

KIC 010271806

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010271806-01 | OBS | 0733.01 | 5.924991 | 134.166675 | 1566.9 | 2.934 | 58.5 | 63.6 | 0.68 | 5016 | 3.19 | 78.10 |
| 010271806-02 | OBS | 0733.02 | 11.349353 | 134.317895 | 1316.2 | 3.266 | 36.5 | 40.1 | 0.68 | 5016 | 2.68 | 32.83 |
| 010271806-03 | OBS | 0733.03 | 3.132962 | 132.540194 | 428.2 | 2.387 | 20.5 | 23.2 | 0.68 | 5016 | 1.71 | 182.66 |
| 010271806-04 | OBS | 0733.04 | 18.643508 | 141.626237 | 866.6 | 1.789 | 15.0 | 17.0 | 0.68 | 5016 | 2.17 | 16.94 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 010271806-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-03 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-04 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

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

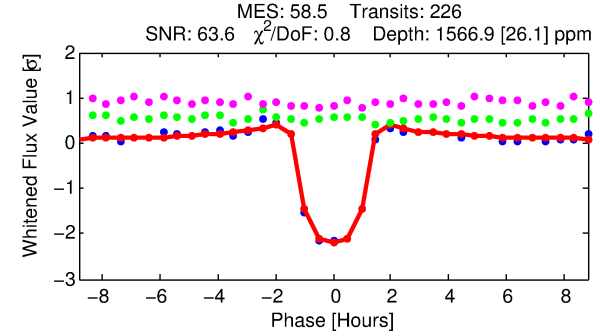
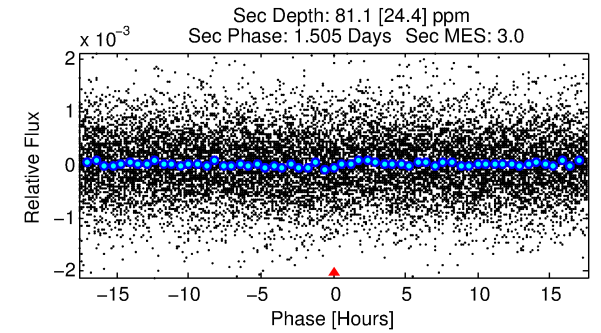
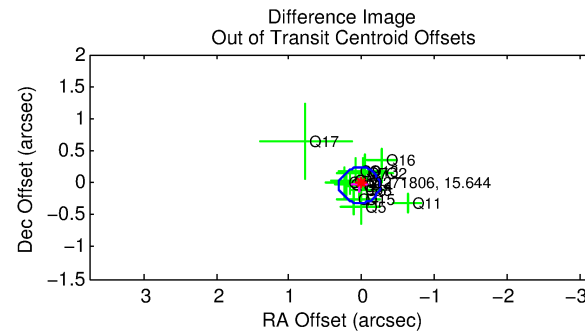
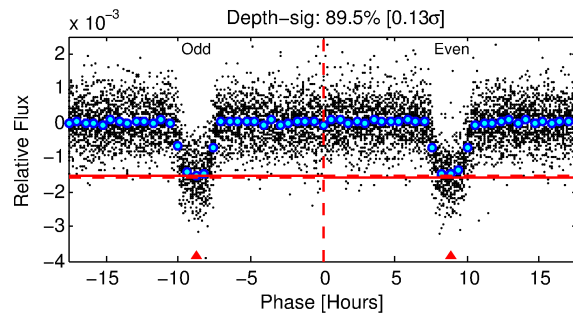
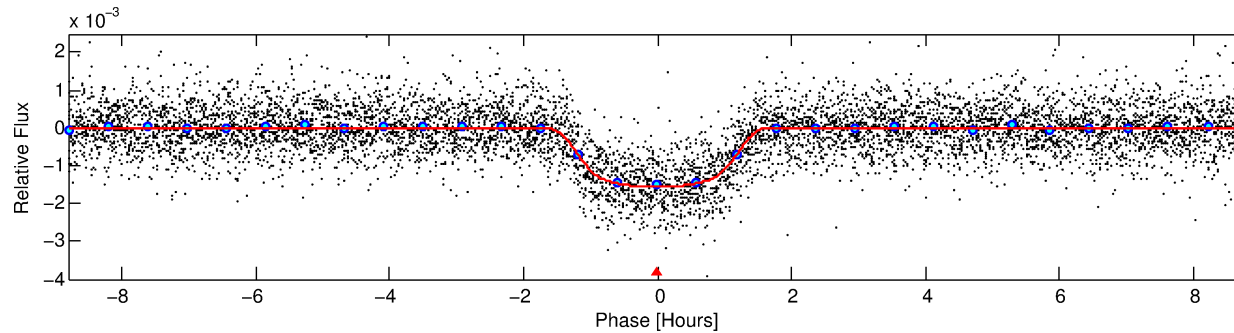
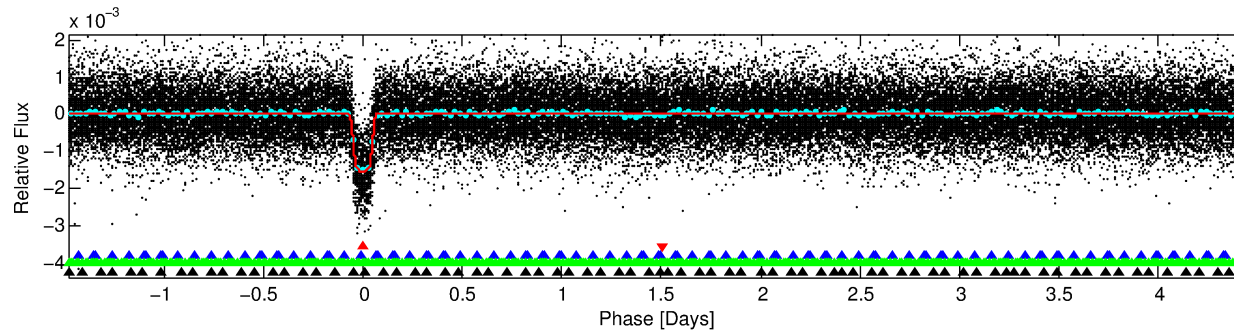
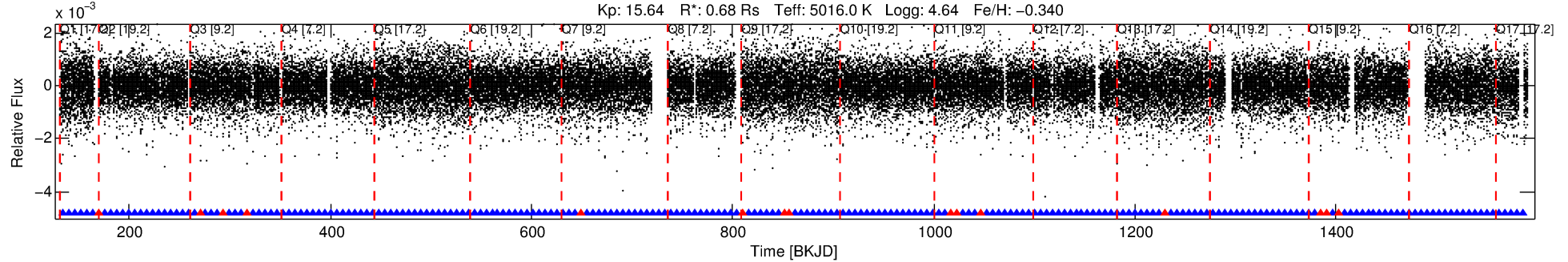
Ephemeris Match Information For 010271806-01

No Significant Match Found

DV One-Page Summary

KIC: 10271806 Candidate: 1 of 4 Period: 5.925 d
KOI: K00733.01 Name: Kepler-224c Corr: 0.988

Kp: 15.64 R*: 0.68 Rs Teff: 5016.0 K Logg: 4.64 Fe/H: -0.340



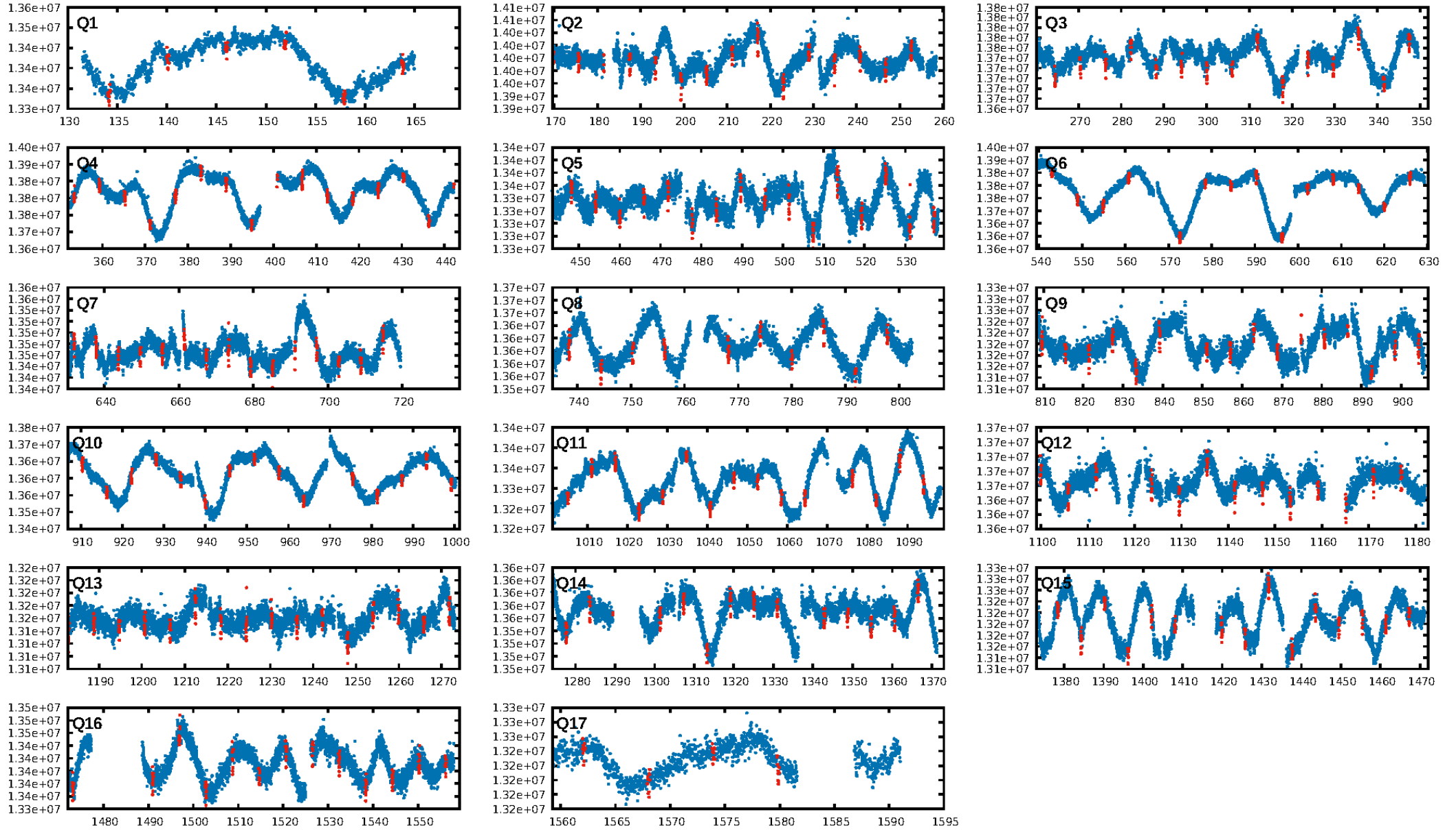
DV Fit Results:

Period = 5.92499 [0.00001] d
Epoch = 134.1667 [0.0008] BKJD
Rp/R* = 0.0430 [0.0015]
a/R* = 8.77 [1.11]
b = 0.88 [0.03]
Seff = 78.10 [9.57]
Teq = 758 [23] K
Rp = 3.19 [0.24] Re
a = 0.0579 [0.0035] AU
Ag = 14.70 [4.76] [2.88σ]
Teffp = 2295 [184] K [8.31σ]

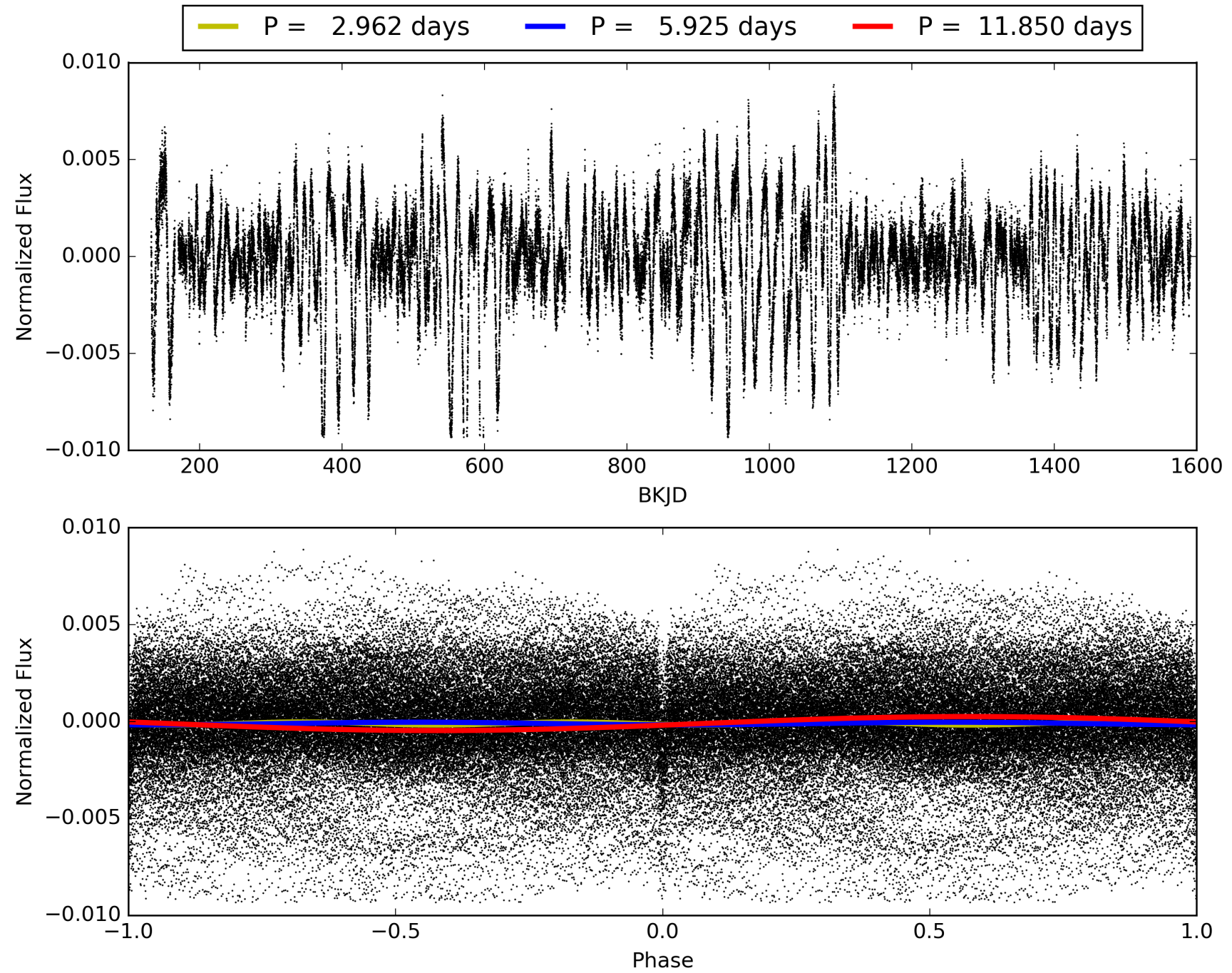
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [17.71σ]
LongPeriod-sig: 100.0% [29.65σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 0.00e+00
RollingBand-fgt: 0.93 [201/216]
GhostDiagnostic-chr: 4.6
Centroid-sig: 51.5%
Centroid-so: 0.121 arcsec [0.64σ]
OotOffset-rm: 0.052 arcsec [0.57σ]
KicOffset-rm: 0.042 arcsec [0.38σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 1.00 [16/16]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 010271806-01, PDC Light Curves

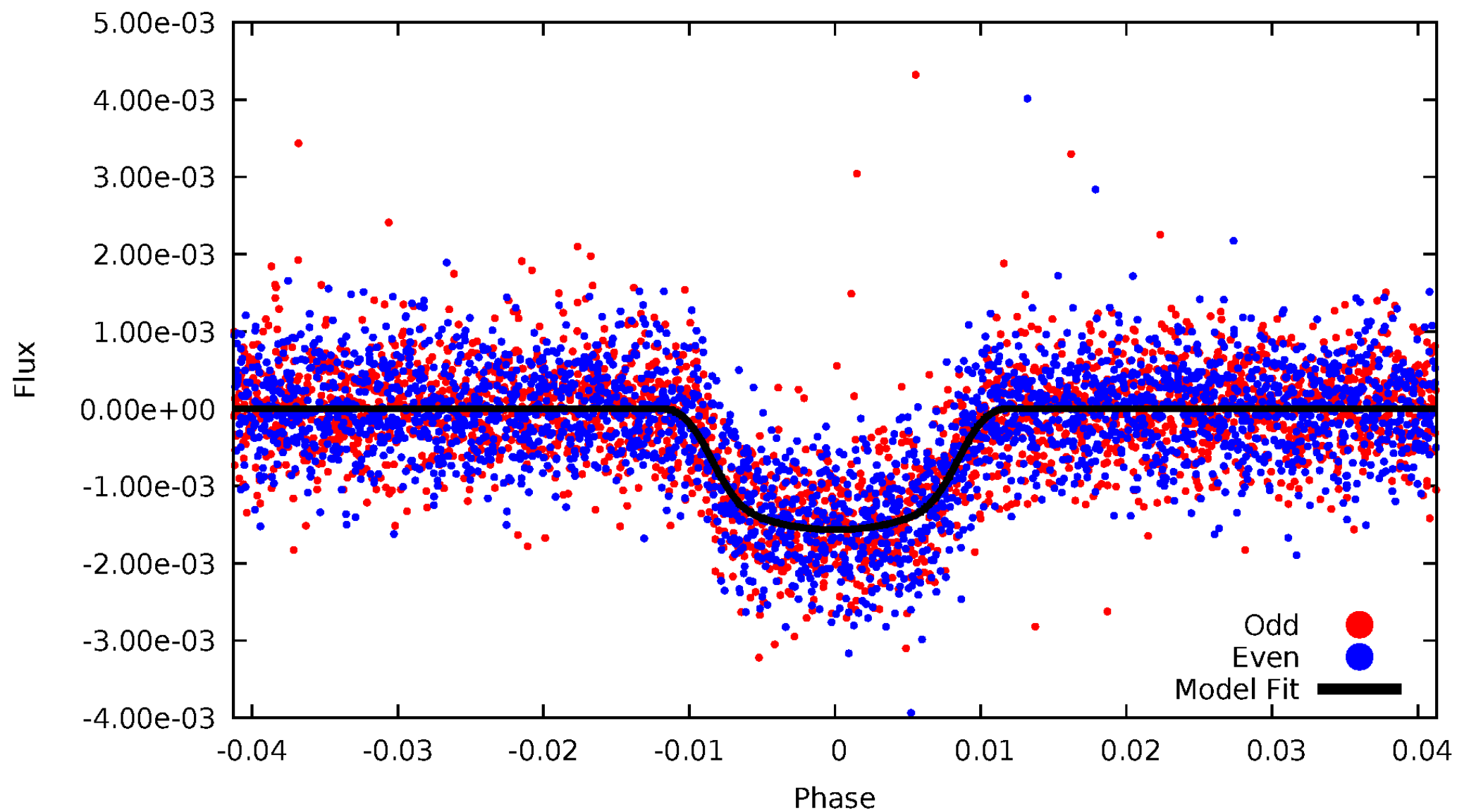


TCE 010271806-01



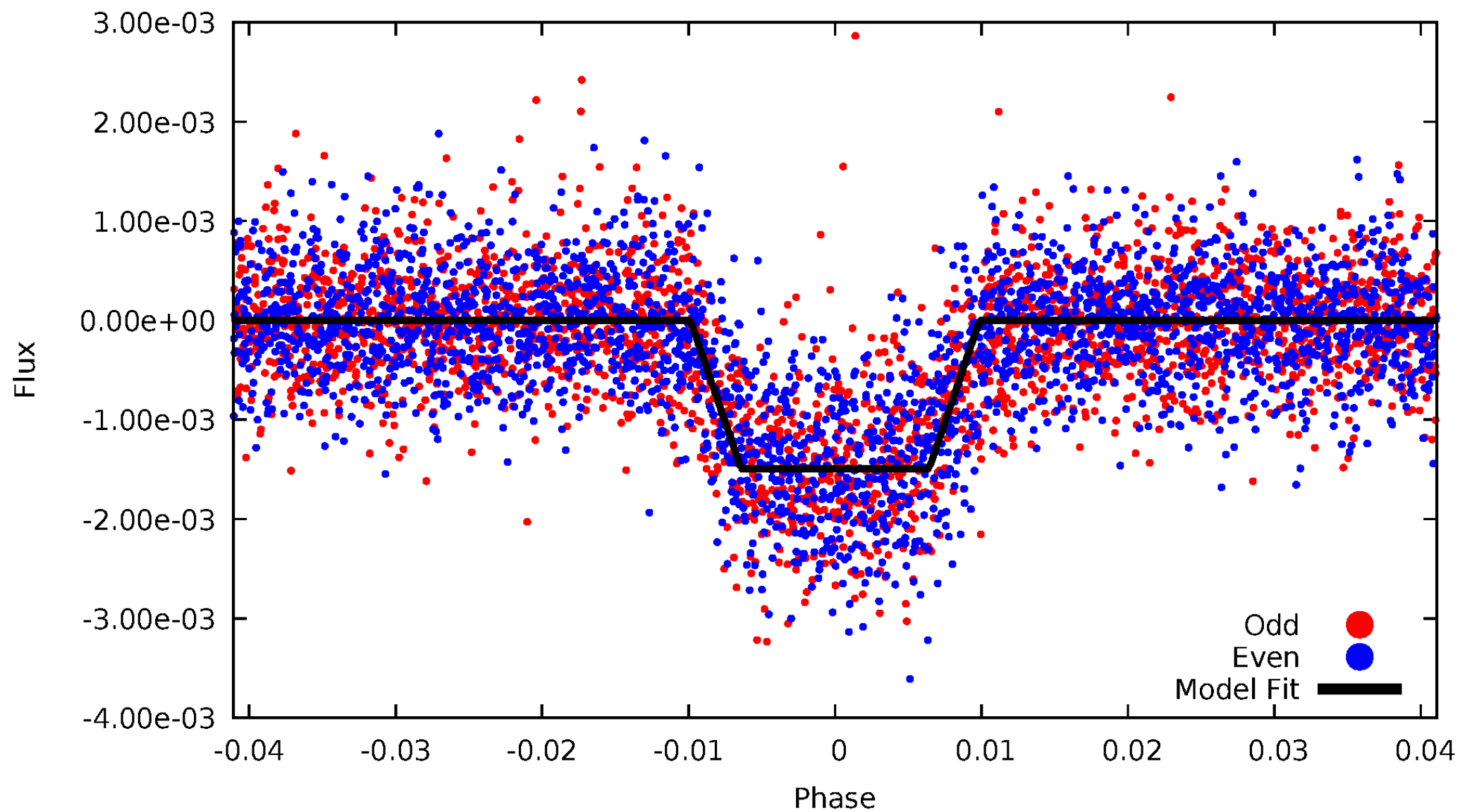
DV Odd/Even

TCE 010271806-01



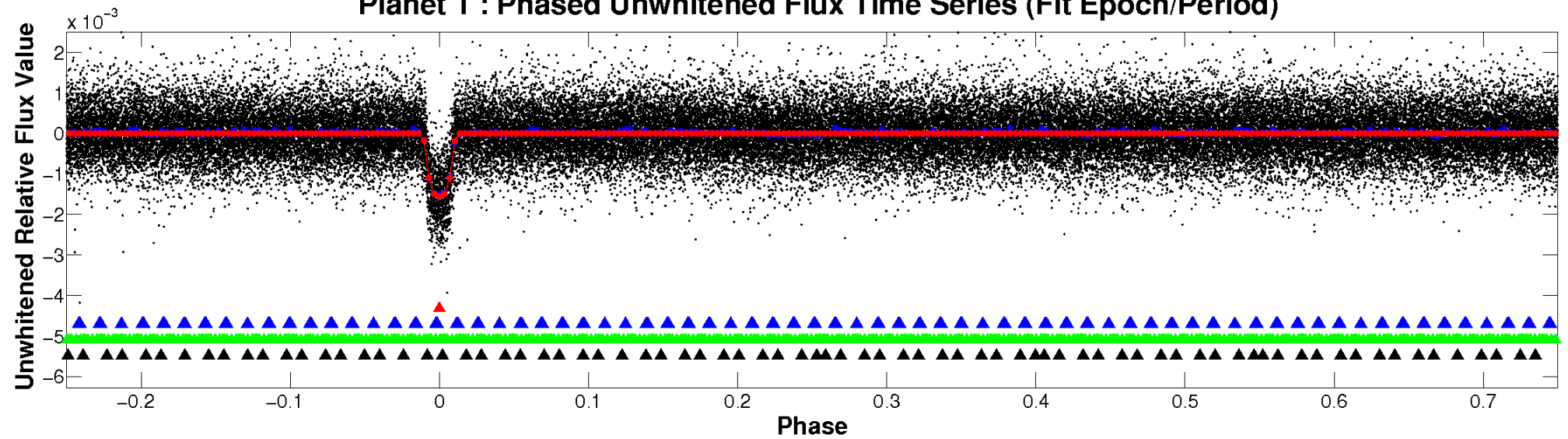
ALT Odd/Even

TCE 010271806-01

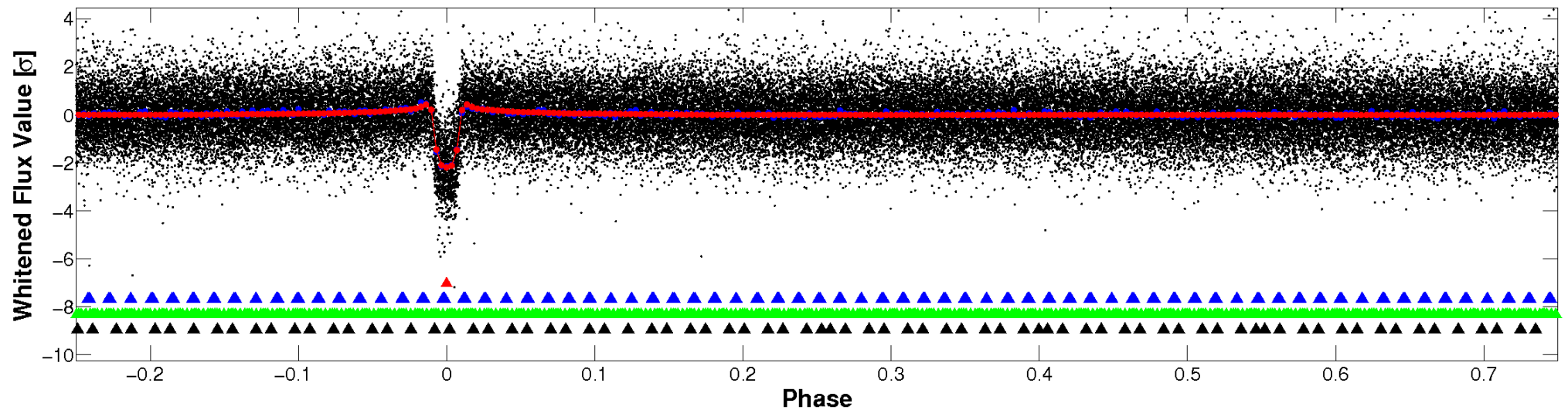


Non-Whitened Vs. Whitened Light Curve

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

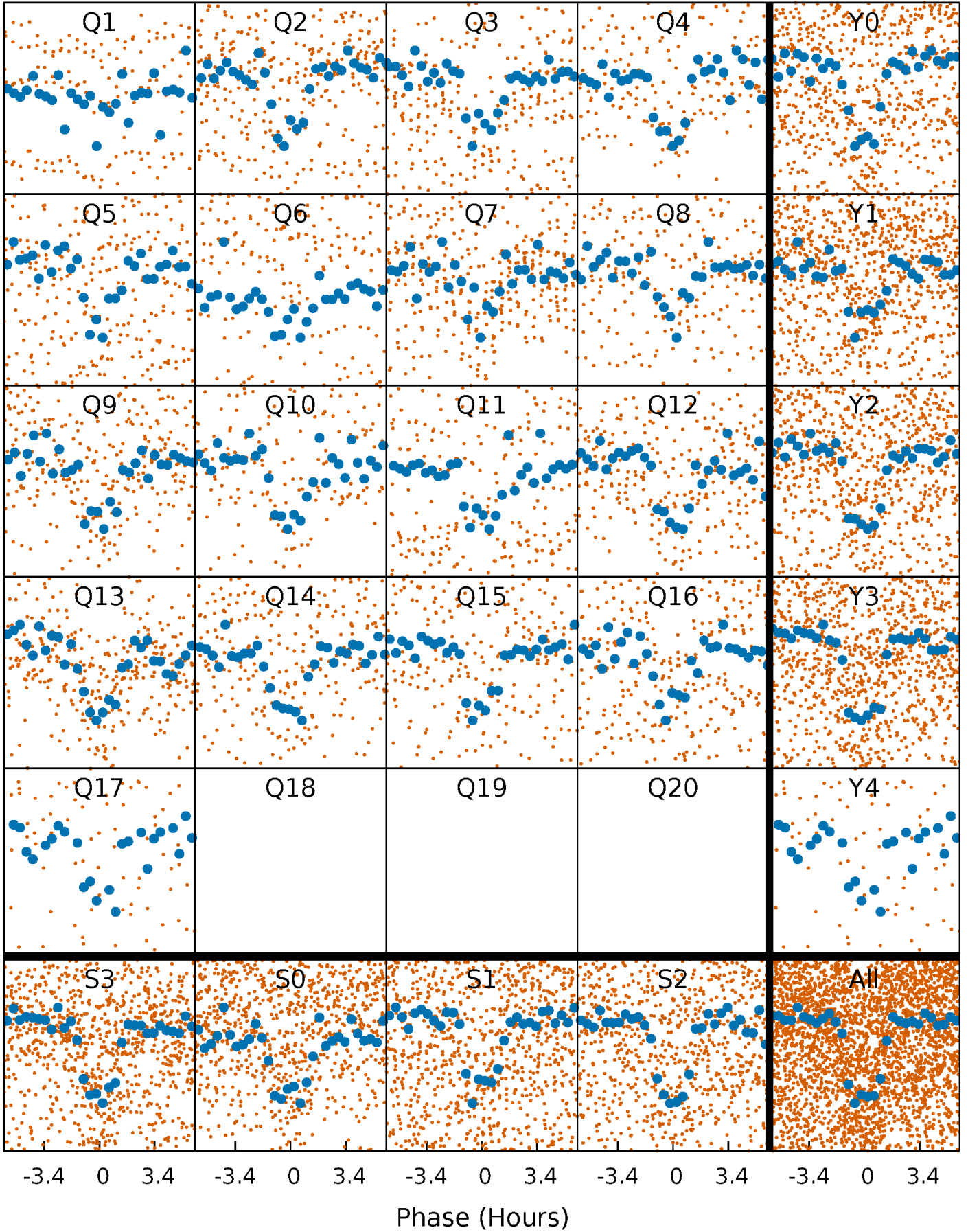


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



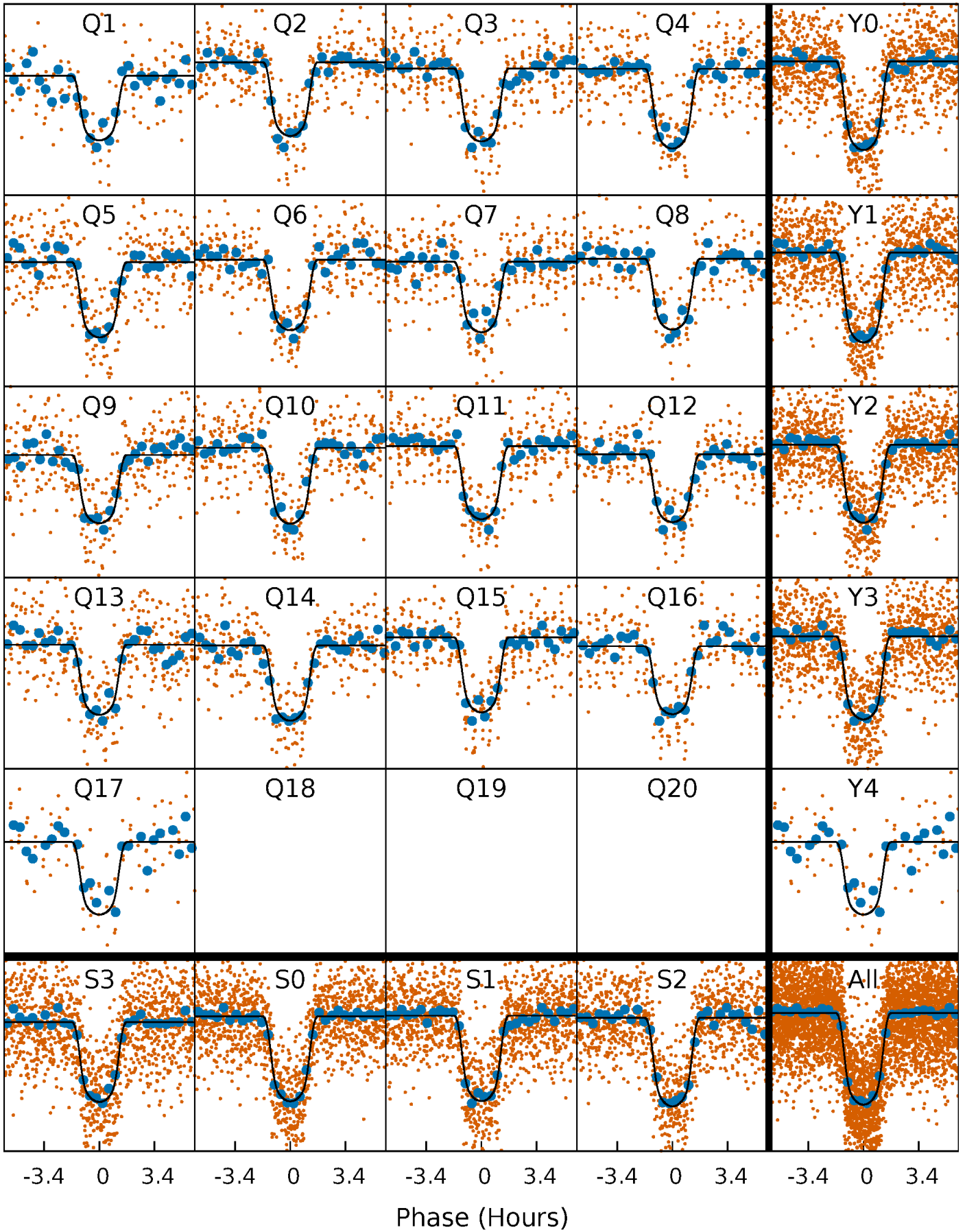
PDC Quarter-Phased Transit Curves

TCE 010271806-01 P= 5.924991 Days $T_0=134.166675$ (BKJD)



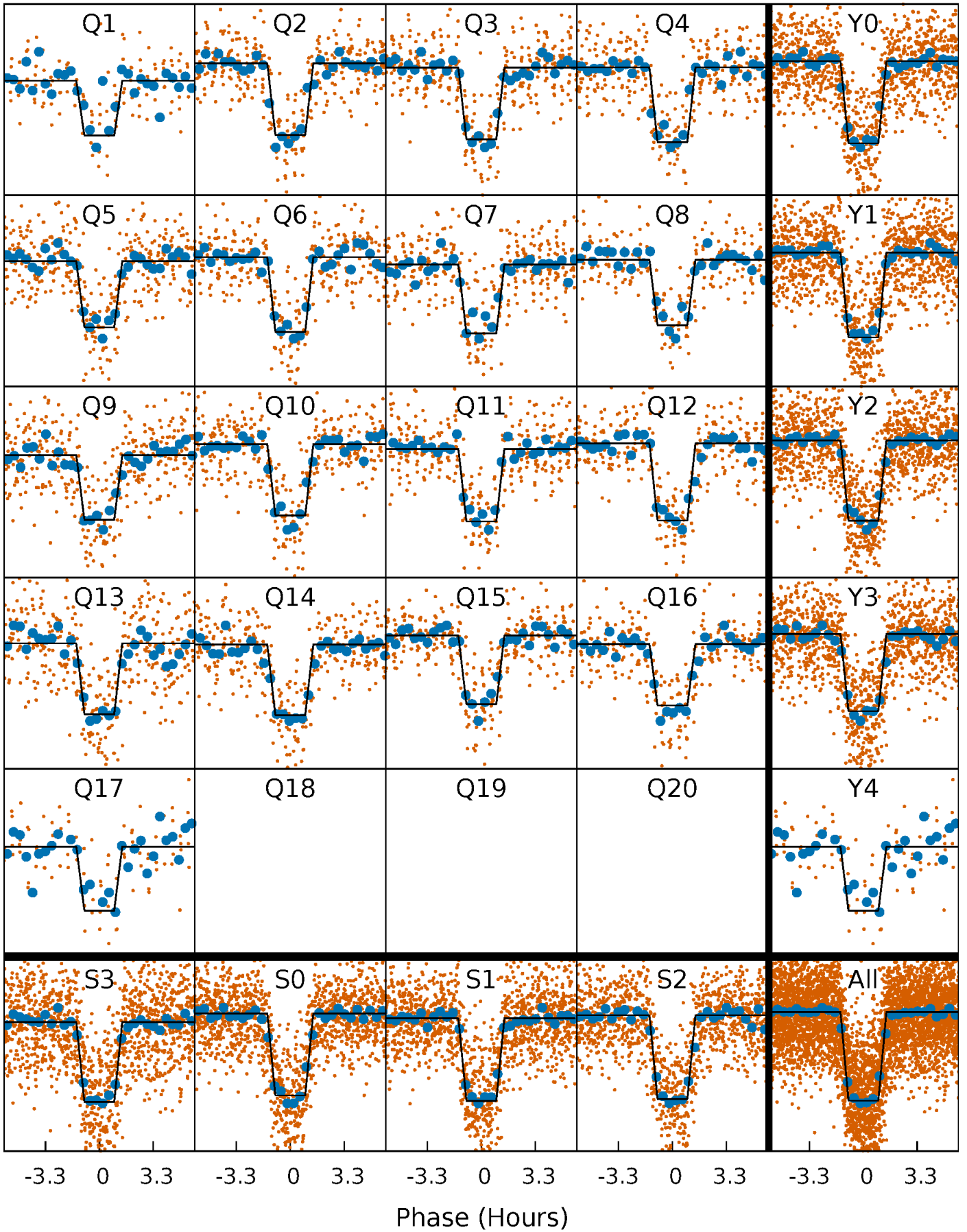
DV Quarter-Phased Transit Curves

TCE 010271806-01 P= 5.924991 Days $T_0=134.166675$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

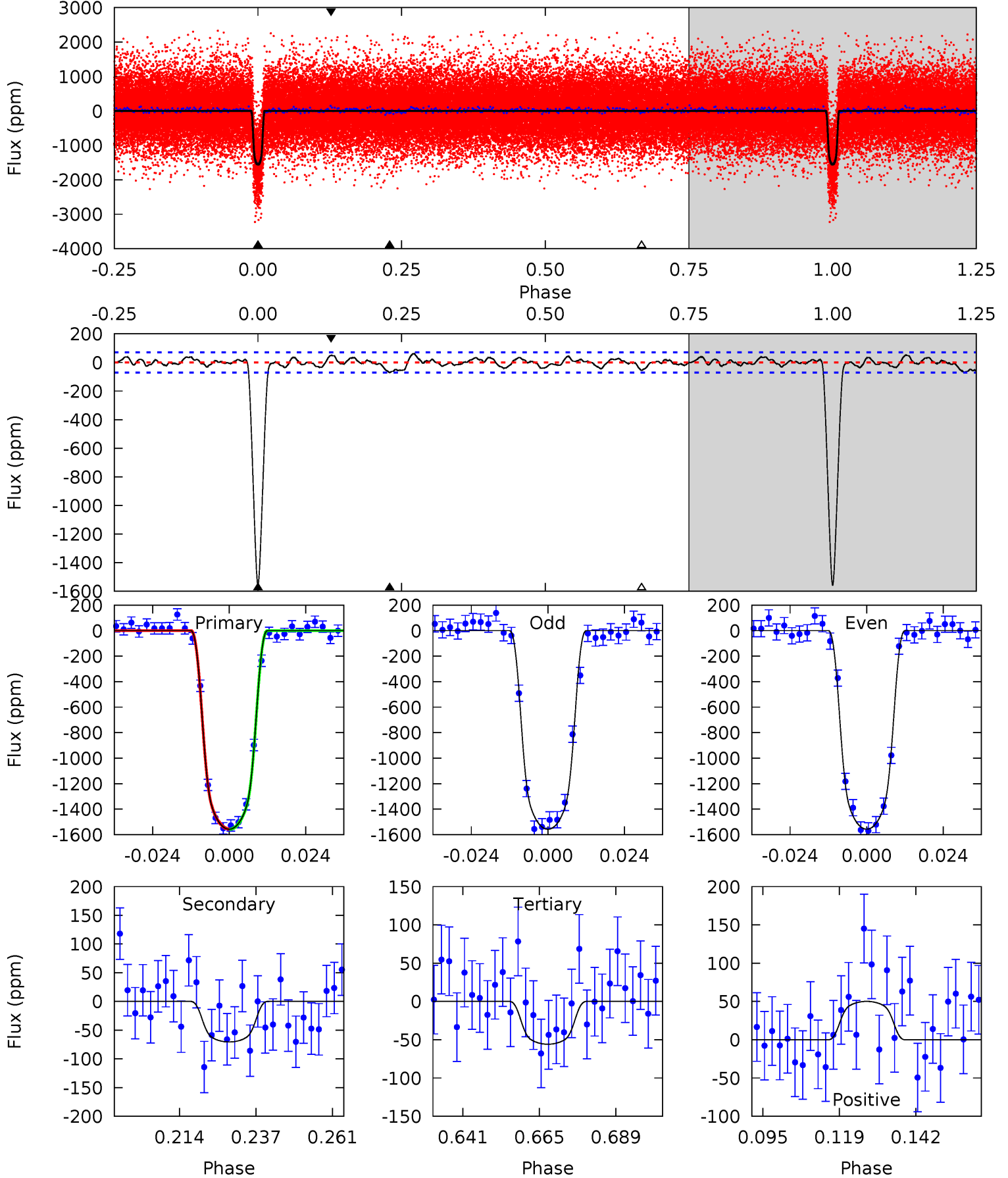
TCE 010271806-01 P= 5.924960 Days $T_0=134.170263$ (BKJD)



DV Model-Shift Uniqueness Test

010271806-01, P = 5.924991 Days, E = 128.241684 Days

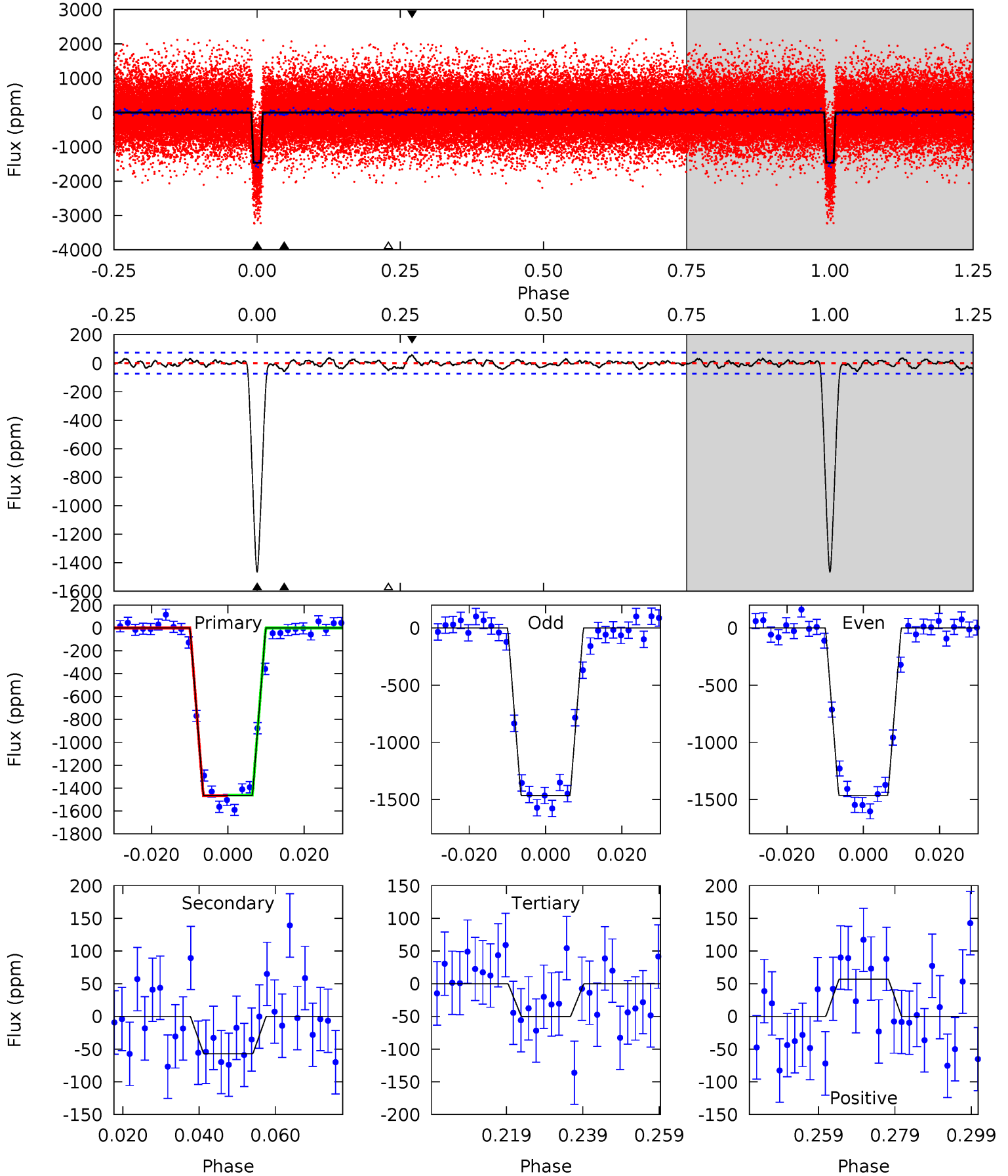
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|-------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 106.1 | 4.81 | 3.80 | 3.41 | 4.86 | 2.26 | 1.43 | 102.3 | 102.7 | 1.00 | 1.40 | 0.01 | 1.00 | 0.04 | 0.10 |



Alt Model-Shift Uniqueness Test

010271806-01, P = 5.924960 Days, E = 128.245303 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 97.0 | 3.78 | 3.32 | 3.78 | 4.89 | 2.33 | 1.15 | 93.7 | 93.2 | 0.47 | 0.01 | 0.03 | 1.01 | 0.04 | 0.17 |



Stellar Parameters For KIC 010271806

| | $T_{\text{eff}}(K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5016^{+100}_{-100} | $4.641^{+0.018}_{-0.053}$ | $-0.340^{+0.150}_{-0.150}$ | $0.679^{+0.046}_{-0.029}$ | $0.743^{+0.034}_{-0.052}$ | $3.340^{+0.263}_{-0.576}$ |
| | +2%/-2% | +0%/-1% | +44%/-44% | +7%/-4% | +5%/-7% | +8%/-17% |
| Source | SPE58 | SPE58 | SPE58 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 010271806-01 / KOI 0733.01

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|------------------|
| DV | -71 ± 15 | $3.23^{+0.16}_{-0.16}$ | 1068^{+25}_{-25} | 2878^{+101}_{-102} | 12^{+3}_{-3} |
| Alt. | -57 ± 15 | $2.90^{+0.15}_{-0.15}$ | 1067^{+26}_{-25} | 2882^{+123}_{-119} | 12^{+4}_{-3} |

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

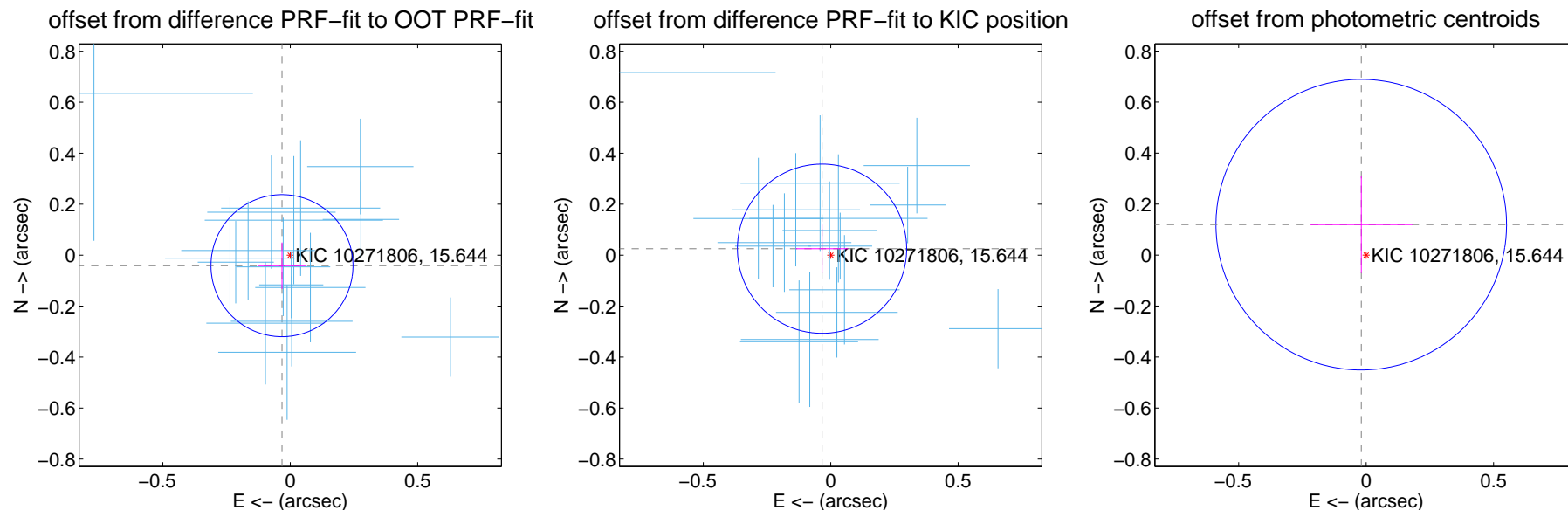
DV Centroid Data

Supplemental centroid analysis for 010271806-01. Kepler magnitude: 15.64. Transit SNR 63.57

There are 16 quarters with good PRF difference image offsets

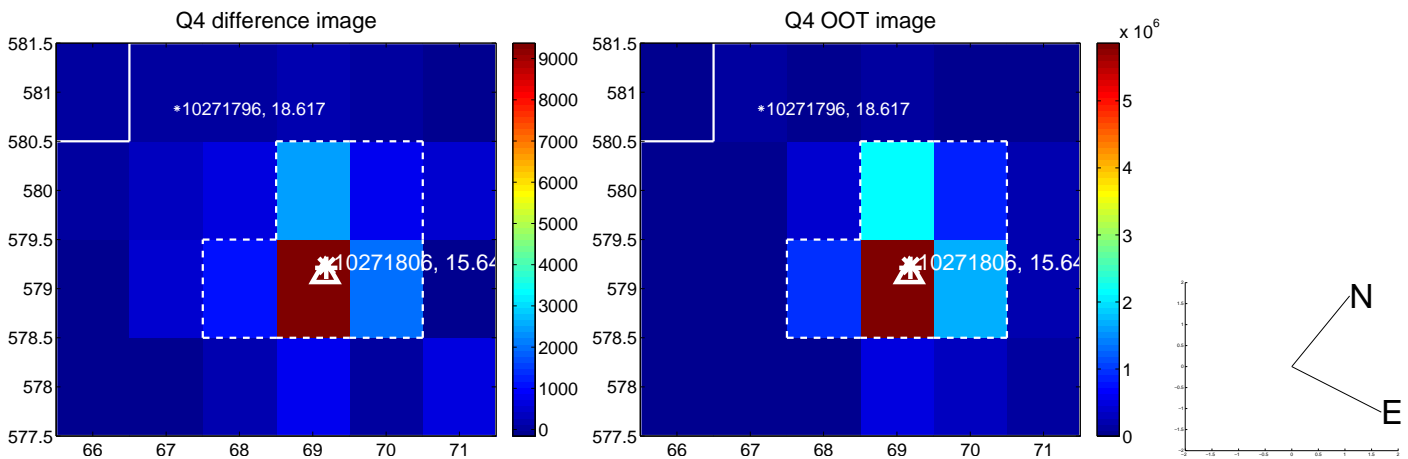
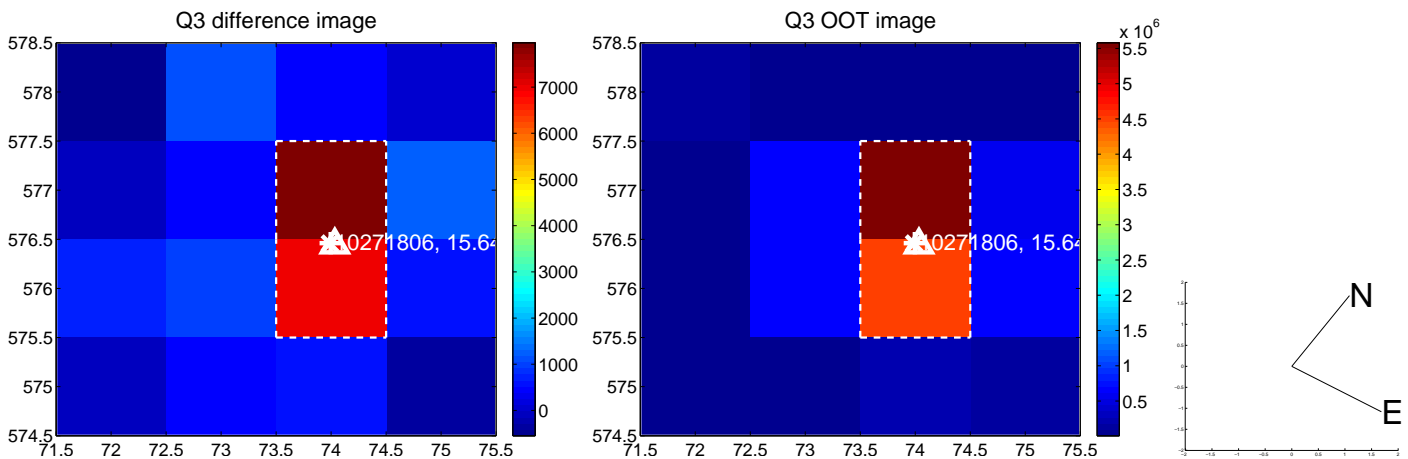
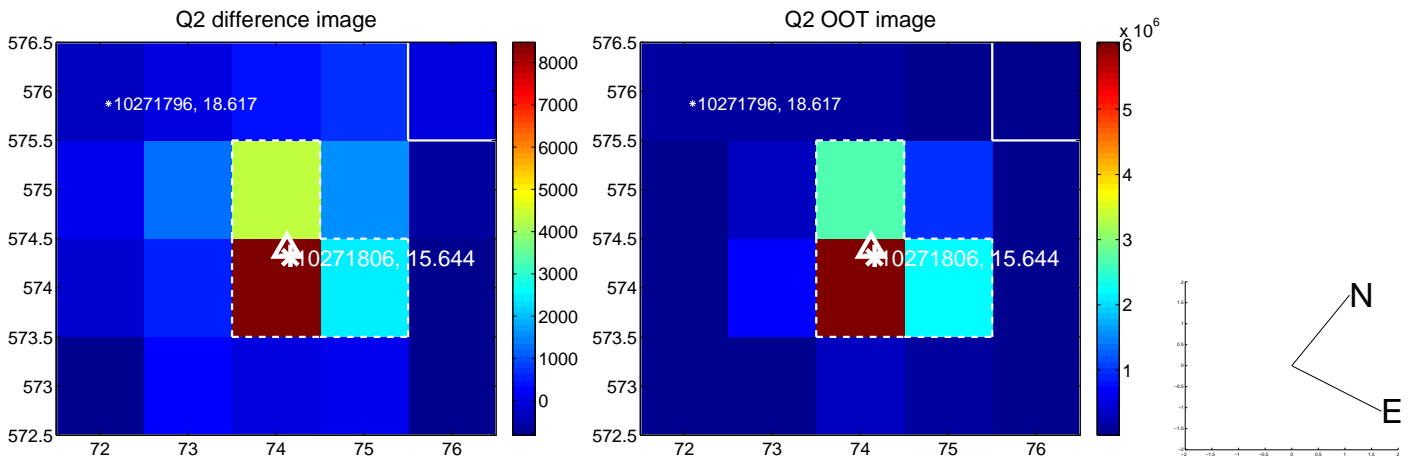
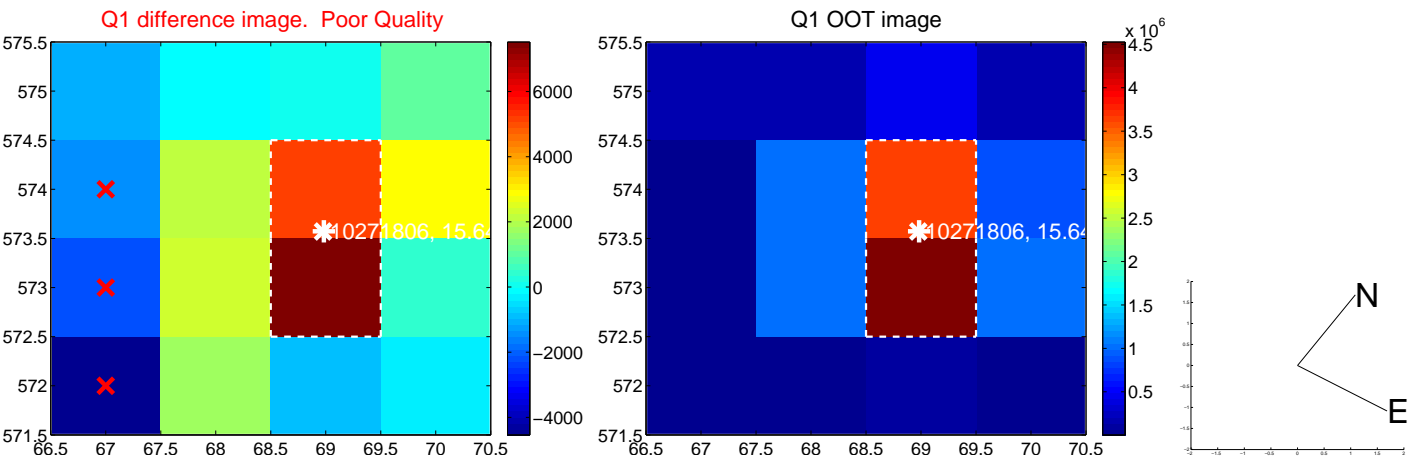
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT | 0.052 ± 0.093 | 0.57 | 0.032 ± 0.096 | -0.041 ± 0.091 |
| PRF-fit source offset from KIC position | 0.042 ± 0.111 | 0.38 | 0.034 ± 0.102 | 0.025 ± 0.095 |
| photometric centroid source offset | 0.12 ± 0.19 | 0.64 | 0.02 ± 0.20 | 0.12 ± 0.19 |

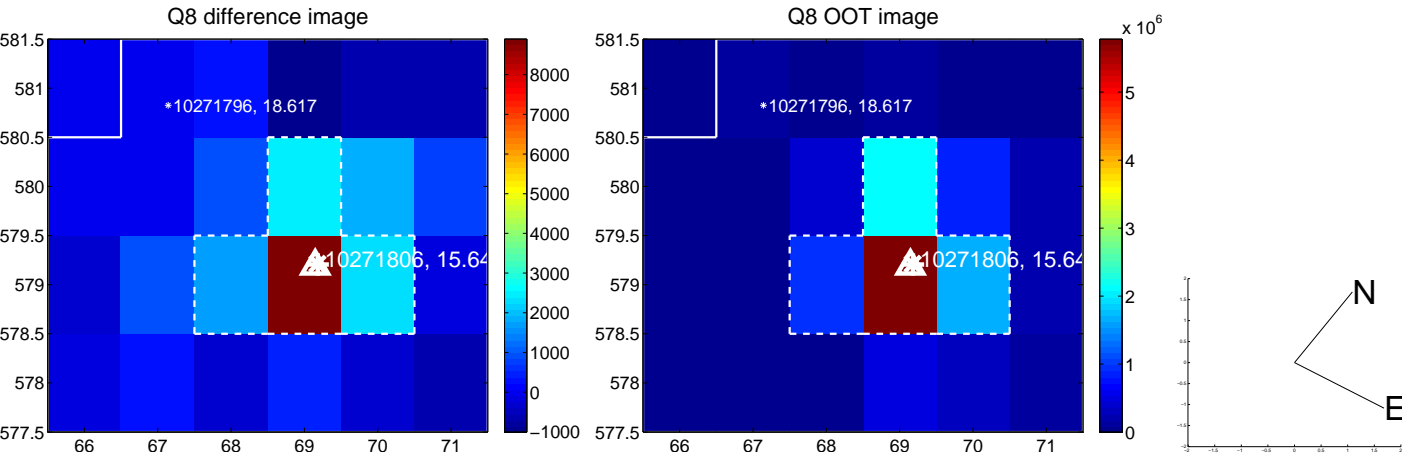
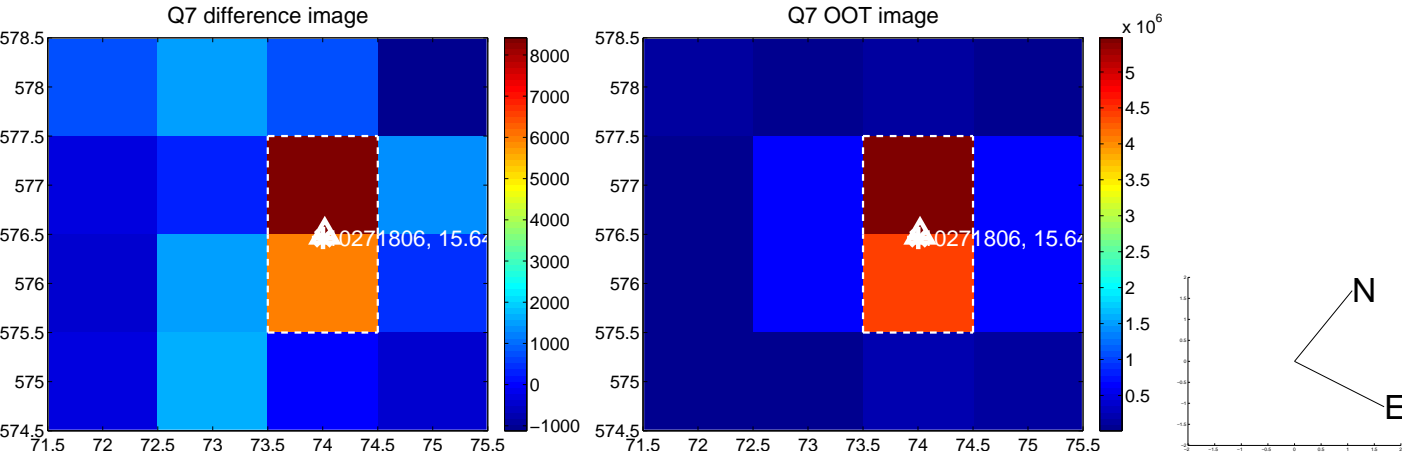
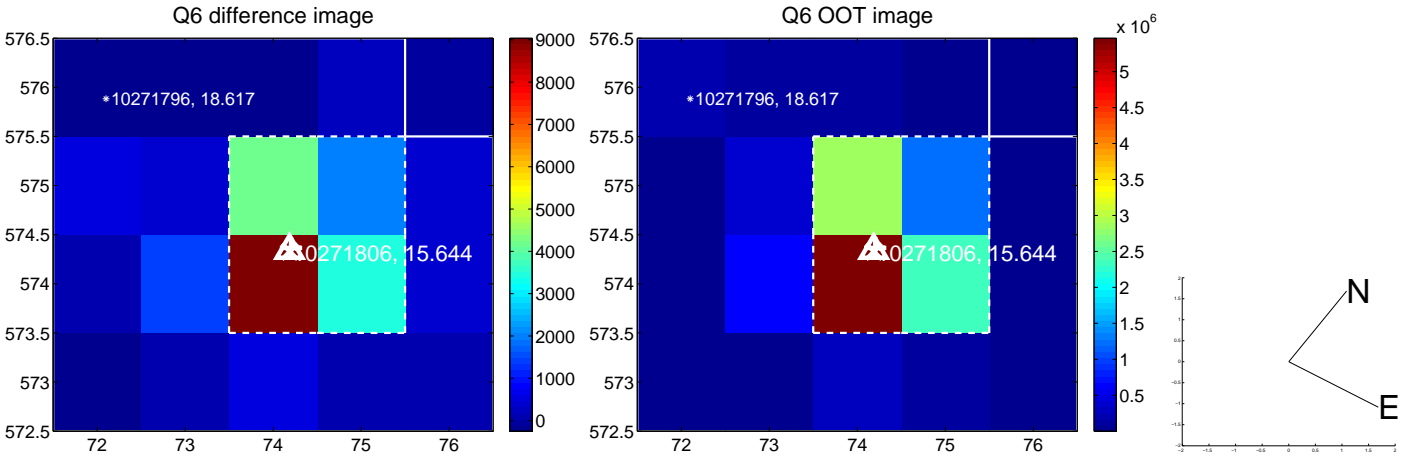
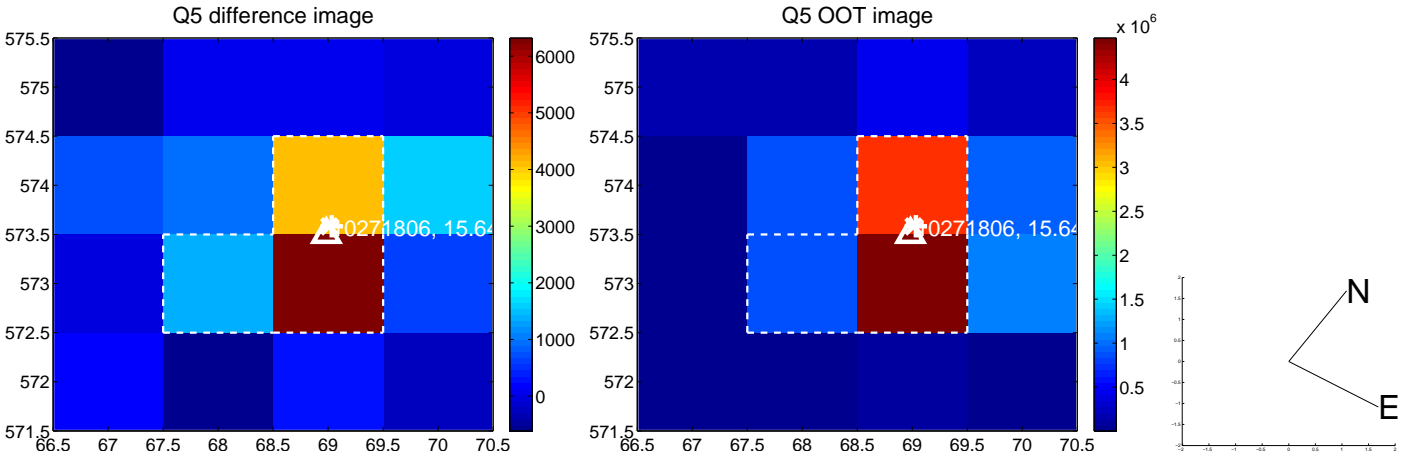


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

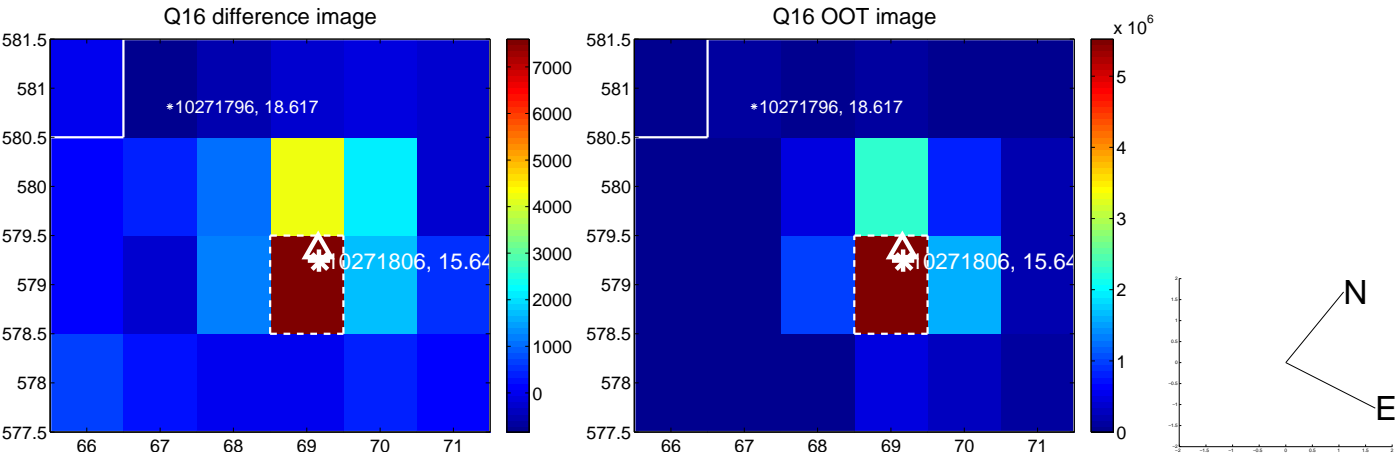
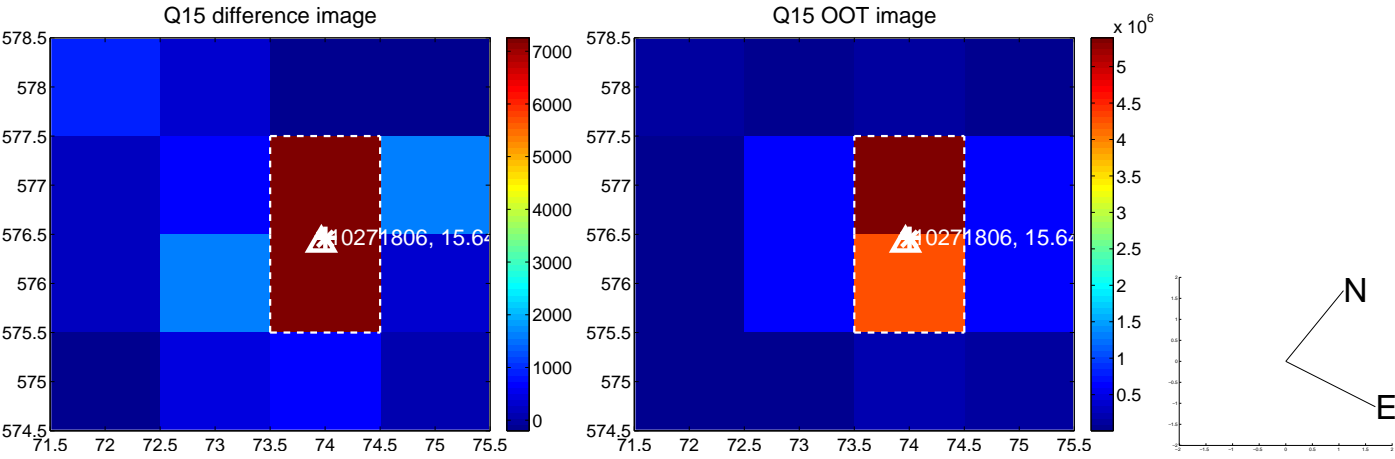
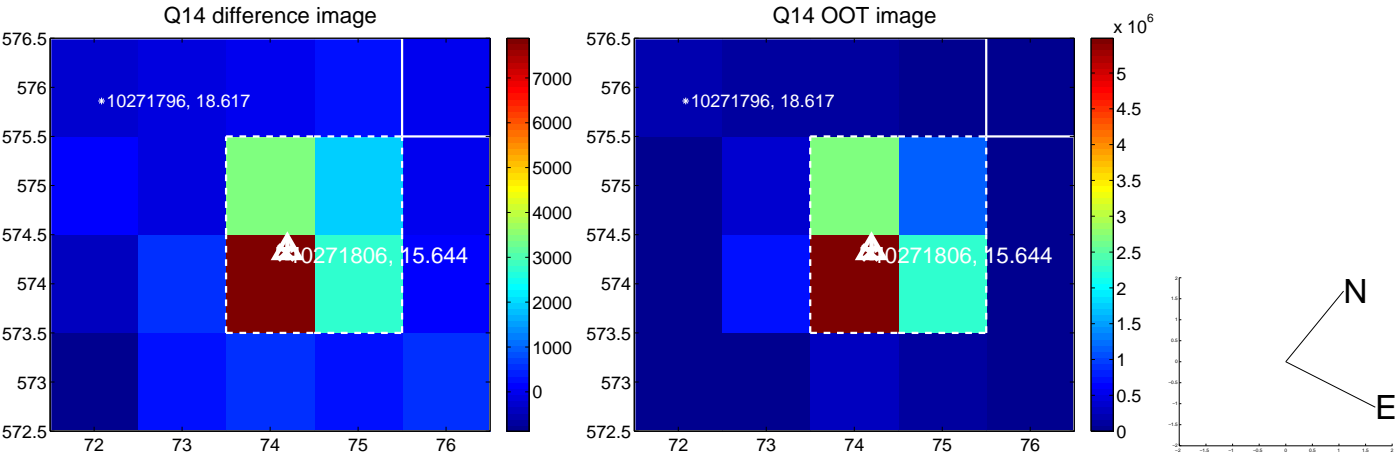
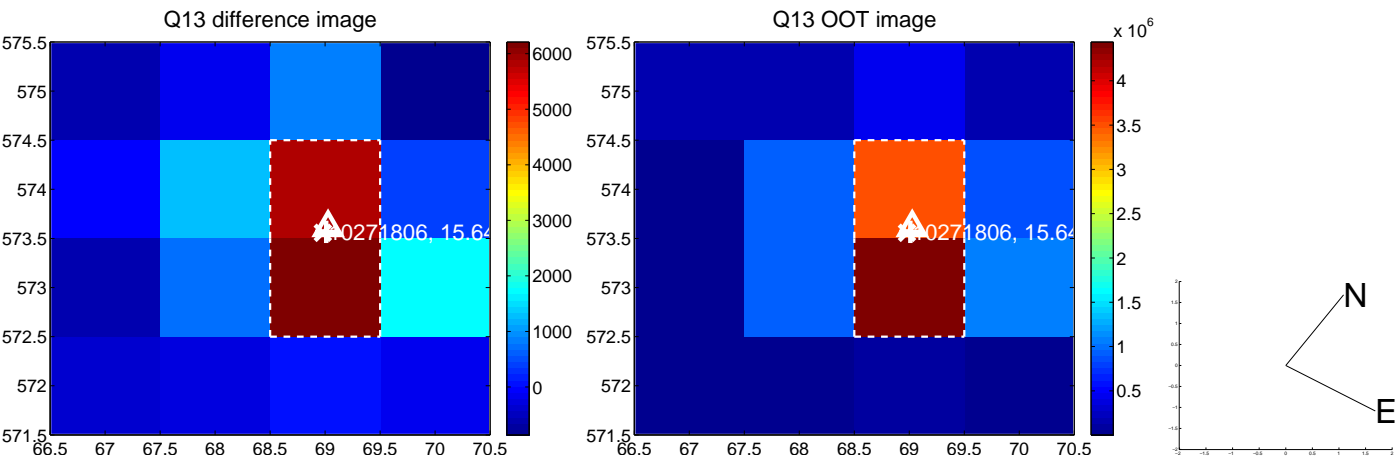
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



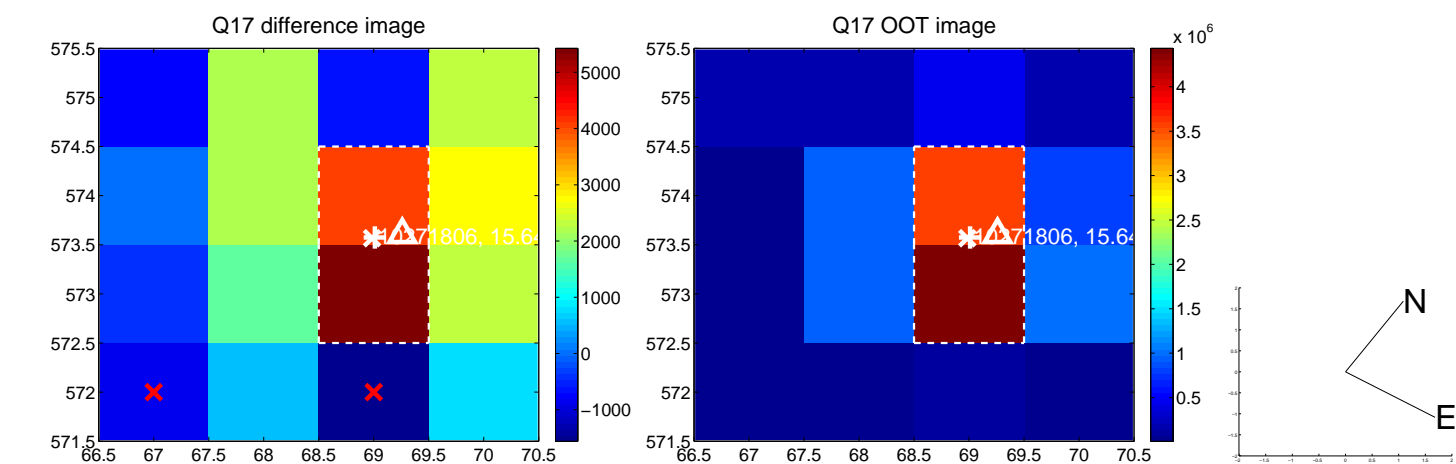
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



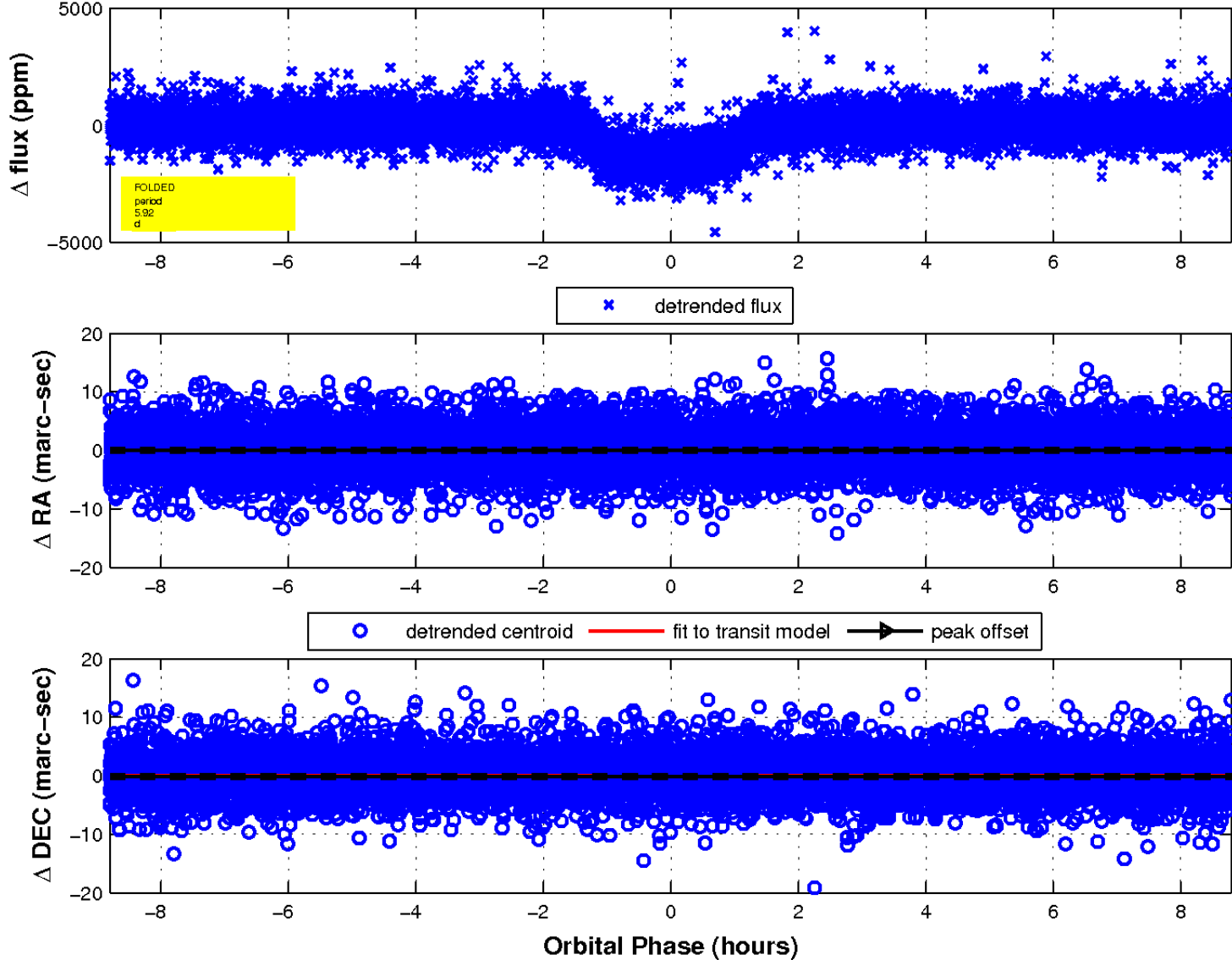
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

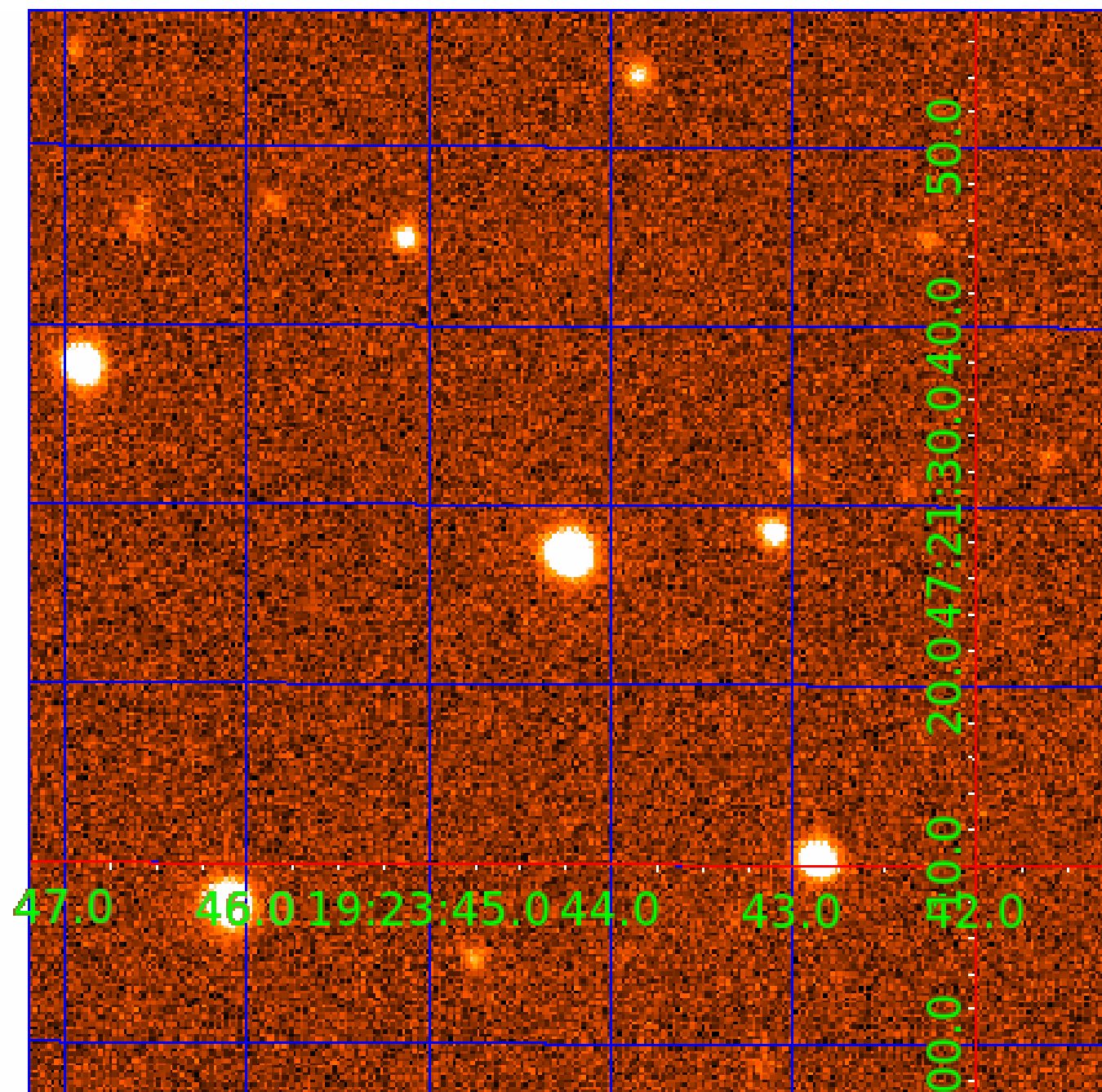


fluxWeightedCentroids, Planet 1 of 4



UKIRT Image

Declination



KIC 010271806

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010271806-01 | OBS | 0733.01 | 5.924991 | 134.166675 | 1566.9 | 2.934 | 58.5 | 63.6 | 0.68 | 5016 | 3.19 | 78.10 |
| 010271806-02 | OBS | 0733.02 | 11.349353 | 134.317895 | 1316.2 | 3.266 | 36.5 | 40.1 | 0.68 | 5016 | 2.68 | 32.83 |
| 010271806-03 | OBS | 0733.03 | 3.132962 | 132.540194 | 428.2 | 2.387 | 20.5 | 23.2 | 0.68 | 5016 | 1.71 | 182.66 |
| 010271806-04 | OBS | 0733.04 | 18.643508 | 141.626237 | 866.6 | 1.789 | 15.0 | 17.0 | 0.68 | 5016 | 2.17 | 16.94 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 010271806-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-03 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-04 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

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

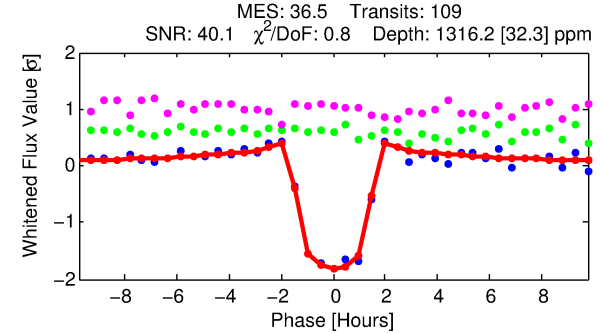
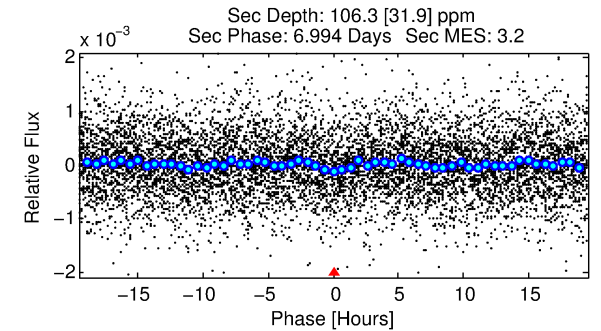
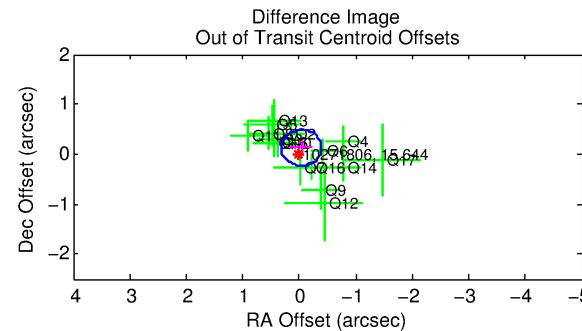
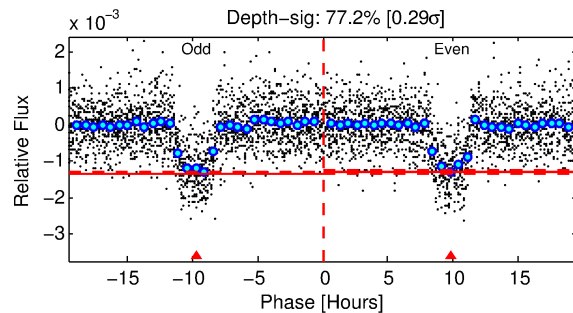
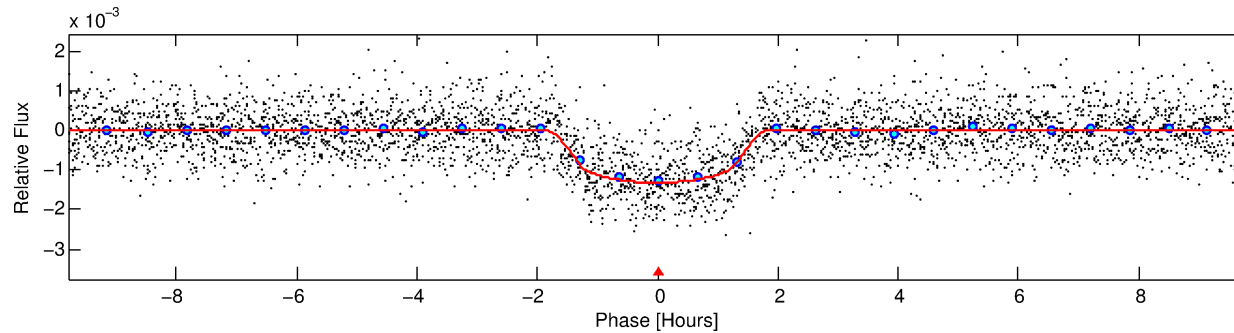
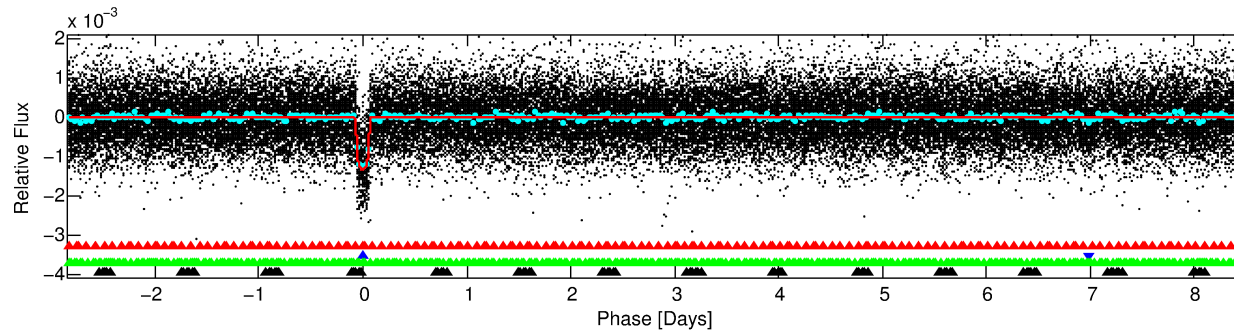
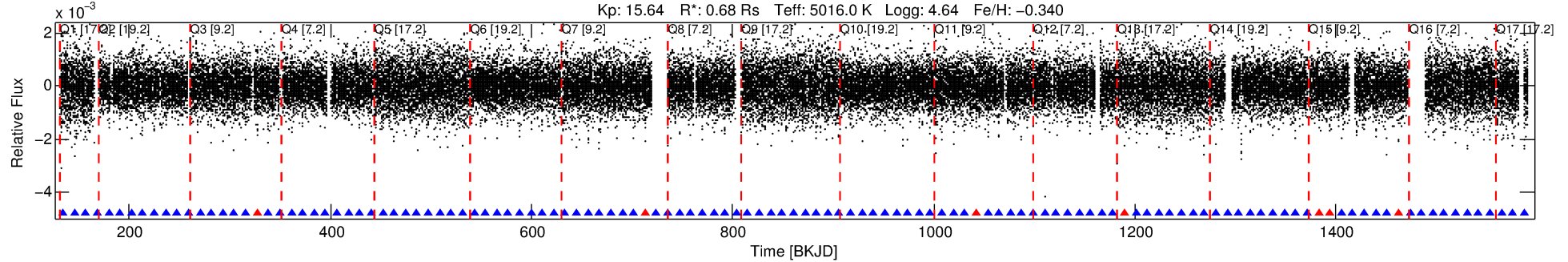
Ephemeris Match Information For 010271806-02

No Significant Match Found

DV One-Page Summary

KIC: 10271806 Candidate: 2 of 4 Period: 11.349 d
KOI: K00733.02 Name: Kepler-224d Corr: 0.975

Kp: 15.64 R*: 0.68 Rs Teff: 5016.0 K Logg: 4.64 Fe/H: -0.340



DV Fit Results:

Period = 11.34935 [0.00002] d
Epoch = 134.3179 [0.0015] BKJD
Rp/R* = 0.0362 [0.0068]
a/R* = 19.01 [12.85]
b = 0.75 [0.41]
Seff = 32.83 [4.02]
Teff = 610 [19] K
Rp = 2.68 [0.54] Re
a = 0.0892 [0.0054] AU
Ag = 64.68 [31.67] [2.01σ]
Teffp = 2676 [326] K [6.33σ]

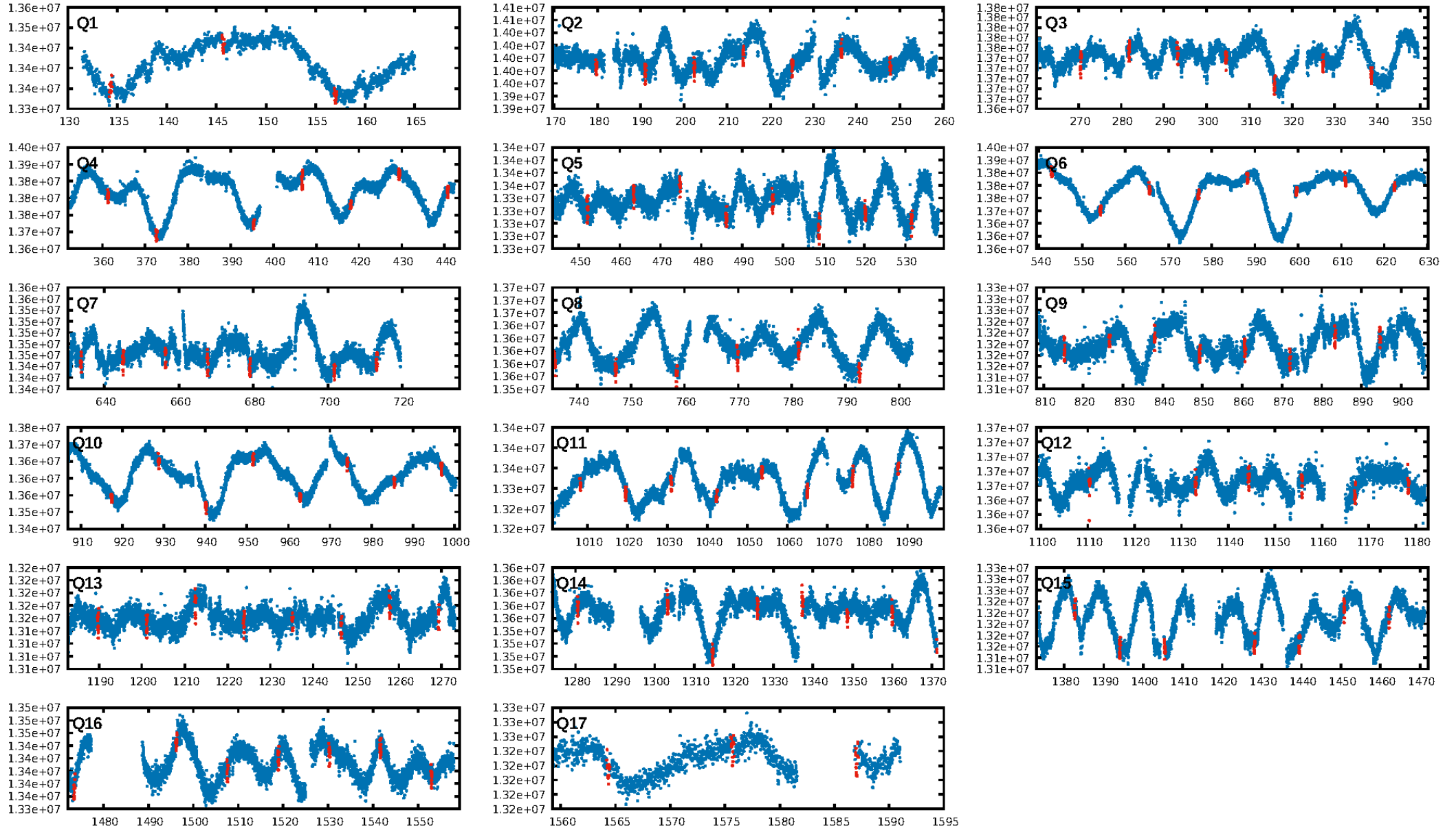
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [29.65σ]
LongPeriod-sig: 100.0% [47.01σ]
ModelChiSquare2-sig: 100.0%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 4.96e-255
RollingBand-fgt: 0.93 [96/103]
GhostDiagnostic-chr: 3.504
Centroid-sig: 20.8%
Centroid-so: 0.270 arcsec [0.91σ]
OotOffset-rm: 0.134 arcsec [1.13σ]
KicOffset-rm: 0.194 arcsec [1.65σ]
OotOffset-st: 4/4/4/4 [16]
KicOffset-st: 4/4/4/4 [16]
DiffImageQuality-fgm: 0.94 [15/16]
DiffImageOverlap-fno: 1.00 [17/17]

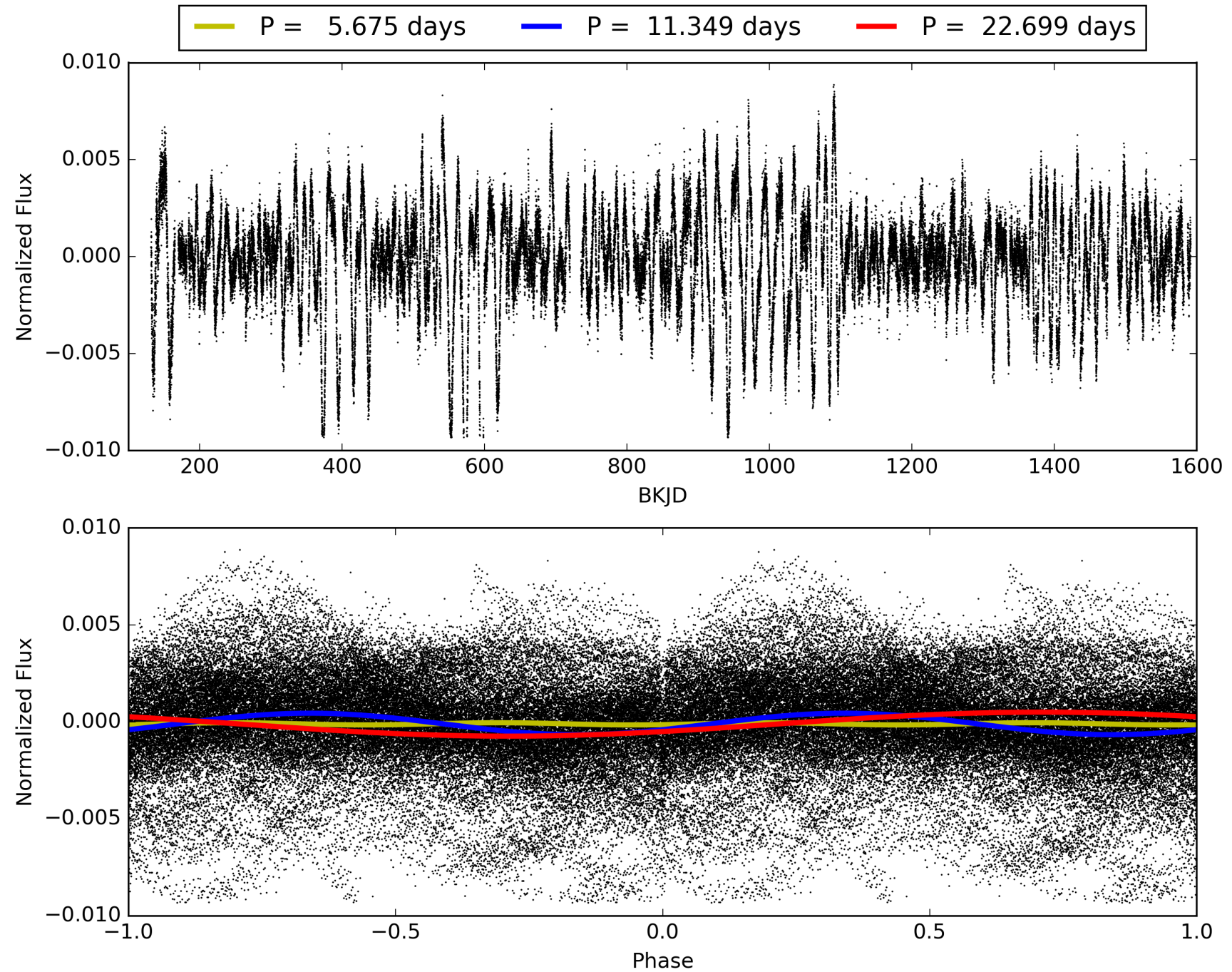
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 12:39:39 Z

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

TCE 010271806-02, PDC Light Curves

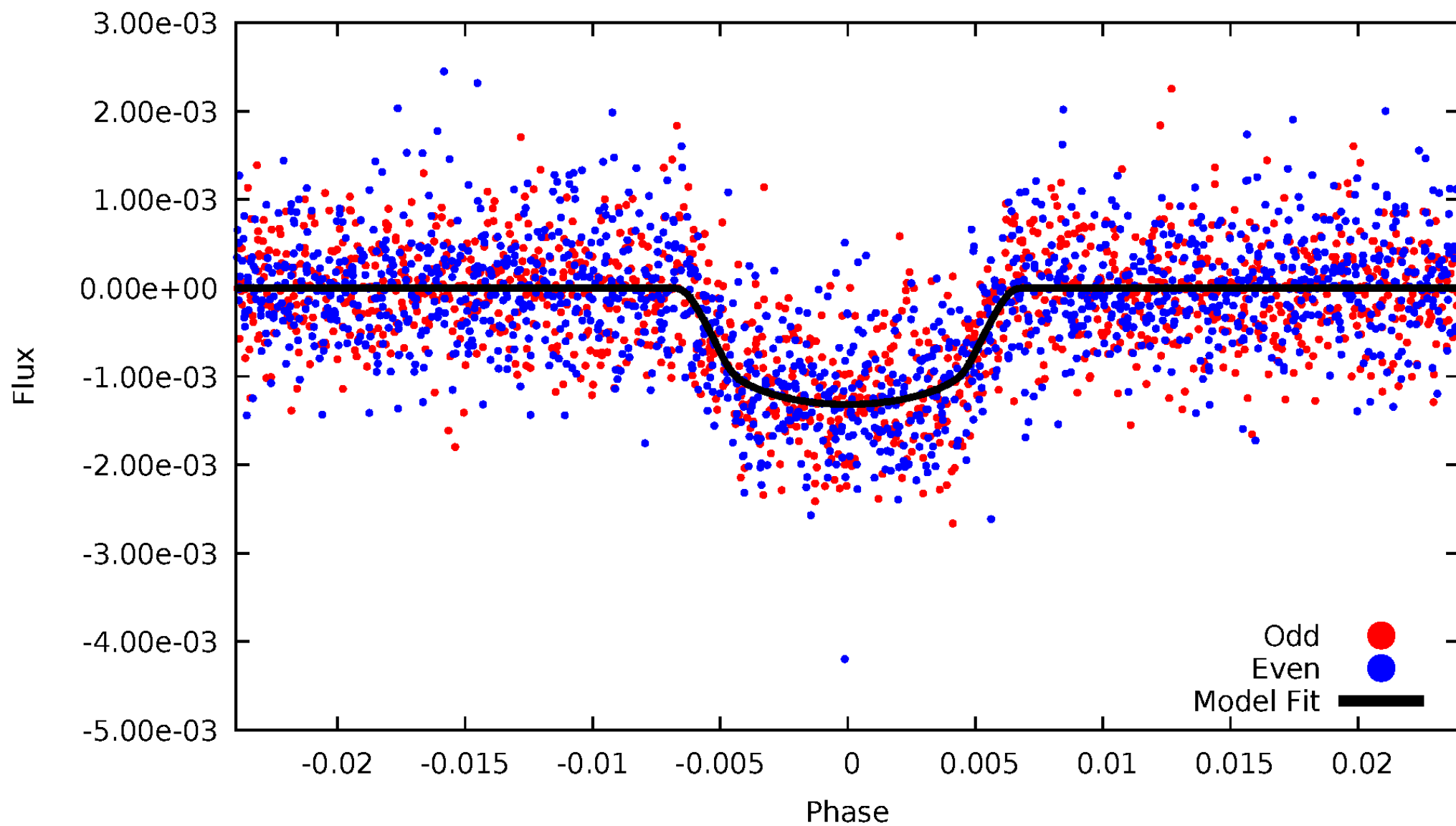


TCE 010271806-02



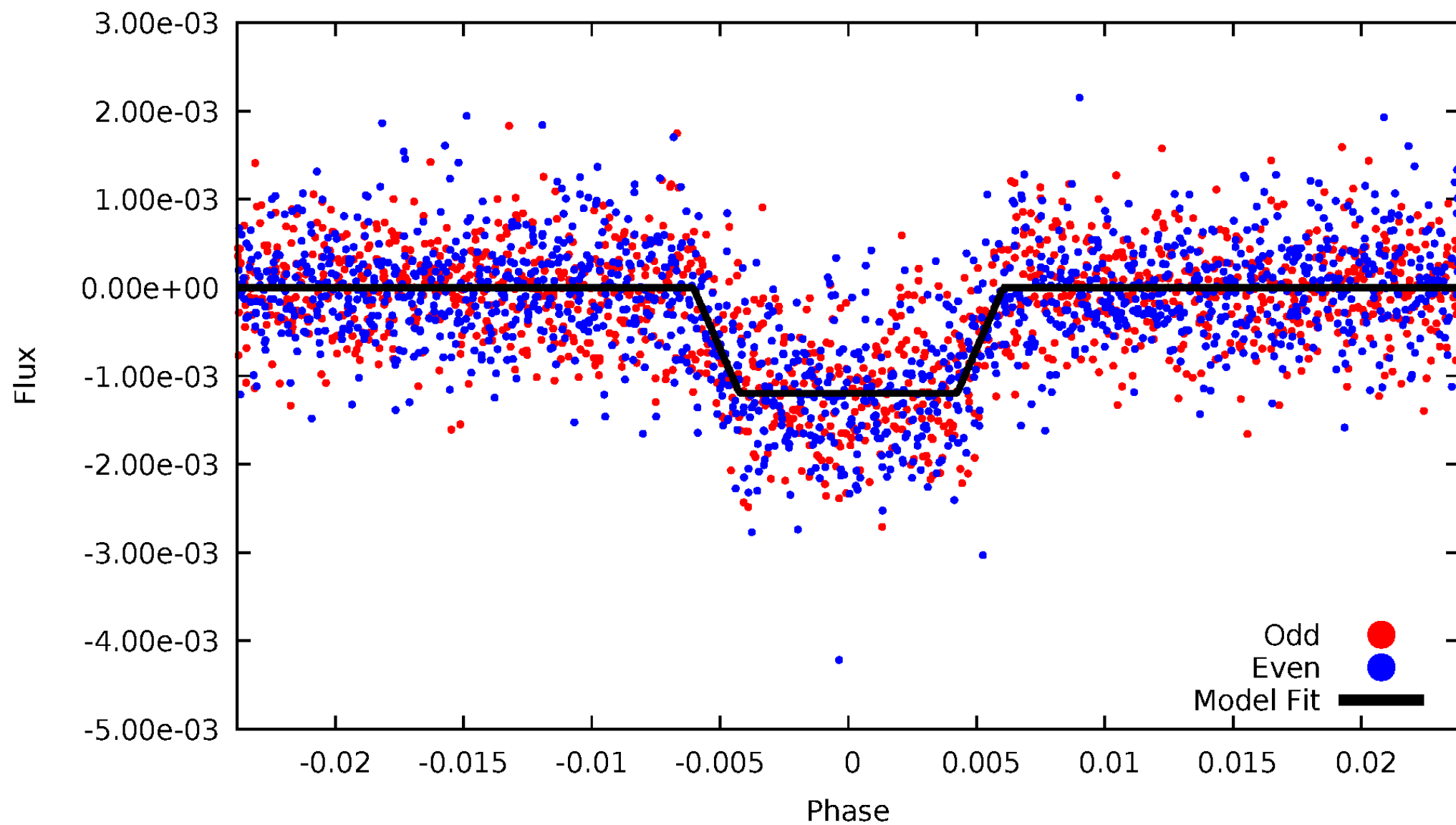
DV Odd/Even

TCE 010271806-02



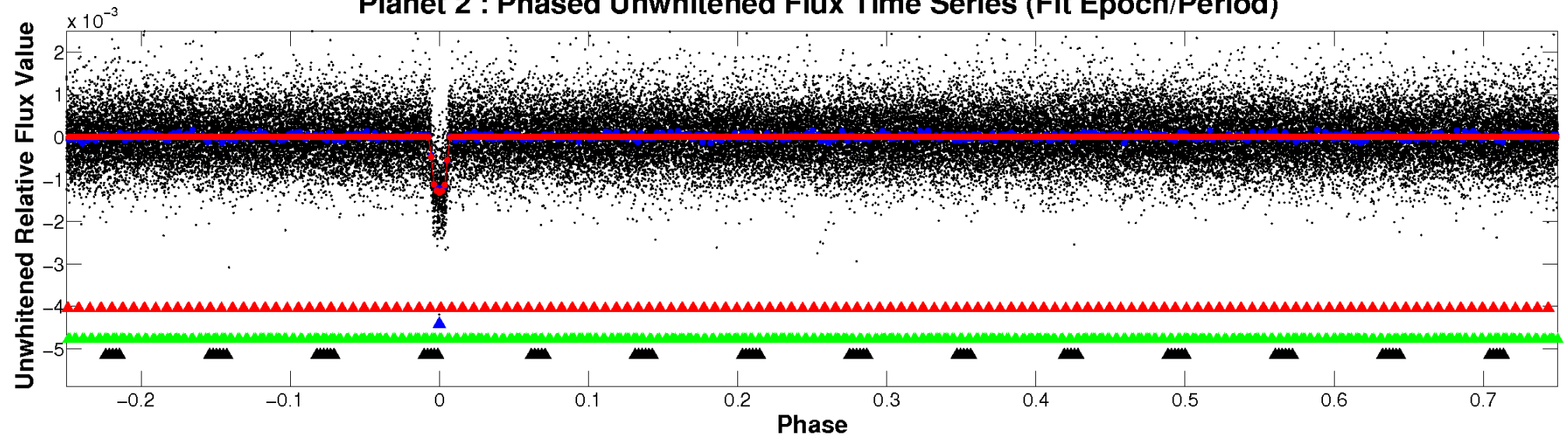
ALT Odd/Even

TCE 010271806-02

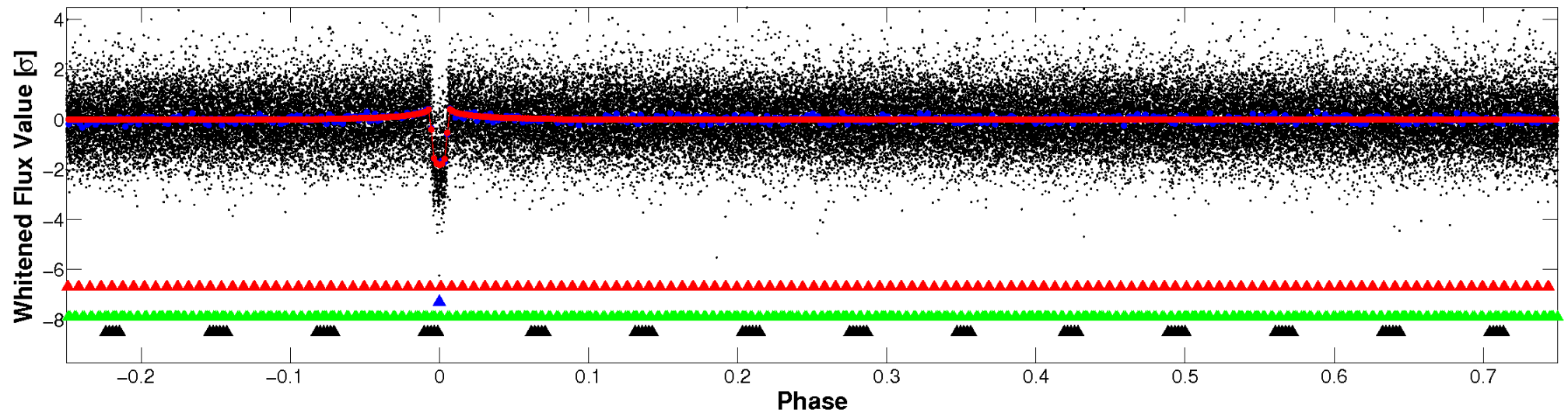


Non-Whitened Vs. Whitened Light Curve

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

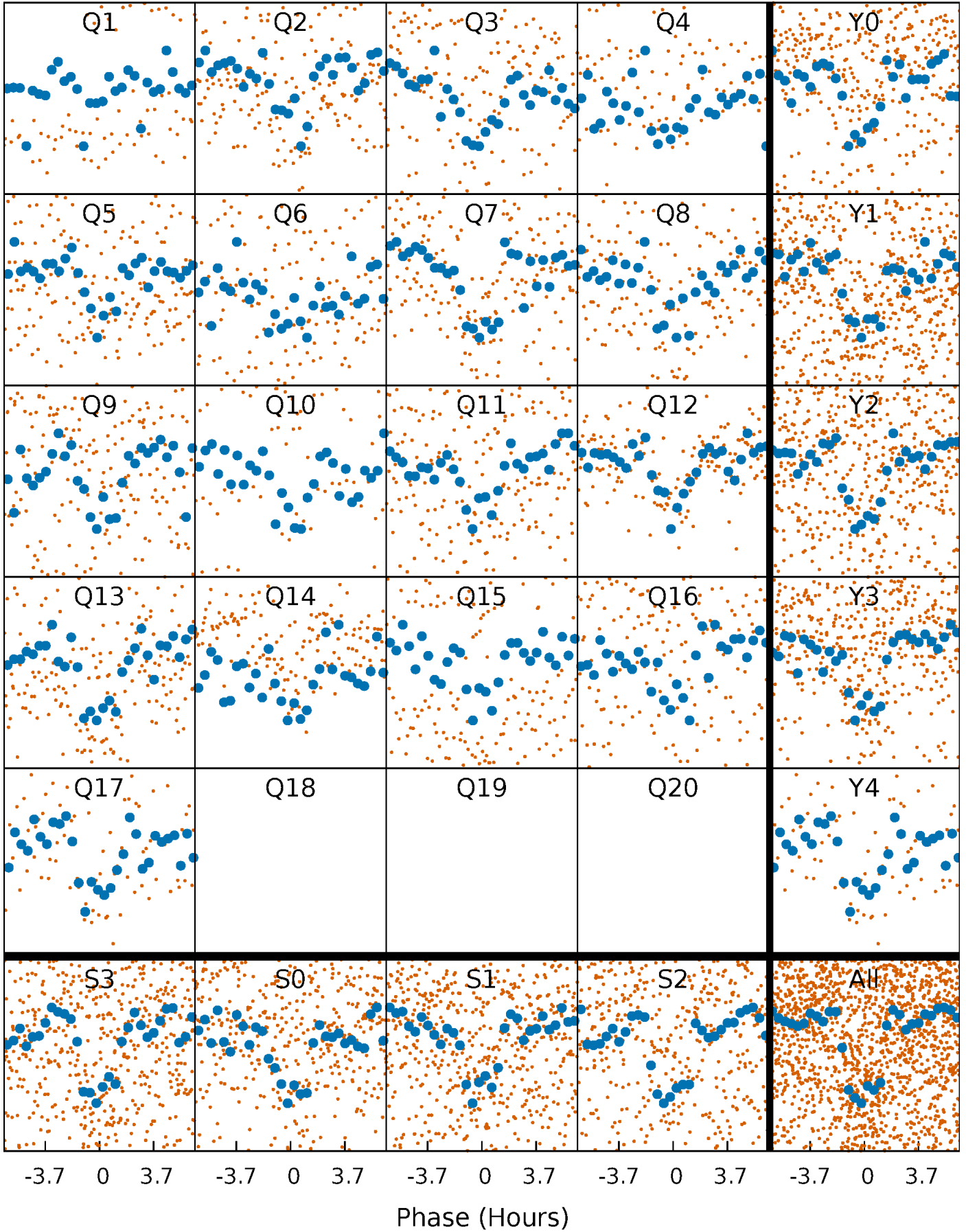


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



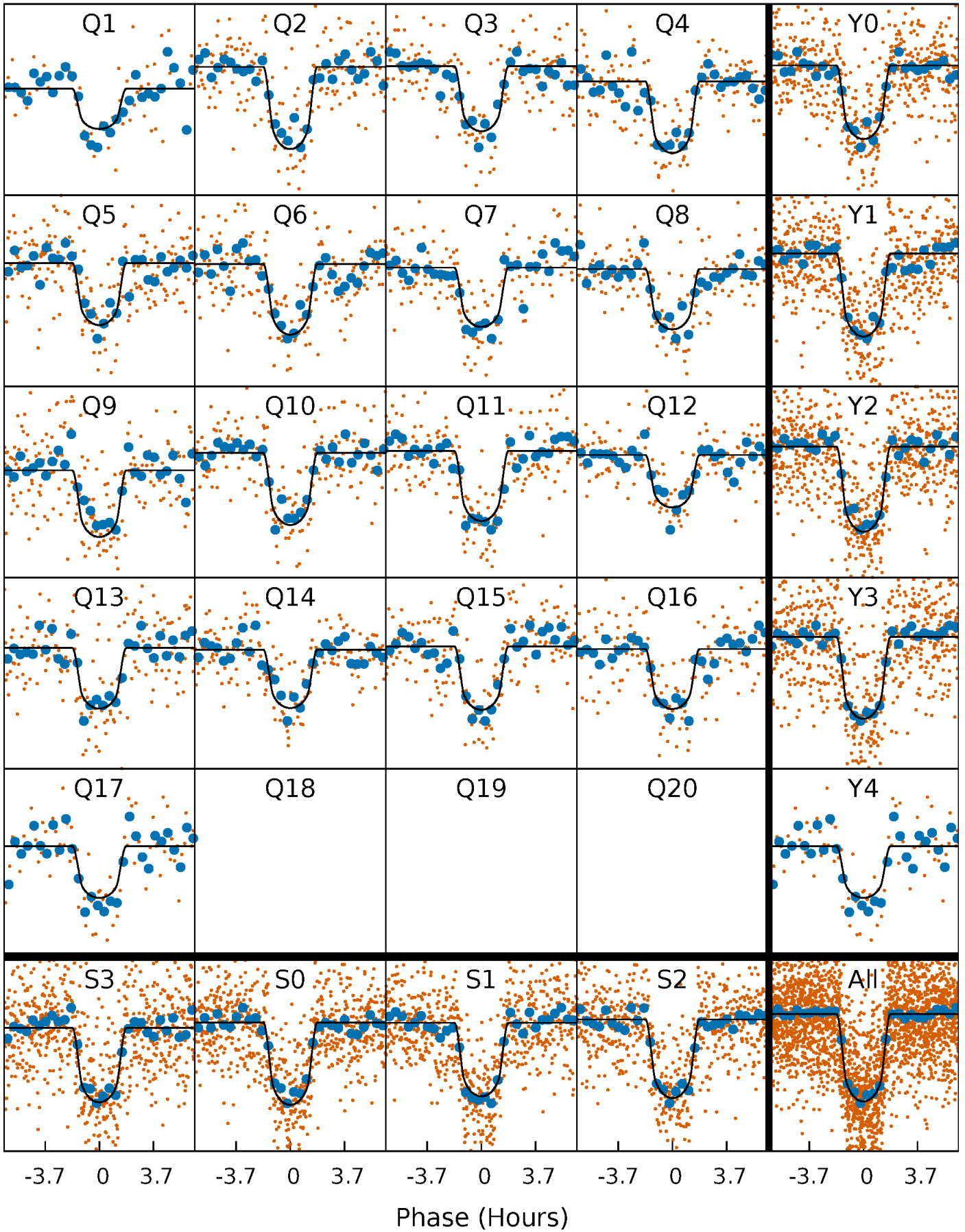
PDC Quarter-Phased Transit Curves

TCE 010271806-02 P= 11.349353 Days $T_0=134.317895$ (BKJD)



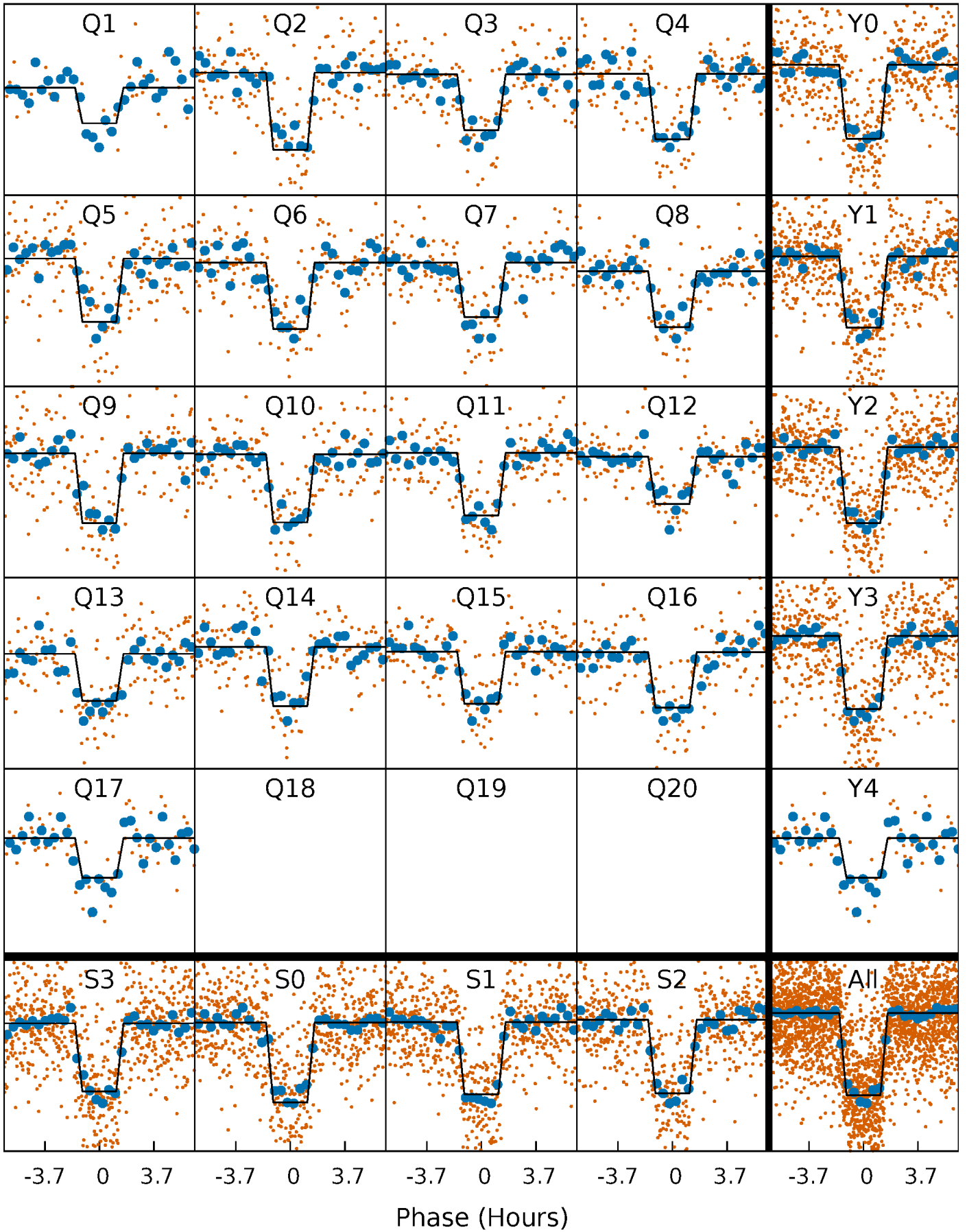
DV Quarter-Phased Transit Curves

TCE 010271806-02 P= 11.349353 Days $T_0=134.317895$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

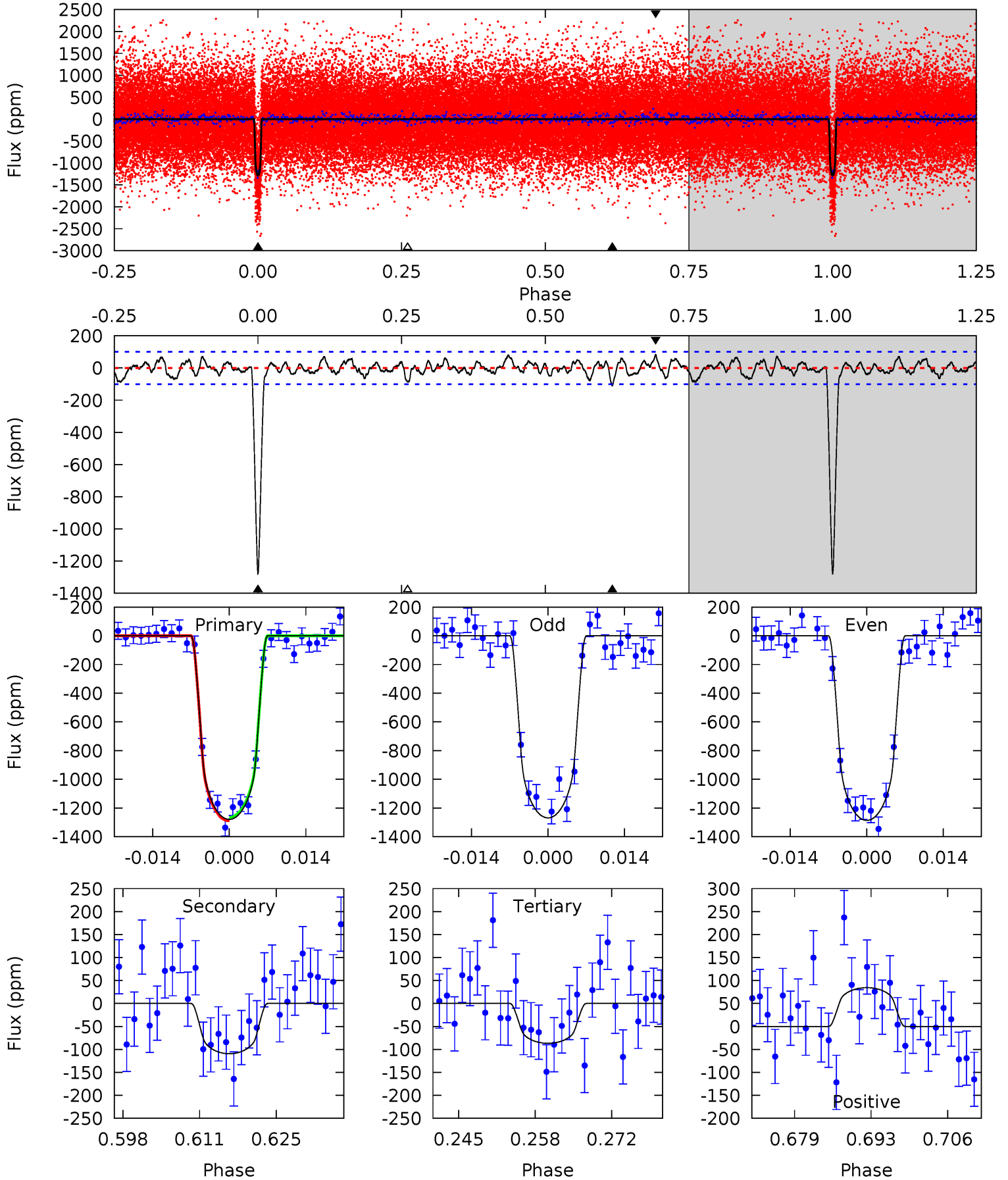
TCE 010271806-02 P= 11.349459 Days $T_0=134.311583$ (BKJD)



DV Model-Shift Uniqueness Test

010271806-02, $P = 11.349353$ Days, $E = 122.968542$ Days

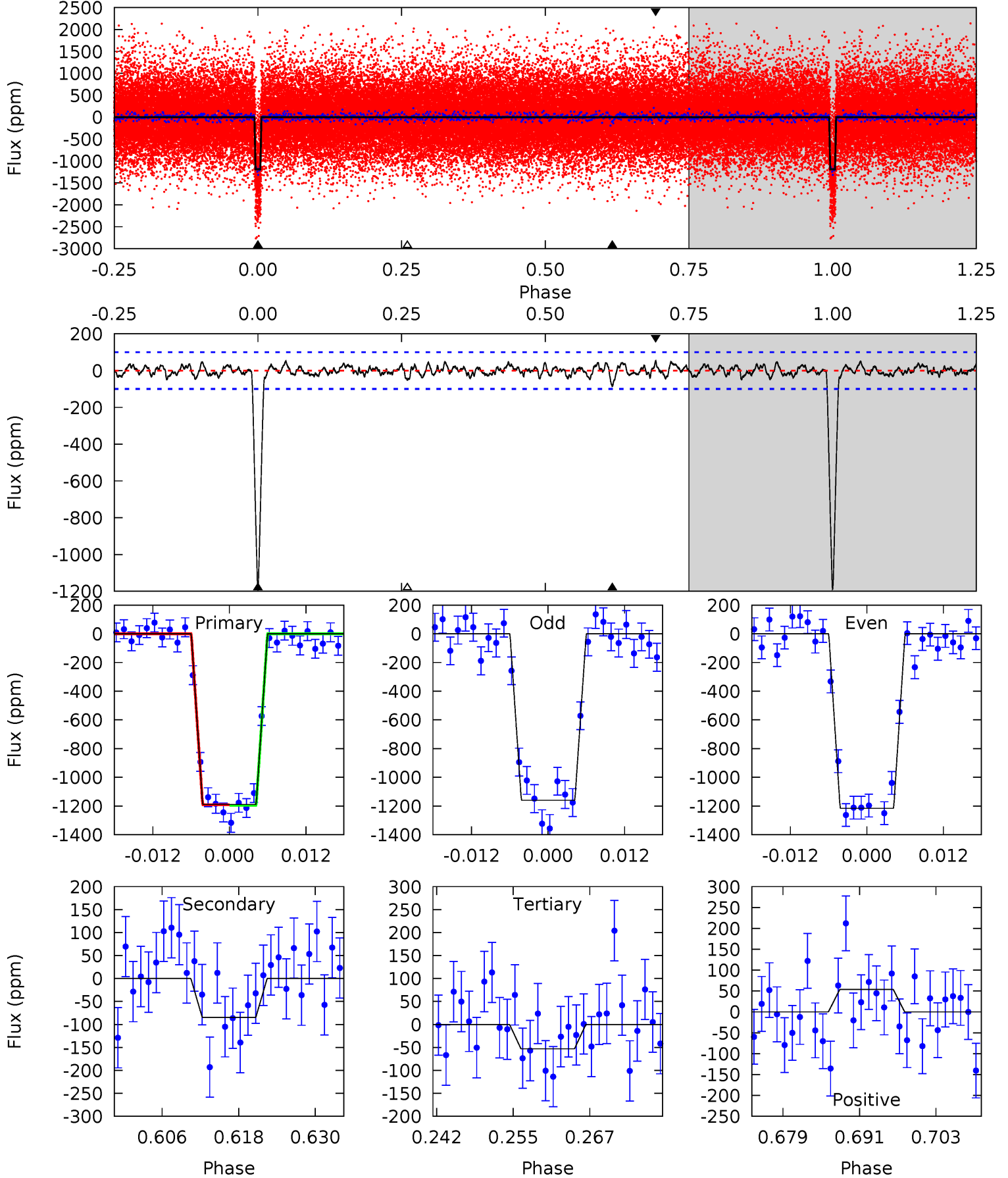
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 63.1 | 5.40 | 4.28 | 4.16 | 4.97 | 2.47 | 1.60 | 58.8 | 58.9 | 1.12 | 1.24 | 0.43 | 1.00 | 0.06 | 0.57 |



Alt Model-Shift Uniqueness Test

010271806-02, P = 11.349459 Days, E = 122.962124 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 59.3 | 4.24 | 2.65 | 2.68 | 4.99 | 2.51 | 1.02 | 56.6 | 56.6 | 1.59 | 1.56 | 1.39 | 0.99 | 0.04 | 0.11 |



Stellar Parameters For KIC 010271806

| | $T_{\text{eff}}(K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5016^{+100}_{-100} | $4.641^{+0.018}_{-0.053}$ | $-0.340^{+0.150}_{-0.150}$ | $0.679^{+0.046}_{-0.029}$ | $0.743^{+0.034}_{-0.052}$ | $3.340^{+0.263}_{-0.576}$ |
| | +2%/-2% | +0%/-1% | +44%/-44% | +7%/-4% | +5%/-7% | +8%/-17% |
| Source | SPE58 | SPE58 | SPE58 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 010271806-02 / KOI 0733.02

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|---------------|------------------------|----------------------|----------------------|------------------|
| DV | -109 ± 20 | $2.71^{+0.53}_{-0.52}$ | 860^{+21}_{-21} | 3232^{+234}_{-187} | 65^{+34}_{-21} |
| Alt. | -85 ± 20 | $2.59^{+0.51}_{-0.49}$ | 858^{+23}_{-20} | 3159^{+218}_{-202} | 55^{+31}_{-19} |

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

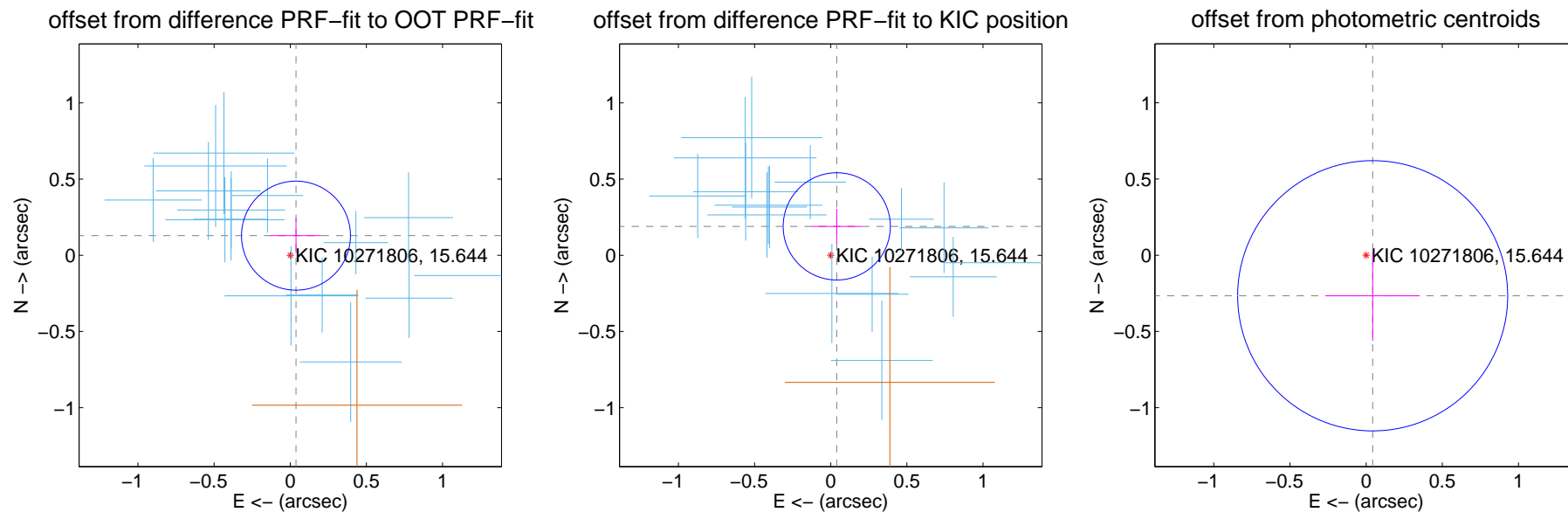
DV Centroid Data

Supplemental centroid analysis for 010271806-02. Kepler magnitude: 15.64. Transit SNR 40.08

There are 15 quarters with good PRF difference image offsets

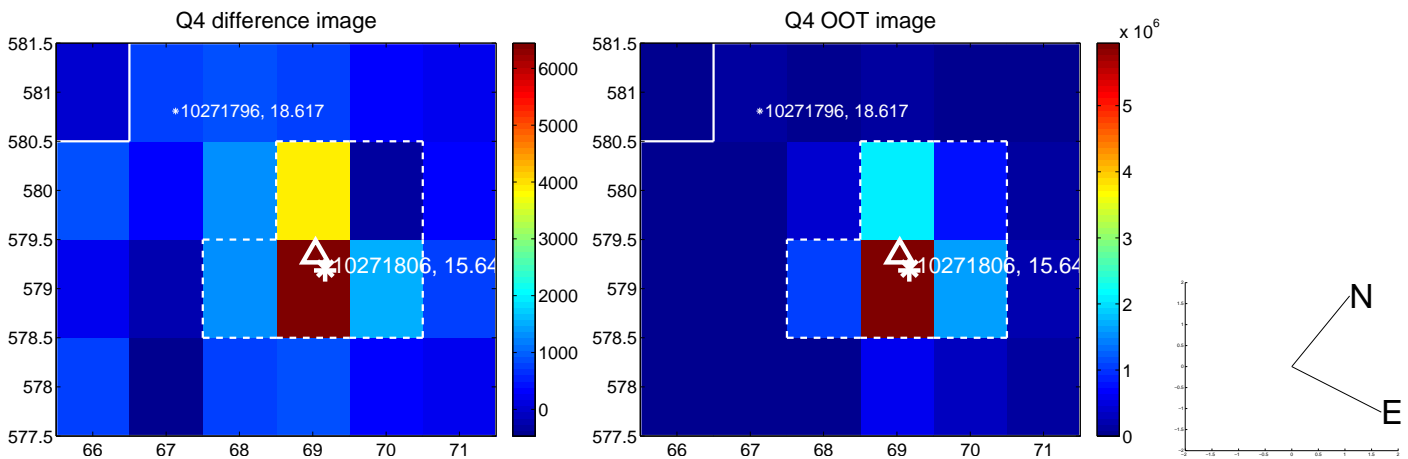
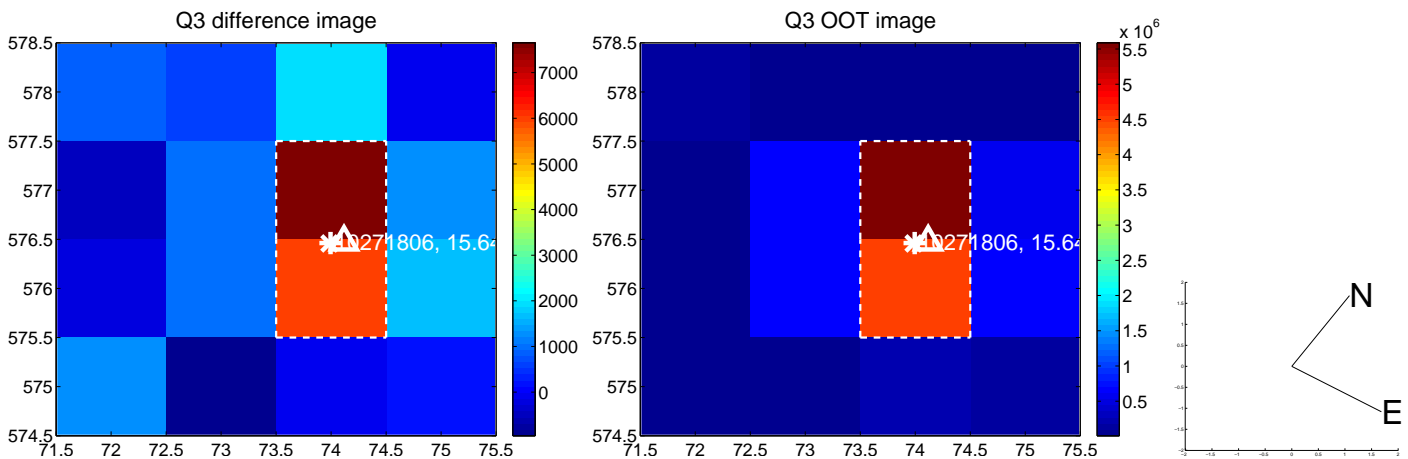
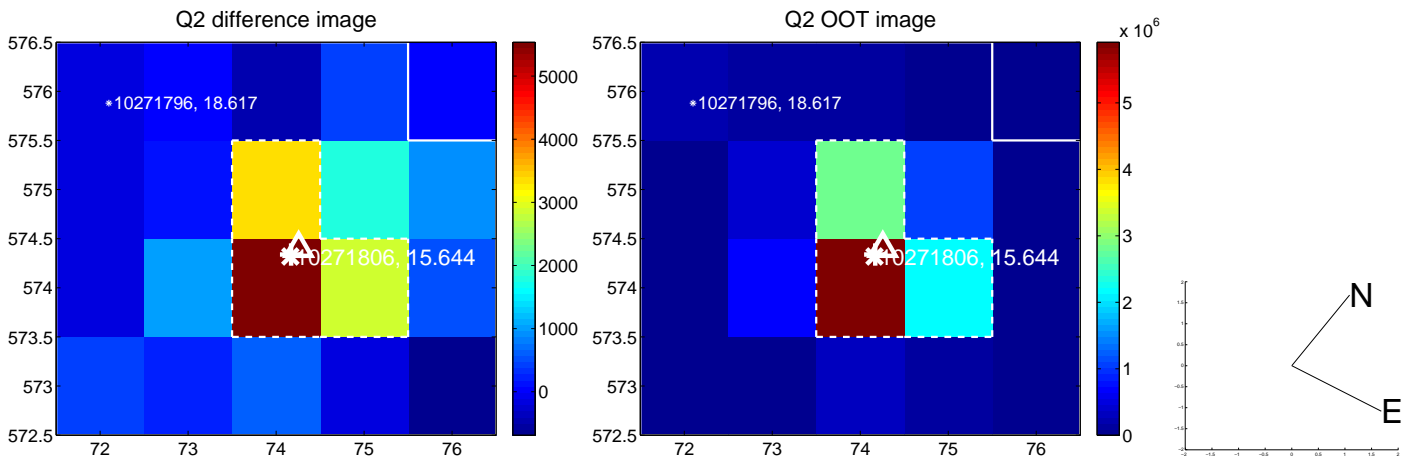
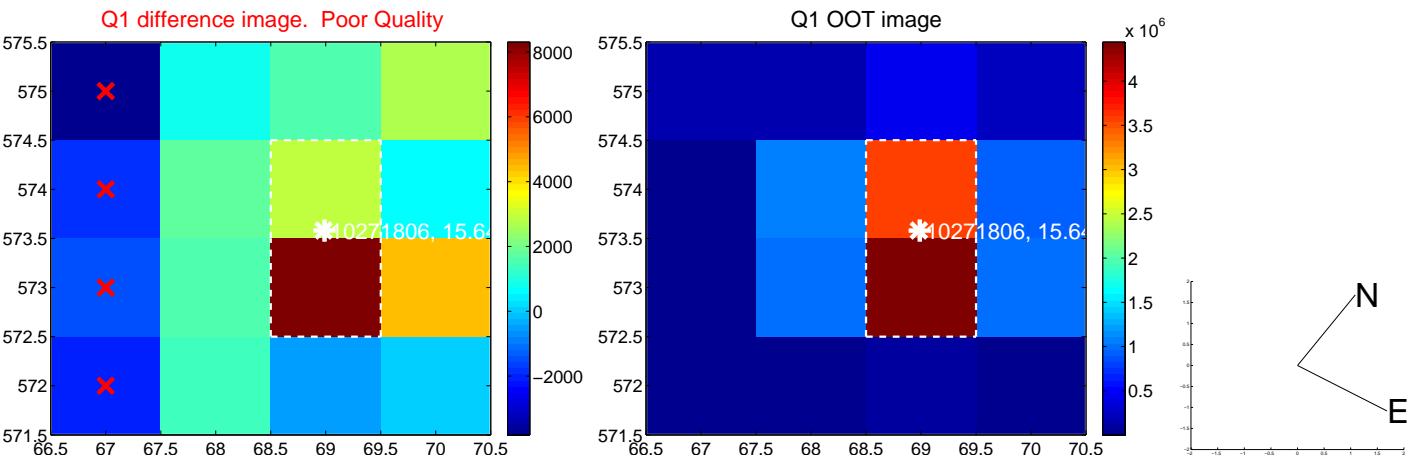
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|-------------------|
| PRF-fit source offset from OOT | 0.134 ± 0.119 | 1.13 | -0.038 ± 0.167 | 0.129 ± 0.114 |
| PRF-fit source offset from KIC position | 0.194 ± 0.117 | 1.65 | -0.040 ± 0.167 | 0.190 ± 0.115 |
| photometric centroid source offset | 0.27 ± 0.30 | 0.91 | -0.04 ± 0.31 | -0.27 ± 0.30 |

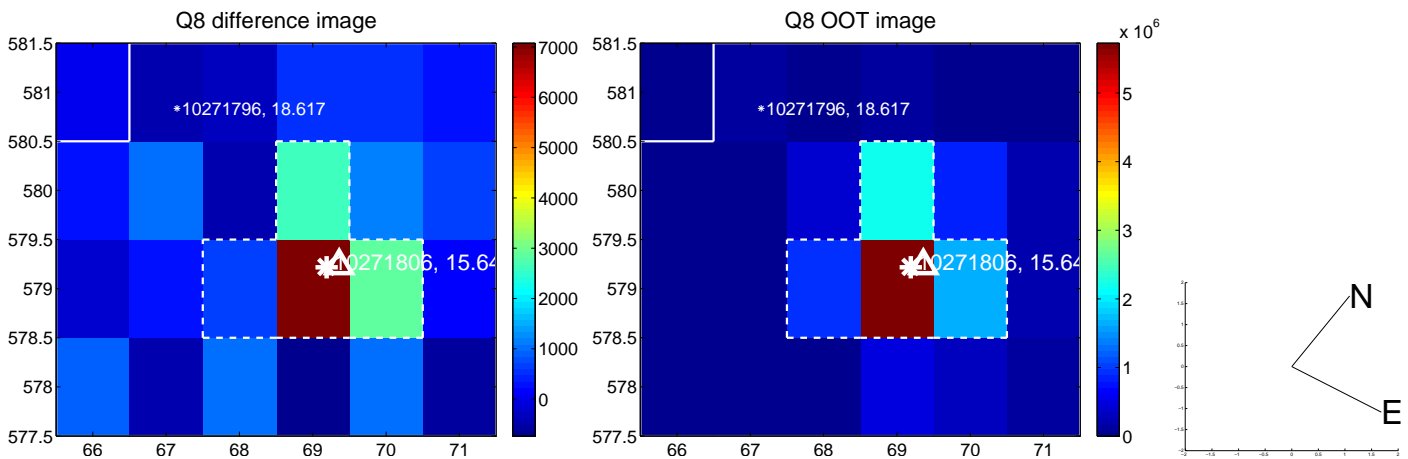
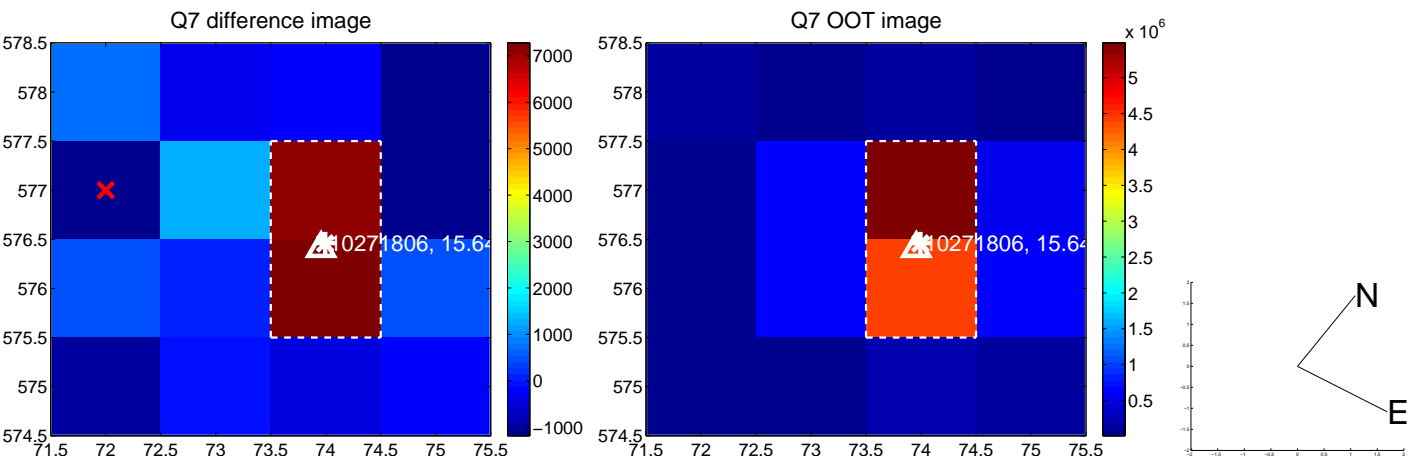
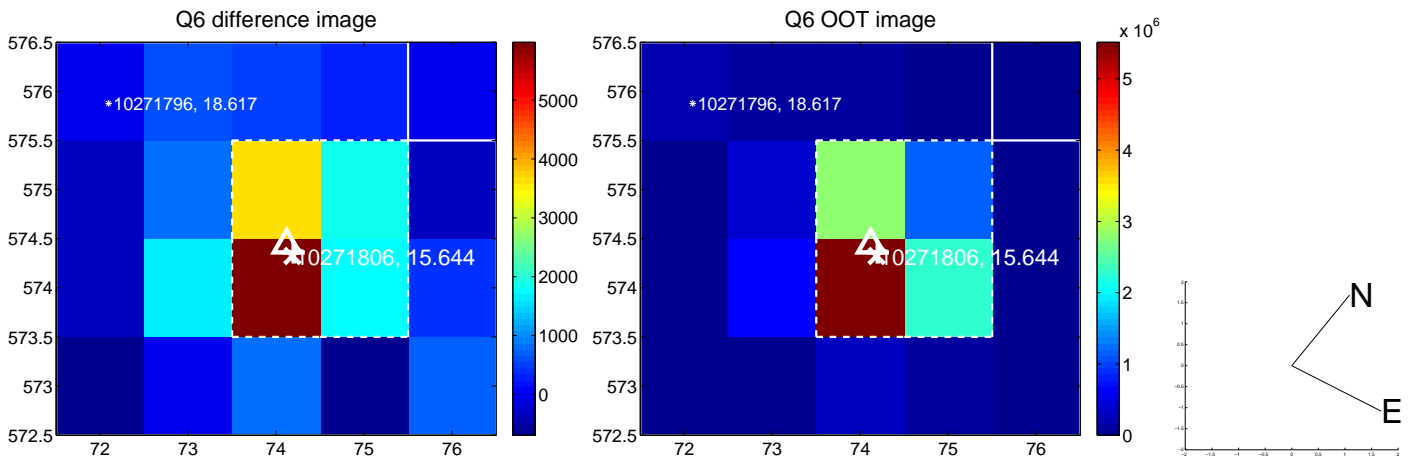
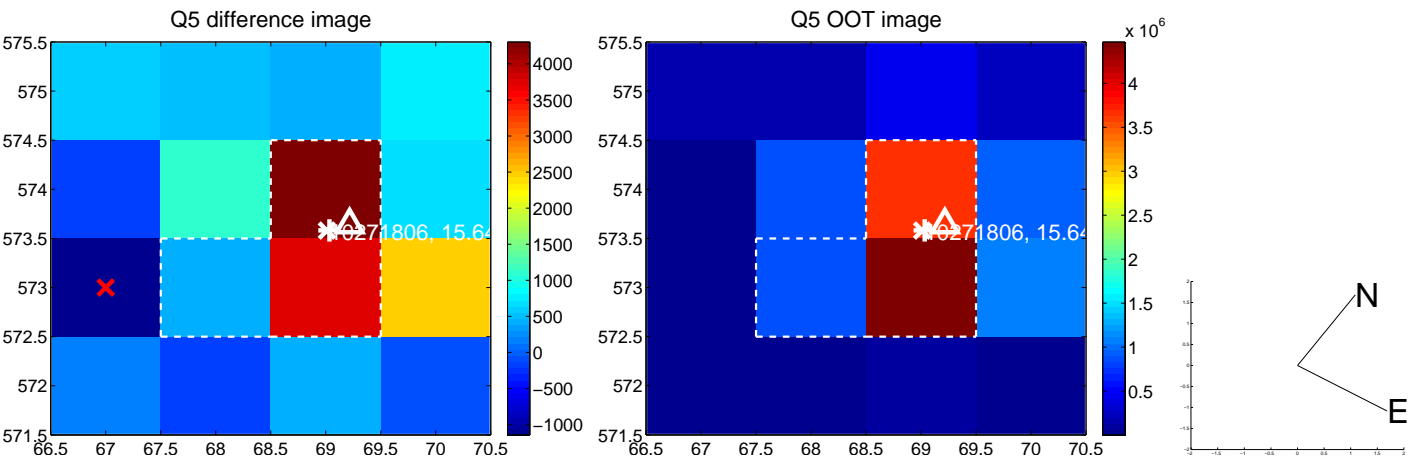


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

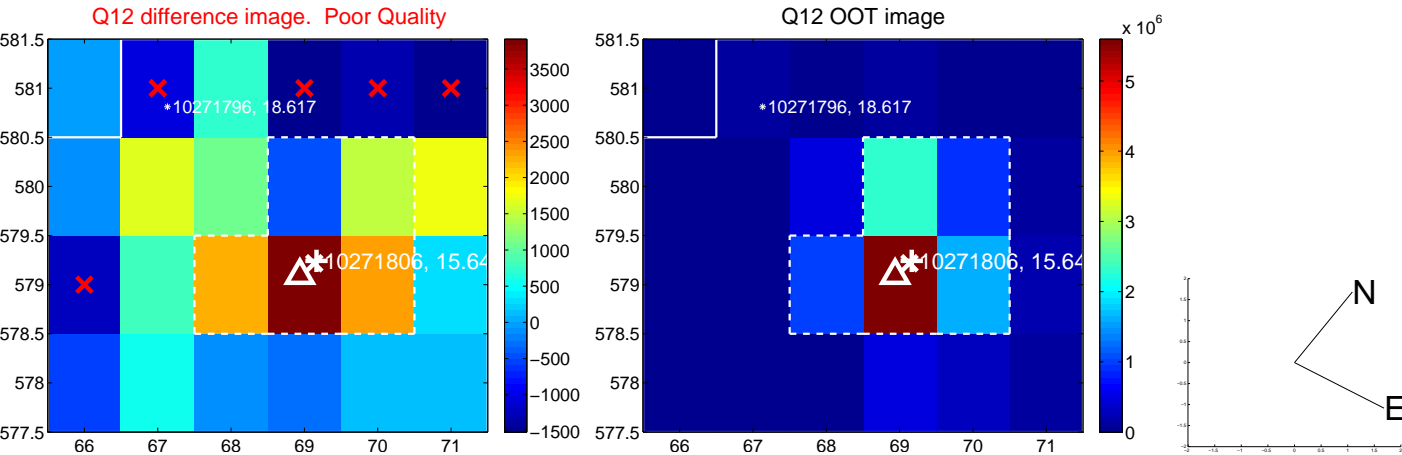
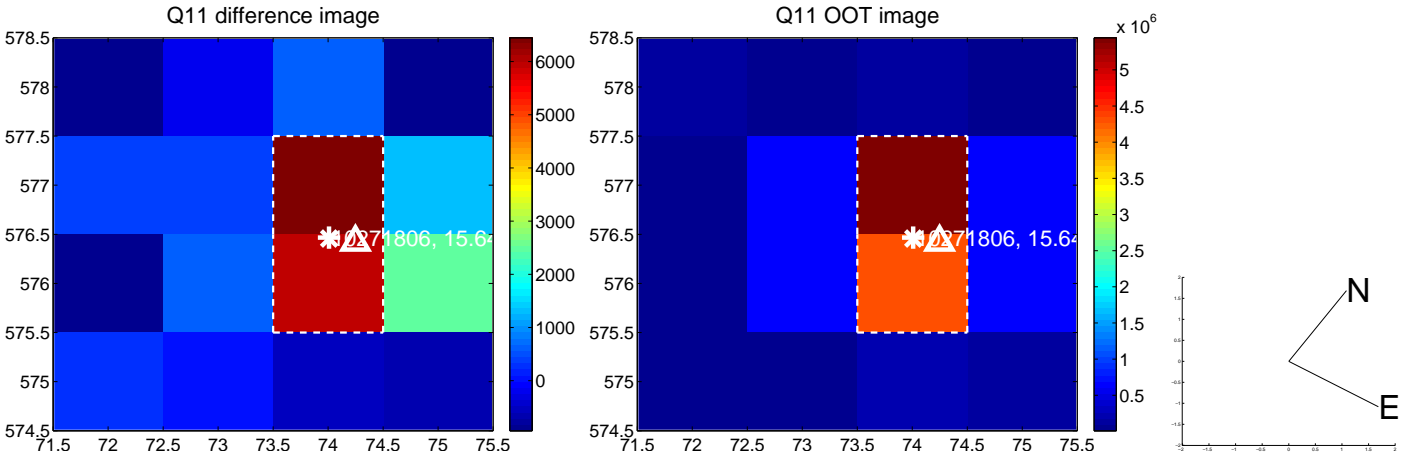
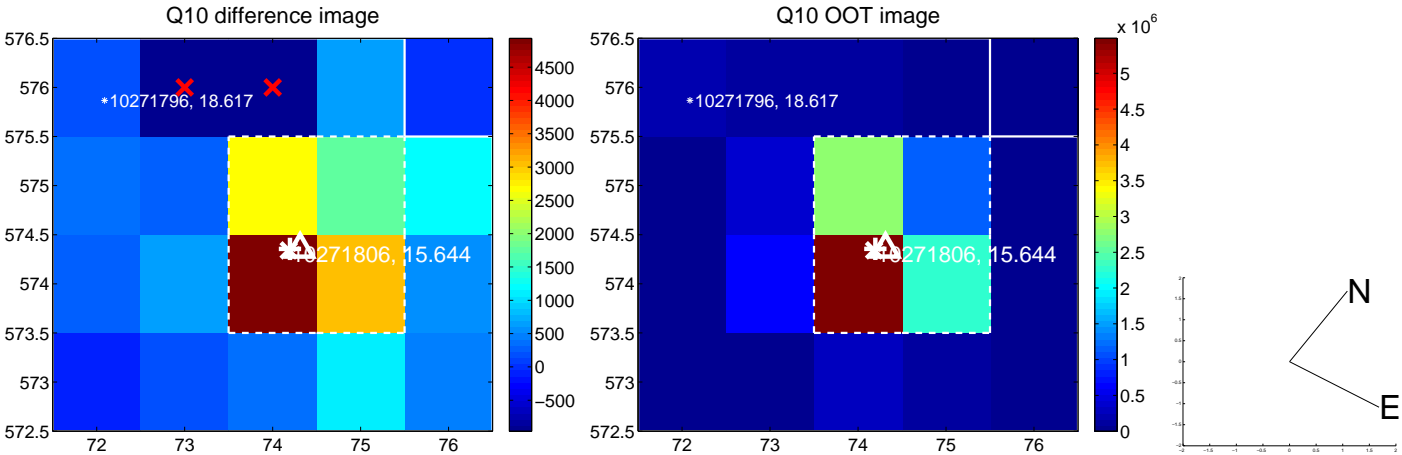
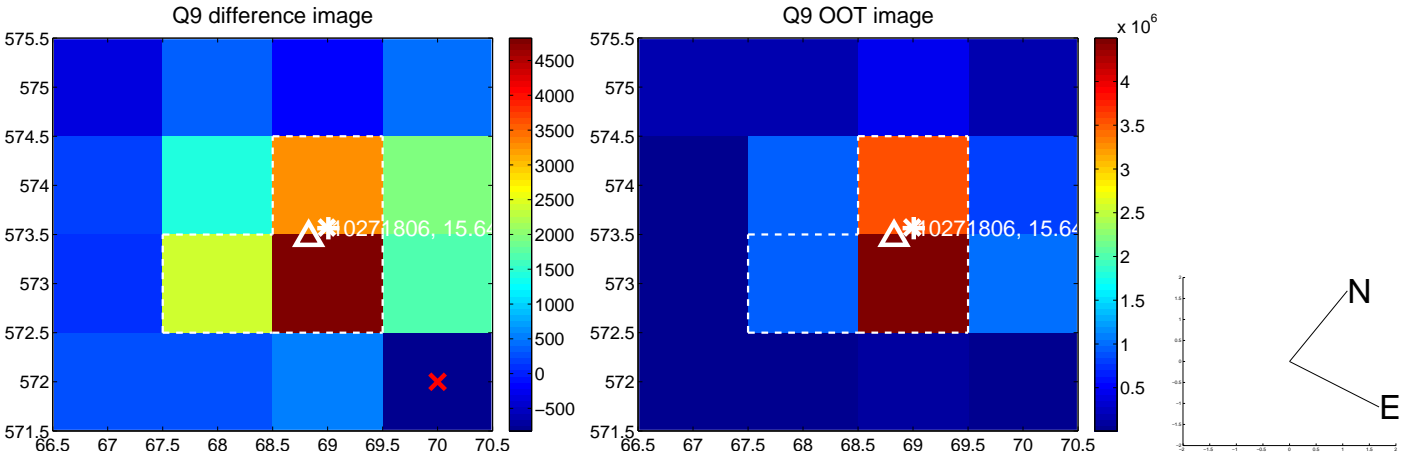
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



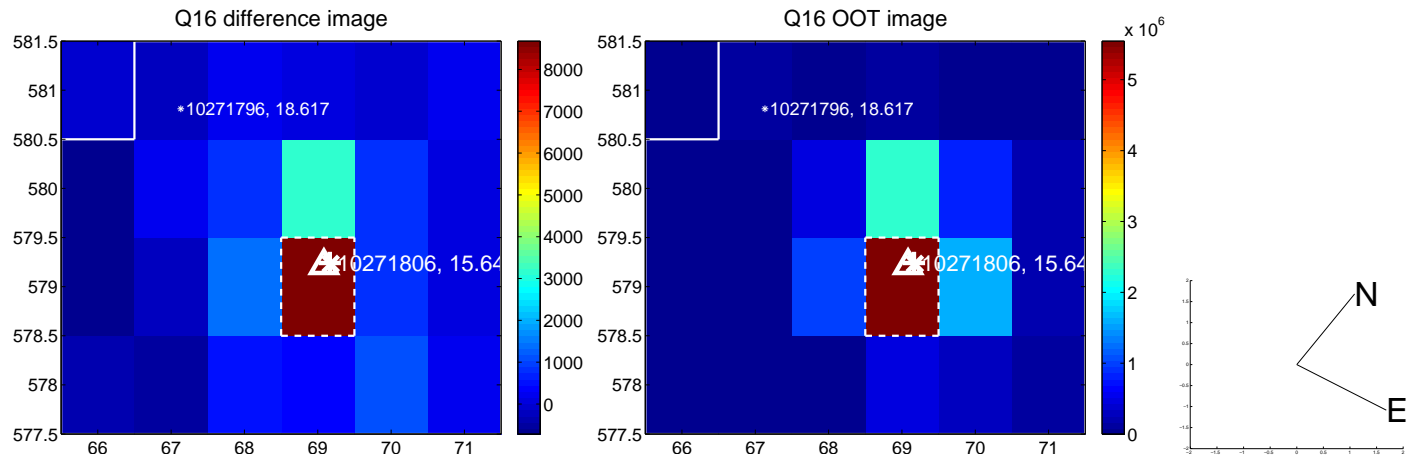
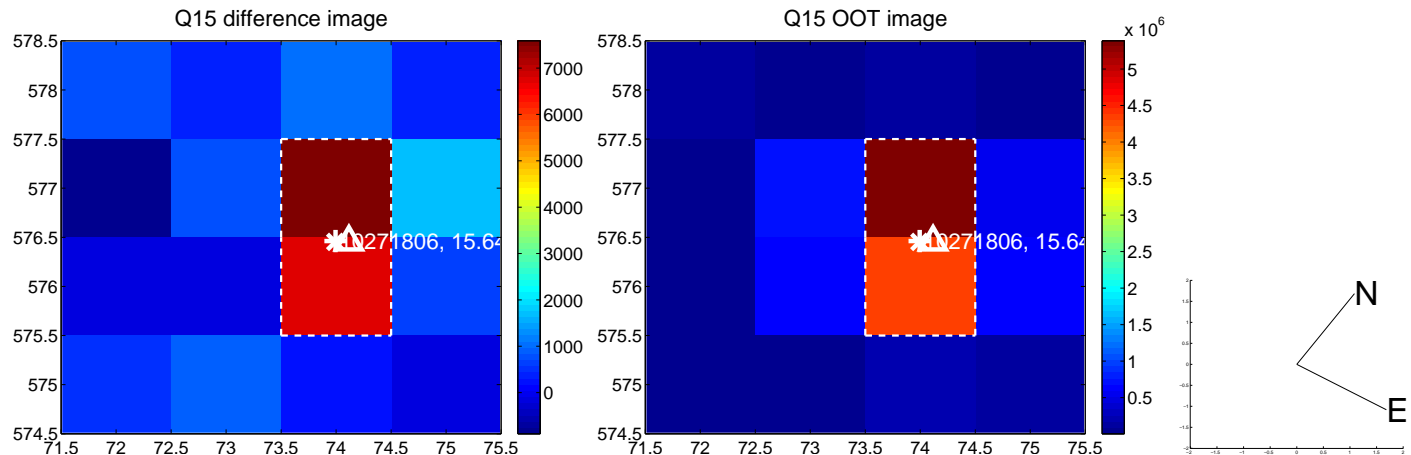
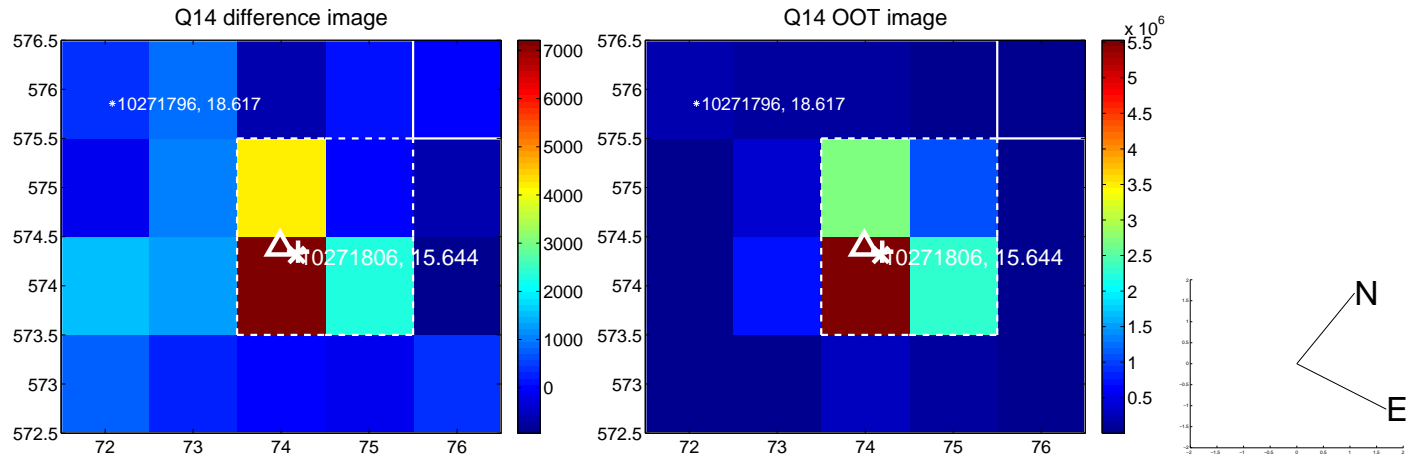
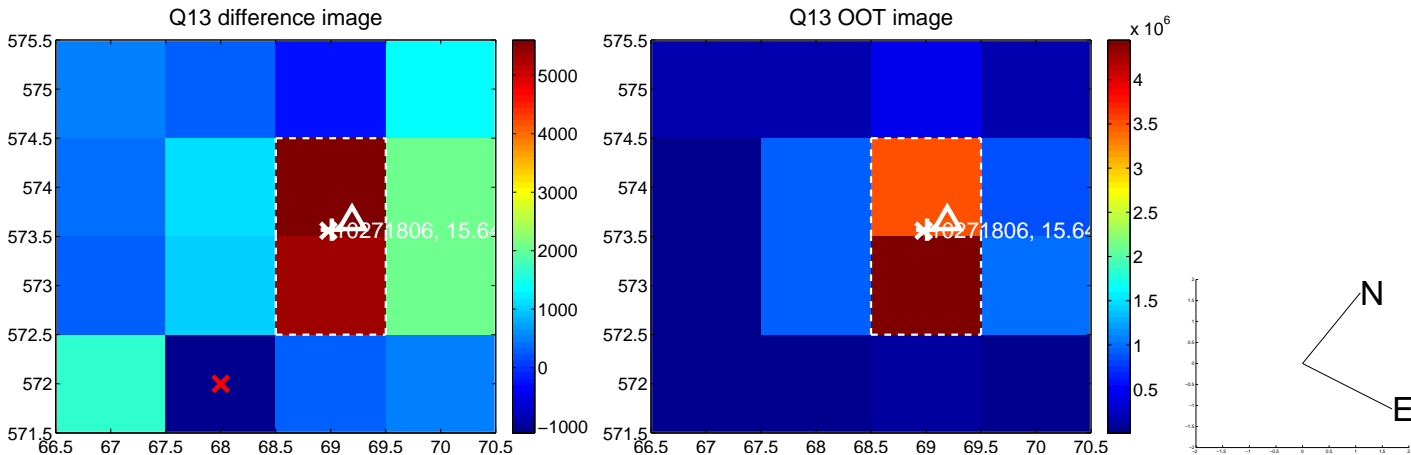
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



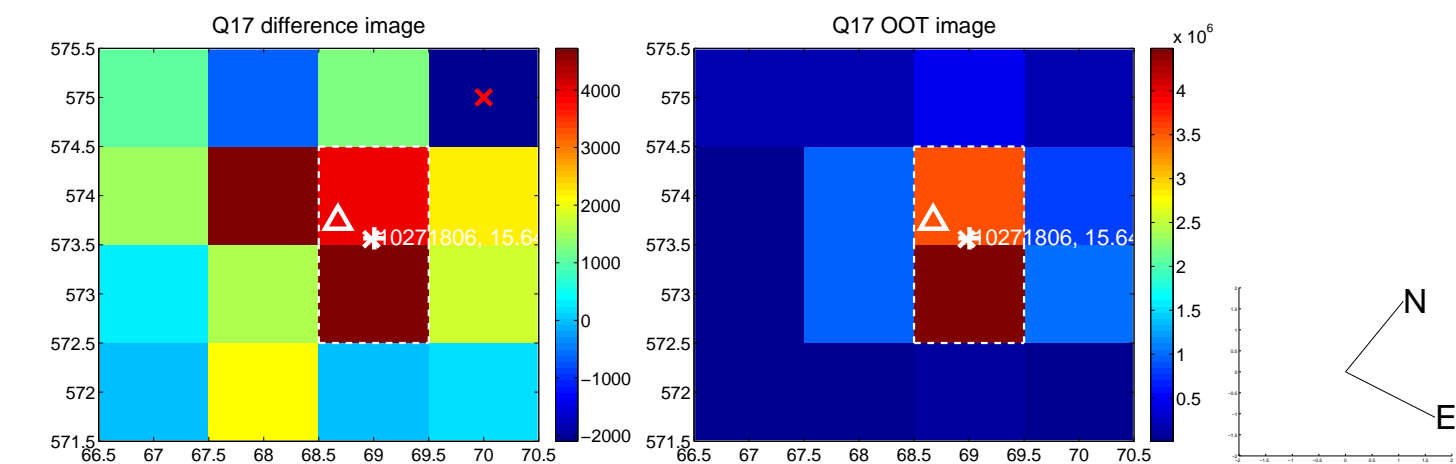
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



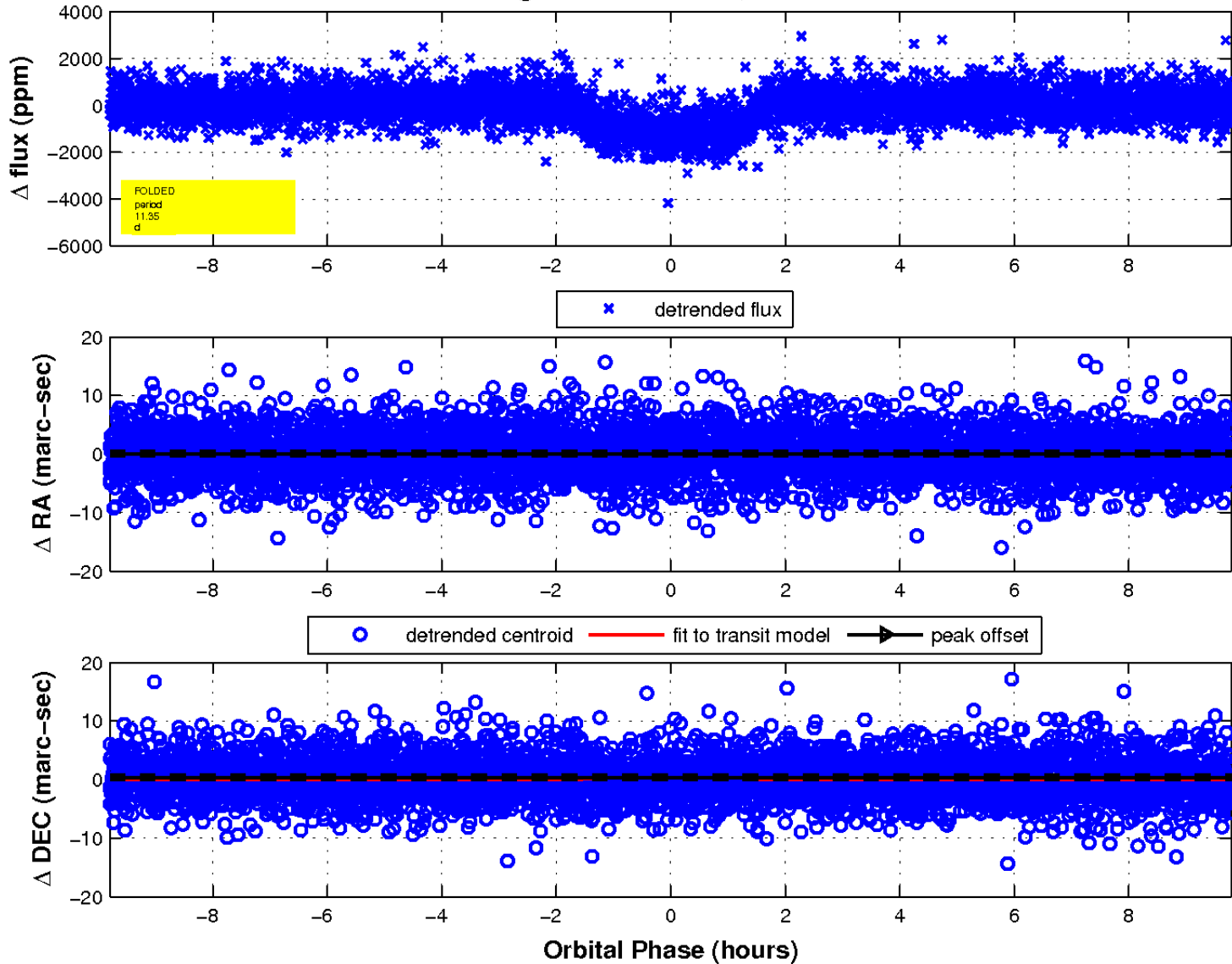
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

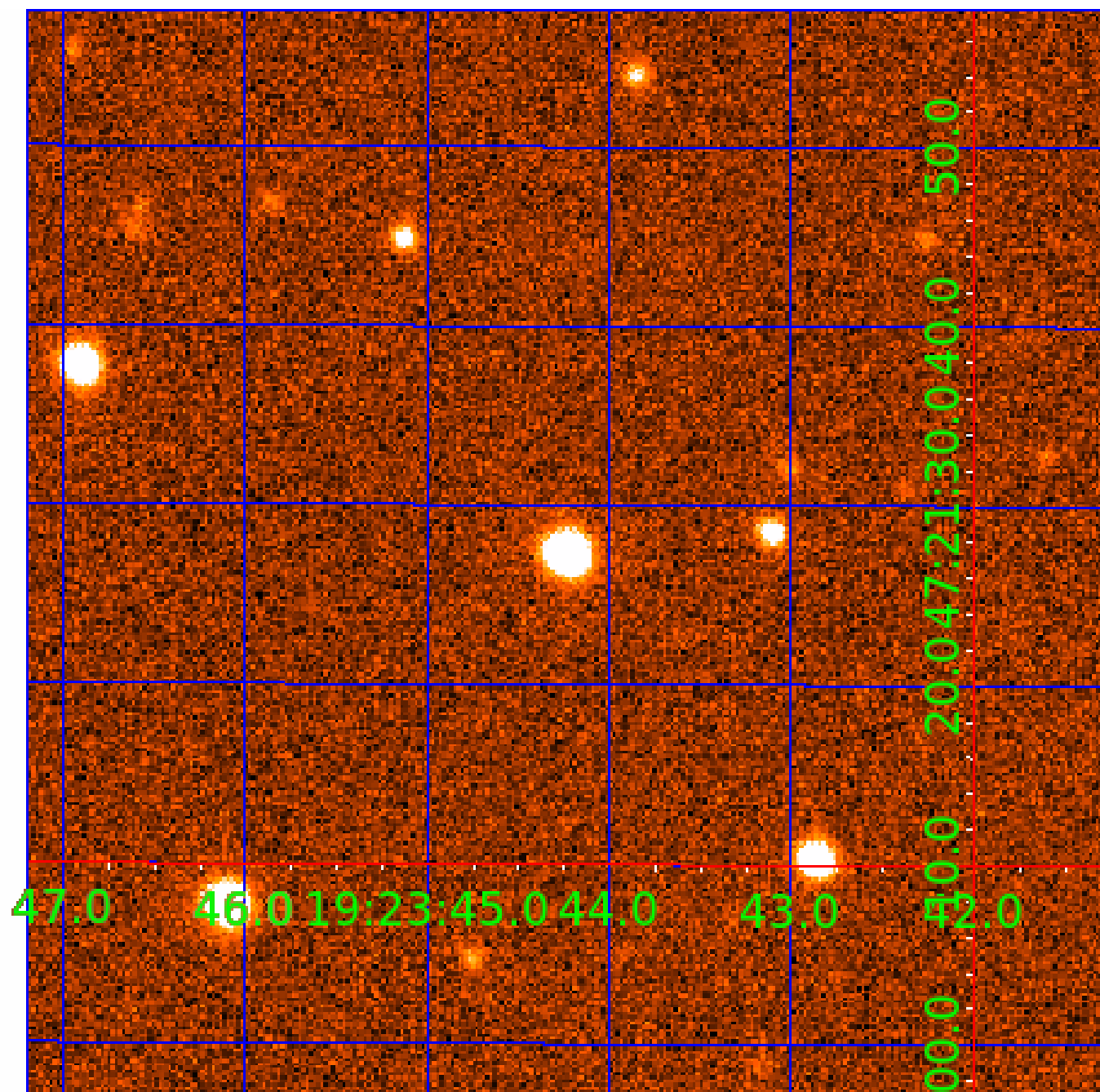


fluxWeightedCentroids, Planet 2 of 4



UKIRT Image

Declination



KIC 010271806

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010271806-01 | OBS | 0733.01 | 5.924991 | 134.166675 | 1566.9 | 2.934 | 58.5 | 63.6 | 0.68 | 5016 | 3.19 | 78.10 |
| 010271806-02 | OBS | 0733.02 | 11.349353 | 134.317895 | 1316.2 | 3.266 | 36.5 | 40.1 | 0.68 | 5016 | 2.68 | 32.83 |
| 010271806-03 | OBS | 0733.03 | 3.132962 | 132.540194 | 428.2 | 2.387 | 20.5 | 23.2 | 0.68 | 5016 | 1.71 | 182.66 |
| 010271806-04 | OBS | 0733.04 | 18.643508 | 141.626237 | 866.6 | 1.789 | 15.0 | 17.0 | 0.68 | 5016 | 2.17 | 16.94 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 010271806-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-03 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-04 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

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

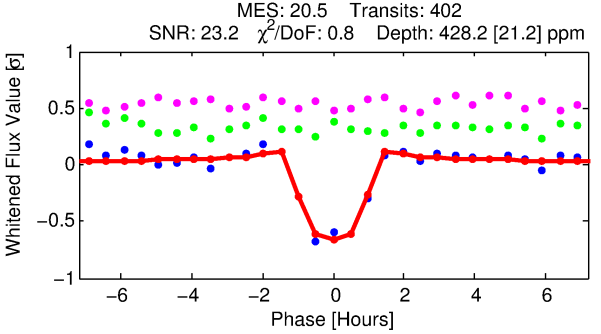
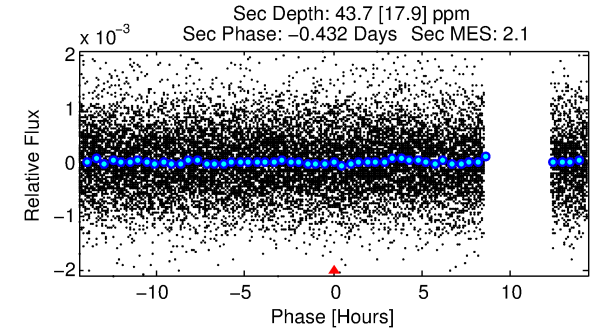
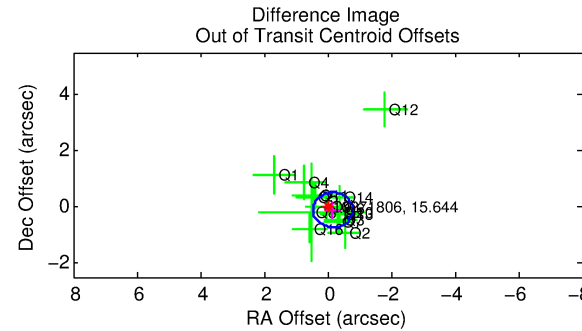
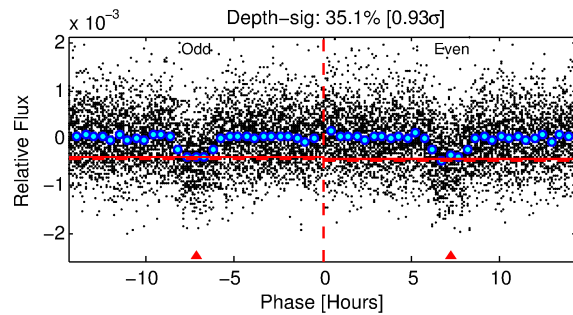
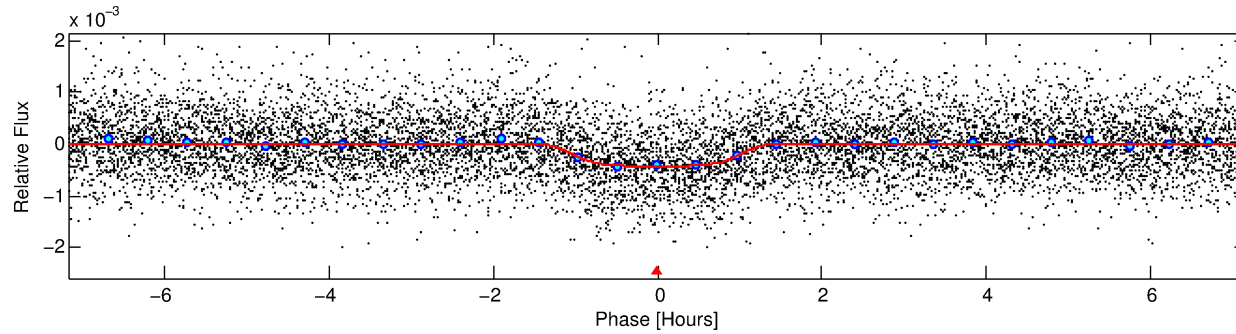
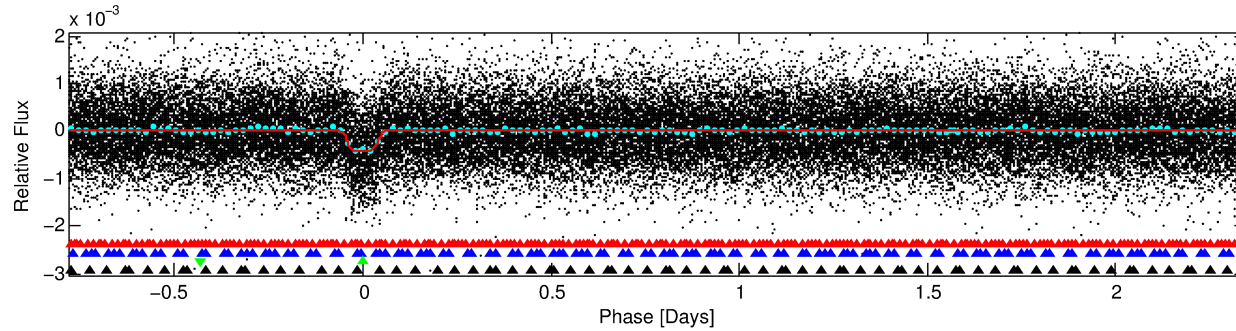
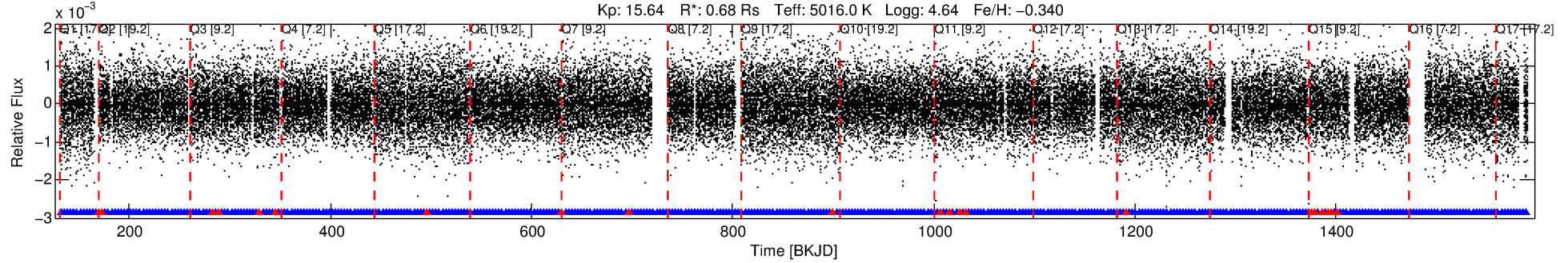
Ephemeris Match Information For 010271806-03

No Significant Match Found

DV One-Page Summary

KIC: 10271806 Candidate: 3 of 4 Period: 3.133 d
KOI: K00733.03 Name: Kepler-224b Corr: 0.955

Kp: 15.64 R*: 0.68 Rs Teff: 5016.0 K Logg: 4.64 Fe/H: -0.340



DV Fit Results:

Period = 3.13296 [0.00001] d
Epoch = 132.5402 [0.0015] BKJD
Rp/R* = 0.0230 [0.0049]
a/R* = 4.95 [4.01]
b = 0.90 [0.18]
Seff = 182.65 [22.38]
Teq = 937 [29] K
Rp = 1.71 [0.38] Re
a = 0.0378 [0.0023] AU
Ag = 11.81 [7.05] [1.53σ]
Teffp = 2687 [399] K [4.37σ]

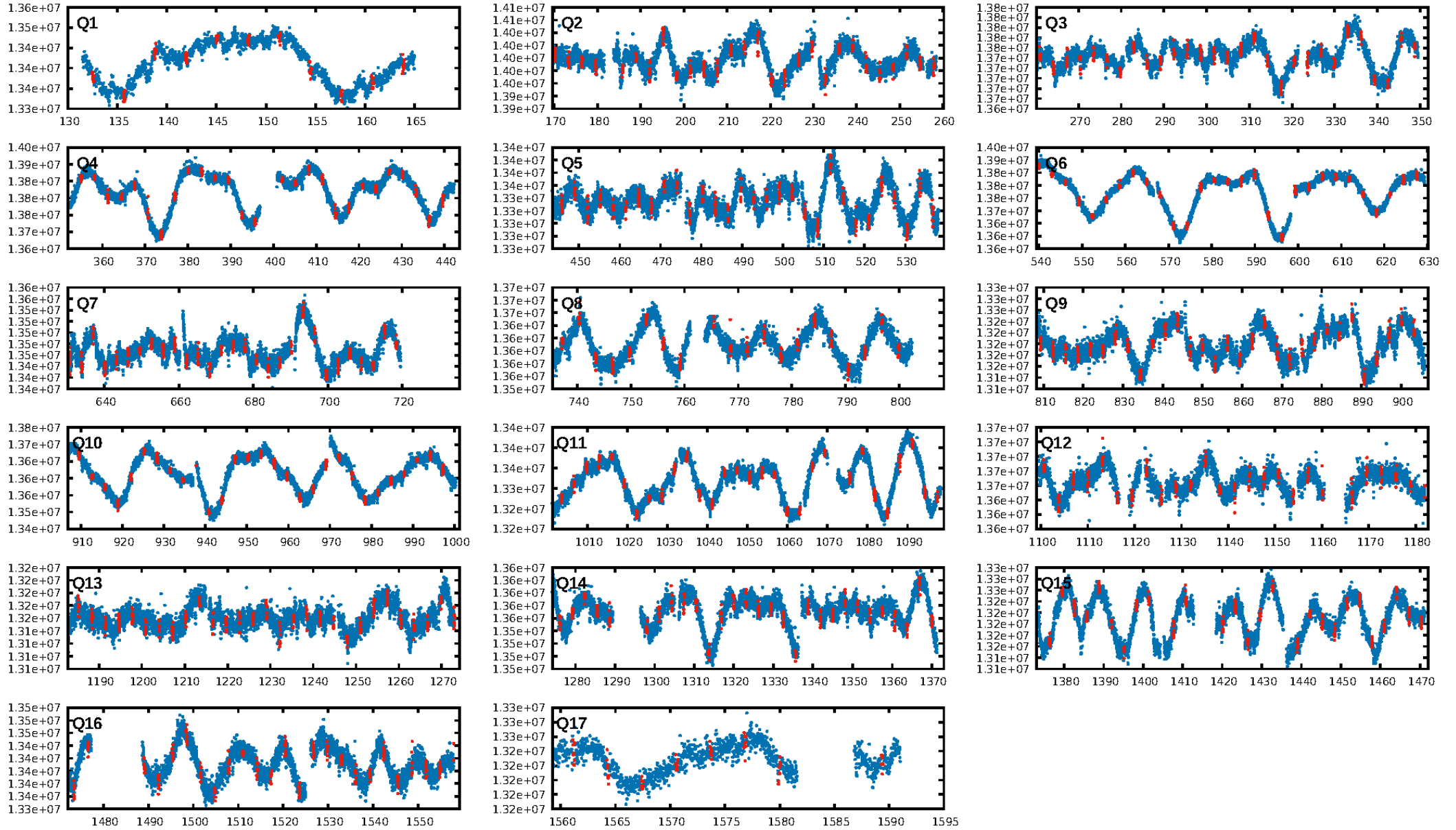
DV Diagnostic Results:

ShortPeriod-sig: N/A
LongPeriod-sig: 100.0% [17.71σ]
ModelChiSquare2-sig: N/A
ModelChiSquareGof-sig: N/A
Bootstrap-pfa: 1.04e-85
RollingBand-fgt: 0.95 [365/386]
GhostDiagnostic-chr: -107.1
Centroid-sig: 10.3%
Centroid-so: 0.695 arcsec [1.28σ]
OotOffset-rm: 0.201 arcsec [0.97σ]
KicOffset-rm: 0.156 arcsec [0.80σ]
OotOffset-st: 4/3/4/4 [15]
KicOffset-st: 4/3/4/4 [15]
DiffImageQuality-fgm: 0.93 [14/15]
DiffImageOverlap-fno: 1.00 [17/17]

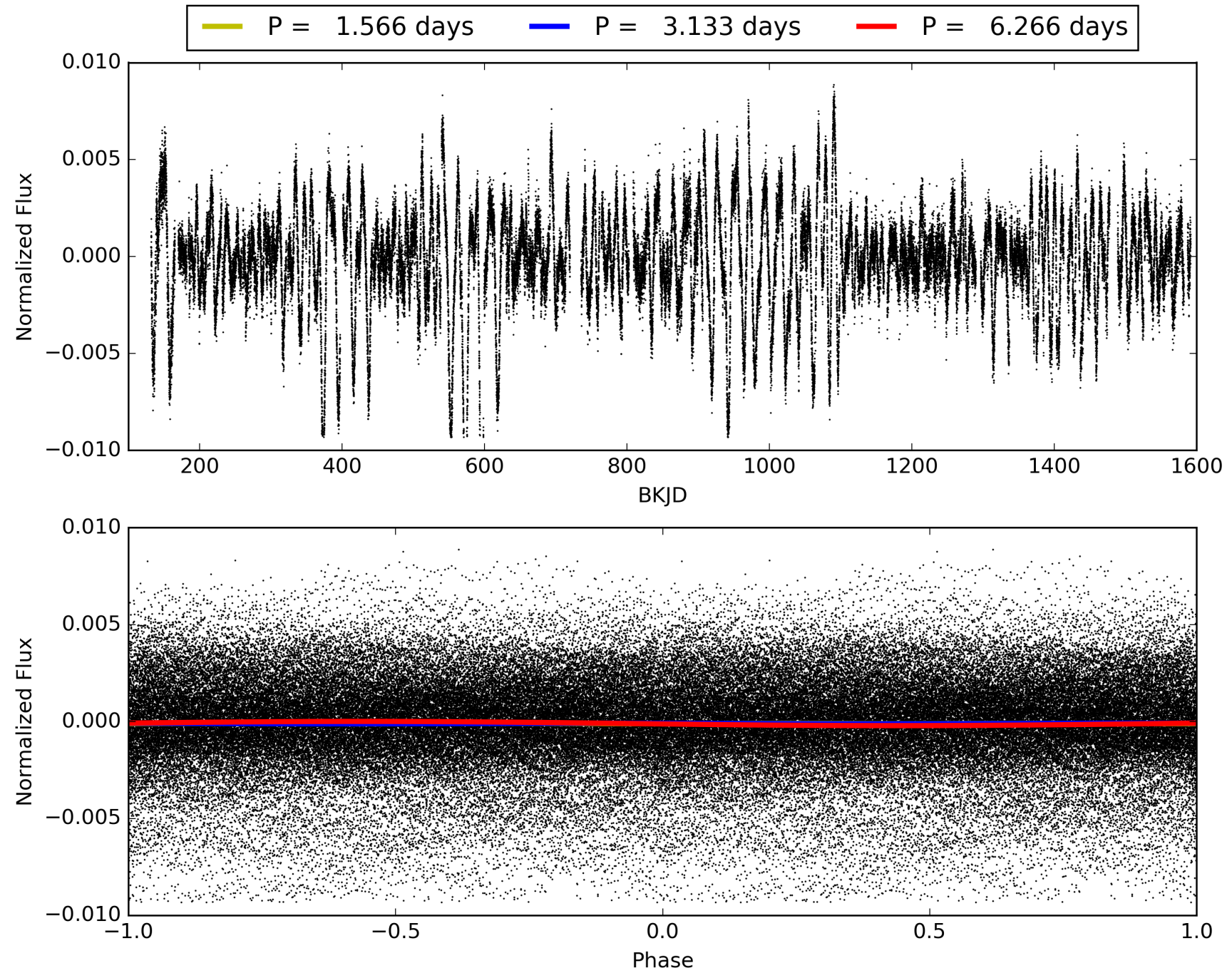
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 12:39:46 Z

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

TCE 010271806-03, PDC Light Curves

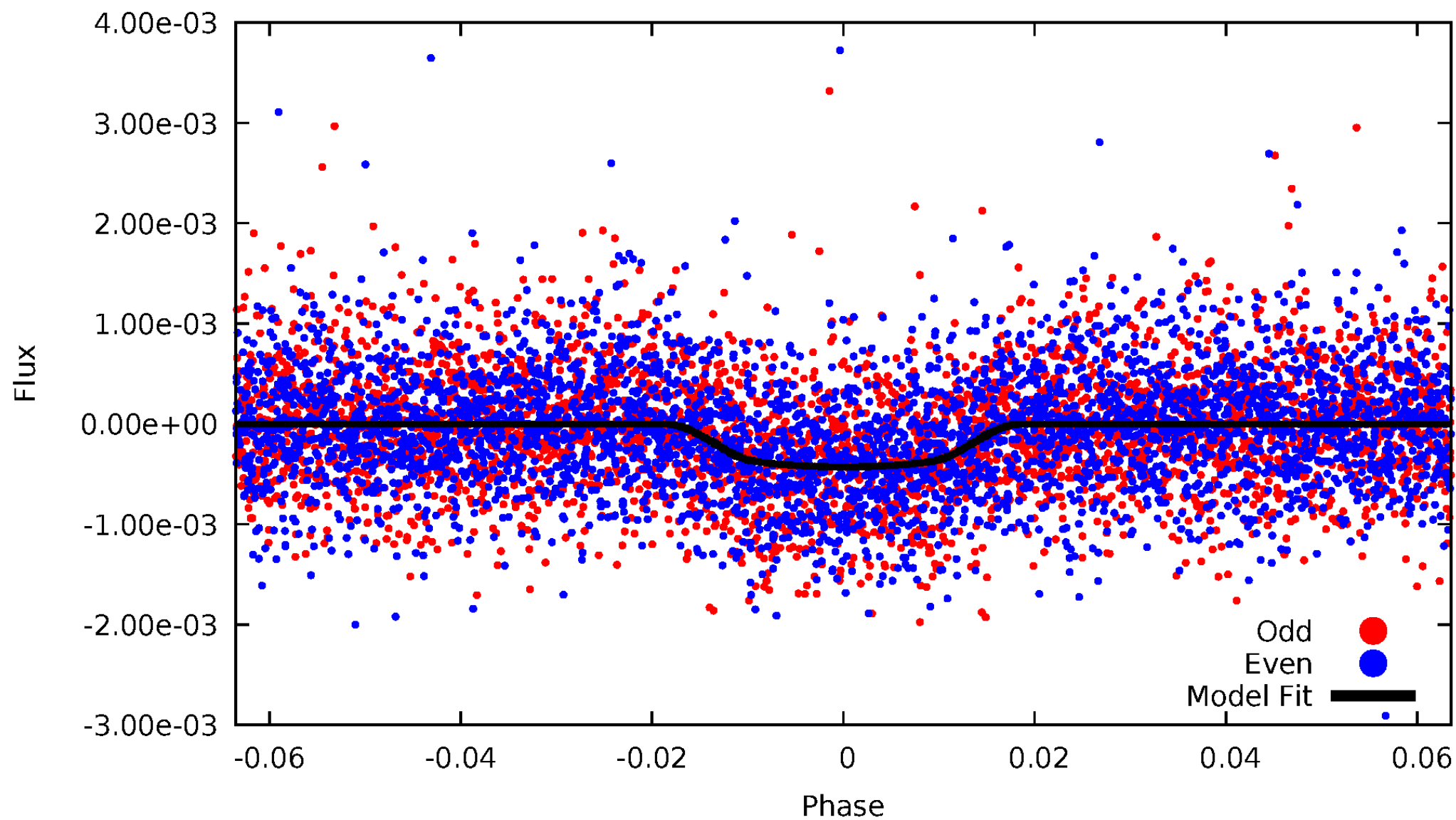


TCE 010271806-03



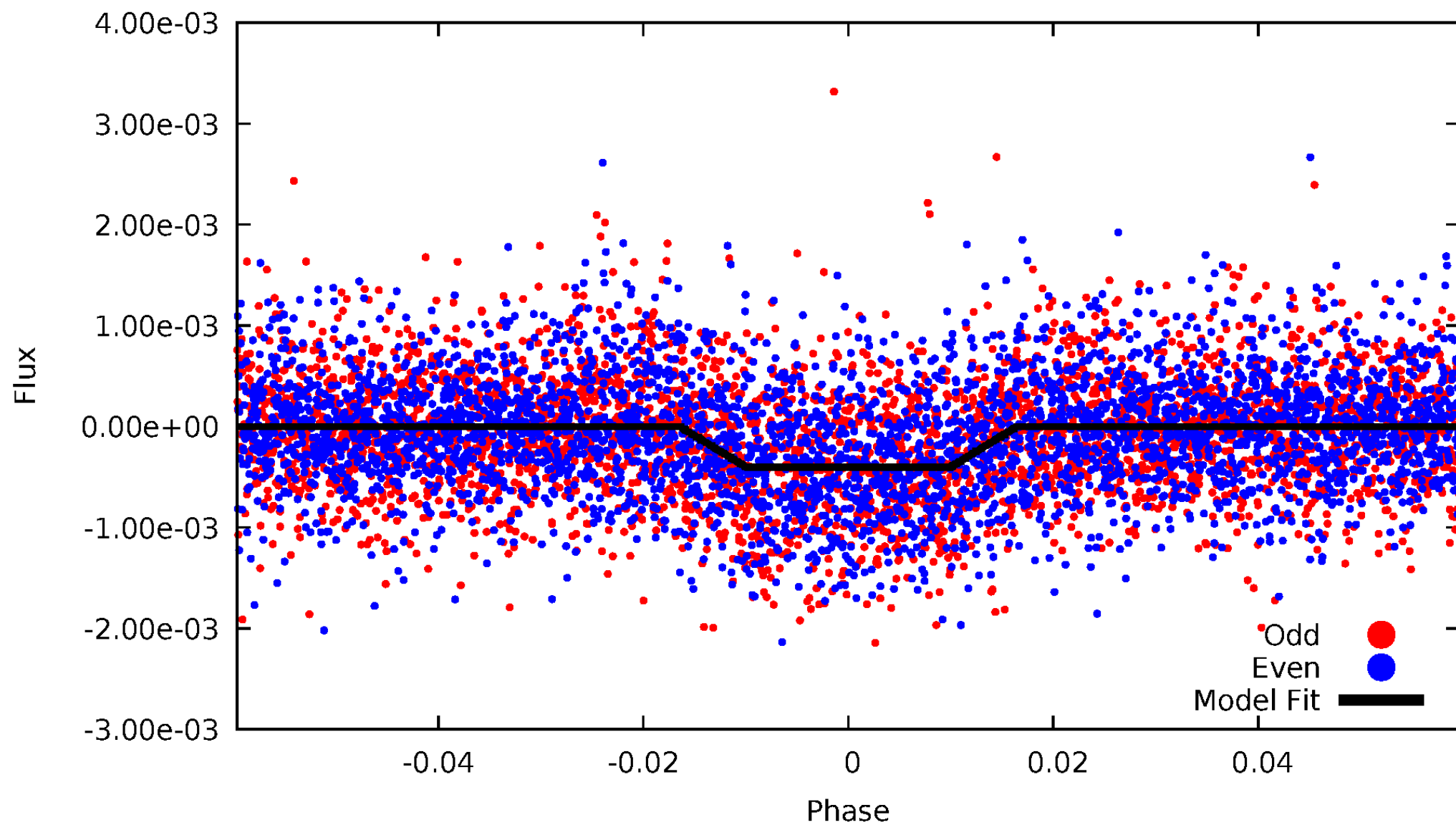
DV Odd/Even

TCE 010271806-03



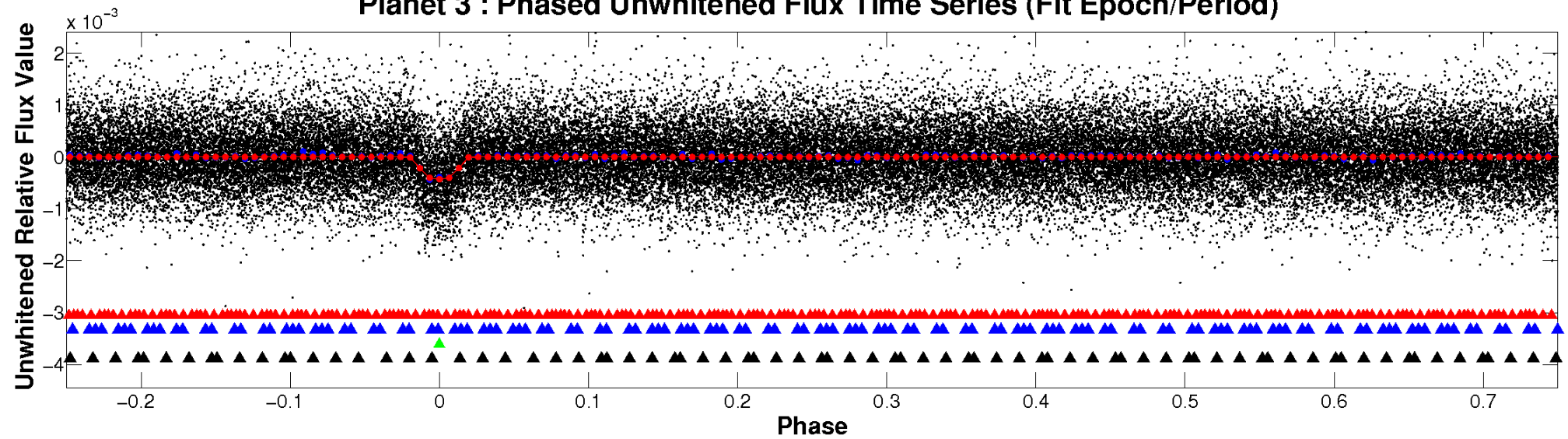
ALT Odd/Even

TCE 010271806-03

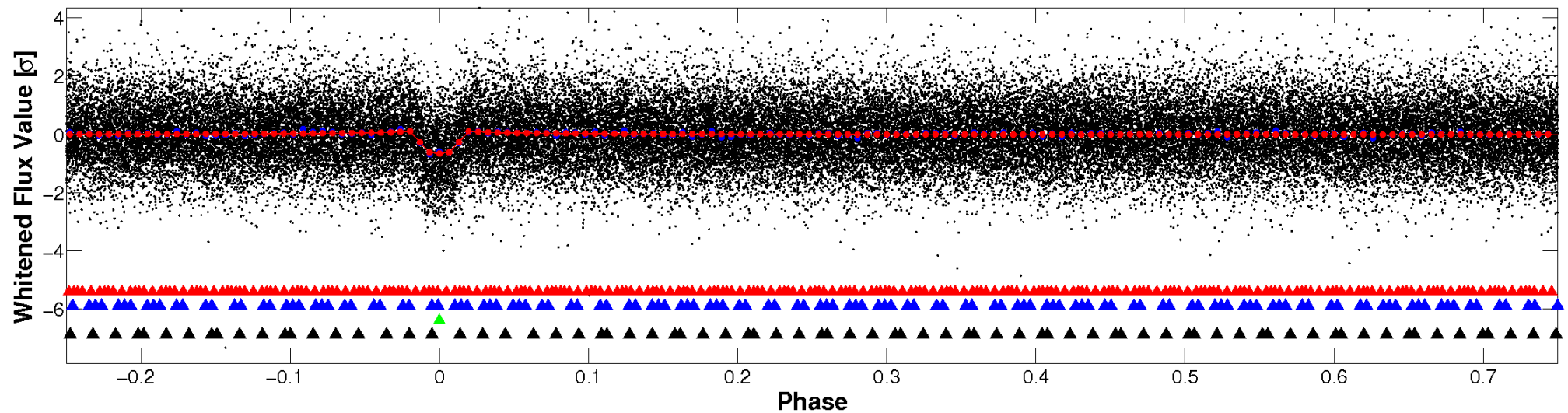


Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

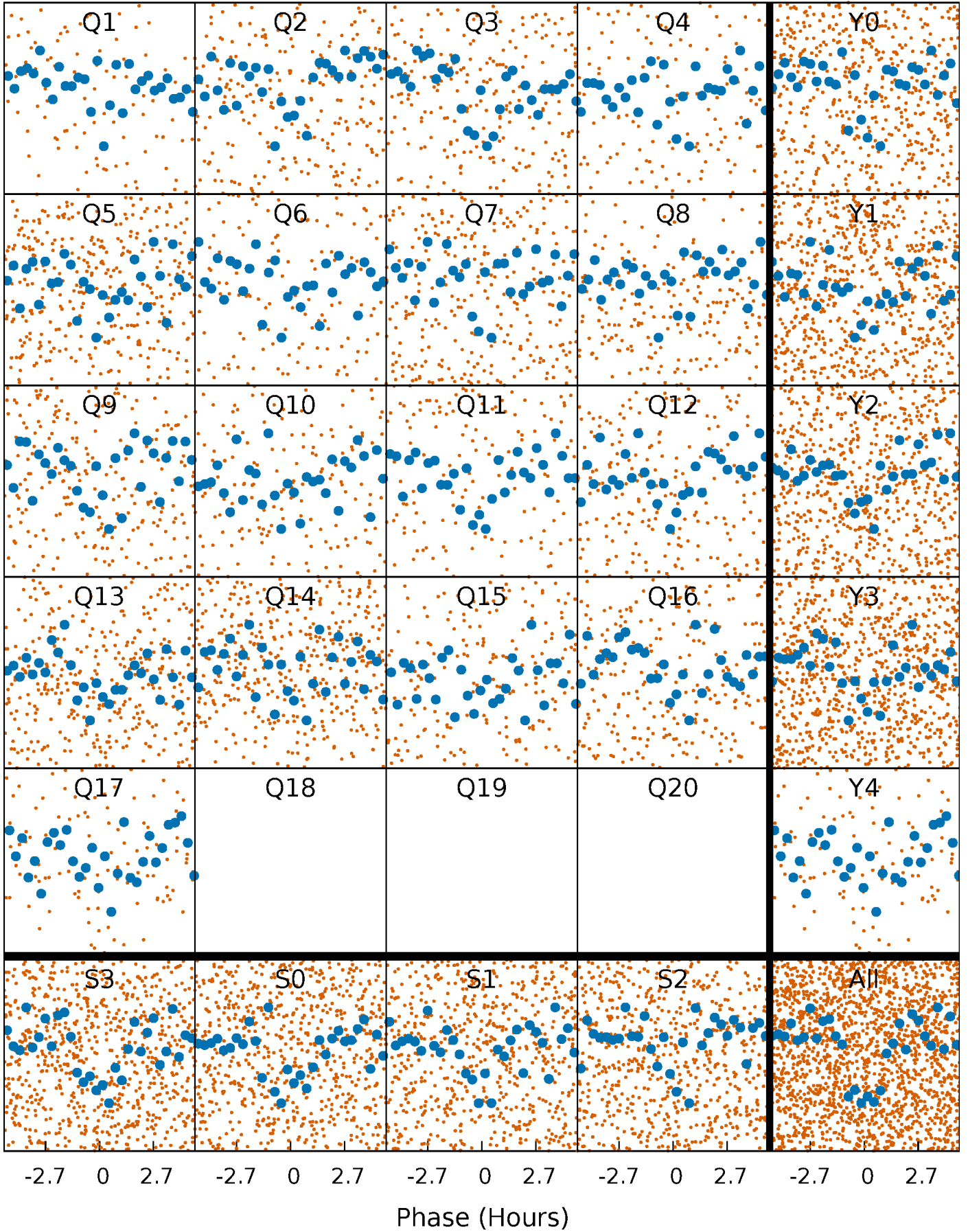


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



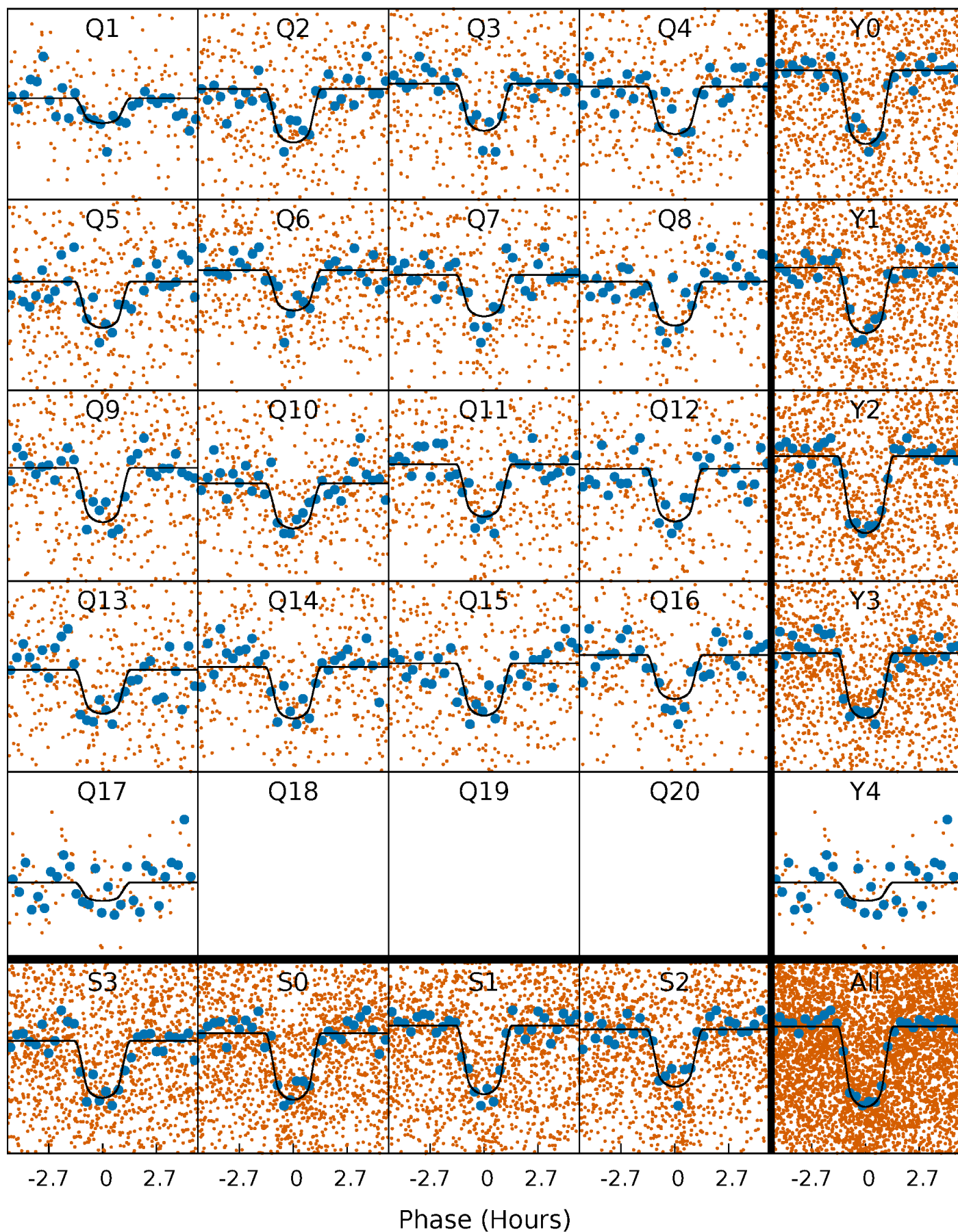
PDC Quarter-Phased Transit Curves

TCE 010271806-03 P= 3.132962 Days $T_0=132.540194$ (BKJD)



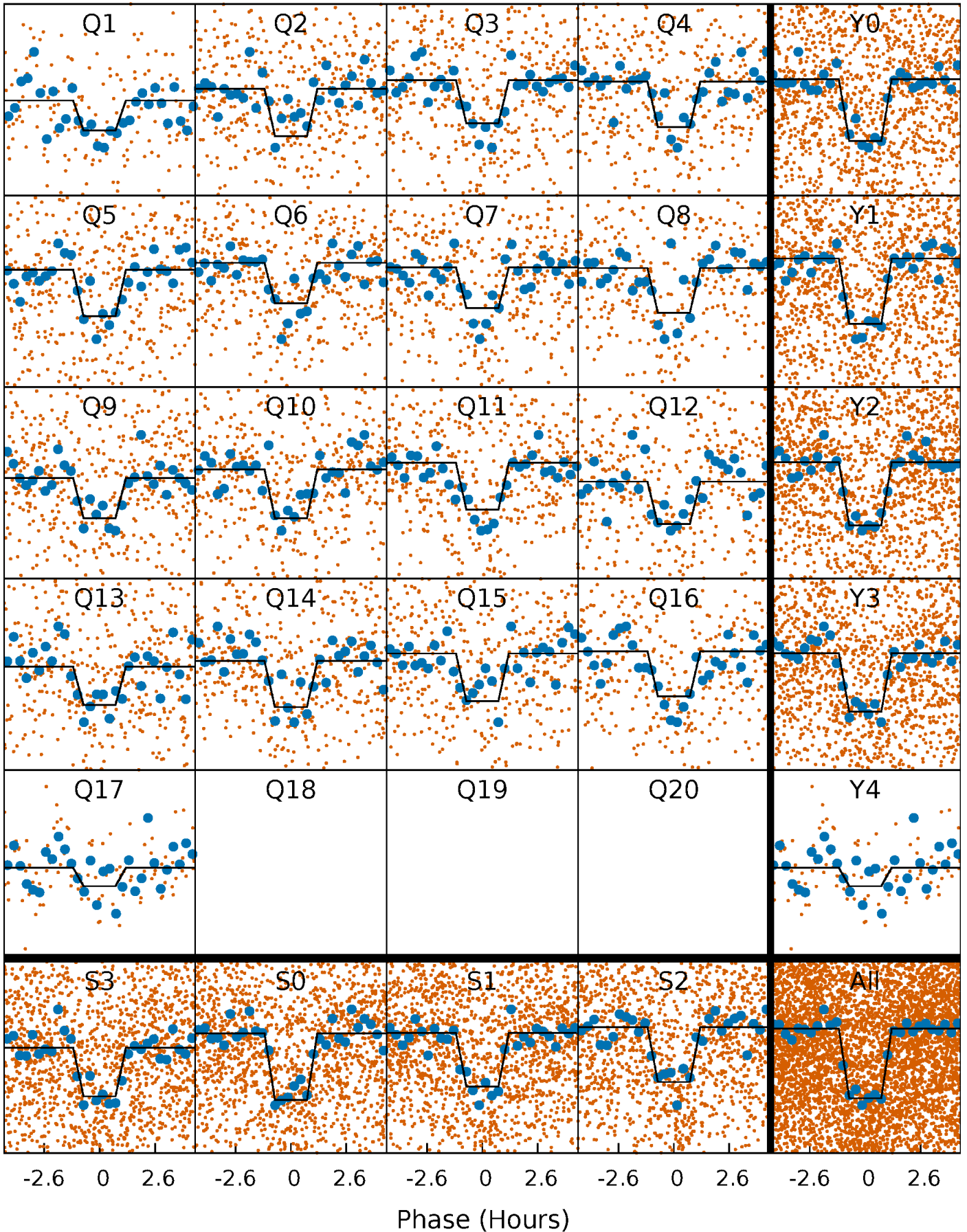
DV Quarter-Phased Transit Curves

TCE 010271806-03 P= 3.132962 Days $T_0=132.540194$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

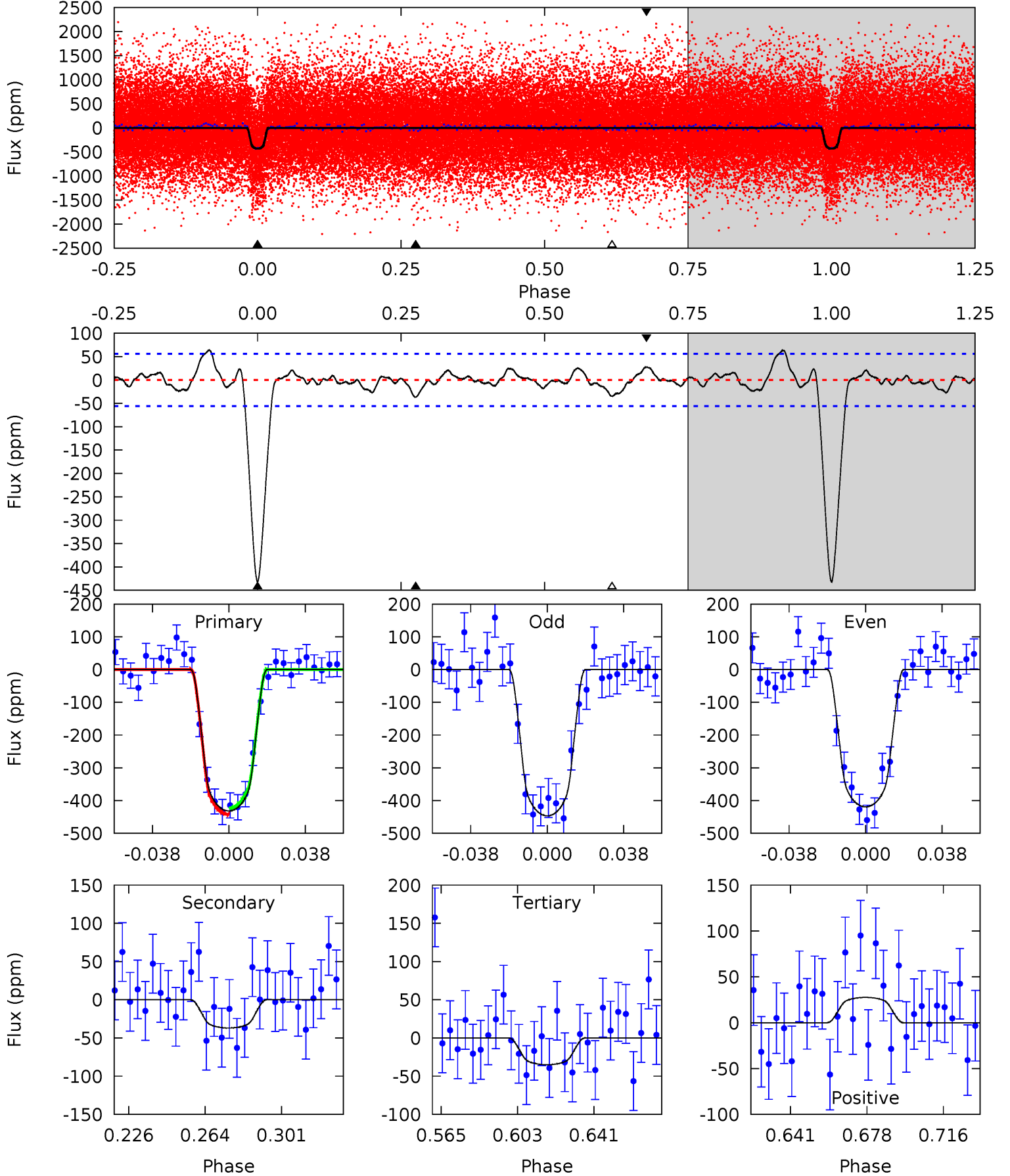
TCE 010271806-03 $P = 3.132956$ Days $T_0 = 132.541402$ (BKJD)



DV Model-Shift Uniqueness Test

010271806-03, P = 3.132962 Days, E = 129.407232 Days

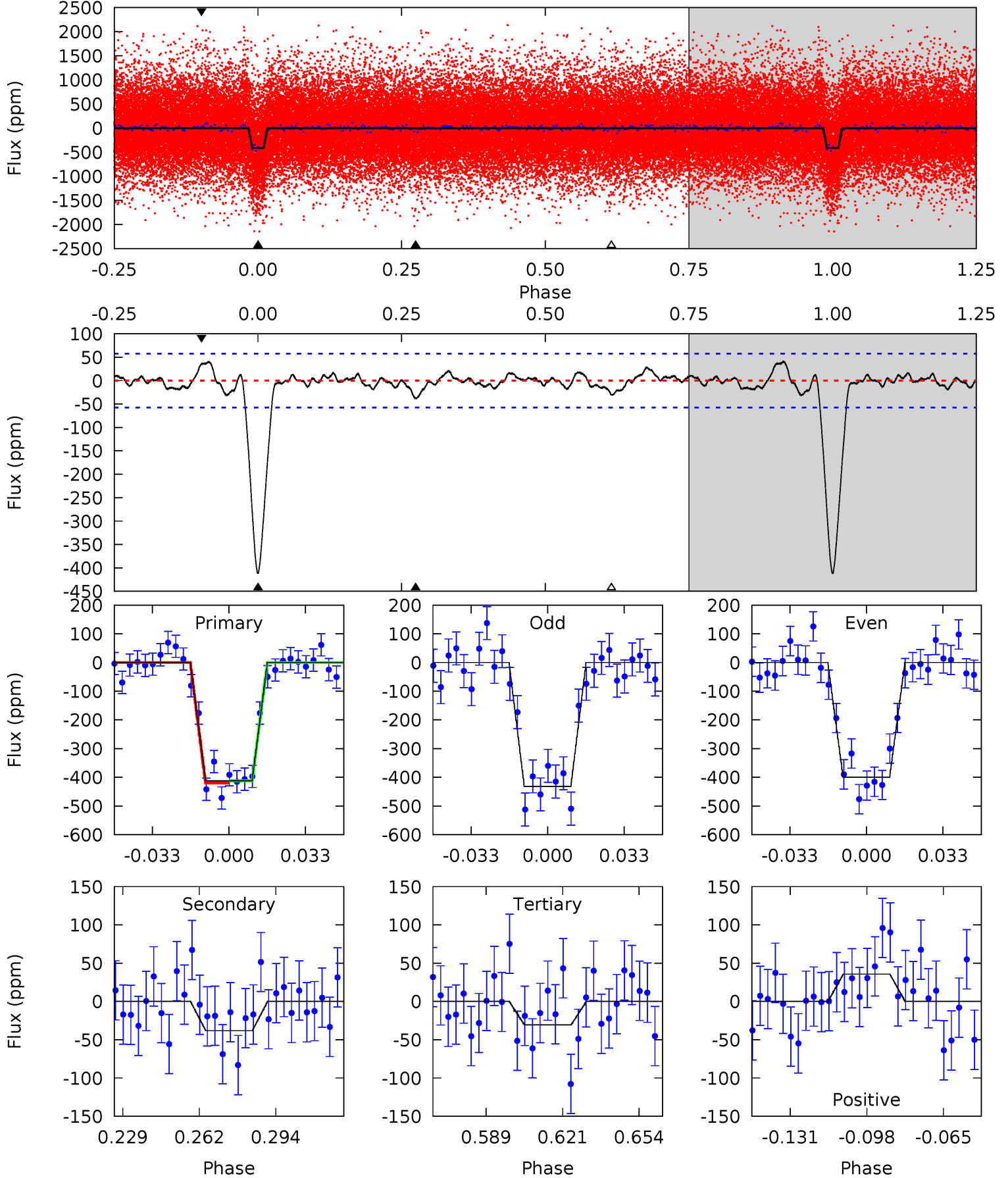
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 36.8 | 3.15 | 2.98 | 2.35 | 4.77 | 2.08 | 1.34 | 33.8 | 34.4 | 0.17 | 0.80 | 1.17 | 0.99 | 0.13 | 0.83 |



Alt Model-Shift Uniqueness Test

010271806-03, P = 3.132956 Days, E = 129.408446 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 34.3 | 3.18 | 2.56 | 2.98 | 4.79 | 2.14 | 1.04 | 31.7 | 31.3 | 0.62 | 0.20 | 1.35 | 1.03 | 0.09 | 0.30 |



Stellar Parameters For KIC 010271806

| | $T_{\text{eff}}(K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5016^{+100}_{-100} | $4.641^{+0.018}_{-0.053}$ | $-0.340^{+0.150}_{-0.150}$ | $0.679^{+0.046}_{-0.029}$ | $0.743^{+0.034}_{-0.052}$ | $3.340^{+0.263}_{-0.576}$ |
| | +2%/-2% | +0%/-1% | +44%/-44% | +7%/-4% | +5%/-7% | +8%/-17% |
| Source | SPE58 | SPE58 | SPE58 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 010271806-03 / KOI 0733.03

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | A_{obs} |
|---------|--------------|------------------------|----------------------|----------------------|---------------------------|
| DV | -37 ± 12 | $1.73^{+0.39}_{-0.38}$ | 1320^{+37}_{-29} | 3134^{+289}_{-240} | $9.666^{+7.331}_{-4.017}$ |
| Alt. | -38 ± 12 | $1.48^{+0.37}_{-0.34}$ | 1318^{+33}_{-30} | 3294^{+335}_{-284} | 13^{+11}_{-6} |

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

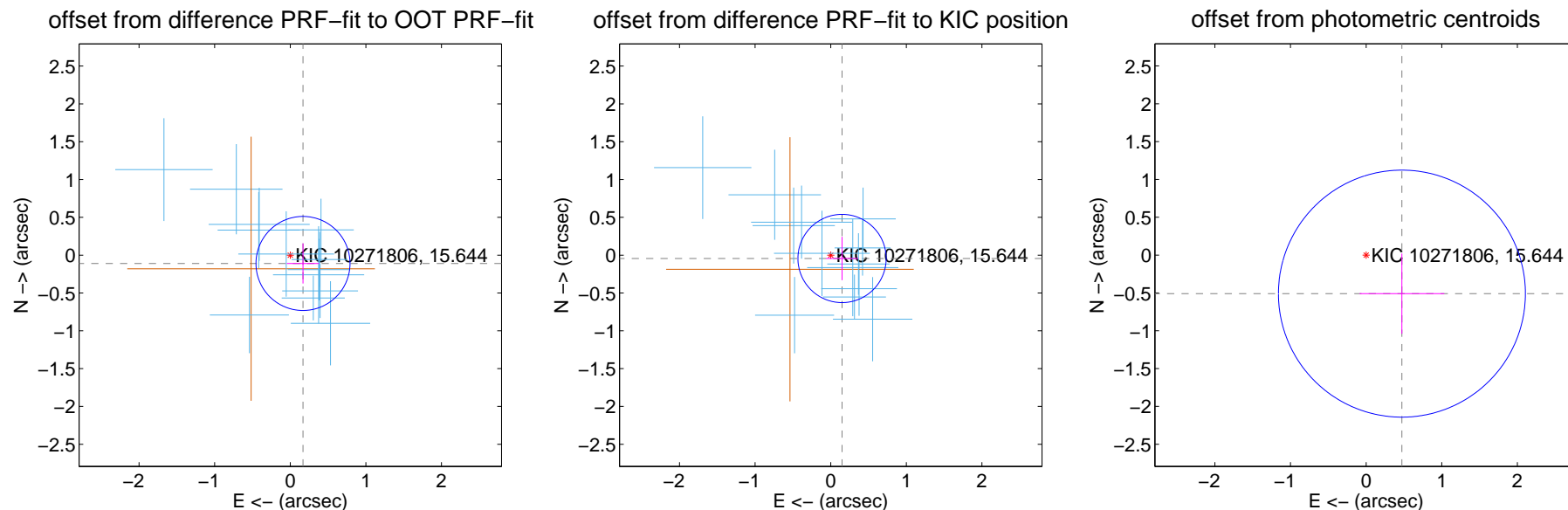
DV Centroid Data

Supplemental centroid analysis for 010271806-03. Kepler magnitude: 15.64. Transit SNR 23.17

There are 14 quarters with good PRF difference image offsets

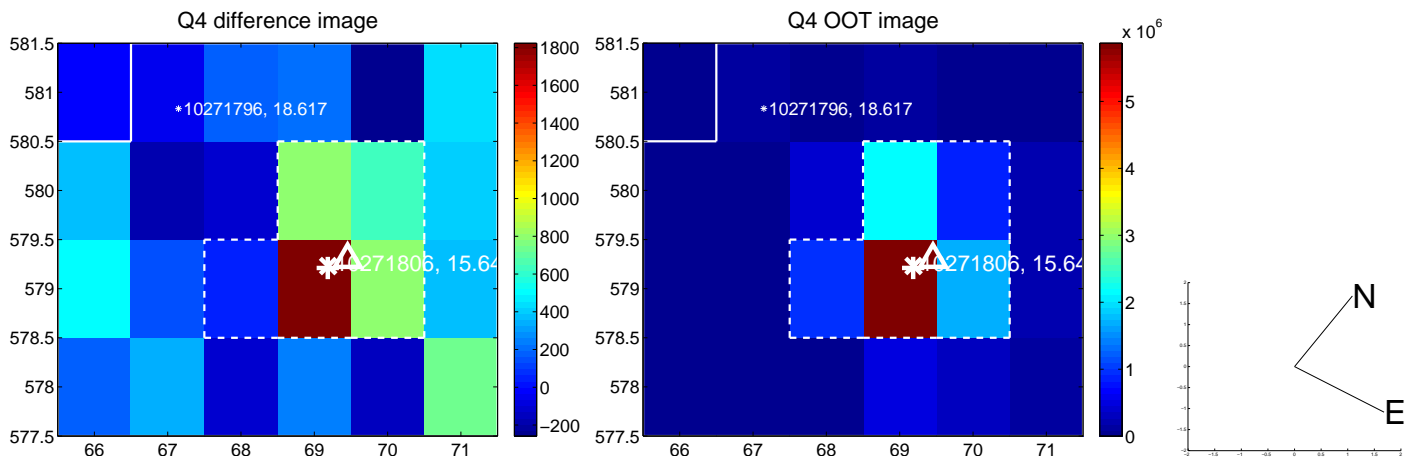
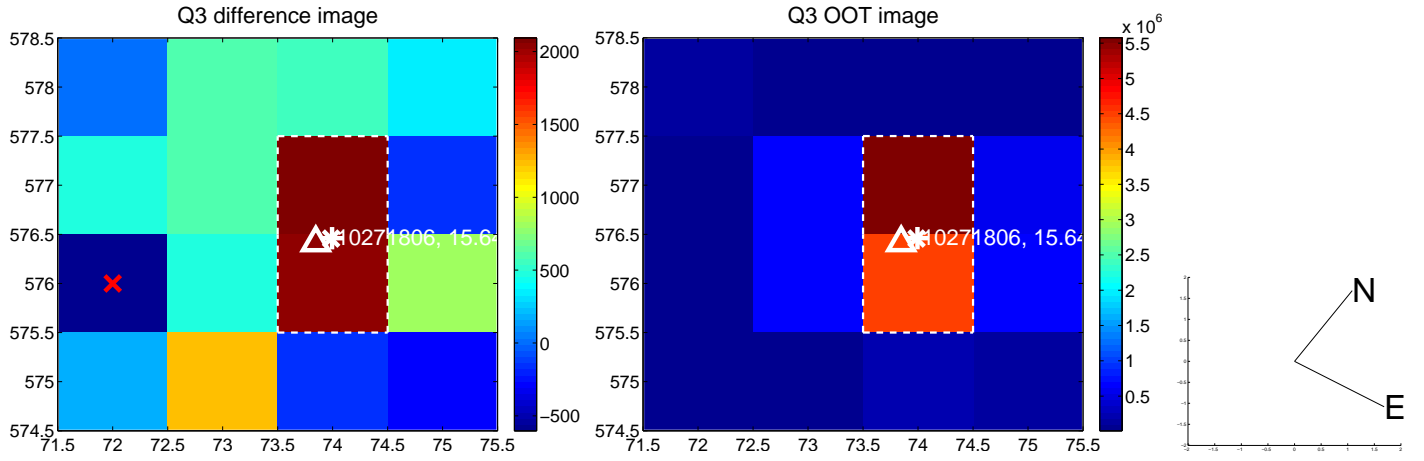
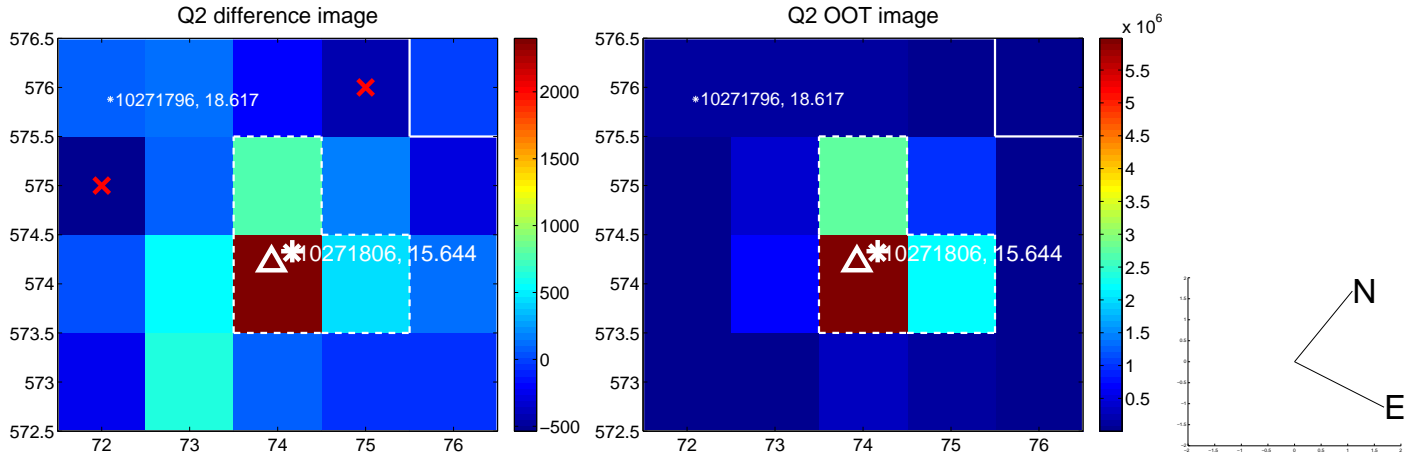
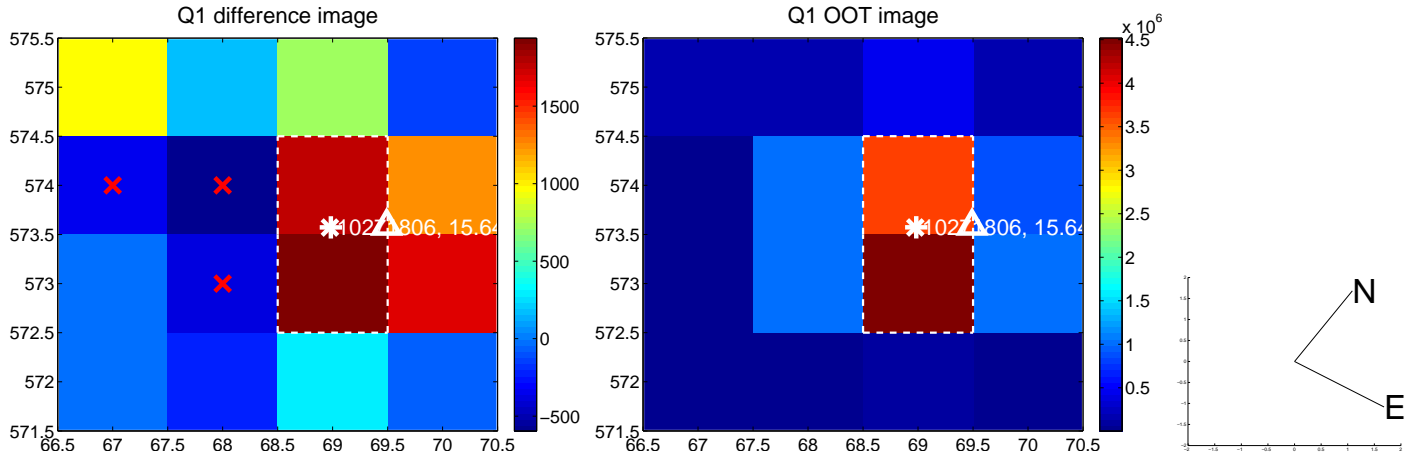
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT | 0.201 ± 0.207 | 0.97 | -0.168 ± 0.214 | -0.110 ± 0.265 |
| PRF-fit source offset from KIC position | 0.156 ± 0.194 | 0.80 | -0.150 ± 0.213 | -0.044 ± 0.287 |
| photometric centroid source offset | 0.70 ± 0.54 | 1.28 | -0.47 ± 0.56 | -0.51 ± 0.53 |

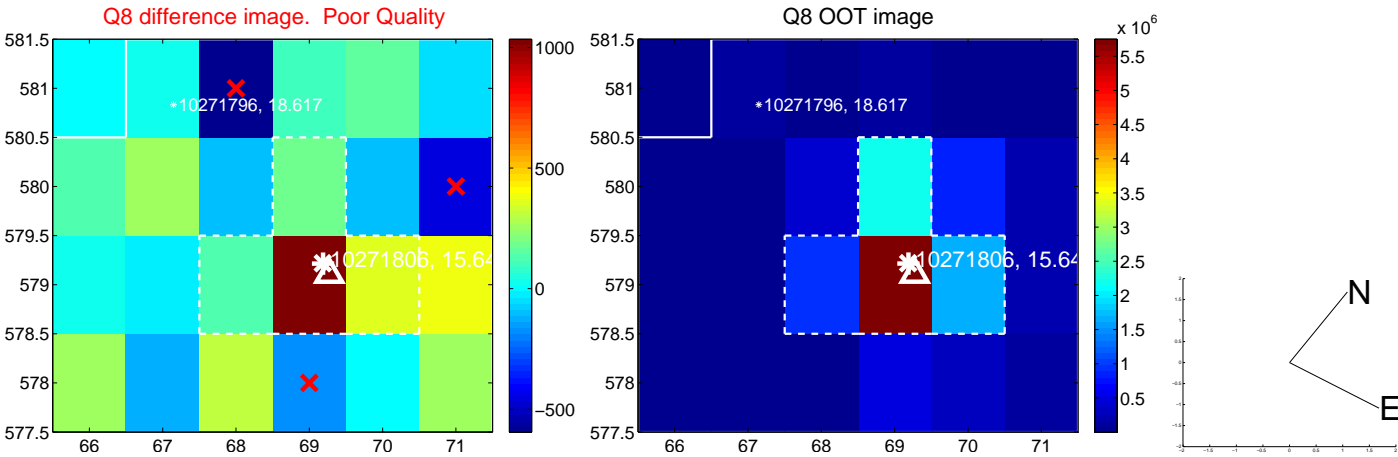
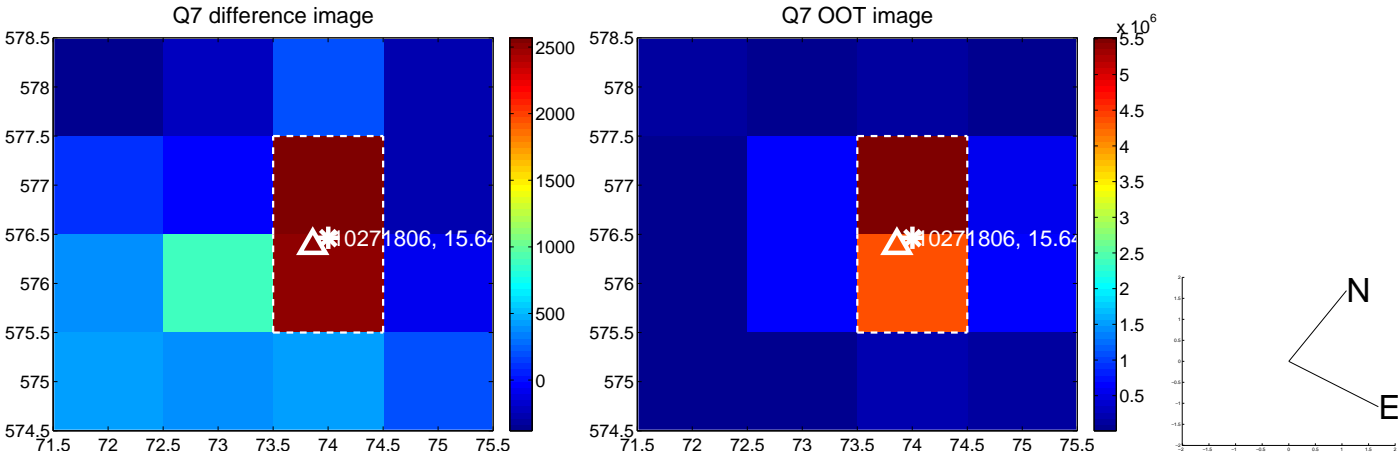
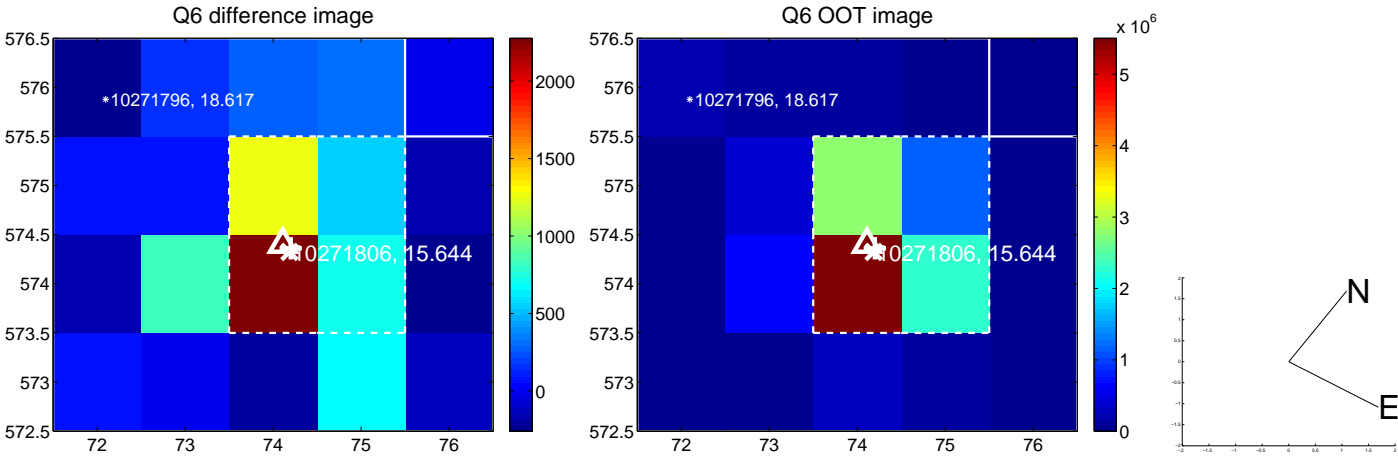
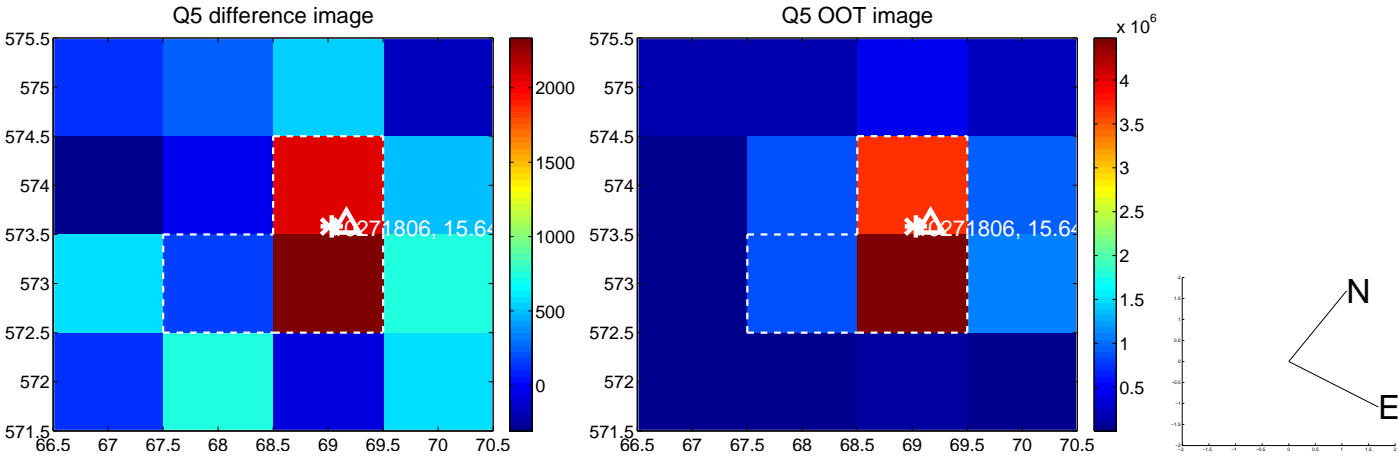


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

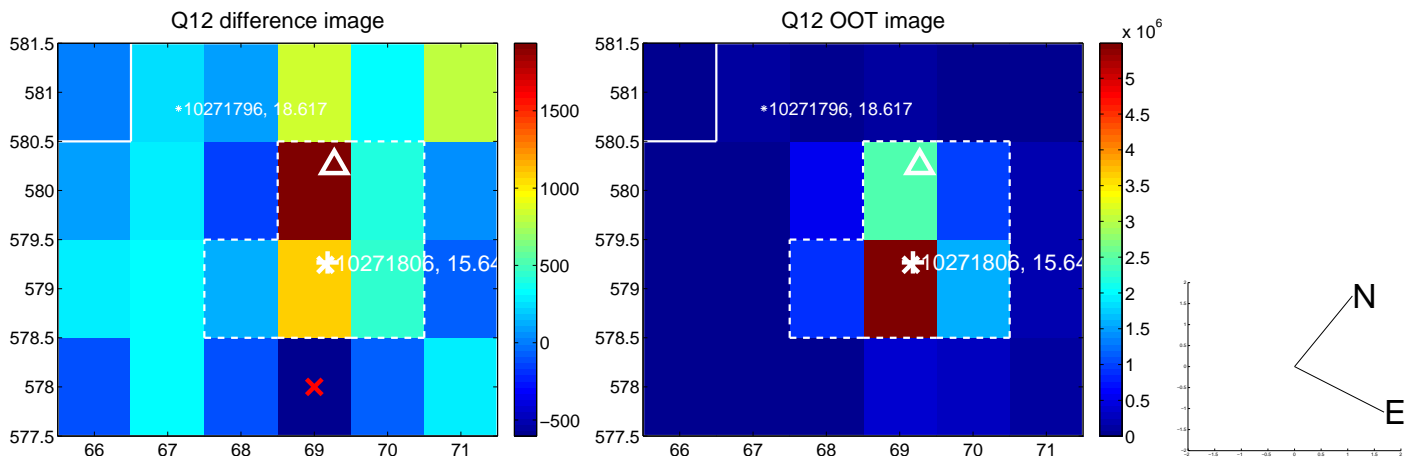
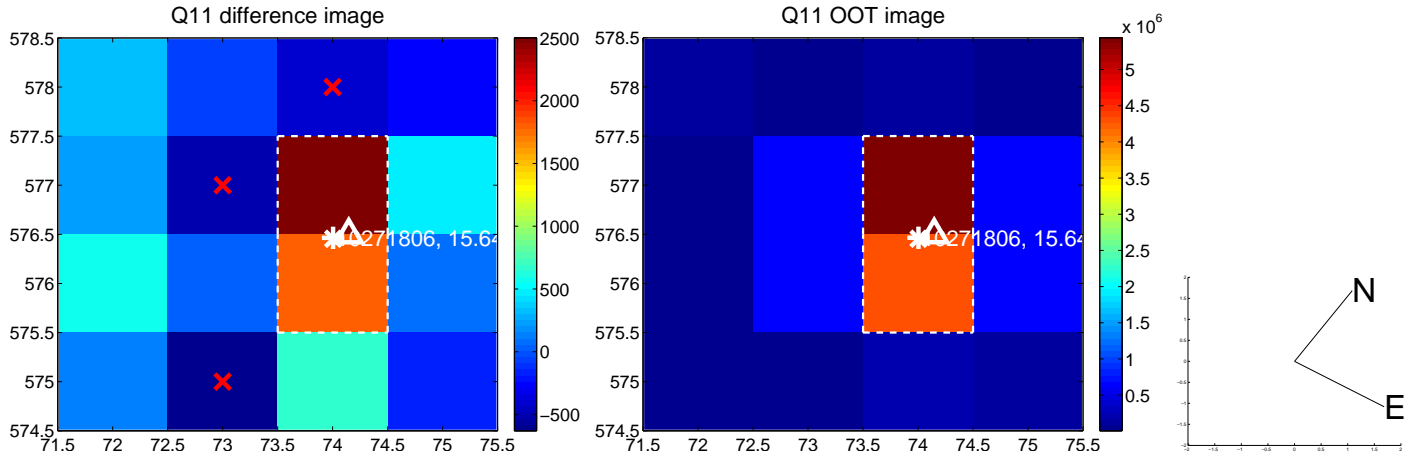
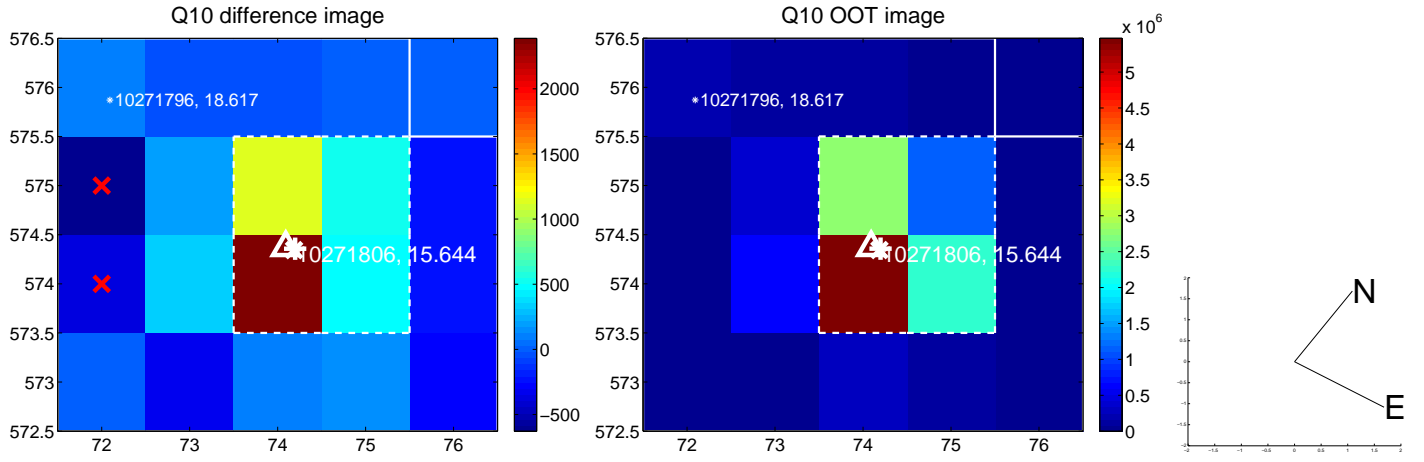
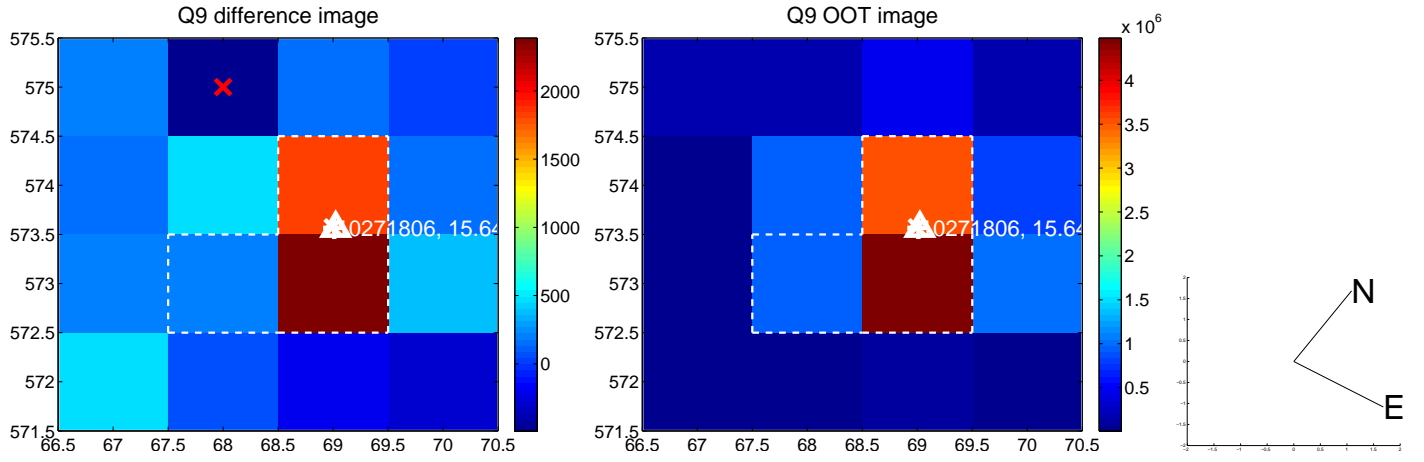
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



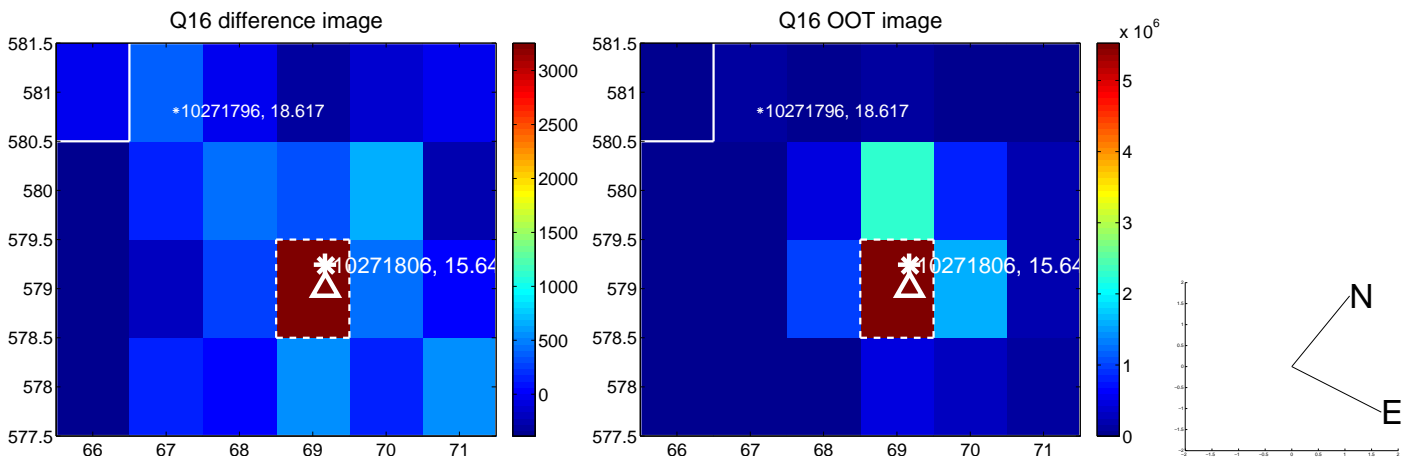
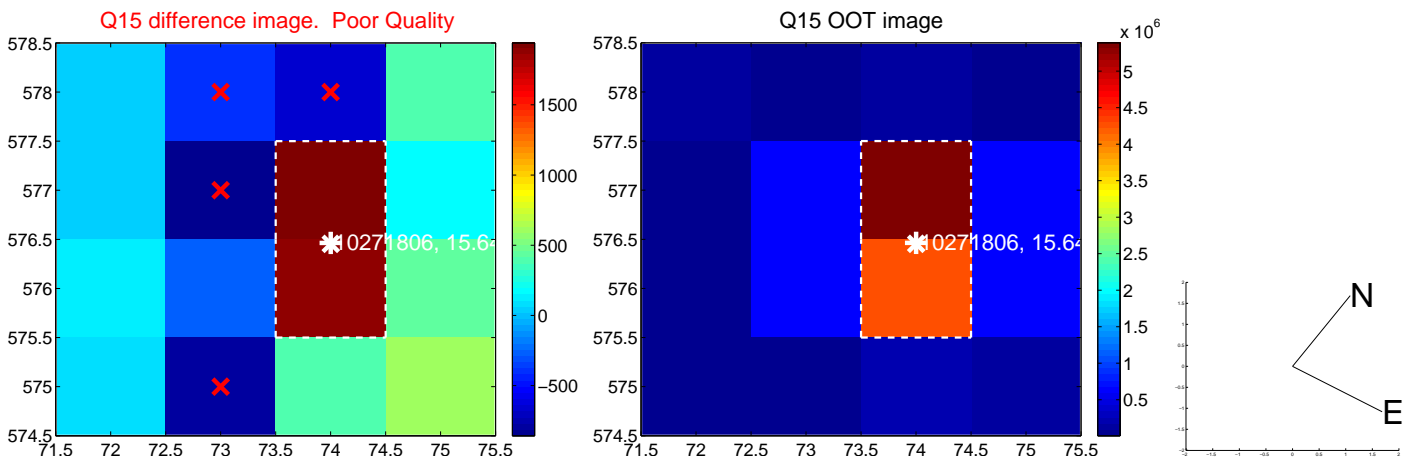
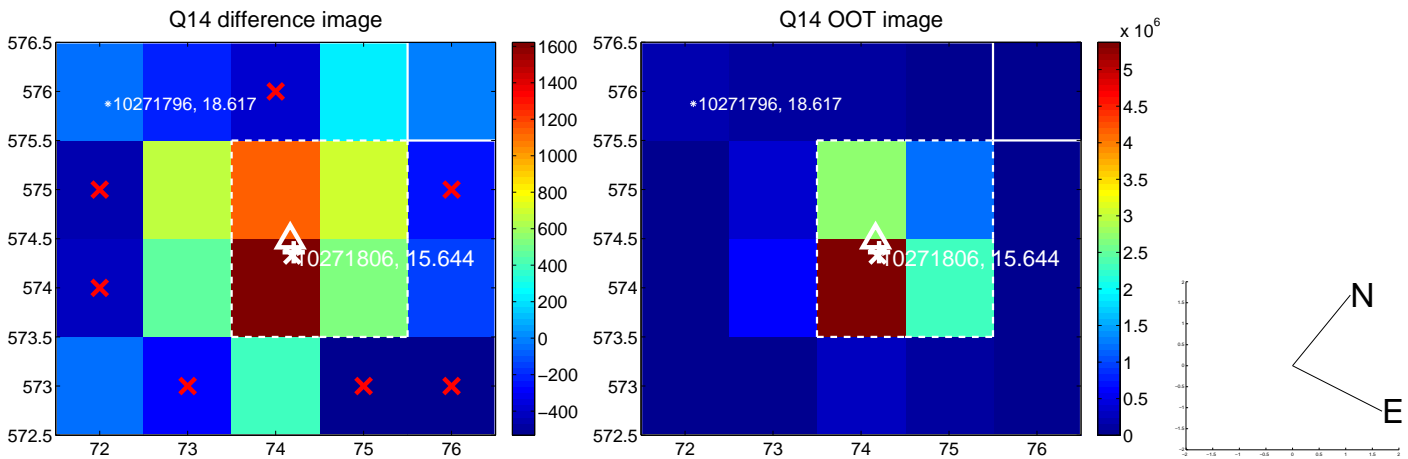
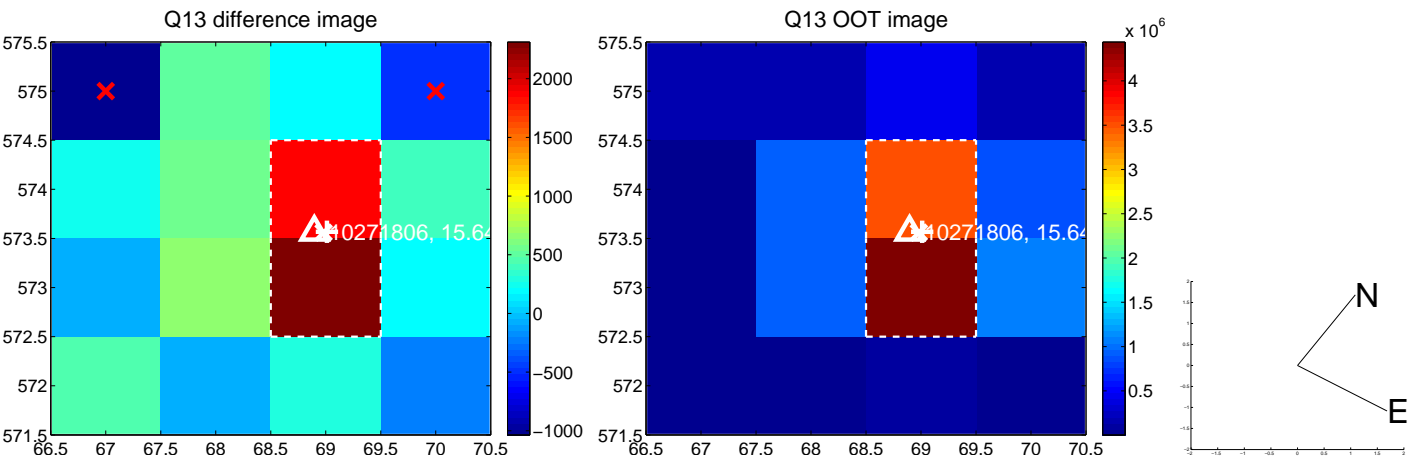
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



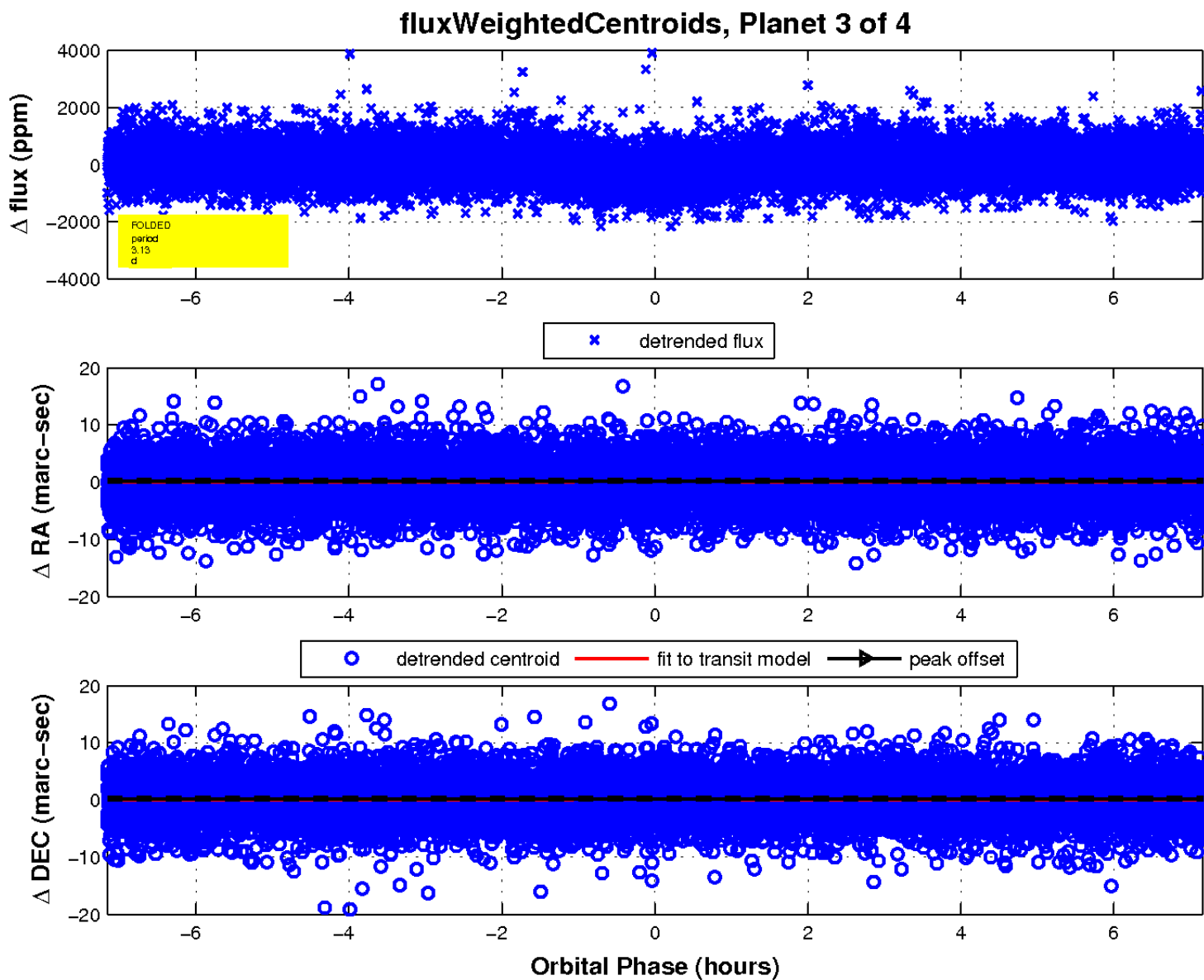
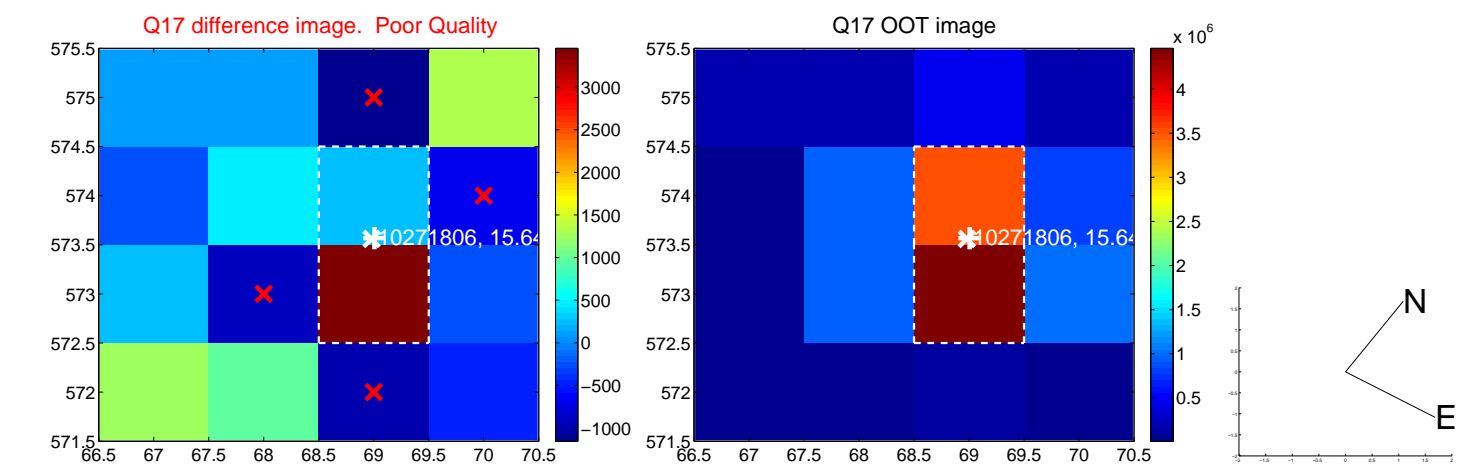
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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

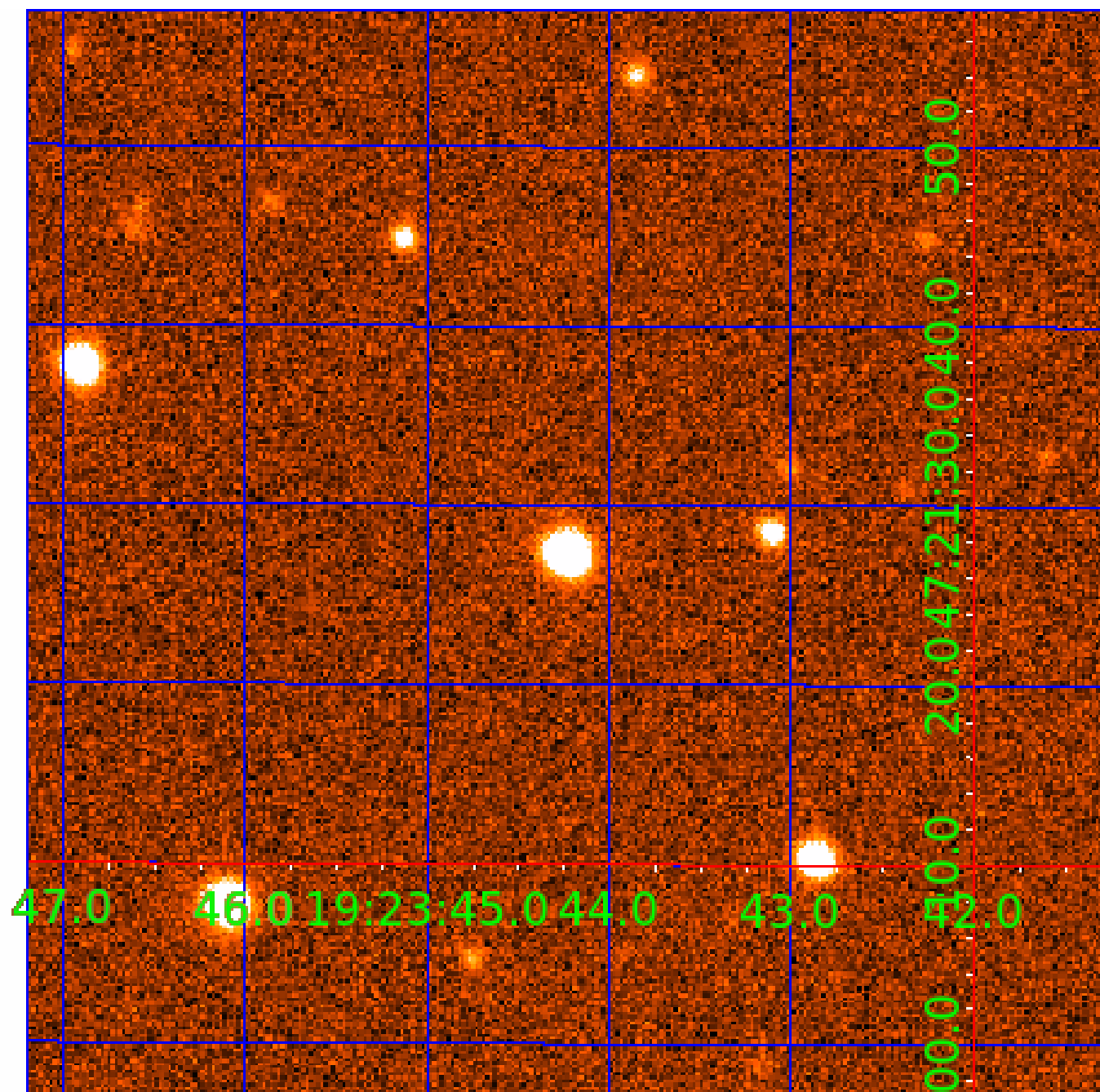


white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



UKIRT Image

Declination



KIC 010271806

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}) |
|--------------|----------|---------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 010271806-01 | OBS | 0733.01 | 5.924991 | 134.166675 | 1566.9 | 2.934 | 58.5 | 63.6 | 0.68 | 5016 | 3.19 | 78.10 |
| 010271806-02 | OBS | 0733.02 | 11.349353 | 134.317895 | 1316.2 | 3.266 | 36.5 | 40.1 | 0.68 | 5016 | 2.68 | 32.83 |
| 010271806-03 | OBS | 0733.03 | 3.132962 | 132.540194 | 428.2 | 2.387 | 20.5 | 23.2 | 0.68 | 5016 | 1.71 | 182.66 |
| 010271806-04 | OBS | 0733.04 | 18.643508 | 141.626237 | 866.6 | 1.789 | 15.0 | 17.0 | 0.68 | 5016 | 2.17 | 16.94 |

Robovetter Results

| TCE | Run Type | Disp | Score | N | S | C | E | Comments |
|--------------|----------|------|-------|---|---|---|---|------------|
| 010271806-01 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-02 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-03 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |
| 010271806-04 | OBS | PC | 1.00 | 0 | 0 | 0 | 0 | NO_COMMENT |

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

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

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

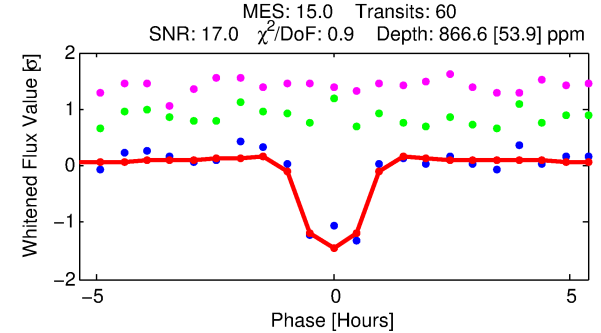
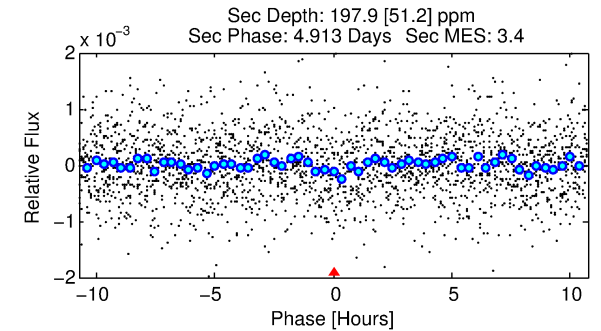
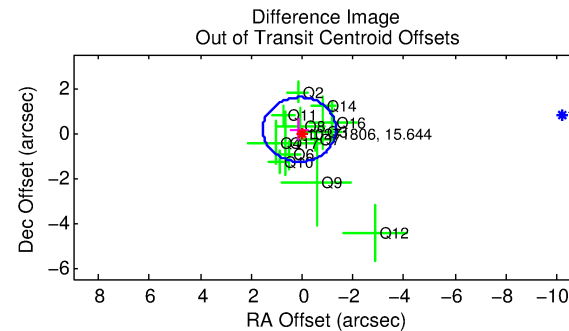
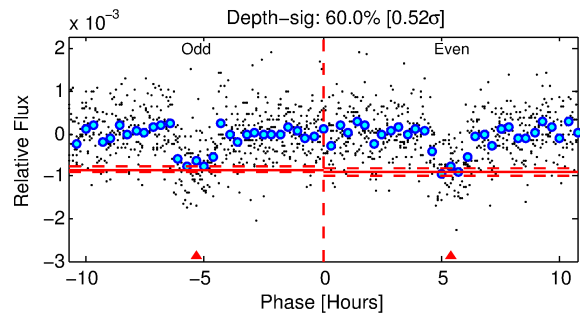
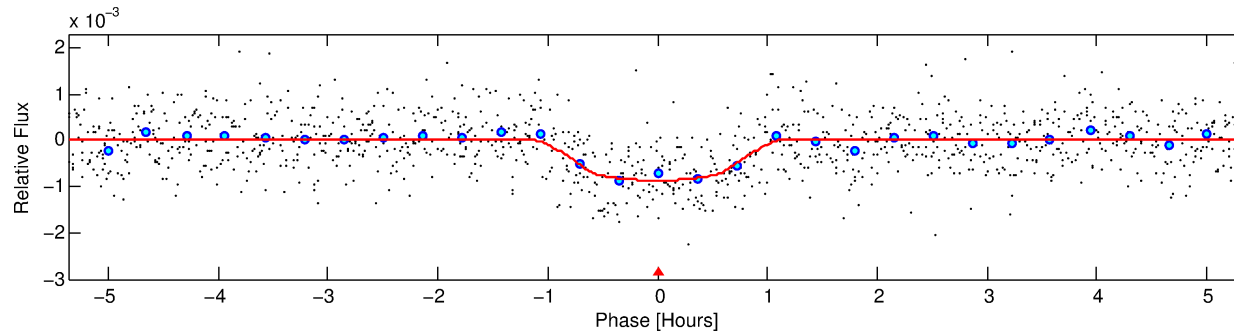
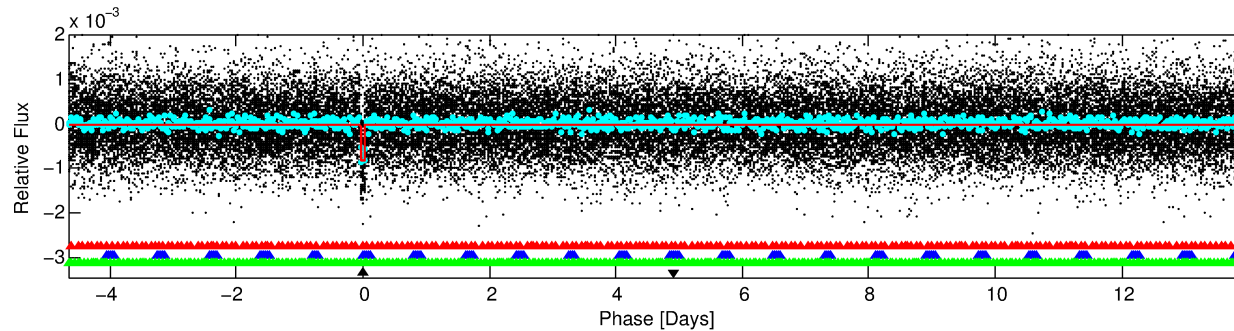
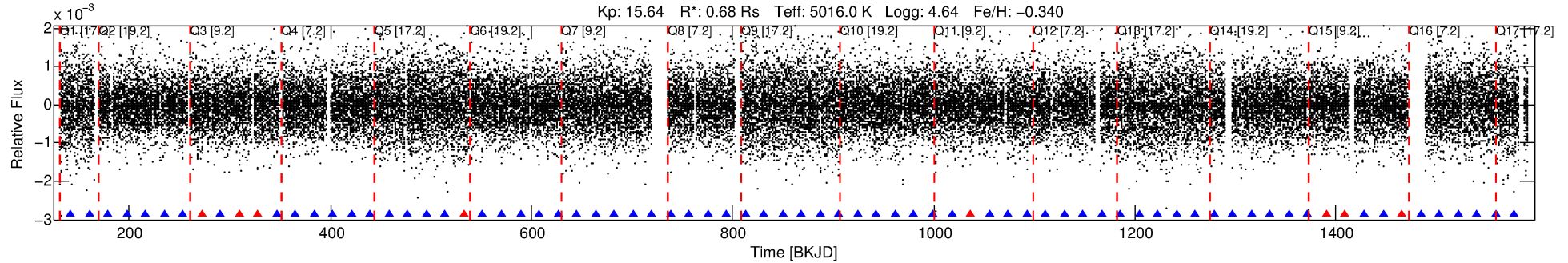
Ephemeris Match Information For 010271806-04

No Significant Match Found

DV One-Page Summary

KIC: 10271806 Candidate: 4 of 4 Period: 18.644 d
KOI: K00733.04 Name: Kepler-224e Corr: 0.993

Kp: 15.64 R*: 0.68 Rs Teff: 5016.0 K Logg: 4.64 Fe/H: -0.340



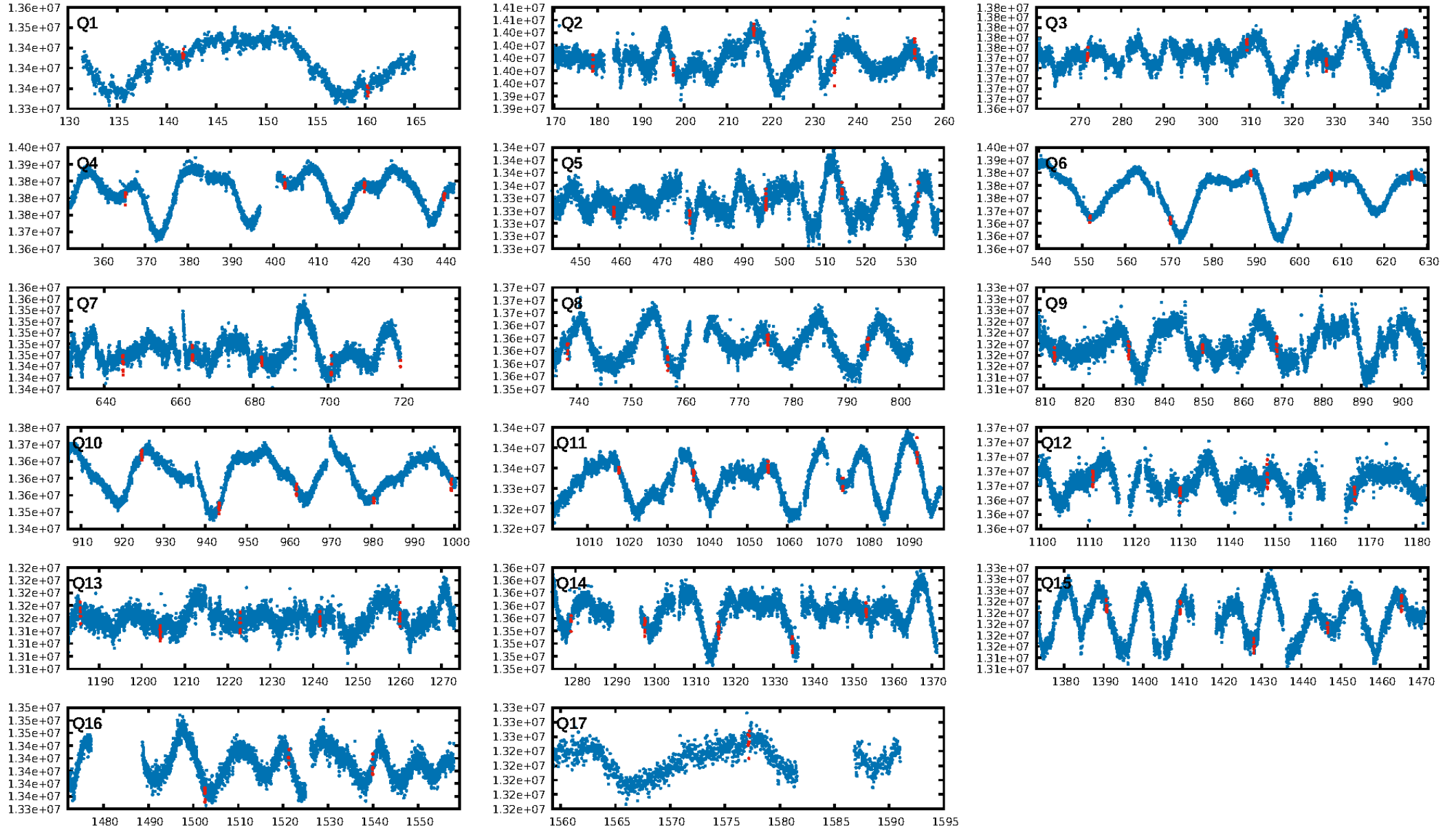
DV Fit Results:

Period = 18.64351 [0.00006] d
Epoch = 141.6262 [0.0026] BKJD
Rp/R* = 0.0293 [0.0290]
a/R* = 57.35 [204.82]
b = 0.74 [2.29]
Seff = 16.94 [2.08]
Teq = 517 [16] K
Rp = 2.17 [2.15] Re
a = 0.1242 [0.0076] AU
Ag = 356.97 [713.83] [0.50σ]
Teffp = 3476 [1737] K [1.70σ]

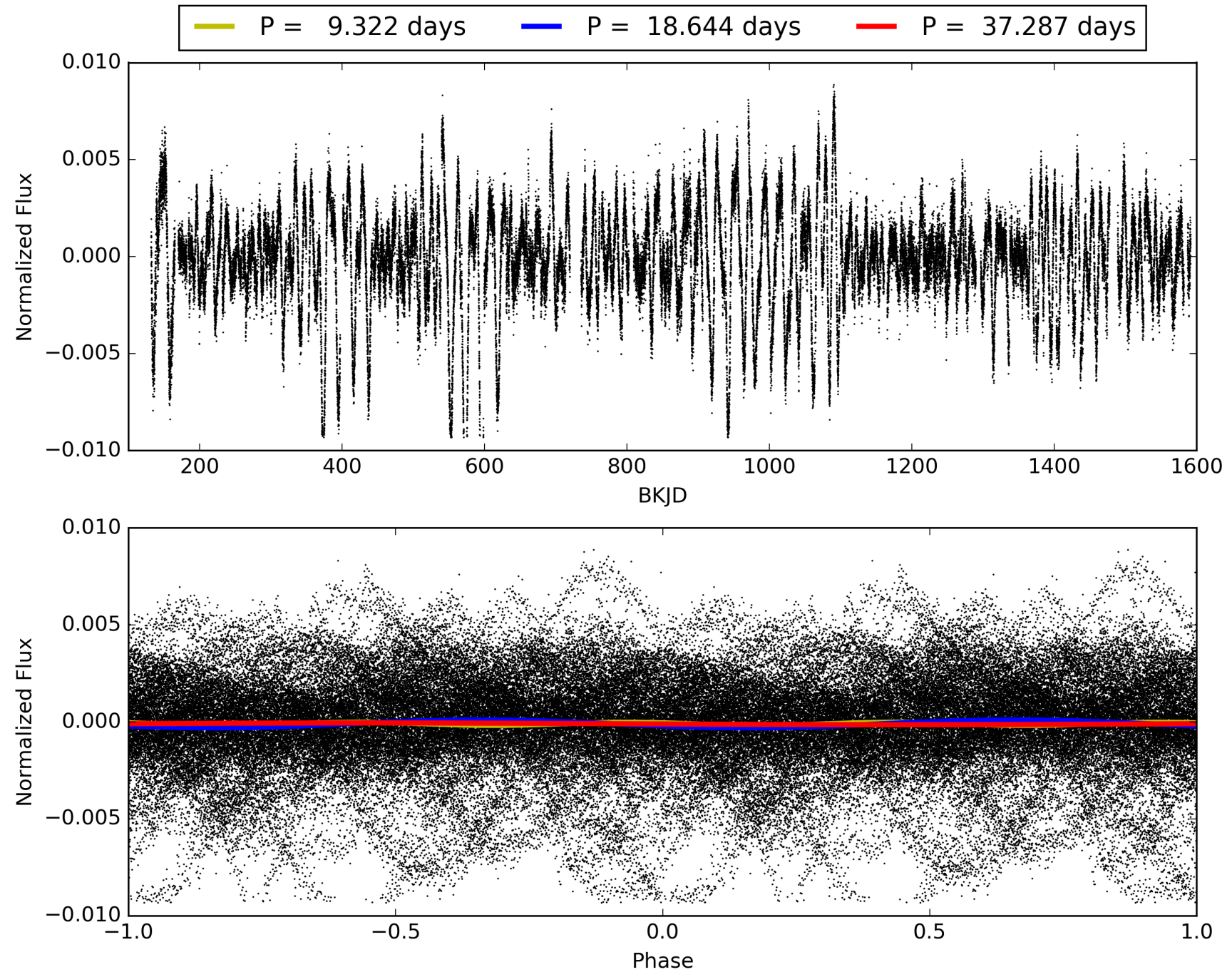
DV Diagnostic Results:

ShortPeriod-sig: 100.0% [47.01σ]
LongPeriod-sig: N/A
ModelChiSquare2-sig: 96.1%
ModelChiSquareGof-sig: 100.0%
Bootstrap-pfa: 2.43e-44
RollingBand-fgt: 0.86 [49/57]
GhostDiagnostic-chr: 3.803
Centroid-sig: 24.9%
Centroid-so: 0.825 arcsec [1.07σ]
OotOffset-rm: 0.188 arcsec [0.39σ]
KicOffset-rm: 0.226 arcsec [0.51σ]
OotOffset-st: 4/3/4/2 [13]
KicOffset-st: 4/3/4/2 [13]
DiffImageQuality-fgm: 0.85 [11/13]
DiffImageOverlap-fno: 1.00 [17/17]

TCE 010271806-04, PDC Light Curves

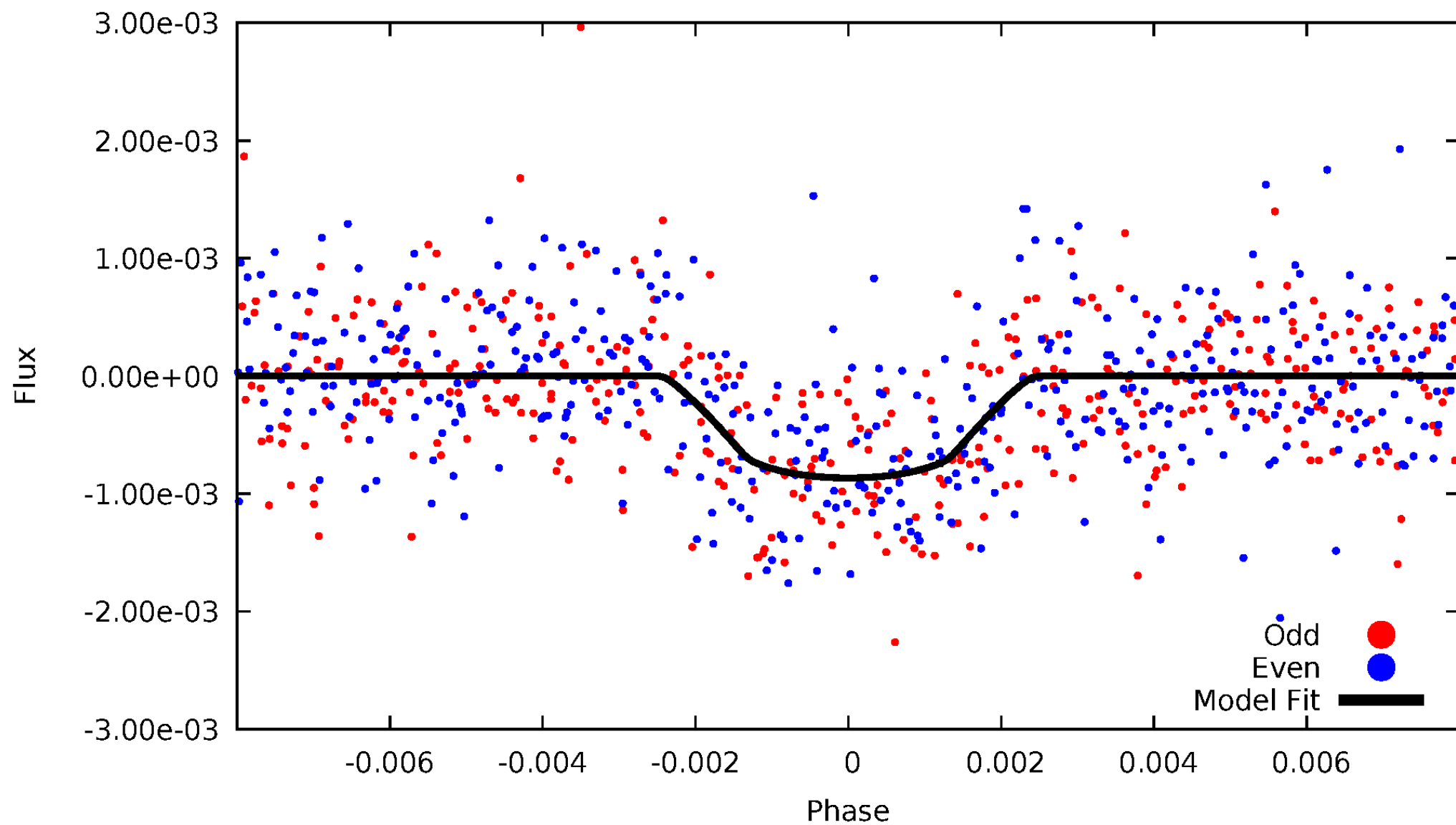


TCE 010271806-04



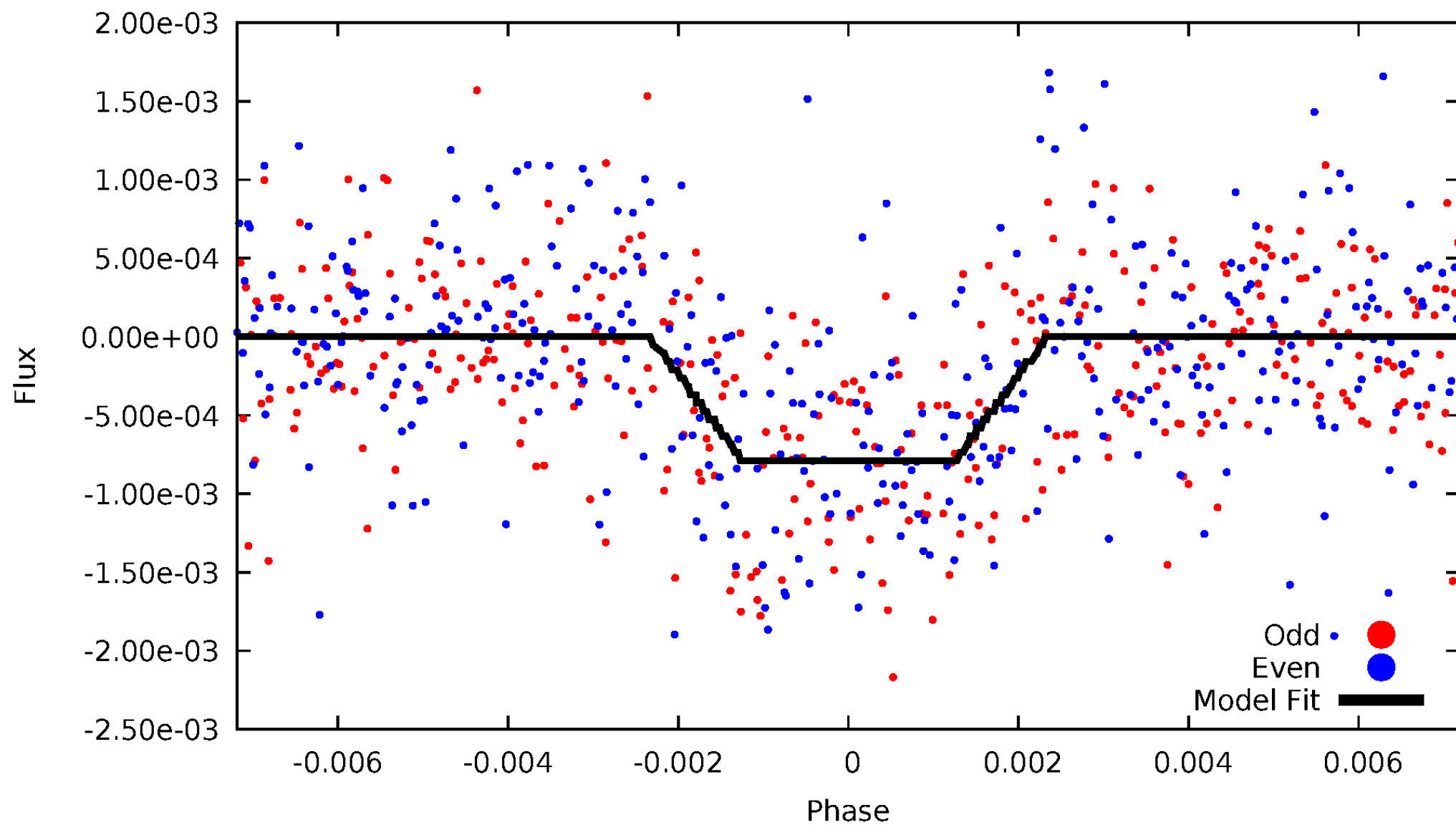
DV Odd/Even

TCE 010271806-04



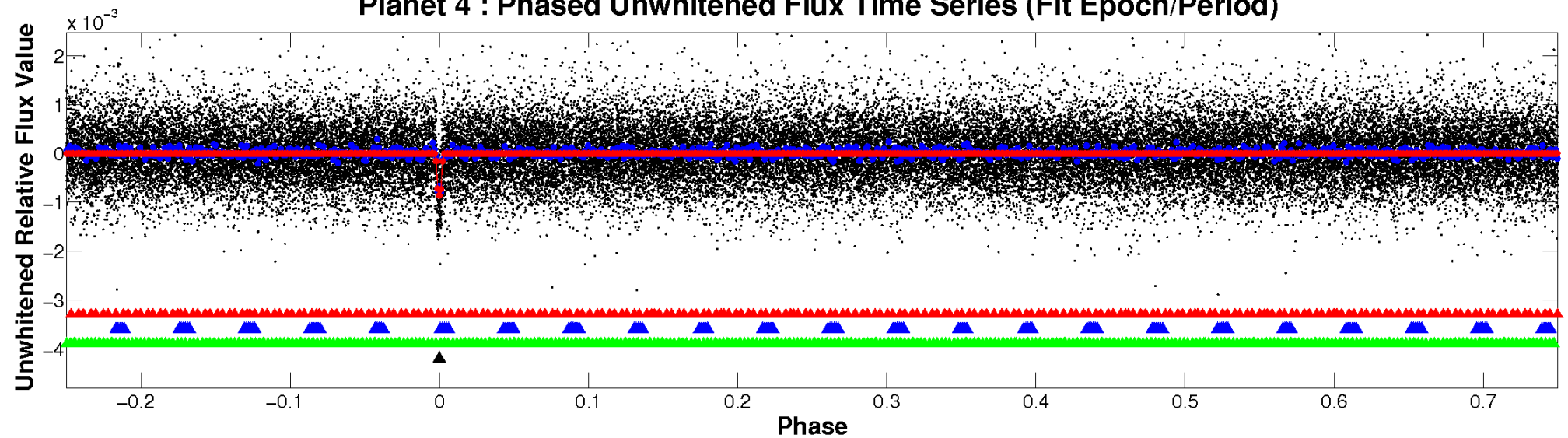
ALT Odd/Even

TCE 010271806-04

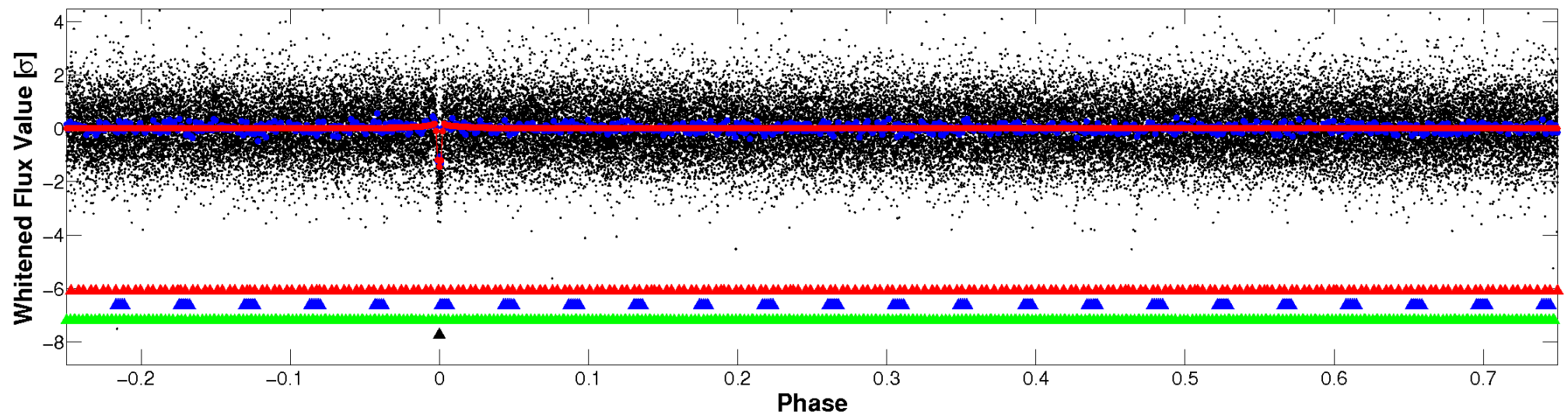


Non-Whitened Vs. Whitened Light Curve

Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

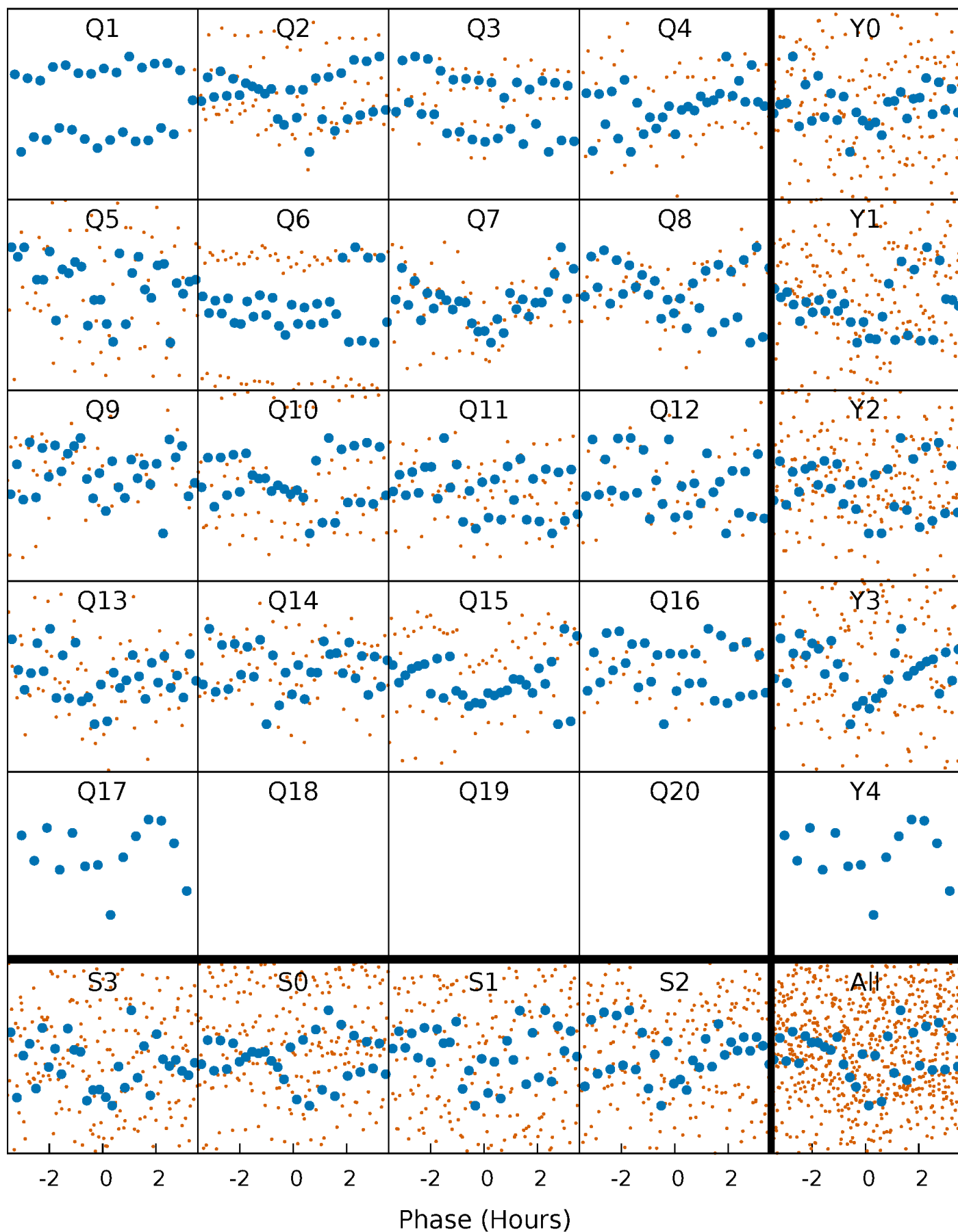


Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



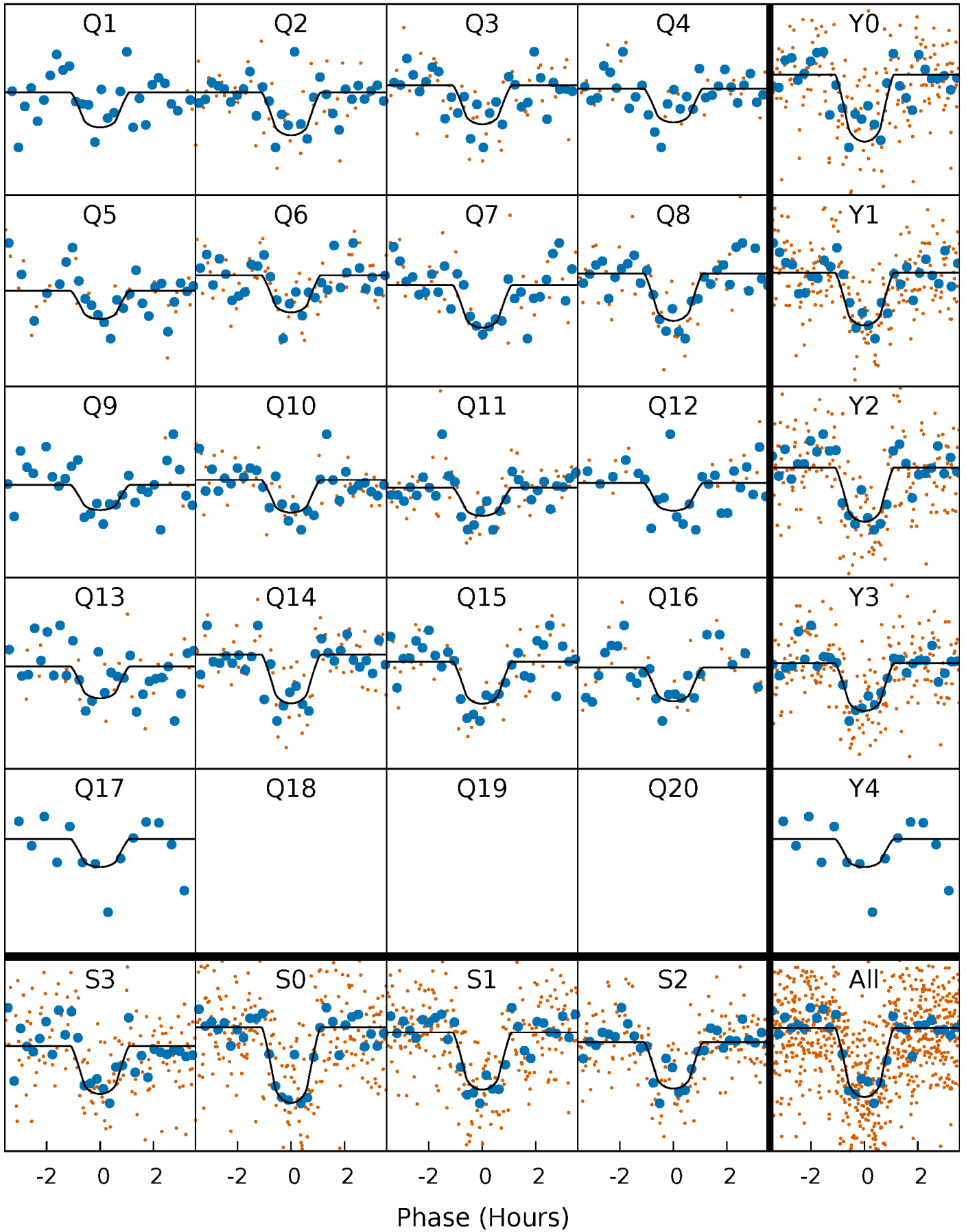
PDC Quarter-Phased Transit Curves

TCE 010271806-04 P= 18.643508 Days $T_0=141.626237$ (BKJD)



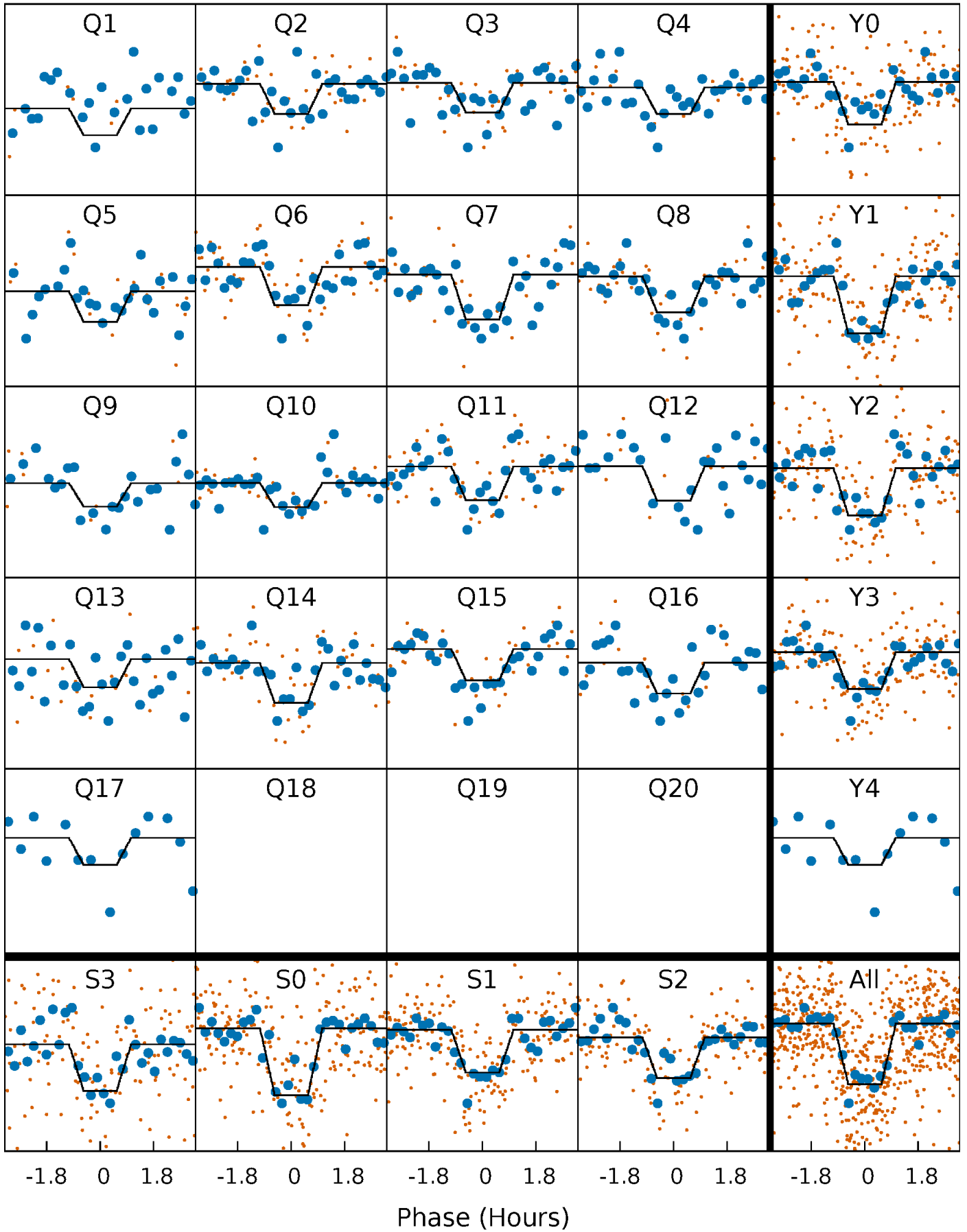
DV Quarter-Phased Transit Curves

TCE 010271806-04 P= 18.643508 Days $T_0=141.626237$ (BKJD)



Alt. Detrend Quarter-Phased Transit Curves

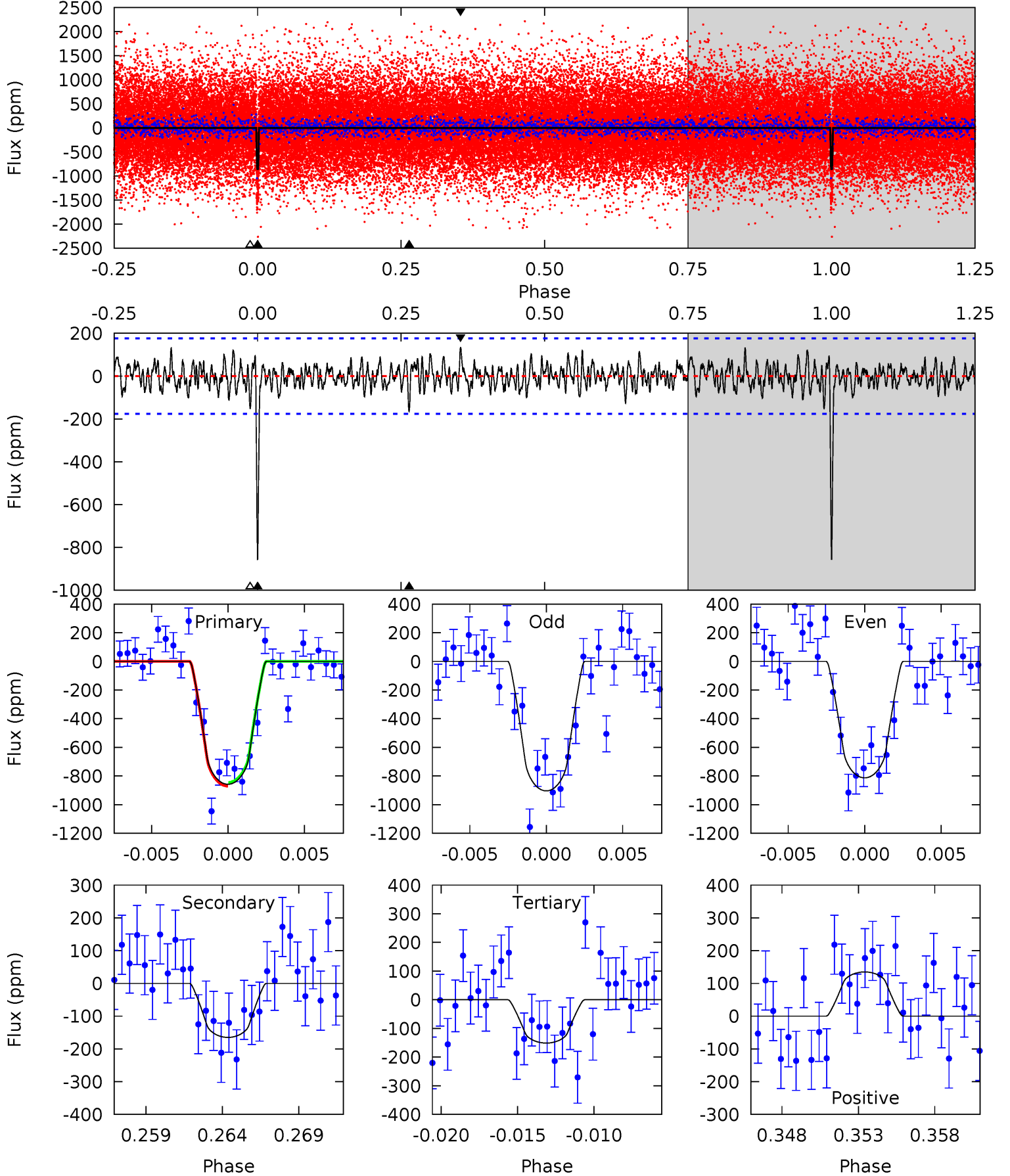
TCE 010271806-04 P= 18.643557 Days $T_0=141.624067$ (BKJD)



DV Model-Shift Uniqueness Test

010271806-04, P = 18.643508 Days, E = 122.982729 Days

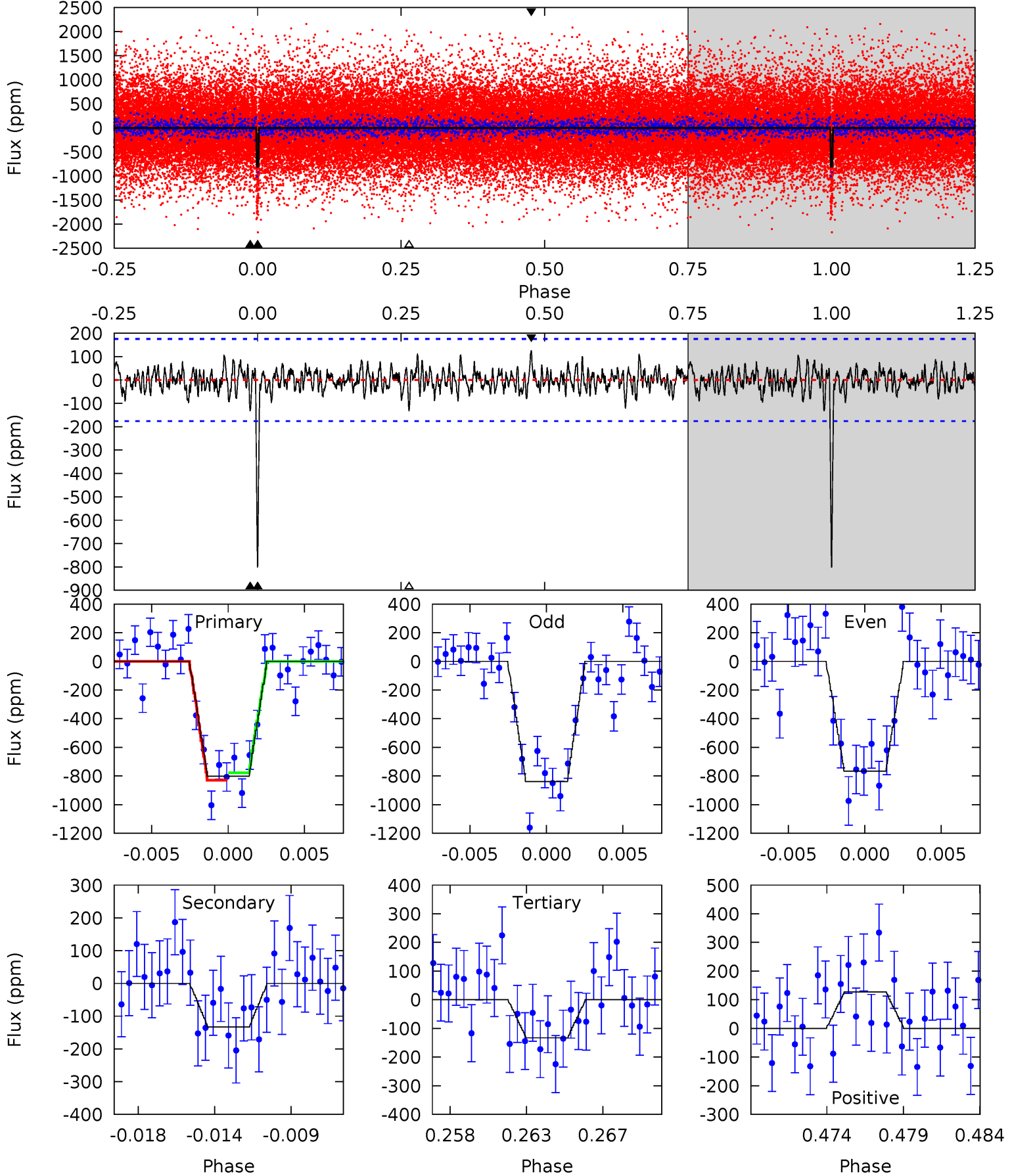
| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 25.1 | 4.83 | 4.42 | 3.95 | 5.16 | 2.81 | 1.30 | 20.7 | 21.2 | 0.41 | 0.88 | 1.34 | 0.93 | 0.14 | 0.36 |



Alt Model-Shift Uniqueness Test

010271806-04, P = 18.643557 Days, E = 122.980510 Days

| Pri | Sec | Ter | Pos | FA ₁ | FA ₂ | F _{Red} | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM | Shape | TAT |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 23.6 | 3.90 | 3.90 | 3.75 | 5.17 | 2.83 | 1.11 | 19.7 | 19.8 | 0.00 | 0.16 | 1.08 | 0.98 | 0.14 | 0.77 |



Stellar Parameters For KIC 010271806

| | $T_{\text{eff}}(K)$ | $\log(g)$ | $[\text{Fe}/\text{H}]$ | $R (R_{\odot})$ | $M(M_{\odot})$ | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
| | 5016^{+100}_{-100} | $4.641^{+0.018}_{-0.053}$ | $-0.340^{+0.150}_{-0.150}$ | $0.679^{+0.046}_{-0.029}$ | $0.743^{+0.034}_{-0.052}$ | $3.340^{+0.263}_{-0.576}$ |
| | +2%/-2% | +0%/-1% | +44%/-44% | +7%/-4% | +5%/-7% | +8%/-17% |
| Source | SPE58 | SPE58 | SPE58 | DSEP | | |

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

Secondary Eclipse Parameters for KIC 010271806-04 / KOI 0733.04

| Detrend | Depth (ppm) | $R_p (R_{\oplus})$ | $T_{max} (K)$ | $T_{obs} (K)$ | A_{obs} |
|---------|---------------|------------------------|-------------------|-----------------------|---------------------|
| DV | -165 ± 34 | $2.69^{+2.00}_{-1.61}$ | 727^{+20}_{-16} | 3429^{+1282}_{-500} | 190^{+923}_{-126} |
| Alt. | -133 ± 34 | $2.71^{+2.12}_{-1.68}$ | 728^{+18}_{-18} | 3314^{+1364}_{-510} | 153^{+950}_{-108} |

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 $A_{obs} \gg 1.0$

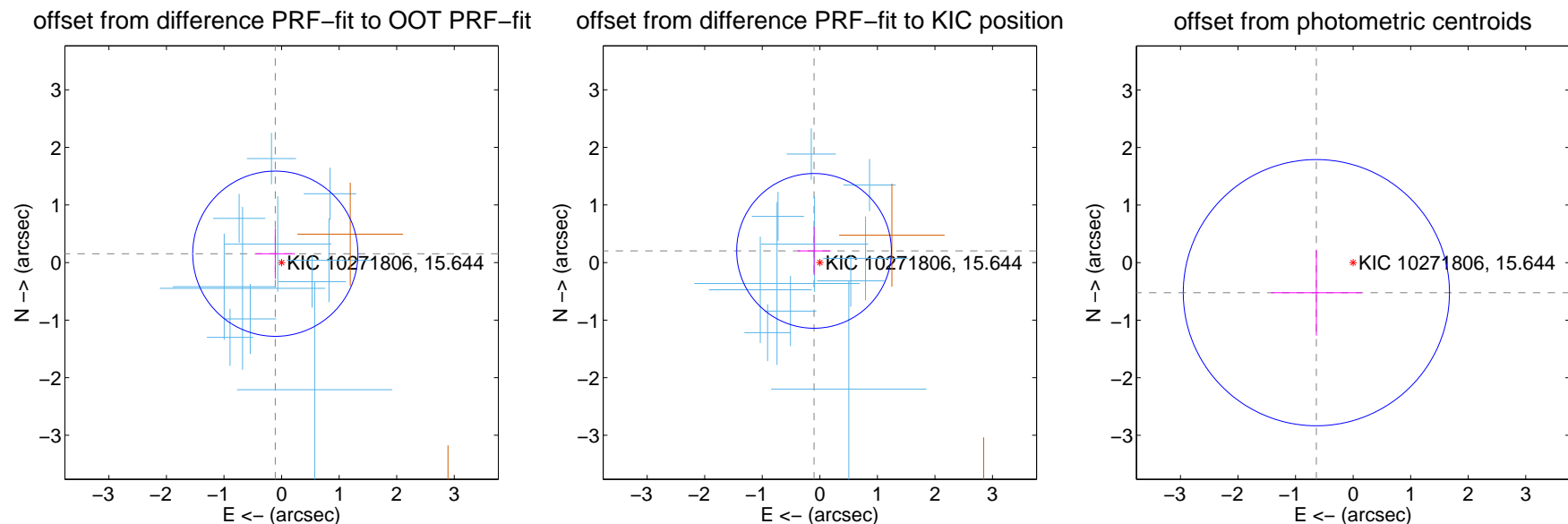
DV Centroid Data

Supplemental centroid analysis for 010271806-04. Kepler magnitude: 15.64. Transit SNR 16.98

There are 11 quarters with good PRF difference image offsets

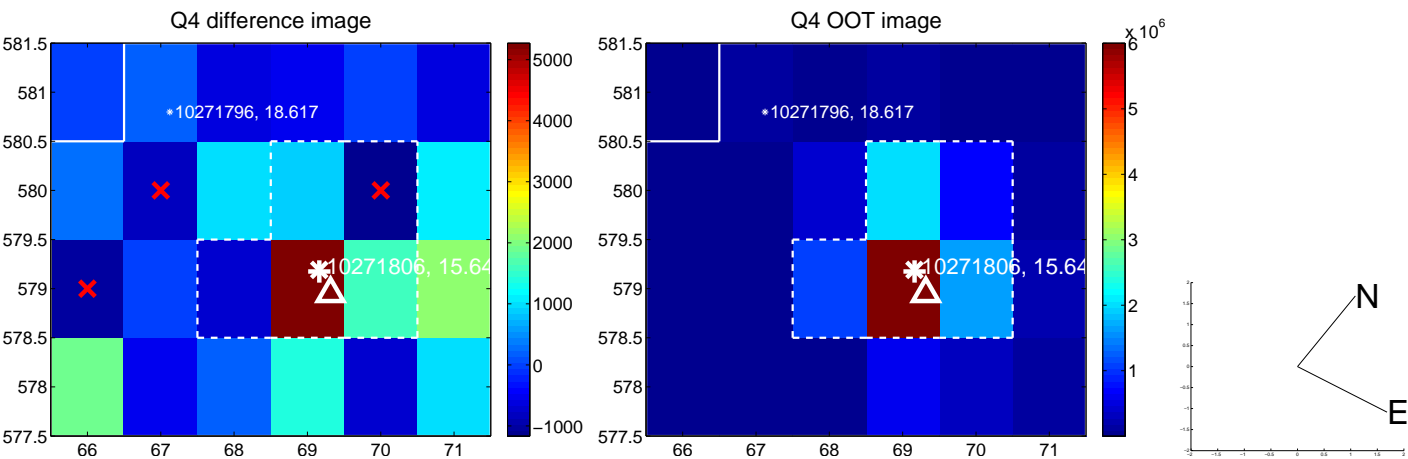
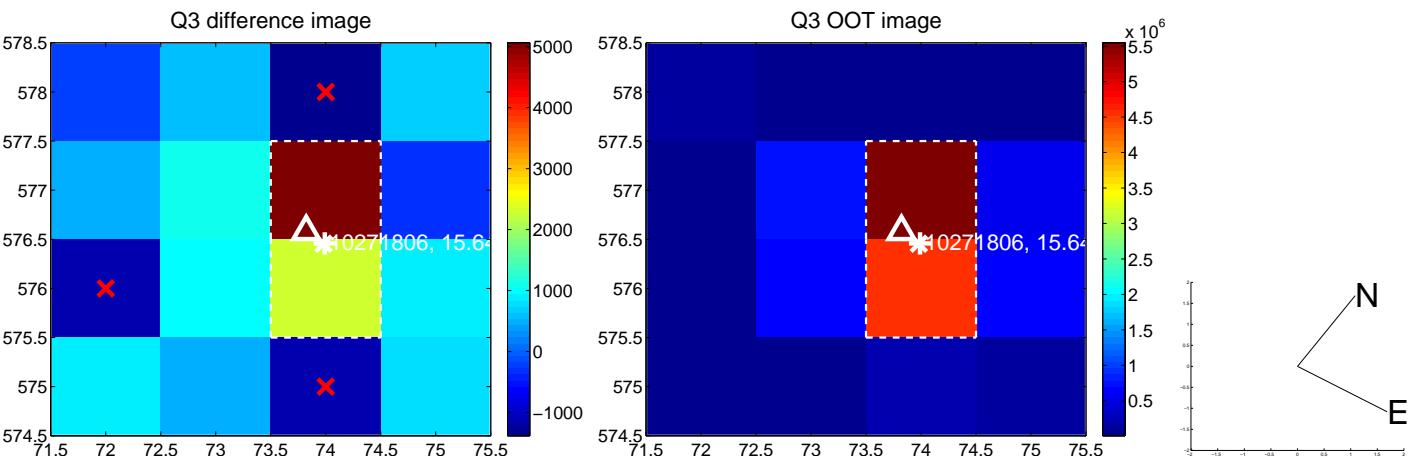
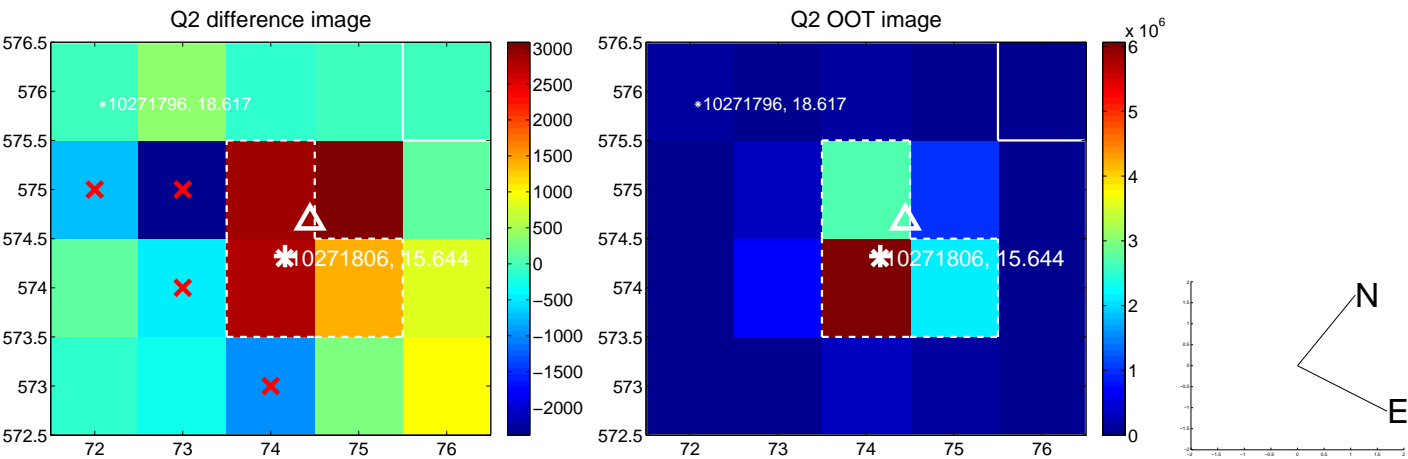
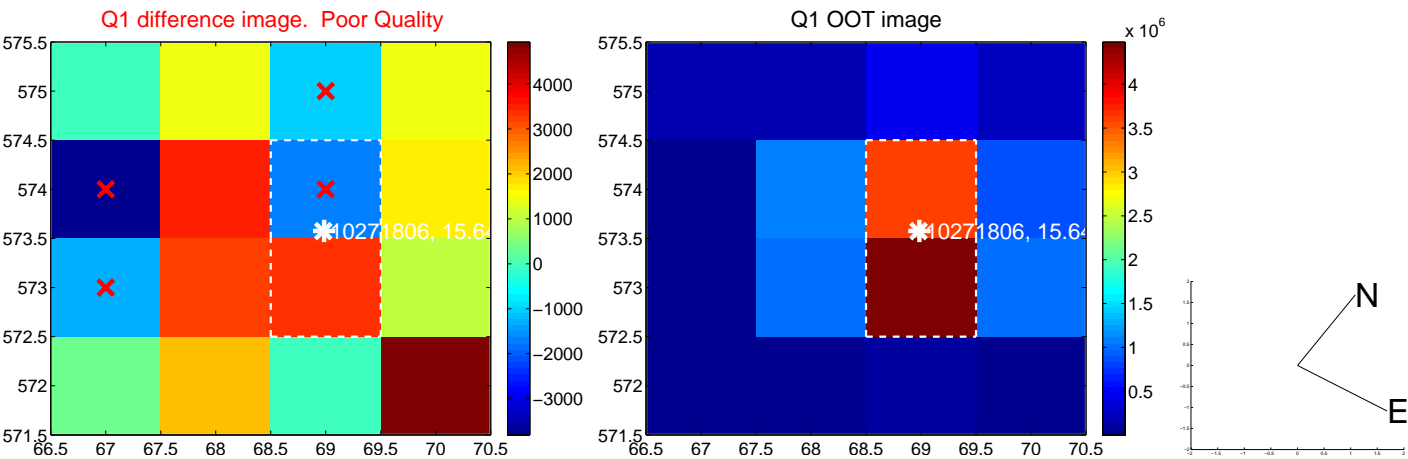
The direct PRF centroid is offset from the target star catalog position by about 0.11 arcsec

| | Distance in arcsec | Distance / σ | Δ RA | Δ Dec |
|---|--------------------|---------------------|-------------------|-------------------|
| PRF-fit source offset from OOT | 0.188 ± 0.478 | 0.39 | 0.109 ± 0.342 | 0.153 ± 0.435 |
| PRF-fit source offset from KIC position | 0.226 ± 0.448 | 0.51 | 0.101 ± 0.285 | 0.203 ± 0.417 |
| photometric centroid source offset | 0.83 ± 0.77 | 1.07 | 0.64 ± 0.79 | -0.52 ± 0.75 |

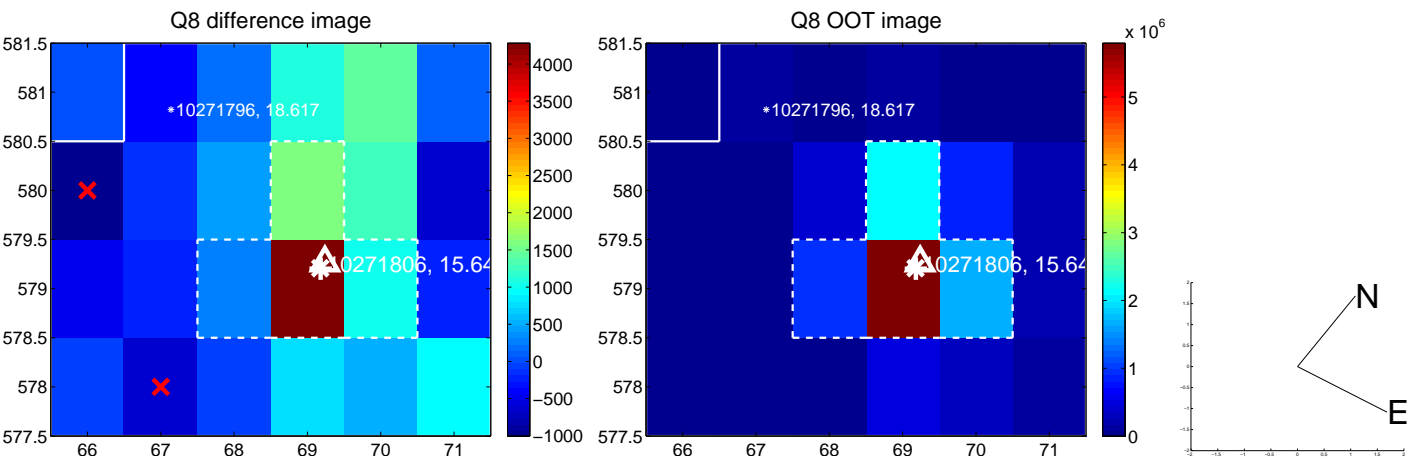
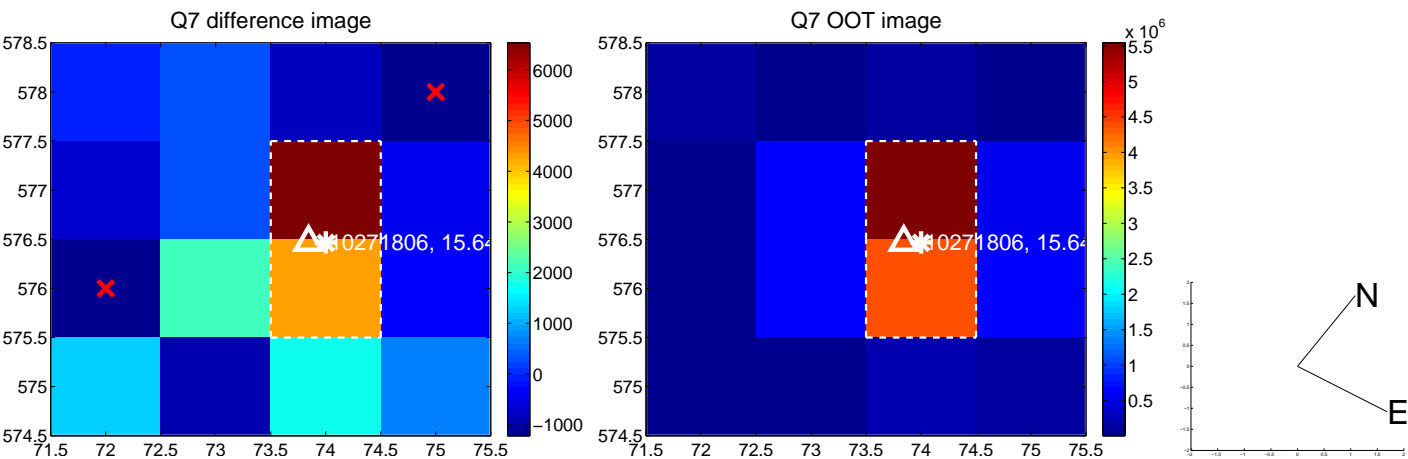
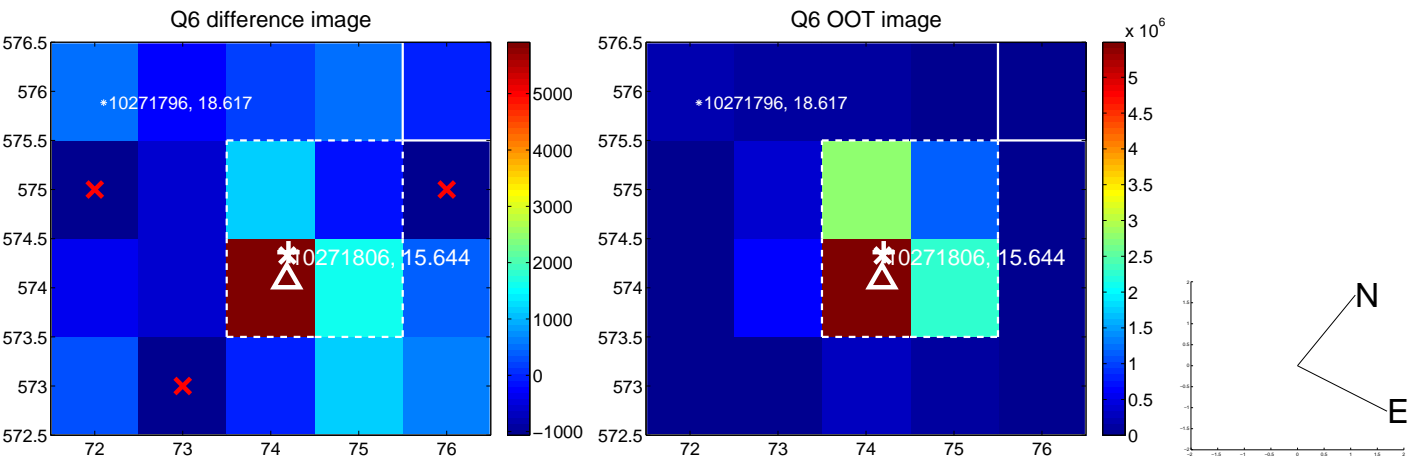
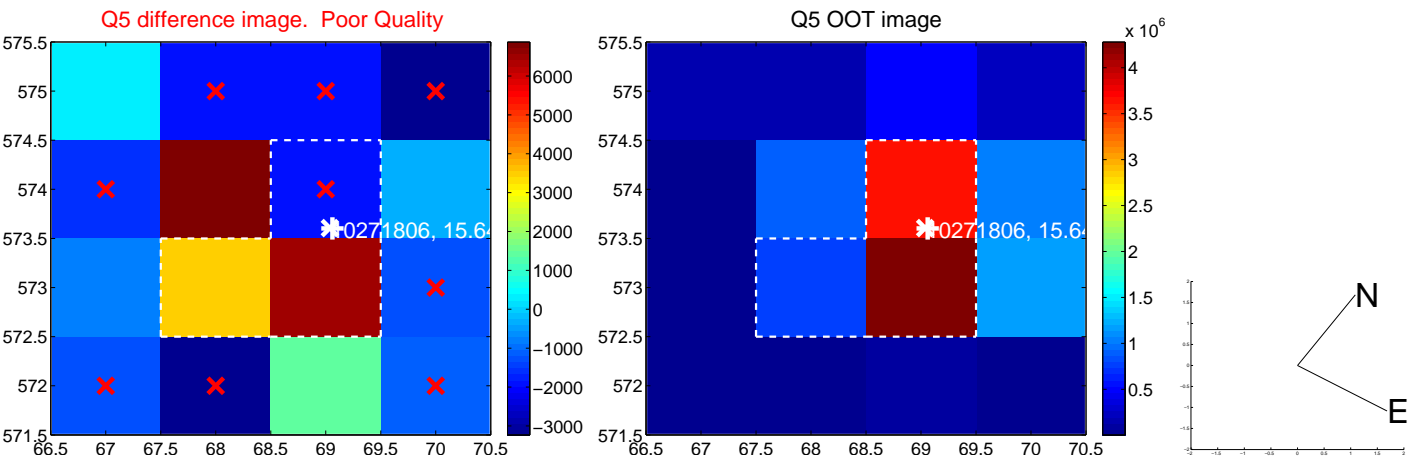


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets**; **Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- σ uncertainty. Blue circle: three-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

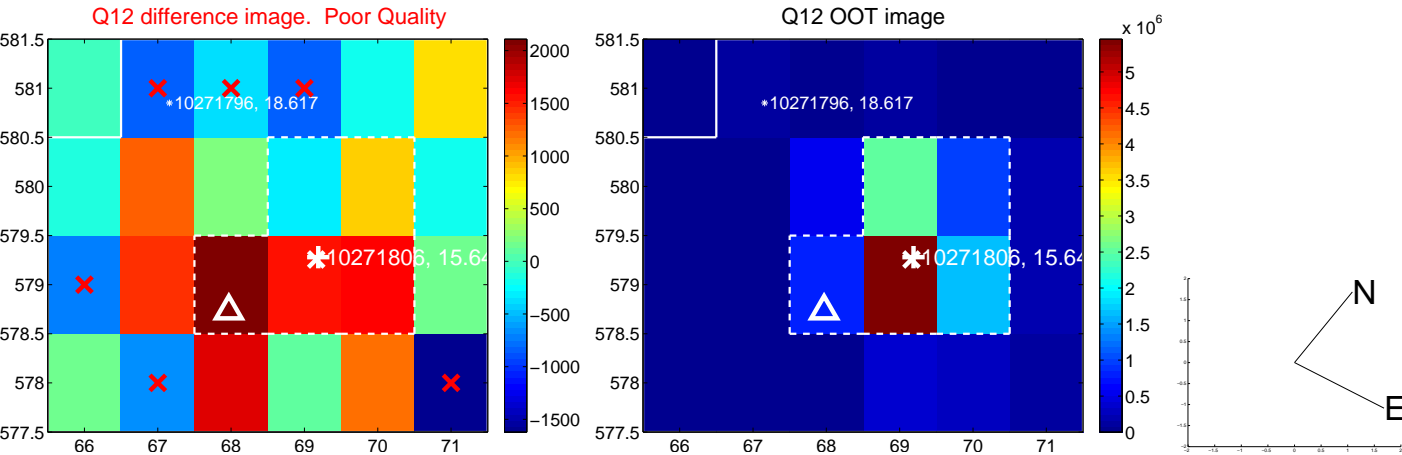
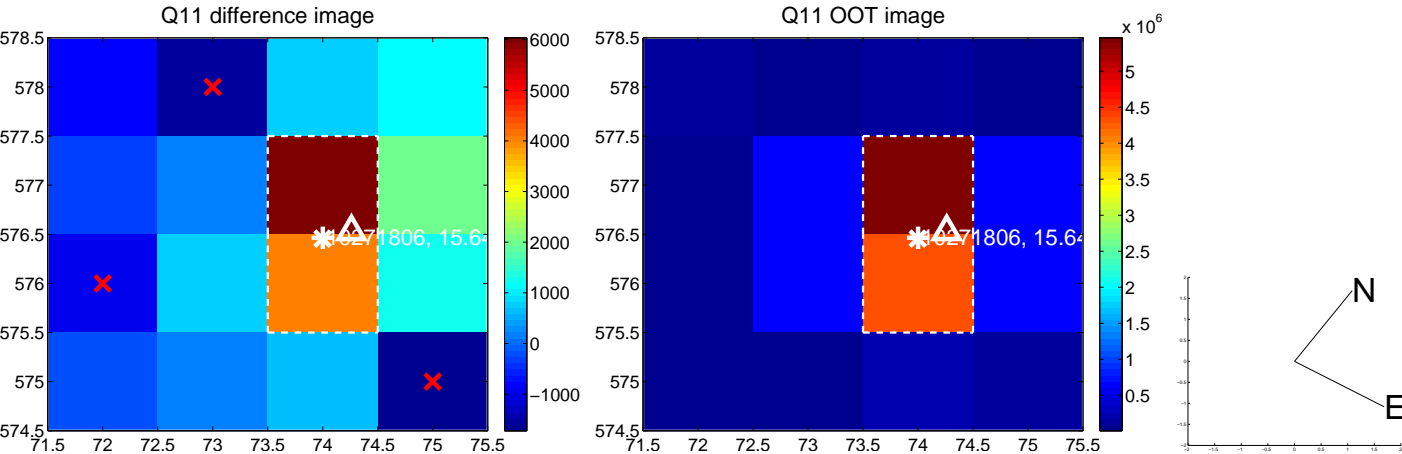
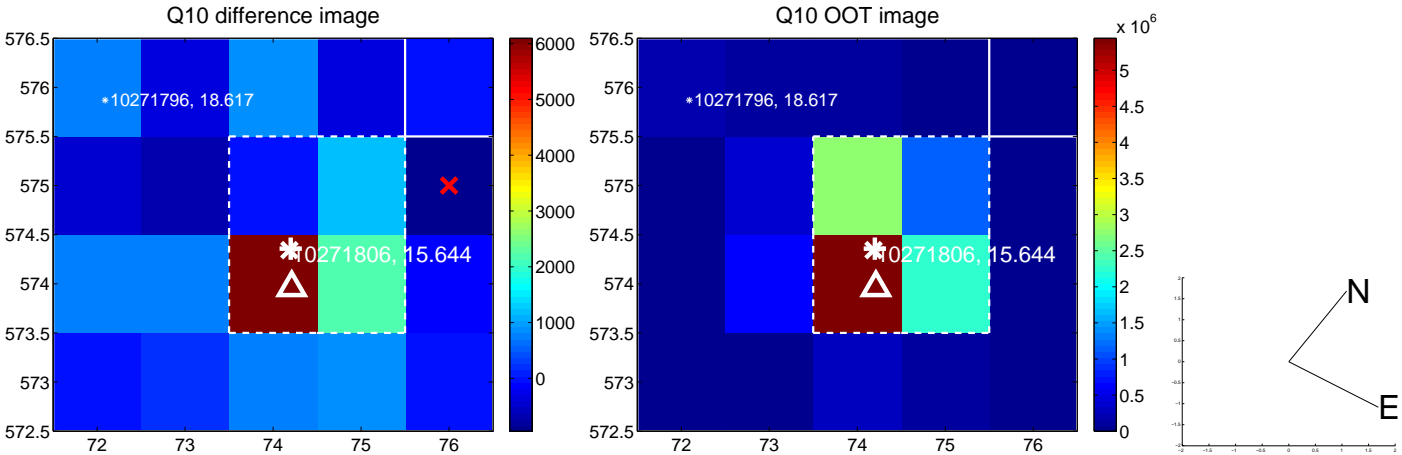
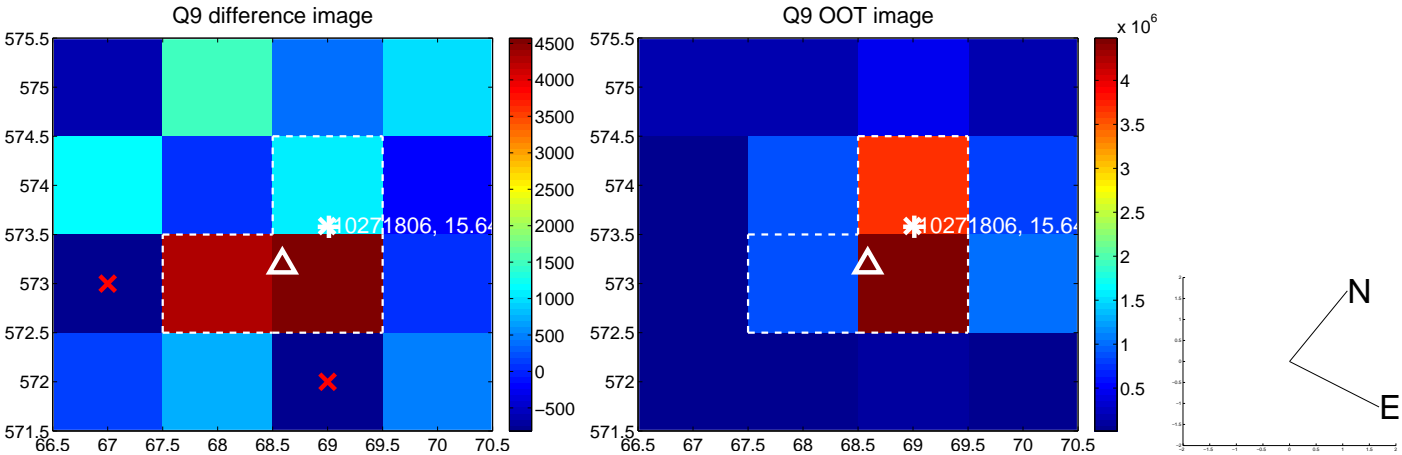
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



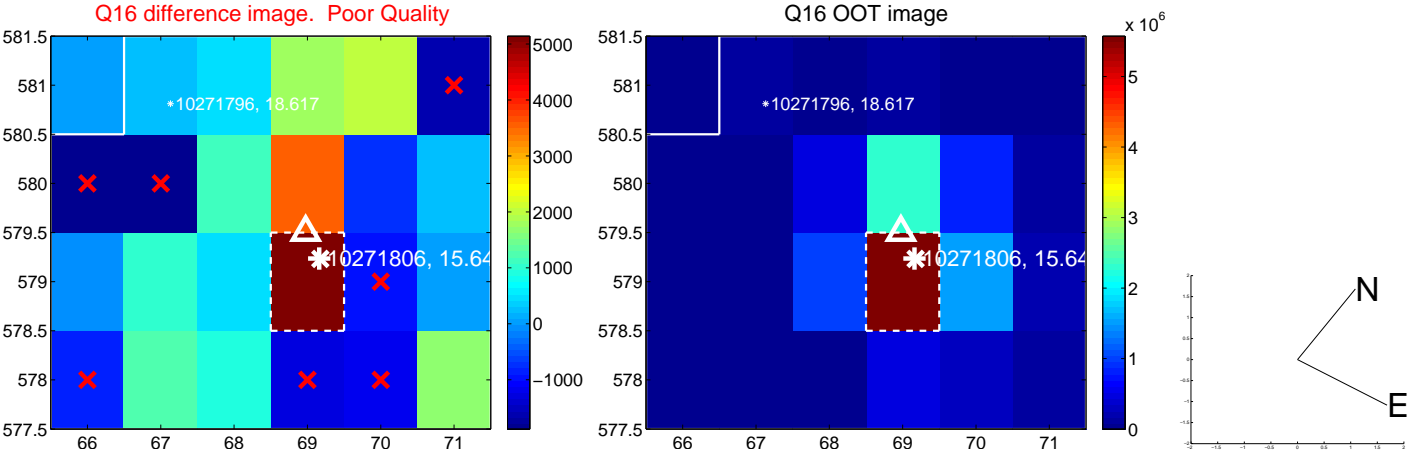
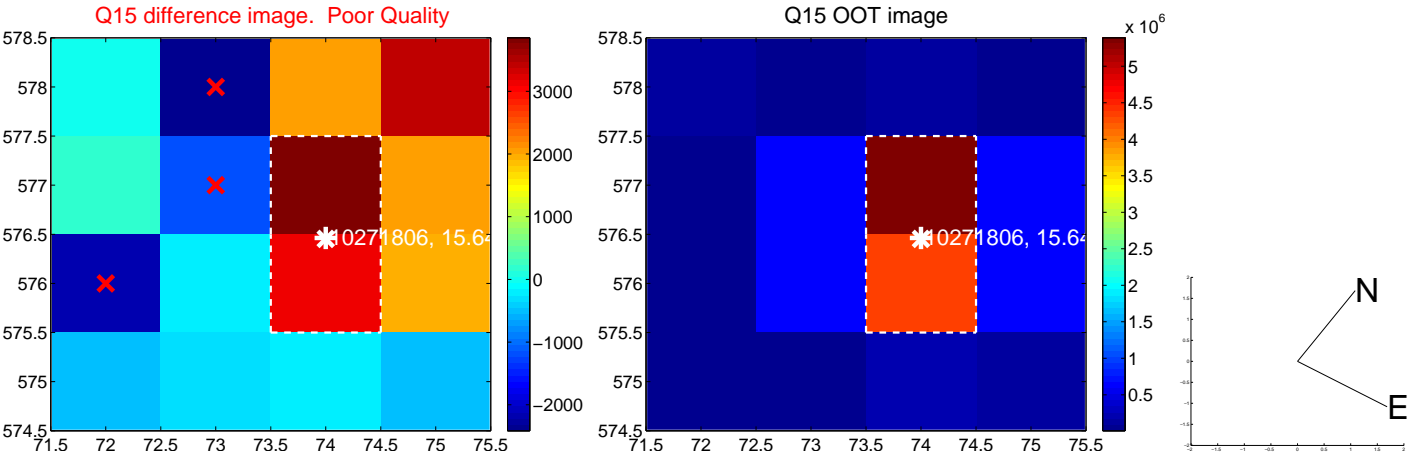
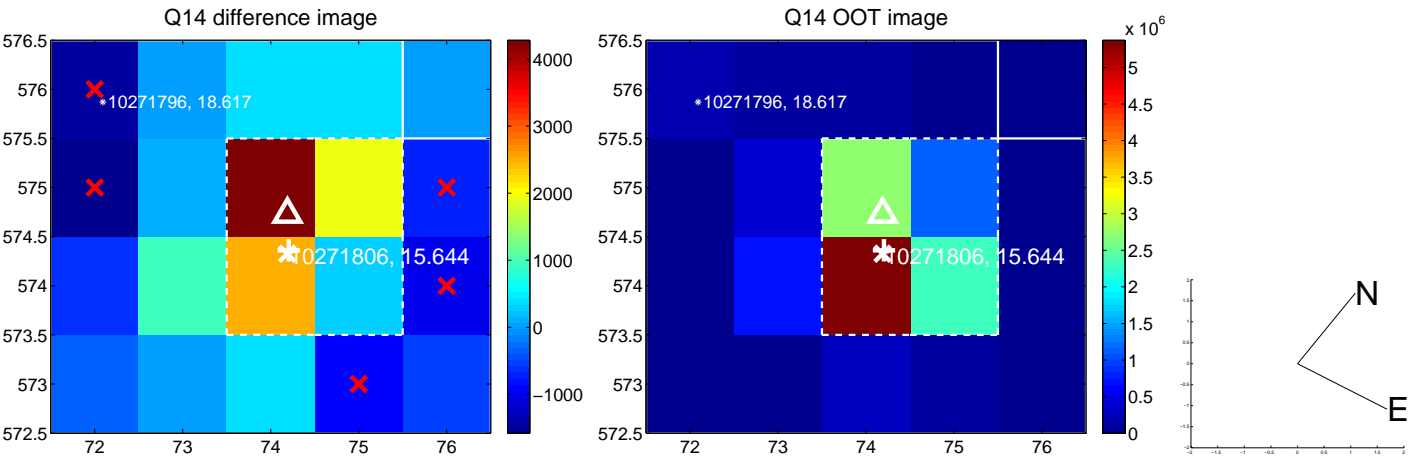
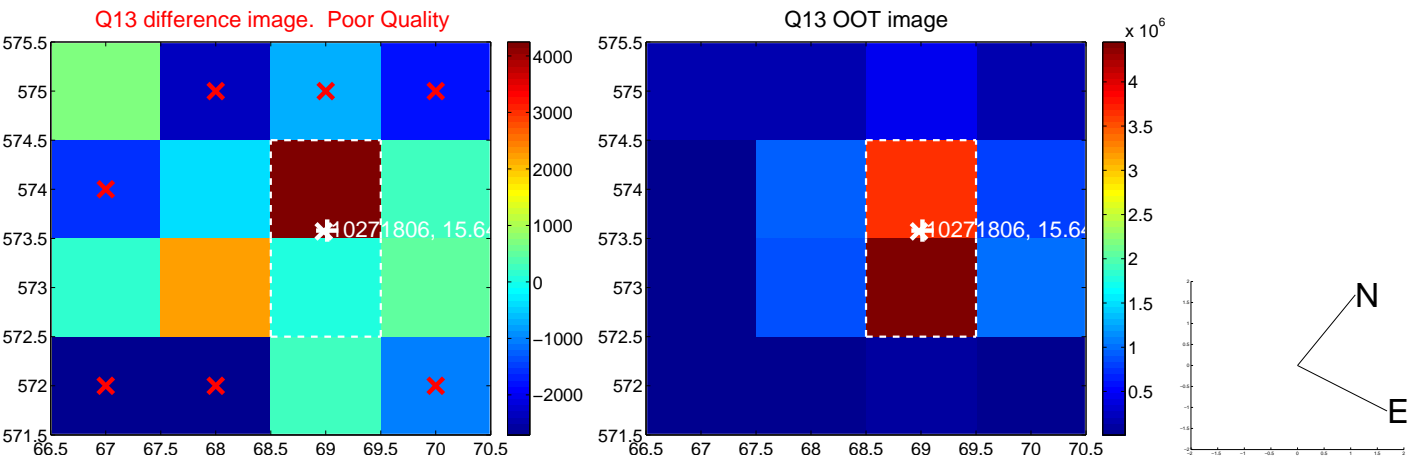
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



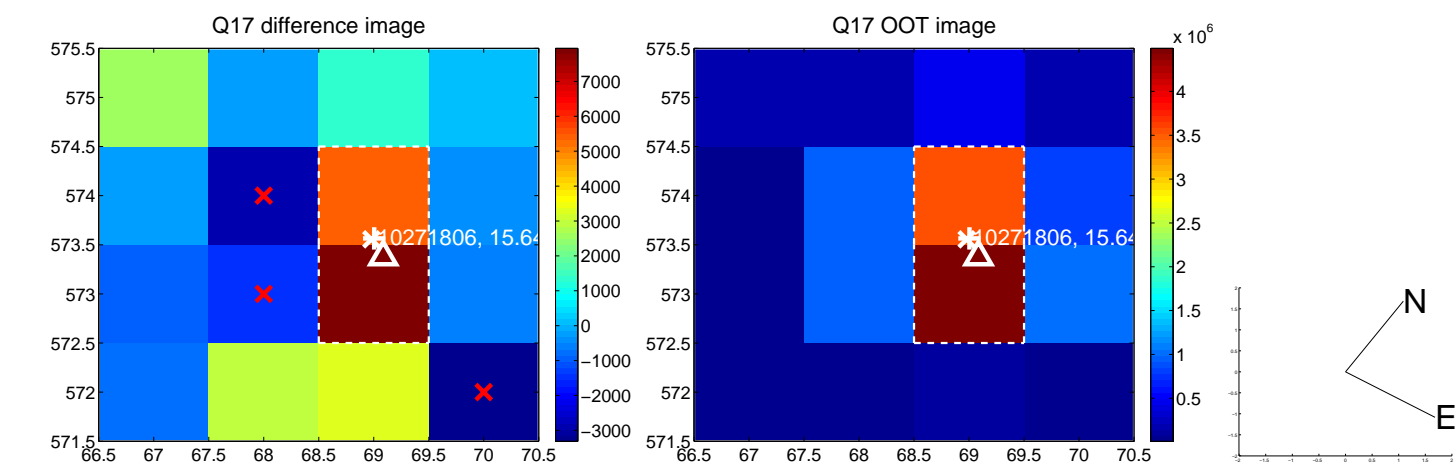
white \times : KIC target position; $+$: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



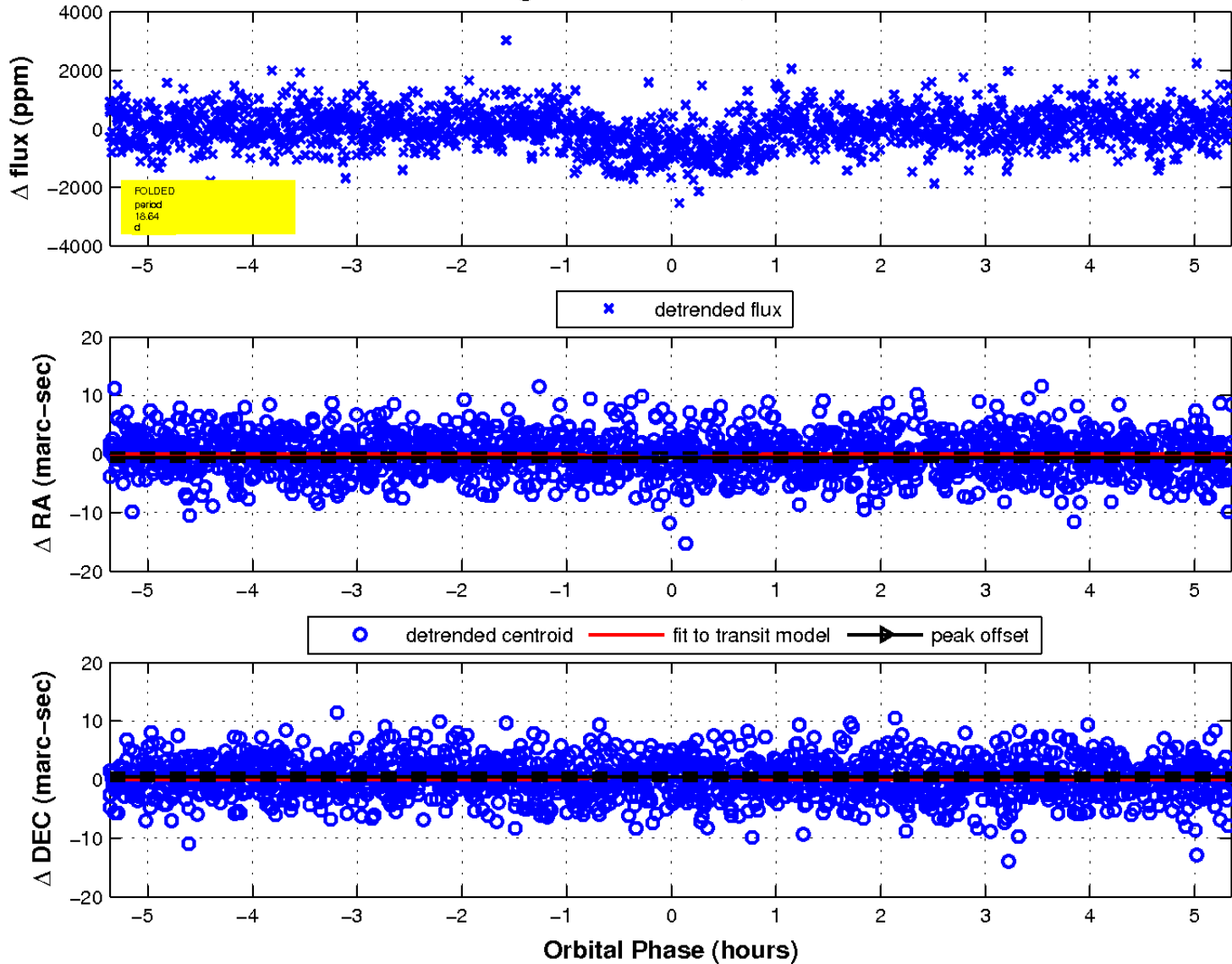
white \times : KIC target position; +: OOT centroid; \triangle : difference centroid. red \times : large negative pixel value.



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



fluxWeightedCentroids, Planet 4 of 4



UKIRT Image

Declination

