

KIC 004861527

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004861527-01 | OBS | 2727.01 | 25.705550 | 156.653297 | 306.4 | 9.152 | 21.0 | 23.3 | 1.00 | 6326 | 3.44 | 47.83 |
| 004861527-02 | OBS | No | 25.706914 | 148.324983 | 223.8 | 3.159 | 14.1 | 15.4 | 1.00 | 6326 | 1.71 | 47.82 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 004861527-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 1 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH |
| 004861527-02 | OBS | FP | 0.00 | 1 | 1 | 1 | 1 | IS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH |

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.

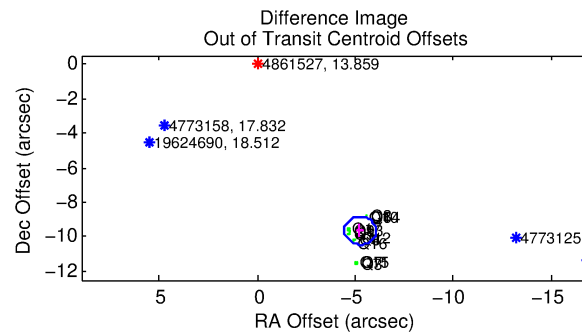
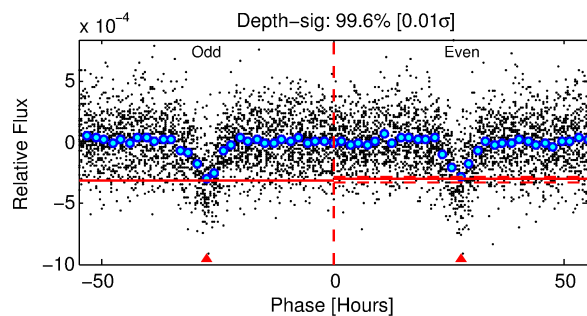
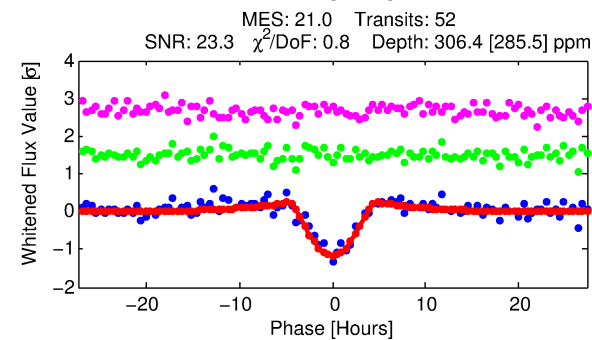
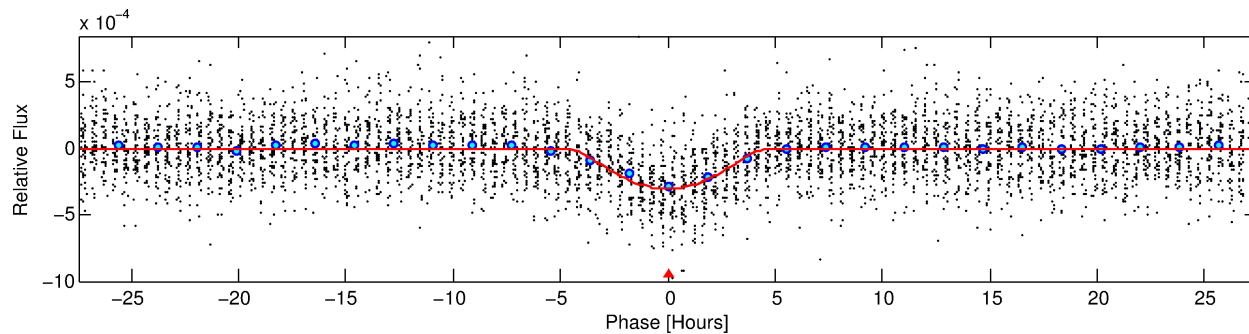
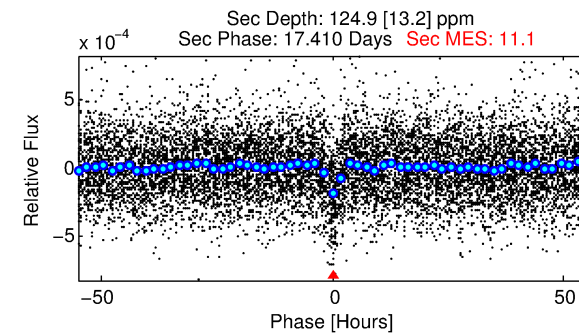
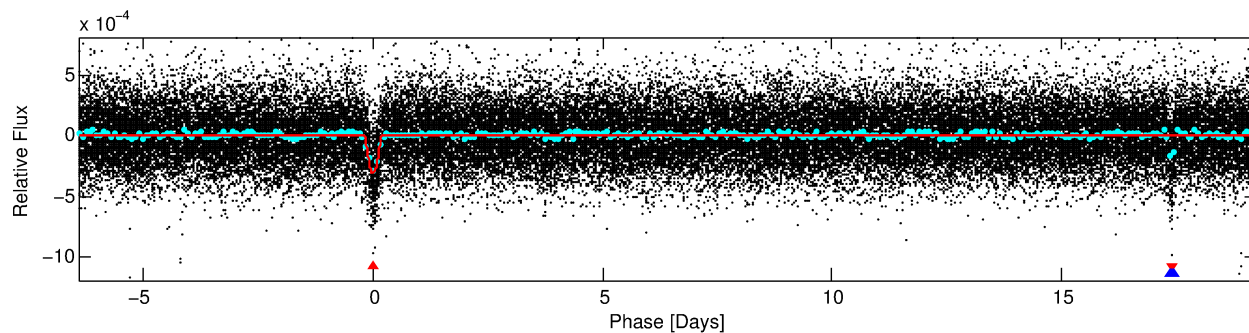
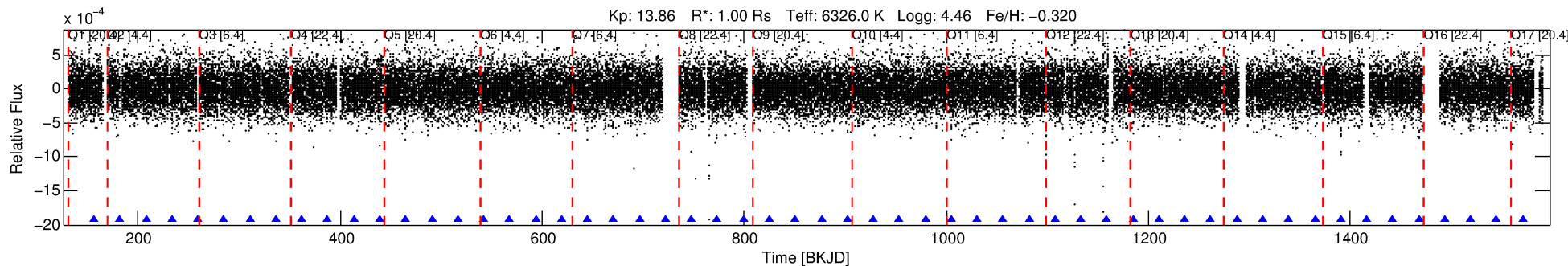
Ephemeris Match Information For 004861527-01

| 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 |
|--------------|---------|--------------|------------|-----------|---------------|--------------|--------------|-------|-------|-----------|------------|------|------------|------------|
| 004861527-01 | 4861527 | 004773155-01 | 4773155 | 1:1 | 22.2 | 5 | 2 | 13.59 | 13.86 | 1571.90 | Direct-PRF | 0 | 0.48 | 0.28 |

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: 4861527 Candidate: 1 of 2 Period: 25.706 d
KOI: K02727.01 Corr: 0.974



DV Fit Results:

Period = 25.70555 [0.00025] d
Epoch = 156.6533 [0.0081] BKJD
Rp/R* = 0.0314 [0.0405]
a/R* = 5.52 [1.80]
b = 1.00 [0.04]
Seff = 47.83 [19.86]
Teq = 671 [70] K
Rp = 3.43 [4.56] Re
a/R* = 0.1734 [0.0468] AU
Ag = 175.12 [456.65] [0.38σ]
Teff = 3772 [2434] K [1.27σ]

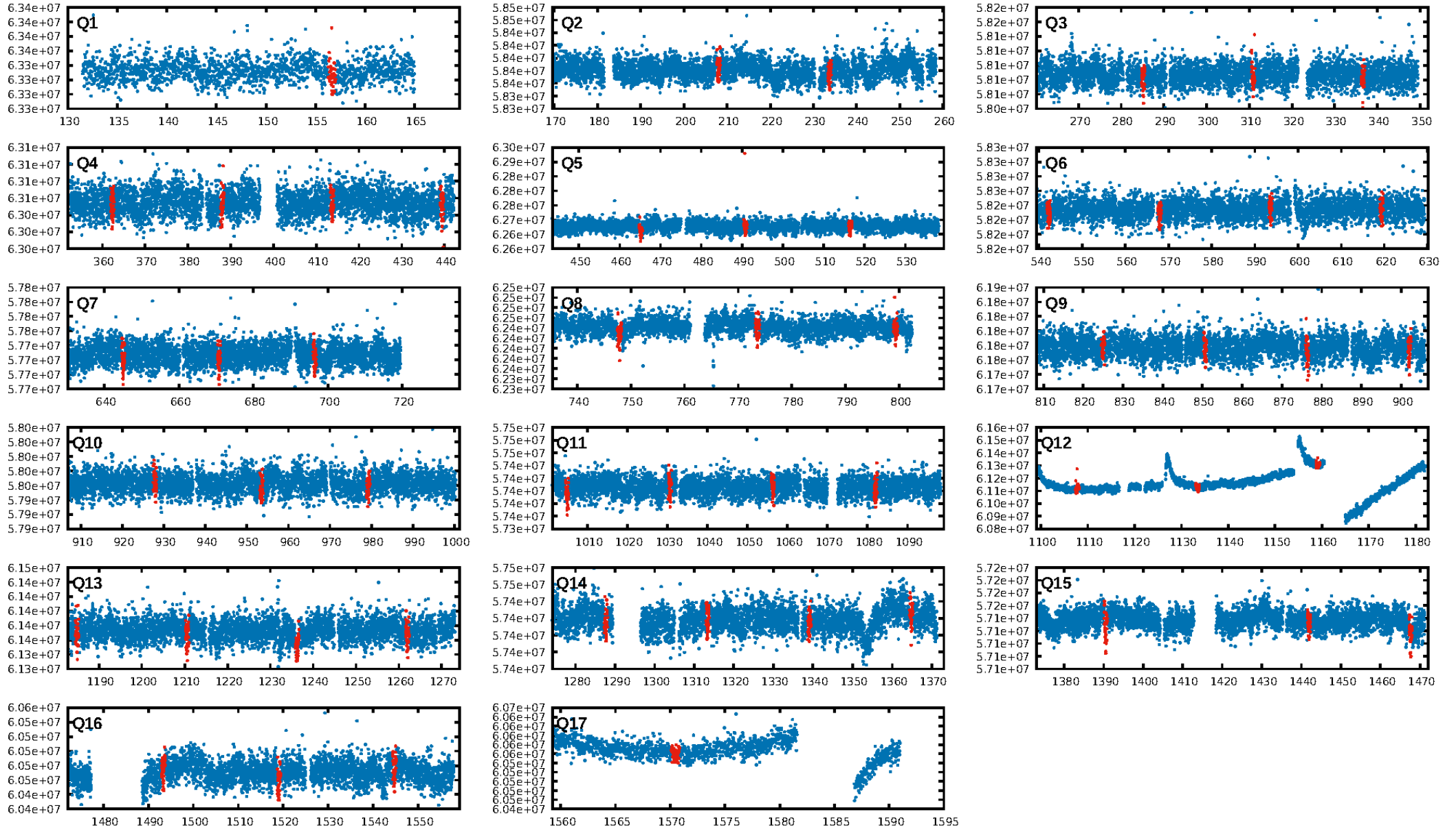
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 0.3% [0.00σ]
ModelChiSquare2-sig: 60.6%
ModelChiSquareGoF-sig: 100.0%
Bootstrap-pfa: 1.01e-93
RollingBand-fgt: 1.00 [50/50]
GhostDiagnostic-chr: -0.3869
Centroid-sig: 0.0%
Centroid-so: 131.746 arcsec [253.11σ]
OotOffset-rm: 10.974 arcsec [40.48σ]
KicOffset-rm: 10.982 arcsec [40.12σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

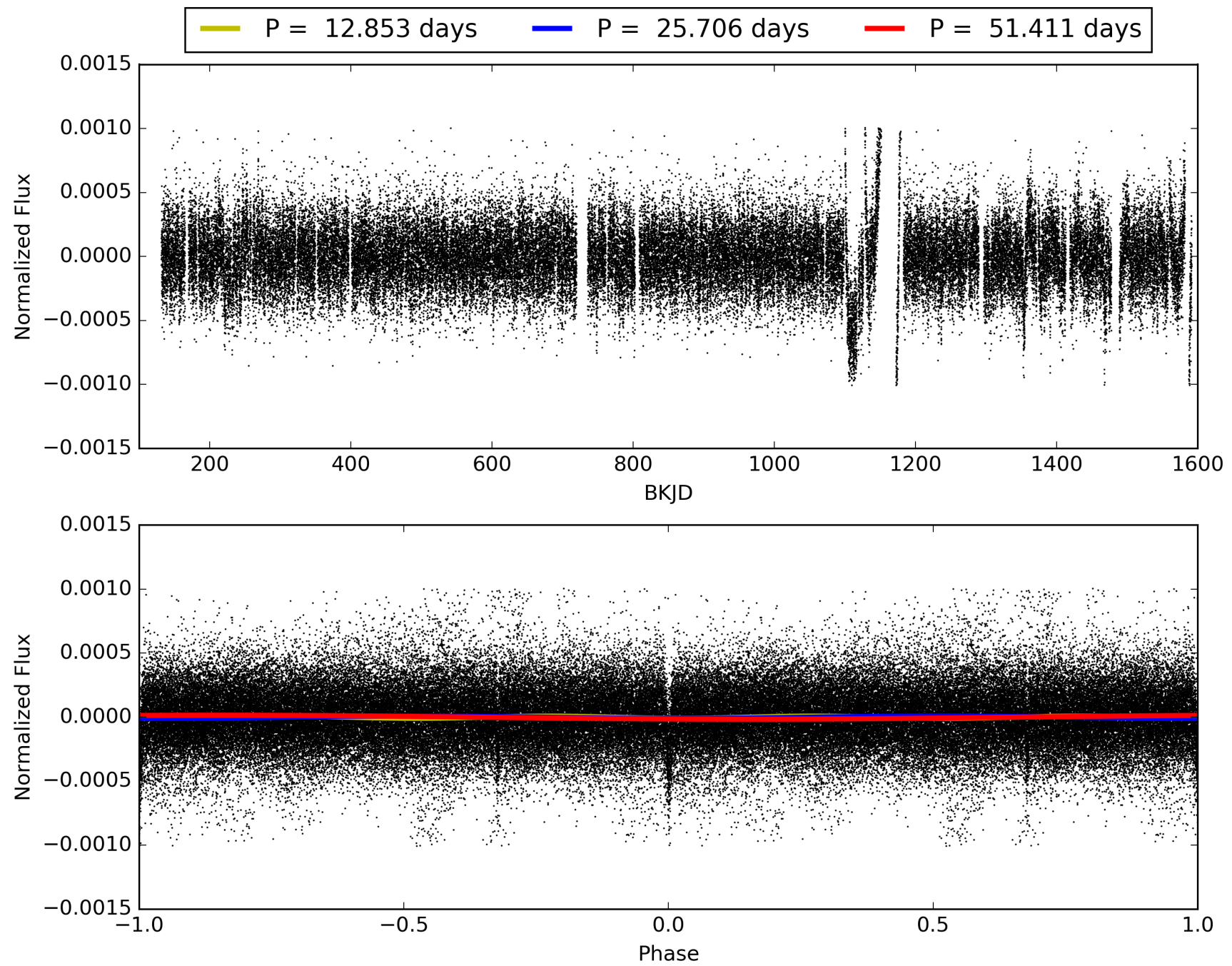
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 10:26:36 Z

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

TCE 004861527-01, PDC Light Curves

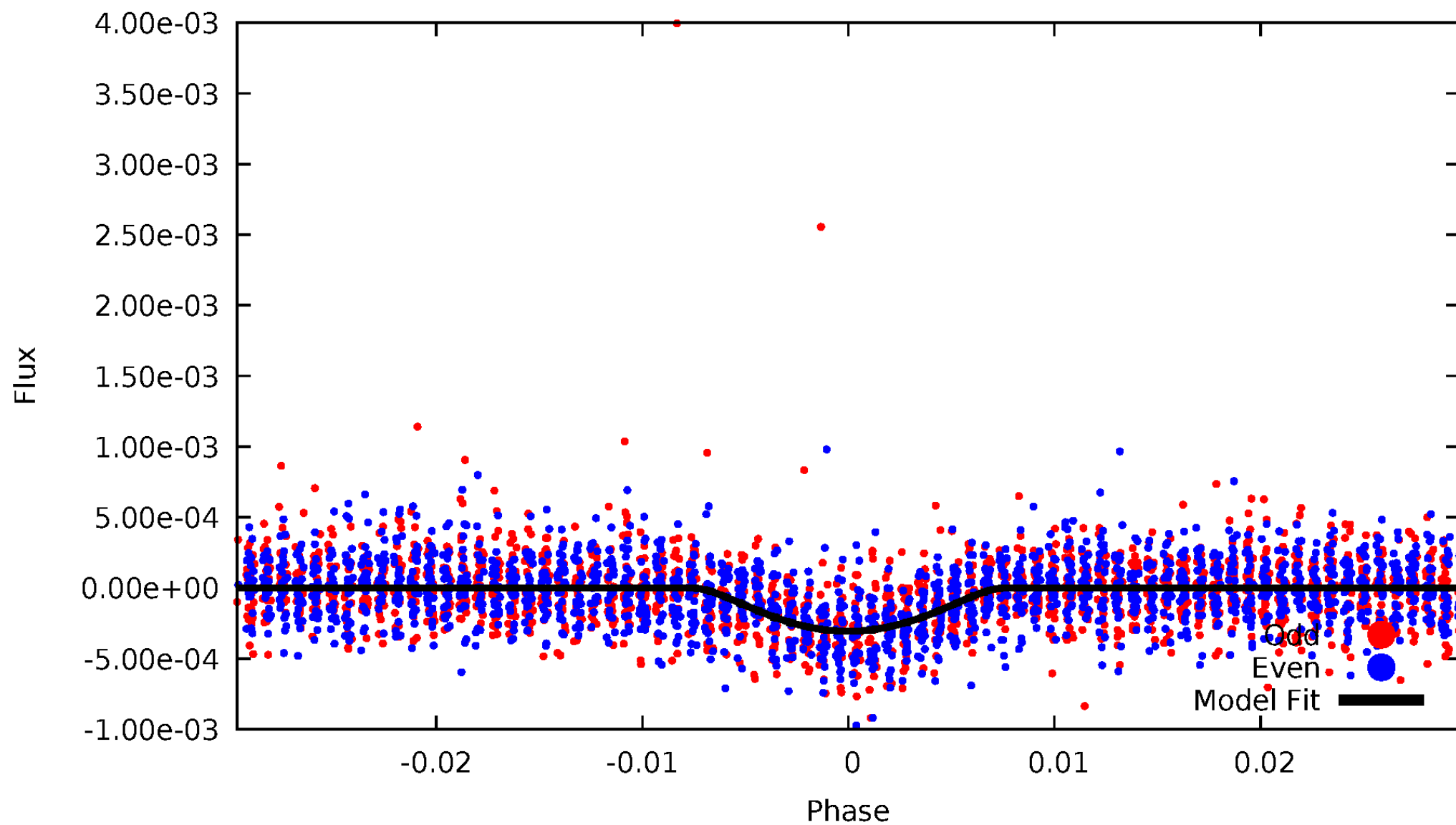


TCE 004861527-01



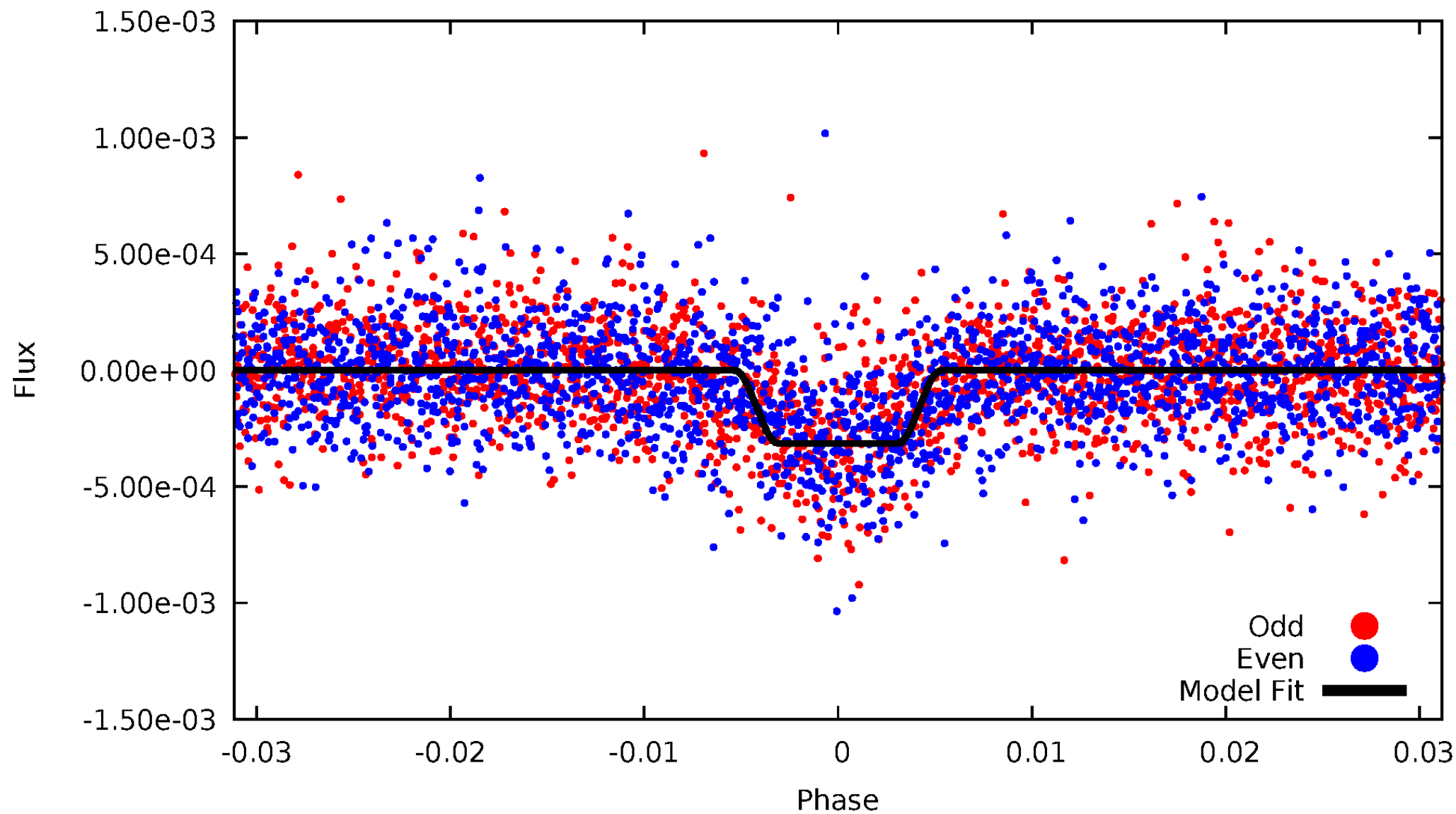
DV Odd/Even

TCE 004861527-01



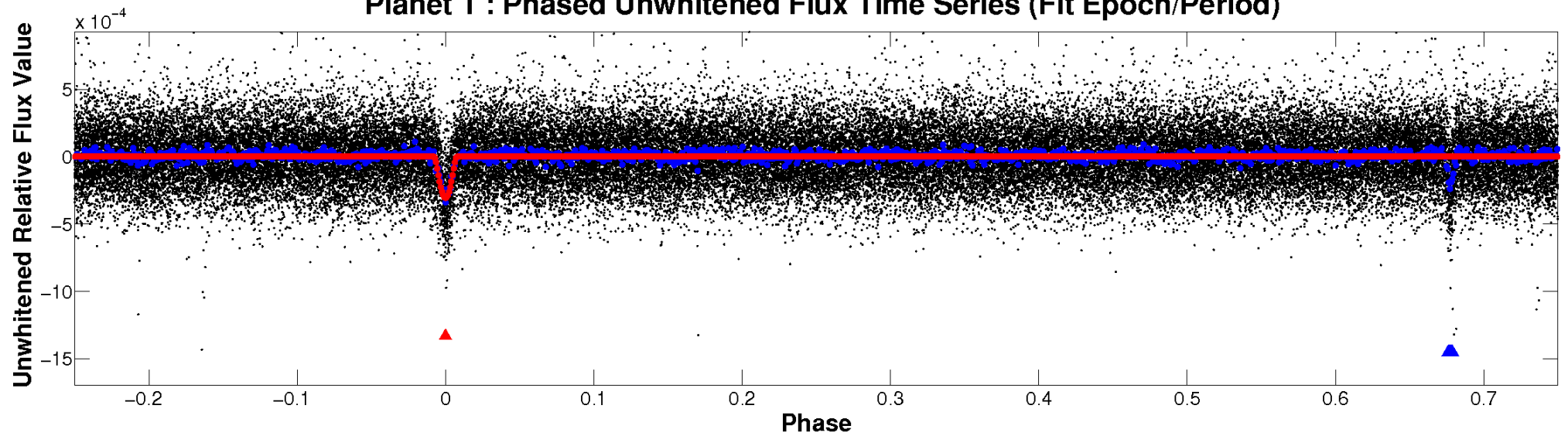
ALT Odd/Even

TCE 004861527-01

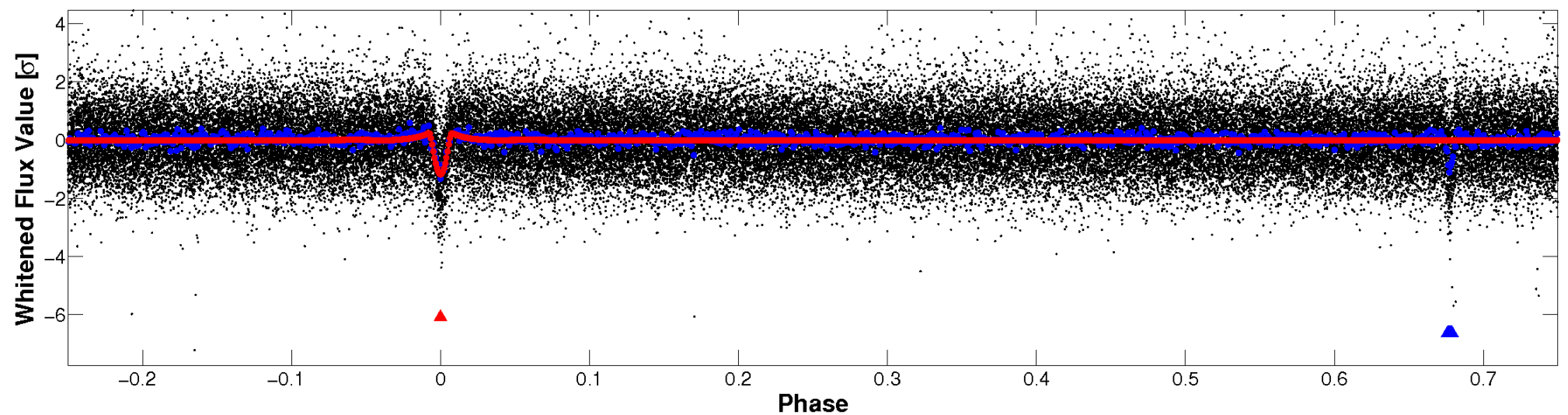


Non-Whitened Vs. Whitened Light Curve

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

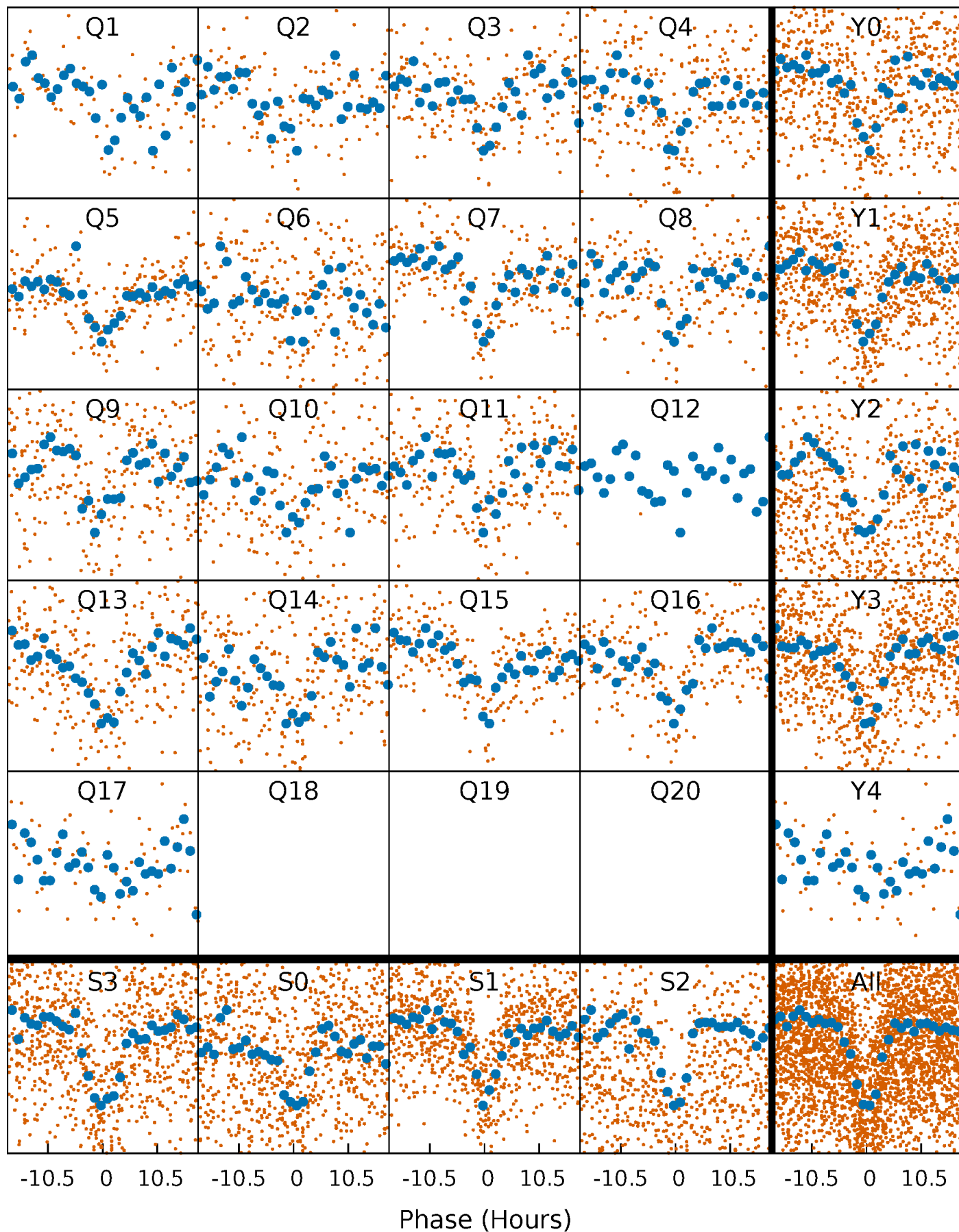


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



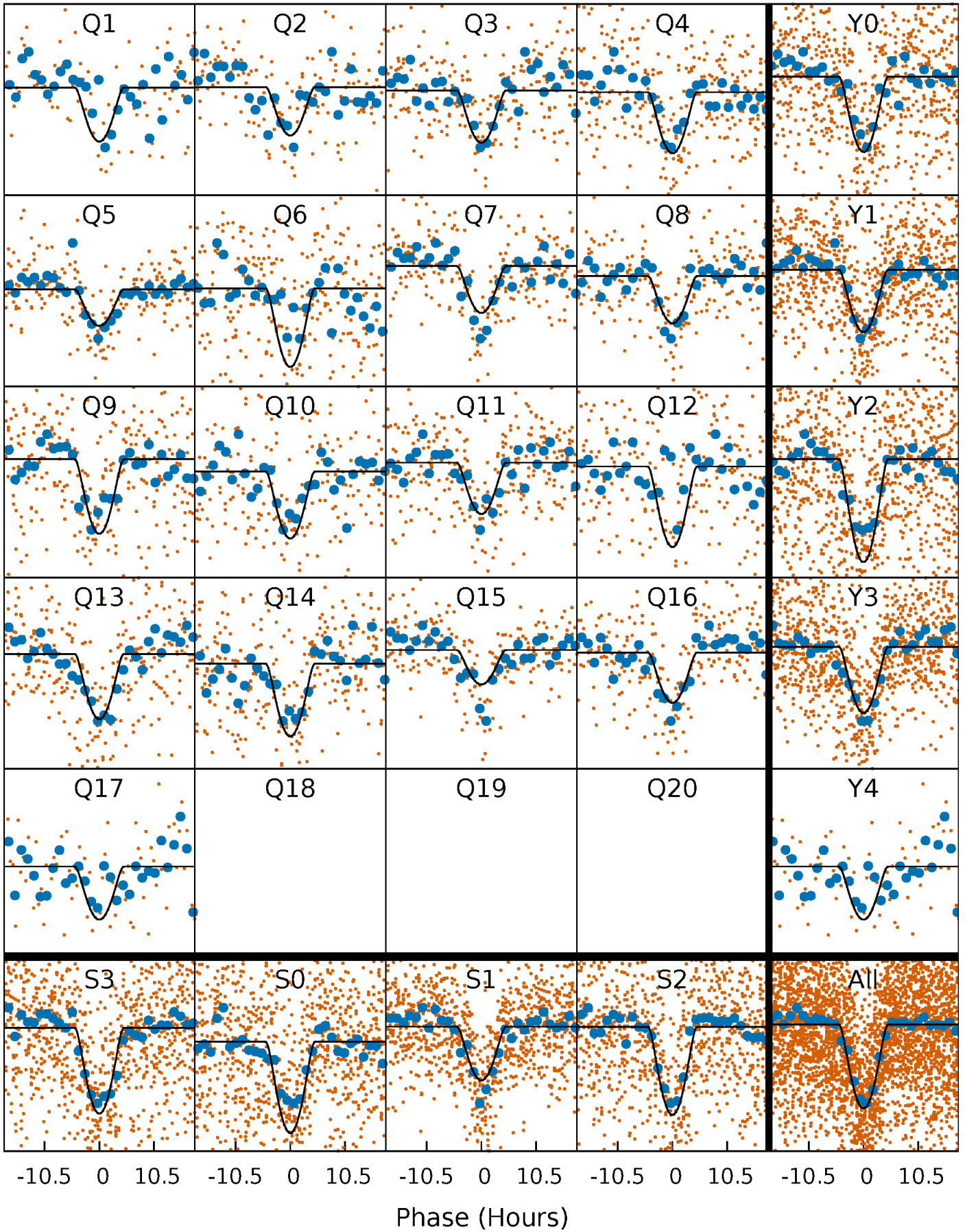
PDC Quarter-Phased Transit Curves

TCE 004861527-01 P= 25.705550 Days $T_0=156.653297$ (BKJD)



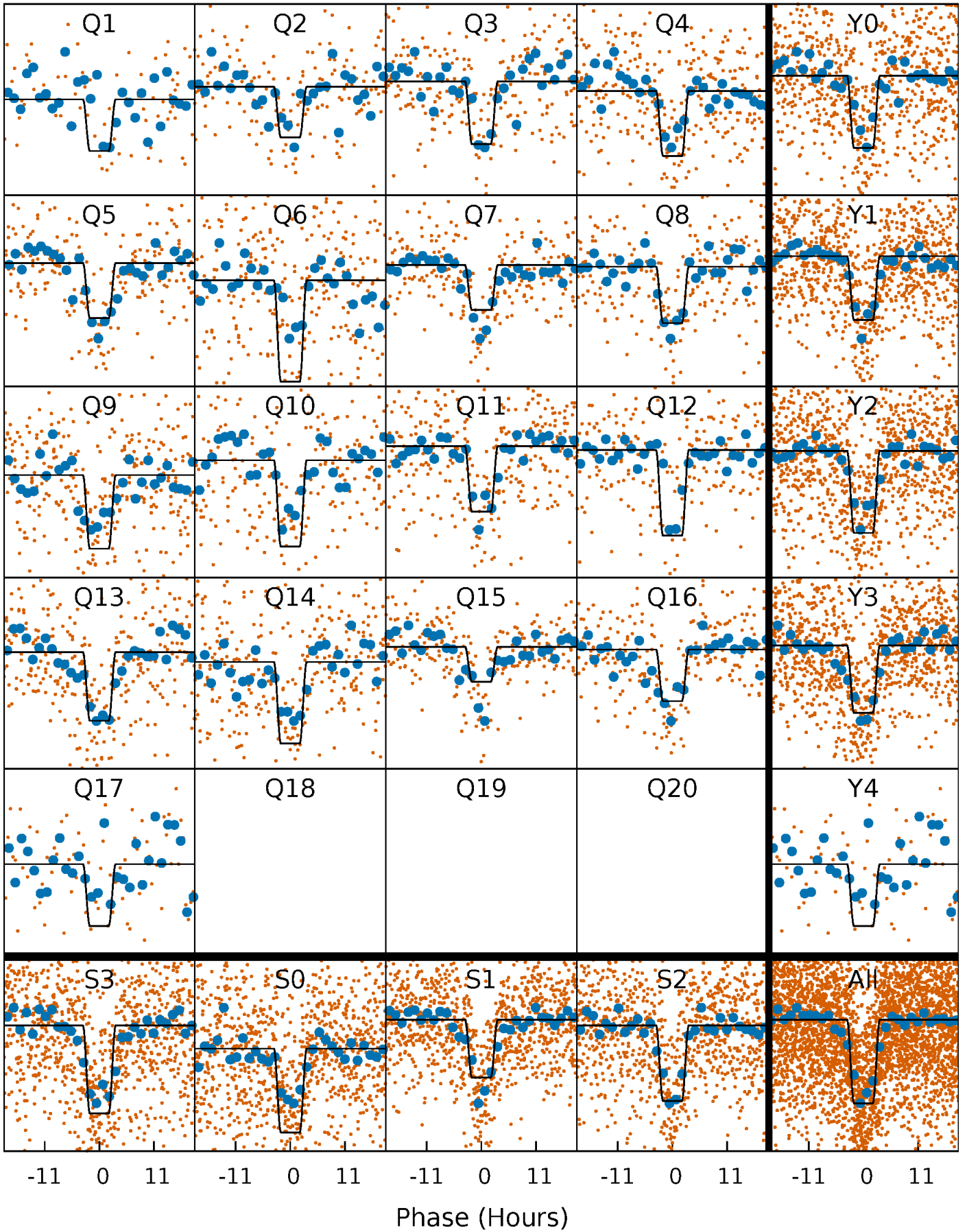
DV Quarter-Phased Transit Curves

TCE 004861527-01 P= 25.705550 Days $T_0=156.653297$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

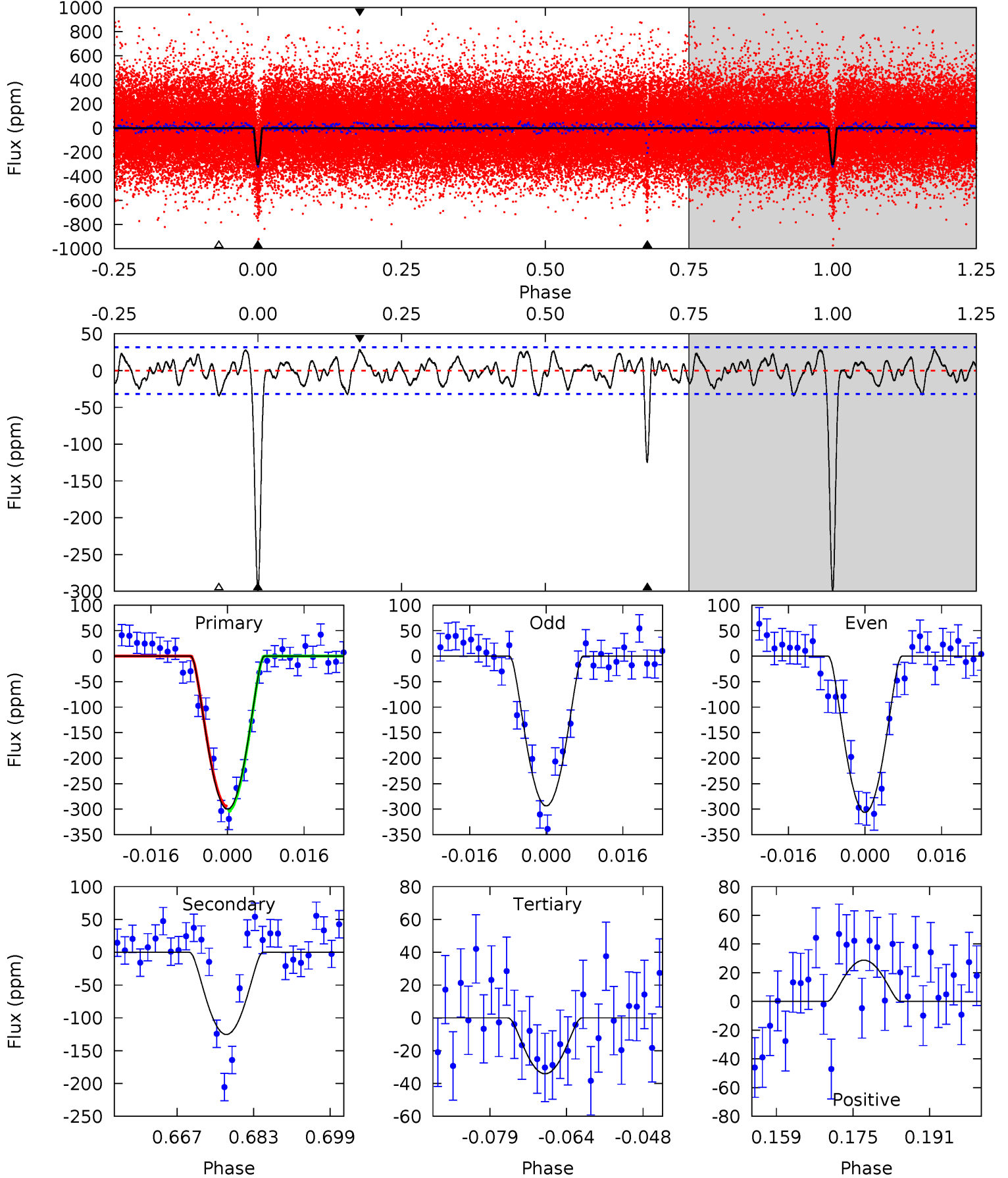
TCE 004861527-01 P= 25.706003 Days $T_0=156.643252$ (BKJD)



DV Model-Shift Uniqueness Test

004861527-01, P = 25.705550 Days, E = 130.947747 Days

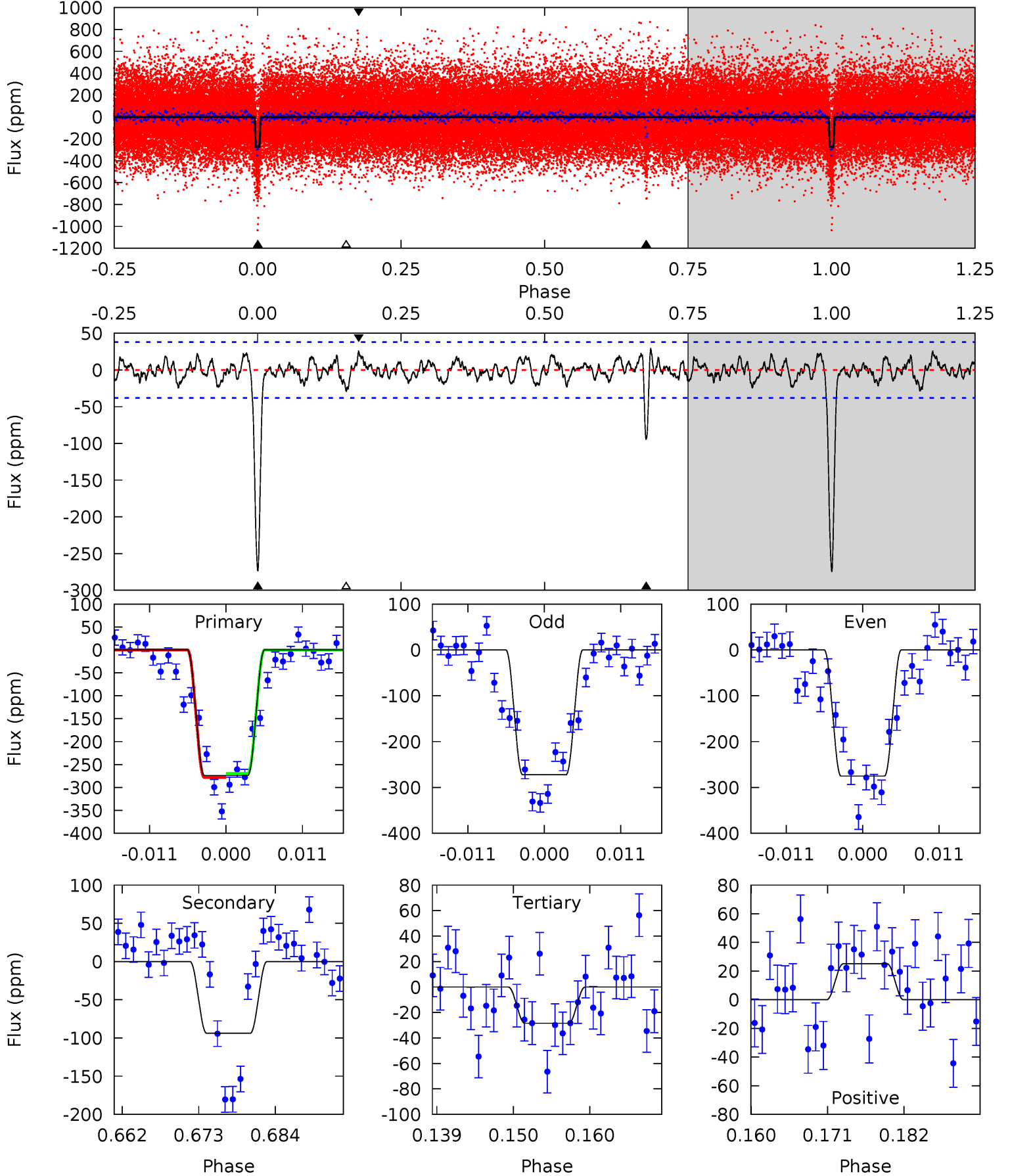
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 46.5 | 19.4 | 5.29 | 4.46 | 4.94 | 2.41 | 1.99 | 41.2 | 42.1 | 14.2 | 15.0 | 1.00 | 1.03 | 0.09 | 0.71 |



Alt Model-Shift Uniqueness Test

004861527-01, $P = 25.706003$ Days, $E = 130.937249$ Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 36.1 | 12.4 | 3.75 | 3.31 | 5.01 | 2.55 | 1.29 | 32.3 | 32.8 | 8.62 | 9.06 | 0.19 | 1.00 | 0.10 | 0.58 |



Stellar Parameters For KIC 004861527

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6326^{+169}_{-207} | $4.459^{+0.054}_{-0.216}$ | $-0.320^{+0.250}_{-0.300}$ | $1.001^{+0.320}_{-0.107}$ | $1.047^{+0.146}_{-0.133}$ | $1.472^{+0.437}_{-0.799}$ |
| | +3%/-3% | +1%/-5% | +78%/-94% | +32%/-11% | +14%/-13% | +30%/-54% |
| 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 004861527-01 / KOI 2727.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|-----------------------|--------------------|
| DV | -125 ± 6 | $5.02^{+4.27}_{-3.24}$ | 959^{+75}_{-48} | 3628^{+1691}_{-610} | 81^{+526}_{-57} |
| Alt. | -94 ± 8 | $3.80^{+4.14}_{-2.47}$ | 952^{+74}_{-45} | 3774^{+1968}_{-768} | 107^{+721}_{-83} |

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

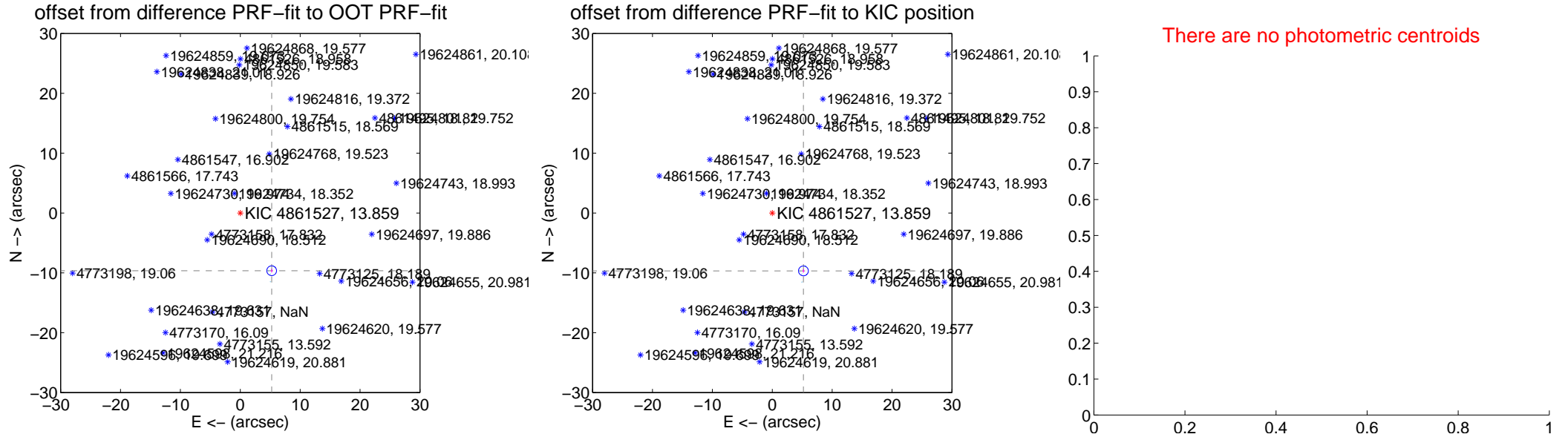
DV Centroid Data

Supplemental centroid analysis for 004861527-01. Kepler magnitude: 13.86. Transit SNR 23.26

There are 17 quarters with good PRF difference image offsets

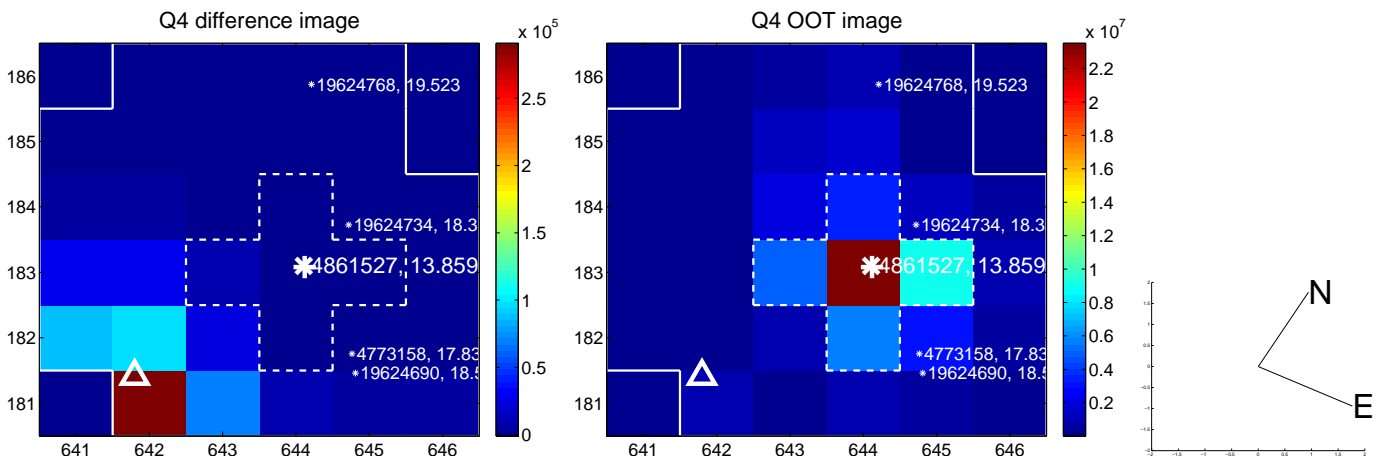
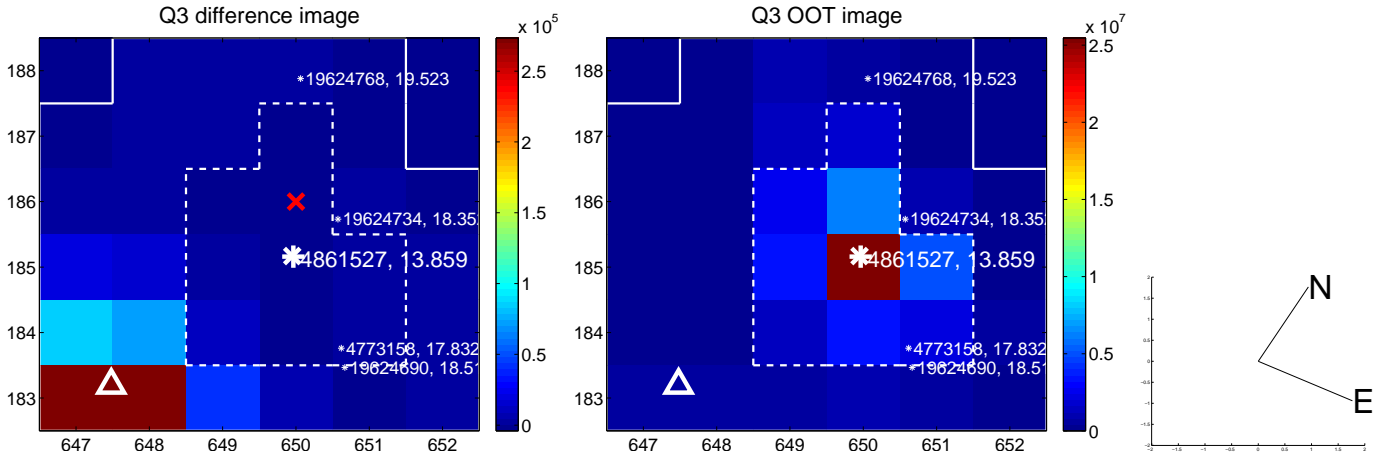
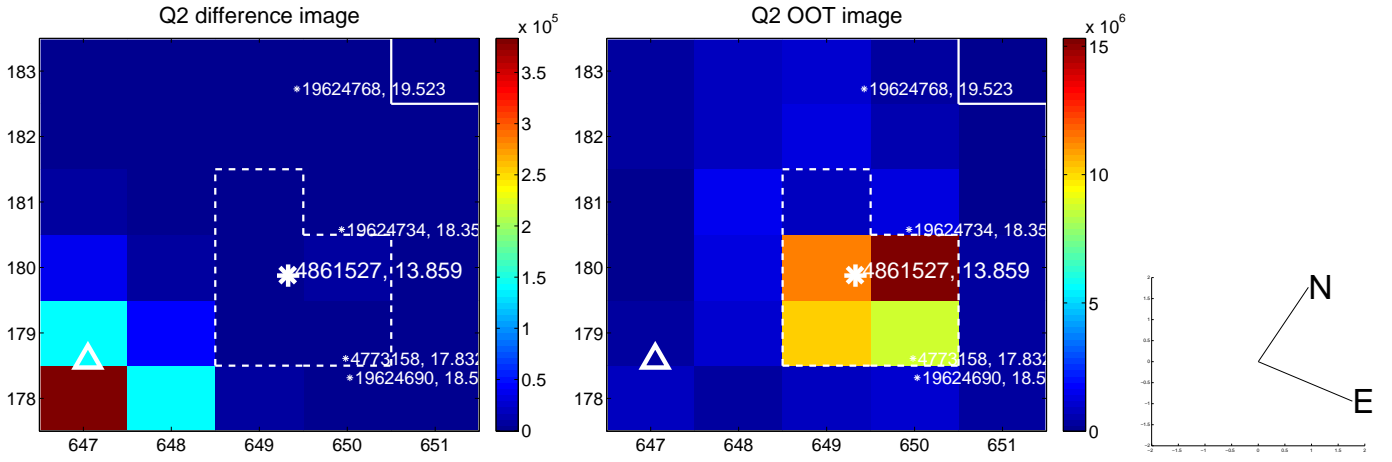
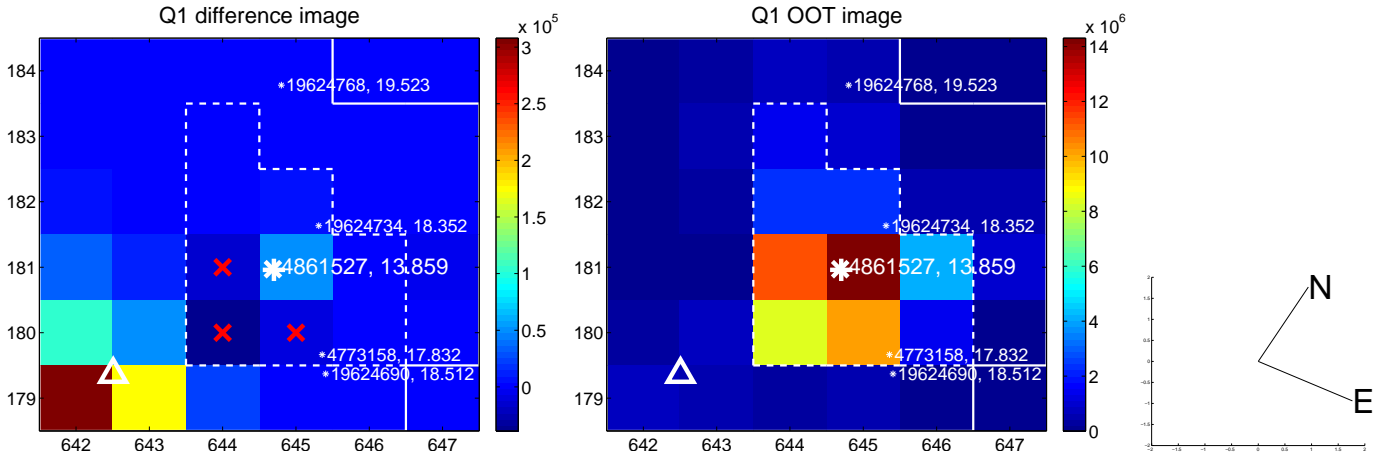
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 10.974 \pm 0.271 | 40.48 | -5.239 \pm 0.116 | -9.643 \pm 0.302 |
| PRF-fit source offset from KIC position | 10.982 \pm 0.274 | 40.12 | -5.204 \pm 0.120 | -9.671 \pm 0.304 |
| photometric centroid source offset | — | — | — | — |

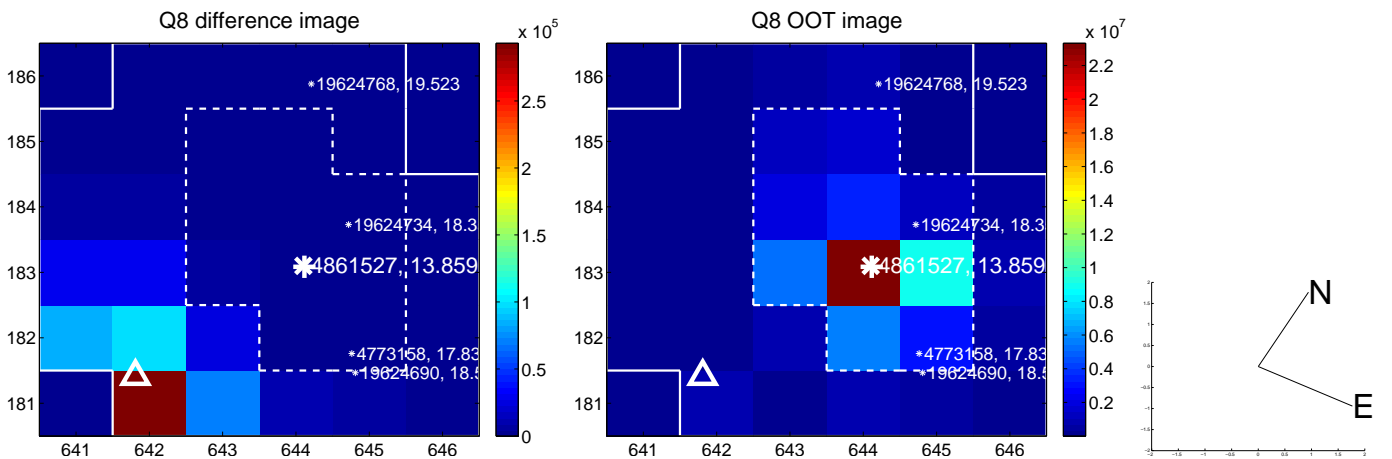
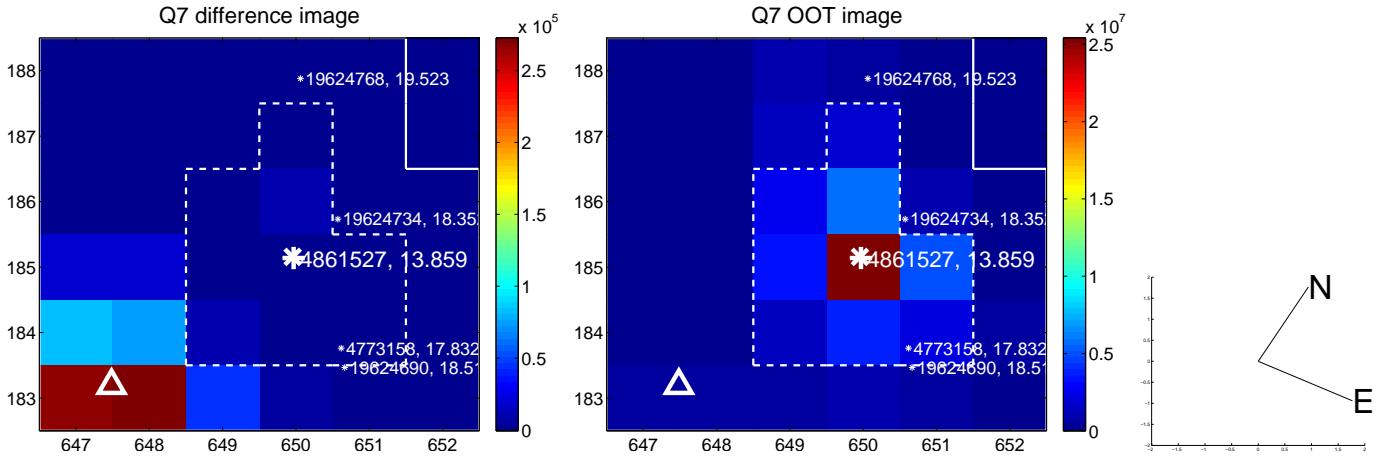
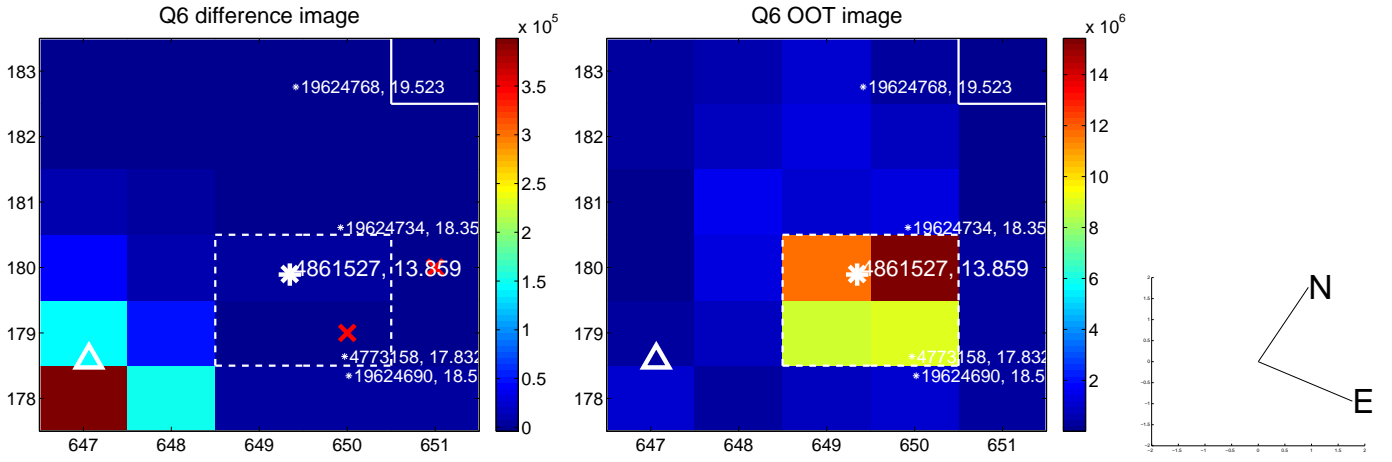
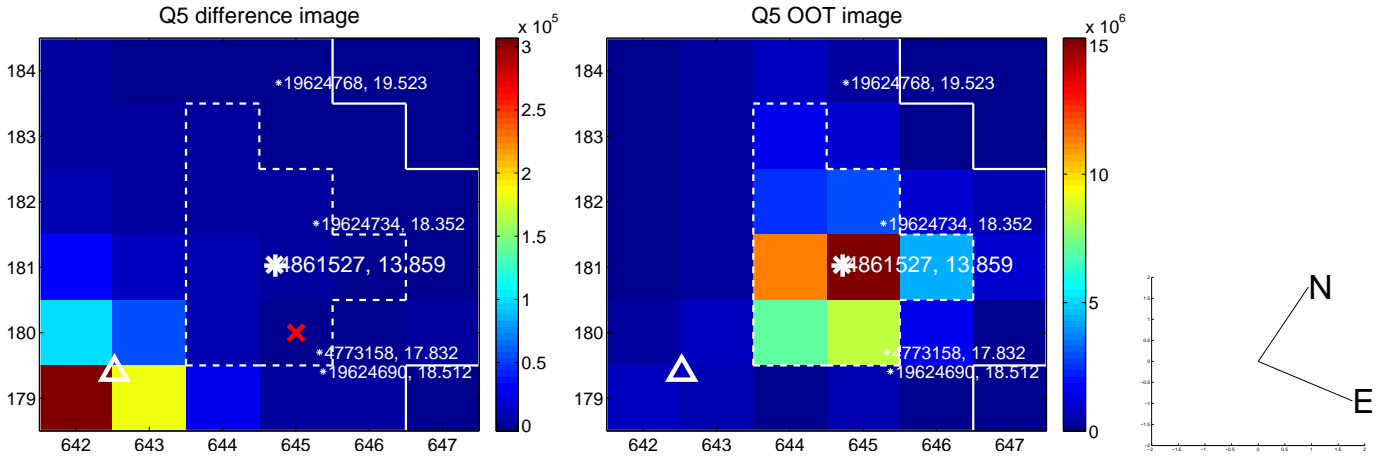


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

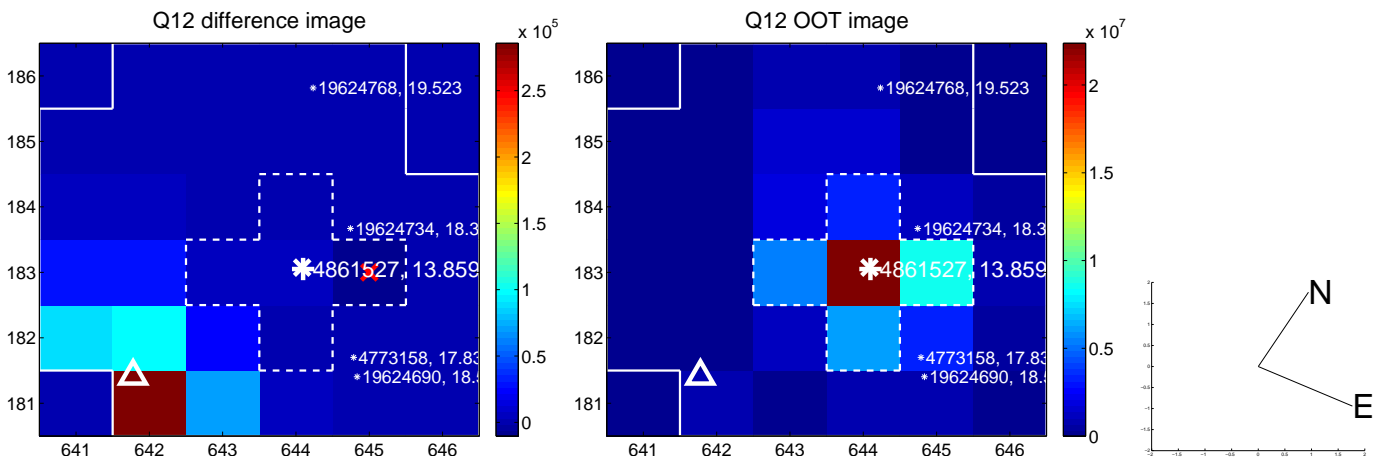
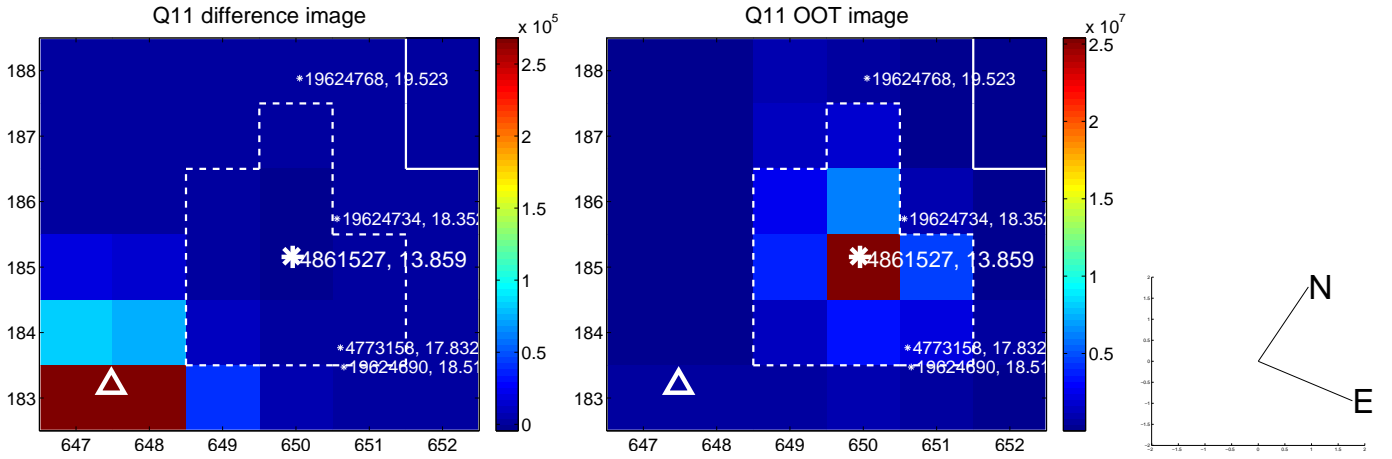
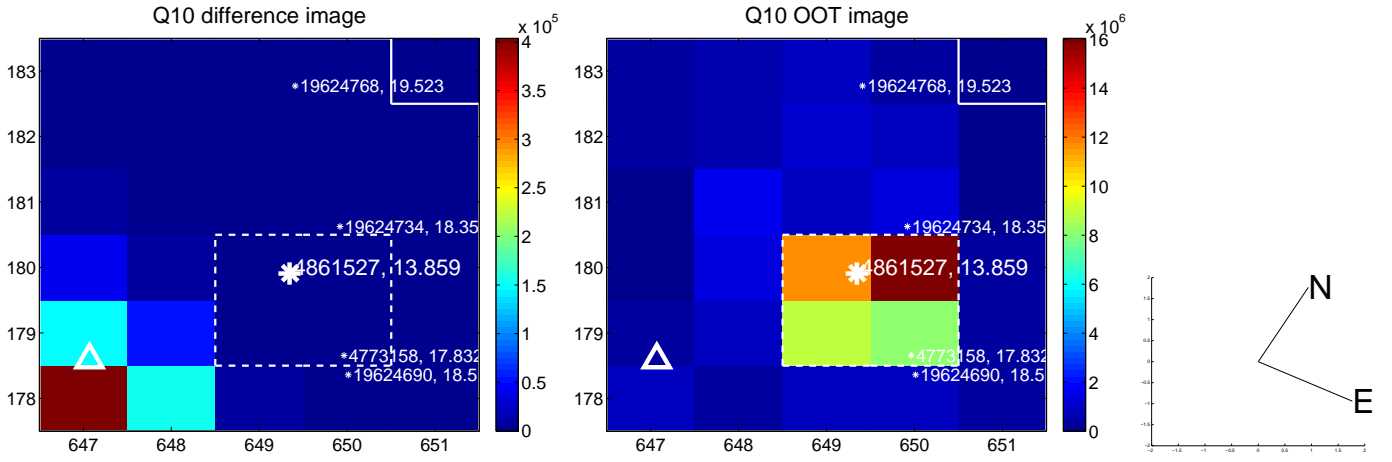
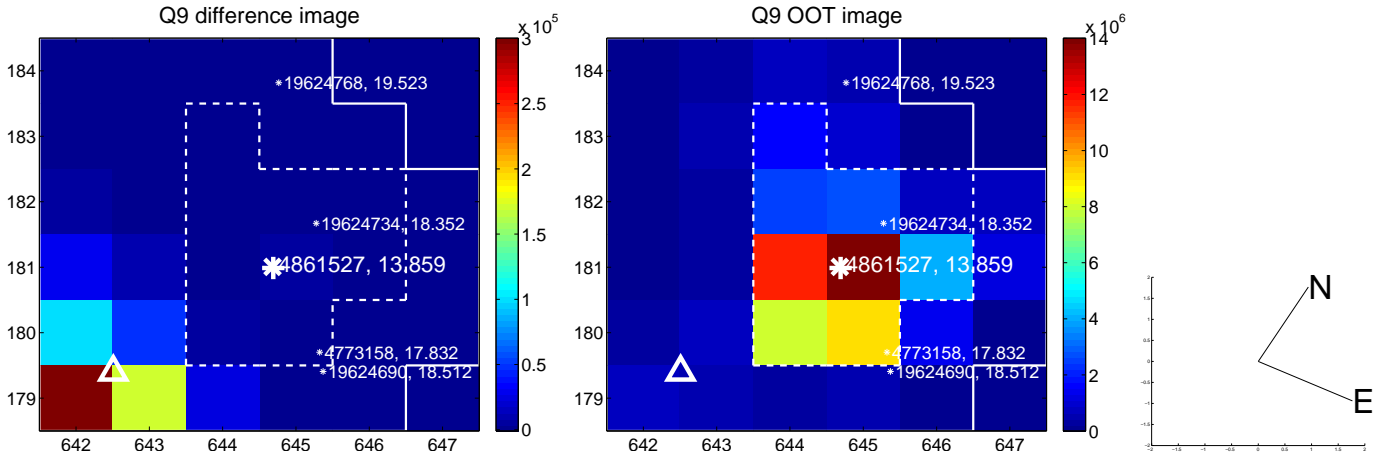
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



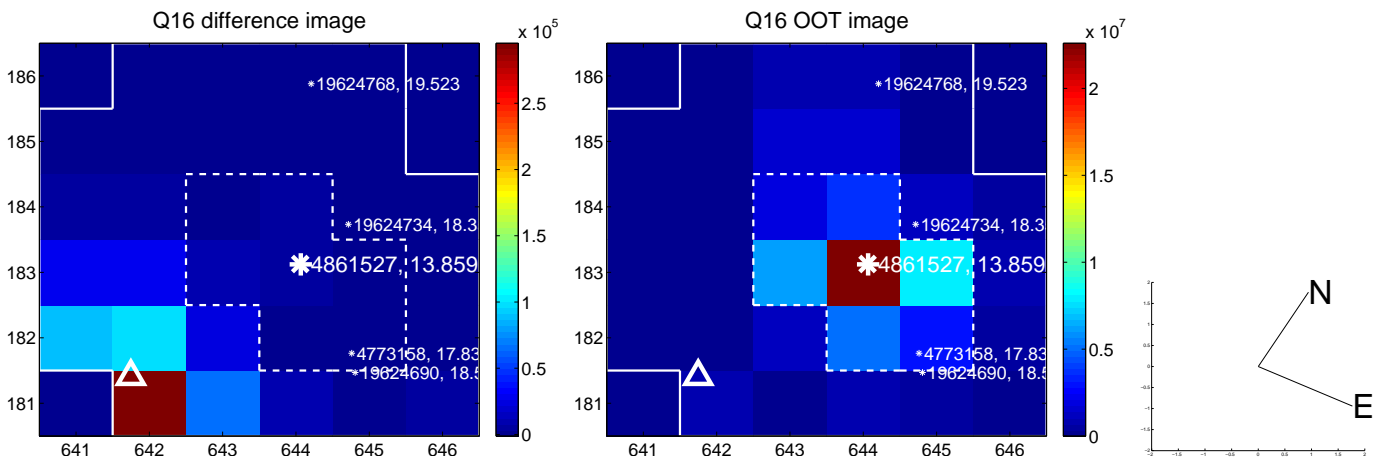
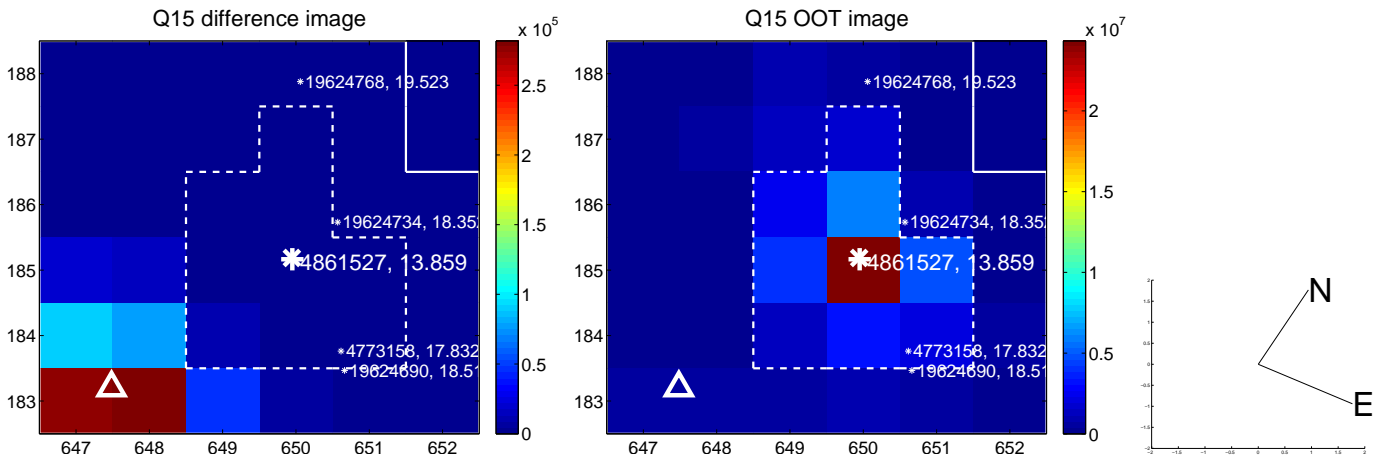
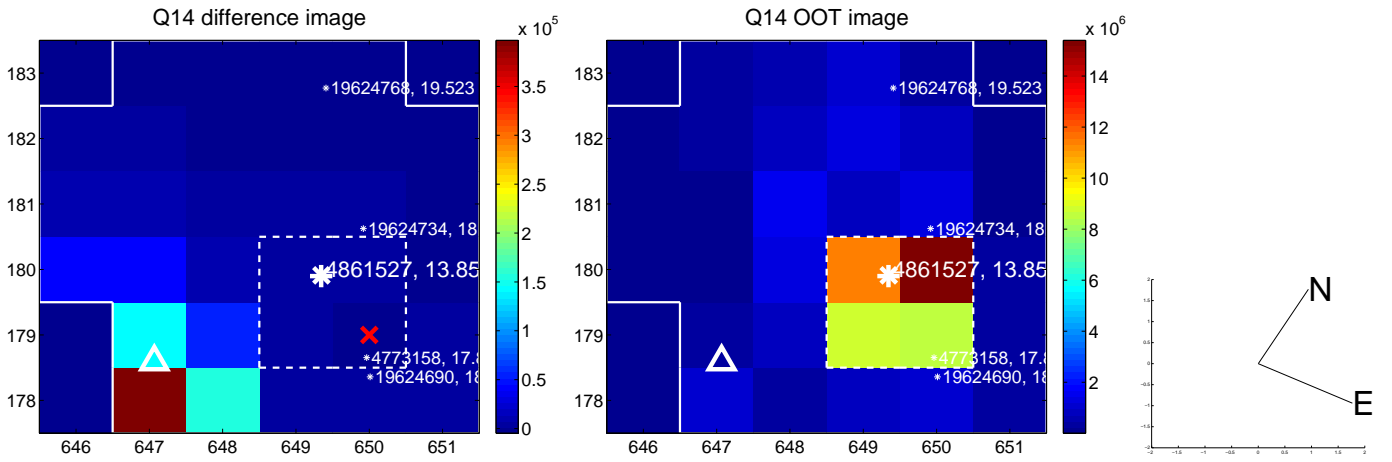
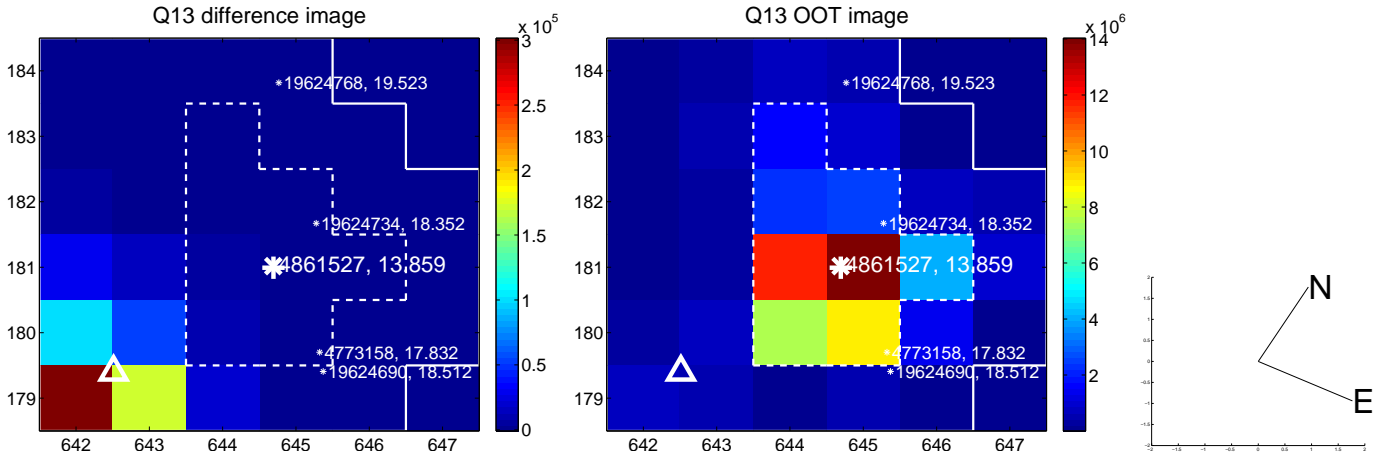
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



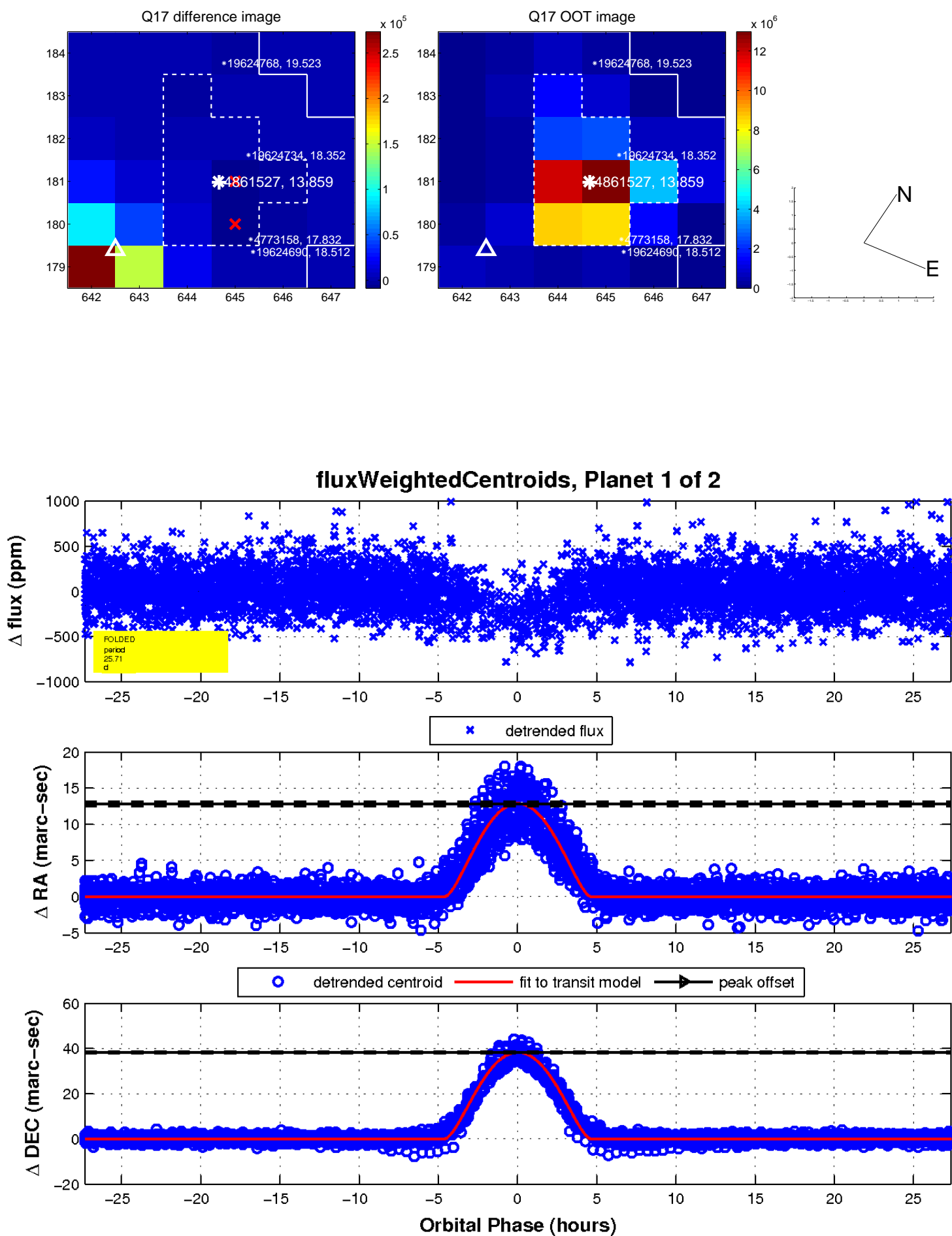
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

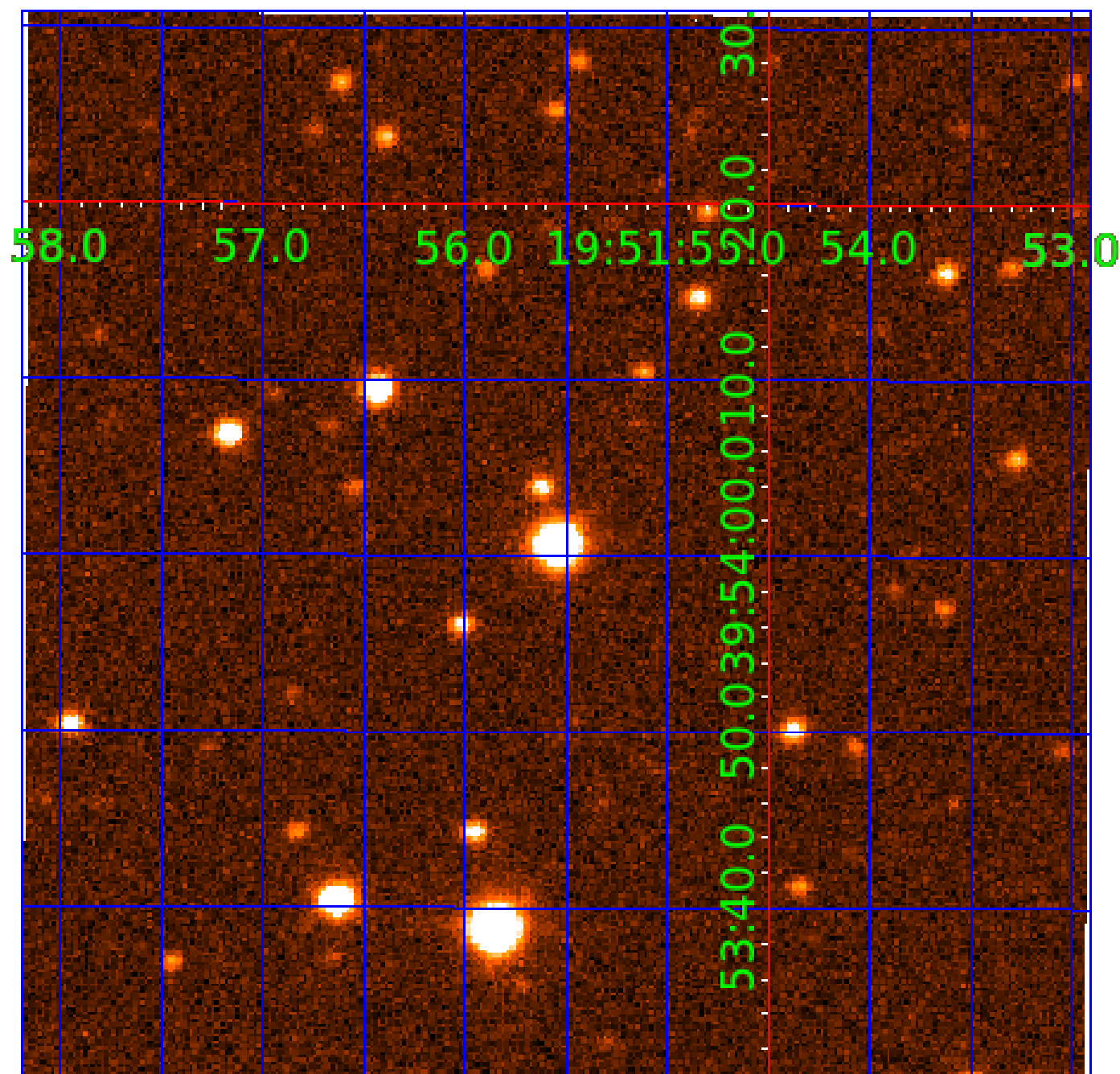


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 004861527

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 004861527-01 | OBS | 2727.01 | 25.705550 | 156.653297 | 306.4 | 9.152 | 21.0 | 23.3 | 1.00 | 6326 | 3.44 | 47.83 |
| 004861527-02 | OBS | No | 25.706914 | 148.324983 | 223.8 | 3.159 | 14.1 | 15.4 | 1.00 | 6326 | 1.71 | 47.82 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|---|
| 004861527-01 | OBS | FP | 0.00 | 0 | 1 | 1 | 1 | MOD_SEC_DV—MOD_SEC_ALT—HAS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH |
| 004861527-02 | OBS | FP | 0.00 | 1 | 1 | 1 | 1 | IS_SEC_TCE—CENT_RESOLVED_OFFSET—EPHEM_MATCH |

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 004861527-02

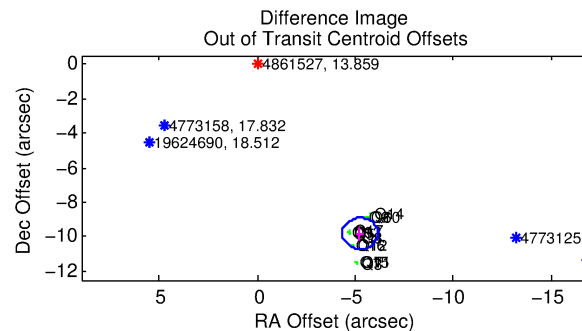
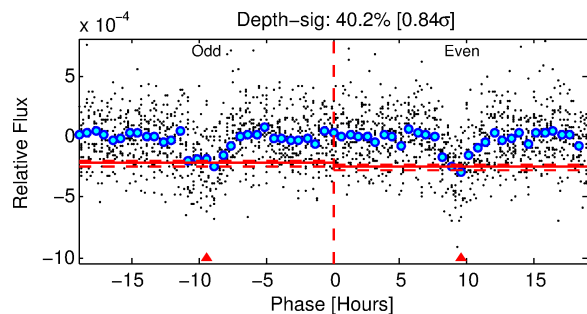
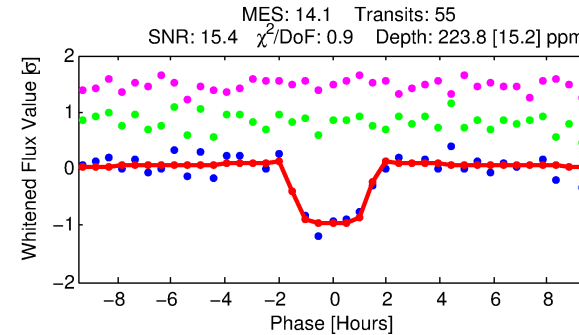
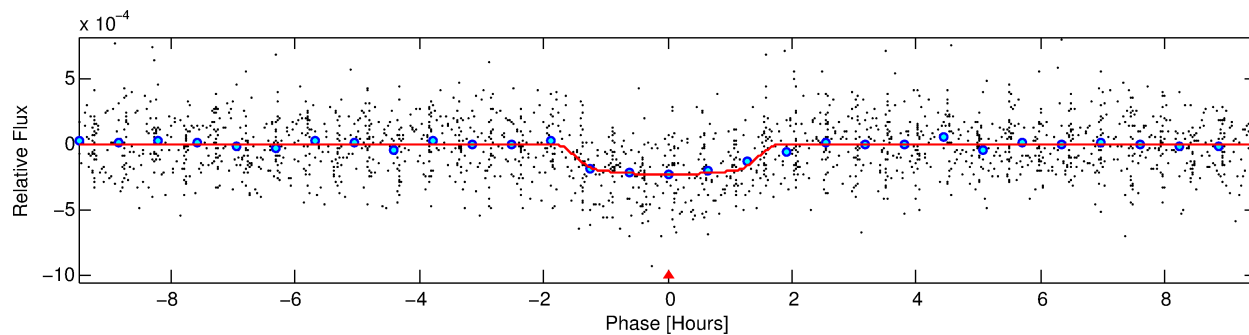
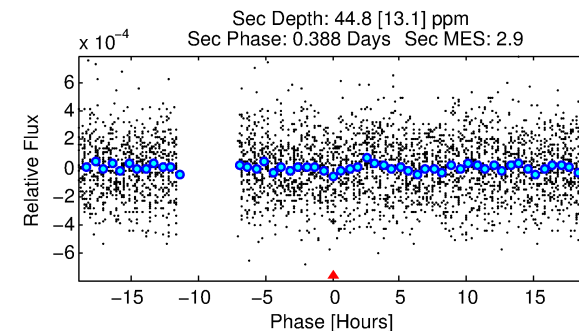
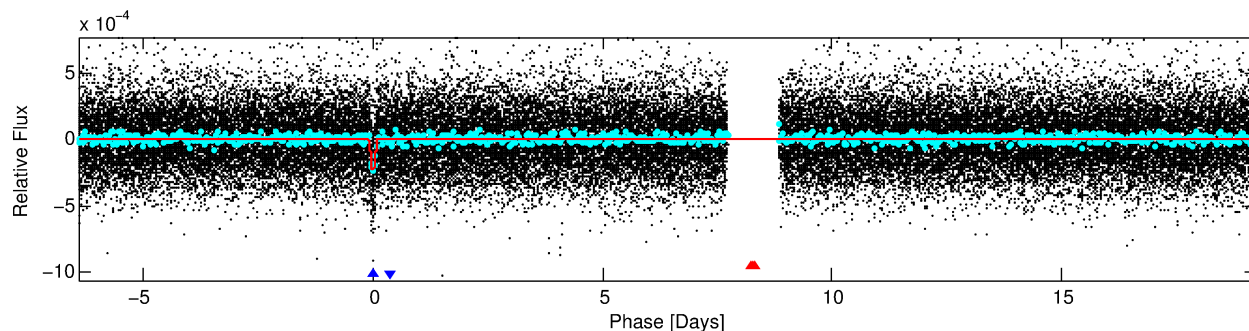
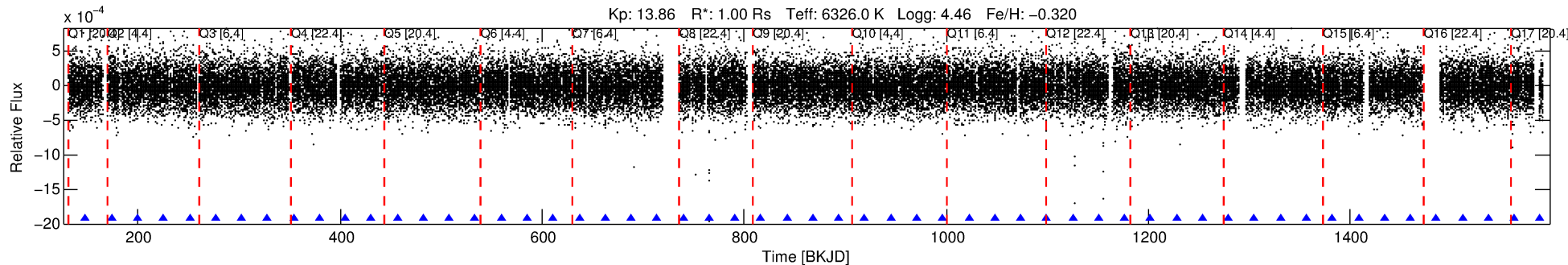
| TCE (1) | KIC | Parent (2) | Parent KIC | $P_1:P_2$ | Dist ($''$) | Δ Row | Δ Col | m_2 | m_1 | D_2/D_1 | Mechanism | Flag | σ_P | σ_T |
|--------------|---------|--------------|------------|-----------|---------------|--------------|--------------|-------|-------|-----------|------------|------|------------|------------|
| 004861527-02 | 4861527 | 004773155-02 | 4773155 | 1:1 | 22.2 | 5 | 2 | 13.59 | 13.86 | 1677.30 | Direct-PRF | 0 | 0.80 | 0.44 |

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: 4861527 Candidate: 2 of 2 Period: 25.707 d
KOI: K02727 Corr: No Ephemeris Match

Kp: 13.86 R*: 1.00 Rs Teff: 6326.0 K Logg: 4.46 Fe/H: -0.320



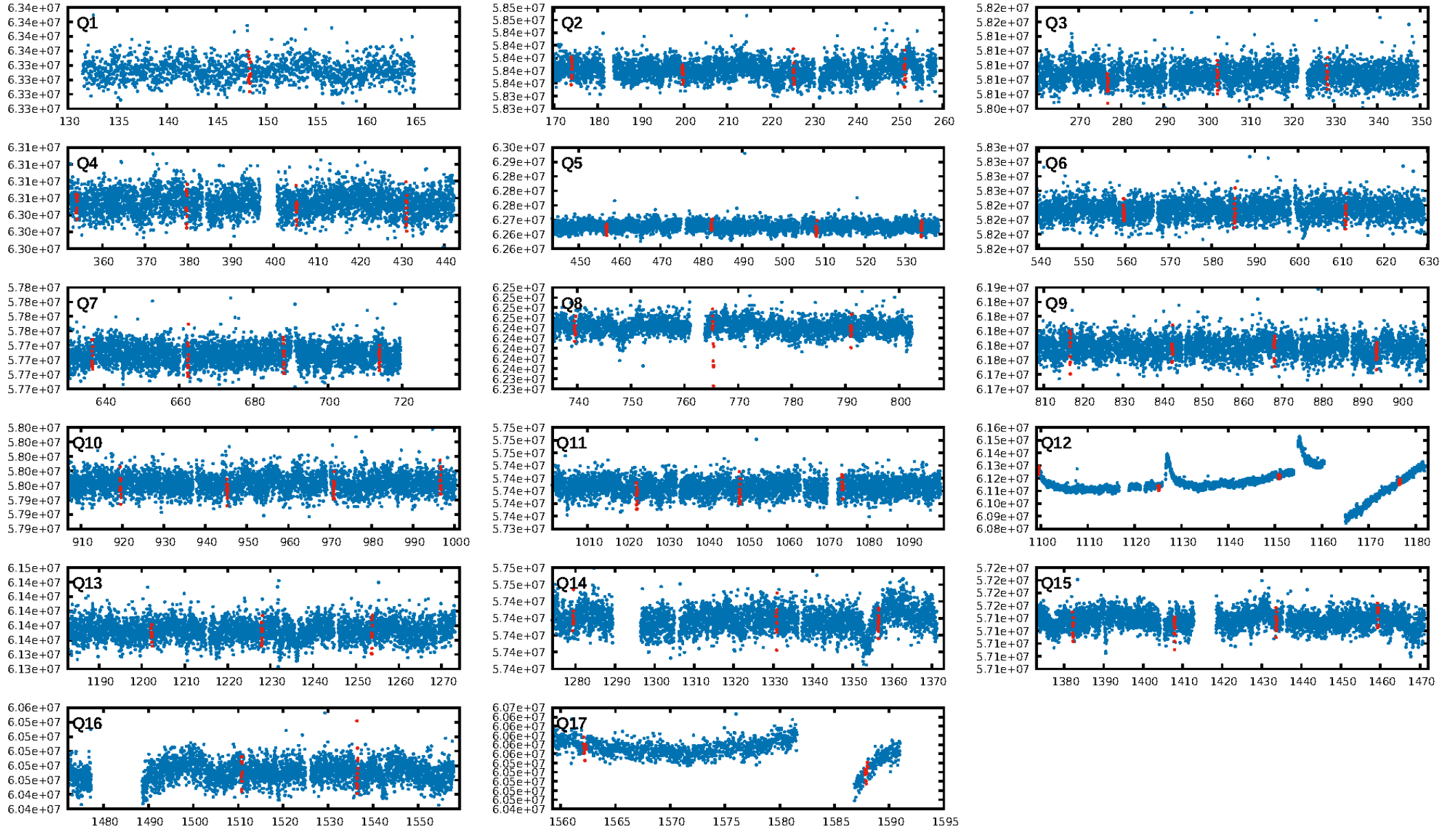
DV Fit Results:

Period = 25.70691 [0.00013] d
Epoch = 148.3250 [0.0042] BKJD
Rp/R* = 0.0156 [0.0070]
a/R* = 33.59 [83.21]
b = 0.86 [0.76]
Seff = 47.82 [19.86]
Teq = 671 [70] K
Rp = 1.70 [0.94] Re
a = 0.1734 [0.0468] AU
Ag = 254.77 [260.37] [0.97σ]
Teff = 4142 [986] K [3.51σ]

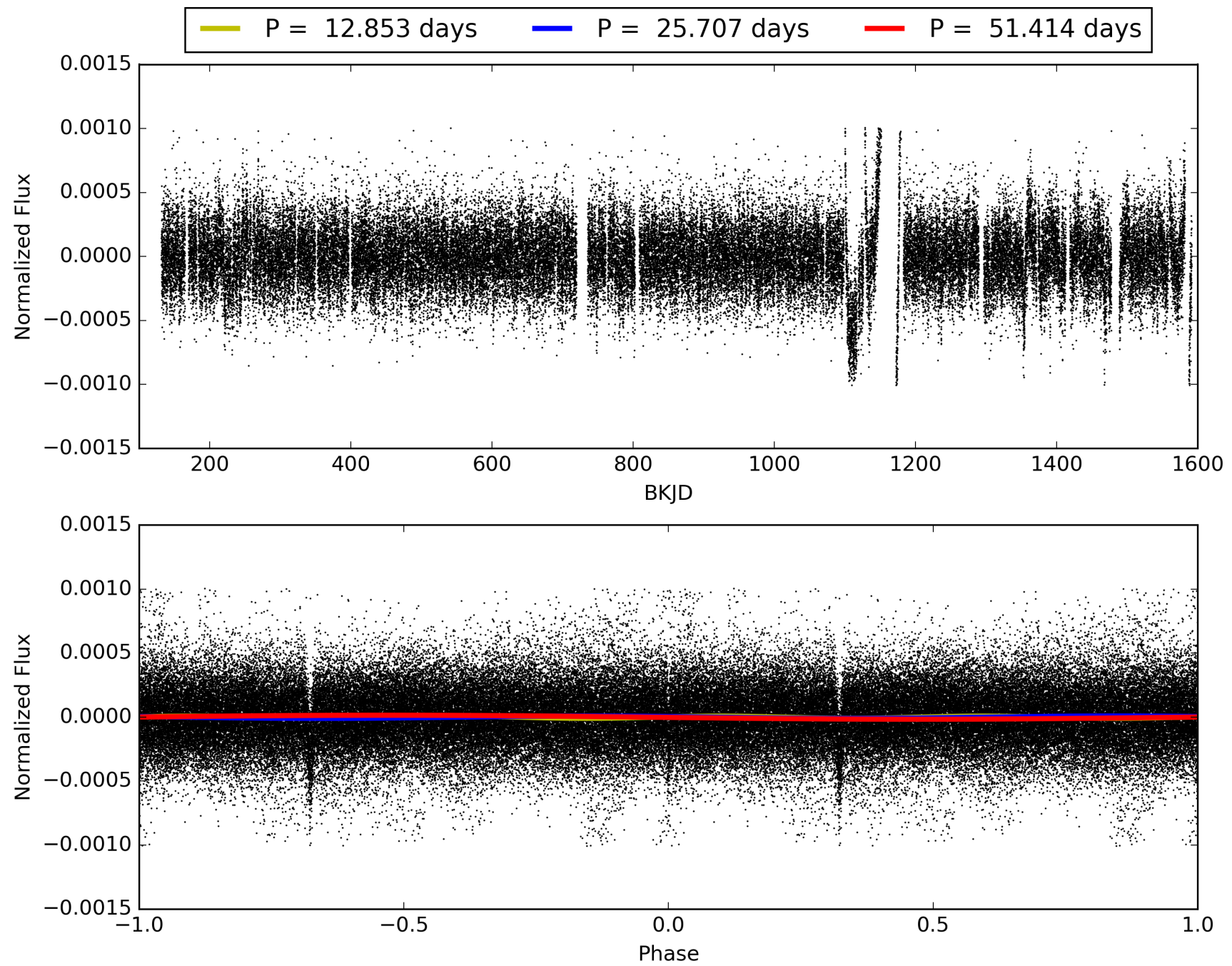
DV Diagnostic Results:

ShortPeriod-sig: 0.3% [0.00σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 50.3%
ModelChiSquareGoF-sig: 100.0%
Bootstrap-pfa: 1.65e-44
RollingBand-fgt: 1.00 [52/52]
GhostDiagnostic-chr: -0.4648
Centroid-sig: 0.0%
Centroid-so: 133.655 arcsec [155.33σ]
OotOffset-rm: 11.121 arcsec [36.90σ]
KicOffset-rm: 11.124 arcsec [36.55σ]
OotOffset-st: 4/4/4/5 [17]
KicOffset-st: 4/4/4/5 [17]
DiffImageQuality-fgm: 1.00 [17/17]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 004861527-02, PDC Light Curves

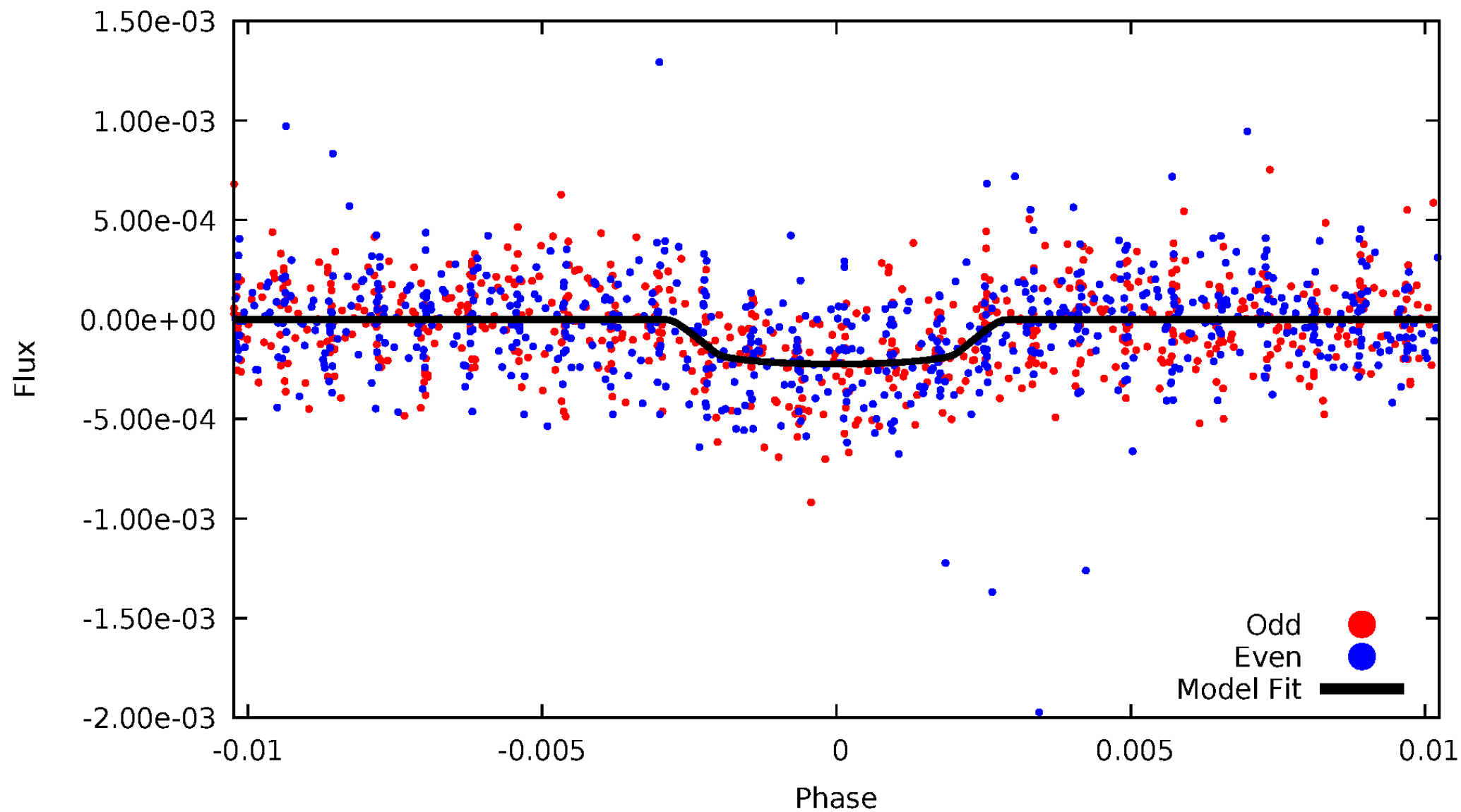


TCE 004861527-02



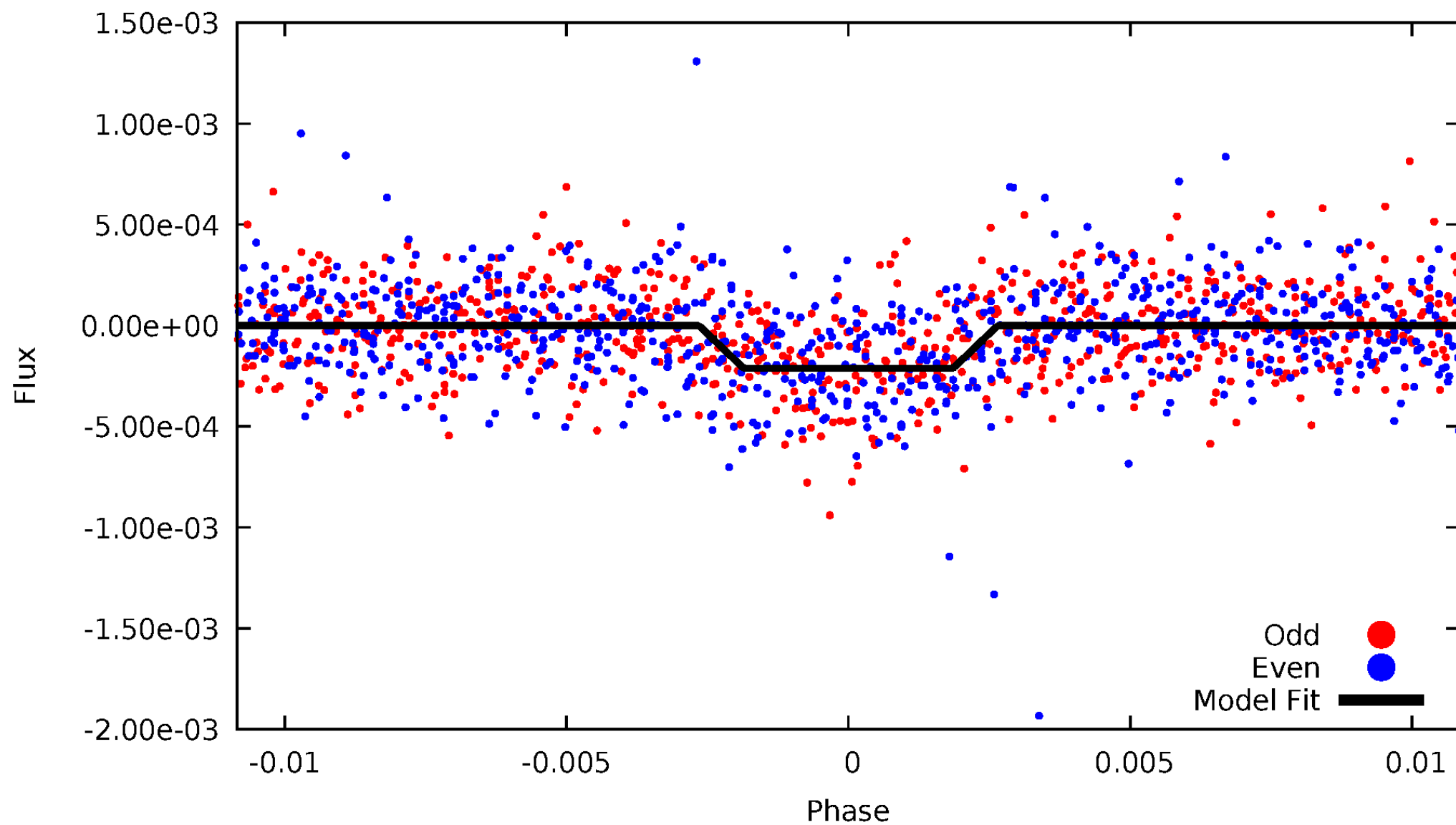
DV Odd/Even

TCE 004861527-02



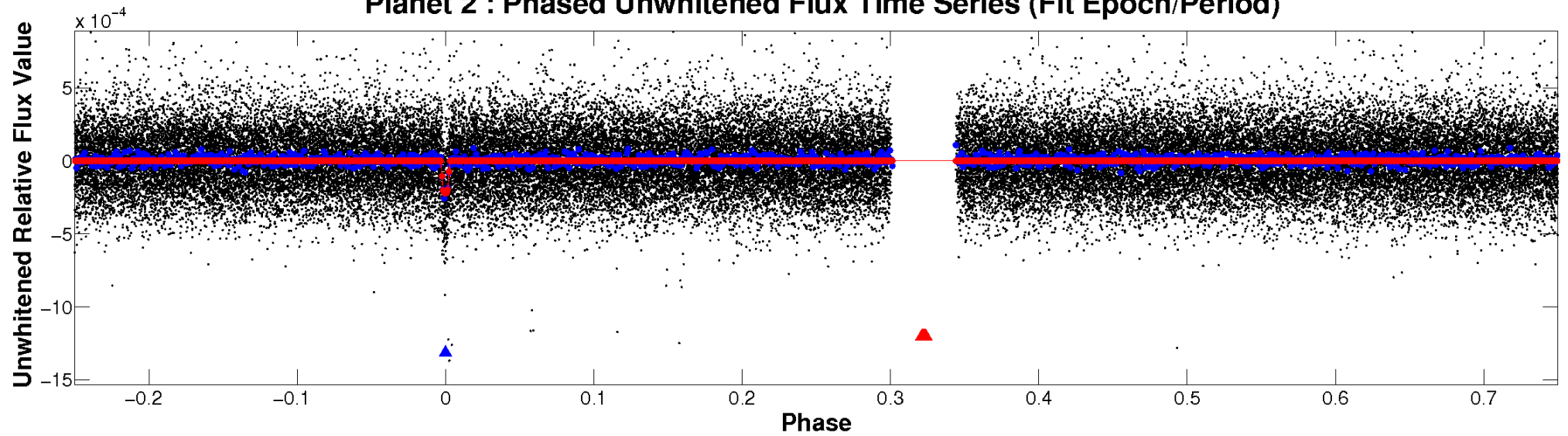
ALT Odd/Even

TCE 004861527-02

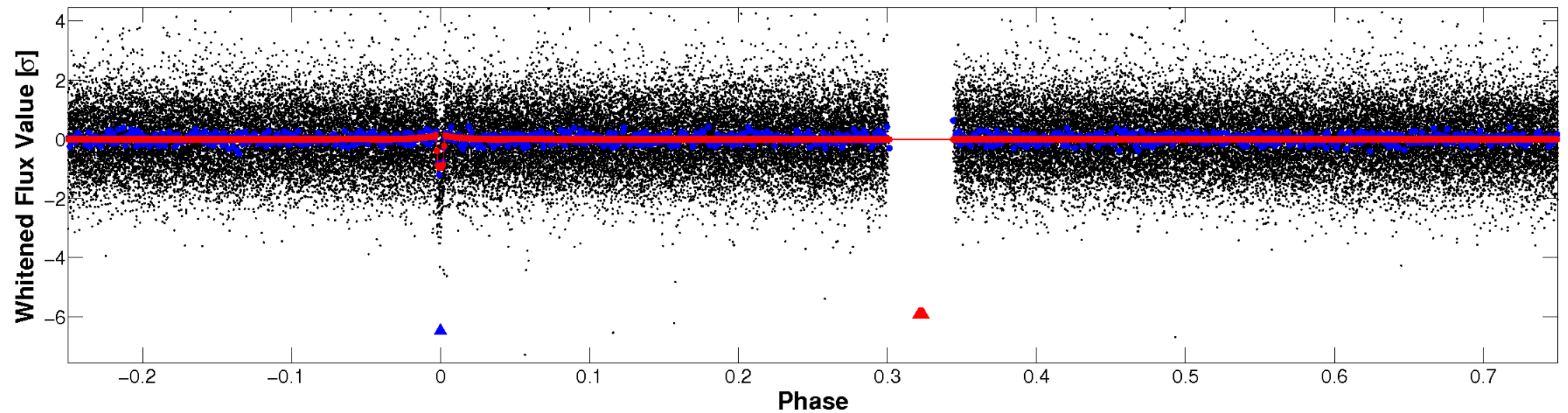


Non-Whitened Vs. Whitened Light Curve

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

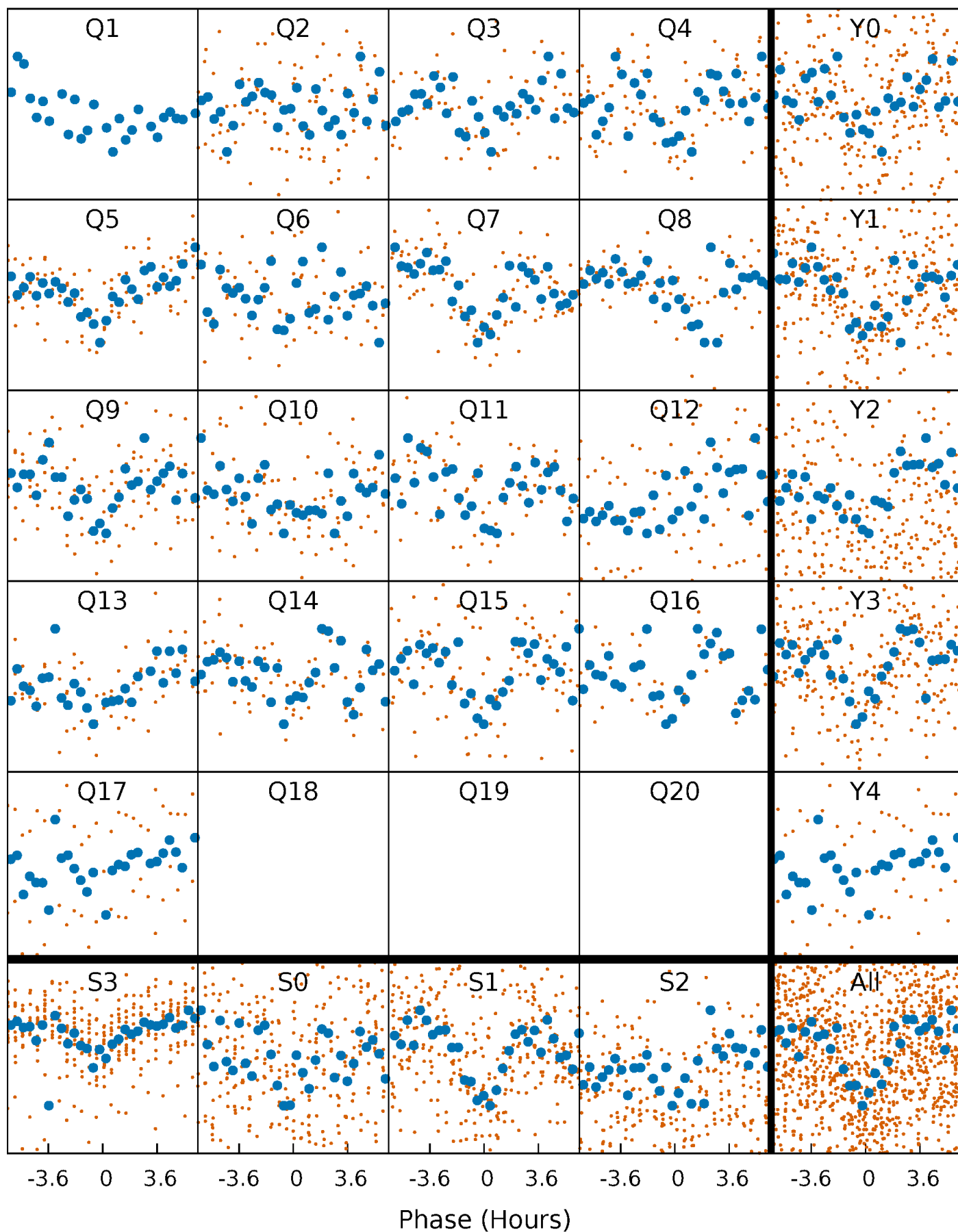


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



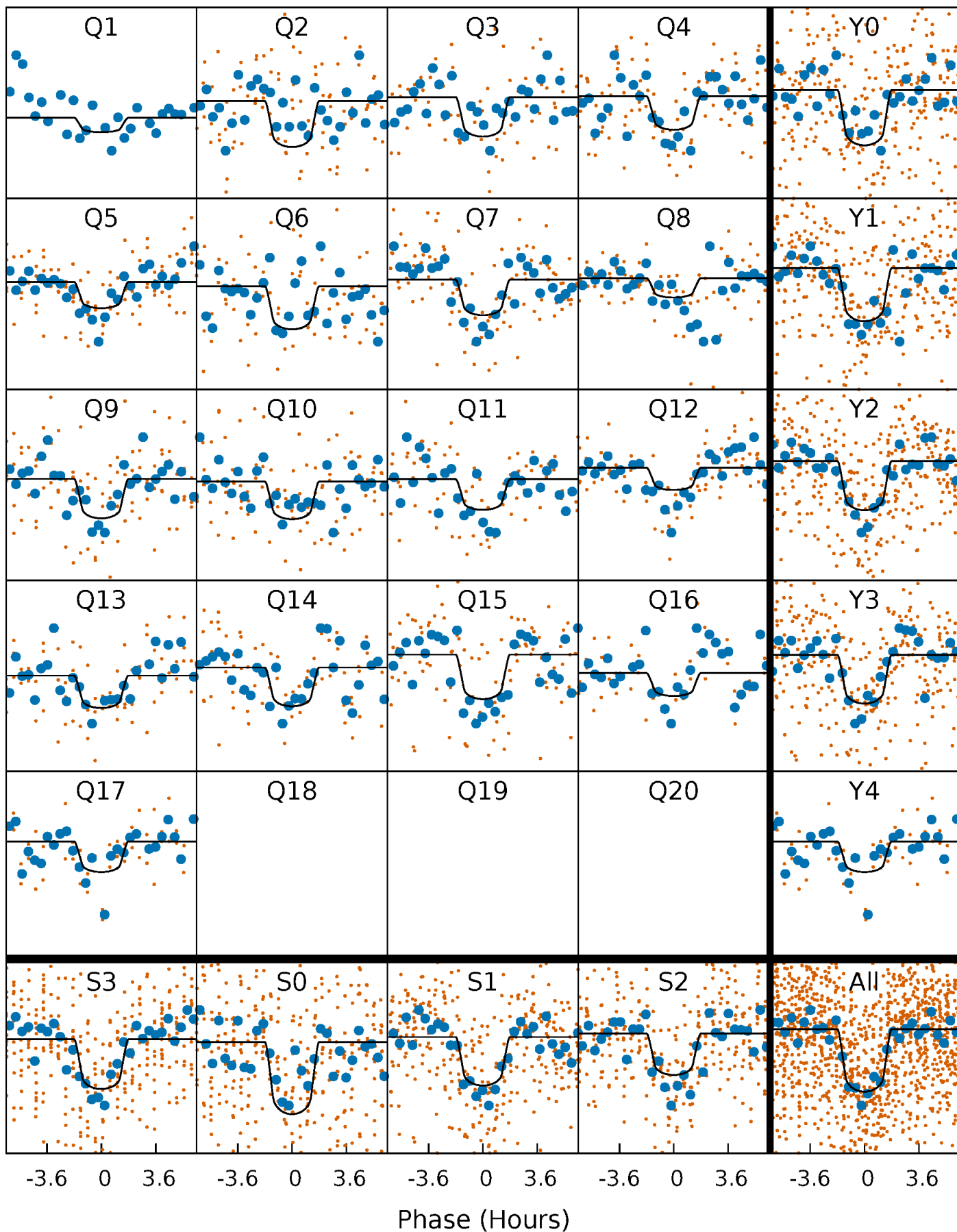
PDC Quarter-Phased Transit Curves

TCE 004861527-02 P= 25.706914 Days $T_0=148.324983$ (BKJD)



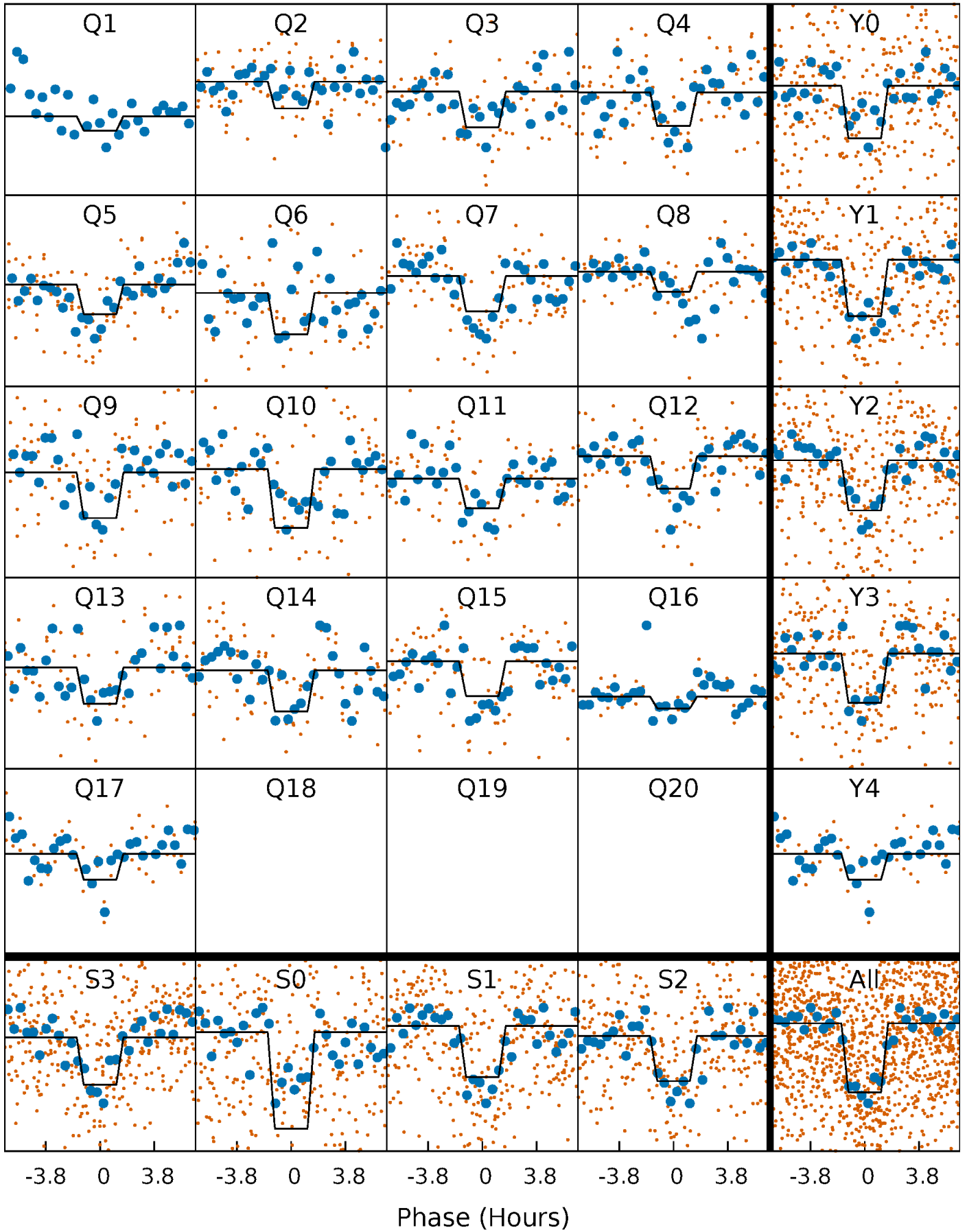
DV Quarter-Phased Transit Curves

TCE 004861527-02 P= 25.706914 Days $T_0=148.324983$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

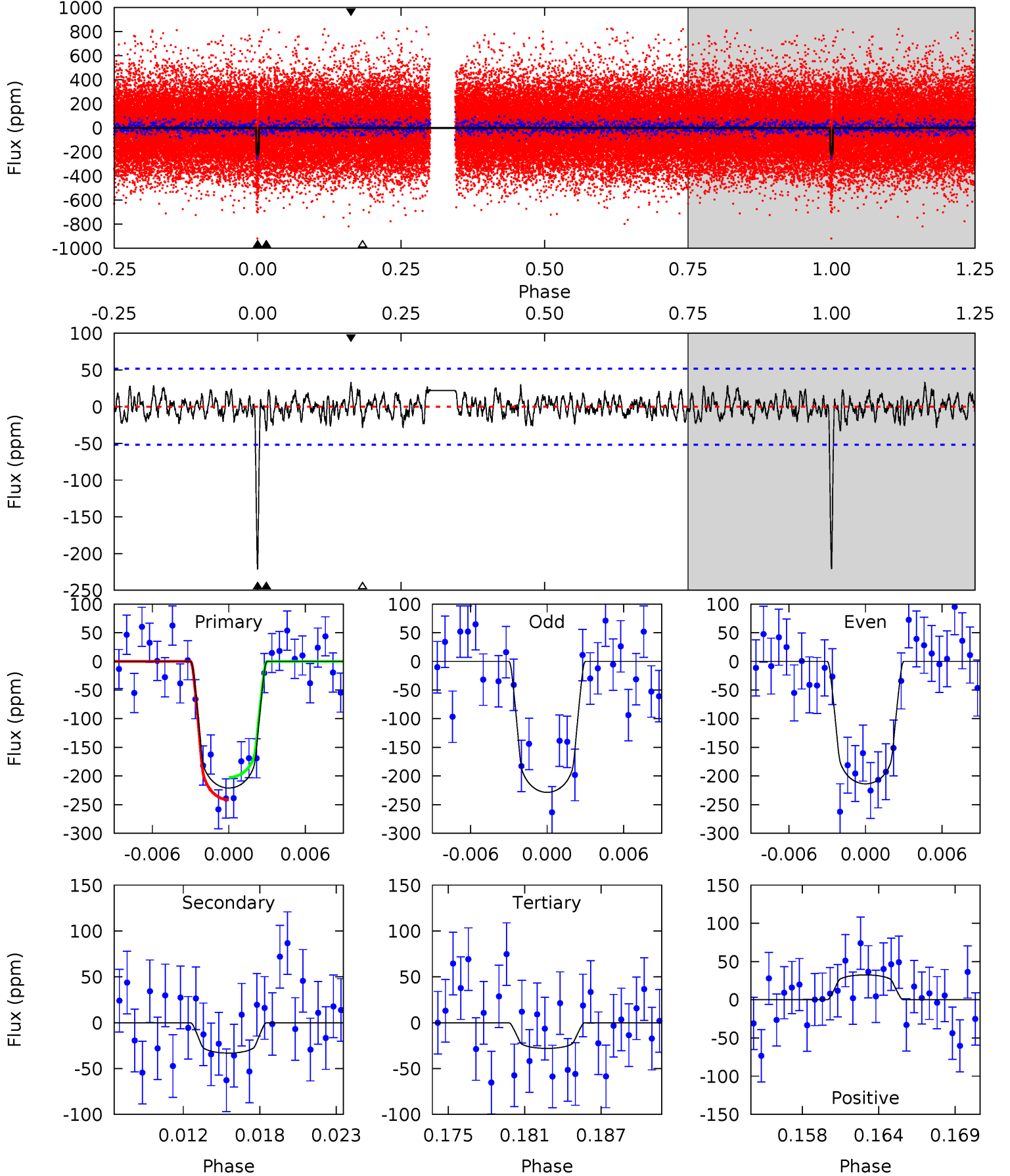
TCE 004861527-02 P= 25.706592 Days $T_0=148.334276$ (BKJD)



DV Model-Shift Uniqueness Test

004861527-02, $P = 25.706914$ Days, $E = 122.618069$ Days

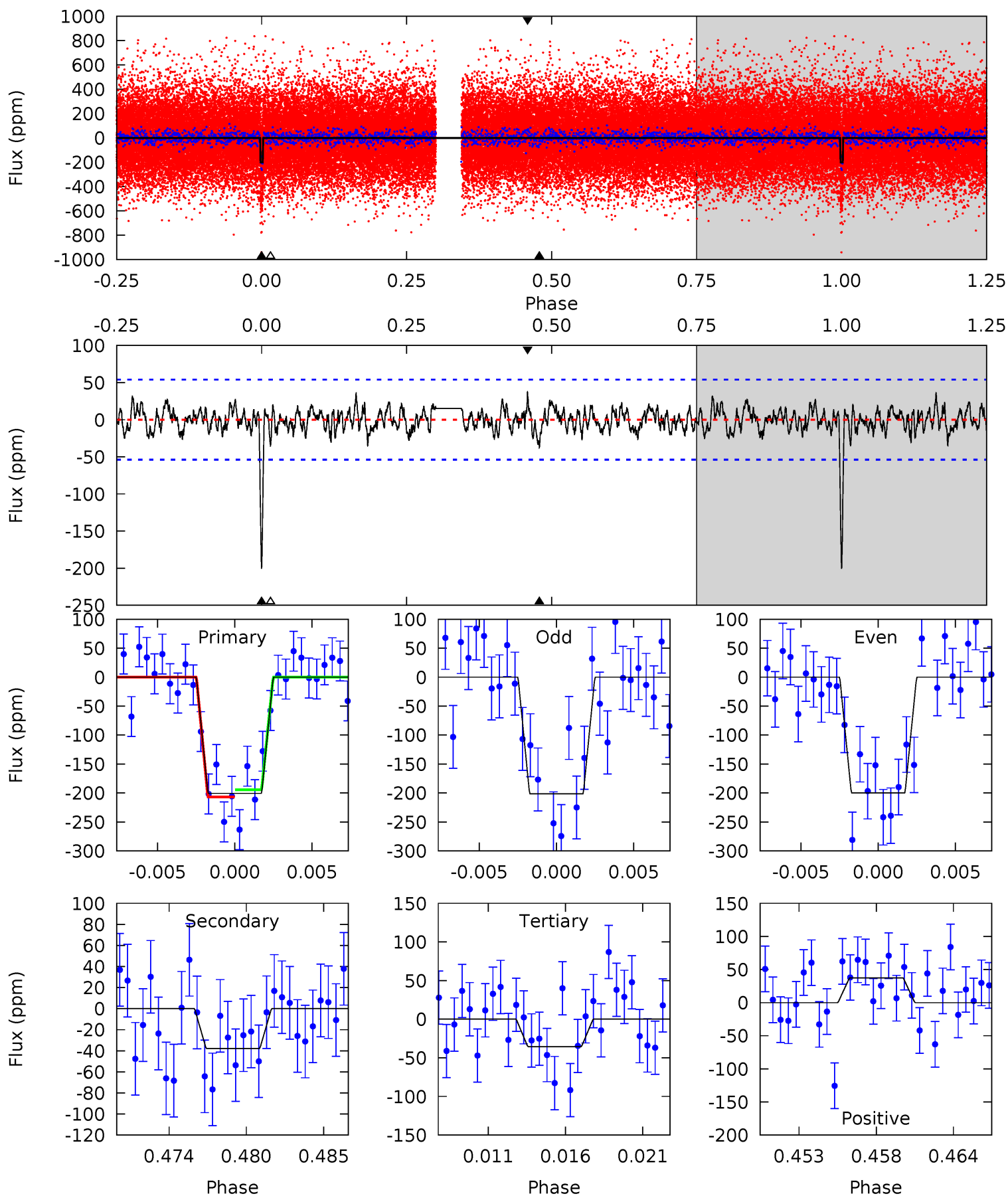
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 21.9 | 3.28 | 2.77 | 3.22 | 5.13 | 2.76 | 1.07 | 19.1 | 18.6 | 0.51 | 0.06 | 0.73 | 1.01 | 0.13 | 1.93 |



Alt Model-Shift Uniqueness Test

004861527-02, $P = 25.706592$ Days, $E = 122.627684$ Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 19.1 | 3.61 | 3.39 | 3.57 | 5.15 | 2.79 | 1.14 | 15.8 | 15.6 | 0.22 | 0.04 | 0.07 | 0.95 | 0.16 | 0.61 |



Stellar Parameters For KIC 004861527

| | $T_{\text{eff}} (K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M (M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 6326^{+169}_{-207} | $4.459^{+0.054}_{-0.216}$ | $-0.320^{+0.250}_{-0.300}$ | $1.001^{+0.320}_{-0.107}$ | $1.047^{+0.146}_{-0.133}$ | $1.472^{+0.437}_{-0.799}$ |
| | +3%/-3% | +1%/-5% | +78%/-94% | +32%/-11% | +14%/-13% | +30%/-54% |
| 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 004861527-02 / KOI

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|--------------|------------------------|-------------------|-----------------------|---------------------|
| DV | -33 ± 10 | $1.81^{+0.94}_{-0.77}$ | 957^{+69}_{-47} | 4071^{+1050}_{-525} | 159^{+350}_{-94} |
| Alt. | -38 ± 10 | $1.72^{+0.84}_{-0.79}$ | 955^{+76}_{-48} | 4254^{+1248}_{-546} | 201^{+512}_{-111} |

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 $A_{obs} \gg 1.0$

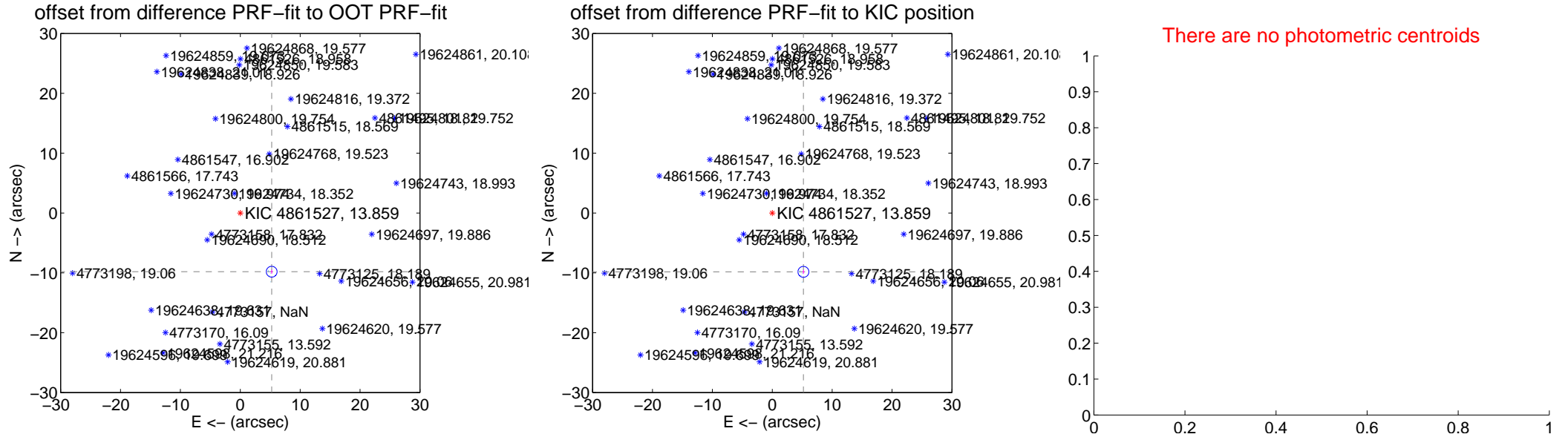
DV Centroid Data

Supplemental centroid analysis for 004861527-02. Kepler magnitude: 13.86. Transit SNR 15.36

There are 17 quarters with good PRF difference image offsets

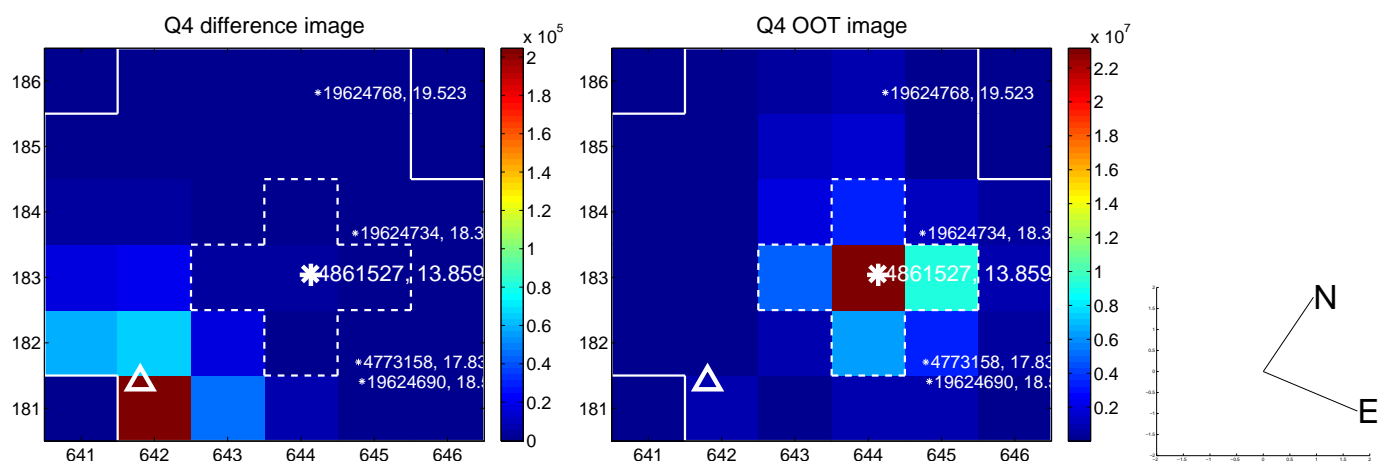
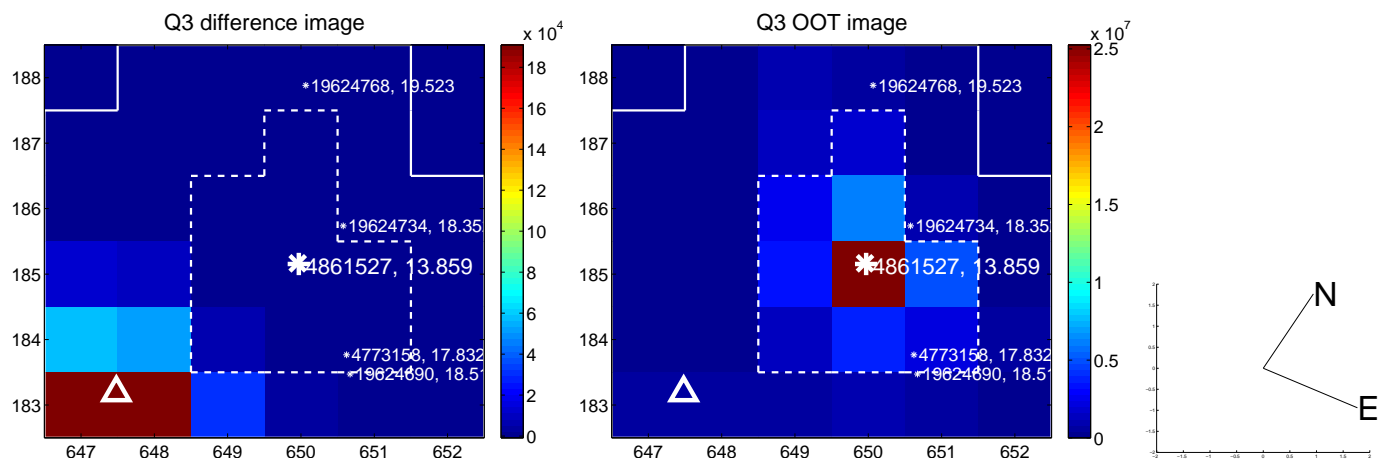
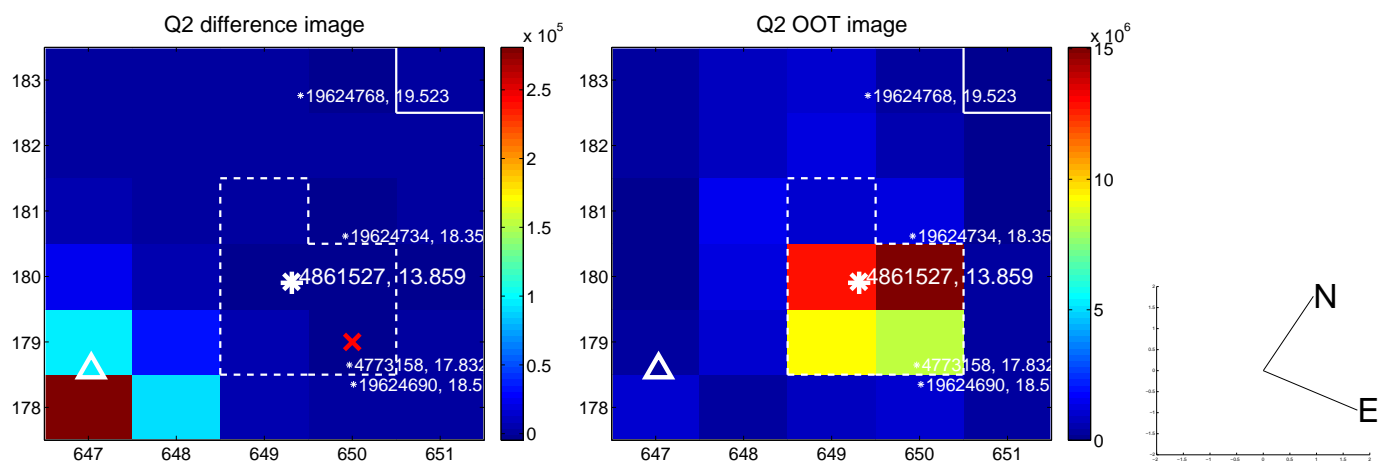
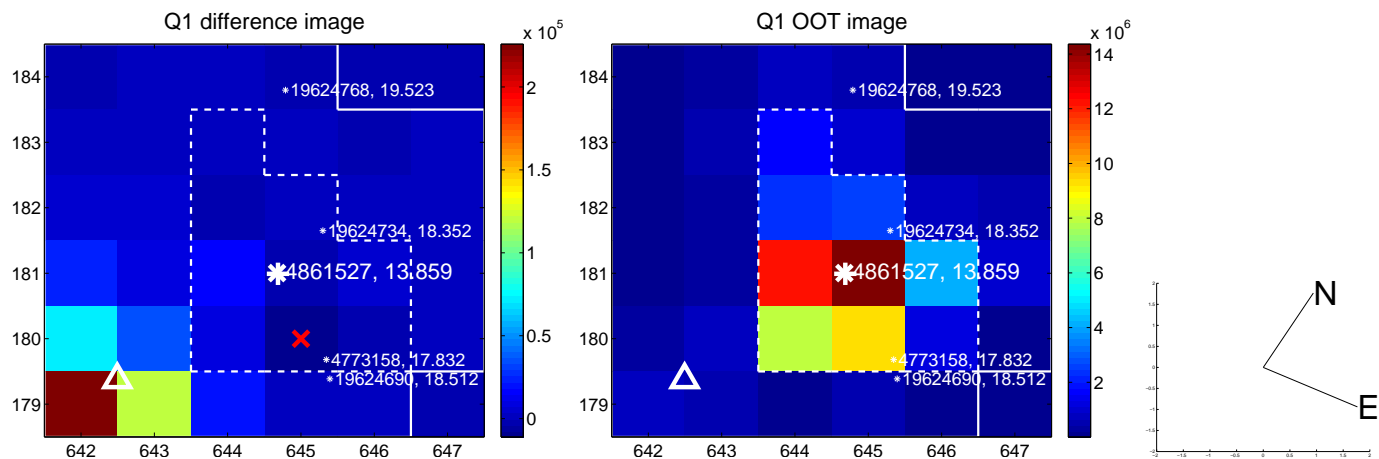
The direct PRF centroid is offset from the target star catalog position by about 0.08 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 11.121 \pm 0.301 | 36.90 | -5.242 \pm 0.120 | -9.809 \pm 0.336 |
| PRF-fit source offset from KIC position | 11.124 \pm 0.304 | 36.55 | -5.204 \pm 0.124 | -9.832 \pm 0.338 |
| photometric centroid source offset | — | — | — | — |

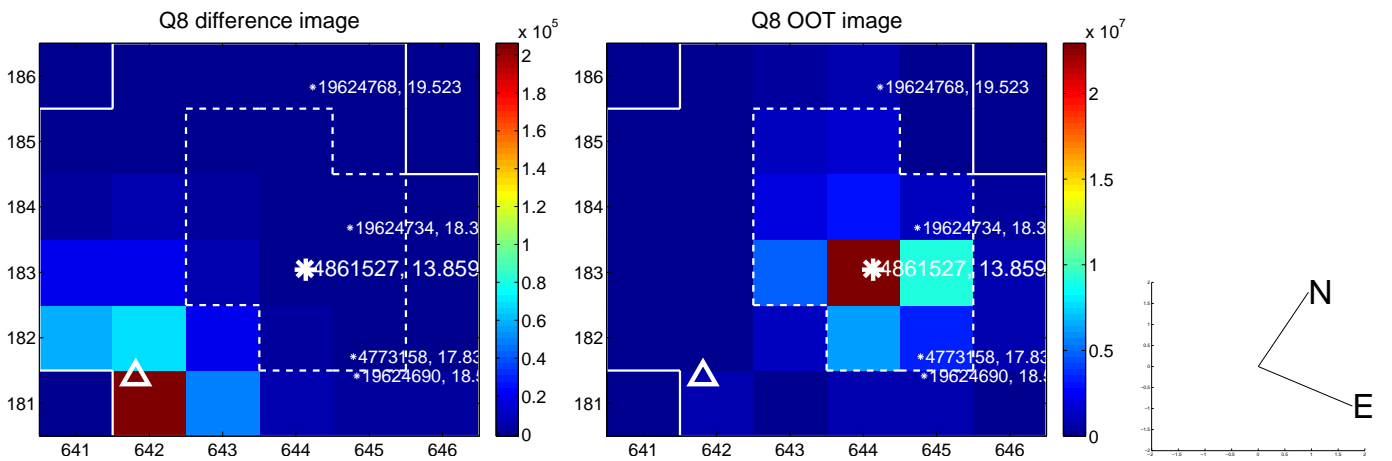
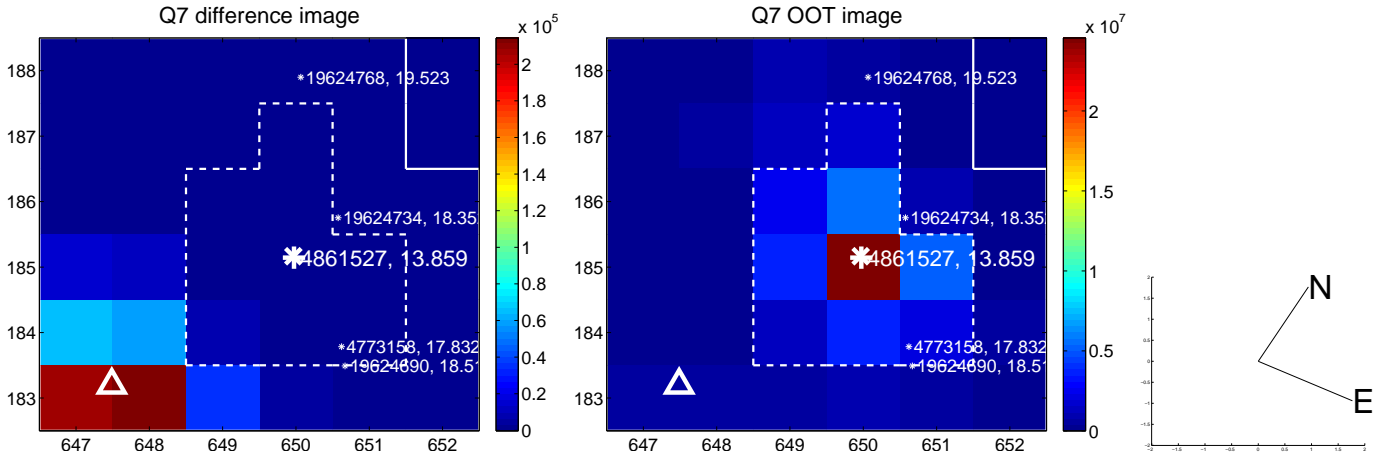
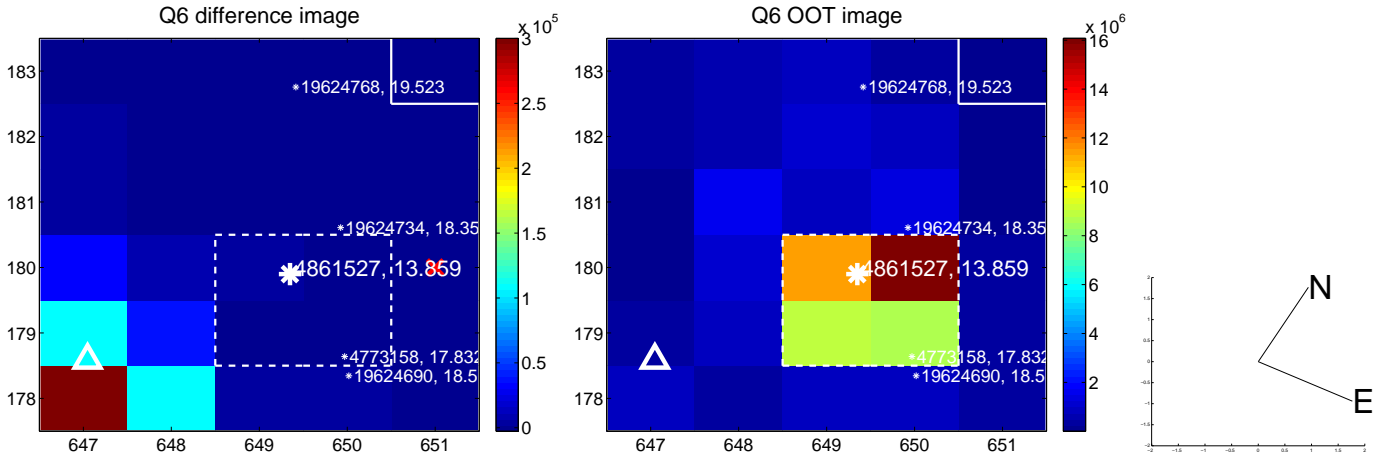
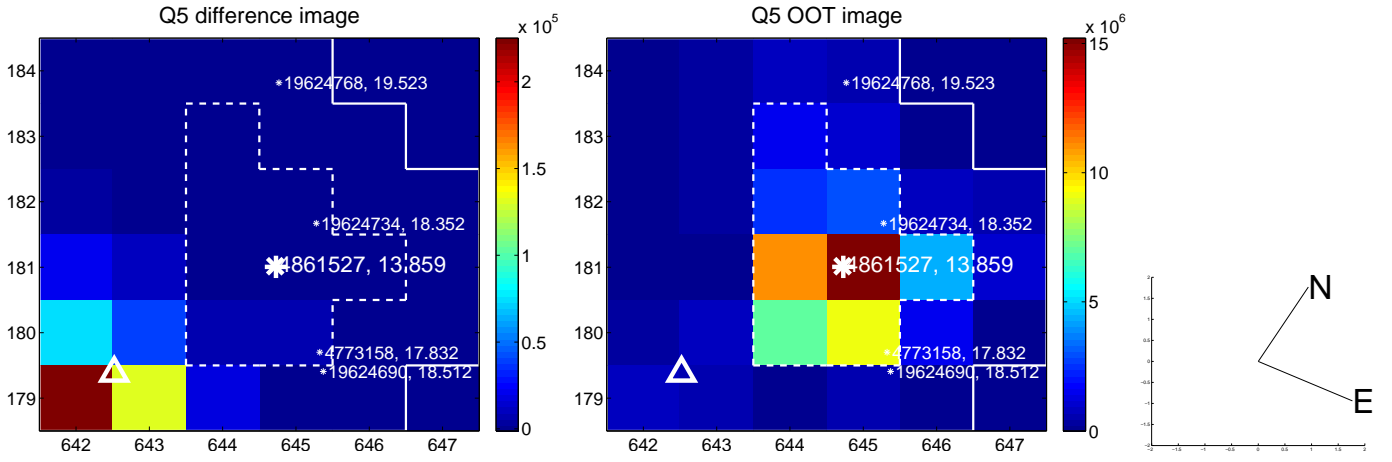


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three- σ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

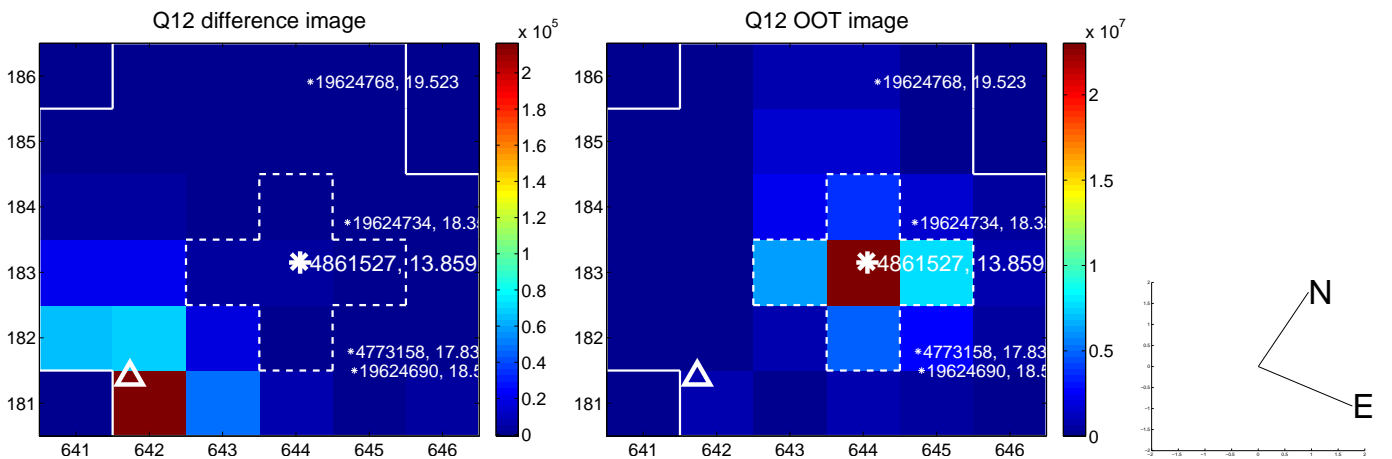
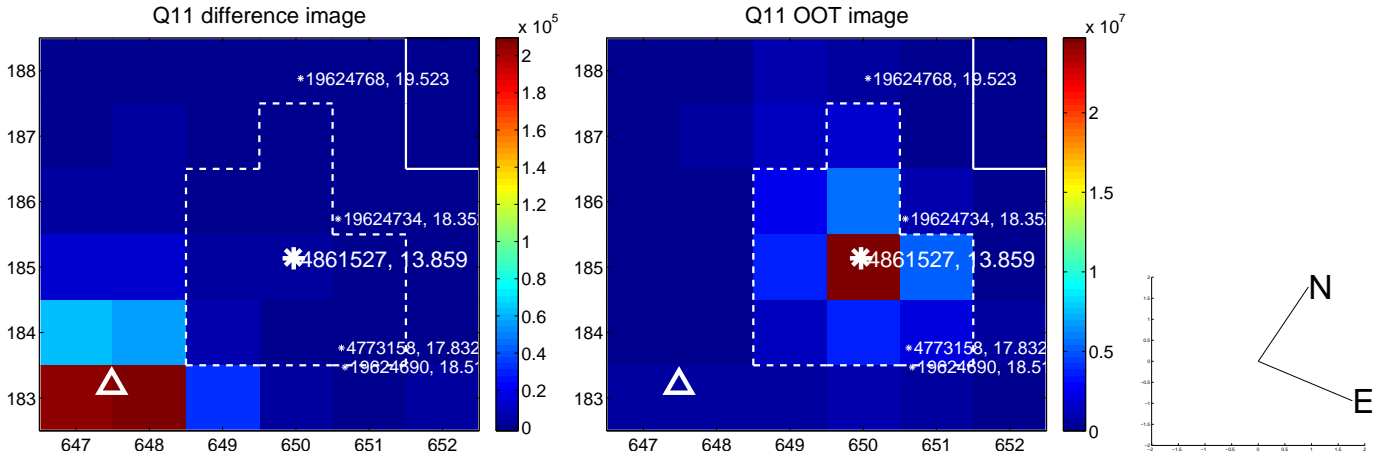
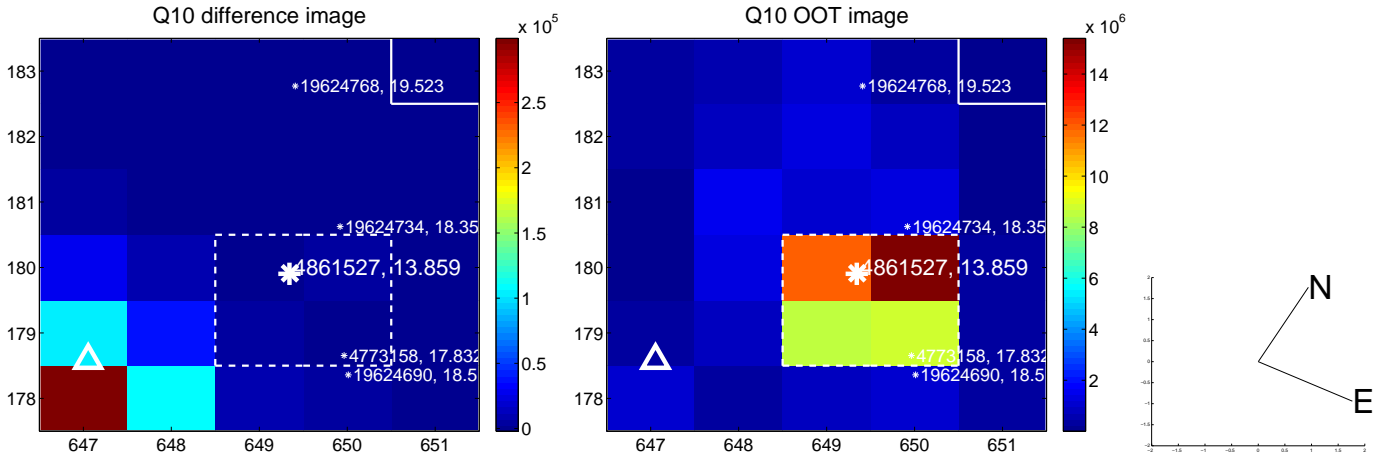
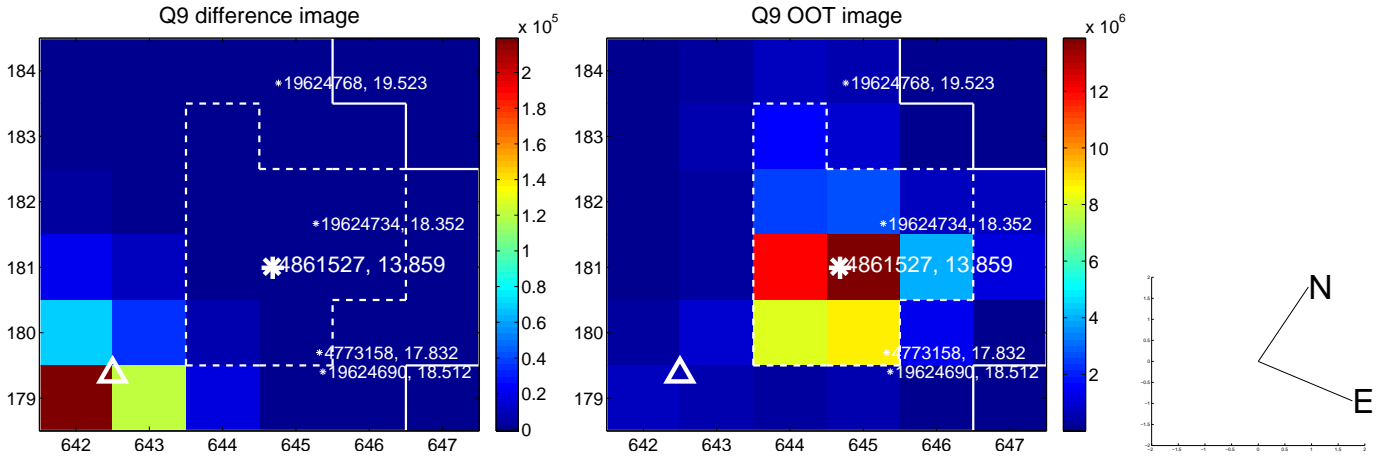
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



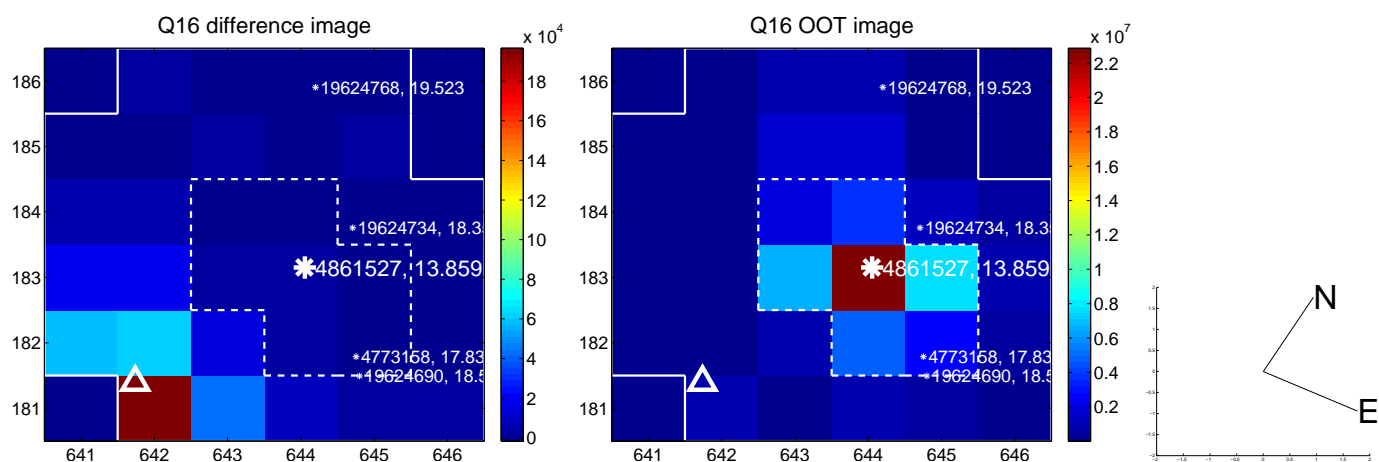
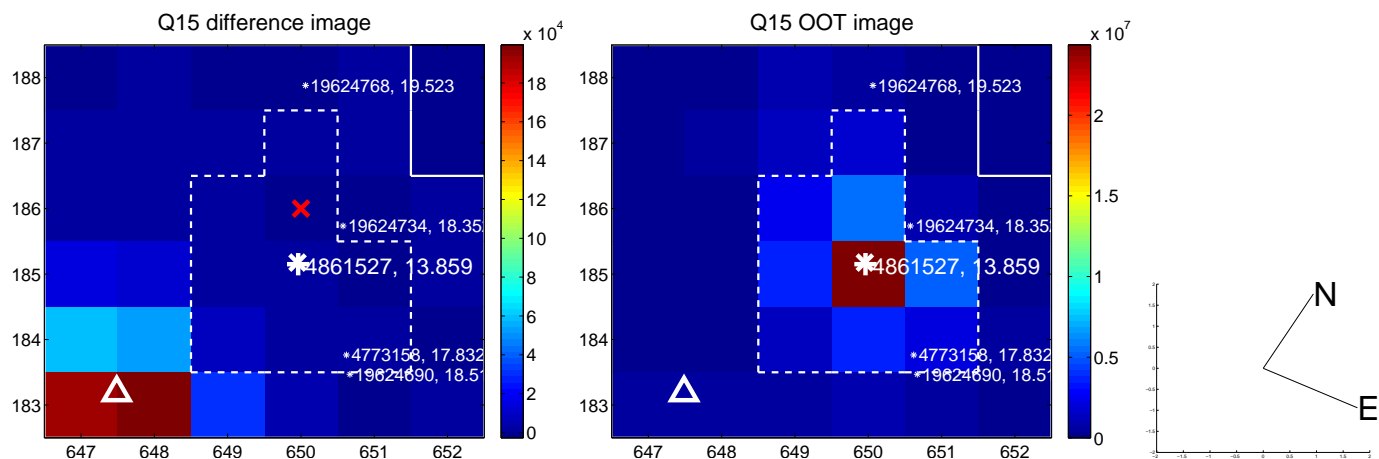
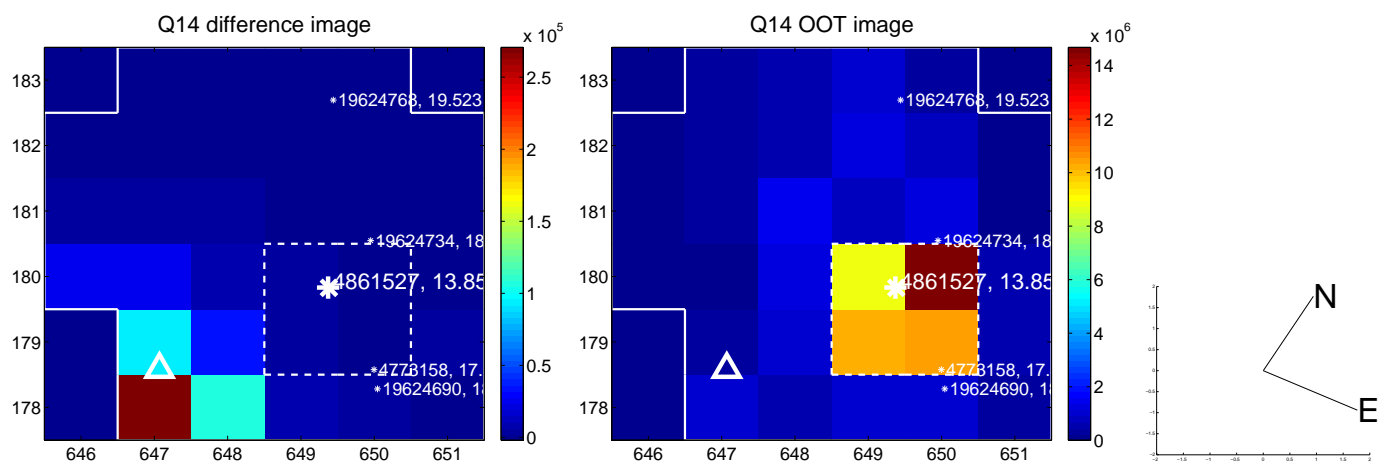
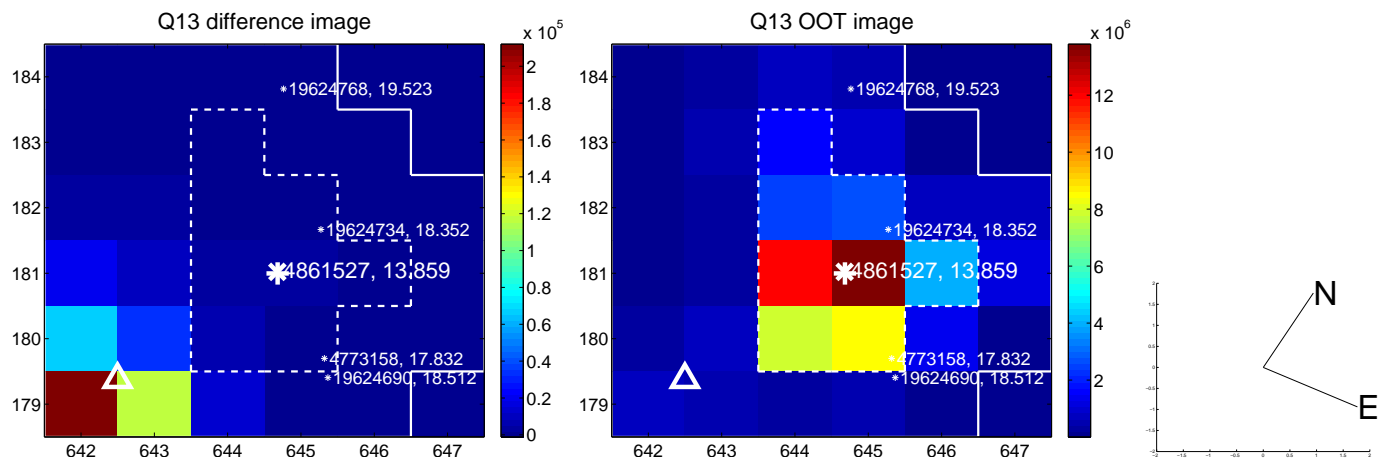
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



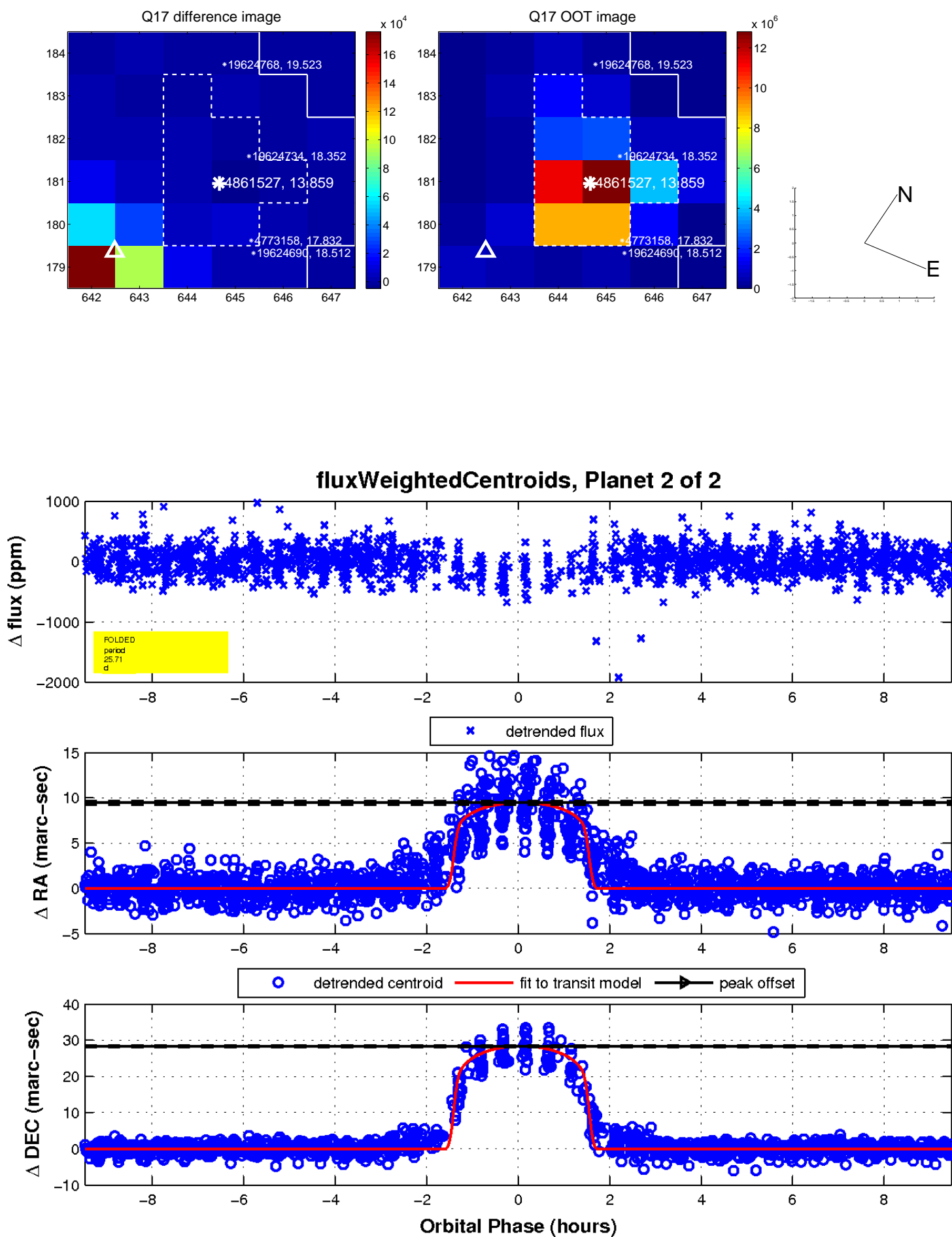
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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.



UKIRT Image

Declination

