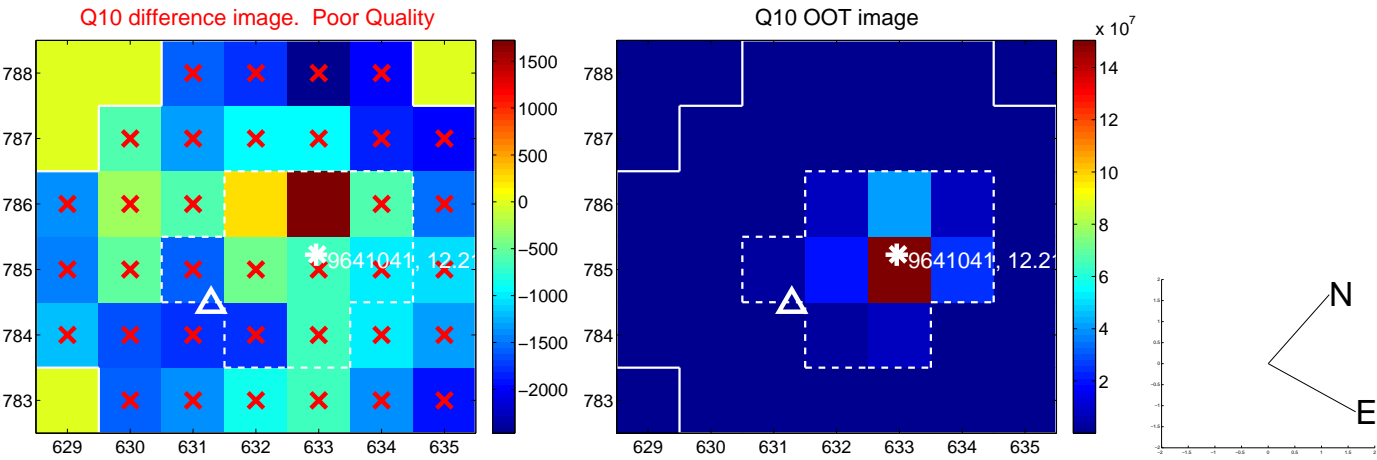
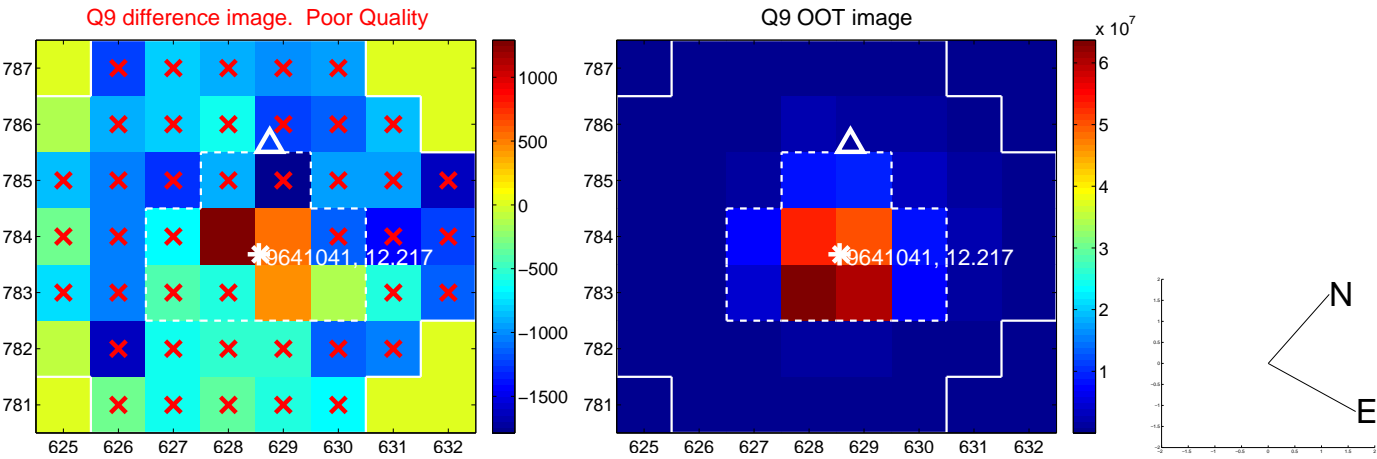
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



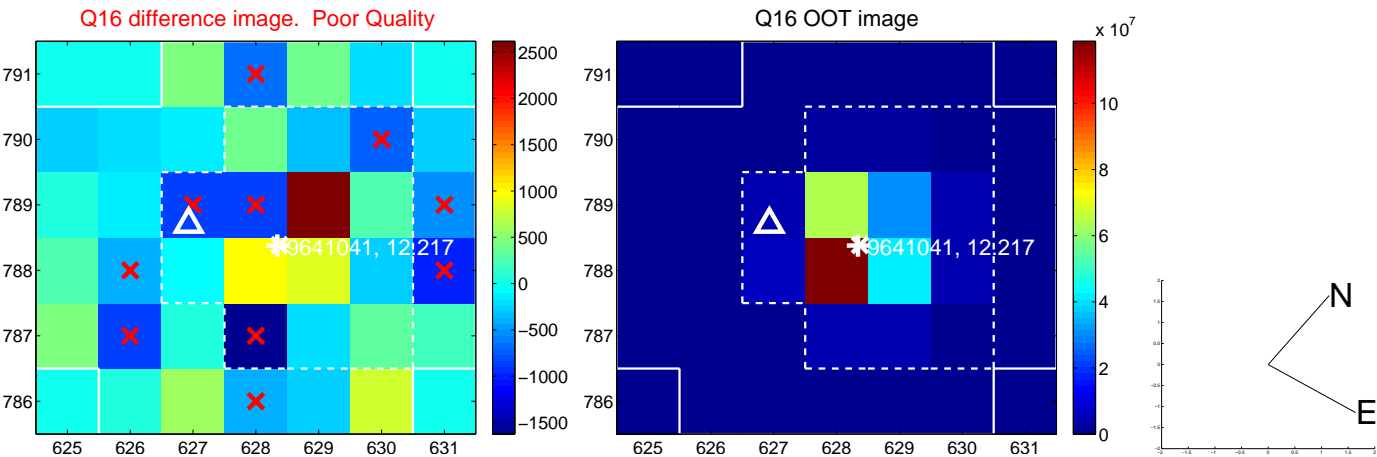
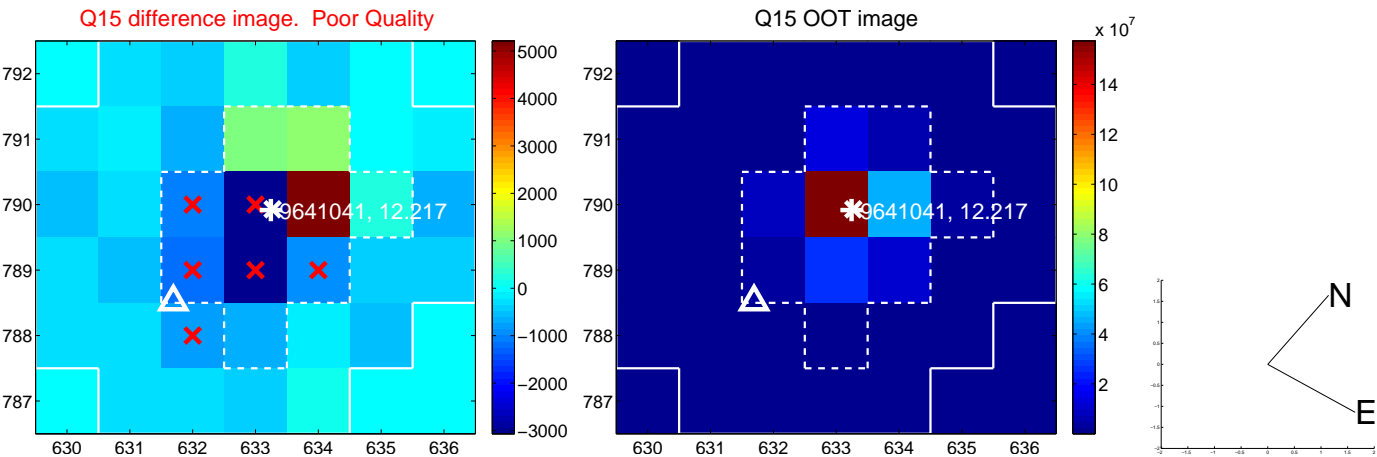
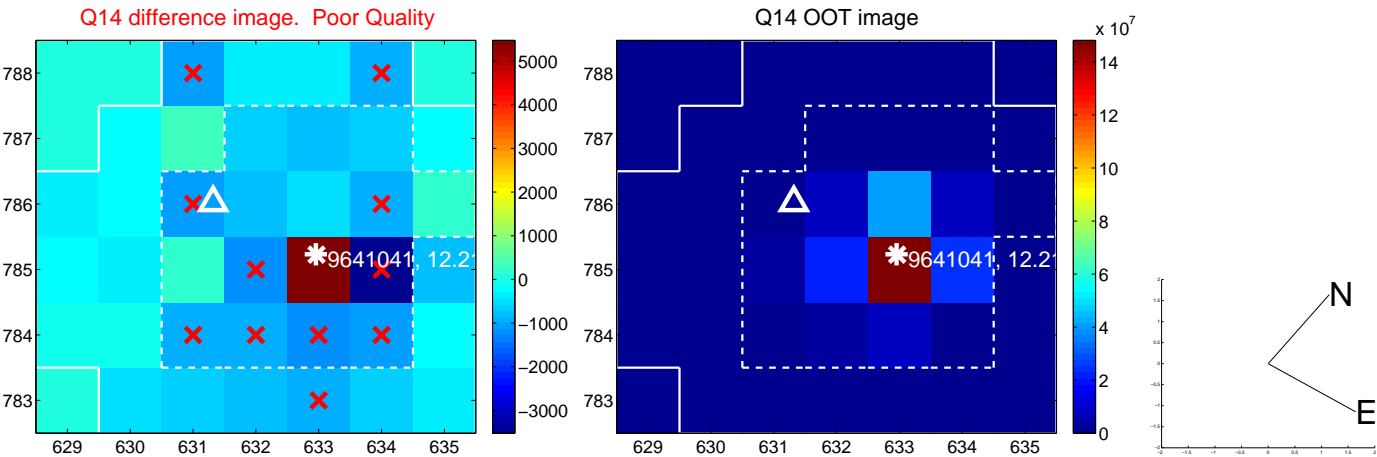
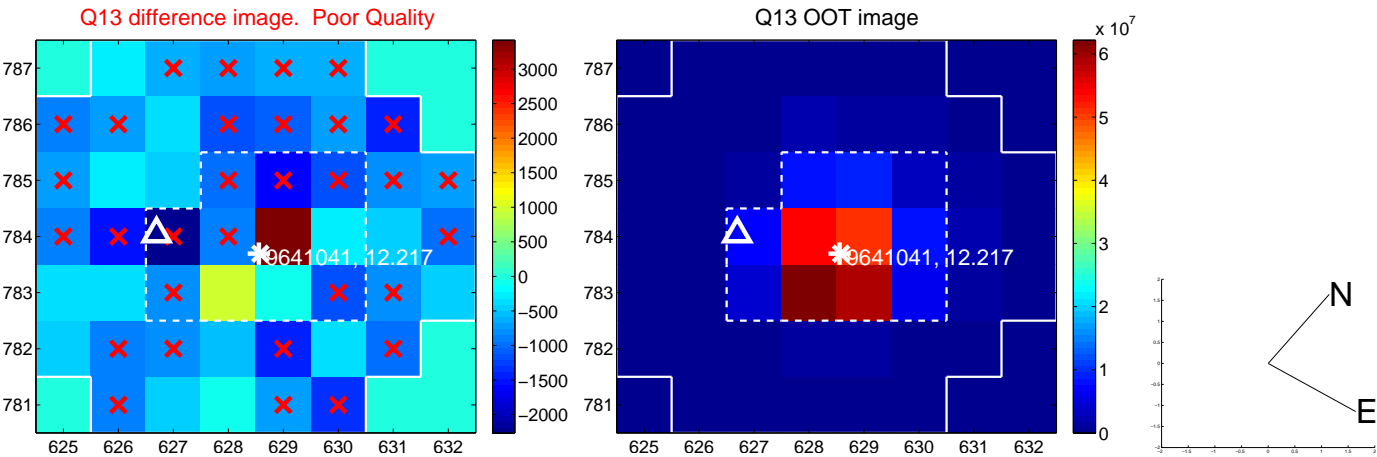
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



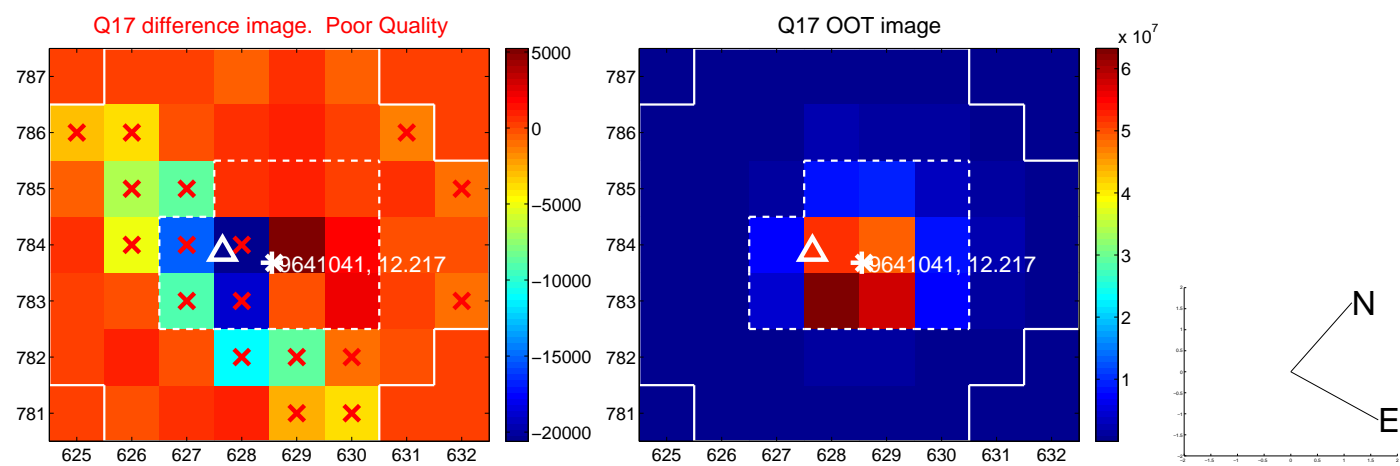
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



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



folded centroid time series figure for this object.

UKIRT Image

Declination

